

ON Semiconductor®



SG388/D
Rev. 9, May-2007

Selection. Service. Support.
Power Solutions from ON Semiconductor

Master Components Selector Guide

Including Pb-Free Leadframe Options



ON Semiconductor Master Components Selector Guide

Power Management, Amplifiers and Comparators, Analog Switches,
Thyristors, Diodes, Rectifiers, Bipolar Transistors, FETs, Circuit Protection,
Clock and Data Management, Interface, and Standard Logic Devices

SG388/D
Rev. 9, May-2007



ON Semiconductor®

© SCILLC, 2007
Previous Edition © 2005
"All Rights Reserved"

ACE Loop, AnyLevel, BERS, Bullet-Proof, CHIPSCRETES, DUOWATT, E-FET, EASY SWITCHER, ECLinPS, ECLinPS Lite, ECLinPS MAX, ECLinPS Plus, EpiBase, Epicap, EZFET, FASTMOS, FLEXMOS, From-the-Socket-to-the-Pocket, FULLPAK, GEMFET, GigaComm, GreenPoint, HDPlus, HVTMOS, ICePAK, L²TMOS, MCCS, MDTL, MECL, MEGAHERTZ, MHTL, MicroIntegration, MicroLeadless, MiniGate, MiniMOS, MiniMOSORB, MOSORB, MRTL, MTTL, Multi-Pak, NOCAP, ON-Demand, PInPAK, PMODE, PowerBase, POWERSENSE, POWER TAP, PureEdge, Quake, SENSEFET, SLEEPMODE, SMALLBLOCK, SMARTDISCRETES, SMART HotPlug, SMARTswitch, Soft-Skip, SUPERBRIDGES, SuperLock, SURMETIC, SWITCHMODE, ThermalTrak, Thermopad, Thermowatt, TMOS, TMOS & Design Device, TMOS Stylized, μ Cool, Unibloc, UNIWATT, VPower, WAVEFET, Z-Switch and ZIP R TRIM are trademarks of Semiconductor Components Industries, LLC (SCILLC).

HDTMOS is a registered trademark of Semiconductor Components Industries, LLC (SCILLC).

All brand names and product names appearing in this document are registered trademarks or trademarks of their respective holders.

ON Semiconductor and **ON** are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

Table of Contents

	Page		Page
Power Management		Industrial/Appliances/Motor Control	68
Family Tree	11	Automotive	69
Power Management	12	Smart Drivers	
Topologies Overview	13	(High-Side, Low-Side & H-Bridge)	70
Summary of Choosing a Topology	17	LIN Transceivers	70
Power Factor Correction Control Modes	18	CAN Transceivers	70
Power Factor Controllers	19	DC Brush Motor Control	71
Variable Frequency / Critical Conduction Mode	20	LS Quad Driver	71
Fixed Frequency / Continuous Conduction Mode	20	Closed Loop Brushless Motor Adapter	71
Fixed Frequency / Discontinuous Conduction Mode	21	Alternator Voltage Regulator FET Drivers	72
Single Stage PFC	21	TRIAC Controllers	72
Off-Line Switching Controllers	22	Stepper Motor Driver	72
Flyback / Forward Fixed Frequency	23	Brushless DC Motor Controllers	73
Flyback Variable Frequency	25	Air Core Motor Drivers / Gauge Drivers	73
Push-Pull / Half-Bridge Controllers	26	Networking / Computing	75
UC384X Type	27	Wireless & Portable	76
Secondary Side Post Regulation Controllers	28	LED / Display Drivers	77
Synchronous Buck Post Regulator Controller		Relay Drivers	78
- Forward Topologies	28	LED Drivers	80
Off-Line Switching Regulators	29	Integrated PNP/NPN Digital Transistor Array	81
Off-Line Switching Regulators	30	Inrush Current Limiter	81
DC-DC Switching Non-Isolated	31	Smart HotPlug™ - Low Side	81
Buck Switching Regulator - (Internal Switch)	32	Smart HotPlug™ - High Side	82
Boost Switching Regulator - (Internal Switch)	33	Hybrid Diode IC	83
Multi-Topology (Step-Up, Step-Down, Inverting)		Floating, Regulated Charge Pump	83
Switching Regulator - (Internal Switch)	34	Overvoltage Protection IC with Integrated P-Channel MOSFET	84
Buck Switching Controllers (External Switch)	35	Amplifiers & Comparators	
Dual Buck Switching Controllers (External Switch)	35	87
Boost Switching Controllers (External Switch)	35	Single Operational Amplifiers	91
DC-DC Switching Isolated	36	Dual Operational Amplifiers	93
Switching Controllers for Step-Down Isolated Topologies	37	Quad Operational Amplifiers	95
DC-DC Switching - CPU DC-DC Controllers	38	Single Comparators	97
Voltage Reference / Feedback Controller	39	Dual Comparators	97
Series Voltage References	40	Quad Comparators	98
Shunt Voltage References	40	Audio Amplifiers	99
Linear Voltage Regulators	41	Transconductance Amplifiers	99
General Purpose Linear Voltage Regulators	41	Video Amplifiers	100
Multi-Market - Low Dropout (LDO) Voltage Regulators	44	Companors	100
Automotive Linear Voltage Regulators	51	Analog Switches	
Voltage Supervisory	55	101
LED / Display Drivers	58	Audio Analog Switches	102
Battery Management	60	Data Analog Switches	102
Drivers	62	General Purpose Analog Switches	102
MOSFET/IGBT Drivers	63	Thyristors	
Alternator Voltage Regulator		105
Darlington Drivers	63	SCRs: Silicon Controlled Rectifiers	108
Dedicated Drivers	64	TRIACs	111
Smart Drivers		Surge Suppressors and Triggers	114
(High-Side, Low-Side & H-Bridge)	66		
LS Quad Driver	66		
LS Pre-Driver	66		
Application Specific Standard Products	67		

	Page
Diodes	
.....	117
Tuning and Switching Diodes	
Abrupt Junction Tuning Diodes	118
Hyper-Abrupt Junction Tuning Diodes	118
Schottky Diodes	119
Pin Switching Diodes	121
General Purpose Signal & Switching Diodes	122
Zener Diodes - Regulation in Axial Leads	124
Zener Diodes - Regulation in Surface Mount	126
Rectifiers	
.....	135
Application Specific Rectifiers	138
Low V_F Schottky	138
Low Leakage Schottky	138
High Voltage Schottky	138
MEGAHERTZ™	139
UltraSoft Rectifiers	139
Energy Rated Rectifiers	139
Automotive Transient Suppressors	139
SCHOTTKY Rectifiers	140
Surface Mount Schottky	140
Axial Lead Schottky	143
TO-220 Type Schottky	144
TO-218 Types and TO-247 Schottky	145
UltraSoft Rectifiers	145
Ultrafast Rectifiers	146
Surface Mount Ultrafast	146
Axial Lead Ultrafast	147
TO-220 Type Ultrafast	148
TO-218 Types and TO-247 Ultrafast	148
Fast Recovery Rectifiers/General Purpose Rectifiers	149
Bipolar Transistors	
Bipolar Transistors	156
Discrete Transistors	157
Surface Mount	157
Through-Hole	158
Darlington Transistors	162
Surface Mount	162
Through-Hole	162
Audio	164
Electronic Lamp Ballasts	166
General-Purpose Transistors	167
General-Purpose Multiple Transistors	172
Low Noise and Good h_{FE} Linearity	173
Darlington Transistors	173
High Current Transistors	174
High Voltage Transistors	176
RF Transistors	177
Switching Transistors	177
Multiple Switching Transistors	178
Digital Transistors (Bias Resistor Transistors)	179
Dual Digital Transistors	
(Bias Resistor Transistors)	181
Combinational Digital Transistors	
(Bias Resistor Transistors)	182
Complex Digital Transistors	183
Low Saturation Voltage Transistors	184
Load Switch Transistors	185

	Page
FETS	
JFETS	190
High-Frequency Amplifiers	190
Switches and Choppers	190
Low-Frequency/Low Noise	191
MOSFET	192
SOT-723 N-Channel	192
SOT-723 P-Channel	192
SOT-563 Complementary	192
SOT-563 N-Channel	192
SOT-563 P-Channel	192
SC-75 N-Channel	192
SC-75 P-Channel	192
SC-89 N-Channel	192
SC-89 P-Channel	192
WDFN6 Complementary	192
WDFN6 FETKY® N-Channel	192
WDFN6 FETKY® P-Channel	192
WDFN6 N-Channel	192
WDFN6 P-Channel	193
WDFN6 P-Channel Load Switch	193
SC-88 Complementary	193
SC-88 N-Channel	193
SC-88 P-Channel	193
SC-88 P-Channel Load Switch	193
SC-70 N-Channel	194
SC-70 P-Channel	194
TSOP-6 N-Channel	194
TSOP-6 P-Channel	194
TSOP-6 P-Channel Load Switch	194
TSSOP-8 N-Channel	194
SOT-23 N-Channel	194
SOT-23 P-Channel	194
ChipFET™ Complementary	195
ChipFET™ FETKY® N-Channel	195
ChipFET™ FETKY® P-Channel	195
ChipFET™ N-Channel	195
ChipFET™ P-Channel	195
Micro8™ FETKY® P-Channel	195
Micro8™ P-Channel	195
DFN 6 N-Channel	196
DFN 6 P-Channel	196
DFN 8 N-Channel	196
SOT-223 N-Channel	196
SOT-223 P-Channel	196
SO-8 Complementary	196
SO-8 FETKY® N-Channel	196
SO-8 FETKY® P-Channel	196
SO-8 N-Channel	196
SO-8 P-Channel	197
SO-8FL N-Channel	197
DPAK N-Channel	197
DPAK P-Channel	198
D ² PAK N-Channel	199
D ² PAK P-Channel	199
TO-92 N-Channel	200
TO-220AB N-Channel	200
TO-220AB P-Channel	200
TO-247 N-Channel	200
TO-264 N-Channel	200
Product Replacement Table	201
Protected MOSFETs	209

	Page
Circuit Protection	
Circuit Protection	
Transient Voltage/ESD Protection	217
TVS Arrays in Surface Mount	217
TVS Low Capacitance Surface Mount for USB 2.0 and 1.1	221
TVS Low Capacitance Surface Mount for High Speed Data Lines	223
TVS (Transient Voltage Suppressors)	224
Axial Leaded	224
500 Watt	224
600 Watt	225
1500 Watt	226
Surface Mount Packages	228
200 Watt (POWERMITE®)	228
200 Watt (SOD-123FL)	229
400 Watt (SMA)	230
600 Watt (SMB)	232
1500 Watt (SMC)	238
TVS/ESD Protection	240
One Line	240
Two Line	243
Four Line	246
Five Line	248
Low Capacitance TVS/ESD Protection	249
One Line	249
Two Line	250
Four Line	251
Eight Line	255
EMI Filter Circuits	
Data Line Protection	256
Audio Line Protection	261
USB DATA Line Protection	262
Clock and Data Management	
Signal Translators	268
Crosspoint Switches	269
Clock Fan-out	270
Clock Dividers	272
Skew Management	273
Prescalers	274
Clock Synthesizers	274
Zero Delay Buffers	275
EMI Suppression Clocks	277
VCO (PLL)	277
Phase/Frequency Detectors	277
Flip-Flops	278
Latches	280

	Page
Shift Registers	281
Multiplexers	282
Serial/Parallel Converter and Parallel/Serial Converters	283
Gates	284
Counters	285
Comparators	286
Parity Checkers	286
Drivers/Receivers	287
Drivers/Buffers	290

Interface

Line Receivers - EIA Standard	294
Line Drivers - EIA Standard	294
Peripheral Drivers	294
Modulator/Demodulators	295
Timers	295
Smart Card and SIM Card Interface	295

Standard Logic Devices

MiniGates	300
VHC One-Gates	300
HC One-Gates	300
LCX One-Gates	301
LCX Two- and Three-Gates	301
VCX One Gates	302
NLU Multi-Gates	302
Low Voltage Standard Logic	303
VCX	303
VHC	303
LCX	301
LVX	305
5.0 V and Greater Standard Logic	308
High Speed CMOS: HC	308
AC/ACT	311
Metal Gate CMOS	314
Logic Special Functions	316
Translators	317

Alphanumeric Parts Index

.....	319
-------	-----

NOTE: The **Tape & Reel Specification** information has been moved to its own publication. Please see ON Semiconductor brochure, BRD8011/D, for information on Tape & Reel.

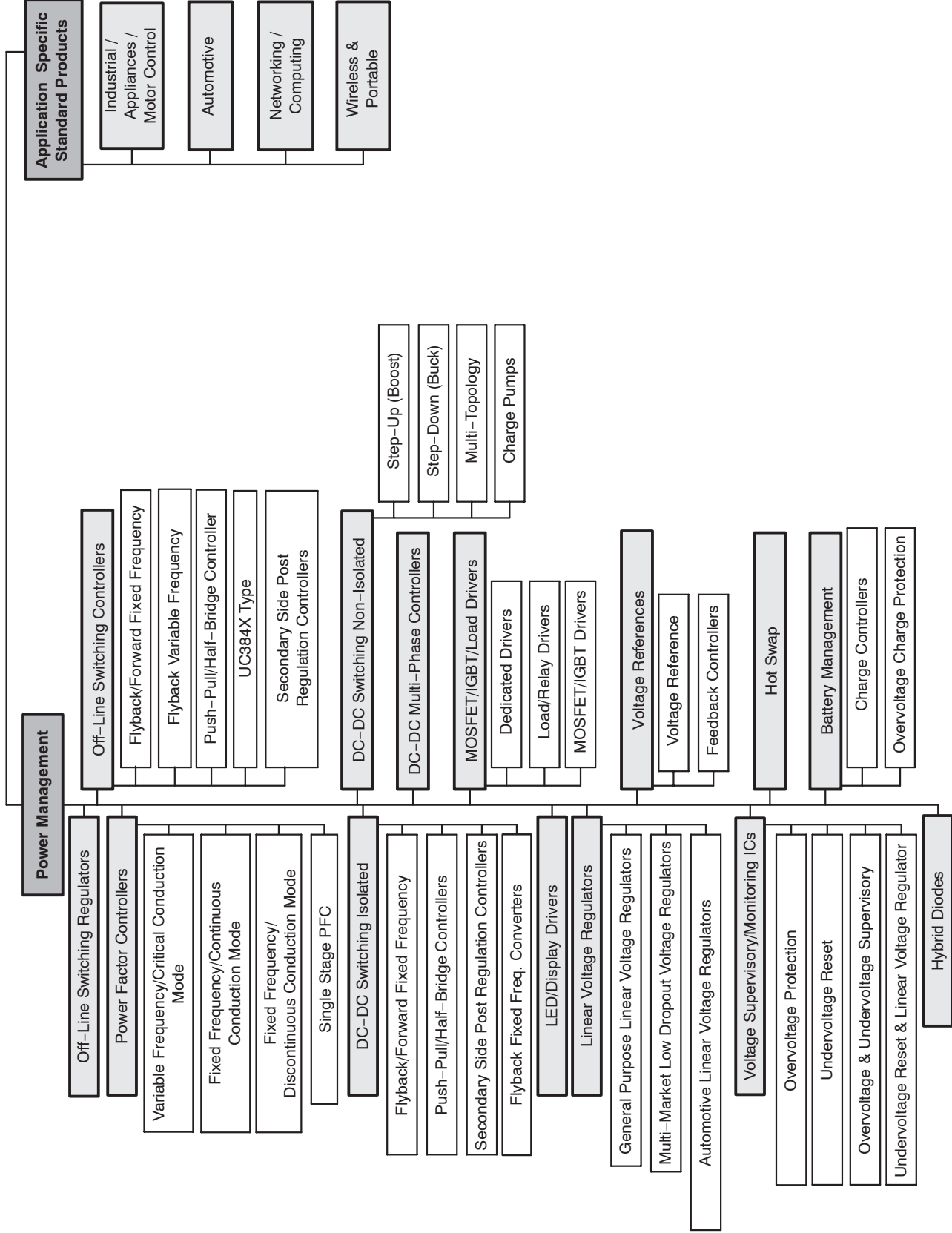
Power Management

Power Management

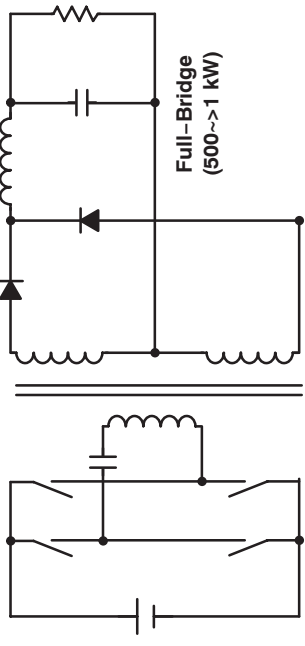
Table of Contents

	Page		Page
FAMILY TREE	11	Multi-Market – Low Dropout (LDO) Voltage Regulators	44
POWER MANAGEMENT	12	Automotive Linear Voltage Regulators	51
Topologies Overview	13	Voltage Supervisory	55
Summary of Choosing a Topology	17	LED / Display Drivers	58
Power Factor Correction Control Modes	18	Battery Management	60
Power Factor Controllers	19	Drivers	62
Variable Frequency / Critical Conduction Mode ...	20	MOSFET/IGBT Drivers	63
Fixed Frequency / Continuous Conduction Mode .	20	Alternator Voltage Regulator	
Fixed Frequency / Discontinuous Conduction Mode	21	Darlington Drivers	63
Single Stage PFC	21	Dedicated Drivers	64
Off-Line Switching Controllers	22	Smart Drivers	
Flyback / Forward Fixed Frequency	23	(High-Side, Low-Side & H-Bridge)	66
Flyback Variable Frequency	25	LS Quad Driver	66
Push-Pull / Half-Bridge Controllers	26	LS Pre-Driver	66
UC384X Type	27	APPLICATION SPECIFIC	
Secondary Side Post Regulation Controllers	28	STANDARD PRODUCTS	67
Synchronous Buck Post Regulator Controller – Forward Topologies	28	Industrial/Appliances/Motor Control	68
Off-Line Switching Regulators	29	Automotive	69
Off-Line Switching Regulators	30	Smart Drivers	
DC-DC Switching Non-Isolated	31	(High-Side, Low-Side & H-Bridge)	70
Buck Switching Regulator – (Internal Switch) ...	32	LIN Transceivers	70
Boost Switching Regulator – (Internal Switch) ...	33	CAN Transceivers	70
Multi-Topology (Step-Up, Step-Down, Inverting) Switching Regulator – (Internal Switch)	34	DC Brush Motor Control	71
Buck Switching Controllers (External Switch) ...	35	LS Quad Driver	71
Dual Buck Switching Controllers (External Switch)	35	Closed Loop Brushless Motor Adapter	71
Boost Switching Controllers (External Switch) ...	35	Alternator Voltage Regulator FET Drivers	72
DC-DC Switching Isolated	36	TRIAC Controllers	72
Switching Controllers for Step-Down Isolated Topologies	37	Stepper Motor Driver	72
DC-DC Switching – CPU DC-DC Controllers	38	Brushless DC Motor Controllers	73
Voltage Reference / Feedback Controller	39	Air Core Motor Drivers / Gauge Drivers	73
Series Voltage References	40	Networking / Computing	75
Shunt Voltage References	40	Wireless & Portable	76
Linear Voltage Regulators	41	LED / Display Drivers	77
General Purpose Linear Voltage Regulators ...	41	Relay Drivers	78
		LED Drivers	80
		Integrated PNP/NPN Digital Transistor Array	81
		Inrush Current Limiter	81
		Smart HotPlug™ – Low Side	81
		Smart HotPlug™ – High Side	82
		Hybrid Diode IC	83
		Floating, Regulated Charge Pump	83
		Overvoltage Protection IC with Integrated P-Channel MOSFET	84

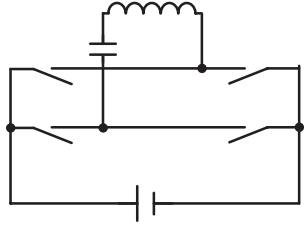
ON Semiconductor's Analog Integrated Circuits



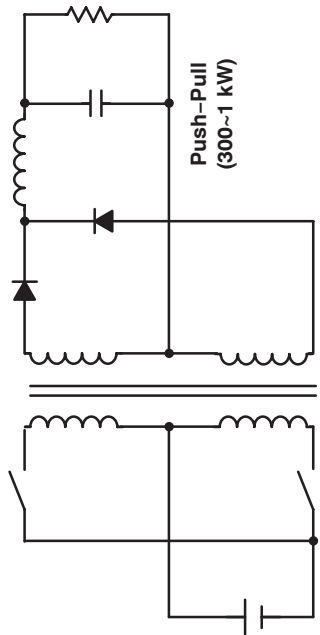
TOPOLOGIES OVERVIEW



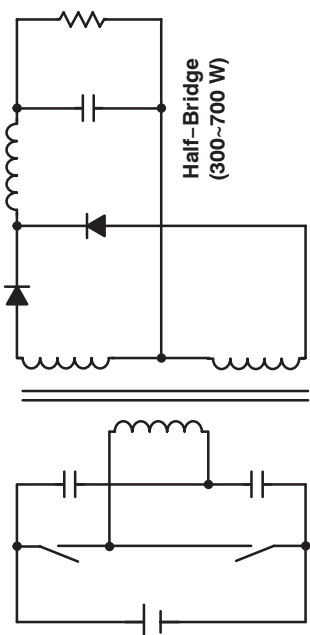
Full-Bridge
(500 ~> 1 kW)



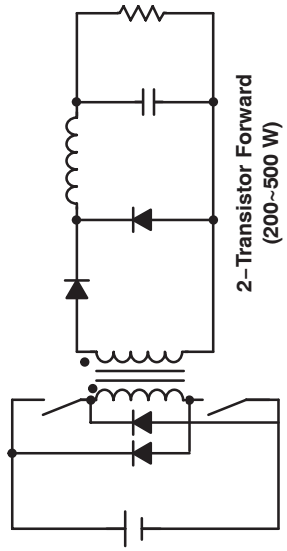
Push-Pull
(300 ~ 1 kW)



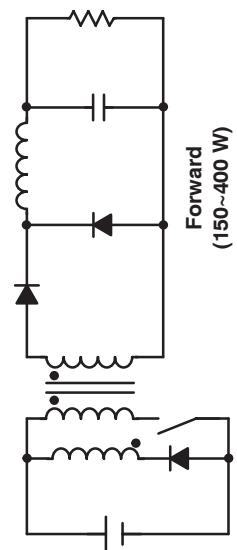
Half-Bridge
(300 ~ 700 W)



Flyback
(0 ~ 200 W)

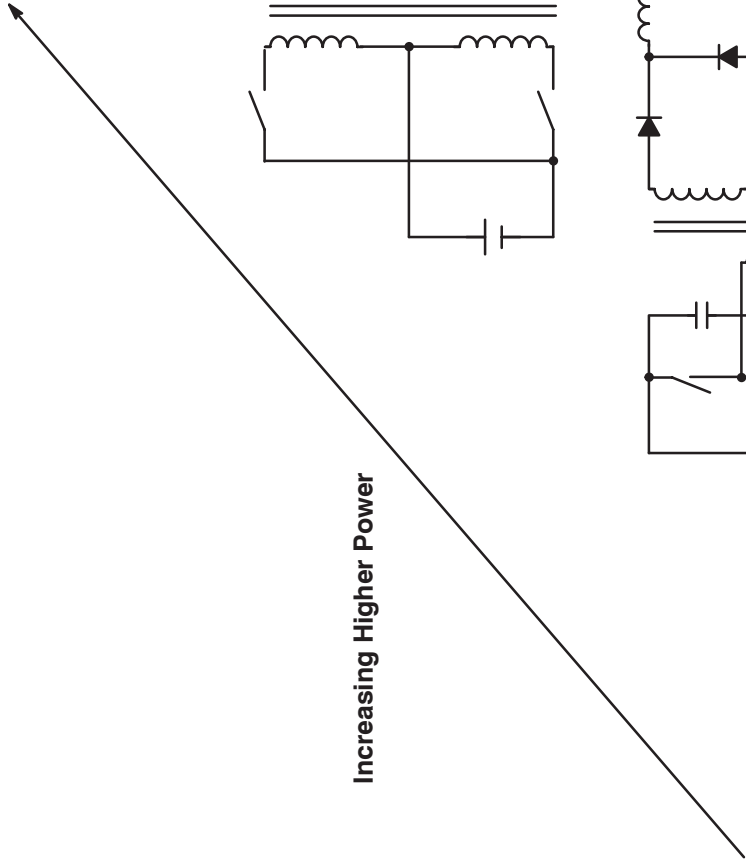


2-Transistor Forward
(200 ~ 500 W)

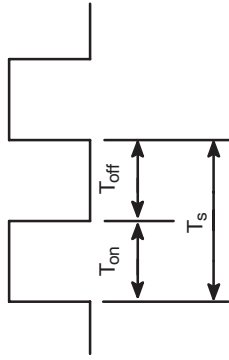


Forward
(150 ~ 400 W)

Increasing Higher Power



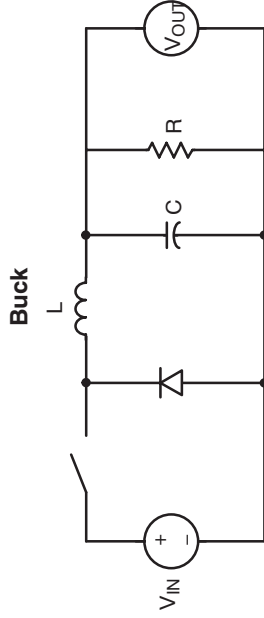
TOPOLOGIES OVERVIEW (continued)



$$\text{Duty Cycle} = D = \frac{T_{on}}{T_{on} + T_{off}} = \frac{T_{on}}{T_s}$$

$$D' = 1 - D = \frac{T_{off}}{T_{on} + T_{off}} = \frac{T_{off}}{T_s}$$

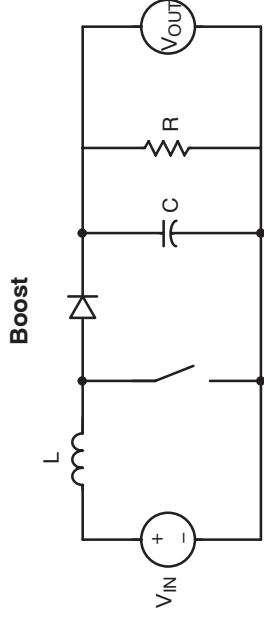
NOTE: In all circuits, equations for V_{OUT} apply to the continuous conduction case.



$$V_{out} = DV_{in}$$

Attributes:

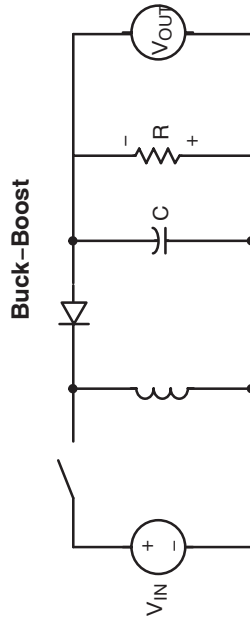
- Step down only
- MOSFET stress = V_{IN}



$$V_{out} = \frac{1}{D'} V_{in}$$

Attributes:

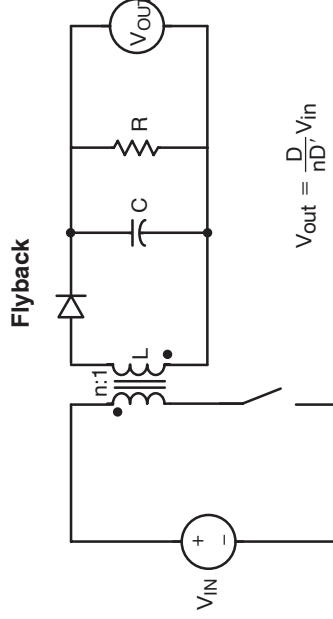
- Step up only
- Used for power factor correction
- MOSFET stress = V_{OUT}



$$V_{out} = -\frac{D}{D'} V_{in}$$

Attributes:

- Inverted output
- Step up or step down
- MOSFET stress = $V_{IN} - V_{OUT}$

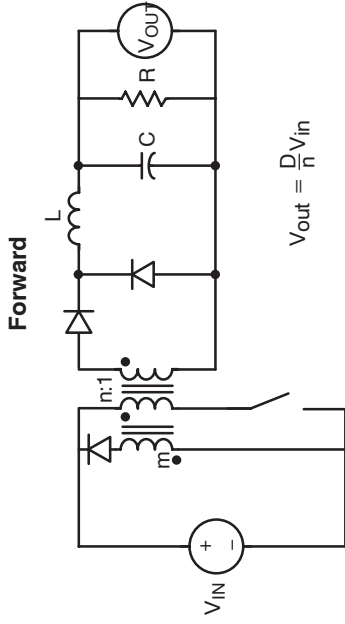


$$V_{out} = \frac{D}{nD'} V_{in}$$

Attributes:

- Step up, step down, or inverting
- Up to 100 W power level
- MOSFET stress $> V_{IN}$

TOPOLOGIES OVERVIEW (continued)

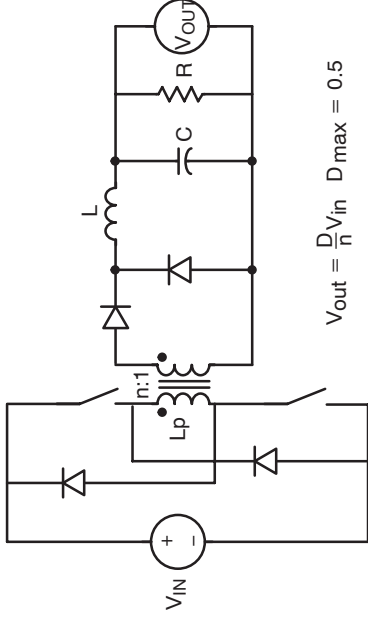


$V_{out} = \frac{D}{n} V_{in}$

Attributes:

- Step up, step down, or inverting
- More complex transformer
- Reset winding is needed ($m < n$)
- Potentially more than 50% duty cycle
- Up to 200 W power level
- MOSFET stress $> V_{IN}$

Two-Transistor Forward

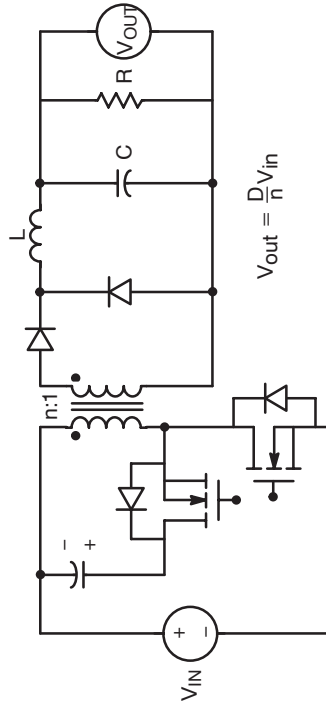


$V_{out} = \frac{D}{n} V_{in}$ $D_{max} = 0.5$

Attributes:

- Step up, step down, or inverting
- Up to 500 W power level
- Simple transformer construction
- Primary winding is also the reset winding, so duty cycle $< 50\%$
- MOSFET stress = V_{IN}

Active Clamp Forward

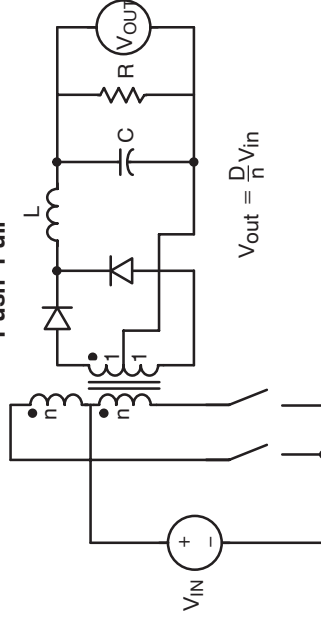


$V_{out} = \frac{D}{n} V_{in}$

Attributes:

- Step up, step down, or inverting
- Simple transformer construction
- Potentially more than 50% duty cycle
- Up to 500 W power level
- MOSFET stress $> V_{IN}$

Push-Pull

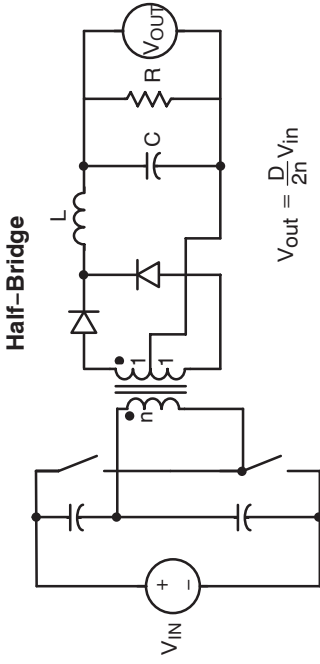


$V_{out} = \frac{D}{n} V_{in}$

Attributes:

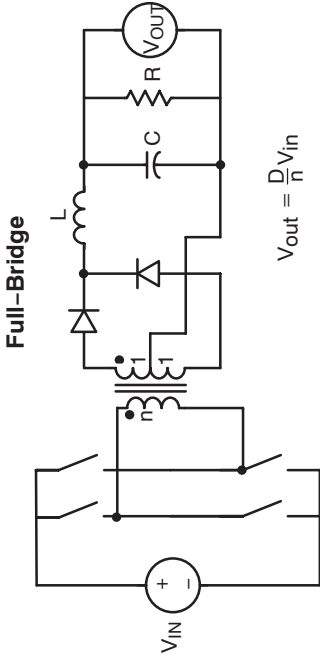
- Step up, step down, or inverting
- Useful for low input voltage applications
- Up to 1.0 kW power level
- More complex transformer
- Duty cycle $< 50\%$
- MOSFET stress = $2.0 V_{IN}$

TOPOLOGIES OVERVIEW (continued)



Attributes:

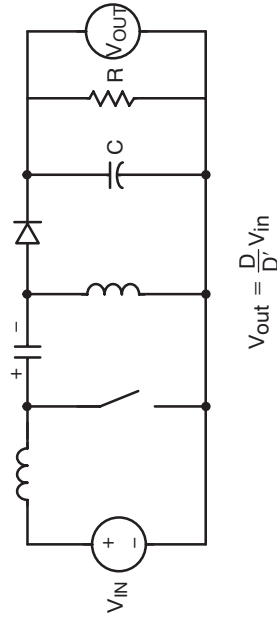
- Step up, step down, or inverting
- Alternative to 2-transistor forward
- Up to 500 W power level
- Duty cycle < 50%
- MOSFET stress = V_{IN}



Attributes:

- High power applications
- Step up, step down, or inverting
- Up to 2.0 kW power level
- Duty cycle < 50%
- Phase-shifted version possible for high density
- Current doubler version useful for very high output currents
- MOSFET stress = V_{IN}

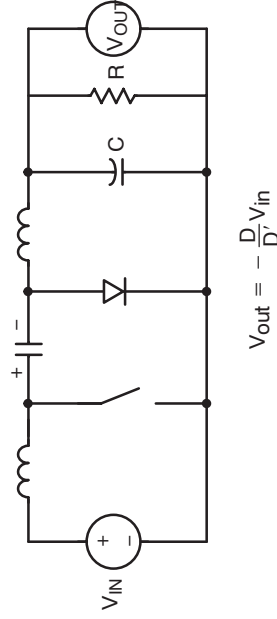
SEPIC (Single-Ended Primary Inductor Converter)



Attributes:

- Step up or step down
- MOSFET stress = $V_{IN} + V_{OUT}$

C'uk (By Slobodan C'uk)



Attributes:

- Inverted output
- Step up or step down
- MOSFET stress > V_{IN} and V_{OUT}

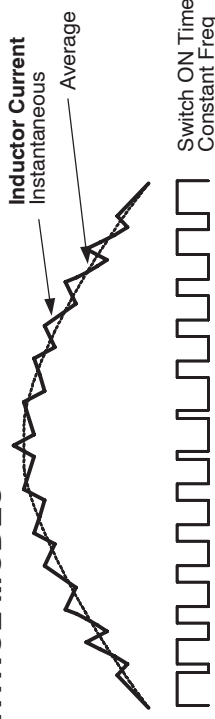
SUMMARY OF CHOOSING A TOPOLOGY

Power	Topology	Conversion	Isolated	Multi-Output	Output Ripple	MOSFET Stress	Isolation
Low	Buck	Step-down	No	No	Small	V_{IN}	Non-Isolated
	Boost	Step-up	No	No	Large	V_{OUT}	
	Buck-Boost	Inverting	No	No	Large	$V_{IN} - V_{OUT}$	
	Cuk	Inverting	No	No	Small	$V_{IN}, > V_{OUT}$	
	Sepic	Up or Down	No	No	Large	$> V_{IN}, > V_{OUT}$	
Medium	Flyback	Up or Down	Yes	Yes	Large	$< 2 V_{IN}$	Isolated
	Forward	Up or Down	Yes	Yes	Small	$< 2 V_{IN}$	
	2-Transistor Forward	Up or Down	Yes	Yes	Small	V_{IN}	
High	Half-Bridge	Up or Down	Yes	Yes	Small	V_{IN}	Isolated
	Push-Pull	Up or Down	Yes	Yes	Small	$2 V_{IN}$	
	Full-Bridge	Up or Down	Yes	Yes	Small	V_{IN}	

POWER FACTOR CORRECTION CONTROL MODES

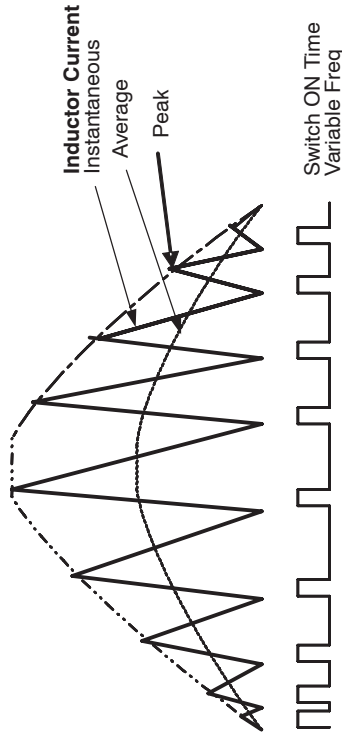
Continuous Conduction Mode (CCM)
 → e.g. NCP1653

- CCM Operation**
 Power Range: 300 W – 1 kW+
 + Constant Frequency
 + Lowest Peak Current
 – Turn-off Losses Because of Hard Switching
 – Inductor Value is Largest



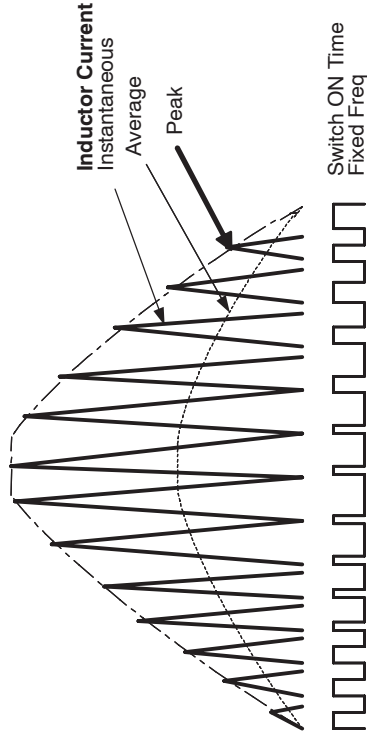
Critical Conduction Mode (CRM)
 → e.g. NCP1601

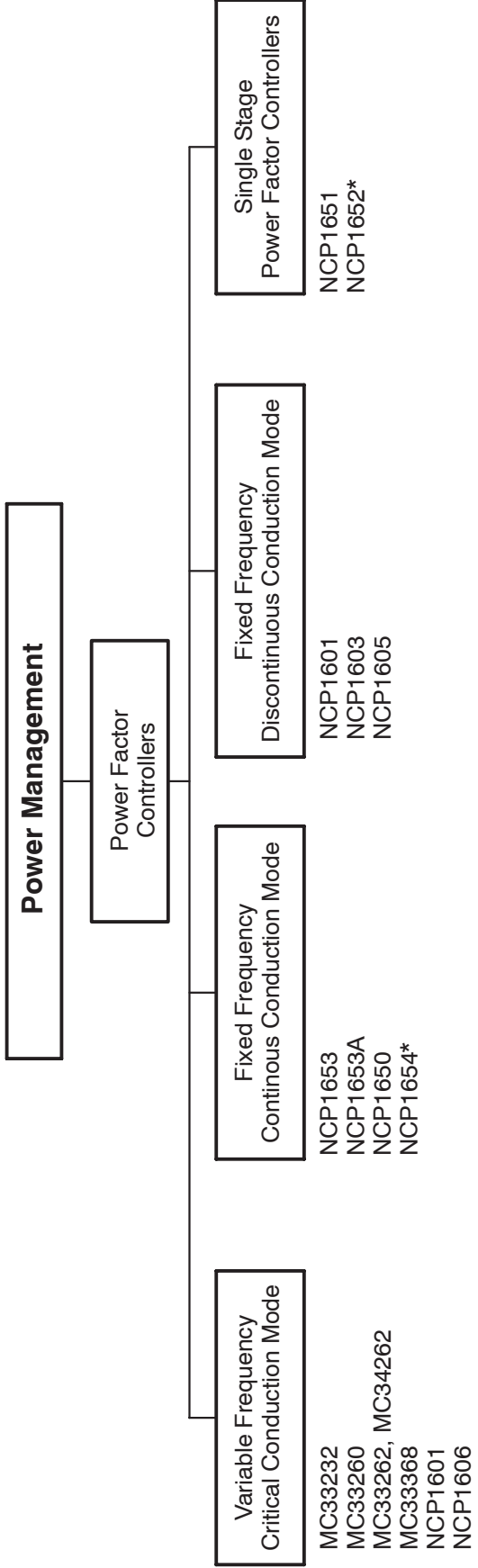
- CRM operation**
 Power Range: 75 W – 400 W
 + No Recovery Effect
 + Fewer External Components
 – High Peak Current
 – Variable Frequency



Discontinuous Conduction Mode (DCM)
 → e.g. NCP1601

- DCM operation**
 Power Range: 75 W – 400 W
 + Constant Frequency
 + No Recovery Effect
 + Best Stability
 – Highest Peak Current





*Coming Soon.

ON Semiconductor Selector Guide – Power Management VARIABLE FREQUENCY / CRITICAL CONDUCTION MODE

Web Part	Control Mode	Topology	Freq Clamp Freq Max (kHz)	Min HV Startup Limit (V)	Under Voltage Lock-Out (V)	Max Startup Consumption (µA)	Current Limit Detection	Latch	Under Voltage Protection	In-Rush Detection	Enable Capability	Synchronization Capability	Max V _{CC} (V)	Drive Capability Source/Sink (mA)	Temp (°C)	Packages
MC33232	Voltage Mode	Boost	NO	N/A	10 to 16 Typ.	50	Current Sensing	NO	Fixed	NO	NO	NO	16	300 / 300	-20 to +85	SO-8, PDIP-8
MC33260	Voltage Mode	Boost and Follower Boost	NO	N/A	8.5 to 11 Typ.	250	Current Sensing	Fixed	Fixed	YES	YES	NO	16	500 / 500	-40 to +105	SO-8, PDIP-8
MC33262	Current Mode	Boost	NO	N/A	8 to 13 Typ.	400	Current Sensing	Fixed	NO	NO	YES	NO	30	500 / 500	-40 to +105	SO-8, PDIP-8
MC34262	Current Mode	Boost	NO	N/A	8 to 13 Typ.	400	Current Sensing	Fixed	NO	NO	YES	NO	30	500 / 500	0 to +85	SO-8, PDIP-8
MC33368	Current Mode	Boost	YES	YES	8.5 to 13 Typ.	N/A	Current Sensing	Fixed	NO	NO	YES	NO	16	1000 / 1000	-25 to +125	SO-16, PDIP-16
NCP1601	Voltage Mode	Boost	405	N/A	9 to 13.75 Typ. 9 to 10.5 Typ.	40	Negative Current Sensing	Fixed	Fixed	YES	N/A	YES	18	500 / 800	-40 to +125	SO-8, PDIP-8
NCP1606	Voltage Mode	Boost	600	N/A	9.5 to 12 Typ.	50	Current Sensing	Program- mable	Fixed	NO	YES	NO	20	500 / 800	-40 to +125	SO-8, PDIP-8

FIXED FREQUENCY / CONTINUOUS CONDUCTION MODE

Web Part	Control Mode	Topology	Switching Freq (kHz)	Under Voltage Lock-Out (V)	Max Startup Consumption (µA)	Over Power Limitation	Current Limit Detection	Brown Out Protection	Latch	Under (Output) Voltage Protection	In-Rush Detection	Enable Capability	Max V _{CC} (V)	Drive Capability Source/Sink (mA)	Temp (°C)	Packages
NCP1653	Average Current Mode or Peak Current Mode	Boost and Follower Boost	67	8.7 to 13.25 Typ.	50	YES	Program- mable Negative Current Sensing	NO	Fixed	Fixed	YES	YES	18	1000 / 1000	-40 to +125	SO-8, PDIP-8
NCP1653A	Average Current Mode or Peak Current Mode	Boost and Follower Boost	100	8.7 to 13.25 Typ.	50	YES	Program- mable Negative Current Sensing	NO	Fixed	Fixed	YES	YES	18	1000 / 1000	-40 to +125	SO-8, PDIP-8
NCP1650	Average Current Mode	Boost	Adjustable 25 to 250	10 to 10.5 Typ.	80	NO	Negative Current Sensing	YES	Fixed	NO	NO	YES	20	1500 / 1500	-40 to +125	SO-16
NCP1654*	Average Current Mode	Boost	Adjustable 66 to 266	9 to 13.75 to 10.5	150	YES	Current Sensing	YES	YES	YES	YES	YES	25	1500 / 1500	-40 to +125	SO-8, PDIP-8

*Coming Soon.

FIXED FREQUENCY / DISCONTINUOUS CONDUCTION MODE

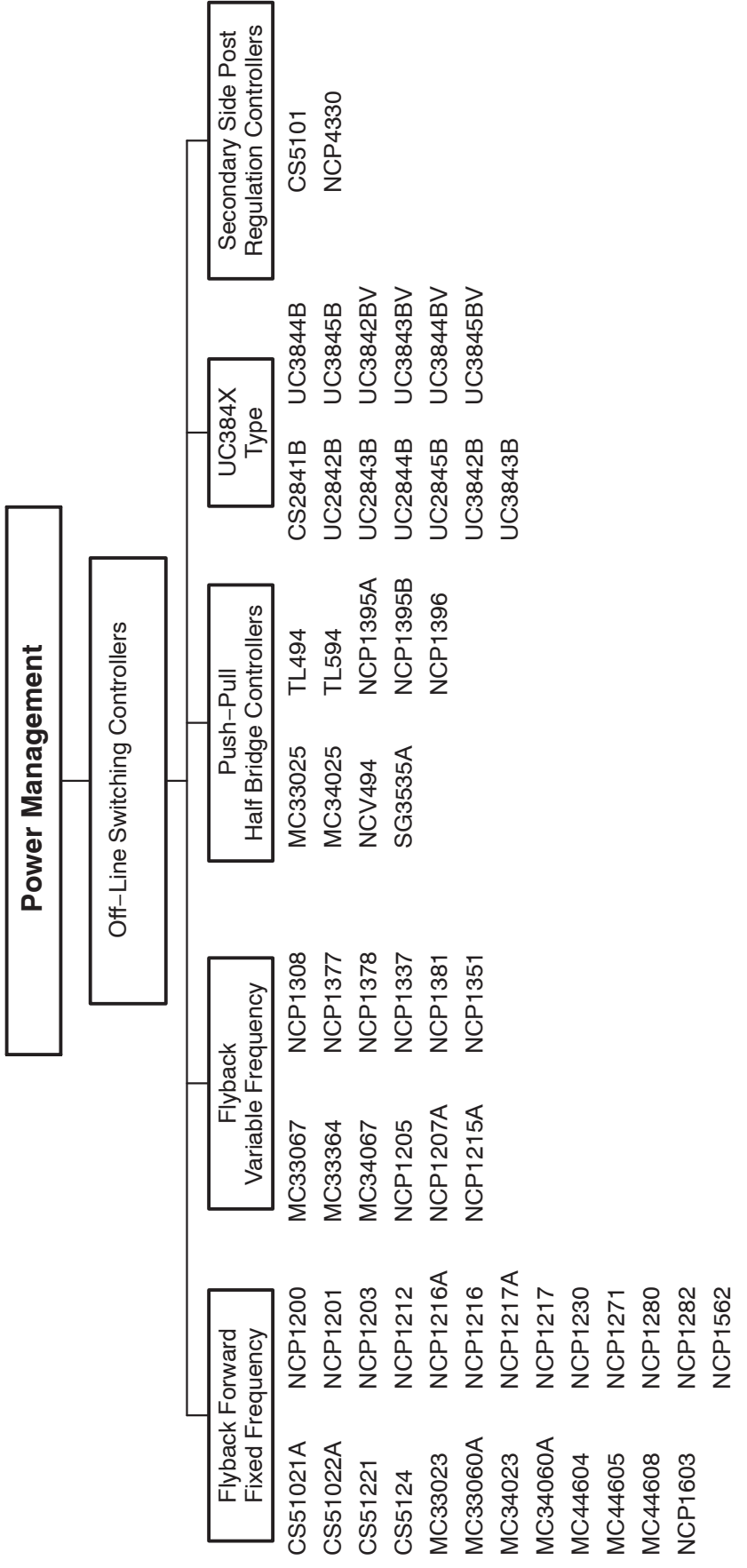
Web Part	Control Mode	Topology	Switching Freq (kHz)	Min HV Startup Limit (V)	Under Voltage Lock-Out (V)	Startup Consumption (µA)	Current Limit Detection	Latch	Under (Output) Voltage Protection	In-Rush Detection	Main PWM Turn On Signal	Enable Capability	Max V _{CC} (V)	Drive Capability Source/Sink (mA)	Temp (°C)	Pack-ages
NCP1601	Voltage Mode	Boost	58	N/A	9 to 13.75 Typ. 9 to 10.5 Typ.	40	Negative Current Sensing	Fixed	Fixed	YES	N/A	YES	18	500 / 800	-40 to +125	SO-8, PDIP-8
NCP1603	Voltage Mode	Boost	100	30	9 to 13.75 Typ.	80	Negative Current Sensing	Fixed	Fixed	YES	N/A	YES	18	500 / 800	-40 to +125	SO-16

SINGLE STAGE PFC

Web Part	Control Mode	Topology	Switching Freq (kHz)	Standby Mode Technique	Min HV Startup Limit (V)	Under Voltage Lock-Out (V)	Max Startup Consumption (mA)	Current Limit Detection	Under (Output) Voltage Protection	Enable Capability	Max V _{CC} (V)	Drive Capability Source/Sink (mA)	In-Rush Detection	Temp (°C)	Pack-ages
NCP1651	Average Current Mode	Boost	Adjustable 25 to 250	N/A	N/A	9.8 to 10.8 Typ.	5.5	Current Sensing	YES	YES	18	1500 / 1500	N/A	-40 to +125	SO-16
NCP1652*	Average Current Mode	Boost	100	Adj Skip Mode	40	11 to 14 Typ.	100	Current Sensing	YES	YES	20	300 / 700	N/A	-40 to +125	SO-16

*Coming Soon.

ON Semiconductor Selector Guide – Power Management



FLYBACK / FORWARD FIXED FREQUENCY

Web Part	Control Mode	Switching Freq (kHz)	Freq Jittering (%)	Standby Mode Technique	Min HV Startup Limit (V)	Dynamic Self Supply (mA)	Under-voltage Lock-Out (V)	Short Circuit Protection	Over Power Compensation	Brown-Out Protection	Latch	Soft-Start (ms)	Max V _{CC} (V)	Drive Capability Source/Sink (mA)	Temp (°C)	Packages	Additional Features
CS51021A	Current Mode	Adjustable	N/A	NO	NO	NO	YES	YES	NO	NO	Via the Latch / Demag	Adj	20	1,000	-40 to +85	SO-16	Bidirectional Synchronization
CS51022A	Current Mode	Adjustable	N/A	NO	NO	NO	YES	YES	NO	NO	Via the Latch / Demag	Adj	20	1,000	-40 to +85	TSSOP-16, SO-16	100 μ A Max Sleep Current
CS51221	Voltage Mode	Adjustable	N/A	NO	NO	NO	YES	YES	NO	NO	Via the Latch / Demag	Adj	15	1,000	-40 to +85	SO-16	
CS5124	Current Mode	400	N/A	NO	NO	NO	YES	YES	NO	NO	NO	Adj	20	200	-40 to +105	SO-8	
MC33023	Voltage or Current	Adjustable	N/A	NO	NO	NO	YES	YES	NO	NO	NO	Adj	30	200	-40 to +105	SO-16 WB	
MC34023	Voltage or Current	Adjustable	N/A	NO	NO	NO	YES	YES	NO	NO	NO	Adj	30	200	0 to +70	PDIP-16	
MC33060A	Voltage Mode	200	N/A	NO	NO	NO	YES	YES	NO	NO	NO	Adj	42	200	-40 to +85	SO-14, PDIP-14	
MC34060A	Voltage Mode	200	N/A	NO	NO	NO	YES	YES	NO	NO	NO	Adj	42	200	0 to +70	SO-14, PDIP-14	
MC44604	Current Mode	250	N/A	YES	14.5	NO	YES	NO	NO	NO	Via the Latch / Demag	Adj	18	750	-25 to +85	PDIP-16	
MC44605	Current Mode	250	N/A	NO	14.5	NO	YES	NO	NO	NO	Via the Latch / Demag	Adj	18	750	-25 to +85	PDIP-16	
MC44608	Voltage Mode	100, 40, 75	N/A	Secondary Reconfig.	50	NO	10 to 13.1 Typ.	NO	YES	NO	Via the Latch / Demag	NO	16	800 / 800	-25 to +85	PDIP-8	
NCP1200	Current Mode	100, 40, 60	± 0.7	Adj Skip Mode	30	4	N/A	When DSS is used	NO	NO	NO	NO	16	250 / 250	-25 to +125	SO-8, PDIP-8	
NCP1201	Current Mode	100, 60	0.82	Adj Skip Mode	30	5.3	10.5 to 12.5 Typ.	When DSS is used	NO	YES	NO	NO	16	250 / 250	-25 to +125	SO-8, PDIP-8	
NCP1203	Current Mode	100, 40, 60	N/A	Adj Skip Mode	30	NO	7.8 to 12.8 Typ.	NO	NO	NO	NO	NO	16	250	-40 to +125	SO-8, PDIP-8	
NCP1212	Current Mode	Adj	N/A	Adj Skip Mode	NO	NO	10 to 25 Typ.	YES	NO	YES	Via the Latch / Demag	NO	28	100 / 300	-25 to +125	SO-8, PDIP-8	
NCP1216A	Current Mode	133, 100, 65	± 4	Adj Skip Mode	30	8	NO	When DSS is used	NO	NO	NO	1.00	16	500	0 to +125	SO-8, PDIP-7	Limited Duty Cycle to 50%
NCP1216	Current Mode	133, 100, 65	± 4	Adj Skip Mode	30	8	NO	When DSS is used	NO	NO	NO	NO	16	500	0 to +125	SO-8, PDIP-7	

ON Semiconductor Selector Guide – Power Management

FLYBACK / FORWARD FIXED FREQUENCY (continued)

Web Part	Control Mode	Switching Freq (kHz)	Freq Jittering (%)	Standby Mode Technique	Min HV Startup Limit (V)	Dynamic Self Supply (mA)	Under-voltage Lock-Out (V)	Short Circuit Protection	Over Power Compensation	Brown-Out Protection	Latch	Soft-Start (ms)	Max V _{CC} (V)	Drive Capability Source/Sink (mA)	Temp (°C)	Packages	Additional Features
NCP1217A	Current Mode	133, 100, 65	N/A	Adj Skip Mode	30	NO	7.6 to 12.8 Typ.	NO	NO	NO	Via the Latch / Demag	1.00	16	500	0 to +125	SO-8, PDIP-7	Limited Duty-Cycle to 50%
NCP1217	Current Mode	133, 100, 65	N/A	Adj Skip Mode	30	NO	7.6 to 12.8 Typ.	NO	NO	NO	Via the Latch / Demag	NO	16	500	0 to +125	SO-8, PDIP-7	
NCP1230	Current Mode	133, 100, 65	±6.4	Adj Skip Mode	20	NO	7.7 to 12.6 Typ.	YES	NO	NO	Via the Latch / Demag	2.50	18	500 / 800	-40 to +125	SO-8, PDIP-7	
NCP1280	Voltage Mode	Adjustable	NO	NO	25	13.8	YES	NO	NO	NO	Via the Latch / Demag	Adj	16	95 / 200	-40 to +125	SO-16	
NCP1271	Current Mode	65, 100	± 7.5	Adj Skip Mode with Transient Load Detection	20	NO	12.6 to 20 Typ.	YES	NO	NO	Via the Latch / Demag	4	20	500 / 800	-40 to +125	SO-7	
NCP1282	Voltage Mode	230	N/A	NO	NO	NO	8.5 to 11 Typ.	NO	NO	NO	Line UV/OV detectors	Adj	20	1000 / 2000	-40 to +125	SO-16	HV Startup up to 500V
NCP1603	Voltage Mode	100	±6.4	Adj Skip Mode	30	NO	9 to 10.5 Typ.	YES	NO	NO	Via the Latch / Demag	2.5	18	100 / 100	-40 to +125	SO-16	
NCP1562	Voltage Mode	230	N/A	NO	NO	NO	7 to 10.3 Typ.	NO	NO	NO	Line UV/OV detectors	Adj	20	1000 / 2000	-40 to +125	SO-16	HV Startup up to 100V

FLYBACK VARIABLE FREQUENCY

Web Part	Control Mode	Freq Clamp Max On Time (µs)	Freq Clamp Min Off Time (µs)	Standby Mode Technique	Min HV Start-Up Limit (V)	Dynamic Self Supply (mA)	Under-voltage Lock-Out (V)	Short Circuit Protection	Over Power Compensation	Brown-Out Protection	Latch	Soft-Start (ms)	Max Vcc (V)	Drive Capability Source/Sink (mA)	Temp (°C)	Packages
MC33067	Voltage Mode	Adj	Adj	NO	NO	NO	9 to 16 Typ.	YES	NO	NO	NO	Adj	20	200 / 200	-40 to +85	SO-16, PDIP-16
MC34067	Voltage Mode	Adj	Adj	NO	NO	NO	9 to 16 Typ.	YES	NO	NO	NO	Adj	20	200 / 200	0 to +70	SO-16, PDIP-16
MC33364	Current Mode	NO	6.9	Freq Clamp	40	NO	7.6 to 15 Typ.	NO	NO	NO	NO	NO	16	220 / 600	-25 to +125	SO-8, SO-16
NCP1205	Current Mode	NO	NO	Frequency Foldback	40	NO	7.2 to 15 Typ.	YES	NO	NO	Adj	NO	30	300 / 300	-25 to +125	SO-16, PDIP-14, PDIP-8
NCP1207A	Current Mode	NO	8	Adj Skip Mode	40	7	9.8 to 10.4 Typ.	YES	NO	NO	Via the Latch / Demag	1	16	500 / 500	-40 to +125	SO-8, PDIP-8
NCP1215A	Quasi Fixed Ton	Fixed Ton	Variable Toff	Frequency Foldback	NO	NO	9 to 15 Typ.	NO	NO	NO	NO	NO	18	30 / 30	0 to +105	SO-8, TSOP-6
NCP1308	Current Mode	NO	10	Adj Skip Mode	40	7	9.8 to 12 Typ.	YES	NO	NO	Fixed on the Vcc	1	16	500 / 500	0 to +125	SO-8
NCP1377	Current Mode	NO	3.8	Adj Skip Mode	40	NO	7.6 to 12.8 Typ.	NO	NO	NO	Via the Latch / Demag	1	16	500 / 500	0 to +125	SO-7, PDIP-7
NCP1378	Current Mode	NO	8	Adj Skip Mode	40	NO	7.6 to 8.5 Typ.	NO	NO	NO	Via the Latch / Demag	1	16	500 / 500	0 to +125	SO-8, PDIP-7
NCP1337	Current Mode	67	35	Soft-Ripple Mode	55	9.5	10 to 12 Typ.	YES	YES	YES	Via the Latch / Demag	4	20	500 / 500	0 to +125	SO-8, PDIP-7
NCP1381	Current Mode	45	8	Adj Skip Mode	NO	NO	10 to 15 Typ.	YES	YES	YES	Via the Latch / Demag	5	20	500 / 800	0 to +125	SO-14
NCP1351	Current Mode	Fixed Ton	Variable Toff	Adj Skip Mode	NO	NO	8.5 to 15 Typ.	YES	NO	NO	NO	NO	20	300 / 150	0 to +125	SO-8, PDIP-8

**ON Semiconductor Selector Guide – Power Management
PUSH-PULL / HALF-BRIDGE CONTROLLERS**

Web Part	Control Mode	Switching Freq (kHz)	Standby Mode Technique	Max Duty Cycle (%)	Under-voltage Lock-Out (V)	Short Circuit Protection	Latch	Internal Ref Voltage (V)	Enable Capability	Soft-Start (ms)	Max V _{CC} (V)	Drive Capability Source/Sink (mA)	Temp (°C)	Packages	Additional Features
MC33025	Voltage & Current mode	1000	NO	45	9.2 & 4.2	YES	NO	5.1	NO	Adj	30	200 / 200	-40 to +105	SO-16, PDIP-16	
MC34025	Voltage & Current mode	1000	NO	45	9.2 & 4.2	YES	NO	5.1	NO	Adj	30	200 / 200	0 to +70	SO-16, PDIP-16	
NCV494	Voltage	200	NO	48	6.43	NO	NO	5	NO	Ad	40	500 / 500	-40 to +125	SO-16	Auto qualified
TL494	Voltage	200	NO	48	6.43	NO	NO	5	NO	Adj	40	500 / 500	-40 to +125 0 to +70 -40 to +85	SO-16, PDIP-16	
SG3525A	Voltage	400	NO	49	7	NO	NO	5.1	YES	Adj	40	400 / 400	0 to +70	SO-16, PDIP-16	
TL594	Voltage	300	NO	50	5.2	NO	NO	5	NO	Adj	42	500 / 500	-40 to +85	SO-16, PDIP-16, TSSOP-16	
NCP1395A	Voltage	1000	Adj Skip Mode	52	9.3	NO	YES	2	YES	Adj	20	180/180	0 to +125	SO-16, PDIP-16	Consumer Applications
NCP1395B	Voltage	1000	Adj Skip Mode	52	9.3	NO	YES	2	YES	Adj	20	180/180	0 to +125	SO-16, PDIP-16	Industrial Applications

ON Semiconductor Selector Guide – Power Management

UC384X TYPE

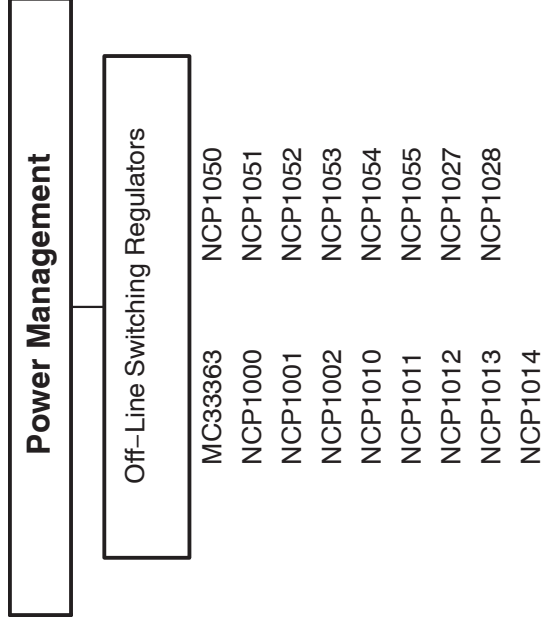
Web Part	Control Mode	Switching Freq (kHz)	Standby Mode Technique	Max Duty Cycle (%)	Undervoltage Lock-out (V)	Short Circuit Protection	Latch	Internal Ref Voltage (V)	Soft-Start (ms)	Max V _{CC} (V)	Drive Capability Source/Sink (mA)	Temp (°C)	Packages
CS2841B	Current Mode	52	NO	50	7.4 to 8 Typ.	YES	N/A	5	NO	40	200 / 200	-40 to +85	SO-14, PDIP-8
UC2842B	Current Mode	52	NO	96	10 to 16 Typ.	YES	N/A	5	NO	30	200 / 200	-25 to +85	SO-14, SO-8, PDIP-8
UC2843B	Current Mode	52	NO	96	7.6 to 8.5 Typ.	YES	N/A	5	NO	30	200 / 200	-25 to +85	SO-14, SO-8, PDIP-8
UC2844B	Current Mode	52	NO	48	10 to 16 Typ.	YES	N/A	5	NO	30	200 / 200	-25 to +85	SO-14, SO-8, PDIP-8
UC2845B	Current Mode	52	NO	48	7.6 to 8.5 Typ.	YES	N/A	5	NO	30	200 / 200	-25 to +85	SO-14, SO-8, PDIP-8
UC3842B	Current Mode	52	NO	96	10 to 16 Typ.	YES	N/A	5	NO	30	200 / 200	0 to +70	SO-14, SO-8, PDIP-8
UC3843B	Current Mode	52	NO	96	7.6 to 8.5 Typ.	YES	N/A	5	NO	30	200 / 200	0 to +70	SO-14, SO-8, PDIP-8
UC3844B	Current Mode	52	NO	50	10 to 16 Typ.	YES	N/A	5	NO	25	200 / 200	0 to +70	SO-14, SO-8, PDIP-8
UC3845B	Current Mode	52	NO	50	7.6 to 8.5 Typ.	YES	N/A	5	NO	25	200 / 200	0 to +70	SO-14, SO-8, PDIP-8
UC3842BV	Current Mode	52	NO	96	10 to 16 Typ.	YES	N/A	5	YES	30	200 / 200	-40 to +105	SO-14, SO-8
UC3843BV	Current Mode	52	NO	96	7.6 to 8.5 Typ.	YES	N/A	5	YES	30	200 / 200	-40 to +105	SO-14, SO-8
UC3844BV	Current Mode	52	NO	50	10 to 16 Typ.	YES	N/A	5	YES	25	200 / 200	-40 to +105	SO-14, SO-8
UC3845BV	Current Mode	52	NO	50	7.6 to 8.5 Typ.	YES	N/A	5	YES	25	200 / 200	-40 to +105	SO-14, SO-8

**ON Semiconductor Selector Guide – Power Management
SECONDARY SIDE POST REGULATION CONTROLLERS**

IC Operating Voltage	Converter Input Voltage	Output Voltage	Output Driver	Freq.	Temp. (T _A)	Package	Part No.	Features
ULVO: 7.0/8.0 V Max: 45 V	(V _{gate} max: 75 V)	(V _{REF} = 2.0 V)	1.5 A	SYNC	-40 to +85°C	SO-16L DIP-14	CS5101EDW16 CS5101EN14	<ul style="list-style-type: none"> • Voltage mode • Configured as either buck or boost with external NFET • Externally programmable overcurrent protection • 5.0 V 2% reference pin

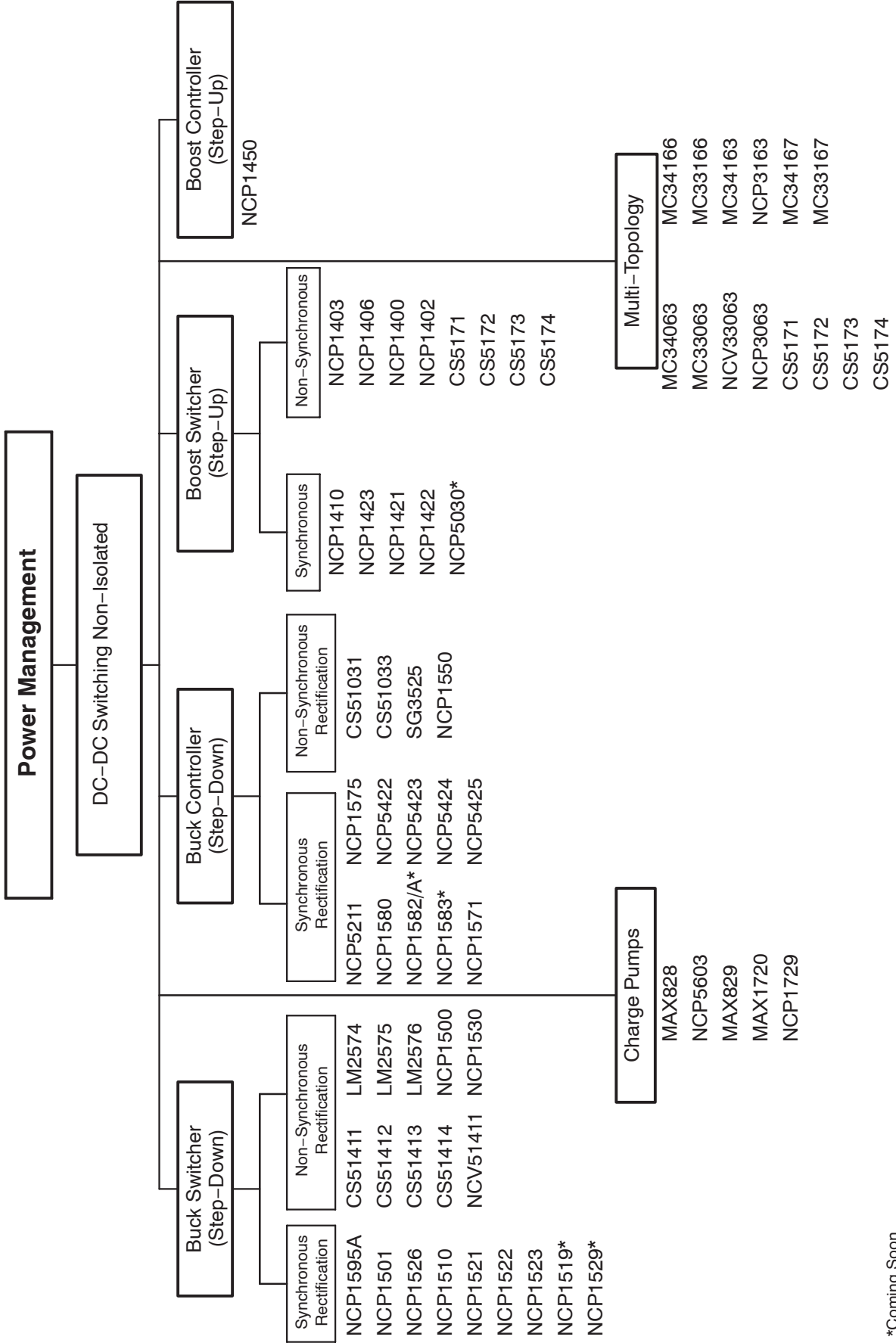
SYNCHRONOUS BUCK POST REGULATOR CONTROLLER – FORWARD TOPOLOGIES

Temp. (T _J)	Package	Part No.
-40 to +125°C	SO-8	NCP4330DR2



ON Semiconductor Selector Guide – Power Management OFF-LINE SWITCHING REGULATORS

Web Part	Control Mode	Switching Freq (kHz)	Freq Jittering (%)	Standby Mode Tech- nique	R _{ps(on)} Typ (Ω)	Max Break- down Voltage (V)	Max Internal Current Set Point (mA)	Min HV Startup Limit (V)	Dynamic Self Supply (mA)	Under- voltage Lock- out (V)	Short Circuit Protec- tion	Over Power Com- pensation	Brown -Out Protec- tion	Latch	Temp (°C)	Pack- ages	Com- ments
MCS3363	Voltage Mode	285	N/A	NO	14	700	400	9	NO	9.5 to 15.2 Typ.	NO	NO	NO	NO	-25 to +150	SO-16, PDIP-16	
NCP1000	Voltage Mode	100	N/A	Skip Mode	18	700	500	20	NO	7.5 to 8.5 Typ.	NO	NO	NO	NO	-40 to +125	PDIP-8	
NCP1001	Voltage Mode	100	N/A	Skip Mode	9	700	1000	20	NO	7.5 to 8.5 Typ.	NO	NO	NO	NO	-40 to +125	PDIP-8	
NCP1002	Voltage Mode	100	N/A	Skip Mode	6	700	1500	20	NO	7.5 to 8.5 Typ.	NO	NO	NO	NO	-40 to +125	PDIP-8	
NCP1010	Current Mode	65, 100, 130	± 3.3	Skip Mode	22	700	100	30	8.5	7.5 to 8.5 Typ.	When DSS is used	NO	NO	YES	0 to +125	PDIP-7, SOT-223	
NCP1011	Current Mode	65, 100, 130	± 3.3	Skip Mode	22	700	250, 450	30	8.5	7.5 to 8.5 Typ.	When DSS is used	NO	NO	YES	0 to +125	PDIP-7, PDIP-7 SMT, SOT-223	
NCP1012	Current Mode	65, 100, 130	± 3.3	Skip Mode	11	700	250	30	8	7.5 to 8.5 Typ.	When DSS is used	NO	NO	YES	0 to +125	PDIP-7, PDIP-7 SMT, SOT-223	
NCP1013	Current Mode	65, 100, 130	± 3.3	Skip Mode	11	700	350	30	8	7.5 to 8.5 Typ.	When DSS is used	NO	NO	YES	0 to +125	PDIP-7, SOT-223	
NCP1014	Current Mode	65, 100, 130	± 3.3	Skip Mode	11	700	450	30	8	7.5 to 8.5 Typ.	When DSS is used	NO	NO	YES	0 to +125	PDIP-7, PDIP-7 SMT, SOT-223	
NCP1050	Gated Oscillator	45.5, 103, 140	± 5.0	Skip Mode	30	700	100	20	6.3	7.5 to 8.5 Typ.	YES	NO	NO	YES	-40 to +150	PDIP-7, SOT-223	
NCP1051	Gated Oscillator	45.5, 103, 140	± 5.0	Skip Mode	30	700	200	20	6.3	7.5 to 8.5 Typ.	YES	NO	NO	YES	-40 to +150	PDIP-7, SOT-223	
NCP1052	Gated Oscillator	45.5, 103, 140	± 5.0	Skip Mode	30	700	300	20	6.3	7.5 to 8.5 Typ.	YES	NO	NO	YES	-40 to +150	PDIP-7, SOT-223	
NCP1053	Gated Oscillator	45.5, 103, 140	± 5.0	Skip Mode	15	700	400	20	6.3	7.5 to 8.5 Typ.	YES	NO	NO	YES	-40 to +150	PDIP-7, SOT-223	
NCP1054	Gated Oscillator	45.5, 103, 140	± 5.0	Skip Mode	15	700	530	20	6.3	7.5 to 8.5 Typ.	YES	NO	NO	YES	-40 to +150	PDIP-7, SOT-223	
NCP1055	Gated Oscillator	45.5, 103, 140	± 5.0	Skip Mode	15	700	680	20	6.3	7.5 to 8.5 Typ.	YES	NO	NO	YES	-40 to +150	PDIP-7, SOT-223	
NCP1027	Current Mode	65, 100	± 6.0	Skip Mode	5.6	700	800	30	N/A	7.2 to 8.5 Typ.	YES	YES	YES	YES	0 to +125	PDIP-7	
NCP1028	Current Mode	65, 100	± 6.0	Skip Mode	5.6	700	800	30	N/A	7.2 to 8.5 Typ.	YES	YES	YES	YES	0 to +125	PDIP-7	No OVP on V _{CC} Pin



*Coming Soon.

ON Semiconductor Selector Guide – Power Management

BUCK SWITCHING REGULATOR – (INTERNAL SWITCH)

Device	V _{IN} (V)		V _{OUT} Options (Adj Range)	I _{OUT} (A)	F _{SW} (kHz)	Mode	Enable	Soft-Start	Comments	Temp Range (°C)	Package
	Min	Max									
CS51411	4.5	40	Down to 1.276 V	1.5 A	260	Voltage	✓	✓	Sync capability; Pin-Compatible with LT1375 and LT1376	-40 to +85	SO-8 / DFN-8
CS51412	4.5	40	Down to 1.276 V	1.5 A	260	Voltage	✓	✓	External Bias; Pin-Compatible with LT1375 and LT1376	-40 to +85	SO-8 / DFN-8
CS51413	4.5	40	Down to 1.276 V	1.5 A	520	Voltage	✓	✓	Sync capability; Pin-Compatible with LT1375 and LT1376	-40 to +85	SO-8 / DFN-8
CS51414	4.5	40	Down to 1.276 V	1.5 A	520	Voltage	✓	✓	External Bias; Pin-Compatible with LT1375 and LT1376	-40 to +85	SO-8 / DFN-8
NCV51411	4.5	40	Down to 1.276 V	1.5 A	260	Voltage	✓	✓	Automotive version	-40 to +125	SO-8 / DFN-8
LM2574	4.75	40	3.3, 5, 12, 15, Adj(1.23 to 37 V)	0.5 A	52	Voltage	✓		No external compensation required	-40 to +125	D2PAK / TO-220
LM2575	4.75	40	3.3, 5, 12, 15, Adj(1.23 to 37 V)	1.0 A	52	Voltage	✓		No external compensation required	-40 to +125	D2PAK / TO-220
LM2576	4.75	40	3.3, 5, 12, 15, Adj(1.23 to 37 V)	3.0 A	52	Voltage	✓		No external compensation required	-40 to +125	D2PAK / TO-220
NCP1595A	4.0	5.5	Down to 0.8 V	1.5 A	1200	Current	✓	✓	Internal compensation; Synchronous Rectification	0 to +85	DFN-6
MC34166	7.5	40	Down to 5.0 V	3.0 A	72	Voltage			Cycle-by-Cycle current limit	0 to +70	D2PAK / TO-220
MC33166	7.5	40	Down to 5.0 V	3.0 A	72	Voltage			Internal thermal shutdown	-40 to +85	D2PAK / TO-220
MC33167	7.0	40	Down to 5.0 V	5.0 A	72	Voltage			Large 5.0 A output capability	-40 to +85	D2PAK / TO-220
MC34167	7.0	40	Down to 5.0 V	5.0 A	72	Voltage			Standby Mode < 36 µA	0 to +70	D2PAK / TO-220
NCP1500	2.7	5.4	1.0, 1.3, 1.5, 1.8 V	300 mA	270 – 630	Voltage			PWM or Linear mode. Can be programmed to work in Linear LDO Regulator mode. External Sync.	-40 to +85	Micro8™
NCP1501	2.7	5.2	1.05, 1.35, 1.57, 1.8 V	300 mA	450–1000	Voltage			Synchronous Rectification. Can be programmed to work in Linear LDO Regulator mode. External Sync.	-40 to +85	Micro8™
NCP1526	2.7	5.5	PWM – 1.2V ; LDO – 2.8 V Other Options Available	PWM: 400 mA LDO: 150 mA	3000	Voltage	✓	✓	Dual output: PWM + LDO. Synchronous Rectification	-40 to +85	Thin DFN-10
NCP1510	2.5	5.2	1.05, 1.35, 1.57, 1.8 V	500 mA	450–1000	Voltage	✓	✓	Synchronous Rectification. Can be programmed to work in Low Iq (14 µA) Pulsed mode at light loads. External Sync.	-40 to +85	Micro-Bump-9
NCP1590	2.7	5	2.5, 2.7, 3.0, 3.3 V	600 mA	600 – 1200	Voltage	✓	✓	Automatic PWM/PFM mode. External Synchronization up to 1.2 MHz	-40 to +85	Micro8™
NCP1521	2.7	5.5	0.9 – 3.3 V	600 mA	1500	Voltage	✓	✓	Auto PWM/ PFM mode. Synchronous Rectification	-40 to +85	Thin SOT-23-5, Thin DFN-6
NCP1522	2.7	5.5	0.9 – 3.3 V	600 mA	3000	Voltage	✓	✓	Auto PWM/ PFM mode. Synchronous Rectification	-40 to +85	Thin SOT-23-5
NCP1523	2.7	5.5	0.9 – 3.3 V	600 mA	3000	Voltage	✓	✓	Auto PWM/ PFM mode. Synchronous Rectification	-40 to +85	Micro-Bump-8
NCP1519*	2.7	5.5	1.2, 1.5, 1.8, Adj(0.9–3.3 V)	600 mA	1700	Voltage	✓	✓	Auto PWM/ PFM mode. Synchronous Rectification	-40 to +85	Thin SOT-23-5
NCP1529*	2.7	5.5	1.2, 1.5, 1.8, Adj(0.9–3.3 V)	1 A	1700	Voltage	✓	✓	Auto PWM/ PFM mode. Synchronous Rectification	-40 to +85	Thin SOT-23-5

*Coming Soon.

BOOST SWITCHING REGULATOR – (INTERNAL SWITCH)

Device	V _{IN} (V)		V _{OUT} Options (Adj Range)	I _{OUT} (A)	F _{SW} (kHz)	Mode	Enable	Soft-Start	Comments	Temp Range (°C)	Package
	Min	Max									
NCP1403	1.2	5.5	up to 15 V	50 mA	300	Voltage	✓	✓	PFM mode	-40 to +85	Thin SOT-23-5
NCP1406	1.4	5.5	up to 25 V	50 mA	1000	Voltage	✓	✓	PFM mode	-40 to +85	Thin SOT-23-5
NCP1400	0.8	5.5	1.8-5.0 V	100 mA	180	Voltage	✓	✓	PWM mode	-40 to +85	Thin SOT-23-5
NCP1402	0.8	5.5	1.8-5.0 V	200 mA	180	Voltage	✓	✓	PFM mode	-40 to +85	Thin SOT-23-5
NCP1410	1.0	5.5	1.5-5.5 V	250 mA	600	Voltage	✓		PFM mode. Synchronous Rectification, Low-battery detect	-40 to +85	Micro8™
NCP1423	0.8	5.5	1.8-5.5 V	400 mA	600	Voltage	✓	✓	PFM mode. Synchronous Rectification, True-cutoff, Low-battery detect	-40 to +85	Micro-10
NCP1421	1.0	5.0	1.5-5.0 V	600 mA	1200	Voltage	✓	✓	PFM Sync-rect, True-cutoff, Low-battery detect	-40 to +85	Micro8™
NCP1422	1.0	5.0	1.5-5.0 V	800 mA	1200	Voltage	✓	✓	PFM mode. Synchronous Rectification, True-cutoff, Low-battery detect	-40 to +85	DFN-10
NCP5030*	2.7	5.5	2.2-5.5 V	1.2 A	1000	Current	✓	✓	Buck/ Boost Converter – can supply either regulated current or regulated output voltage	-40 to +85	DFN-12
CS5171	2.7	30	1.276 to 40 V	1.5 A	280	Current		✓	LT1372/1373 Compatible	-40 to +85	SO-8
CS5172	2.7	30	-2.5 to 40 V	1.5 A	280	Current		✓	Flyback & SEPIC	-40 to +85	SO-8
CS5173	2.7	30	1.276 to 40 V	1.5 A	560	Current		✓	Easy External Synchronization	-40 to +85	SO-8
CS5174	2.7	30	-2.5 to 40 V	1.5 A	560	Current		✓	Negative feedback polarity	-40 to +85	SO-8

*Coming Soon.

ON Semiconductor Selector Guide – Power Management

MULTI-TOPOLOGY (STEP-UP, STEP-DOWN, INVERTING) SWITCHING REGULATOR – (INTERNAL SWITCH)

Device	V _{IN} (V)		V _{OUT} Options (Adj Range)	I _{OUT} (A)	F _{sw} (kHz)	Enable	Mode	Step- Up	Step- Down	Step-Up/ Step- Down	Inv	Comments	Temp Range (°C)	Package
	Min	Max												
MC34063	3.0	40	Down to 2.5 V	1.5	up to 100	✓	Hysteresis	✓	✓	✓	✓	Simple and flexible regulator	0 to +70	SO-8 / PDIP-8
MC33063	3.0	40	Down to 2.5 V	1.5	up to 100	✓	Hysteresis	✓	✓	✓	✓	Minimal number of external components	-40 to +85	SO-8 / PDIP-8
NCV33063	3.0	40	Down to 2.5 V	1.5	up to 100	✓	Hysteresis	✓	✓	✓	✓	Automotive version	-40 to +125	SO-8
NCP3063	3.0	40	Down to 2.5 V	1.5	up to 250	✓	Hysteresis	✓	✓	✓	✓	Higher F _{sw} for optimized size and efficiency	0 to +70	PDIP/SO-8/DFN
NCP3063B	3.0	40	Down to 2.5 V	1.5	up to 250	✓	Hysteresis	✓	✓	✓	✓		-40 to +85	PDIP/SO-8/DFN
CS5171	2.7	30	1.276 to 40 V	1.5	280		Current	✓			✓	LT1372/1373 Compatible	-40 to +85	SO-8
CS5172	2.7	30	-2.5 to 40 V	1.5	280		Current	✓			✓	Flyback and SEPIC	-40 to +85	SO-8
CS5173	2.7	30	1.276 to 40 V	1.5	560		Current	✓			✓	Easy External Synchronization	-40 to +85	SO-8
CS5174	2.7	30	-2.5 to 40 V	1.5	560		Current	✓			✓	Negative feedback polarity	-40 to +85	SO-8
MC34166	7.5	40	Down to 5.0 V	3.0	72		Voltage		✓	✓	✓	Cycle-by-Cycle current limit	0 to +70	D2PAK / TO-220
MC33166	7.5	40	Down to 5.0 V	3.0	72		Voltage		✓	✓	✓	Internal thermal shutdown	-40 to +85	D2PAK / TO-220
MC34163	2.5	40	Down to 1.25 V	3.4	up to 100	✓	Hysteresis	✓	✓	✓	✓	Simple & Flexible regulator	0 to +70	SO-16W / PDIP
MC33163	2.5	40	Down to 1.25 V	3.4	up to 100	✓	Hysteresis	✓	✓	✓	✓	Minimal number of external components	-40 to +85	SO-16W / PDIP
NCP3163	2.5	40	Down to 1.25 V	3.4	up to 300	✓	Hysteresis	✓	✓	✓	✓	Higher F _{sw} for optimized size and efficiency	0 to +70	SO-16WEP
NCP3163B	2.5	40	Down to 1.25 V	3.4	up to 300	✓	Hysteresis	✓	✓	✓	✓		-40 to +85	SO-16WEP
MC34167	7.0	40	Down to 5.0 V	5.0	72		Voltage		✓	✓	✓	Large 5.0A output capability	0 to +70	D2PAK/TO-220
MC33167	7.0	40	Down to 5.0 V	5.0	72		Voltage		✓	✓	✓	Standby Mode < 36 μ A	-40 to +85	D2PAK/TO-220

BUCK SWITCHING CONTROLLERS (EXTERNAL SWITCH)

Device	V _{IN} (V)		V _{OUT} Options (Adj Range)	V _{OUT} Accuracy	F _{SW} (kHz)	Mode	Enable	Soft-Start	Synchronous	Comments	Temp Range (°C)	Package
	Min	Max										
NCP5211	4.5	14	Down to 1.0 V	1.5%	150 – 750	Voltage	✓	✓	✓	1.5 A drive capability	0 to +70	SO-14
NCP5211B	4.5	14	Down to 1.0 V	1.5%	150 – 750	Voltage	✓	✓	✓	1.5 A drive capability	-40 to +85	SO-14
CS51031	4.5	16	Down to 1.25 V	2%	200 – 700	Hysteresis		✓		No compensation required ; PFET	-40 to +85	SO-8
CS51033	3.3	5.0	Down to 1.25 V	2%	200 – 700	Hysteresis		✓		No compensation required ; PFET	-40 to +85	SO-8
SG3525	8.0	35	Down to 5.1 V	1%	100 – 400	Voltage	✓	✓		Flexible configurations; ST Compatible	0 to +70	SO-16W
NCP1580	4.5	15	Down to 0.8 V	1.5%	350	Voltage		✓	✓	1.5 A gate drive; 90% duty cycle	-40 to +85	SO-8
NCP1582/A	4.5	15	Down to 0.8 V	1.5%	350	Voltage	✓	✓	✓	0.7 A gate driver; Short Circuit Protection	-40 to +85	SO-8
NCP1583	4.5	15	Down to 0.8 V	1.5%	300	Voltage	✓	✓	✓	0.7 A gate driver; Short Circuit Protection	-40 to +85	SO-8
NCP1571	2.0	12	Down to 0.980 V	1.0%	200	Voltage	✓	✓	✓	12 V bias supply	0 to +125	SO-8
NCP1575	2.0	12	Down to 0.980 V	1.0%	200 – 500	Voltage		✓	✓	12 V bias supply	0 to +125	SO-8
NCP1550	2.5	5.5	1.8–3.3 V (factory prefixed)	2.0%	600	Voltage	✓	✓		Auto PWM/ PFM mode.	-40 to +85	Thin SOT-23-5

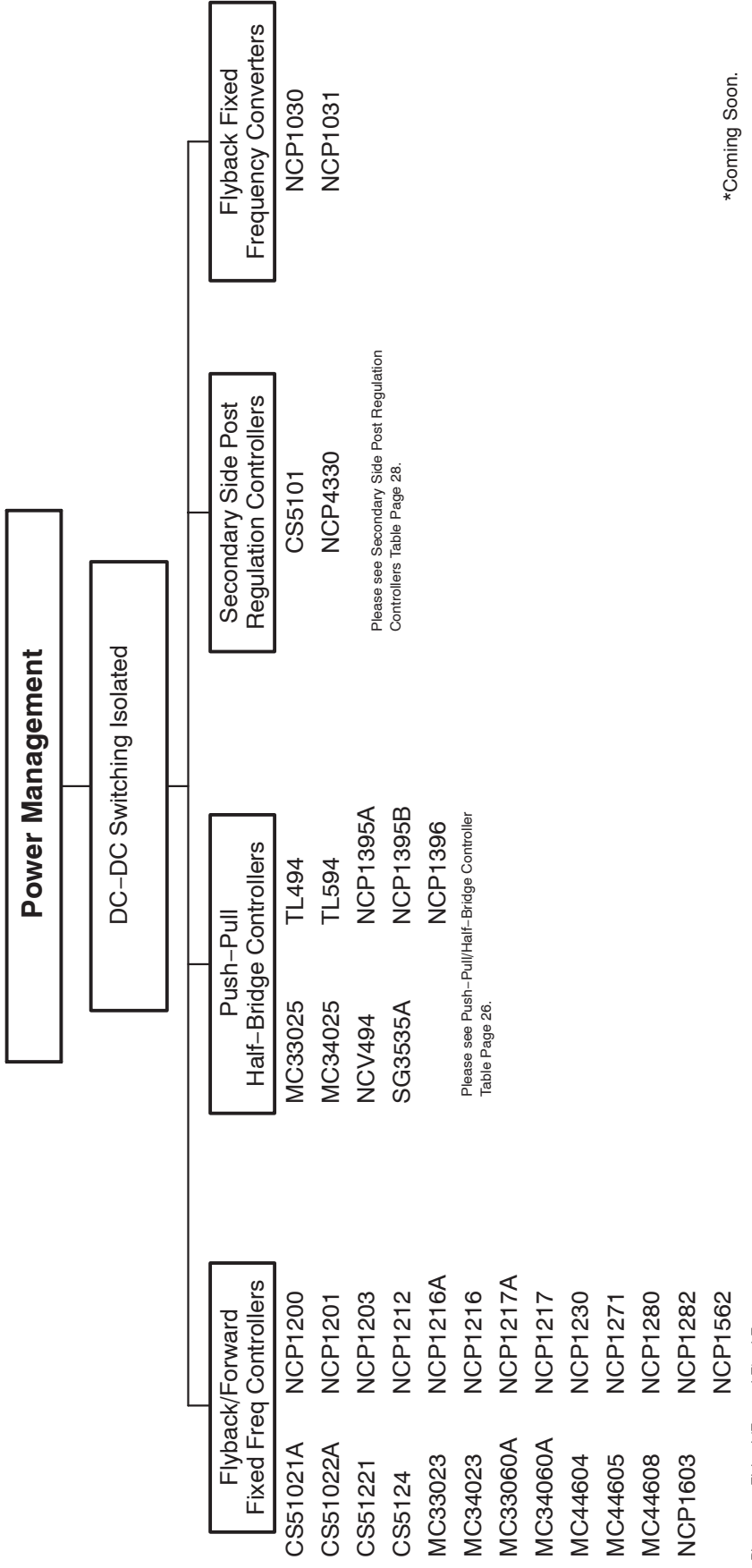
DUAL BUCK SWITCHING CONTROLLERS (EXTERNAL SWITCH)

Device	V _{IN} (V)		V _{OUT} Options (Adj Range)	V _{OUT} Accuracy	F _{SW} (kHz)	Mode	Enable	Soft-Start	Synchronous	Comments	Temp Range (°C)	Package
	Min	Max										
NCP5422	10.8	13.2	Down to 1.0 V	2.0%	150 – 600	Voltage	✓	✓	✓	Hiccup mode overcurrent protection	0 to +70	SO-16
NCP5423	10.8	13.2	Down to 1.0 V	1.0%	150 – 600	Voltage	✓	✓	✓	1% Voltage reference	0 to +70	SO-16
NCP5424	10.8	13.2	Down to 1.0 V	2.0%	150 – 600	Voltage	✓	✓	✓	Hiccup & cycle-by-cycle overcurrent	0 to +70	SO-16
NCP5425	4.6	13.2	Down to 0.8 V	1.0%	150 – 750	Voltage	✓	✓	✓	1.5 A peak drive capability	0 to +125	TSSOP-20

BOOST SWITCHING CONTROLLERS (External Switch)

Device	V _{IN} (V)		V _{OUT} Options (Adj Range)	V _{OUT} Accuracy	F _{SW} (kHz)	Mode	Enable	Soft-Start	Synchronous	Comments	Temp Range (°C)	Package
	Min	Max										
NCP1450	0.9	5.5	1.8–5.0 V (Factory Prefixed)	2.5%	180	Voltage	✓	✓		PFM mode	-40 to +85	Thin SOT-23-5

ON Semiconductor Selector Guide – Power Management



Please see Secondary Side Post Regulation
Controllers Table Page 28.

Please see Push-Pull/Half-Bridge Controller
Table Page 26.

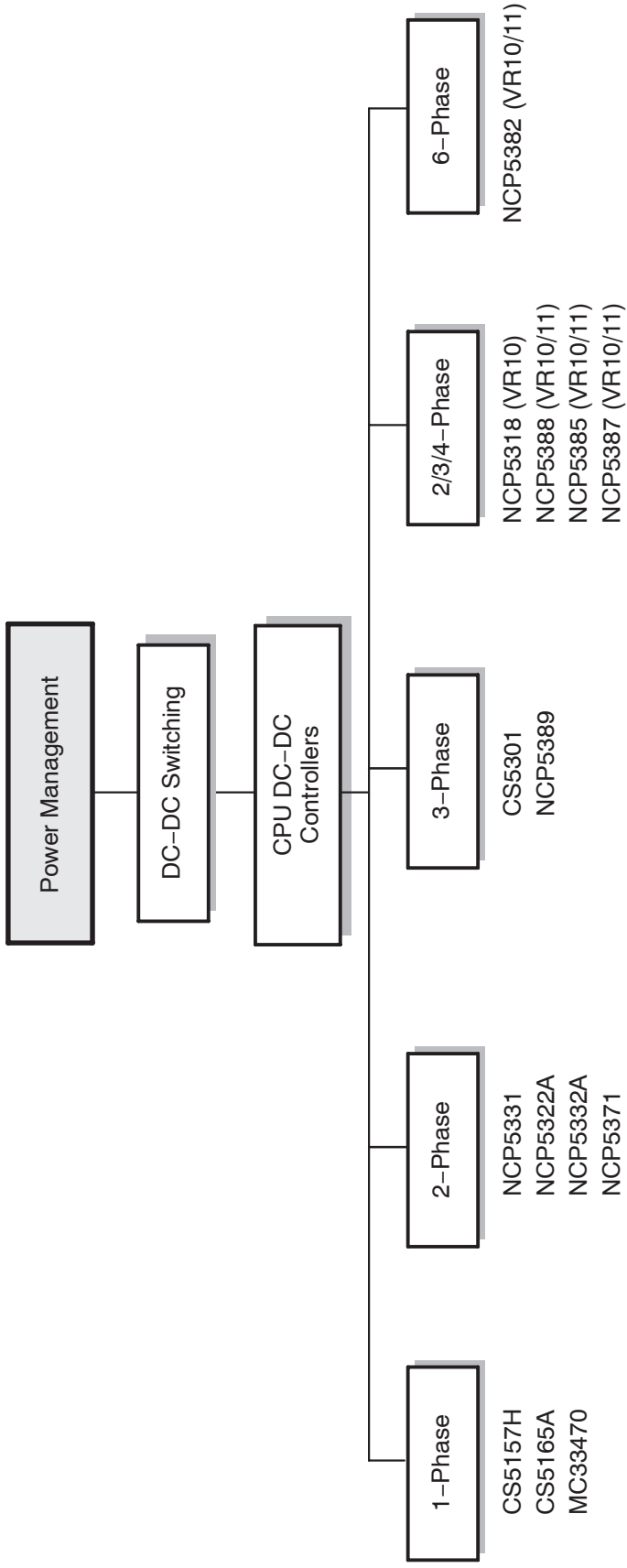
Please see Flyback/Forward Fixed Frequency
Controllers Table Page 23.

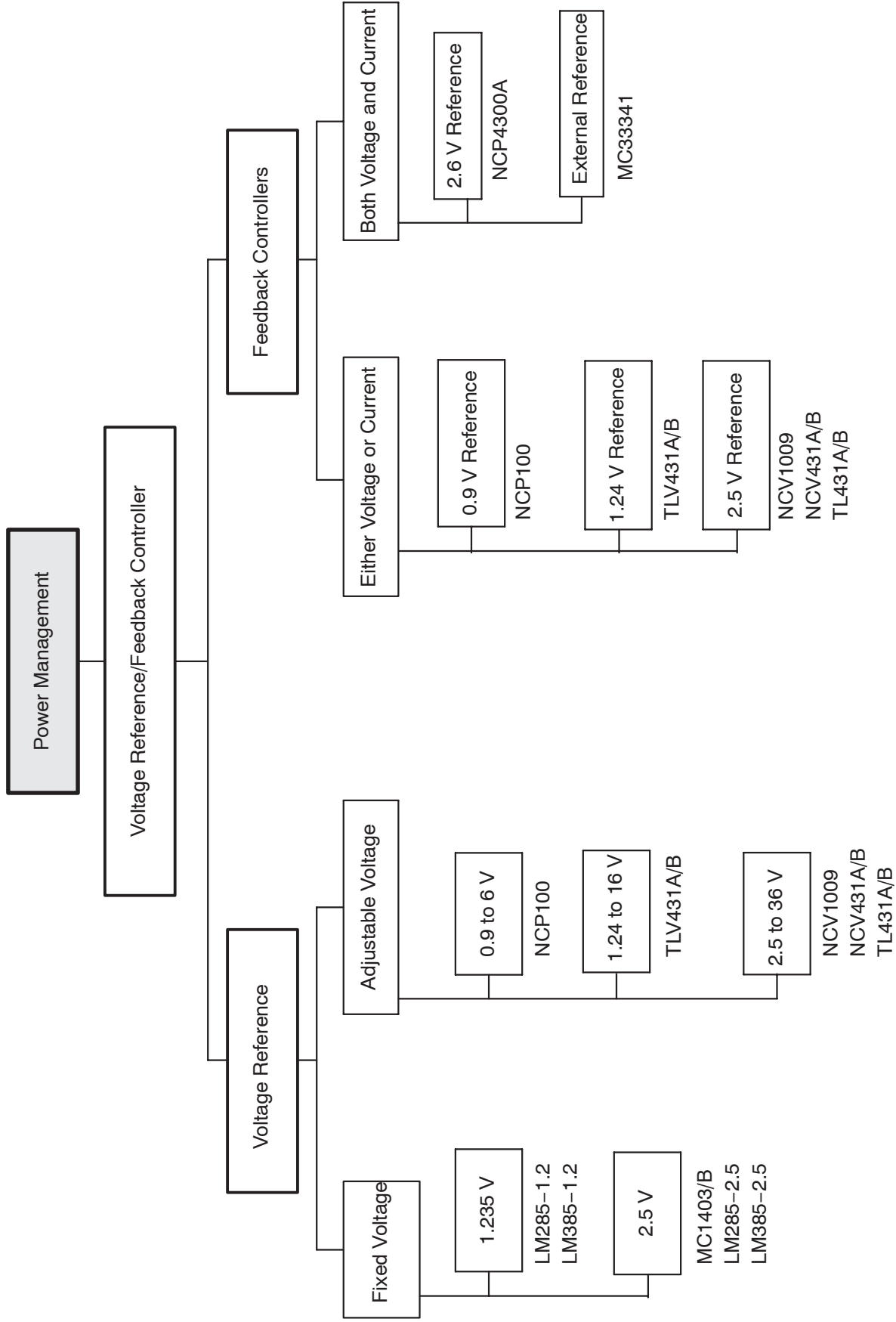
*Coming Soon.

SWITCHING CONTROLLERS FOR STEP-DOWN ISOLATED TOPOLOGIES

Device	V _{IN} (V)		V _{OUT} Options (Adj Range)	V _{OUT} Accuracy	F _{sw} (kHz)	Mode	Enable	Soft-Start	Synchronous	Comments	Temp Range (°C)	Package
	Min	Max										
CS5124	7.7	75	External	-	400	Current Mode	✓	✓		Small PCB footprint; Bias for startup	-40 to +105	SO-8
CS51221	3.3	72	Down to 1.26 V	2%	up to 1000	Voltage Mode		✓		Programmable features; Bias for startup	-40 to +85	SO-16/TSSOP-16
CS51021	3.3	72	Down to 5.0 V	1%	200 – 1000	Current Mode		✓		Synch; Bias for startup	-40 to +85	SO-16/TSSOP-16
CS51022	3.3	72	Down to 5.0 V	1%	200 – 1000	Current Mode		✓		Sleep mode; Bias for startup	-40 to +86	SO-16/TSSOP-16
NCP1030	10	200	2.5 up to V _{IN}	2%	up to 1000	Voltage Mode	✓	✓		PoE applications; Integrated Switch	-40 to +125	Micro8™
NCP1031	10	200	2.5 up to V _{IN}	2%	up to 1000	Voltage Mode	✓	✓		PoE applications; Integrated Switch	-40 to +125	SO-8

ON Semiconductor Selector Guide – Power Management





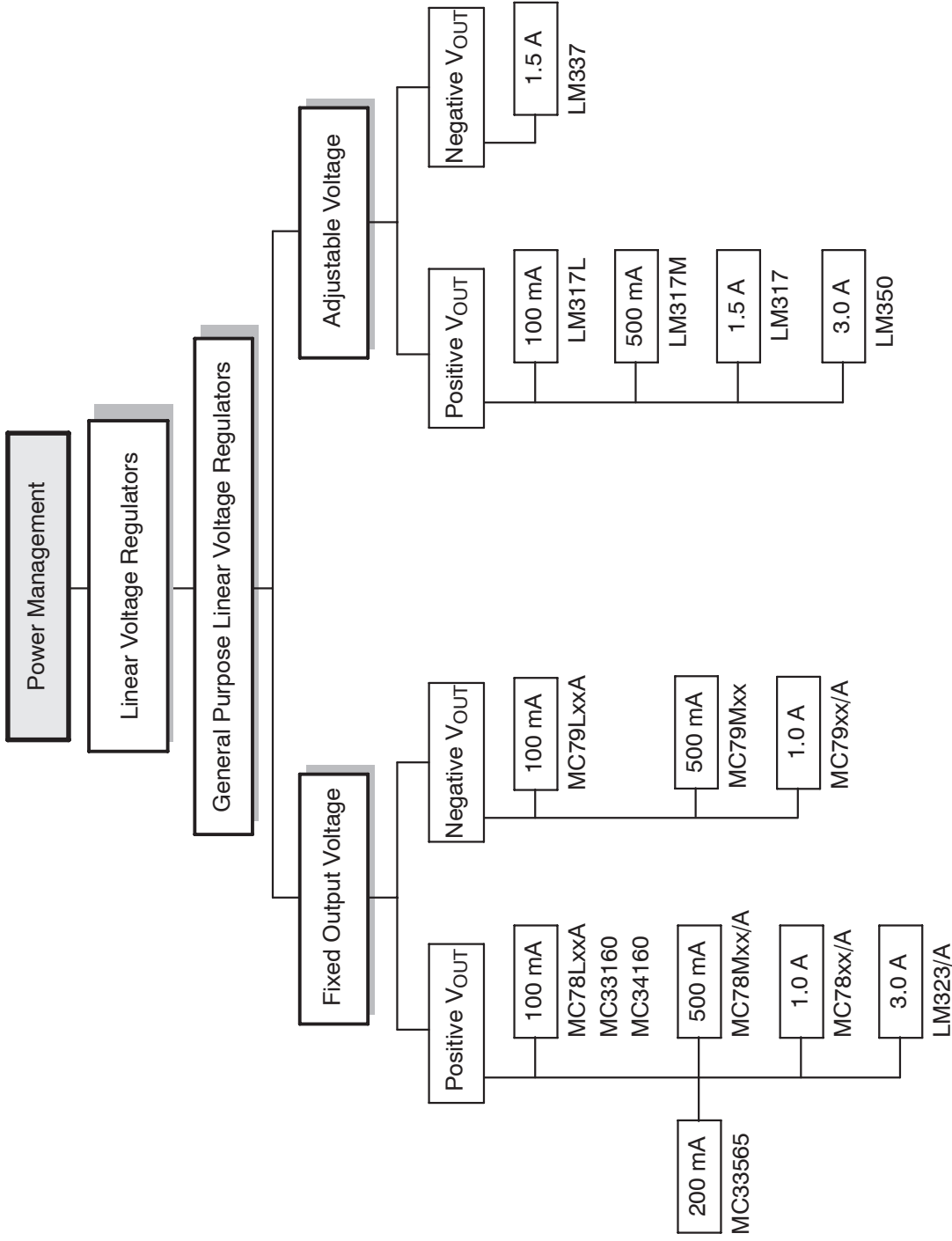
ON Semiconductor Selector Guide – Power Management
SERIES VOLTAGE REFERENCES

Part Number	Reference Voltage (V)	Tolerance ± (%)	Typical Temperature Coefficient (ppm/°C)	Typical Quiescent Current (mA)	Package			Operating Temperature Range (°C)
					SO-8	PDIP	SO-8	
MC1403	2.500	1.0	10	1.200	✓	✓	✓	0 to +70
MC1403B	2.500	1.0	10	1.200	✓	✓	✓	-40 to +85

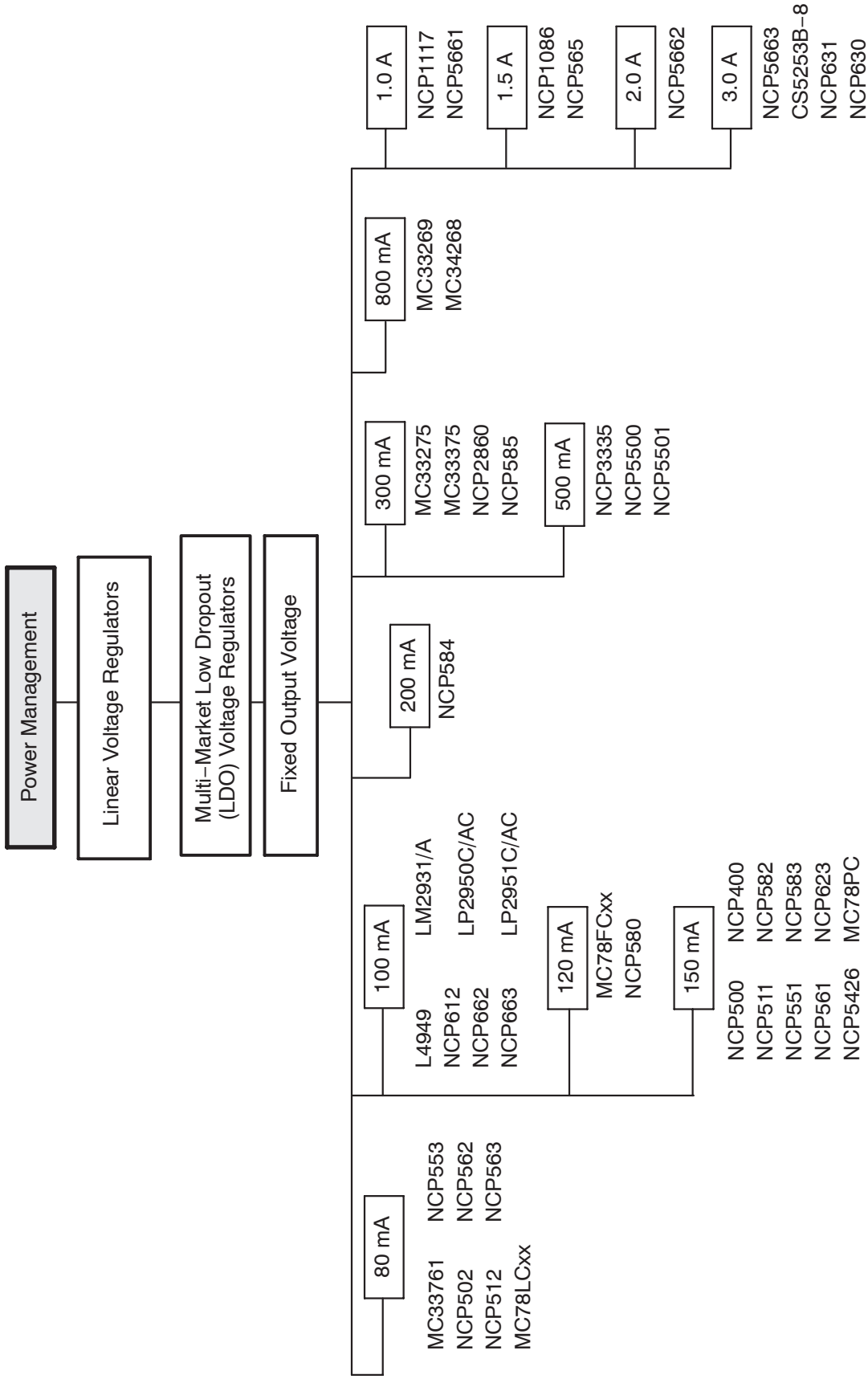
SHUNT VOLTAGE REFERENCES

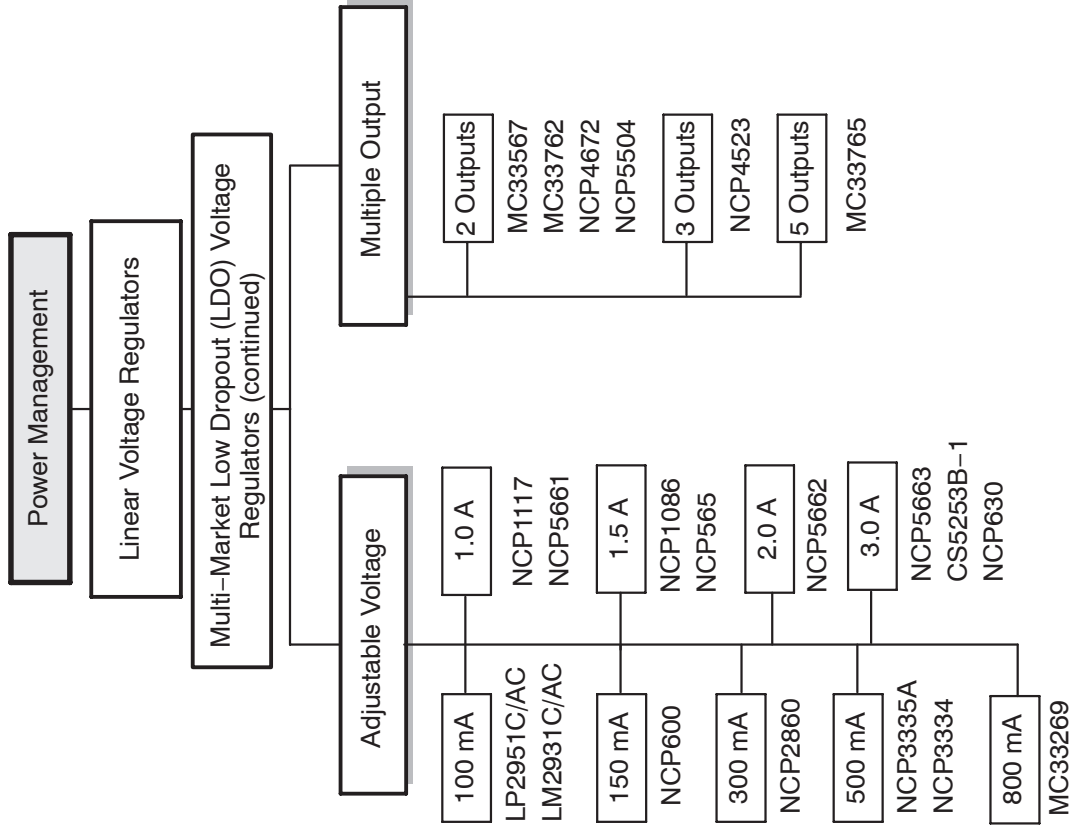
Part Number	Reference Voltage (V)	Tolerance ± (%)	Typical Temperature Coefficient (ppm/°C)	Minimum Operating Current (mA)	Package					Operating Temperature Range (°C)	
					SO-8	TO-92	Micro8	TSOP-5*	PDIP		SOT23-3
LM285-1.2	1.235	1.0	80	0.010	✓						-40 to +85
LM385-1.2	1.235	2.0	80	0.015	✓						0 to +70
LM285-2.5	2.500	1.5	80	0.020	✓						0 to +70
LM385-2.5	2.500	3.0	80	0.020	✓						0 to +70
LM385B-1.2	1.235	1.0	80	0.020	✓						0 to +70
LM385B-2.5	2.500	1.5	80	0.020	✓						0 to +70
NCV1009	2.500	0.2	-	-	✓						-40 to +125
NCP100	Adjustable 0.9 to 6 V	1.0	25	0.100				✓			-40 to +85
TLV431A	Adjustable 1.24 to 16 V	1.0	-	0.050		✓		✓			-40 to +85
TLV431B	Adjustable 1.24 to 16 V	0.5	-	0.050		✓		✓			-40 to +85
TL431C	Adjustable 2.495 to 36 V	2.2	50	0.500	✓	✓		✓			0 to +70
TL431I	Adjustable 2.495 to 36 V	2.2	50	0.500	✓	✓		✓			-40 to +85
TL431AC	Adjustable 2.495 to 36 V	1.0	50	0.500	✓	✓		✓			0 to +70
TL431A	Adjustable 2.495 to 36 V	1.0	50	0.500	✓	✓		✓			-40 to +85
TL431BC	Adjustable 2.495 to 36 V	0.4	50	0.500	✓	✓		✓			0 to +70
TL431BI	Adjustable 2.495 to 36 V	0.4	50	0.500	✓	✓		✓			-40 to +85
NCV431A	Adjustable 2.495 to 36 V	1.0	50	0.500	✓				✓		-40 to +125
NCV431B	Adjustable 2.495 to 36 V	0.4	50	0.500	✓				✓		-40 to +125

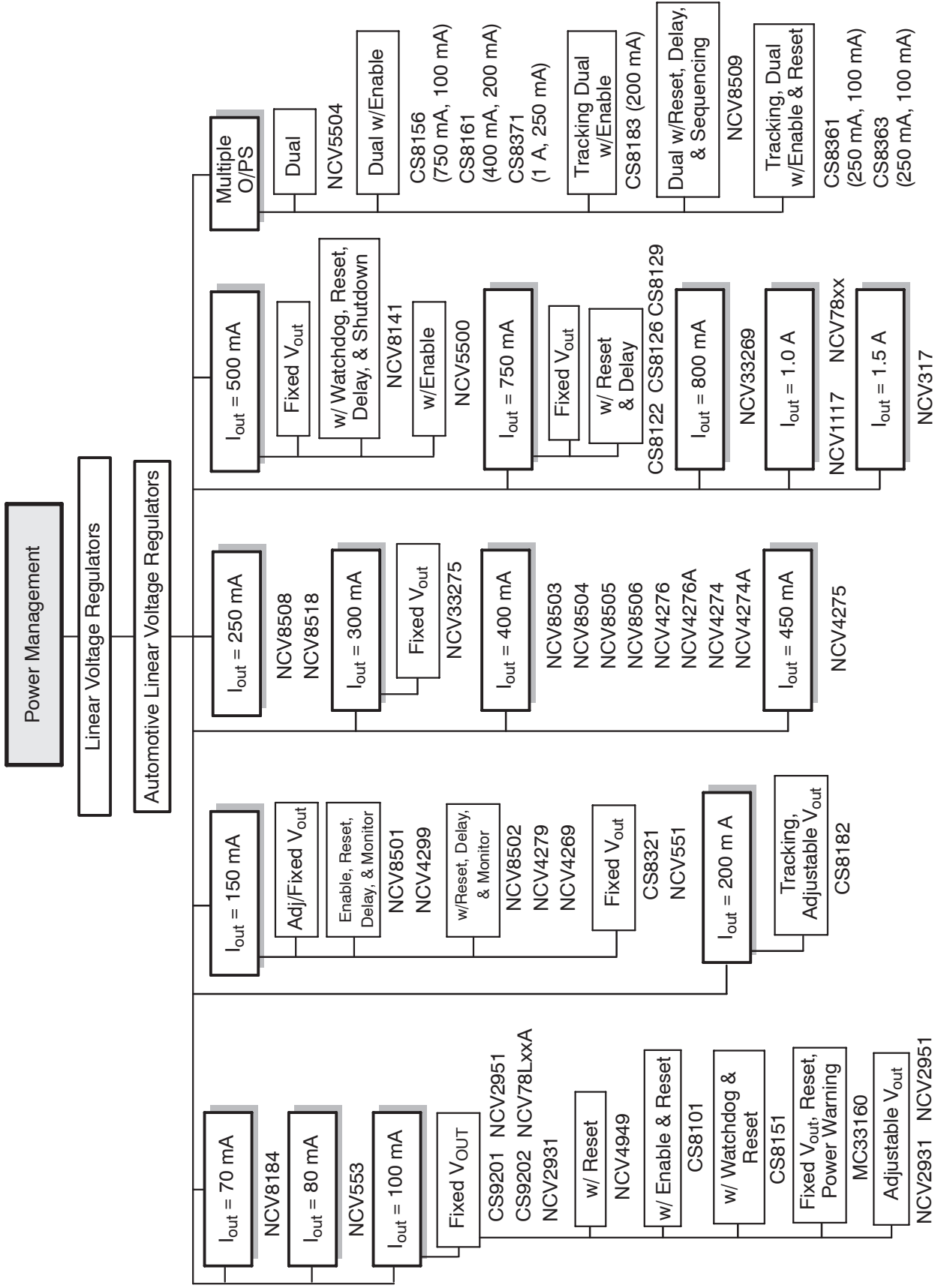
*TSOP-5 – Also known as Thin SOT23-5.

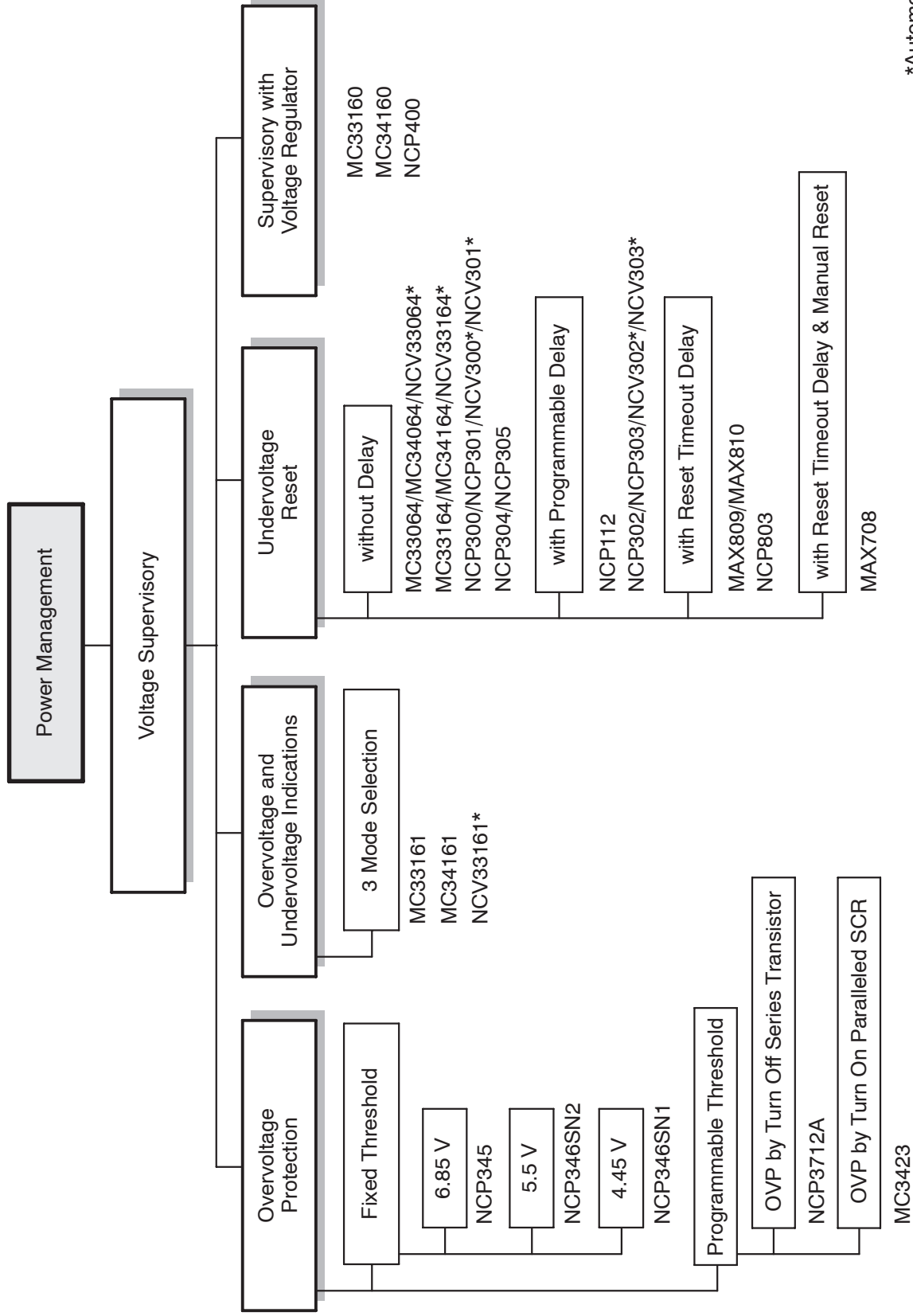


ON Semiconductor Selector Guide – Power Management









*Automotive

ON Semiconductor Selector Guide – Power Management VOLTAGE SUPERVISORY

Description	Typical Threshold Voltage (V_{th}) (V)	Supply Voltage Range (V)	Typical Supply Current (μ A)	Maximum Supply Current (μ A)	Threshold Hysteresis (Typ) (mV)	Operating Temp. Range ($^{\circ}$ C)	Package	Description	Time Delay (Typ)
MAX809	4.90, 4.63, 4.55, 4.38, 4.00, 3.08, 2.93, 2.63, 2.32, 1.60 *	1.0 to 5.5	0.5	2.0	–	–40 to +105	SOT23	3-Pin Microprocessor Reset Monitors	240 msec
MAX810	4.63, 4.38, 3.08, 2.93, 2.63 *	1.0 to 5.5	0.5	2.0	–	–40 to +105	SOT23	3-Pin Microprocessor Reset Monitors	240 msec
MC33064	4.60	1.0 to 6.5	390	500	20	–40 to +85	SO-8, Micro8, TO-92	Undervoltage Sensing Circuit	Ext. Capacitor Dependent
MC34064	4.60	1.0 to 6.5	390	500	20	0 to +70	SO-8, Micro8, TO-92	Undervoltage Sensing Circuit	Ext. Capacitor Dependent
MC33161	1.27	2.0 to 40 (Pos Sensing) 4.0 to 40 (Neg Sensing)	560	900	25	–40 to +85	SO-8, DIP-8	Universal Voltage Monitor	Ext. Capacitor Dependent
MC34161	1.27	2.0 to 40 (Pos Sensing) 4.0 to 40 (Neg Sensing)	560	900	25	0 to +70	SO-8, DIP-8	Universal Voltage Monitor	Ext. Capacitor Dependent
MC33164	2.71 (V_{IN} Increasing) 2.65 (V_{IN} Decreasing)	1.0 to 10	24	40	60	–40 to +125	SO-8, Micro8, TO-92	Micropower Undervoltage Sensing Circuits	Ext. Capacitor Dependent
MC34164	2.71 (V_{IN} Increasing) 2.65 (V_{IN} Decreasing)	1.0 to 10	24	40	60	0 to +70	SO-8, Micro8, TO-92	Micropower Undervoltage Sensing Circuits	Ext. Capacitor Dependent
MC3423	2.6	4.5 to 40	6.0 mA	10 mA	–	0 to +70	SO-8, DIP-8	Overvoltage Crowbar Sensing Circuit	0.5 μ sec
NCP300/1	0.9, 1.8, 2.0, 2.7, 3.0, 4.5, 4.7	0.8 to 10	0.20 to 0.34**	1.2 to 1.4**	45 to 235 Depends on Threshold Voltage	–40 to +125	Thin SOT23-5	Voltage Detector Series NCP300-CMOS, NCP301-Open Drain	High to Low 45–97** μ sec Low to High 77–130** μ sec

*Voltages from 1.6 to 4.9 V by steps of 0.1 V are available upon request.

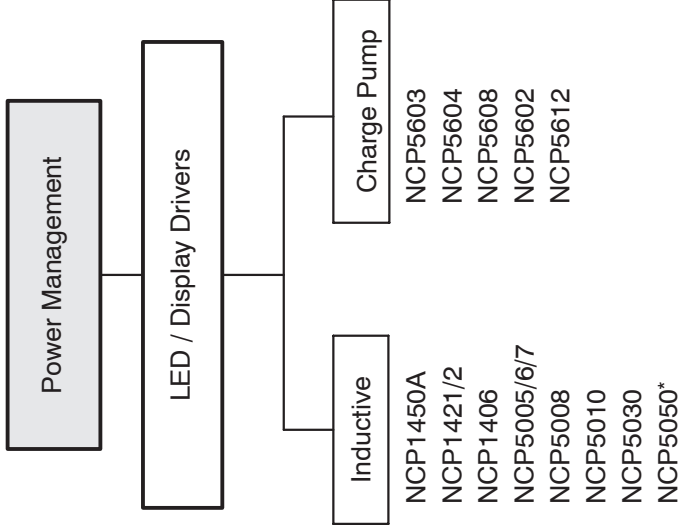
**Depends on the voltage threshold of the part.

VOLTAGE SUPERVISORY (continued)

Description	Typical Threshold Voltage (V _{th}) (V)	Supply Voltage Range (V)	Typical Supply Current (μA)	Maximum Supply Current (μA)	Threshold Hysteresis (Typ) (mV)	Operating Temp. Range (°C)	Package	Description	Time Delay (Typ)
NCP302/3	0.9, 1.8, 2.0, 2.7, 3.0, 4.5, 4.7	0.8 to 10	0.20 to 0.34**	1.2 to 1.4**	45 to 235 Depends on Threshold Voltage	-40 to +125	Thin SOT23-5	Voltage Detector Series with Programmable Delay NCP302-CMOS, NCP303-Open Drain	Ext. Capacitor Dependent
NCP304/5	0.9, 1.8, 2.0, 2.7, 3.0, 4.5, 4.7	0.8 to 10	0.8 to 1.1**	3.0 to 3.9**	45 to 235 Depends on Threshold Voltage	-40 to +125	SC-82AB	Voltage Detector Series NCP304-CMOS, NCP305-Open Drain	High to Low 10-18** μsec Low to High 6-21** μsec
NCP345	6.85	3.0 to 25	750	1000	100	-40 to +85	Thin SOT23-5	Overvoltage Protection IC	10 μsec
NCP346	4.45, 5.5	3.0 to 25	750	1000	50	-40 to 85	Thin SOT23-5	Overvoltage Protection IC	1.8 msec Turn-On 0.5 μsec Turn-Off
NCP803	4.63, 4.38, 3.08, 2.93, 2.63, 2.32, 1.60	1.0 to 5.5	0.5	2.0	-	-40 to +105	SOT-23	3 Pin Microprocessor, Reset Monitors	240 ms
NCP112	3.3, 5.0, 12	4.5 to 16	3.0 mA	5.0 mA	-	0 to +85	SO-14 PDIP-14	Triple Supervisor for Desktop Power Supply Monitoring	Programmable ON/OFF, Power Good, Undervoltage Blocking

**Depends on the voltage threshold of the part.

ON Semiconductor Selector Guide – Power Management



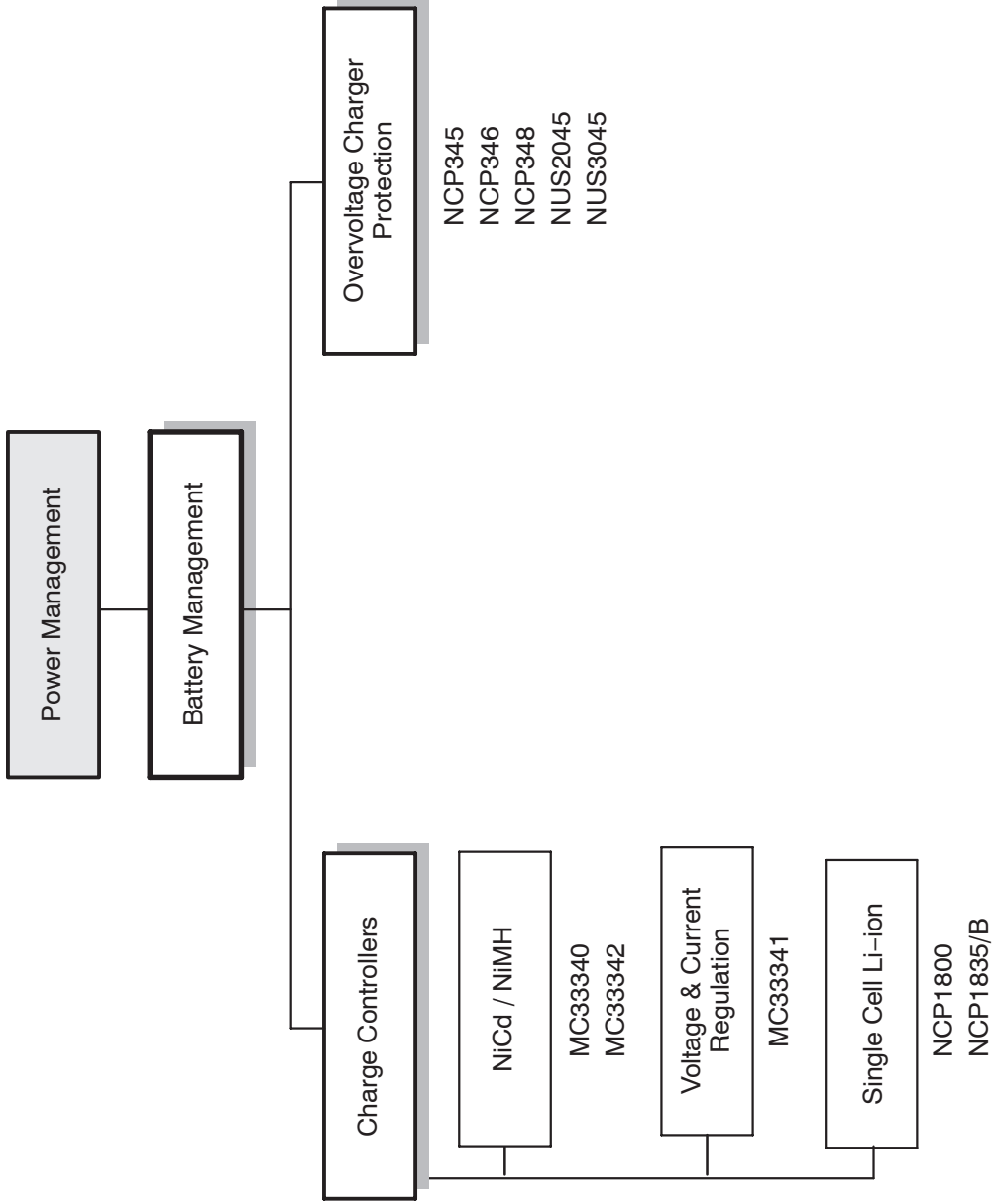
*Coming Soon.

LED/DISPLAY DRIVERS

Application	WLED Type	Number of LED/Connection	Converter Topology	ON Solution	Key Features		
Display Backlighting	Standard, 10 mA – 25 mA	2 – 5 LED/Series	Inductive	NCP5006/5007: Up to 92% efficiency, PFM, Boost, 21 V / 1 W output, Thin SOT23–5	Simple		
		3 – 5 LED/Series	Inductive	NCP5005: Enhanced version of NCP5006. High EMI immunity.	Simple		
		4 – 5 LED/Series	Inductive	NCP5010: 1 MHz PWM Boost, 22 V/0.5 W output integrated rectifier and true-cutoff, Micro-Bump–8 (1.7 x 1.7 mm)	Highly Integrated Driver		
	Flash (Torch)	Low Current – Up to 50 mA for 1 Cell / 100 mA for 2 Cell	2 LEDs/Parallel	Charge Pump	NCP5602: 90% peak efficiency, 2 outputs (25 mA each); 2% current matching, I2C, LGA 12 (2 x 2 mm)	ICON Model I2C Dimming Control	
			2 LEDs/Parallel	Charge Pump	NCP5612: 2 outputs (25 mA each); I2C, LGA 12 (2 x 2 mm)	S–Wire Link Dimming Control	
		Medium Current / Multi-die LED, 100 mA – 350 mA	2 – 6 LEDs/Series	Inductive	NCP1406: Up to 90% efficiency, PFM (up to 1 MHz), 25 V/0.5 W output, Thin SOT23–5 (3 x 3 mm)	Can Operate from 1 or 2 Alkaline or NI–based Cells	
			3 or 4 LEDs/Parallel	Charge Pump	NCP5064A/B: Consistence 90% efficiency, 3 or 4 outputs (25 mA each); 0.5% current matching, TQFN16 (3 x 3 x 0.8 mm)	NCP5604A: Drives 4 LEDs NCP5604B: Drives 3 LEDs	
		High Current LED, Up to 600 mA	Single LED	Inductive	NCP1400ASN50: Fixed frequency PWM micropower boost converter, Thin SOT23–5 (3 x 3 mm)	Can Operate from 1 or 2 Alkaline or NI–based Cells	
			Medium Current Up to 50 mA for 2 Cells and 100 mA for 3 Cells	Single or (Multiple in Parallel)	Charge Pump	NCP5603: 200 mA cont./350 mA pulsed, voltage regulated output, 4.5 V or 5 V, 75% eff., DFN (3 x 3 mm)	High–Current Single Output Charge Pump
			High Current LED, Up to 800 mA	2 – 6 LEDs/Series	Inductive	NCP1406: Up to 90% efficiency, PFM (up to 1 MHz) 25 V/0.5 W output, Thin SOT23–5 (3 x 3 mm)	Simple, Low Cost
Single Driver for Backlight & Flash	High Current LED, Up to 1 A	Single or (Multiple in Parallel)	Inductive	NCP1421: PFM Boost (up to 1.2 MHz), Sync–rect, Output up to 5 V, 600 mA cont. 94% eff., true–cutoff, 50 nA shut–down current, Micro8 (3 x 4.9 mm)	Synchronous Rectification		
		Single or (Multiple in Parallel)	Inductive	NCP1422: PFM Boost (up to 1.2 MHz), Sync–rect, Output up to 5 V, 800 mA cont. 94% eff., true–cutoff, 50 nA shut–down current, DFN10 (3 x 3 mm)	Synchronous Rectification		
	LED (10 mA – 25 mA), Flash LED (100 mA – 300 mA)	2 – 5 LEDs/Series	Inductive	NCP5050*: 23 V/4.5 W output, PWM, 1.7 MHz, DFN–10	Integrated Switch for 2 Adjustable Output Current Levels		
OLED Driver Supply	–	4 LED + Flash LED	Charge Pump	NCP5608: Consistent 90% efficiency, 8 outputs (4 @ 25 mA each + 4 @ 100 mA each); 0.5% current matching, TQFN24 (4 x 4 mm)	One Chip Lighting Solution		
	–	–	Inductive	NCP1406: Up to 90% efficiency, PFM (up to 1 MHz), 25 V/0.5 W output, Thin SOT23–5 (3 x 3 mm)	Can Operate from 1 or 2 Alkaline or NI–based Cells		

*Coming Soon.

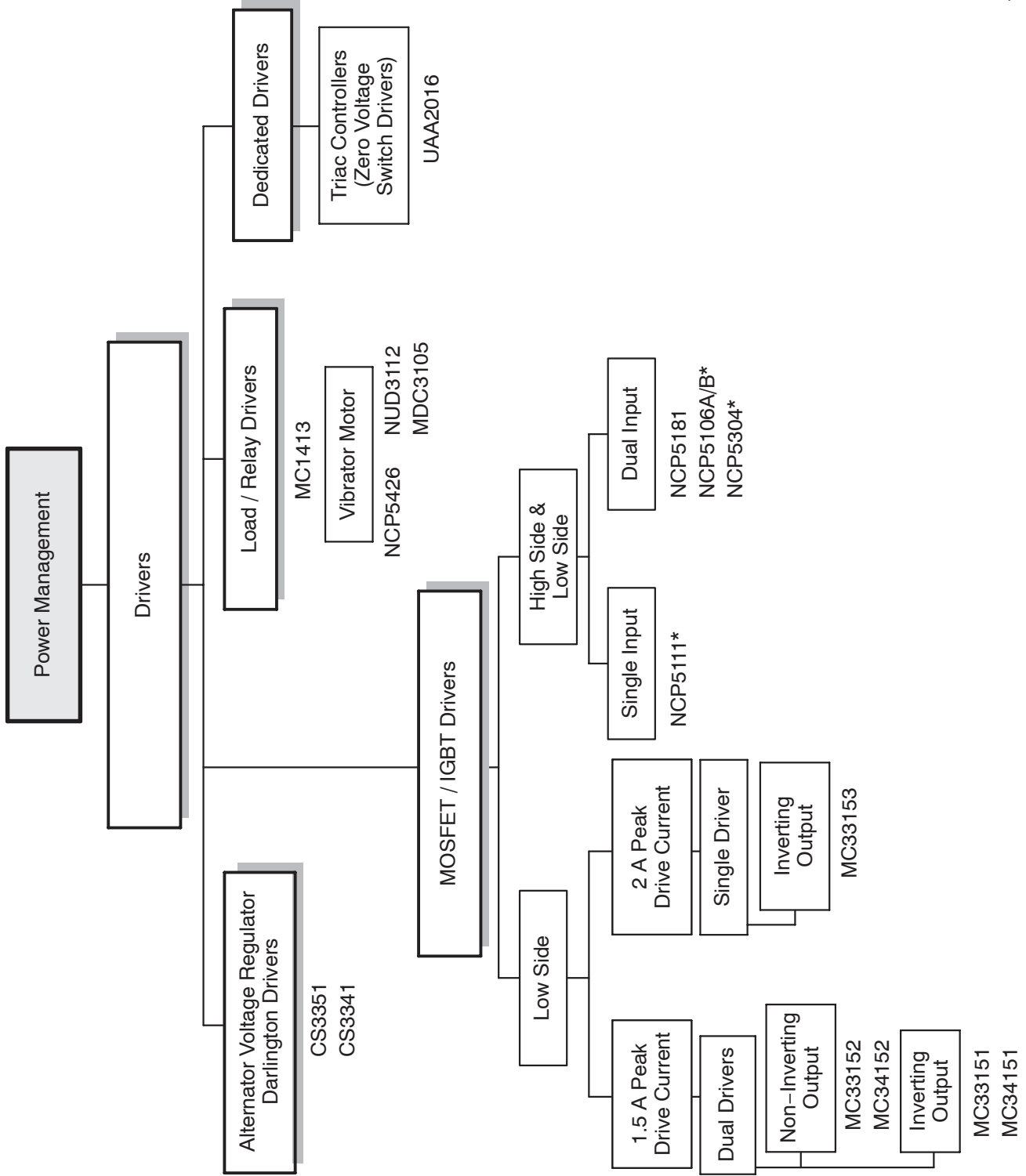
ON Semiconductor Selector Guide – Power Management



BATTERY MANAGEMENT

Device	Description	Package	Key Features
NCP1800	Single-Cell Lithium Ion CCCV Battery Charger	Micro8™	<ul style="list-style-type: none"> Industry Leading Standby Current 0.5 μA Adjustable Charge Current Limit
MC33340/2	Nickel Chemistry Battery Cradle Charger	SO-8	<ul style="list-style-type: none"> Peak Voltage Detection
NCP345	Overvoltage Protection IC	SOT23-5	<ul style="list-style-type: none"> 30 V Capability, 6.85 V Detect Threshold 1 μS Overvoltage Disconnect Time
NCP346	Adjustable Overvoltage Protection IC	SOT23-5	<ul style="list-style-type: none"> 30 V Capability, 4.4 V and 5.5 V Detect Threshold 1 μS Overvoltage Disconnect Time
NCP348	Positive overvoltage protection controller with internal low R_{ON} N-MOSFET and status flat.	DFN-10	<ul style="list-style-type: none"> No External MOSFET
NCP1835	Up to 1 A Single-Cell Lithium-ion/Polymer Integrated CCCV Battery Charger	DFN-10	<ul style="list-style-type: none"> No External MOSFET
NCP1835B	Up to 300 mA Single-Cell Lithium-ion/Polymer Integrated CCCV Battery Charger	DFN-10	<ul style="list-style-type: none"> No External MOSFET
NUS2045	Overvoltage Protection IC with Integrated 20 V P-Channel Power MOSFET	DFN-8	<ul style="list-style-type: none"> Integrated NCP345 + 20 V P-Channel MOSFET
NUS3045	Overvoltage Protection IC with Integrated 30 V P-Channel Power MOSFET	DFN-8	<ul style="list-style-type: none"> Integrated NCP345 + 30 V P-Channel MOSFET
MC33341	Power Supply Battery Charger Regulation Control Unit	SO-8 DIP-8	<ul style="list-style-type: none"> Operating Voltage Range of 2.3 V to 16 V

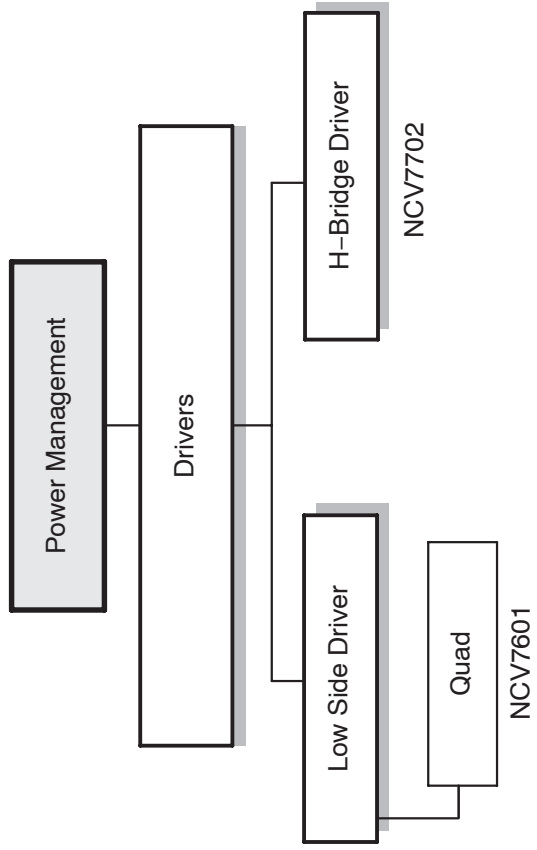
ON Semiconductor Selector Guide – Power Management



*Coming Soon.

**ON Semiconductor Selector Guide – Power Management
DEDICATED DRIVERS**

Part Number	Description	Input Supply Voltage		Supply Current	Features								Package	
		-9.0 V	1.5 mA		Zero Voltage Switch for Triacs	Direct AC Line Operation	Programmable Temp Reduction	Sensor Failsafe	Adj Hysteresis	Sense Pin	Proportional Temp Reg Over $\pm 1^\circ\text{C}$	Stator Powerup		
UAA2016	Zero Voltage Switch Power Controller	-9.0 V	1.5 mA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SOIC-8, PDIP-8



**ON Semiconductor Selector Guide – Power Management
SMART DRIVERS (HIGH-SIDE, LOW-SIDE & H-BRIDGE)**

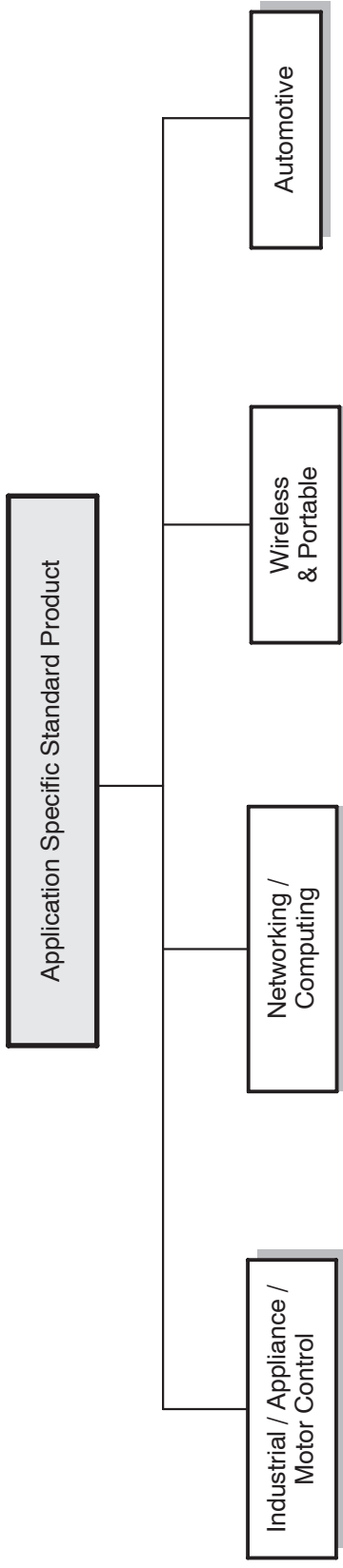
Part		Output		Features										Protection				
Number	Description	Current	$R_{DS(on)}$ @ 25°C	On-Chip Flyback Diode	Active Output Clamp	Parallel Inputs	Serial Interface	Fault Reporting	Undervoltage Lockout	Open Load Detection	Power On Reset	Current Limit	Overvoltage	Over Temperature	Low Duty Cycle Over Current Mode	Peak Transient		
NCV7702B	Configurable Dual H-Bridge Driver	750 mA		√		√		√				√	√	√	√	30 V		

LS QUAD DRIVER

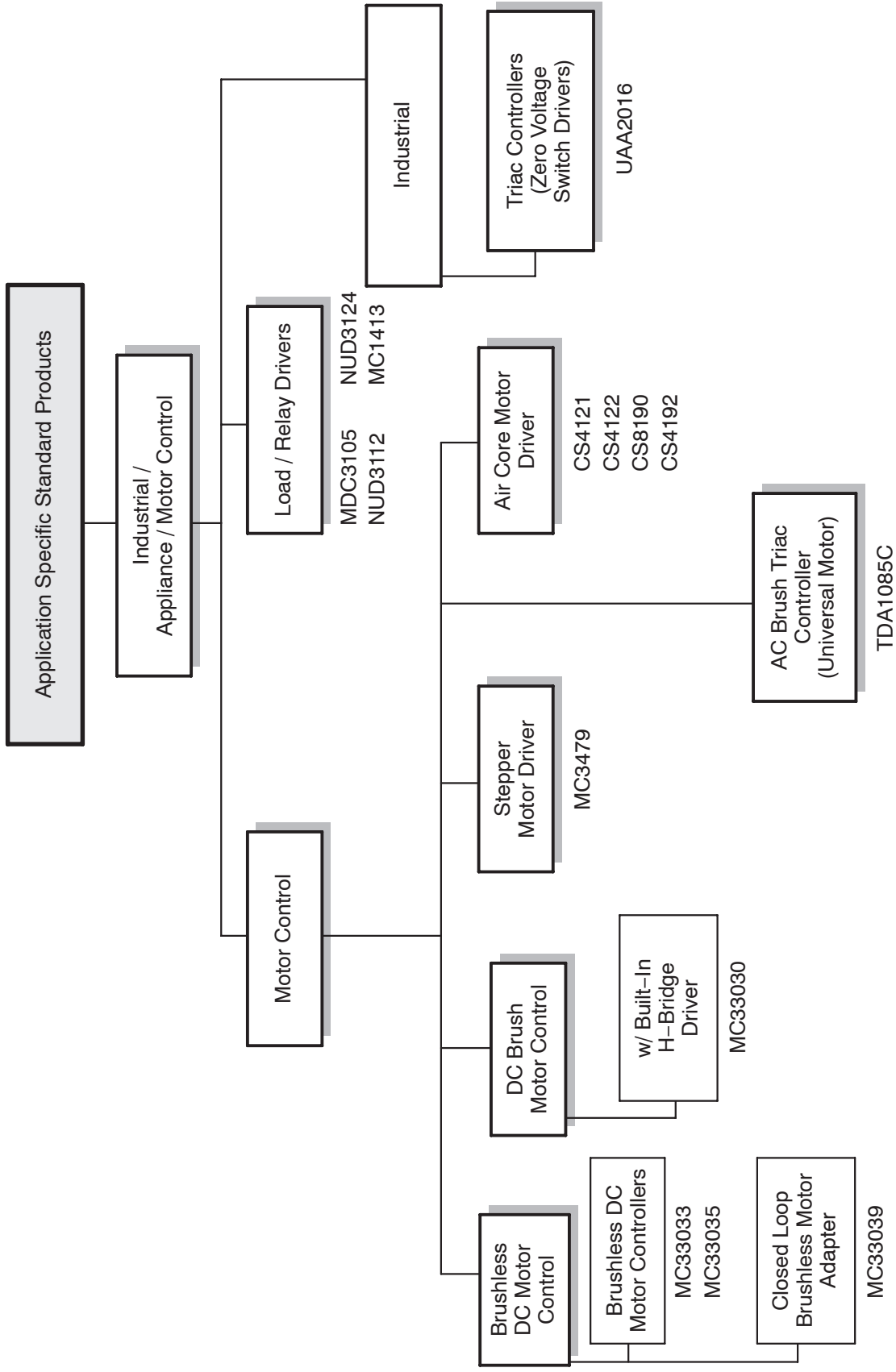
Part Number	Description	Input Supply Voltage	Drivers: Sustaining	Saturation Voltage	Output Clamping Diodes	Compatible Inputs	Package
NCV7601	LS Quad Driver	7.0 V	40 V	650 mV (max)	√	TTL/DTL/CMOS	DIP-16

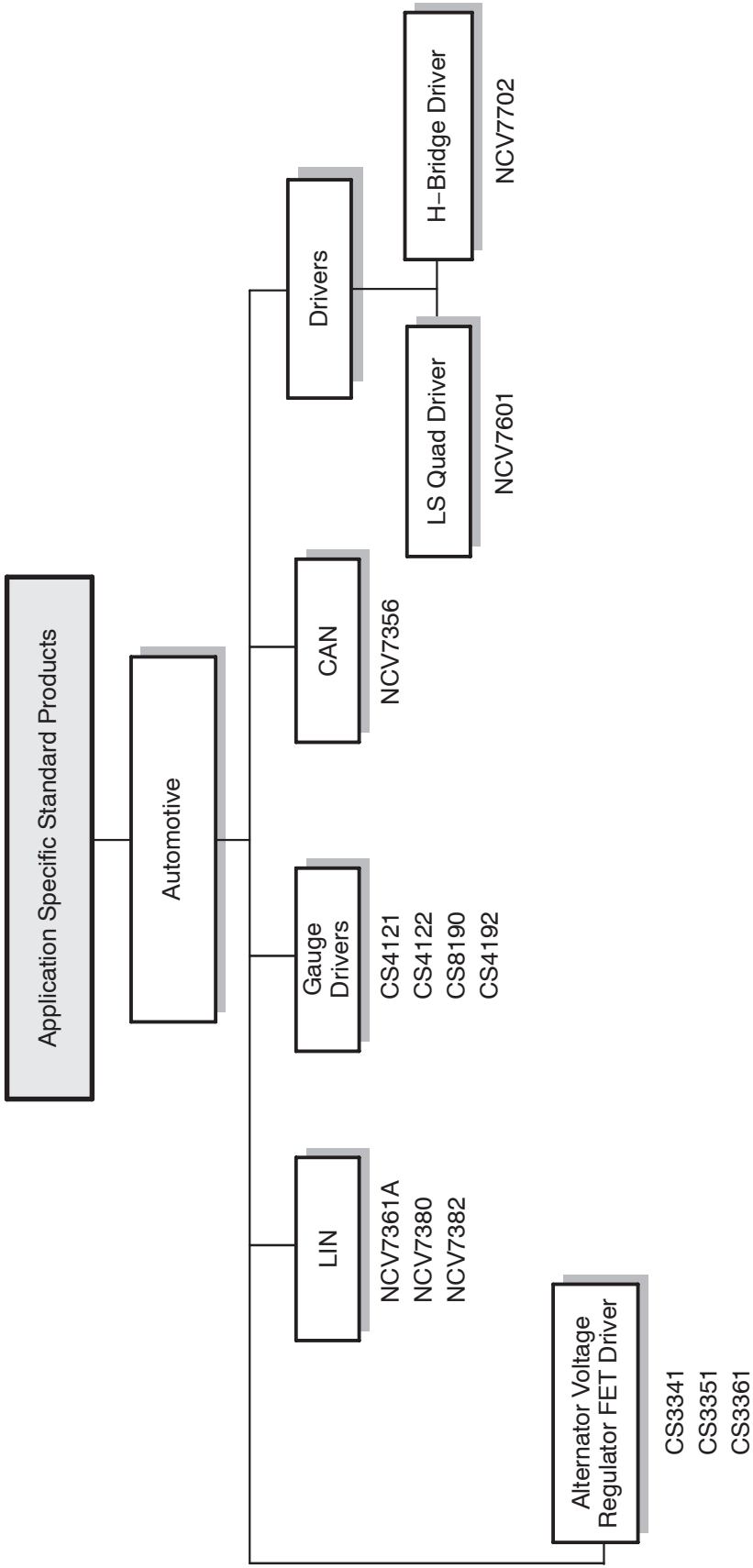
LS PRE-DRIVER

Part Number	Description	Number of Channels	Output Current (mA)	Compatibility	Parallel Inputs	Serial Inputs	PowerOn Reset	Current Limit	Short to Ground	Open Load	Shorted to Load
NCV7513	Hex Low-Side Pre-Driver	6	1.9 – 5.25	3.3 V/5 V	√	√	√	√	√	√	√



ON Semiconductor Selector Guide – Power Management





**ON Semiconductor Selector Guide – Power Management
SMART DRIVERS (HIGH-SIDE, LOW-SIDE & H-BRIDGE)**

Part		Output	Features										Protection				
Number	Description	Current	R _{DS(on)} @ 25°C	On-Chip Flyback Diode	Active Output Clamp	Parallel Inputs	Serial Interface	Fault Reporting	Undervoltage Lockout	Open Load Detection	Power On Reset	Current Limit	Overtolerance	Over Temperature	Low Duty Cycle Over Current Mode	Peak Transient	
NCV7702	Configurable Dual H-Bridge Driver	750 mA		✓		✓		✓				✓	✓	✓	✓	30 V	

LIN TRANSCEIVERS

Part Number	Operating Range		Supply Current (Recessive)			Supply Current (Dominant)			Supply Current (Sleep Mode)	BUS Short Ckt Current	LIN Compatibility
	Min	Max	I _S	I _{CC}	I _S	I _{CC}	I _{CC}				
NCV7380	7.0	18 V	10 µA	14 µA	1.0 mA	0.8 mA	–	–	120 mA	LIN 1.3/2.0	
NCV7382	7.0	18 V	25 µA	50 µA	0.9 mA	0.6 mA	6.5 µA	6.5 µA	120 mA	LIN 1.3/2.0	
NCV7361A	5.25	18 V	–	110 µA (max)	–	–	35 µA	35 µA	40 mA	LIN 1.3/2.0 & SAE J2602	

CAN TRANSCEIVERS

Part Number	Description	Operating Range		Supply Current (Recessive)			Supply Current (Dominant)			Supply Current (Sleep Mode)
		Min	Max	Normal Mode	High Speed Mode	Normal Mode	High Speed Mode	Normal Mode	High Speed Mode	
NCV7856	Single Wire Can Transceiver	5.0	27 V	5.0 mA	8.0 mA (max)	5.0 mA	8.0 mA (max)	30 mA	70 mA	30 µA

DC BRUSH MOTOR CONTROL

Part Number	Description	Input Supply Voltage		Power H-Switch	Features								Protection			Package
		36 V	1.0 A		On-Chip Op Amp	Window Comparator	Self Centering Reference Input	Drive & Brake Logic w/Direction Memory	Temp Compensated Regulation Voltage	Programmable Overcurrent Detector	Programmable Shutdown Delay	Overvoltage				
MC33030	DC Servo Motor Controller/Driver				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SO-14

LS QUAD DRIVER

Part Number	Description	Input Supply Voltage	Drivers: Sustaining	Saturation Voltage	Output Clamping Diodes	Compatible Inputs	Package
NCV7601	LS Quad Driver	7.0 V	40 V	650 mV (max)	✓	TTL/DTL/CMOS	DIP-16

CLOSED LOOP BRUSHLESS MOTOR ADAPTER

Part Number	Description	Input Supply Voltage	Supply Current	Constant Speed Operation	Internal Shunt Regulator	Features						Package
						Sensor Electrical Phasing	TTL Compatible Inputs w/Hysteresis	Programmable Monostable	Digital Edge Detectors	Inverter Output		
MC33039	Designed Primarily for use w/MC33035 Brushless Motor	5.5 V	5.0 mA	Down to 100 RPM	8.25 V	60°/300° and 120°/240°	✓	✓	✓	✓	✓	SO-8, DIP-8

ON Semiconductor Selector Guide – Power Management
ALTERNATOR VOLTAGE REGULATOR FET DRIVERS

Part Number	Description	Input Supply Voltage			Peak Transient	Supply Current (Enabled)	Features						Protection			Package	
		27 V	8.0 V	27 V			80 V	80 V	25 mA	25 mA	10 mA	80 V	80 V	25 mA	25 mA		10 mA
CS3341	Alternator Voltage Regulator Darlington Driver	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SO-14
CS3351	Alternator Voltage Regulator Darlington Driver	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SO-14
CS3361	Alternator Voltage Regulator FET Driver	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SO-14

TRIAC CONTROLLERS

Part Number	Description	Features											Package			
		Input Supply Voltage	Supply Current	Zero Voltage Switch for Triacs	Direct AC Line Operation	Programmable Temp Reduction	Sensor Fail-safe	Adj Hysteresis	Sense Pin	Proportional Temp Reg Over ±1°C	Stator Powerup	Stator Powerup				
UAA2016	Zero Voltage Switch Power Controller	-9.0 V	1.5 mA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SO-8, PIP-8

STEPPER MOTOR DRIVER

Part Number	Description	Input Supply Voltage				Drive Capability	Input Hysteresis	Output Driver	Features				Package		
		7.2 to 16.5 V	350 mA	400 mV (min)	Open-Collector				TTL/CMOS Compatible Inputs	Back-EMF Suppression	Selectable High/Low Output Impedance	Full/Half Step Operation		Allows Reversing Rotation of Motor	
MC3479	Drives a 2-Phase Stepper Motor in the Bipolar Mode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	PDIP-16

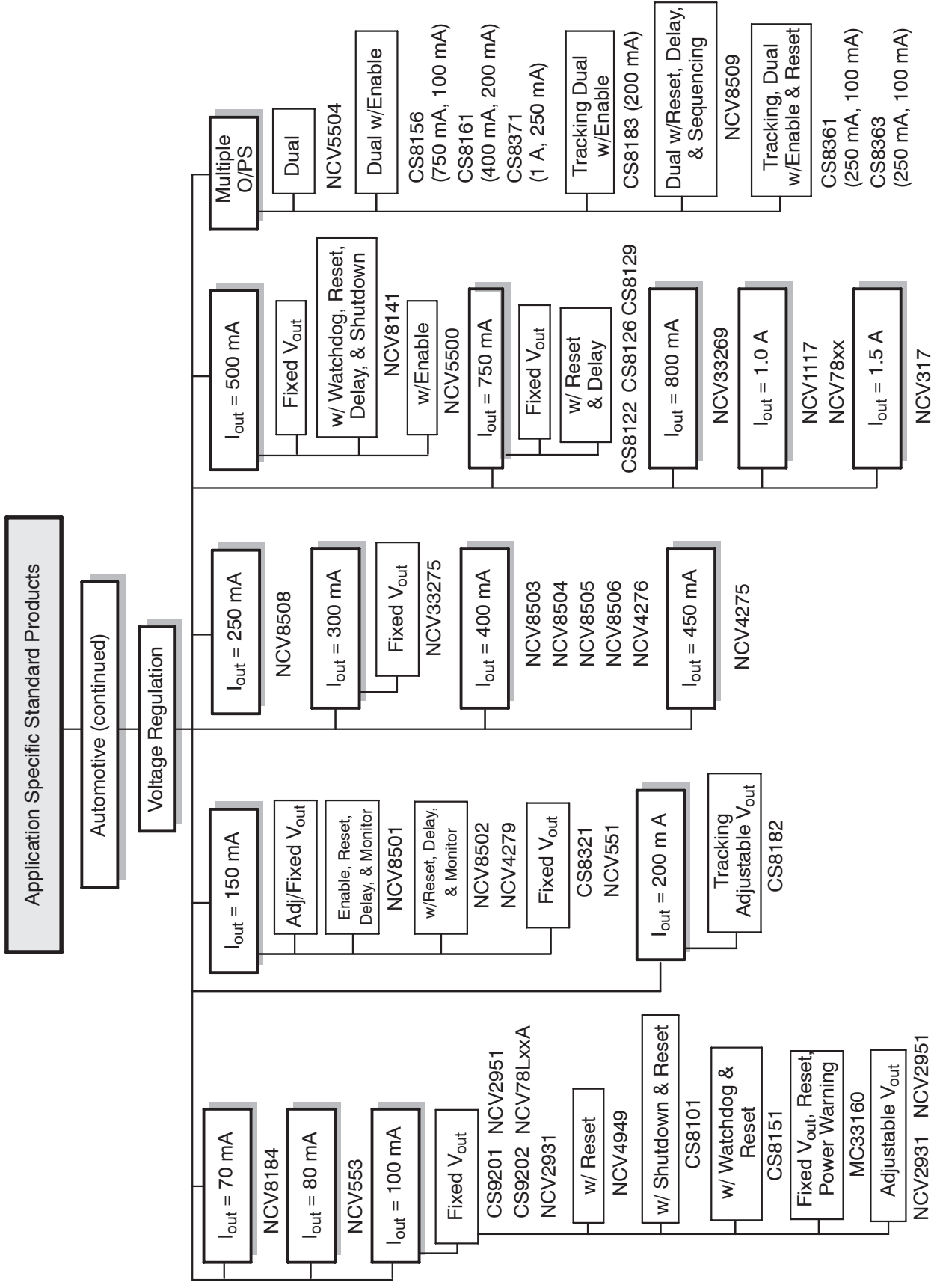
BRUSHLESS DC MOTOR CONTROLLERS

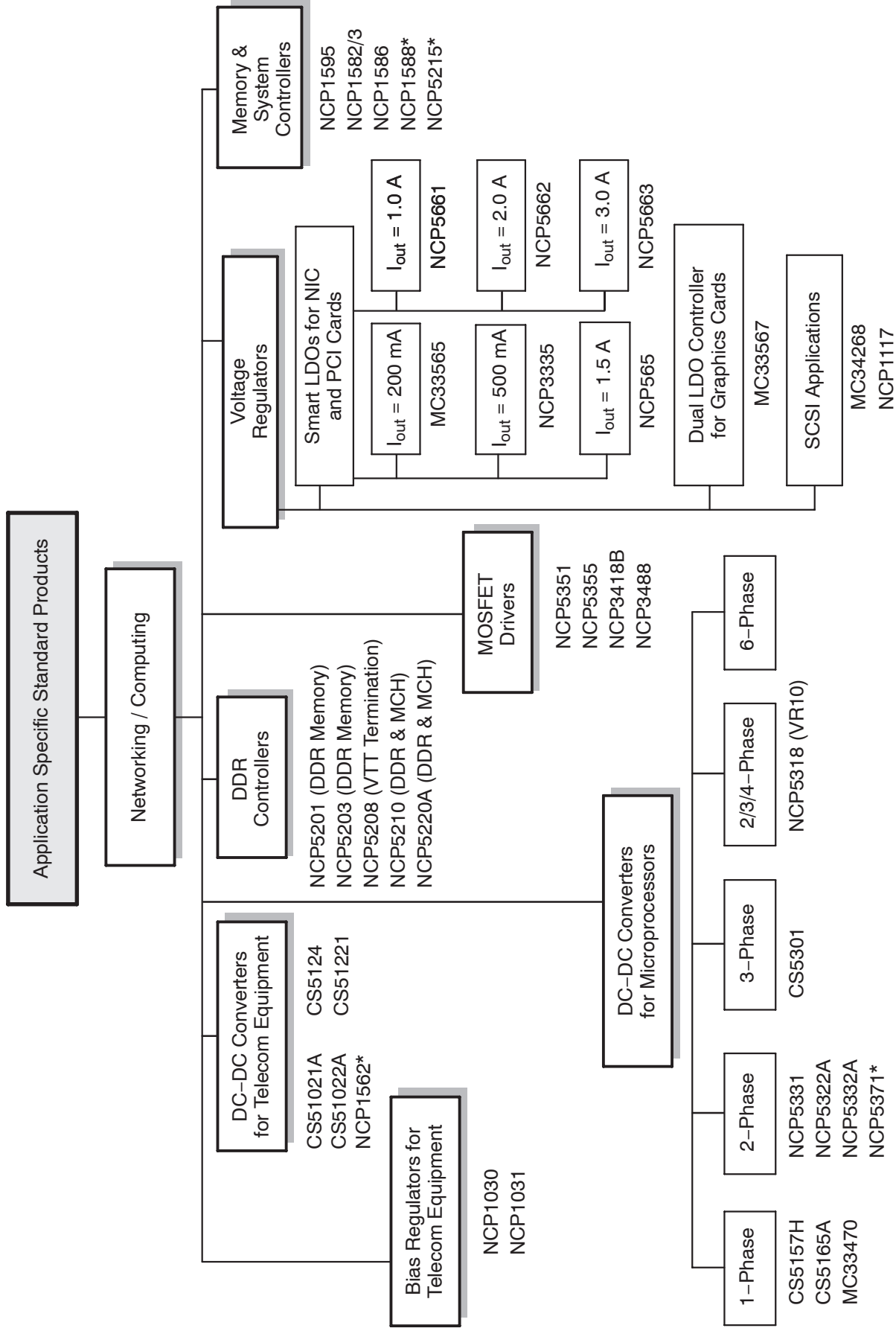
Device	Operating Voltage Range (V)		V _C	Under-voltage Lockout	Internal Thermal Shutdown	Fwd/Rev Control	Sensor Electrical Phasing	Output Enable	Output Drivers		6.25 V Reference Output	Current Sense Comparator Input(s)	Error Amplifier	FAULT Output	Separate Drive V _C Input	Brake Input	Package
	V _{CC}	V _C							Totem Pole (Bottom)	Open Collector (Top)							
MC33033	10 – 30	-		✓	✓	✓	60°/300° and 120°/240°	✓	✓	✓	✓	Noninv. Only	✓	-	-	DIP-20, SO-20L	
MC33035	10 – 40	10 – 30		✓	✓	✓		✓	✓	✓	✓	Noninv. and Inv.	✓	✓	✓	DIP-24, SO-24L	

AIR CORE MOTOR DRIVERS/GAUGE DRIVERS

Part Number	Gauges Driven		Input			Output			Features			Protection		
	Major	Minor	Freq.	PWM	SPI	Current	Method	Return to Zero	UVLO	Regulator Output	Current Limit	Over voltage	Over Temp.	Peak Transient
CS4121	1		✓			33 mA	Differential			✓		✓		60 V
CS4122	1	2	✓		✓	80 mA	Differential				✓	✓	✓	18 V
CS8190	1		✓			33 mA	Differential	✓	✓			✓		60 V
CS4192	1		✓		✓	70 mA	Differential				✓	✓	✓	16 V

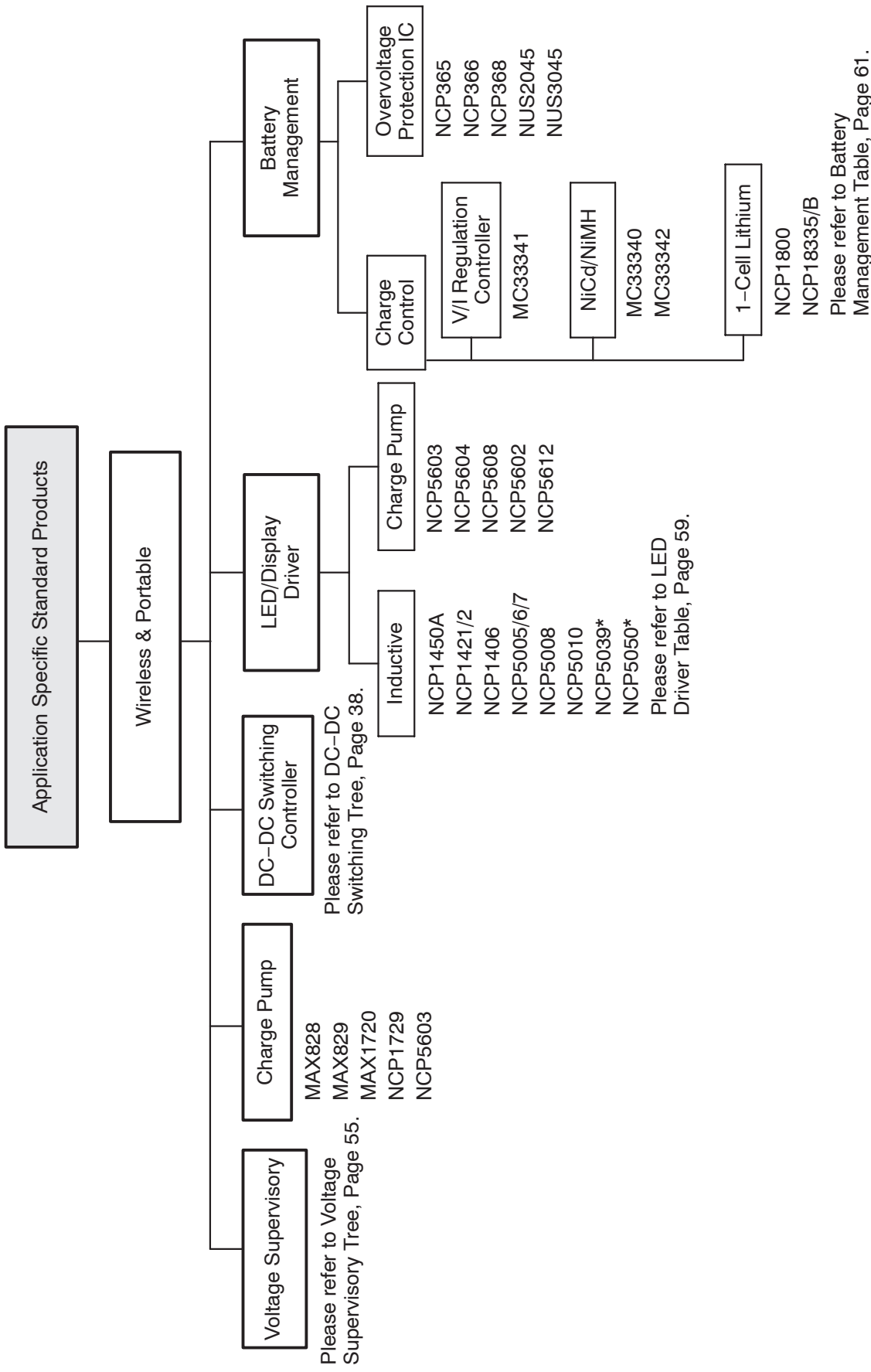
ON Semiconductor Selector Guide – Power Management





*Coming Soon.

ON Semiconductor Selector Guide – Power Management




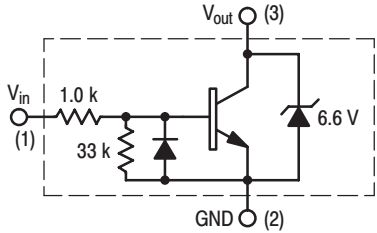
*Coming Soon.

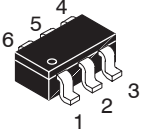
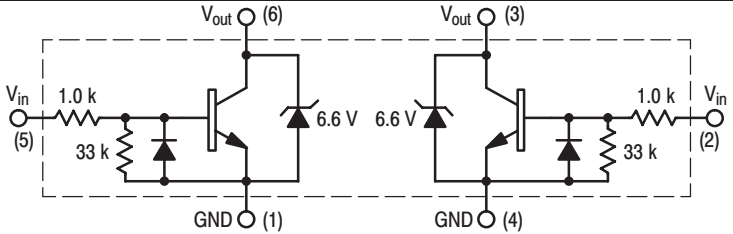
LED/DISPLAY DRIVERS


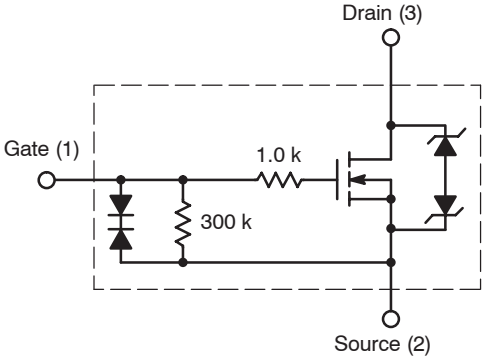
Application	WLED Type	Number of LED/Connection	Converter Topology	ON Solution	Key Features	Availability	
Display Backlighting	Standard, 10 mA – 25 mA	2 – 5 LED/Series	Inductive	NCP5006/5007 : Up to 92% efficiency, PFM, Boost, 21 V / 1 W output, Thin SOT23–5	Simple	Now	
		3 – 5 LED/Series	Inductive	NCP5005 : Enhanced version of NCP5006. High EMI immunity.	Simple	Now	
		4 – 5 LED/Series	Inductive	NCP5010 : 1 MHz PWM Boost, 22 V/0.5 W output integrated rectifier and true-cutoff, Micro-Bump–8 (1.7 x 1.7 mm)	Highly Integrated Driver	Now	
		2 LEDs/Parallel	Charge Pump	NCP5602 : 90% peak efficiency, 2 outputs (25 mA each); 2% current matching, I2C, LLGA 12 (2 x 2 mm)	ICON Model I2C Dimming Control	Now	
	Flash (Torch)	Low Current – Up to 50 mA for 1 Cell / 100 mA for 2 Cell	2 LEDs/Parallel	Charge Pump	NCP5612 : 2 outputs (25 mA each); I2C, LLG 12 (2 x 2 mm)	S–Wire Link Dimming Control	3Q06
			2 – 6 LEDs/Series	Inductive	NCP1406 : Up to 90% efficiency, PFM (up to 1 MHz), 25 V/0.5 W output, Thin SOT23–5 (3 x 3 mm)	Can Operate from 1 or 2 Alkaline or NI–based Cells	Now
		Medium Current / Multi-die LED, 100 mA – 350 mA	3 or 4 LEDs/Parallel	Charge Pump	NCP5064A/B : Consistence 90% efficiency, 3 or 4 outputs (25 mA each); 0.5% current matching, TQFN16 (3 x 3 x 0.8 mm)	NCP5604A : Drives 4 LEDs NCP5604B : Drives 3 LEDs	Now
			Single LED	Inductive	NCP1400ASN50 : Fixed frequency PWM micro-powder boost converter, Thin SOT23–5 (3 x 3 mm)	Can Operate from 1 or 2 Alkaline or NI–based Cells	Now
			Single or (Multiple in Parallel)	Charge Pump	NCP5603 : 200 mA cont./350 mA pulsed, voltage regulated output, 4.5 V or 5 V, 75% eff., DFN (3 x 3 mm)	High–Current Single Output Charge Pump	Now
			2 – 6 LEDs/Series	Inductive	NCP1406 : Up to 90% efficiency, PFM (up to 1 MHz) 25 V/0.5 W output, Thin SOT23–5 (3 x 3 mm)	Simple, Low Cost	Now
Flash (Torch)	High Current LED, Up to 600 mA	Single or (Multiple in Parallel)	Inductive	NCP1421 : PFM Boost (up to 1.2 MHz), Sync–rect, Output up to 5 V, 600 mA cont. 94% eff., true–cutoff, 50 nA shutdown current, Micro8 (3 x 4.9 mm)	Synchronous Rectification	Now	
		Single or (Multiple in Parallel)	Inductive	NCP1422 : PFM Boost (up to 1.2 MHz), Sync–rect, Output up to 5 V, 800 mA cont. 94% eff., true–cutoff, 50 nA shutdown current, DFN10 (3 x 3 mm)	Synchronous Rectification	Now	
	High Current LED, Up to 1 A	2 – 5 LEDs/Series	Inductive	NCP5050 : 23 V/4.5 W output, PWM, 1.7 MHz, DFN–10	Integrated Switch for 2 Adjustable Output Current Levels	4Q06	
		4 LED + Flash LED	Charge Pump	NCP5608 : Consistent 90% efficiency, 8 outputs (4 @ 25 mA each + 4 @ 100 mA each); 0.5% current matching, TQFN24 (4 x 4 mm)	One Chip Lighting Solution	Now	
OLED Driver Supply	–	–	Inductive	NCP1406 : Up to 90% efficiency, PFM (up to 1 MHz), 25 V/0.5 W output, Thin SOT23–5 (3 x 3 mm)	Can Operate from 1 or 2 Alkaline or NI–based Cells	Now	

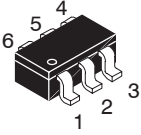
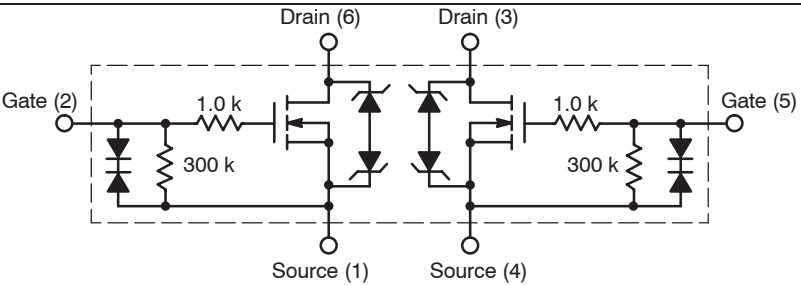
*BOLD denotes a new device.

Relay Drivers

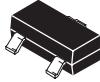
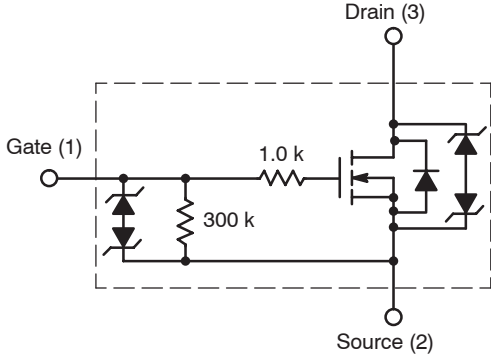
Device	V_{BR} Max (V)	I_D (mA)	E_z (mJ)
 <p>CASE 318 SOT-23</p>			
MDC3105L	6.0	500	50

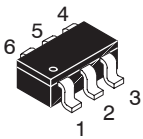
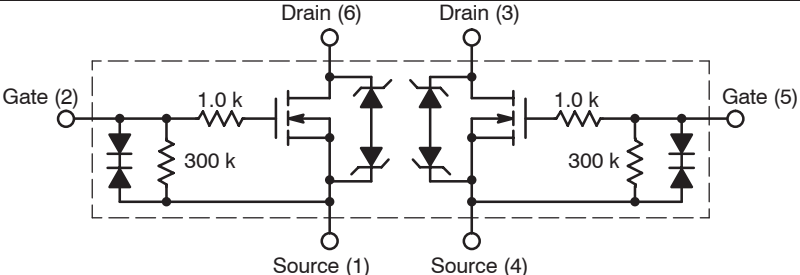
 <p>CASE 318F SC-74</p>			
MDC3105DM	6.0	500	50

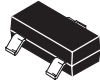
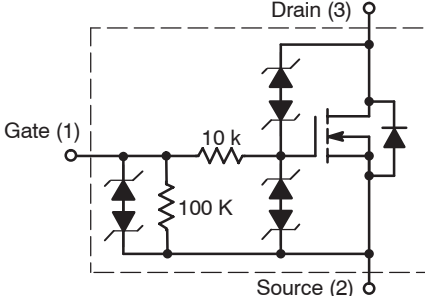
 <p>CASE 318 SOT-23</p>			
NUD3105L	6.0	500	50

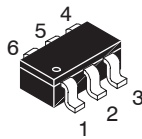
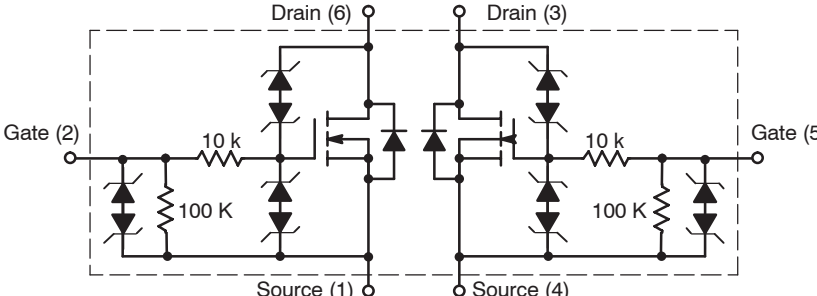
 <p>CASE 318F SC-74</p>			
NUD3105DM	6.0	500	50

Relay Drivers (continued)


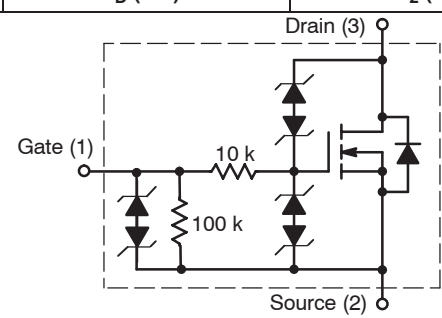
Device	V_{DS} Max (V)	I_D (mA)	E_z (mJ)
 <p>CASE 318 SOT-23</p> 	14	500	50
NUD3112L	14	500	50

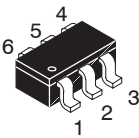
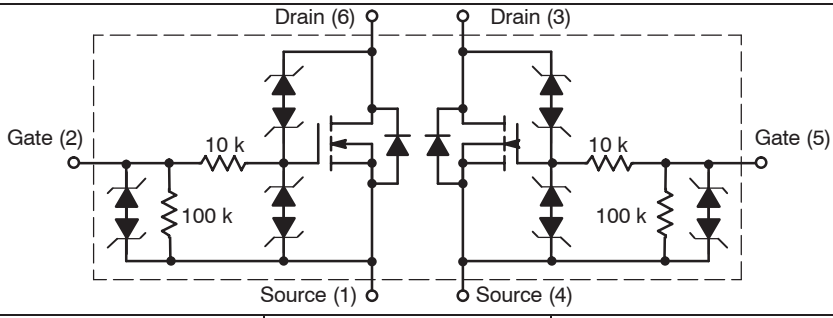
 <p>CASE 318F SC-74</p> 	14	500	50
NUD3112DM	14	500	50

 <p>CASE 318 SOT-23</p> 	28	150	250
NUD3124L	28	150	250


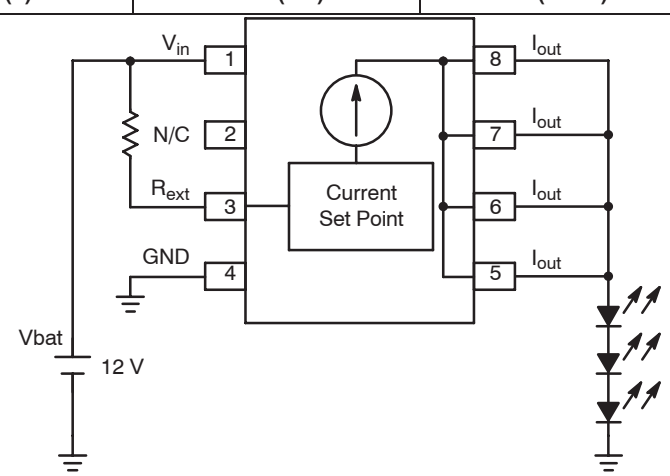
 <p>CASE 318F SC-74</p> 	28	150	250
NUD3124DM	28	150	250

Relay Drivers (continued)

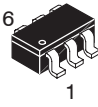
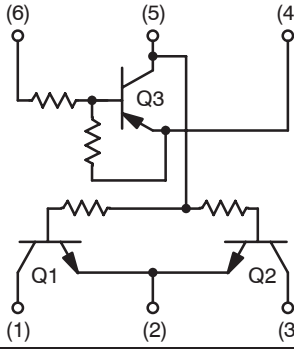
Device	V_{DS} Max (V)	I_D (mA)	E_z (mJ)
 <p>CASE 318 SOT-23</p> 	60	150	250
NUD3160L	60	150	250

 <p>CASE 318F SC-74</p> 	60	150	250
NUD3160DM	60	150	250

LED Drivers

Device	V_{Max} (V)	I_{Max} (mA)	P (Watts)
 <p>CASE 751 SO-8</p> 	30	500	1.13
NUD4001DR2	30	500	1.13
NUD4011DR2	200	70	1.13

Integrated PNP/NPN Digital Transistor Array

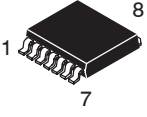
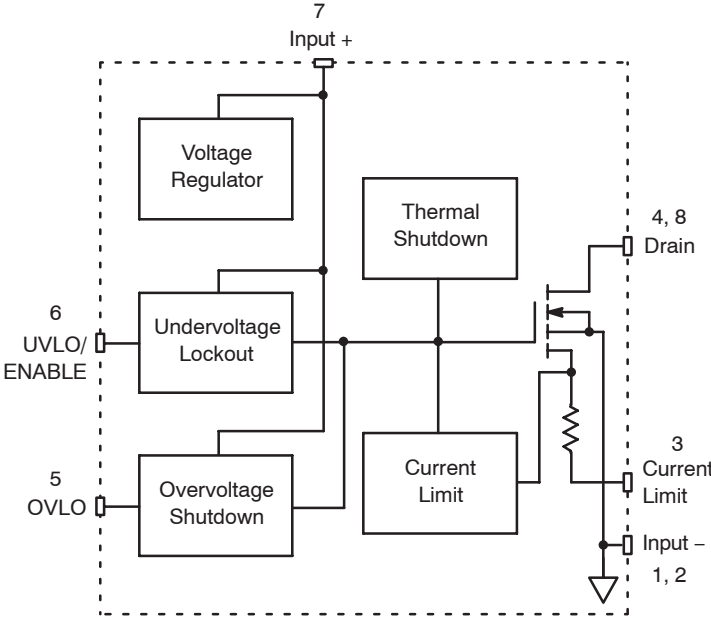
Device	V _{CE} (V)	h _{fe}	V _{BR} (V)	P _D (mW)
 CASE 318F SC-74				
<i>NUS2401SN</i>	0.25	60 & 350	50	350

Devices listed in **bold italic** are ON Semiconductor preferred devices.

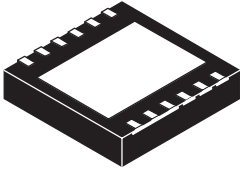
Inrush Current Limiter


SMART HotPlug™ – Low Side

- Integrated Power Device
- Temperature Sensing Diode in Power MOSFET
- Adjustable Current Limit
- Adjustable UVLO and OVLO

Package	Device	V _{in} (V)		R _{DS(on)} (mΩ)	I _D Avg (A)	Thermal Option	Thermal Limit	Thermal Limit Hysteresis
		Min	Max	Typ	Max		Typ °C	Typ °C
 CASE 553AA S-PAK EX SUFFIX								
SPAK	NIS5101E1T1	18	110	43	6.5	Latch Off	135	40
SPAK	NIS5101E2T1	18	110	43	6.5	Auto-Retry	135	40
SPAK	NIS5101E1T1G	18	110	43	6.5	Latch Off	135	40
SPAK	NIS5101E2T1G	18	110	43	6.5	Auto-Retry	135	40

SMART HotPlug™ – High Side


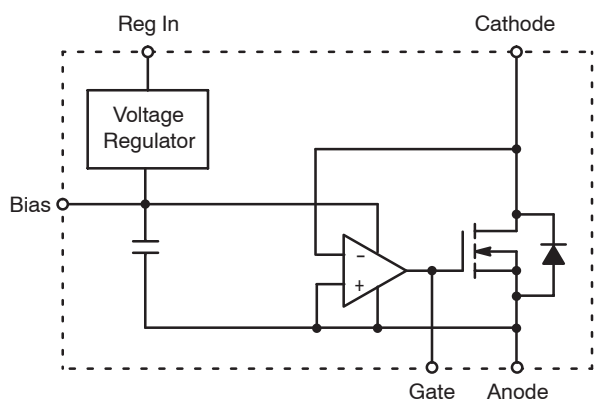
Package	Device	V_{in} (V)		$R_{DS(on)}$ (m Ω)	I_D Avg (A)	Thermal Option	Thermal Limit	Thermal Limit Hysteresis
		Min	Max	Typ	Max		Typ °C	Typ °C
 <p>CASE 488AB 9x9 MM, 12 PIN PLLP</p>								
	QFN 9x9	NIS5102QP1HG	9	18	10	10	Latch Off	135
QFN 9x9	NIS5102QP2HG	9	18	10	10	Auto-Retry	135	40

 <p>CASE 751 SOIC-8 NB</p>								
	SO-8	NIS5112D1R2G	9.0	18	30	3.0	Latch Off	135
SO-8	NIS5112D2R2G	9.0	18	30	3.0	Auto-Retry	135	40


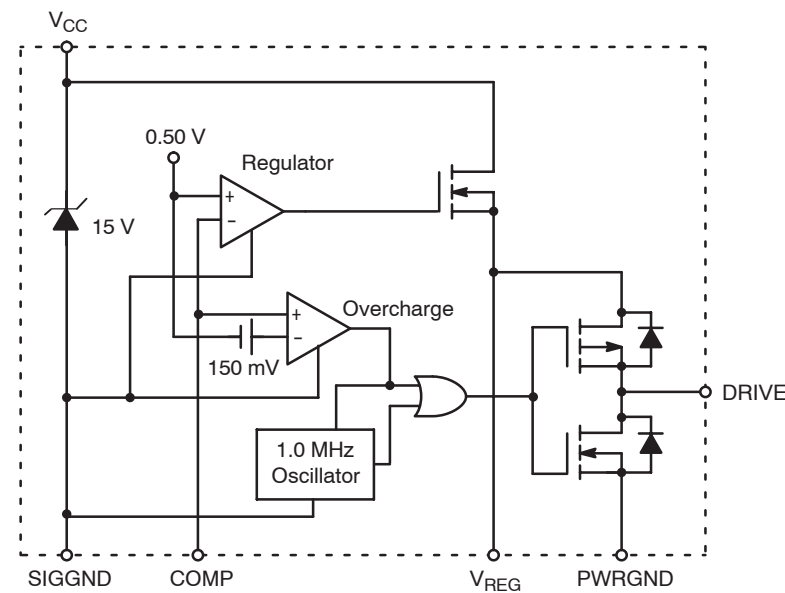
Hybrid Diode IC

Better Efficiency Rectification System, BERS™ IC

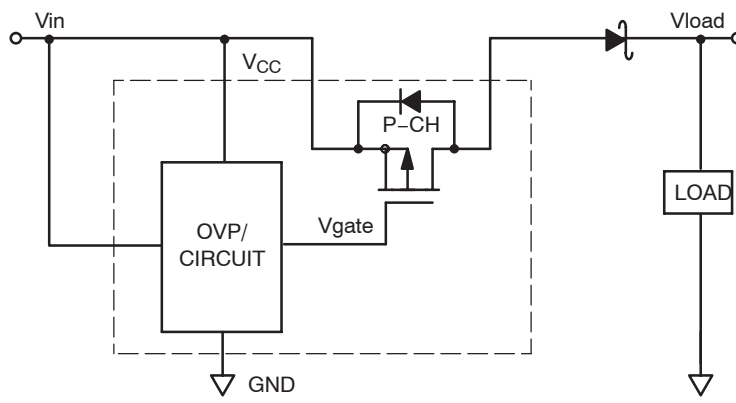
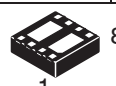

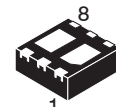
- Integrated Power Device
- Low Forward Drop
- Can be used in High Side and Low Side Configurations
- Gate Drive Available to Parallel Additional MOSFETs

Device	V _{in} (V)		IFAV Avg (A) Max	R _{DS(on)} V _{GS} = 5.0 V I _D = 10 A (mΩ)	Fet Turn-On Time I _{max} = 3.0 A, I _{rev} = 1.0 A, V _{rev} = 5.0 V Typ (nsec)	Turnoff Propagation Delay Time V _{DS} = V _{offset} to I _D = 0 A Typ (nsec)
	Typ	Max				
<p>MARKING DIAGRAM</p>  <p>1 ○ NIS6111 AWLYYWW</p> <p>CASE 488AC PLLP32</p> <p>1 32</p> <p>NIS6111 = Specific Device Code A = Assembly Location WL = Wafer Lot YY = Year WW = Work Week</p>  <p>Reg In Cathode Voltage Regulator Bias Gate Anode</p>						
NIS6111QP	0.8	24	30	3.7	45	35

Floating, Regulated Charge Pump

Device	V _{CC} (V)	I _{davg} , Drive Current Max (A)	Oscillator Frequency f _{osc} Typ (MHz)	R _{DS(on)} High Side FET (Typ) Ω	R _{DS(on)} Low Side FET (Typ) Ω
<p>MARKING DIAGRAM</p>  <p>8 1 NIS6201 ALYWX</p> <p>CASE 751 SOIC-8 NB</p> <p>A = Assembly Location L = Wafer Lot Y = Year W = Work Week</p>  <p>V_{CC} 0.50 V Regulator 15 V Overcharge 150 mV 1.0 MHz Oscillator DRIVE SIGGND COMP V_{REG} PWRGND</p>					
NIS6201	-0.3 to 18	0.05	1.0	20	20

Overvoltage Protection IC with Integrated P-Channel MOSFET

Device	V _{CC} (V)	V _{DSS} (V) Max	I _D (A), Steady State	R _{DS(on)} (mΩ) Typ V _{GS} = -4.5 V I _D (Note 3)	V _{th} (V) Typ	Package and Dimensions						
		CASE 506AL DFN8		CASE 517AH UDFN8		CASE 506AN WDFN6						
							(Package Drawings Not to Scale)					
							NUS2045MN	2.8 to 20	20	-1.0	71	6.85
NUS3045MN	2.8 to 30	30	-1.0	66	6.85	DFN8 3.3x3.3x0.85 mm						
NUS3046MN	2.5 to 30	30	-1.0	66	5.5	DFN8 3.3x3.3x0.85 mm						
NUS3055MN	2.8 to 30	30	-1.0	66	6.85	TLLGA 2.5x3.0x0.55 mm						
NUS1204MN	12	12	-0.6	75	4.725	WDFN6 2.0x2.0x0.85 mm						

3. I_D = -1.0 A

Amplifiers and Comparators

Amplifiers and Comparators

Table of Contents

	Page
Single Operational Amplifiers	91
Dual Operational Amplifiers	93
Quad Operational Amplifiers	95
Single Comparators	97
Dual Comparators	97
Quad Comparators	98
Audio Amplifiers	99
Transconductance Amplifiers	99
Video Amplifiers	100
Compandors	100

SINGLE OPERATIONAL AMPLIFIERS

Device Name	V _{CC} (min) (V)	V _{CC} (max) (V)	GBW (typ) (MHz)	Slew Rate (typ) (V/μs)	V _{IO} (max @ 25°C, V _S = 5.0 V) (mV)	I _B (typ) (nA)	I _D (typ) (mA)	Temp Range (°C)	CMR (typ) (dB)	e _n (typical) (nV/√Hz) @ f = 1.0 kHz	Number of Channels	Supply Type	Package	Description
LM201A	±3.0	±22	1.0	0.5	2.0	30	1.8	-25 to +85	96	-	1	Split	DIP-8, SO-8	General Purpose, Precision Non Compensated
LM201AV	±3.0	±22	1.0	0.5	2.0	30	1.8	-40 to +105	96	-	1	Split	DIP-8, SO-8	General Purpose, Precision Non Compensated
LM301A	±3.0	±18	1.0	0.5	7.5	70	1.8	0 to 70	90	-	1	Split	DIP-8, SO-8	General Purpose, Non Compensated
MC33071	3.0 or ±1.5	44	4.5	13*	5.0	100	1.6	-40 to +85	97	32	1	Single, Split	DIP-8, SO-8	High SR, Wide BW, Single Supply, *Av = -1.0
MC33071A	3.0 or ±1.5	44	4.5	13*	3.0	100	1.6	-40 to +85	97	32	1	Single, Split	DIP-8, SO-8	High SR, Wide BW, Single Supply, *Av = -1.0
MC33171	3.0 or ±1.5	44 or ±22	1.8	2.1	5.0	20	0.18	-40 to +85	90	32	1	Single, Split	DIP-8, SO-8	Low Power, Single Supply, Two Voltage Ranges
MC33201	1.8 or ±0.9	12	2.2	1.0	6.0	80	0.9	-40 to +105	90	20	1	Single, Split	DIP-8, SO-8	Low Voltage, Rail-to-Rail
MC33201V	1.8 or ±0.9	12	2.2	1.0	6.0	80	0.9	-55 to +125	90	20	1	Single, Split	DIP-8, SO-8	Low Voltage, Rail-to-Rail, Extended Temp. Range
MC33501	1.0 or ±0.5	7.0 or ±3.5	4 @ V _S = 5	3.0	5.0	0.04 pA	1.2 @ V _S = 1 V	-40 to +105	75	30	1	Single, Split	TSOP-5*	One Volt SMARTMOS™, Rail-to-Rail
MC33503	1.0 or ±0.5	7.0 or ±3.5	4 @ V _S = 5	3.0	5.0	0.04 pA	1.2 @ V _S = 1 V	-40 to +105	75	30	1	Single, Split	TSOP-5*	One Volt SMARTMOS, Rail-to-Rail

*TSOP-5 – Also known as Thin SOT23-5.

SINGLE OPERATIONAL AMPLIFIERS (continued)

Device Name	V _{cc} (min) (V)	V _{cc} (max) (V)	GBW (typ) (MHz)	Slew Rate (typ) (V/μs)	V _{io} (max @ 25°C, V _s = 5.0 V) (mV)	I _{IB} (typ) (nA)	I _B (typ) (mA)	Temp Range (°C)	CMR (typ) (dB)	e _n (typical) (nV/√Hz) @ f = 1.0 kHz	Number of Channels	Supply Type	Package	Description
MC34071	3.0 or ±1.5	44	4.5	13*	5.0	100	1.6	0 to 70	97	32	1	Single, Split	DIP-8, SO-8	High SR, Wide BW, Single Supply, *Av = -1.0
MC34071A	3.0 or ±1.5	44	4.5	13*	3.0	100	1.6	0 to 70	97	32	1	Single, Split	DIP-8, SO-8	High SR, Wide BW, Single Supply, *Av = -1.0
NCS2001	0.9 or ±0.45	7.0 or ±3.5	1.4	1.6	6.0	10 pA	.80	-40 to +105	70	100	1	Single, Split	TSOP-5*, SC70-5	One Volt, CMOS Rail-to-Rail
NCS2002	0.9 or ±0.45	7.0 or ±3.5	0.8	1.2	6.0	10 pA	.80	-40 to +105	82	100	1	Single, Split	TSOP-6*	One Volt, CMOS Rail-to-Rail with Enable
NCS7101	1.8 or ±0.9	10 or ±5.0	1.0	1.2	7.0	1.0 pA	1.1	-40 to +85	65 (min)	140	1	Single, Split	TSOP-5*	Low Voltage, Rail-to-Rail
NCV2002	0.9 or ±0.45	7.0 or ±3.5	0.8	1.2	6.0	10 pA	.80	-40 to +125	82	100	1	Single, Split	TSOP-6*	One Volt, CMOS Rail-to-Rail with Enable
NE5230	±0.9 or 1.8	±7.5 or 15	0.6	0.25	3.0	40	0.6	0 to 70	95	30	1	Single, Split	SO-8, PDIP-8	Single Low Voltage Op Amp
NE5534	±3.0	±20	10	13	4.0*	500	4.0	0 to 70	100	4.0	1	Single, Split	SO-8, PDIP-8	Single Low Noise Op Amp
NE5534A	±3.0	±20	10	13	4.0*	500	4.0	0 to 70	100	3.5	1	Single, Split	SO-8, PDIP-8	Single Low Noise Op Amp
SA5230	±0.9 or 1.8	±7.5 or 15	0.6	0.25	3.0	40	0.6	-40 to 85	95	30	1	Single, Split	SO-8, PDIP-8	Single Low Voltage Op Amp
SA5534	±3.0	±20	10	13	4.0*	500	4.0	-40 to 85	100	4.0	1	Single, Split	PDIP-8	Single Low Noise Op Amp
SA5534A	±3.0	±20	10	13	4.0*	500	4.0	-40 to 85	100	3.5	1	Single, Split	SO-8, PDIP-8	Single Low Noise Op Amp
SE5534	±3.0	±20	10	13	2.0*	400	4.0	-55 to 125	100	4.0	1	Single, Split	PDIP-8	Single Low Noise Op Amp
SE5534A	±3.0	±20	10	13	2.0*	400	4.0	-55 to 125	100	3.5	1	Single, Split	PDIP-8	Single Low Noise Op Amp

*TSOP-5 – Also known as Thin SOT23-5.

DUAL OPERATIONAL AMPLIFIERS

Device Name	V _{CC} (min) (V)	V _{CC} (max) (V)	GBW (typ) (MHz)	Slew Rate (typ) (V/μs)	V _{IO} (max @ 25°C, V _S = 5.0 V) (mV)	I _{IB} (typ) (nA)	I _D * (typ) (mA)	Temp Range (°C)	CMR (typ) (dB)	e _n (typical) (nV/√Hz) @ f = 1.0 kHz	Number of Channels	Supply Type	Package	Description
LM258	3.0 or ±1.5	32 or ±18	1.0	0.6	5.0	45	0.7	-25 to +85	85	-	2	Single, Split	DIP-8, SO-8, Micro8	Low Noise
LM358	3.0 or ±1.5	32 or ±18	1.0	0.6	7.0	45	0.7	0 to 70	70	-	2	Single, Split	DIP-8, SO-8, Micro8	Low Noise
LM833	±2.5	36	15	7.0	5.0	300	4.0	-40 to +85	100	4.5	2	Single, Split	DIP-8, SO-8	Low Noise
LM2904	3.0 or ±1.5	26 or ±13	1.0	0.6	7.0	45	0.7	-40 to +105	70	-	2	Single, Split	DIP-8, SO-8, Micro8	Low Power
LM2904V	3.0 or ±1.5	26 or ±13	1.0	0.6	7.0	45	0.7	-40 to +125	70	-	2	Single, Split	DIP-8, SO-8, Micro8	Low Power
MC33072	3.0 or ±1.5	44 or ±22	4.5	13*	5.0	100	3.2	-40 to +85	97	32	2	Single, Split	DIP-8, SO-8	High SR, Wide BW, Single Supply, *Av = -1.0
MC33072A	3.0 or ±1.5	44 or ±22	4.5	13*	3.0	100	3.2	-40 to +85	97	32	2	Single, Split	DIP-8, SO-8	High SR, Wide BW, Single Supply, *Av = -1.0
MC33077	±2.5	±18	37	11	1 @ V _S = ±15 V	280	3.5	-40 to +85	107	4.4	2	Split	DIP-8, SO-8	Low Noise
MC33078	±5.0	±18	16	7.0	2.0	300	4.1	-40 to +85	100	4.5	2	Split	DIP-8, SO-8	Low Noise
MC33172	3.0 or ±1.5	44 or ±22	1.8	2.1	5.0	20	0.36	-40 to +85	90	32	2	Single, Split	DIP-8, SO-8	Low Power, Single Supply, Two Voltage Ranges
MC33172V	3.0 or ±1.5	44 or ±22	1.8	2.1	5.0	20	0.36	-40 to +105	90	32	2	Single, Split	SO-8	Low Power, Single Supply, Two Voltage Ranges, Extended Temp. Range
MC33178	±2.0	±18	5.0	2.0	3.0	100	0.85	-40 to +85	110	7.5	2	Split	DIP-8, SO-8	High Output Current, Low Power, Low Noise

*I_D typical for total device (all channels)

DUAL OPERATIONAL AMPLIFIERS (continued)

Device Name	V _{CC} (min) (V)	V _{CC} (max) (V)	GBW (typ) (MHz)	Slew Rate (typ) (V/μs)	V _{IO} (max @ 25°C, V _S = 5.0 V) (mV)	I _B (typ) (nA)	I _B * (typ) (mA)	Temp Range (°C)	CMR (typ) (dB)	e _n (typical) (nV/√Hz) @ f = 1.0 kHz	Number of Channels	Supply Type	Package	Description
MC33202	1.8 or ±0.9	12 or ±6	2.2	1.0	8.0	80	1.8	-40 to +105	90	20	2	Single, Split	DIP-8, SO-8, Micro8™	Low Voltage, Rail-to-Rail
MC33202V	1.8 or ±0.9	12 or ±6	2.2	1.0	8.0	80	1.8	-55 to +125	90	20	2	Single, Split	DIP-8, SO-8	Low Voltage, Rail-to-Rail, Extended Temp. Range
MC33272A	3.0 or ±1.5	36 or ±18	24	10	1 @ V _S = ±15 V 2 @ V _S = 5.0 V	300	4.30	-40 to +85	100	18	2	Single, Split	DIP-8, SO-8	Single Supply, High SR, Low Input Offset Voltage
MC33502	1.0	7.0	5.0	3.0	5.0	0.04 pA	3.3	-40 to +105	75	30	2	Single, Split	DIP-8, SO-8	One Volt SMARTMOS, Rail-to-Rail
MC34072	3.0 or ±1.5	44 or ±22	4.5	13*	5.0	100	3.2	0 to 70	97	32	2	Single, Split	DIP-8, SO-8	High SR, Wide BW, Single Supply, *Av = -1.0
MC34072A	3.0 or ±1.5	44 or ±22	4.5	13*	3.0	100	3.2	0 to 70	97	32	2	Single, Split	DIP-8, SO-8	High SR, Wide BW, Single Supply, *Av = -1.0
MC34072V	3.0 or ±1.5	44 or ±22	4.5	13*	5.0	100	3.2	-40 to +125	97	32	2	Single, Split	DIP-8, SO-8	High SR, Wide BW, Single Supply, Extended Temp. Range, *Av = -1.0
NE592	-8.0	+8.0	90	-	-	9.0 μA	18	0-70	86	-	2	-	SO-8, 14 PDIP-8, 14	Video Amplifier
NE5532/A	±3.0	±20	10	9.0	4.0 @ ±15 V	200	8.0	0 to 70	100	8.0	2	Split	DIP-8, SO-8, SO-16W	Low Noise
SA5532	±3.0	±20	10	9.0	4.0 @ ±15 V	200	8.0	-40 to 85	100	8.0	2	Split	DIP-8	Low Noise
SE5532/A	±3.0	±20	10	9.0	2.0 @ ±15 V	200	8.0	-55 to 125	100	8.0	2	Split	DIP-8, SO-8	Low Noise
TCA0372	5.0 or ±2.5	40 or ±20	1.4	1.4	15 @ ±15 V	100	5.0	-40 to +125	90	22	2	Single, Split	SOP (12+2+2) DIP-8, DIP-16	Power, High Current
TCA0372B	5.0 or ±2.5	40 or ±20	1.4	1.4	15 @ ±15 V	100	5.0	-40 to +125	90	22	2	Single, Split	DIP-8, SO-16W	Power, High Current

*I_B typical for total device (all channels)

QUAD OPERATIONAL AMPLIFIERS

Device Name	V _{CC} (min) (V)	V _{CC} (max) (V)	GBW (typ) (MHz)	Slew Rate (typ) (V/us)	V _{IO} (max @ 25°C, V _S = 5.0 V) (mV)	I _B (typ) (nA)	I _D * (typ) (mA)	Temp Range (°C)	CMR (typ) (dB)	e _n (typical) (nV/√Hz) @ f = 1.0 kHz	Number of Channels	Supply Type	Package	Description
LM224	3.0 ±1.5	32 ±16	1.0	0.6	5.0	90	-	-25 to +85	85	-	4	Single, Split	DIP-14, SO-14	Low Power
LM324	3.0 ±1.5	32 ±16	1.0	0.6	7.0	90	-	0 to 70	70	-	4	Single, Split	DIP-14, SO-14	Low Power
LM324A	3.0 ±1.5	32 ±16	1.0	0.6	3.0	45	0.7	0 to 70	70	-	4	Single, Split	DIP-14, SO-14	Low Power
LM2902	3.0 ±1.5	26 ±13	1.0	0.6	7.0	90	-	-40 to +105	70	-	4	Single, Split	DIP-14, SO-14	Low Power
LM2902V	3.0 ±1.5	26 ±13	1.0	0.6	7.0	90	-	-40 to +125	70	-	4	Single, Split	DIP-14, SO-14	Low Power, Extended Temp. Range
MC3303	3.0 ±1.5	36 ±18	1.0	0.6	8.0	200	2.8	-40 to +85	90	-	4	Single, Split	DIP-14, SO-14	Low Power
MC33074	3.0 or ±1.5	44 or ±22	4.5	13*	5.0	100	6.4	-40 to +85	97	32	4	Single, Split	DIP-14, SO-14, TSSOP-14	High SR, Wide BW, Single Supply, *AV = -1.0
MC33074A	3.0 or ±1.5	44 or ±22	4.5	13*	3.0	100	6.4	-40 to +85	97	32	4	Single, Split	DIP-14, SO-14, TSSOP-14	High SR, Wide BW, Single Supply, *AV = -1.0
MC33079	±5.0	±18	16	7.0	2.5	300	8.4	-40 to +85	100	4.5	4	Split	DIP-14, SO-14	Low Noise
MC33174	3.0 or ±1.5	44 or ±22	1.8	2.1	5.0	20	0.72	-40 to +85	90	32	4	Single, Split	DIP-14, SO-14, TSSOP-14	Low Power, Single Supply, Two Voltage Ranges
MC33174V	3.0 or ±1.5	44 or ±22	1.8	2.1	5.0	20	0.72	-40 to +105	90	32	4	Single, Split	DIP-14, SO-14	Low Power, Single Supply, Two Voltage Ranges, Extended Temp. Range
MC33179	±2.0	±18	5.0	2.0	3.0	100	1.7	-40 to +85	110	7.5	4	Split	DIP-14, SO-14	High Output Current, Low Power, Low Noise

*I_D typical for total device (all channels)

QUAD OPERATIONAL AMPLIFIERS (continued)

Device Name	V _{CC} (min) (V)	V _{CC} (max) (V)	GBW (typ) (MHz)	Slew Rate (typ) (V/μs)	V _{IO} (max @ 25°C, V _S = 5.0 V) (mV)	I _{IB} (typ) (nA)	I _D * (typ) (mA)	Temp Range (°C)	CMR (typ) (dB)	e _n (typical) (nV/√Hz) @ f = 1.0 kHz	Number of Channels	Supply Type	Package	Description
MC33204	1.8 or ±0.9	12 or ±6.0	2.2	1.0	10	80	3.6	-40 to +105	90	20	4	Single, Split	DIP-14, SO-14, TSSOP-14	Low Voltage, Rail-to-Rail
MC33204V	1.8 or ±0.9	12 or ±6.0	2.2	1.0	10	80	3.6	-55 to +125	90	20	4	Single, Split	DIP-14, SO-14	Low Voltage, Rail-to-Rail, Extended Temp. Range
MC33274A	3.0 or ±1.5	36 or ±18	24	10	1.0 @ V _S = ±15 V 2.0 @ V _S = 5.0 V	300	8.6	-40 to +85	100	18	4	Single, Split	DIP-14, SO-14	Single Supply, High SR, Low Input Offset Voltage
MC3403	3.0 ±1.5	36 ±18	1.0	0.6	10	200	2.8	0 to 70	90	-	4	Single, Split	DIP-14, SO-14	Low Power
MC34074	3.0 or ±1.5	44 or ±22	4.5	13*	5.0	100	6.4	0 to 70	97	32	4	Single, Split	DIP-14, SO-14	High SR, Wide BW, Single Supply, *AV = -1.0
MC34074A	3.0 or ±1.5	44 or ±22	4.5	13*	3.0	100	6.4	0 to 70	97	32	4	Single, Split	DIP-14, SO-14	High SR, Wide BW, Single Supply, *AV = -1.0
MC34074V	3.0 or ±1.5	44 or ±22	4.5	13*	5.0	100	6.4	-40 to +125	97	32	4	Single, Split	DIP-14, SO-14	High SR, Wide BW, Single Supply, *AV = -1.0
NCV33274A	3.0 or ±1.5	36 or ±18	24	10	3.5 @ V _S = ±15 V 2.0 @ V _S = ±5.0 V	300	8.6	-40 to +125	100	18	4	Single, Split	DIP-14, SO-14	Single Supply, High SR, Low Input Offset Voltage

*I_D typical for total device (all channels)

SINGLE COMPARATORS

Device Name	V _{CC} (min)	V _{CC} (max)	V _{IO} (max) (mV)	I _{IO} (max) (nA)	I _{IB} (typ) (nA)	I _q (typ) (mA)	Temp Range (°C)	Response Time (ns)	Supply Type	Number of Channels	Package	Description
LM211	5.0 or ±2.5	36 or ±15	3.0	10	45	2.4	-25 to +85	200	Single Split	1	SO-8	Highly Flexible Voltage
LM311	5.0 or ±2.5	36 or ±15	7.5	50	45	2.4	0 to 70	200	Single Split	1	SO-8 DIP-8	Highly Flexible Voltage
NCS2200	0.85 or ±0.425	6.0 or ±3.0	+8.0	-	1.0 pA	10	-40 to +105	700	Single Split	1	SOT23-5 QFN 2x2.2	Low Voltage CMOS
NCS2201	0.85 or ±0.425	6.0 or ±3.0	+8.0	-	1.0 pA	10	-40 to +105	700	Single Split	1	SOT23-6	Low Voltage CMOS with Enable
NCS2202	0.85 or ±0.425	6.0 or ±3.0	+8.0	-	1.0 pA	10	-40 to +105	700	Single Split	1	SOT23-5	Low Voltage CMOS
NCS2203	0.85 or ±0.425	6.0 or ±3.0	+8.0	-	1.0 pA	10	-40 to +105	700	Single Split	1	SOT23-6	Low Voltage CMOS with Enable

DUAL COMPARATORS

Device Name	V _{CC} (min)	V _{CC} (max)	V _{IO} (max) (mV)	I _{IO} (max) (nA)	I _{IB} (typ) (nA)	I _q * (typ) (mA)	Temp Range (°C)	Response Time (ns)	Supply Type	Number of Channels	Package	Description
LM293	2.0 or ±1.0	36 or ±18	5.0	50	25	0.4	-25 to +85	1300	Single Split	2	SO-8	Low Offset Voltage
LM393	2.0 or ±1.0	36 or ±18	5.0	50	25	0.4	0 to 70	1300	Single Split	2	SO-8 DIP-8	Low Offset Voltage
LM2903	2.0 or ±1.0	36 or ±18	7.0	50	25	0.4	-40 to +105	1500	Single Split	2	SO-8 DIP-8	Low Offset Voltage
LM2903V	2.0 or ±1.0	36 or ±18	7.0	50	25	0.4	-40 to +125	1500	Single Split	2	SO-8 DIP-8	Low Offset Voltage

*I_q typical for total device (all channels)

QUAD COMPARATORS

Device Name	V _{cc} (min)	V _{cc} (max)	V _{io} (max) (mV)	I _o (max) (nA)	I _B (typ) (nA)	I _q * (typ) (mA)	Temp Range (°C)	Response Time (ns)	Supply Type	Number of Channels	Package	Description
LM239	3.0 or ±1.5	36 or ±18	5.0	50	25	0.8	-25 to +85	1300	Single Split	4	SO-14 DIP-14	TTL and CMOS Compatible
LM339	3.0 or ±1.5	36 or ±18	5.0	50	25	0.8	0 to 70	1300	Single Split	4	SO-14 DIP-14	TTL and CMOS Compatible
LM2901	3.0 or ±1.5	36 or ±18	7.0	50	25	0.8	-40 to +105	1300	Single Split	4	SO-14 DIP-14	TTL and CMOS Compatible
LM2901V	3.0 or ±1.5	36 or ±18	7.0	50	25	0.8	-40 to +125	1300	Single Split	4	SO-14 DIP-14	TTL and CMOS Compatible
MC3302	3.0 or ±1.5	30 or ±15	20	100	25	0.8	-40 to +85	1300	Single Split	4	SO-14 DIP-14	TTL and CMOS Compatible

*I_q typical for total device (all channels)

AUDIO AMPLIFIERS

Audio Output/ Application	Class	Topology/ Features	Output Power	PSRR @ 217 Hz	Efficiency	THD + N	Turn-On Time (typ)	I _q (typ)	Shutdown Current (typ)	Package	Device Solutions
Mono Speaker – Basic Telephone Operations and Polyphonic Ringtones	AB	BTL	1 W+	-73 dB	63%	0.02%	285 ms	1.5 mA	10 nA	Micro8™ Microbump-9	NCP2890
	AB	BTL	1 W+	-73 dB	63%	0.02%	100 ms	1.5 mA	10 nA	Micro8™ Microbump-9	NCP2892A
	AB	Differential	1 W+	-80 dB	64%	0.006%	140 ms	1.9 mA	20 nA	Microbump-9 DFN-10	NCP4894
Stereo Headphones – MP3 Players, Bluetooth Headsets	AB	Virtual Ground No Output Cap	135 mW/Ch	-82 dB	63%	0.003%	285 ms	1.54 mA	10 nA	Micro10	NCP2809
	AB	Differential	150 mW/Ch	-80 dB	64%	0.006%	140 ms	1.9 mA	20 nA	Microbump-9 DFN10	NCP4894
Mono Speaker/Earpiece – Low Cost Integrated Solution	AB	Single-End/Differential	1 W to Speaker; 250 mW to Earpiece	-70 dB	64%	SE 0.003% BTL 0.01%	140 ms	1.7 mA	20 nA	Microbump-9	NCP4896
Mono Speaker – Handsfree Speaker Phone	D	Filterless, Gain Select by Resistor	2 W+	-65 dB	90%	0.05%	9 ms	2.2 mA	300 nA	Microbump-9 DFN-8	NCP2820
Stereo Speakers – Offer Stereo Sound Quality to Play Video/Music on Demand, MP3	D	Filterless, Gain Selection by Resistor	2W+ per Channel	-65 dB	90%	0.05%	9 ms	4.4 mA	600 nA	Microbump-9	2x NCP2820
Mono Speaker – Handsfree Speaker Phone	D	Filterless Integrated Gain. Selectable Gain of 6 dB or 12 dB on External Pin.	2.65W	-65 dB	90%	0.05%	9 ms	2.5 mA	500 nA	Microbump-9	NCP2821

TRANSCONDUCTANCE AMPLIFIERS

Device Name	Channels	V _{CC} (typ) (V)	T _A (min) (°C)	T _A (max) (°C)	g _M (typ) (μmho)	V _{IO} (typ) (mV)	I _{IB} (typ) (μA)	S _R (typ) (V/μs)	B _w (typ) (MHz)	e _n (typ) (pA/Hz)	THD (typ) (%)	Package
AU5517	2	44	-40	125	9600	0.4	0.4	50	2	25	0.5	SOIC-16
NE5517A	2	44	0	70	9600	0.4	0.4	50	2	25	0.5	PDIP-16
NE5517	2	44	0	70	9600	0.4	0.4	50	2	25	0.5	SOIC-16, PDIP-16

VIDEO AMPLIFIERS

Device Name	Channels	GBW (typ) (MHz)	V _{CC} (max) (V)	I _D (typ) (mA)	T _A (min) (°C)	T _A (max) (°C)	Package
NE592D14	1	90	8	18	0	70	SOIC-14
NE592D8	1	40	8	18	0	70	SOIC-8
NE592N14	1	90	8	18	0	70	PDIP-14
NE592N8	1	40	8	18	0	70	PDIP-8

COMPANDORS

Device Name	Channels	V _{CC} (min) (V)	V _{CC} (max) (V)	I _{CC} (max) (V)	THD (typ) (%)	e _n (typ) (μ V)	V _{REF} (V)	T _A (min) (°C)	T _A (max) (°C)	Package
NE570	2	6	24	4.3	0.3	20	1.8	0	70	SO-16 WB
SA571	2	6	18	4.3	0.5	20	1.8	-40	85	SO-16 WB, PDIP-16
SA572D	2	6	22	6.3	0.05	6	2.5	-40	85	SO-16 WB, TSSOP-16, PDIP-16
SA575D	2	3	7	4.2	0.12	6		-40	85	SOIC-20 WB, TSSOP-20, PDIP-20

Analog Switches

Table of Contents

	Page
Analog Switches	101
Audio Analog Switches	102
Data Analog Switches	102
General Purpose Analog Switches	102

ANALOG SWITCHES

Device	Description	Temperature Range (°C)	Operating Voltage (V)
AUDIO ANALOG SWITCHES			
NLAS3699	Dual DPDT Analog Switch	-55 to +125	1.65 to 3.6
NLAS3699B	Dual DPDT Analog Switch	-55 to +125	1.65 to 4.3
NLAS3799	Dual DPDT Ultra-Low Ron Analog Switch	-55 to +125	1.65 to 3.6
NLAS3799B	Dual DPDT Analog Switch	-55 to +125	1.65 to 4.3
NLAS4157	SPDT 1 Ω Analog Switch	-55 to +125	1.65 to 5.5
NLAS4684	Dual SPDT .5 Ω Analog Switch	-55 to +125	1.8 to 5.5
NLAS4783B	Triple SPDT 1 Ω Analog Switch	-55 to +125	1.65 to 4.3
NLAS5123	SPDT Low Ron Analog Switch	-55 to +125	1.65 to 5.5
NLAS5223	Dual SPDT Ultra-Low Ron Switch	-55 to +125	1.65 to 3.6
NLAS5223B	Dual SPDT Ultra-Low Ron Switch	-55 to +125	1.65 to 4.3
DATA ANALOG SWITCHES			
NLAS4717	Dual SPDT High Bandwidth USB 2.0 Compliant Analog Switch	-55 to +125	1.8 to 5.5
NLAS4717EP	Dual SPDT High Bandwidth USB 2.0 Compliant Analog Switch	-55 to +125	1.8 to 5.5
NLAS7222A	USB 2.0 High Speed Analog Switch	-55 to +125	3.0 to 3.6
GENERAL PURPOSE ANALOG SWITCHES			
M74VHC1GT66	Single Supply Analog Switch	-55 to +125	2 to 5.5
MC14016B	Quad Analog Switch/Quad Multiplexer	-40 to +85	3 to 18
MC14051B	Analog Multiplexer/Demultiplexer	-40 to +85	3 to 18
MC14052B	Analog Multiplexer/Demultiplexer	-40 to +85	3 to 18
MC14053B	Analog Multiplexer/Demultiplexer	-40 to +85	3 to 18
MC14066B	Quad Analog Switch/Quad Multiplexer	-40 to +85	3 to 18
MC14067B	Analog Multiplexer/Demultiplexer	-40 to +85	3 to 18
MC14551B	Quad 2-Channel Analog Multiplexer/Demultiplexer	-40 to +85	3 to 18
MC74HC4051	Analog Multiplexer/Demultiplexer	-55 to +125	2 to 6
MC74HC4052	Analog Multiplexer/Demultiplexer	-55 to +125	2 to 6
MC74HC4053	Analog Multiplexer/Demultiplexer	-55 to +125	2 to 6
MC74HC4066	Quad Analog Switch/Multiplexer/Demultiplexer	-40 to +85	2 to 12
MC74HC4316	Quad Analog Switch/Multiplexer/Demultiplexer	-55 to +125	2 to 6
MC74HC4851	Analog Multiplexers/Demultiplexers with Injection Current Effect Control	-55 to +125	2 to 6
MC74HC4852	Analog Multiplexers/Demultiplexers with Injection Current Effect Control	-55 to +125	2 to 6
MC74LVX4066	Quad Analog Switch/Multiplexer/Demultiplexer	-55 to +125	2 to 6
MC74LVX8051	Analog Multiplexer/Demultiplexer	-40 to +85	2 to 6
MC74LVX8053	Analog Multiplexer/Demultiplexer	-40 to +85	2 to 6
MC74LVXT4066	Quad Analog Switch/Multiplexer/Demultiplexer	-40 to +85	2 to 5.5
MC74LVXT8051	8 Channel Analog Switch	-40 to +85	2 to 5.5
MC74LVXT8053	Analog Multiplexer/Demultiplexer	-40 to +85	2 to 5.5
MC74VHC1G66	Single Supply Analog Switch	-55 to +125	2 to 5.5

ANALOG SWITCHES

Device	Description	Temperature Range (°C)	Operating Voltage (V)
GENERAL PURPOSE ANALOG SWITCHES			
MC74VHC1GT6	Single Supply Analog Switch	-55 to +125	2 to 5.5
MC74VHC4051	Analog Multiplexer/Demultiplexer	-55 to +125	2 to 6
MC74VHC4066	Quad Analog Switch/Multiplexer/Demultiplexer	-40 to +85	2 to 12
NLAS1053	2:1 Mux/Demux Analog Switches	-55 to +125	2 to 5.5
NLAS2066	Dual SPST Analog Switch, OVT Inputs	-55 to +125	1.65 to 5.5
NLAS3158	Dual SPDT Analog Switch	-55 to +125	1.65 to 5.5
NLAS323	Dual SPST Analog Switch, Single Supply	-55 to +125	2 to 5.5
NLAS324	Dual SPST Analog Switch, Single Supply	-55 to +125	2 to 5.5
NLAS325	Dual SPST Analog Switch, Single Supply	-55 to +125	2 to 5.5
NLAS3799	Dual DPDT Ultra-Low Ron Analog Switch	-55 to +125	1.65 to 3.6
NLAS4051	Analog Multiplexer/Demultiplexer	-55 to +125	2.5 to 5.5
NLAS4053	Triple 2:1 Analog Switch – Multiplexer	-55 to +125	2.5 to 5.5
NLAS44599	Dual DPDT Analog Switch	-55 to +125	2 to 5.5
NLAS4501	Single SPST Analog Switch	-55 to +125	2 to 5.5
NLAS4599	Single SPDT Analog Switch Single Supply	-55 to +125	2 to 5.5
NLAS9431	Dual DPDT Analog Switch	-55 to +125	2 to 5.5
NLASB3157	Single SPDT Analog Switch	-55 to +125	1.65 to 5.5
NLAST4051	Analog Multiplexer/Demultiplexer	-55 to +125	2.5 to 5.5
NLAST44599	Dual DPDT Analog Switch, TTL Level	-55 to +125	2 to 5.5
NLAST4501	Single SPST Analog Switch, TTL Level	-55 to +125	2 to 5.5
NLAST4599	Single SPDT Analog Switch Single Supply, TTL Level	-55 to +125	2 to 5.5
NLAST9431	Dual DPDT Analog Switch	-55 to +125	2 to 5.5
NLVHC1G66	Single Supply Analog Switch	-55 to +125	2 to 5.5
NLVHC1GT66	Single Supply Analog Switch	-55 to +125	2 to 5.5

Thyristors

Thyristors

Table of Contents

	Page
SCRs: Silicon Controlled Rectifiers	108
TRIACs	111
Surge Suppressors and Triggers	114

In Brief...

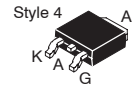
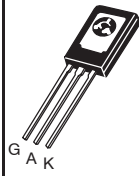
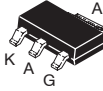
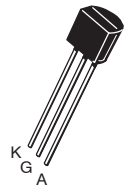
ON Semiconductor's broad line of Thyristors includes...

- A full line of Silicon Controlled Rectifiers (SCR's) covering a forward current range of 0.8 A to 25 A and blocking voltages from 30 V to 800 V. Available in a choice of six different plastic packages in both through hole and surface mount, for space saving requirements.
- An extensive line of Triacs (bidirectional devices) from 0.6 A to 16 A with blocking voltages from 200 V to 800 V. Like the SCR's, the Triacs are available in a choice of six different plastic packages.
- A new line of Thyristor Surge Suppressors in the surface mount SMB package covering surge currents of 50 A and 100 A, with break over voltages from 77 V to 400 V.
- Trigger devices, including Sidacs and PUT's (Programmable Unijunction Transistors). Trigger devices are available in both the axial lead and TO-92 packages.

SCRs

SILICON CONTROLLED RECTIFIERS

On-State RMS Current IT(RMS) (Amps)	Blocking Voltage VDRM, VRRM (Volts)	TO-92 (Note 1) (TO-226AA) Case 029 Style 10	SOT-223 Case 318E Style 10	TO-225AA (TO-126) Case 077 Style 2	D-PAK Case 369C Style 4 & 5 Case 369D Style 5	Surge Current ITSM (Amps) 60 Hz	Max IGT (mA)	Max VGT (Volts)
0.8	30	2N5060				10	0.2	0.8
	60	2N5061						
	100	2N5062						
	200	2N5064						
	100	MCR100-3						
	200	MCR100-4						
	400	MCR100-6						
	600	MCR100-8						
	200		MCR08B					
600		MCR08M						
1.5	400	MCR22-6				15	0.2	0.8
	600	MCR22-8						
4.0	200			C106B		20	0.2	0.8
	400			C106D				
				C106D1				
	600			C106M				
				C106M1				
	400			MCR106-6		25	0.2	1.0
	600			MCR106-8				
	100				MCR703A (Note 2)	25	0.1	0.8
	400				MCR706A (Note 2)			
	600				MCR708A (Note 2)			
				MCR708A1 (Note 2 & 4)				
400				MCR716 (Note 3)				
600				MCR718 (Note 3)				


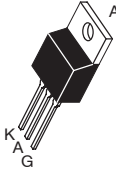
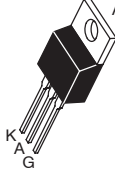


- See TO-92 data sheets for complete device suffix packaging ordering options.
RLRA, RLRE, RL, & RL1 suffixes: Radial Tape and Reel
RLRM & ZL1 suffixes: Radial Tape and Ammo Pack
- Denotes pkg style 5
- Denotes pkg style 4
- Denotes straight lead package

Lead Identification
A = Anode
K = Cathode
G = Gate

Shaded devices denote sensitive gate SCR's

SCRs (continued)

		 CASE 369C	 A K A G	 A K A G			
On-State RMS Current IT(RMS) (Amps)	Blocking Voltage VDRM, VRRM (Volts)	D-PAK Case 369C -001 = Case 369D Style 4	TO-220AB Case 221A-09 Style 3	TO-220AB Case 221A-07 Style 3	Surge Current ITSM (Amps) 60 Hz	Max IGT (mA)	Max VGT (Volts)
8.0	600	MCR8DCM			80	15	1.0
	800	MCR8DCN					
	400		MCR8SD		80	0.2	1.0
	600		MCR8SM				
	800		MCR8SN				
	800		MCR8N		80	15	1.0
	50			C122F1	90	25	1.5
	600	MCR8DSM			90	0.2	1.0
	800	MCR8DSN					
	100			MCR72-3	100	0.2	1.5
	400			MCR72-6			
	600			MCR72-8			
	50			MCR218-2	100	25	1.5
	200			MCR218-4			
400			MCR218-6				
10	400		MCR12LD		100	8.0	0.8
	600		MCR12LM				
	800		MCR12LN				
	800			MCR310-10	100	0.2	1.5
12	600	MCR12DSM			100	0.2	1.0
	800	MCR12DSN					
	800	MCR12DSN-001					
	600	MCR12DCM			100	20	1.0
	800	MCR12DCN					
	400		MCR12D				
	600		MCR12M				
	800		MCR12N				
50			MCR68-2	100	30	1.5	

UL logo indicates UL Recognized File #E69369

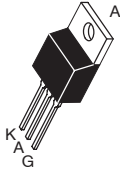
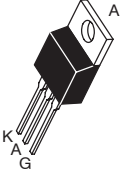
Shaded devices denote sensitive gate SCR's

Lead Identification

A = Anode
K = Cathode
G = Gate

ON Semiconductor Selector Guide – Thyristors

SCRs (continued)

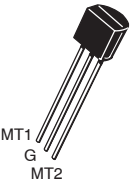
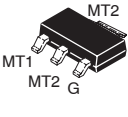
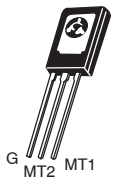
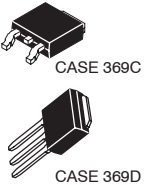
						
On-State RMS Current IT(RMS) (Amps)	Blocking Voltage VDRM, VRRM (Volts)	TO-220AB Case 221A-09 Style 3	TO-220AB Case 221A-07 Style 3	Surge Current ITSM (Amps) 60 Hz	Max IGT (mA)	Max VGT (Volts)
12	50		2N6394	100	30	1.5
	100		2N6395			
	400		2N6397			
	800		2N6399			
16	800	MCR16N		160	20	1.0
	50		2N6400	160	30	1.5
	100		2N6401			
	200		2N6402			
	400		2N6403			
	600		2N6404			
	800		2N6405			
25	400	MCR25D		300	30	1.0
	600	MCR25M				
	800	MCR25N				
	50		2N6504	300	30	1.5
	100		2N6505			
	400		2N6507			
	600		2N6508			
	800		2N6509			
	50		MCR69-2			
	100		MCR69-3			

UL logo indicates UL Recognized File #E69369

Lead Identification

A = Anode
K = Cathode
G = Gate

TRIACs (Bidirectional Devices)

											
		MT1 G MT2	MT1 MT2 G	G MT2 MT1	CASE 369C CASE 369D		Max IGT (mA)				
On-State RMS Current IT(RMS) (Amps)	Blocking Voltage VDRM, VRRM (Volts)	TO-92 (Note 5) (TO-226AA) Case 029 Style 12	SOT-223 Case 318E Style 11	TO-225AA (TO-126) Case 077 Style 5	D-PAK Case 369C -001 = Case 369D Style 6	Surge Current ITSM (Amps) 60 Hz	Q1	Q2	Q3	Q4	
0.6	200	MAC97A4				8.0	5.0	5.0	5.0	7.0	
	400	MAC97A6									
	600	MAC97A8									
0.8	400	MAC997A6									
		MAC997B6					3.0	3.0	3.0	5.0	
		MAC997A8					5.0	5.0	5.0	7.0	
	600	MAC997B8					3.0	3.0	3.0	5.0	
			MAC08B				10	10	10	10	
			MAC08M								
2.5	200			T2322B	25	10	10	10	10		
4.0	200			2N6071A		30	5.0	5.0	5.0	10	
				2N6071B			3.0	3.0	3.0	5.0	
		400		2N6073A			5.0	5.0	5.0	10	
				2N6073B			3.0	3.0	3.0	5.0	
	600		2N6075A			40	5.0	5.0	5.0	10	
			2N6075B				3.0	3.0	3.0	5.0	
					MAC4DLM (Note 6)		3.0	3.0	3.0	5.0	
					MAC4DLM-1 (Note 7)						
					MAC4DHM (Note 6)		5.0	5.0	5.0	10	
					MAC4DHM-1 (Note 7)						

5. See TO-92 data sheets for complete device suffix packaging ordering options.

RLRA, RLRE, RL, & RL1 suffixes: Radial Tape and Reel

RLRM & ZL1 suffixes: Radial Tape and Ammo Pack

6. Denotes SMT package

7. Denotes straight lead package

Lead Identification



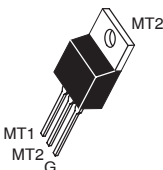
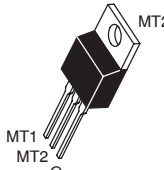
MT1 = Main Terminal 1

MT2 = Main Terminal 2

G = Gate

Shaded devices denote sensitive gate Triacs

TRIACs (Bidirectional Devices) (continued)

On-State RMS Current IT(RMS) (Amps)	Blocking Voltage VDRM, VRRM (Volts)	 CASE 369C  CASE 369D	 MT1 MT2 G	 MT1 MT2 G	Surge Current ITSM (Amps) 60 Hz	Max IGT (mA)									
						Q1	Q2	Q3	Q4						
4.0	600	MAC4DSM (Note 8)			40	10	10	10	-						
		MAC4DSM-1 (Note 9)													
	800	MAC4DSN (Note 8)													
		MAC4DSN-1 (Note 9)													
	600	MAC4DCM (Note 8)								40	35	35	35	-	
		MAC4DCM-1 (Note 9)													
		800	MAC4DCN (Note 8)												
			MAC4DCN-1 (Note 9)												
6.0	400			T2500D	60	25	60	25	60						
8.0	400		MAC8SD		70	5.0	5.0	5.0	-						
	600		MAC8SM												
	800		MAC8SN												
	400		MAC8D		80	35	35	35	-						
	600		MAC8M												
	800		MAC8N												
	400		MAC9D												
	600		MAC9M												
	800		MAC9N												
	200			MAC228A4	5.0	5.0	5.0	5.0	10						
	400			MAC228A6											
	600			MAC228A8											
	800			MAC228A10											
	600			2N6344	100	50	75	50	75						
	400			T2800D						25	60	25	60		

8. Denotes SMT package
9. Denotes straight lead package

UL logo indicates UL Recognized File #E69369

Shaded devices denote sensitive gate Triacs

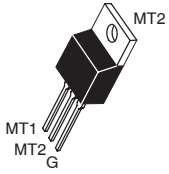
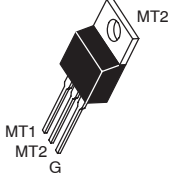
Lead Identification

MT1 = Main Terminal 1

MT2 = Main Terminal 2

G = Gate

TRIACs (Bidirectional Devices) (continued)

												
					Max IGT (mA)							
On-State RMS Current IT(RMS) (Amps)	Blocking Voltage VDRM, VRRM (Volts)	TO-220AB Case 221A-09 Style 4	TO-220AB Case 221A-07 Style 4	Surge Current ITSM (Amps) 60 Hz	Q1	Q2	Q3	Q4				
10	600		MAC210A8	100	50	50	50	75				
	800		MAC210A10									
12	600	MAC12SM		90	5.0	5.0	5.0	-				
	800	MAC12SN										
	400	MAC12HCD		100	50	50	50	-				
	600	MAC12HCM										
	800	MAC12HCN										
	400	MAC12D										
	600	MAC12M										
	800	MAC12N										
	600		MAC212A8						50	50	50	75
	800		MAC212A10									
	600		2N6344A						50	75	50	75
	600		2N6348A									
800		2N6349A										
15	400	MAC15SD		120	5.0	5.0	5.0	-				
	600	MAC15SM										
	800	MAC15SN										
	600	MAC15M		150	35	35	35	-				
	800	MAC15N										
	400		MAC15A6						50	50	50	75
	600		MAC15A8									
	800		MAC15A10									
16	400	MAC16D		50	50	50	-					
	600	MAC16M										
	800	MAC16N										
	600	MAC16CM										
	800	MAC16CN										

UL logo indicates UL Recognized File #E69369


Shaded devices denote sensitive gate Triacs

Lead Identification

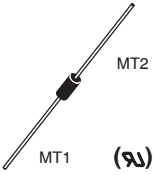
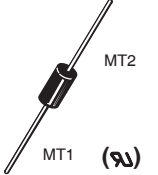
MT1 = Main Terminal 1
 MT2 = Main Terminal 2
 G = Gate

Surge Suppressors and Triggers

THYRISTOR SURGE SUPPRESSORS (Bidirectional Devices)

					
Surge Current IPPS1 10 x 1000 μ sec (Amps)	Maximum Off-State Voltage (Volts)	SMB Case 403C	Maximum Breakover Voltage VBO (Volts)	Minimum Holding Current IH (mA)	General Description
50	58	NP0640SA	77	150	These Thyristor Surge Protector Devices (TSPD) protect telecommunication circuits such as central office, access, and customer premises equipment from overvoltage conditions. These are bidirectional devices so they are able to have functionality of 2 devices in one package, saving valuable space on board layout. These devices will act as a crowbar when overvoltage occurs and will divert the energy away from circuit or device that is being protected. Use of the NP Series in equipment will help meet various regulatory requirements including: GR-1089-CORE, EC 61000-4-5, ITU K.20/21/45, IEC 60950, TIA-968-A, FCC Part 68, EN 60950, UL 1950.
	65	NP0720SA	88		
	75	NP0900SA	98		
	90	NP1100SA	130		
	120	NP1300SA	160		
	140	NP1500SA	180		
	170	NP1800SA	220		
	180	NP2100SA	240		
	190	NP2300SA	260		
	220	NP2600SA	300		
	275	NP3100SA	350		
320	NP3500SA	400			
80	58	NP0640SB	77	150	
	65	NP0720SB	88		
	75	NP0900SB	98		
	90	NP1100SB	130		
	120	NP1300SB	160		
	140	NP1500SB	180		
	170	NP1800SB	220		
	180	NP2100SB	240		
	190	NP2300SB	260		
	220	NP2600SB	300		
	275	NP3100SB	350		
320	NP3500SB	400			
100	58	NP0640SC	77	150	
	65	NP0720SC	88		
	75	NP0900SC	98		
	90	NP1100SC	130		
	120	NP1300SC	160		
	140	NP1500SC	180		
	170	NP1800SC	220		
	180	NP2100SC	240		
	190	NP2300SC	260		
	220	NP2600SC	300		
	275	NP3100SC	350		
320	NP3500SC	400			

High Voltage Bidirectional Triggers: Sidacs

					
On-State RMS Current IT(RMS) (Amps)	DO-41 Case 059A	Surmetic 50 Case 267 Style 2	Breakover Voltage Range VBO (Volts)	Surge Current ITSM (Amps) 60 Hz	General Description
0.9	MKP1V120		110-130	4.0	High voltage trigger devices similar in operation to triacs. Upon reaching the breakover voltage in either direction, the devices switch to a low voltage on state.
	MKP1V130		120-140		
	MKP1V160		150-170		
	MKP1V240		220-250		
1.0		MKP3V120 MKP3V240	220-250	20	

Lead Identification: Suppressor/Sidac

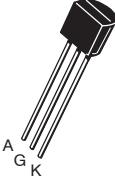
Lead Identification: PUT

Surge Suppressors and Triggers (continued)

MT1 = Main Terminal 1
MT2 = Main Terminal 2

A = Anode
K = Cathode
G = Gate

THYRISTOR TRIGGERS: PROGRAMMABLE UNIJUNCTION TRANSISTORS (PUT's)

					
IP			IV		
RG = 10KΩ (μ Amps max.)	RG = 1MΩ (μ Amps max.)	TO-92 (Note 10) (TO-226AA) Case 029 Style 16	RG = 10KΩ (μ Amps min.)	RG = 1MΩ (μ Amps max.)	General Description
5.0	2.0	2N6027	70	50	Similar to unijunction transistors, except that IP, IV, and intrinsic voltage are programmable (adjustable) by means of external voltage divider.
1.0	0.15	2N6028	25	25	

UL logo indicates UL Recognized File #E116110

10. See TO-92 data sheets for complete device suffix packaging ordering options.

RLRA, RLRE, RL, & RL1 suffixes: Radial Tape and Reel
RLRM & ZL1 suffixes: Radial Tape and Ammo Pack



Diodes

Table of Contents

	Page
Tuning and Switching Diodes	
Abrupt Junction Tuning Diodes	118
Hyper-Abrupt Junction Tuning Diodes	118
Schottky Diodes	119
Pin Switching Diodes	121
General Purpose Signal & Switching Diodes . .	122
Zener Diodes – Regulation in Axial Leads	124
Zener Diodes – Regulation in Surface Mount	126
Dual Zeners – Duals in Surface Mount	133




Tuning and Switching Diodes

TUNING DIODES – ABRUPT JUNCTION

Device	V _R Volts	C _T @ V _R = 4.0 V, 1.0 MHz			Cap Ratio Min	Q @ 4.0 V 50 MHz Typ	Package
		pF Min	pF Nominal	pF Max			
MV2105	30	13.5	15	16.5	2.5	400	 TO-226AC, TO-92 2-Lead Case 182-06
MV2109	30	29.7	33	36.3	2.5	200	
MMBV2105L	30	13.5	15	16.5	2.5	400	 TO-236AB, SOT-23 Case 318-08
MMBV2109L	30	29.7	33	36.3	2.5	200	
MMBV2101L	30	6.1	6.8	7.5	2.5	450	
MMBV3102L	30	20	–	25	4.5	200	







Devices listed in **bold italic** are ON Semiconductor preferred devices.

TUNING DIODES – HYPER-ABRUPT JUNCTION

Device	V _R Volts	C _T (f = 1.0 MHz)			Cap Ratio			Q 3.0 V Min	Type	Package
		pF Min	pF Max	Volts	Min	Max	Volts			
MV209	30	26	32	3.0	5.0	6.5	3.0/25	200	Single	 TO-226AC, TO-92 2-Lead Case 182-06
MV104	32	37	42	3.0	2.5	2.8	–	100	Single	
MMBV105GL	30	1.5	2.8	25	4.0	6.5	3.0/25	200	Single	 TO-236AB, SOT-23 Case 318-08
MMBV109L	30	26	32	3.0	5.0	6.5	3.0/25	200	Single	
MMBV409L	20	26	32	3.0	1.5	1.9	3.0/8.0	200	Single	
MMBV809L	20	4.5	6.1	2.0	1.8	2.6	2.0/8.0	300	Single	
MMBV432L	14	43	48	2.0	1.5	2.0	–	100@ 2.0V	Single	
MMBV609L	20	26	32	3.0	1.8	2.4	3/8	250	Dual Common Cathode	
MMVL109	30	26	32	3	5.0	6.5	3.0/25	200	Single	 SOD-323 Case 477-02

Devices listed in **bold italic** are ON Semiconductor preferred devices.





SCHOTTKY DIODES


Device	V _R Volts	C _T @ V		V _F Volts Max	I _R @ V		Type	Package
		pF Max	Volts		nA Max	Volts		
<i>MBD701</i>	70	1.0	20	1.0	200	35	Single	 TO-226AC, TO-92 2-Lead Case 182-06
<i>MBD301</i>	30	1.5	15	0.6	200	25	Single	
<i>MMSD701</i>	70	1.0	20	1.0	200	35	Single	 SOD-123 Case 425-04
<i>BAT54</i>	30	10	1.0	0.4	2000	25	Single	
<i>MMSD301</i>	30	1.5	15	0.6	200	25	Single	
<i>MMDL770</i>	70	1.0	20	1.0	200	35	Single	 SOD-323 Case 477-02
<i>BAT54H</i>	30	10	1.0	0.4	2000	25	Single	
<i>MMDL301</i>	30	1.5	15	0.6	200	25	Single	
<i>RB751V40</i>	30	2.5	1.0	0.37	500	30	Single	
<i>MMDL101</i>	7.0	1.0	0	0.6	250	3.0	Single	
<i>NSR0320MW2</i>	23	35	5.0	0.27	1000	15	Single	
<i>BAS70L</i>	70	2.0	0	0.75	100	50	Single	 TO-236AB, SOT-23 Case 318-08
<i>BAS70-04L</i>	70	2.0	0	0.75	100	50	Dual Series	
<i>MMBD701L</i>	70	1.0	20	1.0	200	35	Single	
<i>BAS40L</i>	40	5.0	1.0	0.5	1000	25	Single	
<i>BAS40-04L</i>	40	5.0	1.0	0.5	1000	25	Dual Series	
<i>BAS40-06L</i>	40	5.0	1.0	0.5	1000	25	Dual Common Anode	
BAT54CL	30	10	1.0	0.4	2000	25	Dual Common Cathode	
<i>BAT54L</i>	30	10	1.0	0.4	2000	25	Single	
<i>BAT54AL</i>	30	10	1.0	0.4	2000	25	Dual Common Anode	
<i>BAT54SL</i>	30	10	1.0	0.4	2000	25	Dual Series	
<i>MMBD301L</i>	30	1.5	15	0.6	200	25	Single	
MMBD452L	30	1.5	15	0.6	200	25	Dual Series	
<i>MMBD101L</i>	7.0	1.0	0	0.6	250	3.0	Single	
<i>MMBD352L</i>	7.0	1.0	0	0.6	250	3.0	Dual Series	
<i>MMBD353L</i>	7.0	1.0	0	0.6	250	3.0	Dual Series	
<i>MMBD354L</i>	7.0	1.0	0	0.6	250	3.0	Dual Common Cathode	
<i>MMBD355L</i>	7.0	1.0	0	0.6	250	3.0	Dual Common Anode	
<i>MMBD770</i>	70	1.0	20	1.0	200	35	Single	 SC-70, SOT-323 Case 419-04
BAT54AW	30	10	1.0	0.4	2000	25	Dual Common Anode	
BAT54CW	30	10	1.0	0.4	2000	25	Dual Common Cathode	
<i>BAT54W</i>	30	10	1.0	0.4	2000	25	Single	
<i>BAT54SW</i>	30	10	1.0	0.4	2000	25	Dual Series	
<i>MMBD330</i>	30	1.5	15	0.6	200	25	Single	
<i>MMBD717L</i>	20	2.5	1.0	0.37	1000	10	Dual Common Anode	
<i>MMBD352W</i>	7.0	1.0	0	0.6	250	3.0	Dual Series	
BAT54CT	30	10	1.0	0.4	2000	25	Dual Common Cathode	 SOT-416, SC-75, SC-90 Case 463-01


Devices listed in **bold italic** are ON Semiconductor preferred devices.

ON Semiconductor Selector Guide – Diodes

SCHOTTKY DIODES

Device	V _R Volts	C _T @ V		V _F Volts Max	I _R @ V		Type	Package
		pF Max	Volts		nA Max	Volts		
<i>MBD770DW</i>	70	1.0	0	0.5	200	35	Dual Isolated	 SC-88, SOT-363 Case 419B-02
<i>MBD54DW</i>	30	1.0	0	0.32	2000	25	Dual Isolated	
<i>MBD330DW</i>	30	1.5	0	0.4	200	25	Dual Isolated	
<i>NSR15TW1T2</i>	15	1.0	0	0.415	50	1.0	Triple	
NSR0320XV6	23	35	5.0	0.27	1000	15	Single	 SOT-563 Case 463A-01
NSR15ADXV6	15	1.0	0	0.415	50	1.0	Dual Isolated	
BAT54CXV3	30	10	1.0	0.4	2000	25	Dual Common Cathode	 SC-89 Case 463C-03
RB751S40	40	2.5	1.0	0.37	500	30	Single	 SOD-523 Case 502-01
BAT54XV2	30	10	1.0	0.4	2000	25	Single	
RB520S30	30	–	–	0.5	1000	10	Single	
RB521S30	30	–	–	0.6	30000	10	Single	



Device	Technology	V _R Volts	C _T @ V		V _F Max	I _R @ V		T _{RR} nS	Package
			pF Max	Volts	Volts	nA Max	Volts		
NSR30CM3	Schottky	30	10	1.0	0.8	2.0	25	5	 SOT-723 Case 631AA-01

Device	V _R Volts	C _T @ V		V _F Max	I _R @ V		Type	Package
		pF Max	Volts	Volts Max	μA Max	Volts		
NSR0130P2	30	–	–	0.385	0.350	10	Single	 SOD-923 Case 514AA-01
NSR0140P2	40	2.5	1.0	0.350	0.500	30	Single	
NSR0230P2	30	–	–	0.325	10	10	Single	

Devices listed in ***bold italic*** are ON Semiconductor preferred devices.

Switching Diodes





PIN SWITCHING DIODES

Device	V _R Volts Min	C _T @ V		Resistance Ω Max	I _R μA Max	Type	Package
		pF Max	Volts				
MMBV3700L	200	1.0	20	1.0	0.1	Single	 TO-236AB, SOT-23 Case 318-08
<i>MMBV3401L</i>	35	1.0	20	0.7	0.1	Single	
<i>MMVL3401</i>	35	1.0	20	0.7	0.1	Single	 SOD-323 Case 477-02

Devices listed in ***bold italic*** are ON Semiconductor preferred devices.

Switching Diodes








GENERAL-PURPOSE SIGNAL AND SWITCHING DIODES

Device	V _R Min Volts	I _R Max μA	V _F		C _T Max pF	t _{rr} Max ns	Type	Package	
			Min Volts	Max Volts					
<i>BAS21L</i>	250	0.1	–	1.0	5.0	50	Single	 TO-236AB, SOT-23 Case 318-08	
<i>BAS21SL</i>	250	0.1	–	1.0	5.0	50	Dual Series		
<i>MMBD914L</i>	100	5.0	–	1.0	4.0	4.0	Single		
<i>BAS16L</i>	75	1.0	–	1.0	2.0	6.0	Single		
<i>MMBD6050L</i>	70	0.1	0.85	1.1	2.5	4.0	Single		
<i>BAL99L</i>	70	2.5	–	1.0	1.5	6.0	Single		
<i>BAS116L</i>	75	0.005	–	0.9	2.0	3000	Single		
<i>MMBD7000L</i>	100	1.0	0.75	1.1	1.5	4.0	Dual Series		
MMBD2836L	75	0.1	–	1.0	4.0	4.0	Dual Common Anode		
MMBD2838L	75	0.1	–	1.0	4.0	4.0	Dual Common Cathode		
<i>BAV70L</i>	70	5.0	–	1.0	1.5	6.0	Dual Common Cathode		
<i>BAV99L</i>	70	2.5	–	1.0	1.5	4.0	Dual Series		
<i>BAW56L</i>	70	2.5	–	1.0	2.0	6.0	Dual Common Anode		
MMBD6100L	70	0.1	0.85	1.1	2.5	4.0	Dual Common Cathode		
BAV74L	50	0.1	–	1.0	2.0	4.0	Dual Common Cathode		
MMBD2835L	35	0.1	–	1.0	4.0	4.0	Dual Common Anode		
MMBD2837L	35	0.1	–	1.0	4.0	4.0	Dual Common Cathode		
<i>BAV199L</i>	70	0.005	–	0.9	2.0	3000	Dual Series		
<i>BAS20L</i>	200	0.1	–	1.0	5.0	50	Single		
<i>BAS19L</i>	120	0.1	–	1.0	5.0	50	Single		
<i>M1MA151K</i>	40	0.1	–	1.2	2.0	3.0	Single		 SC-59 Case 318D-04
<i>M1MA152K</i>	80	0.1	–	1.2	2.0	3.0	Single		
<i>M1MA151WA</i>	40	0.1	–	1.2	15	10	Dual Common Anode		
<i>M1MA151WK</i>	40	0.1	–	1.2	2.0	3.0	Dual Common Cathode		
<i>M1MA152WA</i>	80	0.1	–	1.2	15	10	Dual Common Anode		
<i>M1MA152WK</i>	80	0.1	–	1.2	2.0	3.0	Dual Common Cathode		
<i>BAS16W</i>	75	1.0	–	1.25	2.0	6.0	Single		
<i>M1MA141K</i>	40	0.1	–	1.2	2.0	3.0	Single	 SC-70, SOT-323 Case 419-04	
<i>M1MA174</i>	100	5.0	–	1.0	4.0	4.0	Single		
<i>M1MA142WK</i>	80	0.1	–	1.2	2.0	3.0	Dual Common Cathode		
<i>M1MA142WA</i>	80	0.1	–	1.2	15	10	Dual Common Anode		
<i>BAW56W</i>	70	2.5	–	1.0	2.0	6.0	Dual Common Anode		
<i>BAV70W</i>	70	5.0	–	1.0	1.5	6.0	Dual Common Cathode		
<i>BAV99W</i>	70	2.5	–	1.0	1.5	6.0	Dual Series		
<i>BAV99RW</i>	70	2.5	–	1.0	1.5	6.0	Dual Series		
<i>M1MA141WA</i>	40	0.1	–	1.2	15	10	Dual Common Anode		
<i>MMSD914</i>	100	5.0	–	1.0	4.0	4.0	Single		 SOD-123 Case 425-04
<i>MMSD103</i>	250	100	–	1.0	5.0	50	Single		
<i>MMSD4148</i>	100	5.0	–	1.0	4.0	4.0	Single		

Devices listed in **bold italic** are ON Semiconductor preferred devices.

Switching Diodes

GENERAL-PURPOSE SIGNAL AND SWITCHING DIODES

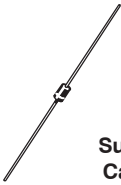

Device	V _R Min Volts	I _R Max μA	V _F		C _T Max pF	t _{rr} Max ns	Type	Package
			Min Volts	Max Volts				
<i>BAS16H</i>	75	1.0	–	1.0	2.0	6.0	Single	 SOD-323 Case 477-02
<i>BAS20H</i>	200	0.1	–	–	5.0	50	Single	
<i>BAS21H</i>	250	0.1	–	1.0	5.0	50	Single	
<i>MMDL914</i>	100	5.0	–	1.0	4.0	4.0	Single	
<i>MMDL6050</i>	70	0.1	0.85	1.1	2.5	4.0	Single	
<i>BAS16T</i>	75	1.0	–	1.0	2.0	6.0	Single	 SOT-416, SC-75, SC-90 Case 463-01
<i>DA121T</i>	80	1.0	–	–	2.0	6.0	Single	
<i>DAP222</i>	80	0.1	–	1.2	3.5	4.0	Dual Common Anode	
<i>BAW56T</i>	70	2.5	–	1.0	2.0	6.0	Dual Common Anode	
<i>DAN222</i>	80	0.1	–	1.2	3.5	4.0	Dual Common Cathode	
<i>BAV70T</i>	70	5.0	–	1.0	1.5	6.0	Dual Common Cathode	
HN2D02FUTW1	85	0.1	–	1.2	2.0	3.0	Triple Isolated	 SC-88 Case 419B-02
BAS21DW5	250	0.1	–	1.0	5.0	50	Dual Isolated	 SC-88A Case 419A-02
1SS400	100	0.1	–	1.2	3.0	4.0	Single	 SOD-523 Case 502-01
BAS16XV2	75	1.0	–	1.0	2.0	6.0	Single	
NSD914XV2	100	–	–	1.0	4.0	4.0	Single	
NSDEMP11XV6	70	0.01	–	1.2	3.5	4.0	Two Dual Common Anode	 SOT-563 Case 463A-01
BAS16DXV6	75	0.001	–	1.25	2.0	6.0	Dual Isolated	
DAN222M3	80	0.1	–	1.2	3.5	4.0	Dual Common Cathode	 SOT-723 Case 631AA-01
DAP222M3	80	0.1	–	1.2	3.5	4.0	Dual Common Anode	

Devices listed in ***bold italic*** are ON Semiconductor preferred devices.

1. Devices in ***bold***, samples starting Oct. 2002, production starting Dec. 2002.
2. Remainder of devices, 4 to 8 weeks after receipt of request based on note 1 timetable.



Zener Diodes – Regulation in Axial Leads

Table 1. AXIAL LEADED – 3, 5 WATT

Nominal Zener Breakdown Voltage	3 Watt		5 Watt
	Cathode = Polarity Band		Cathode = Polarity Band
Volts	 <p>Plastic Surmetic 30 Case 59-10 (DO-41)</p>		 <p>Plastic Surmetic 40 Case 17</p>
1.8 2.0 2.2 2.4 2.5			
2.7 2.8 3.0 3.3 3.6	MZP4729A	1N5913B	1N5333B 1N5334B
3.9 4.3 4.7 5.1 5.6		1N5917B 1N5919B	1N5335B 1N5336B 1N5337B 1N5338B 1N5339B
6.0 6.2 6.8 7.5 8.2	MZP4735A	1N5920B 1N5921B 1N5923B	1N5340B 1N5341B 1N5342B 1N5343B 1N5344B
8.7 9.1 10 11 12		1N5924B 1N5925B 1N5927B	1N5346B 1N5347B 1N5348B 1N5349B
13 14 15 16 17	3EZ16D MZP4746A	1N5929B	1N5350B 1N5351B 1N5352B 1N5353B 1N5354B
18 19 20 22 24	3EZ18D MZP4749A	1N5931B 1N5932B 1N5934B	1N5355B 1N5356B 1N5357B 1N5358B 1N5359B





Zener Diodes – Regulation in Axial Leads (continued)

Table 1. AXIAL LEADED – 3, 5 WATT (continued)

Nominal Zener Breakdown Voltage	3 Watt		5 Watt	
	Cathode = Polarity Band		Cathode = Polarity Band	
Volts	 <p>Plastic Surmetic 30 Case 59-10 (DO-41)</p>		 <p>Plastic Surmetic 40 Case 17</p>	
25	MZP4750A	1N5935B	1N5360B	
27			1N5361B	
28			1N5362B	
30			1N5363B	
33			1N5364B	
36		1N5938B	1N5365B	
39		1N5366B		
43		1N5940B	1N5367B	
47		1N5941B	1N5368B	
51		1N5942B	1N5369B	
56			1N5370B	
60			1N5371B	
62			1N5372B	
68			1N5373B	
75			1N5946B	1N5374B
82			1N5375B	
87			1N5377B	
91			1N5948B	1N5378B
100				
110				
120			1N5380B	
130			1N5381B	
140				
150			1N5953B	1N5383B
160				1N5384B
170			1N5386B	
180			1N5955B	1N5387
190				
200			1N5956B	1N5388B

Zener Diodes – Regulation in Surface Mount





Table 2. SURFACE MOUNT PACKAGES – 0.2 WATT

Nominal Zener Breakdown Voltage	200 mW Standard Tolerance SOD-523	200 mW Tight Tolerance SOD-523	200 mW Standard Tolerance SOD-323	200 mW Tight Tolerance SOD-323
Volts	 Case 502	 Case 502	 Case 477 Style 1	 Case 477 Style 1
1.8 2.0 2.2 2.4 2.5	MM5Z2V4	MM5Z2V4S	MM3Z2V4	
2.7 2.8 3.0 3.3 3.6 3.7	MM5Z2V7 MM5Z3V0 MM5Z3V3 MM5Z3V6		MM3Z2V7 MM3Z3V0 MM3Z3V3 MM3Z3V6	MM3Z3V3S
3.9 4.0 4.3 4.7 5.1 5.6	 MM5Z4V7 MM5Z5V1 MM5Z5V6	 MM5Z4V7S MM5Z5V1S MM5Z5V6S	MM3Z3V9 MM3Z4V3 MM3Z4V7 MM3Z5V1 MM3Z5V6	MM3Z3V9S MM3Z4V3S MM3Z4V7S MM3Z5V1S MM3Z5V6S
6.0 6.2 6.8 7.5 8.2	 MM5Z6V8 MM5Z7V5 MM5Z8V2	 MM5Z6V2S MM5Z6V8S MM5Z8V2S	 MM3Z6V2 MM3Z6V8 MM3Z7V5 MM3Z8V2	 MM3Z6V2S MM3Z6V8S MM3Z7V5S MM3Z8V2S
8.7 9.1 10 11 12	 MM5Z9V1 MM5Z10V MM5Z12V	 MM5Z9V1S 	 MM3Z9V1 MM3Z10V MM3Z11V MM3Z12V	 MM3Z9V1S MM3Z10VS MM3Z12VS
13 14 14.5 15 16 17	 MM5Z15V MM5Z16V		 MM3Z15V MM3Z16V	 MM3Z15V5 MM3Z16VS
18 19 20 22 24			 MM3Z18V MM3Z20V MM3Z22V MM3Z24V	 MM3Z18VS
25 27 28 30 33	 MM5Z27V MM5Z30V MM5Z33V		 MM3Z27V MM3Z33V	

Devices listed in **bold**, *italic* are ON Semiconductor preferred devices.

Zener Diodes – Regulation in Surface Mount

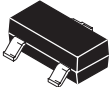
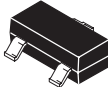
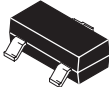
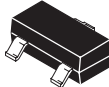
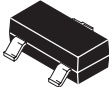
Table 2. SURFACE MOUNT PACKAGES – 0.2 WATT (continued)

Nominal Zener Breakdown Voltage	200 mW Standard Tolerance SOD-523	200 mW Tight Tolerance SOD-523	200 mW Standard Tolerance SOD-323	200 mW Tight Tolerance SOD-323
Volts	 Case 502	 Case 502	 Case 477 Style 1	 Case 477 Style 1
36	<i>MM5Z36V</i>		MM3Z36V	
39			MM3Z39V	
43			MM3Z43V	
47	<i>MM5Z47V</i>			
51				

Devices listed in **bold, italic** are ON Semiconductor preferred devices.

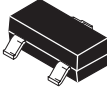
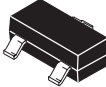
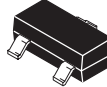

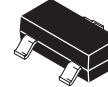
Zener Diodes – Regulation in Surface Mount

Table 3. SURFACE MOUNT PACKAGES – 0.225 WATT

Nominal Zener Breakdown Voltage	225 mW Standard Tolerance SOT-23	225 mW Tight Tolerance SOT-23	225 mW Energy Rated SOT-23	225 mW Standard Tolerance SOT-23	225 mW Energy Rated SOT-23
Volts	 Case 318	 Case 318	 Case 318	 Case 318	 Case 318
1.8					
2.0					
2.2					
2.4	BZX84C2V4L			MMBZ5221BL	
2.5				MMBZ5222BL	
2.7	BZX84C2V7L			MMBZ5223BL	
2.8					
3.0	BZX84C3V0L			MMBZ5225BL	
3.3	BZX84C3V3L		BZX84C3V3E	MMBZ5226BL	
3.6	BZX84C3V6L			MMBZ5227BL	MMBZ5227EL
3.7					
3.9	BZX84C3V9L		BZX84C3V9E	MMBZ5228BL	
4.0					
4.3	BZX84C4V3L			MMBZ5229BL	
4.7	<i>BZX84C4V7L</i>		<i>BZX84C4V7E</i>	MMBZ5230BL	
5.1	<i>BZX84C5V1L</i>	<i>BZX84B5V1L</i>	<i>BZX84C5V1E</i>	<i>MMBZ5231BL</i>	<i>MMBZ5231EL</i>
5.6	<i>BZX84C5V6L</i>	<i>BZX84B5V6L</i>	<i>BZX84C5V6E</i>	<i>MMBZ5232BL</i>	<i>MMBZ5232EL</i>
6.0				MMBZ5233BL	
6.2	<i>BZX84C6V2L</i>	<i>BZX84B6V2L</i>	<i>BZX84C6V2E</i>	<i>MMBZ5234BL</i>	<i>MMBZ5234EL</i>

Zener Diodes – Regulation in Surface Mount (continued)







Table 3. SURFACE MOUNT PACKAGES – 0.225 WATT (continued)

Nominal Zener Breakdown Voltage	225 mW Standard Tolerance SOT-23	225 mW Tight Tolerance SOT-23	225 mW Energy Rated SOT-23	225 mW Standard Tolerance SOT-23	225 mW Energy Rated SOT-23
Volts	 Case 318	 Case 318	 Case 318	 Case 318	 Case 318
6.8	BZX84C6V8L	BZX84B6V8L		MMBZ5235BL	
7.5	BZX84C7V5L	BZX84B7V5L		MMBZ5236BL	
8.2	BZX84C8V2L	BZX84B8V2L	BZX84C8V2E	MMBZ5237BL	MMBZ5237EL
8.7				MMBZ5238BL	
9.1	BZX84C9V1L	BZX84B9V1L	BZX84C9V1E	MMBZ5239BL	
10	BZX84C10L			MMBZ5240BL	MMBZ5240EL
11	BZX84C11L			MMBZ5241BL	
12	BZX84C12L			MMBZ5242BL	MMBZ5242EL
13	BZX84C13L		BZX84C13E	MMBZ5243BL	MMBZ5243EL
14				MMBZ5244BL	MMBZ5244EL
15	BZX84C15L			MMBZ5245BL	MMBZ5245EL
16	BZX84C16L	BZX84B16L		MMBZ5246BL	MMBZ5246EL
17				MMBZ5247BL	
18	BZX84C18L	BZX84B18L	BZX84C18E	MMBZ5248BL	MMBZ5248EL
19				MMBZ5249BL	
20	BZX84C20L			MMBZ5250BL	MMBZ5250EL
22	BZX84C22L			MMBZ5251BL	
24	BZX84C24L			MMBZ5252BL	MMBZ5252EL
25				MMBZ5253BL	
27	BZX84C27L			MMBZ5254BL	
28				MMBZ5255BL	
30	BZX84C30L			MMBZ5256BL	
33	BZX84C33L			MMBZ5257BL	MMBZ5257EL
36	BZX84C36L		BZ84C36E	MMBZ5258BL	
39	BZX84C39L			MMBZ5259BL	
43	BZX84C43L				
47	BZX84C47L			MMBZ5261BL	MMBZ5261EL
51	BZX84C51L			MMBZ5262BL	
56	BZX84C56L			MMBZ5263BL	
60				MMBZ5264BL	
62	BZX84C62L			MMBZ5265BL	
68	BZX84C68L				
75	BZX84C75L				
82				MMBZ5268BL	
87					
91				MMBZ5270BL	

Devices listed in **bold**, *italic* are ON Semiconductor preferred devices.







Zener Diodes – Regulation in Surface Mount (continued)

Table 4. SURFACE MOUNT PACKAGES – 0.5 WATT

Nominal Zener Breakdown Voltage	500 mW SOD-123	500 mW Energy Rated SOD-123	500 mW SOD-123	500 mW Energy Rated SOD-123	500 mW SOD-123	500 mW Energy Rated SOD-123
Volts	 Case 425	 Case 425	 Case 425	 Case 425	 Case 425	 Case 425
1.8 2.0 2.2 2.4 2.5	MMSZ2V4		MMSZ4678 MMSZ4679 MMSZ4680 MMSZ4681		MMSZ5221B MMSZ5222B	MMSZ5221E
2.7 2.8 3.0 3.3 3.6 3.7	MMSZ2V7 MMSZ3V0 MMSZ3V3 MMSZ3V6	MMSZ2V7E	MMSZ4682 MMSZ4683 MMSZ4684 MMSZ4685	MMSZ4684E	MMSZ5223B MMSZ5225B MMSZ5226B MMSZ5227B	MMSZ5223E MMSZ5226E
3.9 4.0 4.3 4.7 5.1 5.6	MMSZ3V9 MMSZ4V3 MMSZ4V7 MMSZ5V1 MMSZ5V6		MMSZ4686 MMSZ4687 MMSZ4688 MMSZ4689 MMSZ4690	MMSZ4688E MMSZ4689E MMSZ4690E	MMSZ5228B MMSZ5229B MMSZ5230B MMSZ5231B MMSZ5232B	
6.0 6.2 6.8 7.5 8.2	MMSZ6V2 MMSZ6V8 MMSZ7V5 MMSZ8V2	MMSZ8V2E	MMSZ4691 MMSZ4692 MMSZ4693 MMSZ4694		MMSZ5233B MMSZ5234B MMSZ5235B MMSZ5236B MMSZ5237B	MMSZ5235E MMSZ5237E
8.7 9.1 10 11 12	MMSZ9V1 MMSZ10 MMSZ11 MMSZ12		MMSZ4695 MMSZ4696 MMSZ4697 MMSZ4698 MMSZ4699		MMSZ5238B MMSZ5239B MMSZ5240B MMSZ5241B MMSZ5242B	MMSZ5240E MMSZ5242E
13 14 15 16 17	MMSZ13 MMSZ15 MMSZ16	MMSZ15E	MMSZ4700 MMSZ4701 MMSZ4702 MMSZ4703 MMSZ4704	MMSZ4701E MMSZ4702E MMSZ4704E	MMSZ5243B MMSZ5244B MMSZ5245B MMSZ5246B MMSZ5247B	MMSZ5244E MMSZ5245E MMSZ5246E
18 19 20 22 24	MMSZ18 MMSZ20 MMSZ22 MMSZ24	MMSZ18E	MMSZ4705 MMSZ4706 MMSZ4707 MMSZ4708 MMSZ4709		MMSZ5248B MMSZ5249B MMSZ5250B MMSZ5251B MMSZ5252B	MMSZ5248E MMSZ5250E MMSZ5252E
25 27 28 30 33	MMSZ27 MMSZ30 MMSZ33		MMSZ4710 MMSZ4711 MMSZ4713 MMSZ4714		MMSZ5253B MMSZ5254B MMSZ5255B MMSZ5256B MMSZ5257B	MMSZ5254E MMSZ5256E MMSZ5257E

Zener Diodes – Regulation in Surface Mount (continued)





Table 4. SURFACE MOUNT PACKAGES – 0.5 WATT (continued)

Nominal Zener Breakdown Voltage	500 mW SOD-123	500 mW Energy Rated SOD-123	500 mW SOD-123	500 mW Energy Rated SOD-123	500 mW SOD-123	500 mW Energy Rated SOD-123
Volts	 Case 425	 Case 425	 Case 425	 Case 425	 Case 425	 Case 425
36	MMSZ36		MMSZ4715		MMSZ5258B	
39	MMSZ39				MMSZ5259B	MMSZ5259E
43	MMSZ43		MMSZ4717		MMSZ5260B	MMSZ5260E
47					MMSZ5261B	
51	MMSZ51				MMSZ5262B	
56	MMSZ56				MMSZ5263B	
60					MMSZ5264B	
62					MMSZ5265B	
68					MMSZ5266B	
75					MMSZ5267B	
82					MMSZ5268B	
87						
91					MMSZ5270B	
100						
110					MMSZ5272B	

Devices listed in **bold, italic** are ON Semiconductor preferred devices.





Zener Diodes – Regulation in Surface Mount (continued)

Table 5. SURFACE MOUNT PACKAGES – 1.5, 3 WATT

Nominal Zener Breakdown Voltage	1.5 Watt SMA	1.5 Watt SMA	3 Watt POWERMITE®	3 Watt SMB
Volts	 Plastic Case 403B Cathode = Notch	 Plastic Case 403B Cathode = Notch	Cathode  Anode Plastic Case 457	 Plastic Case 403A
1.8 2.0 2.2 2.4 2.5				
2.7 2.8 3.0 3.3 3.6	1SMA5913B 1SMA5914B			1SMB5913B 1SMB5914B
3.9 4.3 4.7 5.1 5.6	1SMA5915B 1SMA5916B 1SMA5917B 1SMA5918B 1SMA5919B			1SMB5915B 1SMB5916B 1SMB5917B 1SMB5918B 1SMB5919B
6.0 6.2 6.8 7.5 8.2	1SMA5920B 1SMA5921B 1SMA5922B 1SMA5923B		1PMT5920B 1PMT5921B 1PMT5922B	1SMB5920B 1SMB5921B 1SMB5922B 1SMB5923B
8.7 9.1 10 11 12	1SMA5924B 1SMA5925B 1SMA5927B		1PMT5924B 1PMT5927B	1SMB5924B 1SMB5925B 1SMB5926B 1SMB5927B
13 14 15 16 17	1SMA5928B 1SMA5929B 1SMA5930B	BZG03C15	1PMT5929B	1SMB5928B 1SMB5929B 1SMB5930B
18 19 20 22 24	1SMA5931B 1SMA5932B 1SMA5933B 1SMA5934B		1PMT5933B 1PMT5934B	1SMB5931B 1SMB5932B 1SMB5933B 1SMB5934B
25 27 28 30 33	1SMA5935B 1SMA5936B 1SMA5937B			1SMB5935B 1SMB5936B 1SMB5937B

Zener Diodes – Regulation in Surface Mount (continued)

Table 5. SURFACE MOUNT PACKAGES – 1.5, 3 WATT (continued)

Nominal Zener Breakdown Voltage	1.5 Watt SMA	1.5 Watt SMA	3 Watt POWERMITE®	3 Watt SMB
Volts	 Plastic Case 403B Cathode = Notch	 Plastic Case 403B Cathode = Notch	Cathode  Anode Plastic Case 457	 Plastic Case 403A
36	1SMA5938B			1SMB5938B
39	1SMA5939B			1SMB5939B
43	1SMA5940B			1SMB5940B
47	1SMA5941B		1PMT5941B	1SMB5941B
51	1SMA5942B			1SMB5942B
56	1SMA5943B			1SMB5943B
60				
62				1SMB5944B
68	1SMA5945B			1SMB5945B
75				1SMB5946B
82				1SMB5947B
87				
91				1SMB5948B
100				1SMB5949B
110				
120				1SMB5951B
130				1SMB5952B
150		BZG03C150		1SMB5953B
160				1SMB5954B
180				1SMB5955B
200				1SMB5956B

Dual Zeners – Duals in Surface Mount

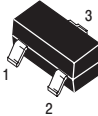

MMBZ15VDLT1 – Common Cathode Series

Table 6. SOT-23 DUAL COMMON CATHODE ZENER; 40 WATTS PEAK POWER (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

BIDIRECTIONAL (Circuit tied to Pins 1 and 2)

($V_F = 0.9\text{ V Max @ } I_F = 10\text{ mA}$)

Device	Breakdown Voltage			@ I_T (mA)	Reverse Voltage Working Peak V_{RWM} (V)	Max Reverse Leakage Current I_R (nA)	Max Reverse Surge Current I_{PP} (A)	Max Reverse Voltage @ I_{PP} (Clamping Voltage) V_C (V)	Maximum Temperature Coefficient of V_{BR} (mV/°C)
	V_{BR} (Note 1) (V)								
	Min	Nom	Max						
 <p style="text-align: center;">CASE 318-08 TO-236AB LOW PROFILE SOT-23</p> 									
MMBZ15VDL	14.3	15	15.8	1.0	12.8	100	1.9	21.2	12

($V_F = 1.1\text{ V Max @ } I_F = 200\text{ mA}$)

MMBZ27VCL	25.65	27	28.35	1.0	22	50	1.0	38	26
-----------	-------	----	-------	-----	----	----	-----	----	----

1. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C .

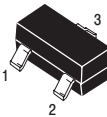

MMBZ5V6ALT1 – Common Anode Series

Table 7. SOT-23 DUAL COMMON ANODE ZENER; 24 WATTS PEAK POWER (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

UNIDIRECTIONAL (Circuit tied to Pins 1 and 3 or Pins 2 and 3)

($V_F = 0.9\text{ V Max @ } I_F = 10\text{ mA}$)

Device	Breakdown Voltage			@ I_T (mA)	Max Reverse Leakage Current		Max Zener Impedance (Note 3)		Max Reverse Surge Current I_{PP} (A)	Max Reverse Voltage @ I_{PP} (Clamping Voltage) V_C (V)	Max Temp Coefficient of V_{BR} (mV/°C)		
	V_{BR} (Note 2) (V)				I_R @ V_R (μA)	V_R (V)	Z_{ZT} @ I_{ZT} (Ω)	I_{ZT} (mA)				Z_{ZK} @ I_{ZK} (Ω)	I_{ZK} (mA)
	Min	Nom	Max										
 <p style="text-align: center;">CASE 318-08 STYLE 12 LOW PROFILE SOT-23 PLASTIC</p> 													
MMBZ5V6AL	5.32	5.6	5.88	20	5.0	3.0	11	1600	0.25	3.0	8.0	1.26	
MMBZ6V2AL	5.89	6.2	6.51	1.0	0.5	3.0	–	–	–	2.76	8.7	2.80	
MMBZ6V8AL	6.46	6.8	7.14	1.0	0.5	4.5	–	–	–	2.5	9.6	3.40	
MMBZ9V1AL	8.65	9.1	9.56	1.0	0.3	6.0	–	–	–	1.7	14	7.50	

2. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C .

3. Z_{ZT} and Z_{ZK} are measured by dividing the AC voltage drop across the device by the AC current supplied. The specified limits are $I_{Z(AC)} = 0.1 I_{Z(DC)}$, with AC frequency = 1 kHz.

Dual Zeners – Duals in Surface Mount (continued)

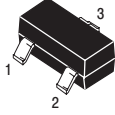
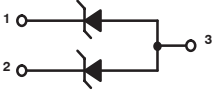
MMBZ5V6ALT1 – Common Anode Series

Table 8. SOT-23 DUAL COMMON ANODE ZENER; 40 WATTS PEAK POWER (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

UNIDIRECTIONAL (Circuit tied to Pins 1 and 3 or Pins 2 and 3)

(V_F = 0.9 V Max @ I_F = 10 mA)

Device	Breakdown Voltage			Reverse Voltage Working Peak V _{RWM} (Volts)	Max Reverse Leakage Current I _R (nA)	Max Reverse Surge Current I _{PP} (A)	Max Reverse Voltage @ I _{PP} (Clamping Voltage) V _C (V)	Maximum Temperature Coefficient of V _{BR} (mV/°C)	
	V _{BR} (Note 4) (V)								
	Min	Nom	Max						
 <p>CASE 318-08 STYLE 12 LOW PROFILE SOT-23 PLASTIC</p> 									
MMBZ12VAL	11.40	12	12.60	1.0	8.5	200	2.35	17	7.50
MMBZ15VAL	14.25	15	15.75	1.0	12.0	50	1.9	21	12.30
MMBZ18VAL	17.10	18	18.90	1.0	14.5	50	1.6	25	15.30
MMBZ20VAL	19.00	20	21.00	1.0	17.0	50	1.4	28	17.20
MMBZ27VAL	25.65	27	28.35	1.0	22.0	50	1.0	40	24.30
MMBZ33VAL	31.35	33	34.65	1.0	26.0	50	0.87	46	30.40

4. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.

Rectifiers

Rectifiers

Table of Contents

	Page
Application Specific Rectifiers	138
Low V_F Schottky	138
Low Leakage Schottky	138
High Voltage Schottky	138
MEGAHERTZ™	139
UltraSoft Rectifiers	139
Energy Rated Rectifiers	139
Automotive Transient Suppressors	139
SCHOTTKY Rectifiers	140
Surface Mount Schottky	140
Axial Lead Schottky	143
TO-220 Type Schottky	144
TO-218 Types and TO-247 Schottky	145
UltraSoft Rectifiers	145
Ultrafast Rectifiers	146
Surface Mount Ultrafast	146
Axial Lead Ultrafast	147
TO-220 Type Ultrafast	148
TO-218 Types and TO-247 Ultrafast	148
Fast Recovery Rectifiers/General	
Purpose Rectifiers	149

In Brief...

Continuing investment in research and development for discrete products has created a rectifier manufacturing facility that matches the precision and versatility of the most advanced integrated circuits. As a result, ON Semiconductor's silicon rectifiers span all high tech applications with quality levels capable of passing the most stringent environmental tests ... including those for automotive under-hood applications.

Product Highlights:

- Surface Mount Devices – A major thrust has been the development and introduction of a broad range of power rectifiers, Schottky and Ultrafast, 1/2 A to 40 A, 10 to 600 V.
- Application Specific Rectifiers –
 - ◆ Schottky rectifiers having lower forward voltage drop (0.3 V to 0.6 V) for use in low voltage SMPS outputs and as “OR”ing diodes.
 - ◆ MEGAHERTZ™ series for high frequency power supplies and power factor correction.
 - ◆ UltraSoft rectifiers for high speed rectification.
 - ◆ Energy rated rectifiers with guaranteed energy handling capability.
 - ◆ Automotive transient suppressors.
- Ultrafast rectifiers having reverse recovery times as low as 25 ns to complement the Schottky devices for higher voltage requirements in high frequency applications.
- A wide variety of package options to match virtually any potential requirement.

The rectifier selector section that follows has generally been arranged by package and technology. The individual tables have been sorted by voltage and current with the package types for the devices listed shown above each table. The Application Specific Rectifiers are also included in their respective tables.

Application Specific Rectifiers

Table 1. Low V_F Schottky Rectifiers

Device	I_O (A)	V_{RRM} (V)	Max V_F @ Rated I_O and $T_C = 25^\circ\text{C}$ (V)	Max I_R @ Rated V_{RRM} and $T_C = 25^\circ\text{C}$ (mA)	Package
MBR0520L	0.5	20	0.385	0.25	SOD-123
MBR120LSF	1.0	20	0.45	0.4	SOD-123 Flat Lead
MBR120VLSF	1.0	20	0.34	0.6	SOD-123 Flat Lead
MBR130LSF	1.0	30	0.38	1.0	SOD-123 Flat Lead
MBRM110L	1.0	10	0.365	0.5	POWERMITE®
MBRA210L	2.0	10	0.35	0.7	SMA
MBRS130L	1.0	30	0.395	1.0	SMB
MBRS230L	2.0	30	0.50	1.0	SMB
MBRS410L	4.0	10	0.33	5.0	SMC
MBRD835L	8.0	35	0.51	1.4	DPAK
MBRD1035CTL	10	35	0.56	2.0	DPAK
MBR2030CTL	20	30	0.58	5.0	TO-220AC
MBRB2535CTL	25	35	0.55	10	D ² PAK
MBR2535CTL	25	35	0.55	5.0	TO-220AC
MBRB2515L	25	15	0.45	15	D ² PAK
MBR2515L	25	15	0.45	15	TO-220AC
MBRB3030CTL	30	30	0.51	2.0	D ² PAK
MBR4015LWT	40	15	0.50	5.0	TO-247
MBR10H100CTG*	10	100	0.85	0.0035	TO-220AB
MBR20H100CTG*	20	100	0.88	0.0045	TO-220AB
MBRF20H100CTG*	20	100	0.88	0.0045	FULL PACK
MBR30H100CTG*	30	100	0.93	0.0045	TO-220AB
MBR40H100WTG*	40	100	0.9	0.01	TO-247
MBR41H100CTG*	40	100	0.9	0.01	TO-220AB
MBRB41H100CT-1G*	40	100	0.9	0.01	I ² PAK
MBR60H100CTG*	60	100	0.98	0.01	TO-220AB
MBRB30H30CT-1G*	30	30	0.55	0.8	I ² PAK
MBR3045ST*	30	45	0.76	0.2	TO-220AB
MBRB3045CT-1G*	30	45	0.76	0.2	I ² PAK
MBRB30H60CT-1G*	30	60	0.78	0.3	I ² PAK
MBRF30H60CTG*	30	60	0.78	0.3	FULL PACK
MBR60L45CT	60	45	0.73	1.2	TO-220AB
MBR60L45WT	60	45	0.73	1.2	TO-247

Table 2. Low Leakage Schottky Rectifiers

Device	I_O (A)	V_{RRM} (V)	Max V_F @ Rated I_O and $T_C = 25^\circ\text{C}$ (V)	Max I_R @ Rated V_{RRM} and $T_C = 25^\circ\text{C}$ (mA)	Package
MBR120ESF	1.0	20	0.53	0.01	SOD-123 FLAT LEAD
MBRM110E	1.0	10	0.53	0.001	POWERMITE®
MBRM120E	1.0	20	0.53	0.01	POWERMITE®
MBRA120E	1.0	20	0.53	0.01	SMA
MBRA210E	2.0	10	0.5	0.015	SMA
MBRS410E	4.0	10	0.5	0.15	SMC

Table 3. High Voltage Schottky Rectifiers

Device	I_O (A)	V_{RRM} (V)	Max V_F @ Rated I_O and $T_C = 25^\circ\text{C}$ (V)	Max I_R @ Rated V_{RRM} and $T_C = 25^\circ\text{C}$ (mA)	Package
MBRS3200	3.0	200	0.84	1.0	SMB
MBRS3201	3.0	200	0.84	1.0	SMC
MBRS4201	4.0	200	0.86	1.0	SMC
MBRB20200CT	20	200	1.0	1.0	D ² PAK
MBR20200CT	20	200	1.0	1.0	TO-220AB

* New Product

All devices listed are ON Semiconductor preferred devices

Application Specific Rectifiers (continued)

Table 4. High Voltage Schottky Rectifiers (continued)

Device	I _O (A)	V _{RRM} (V)	Max V _F @ Rated I _O and T _C = 25°C (V)	Max I _R @ Rated V _{RRM} and T _C = 25°C (mA)	Package
<i>MBRF20200CT</i>	20	200	1.0	1.0	FULL PAK
<i>MBR40250</i>	40	250	0.97	0.03	TO-220AC
<i>MBR40250T</i>	40	250	0.97	0.03	TO-220AB
<i>MBRF40250T</i>	40	250	0.97	0.03	FULL PAK

Table 5. MEGAHERTZ™ Rectifiers

Device	I _O (A)	V _{RRM} (V)	Max V _F @ Rated I _F and T _C = 25°C (V)	Max I _R @ Rated V _{RRM} and T _C = 25°C (mA)	t _{rr} (ns)	Package
<i>MURH840CT</i>	8.0	400	2.2	0.01	28	TO-220AB
<i>MURHB840CT</i>	8.0	400	2.2	0.01	28	TO-220AB
<i>MURHS160</i>	1.0	600	2.4	0.02	35	SMB
<i>MURHD560</i>	5.0	600	2.7	0.01	30	DPAK
<i>MURH860CT</i>	8.0	600	2.8	0.01	35	TO-220AB
<i>MURHB860CT</i>	8.0	600	2.8	0.01	35	TO-220AB
<i>MURHF860CT</i>	8.0	600	2.8	0.01	35	TO-220AB

Table 6. UltraSoft Rectifiers (For High Speed Rectification)

Device	I _O (A)	V _{RRM} (V)	Max V _F @ I _F and T _C = 25°C (V)	Max t _{rr} (ns)	T _J Max (°C)	Package
<i>MSRD620CT</i>	6.0	200	1.35 @ 6.0 A	55	175	DPAK
<i>MSR860</i>	8.0	600	1.7 @ 8.0 A	120	150	TO-220AC
<i>MSR1560</i>	15	600	1.8 @ 15 A	45	150	TO-220AC

Table 7. Energy Rated Rectifiers

Device	I _O (A)	V _{RRM} (V)	Max V _F @ I _F Rated and T _C = 25°C (V)	Max I _R @ Rated V _{RRM} and T _C = 125°C (μA)	Avalanche Energy (mJ)	Package
<i>MUR180E</i>	1.0	800	1.75	10	10	DO-41
<i>MUR1100E</i>	1.0	1000	1.75	10	10	DO-41
<i>MUR480E</i>	4.0	800	1.85	25	20	DO-201AD
<i>MUR4100E</i>	4.0	1000	1.85	25	20	DO-201AD
<i>MUR880E</i>	8.0	800	1.8	25	20	TO-220AC
<i>MUR8100E</i>	8.0	1000	1.8	25	20	TO-220AC

Table 8. Automotive Transient Suppressors





Device	I _O (A)	V _{RRM} (V)	Max V _F @ Rated I _F and T _C = 25°C (V)	I _{RSM} (A)	T _J Max (°C)	Package
<i>MR2535L</i>	6.0	20	1.1 @ 100 A	62 @ 10 mS	150	Axial Lead Button
<i>MR2835SK</i>	32	23	1.1 @ 100 A	62 @ 10 mS	175	Top Can
<i>TRA2532</i>	32	23	1.18 @ 100 A	80 @ 10 mS	175	Micro Button

* New Product

All devices listed are ON Semiconductor preferred devices

SCHOTTKY Rectifiers

Table 9. Surface Mount Schottky Rectifiers

V _{RRM} (V)	I _O ⁽¹⁾ (A)	I _O Rating Condition	Device	Max V _F @ I _F T _C = 25°C (V)	I _{FSM} (A)	T _J Max (°C)	Max I _R ⁽²⁾ T _J = 25°C (mA)	Max I _R ⁽³⁾ (mA)	Package
20	0.5	T _L = 90°C	<i>MBR0520L</i> <i>MBR0520L</i>	0.300 @ 0.1 A 0.385 @ 0.5 A	5.5	125	.075 @ 10 V .250 @ 20 V	5.0 @ 10 V 8.0 @ 20 V	CASE 425-04 (SOD-123) Cathode = Band 
30	0.5	T _L = 100°C	<i>MBR0530</i> <i>MBR0530</i>	0.375 @ 0.1 A 0.430 @ 0.5 A	5.5	125	.020 @ 15 V .130 @ 30 V	-	
40	0.5	T _L = 110°C	<i>MBR0540</i> <i>MBR0540</i>	0.51 @ 0.5 A	5.5	150	.010 @ 20 V .020 @ 40 V	-	
30	1.0	T _L = 65°C	<i>MBR130</i> <i>MBR130</i>	0.51 @ 1.0 A	5.5	125	60 μA	-	
20	1.0	T _L = 140°C	<i>MBR120ESF</i> <i>MBR120ESF</i>	0.53 @ 1.0 A	40	150	.010	1.6 @ 100°C	CASE 498-01 (SOD-123FL) 
20	1.0	T _L = 115°C	<i>MBR120LSF</i> <i>MBR120LSF</i>	0.45 @ 1.0 A	50	125	0.4	25 @ 85°C	
20	1.0	T _L = 119°C	<i>MBR120VLSF</i> <i>MBR120VLSF</i>	0.340 @ 1.0 A	45	125	0.6	15 @ 85°C	
30	1.0	T _L = 117°C	<i>MBR130LSF</i>	0.38 @ 1.0 A	40	125	1.0	25 @ 100°C	
40	1.0	T _L = 112°C	<i>MBR140SF</i> <i>MBR140SF</i>	0.55 @ 1.0 A	30	125	0.5	25 @ 85°C	
10	1.0	T _C = 100°C	<i>MBRM110E</i> <i>MBRM110E</i>	0.53 @ 1.0 A	50	150	0.001	0.5 @ 100°C	CASE 457-04 (POWERMITE®) 
10	1.0	T _C = 115°C	<i>MBRM110L</i> <i>MBRM110L</i>	0.365 @ 1.0 A	50	125	0.5	60 @ 100°C	
20	1.0	T _C = 130°C	<i>MBRM120E</i> <i>MBRM120E</i>	0.530 @ 1.0 A 0.455 @ 0.1 A	50	150	0.010 @ 20 V	1.6 @ 20 V	
20	1.0	T _{tab} ≤ 100°C	<i>MBRM120L</i> <i>MBRM120L</i>	0.45 @ 1.0 A 0.34 @ 0.1 A	50	125	0.4 @ 20 V	N/A	
30	1.0	T _C = 135°C	<i>MBRM130L</i> <i>MBRM130L</i>	0.38 @ 1.0 A	50	125	0.41	N/A	
40	1.0	T _{tab} ≤ 100°C	<i>MBRM140</i>	0.36 @ 0.1 A 0.55 @ 1.0 A	50	125	0.5 @ 40 V	N/A	
20	1.0	T _L = 125°C	<i>MBRA120E</i>	0.530 @ 1.0 A	40	150	0.010	1.6 @ 100°C	CASE 403D-02 (SMA) Cathode = Notch or Polarity Band 
30	1.0	T _C ≤ 105°C	<i>MBRA130L</i>	0.41 @ 1.0 A 0.47 @ 2.0 A	25	125	1.0 @ 30 V 0.4 @ 15 V	25 @ 30 V	
40	1.0	T _C ≤ 100°C	<i>MBRA140</i>	0.55 @ 1.0 A 0.71 @ 2.0 A	30	125	0.5 @ 40 V 0.1 @ 20 V	10 @ 40 V	
60	1.0	T _L = 105°C	<i>MBRA160</i>	0.51 @ 1.0 A	60	125	0.2	10 @ 125°C	
60	1.0	T _L = 105°C	<i>SS16</i>	0.51 @ 1.0 A	40	150	0.2	10 @ 125°C	
10	2.0	T _L = 125°C	<i>MBRA210E</i>	0.50 @ 2.0 A	100	150	0.015	0.2 @ 100°C	
10	2.0	T _L = 110°C	<i>MBRA210L</i>	0.35 @ 2.0 A	160	125	0.70	60 @ 100°C	
40	3.0	T _C = 100°C	<i>MBRA340</i>	0.45 @ 3.0 A	100	150	0.3	15 @ 40 V	

⁽¹⁾I_O is total device current capability.



⁽²⁾At V_{RRM} unless noted

⁽³⁾At V_{RRM}, T_J = 100°C unless noted

All devices listed are ON Semiconductor preferred devices

SCHOTTKY Rectifiers (continued)

Table 10. Surface Mount Schottky Rectifiers (continued)

V_{RRM} (V)	$I_O^{(1)}$ (A)	I_O Rating Condition	Device	Max V_F @ I_F $T_C = 25^\circ\text{C}$ (V)	I_{FSM} (A)	T_J Max ($^\circ\text{C}$)	Max $I_R^{(2)}$ $T_J = 25^\circ\text{C}$ (mA)	Max $I_R^{(3)}$ (mA)	Package
20	1.0	$T_L = 115^\circ\text{C}$	MBRS120	0.6 @ 1.0 A	40	125	1.0	10	CASE 403A-03 (SMB) Cathode = Notch or Polarity Band 
30	1.0	$T_L = 120^\circ\text{C}$	MBRS130L	0.395 @ 1.0 A	40	125	1.0	10	
30	1.0	$T_L = 115^\circ\text{C}$	MBRS130	0.6 @ 1.0 A	40	125	1.0	10	
40	1.0	$T_L = 115^\circ\text{C}$	MBRS140	0.6 @ 1.0 A	40	125	1.0	10	
40	1.0	$T_C = 110^\circ\text{C}$	MBRS140L	0.5 @ 1.0 A	40	125	0.4	10	
90	1.0	$T_L = 120^\circ\text{C}$	MBRS190	0.75 @ 1.0 A	50	175	0.5	5.0	
100	1.0	$T_L = 120^\circ\text{C}$	MBRS1100	0.75 @ 1.0 A	50		0.5	5.0	
40	1.5	$T_C = 100^\circ\text{C}$	MBRS1540	0.54 @ 1.5 A	40	125	0.8	5.7	
30	2.0	$T_C = 110^\circ\text{C}$	MBRS230L	0.5 @ 2.0 A	40	125	1.0	75 @ 125 $^\circ\text{C}$	
40	2.0	$T_C \leq 95^\circ\text{C}$	MBRS240L	0.43 @ 2.0 A 0.53 @ 4.0 A	25	125	2.0 @ 40 V 0.5 @ 20 V	60 @ 40 V 40 @ 20 V	
40	2.0	$T_C = 103^\circ\text{C}$	MBRS2040L	0.43 @ 2.0 A 0.50 @ 4.0 A	70	125	0.80 @ 40 V 0.10 @ 20 V	20 @ 40 V 6.0 @ 20 V	
60	2.0	$T_L = 95^\circ\text{C}$	MBRS260	0.63 @ 2.0 A	60	125	0.2	10 @ 125 $^\circ\text{C}$	
20	2.0	$T_C = 100^\circ\text{C}$	SS22	0.5 @ 2.0 A	75	150	0.4	5.7 @ 100 $^\circ\text{C}$	
40	2.0	$T_C = 100^\circ\text{C}$	SS24	0.5 @ 2.0 A	75	150	0.4	5.7 @ 100 $^\circ\text{C}$	
60	2.0	$T_L = 95^\circ\text{C}$	SS26	0.63 @ 2.0 A	40	150	0.2	10 @ 125 $^\circ\text{C}$	
200	3.0	$T_L = 120^\circ\text{C}$	MBRS3200	0.84 @ 3.0 A	100	150	1.0	5.0 @ 200 V	
20	3.0	$T_L = 110^\circ\text{C}$	MBRS320	0.50 @ 3.0 A	80	125	2.0	20	CASE 403-03 (SMC) Cathode = Notch 
30	3.0	$T_L = 110^\circ\text{C}$	MBRS330	0.50 @ 3.0 A	80	125	2.0	20	
40	3.0	$T_L = 110^\circ\text{C}$	MBRS340	0.5 @ 3.0 A	80	125	2.0	20	
60	3.0	$T_L = 137^\circ\text{C}$	MBRS360T3	0.74 @ 3.0 A	125	175	0.15	10	
100	3.0	$T_L = 100^\circ\text{C}$	MBRS3100	0.79 @ 3.0 A	130	175	0.05	5.0 @ 125 $^\circ\text{C}$	
200	3.0	$T_C = 70^\circ\text{C}$	MBRS3201	0.840 @ 3.0 A	100	150	1.0	5.0 @ 150 $^\circ\text{C}$	
10	4.0	$T_L = 130^\circ\text{C}$	MBRS410E	0.50 @ 4.0 A	250	150	0.15	4.0 @ 100 $^\circ\text{C}$	
10	4.0	$T_L = 110^\circ\text{C}$	MBRS410L	0.33 @ 4.0 A	150	125	5.0	200 @ 100 $^\circ\text{C}$	
200	4.0	$T_L = 70^\circ\text{C}$	MBRS4201	0.860 @ 4.0 A	100	150	1.0	5.0 @ 150 $^\circ\text{C}$	
40	5.0	$T_C = 105^\circ\text{C}$	MBRS540	0.5 @ 5.0 A	190	150	0.3	15 @ 40 V	

(1) I_O is total device current capability.

(2) At V_{RRM} unless noted







(3) At V_{RRM} , $T_J = 100^\circ\text{C}$ unless noted

All devices listed are ON Semiconductor preferred devices

ON Semiconductor Selector Guide – Rectifiers

SCHOTTKY Rectifiers (continued)

Table 10. Surface Mount Schottky Rectifiers (continued)

V_{RRM} (V)	$I_O^{(1)}$ (A)	I_O Rating Condition	Device	Max V_F @ I_F $T_C = 25^\circ\text{C}$ (V)	I_{FSM} (A)	T_J Max ($^\circ\text{C}$)	Max $I_R^{(2)}$ $T_J = 25^\circ\text{C}$ (mA)	Max $I_R^{(3)}$ (mA)	Package	
20	3.0	$T_C = 125^\circ\text{C}$	MBRD320	0.60 @ 3.0 A	75	175	0.2	20 @ 125°C	CASE 369A-13 (DPAK) 	 "CT" Suffix  Non-"CT" Suffix
30	3.0	$T_C = 125^\circ\text{C}$	MBRD330	0.60 @ 3.0 A	75	175	0.2	20 @ 125°C		
40	3.0	$T_C = 125^\circ\text{C}$	MBRD340	0.60 @ 3.0 A	75	175	0.2	20 @ 125°C		
50	3.0	$T_C = 125^\circ\text{C}$	MBRD350	0.60 @ 3.0 A	75	175	0.2	20 @ 125°C		
60	3.0	$T_C = 125^\circ\text{C}$	MBRD360	0.60 @ 3.0 A	75	175	0.2	20 @ 125°C		
20	6.0	$T_C = 130^\circ\text{C}$	MBRD620CT	0.70 @ 3.0 A	75	175	0.1	15 @ 125°C		
30	6.0	$T_C = 130^\circ\text{C}$	MBRD630CT	0.70 @ 3.0 A	75	175	0.1	15 @ 125°C		
40	6.0	$T_C = 130^\circ\text{C}$	MBRD640CT	0.70 @ 3.0 A	75	175	0.1	15 @ 125°C		
50	6.0	$T_C = 130^\circ\text{C}$	MBRD650CT	0.70 @ 3.0 A	75	175	0.1	15 @ 125°C		
60	6.0	$T_C = 130^\circ\text{C}$	MBRD660CT	0.70 @ 3.0 A	75	175	0.1	15 @ 125°C		
35	8.0	$T_C = 88^\circ\text{C}$	MBRD835L	0.40 @ 3.0 A 0.51 @ 8.0 A	75	150	1.4	35	CASE 418B-04 (D ² PAK) 	 "CT" Suffix  Non-"CT" Suffix
35	10	$T_C = 115^\circ\text{C}$	MBRD1035CTL	0.56 @ 10 A	50	150	2.0	130 @ 125°C		
45	10	$T_C = 135^\circ\text{C}$	MBRD1045T4G	0.84 @ 20 A	70	175	0.1	15 @ 125°C		
45	10	$T_C = 135^\circ\text{C}$	MBRB1045	0.84 @ 20 A	150	175	0.1	15 @ 125°C		
45	15	$T_C = 105^\circ\text{C}$	MBRB1545CT	0.84 @ 15 A	150	175	0.1	15 @ 125°C		
45	16	$T_C = 125^\circ\text{C}$	MBRB1645	0.63 @ 16 A	150	150	0.2	40 @ 125°C		
60	20	$T_C = 110^\circ\text{C}$	MBRB2060CT	0.95 @ 20 A	150	175	0.15	135 @ 125°C		
100	20	$T_C = 110^\circ\text{C}$	MBRB20100CT	0.85 @ 10 A 0.95 @ 20 A	150	175	0.1	6.0 @ 125°C		
200	20	$T_C = 134^\circ\text{C}$	MBRB20200CT	1.0 @ 20 A	150	150	1.0	50 @ 125°C		
15	25	$T_C = 90^\circ\text{C}$	MBRB2515L	0.45 @ 25 A	150	100	15	200 @ 70°C		
35	25	$T_C = 110^\circ\text{C}$	MBRB2535CTL	0.47 @ 12.5 A 0.55 @ 25 A	150	125	10	500 @ 125°C		
45	30	$T_C = 130^\circ\text{C}$	MBRB2545CT	0.82 @ 30 A	150	175	0.2	25 @ 125°C		
30	30	$T_C = 134^\circ\text{C}$	MBRB3030CT	0.54 @ 15 A 0.67 @ 30 A	200	175	0.6	145 @ 150°C 46 @ 10 V, 150°C		
30	30	$T_C = 115^\circ\text{C}$	MBRB3030CTL	0.44 @ 15 A 0.51 @ 30 A	300	125	2.0	195 @ 125°C 75 @ 10 V, 125°C		
30	40	$T_C = 115^\circ\text{C}$	MBRB4030	0.46 @ 20 A 0.55 @ 40 A	300	175	0.35	150 @ 125°C		

(1) I_O is total device current capability.


(2) At V_{RRM} unless noted

(3) At V_{RRM} , $T_J = 100^\circ\text{C}$ unless noted

All devices listed are ON Semiconductor preferred devices

SCHOTTKY Rectifiers (continued)

Table 10. Axial Lead Schottky Rectifiers

V _{RRM} (V)	I _O (A)	I _O Rating Condition	Device	Max V _F @ I _F T _C = 25°C (V)	I _{FSM} (A)	T _J Max (°C)	Max I _R ⁽²⁾ T _L = 25°C (mA)	Max I _R ⁽³⁾ (mA)	Package
20	1.0	T _A = 55°C R _{θJA} = 80°C/W	1N5817	0.45 @ 1.0 A	25	125	1.0	10	<p>CASE 59-10 (DO-41) Plastic</p>  <p>Cathode = Polarity Band</p>
30	1.0	T _A = 55°C R _{θJA} = 80°C/W	1N5818	0.55 @ 1.0 A	25	125	1.0	10	
40	1.0	T _A = 55°C R _{θJA} = 80°C/W	1N5819	0.60 @ 1.0 A	25	125	1.0	10	
50	1.0	T _A = 55°C	MBR150	0.75 @ 1.0 A	25	150	0.5	5.0	
60	1.0	T _A = 55°C R _{θJA} = 80°C/W	MBR160	0.75 @ 1.0 A	25	150	0.5	5.0	
100	1.0	T _A = 120°C R _{θJA} = 50°C/W	MBR1100	0.79 @ 1.0 A	50	175	0.5	5.0	
20	3.0	T _A = 76°C R _{θJA} = 28°C/W	1N5820	0.457 @ 3.0 A	80	125	2.0	20	
30	3.0	T _A = 71°C R _{θJA} = 28°C/W	1N5821	0.500 @ 3.0 A	80	125	2.0	20	
40	3.0	T _A = 61°C R _{θJA} = 28°C/W	1N5822	0.525 @ 3.0 A	80	125	2.0	20	
40	3.0	T _A = 65°C R _{θJA} = 28°C/W	MBR340	0.74 @ 3.0 A	80	175	0.6	20	
50	3.0	T _A = 65°C	MBR350RL	0.600 @ 3.0 A	80	150	0.6	20	
60	3.0	T _A = 65°C R _{θJA} = 28°C/W	MBR360RL	0.740 @ 3.0 A	80	150	0.6	20	
100	3.0	T _A = 100°C R _{θJA} = 28°C/W	MBR3100	0.79 @ 3.0 A	150	175	0.6	20	
45	8.0	T _L = 75°C	80SQ045N	0.55 @ 8.0 A	140	125	1.0	50 @ 100°C	

(1) I_O is total device current capability.

(2) At V_{RRM} unless noted

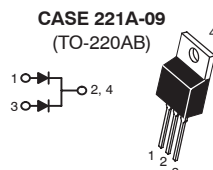
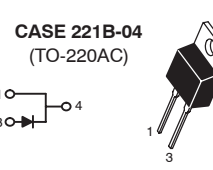


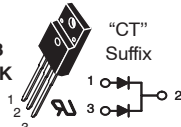




(3) At V_{RRM}, T_J = 100°C unless noted

All devices listed are ON Semiconductor preferred devices

ON Semiconductor Selector Guide – Rectifiers


SCHOTTKY Rectifiers (continued)

Table 11. TO-220 and I²PAK Thru-Hole Schottky Rectifiers

V _{RRM} (V)	I _O (A)	I _O Rating Condition	Device	Max V _F @ I _F T _C = 25°C (V)	I _{FSM} (A)	T _J Max (°C)	Max I _R ⁽²⁾ T _C = 25°C (mA)	Max I _R ⁽³⁾ (mA)	Package
35	15	T _C = 165°C	<i>MBR1535CT</i>	0.84 @ 15 A	150	175	0.1	15 @ 125°C	 <p>CASE 221A-09 (TO-220AB)</p>
45	15	T _C = 165°C	<i>MBR1545CT</i>	0.84 @ 15 A	150	175	0.1	15 @ 125°C	
100	16	T _C = 133°C	<i>MBR16100CT</i>	0.84 @ 16 A	150	175	0.1	5.0 @ 125°C	
30	20	T _C = 137°C	<i>MBR2030CTL</i>	0.52 @ 10 A 0.58 @ 20 A	150	150	5.0	40	
45	20	T _C = 135°C	<i>MBR2045CT</i>	0.84 @ 20 A	150	150	0.1	15 @ 125°C	
60	20	T _C = 133°C	<i>MBR2060CT</i>	0.85 @ 10 A 0.95 @ 20 A	150	150	0.1	6.0 @ 125°C	
80	20	T _C = 133°C	<i>MBR2080CT</i>	0.95 @ 20 A	150	175	0.1	6.0 @ 125°C	
90	20	T _C = 133°C	<i>MBR2090CT</i>	0.95 @ 20 A	150	150	0.1	6.0 @ 125°C	
100	10	T _C = 168°C	<i>MBR10H100CTG</i>	0.85 @ 10 A	180	175	0.0035	4.5 @ 125°C	
100	20	T _C = 162°C	<i>MBR20H100CTG</i>	0.88 @ 20 A	250	175	0.0045	6.0 @ 125°C	
100	30	T _C = 155°C	<i>MBR30H100CTG</i>	0.93 @ 30 A	250	175	0.0045	6.0 @ 125°C	
100	40	T _C = 150°C	<i>MBR41H100CTG</i>	0.9 @ 40 A	350	175	0.01	10 @ 125°C	
100	60	T _C = 133°C	<i>MBR60H100CTG</i>	0.98 @ 60 A	350	175	0.01	10 @ 125°C	
100	20	T _C = 133°C	<i>MBR20100CT</i>	0.85 @ 10 A 0.95 @ 20 A	150	175	0.1	6.0 @ 125°C	
200	20	T _C = 125°C	<i>MBR20200CT</i>	1.0 @ 20 A	150	150	1.0	50 @ 125°C	
35	25	T _C = 95°C	<i>MBR2535CTL</i>	0.55 @ 25 A	150	125	5.0	500 @ 125°C	
45	25	T _C = 130°C	<i>MBR2545CT</i>	0.82 @ 25 A	150	150	0.2	40 @ 125°C	
45	30	T _C = 130°C	<i>MBR3045ST</i>	0.76 @ 30 A	150	175	0.2	40 @ 125°C	
15	40	T _C = 105°C	<i>MBR4015CTL</i>	0.54 @ 25 A	150	125	1.0	400 @ 125°C	
250	40	T _C = 82°C	<i>MBR40250T</i>	0.097 @ 40 A	150	150	0.03	30 @ 125°C	
45	60	T _C = 145°C	<i>MBR60L45CT</i>	0.73 @ 60 A	200	175	1.2	255 @ 125°C	
35	7.5	T _C = 170°C	<i>MBR735</i>	0.8 @ 15 A	150	175	0.1	15 @ 125°C	 <p>CASE 221B-04 (TO-220AC)</p>
45	7.5	T _C = 170°C	<i>MBR745</i>	0.84 @ 15 A	150	175	0.1	15 @ 125°C	
35	10	T _C = 135°C	<i>MBR1035</i>	0.84 @ 20 A	150	150	0.1	15 @ 125°C	
45	10	T _C = 135°C	<i>MBR1045</i>	0.84 @ 20 A	150	150	0.1	15 @ 125°C	
60	10	T _C = 133°C	<i>MBR1060</i>	0.80 @ 10 A	150	150	0.1	6.0 @ 125°C	
80	10	T _C = 133°C	<i>MBR1080</i>	0.80 @ 10 A	150	150	0.1	6.0 @ 125°C	
90	10	T _C = 133°C	<i>MBR1090</i>	0.8 @ 10 A	150	150	0.1	6.0 @ 125°C	
100	10	T _C = 133°C	<i>MBR10100</i>	0.80 @ 10 A	150	150	0.1	6.0 @ 125°C	
35	16	T _C = 125°C	<i>MBR1635</i>	0.63 @ 16 A	150	175	0.2	40 @ 125°C	
45	16	T _C = 125°C	<i>MBR1645</i>	0.63 @ 16 A	150	175	0.2	40 @ 125°C	
15	25	T _C = 90°C	<i>MBR2515L</i>	0.45 @ 25 A	150	100	15	200 @ 70°C	
250	40	T _C = 82°C	<i>MBR40250</i>	0.097 @ 40 A	150	150	0.03	30 @ 125°C	
30	30		<i>MBRB30H30CT-1G</i>	0.6 @ 30 A	260	150	0.5	45 @ 125°C	 <p>CASE 418D-01 I²PAK (TO-262)</p>
45	30	T _C = 130°C	<i>MBRB3045CT-1G</i>	0.76 @ 30 A	150	175	0.2	40 @ 125°C	
60	30	T _C = 159°C	<i>MBRB30H60CT-1G</i>	0.78 @ 30 A	260	175	0.3	45 @ 125°C	
100	40	T _C = 150°C	<i>MBRB41H100CT-1G</i>	0.9 @ 40 A	350	175	0.01	10 @ 125°C	
60	20	T _C = 133°C	 <i>MBRF2060CT</i>	0.95 @ 20 A	150	150	0.15	15 @ 125°C	 <p>CASE 221D-03 FULL PAK "CT" Suffix</p>
100	20	T _C = 133°C	 <i>MBRF20100CT</i>	0.95 @ 20 A	150	150	0.15	15 @ 125°C	
200	20	T _C = 125°C	 <i>MBRF20200CT</i>	1.0 @ 20 A	150	150	1.0	50 @ 125°C	
45	25	T _C = 125°C	 <i>MBRF2545CT</i>	0.82 @ 25 A	150	150	0.2	40 @ 125°C	
60	30	T _C = 159°C	<i>MBRF30H60CTG</i>	0.79 @ 30 A	260	175	0.3	45 @ 125°C	
250	40	T _C = 46°C	 <i>MBRF40250T</i>	0.097 @ 40 A	150	150	0.03	30 @ 125°C	

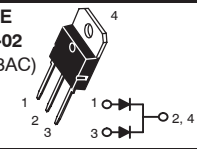
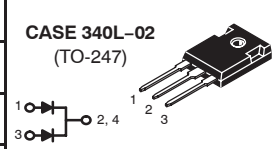
⁽²⁾At V_{RRM} unless noted

⁽³⁾At V_{RRM}, T_J = 100°C unless noted

 Indicates UL Recognized – File #E69369

SCHOTTKY Rectifiers (continued)

Table 12. TO-218 and TO-247 Schottky Rectifiers

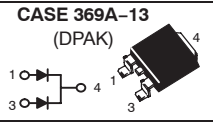
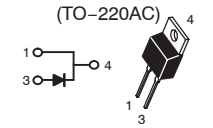
V_{RRM} (V)	I_O (A)	I_O Rating Condition	Device	Max V_F @ I_F $T_C = 25^\circ\text{C}$ (V)	I_{FSM} (A)	T_J Max ($^\circ\text{C}$)	Max $I_R^{(2)}$ $T_C = 25^\circ\text{C}$ (mA)	Max $I_R^{(3)}$ (mA)	Package
45	30	$T_C = 105^\circ\text{C}$	<i>MBR3045PT</i>	0.76 @ 30 A	200	150	1.0	100 @ 125 $^\circ\text{C}$	CASE 340D-02 (TO-218AC) 
45	40	$T_C = 125^\circ\text{C}$	<i>MBR4045PT</i>	0.70 @ 20 A 0.80 @ 40 A	400	175	1.0	50 @ 125 $^\circ\text{C}$	
45	60	$T_C = 125^\circ\text{C}$	<i>MBR6045PT</i>	0.62 @ 30 A 0.75 @ 60 A	500	150	1.0	50	
45	30	$T_C = 105^\circ\text{C}$	<i>MBR3045WT</i>	0.76 @ 30 A	200	150	1.0	100 @ 125 $^\circ\text{C}$	CASE 340L-02 (TO-247) 
15	40	$T_C = 125^\circ\text{C}$	<i>MBR4015LWT</i>	0.42 @ 20 A 0.50 @ 40 A	400	100	5.0	150 @ 75 $^\circ\text{C}$	
45	40	$T_C = 125^\circ\text{C}$	<i>MBR4045WT</i>	0.70 @ 20 A 0.80 @ 40 A	400	150	1.0	50	
45	60	$T_C = 125^\circ\text{C}$	<i>MBR6045WT</i>	0.62 @ 30 A 0.75 @ 60 A	500	175	1.0	50	
30	70	$T_C = 100^\circ\text{C}$	<i>MBR7030WT</i>	0.72 @ 70 A	500	150	5.0	250 @ 100 $^\circ\text{C}$	
100	40	$T_C = 150^\circ\text{C}$	<i>MBR40H100WT</i>	0.9 @ 40 A	200	175	0.01	10 @ 125 $^\circ\text{C}$	
45	60	$T_C = 165^\circ\text{C}$	<i>MBR60L45WT</i>	0.73 @ 60 A	200	175	1.2	275 @ 125 $^\circ\text{C}$	

⁽²⁾At V_{RRM} unless noted

⁽³⁾At V_{RRM} , $T_J = 100^\circ\text{C}$ unless noted

UltraSoft Rectifiers

Table 13. UltraSoft Rectifiers (For High Speed Rectification)

V_{RRM} (V)	$I_O^{(1)}$ (A)	I_O Rating Condition	Device	Max V_F @ I_F $T_C = 29^\circ\text{C}$ (V)	t_{rr} (ns)	T_J Max ($^\circ\text{C}$)	Max $I_R^{(2)}$ $T_C = 25^\circ\text{C}$ (μA)	Max $I_R^{(3)}$ (μA)	Package
200	6.0	$T_C = 137^\circ\text{C}$	<i>MSRD620CT</i>	1.35 @ 6.0 A	55	175	5.0	200	CASE 369A-13 (DPAK) 
600	8.0	$T_C = 125^\circ\text{C}$	<i>MSR860</i>	1.7 @ 8.0 A	120	150	10	1000	CASE 221B-04 (TO-220AC) 
600	15	$T_C = 125^\circ\text{C}$	<i>MSR1560</i>	1.8 @ 15 A	45	150	15	5000	





⁽¹⁾ I_O is total device current capability.

⁽²⁾At V_{RRM} unless noted

⁽³⁾At V_{RRM} , $T_J = 150^\circ\text{C}$ unless noted

Ultrafast Rectifiers (continued)

Table 14. Surface Mount Ultrafast Rectifiers

V _{RRM} (V)	I _O ⁽¹⁾ (A)	I _O Rating Condition	Device	Max t _{rr} (ns)	Max V _F @ I _F T _C = 25°C (V)	I _{FSM} (A)	T _J Max (°C)	Max I _R ⁽²⁾ T _J = 25°C (μA)	Max I _R ⁽⁴⁾ (μA)	Package	
50	1.0	T _L = 155°C	<i>MURA105</i>	30	0.875 @ 1.0 A	50	175	2.0	50	CASE 403D-02 SMA  Cathode = Polarity Band	
100	1.0	T _L = 155°C	<i>MURA110</i>	30	0.875 @ 1.0 A	50	175	2.0	50		
150	1.0	T _L = 155°C	<i>MURA115</i>	35	0.875 @ 1.0 A	40	175	2.0	50		
200	1.0	T _L = 155°C	<i>MURA120</i>	35	0.875 @ 1.0 A	40	175	2.0	50		
300	1.0	T _L = 150°C	<i>MURA130</i>	35	1.1 @ 1.0 A	35	175	5.0	150		
400	1.0	T _L = 150°C	<i>MURA140</i>	35	1.1 @ 1.0 A	35	175	5.0	150		
600	1.0	T _L = 145°C	<i>MURA160</i>	75	1.25 @ 1.0 A	30	175	5.0	150		
600	1.0	T _L = 145°C	<i>MURHS160</i>	35	2.4 @ 1.0 A	15	175	20	200 @ 125°C		
50	2.0	T _L = 135°C	<i>MURA205</i>	30	0.94 @ 2.0 A	50	175	2.0	50		
100	2.0	T _L = 135°C	<i>MURA210</i>	30	0.94 @ 2.0 A	50	175	2.0	50		
150	2.0	T _L = 135°C	<i>MURA215</i>	35	0.95 @ 2.0 A	40	175	2.0	50		
200	2.0	T _L = 135°C	<i>MURA220</i>	35	0.95 @ 2.0 A	40	175	2.0	50		
300	2.0	T _L = 125°C	<i>MURA230</i>	65	1.3 @ 2.0 A	35	175	5.0	150		
400	2.0	T _L = 125°C	<i>MURA240</i>	65	1.3 @ 2.0 A	35	175	5.0	150		
600	2.0	T _L = 110°C	<i>MURA260</i>	75	1.45 @ 2.0 A	30	175	5.0	150		
50	1.0	T _L = 155°C	<i>MURS105</i>	35	0.875 @ 1.0 A	40	175	2.0	50		CASE 403A-03 SMB  Cathode = Polarity Band
100	1.0	T _L = 155°C	<i>MURS110</i>	35	0.875 @ 1.0 A	40	175	2.0	50		
150	1.0	T _L = 155°C	<i>MURS115</i>	35	0.875 @ 1.0 A	40	175	2.0	50		
200	1.0	T _L = 155°C	<i>MURS120</i>	35	0.875 @ 1.0 A	40	175	2.0	50		
400	1.0	T _L = 150°C	<i>MURS140</i>	75	1.25 @ 1.0 A	35	175	5.0	150		
600	1.0	T _L = 150°C	<i>MURS160</i>	75	1.25 @ 1.0 A	35	175	5.0	150		
50	2.0	T _L = 125°C	<i>MURS205</i>	30	0.94 @ 2.0 A	50	175	2.0	50		
100	2.0	T _L = 125°C	<i>MURS210</i>	30	0.94 @ 2.0 A	50	175	2.0	50		
200	2.0	T _L = 145°C	<i>MURS220</i>	35	0.95 @ 2.0 A	40	175	2.0	50		
300	2.0	T _L = 125°C	<i>MURS230</i>	65	1.3 @ 2.0 A	35	175	5.0	150		
400	2.0	T _L = 125°C	<i>MURS240</i>	65	1.3 @ 2.0 A	35	175	5.0	150		
600	2.0	T _L = 125°C	<i>MURS260</i>	75	1.45 @ 2.0 A	35	175	5.0	150		
200	3.0	T _L = 140°C	<i>MURS320</i>	35	0.875 @ 3.0 A	75	175	5.0	150		
400	3.0	T _L = 130°C	<i>MURS340</i>	75	1.25 @ 3.0 A	75	175	10	250		
600	3.0	T _L = 130°C	<i>MURS360</i>	75	1.25 @ 3.0 A	75	175	10	250		
200	6.0	T _C = 140°C	<i>MURD620CT</i>	35	1.0 @ 3.0 A	50	175	5.0	250 @ 125°C	CASE 403-03 SMC Cathode = Notch 	
200	3.0	T _C = 158°C	<i>MURD320</i>	35	0.95 @ 3.0 A	75	175	5.0	500 @ 125°C		
300	3.0	T _C = 140°C	<i>MURD330</i>	50	1.15 @ 3.0 A	90	175	5.0	500		
300	3.0	T _C = 160°C	<i>MURD330</i>	50	1.15 @ 3.0 A	75	175	5.0	500		
400	3.0	T _C = 160°C	<i>MURD340</i>	50	1.15 @ 3.0 A	75	175	5.0	500		
600	5.0	T _C = 159°C	<i>MURHD560</i>	30	2.7 @ 5.0 A	50	175	10	70 @ 125°C		
400	8.0	T _C = 120°C	<i>MURHB840CT</i>	28	2.2 @ 4.0 A	100	175	10	500		
600	8.0	T _C = 120°C	<i>MURHB860CT</i>	35	2.8 @ 4.0 A	100	175	10	500	D²PAK CASE 418B-04 	
200	16	T _C = 150°C	<i>MURB1620CT</i>	35	0.975 @ 8.0 A	100	175	5.0	250		
600	16	T _C = 150°C	<i>MURB1660CT</i>	60	1.5 @ 8.0 A	100	175	10	500		

(1)I_O is total device current capability.


(2)At V_{RRM} unless noted

(4)At V_{RRM}, T_J = 150°C unless noted

All devices listed are ON Semiconductor preferred devices

Ultrafast Rectifiers (continued)

Table 15. Axial Lead Ultrafast Rectifiers

V_{RRM} (V)	I_O (A)	I_O Rating Condition	Device	Max t_{rr} (ns)	Max V_F @ I_F $T_C = 25^\circ\text{C}$ (V)	I_{FSM} (A)	T_J Max ($^\circ\text{C}$)	Max $I_R^{(2)}$ $T_J = 25^\circ\text{C}$ (μA)	Max $I_R^{(4)}$ (μA)	Package
50	1.0	$T_A = 130^\circ\text{C}$	MUR105	35	0.875 @ 1.0 A	35	175	2.0	50	 <p>CASE 59-10 (DO-41) Plastic Cathode = Polarity Band</p>
100	1.0	$T_A = 130^\circ\text{C}$	MUR110	35	0.875 @ 1.0 A	35	175	2.0	50	
150	1.0	$T_A = 130^\circ\text{C}$	MUR115	35	0.875 @ 1.0 A	35	175	2.0	50	
200	1.0	$T_A = 130^\circ\text{C}$ $R_{\theta JA} = 50^\circ\text{C/W}$	MUR120	25	0.875 @ 1.0 A	35	175	2.0	50	
300	1.0	$T_A = 120^\circ\text{C}$	MUR130	75	1.25 @ 1.0 A	35	175	5.0	150	
400	1.0	$T_A = 120^\circ\text{C}$	MUR140	75	1.25 @ 1.0 A	35	175	5.0	150	
600	1.0	$T_A = 120^\circ\text{C}$ $R_{\theta JA} = 50^\circ\text{C/W}$	MUR160	75	1.25 @ 1.0 A	35	175	5.0	150	
800	1.0	$T_A = 95^\circ\text{C}$	MUR180E	75	1.75 @ 1.0 A	35	175	10	600 @ 100 $^\circ\text{C}$	
1000	1.0	$T_A = 95^\circ\text{C}$ $R_{\theta JA} = 50^\circ\text{C/W}$	MUR1100E	75	1.75 @ 1.0 A	35	175	10	600 @ 100 $^\circ\text{C}$	
200	2.0	$T_A = 90^\circ\text{C}$	MUR220	35	0.95 @ 2.0 A	35	175	2.0	50	
400	2.0	$T_A = 85^\circ\text{C}$	MUR240	65	1.15 @ 2.0 A	35	175	5.0	150	
600	2.0	$T_A = 60^\circ\text{C}$	MUR260	75	1.35 @ 2.0 A	35	175	5.0	150	
1000	2.0	$T_A = 35^\circ\text{C}$	MUR2100E	100	2.2 @ 2.0 A	35	175	10	600	
50	4.0	$T_A = 80^\circ\text{C}$	MUR405	35	0.89 @ 4.0 A	125	175	5.0	150	
100	4.0	$T_A = 80^\circ\text{C}$	MUR410	35	0.89 @ 4.0 A	125	175	5.0	150	
150	4.0	$T_A = 80^\circ\text{C}$	MUR415	35	0.89 @ 4.0 A	125	175	5.0	150	
200	4.0	$T_A = 80^\circ\text{C}$ $R_{\theta JA} = 28^\circ\text{C/W}$	MUR420	35	0.88 @ 3.0 A	125	175	5.0	150	
400	4.0	$T_A = 40^\circ\text{C}$	MUR440	75	1.28 @ 4.0 A	110	175	10	250	
600	4.0	$T_A = 40^\circ\text{C}$ $R_{\theta JA} = 28^\circ\text{C/W}$	MUR460	75	1.25 @ 3.0 A	110	175	10	250	
800	4.0	$T_A = 35^\circ\text{C}$	MUR480E	75	1.75 @ 3.0 A	70	175	25	900	
1000	4.0	$T_A = 35^\circ\text{C}$ $R_{\theta JA} = 28^\circ\text{C/W}$	MUR4100E	75	1.75 @ 3.0 A	70	175	25	900	

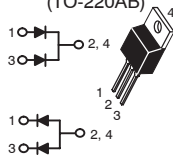
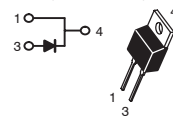




(2)At V_{RRM} unless noted

(4)At V_{RRM} , $T_J = 150^\circ\text{C}$ unless noted

ON Semiconductor Selector Guide – Rectifiers

Ultrafast Rectifiers (continued)

Table 16. TO-220 Ultrafast and MEGAHERTZ™ Rectifiers

V _{RRM} (V)	I _O ⁽¹⁾ (A)	I _O Rating Condition	Device	Max t _{rr} (ns)	Max V _F @ I _F T _C = 25°C (V)	I _{FSM} (A)	T _J Max (°C)	Max I _R ⁽²⁾ T _C = 25°C (μA)	Max I _R ⁽⁴⁾ (μA)	Package	
200	6.0	T _C = 130°C	<i>MUR620CT</i>	35	0.975 @ 3.0 A	75	175	5.0	250	CASE 221A-09 (TO-220AB) 	
400	8.0	T _C = 120°C	<i>MURH840CT</i>	28	2.2 @ 4.0 A	100	175	10	500		
600	8.0	T _C = 120°C	<i>MURH860CT</i>	35	2.8 @ 4.0 A	100	175	10	500		
100	16	T _C = 150°C	<i>MUR1610CT</i>	35	0.975 @ 8.0 A	100	175	5.0	250		
150	16	T _C = 150°C	<i>MUR1615CT</i>	35	0.975 @ 8.0 A	100	175	5.0	250		
200	16	T _C = 150°C	<i>MUR1620CT</i>	35	0.975 @ 8.0 A	100	175	5.0	250		
200	16	T _C = 160°C	<i>MUR1620CTR</i>	85	1.2 @ 8.0 A	100	175	5.0	500		MUR1620CTR Only
400	16	T _C = 150°C	<i>MUR1640CT</i>	60	1.30 @ 8.0 A	100	175	10	250		
600	16	T _C = 150°C	<i>MUR1660CT</i>	60	1.5 @ 8.0 A	100	175	10	500		
50	8.0	T _C = 150°C	<i>MUR805</i>	35	0.975 @ 8.0 A	100	175	5.0	250		CASE 221B-04 (TO-220AC) 
100	8.0	T _C = 150°C	<i>MUR810</i>	35	0.975 @ 8.0 A	100	175	5.0	250		
150	8.0	T _C = 150°C	<i>MUR815</i>	35	0.975 @ 8.0 A	100	175	5.0	250		
200	8.0	T _C = 150°C	<i>MUR820</i>	35	0.975 @ 8.0 A	100	175	5.0	250		
400	8.0	T _C = 150°C	<i>MUR840</i>	60	1.30 @ 8.0 A	100	175	10	500		
600	8.0	T _C = 150°C	<i>MUR860</i>	60	1.50 @ 8.0 A	100	175	10	500		
800	8.0	T _C = 150°C	<i>MUR880E</i>	75	1.80 @ 8.0 A	100	175	25	500 @ 100°C		
1000	8.0	T _C = 150°C	<i>MUR8100E</i>	75	1.80 @ 8.0 A	100	175	25	500 @ 100°C		
100	15	T _C = 150°C	<i>MUR1510</i>	35	1.05 @ 15 A	200	175	10	500		
150	15	T _C = 150°C	<i>MUR1515</i>	35	1.05 @ 15 A	200	175	10	500		
200	15	T _C = 150°C	<i>MUR1520</i>	35	1.05 @ 15 A	200	175	10	500		
400	15	T _C = 150°C	<i>MUR1540</i>	60	1.25 @ 15 A	150	175	10	500		
600	15	T _C = 145°C	<i>MUR1560</i>	60	1.50 @ 15 A	150	175	10	1000		
200	20	T _C = 125°C	<i>MUR2020R</i>	95	1.10 @ 20 A	250	175	50	1000		
200	16	T _C = 150°C	 <i>MURF1620CT</i>	35	0.975 @ 8.0 A	100	150	5.0	250	CASE 221D-03 (TO-220) FULL PAK 	
600	16	T _C = 150°C	 <i>MURF1660CT</i>	60	1.5 @ 8.0 A	100	150	10	500		
600	8.0	T _C ≤ 120°C	 <i>MURHF860CT</i>	35	2.8 @ 4.0 A	100	150	10	500		

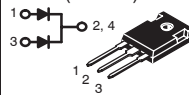
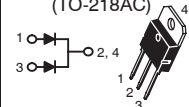
(1) I_O is total device capability

(2) At V_{RRM} unless noted

(4) At V_{RRM}, T_J = 150°C unless noted

 Indicates UL Recognized – File #E69369

Table 17. TO-218 and TO-247 Ultrafast Rectifiers







V _{RRM} (V)	I _O (A)	I _O Rating Condition	Device	Max t _{rr} (ns)	Max V _F @ I _F T _C = 25°C (V)	I _{FSM} (A)	T _J Max (°C)	Max I _R ⁽²⁾ T _J = 25°C (μA)	Max I _R ⁽⁴⁾ (mA)	Package
200	30	T _C = 145°C	<i>MUR3020WT</i>	35	1.05 @ 15 A	200	175	10	0.5	CASE 340L-02 (TO-247) 
600	30	T _C = 145°C	<i>MUR3060WT</i>	60	1.70 @ 15 A	150	175	10	1.0	
200	30	T _C = 150°C	<i>MUR3020PT</i>	35	1.05 @ 15 A	200	175	10	0.5	CASE 340D-02 (TO-218AC) 
400	30	T _C = 150°C	<i>MUR3040PT</i>	60	1.25 @ 15 A	150	175	10	0.5	
600	30	T _C = 145°C	<i>MUR3060PT</i>	60	1.50 @ 15 A	150	175	10	1.0	

(2) At V_{RRM} unless noted

(4) At V_{RRM}, T_J = 150°C unless noted

Fast Recovery Rectifiers/General Purpose Rectifiers

Table 18. Fast Recovery Rectifiers/General Purpose Rectifiers

V _{RRM} (V)	I _O (A)	I _O Rating Condition	Device	Max V _F @ I _F T _J = 25°C (V)	Max t _{rr} (ns)	I _{FSM} (A)	T _J Max (°C)	Max I _R ⁽²⁾ T _J = 25°C (μA)	Max I _R ⁽³⁾ (μA)	Package	
400	1.5	T _L = 118°C	MRS1504	1.04 @ 1.5 A	–	50	150	1.0	340	CASE 403A-03 SMB 	
300	1.0	T _L = 150°C	MRA4003G	1.1 @ 1.0 A	–	30	175	10	50	CASE 403B-02 SMA  Cathode = Notch	
400	1.0	T _L = 150°C	MRA4004G	1.1 @ 1.0 A	–	30	175	10	50		
600	1.0	T _L = 150°C	MRA4005G	1.1 @ 1.0 A	–	30	175	10	50		
800	1.0	T _L = 150°C	MRA4006G	1.1 @ 1.0 A	–	30	175	10	50		
1000	1.0	T _L = 150°C	MRA4007G	1.1 @ 1.0 A	–	30	175	10	50		
50	1.0	T _A = 75°C	1N4001RL	1.1 @ 1.0 A	–	30	175	10	50	CASE 59-10 ⁽⁷⁾ (DO-41) Plastic  Cathode = Polarity Band	
100	1.0	T _A = 75°C	1N4002RL	1.1 @ 1.0 A	–	30	175	10	50		
200	1.0	T _A = 75°C	1N4003RL	1.1 @ 1.0 A	–	30	175	10	50		
400	1.0	T _A = 75°C	1N4004RL	1.1 @ 1.0 A	–	30	175	10	50		
600	1.0	T _A = 75°C	1N4005RL	1.1 @ 1.0 A	–	30	175	10	50		
800	1.0	T _A = 75°C	1N4006RL	1.1 @ 1.0 A	–	30	175	10	50		
1000	1.0	T _A = 75°C	1N4007RL	1.1 @ 1.0 A	–	30	175	10	50		
50	1.0	T _A = 75°C	1N4933RL	1.2 @ 1.0 A	200	30	150	5.0	100		
100	1.0	T _A = 75°C	1N4934RL	1.2 @ 1.0 A	200	30	150	5.0	100		
200	1.0	T _A = 75°C	1N4935RL	1.2 @ 1.0 A	200	30	150	5.0	100		
400	1.0	T _A = 75°C	1N4936RL	1.2 @ 1.0 A	200	30	150	5.0	100		
600	1.0	T _A = 75°C	1N4937RL	1.2 @ 1.0 A	200	30	150	5.0	100		
50	3.0	T _L = 105°C	1N5400RL	1.0 @ 3.0 A	–	200	170	10	100 @ 150°C		CASE 267-05 (DO-201AD) Plastic  Cathode = Polarity Band
100	3.0	T _L = 105°C	1N5401RL	1.0 @ 3.0 A	–	200	170	10	100 @ 150°C		
200	3.0	T _L = 105°C	1N5402RL	1.0 @ 3.0 A	–	200	170	10	100 @ 150°C		
400	3.0	T _L = 105°C	1N5404RL	1.0 @ 3.0 A	–	200	170	10	100 @ 150°C		
600	3.0	T _L = 105°C	1N5406RL	1.0 @ 3.0 A	–	200	170	10	100 @ 150°C		
800	3.0	T _L = 105°C	1N5407RL	1.0 @ 3.0 A	–	200	170	10	100 @ 150°C		
1000	3.0	T _L = 105°C	1N5408RL	1.0 @ 3.0 A	–	200	170	10	100 @ 150°C		
200	3.0	T _A = 80°C ⁽⁸⁾	MR852RL	1.25 @ 3.0 A	200	100	150	10	150		
400	3.0	T _A = 80°C ⁽⁸⁾	MR854RL	1.25 @ 3.0 A	200	100	150	10	150		
600	3.0	T _A = 80°C ⁽⁸⁾	MR856RL	1.25 @ 3.0 A	200	100	150	10	150		
50	6.0	T _A = 60°C R _{θJA} = 25°C/W	MR750RL	1.25 @ 100 A	–	400	175	25	1000	CASE 194-04 Axial Lead Micro Button  Cathode indicated by diode symbol	
100	6.0	T _A = 60°C R _{θJA} = 25°C/W	MR751RL	1.25 @ 100 A	–	400	175	25	1000		
200	6.0	T _A = 60°C R _{θJA} = 25°C/W	MR752RL	1.25 @ 100 A	–	400	175	25	1000		
400	6.0	T _A = 60°C R _{θJA} = 25°C/W	MR754RL	1.25 @ 100 A	–	400	175	25	1000		
600	6.0	T _A = 60°C R _{θJA} = 25°C/W	MR756RL	1.25 @ 100 A	–	400	175	25	1000		
200	25	T _C = 150°C	MR2502	1.18 @ 78.5 A	–	400	175	100	500	CASE 193-04 Micro Button  Cathode = Polarity Band	
400	25	T _C = 150°C	MR2504	1.18 @ 78.5 A	–	400	175	100	500		

⁽²⁾At V_{RRM} unless noted

⁽³⁾At V_{RRM}, T_J = 100°C unless noted

⁽⁷⁾Package Size: 0.120" max diameter by 0.260" length.




⁽⁸⁾Must be derated for reverse power dissipation. See data sheet.

⁽⁹⁾Overvoltage Transient Suppressor: 24–32 volts avalanche voltage.

ON Semiconductor Selector Guide – Rectifiers

Fast Recovery Rectifiers/General Purpose Rectifiers (continued)

Table 19. Overvoltage Transient Suppressors

V _{RRM} (V)	V _{BR} ⁽¹⁾ (V)	V _{BR} (V)	I _O (A)	Device	Max V _F @ I _F T _J = 25°C (V)	I _{FSM} (A)	T _J Max (°C)	I _{RSM} (A)	Max I _R ⁽⁶⁾ (μA)	Package
20	24–32	40 ⁽²⁾	6.0 T _C = 125°C	MR2535L	1.1 I _F = 100A	400	175	62 ⁽⁵⁾	0.2	CASE 194–04 Axial Lead Micro Button  Cathode = Diode Symbol
23	24–32	40 ⁽⁴⁾	32 T _C = 150°C	TRA2532	1.18 I _F = 100A	500	175	80 ⁽⁵⁾	10	CASE 193–04 Micro Button  Cathode = Polarity Band
23	24–32	40 ⁽³⁾	32 T _C = 150°C	MR2835SK	1.1 I _F = 100A	400	150	62 ⁽⁵⁾	5.0 @ 20 V	CASE 460–02 Top Can  Cathode = Terminal

(1)At I_r = 100 mA, 25°C

(2)At I_r = 90 A, T_c = 150°C, PW = 80 μS

(3)At I_r = 80 A, T_c = 85°C, PW = 80 μS

(4)At I_r = 80 A, T_c = 25°C, PW = 80 μS

(5)Time Constant = 10 mS, 25°C

(6)At V_{RRM}, T_j = 25°C unless noted

Bipolar Transistors

Bipolar Transistors

Table of Contents

	Page
Bipolar Transistors	156
Discrete Transistors	157
Surface Mount	157
Through-Hole	158
Darlington Transistors	162
Surface Mount	162
Through-Hole	162
Audio	164
Electronic Lamp Ballasts	166
General-Purpose Transistors	167
General-Purpose Multiple Transistors	172
Low Noise and Good h_{FE} Linearity	173
Darlington Transistors	173
High Current Transistors	174
High Voltage Transistors	176
RF Transistors	177
Switching Transistors	177
Multiple Switching Transistors	178
Digital Transistors (Bias Resistor Transistors)	179
Dual Digital Transistors	
(Bias Resistor Transistors)	181
Combinational Digital Transistors	
(Bias Resistor Transistors)	182
Complex Digital Transistors	183
Low Saturation Voltage Transistors	184
Load Switch Transistors	185

In Brief...

Through ON Semiconductor's extensive process improvements and stringent quality control standards, we are proud to offer a broad line of bipolar power transistors that meet or exceed those of other suppliers. This portfolio consists of discrete and Darlington transistors in a variety of popular packages from the low power surface mount SOT-223 to the high power TO-3.

Product Highlights

Audio Transistors:

- Improved gain linearity, complementary pair gain matching and optimized die area for symmetrical characteristics in complementary configurations.
- Unsurpassed high voltage FBSOA performance.
- New state of the art 150 W and 180 W high frequency discrete transistors.
- ThermalTrak™ output transistors with internal bias control eliminate amplifier warm-up period, enable instant temperature adjustment, upgrade sound quality and improve bias stability.
- High voltage discrete audio output transistors that reach higher voltages than previously available.

Electronic Lamp Ballast:

- High frequency, high gain bipolar transistors that utilize monolithic collector/emitter diode tailored to meet the needs of lamp ballasts.
- Active anti-saturation network to provide short and highly reproducible collector current storage time.

Low $V_{CE(sat)}$ Transistors:

- Devices with combination of low saturation voltage and high gain are ideal for high speed switching applications where power savings is a concern.

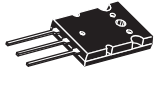
Ultra High Current Transistors:

- Dual matched die configurations up to 60 A.
- Working voltages from 60 V to 120 V.





ON Semiconductor has a commitment to quality and total customer satisfaction. We will continue to demonstrate this in the new and innovative products we plan to announce in the coming year.

BIPOLAR TRANSISTORS SELECTOR GUIDE

SELECTION BY PACKAGE

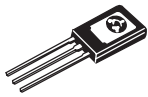

Package	I_C Range (Amps)	V_{CE} Range (Volts)	P_D (Watts)
 SOT-223	0.5-3.0	30-300	2.75-3.0
 DPAK	0.5-10	25-450	12.5-25
 D ² PAK	6.0-10	80-350	50-75
 DPAK	0.5-10	25-450	12.5-25
 TO-225AA	0.3-5.0	25-500	12.5-50
 TO-220AB	0.5-15	32-400	30-150
 Isolated TO-220	1.0-10	60-450	28-45
 TO-218	10-25	60-350	80-150
 TO-247	8.0-30	150-250	100-200
 TO-264	15-20	250-350	200-250
 TO-264 5-Lead	15	260	200
 TO-3 (TO-204AA) 40 Mil Pins	4.0-30	40-250	115-250
 TO-3 (TO-204AE) 60 Mil Pins	40-60	60-250	150-300

DISCRETE TRANSISTORS

I _C Cont Amps Max	V _{CEO(sus)} Volts Min	Device Type		h _{FE} Min/Max	@ I _C Amp	f _T MHz Min	P _D (Case) Watts @ 25°C	Package
		NPN	PNP					
0.5	300		MMJT350T1	30/240	0.05	30	2.75	 SOT-223
3.0	30	MMJT9410T1	MMJT9435T1	50	1.0	100 typ	3.0	
	40		NJT4030P	200/400	1.0	160 typ	2.0	
0.5	300	MJD340T4	MJD350T4	30/240	0.05	30	15	 DPAK
1.0	250	MJD47T4		30/150	0.3	10	15	
	350		MJD5731T4	10 min	1.0	10	15	
	400	MJD50T4		30/150	0.3	10	15	
2.0	45		MJD148T4	50 min	2.0	3.0	20	
	50	NJD2873T4		40 min	2.0	30	12.5	
	450	MJD18002D2T4		6.0 min	2.0	13 typ	25	
3.0	40	MJD31T4	MJD32T4	10 min	1.0	3.0	15	
	100	MJD31CT4	MJD32CT4	10 min	1.0	3.0	15	
4.0	100	MJD243T4	MJD253T4	40/180	0.2	40	12.5	
5.0	25	MJD200T4	MJD210T4	45/180	2.0	65	12.5	
6.0	100	MJD41CT4	MJD42CT4	15/75	3.0	3.0	20	
8.0	80	MJD44H11T4	MJD45H11T4	40 min	4.0	50 typ	20	
10	60	MJD3055T4	MJD2955T4	20/100	4.0	2.0	20	
6.0	100	MJB41CT4	MJB42CT4	15/75	3.0	3.0	65	 D²PAK
8.0	80	MJB44H11T4	MJB45H11T4	40/100	4.0	40	50	
0.3	350	MJE3439		40/160	0.02	15	15	 TO-225AA
0.5	200	MJE344		30/300	0.05	15	20.8	
	250	2N5655		30/250	0.1	10	20	
	300	MJE340	MJE350	30/240	0.05	30	20.8	
	350	2N5657		30/250	0.1	10	20	
		BD159		30/240	0.05	30	20	
1.0	40	2N4921	2N4918	20/100	0.5	3.0	30	
	60	2N4922	2N4919	20/100	0.5	3.0	30	
	80	2N4923	2N4920	20/100	0.5	3.0	30	
1.5	45	BD135	BD136	40/250	0.15	50	12.5	
	60	BD137	BD138	40/250	0.15	50	12.5	
	80	BD139	BD140	40/250	0.15	50	12.5	
2.0	45		BD234	25 min	1.0	3.0	25	
	80	BD237		25 min	1.0	3.0	25	
3.0	40	MJE180	MJE170	50/250	0.1	50	12.5	
	60	MJE181	MJE171	50/250	0.1	50	12.5	
	80	BD179	BD180	40/250	0.15	3.0	25	
		MJE182	MJE172	50/250	0.1	50	12.5	
	500	BUH51 †		8.0 min	1.0	12 typ	50	

†Style 3.

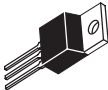
DISCRETE TRANSISTORS (continued)

I _C Cont Amps Max	V _{CEO(sus)} Volts Min	Device Type		h _{FE} Min/Max	@ I _C Amp	f _T MHz Min	P _D (Case) Watts @ 25°C	Package	
		NPN	PNP						
4.0	32	BD435	BD436	50 min	2.0	3.0	36	 TO-225AA	
		MJE521	MJE371	40 min	1.0	3.0	40		
	2N5190		25 min	1.5	2.0	40			
	45	BD437	BD438	40 min	2.0	3.0	36		
		60	BD439	BD440	25 min	2.0	3.0		36
			BD787	BD788	20 min	2.0	50		15
	80	2N5191	2N5194	25/100	1.5	2.0	40		
		2N5192	2N5195	25/100	1.5	2.0	40		
BD441	BD442	15 min	2.0	3.0	36				
100	MJE243	MJE253	40/120	0.2	40	15			
5.0	25	MJE200	MJE210	45/180	2.0	65	15		
1.0	60	TIP29A		15/75	1.0	3.0	30	 TO-220AB	
		TIP29B		15/75	1.0	3.0	30		
	100	TIP29C	TIP30C	15/75	1.0	3.0	30		
	250	TIP47		30/150	0.3	10	40		
	300	TIP48	MJE5730	30/150	0.3	10	40		
	350		MJE5731	30/150	0.3	10	40		
	375		MJE5731A	30/150	0.3	10	40		
	400	TIP50		30/150	0.3	10	40		
2.0	400/700	BUL44		14/36	0.4	13 typ	50		
	450/1000	BUX85		30	0.1	4.0	50		
		MJE18002		14/34	0.2	12 typ	40		
3.0	40	TIP31	TIP32	25 min	1.0	3.0	40		
		TIP31A	TIP32A	25 min	1.0	3.0	40		
	80		BD242B	25 min	1.0	3.0	40		
		TIP31B	TIP32B	25 min	1.0	3.0	40		
	100	BD241C	BD242C	25 min	1.0	3.0	40		
		TIP31C	TIP32C	25 min	1.0	3.0	40		
4.0	80	D44C12	D45C12	40/120	0.2	40 typ	30		
		350	MJE15034	MJE15035	10 min	2.0	30	50	
	400/700	MJE13005		6/30	3.0	4.0	60		
	500/800	BUH50		10 typ	2.0	4.0	50		
5.0	250	2N6497		10/75	2.5	5.0	80		
		400/700	BUL45		14/34	0.3	12 typ	75	
	BUL45D2*			22 min	0.8	13 typ	75		
	450/1000	MJE18004		14/34	0.3	13	75		
		MJE18004D2*		15 min	0.8	13	75		

NOTE: When two voltages are given, the format is V_{CEO(sus)}/V_{CES}.

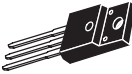


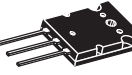

*D2 suffix indicates transistor with built-in C-E freewheeling diode and antisaturation network.

DISCRETE TRANSISTORS (continued)

I _C Cont Amps Max	V _{CEO(sus)} Volts Min	Device Type		h _{FE} Min/Max	@ I _C Amp	f _T MHz Min	P _D (Case) Watts @ 25°C	Package
		NPN	PNP					
6.0	40		TIP42	15/75	3.0	3.0	65	 TO-220AB
	60	TIP41A	TIP42A	15/75	3.0	3.0	65	
	80	TIP41B	TIP42B	15/75	3.0	3.0	65	
			BD244B	15 min	3.0	3.0	65	
	100	BD243C	BD244C	15 min	3.0	3.0	65	
		TIP41C	TIP42C	15/75	3.0	3.0	65	
	400/700	BUL146		14/34	0.5	14 typ	100	
450/1000	MJE18006		14/34	0.5	14 typ	100		
7.0	30	2N6288	2N6111	30/150	3.0	4.0	40	
	50		2N6109	30/150	2.5	4.0	40	
	70	2N6292	2N6107	30/150	2.0	4.0	40	
	200	BU406		30 min	1.5	10	60	
8.0	120	MJE15028	MJE15029	20 min	4.0	30	50	
	150	MJE15030	MJE15031	20 min	4.0	30	50	
	250	MJE15032	MJE15033	10 min	2.0	30	50	
	300		MJE5850	15 min	2.0	30 typ	80	
	350		MJE5851	15 min	2.0	30 typ	80	
	400		MJE5852	15 min	2.0	30 typ	80	
			MJE13007		5/30	5.0	14 typ	80
450/1000	MJE18008		16/34	1.0	13 typ	125		
10	60	D44H8	D45H8	40 min	4.0	3.0	50	
		MJE3055T	MJE2955T	20/70	4.0	3.0	75	
	80	BD809	BD810	15 min	4.0	1.5	90	
		D44H11	D45H11	40 min	4.0	50 typ	50	
	400/700	BUH100		6.0 min	10	23 typ	100	
12	90	BUV26		12 min	12	30 typ	85	
	120	BUV27		12 min	8.0	30 typ	70	
	400/700	MJE13009		6/30	8.0	4.0	100	
15	60	2N6487	2N6490	20/150	5.0	5.0	75	
	80	2N6488	2N6491	20/150	5.0	5.0	75	
		D44VH10	D45VH10	20 min	4.0	50 typ	83	
	400/700	BUH150		4.0 min	20	23 typ	150	



NOTE: When two voltages are given, the format is V_{CEO(sus)}/V_{CES}.

DISCRETE TRANSISTORS (continued)



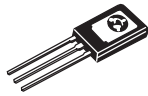

I _C Cont Amps Max	V _{CE0(sus)} Volts Min	Device Type		h _{FE} Min/Max	@ I _C Amp	f _T MHz Min	P _D (Case) Watts @ 25°C	Package
		NPN	PNP					
1.0	250	MJF47		30/150	0.3	10	28	 Isolated TO-220
3.0	100	MJF31C	MJF32C	10 min	1.0	3.0	28	
5.0	450/1000	MJF18004		14/34	0.3	13 typ	35	
6.0	400/700	BUL146F		14/34	0.5	14 typ	40	
8.0	150	MJF15030	MJF15031	40 min	3.0	30	35	
	450/1000	MJF18008		16/34	1.0	13 typ	45	
10	60	MJF3055	MJF2955	20/100	4.0	2.0	40	
	80	MJF44H11	MJF45H11	40/100	4.0	40	35	
10	100	TIP33C		20/100	3.0	3.0	80	 TO-218
15	60	TIP3055	TIP2955	5 min	10	2.5	80	
16	160	MJE4343	MJE4353	15 min	8.0	1.0	125	
25	60	TIP35A	TIP36A	15/75	15	3.0	125	
	100	TIP35C	TIP36C	15/75	15	3.0	125	
8.0	150	MJW21192	MJW21191	15 min	8.0	4.0	100	 TO-247
15	260	MJW0281A	MJW0302A	75/150	3.0	30	150	
		MJW3281A	MJW1302A	75/150	4.0	30	200	
16	250	MJW21194	MJW21193	20/60	8.0	4.0	200	
		MJW21196	MJW21195	20/60	8.0	4.0	200	
30	450/1000	MJW18020		14/35	3.0	13 typ	250	
15	260	MJL3281A	MJL1302A	75/150	4.0	30	200	 TO-264
		MJL0281A	MJL0302A	75/150	3.0	30	180	
	350	MJL4281A	MJL4302A	80/250	5.0	35	230	
16	250	MJL21194	MJL21193	25/75	8.0	4.0	200	
		MJL21196	MJL21195	25/75	8.0	4.0	200	
15	260	NJL0281D	NJL0302D	75/150	3.0	30	180	 TO-264 (5-Lead)
	260	NJL3281D	NJL1302D	75/150	4.0	30	200	
	350	NJL4281D	NJL4302D	75/150	5.0	30	250	
16	250	NJL21194D	NJL21193D	25/75	8.0	4.0	200	
10	140	2N3442		20/70	4.0	3.0	117	
	250	MJ15011		20/100	2.0	3.0	200	
15	60	2N3055	MJ2955	20/70	4.0	2.5	115	
		2N3055A		20/70	4.0	0.8	115	
	120	MJ15015	MJ15016	20/70	4.0	1.0	180	
140	MJ15001	MJ15002	25/150	4.0	2.0	200		

NOTE: When two voltages are given, the format is V_{CE0(sus)}/V_{CES}.

DISCRETE TRANSISTORS (continued)

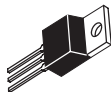




I _C Cont Amps Max	V _{CE0(sus)} Volts Min	Device Type		h _{FE} Min/Max	@ I _C Amp	f _T MHz Min	P _D (Case) Watts @ 25°C	Package
		NPN	PNP					
16	140	2N3773		15/60	8.0	4.0	150	 <p>TO-3 (TO-204AA)</p>
	200	MJ15022	MJ15023	15/60	8.0	5.0	250	
	250	MJ15024	MJ15025	15/60	8.0	5.0	250	
		MJ21194	MJ21193	25/75	8.0	4.0	250	
		MJ21196	MJ21195	25/75	8.0	4.0	250	
20	60	2N3772		15/60	10	2.0	150	
	90	2N5038		20/100	12	60	140	
	140	MJ15003	MJ15004	25/150	5.0	2.0	250	
25	60	2N5885	2N5883	20/100	10	4.0	200	
	80	2N5886	2N5884	20/100	10	4.0	200	
	100	2N6338		30/120	10	40	200	
	150	2N6341		30/120	10	40	200	
30	40	2N3771		15/60	15	2.0	150	
	60	2N5302		15/60	15	2.0	200	
	100	MJ802	MJ4502	25/100	7.5	2.0	200	
40	200	BUV21		10 min	25	8.0	150	 <p>TO-3 (TO-204AE)</p>
	250	BUV22		10 min	20	8.0	250	
50	80	2N5686	2N5684	15/60	25	2.0	300	
60	60		MJ14001	15/100	50	3.0	300	
	80	MJ14002		15/100	50	3.0	300	

DARLINGTON TRANSISTORS

I _C Cont Amps Max	V _{CEO(sus)} Volts Min	Device Type		h _{FE} Min/Max	@ I _C Amp	f _T MHz Min	P _D (Case) Watts @ 25°C	Package
		NPN	PNP					
2.0	100	MJD112T4	MJD117T4	1000 min	2.0	25	20	 DPAK
4.0	80	MJD6039T4		1k/2k	2.0	25	20	
	350	NJD35N04		2000 min	2.0	90	45	
8.0	100	MJD122T4	MJD127T4	1k/2k	4.0	4	20	
	120		MJD128T4	1k/2k	4.0	4	20	
10	80	MJD44E3T4		1k min	5.0		20	
10	350	BUB323Z		500/3400	5.0	2.0	75	 D²PAK
2.0	100	MJE270†	MJE271†	1.5k min	0.12	6.0	15	 TO-225AA
4.0	40		2N6034	25 min	1.5	2.0	40	
	45	BD675	BD676	750	1.5	3.0	40	
60		BD675A	BD676A	750	2.0	3.0	40	
		BD677	BD678	750 min	1.5		40	
	BD677A	BD678A	750 min	2.0		40		
	MJE800	MJE700	750 min	1.5	1.0	40		
80		2N6038	2N6035	750/18k	2.0	25	40	
		BD679	BD680	750 min	1.5		40	
	BD679A	BD680A	750 min	2.0		40		
	MJE802	MJE702	750 min	1.5	1.0	40		
100		MJE803	MJE703	750 min	2.0	1.0	40	
		2N6039	2N6036	750/18k	2.0	25	40	
	BD681	BD682	750 min	1.5		40		
2.0	60	TIP110	TIP115	500 min	2.0	25	50	 TO-220AB
	80	TIP111	TIP116	500 min	2.0	25	50	
	100	TIP112	TIP117	500 min	2.0	25	50	
5.0	60	TIP120	TIP125	1k min	3.0	4.0	65	
	80	TIP121	TIP126	1k min	3.0	4.0	65	
	100	TIP122	TIP127	1k min	3.0	4.0	75	
8.0	60	2N6043	2N6040	1k/10k	4.0	4.0	75	
		TIP100		1k/20k	3.0	4.0	80	
	80	BDX53B	BDX54B	750 min	3.0	4.0	60	
		TIP101	TIP106	1k/20k	3.0	4.0	80	
		TIP131		1k/15k	4.0		70	
	100	TIP132		1k/15k	4.0		70	
		2N6045	2N6042	1k/10k	3.0	4.0	75	
		BDX53C	BDX54C	750 min	3.0			
TIP102		TIP107	1k/20k	3.0	4.0	80		
400	MJE5742		200 min	4.0		80		

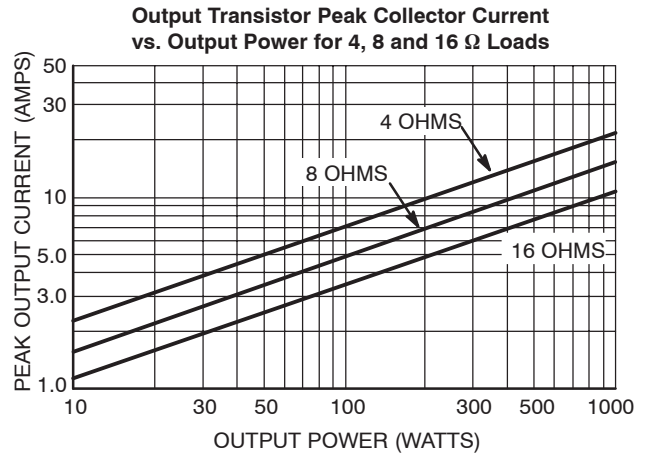
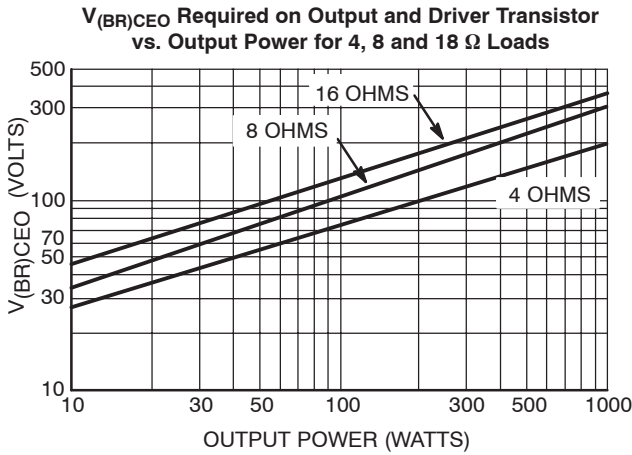
NOTE: When two voltages are given, the format is V_{CEO(sus)}/V_{CES}.
 †Style 3.

DARLINGTON TRANSISTORS (continued)

I _C Cont Amps Max	V _{CEO(sus)} Volts Min	Device Type		h _{FE} Min/Max	@ I _C Amp	f _T MHz Min	P _D (Case) Watts @ 25°C	Package
		NPN	PNP					
10	60	2N6387	2N6667	1k/20k	5.0	20	65	 TO-220AB
	80	BDX33B	BDX34B	750 min	3.0	3.0	70	
		2N6388		1k/20k	5.0	20	65	
	100	BDX33C	BDX34C	750 min	3.0	3.0	70	
15	80		BDW46	1k min	5.0	4.0	85	
	100	BDW42	BDW47	1k min	5.0	4.0	85	
5.0	100	MJF122	MJF127	2000 min	3.0	4.0	28	 Isolated TO-220
10	100	MJF6388	MJF6668	3k/20k	3.0	20	40	
10	60	TIP140		500 min	10	4.0	125	 TO-218
		TIP141		500 min	10	4.0	125	
	100	BDV65B	BDV64B	1k min	5.0		125	
		TIP142	TIP147	500 min	10	4.0	125	
	350	BU323Z		500/3400	5.0		150	
15	150		MJH11017	400/15k	10	3.0	150	
	200	MJH11020	MJH11019	400/15k	10	3.0	150	
	250	MJH11022	MJH11021	400/15k	10	3.0	150	
20	100	MJH6284	MJH6287	750/18k	10	4.0	125	
12	100		2N6052	750/18k	6.0	4.0	150	 TO-3 (TO-204AA)
15	250	MJ11022	MJ11021	100 min	15	3.0	175	
20	80		2N6286	750/18k	10	4.0	160	
	100	2N6284	2N6287	750/18k	10	4.0	160	
30	60	MJ11012		1k min	20	4.0	200	
	120	MJ11016	MJ11015	1k min	20	4.0	200	
	250	MJ11022	MJ11021	400/15k	10	3.0	200	
50	60	MJ11028		400 min	50		300	 TO-3 (TO-204AE)
	90	MJ11030		400 min	50		300	
	120	MJ11032	MJ11033	400 min	50		300	

Audio

GENERAL DESIGN CURVES FOR POWER AUDIO OUTPUT STAGES



Another important parameter that must be considered before selecting the output transistors is the safe-operating area these devices must withstand. For a complete discussion see Application Note AN485.

RECOMMENDED POWER TRANSISTORS FOR AUDIO/SERVO LOADS


RMS Power Output	NPN	PNP	Package	P_D Watts @ 25°C	V_{CEO}	I_C Max	h_{FE}		f_T MHz Typ
							Min/Max	@ I_C Amps	
To 25 W	MJE15030	MJE15031	TO-220	50	150	8.0	20 min	4.0	30
	MJE15032	MJE15033	TO-220	50	250	8.0	50 min	1.0	30
25 to 50 W	MJE15034	MJE15035	TO-220	50	350	4.0	50 min	1.0	30
	MJ15001	MJ15002	TO-3	200	140	15	25/150	4.0	3.0
50 to 100 W	MJ15003	MJ15004	TO-3	150	140	20	25/150	5.0	3.0
	MJ15015	MJ15016	TO-3	180	120	15	20/70	4.0	3.0
Over 100 W	MJW21192	MJW21191	TO-3	100	150	8.0	15 min	4.0	4.0
	MJW0281A	MJW0302A	TO-3	150	260	15	75/150	3.0	30
	MJL0281A	MJL0302A	TO-264	180	260	15	75/150	3.0	30
	NJL0281D	NJL0302D	TO-264 (5-Lead)	180	260	15	75/150	3.0	30
	MJL21194	MJL21193	TO-264	200	250	16	25/75	8.0	4.0
	MJL21196	MJL21195	TO-264	200	250	16	25/75	8.0	4.0
	MJW21194	MJW21193	TO-247	200	250	16	20/60	8.0	4.0
	MJW21196	MJW21195	TO-247	200	250	16	25/60	8.0	4.0
	MJL3281A	MJL1302A	TO-264	200	260	15	75/150	5.0	30

RECOMMENDED POWER TRANSISTORS FOR AUDIO/SERVO LOADS (continued)


RMS Power Output	NPN	PNP	Package	P _D Watts @ 25°C	V _{CEO}	I _C Max	h _{FE}		f _T MHz Typ
							Min/Max	@ I _C Amps	
	MJW3281A	MJW1302A	TO-247	200	260	15	75/150	5.0	30
	MJL4281A	MJL4302A	TO-264	200	350	15	80/200	5.0	35
	NJL3281D	NJL1302D	TO-264 (5-Lead)	200	260	15	75/150	7.0	30
	NJL4281D	NJL4302D	TO-264 (5-Lead)	250	350	15	75/150	5.0	30
	MJ15024	MJ15025	TO-3	250	250	16	15/60	8.0	4.0
	MJ21194	MJ21193	TO-3	250	250	16	25/75	8.0	4.0

The Power Transistors shown are provided for reference only and show device capability. The final choice of the Power Transistors used is left to the circuit designer and depends upon the particular safe-operating area required and the mounting and heat sinking configuration used.


Bipolar Power Transistors for Electronic Lamp Ballasts

I _C Cont Amps Max	V _{CEO(sus)} Volts Min	V _{CES} Volts Min	Device Type	I _C Operating Amps	h _{FE} min @ I _C Operating V _{CE} = 1.0 V	Inductive Switching @ I _C Operating t _{si} /t _{fi} Max (μs)	P _D (Case) Watts @ 25°C	Package
2.0	400	700	BUL44	1.0	8.0	2.75/0.175	50	 TO-220AB
	450	1000	MJE18002	1.0	6.0	2.75/0.175	50	
4.0	500	800	BUH50	2.0	8.0 typ	2.75/0.15	50	
5.0	400	700	BUL45	2.0	7.0	3.8/0.17	75	
		700	BUL45D2*	2.0	10	2.25/0.015	75	
	450	1000	MJE18004	2.0	6.0	2.5/0.175	75	
6.0	400	700	BUL146	3.0	8.0	2.5/0.15	100	
		1000	MJE18006	3.0	6.0	3.2/0.15	100	
8.0	450	1000	MJE18008	4.5	6.0	3.2/0.15	125	
10	400	700	BUH100	5.0	10 typ	3.5/0.15	100	
15	400	700	BUH150	10	8.0 typ	2.75/0.175	150	


Isolated TO-220

I _C Cont Amps Max	V _{CEO(sus)} Volts Min	V _{CES} Volts Min	Device Type	I _C Operating Amps	h _{FE} min @ I _C Operating V _{CE} = 1.0 V	Inductive Switching @ I _C Operating t _{si} /t _{fi} Max (μs)	P _D (Case) Watts @ 25°C	Package
5.0	450	1000	MJF18004	2.0	6.0	2.5/0.175	35	 Isolated TO-220
6.0	400	700	BUL146F	3.0	8.0	2.5/0.15	40	
8.0	450	1000	MJF18008	4.5	6.0	3.2/0.15	45	

DPAK

I _C Cont Amps Max	V _{CEO(sus)} Volts Min	V _{CES} Volts Min	Device Type	I _C Operating Amps	h _{FE} min @ I _C Operating V _{CE} = 1.0 V	Inductive Switching @ I _C Operating t _{si} /t _{fi} Max (μs)	P _D (Case) Watts @ 25°C	Package
2.0	450	1000	MJD18002D2T4	1.0	6.0	1.2/0.150	25	 DPAK

TO-225AA (TO-126)

I _C Cont Amps Max	V _{CEO(sus)} Volts Min	V _{CES} Volts Min	Device Type	I _C Operating Amps	h _{FE} min @ I _C Operating V _{CE} = 1.0 V	Inductive Switching @ I _C Operating t _{si} /t _{fi} Max (μs)	P _D (Case) Watts @ 25°C	Package
3.0	500	800	BUH51†	1.0	8.0	3.75/0.3	50	 TO-225AA

BUH-Series are specified for Halogen applications.


*D2 suffix indicates transistor with built-in C-E freewheeling diode and antisaturation network.

†Style 3.

The isolated TO-220 is UL RECOGNIZED for its isolation feature and has been evaluated to 3500 volts RMS. Actual isolation rating depends on specific mounting position and maintaining required strike and creepage distances.

Bipolar Transistors



GENERAL-PURPOSE TRANSISTORS

NPN	PNP	V _{(BR)CEO}	I _C mA Max	h _{FE}		f _T MHz Min	NF dB Max	Package
				Min	Max			
MPS8099	MPS8599	80	500	100	300	150	–	 <p>TO-226AA, TO-92 Case 29-11</p>
MPSA06	MPSA56	80	500	100	–	100	–	
	BC490	80	1000	60	400	200/150 (Typ)	0.3/0.5	
BC639	BC640	80	500	40	160	60	0.5	
BC489B	–	80	1000	160	400	100	0.5	
BC639-16	BC640-16	80	1000	100	250	60	0.5	
BC546B	BC556B	65	100	180	450	150	10	
MPSA05	MPSA55	60	500	100	–	100	–	
–	MPS2907A	60	600	100	300	200	–	
MPS651	MPS751	60	2000	75	–	75	0.5	
BC637		60	500	40	160	–	0.5	
–	2N5087	50	50	250	800	40	2.0	
BC182B	BC212B	50	100	200	500	200	10	
BC237B	BC307B	45	100	200	460	150	10	
BC337	BC327	45	800	100	630	210 (Typ)	–	
BC337-16	BC327-16	45	800	100	250	260 (Typ)	–	
BC337-25	BC327-25	45	800	160	400	260 (Typ)	–	
BC337-40	BC327-40	45	800	250	630	260 (Typ)	–	
BC550C	BC560C	45	100	380	800	250 (Typ)	2.5	
BC547A	BC557A	45	100	120	220	150	10	
BC547B	BC557B	45	100	180	450	150	10	
BC547C	BC557C	45	100	380	800	150	10	
MPSA18	–	45	200	500	–	100	1.5	
MPSA20	–	40	100	40	400	125	–	
MPS2222A	–	40	600	100	300	300	–	
2N4401	2N4403	40	600	100	300	200	–	
	MPS6652	40	1000	50	–	100	–	
2N3904	2N3906	40	200	100	300	250	5.0	
–	MPS4250	40	–	250	800	–	2.0	
BC548B		30	100	200	450	300 (Typ)	10	
BC548C	BC558C	30	100	420	800	300	10	
BC549C	–	30	100	420	800	–	–	
MPS2222	–	30	600	100	300	250	–	
2N5088	–	30	50	350	–	50	3.0	
2N5089	–	25	50	450	–	50	2.0	
2N4124	–	25	200	120	360	300	–	
MPS4124	–	25	200	120	360	170	5.0	
–	MPS4126	25	200	120	360	170	4.0	
MPS5172	–	25	100	100	500	–	–	
BC368	BC369	20	1000	60	–	65	0.5	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

Bipolar Transistors


GENERAL-PURPOSE TRANSISTORS (continued)

NPN	PNP	$V_{(BR)CEO}$	I_C mA Max	h_{FE}		f_T MHz Min	NF dB Max	Package
				Min	Max			
MPSW06	MPSW56	80	500	80	–	50	–	 TO-226AE (1-WATT) TO-92 Case 29-10
MPS6717	–	80	500	50	250	100	–	
MPSW05	MPSW55	60	500	60	–	50	250	
MPSW01A	MPSW51A	40	1000	50	–	50	–	
MPSW01	MPSW51	30	1000	50	–	50	–	
MPS6726	–	30	1000	50	250	–	–	
MMBT5550L	–	140	600	60	250	–	–	 TO-236AB, SOT-23 Case 318-08
–	BSS63L	100	100	30	–	50	–0.25	
BSS64L	–	80	100	20	–	60	0.15	
MMBTA06L	MMBTA56L	80	500	100	–	100	–	
MMBT8099L	–	80	500	100	300	150	–	
BC846AL	–	65	100	110	220	100	10	
BC846BL	–	65	100	200	450	100	10	
–	BC856AL	65	100	125	250	100	10	
–	BC856BL	65	100	220	475	100	10	
–	MMBT2907AL	60	600	100	300	200	–	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

Bipolar Transistors




GENERAL-PURPOSE TRANSISTORS (continued)

NPN	PNP	V _{(BR)CEO}	I _c mA Max	h _{FE}		f _T MHz Min	NF dB Max	Package
				Min	Max			
MMBT2484L	-	60	50	250	-	-	3.0	 <p>TO-236AB, SOT-23 Case 318-08</p>
MMBTA05L	-	60	500	100	-	100	-	
-	MMBTA55L	60	500	100	-	50	-	
MMBT6428L	-	50	200	250	-	100	3.0 (Typ)	
-	MMBT5087L	50	50	250	-	40	2.0	
MMBT6429L	-	45	200	500	-	100	3.0 (Typ)	
BC817-16L	-	45	500	100	250	100	-	
BC817-25L	-	45	500	160	400	100	-	
BC817-40L	-	45	500	250	600	100	-	
-	BC807-16L	45	500	100	250	100	-	
-	BC807-25L	45	500	160	400	100	-	
-	BC807-40L	45	500	250	600	100	-	
BC847AL	-	45	100	110	220	100	10	
BC847BL	-	45	100	200	450	100	10	
BC847CL	-	45	100	420	800	100	10	
BC850BL	-	45	100	200	450	100	4.0	
BC850CL	-	45	100	420	800	100	4.0	
-	BC857AL	45	100	125	250	100	10	
-	BC857BL	45	100	220	475	100	10	
-	BC857CL	45	100	420	800	100	10	
-	BCW68GL	45	800	120	400	100	10	
-	BCW70L	45	100	215	500	-	10	
BCW72L	-	45	100	200	450	300	10	
-	BCX17L	45	500	100	600	-	-	
BCX19L	-	45	500	100	600	-	-	
MMBT2222AL	-	40	600	100	300	300	4.0	
MMBT3904L	-	40	200	100	300	200	5.0	
-	MMBT3906L	40	200	100	300	250	4.0	
MMBT4401L	-	40	600	100	300	250	-	
-	MMBT4403L	40	600	100	300	200	-	
MMBT3416L	-	40	100	75	225	-	-	
-	MMBTA70L	40	100	40	400	125	-	
-	BCW30L	32	100	215	500	-	10	
BCW32L	-	32	100	200	450	-	10	
BCW65AL	-	32	800	100	250	100	10	
BCW65CL	-	32	100	250	630	100	10	
BC848AL	-	30	100	110	220	100	10	
BC848BL	-	30	100	200	450	100	10	
BC848CL	-	30	100	420	800	100	10	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

Bipolar Transistors







GENERAL-PURPOSE TRANSISTORS (continued)

NPN	PNP	V _{(BR)CEO}	I _c mA Max	h _{FE}		f _T MHz Min	NF dB Max	Package
				Min	Max			
<i>BC849BL</i>	-	30	100	200	450	100	4.0	 TO-236AB, SOT-23 Case 318-08
<i>BC849CL</i>	-	30	100	420	800	100	4.0	
MMBT489L	-	30	1000	300	900	100	-	
-	MMBT589L	30	1000	100	300	100	-	
-	<i>BC858AL</i>	30	100	125	250	100	10	
-	<i>BC858BL</i>	30	100	220	475	100	10	
-	<i>BC858CL</i>	30	100	420	800	100	10	
-	<i>BC859BL</i>	30	100	220	475	100	4.0	
<i>MMBT5088L</i>	-	30	50	300	900	5	3.0	
MMBT2222L	-	30	600	100	300	250	4.0	
MMBT6521L	-	25	100	300	600	-	-	
<i>MMBT5089L</i>	-	25	50	400	1200	50	2.0	
<i>MMBT4124L</i>	-	25	200	120	360	300	5.0	
BC818-40L	-	25	500	250	600	100	-	
-	MMBT4126L	25	200	120	300	250	4.0	
-	BC808-25L	25	500	160	400	100	-	
BCW33L	-	20	100	420	800	-	10	
<i>MSD601-R</i>	-	50	100	210	340	-	-	 SC-59 Case 318D-04
<i>MSD602-R</i>	-	50	500	120	240	-	-	
<i>MSC2712G</i>	-	50	100	200	400	-	-	
-	<i>MSA1162G</i>	50	100	200	400	-	-	
MSC2712Y	-	50	100	120	240	-	-	
-	<i>MSA1162Y</i>	50	100	120	240	-	-	
-	<i>MSB710-R</i>	50	500	120	240	-	-	
-	<i>MSB709-R</i>	45	100	210	340	-	-	
MSD1328-R	-	20	500	200	350	-	-	
MSD1328-S	-	20	500	300	500	-	-	
<i>MMBTA06W</i>	<i>MMBTA56W</i>	80	500	100	-	100	-	 SC-70, SOT-323 Case 419-04
<i>BC846BW</i>	-	65	100	200	450	100	10	
-	<i>BC856BW</i>	65	100	220	475	100	10	
-	<i>MMBT2907AW</i>	60	600	100	-	200	-	
<i>MSD1819A-R</i>	-	50	100	210	340	-	-	
<i>BC847AW</i>	-	45	100	110	220	100	10	
<i>BC847BW</i>	-	45	100	200	450	100	10	
<i>BC847CW</i>	-	45	100	420	800	100	4.0	
-	<i>BC857BW</i>	45	100	220	475	100	10	
-	<i>BC857CW</i>	45	100	420	800	100	10	
-	<i>MSB1218A-R</i>	45	100	210	340	-	-	
MMBT4401W	-	40	600	100	300	250	-	
-	MMBT4403W	40	600	100	300	200	-	
<i>MMBT2222AW</i>	-	40	600	100	300	300	4.0	
<i>MMBT3904W</i>	-	40	200	100	300	300	5.0	
-	<i>MMBT3906W</i>	40	200	100	300	250	4.0	
<i>BC848BW</i>	-	30	100	200	450	100	10	
<i>BC848CW</i>	-	30	100	420	800	100	4.0	
-	<i>BC858AW</i>	30	100	110	220	100	10	
-	<i>BC858BW</i>	30	100	200	450	100	10	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

Bipolar Transistors





GENERAL-PURPOSE TRANSISTORS (continued)

NPN	PNP	$V_{(BR)CEO}$	I_C mA Max	h_{FE}		f_T MHz Min	NF dB Max	Package
				Min	Max			
<i>2SC4617</i>	–	50	100	120	560	180 (Typ)	–	 SOT-416, SC-75, SC-90 Case 463-01
–	<i>2SA1774</i>	50	100	120	560	140 (Typ)	–	
<i>BC847BT</i>	–	45	100	200	450	100	10	
<i>BC847CT</i>	–	45	100	420	800	100	4.0	
–	<i>BC857BT</i>	45	100	220	475	100	10	
<i>MMBT3904T</i>	–	40	200	100	300	300	5.0	
–	<i>MMBT3906T</i>	40	200	100	300	250	4.0	
<i>MMBT2222AT</i>	–	40	600	100	300	300	4.0	
–	2SA2029M3	50	100	120	560	140 (Typ)	–	 SOT-723 Case 631AA-01
–	BC856BM3	45	100	220	475	100	10	
–	MMBT2907AM3	60	600	100	–	200	–	
BC846BM3	–	65	100	200	450	100	10	
2SC5658M3	–	50	100	120	560	180 (Typ)	–	
BC847BM3	–	45	100	200	450	100	10	
–	–	40	600	100	300	300	4.0	
<i>BCP56</i>	<i>BCP53</i>	80	1000	40	250	50 (Typ)	–	 SOT-223 Case 318E-04
<i>BCP56-10</i>	<i>BCP53-10</i>	80	1000	63	160	50 (Typ)	–	
<i>BCP56-16</i>	<i>BCP53-16</i>	80	1000	100	250	50 (Typ)	–	
–	<i>PZT2907A</i>	60	600	100	300	200	–	
<i>PZT651</i>	<i>PZT751</i>	60	2000	75	–	75	–	
<i>PZT2222A</i>	–	40	600	100	300	300	–	
<i>BCP68</i>	<i>BCP69</i>	25	1000	85	375	60 (Typ)	–	
–	MMBT2131	30	700	150	–	–	–	 SO-74 Case 318F-05
–	MBT35200M	35	2000	100	400	100	–	 TSOP-6 SINGLE Case 318G-02
NST489AM	–	30	3000	300	900	200	–	
–	NSL12AW	12	2000	100	300	100	–	 SC-88, SOT-363 Case 419B-02

Devices listed in **bold italic** are ON Semiconductor preferred devices.

Bipolar Transistors

GENERAL-PURPOSE MULTIPLE TRANSISTORS



Device	Type	V _{(BR)CEO}	I _C mA Max	h _{FE}		f _T MHz Min	NF dB Max	Package
				Min	Max			
BC846BDW1	Dual NPN	65	100	200	450	100	10	 SC-88, SOT-363 Case 419B-02
BC856BDW1	Dual PNP	65	100	220	475	100	10	
BC846BPDW1	Dual Complementary	65	100	200	475	100	10	
BC847BDW1	Dual NPN	45	100	200	290	100	10	
BC847CDW1	Dual NPN	45	100	420	520	100	4.0	
BC857BDW1	Dual PNP	45	100	220	290	100	10	
BC857CDW1	Dual PNP	45	100	420	520	100	10	
BC847BPDW1	Dual Complementary	45	100	200	290	100	10	
MBT3904DW1	Dual NPN	40	200	100	300	300	5.0	
MBT3906DW1	Dual PNP	40	200	100	300	250	4.0	
MBT3946DW1	Dual Complementary	40	200	100	300	250	5.0/4.0	
MBT2222ADW1	Dual NPN	40	600	100	300	300	4.0	
MBT6429DW1	Dual NPN	45	200	500	1250	100	–	
UMZ1N	Dual Complementary	50	200	200	400	114 (Typ)	–	
BC848CDW1	Dual NPN	30	100	420	250	100	4.0	
BC848CPDW1	Dual Complementary	30	100	420	520	100	4.0/10	
BC847CDXV6	NPN	45	100	420	520	100	–	 SOT-563 Case 463A-01
EMT1DXV6	Dual PNP	60	100	120	560	140 (Typ)	–	
EMX1DXV6	Dual NPN	50	100	120	560	180 (Typ)	–	
EMX2DXV6	Dual NPN	50	100	120	560	180 (Typ)	–	
EMZ1DXV6	Complementary	60	100	120	560	140 (Typ)	–	
BC847BPDXV6	Complementary	45	100	200	290	100	–	
NST3904DXV6	Dual NPN	40	200	100	300	300	–	
NST3906DXV6	Dual PNP	40	200	100	300	250	–	
NST3946DXV6	Complementary	40	200	100	300	250	–	
NST30010MXV6	Matched Dual PNP	30	100	420	520	100	–	
BC858CDXV6	Dual PNP	30	100	420	520	100	–	
HN1B01FDW1	Complimentary	50	200	200	400	–	–	 SO-74 Case 318F-05  8 1 SOIC-8 Case 751 STYLE 16
NSS40301MD08	Matched Dual NPN	40	3000	200	500	150	–	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

1. Devices in **bold**, samples starting Oct. 2002, production starting Dec. 2002.
2. Remainder of devices, 4 to 8 weeks after receipt of request based on note 1 timetable.

Bipolar Transistors





LOW NOISE AND GOOD h_{FE} LINEARITY

NPN	PNP	$V_{(BR)CEO}$	I_C mA Max	h_{FE}		f_T MHz Min	NF dB Max	Package
				Min	Max			
–	2N5087	50	50	250	800	40	2.0	 TO-226AA, TO-92 Case 29-11 (Note 1)
BC550C	BC560C	45	100	380	800	250 (Typ)	2.5	
MPSA18	–	45	200	500	–	100	1.5	
2N5088	–	30	50	350	–	50	3.0	
2N5089	–	25	50	450	–	50	2.0	
MMBT2484L	–	60	50	250	–	–	3.0	 TO-236AB, SOT-23 Case 318-08
MMBT6428L	–	50	200	250	–	100	3.0 (Typ)	
–	MMBT5087L	50	50	250	–	40	2.0	
MMBT6429L	–	45	200	500	–	100	3.0 (Typ)	
MMBT5088L	–	30	50	300	900	5	3.0	
MMBT5089L	–	25	50	400	–	50	2.0	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

1. N_F : Noise Figure at $R_S = 2.0\text{ k}\Omega$, $I_C = 200\text{ }\mu\text{A}$, $V_{CE} = 5.0\text{ Volts}$. $f = 30\text{ Hz to }15\text{ kHz}$.



DARLINGTON TRANSISTORS

NPN	PNP	$V_{(BR)CEO}$	I_C mA Max	h_{FE}		f_T MHz Min	NF dB Max	Package
				Min	Max			
MPSW45A	–	50	1000	25K	150K	100	1.5	 TO-226AE (1-WATT) TO-92 Case 29-10
MPSW45	–	40	1000	25K	150K	100	1.5	
–	MPSW63	30	500	10K	–	125	1.5	
MPSW13	–	30	1000	10K	–	125	1.5	
MPSA29	–	100	500	10K	–	125	1.5	 TO-226AA, TO-92 Case 29-11
BC372	–	100	1000	10K	160K	100	1.1	
BC373	–	80	1000	10K	160K	100	1.1	
MPSA27	MPSA77	60	500	10K	–	–	1.5	
BC618	–	55	1000	10K	50K	150	1.1	
–	MPSA75	40	500	10K	–	–	1.5	
2N6427	–	40	500	20K	200K	–	1.5	
2N6426	–	40	500	30K	300K	125	1.5	
MPSA14	MPSA64	30	500	20K	–	125	1.5	
MPSA13	MPSA63	30	500	10K	–	125	1.5	
BC517	–	30	1000	30K	–	200 (Typ)	1.0	
MMBT6427L	–	40	500	20000	200000	–	10	 TO-236AB, SOT-23 Case 318-08
MMBTA14L	MMBTA64L	30	300	20K	–	125	–	
MMBTA13L	–	30	300	10000	–	125	–	
–	MMBTA63L	30	500	10000	–	125	–	
BSP52	–	80	1000	2000	–	–	–	 SOT-223 Case 318E-04

Devices listed in **bold italic** are ON Semiconductor preferred devices.

Bipolar Transistors





HIGH CURRENT TRANSISTORS (≥ 500 mA)

NPN	PNP	$V_{(BR)CEO}$	I_C mA Max	h_{FE}		f_T MHz Min	NF dB Max	Package	
				Min	Max				
BC489	BC490	80	1000	60	400	200/150 (Typ)	0.3/0.5	 <p>TO-226AA, TO-92 Case 29-11</p>	
BC639	BC640	80	500	40	160	60	0.5		
BC489A		80	1000	100	250	100	0.5		
BC639-16	BC640-16	80	1000	100	250	60	0.5		
<i>MPS8099</i>	<i>MPS8599</i>	80	500	100	300	150	-		
<i>MPSA06</i>	<i>MPSA56</i>	80	500	100	-	100	-		
<i>MPS651</i>	<i>MPS751</i>	60	2000	75	-	75	0.5		
BC637		60	500	40	160	-	0.5		
MPSA05	MPSA55	60	500	100	-	100	-		
-	<i>MPS2907A</i>	60	600	100	300	200	-		
-	P2N2907A	60	600	100	300	200	-		
-	PN2907A	60	600	100	300	200	-		
BC337	BC327	45	800	100	630	210 (Typ)	-		
BC337-25	BC327-25	45	800	160	400	260 (Typ)	-		
BC337-40	BC327-40	45	800	250	630	260 (Typ)	-		
MPS650	MPS750	40	2000	40	-	75	-		
<i>MPS2222A</i>	-	40	600	100	300	300	-		
<i>2N4401</i>	<i>2N4403</i>	40	600	100	300	200	-		
P2N2222A	-	40	600	100	300	300	-		
PN2222A	-	40	600	100	300	300	-		
	<i>MPS6652</i>	40	1000	50	-	100	-		
PN2222	-	30	600	100	300	250	-		
MPS2222	-	30	600	100	300	250	-		
MPS6560	-	25	500	50	200	60	-		
MPS6601	-	25	1000	50	-	100	-		
BC368	BC369	20	1000	60	-	65	0.5		
<i>MPSW06</i>	<i>MPSW56</i>	80	500	80	-	50	-		 <p>TO-226AE (1-WATT) TO-92 Case 29-10</p>
MPS6717	-	80	500	50	250	100	-		
MPSW05	MPSW55	60	500	60	-	50	250		
<i>MPSW01A</i>	<i>MPSW51A</i>	40	1000	50	-	50	-		
MPSW01	MPSW51	30	1000	50	-	50	-		
MPS6726	-	30	1000	50	250	-	-		

Devices listed in ***bold italic*** are ON Semiconductor preferred devices.

Bipolar Transistors






HIGH CURRENT TRANSISTORS (≥ 500 mA) (continued)

NPN	PNP	$V_{(BR)CEO}$	I_C mA Max	h_{FE}		f_T MHz Min	NF dB Max	Package
				Min	Max			
MMBT5550L	–	140	600	60	250	–	–	 TO-236AB, SOT-23 Case 318-08
MMBTA06L	MMBTA56L	80	500	100	–	100	–	
MMBT8099L	–	80	500	100	300	150	–	
–	MMBT2907AL	60	600	100	300	200	–	
MMBTA05L	–	60	500	100	–	100	–	
–	MMBTA55L	60	500	100	–	50	–	
–	BCW68GL	45	800	120	400	100	10	
BCW66GL	–	45	800	160	400	100	10	
–	BCX17L	45	500	100	600	–	–	
BCX19L	–	45	500	100	600	–	–	
MMBT2222AL	–	40	600	100	300	300	4.0	
MMBT4401L	–	40	600	100	300	250	–	
–	MMBT4403L	40	600	100	300	200	–	
BCW65AL	–	32	800	100	250	100	10	
MMBT2222L	–	30	600	100	300	250	4.0	
BCP56	BCP53	80	1000	40	250	50 (Typ)	–	 SOT-223 Case 318E-04
BCP56-10	BCP53-10	80	1000	63	160	50 (Typ)	–	
BCP56-16	BCP53-16	80	1000	100	250	50 (Typ)	–	
–	PZT2907A	60	600	100	300	200	–	
PZT651	PZT751	60	2000	75	–	75	–	
PZT2222A	–	40	600	100	300	300	–	
BCP68	BCP69	25	1000	85	375	60 (Typ)	–	
MMBT2222AT	–	40	600	100	300	300	4.0	 SOT-416, SC-75, SC-90 Case 463-01
–	MMBT2907AW	60	600	100	–	200	–	 SC-70, SOT-323 Case 419-04
MMBT2222AW	–	40	600	100	300	300	4.0	
–	MSB92ASW	300	500	120	200	50	–	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

Bipolar Transistors




HIGH VOLTAGE TRANSISTORS (> 100 V)

NPN	PNP	V _{(BR)CEO}	I _C mA Max	h _{FE}		f _T MHz Min	NF dB Max	Package
				Min	Max			
-	BF493S	350	500	40	-	50	20	 TO-226AE (1-WATT) TO-92 Case 29-10
MPSW42	-	300	500	40	-	50	0.5	
-	MPSW92	300	500	25	-	50	0.5	
BF393	-	300	500	40	-	50	-	
2N5551	-	160	600	80	250	100	8.0	
-	2N5401	150	600	60	240	100	8.0	
MPSA44	-	400	300	50	200	-	-	 TO-226AA, TO-92 Case 29-11
2N6517	2N6520	350	500	30	200	40	-	
MPSA42	-	300	500	40	-	50	0.5	
-	MPSA92	300	500	40	-	50	0.5	
BF422	BF423	250	500	50	-	60	-	
MPSA43	-	200	500	40	-	50	-	
-	MPSA93	200	500	25	-	50	-	
2N5550	-	160	600	80	-	100	0.15	
2N6515	-	250	500	50	300	40	0.3	
MMBT6517L	-	350	500	15	-	40	-	 TO-236AB, SOT-23 Case 318-08
-	MMBT6520L	350	500	15	-	40	-	
MMBTA42L	-	300	500	40	-	50	-	
-	MMBTA92L	300	500	25	-	50	-	
MMBTA43L	-	200	500	40	-	50	-	
MMBT5551L	-	160	600	80	250	-	-	
-	MMBT5401L	150	500	50	-	100	8.0	
MMBT5550L	-	140	600	60	250	-	-	
PZTA96S	-	450	500	50	150	-	-	 SOT-223 Case 318E-04
BSP19A	-	350	1000	40	-	70	-	
PZTA42	PZTA92	300	500	40	-	50	-	
-	PZTA96S	450	500	50	150	-	-	
-	BSP16	300	1000	30	120	15	-	
BF720	BF721	250	100	50	-	60	-	
MSD42W	-	300	150	40	-	-	-	 SC-70, SOT-323 Case 419-04
-	MSB92W	300	500	25	-	50	-	
-	MSB92AW	300	500	120	200	50	-	
-	MSB92ASW	300	500	120	200	50	-	

Devices listed in **bold italic** are ON Semiconductor preferred devices.



Bipolar Transistors

RF TRANSISTORS

NPN	PNP	$V_{(BR)CEO}$	I_C mA Max	h_{FE}		f_T MHz Min	Cap pF Max	Package
				Min	Max			
<i>MPSH10</i>	–	25	–	60	–	650	$C_{RB} = 0.65$	 TO-226AA, TO-92 Case 29-11
BF959	–	20	100	40	–	600	$C_{RE} = 0.65$ (Typ)	
<i>MPSH17</i>	–	15	–	25	250	800	$C_{CB} = 0.9$	
<i>MMBTH10L</i>	–	25	–	60	–	650	$C_{CB} = 0.7$	 TO-236AB, SOT-23 Case 318-08
<i>MMBTH10-4L</i>	–	25	–	120	240	800	$C_{CB} = 0.7$	
MMBT918L	–	15	50	20	–	600	$C_{OBO} = 1.7$	
BSV52L	–	12	100	40	120	400	–	
<i>MSC2295-C</i>	–	20	30	110	220	150	$C_{RE} = 1.5$	 SC-59 Case 318D-04

Devices listed in ***bold italic*** are ON Semiconductor preferred devices.



SWITCHING TRANSISTORS

NPN	PNP	$V_{(BR)CEO}$	I_C mA Max	h_{FE}		f_T MHz Min	T_{off} ns Max	Package
				Min	Max			
–	P2N2907A	60	600	100	300	200	110	 TO-226AA, TO-92 Case 29-11
–	<i>MPS2907A</i>	60	600	100	300	200	110	
<i>2N4401</i>	<i>2N4403</i>	40	600	100	300	200	–	
<i>2N3904</i>	<i>2N3906</i>	40	200	100	300	250	300	
P2N2222A	–	40	600	100	300	300	285	
<i>MPS2222A</i>	–	40	600	100	300	300	285	
–	<i>MMBT2907AL</i>	60	600	100	300	200	100	 TO-236AB, SOT-23 Case 318-08
<i>MMBT2222AL</i>	–	40	600	100	300	300	285	
<i>MMBT3904L</i>	–	40	200	100	300	300	250	
–	<i>MMBT3906L</i>	40	200	100	300	250	300	
<i>MMBT4401L</i>	–	40	600	100	300	250	255	
–	<i>MMBT4403L</i>	40	600	100	300	200	255	
<i>MMBT2369L</i>	–	15	200	40	120	–	18	
<i>MMBT2369AL</i>	–	15	200	40	120	–	18	

Devices listed in ***bold italic*** are ON Semiconductor preferred devices.



Bipolar Transistors

SWITCHING TRANSISTORS

NPN	PNP	$V_{(BR)CEO}$	I_C mA Max	h_{FE}		f_T MHz Min	T_{off} ns Max	Package
				Min	Max			
–	<i>MMBT2907AW</i>	60	600	100	300	200	100	 SC-70, SOT-323 Case 419-04
<i>MMBT3904W</i>	–	40	200	100	300	300	250	
–	<i>MMBT3906W</i>	40	200	100	300	250	300	
<i>MMBT2222AW</i>	–	40	600	100	300	300	285	
<i>MMBT4401W</i>	–	40	600	100	300	250	255	
–	<i>MMBT4403W</i>	40	600	100	300	200	255	
<i>MMBT3904T</i>	–	40	200	100	300	300	250	 SOT-416, SC-75, SC-90 Case 463-01
–	<i>MMBT3906T</i>	40	200	100	300	250	300	
<i>MMBT2222AT</i>	–	40	600	100	300	300	285	

Devices listed in ***bold italic*** are ON Semiconductor preferred devices.

MULTIPLE SWITCHING TRANSISTORS

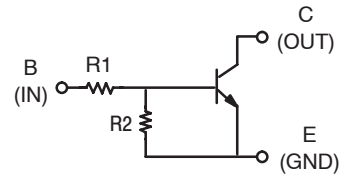
Device	Type	$V_{(BR)CEO}$	I_C mA Max	h_{FE}		f_T MHz Min	T_{off} ns Max	Package
				Min	Max			
<i>MBT3904DW1</i>	Dual NPN	40	200	100	300	300	250	 SC-88, SOT-363 Case 419B-02
<i>MBT3906DW1</i>	Dual PNP	40	200	100	300	250	300	
<i>MBT3946DW1</i>	Dual Complementary	40	200	100	300	250	250/300	
<i>MBT2222ADW1</i>	Dual NPN	40	600	100	300	300	285	
HN1B01FDW1	Dual Complementary	50	200	200	400	–	–	 SC-74 Case 318F-05




Devices listed in ***bold italic*** are ON Semiconductor preferred devices.

Bipolar Transistors

DIGITAL TRANSISTORS (BIAS RESISTOR TRANSISTORS)

These devices include bias resistors on the semiconductor chip with the transistor. See the BRT diagram for orientation of resistors.



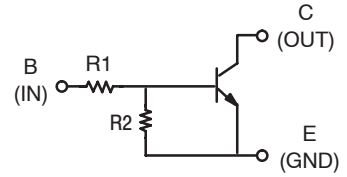
NPN	PNP	$V_{(BR)CEO}$	I_C mA Max	h_{FE} Min	R_1 Ω	R_2 Ω	Package
<i>MUN2211</i>	<i>MUN2111</i>	50	100	35	10K	10K	 SC-59 Case 318D-04
<i>MUN2212</i>	<i>MUN2112</i>	50	100	60	22K	22K	
<i>MUN2213</i>	<i>MUN2113</i>	50	100	80	47K	47K	
<i>MUN2214</i>	<i>MUN2114</i>	50	100	80	10K	47K	
<i>MUN2215</i>		50	100	160	10K	∞	
<i>MUN2216</i>		50	100	160	4.7K	∞	
<i>MUN2230</i>		50	100	3.0	1.0K	1.0K	
<i>MUN2232</i>	<i>MUN2132</i>	50	100	15	4.7K	4.7K	
<i>MUN2233</i>		50	100	80	4.7K	47K	
<i>MUN2234</i>		50	100	80	22K	47K	
<i>MUN2237</i>		50	100	80	47K	22K	
<i>MUN2240</i>	-	50	100	160	47K	∞	
<i>MMUN2211L</i>	<i>MMUN2111L</i>	50	100	35	10K	10K	 TO-236AB, SOT-23 Case 318-08
<i>MMUN2212L</i>	<i>MMUN2112L</i>	50	100	60	22K	22K	
<i>MMUN2213L</i>	<i>MMUN2113L</i>	50	100	80	47K	47K	
<i>MMUN2214L</i>	<i>MMUN2114L</i>	50	100	80	10K	47K	
<i>MMUN2215L</i>	<i>MMUN2115L</i>	50	100	160	10K	∞	
<i>MMUN2216L</i>	<i>MMUN2116L</i>	50	100	160	4.7K	∞	
<i>MMUN2231L</i>		50	100	8.0	2.2K	2.2K	
<i>MMUN2232L</i>	<i>MMUN2132L</i>	50	100	15	4.7K	4.7K	
<i>MMUN2233L</i>	<i>MMUN2133L</i>	50	100	80	4.7K	47K	
<i>MMUN2234L</i>		50	100	80	22K	47K	
<i>MMUN2238L</i>	-	50	100	160	2.2K	∞	
<i>MUN5211</i>	<i>MUN5111</i>	50	100	35	10K	10K	 SC-70, SOT-323 Case 419-04
<i>MUN5212</i>	<i>MUN5112</i>	50	100	60	22K	22K	
<i>MUN5213</i>	<i>MUN5113</i>	50	100	80	47K	47K	
<i>MUN5214</i>	<i>MUN5114</i>	50	100	80	10K	47K	
<i>MUN5215</i>		50	100	160	10K	∞	
<i>MUN5230</i>		50	100	3.0	1.0K	1.0K	
	<i>MUN5131</i>	50	100	8.0	2.2K	2.2K	
<i>MUN5232</i>	<i>MUN5132</i>	50	100	15	4.7K	4.7K	
<i>MUN5233</i>	<i>MUN5133</i>	50	100	80	4.7K	47K	
<i>MUN5235</i>	<i>MUN5135</i>	50	100	80	2.2K	47K	



Devices listed in ***bold italic*** are ON Semiconductor preferred devices.

Bipolar Transistors

DIGITAL TRANSISTORS (BIAS RESISTOR TRANSISTORS) (continued)

These devices include bias resistors on the semiconductor chip with the transistor. See the BRT diagram for orientation of resistors.



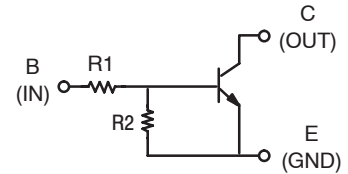
NPN	PNP	$V_{(BR)CEO}$	I_C mA Max	h_{FE} Min	R1 Ω	R2 Ω	Package	
<i>DTC114EE</i>	<i>DTA114EE</i>	50	100	35	10K	10K	 SOT-416, SC-75, SC-90 Case 463-01	
<i>DTC124EE</i>		50	100	60	22K	22K		
<i>DTC144EE</i>	<i>DTA144EE</i>	50	100	80	47K	47K		
<i>DTC114YE</i>	<i>DTA114YE</i>	50	100	80	10K	47K		
<i>DTC114TE</i>	<i>DTA114TE</i>	50	100	160	10K	∞		
<i>DTC143TE</i>	<i>DTA143TE</i>	50	100	160	4.7K	∞		
<i>DTC123EE</i>		50	100	8.0	2.2K	2.2K		
<i>DTC143EE</i>	<i>DTA143EE</i>	50	100	15	4.7K	4.7K		
<i>DTC143ZE</i>	<i>DTA143ZE</i>	50	100	80	4.7K	4.7K		
<i>DTC124XE</i>	-	50	100	80	22K	47K		
<i>DTC123JE</i>		50	100	80	2.2K	47K		
<i>DTC115EE</i>	<i>DTA115EE</i>	50	100	80	100K	100K		
<i>DTC114EM3</i>	<i>DTA114EM3</i>	50	100	35	10K	10K		 SOT-723 Case 631AA-01
<i>DTC124EM3</i>	<i>DTA124EM3</i>	50	100	60	22K	22K		
<i>DTC144EM3</i>	<i>DTA144EM3</i>	50	100	80	47K	47K		
<i>DTC114YM3</i>	<i>DTA114YM3</i>	50	100	80	10K	47K		
<i>DTC114TM3</i>	<i>DTA114TM3</i>	50	100	160	10K	∞		
<i>DTC143TM3</i>	<i>DTA143TM3</i>	50	100	160	4.7K	∞		
<i>DTC123EM3</i>	<i>DTA123EM3</i>	50	100	8.0	2.2K	2.2K		
<i>DTC143EM3</i>	<i>DTA143EM3</i>	50	100	15	4.7K	4.7K		
<i>DTC143ZM3</i>	<i>DTA143ZM3</i>	50	100	80	4.7K	4.7K		
<i>DTC124XM3</i>	<i>DTA124XM3</i>	50	100	80	22K	47K		
<i>DTC123JM3</i>		50	100	80	2.2K	47K		
<i>DTC115EM3</i>	<i>DTA115EM3</i>	50	100	80	100K	100K		
<i>DTC144WM3</i>	<i>DTA144WM3</i>	50	100	80	47K	22K		
<i>DTC144TM3</i>	<i>DTA144TM3</i>	50	100	160	47K	∞		




Devices listed in **bold italic** are ON Semiconductor preferred devices.

Bipolar Transistors

DUAL DIGITAL TRANSISTORS (BIAS RESISTOR TRANSISTORS)

These devices include bias resistors on the semiconductor chip with the transistor. See the BRT diagram for orientation of resistors.



NPN	PNP	$V_{(BR)CEO}$	I_C mA Max	h_{FE} Min	R_1 Ω	R_2 Ω	Package
<i>MUN5211DW1</i>	<i>MUN5111DW1</i>	50	100	35	10K	10K	 SC-88, SOT-363 Duals Case 419B-02
<i>MUN5212DW1</i>		50	100	60	22K	22K	
<i>MUN5213DW1</i>	<i>MUN5113DW1</i>	50	100	80	47K	47K	
<i>MUN5214DW1</i>	<i>MUN5114DW1</i>	50	100	80	10K	47K	
<i>MUN5215DW1</i>	<i>MUN5115DW1</i>	50	100	160	10K	∞	
<i>MUN5216DW1</i>	<i>MUN5116DW1</i>	50	100	160	4.7K	∞	
<i>MUN5230DW1</i>		50	100	3.0	1.0K	1.0K	
<i>MUN5232DW1</i>	<i>MUN5132DW1</i>	50	100	15	4.7K	4.7K	
<i>MUN5233DW1</i>	<i>MUN5133DW1</i>	50	100	80	4.7K	47K	
<i>MUN5235DW1</i>	<i>MUN5135DW1</i>	50	100	80	2.2K	47K	
NSBC114EDXV6	NSBA114EDXV6	50	100	35	10K	10K	 SOT-563 Duals Case 463A-01
NSBC124EDXV6		50	100	60	22K	22K	
NSBC144EDXV6	NSBA144EDXV6	50	100	80	47K	47K	
NSBC114YDXV6	NSBA114YDXV6	50	100	80	10K	10K	
NSBC114TDXV6		50	100	160	10K	–	
NSBC143ZDXV6		50	100	80	4.7K	4.7K	
	NSBA123JDXV6	50	100	80	2.2K	47K	
NSBC115EDXV6	NSBA115EDXV6	50	100	80	100K	100K	
IMH20TR1	–	15	600	100	2.2K	–	 SC-74 Case 318F-05

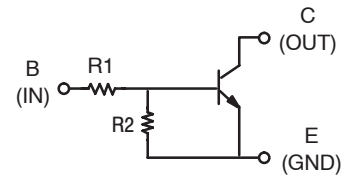
Devices listed in **bold italic** are ON Semiconductor preferred devices.





1. Devices in **bold**, samples starting Oct. 2002, production starting Dec. 2002.
2. Remainder of devices, 4 to 8 weeks after receipt of request based on note 1 timetable.

Bipolar Transistors

COMBINATIONAL DIGITAL TRANSISTORS (BIAS RESISTOR TRANSISTORS)

These devices include bias resistors on the semiconductor chip with the transistor. See the BRT diagram for orientation of resistors.



Device	Type	$V_{(BR)CEO}$	I_C mA Max	h_{FE} Min	Q1	Q2	Package
<i>MUN5311DW1</i>	Dual Complementary	50	100	35	MUN5211	MUN5111	 SC-88, SOT-363 Case 419B-02
<i>MUN5312DW1</i>		50	100	60	MUN5212	MUN5112	
<i>MUN5313DW1</i>		50	100	80	MUN5213	MUN5113	
<i>MUN5314DW1</i>		50	100	80	MUN5214	MUN5114	
<i>MUN5315DW1</i>		50	100	160	MUN5215	MUN5115	
<i>MUN5316DW1</i>		50	100	160	MUN5216	MUN5116	
<i>MUN5330DW1</i>		50	100	3.0	MUN5230	MUN5130	
<i>MUN5333DW1</i>		50	100	80	MUN5233	MUN5133	
<i>MUN5335DW1</i>		50	100	80	MUN5235	MUN5135	
<i>UMC3N</i>	Dual Common Base Collector	50	100	35	4.7K/10K	47K/47K	 SC-88A, SOT-353 SC70-5 Case 419A-02
<i>UMC5N</i>	Dual Common Base Collector	50	100	20	47K/∞	47K/∞	
NSB1706DMW5	Dual Common Emitter	50	100	80	4.7K/47K	4.7K/47K	
EMC3DXV5	Dual Common Base Collector	50	100	35	10K/10K	10K/10K	 SOT-553 Case 463B-01
EMC4DXV5	Dual Common Base Collector	50	100	80	10K/47K	4.7K/47K	
EMC5DXV5	Dual Common Base Collector	50	100	35	4.7K/10K	4.7K/47K	
EMG2DXV5	Dual Common Base, Common Emitter	50	100	80	4.7K/47K	4.7K/47K	
NSB1010XV5	Dual Common Base Collector	50	100	–	4.7K/4.7K	10K/10K	
EMD4DXV6	Dual Complementary	50	100	80	10K/47K	47K/47K	 SOT-563 Case 463A-01
NSB1011XV6	Dual	50	100	–	2.2K/47K	10K/10K	

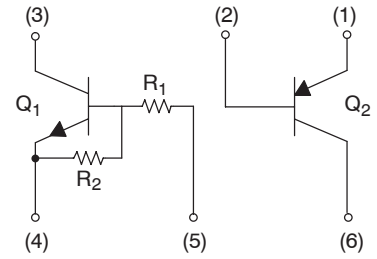
Devices listed in ***bold italic*** are ON Semiconductor preferred devices.


1. Devices in **bold**, samples starting Oct. 2002, production starting Dec. 2002.
2. Remainder of devices, 4 to 8 weeks after receipt of request based on note 1 timetable.

Bipolar Transistors

COMPLEX DIGITAL TRANSISTORS

These devices include bias resistors on the semiconductor chip with the transistor. See the BRT diagram for orientation of resistors.










Device	Switching Transistor				Digital Transistor			Package
	$V_{(BR)CEO}$ V	I_C (mA) Max	h_{FE}		h_{FE} Min	R1 Ω	R2 Ω	
			Min	Max				
EMF5XV6	12	500	270	680	80	47K	47K	 SOT-563 Case 463A-01
EMF18XV6	60	100	120	560	80	47K	47K	

Devices listed in ***bold italic*** are ON Semiconductor preferred devices.

1. Devices in ***bold***, samples starting Oct. 2002, production starting Dec. 2002.
2. Remainder of devices, 4 to 8 weeks after receipt of request based on note 1 timetable.

Bipolar Transistors




LOW SATURATION VOLTAGE TRANSISTORS

NPN	PNP	$V_{(BR)CEO}$	I_C DC A Max	I_C Peak A Max	h_{FE} @ 1.0 A		f_t MHz Min	$V_{CE(sat)}$ @ 1.0 A Max	Package
					Min	Max			
NSS60201L		60	2	4	200	500	150	0.070	 TO-236AB, SOT-23 Case 318-08 STYLE 6
	NSS60200L	60	2	4	200	500	150	0.095	
NSS40201L	-	40	2	4	200	500	150	0.060	
-	NSS40200L	40	2	4	200	500	150	0.090	
NSS30101L		30	1	2	100	500	100	0.200	
-	NSS30100L	30	1	2	100	500	100	0.300	
NSS20201L	-	20	2	4	200	500	150	0.050	
-	NSS20200L	20	2	4	200	500	150	0.080	
NSS12201L	-	12	2	4	200	500	150	0.055	
-	NSS12200L	12	2	4	200	500	150	0.080	
NSS30071MR6	-	30	0.7	2	150	500	100	0.250	 SC-74 Case 318F-05 STYLE 2
-	NSS30070MR6	30	0.7	2	150	500	100	0.250	
-	NSS35200MR6	35	2	5	100	400	100	0.150	 TSOP-6 Single Case 318G-02 STYLE 6
NSS30201MR6	-	30	2	5	200	900	100	0.150	
NSS20201MR6	-	20	2	5	200	900	100	0.150	
-	NSS20300MR6	20	2	5	100	400	100	0.150	
NSS40601CF8	-	40	6	6	225	500	100	0.065	 ChipFET™ Case 1206A-03 STYLE 4
-	NSS40600CF8	40	6	6	220	500	100	0.065	
-	NSS35200CF8	35	2	7	100	400	100	0.150	
NSS20601CF8	-	20	6	6	250	500	100	0.050	
-	NSS20600CF8	20	6	6	220	500	100	0.060	
NSS12601CF8	-	12	6	6	250	500	100	0.050	
-	NSS12600CF8	12	6	6	210	500	100	0.060	
NSS40501UW3	-	40	5	6	250	500	100	0.045	 WDFN3 Case 506AU-01
-	NSS40500UW3	40	5	6	250	500	100	0.080	
NSS20501UW3		20	5	6	250	500	100	0.045	
-	NSS20500UW3	20	5	6	250	500	100	0.090	
NSS12501UW3	-	12	5	6	250	500	100	0.045	
-	NSS12500UW3	12	5	6	250	500	100	0.070	
-	NSS40200UW6	40	2	4	150	500	100	0.120	 WDFN6 Case 506AS-01
-	NSS12200MW6	12	1	2	200	500	150	0.280	 SC-88, SOT-363 Case 419B-02 STYLE 20
-	NSS12200W	12	2	3	100	300	100	0.290	

Devices listed in **bold italic** are ON Semiconductor preferred devices.


Bipolar Transistors

LOW SATURATION VOLTAGE TRANSISTORS (continued)


NPN	PNP	$V_{(BR)CEO}$	I_C DC A Max	I_C Peak A Max	h_{FE} @ 1.0 A		f_t MHz Min	$V_{CE(sat)}$ @ 1.0 A Max	Package
					Min	Max			
-	NSS12100XV6	12	1	2	200	500	150	0.280	 SOT-563 Case 463A-01
NJD2873	-	50	2	3	120	360	65	0.300	 DPAK Case 369C-01
NSS40301MZ4	-	40	3	5	200	500	150	0.045	 SOT-223 Case 318E-04
-	NSS40300MZ4	40	3	5	200	500	150	0.050	
NSS60301MZ4	-	60	3	5	200	500	150	0.060	
-	NSS60300MZ4	60	3	5	200	500	150	0.065	
-	NSB9435	30	3	5	125	500	110	0.210	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

LOW SATURATION VOLTAGE MULTIPLE TRANSISTORS

Device	Type	$V_{(BR)CEO}$	I_C DC	I_C Peak	h_{FE}		f_t	$V_{CE(sat)}$	Package
					Min	Max			
NSS40301MD08	Matched Dual NPN	40	3	4	200	500	150	0.044	8  1 SOIC-8 Case 751

LOAD SWITCH TRANSISTORS (Low Saturation Voltage Transistors with BRT Driver)

NPN	PNP	$V_{(BR)CEO}$	I_C DC A Max	I_C Peak A Max	h_{FE} @ 1.0 A		f_t MHz Min	$V_{CE(sat)}$ @ 0.1 A Max	Package
					Min	Max			
-	EMF5XV6	12	0.1	0.5	270	680	-	0.250	 SOT-563 Case 463A-01
-	EMF18XV6	600	0.1	0.5	120	560	-	0.400	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

FETs

FETs

Table of Contents

	Page
JFETS	190
High-Frequency Amplifiers	190
Switches and Choppers	190
Low-Frequency/Low Noise	191
MOSFET	189
SOT-723 N-Channel	192
SOT-723 P-Channel	192
SOT-563 Complementary	192
SOT-563 N-Channel	192
SOT-563 P-Channel	192
SC-75 N-Channel	192
SC-75 P-Channel	192
SC-89 N-Channel	192
SC-89 P-Channel	192
WDFN6 Complementary	192
WDFN6 FETKY® N-Channel	192
WDFN6 FETKY® P-Channel	192
WDFN6 N-Channel	192
WDFN6 P-Channel	193
WDFN6 P-Channel Load Switch	193
SC-88 Complementary	193
SC-88 N-Channel	193
SC-88 P-Channel	193
SC-88 P-Channel Load Switch	193
SC-70 N-Channel	194
SC-70 P-Channel	194
TSOP-6 N-Channel	194
TSOP-6 P-Channel	194
TSOP-6 P-Channel Load Switch	194
TSSOP-8 N-Channel	194
SOT-23 N-Channel	194
SOT-23 P-Channel	194
ChipFET™ Complementary	195
ChipFET™ FETKY® N-Channel	195
ChipFET™ FETKY® P-Channel	195
ChipFET™ N-Channel	195
ChipFET™ P-Channel	195
Micro8™ FETKY® P-Channel	195
Micro8™ P-Channel	195
DFN 6 N-Channel	196
DFN 6 P-Channel	196
DFN 8 N-Channel	196
SOT-223 N-Channel	196
SOT-223 P-Channel	196
SO-8 Complementary	196
SO-8 FETKY® N-Channel	196
SO-8 FETKY® P-Channel	196
SO-8 N-Channel	196
SO-8 P-Channel	197
SO-8FL N-Channel	197
DPAK N-Channel	197
DPAK P-Channel	198
D ² PAK N-Channel	199
D ² PAK P-Channel	199
TO-92 N-Channel	200
TO-220AB N-Channel	200
TO-220AB P-Channel	200
TO-247 N-Channel	200
TO-264 N-Channel	200
Product Replacement Table	201
Protected MOSFETs	209

In Brief...

Product Summary

Product	Description		Page
MOSFET	Power and Small Signal (8.0 to 250 V)	Surface Mount	192
		Through-Hole	200

What's New For . . .

Computing – MOSFETs for Desktop and Notebook PCs, Workstations, Graphic Cards, Hard Disk Drives, Game Consoles

ON Semiconductor has introduced an enhanced portfolio of 30 V MOSFETs utilizing our latest Trench technology providing up to a 54% reduction in R_G . These products are available in two packages: DPAK (including IPAK and IPAK with trimmed leads) and our leading edge SO-8FL flat lead power package.

The new 30 V DPAK devices include the NTD4809NH, NTD4810NH, NTD4813NH, and NTD4815NH.

The new 30 V SO-8FL devices include the NTMFS4837NH, NTMFS4839NH, and NTMFS4841NH.

Digital Consumer – MOSFETs for Cell Phones, Digital Still Cameras, Media Players, PDAs, Portable Games, Battery Packs, MP3 Players, GPS, USB, Modems, Radio, Set-Top Boxes.

Addressing the industry's needs for thinner, smaller, faster, and cooler devices for portable devices, ON Semiconductor is pleased to announce the following 20 V NTGD3133P, 20 V NTGS3443T, and 30 V NTGS4111P additions to the TSOP-6 family.

ON Semiconductor has also expanded its SOT-723 offering with the addition of the 20 V NTK3043N, NTK3134N, NTK3139P, and NTK3142P. The devices feature low $I_{GSS} < 1.0 \mu A$, ESD protected gates, $R_{DS(on)} 1.5 V_{GS}$ rated, and an ultra-low profile of 0.50 mm for slim designs.

Automotive – MOSFETs for Entertainment, Power Train, Safety and Control, Comfort and Convenience, Body Electronics.

ON Semiconductor has released a line of 40 V low $R_{DS(on)}$ devices targeted for ABS applications including the NTB5404N, NTB5405N, NTD5406N, and NTD5407N.

How To Use This Selector Guide



1. Choose the Product Type (MOSFET).
2. Choose the Package Type, i.e., DPAK, SOT-23.
3. Choose the Channel Polarity* (i.e., N, P, Complementary).
4. Choose the Voltage Level.
5. View the Electrical Specifications and Find the Device Number.

*Configuration Codes: S = Single, D = Dual, C = Complementary, F = FETKY, L = Load Switch, Q = Quad

Junction Field–Effect Transistors



JFETs

HIGH–FREQUENCY AMPLIFIERS

N–Channel	$R_e Y_{fs} $ mmho	$R_e Y_{os} $ μ mho	C_{iss} pF	C_{rss} pF	NF dB	V_{GSS} V_{GDO} Volts	$V_{GS(off)}$ Volts		I_{DSS} mA		Package
	Min	Max	Max	Max			Min	Max	Min	Max	
MPF102	1.6	200	7.0	3.0	–	25	–	8.0	2.0	20	 TO–226AA, TO–92 Case 29–11
2N5486	3.5	100	5.0	1.0	4.0	25	2.0	6.0	8.0	20	
J309	12 (Typ)	250 (Typ)	7.5	2.5	1.5 (Typ)	25	1.0	4.0	12	30	
J310	12 (Typ)	250 (Typ)	7.5	2.5	1.5 (Typ)	25	2.0	6.5	24	60	
MMBF5457L	1.0	50	7.0	3.0	4.0	25	0.5	6.0	1.0	5.0	 TO–236AB, SOT–23 Case 318–08
MMBF5484L	3.0	50	5.0	1.0	3.0	25	0.3	3.0	1.0	5.0	
MMBFJ309L	10	250	5.0	2.5	4.0	25	1.0	4.0	12	30	
MMBFJ310L	8.0	250	5.0	2.5	4.0	25	2.0	6.5	24	60	
MMBFU310L	10	250	5.0	2.5	4.0	25	2.5	6.0	24	60	
MMBF4416L	4.5	50	4.0	0.8	2.0	30	–	6.0	5.0	15	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

SWITCHES AND CHOPPERS



N–Channel	P–Channel	$R_{DS(on)}$ Ω	C_{iss} pF	C_{rss} pF	V_{GSS} V_{GDO} Volts	$V_{GS(off)}$ Volts		I_{DSS} mA		t_{on} ns	t_{off} ns	Package
						Min	Max	Min	Max			
J112	–	50	28	5.0	35	1.0	5.0	5.0	–	–	–	 TO–226AA, TO–92 Case 29–11
MPF4392	–	60	10	3.5	30	–	–	25	75	15	35	
2N5639	–	60	10	4.0	30	–	8.0 (Typ)	25	–	–	–	
MPF4393	–	100	10	3.5	30	–	12 (Typ)	5.0	30	15	55	
J110	–	18	–	–	25	0.5	4.0	10	–	–	–	
2N5638	–	30	10	4.0	30	–	–	50	–	4.0	5.0	
J111	–	30	28	5.0	35	3.0	10	20	–	–	–	
BSR58L	–	60	28	5.0	40	0.8	4.0	8.0	80	–	–	 TO–236AB, SOT–23 Case 318–08
MMBF4391L	–	30	10	3.5	30	4.0	10	50	150	–	–	
MMBF4392L	–	60	10	3.5	30	2.0	5.0	25	75	–	–	
MMBF4393L	–	100	10	3.5	30	0.5	3.0	5.0	30	–	–	
–	MMBFJ175L	125	11	5.5	30	3.0	6.0	7.0	60	–	–	
–	MMBFJ177L	300	–	–	30	0.8	2.5	1.5	20	–	–	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

Junctional Field-Effect Transistors

JFETs

LOW-FREQUENCY/LOW-NOISE

N-Channel	P-Channel	$R_e Y_{fs} $ @ 1 kHz mmho	$R_e Y_{os} $ @ 1 kHz μ mho	C_{iss} pF	C_{rss} pF	V_{GSS} V_{GDO} Volts	$V_{GS(off)}$ Volts		I_{DSS} mA		Package
		Min	Max	Max	Max	Min	Min	Max	Min	Max	
2N5457	–	1.0	50	7.0	3.0	25	0.5	6.0	1.0	5.0	 TO-226AA, TO-92 Case 29-11
2N5458	–	1.5	50	7.0	3.0	25	1.0	7.0	2.0	9.0	
–	2N5460	1.0	75	7.0	2.0	40	0.75	6.0	1.0	5.0	
–	2N5461	1.5	75	7.0	2.0	40	1.0	7.5	2.0	9.0	
–	2N5462	2.0	75	7.0	2.0	40	1.8	9.0	4.0	16	
BF256A	–	4.5	–	–	–	30	0.5	7.5	3.0	7.0	
–	MMBF5460L	1.0	75	7.0	2.0	40	0.8	6.0	1.0	5.0	 TO-236AB, SOT-23 Case 318-08
BFR30L	–	1.0	40	5.0	1.5	25	–	5.0	4.0	10	
BFR31L	–	1.5	20	5.0	1.5	25	–	2.5	1.0	5.0	

Devices listed in **bold italic** are ON Semiconductor preferred devices.

ON Semiconductor Selector Guide – FETs

MOSFET – Surface Mount

V _{DSS} (V)	R _{DS(on)} Max (Ω) @ V _{GS} =				Q _T Typ (nC) @ V _{GS} = 4.5 V (5.0 V)/10 V	Max Rating		Device	Config.
	10 V	4.5 V/ 5.0 V	2.5 V/ 2.7 V	1.8 V/ 1.65 V		I _D (A)	P _D (W)		

SOT-723 – Case 631AA

N-Channel									
20		3.4	4.5	10.0		0.255	0.4	NTK3043N	S
		0.4	0.5	0.7		0.890	0.5	NTK3134N	S
P-Channel									
20		0.5	0.7	1.0		0.780	0.5	NTK3139P	S
		0.3	0.5	10.0		0.260	0.4	NTK3142P	S

SOT-563 – Case 463A

Complementary									
20		0.55/0.9	0.7/1.2	0.9/2.0	1.5/1.7	0.57/ 0.455	0.3	NTZD3155C	C
N-Channel									
20		0.55	0.07	0.90	1.5	0.570	0.3	NTZD3154N	D
P-Channel									
20		0.90	1.20	2.00	1.7	0.455	0.3	NTZD3152P	D
		0.15	0.20	0.24	5.6	0.950	0.2	NTZS3151P	S

SC-75 – Case 463

N-Channel									
20		3.000	3.500			0.238	0.3	NTA4001N	S
		0.230	0.275	0.070	1.8	0.915	0.3	NTA4153N	S
30		7.000	7.500			0.154	0.3	NTA7002N	S
P-Channel									
20		0.360	0.450	1.000	2.1	0.760	0.3	NTA4151P	S

SC-89 – Case 463C

N-Channel									
20		0.230	0.275	0.700	1.8	0.915	0.3	NTE4153N	S
P-Channel									
20		0.360	0.450	1.000	2.1	0.760	0.3	NTE4151P	S

WDFN6 2*2*.75 (μCool™) – Case 506AN

Complementary									
20			0.065/ 0.100	.075/ 0.135	0.120/0.200	3.800	3.3	NTLJD3119C	C
FETKY® N-Channel									
20		0.065	0.075	0.120	3.7	3.800	1.5	NTLJF3118N	F
		0.070	0.090	0.125/ 0.250	5.4	4.600	1.5	NTLJF4156N	F
FETKY® P-Channel									
20		0.100	0.135	0.200	5.5	3.300	1.5	NTLJF3117P	F
N-Channel									
30		0.070	0.090	0.125/ 0.0250	5.4	4.600	1.5	NTLJD4116N	D
		0.035	0.045	0.055	8.5	7.800	1.9	NTLJS4114N	S
		0.035	0.045	0.055	12.1	7.800	1.9	NTLJS4159N	S

MOSFET – Surface Mount (continued)

V _{DSS} (V)	R _{DS(on)} Max (Ω) @ V _{GS} =				Q _T Typ (nC) @ V _{GS} = 4.5 V (5.0 V)/10 V	Max Rating		Device	Config.
	10 V	4.5 V/ 5.0 V	2.5 V/ 2.7 V	1.8 V/ 1.65 V		I _D (A)	P _D (W)		
WDFN6 2*2*.75 (μCool™) – Case 506AN									
P-Channel									
20		0.100	0.135	0.200	5.5	4.100	1.5	NTLJD3115P	D
		0.040	0.050	0.075/0.2	13.0	7.700	1.9	NTLJS3113P	S
P-Channel Load Switch									
20			0.050	0.060	0.1	4.300	1.6	NTLJD2105L	L
SC-88 (SOT-363) – Case 419B									
Complementary									
20 V/8 V		0.375/ 0.3	0.455/ 0.46	0.900	1.3/2.2	0.63/ 0.755	0.3	NTJD4105C	C
30 V/20 V		1.5/ 0.260	2.5/0.500			0.25/ 0.88	0.3	NTJD4158C	C
N-Channel									
20		0.375	0.445		1.3	0.630	0.3	NTJD4401N	D
		0.060	0.070	0.085	6.9	3.200	1.0	NTJS3157N	S
25		0.350	0.040		0.8	1.200	0.6	NTJS4405N	S
30		1.500	2.500		0.9	0.250	0.3	NTJD4001N	D
	0.060	0.085			2.8	2.600	1.0	NTJS4160N	S
P-Channel									
8		0.300	0.460	0.900	2.2	0.775	0.3	NTJD2152P	D
12		0.060	0.090	0.160	8.6	3.300	0.6	NTJS3151P	S
20		0.260	0.500	1.000	2.2	0.880	0.4	NTJD4152P	D
		0.060	0.085	0.205	10.0	4.200	1.0	NTJS4151P	S
P-Channel Load Switch									
8		0.175	0.220	0.320		1.300	0.4	NTJD1155L	L

ON Semiconductor Selector Guide – FETs

MOSFET – Surface Mount (continued)

V _{DSS} (V)	R _{DS(on)} Max (Ω) @ V _{GS} =				Q _T Typ (nC) @ V _{GS} = 4.5 V (5.0 V)/10 V	Max Rating		Device	Config.
	10 V	4.5 V/ 5.0 V	2.5 V/ 2.7 V	1.8 V		I _D (A)	P _D (W)		

SC-70 – Case 419

N-Channel									
20	1.00	1.40			1.4	0.300	0.2	MMBF2201N	S
25		0.35	0.40		1.2	0.700	0.3	NTS4409N	S
30		1.50	2.00		0.9	0.270	0.3	NTS4001N	S
P-Channel									
8		0.10	0.14	0.21	6.4	1.400	0.3	NTS2101P	S
20		0.12	0.16		6.4	1.370	0.3	MMBF2202P	S
	2.20	3.50			2.7	0.300	0.2	NTS4101P	S

TSOP-6 – Case 318G

N-Channel									
20		0.045	0.055		8.0	5.100	1.0	NTGS3446	S
30	0.025	0.035			12.0	7.000	1.0	NTGS4141N	S
P-Channel									
12		0.075	0.095		7.0	3.300	1.0	NTGS3433	S
20		0.145	0.200		3.7	2.300	1.1	NTGD3133P	D
		0.170	0.280			2.000	1.0	NTGD4161P	D
		0.090	0.135		6.2	3.300	1.0	NTGS3441	S
		0.110	0.165		3.3	3.160	1.0	NTGS3441P	S
30		0.065	1.000		7.5	4.400	1.0	NTGS3443	S
	0.100	0.170			9.0	3.500	1.0	NTGS3455	S
	0.060	0.110			15.3	4.700	1.3	NTGS4111P	S
P-Channel Load Switch									
8		0.055	0.070	0.140		3.300	0.8	NTGD1100L	L

TSSOP-8 – Case 948S

N-Channel									
20		0.030	0.038		1.3	6.900	2.0	NTQD6866	D
		0.022	0.030		12.5	7.000	1.8	NTQD6968N	D

SOT-23 – Case 318

N-Channel									
20	0.090	0.130			6.0	0.750	0.4	MGSF1N02L	S
			0.085	0.115	3.5	2.800	1.3	MGSF2N02EL	S
	1.100	1.400			1.4	0.300	0.2	MMBF0201NL	S
		0.080	0.105		2.4	3.200	1.3	NTR4501N	S
30	0.100	0.145			6.0	2.100	0.7	MGSF1N03L	S
		1.500	2.000		1.2	0.560	0.8	NTR4003N	S
	0.110	0.140			3.6	2.500	0.7	NTR4503N	S
50		3.500	10.000			0.200	0.2	BSS138L	S
60	7.500					0.115	0.2	2N7002L	S
	5.000					0.500	0.2	MMBF170L	S
100	6.000					0.170	0.2	BSS123L	S
P-Channel									
8		0.052	0.072	0.120	12.0	3.700	1.0	NTR2101P	S

MOSFET – Surface Mount (continued)

V _{DSS} (V)	R _{DS(on)} Max (Ω) @ V _{GS} =				Q _T Typ (nC) @ V _{GS} = 4.5 V (5.0 V)/10 V	Max Rating		Device	Config.
	10 V	4.5 V/ 5.0 V	2.5 V/ 2.7 V	1.8 V		I _D (A)	P _D (W)		

SOT-23 – Case 318

P-Channel									
20	0.800	1.100			2.2	0.400	0.2	NTR0202PL	S
	0.180	0.280			2.5	1.000	0.4	NTR1P02	S
		0.200	0.350			1.300	0.4	NTR1P02L	S
		0.850	0.120	0.210	7.5	3.200	1.3	NTR4101P	S
30	0.200	0.350			6.0	1.950	1.3	NTR4502P	S
50		10.000			6.0	0.130	0.2	BSS84L	S

ChipFET™ – Case 1206A

Complementary									
20		0.08/ 0.115	0.115/ 0.240		2.6/3.0	3.1/2.1	1.1	NTHC5513	C
		0.080	0.115/ 0.110		2.3/7.4	3.9/4.4	1.1	NTHD3100C	C
		0.045/ 0.080	0.050/ 0.110	0.070/ 0.15	7.9/8.9	5.5/4.2	1.1	NTHD3102C	C
FETKY® N-Channel									
20		0.080	0.115		2.6	2.700	1.1	NTHD4N02F	F
FETKY® P-Channel									
20		0.080	0.110	0.170	7.4	4.400	1.1	NTHD3101F	F
		0.155	0.240		3.0	4.400	1.1	NTHD4P02F	F
N-Channel									
20		0.075	0.115		2.6	4.100	1.1	NTHD4508N	D
		0.065	0.105		4.0	4.500	1.1	NTHD5904N	D
		0.030	0.045		12.0	7.200	1.3	NTHS5404	S
30	0.085	0.140			3.6	3.900	1.1	NTHD4502N	D
	0.038	0.050			9.1	6.700	1.3	NTHS4501N	S
P-Channel									
8		0.058	0.085	0.160	8.0	4.600	1.1	NTHD2102P	D
		0.025	0.036	0.048	15.0	7.500	1.3	NTHS2101P	S
20		0.080	0.110	0.170	7.6	4.100	1.1	NTHD4102P	D
		0.155	0.240		3.0	2.100	1.1	NTHD4401P	D
		0.155	0.260		3.7	3.000	1.1	NTHD5903	D
		0.034	0.040	0.052	25.0	6.700	1.3	NTHS4101P	S
			0.083		9.7	5.300	1.3	NTHS5441	S
		0.065	0.110		7.5	4.900	1.3	NTHS5443	S

Micro8™ – Case 846A

FETKY® P-Channel									
20		0.090	0.150		10.0	3.300	1.4	NTTD4401FR	F
P-Channel									
20		0.090	0.130		10.0	3.200	1.4	NTTS2P02	S
30	0.085	0.135			15.0	3.750	1.8	NTTS2P03	S

ON Semiconductor Selector Guide – FETs

MOSFET – Surface Mount (continued)

V _{DSS} (V)	R _{DS(on)} Max (Ω) @ V _{GS} =				Q _T Typ (nC) @ V _{GS} = 4.5 V (5.0 V)/10 V	Max Rating		Device	Config.
	10 V	4.5 V/ 5.0 V	2.5 V/ 2.7 V	1.8 V		I _D (A)	P _D (W)		

DFN 6 3*3*.85 (μCool™) – Case 506

N-Channel									
20		0.090	0.120		2.1	4.600	1.7	NTLGF3501N	F
P-Channel									
20		0.140	0.225		3.8	3.900	1.6	NTLGF3402P	F

DFN 8 3.3*3.3 (EZFET™) – Case 846C

N-Channel									
20		0.026	0.031		12.0	9.000	3.2	NTLTD7900ZN	D

SOT-223 – Case 318E

N-Channel									
60	1.700				3.2	0.300	0.8	MMFT960	S
	0.110				10.6	3.000	2.1	NTF3055-100	S
60		0.120			7.6	3.000	2.1	NTF3055L108	S
60		0.175			5.1	2.000	2.1	NTF3055L175	S
P-Channel									
20		0.050	0.070		15.0	10.000	8.3	NTF6P02	S
30	0.100	0.150			15.0	5.200	3.1	NTF5P03	S
60	0.170				14.3	2.600	2.3	NTF2955	S

SO-8 (MiniMOS™) – Case 751

Complementary									
20		.043/ 0.100	0.048/ 0.130		12.0/10.0	5.2/3.4	2.0	NTMD2C02	C
30	0.070/ 0.200	0.075/ 0.300			11.5/14.2	4.100	2.0	MMDF2C03HD	C
FETKY® N-Channel									
30	0.032	0.040			19.0	6.000	2.0	NTMD6N03	F
	0.032	0.040			19.0	6.000	2.0	NTMSD6N303	F
FETKY® P-Channel									
20		0.090	0.130			3.850	2.0	NTMSD2P102	F
		0.090	0.015		16.0	3.850	2.0	NTMSD2P102L	F
	0.085	0.125			16.0	3.860	2.0	NTMSD3P102	F
30	0.085	0.125			16.0	3.860	2.0	NTMSD3P303	F
N-Channel									
20	0.090	0.100			12.5	3.800	2.0	MMDF3N02HD	D
		0.035	0.048		12.0	6.500	2.0	NTMD6N02	D
		0.040	0.050		11.0	5.900	2.5	NTMS4N01	S
	0.023	0.028			26.0	6.500	2.5	NTMS7N03	S
25	0.100	0.200			10.6	3.600	2.0	MMDF2N02E	D
28	0.0080	0.0098			23.0	14.000	2.5	NTMS4503N	S
30	0.0600	0.0800			8.0	4.000	2.0	NTMD4N03	D
	0.0045	0.0055			45.0	18.000	2.5	NTMS4107N	S
	0.0100	0.0140			11.0	12.000	2.3	NTMS4705N	S
	0.0120	0.0150			10.0	10.300	2.2	NTMS4706N	S
40	0.080	0.100			13.9	3.400	2.0	MMDF3N04HD	D

MOSFET – Surface Mount (continued)

V _{DSS} (V)	R _{DS(on)} Max (Ω) @ V _{GS} =				Q _T Typ (nC) @ V _{GS} = 4.5 V (5.0 V)/10 V	Max Rating		Device	Config.
	10 V	4.5 V/ 5.0 V	2.5 V/ 2.7 V	1.8 V		I _D (A)	P _D (W)		

SO-8 (MiniMOS™) – Case 751

N-Channel									
50	0.300	0.500	300.000		12.5	2.000	2.0	M MDF1N05E	D
P-Channel									
16		0.100	0.150		10.0	3.850	2.0	NTMD2P01	D
20	0.160	0.180			15.0	3.300	2.0	M MDF2P02HD	D
	0.075	0.095			33.0	5.600	2.5	M MSF3P02HD	S
		0.033	0.050		20.0	7.800	2.0	NTMD6P02	D
		0.014	0.020		48.0	10.000	2.5	NTMS10P02	S
20		0.033	0.048		20.0	7.000	2.5	NTMS5P02	S
	0.250	0.400			10.0	2.500	2.0	M MDF2P02E	D
30	0.035	0.050	35.000		37.9	7.000	2.5	M MSF7P03HD	S
	0.085	0.125			16.0	3.860	2.0	NTMD3P03	D
	0.085	0.115			16.0	3.860	2.3	NTMS3P03	S

SO-8FL – Case 488

N-Channel									
30	0.0022	0.0034			47.0	35.000	6.3	NTMFS4108N	S
	0.0035	0.0048			37.0	30.000	6.1	NTMFS4119N	S
	0.0045	0.0055			33.0	31.000	6.9	NTMFS4120N	S
	0.0053	0.0070			24.0	29.000	6.6	NTMFS4121N	S
	0.0060	0.0085			23.0	23.000	5.8	NTMFS4122N	S
	0.0080	0.0110			11.0	12.300	2.3	NTMFS4701N	S
	0.0130	0.0170			7.5	10.200	2.3	NTMFS4707N	S
	0.0100	0.0140			10.0	11.500	2.2	NTMFS4708N	S
	0.0100	0.0140			10.0	11.000	2.2	NTMFS4744N	S
	0.0020	0.0030			39.0	191.000	125.0	NTMFS4833N	S
	0.0030	0.0040			32.0	130.000	86.2	NTMFS4834N	S
	0.0035	0.0050			22.0	104.000	62.5	NTMFS4835N	S
	0.0030	0.0060			20.0	90.000	55.6	NTMFS4836N	S
	0.0050	0.0075			14.2	74.000	47.2	NTMFS4837N	S
	0.0055	0.0095			13.0	66.000	41.7	NTMFS4839N	S
0.0070	0.0114			11.5	57.000	41.7	NTMFS4841N	S	

DPAK (TO-252) – Case 369X *

N-Channel									
24	0.0046	0.0062			23.6	32.0	110.0	NTD110N02	S
	0.0145				14.4	30.0	75.0	NTD30N02	S
	0.0058	0.0090			30.0	80.0	75.0	NTD80N02	S
	0.0052				17.7	32.0	78.1	NTD85N02R	S
	0.0050	0.0080			21.0	32.0	86.0	NTD95N02R	S

ON Semiconductor Selector Guide – FETs

MOSFET – Surface Mount (continued)

V _{DSS} (V)	R _{DS(on)} Max (Ω) @ V _{GS} =				Q _T Typ (nC) @ V _{GS} = 4.5 V (5.0 V)/10 V	Max Rating		Device	Config.
	10 V	4.5 V/ 5.0 V	2.5 V/ 2.7 V	1.8 V		I _D (A)	P _D (W)		
DPAK (TO-252) – Case 369X *									
N-Channel									
25	0.0950	0.1300			1.8	14.0	20.8	NTD14N03R	S
	0.0450	0.0600			3.8	17.1	22.3	NTD23N03R	S
	0.0165	0.0230			5.8	32.0	50.0	NTD40N03R	S
	0.0140	0.0230			6.0	45.0	50.0	NTD50N03R	S
	0.0105	0.0125			9.5	32.0	58.0	NTD60N02R	S
	0.0084	0.0146			12.2	65.0	50.0	NTD65N03R	S
	0.0080	0.0130			13.2	32.0	62.5	NTD70N03R	S
	0.0060	0.0078			25.5	78.0	64.0	NTD78N03	S
30		0.0270			13.8	20.0	74.0	NTD20N03L27	S
	0.0100	0.0130			55.0	68.0	75.0	NTD4302	S
	0.0040	0.0055			30.0	117.0	93.8	NTD4804N	S
	0.0050	0.0074			20.5	88.0	66.0	NTD4805N	S
	0.0060	0.0094			15.0	76.0	60.0	NTD4806N	S
	0.0080	0.0124			11.3	63.0	54.6	NTD4808N	S
	0.0090	0.0140			10.7	58.0	52.0	NTD4809N	S
	0.0090	0.0125			12.5	58.0	52.0	NTD4809NH	S
	0.0100	0.0157			9.0	54.0	50.0	NTD4810N	S
	0.0100	0.0167			8.9	54.0	50.0	NTD4810NH	S
	0.0130	0.0240			6.9	40.0	35.3	NTD4813N	S
	0.0130	0.0259			7.1	40.0	35.3	NTD4813NH	S
	0.0150	0.0250			6.0	35.0	32.6	NTD4815N	S
0.0150	0.0277			6.4	35.0	32.6	NTD4815NH	S	
40	10.000	17.000			45.0	70.0	100.0	NTD5406N	S
	26.000	40.000			20.0	38.0	75.0	NTD5407N	S
60	0.060				15.3	18.0	55.0	NTD18N06	S
		0.065			11.0	18.0	55.0	NTD18N06L	S
	0.046				21.2	20.0	60.0	NTD20N06	S
		0.048			16.6	20.0	60.0	NTD20N06L	S
	0.042				24.0	24.0	62.5	NTD24N06	S
		0.045			16.0	24.0	62.5	NTD24N06L	S
	0.094				10.9	12.0	48.0	NTD3055-094	S
	0.150				7.1	9.0	28.8	NTD3055-150	S
		0.104			7.4	12.0	48.0	NTD3055L104	S
		0.170			4.7	9.0	28.5	NTD3055L170	S
100	0.062				33.0	32.0	93.8	NTD32N06	S
		0.028			23.0	32.0	93.8	NTD32N06L	S
150	0.165				14.0	12.0	53.6	NTD12N10	S
	0.146				11.3	12.0	56.6	NTD6600N	S
200	0.300				15.0	6.0	20.0	MTD6N15	S
200	0.700				13.7	6.0	50.0	MTD6N20E	S
P-Channel									
30		0.072			15.0	25.0	75.0	NTD25P03L	S
		0.072			15.0	25.0	75.0	NTD25P03L	S

MOSFET – Surface Mount (continued)

V _{DSS} (V)	R _{DS(on)} Max (Ω) @ V _{GS} =				Q _T Typ (nC) @ V _{GS} = 4.5 V (5.0 V)/10 V	Max Rating		Device	Config.
	10 V	4.5 V/ 5.0 V	2.5 V/ 2.7 V	1.8 V		I _D (A)	P _D (W)		

DPAK (TO-252) – Case 369X *

P-Channel									
60	0.450				12.0	5.0	40.0	MTD5P06V	S
		0.150			15.0	15.5	65.0	NTD20P06L	S
	0.180				15.0	12.0	55.0	NTD2955	S

D²PAK (TO-264) – Case 418B

N-Channel									
24	0.0046	0.0062			23.6	125.0	113.6	NTB125N02R	S
	0.0105	0.0125			9.5	65.0	62.5	NTB65N02R	S
	0.0058	0.0090			29.0	90.0	85.0	NTB90N02	S
25	0.0450	0.0600			3.8	23.0	37.5	NTB23N03R	S
	0.0080	0.0130			13.2	75.0	74.4	NTB75N03R	S
28	0.0068				29.0	85.0	80.0	NTB85N03	S
	0.0093	0.0125			28.0	74.0	80.0	NTB4302	S
	0.0065				57.0	75.0	125.0	NTB75N03-6	S
		0.0080			57.0	75.0	125.0	NTB75N03L09	S
40	4.5000	7.0000			125.0	136.0	167.0	NTB5404N	S
	5.8000	8.0000			88.0	116.0	150.0	NTB5405N	S
60	0.0900				12.0	15.0	48.4	NTB18N06	S
		0.1000			7.3	15.0	48.4	NTB18N06L	S
	0.0420				23.4	27.0	88.2	NTB30N06	S
		0.0460			16.0	30.0	88.2	NTB30N06L	S
	0.0260				33.0	45.0	125.0	NTB45N06	S
		0.0280			23.0	45.0	125.0	NTB45N06L	S
	0.0140				62.0	60.0	150.0	NTB60N06	S
		0.0160			43.2	60.0	150.0	NTB60N06L	S
	0.0095				92.0	75.0	214.0	NTB75N06	S
	0.0110			66.0	75.0	214.0	NTB75N06L	S	
100	0.1650				14.0	13.0	64.7	NTB13N10	S
	0.0300				72.0	52.0	178.0	NTB52N10	S
150	0.0500				70.0	37.0	178.0	NTB35N15	S
200	0.0810				75.0	30.0	214.0	NTB30N20	S
P-Channel									
30			25.000			50.0	125.0	MTB50P03HDL	S
60			80.000			30.0	125.0	MTB30P06V	S
60	0.075				33.0	27.5	120.0	NTB25P06	S
60		0.140			13.0	18.5	88.0	NTB5605P	S
500			6000.000			2.0	2.5	MTB2P50E	S

ON Semiconductor Selector Guide – FETs

MOSFET – Through Hole

V _{DSS} (V)	R _{DS(on)} Max (Ω) @ V _{GS} =				Q _T Typ (nC) @ V _{GS} = 4.5 V (5.0 V)/10 V	Max Rating		Device	Config.
	10 V	4.5 V/ 5.0 V	2.5 V/ 2.7 V	1.8 V/ 1.65 V		I _D (A)	P _D (W)		

TO-92 – Case 29

N-Channel									
60	5.000	6.000				0.200	0.35	2N7000	S
	5.000					0.500	0.35	BS170	S
	7.500					0.150	0.40	VN2222LL	S
200	14.000		28.000			0.250	0.35	BS107	S
	6.000					0.250	0.35	BS107A	S
			10.000			0.250	0.35	BS108	S
240	10.000					0.200	0.35	VN2410L	S

TO-220AB – Case 221A

N-Channel									
24	0.0046	0.0062			23.6	125.0	113.6	NTP125N02R	S
	0.0105	0.0125			9.5	65.0	62.5	NTP65N02R	S
	0.0058	0.0090			29.0	90.0	85.0	NTP90N02	S
25	0.0080	0.0130			13.0	75.0	74.4	NTP75N03R	S
28	0.0068				29.0	85.0	80.0	NTP85N03	S
30	0.0065				57.0	75.0	125.0	NTP75N03-6	S
		0.0080			57.0	75.0	125.0	NTP75N03L09	S
60	0.0900				12.0	15.0	48.4	NTP18N06	S
		0.1000			7.3	15.0	48.4	NTP18N06L	S
	0.0460				21.2	27.0	88.2	NTP27N06	S
		0.0460			16.0	30.0	88.2	NTP30N06L	S
	0.0260				33.0	45.0	125.0	NTP45N06	S
		0.0280			23.0	45.0	125.0	NTP45N06L	S
	0.0140				62.0	60.0	150.0	NTP60N06	S
		0.0160			43.2	60.0	150.0	NTP60N06L	S
100		0.2200			9.3	10.0	40.0	MTP10N10EL	S
	0.0300				72.0	52.0	214.0	NTP52N10	S
150	0.0500				70.0	37.0	178.0	NTP35N15	S
200	0.8100				75.0	30.0	214.0	NTP30N20	S
P-Channel									
30		0.025			74.0	50.0	125.0	MTP50P03HDL	S
60	0.120				38.0	23.0	90.0	MTP23P06V	S
	0.153				14.0	14.0	55.6	NTP2955	S
100	0.300				33.0	12.0	75.0	MTP12P10	S
500	6.000				19.0	2.0	75.0	MTP2P50E	S

TO-247 – Case 340K

N-Channel									
200	0.075				85.0	32.000	180.0	MTW32N20E	S

TO-264 – Case 340G

N-Channel									
100	0.010				200.0	123.000	313.0	NTY100N10	S

Product Replacements

Replacement parts are parts that are equivalent to older versions, but built in newer technologies.

PRODUCT REPLACEMENT TABLE

Part Number	Recommended New Part Numbers	New Part Status
2N7000ZL1	2N7000G	ACTIVE
BS107ARLRM	BS107AG	ACTIVE
BS107ARLRP	BS107AG	ACTIVE
BS107RL1	BS107AG	ACTIVE
BS107RLRA	BS107AG	ACTIVE
IRF510	MTP10N10ELG	ACTIVE
IRF520	MTP10N10ELG	ACTIVE
MGSF1N02ELT1	NTR4501NT1G	ACTIVE
MGSF1N02ELT1G	NTR4501NT1G	ACTIVE
MGSF1N02ELT3	NTR4501NT3G	ACTIVE
MGSF1P02ELT1	NTR1P02LT1G	ACTIVE
MGSF1P02ELT3	NTR1P02LT1G	ACTIVE
MGSF1P02LT1	NTR1P02T1G	ACTIVE
MGSF1P02LT1G	NTR1P02T1G	ACTIVE
MGSF1P02LT3	NTR1P02T3G	ACTIVE
MGSF1P02LT3	NTR1P02T3G	ACTIVE
MGSF1P02LT3G	NTR1P02T3G	ACTIVE
MGSF2P02HDT1	NTGS3441T1G	ACTIVE
MGSF3442VT1	NTGS3446T1G	ACTIVE
MGSF3454VT1	NTHS4501NT1G	ACTIVE
MMBF0202PLT1	NTR0202PLT1G	ACTIVE
MMBF0202PLT1G	NTR0202PLT1G	ACTIVE
MMDF2P01HDR2	NTMD3P03R2G	ACTIVE
MMDF2P03HDR2	NTMD3P03R2G	ACTIVE
MMDF3N03HDR2	NTMD4N03R2G	ACTIVE
MMDF4N01HDR2	NTMD6N02R2G	ACTIVE
MMDF4P03HDR2	NTMD3P03R2G	ACTIVE
MMDF6N02HDR2	NTMD6N02R2G	ACTIVE
MMDF6N03HDR2	NTMD6N03R2G	ACTIVE
MMDFS2P102R2	NTMSD3P102R2G	ACTIVE
MMDFS3P303R2	NTMSD3P303R2G	ACTIVE
MMDFS6N303R2	NTMSD6N303R2G	ACTIVE
MMFT2955ET1	NTF2955T1G	ACTIVE
MMFT2955ET1G	NTF2955T1G	ACTIVE
MMFT2955ET3	NTF2955T1G	ACTIVE
MMFT3055ET1	NTF3055-100T1G	ACTIVE
MMFT3055VLT1	NTF3055L108T1G	ACTIVE
MMFT3055VLT1G	NTF3055L108T1G	ACTIVE
MMFT3055VLT3	NTF3055L108T3G	ACTIVE

ON Semiconductor Selector Guide – FETs

PRODUCT REPLACEMENT TABLE

Part Number	Recommended New Part Numbers	New Part Status
MMFT3055VLT3G	NTF3055L108T3G	ACTIVE
MMFT3055VLT3-LF	NTF3055L108T3LFG	ACTIVE
MMFT3055VT1	NTF3055-100T1G	ACTIVE
MMFT3055VT1G	NTF3055-100T1G	ACTIVE
MMFT3055VT3	NTF3055-100T3G	ACTIVE
MMFT3055VT3	NTF3055-100T3G	ACTIVE
MMFT3055VT3G	NTF3055-100T3G	ACTIVE
MMFT5P03HDT3	NTF5P03T3G	ACTIVE
MMSF2P02ER2	NTTS2P02R2G	ACTIVE
MMSF3P03HDR2	NTMS3P03R2G	ACTIVE
MMSF4N01HDR2	NTMS4N01R2G	ACTIVE
MMSF4P01HDR2	NTMS5P02R2G	ACTIVE
MMSF5N02HDR2	NTMS4N01R2G	ACTIVE
MMSF5P02HDR2	NTMS5P02R2G	ACTIVE
MPF9200	BS107G	ACTIVE
MTB1306	NTB75N03L09G	ACTIVE
MTB1306T4	NTB75N03L09T4G	ACTIVE
MTB20N20E	NTB30N20G	ACTIVE
MTB20N20ET4	NTB30N20T4G	ACTIVE
MTB23P06V	NTB25P06G	ACTIVE
MTB23P06VT4	NTB25P06T4G	ACTIVE
MTB29N15E	NTB35N15G	ACTIVE
MTB29N15E1	NTP35N15G	ACTIVE
MTB29N15ET4	NTB35N15T4G	ACTIVE
MTB29N15ET4	NTB35N15T4G	ACTIVE
MTB30N06VL	NTB30N06LT4G	ACTIVE
MTB30N06VLT4	NTB30N06LT4G	ACTIVE
MTB33N10E	NTB52N10G	ACTIVE
MTB33N10ET4	NTB52N10T4G	ACTIVE
MTB36N06V	NTB45N06T4G	ACTIVE
MTB36N06VT4	NTB45N06T4G	ACTIVE
MTB40N10E	NTB52N10T4G	ACTIVE
MTB40N10ET4	NTB52N10T4G	ACTIVE
MTB50N06V	NTB45N06G	ACTIVE
MTB50N06VL	NTB45N06LG	ACTIVE
MTB50N06VLT4	NTB45N06LT4G	ACTIVE
MTB50N06VT4	NTB45N06T4G	ACTIVE
MTB52N06V	NTB60N06G	ACTIVE
MTB52N06VL	NTB60N06LG	ACTIVE
MTB52N06VLT4	NTB60N06LT4G	ACTIVE
MTB52N06VT4	NTB60N06T4G	ACTIVE
MTB55N06Z	NTB75N06G	ACTIVE

PRODUCT REPLACEMENT TABLE

Part Number	Recommended New Part Numbers	New Part Status
MTB55N06ZT4	NTB75N06T4G	ACTIVE
MTB60N05HDL	NTB75N06LG	ACTIVE
MTB60N05HDLT4	NTB75N06LT4G	ACTIVE
MTB60N06HD	NTB60N06G	ACTIVE
MTB60N06HDT4	NTB60N06T4G	ACTIVE
MTB75N03HDL	NTB75N03L09G	ACTIVE
MTB75N03HDLT4	NTB75N03L09T4G	ACTIVE
MTB75N05HD	NTB75N06G	ACTIVE
MTB75N05HDG	NTB75N06T4G	ACTIVE
MTB75N05HDT4	NTB75N06T4G	ACTIVE
MTB75N05HDT4G	NTB75N06T4G	ACTIVE
MTB75N06HD	NTB75N06G	ACTIVE
MTB75N06HDT4	NTB75N06T4G	ACTIVE
MTD10N10EL	NTD6600NT4G	ACTIVE
MTD10N10ELT4	NTD6600NT4G	ACTIVE
MTD10N10ELT4G	NTD6600NT4G	ACTIVE
MTD1302	NTD4302G	ACTIVE
MTD1302T4	NTD4302T4G	ACTIVE
MTD1312T4	NTD20N03L27T4G	ACTIVE
MTD14N10ET4	NTD6600NT4G	ACTIVE
MTD15N06V	NTD18N06G	ACTIVE
MTD15N06V	NTD18N06G	ACTIVE
MTD15N06VL	NTD18N06LG	ACTIVE
MTD15N06VL	NTD18N06LG	ACTIVE
MTD15N06VL1	NTD18N06L-1G	ACTIVE
MTD15N06VLT4	NTD18N06LT4G	ACTIVE
MTD15N06VT4	NTD18N06T4G	ACTIVE
MTD20N03HDL	NTD20N03L27G	ACTIVE
MTD20N03HDL1	NTD20N03L27-1G	ACTIVE
MTD20N03HDLG	NTD20N03L27G	ACTIVE
MTD20N03HDLT4	NTD20N03L27T4G	ACTIVE
MTD20N03HDLT4G	NTD20N03L27T4G	ACTIVE
MTD20N06HD	NTD24N06G	ACTIVE
MTD20N06HD1	NTD24N06-1G	ACTIVE
MTD20N06HDL	NTD24N06LG	ACTIVE
MTD20N06HDL1	NTD24N06LG	ACTIVE
MTD20N06HDLT4	NTD24N06LT4G	ACTIVE
MTD20N06HDLT4G	NTD24N06LT4G	ACTIVE
MTD20N06HDT4	NTD24N06T4G	ACTIVE
MTD20N06HDT4G	NTD24N06T4G	ACTIVE
MTD20N06V	NTD20N06G	ACTIVE
MTD20P03HDLT4	NTD25P03LT4G	ACTIVE

ON Semiconductor Selector Guide – FETs

PRODUCT REPLACEMENT TABLE

Part Number	Recommended New Part Numbers	New Part Status
MTD20P06HDLG	NTD20P06LG	ACTIVE
MTD20P06HDLT4	NTD20P06LT4G	ACTIVE
MTD20P06HDLT4G	NTD20P06LT4G	ACTIVE
MTD2955ET4	NTD2955T4G	ACTIVE
MTD2955V	NTD2955G	ACTIVE
MTD2955V1	NTD2955-001	ACTIVE
MTD2955V1G	NTD2955-1G	ACTIVE
MTD2955VG	NTD2955G	ACTIVE
MTD2955VT4	NTD2955T4G	ACTIVE
MTD2955VT4G	NTD2955T4G	ACTIVE
MTD3055ELT4	NTD3055L104T4G	ACTIVE
MTD3055V	NTD3055-094G	ACTIVE
MTD3055V1	NTD3055-094-1G	ACTIVE
MTD3055VL	NTD3055L104G	ACTIVE
MTD3055VL1	NTD3055L104-001	ACTIVE
MTD3055VLT4	NTD3055L104T4G	ACTIVE
MTD3055VT4	NTD3055-094T4G	ACTIVE
MTD3302	NTD4302G	ACTIVE
MTD3302T4	NTD4302T4G	ACTIVE
MTD9N10E	NTD12N10G	ACTIVE
MTD9N10E1	NTD12N10G	ACTIVE
MTD9N10ET4	NTD12N10T4G	ACTIVE
MTDF2N06HDR2	NTF3055-100T3G	ACTIVE
MTP10N10E	MTP10N10ELG	ACTIVE
MTP1302	NTP75N03L09G	ACTIVE
MTP15N06V	NTP18N06G	ACTIVE
MTP15N06VL	NTP18N06LG	ACTIVE
MTP20N06V	NTP45N06G	ACTIVE
MTP2955V	NTP2955G	ACTIVE
MTP2955VG	NTP2955G	ACTIVE
MTP29N15E	NTP35N15G	ACTIVE
MTP3055V	NTP18N06G	ACTIVE
MTP3055VL	NTP18N06LG	ACTIVE
MTP30N06VL	NTP30N06LG	ACTIVE
MTP33N10E	NTP52N10G	ACTIVE
MTP36N06V	NTP45N06G	ACTIVE
MTP40N10E	NTP52N10G	ACTIVE
MTP50N06V	NTP45N06G	ACTIVE
MTP50N06VL	NTP45N06LG	ACTIVE
MTP52N06V	NTP60N06G	ACTIVE
MTP52N06VL	NTP60N06LG	ACTIVE
MTP52N06VLG	NTP60N06LG	ACTIVE

PRODUCT REPLACEMENT TABLE

Part Number	Recommended New Part Numbers	New Part Status
MTP5P06V	MTP23P06VG	ACTIVE
MTP60N06HD	NTP60N06G	ACTIVE
MTP75N03HDL	NTP75N03L09G	ACTIVE
MTP75N06HD	NTP75N06G	ACTIVE
MTSF2P02HDR2	NTTS2P02R2G	ACTIVE
MTSF2P03HDR2	NTTS2P03R2G	ACTIVE
MTW35N15E	NTP35N15G	ACTIVE
MTW45N10E	NTP52N10G	ACTIVE
MTY100N10E	NTY100N10G	ACTIVE
NMFT3055AVLT1	NTF3055L108T1G	ACTIVE
NMFT3055AVLT3	NTF3055L108T1G	ACTIVE
NTB22N06	NTB18N06G	ACTIVE
NTB22N06L	NTB18N06G	ACTIVE
NTB22N06LT4	NTB18N06LT4G	ACTIVE
NTB22N06T4	NTB18N06T4G	ACTIVE
NTB23N03R	NTB23N03RG	ACTIVE
NTB27N06L	NTB30N06LG	ACTIVE
NTB27N06LT4	NTB30N06LT4G	ACTIVE
NTB75N06L	NTB75N06LG	ACTIVE
NTD18N06-001	NTD18N06-1G	ACTIVE
NTD20N06-001	NTD20N06-1G	ACTIVE
NTD24N06L-001	NTD24N06L-1G	ACTIVE
NTD3055L170-001	NTD3055L170-1G	ACTIVE
NTD32N06-001	NTD32N06-1G	ACTIVE
NTD32N06L-001	NTD32N06L-1G	ACTIVE
NTD40N03RT4	NTD40N03RT4G	ACTIVE
NTD4404NT4	NTD4404NT4G	ACTIVE
NTD60N03	NTD70N03RG	ACTIVE
NTD60N03-001	NTD70N03R-001	ACTIVE
NTD60N03T4	NTD70N03RT4G	ACTIVE
NTD85N02R	NTD85N02RG	ACTIVE
NTD85N02R-001	NTD85N02R-1G	ACTIVE
NTD95N02R	NTD95N02RG	ACTIVE
NTD95N02R-001	NTD95N02R-1G	ACTIVE
NTF3055-160T1	NTF3055-100T1G	ACTIVE
NTF3055-160T3	NTF3055-100T3G	ACTIVE
NTF3055-160T3LF	NTF3055-100T3G	ACTIVE
NTGS4111PT1	NTGS4111PT1G	ACTIVE
NTHD3100CT3	NTHD3100CT1G	ACTIVE
NTHD3100CT3G	NTHD3100CT1G	ACTIVE
NTHD3101FT3	NTHD3101FT1G	ACTIVE
NTHD3101FT3G	NTHD3101FT1G	ACTIVE

ON Semiconductor Selector Guide – FETs

PRODUCT REPLACEMENT TABLE

Part Number	Recommended New Part Numbers	New Part Status
NTHD5902T1	NTHD4502NT1G	ACTIVE
NTHD5904NT3	NTHD5904NT1G	ACTIVE
NTHD5904NT3G	NTHD5904NT1G	ACTIVE
NTHD5904T1	NTHD4508NT1G	ACTIVE
NTHD5905T1	NTHD2102PT1G	ACTIVE
NTHS5402T1	NTHS4501NT1G	ACTIVE
NTHS5402T1G	NTHS4501NT1G	ACTIVE
NTHS5445T1	NTHS2101PT1G	ACTIVE
NTJD4105CT4G	NTJD4105CT2G	ACTIVE
NTJS4405NT4	NTJS4405NT4G	ACTIVE
NTMS4P01R2	NTMS5P02R2G	ACTIVE
NTMSD3P102R2	NTMSD3P102R2G	ACTIVE
NTP22N06	NTP18N06G	ACTIVE
NTP22N06L	NTP18N06LG	ACTIVE
NTP27N06L	NTP30N06LG	ACTIVE
NTP3055AV	NTP18N06G	ACTIVE
NTP30N06	NTP45N06G	ACTIVE
NTP75N06L	NTP75N06G	ACTIVE
NTP85N03	NTP85N03G	ACTIVE
NTQD6866R2	NTQD6866R2G	ACTIVE
NTQD6968NR2	NTQD6968NR2G	ACTIVE
NTQD6968R2	NTQD6968NR2G	ACTIVE
NTQD6968R2G	NTQD6968NR2G	ACTIVE
NTR4501NT3	NTR4501NT1G	ACTIVE
NTTD1P02R2	NTTD4401FR2	ACTIVE
NTTD1P02R2G	NTTD4401FR2G	ACTIVE
SBSS138LT3	BSS138LT3G	ACTIVE
SMBF1026LT1	MMBF170LT1G	ACTIVE
SMBF1034LT1	2N7002LT1G	ACTIVE
SMBF1034LT1G	2N7002LT1G	ACTIVE
SMBF1035LT3G	BSS123LT3G	ACTIVE
SMBF1046LT1	2N7002LT1G	ACTIVE
SMBF1049LT1	BSS123LT1G	ACTIVE
SMBF1057LT1	2N7002LT1G	ACTIVE
SMBF1062LT1	BSS123LT1G	ACTIVE
SMFT3355VLT3	NTF3055L108T1G	ACTIVE
SMTD10N10ELT4	NTD12N10T4G	ACTIVE
SMTD10N10ELT4	NTD12N10T4G	ACTIVE
SMTD20P03HDLT4	NTD25P03LT4G	ACTIVE
SMTD2955VT4	NTD2955T4G	ACTIVE
SPF3161KRLRP	2N7000G	ACTIVE
STB23P06VT4	NTB25P06T4G	ACTIVE

PRODUCT REPLACEMENT TABLE


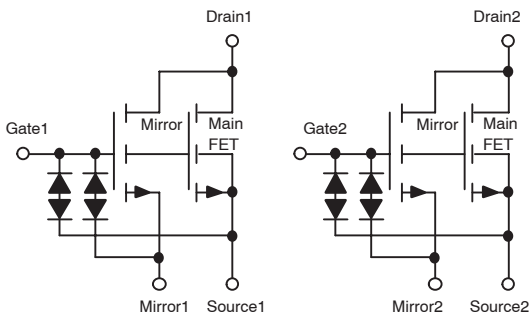
Part Number	Recommended New Part Numbers	New Part Status
STB30N06VLT4	NTB45N06LT4G	ACTIVE
STB33N10E	NTB52N10T4G	ACTIVE
STB33N10ET4	NTB52N10T4G	ACTIVE
STB36N06VT4	NTB45N06T4G	ACTIVE
STB40N10ET4	NTB52N10T4G	ACTIVE
STB50N06ET4	NTB75N06T4G	ACTIVE
STB50N06VLT4	NTB45N06LT4G	ACTIVE
STB52N06VLT4	NTB60N06LT4G	ACTIVE
STB52N06VT4	NTB60N06T4G	ACTIVE
STB52N06VT4G	NTB60N06T4G	ACTIVE
STB60N06HDT4	NTB60N06G	ACTIVE
STB75N06HDT4	NTB75N06T4G	ACTIVE
STD1003T4	MTD5P06VT4G	ACTIVE
STD1009V-001	NTD3055-094-1G	ACTIVE
STD1009VT4	NTD3055-094T4G	ACTIVE
STD1010ET4	NTD12N10G	ACTIVE
STD1010V	NTD3055L104G	ACTIVE
STD1010VT4	NTD3055L104T4G	ACTIVE
STD1013T4	NTD3055L104T4G	ACTIVE
STD1028T4	NTD18N06T4G	ACTIVE
STD1030-001	NTD3055-150G	ACTIVE
STD1039T4	NTD2955T4G	ACTIVE
STD1040T4	NTD3055L104T4G	ACTIVE
STD1045T4	NTD2955T4G	ACTIVE
STD1057T4	NTB18N06T4G	ACTIVE
STD1066-001	NTD3055L104-001	ACTIVE
STD1068HDL-001	NTD20N06L-001	ACTIVE
STD1069T4	NTD3055-094G	ACTIVE
STD2000T4	NTD3055L104T4G	ACTIVE
STD2002T4	NTD3055-150G	ACTIVE
STD2004-001	NTD2955-001	ACTIVE
STD20P06HDLT4	NTD20P06LT4G	ACTIVE
STD3055VLT4	NTD3055L104T4G	ACTIVE
STD3055VLT4	NTD3055L104T4G	ACTIVE
STD5P06VT4	MTD5P06VT4G	ACTIVE
STD9N10ET4	NTD12N10G	ACTIVE
STDP7222VT4	MTD5P06VT4G	ACTIVE
STP20N06VLF	NTP45N06G	ACTIVE
STP3055VL	NTP18N06LG	ACTIVE
STP30N06EL	NTP30N06LG	ACTIVE
STP36N06V	NTP45N06G	ACTIVE
STP4119	NTD3055-150G	ACTIVE


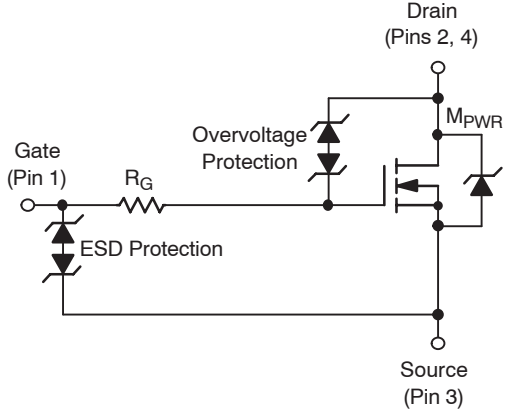
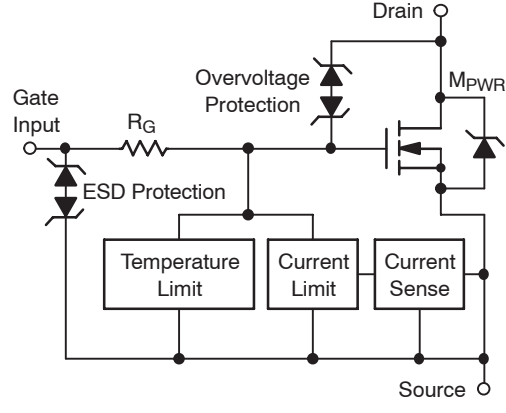
ON Semiconductor Selector Guide – FETs

PRODUCT REPLACEMENT TABLE

Part Number	Recommended New Part Numbers	New Part Status
STP4347	NTP60N06G	ACTIVE
STP4348	NTP60N06LG	ACTIVE
STP4384	NTP18N06LG	ACTIVE
STP4391	NTP18N06LG	ACTIVE
STP50N06V	NTP45N06G	ACTIVE
STP60N06HDLF	NTP60N06LG	ACTIVE
STP8023	NTP45N06LG	ACTIVE
STW1019	NTP35N15G	ACTIVE
VN2222LLRL	VN2222LLRLRAG	ACTIVE
VN2222LLRLRM	VN2222LLRLRAG	ACTIVE

Protected MOSFETs (Automotive/Industrial) (continued)

Device	$V_{(BR)DSS}$ (V)	$R_{DS(ON)}$ (Ω) @ $V_{GS} = 10\text{ V}$	Integrated Protection					Max Rating		
			Overvoltage	Overcurrent	Overtemperature	ESD	Current Sense Output	P_D (W)		
 8 1		CASE 751 SO-8 "Dual"								
			NIMD6302R	30	0.05	-	-	-		

 CASE 318E SOT-223	 NIF9N05CL		 NIF62514, NIF5002N, NIF5003N					
	NIF9N05CL	55	0.125	X	-	-	X	-
NIF62514	42	0.1	X	X	X	X	-	1.7
NIF5002N	42	0.2	X	-	-	X	-	1.1
NIF5003N	42	0.068	X	X	X	X	-	1.9

Protected MOSFETs (Automotive/Industrial) (continued)

Device	$V_{(BR)DSS}$ (V)	$R_{DS(ON)}$ (Ω) @ $V_{GS} = 10\text{ V}$	Integrated Protection					Max Rating	
			Overvoltage	Overcurrent	Overtemperature	ESD	Current Sense Output	P_D (W)	
NID9N05CL					NID5001N, 5003N, 5004N, 6002N				
NID9N05CL	55	0.09	X	-	-	X	-	28.8	
NID5001N	42	0.029	X	-	-	X	-	64	
NID5003N	42	0.05	X	-	-	X	-	1.3	
NID6002N	60	0.21	X	-	-	X	-	1.3	
NID5004N	40	0.15	X	-	-	X	-	1.3	

MLD1N06CL, MLD2N06CL									
MLD1N06CL	60	0.75 @ $V_{GS} = 5.0\text{ V}$	X	X	-	X	-	40	
MLD1N06CL	62	0.4 @ $V_{GS} = 5.0\text{ V}$	X	X	-	X	-	40	

Circuit Protection

Circuit Protection

Table of Contents

	Page
Circuit Protection	
Transient Voltage/ESD Protection	217
TVS Arrays in Surface Mount	217
TVS Low Capacitance Surface Mount for USB 2.0 and 1.1	221
TVS Low Capacitance Surface Mount for High Speed Data Lines	223
TVS (Transient Voltage Suppressors)	224
Axial Leaded	224
500 Watt	224
600 Watt	225
1500 Watt	226
Surface Mount Packages	228
200 Watt (POWERMITE®)	228
200 Watt (SOD-123FL)	229
400 Watt (SMA)	230
600 Watt (SMB)	232
1500 Watt (SMC)	238
TVS/ESD Protection	240
One Line	240
Two Line	243
Four Line	246
Five Line	248
Low Capacitance TVS/ESD Protection	249
One Line	249
Two Line	250
Four Line	251
Eight Line	255
EMI Filter Circuits	
Data Line Protection	256
Audio Line Protection	261
USB DATA Line Protection	262

In Brief...

What's New for Integrated Functions


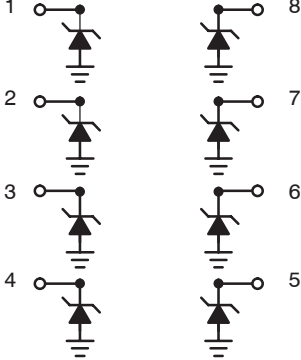
TVS Protection Arrays – ON Semiconductor miniaturizes its TVS array products by introducing the industry's smallest TVS array. The **NUP45V6** series in the ultra small SOT-953 package provides electrostatic discharge (ESD) protection of four data lines in wireless and portable applications. Other recently released products include the **NUP2202** and **NUP4202** low capacitance arrays for USB 2.0 applications.

EMI Filters – ON Semiconductor is the leading provider of integrated EMI Filter Products designed to suppress EMI radio frequency interference (RFI) noise and provide electrostatic discharge (ESD) Protection for advanced Wireless Cell Phones, Portable electronics and Computing applications. We have released more than 25 new products in miniature DFN/WDFN packages in 2005.

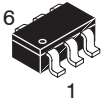
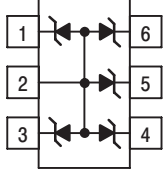
Our next generation EMI filter packages will be available in Low profile (typical 0.5 mm height) miniature μ DFN includes 4-channel (**NUF4001MU**), 6-channel (**NUF6001MU**) and 8-channel (and **NUF8001MU**) provides superior filtering performance over traditional CSP or BGA Package due to low parasitic Inductance and reliability in terms of handling and solderability.

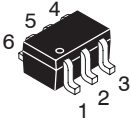
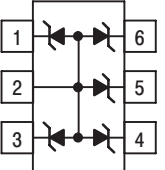
TVS Protection – Arrays in Surface Mount

- Human Body Model ESD Rating (> 16 kV)
- IEC 61000-4-2 (ESD) 15 kV (air) 8 kV (contact)
- Eight Line Protection

Device	Breakdown Voltage			Max Reverse Leakage Current		Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{PP} (Clamping Voltage)	Peak Power Rating (8x20 μsec) (Note 1)	
	V _{BR} (V)		@ I _T	I _R	V _{RWM}	Typ	Max				
	Min	Nom	Max	(mA)	(μA)	(V)			I _{PP} (A)	V _C (V)	Watts
 <p style="text-align: center;">CASE 506AK DFN8</p> 											
NUP8010MN	5.3	5.6	5.9	1.0	1.0	3.3	13	17	1.6	13	20

- Five Line Protection


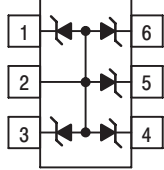
 <p style="text-align: center;">CASE 318F STYLE 1 SC-74 PLASTIC</p> 											
SMS05C	6.2	–	7.2	1.0	5.0	5.0	260	–	24	14.5	350
SMS12C	13.3	–	15	1.0	1.0	12	120	–	15	23	350
SMS15C	17	–	19	1.0	1.0	15	95	–	12	29	350
SMS24C	26.7	–	32	1.0	1.0	24	60	–	8.0	44	350

 <p style="text-align: center;">CASE 419B SC-88 (SOT-363)</p> 											
SMF05C	6.2	–	7.2	1.0	5.0	5.0	80	–	8.0	12.5	100
SMF12C	13.3	–	15	1.0	1.0	12	40	–	6.0	23	100
SMF15C	17	–	19	1.0	1.0	15	33	–	5.0	29	100
SMF24C	26.7	–	32	1.0	1.0	24	21	–	2.5	44	100


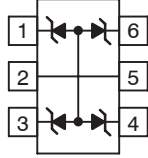
1. Surge waveform 8 x 20 μsec.

TVS Protection – Arrays in Surface Mount (continued)

- Human Body Model ESD Rating (> 16 kV)
- IEC 61000-4-2 (ESD) 15 kV (air) 8 kV (contact)
- Five Line Protection

Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{PP} (Clamping Voltage)	Peak Power Rating (8x20 μsec) (Note 2)
		V _{BR} (V)		@ I _T	I _R	V _{RWM}					
	Min	Nom	Max	(mA)	(μA)	(V)	Typ	Max	I _{PP} (A)	V _C (V)	Watts
 <p style="text-align: center;">CASE 463A SOT-563</p> 											
NUP5120X6	6.2	6.8	7.2	1.0	0.5	3.0	54	-	-	-	90

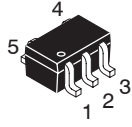
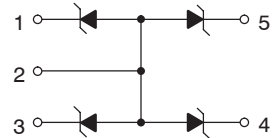
- Four Line Protection

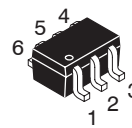
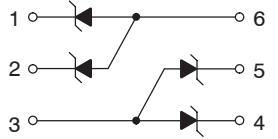
 <p style="text-align: center;">CASE 318F STYLE 1 SC-74 PLASTIC</p> 											
MMQA5V6	5.32	5.6	5.88	1.0	2.0	3.0	257	-	3.0	8.0	150
MMQA6V2	5.89	6.2	6.51	1.0	0.7	4.0	225	-	2.66	9.0	150
MMQA6V8	6.46	6.8	7.14	1.0	0.5	4.3	210	-	2.45	9.8	150
MMQA12V	11.4	12	12.6	1.0	0.075	9.1	117	-	1.39	17.3	150
MMQA13V	12.4	13	13.7	1.0	0.075	9.8	108	-	1.29	18.6	150
MMQA15V	14.3	15	15.8	1.0	0.075	11	93	-	1.1	21.7	150
MMQA18V	17.1	18	18.9	1.0	0.075	14	77	-	0.923	26	150
MMQA20V	19	20	21	1.0	0.075	15	69	-	0.84	28.6	150
MMQA22V	20.9	22	23.1	1.0	0.075	17	63	-	0.758	31.7	150
MMQA24V	22.8	24	25.2	1.0	0.075	18	58	-	0.694	34.6	150
MMQA27V	25.7	27	28.4	1.0	0.075	21	50	-	0.615	39	150
MMQA30V	28.5	30	31.5	1.0	0.075	23	40	-	0.554	43.3	150
MMQA33V	31.4	33	34.7	1.0	0.075	25	42	-	0.504	48.6	150
SMS05	6.0	-	7.2	1.0	20	5.0	300	400	23	15.5	350
SMS12	13.3	-	15	1.0	1.0	12	120	150	15	23	350
SMS15	16.7	-	18.5	1.0	1.0	15	100	125	12	29	350
SMS24	26.7	-	32	1.0	1.0	24	60	75	8.0	44	350

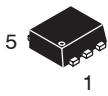
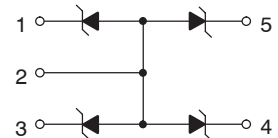
2. Surge waveform 8 x 20 μsec.

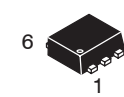
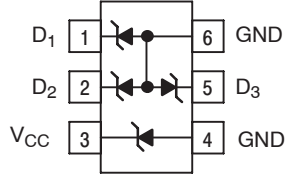
TVS Protection – Arrays in Surface Mount (continued)

- Human Body Model ESD Rating (> 16 kV)
- IEC 61000-4-2 (ESD) 15 kV (air) 8 kV (contact)
- Four Line Protection

Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{pp} (Clamping Voltage)	Peak Power Rating (8x20 μsec) (Note 3)
		V _{BR} (V)		@ I _T	I _R	V _{RWM}					
	Min	Nom	Max	(mA)	(μA)	(V)	Typ	Max	I _{pp} (A)	V _C (V)	Watts
 <p style="text-align: center;">CASE 419A SC-88A (SOT-353)</p> 											
MSQA6V1W5	6.1	6.6	7.2	1.0	1.0	3.0	90	–	–	–	150
NSQA6V8AW5	6.4	6.8	7.1	1.0	1.0	5.0	12	15	1.6	13	20
NSQA12VAW5	11.4	12	12.7	5.0	0.05	9.0	7.0	15	0.9	23	20
SMF05	6.0	–	7.2	1.0	5.0	5.0	90	–	12	12.5	200

 <p style="text-align: center;">CASE 419B SC-88 (SOT-363)</p> 											
DF6A6.8FU	6.4	6.8	7.2	1.0	1.0	5.0	40	–	7.0	11.4	75

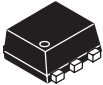
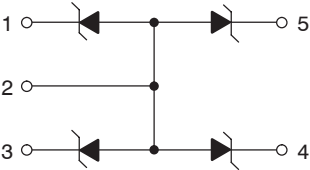
 <p style="text-align: center;">CASE 463B SOT-553</p> 											
NZQA5V6XV5	5.32	5.6	5.88	1.0	1.0	3.0	90	–	10	10.5	100
NZQA6V2XV5	5.89	6.2	6.51	1.0	0.5	4.0	80	–	9.0	11.5	100
NZQA6V8XV5	6.46	6.8	7.14	1.0	0.1	4.3	70	–	8.0	12.5	100
NZQA5V6AXV5	5.3	5.6	5.9	1.0	1.0	3.0	13	17	1.6	13	20
NZQA6V8AXV5	6.1	6.8	7.2	1.0	1.0	3.0	12	15	1.6	13	20


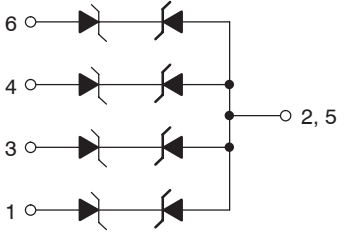
 <p style="text-align: center;">CASE 463A SOT-563</p> 											
NUP4060AXV6 (D ₁ , D ₂ , and D ₃)	6.2	6.8	7.2	1.0	0.5	3.0	7.0	10	1.6	13	20
NUP4060AXV6 (V _{CC})	15.3	16	17.1	5.0	0.05	11	105	–	–	–	0.200


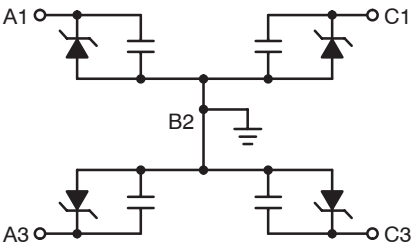
3. Surge waveform 8 x 20 μsec.

TVS Protection – Arrays in Surface Mount (continued)

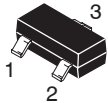
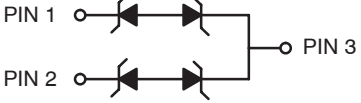
- Human Body Model ESD Rating (> 16 kV)
- IEC 61000-4-2 (ESD) 15 kV (air) 8 kV (contact)
- Four Line Protection

Device	Breakdown Voltage V_{BR} @ 1 mA (V)			Leakage Current I_{RM} @ V_{RM}		Typ Capacitance @ 0 V (pF) (Note 4)		Typ Capacitance @ 3 V Bias (pF) (Note 4)		
	Min	Nom	Max	V_{RWM}	I_{RWM} (μ A)	Typ	Max	Typ	Max	
 <p style="text-align: center;">CASE 526AB SOT-953</p>										
	NUP45V6P5	5.3	5.6	5.9	3.0	1.0	13	17	7.0	11.5
	NUP46V8P5	6.47	6.8	7.14	4.3	1.0	12	15	6.7	9.5
	NUP412VP5	11.4	12	12.7	9.0	1.0	6.5	10	3.5	5.0

Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I_{PP} (Clamping Voltage)	Peak Power Rating (8x20 μ sec) (Note 4)
		V_{BR} (V)		@ I_T	I_R	V_{RWM}					
	Min	Nom	Max	(mA)	(μ A)	(V)	Typ	Max	I_{PP} (A)	V_C (V)	Watts
 <p style="text-align: center;">CASE 463A SOT-563</p>											
	NUP4102XV6	13.6	-	17.8	1.0	0.1	12	13	15	3.0	25

 <p style="text-align: center;">CASE 766AB 5 PIN FLIP-CHIP CSP</p>											
	NUP4103FC	6.0	7.0	8.0	1.0	0.1	3.3	47	-	-	-

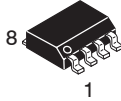
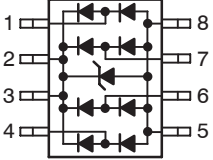
- Two Line Protection

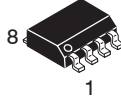
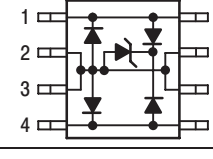
 <p style="text-align: center;">CASE 318 SOT-23</p>											
	NUP2105L	26.2	-	32	1.0	0.1	24	30	-	8.0	44

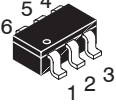
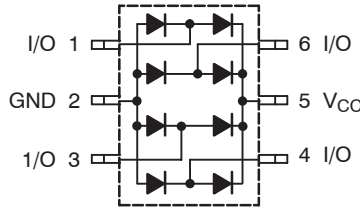
4. Surge waveform 8 x 20 μ sec.

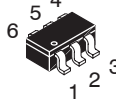
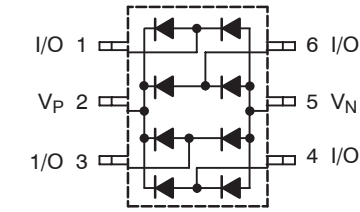
TVS Protection – Low Capacitance Surface Mount for USB 2.0 and 1.1

- ESD Protection Meeting IEC 61000-4-2, 4-4, 4-5

Device	Breakdown Voltage			Max Reverse Leakage Current			Capacitance* (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{pp} (Clamping Voltage)	Peak Power Rating (8x20 μsec)
	V _{BR} (V)			@ I _T	I _R	V _{RWM}					
	Min	Nom	Max	(mA)	(μA)	(V)	Typ	Max	I _{pp} (A)	V _C (V)	Watts
 <p style="text-align: center;">CASE 751 SO-8</p> 											
USB 2.0											
NUP4201DR2	6.0	-	-	1.0	10	5.0	2.5	5.0	10	12	500
SRDA05-4R2	6.0	-	-	1.0	10	5.0	4.0	8.0	10	12	500

 <p style="text-align: center;">CASE 751 SO-8</p> 											
USB 1.1											
LC03-6	6.8	-	-	1.0	20	5.0	8.0	12	50	15	2000

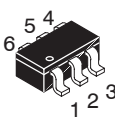
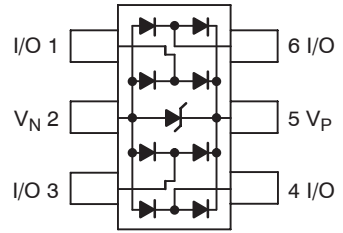
 <p style="text-align: center;">CASE 318G TSOP-6</p> 											
USB 2.0											
NUP4301MR6	70	-	-	0.1	2.5	-	0.8	1.5	-	-	-
NUP4302MR6	30	-	-	0.1	30	-	-	18	-	-	-

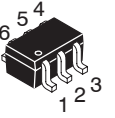
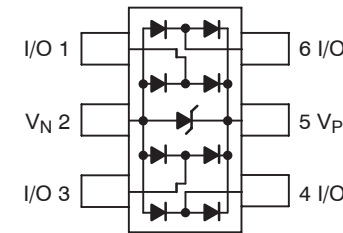
 <p style="text-align: center;">CASE 318F TSOP-6</p> 											
USB 2.0											
NUP4304MR6	70	-	-	0.1	2.5	-	0.8	1.5	-	-	-

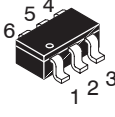
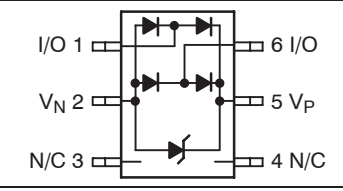
*C_J = Between I/O pins

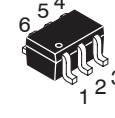
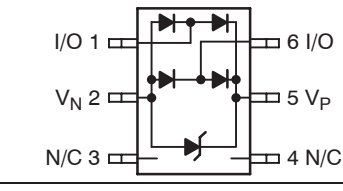
TVS Protection – Low Capacitance Surface Mount for USB 2.0 and 1.1 (continued)

- ESD Protection Meeting IEC 61000-4-2, 4-4, 4-5

Device	Breakdown Voltage			Max Reverse Leakage Current			Capacitance* (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{PP} (Clamping Voltage)	Peak Power Rating (8x20 μsec)
	V _{BR} (V)			@ I _T			Typ	Max	I _{PP} (A)	V _C (V)	Watts
	Min	Nom	Max	(mA)	(μA)	(V)					
 <p>CASE 318G TSOP-6</p> 	<p>USB 2.0</p>										
NUP4201MR6	6.0	-	-	1.0	5.0	5.0	3.0	5.0	25	20	500

 <p>CASE 419B SC-88</p> 	<p>USB 2.0</p>										
NUP4202W1	6.0	-	-	1.0	5.0	5.0	3.0	5.0	28	20	500

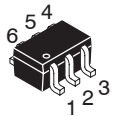
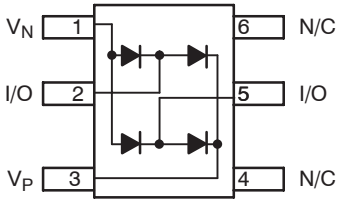
 <p>CASE 318G TSOP-6</p> 	<p>USB 2.0</p>										
NUP2201MR6	6.0	-	-	1.0	5.0	5.0	3.0	5.0	25	20	500

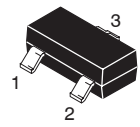
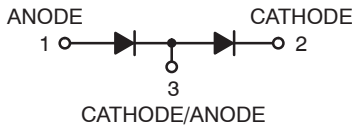
 <p>CASE 419B SC-88</p> 	<p>USB 2.0</p>										
NUP2202W1	6.0	-	-	1.0	5.0	5.0	3.0	5.0	28	20	500

*C_J = Between I/O pin to ground

TVS Protection – Low Capacitance Surface Mount for USB 2.0 and 1.1 (continued)

- ESD Protection Meeting IEC 61000-4-2, 4-4, 4-5

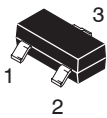
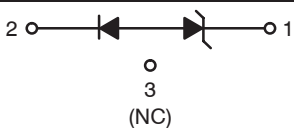
Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance* (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{PP} (Clamping Voltage)	Peak Power Rating (8x20 μsec)
	V _{BR} (V)			@ I _T	I _R	V _{RWM}					
	Min	Nom	Max	(mA)	(μA)	(V)	Typ	Max	I _{PP} (A)	V _C (V)	Watts
 <p style="text-align: center;">CASE 419B SC-88</p> 											
USB 2.0											
NUP2301MW6	70	-	-	-	0.1	2.5	0.8	1.5	-	-	-

 <p style="text-align: center;">CASE 318 SOT-23</p> 											
USB 2.0											
NUP1301ML3	70	-	-	-	0.1	2.5	0.8	1.5	-	-	-

*C_j = Between I/O pins


TVS Protection – Low Capacitance Surface Mount for High Speed Data Lines

- ESD Protection Meeting IEC 61000-4-2, 4-4, 4-5

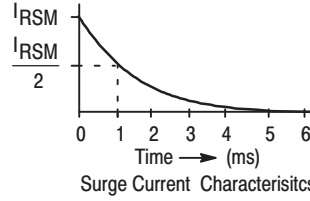
Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{PP} = 5 A (Clamping Voltage)	Peak Power Rating (8x20 μsec)
	V _{BR} (V)			@ I _T	I _R	V _{RWM}					
	Min	Nom	Max	(mA)	(μA)	(V)	Typ	Max	I _{PP} (A)	V _C (V)	Watts
 <p style="text-align: center;">CASE 318 STYLE 26 SOT-23</p> 											
SL05	6.0	-	8.0	1.0	20	5.0	3.5	5.0	17	11	300
SL15	16.7	-	18.5	1.0	1.0	15	3.5	5.0	10	30	300
SL24	26.7	-	29	1.0	1.0	24	3.5	5.0	5.0	55	300

TVS – in Axial Leads

Table 1. Peak Power Dissipation, 500 Watts @ 1 ms Surge (10 x 1000 μs) Case 59 – MiniMOSORB™



CASE 59 (MiniMOSORB™)
PLASTIC
Cathode = Polarity Band



Surge Current Characteristics

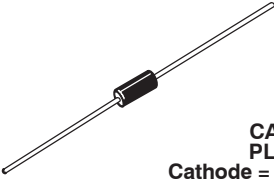
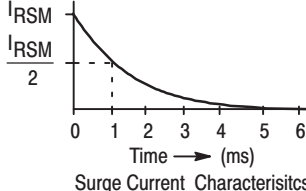
ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) $V_F = 3.5\text{ V Max}$, $I_F = 35\text{ A Pulse}$ (except bidirectional devices).

Working Peak Reverse Voltage V_{RWM} (Volts) (Note 1)	Device	Breakdown Voltage			Maximum Reverse Leakage @ V_{RWM} I_R (μA)	Maximum Reverse Surge Current I_{RSM} (Amps) (Note 3)	Maximum Reverse Voltage @ I_{RSM} (Clamping Voltage) V_{RSM} (Volts)
		V_{BR} (Volts)		@ I_T Pulse (mA)			
		Min (Note 2)	Max				
5	SA5.0A	6.4	7	10	600	54.3	9.2
6	SA6.0A	6.67	7.37	10	600	48.5	10.3
7	SA7.0A	7.78	8.6	10	150	41.7	12
9	SA9.0A	10	11.1	1	1	32.5	15.4
10	SA10A	11.1	12.3	1	1	29.4	17
12	SA12A	13.3	14.7	1	1	25.1	19.9
13	SA13A	14.4	15.9	1	1	23.2	21.5
15	SA15A	16.7	18.5	1	1	20.6	24.4
16	SA16A	17.8	19.7	1	1	19.2	26
17	SA17A	18.9	20.9	1	1	18.1	27.6
18	SA18A	20	22.1	1	1	17.2	29.2
20	SA20A	22.2	24.5	1	1	15.4	32.4
24	SA24A	26.7	29.5	1	1	12.8	38.9
26	SA26A	28.9	31.9	1	1	11.9	42.1
28	SA28A	31.1	34.4	1	1	11	45.4
30	SA30A	33.3	36.8	1	1	10.3	48.4
33	SA33A	36.7	40.6	1	1	9.4	53.3
36	SA36A	40	44.2	1	1	8.6	58.1
51	SA51A	56.7	62.7	1	1	6.1	82.4
64	SA64A	71.1	78.6	1	1	4.9	103
170	SA170A	189	209	1	1	1.8	275

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C .
3. $10 \times 1000\ \mu\text{s}$ exponential decay surge waveform.

TVS – in Axial Leads (continued)

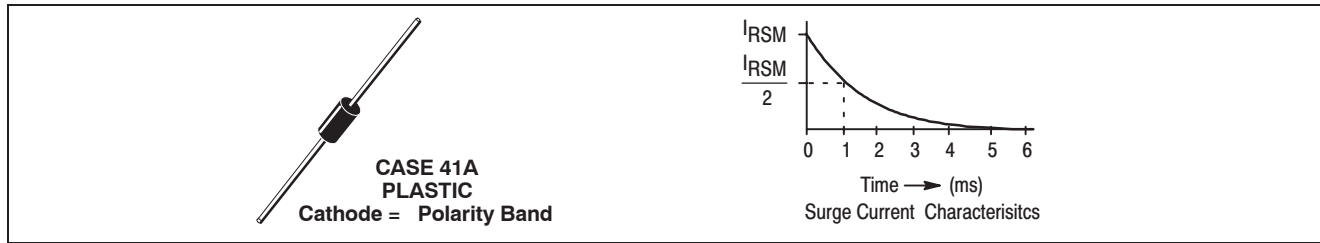
Table 1. Peak Power Dissipation, 500 Watts @ 1 ms Surge (10 x 1000 μs) Case 59 – MiniMOSORB™
(continued)

 <p>CASE 17 PLASTIC Cathode = Polarity Band</p>		 <p>Surge Current Characteristics</p>				
ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) $V_F = 3.5\text{ V Max}$, $I_F = 50\text{ A Pulse}$ (except bidirectional devices).						
Breakdown Voltage (Note 2)		Device	Working Peak Reverse Voltage V_{RWM} (Volts) (Note 1)	Maximum Reverse Leakage @ V_{RWM} I_R (μA)	Maximum Reverse Surge Current I_{RSM} (Amps) (Note 3)	Maximum Reverse Voltage @ I_{RSM} (Clamping Voltage) V_{RSM} (Volts)
V_{BR} (Volts)	@ I_T Pulse (mA)					
Nom						
6.8	10	P6KE6.8A	5.8	1000	57	10.5
7.5	10	P6KE7.5A	6.4	500	53	11.3
10	1	P6KE10A	8.55	10	41	14.5
12	1	P6KE12A	10.2	5	36	16.7
13	1	P6KE13A	11.1	5	33	18.2
15	1	P6KE15A	12.8	5	28	21.2
16	1	P6KE16A	13.6	5	27	22.5
18	1	P6KE18A	15.3	5	24	25.2
20	1	P6KE20A	17.1	5	22	27.7
22	1	P6KE22A	18.8	5	20	30.6
24	1	P6KE24A	20.5	5	18	33.2
27	1	P6KE27A	23.1	5	16	37.5
30	1	P6KE30A	25.6	5	14.4	41.4
33	1	P6KE33A	28.2	5	13.2	45.7
36	1	P6KE36A	30.8	5	12	49.9
39	1	P6KE39A	33.3	5	11.2	53.9
43	1	P6KE43A	36.8	5	10.1	59.3
47	1	P6KE47A	40.2	5	9.3	64.8
51	1	P6KE51A	43.6	5	8.6	70.1
56	1	P6KE56A	47.8	5	7.8	77
62	1	P6KE62A	53	5	7.1	85
68	1	P6KE68A	58.1	5	6.5	92
75	1	P6KE75A	64.1	5	5.8	103
82	1	P6KE82A	70.1	5	5.3	113
100	1	P6KE100A	85.5	5	4.4	137
150	1	P6KE150A	128	5	2.9	207
160	1	P6KE160A	136	5	2.7	219
170	1	P6KE170A	145	5	2.6	234
180	1	P6KE180A	154	5	2.4	246
200	1	P6KE200A	171	5	2.2	274

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C .
3. $10 \times 1000\ \mu\text{s}$ exponential decay surge waveform.

TVS – in Axial Leads (continued)

Table 1. Peak Power Dissipation, 500 Watts @ 1 ms Surge (10 x 1000 μs) Case 59 – MiniMOSORB™
(continued)




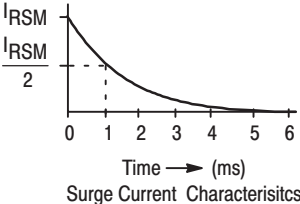
ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) $V_F = 3.5\text{ V Max}$, $I_F = 100\text{ A Pulse}$
(C suffix denotes standard back to back bidirectional versions. Test both polarities)

Max Reverse Stand-Off Voltage V_{RWM} (Volts) (Note 1)	JEDEC Device	Device	Breakdown Voltage		Maximum Reverse Leakage @ V_{RWM} I_R (μA)	Maximum Reverse Surge Current I_{RSM} (Volts) (Note 3)	Maximum Reverse Voltage @ I_{RSM} (Clamping Voltage) V_{RSM} (Volts)	Clamping Voltage	
			V_{BR} Volts Min (Note 2)	@ I_T Pulse (mA)				Peak Pulse Current @ $I_{pp1} = 1\text{ A}$ V_{C1} (Volts max)	Peak Pulse Current @ $I_{pp2} = 10\text{ A}$ V_{C2} (Volts max)
5	1N5908		6	1	300	120	8.5	7.6 @ 30 A	8 @ 60 A
5	1N6373	ICTE-5	6	1	300	160	9.4	7.1	7.5
12	1N6376	ICTE-12	14.1	1	2	70	21.2	16.1	16.5
15	1N6377	ICTE-15	17.6	1	2	60	25	20.1	20.6
18		ICTE-18	21.2	1	2	50	30	24.2	25.2
36	1N6380	ICTE-36	42.4	1	2	23	65.2	50.6	54.3

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C .
3. $10 \times 1000\ \mu\text{s}$ exponential decay surge waveform.

TVS – in Axial Leads (continued)

Table 2. Peak Power Dissipation, 1500 Watts @ 1 ms Surge (10 x 1000 μs) Case 41A – MOSORB


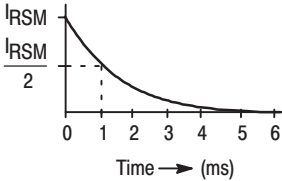
 <p>CASE 41A PLASTIC Cathode = Polarity Band</p>		 <p>Surge Current Characteristics</p>					
<p>ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) $V_F = 3.5\text{ V Max}$, $I_F = 100\text{ A Pulse}$</p>							
Breakdown Voltage (Note 2)		JEDEC Device	Device	Working Peak Reverse Voltage V_{RWM} (Volts) (Note 1)	Maximum Reverse Leakage @ V_{RWM} I_R (μA)	Maximum Reverse Surge Current I_{RSM} (Amps) (Note 3)	Maximum Reverse Voltage @ I_{RSM} (Clamping Voltage) V_{RSM} (Volts)
V_{BR} Volts	@ I_T Pulse (mA)						
Nom							
6.8	10	1N6267A	1.5KE6.8A	5.8	1000	143	10.5
8.2	10		1.5KE8.2A	7.02	200	124	12.1
10	1	1N6271A	1.5KE10A	8.55	10	103	14.5
11	1		1.5KE11A	9.4	5	96	15.6
12	1		1.5KE12A	10.2	5	90	16.7
13	1	1N6274A	1.5KE13A	11.1	5	82	18.2
15	1	1N6275A	1.5KE15A	12.8	5	71	21.2
16	1	1N6276A	1.5KE16A	13.6	5	67	22.5
18	1	1N6277A	1.5KE18A	15.3	5	59.5	25.2
20	1	1N6278A	1.5KE20A	17.1	5	54	27.7
22	1	1N6279A		18.8	5	49	30.6
24	1	1N6280A	1.5KE24A	20.5	5	45	33.2
27	1	1N6281A	1.5KE27A	23.1	5	40	37.5
30	1	1N6282A	1.5KE30A	25.6	5	36	41.4
33	1	1N6283A	1.5KE33A	28.2	5	33	45.7
36	1	1N6284A	1.5KE36A	30.8	5	30	49.9
39	1	1N6285A	1.5KE39A	33.3	5	28	53.9
43	1	1N6286A	1.5KE43A	36.8	5	25.3	59.3
47	1	1N6287A	1.5KE47A	40.2	5	23.2	64.8
51	1	1N6288A	1.5KE51A	43.6	5	21.4	70.1
56	1	1N6289A	1.5KE56A	47.8	5	19.5	77
62	1	1N6290A	1.5KE62A	53	5	17.7	85
68	1	1N6291A	1.5KE68A	58.1	5	16.3	92
75	1	1N6292A	1.5KE75A	64.1	5	14.6	103
82	1		1.5KE82A	70.1	5	13.3	113
91	1	1N6294A	1.5KE91A	77.8	5	12	125
100	1	1N6295A		85.5	5	11	137

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C .
3. $10 \times 1000\ \mu\text{s}$ exponential decay surge waveform.

TVS – in Surface Mount

Table 3. 1PMT Series Unidirectional Overvoltage Transient Suppressors, 200 Watts Peak Power @ 1 ms Surge (10 x 1000 μ s)

ELECTRICAL CHARACTERISTICS ($T_L = 30^\circ\text{C}$ unless otherwise noted) ($V_F = 1.25$ Volts @ 200 mA)

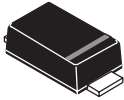
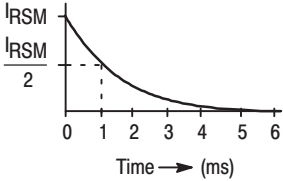
Device	Marking	V_{RWM} (V)	V_{BR} @ I_T (V) (Note 2)			I_T	I_R @ V_{RWM}	V_C @ I_{PP}	I_{PP} (A)
		(Note 1)	Min	Nom	Max	(mA)	(μ A)	(V)	(Note 3)
 <p>POWERMITE® CASE 457 PLASTIC</p>		 <p>Surge Current Characteristics</p>							
		1PMT5.0A	MKE	5.0	6.4	6.7	7.0	10	800
1PMT7.0A	MKM	7.0	7.78	8.2	8.6	10	500	12	14.6
1PMT12A	MLE	12	13.3	14	14.7	1.0	5.0	19.9	8.8
1PMT16A	MLP	16	17.8	18.75	19.7	1.0	5.0	26	7.0
1PMT22A	MLX	22	24.4	25.6	26.9	1.0	5.0	35.5	4.9
1PMT26A	MME	26	28.9	30.4	31.9	1.0	5.0	42.1	4.2
1PMT33A	MMM	33	36.7	38.7	40.6	1.0	5.0	53.3	3.3

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C .
3. 10 x 1000 μ s exponential decay surge waveform.

TVS – in Surface Mount (continued)

Table 4. SMF Series Unidirectional Overvoltage Transient Suppressors, 200 Watts Peak Power @ 1 ms Surge (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS ($T_L = 30^\circ\text{C}$ unless otherwise noted) ($V_F = 1.25$ Volts @ 200 mA)


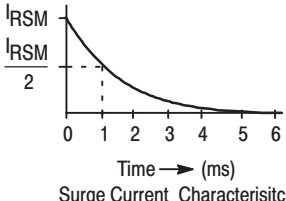
Device	Marking	V_{RWM} (V)	V_{BR} @ I_T (V) (Note 2)			I_T	I_R @ V_{RWM}	V_C @ I_{PP}	I_{PP} (A)
		(Note 1)	Min	Nom	Max	(mA)	(μA)	(V)	(Note 3)
 <p>SOD-123FL CASE 498 PLASTIC</p>		 <p>Surge Current Characteristics</p>							
		SMF5.0A	KE	5.0	6.4	6.7	7.0	10	400
SMF6.0A	KG	6.0	6.67	7.02	7.37	10	400	10.3	14.6
SMF6.5A	KK	6.5	7.22	7.6	7.98	10	250	11.2	13.4
SMF7.0A	KM	7.0	7.78	8.2	8.6	10	100	12	12.5
SMF7.5A	KP	7.5	8.33	8.77	9.21	1.0	50	12.9	11.6
SMF8.0A	KR	8.0	8.89	9.36	9.83	1.0	25	13.6	11
SMF9.0A	KV	9.0	10	10.55	11.1	1.0	5.0	15.4	9.7
SMF10A	KX	10	11.1	11.7	12.3	1.0	2.5	17	8.8
SMF11A	KZ	11	12.2	12.85	13.5	1.0	2.5	18.2	8.2
SMF12A	LE	12	13.3	14	14.7	1.0	2.5	19.9	7.5
SMF13A	LG	13	14.4	15.15	15.9	1.0	1.0	21.5	7.0
SMF14A	LK	14	15.6	16.4	17.2	1.0	1.0	23.2	6.5
SMF15A	LM	15	16.7	17.6	18.5	1.0	1.0	24.4	6.1
SMF17A	LR	17	18.9	19.9	20.9	1.0	1.0	27.6	5.4
SMF18A	LT	18	20	21	22.1	1.0	1.0	29.2	5.1
SMF20A	LV	20	22.2	23.35	24.5	1.0	1.0	32.4	4.6
SMF22A	LX	22	24.4	25.6	26.9	1.0	1.0	35.5	4.2
SMF24A	LZ	24	26.7	28.1	29.5	1.0	1.0	38.9	3.9
SMF26A	ME	26	28.9	30.4	31.9	1.0	1.0	42.1	3.6
SMF28A	MG	28	31.1	32.8	34.4	1.0	1.0	45.4	3.3
SMF30A	MK	30	33.3	35.1	36.8	1.0	1.0	48.4	3.1
SMF33A	MM	33	36.7	38.7	40.6	1.0	1.0	53.3	2.8
SMF36A	MP	36	40	42.1	44.2	1.0	1.0	58.1	2.6
SMF40A	MR	40	44.4	46.8	49.1	1.0	1.0	64.5	2.3
SMF43A	MT	43	47.8	50.3	52.8	1.0	1.0	69.4	2.2
SMF45A	MV	45	50	52.65	55.3	1.0	1.0	72.7	2.1
SMF48A	MX	48	53.3	56.1	58.9	1.0	1.0	77.4	1.9
SMF51A	MZ	51	56.7	59.7	62.7	1.0	1.0	82.4	1.8
SMF54A	NE	54	60	63.15	66.3	1.0	1.0	87.1	1.7

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C .
3. $10 \times 1000 \mu\text{s}$ exponential decay surge waveform. TVS – in Surface Mount (continued)

TVS – in Surface Mount (continued)

Table 5. 1SMA Series Unidirectional Overvoltage Transient Suppressors; 400 Watts Peak Power @ 1 ms Surge (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) ($V_F = 3.5$ Volts @ $I_F = 40$ A for all types) (Note 4)


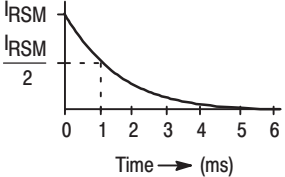
Device	Working Peak Reverse Voltage V_{RWM} (Volts) (Note 1)	Breakdown Voltage		Maximum Reverse Voltage @ I_{RSM} (Clamping Voltage) V_C (Volts)	Maximum Reverse Surge Current I_{PP} (Amps) (Note 3)	Maximum Reverse Leakage @ V_{RWM} I_R (μA)	Device Marking
		V_{BR} Volts (Min) (Note 2)	I_T mA				
 <p>SMA CASE 403B PLASTIC</p>  <p>Surge Current Characteristics</p>							
1SMA5.0A	5.0	6.4	10	9.2	43.5	400	QE
1SMA6.0A	6.0	6.67	10	10.3	38.8	400	QG
1SMA6.5A	6.5	7.22	10	11.2	35.7	250	QK
1SMA8.0A	8.0	8.89	1	13.6	29.4	25	QR
1SMA8.5A	8.5	9.44	1	14.4	27.8	5.0	QT
1SMA9.0A	9.0	10	1	15.4	26.0	2.5	QV
1SMA10A	10	11.1	1	17.0	23.5	2.5	QX
1SMA11A	11	12.2	1	18.2	22.0	2.5	QZ
1SMA12A	12	13.3	1	19.9	20.1	2.5	RE
1SMA13A	13	14.4	1	21.5	18.6	2.5	RG
1SMA15A	15	16.7	1	24.4	16.4	2.5	RM
1SMA16A	16	17.8	1	26.0	15.4	2.5	RP
1SMA17A	17	18.9	1	27.6	14.5	2.5	RR
1SMA18A	18	20	1	29.2	13.7	2.5	RT
1SMA20A	20	22.2	1	32.4	12.3	2.5	RV
1SMA22A	22	24.4	1	35.5	11.3	2.5	RX
1SMA24A	24	26.7	1	38.9	10.3	2.5	RZ
1SMA26A	26	28.9	1	42.1	9.5	2.5	SE
1SMA28A	28	31.1	1	45.4	8.8	2.5	SG
1SMA30A	30	33.3	1	48.4	8.3	2.5	SK
1SMA33A	33	36.7	1	53.3	7.5	2.5	SM
1SMA36A	36	40	1	58.1	6.9	2.5	SP
1SMA40A	40	44.4	1	64.5	6.2	2.5	SR
1SMA43A	43	47.8	1	69.4	5.8	2.5	ST
1SMA45A	45	50	1	72.2	5.5	2.5	SV
1SMA48A	48	53.3	1	77.4	5.2	2.5	SX
1SMA54A	54	60	1	87.1	4.6	2.5	TE
1SMA58A	58	64.4	1	93.6	4.8	2.5	TG
1SMA70A	70	77.8	1	113.0	3.5	2.5	TP

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C .
3. $10 \times 1000 \mu\text{s}$ exponential decay surge waveform.
4. 1/2 sine wave (or equivalent square pulse, $PW = 8.3$ ms, duty cycle = 4 pulses per minute).

TVS – in Surface Mount (continued)

Table 6. 1SMA Series Bidirectional Zener Overvoltage Transient Suppressors; 400 Watts Peak Power @ 1 ms Surge (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)


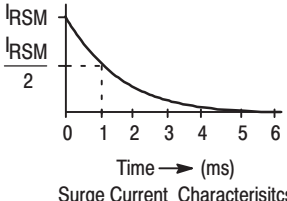
Device	Working Peak Reverse Voltage V _{RWM} (Volts) (Note 1)	Breakdown Voltage		Maximum Reverse Voltage @ I _{RSM} (Clamping Voltage) V _C (Volts)	Maximum Reverse Surge Current I _{PP} (Amps) (Note 3)	Maximum Reverse Leakage @ V _{RWM} I _R (μA)	Device Marking
		V _{BR} Volts (Min) (Note 2)	I _T mA				
 <p>SMA CASE 403B PLASTIC</p>  <p>Surge Current Characteristics</p>							
1SMA10CA	10	11.1	1	17.0	23.5	2.5	QXC
1SMA13CA	13	14.4	1	21.5	18.6	2.5	RGC
1SMA15CA	15	16.7	1	24.4	16.4	2.5	RMC
1SMA16CA	16	17.8	1	26.0	15.4	2.5	RPC
1SMA18CA	18	20	1	29.2	13.7	2.5	RTC
1SMA20CA	20	22.2	1	32.4	12.3	2.5	RVC
1SMA24CA	24	26.7	1	38.9	10.3	2.5	RZC
1SMA26CA	26	28.9	1	42.1	9.5	2.5	SEC
1SMA30CA	30	33.3	1	48.4	8.3	2.5	SKC
1SMA33CA	33	36.7	1	53.3	7.5	2.5	SMC
1SMA36CA	36	40	1	58.1	6.9	2.5	SPC
1SMA40CA	40	44.4	1	64.5	6.2	2.5	SRC
1SMA48CA	48	53.3	1	77.4	5.2	2.5	SXC
1SMA58CA	58	64.4	1	93.6	4.3	2.5	TGC
1SMA60CA	60	66.7	1	96.8	4.1	2.5	TKC
1SMA70CA	70	77.8	1	113.0	3.5	2.5	TPC
1SMA78CA	78	86.7	1	126.0	3.2	2.5	TSC

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform.

TVS – in Surface Mount (continued)

Table 7. 1SMB Series Unidirectional Overvoltage Transient Suppressors; 600 Watts Peak Power @ 1ms Surge (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (V_F = 3.5 V Max @ I_F = 30 A) (Note 4)

Device	Working Peak Reverse Voltage V _{RWM} Volts (Note 1)	Breakdown Voltage V _{BR} @ I _T		Maximum Clamping Voltage V _C @ I _{pp} Volts	Peak Pulse Current I _{pp} Amps (Note 3)	Maximum Reverse Leakage @ V _R I _R μA	Device Marking
		Volts (Min) (Note 2)	mA				
 <p>SMB CASE 403A PLASTIC</p>  <p>Surge Current Characteristics</p>							
1SMB5.0A	5.0	6.40	10	9.2	65.2	800	KE
1SMB6.0A	6.0	6.67	10	10.3	58.3	800	KG
1SMB6.5A	6.5	7.22	10	11.2	53.6	500	KK
1SMB7.0A	7.0	7.78	10	12.0	50.0	200	KM
1SMB7.5A	7.5	8.33	1.0	12.9	46.5	100	KP
1SMB8.0A	8.0	8.89	1.0	13.6	44.1	50	KR
1SMB8.5A	8.5	9.44	1.0	14.4	41.7	10	KT
1SMB9.0A	9.0	10.0	1.0	15.4	39.0	5.0	KV
1SMB10A	10	11.1	1.0	17.0	35.3	5.0	KX
1SMB11A	11	12.2	1.0	18.2	33.0	5.0	KZ
1SMB12A	12	13.3	1.0	19.9	30.2	5.0	LE
1SMB13A	13	14.4	1.0	21.5	27.9	5.0	LG
1SMB14A	14	15.6	1.0	23.2	25.8	5.0	LK
1SMB15A	15	16.7	1.0	24.4	24.0	5.0	LM
1SMB16A	16	17.8	1.0	26.0	23.1	5.0	LP
1SMB17A	17	18.9	1.0	27.6	21.7	5.0	LR
1SMB18A	18	20.0	1.0	29.2	20.5	5.0	LT
1SMB20A	20	22.2	1.0	32.4	18.5	5.0	LV
1SMB22A	22	24.4	1.0	35.5	16.9	5.0	LX
1SMB24A	24	26.7	1.0	38.9	15.4	5.0	LZ
1SMB26A	26	28.9	1.0	42.1	14.2	5.0	ME
1SMB28A	28	31.1	1.0	45.4	13.2	5.0	MG
1SMB30A	30	33.3	1.0	48.4	12.4	5.0	MK
1SMB33A	33	36.7	1.0	53.3	11.3	5.0	MM
1SMB36A	36	40.0	1.0	58.1	10.3	5.0	MP
1SMB40A	40	44.4	1.0	64.5	9.3	5.0	MR
1SMB43A	43	47.8	1.0	69.4	8.6	5.0	MT
1SMB45A	45	50.0	1.0	72.7	8.3	5.0	MV
1SMB48A	48	53.3	1.0	77.4	7.7	5.0	MX
1SMB51A	51	56.7	1.0	82.4	7.3	5.0	MZ
1SMB54A	54	60.0	1.0	87.1	6.9	5.0	NE
1SMB58A	58	64.4	1.0	93.6	6.4	5.0	NG
1SMB60A	60	66.7	1.0	96.8	6.2	5.0	NK
1SMB64A	64	71.1	1.0	103	5.8	5.0	NM
1SMB70A	70	77.8	1.0	113	5.3	5.0	NP
1SMB75A	75	83.3	1.0	121	4.9	5.0	NR
1SMB85A	85	94.4	1.0	137	4.4	5.0	NV
1SMB90A	90	100	1.0	146	4.1	5.0	NX
1SMB100A	100	111	1.0	162	3.7	5.0	NZ


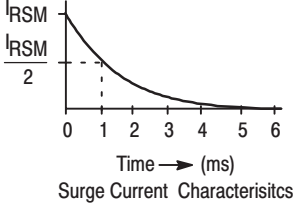
1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform.
4. 1/2 sine wave (or equivalent square pulse, PW = 8.3 ms, duty cycle = 4 pulses per minute).

Devices listed in **bold, italic** are ON Semiconductor preferred devices.

TVS – in Surface Mount (continued)

Table 7. 1SMB Series Unidirectional Overvoltage Transient Suppressors; 600 Watts Peak Power @ 1ms Surge (10 x 1000 μs) (continued)

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) ($V_F = 3.5\text{ V Max @ } I_F = 30\text{ A}$) (Note 4)


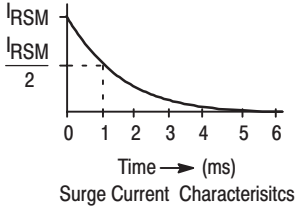
Device	Working Peak Reverse Voltage V_{RWM} Volts (Note 1)	Breakdown Voltage V_{BR} @ I_T		Maximum Clamping Voltage V_C @ I_{pp} Volts	Peak Pulse Current I_{pp} Amps (Note 3)	Maximum Reverse Leakage @ V_R I_R μA	Device Marking
		Volts (Min) (Note 2)	mA				
 <p>SMB CASE 403A PLASTIC</p>  <p>Surge Current Characteristics</p>							
1SMB110A	110	122	1.0	177	3.4	5.0	PE
1SMB120A	120	133	1.0	193	3.1	5.0	PG
1SMB130A	130	144	1.0	209	2.9	5.0	PK
1SMB150A	150	167	1.0	243	2.5	5.0	PM
1SMB160A	160	178	1.0	259	2.3	5.0	PP
1SMB170A	170	189	1.0	275	2.2	5.0	PR

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C .
3. $10 \times 1000\ \mu\text{s}$ exponential decay surge waveform.
4. 1/2 sine wave (or equivalent square pulse, $PW = 8.3\text{ ms}$, duty cycle = 4 pulses per minute).

TVS – in Surface Mount (continued)

Table 8. 1SMB Series Bidirectional Overvoltage Transient Suppressors; 600 Watts Peak Power @ 1ms Surge (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted).

Device	Working Peak Reverse Voltage V _{RWM} Volts (Note 1)	Breakdown Voltage		Maximum Clamping Voltage V _C @ I _{pp} Volts	Peak Pulse Current I _{pp} Amps (Note 3)	Maximum Reverse Leakage @ V _R I _R μA	Device Marking
		V _{BR} @ I _T					
		Volts (Min) (Note 2)	mA				
 <p>SMB CASE 403A PLASTIC</p>  <p>Surge Current Characteristics</p>							
1SMB10CA	10	11.1	1.0	17.0	35.3	5.0	KXC
1SMB11CA	11	12.2	1.0	18.2	33.0	5.0	KZC
1SMB12CA	12	13.3	1.0	19.9	30.2	5.0	LEC
1SMB13CA	13	14.4	1.0	21.5	27.9	5.0	LGC
1SMB14CA	14	15.6	1.0	23.2	25.8	5.0	LKC
1SMB15CA	15	16.7	1.0	24.4	24.0	5.0	LMC
1SMB16CA	16	17.8	1.0	26.0	23.1	5.0	LPC
1SMB17CA	17	18.9	1.0	27.6	21.7	5.0	LRC
1SMB18CA	18	20.0	1.0	29.2	20.5	5.0	LTC
1SMB20CA	20	22.2	1.0	32.4	18.5	5.0	LVC
1SMB22CA	22	24.4	1.0	35.5	16.9	5.0	LXC
1SMB24CA	24	26.7	1.0	38.9	15.4	5.0	LZC
1SMB26CA	26	28.9	1.0	42.1	14.2	5.0	MEC
1SMB28CA	28	31.1	1.0	45.4	13.2	5.0	MGC
1SMB30CA	30	33.3	1.0	48.4	12.4	5.0	MKC
1SMB33CA	33	36.7	1.0	53.3	11.3	5.0	MMC
1SMB36CA	36	40.0	1.0	58.1	10.3	5.0	MPC
1SMB40CA	40	44.4	1.0	64.5	9.3	5.0	MRC
1SMB43CA	43	47.8	1.0	69.4	8.6	5.0	MTC
1SMB45CA	45	50.0	1.0	72.7	8.3	5.0	MVC
1SMB48CA	48	53.3	1.0	77.4	7.7	5.0	MXC
1SMB51CA	51	56.7	1.0	82.4	7.3	5.0	MZC
1SMB54CA	54	60.0	1.0	87.1	6.9	5.0	NEC
1SMB58CA	58	64.4	1.0	93.6	6.4	5.0	NGC
1SMB60CA	60	66.7	1.0	96.8	6.2	5.0	NKC
1SMB64CA	64	71.1	1.0	103	5.8	5.0	NMC
1SMB75CA	75	83.3	1.0	121	4.9	5.0	NRC


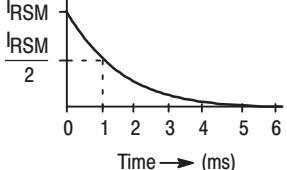
1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform.

Devices listed in **bold, italic** are ON Semiconductor preferred devices.

TVS – in Surface Mount (continued)

Table 9. P6SMB Series Unidirectional Overvoltage Transient Suppressors; 600 Watts Peak Power @ 1 ms Surge (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (V_F = 3.5 V Max, I_F = 50 A for all types) (Note 4)


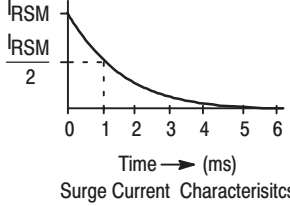
Device	Breakdown Voltage				Working Peak Reverse Voltage V _{RWM} Volts (Note 1)	Maximum Reverse Leakage @ V _{RWM} I _R μA	Maximum Reverse Surge Current I _{PP} Amps (Note 3)	Maximum Reverse Voltage @ I _{PP} (Clamping Voltage) V _C Volts	Maximum Temperature Coefficient of V _{BR} %/°C	Device Marking
	V _{BR} @ I _T Volts (Note 2)									
	Min	Nom	Max	mA						
 <p>SMB CASE 403A PLASTIC</p>  <p>Surge Current Characteristics</p>										
P6SMB6.8A	6.45	6.8	7.14	10	5.8	1000	57	10.5	0.057	6V8A
P6SMB7.5A	7.13	7.5	7.88	10	6.4	500	53	11.3	0.061	7V5A
P6SMB8.2A	7.79	8.2	8.61	10	7.02	200	50	12.1	0.065	8V2A
P6SMB9.1A	8.65	9.1	9.55	1	7.78	50	45	13.4	0.068	9V1A
P6SMB10A	9.5	10	10.5	1	8.55	10	41	14.5	0.073	10A
P6SMB12A	11.4	12	12.6	1	10.2	5	36	16.7	0.078	12A
P6SMB13A	12.4	13	13.7	1	11.1	5	33	18.2	0.081	13A
P6SMB15A	14.3	15	15.8	1	12.8	5	28	21.2	0.084	15A
P6SMB16A	15.2	16	16.8	1	13.6	5	27	22.5	0.086	16A
P6SMB18A	17.1	18	18.9	1	15.3	5	24	25.2	0.088	18A
P6SMB20A	19	20	21	1	17.1	5	22	27.7	0.09	20A
P6SMB22A	20.9	22	23.1	1	18.8	5	20	30.6	0.092	22A
P6SMB24A	22.8	24	25.2	1	20.5	5	18	33.2	0.094	24A
P6SMB27A	25.7	27	28.4	1	23.1	5	16	37.5	0.096	27A
P6SMB30A	28.5	30	31.5	1	25.6	5	14.4	41.4	0.097	30A
P6SMB33A	31.4	33	34.7	1	28.2	5	13.2	45.7	0.098	33A
P6SMB36A	34.2	36	37.8	1	30.8	5	12	49.9	0.099	36A
P6SMB39A	37.1	39	41	1	33.3	5	11.2	53.9	0.1	39A
P6SMB43A	40.9	43	45.2	1	36.8	5	10.1	59.3	0.101	43A
P6SMB47A	44.7	47	49.4	1	40.2	5	9.3	64.8	0.101	47A
P6SMB51A	48.5	51	53.6	1	43.6	5	8.6	70.1	0.102	51A
P6SMB56A	53.2	56	58.8	1	47.8	5	7.8	77	0.103	56A
P6SMB62A	58.9	62	65.1	1	53	5	7.1	85	0.104	62A
P6SMB68A	64.6	68	71.4	1	58.1	5	6.5	92	0.104	68A
P6SMB75A	71.3	75	78.8	1	64.1	5	5.8	103	0.105	75A
P6SMB82A	77.9	82	86.1	1	70.1	5	5.3	113	0.105	82A
P6SMB91A	86.5	91	95.5	1	77.8	5	4.8	125	0.106	91A
P6SMB100A	95	100	105	1	85.5	5	4.4	137	0.106	100A
P6SMB110A	105	110	116	1	94	5	4	152	0.107	110A
P6SMB120A	114	120	126	1	102	5	3.6	165	0.107	120A
P6SMB130A	124	130	137	1	111	5	3.3	179	0.107	130A
P6SMB150A	143	150	158	1	128	5	2.9	207	0.108	150A
P6SMB160A	152	160	168	1	136	5	2.7	219	0.108	160A
P6SMB180A	171	180	189	1	154	5	2.4	246	0.108	180A
P6SMB200A	190	200	210	1	171	5	2.2	274	0.108	200A

- Devices listed in **bold, italic** are ON Semiconductor preferred devices.
1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
 2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C.
 3. 10 x 1000 μs exponential decay surge waveform.
 4. 1/2 sine wave (or equivalent square pulse, PW = 8.3 ms, duty cycle = 4 pulses per minute).

TVS – in Surface Mount (continued)

Table 10. P6SMB Series Bidirectional Overvoltage Transient Suppressors; 600 Watts Peak Power @ 1 ms Surge (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Device	Breakdown Voltage				Working Peak Reverse Voltage V _{RWM} Volts (Note 1)	Maximum Reverse Leakage @ V _{RWM} I _R μA	Maximum Reverse Surge Current I _{PP} Amps (Note 3)	Maximum Reverse Voltage @ I _{PP} (Clamping Voltage) V _C Volts	Maximum Temperature Coefficient of V _{BR} %/°C	Device Marking
	V _{BR} @ I _T Volts (Note 2)									
	Min	Nom	Max	mA						
 <p style="text-align: center;">SMB CASE 403A PLASTIC</p>  <p style="text-align: center;">Surge Current Characteristics</p>										
P6SMB11CA	10.5	11	11.6	1	9.4	5	38	15.6	0.075	11C
P6SMB12CA	11.4	12	12.6	1	10.2	5	36	16.7	0.078	12C
P6SMB15CA	14.3	15	15.8	1	12.8	5	28	21.2	0.084	15C
P6SMB16CA	15.2	16	16.8	1	13.6	5	27	22.5	0.086	16C
P6SMB18CA	17.1	18	18.9	1	15.3	5	24	25.2	0.088	18C
P6SMB20CA	19	20	21	1	17.1	5	22	27.7	0.09	20C
P6SMB22CA	20.9	22	23.1	1	18.8	5	20	30.6	0.092	22C
P6SMB24CA	22.8	24	25.2	1	20.5	5	18	33.2	0.094	24C
P6SMB27CA	25.7	27	28.4	1	23.1	5	16	37.5	0.096	27C
P6SMB30CA	28.5	30	31.5	1	25.6	5	14.4	41.4	0.097	30C
P6SMB33CA	31.4	33	34.7	1	28.2	5	13.2	45.7	0.098	33C
P6SMB36CA	34.2	36	37.8	1	30.8	5	12	49.9	0.099	36C
P6SMB39CA	37.1	39	41	1	33.3	5	11.2	53.9	0.1	39C
P6SMB43CA	40.9	43	45.2	1	36.8	5	10.1	59.3	0.101	43C
P6SMB47CA	44.7	47	49.4	1	40.2	5	9.3	64.8	0.101	47C
P6SMB51CA	48.5	51	53.6	1	43.6	5	8.6	70.1	0.102	51C
P6SMB56CA	53.2	56	58.8	1	47.8	5	7.8	77	0.103	56C
P6SMB62CA	58.9	62	65.1	1	53	5	7.1	85	0.104	62C
P6SMB68CA	64.6	68	71.4	1	58.1	5	6.5	92	0.104	68C
P6SMB82CA	77.9	82	86.1	1	70.1	5	5.3	113	0.105	82C


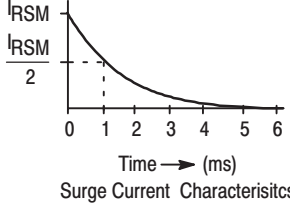
1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform.

Devices listed in **bold, italic** are ON Semiconductor preferred devices.

TVS – in Surface Mount (continued)

Table 11. SMBJ12AON Series Bidirectional Overvoltage Transient Suppressors; 600 Watts Peak Power @ 1 ms Surge (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)


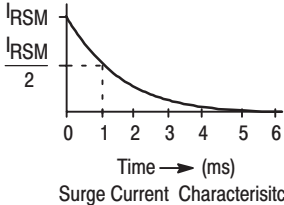
Device	Breakdown Voltage				Working Peak Reverse Voltage V _{RWM} Volts (Note 1)	Maximum Reverse Leakage @ V _{RWM} I _R μA	Maximum Reverse Surge Current I _{PP} Amps (Note 3)	Maximum Reverse Voltage @ I _{PP} (Clamping Voltage) V _C Volts	
	V _{BR} @ I _T Volts (Note 2)								
	Min	Nom	Max	mA					
 <p>SMB CASE 403A PLASTIC</p>					 <p>Surge Current Characteristics</p>				
SMBJ12AON	13.2	13.75	14.3	1	12	5	17.5	15.6	

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform.

TVS – in Surface Mount (continued)

Table 12. 1SMC Series Unidirectional Overvoltage Transient Suppressors; 1500 Watts Peak Power @ 1 ms Surge (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (V_F = 3.5 V Max @ I_F = 100 A) (Note 4)

Device	Working Peak Reverse Voltage V _R Volts (Note 1)	Breakdown Voltage		Maximum Clamping Voltage V _C @ I _{pp} Volts	Peak Pulse Current I _{pp} Amps (Note 3)	Maximum Reverse Leakage @ V _R I _R μA	Device Marking
		V _{BR} @ I _T					
		Volts (Min) (Note 2)	mA				
 <p>SMC CASE 403B PLASTIC</p>  <p>Surge Current Characteristics</p>							
1SMC5.0A	5.0	6.40	10	9.2	163.0	1000	GDE
1SMC6.0A	6.0	6.67	10	10.3	145.6	1000	GDG
1SMC6.5A	6.5	7.22	10	11.2	133.9	500	GDK
1SMC7.0A	7.0	7.78	10	12.0	125.0	200	GDM
1SMC7.5A	7.5	8.33	1.0	12.9	116.3	100	GDP
1SMC8.0A	8.0	8.89	1.0	13.6	110.3	50	GDR
1SMC9.0A	9.0	10.0	1.0	15.4	97.4	10	GDV
1SMC10A	10	11.1	1.0	17.0	88.2	5.0	GDX
1SMC12A	12	13.3	1.0	19.9	75.3	5.0	GEE
1SMC13A	13	14.4	1.0	21.5	69.7	5.0	GEG
1SMC14A	14	15.6	1.0	23.2	64.7	5.0	GEK
1SMC15A	15	16.7	1.0	24.4	61.5	5.0	GEM
1SMC16A	16	17.8	1.0	26.0	57.7	5.0	GEP
1SMC17A	17	18.9	1.0	27.6	53.3	5.0	GER
1SMC18A	18	20.0	1.0	29.2	51.4	5.0	GET
1SMC20A	20	22.2	1.0	32.4	46.3	5.0	GEV
1SMC22A	22	24.4	1.0	35.5	42.2	5.0	GEX
1SMC24A	24	26.7	1.0	38.9	38.6	5.0	GEZ
1SMC26A	26	28.9	1.0	42.1	35.6	5.0	GFE
1SMC28A	28	31.1	1.0	45.4	33.0	5.0	GFG
1SMC30A	30	33.3	1.0	48.4	31.0	5.0	GFK
1SMC33A	33	36.7	1.0	53.3	28.1	5.0	GFM
1SMC36A	36	40.0	1.0	58.1	25.8	5.0	GFP
1SMC40A	40	44.4	1.0	64.5	23.2	5.0	GFR
1SMC43A	43	47.8	1.0	69.4	21.6	5.0	GFT
1SMC48A	48	53.3	1.0	77.4	19.4	5.0	GFY
1SMC51A	51	56.7	1.0	82.4	18.2	5.0	GFZ
1SMC54A	54	60.0	1.0	87.1	17.2	5.0	GGE
1SMC58A	58	64.4	1.0	93.6	16.0	5.0	GGG
1SMC60A	60	66.7	1.0	96.8	15.5	5.0	GGK
1SMC64A	64	71.1	1.0	103	14.6	5.0	GGM
1SMC70A	70	77.8	1.0	113	13.3	5.0	GGP
1SMC75A	75	83.3	1.0	121	12.4	5.0	GGR
1SMC78A	78	86.7	1.0	126	11.4	5.0	GGT


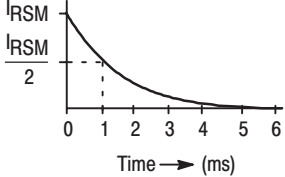
1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform.
4. 1/2 sine wave (or equivalent square pulse, PW = 8.3 ms, duty cycle = 4 pulses per minute).

Devices listed in **bold, italic** are ON Semiconductor preferred devices.

TVS – in Surface Mount (continued)

Table 13. 1.5 SMC Series Unidirectional Overvoltage Transient Suppressors; 1500 Watts Peak Power @ 1 ms Surge (10 x 1000 μs)

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (V_F = 3.5 V Max, I_F = 100 A for all types) (Note 4)

Device	Breakdown Voltage				Working Peak Reverse Voltage V _{RWM} Volts (Note 1)	Maximum Reverse Leakage @ V _{RWM} I _R μA	Maximum Reverse Surge Current I _{pp} Amps (Note 3)	Maximum Reverse Voltage @ I _{pp} (Clamping Voltage) V _C Volts	Maximum Temperature Coefficient of V _{BR} %/°C	Device Marking
	V _{BR} @ I _T Volts (Note 2)									
	Min	Nom	Max	mA						
 <p style="text-align: center;">SMC CASE 403 PLASTIC</p> <div style="display: flex; justify-content: space-around; align-items: center;">  </div> <p style="text-align: center;">Surge Current Characteristics</p>										
1.5SMC6.8A	6.45	6.8	7.14	10	5.8	1000	143	10.5	0.057	6V8A
1.5SMC7.5A	7.13	7.5	7.88	10	6.4	500	132	11.3	0.061	7V5A
1.5SMC10A	9.5	10	10.5	1	8.55	10	103	14.5	0.073	10A
1.5SMC12A	11.4	12	12.6	1	10.2	5	90	16.7	0.078	12A
1.5SMC13A	12.4	13	13.7	1	11.1	5	82	18.2	0.081	13A
1.5SMC15A	14.3	15	15.8	1	12.8	5	71	21.2	0.084	15A
1.5SMC16A	15.2	16	16.8	1	13.6	5	67	22.5	0.086	16A
1.5SMC18A	17.1	18	18.9	1	15.3	5	59.5	25.2	0.088	18A
1.5SMC20A	19	20	21	1	17.1	5	54	27.7	0.09	20A
1.5SMC22A	20.9	22	23.1	1	18.8	5	49	30.6	0.092	22A
1.5SMC24A	22.8	24	25.2	1	20.5	5	45	33.2	0.094	24A
1.5SMC27A	25.7	27	28.4	1	23.1	5	40	37.5	0.096	27A
1.5SMC30A	28.5	30	31.5	1	25.6	5	36	41.4	0.097	30A
1.5SMC33A	31.4	33	34.7	1	28.2	5	33	45.7	0.098	33A
1.5SMC36A	34.2	36	37.8	1	30.8	5	30	49.9	0.099	36A
1.5SMC39A	37.1	39	41	1	33.3	5	28	53.9	0.1	39A
1.5SMC43A	40.9	43	45.2	1	36.8	5	25.3	59.3	0.101	43A
1.5SMC47A	44.7	47	49.4	1	40.2	5	23.2	64.8	0.101	47A
1.5SMC51A	48.5	51	53.6	1	43.6	5	21.4	70.1	0.102	51A
1.5SMC56A	53.2	56	58.8	1	47.8	5	19.5	77	0.103	56A
1.5SMC62A	58.9	62	65.1	1	53	5	17.7	85	0.104	62A
1.5SMC68A	64.6	68	71.4	1	58.1	5	16.3	92	0.104	68A
1.5SMC75A	71.3	75	78.8	1	64.1	5	14.6	103	0.105	75A
1.5SMC82A	77.9	82	86.1	1	70.1	5	13.3	113	0.105	82A
1.5SMC91A	86.5	91	95.5	1	77.8	5	12	125	0.106	91A

1. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C.
3. 10 x 1000 μs exponential decay surge waveform.
4. 1/2 sine wave (or equivalent square pulse, PW = 8.3 ms, duty cycle = 4 pulses per minute).



Devices listed in **bold, italic** are ON Semiconductor preferred devices.

TVS/ESD Protection – One Line

SD05 Series

Table 14. Single Line TVS/ESD in SOD–323; 350 Watts Peak Power (8 x 20 μs); Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
UNIDIRECTIONAL



Device	Breakdown Voltage				Reverse Voltage Working Peak V _{RWM} (Volts)	Max Reverse Leakage Current I _R (μA)	Max Reverse Surge Current I _{PP} (A)	Max Reverse Voltage @ I _{PP} (Clamping Voltage) V _C (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	V _{BR} (Note 5) (V)			@ I _T (mA)					
	Min	Nom	Max						
 CASE 477 STYLE 1 SOD–323 									
SD05	6.2	6.75	7.3	1.0	5.0	10	24	14.5	350
SD12	13.3	14.5	15.75	1.0	12	1.0	15	25	150

5. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.

SD12C

Table 15. Single Line TVS/ESD in SOD–323; 350 Watts Peak Power (8 x 20 μs); Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
BIDIRECTIONAL

Device	Breakdown Voltage				Reverse Voltage Working Peak V _{RWM} (Volts)	Max Reverse Leakage Current I _R (μA)	Max Reverse Surge Current I _{PP} (A)	Max Reverse Voltage @ I _{PP} (Clamping Voltage) V _C (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	V _{BR} (Note 6) (V)			@ I _T (mA)					
	Min	Nom	Max						
 CASE 477 STYLE 1 SOD–323 									
SD12C	13.3	–	–	1.0	12	1.0	15	24	64



6. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.

TVS/ESD Protection – One Line (continued)

ESD5Z Series

Table 16. Single Line TVS/ESD in SOD–523; 200 Watts Peak Power (8 x 20 μs); Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
UNIDIRECTIONAL



Device	Breakdown Voltage				Reverse Voltage Working Peak V _{RWM} (Volts)	Max Reverse Leakage Current I _R (μA)	Max Reverse Surge Current I _{PP} (A)	Max Reverse Voltage @ I _{PP} (Clamping Voltage) V _C (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	V _{BR} (Note 7) (V)			@ I _T (mA)					
	Min	Nom	Max						
 CASE 502 SOD–523 									
ESD5Z2.5	4.0	–	–	1.0	2.5	6.0	11	10.9	145
ESD5Z3.3	5.0	–	–	1.0	3.3	0.05	11.2	14.1	105
ESD5Z5.0	6.2	–	–	1.0	5.0	0.05	9.4	18.6	80
ESD5Z6.0	6.8	–	–	1.0	6.0	0.01	8.8	20.5	70
ESD5Z7.0	7.5	–	–	1.0	7.0	0.01	8.8	22.7	65
ESD5Z12	14.1	–	–	1.0	12	0.01	9.6	25	55

7. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.

μESD Series

Table 17. Single Line TVS/ESD in SOD–723; 100 Watts Peak Power (8 x 20 μs); Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
UNIDIRECTIONAL

Device	Breakdown Voltage				Reverse Voltage Working Peak V _{RWM} (V)	Max Reverse Leakage Current I _R (μA)	Max Reverse Surge Current I _{PP} (A)	Max Reverse Voltage @ I _{PP} (Clamping Voltage) V _C (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	V _{BR} (V) @ I _T (Note 8)			@ I _T (mA)					
	Min	Nom	Max						
 CASE 509AA SOD–723 									
μESD3.3S	5.0	–	–	1.0	3.3	2.5	10.4	10.9	80
μESD5.0S	6.2	–	–	1.0	5.0	1.0	8.8	13.3	65
μESD12S	13.5	–	–	1.0	12	1.0	5.4	23.7	30



8. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.

TVS/ESD Protection – One Line (continued)

ESD9X Series

Table 18. Single Line TVS/ESD in SOD–923; 100 Watts Peak Power (8 x 20 μs); Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
UNIDIRECTIONAL

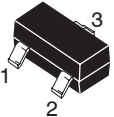
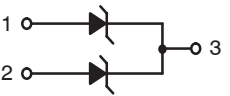
Device	Breakdown Voltage				Reverse Voltage Working Peak V _{RWM} (V)	Max Reverse Leakage Current I _R (μA)	Max Reverse Surge Current I _{PP} (A)	Max Reverse Voltage @ I _{PP} (Clamping Voltage) V _C (V)	Typical Capacitance (pF) Pin 1 to 2 @ 0 Volts
	V _{BR} (V) @ I _T (Note 9)			@ I _T (mA)					
	Min	Nom	Max						
 CASE 514AA SOD–923 									
ESD9X3.3S	5.0	–	–	1.0	3.3	2.5	9.8	10.4	80
ESD9X5.0S	6.2	–	–	1.0	5.0	1.0	8.7	13.3	65
ESD9X12S	13.5	–	–	1.0	12	1.0	5.9	23.7	30

9. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.

NUP1105L – LIN Bus Protector

Table 19. Single Line TVS/ESD in SOT–23; 350 Watts Peak Power (8 x 20 μs); Meets IEC61000–4–2, Level 4

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
BIDIRECTIONAL

Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current I _{PP} (A)	Max Reverse Voltage @ I _{PP} (Clamping Voltage) V _C (V)	Peak Power Rating (8x20 μsec) (Note 10)
	V _{BR} (V)			@ I _T (mA)	I _R (μA)	V _{RWM} (V)	Typ	Max			
	Min	Nom	Max								
 CASE 318 STYLE 27 SOT–23 											
NUP1105L	25.7	–	28.4	1.0	0.1	24	–	30	8.0	44	350

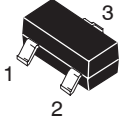
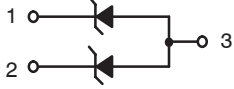
10. Surge waveform 8 x 20 μsec.

TVS/ESD Protection – Two Line

SM05 – Common Anode Series

Table 20. Two Line TVS/ESD in SOT-23; 300 Watts Peak Power (8 x 20 μs); Meets IEC61000-4-2, Level 4

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
UNIDIRECTIONAL

Device	Breakdown Voltage				Reverse Voltage Working Peak V _{RWM} (Volts)	Max Reverse Leakage Current I _R (μA)	Max Reverse Surge Current I _{PP} (A)	Max Reverse Voltage @ I _{PP} (Clamping Voltage) V _C (V)	Typical Capacitance (pF) Pin 1 to 3 @ 0 Volts
	V _{BR} (Note 11) (V)			@ I _T (mA)					
	Min	Nom	Max						
 <p style="text-align: center;">CASE 318 STYLE 12 LOW PROFILE SOT-23 PLASTIC</p> 									
SM05	6.2	6.75	7.3	1.0	5.0	10	17	9.8	225
SM12	13.3	14.5	15.75	1.0	12	1.0	12	19	95

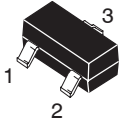
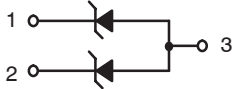
11. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.

MA3075WAL

Table 21. Two Line TVS/ESD in SOT-23; Meets IEC61000-4-2, Level 4

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
UNIDIRECTIONAL

(V_F = 0.9 V Max @ I_F = 10 mA)

Device	Breakdown Voltage				@ I _T (mA)	Max Reverse Leakage Current I _R (μA @ 5 V)	Maximum Temperature Coefficient of V _{BR} (mV/°C)
	V _{BR} (Note 12) (V)						
	Min	Nom	Max				
 <p style="text-align: center;">CASE 318 STYLE 12 LOW PROFILE SOT-23 PLASTIC</p> 							
MA3075WAL	7.2	7.5	7.9	5.0	1.0	5.3	

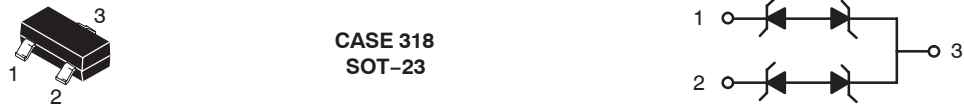
12. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.

TVS/ESD Protection – Two Line (continued)

NUP2105L – CAN Bus Protector

Table 22. Two Line TVS/ESD in SOT-23; 350 Watts Peak Power (8 x 20 μs); Meets IEC61000-4-2, Level 4

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
 BIDIRECTIONAL


Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{PP} (Clamping Voltage)	Peak Power Rating (8x20 μsec) (Note 13)
	V _{BR} (V)			@ I _T	I _R	V _{RWM}					
	Min	Nom	Max	(mA)	(μA)	(V)	Typ	Max	I _{PP} (A)	V _C (V)	Watts
 <p>CASE 318 SOT-23</p>											
NUP2105L	26.2	-	32	1.0	0.1	24	30	-	8.0	44	350

13. Surge waveform 8 x 20 μsec.

DF3A6.8FU

Table 23. Two Line TVS/ESD in SC-70; 150 Watts Peak Power (8 x 20 μs); Meets IEC61000-4-2, Level 4

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
 UNIDIRECTIONAL
 (V_F = 0.9 V Max @ I_F = 10 mA)

Device	Breakdown Voltage			@ I _T (mA)	Max Reverse Leakage Current		Max Reverse Surge Current I _{PP} (A)	Max Reverse Voltage @ I _{PP} (Clamping Voltage) V _C (V)
	V _{BR} (Note 14) (V)				I _R @ V _R (μA) (V)			
	Min	Nom	Max					
 <p>CASE 419 SC-70 (SOT-323)</p>								
DF3A6.8FU	6.4	6.8	7.2	5.0	0.5	5.0	2.0	9.6

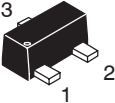
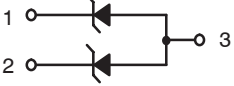
14. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.

TVS/ESD Protection – Two Line (continued)

NZL5V6AXV Series

Table 24. Two Line ESD Protection in SC-89; Meets IEC61000-4-2, Level 4

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
 UNIDIRECTIONAL
 (V_F = 0.9 V Max @ I_F = 10 mA)

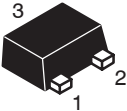
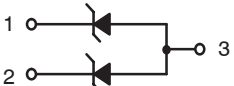
Device	Breakdown Voltage				Max Reverse Leakage Current	
	V _{BR} (Note 15) (V)			@ I _T (mA)	I _R @ V _R (μA) (V)	
	Min	Nom	Max			
 <p style="text-align: center;">CASE 463C SC-89</p> 						
NZL5V6AXV3	5.32	5.6	5.88	5.0	5.0	3.0
NZL6V8AXV3	6.46	6.8	7.14	5.0	1.0	4.5
NZL7V5AXV3	7.12	7.5	7.88	5.0	1.0	5.0

15. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.

μESD3.3D Series

Table 25. Two Line ESD Protection in SOT-723; Meets IEC61000-4-2, Level 4


ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
 UNIDIRECTIONAL
 (V_F = 0.9 V Max @ I_F = 10 mA)


Device	Breakdown Voltage				Max Reverse Leakage Current	
	V _{BR} (Note 16) (V)			@ I _T (mA)	I _R @ V _{RWM} (μA) (V)	
	Min	Nom	Max			
 <p style="text-align: center;">CASE 631AA STYLE 4 SOT-723</p> 						
μESD3.3D	5.0	–	–	1.0	1.0	–
μESD5.0D	6.2	–	–	1.0	0.1	–
μESD6.0D	7.0	–	–	1.0	0.1	–

16. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.

TVS/ESD Protection – Four Line

Table 26. Four Line TVS/ESD Protection; Meets IEC61000-4-2, Level 4

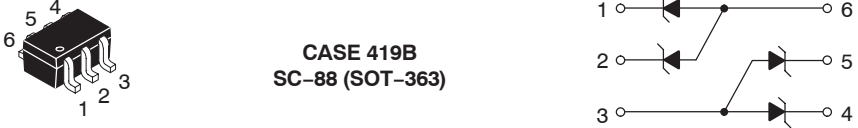
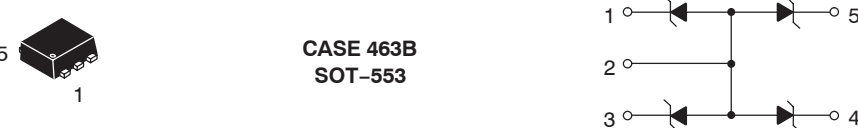
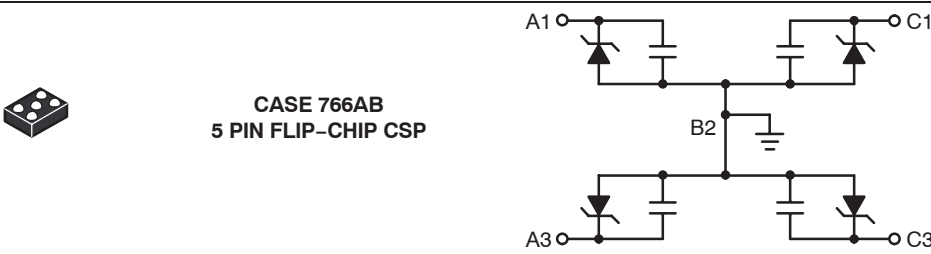
Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{pp} (Clamping Voltage)	Peak Power Rating (8x20 μsec) (Note 17)
	V _{BR} (V)		@ I _T	I _R	V _{RWM}						
	Min	Nom	Max	(mA)	(μA)	(V)	Typ	Max	I _{pp} (A)	V _C (V)	Watts
 <p style="text-align: center;">CASE 318F STYLE 1 SC-74 PLASTIC</p>											
MMQA5V6	5.32	5.6	5.88	1.0	2.0	3.0	257	-	3.0	8.0	150
MMQA6V2	5.89	6.2	6.51	1.0	0.7	4.0	225	-	2.66	9.0	150
MMQA6V8	6.46	6.8	7.14	1.0	0.5	4.3	210	-	2.45	9.8	150
MMQA12V	11.4	12	12.6	1.0	0.075	9.1	117	-	1.39	17.3	150
MMQA13V	12.4	13	13.7	1.0	0.075	9.8	108	-	1.29	18.6	150
MMQA15V	14.3	15	15.8	1.0	0.075	11	93	-	1.1	21.7	150
MMQA18V	17.1	18	18.9	1.0	0.075	14	77	-	0.923	26	150
MMQA20V	19	20	21	1.0	0.075	15	69	-	0.84	28.6	150
MMQA22V	20.9	22	23.1	1.0	0.075	17	63	-	0.758	31.7	150
MMQA24V	22.8	24	25.2	1.0	0.075	18	58	-	0.694	34.6	150
MMQA27V	25.7	27	28.4	1.0	0.075	21	50	-	0.615	39	150
MMQA30V	28.5	30	31.5	1.0	0.075	23	40	-	0.554	43.3	150
MMQA33V	31.4	33	34.7	1.0	0.075	25	42	-	0.504	48.6	150
SMS05	6.0	-	7.2	1.0	20	5.0	300	400	23	15.5	350
SMS12	13.3	-	15	1.0	1.0	12	120	150	15	23	350
SMS15	16.7	-	18.5	1.0	1.0	15	100	125	12	29	350
SMS24	26.7	-	32	1.0	1.0	24	60	75	8.0	44	350

 <p style="text-align: center;">CASE 419A SC-88A (SOT-353)</p>											
MSQA6V1W5	6.1	6.6	7.2	1.0	1.0	3.0	90	-	-	-	150
SMF05	6.0	-	7.2	1.0	5.0	5.0	90	-	12	12.5	200

17. Surge waveform 8 x 20 μsec.

TVS/ESD Protection – Four Line (continued)

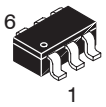
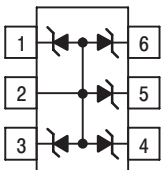
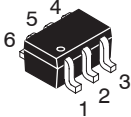
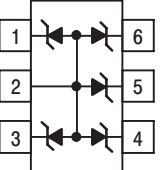
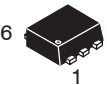
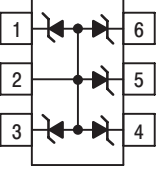
Table 26. Four Line TVS/ESD Protection; Meets IEC61000-4-2, Level 4 (continued)

Device	Breakdown Voltage			Max Reverse Leakage Current			Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{pp} (Clamping Voltage)	Peak Power Rating (8x20 μsec) (Note 18)
	V _{BR} (V)			@ I _T	I _R	V _{RWM}	Typ	Max	I _{pp} (A)	V _C (V)	Watts
	Min	Nom	Max	(mA)	(μA)	(V)					
 <p>CASE 419B SC-88 (SOT-363)</p>											
DF6A6.8FU	6.4	6.8	7.2	1.0	1.0	5.0	40	-	7.0	11.4	75
 <p>CASE 463B SOT-553</p>											
NZQA5V6XV5	5.32	5.6	5.88	1.0	1.0	3.0	90	-	10	10.5	100
NZQA6V2XV5	5.89	6.2	6.51	1.0	0.5	4.0	80	-	9.0	11.5	100
NZQA6V8XV5	6.46	6.8	7.14	1.0	0.1	4.3	70	-	8.0	12.5	100
 <p>CASE 766AB 5 PIN FLIP-CHIP CSP</p>											
NUP4103FC	6.0	7.0	8.0	1.0	0.1	3.3	47	-	-	-	-

18. Surge waveform 8 x 20 μsec.

TVS/ESD Protection – Five Line

Table 27. Five Line TVS/ESD Protection; Meets IEC61000-4-2, Level 4

Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{pp} (Clamping Voltage)	Peak Power Rating (8x20 μsec) (Note 19)
		V _{BR} (V)		@ I _T	I _R	V _{RWM}	Typ	Max			
	Min	Nom	Max	(mA)	(μA)	(V)			I _{pp} (A)	V _C (V)	Watts
 <p style="text-align: center;">CASE 318F STYLE 1 SC-74 PLASTIC</p> 											
SMS05C	6.2	–	7.2	1.0	5.0	5.0	260	–	24	14.5	350
SMS12C	13.3	–	15	1.0	1.0	12	120	–	15	23	350
SMS15C	17	–	19	1.0	1.0	15	95	–	12	29	350
SMS24C	26.7	–	32	1.0	1.0	24	60	–	8.0	44	350
 <p style="text-align: center;">CASE 419B SC-88 (SOT-363)</p> 											
SMF05C	6.2	–	7.2	1.0	5.0	5.0	80	–	8.0	12.5	100
SMF12C	13.3	–	15	1.0	1.0	12	40	–	6.0	23	100
SMF15C	17	–	19	1.0	1.0	15	33	–	5.0	29	100
SMF24C	26.7	–	32	1.0	1.0	24	21	–	2.5	44	100
 <p style="text-align: center;">CASE 463A SOT-563</p> 											
NUP5120X6	6.2	6.8	7.2	1.0	0.5	3.0	54	–	–	–	90

19. Surge waveform 8 x 20 μsec.

Low Capacitance TVS/ESD Protection – One Line

SL05 Series

Table 28. Single Line Low Cap TVS/ESD in SOT-23; 300 Watts Peak Power (8 x 20 μ s); Meets IEC61000-4-2, Level 4


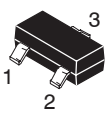
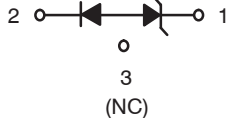
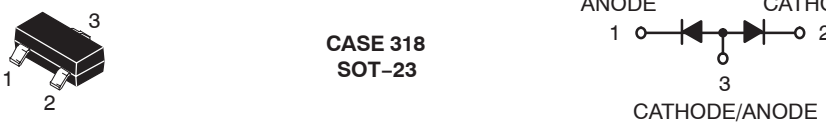
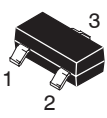
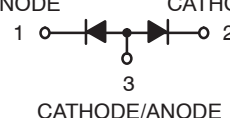
Device	Breakdown Voltage			Max Reverse Leakage Current			Capacitance (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{pp} (Clamping Voltage)	Peak Power Rating (8x20 μ sec)
	V _{BR} (V)		@ I _T	I _R	V _{RWM}	Typ	Max	I _{pp} (A)	V _C (V)	Watts	
	Min	Nom	Max	(mA)	(μ A)						(V)
 <p>  CASE 318 STYLE 26 SOT-23  </p>											
SL05	6.0	–	8.0	1.0	20	5.0	3.5	5.0	17	11	300
SL15	16.7	–	18.5	1.0	1.0	15	3.5	5.0	10	30	300
SL24	26.7	–	29	1.0	1.0	24	3.5	5.0	5.0	55	300

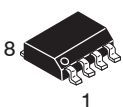
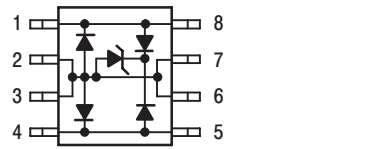
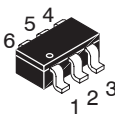
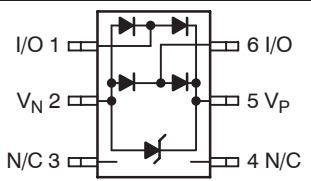
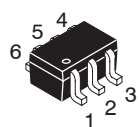
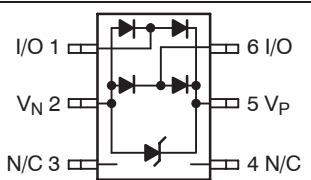
Table 29. Meets IEC61000-4-2, Level 4

Device	Breakdown Voltage		Forward Voltage		Capacitance* (pF) @ 0 V, 1.0 MHz	
	V _{BR} (V)	@ I _{br}	V _f (V)	I _f	Typ	Max
	Min	μ A	Max	mA		
 <p>  CASE 318 SOT-23  </p>						
USB 2.0						
NUP1301ML3	70	100	0.855	10	–	0.9

*C_j = Between I/O pin and ground.

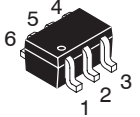
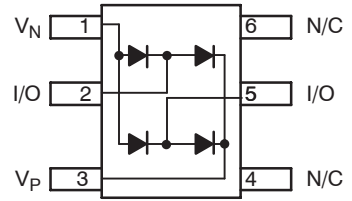
Low Capacitance TVS/ESD Protection – Two Line

Table 30. Two Line Low Cap TVS/ESD Protection; Meets IEC61000–4–2, Level 4

Device	Breakdown Voltage			Max Reverse Leakage Current			Capacitance* (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{pp} (Clamping Voltage)	Peak Power Rating (8x20 μsec)
	Min	Nom	Max	@ I _T (mA)	I _R (μA)	V _{RWM} (V)	Typ	Max	I _{pp} (A)	V _C (V)	Watts
 CASE 751 SO-8											
USB 1.1											
LC03-6	6.8	-	-	1.0	20	5.0	16	25	50	15	2000
 CASE 318G TSOP-6											
USB 2.0											
NUP2201MR6	6.0	-	-	1.0	5.0	5.0	3.0	5.0	25	20	500
 CASE 419B SC-88 (SOT-363)											
USB 2.0											
NUP2202W1	6.0	-	-	1.0	5.0	5.0	3.0	5.0	28	20	500

*C_j = Between I/O pin and ground.

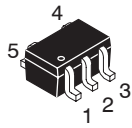
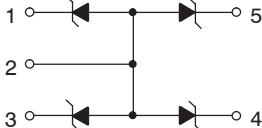
Table 31. Meets IEC61000–4–2, Level 4

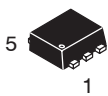
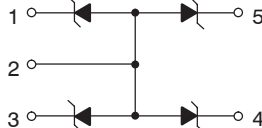
Device	Breakdown Voltage		Forward Voltage		Capacitance* (pF) @ 0 V, 1.0 MHz	
	V _{BR} (V)	@ I _{br}	V _f (V)	I _f	Typ	Max
	Min	μA	Max	mA		
 CASE 419B SC-88						
USB 2.0						
NUP2301MW6	70	100	0.855	10	1.6	3.0

*C_j = Between I/O pin and ground.

Low Capacitance TVS/ESD Protection – Four Line


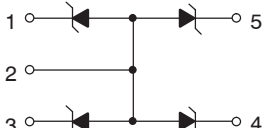
Table 32. Four Line Low Cap TVS/ESD Protection; Meets IEC61000–4–2, Level 4

Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance* (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{pp} (Clamping Voltage)	Peak Power Rating (8x20 μsec) (Note 20)
	V _{BR} (V)		@ I _T	I _R	V _{RWM}	Typ	Max				
	Min	Nom						Max	(mA)	(μA)	(V)
 <p style="text-align: center;">CASE 419A SC-88A (SOT-353)</p> 											
NSQA6V8AW5	6.4	6.8	7.1	1.0	1.0	5.0	12	15	1.6	13	20
NSQA12VAW5	11.4	12	12.7	5.0	0.05	9.0	7.0	15	0.9	23	20

 <p style="text-align: center;">CASE 463B SOT-553</p> 											
NZQA5V6AXV5	5.3	5.6	5.9	1.0	1.0	3.0	13	17	1.6	13	20
NZQA6V8AXV5	6.1	6.8	7.2	1.0	1.0	4.3	12	15	1.6	13	20

*C_j = Between I/O pin and ground.
20. Surge waveform 8 x 20 μsec.

Table 33. Four Line Low Cap TVS/ESD Protection in SOT-953; Meets IEC61000–4–2, Level 4

Device	Breakdown Voltage V _{BR} @ 1.0 mA (Volts)			Leakage Current I _{RM} @ V _{RM}		Typ Capacitance @ 0 V Bias (pF)		Typ Capacitance @ 3.0 V Bias (pF)	
	Min	Nom	Max	V _{RWM}	I _{RWM} (μA)	Typ	Max	Typ	Max
 <p style="text-align: center;">CASE 527AB SOT-953</p> 									
NUP45V6P5	5.3	5.6	5.9	3.0	1.0	13	17	7.0	11.5
NUP46V8P5	6.47	6.8	7.14	4.3	1.0	12	15	6.7	9.5
NUP412VP5	11.4	12	12.7	9.0	1.0	6.5	10	3.5	5.0

Low Capacitance TVS/ESD Protection – Four Line (continued)

Table 34. Four Line Low Cap TVS/ESD Protection in SOT-563; Meets IEC61000-4-2, Level 4


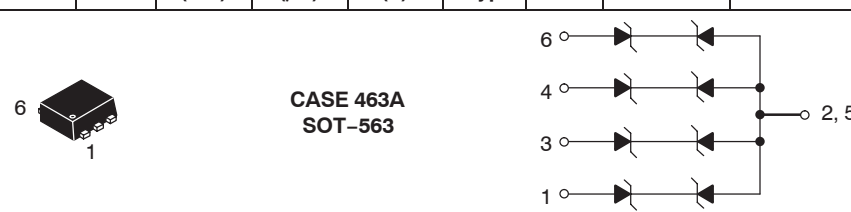
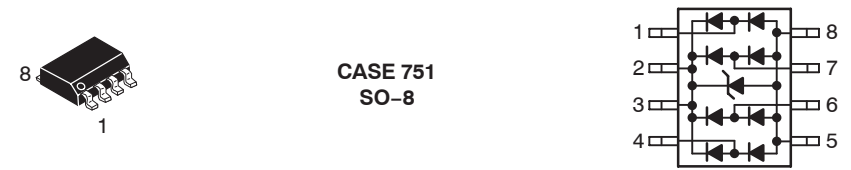
Device	Breakdown Voltage (D ₁ , D ₂ , and D ₃)				Breakdown Voltage (V _{CC})				Working Peak Reverse Voltage (D ₁ , D ₂ , and D ₃)	Max Reverse Leakage Current (D ₁ , D ₂ , and D ₃)		Max Reverse Leakage Current (V _{CC})		Capacitance (pF) @ 3.0 V, 1.0 MHz		Peak Power Rating (8x20 μsec) (D ₁ , D ₂ , and D ₃)	Peak Power Rating (8x20 μsec) (V _{CC})
	V _{BR} (V)		@ I _T (mA)	V _{BR} (V)	@ I _T (mA)		V _{RWM} (V)	I _R (μA)	V _{RWM} (V)	I _R (μA)	V _R (V)	Typ	Max	Watts	(mW)		
	Min	Nom			Max	Min										Nom	Max
 <p style="text-align: center;">CASE 463A SOT-563</p>																	
NUP4060AXV6	6.2	6.8	7.2	1.0	15.3	16	17.1	5.0	5.0	0.5	3.0	0.05	11	7.0	10	20	200

Table 35. Four Line Low Cap Bidirectional TVS/ESD Protection in SOT-563; Meets IEC61000-4-2, Level 4

Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance* (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{PP} (Clamping Voltage)	Peak Power Rating (8x20 μsec)
	V _{BR} (V)		@ I _T (mA)	nA	V _{RWM} (V)	Typ	Max	I _{PP} (A)	V _C (V)	Watts	
	Min	Nom									Max
 <p style="text-align: center;">CASE 463A SOT-563</p>											
NUP4102XV6	13.6	-	17.8	1.0	100	12	13	15	3.0	25	75

*C_J = Between I/O pin and ground.

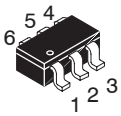
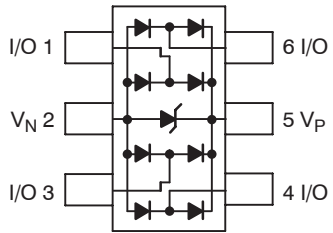
Table 36. Four Line Low Cap TVS/ESD Protection; Meets IEC61000-4-2, Level 4

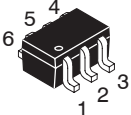
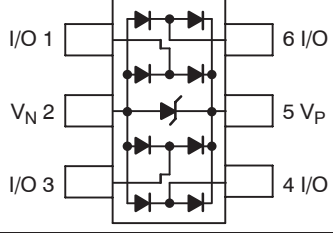
Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance* (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{PP} (Clamping Voltage)	Peak Power Rating (8x20 μsec)
	V _{BR} (V)		@ I _T (mA)	I _R (μA)	V _{RWM} (V)	Typ	Max	I _{PP} (A)	V _C (V)	Watts	
	Min	Nom									Max
 <p style="text-align: center;">CASE 751 SO-8</p>											
USB 2.0											
NUP4201DR2	6.0	-	-	1.0	10	5.0	5.0	10	10	12	500
SRDA05-4R2	6.0	-	-	1.0	10	5.0	10	15	10	12	500

*C_J = Between I/O pin and ground.

Low Capacitance TVS/ESD Protection – Four Line (continued)

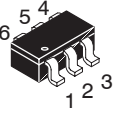
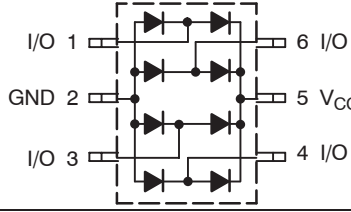
Table 36. Four Line Low Cap TVS/ESD Protection; Meets IEC61000-4-2, Level 4 (continued)

Device	Breakdown Voltage			Max Reverse Leakage Current			Capacitance* (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{pp} (Clamping Voltage)	Peak Power Rating (8x20 μsec)
	V _{BR} (V)		@ I _T	I _R	V _{RWM}	Typ	Max				
	Min	Nom	Max	(mA)	(μA)			(V)	I _{pp} (A)	V _C (V)	Watts
 <p style="text-align: center;">CASE 318G TSOP-6</p> 											
USB 2.0											
NUP4201MR6	6.0	-	-	1.0	5.0	5.0	3.0	5.0	25	20	500

 <p style="text-align: center;">CASE 419B SC-88 (SOT-363)</p> 											
USB 2.0											
NUP4202W1	6.0	-	-	1.0	5.0	5.0	3.0	5.0	28	20	500

*C_j = Between I/O pin and ground.

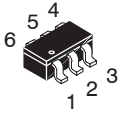
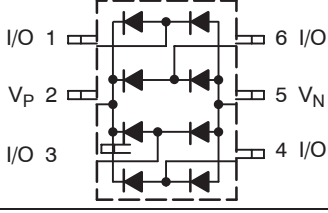
Table 37. Four Line Low Cap TVS/ESD Protection; Meets IEC61000-4-2, Level 4

Device	Breakdown Voltage		Forward Voltage		Capacitance* (pF) @ 0 V, 1.0 MHz	
	V _{BR} (V)	@ I _{br}	V _f (V)	I _f	Typ	Max
	Min	μA	Max	mA		
 <p style="text-align: center;">CASE 318G TSOP-6</p> 						
USB 2.0						
NUP4301MR6	70	100	0.855	10	1.6	3.0

*C_j = Between I/O pin and ground.

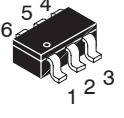
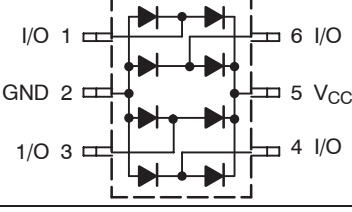
Low Capacitance TVS/ESD Protection – Four Line (continued)

Table 37. Four Line Low Cap TVS/ESD Protection; Meets IEC61000–4–2, Level 4 (continued)

Device	Breakdown Voltage		Forward Voltage		Capacitance* (pF) @ 0 V, 1.0 MHz	
	V _{BR} (V)	@ I _{br}	V _f (V)	I _f	Typ	Max
	Min	μA	Max	mA		
 CASE 318F TSOP-6						
USB 2.0						
NUP4304MR6	70	100	0.855	10	1.6	3.0

*C_j = Between I/O pin and ground.


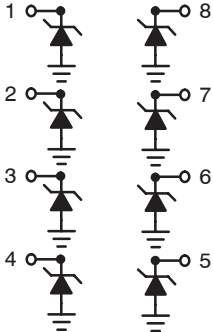
Table 38. Four Line Low Cap TVS/ESD Protection; Meets IEC61000–4–2, Level 4

Device	Breakdown Voltage			Max Reverse Leakage Current		Capacitance* (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{pp} (Clamping Voltage)	Peak Power Rating (8x20 μsec)	
	V _{BR} (V)			I _R	V _{RWM}	pF @ 0 V, 1.0 MHz		I _{pp} (A)	V _C (V)	Watts	
	Min	Nom	Max	(mA)	(μA)	(V)	Typ	Max	(A)	(V)	
 CASE 318G TSOP-6											
USB 2.0											
NUP4302MR6	30	-	-	0.1	30	-	-	28	-	-	-

*C_j = Between I/O pin and ground.

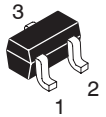
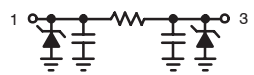
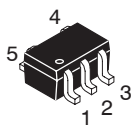
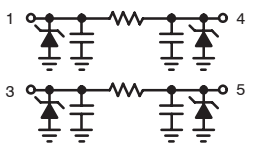

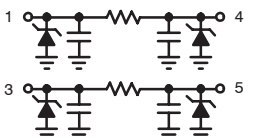
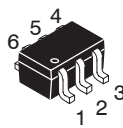
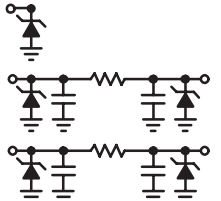

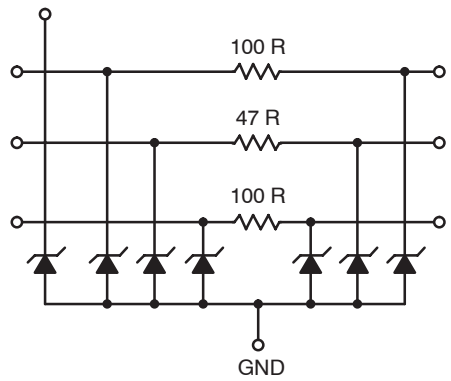
Low Capacitance TVS/ESD Protection – Eight Line

Table 39. . Eight Line Low Cap TVS/ESD Protection; Meets IEC61000–4–2, Level 4

Device	Breakdown Voltage				Max Reverse Leakage Current		Capacitance* (pF) @ 0 V, 1.0 MHz		Max Reverse Surge Current	Max Reverse Voltage @ I _{pp} (Clamping Voltage)	Peak Power Rating (8x20 μsec)
	V _{BR} (V)			@ I _T	I _R	V _{RWM}	Typ	Max	I _{pp} (A)	V _C (V)	Watts
	Min	Nom	Max	(mA)	(μA)	(V)					
 CASE 506AK DFN8											
	NUP8010MN	5.3	5.6	5.9	1.0	1.0	3.3	13	17	1.6	13

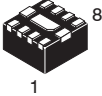
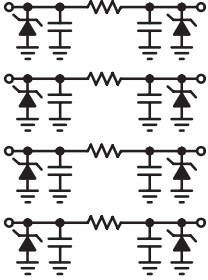
*C_j = Between I/O pin and ground.

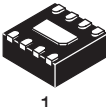
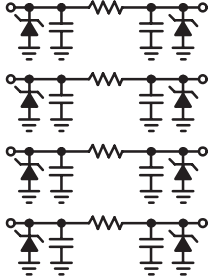
Data Line Filters


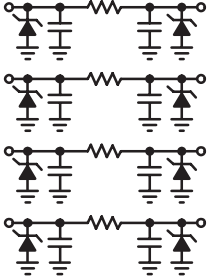
Device	V_{BR} (V)		I_R (μ A)	V_{RWM}	C_{diode} (pF) @ 2.5 V (Note 21)	Resistor		
	Typ	Max	Max		Typ	Typ	Max	
 <p>CASE 463 SC-75 PLASTIC</p> 	NZF220T	7.0	8.0	1.0	3.0	10	100	110
 <p>CASE 419A SC-88A</p> 	NZF220DF	7.0	8.0	1.0	3.0	7.5	100	110
 <p>CASE 463A SOT-563</p> 	NUF2220XV6	7.0	–	1.0	5.0	7.0	100	115
NUF2230XV6	7.0	–	1.0	5.0	16	100	110	
 <p>CASE 419B SC-88</p> 	NUF2240W1	7.0	–	1.0	5.0	17	100	115
 <p>CASE 499AG-01 FLIP-CHIP</p> 	NUF3101FC	7.0	8.0	0.1	3.0	15	100	120


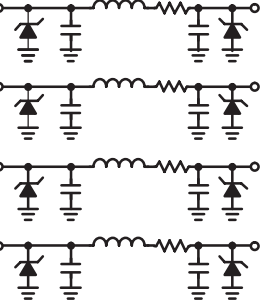
21. Line capacitance is 2x the diode capacitance (C_{diode}).

Data Line Filters (continued)

Device	V_{BR} (V)		I_R (μ A)	@ V_{RWM} (V)	C_{diode} (pF) @ 2.5 V (Note 22)	Resistor	
	Typ	Max	Max		Typ	Typ	Max
 CASE 517AK DFN8 (1.6 x 1.6 x 0.85 mm)							
NUF4402MN	7.0	8.0	0.1	5.0	12	100	115
NUF4403MN	7.0	8.0	0.1	5.0	17	100	115
NUF4210MN	7.0	8.0	0.1	5.0	8.5	100	115

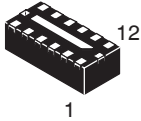
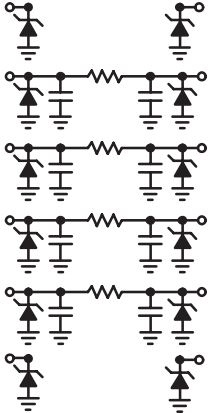

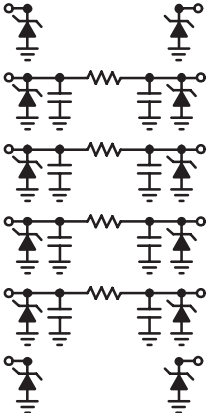
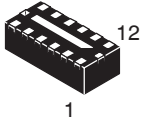
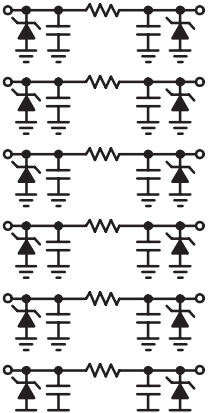
 CASE 506AA DFN8 (2.0 x 2.0 x 0.85 mm)							
NUF4401MN	7.0	8.0	0.1	5.0	15	200	230

 CASE 517AD UDFN8 (1.2 x 1.8 0.5 mm)							
NUF4001MU	7.0	8.0	0.1	5.0	12	100	115

 CASE 517AD UDFN8 (1.2 x 1.8 0.5 mm)							
NUF4152MU	7.0	8.0	0.1	5.0	20	25	30

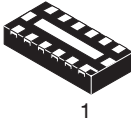
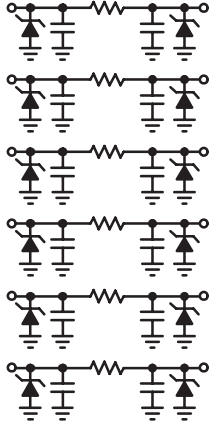

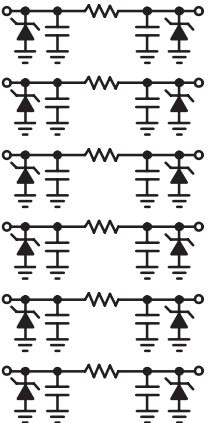
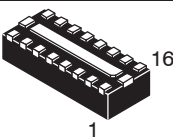
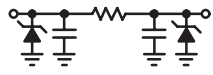
22. Line capacitance is 2x the diode capacitance (C_{diode}).

Data Line Filters (continued)

Device	V _{BR} (V)		I _R (μ A)	@V _{RWM} (V)	C _{diode} (pF) @ 2.5 V (Note 23)	Resistor		
	Typ	Max	Max		Typ	Typ	Max	
 <p>CASE 506AD DFN12 (1.35 x 3.0 x 0.85 mm)</p>								
	NUF6402MN	7.0	8.0	1.0	5.0	17	100	115
 <p>CASE 499D FLIP-CHIP 300 μm Bumps (1.35 x 3.0 x 0.65 mm)</p>								
	NUF4105FC	7.0	8.0	0.1	3.3	23	100	120
 <p>CASE 506AD DFN12 (1.35 x 3.0 x 0.85 mm)</p>								
	NUF6401MN	7.0	–	1.0	5.0	17	100	115
	NUF6406MN	7.0	–	1.0	5.0	12	100	115

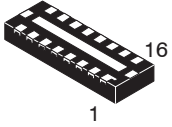
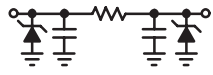
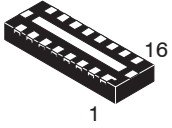
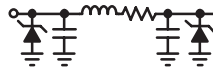
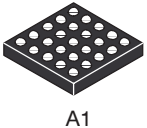
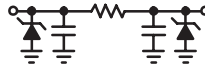
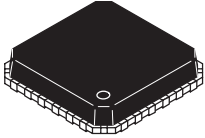
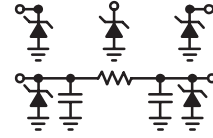
23. Line capacitance is 2x the diode capacitance (C_{diode}).

Data Line Filters (continued)

Device	V_{BR} (V)		I_R (μ A)	@ V_{RWM} (V)	C_{diode} (pF) @ 2.5 V (Note 24)	Resistor		
	Typ	Max	Max		Typ	Typ	Max	
 <p>CASE 517AE UDFN12 (1.2 x 2.5 x 0.5 mm)</p>								
	NUF6001MU	7.0	-	1.0	5.0	17	100	115
 <p>CASE 499D FLIP-CHIP 300 μm Bumps (1.35 x 3.0 x 0.65 mm)</p>								
	NUF6106FC	7.0	8.0	0.1	3.3	10	100	120
NUF6105FC	7.0	8.0	0.1	3.3	23	100	120	
 <p>CASE 507AC DFN16 (1.6 x 4.0 x 0.85 mm)</p>	 <p>1 of 8 Filter Lines</p>							
	NUF8401MN	7.0	8.0	0.1	5.0	12	100	115
	NUF8402MN	7.0	8.0	0.1	3.3	17	100	115
NUF8410MN	7.0	8.0	0.1	5.0	8.5	100	115	


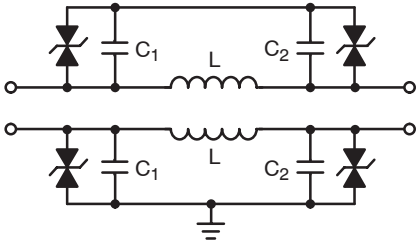
24. Line capacitance is 2x the diode capacitance (C_{diode}).


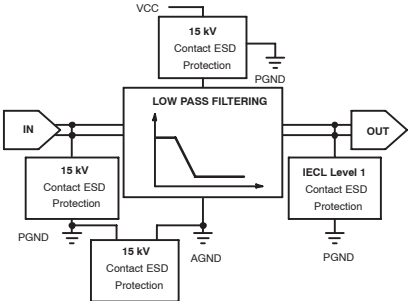
Data Line Filters (continued)

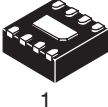
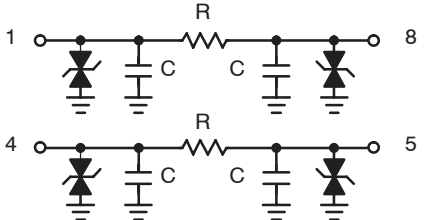
Device	V _{BR} (V)		I _R (μA)	@V _{RWM} (V)	C _{diode} (pF) @ 2.5 V (Note 25)	Resistor	
	Typ	Max	Max		Typ	Typ	Max
 CASE 517AF UDFN16 (1.2 x 3.5 x 0.5 mm)					 1 of 8 Filter Lines		
NUF8001MU	7.0	8.0	0.1	5.0	12	100	115
 CASE 517AF UDFN16 (1.2 x 3.5 x 0.5 mm)					 1 of 8 Filter Lines		
NUF8152MU	7.0	8.0	0.1	5.0	20	25	30
 CASE 499G FLIP-CHIP CSP (2.64 x 2.64 x 0.65 mm)					 1 of 10 Filter Lines		
NUF9001FC	7.0	8.0	0.1	5.0	15	200	230
NUF9002FC	7.0	8.0	0.1	5.0	10	100	115
 CASE 485F 24 PIN MLF					 1 of 9 Filter Lines		
NZMM7V0T4	7.0	8.0	0.1	3.0	10	100	110

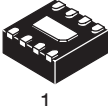
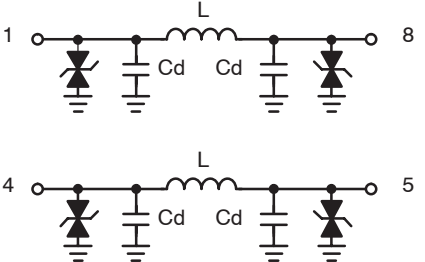
25. Line capacitance is 2x the diode capacitance (C_{diode}).

Audio Filters

Device	V_{BR} (V)		I_R (μ A)	@ V_{RWM} (V)	C_{diode} (pF) @ 2.5 V (Note 26)	Resistor	
	Typ	Max	Max		Typ	Typ	Max
 A1 CASE 499J FLIP-CHIP	 Typical L = 2.9 nH						
	NUF2441FC	14.5	17.7	0.1	12	100	0.28

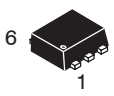
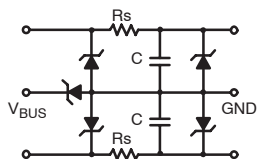
 A1 CASE 499AE FLIP-CHIP							
	NMF3000FC	12	–	0.5	10	500	950

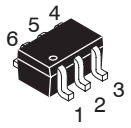
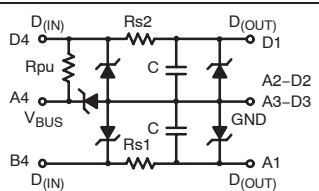
 1 CASE 506AA DFN8							
	NUF2114MN	15.7	17.7	0.1	12	60	8.4
NUF2116MN	15.7	17.7	0.01	12	50	64	75

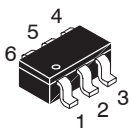
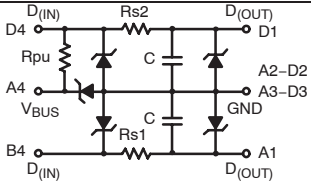
 1 CASE 506AA DFN8	 Typical L = 10 nH						
	NUF2070MN	15.7	17.7	0.1	12	64	2.4


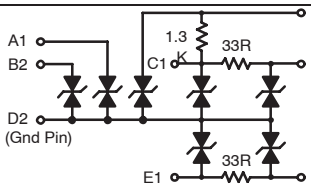
26. Line capacitance is 2x the diode capacitance.

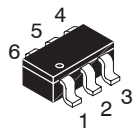
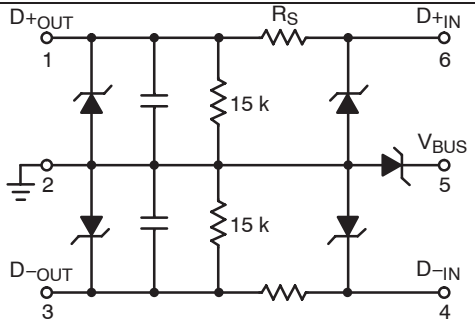
Data Line Filters

Device	V_{BR} (V)		I_R (μ A)	V_{RWM}	C_{line} (pF) @ 2.5 V	Resistor	
	Typ	Max	Max		Typ	Typ	Max
 CASE 463A SOT-563							
NUF2030XV6	6.8	8.0	0.1	5.25	30	22	26.4
NUF2042XV6	6.8	8.0	0.1	5.25	42	22	26.4


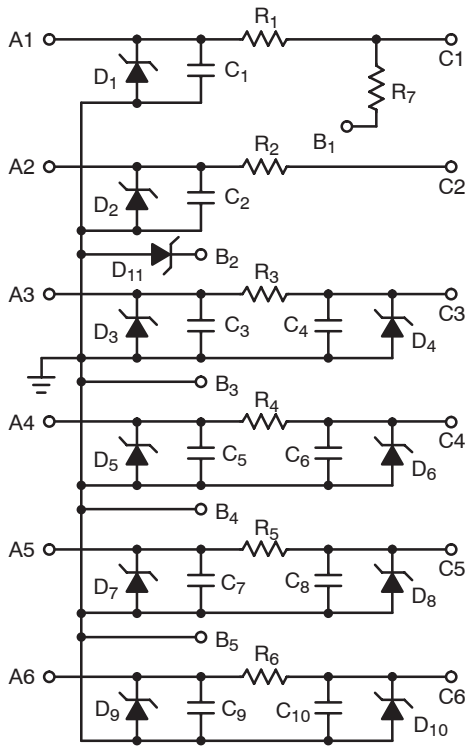
 CASE 419B SC-88 (SOT-363)							
NUF2015W1	6.8	8.0	0.1	5.25	42	15	18
NUF2221W1	6.8	8.0	0.1	5.25	42	22	26.4

 CASE 318G TSOP-6							
STF202-22	7.0	8.0	5.0	5.25	57	22	24

 CASE 499AM FLIP-CHIP							
NUF2222FC	7.8	8.8	0.1	5.0	34	33	38

 CASE 318G STYLE 10 TSOP-6							
NUF2101M	7.0	8.0	1.0	5.25	46	30	33.7

Data Line Filters (continued)

Device	V_{BR} (V)		I_R (μ A)	$@V_{RWM}$ (V)	C_{line} (pF) @ 2.5 V	Resistor	
	Typ	Max	Max		Typ	Typ	Max
 A1 CASE 499AD FLIP-CHIP CSP							
	NUF4107FC (Pin A1 to C1, Pin A2 to C2)	7.0	8.0	0.1	5.25	36	22
NUF4107FC (Pin A3 to C3, Pin A4 to C4, Pin A5 to C5, Pin A6 to C6)	7.0	8.0	0.1	5.25	60	100	120

Clock and Data Management

Clock and Data Management

Table of Contents

	Page
Signal Translators	268
Crosspoint Switches	269
Clock Fan-out	270
Clock Dividers	272
Skew Management	273
Prescalers	274
Clock Synthesizers	274
Zero Delay Buffers	275
EMI Suppression Clocks	277
VCO (PLL)	277
Phase/Frequency Detectors	277
Flip-Flops	278
Latches	280
Shift Registers	281
Multiplexers	282
Serial/Parallel Converter and Parallel/Serial Converters	283
Gates	284
Counters	285
Comparators	286
Parity Checkers	286
Drivers/Receivers	287
Drivers/Buffers	290

In Brief...

Advanced clock management devices from ON Semiconductor deliver superior performance by providing the lowest skew and lowest jitter with the highest operating frequencies.

ON Semiconductor offers a complete family of Phase Lock Loop (PLL) based products for applications ranging from low cost portable MP3 players, to massive, mission critical servers. Our oscillator replacement ICs offer performance rivaling crystal oscillator solutions at a fraction of the cost, and our new Zero Delay Buffer family is one of the most complete in the industry. Lastly, ON Semiconductor has a series of EMI Suppression Clocks that utilize spread spectrum to minimize the peak electromagnetic interference emissions in consumer products.

This portfolio of products makes designing any low skew, high frequency clock tree an easy task with a large range of clock **distribution, generation and skew management** devices. We address the needs of today's systems whether operating at 2.5 V, 3.3 V or legacy systems at 5.0 V or -5.2 V.

ON Semiconductor's High Performance Data Management products are designed into state-of-the-art systems such as communication and networking switches, high-end servers, engineering workstations, high-density memory modules, storage networks and precision test and measurement systems.

While our ECLinPS™ families serve the market well at frequencies up to 6.0 GHz, GigaComm™ family of silicon germanium products enables safe and reliable design up to 12 GHz. GigaComm delivers the performance necessary for high frequency applications, while maintaining the manufacturability and price point required for cost-effective volume production.

ON Semiconductor Selector Guide – Clock and Data Management Devices

SIGNAL TRANSLATORS (Specifications are at 25°C unless otherwise stated)

Device(s)	From	To	Voltage	# of Channels	Freq. (Typ) MHz	Prop. Delay (Typ) ps	Tr & Tf (Max) ps	Package
MC100EL90	LVNECL/NECL	PECL	3.3/5	3	650	500	500	SO-20
MC100EL91	LVPECL/PECL	NECL	3.3/5	3	700	670	400	SO-20
MC100ELT20	TTL	PECL	5	1	100 MHz (min)*	1200	1500	SO-8/TSSOP-8
MC100ELT21	PECL	TTL	5	1	TBD	5500	750 (10%-90%)	SO-8/TSSOP-8
MC100ELT22	TTL	PECL	5	2	100 MHz (min)*	1200	1600	SO-8/TSSOP-8
MC100ELT23	PECL	TTL	5	2	100	3500	1600 (10%-90%)	SO-8/TSSOP-8
MC100ELT24	TTL	NECL	5	1	400	950	1250	SO-8/TSSOP-8
MC100ELT25	NECL	TTL	5/-5.2	1	100	3300*	2300 (10%-90%)	SO-8/TSSOP-8
MC100ELT28	PECL to TTL & TTL to PECL (Dual)	PECL to TTL & TTL to PECL (Dual)	5	2	100	3500 PECL-to-TTL/ 1200 TTL-to-PECL	1500	SO-8/TSSOP-8
MC100EP90	LVNECL/NECL	LVPECL/PECL	0.66	3	>3000	260	180	SO-20
MC100EPT20	LVTTTL/LVCMOS	LVPECL	3.3	1	>1000	370	180	SO-8/TSSOP-8
MC100EPT21	LVPECL	LVTTTL	3.3	1	350	1400	600/900 (0.8-2.0 V)	SO-8/TSSOP-8
MC100EPT22	LVTTTL/LVCMOS	LVPECL	3.3	2	1100	420	220	SO-8/TSSOP-8
MC100EPT23	LVPECL	LVTTTL	3.3	2	350	1500	600/900 (0.8-2.0 V)	SO-8/TSSOP-8
MC100EPT24	LVTTTL/LVCMOS	LVPECL	3.3	1	>1000	530	180	SO-8/TSSOP-8
MC100EPT25	LVNECL/NECL	LVTTTL	3.3/-3.3 to -5.2	1	275	1100	1100/1400 (0.8-2.0 V)	SO-8/TSSOP-8
MC100EPT26	LVPECL	LVTTTL	3.3	1	275	1500	900	SO-8/TSSOP-8
MC100EPT622	LVTTTL/LVCMOS	PECL (10-Bit)	3.3	1	1500	450	250	LQFP-32
MC100LVEL90	LVNECL/NECL	LVPECL	0.66	3	650	500	500	SO-20
MC100LVEL91	LVPECL/PECL	LVNECL	3.3/5	3	600	620	580	
MC100LVEL92	PECL	LVPECL	3.3/5	3	600	610	580	SO-20
MC100LVELT22	LVTTTL/LVCMOS	LVPECL	3.3	2	100 MHz (min)*	350	500	SO-8/TSSOP-8
MC100LVELT23	LVPECL	LVTTTL	3.3	2	>180	1700	600/900 (0.8-2.0 V)	SO-8/TSSOP-8
MC100ELT20	TTL	PECL	5	1	100 MHz (min)*	1200	1500	SO-8/TSSOP-8
MC100ELT21	PECL	TTL	5	1	TBD	5500	750 (10%-90%)	SO-8/TSSOP-8
MC100LVELT20	LVTTTL/LVCMOS	LVPECL	3.3	1	800	390	225	SO-8

SIGNAL TRANSLATORS (continued) (Specifications are at 25°C unless otherwise stated)

Device(s)	From	To	Voltage	# of Channels	Freq. (Typ) MHz	Prop. Delay (Typ) ps	Tr & Tf (Max) ps	Package
MC10ELT22	TTL	PECL	5	2	100MHz (min)*	1200	1600	SO-8/TSSOP-8
MC10ELT24	TTL	NECL	5	1	400	950	1250	SO-8/TSSOP-8
MC10ELT25	NECL	TTL	5/-5.2	1	100	3300*	2300 (10%-90%)	SO-8/TSSOP-8
MC10ELT28	PECL to TTL & TTL to PECL (Dual)	PECL to TTL & TTL to PECL (Dual)	5	2	100	3500 PECL-to-TTL/ 1200 TTL-to-PECL	1500	SO-8/TSSOP-8
MC10EP90	LVNECL/NECL	LVPECL/PECL	0.66	3	>3000	260	180	SO-20
MC10EPT20	LVTTTL/LVCMOS	LVPECL	3.3	1	>1000	370	180	SO-8/TSSOP-8
NB100ELT23L	LVPECL	LVTTTL	3.3	2	275	2.1	1300	SO-8/TSSOP-8
NB100LVEP91	LVPECL/LVTTTL/ LVCMOS/HSTL/ CML/LVDS	LVNECL/NECL	2.5/3.3	3	2500	430	85 (typ)	SO-20, QFN-24
*NB4N5275	LVPECL/LVTTTL/ LVCMOS/HSTL/ CML/LVDS	LVDS	3.3	2	1250	500	300	QFN-16
*NB4N8555	LVPECL/LVTTTL/ LVCMOS/HSTL/ CML/LVDS	LVDS	3.3	2	1000	490	180	Micro10

*Duplicate in Receiver/Driver category.

CROSSPOINT SWITCHES

Device(s)	From	To	Voltage	# of Inputs	# of Outputs	Freq. (Typ) MHz	Prop. Delay (Typ) ps	Tr & Tf (Max) ps	Package
NB4L858M	LVPECL/CML	CML	2.5/3.3	2+2	2+2	3000	350	80	LQFP-32
NB4N840M	LVPECL/CML	CML	3.3	2+2	2+2	2700	225	80	QFN-32
NBSG72A	Any Level	LVPECL (w/o LS)	2.5/3.3	2	2	7000	200	55	QFN-16

ON Semiconductor Selector Guide – Clock and Data Management Devices

CLOCK FAN-OUT (Specifications are at 25°C unless otherwise stated)

Device(s)	Input Clock	Output Clock	Voltage	# of Input Channels	# of Outputs per Channel	Frequency (Typ) GHz	Output-to-Output Skew (Max) ps	Cycle-to-Cycle Jitter (Typ/Max) ps	Tr & Tf (Max) ps	Package
MC100E111	ECL/PECL	ECL/PECL	5	1	9	>1.5	50	0.2	600	PLCC-28
MC100E210	ECL/PECL	ECL/PECL	5	2	4/5	0.7	75	0.2	600	PLCC-28
MC100E211	ECL/PECL	ECL/PECL	5	1	6	>1.5	75	0.2	400	PLCC-28
MC100E310	ECL/PECL	ECL/PECL	5	1	8	1	50	0.2	600	PLCC-28
MC100EL11	ECL/PECL	ECL/PECL	5	1	2	2	5	0.2	350	SO-8, TSSOP-8
MC100EL13	ECL/PECL	ECL/PECL	5	2	3	1	50	0.2	500	SO-20
MC100EL14	ECL/PECL	ECL/PECL	5	1	5	1	50	0.2	500	SO-8, TSSOP-8
MC100EL15	ECL/PECL	ECL/PECL	5	1	4	1	50	0.2	575	SO-16
MC100EP11	ECL/PECL	ECL/PECL	3.3/5	1	2	>3	20	0.2	180	SO-8, TSSOP-8
MC100EP14	ECL/PECL/HSTL	ECL/PECL	3.3/5	1	5	>2	45	0.2	270	TSSOP-20
MC100EP210S	LVDS/PECL	LVDS	3.3	2	5	>1	20	0.2	225	LQFP-32
MC100EP809	ECL/PECL/HSTL	HSTL	3.3	1	9	>0.75	15	1.4	600	LQFP-32
MC100LVE111	ECL/PECL	ECL/PECL	3.3	1	9	>1.5	20	0.2	600	PLCC-28
MC100LVE210	ECL/PECL	ECL/PECL	3.3	2	4/5	0.7	75	0.2	600	PLCC-28
MC100LVE310	ECL/PECL	ECL/PECL	3.3	1	8	1.5	50	0.2	600	PLCC-28
MC100LVEL11	ECL/PECL	ECL/PECL	3.3	1	2	>3	20	0.2	180	SO-8, TSSOP-8
MC100LVEL13	ECL/PECL	ECL/PECL	3.3	2	3	1	50	0.2	500	SO-20
MC100LVEL14	ECL/PECL	ECL/PECL	3.3	1	5	>1	50	0.2	500	SOIC-20
MC100LVEP11	ECL/PECL	ECL/PECL	2.5/3.3	1	2	>3	20	0.2	180	SO-8, TSSOP-8
MC100LVEP111	ECL/PECL	ECL/PECL	2.5/3.3	1	10	>3	25	0.2	150	LQFP-32, QFN-32
MC100LVEP14	ECL/PECL/HSTL	ECL/PECL	2.5/3.3	1	5	>2	25	0.2	250	TSSOP-20
MC100LVEP210	ECL/PECL/HSTL	ECL/PECL	2.5/3.3	2	5	>3	20	0.2	270	LQFP-32
MC10E111	ECL/PECL	ECL/PECL	5	1	9	>1.5	50	0.2	600	PLCC-28
MC10E211	ECL/PECL	ECL/PECL	5	1	6	>1.5	75	0.2	400	PLCC-28

CLOCK FAN-OUT (continued) (Specifications are at 25°C unless otherwise stated)

Device(s)	Input Clock	Output Clock	Voltage	# of Input Channels	# of Outputs per Channel	Frequency (Typ) GHz	Output-to-Output Skew (Max) ps	Cycle-to-Cycle Jitter (Typ/Max) ps	Tr & Tf (Max) ps	Package
MC10E411	ECL/PECL	ECL/PECL	5	1	9	1	50	0.2	600	PLCC-28
MC10EL11	ECL/PECL	ECL/PECL	5	1	2	2	5	0.2	350	SO-8, TSSOP-8
MC10EL15	ECL/PECL	ECL/PECL	5	1	4	1	50	0.2	575	SO-16
MC10EP11	ECL/PECL	ECL/PECL	3.3/5	1	2	>3	20	0.2	180	SO-8, TSSOP-8
MC10LVEP11	ECL/PECL	ECL/PECL	2.5/3.3	1	2	>3	20	0.2	180	SO-8, TSSOP-8
NB100EP223	ECL/PECL/HSTL	HSTL	3.3	1	22	>0.5	25	0.2	700	LQFP-64
NB100LVEP221	ECL/PECL/HSTL	ECL/PECL	2.5/3.3	1	20	>1	20	0.2	200 (typ)	LQFP-52
NB100LVEP224	ECL/PECL	ECL/PECL	2.5/3.3	1	24	>1	15	0.2	160 (min)	LQFP-64
NBSG11	ECL/TTL/CMOS/ CML/LVDS	RSPECL/RSECL	2.5/3.3	1	2	>12	15	0.5	30	FCBGA-16
NBSG111	ECL/PECL/TTL/ CMOS/CML/LVDS	RSPECL/RSECL	2.5/3.3	1	10	>6	15 (typ)	0.2	40 (typ)	FCBGA-14
NBSG14	ECL/PECL/TTL/ CMOS/CML/LVDS	RSPECL/RSECL	2.5/3.3	1	5	12	15	0.5	55	FCBGA-16
NB6L11	LVPECL, LVDS, CML, LVCMOS or LVTTL	LVECL/LVPECL	2.5, 3.3	1	2	>6	15	0.2	120	SO-8, TSSOP-8
NB7L11M	ECL/TTL/ CMOS/CML/LVDS	CML	2.5/3.3	1	2	>8	15	0.2	60	QFN-16
NB7L14M	ECL/TTL/ CMOS/CML/LVDS	CML	2.5/3.3	1	5	>8	15	0.2	60	QFN-16
NB7L111M	ECL/TTL/ CMOS/CML/LVDS	CML	2.5/3.3	1	10	>5.5	20	0.2	75	QFN-52
NB4N11S	ECL/TTL/ CMOS/CML/LVDS	LVDS	3.3	1	2	2.0	25	0.5	170	QFN-16
NB4N11M	ECL/TTL/ CMOS/CML/LVDS	CML	3.3	1	2	2.5	25	1	300	TSSOP-8

ON Semiconductor Selector Guide – Clock and Data Management Devices

CLOCK DIVIDERS (Specifications are at 25°C unless otherwise stated)

Device(s)	Output	Frequency Division	# of Channels	Outputs per Bank	Voltage	Frequency (Typ) GHz	Propagation Delay (Typ) ps	Cycle-to-Cycle Jitter (Typ/Max) ps	Tr & Tf (Max) ps	Package
MC100EL32	ECL/PECL	Div2	1	1	5	>3	510	0.2 / 1.0	350	SO-8, TSSOP-8
MC100EL33	ECL/PECL	Div4	1	1	5	>4	650	1.0 (typ)	350	SO-8, TSSOP-8
MC100EL34	ECL/PECL	Div2, Div4, Div8	1	1+1+1	5	1.1	1000	<1 (typ)	525	SO-16
MC100EL38	ECL/PECL	Div2, Div4/6	1	2+2	5	1	900	0.2 / 1.0	550	SO-20
MC100EL39	ECL/PECL	Div2/4, Div4/6	1	2+2	5	1	900	0.2 / 1.0	550	SO-20
MC100EP139	ECL/PECL	Div2/4, Div4/5/6	1	2+2	3.3/5	>1	750	0.2 / 1.0	275	SO-20, TSSOP-20
MC100EP32	ECL/PECL	Div2	1	1	3.3/5	>4	350	0.2 / 1.0	170	SO-8, TSSOP-8, DFN-8
MC100EP33	ECL/PECL	Div4	1	1	3.3/5	>4	320	0.2 / 1.0	180	SO-8, TSSOP-8
MC100LVE222	ECL/PECL	1:15 Diff, Div1, Div2	2	15	3.3	1.5	1180	0.2 / 1.0	600	TQFP-52
MC100LVEL32	ECL/PECL	Div2	1	1	3.3	>2.6	510	0.2 / 1.0	320	SO-8, TSSOP-8
MC100LVEL33	ECL/PECL	Div4	1	1	3.3	>4	630	0.2 / 1.0	320	SO-8, TSSOP-8
MC100LVEL34	ECL/PECL	Div2, Div4, Div8	1	1+1+1	3.3	1.5	700	<1 (typ)	250	SO-16, TSSOP-16
MC100LVEL37	ECL/PECL	Div1 Div2	2	2+2	3.3	1	700	0.2 / 1.0	550	SO-20
MC100LVEL38	ECL/PECL	Div2 Div4/6	1	2+2	3.3	1	900	0.2 / 1.0	550	SO-20
MC100LVEL39	ECL/PECL	Div2/4, Div4/6	1	2+2	3.3	1	900	0.2 / 1.0	550	SO-20
MC100LVEP34	ECL/PECL	Div2, Div4, Div8	1	1+1+1	3.3	2.8	700	<1 (typ)	250	SO-16
MC10EL32	ECL/PECL	Div2	1	1	5	>3	510	0.2 / 1.0	350	SO-8, TSSOP-8
MC10EL33	ECL/PECL	Div4	1	1	5	>4	650	1.0 (typ)	350	SO-8, TSSOP-8
MC10EL34	ECL/PECL	Div2, Div4, Div8	1	1+1+1	5	1.1	1000	<1 (typ)	525	SO-16
MC10EP139	ECL/PECL	Div2/4, Div4/5/6	1	2+2	3.3/5	>1	750	0.2 / 1.0	275	SO-20, TSSOP-20
MC10EP32	ECL/PECL	Div2	1	1	3.3/5	>4	350	0.2 / 1.0	170	SO-8, TSSOP-8

CLOCK DIVIDERS (continued) (Specifications are at 25°C unless otherwise stated)

Device(s)	Output	Frequency Division	# of Channels	Outputs per Bank	Voltage	Frequency (Typ) GHz	Propagation Delay (Typ) ps	Cycle-to-Cycle Jitter (Typ/Max) ps	Tr & Tf (Max) ps	Package
MC10EP33	ECL/PECL	Div4	1	1	3.3/5	>4	320	0.2 / 1.0	180	SO-8, TSSOP-8
NB100LVEP222	ECL/PECL	1:15 Diff, Div1, Div2	2	15	2.5/3.3	1	875	0.2 / 1.0	160 (typ)	LQFP-52
NBSG53A	RSECL	Div1, Div2	2	1	2.5/3.3	>8	210	0.5 / 1.0	60	FCBGA-16
NB6L239	PECL	1/2/4/8, 2/4/8/16	2	1	2.5, 3.3	3	470	0.2 / 1.0	120	QFN-16
NB6N239S	LVDS	1/2/4/8, 2/4/8/16	2	1	3.3	3	470	0.2 / 1.0	120	QFN-16
NB7N017M	CML	Dual 8-Bit Modulus	1	1	3.3	3.5	500	3.0	65	QFN-52
NB7L32M	CML	Div2	1	1	2.5/3.3	14	200	<0.5	30	QFN-16

SKEW MANAGEMENT (Specifications are at 25°C unless otherwise stated)

Device(s)	Voltage	Frequency (Typ) GHz	Min Programmable Delay (Typ) ns	Max Programmable Delay (Typ) ns	Step Delay Resolution (Typ) ps	Cycle-to-Cycle Jitter (Max) ps	Tr & Tf (Max) ps	Package
MC100E195	5	>1	2.05	2.6	20	<5	325	PLCC-28
MC100E196 ¹	5	>1	2.05	2.6	20	<5	325	PLCC-28
MC100EP195	3.3/5	>2.5	2.2	12.2	10	0.2 / 1.0	300	LQFP-32
MC100EP196 ²	3.3/5	>1.8	2.2	12.2	10	0.2 / 1.0	210	LQFP32
MC10E195	5	>1	2.05	2.6	20	<5	325	PLCC-28
MC10E196 ¹	5	>1	2.05	2.6	20	<5	325	PLCC-28
MC10EP195	3.3/5	>2.5	2.2	12.2	10	0.2 / 1.0	300	LQFP-32
MC10EP196 ²	3.3/5	>1.8	2.2	12.2	10	0.2 / 1.0	210	LQFP32

SPECIAL NOTES/FEATURES:

¹ FTUNE input provides < 20 pS resolution control.

² FTUNE input provides 0 to 60 pS programmable resolution control.

ON Semiconductor Selector Guide – Clock and Data Management Devices

PRESCALERS (Specifications are at 25°C unless otherwise stated)

Device(s)	Frequency Division	Voltage	Supply Current (I _{cc} -Max) mA	Frequency (Max) GHz	Supply Current Un-loaded (Typ) mA	Input Voltage Sensitivity Min/Max (mV p-p)	Package
MC12026A	Div8/9 or Div16/17	5	5.3	1.1	4	100 / 1000	SO-8
MC12080	Div10, Div20, Div40, Div80	5	5	1.1	3.7	100 / 1000	SO-8
MC12093	Div2, Div4, Div8	3.3/5	4.5	1.1	3	100 / 1000	SO-8
MC12095	Div2, Div4, Div8	3.3/5	14	2.5	3	200 / 1000	SO-8

CLOCK SYNTHESIZERS (Specifications are at 25°C unless otherwise stated)

Device(s)	V _{CC} (Typ) V	Min Output Freq. (MHz)	Max Output Freq. (MHz)	Max Input Freq. XTAL (MHz)	t _{jitter} (+-ps)	Min Output Rise/Fall (ps)	Temperature Rating	Package
NBC12429	3.3, 5	25	400	20	20	300	0 to 70°C	28-PLCC, 32-LQFP
NBC12430	3.3, 5	50	800	20	20	175	0 to 70°C	28-PLCC, 32-LQFP
NBC12439	3.3, 5	50	800	20	25	300	0 to 70°C	28-PLCC, 32-LQFP
NBC12429A	3.3, 5	25	400	20	20	300	-40 to 85°C	28-PLCC, 32-LQFP, QFN-32
NBC12430A	3.3, 5	50	800	20	20	175	-40 to 85°C	28-PLCC, 32-LQFP, QFN-32
NBC12439A	3.3, 5	50	800	20	25	300	-40 to 85°C	28-PLCC, 32-LQFP, QFN-32
NB4N507A	3.3, 5	50	200	27	10	50	-40 to 85°C	SOIC-16

ZERO DELAY BUFFERS (Specifications are at 25°C unless otherwise stated)

Device(s)	Outputs Per Device	V _{DD} Typ (V)	tskew (O-O) Max (ps)	F Max (MHz)	t _{Jitter} Max (ps)	Package
NB2304AC1D	4	3.3	200	133.3	100	SOIC-8
NB2304AI1D	4	3.3	200	133.3	100	SOIC-8
NB2304AC1HD	4	3.3	200	133.3	100	SOIC-8
NB2304AI1HD	4	3.3	200	133.3	100	SOIC-8
NB2304AC2D	4	3.3	200	133.3	100	SOIC-8
NB2304AI2D	4	3.3	200	133.3	100	SOIC-8
NB2305AC1D	5	3.3	250	133.3	200	SOIC-8
NB2305AI1D	5	3.3	250	133.3	200	SOIC-8
NB2305AC1DT	5	3.3	250	133.3	200	TSSOP-8
NB2305AI1DT	5	3.3	250	133.3	200	TSSOP-8
NB2305AC1HD	5	3.3	250	133.3	200	SOIC-8
NB2305AI1HD	5	3.3	250	133.3	200	SOIC-8
NB2305AC1HDT	5	3.3	250	133.3	200	TSSOP-8
NB2305AI1HDT	5	3.3	250	133.3	200	TSSOP-8
NB2308AC1D	8	3.3	200	133.3	100	SOIC-16
NB2308AI1D	8	3.3	200	133.3	100	SOIC-16
NB2308AC1DT	8	3.3	200	133.3	100	TSSOP-16
NB2308AI1DT	8	3.3	200	133.3	100	TSSOP-16
NB2308AC1HD	8	3.3	200	133.3	100	SOIC-16
NB2308AI1HD	8	3.3	200	133.3	100	SOIC-16
NB2308AC1HDT	8	3.3	200	133.3	100	TSSOP-16
NB2308AI1HDT	8	3.3	200	133.3	100	TSSOP-16
NB2308AC2D	8	3.3	200	133.3	100	SOIC-16
NB2308AI2D	8	3.3	200	133.3	100	SOIC-16
NB2308AC2DT	8	3.3	200	133.3	100	TSSOP-16
NB2308AI2DT	8	3.3	200	133.3	100	TSSOP-16
NB2308AC3D	8	3.3	200	133.3	100	SOIC-16

ON Semiconductor Selector Guide – Clock and Data Management Devices

ZERO DELAY BUFFERS (continued) (Specifications are at 25°C unless otherwise stated)

Device(s)	Outputs Per Device	V _{DD} Typ (V)	tskew (O–O) Max (ps)	F Max (MHz)	t _{Jitter} Max (ps)	Package
NB2308AI3D	8	3.3	200	133.3	100	SOIC–16
NB2308AC3DT	8	3.3	200	133.3	100	TSSOP–16
NB2308AI3DT	8	3.3	200	133.3	100	TSSOP–16
NB2308AC4D	8	3.3	200	133.3	100	SOIC–16
NB2308AI4D	8	3.3	200	133.3	100	SOIC–16
NB2308AC4DT	8	3.3	200	133.3	100	TSSOP–16
NB2308AI4DT	8	3.3	200	133.3	100	TSSOP–16
NB2308AC5HD	8	3.3	200	133.3	100	SOIC–16
NB2308AI5HD	8	3.3	200	133.3	100	SOIC–16
NB2308AC5HDT	8	3.3	200	133.3	100	TSSOP–16
NB2308AI5HDT	8	3.3	200	133.3	100	TSSOP–16
NB2309AC1D	9	3.3	250	133.3	200	SOIC–16
NB2309AI1D	9	3.3	250	133.3	200	SOIC–16
NB2309AC1DT	9	3.3	250	133.3	200	SOIC–16
NB2309AI1DT	9	3.3	250	133.3	200	TSSOP–16
NB2309AC1HD	9	3.3	250	133.3	200	SOIC–16
NB2309AI1HD	9	3.3	250	133.3	200	SOIC–16
NB2309AC1HDT	9	3.3	250	133.3	200	TSSOP–16
NB2309AI1HDT	9	3.3	250	133.3	200	TSSOP–16

EMI SUPPRESSION CLOCKS (Specifications are at 25°C unless otherwise stated) 133.3

Device(s)	V _{DD} Typ (V)	Modulation	F Max (MHz)	Duty Cycle	tR & tF Max (ps)	Package
NB2579A	3.3	± 1%	40	50	1100	TSSOP-6
NB2669A	3.3	± 1%	12	50	1100	TSSOP-6
NB2760A	3.3	± 0.75%	12	50	1100	TSSOP-6
NB2762A	3.3	- 1.25%	12	50	1100	TSSOP-6
NB2769A	3.3	± 1%	12	50	1100	TSSOP-6
NB2779A	3.3	± 1%	30	50	1100	TSSOP-6
NB2780A	3.3	± 0.75%	50	50	1100	TSSOP-6
NB2869A	3.3	± 1%	12	50	1100	TSSOP-6
NB2870A	3.3	± 0.75%	30	50	1100	TSSOP-6
NB2872A	3.3	- 1.25%	30	50	1100	TSSOP-6
NB2879A	3.3	± 1%	30	50	1100	TSSOP-6
NB2969A	3.3	± 1%	12	50	1100	TSSOP-6

VCO (PLL) (Specifications are at 25°C unless otherwise stated)

Device(s)	Frequency (Max) GHz	Voltage	Duty Cycle (Typ) %	SNR from Carrier (dB)	Package
MC100EL1648	1.1	5	50	40	SOIC-8, TSSOP-8, SOIC EIAJ-14

PHASE/FREQUENCY DETECTORS (Specifications are at 25°C unless otherwise stated)

Device(s)	Voltage	Transfer Gain mV/Degree	Vref & FB Inputs (S.E./Diff.)	Frequency (Typ) GHz	Propagation Delay (Typ) ps	Cycle-to-Cycle Jitter (Typ) ps	Tr & Tf (Max) ps	Package
MC100LVEL40	3.3/5	2	Diff	0.25	1350	0.2 / 1.0	475	SO-20
MC100EP40	3.3/5	0.93	Diff	>2	550	0.2 / 1.0	150	TSSOP-20
MC100EP140	3.3	1.2073	S.E.	>2	475	0.2 / 1.0	200	SO-8
MCH12140	3.3, 5	N/A	S.E.	800	0.44	N/A	350	SOIC 8
MCK12140	3.3, 5	N/A	S.E.	800	0.44	N/A	350	SOIC 8

ON Semiconductor Selector Guide – Clock and Data Management Devices

FLIP–FLOPS (Specifications are at 25°C unless otherwise stated)

Device(s)	Description	Voltage	Freq. (Typ) GHz	Prop. Delay (Typ) ps	Setup Time (Min) ps	Hold Time (Min) ps	Set/ Reset Recovery (Min) ps	Jitter (Typ) ps RMS	Tr & Tf (Max) ps	Package
MC100E131	3.3/5 V ECL Quad D Flip–Flop with Set, Reset and Differential Clock	5	1.1	500	150	175	290	1	480	LQFP–32
MC100E431	5 V ECL Triple Differential Data and Clock D Flip–Flop with Edge Triggered Set and Reset	5	1.1	600	200	200	400	<1	650	PLCC–28
MC100EL29	5 V ECL Dual Differential Data and Clock D Flip–Flop with Set and Reset	5	1.1	580	0	100	100	<1	550	SO–20
MC100EL30	5 V ECL Triple D Flip Flop with Set and Reset	5	1.2	450	150	200	400	<1	550	SO–20
MC100EL31	5 V ECL D Flip–Flop with Set and Reset	5	2.8	475	150	250	400	<1	350	SO–8, TSSOP–8
MC100EL35	5 V ECL JK Flip Flop	5	2.2	525	150	250	400	<1	350	SO–8, TSSOP–8
MC100EL51	5 V ECL Differential D Flip–Flop	3.3/5	2.8	475	150	250	400	<1	350	SO–8, TSSOP–8
MC100EL52	5 V Differential Data and Clock D Flip–Flop	5	2.8	365	125	150	N/A	<1	350	SO–8, TSSOP–8
MC100EP131	3.3/5 V ECL Quad D Flip–Flop with Set, Reset and Differential Clock	3.3/5	>3	460	120	120	290	0.2	290	LQFP–32
MC100EP29	3.3/5 V ECL Dual Differential Data and Clock D Flip–Flop with Set and Reset	3.3/5	3	420	100	100	150	0.2	300	TSSOP–20
MC100EP31	3.3/5 V ECL D Flip–Flop with Set and Reset	3.3/5	>3	340	100	150	225	0.2	200	SO–8, TSSOP–8
MC100EP35	3.3/5 V ECL JK Flip Flop	3.3/5	>3	410	150	150	150	0.2	180	SO–8, TSSOP–8
MC100EP51	3.3/5 V ECL Differential Data and Clock D Flip–Flop	3.3	>3	375	100	100	150	0.2	180	SO–8, TSSOP–8
MC100EP52	3.3/5 V Differential Data and Clock D Flip–Flop	3.3/5	>4	330	50	0	N/A	0.2	180	SO–8, TSSOP–8
MC100LVEL29	3.3 V ECL Dual Differential Data and Clock D Flip–Flop with Set and Reset	3.3	1.1	580	0	100	100	<1	550	SO–20
MC100LVEL30	3.3 V ECL Triple D Flip Flop with Set and Reset	5	1.2	450	150	200	400	<1	550	SO–20
MC100LVEL31	3.3 V ECL D Flip–Flop with Set & Reset	3.3	2.9 (min)	475	150	250	400	<1	320	SO–8, TSSOP–8

FLIP–FLOPS (continued) (Specifications are at 25°C unless otherwise stated)

Device(s)	Description	Voltage	Freq. (Typ) GHz	Prop. Delay (Typ) ps	Setup Time (Min) ps	Hold Time (Min) ps	Set/ Reset Recovery (Min) ps	Jitter (Typ) ps RMS	Tr & Tf (Max) ps	Package
MC100LVEL51	3.3 V ECL Differential D Flip–Flop	3.3	2.8	475	150	250	350	<1	320	SO–8, TSSOP–8
MC10E131	5 V ECL Quad Differential Data and S.E. Clock D Flip–Flop with Edge Triggered Set and Reset	5	1.1	500	150	175	400	<1	480 (typ)	PLCC–28
MC10E431	5 V ECL Triple Differential Data and Clock D Flip–Flop with Edge Triggered Set and Reset	5	1.1	600	200	200	400	<1	650	PLCC–28
MC10EL30	5 V ECL Triple D Flip Flop with Set and Reset	5	1.2	450	150	200	400	<1	550	SO–20
MC10EL31	5 V ECL D Flip–Flop with Set and Reset	5	2.8	475	150	250	400	<1	350	SO–8, TSSOP–8
MC10EL35	5 V ECL JK Flip Flop	5	2.2	525	150	250	400	<1	350	SO–8, TSSOP–8
MC10EL51	5 V ECL Differential D Flip–Flop	3.3/5	2.8	475	150	250	400	<1	350	SO–8, TSSOP–8
MC10EL52	5 V Differential Data and Clock D Flip–Flop	5	2.8	365	125	150	N/A	<1	350	SO–8, TSSOP–8
MC10EP29	3.3/5 V ECL Dual Differential Data and Clock D Flip–Flop with Set and Reset	3.3/5	3	420	100	100	150	0.2	300	TSSOP–20
MC10EP131	3.3/5 V ECL Quad D Flip–Flop with Set, Reset and Differential Clock	3.3/5	>3	460	120	120	290	0.2	290	LQFP–32
MC10EP31	3.3/5 V ECL D Flip–Flop with Set and Reset	3.3/5	>3	340	100	150	225	0.2	200	SO–8, TSSOP–8
MC10EP35	3.3/5 V ECL JK Flip Flop	3.3/5	>3	410	150	150	150	0.2	180	SO–8, TSSOP–8
MC10EP51	3.3/5 V ECL Differential Data and Clock D Flip–Flop	3.3	>3	375	100	100	150	0.2	180	SO–8, TSSOP–8
MC10EP52	3.3/5 V Differential Data and Clock D Flip–Flop	3.3/5	>4	330	50	0	N/A	<1	180	SO–8, TSSOP–8
NB4L52	2.5 to 5.5 V ECL D–Flip–Flop with Differential Reset and Input Termination	2.5/3.3/5	>4	330	145	50	100	<1	190	QFN–16

ON Semiconductor Selector Guide – Clock and Data Management Devices

LATCHES (Specifications are at 25°C unless otherwise stated)

Device(s)	Description	Voltage	Freq. (Typ) GHz	Prop. Delay (Typ) ps	Setup Time (Min) ps	Hold Time (Min) ps	Set/Reset Recovery (Min) ps	Tr & Tf (Max) ps	Package
MC10E150	5 V ECL 6-Bit D Latch	5	>1	800	200	200	750	450	PLCC-28
MC10E151	5 V ECL 6-Bit Register	5	1.1	650	150	350	750	450	PLCC-28
MC100E150	5 V ECL 6-Bit D Latch	5	>1	800	200	200	750	450	PLCC-28
MC100E151	5 V ECL 6-Bit Register	5	1.1	650	150	350	750	450	PLCC-28
MC10E175	5 V ECL 9-Bit Latch With Parity	5	>1	600	275	175	850	800	PLCC-28
MC100E175	5 V ECL 9-Bit Latch With Parity	5	>1	600	275	175	850	800	PLCC-28
MC10E154	5 V ECL 5-Bit 2:1 Mux-Latch	5	>1	500	300	300	800	800	PLCC-28
MC10E155	5 V ECL 6-Bit 2:1 Mux-Latch	5	>1	500	300	300	800	800	PLCC-28
MC10E156	5 V ECL 3-Bit 4:1 Mux-Latch	5	>1	600	400	300	800	700	PLCC-28
MC100E154	5 V ECL 5-Bit 2:1 Mux-Latch	5	>1	500	300	300	800	800	PLCC-28
MC100E155	5 V ECL 6-Bit 2:1 Mux-Latch	5	>1	500	300	300	800	800	PLCC-28
MC100E156	5 V ECL 3-Bit 4:1 Mux-Latch	5	>1	600	400	300	800	700	PLCC-28

SHIFT REGISTERS (Specifications are at 25°C unless otherwise stated)

Device(s)	Description	Voltage	# of Bits	Clock Source	Freq. (Typ) GHz	Prop. Delay (Typ) ps	Setup Time (Min) ps	Hold Time (Min) ps	Set/Reset Recovery (Min) ps	Jitter (Typ) ps RMS	Tr & Tf (Max) ps	Package
MC100E141	5 V ECL 8–Bit Shift Register	5	8	S.E.	0.9	750	175	200	900	<1	800	PLCC–28
MC100E142	5 V ECL 9–Bit Shift Register	5	9	Dual S.E. (OR'ed)	0.9	800	50	300	900	<1	800	PLCC–28
MC100E143	5 V ECL 9–Bit Hold Register	5	S.E.	Dual (OR'ed)	>1	800	50	300	900	<1	800	PLCC–28
MC100E151	5 V ECL 6–Bit Register	5	S.E.	Dual (OR'ed)	1.1	650	150	350	750	<1	450	PLCC–28
MC100E212	5 V ECL 3–Bit Scannable Registered Address Driver	5	3	S.E.	0.9	800	175	250	600	<1	600	PLCC–28
MC100E241	5 V ECL 8–Bit Scannable Register	5	8	S.E.	0.9	750	175	200	900	<1	800	PLCC–28
MC100E451	5 V ECL 6–Bit D Register with Differential Data and Clock Inputs	5	Diff.	Diff.	1.1	650	150	350	750	<1	800	PLCC–28
MC100E452	5 V ECL 5–Bit Differential Register	5	Diff.	Diff.	1.1	600	175	225	750	<1	650	PLCC–28
MC100EP131	3.3/5 V ECL Quad D Flip–Flop with Set, Reset and Differential Clock	3.3/5	S.E.	Diff.	>3	460	120	120	290	0.2	290	LOFP–32
MC100EP142	5 V ECL 9–Bit Shift Register	3.3/5	9	Dual Diff. (OR'ed)	3.4	675	50	100	800	1	275	LOFP–32
MC100EP451	3.3/5 V ECL 6–Bit D Register with Differential Data and Clock Inputs	3.3/5	Diff.	Diff.	>3	450	80	80	250	0.2	260	LOFP–32
MC10E141	5 V ECL 8–Bit Shift Register	5	8	S.E.	0.9	750	175	200	900	<1	800	PLCC–28
MC10E142	5 V ECL 9–Bit Shift Register	5	9	Dual S.E. (OR'ed)	0.9	800	50	300	900	<1	800	PLCC–28
MC10E143	5 V ECL 9–Bit Hold Register	5	S.E.	Dual (OR'ed)	>1	800	50	300	900	<1	800	PLCC–28
MC10E151	5 V ECL 6–Bit Register	5	S.E.	Dual (OR'ed)	1.1	650	150	350	750	<1	450	PLCC–28
MC10E451	5 V ECL 6–Bit D Register with Differential Data and Clock Inputs	5	Diff.	Diff.	1.1	650	150	350	750	<1	800	PLCC–28
MC10E452	5 V ECL 5–Bit Differential Register	5	Diff.	Diff.	1.1	600	175	225	750	<1	650	PLCC–28
MC10EP142	5 V ECL 9–Bit Shift Register	3.3/5	9	Dual Diff. (OR'ed)	3.4	675	50	100	800	1	275	LOFP–32
MC10EP451	3.3/5 V ECL 6–Bit D Register with Differential Data and Clock Inputs	3.3/5	Diff.	Diff.	>3	450	80	80	250	0.2	260	LOFP–32
MC10H141	4–Bit Universal Shift Register	5	4	S.E.	0.25	1500	1500	1000	N/A	N/A	2400	PLCC–20, PDIP–16

ON Semiconductor Selector Guide – Clock and Data Management Devices

MULTIPLEXERS (Specifications are at 25°C unless otherwise stated)

Device(s)	Voltage	Mux Radio	# of Muxes	Data Path	Freq. (Typ) GHz	Prop. Delay (Typ) ps	Within Device Skew (Max) ps	Jitter (Typ) ps RMS	Tr/Tf (Max) ps	Package
MC100E157	5	2:1	4	S.E.	>1	380	70	<1	650	PLCC-28
MC100E158	5	2:1	5	S.E.	>1	385	60	<1	650	PLCC-28
MC100E163	5	8:1	2	S.E.	>1	550	40	<1	575	PLCC-28
MC100E164	5	16:1	1	S.E.	>1	600	50 (typ)	<1	550	PLCC-28
MC100E167	5	2:1	6	S.E.	1	650	75	<1	800	PLCC-28
MC100E171	5	4:1	3	S.E.	>1	480	60 (typ)	<1	650	PLCC-28
MC100E256	5	4:1	3	S.E.	>1	600	50	<1	700	PLCC-28
MC100E457	5	2:1	3	Diff.	>1	475	40	<1	500	PLCC-28
MC100EL56	3.3	2:1	2	Diff.	>1	440	80	<1	540	SO-20
MC100EL57	5	4:1	1	Diff.	>1	560	100	<1	375	SO-16
MC100EL58	5	2:1	1	S.E.	1.5	230	N/A	<1	350	SO-8
MC100EL59	5	2:1	3	S.E.	>1	500	100	<1	540	SO-20
MC100EP56	3.3/5	2:1	2	Diff.	>3	360	100	0.2	180	SO-20
MC100EP57	3.3/5	4:1	1	Diff.	>3	475	200	0.2	200	TSSOP-20
MC100EP58	3.3/5	2:1	1	S.E.	>3	310	N/A	0.2	180	SO-8
MC100LVE164	3.3	16:1	1	S.E.	>1	600	50	<1	550	TQFP-32
MC100LVEL56	3.3	2:1	2	Diff.	>1	440	80	<3 (typ)	540	SO-20
MC100LVEL58	3.3	2:1	1	S.E.	1.5	440	N/A	<1	320	SO-8
MC100LVEL59	3.3	2:1	3	S.E.	>1	500	100	<1	540	SO-20
MC10E154	5	2:1	5	S.E.	>1	500	50	<1	800	PLCC-28
MC10E155	5	2:1	6	S.E.	>1	500	75	<1	800	PLCC-28
MC10E156	5	4:1	3	S.E.	>1	600	50	<1	700	PLCC-28
MC10E157	5	2:1	4	S.E.	>1	380	70	<1	650	PLCC-28
MC10E158	5	2:1	5	S.E.	>1	385	60	<1	650	PLCC-28

MULTIPLEXERS (continued) (Specifications are at 25°C unless otherwise stated)

Device(s)	Voltage	Mux Radio	# of Muxes	Data Path	Freq. (Typ) GHz	Prop. Delay (Typ) ps	Within Device Skew (Max) ps	Jitter (Typ) ps RMS	Tr/Tf (Max) ps	Package
MC10E163	5	8:1	2	S.E.	>1	550	40	<1	575	PLCC-28
MC10E164	5	16:1	1	S.E.	>1	600	50 (typ)	<1	550	PLCC-28
MC10E167	5	2:1	6	S.E.	1	650	75	<1	800	PLCC-28
MC10E171	5	4:1	3	S.E.	>1	480	60 (typ)	<1	650	PLCC-28
MC10E457	5	2:1	3	Diff.	>1	475	40	<1	500	PLCC-28
MC10EL56	3.3	2:1	2	Diff.	>1	440	80	<1	540	SO-20
MC10EL57	5	4:1	1	Diff.	>1	560	100	<1	375	SO-16
MC10EL58	5	2:1	1	S.E.	1.5	230	N/A	<1	350	SO-8
MC10EP56	3.3/5	2:1	2	Diff.	>3	360	100	0.2	180	SO-20
MC10EP57	3.3/5	4:1	1	Diff.	>3	475	200	0.2	200	TSSOP-20
MC10EP58	3.3/5	2:1	1	S.E.	>3	310	N/A	0.2	180	SO-8
MC10LVEL58	3.3	2:1	1	S.E.	1.5	440	N/A	<1	320	SO-8
NB100LVEP56	2.5/3.3/5	2:1	2	Diff.	>2.5	700	650	0.2	170	TSSOP-20, QFN-24
NBSG86A	2.5	2:1	1	Diff.	>8	165	15	0.5	65	FCBGA-16, QFN-16
NB7L86M	2.5/3.3	2:1	1	Diff.	>8	90	10	0.2	60	QFN-16

SERIAL/PARALLEL CONVERTER AND PARALLEL/SERIAL CONVERTERS (Specifications are at 25°C unless otherwise stated)

Device(s)	Description	Voltage	Data Rate (Typ) Gb/s	Prop. Delay (Typ) ps	Setup Time (Typ) ps	Hold Time (Typ) ps	Reset Recovery (Typ) ps	Jitter (Typ) ps RMS	Tr/Tf (Max) ps	Package
MC100E445	5 V ECL 4–Bit Serial/Parallel Converter	5	2.0 (min)	1800	-250	300	300	<1	350	PLCC-28
MC100E446	5 V ECL 4–Bit Parallel/Serial Converter	5	1.6	1200	-450	650	N/A	<1	350	PLCC-28
MC100EP445	3.3/5 V ECL 8–Bit Serial/Parallel Converter	3.3/5	2.5	1300	-400	600	180	0.2	300	LQFP-32
MC100EP446	3.3/5 V ECL 8–Bit Parallel/Serial Converter	3.3/5	3.4	800	-450	-600	N/A	0.2	170	LQFP-32
MC10E445	5 V ECL 4–Bit Serial/Parallel Converter	5	2.0 (min)	1800	-250	300	300	<1	350	PLCC-28
MC10E446	5 V ECL 4–Bit Parallel/Serial Converter	5	1.6	1200	-450	650	N/A	<1	350	PLCC-28
MC10EP445	3.3/5 V ECL 8–Bit Serial/Parallel Converter	3.3/5	2.5	1300	-400	600	180	0.2	300	LQFP-32
MC10EP446	3.3/5 V ECL 8–Bit Parallel/Serial Converter	3.3/5	3.4	800	-450	-600	N/A	0.2	170	LQFP-32

ON Semiconductor Selector Guide – Clock and Data Management Devices

GATES (Specifications are at 25°C unless otherwise stated)

Device(s)	Output Type	Type	Frequency (Typ) GHz	Propagation Delay (Typ) ps	Jitter (Typ) ps RMS	Tr/Tf (Max) ps	Package
MC100E101	ECL/PECL	OR/NOR	2	350	<1	575	PLCC-28
MC100E104	ECL/PECL	AND/NAND	2	385	<1	700	PLCC-28
MC100E107	ECL/PECL	XOR/XNOR	2	410	<1	700	PLCC-28
MC100E404	ECL/PECL	AND/NAND	2	475	<1	400	PLCC-28
MC100EL01	ECL/PECL	OR/NOR	2	230	<1	235	SO-8, TSSOP-8
MC100EL04	ECL/PECL	AND/NAND	2	240	<1	350	SO-8, TSSOP-8
MC100EL05	ECL/PECL	AND/NAND	2	275	<1	350	SO-8, TSSOP-8
MC100EL07	ECL/PECL	XOR/XNOR	2	260	<1	225	SO-8, TSSOP-8
MC100EP01	ECL/PECL	OR/NOR	>3	270	0.2	180	SO-8, TSSOP-8
MC100EP05	ECL/PECL	AND/NAND	>3	220	0.2	180	SO-8, TSSOP-8
MC100EP08	ECL/PECL	XOR/XNOR	>3	250	0.2	180	SO-8, TSSOP-8
MC100EP101	ECL/PECL	OR/NOR	>3	300	0.2	220	PLCC-28
MC100EP105	ECL/PECL	AND/NAND	>3	220	0.2	180	SO-8, TSSOP-8
MC100LVEL01	ECL/PECL	OR/NOR	2	370	<1	320	SO-8, TSSOP-8
MC100LVEL05	ECL/PECL	AND/NAND	2	340	<1	320	SO-8, TSSOP-8
MC10E101	ECL/PECL	OR/NOR	2	350	<1	575	PLCC-28
MC10E104	ECL/PECL	AND/NAND	2	385	<1	700	PLCC-28
MC10E107	ECL/PECL	XOR/XNOR	2	410	<1	700	PLCC-28
MC10E404	ECL/PECL	AND/NAND	2	475	<1	400	PLCC-28
MC10EL01	ECL/PECL	OR/NOR	2	230	<1	235	SO-8, TSSOP-8
MC10EL04	ECL/PECL	AND/NAND	2	240	<1	350	SO-8, TSSOP-8
MC10EL05	ECL/PECL	AND/NAND	2	275	<1	350	SO-8, TSSOP-8
MC10EL07	ECL/PECL	XOR/XNOR	2	260	<1	225	SO-8, TSSOP-8
MC10EP01	ECL/PECL	OR/NOR	>3	270	0.2	180	SO-8, TSSOP-8
MC10EP05	ECL/PECL	AND/NAND	>3	220	0.2	180	SO-8, TSSOP-8

GATES (continued) (Specifications are at 25°C unless otherwise stated)

Device(s)	Output Type	Type	Frequency (Typ) GHz	Propagation Delay (Typ) ps	Jitter (Typ) ps RMS	Tr/Tf (Max) ps	Package
MC10EP08	ECL/PECL	XOR/XNOR	>3	250	0.2	180	SO-8, TSSOP-8
MC10EP101	ECL/PECL	OR/NOR	>3	300	0.2	220	PLCC-28
MC10EP105	ECL/PECL	AND/NAND	>3	220	0.2	180	SO-8, TSSOP-8
NBSG86A	PECL with Output Level Select	Smart Gate (AND/NAND, OR/NOR, XOR/XNOR, 2:1 MUX)	>8	165	0.5	65	FCBGA-16, QFN-16
NB7L86M	CML	Smart Gate (AND/NAND, OR/NOR, XOR/XNOR, 2:1 MUX)	>8	120	0.2	60	QFN-16

COUNTERS (Specifications are at 25°C unless otherwise stated)

Device(s)	Description	Voltage	Count Freq. (Typ) GHz	Prop. Delay (Typ) ps	Setup Time (Typ) ps	Hold Time (Typ) ps	Reset Recovery (Typ) ps	Jitter (Typ) ps RMS	Tr/Tf (Max) ps	Package
MC100E016	5 V ECL 8-Bit Synchronous Binary Up Counter	5	0.9	775	-30	100	700	3	800	PLCC-28
MC100E136	5 V ECL 6-Bit Universal Up/Down Counter	5	0.65	1150	650	-200	700	<5	600	PLCC-28
MC100E137	5 V ECL 8-Bit Ripple Counter	5	2.2	2900	-150	150	200	<5	600	PLCC-28
MC100EP016A	3.3 V ECL 8-Bit Synchronous Binary Up Counter	3.3	1.4	570	240	-155	205	2.5	320	LQFP-32
MC10E016	5 V ECL 8-Bit Synchronous Binary Up Counter	5	0.9	775	-30	100	700	3	800	PLCC-28
MC10E136	5 V ECL 6-Bit Universal Up/Down Counter	5	0.65	1150	650	-200	700	<5	600	PLCC-28
MC10E137	5 V ECL 8-Bit Ripple Counter	5	2.2	2900	-150	150	200	<5	600	PLCC-28

ON Semiconductor Selector Guide – Clock and Data Management Devices

COMPARATORS (Specifications are at 25°C unless otherwise stated)

Device(s)	Description	Voltage	Frequency (Typ) GHz	Propagation Delay (Typ) ps	Jitter (Typ) ps RMS	Tr/Tf (Max) ps	Package
MC10E166	5 V ECL 9-Bit Magnitude Comparator	5	>1	850	<1	800	PLCC-28
MC100E166	5 V ECL 9-Bit Magnitude Comparator	5	>1	850	<1	800	PLCC-28
MC10E1651	5 V, -5 V ECL Dual ECL Output Comparator with Latch	5 / -5	>1	775	<1	475	CDIP-16, PLCC-20
MC10E1652	5 V ECL Dual ECL Output Comparator with Latch	5	>1	775	<1	475	CDIP-16, PLCC-20

PARITY CHECKERS (Specifications are at 25°C unless otherwise stated)

Device(s)	Description	Voltage	Propagation Delay (Typ) ps	Setup Time (Typ) ps	Hold Time (Typ) ps	Tr/Tf (Max) ps	Package
MC10/100E160	5 V ECL 12-Bit Parity Generator/Checker	5	650	900	-900	650	PLCC-28
MC100E193	5 V ECL Error Detection/Correction Circuit	5	775	350	-350	1100	PLCC-28

DRIVERS/RECEIVERS (Specifications are at 25°C unless otherwise stated)

Device(s)	Description	Input I/O	Output I/O	Voltage	Freq. (Typ) GHz	Prop. Delay (Typ) ps	Jitter (Typ) ps RMS	Tr/Tf (Max) ps	Package
MC10100EP16VB	3.3/5 V ECL Differential Receiver/Driver with High and Low Gain	ECL/PECL	ECL/PECL	3.3/5	>3	300	0.2	240	SO-8, TSSOP-8
MC10100EP16VC	3.3/5 V ECL Differential Receiver/Driver with High Gain and Enable Output	ECL/PECL	ECL/PECL	3.3/5	>3	380	0.2	240	SO-8, TSSOP-8
MC100E116	5 V ECL Quint Differential Line Receiver	ECL/PECL	ECL/PECL	5	>1.2	300	0.2	575	PLCC-28
MC100E416	5 V ECL Quint Differential Line Receiver	ECL/PECL	ECL/PECL	5	>2	350	0.2	350	PLCC-28
MC100EL16	5 V ECL Differential Receiver	ECL/PECL	ECL/PECL	5	>2	250	0.2	350	SO-8, TSSOP-8
MC100EL17	5 V ECL Quad Differential Receiver	ECL/PECL	ECL/PECL	5	>2	425	0.2	550	SO-20
MC100EP116	3.3/5 V ECL Hex Differential Line Receiver/Driver	ECL/PECL	ECL/PECL	3.3/5	>3	260	0.2	240	LQFP-32
MC100EP16	3.3/5 V ECL Differential Receiver/Driver	ECL/PECL	ECL/PECL	3.3/5	>4	220	0.2	180	SO-8, TSSOP-8
MC100EP16F	3.3/5 V ECL Differential Receiver/Driver	ECL/PECL	ECL/PECL	2.5/3.3	>3	300	0.2	100	SO-8, TSSOP-8
MC100EP16T	3.3/5 V ECL Differential Receiver/Driver with Internal Input Termination	ECL/PECL	ECL/PECL	3.3/5	>3	220	0.2	180	SO-8, TSSOP-8
MC100EP16VA	3.3/5 V ECL Differential Receiver/Driver with High Gain	ECL/PECL	ECL/PECL	3.3/5	>3	270	0.2	180	SO-8, TSSOP-8
MC100EP16VB	3.3/5 V ECL Differential Receiver/Driver with High and Low Gain	ECL/PECL	ECL/PECL	3.3/5	>3	300	0.2	240	SO-8, TSSOP-8
MC100EP16VC	3.3/5 V ECL Differential Receiver/Driver with High Gain and Enable Output	ECL/PECL	ECL/PECL	3.3/5	>3	380	0.2	240	SO-8, TSSOP-8
MC100EP16VS	3.3/5 V ECL Differential Receiver/Driver with Variable Output Swing	ECL/PECL	ECL/PECL	3.3/5	>4	220	0.2	180	SO-8, TSSOP-8

ON Semiconductor Selector Guide – Clock and Data Management Devices

DRIVERS/RECEIVERS (continued) (Specifications are at 25°C unless otherwise stated)

Device(s)	Description	Input I/O	Output I/O	Voltage	Freq. (Typ) GHz	Prop. Delay (Typ) ps	Jitter (Typ) ps RMS	Tr/Tf (Max) ps	Package
NB4L16M	2.5/3.3 V 5 Gb/s Multi Level Clock/Data Input to CML Driver/Receiver/Buffer/Translator with Internal Termination	LVPECL, LVTTTL, LVCMOS, CML, LVDS	CML	2.5/3.3	3.5	220	0.2	90	QFN-16
MC100EP16VT	3.3/5 V ECL Differential Receiver/Driver with Variable Output Swing and Internal Input Termination	ECL/PECL	ECL/PECL	3.3/5	>4	300	0.2	180	SO-8, TSSOP-8
MC100EP17	3.3 V ECL Quad Differential Receiver	ECL/PECL	ECL/PECL	3.3/5	>3	220	0.2	230	SO-20, TSSOP-20
MC100LVEL16	3.3 V ECL Differential Receiver	ECL/PECL	ECL/PECL	3.3	>2	300	0.2	320	SO-8, TSSOP-8
MC100LVEL17	3.3 V ECL Quad Differential Receiver	ECL/PECL	ECL/PECL	3.3	>2	425	0.2	550	SO-20
MC100LVEP16	2.5/3.3 V ECL Differential Receiver/Driver	ECL/PECL	ECL/PECL	2.5/3.3	>4	240	0.2	180	SO-8, TSSOP-8
MC10E116	5 V ECL Quint Differential Line Receiver	ECL/PECL	ECL/PECL	5	>2	300	0.2	575	PLCC-28
MC10E416	5 V ECL Quint Differential Line Receiver	ECL/PECL	ECL/PECL	5	>2	350	0.2	350	PLCC-28
MC10EL16	5 V ECL Differential Receiver	ECL/PECL	ECL/PECL	5	>2	250	0.2	350	SO-8, TSSOP-8
MC10EP116	3.3/5 V ECL Hex Differential Line Receiver/Driver	ECL/PECL	ECL/PECL	3.3/5	>3	260	0.2	240	LQFP-32
MC10EP16	3.3/5 V ECL Differential Receiver/Driver	ECL/PECL	ECL/PECL	3.3/5	>4	220	0.2	180	SO-8, TSSOP-8
MC10EP16T	3.3/5 V ECL Differential Receiver/Driver with Internal Input Termination	ECL/PECL	ECL/PECL	3.3/5	>3	220	0.2	180	SO-8, TSSOP-8
MC10EP16VA	3.3/5 V ECL Differential Receiver/Driver with High Gain	ECL/PECL	ECL/PECL	3.3/5	>3	270	0.2	180	SO-8, TSSOP-8
MC10EP16VB	3.3/5 V ECL Differential Receiver/Driver with High and Low Gain	ECL/PECL	ECL/PECL	3.3/5	>3	300	0.2	240	SO-8, TSSOP-8
MC10EP16VC	3.3/5 V ECL Differential Receiver/Driver with High Gain and Enable Output	ECL/PECL	ECL/PECL	3.3/5	>3	380	0.2	240	SO-8, TSSOP-8

DRIVERS/RECEIVERS (continued) (Specifications are at 25°C unless otherwise stated)

Device(s)	Description	Input I/O	Output I/O	Voltage	Freq. (Typ) GHz	Prop. Delay (Typ) ps	Jitter (Typ) ps RMS	Tr/Tf (Max) ps	Package
MC10EP16VT	3.3/5 V ECL Differential Receiver/Driver with Variable Output Swing and Internal Input Termination	ECL/PECL	ECL/PECL	3.3/5	>4	300	0.2	180	SO-8, TSSOP-8
MC10EP17	3.3 V ECL Quad Differential Receiver	ECL/PECL	ECL/PECL	3.3/5	>3	220	0.2	230	SO-20, TSSOP-20
MC10LVEP16	2.5/3.3 V ECL Differential Receiver/Driver	ECL/PECL	ECL/PECL	2.5/3.3	>4	240	0.2	180	SO-8, TSSOP-8
NB100LVEP17	2.5 V/3.3 V/5 V ECL Quad Differential Driver/Receiver	ECL/PECL	ECL/PECL	2.5/3.3/5	>2.5	250	0.5	240	TSSOP-20, QFN-24
NBSG16	2.5/3.3 V SiGe Differential Receiver/Driver with RSPECL Output	ECL/PECL, HSTL, GTL, TTL, CMOS, CML or LVDS	RSECL	2.5/3.3	>12	120	0.3	65	FCBGA-16, QFN-16
NBSG16VS	2.5/3.3 V SiGe Differential Receiver/Driver with Variable Output Swing	ECL/PECL, TTL, CMOS, LVDS or LVDS	ECL/PECL	2.5/3.3	>12	125	0.8	55	FCBGA-16, QFN-16
NB6L16	2.5/3.3 V Multi-level Input to Differential LVPECL Clock or Data Translator/Receiver/Driver Buffer	LVDS, LVPECL, LVNECL, CML, LVCMOS or LVTTTL	ECL/PECL	2.5/3.3	>6	130	0.2	120	SO-8, TSSOP-8
NBSG16M	2.5/3.3 V Multi-level Input to CML Clock/Data Receiver/Driver/Translator Buffer	ECL/PECL/LVTTTL/LVCMOS/CML/LVDS	CML	2.5/3.3	>10	120	0.2	53	QFN-16
NB4N527S	3.3 V 2.5 Gb/s Dual Any Level to LVDS Receiver/Driver/Buffer/Translator with Input Termination	LVNECL, LVPECL, LVTTTL, LVCMOS, CML, LVDS, HSTL	LVDS	3.3	>1.25	275	0.5	140	QFN-16
NB4L16M	2.5/3.3 V 5 Gb/s Multi Level Clock/Data Input to CML Driver/Receiver/Buffer/Translator with Internal Termination	LVPECL, LVDS, CML, LVCMOS, LVTTTL	CML	2.5/3.3	>3.5	220	0.2	90	QFN-16
NB7L216	2.5/3.3 V 12 Gb/s Multi Level Clock/Data Input to RSECL High Gain Receiver/Buffer/Translator with Internal Termination	LVNECL, LVPECL, HSTL, LVTTTL, LVCMOS, CML or LVDS	RSECL	2.5/3.3	>8.5	120	0.1	45	QFN-16
NB4N316M	3.3 V Any Level Input to Open Collector CML Output Buffer/Translator with Input Hysteresis	LVPECL, CML, LVCMOS, LVTTTL, LVDS	CML	3.3	>2	550	1	150	TSSOP-8

ON Semiconductor Selector Guide – Clock and Data Management Devices

DRIVERS/BUFFERS (Specifications are at 25°C unless otherwise stated)

Device(s)	Description	Voltage	Outputs	Propagation Delay (Typ) ps	Within Gate Skew (Max) ps	Tr/Tf (Max) ps	Package
MC10EL12	5 V ECL Low Impedance 1:2 Driver	5	OR/NOR ECL	290	N/A	550	SO-8, TSSOP-8
MC100EL12	5 V ECL Low Impedance 1:2 Driver	5	OR/NOR ECL	290	N/A	550	SO-8, TSSOP-8
MC100LVEL12	3.3 V ECL Low Impedance 1:2 Driver	3.3	OR/NOR ECL	445	N/A	550	SO-8, TSSOP-8
MC10E112	5 V ECL Quad Driver	5	OR/NOR ECL	400	40	700	PLCC-28
MC10E212	5 V ECL 3-Bit Scannable Registered Address Driver	5	OR/NOR ECL	800	50	650	PLCC-28
MC10E122	5 V ECL 9-Bit Buffer	5	S.E.	350	75	800	PLCC-28
MC100E112	5 V ECL Quad Driver	5	OR/NOR ECL	400	40	700	PLCC-28
MC100E212	5 V ECL 3-Bit Scannable Registered Address Driver	5	OR/NOR ECL	800	50	650	PLCC-28
MC100E122	5 V ECL 9-Bit Buffer	5	S.E.	350	75	800	PLCC-28

Interface

Table of Contents

	Page
Line Receivers – EIA Standard	294
Line Drivers – EIA Standard	294
Peripheral Drivers	294
Modulator/Demodulators	295
Timers	295
Smart Card and SIM Card Interface	295

Data Transmission

LINE RECEIVERS – EIA STANDARD

S = Single Ended D = Differential	Type of Output	t _{prop} Delay Time Max (ns)	Party Line Operation	Strobe or Enable	Power Supplies (V)	Device	Suffix/Package	Receivers Per Package	Companion Drivers	Comments
S	R (Note 27)	85	-	-	+5.0	MC1489 MC1489A	DIP-16, SO-16	4	MC1488 MC14C88B	EIA-232-D

27. R = Resistor Pull-up, TP = Totem-pole output.

LINE DRIVERS – EIA STANDARD

Output Current Capability (mA)	t _{prop} Delay Time Max (ns)	S = Single Ended D = Differential	Party Line Operation	Strobe or Enable	Power Supplies (V)	Device	Suffix/Package	Receivers Per Package	Companion Drivers	Comments
85	35	D	√	√	+5.0	MC75174B MC75172B	SO-20L	4	-	EIA-485
10	350	S	-	√	±9.0 to ±12	MC1488	DIP-8, SO-8	4	MC1489 MC1489A	EIA-232-D
60	300	S/D	-	EIA-422 √ EIA-423 -	±5.0	MC26LS30	SO-16	4 (423) 2 (422)	-	EIA-422 or EIA-423 Switchable
18	-	D	-	-	±10.8 to ±13.2	MC3488A	SO-8	1 (423) 1 (232)	-	Dual EIA-423 EIA-232D

PERIPHERAL DRIVERS

Output Current Capability (mA)	Input Capability	Propagation Delay Time Max (µs)	Output Clamp Diode	Off State Voltage Max (V)	Device	Drivers Per Package	Suffix/Package	Logic Function
500	TTL, 5.0 V CMOS	1.0	√	50	MC1413B	7	DIP-16, SO-16	Invert

MODULATOR/DEMODULATORS

Product	T _A (min) (°C)	T _A (max) (°C)	Z _{is} (typ) (kΩ)	Z _{os} (typ) (kΩ)	V _{CFT} (typ) (μV)	V _{Cs} (typ) (mV)	A _{vs} (typ) (V)	B _w (typ) (MHz)	I _{IB} (typ) (μA)	A _{CM} (typ) (dB)	Packages
MC1496BD	-40	125	200	40	20	65	3.5	300	12	85	SOIC-14
MC1496BP	-40	125	200	40	20	65	3.5	300	12	85	PDIP-14
MC1496D	0	70	200	40	20	65	3.5	300	12	85	SOIC-14
MC1496P	0	70	200	40	20	65	3.5	300	12	85	PDIP-14

TIMERS

Product	T _A (min) (°C)	T _A (max) (°C)	V _{CC} (min) (V)	V _{CC} (max) (V)	E _T (max) (%)	Packages
MC1455B	-40	85	4.5	16	1	SOIC-8 Narrow Body
MC1455D	0	70	4.5	16	1	SOIC-8 Narrow Body
MC1455P	0	70	4.5	16	1	PDIP-8
NCV1455B	-40	125	4.5	16	1	SOIC-8 Narrow Body

SMART CARD AND SIM CARD INTERFACE

Product	Description	V _{CC} (min) (V)	V _{CC} (max) (V)	I _T (typ) (mA)	I _{I(standby)} (max) (μA)	f _{Clock} (max) (MHz)	Packages
NCN4555	SIM Card Power Supply/Level Translator	1.8	5.5	0.03	4	5	QFN-16
NCN4557	Dual SIM/Smart Card Interface	1.8	5.5	0.03	3	5	QFN-16
NCN6000	Compact Smart Card Interface	2.7	6	5	15	40	TSSOP-20
NCN6001	Compact Smart Card Interface	2.7	6	0.5	60	40	TSSOP-20
NCN6004A	Dual Asynchronous/Synchronous Smart Card Interface	1.8	5.5		50		QFP-48
NCN6010	Power Management and Level Shifter for SIM Cards	2.7	6	20	2	10	TSSOP-14

Standard Logic

Standard Logic

Table of Contents

	Page
MiniGates	300
VHC One-Gates	300
HC One-Gates	300
LCX One-Gates	301
LCX Two- and Three-Gates	301
VCX One Gates	302
NLU Multi-Gates	302
Low Voltage Standard Logic	303
VCX	303
VHC	303
LCX	301
LVX	305
5.0 V and Greater Standard Logic	308
High Speed CMOS	308
AC/ACT	311
Metal Gate CMOS	314
Logic Special Functions	316
Translators	317

In Brief...

This selector guide is a quick reference to ON Semiconductor's offering of exciting new Analog Switches and MiniGate™ products as well as the traditional standard logic integrated circuits. ON Semiconductor continues to increase the breadth of its portfolio offering in the MiniGate arena, and continues to offer the traditional industry standard IC Logic families that have become the foundation for a multitude of legacy electronic systems. The company's standard logic portfolio provides designers with a wide selection of voltages and speed/drive combinations to meet their application needs.

The **MiniGate** family of devices takes advantage of ON Semiconductor's world class discrete micropackaging manufacturing technology to enable best-in-class products. The technologies offered in the MiniGate family are direct "relatives" of the standard IC Logic products, designed and manufactured in the same CMOS based technology. These include Analog Switch, LCX, VHC and HC technologies, with the majority of the popular functions available in these different families in industry standard 5, 6 and 8 pin packages.

The traditional industry standard Logic IC offerings consist of families in the high voltage standard logic arena (5.0 V and greater).

In the low voltage standard logic arena, ON Semiconductor offers the following families:

VCX: This is the fastest, lowest voltage logic family offered by ON Semiconductor. Ten devices in all are offered, with five of the most popular functions, as well as five enhanced devices with a bus hold option. It is specified at 0.9 V to 3.6 V, is offered in the industry standard 48 pin TSSOP package and is specifically well suited for networking/ communication equipment applications, demanding high speed and low power.

LCX: LCX is fast becoming the industry "workhorse" product family in 3.0 V applications. This family features 5.0 V tolerant inputs and outputs and is especially suited for mixed-voltage, high-end, advanced workstation designs, as well as for low-power portable applications.

LVX: LVX is specified from 2.0 V to 3.6 V and is similar tin performance to VHC, but with lower output drive. It too has overvoltage tolerant (OVT) inputs to 7.0 V, allowing the interface of 5.0 V systems to 3.0 V systems. This family is available in industry standard JEDEC SOIC, EIAJ SOIC, and the popular TSSOP packages. It is specified at -55 to +125°C.

VHC: This "5.0 V to 3.0 V transitional family" is specified at 2.0 V to 5.5 V. When operating at supply voltages below 5.0 V, this family features 5.0 V tolerant inputs to support 3.0 V to 5.0 V mixed voltage system designs. Low power, low switching noise and fast switching speeds make this family perfect for low power, low cost applications. The VHCT functions offer TTL level compatibility with CMOS low power performance. VHCT accepts TTL level inputs and delivers full swing (4.5 V to 5.5 V) outputs. The supply voltage range for VHCT is VCC = 4.5 V - 5.5 V. The temperature range for this family is also -55 to +125°C and is also available in the same packages as LVX family.

There are three families offered in the more mature 5.0 V and greater operating voltage arena. **FACT** (AC/ACT), **High Speed** (HC/HCT) and **Metal Gate** (14000 series), remain as the legacy logic families. These families, although past the maturity stage in the industry product life cycle, continue to find new applications and will remain industry standards for many more years.

MiniGates

VHC One-Gates

Ordering Suffixes: TSSOP-5 = DTT1, SC-88A = DFT2 (available in T & R only), G = Pb-free				
Part Number	Description	Surface Mount Packages	Temperature	Operating Voltage
MC74VHC1G00	2-Input NAND Gate	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1GT00	2-Input NAND Gate (TTL Compatible)	TSOP-5, SC-88A	-55 to +125	3.0 to 5.5 V
MC74VHC1G01	2-Input NAND Gate (Open Drain)	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1G02	2-Input NOR Gate	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1GT02	2-Input NOR Gate (TTL Compatible)	TSOP-5, SC-88A	-55 to +125	3.0 to 5.5 V
MC74VHC1G03	2-Input NOR Gate (Open Drain)	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1G04	Inverter	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1GT04	Inverter (TTL Compatible)	TSOP-5, SC-88A	-55 to +125	3.0 to 5.5 V
MC74VHC1GU04	Inverter (Unbuffered)	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1G05	Inverter w/Open-Drain Output	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1G07	Buffer w/Open-Drain Output	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1G08	2-Input AND Gate	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1GT08	2-Input AND Gate (TTL Compatible)	TSOP-5, SC-88A	-55 to +125	3.0 to 5.5 V
MC74VHC1G09	2-Input AND Gate (Open Drain)	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1G14	Schmitt Trigger-Inverter	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1GT14	Schmitt Trigger Inverter (TTL Compatible)	TSOP-5, SC-88A	-55 to +125	3.0 to 5.5 V
MC74VHC1G32	2-Input OR Gate	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1GT32	2-Input OR Gate (TTL Compatible)	TSOP-5, SC-88A	-55 to +125	3.0 to 5.5 V
MC74VHC1G50	Buffer	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1GT50	Buffer (TTL Compatible)	TSOP-5, SC-88A	-55 to +125	3.0 to 5.5 V
MC74VHC1G66	Analog Switch	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1GT66	Analog Switch	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1G86	2-Input Exclusive-OR Gate	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1GT86	2-Input Exclusive-OR Gate (TTL Compatible)	TSOP-5, SC-88A	-55 to +125	3.0 to 5.5 V
MC74VHC1G125	Bus Buffer (3-State)	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1GT125	Non-Inverting Tri-State Buffer, Low Enable	TSOP-5, SC-88A	-55 to +125	3.0 to 5.5 V
MC74VHC1G126	Non-Inverting Tri-State Buffer, High Enable	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1GT126	Bus Buffer Gate (3-State) (TTL Compatible)	TSOP-5, SC-88A	-55 to +125	3.0 to 5.5 V
MC74VHC1G132	Quad 2-Input Schmitt NAND Gate	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V
MC74VHC1G135	2-Input NAND Schmitt-Trigger with Open Drain Output	TSOP-5, SC-88A	-55 to +125	2.0 to 5.5 V

HC One-Gates

Ordering Suffixes: TSSOP-5 = DTT1, SC-88A = DFT2 (available in T & R only), G = Pb-free				
Part Number	Description	Surface Mount Packages	Temperature	Operating Voltage
MC74HC1G00	2-Input NAND Gate	TSOP-5, SC-88A	-55 to +125	2.0 to 6.0 V
MC74HC1G02	2-Input Positive-NOR Gate	TSOP-5, SC-88A	-55 to +125	2.0 to 6.0 V
MC74HC1G04	Inverter	TSOP-5, SC-88A	-55 to +125	2.0 to 6.0 V
MC74HC1G08	2-Input AND Gate	TSOP-5, SC-88A	-55 to +125	2.0 to 6.0 V
MC74HC1G14	Inverter with Schmitt Trigger	TSOP-5, SC-88A	-55 to +125	2.0 to 6.0 V
MC74HC1G32	2-Input OR Gate	TSOP-5, SC-88A	-55 to +125	2.0 to 6.0 V
MC74HC1GU04	Inverter (Unbuffered)	TSOP-5, SC-88A	-55 to +125	2.0 to 6.0 V

LCX One–Gates

Ordering Suffixes: SC–88/A = DFT2, US = US8 (available in T & R only), G = Pb–free, UDFN6 = MUR2				
Part Number	Description	Surface Mount Packages	Temperature	Operating Voltage
NL7SZ18	2:1 Multiplexer, Tri–State	SC–88A, UDFN6	–40 to +85	1.65 to 5.5 V
NL7SZ19	2:1 Multiplexer	SC–88, UDFN6	–40 to +85	1.65 to 5.5 V
NL17SZ00	Single 2–Input NAND Gate	SC–88A, SOT–553	–40 to +85	1.65 to 5.5 V
NL17SZ02	Single 2–Input NOR Gate	SC–88A, SOT–553	–40 to +85	1.65 to 5.5 V
NL17SZ04	Single Inverter	SC–88A, SOT–553	–40 to +85	1.65 to 5.5 V
NL17SZ06	Inverter w/Open Drain Outputs	SC–88A, SOT–553	–40 to +85	1.65 to 5.5 V
NL17SZ07	Buffer w/Open–Drain Output	SC–88A, SOT–553	–40 to +85	1.65 to 5.5 V
NL17SZ08	Single 2–Input AND Gate	SC–88A, SOT–553	–40 to +85	1.65 to 5.5 V
NL17SZ14	Schmitt Trigger Inverter	SC–88A, SOT–553	–40 to +85	1.65 to 5.5 V
NL17SZ16	Single Buffer	SC–88A, SOT–553	–40 to +85	1.65 to 5.5 V
NL17SZ17	Non–Inverting Schmitt Trigger Buffer	SC–88A, SOT–553	–40 to +85	1.65 to 5.5 V
NL17SZ32	Single 2–Input OR Gate	SC–88A, SOT–553	–40 to +85	1.65 to 5.5 V
NL17SZ74	D Flip–Flop	US8	–40 to +85	1.65 to 5.5 V
NL17SZ86	Exclusive OR Gate	SC–88A	–40 to +85	1.65 to 5.5 V
NL17SZ125	Non–Inverting Tri–State Buffer, Low Enable	SC–88A	–40 to +85	1.65 to 5.5 V
NL17SZ126	Non–Inverting Tri–State Buffer, High Enable	SC–88A	–40 to +85	1.65 to 5.5 V
NL17SZU04	Single Inverter, Unbuffered	SC–88A, SOT–553	–40 to +85	1.65 to 5.5 V

LCX Two–Gates and Three–Gates

Ordering Suffixes: TSSOP–5/6 = DTT1, SC–88/A = DFT2, US = US8 (available in T & R only), G = Pb–free				
Part Number	Description	Surface Mount Packages	Temperature	Operating Voltage
NL27WZ00	Dual 2–Input NAND Gate	US8	–40 to +85	1.65 to 5.5 V
NL27WZ02	Dual 2–Input NOR Gate	US8	–40 to +85	1.65 to 5.5 V
NL27WZ04	Dual Inverter	TSOP–6, SC–88	–40 to +85	1.65 to 5.5 V
NL27WZ06	Dual Inverter w/Open Drain Outputs	TSOP–6, SC–88	–40 to +85	1.65 to 5.5 V
NL27WZ07	Dual Non–Inverting Buffer, Open Drain	TSOP–6, SC–88	–40 to +85	1.65 to 5.5 V
NL27WZ08	Dual 2–Input AND Gate	US8	–40 to +85	1.65 to 5.5 V
NL27WZ14	Dual Schmitt Trigger Inverter	TSOP–6, SC–88	–40 to +85	1.65 to 5.5 V
NL27WZ16	Dual Non–Inverting Buffer	TSOP–6, SC–88	–40 to +85	1.65 to 5.5 V
NL27WZ17	Dual Non–Inverting Schmitt Trigger Buffer	TSOP–6, SC–88	–40 to +85	1.65 to 5.5 V
NL27WZ32	Dual 2–Input OR Gate	US8	–40 to +85	1.65 to 5.5 V
NL27WZ86	Dual Exclusive OR Gate	US8	–40 to +85	1.65 to 5.5 V
NL27WZ125	Dual Non–Inverting Tri–State Buffer, Low Enable	US8	–40 to +85	1.65 to 5.5 V
NL27WZ126	Dual Non–Inverting Tri–State Buffer, High Enable	US8	–40 to +85	1.65 to 5.5 V
NL27WZU04	Dual Inverter, Unbuffered	TSOP–6, SC–88	–40 to +85	1.65 to 5.5 V
NL37WZ04	Triple Inverter	US8	–40 to +85	1.65 to 5.5 V
NL37WZ06	Triple Inverter w/Open Drain Outputs	US8	–40 to +85	1.65 to 5.5 V
NL37WZ07	Triple Non–Inverting Buffer, Open Drain	US8	–40 to +85	1.65 to 5.5 V
NL37WZ14	Triple Schmitt Trigger Inverter	US8	–40 to +85	1.65 to 5.5 V
NL37WZ16	Triple Buffer	US8	–40 to +85	1.65 to 5.5 V
NL37WZ17	Triple Non–Inverting Schmitt Trigger Buffer	US8	–40 to +85	1.65 to 5.5 V

ON Semiconductor Selector Guide – Standard Logic

VCX One Gates

Ordering Suffixes: XV5T2 = SOT-553 (available in T & R only), G = Pb-free

Part Number	Description	Surface Mount Packages	Temperature	Operating Voltage
NL17SV00	Single 2-Input NAND Gate	SOT-553	-40 to +85	0.9 to 3.6 V
NL17SV02	Single 2-Input NOR Gate	SOT-553	-40 to +85	0.9 to 3.6 V
NL17SV04	Single Inverter	SOT-553	-40 to +85	0.9 to 3.6 V
NL17SV08	Single 2-Input AND Gate	SOT-553	-40 to +85	0.9 to 3.6 V
NL17SV16	Single Buffer	SOT-553	-40 to +85	0.9 to 3.6 V
NL17SV32	Single 2-Input OR Gate	SOT-553	-40 to +85	0.9 to 3.6 V

NLU Multi-Gates

Part Number	Description	Operating Voltage (V)	Package Type	Size	Production
NLU1G04MUTCG	Single Inverter	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU1G14MUTCG	Single Inverter, Schmitt Input	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU1GT04MUTCG	Single Inverter, TTL Level	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU1GT14MUTCG	Single Inverter, Schmitt Input, TTL Level	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU1GT50MUTCG	Single Buffer Non Inverting, TTL Level	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU1GU04MUTCG	Single Inverter Unbuffered	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU1G07MUTCG	Single Non Inverting Buffer, Open Drain	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU1G08MUTCG	Single 2-Input AND Gate	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU1G32MUTCG	Single 2-Input OR Gate	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU1G86MUTCG	Single 2-Input Exclusive OR Gate	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU1GT32MUTCG	Single 2-Input OR Gate, TTL Levels	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU1GT86MUTCG	Single 2-Input Exclusive OR Gate, TTL Levels	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU1GT125MUTCG	Non-Inverting 3-State Buffer, TTL Levels	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU1GT126MUTCG	Non-Inverting 3-State Buffer, TTL Levels	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU2G04MUTCG	Dual Inverter	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU2G06MUTCG	Dual Inverter, Open Drain	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU2G07MUTCG	Dual Buffer, Open Drain	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU2G14MUTCG	Dual Inverter, Schmitt	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU2G16MUTCG	Dual Buffer	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU2G17MUTCG	Dual Buffer Schmitt	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU2GU04MUTCG	Dual Unbuffered Inverter	1.65 to 5.5	UDFN6	1.2 mm x 1.0mm x 0.5 mm	2Q07
NLU3G14MUTCG	Triple Inverter, Schmitt	1.65 to 5.5	UDFN8	1.8 mm x 1.2 mm x 0.5 mm	2Q07
NLU3G16MUTCG	Triple Buffer	1.65 to 5.5	UDFN8	1.8 mm x 1.2 mm x 0.5 mm	2Q07
NLU3G17MUTCG	Triple Non Inverting Schmitt Trigger Buffer	1.65 to 5.5	UDFN8	1.8 mm x 1.2 mm x 0.5 mm	2Q07

Low Voltage Standard Logic

VCX

Ordering Suffixes: DTR = TSSOP T & R, MNR2 = DFN, G = Pb-free				
Part Number	Description	Surface Mount Packages	Temperature	Operating Voltage
74VCXH245	8-Bit Bus Buffer (3-State, Bus Hold)	QFN-20	-40 to +85	1.65 to 3.6 V
74VCXH16245	16-Bit Bus Transceiver (3-State, Bus Hold)	TSSOP-48	-40 to +85	1.65 to 3.6 V

VHC

Ordering Suffixes: D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, M = SOEIAJ Rail, MEL = SOEIAJ T & R, G = Pb-free				
Part Number	Description	Surface Mount Packages	Temperature	Operating Voltage
MC74VHC00	Quad 2-Input NAND Gate	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHCT00A	Quad 2-Input NAND Gate (TTL Compatible)	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74VHC02	Quad 2-Input Positive-NOR Gate	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHCT02A	Quad 2-Input Positive-NOR Gate	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74VHC04	Hex Inverter	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHCT04A	Hex Inverter (TTL Compatible)	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74VHC04	Hex Inverter (Unbuffered)	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHC08	Quad 2-Input AND Gate	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHCT08A	Quad 2-Input AND Gate, TTL Compatible	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74VHC14	Hex Schmitt Trigger	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHCT14A	Hex Schmitt Trigger, TTL Compatible	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74VHC32	Quad 2-Input OR Gate	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHCT32A	Quad 2-Input OR Gate (TTL Compatible)	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74VHC50	Hex Buffer	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHCT50A	Hex Buffer (TTL Compatible)	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74VHC74	Dual D Flip-Flop w/Preset and Clear	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHCT74A	Dual D Flip-Flop w/Preset and Clear (TTL Compatible)	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74VHC86	Quad Exclusive-OR Gate	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHCT86A	Quad 2-Input Exclusive-OR Gate (TTL Compatible)	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74VHC125	Quad Bus Buffer (3-State)	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHCT125A	Quad Bus Buffer Gate (3-State) (TTL Compatible)	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74VHC126	Quad Bus Buffer (3-State)	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHCT126A	Quad Bus Buffer Gate (3-State) (TTL Compatible)	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74VHC132	Quad 2-Input Schmitt NAND Gate	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHCT132A	Quad 2-Input Schmitt NAND Gate	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74VHC138	3-to-8 Line Decoder/Demultiplexer	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 5.5 V
MC74VHCT138A	3-to-8 Line Decoder (TTL Compatible)	SO-16, TSSOP-16, EIAJ-16	-55 to +125	4.5 to 5.5 V
MC74VHC139	Dual 2-to-4 Line Decoder/Demultiplexer	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 5.5 V
MC74VHCT139A	Dual 2-to-4 Line Decoder/DeMultiplexer (TTL Compatible)	SO-16, TSSOP-16, EIAJ-16	-55 to +125	4.5 to 5.5 V
MC74VHC157	Quad 2-Channel Multiplexer	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 5.5 V
MC74VHCT157A	Quad 2-to-1 Data Selector/Multiplexer (TTL Compatible)	SO-16, TSSOP-16, EIAJ-16	-55 to +125	4.5 to 5.5 V
MC74VHC240	Octal Bus Buffer (3-State/Inverted)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 5.5 V
MC74VHCT240A	Octal Bus Buffer (3-State/Inverted) (TTL Compatible)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V

ON Semiconductor Selector Guide – Standard Logic

VHC (continued)

Ordering Suffixes: D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, M = SOEIAJ Rail, MEL = SOEIAJ T & R, G = Pb-free				
Part Number	Description	Surface Mount Packages	Temperature	Operating Voltage
MC74VHC244	Octal Bus Buffer (3-State)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 5.5 V
MC74VHCT244A	Octal Bus Buffer (3-State) (TTL Compatible)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74VHC245	Octal Bus Transceiver (3-State)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 5.5 V
MC74VHCT245A	Octal Bus Transceiver (3-State) (TTL Compatible)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74VHC257	Quad 2-Line to 1-Line Data Selectors/Multiplexer (3-State)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 5.5 V
MC74VHCT257A	Quad 2-to-1 Data Selectors/Mux (3-State) (TTL Compatible)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74VHC259	8-Bit Addressable Latch	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHCT259A	8-Bit Addressable Latch (TTL Compatible)	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74VHC373	Octal D-Type Latch (3-State)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 5.5 V
MC74VHCT373A	Octal D-Type Latch (3-State) (TTL Compatible)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74VHC374	Octal D-Type Flip-Flop (3-State)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 5.5 V
MC74VHCT374A	Octal D-Type Flip-Flop (3-State) (TTL Compatible)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74VHC540	Octal Bus Buffer (3-State/Inverted)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 5.5 V
MC74VHCT540A	Octal Bus Buffer (3-State/Inverted) (TTL Compatible)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74VHC541	Octal Bus Buffer (3-State)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 5.5 V
MC74VHCT541A	Octal Bus Buffer (3-State) (TTL Compatible)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74VHC573	Octal D-Type Latch (3-State)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 5.5 V
MC74VHCT573A	Octal D-Type Latch (3-State) (TTL Compatible)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74VHC574	Octal D-Type Flip-Flop (3-State)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 5.5 V
MC74VHCT574A	Octal D-Type Flip-Flop (3-State) (TTL Compatible)	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74VHC4051	8-to-1 Channel Analog Multiplexer	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 5.5 V
MC74VHC4052	Dual 4 Channel Analog Multiplexer	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 5.5 V
MC74VHC4053	Triple 2 Channel Analog Multiplexer	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 5.5 V
MC74VHC4066	Quad Analog Switch	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC74VHC4316	Quad Analog Switch w/Translator	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 5.5 V

LCX

Ordering Suffixes: D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, M = SOEIAJ Rail, MEL = SOEIAJ T & R, G = Pb-free				
Part Number	Description	Surface Mount Packages	Temperature	Operating Voltage
MC74LCX00	Quad 2-Input NAND Gate	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LCX02	Quad 2-Input Positive-NOR Gate	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LCX04	Hex Inverter	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LCXU04	Hex Inverter (Unbuffered)	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LCX06	Hex Inverter w/Open-Drain Output	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LCX07	Hex Buffer w/Open-Drain Output	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LCX08	Quad 2-Input AND Gate	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LCX14	Hex Schmitt Trigger	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LCX32	Quad 2-Input OR Gate	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LCX74	Dual D Flip-Flop w/Presets and Clear	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V

LCX (continued)

Ordering Suffixes: D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, M = SOEIAJ Rail, MEL = SOEIAJ T & R, G = Pb-free				
Part Number	Description	Surface Mount Packages	Temperature	Operating Voltage
MC74LCX86	Quad Exclusive-OR Gate	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LCX125	Quad Bus Buffer (3-State)	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LCX138	3-to-8 Line Decoder/Demultiplexer	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LCX139	Dual 2-to-4 Line Decoder/Demultiplexer	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LCX157	Quad 2-Channel Multiplexer	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LCX158	Quad 2-to-1 Data Selector/Multiplexer	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LCX240	Octal Bus Buffer (3-State/Inverted)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LCX244	Octal Bus Buffer (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LCX245	Octal Bus Transceiver (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LCX257	Quad 2-Line To 1-Line Data Selectors/Multiplexer (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LCX258	Quad 2-Line To 1-Line Data Selectors/Multiplexer (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LCX373	Octal D-Type Latch (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LCX374	Octal D-Type Flip-Flop (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LCX540	Octal Bus Buffer (3-State/Inverted)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LCX541	Octal Bus Buffer (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LCX573	Octal D-Type Latch (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LCX574	Octal D-Type Flip-Flop (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LCX16240	16-Bit Bus Buffer (3-State/Inverted)	TSSOP-48	-40 to +85	2.0 to 3.6 V
MC74LCX16244	16-Bit Bus Buffer (3-State)	TSSOP-48	-40 to +85	2.0 to 3.6 V
MC74LCX16245	16-Bit Bus Transceiver (3-State)	TSSOP-48	-40 to +85	2.0 to 3.6 V
MC74LCX16373	16-Bit D-Type Latch (3-State)	TSSOP-48	-40 to +85	2.0 to 3.6 V
MC74LCX16374	16-Bit D-Type Flip-Flop (3-State)	TSSOP-48	-40 to +85	2.0 to 3.6 V

LVX

Ordering Suffixes: D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, M = SOEIAJ Rail, MEL = SOEIAJ T & R, G = Pb-free				
Part Number	Description	Surface Mount Packages	Temperature	Operating Voltage
MC74LVX00	Quad 2-Input NAND Gate	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX02	Quad 2-Input Positive-NOR Gate	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX04	Hex Inverter	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVXU04	Hex Inverter (Unbuffered)	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX08	Quad 2-Input AND Gate	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX14	Hex Schmitt Trigger	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX32	Quad 2-Input OR Gate	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX50	Hex Buffer	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX74	Dual D Flip-Flop w/Preset and Clear	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX86	Quad Exclusive-OR Gate	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX125	Non-Inverting Tri-State Buffer, Low Enable	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX126	Quad Bus Buffer	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX132	Quad 2-Input NAND Schmitt Trigger	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX138	3-to-8 Line Decoder/Demultiplexer	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LVX139	Dual 2-to-4 Line Decoder/Demultiplexer	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LVX157	Quad 2-Channel Multiplexer	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LVX240	Octal Bus Buffer (3-State/Inverted)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LVX244	Octal Bus Buffer (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LVX245	Octal Bus Transceiver (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V

ON Semiconductor Selector Guide – Standard Logic

LVX (continued)

Ordering Suffixes: D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, M = SOEIAJ Rail, MEL = SOEIAJ T & R, G = Pb-free				
Part Number	Description	Surface Mount Packages	Temperature	Operating Voltage
MC74LVX257	Quad 2-Line to 1-Line Data Selectors/Multiplexer (3-State)	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX259	8-Bit Addressable Latch	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LVX373	Octal D-Type Latch (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LVX374	Octal D-Type Flip-Flop (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LVX540	Octal Inverting Bus Buffer	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.6 to 3.6 V
MC74LVX541	Octal Bus Buffer (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LVX573	Octal D-Type Latch (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LVX574	Octal D-Type Flip-Flop (3-State)	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 3.6 V
MC74LVXC3245	Octal Dual Supply Translating Bus Transceiver	SO-24W, TSSOP-24	-40 to +85	2.0 to 3.6 V
MC74LVX4051	8-to-1 Channel Analog Multiplexer	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LVXT4051	8-to-1 Channel Analog Multiplexer (TTL Compatible Inputs)	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LVX4052	Dual 4 Channel Analog Multiplexer	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LVXT4052	Dual 4 Channel Analog Multiplexer (TTL Compatible Inputs)	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LVX4053	Triple 2 Channel Analog Multiplexer	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LVXT4053	Triple 2 Channel Analog Multiplexer (TTL Compatible Inputs)	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LVX4066	Quad Analog Switch	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVXT4066	Quad Analog Switch (TTL Compatible Inputs)	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 3.6 V
MC74LVX4245	Octal Dual Supply Translating Bus Transceiver	SO-24W, TSSOP-24	-40 to +85	2.0 to 3.6 V
MC74LVX8051	8-to-1 Channel Analog Multiplexer	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LVXT8051	8-to-1 Channel Analog Multiplexer (TTL Compatible Inputs)	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LVX8053	Triple 2 Channel Analog Multiplexer	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V
MC74LVXT8053	Triple 2 Channel Analog Multiplexer	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 3.6 V

High-Speed CMOS Product Designation Definitions

HC vs. HCT

ON Semiconductor's High-Speed CMOS product family, intended to give the designer an alternative to LSTTL. HSCMOS, with the faster speed advantage over metal-gate CMOS (MC14000 series) and the lower power consumption advantage over LSTTL, is an optimum choice for midrange designs. With the availability of high-speed CMOS microprocessors and memories, the ability to design a 100% CMOS system is possible.

HCT devices offer a short-term solution to the TTL/NMOS-to-CMOS interface problem. To achieve this interface capability, some CMOS advantages had to be compromised. These compromises include power consumption, operating voltage range, and noise immunity.

In most cases HCT devices are drop-in replacements of TTL devices with significant advantages over the TTL

devices. However, in some cases, an equivalent HCT device may not replace a TTL device without some form of circuit modification.

Designers can use HCT devices to perform logic level conversions only. In newer designs, the designer wants all the advantages of a true CMOS system and designs using only HC devices.

“A” versus “Non-A”

“A” Versus “Non-A” — ON Semiconductor has a device performance enhancement program for the High-Speed CMOS family. This is indicated by an “A” suffix on the device identification. Some of the characteristics of this “A” enhancement program are improved design, a better quality process, faster performing AC propagation delays and enhancements to various DC characteristics.

5.0 V and Greater Standard Logic

High Speed CMOS: HC A-Family

Ordering Suffixes: N = PDIP Rail, D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, F = SOEIAJ Rail, FEL = SOEIAJ T & R, G = Pb-free					
Part Number	Description	Dual-In-Line Packages	Surface Mount Packages	Temperature	Operating Voltage
MC74HC00A	Quad 2-Input NAND Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HC02A	Quad 2-Input Positive-NOR Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HC03A	Quad 2-Input NAND Gate (Open Drain)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HC04A	Hex Inverter	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HCT04A	Hex Inverter (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74HCU04A	Hex Inverter (Unbuffered)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HC08A	Quad 2-Input AND Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HC14A	Hex Schmitt Trigger	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HCT14A	Hex Schmitt Trigger Inverter (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74HC32A	Quad 2-Input OR Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HC74A	Dual D Flip-Flop w/Preset and Clear	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HCT74A	Dual D Flip-Flop w/ Preset and Clear (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	4.5 to 5.5 V
MC74HC86A	Quad Exclusive-OR Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HC125A	Quad Bus Buffer (3-State)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HC126A	Quad Bus Buffer (3-State)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HC132A	Quad 2-Input Schmitt NAND Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HC138A	3-to-8 Line Decoder/Demultiplexer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HCT138A	Dual 2-to-4 Line Decoder/Demultiplexer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	4.5 to 5.5 V
MC74HC139A	Dual 1-of-4 Decoder/Demultiplexer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC157A	Quad 2-Channel Multiplexer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC161A	Synchronous Binary Counter w/Asynchronous Clear	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC163A	Synchronous Binary Counter w/Asynchronous Clear	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC164A	8-Bit SIPO Shift Register	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HC165A	8-Bit PISO Shift Register	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC174A	Hex D Flip-Flop w/Clear	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC175A	Quad D Flip-Flop w/Clear	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC240A	Octal Bus Buffer (3-State/Inverted)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 6.0 V
MC74HC244A	Octal Bus Buffer (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 6.0 V
MC74HCT244A	Octal Bus Buffer (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74HC245A	Octal Bus Transceiver (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 6.0 V

High Speed CMOS: HC A-Family

Ordering Suffixes: N = PDIP Rail, D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, F = SOEIAJ Rail, FEL = SOEIAJ T & R, G = Pb-free					
Part Number	Description	Dual-In-Line Packages	Surface Mount Packages	Temperature	Operating Voltage
MC74HCT245A	Octal Bus Transceiver (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74HC273A	Octal D-Type Flip-Flop	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 5.5 V
MC74HCT273A	Octal D-Type Flip-Flop w/Clear (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74HC373A	Octal D-Type Latch (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 6.0 V
MC74HCT373A	Octal D-Type Latch (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74HC374A	Octal D-Type Flip-Flop (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 6.0 V
MC74HCT374A	Octal D-Type Flip-Flop (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74HC390A	Dual Binary Counter w/ +2 +5 Sections	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC393A	Dual 4-Stage Binary Ripple Counter	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HC540A	Octal Bus Buffer (3-State/Inverted)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 6.0 V
MC74HC541A	Octal Bus Buffer (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 6.0 V
MC74HCT541A	Octal Bus Buffer (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74HC573A	Octal D-Type Latch (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 6.0 V
MC74HCT573A	Octal D-Type Latch (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74HC574A	Octal D-Type Flip-Flop (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	2.0 to 6.0 V
MC74HCT574A	Octal D-Type Flip-Flop (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-55 to +125	4.5 to 5.5 V
MC74HC589A	8-Bit Shift Register	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC595A	8-Bit Shift Register/Latch (3-State)	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC4020A	14-Stage Binary Ripple Counter	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC4040A	12-Stage Binary Ripple Counter	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC4046A	Phase Lock Loop	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC4051A	8-to-1 Channel Analog Multiplexer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC4052A	Dual 4 Channel Analog Multiplexer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC4053A	Triple 2 Channel Analog Multiplexer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC4060A	14-Stage Binary Ripple Counter w/Oscillator	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC4066A	Quad Analog Switch	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 6.0 V
MC74HC4316A	Quad Analog Switch w/Translator	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V

High Speed CMOS: HC A-Family

Ordering Suffixes: N = PDIP Rail, D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, F = SOEIAJ Rail, FEL = SOEIAJ T & R, G = Pb-free					
Part Number	Description	Dual-In-Line Packages	Surface Mount Packages	Temperature	Operating Voltage
MC74HC4538A	Dual Re-triggerable Precision Monostable Multivibrator	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC4851A	8-to-1 Channel Analog Multiplexer w/Inj Current Control	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V
MC74HC4852A	Dual 4 Channel Analog Multiplexer w/Inj Current Control	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	2.0 to 6.0 V

High Speed CMOS: HC Family

Ordering Suffixes: DR2G = Pb-free SOIC in Tape & Reel, DTR2G = Pb-free TSSOP in Tape & Reel				
Part Number	Description	Packages	Temperature (°C)	Operating Voltage (V)
74HC00	Quad 2-Input NAND Gate	SO-14, TSSOP-14	-55 to +125	2.0 to 6.0
74HC02	Quad 2-Input Positive NOR Gate	SO-14, TSSOP-14	-55 to +125	2.0 to 6.0
74HC04	Hex Inverter	SO-14, TSSOP-14	-55 to +125	2.0 to 6.0
74HCT04	Hex Inverter (TTL Compatible)	SO-14, TSSOP-14	-55 to +125	4.5 to 6.0
74HCU04	Hex Inverter (Unbuffered)	SO-14, TSSOP-14	-55 to +125	4.5 to 6.0
74HC08	Quad 2-Input AND Gate	SO-14, TSSOP-14	-55 to +125	2.0 to 6.0
74HCT08	Quad 2-Input AND Gate (TTL Compatible)	SO-14, TSSOP-14	-55 to +125	4.5 to 6.0
74HC14	Hex Schmitt Trigger	SO-14, TSSOP-14	-55 to +125	2.0 to 6.0
74HCT14	Hex Schmitt Trigger (TTL Compatible)	SO-14, TSSOP-14	-55 to +125	4.5 to 6.0
74HC32	Quad 2-Input OR Gate	SO-14, TSSOP-14	-55 to +125	2.0 to 6.0
74HC74	Dual D Flip-Flop 2/ Preset and Clear	SO-14, TSSOP-14	-55 to +125	2.0 to 6.0
74HC86	Quad Exclusive OR Gate	SO-14, TSSOP-14	-55 to +125	2.0 to 6.0
74HC125	Quad Bus Buffer 3-State	SO-14, TSSOP-14	-55 to +125	2.0 to 6.0
74HC132	Quad 2-Input Schmitt NAND Gate	SO-14, TSSOP-14	-55 to +125	2.0 to 6.0
74HC138	3-to-8 Line Decoder / Demultiplexer	SO-16, TSSOP-16	-55 to +125	2.0 to 6.0
74HCT157	Quad 2-Channel Multiplexer (TTL Compatible)	SO-16, TSSOP-16	-55 to +125	4.5 to 6.0
74HC244	Octal Bus Buffer (3-State)	TSSOP-20	-55 to +125	2.0 to 6.0
74HC245	Octal Bus Transceiver (3-State)	TSSOP-20	-55 to +125	2.0 to 6.0
74HC373	Octal D-Type Latch (3-State)	TSSOP-20	-55 to +125	2.0 to 6.0
74HC374	Octal D-Type Flip-Flop (3-State)	TSSOP-20	-55 to +125	2.0 to 6.0
74HC574	Octal D-Type Flip Flop (3-State)	TSSOP-20	-55 to +125	2.0 to 6.0
74HC595	8 Bit Shift Register/Latch (3-State)	SO-16, TSSOP-16	-55 to +125	2.0 to 6.0

AC/ACT

Ordering Suffixes: N = PDIP Rail, D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, M = SOEIAJ Rail, MEL = SOEIAJ T & R, G = Pb-free					
Part Number	Description	Dual-In-Line Packages	Surface Mount Packages	Temperature	Operating Voltage
MC74AC00	Quad 2-Input NAND Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 6.0 V
MC74ACT00	Quad 2-Input NAND Gate (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC02	Quad 2-Input NOR Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 6.0 V
MC74ACT02	Quad 2-Input NOR Gate (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC04	Hex Inverter	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 6.0 V
MC74ACT04	Hex Inverter (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC05	Hex Inverter w/Open-Drain Output	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 6.0 V
MC74ACT05	Hex Inverter w/Open-Drain Output (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC08	Quad 2-Input AND Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 6.0 V
MC74ACT08	Quad 2-Input AND Gate (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC10	Triple 3-Input NAND Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 6.0 V
MC74ACT10	Triple 3-Input NAND Gate (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC11	Triple 3-Input AND Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 6.0 V
MC74ACT11	Triple 3-Input AND Gate (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC14	Hex Schmitt Trigger	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 6.0 V
MC74ACT14	Hex Schmitt Trigger Inverter (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC20	Dual 4-Input NAND Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 6.0 V
MC74ACT20	Dual 4-Input NAND Gate (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC32	Quad 2-Input OR Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 6.0 V
MC74ACT32	Quad 2-Input OR Gate (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC74	Dual D Flip-Flop w/Preset and Clear	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 6.0 V
MC74ACT74	Dual D Flip-Flop w/Preset and Clear (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC86	Quad Exclusive-OR Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 6.0 V
MC74ACT86	Quad 2-Input Exclusive-OR Gate (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC125	Quad Bus Buffer (3-State)	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 6.0 V
MC74ACT125	Quad Bus Buffer Gate (3-State) (TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC132	Quad 2-Input NAND Gate (Schmitt-Trigger)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	2.0 to 6.0 V
MC74ACT132	Quad 2-Input NAND Gate (Schmitt-Trigger, TTL Compatible)	DIP-14	SO-14, TSSOP-14, EIAJ-14	-40 to +85	4.5 to 5.5 V
MC74AC138	3-to-8 Line Decoder/Demultiplexer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 6.0 V

ON Semiconductor Selector Guide – Standard Logic

AC/ACT

Ordering Suffixes: N = PDIP Rail, D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, M = SOEIAJ Rail, MEL = SOEIAJ T & R, G = Pb-free					
MC74ACT138	3-to-8 Line Decoder (TTL Compatible)	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	4.5 to 5.5 V
MC74AC139	Dual 2-to-4 Line Decoder/Demultiplexer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 6.0 V
MC74ACT139	Dual 2-to-4 Line Decoder/DeMultiplexer (TTL Compatible)	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	4.5 to 5.5 V
MC74ACT153	Dual 4-Input Multiplexer, TTL Compatible Inputs	DIP-16	SO-16, EIAJ-16	-40 to +85	4.5 to 5.5 V
MC74AC157	Quad 2-Channel Multiplexer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 6.0 V
MC74ACT157	Quad 2-to-1 Data Selector/Multiplexer (TTL Compatible)	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	4.5 to 5.5 V
MC74AC161	Synchronous Presettable Binary Counter	DIP-16	SO-16, EIAJ-16	-40 to +85	2.0 to 6.0 V
MC74ACT161	Synchronous Presettable Binary Counter, TTL Compatible Inputs	DIP-16	SO-16, EIAJ-16	-40 to +85	4.5 to 5.5 V
MC74AC163	Synchronous Presettable Binary Counter	DIP-16	SO-16, EIAJ-16	-40 to +85	2.0 to 6.0 V
MC74ACT163	Synchronous Presettable Binary Counter, TTL Compatible Inputs	DIP-16	SO-16, EIAJ-16	-40 to +85	4.5 to 5.5 V
MC74AC240	Octal Bus Buffer (3-State/Inverted)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 6.0 V
MC74ACT240	Octal Bus Buffer (3-State/Inverted) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74ACT241	Octal Bus Buffer (3-State/Non-Inverted) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74AC244	Octal Bus Buffer (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 6.0 V
MC74ACT244	Octal Bus Buffer (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74AC245	Octal Bus Transceiver (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 6.0 V
MC74ACT245	Octal Bus Transceiver (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74AC253	Dual 4-Input Multiplexer w/3-State Outputs	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 6.0 V
MC74ACT253	Dual 4-Input Multiplexer w/3-State Outputs	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	4.5 to 5.5 V
MC74AC257	Quad 2-Line to 1-Line Data Selectors/Multiplexer (3-State)	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 6.0 V
MC74ACT257	Quad 2-to-1 Data Selectors/Mux (3-State) (TTL Compatible)	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	4.5 to 5.5 V
MC74AC259	8-Bit Addressable Latch	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 6.0 V
MC74ACT259	8-Bit Addressable Latch	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	4.5 to 5.5 V
MC74AC273	Octal D-Type Flip-Flop	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 6.0 V
MC74ACT273	Octal D-Type Flip-Flop w/Clear (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74AC373	Octal D-Type Latch (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 6.0 V

AC/ACT

Ordering Suffixes: N = PDIP Rail, D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, M = SOEIAJ Rail, MEL = SOEIAJ T & R, G = Pb-free					
MC74ACT373	Octal D-Type Latch (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74AC374	Octal D-Type Flip-Flop (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 6.0 V
MC74ACT374	Octal D-Type Flip-Flop (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74AC377	Octal D-Type Flip-Flop w/Data Enable (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 6.0 V
MC74ACT377	Octal D-Type Flip-Flop w/Data Enable (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74AC540	Octal Bus Buffer (3-State/Inverted)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 6.0 V
MC74ACT540	Octal Bus Buffer (3-State/Inverted) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74AC541	Octal Bus Buffer (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 6.0 V
MC74ACT541	Octal Bus Buffer (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74ACT564	Octal D-Type Latch w/3-State Outputs (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74AC573	Octal D-Type Latch (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 6.0 V
MC74ACT573	Octal D-Type Latch (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74AC574	Octal D-Type Flip-Flop (3-State)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	2.0 to 6.0 V
MC74ACT574	Octal D-Type Flip-Flop (3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74ACT640	Octal Bus Transceiver (Inverting, 3-State) (TTL Compatible)	DIP-20	SO-20W, TSSOP-20, EIAJ-20	-40 to +85	4.5 to 5.5 V
MC74AC646	Octal Bus Transceiver/Register (3-State)	DIP-24	SO-24W, TSSOP-24, EIAJ-24	-40 to +85	2.0 to 6.0 V
MC74ACT646	Octal Bus Transceiver/Register (3-State) (TTL Compatible)	DIP-24	SO-24W, TSSOP-24, EIAJ-24	-40 to +85	4.5 to 5.5 V
MC74AC652	Octal Bus Transceiver/Register (3-State)	DIP-24	SO-24W, TSSOP-24, EIAJ-24	-40 to +85	2.0 to 6.0 V
MC74ACT652	Octal Bus Transceiver/Register (3-State) (TTL Compatible)	DIP-24	SO-24W, TSSOP-24, EIAJ-24	-40 to +85	4.5 to 5.5 V
MC74AC4040	12-Stage Binary Ripple Counter	DIP-16	SO-16, TSSOP-16, EIAJ-16	-40 to +85	2.0 to 6.0 V

ON Semiconductor Selector Guide – Standard Logic

Metal Gate CMOS

Ordering Suffixes: CP = PDIP, D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, F = SOEIAJ Rail, FEL = SOEIAJ T & R, G = Pb-free					
Part Number	Description	Dual-In-Line Packages	Surface Mount Packages	Temperature	Operating Voltage
MC14001B	Quad 2-Input NOR Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14001UB	Quad 2-Input NOR Gate Unbuffered	DIP-14	SO-14	-55 to +125	3.0 to 18 V
MC14007UB	Dual Complementary Pair plus Inverter	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14008B	4-Bit Full Adder	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14011B	Quad 2-Input NAND Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14011UB	Quad 2-Input NAND Gate Unbuffered	DIP-14	SO-14	-55 to +125	3.0 to 18 V
MC14012B	Dual 4-Input NAND Gate	DIP-14	SO-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14013B	Dual D Flip-Flop	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14014B	8-Bit Static Shift Register	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14015B	Dual 4-Bit Static Shift Register	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14016B	Quad Analog Switch/Multiplexer	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14017B	Decade Counter	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14018B	Presetable Divide-by-N Counter	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14020B	14-Bit Binary Counter	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14021B	8-Bit Static Shift Register	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14022B	Octal Counter	DIP-16	SO-16	-55 to +125	3.0 to 18 V
MC14023B	Triple 3-Input NAND Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14024B	7-Stage Ripple Counter	DIP-14	SO-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14025B	Triple 3-Input NOR Gate	DIP-14	SO-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14027B	Dual J-K Flip-Flop	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14028B	BCD-to-Decimal/Binary-to-Octal Decoder	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14029B	Presetable Binary/BCD Up/Down Counter	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14040B	12-Stage Ripple-Carry Binary Counter/Divider	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14042B	Quad Clocked D-Latch	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14043B	Quad NOR R-S Latch	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14044B	Quad NAND R-S Latch	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14046B	Phase-Locked Loop	DIP-16	SO-16W, EIAJ-16	-55 to +125	3.0 to 18 V
MC14049B	Hex Inverter	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14049UB	Hex Inverter Unbuffered	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14050B	Hex Buffer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V

Metal Gate CMOS

Ordering Suffixes: CP = PDIP, D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, F = SOEIAJ Rail, FEL = SOEIAJ T & R, G = Pb-free					
Part Number	Description	Dual-In-Line Packages	Surface Mount Packages	Temperature	Operating Voltage
MC14051B	8-Channel Analog Multiplexer/Demultiplexer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14052B	Dual 4-Channel Analog Multiplexer/Demultiplexer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14053B	Triple 2-Channel Analog Multiplexer/Demultiplexer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14060B	14-Stage Binary Counter/Oscillator	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14066B	Quad Analog Switch	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14067B	16-Channel Analog Multiplexer/Demultiplexer	DIP-24	SO-24W, TSSOP-24	-55 to +125	3.0 to 18 V
MC14069UB	Hex Inverter	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14070B	Quad 2-Input Exclusive-OR Gate	DIP-14	SO-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14071B	Quad 2-Input OR Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14073B	Triple 3-Input AND Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14076B	Quad D-Type Register w/3-State Outputs	DIP-24	SO-24	-55 to +125	3.0 to 18 V
MC14077B	Quad 2-Input Exclusive-NOR Gate	DIP-14	SO-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14081B	Quad 2-Input AND Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14082B	Dual 4-Input AND Gate	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14093B	Quad 2-Input Schmitt Trigger NAND	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	3.0 to 18 V
MC14094B	8-Stage Shift/Store Register w/3-State Outputs	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14099B	8-Bit Addressable Latch	DIP-16	SO-16W	-55 to +125	3.0 to 18 V
MC14106B	Hex Schmitt Trigger	DIP-14	SO-14, TSSOP-14	-55 to +125	3.0 to 18 V
MC14174B	Hex D Flip-Flop	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14175B	Quad D Flip-Flop	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14490	Hex Contact Bounce Eliminator	DIP-16	SO-16W, EIAJ-16	-55 to +125	3.0 to 18 V
MC14503B	Hex 3-State Buffer	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14504B	TTL or CMOS to CMOS Hex Level Shifter	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14511B	BCD-to-7 Segment Latch/Decoder/Driver	DIP-16	SO-16, SO-16W, EIAJ-16	-55 to +125	3.0 to 18 V
MC14512B	8-Channel Data Selector	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14513B	BCD-to-7 Segment Latch/Decoder/Driver w/Ripple Blanking	DIP-18	N/A	-55 to +125	3.0 to 18 V
MC14514B	4-Bit Transparent Latch/4-to-16 Line Decoder (High)	DIP-24	SO-24W	-55 to +125	3.0 to 18 V
MC14515B	4-Bit Transparent Latch/4-to-16 Line Decoder (Low)	DIP-24	SO-24W	-55 to +125	3.0 to 18 V
MC14516B	Presetable Binary Up/Down Counter	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V

ON Semiconductor Selector Guide – Standard Logic

Metal Gate CMOS

Ordering Suffixes: CP = PDIP, D = SOIC Rail, DR2 = SOIC T & R, DW = SOICW Rail, DWR2 = SOICW T & R, DT = TSSOP Rail, DTR2 = TSSOP T & R, F = SOEIAJ Rail, FEL = SOEIAJ T & R, G = Pb-free					
Part Number	Description	Dual-In-Line Packages	Surface Mount Packages	Temperature	Operating Voltage
MC14517B	Dual 64-Bit Static Shift Register	DIP-16	SO-16W	-55 to +125	3.0 to 18 V
MC14518B	Dual BCD Up Counter	DIP-16	SO-16W, EIAJ-16	-55 to +125	3.0 to 18 V
MC14520B	Dual Binary Up Counter	DIP-16	SO-16W, EIAJ-16	-55 to +125	3.0 to 18 V
MC14521B	24-Stage Frequency Divider	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14526B	Presettable 4-Bit Binary Down Counter	DIP-16	SO-16W, EIAJ-16	-55 to +125	3.0 to 18 V
MC14528B	Dual Monostable Multivibrator	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14532B	8-Bit Priority Encoder	DIP-16	SO-16, EIAJ-16,	-55 to +125	3.0 to 18 V
MC14536B	Programmable Timer	DIP-16	SO-16W, EIAJ-16	-55 to +125	3.0 to 18 V
MC14538B	Dual Precision Monostable Multivibrator	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14541B	Programmable Oscillator/Timer	DIP-16	SO-16, TSSOP-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14543B	BCD-to-7 Segment Latch/Decoder/Driver for LCD	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14549B	Successive Approximation Register	DIP-16	SO-16W	-55 to +125	3.0 to 18 V
MC14551B	Quad 2-Channel Analog Multiplexer/Demultiplexer	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14553B	3-Digit BCD Counter	DIP-16	SO-16W	-55 to +125	3.0 to 18 V
MC14555B	Dual Binary to 1-of-4 Decoder (Active High Outputs)	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14556B	Dual Binary to 1-or-4 Decoder/Demultiplexer	DIP-16	SO-16, EIAJ-16	-55 to +125	3.0 to 18 V
MC14557B	1-to-64 Bit Variable Length Shift Register	DIP-16	SO-16W, EIAJ-16	-55 to +125	3.0 to 18 V
MC14559B	Successive Approximation Register	DIP-16	SO-16W	-55 to +125	3.0 to 18 V
MC14562B	128-Bit Static Shift Register	DIP-14	N/A	-55 to +125	3.0 to 18 V
MC14569B	Programmable Dual 4-Bit Binary/BCD Down Converter	DIP-16	SO-16W, TSSOP-16	-55 to +125	3.0 to 18 V
MC14572UB	Hex Gate Unbuffered	DIP-16	SO-16, EIAJ-16	-55 to +125	2.0 to 5.5 V
MC14584B	Hex Schmitt Trigger	DIP-14	SO-14, TSSOP-14, EIAJ-14	-55 to +125	2.0 to 5.5 V
MC14585B	4-Bit Magnitude Comparator	DIP-16	SO-16, EIAJ-16	-55 to +125	2.0 to 5.5 V
MC14598B	8-Bit Bus-Compatible Addressable Latch	DIP-18	N/A	-55 to +125	2.0 to 5.5 V

Logic Special Functions

Part Number	Description	Dual-In-Line Packages	Surface Mount Packages	Temperature	Operating Voltage
JLC1562	I2C Bus I/O Expander	DIP-16	EIAJ-16	-40 to +85	4.2 to 6.0 V
NL7SZ18	2:1 Digital MUX, 3-State Output		SC-88	-40 to +85	1.65 to 5.5 V
NL7SZ19	2:1 Digital MUX		SC-88	-40 to +85	1.65 to 5.5 V
NLSF1174	Hex D Flip-Flop with Clear		QFN-16, 3x3mm	-55 to +125	2.0 to 6.0 V
NLSF2500	Keypad Multiplexer		QFN-16, 3x3mm	-40 to +85	1.5 to 5.5 V
NLSF3T125	Quad Bus Buffer, TTL Compatible		QFN-16, 3x3mm	-40 to +85	2.5 to 5.5 V
NLSF3T126	Quad Bus Buffer, TTL Compatible		QFN-16, 3x3mm	-40 to +85	2.5 to 5.5 V
NLSF595	Serial (SPI) Tri-Color LED Driver		TSSOP-16, SOIC-16, QFN-16	-55 to +125	2.0 to 5.5 V

Translators

Device	Type	Description	Package	Size	Production
NLSX3014MUTAG	Auto Sense Bi-Directional	4-Bit 100 Mbps Configurable Dual-Supply Level Translator	UQFN12	2.00 mm x 1.70 mm	2Q07
NLSV4T3234FCT1G	Uni-Directional	4-Bit Dual-Supply Bus Buffer Level Translator with 26 Ohm Output Series Resistor	μBump11	2.04 mm x 1.41 mm	NOW
NLSV1T240MUTAG	Uni-Directional	1-Bit Configurable Dual-Supply Bus Buffer Level Translator (Inverter)	UDFN6	1.20 mm x 1.00 mm	2Q07
NLSV1T244MUTAG	Uni-Directional	1-Bit Configurable Dual-Supply Bus Buffer Level Translator	UDFN6	1.20 mm x 1.00 mm	2Q07
NLSV2T240MUTAG	Uni-Directional	2-Bit Configurable Dual-Supply Bus Buffer Level Translator (Inverter)	UDFN8	1.80 mm x 1.20 mm	2Q07
NLSV2T244MUTAG	Uni-Directional	2-Bit Configurable Dual-Supply Bus Buffer Level Translator	UDFN8	1.80 mm x 1.20 mm	2Q07
NLSV4T240MUTAG	Uni-Directional	4-Bit Configurable Dual-Supply Bus Buffer Level Translator (Inverter)	UQFN12	1.70 mm x 2.00 mm	2Q07
NLSV4T244MUTAG	Uni-Directional	4-Bit Configurable Dual-Supply Bus Buffer Level Translator	UQFN12	1.70 mm x 2.00 mm	2Q07

Alphanumeric Parts Index

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
1.5KE10A	227	1.5SMC82A	239	1N5368B	125
1.5KE11A	227	1.5SMC91A	239	1N5369B	125
1.5KE12A	227	1N4001	149	1N5370B	125
1.5KE13A	227	1N4002	149	1N5371B	125
1.5KE15A	227	1N4003	149	1N5372B	125
1.5KE16A	227	1N4004	149	1N5373B	125
1.5KE18A	227	1N4005	149	1N5374B	125
1.5KE20A	227	1N4006	149	1N5375B	125
1.5KE24A	227	1N4007	149	1N5377B	125
1.5KE27A	227	1N4933	149	1N5378B	125
1.5KE30A	227	1N4934	149	1N5380B	125
1.5KE33A	227	1N4935	149	1N5381B	125
1.5KE36A	227	1N4936	149	1N5383B	125
1.5KE39A	227	1N4937	149	1N5384B	125
1.5KE43A	227	1N5333B	124	1N5386B	125
1.5KE47A	227	1N5334B	124	1N5387	125
1.5KE51A	227	1N5335B	124	1N5388B	125
1.5KE56A	227	1N5336B	124	1N5400	149
1.5KE6.8A	227	1N5337B	124	1N5401	149
1.5KE62A	227	1N5338B	124	1N5402	149
1.5KE68A	227	1N5339B	124	1N5404	149
1.5KE75A	227	1N5340B	124	1N5406	149
1.5KE8.2A	227	1N5341B	124	1N5407	149
1.5KE82A	227	1N5342B	124	1N5408	149
1.5KE91A	227	1N5343B	124	1N5817	143
1.5SMC10A	239	1N5344B	124	1N5818	143
1.5SMC12A	239	1N5346B	124	1N5819	143
1.5SMC13A	239	1N5347B	124	1N5820	143
1.5SMC15A	239	1N5348B	124	1N5821	143
1.5SMC16A	239	1N5349B	124	1N5822	143
1.5SMC18A	239	1N5350B	124	1N5908	226
1.5SMC20A	239	1N5351B	124	1N5913B	124
1.5SMC22A	239	1N5352B	124	1N5917B	124
1.5SMC24A	239	1N5353B	124	1N5919B	124
1.5SMC27A	239	1N5354B	124	1N5920B	124
1.5SMC30A	239	1N5355B	124	1N5921B	124
1.5SMC33A	239	1N5356B	124	1N5923B	124
1.5SMC36A	239	1N5357B	124	1N5924B	124
1.5SMC39A	239	1N5358B	124	1N5925B	124
1.5SMC43A	239	1N5359B	124	1N5927B	124
1.5SMC47A	239	1N5360B	125	1N5929B	124
1.5SMC51A	239	1N5361B	125	1N5931B	124
1.5SMC56A	239	1N5362B	125	1N5932B	124
1.5SMC6.8A	239	1N5363B	125	1N5934B	124
1.5SMC62A	239	1N5364B	125	1N5935B	125
1.5SMC68A	239	1N5365B	125	1N5937B	125
1.5SMC7.5A	239	1N5366B	125	1N5938B	125
1.5SMC75A	239	1N5367B	125	1N5940B	125

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
1N5941B	125	1PMT5941B	132	1SMA5922B	131
1N5942B	125	1PMT7.0A	228	1SMA5923B	131
1N5946B	125	1SMA10A	230	1SMA5924B	131
1N5948B	125	1SMA10CA	231	1SMA5925B	131
1N5953B	125	1SMA11A	230	1SMA5927B	131
1N5955B	125	1SMA12A	230	1SMA5928B	131
1N5956B	125	1SMA13A	230	1SMA5929B	131
1N6267A	227	1SMA13CA	231	1SMA5930B	131
1N6271A	227	1SMA15A	230	1SMA5931B	131
1N6274A	227	1SMA15CA	231	1SMA5932B	131
1N6275A	227	1SMA16A	230	1SMA5933B	131
1N6276A	227	1SMA16CA	231	1SMA5934B	131
1N6277A	227	1SMA17A	230	1SMA5935B	131
1N6278A	227	1SMA18A	230	1SMA5936B	131
1N6279A	227	1SMA18CA	231	1SMA5937B	131
1N6280A	227	1SMA20A	230	1SMA5938B	132
1N6281A	227	1SMA20CA	231	1SMA5939B	132
1N6282A	227	1SMA22A	230	1SMA5940B	132
1N6283A	227	1SMA24A	230	1SMA5941B	132
1N6284A	227	1SMA24CA	231	1SMA5942B	132
1N6285A	227	1SMA26A	230	1SMA5943B	132
1N6286A	227	1SMA26CA	231	1SMA5945B	132
1N6287A	227	1SMA28A	230	1SMA6.0A	230
1N6288A	227	1SMA30A	230	1SMA6.5A	230
1N6289A	227	1SMA30CA	231	1SMA60CA	231
1N6290A	227	1SMA33A	230	1SMA70A	230
1N6291A	227	1SMA33CA	231	1SMA70CA	231
1N6292A	227	1SMA36A	230	1SMA78CA	231
1N6294A	227	1SMA36CA	231	1SMA8.0A	230
1N6295A	227	1SMA40A	230	1SMA8.5A	230
1N6373	226	1SMA40CA	231	1SMA9.0A	230
1N6376	226	1SMA43A	230	1SMB100A	232
1N6377	226	1SMA45A	230	1SMB10A	232
1N6380	226	1SMA48A	230	1SMB10CA	234
1PMT12A	228	1SMA48CA	231	1SMB110A	233
1PMT16A	228	1SMA5.0A	230	1SMB11A	232
1PMT22A	228	1SMA54A	230	1SMB11CA	234
1PMT26A	228	1SMA58A	230	1SMB120A	233
1PMT33A	228	1SMA58CA	231	1SMB12A	232
1PMT5.0A	228	1SMA5913B	131	1SMB12CA	234
1PMT5920B	131	1SMA5914B	131	1SMB130A	233
1PMT5921B	131	1SMA5915B	131	1SMB13A	232
1PMT5922B	131	1SMA5916B	131	1SMB13CA	234
1PMT5924B	131	1SMA5917B	131	1SMB14A	232
1PMT5927B	131	1SMA5918B	131	1SMB14CA	234
1PMT5929B	131	1SMA5919B	131	1SMB150A	233
1PMT5933B	131	1SMA5920B	131	1SMB15A	232
1PMT5934B	131	1SMA5921B	131	1SMB15CA	234

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
1SMB160A	233	1SMB5922B	131	1SMB9.0A	232
1SMB16A	232	1SMB5923B	131	1SMB90A	232
1SMB16CA	234	1SMB5924B	131	1SMC10A	238
1SMB170A	233	1SMB5925B	131	1SMC12A	238
1SMB17A	232	1SMB5926B	131	1SMC13A	238
1SMB17CA	234	1SMB5927B	131	1SMC14A	238
1SMB18A	232	1SMB5928B	131	1SMC15A	238
1SMB18CA	234	1SMB5929B	131	1SMC16A	238
1SMB20A	232	1SMB5930B	131	1SMC17A	238
1SMB20CA	234	1SMB5931B	131	1SMC18A	238
1SMB22A	232	1SMB5932B	131	1SMC20A	238
1SMB22CA	234	1SMB5933B	131	1SMC22A	238
1SMB24A	232	1SMB5934B	131	1SMC24A	238
1SMB24CA	234	1SMB5935B	131	1SMC26A	238
1SMB26A	232	1SMB5936B	131	1SMC28A	238
1SMB26CA	234	1SMB5937B	131	1SMC30A	238
1SMB28A	232	1SMB5938B	132	1SMC33A	238
1SMB28CA	234	1SMB5939B	132	1SMC36A	238
1SMB30A	232	1SMB5940B	132	1SMC40A	238
1SMB30CA	234	1SMB5941B	132	1SMC43A	238
1SMB33A	232	1SMB5942B	132	1SMC48A	238
1SMB33CA	234	1SMB5943B	132	1SMC5.0A	238
1SMB36A	232	1SMB5944B	132	1SMC51A	238
1SMB36CA	234	1SMB5945B	132	1SMC54A	238
1SMB40A	232	1SMB5946B	132	1SMC58A	238
1SMB40CA	234	1SMB5947B	132	1SMC6.0A	238
1SMB43A	232	1SMB5948B	132	1SMC6.5A	238
1SMB43CA	234	1SMB5949B	132	1SMC60A	238
1SMB45A	232	1SMB5951B	132	1SMC64A	238
1SMB45CA	234	1SMB5952B	132	1SMC7.0A	238
1SMB48A	232	1SMB5953B	132	1SMC7.5A	238
1SMB48CA	234	1SMB5954B	132	1SMC70A	238
1SMB5.0A	232	1SMB5955B	132	1SMC75A	238
1SMB51A	232	1SMB5956B	132	1SMC78A	238
1SMB51CA	234	1SMB6.0A	232	1SMC8.0A	238
1SMB54A	232	1SMB6.5A	232	1SMC9.0A	238
1SMB54CA	234	1SMB60A	232	1SS400T1	123
1SMB58A	232	1SMB60CA	234	2N3055	160
1SMB58CA	234	1SMB64A	232	2N3055A	160
1SMB5913B	131	1SMB64CA	234	2N3442	160
1SMB5914B	131	1SMB7.0A	232	2N3771	161
1SMB5915B	131	1SMB7.5A	232	2N3772	161
1SMB5916B	131	1SMB70A	232	2N3773	161
1SMB5917B	131	1SMB75A	232	2N3904	167,177
1SMB5918B	131	1SMB75CA	234	2N3906	167,177
1SMB5919B	131	1SMB8.0A	232	2N4124	167
1SMB5920B	131	1SMB8.5A	232	2N4401	167,174,177
1SMB5921B	131	1SMB85A	232	2N4403	167,174,177

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
2N4918	157	2N6043	162	2N6517	176
2N4919	157	2N6045	162	2N6520	176
2N4920	157	2N6052	163	2N6667	163
2N4921	157	2N6071A	111	2N7000	200
2N4922	157	2N6071B	111	2N7000G	201,206
2N4923	157	2N6073A	111	2N7000ZL1	201
2N5038	161	2N6073B	111	2N7002L	194
2N5060	108	2N6075A	111	2N7002LT1G	206
2N5061	108	2N6075B	111	2SA1774	171
2N5062	108	2N6107	159	2SA2029BM3T5G	171
2N5064	108	2N6109	159	2SC4617	171
2N5087	167,173	2N6111	159	2SC5658BM3T5G	171
2N5088	167,173	2N6284	163	3EZ16D	124
2N5089	167,173	2N6286	163	3EZ18D	124
2N5190	158	2N6287	163	74HC00	310
2N5191	158	2N6288	159	74HC02	310
2N5192	158	2N6292	159	74HC04	310
2N5194	158	2N6338	161	74HC08	310
2N5195	158	2N6341	161	74HC125	310
2N5302	161	2N6344	112	74HC132	310
2N5401	176	2N6344A	113	74HC138	310
2N5457	191	2N6348A	113	74HC14	310
2N5458	191	2N6349A	113	74HC244	310
2N5460	191	2N6387	163	74HC245	310
2N5461	191	2N6388	163	74HC32	310
2N5462	191	2N6394	110	74HC373	310
2N5486	190	2N6395	110	74HC374	310
2N5550	176	2N6397	110	74HC574	310
2N5551	176	2N6399	110	74HC595	310
2N5638	190	2N6400	110	74HC74	310
2N5639	190	2N6401	110	74HC86	310
2N5655	157	2N6402	110	74HCT04	310
2N5657	157	2N6403	110	74HCT08	310
2N5684	161	2N6404	110	74HCT14	310
2N5686	161	2N6405	110	74HCT157	310
2N5883	161	2N6426	173	74HCU04	310
2N5884	161	2N6427	173	74VCXH16245	303
2N5885	161	2N6487	159	74VCXH245	303
2N5886	161	2N6488	159	80SQ045N	143
2N6027	115	2N6490	159	AU5517	99
2N6028	115	2N6491	159	BAL99LT1	122
2N6034	162	2N6497	158	BAS116LT1	122
2N6035	162	2N6504	110	BAS16DXV6T1	123
2N6036	162	2N6505	110	BAS16HT1	123
2N6038	162	2N6507	110	BAS16LT1	122
2N6039	162	2N6508	110	BAS16TT1	123
2N6040	162	2N6509	110	BAS16WT1	122
2N6042	162	2N6515	176	BAS16XV2T1	123

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
BAS19LT1	122	BC368	167,174	BC847BPDW1T1	172
BAS20HT1	123	BC369	167,174	BC847BPDV6T1	172
BAS20LT1	122	BC372	173	BC847BTT1	171
BAS21DW5T1	123	BC373	173	BC847BWT1	170
BAS21HT1	123	BC489	174	BC847CDW1T1	172
BAS21LT1	122	BC489A	174	BC847CDXV6T1	172
BAS21SL	122	BC489B	167	BC847CLT1	169
BAS40-04LT1	119	BC490	167,174	BC847CTT1	171
BAS40-06LT1	119	BC517	173	BC847CWT1	170
BAS40LT1	119	BC546B	167	BC848ALT1	169
BAS70-04LT1	119	BC547A	167	BC848BLT1	169
BAS70LT1	119	BC547B	167	BC848BWT1	170
BAT54ALT1	119	BC547C	167	BC848CDW1T1	172
BAT54AWT1	119	BC548B	167	BC848CLT1	169
BAT54CLT1	119	BC548C	167	BC848CPDW1T1	172
BAT54CTT1	119	BC549C	167	BC848CWT1	170
BAT54CWT1	119	BC550C	167,173	BC849BLT1	170
BAT54CXV3T1	120	BC556B	167	BC849CLT1	170
BAT54HT1	119	BC557A	167	BC850BLT1	169
BAT54LT1	119	BC557B	167	BC850CLT1	169
BAT54SLT1	119	BC557C	167	BC856ALT1	168
BAT54SWT1	119	BC558C	167	BC856BDW1T1	172
BAT54T1	119	BC560C	167,173	BC856BLT1	168
BAT54WT1	119	BC618	173	BC856BM3T5G	171
BAT54XV2T1	120	BC637	167,174	BC856BWT1	170
BAV199LT1	122	BC639	167,174	BC857ALT1	169
BAV70LT1	122	BC639-16	167,174	BC857BDW1T1	172
BAV70TT1	123	BC640	167,174	BC857BLT1	169
BAV70WT1	122	BC640-16	167,174	BC857BTT1	171
BAV74LT1	122	BC807-16LT1	169	BC857BWT1	170
BAV99LT1	122	BC807-25LT1	169	BC857CDW1T1	172
BAV99RWT1	122	BC807-40LT1	169	BC857CLT1	169
BAV99WT1	122	BC808-25L	170	BC857CWT1	170
BAW56LT1	122	BC817-16LT1	169	BC858ALT1	170
BAW56TT1	123	BC817-25LT1	169	BC858AWT1	170
BAW56WT1	122	BC817-40LT1	169	BC858BLT1	170
BC182B	167	BC818-40L	170	BC858BWT1	170
BC212B	167	BC846ALT1	168	BC858CDXV6T1	172
BC237B	167	BC846BDW1T1	172	BC858CLT1	170
BC307B	167	BC846BLT1	168	BC859BLT1	170
BC327	167,174	BC846BM3T5G	171	BCEP53-10	171,175
BC327-16	167	BC846BPDW1T1	172	BCEP53-16	171,175
BC327-25	167,174	BC846BWT1	170	BCEP53T1	171,175
BC327-40	167,174	BC847ALT1	169	BCEP56-10	171,175
BC337	167,174	BC847AWT1	170	BCEP56-16	171,175
BC337-16	167	BC847BDW1T1	172	BCEP56T1	171,175
BC337-25	167,174	BC847BLT1	169	BCEP68T1	171,175
BC337-40	167,174	BC847BM3T5G	171	BCEP69T1	171,175

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
BCW30LT1	169	BD681	162	BSS63LT1	168
BCW32LT1	169	BD682	162	BSS64LT1	168
BCW33LT1	170	BD787	158	BSS84L	195
BCW65ALT1	169,175	BD788	158	BSV52LT1	177
BCW65CLT1	169	BD809	159	BU323Z	163
BCW66GLT1	175	BD810	159	BU406	159
BCW68GLT1	169,175	BDV64B	163	BUB323Z	162
BCW70LT1	169	BDV65B	163	BUH100	159,166
BCW72LT1	169	BDW42	163	BUH150	159,166
BCX17LT1	169,175	BDW46	163	BUH50	158,166
BCX19LT1	169,175	BDW47	163	BUH51	157,166
BD135	157	BDX33B	163	BUL146	159,166
BD136	157	BDX33C	163	BUL146F	160,166
BD137	157	BDX34B	163	BUL44	158,166
BD138	157	BDX34C	163	BUL45	158,166
BD139	157	BDX53B	162	BUL45D2	158,166
BD140	157	BDX53C	162	BUV21	161
BD159	157	BDX54B	162	BUV22	161
BD179	157	BDX54C	162	BUV26	159
BD180	157	BF256A	191	BUV27	159
BD234	157	BF393	176	BUX85	158
BD237	157	BF422	176	BZ84C36E	128
BD241C	158	BF423	176	BZG03C15	131
BD242B	158	BF493S	176	BZG03C150	132
BD242C	158	BF720T1	176	BZX84B16L	128
BD243C	159	BF721T1	176	BZX84B18L	128
BD244B	159	BF959	177	BZX84B5V1L	127
BD244C	159	BFR30LT1	191	BZX84B5V6L	127
BD435	158	BFR31LT1	191	BZX84B6V2L	127
BD436	158	BS107	200	BZX84B6V8L	128
BD437	158	BS107A	200	BZX84B7V5L	128
BD438	158	BS107AG	201	BZX84B8V2L	128
BD439	158	BS107ARLRM	201	BZX84B9V1L	128
BD440	158	BS107ARLRP	201	BZX84C10L	128
BD441	158	BS107G	202	BZX84C11L	128
BD442	158	BS107RL1	201	BZX84C12L	128
BD675	162	BS107RLRA	201	BZX84C13E	128
BD675A	162	BS108	200	BZX84C13L	128
BD676	162	BS170	200	BZX84C15L	128
BD676A	162	BSP16T1	176	BZX84C16L	128
BD677	162	BSP19AT1	176	BZX84C18E	128
BD677A	162	BSP52T1	173	BZX84C18L	128
BD678	162	BSR58LT1	190	BZX84C20L	128
BD678A	162	BSS123L	194	BZX84C22L	128
BD679	162	BSS123LT1G	206	BZX84C24L	128
BD679A	162	BSS123LT3G	206	BZX84C27L	128
BD680	162	BSS138L	194	BZX84C2V4L	127
BD680A	162	BSS138LT3G	206	BZX84C2V7L	127

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
BZX84C30L	128	CS51021	37	DAN222	123
BZX84C33L	128	CS51021A	22,23,36,75	DAN222M3T5G	123
BZX84C36L	128	CS51022	37	DAP222	123
BZX84C39L	128	CS51022A	22,23,36,75	DAP222M3T5G	123
BZX84C3V0L	127	CS51031	31,35	DF3A6.8FU	244
BZX84C3V3E	127	CS51033	31,35	DF6A6.8FU	219,247
BZX84C3V3L	127	CS51221	22,23,36,37,75	DTA114EET1	180
BZX84C3V6L	127	CS5124	22,23,36,37,75	DTA114EM3T5G	180
BZX84C3V9E	127	CS51411	31,32	DTA114TET1	180
BZX84C3V9L	127	CS51412	31,32	DTA114TM3T5G	180
BZX84C43L	128	CS51413	31,32	DTA114YET1	180
BZX84C47L	128	CS51414	31,32	DTA114YM3T5G	180
BZX84C4V3L	127	CS5157H	38,75	DTA115EET1	180
BZX84C4V7E	127	CS5165A	38,75	DTA115EM3T5G	180
BZX84C4V7L	127	CS5171	31,33,34	DTA123EM3T5G	180
BZX84C51L	128	CS5172	31,33,34	DTA124EM3T5G	180
BZX84C56L	128	CS5173	31,33,34	DTA124XM3T5G	180
BZX84C5V1E	127	CS5174	31,33,34	DTA143EE	180
BZX84C5V1L	127	CS5253B-1	45,49	DTA143EM3T5G	180
BZX84C5V6E	127	CS5253B-8	44,49	DTA143TE	180
BZX84C5V6L	127	CS5301	38,75	DTA143TM3T5G	180
BZX84C62L	128	CS8101	51,52,74	DTA143ZET1	180
BZX84C68L	128	CS8122	51,74	DTA143ZM3T5G	180
BZX84C6V2E	127	CS8126	51,74	DTA144EET1	180
BZX84C6V2L	127	CS8126-1	53	DTA144EM3T5G	180
BZX84C6V8L	128	CS8129	51,53,74	DTA144TM3	180
BZX84C75L	128	CS8151	51,52,74	DTA144WM3T5G	180
BZX84C7V5L	128	CS8156	51,74	DTC114EET1	180
BZX84C8V2E	128	CS8161	51,74	DTC114EM3T5G	180
BZX84C8V2L	128	CS8182	51,53,74	DTC114TET1	180
BZX84C9V1E	128	CS8183	51,54	DTC114TM3T5G	180
BZX84C9V1L	128	CS8190	68,69,73	DTC114YET1	180
C106B	108	CS8321	51,52,74	DTC114YM3T5G	180
C106D	108	CS8361	51,54,74	DTC115EET1	180
C106D1	108	CS8363	51,54,74	DTC115EM3T5G	180
C106M	108	CS8371	51,74	DTC123EET1	180
C106M1	108	CS9201	51,52,74	DTC123EM3T5G	180
C122F1	109	CS9202	51,52,74	DTC123JET1	180
CS2841B	22,27	CV78LxxA	51	DTC123JM3T5G	180
CS3341	62,63,69,72	D44C12	158	DTC124EET1	180
CS3351	62,63,69,72	D44H11	159	DTC124EM3T5G	180
CS3361	69,72	D44H8	159	DTC124XET1	180
CS4121	68,69,73	D44VH10	159	DTC124XM3T5G	180
CS4122	68,69,73	D45C12	158	DTC143EET1	180
CS4192	68,69,73	D45H11	159	DTC143EM3T5G	180
CS5101	22,36	D45H8	159	DTC143TE	180
CS5101EDW16	28	D45VH10	159	DTC143TM3T5G	180
CS5101EN14	28	DA121TT1	123	DTC143ZET1	180

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
DTC143ZM3T5G	180	LM201AV	91	M1MA151WKT1	122
DTC144EET1	180	LM211	97	M1MA152KT1	122
DTC144EM3T5G	180	LM224	95	M1MA152WAT1	122
DTC144TM3T5G	180	LM239	98	M1MA152WKT1	122
DTC144WM3T5G	180	LM2574	31,32	M1MA174T1	122
EMC3DXV5T5	182	LM2575	31,32	M74VHC1GT66	102
EMC4DXV5T5	182	LM2576	31,32	MA3075WAL	243
EMC5DXV5T5	182	LM258	93	MAC08B	111
EMD4DXV6T1	182	LM285	39,40	MAC08M	111
EMF18XV6	185	LM2901	98	MAC12D	113
EMF18XV6T5	183	LM2902	95	MAC12HCD	113
EMF5XV6	185	LM2902V	95	MAC12HCM	113
EMF5XV6T5	183	LM2903	97	MAC12HCN	113
EMG2DXV5T5	182	LM2904	93	MAC12M	113
EMT1DXV6	172	LM293	97	MAC12N	113
EMX1DXV6T1	172	LM2931	44,46	MAC12SM	113
EMX2DXV6T1	172	LM2931A	44,46	MAC12SN	113
EMZ1DXV6T1	172	LM2931AC	45,46	MAC15A10	113
ESD5Z12	241	LM2931C	45	MAC15A6	113
ESD5Z2.5	241	LM301A	91	MAC15A8	113
ESD5Z3.3	241	LM311	97	MAC15M	113
ESD5Z5.0	241	LM317	41,43	MAC15N	113
ESD5Z6.0	241	LM317L	41,42	MAC15SD	113
ESD5Z7.0	241	LM317M	41,42	MAC15SM	113
ESD9XSeries	242	LM323	41,43	MAC15SN	113
ESD9X12S	242	LM323A	41	MAC16CM	113
ESD9X3.3S	242	LM324	95	MAC16CN	113
ESD9X5.0S	242	LM337	41,43	MAC16D	113
HN1B01FDW1	172	LM339	98	MAC16M	113
HN1B01FDW1T1	178	LM350	41,43	MAC16N	113
HN2D02FUTW1T1	123	LM358	93	MAC210A10	113
ICTE-12	226	LM385	39,40	MAC210A8	113
ICTE-15	226	LM393	97	MAC212A10	113
ICTE-18	226	LM833	93	MAC212A8	113
ICTE-36	226	LP2950	46	MAC228A10	112
ICTE-5	226	LP2950AC	46	MAC228A4	112
IMH20TR1	181	LP2950C	44	MAC228A6	112
IRF510	201	LP2950CAC	44	MAC228A8	112
IRF520	201	LP2951	46	MAC4DCM-1	112
J110	190	LP2951AC	45,46	MAC4DCMT4	112
J111	190	LP2951C	44,45	MAC4DCN-1	112
J112	190	LP2951CAC	44	MAC4DHM	111
J309	190	M1MA141KT1	122	MAC4DHM-1	111
J310	190	M1MA141WAT1	122	MAC4DLM	111
JLC1562	316	M1MA142WAT1	122	MAC4DLM-1	111
L4949	44,46	M1MA142WKT1	122	MAC4DSM-1	112
LC03-6	221,250	M1MA151KT1	122	MAC4DSMT4	112
LM201A	91	M1MA151WAT1	122	MAC4DSN-1	112

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MAC4DSNT4	112	MBR160	143	MBRB1045	142
MAC8D	112	MBR16100CT	144	MBRB1545CT	142
MAC8M	112	MBR1635	144	MBRB1645	142
MAC8N	112	MBR1645	144	MBRB20100CT	142
MAC8SD	112	MBR20100CT	144	MBRB20200CT	138,142
MAC8SM	112	MBR20200CT	138,144	MBRB2060CT	142
MAC8SN	112	MBR2030CTL	138,144	MBRB2515L	138,142
MAC97A4	111	MBR2045CT	144	MBRB2535CTL	138,142
MAC97A6	111	MBR2060CT	144	MBRB2545CT	142
MAC97A8	111	MBR2080CT	144	MBRB3030CT	142
MAC997A6	111	MBR2090CT	144	MBRB3030CTL	138,142
MAC997A8	111	MBR20H100CTG	138,144	MBRB3045CT-1G	138,144
MAC997B6	111	MBR2515L	138,144	MBRB30H30CT-1G	138,144
MAC997B8	111	MBR2535CTL	138,144	MBRB30H60CT-1G	138,144
MAC9D	112	MBR2545CT	144	MBRB4030	142
MAC9M	112	MBR3045PT	145	MBRB41H100CT-1G	138,144
MAC9N	112	MBR3045ST	138,144	MBRD1035CTL	138,142
MAX1720	31,76	MBR3045WT	145	MBRD1045T4G	142
MAX708	55	MBR30H100CTG	138,144	MBRD320	142
MAX809	55,56	MBR3100	143	MBRD330	142
MAX810	55,56	MBR340	143	MBRD340	142
MAX828	31,76	MBR350RL	143	MBRD350	142
MAX829	31,76	MBR360RL	143	MBRD360	142
MBD301	119	MBR4015CTL	144	MBRD620CT	142
MBD330DWT1	120	MBR4015LWT	145	MBRD630CT	142
MBD54DWT1	120	MBR4015WT	138	MBRD640CT	142
MBD701	119	MBR40250	139,144	MBRD650CT	142
MBD770DWT1	120	MBR40250T	139,144	MBRD660CT	142
MBR0520L	138,140	MBR4045PT	145	MBRD835L	138,142
MBR0530	140	MBR4045WT	145	MBRF20100CT	144
MBR0540	140	MBR40H100WT	145	MBRF20200CT	139,144
MBR10100	144	MBR40H100WTG	138	MBRF2060CT	144
MBR1035	144	MBR41H100CTG	138,144	MBRF20H100CTG	138
MBR1045	144	MBR6045PT	145	MBRF2545CT	144
MBR1060	144	MBR6045WT	145	MBRF30H60CTG	138,144
MBR1080	144	MBR60H100CTG	138,144	MBRF40250T	139,144
MBR1090	144	MBR60L45CT	138,144	MBRM110E	138,140
MBR10H100CTG	138,144	MBR60L45WT	138,145	MBRM110L	138,140
MBR1100	143	MBR7030WT	145	MBRM120E	138,140
MBR120ESF	138,140	MBR735	144	MBRM120L	140
MBR120LSF	138,140	MBR745	144	MBRM130L	140
MBR120VLSF	138,140	MBRA120E	138,140	MBRM140	140
MBR130	140	MBRA130L	140	MBRS1100	141
MBR130LSF	138,140	MBRA140	140	MBRS120	141
MBR140SF	140	MBRA160	140	MBRS130	141
MBR150	143	MBRA210E	138,140	MBRS130L	138,141
MBR1535CT	144	MBRA210L	138,140	MBRS140	141
MBR1545CT	144	MBRA340	140	MBRS140L	141

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MBRS1540	141	MC100E164	282	MC100EL59	282
MBRS190	141	MC100E166	286	MC100EL90	268
MBRS2040L	141	MC100E167	282	MC100EL91	268
MBRS230L	138,141	MC100E171	282	MC100ELT20	268
MBRS240L	141	MC100E175	280	MC100ELT21	268
MBRS260	141	MC100E193	286	MC100ELT22	268
MBRS3100	141	MC100E195	273	MC100ELT23	268
MBRS320	141	MC100E196	273	MC100ELT24	268
MBRS3200	138,141	MC100E210	270	MC100ELT25	268
MBRS3201	138,141	MC100E211	270	MC100ELT28	268
MBRS330	141	MC100E212	281,290	MC100EP01	284
MBRS340	141	MC100E241	281	MC100EP016A	285
MBRS360T3	141	MC100E256	282	MC100EP05	284
MBRS410E	138,141	MC100E310	270	MC100EP08	284
MBRS410L	138,141	MC100E404	284	MC100EP101	284
MBRS4201	138,141	MC100E416	287	MC100EP105	284
MBRS540	141	MC100E431	278	MC100EP11	270
MBT2222ADW1T1	172,178	MC100E445	283	MC100EP116	287
MBT35200M	171	MC100E446	283	MC100EP131	278,281
MBT3904DW1T1	172,178	MC100E451	281	MC100EP139	272
MBT3906DW1T1	172,178	MC100E452	281	MC100EP14	270
MBT3946DW1T1	172,178	MC100E457	282	MC100EP140	277
MBT6429DW1T1	172	MC100EL01	284	MC100EP142	281
MC10/100E160	286	MC100EL04	284	MC100EP16	287
MC10/100EP16VB	287	MC100EL05	284	MC100EP16F	287
MC10/100EP16VC	287	MC100EL07	284	MC100EP16T	287
MC100E016	285	MC100EL11	270	MC100EP16VA	287
MC100E101	284	MC100EL12	290	MC100EP16VB	287
MC100E104	284	MC100EL13	270	MC100EP16VC	287
MC100E107	284	MC100EL14	270	MC100EP16VS	287
MC100E111	270	MC100EL15	270	MC100EP16VT	288
MC100E112	290	MC100EL16	287	MC100EP17	288
MC100E116	287	MC100EL1648	277	MC100EP195	273
MC100E122	290	MC100EL17	287	MC100EP196	273
MC100E131	278	MC100EL29	278	MC100EP210S	270
MC100E136	285	MC100EL30	278	MC100EP29	278
MC100E137	285	MC100EL31	278	MC100EP31	278
MC100E141	281	MC100EL32	272	MC100EP32	272
MC100E142	281	MC100EL33	272	MC100EP33	272
MC100E143	281	MC100EL34	272	MC100EP35	278
MC100E150	280	MC100EL35	278	MC100EP40	277
MC100E151	280,281	MC100EL38	272	MC100EP445	283
MC100E154	280	MC100EL39	272	MC100EP446	283
MC100E155	280	MC100EL51	278	MC100EP451	281
MC100E156	280	MC100EL52	278	MC100EP51	278
MC100E157	282	MC100EL56	282	MC100EP52	278
MC100E158	282	MC100EL57	282	MC100EP56	282
MC100E163	282	MC100EL58	282	MC100EP57	282

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MC100EP58	282	MC100LVEP210	270	MC10EL11	271
MC100EP809	270	MC100LVEP34	272	MC10EL12	290
MC100EP90	268	MC10E016	285	MC10EL15	271
MC100EPT20	268	MC10E101	284	MC10EL16	288
MC100EPT21	268	MC10E104	284	MC10EL30	279
MC100EPT22	268	MC10E107	284	MC10EL31	279
MC100EPT23	268	MC10E111	270	MC10EL32	272
MC100EPT24	268	MC10E112	290	MC10EL33	272
MC100EPT25	268	MC10E116	288	MC10EL34	272
MC100EPT26	268	MC10E122	290	MC10EL35	279
MC100EPT622	268	MC10E131	279	MC10EL51	279
MC100LVE111	270	MC10E136	285	MC10EL52	279
MC100LVE164	282	MC10E137	285	MC10EL56	283
MC100LVE210	270	MC10E141	281	MC10EL57	283
MC100LVE222	272	MC10E142	281	MC10EL58	283
MC100LVE310	270	MC10E143	281	MC10ELT20	268
MC100LVEL01	284	MC10E150	280	MC10ELT21	268
MC100LVEL05	284	MC10E151	280,281	MC10ELT22	269
MC100LVEL11	270	MC10E154	280,282	MC10ELT24	269
MC100LVEL12	290	MC10E155	280,282	MC10ELT25	269
MC100LVEL13	270	MC10E156	280,282	MC10ELT28	269
MC100LVEL14	270	MC10E157	282	MC10EP01	284
MC100LVEL16	288	MC10E158	282	MC10EP05	284
MC100LVEL17	288	MC10E163	283	MC10EP08	285
MC100LVEL29	278	MC10E164	283	MC10EP101	285
MC100LVEL30	278	MC10E1651	286	MC10EP105	285
MC100LVEL31	278	MC10E1652	286	MC10EP11	271
MC100LVEL32	272	MC10E166	286	MC10EP116	288
MC100LVEL33	272	MC10E167	283	MC10EP131	279
MC100LVEL34	272	MC10E171	283	MC10EP139	272
MC100LVEL37	272	MC10E175	280	MC10EP142	281
MC100LVEL38	272	MC10E195	273	MC10EP16	288
MC100LVEL39	272	MC10E196	273	MC10EP16T	288
MC100LVEL40	277	MC10E211	270	MC10EP16VA	288
MC100LVEL51	279	MC10E212	290	MC10EP16VB	288
MC100LVEL56	282	MC10E404	284	MC10EP16VC	288
MC100LVEL58	282	MC10E411	271	MC10EP16VT	289
MC100LVEL59	282	MC10E416	288	MC10EP17	289
MC100LVEL90	268	MC10E431	279	MC10EP195	273
MC100LVEL91	268	MC10E445	283	MC10EP196	273
MC100LVEL92	268	MC10E446	283	MC10EP29	279
MC100LVELT20	268	MC10E451	281	MC10EP31	279
MC100LVELT22	268	MC10E452	281	MC10EP32	272
MC100LVELT23	268	MC10E457	283	MC10EP33	273
MC100LVEP11	270	MC10EL01	284	MC10EP35	279
MC100LVEP111	270	MC10EL04	284	MC10EP445	283
MC100LVEP14	270	MC10EL05	284	MC10EP446	283
MC100LVEP16	288	MC10EL07	284	MC10EP451	281

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MC10EP51	279	MC14052B	102,315	MC1455D	295
MC10EP52	279	MC14053B	102,315	MC1455P	295
MC10EP56	283	MC14060B	315	MC14562B	316
MC10EP57	283	MC14066B	102,315	MC14569B	316
MC10EP58	283	MC14067B	102,315	MC14572UB	316
MC10EP90	269	MC14069UB	315	MC14584B	316
MC10EPT20	269	MC14070B	315	MC14585B	316
MC10H141	281	MC14071B	315	MC14598B	316
MC10LVLE58	283	MC14073B	315	MC1488	294
MC10LVEP11	271	MC14076B	315	MC1489	294
MC10LVEP16	289	MC14077B	315	MC1496BD	295
MC12026A	274	MC14081B	315	MC1496BP	295
MC12080	274	MC14082B	315	MC1496D	295
MC12093	274	MC14093B	315	MC1496P	295
MC12095	274	MC14094B	315	MC26LS30	294
MC14001B	314	MC14099B	315	MC3302	98
MC14001UB	314	MC14106B	315	MC33023	22,23,36
MC14007UB	314	MC1413	62,68,294	MC33025	22,26,36
MC14008B	314	MC14174B	315	MC3303	95
MC14011B	314	MC14175B	315	MC33030	68,71
MC14011UB	314	MC14490	315	MC33033	68,73
MC14012B	314	MC14503B	315	MC33035	68,73
MC14013B	314	MC14504B	315	MC33039	68,71
MC14014B	314	MC14511B	315	MC33060A	22,23,36
MC14015B	314	MC14512B	315	MC33063	31,34
MC14016B	102,314	MC14513B	315	MC33064	55,56
MC14017B	314	MC14514B	315	MC33067	22,25
MC14018B	314	MC14515B	315	MC33071	91
MC14020B	314	MC14516B	315	MC33072	93
MC14021B	314	MC14517B	316	MC33074	95
MC14022B	314	MC14518B	316	MC33077	93
MC14023B	314	MC14520B	316	MC33078	93
MC14024B	314	MC14521B	316	MC33079	95
MC14025B	314	MC14526B	316	MC33151	62,63
MC14027B	314	MC14528B	316	MC33152	62,63
MC14028B	314	MC14532B	316	MC33153	62,63
MC14029B	314	MC14536B	316	MC33160	41,42,51,55,74
MC1403	39,40	MC14538B	316	MC33161	55,56
MC1403B	39	MC14541B	316	MC33163	34
MC14040B	314	MC14543B	316	MC33164	55,56
MC14042B	314	MC14549B	316	MC33166	31,32,34
MC14043B	314	MC14551B	102,316	MC33167	31,32,34
MC14044B	314	MC14553B	316	MC33171	91
MC14046B	314	MC14555B	316	MC33172	93
MC14049B	314	MC14556B	316	MC33172V	93
MC14049UB	314	MC14557B	316	MC33174	95
MC14050B	314	MC14559B	316	MC33174V	95
MC14051B	102,315	MC1455B	295	MC33178	93

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MC33179	95	MC34167	31,32,34	MC74ACT08	311
MC33201	91	MC3423	55,56	MC74ACT10	311
MC33202	94	MC34262	19,20	MC74ACT11	311
MC33204	96	MC34268	44,49,75	MC74ACT125	311
MC33204V	96	MC3479	68,72	MC74ACT132	311
MC33232	19,20	MC44604	22,23,36	MC74ACT138	312
MC33260	19,20	MC44605	22,23,36	MC74ACT139	312
MC33262	19,20	MC44608	22,23,36	MC74ACT14	311
MC33269	44,45,49	MC74AC00	311	MC74ACT153	312
MC33272A	94	MC74AC02	311	MC74ACT157	312
MC33274A	96	MC74AC04	311	MC74ACT161	312
MC33275	44,48	MC74AC05	311	MC74ACT163	312
MC33340	60,61,76	MC74AC08	311	MC74ACT20	311
MC33341	39,60,61,76	MC74AC10	311	MC74ACT240	312
MC33342	60,61,76	MC74AC11	311	MC74ACT241	312
MC33363	29,30	MC74AC125	311	MC74ACT244	312
MC33364	25	MC74AC132	311	MC74ACT245	312
MC33364	22	MC74AC138	311	MC74ACT253	312
MC33368	19,20	MC74AC139	312	MC74ACT257	312
MC33375	44,48	MC74AC14	311	MC74ACT259	312
MC33470	38,75	MC74AC157	312	MC74ACT273	312
MC33501	91	MC74AC161	312	MC74ACT32	311
MC33502	94	MC74AC163	312	MC74ACT373	313
MC33503	91	MC74AC20	311	MC74ACT374	313
MC33565	41,42,75	MC74AC240	312	MC74ACT377	313
MC33567	45,50,75	MC74AC244	312	MC74ACT540	313
MC33761	44,46	MC74AC245	312	MC74ACT541	313
MC33762	45,46	MC74AC253	312	MC74ACT564	313
MC33765	45,49	MC74AC257	312	MC74ACT573	313
MC34023	22,23,36	MC74AC259	312	MC74ACT574	313
MC34025	22,26,36	MC74AC273	312	MC74ACT640	313
MC3403	96	MC74AC32	311	MC74ACT646	313
MC34060A	22,23,36	MC74AC373	312	MC74ACT652	313
MC34063	31,34	MC74AC374	313	MC74ACT74	311
MC34064	55,56	MC74AC377	313	MC74ACT86	311
MC34067	22,25	MC74AC4040	313	MC74HC00A	308
MC34071	92	MC74AC540	313	MC74HC02A	308
MC34072	94	MC74AC541	313	MC74HC03A	308
MC34074	96	MC74AC573	313	MC74HC04A	308
MC34074A	96	MC74AC574	313	MC74HC08A	308
MC34074V	96	MC74AC646	313	MC74HC125A	308
MC34151	62,63	MC74AC652	313	MC74HC126A	308
MC34152	62,63	MC74AC74	311	MC74HC132A	308
MC34160	41,42,55	MC74AC86	311	MC74HC138A	308
MC34161	55,56	MC74ACT00	311	MC74HC139A	308
MC34163	31,34	MC74ACT02	311	MC74HC14A	308
MC34164	55,56	MC74ACT04	311	MC74HC157A	308
MC34166	31,32,34	MC74ACT05	311	MC74HC161A	308

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MC74HC163A	308	MC74HCT04A	308	MC74LVX08	305
MC74HC164A	308	MC74HCT138A	308	MC74LVX125	305
MC74HC165A	308	MC74HCT14A	308	MC74LVX126	305
MC74HC174A	308	MC74HCT244A	308	MC74LVX132	305
MC74HC175A	308	MC74HCT245A	309	MC74LVX138	305
MC74HC1G00	300	MC74HCT273A	309	MC74LVX139	305
MC74HC1G02	300	MC74HCT373A	309	MC74LVX14	305
MC74HC1G04	300	MC74HCT374A	309	MC74LVX157	305
MC74HC1G08	300	MC74HCT541A	309	MC74LVX240	305
MC74HC1G14	300	MC74HCT573A	309	MC74LVX244	305
MC74HC1G32	300	MC74HCT574A	309	MC74LVX245	305
MC74HC1GU04	300	MC74HCT74A	308	MC74LVX257	306
MC74HC240A	308	MC74HCU04A	308	MC74LVX259	306
MC74HC244A	308	MC74LCX00	304	MC74LVX32	305
MC74HC245A	308	MC74LCX02	304	MC74LVX373	306
MC74HC273A	309	MC74LCX04	304	MC74LVX374	306
MC74HC32A	308	MC74LCX06	304	MC74LVX4051	306
MC74HC373A	309	MC74LCX07	304	MC74LVX4052	306
MC74HC374A	309	MC74LCX08	304	MC74LVX4053	306
MC74HC390A	309	MC74LCX125	305	MC74LVX4066	102,306
MC74HC393A	309	MC74LCX138	305	MC74LVX4245	306
MC74HC4020A	309	MC74LCX139	305	MC74LVX50	305
MC74HC4040A	309	MC74LCX14	304	MC74LVX540	306
MC74HC4046A	309	MC74LCX157	305	MC74LVX541	306
MC74HC4051	102	MC74LCX158	305	MC74LVX573	306
MC74HC4051A	309	MC74LCX16240	305	MC74LVX574	306
MC74HC4052	102	MC74LCX16244	305	MC74LVX74	305
MC74HC4052A	309	MC74LCX16245	305	MC74LVX8051	102,306
MC74HC4053	102	MC74LCX16373	305	MC74LVX8053	102,306
MC74HC4053A	309	MC74LCX16374	305	MC74LVX86	305
MC74HC4060A	309	MC74LCX240	305	MC74LVXC3245	306
MC74HC4066	102	MC74LCX244	305	MC74LVXT4051	306
MC74HC4066A	309	MC74LCX245	305	MC74LVXT4052	306
MC74HC4316	102	MC74LCX257	305	MC74LVXT4053	306
MC74HC4316A	309	MC74LCX258	305	MC74LVXT4066	102,306
MC74HC4538A	310	MC74LCX32	304	MC74LVXT8051	102,306
MC74HC4851	102	MC74LCX373	305	MC74LVXT8053	102,306
MC74HC4851A	310	MC74LCX374	305	MC74LVXU04	305
MC74HC4852	102	MC74LCX540	305	MC74VHC00	303
MC74HC4852A	310	MC74LCX541	305	MC74VHC02	303
MC74HC540A	309	MC74LCX573	305	MC74VHC04	303
MC74HC541A	309	MC74LCX574	305	MC74VHC08	303
MC74HC573A	309	MC74LCX74	304	MC74VHC125	303
MC74HC574A	309	MC74LCX86	305	MC74VHC126	303
MC74HC589A	309	MC74LCXU04	304	MC74VHC132	303
MC74HC595A	309	MC74LVX00	305	MC74VHC138	303
MC74HC74A	308	MC74LVX02	305	MC74VHC139	303
MC74HC86A	308	MC74LVX04	305	MC74VHC14	303

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MC74VHC157	303	MC74VHC573	304	MC79LxxA	41
MC74VHC1G00	300	MC74VHC574	304	MC79M00Series	42
MC74VHC1G01	300	MC74VHC74	303	MC79Mxx	41
MC74VHC1G02	300	MC74VHC86	303	MC79xx	41
MC74VHC1G03	300	MC74VHCT00A	303	MC79xxA	41
MC74VHC1G04	300	MC74VHCT02A	303	MCH12140	277
MC74VHC1G05	300	MC74VHCT04A	303	MCK12140	277
MC74VHC1G07	300	MC74VHCT08A	303	MCR08B	108
MC74VHC1G08	300	MC74VHCT125A	303	MCR08M	108
MC74VHC1G09	300	MC74VHCT126A	303	MCR100-3	108
MC74VHC1G125	300	MC74VHCT132A	303	MCR100-4	108
MC74VHC1G126	300	MC74VHCT138A	303	MCR100-6	108
MC74VHC1G132	300	MC74VHCT139A	303	MCR100-8	108
MC74VHC1G135	300	MC74VHCT14A	303	MCR106-6	108
MC74VHC1G14	300	MC74VHCT157A	303	MCR106-8	108
MC74VHC1G32	300	MC74VHCT240A	303	MCR12D	109
MC74VHC1G50	300	MC74VHCT244A	304	MCR12DCM	109
MC74VHC1G66	102,300	MC74VHCT245A	304	MCR12DCN	109
MC74VHC1G86	300	MC74VHCT257A	304	MCR12DSM	109
MC74VHC1GT00	300	MC74VHCT259A	304	MCR12DSN	109
MC74VHC1GT02	300	MC74VHCT32A	303	MCR12DSN-001	109
MC74VHC1GT04	300	MC74VHCT373A	304	MCR12LD	109
MC74VHC1GT08	300	MC74VHCT374A	304	MCR12LM	109
MC74VHC1GT125	300	MC74VHCT50A	303	MCR12LN	109
MC74VHC1GT126	300	MC74VHCT540A	304	MCR12M	109
MC74VHC1GT14	300	MC74VHCT541A	304	MCR12N	109
MC74VHC1GT32	300	MC74VHCT573A	304	MCR16N	110
MC74VHC1GT50	300	MC74VHCT574A	304	MCR218-2	109
MC74VHC1GT6	103	MC74VHCT74A	303	MCR218-4	109
MC74VHC1GT66	300	MC74VHCT86A	303	MCR218-6	109
MC74VHC1GT86	300	MC74VHCU04	303	MCR22-6	108
MC74VHC1GU04	300	MC75172B	294	MCR22-8	108
MC74VHC240	303	MC75174B	294	MCR25D	110
MC74VHC244	304	MC7800Series	42	MCR25M	110
MC74VHC245	304	MC78FC00Series	47	MCR25N	110
MC74VHC257	304	MC78FCxx	44	MCR310-10	109
MC74VHC259	304	MC78L00ASeries	42	MCR68-2	109
MC74VHC32	303	MC78LCxx	44,46	MCR69-2	110
MC74VHC373	304	MC78LxxA	41	MCR69-3	110
MC74VHC374	304	MC78M00Series	42	MCR703A	108
MC74VHC4051	103,304	MC78Mxx	41	MCR706A	108
MC74VHC4052	304	MC78MxxA	41	MCR708A	108
MC74VHC4053	304	MC78PC	44	MCR708A1	108
MC74VHC4066	103,304	MC78PC00Series	47	MCR716	108
MC74VHC4316	304	MC78xx	41	MCR718	108
MC74VHC50	303	MC78xxA	41	MCR72-3	109
MC74VHC540	304	MC7900Series	42	MCR72-6	109
MC74VHC541	304	MC79L00Series	42	MCR72-8	109

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MCR8DCM	109	MJ21193	161,165	MJE15035	158,164
MCR8DCN	109	MJ21194	161,165	MJE170	157
MCR8DSM	109	MJ21195	161	MJE171	157
MCR8DSN	109	MJ21196	161	MJE172	157
MCR8N	109	MJ2955	160	MJE180	157
MCR8SD	109	MJ4502	161	MJE18002	158,166
MCR8SM	109	MJ802	161	MJE18004	158,166
MCR8SN	109	MJB41CT4	157	MJE18004D2	158,166
MDC3105	62,68	MJB42CT4	157	MJE18006	159,166
MDC3105DM	78	MJB44H11T4	157	MJE18008	159,166
MDC3105L	78	MJB45H11T4	157	MJE181	157
MGSF1N02ELT1	201	MJD112T4	162	MJE182	157
MGSF1N02ELT1G	201	MJD117T4	162	MJE200	158
MGSF1N02ELT3	201	MJD122T4	162	MJE210	158
MGSF1N02L	194	MJD127T4	162	MJE243	158
MGSF1N03L	194	MJD148T4	157	MJE253	158
MGSF1P02ELT1	201	MJD18002D2T4	157,166	MJE270	162
MGSF1P02ELT3	201	MJD200T4	157	MJE271	162
MGSF1P02LT1	201	MJD210T4	157	MJE2955T	159
MGSF1P02LT1G	201	MJD243T4	157	MJE3055T	159
MGSF1P02LT3	201	MJD253T4	157	MJE340	157
MGSF1P02LT3G	201	MJD2955T4	157	MJE3439	157
MGSF2N02EL	194	MJD3055T4	157	MJE344	157
MGSF2P02HDT1	201	MJD31CT4	157	MJE350	157
MGSF3442VT1	201	MJD31T4	157	MJE371	158
MGSF3454VT1	201	MJD32CT4	157	MJE4343	160
MJ11012	163	MJD32T4	157	MJE4353	160
MJ11015	163	MJD340T4	157	MJE521	158
MJ11016	163	MJD350T4	157	MJE5730	158
MJ11021	163	MJD41CT4	157	MJE5731	158
MJ11022	163	MJD42CT4	157	MJE5731A	158
MJ11028	163	MJD44E3T4	162	MJE5742	162
MJ11030	163	MJD44H11T4	157	MJE5850	159
MJ11032	163	MJD45H11T4	157	MJE5851	159
MJ11033	163	MJD47T4	157	MJE5852	159
MJ14001	161	MJD50T4	157	MJE700	162
MJ14002	161	MJD5731T4	157	MJE702	162
MJ15001	160,164	MJD6039T4	162	MJE703	162
MJ15002	160,164	MJE13005	158	MJE800	162
MJ15003	161,164	MJE13007	159	MJE802	162
MJ15004	161,164	MJE13009	159	MJE803	162
MJ15011	160	MJE15028	159	MJF122	163
MJ15015	160,164	MJE15029	159	MJF127	163
MJ15016	160,164	MJE15030	159,164	MJF15030	160
MJ15022	161	MJE15031	159,164	MJF15031	160
MJ15023	161	MJE15032	159,164	MJF18004	160,166
MJ15024	161,165	MJE15033	159,164	MJF18008	160,166
MJ15025	161,165	MJE15034	158,164	MJF2955	160

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MJF3055	160	MM3Z13V	126	MM5Z2V7	126
MJF31C	160	MM3Z15V	126	MM5Z30V	126
MJF32C	160	MM3Z15V5	126	MM5Z33V	126
MJF44H11	160	MM3Z16V	126	MM5Z36V	127
MJF45H11	160	MM3Z16VS	126	MM5Z3V0	126
MJF47	160	MM3Z18V	126	MM5Z3V3	126
MJF6388	163	MM3Z18VS	126	MM5Z3V6	126
MJF6668	163	MM3Z20V	126	MM5Z47V	127
MJH11017	163	MM3Z22V	126	MM5Z4V7	126
MJH11019	163	MM3Z24V	126	MM5Z4V7S	126
MJH11020	163	MM3Z27V	126	MM5Z5V1	126
MJH11021	163	MM3Z2V4	126	MM5Z5V1S	126
MJH11022	163	MM3Z2V7	126	MM5Z5V6	126
MJH6284	163	MM3Z33V	126	MM5Z5V6S	126
MJH6287	163	MM3Z36V	127	MM5Z6V2S	126
MJL0281A	160,164	MM3Z39V	127	MM5Z6V8	126
MJL0302A	160,164	MM3Z3V0	126	MM5Z6V8S	126
MJL1302A	160,164	MM3Z3V3	126	MM5Z7V5	126
MJL21193	160,164	MM3Z3V3S	126	MM5Z8V2	126
MJL21194	160,164	MM3Z3V6	126	MM5Z8V2S	126
MJL21195	160,164	MM3Z3V9	126	MM5Z9V1	126
MJL21196	160,164	MM3Z3V9S	126	MM5Z9V1S	126
MJL3281A	160,164	MM3Z43V	127	MMBD101LT1	119
MJL4281A	160,165	MM3Z4V3	126	MMBD2835LT1	122
MJL4302A	160,165	MM3Z4V3S	126	MMBD2836LT1	122
MJW0281A	160,164	MM3Z4V7	126	MMBD2837LT1	122
MJW0302A	160,164	MM3Z4V7S	126	MMBD2838LT1	122
MJW1302A	160,165	MM3Z5V1	126	MMBD301LT1	119
MJW18020	160	MM3Z5V1S	126	MMBD330T1	119
MJW21191	160,164	MM3Z5V6	126	MMBD352LT1	119
MJW21192	160,164	MM3Z5V6S	126	MMBD352WT1	119
MJW21193	160,164	MM3Z6V2	126	MMBD353LT1	119
MJW21194	160,164	MM3Z6V2S	126	MMBD354LT1	119
MJW21195	160,164	MM3Z6V8	126	MMBD355LT1	119
MJW21196	160,164	MM3Z6V8S	126	MMBD452LT1	119
MJW3281A	160,165	MM3Z7V5	126	MMBD6050LT1	122
MKP1V120	115	MM3Z7V5S	126	MMBD6100LT1	122
MKP1V130	115	MM3Z8V2	126	MMBD7000LT1	122
MKP1V160	115	MM3Z8V2S	126	MMBD701LT1	119
MKP1V240	115	MM3Z9V1	126	MMBD717LT1	119
MKP3V120	115	MM3Z9V1S	126	MMBD770T1	119
MKP3V240	115	MM5Z10V	126	MMBD914LT1	122
MLD1N06CL	211	MM5Z12V	126	MMBF0201NL	194
MM3Z10V	126	MM5Z15V	126	MMBF0202PLT1	201
MM3Z10VS	126	MM5Z16V	126	MMBF0202PLT1G	201
MM3Z11V	126	MM5Z27V	126	MMBF170L	194
MM3Z12V	126	MM5Z2V4	126	MMBF170LT1G	206
MM3Z12VS	126	MM5Z2V4S	126	MMBF2201N	194

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MMBF2202P	194	MMBT6429LT1	169,173	MMBZ5227BL	127
MMBF4391LT1	190	MMBT6517LT1	176	MMBZ5227EL	127
MMBF4392LT1	190	MMBT6520LT1	176	MMBZ5228BL	127
MMBF4393LT1	190	MMBT6521L	170	MMBZ5229BL	127
MMBF4416LT1	190	MMBT8099LT1	168,175	MMBZ5230BL	127
MMBF5457LT1	190	MMBT918LT1	177	MMBZ5231BL	127
MMBF5460LT1	191	MMBTA05LT1	169,175	MMBZ5231EL	127
MMBF5484LT1	190	MMBTA06LT1	168,175	MMBZ5232BL	127
MMBFJ175LT1	190	MMBTA06WT1	170	MMBZ5232EL	127
MMBFJ177LT1	190	MMBTA13LT1	173	MMBZ5233BL	127
MMBFJ309LT1	190	MMBTA14LT1	173	MMBZ5234BL	127
MMBFJ310LT1	190	MMBTA42LT1	176	MMBZ5234EL	127
MMBFU310LT1	190	MMBTA43L	176	MMBZ5235BL	128
MMBT2131	171	MMBTA55LT1	169,175	MMBZ5236BL	128
MMBT2222ALT1	169,175,177	MMBTA56LT1	168,175	MMBZ5237BL	128
MMBT2222ATT1	171,175,178	MMBTA56WT1	170	MMBZ5237EL	128
MMBT2222AWT1	170,175,178	MMBTA63LT1	173	MMBZ5238BL	128
MMBT2222LT1	170,175	MMBTA64LT1	173	MMBZ5239BL	128
MMBT2369ALT1	177	MMBTA70LT1	169	MMBZ5240BL	128
MMBT2369LT1	177	MMBTA92LT1	176	MMBZ5240EL	128
MMBT2484LT1	169,173	MMBTH10-4L	177	MMBZ5241BL	128
MMBT2907ALT1	168,175,177	MMBTH10LT1	177	MMBZ5242BL	128
MMBT2907AM3T5G	171	MMBV105GLT1	118	MMBZ5242EL	128
MMBT2907AWT1	170,175,178	MMBV109LT1	118	MMBZ5243BL	128
MMBT3416L	169	MMBV2101LT1	118	MMBZ5243EL	128
MMBT3904LT1	169,177	MMBV2105LT1	118	MMBZ5244BL	128
MMBT3904TT1	171,178	MMBV2109LT1	118	MMBZ5244EL	128
MMBT3904WT1	170,178	MMBV3102LT1	118	MMBZ5245BL	128
MMBT3906LT1	169,177	MMBV3401LT1	121	MMBZ5245EL	128
MMBT3906TT1	171,178	MMBV3700LT1	121	MMBZ5246BL	128
MMBT3906WT1	170,178	MMBV409LT1	118	MMBZ5246EL	128
MMBT4124LT1	170	MMBV432LT1	118	MMBZ5247BL	128
MMBT4126LT1	170	MMBV609LT1	118	MMBZ5248BL	128
MMBT4401LT1	169,175,177	MMBV809LT1	118	MMBZ5248EL	128
MMBT4401WT1	170,178	MMBZ12VAL	134	MMBZ5249BL	128
MMBT4403LT1	169,175,177	MMBZ15VAL	134	MMBZ5250BL	128
MMBT4403WT1	170,178	MMBZ15VDL	133	MMBZ5251BL	128
MMBT489L	170	MMBZ15VDLT1	133	MMBZ5252BL	128
MMBT5087LT1	169,173	MMBZ18VAL	134	MMBZ5252EL	128
MMBT5088LT1	170,173	MMBZ20VAL	134	MMBZ5253BL	128
MMBT5089LT1	170,173	MMBZ27VAL	134	MMBZ5254BL	128
MMBT5401LT1	176	MMBZ27VCL	133	MMBZ5255BL	128
MMBT5550L	168	MMBZ33VAL	134	MMBZ5256BL	128
MMBT5550LT1	175,176	MMBZ5221BL	127	MMBZ5257BL	128
MMBT5551LT1	176	MMBZ5222BL	127	MMBZ5258BL	128
MMBT589L	170	MMBZ5223BL	127	MMBZ5259BL	128
MMBT6427LT1	173	MMBZ5225BL	127	MMBZ5261BL	128
MMBT6428LT1	169,173	MMBZ5226BL	127	MMBZ5261EL	128

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MMBZ5262BL	128	MMJT350T1	157	MMSZ39	130
MMBZ5263BL	128	MMJT9410T1	157	MMSZ3V0	129
MMBZ5264BL	128	MMJT9435T1	157	MMSZ3V3	129
MMBZ5265BL	128	MMQA12V	218,246	MMSZ3V6	129
MMBZ5268BL	128	MMQA13V	218,246	MMSZ3V9	129
MMBZ5270BL	128	MMQA15V	218,246	MMSZ43	130
MMBZ5V6AL	133	MMQA18V	218,246	MMSZ4678	129
MMBZ5V6ALT1	133,134	MMQA20V	218,246	MMSZ4679	129
MMBZ6V2AL	133	MMQA22V	218,246	MMSZ4680	129
MMBZ6V8AL	133	MMQA24V	218,246	MMSZ4681	129
MMBZ9V1AL	133	MMQA27V	218,246	MMSZ4682	129
MMDF1N05E	197	MMQA30V	218,246	MMSZ4683	129
MMDF2C03HD	196	MMQA33V	218,246	MMSZ4684	129
MMDF2N02E	196	MMQA5V6	218,246	MMSZ4684E	129
MMDF2P01HDR2	201	MMQA6V2	218,246	MMSZ4685	129
MMDF2P02E	197	MMQA6V8	218,246	MMSZ4686	129
MMDF2P02HD	197	MMSD103T1	122	MMSZ4687	129
MMDF2P03HDR2	201	MMSD301T1	119	MMSZ4688	129
MMDF3N02HD	196	MMSD4148T1	122	MMSZ4688E	129
MMDF3N03HDR2	201	MMSD701T1	119	MMSZ4689	129
MMDF3N04HD	196	MMSD914T1	122	MMSZ4689E	129
MMDF4N01HDR2	201	MMSF2P02ER2	202	MMSZ4690	129
MMDF4P03HDR2	201	MMSF3P02HD	197	MMSZ4690E	129
MMDF6N02HDR2	201	MMSF3P03HDR2	202	MMSZ4691	129
MMDF6N03HDR2	201	MMSF4N01HDR2	202	MMSZ4692	129
MMDFS2P102R2	201	MMSF4P01HDR2	202	MMSZ4693	129
MMDFS3P303R2	201	MMSF5N02HDR2	202	MMSZ4694	129
MMDFS6N303R2	201	MMSF5P02HDR2	202	MMSZ4695	129
MMDL101T1	119	MMSF7P03HD	197	MMSZ4696	129
MMDL301T1	119	MMSZ10	129	MMSZ4697	129
MMDL6050T1	123	MMSZ11	129	MMSZ4698	129
MMDL770T1	119	MMSZ12	129	MMSZ4699	129
MMDL914T1	123	MMSZ13	129	MMSZ4700	129
MMFT2955ET1	201	MMSZ15	129	MMSZ4701	129
MMFT2955ET1G	201	MMSZ15E	129	MMSZ4701E	129
MMFT2955ET3	201	MMSZ16	129	MMSZ4702	129
MMFT3055ET1	201	MMSZ18	129	MMSZ4702E	129
MMFT3055VLT1	201	MMSZ18E	129	MMSZ4703	129
MMFT3055VLT1G	201	MMSZ20	129	MMSZ4704	129
MMFT3055VLT3	201	MMSZ22	129	MMSZ4704E	129
MMFT3055VLT3-LF	202	MMSZ24	129	MMSZ4705	129
MMFT3055VLT3G	202	MMSZ27	129	MMSZ4706	129
MMFT3055VT1	202	MMSZ2V4	129	MMSZ4707	129
MMFT3055VT1G	202	MMSZ2V7	129	MMSZ4708	129
MMFT3055VT3	202	MMSZ2V7E	129	MMSZ4709	129
MMFT3055VT3G	202	MMSZ30	129	MMSZ4710	129
MMFT5P03HDT3	202	MMSZ33	129	MMSZ4711	129
MMFT960	196	MMSZ36	130	MMSZ4713	129

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MMSZ4714	129	MMSZ5252B	129	MMUN2231LT1	179
MMSZ4715	130	MMSZ5252E	129	MMUN2232LT1	179
MMSZ4717	130	MMSZ5253B	129	MMUN2233LT1	179
MMSZ4V3	129	MMSZ5254B	129	MMUN2234LT1	179
MMSZ4V7	129	MMSZ5254E	129	MMUN2238LT1	179
MMSZ51	130	MMSZ5255B	129	MMVL109T1	118
MMSZ5221B	129	MMSZ5256B	129	MMVL3401T1	121
MMSZ5221E	129	MMSZ5256E	129	MPF102	190
MMSZ5222B	129	MMSZ5257B	129	MPF4392	190
MMSZ5223B	129	MMSZ5257E	129	MPF4393	190
MMSZ5223E	129	MMSZ5258B	130	MPF9200	202
MMSZ5225B	129	MMSZ5259B	130	MPS2222	167,174
MMSZ5226B	129	MMSZ5259E	130	MPS2222A	167,174,177
MMSZ5226E	129	MMSZ5260B	130	MPS2907A	167,174,177
MMSZ5227B	129	MMSZ5260E	130	MPS4124	167
MMSZ5228B	129	MMSZ5261B	130	MPS4126	167
MMSZ5229B	129	MMSZ5262B	130	MPS4250	167
MMSZ5230B	129	MMSZ5263B	130	MPS5172	167
MMSZ5231B	129	MMSZ5264B	130	MPS650	174
MMSZ5232B	129	MMSZ5265B	130	MPS651	167,174
MMSZ5233B	129	MMSZ5266B	130	MPS6560	174
MMSZ5234B	129	MMSZ5267B	130	MPS6601	174
MMSZ5235B	129	MMSZ5268B	130	MPS6652	167,174
MMSZ5235E	129	MMSZ5270B	130	MPS6717	168,174
MMSZ5236B	129	MMSZ5272B	130	MPS6726	168,174
MMSZ5237B	129	MMSZ56	130	MPS750	174
MMSZ5237E	129	MMSZ5V1	129	MPS751	167,174
MMSZ5238B	129	MMSZ5V6	129	MPS8099	167,174
MMSZ5239B	129	MMSZ6V2	129	MPS8599	167,174
MMSZ5240B	129	MMSZ6V8	129	MPSA05	167,174
MMSZ5240E	129	MMSZ7V5	129	MPSA06	167,174
MMSZ5241B	129	MMSZ8V2	129	MPSA13	173
MMSZ5242B	129	MMSZ8V2E	129	MPSA14	173
MMSZ5242E	129	MMSZ9V1	129	MPSA18	167,173
MMSZ5243B	129	MMUN2111LT1	179	MPSA20	167
MMSZ5244B	129	MMUN2112LT1	179	MPSA27	173
MMSZ5244E	129	MMUN2113LT1	179	MPSA29	173
MMSZ5245B	129	MMUN2114LT1	179	MPSA42	176
MMSZ5245E	129	MMUN2115LT1	179	MPSA43	176
MMSZ5246B	129	MMUN2116LT1	179	MPSA44	176
MMSZ5246E	129	MMUN2132LT1	179	MPSA55	167,174
MMSZ5247B	129	MMUN2133LT1	179	MPSA56	167,174
MMSZ5248B	129	MMUN2211LT1	179	MPSA63	173
MMSZ5248E	129	MMUN2212LT1	179	MPSA64	173
MMSZ5249B	129	MMUN2213LT1	179	MPSA75	173
MMSZ5250B	129	MMUN2214LT1	179	MPSA77	173
MMSZ5250E	129	MMUN2215LT1	179	MPSA92	176
MMSZ5251B	129	MMUN2216LT1	179	MPSA93	176

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MPSH10	177	MSD1819A-RT1	170	MTB75N06HD	203
MPSH17	177	MSD42WT1	176	MTB75N06HDT4	203
MPSW01	168,174	MSD601-RT1	170	MTD10N10EL	203
MPSW01A	168,174	MSD602-RT1	170	MTD10N10ELT4	203
MPSW05	168,174	MSQA6V1W5	219,246	MTD10N10ELT4G	203
MPSW06	168,174	MSR1560	139,145	MTD1302	203
MPSW13	173	MSR860	139,145	MTD1302T4	203
MPSW42	176	MSRD620CT	139,145	MTD1312T4	203
MPSW45	173	MTB1306	202	MTD14N10ET4	203
MPSW45A	173	MTB1306T4	202	MTD15N06V	203
MPSW51	168,174	MTB20N20E	202	MTD15N06VL	203
MPSW51A	168,174	MTB20N20ET4	202	MTD15N06VL1	203
MPSW55	168,174	MTB23P06V	202	MTD15N06VLT4	203
MPSW56	168,174	MTB23P06VT4	202	MTD15N06VT4	203
MPSW63	173	MTB29N15E	202	MTD20N03HDL	203
MPSW92	176	MTB29N15E1	202	MTD20N03HDL1	203
MPX4729A	124	MTB29N15ET4	202	MTD20N03HDLG	203
MR2502	149	MTB2P50E	199	MTD20N03HDLT4	203
MR2504	149	MTB30N06VL	202	MTD20N03HDLT4G	203
MR2535L	139,150	MTB30N06VLT4	202	MTD20N06HD	203
MR2835SK	139,150	MTB30P06V	199	MTD20N06HD1	203
MR750	149	MTB33N10E	202	MTD20N06HDL	203
MR751	149	MTB33N10ET4	202	MTD20N06HDL1	203
MR752	149	MTB36N06V	202	MTD20N06HDLT4	203
MR754	149	MTB36N06VT4	202	MTD20N06HDLT4G	203
MR756	149	MTB40N10E	202	MTD20N06HDT4	203
MR852	149	MTB40N10ET4	202	MTD20N06HDT4G	203
MR854	149	MTB50N06V	202	MTD20N06V	203
MR856	149	MTB50N06VL	202	MTD20P03HDLT4	203
MRA4003	149	MTB50N06VLT4	202	MTD20P06HDLG	204
MRA4004	149	MTB50N06VT4	202	MTD20P06HDLT4	204
MRA4005	149	MTB50P03HDL	199	MTD20P06HDLT4G	204
MRA4006	149	MTB52N06V	202	MTD2955ET4	204
MRA4007	149	MTB52N06VL	202	MTD2955V	204
MRS1504	149	MTB52N06VLT4	202	MTD2955V1	204
MSA1162GT1	170	MTB52N06VT4	202	MTD2955V1G	204
MSA1162YT1	170	MTB55N06Z	202	MTD2955VG	204
MSB1218A-RT1	170	MTB55N06ZT4	203	MTD2955VT4	204
MSB709-RT1	170	MTB60N05HDL	203	MTD2955VT4G	204
MSB710-RT1	170	MTB60N05HDLT4	203	MTD3055ELT4	204
MSB92ASW	175,176	MTB60N06HD	203	MTD3055V	204
MSB92AWT1	176	MTB60N06HDT4	203	MTD3055V1	204
MSB92WT1	176	MTB75N03HDL	203	MTD3055VL	204
MSC2295-C	177	MTB75N03HDLT4	203	MTD3055VL1	204
MSC2712GT1	170	MTB75N05HD	203	MTD3055VLT4	204
MSC2712YT1	170	MTB75N05HDG	203	MTD3055VT4	204
MSD1328-RT1	170	MTB75N05HDT4	203	MTD3302	204
MSD1328-ST1	170	MTB75N05HDT4G	203	MTD3302T4	204

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MTD5P06V	199	MUN2132T1	179	MUN5311DW1T1	182
MTD5P06VT4G	207	MUN2211T1	179	MUN5312DW1T1	182
MTD6N15	198	MUN2212T1	179	MUN5313DW1T1	182
MTD6N20E	198	MUN2213T1	179	MUN5314DW1T1	182
MTD9N10E	204	MUN2214T1	179	MUN5315DW1T1	182
MTD9N10E1	204	MUN2215T1	179	MUN5316DW1T1	182
MTD9N10ET4	204	MUN2216T1	179	MUN5330DW1T1	182
MTDF2N06HDR2	204	MUN2230T1	179	MUN5333DW1T1	182
MTP10N10E	204	MUN2232T1	179	MUN5335DW1T1	182
MTP10N10EL	200	MUN2233T1	179	MUR105	147
MTP10N10ELG	201,204	MUN2234T1	179	MUR110	147
MTP12P10	200	MUN2237T1	179	MUR1100E	139,147
MTP1302	204	MUN2240T1	179	MUR115	147
MTP15N06V	204	MUN5111DW1T1	181	MUR120	147
MTP15N06VL	204	MUN5111T1	179	MUR130	147
MTP20N06V	204	MUN5112T1	179	MUR140	147
MTP23P06V	200	MUN5113DW1T1	181	MUR1510	148
MTP23P06VG	205	MUN5113T1	179	MUR1515	148
MTP2955V	204	MUN5114DW1T1	181	MUR1520	148
MTP2955VG	204	MUN5114T1	179	MUR1540	148
MTP29N15E	204	MUN5115DW1T1	181	MUR1560	148
MTP2P50E	200	MUN5116DW1T1	181	MUR160	147
MTP3055V	204	MUN5131T1	179	MUR1610CT	148
MTP3055VL	204	MUN5132DW1T1	181	MUR1615CT	148
MTP30N06VL	204	MUN5132T1	179	MUR1620CT	148
MTP33N10E	204	MUN5133DW1T1	181	MUR1620CTR	148
MTP36N06V	204	MUN5133T1	179	MUR1640CT	148
MTP40N10E	204	MUN5135DW1T1	181	MUR1660CT	148
MTP50N06V	204	MUN5135T1	179	MUR180E	139,147
MTP50N06VL	204	MUN5211DW1T1	181	MUR2020R	148
MTP50P03HDL	200	MUN5211T1	179	MUR2100E	147
MTP52N06V	204	MUN5212DW1T1	181	MUR220	147
MTP52N06VL	204	MUN5212T1	179	MUR240	147
MTP52N06VLG	204	MUN5213DW1T1	181	MUR260	147
MTP5P06V	205	MUN5213T1	179	MUR3020PT	148
MTP60N06HD	205	MUN5214DW1T1	181	MUR3020WT	148
MTP75N03HDL	205	MUN5214T1	179	MUR3040PT	148
MTP75N06HD	205	MUN5215DW1T1	181	MUR3060PT	148
MTSF2P02HDR2	205	MUN5215T1	179	MUR3060WT	148
MTSF2P03HDR2	205	MUN5216DW1T1	181	MUR405	147
MTW32N20E	200	MUN5230DW1T1	181	MUR410	147
MTW35N15E	205	MUN5230T1	179	MUR4100E	139,147
MTW45N10E	205	MUN5232DW1T1	181	MUR415	147
MTY100N10E	205	MUN5232T1	179	MUR420	147
MUN2111T1	179	MUN5233DW1T1	181	MUR440	147
MUN2112T1	179	MUN5233T1	179	MUR460	147
MUN2113T1	179	MUN5235DW1T1	181	MUR480E	139,147
MUN2114T1	179	MUN5235T1	179	MUR620CT	148

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
MUR805	148	MURS260	146	NB2308AI1HD	275
MUR810	148	MURS320	146	NB2308AI1HDT	275
MUR8100E	139,148	MURS340	146	NB2308AI2D	275
MUR815	148	MURS360	146	NB2308AI2DT	275
MUR820	148	MV104	118	NB2308AI3D	276
MUR840	148	MV209	118	NB2308AI3DT	276
MUR860	148	MV2105	118	NB2308AI4D	276
MUR880E	139,148	MV2109	118	NB2308AI4DT	276
MURA105	146	MZP4735A	124	NB2308AI5HD	276
MURA110	146	MZP4746A	124	NB2308AI5HDT	276
MURA115	146	MZP4749A	124	NB2309AC1D	276
MURA120	146	MZP4750A	125	NB2309AC1DT	276
MURA130	146	NB100ELT23L	269	NB2309AC1HD	276
MURA140	146	NB100EP223	271	NB2309AC1HDT	276
MURA160	146	NB100LVEP17	289	NB2309AI1D	276
MURA205	146	NB100LVEP221	271	NB2309AI1DT	276
MURA210	146	NB100LVEP222	273	NB2309AI1HD	276
MURA215	146	NB100LVEP224	271	NB2309AI1HDT	276
MURA220	146	NB100LVEP56	283	NB2579A	277
MURA230	146	NB100LVEP91	269	NB2669A	277
MURA240	146	NB2304AC1D	275	NB2760A	277
MURA260	146	NB2304AC1HD	275	NB2762A	277
MURB1620CT	146	NB2304AC2D	275	NB2769A	277
MURB1660CT	146	NB2304AI1D	275	NB2779A	277
MURD320	146	NB2304AI1HD	275	NB2780A	277
MURD330	146	NB2304AI2D	275	NB2869A	277
MURD340	146	NB2305AC1D	275	NB2870A	277
MURD620CT	146	NB2305AC1DT	275	NB2872A	277
MURF1620CT	148	NB2305AC1HD	275	NB2879A	277
MURF1660CT	148	NB2305AC1HDT	275	NB2969A	277
MURH840CT	139,148	NB2305AI1D	275	NB4L16M	288,289
MURH860CT	139,148	NB2305AI1DT	275	NB4L52	279
MURHB840CT	139,146	NB2305AI1HD	275	NB4L858M	269
MURHB860CT	139,146	NB2305AI1HDT	275	NB4N11M	271
MURHD560	139,146	NB2308AC1D	275	NB4N11S	271
MURHF860CT	139,148	NB2308AC1DT	275	NB4N316M	289
MURHS160	146	NB2308AC1HD	275	NB4N507A	274
MURS105	146	NB2308AC1HDT	275	NB4N5275	269
MURS110	146	NB2308AC2D	275	NB4N527S	289
MURS115	146	NB2308AC2DT	275	NB4N840M	269
MURS120	146	NB2308AC3D	275	NB6L11	271
MURS140	146	NB2308AC3DT	276	NB6L16	289
MURS160	146	NB2308AC4D	276	NB6L239	273
MURS205	146	NB2308AC4DT	276	NB6N239S	273
MURS210	146	NB2308AC5HD	276	NB7L111M	271
MURS220	146	NB2308AC5HDT	276	NB7L11M	271
MURS230	146	NB2308AI1D	275	NB7L14M	271
MURS240	146	NB2308AI1DT	275	NB7L216	289

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NB7L32M	273	NCP1200	22	NCP1530	31,32
NB7L86M	283,285	NCP1201	22,23,36	NCP1550	31,35
NB7N017M	273	NCP1203	22,23,36	NCP1562	22,24,36,75
NBC12429	274	NCP1205	25	NCP1571	31,35
NBC12429A	274	NCP1205	22	NCP1575	26,31,35
NBC12430	274	NCP1207A	22,25	NCP1580	31,35
NBC12430A	274	NCP1212	22,23,36	NCP1582	31,35,75
NBC12439	274	NCP1215A	22,25	NCP1582A	31,35
NBC12439A	274	NCP1216	22,23,36	NCP1583	31,35,75
NBSG11	271	NCP1216A	22,23,36	NCP1586	75
NBSG111	271	NCP1217	22,24,36	NCP1588	75
NBSG14	271	NCP1217A	22,24,36	NCP1595	75
NBSG16	289	NCP1230	22,24,36	NCP1595A	31,32
NBSG16M	289	NCP1271	22,24,36	NCP1601	19,20,21
NBSG16VS	289	NCP1280	24,36	NCP1603	19,21,22,24,36
NBSG53A	273	NCP1280	22	NCP1605	19
NBSG72A	269	NCP1282	22,24,36	NCP1606	19,20
NBSG86A	283,285	NCP1308	22,25	NCP1650	19,20
NCN4555	295	NCP1337	22,25	NCP1651	19,21
NCN4557	295	NCP1351	22,25	NCP1652	19,21
NCN6000	295	NCP1377	22,25	NCP1653	19,20
NCN6001	295	NCP1378	25	NCP1653A	19,20
NCN6004A	295	NCP1378	22	NCP1654	19,20
NCN6010	295	NCP1381	22,25	NCP1729	31,76
NCP100	39,40	NCP1395A	22,26,36	NCP1800	60,61,76
NCP1000	29,30	NCP1395B	22,36	NCP18335/B	76
NCP1001	29,30	NCP1396	22,36	NCP1835	60,61
NCP1002	29,30	NCP1400	31,33	NCP1835B	60,61
NCP1010	29,30	NCP1400ASN50	59,77	NCP2809	99
NCP1011	29,30	NCP1402	31,33	NCP2820	99
NCP1012	29,30	NCP1403	31,33	NCP2821	99
NCP1013	29,30	NCP1406	31,33,58,59,76,77	NCP2860	44,45,48
NCP1014	29,30	NCP1410	31,33	NCP2890	99
NCP1027	29,30	NCP1421	31,33,59,76,77	NCP2892A	99
NCP1028	29,30	NCP1421/2	58	NCP300	55,56
NCP1030	36,37,75	NCP1422	31,33,59,76,77	NCP301	56
NCP1031	36,37,75	NCP1423	31,33	NCP301	55
NCP1050	29,30	NCP1450	31,35	NCP302	55,57
NCP1051	29,30	NCP1450A	58,76	NCP303	55,57
NCP1052	29,30	NCP1500	31,32	NCP304	55,57
NCP1053	29,30	NCP1501	31,32	NCP305	55,57
NCP1054	29,30	NCP1510	31,32	NCP3063	31,34
NCP1055	29,30	NCP1519	31,32	NCP3063B	34
NCP1086	44,45,49	NCP1521	31,32	NCP3163	31,34
NCP1117	44,45,49	NCP1522	32	NCP3163B	34
	,75	NCP1523	31,32	NCP3334	45,48
NCP112	55,57	NCP1526	31,32	NCP3335	44,75
NCP1200	23,36	NCP1529	31,32	NCP3335A	45,48

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NCP3418B	75	NCP5331	38,75	NCS2200	97
NCP345	55,57,60,61	NCP5332A	38,75	NCS2201	97
NCP346	57,60,61	NCP5351	75	NCS2202	97
NCP346SN1	55	NCP5355	75	NCS2203	97
NCP346SN2	55	NCP5371	38,75	NCS7101	92
NCP348	60,61	NCP5382	38	NCV1009	39,40
NCP3488	75	NCP5385	38	NCV1117	51,53,74
NCP365	76	NCP5387	38	NCV1455B	295
NCP366	76	NCP5388	38	NCV2931	51,52,74
NCP368	76	NCP5389	38	NCV2931A	52
NCP3712A	55	NCP5422	31,35	NCV2951	51,52,74
NCP400	44,47,55	NCP5423	31,35	NCV2951A	52
NCP4300A	39	NCP5424	31,35	NCV300	55
NCP4330	22,36	NCP5425	31,35	NCV301	55
NCP4330DR2	28	NCP5426	44,47,62	NCV302	55
NCP4523	45,50	NCP5500	44,49	NCV303	55
NCP4672	45,50	NCP5501	44,48	NCV317	51,53,74
NCP4894	99	NCP5504	45,50	NCV33063	31,34
NCP4896	99	NCP551	44,47	NCV33064	55
NCP500	44,47	NCP553	44,46	NCV33161	55
NCP5005	59,77	NCP5602	58,59,76,77	NCV33164	55
NCP5005/6/7	58,76	NCP5603	31,58,59	NCV33269	51,53,74
NCP5006	59,77	NCP5604	58,76	NCV33274A	96
NCP5007	59,77	NCP5604B	77	NCV33275	51,53,74
NCP5008	58,76	NCP5608	58,59,76,77	NCV4264	52
NCP5010	58,59,76,77	NCP561	44,47	NCV4264-2	52
NCP502	44,46	NCP5612	58,59,76,77	NCV4269	51,52
NCP5030	31,33,58	NCP562	44,46	NCV4274	51,53
NCP5050	59,76,77	NCP563	44,46	NCV4274A	51,53
NCP5064A	59,77	NCP565	44,45,49,75	NCV4275	51,74
NCP5064B	59,77	NCP5661	44,45,49,75	NCV4276	51,53,74
NCP5106A	62,63	NCP5662	44,45,75	NCV4276A	51,53
NCP5106B	62,63	NCP5663	44,45,49,75	NCV4279	51,52,74
NCP511	44,47	NCP580	44,47	NCV4299	51,52
NCP5111	62,63	NCP582	44,48	NCV431A	39,40
NCP512	44,46	NCP583	44,48	NCV431B	39,40
NCP5181	62,63	NCP584	44,48	NCV4381B	39
NCP5201	75	NCP585	44,48	NCV494	22,26,36
NCP5203	75	NCP600	45,48	NCV4949	51,52,74
NCP5208	75	NCP612	44,47	NCV51411	31,32
NCP5210	75	NCP623	44,47	NCV5500	51,53,74
NCP5211	31,35	NCP630	44,45,49	NCV5501	53
NCP5211B	35	NCP631	44,50	NCV5504	51,54,74
NCP5215	75	NCP662	44,47	NCV551	51,52,74
NCP5220A	75	NCP663	44,47	NCV553	51,52,74
NCP5304	62,63	NCP803	55,57	NCV612	52
NCP5318	38,75	NCS2001	92	NCV662	52
NCP5322A	38,75	NCS2002	92	NCV663	52

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NCV7356	69,70	NIS5101E1T1G	81	NL27WZ126	301
NCV7361A	69,70	NIS5101E2T1	81	NL27WZ14	301
NCV7380	69,70	NIS5101E2T1G	81	NL27WZ16	301
NCV7382	69,70	NIS5102QP1HG	82	NL27WZ17	301
NCV7513	66	NIS5102QP2HG	82	NL27WZ32	301
NCV7601	65,66,69,71	NIS5112D1R2G	82	NL27WZ86	301
NCV7702	65,69,70	NIS5112D2R2G	82	NL27WZU04	301
NCV7702B	66	NIS6111QP	83	NL37WZ04	301
NCV78LxxA	52,74	NJD2873	185	NL37WZ06	301
NCV78xx	51,53,74	NJD2873T4	157	NL37WZ07	301
NCV8141	51,53,74	NJD35N04	162	NL37WZ14	301
NCV8184	51,52,74	NJL0281D	160,164	NL37WZ16	301
NCV8501	51,52,74	NJL0302D	160,164	NL37WZ17	301
NCV8502	51,53,74	NJL1302D	160,165	NL7SZ18	301,316
NCV8503	51,53,74	NJL21193D	160	NL7SZ19	301,316
NCV8504	51,53,74	NJL21194D	160	NLAS1053	103
NCV8505	51,53,74	NJL3281D	160,165	NLAS2066	103
NCV8506	51,53,74	NJL4281D	160,165	NLAS3158	103
NCV8508	51,53,74	NJL4302D	160,165	NLAS323	103
NCV8509	51,54,74	NJT4030P	157	NLAS324	103
NCV8512	53	NL17SV00	302	NLAS325	103
NCV8518	51,53	NL17SV02	302	NLAS3699	102
NCV8664	52	NL17SV04	302	NLAS3699B	102
NE5230	92	NL17SV08	302	NLAS3799	102,103
NE5517	99	NL17SV16	302	NLAS3799B	102
NE5517A	99	NL17SV32	302	NLAS4051	103
NE5532	94	NL17SZ00	301	NLAS4053	103
NE5532A	94	NL17SZ02	301	NLAS4157	102
NE5534	92	NL17SZ04	301	NLAS44599	103
NE5534A	92	NL17SZ06	301	NLAS4501	103
NE570	100	NL17SZ07	301	NLAS4599	103
NE592	94	NL17SZ08	301	NLAS4684	102
NE592D14	100	NL17SZ125	301	NLAS4717	102
NE592D8	100	NL17SZ126	301	NLAS4717EP	102
NE592N14	100	NL17SZ14	301	NLAS4783B	102
NE592N8	100	NL17SZ16	301	NLAS5123	102
NID5001N	211	NL17SZ17	301	NLAS5223	102
NID5003N	211	NL17SZ32	301	NLAS5223B	102
NID5004N	211	NL17SZ74	301	NLAS7222A	102
NID6002N	211	NL17SZ86	301	NLAS9431	103
NID9N05CL	211	NL17SZU04	301	NLASB3157	103
NIF5002N	210	NL27WZ00	301	NLAST4051	103
NIF5003N	210	NL27WZ02	301	NLAST44599	103
NIF62514	210	NL27WZ04	301	NLAST4501	103
NIF9N05CL	210	NL27WZ06	301	NLAST4599	103
NILMS4501N	209	NL27WZ07	301	NLAST9431	103
NIMD6302R	210	NL27WZ08	301	NLSF1174	316
NIS5101E1T1	81	NL27WZ125	301	NLSF2500	316

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NLSF3T125	316	NP0900SC	114	NSR0130P2	120
NLSF3T126	316	NP1100SA	114	NSR0140P2	120
NLSF595	316	NP1100SB	114	NSR0230P2	120
NLSV1T240MUTAG	317	NP1300SA	114	NSR0320MW2T1	119
NLSV1T244MUTAG	317	NP1300SB	114	NSR0320XV6T1	120
NLSV2T240MUTAG	317	NP1300SC	114	NSR15ADXV6	120
NLSV2T244MUTAG	317	NP1500SA	114	NSR30CM3T5G	120
NLSV4T240MUTAG	317	NP1500SB	114	NSS12100XV6	185
NLSV4T244MUTAG	317	NP1500SC	114	NSS12200L	184
NLSV4T3234FCT1G	317	NP1800SA	114	NSS12200MW6	184
NLSX3014MUTAG	317	NP1800SB	114	NSS12200W	184
NLU1G04MUTCG	302	NP1800SC	114	NSS12201L	184
NLU1G07MUTCG	302	NP2100SA	114	NSS12500UW3	184
NLU1G08MUTCG	302	NP2100SB	114	NSS12501UW3	184
NLU1G14MUTCG	302	NP2100SC	114	NSS12600CF8	184
NLU1G32MUTCG	302	NP2300SA	114	NSS12601CF8	184
NLU1G86MUTCG	302	NP2300SB	114	NSS20200L	184
NLU1GT04MUTCG	302	NP2300SC	114	NSS20201L	184
NLU1GT125MUTCG	302	NP2600SA	114	NSS20201MR6	184
NLU1GT126MUTCG	302	NP2600SB	114	NSS20300MR6	184
NLU1GT14MUTCG	302	NP2600SC	114	NSS20500UW3	184
NLU1GT32MUTCG	302	NP3100SA	114	NSS20501UW3	184
NLU1GT50MUTCG	302	NP3100SB	114	NSS20600CF8	184
NLU1GT86MUTCG	302	NP3100SC	114	NSS20601CF8	184
NLU1GU04MUTCG	302	NP3500SA	114	NSS30070MR6	184
NLU2G04MUTCG	302	NP3500SB	114	NSS30071MR6	184
NLU2G06MUTCG	302	NP3500SC	114	NSS30100L	184
NLU2G07MUTCG	302	NSB1010XV5T5	182	NSS30101L	184
NLU2G14MUTCG	302	NSB1011XV6T1	182	NSS30201MR6	184
NLU2G16MUTCG	302	NSB1706DMW5T1	182	NSS35200CF8	184
NLU2G17MUTCG	302	NSB9435	185	NSS35200MR6	184
NLU2GU04MUTCG	302	NSBA114EDXV6T1	181	NSS40200L	184
NLU3G14MUTCG	302	NSBA114YDXV6T1	181	NSS40200UW6	184
NLU3G16MUTCG	302	NSBA115EDXV6T1	181	NSS40201L	184
NLU3G17MUTCG	302	NSBA123JDXV6T1	181	NSS40300MZ4T1G	185
NLVHC1G66	103	NSBA144EDXV6T1	181	NSS40301MD08	172,185
NLVHC1GT66	103	NSBC114EDXV6T1	181	NSS40301MZ4T1G	185
NMF3000FC	261	NSBC114TDXV6T1	181	NSS40500UW3	184
NMFT3055AVLT1	205	NSBC114YDXV6T1	181	NSS40501UW3	184
NMFT3055AVLT3	205	NSBC115EDXV6T1	181	NSS40600CF8	184
NP0640SA	114	NSBC124EDXV6T1	181	NSS40601CF8	184
NP0640SB	114	NSBC143ZDXV6T1	181	NSS60200L	184
NP0640SC	114	NSBC144EDXV6T1	181	NSS60201L	184
NP0720SA	114	NSD914XV2T1	123	NSS60300MZ4T1G	185
NP0720SB	114	NSDEMP11XV6T1	123	NSS60301MZ4T1G	185
NP0720SC	114	NSL12AW	171	NST30010MXV6	172
NP0900SA	114	NSQA12VAW5	219,251	NST3904DXV6T1	172
NP0900SB	114	NSQA6V8AW5	219,251	NST3906DXV6T1	172

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NST3946DXV6T1	172	NTB60N06G	202,203,207	NTD24N06-1G	203
NST489AM	171	NTB60N06L	199	NTD24N06G	203
NTA4001N	192	NTB60N06LG	202	NTD24N06L	198
NTA4151P	192	NTB60N06LT4G	202,207	NTD24N06L-001	205
NTA4153N	192	NTB60N06T4G	202,203,207	NTD24N06L-1G	205
NTA7002N	192	NTB65N02R	199	NTD24N06LG	203
NTB125N02R	199	NTB75N03-6	199	NTD24N06LT4G	203
NTB13N10	199	NTB75N03L09	199	NTD24N06T4G	203
NTB18N06	199	NTB75N03L09G	202,203	NTD25P03L	198
NTB18N06G	205	NTB75N03L09T4G	202,203	NTD25P03LT4G	203,206
NTB18N06L	199	NTB75N03R	199	NTD2955	199
NTB18N06LT4G	205	NTB75N06	199	NTD2955-001	204,207
NTB18N06T4G	205,207	NTB75N06G	202,203	NTD2955-1G	204
NTB22N06	205	NTB75N06L	199,205	NTD2955G	204
NTB22N06L	205	NTB75N06LG	203,205	NTD2955T4G	204,206,207
NTB22N06LT4	205	NTB75N06LT4G	203	NTD3055-094	198
NTB22N06T4	205	NTB75N06T4G	203,207	NTD3055-094-1G	204,207
NTB23N03R	199,205	NTB85N03	199	NTD3055-094G	204,207
NTB23N03RG	205	NTB90N02	199	NTD3055-094T4G	204,207
NTB25P06	199	NTD110N02	197	NTD3055-150	198
NTB25P06G	202	NTD12N10	198	NTD3055-150G	207
NTB25P06T4G	202,206	NTD12N10G	204,207	NTD3055L104	198
NTB27N06L	205	NTD12N10T4G	204,206	NTD3055L104-001	204,207
NTB27N06LT4	205	NTD14N03R	198	NTD3055L104G	204,207
NTB30N06	199	NTD18N06	198	NTD3055L104T4G	204,207
NTB30N06L	199	NTD18N06-001	205	NTD3055L170	198
NTB30N06LG	205	NTD18N06-1G	205	NTD3055L170-001	205
NTB30N06LT4G	202,205	NTD18N06G	203	NTD3055L170-1G	205
NTB30N20	199	NTD18N06L	198	NTD30N02	197
NTB30N20G	202	NTD18N06L-1G	203	NTD32N06	198
NTB30N20T4G	202	NTD18N06LG	203	NTD32N06-001	205
NTB35N15	199	NTD18N06LT4G	203	NTD32N06-1G	205
NTB35N15G	202	NTD18N06T4G	203,207	NTD32N06L	198
NTB35N15T4G	202	NTD20N03L27	198	NTD32N06L-001	205
NTB4302	199	NTD20N03L27-1G	203	NTD32N06L-1G	205
NTB45N06	199	NTD20N03L27G	203	NTD40N03R	198
NTB45N06G	202	NTD20N03L27T4G	203	NTD40N03RT4	205
NTB45N06L	199	NTD20N06	198	NTD40N03RT4G	205
NTB45N06LG	202	NTD20N06-001	205	NTD4302	198
NTB45N06LT4G	202,207	NTD20N06-1G	205	NTD4302G	203,204
NTB45N06T4G	202,207	NTD20N06G	203	NTD4302T4G	203,204
NTB52N10	199	NTD20N06L	198	NTD4404NT4	205
NTB52N10G	202	NTD20N06L-001	207	NTD4404NT4G	205
NTB52N10T4G	202,207	NTD20P06L	199	NTD4804N	198
NTB5404N	199	NTD20P06LG	204	NTD4805N	198
NTB5405N	199	NTD20P06LT4G	204,207	NTD4806N	198
NTB5605P	199	NTD23N03R	198	NTD4808N	198
NTB60N06	199	NTD24N06	198	NTD4809N	198

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NTD4809NH	198	NTF6P02	196	NTHS4501NT1G	201,206
NTD4810N	198	NTGD1100L	194	NTHS5402T1	206
NTD4810NH	198	NTGD3133P	194	NTHS5402T1G	206
NTD4813N	198	NTGD4161P	194	NTHS5404	195
NTD4813NH	198	NTGS3433	194	NTHS5441	195
NTD4815N	198	NTGS3441	194	NTHS5443	195
NTD4815NH	198	NTGS3441P	194	NTHS5445T1	206
NTD50N03R	198	NTGS3441T1G	201	NTJD2152P	193
NTD5406N	198	NTGS3443	194	NTJD4001N	193
NTD5407N	198	NTGS3446	194	NTJD4105C	193
NTD60N02R	198	NTGS3446T1G	201	NTJD4105CT2G	206
NTD60N03	205	NTGS3455	194	NTJD4105CT4G	206
NTD60N03-001	205	NTGS4111P	194	NTJD4152P	193
NTD60N03T4	205	NTGS4111PT1	205	NTJD4158C	193
NTD65N03R	198	NTGS4111PT1G	205	NTJD4401N	193
NTD6600N	198	NTGS4141N	194	NTJS3151P	193
NTD6600NT4G	203	NTHC5513	195	NTJS3157N	193
NTD70N03R	198	NTHD2102P	195	NTJS4151P	193
NTD70N03R-001	205	NTHD2102PT1G	206	NTJS4160N	193
NTD70N03RG	205	NTHD3100C	195	NTJS4405N	193
NTD70N03RT4G	205	NTHD3100CT1G	205	NTJS4405NT4	206
NTD78N03	198	NTHD3100CT3	205	NTJS4405NT4G	206
NTD80N02	197	NTHD3100CT3G	205	NTK3043N	192
NTD85N02R	197,205	NTHD3101F	195	NTK3134N	192
NTD85N02R-001	205	NTHD3101FT1G	205	NTK3139P	192
NTD85N02R-1G	205	NTHD3101FT3	205	NTK3142P	192
NTD85N02RG	205	NTHD3101FT3G	205	NLGF3402P	196
NTD95N02R	197,205	NTHD3102C	195	NLGF3501N	196
NTD95N02R-001	205	NTHD4102P	195	NLJD2105L	193
NTD95N02R-1G	205	NTHD4401P	195	NLJD3115P	193
NTD95N02RG	205	NTHD4502N	195	NLJD3119C	192
NTE4151P	192	NTHD4502NT1G	206	NLJD4116N	192
NTE4153N	192	NTHD4508N	195	NLJF3117P	192
NTF2955	196	NTHD4508NT1G	206	NLJF3118N	192
NTF2955T1G	201	NTHD4N02F	195	NLJF4156N	192
NTF3055-100	196	NTHD4P02F	195	NLJS3113P	193
NTF3055-100T1G	201,202,205	NTHD5902T1	206	NLJS4114N	192
NTF3055-100T3G	202,204,205	NTHD5903	195	NLJS4159N	192
NTF3055-160T1	205	NTHD5904N	195	NLTD7900ZN	196
NTF3055-160T3	205	NTHD5904NT1G	206	NTMD2C02	196
NTF3055-160T3LF	205	NTHD5904NT3	206	NTMD2P01	197
NTF3055L108	196	NTHD5904NT3G	206	NTMD3P03	197
NTF3055L108T1G	201,205,206	NTHD5904T1	206	NTMD3P03R2G	201
NTF3055L108T3G	201,202	NTHD5905T1	206	NTMD4N03	196
NTF3055L108T3LFG	202	NTHS2101P	195	NTMD4N03R2G	201
NTF3055L175	196	NTHS2101PT1G	206	NTMD6N02	196
NTF5P03	196	NTHS4101P	195	NTMD6N02R2G	201
NTF5P03T3G	202	NTHS4501N	195	NTMD6N03	196

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NTMD6N03R2G	201	NTP27N06L	206	NTR4101P	195
NTMD6P02	197	NTP2955	200	NTR4501N	194
NTMFS4108N	197	NTP2955G	204	NTR4501NT1G	201,206
NTMFS4119N	197	NTP3055AV	206	NTR4501NT3	206
NTMFS4120N	197	NTP30N06	206	NTR4501NT3G	201
NTMFS4121N	197	NTP30N06L	200	NTR4502P	195
NTMFS4122N	197	NTP30N06LG	204,206,207	NTR4503N	194
NTMFS4701N	197	NTP30N20	200	NTS2101P	194
NTMFS4707N	197	NTP35N15	200	NTS4001N	194
NTMFS4708N	197	NTP35N15G	202,204	NTS4101P	194
NTMFS4744N	197	NTP45N06	200	NTS4409N	194
NTMFS4833N	197	NTP45N06G	204,206,207,208	NTTD1P02R2	206
NTMFS4834N	197	NTP45N06L	200	NTTD1P02R2G	206
NTMFS4835N	197	NTP45N06LG	204,208	NTTD4401FR	195
NTMFS4836N	197	NTP52N10	200	NTTD4401FR2	206
NTMFS4837N	197	NTP52N10G	204,205	NTTD4401FR2G	206
NTMFS4839N	197	NTP60N06	200	NTTS2P02	195
NTMFS4841N	197	NTP60N06G	204,205,208	NTTS2P02R2G	202,205
NTMS10P02	197	NTP60N06L	200	NTTS2P03	195
NTMS3P03	197	NTP60N06LG	204,208	NTTS2P03R2G	205
NTMS3P03R2G	202	NTP65N02R	200	NTY100N10	200
NTMS4107N	196	NTP75N03-6	200	NTY100N10G	205
NTMS4503N	196	NTP75N03L09	200	NTZD3152P	192
NTMS4705N	196	NTP75N03L09G	204,205	NTZD3154N	192
NTMS4706N	196	NTP75N03R	200	NTZD3155C	192
NTMS4N01	196	NTP75N06	200	NTZS3151P	192
NTMS4N01R2G	202	NTP75N06G	205,206	NUD3048M	209
NTMS4P01R2	206	NTP75N06L	206	NUD3105DM	78
NTMS5P02	197	NTP85N03	200,206	NUD3105L	78
NTMS5P02R2G	202,206	NTP85N03G	206	NUD3112	62,68
NTMS7N03	196	NTP90N02	200	NUD3112DM	79
NTMSD2P102	196	NTQD6866	194	NUD3112L	79
NTMSD2P102L	196	NTQD6866R2	206	NUD3124	68
NTMSD3P102	196	NTQD6866R2G	206	NUD3124DM	79
NTMSD3P102R2	206	NTQD6968N	194	NUD3124L	79
NTMSD3P102R2G	201,206	NTQD6968NR2	206	NUD3160DM	80
NTMSD3P303	196	NTQD6968NR2G	206	NUD3160L	80
NTMSD3P303R2G	201	NTQD6968R2	206	NUD4001DR2	80
NTMSD6N303	196	NTQD6968R2G	206	NUD4011DR2	80
NTMSD6N303R2G	201	NTR0202PL	195	NUF2015W1	262
NTP125N02R	200	NTR0202PLT1G	201	NUF2030XV6	262
NTP18N06	200	NTR1P02	195	NUF2042XV6	262
NTP18N06G	204,206	NTR1P02L	195	NUF2070MN	261
NTP18N06L	200	NTR1P02LT1G	201	NUF2101M	262
NTP18N06LG	204,206,207,208	NTR1P02T1G	201	NUF2114MN	261
NTP22N06	206	NTR1P02T3G	201	NUF2116MN	261
NTP22N06L	206	NTR2101P	194	NUF2220XV6	256
NTP27N06	200	NTR4003N	194	NUF2221W1	262

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
NUF2222FC	262	NUS2401SN	81	P6SMB100A	235
NUF2230XV6	256	NUS3045	60,61,76	P6SMB10A	235
NUF2240W1	256	NUS3045MN	84	P6SMB110A	235
NUF3101FC	256	NUS3046MN	84	P6SMB11CA	236
NUF4001MU	257	NUS3055MN	84	P6SMB120A	235
NUF4105FC	258	NZF220DF	256	P6SMB12A	235
NUF4107FC	263	NZF220T	256	P6SMB12CA	236
NUF4152MU	257	NZL5V6AXV3	245	P6SMB130A	235
NUF4210MN	257	NZL6V8AXV3	245	P6SMB13A	235
NUF4401MN	257	NZL7V5AXV3	245	P6SMB150A	235
NUF4402MN	257	NZMM7V0T4	260	P6SMB15A	235
NUF4403MN	257	NZQA5V6AXV5	219,251	P6SMB15CA	236
NUF6001MU	259	NZQA5V6XV5	219,247	P6SMB160A	235
NUF6105FC	259	NZQA6V2XV5	219,247	P6SMB16A	235
NUF6106FC	259	NZQA6V8AXV5	219,251	P6SMB16CA	236
NUF6401MN	258	NZQA6V8XV5	219,247	P6SMB180A	235
NUF6402MN	258	P2N2222A	174,177	P6SMB18A	235
NUF6406MN	258	P2N2907A	174,177	P6SMB18CA	236
NUF8001MU	260	P6KE100A	225	P6SMB200A	235
NUF8152MU	260	P6KE10A	225	P6SMB20A	235
NUF8401MN	259	P6KE12A	225	P6SMB20CA	236
NUF8402MN	259	P6KE13A	225	P6SMB22A	235
NUF8410MN	259	P6KE150A	225	P6SMB22CA	236
NUF9001FC	260	P6KE15A	225	P6SMB24A	235
NUF9002FC	260	P6KE160A	225	P6SMB24CA	236
NUP1105L	242	P6KE16A	225	P6SMB27A	235
NUP1301ML3	223,249	P6KE170A	225	P6SMB27CA	236
NUP2105L	220,244	P6KE180A	225	P6SMB30A	235
NUP2201MR6	222,250	P6KE18A	225	P6SMB30CA	236
NUP2202W1	222,250	P6KE200A	225	P6SMB33A	235
NUP2301MW6	223,250	P6KE20A	225	P6SMB33CA	236
NUP4060AXV6	219,252	P6KE22A	225	P6SMB36A	235
NUP4102XV6	220,252	P6KE24A	225	P6SMB36CA	236
NUP4103FC	220,247	P6KE27A	225	P6SMB39A	235
NUP412VP5	220,251	P6KE30A	225	P6SMB39CA	236
NUP4201DR2	221,252	P6KE33A	225	P6SMB43A	235
NUP4201MR6	222,253	P6KE36A	225	P6SMB43CA	236
NUP4202W1	222,253	P6KE39A	225	P6SMB47A	235
NUP4301MR6	221,253	P6KE43A	225	P6SMB47CA	236
NUP4302MR6	221,254	P6KE47A	225	P6SMB51A	235
NUP4304MR6	221,254	P6KE51A	225	P6SMB51CA	236
NUP45V6P5	220,251	P6KE56A	225	P6SMB56A	235
NUP46V8P5	220,251	P6KE6.8A	225	P6SMB56CA	236
NUP5120X6	218,248	P6KE62A	225	P6SMB6.8A	235
NUP8010MN	217,255	P6KE68A	225	P6SMB62A	235
NUS1204MN	84	P6KE7.5A	225	P6SMB62CA	236
NUS2045	60,61,76	P6KE75A	225	P6SMB68A	235
NUS2045MN	84	P6KE82A	225	P6SMB68CA	236

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
P6SMB7.5A	235	SA9.0A	224	SMF43A	229
P6SMB75A	235	SBSS138LT3	206	SMF45A	229
P6SMB8.2A	235	SD05	240	SMF48A	229
P6SMB82A	235	SD12	240	SMF5.0A	229
P6SMB82CA	236	SD12C	240	SMF51A	229
P6SMB9.1A	235	SE5532	94	SMF54A	229
P6SMB91A	235	SE5532A	94	SMF6.0A	229
PN2222	174	SE5534	92	SMF6.5A	229
PN2222A	174	SE5534A	92	SMF7.0A	229
PN2907A	174	SG3525	31,35	SMF7.5A	229
PZT2222AT1	171,175	SG3525A	26	SMF8.0A	229
PZT2907AT1	171,175	SG3535A	22,36	SMF9.0A	229
PZT651T1	171,175	SL05	223,249	SMFT3355VLT3	206
PZT751T1	171,175	SL15	223,249	SMS05	218,246
PZTA42T1	176	SL24	223,249	SMS05C	217,248
PZTA92T1	176	SM05	243	SMS12	218,246
PZTA96S	176	SM12	243	SMS12C	217,248
RB520S30T1	120	SMBF1026LT1	206	SMS15	218,246
RB521S30T1	120	SMBF1034LT1	206	SMS15C	217,248
RB751S40T1	120	SMBF1034LT1G	206	SMS24	218,246
RB751V40T1	119	SMBF1035LT3G	206	SMS24C	217,248
SA10A	224	SMBF1046LT1	206	SMTD10N10ELT4	206
SA12A	224	SMBF1049LT1	206	SMTD20P03HDLT4	206
SA13A	224	SMBF1057LT1	206	SMTD2955VT4	206
SA15A	224	SMBF1062LT1	206	SPF3161KRLRP	206
SA16A	224	SMBJ12AON	237	SS16	140
SA170A	224	SMF05	219,246	SS22	141
SA17A	224	SMF05C	217,248	SS24	141
SA18A	224	SMF10A	229	SS26	141
SA20A	224	SMF11A	229	STB23P06VT4	206
SA24A	224	SMF12A	229	STB30N06VLT4	207
SA26A	224	SMF12C	217,248	STB33N10E	207
SA28A	224	SMF13A	229	STB33N10ET4	207
SA30A	224	SMF14A	229	STB36N06VT4	207
SA33A	224	SMF15A	229	STB40N10ET4	207
SA36A	224	SMF15C	217,248	STB50N06ET4	207
SA5.0A	224	SMF17A	229	STB50N06VLT4	207
SA51A	224	SMF18A	229	STB52N06VLT4	207
SA5230	92	SMF20A	229	STB52N06VT4	207
SA5532	94	SMF22A	229	STB52N06VT4G	207
SA5534	92	SMF24A	229	STB60N06HDT4	207
SA5534A	92	SMF24C	217,248	STB75N06HDT4	207
SA571	100	SMF26A	229	STD1003T4	207
SA572D	100	SMF28A	229	STD1009V-001	207
SA575D	100	SMF30A	229	STD1009VT4	207
SA6.0A	224	SMF33A	229	STD1010ET4	207
SA64A	224	SMF36A	229	STD1010V	207
SA7.0A	224	SMF40A	229	STD1010VT4	207

Alphabetical Parts Listing

Device Number	Page	Device Number	Page	Device Number	Page
STD1013T4	207	TIP117	162	TLV431B	39,40
STD1028T4	207	TIP120	162	TRA2532	139,150
STD1030-001	207	TIP121	162	UAA2016	62,64,68,72
STD1039T4	207	TIP122	162	UC2842B	22,27
STD1040T4	207	TIP125	162	UC2843B	22,27
STD1045T4	207	TIP126	162	UC2844B	22,27
STD1057T4	207	TIP127	162	UC2845B	22,27
STD1066-001	207	TIP131	162	UC3842B	22,27
STD1068HDL-001	207	TIP132	162	UC3842BV	22,27
STD1069T4	207	TIP140	163	UC3843B	22,27
STD2000T4	207	TIP141	163	UC3843BV	22,27
STD2002T4	207	TIP142	163	UC3844B	22,27
STD2004-001	207	TIP147	163	UC3844BV	22,27
STD20P06HDLT4	207	TIP2955	160	UC3845B	22,27
STD3055VLT4	207	TIP29A	158	UC3845BV	22,27
STD5P06VT4	207	TIP29B	158	uESD12S	241
STD9N10ET4	207	TIP29C	158	uESD3.3D	245
STDP7222VT4	207	TIP3055	160	uESD3.3S	241
STF202-22	262	TIP30C	158	uESD5.0S	241
STP20N06VLF	207	TIP31	158	UMC3NT1	182
STP3055VL	207	TIP31A	158	UMC5NT1	182
STP30N06EL	207	TIP31B	158	UMZ1NT1	172
STP36N06V	207	TIP31C	158	VN2222LL	200
STP4119	207	TIP32	158	VN2222LLRL	208
STP4347	208	TIP32A	158	VN2222LLRLRAG	208
STP4348	208	TIP32B	158	VN2222LLRLRM	208
STP4384	208	TIP32C	158	VN2410L	200
STP4391	208	TIP33C	160		
STP50N06V	208	TIP35A	160		
STP60N06HDLF	208	TIP35C	160		
STP8023	208	TIP36A	160		
STW1019	208	TIP36C	160		
T2322B	111	TIP41A	159		
T2500D	112	TIP41B	159		
T2800D	112	TIP41C	159		
TCA0372	94	TIP42	159		
TCA0372B	94	TIP42A	159		
TDA1085C	68	TIP42B	159		
TIP100	162	TIP42C	159		
TIP101	162	TIP47	158		
TIP102	162	TIP48	158		
TIP106	162	TIP50	158		
TIP107	162	TL431A	39,40		
TIP110	162	TL431B	39,40		
TIP111	162	TL494	22,26,36		
TIP112	162	TL594	22,26,36		
TIP115	162	TLV431A	39,40		
TIP116	162	TLV431A/B	39		

Sales and Design Assistance from ON Semiconductor



www.onsemi.com

NORTH AMERICA SALES OFFICES & REP FIRMS

Alabama	Huntsville	e-Components	(256) 533-2444
	Huntsville	ON Sales Office	(256) 774-1004
Arizona	Phoenix	Centaur Corporation	(480) 839-2320
California	Irvine	Centaur Corporation	(949) 261-2123
	Los Angeles	Centaur Corporation	(805) 579-0519
	San Diego	Centaur Corporation	(858) 278-4950
CANADA	All Regions	Astec	(905) 607-1444
Colorado	Englewood	ON Sales Office	Karl Hill: (720) 895-1367 Mike Barone: (303) 670-8000
Connecticut	Monroe	Impact Technical Sales	(203) 268-7229
Florida	Boca Raton	e-Components	(561) 289-1379
	Lake Mary	e-Components	(407) 804-0042
	Plantation	ON Sales Office	(954) 325-1223
	Palm Harbor	e-Components	(727) 937-3016
	Melbourne	e-Components	(321) 676-5659
Georgia	Duluth	e-Components	(678) 380-5080
Illinois	Hoffman Estates	Stan Clothier	(847) 781-4010
Indiana	Fishers	Bear VAI	(317) 570-0707
	Kokomo	ON Sales Office	(765) 865-2091
Iowa	Cedar Rapids	Stan Clothier	(319) 393-1576
Kansas	Overland Park	Stan Clothier	(913) 894-1675
Maryland	Columbia	Third Wave Solutions	(410) 290-5990
Massachusetts	Burlington	Impact Technical Sales	(781) 238-8888
	Lowell	ON Sales Office	(978) 452-6075
Michigan	Livonia	ON Sales Office	(734) 953-6848
Minnesota	Eden Prairie	Stan Clothier	(952) 944-3456
Missouri	St. Charles	Stan Clothier	(636) 916-3777
New Jersey	Denville	CJR Associates	(973) 625-2796
New York	Long Island	CJR Associates	(973) 625-2796
	New York City	CJR Associates	(973) 625-2796
	Rochester	TriTech	(716) 385-6500
	Binghamton	TriTech	(607) 722-3580
	Brecksville	Bear VAI	(937) 748-1341
Oregon	Portland	SiFore Technical Sales	(503) 977-6267
Pennsylvania	Hatboro	Delta Technical Sales	(215) 957-0600
Texas	Austin	West Associates	(512) 343-1199
	Richardson	West Associates	(972) 680-2800
Washington	Bellevue	SiFore Technical Sales	(425) 990-4701
Wisconsin	Statewide	Stan Clothier	(847) 781-4010

ON Semiconductor Distribution Partners

Arrow Electronics	www.arrow.com	(800) 777-2776
Avnet	www.em.avnet.com	(800) 332-8638
Chip Supply	www.chipsupply.com	(407) 298-7100
Digi-Key	www.digikey.com	(800) 338-1003
EBV Elektronik	www.ebv.com/en/locations.html	(49) 8121 774-0
Farnell InOne	www.farnellinone.com	+44 8701 200 200
Future Electronics Europe	www.futureelectronics.com/contact	info-eur-future@futureelectronics.com
Future & FAI Electronics	www.futureelectronics.com/contact	1-800-FUTURE1 (388-8731)
Marubun/Arrow	www.marubunarrow.com	(852) 2375-1126
Minco	www.mincotech.com	(512) 834-2022
Mouser Electronics	www.mouser.com	(800) 346-6873
Newark Electronics	www.newark.com	(800) 4-NEWARK
NuVision	www.nuvision-tech.com	(886) 2 8228-0688
Rochester Electronics	www.rocelec.com	(978) 462-9332
Semi Dice Inc	www.semidice.com	1 (800) 345-6633
Silica (An Avnet Company)	www.silica.com	+33 1 6447 2929
WPI	www.wpi-group.com	(886) 2 2788-5200
Spoerle (An Arrow Company)	www.spoerle.de/de/about/offices	+49 6103 3040

INTERNATIONAL

BRAZIL	San Paulo	(55-11) 3842-8911
GREATER CHINA	Beijing	86-10-8518-2323
	Chengdu	86-28-8678-4078
	Hong Kong	852-2689-0088
	Shenzhen	86-755-8209-1128
	Shanghai	86-21-5131-7168
	Taipei, Taiwan	886-2-2377-9911

INTERNATIONAL

FRANCE	Paris	33 (0)1 39-26-41-00
GERMANY	Munich	49 (0) 89-93-0808-0
INDIA	Bangalore	91-80-2532-5084
ISRAEL	Herzelia	972 (0) 9-9609-111
ITALY	Milan	39 02-530-0951
JAPAN	Tokyo	81-3-5773-3850
KOREA	Seoul	82-2-2190-3500

INTERNATIONAL

MALAYSIA	Penang	60-4-226-9368
MEXICO	Guadalajara	(5233) 3123-9199
SINGAPORE	Singapore	65-6391-1260
SLOVAKIA	Piestany	421 33 790 2450
UNITED KINGDOM	Slough	44 (0) 1753 70 1676

Mar-07

ON Semiconductor and the ON logo are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada.

Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910

Japan Customer Focus Center
Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local
Sales Representative