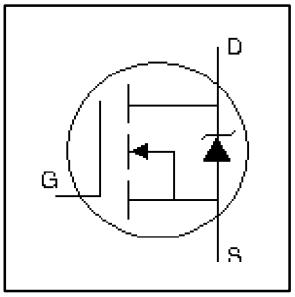
International
IOR Rectifier

PD - 9.1092A

IRLI2203G

HEXFET® Power MOSFET

- Advanced Process Technology
- Ultra Low On-Resistance
- Isolated Package
- High Voltage Isolation = 2.5KVRMS⑥
- Sink to Lead Creepage Dist. = 4.8mm
- Logic-Level Gate Drive
- $R_{DS(on)}$ Specified at V_{GS}=5.0V & 10V



V_{DSS} = 30V

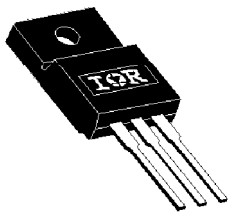
$R_{DS(on)}$ = 0.010Ω

I_D = 52A⑤

Description

Fourth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve the lowest possible 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 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.



TO-220 FULLPAK

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	52⑤	A
I_D @ T_C = 100°C	Continuous Collector Current, V_{GS} @ 10V	37	
I_{DM}	Pulsed Drain Current ①	210	
P_D @T_C = 25°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 Energy ②	90	mJ
I_{AR}	Avalanche Current①	31	A
E_{AR}	Repetitive Avalanche Energy ①	4.8	mJ
dv/dt	Peak Diode Recovery dv/dt ③	4.5	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°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	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	——	——	3.1	°C/W
$R_{\theta JA}$	Junction-to-Ambient	——	——	65	

Revision 1

IRLI2203G

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	30	—	—	V	V_{GS} = 0V, I_D = 250µA, T_J >-40°C
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.039	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.010	Ω	V_{GS} = 10V, I_D = 31A ④
		—	—	0.015		V_{GS} = 5.0V, I_D = 26A ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	2.0	V	V_{DS} = V_{GS}, I_D = 250µA
g_{fs}	Forward Transconductance	44	—	—	S	V_{DS} = 25V, I_D = 55A
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	µA	V_{DS} = 30V, V_{GS} = 0V
		—	—	250		V_{DS} = 24V, V_{GS} = 0V, T_J = 150°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V_{GS} = 10V
	Gate-to-Source Reverse Leakage	—	—	-100		V_{GS} = -10V
Q_g	Total Gate Charge	—	—	85	nC	I_D= 46A, V_{DS}= 24V, V_{GS}= 5.0V
		—	—	150		I_D= 55A
Q_{gs}	Gate-to-Source Charge	—	—	23		V_{DS} = 24V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	36		V_{GS} = 10V, See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	9.1	—	ns	V_{DD} = 15V
t_r	Rise Time	—	110	—		I_D = 55A
$t_{d(off)}$	Turn-Off Delay Time	—	110	—		R_G = 5.0Ω
t_f	Fall Time	—	100	—		R_D = 0.26Ω, See Fig. 10 ④
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	—	3700	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	1700	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	310	—		f = 1.0MHz, See Fig. 5
C	Drain to Sink Capacitance	—	12	—	pF	f = 1.0MHz

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	52⑤	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	210		
V_{SD}	Diode Forward Voltage	—	—	1.6	V	T_J = 25°C, I_S = 31A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	59	89	ns	T_J = 25°C, I_F = 55A
Q_{rr}	Reverse RecoveryCharge	—	0.11	0.17	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 V_{DD} = 25V, starting T_J = 25°C, L = 20µH R_G = 25Ω, I_{AS} = 55A. (See Figure 12)

③ I_{SD} ≤ 55A, di/dt ≤ 100A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 175°C

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

⑤ Caculated continuous current based on maximum allowable junction temperature; for recomended current-handling of the package refer to Design Tip # 93-4

⑥ t=60s, f=60Hz

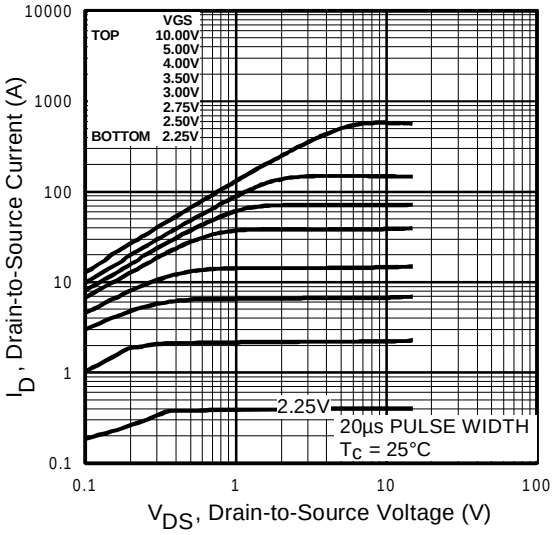


Fig 1. Typical Output Characteristics, $T_C = 25^oC$

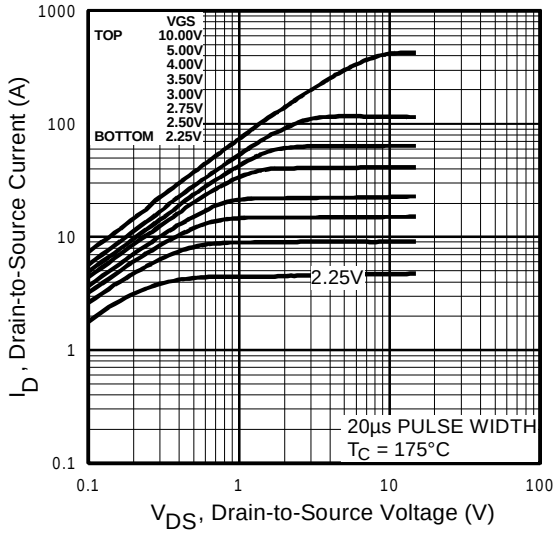


Fig 2. Typical Output Characteristics, $T_C = 175^oC$

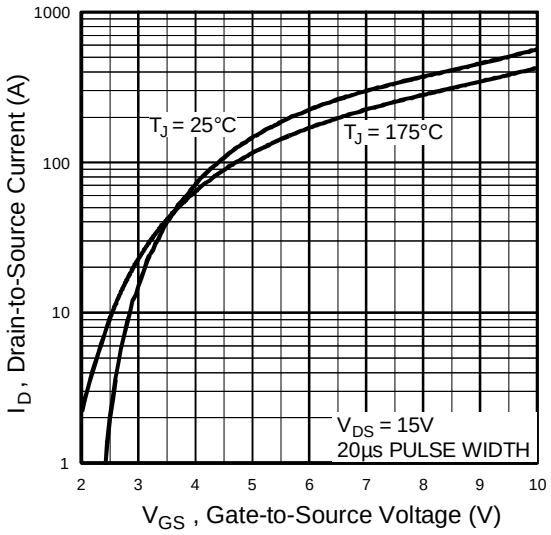


Fig 3. Typical Transfer Characteristics

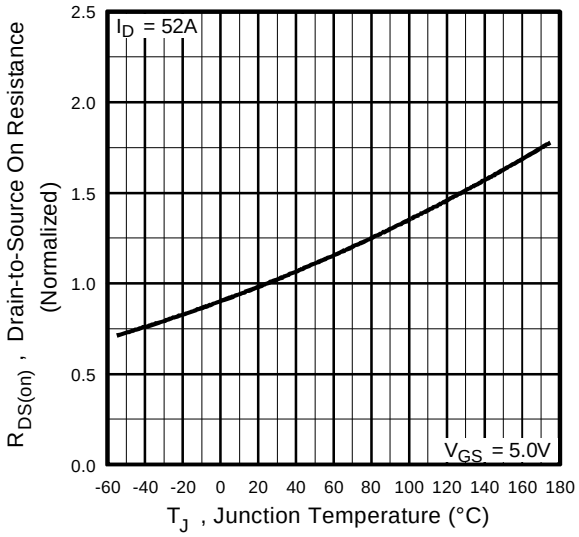


Fig 4. Normalized On-Resistance Vs. Temperature

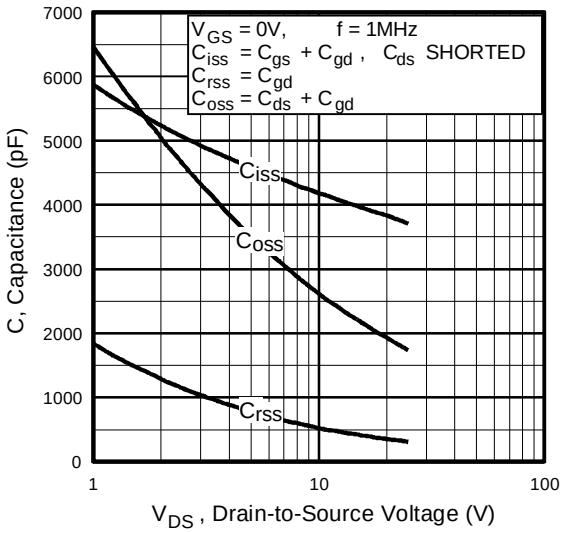


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

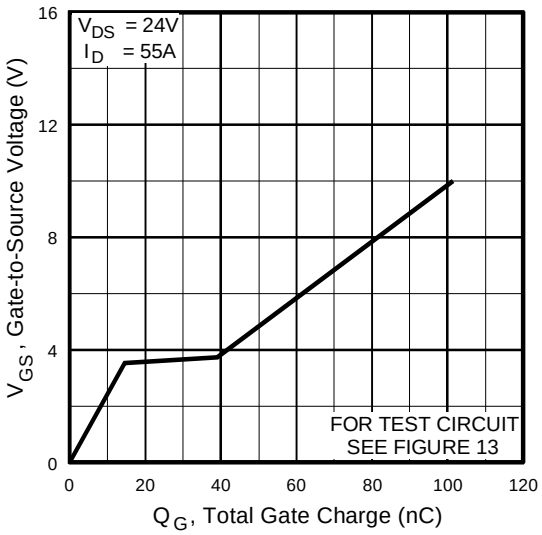


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

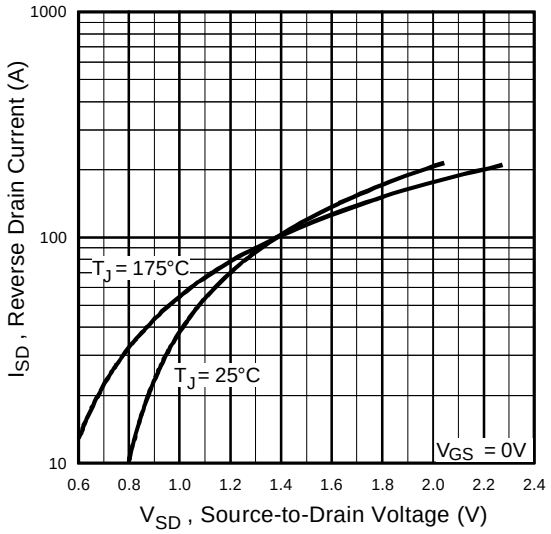


Fig 7. Typical Source-Drain Diode Forward Voltage

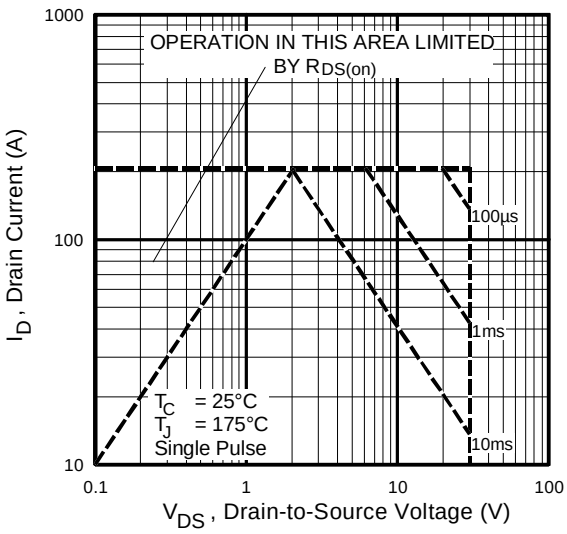


Fig 8. Maximum Safe Operating Area

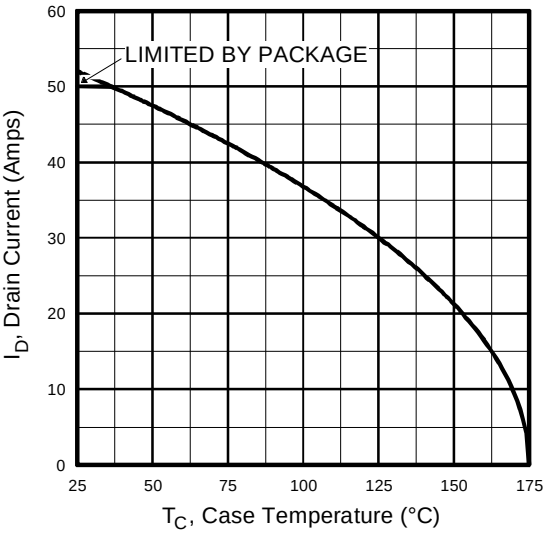


Fig 9. Maximum Drain Current Vs. Case Temperature

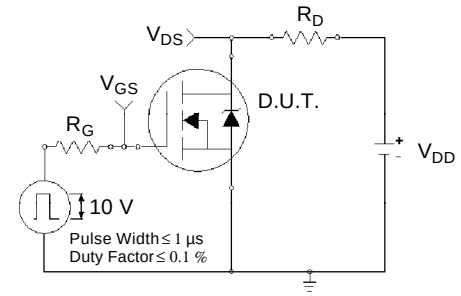


Fig 10a. Switching Time Test Circuit

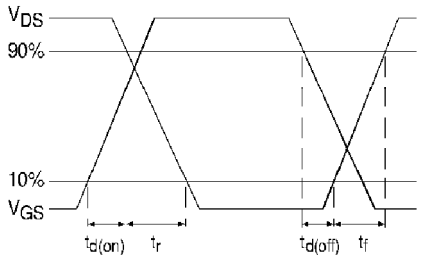


Fig 10b. Switching Time Waveforms

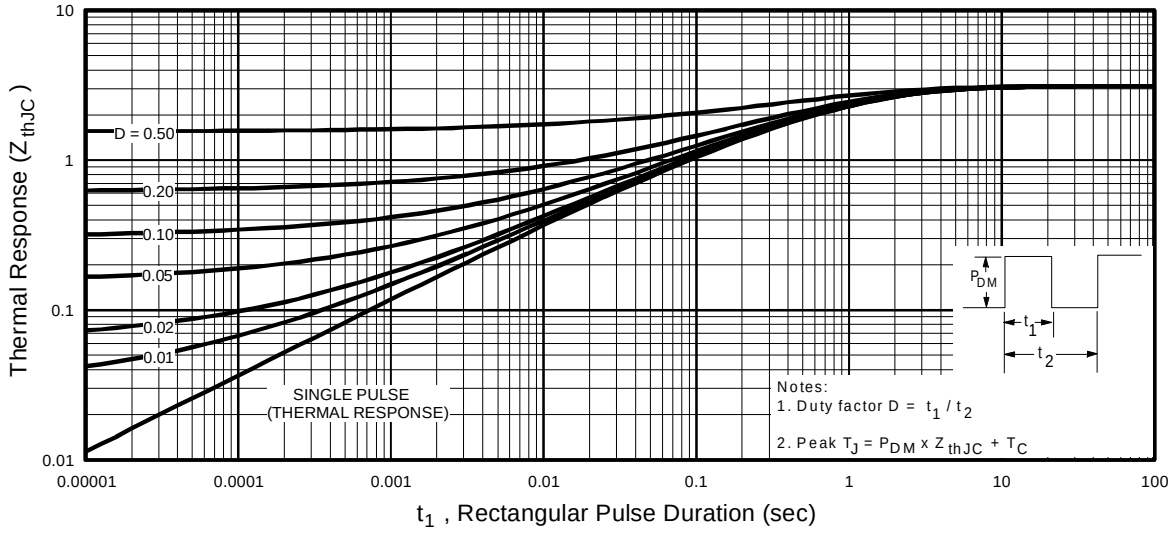


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

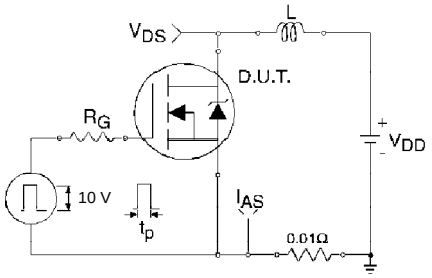


Fig 12a. Unclamped Inductive Test Circuit

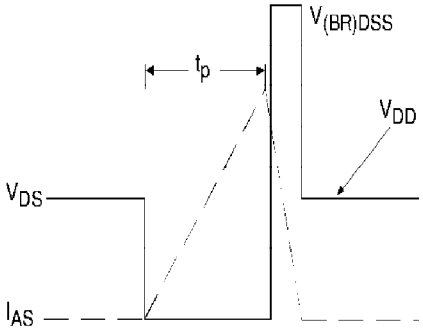


Fig 12b. Unclamped Inductive Waveforms

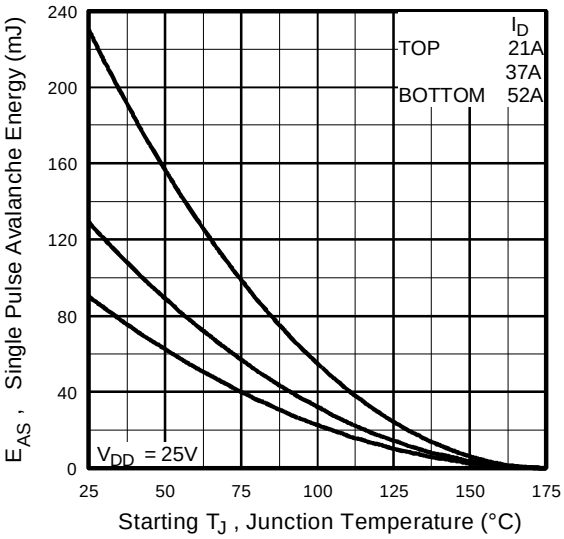


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

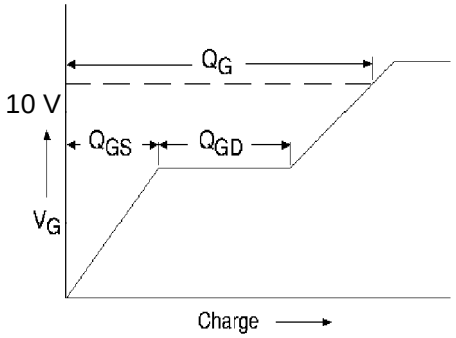


Fig 13a. Basic Gate Charge Waveform

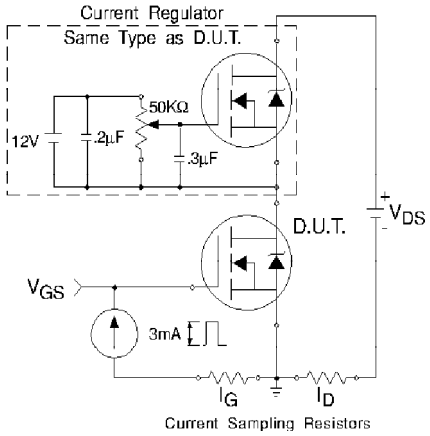
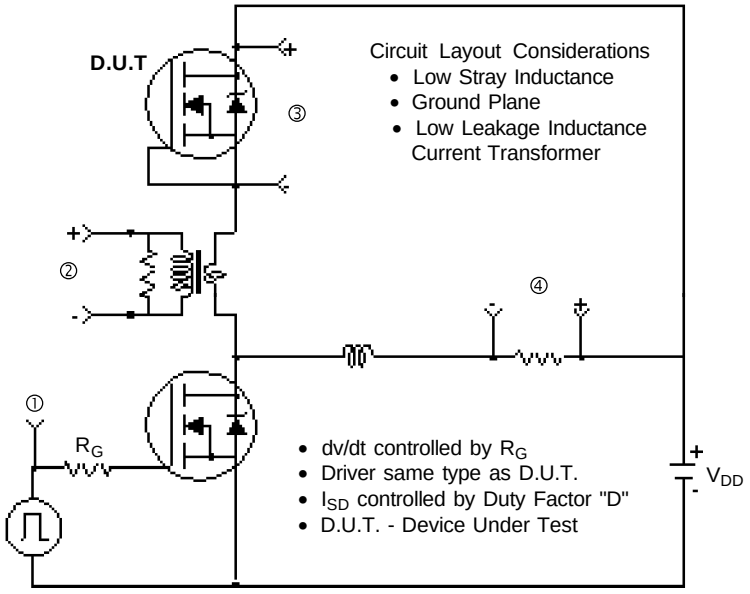
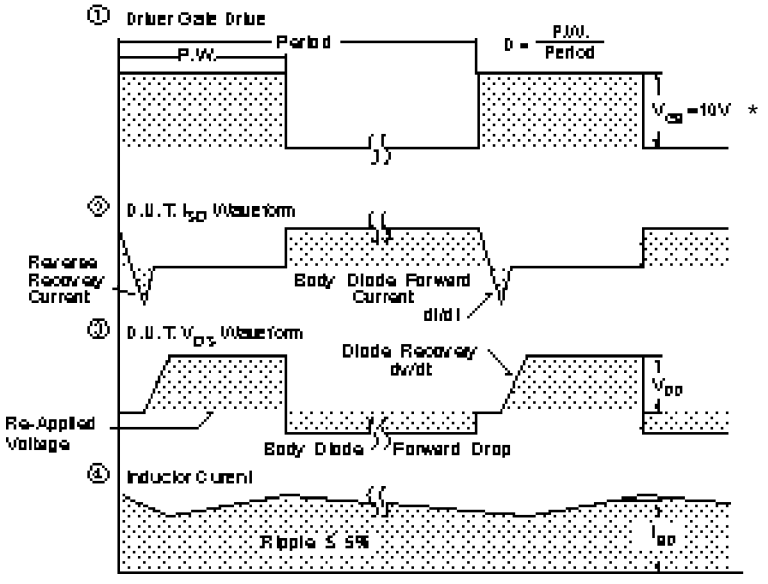


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit





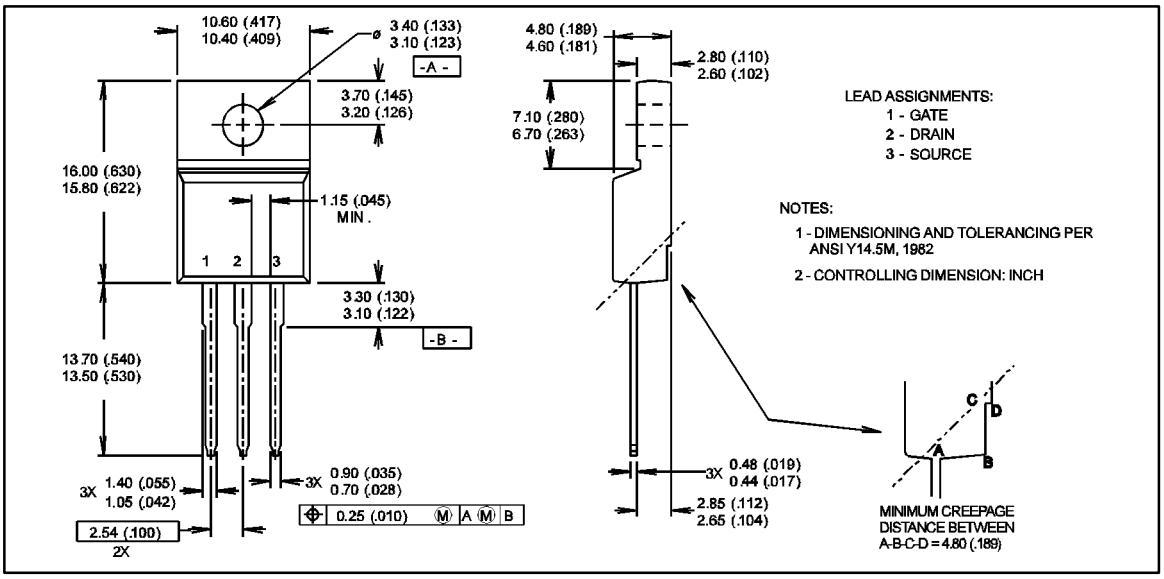
* VGS = 5V for Logic Level Devices

Fig 14. For N-Channel HEXFETS

IRLI2203G

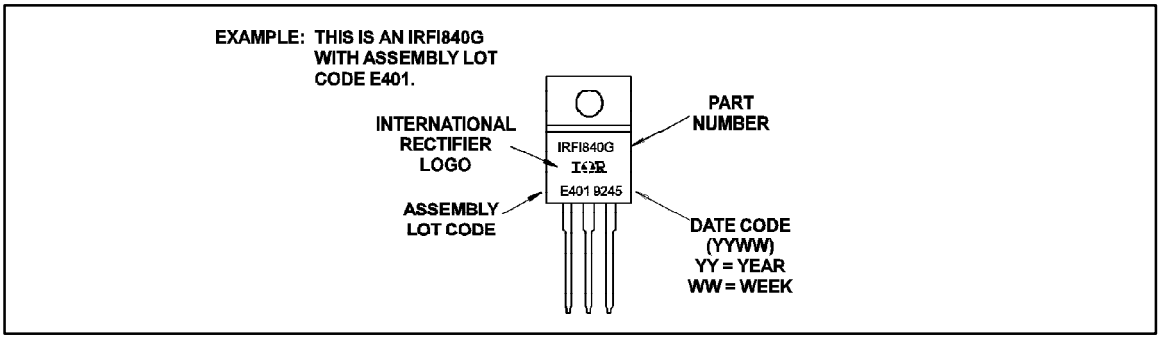
Package Outline

TO-220 FullPak Outline
Dimensions are shown in millimeters (inches)



Part Marking Information

TO-220 FullPak



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