

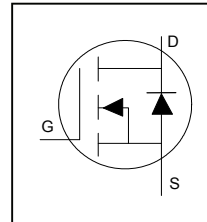
**Application**

- Optimized for UPS/Inverter Applications
- Low Voltage Power Tools

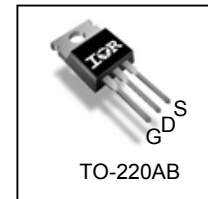
**Benefits**

- Best in Class Performance for UPS/Inverter Applications
- Very Low RDS(on) at 4.5V VGS
- Ultra-Low Gate Impedance
- Fully Characterized Avalanche Voltage and Current
- Lead-Free, RoHS Compliant

HEXFET® Power MOSFET



<b>V<sub>DSS</sub></b>	<b>30</b>	<b>V</b>
<b>R<sub>DS(on)</sub> max</b> (@ V <sub>GS</sub> = 10V)	<b>3.5</b>	<b>mΩ</b>
(@ V <sub>GS</sub> = 4.5V)	<b>4.5</b>	
<b>Q<sub>g</sub></b> (typical)	<b>36</b>	<b>nC</b>
<b>I<sub>D</sub></b> (Silicon Limited)	<b>150④</b>	<b>A</b>
<b>I<sub>D</sub></b> (Package Limited)	<b>78A</b>	



<b>G</b>	<b>D</b>	<b>S</b>
Gate	Drain	Source

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRLB4132PbF	TO-220AB	Tube	50	IRLB4132PbF

**Absolute Maximum Rating**

Symbol	Parameter	Max.	Units
V <sub>DS</sub>	Drain-to-Source Voltage	30	V
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	V
I <sub>D</sub> @ T <sub>C</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V (Silicon Limited)	150④	A
I <sub>D</sub> @ T <sub>C</sub> = 100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V (Silicon Limited)	100	
I <sub>D</sub> @ T <sub>C</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V (Package Limited)	78	
I <sub>DM</sub>	Pulsed Drain Current ①	620	
P <sub>D</sub> @ T <sub>C</sub> = 25°C	Maximum Power Dissipation ⑥	140	W
P <sub>D</sub> @ T <sub>C</sub> = 100°C	Maximum Power Dissipation ⑥	68	W
	Linear Derating Factor	0.90	W/°C
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	10 lbf-in (1.1 N-m)	

**Thermal Resistance**

Symbol	Parameter	Typ.	Max.	Units
R <sub>θJC</sub>	Junction-to-Case ⑥	—	1.11	°C/W
R <sub>θCS</sub>	Case-to-Sink, Flat Greased Surface	0.50	—	
R <sub>θJA</sub>	Junction-to-Ambient ⑤	—	62	

Notes ① through ⑦ are on page 8

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

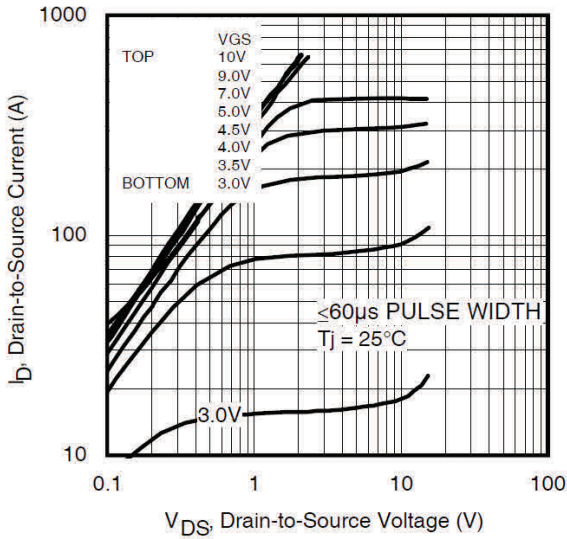
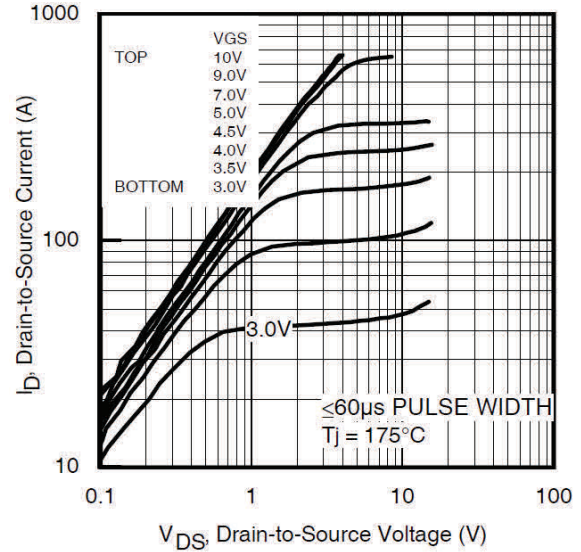
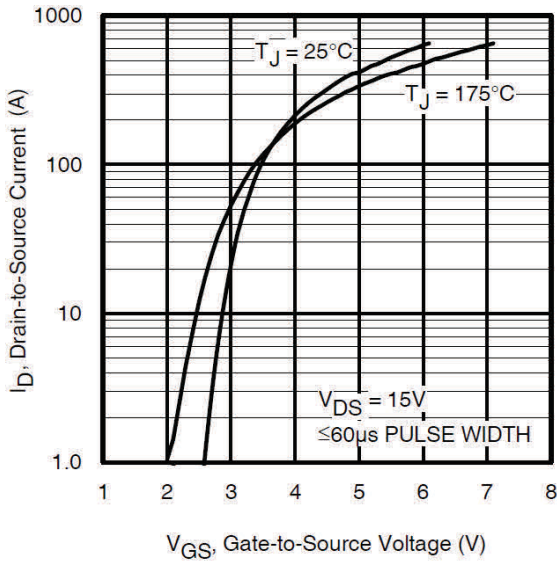
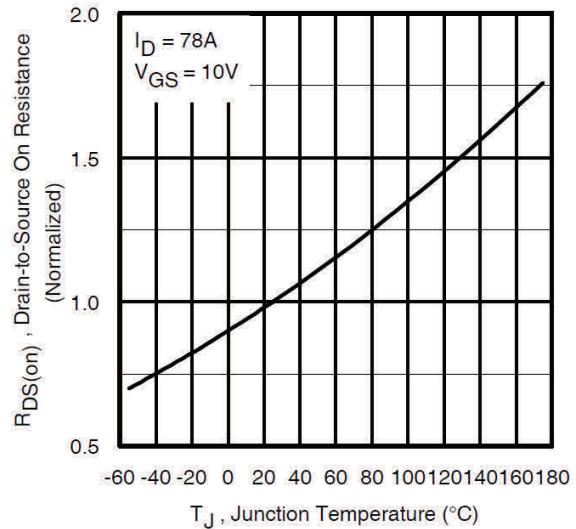
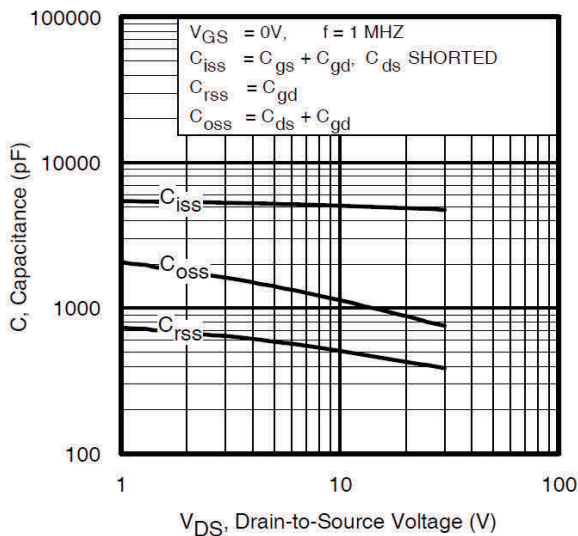
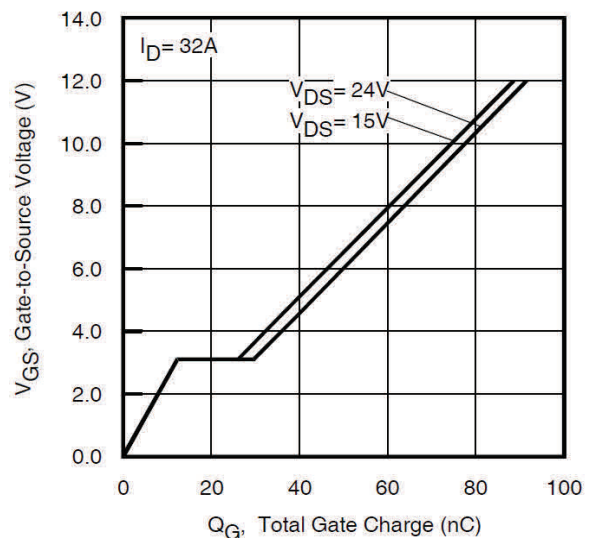
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
BV <sub>DSS</sub>	Drain-to-Source Breakdown Voltage	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	17	—	mV/°C	Reference to 25°C, I <sub>D</sub> = 1mA ①
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	2.5	3.5	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 40A ③
		—	3.5	4.5		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 32A ③
V <sub>GS(th)</sub>	Gate Threshold Voltage	1.35	1.8	2.35	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 100μA
ΔV <sub>GS(th)</sub> /ΔT <sub>J</sub>	Gate Threshold Voltage Coefficient	—	-7.7	—	mV/°C	
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	1.0	μA	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V
		—	—	100		V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	100	nA	V <sub>GS</sub> = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V <sub>GS</sub> = -20V
g <sub>fs</sub>	Forward Transconductance	190	—	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 32A
Q <sub>g</sub>	Total Gate Charge	—	36	54	nC	V <sub>DS</sub> = 15V V <sub>GS</sub> = 4.5V I <sub>D</sub> = 32A
Q <sub>gs1</sub>	Pre-V <sub>th</sub> Gate-to-Source Charge	—	9.1	—		
Q <sub>gs2</sub>	Post-V <sub>th</sub> Gate-to-Source Charge	—	4.2	—		
Q <sub>gd</sub>	Gate-to-Drain Charge	—	13	—		
Q <sub>godr</sub>	Gate Charge Overdrive	—	13	—		
Q <sub>sw</sub>	Switch Charge (Q <sub>gs2</sub> + Q <sub>gd</sub> )	—	17.2	—		
Q <sub>oss</sub>	Output Charge	—	21	—		
R <sub>G</sub>	Gate Resistance	—	0.85	1.5	Ω	
t <sub>d(on)</sub>	Turn-On Delay Time	—	23	—	ns	V <sub>DD</sub> = 15V I <sub>D</sub> = 32A R <sub>G</sub> = 1.8Ω V <sub>GS</sub> = 4.5V ③
t <sub>r</sub>	Rise Time	—	92	—		
t <sub>d(off)</sub>	Turn-Off Delay Time	—	25	—		
t <sub>f</sub>	Fall Time	—	36	—		
C <sub>iss</sub>	Input Capacitance	—	5110	—	pF	V <sub>GS</sub> = 0V V <sub>DS</sub> = 15V f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	—	960	—		
C <sub>rss</sub>	Reverse Transfer Capacitance	—	440	—		

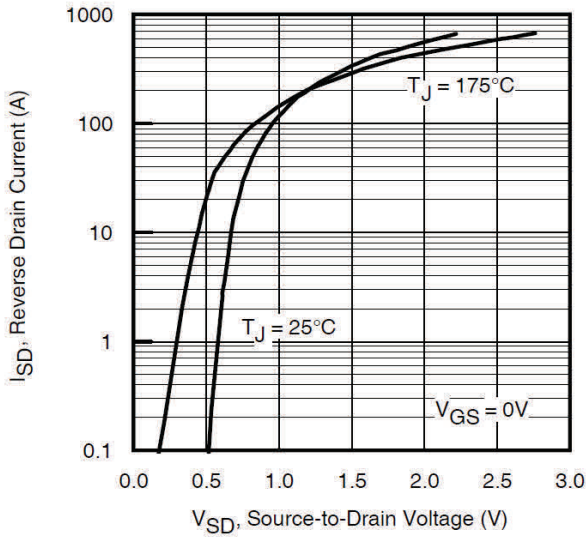
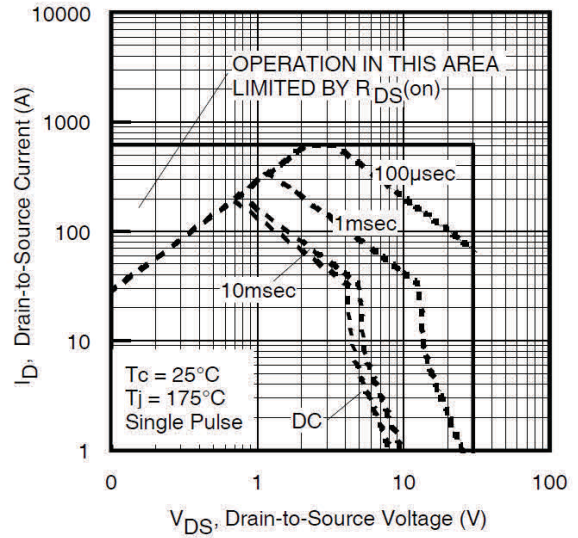
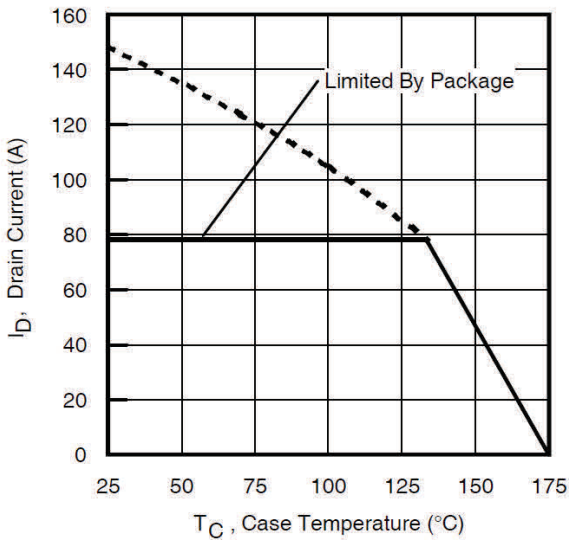
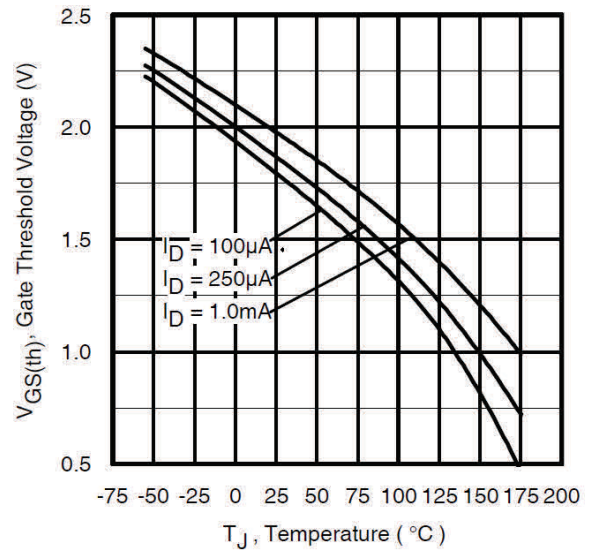
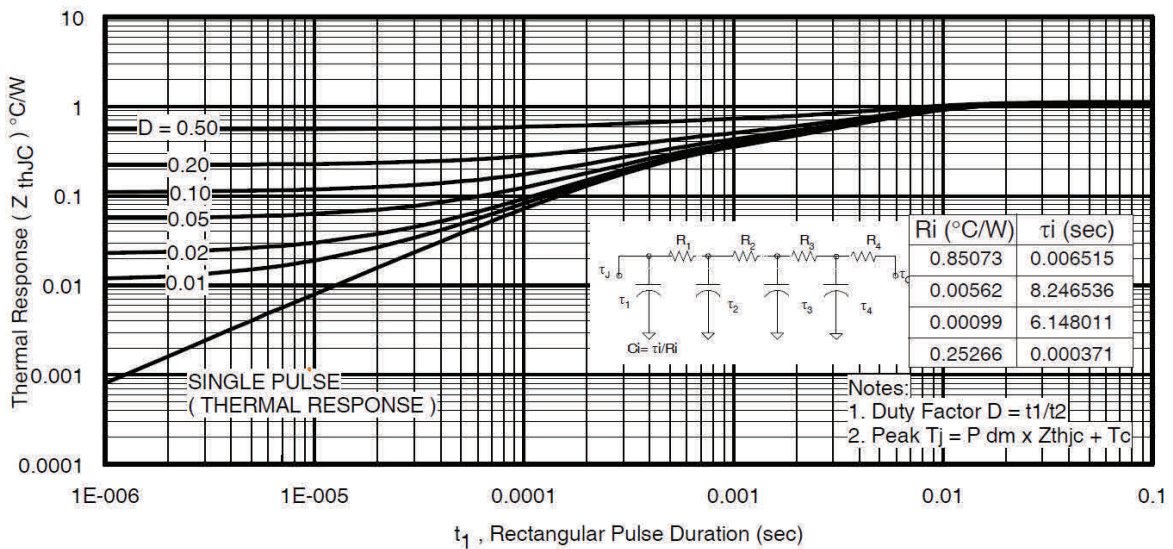
**Avalanche Characteristics**

E <sub>AS</sub> (Thermally limited)	Single Pulse Avalanche Energy ②	310	mJ
E <sub>AS</sub> (tested)	Single Pulse Avalanche Energy Tested Value ⑦	900	
I <sub>AR</sub>	Avalanche Current ①	32	A
E <sub>AR</sub>	Repetitive Avalanche Energy ①	14	mJ

**Diode Characteristics**

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode) ①	—	—	150 ④	A	MOSFET symbol showing the integral reverse p-n junction diode.
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	620		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.0	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 32A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	29	44	ns	T <sub>J</sub> = 25°C I <sub>F</sub> = 32A, V <sub>DD</sub> = 15V
Q <sub>rr</sub>	Reverse Recovery Charge	—	49	74	nC	di/dt = 200A/μs ③


**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 10.** Threshold Voltage vs. Temperature

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

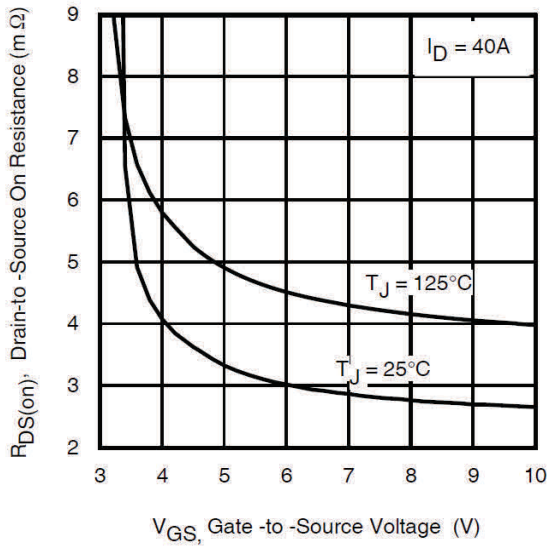


Fig 12. Typical On-Resistance vs. Gate Voltage

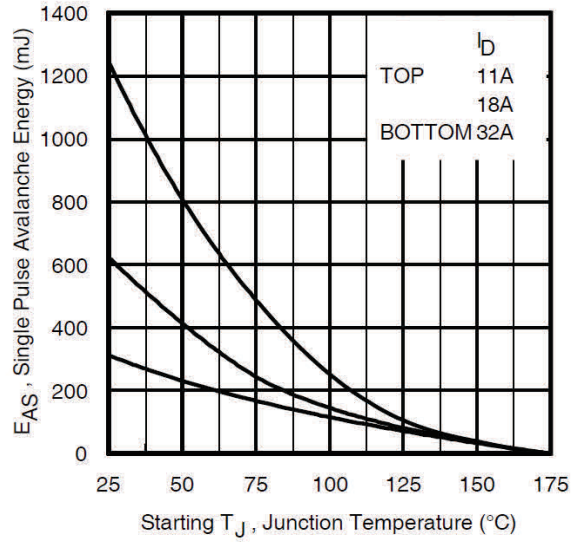
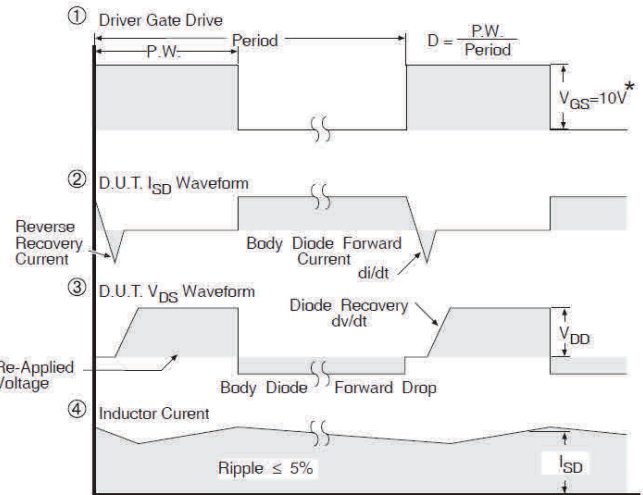
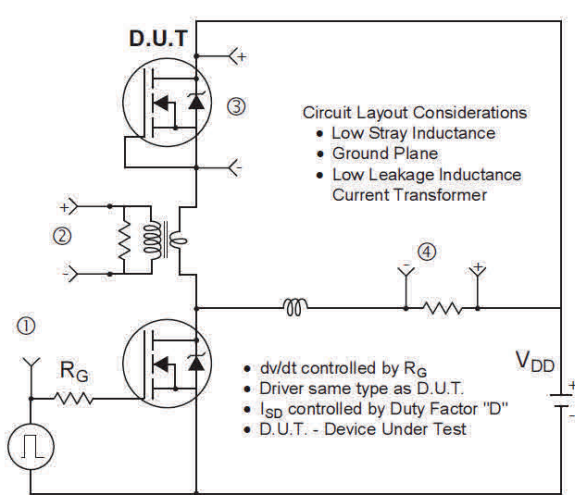
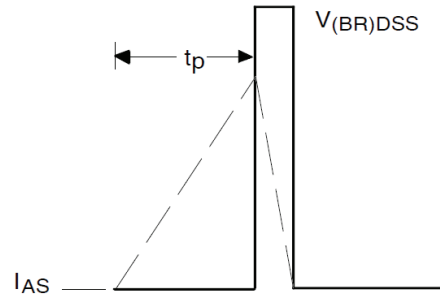
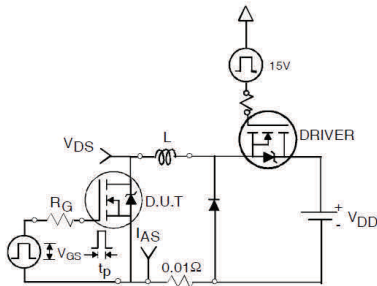


Fig 13. Maximum Avalanche Energy vs. Drain Current



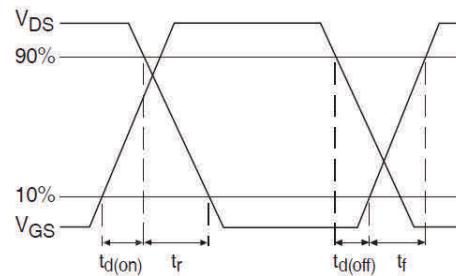
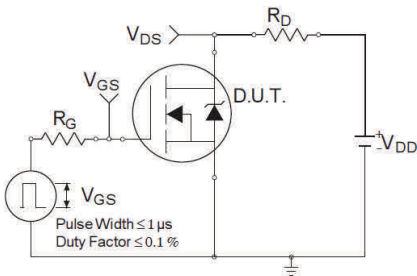
\*  $V_{GS} = 5V$  for Logic Level Devices

**Fig 14.** Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET® Power MOSFETs



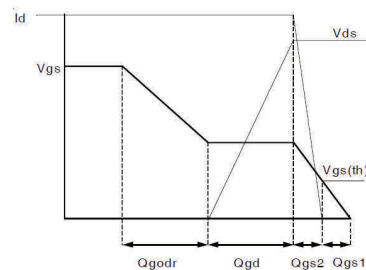
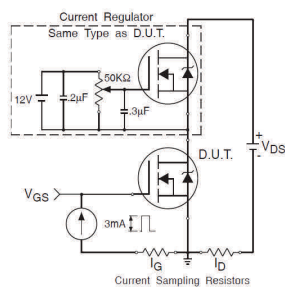
**Fig 15a.** Unclamped Inductive Test Circuit

**Fig 15b.** Unclamped Inductive Waveforms



**Fig 16a.** Switching Time Test Circuit

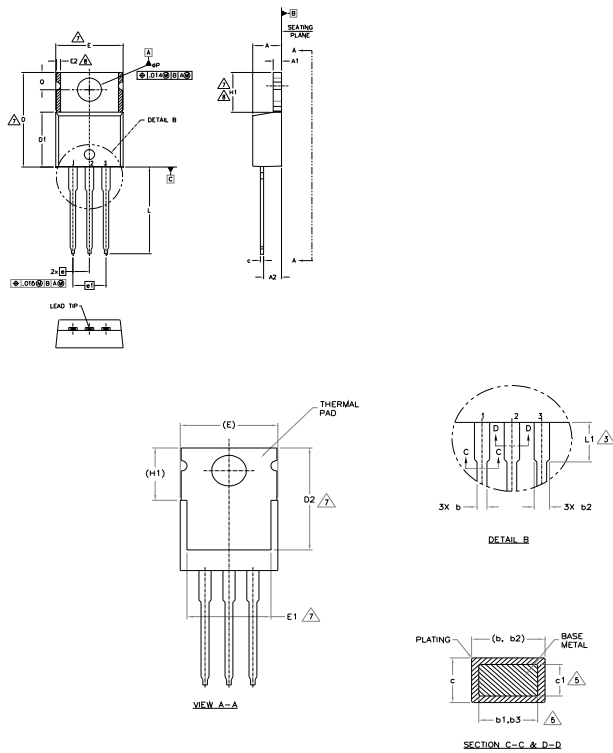
**Fig 16b.** Switching Time Waveforms



**Fig 17a.** Gate Charge Test Circuit

**Fig 17b.** Gate Charge Waveform

**TO-220AB Package Outline (Dimensions are shown in millimeters (inches))**



- NOTES:
- 1.- DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M- 1994.
  - 2.- DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
  - 3.- LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
  - 4.- DIMENSION D, D1 & 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, b3 & 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.
  - 9.- OUTLINE CONFORMS TO JEDEC TO-220, EXCEPT A2 (max.) AND D2 (min.) WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE.

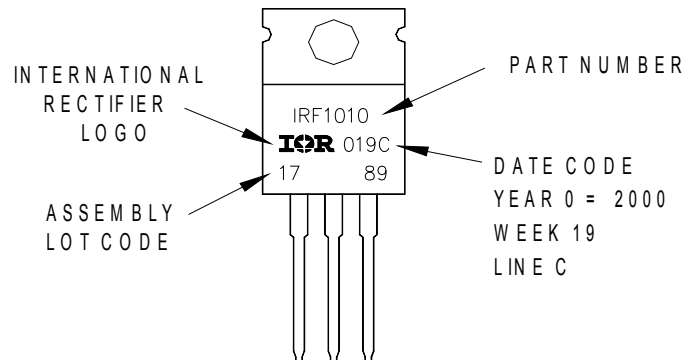
SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.83	.140	.190	
A1	0.51	1.40	.020	.055	
A2	2.03	2.92	.080	.115	
b	0.38	1.01	.015	.040	
b1	0.38	0.97	.015	.038	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
c	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	5
D	14.22	16.51	.560	.650	4
D1	8.38	9.02	.330	.355	
D2	11.68	12.88	.460	.507	7
E	9.65	10.67	.380	.420	4,7
E1	6.86	8.89	.270	.350	7
E2	-	0.76	-	.030	8
e	2.54 BSC		.100 BSC		
e1	5.08 BSC		.200 BSC		
H1	5.84	6.86	.230	.270	7,8
L	12.70	14.73	.500	.580	
L1	3.56	4.06	.140	.160	3
øP	3.54	4.08	.139	.161	
Q	2.54	3.42	.100	.135	

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

**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.

**Qualification Information**

<b>Qualification Level</b>	Industrial (per JEDEC JESD47F) †	
<b>Moisture Sensitivity Level</b>	TO-220AB	N/A
<b>RoHS Compliant</b>	Yes	

† Applicable version of JEDEC standard at the time of product release.

**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by  $T_{Jmax}$ , starting  $T_J = 25^{\circ}C$ ,  $L = 0.61mH$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 32A$ .
- ③ Pulse width  $\leq 400\mu s$ ; duty cycle  $\leq 2\%$ .
- ④ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 78A.
- ⑤ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques Refer to application note #AN-994.
- ⑥  $R_{\theta}$  is measured at  $T_J$  approximately  $90^{\circ}C$ .
- ⑦ Starting  $T_J = 25^{\circ}C$ ,  $L = 0.50mH$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 60A$ ,  $V_{DD} = 25V$ . (Statistical Limit)



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