

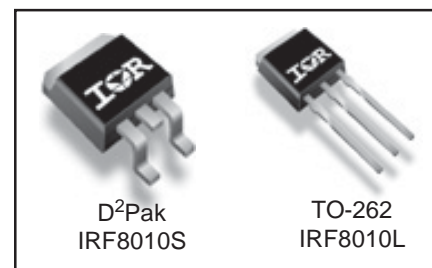
Applications

- High frequency DC-DC converters
- UPS and Motor Control
- Lead-Free

V_{DSS}	R_{DS(on)} max	I_D
100V	15mΩ	80A[Ⓓ]

Benefits

- Low Gate-to-Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective C_{OSS} to Simplify Design, (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current
- Typical R_{DS(on)} = 12mΩ



Absolute Maximum Ratings

	Parameter	Max.	Units
I _D @ T _C = 25°C	Continuous Drain Current, V _{GS} @ 10V	80 [Ⓓ]	A
I _D @ T _C = 100°C	Continuous Drain Current, V _{GS} @ 10V	57	
I _{DM}	Pulsed Drain Current [Ⓔ]	320	
P _D @ T _C = 25°C	Power Dissipation	260	W
	Linear Derating Factor	1.8	W/°C
V _{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery dv/dt [Ⓢ]	16	V/ns
T _J	Operating Junction and	-55 to + 175	°C
T _{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case	—	0.57	°C/W
R _{θJC}	Junction-to-Case (end of life) [Ⓢ]	—	0.80	
R _{θCS}	Case-to-Sink, Flat, Greased Surface	0.50	—	
R _{θJA}	Junction-to-Ambient (PCB Mount, steady state) [Ⓢ]	—	40	

Notes [Ⓔ] through [Ⓢ] are on page 8

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Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	100	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.11	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	12	15	mΩ	V _{GS} = 10V, I _D = 45A ④
V _{GS(th)}	Gate Threshold Voltage	2.0	—	4.0	V	V _{DS} = V _{GS} , I _D = 250μA
I _{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	V _{DS} = 100V, V _{GS} = 0V
		—	—	250		V _{DS} = 100V, V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	V _{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-200		V _{GS} = -20V

Dynamic @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
g _{fs}	Forward Transconductance	82	—	—	V	V _{DS} = 25V, I _D = 45A
Q _g	Total Gate Charge	—	81	120	nC	I _D = 80A
Q _{gs}	Gate-to-Source Charge	—	22	—		V _{DS} = 80V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	26	—		V _{GS} = 10V ④
t _{d(on)}	Turn-On Delay Time	—	15	—	ns	V _{DD} = 50V
t _r	Rise Time	—	130	—		I _D = 80A
t _{d(off)}	Turn-Off Delay Time	—	61	—		R _G = 39Ω
t _f	Fall Time	—	120	—		V _{GS} = 10V ④
C _{iss}	Input Capacitance	—	3830	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	480	—		V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance	—	59	—		f = 1.0MHz
C _{oss}	Output Capacitance	—	3830	—		V _{GS} = 0V, V _{DS} = 1.0V, f = 1.0MHz
C _{oss}	Output Capacitance	—	280	—		V _{GS} = 0V, V _{DS} = 80V, f = 1.0MHz
C _{oss eff.}	Effective Output Capacitance	—	530	—		V _{GS} = 0V, V _{DS} = 0V to 80V ③

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy ②⑦	—	310	mJ
I _{AR}	Avalanche Current ①	—	45	A
E _{AR}	Repetitive Avalanche Energy ①	—	26	mJ

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	80	A	MOSFET symbol showing the integral reverse p-n junction diode.
I _{SM}	Pulsed Source Current (Body Diode) ①⑦	—	—	320		
V _{SD}	Diode Forward Voltage	—	—	1.3	V	T _J = 25°C, I _S = 80A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	99	150	ns	T _J = 150°C, I _F = 80A, V _{DD} = 50V
Q _{rr}	Reverse Recovery Charge	—	460	700	nC	di/dt = 100A/μs ④
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

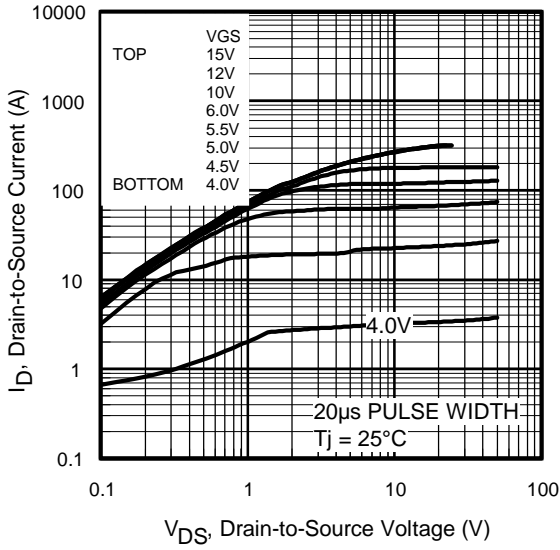


Fig 1. Typical Output Characteristics

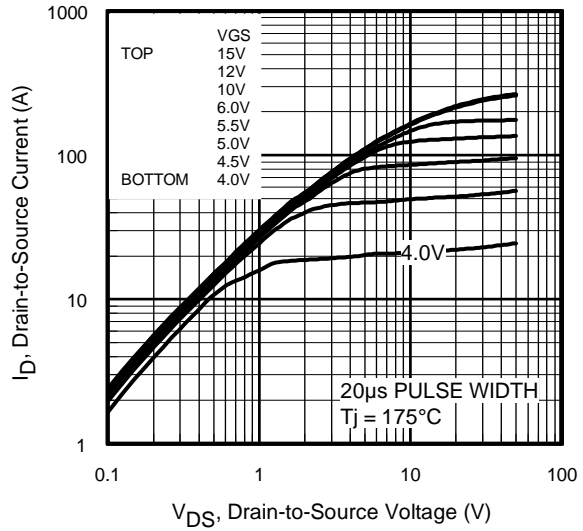


Fig 2. Typical Output Characteristics

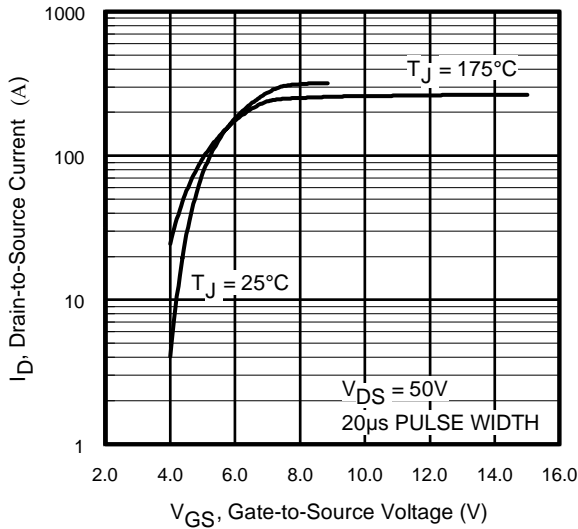


Fig 3. Typical Transfer Characteristics

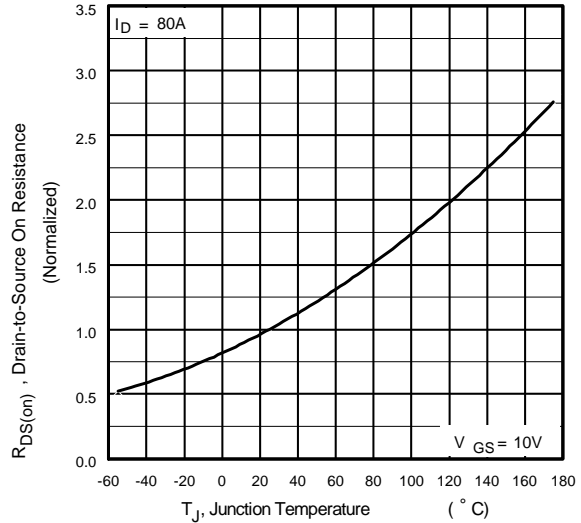


Fig 4. Normalized On-Resistance Vs. Temperature

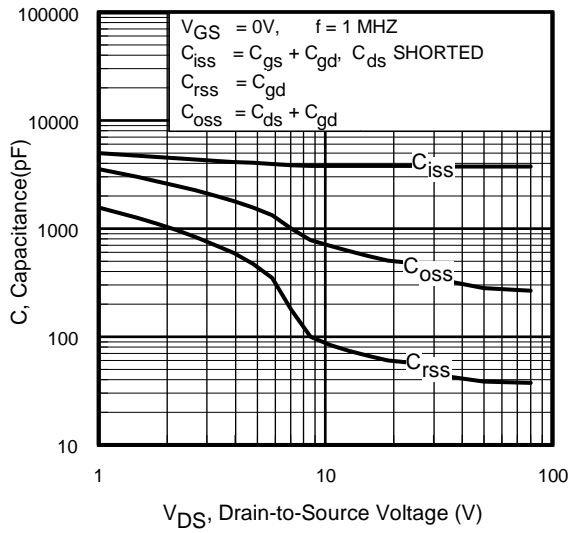


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

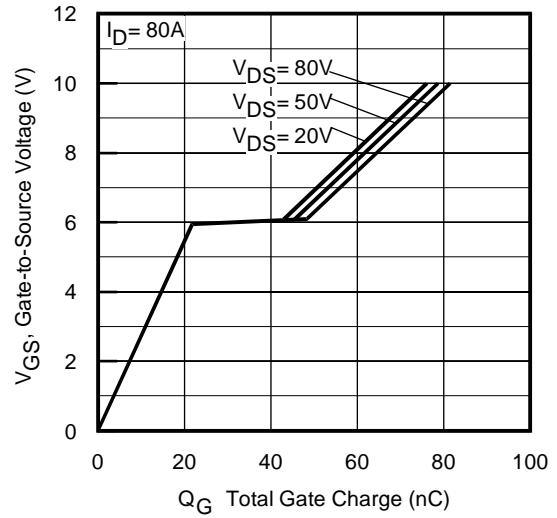


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

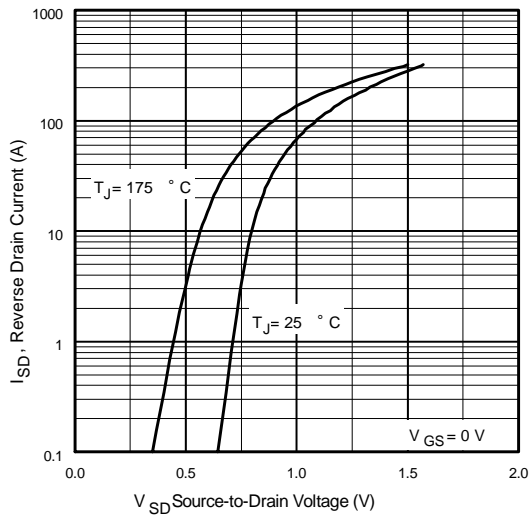


Fig 7. Typical Source-Drain Diode Forward Voltage

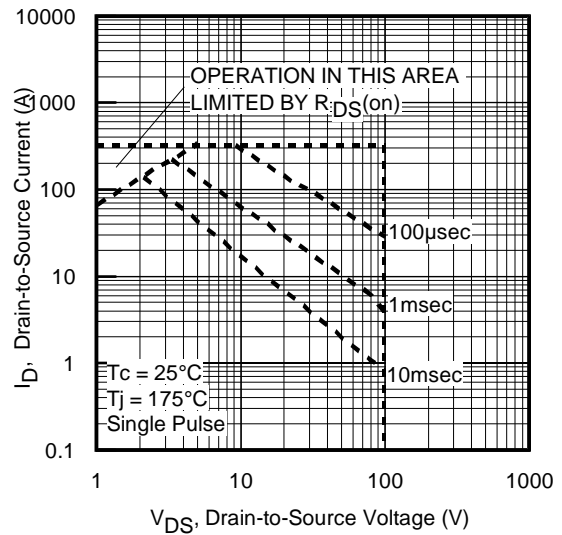


Fig 8. Maximum Safe Operating Area

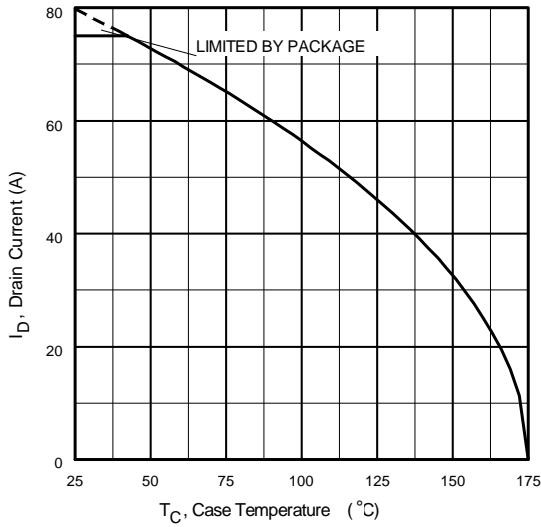


Fig 9. Maximum Drain Current Vs. Case Temperature

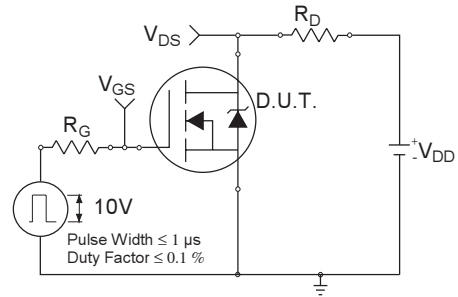


Fig 10a. Switching Time Test Circuit

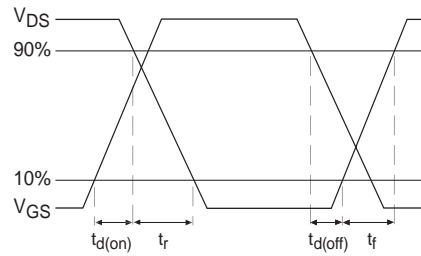


Fig 10b. Switching Time Waveforms

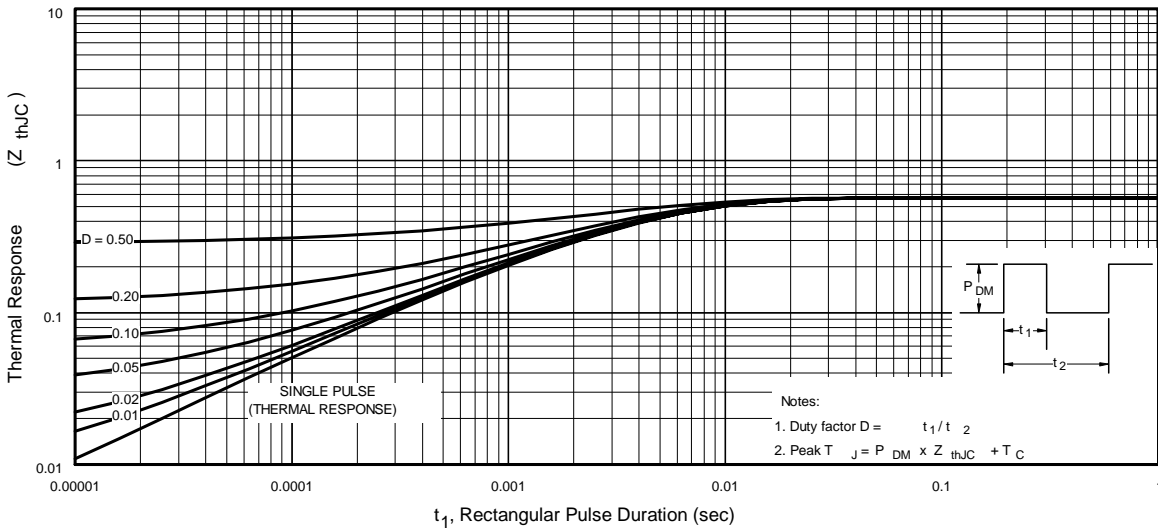


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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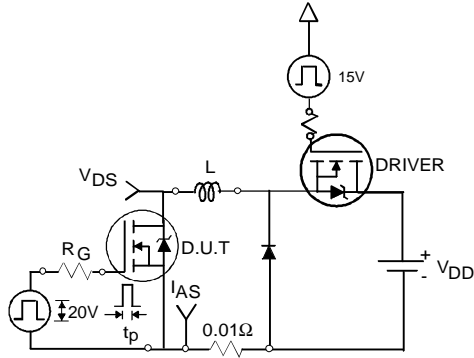


Fig 12a. Unclamped Inductive Test Circuit

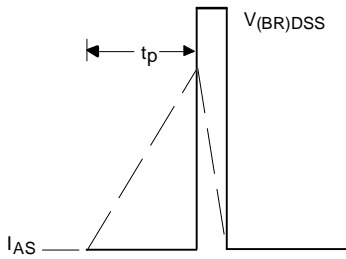


Fig 12b. Unclamped Inductive Waveforms

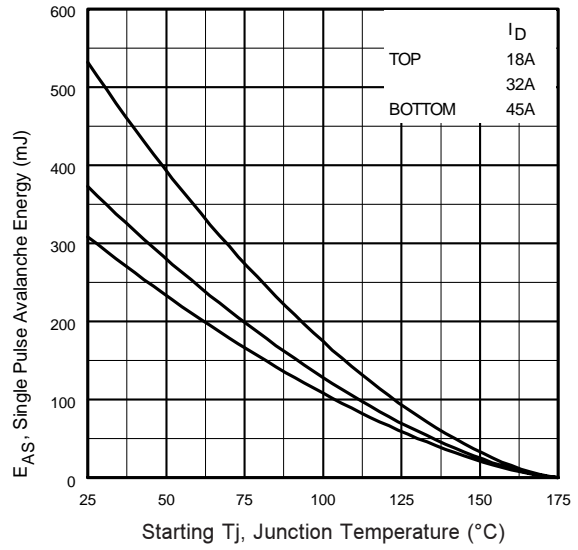


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

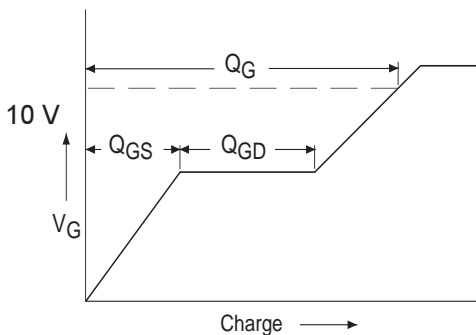


Fig 13a. Basic Gate Charge Waveform

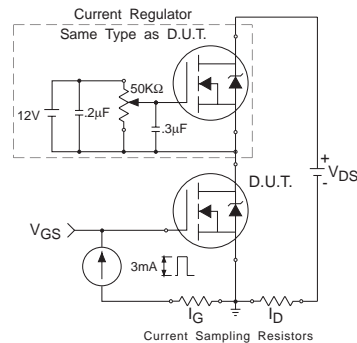


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



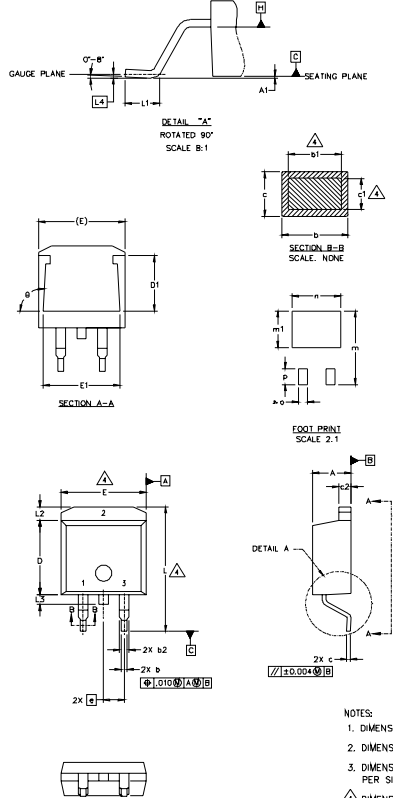
* $V_{GS} = 5V$ for Logic Level Devices

Fig 14. For N-Channel HEXFET® Power MOSFETs

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D²Pak Package Outline

Dimensions are shown in millimeters (inches)



SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1		0.127		.005	
b	0.51	0.99	.020	.039	4
b1	0.51	0.89	.020	.035	
b2	1.14	1.40	.045	.055	4
c	0.43	0.63	.017	.025	
c1	0.38	0.74	.015	.029	4
c2	1.14	1.40	.045	.055	
D	8.51	9.65	.335	.380	3
D1	5.33		.210		3
E	9.65	10.67	.380	.420	
E1	6.22		.245		3
e	2.54 BSC		.100 BSC		
L	14.61	15.88	.575	.625	
L1	1.78	2.79	.070	.110	
L2	1.27	1.65	.050	.065	
L3	1.27	1.78	.050	.070	
L4	0.25 BSC		.010 BSC		
m	17.78		.700		
m1	8.89		.350		
n	11.43		.450		
o	2.08		.082		
p	3.81		.150		
theta	90°	93°	90°	93°	

LEAD ASSIGNMENTS

HEXFET	IGBTs, CoPACK	DIODES
1 - GATE	1 - GATE	1 - ANODE *
2 - DRAIN	2 - COLLECTOR	2 - CATHODE
3 - SOURCE	3 - EMITTER	3 - ANODE

* PART DEPENDENT.

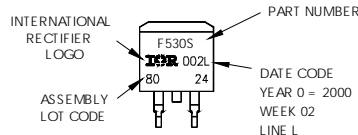
NOTES:

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
- DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
- DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
- DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
- CONTROLLING DIMENSION: INCH.

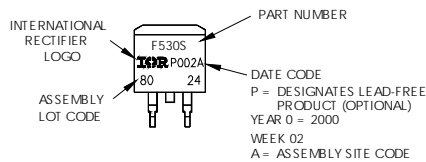
D²Pak Part Marking Information

EXAMPLE: THIS IS AN IRF530S WITH
LOT CODE 8024
ASSEMBLED ON WW 02, 2000
IN THE ASSEMBLY LINE "L"

Note: "P" in assembly line
position indicates "Lead-Free"

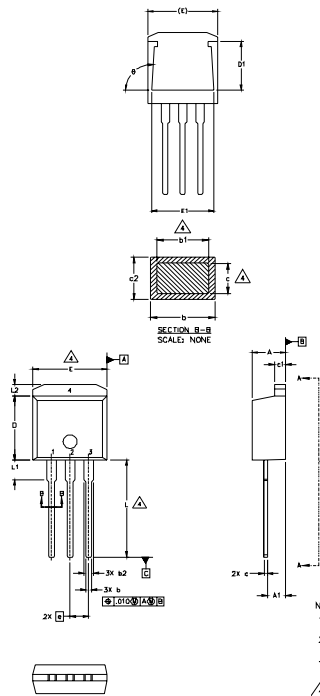


OR



TO-262 Package Outline

Dimensions are shown in millimeters (inches)



SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	2.03	2.92	.080	.115	
b	0.51	0.99	.020	.039	4
b1	0.51	0.89	.020	.035	
b2	1.14	1.40	.045	.055	4
c	0.38	0.63	.015	.025	
c1	1.14	1.40	.045	.055	
c2	0.43	.063	.017	.029	3
D	8.51	9.65	.335	.380	
D1	5.33		.210		3
E	9.65	10.67	.380	.420	
E1	6.22		.245		
e	2.54 BSC		.100 BSC		
L	13.46	14.09	.530	.555	
L1	3.56	3.71	.140	.146	
L2		1.65		.065	

LEAD ASSIGNMENTS

HEXFET

- 1.- GATE
- 2.- DRAIN
- 3.- SOURCE
- 4.- DRAIN

IGBT

- 1 - GATE
- 2 - COLLECTOR
- 3 - EMITTER

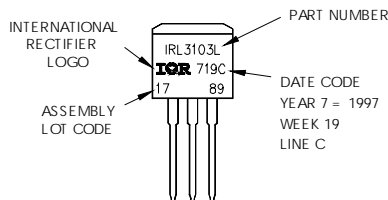
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES]
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
4. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
5. CONTROLLING DIMENSION: INCH.

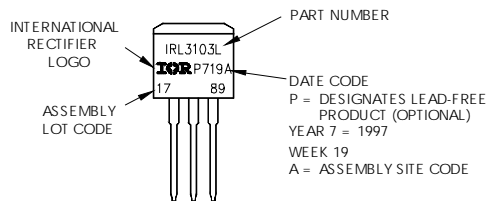
TO-262 Part Marking Information

EXAMPLE: THIS IS AN IRL3103L
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"

Note: "P" in assembly line position indicates "Lead-Free"



OR

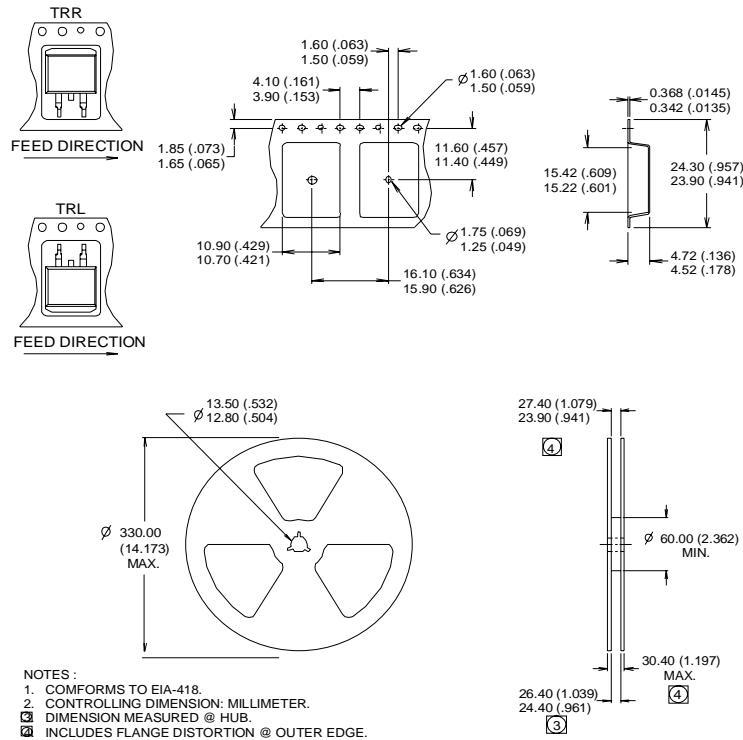


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D²Pak Tape & Reel Information

Dimensions are shown in millimeters (inches)



Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 0.31\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 45\text{A}$.
- ③ $I_{SD} \leq 45\text{A}$, $di/dt \leq 110\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$.
- ④ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.
- ⑤ $R_{th(jc)}$ (end of life) is the maximum measured value after 1000 temperature cycles from -55 to 150°C and is accounted for by the physical wearout of the die attach medium in worse case PCB mounting condition of material (solder/substrate), process and re-flow temperature.
- ⑥ C_{oss} eff. is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS} .
- ⑦ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.
- ⑧ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.

Data and specifications subject to change without notice.
This product has been designed and qualified for the Industrial market.
Qualification Standards can be found on IR's Web site.

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TAC Fax: (310) 252-7903

Visit us at www.irf.com for sales contact information.06/04

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Note: For the most current drawings please refer to the IR website at:
<http://www.irf.com/package/>