



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from Europe, America and south Asia, supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts, Customers Priority, Honest Operation, and Considerate Service", our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip, ALPS, ROHM, Xilinx, Pulse, ON, Everlight and Freescale. Main products comprise IC, Modules, Potentiometer, IC Socket, Relay, Connector. Our parts cover such applications as commercial, industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

IRF9520NS/L

HEXFET® Power MOSFET

- Advanced Process Technology
- Surface Mount (IRF9520S)
- Low-profile through-hole (IRF9520L)
- 175°C Operating Temperature
- Fast Switching
- P-Channel
- Fully Avalanche Rated

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 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.

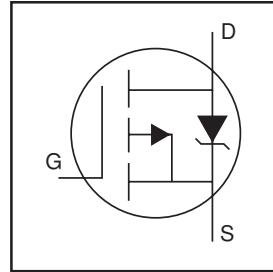
The through-hole version (IRF9520L) is available for low-profile applications.

Absolute Maximum Ratings

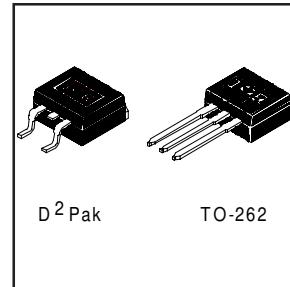
	Parameter	Max.	Units
I _D @ T _C = 25°C	Continuous Drain Current, V _{GS} @ -10V ^⑤	-6.8	
I _D @ T _C = 100°C	Continuous Drain Current, V _{GS} @ -10V ^⑤	-4.8	A
I _{DM}	Pulsed Drain Current ①⑤	-27	
P _D @T _A = 25°C	Power Dissipation	3.8	W
P _D @T _C = 25°C	Power Dissipation	48	W
	Linear Derating Factor	0.32	W/°C
V _{GS}	Gate-to-Source Voltage	± 20	V
E _{AS}	Single Pulse Avalanche Energy ^{②⑤}	140	mJ
I _{AR}	Avalanche Current ^①	-4.0	A
E _{AR}	Repetitive Avalanche Energy ^①	4.8	mJ
dv/dt	Peak Diode Recovery dv/dt ^{③⑤}	-5.0	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 _{θJC}	Junction-to-Case	—	3.1	°C/W
R _{θJA}	Junction-to-Ambient (PCB Mounted,steady-state)**	—	40	



$V_{DSS} = -100V$
 $R_{DS(on)} = 0.48\Omega$
 $I_D = -6.8A$



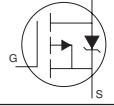
IRF9520NS/L

International
Rectifier

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(\text{BR})\text{DSS}}$	Drain-to-Source Breakdown Voltage	-100	—	—	V	$V_{GS} = 0\text{V}$, $I_D = -250\mu\text{A}$
$\Delta V_{(\text{BR})\text{DSS}/\Delta T_J}$	Breakdown Voltage Temp. Coefficient	—	-0.10	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = -1\text{mA}$ ⑤
$R_{DS(\text{on})}$	Static Drain-to-Source On-Resistance	—	—	0.48	Ω	$V_{GS} = 10\text{V}$, $I_D = -4.0\text{A}$ ④
$V_{GS(\text{th})}$	Gate Threshold Voltage	-2.0	—	-4.0	V	$V_{DS} = V_{GS}$, $I_D = -250\mu\text{A}$
g_{fs}	Forward Transconductance	1.4	—	—	S	$V_{DS} = -50\text{V}$, $I_D = -4.0\text{A}$ ⑤
I_{DSS}	Drain-to-Source Leakage Current	—	—	-25	μA	$V_{DS} = -100\text{V}$, $V_{GS} = 0\text{V}$
		—	—	-250		$V_{DS} = -80\text{V}$, $V_{GS} = 0\text{V}$, $T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20\text{V}$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20\text{V}$
Q_g	Total Gate Charge	—	—	27	nC	$I_D = -4.0\text{A}$
Q_{gs}	Gate-to-Source Charge	—	—	5.0		$V_{DS} = -80\text{V}$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	15		$V_{GS} = -10\text{V}$, See Fig. 6 and 13 ④⑤
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	$V_{DD} = -50\text{V}$
t_r	Rise Time	—	47	—		$I_D = -4.0\text{A}$
$t_{d(off)}$	Turn-Off Delay Time	—	28	—		$R_G = 22\Omega$
t_f	Fall Time	—	31	—		$R_D = 12\Omega$, See Fig. 10 ④⑤
L_s	Internal Source Inductance	—	7.5	—	nH	Between lead, and center of die contact
C_{iss}	Input Capacitance	—	350	—	pF	$V_{GS} = 0\text{V}$
C_{oss}	Output Capacitance	—	110	—		$V_{DS} = -25\text{V}$
C_{rss}	Reverse Transfer Capacitance	—	70	—		$f = 1.0\text{MHz}$, See Fig. 5⑤

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	-6.8	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	-27		
V_{SD}	Diode Forward Voltage	—	—	-1.6		$T_J = 25^\circ\text{C}$, $I_S = -4.0\text{A}$, $V_{GS} = 0\text{V}$ ④
t_{rr}	Reverse Recovery Time	—	100	150	ns	$T_J = 25^\circ\text{C}$, $I_F = -4.0\text{A}$
Q_{rr}	Reverse Recovery Charge	—	420	630	nC	$di/dt = -100\text{A}/\mu\text{s}$ 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)

④ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$

② Starting $T_J = 25^\circ\text{C}$, $L = 18\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = -4.0\text{A}$. (See Figure 12)

⑤ Uses IRF9520N data and test conditions

③ $I_{SD} \leq -4.0\text{A}$, $di/dt \leq -300\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(\text{BR})\text{DSS}}$,
 $T_J \leq 175^\circ\text{C}$

** When mounted on 1" square PCB (FR-4 or G-10 Material).

For recommended footprint and soldering techniques refer to application note #AN-994.

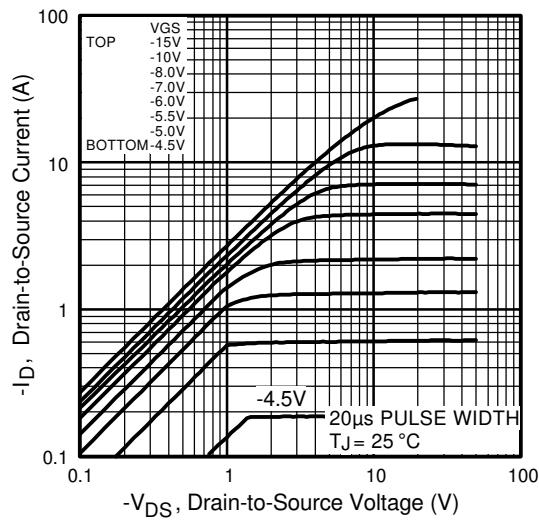


Fig 1. Typical Output Characteristics,

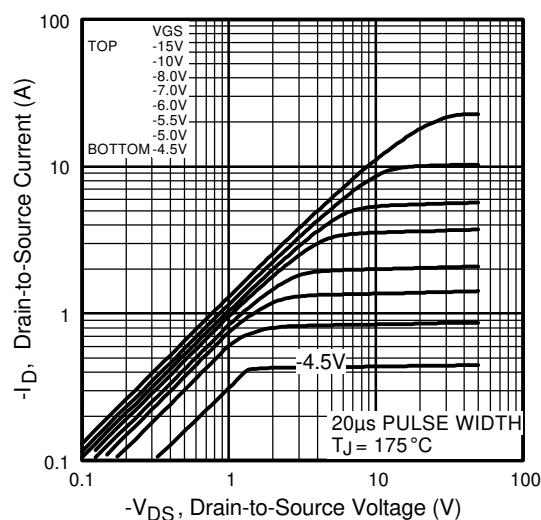


Fig 2. Typical Output Characteristics,

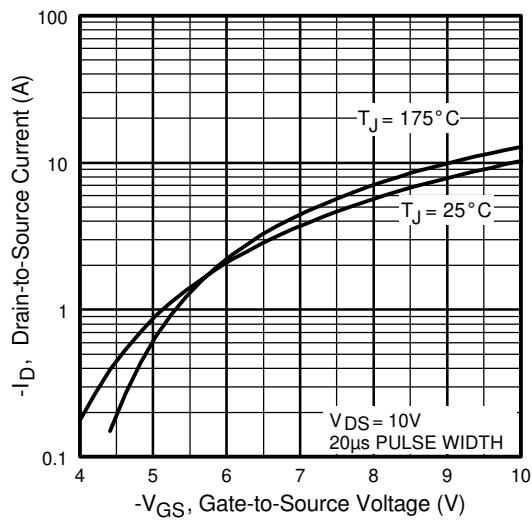


Fig 3. Typical Transfer Characteristics

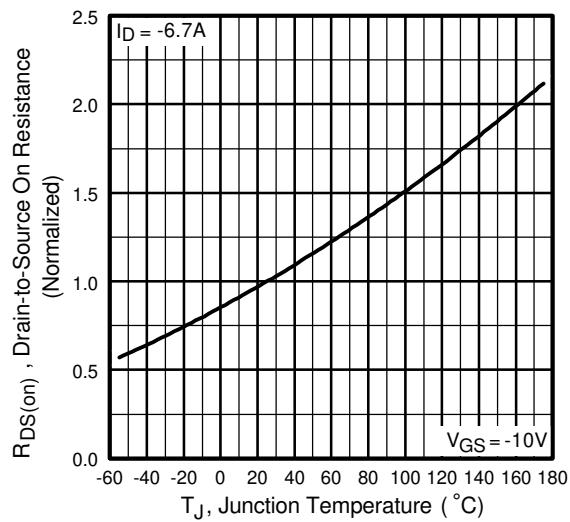


Fig 4. Normalized On-Resistance
Vs. Temperature

IRF9520NS/L

International
IR Rectifier

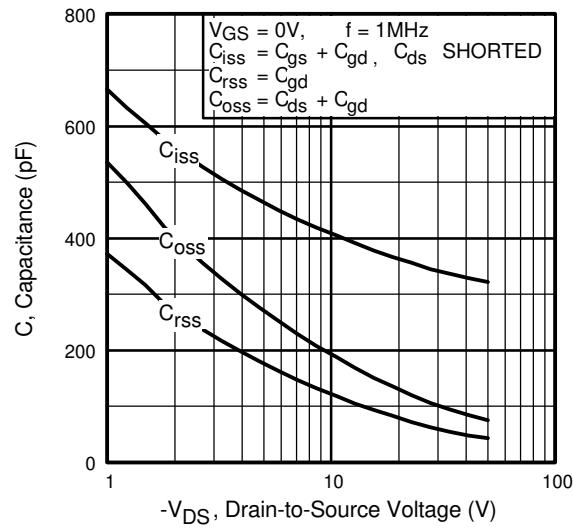


Fig 5. Typical Capacitance Vs.
Drain-to-Source Voltage

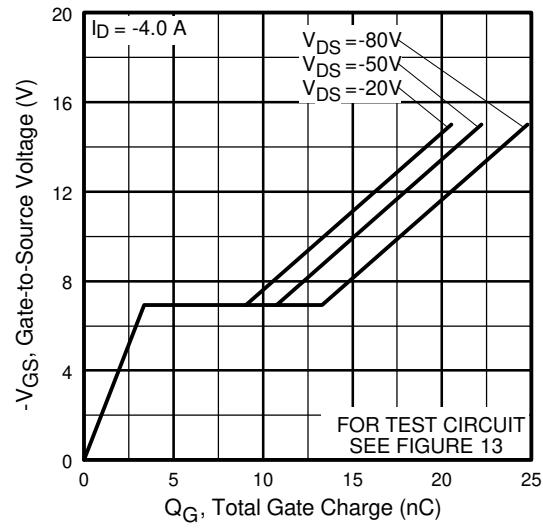


Fig 6. Typical Gate Charge Vs.
Gate-to-Source Voltage

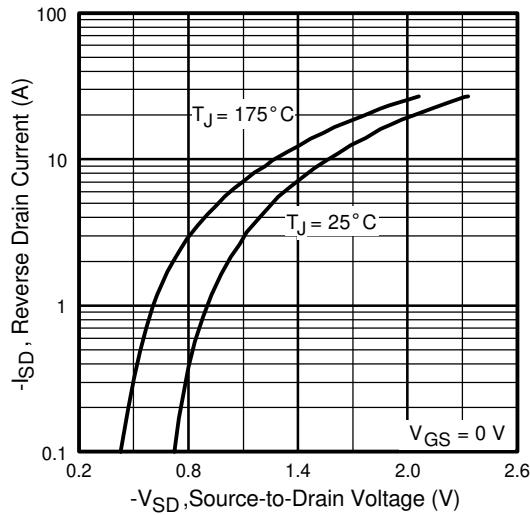


Fig 7. Typical Source-Drain Diode
Forward Voltage

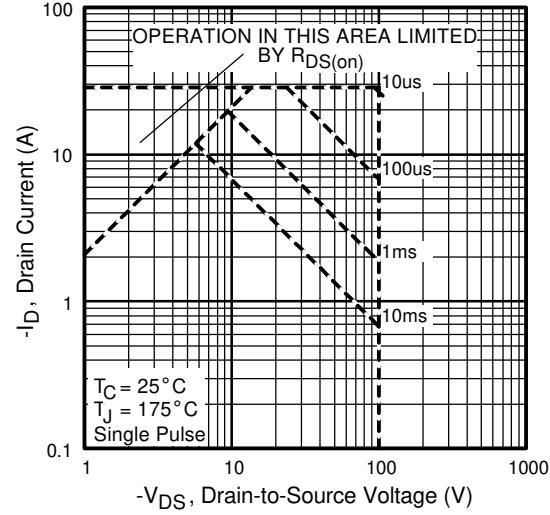


Fig 8. Maximum Safe Operating Area

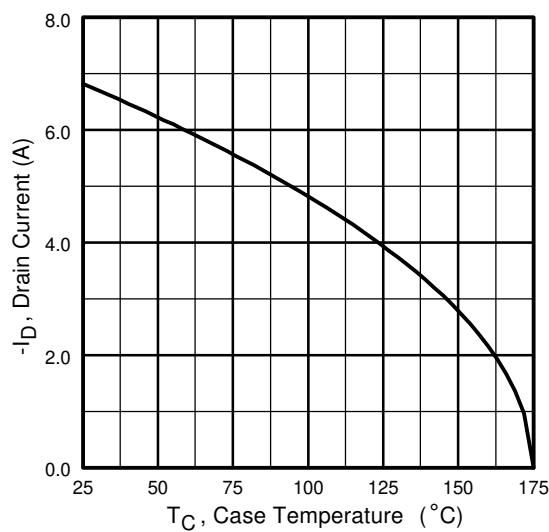


Fig 9. Maximum Drain Current Vs.
Case Temperature

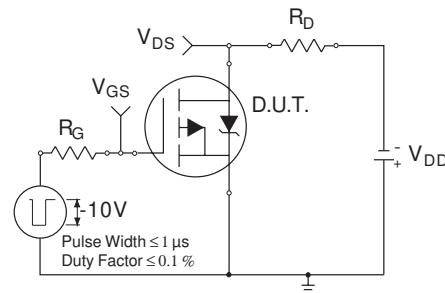


Fig 10a. Switching Time Test Circuit

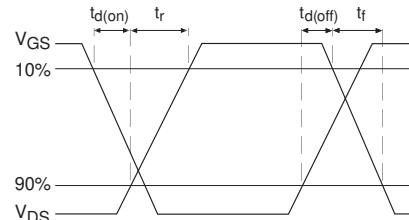


Fig 10b. Switching Time Waveforms

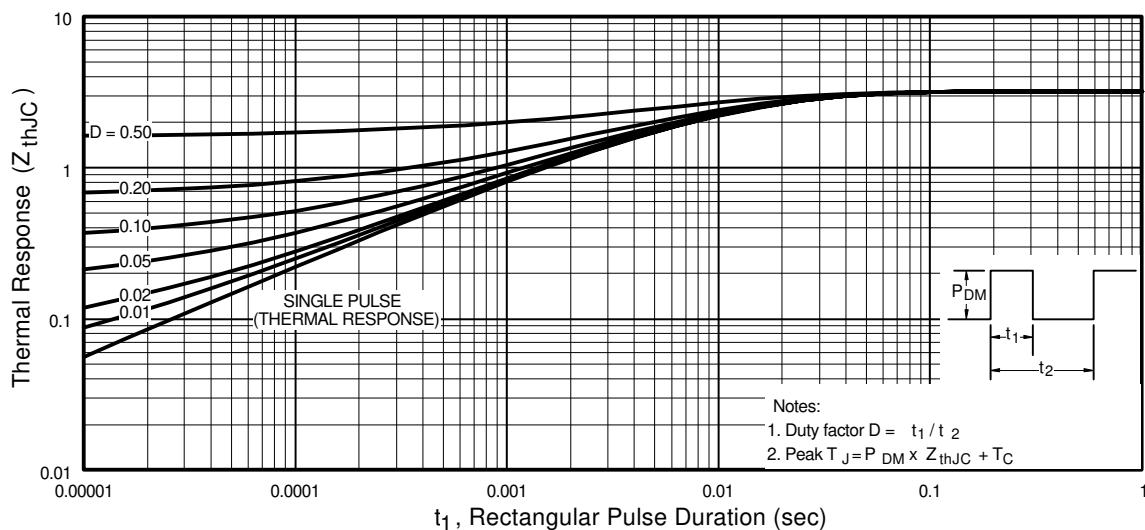


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

IRF9520NS/L

International
IR Rectifier

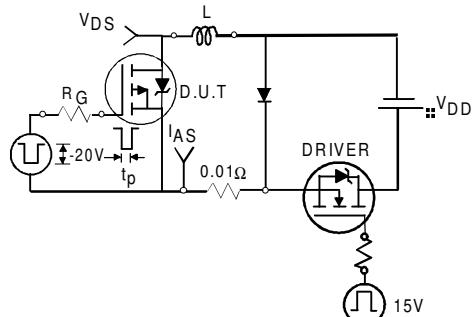


Fig 12a. Unclamped Inductive Test Circuit

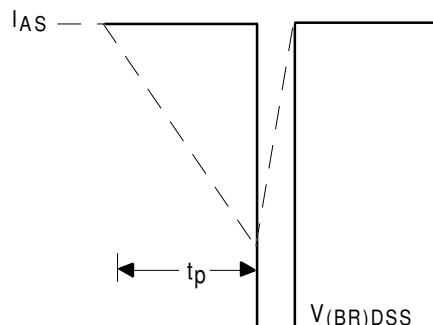


Fig 12b. Unclamped Inductive Waveforms

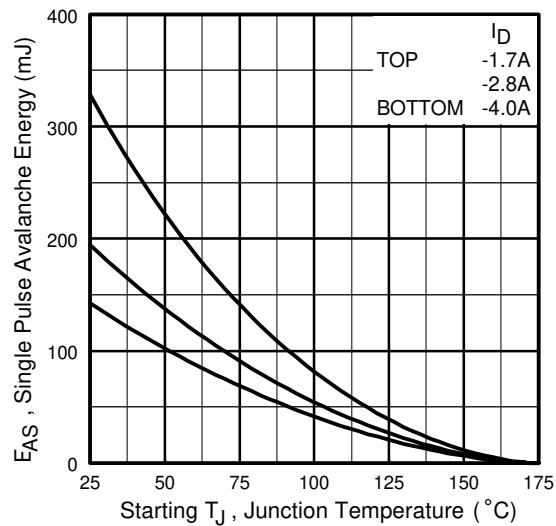


Fig 12c. Maximum Avalanche Energy
Vs. Drain Current

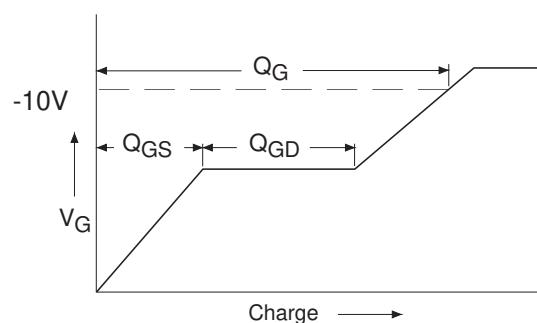


Fig 13a. Basic Gate Charge Waveform

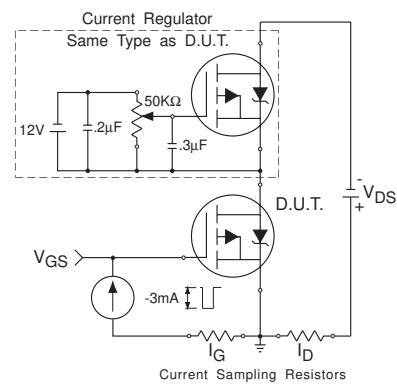
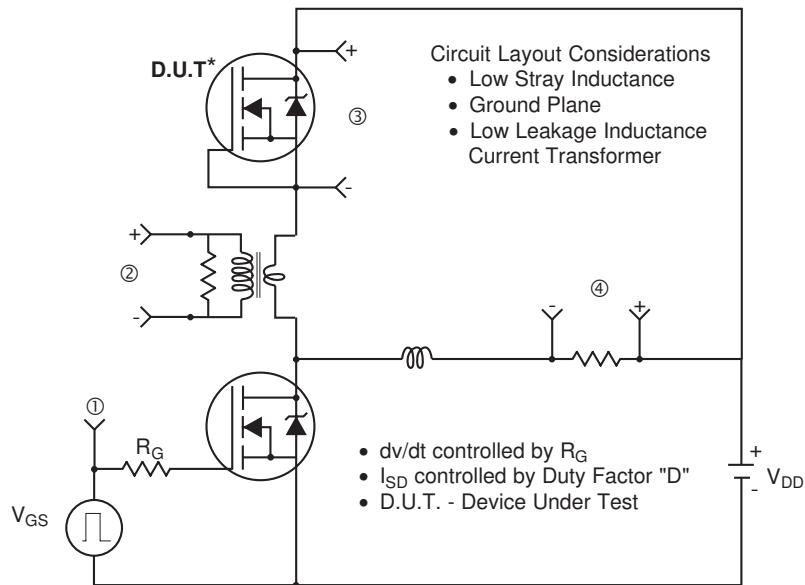
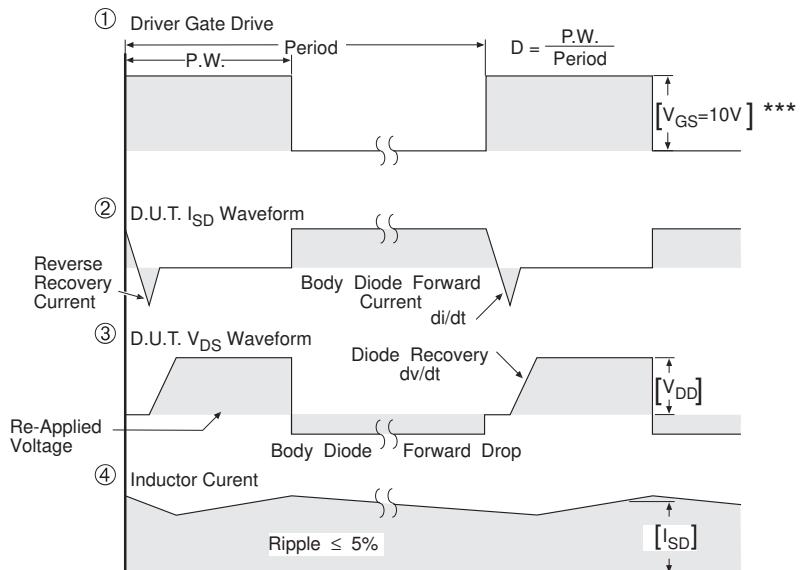


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



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



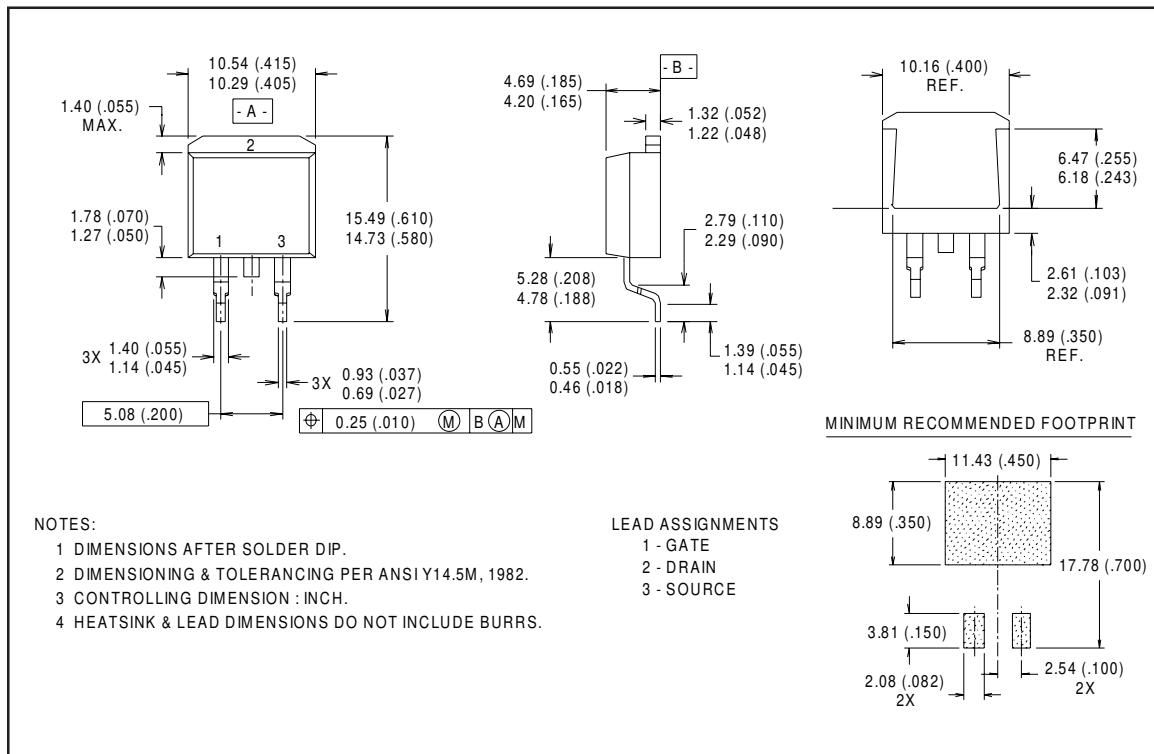
*** $V_{GS} = 5.0V$ for Logic Level and 3V Drive Devices

Fig 14. For P-Channel HEXFETS

IRF9520NS/L

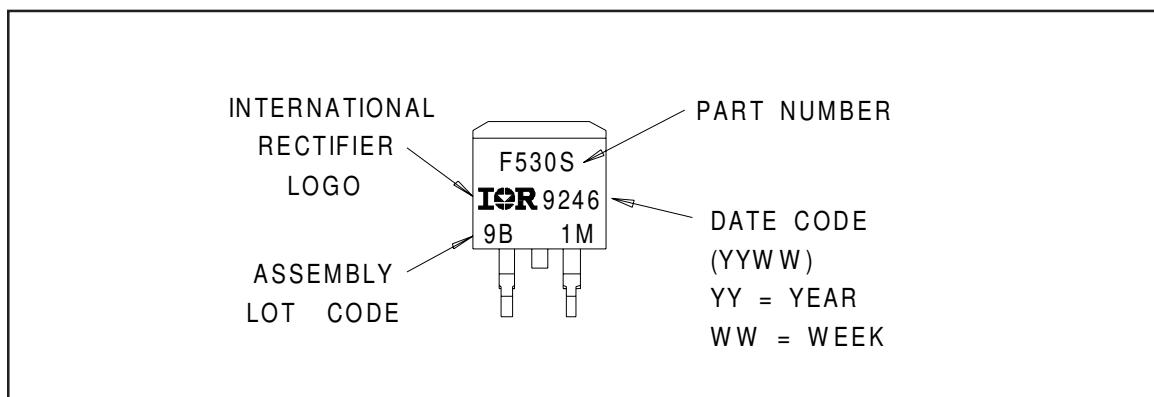
International
IR Rectifier

D²Pak Package Outline



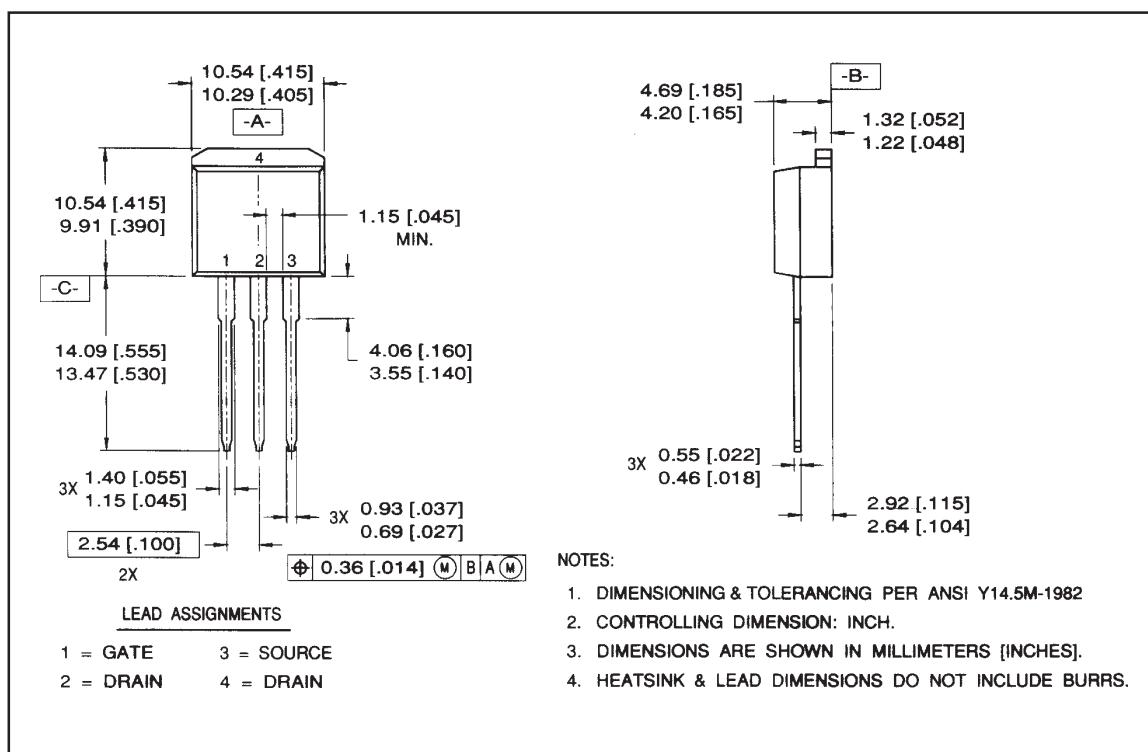
Part Marking Information

D²Pak



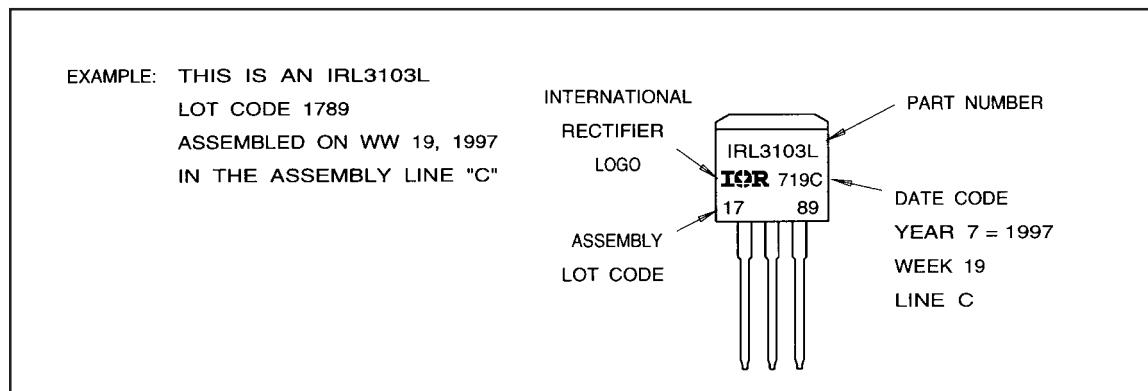
Package Outline

TO-262 Outline

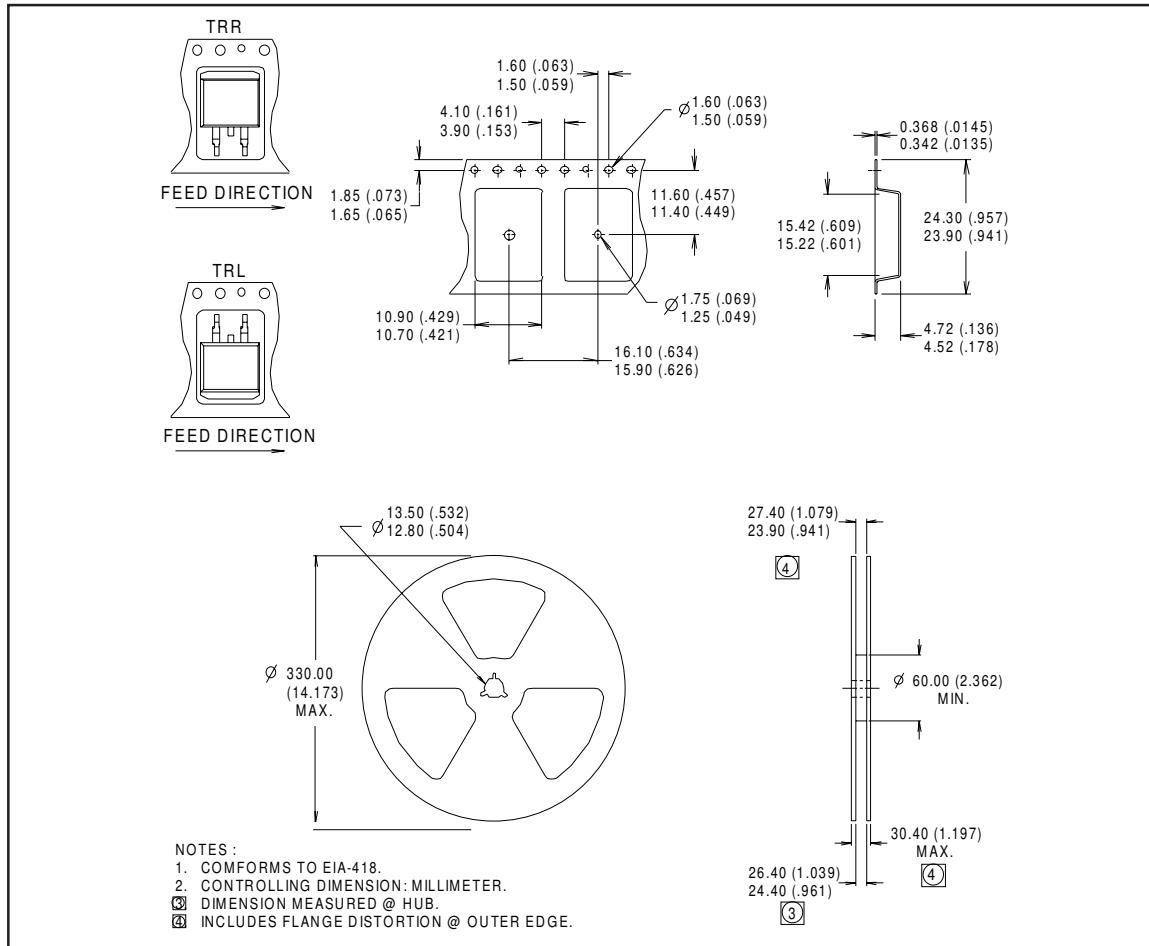


Part Marking Information

TO-262



Tape & Reel Information D²Pak



International
IR 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

<http://www.irf.com/> Data and specifications subject to change without notice. 5/98

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