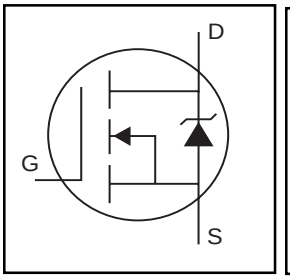
International
IOR Rectifier

PRELIMINARY

IRF3315S/L

HEXFET® Power MOSFET

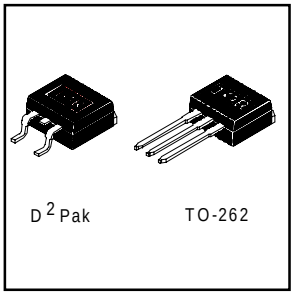
- Advanced Process Technology
- Surface Mount (IRF3315S)
- Low-profile through-hole (IRF3315L)
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated



V_{DSS} = 150V

$R_{DS(on)}$ = 0.082Ω

I_D = 21A



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 D^2Pak is a surface mount power package capable of accommodating die sizes up to HEX-4. It provides the highest power capability and the lowest possible on-resistance in any existing surface mount package. The D^2Pak is suitable for high current applications because of its low internal connection resistance and can dissipate up to 2.0W in a typical surface mount application.

The through-hole version (IRF3315L) is available for low-profile applications.

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V⑤	21	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V⑤	15	
I_{DM}	Pulsed Drain Current ①⑤	84	
P_D @T_A = 25°C	Power Dissipation	3.8	W
P_D @T_C = 25°C	Power Dissipation	94	W
	Linear Derating Factor	0.63	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy②⑤	350	mJ
I_{AR}	Avalanche Current①	12	A
E_{AR}	Repetitive Avalanche Energy①	9.4	mJ
dv/dt	Peak Diode Recovery dv/dt ③⑤	2.5	V/ns
T_J	Operating Junction and	-55 to + 175	℃
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

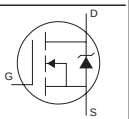
Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	——	1.6	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mounted,steady-state)**	——	40	

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	150	—	—	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.187	—	V/°C	Reference to 25°C, I_D = 1mA⑤
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.082	Ω	V_{GS} = 10V, I_D = 12A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
g_{fs}	Forward Transconductance	17	—	—	S	V_{DS} = 50V, I_D = 12A⑤
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	µA	V_{DS} = 150V, V_{GS} = 0V
		—	—	250		V_{DS} = 120V, V_{GS} = 0V, T_J = 125°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	—	—	95	nC	I_D = 12A
Q_{gs}	Gate-to-Source Charge	—	—	11		V_{DS} = 120V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	47		V_{GS} = 10V, See Fig. 6 and 13 ④⑤
$t_{d(on)}$	Turn-On Delay Time	—	9.6	—	ns	V_{DD} = 75V
t_r	Rise Time	—	32	—		I_D = 12A
$t_{d(off)}$	Turn-Off Delay Time	—	49	—		R_G = 5.1Ω
t_f	Fall Time	—	38	—		R_D = 5.9Ω, See Fig. 10 ④⑤
L_S	Internal Source Inductance	—	7.5	—	nH	Between lead, and center of die contact
C_{iss}	Input Capacitance	—	1300	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	300	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	160	—		f = 1.0MHz, See Fig. 5⑤

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	21	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	84		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	T_J = 25°C, I_S = 43A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	174	260	ns	T_J = 25°C, I_F = 43A
Q_{rr}	Reverse Recovery Charge	—	1.2	1.7	µC	di/dt = 100A/µs ④⑤
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 = 4.9 mH R_G = 25Ω, I_{AS} = 12A. (See Figure 12)

③ I_{SD} ≤ 12A, di/dt ≤ 140A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 175°C

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

⑤ Uses IRF3315 data and test conditions

** When mounted on 1" square PCB (FR-4 or G-10 Material).
For recommended footprint and soldering techniques refer to application note #AN-994.

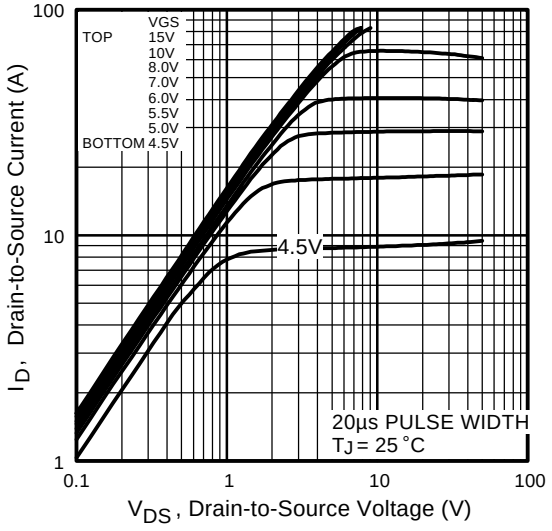


Fig 1. Typical Output Characteristics

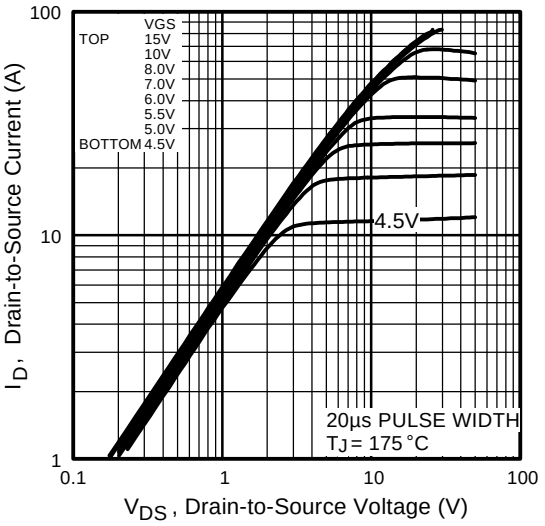


Fig 2. Typical Output Characteristics

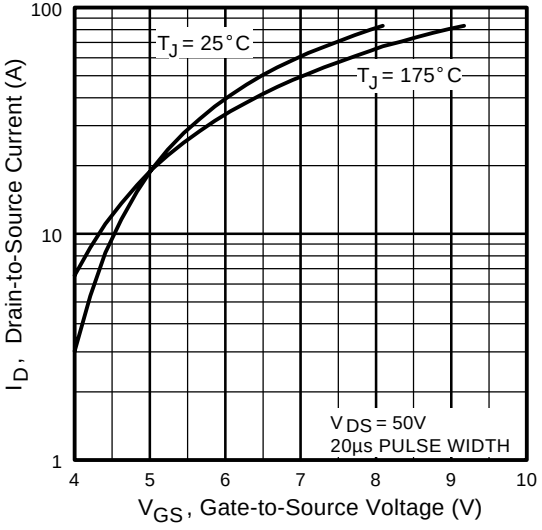


Fig 3. Typical Transfer Characteristics

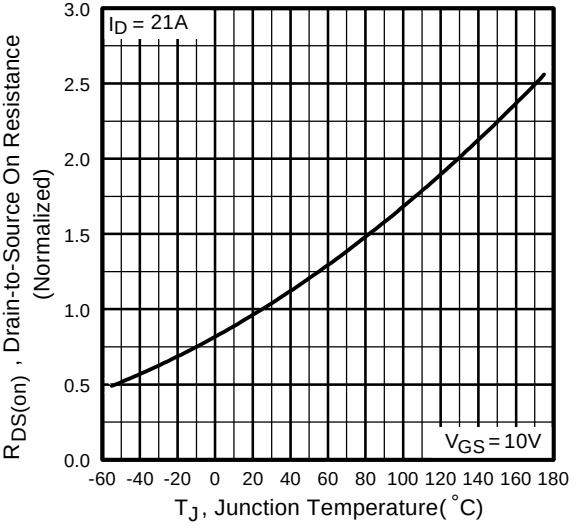


Fig 4. Normalized On-Resistance Vs. Temperature

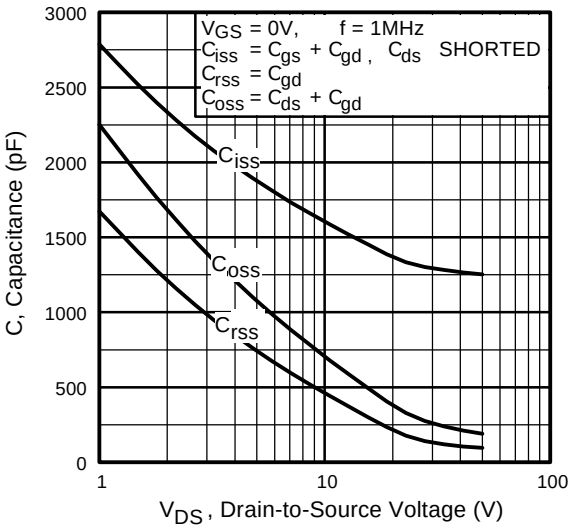


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

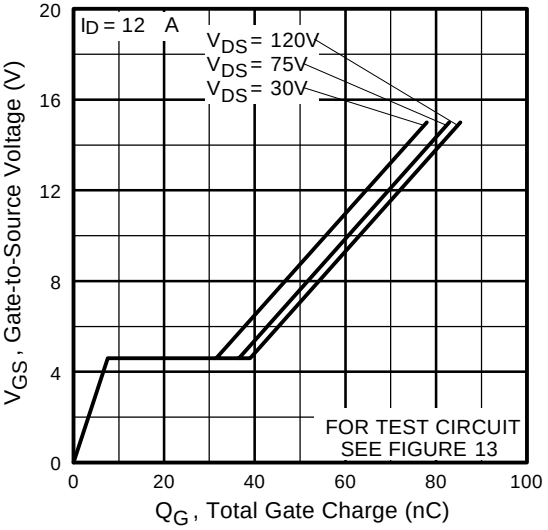


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

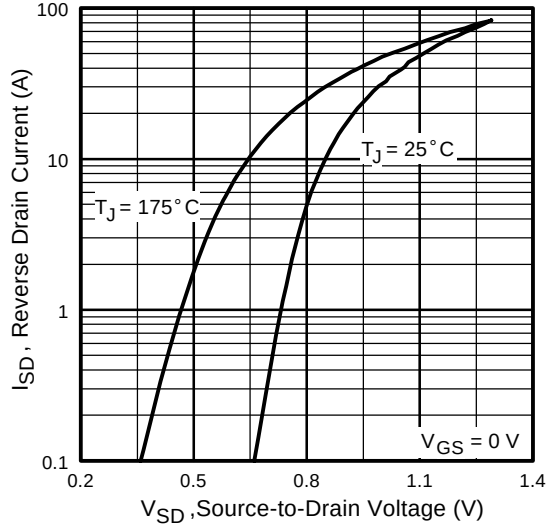


Fig 7. Typical Source-Drain Diode Forward Voltage

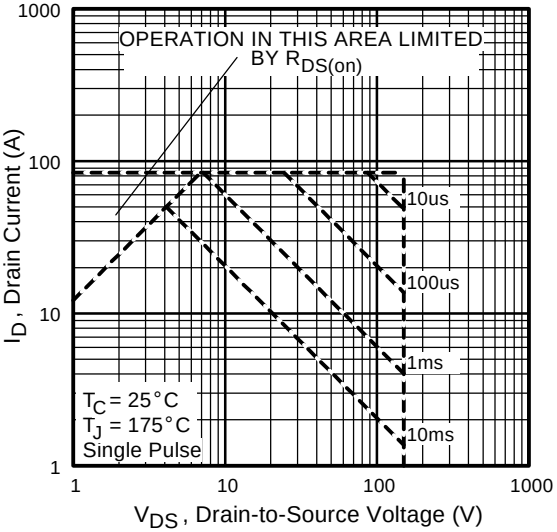


Fig 8. Maximum Safe Operating Area

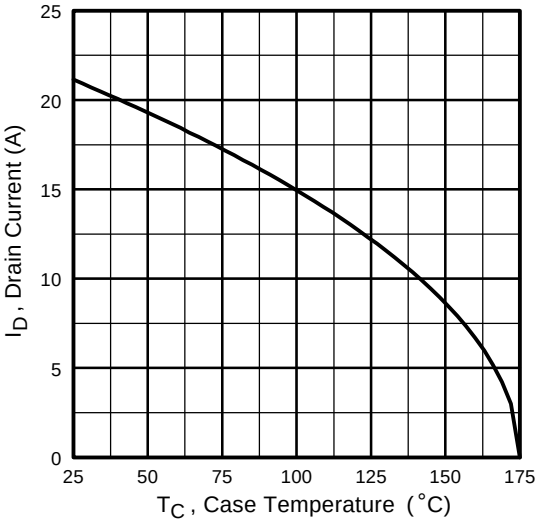


Fig 9. Maximum Drain Current Vs. Case Temperature

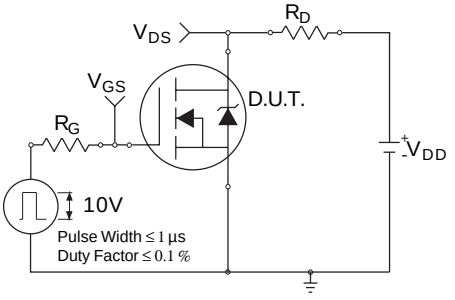


Fig 10a. Switching Time Test Circuit

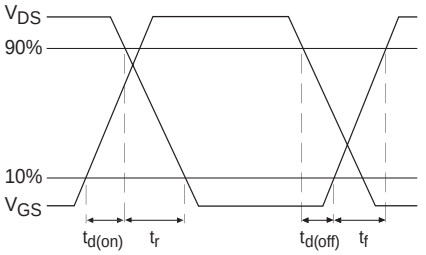


Fig 10b. Switching Time Waveforms

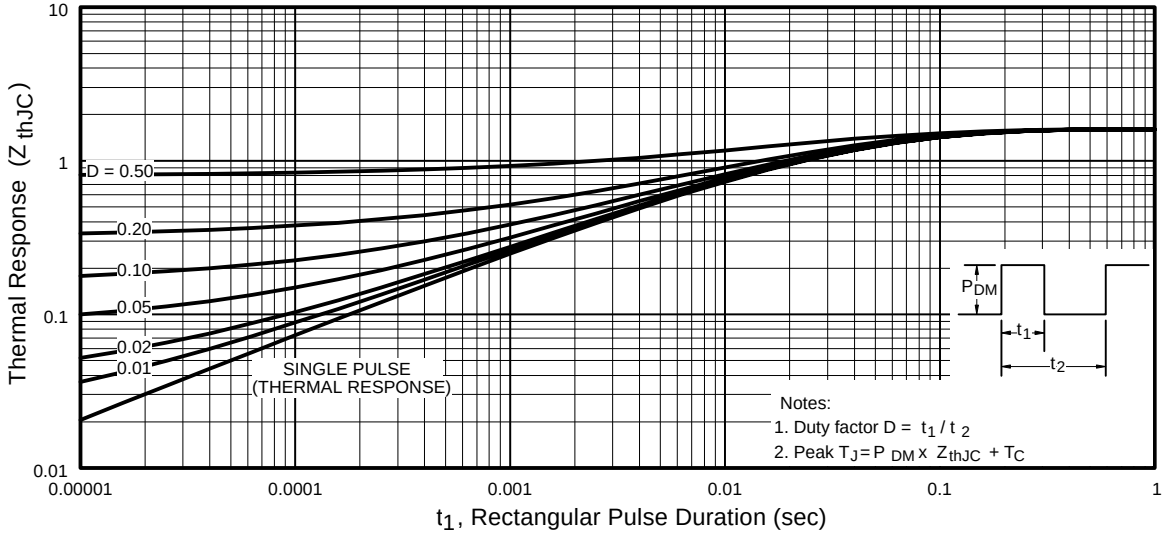


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

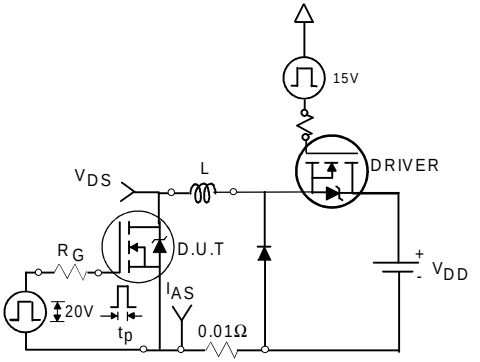


Fig 12a. Unclamped Inductive Test Circuit

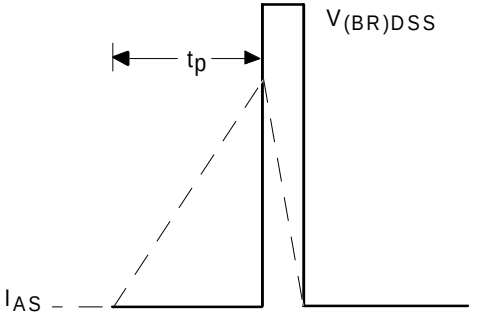


Fig 12b. Unclamped Inductive Waveforms

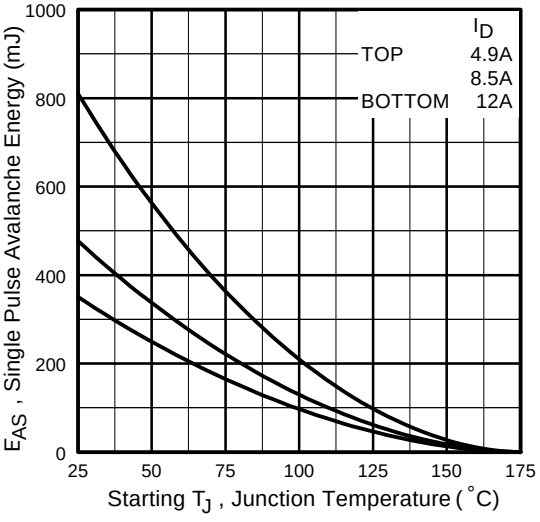


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

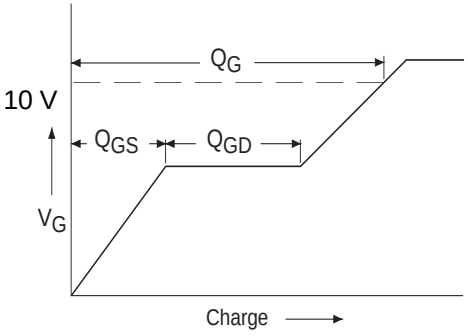


Fig 13a. Basic Gate Charge Waveform

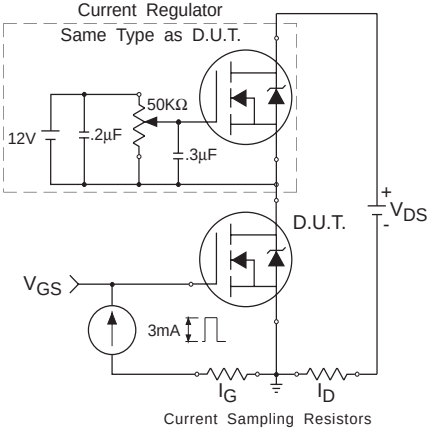
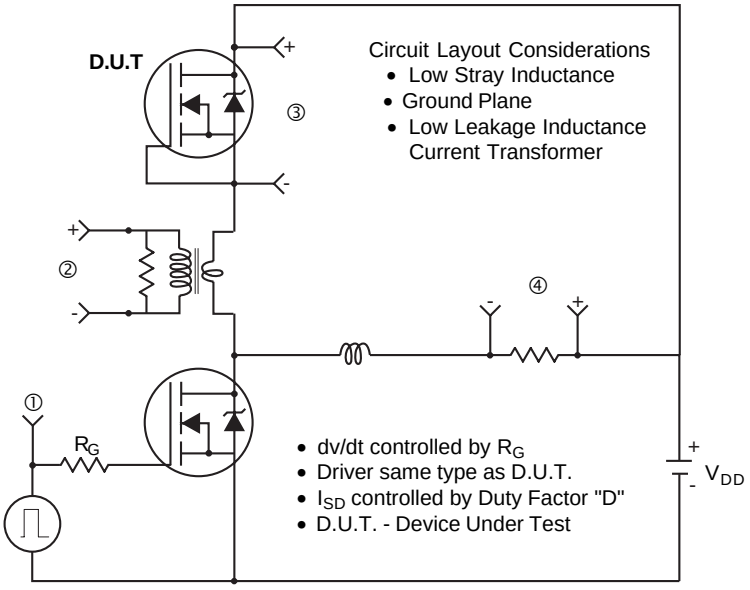
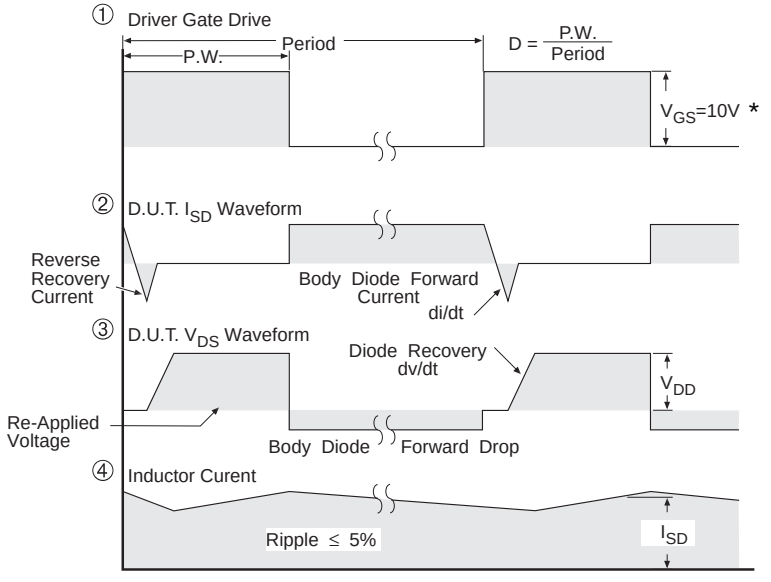


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit

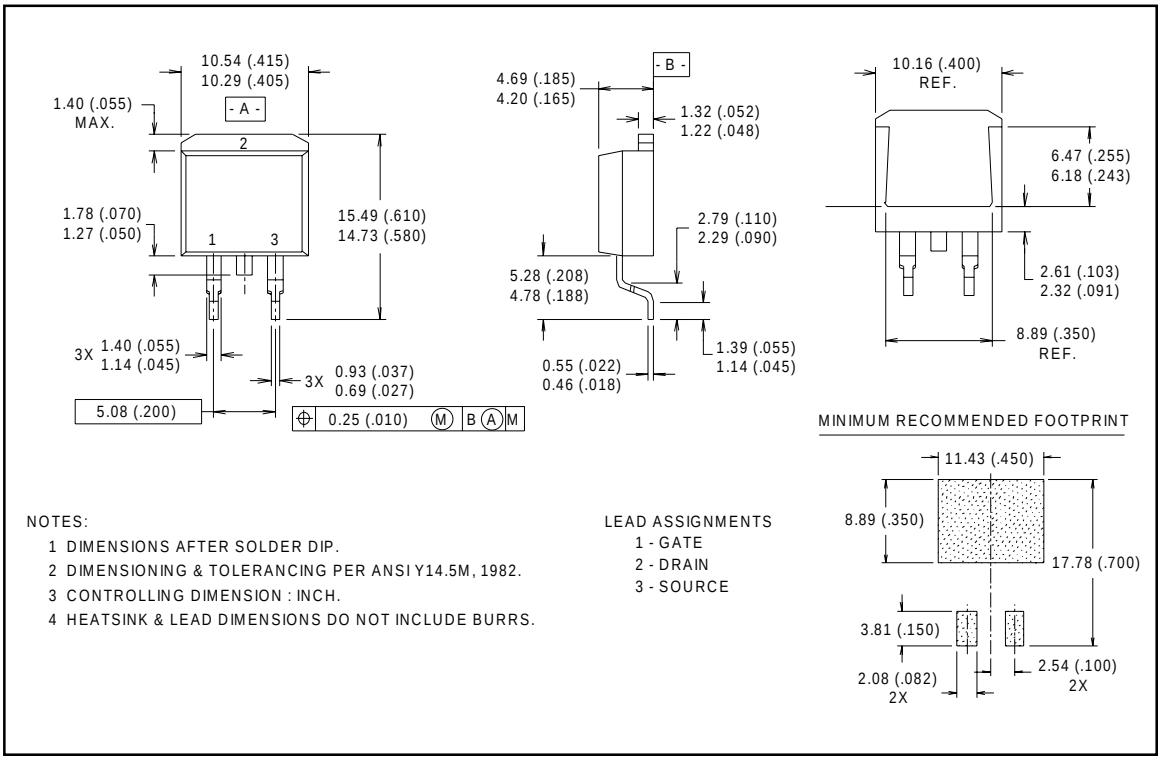




* V_{GS} = 5V for Logic Level Devices

Fig 14. For N-Channel HEXFETS

D²Pak Package Outline



NOTES:

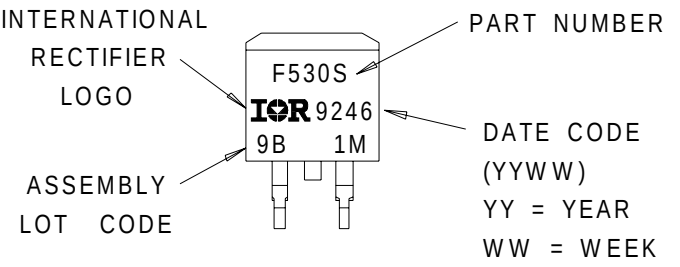
1 DIMENSIONS AFTER SOLDER DIP.
2 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
3 CONTROLLING DIMENSION : INCH.
4 HEATSINK & LEAD DIMENSIONS DO NOT INCLUDE BURRS.

LEAD ASSIGNMENTS

1 - GATE
2 - DRAIN
3 - SOURCE

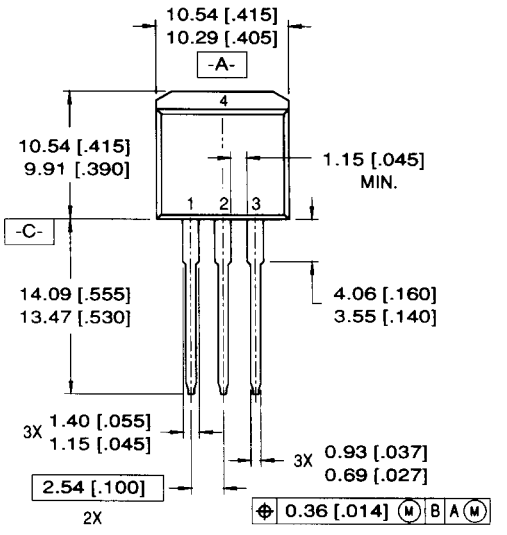
Part Marking Information

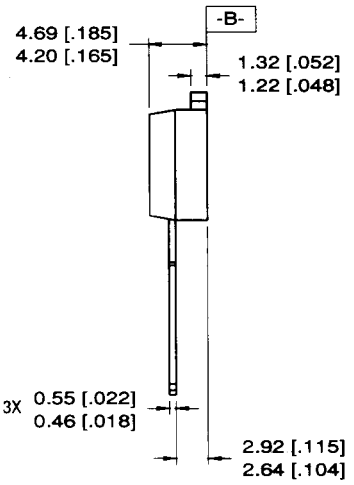
D²Pak



Package Outline

TO-262 Outline





LEAD ASSIGNMENTS

1 = GATE 3 = SOURCE
2 = DRAIN 4 = DRAIN

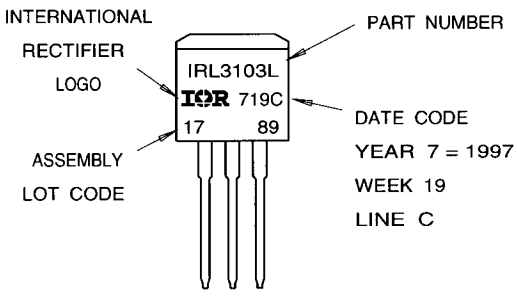
NOTES:

1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. HEATSINK & LEAD DIMENSIONS DO NOT INCLUDE BURRS.

Part Marking Information

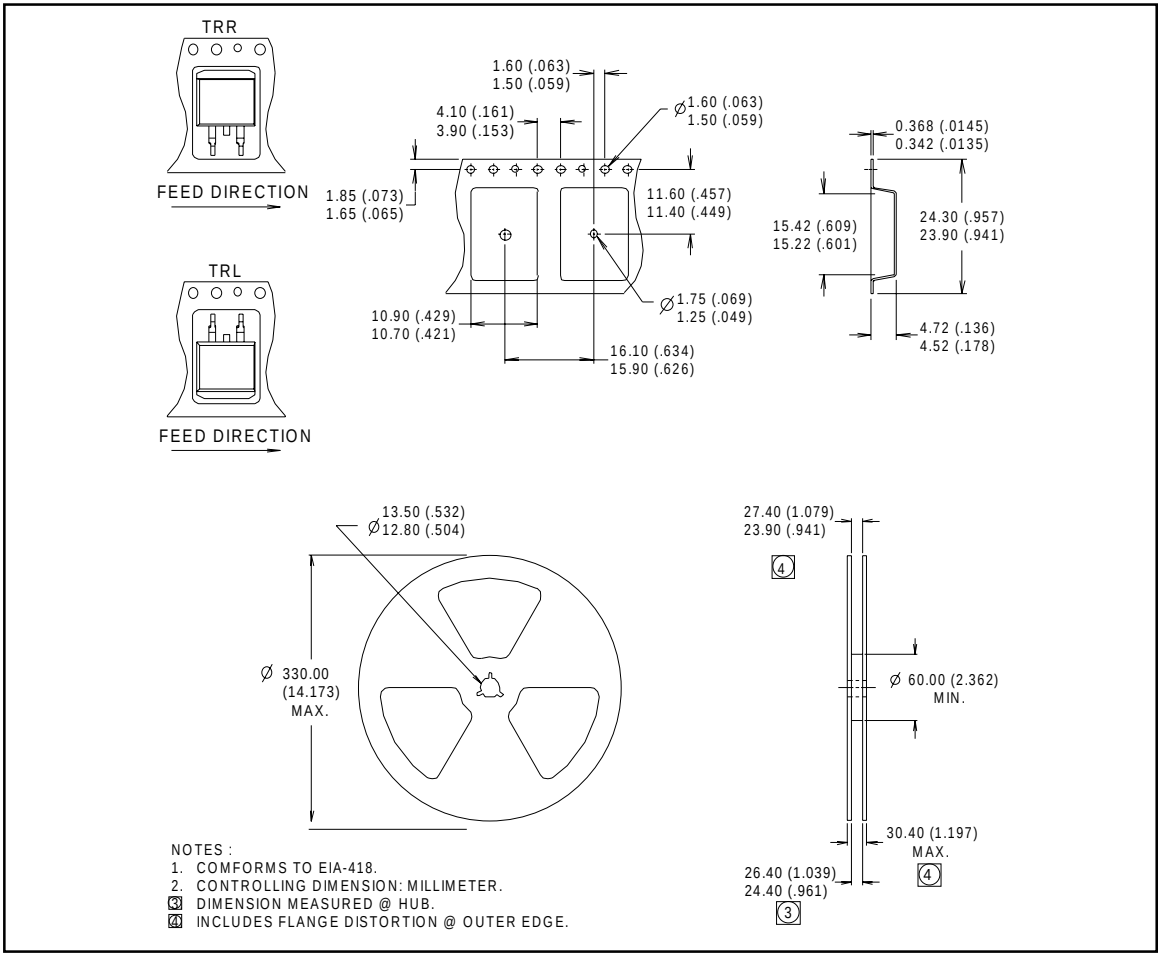
TO-262

EXAMPLE: THIS IS AN IRL3103L
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"



Tape & Reel Information

D^2Pak



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, 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