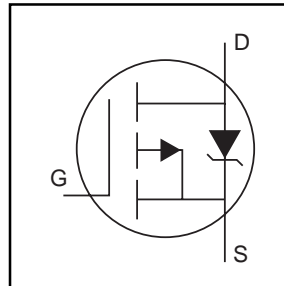


- Advanced Process Technology
- Isolated Package
- High Voltage Isolation = 2.5KV RMS ⑤
- Sink to Lead Creepage Dist. = 4.8mm
- P-Channel
- Fully Avalanche Rated



$$V_{DSS} = -100V$$

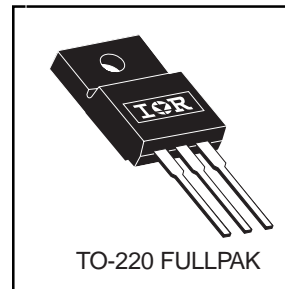
$$R_{DS(on)} = 0.06\Omega$$

$$I_D = -23A$$

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

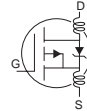
	Parameter	Max.	Units
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ -10V$	-23	A
I_D @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ -10V$	-16	
I_{DM}	Pulsed Drain Current ①⑥	-140	
P_D @ $T_C = 25^\circ\text{C}$	Power Dissipation	63	W
	Linear Derating Factor	0.42	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy②⑥	690	mJ
I_{AR}	Avalanche Current①⑥	-21	A
E_{AR}	Repetitive Avalanche Energy①	6.3	mJ
dv/dt	Peak Diode Recovery dv/dt ③⑥	-5.0	V/ns
T_J	Operating Junction and Storage Temperature Range	-55 to + 175	°C
T_{STG}			
	Mounting torque, 6-32 or M3 srew	10 lbf•in (1.1N•m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	2.4	°C/W
$R_{\theta JA}$	Junction-to-Ambient	—	65	

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
	$V_{(BR)DSS}$	-100	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
	$\Delta V_{(BR)DSS}/\Delta T_J$	—	-0.11	—	V/°C	Reference to $25^\circ\text{C}, I_D = -1\text{mA}$ ⑥
	$R_{DS(on)}$	—	—	0.06	Ω	$V_{GS} = 10V, I_D = -12A$ ④
	$V_{GS(th)}$	-2.0	—	-4.0	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
	g_{fs}	10	—	—	S	$V_{DS} = -50V, I_D = -21A$ ⑥
	I_{DSS}	—	—	-25	μA	$V_{DS} = -100V, V_{GS} = 0V$
		—	—	-250		$V_{DS} = -80V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
	I_{GSS}	—	—	100	nA	$V_{GS} = 20V$
		—	—	-100		$V_{GS} = -20V$
	Q_g	—	—	180	nC	$I_D = -21A$
	Q_{gs}	—	—	25	nC	$V_{DS} = -80V$
	Q_{gd}	—	—	97	nC	$V_{GS} = -10V$, See Fig. 6 and 13 ④⑥
	$t_{d(on)}$	—	17	—	ns	$V_{DD} = -50V$ $I_D = -21A$ $R_G = 2.5\Omega$ $R_D = 2.4\Omega$, See Fig. 10 ④⑥
	t_r	—	86	—		
	$t_{d(off)}$	—	79	—		
	t_f	—	81	—		
	L_D	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
	L_S	—	7.5	—		
	C_{iss}	—	2700	—	pF	$V_{GS} = 0V$ $V_{DS} = -25V$ $f = 1.0\text{MHz}$, See Fig. 5⑥ $f = 1.0\text{MHz}$
	C_{oss}	—	790	—		
	C_{rss}	—	450	—		
	C	—	12	—		



Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
	I_S	—	—	-23	A	MOSFET symbol showing the integral reverse p-n junction diode.
	I_{SM}	—	—	-140		
	V_{SD}	—	—	-1.3	V	$T_J = 25^\circ\text{C}, I_S = -12A, V_{GS} = 0V$ ④
	t_{rr}	—	170	260	ns	$T_J = 25^\circ\text{C}, I_F = -21A$
	Q_{rr}	—	1.2	1.8	μC	$di/dt = -100A/\mu s$ ④⑥

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- ② $V_{DD} = -25V$, starting $T_J = 25^\circ\text{C}$, $L = 3.1\text{mH}$
 $R_G = 25\Omega, I_{AS} = -21A$. (See Figure 12)
- ③ $I_{SD} \leq -21A, di/dt \leq -480A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 175^\circ\text{C}$
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.
- ⑤ $t = 60s, f = 60\text{Hz}$
- ⑥ Uses IRF5210 data and test conditions

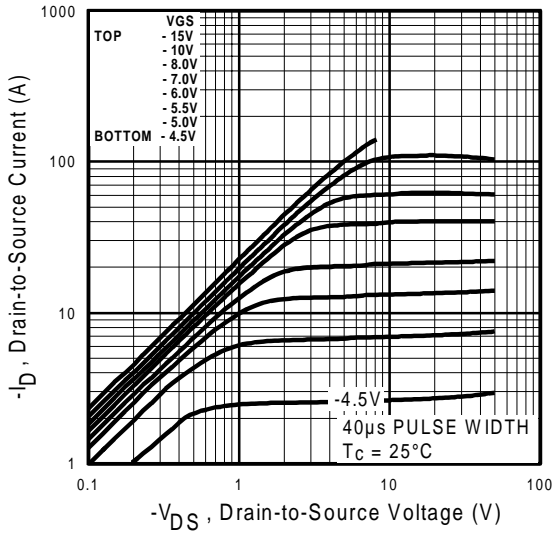


Fig 1. Typical Output Characteristics

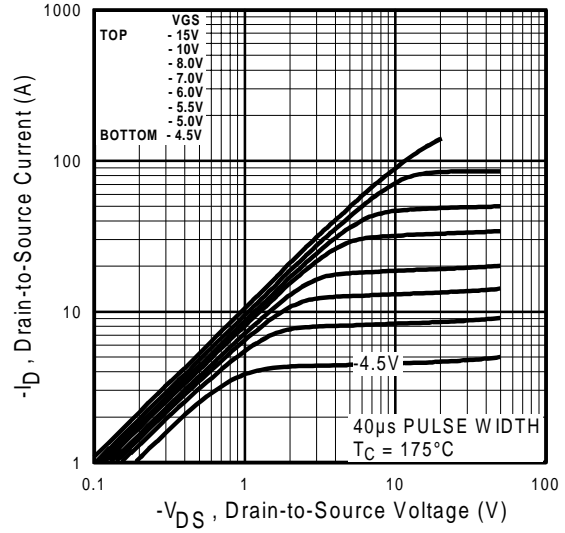


Fig 2. Typical Output Characteristics

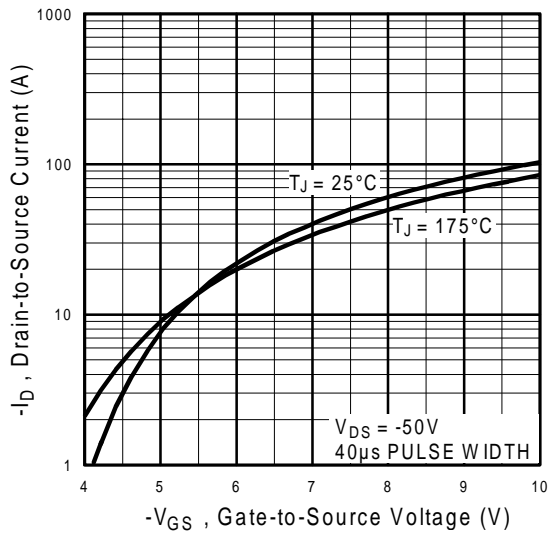


Fig 3. Typical Transfer Characteristics

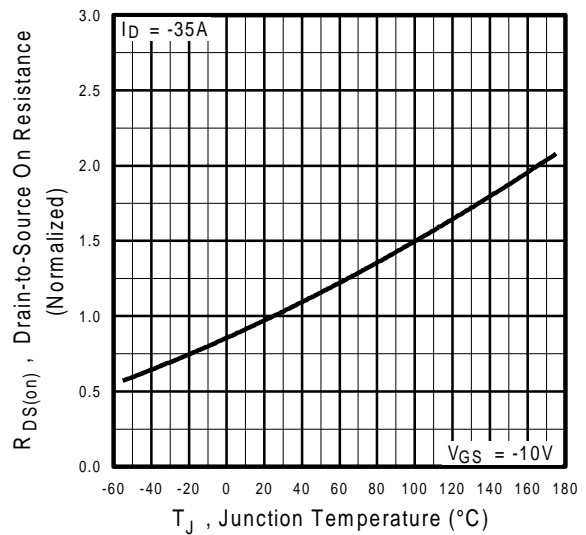


Fig 4. Normalized On-Resistance Vs. Temperature

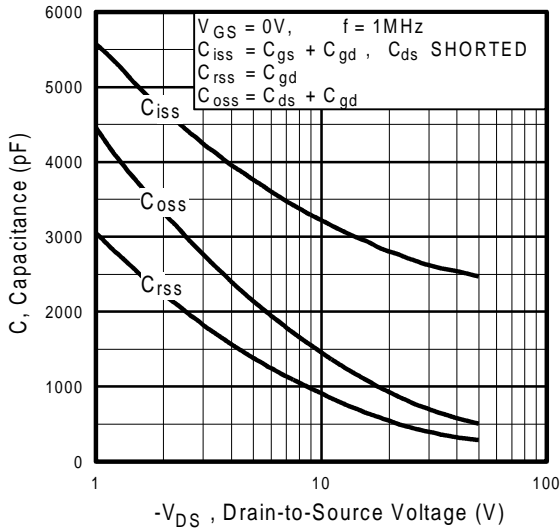


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

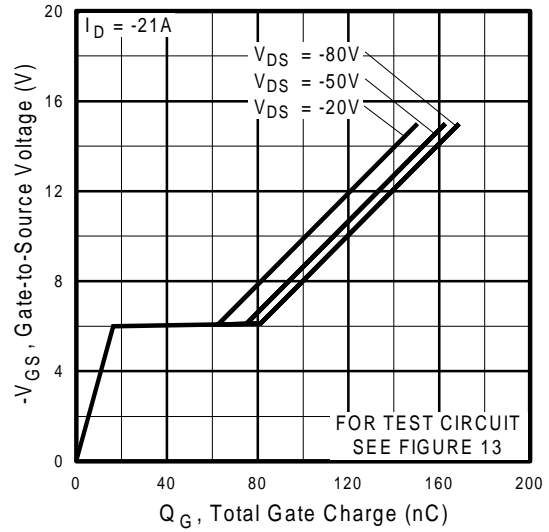


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

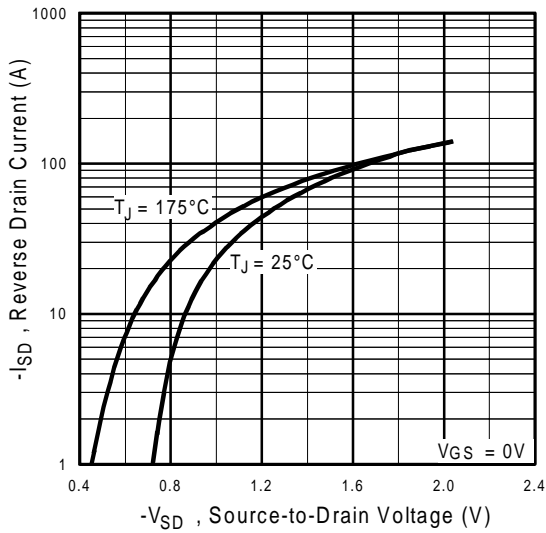


Fig 7. Typical Source-Drain Diode Forward Voltage

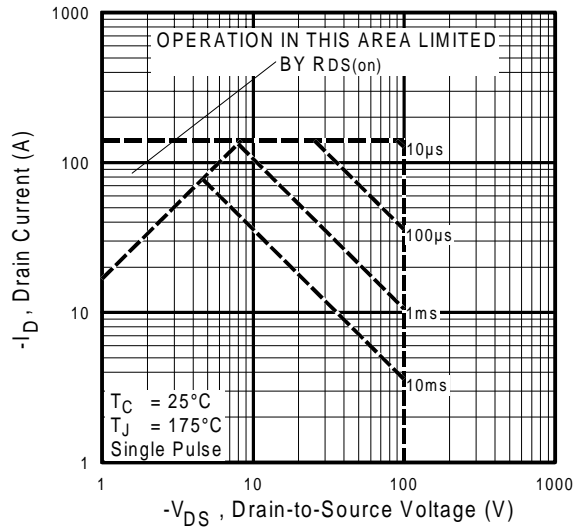


Fig 8. Maximum Safe Operating Area

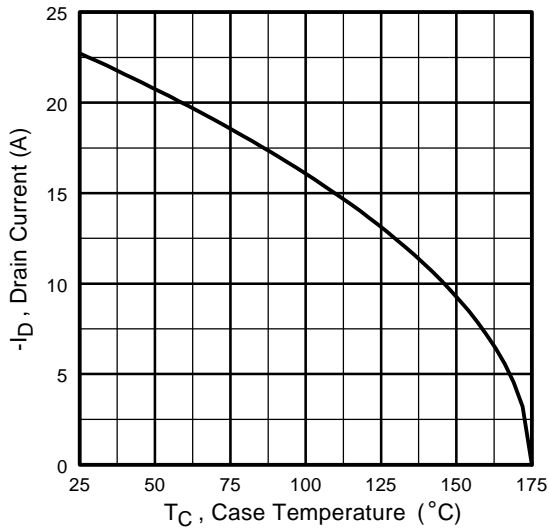


Fig 9. Maximum Drain Current Vs. Case Temperature

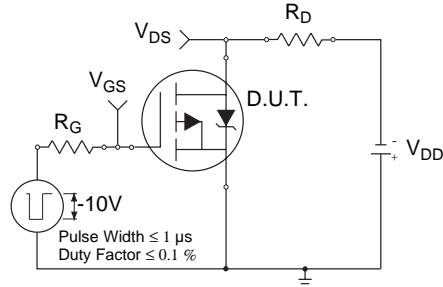


Fig 10a. Switching Time Test Circuit

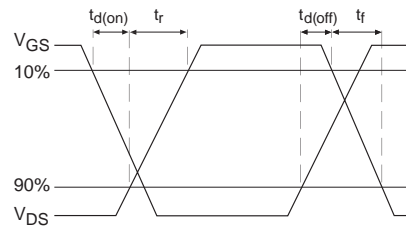


Fig 10b. Switching Time Waveforms

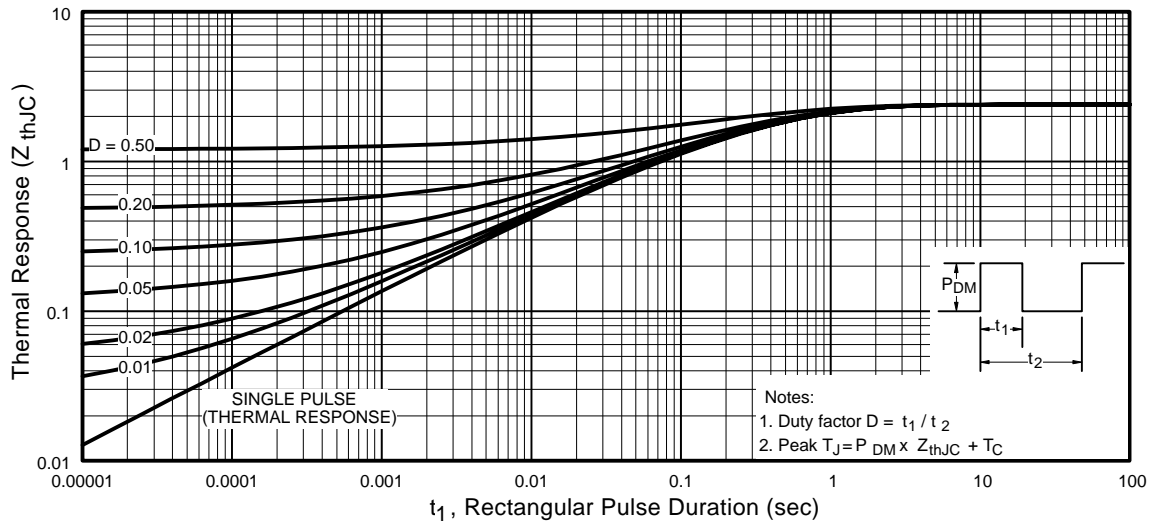


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

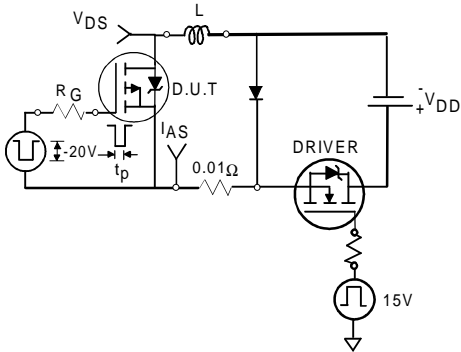


Fig 12a. Unclamped Inductive Test Circuit

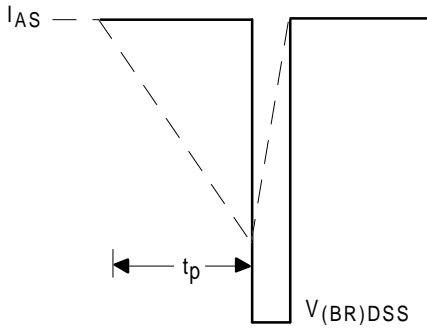


Fig 12b. Unclamped Inductive Waveforms

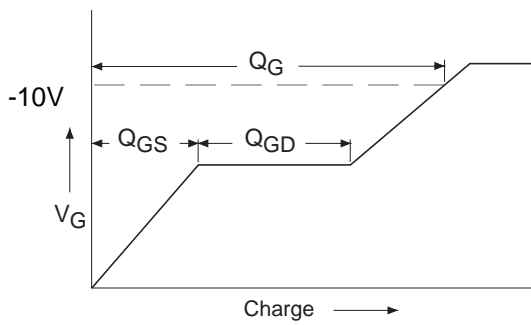


Fig 13a. Basic Gate Charge Waveform

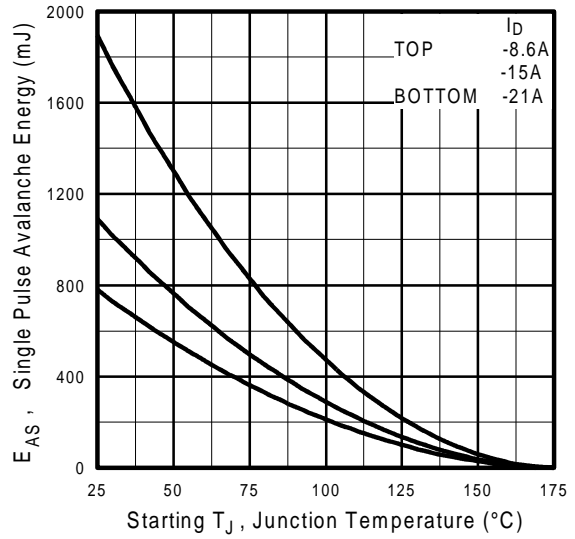


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

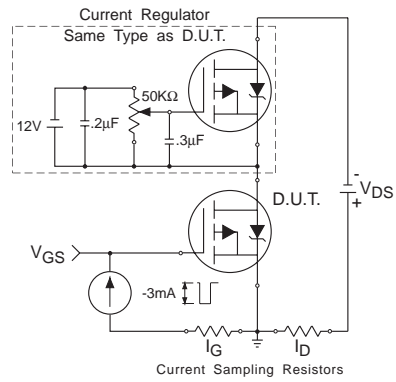
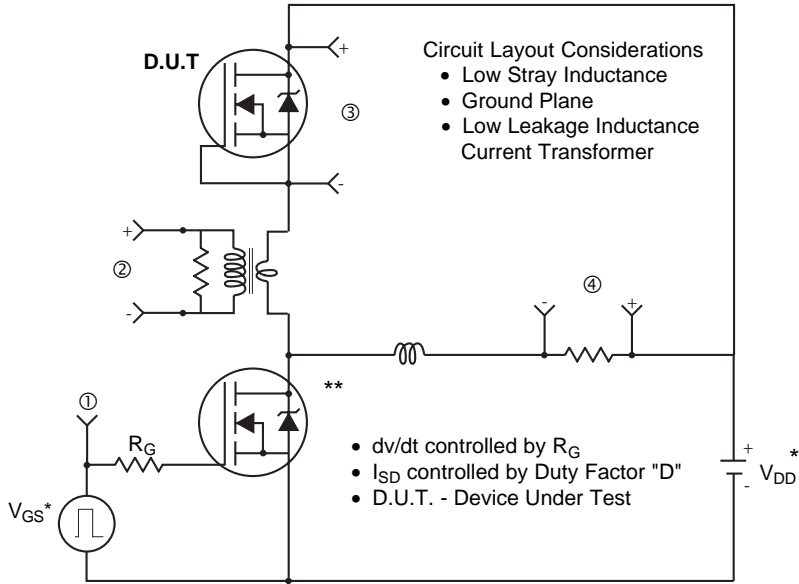
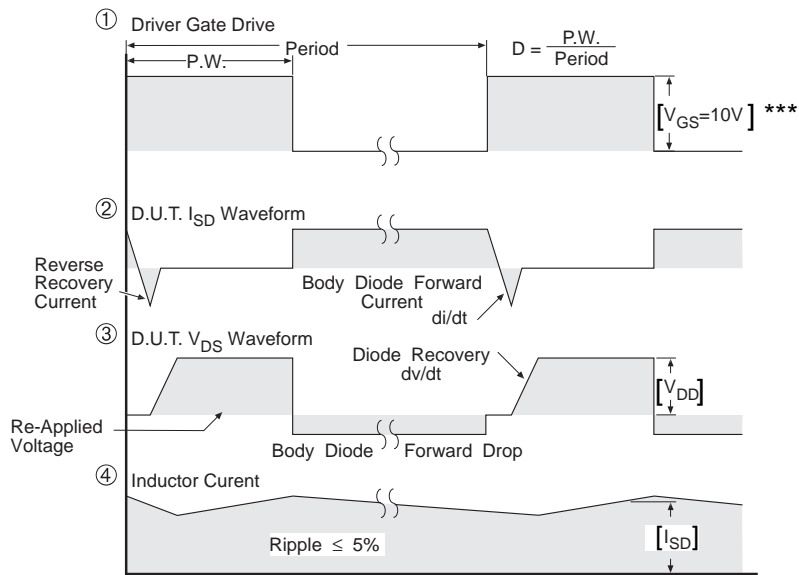


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



* Reverse Polarity for P-Channel
 ** Use P-Channel Driver for P-Channel Measurements



*** $V_{GS} = 5.0V$ for Logic Level and 3V Drive Devices

Fig 14. For P-Channel HEXFETS

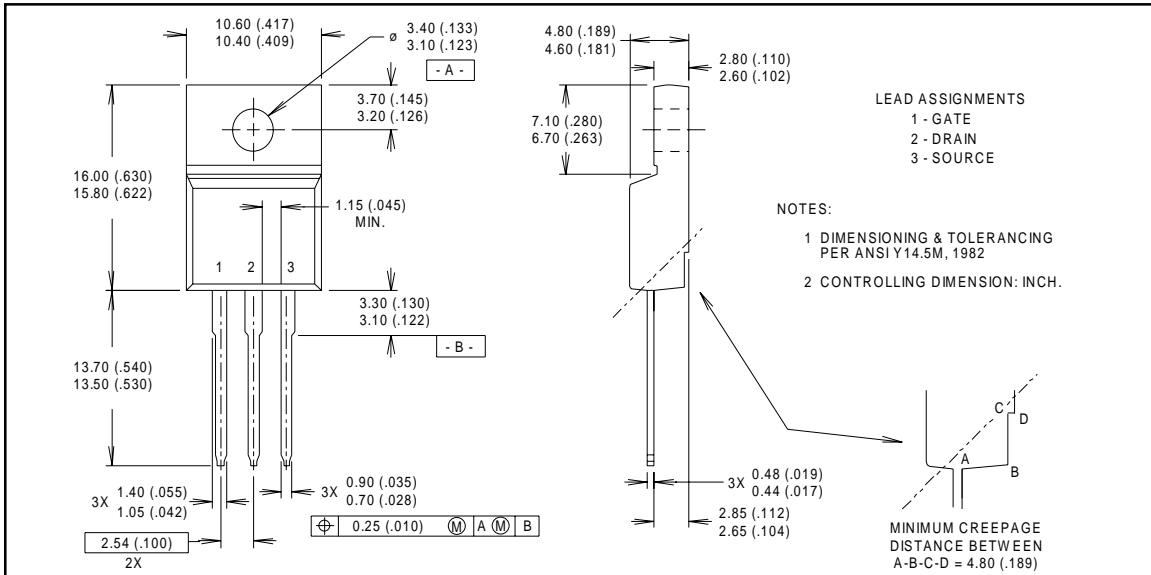
IRFI5210

International
IR Rectifier

Package Outline

TO-220 Fullpak Outline

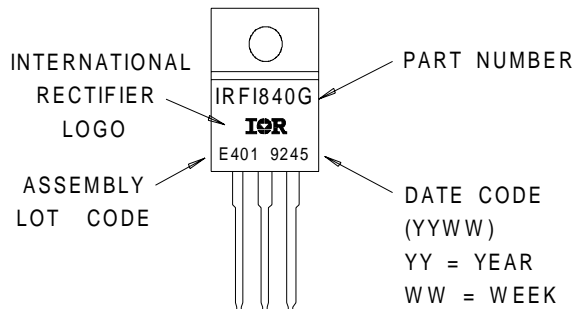
Dimensions are shown in millimeters (inches)



Part Marking Information

TO-220 Fullpak

EXAMPLE : THIS IS AN IRFI840G
 WITH ASSEMBLY
 LOT CODE E401



International
IR Rectifier

WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, Tel: (310) 322 3331
EUROPEAN HEADQUARTERS: Hurst Green, Oxted, Surrey RH8 9BB, UK Tel: ++ 44 1883 732020
IR CANADA: 7321 Victoria Park Ave., Suite 201, Markham, Ontario L3R 2Z8, Tel: (905) 475 1897
IR GERMANY: Saalburgstrasse 157, 61350 Bad Homburg Tel: ++ 49 6172 96590
IR ITALY: Via Liguria 49, 10071 Borgaro, Torino Tel: ++ 39 11 451 0111
IR FAR EAST: K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo Japan 171 Tel: 81 3 3983 0086
IR SOUTHEAST ASIA: 315 Outram Road, #10-02 Tan Boon Liat Building, Singapore 0316 Tel: 65 221 8371
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