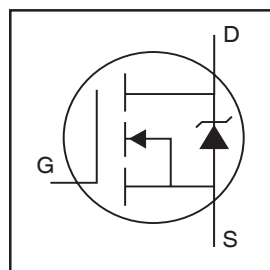


IRF530NSPbF

IRF530NLPbF

HEXFET® Power MOSFET

- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Lead-Free



$$V_{DS} = 100V$$

$$R_{DS(on)} = 90m\Omega$$

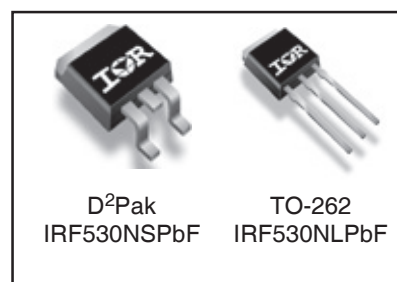
$$I_D = 17A$$

Description

Advanced HEXFET® Power MOSFETs 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 D²Pak 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 D²Pak 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 (IRF530NL) is available for low-profile applications.



D²Pak
IRF530NSPbF

TO-262
IRF530NLPbF

Absolute Maximum Ratings

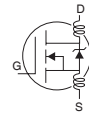
	Parameter	Max.	Units
I_D @ $T_C = 25^\circ C$	Continuous Drain Current, V_{GS} @ 10V ⑦	17	A
I_D @ $T_C = 100^\circ C$	Continuous Drain Current, V_{GS} @ 10V ⑦	12	
I_{DM}	Pulsed Drain Current ① ⑦	60	
P_D @ $T_A = 25^\circ C$	Power Dissipation	3.8	W
P_D @ $T_C = 25^\circ C$	Power Dissipation	70	W
	Linear Derating Factor	0.47	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
I_{AR}	Avalanche Current①	9.0	A
E_{AR}	Repetitive Avalanche Energy①	7.0	mJ
dv/dt	Peak Diode Recovery dv/dt ③ ⑦	7.4	V/ns
T_J	Operating Junction and	-55 to + 175	°C
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	—	2.15	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mounted, steady-state)**	—	40	

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	—	0.11	—	V/°C	Reference to 25°C , $I_D = 1\text{mA}$ ⑦
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	90	mΩ	$V_{GS} = 10V, I_D = 9.0A$ 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	12	—	—	S	$V_{DS} = 50V, I_D = 9.0A$ ④ ⑦
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 100V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 80V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
Q_g	Total Gate Charge	—	—	37	nC	$I_D = 9.0A$
Q_{gs}	Gate-to-Source Charge	—	—	7.2		$V_{DS} = 80V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	11		$V_{GS} = 10V$, See Fig. 6 and 13 ⑦
$t_{d(on)}$	Turn-On Delay Time	—	9.2	—	ns	$V_{DD} = 50V$
t_r	Rise Time	—	22	—		$I_D = 9.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	35	—		$R_G = 12\Omega$
t_f	Fall Time	—	25	—		$V_{GS} = 10V$, See Fig. 10 ④ ⑦
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	—	920	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	130	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	19	—		$f = 1.0\text{MHz}$, See Fig. 5 ⑦
E_{AS}	Single Pulse Avalanche Energy ② ⑦	—	340 ⑤	93 ⑥		$I_{AS} = 9.0A, L = 2.3\text{mH}$



Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	17	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	60		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 9.0A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	93	140	ns	$T_J = 25^\circ\text{C}, I_F = 9.0A$
Q_{rr}	Reverse Recovery Charge	—	320	480	nC	$di/dt = 100A/\mu s$ ④ ⑦
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 $T_J = 25^\circ\text{C}$, $L = 2.3\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 9.0A$, $V_{GS} = 10V$ (See Figure 12)
- ③ $I_{SD} \leq 9.0A$, $di/dt \leq 410A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$,
 $T_J \leq 175^\circ\text{C}$
- ④ Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.

⑤ This is a typical value at device destruction and represents operation outside rated limits.

⑥ This is a calculated value limited to $T_J = 175^\circ\text{C}$.

⑦ Uses IRF530N 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

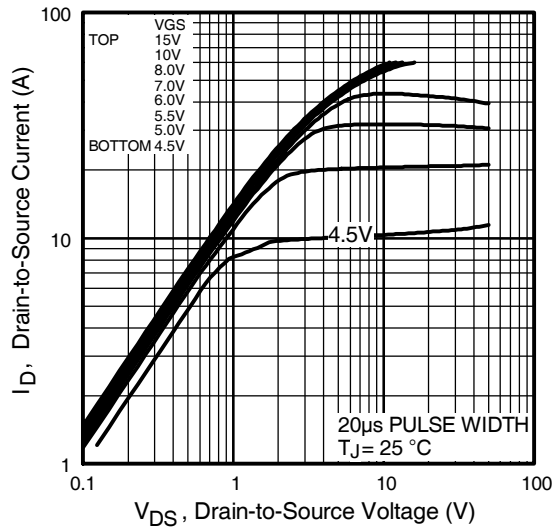


Fig 1. Typical Output Characteristics

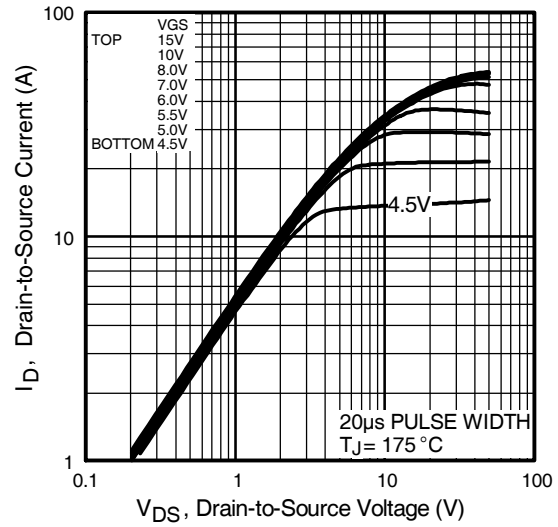


Fig 2. Typical Output Characteristics

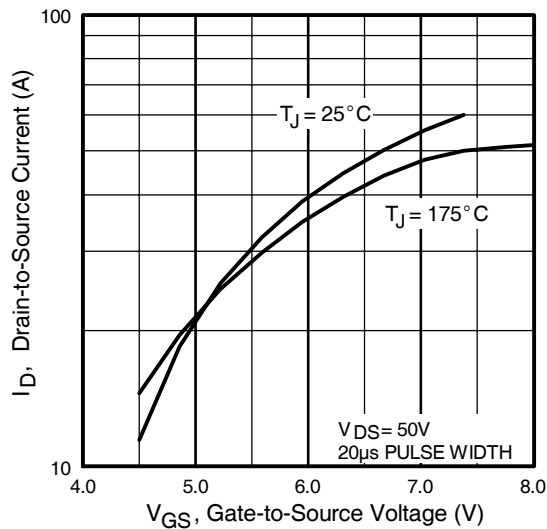


Fig 3. Typical Transfer Characteristics

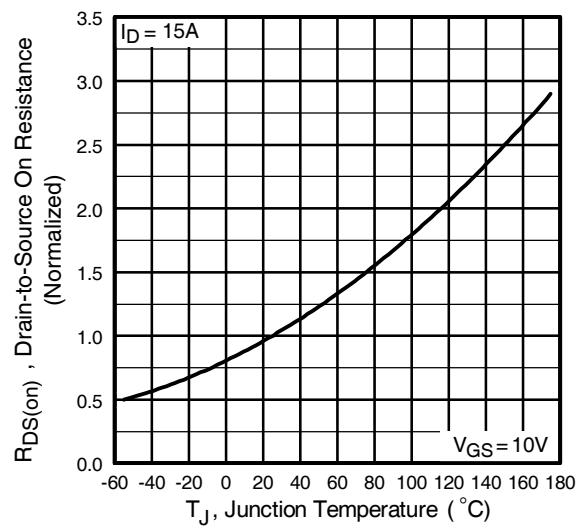


Fig 4. Normalized On-Resistance Vs. Temperature

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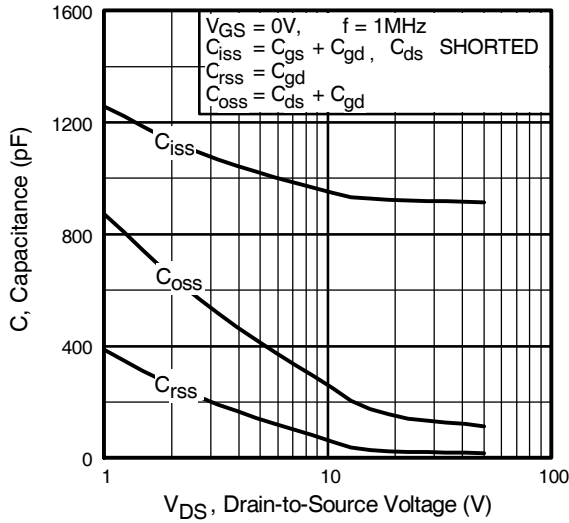


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

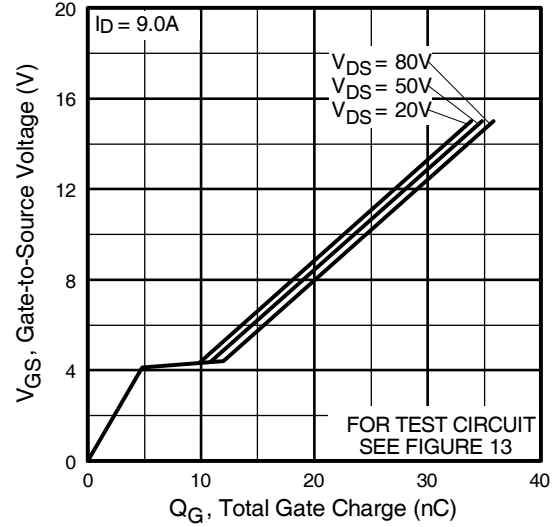


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

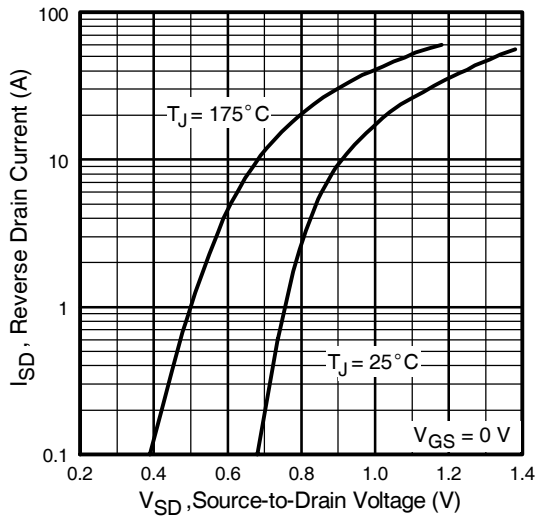


Fig 7. Typical Source-Drain Diode Forward Voltage

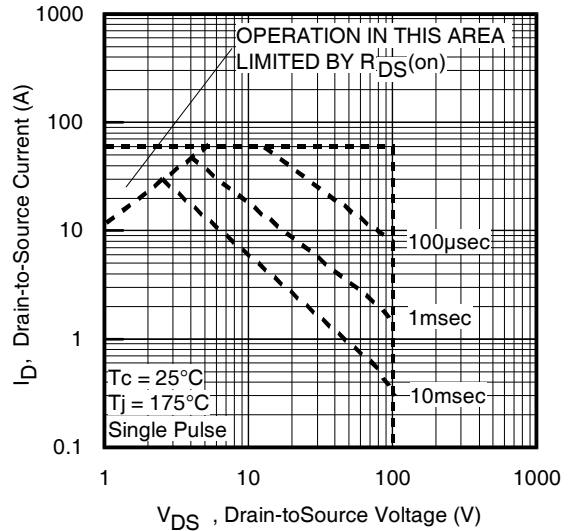


Fig 8. Maximum Safe Operating Area

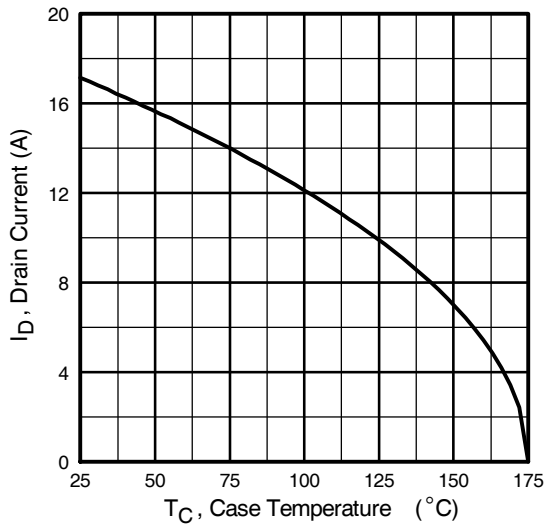


Fig 9. Maximum Drain Current Vs. Case Temperature

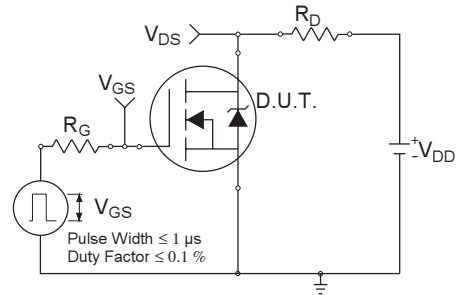


Fig 10a. Switching Time Test Circuit

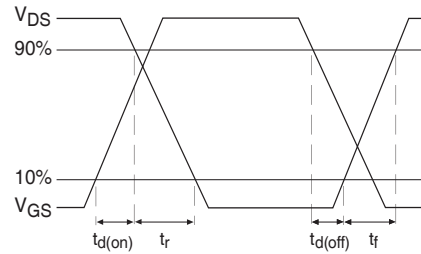


Fig 10b. Switching Time Waveforms

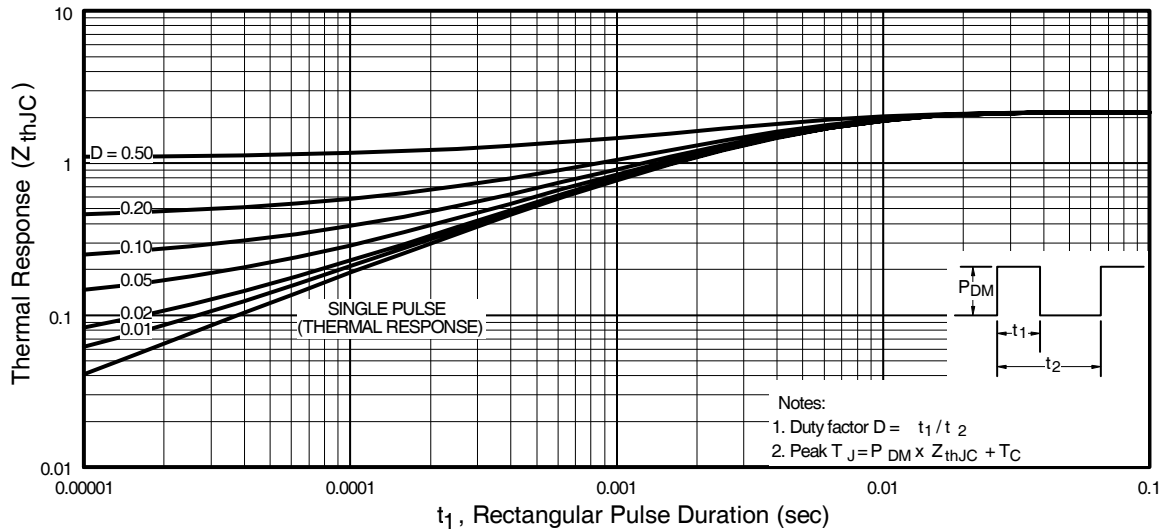


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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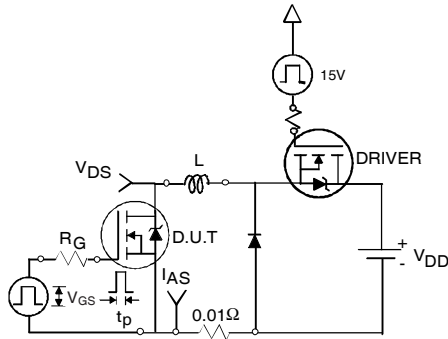


Fig 12a. Unclamped Inductive Test Circuit

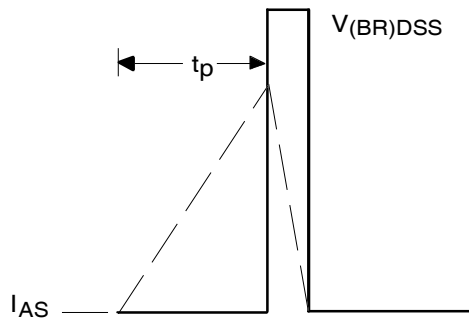


Fig 12b. Unclamped Inductive Waveforms

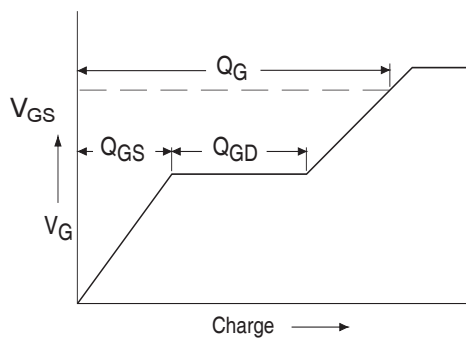


Fig 13a. Basic Gate Charge Waveform

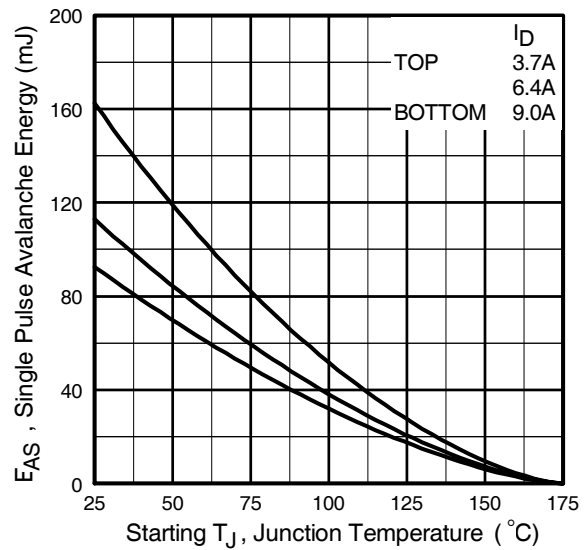


Fig 12c. Maximum Avalanche Energy
Vs. Drain Current

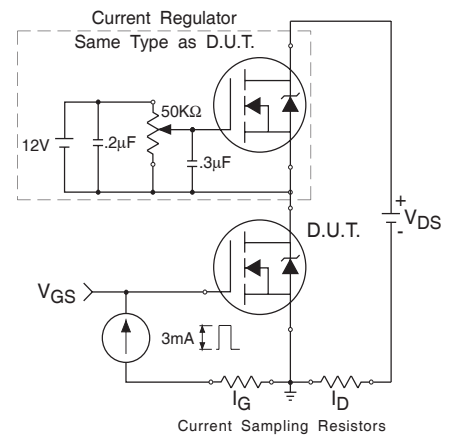
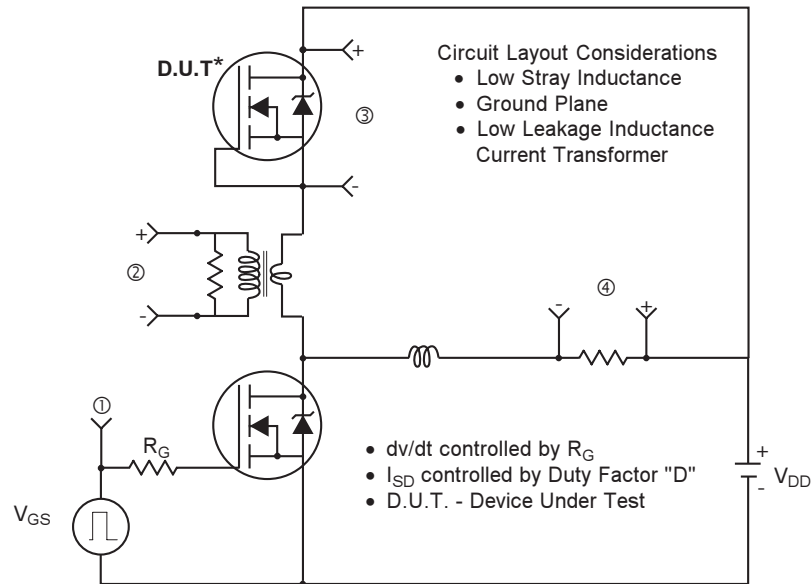
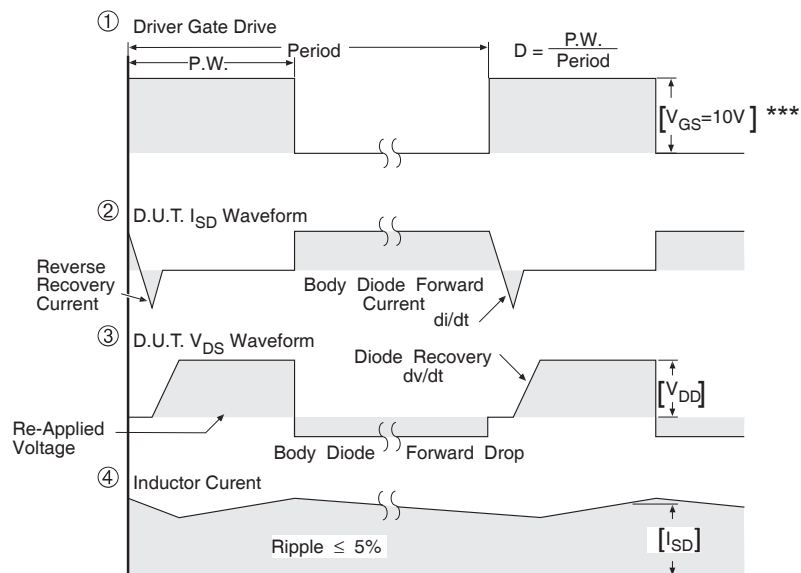


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



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

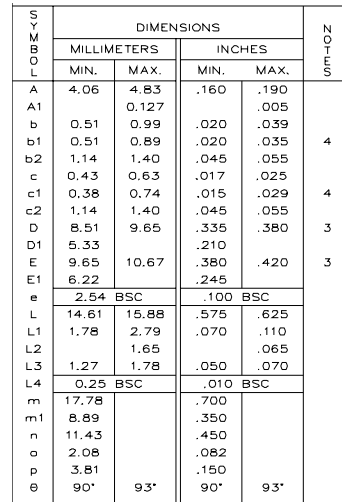


*** $V_{GS} = 5.0V$ for Logic Level and 3V Drive Devices

Fig 14. For N-channel HEXFET® power MOSFETs

International
IOR Rectifier

Dimensions are shown in millimeters (inches)



<u>HEXFET</u>	<u>IGBTs, CoPACK</u>	<u>DIODES</u>
1.- GATE	1.- GATE	1.- ANODE *
2.- DRAIN	2.- COLLECTOR	2.- CATHODE
3.- SOURCE	3.- EMITTER	3.- ANODE

* PART DEPENDENT.

D²Pak Part Marking Information (Lead-Free)

Diagram illustrating the identification codes on the F530S MOSFET package:

- INTERNATIONAL RECTIFIER LOGO**: Points to the IR logo on the package.
- PART NUMBER**: Points to the F530S marking.
- DATE CODE**: Points to the 002L marking.
 - YEAR 0 = 2000
 - WEEK 02
 - LINE L
- ASSEMBLY LOT CODE**: Points to the 80 marking.

OR

INTERNATIONAL RECTIFIER LOGO

PART NUMBER

DATE CODE

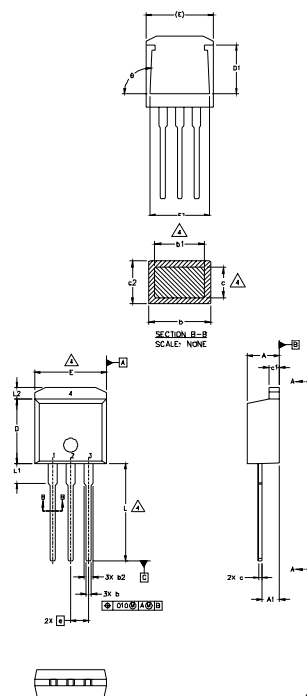
ASSEMBLY LOT CODE

ASSEMBLY SITE CODE

F 530S
IR P002A
 80 24

P = DESIGNATES LEAD-FREE PRODUCT (OPTIONAL)
 YEAR 0 = 2000
 WEEK 02
 A = ASSEMBLY SITE CODE

TO-262 Package Outline



SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	2.03	2.92	.080	.115	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	4
b2	1.14	1.40	.045	.055	
c	0.38	0.63	.015	.025	4
c1	1.14	1.40	.045	.055	
c2	0.43	.063	.017	.029	
D	8.51	9.65	.335	.380	3
D1	5.33		.210		
E	9.65	10.67	.380	.420	3
E1	6.22		.245		
e	2.54 BSC		.100 BSC		
L	13.46	14.09	.530	.555	
L1	3.56	3.71	.140	.146	
L2		1.65		.065	

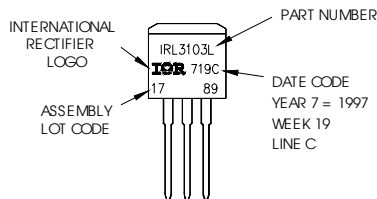
LEAD ASSIGNMENTS

HEXFET	IGBT
1.- GATE	1- GATE
2.- DRAIN	2- COLLECTOR
3.- SOURCE	3- EMITTER
4.- DRAIN	

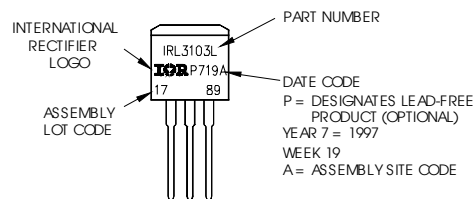
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
 2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES]
 3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
 4. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
 5. CONTROLLING DIMENSION: INCH.

TO-262 Part Marking Information

EXAMPLE: THIS IS AN IRL3103L
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"
Note: "P" in assembly line
position indicates "Lead-Free"



OR

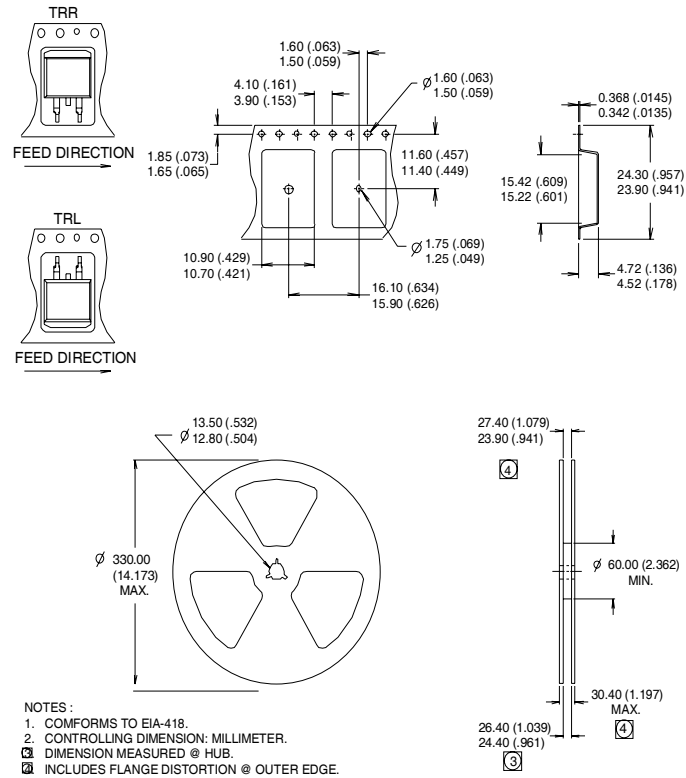


IRF530NS/LPbF

International
IR Rectifier

D²Pak Tape & Reel Infomation

Dimensions are shown in millimeters (inches)



Data and specifications subject to change without notice.
This product has been designed and qualified for the Industrial market.
Qualification Standards can be found on IR's Web site.

International
IR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903

Visit us at www.irf.com for sales contact information.03/04

www.irf.com

Note: For the most current drawings please refer to the IR website at:
<http://www.irf.com/package/>

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