

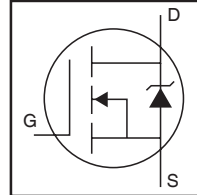
Applications

- High Efficiency Synchronous Rectification in SMPS
- Uninterruptible Power Supply
- High Speed Power Switching
- Hard Switched and High Frequency Circuits

Benefits

- Improved Gate, Avalanche and Dynamic dV/dt Ruggedness
- Fully Characterized Capacitance and Avalanche SOA
- Enhanced body diode dV/dt and dI/dt Capability

HEXFET® Power MOSFET



V_{DSS}		100V
R_{DS(on)}	typ.	8.0mΩ
	max.	10mΩ
I_D		96A



Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
I _D @ T _C = 25°C	Continuous Drain Current, V _{GS} @ 10V	96①	A
I _D @ T _C = 100°C	Continuous Drain Current, V _{GS} @ 10V	68①	
I _{DM}	Pulsed Drain Current ②	380	
P _D @ T _C = 25°C	Maximum Power Dissipation	250	W
	Linear Derating Factor	1.6	W/°C
V _{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery ④	19	V/ns
T _J T _{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	
	Mounting torque, 6-32 or M3 screw	10lb·in (1.1N·m)	

Avalanche Characteristics

E _{AS} (Thermally limited)	Single Pulse Avalanche Energy ③	220	mJ
I _{AR}	Avalanche Current ①	See Fig. 14, 15, 16a, 16b	A
E _{AR}	Repetitive Avalanche Energy ⑤		mJ

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case ⑥	—	0.61	°C/W
R _{θCS}	Case-to-Sink, Flat Greased Surface, TO-220	0.50	—	
R _{θJA}	Junction-to-Ambient, TO-220 ⑦	—	62	
R _{θJA}	Junction-to-Ambient (PCB Mount), D²Pak ⑧⑨	—	40	

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

Symbol	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	—	0.094	—	V/°C	Reference to 25°C, I _D = 1mA ^②
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	8.0	10	mΩ	V _{GS} = 10V, I _D = 58A ^③
V _{GS(th)}	Gate Threshold Voltage	2.0	—	4.0	V	V _{DS} = V _{GS} , I _D = 150μA
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
R _G	Gate Input Resistance	—	1.5	—	Ω	f = 1MHz, open drain

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g _{fs}	Forward Transconductance	120	—	—	S	V _{DS} = 50V, I _D = 58A
Q _g	Total Gate Charge	—	120	180	nC	I _D = 58A
Q _{gs}	Gate-to-Source Charge	—	31	—		V _{DS} = 80V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	44	—		V _{GS} = 10V ^④
t _{d(on)}	Turn-On Delay Time	—	24	—	ns	V _{DD} = 65V
t _r	Rise Time	—	80	—		I _D = 58A
t _{d(off)}	Turn-Off Delay Time	—	55	—		R _G = 4.1Ω
t _f	Fall Time	—	50	—		V _{GS} = 10V ^④
C _{iss}	Input Capacitance	—	5150	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	360	—		V _{DS} = 50V
C _{rss}	Reverse Transfer Capacitance	—	190	—		f = 1.0MHz
C _{oss} eff. (ER)	Effective Output Capacitance (Energy Related)	—	420	—		V _{GS} = 0V, V _{DS} = 0V to 80V ^⑤ , See Fig. 11
C _{oss} eff. (TR)	Effective Output Capacitance (Time Related) ^⑥	—	500	—		V _{GS} = 0V, V _{DS} = 0V to 80V ^⑥ , See Fig. 5

Diode Characteristics

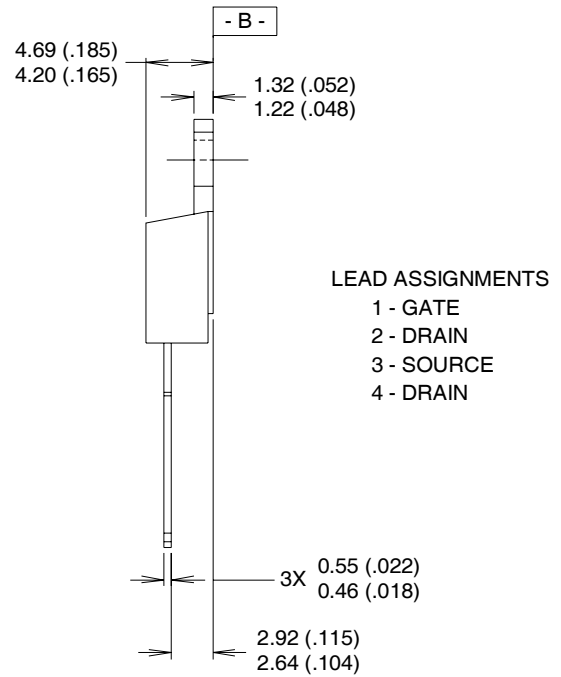
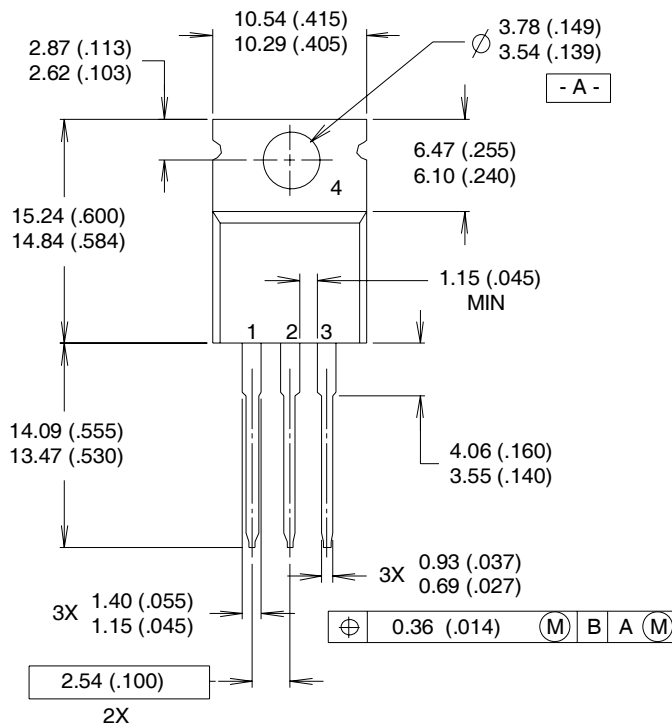
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	96 ^①	A	MOSFET symbol showing the integral reverse p-n junction diode.
I _{SM}	Pulsed Source Current (Body Diode) ^②	—	—	380	A	
V _{SD}	Diode Forward Voltage	—	—	1.3	V	T _J = 25°C, I _S = 58A, V _{GS} = 0V ^④
t _{rr}	Reverse Recovery Time	—	38	56	ns	T _J = 25°C V _R = 85V,
		—	51	77		T _J = 125°C I _F = 58A
Q _{rr}	Reverse Recovery Charge	—	61	92	nC	T _J = 25°C di/dt = 100A/μs ^⑤
		—	110	170		T _J = 125°C
I _{RRM}	Reverse Recovery Current	—	2.8	—	A	T _J = 25°C
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

- ① Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ Limited by T_{Jmax}, starting T_J = 25°C, L = 0.14mH
R_G = 25Ω, I_{AS} = 58A, V_{GS} = 10V. Part not recommended for use above this value.
- ④ I_{SD} ≤ 58A, di/dt ≤ 650A/μs, V_{DD} ≤ V_{(BR)DSS}, T_J ≤ 175°C.
- ⑤ Pulse width ≤ 400μs; duty cycle ≤ 2%.
- ⑥ C_{oss} eff. (TR) 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 C_{oss} eff. (ER) is a fixed capacitance that gives the same energy as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}.
- 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.
- ⑨ R_θ is measured at T_J approximately 90°C.

TO-220AB Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

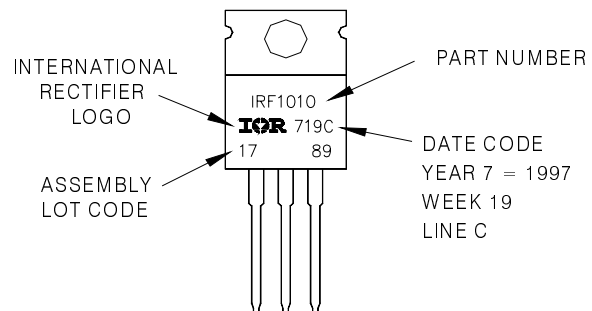
- 1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
- 2 CONTROLLING DIMENSION : INCH

- 3 OUTLINE CONFORMS TO JEDEC OUTLINE TO-220AB.
- 4 HEATSINK & LEAD MEASUREMENTS DO NOT INCLUDE BURRS.

TO-220AB Part Marking Information

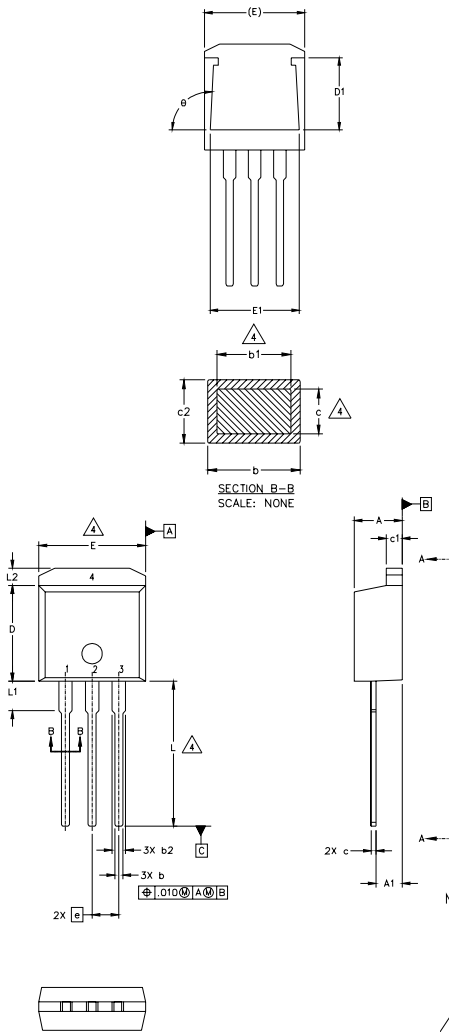
EXAMPLE: THIS IS AN IRF1010
 LOT CODE 1789
 ASSEMBLED ON WW 19, 1997
 IN THE ASSEMBLY LINE "C"

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



TO-220AB packages are not recommended for Surface Mount Application.

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	4	
A1	2.03	2.92	.080	.115		
b	0.51	0.99	.020	.039		
b1	0.51	0.89	.020	.035		
b2	1.14	1.40	.045	.055		
c	0.38	0.63	.015	.025		4
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			
E	9.65	10.67	.380	.420	3	
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

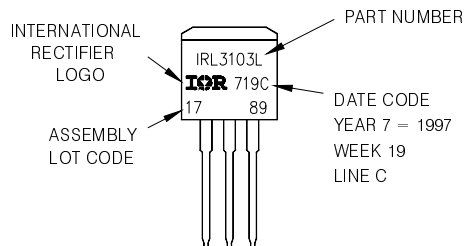
HEXFET	IGBT
1. - GATE	1- GATE
2. - DRAIN	2- COLLECTOR
3. - SOURCE	3- EMITTER
4. - DRAIN	4- COLLECTOR

- 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 [.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.

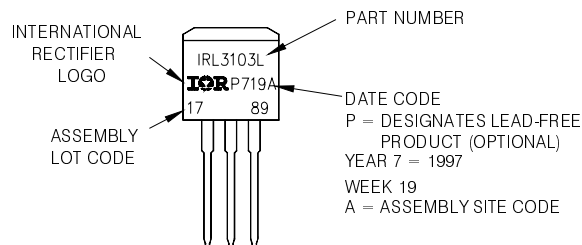
TO-262 Part Marking Information

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

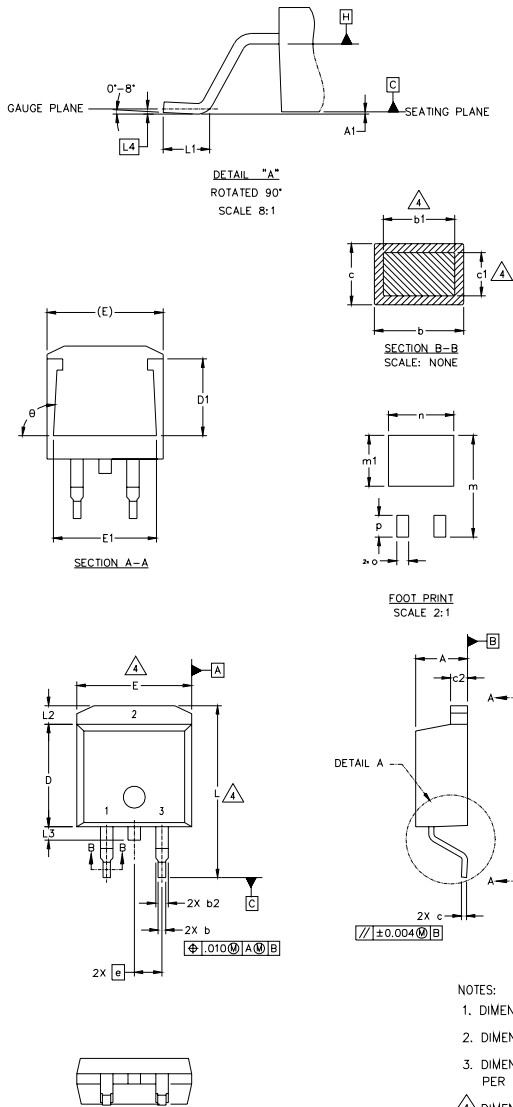
Note: 'P' in assembly line position indicates 'Lead-Free'



OR



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	4
A1		0.127		.005	
b	0.51	0.99	.020	.039	
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	3
c2	1.14	1.40	.045	.055	
D	8.51	9.65	.335	.380	3
D1	5.33		.210		
E	9.65	10.67	.380	.420	3
E1	6.22		.245		
e	2.54 BSC		.100 BSC		
L	14.61	15.88	.575	.625	
L1	1.78	2.79	.070	.110	
L2		1.65		.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		
θ	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.

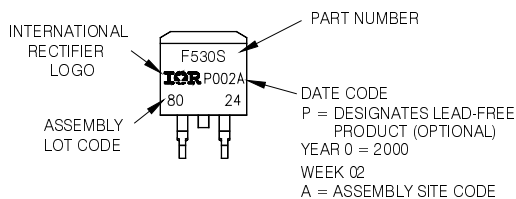
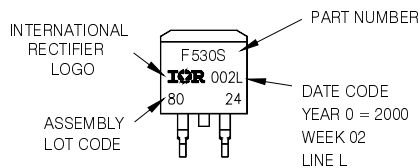
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4. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
5. CONTROLLING DIMENSION: INCH.

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