

International IOR Rectifier

HEXFET® Power MOSFET

- Surface Mount
- Available in Tape & Reel
- Dynamic dv/dt Rating
- Logic-Level Gate Drive
- $R_{DS(on)}$ Specified at $V_{GS}=4V$ & $5V$
- 175°C Operating Temperature
- Fast Switching

Description

Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The SMD-220 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 SMD-220 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.

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 5.0 V	50*	A
I_D @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 5.0 V	36	
I_{DM}	Pulsed Drain Current ①	200	
P_D @ $T_C = 25^\circ\text{C}$	Power Dissipation	150	W
P_D @ $T_A = 25^\circ\text{C}$	Power Dissipation (PCB Mount)**	3.7	
	Linear Derating Factor	1.0	W/°C
	Linear Derating Factor (PCB Mount)**	0.025	
V_{GS}	Gate-to-Source Voltage	± 10	V
E_{AS}	Single Pulse Avalanche Energy ②	400	mJ
dv/dt	Peak Diode Recovery dv/dt ③	4.5	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to +175	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

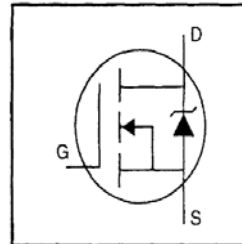
Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	1.0	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB mount)**	—	—	40	
$R_{\theta JA}$	Junction-to-Ambient	—	—	62	

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

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

IRLZ44SPbF



$$V_{DSS} = 60V$$

$$R_{DS(on)} = 0.028\Omega$$

$$I_D = 50^*A$$



SMD-220

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

	Parameter	Min.	Typ.	Max.	Units	Test 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	—	0.070	—	$V/^\circ\text{C}$	Reference to 25°C , $I_D=1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.028	Ω	$V_{GS}=5.0V$, $I_D=31A$ ④
		—	—	0.039		$V_{GS}=4.0V$, $I_D=25A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	2.0	V	$V_{DS}=V_{GS}$, $I_D=250\mu A$
g_{fs}	Forward Transconductance	23	—	—	S	$V_{DS}=25V$, $I_D=31A$ ④
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	$V_{GS}=10V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS}=-10V$
Q_g	Total Gate Charge	—	—	66	nC	$I_D=51A$
Q_{gs}	Gate-to-Source Charge	—	—	12		$V_{DS}=48V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	43		$V_{GS}=5.0V$ See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	17	—	ns	$V_{DD}=30V$
t_r	Rise Time	—	230	—		$I_D=51A$
$t_{d(off)}$	Turn-Off Delay Time	—	42	—		$R_G=4.6\Omega$
t_f	Fall Time	—	110	—		$R_D=0.56\Omega$ See Figure 10 ④
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6 mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	7.5	—		
C_{iss}	Input Capacitance	—	3300	—	pF	$V_{GS}=0V$
C_{oss}	Output Capacitance	—	1200	—		$V_{DS}=25V$
C_{rss}	Reverse Transfer Capacitance	—	200	—		$f=1.0MHz$ See Figure 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	50*	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	200		
V_{SD}	Diode Forward Voltage	—	—	2.5	V	$T_J=25^\circ\text{C}$, $I_S=51A$, $V_{GS}=0V$ ④
t_{rr}	Reverse Recovery Time	—	130	180	ns	$T_J=25^\circ\text{C}$, $I_F=51A$
Q_{rr}	Reverse Recovery Charge	—	0.84	1.3	μC	$di/dt=100A/\mu s$ ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

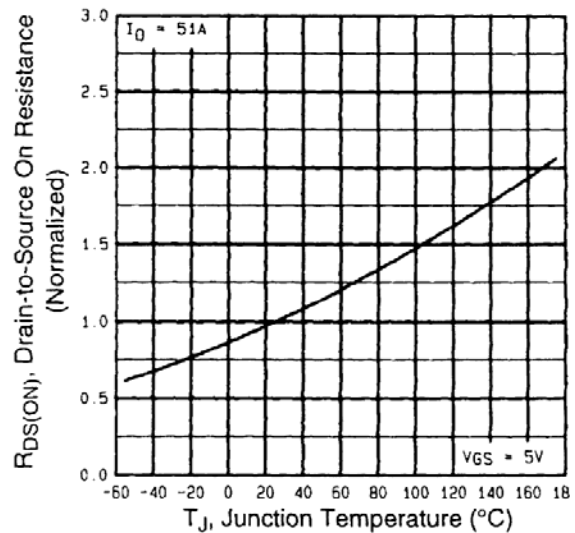
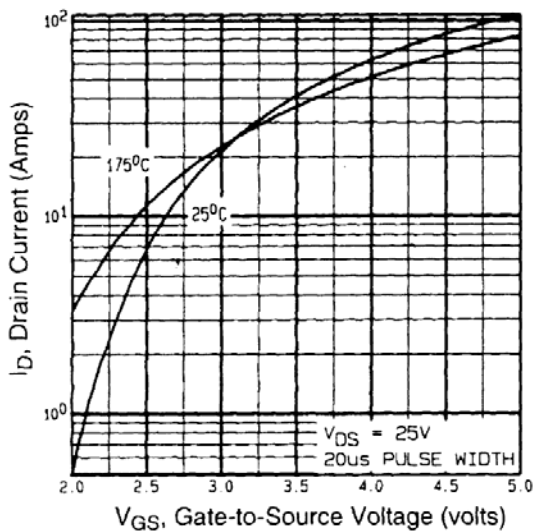
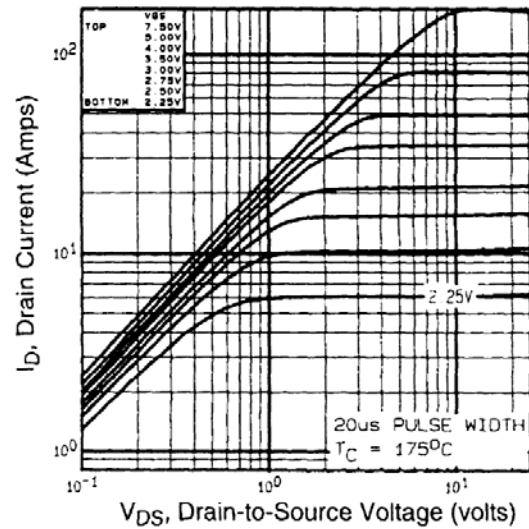
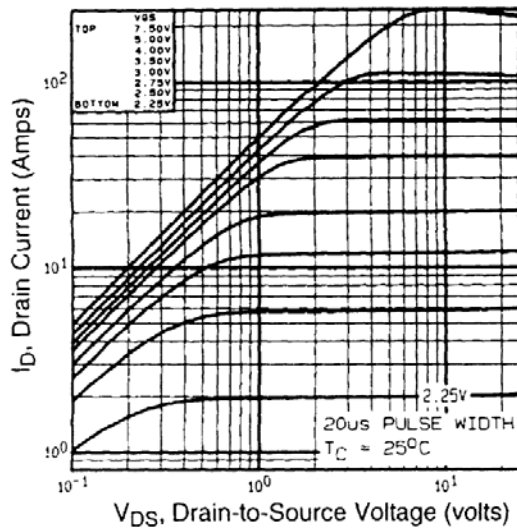
① Repetitive rating; pulse width limited by max. junction temperature (See Figure 11)

③ $I_{SD} \leq 51A$, $di/dt \leq 250A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$

② $V_{DD}=25V$, starting $T_J=25^\circ\text{C}$, $L=179\mu H$, $R_G=25\Omega$, $I_{AS}=51A$ (See Figure 12)

④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

* Current limited by the package, (Die Current = 51A)



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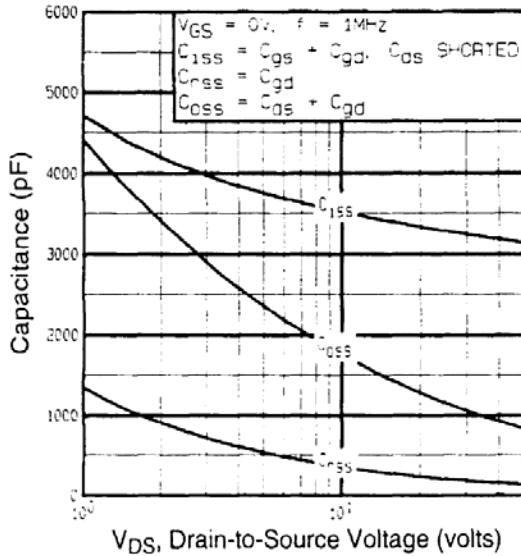


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

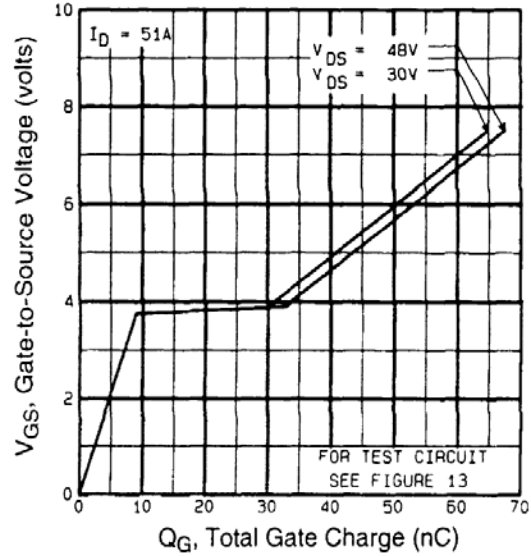


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

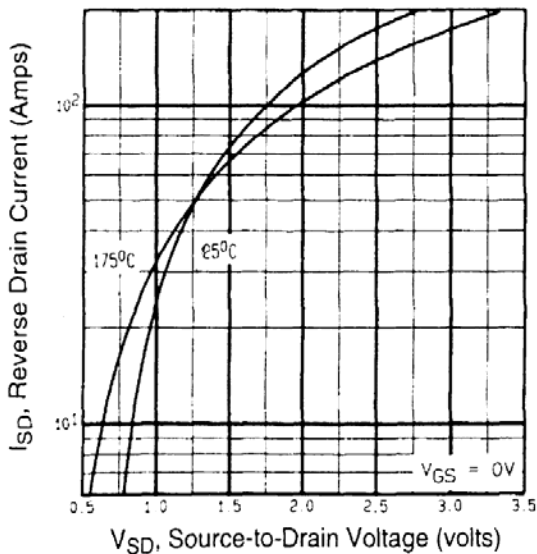


Fig 7. Typical Source-Drain Diode Forward Voltage

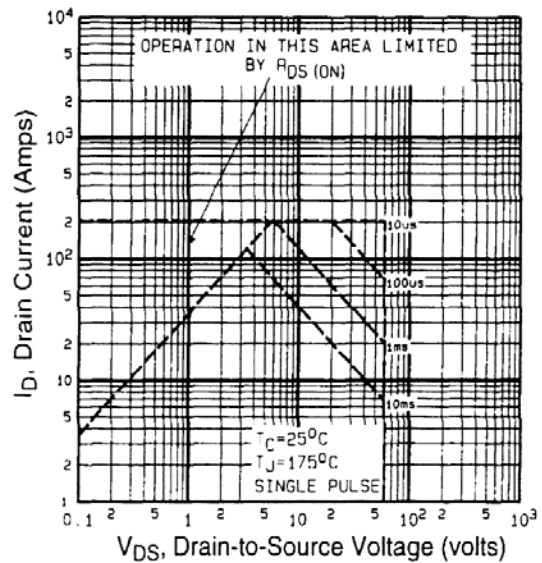


Fig 8. Maximum Safe Operating Area

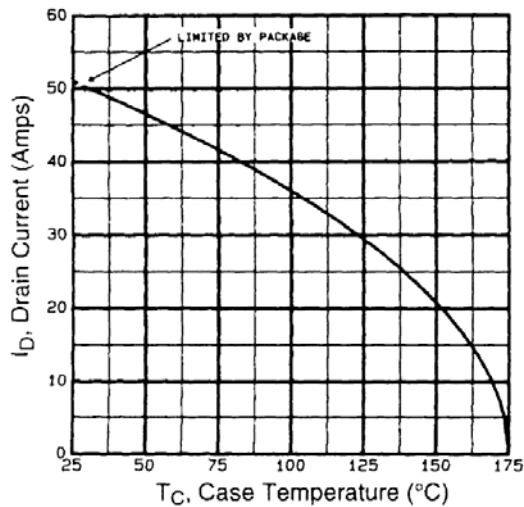


Fig 9. Maximum Drain Current Vs. Case Temperature

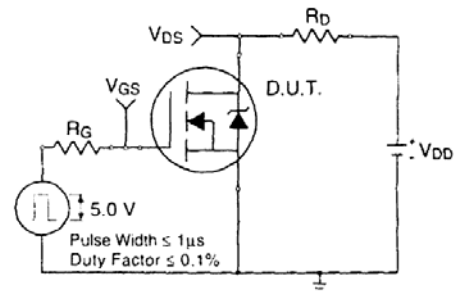


Fig 10a. Switching Time Test Circuit

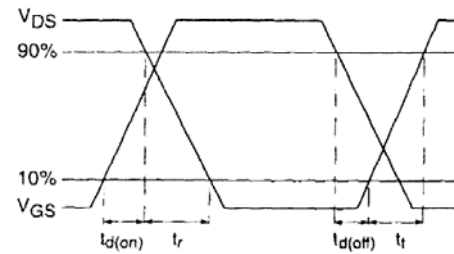


Fig 10b. Switching Time Waveforms

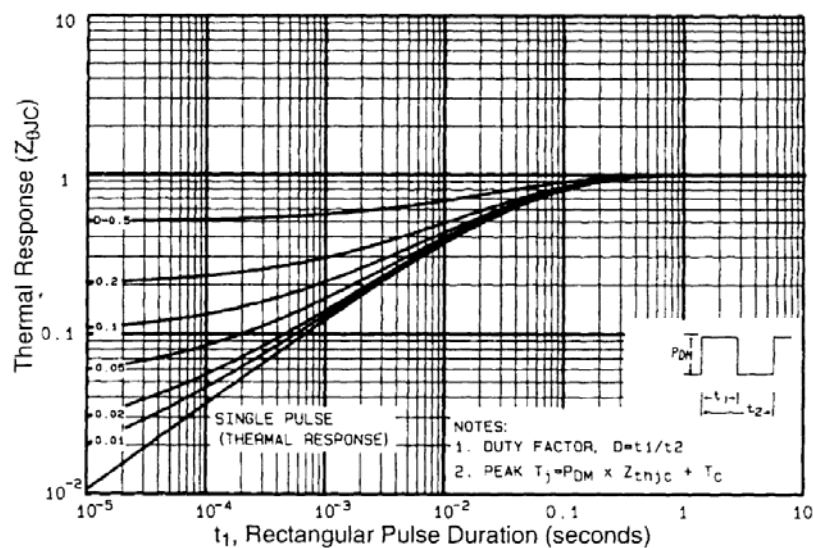


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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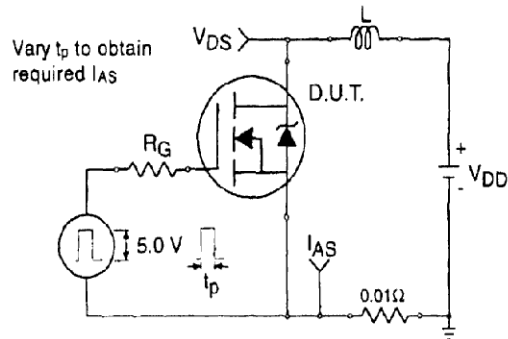


Fig 12a. Unclamped Inductive Test Circuit

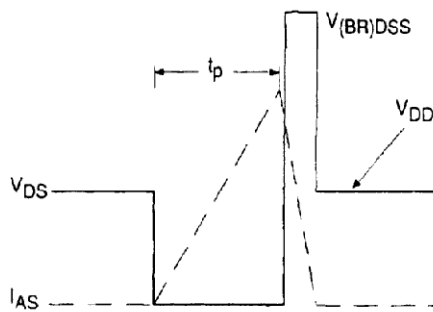


Fig 12b. Unclamped Inductive Waveforms

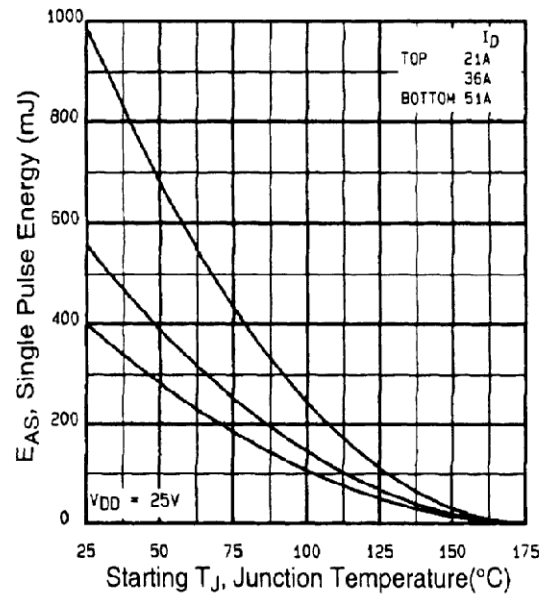


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

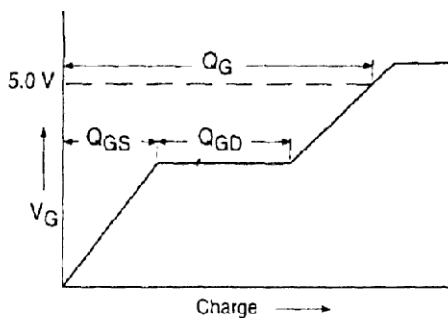


Fig 13a. Basic Gate Charge Waveform

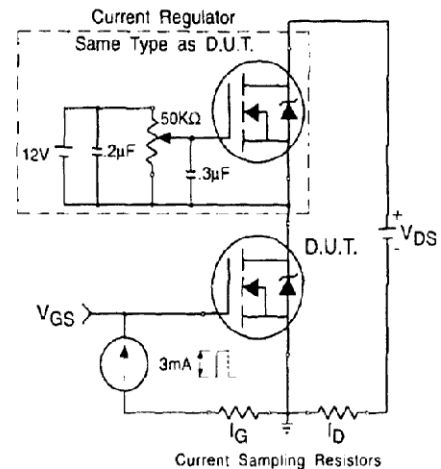


Fig 13b. Gate Charge Test Circuit

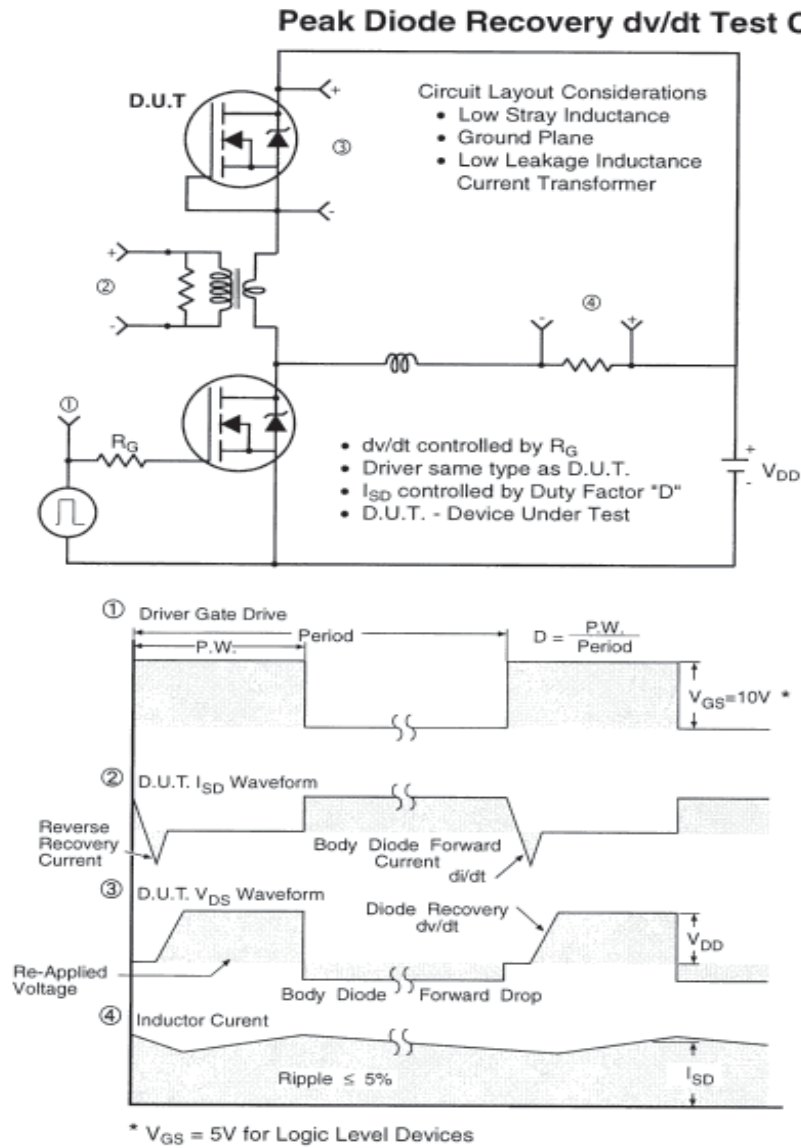
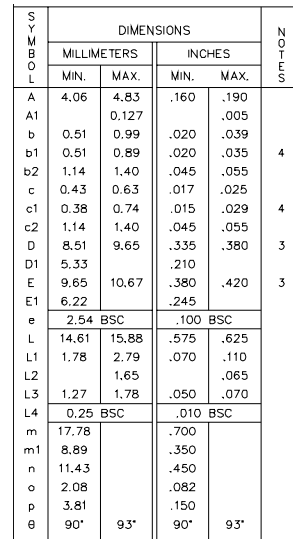


Fig 14. For N-Channel HEXFETS

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Dimensions are shown in millimeters (inches)



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

- PART DEPENDENT.

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.

EXAMPLE: THIS IS AN IRF530S WITH
LOT CODE 8024
ASSEMBLED ON WW 02, 2000
IN THE ASSEMBLY LINE "L"

Note: "P" in assembly line position indicates "Lead-Free"

Diagram of a 3-terminal diode package with the following labels and markings:

- 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**: Points to the 80 marking.
- WEEK 02**: Points to the 24 marking.
- LINE L**: Points to the 24 marking.
- ASSEMBLY LOT CODE**: Points to the 80 marking.

OR

INTERNATIONAL RECTIFIER LOGO

PART NUMBER

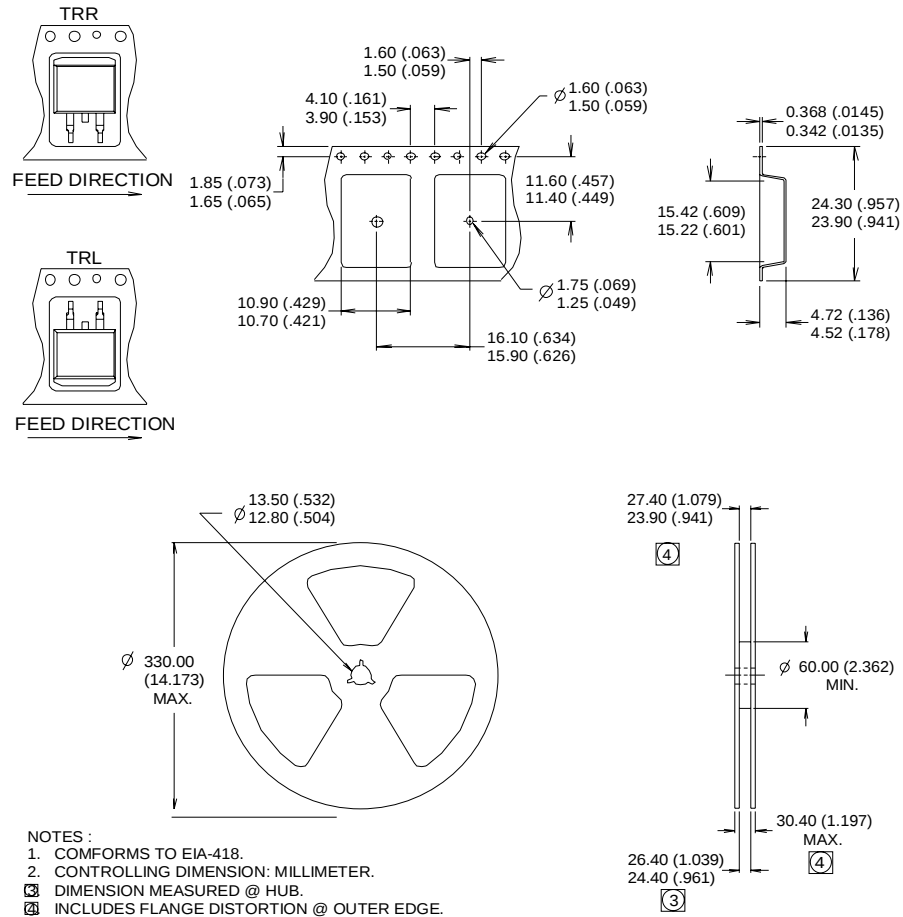
DATE CODE

ASSEMBLY LOT CODE

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

D²Pak Tape & Reel Information

Dimensions are shown in millimeters (inches)



Data and specifications subject to change without notice.



Notice

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