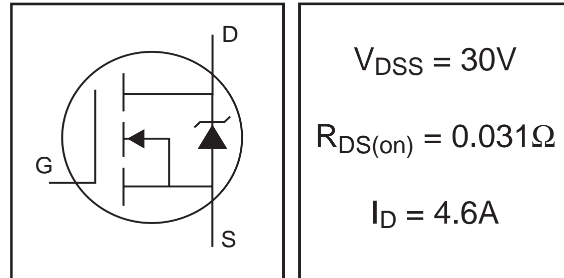
International
IOR Rectifier

PD- 95223

IRLL3303PbF

HEXFET® Power MOSFET

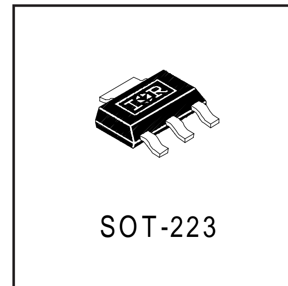
- Surface Mount
- Dynamic dv/dt Rating
- Logic-Level Gate Drive
- Fast Switching
- Ease of Paralleling
- Advanced Process Technology
- Ultra Low On-Resistance
- Lead-Free



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 SOT-223 package is designed for surface-mount using vapor phase, infra red, or wave soldering techniques. Its unique package design allows for easy automatic pick-and-place as with other SOT or SOIC packages but has the added advantage of improved thermal performance due to an enlarged tab for heatsinking. Power dissipation of 1.0W is possible in a typical surface mount application.



Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V**	6.5	A
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V*	4.6	
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V*	3.7	
I_{DM}	Pulsed Drain Current ①	37	
P_D @T_A = 25°C	Power Dissipation (PCB Mount)**	2.1	W
P_D @T_A = 25°C	Power Dissipation (PCB Mount)*	1.0	W
	Linear Derating Factor (PCB Mount)*	8.3	mW/°C
V_{GS}	Gate-to-Source Voltage	± 16	V
E_{AS}	Single Pulse Avalanche Energy②	140	mJ
I_{AR}	Avalanche Current①	4.6	A
E_{AR}	Repetitive Avalanche Energy①	0.10	mJ
dv/dt	Peak Diode Recovery dv/dt ③	1.3	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Amb. (PCB Mount, steady state)*	93	120	°C/W
$R_{\theta JA}$	Junction-to-Amb. (PCB Mount, steady state)**	48	60	

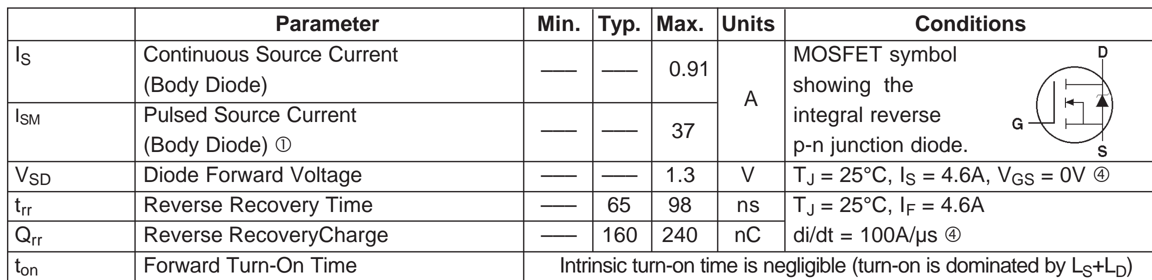
* When mounted on FR-4 board using minimum recommended footprint.
** When mounted on 1 inch square copper board, for comparison with other SMD devices.

04/27/04

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	30	——	——	V	V_{GS} = 0V, I_D = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.034	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	——	0.031	Ω	V_{GS} = 10V, I_D = 4.6A ④
		——	——	0.045		V_{GS} = 4.5V, I_D = 2.3A ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	——	——	V	V_{DS} = V_{GS}, I_D = 250μA
g_{fs}	Forward Transconductance	5.5	——	——	S	V_{DS} = 10V, I_D = 2.3A
I_{DSS}	Drain-to-Source Leakage Current	——	——	25	μA	V_{DS} = 30V, V_{GS} = 0V
		——	——	250		V_{DS} = 24V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	-100	nA	V_{GS} = -16V
	Gate-to-Source Reverse Leakage	——	——	100		V_{GS} = 16V
Q_g	Total Gate Charge	——	34	50	nC	I_D = 4.6A
Q_{gs}	Gate-to-Source Charge	——	4.4	6.5		V_{DS} = 24V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	10	16		V_{GS} = 10V, See Fig. 6 and 9 ④
$t_{d(on)}$	Turn-On Delay Time	——	7.2	——	ns	V_{DD} = 15V
t_r	Rise Time	——	22	——		I_D = 4.6A
$t_{d(off)}$	Turn-Off Delay Time	——	33	——		R_G = 6.2Ω
t_f	Fall Time	——	28	——		R_D = 3.2Ω, See Fig. 10 ④
C_{iss}	Input Capacitance	——	840	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	340	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	170	——		f = 1.0MHz, See Fig. 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	0.91	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	37		
V_{SD}	Diode Forward Voltage	——	——	1.3	V	T_J = 25°C, I_S = 4.6A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	65	98	ns	T_J = 25°C, I_F = 4.6A
Q_{rr}	Reverse RecoveryCharge	——	160	240	nC	di/dt = 100A/μs ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Specification changes

Rev. #	Parameters	Old spec.	New spec.	Comments	Revision Date
1	$V_{GS(th)}$ (Max.)	2.5V	No spec.	Removed $V_{GS(th)}$ (Max). Specification	11/1/96
1	V_{GS} (Max.)	±20	±16	Decrease V_{GS} (Max). Specification	11/1/96

Notes:

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

② V_{DD} = 15V, starting T_J = 25°C, L = 13mH R_G = 25Ω, I_{AS} = 4.6A. (See Figure 12)

③ $I_{SD} \leq$ 4.6A, di/dt ≤ 110A/μs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 150°C

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

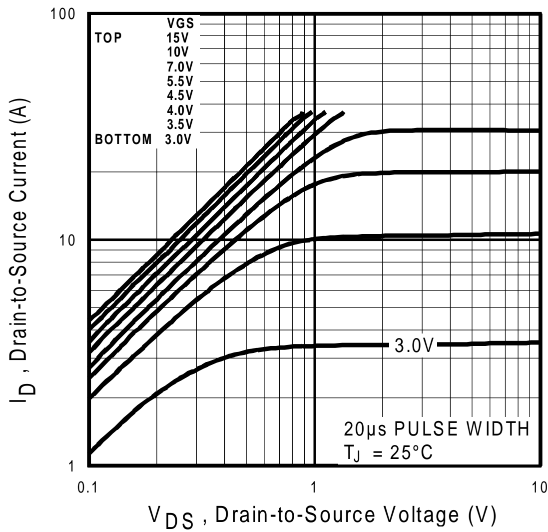


Fig 1. Typical Output Characteristics

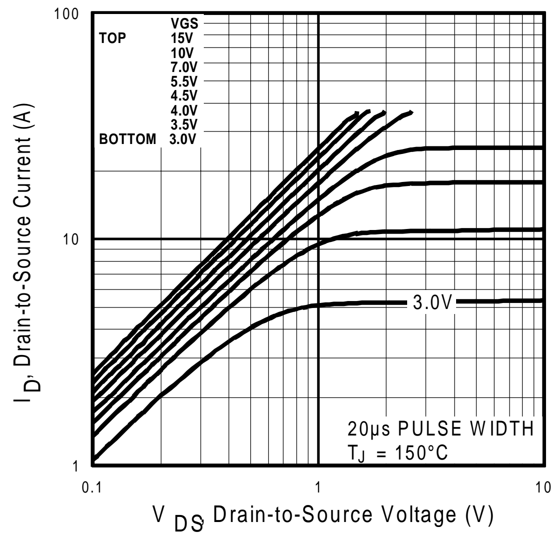


Fig 2. Typical Output Characteristics

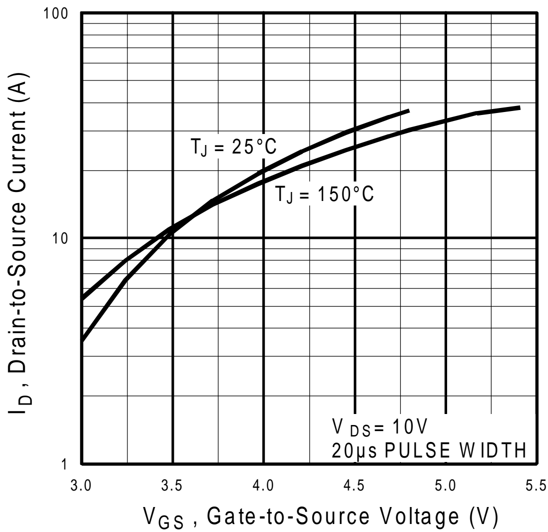


Fig 3. Typical Transfer Characteristics

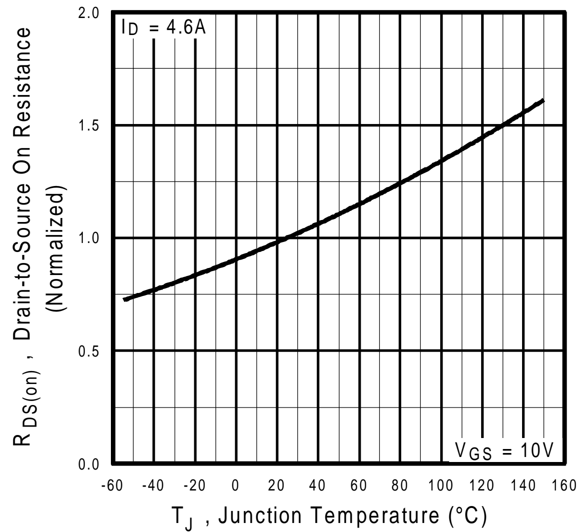


Fig 4. Normalized On-Resistance Vs. Temperature

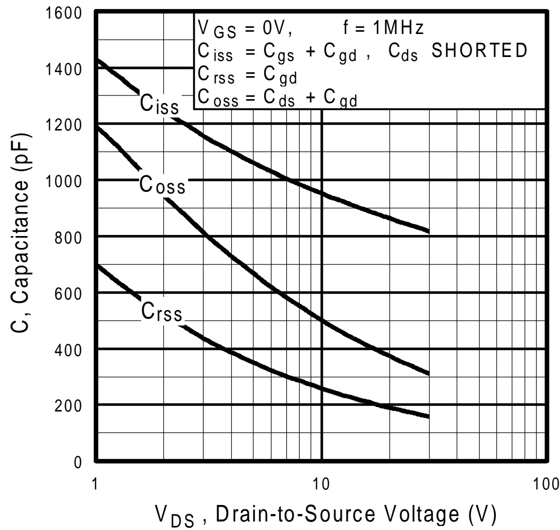


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

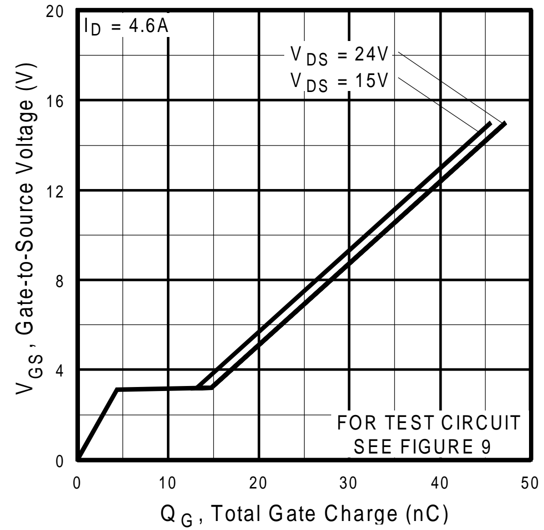


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

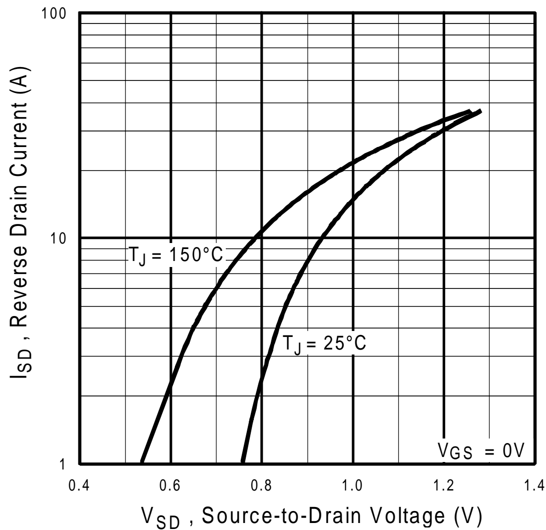


Fig 7. Typical Source-Drain Diode Forward Voltage

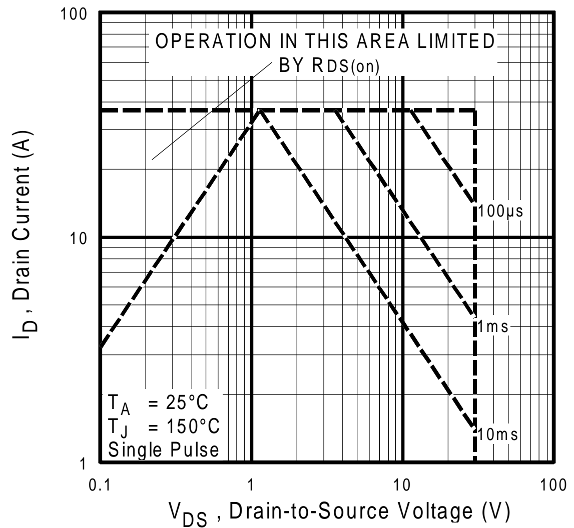


Fig 8. Maximum Safe Operating Area

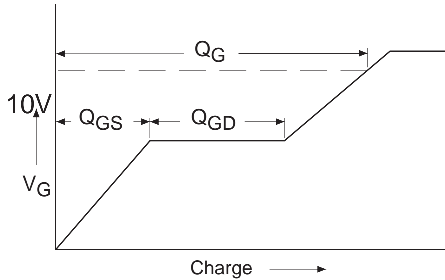


Fig 9a. Basic Gate Charge Waveform

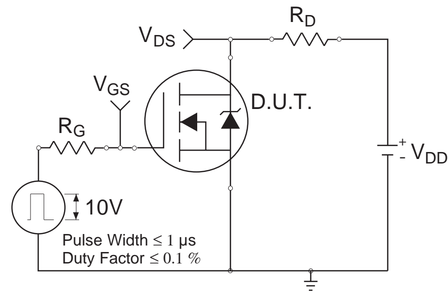


Fig 10a. Switching Time Test Circuit

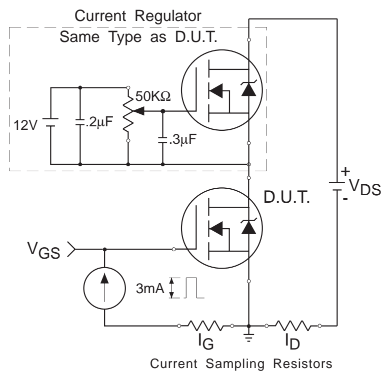


Fig 9b. Gate Charge Test Circuit

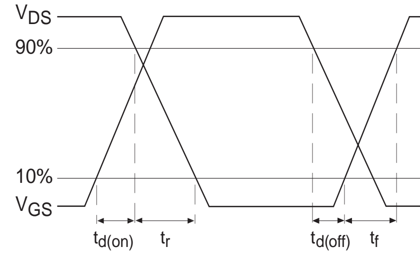


Fig 10b. Switching Time Waveforms

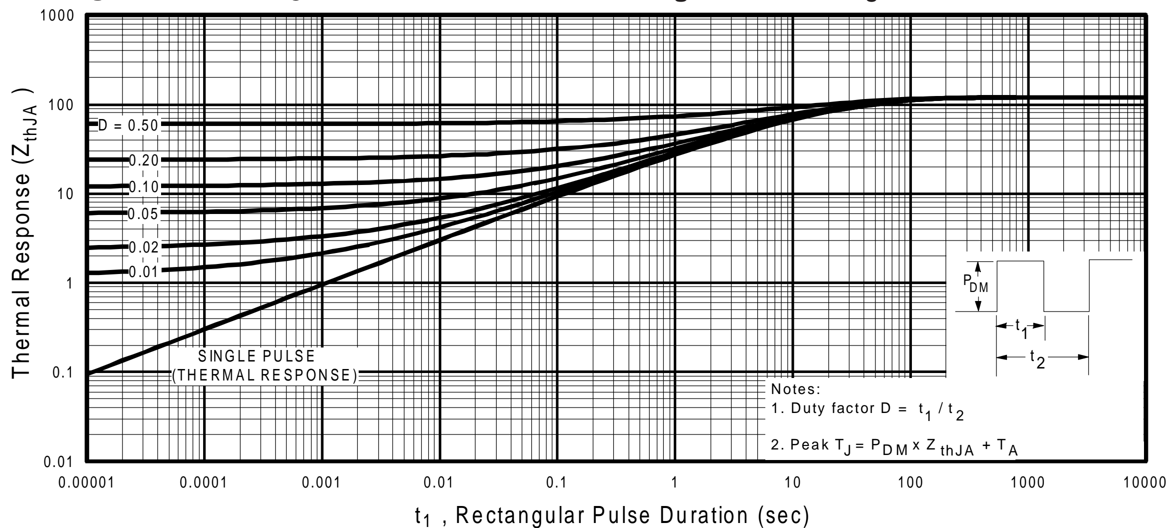


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

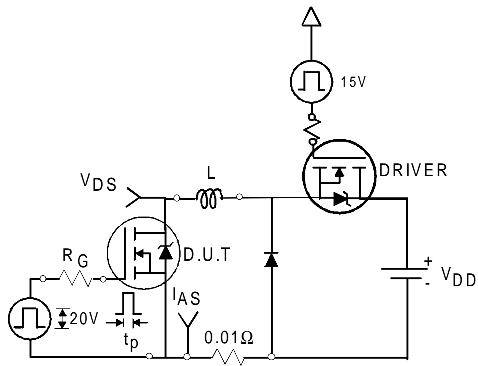


Fig 12a. Unclamped Inductive Test Circuit

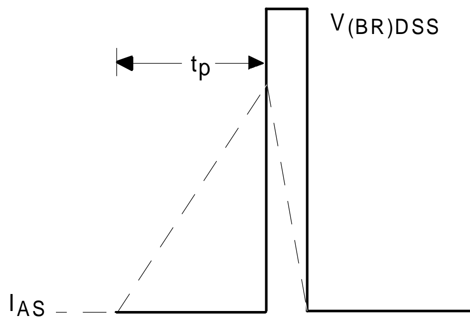


Fig 12b. Unclamped Inductive Waveforms

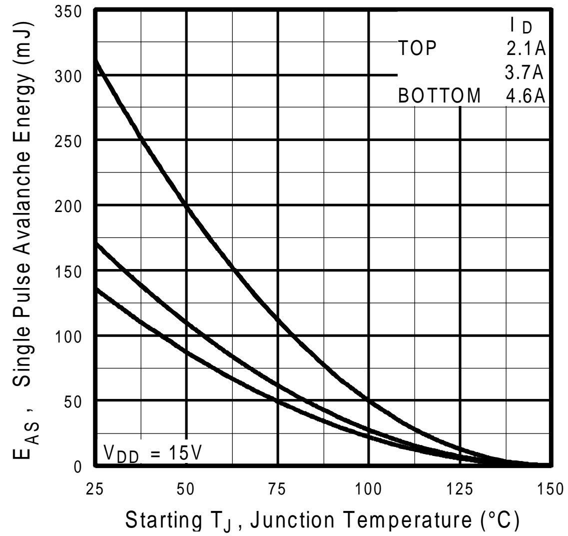
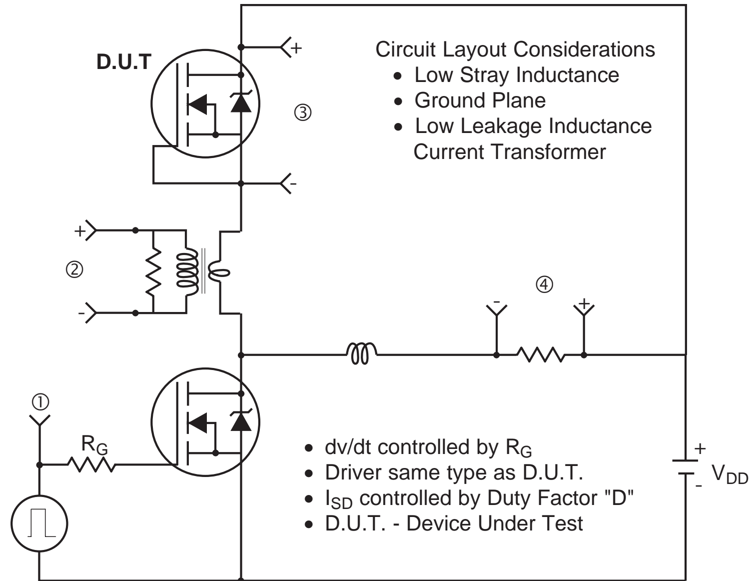
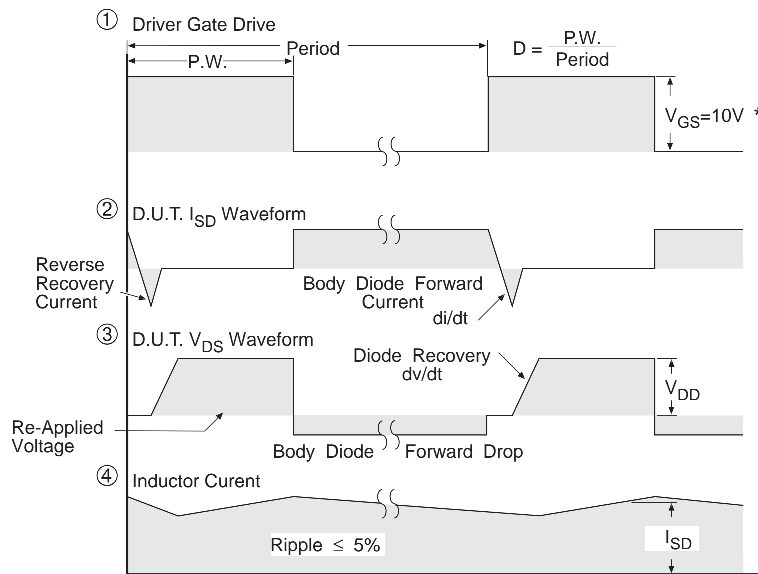


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

Peak Diode Recovery dv/dt Test Circuit



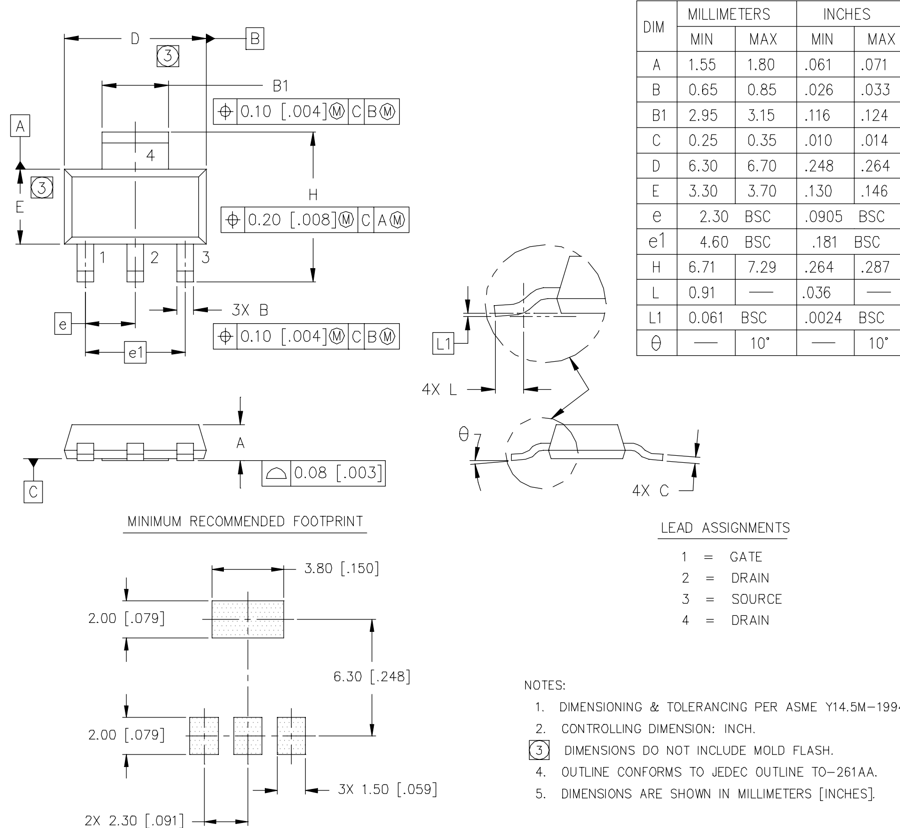


* V_{GS} = 5V for Logic Level Devices

Fig 13. For N-Channel HEXFETS

SOT-223 (TO-261AA) Package Outline

Dimensions are shown in milimeters (inches)

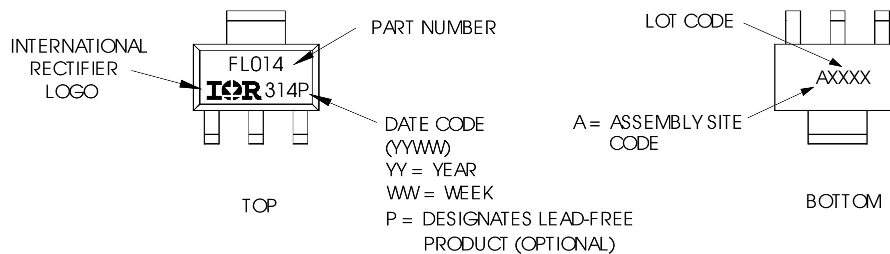


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.55	1.80	.061	.071
B	0.65	0.85	.026	.033
B1	2.95	3.15	.116	.124
C	0.25	0.35	.010	.014
D	6.30	6.70	.248	.264
E	3.30	3.70	.130	.146
e	2.30 BSC		.0905 BSC	
e1	4.60 BSC		.181 BSC	
H	6.71	7.29	.264	.287
L	0.91	—	.036	—
L1	0.061 BSC		.0024 BSC	
θ	—	10°	—	10°

SOT-223 (TO-261AA) Part Marking Information

HEXFET PRODUCT MARKING

EXAMPLE: THIS IS AN IRFL014



SOT-223 (TO-261AA) Tape & Reel Information

Dimensions are shown in milimeters (inches)

TR

FEED DIRECTION

4.10 (.161)
3.90 (.154)

2.05 (.080)
1.95 (.077)

1.85 (.072)
1.65 (.065)

0.35 (.013)
0.25 (.010)

7.55 (.297)
7.45 (.294)

7.60 (.299)
7.40 (.292)

16.30 (.641)
15.70 (.619)

Ø 1.60 (.062)
1.50 (.059)
TYP.

2.30 (.090)
2.10 (.083)

7.10 (.279)
6.90 (.272)

12.10 (.475)
11.90 (.469)

NOTES :
1. CONTROLLING DIMENSION: MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.
3. EACH Ø330.00 (13.00) REEL CONTAINS 2,500 DEVICES.

13.20 (.519)
Ø12.80 (.504)

Ø 330.00
(13.000)
MAX.

15.40 (.607)
11.90 (.469)
4

Ø 50.00 (1.969)
MIN.

18.40 (.724)
MAX.
4

14.40 (.566)
12.40 (.488)
3

NOTES :
1. OUTLINE COMFORMS TO EIA-418-1.
2. CONTROLLING DIMENSION: MILLIMETER..
3. DIMENSION MEASURED @ HUB.
4. INCLUDES FLANGE DISTORTION @ OUTER EDGE.

Data and specifications subject to change without notice.

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