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 = -1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	——	0.48	Ω	V_{GS} = -10V, I_D = -3.9A ④
$V_{GS(th)}$	Gate Threshold Voltage	-2.0	——	-4.0	V	V_{DS} = V_{GS}, I_D = -250µA
g_{fs}	Forward Transconductance	1.4	——	——	S	V_{DS} = -50V, I_D = -4.0A⑥
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	——	——	27	nC	I_D = -4.0A
Q_{gs}	Gate-to-Source Charge	——	——	5.0		V_{DS} = -80V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	——	15		V_{GS} = -10V, See Fig. 6 and 13 ④⑥
$t_{d(on)}$	Turn-On Delay Time	——	14	——	ns	V_{DD} = -50V
t_r	Rise Time	——	47	——		I_D = -4.0A
$t_{d(off)}$	Turn-Off Delay Time	——	28	——		R_G = 12 Ω
t_f	Fall Time	——	31	——		R_D =12 Ω, See Fig. 10 ④⑥
L_D	Internal Drain Inductance	——	4.5	——	nH	Between lead, 6mm (0.25in.) from package and center of die contact⑤
L_S	Internal Source Inductance	——	7.5	——		
C_{iss}	Input Capacitance	——	350	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	110	——		V_{DS} = -25V
C_{rss}	Reverse Transfer Capacitance	——	70	——		f = 1.0MHz, See Fig. 5⑥

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	-6.6	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	-26		
V_{SD}	Diode Forward Voltage	——	——	-1.6	V	T_J = 25°C, I_S = -3.9A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	100	150	ns	T_J = 25°C, I_F = -4.0A
Q_{rr}	Reverse Recovery Charge	——	420	630	nC	di/dt = 100A/µs ④⑥
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°C, L = 13mH R_G = 25Ω, I_{AS} = -3.9A. (See Figure 12)

③ I_{SD} ≤ -4.0A, di/dt ≤ 300A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 150°C

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

⑤This is applied for I-PAK, L_S of D-PAK is measured between lead and center of die contact

⑥ Uses IRF9520N 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

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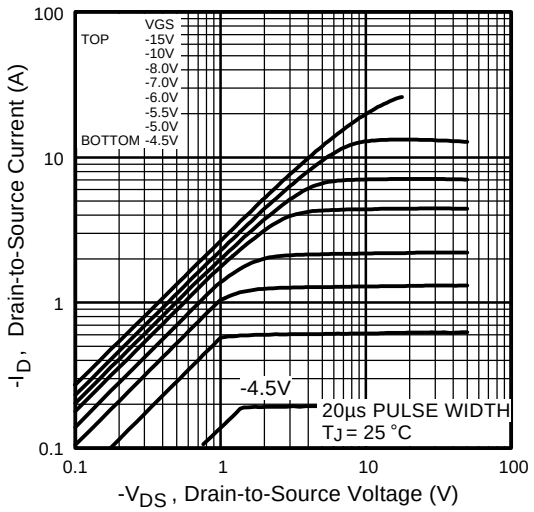

Fig 1. Typical Output Characteristics

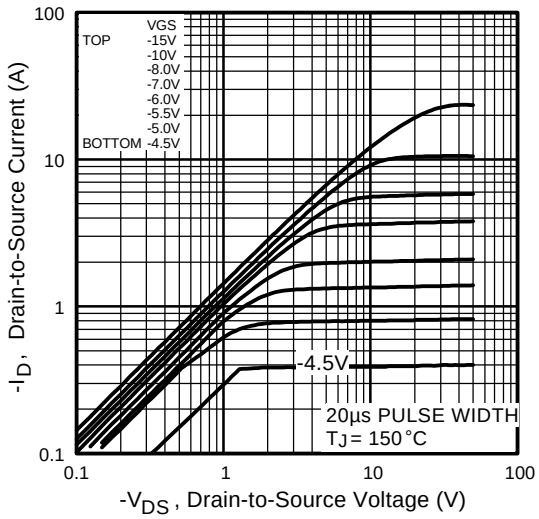

Fig 2. Typical Output Characteristics

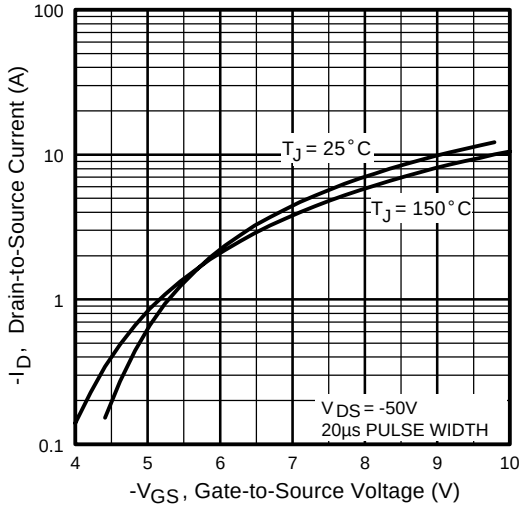

Fig 3. Typical Transfer Characteristics

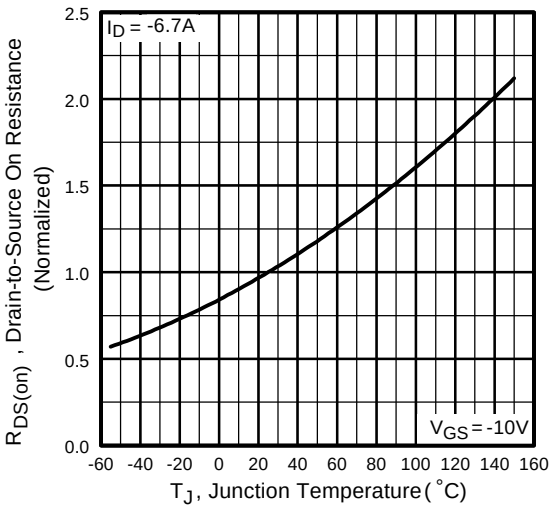

Fig 4. Normalized On-Resistance Vs. Temperature

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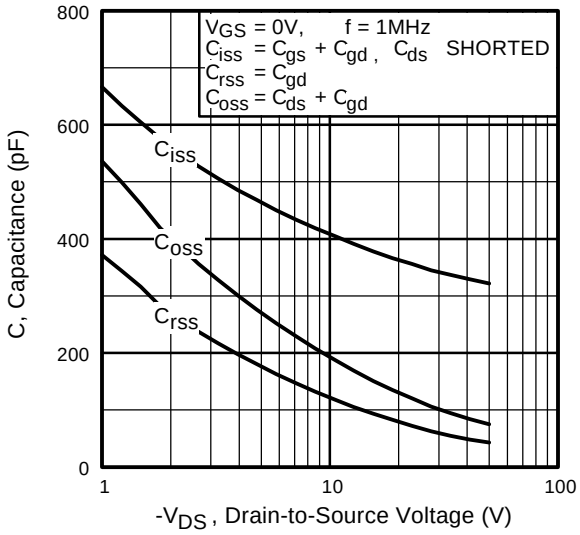

Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

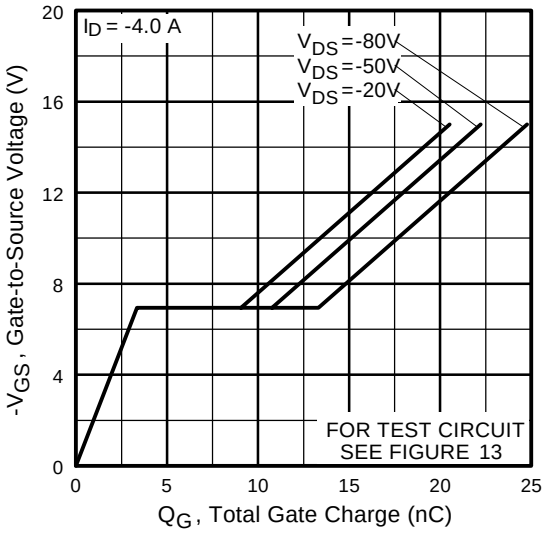

Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

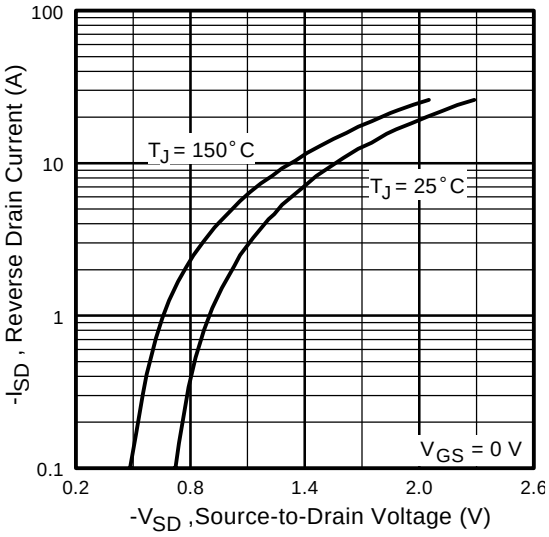

Fig 7. Typical Source-Drain Diode Forward Voltage

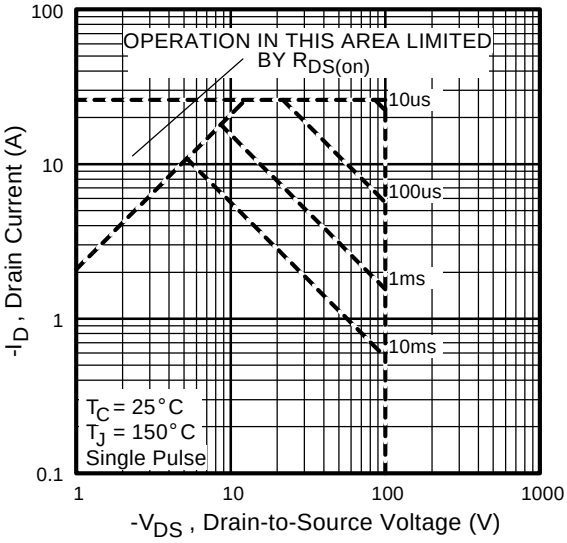

Fig 8. Maximum Safe Operating Area

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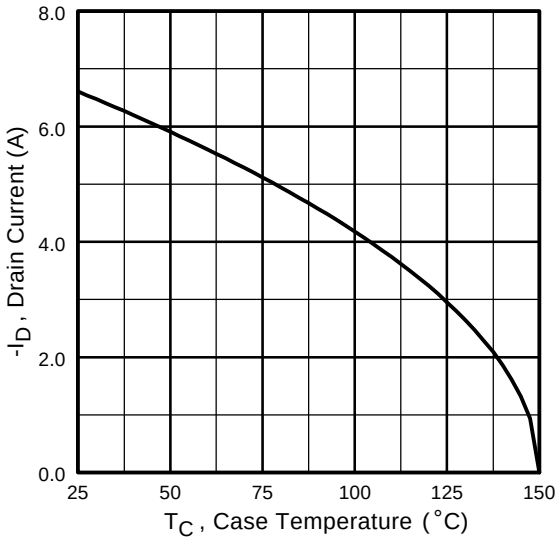

Fig 9. Maximum Drain Current Vs. Case Temperature

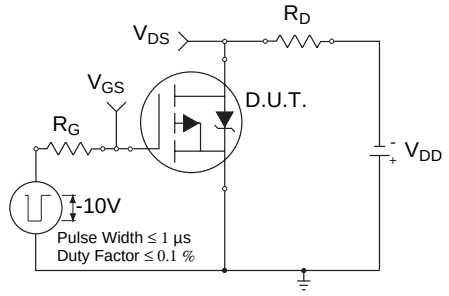

Fig 10a. Switching Time Test Circuit

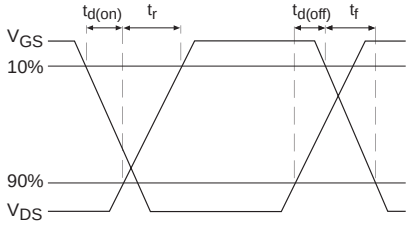

Fig 10b. Switching Time Waveforms

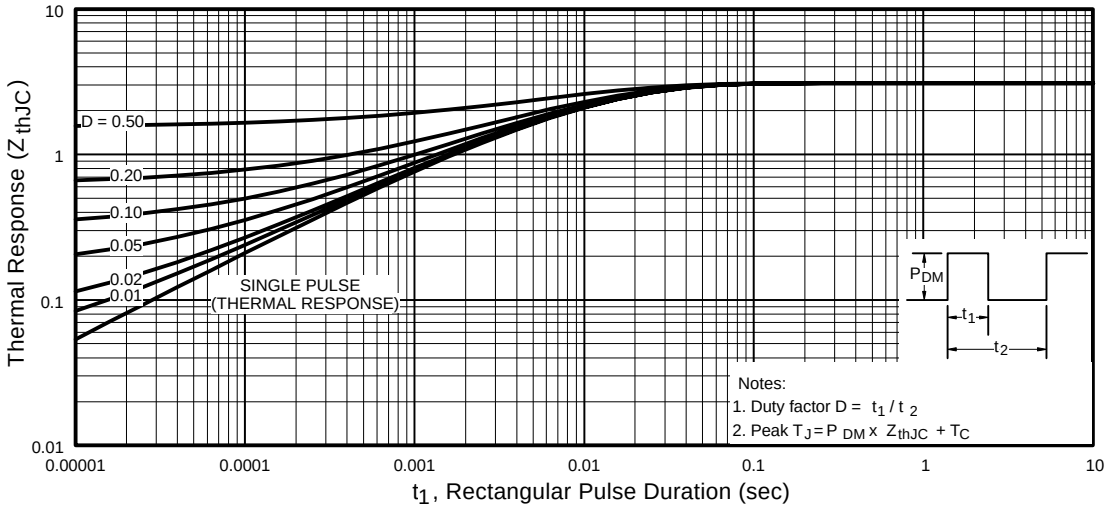

Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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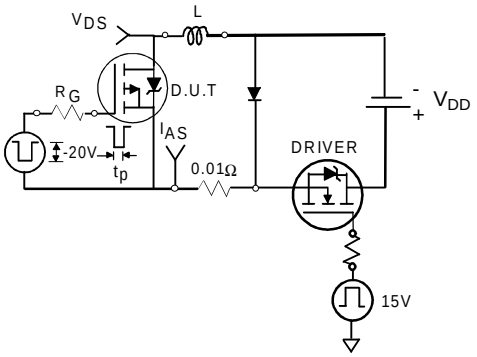

Fig 12a. Unclamped Inductive Test Circuit

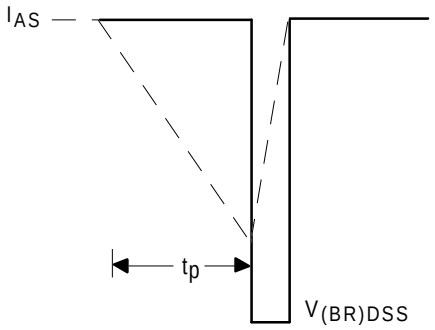

Fig 12b. Unclamped Inductive Waveforms

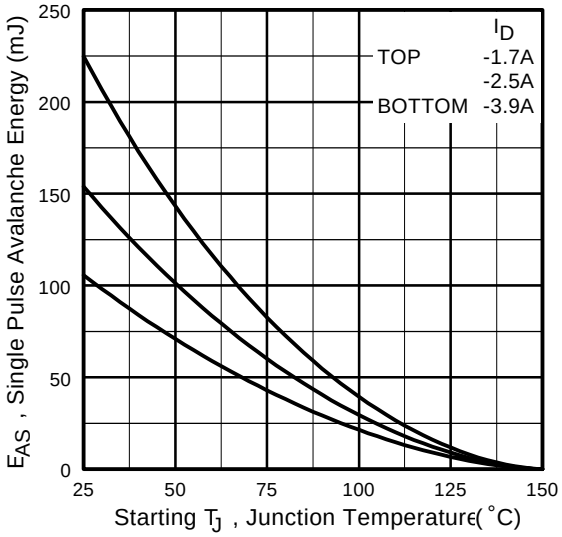

Fig 12c. Maximum Avalanche Energy Vs. Drain Current

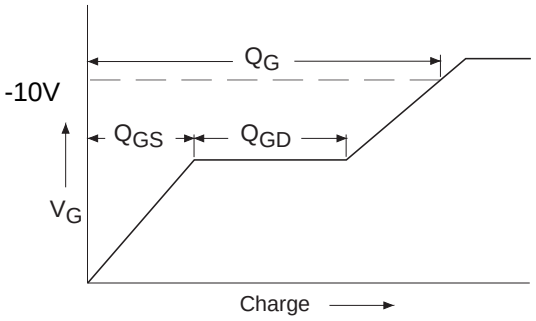

Fig 13a. Basic Gate Charge Waveform

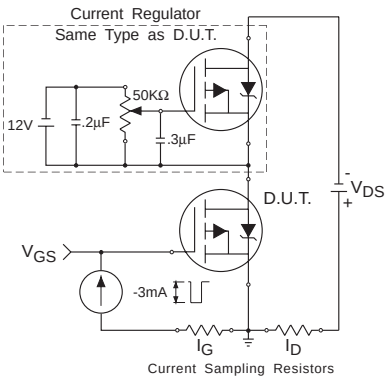

Fig 13b. Gate Charge Test Circuit

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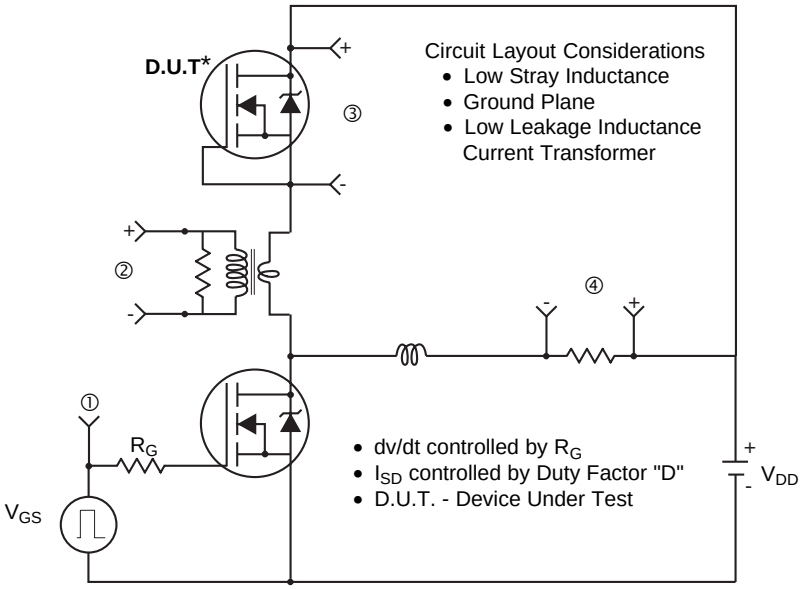
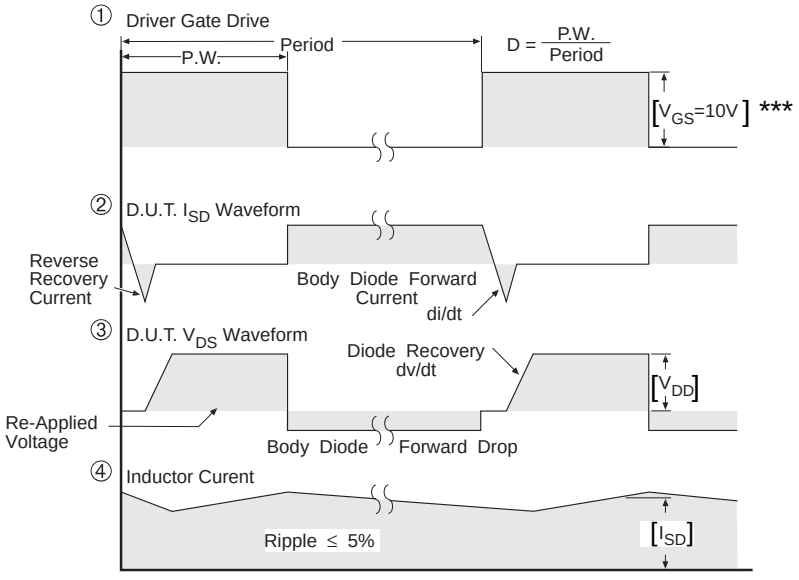
Peak Diode Recovery dv/dt Test Circuit



* 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

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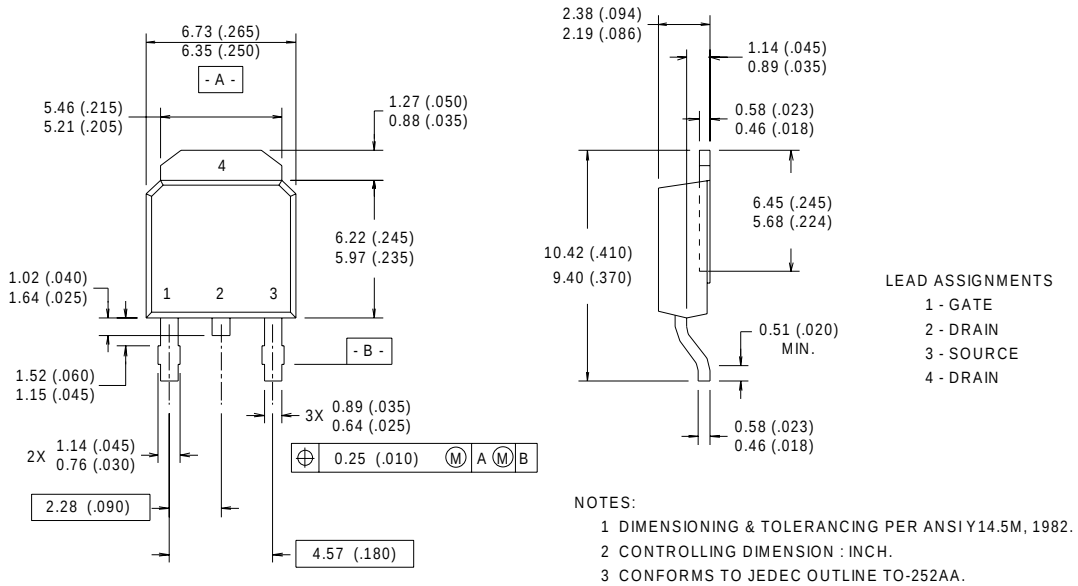
Package Outline

TO-252AA Outline
Dimensions are shown in millimeters (inches)

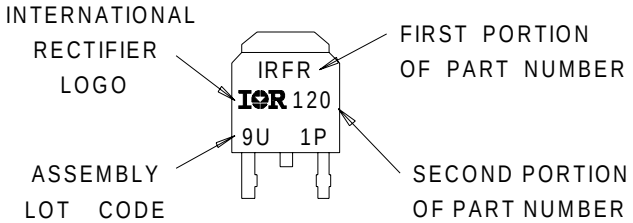


NOTES:
1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
2 CONTROLLING DIMENSION : INCH.
3 CONFORMS TO JEDEC OUTLINE TO-252AA.
4 DIMENSIONS SHOWN ARE BEFORE SOLDER DIP, SOLDER DIP MAX. +0.16 (.006).

Part Marking Information

TO-252AA (D-Pak)

EXAMPLE : THIS IS AN IRFR120
WITH ASSEMBLY
LOT CODE 9U1P



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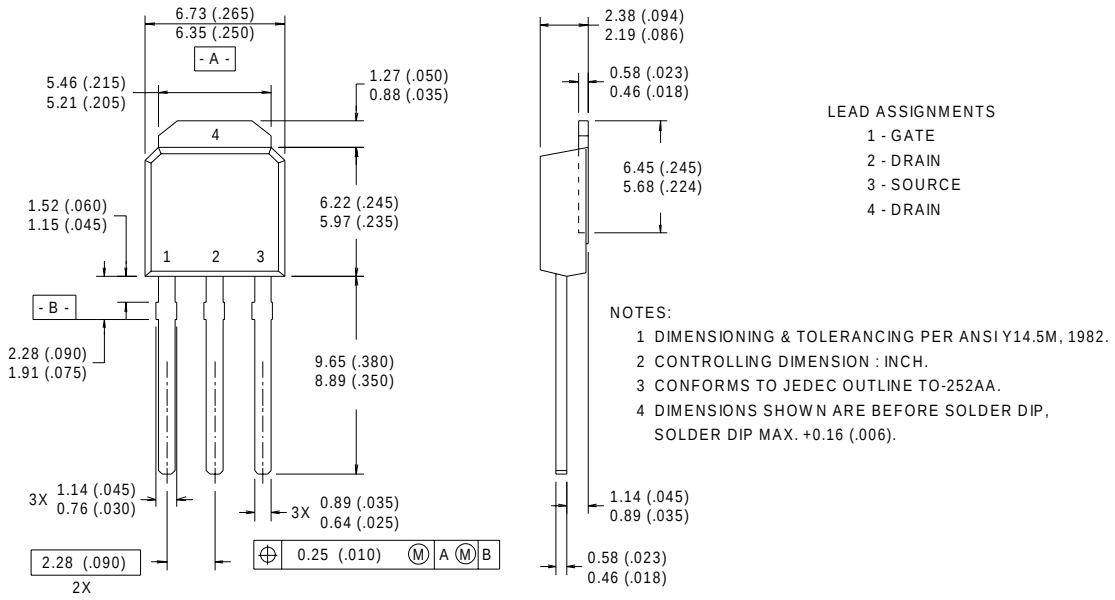
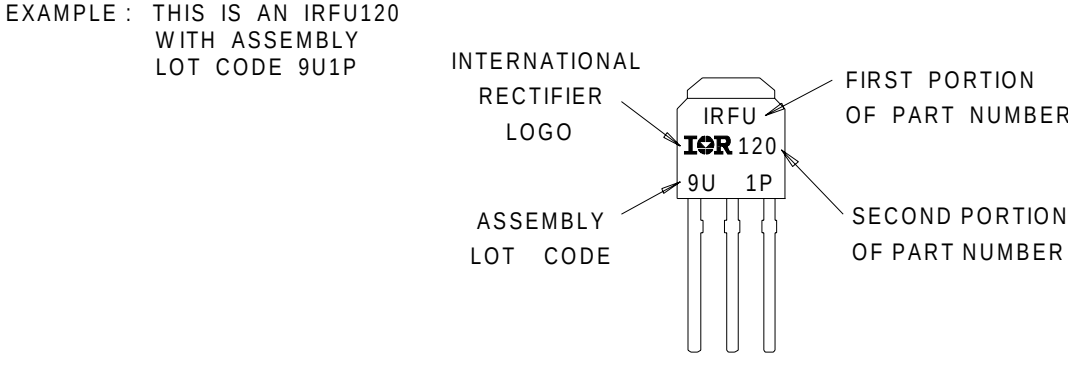
Package Outline

TO-251AA Outline
Dimensions are shown in millimeters (inches)



Part Marking Information

TO-251AA (I-Pak)



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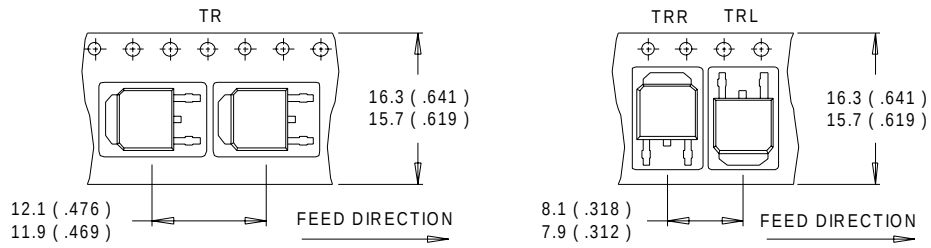
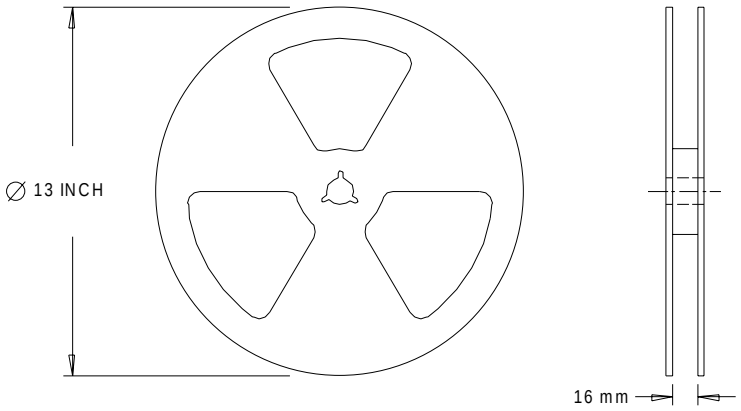
Tape & Reel Information

TO-252AA



NOTES :
1. CONTROLLING DIMENSION : MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



NOTES :
1. OUTLINE CONFORMS TO EIA-481.

International
IOR Rectifier

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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. 3/98

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Note: For the most current drawings please refer to the IR website at:
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