

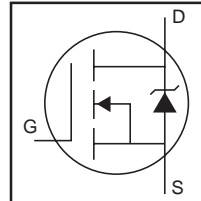
**Applications**

- 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
- Lead-Free

HEXFET® Power MOSFET



<b>V<sub>DSS</sub></b>	<b>100V</b>
<b>R<sub>DS(on)</sub> typ.</b>	<b>5.6mΩ</b>
	<b>7.0mΩ</b>
<b>I<sub>D</sub></b>	<b>130A</b>



**Absolute Maximum Ratings**

Symbol	Parameter	Max.	Units
I <sub>D</sub> @ T <sub>C</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	130①	A
I <sub>D</sub> @ T <sub>C</sub> = 100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	92①	
I <sub>DM</sub>	Pulsed Drain Current ②	550	
P <sub>D</sub> @ T <sub>C</sub> = 25°C	Maximum Power Dissipation	300	W
	Linear Derating Factor	2.0	W/°C
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	V
dV/dt	Peak Diode Recovery ④	14	V/ns
T <sub>J</sub>	Operating Junction and	-55 to + 175	°C
T <sub>STG</sub>	Storage Temperature Range		
	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 <sub>AS</sub> (Thermally limited)	Single Pulse Avalanche Energy ③	980	mJ
I <sub>AR</sub>	Avalanche Current ①	See Fig. 14, 15, 22a, 22b,	A
E <sub>AR</sub>	Repetitive Avalanche Energy ⑤		mJ

**Thermal Resistance**

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

Static @ T<sub>J</sub> = 25°C (unless otherwise specified)

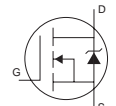
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	100	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔV <sub>(BR)DSS/ΔT<sub>J</sub></sub>	Breakdown Voltage Temp. Coefficient	—	0.064	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA <sup>②</sup>
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	5.6	7.0	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 75A <sup>③</sup>
V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	—	4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	20	μA	V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V
		—	—	250		V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	200	nA	V <sub>GS</sub> = 20V
	Gate-to-Source Reverse Leakage	—	—	-200		V <sub>GS</sub> = -20V
R <sub>G</sub>	Gate Input Resistance	—	1.4	—	Ω	f = 1MHz, open drain

Dynamic @ T<sub>J</sub> = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
gfs	Forward Transconductance	160	—	—	S	V <sub>DS</sub> = 50V, I <sub>D</sub> = 75A
Q <sub>g</sub>	Total Gate Charge	—	170	250	nC	I <sub>D</sub> = 75A
Q <sub>gs</sub>	Gate-to-Source Charge	—	46	—		V <sub>DS</sub> = 80V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge	—	62	—		V <sub>GS</sub> = 10V <sup>⑤</sup>
t <sub>d(on)</sub>	Turn-On Delay Time	—	26	—	ns	V <sub>DD</sub> = 65V
t <sub>r</sub>	Rise Time	—	110	—		I <sub>D</sub> = 75A
t <sub>d(off)</sub>	Turn-Off Delay Time	—	68	—		R <sub>G</sub> = 2.6Ω
t <sub>f</sub>	Fall Time	—	78	—		V <sub>GS</sub> = 10V <sup>⑤</sup>
C <sub>iss</sub>	Input Capacitance	—	7670	—	pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance	—	540	—		V <sub>DS</sub> = 50V
C <sub>rss</sub>	Reverse Transfer Capacitance	—	280	—		f = 1.0MHz
C <sub>oss eff. (ER)</sub>	Effective Output Capacitance (Energy Related) <sup>⑦</sup>	—	650	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V to 80V <sup>⑧</sup> , See Fig.11
C <sub>oss eff. (TR)</sub>	Effective Output Capacitance (Time Related) <sup>⑥</sup>	—	720.1	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V to 80V <sup>⑥</sup> , See Fig. 5

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	130 <sup>①</sup>	A	MOSFET symbol showing the integral reverse p-n junction diode.
I <sub>SM</sub>	Pulsed Source Current (Body Diode) <sup>②⑦</sup>	—	—	550		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.3	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 75A, V <sub>GS</sub> = 0V <sup>⑤</sup>
t <sub>rr</sub>	Reverse Recovery Time	—	45	68	ns	T <sub>J</sub> = 25°C
		—	55	83		T <sub>J</sub> = 125°C
Q <sub>rr</sub>	Reverse Recovery Charge	—	82	120	nC	T <sub>J</sub> = 25°C
		—	120	180		T <sub>J</sub> = 125°C
I <sub>RRM</sub>	Reverse Recovery Current	—	3.3	—	A	T <sub>J</sub> = 25°C
t <sub>on</sub>	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

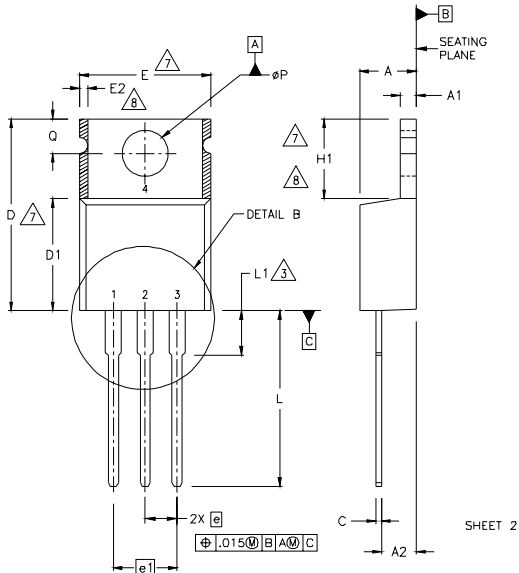


Notes:

- 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<sub>Jmax</sub>, starting T<sub>J</sub> = 25°C, L = 0.35mH  
R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 75A, V<sub>GS</sub> = 10V. Part not recommended for use above this value.
- ④ I<sub>SD</sub> ≤ 75A, di/dt ≤ 550A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 175°C.
- ⑤ Pulse width ≤ 400μs; duty cycle ≤ 2%.
- ⑥ C<sub>oss eff. (TR)</sub> is a fixed capacitance that gives the same charging time as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 to 80% V<sub>DSS</sub>.
- ⑦ C<sub>oss eff. (ER)</sub> is a fixed capacitance that gives the same energy as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 to 80% V<sub>DSS</sub>.
- 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<sub>θ</sub> is measured at T<sub>J</sub> approximately 90°C.

## TO-220AB Package Outline

Dimensions are shown in millimeters (inches)



- NOTES:
- 1 DIMENSIONING AND TOLERANCING PER ASME Y14.5 M- 1994.
  - 2 DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
  - 3 LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
  - 4 DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
  - 5 DIMENSION b1 & c1 APPLY TO BASE METAL ONLY.
  - 6 CONTROLLING DIMENSION : INCHES.
  - 7 THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E,H1,D2 & E1
  - 8 DIMENSION E2 X H1 DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.

**LEAD ASSIGNMENTS**

**HEXFEET**

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

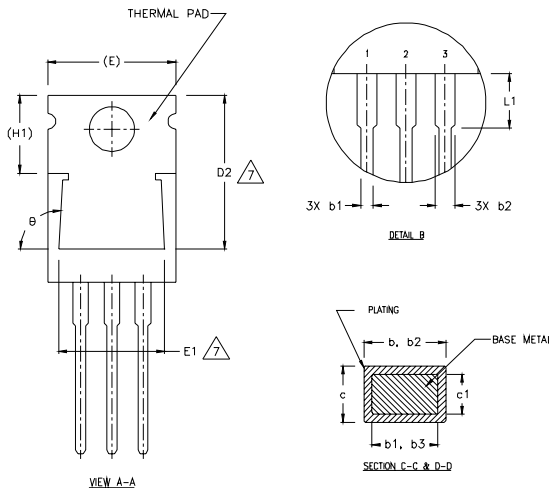
**IRFETS, CO-PACK**

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

**DIODES**

- 1.- ANODE/OPEN
- 2.- CATHODE
- 3.- ANODE

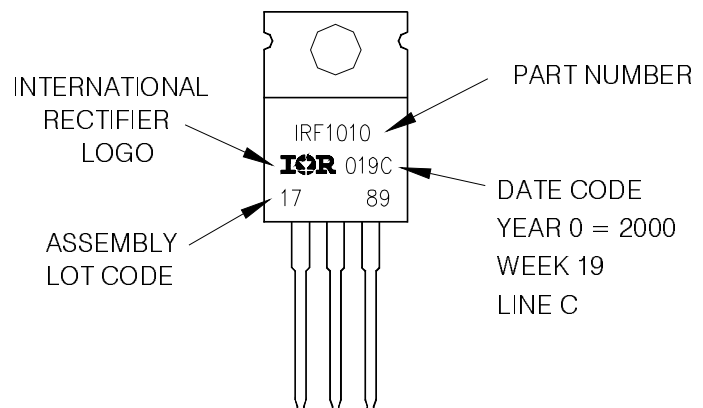
SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.82	.140	.190	
A1	0.51	1.40	.020	.055	
A2	2.04	2.92	.080	.115	
b	0.38	1.01	.015	.040	
b1	0.38	0.96	.015	.038	5
b2	1.15	1.77	.045	.070	
b3	1.15	1.73	.045	.068	
c	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	5
D	14.22	16.51	.560	.650	4
D1	8.38	9.02	.330	.355	
D2	12.19	12.88	.480	.507	7
E	9.66	10.66	.380	.420	4,7
E1	8.38	8.89	.330	.350	7
e	2.54 BSC		.100 BSC		
e1	5.08		.200 BSC		
H1	5.85	6.55	.230	.270	7,8
L	12.70	14.73	.500	.580	
L1	-	6.35	-	.250	3
phi P	3.54	4.08	.139	.161	
Q	2.54	3.42	.100	.135	
phi	90°-93°		90°-93°		



## TO-220AB Part Marking Information

EXAMPLE: THIS IS AN IRF1010  
 LOT CODE 1789  
 ASSEMBLED ON WW 19, 2000  
 IN THE ASSEMBLY LINE "C"

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



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