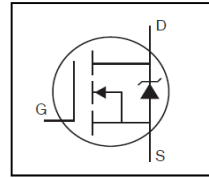


- Surface Mount
- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- Fast Switching
- Fully Avalanche Rated
- Lead-Free

HEXFET® Power MOSFET



V_{DS}	55V
$R_{DS(on)}$	0.045Ω
I_D	3.7A



G	D	S
Gate	Drain	Source

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 heat sinking. Power dissipation of 1.0W is possible in a typical surface mount application.

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRFL4105PbF	SOT-223	Tape and Reel	2500	IRFL4105PbF

Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$ ⑥	5.2	A
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$ ⑤	3.7	
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$ ⑤	3.0	
I_{DM}	Pulsed Drain Current ①	30	
$P_D @ T_A = 25^\circ\text{C}$	Maximum Power Dissipation (PCB Mount) ⑥	2.1	W
$P_D @ T_A = 25^\circ\text{C}$	Maximum Power Dissipation (PCB Mount) ⑤	1.0	
	Linear Derating Factor (PCB Mount) ⑤	8.3	mW/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy (Thermally Limited) ②	110	mJ
I_{AR}	Avalanche Current ①	3.7	A
E_{AR}	Repetitive Avalanche Energy ①	0.10	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

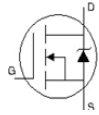
Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount, steady state) ⑤	90	120	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount, steady state) ⑥	50	60	

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

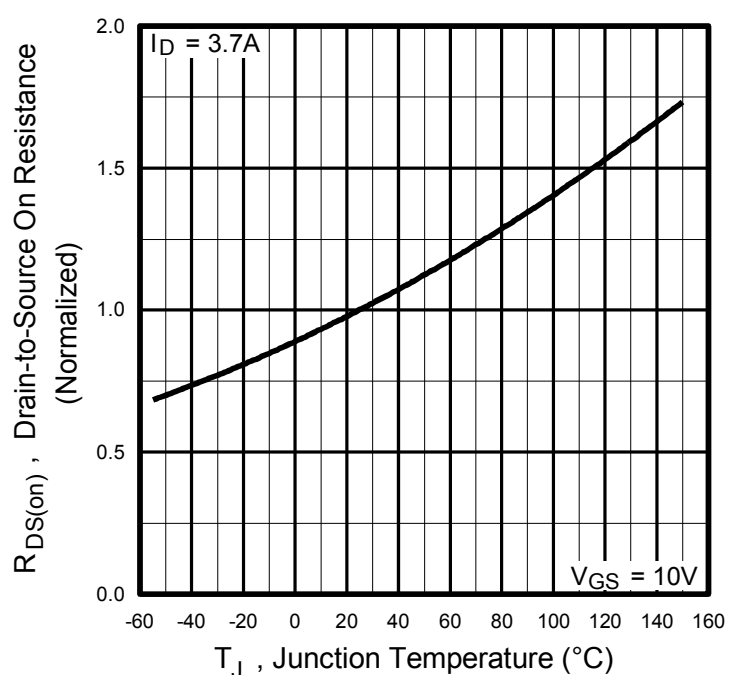
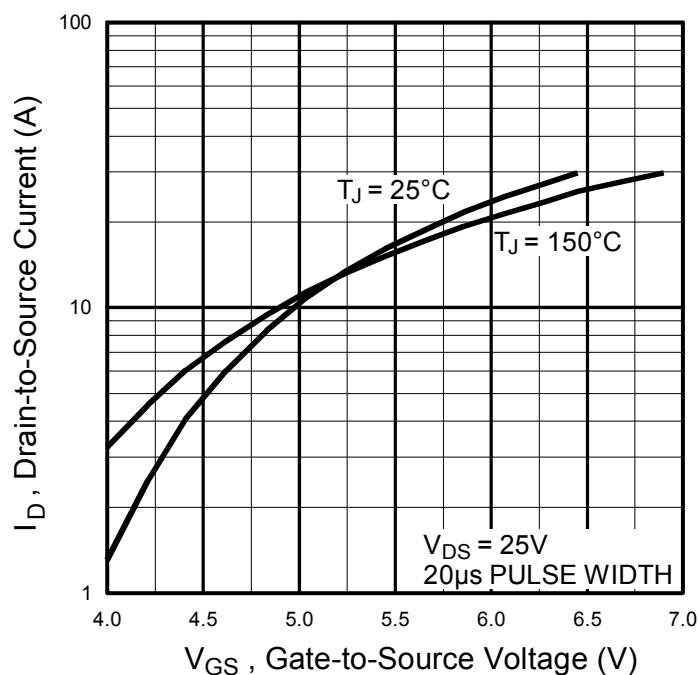
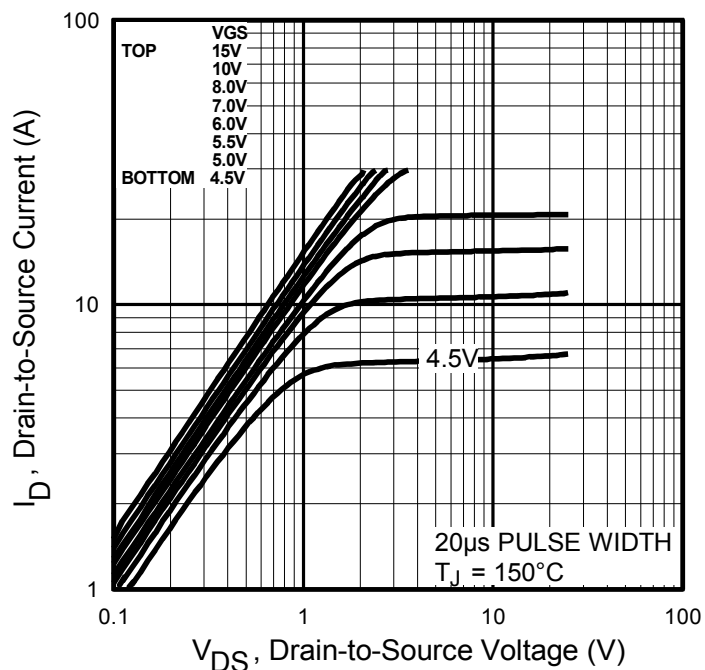
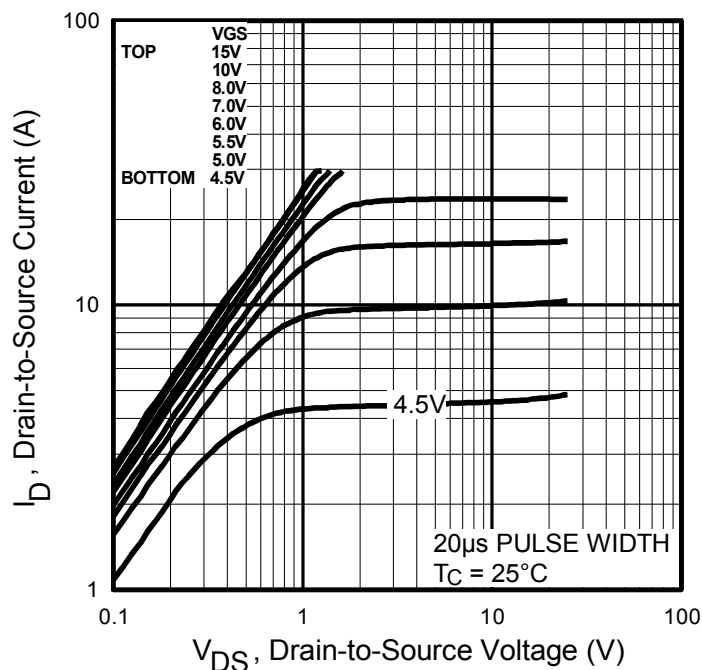
	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.058	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.045	Ω	$V_{GS} = 10V, I_D = 3.7A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
g_{fs}	Forward Trans conductance	3.8	—	—	S	$V_{DS} = 25V, I_D = 1.9A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 55V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 44V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
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	—	23	35	nC	$I_D = 3.7A$
Q_{gs}	Gate-to-Source Charge	—	3.4	5.1		$V_{DS} = 44V$
Q_{gd}	Gate-to-Drain Charge	—	9.8	15		$V_{GS} = 10V$, See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	7.1	—	ns	$V_{DD} = 28V$
t_r	Rise Time	—	12	—		$I_D = 3.7A$
$t_{d(off)}$	Turn-Off Delay Time	—	19	—		$R_G = 6.0\Omega$
t_f	Fall Time	—	12	—		$R_D = 7.5\Omega$, See Fig. 10 ④
C_{iss}	Input Capacitance	—	660	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	230	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	99	—		$f = 1.0\text{MHz}$, See Fig. 5

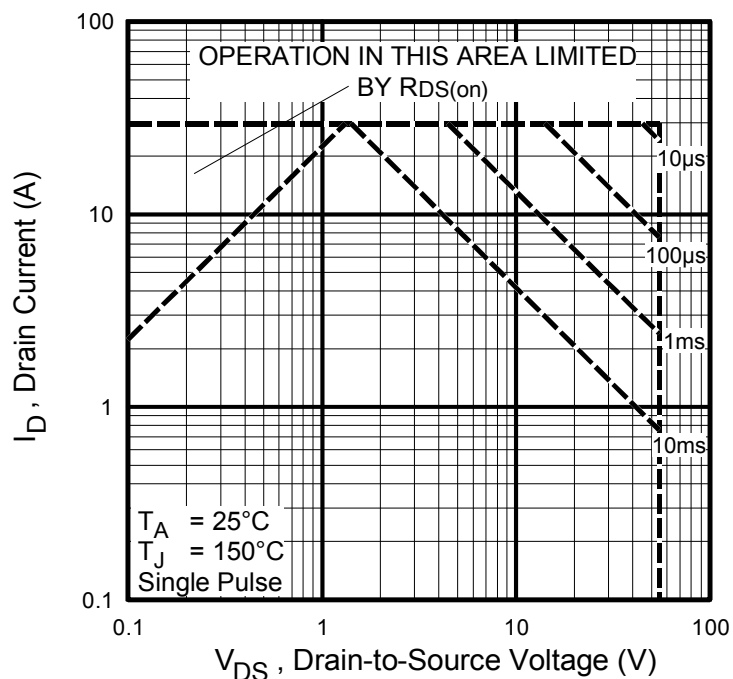
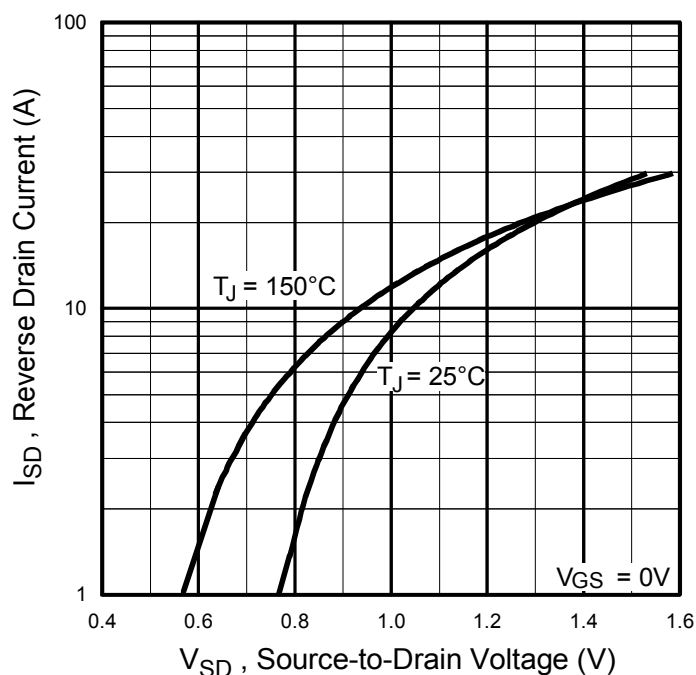
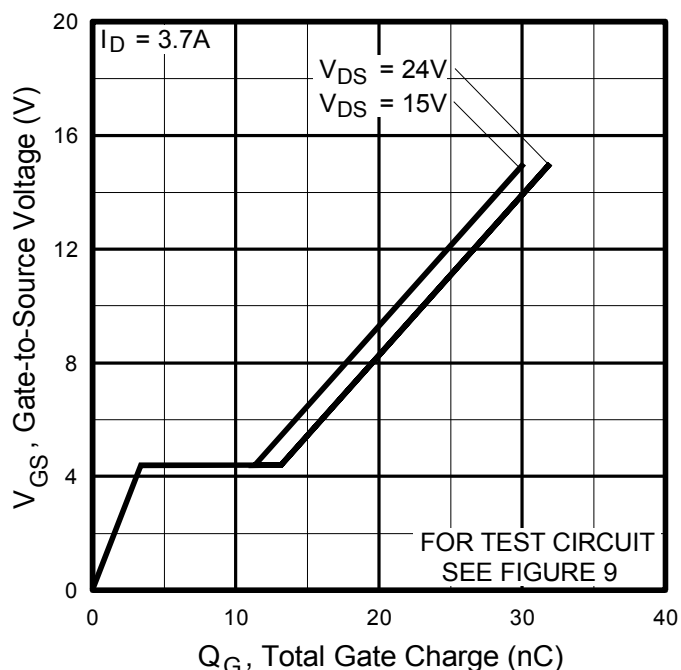
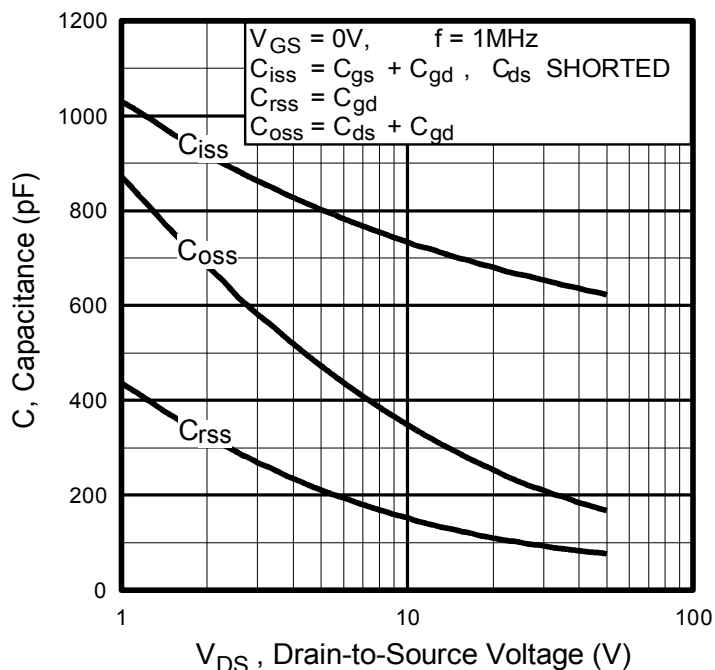
Source-Drain Ratings and Characteristics

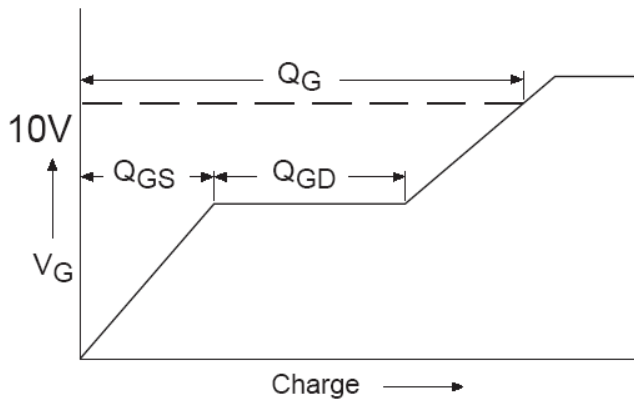
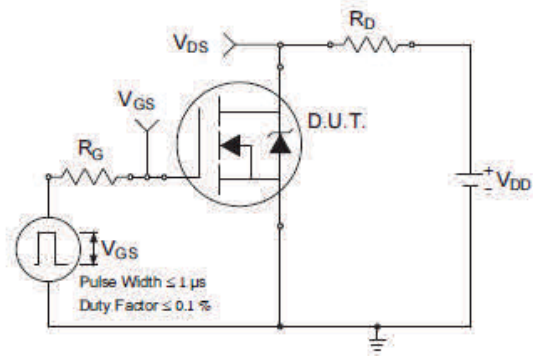
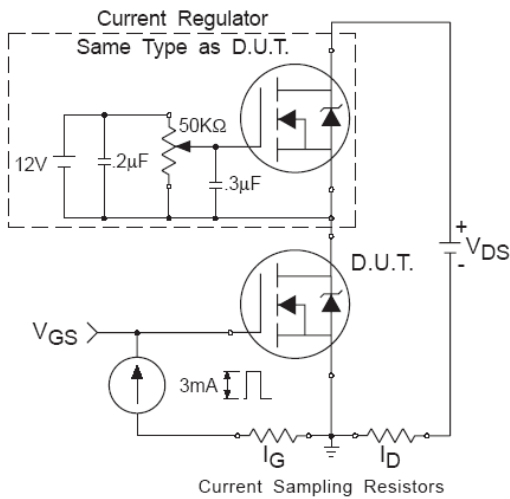
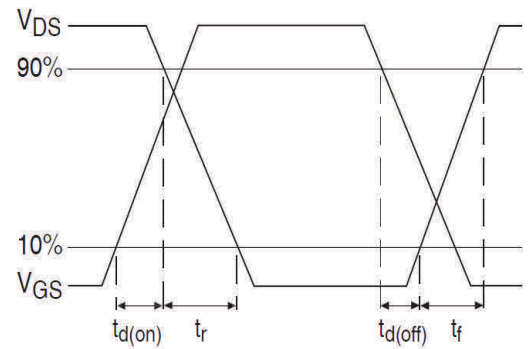
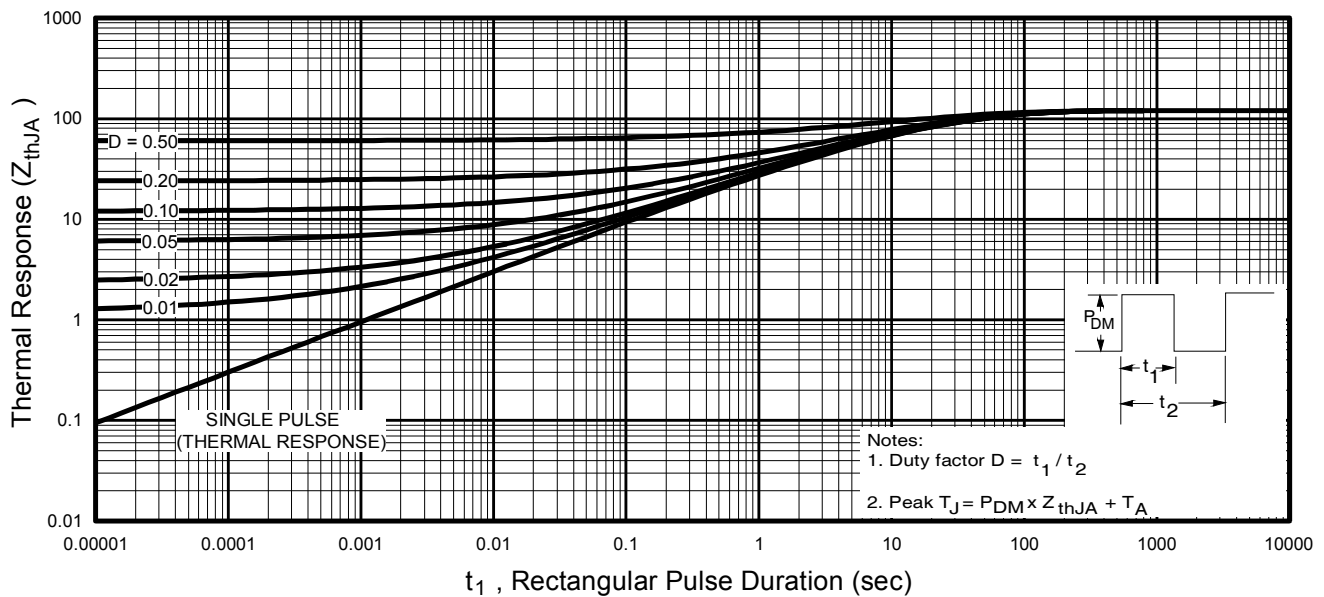
	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	1.3	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	30		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 3.7A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	55	82	ns	$T_J = 25^\circ\text{C}, I_F = 3.7A$
Q_{rr}	Reverse Recovery Charge	—	120	170	nC	$di/dt = 100A/\mu s$ ④

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- ② starting $T_J = 25^\circ\text{C}$, $L = 16\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 3.7A$ (See fig. 12)
- ③ $I_{SD} \leq 3.7A$, $di/dt \leq 110A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150^\circ\text{C}$.
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.






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

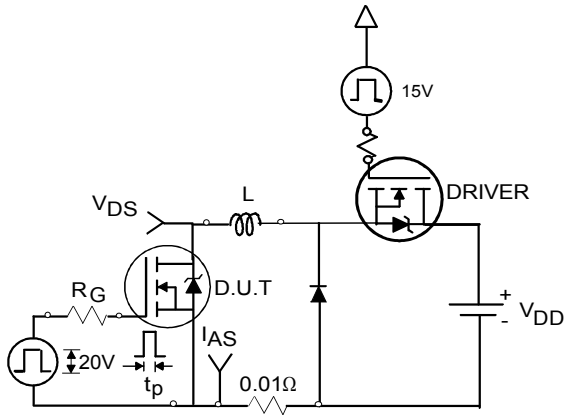


Fig 12a. Unclamped Inductive Test Circuit

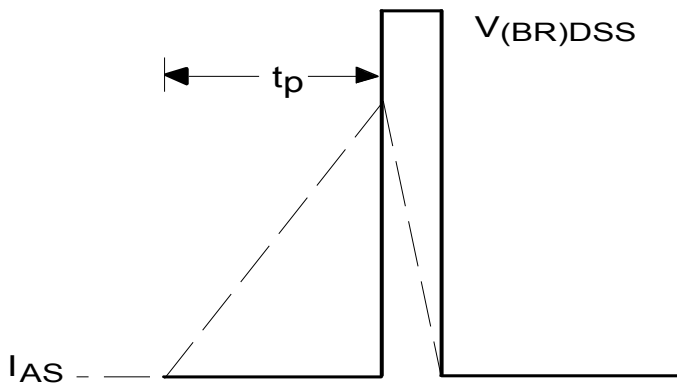


Fig 12b. Unclamped Inductive Waveforms

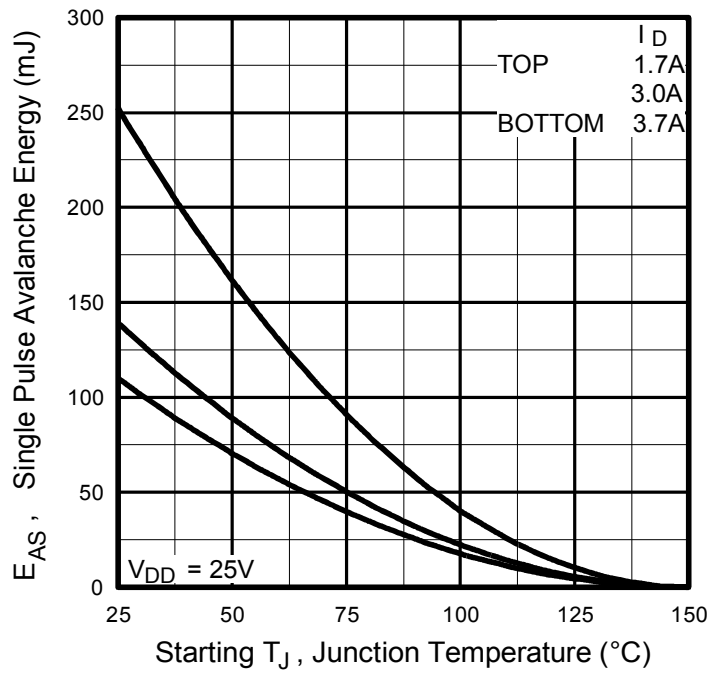


Fig 12c. Maximum Avalanche Energy vs. Drain Current

Circuit Layout Considerations

- Low Stray Inductance
- Ground Plane
- Low Leakage Inductance
- Current Transformer

Annotations:

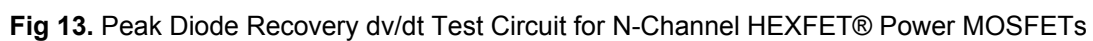
- ①: Pulse generator
- ②: Load inductor
- ③: Load resistor
- ④: Load resistor
- ⑤: Current transformer

Labels:

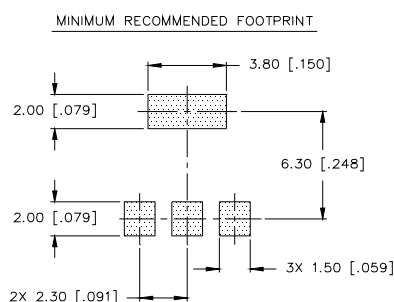
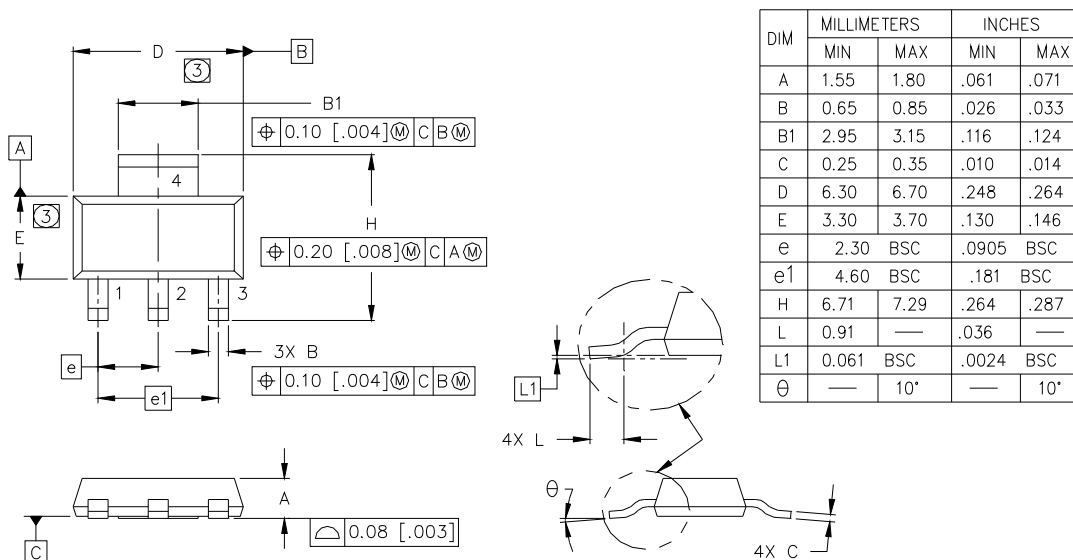
- D.U.T. (Device Under Test)
- R_G (Gate resistor)
- V_{DD} (DC supply)

Notes:

- dv/dt controlled by R_G
- Driver same type as D.U.T.
- I_{SD} controlled by Duty Factor "D"
- D.U.T. - Device Under Test



SOT-223 (TO-261AA) Package Outline (Dimensions are shown in millimeters (inches))



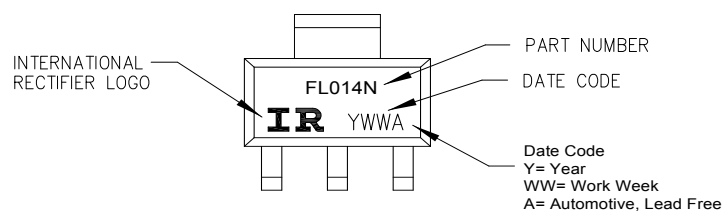
LEAD ASSIGNMENTS

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

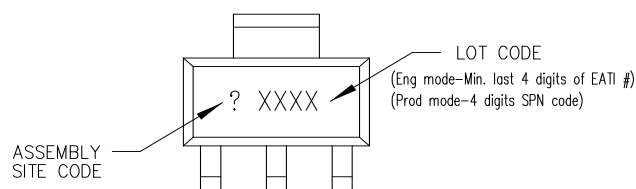
NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS DO NOT INCLUDE MOLD FLASH.
4. OUTLINE CONFORMS TO JEDEC OUTLINE TO-261AA.
5. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

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



TOP MARKING



BOTTOM MARKING

Note: For the most current drawing please refer to Infineon's web site www.infineon.com

Technical drawing of a mold cavity with dimensions in inches and millimeters. The drawing includes a top view, a side view, and a cross-sectional view. The top view shows a rectangular cavity with a central rectangular feature and a circular feature. The side view shows the profile of the cavity with a central rectangular feature and a circular feature. The cross-sectional view shows the internal structure of the cavity with a central rectangular feature and a circular feature. Dimensions are provided in inches and millimeters.

Dimensions (Inches / Millimeters):

- Top View:
 - Overall Width: 12.10 (.475) / 11.90 (.469)
 - Overall Height: 7.55 (.297) / 7.45 (.294)
 - Central Feature Width: 4.10 (.161) / 3.90 (.154)
 - Central Feature Height: 2.05 (.080) / 1.95 (.077)
 - Side Feature Width: 1.85 (.072) / 1.65 (.065)
 - Side Feature Height: 7.60 (.299) / 7.40 (.292)
 - Side Feature Radius: 1.60 (.062) / 1.50 (.059) TYP.
- Side View:
 - Overall Width: 16.30 (.641) / 15.70 (.619)
 - Overall Height: 0.35 (.013) / 0.25 (.010)
 - Central Feature Width: 2.30 (.090) / 2.10 (.083)
- Cross-sectional View:
 - Overall Width: 12.10 (.475) / 11.90 (.469)
 - Overall Height: 7.55 (.297) / 7.45 (.294)
 - Central Feature Width: 4.10 (.161) / 3.90 (.154)
 - Central Feature Height: 2.05 (.080) / 1.95 (.077)
 - Side Feature Width: 1.85 (.072) / 1.65 (.065)
 - Side Feature Height: 7.60 (.299) / 7.40 (.292)
 - Side Feature Radius: 1.60 (.062) / 1.50 (.059) TYP.

FEED DIRECTION: Indicated by an arrow pointing to the right.

-

-
- Technical drawing of a vertical shaft assembly. The drawing shows a shaft with a central hole and a smaller hole on the right side. Dimensions are given in millimeters (mm) and inches (in). Callouts 4 and 3 are present.
- Dimensions (mm / in):
- Top section: 15.40 (.607) and 11.90 (.469)
 - Bottom section: 14.40 (.566) and 12.40 (.488)
 - Right side hole: $\varnothing$ 50.00 (1.969) MIN.
 - Bottom section: 18.40 (.724) MAX.
- Callouts:
- 4 (top left)
 - 3 (bottom left)
 - 4 (bottom right)

2016-5-27

Qualification Information[†]

Qualification Level	Industrial (per JEDEC JESD47F) ^{††}	
Moisture Sensitivity Level	SOT-223	MSL1 (per JEDEC J-STD-020D) ^{††}
RoHS Compliant	Yes	

[†] Qualification standards can be found at Infineon's web site www.infineon.com

^{††} Applicable version of JEDEC standard at the time of product release.

Revision History

Date	Comments
5/27/2016	- Updated datasheet with corporate template. - Added disclaimer on last page.

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Edition 2016-04-19

Published by

Infineon Technologies AG
81726 Munich, Germany

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