International
IOR Rectifier

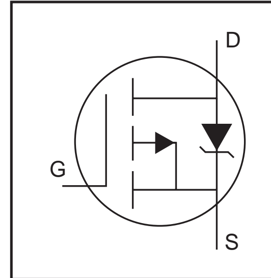
PD - 9.1488

PRELIMINARY

IRFI9634G

HEXFET® Power MOSFET

- Advanced Process Technology
- Dynamic dv/dt Rating
- 150°C Operating Temperature
- Fast Switching
- P-Channel
- Fully Avalanche Rated



V_{DSS} = -250V

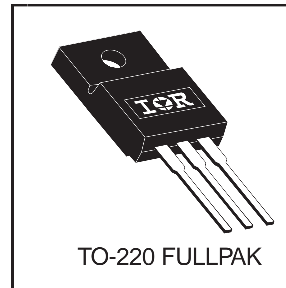
$R_{DS(on)}$ = 1.0Ω

I_D = -4.1A

Description

Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

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.



TO-220 FULLPAK

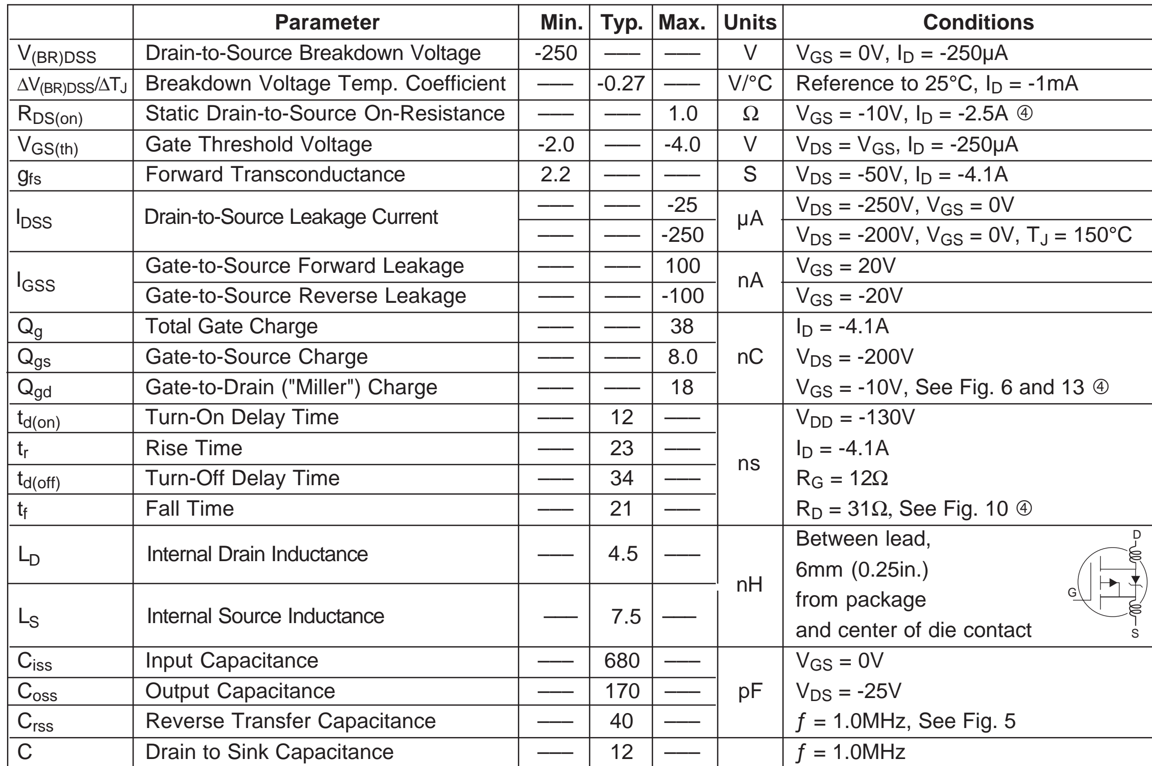
Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ -10V	-4.1	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ -10V	-2.6	
I_{DM}	Pulsed Drain Current ①	-16	
P_D @T_C = 25°C	Power Dissipation	35	W
	Linear Derating Factor	0.28	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy②	520	mJ
I_{AR}	Avalanche Current①	-4.1	A
E_{AR}	Repetitive Avalanche Energy①	3.5	mJ
dv/dt	Peak Diode Recovery dv/dt ③	-5.0	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C
	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	—–	3.6	°C/W
$R_{\theta JA}$	Junction-to-Ambient	—–	65	

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)



	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-250	——	——	V	V_{GS} = 0V, I_D = -250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	-0.27	——	V/°C	Reference to 25°C, I_D = -1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	——	1.0	Ω	V_{GS} = -10V, I_D = -2.5A ④
$V_{GS(th)}$	Gate Threshold Voltage	-2.0	——	-4.0	V	V_{DS} = V_{GS}, I_D = -250μA
g_{fs}	Forward Transconductance	2.2	——	——	S	V_{DS} = -50V, I_D = -4.1A
I_{DSS}	Drain-to-Source Leakage Current	——	——	-25	μA	V_{DS} = -250V, V_{GS} = 0V
		——	——	-250		V_{DS} = -200V, V_{GS} = 0V, T_J = 150°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	——	——	38	nC	I_D = -4.1A
Q_{gs}	Gate-to-Source Charge	——	——	8.0		V_{DS} = -200V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	——	18		V_{GS} = -10V, See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	——	12	——	ns	V_{DD} = -130V
t_r	Rise Time	——	23	——		I_D = -4.1A
$t_{d(off)}$	Turn-Off Delay Time	——	34	——		R_G = 12Ω
t_f	Fall Time	——	21	——		R_D = 31Ω, See Fig. 10 ④
L_D	Internal Drain Inductance	——	4.5	——	nH	Between lead, 6mm (0.25in.)
L_S	Internal Source Inductance	——	7.5	——		from package and center of die contact
C_{iss}	Input Capacitance	——	680	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	170	——		V_{DS} = -25V
C_{rss}	Reverse Transfer Capacitance	——	40	——		ƒ = 1.0MHz, See Fig. 5
C	Drain to Sink Capacitance	——	12	——		ƒ = 1.0MHz

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	-4.1	A	MOSFET symbol showing the
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	-16		integral reverse p-n junction diode.
V_{SD}	Diode Forward Voltage	——	——	-6.5	V	T_J = 25°C, I_S = -4.1A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	190	290	ns	T_J = 25°C, I_F = -4.1A
Q_{rr}	Reverse RecoveryCharge	——	1.5	2.2	μC	di/dt = -100A/μs ④
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°C, L = 62mH R_G = 25Ω, I_{AS} = -4.1A. (See Figure 12)

③ I_{SD} ≤ -4.1A, di/dt ≤ -640A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 150°C

④ Pulse width ≤ 300μs; duty cycle ≤ 2%.

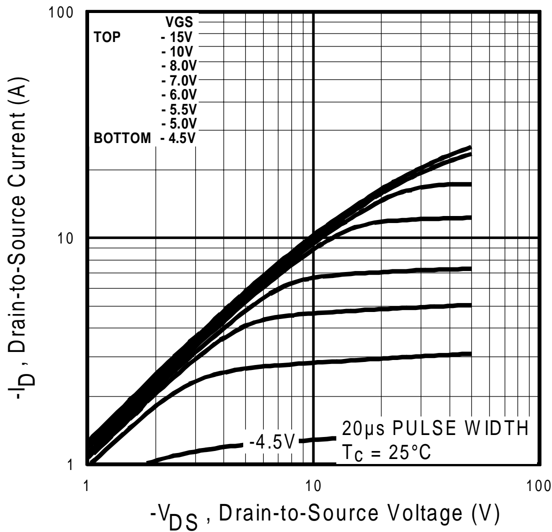


Fig 1. Typical Output Characteristics, $T_J = 25^oC$

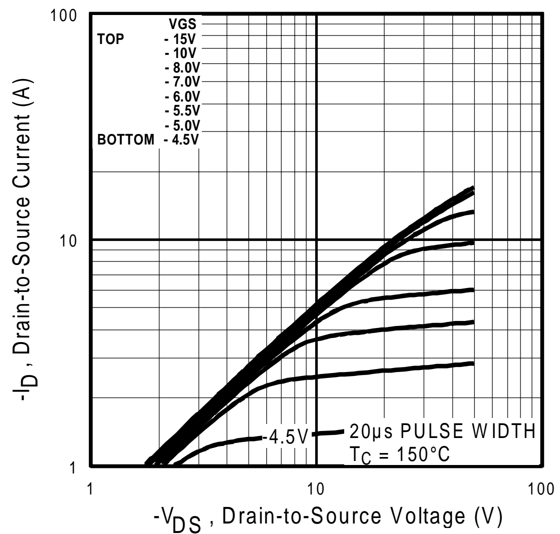


Fig 2. Typical Output Characteristics, $T_J = 150^oC$

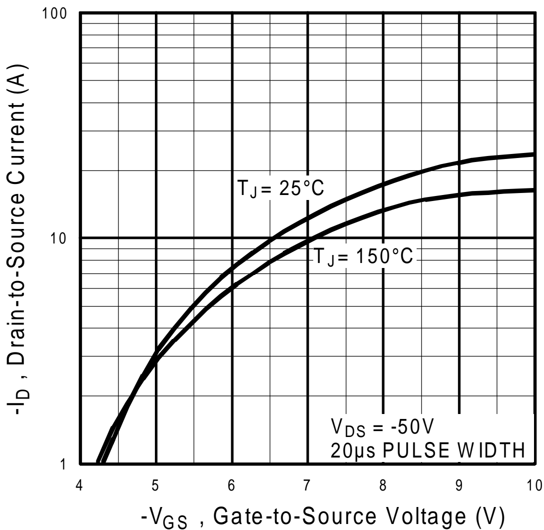


Fig 3. Typical Transfer Characteristics

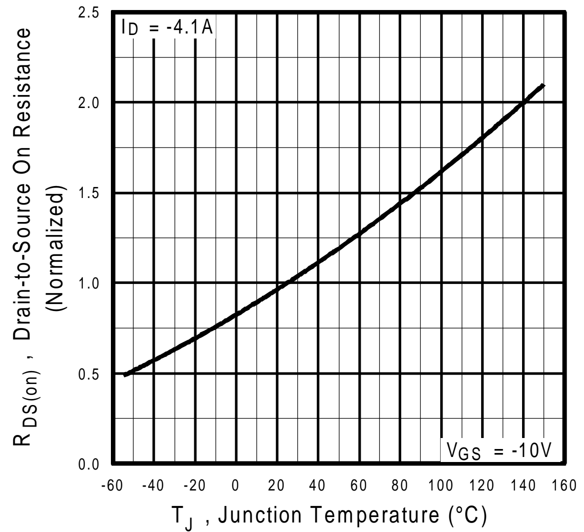


Fig 4. Normalized On-Resistance Vs. Temperature

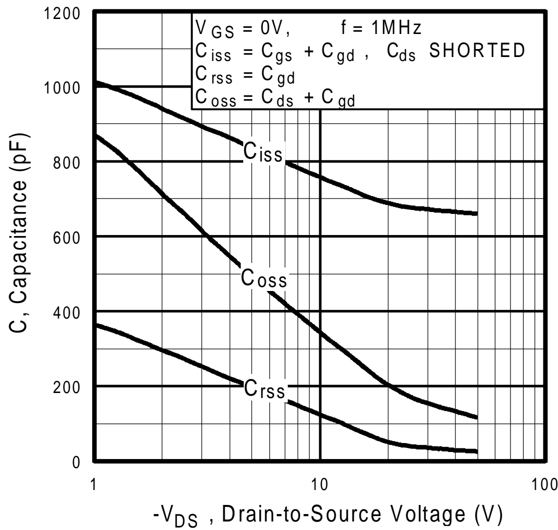


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

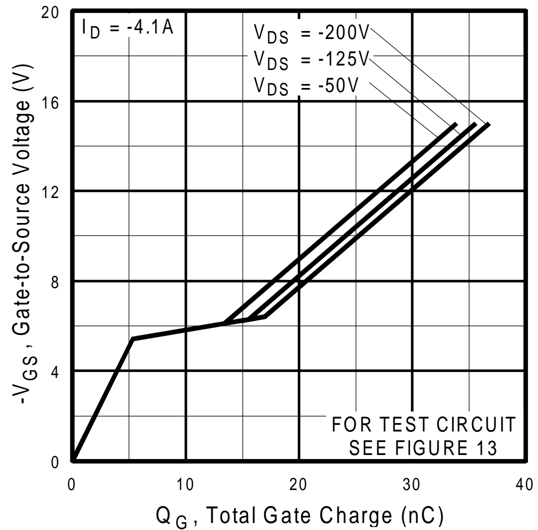


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

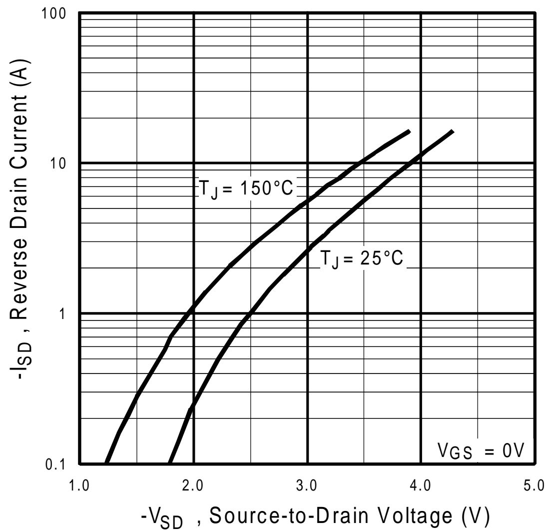


Fig 7. Typical Source-Drain Diode Forward Voltage

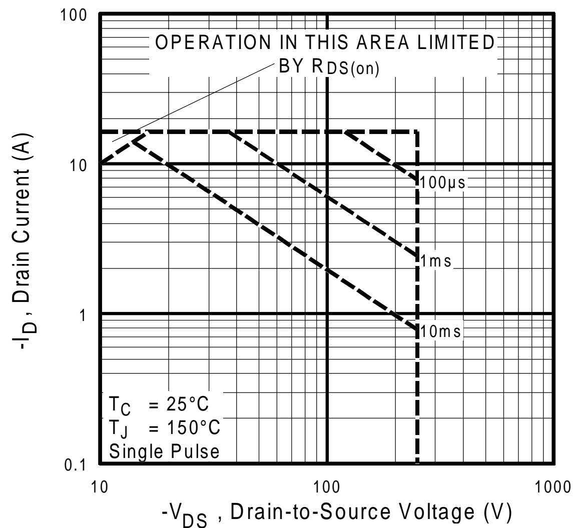


Fig 8. Maximum Safe Operating Area

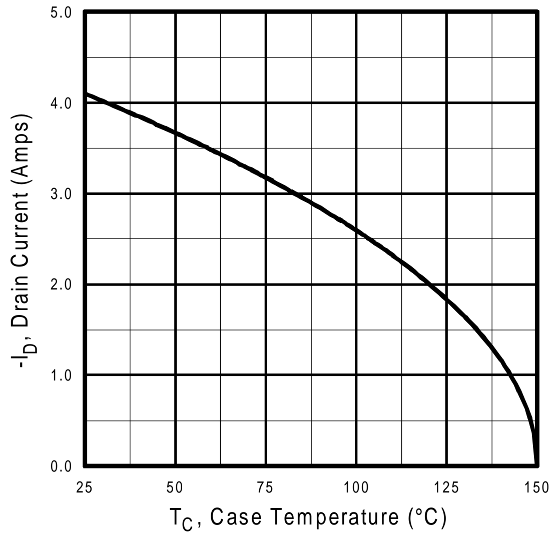


Fig 9. Maximum Drain Current Vs. Case Temperature

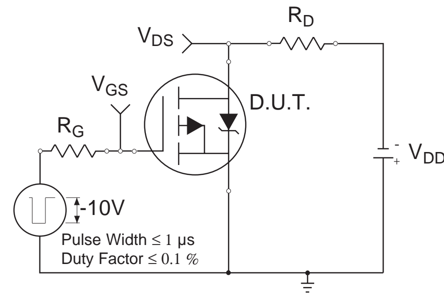


Fig 10a. Switching Time Test Circuit

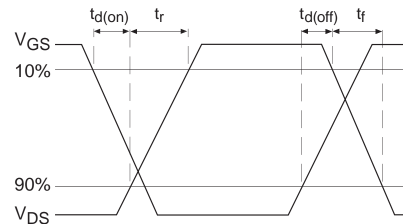


Fig 10b. Switching Time Waveforms

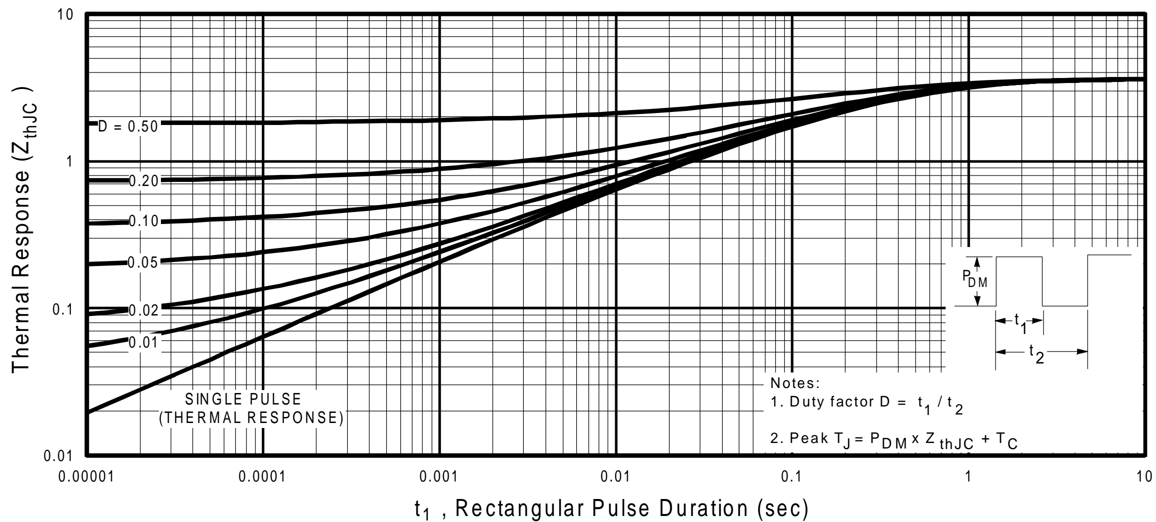


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

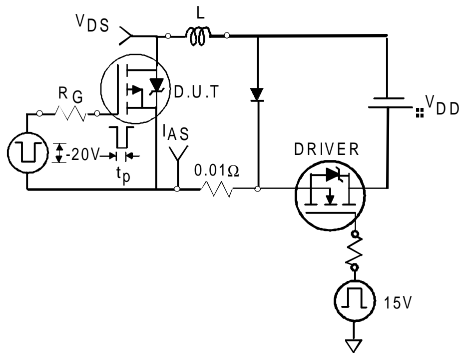


Fig 12a. Unclamped Inductive Test Circuit

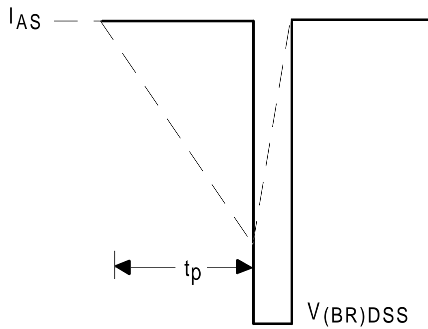


Fig 12b. Unclamped Inductive Waveforms

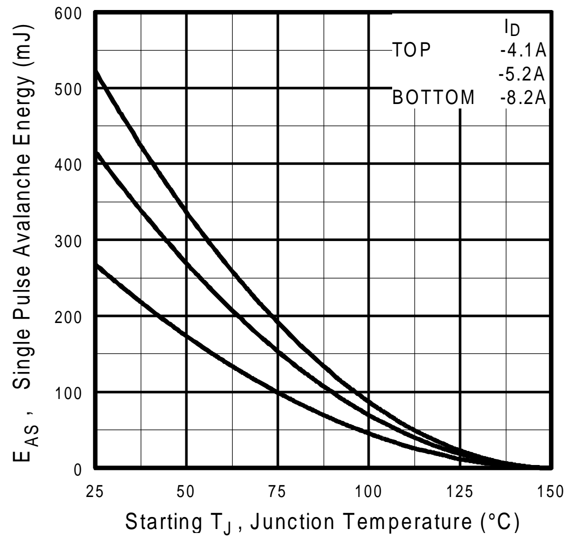


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

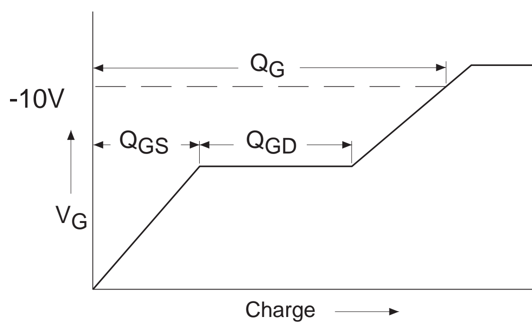


Fig 13a. Basic Gate Charge Waveform

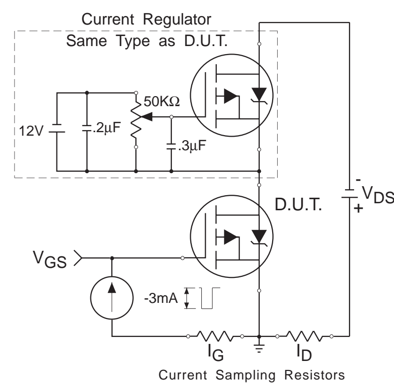
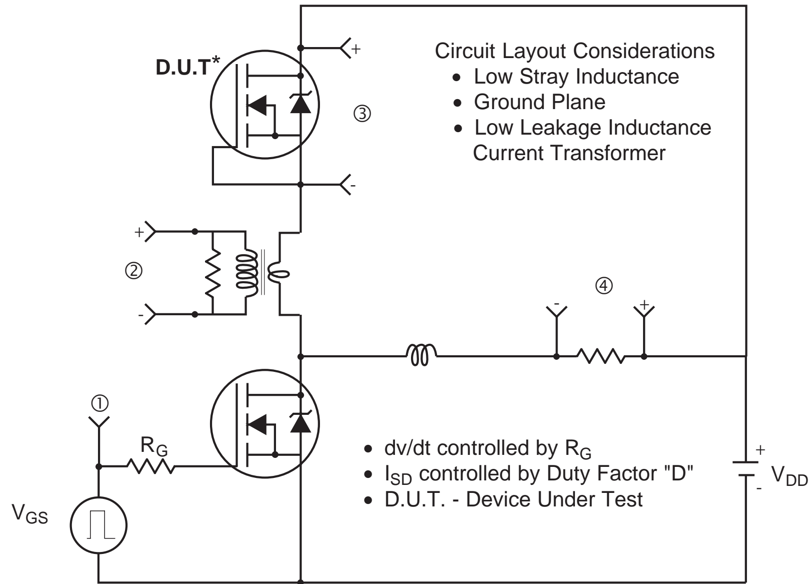
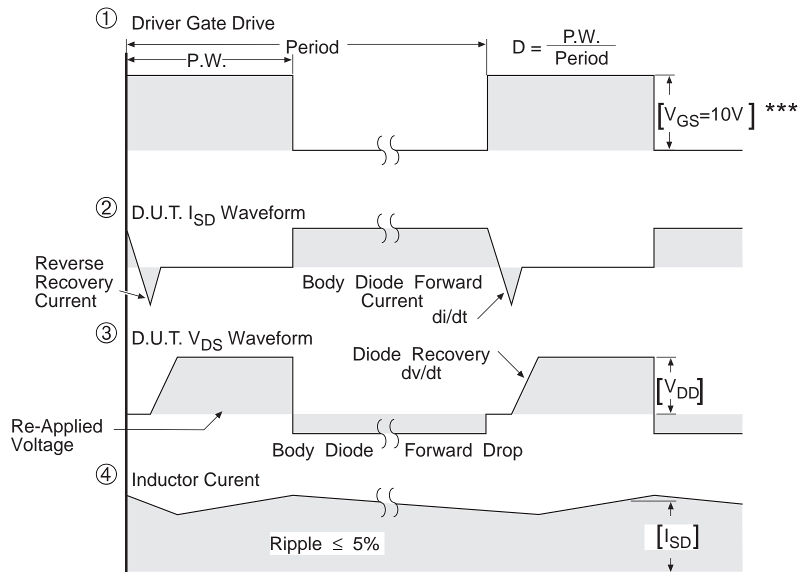


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



* Reverse Polarity of D.U.T for P-Channel



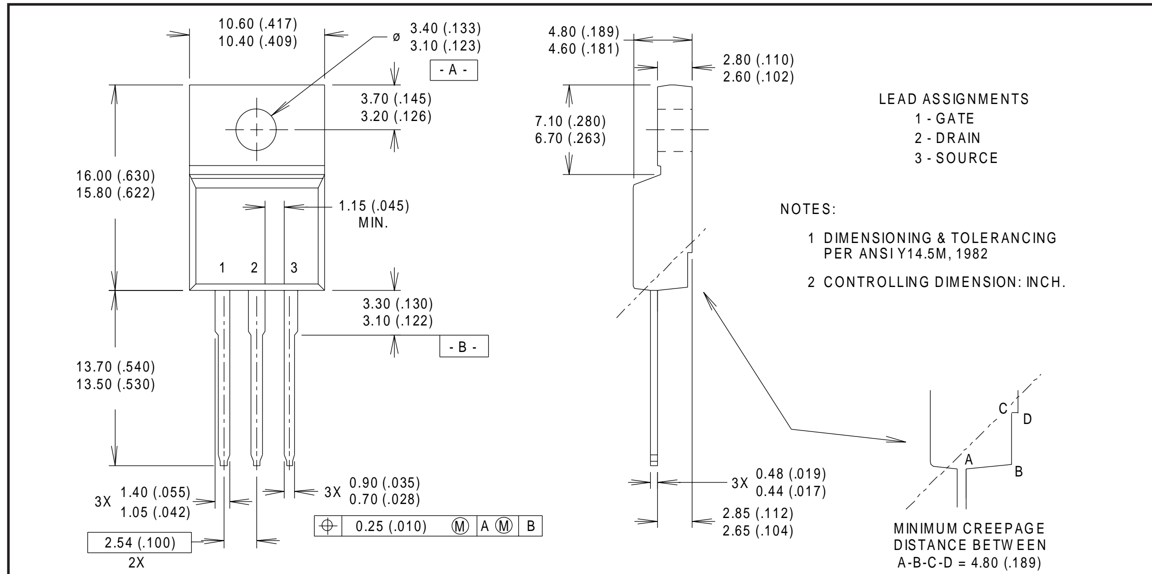
*** V_{GS} = 5.0V for Logic Level and 3V Drive Devices

Fig 14. For P-Channel HEXFETS

Package Outline

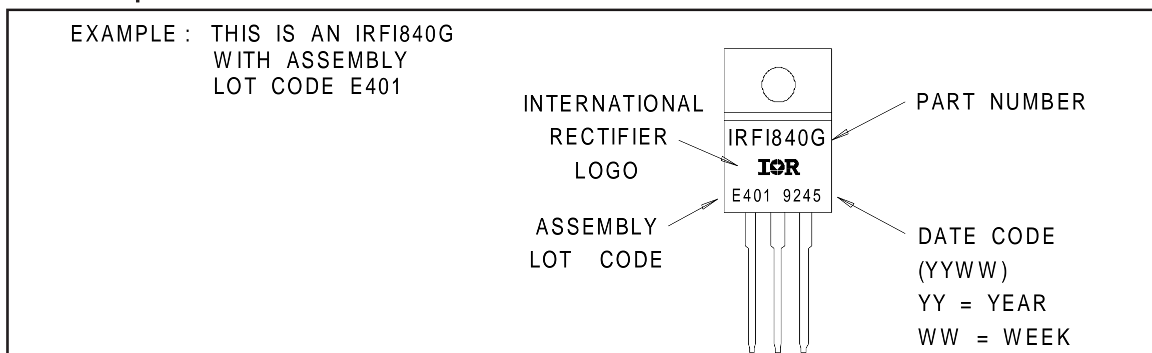
TO-220 Fullpak Outline

Dimensions are shown in millimeters (inches)



Part Marking Information

TO-220 Fullpak



International
IOR 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, 3-30-4 Nishi-Ikeburo 3-Chome, Toshima-Ki, 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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