



Micrel Shortform Catalog



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Corporate Profile

Micrel Inc., is a leading global manufacturer of IC solutions for the worldwide Analog, Ethernet and High Bandwidth markets. The Company's products include advanced mixed-signal, analog and power semiconductors; high performance communication, clock management, Ethernet switch and physical layer transceiver ICs. Company customers include leading manufacturers of enterprise, consumer, industrial, mobile, telecommunications, automotive, and computer products. Corporation headquarters and state-of-the-art wafer fabrication facilities are located in San Jose, CA with regional sales and support offices and advanced technology design centers situated throughout the Americas, Europe and Asia. In addition, the Company maintains an extensive network of distributors and reps worldwide. Web: <http://www.micrel.com>.

Founded in 1978, Micrel maintains a portfolio of world class wafer fabrication processes that enable the Company to produce new products faster than the competition. The Company uses, singularly or in combination, CMOS, Bipolar and DMOS technologies in its analog products. With the acquisition of Synergy Semiconductor in 1998, Micrel has high-speed bipolar capability in the form of ASSET™ (All Spacer Separated Element Transistor) process. This proprietary, patented bipolar technology employs a narrow deep-trench isolation technique allowing for electrical isolation between adjacent circuit elements. This means the Company can place multiple analog and digital functions on the same IC without the various functions causing interference typically found when alternate techniques are utilized.

Ethernet ICs

Micrel is a leader in Ethernet technology. The Company's Ethernet products are consistently used in Wireless, VoIP, IP-STB, Industrial, Embedded and Media Converter Ethernet applications, to name but a few. There are a wide range of field-proven, multi-port products in a variety of packages, including Physical Layer Transceivers (Phys), Embedded Controllers, Unmanaged and Managed Switches and System-on-chip (SoC) ICs with an integrated ARM processor and fully managed 5-port switch. Micrel's comprehensive portfolio of Ethernet products operate over commercial and industrial temperature ranges, and are available in a series of environmentally friendly, lead-free packaging options.

High-Bandwidth and Communication Semiconductor Solutions

Micrel's High-Bandwidth and Communication products include PMD (Physical Media Device) ICs such as multi-rate (up to 4.25Gbps) Laser drivers, post amplifiers and optical module management controllers for all types of fiber optical module applications. It also includes physical layer ICs such as 155Mbps and multi-rate (up to 2.7Gbps) CDRs (Clock and Data Recovery), and MUX/DeMUX ICs for Access and Telecommunications applications. This growing family of devices leads the industry in design innovation and flexibility. The ICs often exceed stringent industry requirements.

Precision Edge® Products

Micrel's Precision Edge® product family includes precision frequency synthesizers, clock distribution and translation, multiplexers, crosspoint switches, and high-speed gates—all aimed at meeting the most rigorous, timing-critical applications. All Precision Edge® products are designed to provide the lowest skew and jitter IC solutions available.

Low-Dropout Voltage Regulators

Micrel has gained a reputation as a leading supplier of LDO regulators and is a major global supplier to the mobile phone and computing industries. The Company maintains a very broad portfolio of LDO regulators ranging from 80mA devices in Teeny™ SC-70-5 packages to 7.5A power devices and LDO controllers for even higher current applications.

Radio Frequency Products

Micrel's RF offering consists of two product groups: QwikRadio® receivers and transmitters for actuation devices such as remote controls and remote keyless entry; and RadioWire® transceivers for connectivity applications such as wire replacement in industrial control and security systems.

Universal Serial Bus and PCMCIA

As a recognized leader of USB and PC Card power distribution solutions, Micrel's extensive selection of ICs are consistently used by many of the leading PC and peripheral OEMs.

Hot Swap Controllers

Micrel's hot swap power controllers support the industry requirement for high availability (24/7/365) operation in servers, telecom and datacom equipment, and enterprise storage networks. These products allow customers to upgrade or replace system boards without having to power down the entire system. Offering products for primary- and

secondary-side applications, Micrel's family of hot swap power controllers offers customers a wide range of product choices uniquely suited to these applications. This product portfolio includes the award-winning MIC2590B, the industry's most integrated dual-slot hot swap power controller for PCI and CompactPCI applications. Leveraging Micrel's expertise in power control and distribution, the MIC2590B was designed to support Intel's Itanium® 64-bit server platforms. To address the next generation, dual-slot power controllers are in development. For primary-side applications, the Company continues to add innovative products to the high-voltage hot swap product portfolio, addressing power control applications for the telecommunications, data communications, and data storage equipment markets.

MOSFET Drivers

Micrel offers a broad range of MOSFET drivers, ranging from IttyBitty® devices in SOT-23 packaging to 12A high-power devices. "New" device families offer thermally enhanced exposed pad SOIC, MSOP and space saving efficient MLF® 2mm x 2mm, 3mm x 3mm and 4mm x 4mm package options.

Switch-Mode Power Supply Products

Micrel has a rapidly expanding portfolio of switching regulator products serving the mobile device, portable computer, telecommunications and industrial markets. All products combine Micrel's advanced processes with the Company's strong design expertise to produce best-in-class products. These products address step-up, step-down and multi-output systems, all offering designers speed and efficiency advantages.

System/Thermal Management Products

Thermal management is an increasingly critical function in today's portable and high performance systems. Micrel's proprietary technology enables more functionality in smaller packages and superior, real-world accuracy in temperature measurement via embedded thermal diodes. Thermal diodes are increasingly used to monitor the die temperature of high-performance integrated circuits such as Intel® and AMD® microprocessors, Xilinx Virtex®, FPGAs, and ASICs. Micrel's family of products include the world's first and only IttyBitty® SOT-23 thermal diode supervisor IC and the smallest three-zone thermal supervisor. All together, Micrel offers a complete family of one, two, and three-zone thermal supervisor ICs as well as both analog and digital fan controllers.

Operational Amplifiers and Comparators

The Company has a broad range of high and low voltage op amps and comparators. These ICs range from general purpose to high speed devices. Of particular note is the MIC86x family of ICs which are, by far, the lowest power consumption op amps of their type on the market. The advanced features of these products make them ideally suited for all forms of battery-powered equipment.

Other Product Lines

- Charge pumps
- Voltage references
- Voltage/processor supervisors
- Miniature MOSFETs
- Serial and parallel-input latched drivers
- Display drivers
- Latch drivers
- Custom and semi-custom products

Big Technology, Small Package Innovation

In response to increasing demands for smaller and smaller footprint solutions, Micrel leads the industry in packaging innovation with IC packaging options, including MLF® technology, down to 1.2mm x 1.6mm and smaller

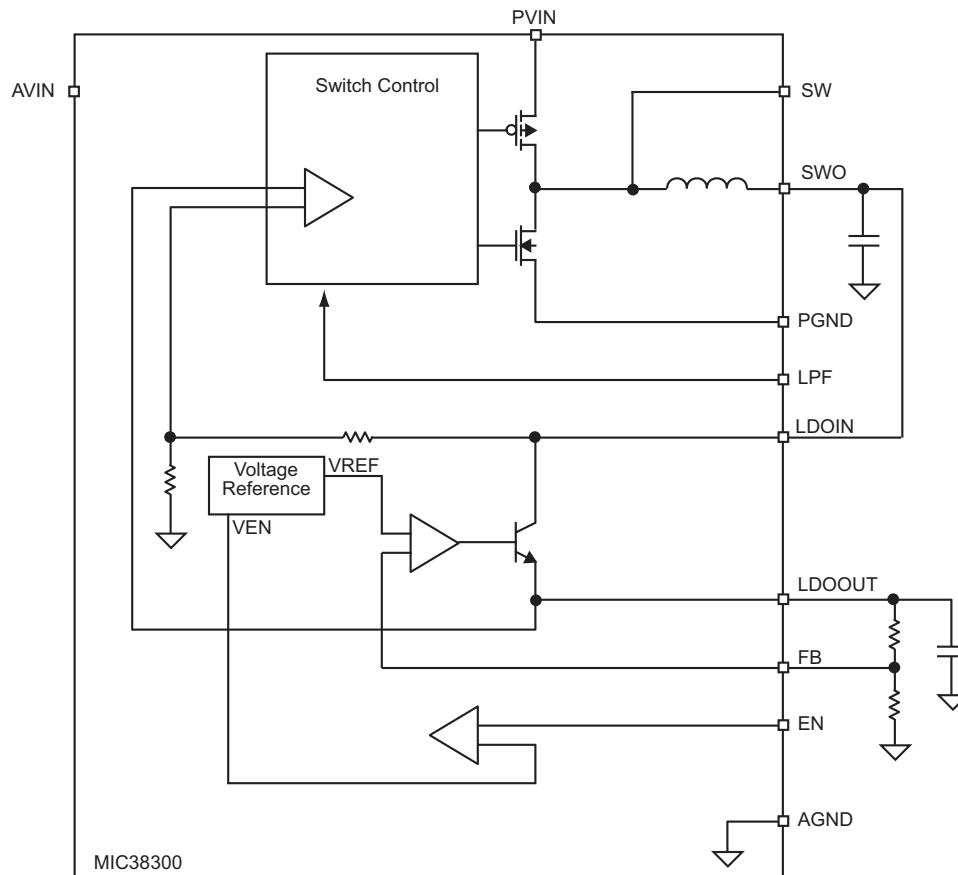
Quality Assurance

Micrel first achieved ISO 9001 registration on March 31, 1997 and in December of 2004, the Company's wafer fabrication facility was certified to ISO14001:1996, the International Environmental Management System Standard. The goal of the environmental management system is to ensure regulatory compliance and to reduce environmental impact through waste reduction and recycling. Micrel is committed to delivering products and services that meet or exceed our customers' expectations—error free, on-schedule, and at a competitive price. Micrel maintains a culture of continuous improvement that runs through all disciplines in the company and includes the activities of its suppliers.

Commitment to Customer Satisfaction

Micrel remains committed to contributing to its customers' success. Internal processes have been developed with flexibility in mind, so the Company can quickly react to changing requirements. Micrel's outstanding sales, customer service and technical support organizations are set up to address customer needs and requirements.

Analog Product Highlight — MIC38300–3A HELDO™



MIC38300 Block Diagram

The MIC38300 is a 3A peak, 2.2A continuous output current step down converter and the first device in a new generation of HELDO™ (High Efficiency Low Dropout) power conversion devices providing the benefits of LDOs in respect to ease-of-use, fast transient performance, high PSRR and low noise while offering the efficiency of a switching regulator.

As output voltages move lower, the output noise and transient response of a switching regulator become an increasing challenge for designers. By combining a switcher whose output is slaved to the input of a high performance LDO, high efficiency is achieved with a clean low noise output. The MIC38300 is designed to provide less than 5mV of peak to peak noise and over 70dB of PSRR at 1kHz. Furthermore, the architecture of the MIC38300 is optimized for fast load transients allowing to maintain less than 30mV of output voltage deviation even during ultra-fast load steps, making the MIC38300 an ideal choice for low voltage ASICs and other digital ICs.

The MIC38300 features a fully integrated switching regulator and LDO combo, operates with input voltages from 3.0V to 5.5V input and offers adjustable output voltages down to 1.0V.

Features

- 3A peak output current
- 2.2A continuous operating current
- Input voltage range: 3.0V to 5.5V
- Adjustable output voltage down to 1.0V
- Output noise less than 5mV
- Ultra fast transient performance
- Unique switcher plus LDO architecture
- Fully integrated MOSFET switches
- Micro-power shutdown
- Easy upgrade from LDO as power dissipation becomes an issue
- Thermal shutdown and current limit protection
- 4mm × 6mm × 0.9mm MLF® package

Applications

- Point-of-load applications
- Networking, server, industrial power
- Wireless base-stations
- Sensitive RF applications

LDO Regulator Selection Guide

Micrel Advantage

- Industry's broadest LDO portfolio
- Lowest input voltages
- Best transient performance
- Lowest quiescent current and dropout
- High PSRR, Low noise
- Small and efficient packaging

Single Outputs

Device	I _{OUT}	V _{IN}	V _{OUT}	I _{GND} (Typ.)	V _{DROPOUT} (Typ.)	Package	Comments	µCap
MIC5231	10mA	3.5V to 12V	2.75, 3.0, 3.3, 5.0	650nA	150mV	SOT-23		Yes
MIC5232 <i>New!</i>	10mA	2.7V to 5.5V	1.2, 2.8, 3.3	1.8µA	100mV	TSOT-23-5, MLF® (2x2mm)	Ultra Low I _Q µCap 10mA LDO with Reverse Current Protection	Yes
MIC5280 <i>New!</i>	25mA	4.5V to 120V	Adj.	31µA	1.1V	eSOIC-8	Wide Input Voltage Range	
MIC5203	80mA	2.5V to 16V	2.6, 2.8, 3.0, 3.3, 3.6, 3.8, 4.0, 4.5, 5.0	180µA	300mV	SOT-23		Yes
MIC5213	80mA	2.5V to 16V	2.5, 2.6, 2.7, 2.8, 3.0, 3.3, 3.6, 5.0	180µA	300mV	SC70		Yes
LP2950	100mA	2V to 30V	5.0, 5.0(0.5%)	100µA	380mV		2nd Source to Natl.	
LP2951	100mA	2V to 30V	5.0(0.5%), 5.0(1%), Adj.	100µA	380mV	SOIC, PDIP	2nd Source to Natl.	
MIC5200	100mA	2.5V to 26V	3.0, 3.3, 4.8, 5.0	130µA	230mV	MSOP, SOIC, SOT-223	Load Dump Protection.	
MIC5233	100mA	2.3V to 36V	1.8, 2.5, 3.0, 3.3, 5.0, Adj.	18µA	270mV	SOT-23	Reverse Battery Protection.	Yes
MIC5253	100mA	2.7V to 6V	1.5, 1.8, 1.85, 2.5, 2.6, 2.7, 2.8, 2.85, 2.9, 3.0, 3.1, 3.2, 3.3	100µA	165mV	SC70		Yes
MIC5270	100mA	-2V to -16V	-3.0, -4.1, -5.0, Adj.	35µA	480mV	SOT-23	Negative µCap LDO.	Yes
MIC5271	100mA	-3.3V to -16V	-3.0, -5.0, Adj.	35µA	480mV	SOT-23	Negative µCap LDO.	Yes
MIC2950	150mA	2V to 30V	5.0, 5.0(0.5%)	120µA	300mV		High V _{IN} , Load Dump Protection.	
MIC2951	150mA	2V to 30V	3.3, 4.85, 5.0(0.5%), 5.0(1%) Adj	120µA	300mV	MSOP, SOIC, PDIP	High V _{IN} , Load Dump Protection.	
MIC5301	150mA	2.3V to 5.5V	1.3, 1.5, 1.8, 2.1, 2.5, 2.85, 2.8, 2.9, 3.0, 3.3, 4.6, Adj.	85µA	40mV	TMLF-6, TSOT23-5 MLF® (1.6x1.6mm)		Yes
MIC5302	150mA	2.3V to 5.5V	1.3, 1.5, 1.8, 2.1, 2.5, 2.85, 2.8, 2.9, 3.0, 3.3, 4.6, Adj.	85µA	50mV	TMLF (1.2x1.6mm)	Ultra-small	Yes
MIC5205	150mA	2.5V to 16V	2.5, 2.7, 2.8, 2.85, 2.9, 3.0, 3.1, 3.2, 3.3, 3.6, 3.8, 4.0, 5.0, Adj.	80µA	165mV	SOT-23	Low Noise LDO.	
MIC5206	150mA	2.5V to 16V	2.5, 2.7, 3.0, 3.2, 3.3, 3.6, 3.8, 4.0, 5.0, Adj	80µA	165mV	MSOP, SOT-23	Low Noise LDO w/Error Flag.	
MIC5235	150mA	2.3V to 24V	1.5, 1.8, 2.5, 2.7, 3.0, 3.3, 5.0, Adj.	18µA	310mV	SOT-23	Zero Shutdown Current, Reverse Battery Protection.	Yes
MIC5236	150mA	2.3V to 30V	2.5, 3.0, 3.3, 5.0, Adj.	20µA	350mV	P-MSOP, P-SOIC	Load Dump Protected µCap LDO.	Yes
MIC5238	150mA	1.5V to 6V	1.0, 1.1, 1.2, 1.3	23µA	310mV	T/SOT	Low Voltage, Dual Supply µCap.	Yes
MIC5247	150mA	2.7V to 6V	1.5, 1.6, 1.8, 1.85, 2.0, 2.4	85µA	150mV	MLF® (2x2mm), T/SOT		Yes
MIC5248	150mA	2.7V to 6V	1.2	85µA	n/a	SOT-23	1.2V LDO with Power Good.	Yes
MIC5252	150mA	2.7V to 6V	1.8, 2.5, 2.8, 2.85, 3.0, 4.75	90µA	135mV	MLF® (2x2mm), SOT-23	Low Noise LDO.	Yes
MIC5255	150mA	2.7V to 6V	2.5, 2.6, 2.7, 2.75, 2.8, 2.85, 2.9, 3.0, 3.1, 3.2, 3.3, 3.5	90µA	135mV	MLF® (2x2mm), TSOT	Low Noise LDO.	Yes
MIC5256	150mA	2.7V to 6V	2.5, 2.6, 2.7, 2.9, 2.8, 2.85, 3.0, 3.1, 3.3	90µA	135mV	T/SOT	Low Noise with Error Flag.	Yes
MIC5258	150mA	2.7V to 6V	1.2	85µA	n/a	SOT-23	1.2V LDO with Power Good.	Yes
MIC5265	150mA	2.7V to 5.5V	1.5, 1.8, 1.85, 2.5, 2.6, 2.7, 2.8, 2.85, 2.9, 3.0, 3.1, 3.2, 3.3	75µA	210mV	TSOT	General Purpose LDO.	Yes
MIC5268	150mA	2.7V to 6V	1.2	85µA	n/a	SOT-23		Yes
MIC5305	150mA	2.25V to 5.5V	1.5, 1.8, 2.5, 2.6, 2.7, 2.8, 2.85, 2.9, 3.0, 3.3, 4.75, Adj.	90µA	60mV	MLF® (2x2mm), TSOT TMLF-6	High PSRR Low Noise ULDO™.	Yes
MIC5306	150mA	2.25V to 5.5V	1.5, 1.8, 2.7, 2.8, 3.0, 3.1, 3.3	16µA	120mV	TSOT, MLF® (2x2mm)	Low I _Q , 150mA ULDO™.	Yes
MIC5308	150mA	1.6V to 5.5V	1.0, 1.2, 1.3, 1.5, Adj.	23µA	50mV	TSOT-23-6, MLF® (1.6x1.6mm)	Low V _{IN} /V _{OUT} with Ultra-low I _Q .	
MIC5309	300mA	1.7V to 5.5V	1.0, 1.2, 1.3, 1.5, Adj.	23µA	100mV	TSOT-23-6, MLF® (1.6x1.6mm)	Low V _{IN} /V _{OUT} with Ultra-low I _Q .	
MIC5325 <i>New!</i>	400mA	1.7V to 5.5V	1.2, 1.5, 1.8, ADJ	35µA	110mV	Thin MLF® (2x2mm)	Single 400mA ULDO™ Pin Compatible to LTC3025	Yes
MIC5207	180mA	2.5V to 16V	1.8, 2.5, 2.8, 2.9, 3.0, 3.1, 3.2, 3.3, 3.6, 3.8, 4.0, 5.0, Adj.	80µA	165mV	T/SOT	Low Noise LDO.	
MIC5201	200mA	2.5V to 26V	3.0, 3.3, 4.8, 5.0, Adj	130µA	270mV	SOIC, SOT-223	Load Dump Protection.	
MIC2954	250mA	2V to 30V	5.0, 5.0(0.5%) Adj.	140µA	375mV	SOIC, SOT-223, TO-220	Load Dump Protection.	
MIC5303	300mA	2.3V to 5.5V	1.3, 1.5, 1.8, 2.1, 2.5, 2.85, 2.8, 2.9, 3.0, 3.3, 4.6, Adj.	85µA	100mV	TMLF (1.2x1.6mm)	High I _{OUT} , ultra-small.	Yes

LDO Regulator Selection Guide

Single Outputs (continued)

Device	I _{OUT}	V _{IN}	V _{OUT}	I _{GND} (Typ.)	V _{DROPOUT} (Typ.)	Package	Comments	µCap
MIC5307	300mA	2.4V to 5.5V	2.8, 3.0, Adj.	20µA	120mV	MLF [®] (1.6x1.6mm) TSOT-23	Ultra-low I _Q , 300mA ULDO™.	Yes
MIC5318	300mA	2.3V to 6.0V	2.8, 2.85, Adj.	85µA	100mV	TMLF (1.6x1.6mm) TSOT-23	High V _{IN} .	Yes
MIC5249	300mA	2.7V to 6V	1.8, 2.5, 2.6, 2.8, 2.85, 3.0, 3.3	90µA	400mV	MSOP	LDO w/POR.	Yes
MIC5259	300mA	2.7V to 6V	1.5, 1.8, 2.5, 2.8, 2.85, 3.0, 3.3	90µA	300mV	MLF [®] (2x2mm), TSOT	High PSRR Low Noise LDO.	Yes
MIC29201	400mA	4.3V to 26V	3.3, 4.85, 5.0, 12	140µA	450mV	SOIC, TO-220, TO-263	Load Dump Protection.	
MIC29202	400mA	4.3V to 26V	Adj.	140µA	450mV	TO-220, TO-263	Load Dump Protection.	
MIC29204	400mA	4.3V to 26V	5.0, Adj.	140µA	450mV	SOIC, PDIP	Load Dump Protection.	
MIC2920A	400mA	4.3V to 26V	3.3, 4.8, 5.0, 12	140µA	450mV	SOT-223, TO-220	Load Dump Protection.	
MIC5209	500mA	2.5V to 16V	1.8, 2.5, 3.0, 3.3, 3.6, 4.2, 5.0, Adj.	80µA	300mV	P-SOIC, SOT-223, TO-263	Low Noise LDO.	
MIC5216	500mA	2.5V to 12V	2.5, 3.3, 3.6, 5.0	80µA	300mV	SOT-23, P-MSOP	Low Noise LDO w/Error Flag.	
MIC5219	500mA	2.5V to 12V	2.5, 2.6, 2.7, 2.8, 2.85, 2.9, 3.0, 3.1, 3.3, 3.6, 5.0, Adj.	80µA	300mV	SOT-23, P-MSOP, MLF [®] (2x2mm)	Low Noise LDO.	
MIC5237	500mA	2.5V to 16V	2.5, 3.3, 5.0	80µA	300mV	TO-220 TO-263	>3% O/P Voltage Accuracy.	
MIC5239	500mA	2.3V to 30V	1.5, 1.8, 2.5, 3.0, 3.3, 5.0, Adj.	23µA	350mV	P-MSOP, P-SOIC, SOT-223	Reverse Battert Protection.	Yes
MIC5319	500mA	2.5V to 5.5V	1.375, 1.8, 1.85, 2.5, 2.6, 2.7, 2.8, 2.85, 2.9, 3.0, 3.3, 5.0, Adj.	90µA	200mV	MLF [®] (2x2mm), TSOT	ULDO™ High PSRR.	Yes
MIC29371	750mA	4.3V to 26V	3.3, 5.0, 12	160µA	370mV	TO-220, TO-263	Load Dump Protection.	
MIC29372	750mA	4.3V to 26V	Adj.	160µA	370mV	TO-220, TO-263	Load Dump Protection.	
MIC2937A	750mA	4.3V to 26V	3.3, 5.0, 12	160µA	370mV	TO-220, TO-263	Load Dump Protection.	
MIC3775	750mA	2.25V to 6V	1.5, 1.65, 1.8, 2.5, 3.0, 3.3, Adj.	400µA	300mV	P-MSOP	Wide V _{IN} Range.	Yes
MIC3975	750mA	2.25V to 16V	1.8, 2.5, 3.0, 3.3, 5.0, Adj.	400µA	300mV	P-MSOP	Wide V _{IN} Range.	Yes
MIC37100	1A	2.25V to 6V	1.5, 1.65, 1.8, 2.5, 3.3	400µA	280mV	SOT-223		Yes
MIC37101	1A	2.25V to 6V	1.5, 1.65, 1.8, 2.1, 2.5, 3.3	400µA	280mV	P-SOIC	w/EN and Error Flag.	Yes
MIC37102	1A	2.25V to 6V	Adj.	400µA	280mV	P-SOIC, SPAK		Yes
MIC39100	1A	2.25V to 16V	1.8, 2.5, 3.3, 5.0	400µA	410mV	SOT-223, TO-220, TO-263	Ultra-Low Dropout.	
MIC39101	1A	2.25V to 16V	1.8, 2.5, 3.3, 5.0	400µA	410mV	P-SOIC	Ultra-Low Dropout.	
MIC39102	1A	2.25V to 16V	Adj.	400µA	410mV	P-SOIC	Ultra-Low Dropout.	
MIC47100	1A	1.0V to 3.6V	0.8, 1.0, 1.2, Adj.	350µA	80mV	MLF [®] (2x2mm), eMSOP-8		
MIC6910x	1A	1.65V to 5.5V	1.8, Adj.	12mA	500mV	MLF [®] (3x3mm), P-MSOP-8	Ultra-small 1A LDO. Single Supply Operation.	
MIC2940A	1.25A	4.3V to 26V	3.3, 5.0, 12	240µA	400mV	TO-220, TO-263	Load Dump Protection.	
MIC2941A	1.25A	4.3V to 26V	Adj.	240µA	400mV	TO-220, TO-263	Load Dump Protection.	
MIC2915x	1.5A	2.25V to 26V	3.3, 5.0, 12, Adj.	225µA	350mV	TO-220, TO-263	Load Dump Protection.	
MIC37139	1.5A	2.25V to 6V	1.8	17mA	350mV	SOT-223		Yes
MIC37150	1.5A	2.25 to 6V	1.5, 1.65, 1.8, 2.5, 3.3	17mA	325mV	SPAK	Fixed Voltage in 3-pin Package.	Yes
MIC37151	1.5A	2.25V to 6V	1.5, 1.65, 1.8, 2.5, 3.3	17mA	325mV	SPAK, eSOIC	w/EN and Error Flag.	Yes
MIC37152	1.5A	2.25V to 6V	Adj.	17mA	325mV	SPAK		Yes
MIC37153	1.5A	2.25V to 6V	Adj.	17mA	325mV	eSOIC	w/EN and Error Flag.	Yes
MIC39150	1.5A	2.25V to 16V	1.65, 1.8, 2.5	300µA	375mV	TO-220, TO-263	Ultra-Low Dropout.	
MIC39151	1.5A	2.25V to 16V	1.65, 1.8, 2.5	300µA	375mV	TO-220, TO-263	Ultra-Low Dropout w/EN.	
MIC49150	1.5A	1.4V to 6V	0.9, 1.2, 1.5, 1.8, Adj.	15mA	280mV	P-MSOP, S-PAK	Dual Supply µCap LDO.	Yes
MIC6915x	1.5A	1.65V to 5.5V	1.8, Adj.	22mA	500mV	MLF [®] (3x3mm), eSOIC-8	Single Supply Operation.	
MIC49200	2A	1.4V to 6V	1.0, 1.8, Adj.	15mA	400mV	SPAK, TO-263	Dual Supply µCap LDO.	Yes
MIC68200	2A	1.65V to 5.5V	1.2, 1.5, 1.8, 2.5, 3.3, Adj.	7mA	140mV	MLF [®] (3x3mm)	Tracking & Ramp Control.	Yes
MIC37252	2.5A	3.0V to 6V	Adj.	40mA	550mV	SPAK, TO-263	Low Voltage µCap LDO.	
MIC37253	2.5A	3.0V to 6V	Adj.	40mA	600mV	eSOIC	w/EN and Error Flag.	
MIC2930x	3A	2.25V to 26V	3.3, 5.0, 12, Adj.	225µA	370mV	TO-220, TO-263	Load Dump Protection.	
MIC29310/2	3A	2.3V to 16V	3.3, 5.0, Adj.	400µA	600mV	TO-220, TO-263		
MIC29311	3A	2.3V to 16V	5.1	400µA	600mV	TO-220	USB LDO.	
MIC37301	3A	2.25V to 6V	1.5, 1.65, 1.8, 2.5, 3.3	27mA	300mV	SPAK		Yes

LDO Regulator Selection Guide

Single Outputs (continued)

Device	I _{OUT}	V _{IN}	V _{OUT}	I _{GND} (Typ.)	V _{DROPOUT} (Typ.)	Package	Comments	μCaP
MIC37302	3A	2.25V to 6V	Adj.	27mA	300mV	SPAK, TO-263		Yes
MIC37303	3A	2.25V to 6V	Adj.	27mA	325mV	eSOIC	w/EN and Error Flag.	Yes
MIC39300	3A	2.25V to 16V	1.8, 2.5	5mA	300mV	TO-220, TO-263	Ultra-Low Dropout.	
MIC39301	3A	2.25V to 16V	1.8, 2.5	5mA	350mV	TO-220, TO-263	Ultra-Low Dropout w/EN.	
MIC49300	3A	1.4V to 6V	0.9, 1.2, 1.5, 1.8, Adj.	25mA	280mV	SPAK	Dual Supply μCap LDO.	Yes
MIC69301 New!	3A	1.65V to 5.5V	1.0, 1.2, 1.8	40mA	275mV	SPAK, eSOIC	Low Voltage Single Input Supply.	Yes
MIC69302 New!	3A	1.65V to 5.5V	Adj.	40mA	275mV	SPAK, eSOIC	Low Voltage Single Input Supply.	Yes
MIC68400	4A	1.65V to 5.5V	0.8, 1.0, 1.2, 1.5, 1.8, 2.5, Adj.	18mA	300mV	TSSOP, MLF [®] (4x4mm)	Tracking and Ramp Control.	Yes
MIC2950x	5A	2.25V to 26V	3.3, 5.0, Adj.	225μA	370mV	TO-220, TO-263	Load Dump Protection.	
MIC29510/2	5A	2.3V to 16V	3.3, 5.0, Adj.	500μA	700mV	TO-220		
MIC37501	5A	2.3V to 6V	1.5, 1.65, 1.8, 2.5, 3.3	57mA	330mV	SPAK		Yes
MIC37502	5A	2.3V to 6V	Adj.	57mA	330mV	SPAK, TO-263		Yes
MIC39500	5A	2.25V to 16V	1.8, 2.5	70mA	350mV	TO-220, TO-263	Ultra-Low Dropout.	
MIC39501	5A	2.25V to 16V	1.8, 2.5	70mA	350mV	TO-220, TO-263	Ultra-Low Dropout w/EN.	
MIC49500	5A	1.4V to 6V	.0.9, 1.2, Adj.	55mA	290mV	SPAK, TO-263	Dual Supply μCap LDO.	Yes
MIC69502	5A	1.65 to 5.5V	Adj.	54mA	250mV	SPAK	Low Voltage Single Input Supply.	Yes
MIC2971x	7.5A	2.3V to 16V	3.3, 5.0, Adj.	1mA	700mV	TO-220		
MIC29750	7.5A	2.5V to 26V	3.3, 5.0	35mA	425mV	TO-247	Load Dump Protection.	
MIC29751	7.5A	2.5V to 26V	3.3, 5.0	35mA	425mV	TO-247	Load Dump Protection.	
MIC29752	7.5A	2.5V to 26V	Adj.	35mA	425mV	TO-247	Load Dump Protection.	

Multiple Outputs, DUAL

Device	I _{OUT}	V _{IN}	V _{OUT}	I _{GND} (Typ.)	V _{DROPOUT} (Typ.)	Package	Comments	μCaP
MIC5208	50/50mA	2.5V to 16V	3.3, 3.8, 4.0	180μA	250mV	MSOP	±3%	Yes
MIC5211	50/50mA	2.5V to 16V	1.8, 1.8/2.5, 1.8/3.3, 2.5, 2.5/3.3, 2.7, 2.8, 3.0, 3.3, 3.3/5.0, 3.6, 5.0,					
MIC5202	100/100mA	2.5V to 26V	3.0, 3.3, 4.8, 5.0	170μA	225mV	SOIC	±1%	
MIC5254	150mA	2.7V to 6V	3.3/2.5	117μA	135mV	MSOP	w/Error Flags.	Yes
MIC5310	150/150mA	2.3V to 5.5V	1.8/1.5, 1.8/1.8, 1.8/1.6, 2.5/1.8, 2.5/2.5, 2.6/1.85, 2.6/1.8, 2.7/2.7, 2.8/1.5, 2.8/1.8, 2.8/2.6, 2.8/2.8, 2.85/1.85, 2.85/2.6, 2.85/2.85, 2.9/1.5, 2.9/1.8, 2.9/2.9, 3.0/1.8, 3.0/2.5, 3.0/2.6, 3.0/2.8, 3.0/2.85, 3.0/3.0, 3.3/1.5, 3.3/1.8, 3.3/2.5, 3.3/2.6, 3.3/2.8, 3.3/2.85, 3.3/2.9, 3.3/3.0, 3.3/3.2, 3.3/3.3,	75μA	35mV	MLF [®] (2x2mm)	Tiny ULDO™ • Dual Enable • High PSRR	Yes
MIC5320	150/150mA	2.3V to 5.5V	1.8/1.5, 1.8/1.8, 1.8/1.6, 2.4/1.5, 2.5/1.8, 2.5/2.5, 2.6/1.85, 2.6/1.8, 2.7/2.7, 2.8/1.5, 2.8/1.8, 2.8/2.6, 2.8/2.8, 2.85/1.85, 2.85/2.6, 2.85/2.85, 2.9/1.5, 2.9/1.8, 2.9/2.9, 3.0/1.8, 3.0/2.5, 3.0/2.6, 3.0/2.8, 3.0/2.85, 3.0/3.0, 3.3/1.5, 3.3/1.8, 3.3/2.5, 3.3/2.6, 3.3/2.8, 3.3/2.85, 3.3/2.9, 3.3/3.0, 3.3/3.2, 3.3/3.3, 4.6/2.8,	75μA	35mV	MLF [®] (1.6x1.6mm) TSOT-06	Tiny ULDO™ • Dual Enable	Yes
MIC5321	150/150mA	2.3V to 5.5V	1.8/1.5, 1.8/1.8, 1.8/1.6, 2.4/1.5, 2.5/1.8, 2.5/2.5, 2.6/1.85, 2.6/1.8, 2.7/2.7, 2.8/1.5, 2.8/1.8, 2.8/2.6, 2.8/2.8, 2.85/1.85, 2.85/2.6, 2.85/2.85, 2.9/1.5, 2.9/1.8, 2.9/2.9, 3.0/1.8, 3.0/2.5, 3.0/2.6, 3.0/2.8, 3.0/2.85, 3.0/3.0, 3.3/1.5, 3.3/1.8, 3.3/2.5, 3.3/2.6, 3.3/2.8, 3.3/2.85, 3.3/2.9, 3.3/3.0, 3.3/3.2, 3.3/3.3, 4.6/2.8,	75μA	35mV	MLF [®] (1.6x1.6mm) TSOT-6	Tiny ULDO™ • High PSRR • Common Enable • Bypass Pin	Yes
MIC5322 New!	150/150mA	2.5-5.5V	2.8/1.5, 2.8/1.8, 2.85/2.85, 3.0/2.8, 3.0/2.85, 3.0/3.0	150uA	35mV	Thin MLF [®] (1.6x1.6mm)	Tiny ULDO™ • High PSRR • Common Active Low Enable • Bypass	yes
MIC5210	150/150mA	2.5V to 16V	2.7, 2.8, 3.0, 3.3, 3.6, 4.0, 5.0	80μA	165mV	MSOP	Low Noise LDO.	
MIC5264	150/150mA	2.7V to 5.5V	2.5/1.8, 2.6/1.8, 2.6/2.6, 2.8/1.5, 2.8/1.8, 2.8/2.5, 2.8/2.6, 2.8/2.8, 2.85/1.52, 2.85/1.8, 2.85/2.85, 2.9/2.6, 3.0/1.8, 3.0/2.5, 3.0/2.8, 3.0/3.0, 3.3/3.3	75μA/LDO210mV		MLF [®] (2.5x2.5mm)	μCap LDO Regulator.	Yes
MIC2210	150/300mA	2.25V to 5.5V	1.5/2.8, 1.8/3.3, 2.8/1.6, 2.8/3.0, 3.0/3.3, 3.3/3.3	48μA	120mV	MLF [®] (3x3mm)	LDO w/Driver & Error Flag.	

LDO Regulator Selection Guide

Multiple Outputs, DUAL (continued)

Device	I _{OUT}	V _{IN}	V _{OUT}	I _{GND} (Typ.)	V _{DROPOUT} (Typ.)	Package	Comments	μCap
MIC2211	150/300mA	2.25V to 5.5V	Adj./Adj., 1.5/1.8, 1.5/2.8, 1.5/2.85, 1.5/2.9, 1.5/3.1, 1.6/2.8, 1.6/2.9, 1.6/3.3, 1.8/2.5, 1.8/2.6, 1.8/2.8, 1.8/2.9, 1.8/3.0, 1.8/3.3, 1.9/2.8, 2.0/3.0, 2.5/1.8, 2.5/1.9, 2.5/2.8, 2.5/3.0, 2.5/3.3, 2.6/1.8, 2.6/2.85, 2.6/3.0, 2.7/1.8, 2.7/3.0, 2.8/1.5, 2.8/1.6, 2.8/1.8, 2.8/2.5, 2.8/2.8, 2.8/3.0, 2.8/3.3, 2.85/2.85, 2.85/3.3, 2.9/1.5, 2.9/2.9, 3.0/1.6, 3.0/2.7, 3.0/2.8, 3.0/2.85, 3.0/3.0, 3.0/3.3, 3.3/1.8, 3.3/2.8, 3.3/3.3, 3.6/3.6	48μA	120mV	MLF [®] (3x3mm)	LDO.	Yes
MIC2212	150/300mA	2.25V to 5.5V	1.6/2.8, 1.6/3.3, 1.8/2.6, 1.8/2.7, 1.8/2.8, 1.8/3.0, 1.8/3.3, 1.85/2.85, 1.85/2.9, 2.5/3.3, 2.6/2.8, 2.6/2.85, 2.7/2.8, 2.7/2.9, 2.7/3.0, 2.8/2.6, 2.8/2.8, 2.8/3.0, 2.85/2.85, 3.0/2.8, 3.0/2.85, 3.0/3.0, 3.0/3.3, 3.3/1.8, 3.3/2.5, 3.3/2.8	48μA	120mV	MLF [®] (3x3mm)	LDO w/POR.	Yes
MIC2213	150/300mA	2.25V to 5.5V	1.8/2.85, 1.8/3.3, 2.5/3.3, Adj./Adj.	48μA	120mV	MLF [®] (3x3mm)	Sequenced w/POR & Driver.	Yes
MIC2214	150/300mA	2.25V to 5.5V	1.5/2.8, 1.6/2.8, 1.6/3.0, 1.6/3.3, 1.8/2.6, 1.8/2.7, 1.8/2.8, 1.8/2.9, 1.8/3.0, 1.8/3.3, 1.85/2.6, 1.85/2.65, 1.85/2.7, 1.85/2.85, 1.85/2.9, 2.5/1.8, 2.5/2.8, 2.5/3.0, 2.5/3.1, 2.6/2.6, 2.6/2.8, 2.6/2.85, 2.6/3.0, 2.7/2.8, 2.7/3.0, 2.8/2.8, 2.8/3.0, 2.85/2.85, 3.0/2.8, 3.0/2.85, 3.0/3.3, 3.0/1.6, 3.3/1.8, 3.3/2.8, 3.3/1.6, Adj./Adj.	48μA	120mV	MLF [®] (3x3mm)	LDO w/POR & LED Driver.	Yes
MIC2219	150/300mA	2.25V to 5.5V	3.0/3.3	48μA	120mV	MLF [®] (3x3mm)	Dynamically Adjustable μCap.	Yes
MIC5311	300/300mA	2.5V to 5.5V	1.8/2.8, 1.85/2.6, 2.85/2.7	28μA	120mV	MLF [®] (3x3mm)	LowQ [®] Mode (7μA).	Yes
MIC5312	300/300mA	2.5V to 5.5V	1.8/2.8, 1.8/3.0, 1.85/2.6, 2.8/2.8, 2.85/2.85	28μA	120mV	MLF [®] (3x3mm)	LowQ [®] Mode & POR (7μA).	Yes
MIC5313	New! 300/300mA	1.7V to 5.5V	1.5/1.0, 1.5/1.1, 1.5/1.2, 1.5/1.3, 1.5/1.4, 1.5/1.5, 1.8/1.2, 1.8/1.8	37μA	85mV	Thin MLF [®] (2x2mm)	Dual 300mA Low V _{IN} /Low V _{OUT} LDO	Yes
MIC5314	New! 300/300mA	1.7V to 5.5V	1.5/1.0, 1.5/1.1, 1.5/1.2, 1.5/1.3, 1.5/1.4, 1.5/1.5, 1.8/1.2, 1.8/1.8	37μA	85mV	Thin MLF [®] (2.5x 2.5mm)	Dual 300mA Low V _{IN} /Low V _{OUT} LDO with POR and CSET.	Yes
MIC5315	New! 300/300mA	1.7V to 5.5V	1.5/1.0, 1.5/1.1, 1.5/1.2, 1.5/1.3, 1.5/1.4, 1.5/1.5, 1.8/1.2, 1.8/1.8	37μA	85mV	Thin MLF [®] (2x2mm)	Dual 300mA Low V _{IN} /Low V _{OUT} LDO with Voltage Scaling.	Yes
MIC5316	New! 300/300mA	1.7V to 5.5V	1.5/1.0, 1.5/1.1, 1.5/1.2, 1.5/1.3, 1.5/1.4, 1.5/1.5, 1.8/1.2, 1.8/1.8	37μA	85mV	Thin MLF [®] (2.5x 2.5mm)	Dual 300mA Low V _{IN} /Low V _{OUT} LDO with POR, CSET and Voltage Scaling.	Yes
MIC5330	300/300mA	2.3V to 5.5V	1.8/1.5, 1.8/1.5, 1.8/1.6, 2.5/1.8, 2.5/2.5, 2.6/1.85, 2.6/1.8, 2.7/2.7, 2.8/1.5, 2.8/1.8, 2.8/2.6, 2.8/2.8, 2.85/1.85, 2.85/2.6, 2.85/2.85, 2.9/1.5, 2.9/1.8, 2.9/2.9, 3.0/1.8, 3.0/2.5, 3.0/2.6, 3.0/2.8, 3.0/2.85, 3.0/3.0, 3.3/1.5, 3.3/1.8, 3.3/2.5, 3.3/1.8, 3.3/2.5, 3.3/2.6, 3.3/2.8, 3.3/2.85, 3.3/2.9, 3.3/3.0, 3.3/3.2, 3.3/3.3	75μA	75mV	MLF [®] (2x2mm)	Tiny ULDO™ • Dual Enable • High PSRR	Yes
MIC5335	300/300mA	2.3V to 5.5V	1.8/1.5, 1.8/1.8, 1.8/1.6, 2.5/1.8, 2.5/2.5, 2.6/1.85, 2.6/1.8, 2.7/2.7, 2.8/1.5, 2.8/1.8, 2.8/2.6, 2.8/2.8, 2.85/1.85, 2.85/2.6, 2.85/2.85, 2.9/1.5, 2.9/1.8, 2.9/2.9, 3.0/1.8, 3.0/2.5, 3.0/2.6, 3.0/2.8, 3.0/2.85, 3.0/3.0, 3.3/1.5, 3.3/1.8, 3.3/2.5, 3.3/2.6, 3.3/2.7, 3.3/2.8, 3.3/2.85, 3.3/2.9, 3.3/3.0, 3.3/3.2, 3.3/3.3,	75μA	75mV	Thin MLF [®] (1.6x1.6mm)	High I _{OUT} , Ultra-small.	Yes
MIC5212	500/500mA	4.0V to 16V	3.3/2.5	1.5mA	350mV	SOIC	Small, High-Current Dual.	
MIC68220	2A/2A	1.65V to 5.5V	Adj./Adj.	15mA	300mV	MLF [®] (4x5mm)	Trading and Ramp Control.	Yes

Multiple Outputs, TRIPLE

Device	I _{OUT}	V _{IN}	V _{OUT}	I _{GND} (Typ.)	V _{DROPOUT} (Typ.)	Package	Comments	μCap
MIC2215	250/250/250mA	2.25V to 5.5V	2.8/2.8/2.8, 3.0/2.8/2.8, 3.0/3.0/2.8, 3.0/3.0/1.8, 3.0/3.0/3.0, Adj./Adj./Adj.	110μA/LDO	170mV	MLF [®] (4x4mm)	Triple High PSRR μCap LDO.	Yes

LDO Controllers (N- and P-Channel), and DDR Terminators

MIC5156	—	3.0V to 36V	3.3, 5.0, Adj.	—	—	SOIC	Drives External N-Ch MOSFET.	
MIC5157	—	3.0V to 36V	Selectable 3.3, 5.0, 12	—	—	PDIP, SOIC	Drives External N-Ch MOSFET.	
MIC5158	—	3.0V to 36V	5.0, Adj.	—	—	PDIP, SOIC	Drives External N-Ch MOSFET.	
MIC5159	—	1.65V to 5.5V	1.8, 3.0, Adj.	—	—	SOT-23	Low Input Voltage P-Ch MOSFET.	
MIC5162	—	1.35V to 6V	—	—	—	MSOP	DDR Memory Termination.	
MIC5190	—	0.9V to 5.5V	Adj. down to 0.5V	17mA	—	MSOP, MLF [®] (3x3mm)	N-Ch Controller HBW>500kHz.	
MIC5191	—	1.0V to 5.5V	Adj. down to 1.0V	17mA	—	MSOP, MLF [®] (3x3mm)	N-Ch Controller HBW>500kHz.	

Specific voltage/package options offered as noted on posted data sheets at: www.micrel.com.

T/SOT = Thin SOT-23 & SOT-23

ULDO™ = Ultra Low Dropout

LDO Regulator Selection Guide

HELDO™ (High Efficiency LDO)

Device	I _{OUT}	V _{IN}	V _{OUT}	Output Noise	Package	Comment
MIC38300	2.2A	3.0V to 5.5V	Adj. to 1V	5mV	MLF® (4mmx6mmx0.9mm)	Integrated switcher, LDO, inductor, ultra-low noise. Fast transient response. Ease-of-use.

Automotive (AEC-Q100 Qualified)

Device	I _{OUT}	V _{IN}	V _{OUT}	I _{GND} (Typ.)	V _{DROPOUT}	Package	Comment
MAQ5280 <i>New!</i>	25mA	4.5V to 120V	Adj.	31µA	1.1V	eSOIC-8	AEC-Q100 qualified, wide V _{IN} range.

Power Management Selection Guide

Device	I _{OUT}	V _{IN}	V _{OUT} ⁽¹⁾	I _{GND} (Typ.)	V _{DROPOUT} (Typ.)	Package	Comments
MIC2225	600/300mA	2.7V to 5.5V	1.2/2.6, 1.2/2.8, 1.2/2.9, 1.2/3.3, 1.8/1.2, 1.8/1.5, 1.8/2.5, 1.8/2.8		210mV	MLF-10 (2x2mm)	Digital Power Management IC, 2MHz DC/DC converter with LDO.
MIC2800	600/300/300mA	2.7V to 5.5V	Adj./1.2/3.3, 1.87/1.2/2.8, 1.87/1.5/2.8, 1.8/1.2/2.5, 1.8/1.2/2.6, 1.8/1.2/3.3, 1.8/1.58/3.3, 1.8/1.52/2.8, 1.8/1.2/2.8	30µA	142mV	MLF-16 (3x3mm)	Digital Power Management IC, 2MHz DC/DC converter with two Linear Regulators. LDO1 is directly connected to the output of the DC/DC converter.
MIC2810	600/300/300mA	2.7V to 5.5V 1.65V to 5.5V	1.2/1.2/2.8, 1.2/1.8/2.6, 1.2/1.8/2.8, 1.2/1.8/3.0, 1.2/1.8/3.3, 1.2/2.7/3.3, 1.2/2.8/3.3, 1.0/1.8/2.5			MLF-16 (3x3mm)	Digital Power Management IC, 2MHz with two Linear Regulators. LDO1 has a separate V _{IN} pin and can either post-regulate the DC/DC converter to be connected directly to the main input supply.
MIC2807	600/200/30mA	2.7V to 5.5V	2.8/2.8, 2.85/2.85			MLF-17 (2.5x2.8mm)	RF Power Management IC, 600mA DC/DC converter with DAC controlled output to power amplifier. 200mA RF LDO output current (provides bias voltage supply for PA), 30mA PA LDO (provides highly accurate PA reference voltage).
MIC2811 <i>New!</i>	600/300/300/300mA	2.7V to 5.5V 1.65V to 5.5V 1.65V to 5.5V	1.2/1.8/2.5/2.7, 1.2/1.8/2.8/3.3		142mV	MLF-16 (3x3mm)	2MHz DC/DC converter with 3 LDOs. Bypass cap for improved noise performance on LDO1 and 2. LDO1 and 2 have separate V _{IN} pins.
MIC2821 <i>New!</i>	600/300/300/300mA	2.7V to 5.5V 1.65V to 5.5V 1.65V to 5.5V	1.2/1.8/2.5/2.7, 1.2/1.8/2.8/3.3		142mV	MLF-16 (3x3mm)	2MHz DC/DC converter with 3 LDOs. LDO1 and 2 have separate V _{IN} pins. Independent enable for all four regulators.

1. Contact factory for additional output voltage options.

Battery Charger Selection Guide

Linear Battery Chargers

Device	Charge Cell Type	Charge Voltage	Voltage Accuracy	V _{IN}	I _{GND} (Typ.)	I _{GND} Shutdown (Typ.)	V _{DROPOUT} +25°C (Typ.)	V _{DROPOUT} Temp. Max.	Package
MIC79050	Li-Ion, 1 cell	4.2V	±0.75%	2.5V to 16V	85µA	3µA	380mV	600mV	MSOP, Power SOIC, SOT-223
MIC79110	Li-Ion	4.2V, Adj.	±0.75%	2.5V to 16V	2mA	0.1µA	375mV	550mV	MLF® (3x3mm)

High-Side Load Switches Selection Guide

Micrel Advantage

- Lowest $R_{DS(on)}$
- Highest Power Handling
- Highest Current Drive Capability
- Soft-Start

Device	Type	Operating Voltage Min.	Operating Voltage Max.	Max. Switch Current	$R_{DS(on)}$ @5V	Load Discharge	Soft-Start	Enable Logic	Input Pull-Up Resistor	Reverse Current Blocking	Package
MIC94030	Single	2.7V	13.5V	1.0A	750m Ω			Low True		Yes	SOT-143
MIC94031	Single	2.7V	13.5V	1.0A	750m Ω			Low True	Yes	Yes	SOT-143
MIC94040 <i>New!</i>	Single	1.8V	5.5V	3.0A	28m Ω			High True		No	MLF-4 (1.2x1.2mm)
MIC94041 <i>New!</i>	Single	1.8V	5.5V	3.0A	28m Ω	Yes		High True		No	MLF-4 (1.2x1.2mm)
MIC94042 <i>New!</i>	Single	1.8V	5.5V	3.0A	28m Ω		Yes	High True		No	MLF-4 (1.2x1.2mm)
MIC94043 <i>New!</i>	Single	1.8V	5.5V	3.0A	28m Ω	Yes	Yes	High True		No	MLF-4 (1.2x1.2mm)
MIC94050	Single	1.8V	5.5V	1.8A	125m Ω			Low True		Yes	SOT-143
MIC94051	Single	1.8V	5.5V	1.8A	125m Ω			Low True	Yes	Yes	SOT-143
MIC94052	Single	1.8V	5.5V	2.0A	70m Ω			Low True		No	SC-70-6
MIC94053	Single	1.8V	5.5V	2.0A	70m Ω			Low True	Yes	No	SC-70-6
MIC94060	Single	1.7V	5.5V	2.0A	75m Ω			High True		No	SC-70-6, MLF-4 (1.2x1.6mm)
MIC94061	Single	1.7V	5.5V	2.0A	75m Ω	Yes		High True		No	SC-70-6, MLF-4 (1.2x1.6mm)
MIC94062	Single	1.7V	5.5V	2.0A	75m Ω		Yes ⁽¹⁾	High True		No	SC-70-6, MLF-4 (1.2x1.6mm)
MIC94063	Single	1.7V	5.5V	2.0A	75m Ω	Yes	Yes ⁽¹⁾	High True		No	SC-70-6, MLF-4 (1.2x1.6mm)
MIC94064	Single	1.7V	5.5V	2.0A	75m Ω		Yes ⁽²⁾	High True		No	SC-70-6, MLF-4
MIC94065	Single	1.7V	5.5V	2.0A	75m Ω	Yes	Yes ⁽²⁾	High True		No	SC-70-6, MLF-4
MIC94066	Dual	1.7V	5.5V	2.0A	75m Ω			High True		No	MLF-8
MIC94067	Dual	1.7V	5.5V	2.0A	75m Ω	Yes		High True		No	MLF-8
MIC94068	Dual	1.7V	5.5V	2.0A	75m Ω		Yes	High True		No	MLF-8
MIC94069	Dual	1.7V	5.5V	2.0A	75m Ω	Yes	Yes	High True		No	MLF-8
MIC94070	Single	1.7V	5.5V	1.2A	120m Ω			High True		No	SC-70-6, MLF-4 (1.2x1.6mm)
MIC94071	Single	1.7V	5.5V	1.2A	120m Ω	Yes		High True		No	SC-70-6, MLF-4 (1.2x1.6mm)
MIC94072	Single	1.7V	5.5V	1.2A	120m Ω		Yes	High True		No	SC-70-6, MLF-4 (1.2x1.6mm)
MIC94073	Single	1.7V	5.5V	1.2A	120m Ω	Yes	Yes	High True		No	SC-70-6, MLF-4 (1.2x1.6mm)

1. 800 μ s turn-on rising time.

2. 115 μ s turn-on rising time.

Switch-Mode Voltage Regulator Selection Guide

Micrel Advantage

- Best efficiency
- Highest speed
- Smallest solution size

Buck Regulators (Internal Switches)

Device	V _{IN} Range	V _{OUT}	I _{SW} ⁽¹⁾ (Avg)(Max)	Frequency	Package(s)	Comments
MIC4721	2.7V to 5.5V	Adj. to 1V	1.5A	2MHz	MSOP-10	Ultra-Fast Response Internal Compensation.
MIC4722	2.7V to 5.5V	Adj. to 1V	3A	2.7MHz	MLF-12 (3x3mm)	Ultra-Fast, Ultra-Small.
MIC4723	2.7V to 5.5V	Adj. to 1V	3A	2MHz	MLF-12 (3x3mm), eMSOP-10	Ultra-Fast, Ultra-Small.
MIC4724 New!	6V	Adj. to 1V	3A	2MHz	eMSOP-10	Ultra-Fast, Ultra-Small.
MIC2207	2.7V to 5.5V	Adj. to 1V	3A	2MHz	MLF-12 (3x3mm)	Ultra-Fast, Ultra-Small.
MIC2208	2.7V to 5.5V	Adj. to 1V	3A	1MHz	MLF-12 (3x3mm)	External Compensation.
MIC4720	2.7V to 5.5V	Adj. to 1V	2A	2MHz	MLF-12 (3x3mm), eMSOP-10	Ultra-Fast, Ultra-Small.
MIC4680	4V to 34V	3.3V, 5V, Adj.	1.3A	200kHz	SOIC-8	
MIC4681	4V to 30V	Adj.	2A Peak	200kHz	SOIC-8	
MIC4682	4V to 34V	Adj.	2A	200kHz	SOIC-8	10% Precision Adjustable Current Limit.
MIC4684	4V to 30V	Adj.	2A	200kHz	SOIC-8	
MIC4685	4V to 30V	Adj.	3A	200kHz	SPAK-7	33% Smaller Than TO-263 (D2PAK).
MIC4690	4V to 30V	Adj.	1.3A	500kHz	SOIC-8	500kHz: Small Inductor.
MIC4574	4V to 24V	3.3V, 5V, Adj.	0.5A	200kHz	PDIP-8, SOIC-14	
MIC4575	4V to 24V	3.3V, 5V, Adj.	1A	200kHz	TO220-5, TO263-5	
MIC4576	4V to 36V	3.3V, 5V, Adj.	3A	200kHz	TO220-5, TO263-5	
LM2574	4V to 40V	3.3V, 5V, 12V, Adj.	0.5A	52kHz	PDIP-8	
LM2575	4V to 40V	3.3V, 5V, 12V, Adj.	1A	52kHz	TO220-5, TO263-5, PDIP-16, SOIC-24	
LM2576	4V to 40V	3.3V, 5V, 12V, Adj.	3A	52kHz	TO220-5, TO263-5	

1. I_{SW} (Avg) refers to the average current flowing through the switch.

Synchronous Buck Regulators (Internal Switches)

Device	V _{IN} Range	V _{OUT}	I _{SW} ⁽¹⁾ (Avg)(Max)	Frequency	Package(s)	Comments
MIC2177	4.5V to 16.5V	3.3V, 5V, Adj.	2.5A	200kHz	WSOIC-20	Auto-Skip Mode.
MIC2178	4.5V to 16.5V	3.3V, 5V, Adj.	2.5A	200kHz	WSOIC-20	Manual-Select Skip Mode.
MIC2179	4.5V to 16.5V	3.3V, 5V, Adj.	1.5A	200kHz	SSOP-20	
MIC2202	2.3V to 5.5V	Adj. to 0.5V	0.6A	2MHz	MSOP-10, MLF-10 (3x3mm)	1μF Ceramic Stable.
MIC2203	2.3V to 5.5V	Adj. to 0.5V	0.3A	1MHz	MSOP-10, MLF-10 (3x3mm)	1μF Ceramic Stable.
MIC2204	2.3V to 5.5V	Adj. to 1V	0.6A	2MHz	MSOP-10, MLF-10 (3x3mm)	
MIC2205	2.7V to 5.5V	Adj.	0.6A	2MHz	MLF-10 (3x3mm)	LowQ [®] LDO Mode: 18μA.
MIC2245	2.7V to 5.5V	Adj.	0.5A	4MHz	MLF-10 (3x3mm)	LowQ [®] LDO Mode: 20μA.
MIC2285A	2.7V to 5.5V	Adj.	0.6A	8MHz	MLF-10 (3x3mm)	Operation w/0.47μH Chip Inductor.
MIC2206	2.7V to 5.5V	1.8V(1.0V), 1.2V(1.0V)	0.6A/0.6A	2MHz	MLF-10 (3x3mm)	Voltage Scaling in LowQ [®] Mode.
MIC2224	2.7V to 5.5V	Adj.	0.6A	2MHz	MLF-10 (3x3mm)	DAC Controlled V _{OUT} with Bypass Switch.
MIC22400	2.6V to 5.5V	Adj. to 0.7V	4A	800kHz to 4MHz	MLF-20 (3x4mm), eTSSOP-20	Sequencing/Tracking Easy Compensation.
MIC22600	2.6V to 5.5V	Adj. to 0.7V	6A	1MHz	MLF-24	Sequencing/Tracking Easy Compensation.
MIC23050	2.7V to 5.5V	1.2V, 1.8V, 3.3V	0.5A	4MHz	MLF [®] (2x2mm)	PWM Buck Regulator with HyperLight Load [™] .
MIC23051	2.7V to 5.5V	1.2V (1.0V), 1.25V (0.95V), 1.4V (1.15V), 1.8V (1.0V),	0.5A	4MHz	MLF [®] (2x2mm)	PWM Buck Regulator with HyperLight Load [™] and Voltage Scaling.
MIC23031 New!	2.7V to 5.5V	1.0V, 1.2V, 1.5V, 1.8V, Adj.	0.4A	4MHz	MLF [®] (1.6x1.6mm)	PWM Buck Regulator with HyperLight Load [™] .
MIC23030 New!	2.7V to 5.5V	1.0V, 1.2V, 1.5V, 1.8V, Adj.	0.4A	8MHz	MLF [®] (1.6x1.6mm)	PWM Buck Regulator with HyperLight Load [™] .

Synchronous Buck Regulators (Internal Switches + Internal Inductor)

Device	V _{IN} Range	V _{OUT}	I _{SW} ⁽¹⁾ (Avg)(Max)	Frequency	Package(s)	Comments
MIC33050	2.7V to 5.5V	1.2V, 1.8V, 3.3V	0.5A	4MHz	MLF-12 (3x3mm)	4MHz Operation with Internal Chip Inductor.
MIC3385	2.7V to 5.5V	1.5V, Adj.	0.6A	8MHz	MLF-14 (3x3.5mm)	8MHz Operation with Internal Chip Inductor, HyperLight Load [™] .

Switch-Mode Voltage Regulator Selection Guide

Dual Synchronous Buck Regulators (Internal Switches)

Device	V _{IN} Range	V _{OUT}	I _{SW} ⁽¹⁾ (Avg)(Max)	Frequency	Package(s)	Comments
MIC2238	2.5V to 5.5V	1.2/1.8V, 1.2/1.5V, 1.2/2.5V, 1.2/3.3V, 1.0/1.5V, 1.0/1.8V, 1.0/2.5V, Adj./Adj.	800/800mA	2.5MHz	MLF-12 (3x3mm)	POR/PG Pin. Trickle Mode™ at Light Load. Independent Enables.
MIC23250	2.7V to 5.5V	1.2/1.8V, 1.0/1.2V, 0.9/1.1V, 1.2/1.6V, 1.2/2.5V, 1.2/3.3V, 2.6/3.3V, Adj./Adj.	400/400mA	4MHz	MLF-10 (2x2mm)	PWM Buck Regulators with HyperLight Load™. Independent Enables.

Buck Controllers (External Switches)

Device	V _{IN} Range	V _{OUT}	I _{SW} ⁽¹⁾ (Avg)(Max)	Efficiency (Typ)	I _Q (Typ)	Shutdown I _Q (Typ)	Frequency	Package(s)	Comments
MIC2184	2.9V to 16V	Adj.	External P-FET, 1A to 10A	90%	600μA	0.5μA	200/400kHz	SOIC-16, QSOP-16	Can also be configured as Buck-Boost
MIC2194	2.9V to 14V	Adj.	External P-FET, 1A to 10A	90%	1mA	0.5μA	400kHz	SOIC-8	

Synchronous Buck Controllers (External Switches)

Device	V _{IN} Range	V _{OUT}	I _{SW} ⁽¹⁾ (Avg)(Max)	Efficiency (Typ)	I _Q (Typ)	Shutdown I _Q (Typ)	Frequency	Package(s)	Comments
MIC2130	8V to 40V	Adj. to 0.7V	External FETs, 15A				150/400kHz	MLF-16, eTSSOP-16	
MIC2131	8V to 40V	Adj. to 0.7V	External FETs, 15A				150/400kHz	MLF-16, eTSSOP-16	Low EMI Frequency Dithering.
MIC2168	3V to 14.5V	Adj. to 0.8V	External N-FETs, 10A	95%	1mA	50μA	1MHz	MSOP-10	Small and Fast.
MIC2168A	3V to 14.5V	Adj. to 0.8V	External N-FETs, 10A	95%	1mA	50μA	1MHz	MSOP-10	Small and Fast, Enable Function.
MIC2169	3V to 14.5V	Adj. to 0.8V	External N-FETs, 15A	95%	1mA	50μA	500kHz	MSOP-10	Small and Super Efficient.
MIC2169A	3V to 14.5V	Adj. to 0.8V	External N-FETs, 15A				500kHz	MSOP-10	Small and Super Efficient; Enable Function.
MIC2159	3V to 14.5V	Adj. to 0.8V	External N-FETs, 20A				400kHz	EPAD-MSOP-10	Higher Current, Enable Function.
MIC2182	4.5V to 32V	3.3V, 5V, Adj.	External N-FETs, 2.5A to 20A	90%+	600μA	2μA	300kHz	SOIC-16, TSSOP-16	
MIC2183	2.9V to 14V	Adj. to 1.25V	External N- and P-FET, 1A to 10A	95%+	600μA	0.5μA	400/200kHz	MSOP-16, QSOP-16	100% Max. Duty Cycle.
MIC2193	2.9V to 14V	Adj.	External N- and P-FET, 1A to 10A	93%+	1mA	–	400kHz	SOIC-8	100% Max. Duty Cycle.
MIC2198	4.5V to 32V	Adj. To 0.8V	External N-FETs, 1A to 20A	95%+	3.5mA	0.1μA	500kHz	MLF-12 (4x4mm)	
MIC2199	4.5V to 32V	Adj. To 0.8V	External N-FETs, 1A to 20A	95%+	1.6mA	0.1μA	300kHz	MLF-12 (4x4mm)	

1. I_{SW} (Avg) refers to the average current flowing through the switch.

Boost Regulators (Internal Switches)

Device	V _{IN} Range	V _{OUT}	I _{SW} (Typ)	Frequency	Package(s)	Comments
MIC2141	2.5V to 14V	Adj. to 22V	0.1A	330kHz	SOT-23-5	Dynamically Adjustable V _{OUT} for LCD Bias.
MIC2142	2.2V to 16V	Adj. to 22V	0.1A	330kHz	SOT-23-5	
MIC2145	2.4V to 16V	Adj. to 16V	1A	450kHz	MSOP-8, MLF-10 (3x3mm)	
MIC2171	3V to 40V	Adj. to 60V	4A	100kHz	TO-220-5, TO-263-5	High-Current, High-Voltage.
MIC2172	3V to 40V	Adj. to 60V	2.5A	100kHz	SOIC-8, DIP-8	Sync Pin., High-Current, High-Voltage.
MIC2288	2.5V to 10V	Adj. to 34V	1.2A	1.2MHz	TSOT-23-5, MLF-8 (2x2mm)	OLED Driver, High Accuracy, OVP.
MIC2289	2.5V to 10V	Adj. to 34V	0.75A	1.2MHz	MLF-8 (2x2mm)	Internal Schottky White LED Driver, OVP.
MIC2570	1.3V to 15V	2.85V, 3.3V, 5V, Adj. to 33V	1.1A	20kHz	SOIC-8	Low Input Voltage.
MIC2571	0.9V to 15V	2.85V, 3.3V, 5V, Adj. to 33V	1.1A	20kHz	SOIC-8	Low Input Voltage.
MIC2290	2.5V to 10V	Adj. to 34V	0.75A	1.2MHz	MLF-8 (2x2mm)	Internal Schottky, OVP.
MIC2295	2.5V to 10V	Adj. to 34V	1.2A	1.2MHz	TSOT-23-5, MLF-8 (2x2mm)	High-Current, High-Efficiency, OVP.
MIC2296	2.5V to 10V	Adj. to 34V	1.7A	0.6MHz	TSOT-23-5, MLF-8 (2x2mm)	High-Current, High-Efficiency, OVP.
MIC2297	2.5V to 10V	Adj. to 40V	1.2A	0.6MHz	MLF-10 (2x2mm)	High Voltage White LED Driver, OVP.
MIC2298	2.5V to 10V	Adj. to 15V	4.75A	1.0MHz	MLF-12 (3x3mm)	High Power Photo Flash LED Driver with Torch Mode, OVP.
MIC2299	2.5V to 10V	Adj. to 30V	4.75A	2.0MHz	MLF-12 (3x3mm)	High Power Photo Flash LED Driver with Torch Mode, OVP.
MIC2601/2	New! 4.5V to 20V	Adj. to 40V	1.2A	1.2/2MHz	MLF-8 (2x2mm)	Enable Pin/SS/ Low Shutdown Current.
MIC2605/6	New! 4.5V to 20V	Adj. to 40V	0.5A	1.2/2MHz	MLF-8 (2x2mm)	Enable Pin/SS/ Low Shutdown Current. Integrated Schottky.
MIC3172	3V to 40V	Adj. to 34V	2.25A	100kHz	SOIC-8, PDIP-8	Enable Pin.

Switch-Mode Voltage Regulator Selection Guide

Boost Controllers (External Switches)

Device	V _{IN} Range	V _{OUT}	Output Current	Efficiency (Typ)	I _Q (Typ)	Shutdown I _Q (Typ)	Frequency	Package(s)	Comments
MIC2186	2.9V to 14V	Adj.	External N-FET, 1A to 10A	90%	600µA	0.5µA	100/200/400kHz	SOIC-, QSOP-16	
MIC2196	2.9V to 14V	Adj.	External N-FET, 1A to 10A	90%	1mA	0.5µA	400kHz	SOIC-8	Boost, SEPIC, Cuk Configurations.

Synchronous Boost Controllers (External Switches)

MIC2185	2.9V to 14V	Adj.	External N-FET/P-FET, 1A to 10A	95%	600µA	0.5µA	400kHz	SOIC-8	High Efficiency.
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Flyback/Forward Converter/Push-Pull Controllers for Isolated Applications (External Switches)

Device	V _{IN} Range	Gate Drive		Start-Up		Duty Cycle		Topology	Frequency	Package(s)	Comments
		V _{START}	V _{STOP}	V _{START}	V _{STOP}	Current (Max)	(Max)				
MIC9130	9V to 180V	1A	9V	–	–	–	50%	Forward/Flyback	Adj. to 1.5MHz	SOIC-, QSOP-16	Fast. Built-in 180V Start-up Circuitry.
MIC9131	9V to 180V	1A	9V	–	–	–	75%	Forward/Flyback	Adj. to 1MHz	SOIC-, QSOP-16	Fast. Built-in 180V Start-up Circuitry.
MIC3808	8.3V to 15V	0.5A	12.5V	8.3V	–	130µA	50%	Push-Pull	Adj. to 1MHz	SOIC-, MSOP-8	High-Output Current.
MIC3809	4.1V to 15V	0.5A	4.3V	4.1V	–	130µA	50%	Push-Pull	Adj. to 1MHz	SOIC-, MSOP-8	High-Output Current.
MIC3838	8.3V to 15V	0.5A	12.5V	8.3V	–	130µA	50%	Push-Pull	Adj. to 1MHz	MSOP-10	Can Implement Volt-Second Clamp.
MIC3839	4.1V to 15V	0.5A	4.3V	4.1V	–	130µA	50%	Push-Pull	Adj. to 1MHz	MSOP-10	Can Implement Volt-Second Clamp.
MIC38C42	15.5V to 20V	0.5A	14.5V	9.0V	–	200µA	96%	Forward/Flyback	Adj. to 500kHz	PDIP-8, -14, SOIC-8, -14, MSOP-8	
MIC38C43	9V to 20V	0.5A	8.4V	7.6V	–	200µA	96%	Forward/Flyback	Adj. to 500kHz	PDIP-8, -14, SOIC-8, -14, MSOP-8	
MIC38C44	15.5V to 20V	0.5A	14.5V	9.0V	–	200µA	50%	Forward/Flyback	Adj. to 500kHz	PDIP-8, -14, SOIC-8, -14, MSOP-8	
MIC38C45	9V to 20V	0.5A	8.4V	7.6V	–	200µA	50%	Forward/Flyback	Adj. to 500kHz	PDIP-8, -14, SOIC-8, -14, MSOP-8	
MIC38HC42	15.5V to 20V	1A	14.5V	9.0V	–	200µA	96%	Forward/Flyback	Adj. to 500kHz	PDIP-8, -14, SOIC-8, -14	
MIC38HC43	9V to 20V	1A	8.4V	7.6V	–	200µA	96%	Forward/Flyback	Adj. to 500kHz	PDIP-8, -14, SOIC-8, -14	
MIC38HC44	15.5V to 20V	1A	14.5V	9.0V	–	200µA	50%	Forward/Flyback	Adj. to 500kHz	PDIP-8, -14, SOIC-8, -14	
MIC38HC45	9V to 20V	1A	8.4V	7.6V	–	200µA	50%	Forward/Flyback	Adj. to 500kHz	PDIP-8, -14, SOIC-8, -14	
MIC38C42A ⁽¹⁾	15.5V to 20V	0.5A	14.5V	9.0V	–	200µA	96%	Forward/Flyback	Adj. to 500kHz	SOIC-8, -14	
MIC38C43A ⁽¹⁾	9V to 20V	0.5A	14.5V	9.0V	–	200µA	96%	Forward/Flyback	Adj. to 500kHz	SOIC-8, -14	
MIC38C44A ⁽¹⁾	15.5V to 20V	0.5A	14.5V	9.0V	–	200µA	50%	Forward/Flyback	Adj. to 500kHz	SOIC-8, -14	
MIC38C45A ⁽¹⁾	9V to 20V	0.5A	14.5V	9.0V	–	200µA	50%	Forward/Flyback	Adj. to 500kHz	SOIC-8, -14	

1. Recommended for new designs.

WLED Driver Selection Guide

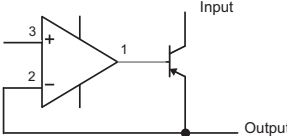
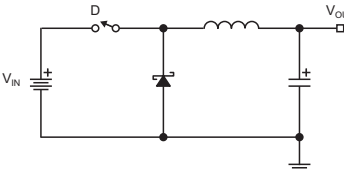
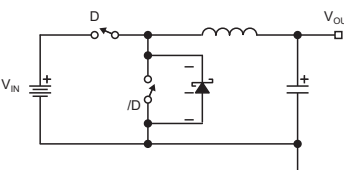
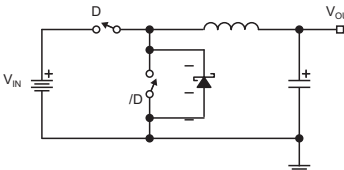
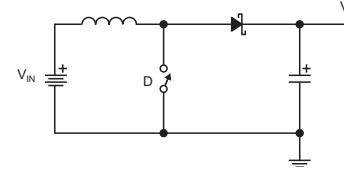
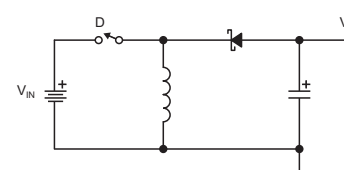
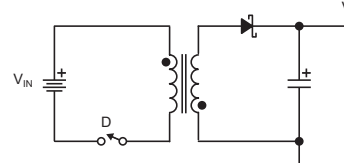
Boost LED Drivers

Device	V _{IN} Range	V _{OUT}	I _{sw} (Typ)	Frequency	Package(s)	Comments
MIC3287	2.8V to 5.5V	Adj. to 24V	0.35A	1.2MHz	TSOT-23-5, TSOT-23-6, MLF-8 (2x2mm)	White LED Driver.
MIC2287	2.5V to 10V	Adj. to 34V	0.75A	1.2MHz	TSOT-23-5, MLF-8 (2x2mm)	White LED Driver.
MIC2287C	2.5V to 10V	Adj. to 34V	0.75A	1.2MHz	TSOT-23-5, MLF-8 (2x2mm)	White LED Driver. 10% ILED accuracy
MIC2289	2.5V to 10V	Adj. to 34V	0.75A	1.2MHz	MLF-8 (2x2mm)	Internal Schottky White LED Driver, OVP.
MIC2291	2.5V to 10V	Adj. to 34V	1.2A	1.2MHz	TSOT23-5, MLF-8 (2x2mm)	Photo Flash LED Driver, OVP.
MIC2292	2.5V to 10V	Adj. to 34V	0.5A	1.6MHz	MLF-8 (2x2mm)	High-Frequency White LED Driver w/Internal Schottky Diode, OVP.
MIC2293	2.5V to 10V	Adj. to 34V	0.5A	2MHz	MLF-8 (2x2mm)	High-Frequency White LED Driver w/Internal Schottky Diode, OVP.
MIC2293C	2.5V to 10V	Adj. to 34V	0.5A	2MHz	MLF-8 (2x2mm)	High-Frequency White LED Driver w/Internal Schottky Diode, OVP. 10% ILED accuracy
MIC3287	2.8V to 5.5V	Adj. to 24V	0.35A	1.2MHz	TSOT-23-5, TSOT-23-6, MLF-8 (2x2mm)	White LED Driver.
MIC2297	2.5V to 10V	Adj. to 40V	1.2A	0.6MHz	MLF-10 (2x2mm)	High Voltage White LED Driver, OVP.
MIC2298	2.5V to 10V	Adj. to 15V	4.75A	1.0MHz	MLF-12 (3x3mm)	High Power Photo Flash LED Driver with Torch Mode, OVP.
MIC2299	2.5V to 10V	Adj. to 30V	4.75A	2.0MHz	MLF-12 (3x3mm)	High Power Photo Flash LED Driver with Torch Mode.
MIC3289	2.5V to 6.5V	Adj. to 24V	0.5A	1.2MHz	TSOT-23-6, MLF-8 (2x2mm)	Single Wire Digital Brightness Control w/Internal Schottky Diode.

Linear LED Drivers

Device	V _{IN} Range	Output	Dimming	ILED Accuracy	LDOs	Package(s)	Comments
MIC2841	3.0V to 5.5V	4 x 20mA	PWM to 20kHz	5%	-	MLF-10 (2x2mm)	Linear WLED Driver
MIC2842	3.0V - 5.5V	4 x 20mA	Digital	5%	-	MLF-10 (2x2mm)	Linear WLED Driver
MIC2843	3.0V - 5.5V	6 x 20mA	PWM to 20kHz	5%	-	MLF-10 (2x2mm)	Linear WLED Driver
MIC2844	3.0V - 5.5V	6 x 20mA	Digital	5%	-	MLF-10 (2x2mm)	Linear WLED Driver
MIC2845	3.0V - 5.5V	6 x 20mA	PWM to 20kHz	5%	2 x 150mA	MLF-14(2.5x2.5mm)	Linear WLED Driver w/ dual LDOs
MIC2846	3.0V - 5.5V	6 x 20mA	Digital	5%	2 x 150mA	MLF-14(2.5x2.5mm)	Linear WLED Driver w/ dual LDOs

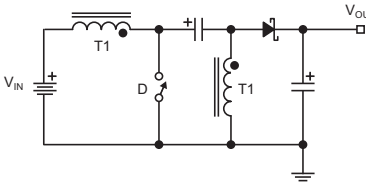
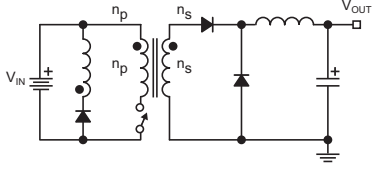
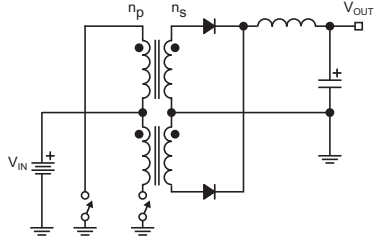
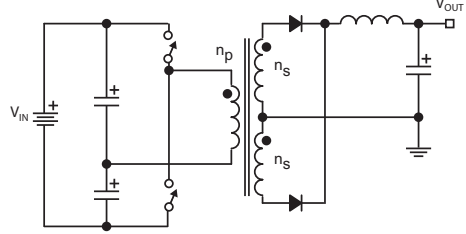
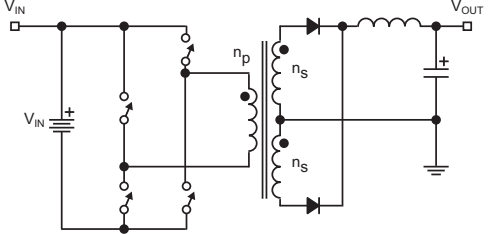
Switch-Mode Voltage Regulator DC-to-DC Topologies

Device	Typical Applications	Pros	Cons
MIC5203 MIC5205 MIC5219 MIC5245 MIC2940A	MIC39100 MIC39150 MIC47100* MIC69103* MIC69153* MIC69302*	 <p>Linear Regulator Only Steps Down ($V_{OUT} < V_{IN}$)</p> <ul style="list-style-type: none"> - Inexpensive - Very Small - Low Noise/EMI - Ideal for: <ul style="list-style-type: none"> - 3.3V to 2.5V - 2.5V to 1.8V 	<p>Inefficient at high input to output voltage differential Eff = V_{OUT}/V_{IN}</p> <p><i>Note:</i> If a linear regulator gets too hot, then use a buck switching regulator instead or the new HELDO™ MIC38300).</p>
LM257x MIC457x MIC2207 MIC2208 MIC4680* MIC4681* MIC4682* MIC4684*	MIC4685* MIC4690* MIC4720* MIC4721* MIC4722* MIC4723* MIC4724* MIC4724*	 <p>Buck Regulator (Internal Switch) Only Steps Down ($V_{OUT} < V_{IN}$)</p> <ul style="list-style-type: none"> - Lowest Peak Current - Only One Switch Voltage Drop - Low-Ripple Current In <ul style="list-style-type: none"> - Output-Filter Capacitor - Simple Inductor - Low Switch-Stress Voltage <p>Eff = +85%</p>	<p>High-Side Switch</p> <p>$I_{SW} (Avg) \approx I_{OUT}$</p> <p>DC $\approx \frac{V_{OUT}}{V_{IN} \times Eff}$</p>
MIC2177* MIC2178* MIC2179* MIC2202* MIC2203* MIC2204* MIC2205*	MIC2206* MIC2224* MIC2245* MIC2285* MIC22400* MIC22600* MIC23xxx	 <p>Synchronous Buck Regulator (Internal Switch) High Efficiency Step Down</p> <ul style="list-style-type: none"> - Highest Efficiency (+90%) - Pros are same as Buck - High Output Current (Up to 20A) 	<p>Two Switches</p> <p>$I_{SW} (Avg) \approx I_{OUT}$</p> <p>DC $\approx \frac{V_{OUT}}{V_{IN} \times Eff}$</p>
MIC2130/1* MIC2159* MIC2168A* MIC2169A* MIC2182*	MIC2183 MIC2193* MIC2198* MIC2199* MIC2182*	 <p>Synchronous Buck Regulator (External Switch) High Efficiency Step Down</p> <ul style="list-style-type: none"> - Highest Efficiency (+90%) - Pros are same as Buck - High Output Current (Up to 20A) 	<p>Two Switches</p> <p>$I_{SW} (Avg) \approx I_{OUT}$</p> <p>DC $\approx \frac{V_{OUT}}{V_{IN} \times Eff}$</p>
MIC2142* MIC2145* MIC2186* MIC2288 MIC2290 MIC2570*	MIC2601/2 MIC2605/6 MIC3172* MIC2171* MIC3289*	 <p>Boost Only Steps Up ($V_{OUT} > V_{IN}$)</p> <ul style="list-style-type: none"> - Low Peak Current - Low-Side Switch - Simple Inductor - Low Switch-Stress Voltage <p>Eff \approx 85%</p>	<p>Output can't be completely turned off. No short-circuit protection.</p> <p>$I_{SW} (Avg) \approx \frac{V_{OUT} \times I_{OUT}}{V_{IN} \times Eff.}$</p> <p>DC $\approx \frac{V_{OUT} - (V_{IN} \times Eff.)}{V_{OUT}}$</p>
MIC2196* LM257x MIC457x	MIC4680 MIC4681 MIC4690	 <p>Inverter/Buck Boost Negative Output Only</p> <ul style="list-style-type: none"> - Simple Inductor <p>Eff \approx 80%</p>	<p>High-Side Switch High Peak Currents</p> <p>$I_{SW} (Avg) \approx \frac{V_{OUT} \times I_{OUT} + I_{OUT}}{V_{OUT} \times Eff.}$</p> <p>DC $\approx \frac{V_{OUT}}{V_{OUT} + (V_{IN} \times Eff.)}$</p>
MIC38HC4x MIC38C4x		 <p>Forward Step Up and Down</p> <ul style="list-style-type: none"> - Isolated Outputs - Low Side Switch - Low Input/Output Ripple <p>Eff \approx 90%</p>	<p>$I_{SW} (Avg) \approx \frac{n_s}{n_p} \times I_{OUT}$</p> <p>DC $\approx \frac{V_{OUT}}{(Eff \times V_{IN})} \times \frac{n_p}{n_s}$</p>

Note:

* = evaluation board is available.

Switch-Mode Voltage Regulator DC-to-DC Topologies

Device	Typical Applications	Pros	Cons	
MIC2171 MIC2186* MIC2196* MIC38C4x	MIC38HC4x MIC9130** (POE) MIC9131*		Flyback Applications (External Switches) Step Up and Down Isolated Output Multiple Outputs Negative Output High Output Voltage – Low-Side Switch Eff ≈ 80%	Transformer instead of Inductor High Peak Current High Switch-Stress Voltage $I_{SW} (Avg) \approx \frac{2 \times V_{OUT} \times I_{OUT}}{V_{IN} \times Eff.}$ DC ≈ Duty Cycle DC ≈ Assume 50%
MIC2142* MIC2145* MIC2171* MIC2172* MIC2186*	MIC2196* MIC2288* MIC2295* MIC2570* MIC3172*		SEPIC Step Up and Down – Low-Side Switch Eff ≈ 80%	High Peak Currents 2 inductors or coupled inductor. High Switch-Stress Voltage $I_{SW} (Avg) \approx \frac{V_{OUT} \times I_{OUT} + I_{OUT}}{V_{OUT} \times Eff.}$ $DC \approx \frac{V_{OUT}}{V_{OUT} + (V_{IN} \times Eff.)}$
MIC3808/9 MIC3838/9			Push-Pull Step Up and Down – Isolated Outputs – Low Side Switches – Low Input/Output Ripple Eff ≈ 94%	$I_{SW} (Avg) \approx \frac{n_s}{n_p} \times I_{OUT}$ $DC \approx \frac{V_{OUT}}{2(Eff \times V_{IN})} \times \frac{n_p}{n_s}$
MIC3808 MIC3809* MIC3838/9			Half-Bridge Step Up and Down – Isolated Outputs – Low FET Stress – Low Transformer Leakage Eff ≈ 95%	$I_{SW} (Avg) \approx \frac{n_s}{n_p} \times I_{OUT}$ $DC \approx \frac{V_{OUT}}{2(Eff \times V_{IN})} \times \frac{n_p}{n_s}$
MIC3808 MIC3809* MIC3838/9			Full-Bridge Step Up and Down – Isolated Outputs – High Power – Low FET Stress Eff ≈ 95%	$I_{SW} (Avg) \approx \frac{n_s}{n_p} \times I_{OUT}$ $DC \approx \frac{V_{OUT}}{2(Eff \times V_{IN})} \times \frac{n_p}{n_s}$

Note:
* = evaluation board is available.

General Purpose Power Distribution Switch Selection Guide

Micrel Advantage

- Highest Efficiency
- Highest Current Density
- Low $R_{DS\ ON}$
- Best CLS Performance

Device	Type	Switch Element	Internal Charge Pump	Operating Voltage	Current Limit Fixed (Min.)	Adj. (Max.)	Output Resistance	Body Diode Blocking	Enable Logic	Under Voltage Lockout	Current Limit	Thermal Shutdown	Fault Flag	Flag Transient Filter	Package
MIC2003/13	Single	P-Channel	n/a	2.5V to 5.5V	500mA 800mA 1.2A		100mΩ@5V	No	Noninverting	Yes	Yes	Yes	No	Yes	SOT-23-6, MLF [®] (2x2mm)
MIC2004/14	Single	P-Channel	n/a	2.5V to 5.5V	500mA 800mA 1.2A		100mΩ@5V	No	Noninverting	Yes	Yes	Yes	No	Yes	SOT-23-6, MLF [®] (2x2mm)
MIC2005/15	Single	P-Channel	n/a	2.5V to 5.5V	500mA 800mA 1.2A		100mΩ@5V	No	Noninverting	Yes	Yes	Yes	Yes	Yes	SOT-23-6, MLF [®] (2x2mm)
MIC2006/16	Single	P-Channel	n/a	2.5V to 5.5V	500mA 800mA 1.2A		100mΩ@5V	No	Noninverting	Yes	Yes	Yes	No	Yes	SOT-23-6, MLF [®] (2x2mm)
MIC2007/17	Single	P-Channel	n/a	2.5V to 5.5V	200mA	2.0A	100mΩ@5V	No	Noninverting	Yes	Yes	Yes	No	Yes	SOT-23-6, MLF [®] (2x2mm)
MIC2008/18	Single	P-Channel	n/a	2.5V to 5.5V	200mA	2.0A	100mΩ@5V	No	Noninverting	Yes	Yes	Yes	No	Yes	SOT-23-6, MLF [®] (2x2mm)
MIC2009/19	Single	P-Channel	n/a	2.5V to 5.5V	200mA	2.0A	100mΩ@5V	No	Noninverting	Yes	Yes	Yes	Yes	Yes	SOT-23-6, MLF [®] (2x2mm)
MIC2025-1	Single	N-Channel	Yes	2.7V to 5.5V	500mA		140mΩ@5V	Yes	Noninverting	Yes	Yes	Yes	Yes	Yes	SOIC-8, MSOP-8
MIC2025-2	Single	N-Channel	Yes	2.7V to 5.5V	500mA		140mΩ@5V	Yes	Inverting	Yes	Yes	Yes	Yes	Yes	SOIC-8, MSOP-8
MIC2026-1	Dual	N-Channel	Yes	2.7V to 5.5V	500mA		140mΩ@5V	Yes	Noninverting	Yes	Yes	Yes	Yes	Yes	SOIC-8, DIP-8
MIC2026-2	Dual	N-Channel	Yes	2.7V to 5.5V	500mA		140mΩ@5V	Yes	Inverting	Yes	Yes	Yes	Yes	Yes	SOIC-8, DIP-8
MIC2027-1	Quad	N-Channel	Yes	2.7V to 5.5V	500mA		150mΩ@5V	Yes	Noninverting	Yes	Yes	Yes	Yes	Yes	SOIC-16
MIC2027-2	Quad	N-Channel	Yes	2.7V to 5.5V	500mA		150mΩ@5V	Yes	Inverting	Yes	Yes	Yes	Yes	Yes	SOIC-16
MIC2040-1	Single	N-Channel	Yes	0.8V to 5.5V	250mA	1.5A	80mΩ@5V	Yes	Noninverting	Yes	Yes	Yes	Yes	Yes	MSOP-10
MIC2040-2	Single	N-Channel	Yes	0.8V to 5.5V	250mA	1.5A	80mΩ@5V	Yes	Inverting	Yes	Yes	Yes	Yes	Yes	MSOP-10
MIC2041-1	Single	N-Channel	Yes	0.8V to 5.5V	250mA	1.5A	80mΩ@5V	Yes	Noninverting	Yes	Latched	Yes	Yes	Yes	MSOP-10
MIC2041-2	Single	N-Channel	Yes	0.8V to 5.5V	250mA	1.5A	80mΩ@5V	Yes	Inverting	Yes	Latched	Yes	Yes	Yes	MSOP-10
MIC2042-1	Single	N-Channel	Yes	0.8V to 5.5V	500mA	3.0A	40mΩ@5V	Yes	Noninverting	Yes	Yes	Yes	Yes	Yes	SOIC-8, TSSOP-14
MIC2042-2	Single	N-Channel	Yes	0.8V to 5.5V	500mA	3.0A	40mΩ@5V	Yes	Inverting	Yes	Yes	Yes	Yes	Yes	SOIC-8, TSSOP-14
MIC2043-1	Single	N-Channel	Yes	0.8V to 5.5V	500mA	3.0A	40mΩ@5V	Yes	Noninverting	Yes	Latched	Yes	Yes	Yes	SOIC-8, TSSOP-14
MIC2043-2	Single	N-Channel	Yes	0.8V to 5.5V	500mA	3.0A	40mΩ@5V	Yes	Inverting	Yes	Latched	Yes	Yes	Yes	SOIC-8, TSSOP-14
MIC2044-1	Single	N-Channel	Yes	0.8V to 5.5V	1.0A	6.0A	20mΩ@5V	Yes	Noninverting	Yes	Yes	Yes	Yes	Yes	TSSOP-16
MIC2044-2	Single	N-Channel	Yes	0.8V to 5.5V	1.0A	6.0A	20mΩ@5V	Yes	Inverting	Yes	Yes	Yes	Yes	Yes	TSSOP-16
MIC2045-1	Single	N-Channel	Yes	0.8V to 5.5V	1.0A	6.0A	20mΩ@5V	Yes	Noninverting	Yes	Latched	Yes	Yes	Yes	TSSOP-16
MIC2045-2	Single	N-Channel	Yes	0.8V to 5.5V	1.0A	6.0A	20mΩ@5V	Yes	Inverting	Yes	Latched	Yes	Yes	Yes	TSSOP-16
MIC2075-1	Single	N-Channel	Yes	2.7V to 5.5V	500mA		140mΩ@5V	Yes	Noninverting	Yes	Yes	Latched	Yes	Yes	SOIC-8, MSOP-8
MIC2075-2	Single	N-Channel	Yes	2.7V to 5.5V	500mA		140mΩ@5V	Yes	Inverting	Yes	Yes	Latched	Yes	Yes	SOIC-8, MSOP-8
MIC2076-1	Dual	N-Channel	Yes	2.7V to 5.5V	500mA		140mΩ@5V	Yes	Noninverting	Yes	Yes	Latched	Yes	Yes	SOIC-8, DIP-8
MIC2076-2	Dual	N-Channel	Yes	2.7V to 5.5V	500mA		140mΩ@5V	Yes	Inverting	Yes	Yes	Latched	Yes	Yes	SOIC-8, DIP-8
MIC2077-1	Quad	N-Channel	Yes	2.7V to 5.5V	500mA		150mΩ@5V	Yes	Noninverting	Yes	Yes	Latched	Yes	Yes	SOIC-16
MIC2077-2	Quad	N-Channel	Yes	2.7V to 5.5V	500mA		150mΩ@5V	Yes	Inverting	Yes	Yes	Latched	Yes	Yes	SOIC-16
MIC2505	Single	N-Channel	Yes	2.7V to 7.5V	2.0A		50mΩ@5V	Yes	Noninverting		Yes	Yes	Yes	Yes	SOIC-8 MIC2505-1
MIC2505-1	Single	N-Channel	Yes	2.7V to 7.5V	2.0A		50mΩ@5V	Yes	Noninverting		Yes	Yes	Yes	Yes	SOIC-8 MIC2505-2
MIC2505-2	Single	N-Channel	Yes	2.7V to 7.5V	2.0A		50mΩ@5V	Yes	Inverting		Yes	Yes	Yes	Yes	SOIC-8
MIC2506	Dual	N-Channel	Yes	2.7V to 7.5V	1.0A		125mΩ@5V	Yes	Noninverting		Yes	Yes	Yes	Yes	SOIC-8
MIC2514	Single	P-Channel	Yes	3V to 13.5V	400mA		2.4Ω@5V		Noninverting		Yes	Yes			SOT-23-5
MIC2536-1	Dual	N-Channel	Yes	2.7V to 5.5V	100mA		700mΩ@5V	Yes	Noninverting		Yes	Yes	Yes	Yes	SOIC-8, MSOP-8
MIC2536-2	Dual	N-Channel	Yes	2.7V to 5.5V	100mA		700mΩ@5V	Yes	Inverting		Yes	Yes	Yes	Yes	SOIC-8, MSOP-8
MIC2537-1	Quad	N-Channel	Yes	2.7V to 5.5V	100mA		700mΩ@5V	Yes	Noninverting		Yes	Yes	Yes		SOIC-16
MIC2537-2	Quad	N-Channel	Yes	2.7V to 5.5V	100mA		700mΩ@5V	Yes	Inverting		Yes	Yes	Yes		SOIC-16
MIC2544-1	Single	N-Channel	Yes	2.7V to 5.5V	100mA	1.5A	120mΩ@5V	Yes	Noninverting		Yes	Yes	Yes		SOIC-8, MSOP-8
MIC2544-2	Single	N-Channel	Yes	2.7V to 5.5V	100mA	1.5A	120mΩ@5V	Yes	Inverting		Yes	Yes	Yes		SOIC-8, MSOP-8

General Purpose Power Distribution Switch Selection Guide

Device	Type	Switch Element	Internal Charge Pump	Operating Voltage	Current Limit		Output Resistance	Body Diode Blocking	Enable Logic	Under Voltage Lockout	Current Limit	Thermal Shutdown	Flag		
					Fixed (Min.)	Adj. (Max.)							Fault Flag	Transient Filter	Package
MIC2545A-1	Single	N-Channel	Yes	2.7V to 5.5V	500mA	3.0A	50mΩ@5V	Yes	Noninverting		Yes	Yes	Yes		SOIC-8, DIP-8, TSSOP-14
MIC2545A-2	Single	N-Channel	Yes	2.7V to 5.5V	500mA	3.0A	50mΩ@5V	Yes	Inverting		Yes	Yes	Yes		SOIC-8, DIP-8, TSSOP-14
MIC2546-1	Dual	N-Channel	Yes	2.7V to 5.5V	100mA	1.5A	120mΩ@5V	Yes	Noninverting		Yes	Yes	Yes		SOIC-16, TSSOP-16
MIC2546-2	Dual	N-Channel	Yes	2.7V to 5.5V	100mA	1.5A	120mΩ@5V	Yes	Inverting		Yes	Yes	Yes		SOIC-16, TSSOP-16
MIC2546-1	Dual	N-Channel	Yes	2.7V to 5.5V	100mA	1.5A	120mΩ@5V	Yes	Noninverting		Yes	Yes	Yes		SOIC-, TSSOP-16
MIC2546-2	Dual	N-Channel	Yes	2.7V to 5.5V	100mA	1.5A	120mΩ@5V	Yes	Inverting		Yes	Yes	Yes		SOIC-, TSSOP-16
MIC2547-1	Dual	N-Channel	Yes	2.7V to 5.5V	100mA	1.5A	120mΩ@5V	Yes	Noninverting		Yes	Latched	Yes		SOIC-, TSSOP-16
MIC2547-2	Dual	N-Channel	Yes	2.7V to 5.5V	100mA	1.5A	120mΩ@5V	Yes	Inverting		Yes	Latched	Yes		SOIC-, TSSOP-16
MIC2548-1	Single	N-Channel	Yes	2.7V to 5.5V	100mA	1.5A	120mΩ@5V	Yes	Noninverting		Yes	Latched	Yes		SOIC-, MSOP-8
MIC2548-2	Single	N-Channel	Yes	2.7V to 5.5V	100mA	1.5A	120mΩ@5V	Yes	Inverting		Yes	Latched	Yes		SOIC-, MSOP-8
MIC2549A-1	Single	N-Channel	Yes	2.7V to 5.5V	500mA	3.0A	50mΩ@5V	Yes	Noninverting		Yes	Latched	Yes		SOIC-, PDIP-8, TSSOP-14
MIC2549A-2	Single	N-Channel	Yes	2.7V to 5.5V	500mA	2.5A	50mΩ@5V	Yes	Inverting		Yes	Latched	Yes		SOIC-, PDIP-8, TSSOP-14

USB Switches and USB Switches Supporting ACPI S0/S3 State Transitions⁽¹⁾

MIC2010-1	Dual	N-Channel	Yes	4.5V to 5.5V	500mA	300mA ⁽²⁾	140mΩ@5V	Yes	Noninverting	Yes	Yes	Yes	Yes	Yes	Yes	QSOP-16
MIC2010-2	Dual	N-Channel	Yes	4.5V to 5.5V	500mA	300mA ⁽²⁾	140mΩ@5V	Yes	Inverting	Yes	Yes	Yes	Yes	Yes	Yes	QSOP-16
MIC2012-1	Dual	N-Channel	Yes	4.5V to 5.5V	500mA		140mΩ@5V	Yes	Noninverting	Yes	Yes	Yes	Yes	Yes	Yes	QSOP-16
MIC2012-2	Dual	N-Channel	Yes	4.5V to 5.5V	500mA		140mΩ@5V	Yes	Inverting	Yes	Yes	Yes	Yes	Yes	Yes	QSOP-16
MIC2012	Dual	N-Channel	Yes	4.5V to 5.5V	500mA		140mΩ@5V	Yes	—	Yes	Yes	Yes	Yes	Yes	Yes	SOIC-8
MIC2070-1	Dual	N-Channel	Yes	4.5V to 5.5V	500mA	300mA ⁽²⁾	140mΩ@5V	Yes	Noninverting	Yes	Yes	Latched	Yes	Yes	Yes	QSOP-16
MIC2070-2	Dual	N-Channel	Yes	4.5V to 5.5V	500mA	300mA ⁽²⁾	140mΩ@5V	Yes	Inverting	Yes	Yes	Latched	Yes	Yes	Yes	QSOP-16
MIC2072-1	Dual	N-Channel	Yes	4.5V to 5.5V	500mA		140mΩ@5V	Yes	Noninverting	Yes	Yes	Latched	Yes	Yes	Yes	QSOP-16
MIC2072-2	Dual	N-Channel	Yes	4.5V to 5.5V	500mA		140mΩ@5V	Yes	Inverting	Yes	Yes	Latched	Yes	Yes	Yes	QSOP-16
MIC2072	Dual	N-Channel	Yes	4.5V to 5.5V	500mA		140mΩ@5V	Yes	—	Yes	Yes	Latched	Yes	Yes	Yes	SOIC-8

1. Contact factory for availability of specific options. Specifications are given for "MAIN" mode operation.

2. S3 State.

USB Transceiver Selection Guide

Device	Description	Supported Speeds	Package
MIC2550A	Universal Serial Bus Transceiver	1.5Mbps (low) and 12Mbps (full)	TSSOP-14, MLF-16
MIC2551A	Universal Serial Bus Transceiver	1.5Mbps (low) and 12Mbps (full)	TSSOP-14, MLF-16
MIC2551A-2.5	Universal Serial Bus Transceiver	1.5Mbps (low) and 12Mbps (full)	MLF-14 (2.5x2.5mm)
MIC2555	Universal Serial Bus On-The-Go (OTG) Transceiver	1.5Mbps (low) and 12Mbps (full)	MLF-24 (4x4mm)

PC Card/PCMCIA/CardBus Power Distribution Switch Selection Guide

Micrel Advantage

- Single Chip Smallest Footprint Solution
- First Company with PCMCIA Solution

Device	Slots Supported	V _{CC3} On-Resistance	V _{CC5} On-Resistance	V _{PP} On-Resistance	Current Limit	Thermal Shutdown	Charge Pump ⁽¹⁾	Package
MIC2560	Single	40mΩ	70mΩ	550mΩ	Yes	Yes		WSOIC-16
MIC2561	Single	110mΩ	210mΩ	550mΩ	Yes	Yes		SOIC-14
MIC2562A	Single	100mΩ	70mΩ	600mΩ	Yes	Yes	Yes	SOIC-14
MIC2563A	Dual	100mΩ	70mΩ	600mΩ	Yes	Yes	Yes	SSOP-28
MIC2564A	Dual	120mΩ	85mΩ	1300mΩ	Yes	Yes	Yes	SSOP-24, TSSOP-24
MIC2566	Single	120mΩ	85mΩ	—	Yes	Yes	Yes	SOIC-14, TSSOP-14
MIC2568	Dual	120mΩ	85mΩ	—	Yes	Yes	Yes	SSOP-28, TSSOP-28
MIC2569 <i>New!</i>		90mΩ	—	275mΩ	Yes	Yes	Yes	QSOP-16

1. 12V is not required for switching when equipped with a charge pump.

Operational Amplifier Selection Guide

Micrel Advantange

- Low Power
- Low Current
- Can Drive Large Capacitance Loads
- Best Performance

Device	Description	GBW	Slew Rate	Supply Current (per Op Amp)	Input Offset Voltage (max.)	Input Bias Current	Supply Range	Rail-to-Rail I/O	# of Op Amps Per Package	Package	Comments
MIC6211	High-Voltage Op Amp	2.5MHz	6V/μs	1.2mA	7mV	50nA	4V–32V		1	SOT-23-5	High-Voltage General Purpose.
LMC7101	General Purpose Op Amp	500kHz	0.5V/μs	500μA	6mV	1pA	2.7V–10V	Input/Output	1	SOT-23-5	Rail-to-Rail Input and Output.
MIC7111	Micropower 1.8V Op Amp	25kHz	20mV/μs	15μA	7mV	1pA	1.8V–11V	Input/Output	1	SOT-23-5	Rail-to-Rail Input and Output.
MIC7122	Rail-to-Rail Dual Op Amp	750kHz	0.7V/μs	350μA	9mV	1pA	2.2V–15V	Input/Output	2	MSOP-8	Rail-to-Rail Input and Output.
MIC7300	High Output Drive Op Amp	500kHz	0.5V/μs	700μA	9mV	0.5pA	2.2V–10V	Input/Output	1	SOT-23-5 MSOP-8	Rail-to-Rail Input and Output.
MIC860	4MHz/30μA Op Amp	4MHz	3V/μs	30μA	15mV	20pA	2.43V–5.25V	Output	1	SC-70-5	Very Low Power.
MIC861	400kHz/4.6μA Op Amp	400kHz	0.12V/μs	4.6μA	10mV	20pA	2.43V–5.25V	Output	1	SC-70-5	Very Low Power.
MIC862	Dual 3MHz/31μA Op Amp	3MHz	4V/μs	31μA	6mV	10pA	2V–5.25V	Output	2	SOT-23-8	Very Low Power.
MIC863	Dual 450KHz/4.2μA Op Amp	450KHz	0.35V/μs	4.2μA	6mV	10pA	2V–5.25V	Output	2	SOT-23-8	Very Low Power.
MIC910	135MHz Op Amp	135MHz	270V/μs	2.4mA	15mV	3.5μA	5V–18V		1	SOT-23-5	Low Power/High Speed.
MIC911	105MHz Op Amp	105MHz	120V/μs	1.25mA	10mV	1.5μA	5V–18V		1	SOT-23-5	Low Power/High Speed.
MIC912	200MHz Op Amp	200MHz	360V/μs	2.4mA	15mV	3.5μA	5V–18V		1	SOT-23-5	Low Power/High Speed.
MIC913	350MHz Op Amp	350MHz	500V/μs	4.2mA	16mV	5.5μA	5V–18V		1	SOT-23-5	Low Power/High Speed.
MIC914	160MHz Op Amp	160MHz	160V/μs	1.25mA	10mV	1.5μA	5V–18V		1	SOT-23-5	Low Power/High Speed.
MIC915	Dual MIC910	135MHz	270V/μs	2.4mA	15mV	3.5μA	5V–18V		2	MSOP-10	Low Power/High Speed.
MIC916	Triple MIC910	135MHz	270V/μs	2.4mA	15mV	3.5μA	5V–18V		3	QSOP-8	Low Power/High Speed.
MIC918	1500V/μs Op Amp	51MHz	1500V/μs	550μA	5mV	0.26μA	5V–18V		1	SC-70-5	Low Power/High Speed.
MIC919	1500V/μs Op Amp	27MHz	1500V/μs	360μA	5mV	0.13μA	5V–18V		1	SC-70-5	Low Power/High Speed.
MIC920	3000V/μs Op Amp	80MHz	3000V/μs	500μA	5mV	0.26μA	5V–18V		1	SC-70-5	Low Power/High Speed.
MIC921	3000V/μs Op Amp	45MHz	3000V/μs	300μA	5mV	0.13μA	5V–18V		1	SC-70-5	Low Power/High Speed.
MIC922	230MHz Op Amp	230MHz	1500V/μs	2.5mA	5mV	1.7μA	5V–18V		1	SC-70-5	Low Power/High Speed.
MIC923	410MHz/2200V/μs Op Amp	410MHz	2200V/μs	2.5mA	5mV	1.7μA	5V–18V		1	SC-70-5	Low Power/High Speed.

Comparator Selection Guide

Device	Description	Response Time	Supply Current	Input Offset Voltage (max.)	Input Bias Current	Supply Range	Package	Comments
MIC6270	High-Voltage Comparator	600ns	0.3mA	5mV	25nA	2V–36V	SOT-23-5	
MIC7211	Rail-to-Rail Input Comparator	4μs	5μA	10mV	5pA	2.2V–10V	SOT-23-5	Push-Pull Output.
MIC7221	Rail-to-Rail Input Comparator	4μs	5μA	10mV	5pA	2.2V–10V	SOT-23-5	Open-Drain Output.
MIC833	Comparator and Reference w/Adjustable Hysteresis	5μs	1μA	n/a	5pA	1.5V–5.5V	SOT-23-5	Internal 1% Reference.
MIC834	Comparator and Reference	5μs	1.5μA	n/a	5pA	1.5V–5.5V	SOT-23-5	Internal 1% Reference.
MIC841	Comparator and Reference w/Adjustable Hysteresis	12μs	1.5μA	n/a	5pA	1.5V–5.5V	SC-70-5	Internal 1.25% Reference.
MIC842	Comparator and Reference	12μs	1.5μA	n/a	5pA	1.5V–5.5V	SC-70-5	Internal 1.25% Reference.
MIC845	Micro-Power Comparator Battery Monitor	12μs	1.0μA	n/a	5pA	2.75V–5.5V	SC-70-5	Internal 2% Reference, 2.55V Reference.

MOSFET Driver Selection Guide

Device	Function	Type	Logic	Sink/Source Peak Output	Sink/Source Output Impedance	t_r/t_f	t_{pd} (input rising/falling)	Supply Voltage	Package	Comments
Half-Bridge Drivers										
MIC4100	Half-Bridge MOSFET Driver	Dual	Non-Inverting (CMOS)	2A/2A	2.5Ω/2.5Ω	10ns into 1000pF	27ns into 1,000pF	up to 100V	SOIC-8, MLF-8 (3x3mm) ⁽¹⁾	Hysteresis on input pins for noisy or slow signals.
MIC4101	Half-Bridge MOSFET Driver	Dual	Non-Inverting (TTL)	2A/2A	2.5Ω/2.5Ω	10ns into 1000pF	27ns into 1,000pF	up to 100V	SOIC-8, MLF-8 (3x3mm) ⁽¹⁾	Level shift between V_{IN} signal and V_{DD} supply voltage.
MIC4102	High-Voltage Sync. Buck Driver	Dual	Non-Inverting (TTL)	3A/2A	1.5Ω/2.5Ω	10ns/6ns into 1000pF	27ns into 1,000pF	up to 100V	SOIC-8, MLF-8 (3x3mm) ⁽¹⁾	Embedded Anti-Shoot through Protection.
MIC4103	Half-Bridge MOSFET Driver	Dual	Non-Inverting (CMOS)	3A/2A	1.25Ω/2.5Ω	10ns/6ns into 1000pF	27ns into 1,000pF	up to 100V	SOIC-8, MLF-8 (3x3mm) ⁽¹⁾	
MIC4104	Half-Bridge MOSFET Driver	Dual	Non-Inverting (TTL)	3A/2A	1.25Ω/2.5Ω	10ns/6ns into 1000pF	27ns into 1,000pF	up to 100V	SOIC-8, MLF-8 (3x3mm) ⁽¹⁾	
Low-Side Drivers										
MIC4120 ⁽²⁾	Low-Side Driver	Single	Non-Inverting	6A	1.5Ω	12ns/13ns into 2500pF	45ns/50ns into 2,500pF	4.5V to 20V	EPAD-SOIC-8, MLF-8 (3x3mm)	MIC4420 upgrade; Advanced packaging; Higher input voltage; Input pulse down to 50ns.
MIC4123 ⁽²⁾	Low-Side Driver	Dual	Inverting	3A	2.2Ω	23ns/25ns into 1800pF	44ns/59ns into 1,800pF	4.5V to 20V	EPAD-SOIC-8, MLF-8 (4x4mm)	MIC4423 upgrade; Advanced packaging; Higher input voltage; Input pulse down to 50ns.
MIC4124 ⁽²⁾	Low-Side Driver	Dual	Non-Inverting	3A	2.2Ω	23ns/25ns into 1800pF	44ns/59ns into 1,800pF	4.5V to 20V	EPAD-SOIC-8, MLF-8 (4x4mm)	MIC4424 upgrade; Advanced packaging; Higher input voltage; Input pulse down to 50ns.
MIC4125 ⁽²⁾	Low-Side Driver	Dual	Inverting + Non-Inverting	3A	2.2Ω	23ns/25ns into 1800pF	44ns/59ns into 1,800pF	4.5V to 20V	EPAD-SOIC-8, MLF-8 (4x4mm)	MIC4425 upgrade; Advanced packaging; Higher input voltage; Input pulse down to 50ns.
MIC4126 ⁽²⁾	Low-Side Driver	Dual	Inverting	1.5A	6Ω	13ns/15ns into 1000pF	37ns/40ns into 1000pF	4.5V to 20V	EPAD-SOIC-8, EPAD-MSOP-8, MLF-8 (3x3mm)	MIC4426 upgrade; Advanced packaging; Higher input voltage; Input pulse down to 50ns.
MIC4127 ⁽²⁾	Low-Side Driver	Dual	Non-Inverting	1.5A	6Ω	13ns/15ns into 1000pF	37ns/40ns into 1000pF	4.5V to 20V	EPAD-SOIC-8, EPAD-MSOP-8, MLF-8 (3x3mm)	MIC4427 upgrade; Advanced packaging; Higher input voltage; Input pulse down to 50ns.
MIC4128 ⁽²⁾	Low-Side Driver	Dual	Inverting + Non-Inverting	1.5A	6Ω	13ns/15ns into 1000pF	37ns/40ns into 1000pF	4.5V to 20V	EPAD-SOIC-8, EPAD-MSOP-8, MLF-8 (3x3mm)	MIC4428 upgrade; Advanced packaging; Higher input voltage; Input pulsedown to 50ns.
MIC4129 ⁽²⁾	Low-Side Driver	Single	Inverting	6A	1.5Ω	12ns/13ns into 2500pF	45ns/50ns into 2,500pF	4.5V to 20V	EPAD SOIC-8, MLF-8 (3x3mm)	MIC4429 upgrade; Advanced packaging; Higher input voltage; Input pulse down to 50ns.
MIC4416	Low-Side Driver	Single	Non-Inverting	1.2A	7.6Ω/7.8Ω	24ns/28ns into 1000pF	42ns into 1,000pF	4.5V to 18V	SOT-143	IttyBitty® Device.
MIC4417	Low-Side Driver	Single	Inverting	1.2A	7.6Ω/7.8Ω	24ns/28ns into 1000pF	37ns into 1,000pF	4.5V to 18V	SOT-143	IttyBitty® Device.
MIC44F18	N-Channel MOSFET Driver	Single	Non-Inverting (TTL)	6A	2Ω	10ns/10ns into 1000pF	15ns/13ns into 1000pF	4.5V to 13.2V	MLF-8 (2x2mm), EPAD MSOP-8	High Speed; small, thermally efficient package.
MIC44F19	P-Channel MOSFET Driver	Single	Inverting (TTL)	6A	2Ω	10ns/10ns into 1000pF	15ns/13ns into 1000pF	4.5V to 13.2V	MLF-8 (2x2mm), EPAD MSOP-8	High Speed; small, thermally efficient package.
MIC44F20	N-Channel MOSFET Driver	Single	Inverting (TTL)	6A	2Ω	10ns/10ns into 1000pF	15ns/13ns into 1000pF	4.5V to 13.2V	MLF-8 (2x2mm), EPAD MSOP-8	High Speed; small, thermally efficient package.
MIC4420	Low-Side Driver	Single	Non-Inverting	6A	1.7Ω/1.5Ω	12ns/13ns into 2500pF	18ns/48ns into 2500pF	4.5V to 18V	SOIC-8, MSOP-8, PDIP-8, TO-220-5, CerDIP-8 ⁽³⁾	Drives Hex 6–Hex 7 Size. MOSFET: 1,500pF to 16,000pF; Latch-Up Protected; Input to –5V.
MIC4429	Low-Side Driver	Single	Inverting	6A	1.7Ω/1.5Ω	12ns/13ns into 2500pF	18ns/48ns into 2500pF	4.5V to 18V	SOIC-8, MSOP-8, PDIP-8, TO-220-5	Drives a Hex 6–Hex 7 Size. MOSFET: 1,500pF to 16,000pF; Latch-Up Protected; Input to –5V.
MIC4421	Low-Side Driver	Single	Inverting	9A	0.8Ω/0.6Ω	20ns/24ns into 10nF	15ns/35ns into 10nF	4.5V to 18V	PDIP-8, SOIC-8, TO-220-5	Drives 1,500pF to 47,000pF; Latch-Up Protected; Input to –5V.
MIC4421A ⁽²⁾					0.8Ω/0.6Ω	20ns/24ns into 10nF	15ns/35ns into 10nF			
MIC4422	Low-Side Driver	Single	Non-inverting	9A	0.8Ω/0.6Ω	20ns/24ns into 10nF	15ns/35ns into 10nF	4.5V to 18V	PDIP-8, SOIC-8, TO-220-5	Drives 1,500pF to 47,000pF; Latch-Up Protected; Input to –5V.
MIC4422A ⁽²⁾					0.8Ω/0.6Ω	20ns/24ns into 10nF	15ns/35ns into 10nF			

1. Contact factory for MLF® availability.
2. Recommended for new designs.
3. SMD (military) 5962-8877003PA.

MOSFET Driver Selection Guide

Device	Function	Type	Logic	Sink/Source	Sink/Source	t_r/t_f	t_{pd} (input rising/falling)	Supply Voltage	Package	Comments
				Peak Output	Output Impedance					
MIC4423	Low-Side Driver	Dual	Inverting	3A	3.8Ω/3.5Ω	23ns/25ns into 1800pF	33ns/38ns into 1800pF	4.5V to 18V	SOIC-8, WSOIC-16, PDIP-8	Drives Hex 4–Hex 5 Size. MOSFET: 6,000pF to 12,000pF; Latch-Up Protected; Input to –5V.
MIC4424	Low-Side Driver	Dual	Non-inverting	3A	3.8Ω/3.5Ω	23ns/25ns into 1800pF	33ns/38ns into 1800pF	4.5V to 18V	SOIC-8, WSOIC-16, PDIP-8, CerDIP ⁽⁵⁾	Drives a Hex 4–Hex 5 Size. MOSFET: 6,000pF to 12,000pF; Latch-up Protected; Input to –5V.
MIC4425	Low-Side Driver	Dual	Inverting + Non-Inverting	3A	3.8Ω/3.5Ω	23ns/25ns into 1800pF	33ns/38ns into 1800pF	4.5V to 18V	SOIC-8, -16, PDIP-8	Drives a Hex 4–Hex 5 Size. MOSFET: 6,000pF to 12,000pF; Latch-up Protected; Input to –5V.
MIC4426	Low-Side Driver	Dual	Inverting	1.5A	6Ω	18ns/15ns into 1000pF	17ns/23ns into 1000pF	4.5V to 18V	SOIC-8, MSOP-8, PDIP-8, CerDIP-8 ⁽⁶⁾	Drives a Hex 0–Hex 3 Size. MOSFET: 400pF to 3,000pF; Latch-up Protected; Input to –5V.
MIC4427	Low-Side Driver	Dual	Non-inverting	1.5A	6Ω	18ns/15ns into 1000pF	17ns/23ns into 1000pF	4.5V to 18V	SOIC-8, MSOP-8, PDIP-8, CerDIP-8 ⁽⁷⁾	Drives a Hex 0–Hex 3 Size. MOSFET: 400pF to 3,000pF; Latch-up Protected; Input to –5V.
MIC4428	Low-Side Driver	Dual	Inverting + Non-Inverting	1.5A	6Ω	18ns/15ns into 1000pF	17ns/23ns into 1000pF	4.5V to 18V	SOIC-8 MSOP-8, PDIP-8, CerDIP-8 ⁽⁸⁾	Drives a Hex 0–Hex 3 Size. MOSFET: 400pF to 3,000pF; Latch-up Protected; Input to –5V.
MIC4451 MIC4451A ⁽⁴⁾	Low-Side Driver	Single	Inverting	12A	0.8Ω/0.6Ω	20ns/24ns into 15nF	15ns/35ns into 15nF	4.5V to 18V	SOIC-8, PDIP-8, TO-220-5	Drives 1,500pF to 62,000pF; Latch-up Protected; Input to –5V.
MIC4452 MIC4452A ⁽⁴⁾	Low-Side Driver	Single	Non-inverting	12A	0.8Ω/0.6Ω	20ns/24ns into 15nF	15ns/35ns into 15nF	4.5V to 18V	SOIC-8, PDIP-8, TO-220-5	Drives 1,500pF to 62,000pF; Latch-up Protected; Input to –5V.
MIC4467	Low-Side Driver	Quad	Non-inverting NAND Inputs	1.2A	5Ω	14ns/13ns into 470pF	30ns/45ns into 470pF	4.5V to 18V	WSOIC-16, PDIP-14	Drives a Hex 0–Hex 3 Size. MOSFET: 400pF to 3,000pF; Latch-up Protected; Input to –5V.
MIC4468	Low-Side Driver	Quad	Non-inverting AND Inputs	1.2A	5Ω	14ns/13ns into 470pF	30ns/45ns into 470pF	4.5V to 18V	WSOIC-16, PDIP-14	Drives a Hex 0–Hex 3 Size. MOSFET: 400pF to 3,000pF; Latch-up Protected; Input to –5V.
MIC4469	Low-Side Driver	Quad	Inverting + Non-inverting AND Inputs	1.2A	5Ω	14ns/13ns into 470pF	30ns/45ns into 470pF	4.5V to 18V	WSOIC-16, PDIP-14, CerDIP-14 ⁽⁹⁾	Drives a Hex 0–Hex 3 Size. MOSFET: 400pF to 3,000pF; Latch-up Protected; Input to –5V.
MIC5011	High- or Low-Side Driver	Single	Non-inverting	–	–	60μs into 1,000pF		4.75V to 32V	SOIC-8, PDIP-8	External Charge Pump. Capacitors (opt.).
MIC5013	High- or Low-Side Driver	Single	Non-inverting	–	–	60μs into 1,000pF		7V to 32V	SOIC-8, PDIP-8	Current Sense, Fault.
MIC5014	High- or Low-Side Driver	Single	Non-inverting	–	–	90μs into 1,000pF		2.75V to 30V	SOIC-8, PDIP-8	
MIC5015	High- or Low-Side Driver	Single	Inverting	–	–	90μs into 1,000pF		2.75V to 30V	SOIC-8, PDIP-8	
MIC5016 ⁽¹⁰⁾	High- or Low-Side Driver	Dual	Non-inverting	–	–	90μs into 1,000pF		2.75V to 30V	WSOIC-16, PDIP-14	
MIC5017 ⁽¹⁰⁾	High- or Low-Side Driver	Dual	Inverting	–	–	90μs into 1,000pF		2.75V to 30V	WSOIC-16, PDIP-14	
MIC5018	High- or Low-Side Driver	Single	Non-inverting	–	–	2.1ms into 3,000pF		2.7V to 9V	SOT-143	IttyBitty [®] Device.
MIC5020	Complementary Low-Side Driver	Single	Non-inverting	–	–	1.1μs into 1,500pF		11V to 50V	SOIC-8	Complement to MIC5021 (Similar Performance), Current Sense (50mV nominal).
MIC5021	High-Speed High-Side Driver	Single	Non-inverting	–	–	0.9μs into 1,500pF		12V to 36V	SOIC-8, PDIP-8	Current Sense (50mV nominal).

4. Recommended for new designs.

5. SMD (military) 5962-8850305PA.

6. SMD (military) 5962-8850307PA.

7. SMD (military) 5962-8850308PA.

8. SMD (military) 5962-8850309PA.

9. SMD (military) 5962-9459403MCA.

10. Product family discontinuance announced effective June 3, 2005. Recommended Micrel alternatives; two each MIC5014 and two each MIC5015.

Voltage Monitors and Voltage/Processor Supervisors Selection Guide

Micrel Advantange

- Industry Standards
- Cross to Maxim
- Very Low IQ
- Very Low Supply Voltage
- Adjustable Hysterisis

Standard Voltage Supervisors

Device	Manual Reset Input	Reset Output Polarity	Reset Threshold Voltage	t _{RESET} (ms)	I _{SUPPLY} (μA)	Package
MIC1810-15/-10/-5	No	Low	4.12V, 4.37V, 4.62V	100	9.0	SOT-23-3
MIC1815-20/-10	No	Low	2.55V, 2.88V	100	9.0	SOT-23-3
MIC809R/S/T/J/M/L	No	Low	2.63V, 2.93V, 3.08V, 4.00V, 4.38V, 4.63V	140	9.0	SOT-23-3, SC-70-5
MIC810R/S/T/J/M/L	No	High	2.63V, 2.93V, 3.08V, 4.00V, 4.38V, 4.63V	140	9.0	SOT-23-3, SC-70-5
MIC811R/S/T/J/M/L	Yes	Low	2.63V, 2.93V, 3.08V, 4.00V, 4.38V, 4.63V	140	9.0	SOT-143
MIC812R/S/T/J/M/L	Yes	High	2.63V, 2.93V, 3.08V, 4.00V, 4.38V, 4.63V	140	9.0	SOT-143
MIC6315-xxD2	Yes	Low	2.5–5.0V in 100mV increments	20	9.0	SOT-143
MIC6315-xxD3	Yes	Low	2.5–5.0V in 100mV increments	140	9.0	SOT-143
MIC6315-xxD4	Yes	Low	2.5–5.0V in 100mV increments	1100	9.0	SOT-143
MIC707	Yes	Both	4.65V	140	60	SOIC-8, PDIP-8
MIC708	Yes	Both	4.40V	140	60	SOIC-8, PDIP-8
MIC708R/S/T	Yes	Both	2.63V, 2.93V, 3.08V	140	30	SOIC-8, PDIP-8

Microprocessor Supervisors with Watchdog Timers

Device	Manual Reset Input	Reset Output(s) Polarity	Reset Threshold Voltage	Watchdog Timeout	Power Fail Detect	t _{RESET} (ms)	I _{SUPPLY} (μA)	Package
MIC705	Yes	Low	4.65V	1.6s	Yes	140	60	SOIC-8, PDIP-8
MIC706	Yes	Low	4.40V	1.6s	Yes	140	60	SOIC-8, PDIP-8
MIC706P	Yes	High	2.63V	1.6s	Yes	140	30	SOIC-8, PDIP-8
MIC706R/S/T	Yes	Low	2.63V, 2.93V, 3.08V	1.6s	Yes	140	30	SOIC-8, PDIP-8
MIC1232	Yes	Both	4.62V or 4.37V	150ms/600ms/1.2s	Yes	250	30	SOIC-8, PDIP-8
MIC1832	Yes	Both	2.88V or 2.55V	150ms/600ms/1.2s	Yes	250	30	SOIC-8, PDIP-8

Standard Voltage Supervisors for AMD Elan™ Microprocessors

Device	Manual Reset Input	Reset Output Polarity	Reset Threshold Voltage	t _{RESET} (ms)	I _{SUPPLY} (μA)	Package
MIC8114T (SC400/410)	Yes	Low	3.08V	790	9.0	SOT-143
MIC8115T (SC500)	Yes	Low	3.08V	1100	9.0	SOT-143

Single and Dual Ultra-Low Voltage Supervisors

Device	Single/Dual	Manual Reset Input	Reset Output(s) Polarity	Reset Threshold Voltage	t _{RESET} (ms)	I _{SUPPLY} (μA)	Package
MIC2772-xxxxYM5	Dual	Yes	Low	2.93V, 3.08V, 4.38V, 4.63V	140	10	MLF-8
MIC2774H-xxYM5	Dual	Yes	High	Fixed: 1.69V, 2.25V, 2.34V, 2.53V, 2.67V, 2.81V,	140	3.5	SOT-23-5
MIC2774N-xxYM5			Open-Drain	2.93V, 3.09V, 4.43V, 4.68V;			
MIC2774L-xxYM5			Low	Adjustable from 0.300V min.			
MIC2775-xxYM5	Single	Yes	Both	1.69V, 2.25V, 2.34V, 2.53V, 2.67V, 2.81V, 2.93V, 3.09V, 4.43V, 4.68V	140	3.5	SOT-23-5
MIC2776N-YM5	Single	Yes	Open-Drain	Adjustable from 0.300V min.	140	3.5	SOT-23-5
MIC2776L-YM5	Single	Yes	Low	Adjustable from 0.300V min.	140	3.5	SOT-23-5
MIC2776H-YM5	Single	Yes	High	Adjustable from 0.300V min.	140	3.5	SOT-23-5
MIC2777-xxYM5	Dual	Yes ⁽¹⁾	Both	Fixed: 1.69V, 2.25V, 2.34V, 2.53V, 2.67V, 2.81V, 2.93V, 3.09V, 4.43V, 4.68V; Adjustable from 0.300V min.	140	3.5	SOT-23-5

1. Manual reset switch connects to adjustable input.

Voltage Monitors and Voltage/Processor Supervisors Selection Guide

Voltage Monitors and Supervisors Optimized for Battery Monitoring

Device	Manual Reset Input	Reset Output(s) Polarity	V _{RESET}	Adjustable Hysteresis	t _{RESET} (ms)	I _{SUPPLY} (μA)	Package
MIC833	No	High	Adjustable ≥ 1.25V	Y	n/a	1.0	SOT-23-5
MIC834	No	High	Adjustable ≥ 1.25V	N	n/a	1.5	SOT-23-5
MIC841	No	High or Low	Adjustable ≥ 1.25V	Y	n/a	1.5	SC-70-5
MIC842	No	High or Low	Adjustable ≥ 1.25V	N	n/a	1.5	SC-70-5
MIC845	n/a	High or Low	2.55V or adjustable >2.55V	N	n/a	1.0	SC-70-5
MIC2755	Yes	Open-Drain	Adjustable ≥ 1.25V	Y	700	2.0	MSOP-8
MIC2778-1/-2 ⁽¹⁾	No	Low	Adjustable ≥ 1.25V	Y	140	1.0	SOT-23-5
MIC2779L-1/-2 ⁽¹⁾	No	Low	Adjustable ≥ 1.25V	Y	140	1.0	SOT-23-5
MIC2779H-1/-2 ⁽¹⁾	No	High	Adjustable ≥ 1.25V	Y	140	1.0	SOT-23-5

1. -1 is 1% and -2 is 2% 1.25V reference tolerance.

Thermal/System Management, Transistors and Arrays, Timers, References, and SCSI Terminators Selection Guides

Micrel Advantange

- General Purpose Flexible Design

2-Wire Serial Thermal Supervisors

Device	Description	Remote Zone	Internal Zone	Data Width	CRIT Output	Device Bus	Resolution (Bits)	Accuracy	Package
MIC184	Local/Remote Thermal Supervisor	1 ⁽¹⁾	Yes	9	—	8 ⁽²⁾	9	3%	SOIC-8, MSOP-8
MIC280	Precision IttyBitty® Thermal Supervisor	1	Yes	12	Yes	8	12	1%	SOT-23-6
MIC281	Low-Cost IttyBitty® Thermal Sensor	1	—	8	—	8	8	3%	SOT-23-6
MIC284	2-Zone Thermal Supervisor w/CRIT Output	1	Yes	8	Yes	8	8	3%	SOIC-8, MSOP-8
MIC384	3-Zone Thermal Supervisor	2	Yes	8	—	8	8	3%	SOIC-8, MSOP-8

1. MIC184 has limit registers for monitoring one zone at a time; either the internal or external zone may be monitored at any given time.

2. In LM75 mode; 4 when using T1 function.

Fan Management ICs

Device	Description	Package
MIC502	Fan Management IC	PDIP-8, SOIC-8
MIC74	2-Wire Serial I/O Expander and Fan Controller	QSOP-16

I/O Expanders

Device	Description	Package
MIC74	2-Wire Serial I/O Expander and Fan Controller	QSOP-16

Transistors/Switches

Device	Description	Voltage Range	On-Resistance	Substrate Pin	Gate Pull-Up Resistor	Package
MIC94030	Single P-Channel MOSFET	2.7V to 13.5V	0.75Ω @ V _{GS} = 4.5V	Yes	—	SOT-143-4
MIC94031	Single P-Channel MOSFET	2.7V to 13.5V	0.75Ω @ V _{GS} = 4.5V	Yes	Yes	SOT-143-4
MIC94050	Single P-Channel MOSFET	1.8V to 5.5V	0.125Ω @ V _{GS} = 4.5V	Yes	—	SOT-143
MIC94051	Single P-Channel MOSFET	1.8V to 5.5V	0.125Ω @ V _{GS} = 4.5V	Yes	Yes	SOT-143
MIC94052	Single P-Channel MOSFET	1.8V to 5.5V	0.07Ω @ V _{GS} = 4.5V	—	—	SC-70-6
MIC94053	Single P-Channel MOSFET	1.8V to 5.5V	0.07Ω @ V _{GS} = 4.5V	—	Yes	SC-70-6

Array

Device	Description	Voltage	Input Signal	Package
MIC2981/82	Octal Source-Driver Array	50V	5V-TTL or 5V-to-15V CMOS or PMOS	PDIP-18, WSOIC-18

Timers

Device	Description	Package
MIC1555	IttyBitty® RC Timer/Oscillator	SOT-23-5
MIC1557	IttyBitty® RC Oscillator	SOT-23-5

References

Device	Description	Package
LM4040/4041	Precision Micropower Shunt Voltage Reference	SOT-23-3

Hot Swap Power Controller Selection Guide

Micrel Advantange

- Robustness
- High voltage capability
- Superior parametric performance
- Smallest solution size

Device	Outputs	Input Voltage Range	Latch Off	Auto Retry	/FAULT	/POR	PWRGD or RST	OV SCR	Foldback Current Limit	Packages	Comments
MIC2085	1	+2.3V to +16.5V	Yes		Yes	Yes		Yes	Yes	QSOP-16	Pin-for-pin equivalent to LTC1642; Uncommitted comparator and crowbar output.
MIC2086	1	+2.3V to +16.5V	Yes		Yes	Yes	/PWRGD	Yes	Yes	QSOP-20	Uncommitted comparator, crowbar output, and C _L discharge capability.
MIC2580A	4	±12V, +3.3V, +5V	Yes		Yes	Yes	/PWRGD		Yes	TSSOP-24	Single-slot controller for CompactPCI applications.
MIC2582	1	+2.3V to +13.2V	Yes			Yes				SOIC-8	Pin-for-pin functional equivalent to LTC1422; Dual-level fault detection.
MIC2583	1	+2.3V to +13.2V	Yes		Yes	Yes	PWRGD			QSOP-16	Dual-level fault detection; C _L discharge capability.
MIC2583R	1	+2.3V to +13.2V		Yes	Yes	Yes	PWRGD			QSOP-16	Dual-level fault detection; C _L discharge capability.
MIC2310-1 MIC2310-2	New! 1	+10.8V to +13.2V	Yes	Yes	HW_FLT, I_FLT HW_FLT, I_FLT		PWRGD /PWRGD			TSSOP-24	Single FET, constant power-limit, Hot plug controller for general purpose power-limiting applications and UL60950 systems (240-VA).
MIC2584	2	CH1: +2.3V to +13.2V CH2: +1V to +13.2V	Yes		Yes	Yes				TSSOP-16	Output voltage tracking with dual-level fault detection.
MIC2585-1 MIC2585-2	2 2	CH1: +2.3V to +13.2V CH2: +1V to +13.2V	Yes		Yes	Yes	PWRGD			TSSOP-24	V _{OUT} sequencing/tracking with dual-level detection and C _L discharge capability: -1: V _{OUT2} follows V _{OUT1} ; -2: V _{OUT1} follows V _{OUT2} .
MIC2590B	10	±12V, +5V, +3.3V, and +3.3V _{AUX}	Yes		Yes					TQFP-48	Dual-slot controller for PCI v2.x and PCI-X 1.0b. Compliant applications with IPMI v1.0 support.
MIC2593	10	±12V, +5V, +3.3V, and +3.3V _{AUX}	Yes		Yes					TQFP-48	Dual-slot controller for PCI v2.x and PCI-X 1.0b. Compliant applications without IPMI v1.0 support.
MIC2341 MIC2341R	New! 6	+12V, +3.3V, and +3.3V _{AUX}	Yes	Yes	Yes		/PWRGD /DLY_PWRGD			TQFP-48	Dual-slot controller for PCI-Express systems without the SMBus interface (hardware mode only); MAIN & AUX outputs are independent.
MIC2342 MIC2342R	New! 6	+12V, +3.3V, and +3.3V _{AUX}	Yes	Yes	Yes		/PWRGD /DLY_PWRGD			TQFP-48	Dual-slot controller for PCI-Express systems without the SMBus interface (hardware mode only); MAIN & AUX outputs are inter-dependent upon AUX overcurrent event.
MIC2591B	6	+12V, +3.3V, and +3.3V _{AUX}	Yes		Yes		/PWRGD			TQFP-48	Dual-slot controller for PCI-Express systems with IPMI v1.0 support.
MIC2592B	6	+12V, +3.3V, and +3.3V _{AUX}	Yes		Yes		/PWRGD			TQFP-48	Dual-slot controller for PCI-Express systems where IPMI v1.0 support not needed.
MIC2586-1 MIC2586-2	1	+10V to +80V	Yes				PWRGD /PWRGD		Yes	SOIC-14	Multiple PWRGD outputs for sequencing, user-programmable delay.
MIC2586R-1 MIC2586R-2	1	+10V to +80V		Yes			PWRGD /PWRGD		Yes	SOIC-14	Multiple PWRGD outputs for sequencing, user-programmable delay.
MIC2587-1 MIC2587-2	1	+10V to +80V	Yes				PWRGD /PWRGD		Yes	SOIC-8	1st Generation +48V controller. Pin-for-pin equivalent to LT1641-1.
MIC2587R-1 MIC2587R-2	1	+10V to +80V		Yes			PWRGD /PWRGD		Yes	SOIC-8	1st Generation +48V controller. Fault condition: Auto-retry. Pin-for-pin equivalent to LT1641-2.
MIC2588-1 MIC2588-2	1	-19V to -80V	Yes				PWRGD /PWRGD			SOIC-8	1st Generation -48V controller; pin-for-pin equivalent to LT1640/LT1640A/LT4250.
MIC2594-1 MIC2594-2	1	-19V to -80V	Yes				PWRGD /PWRGD			SOIC-8	MIC2588 with Programmable input ON/OFF control.
MIC2589-1 MIC2589-2	1	-19V to -80V	Yes				PWRGD /PWRGD			SOIC-14	Programmable UVLO and OV protection and three PWRGD outputs for sequencing.
MIC2589R-1 MIC2589R-2	1	-19V to -80V		Yes			PWRGD /PWRGD			SOIC-14	Programmable UVLO and OV protection and three PWRGD outputs for sequencing.
MIC2595-1 MIC2595-2	1	-19V to -80V	Yes				PWRGD /PWRGD			SOIC-14	Programmable input ON/OFF control and three PWRGD outputs for sequencing.
MIC2595R-1 MIC2595R-2	1	-19V to -80V		Yes			PWRGD /PWRGD			SOIC-14	Programmable input ON/OFF control and three PWRGD outputs for sequencing.

QwikRadio® Selection Guide

Micrel Advantage

- Highest Integration
- High Performance

- Easy to Design with No Tuning Required
- Low External Part Count
- Extended Distance Capability (Best Sensitivity)

QwikRadio® RF Transmitters

Device	Frequency Range	Selection Data Rate	Supply Current (Mean)	Operating Voltage (Min.)	Modulation Type	Package	Key Features
MICRF102	300MHz-440MHz	20kbps	5.7mA	4.75V	ASK/OOK	SOIC-8	
MICRF103	800MHz-1GHz	115kbps	16mA	4.75V	ASK/OOK	SOIC-8	
MICRF104 ⁽¹⁾	300MHz-440MHz	20kbps	12mA	1.8V	ASK/OOK	SOIC-14	
MICRF112	300MHz-450MHz	50kbps ASK 10kbps FSK	8.5mA 12mA	1.8V 1.8V	ASK/OOK ASK/OOK	MSOP-10 MSOP-10	Operates 1.8 to 3.6V. Max Temp. +125°C to -40°C.
MICRF113 New!	300MHz-400MHz	10kbps ASK	8.5mA	1.8V	ASK/OOK	SOT-23	Low Pin Count ASK/OOK Transmitter.

QwikRadio® RF Receivers

Device	Frequency Range	Maximum Data Rate	Supply Current	Power Cycle	Modulation Type	Package	Key Features
MICRF001	300MHz-440MHz	4.8kbps	6.3mA		ASK/OOK	SOIC-14, PDIP-14	
MICRF011	300MHz-440MHz	10kbps	2.4mA		ASK/OOK	SOIC-14, PDIP-14	
MICRF002	300MHz-440MHz	10kbps	2.4mA	Yes	ASK/OOK	SOIC-16, PDIP-16	Power-Cycle Mode.
MICRF022	300MHz-440MHz	10kbps	2.4mA	Yes	ASK/OOK	SOIC-8	Smaller Package.
MICRF005 ⁽¹⁾	800MHz-1GHz	115kbps	10mA	Yes	ASK/OOK	SOIC-14	900MHz, Rx.
MICRF007	300MHz-440MHz	1.2kbps	3.0mA	Yes	ASK/OOK	SOIC-8	
MICRF008	300MHz-440MHz	4.8kbps	7mA	Yes	ASK/OOK	SOIC-8	Lowest Cost.
MICRF009	300MHz-440MHz	2kbps	2.9mA	Yes	ASK/OOK	SOIC-16	Good Sensitivity.
MICRF010	300MHz-440MHz	2kbps	2.9mA	Yes	ASK/OOK	SOIC-8	Good Sensitivity.
MICRF211	380MHz-450MHz	10kbps	6mA	Yes	ASK/OOK	QSOP-16	3.0V to 3.6V Op. Voltage. -110dBm Sensitivity.
MICRF213	300MHz-350MHz	7.2kbps	3.9mA	Yes	ASK/OOK	QSOP-16	3.0V to 3.6V Op. Voltage. -110dBm Sensitivity.
MICRF218 New!	300MHz-450MHz	10kbps	4mA	Yes	ASK/OOK	QSOP-16	Dual IF BW: narrow IF for performance. Wide IF to capture signal from low cost transmitters.
MICRF221 New!	50MHz-950MHz	10kbps	9.5mA	Yes	ASK/OOK	QSOP-16	900MHz, -109dBm Sensitivity.

1. Not recommended for new designs.

RadioWire® RF Transceivers Selection Guide

Micrel Advantage

- Highest Performance Transceivers
- Lowest Power
- High Sensitivity
- Micrel Net
- Low Component Count
- Easy to Design
- Modules Available

RadioWire® RF Transceiver

Device	Frequency Range	Maximum Data Rate	Receive	Supply Current Transmit	Modulation Type	Package	Key Features
MICRF500	700MHz–1.1GHz	128kbps	12mA	50mA	FSK	LQFP-44	
MICRF501 ⁽¹⁾	300MHz–600MHz	128kbps	8mA	45mA	FSK	LQFP-44	
MICRF505	850MHz–950MHz	200kbps	13mA	28mA	FSK	MLF-32	High integration, Low BOM cost
MICRF506	410MHz–450MHz	200kbps	12mA	21mA	FSK	MLF-32	High integration, Low BOM cost

RadioWire® RF Transmitter

Device	Frequency Range	Maximum Data Rate	Supply Current	Modulation Type	Package	Key Features
MICRF405	290MHz–980MHz	200kbps	18mA	FSK/ASK/OOK	MLF-24	High integration, Low BOM cost.

RadioWire® RF Module

Device	Frequency Range	Maximum Data Rate	Receive	Supply Current Transmit	Modulation Type	Package
MICRF600	902MHz–928MHz	20kbps	13mA	28mA	FSK	Small Size 11.5 x 14.1mm
MICRF600Z	902MHz–928MHz	20kbps	13mA	28mA	FSK	Small Size 11.5 x 14.1mm Lead-Free
MICRF610	868MHz–870MHz	15kbps	13mA	26mA	FSK	Small Size 11.5 x 14.1mm
MICRF610Z	868MHz–870MHz	15kbps	13mA	26mA	FSK	Small Size 11.5 x 14.1mm Lead-Free
MICRF620	410MHz–450MHz	20kbps	12mA	23mA	FSK	Small Size 11.5 x 14.1mm
MICRF620Z	410MHz–450MHz	20kbps	12mA	23mA	FSK	Small Size 11.5 x 14.1mm
RFB433 ⁽¹⁾	433MHz	19.2kbps	8mA	45mA	FSK	1 x 1in
RFB868 ⁽¹⁾	868MHz–870MHz	19.2kbps	10mA	50mA	FSK	1 x 1in
RFB915 ⁽¹⁾	902MHz–928MHz	19.2kbps	10mA	50mA	FSK	1 x 1in

1. Not recommended for new designs.

Electroluminescent Drivers Selection Guide

Micrel Advantage

- Low Noise
- Low Power
- Bright Light

Device	Description	Package
MIC4826	Low Input Voltage, 160V _{PP} Output Voltage EL Driver	MSOP-8
MIC4827	Low Input Voltage, 180V _{PP} Output Voltage EL Driver	MSOP-8
MIC4830	Low Input Voltage, Low Noise, 180V _{PP} Output Voltage EL Driver	MLF-10 (3x3mm), MSOP-8
MIC4832	Low Input Voltage, Low Noise, 220V _{PP} Output Voltage EL Driver	MLF-10 (3x3mm), MSOP-8
MIC4833 <i>New!</i>	Low Input Voltage, Low Noise, 220V _{PP} Output Voltage EL Driver	MLF-10 (3x3mm), MSOP-10
MIC4834 <i>New!</i>	Low Input Voltage, Low Noise, 220V _{PP} Output Voltage EL Driver with Fixed EL Frequency	

Display Driver Selection Guide

Micrel Advantage

- High Current
- High Voltage
- Video Image Speeds

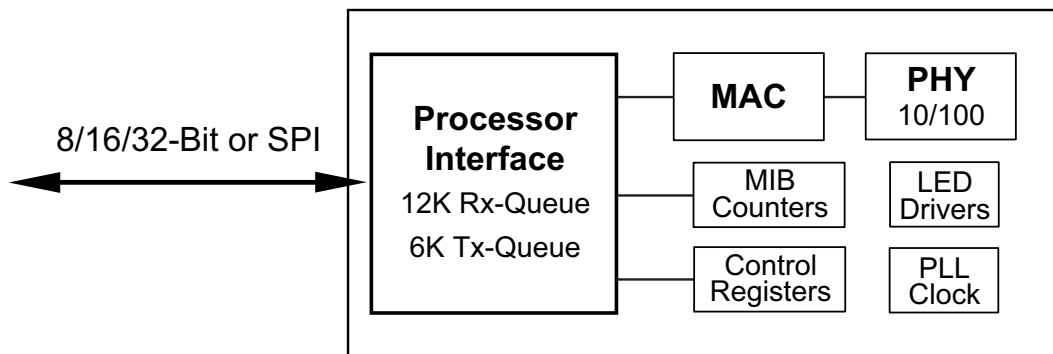
Device	Description	Segments	LEDs	Package
MIC5400	LED Video Display Driver		16	SOIC-28
MM5450	LED Display Driver	34		PDIP-40, PLCC-44
MM5451	LED Display Driver	35		PDIP-40, PLCC-44

Latched Driver Selection Guide

Device	Input	Number Output Channels	Nominal Sink Current	Nominal Source Current	Maximum Output Voltage	Thermal, UVLO, Overcurrent Protection	Packages			
							SOIC	PLCC	PDIP	CerDIP
MIC5800	Parallel	4	400mA	—	50V	—	14-pin	—	14-pin	—
MIC5801	Parallel	8	400mA	—	50V	—	24-pin	28-pin	22-pin	22-pin ⁽¹⁾
MIC58P01	Parallel	8	400mA	—	80V	Yes	24-pin wide	28-pin	22-pin	—
MIC5821	Serial	8	400mA	—	50V / 35V	—	—	—	16-pin	—
MIC5822	Serial	8	400mA	—	80V / 50V	—	—	—	16-pin	—
MIC5841	Serial	8	400mA	—	50V / 35V	—	18-pin wide	20-pin	18-pin	—
MIC5842	Serial	8	400mA	—	80V / 50V	—	18-pin wide	20-pin	18-pin	—
MIC58P42	Serial	8	400mA	—	80V / 50V	Yes	18-pin wide	20-pin	18-pin	—
MIC5891	Serial	8	—	400mA	50V	—	16-pin wide	—	16-pin	—
MIC59P50	Parallel	8	400mA	—	80V	Yes	24-pin wide	28-pin	24-pin	—
MIC59P60	Serial	8	400mA	—	80V / 50V	Yes	20-pin wide	20-pin	20-pin	—

1. SMD (military) 5962-8764001WA.

Ethernet Product Highlight — KSZ8851



KSZ8851 Block Diagram

The KSZ8851 is a single-port embedded controller chip with 8/16/32-bit and SPI host interfaces. The device is pin compatible with Micrel's KSZ8841 and KSZ8842 product families.

The KSZ8851 integrates a Fast Ethernet MAC/PHY with an 8/16/32-bit generic host processor interface and SPI interface. The device has 18KB of internal buffer memory shared between the RXQ and TXQ. The buffer memory on the receive queue is 12KB while the buffer memory for the transmit queue is 6KB.

The KSZ8851 is designed with flexibility in mind. The device is designed using a low-power CMOS process which features programmable IO options of 1.8/2.5/3.3V.

The KSZ8851 supports cable diagnostics feature LinkMD[®] and Hewlett Packard (HP) Auto-MDIX. The LinkMD[®] feature determines the length of the cabling plant and also ascertains if there is an open or short condition in the cable. Hewlett Packard (HP) Auto-MDIX features eliminates the need to differentiate between straight or crossover cables.

The KSZ8851 is designed to be fully compliant with the IEEE 802.3 standards. The KSZ8851 is also available in industrial grade version.

Features

- Single-chip 10Base-T/100Base-TX physical layer solution
- Single chip 10BASE-T/100BASE-TX Ethernet controller with IEEE802.3u support
- Supports IEEE 802.3x full-duplex flow control and half-duplex back-pressure collision flow control
- Single bus timing for register and data accesses
- Supports burst data transfers
- Flexible 8-bit, 16-bit, 32-bit generic host processor interfaces and SPI host interface
- Supports both Big- and Little-Endian processors
- Efficient architecture design with configurable host interrupt schemes to minimize host CPU overhead and utilization
- 18KB internal memory for RX/TX FIFO buffers
 - 12KB RXQ and 6KB TXQ

- Ability to transmit and receive frames up to 2000 bytes
- Supports TCP/UDP/ICMP/IPv4/IPv6 32-bit CRC checksum generation and checking
- Powerful and flexible address filtering scheme
- Support for loop back mode
- Wake-on-LAN functionality
 - Incorporates Magic Packet[™], network link state, and wake-up frame technology
- Enhanced power management feature with energy detect mode and power-down mode to ensure low-power dissipation during device idle periods
- HP Auto MDI-X[™] crossover with disable/enable option
- Micrel LinkMD[®] cable diagnostic capabilities to determine cable length, diagnose faulty cables, and determine distance to fault
- Comprehensive LED indicator support for link, activity, full/half duplex, and 10/100 speed (4 LEDs)
 - User programmable
- Low-power CMOS design
- Programmable IO Options: 3.3V/2.5/1.8V
- Commercial Temperature Range: 0°C to +70°C
- Industrial Temperature Range: –40°C to +85°C
- Available in 128-pin PQFP (8/16/32 Generic Bus), 48-pin LQFP (8/16 Generic Bus) and 32-pin QFN (SPI)

Applications

- Printer
- LOM
- Game Console
- IPTV
- IP Phone
- IP Set-top Box
- Media Converter

Ethernet Selection Guide^(1,3)

Micrel Advantage

- Best-in-class patented mixed signal technology resulting in the lowest power dissipation in the industry for FE products
- Best-in-class feature sets for targeted applications (e.g. VoIP, ATA, IP-STB)
- Largest family of cost effective Embedded Controllers in the industry

Physical Layer Products

Part Number	Description	Package	Comments
KS8001L	Single 3.3V Supply, LinkMD [®] Cable Diagnostics, 10/100BASE-T/TX/FX MII and SMII, Digital Interface Physical Layer Transceiver with HP Auto-MDIX	LQFP-48	
KSZ8001L	Same as KS8001L (lead free version)	LQFP-48	
KSZ8001LI ⁽²⁾	Same as KSZ8001L (lead free version, Industrial)	LQFP-48	
KS8001S	1.8V/3.3V Tolerant I/O, 10/100BASE-TX/FX MII Physical Layer Transceiver with Auto Crossover	SSOP-48	
KSZ8001S	Same as KS8001S (lead free version)	SSOP-48	
KSZ8001SI ⁽²⁾	Same as KSZ8001S (lead free, Industrial version)	SSOP-48	
KSZ8041NL	3.3V, 10BASE-T/100BASE-TX Physical Layer Transceiver	MLF-32	
KSZ8041NLI ⁽²⁾	Same as 3.3V, KSZ8041NL (lead free, Industrial version)	MLF-32	
KSZ8041TL	3.3V, 10BASE-T/100BASE-TX Physical Layer Transceiver (lead free version)	TQFP-48	
KSZ8041FTL	3.3V, 10BASE-T/100BASE-TX/FX Physical Layer Transceiver (lead free version)	TQFP-48	
KS8721B	2.5V/3.3V Tolerant I/O, 10/100BASE-TX/FX MII Physical Layer Transceiver with Auto Crossover	SSOP-48 and TQFP-48	
KSZ8721B	Same as KS8721 (lead free version)	SSOP-48 and TQFP-48	
KSZ8721BI ⁽²⁾	Same as KS8721 (lead free, Industrial version)	SSOP-48 and TQFP-48	
KS8721BL	3.3V 10/100BASE TX/FX MII Physical Layer Transceiver	LQFP-48	
KSZ8721BL	Same as KS8721BL (lead free version)	LQFP-48	
KS8721BLI ⁽²⁾	3.3V 10/100BASE TX/FX MII Physical Layer Transceiver (Industrial version)	LQFP-48	
KSZ8721BLI ⁽²⁾	Same as KS8721BLI (lead free, Industrial version)	LQFP-48	
KS8721BT	2.5V 10/100BASE-TX/FX MII Physical Layer Transceiver with Auto Crossover	TQFP-48	
KSZ8721BT	Same as KS8721BT (lead free version)	TQFP-48	
KS8721CL	Single 3.3V Supply, 10/100BASE-TX/FX MII Physical Layer Transceiver with Auto Crossover	LQFP-48	
KSZ8721CL	Same as KS8721CL (lead free version)	LQFP-48	
KS8721SL	3.3V 10/100BASE TX/FX MII Physical Layer Transceiver	SSOP-48	
KSZ8721SL	Same as KS8721SL (lead free version)	SSOP-48	
KSZ8721SLI ⁽²⁾	Same as KS8721SL (lead free, Industrial version)	SSOP-48	

Layer 2 Switch Products - Unmanaged

Part Number	Description	Package	Comments
KS8993	3-Port 10/100 Integrated Switch	PQFP-128	
KS8993I ⁽²⁾	Industrial Temperature grade, 3-Port 10/100 Integrated Switch	PQFP-128	
KSZ8993	Same as KS8993 (lead free version)	PQFP-128	
KS8995XA	5-Port 10/100 Integrated Switch (Unmanaged)	PQFP-128	
KSZ8995XA	Same as KS8995XA (lead free version)	PQFP-128	
KS8995X	5-Port 10/100 Integrated Switch (Unmanaged)	PQFP-128	
KSZ8995X	Same as KS8995X (lead free version)	PQFP-128	
KS8997	8-Port 10/100 Integrated Switch	PQFP-128	
KSZ8997	Same as KS8997 (lead free version)	PQFP-128	
KS8999	9-Port 10/100 Integrated Switch	PQFP-208	
KSZ8999	Same as KS8999 (lead free version)	PQFP-208	
KS8999I ⁽²⁾	9-Port 10/100 Integrated Switch (Industrial version)	PQFP-208	
KSZ8999I ⁽²⁾	Same as KS8999I (lead free, Industrial version)	PQFP-208	

1. "KSZ" is the lead-free RoHS-compliant version of the KS part.

2. If the part number has an "I" at the end of it (e.g.: KSZ8721BI), this indicates it is industrial temperature tested.

3. With the exception of the KS8997, all of Micrel Ethernet Products may be used in Media Converter applications.

Embedded Controllers

Part Number	Description	Package	Comments
KSZ8841-16MQL	Single Port Ethernet MAC Controller with 8- or 16-Bit Generic Bus Interface (lead free version)	PQFP-128	
KSZ8841-16MVL	Single Port Ethernet MAC Controller with 8- or 16-Bit Generic Bus Interface (lead free version)	LQFP-128	
KSZ8841-16MVL ⁽²⁾	Single Port Ethernet MAC Controller with 8- or 16-Bit Generic Bus Interface (Industrial version)	LQFP-128	
KSZ8841-32MQL	Single Port Ethernet MAC Controller with 32b Generic Bus Interface (lead free version)	PQFP-128	
KSZ8841-32MVL	Single Port Ethernet MAC Controller with 32b Generic Bus Interface (lead free version)	LQFP-128	
KSZ8841-PMQL	Single Port Ethernet MAC Controller with 32b/33MHz PCI Interface (lead free version)	PQFP-128	
KSZ8841-PMQL ⁽²⁾	Single Port Ethernet MAC Controller with 32b/33MHz PCI Interface (Industrial version)	PQFP-128	
KSZ8842-16MQL	2-Port Ethernet Switch Plus 8-, 16-Bit Generic Bus Interface (lead free version)	PQFP-128	
KSZ8842-16MVL	2-Port Ethernet Switch Plus 8-, 16-Bit Generic Bus Interface (lead free version)	LQFP-128	
KSZ8842-16MVL ⁽²⁾	2-Port Ethernet Switch Plus 8-, 16-Bit Generic Bus Interface (Industrial version)	LQFP-128	
KSZ8842-32MQL	2-Port Ethernet Switch Plus 32-Bit Generic Bus Interface (lead free version)	PQFP-128	
KSZ8842-32MVL	2-Port Ethernet Switch Plus 32-Bit Generic Bus Interface (lead free version)	LQFP-128	
KSZ8842-PMQL	2-Port Ethernet Switch Plus 32b/33MHz PCI Interface (lead free version)	PQFP-128	
KSZ8842-PMQL ⁽²⁾	2-Port Ethernet Switch Plus 32b/33MHz PCI Interface (Industrial version)	PQFP-128	
KSZ8851-16MLL	New! Single-Port Ethernet MAC Controller with 8-Bit or 16-Bit Non-PCI Interface	LQFP-48	
KSZ8851-16MQL	New! Single-Port Ethernet MAC Controller with 8/16-Bit or 32-Bit Non-PCI Interface	PQFP-128	
KSZ8851SNL	New! Single-Port Ethernet Controller with SPI Interface	MLF-32	

Layer 2 Switch Products - Managed

Part Number	Description	Package	Comments
KSZ8842-16MQL	2-Port Ethernet Switch Plus 8-, 16-Bit Generic Bus Interface (lead free version)	PQFP-128	
KSZ8842-16MVL	2-Port Ethernet Switch Plus 8-, 16-Bit Generic Bus Interface (lead free version)	LQFP-128	
KSZ8842-16MVL ⁽²⁾	2-Port Ethernet Switch Plus 8-, 16-Bit Generic Bus Interface (Industrial version)	LQFP-128	
KSZ8842-32MQL	2-Port Ethernet Switch Plus 32-Bit Generic Bus Interface (lead free version)	PQFP-128	
KSZ8842-32MVL	2-Port Ethernet Switch Plus 32-Bit Generic Bus Interface (lead free version)	LQFP-128	
KSZ8842-PMQL	2-Port Ethernet Switch Plus 32b/33MHz PCI Interface (lead free version)	PQFP-128	
KSZ8842-PMQL ⁽²⁾	2-Port Ethernet Switch Plus 32b/33MHz PCI Interface (Industrial version)	PQFP-128	
KSZ8893MQL	3-Port Ethernet Switch (lead free version)	PQFP-128	
KSZ8893MQL ⁽²⁾	3-Port Ethernet Switch (Industrial version)	PQFP-128	
KS8993M	3-Port 10/100 Integrated Switch	PQFP-128	
KSZ8993M	Same as KS8993M (lead free version)	PQFP-128	
KS8993MI ⁽²⁾	3-Port 10/100 Integrated Switch (Industrial version)	PQFP-128	
KSZ8993MI ⁽²⁾	Same as KS8993MI (lead free version)	PQFP-128	
KS8993ML	Single 3.3V, 3-Port 10/100 Integrated Switch	PQFP-128	
KSZ8993ML	Same as KS8993ML (lead free version)	PQFP-128	
KS8995M	5-Port 10/100 Integrated Managed Switch	PQFP-128	
KSZ8995M	Same as KS8995M (lead free version)	PQFP-128	
KS8995MI ⁽²⁾	5-Port 10/100 Integrated Managed Switch, (Industrial version)	PQFP-128	
KSZ8995MI ⁽²⁾	Same as KS8995MI (lead free, Industrial version)	PQFP-128	
KS8995MA	5-Port 10/100 Integrated Managed Switch	PQFP-128	
KSZ8995MA	Same as KS8995MA (lead free version, FX on port 4, 5)	PQFP-128	
KS8995MAI ⁽²⁾	5-Port 10/100 Integrated Managed Switch (Industrial version)	PQFP-128	
KSZ8995MAI ⁽²⁾	Same as KS8995MAI (lead free, Industrial version)	PQFP-128	
KSZ8995FQ	Same as KS8995MA (lead free version, FX on port 3, 4)	PQFP-128	

1. "KSZ" is the lead-free RoHS-compliant version of the KS part.

2. If the part number has an "I" at the end of it (e.g.: KSZ8721BI), this indicates it is industrial temperature tested.

3. With the exception of the KS8997, all of Micrel Ethernet Products may be used in Media Converter applications.

System-On-a-Chip

Part Number	Description	Package	Comments
KS8695X	5-Port 10/100 Managed Switch and PHY	PQFP-208	
KSZ8695X	Same as KS8695X (lead free version)	PQFP-208	
KS8695P	5-Port 10/100 Integrated Managed Switch and PHY with 3 PCI Master Support	PBGA-289	
KSZ8695P	Same as KS8695P (lead free version)	PBGA-289	
KS8695PI ⁽²⁾	Industrial version of KS8695P	PBGA-289	
KSZ8695PI ⁽²⁾	Industrial version of KSZ8695P	PBGA-289	
KS8695PX	5-Port 10/100 Integrated Managed Switch and PHY with 1 PCI Master Support	PBGA-289	
KSZ8695PX	Same as KS8695PX (lead free version)	PBGA-289	

Media Converters

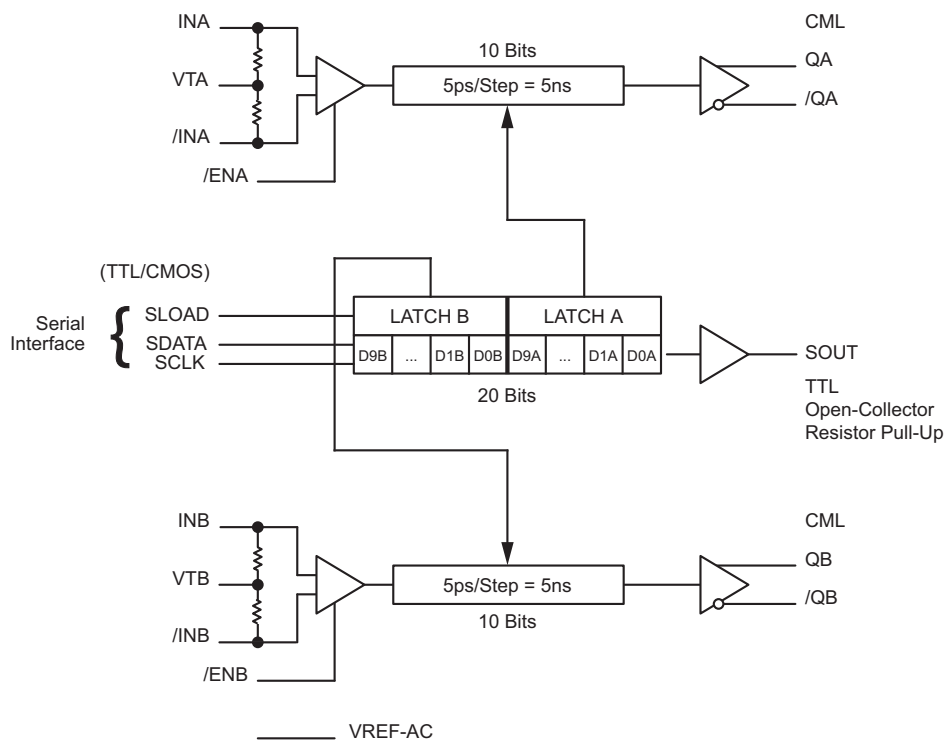
Part Number	Description	Package	Comments
KSZ8862-16MQL	2-Port Ethernet Switch with Integrated 10B-FL/100B-SX LED Driver and Post Amplifier Plus 8- or 16-bit Generic Bus Interface	PQFP-128	
KSZ8862-16MQL-FX	2-Port Ethernet Switch with 100B-FX TTC TS-1000 V2-Compliant OAM Sublayer Plus 8- or 16-bit Generic Bus Interface	PQFP-128	
KSZ8862-32MQL	2-Port Ethernet Switch with Integrated 10B-FL/100B-SX LED Driver and Post Amplifier plus 32-bit Generic Bus interface	PQFP-128	
KSZ8862-32MQL-FX	2-Port Ethernet Switch with 100B-FX TTC TS-1000 V2-Compliant OAM Sublayer Plus 32-bit Generic Bus Interface	PQFP-128	
KSZ8893FQL	3-Port Ethernet Switch with Integrated 10B-FL/100B-SX LED Driver and Post Amplifier	PQFP-128	
KSZ8893FQL-FX	3-Port Ethernet Switch with 100B-FX TTC TS-1000 V2-Compliant OAM Sublayer	PQFP-128	
KS8993F	Single Chip Fast Ethernet Media Converter with TTC TS-1000-Compliant OAM Sublayer	PQFP-128	
KSZ8993F	Same as KS8993F (lead free version)	PQFP-128	
KS8993FL	Single Chip Fast Ethernet Media Converter with TTC TS-1000-Compliant OAM Sublayer	PQFP-128	
KSZ8993FL	Same as KS8993FL (lead free version)	PQFP-128	

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Precision Edge® Product Highlight – SY89297U



SY89297U, 3.2Gbps Dual-Channel Programmable Delay Line

The SY89297U is a DC-3.2Gbps programmable, two-channel delay line. Each channel has a delay range from 2ns to 7ns (5ns delta delay) in programmable increments as small as 5ps. The delay step is extremely linear and monotonic over the entire programming range, with 20ps INL over temperature and voltage.

The delay varies in discrete steps based on a serial control word provided by the 3-pin serial control (SDATA, SCLK, and SLOAD). The control word for each channel is 10-bits. Both channels are programmed through a common serial interface. For increased delay, multiple SY89297U delay lines can be cascaded together.

The SY89297U provides two independent 3.2Gbps delay lines in an ultra-small 4mm x 4mm, 24-pin MLF® package. For other delay line solutions, consider the SY89295U and SY89296U single-channel delay lines. Evaluation boards are available for all these parts.

Features

- Dual-channel, programmable delay line
- Serial programming interface (SDATA, SCLK, SLOAD)
- Guaranteed AC performance over temperature and voltage:
 - > 3.2Gbps/1.6GHz fMAX
- Programming Accuracy:
 - Linearity: -15ps to +20ps INL
 - Monotonic: -10ps to +20ps
 - Resolution: 5ps programming increments

- Low-jitter design: 2psRMS typical random jitter
- Programmable delay range: 5ns delay range
- Cascade capability for increased delay
- Low voltage operation: $2.5V \pm 5\%$
- Temperature range: $0^{\circ}C$ to $+75^{\circ}C$
- Available in 24-pin (4mm x 4mm) MLF® (QFN)

Applications

- Clock de-skewing
- Timing adjustments
- Aperture centering
- System calibration

Markets

- Automated test equipment
- Digital radio and video broadcasting
- Closed caption encoders/decoders
- Test and measurement

Precision Edge® Selection Guide

Micrel Advantage

- Highest precision, lowest Jitter
 - Internal Termination — Stubless Design
 - MUX Isolation — 70% Crosstalk Noise Improvement
 - Fail-Safe Input — Prevents Metastable Condition
 - Runt Pulse Elimination
- Highest Speed
 - CML
 - LVPECL
 - LVDS
- Smallest Footprint
 - MLF® Package
 - Integration

Clock Distribution

Part Number	Fanout	Input	Output	Voltage	Max. Freq. (GHz)	Package	Description
SY54011R <i>New!</i>	1:2	ANY	CML	1.2/1.8V	3.2	MLF-16	Low Voltage CML Fanout Buffer/Translator
SY56011R <i>New!</i>	1:2	ANY	CML	1.2/1.8/2.5V	4.5	MLF-16	Low Voltage EQ Fanout Buffer
SY58011U	1:2	ANY	CML	2.5/3.3V	7	MLF-16	Fanout Buffer/Translator
SY58012U	1:2	ANY	LVPECL	2.5/3.3V	5	MLF-16	Fanout Buffer/Translator
SY58013U	1:2	ANY	RS-LVPECL	2.5/3.3V	6	MLF-16	Fanout Buffer/Translator with 400mV Output Swing
SY58020U	1:4	ANY	CML	2.5/3.3V	6	MLF-16	Fanout Buffer/Translator
SY58021U	1:4	ANY	LVPECL	2.5/3.3V	4	MLF-16	Fanout Buffer/Translator
SY58022U	1:4	ANY	RS-LVPECL	2.5/3.3V	5.5	MLF-16	Fanout Buffer/Translator with 400mV Output Swing
SY58031U	1:8	ANY	CML	2.5/3.3V	5	MLF-32	Fanout Buffer
SY58032U	1:8	ANY	LVPECL	2.5/3.3V	4	MLF-32	Fanout Buffer
SY58033U	1:8	ANY	RS-LVPECL	2.5/3.3V	5.5	MLF-32	Fanout Buffer with 400mV Output Swing
SY58034U	2:6	ANY	CML	2.5/3.3V	6	MLF-32	Fanout Buffer w/2:1 MUX Input
SY58035U	2:6	ANY	LVPECL	2.5/3.3V	4.5	MLF-32	Fanout Buffer w/2:1 MUX Input
SY58036U	2:6	ANY	RS-LVPECL	2.5/3.3V	6	MLF-32	Fanout Buffer w/2:1 MUX Input and 400mV Output Swing
SY58606U	1:2	ANY	CML	2.5/3.3V	2.5	MLF-16	Fanout Buffer with Fail-Safe Input
SY58607U	1:2	ANY	LVPECL	2.5/3.3V	2.5	MLF-16	Fanout Buffer with Fail-Safe Input
SY58608U	1:2	ANY	LVDS	2.5V	2	MLF-16	Fanout Buffer with Fail-Safe Input
SY89112U	2:12	ANY	LVPECL	2.5/3.3V	3	MLF-44	Improved EP111 Replacement
SY89113U	2:12	ANY	LVDS	2.5V	1	MLF-44	Fanout Buffer
SY89200U	1:8	ANY	LVDS	2.5V	1.5	MLF-32	3 Banks (+1, +2, +4)
SY89202U	1:8	ANY	LVPECL	2.5/3.3V	1.5	MLF-32	3 Banks (+1, +2, +4)
SY89311U	1:2	ECL/PECL/LVPECL/LVECL	ECL/PECL/LVPECL/LVECL	2.5/3.3/5V	3	MLF-8	Differential Fanout Buffer
SY89467U	2:20	ANY	LVPECL	2.5/3.3V	1.5	TQFP-64	Fanout Buffer with Fail-Safe Input
SY89468U	2:20	ANY	LVDS	2.5V	1.5	TQFP-64	Fanout Buffer with Fail-Safe Input
SY89645L	1:4	LVCOS/LVTTL	LVDS	3.3V	0.65	TSSOP-16	LVCOS/LVTTL-to-LVDS Fanout Buffer
SY89808L	1:9	LVPECL/HSTL	HSTL	3.3V	0.5	TQFP-32	Fanout Buffer
SY89809L	1:9	LVPECL/HSTL	HSTL	3.3V	0.5	TQFP-32	Bus Clock Driver
SY89823L	1:22	LVPECL/HSTL	HSTL	3.3V	0.5	TQFP-64	Fanout Buffer/Translator
SY89824L	1:22	LVPECL/HSTL	HSTL	3.3V	0.5	TQFP-64	Bus Clock Driver
SY89825U	1:22	LVPECL/LVDS	LVPECL	2.5/3.3V	1	TQFP-64	Bus Clock Driver/Translator
SY89826L	1:22	LVPECL/LVDS	LVDS	3.3V	1	TQFP-64	Fanout Buffer/Translator
SY89827L	Dual 1:10	LVPECL/HSTL	HSTL	3.3V	0.5	TQFP-64	Fanout Buffer/Translator
SY89828L	Dual 1:10	LVPECL/LVDS	LVDS	3.3V	1	TQFP-64	Fanout Buffer/Translator
SY89829U	Dual 1:10	LVPECL/LVDS	LVPECL	2.5/3.3V	2	TQFP-64	Clock Driver
SY89830U	2:4	ECL/PECL/LVPECL/LVECL	ECL/PECL/LVPECL/LVECL	2.5/3.3/5V	2.5	TSSOP-16	Clock Driver w/2:1 MUX Input
SY89831U	1:4	ANY	LVPECL	2.5/3.3V	2.0	MLF-16	Fanout Buffer/Translator
SY89832U	1:4	ANY	LVDS	2.5V	2.0	MLF-16	Fanout Buffer/Translator
SY89833L	1:4	ANY	LVDS	3.3V	2	MLF-16	Fanout Buffer/Translator
SY89834U	2:4	LVTTL	LVPECL	2.5/3.3V	1	MLF-16	Fanout Buffer with 2:1 MUX Input
SY89837U	2:8 RPE	ANY	LVPECL	2.5/3.3V	1.5	MLF-32	RPE, FSI Fanout with 2:1 MUX Input

Clock Distribution (continued)

Part Number	Fanout	Input	Output	Voltage	Max. Freq. (GHz)	Package	Description
SY89838U	2:8 RPE	ANY	LVDS	2.5V	1.5	MLF-32	RPE, FSI Fanout with 2:1 MUX Input
SY89843U	2:2 RPE	ANY	LVPECL	2.5/3.3V	1.5	MLF-24	RPE, FSI Fanout with 2:1 MUX Input
SY89844U	2:2 RPE	ANY	LVDS	2.5V	1.5	MLF-24	RPE, FSI Fanout with 2:1 MUX Input
SY89464U	2:10 RPE	ANY	LVPECL	2.5/3.3V	2	MLF-44	RPE, FSI Input MUX with 2:1 MUX Input
SY89465U	2:10 RPE	ANY	LVDS	2.5V	2	MLF-44	RPE, FSI Input MUX with 2:1 MUX Input
SY89473U	2:2	ANY	LVPECL	2.5/3.3V	3	MLF-24	Fanout Buffer/Translator
SY89474U	2:2	ANY	LVDS	2.5V	2.5	MLF-24	Fanout Buffer/Translator
SY89846U	2:5	ANY	LVPECL	2.5/3.3V	1.5	MLF-32	Fanout Buffer with Fail-Safe Input
SY89847U	2:5	ANY	LVDS	2.5V	1.5	MLF-32	Fanout Buffer with Fail-Safe Input
SY89850U	1:1	ANY	LVPECL	2.5/3.3V	4	MLF-8	LVPECL Line Driver/Receiver
SY89851U	1:2	ANY	LVPECL	2.5/3.3V	3	MLF-16	Low Power Fanout Buffer/Trans.
SY89854U	1:4	ANY	LVPECL	2.5/3.3V	3.5	MLF-16	Low Power Fanout Buffer/Trans.
SY89856U	2:6	ANY	LVPECL	2.5/3.3V	3	MLF-32	Low Power Fanout Buffer with 2:1 MUX Input
SY89858U	1:8	ANY	LVPECL	2.5/3.3V	3	MLF-32	Low Power Fanout Buffer

Clock Dividers/Generators

Part Number	Fanout Buffer	Input	Output	Voltage	Max. Freq. (GHz)	Package	Description
SY89200U	Y	ANY	LVDS	2.5V	1.5	MLF-32	3 Banks (+1, +2, +4) 8 Total
SY89202U	Y	ANY	LVPECL	2.5/3.3V	1.5	MLF-32	3 Banks (+1, +2, +4) 8 Total
SY89218U	Y	ANY	LVDS	2.5V	1.5	TQFP-64	4 Banks (+1, +2, +4) 15 Total FSI Input
SY89221U	Y	ANY	LVPECL	2.5/3.3V	1.5	TQFP-64	4 Banks (+1, +2, +4) 15 Total FSI Input
SY89228U	N	ANY	LVPECL	2.5/3.3V	1	MLF-16	+3, +5 FSI Input
SY89229U	N	ANY	LVDS	2.5V	1	MLF-16	+3, +5 FSI Input
SY89230U	N	ANY	LVPECL	2.5/3.3V	3.2	MLF-16	+3, +5
SY89231U	N	ANY	LVDS	2.5V	3.2	MLF-16	+3, +5
SY89312V	N	ECL/PECL	ECL/PECL	3.3/5V	4	MLF-8	+2
SY89313V	N	ECL/PECL	ECL/PECL	3.3/5V	4	MLF-8	+4
SY89871U	Y	ANY	LVPECL	2.5/3.3V	2.5	MLF-16	2 Banks (+1, +2, +4, +8, +16)
SY89872U	Y	ANY	LVDS	2.5V	2	MLF-16	2 Banks (+1, +2, +4, +8, +16)
SY89873L	Y	ANY	LVDS	3.3V	2	MLF-16	2 Banks (+1, +2, +4, +8, +16)
SY89874U	Y	ANY	LVPECL	2.5/3.3V	2.5	MLF-16	+1, +2, +4, +8, +16
SY89875U	Y	ANY	LVDS	2.5V	2	MLF-16	+1, +2, +4, +8, +16
SY89876L	Y	ANY	LVDS	3.3V	2	MLF-16	+1, +2, +4, +8, +16
SY100S834L	N	ECL/PECL/LVPECL	ECL/PECL	3.3/5V	—	SOIC-16	(+1, 2, 4) or (+2, 4, 8)
SY100S838L	N	ECL/PECL/LVPECL	ECL/PECL	3.3/5V	—	SOIC-20	(+1, 2/3) or (+2, 4/6)
SY100S839V	N	ECL/PECL/LVPECL	ECL/PECL	3.3/5V	—	SOIC-20	(+2/4) or (+4/5/6)

Crosspoint Switches

Part Number	Input	Output	Voltage	Max. Data Rate (Gbps)	Package	Description
SY54023R New!	ANY	CML	1.2/1.8V	3.2	MLF-16	2x2 with Fail-Safe Inputs
SY56023R New!	ANY	CML	1.2/1.8/2.5V	6.4	MLF-16	2x2 with Equalization
SY58023U	ANY	CML	2.5/3.3V	10.7	MLF-16	2x2
SY58024U	ANY	CML	2.5/3.3V	10.7	MLF-32	Dual 2x2
SY58040U	ANY	CML	2.5/3.3V	5	MLF-44	4x4
SY89540U	ANY	LVDS	2.5V	3.2	MLF-44	4x4
SY55854U	ANY	CML	2.5/3.3/5V	2.5	QSOP-16	2x2
SY55858U	CML/PECL/LVPECL	CML	2.5/3.3V	3	TQFP-32	Dual 2x2
SY55859L	CML	CML	3.3V	2.7	MLF-32	Dual 2x2

Clock Synthesis

Part Number	Input	Output	Voltage	Min Freq. (MHz)	Max Freq. (MHz)	Package	Description
SY87729L	XTAL	PECL	3.3V	10	365	TQFP-32	AnyClock® Fractional-N Synthesizer
SY87739L	XTAL	PECL	3.3V	10	730	TQFP-32	AnyClock® Fractional-N Synthesizer
SY89426	TTL	PECL	5V	33	622	PLCC-28	SONET OC-12/OC-3
SY89529L	XTAL	LVPECL	3.3V	—	200	TQFP-32, SOIC-28	Spectrum Clock Synthesizer
SY89531L	XTAL	HSTL/LVPECL	3.3V	33	500	TQFP-64	XTAL Input Snth.
SY89532L	XTAL	LVPECL	3.3V	33	500	TQFP-64	XTAL Input Snth.
SY89533L	XTAL	LVDS/LVPECL	3.3V	33	500	TQFP-64	XTAL Input Snth.
SY89534L	ANYX	LVPECL	3.3V	33	500	TQFP-64	Ref. Input Snth.
SY89535L	ANYX	LVDS/LVPECL	3.3V	33	500	TQFP-64	Ref. Input Snth.
SY89536L	ANYX	HSTL/LVPECL	3.3V	33	500	TQFP-64	Ref. Input Snth.
SY89537L	ANYX	LVDS/LVPECL	3.3V	73	750	MLF-44	Ref. and XTAL Prog. Frequency
SY89538L	ANYX	LVDS/LVPECL	3.3V	73	750	TQFP-64	Ref. Input, Multiple Banks, Zero Delay
SY89610L <i>New!</i>	ANY	CML	3.3V	19	694	MLF-32	Clock Synthesizer with Ultra Low Jitter

Receivers/Buffers/Drivers

Part Number	Input	Output	Voltage	Max. Data Rate (Gbps)	Max. Freq. (GHz)	Package	Description
SY54016R <i>New!</i>	ANY	CML	1.2/1.8V	3.2	2.5	MLF-8 (2x2mm)	Low Voltage CML Translator with Fail-Safe Input
SY54016AR <i>New!</i>	ANY	CML	1.2/1.8V	3.2	3.2	MLF-8 (2x2mm)	Low Voltage CML Translator
SY58016L	CML/PECL	CML	3.3V	10.7	7	MLF-16 (3x3mm)	Differential CML Line Driver/Receiver
SY58600U	ANY	CML	2.5/3.3V	10.7	7	MLF-8 (2x2mm)	Line/Driver Receiver
SY58601U	ANY	LVPECL	2.5/3.3V	5	5	MLF-8 (2x2mm)	Line/Driver Receiver
SY58602U	ANY	RS-LVPECL	2.5/3.3V	10.7	7	MLF-8 (2x2mm)	Line/Driver Receiver with 400mV Output Swing
SY58603U	ANY	CML	2.5/3.3V	4.25	2.5	MLF-8 (2x2mm)	Line/Driver Receiver with Fail-Safe Input
SY58604U	ANY	LVPECL	2.5/3.3V	3.2	2.5	MLF-8 (2x2mm)	Line/Driver Receiver with Fail-Safe Input
SY58605U	ANY	LVDS	2.5V	3.2	2	MLF-8 (2x2mm)	Line/Driver Receiver with Fail-Safe Input
SY58620L	ANY	CML	3.3V	4.25	2.5	MLF-24 (4x4mm)	Backplane Transceiver
SY89206V	ECL/PECL	ECL/PECL	3.3/5V	—	1	MLF-8 (2x2mm)	Receiver/Buffer-100k Comp
SY89207L	LVECL/LVPECL	PECL	3.3V	—	0.8	MSOP-10	Amp. w/Low-Gain Feedback
SY89216V	ECL/PECL	ECL/PECL	3.3/5V	—	1	MLF-8 (2x2mm)	Receiver/Buffer-10k Comp
SY89250V	ECL/PECL	ECL/PECL	3.3/5V	—	—	MLF-8 (2x2mm)	Enhanced Diff. Receiver
SY89306V	ECL/PECL	ECL/PECL	3.3/5V	—	2.5	MLF-8 (2x2mm)	Receiver/Buffer-100k Comp
SY89307V	ECL/PECL	ECL/PECL	3.3/5V	2.5	—	MLF-8 (2x2mm)	Variable Output Swing Differential Receiver
SY89316V	ECL/PECL	ECL/PECL	3.3/5V	—	2.5	MLF-8 (2x2mm)	Diff. Receiver/Buffer-10k Comp
SY89835U	LVDS	LVDS	2.5V	3.2	2	MLF-8 (2x2mm)	Buffer with Fail-Safe Input
SY89850U	CML/PECL/LVDS	LVPECL	2.5/3.3V	3.2	4	MLF-8 (2x2mm)	Low Power

Gates and Flip-Flops

Part Number	Input	Output	Voltage	Max. Freq. (GHz)	Package	Description
SY58051U	ANY	CML	2.5/3.3V	7	ANY-16	CML AnyGate®
SY58052U	ANY	CML	2.5/3.3V	10.7	MLF-16	Data/Clock Synchronizer
SY55851/A	CML/PECL/LVPECL	CML	2.5/3.3V	3	MSOP-10	CML AnyGate®
SY55852U	CML/PECL/LVPECL	CML	2.5/3.3/5V	2.5	MSOP-10	D Flip Flop
SY55853U	CML/PECL/LVPECL	CML	2.5/3.3/5V	2.5	MSOP-10	D Latch

Multiplexers

Part Number	Fanout	Input	Output	Voltage	Frequency (Gbps)	Max. Freq. (GHz)	Package	Description
SY54017R <i>New!</i>	2:1	ANY	CML	1.2/1.8V	3.2	2.5	MLF-16	Low Voltage CML with Fail-Safe Input
SY54017AR <i>New!</i>	2:1	ANY	CML	1.2/1.8V	3.2	2.5	MLF-16	Low Voltage CML MUX
SY56017R <i>New!</i>	2:1	ANY	CML	1.2/1.8/2.5V	6.4	3.2	MLF-16	Low Voltage EQ MUX
SY58017U	2:1	ANY	CML	2.5/3.3V	10.7	7	MLF-16	Internal Termination
SY58018U	2:1	ANY	LVPECL	2.5/3.3V	5	4	MLF-16	Internal Termination and 800mV Output Swing
SY58019U	2:1	ANY	RS-LVPECL	2.5/3.3V	10.7	7	MLF-16	Internal Termination and 400mV Output Swing
SY58025U	Dual 2:1	ANY	CML	2.5/3.3V	10.7	7	MLF-32	Internal Termination
SY58026U	Dual 2:1	ANY	LVPECL	2.5/3.3V	5	6	MLF-32	Internal Termination and 800mV Output Swing
SY58027U	Dual 2:1	ANY	RS-LVPECL	2.5/3.3V	10.7	6	MLF-32	Internal Termination and 400mV Output Swing
SY58028U	4:2	ANY	CML	2.5/3.3V	10.7	7	MLF-32	Internal Termination
SY58029U	4:2	ANY	LVPECL	2.5/3.3V	5	4	MLF-32	Internal Termination and 800mV Output Swing
SY58030U	4:2	ANY	RS-LVPECL	2.5/3.3V	10.7	7	MLF-32	Internal Termination and 400mV Output Swing
SY58037U	8:2	ANY	CML	2.5/3.3V	5	4	MLF-44	Internal Termination
SY58038U	8:2	ANY	LVPECL	2.5/3.3V	4.5	5	MLF-44	Internal Termination and 800mV Output Swing
SY58039U	8:2	ANY	RS-LVPECL	2.5/3.3V	5	5.5	MLF-44	Internal Termination and 400mV Output Swing
SY58609U	2:1	ANY	CML	2.5/3.3V	4.25	2.5	MLF-16	Fail-Safe Input and Internal Termination
SY58610U	2:1	ANY	LVPECL	2.5/3.3V	3.2	2.5	MLF-16	Fail-Safe Input and Internal Termination
SY58611U	2:1	ANY	LVDS	2.5V	3.2	2.5	MLF-16	Fail-Safe Input and Internal Termination
SY89208V	2:1	ECL/PECL	ECL/PECL	3.3/5V	—	3	MLF-8	Internal Termination and 800mV Output Swing
SY89464U	2:10	ANY	LVPECL	2.5/3.3V	—	2	MLF-44	Internal Termination and 800mV Output Swing
SY89465U	2:10	ANY	LVDS	2.5V	—	2	MLF-44	Fast Edge Rates and Internal Termination
SY89473U	2:2	ANY	LVPECL	2.5/3.3V	3.2	3	MLF-24	Internal Termination and 800mV Output Swing
SY89474U	2:2	ANY	LVDS	2.5V	3.2	4	MLF-24	Fast Edge Rates and Internal Termination
SY89542U	Dual 2:1	ANY	LVDS	2.5V	3.2	4	MLF-32	Fast Edge Rates and Internal Termination
SY89543L	Dual 2:1	ANY	LVDS	3.3V	3.2	3	MLF-32	Fast Edge Rates and Internal Termination
SY89544U	4:1	ANY	LVDS	2.5V	3.2	4	MLF-32	Fast Edge Rates and Internal Termination
SY89545L	4:1	ANY	LVDS	3.3V	3.2	3	MLF-32	Fast Edge Rates and Internal Termination
SY89546U	4:2	ANY	LVDS	2.5V	3.2	4	MLF-32	Fast Edge Rates and Internal Termination
SY89547L	4:2	ANY	LVDS	3.3V	3.2	4	MLF-32	Fast Edge Rates and Internal Termination
SY89840U	2:1	ANY	LVPECL	2.5/3.3V	—	2	MLF-16	Internal Termination and 800mV Output Swing
SY89841U	2:1	ANY	LVDS	2.5V	—	1.5	MLF-16	Fast Edge Rates and Internal Termination
SY89842U	2:1	ANY	CML	2.5/3.3V	—	2	MLF-16	Internal Termination
SY89843U	2:2	ANY	LVPECL	2.5/3.3V	—	2	MLF-24	Internal Termination and 800mV Output Swing
SY89844U	2:2	ANY	LVDS	2.5V	—	2	MLF-24	Fast Edge Rates and Internal Termination
SY89845U	2:2	ANY	CML	2.5/3.3V	—	2	MLF-24	Internal Termination
SY89852U	2:1	ANY	LVPECL	2.5/3.3V	3.2	3.5	MLF-16	Internal Termination and 800mV Output Swing
SY89853U	Dual 2:1	ANY	LVPECL	2.5/3.3V	2.5	2.5	MLF-32	Internal Termination and 800mV Output Swing
SY89855U	4:2	ANY	LVPECL	2.5/3.3V	2.5	2.5	MLF-32	Internal Termination and 800mV Output Swing
SY89859U	8:2	ANY	LVPECL	2.5/3.3V	2.5	3.5	MLF-44	Internal Termination and 800mV Output Swing

Backplane and Cable Management Solutions

Part Number	Input	Output	Voltage	Max. Data Rate (Gbps)	Package	Description
SY58620L	ANY	CML	3.3V	4.25	MLF-24	Backplane Transceiver with Integrated Loopback
SY58621L	ANY	LVPECL/CML	3.3V	3.2	MLF-24	Backplane Transceiver with Integrated Loopback
SY58626L	ANY	CML	3.3V	6.4	MLF-32	Pre-Emphasis Driver with Integrated Loopback
SY58627L	ANY	CML	3.3V	6.4	MLF-32	Equalization Receiver with Integrated Loopback

Phase-Locked Loop

Part Number	Input	Output	Voltage	Max. Data Rate (Gbps)	Package	Description
SY89420V	Ref.	PECL	3.3/5V	10MHz to 666MHz	PLCC-28	Dual Phase-Locked Loop w/Freq. Doubler Mode
SY89421V	Ref.	PECL	3.3/5V	10MHz to 666MHz	SOIC-20	High-Performance Phase-Locked Loop

Skew Management

Part Number	Input	Output	Voltage	Max. Freq. (GHz)	Package	Description
SY89295U	LVPECL/LVTTL	LVPECL	2.5/3.3V	1.5	TQFP/MLF-32	Prog. Delay
SY89296U	LVPECL/LVTTL	LVPECL	2.5/3.3V	1.5	TQFP/MLF-32	Prog. Delay with Fine Tune Control
SY89297U <i>New!</i>	ANY	CML	2.5V	1.6/3.2(Gbps)	MLF-24	5ps /Step Programmable Delay, Dual Channel
SY55856U	CML	CML	2.5/3.3V	2.5	TQFP-32	Two Channel Delay Line

Translators

Part Number	Input	Output	Voltage	Max. Freq. (GHz)	Package	Single/Dual
SY55851/A	PECL/LVPECL/CML	CML	2.5/3.3V	3	10-Pin MSOP	Single
SY55855V	ANY	LVDS	3.3/5V	0.75	10-Pin MSOP	Dual
SY55857L	ANY	LVPECL	3.3V	2.5	10-Pin MSOP	Dual
SY89222L	TTL	PECL	3.3V	0.4	MLF-8 (2x2mm)	Dual
SY89223L	LVPECL	LVTTL	3.3V	0.16	MLF-8 (2x2mm)	Dual
SY89321L	LVPECL	LVTTL	3.3V	0.275	MLF-8 (2x2mm)	Single
SY89322V	LVTTL	LVPECL	3.3/5V	0.8	MLF-8 (2x2mm)	Dual
SY89323L	LVPECL	LVTTL	3.3V	0.275	MLF-8 (2x2mm)	Dual
SY89325V	ANY	LVDS	3.3V	0.750	MLF-8 (2x2mm)	Single
SY89327L	ANY	LVPECL	3.3V	2.5	MLF-8 (2x2mm)	Single
SY89328L	LVPECL/LVTTL	LVTTL/LVPECL	3.3V	0.275	MLF-8 (2x2mm)	Single
SY89329V	LVTTL	LVPECL	3.3/5V	0.8	MLF-8 (2x2mm)	Single
SY89464U	ANY	LVPECL	2.5/3.3V	2.0	MLF-44	Single
SY89465U	ANY	LVDS	2.5V	2.0	MLF-44	Single
SY89645L	LVCOS/LVTTL	LVDS	3.3V	0.65	TSSOP-16	Single
SY89825U	LVDS/LVPECL	LVPECL	2.5/3.3V	1.0	TQFP-64	Single
SY89826L	LVDS/LVPECL	LVDS	3.3V	1.0	TQFP-64	Single
SY89827L	HSTL/LVPECL	HSTL	3.3V	0.5	TQFP-64	Dual
SY89828L	LVDS/LVPECL	LVDS	3.3V	1.0	TQFP-64	Dual
SY89829U	LVDS/LVPECL	LVPECL	2.5/3.3V	1.0	TQFP-64	Dual
SY89831U	LVPECL/HSTL/CML	LVPECL	2.5/3.3V	2.5	MLF-16 (3x3mm)	Single
SY89832U	LVPECL/HSTL/LVDS/CML	LVDS	2.5V	2.5	MLF-16 (3x3mm)	Single
SY89833L	LVPECL/HSTL/LVDS/CML	LVDS	3.3V	2.0	MLF-16 (3x3mm)	Single
SY89834U	LVTTL/CMOS	LVPECL	2.5/3.3V	1.0	MLF-16 (3x3mm)	Single

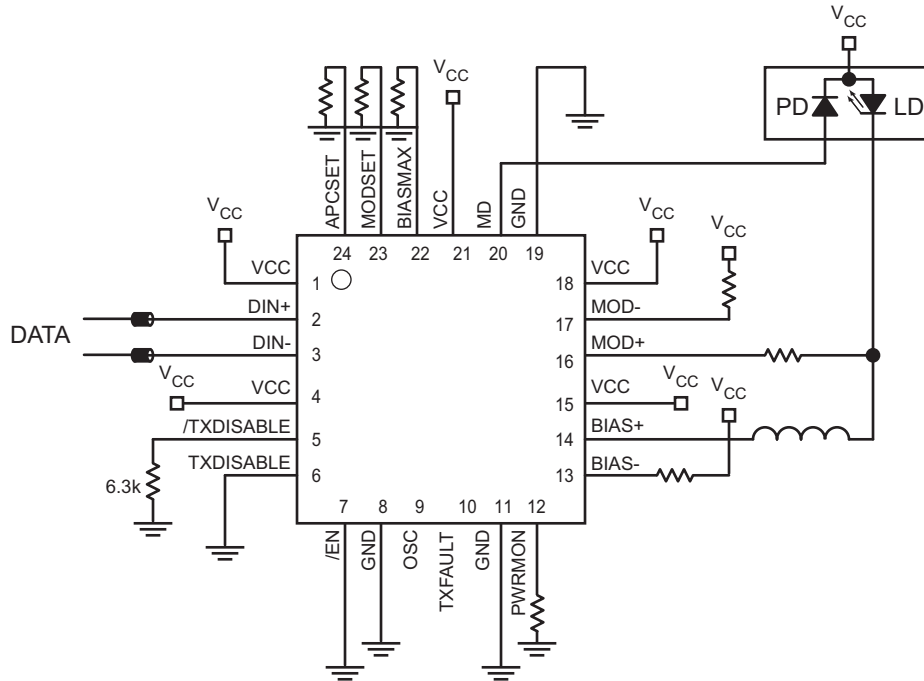
MLF-8 (2mm x 2mm) Solutions

Part Number	Equivalent	Input	Output	Voltage	Max. Freq. (GHz)	Description
SY58600U	—	ANY	CML	2.5V/3.3V	7	7GHz/10.7Gbps Diff. Trans.
SY58601U	—	ANY	LVPECL	2.5V/3.3V	5	5GHz/5Gbps Diff. Translator
SY58602U	—	ANY	LVPECL	2.5V/3.3V	7	7GHz/10.7Gbps Diff. Trans.
SY58603U	—	ANY	CML	2.5V/3.3V	2.5	Fail-Safe Input Buffers
SY58604U	—	ANY	LVPECL	2.5V/3.3V	2.5	Fail-Safe Input Buffers
SY58605U	—	ANY	LVDS	2.5V	2	Fail-Safe Input Buffers
SY89206V	100EL16V	PECL	PECL	3.3/5V	1	Diff. Receiver/Buffer
SY89208V	100EP58V	PECL	PECL	3.3/5V	3	2:1 Multiplexer
SY89216V	10EL16V	PECL	PECL	3.3/5V	1	Diff. Receiver/Buffer
SY89222L	100ELT22L	TTL	PECL	3.3V	0.40	Dual Diff. Translator
SY89223L	100ELT23L	LVPECL	LVTTTL	3.3V	0.16	Dual Diff. Translator
SY89250V	100EL16VC	PECL	PECL	3.3/5V	1	Enhanced Diff. Receiver
SY89306V	100EP16V	PECL	PECL	3.3/5V	2.5	Diff. Receiver/Buffer
SY89307V	100EP16VS	PECL	PECL	3.3/5V	2.5	Variable-out Diff. Receiver
SY89311U	100EP11U	PECL	PECL	2.5/3.3/5V	3	Diff. 1:2 FOB
SY89312V	100EP32V	PECL	PECL	3.3/5V	4	+2 Clock Gen.
SY89313V	100EP33V	PECL	PECL	3.3/5V	4	+4 Clock Gen.
SY89316V	10EP16V	PECL	PECL	3.3/5V	2.5	Diff. Receiver/Buffer
SY89321L	100EPT21L	LVPECL	LVTTTL	3.3V	0.275	Diff. Translator
SY89322V	100EPT22V	LVTTTL	LVPECL	3.3/5V	0.800	Dual Diff. Translator
SY89323L	100EPT23L	LVPECL	LVTTTL	3.3V	0.275	Dual Diff. Translator
SY89325V	55855V	ANYX	LVDS	3.3/5V	0.750	Diff. Translator
SY89327L	55857L	ANYX	LVPECL	3.3V	2.5	Diff. Translator
SY89328L	100EPT28L	LVTTTL/LVPECL	LVTTTL/LVPECL	3.3V	0.275	Dual Diff. Translator
SY89329V	100EPT20V	LVTTTL	LVPECL	3.3/5V	0.800	Diff. Translator

Communications Product Highlight — SY88212L

Micrel Advantage

- Integrated APC
- Power Monitoring
- Active-High TXfault



SY88212L Laser Diode Driver with APC and Power Monitoring

The SY88212L is Micrel's new stand-alone 2.5Gbps laser diode driver (LDD) featuring power monitoring and integrated Automatic Power Control (APC) to keep average optical power constant during temperature changes and over the lifetime of the laser. The SY88212L is also designed with high compliance voltage, allowing it to be DC-coupled to the laser to reduce external component count and power consumption. The SY88212L is a single-supply, 3.3V laser driver designed for datacom and telecom applications; including LAN and MAN with any data rate up to 2.5Gbps: FC, GbE, SONET, OC3/12/24/48 and SDH, STM 1/4/8. The device is also well suited for SFF and SFP modules.

The driver can deliver modulation current up to 85mA and bias current up to 70mA, and is suitable for both AC and DC-coupled laser interfaces due to its high compliance voltage. The SY88212L also features an active-high APC fault (TXfault) indicator, TXenable/TXdisable for enabling/disabling the driver, and a power-monitoring pin, which monitors the current that is proportional to the sum of bias current and half of modulation current. It is available in a 24-pin (4mm x 4mm) MFL[®] package.

Features

- 2.4V minimum laser compliance voltage
- Operation up to 2.5Gbps
- Modulation current up to 85mA
- Bias current up to 70mA
- Power monitoring
- Available in 24-pin (4mm x 4mm) MFL[®] package

Communications Selection Guide

CDRs with Integrated Clock Synthesis

Part Number	Description	Function	Data Rate (Mbps)	Data Output Type	V _{CC}	Package	Eval. Board
SY69753AL ⁽¹⁾	Clock and Data Recovery	CDR	125-155	PECL	3.3V	EPAD-TQFP-32	Yes
SY69754AL	Clock and Data Recovery	CDR	622	PECL	3.3V	EPAD-TQFP-32	Yes
SY87700AL ⁽¹⁾	AnyRate [®] Clock and Data Recovery	CDR	32-208	PECL	3.3V	EPAD-TQFP-32, SOIC-28 ⁽²⁾	Yes
SY87701AL ⁽¹⁾	AnyRate [®] Clock and Data Recovery	CDR	28-1300	PECL	3.3V	EPAD-TQFP-32, SOIC-28 ⁽²⁾	Yes
SY87813L	AnyRate [®] Clock and Data Recovery with Differential Clock	CDR	28-1300	PECL	3.3V	EPAD-TQFP-32	Yes
SY87700V	AnyRate [®] Clock and Data Recovery	CDR	32-175	PECL	3.3/5V	EPAD-TQFP-32, SOIC-28 ⁽²⁾	Yes
SY87700L	AnyRate [®] Clock and Data Recovery	CDR	32-175	PECL	3.3V	EPAD-TQFP-32, SOIC-28 ⁽²⁾	Yes
SY87701V	AnyRate [®] Clock and Data Recovery	CDR	32-1250	PECL	3.3/5V	EPAD-TQFP-32, SOIC-28 ⁽²⁾	Yes
SY87701L	AnyRate [®] Clock and Data Recovery	CDR	32-1250	PECL	3.3V	EPAD-TQFP-32, SOIC-28 ⁽²⁾	Yes
SY87721L	AnyRate [®] Clock and Data Recovery	CDR	28-2700	CML/PECL	3.3V	EPAD-TQFP-64	Yes
SY69753L	Clock and Data Recovery	CDR	125-155	PECL	3.3V	EPAD-TQFP-64	Yes
SY69952	Clock Recovering Transceiver	Transceiver	51.84-155	PECL	5V	SOIC-28 ⁽²⁾	n/a

1. Run on 30% less I_{CC} than the SY69753L, SY87700V/L or SY87701V/L and are recommended for new designs.

2. 28-Pin SOIC is available, but not recommended for new designs.

Fiber Optic Transceiver ICs

Laser Drivers

Part Number	Description	Data Rate (Gbps)	Drive Current (mA)	V _{CC}	Package	Eval. Board
SY88212L New!	Laser Driver with APC and Power Monitoring	2.5	85	3.3V	MLF-24 (4mm x 4mm)	Yes
SY88216L	Burst Mode Laser Driver	2.5	85	3.3V	MLF-24 (4mm x 4mm)	Yes
SY88422L ⁽⁴⁾	Laser Driver with Integrated Bias	4.25	90	3.3V	MLF-16 (3mm x 3mm)	Yes
SY88722V	Laser Driver with Output Enable	0.622	30	3.3/5V	MSOP-10	Yes
SY88782L ⁽⁴⁾	High-Current, Low Power FP/DFB Laser Driver	1.25	90	3.3V	MLF-16 (3mm x 3mm)	n/a
SY88822V	Laser Driver with Output Enable	0.155	25	3.3/5V	MSOP-10	Yes
SY88902V	VCSEL Laser Driver with Output Enable	1.25	25	5V	MSOP-10	n/a
SY88912L	SONET/SDH Laser Driver	3.2	60	3.3V	MLF-16 (3mm x 3mm)	n/a
SY88922	SONET/SDH VCSEL Laser Driver	2.5	25	5V	MSOP-10 (3mm x 3mm)	n/a
SY88922V	SONET/SDH VCSEL Laser Driver	2.5	25	3.3/5V	MSOP-10 (3mm x 3mm)	n/a
SY88932L ⁽⁴⁾	VCSEL/FP/DFB Laser Driver	4.25	60	3.3V	MLF-16 (3mm x 3mm)	Yes
SY88982L ⁽⁴⁾	High-Current, Low Power FP/DFB Laser Driver	2.7	90	3.3V	MLF-16 (3mm x 3mm)	Yes
SY88992L ⁽⁴⁾	VCSEL Driver	4.25	25	3.3	MLF-16 (3mm x 3mm)	Yes
SY89307V ⁽⁴⁾	Output Swing Differential Receiver—VCSEL Driver	2.125	25	3.3V/5V	MLF-8 (2mm x 2mm)	Yes
SY100EL1003	Laser Driver with Output Enable	1.25	75	5V	SOIC-16	n/a
SY100EL16VS	Variable Output Swing Differential Receiver	1.25	25	3.3V/5V	MSOP-8 (3mm x 3mm), SOIC-8	n/a
SY100EP16VS	Variable Output Swing Differential Receiver	2.5	25	3.3V/5V	MSOP-8 (3mm x 3mm), SOIC-8	n/a

4. To be interfaced with MIC3001/2 controllers.

Controllers

Part Number	Description	Package
MIC3001	FOM Management IC with Internal Calibration	MLF-24 (4x4mm)
MIC3002	FOM Management IC with Internal/External Calibration	MLF-24 (4x4mm)

Post Amplifiers

Part Number	Data Rate (Gbps)	V _{CC}	LOS/SD	Input	Output	LOS/SD Gain	RC Time Constant	Hysteresis Typ. (dB)	Package
SY88147DL	1.25	3.3V	LOS (TTL)	PECL	PECL	4X	20X	3.5	MSOP-10
SY88149CL	1.25	3.3V	SD (TTL)	PECL	PECL	4X	1X	3.5	MSOP-10
SY88289AL ⁽¹⁾	3.2	3.3V	LOS (TTL)	PECL with internal 50Ω to V _{REF}	CML	1X	20X	3.5	MLF-16
SY88289CL ⁽¹⁾	3.2	3.3V	LOS (TTL)	PECL	CML	4X	20X	3.5	MLF-16
SY88289HL	3.2	3.3V	LOS (TTL)	PECL	CML	4X	20X	3.5	MLF-16
SY88303BL	3.2	3.3V	LOS (TTL)	PECL with internal 50Ω to V _{REF}	CML	0.5X	20X	3.5	EPAD-MSOP-10, MLF-16
SY88305BL	3.2	3.3V	SD (TTL)	PECL with internal 50Ω to V _{REF}	CML	0.5X	20X	3.5	EPAD-MSOP-10, MLF-16
SY88307BL	3.2	3.3V	LOS (TTL)	PECL with internal 50Ω to V _{REF}	PECL	0.5X	20X	3.5	EPAD-MSOP-10, MLF-16
SY88309BL	3.2	3.3V	SD (TTL)	PECL with internal 50Ω to V _{REF}	PECL	0.5X	20X	3.5	EPAD-MSOP-10, MLF-16
SY88313BL	3.2	3.3V	LOS (TTL)	PECL with internal 50Ω to V _{REF}	CML	1X	20X	3.5	EPAD-MSOP-10, MLF-16
SY88315BL	3.2	3.3V	SD (TTL)	PECL with internal 50Ω to V _{REF}	CML	1X	20X	3.5	EPAD-MSOP-10, MLF-16
SY88343BL	3.2	3.3V	LOS (TTL)	PECL with internal 50Ω to V _{REF}	CML	4X	20X	3.5	EPAD-MSOP-10, MLF-16
SY88343DL	3.2	3.3V	LOS (TTL)	PECL	CML	4X	20X	3.5	MLF-16
SY88343HL	3.2	3.3V	LOS (TTL)	PECL	CML	4X	20X	3.5	MLF-16
SY88345BL	3.2	3.3V	SD (TTL)	PECL with internal 50Ω to V _{REF}	CML	4X	20X	3.5	EPAD-MSOP-10, MLF-16
SY88347DL	3.2	3.3V	LOS (TTL)	PECL	PECL	4X	20X	3.5	MSOP-10
SY88353BL ⁽²⁾	3.2	3.3V	LOS (TTL)	PECL with internal 50Ω to V _{REF}	CML	1X	20X	3.5	MLF-16
SY88403BL	4.25	3.3V	LOS (TTL)	PECL with internal 50Ω to V _{REF}	CML	1X	20X	3.5	EPAD-MSOP-10, MLF-16
SY88713V	0.622	3.3V/5V	SD (PECL)	PECL	PECL	1X	1X	4.6	MSOP-10
SY88773V	3.2	3.3V/5V	LOS (TTL)	PECL	CML	1X	1X	4.6	EPAD-MSOP-10, MLF-16
SY88803V	0.155	3.3V/5V	LOS (TTL)	PECL	PECL	1X	1X	4.6	MSOP-10
SY88813V	0.155	3.3V/5V	SD (PECL)	PECL	PECL	1X	1X	4.6	MSOP-10
SY88843V	3.2	3.3V/5V	SD (TTL)	PECL with internal 50Ω to V _{REF}	CML	1X	1X	4.6	EPAD-MSOP-10, MLF-16
SY88903AL	1.25	3.3V	LOS (TTL)	PECL	PECL	4X	1X	3.5	MSOP-10
SY88903V	1.25	3.3V/5V	LOS (TTL)	PECL	PECL	1X	1X	4.6	MSOP-10
SY88913V	1.25	3.3V/5V	LOS (PECL)	PECL	PECL	1X	1X	4.6	MSOP-10
SY88923AV	3.2	3.3V/5V	LOS (TTL)	PECL	PECL	1X	1X	4.6	EPAD-MSOP-10, MSOP-10
SY88923V	2.5	3.3V/5V	LOS (TTL)	PECL	PECL	1X	1X	4.6	MSOP-10
SY88933AL	1.25	3.3V	SD (TTL)	PECL	PECL	4X	20X	3.5	MSOP-10
SY88933V	1.25	3.3V/5V	SD (TTL)	PECL	PECL	1X	1X	4.6	MSOP-10
SY88943V	2.5	3.3V/5V	SD (TTL)	PECL	PECL	1X	1X	4.6	MSOP-10
SY88953L ⁽²⁾	10.7	3.3V	SD & LOS (TTL)	CML	CML	1X	1X	4.6	MLF-16
SY88973V	3.2	3.3V/5V	LOS (TTL)	PECL with internal 50Ω to V _{REF}	CML	1X	1X	4.6	EPAD-MSOP-10, MLF-16
SY88973BL ⁽³⁾	3.2	3.3V	LOS (TTL)	PECL with internal 50Ω to V _{REF}	CML	1X	1X	4.6	MLF-16
SY88983V	3.2	3.3V/5V	SD (TTL)	PECL with internal 50Ω to V _{REF}	CML	1X	1X	4.6	EPAD-MSOP-10, MLF-16
SY88993AV	3.2	3.3V/5V	LOS (TTL)	PECL	CML	1X	1X	4.6	MSOP-10
SY88993V	3.2	3.3V/5V	LOS (TTL)	PECL	CML	1X	1X	5.6	MSOP-10

1. I/O compatible with ADN2891.

2. With Decision Threshold Adjustment: to correct input DC offset and optimize BER performance.

3. The pull-up resistor between LOS output and V_{CC} is external.

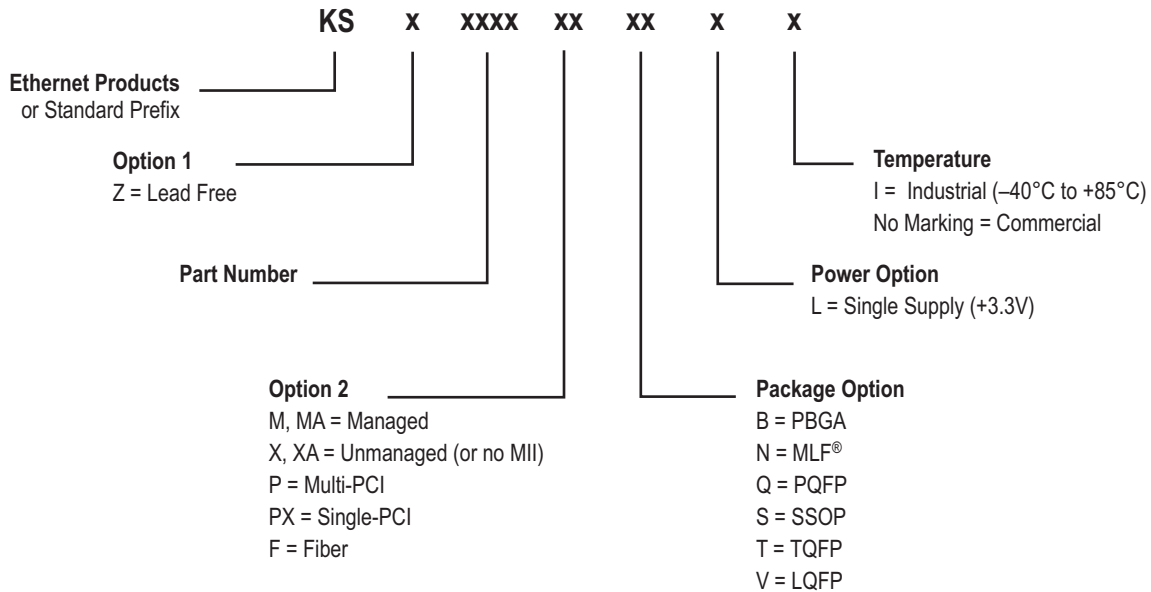
Fractional N Synthesizers

Part Number	Description	Output Range	Input Ref. Osc.	Temperature	Package	Eval. Software
SY87729L	3.3V, AnyClock® 10MHz to 365MHz Fractional N Synthesizer	10MHz to 365MHz	27MHz	Industrial	TQFP-32	Yes
SY87739L	3.3V, Protocol Transparent 10MHz to 729MHz Fractional N Synthesizer	10MHz to 729MHz	27MHz	Industrial	TQFP-32	Yes

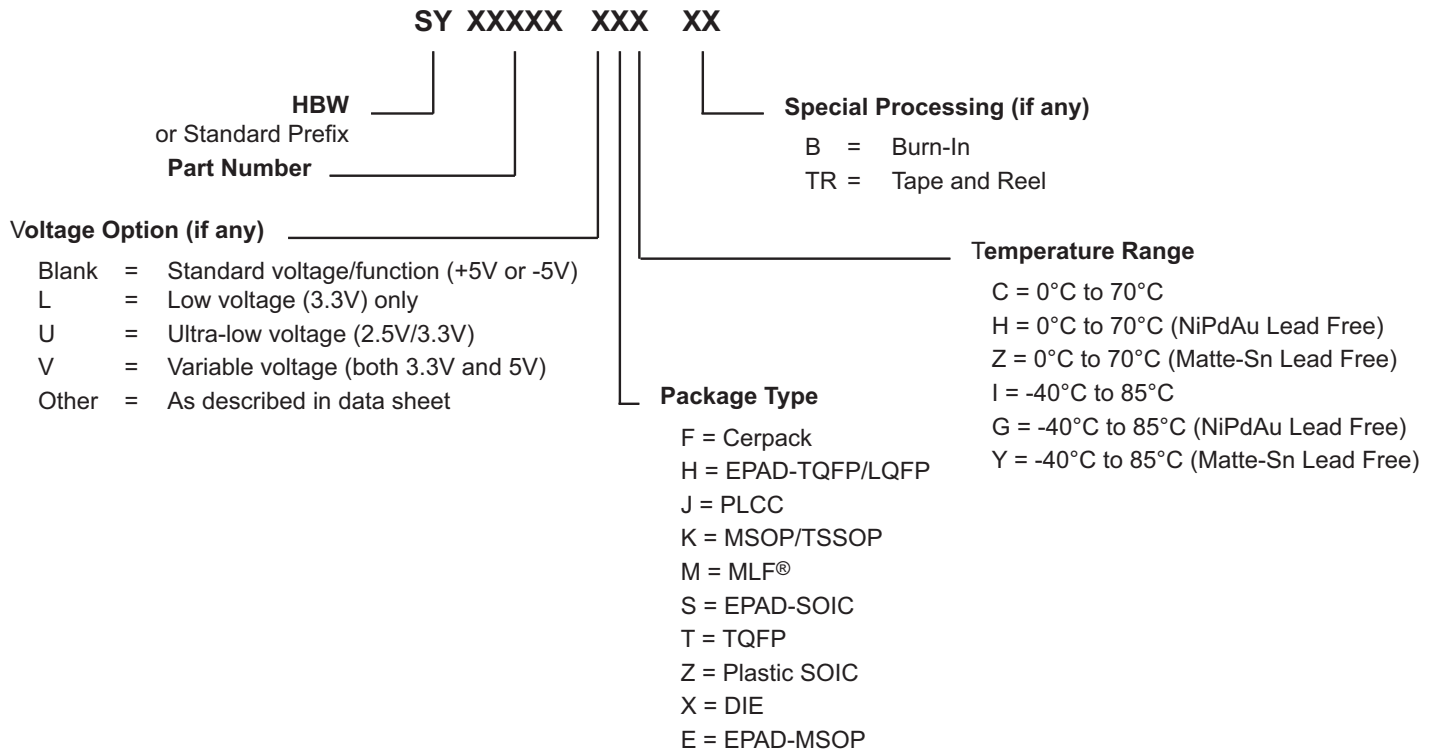
Multiplexer/Demultiplexer

Part Number	Function	Data Rate	Data Output Type	V _{CC}	Temperature	Conversion	Package
SY87724L	MUX and DeMUX	2.7Gbps	PECL	3.3V	Industrial	1:, 1:5, 1:8, 1:10, 4:1, 5:1, 8:1, 10:1	TQFP-80
SY87725L	SERDES	2.5Gbps	CML	3.3V	Industrial	1:4, 4:1	EPAD-TQFP-64
SY10/100E445	DeMUX	2.5Gbps	PECL	5V	Commercial	1:4	LPCC-28
SY10/100E446	MUX	1.6Gbps	PECL	5V	Commercial	4:1	LPCC-28

Ethernet Part Identification

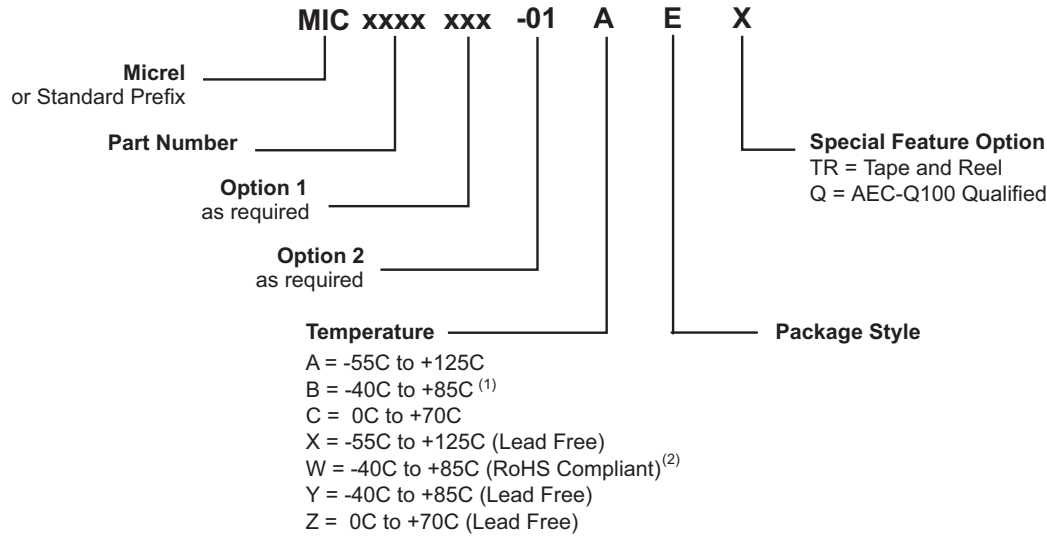


High Bandwidth Part Identification



Analog Part Identification

Micrel Analog Standard

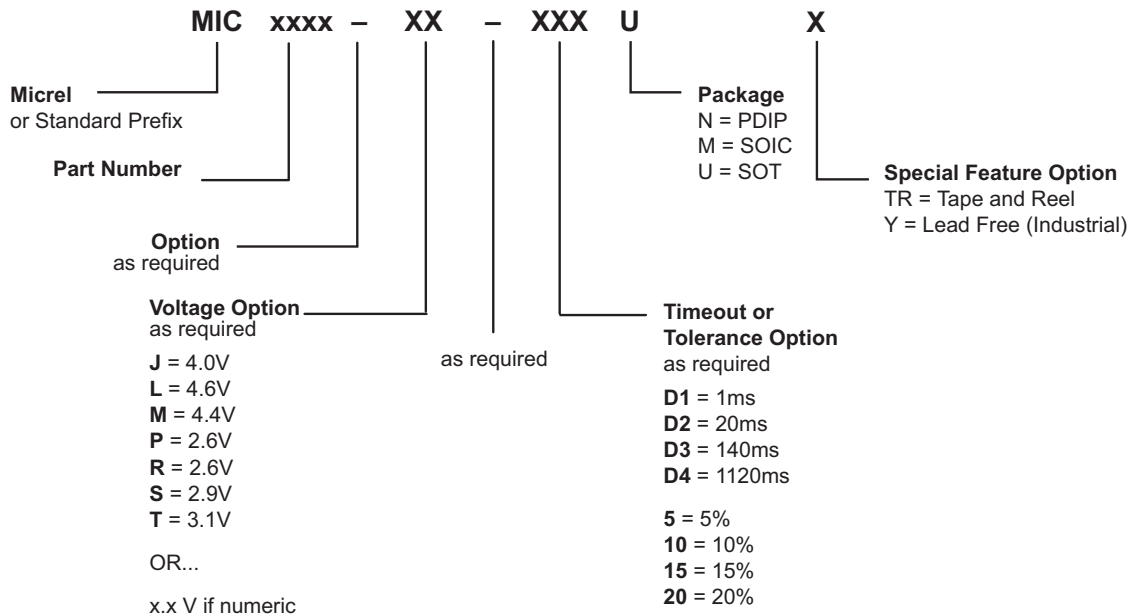


Notes:

- Typically, industrial grade power products rate the junction temperature up to +125C. Refer to the datasheet.
- Applicable to TO-220, TO-247, TO-263, SOT-223, SPAK packages using 85% lead plus lead alloy die attach material. Refer to the datasheet.

C3 = SC70-3	M = 150 mil SOIC	M6 = SOT-23-6	TS = TSSOP
C4 = SC70-4	ME = 150 mil EPAD-SOIC	M8 = SOT-23-8	TSE = EPAD-TSSOP
C5 = SC70-5	ML = MLF [®]	N = Plastic DIP	TQ = TQFP
C6 = SC70-6	MM = MSOP	QS = QSOP	TQE = EPAD-TQFP
D5 = Thin SOT	MM = EPAD-MSOP	QSE = EPAD-QSOP	U = TO-263
FL = MLF [®]	MT = Thin MLF [®]	R = SPAK	V = PLCC
HL = Hybrid MLF [®]	M3 = SOT-23-3	S = SOT-223	WM = 300 mil Wide SOIC
J = Ceramic DIP	M4 = SOT-143	SM = SSOP	WME = 300 mil Wide EPAD-SOIC
LQ = LQFP (Low Profile QFP)	M5 = SOT-23-5	T = TO-220	WT = TO-247

Industry Standard Voltage Supervisors



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China	Dist.	Arrow Asia PAC Ltd.	20/F, Tower 2, Ever Gain Plaza, 88 Container Port Rd.	Kwai City	Hong Kong	Tel: 852 2484 2484	Fax: 852 2484 2468
China	Dist.	Comtech Group, Inc.	Room 101, Tower C, Skyworth Bldg. High-Tech Industrial Park, Nanshan	Shenzhen	China	Tel: +86 (755) 2674-3210	Fax: +86 (755) 2674-3508
China	Dist.	Future Electronics-Beijing	Room N, 4/F, Tower B, East Gate Plaza 29 Dong Zhong Street, Dong Cheng District	Beijing 100027	China	Tel: +86 (10) 6418-2335	Fax: +86 (10) 6418-2290
China	Dist.	Future Electronics-Chengdu	Room 609, 6/F, Tiange Building Mo Zi Qiao, Nan Er Duan, Yi Huan Rd.	Chengdu 610041	China	Tel: +86 (28) 8545-4789	Fax: +86 (28) 8543-2616
China	Dist.	Future Electronics-Guangzhou	Rm 505, Yi An Plaza, 33 Jian She Liu Rd.	Guangzhou 510060	China	Tel: +86 (20) 8363-4927	Fax: +86 (20) 8363-3578
China	Dist.	Future Electronics-Nanjing	Rm B1, 15/F, G.E. Plaza Hotel, No. 89, Hanzhong Rd.	Nanjing 210029	China	Tel: +86 (25) 4710047	Fax: +86 (25) 4717972
China	Dist.	Future Electronics-Qingdao	B707A, Fullhope Plaza, No. 12, Xianggang Zhong Rd.	Qingdao Municipality 210029	China	Tel: +86 (532) 502-6035	Fax: +86 (532) 502-6015
China	Dist.	Future Electronics-Tianjin	Rm D, 31/F, Block A The Mansion of Triumphal Arch, No. 66, Nanjing Rd.	Nanjing 300042	China	Tel: +86 (22) 2302-2520	Fax: +86 (22) 2302-2523
China	Dist.	Future Electronics-Xiamen	Rm 02, 30/F, The Bank Center, 189 Xiahe Lu, Kaiyuan District	Xiamen 361003	China	Tel: +86 (592) 239-8230	Fax: +86 (592) 239-8236
China	Dist.	Future Electronics-Shanghai	Rm 401, Pacheer Commercial Center, 555 Nanjing West Rd.	Shanghai 200041	China	Tel: +86 (21) 6255-3980	Fax: +86 (21) 6255-3986

China	Dist.	Future Electronics—Shenzhen	Rm 1506, Block A Electronic Science & Tech. Bldg. No. 2070 Shennan Zhong Rd., Futian District	Shenzhen 518031	China	Tel: + 86 (755) 8366-9286	Fax: + 86 (755) 8366-9280
China	Dist.	Secom Telecom Co., Ltd.	32/F, Block A, Shenfang Plaza, No. 3005 Renminnan Rd.	Shenzhen 518001	China	Tel: + 86 (755) 2515-5888	Fax: + 86 (755) 2515-5880
China	Dist.	Secom Telecom Co., Ltd.	Unit F, 8/F, Roangye Mansion, 1100 Dingxi Rd.	Shanghai 200050	China	Tel: + 86 (21) 6212-1097	Fax: + 86 (21) 3212-0694
China	Dist.	Secom Telecom Co., Ltd.	Rm 707, New Era Mansion, 402 Zhongshandong Rd.	Nanjing 210002	China	Tel: + 86 (25) 8445-3616	Fax: + 86 (25) 8440-2730
China	Dist.	Secom Telecom Co., Ltd.	Unit G, 11/F, Era Plaza, 42 Wenwu Rd., Xinhua Ave.	Chengdu 610031	China	Tel: + 86 (28) 8298-1751	Fax: + 86 (28) 8298-1753
China	Dist.	Secom Telecom Co., Ltd.	Rm B511, Guantong Bldg., 44 Huayuanbei Rd. Haidian District	Beijing 100083	China	Tel: + 86 (10) 6235-8916	Fax: + 86 (10) 6235-8917
China	Dist.	Secom Telecom Co., Ltd.	Rm 9006, Block C, 9/F Chuangye Bldg. 16 Gaoxin No. 1 Rd., High Tech. Development Zone	Xi'an 710075	China	Tel: + 86 (29) 8832-3435	Fax: + 86 (29) 8832-3331
China	Dist.	Synnex Pacific, Ltd.	Rm 302, 3/F Block A, Overseas Decoration Bldg. 122 Zhenhua Rd., Futian District	Shenzhen 518031	China	Tel: + 86 (755) 8334-2722	Fax: + 86 (755) 8323-7466
China	Dist.	Synnex Pacific, Ltd.	15# 12A/F Block B, China Int'l Science Tech. Convention Center, 12# Yumin Street, Chaoyang District	Beijing 100029	China	Tel: + 86 (10) 8225-3522	Fax: + 86 (10) 8225-3525
China	Dist.	Synnex Pacific, Ltd.	5/F Apon Mansion, 585 Lingling Rd.	Shanghai 200030	China	Tel: + 86 (21) 6469-1773	Fax: + 86 (21) 6439-3256
China	Dist.	Synnex Pacific, Ltd.	Rm C503, 5/F Haiyue Bldg., No. 3 Haiy, Xiang Zhou District	Zhuhai 519000	China	Tel: + 86 (756) 2216298	
China	Rep.	Galaxy Far East Corp.	Unit 222, China Hall of Science and Technology 3 Fu-Xing Rd.	Beijing 100038	China	Tel: + 86 (10) 6851-8822	Fax: + 86 (10) 6853-0126
China	Rep.	Galaxy Far East Corp.	Rm 0612, New Caohejing Tower, 509 Caobao Rd.	Shanghai 200233	China	Tel: + 86 (21) 6495-6484	Fax: + 86 (21) 6485-2237
China	Rep.	Galaxy Far East Corp.	Rm 1121 Hualianfa Industrial Tower No. 2006, North Road Huaqiang Rd.	Shenzhen 518031	China	Tel: + 86 (755) 8399-8903	Fax: + 86 (755) 8399-9440
China	Rep.	Galaxy Far East Corp.	Dong-Fu Tower 1411, North Yu Lin Rd. 3	Chengdu 610041	China	Tel: + 86 (28) 8554-8390	Fax: + 86 (28) 8554-7613
China	Rep.	Galaxy Far East Corp.	11# Bldg., 1 Innovation Science & Tech. Park of China Baocun Group, South Lake Garden City	Wuhan 430071	China	Tel: + 86 (27) 8730-6822	Fax: + 86 (27) 8730-6822
China	Rep.	Lestina International Ltd.	Rm 1101, Haojing Bldg., No. 46, Zhichun Rd. Hai Dian District	Beijing 100086	China	Tel: + 86 (10) 6210-1671	Fax: + 86 (10) 6210-1650
China	Rep.	Lestina International Ltd.	Rm 417, Yongfeng Bldg., No. 52, Yongfeng Rd. Area Gaoxin	Chengdu 610041	China	Tel: + 86 (28) 514-4000	Fax: + 86 (28) 518-7012
China	Rep.	Lestina International Ltd.	Rm 806, Lawyer Bldg., No. 1538 Zhongshan West Rd.	Shanghai 200235	China	Tel: + 86 (21) 6464-6969	Fax: + 86 (21) 6464-4848
China	Rep.	Lestina International Ltd.	Rm 806, Tian'an High-Tech Plaza, Tower A Tian'an Cyber Park, Futian District	Shenzhen 518040	China	Tel: + 86 (755) 8343-8383	Fax: + 86 (755) 8343-9867
China	SRep.	Tekall Technologies Co., Ltd. (RF products only)	Rm 1309, Tower B, Tian'an High-Tech Plaza Tian'an Cyber Park	Shenzhen 518040	China	Tel: + 86 (755) 8386-7700	Fax: + 86 (755) 8386-7799
China	SRep.	Tekall Technologies Co., Ltd. (RF products only)	Room 502, Ju'an Bldg., Chedaogou Rd. Hai Dian District	Beijing 100081	China	Tel: + 86 (10) 6872-7716	Fax: + 86 (10) 6872-7713
China	SRep.	Tekall Technologies Co., Ltd. (RF products only)	No. 1, Qiaoko Economic Special Zone, 2nd Gu Tian Rd.	Wuhan 430063	China	Tel: + 86 (27) 8385-8150	Fax: + 86 (27) 8385-8150
Czech Republic	Dist.	SASCO Holz Prague	Charkovska 24	CZ-101 00 Praha 10	Czech Republic	Tel: + 420 271 001 470	Fax: + 420 271 001 471
Denmark	Dist.	Arrow Denmark	Smedeholm 13A	DK-2730 Herlev	Denmark	Tel: + 45 70 10 22 11	
Denmark	Dist.	Arrow Denmark	Tindbjergvej 18	DK-8600 Silkeborg	Denmark	Tel: + 45 70 10 22 11	
Denmark	Dist.	Arrow Nordic Components AB	Isafjordgatan 7, Box 67	S-16494 Kista	Sweden	Tel: + 44 1279 441144	Fax: + 44 1279 455777
Denmark	Dist.	Future Electronics	Skomagervej 13D	7100 Vejle	Denmark	Tel: + 45 76 40 87 64	Fax: + 45 76 40 87 65
Estonia	Dist.	Arrow Nordic Components AB	Isafjordgatan 7, Box 67	S-16494 Kista	Sweden	Tel: + 44 1279 441144	Fax: + 44 1279 455777
Estonia	Dist.	Arrow Estonia	Järvevana Tee 9	EE-11314 Tallin	Estonia	Tel: + 372 6 77 42 50	
Estonia	Dist.	Future Electronics	Narva mnt. 13A	Tallin, 10151	Estonia	Tel: + 372 614 3201	
Europe	Die Dist.	Chip Supply, Inc.	5 Queen Street, Oldham	OL1 1RD	UK	Tel: + 44 (1616) 336627	Fax: + 44 (1616) 260380
Europe	Die Dist.	Die Technology, Ltd.	2 Hellesden Park Rd., Drayton High Rd.	Norwich, NR6 5DR	UK	Tel: + 44 (0) 1603 788967	Fax: + 44 (0) 1604 788920
Finland	Dist.	Arrow Finland	Kalkkipellontie 4, Box 280	FI - 02601 Espoo	Finland	Tel: + 358 (9) 47 66 60	
Finland	Dist.	Arrow Finland	Lentokentäntie 11	FI - 90460 Oulunsalo	Finland	Tel: +358 8 321 28 00	
Finland	Dist.	Arrow Finland	Tykistökatu 2B	FI-20520 Turku	Finland	Tel: +358 2 214 84 00	
Finland	Dist.	Arrow Nordic Components AB	Isafjordgatan 7, Box 67	S-16494 Kista	Sweden	Tel: + 44 1279 441144	Fax: + 44 1279 455777
Finland	Dist.	Future Electronics	Ayritie 12C	01510 Vantaa	Finland	Tel: + 358 (9) 525 9950	Fax: + 358 (9) 455 1050
France	Dist.	Arrow France—Rungis	17, rue du Jura, Silic 565	94653 Rungis Cedex	France	Tel: + 33 (1) 56.30.24.25	Fax: + 33 (1) 56.30.25.25
France	Dist.	Arrow France—Lyon	33, rue du Dr. Georges Levy, Parc Club du Moulin a Vent, bat 53	69693 Venissieux	France	Tel: + 33 (4) 72.78.14.80	Fax: + 33 (4) 72.78.14.99
France	Dist.	Arrow France—Toulouse	Bat Antares, 2 Rue Marcel Doret, BP108	31703 Blagnac Cedex	France	Tel: + 33 (5) 34.60.46.70	Fax: + 33 (5) 34.60.46.79
France	Dist.	Arrow France—Rennes	46 D rue Kerautret Botmel, ZAC de la Poterie	35000 Rennes	France	Tel: + 33 (2) 99.51.51.51	Fax: + 33 (2) 99.53.61.50
France	Dist.	Arrow France—Strasbourg	3 rue du Verdon	67100 Strasbourg	France	Tel: + 33 (3) 88.65.82.82	Fax: + 33 (3) 88.79.48.18
France	Dist.	Arrow France—Bordeaux	Parc d'Activite Kennedy, bat F, 5 rue Becquerel	33700 Merignac	France	Tel: + 33 (5) 56.13.71.80	Fax: + 33 (5) 56.34.48.98
France	Dist.	Arrow France—Lille	4 Av de la Creativite	59657 Villeneuve D'ASCQ	France	Tel: + 33 (3) 20.05.10.56	Fax: + 33 (5) 20.91.91.55
France	Dist.	Arrow France—Grenoble	3 Allee de Bethleem	38610 Gieres	France	Tel: + 33 (4) 76.59.43.00	Fax: + 33 (4) 76.59.31.61
France	Dist.	Attitude Electronics S.A.S.	142-176 Av De Stalingrad	92703 Colombes	France	Tel: + 33 (1) 46.49.30.30	Fax: + 33 (1) 47.85.69.06
France	Dist.	Future Electronics—Paris	Parc Technopolis LP854, 3 Avenue du Canada Batiment Theta 2	91974 Courtaboeuf Cedex	France	Tel: + 33 (1) 69.82.11.11	Fax: + 33 (1) 69.82.11.00
France	Dist.	Future Electronics—Lyon	Europarc du Chêne, 4 rue Edison, Batiment A	69673 Lyon, Bron Cedex	France	Tel: + 33 (4) 72.15.86.00	Fax: + 33 (4) 72.15.00.68
France	Dist.	Future Electronics—Rennes	3D rue de Paris	35510 Cesson Sevigne	France	Tel: + 33 (2) 23.45.60.80	Fax: + 33 (2) 23.45.60.79

France	Dist.	Future Electronics-Toulouse	5 Avenue Albert Durand, Aeropole 3	31700 Blagnac	France	Tel: + 33 (5) 62.74.72.40	Fax: + 33 (5) 62.74.14.72
France	Die Dist.	Die Technology, Ltd.	Corbrock Rd., Chadderton, Oldham	Lancashire L09 9SD	UK	Tel: + 44 (0) 1603 788967	Fax: + 44 (0) 1604 788920
France	Dist.	Tekelec Europe-Rungis	21 rue du Jura, Silic 565	94653 Rungis Cedex	France	Tel: + 33 (1) 56.30.24.25	Fax: + 33 (1) 56.30.25.25
Germany	Dist.	Dacom Sued GmbH	Freisinger Strasse 13	85737 Ismaning	Germany	Tel: + 49 (89) 96 48 80	Fax: + 49 (89) 96 51 65
Germany	Dist.	Future Electronics Deutschland	Oskar-Messter-Strasse 25	85737 Ismaning	Germany	Tel: + 49 (89) 95 72 70	Fax: + 49 (89) 95 78 838
Germany	Dist.	Future Electronics Deutschland	Zum Pier 71	D-44536 Luene	Germany	Tel: + 49 (231) 975 048 0	Fax: + 49 (231) 975 048 23
Germany	Dist.	Future Electronics Deutschland	Haarbergstrasse 61a	D-99097 Erfurt	Germany	Tel: + 49 (361) 42 087 0	Fax: + 49 (361) 42 087 60
Germany	Dist.	Future Electronics Deutschland	Black & Decker Strasse 17c	D-65510 Idstein	Germany	Tel: + 49 (612) 69 321 0	Fax: + 49 (612) 69 321 55
Germany	Dist.	Future Electronics Deutschland	Fangdieckstrasse 64	22547 Hamburg	Germany	Tel: + 49 (40) 547277 0	Fax: + 49 (40) 547277 77
Germany	Dist.	Future Electronics Deutschland	Talstrasse 11	70825 Komtal-Muenchingen	Germany	Tel: + 49 (711) 830 830	Fax: + 49 (711) 730 7373
Germany	Dist.	SASCO Holz Berlin	Motardstrasse 54/Geb. 22	D-13629 Berlin	Germany	Tel: + 49 (0) 30/34 99 24-0	Fax: + 49 (0) 30/34 99 24-36
Germany	Dist.	SASCO Holz Dortmund	Hildebrandstrasse 11	D-44319 Dortmund	Germany	Tel: + 49 (0) 2 31/91 72 00-0	Fax: + 49 (0) 2 31/91 72 00-9 94
Germany	Dist.	SASCO Holz Frankfurt	Max-Planck-Strasse 1-3	D-63303 Dreieich	Germany	Tel: + 49 (0) 61 03/93 73-0	Fax: + 49 (0) 61 03/93 73-1 65
Germany	Dist.	SASCO Holz Hamburg	Schnackenburgallee 149c	D-22525 Hamburg	Germany	Tel: + 49 (0) 40/52 87 46-0	Fax: + 49 (0) 40/52 87 46-22
Germany	Dist.	SASCO Holz Munich	Wernher-von-Braun-Strasse 9a	D-85640 Putzbrunn	Germany	Tel: + 49 (0) 89/46 11-2 11	Fax: + 49 (0) 89/46 11-2 71
Germany	Dist.	SASCO Holz Nuremberg	O'Brienstrasse 3	D-91126 Schwabach	Germany	Tel: + 49 (0) 91 22/87 69-0	Fax: + 49 (0) 91 22/87 69-51
Germany	Dist.	SASCO Holz Stuttgart North	Hoepfigheimer Strasse 5	D-74321 Bietigheim-Bissingen	Germany	Tel: + 49 (0) 71 42/9 60-0	Fax: + 49 (0) 71 42/9 60-1 00
Germany	Dist.	SASCO Holz Stuttgart South	Hans-Boeckler-Strasse 29	D-73230 Kirchheim unter Teck	Germany	Tel: + 49 (0) 70 21/9 83 90	Fax: + 49 (0) 70 21/8 15 34
Germany	Rep.	Activerep Electronic GmbH	Ruiter Strasse 2	75015 Bretten	Germany	Tel: + 49 7252-537-101	Fax: + 49 7252-537-537
Hong Kong	Dist.	Arrow Asia PAC Ltd.	20/F, Tower 2, Ever Gain Plaza, 88 Container Port Rd.	Kwai City	Hong Kong	Tel: + (852) 2484 2484	Fax: + (852) 2484 2468
Hong Kong	Dist.	Future Electronics	Unit 4607-19, Metroplaza Tower 1, 223 Hing Fong Rd.	Kwai Fong	Hong Kong	Tel: + (852) 2420-6238	Fax: + (852) 2423-0767
Hong Kong	DRep.	RTI Holdings Ltd.	Room 402, Nan Fung Commercial Centre 19 Lam Lok Street, Kowloon Bay	Kowloon	Hong Kong	Tel: + (852) 2795-7421	Fax:
Hong Kong	Rep.	Lestina International Ltd.	14th Floor, Park Tower, 15 Austin Rd., Tsimshatsui	Kowloon	Hong Kong	Tel: + (852) 2735-1736	Fax: + (852) 2730-5260
Hungary	Dist.	Future Electronics	Alkotas ut 53. , MOM Park, Building D, 2nd FL.	Budapest H-1123	Hungary	Tel: + 36 (1) 224 0510	Fax: + 36 (1) 224 0511
Hungary	Dist.	SASCO Holz Budapest	Vaci ut 140	H-1138 Budapest	Hungary	Tel: + 36 (0) 1/28 87 30-0	Fax: + 36 (0) 1/28 87 30-1
India	Rep.	Syratron Marketing Private, Ltd.	203 Copper Arch, 83 Infantry Rd.	Bangalore	India	Tel: + 91-80-25591031	Fax: + 91-80-2559-1056
India	Dist.	Arrow Asia PAC Ltd.	20/F, Tower 2, Ever Gain Plaza, 88 Container Port Rd.	Kwai City	Hong Kong	Tel: + (852) 2484 2484	Fax: + (852) 2484 2468
India	Dist.	Arrow Electronics India Pvt. Ltd.	26, 4th Floor, Akshaya Commercial Complex Victoria Layout	Bangalore 560 047	India	Tel: + 91 (80) 51353800	Fax: + 91 (80) 51127784
India	Dist.	Arrow Electronics India Pvt. Ltd.	II Floor, 5 Pusa Rd.	New Delhi 110 005	India	Tel: + 91 (11) 25784629	Fax: + 91 (11) 25785751
India	Dist.	Arrow Electronics India Pvt. Ltd.	311 & 312, Chintamani Plaza, Andheri Kurla Rd. Andheri East	Mumbai 400 099	India	Tel: + 91 (22) 56925196	Fax: + 91 (22) 56921415
India	Dist.	Arrow Electronics India Pvt. Ltd.	#505, 5th Floor, Mahavir House, 3-6-322 Basheer Bagh	Hyderabad 500 029	India	Tel: + 91 (40) 55774146	Fax: + 91 (40) 55774138
India	Dist.	Future Electronics	T8 & 9, No. 66, GEM Plaza, Infantry Rd.	Bangalore-1 560 001	India	Tel: + 91 (80) 558-7885	Fax: + 91 (80) 559-2995
India	Dist.	Future Electronics	404, Gateway Plaza, Hiranandari Gardens, Powai	Mumbai, Bombay 400 076	India	Tel: + 91 (22) 570-2745	Fax: + 91 (22) 570-2743
India	Dist.	Future Electronics	1308-1310 Ansai Tower, 38 Nehru Place	New Delhi 110 019	India	Tel: + 91 (11) 646-1414	Fax: + 91 (11) 646-1418
India	Dist.	Arrow Asia PAC Ltd.	20/F, Tower 2, Ever Gain Plaza, 88 Container Port Rd.	Kwai City	Hong Kong	Tel: + (852) 2484 2484	Fax: + (852) 2484 2468
Indonesia	Dist.	Arrow Asia PAC Ltd.	20/F, Tower 2, Ever Gain Plaza, 88 Container Port Rd.	Kwai City	Hong Kong	Tel: + (852) 2484 2484	Fax: + (852) 2484 2468
Indonesia	Dist.	Weikeng Technology Pte. Ltd.	11F, 308, Section 1, NeiHu Rd.	Taipei	Taiwan, R.O.C.	Tel: + 886-2-2659-0202	Fax: + 886-2-2658-0959
Ireland	Dist.	Arrow Nordic Components AB	Isafjordgatan 7, Box 67	S-16494 Kista	Sweden	Tel: + 44 1279 441144	Fax: + 44 1279 455777
Ireland	Dist.	Future Electronics Ltd.	26 Merchants Square, Ennis	Co. Clare	Ireland	Tel: + 353 (65) 41 330	Fax: + 353 (65) 40 654
Israel	Rep.	2BePresent Ltd.	52 Smilansky St.	Rishon Le Tzion	Israel	Tel: + 972 (77) 7505017	Fax: + 972 (77) 7505017
Israel	Dist.	Future Electronics	85 Medinat Hayehudim Street, POB 4024	46140 Herzeliya	Israel	Tel: + 972 (9) 970 1414	Fax: + 972 (9) 958 4333
Israel	Dist.	Gitronics Ltd.	18, Hashaham Street, P.O. Box 2628	Petah-Tikva 49125	Israel	Tel: + 972 (3) 927-4738	Fax: + 972 (3) 927-4757
Italy	Dist.	Claitron	Viale Fulvio Testi 280	Milano 20126	Italy	Tel: + 39 (02) 661431	Fax: + 39 (02) 66126253
Italy	Dist.	Future Electronics Srl	Via Fosse Ardeantine 4, 20092 Cinisello	Balsamo Milan	Italy	Tel: + 39 (02) 660 941	Fax: + 39 (02) 660 12843
Italy	Dist.	Future Electronics Srl	Galleria Ronzani 3/9, Casalecchio Di Reno	Bologna 40033	Italy	Tel: + 39 (51) 613 6711	Fax: + 39 (51) 613 0724
Italy	Dist.	Future Electronics Srl	Via Domenico Turazza 30	Padova 31528	Italy	Tel: + 39 (49) 899 20111	Fax: + 39 (49) 807 0582
Italy	Rep.	Aertronica S.r.l.	Viale Misurata 18, 20146 Milano	Monza (MI)	Italy	Tel: + 39 (039) 230 2240	Fax: + 39 (039) 230 2226
Japan	Dist.	Future Electronics-Osaka	Kawaramachi As Bldg., No. 5, 2-6-1 Kawaramachi Chuo-Ku	Oska 541-0048	Japan	Tel: + 81 (6) 6221-2201	Fax: + 81 (6) 6221-2203
Japan	Dist.	Future Electronics-Tokyo	Yokohama Landmark Tower 24F 2-2-1 Minatomirai Nishi-ku, Yokohama City	Kanagawa 220-8124	Japan	Tel: + 81 (45) 224-2155	Fax: + 81 (45) 224-2156
Japan	Dist.	Ryosan Company Ltd.	2-3-5 Higashikanda, Chiyoda-Ku	Tokyo 101-0031	Japan	Tel: + 81 (3) 862-2635	Fax: + 81 (3) 862-2636
Japan	Dist.	Uni-Electronics, Inc.	P.O. Box 68, Shinjuku Sumitomo Bldg., 18L 6-1, 2-Chome, Nishi Shinjuku, Shinjuku	Tokyo 163-0218	Japan	Tel: + 81 (3) 3347-8878	Fax: + 81 (3) 3347-8808
Japan	Rep.	Hakuto Co. Ltd.	Nagoya-Misono Bldg., 10-21, Sakae 1-chome, Naka-ku, Nagoya	Aichi 460-0008	Japan	Tel: + 81 (52) 204-8910	Fax: + 81 (52) 204-8935
Japan	Rep.	Hakuto Co. Ltd.	292-4, Asouda-machi, Matsuyama	Ehime 790	Japan	Tel: + 81 (89) 931-8910	Fax: + 81 (89) 945-6218
Japan	Rep.	Hakuto Co. Ltd.	Felix Iwai Bldg., 2-3, Hakataekiminami, 3-chome Hakata-ku	Fukoka 812	Japan	Tel: + 81 (92) 431-5330	Fax: + 81 (92) 431-5265
Japan	Rep.	Hakuto Co. Ltd.	3-18, Miyanomae, 2-chome, Itami	Hoygo 664	Japan	Tel: + 81 (72) 784-8910	Fax: + 81 (72) 784-7860
Japan	Rep.	Hakuto Co. Ltd.	1-13, Shinjuku, 1-chome, Shinjuku-ku	Tokyo, 160-8910	Japan	Tel: + 81 (3) 3355-7629	Fax: + 81 (3) 3355-7648
Korea	Rep.	Brainworld Co. Ltd.	2F, KT Gongneung Center, 375-4, Gongneung 3-dong, Nowon-gu	Seoul 139-243	Korea	Tel: + 82 (2) 974-2647	Fax: + 82 (2) 974-2648
Korea	Rep.	GenCore Technology Co., Ltd.	5FL, Samho Bldg. 275-6, Yangjae-dong, Seocho-ku	Seoul 137-941	Korea	Tel: + 82 (2) 3463-0040	Fax: + 82 (2) 3463-4935

Korea	DRep.	Progate Technology Ltd.	4FL, 472-247 Baekhyun-Dong, Bundang-Ku Seongnam City,	Kyungki-Do 463-420	South Korea	Tel: + 82 (31) 707-3274	Fax: + 82 (31) 709-3272
Latvia	Dist.	Arrow Latvia	Unijas 47	Riga, LV-1039	Latvia	Tel: + 371 7311490	
Latvia	Dist.	Arrow Nordic Components AB	Isafjordgatan 7, Box 67	S-16494 Kista	Sweden	Tel: + 44 1279 441144	Fax: + 44 1279 455777
Lithuania	Dist.	Arrow Lithuania	Savanoriu pr. 363A-306	Kaunas, LT-49425	Lithuania	Tel: + 370-37-759015	Fax: + 44 1279 455777
Lithuania	Dist.	Future Electronics	Jurbarko g. 2-302	Kaunas, 47183	Lithuania	Tel: + 370 37 408 482	
Malaysia	Dist.	Arrow Asia PAC Ltd.	20/F, Tower 2, Ever Gain Plaza, 88 Container Port Rd.	Kwai City	Hong Kong	Tel: + (852) 2484 2484	Fax: + (852) 2484 2468
Malaysia	Dist.	Future Electronics-Kuala Lumpur	306, 3rd Floor, Block A, Kelana Centre Point No. 3, Jalan SS7/19 Selangor	Petaling Jaya 47301	Malaysia	Tel: + 60 (3) 703-7133	Fax: + 60 (3) 706-3873
Malaysia	Dist.	Future Electronics-Penang	51-7-A1, Menara Bhi Bank, 51 Jalan Sultan Ahmad Shah	Penang	Malaysia	Tel: + 60 (4) 227-7213	Fax: + 60 (4) 227-7263
Malaysia	Dist.	JAG Components Sdn Bhd	17-2-27 Bayan Point, Medan Kampung Relau 11900 Bayan Lepas,	Penang	Malaysia	Tel: + 60 (4) 6469488	Fax: + 60 (4) 6467322
Malaysia	Dist.	Weikeng Technology Pte. Ltd.	11F, 308, Section 1, NeiHu Rd.	Taipei	Taiwan, R.O.C.	Tel: + 886-2-2659-0202	Fax: + 886-2-2658-0959
Mexico	Dist.	Future Electronics-Mexico	4° Piso, Suite 6, Chimalhuacán 3569, Ciudad del Sol	45050 Zapopan, Jalisco	Mexico	Tel: + 52 (33) 3122-00-43	Fax: + 52 (3) 122-10-66
Mexico	Rep.	BP Electronica S.A. DEC V	689 West Renner Rd., Suite 101	Richardson, TX 75080	USA	Tel: + (972) 234-8438	Fax: + (972) 437-0837
Netherlands	Dist.	Future Electronics	Tinstraat No. 3 Breda	4823AA Holland	Netherlands	Tel: + 31 76 5444 888	Fax: + 31 76 5444 880
Netherlands	Dist.	SASCO Holz Utrecht	Elzenkade 3	NL-3992 AD Houten	Netherlands	Tel: + 31 (0) 30/63 91 21-5	Fax: + 31 (0) 30/63 91 21-6
Netherlands	Rep.	Nijkerk Electronics B.V.	Joop Geesinkweg No. 140	NL-1096 Amsterdam	Netherlands	Tel: + 31 (0) 20 504 14 24	Fax: + 31 (0) 20 642 39 48
New Zealand	Dist.	Arrow Asia PAC Ltd.	20/F, Tower 2, Ever Gain Plaza, 88 Container Port Rd.	Kwai City	Hong Kong	Tel: + (852) 2484 2484	Fax: + (852) 2484 2468
New Zealand	Dist.	Braemac Pty. Ltd.	1/59-61 Burrow Rd.	Alexandria, Sydney 2015	New Zealand	Tel: 61 (2) 9550-6600	Fax: 61 (2) 9550-6377
New Zealand	Dist.	Future Electronics	Unit 2, 7 Wordsworth Street, P.O. Box 7500	Christchurch 8002	New Zealand	Tel: 64 (3) 9823256	Fax: 64 (3) 9823258
North America	Die Dist.	Chip Supply, Inc.	7725 Orange Blossom Trail	Orlando, FL 32810-2696	USA	Tel: + 1 407-298-7100	Fax: + 1-407-290-0164
Norway	Dist.	Arrow Norway	Trygve Nilsens Vei 8, box 92	N-1001 Oslo	Norway	Tel: + 47 52763000	
Norway	Dist.	Arrow Norway	Åmsosen	N-5578 Nedre Vats	Norway	Tel: + 47 52763000	
Norway	Dist.	Arrow Nordic Components AB	Isafjordgatan 7, Box 67	S-16494 Kista	Sweden	Tel: + 44 1279 441144	Fax: + 44 1279 455777
Norway	Dist.	Future Electronics A/S	23 Tevlingveien	N-1081 Oslo	Norway	Tel: + 47 (22) 90 5800	Fax: + 47 (22) 90 5790
Philippines	Dist.	Arrow Asia PAC Ltd.	20/F, Tower 2, Ever Gain Plaza, 88 Container Port Rd.	Kwai City	Hong Kong	Tel: + (852) 2484 2484	Fax: + (852) 2484 2468
Philippines	Dist.	Future Electronics-Philippines	Suite 203, Richville Corporate Center, 1314 Commerce Ave., Madrigal Business Park Ayala	Alabang, Muntinlupa City	Philippines	Tel: 63 (2) 807-5092/3512	Fax: 63 (2) 807-5187
Philippines	Dist.	Weikeng Technology Pte. Ltd.	11F, 308, Section 1, NeiHu Rd.	Taipei	Taiwan, R.O.C.	Tel: + 886-2-2659-0202	Fax: + 886-2-2658-0959
Poland	Dist.	Future Electronics	Polska, U1 Panienska 9	Warsaw 03-704	Poland	Tel: + 48 (22) 618 9202	Fax: + 48 (22) 618 8050
Poland	Dist.	SASCO Holz Warsaw	ul. Sobieskiego 110/28	PL-00 764 Warszawa	Poland	Tel: + 48 (0) 22/5 58 82 82	Fax: + 48 (0) 22/5 58 82 83
Portugal	Dist.	Arrow-Iberia	C/Albasanz, 75	28037 Madrid	Spain	Tel: + 34 (91) 304 3040	Fax: + 34 (91) 304 7559
Puerto Rico	Die Dist.	ES Components, Inc.	108 Pratts Junction Rd.	Sterling, FL 01564	USA	Tel: + 1 978-422-7641	Fax: + 1 978-422-0011
Russia	Dist.	Eltech, Ltd.	Pobedy Str., 11	Saint Petersburg 196070	Russia	Tel: + 7 812-327-9090	Fax: + 7 812-373-9890
Russia	Dist.	SASCO Holz Moscow	Konushkovskaya 28, Office 4	R-123242 Moscow	Russia	Tel: + 7 49 59 26 55 97	Fax: + 7 49 59 26 55 98
Singapore	Dist.	Arrow Asia PAC Ltd.	20/F, Tower 2, Ever Gain Plaza, 88 Container Port Rd.	Kwai City	Hong Kong	Tel: + (852) 2484 2484	Fax: + (852) 2484 2468
Singapore	Dist.	Hynetic Electronics	78/1, 3rd Cross, Gavipuram Extension	Bangalore 560 019	India	Tel: + 91 (80) 652-0852	Fax: + 91 (80) 652-4073
Singapore	Dist.	JAG Components Pte. Ltd.	57 Ubi Ave. 1, #06-12, UBI Center	Singapore	408936	Tel: + (65) 6749 5663	Fax: + (65) 6749 5662
Singapore	Dist.	Future Electronics Ltd.	396 Alexandra Rd., #15-02 BP Tower	Singapore	119954	Tel: + (65) 6479 1300	Fax: + (65) 6479 3151
Singapore	Dist.	Weikeng Technology Pte. Ltd.	11F, 308, Section 1, NeiHu Rd.	Taipei	Taiwan, R.O.C.	Tel: + 886-2-2659-0202	Fax: + 886-2-2658-0959
South Africa	Rep.	MB Silicon Systems (Pty.) Ltd.	P.O. Box 2292	Johannesburg	South Africa	Tel: + 27 (11) 728 4757	Fax: + 27 (11) 728 4979
South America	Rep.	BP & M Ltd.	689 West Renner Rd., Suite 101	Richardson, TX 75070	USA	Tel: + 1 972-234-8438	Fax: + 1 972-437-0897
South Korea	Dist.	Arrow Asia PAC Ltd.	20/F, Tower 2, Ever Gain Plaza, 88 Container Port Rd.	Kwai City	Hong Kong	Tel: + (852) 2484 2484	Fax: + (852) 2484 2468
Spain	Dist.	Arrow-Iberia	C/Albasanz, 75,	28037 Madrid	Spain	Tel: + 34 (91) 304 3040	Fax: + 34 (91) 304 7559
Spain	Dist.	Future Electronics	Avenida del Parenon 10	Madrid 28042	Spain	Tel: + 34 (91) 721 4270	Fax: + 34 (91) 721 1043
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Sweden	Dist.	Arrow Nordic Components	F.O. Petersons gata 30	S-421 31 Västra Frölunda	Sweden	Tel: + 46 31 7219800	
Sweden	Dist.	Arrow Nordic Components	Norrbölegatan 66	S - 931 27 Skellefteå	Sweden	Tel: + 46 910 715 360	
Sweden	Dist.	Future Electronics AB	Kabelgatan 9	434 37 Kungsbacka	Sweden	Tel: + 46 300 30300	Fax: + 46 300 30320
Sweden	Dist.	Future Electronics AB	Verkstads gatan 4	233 51 Svedala	Sweden	Tel: + 46 (40) 406990	Fax: + 46 (40) 406999
Sweden	Dist.	Future Electronics AB	Gustav III Blvd. 46	169 27 Solna	Sweden	Tel: + 46 (8) 624 8800	Fax: + 46 (8) 624 8890
Switzerland	Dist.	SASCO Holz Yverdon	En Chamard 35, Case Postal	CH-1440 Montagny p/Yverdon	Switzerland	Tel: + 41 (0) 24/4 47 01 41	Fax: + 41 (0) 24/4 47 01 40
Switzerland	Dist.	SASCO Holz Zurich	Riedmatt 9	CH-8153 Ruemlang	Switzerland	Tel: + 41 (0) 44/81 76 28-0	Fax: + 41 (0) 44/81 76 28-1
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Taiwan, R.O.C.	Dist.	Future Electronics-Hsin Chu	18F-2, No. 295, Sec. 2, Kuang-Fu Rd.	Hsin Chu City	Taiwan, R.O.C.	Tel: + 886 (3) 574-4646	Fax: + 886 (3) 574-4670
Taiwan, R.O.C.	Dist.	Future Electronics-Taipei	8F, No. 172, Sec. 4, Chen The Rd., Shih-Lin,	Taipei	Taiwan, R.O.C.	Tel: + 886 (2) 8861-5288	Fax: + 886 (2) 8861-4961
Taiwan, R.O.C.	Dist.	Galaxy Far East Corp.	1F, No. 15 Alley 20 Lane, 544, Sec. 1, Kuang Fu Rd.	Hsinchu	Taiwan, R.O.C.	Tel: + 886 (3) 578-6766	Fax: + 886 (3) 577-4795
Taiwan, R.O.C.	Dist.	Galaxy Far East Corp.	7F-A3, 29 Haiapien Road	Kaohsiung	Taiwan, R.O.C.	Tel: + 886 (7) 338-0559	Fax: + 886 (7) 338-1343
Taiwan, R.O.C.	Dist.	Galaxy Far East Corp.	14F, 207-5, Sec. 3, Pei-Hsin Rd., Hsintien	Taipei	Taiwan, R.O.C.	Tel: + 886 (2) 8913-2200	Fax: + 886 (2) 8913-2277
Taiwan, R.O.C.	Dist.	Techmosa International Corp.	7F, No. 136, Lide St., Chung Ho City,	Taipei Hsien	Taiwan, R.O.C.	Tel: + 886 (2) 8226-7698	Fax: + 886 (2) 2225-8960
Taiwan, R.O.C.	Dist.	Weikeng Technology Pte. Ltd.	11F, 308, Section 1, NeiHu Rd.	Taipei	Taiwan, R.O.C.	Tel: + 886 (2) 2659-0202	Fax: + 886 (2) 2658-0959
Thailand	Dist.	Arrow Asia PAC Ltd.	20/F, Tower 2, Ever Gain Plaza, 88 Container Port Rd.	Kwai City	Hong Kong	Tel: + (852) 2484 2484	Fax: + (852) 2484 2468
Thailand	Dist.	Future Electronics-Thailand	947 Thosapol Land, 3 Bldg., Room C2 21st Floor, Banga-Trad Rd. K.M.3	Bangna, Bangkok	Thailand	Tel: + 662-3618400	Fax: + 662-3618433
Thailand	Dist.	JAG Components Thailand Co. Ltd.	700/70 Regent Srinakaran Tower Tower Bldg. A 4th Floor Soi Praji Srinakaran Rd. Suanluang	Suanluang Dist., Bangkok 10250	Thailand	Tel: + 662-720-4302	Fax: + 662-722-8930
Thailand	Dist.	Weikeng Technology Pte. Ltd.	11F, 308, Section 1, NeiHu Rd.	Taipei	Taiwan, R.O.C.	Tel: + 886-2-2659-0202	Fax: + 886-2-2658-0959

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Turkey	Dist.	Future Electronics	Turkiye Irtibat Brosu, Perdemsac Plaza Bayar Caddesi Gulbahar Sok No 17/144	Kozyatagi TR 81090 Istanbul	Turkey	Tel: + 90 (216) 445 8700	Fax: + 90 (216) 445 8704
UK	Dist.	Arrow UK	Edinburgh Way, Harlow	Essex CM20 2DF	UK	Tel: + 44 1279 441144	Fax: + 44 1279 455466
UK	Dist.	Future Electronics Ltd.	Future House, Poyle Road, Colnbrook	Berkshire SL3 0E2	UK	Tel: + 44 (1753) 763000	Fax: + 44 (1753) 689100
Ukraine	Dist.	SASCO Holz Kiev	Glubochitskaya Street 40	UA-04050 Kiev	Ukraine	Tel: + 38 06 72 31 09 50	
Vietnam	Dist.	Arrow Asia PAC Ltd.	20/F, Tower 2, Ever Gain Plaza, 88 Container Port Rd.	Kwai City	Hong Kong	Tel: + (852) 2484 2484	Fax: + (852) 2484 2468



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