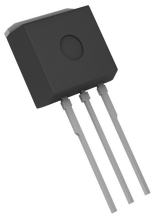
KERSEMI ELECTRONIC CO.,LTD.

IRF520NS/L

- Advanced Process Technology
- Surface Mount (IRF520NS)
- Low-profile through-hole (IRF520NL)
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated

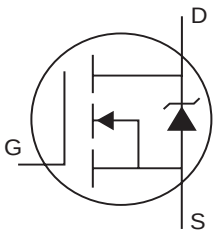
TO-263

TO-262



Description

The D2Pak is a surface mount power package capable of accommodating die sizes up to HEX-4. It provides the high est power capability and the lowest pos sible on-resistance in any existing surfa ce 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 surf ace mount application. The through-hole version (IRF520NL) is available for low-pr ofile applications.



V_{DSS} = 100V

$R_{DS(on)}$ = 0.20Ω

I_D = 9.7A

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V⑤	9.7	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V⑤	6.8	
I_{DM}	Pulsed Drain Current ①⑤	38	
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 Energy②⑤	91	mJ
I_{AR}	Avalanche Current①	5.7	A
E_{AR}	Repetitive Avalanche Energy①	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)	

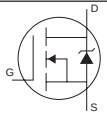
Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	——	3.1	°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	100	——	——	V	V_{GS} = 0V, I_D = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.11	——	V/°C	Reference to 25°C, I_D = 1mA⑤
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	——	0.20	Ω	V_{GS} = 10V, I_D = 5.7A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	——	4.0	V	V_{DS} = V_{GS}, I_D = 250μA
g_{fs}	Forward Transconductance	2.7	——	——	S	V_{DS} = 25V, I_D = 5.7A⑤
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°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	——	——	25	nC	I_D = 5.7A
Q_{gs}	Gate-to-Source Charge	——	——	4.8		V_{DS} = 80V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	——	11		V_{GS} = 10V, See Fig. 6 and 13 ④⑤
$t_{d(on)}$	Turn-On Delay Time	——	4.5	——	ns	V_{DD} = 50V
t_r	Rise Time	——	23	——		I_D = 5.7A
$t_{d(off)}$	Turn-Off Delay Time	——	32	——		R_G = 22Ω
t_f	Fall Time	——	23	——		R_D = 8.6Ω, See Fig. 10 ④⑤
L_S	Internal Source Inductance	——	7.5	——	nH	Between lead, and center of die contact
C_{iss}	Input Capacitance	——	330	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	92	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	54	——		f = 1.0MHz, See Fig. 5⑤

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	9.7	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①⑤	——	——	38		
V_{SD}	Diode Forward Voltage	——	——	1.3	V	T_J = 25°C, I_S = 5.7A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	99	150	ns	T_J = 25°C, I_F = 5.7A
Q_{rr}	Reverse RecoveryCharge	——	390	580	nC	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 = 4.7mH R_G = 25Ω, I_{AS} = 5.7A. (See Figure 12)

③ I_{SD} ≤ 5.7A, di/dt ≤ 240A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 175°C

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

⑤ Uses IRF520N data and test conditions

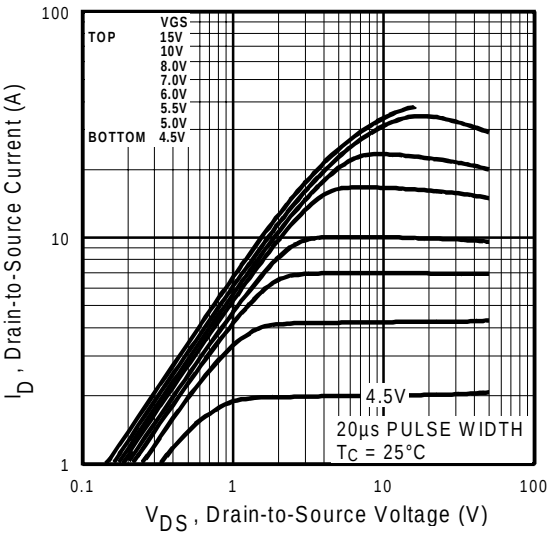


Fig 1. Typical Output Characteristics

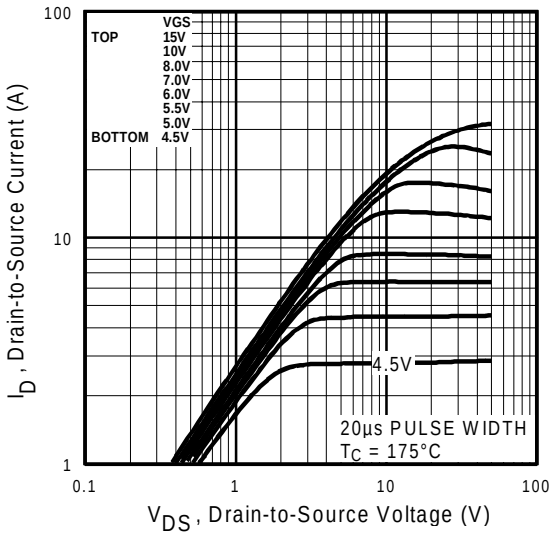


Fig 2. Typical Output Characteristics

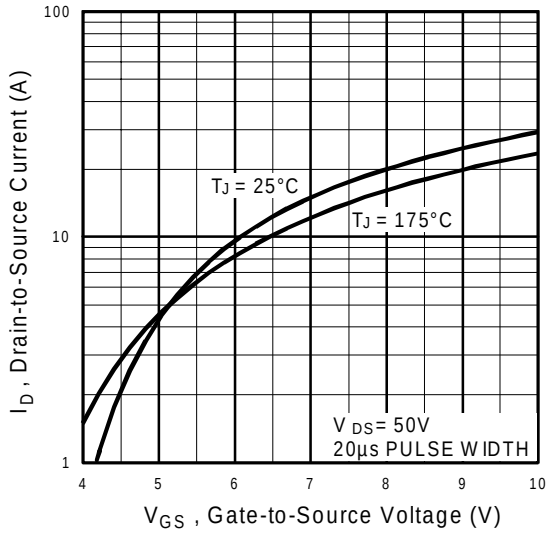


Fig 3. Typical Transfer Characteristics

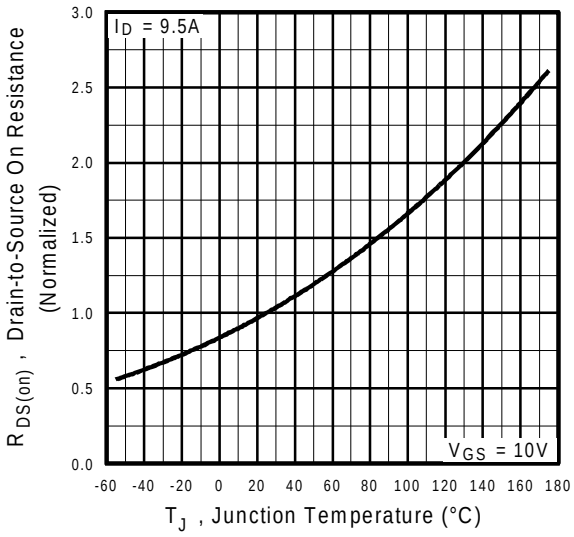


Fig 4. Normalized On-Resistance Vs. Temperature

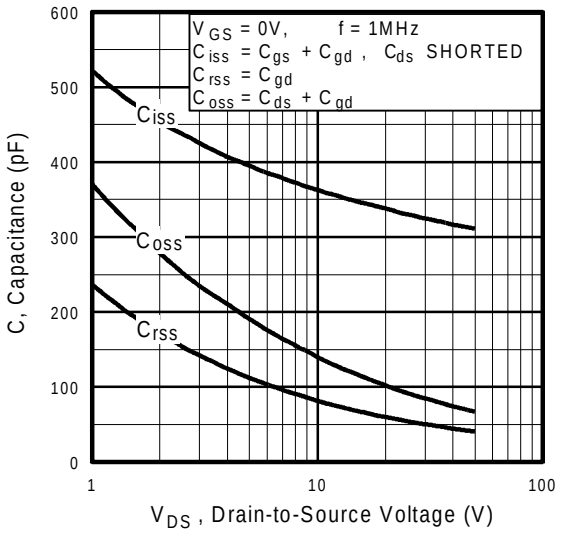


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

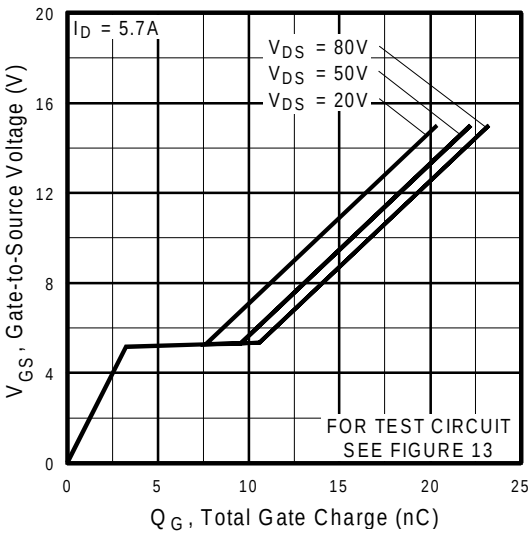


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

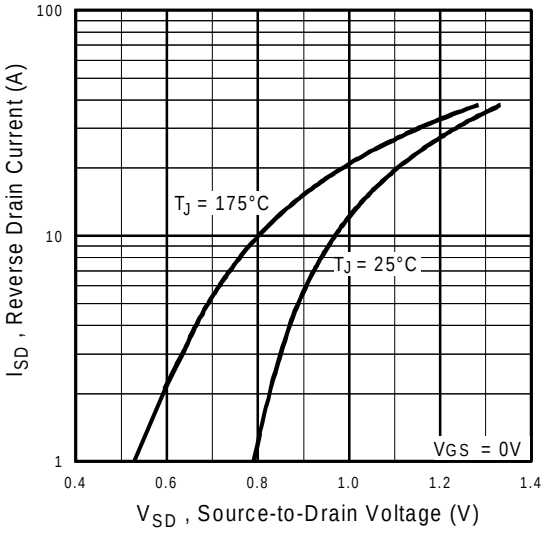


Fig 7. Typical Source-Drain Diode Forward Voltage

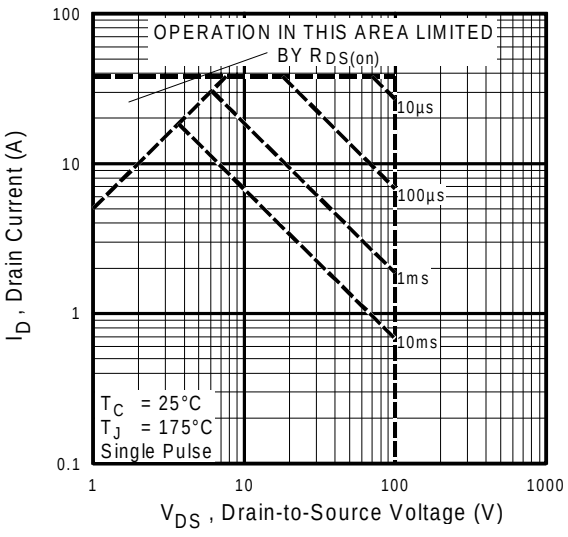


Fig 8. Maximum Safe Operating Area

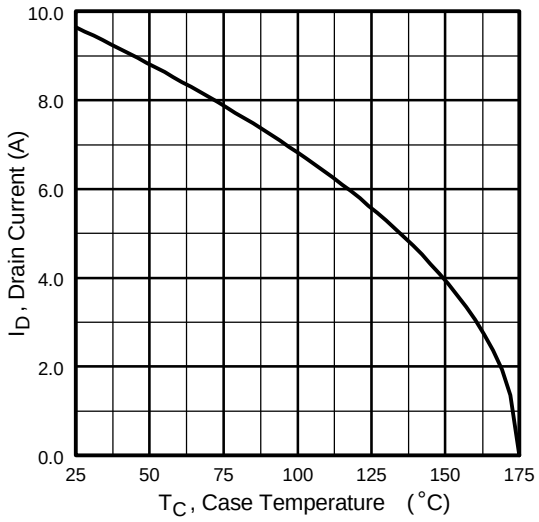


Fig 9. Maximum Drain Current Vs. Case Temperature

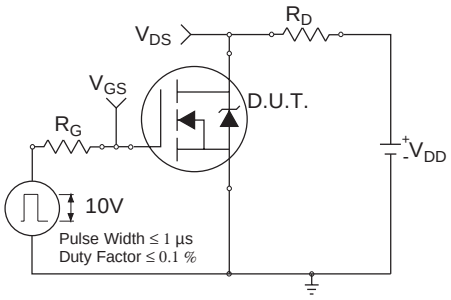


Fig 10a. Switching Time Test Circuit

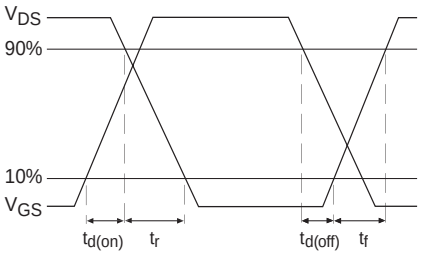


Fig 10b. Switching Time Waveforms

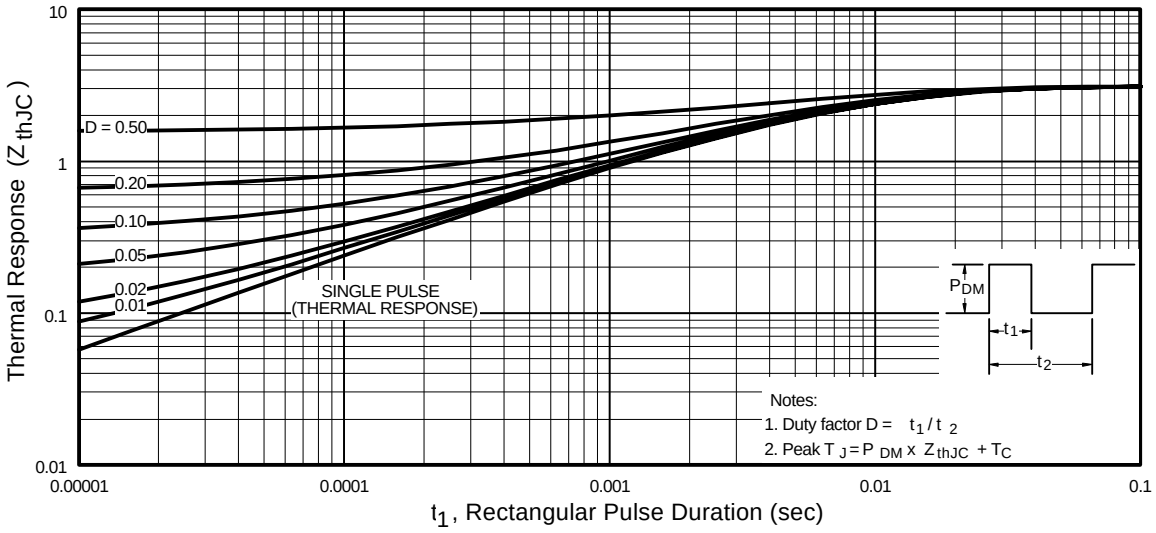


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

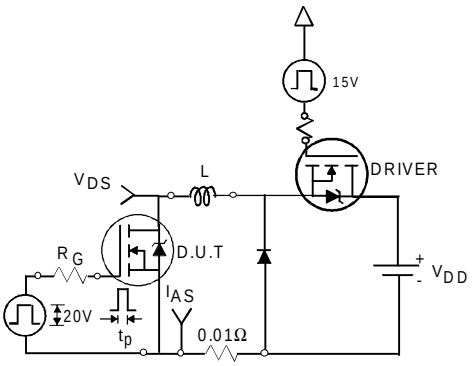


Fig 12a. Unclamped Inductive Test Circuit

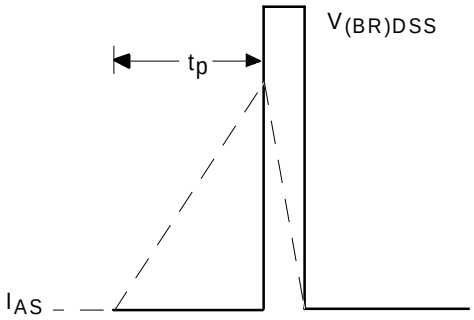


Fig 12b. Unclamped Inductive Waveforms

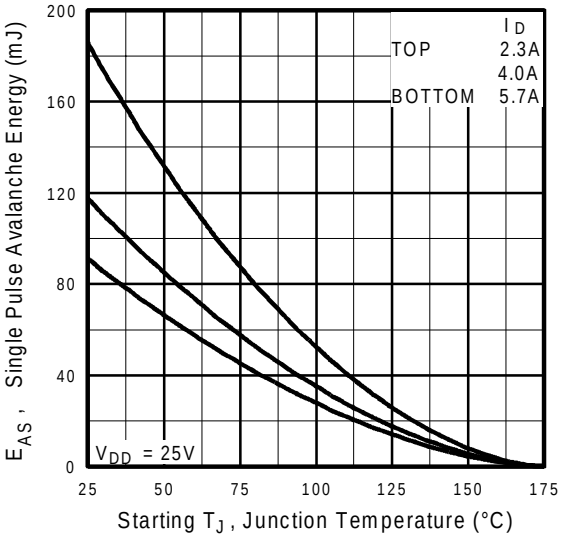


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

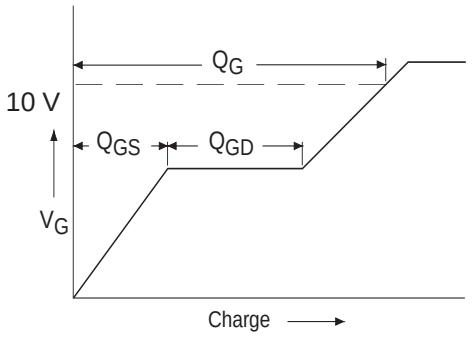


Fig 13a. Basic Gate Charge Waveform

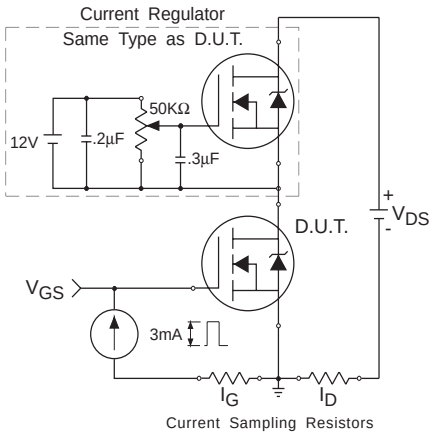
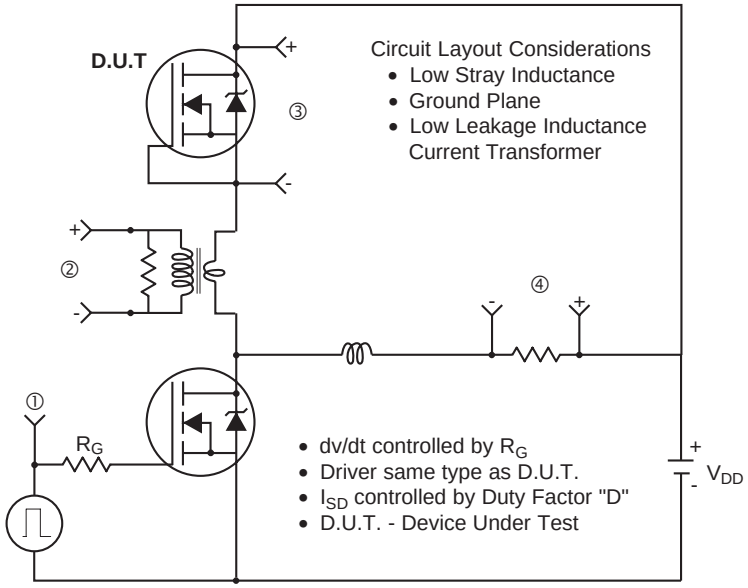
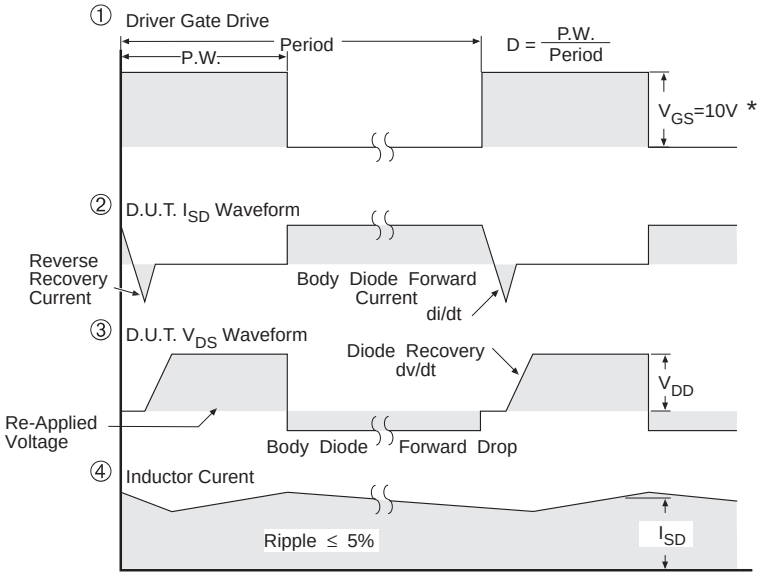


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit

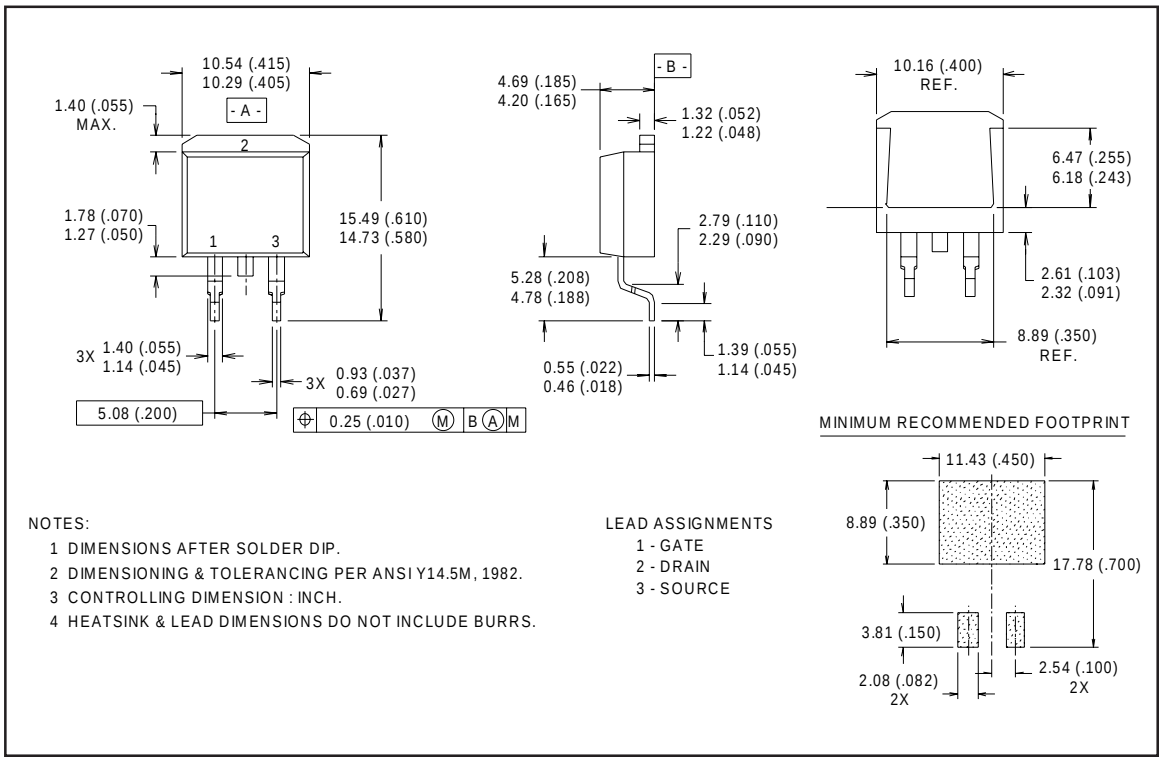




* V_{GS} = 5V for Logic Level Devices

Fig 14. For N-Channel HEXFETS

D^{2}Pak Package Outline

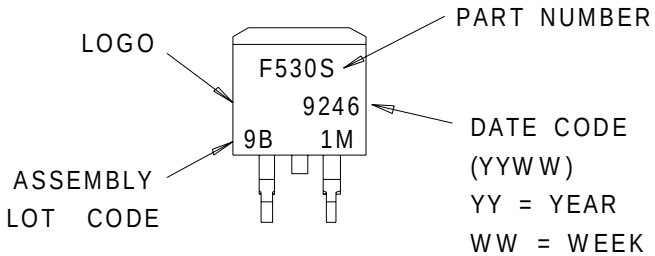


NOTES:
1 DIMENSIONS AFTER SOLDER DIP.
2 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
3 CONTROLLING DIMENSION : INCH.
4 HEATSINK & LEAD DIMENSIONS DO NOT INCLUDE BURRS.

LEAD ASSIGNMENTS
1 - GATE
2 - DRAIN
3 - SOURCE

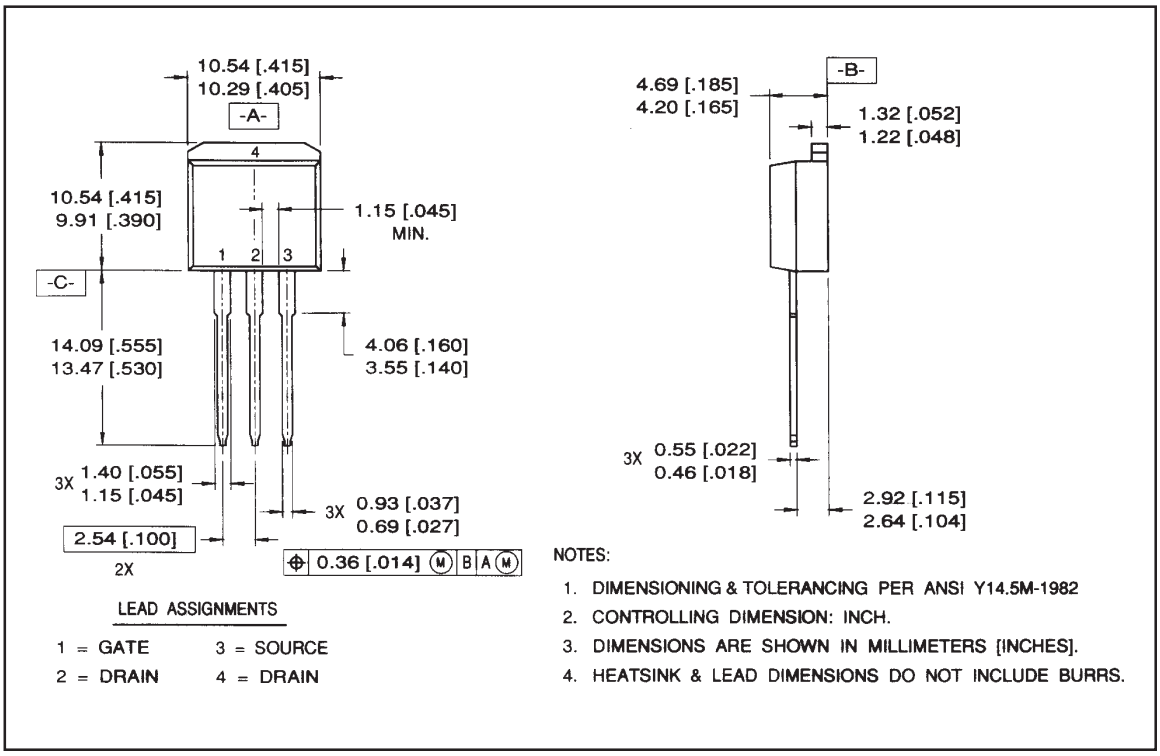
Part Marking Information

D^{2}Pak



Package Outline

TO-262 Outline



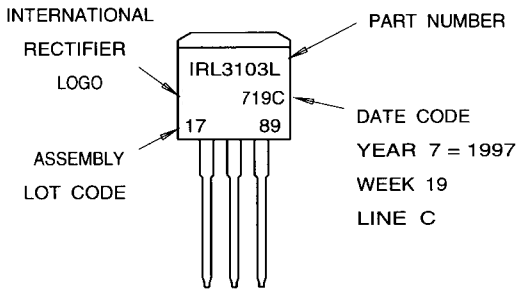
NOTES:

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

D²Pak