International Rectifier

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

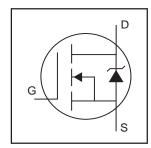
Description

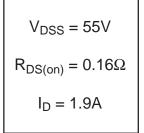
Fifth Generation HEXFET® MOSFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET® power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of applications.

The SOT-223 package is designed for surface-mount using vapor phase, infrared, 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.

IRFL014NPbF

HEXFET® Power MOSFET







Absolute Maximum Ratings

	Parameter	Max.	Units
I _D @ T _A = 25°C	Continuous Drain Current, V _{GS} @ 10V**	2.7	
$I_D @ T_A = 25^{\circ}C$	Continuous Drain Current, V _{GS} @ 10V*	1.9	Α
I _D @ T _A = 70°C	Continuous Drain Current, V _{GS} @ 10V*	1.5	7
I _{DM}	Pulsed Drain Current ①	15	1
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	± 20	V
E _{AS}	Single Pulse Avalanche Energy®	48	mJ
I _{AR}	Avalanche Current①	1.7	А
E _{AR}	Repetitive Avalanche Energy①*	0.1	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T _J , T _{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Тур.	Max.	Units
$R_{\theta JA}$	Junction-to-Amb. (PCB Mount, steady state)*	90	120	°C/W
$R_{\theta JA}$	Junction-to-Amb. (PCB Mount, steady state)**	50	60	0/00

^{*} When mounted on FR-4 board using minimum recommended footprint.

^{**} When mounted on 1 inch square copper board, for comparison with other SMD devices.

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

	Parameter	Min.	Тур.	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		0.054		V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance			0.16	Ω	V _{GS} = 10V, I _D = 1.9A ⊕
V _{GS(th)}	Gate Threshold Voltage	2.0		4.0	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$
9 _{fs}	Forward Transconductance	1.6			S	$V_{DS} = 25V, I_{D} = 0.85A$
I	Drain-to-Source Leakage Current			1.0	μA	$V_{DS} = 44V, V_{GS} = 0V$
I _{DSS}	Brain-to-Godroc Leakage Gurrent			25	μΑ	$V_{DS} = 44V, V_{GS} = 0V, T_{J} = 150^{\circ}C$
Land	Gate-to-Source Forward Leakage			100	nA -	V _{GS} = 20V
I _{GSS}	Gate-to-Source Reverse Leakage			-100		$V_{GS} = -20V$
Qg	Total Gate Charge		7.0	11		I _D = 1.7A
Q _{gs}	Gate-to-Source Charge		1.2	1.8	nC	$V_{DS} = 44V$
Q _{gd}	Gate-to-Drain ("Miller") Charge		3.3	5.0		V_{GS} = 10V, See Fig. 6 and 13 \oplus
t _{d(on)}	Turn-On Delay Time		6.6			$V_{DD} = 28V$
t _r	Rise Time		7.1			$I_D = 1.7A$
t _{d(off)}	Turn-Off Delay Time		12		ns	$R_G = 6.0\Omega$
t _f	Fall Time		3.3			$R_D = 16\Omega$, See Fig. 10 @
C _{iss}	Input Capacitance		190			$V_{GS} = 0V$
Coss	Output Capacitance		72		pF	$V_{DS} = 25V$
C _{rss}	Reverse Transfer Capacitance		33			f = 1.0MHz, See Fig. 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Тур.	Max.	Units	Conditions
Is	Continuous Source Current (Body Diode)			1.3		MOSFET symbol D Showing the
I _{SM}	Pulsed Source Current				A	integral reverse
	(Body Diode) ①			15	15	p-n junction diode.
V _{SD}	Diode Forward Voltage	I		1.0	V	$T_J = 25$ °C, $I_S = 1.7$ A, $V_{GS} = 0$ V ③
t _{rr}	Reverse Recovery Time		41	61	ns	$T_J = 25^{\circ}C, I_F = 1.7A$
Q _{rr}	Reverse RecoveryCharge		64	95	nC	di/dt = 100A/µs ③

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- $\begin{tabular}{ll} \mathbb{O} $V_{DD}=25V, starting $T_J=25^\circ$C, $L=8.2mH$ \\ $R_G=25\Omega, I_{AS}=3.4A.$ (See Figure 12) \\ \end{tabular}$
- $\label{eq:loss} \begin{array}{l} \mbox{ } 3 \mbox{ } I_{SD} \leq 1.7A, \mbox{ } di/dt \leq 250A/\mu s, \mbox{ } V_{DD} \leq V_{(BR)DSS}, \\ \mbox{ } T_{J} \leq 150 \mbox{ } ^{\circ} \mbox{C} \end{array}$
- 4 Pulse width $\leq 300 \mu s$; duty cycle $\leq 2\%$.

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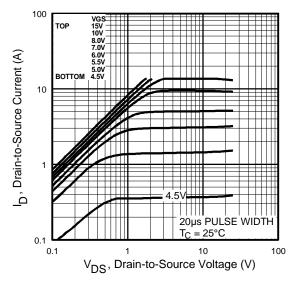


Fig 1. Typical Output Characteristics

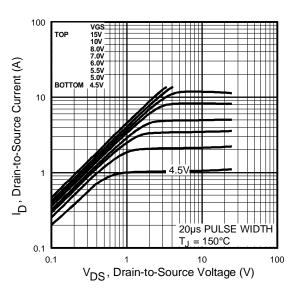


Fig 2. Typical Output Characteristics

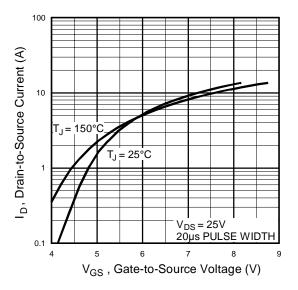


Fig 3. Typical Transfer Characteristics

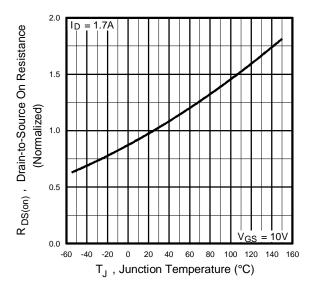


Fig 4. Normalized On-Resistance Vs. Temperature

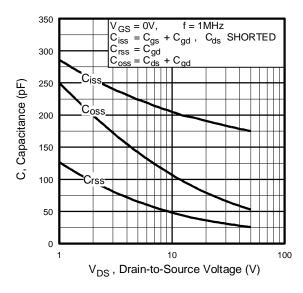


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

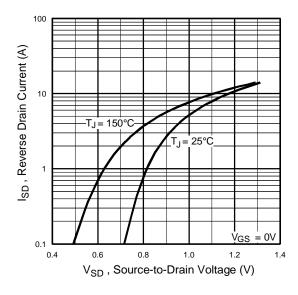


Fig 7. Typical Source-Drain Diode Forward Voltage

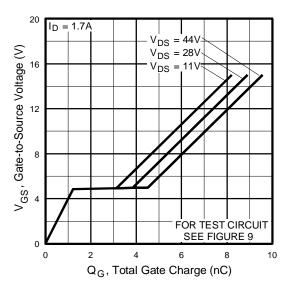


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

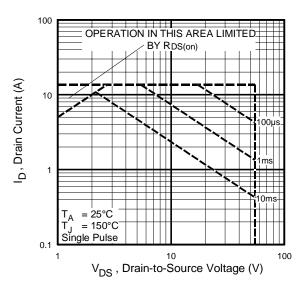


Fig 8. Maximum Safe Operating Area

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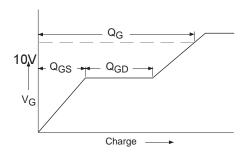


Fig 9a. Basic Gate Charge Waveform

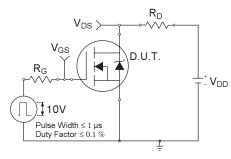


Fig 10a. Switching Time Test Circuit

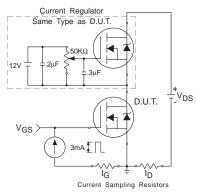


Fig 9b. Gate Charge Test Circuit

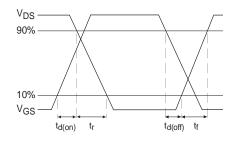


Fig 10b. Switching Time Waveforms

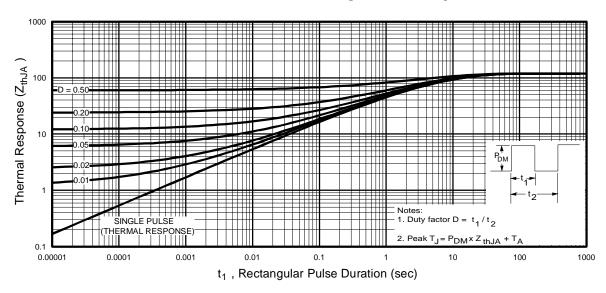


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

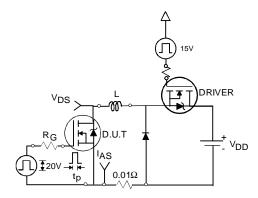


Fig 12a. Unclamped Inductive Test Circuit

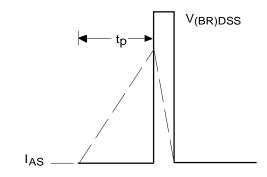


Fig 12b. Unclamped Inductive Waveforms

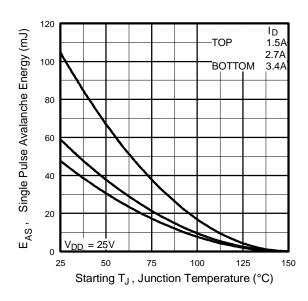
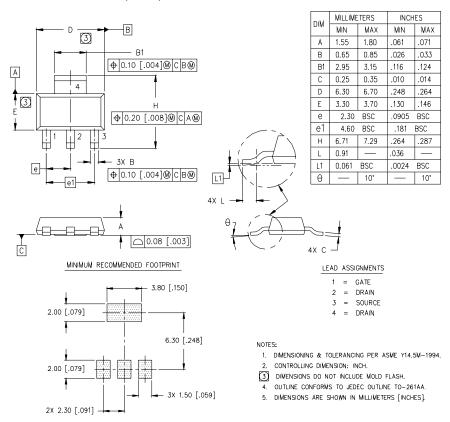


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

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SOT-223 (TO-261AA) Package Outline

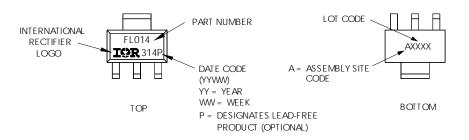
Dimensions are shown in milimeters (inches)



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

HEXFET PRODUCT MARKING

EXAMPLE: THIS IS AN IRFL014

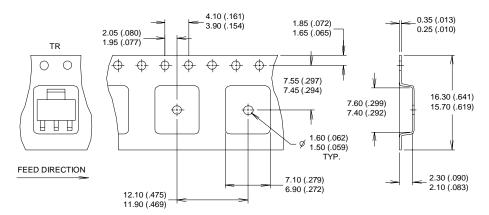


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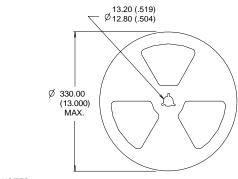
International IOR Rectifier

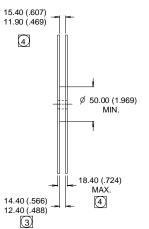
SOT-223 (TO-261AA) Tape & Reel Information

Dimensions are shown in milimeters (inches)



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





NOTES:

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

Data and specifications subject to change without notice.



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