

International IR Rectifier

- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Optimized for SMPS Applications

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 (IRFZ34VL) is available for low-profile application.

Absolute Maximum Ratings

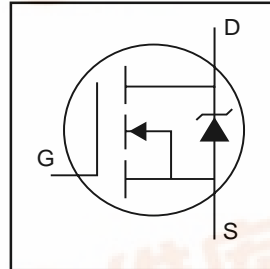
	Parameter	Max.	Units
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}^{\text{⑤}}$	30	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}^{\text{⑤}}$	21	
I_{DM}	Pulsed Drain Current ①⑤	120	
$P_D @ T_C = 25^\circ\text{C}$	Power Dissipation	70	W
	Linear Derating Factor	0.46	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
I_{AR}	Avalanche Current①	30	A
E_{AR}	Repetitive Avalanche Energy①	7.0	mJ
dv/dt	Peak Diode Recovery dv/dt ③⑤	4.5	V/ns
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		

Thermal Resistance

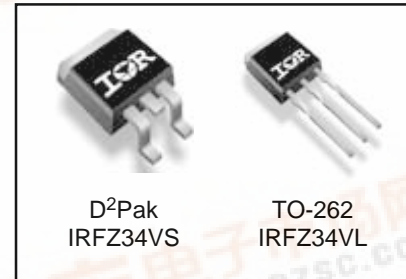
	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	2.15	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mounted)**	—	40	

PD - 94180

IRFZ34VS
IRFZ34VL
HEXFET® Power MOSFET



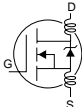
$V_{DSS} = 60\text{V}$
$R_{DS(on)} = 28\text{m}\Omega$
$I_D = 30\text{A}$



IRFZ34VS/IRFZ34VL

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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	60	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.062	—	V/°C	Reference to 25°C , $I_D = 1\text{mA}$ ⑤
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	28	mΩ	$V_{GS} = 10V, I_D = 18A$ 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	15	—	—	S	$V_{DS} = 25V, I_D = 18A$ ④ ⑤
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 60V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 48V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
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	—	—	49	nC	$I_D = 30A$
Q_{gs}	Gate-to-Source Charge	—	—	12		$V_{DS} = 48V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	18		$V_{GS} = 10V$, See Fig. 6 and 13 ⑤
$t_{d(on)}$	Turn-On Delay Time	—	10	—	ns	$V_{DD} = 30V$
t_r	Rise Time	—	65	—		$I_D = 30A$
$t_{d(off)}$	Turn-Off Delay Time	—	31	—		$R_G = 12\Omega$
t_f	Fall Time	—	40	—		$V_{GS} = 10V$, See Fig. 10 ④ ⑤
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	—	1120	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	250	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	59	—		$f = 1.0\text{MHz}$, See Fig. 5 ⑤
E_{AS}	Single Pulse Avalanche Energy ② ⑤	—	260	81	mJ	

Source-Drain Ratings and Characteristics

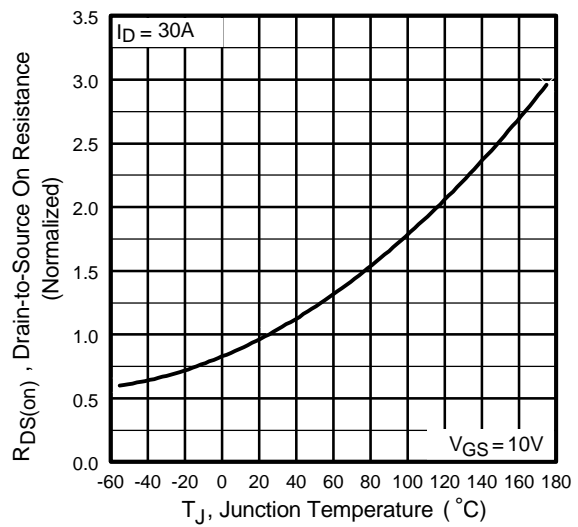
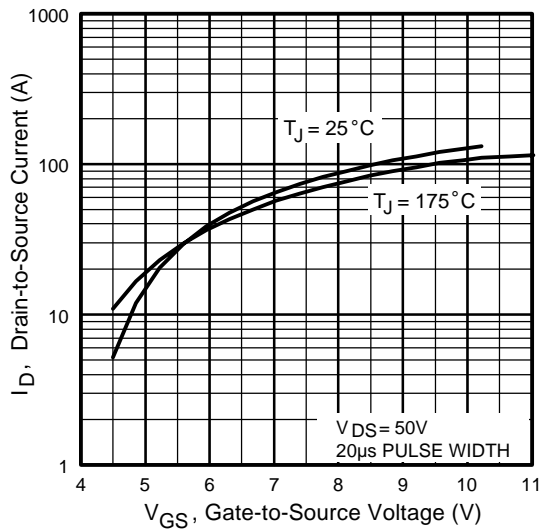
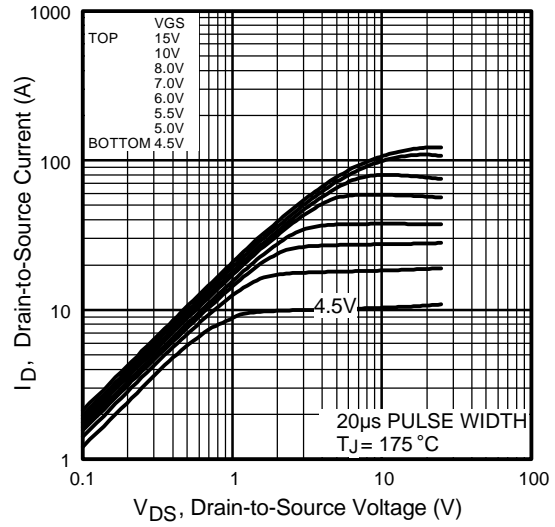
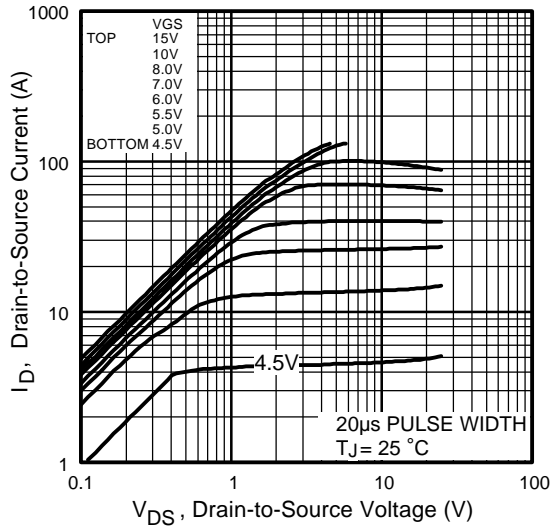
	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	30	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	120		
V_{SD}	Diode Forward Voltage	—	—	1.6	V	$T_J = 25^\circ\text{C}, I_S = 30A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	70	110	ns	$T_J = 25^\circ\text{C}, I_F = 30A$
Q_{rr}	Reverse Recovery Charge	—	99	150	nC	$di/dt = 100A/\mu s$ ④ ⑤
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 $T_J = 25^\circ\text{C}$, $L = 180\mu H$
 $R_G = 25\Omega$, $I_{AS} = 30A$. (See Figure 12)
- ③ $I_{SD} \leq 30A$, $di/dt \leq 250A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$,
 $T_J \leq 175^\circ\text{C}$

- ④ Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.
- ⑤ Uses IRFZ34V 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.



IRFZ34VS/IRFZ34VL

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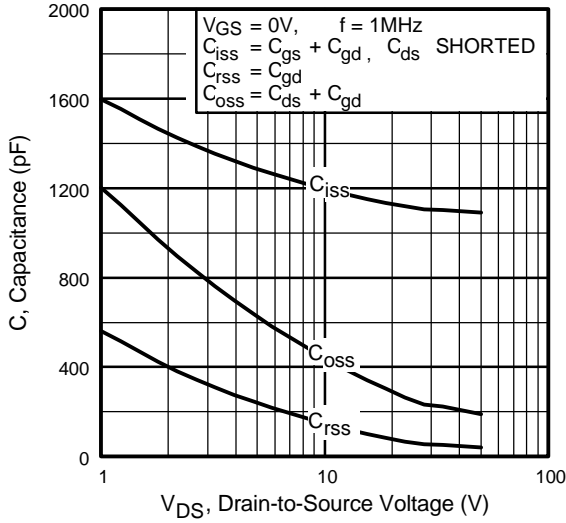


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

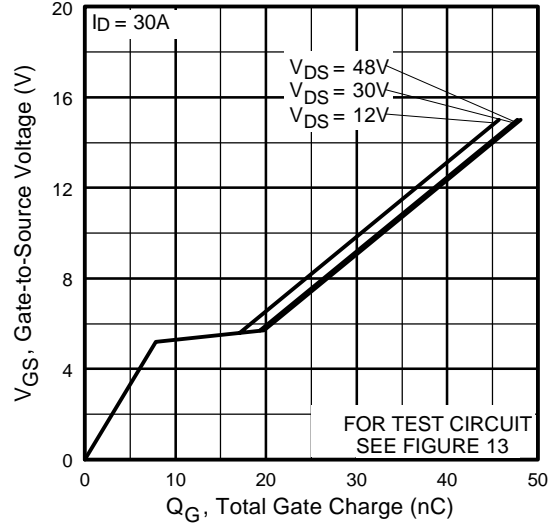


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

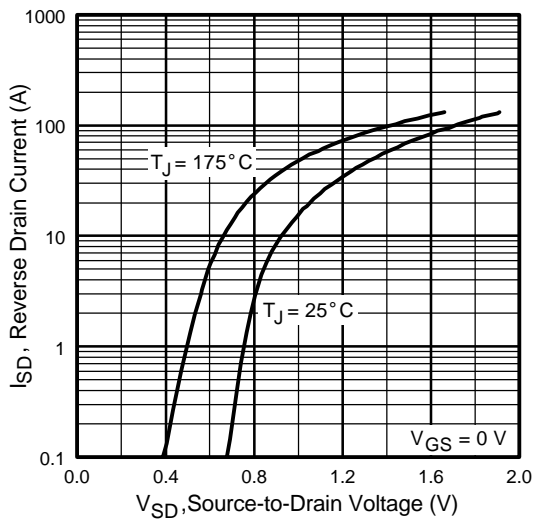


Fig 7. Typical Source-Drain Diode Forward Voltage

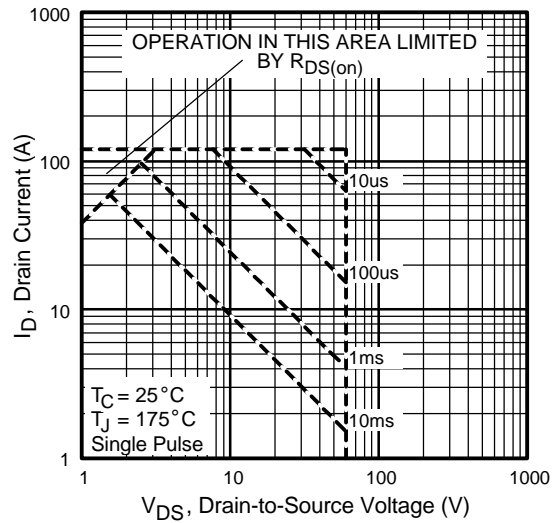


Fig 8. Maximum Safe Operating Area

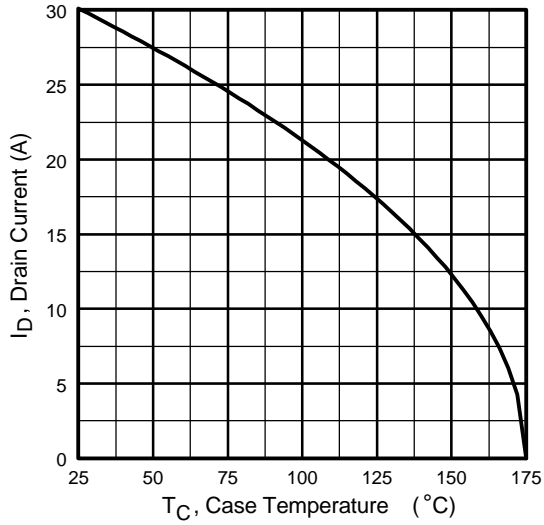


Fig 9. Maximum Drain Current Vs. Case Temperature

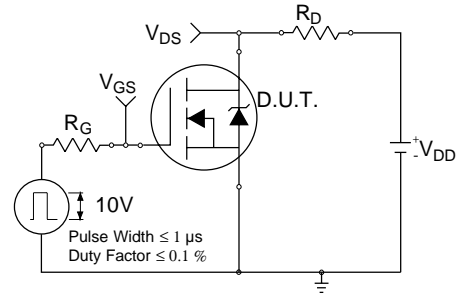


Fig 10a. Switching Time Test Circuit

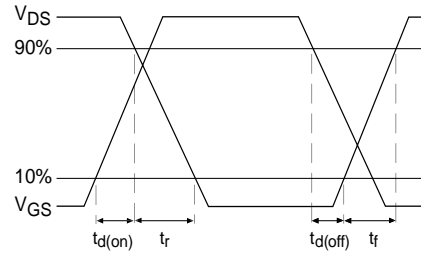


Fig 10b. Switching Time Waveforms

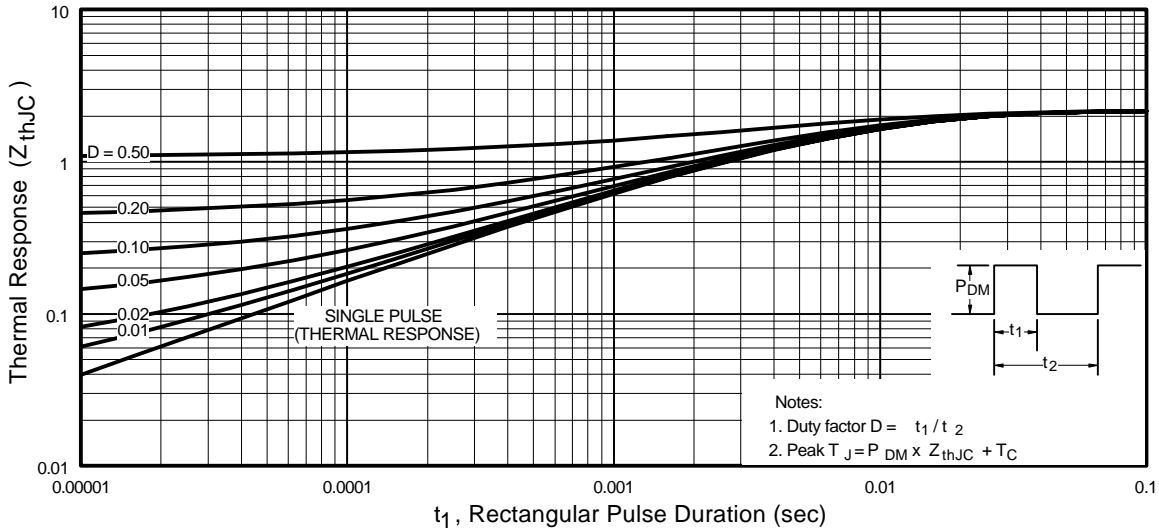


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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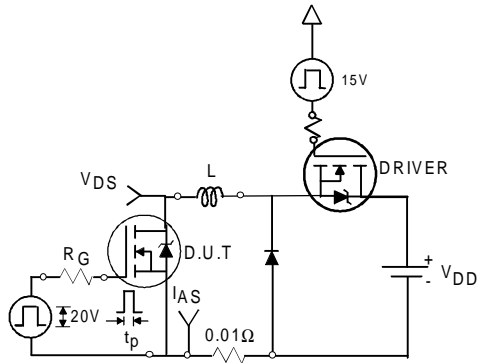


Fig 12a. Unclamped Inductive Test Circuit

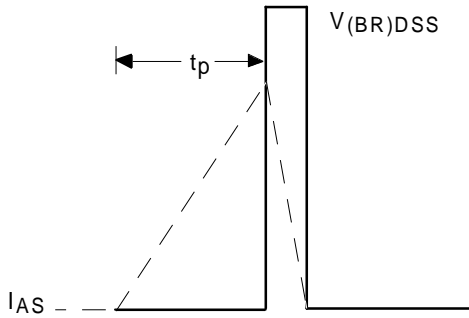


Fig 12b. Unclamped Inductive Waveforms

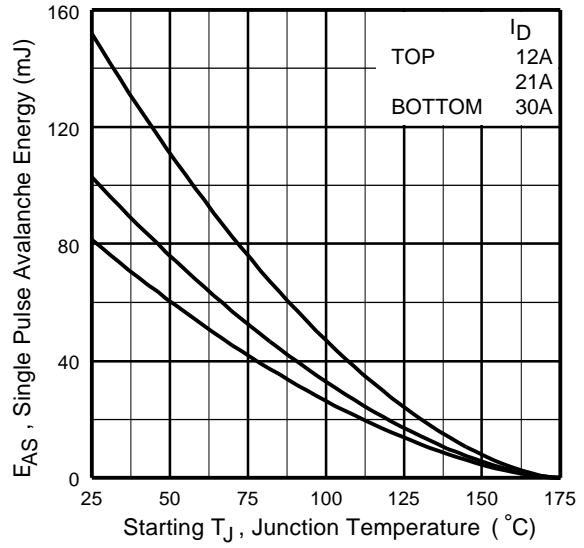


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

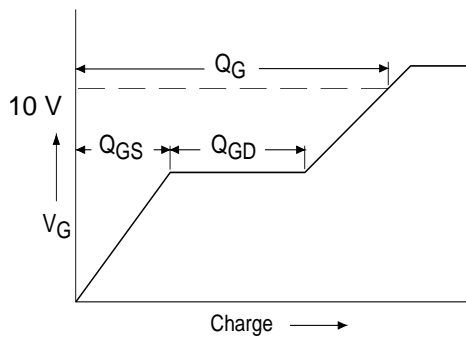


Fig 13a. Basic Gate Charge Waveform

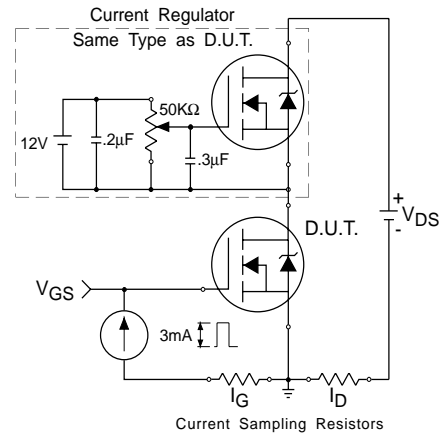
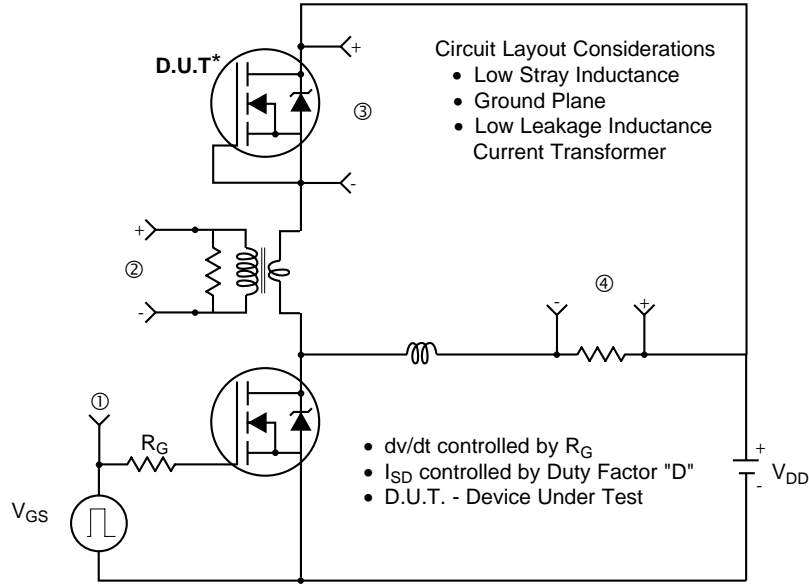
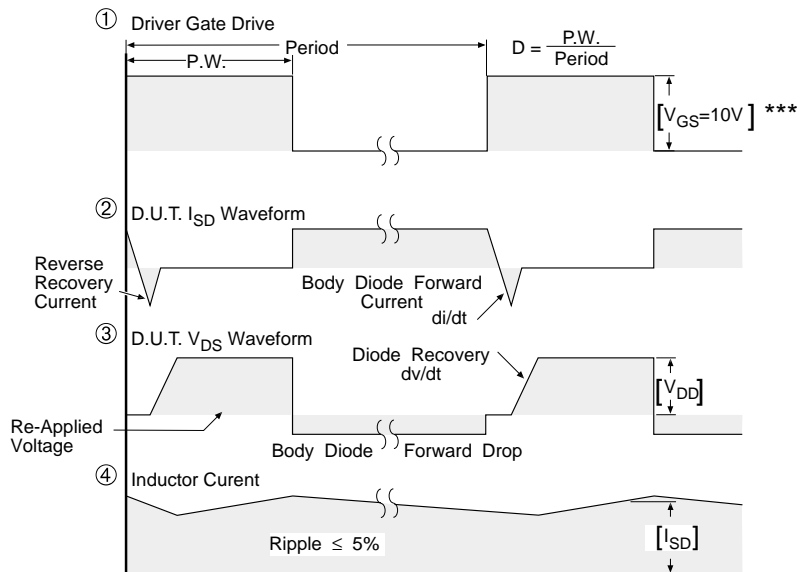


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



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



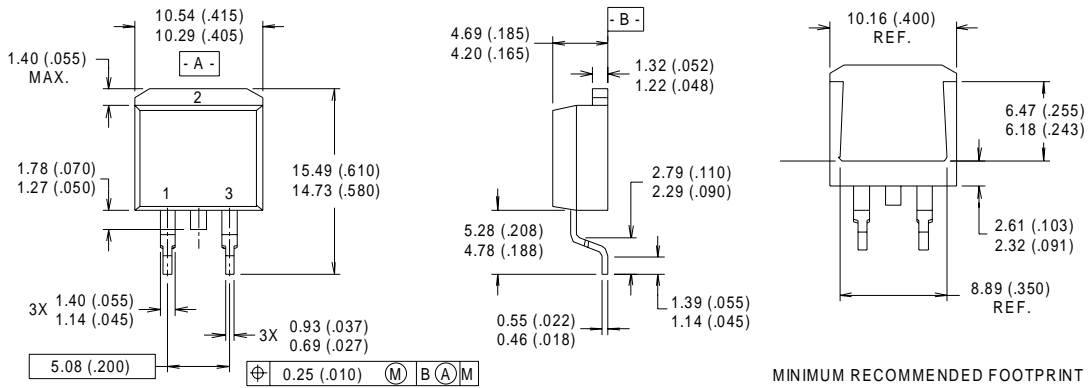
*** $V_{GS} = 5.0V$ for Logic Level and 3V Drive Devices

Fig 14. For N-channel HEXFET® power MOSFETs

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D²Pak Package Outline



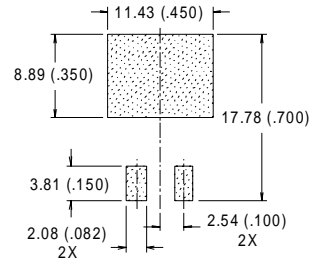
NOTES:

- 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

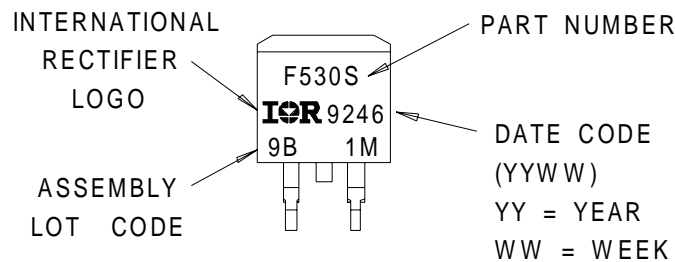
- 1 - GATE
- 2 - DRAIN
- 3 - SOURCE

MINIMUM RECOMMENDED FOOTPRINT



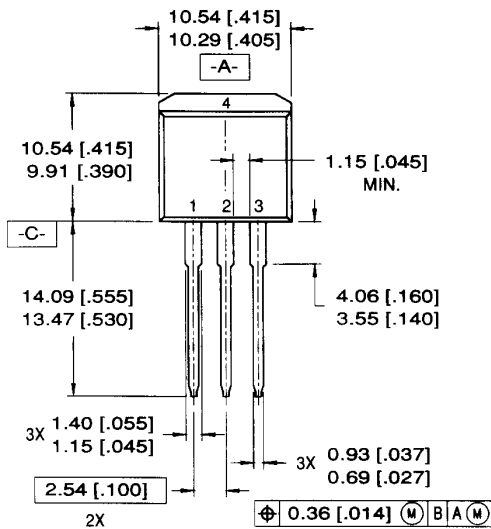
Part Marking Information

D²Pak



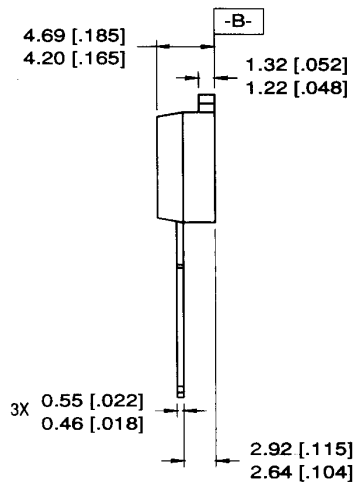
Package Outline

TO-262 Outline



LEAD ASSIGNMENTS

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



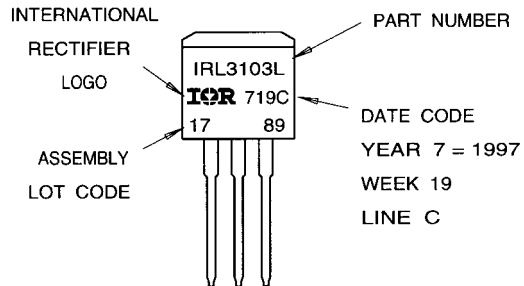
NOTES:

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

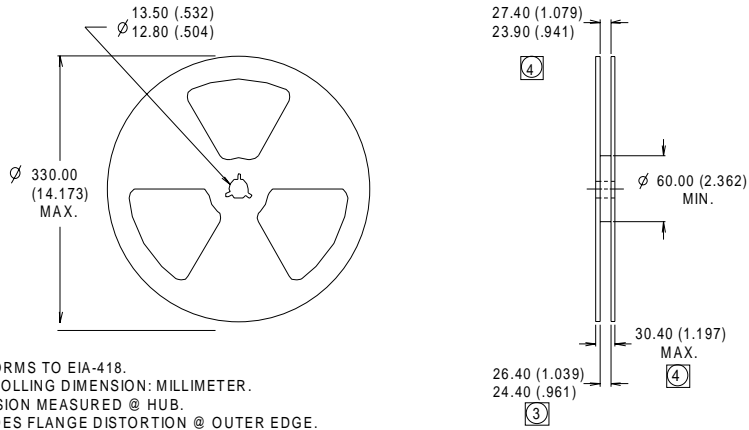
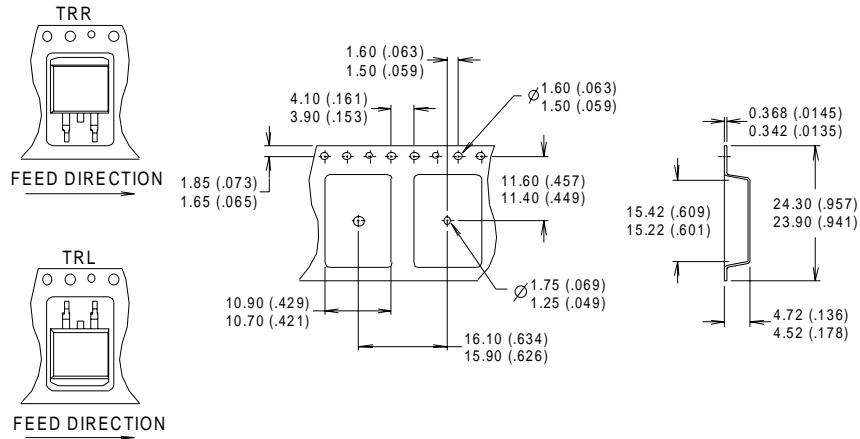
EXAMPLE: THIS IS AN IRL3103L
 LOT CODE 1789
 ASSEMBLED ON WW 19, 1997
 IN THE ASSEMBLY LINE "C"



IRFZ34VS/IRFZ34VL

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Tape & Reel Information D²Pak



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.

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