

- Advanced Process Technology
- Isolated Package
- High Voltage Isolation = 2.5KVRMS ⑤
- Sink to Lead Creepage Dist. = 4.8mm
- Fully Avalanche Rated

Description

Fifth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET Power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of applications.

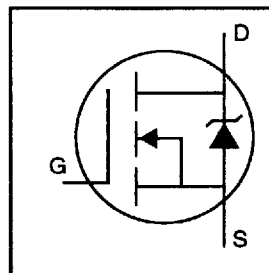
The TO-220 Fullpak eliminates the need for additional insulating hardware in commercial-industrial applications. The moulding compound used provides a high isolation capability and a low thermal resistance between the tab and external heatsink. This isolation is equivalent to using a 100 micron mica barrier with standard TO-220 product. The Fullpak is mounted to a heatsink using a single clip or by a single screw fixing.

Absolute Maximum Ratings

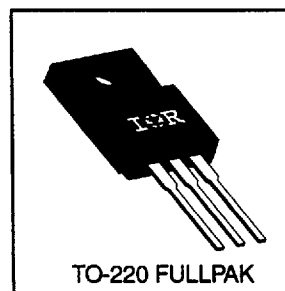
	Parameter	Max.	Units
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	40	A
I_D @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	28	
I_{DM}	Pulsed Drain Current ①⑥	280	
P_D @ $T_C = 25^\circ\text{C}$	Power Dissipation	48	W
	Linear Derating Factor	0.32	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy②⑥	570	mJ
I_{AR}	Avalanche Current①	43	A
E_{AR}	Repetitive Avalanche Energy①	15	mJ
dv/dt	Peak Diode Recovery dv/dt ③⑥	6.5	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)	
	Mounting torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	3.1	°C/W
$R_{\theta JA}$	Junction-to-Ambient	—	65	



$V_{DSS} = 75\text{V}$
$R_{DS(on)} = 0.013\Omega$
$I_D = 40\text{A}$



TO-220 FULLPAK

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	75	—	—	V	$V_{GS} = 0V$, $I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.078	—	$V/^\circ\text{C}$	Reference to 25°C , $I_D = 1mA$ ④
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.013	Ω	$V_{GS} = 10V$, $I_D = 43A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}$, $I_D = 250\mu A$
g_{fs}	Forward Transconductance	30	—	—	S	$V_{DS} = 50V$, $I_D = 43A$ ⑥
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 75V$, $V_{GS} = 0V$
		—	—	250		$V_{DS} = 60V$, $V_{GS} = 0V$, $T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
Q_g	Total Gate Charge	—	—	150	nC	$I_D = 43A$
Q_{gs}	Gate-to-Source Charge	—	—	24		$V_{DS} = 60V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	55		$V_{GS} = 10V$, See Fig. 6 and 13 ④⑥
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	$V_{DD} = 38V$
t_r	Rise Time	—	62	—		$I_D = 43A$
$t_{d(off)}$	Turn-Off Delay Time	—	47	—		$R_G = 2.5\Omega$
t_f	Fall Time	—	58	—		$R_D = 0.87\Omega$, See Fig. 10 ④⑥
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	7.5	—		
C_{iss}	Input Capacitance	—	3400	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	830	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	240	—		$f = 1.0MHz$, See Fig. 5⑥

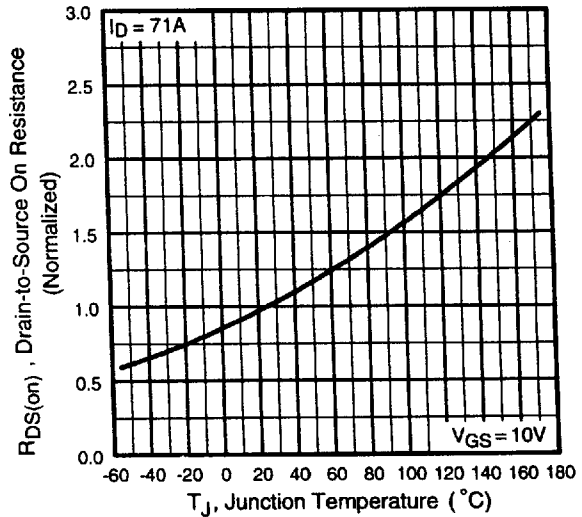
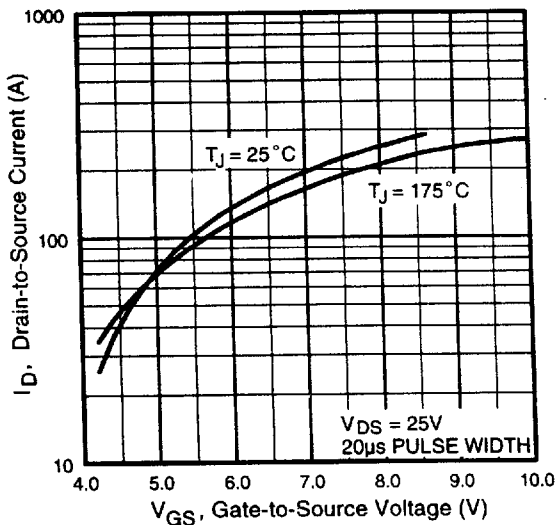
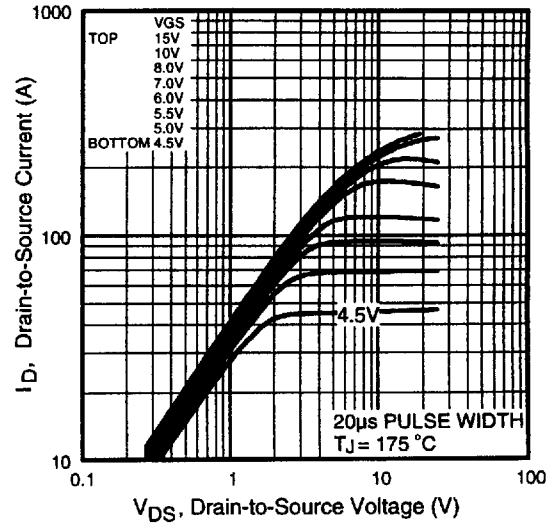
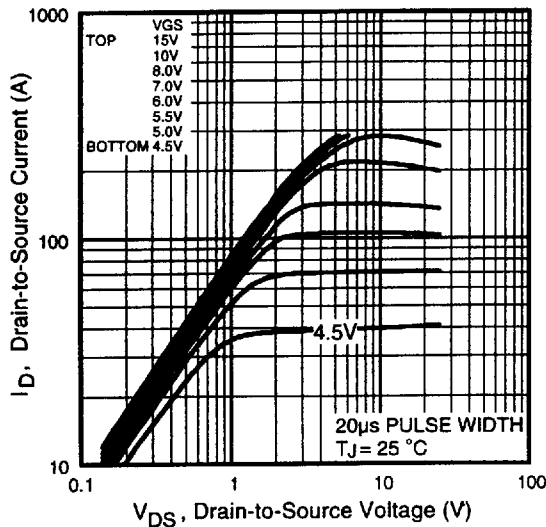
Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	40	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①⑤	—	—	280		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}$, $I_S = 43A$, $V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	120	190	ns	$T_J = 25^\circ\text{C}$, $I_F = 43A$
Q_{rr}	Reverse Recovery Charge	—	510	760	nC	$di/dt = 100A/\mu s$ ④⑥
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$)				

Notes:

① Repetitive rating; pulse width limited by
max. junction temperature. (See fig. 11)② Starting $T_J = 25^\circ\text{C}$, $L = 620\mu H$
 $R_G = 25\Omega$, $I_{AS} = 43A$. (See Figure 12)③ $I_{SD} \leq 43A$, $di/dt \leq 330A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$,
 $T_J \leq 175^\circ\text{C}$ ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.⑤ $t = 60s$, $f = 60Hz$

⑥ Uses IRF2807 data and test conditions



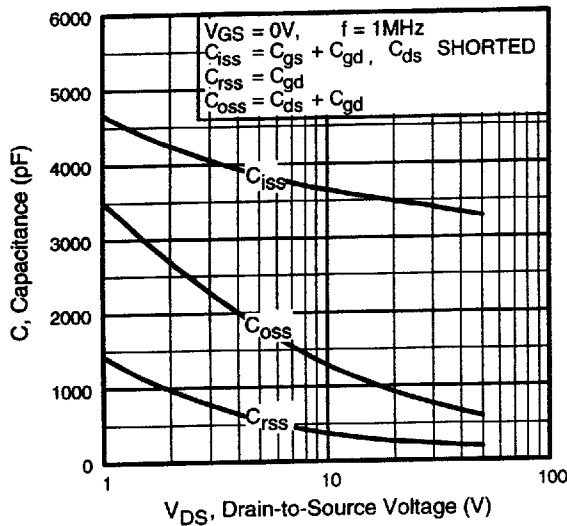


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

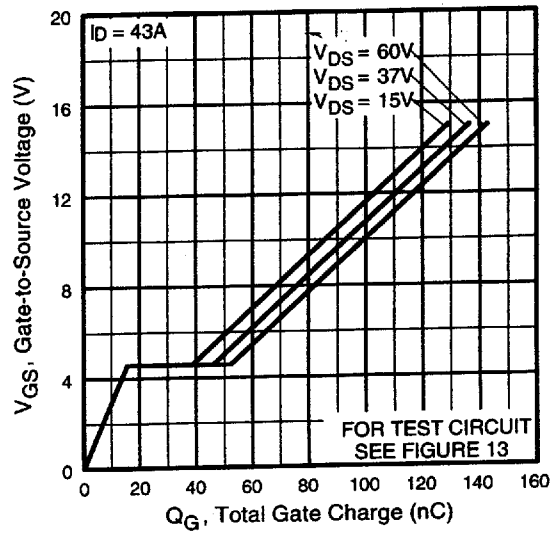


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

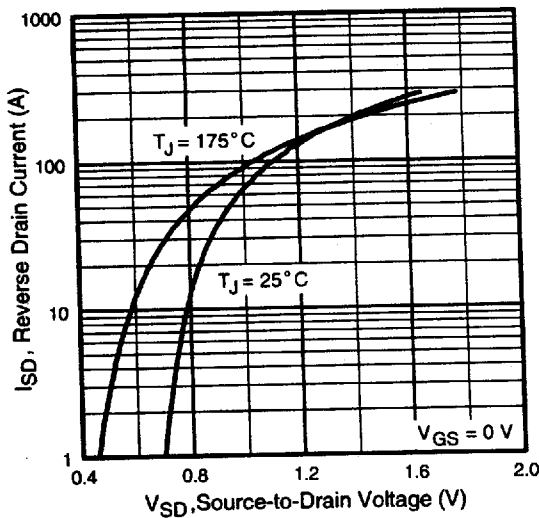


Fig 7. Typical Source-Drain Diode Forward Voltage

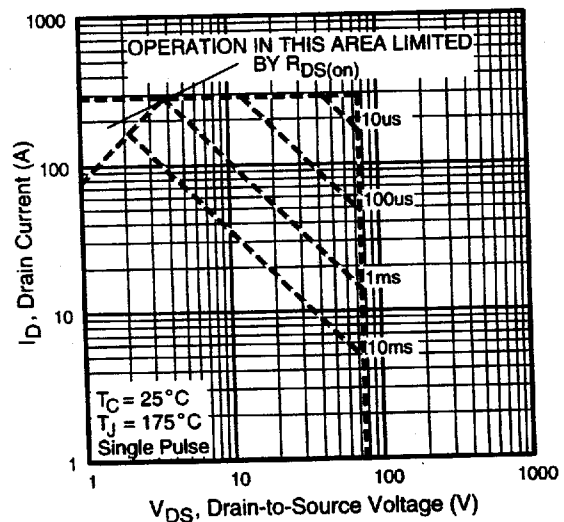


Fig 8. Maximum Safe Operating Area

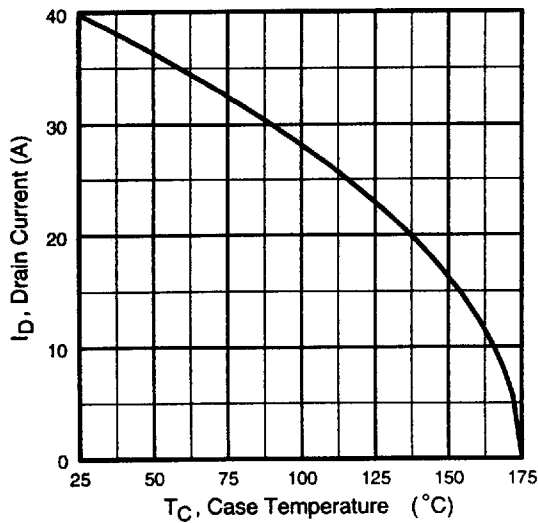


Fig 9. Maximum Drain Current Vs. Case Temperature

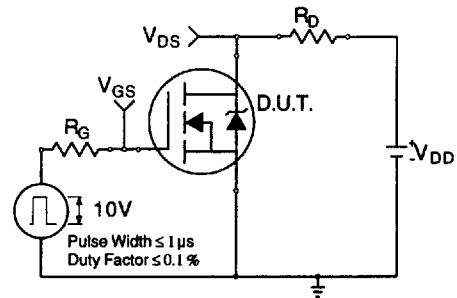


Fig 10a. Switching Time Test Circuit

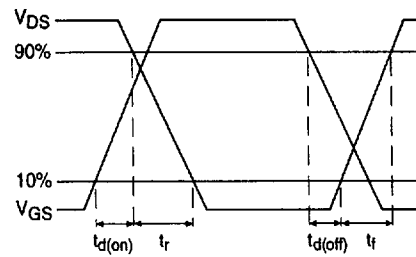


Fig 10b. Switching Time Waveforms

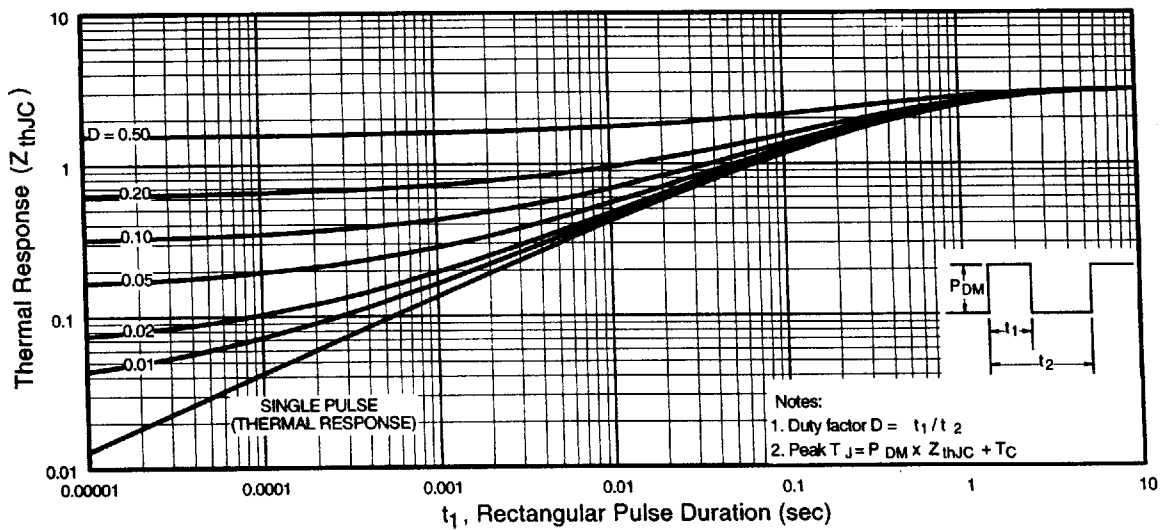


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

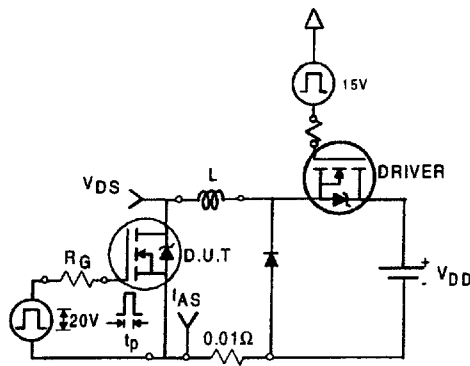


Fig 12a. Unclamped Inductive Test Circuit

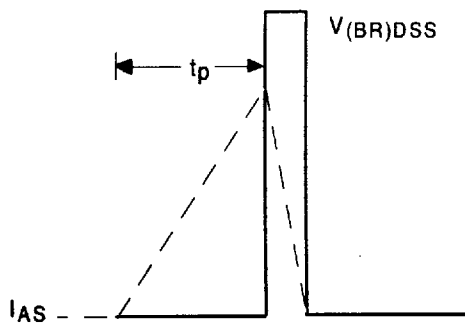


Fig 12b. Unclamped Inductive Waveforms

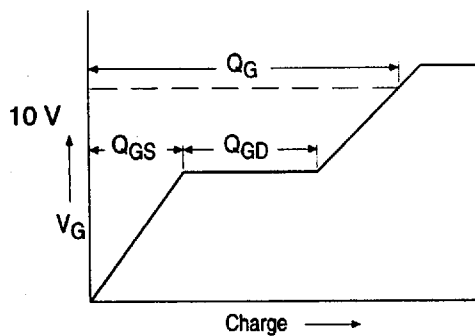


Fig 13a. Basic Gate Charge Waveform

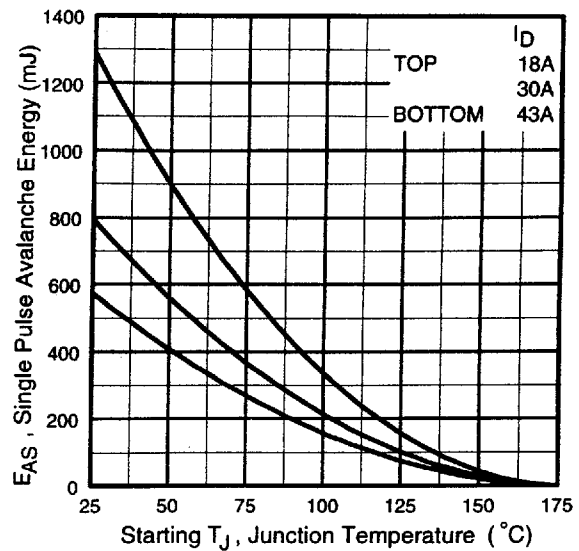


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

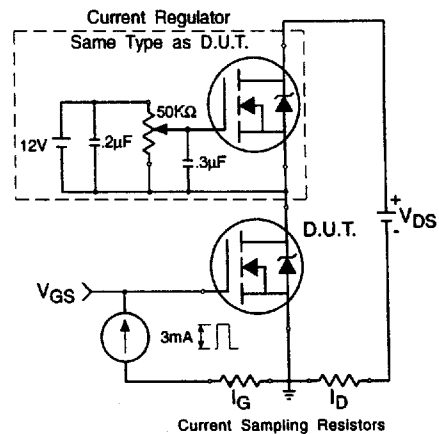
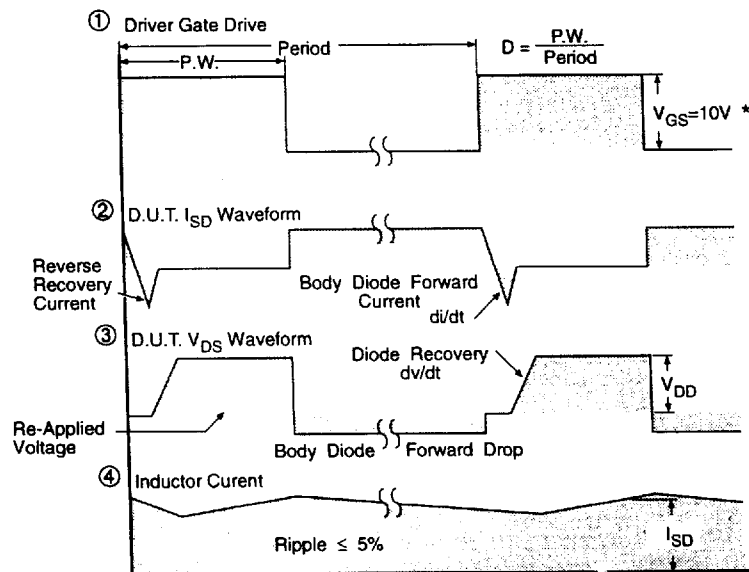
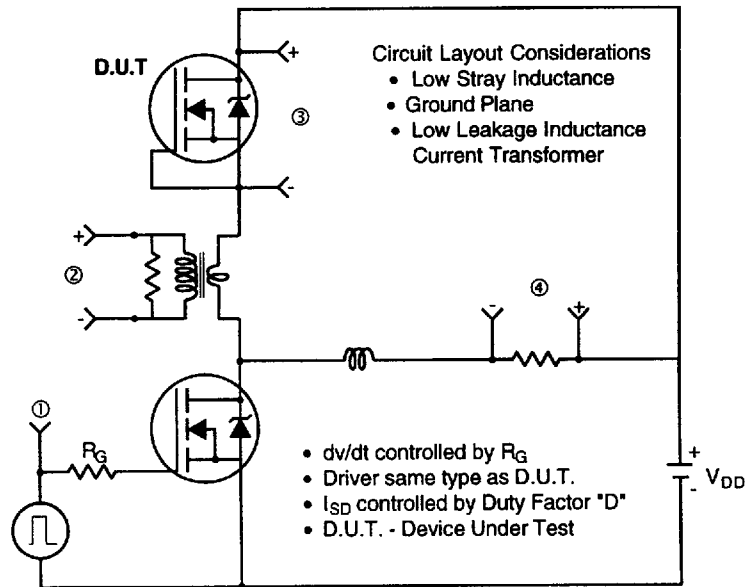


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



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

Fig 14. For N-Channel HEXFETS

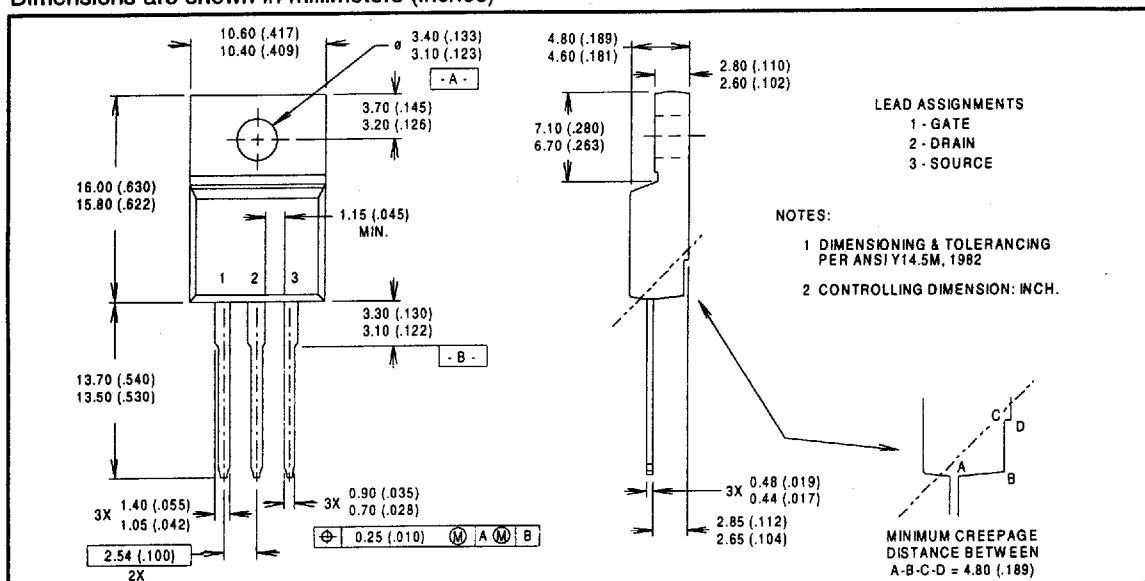
IRFI2807

International
IOR Rectifier

Package Outline

TO-220 Fullpak Outline

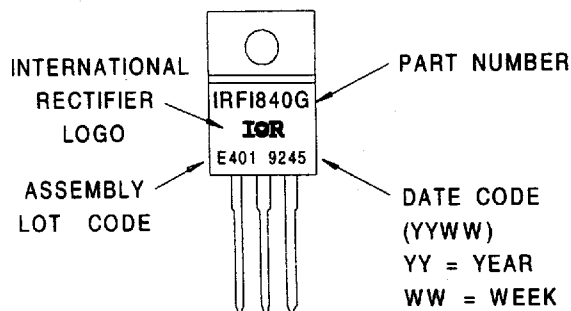
Dimensions are shown in millimeters (inches)



Part Marking Information

TO-220 Fullpak

EXAMPLE: THIS IS AN IRFI840G
WITH ASSEMBLY
LOT CODE E401



International
IOR Rectifier

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