

International Rectifier

Rectifier

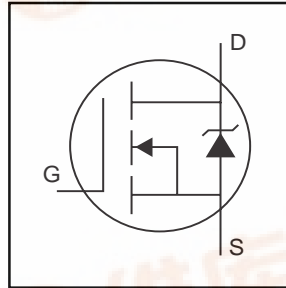
HEXFET® Power MOSFET

PRELIMINARY

PD - 9.1353A

IRFI530N

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

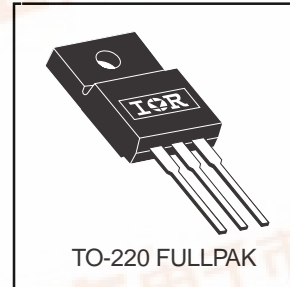


$V_{DSS} = 100V$
$R_{DS(on)} = 0.11\Omega$
$I_D = 12A$

Description

Fifth 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.



Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	12	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	8.6	
I_{DM}	Pulsed Drain Current ①⑥	60	
$P_D @ T_C = 25^\circ C$	Power Dissipation	41	W
	Linear Derating Factor	0.27	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②⑥	150	mJ
I_{AR}	Avalanche Current ①⑥	9.0	A
E_{AR}	Repetitive Avalanche Current ①	4.1	mJ
dv/dt	Peak Diode Recovery dv/dt ③⑥	5.0	V/ns
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		
	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	—	—	3.7	°C/W
$R_{\theta JA}$	Junction-to-Ambient	—	—	65	

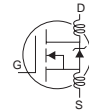


IRFI530N

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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	100	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.12	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1\text{mA}$ ⑥
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.11	Ω	$V_{GS} = 10V, I_D = 6.6A$ 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	6.4	—	—	S	$V_{DS} = 50V, I_D = 9.0A$ ⑥
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 100V, V_{GS} = 0V$ $V_{DS} = 80V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100	nA	$V_{GS} = -20V$
Q_g	Total Gate Charge	—	—	44	nC	$I_D = 9.0A$
Q_{gs}	Gate-to-Source Charge	—	—	6.2	nC	$V_{DS} = 80V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	21	nC	$V_{GS} = 10V$, See Fig. 6 and 13 ④ ⑥
$t_{d(on)}$	Turn-On Delay Time	—	6.4	—	ns	$V_{DD} = 50V$ $I_D = 9.0A$ $R_G = 12\Omega$ $R_D = 5.5\Omega$, See Fig. 10 ④ ⑥
t_r	Rise Time	—	27	—		
$t_{d(off)}$	Turn-Off Delay Time	—	37	—		
t_f	Fall Time	—	25	—		
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	—	640	—	pF	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1.0\text{MHz}$, See Fig. 5 ⑥
C_{oss}	Output Capacitance	—	160	—		
C_{rss}	Reverse Transfer Capacitance	—	88	—		
C	Drain to Sink Capacitance	—	12	—		

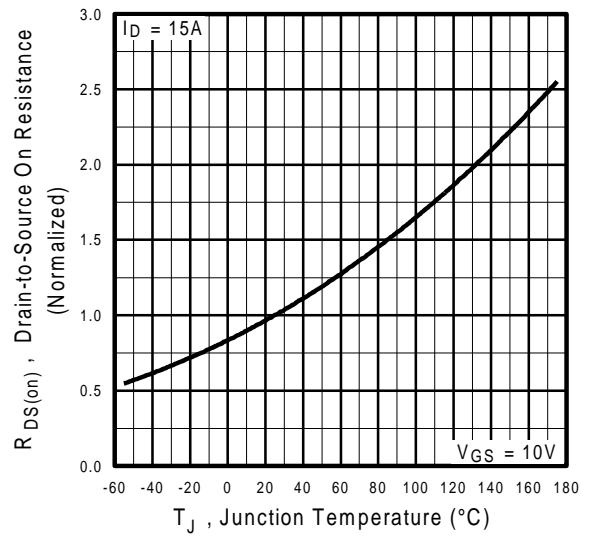
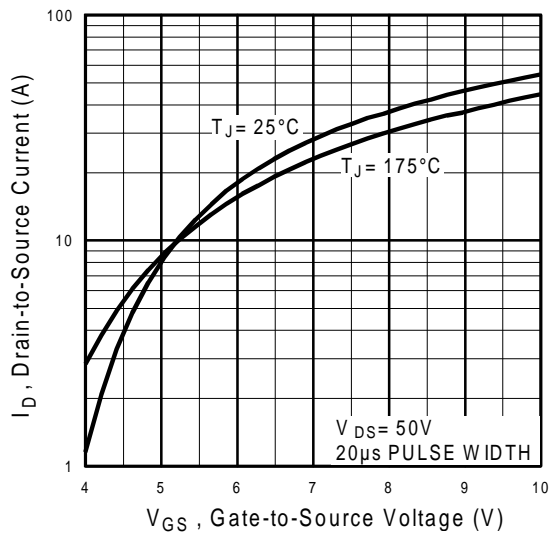
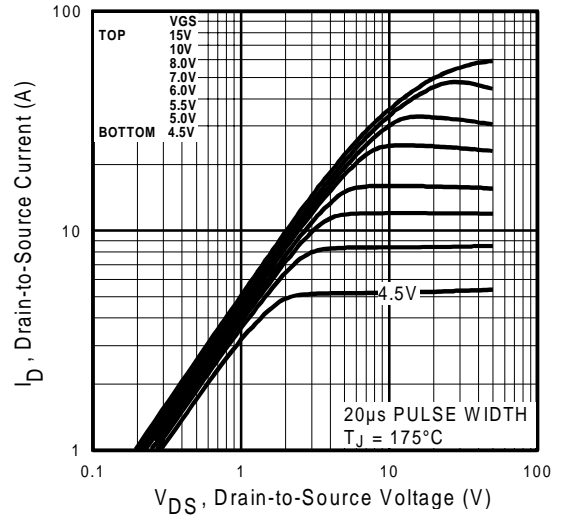
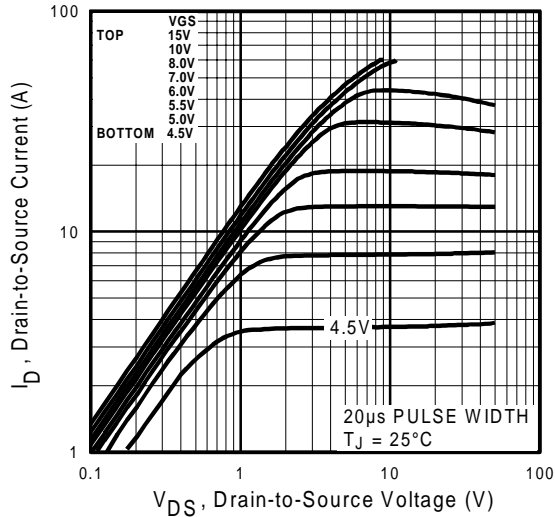


Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	12	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ① ⑥	—	—	60		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 6.6A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	130	190	ns	$T_J = 25^\circ\text{C}, I_F = 9.0A$
Q_{rr}	Reverse Recovery Charge	—	650	970	nC	$di/dt = 100A/\mu s$ ④ ⑥

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- ② $V_{DD} = 15V$, starting $T_J = 25^\circ\text{C}$, $L = 3.1\text{mH}$
 $R_G = 25\Omega, I_{AS} = 9.0A$. (See Figure 12)
- ③ $I_{SD} \leq 9.0A$, $di/dt \leq 520A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$,
 $T_J \leq 175^\circ\text{C}$
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.
- ⑤ $t = 60s$, $f = 60\text{Hz}$
- ⑥ Uses IRFI530N data and test conditions



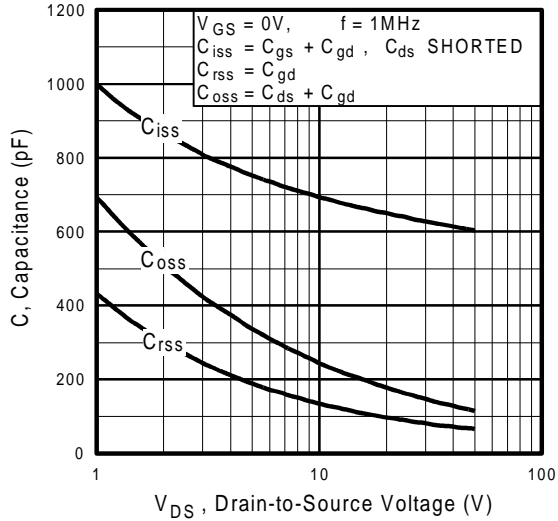


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

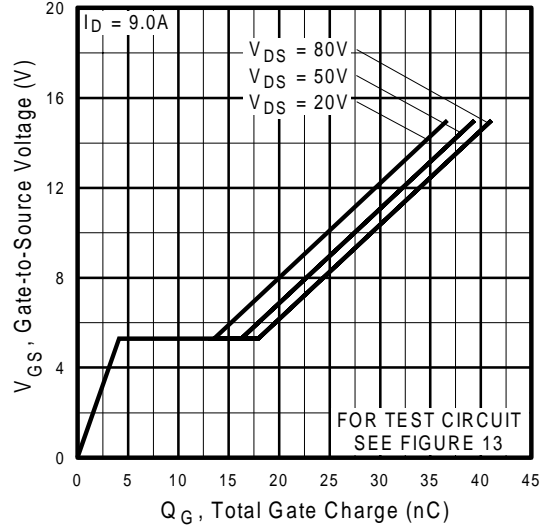


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

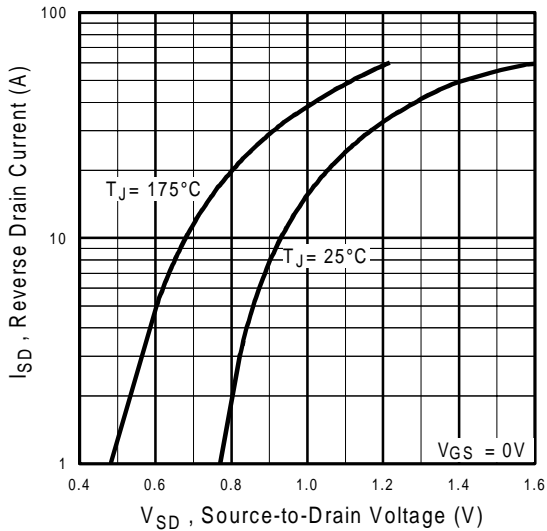


Fig 7. Typical Source-Drain Diode Forward Voltage

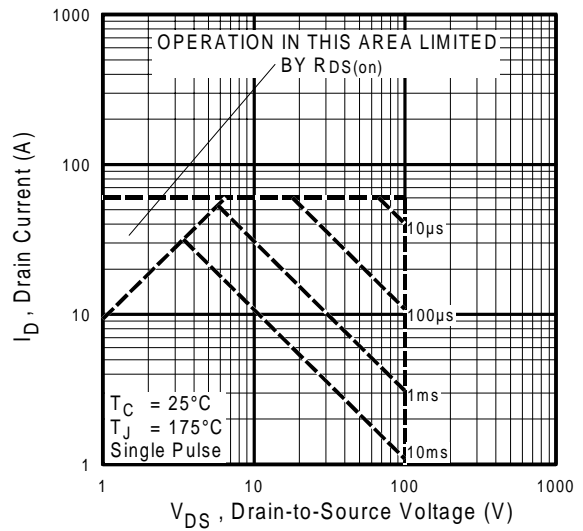


Fig 8. Maximum Safe Operating Area

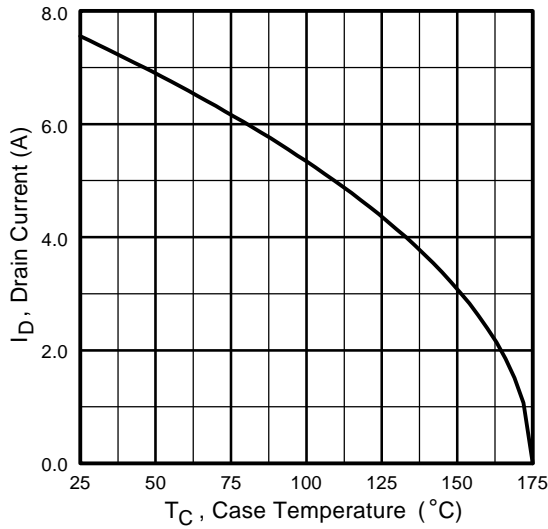


Fig 9. Maximum Drain Current Vs. Case Temperature

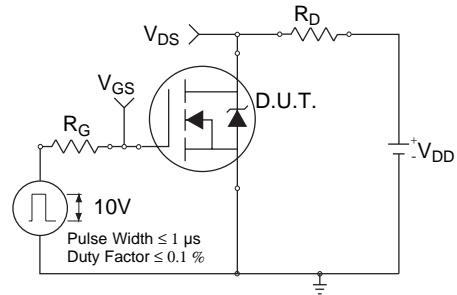


Fig 10a. Switching Time Test Circuit

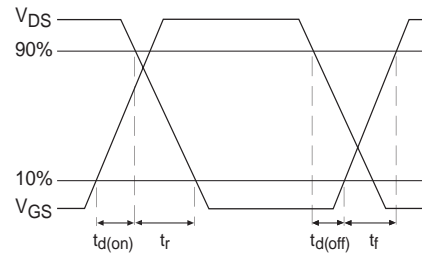


Fig 10b. Switching Time Waveforms

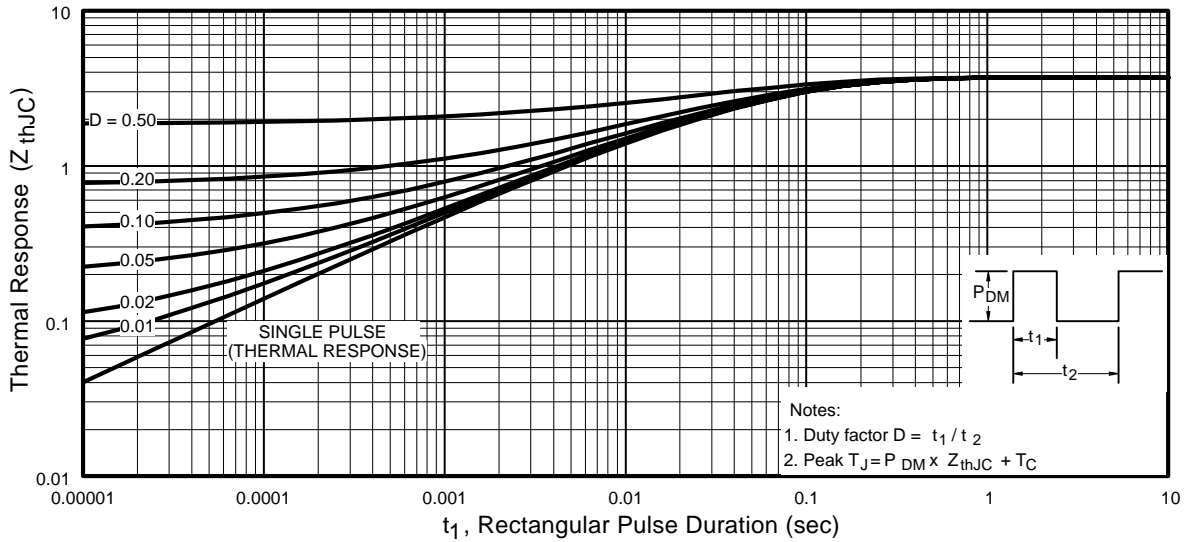


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

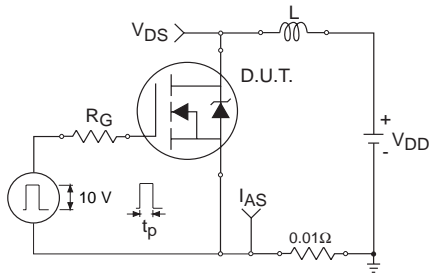


Fig 12a. Unclamped Inductive Test Circuit

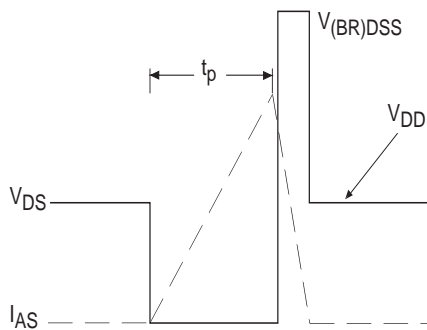


Fig 12b. Unclamped Inductive Waveforms

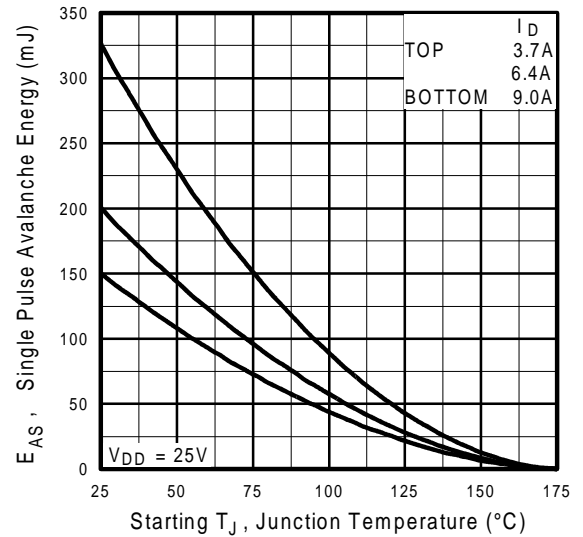


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

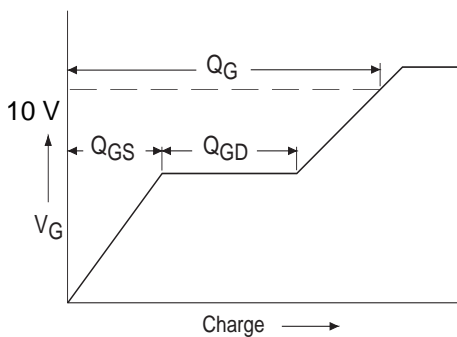


Fig 13a. Basic Gate Charge Waveform

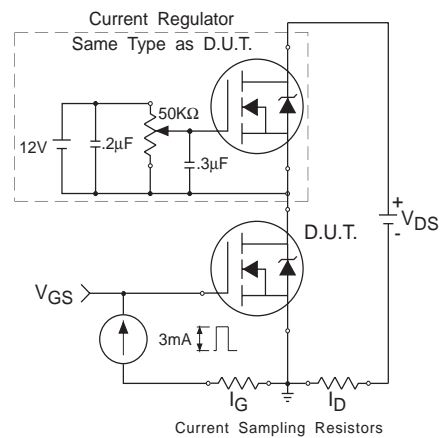
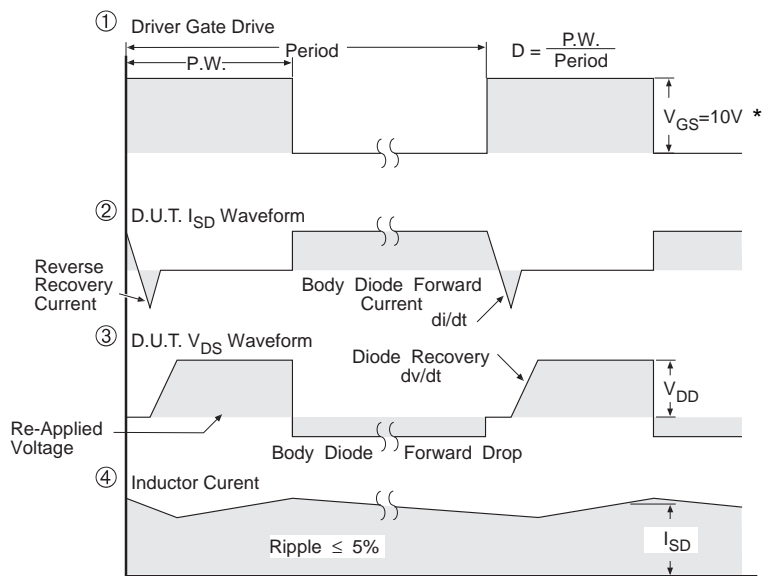
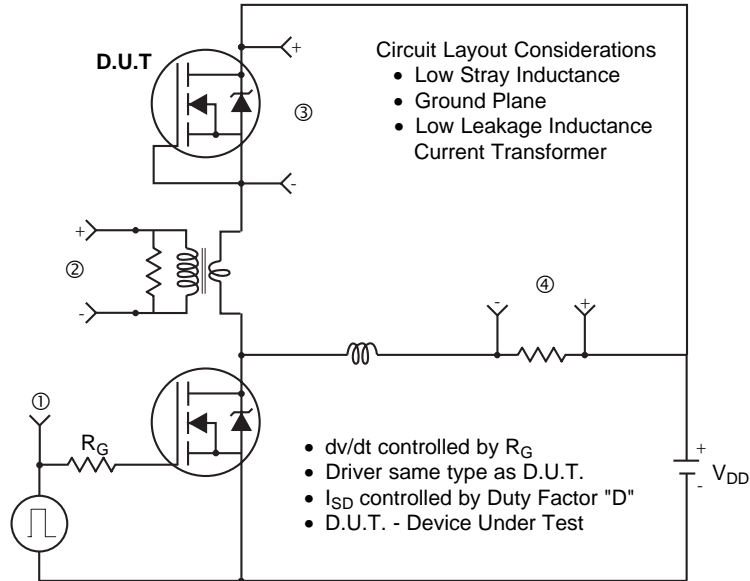


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



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

Fig 14. For N-Channel HEXFETS

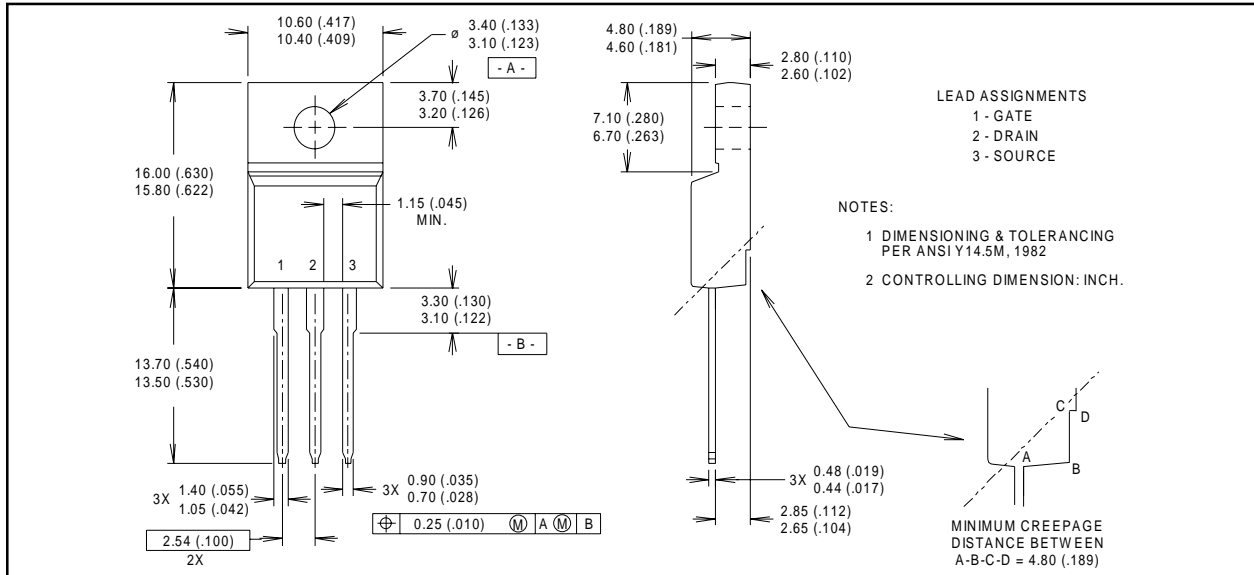
IRFI530N

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Package Outline

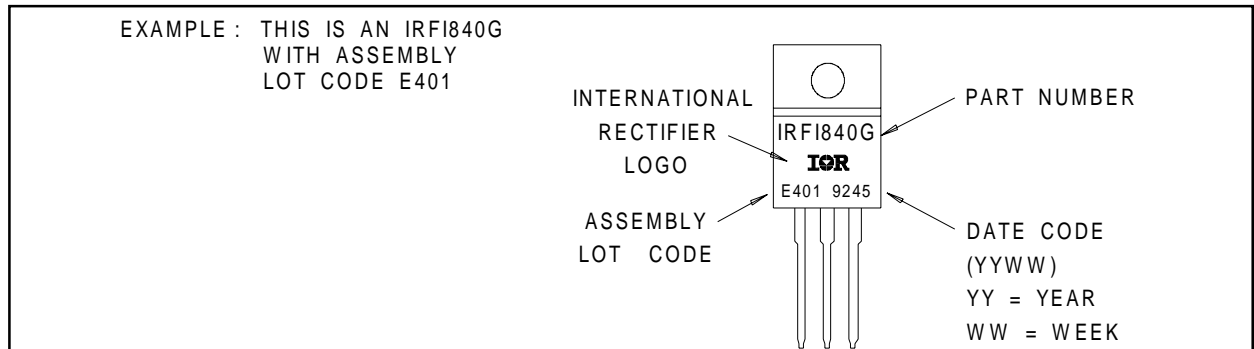
TO-220 FullPak Outline

Dimensions are shown in millimeters (inches)



Part Marking Information

TO-220 FullPak



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IR ITALY: Via Liguria 49, 10071 Borgaro, Torino Tel: ++ 39 11 451 0111
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