

# IRFL214PbF

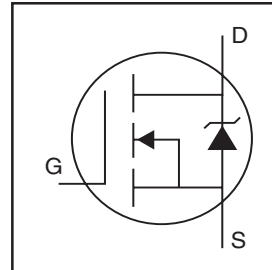
## HEXFET® Power MOSFET

- Surface Mount
- Available in Tape & Reel
- Dynamic dv/dt Rating
- Repetitive Avalanche Rated
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements
- Lead-Free

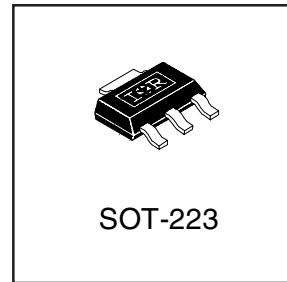
### Description

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 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 greater than 1.25W is possible in a typical surface mount application.



|                          |
|--------------------------|
| $V_{DS} = 250V$          |
| $R_{DS(on)} = 2.0\Omega$ |
| $I_D = 0.79A$            |



### Absolute Maximum Ratings

|                           | Parameter                                 | Max.                  | Units |
|---------------------------|---|-----------------------|-------|
| $I_D @ T_c = 25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10 V$ | 0.79                  | A     |
| $I_D @ T_c = 100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10 V$ | 0.50                  |       |
| $I_{DM}$                  | Pulsed Drain Current ①                    | 6.3                   |       |
| $P_D @ T_c = 25^\circ C$  | Power Dissipation                         | 3.1                   | W     |
| $P_D @ T_A = 25^\circ C$  | Power Dissipation (PCB Mount)**           | 2.0                   |       |
|                           | Linear Derating Factor                    | 0.025                 | W/°C  |
|                           | Linear Derating Factor (PCB Mount)**      | 0.017                 |       |
| $V_{GS}$                  | Gate-to-Source Voltage                    | -/+20                 | V     |
| $E_{AS}$                  | Single Pulse Avalanche Energy ②           | 50                    | mJ    |
| $I_{AR}$                  | Avalanche Current ①                       | 0.79                  | A     |
| $E_{AR}$                  | Repetitive Avalanche Energy ①             | 0.31                  | mJ    |
| dv/dt                     | Peak Diode Recovery dv/dt ③               | 4.8                   | V/ns  |
| $T_J, T_{STG}$            | Junction and Storage Temperature Range    | -55 to + 150          | °C    |
|                           | Soldewring Temperature, for 10 seconds    | 300 (1.6mm from case) |       |

### Thermal Resistance


|                 | Parameter                          | Typ. | Max. | Units |
|-----------------|------------------------------------|------|------|-------|
| $R_{\theta JC}$ | Junction-to-PCB                    | —    | 40   | °C/W  |
| $R_{\theta JA}$ | Junction-to-Ambient. (PCB Mount)** | —    | 60   |       |

\*\* When mounted on 1" SQUARE pcb (FR-4 or G-10 Material).

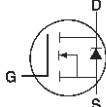
For recommended footprint and soldering techniques refer to application note #AN-994.

# IRFL214PbF

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

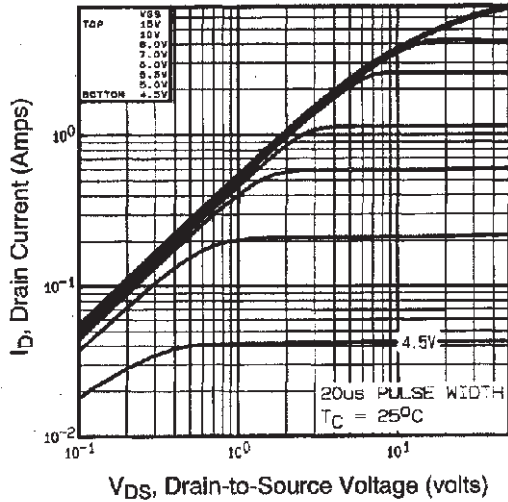
|                                 | Parameter                            | Min. | Typ. | Max. | Units               | Conditions  |
|---------------------------------|--------------------------------------|------|------|------|---------------------|---|
| $V_{(BR)DSS}$                   | Drain-to-Source Breakdown Voltage    | 250  | —    | —    | V                   | $V_{GS} = 0V, I_D = 250\mu A$   |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —    | 0.39 | —    | V/ $^\circ\text{C}$ | Reference to $25^\circ\text{C}, I_D = 1\text{mA}$   |
| $R_{DS(on)}$                    | Static Drain-to-Source On-Resistance | —    | —    | 2.0  | $\Omega$            | $V_{GS} = 10V, I_D = 0.47A$ ④   |
| $V_{GS(th)}$                    | Gate Threshold Voltage               | 2.0  | —    | 4.0  | V                   | $V_{DS} = V_{GS}, I_D = 250\mu A$   |
| $g_{fs}$                        | Forward Transconductance             | 0.50 | —    | —    | S                   | $V_{DS} = 50V, I_D = 0.47A$ ④   |
| $I_{DSS}$                       | Drain-to-Source Leakage Current      | —    | —    | 25   | $\mu A$             | $V_{DS} = 250V, V_{GS} = 0V$  |
|                                 |                                      | —    | —    | 250  |                     | $V_{DS} = 200V, V_{GS} = 0V, T_J = 125^\circ\text{C}$   |
| $I_{GSS}$                       | Gate-to-Source Forward Leakage       | —    | —    | 100  | nA                  | $V_{GS} = 20V$  |
|                                 | Gate-to-Source Reverse Leakage       | —    | —    | -100 |                     | $V_{GS} = -20V$   |
| $Q_g$                           | Total Gate Charge                    | —    | —    | 8.2  | nC                  | $I_D = 2.7A$<br>$V_{DS} = 200V$<br>$V_{GS} = 10V$ , See Fig. 6 and 13 ④   |
| $Q_{gs}$                        | Gate-to-Source Charge                | —    | —    | 1.8  |                     |   |
| $Q_{gd}$                        | Gate-to-Drain ("Miller") Charge      | —    | —    | 4.5  |                     |   |
| $t_{d(on)}$                     | Turn-On Delay Time                   | —    | 7.0  | —    | ns                  | $V_{DD} = 125V$<br>$I_D = 2.7A$<br>$R_G = 24\ \Omega$<br>$R_D = 45\ \Omega$ , See Fig. 10 ④   |
| $t_r$                           | Rise Time                            | —    | 7.6  | —    |                     |   |
| $t_{d(off)}$                    | Turn-Off Delay Time                  | —    | 16   | —    |                     |   |
| $t_f$                           | Fall Time                            | —    | 7.0  | —    |                     |   |
| $L_D$                           | Internal Drain Inductance            | —    | 4.0  | —    | nH                  | Between lead, 6mm(0.25in) from package and center of die contact.  |
| $L_S$                           | Internal Source Inductance           | —    | 6.0  | —    |                     |   |
| $C_{iss}$                       | Input Capacitance                    | —    | 140  | —    | pF                  | $V_{GS} = 0V$<br>$V_{DS} = 25V$<br>$f = 1.0\text{MHz}$ , See Fig. 5   |
| $C_{oss}$                       | Output Capacitance                   | —    | 42   | —    |                     |   |
| $C_{rss}$                       | Reverse Transfer Capacitance         | —    | 9.6  | —    |                     |   |

## Source-Drain Ratings and Characteristics

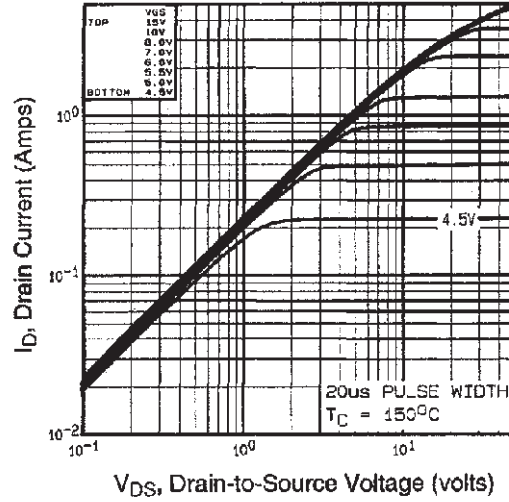
|          | Parameter                              | Min.  | Typ. | Max. | Units   | Conditions   |
|----------|--|---|------|------|---------|--|
| $I_S$    | Continuous Source Current (Body Diode) | —   | —    | 0.79 | A       | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ①   | —   | —    | 6.3  |         |  |
| $V_{SD}$ | Diode Forward Voltage                  | —   | —    | 2.0  | V       | $T_J = 25^\circ\text{C}, I_S = 0.79A, V_{GS} = 0V$ ④   |
| $t_{rr}$ | Reverse Recovery Time                  | —   | 190  | 390  | ns      | $T_J = 25^\circ\text{C}, I_F = 2.7A$   |
| $Q_{rr}$ | Reverse Recovery Charge                | —   | 0.64 | 1.3  | $\mu C$ | $di/dt = 100A/\mu s$ ④   |
| $t_{on}$ | Forward Turn-On Time                   | Intrinsic turn-on time is negligible (turn-on is dominated by $L_S+L_D$ ) |      |      |         |  |

### Notes:

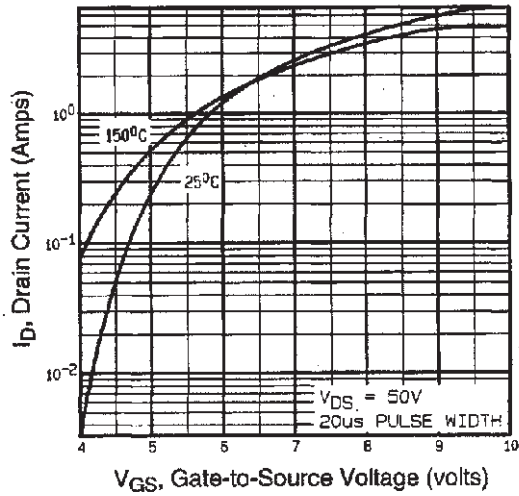
- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )
- ②  $V_{DD}=50V$ , starting  $T_J = 25^\circ\text{C}$ ,  $L = 128\text{ mH}$   
 $R_G = 25\Omega$ ,  $I_{AS} = 0.79$ . (See Figure 12)
- ③  $I_{SD} \leq 2.7A$ ,  $di/dt \leq 65A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  
 $T_J \leq 150^\circ\text{C}$
- ④ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .



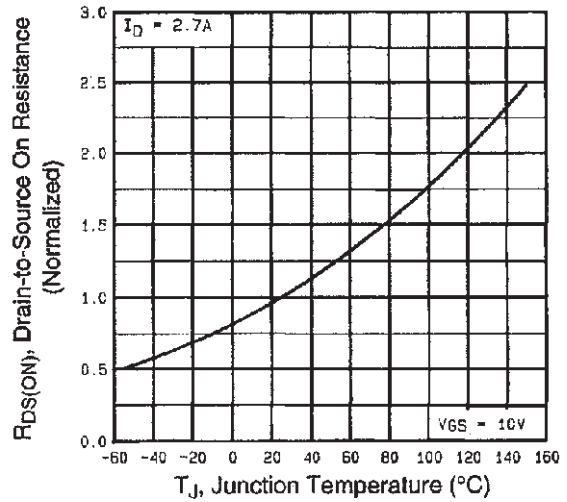
**Fig 1.** Typical Output Characteristics,



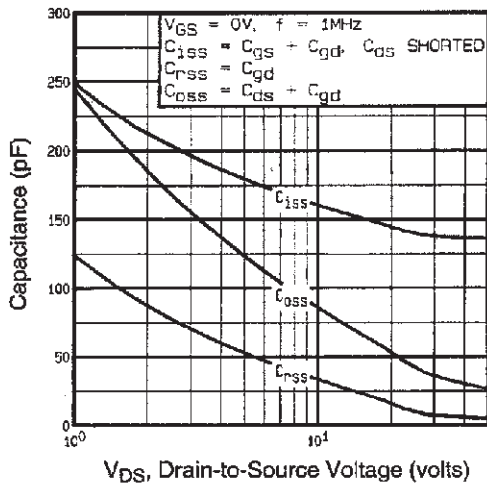
**Fig 2.** Typical Output Characteristics,



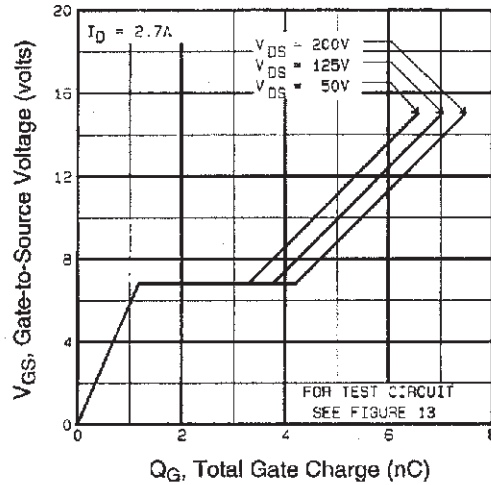
**Fig 3.** Typical Transfer Characteristics



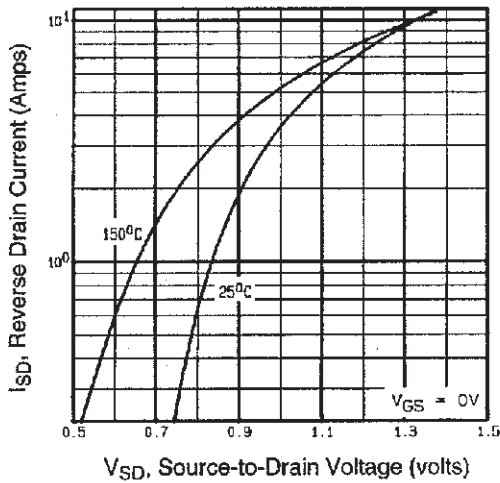
**Fig 4.** Normalized On-Resistance Vs. Temperature



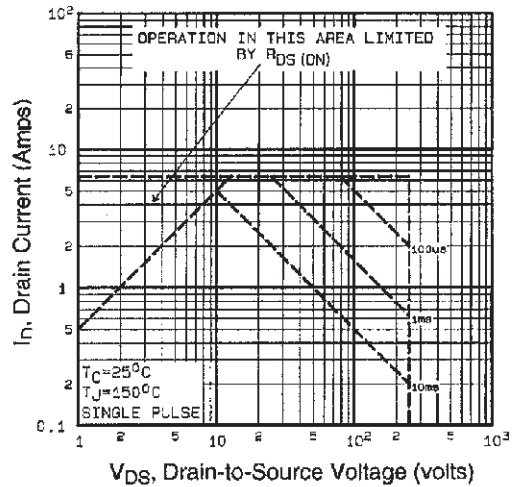
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



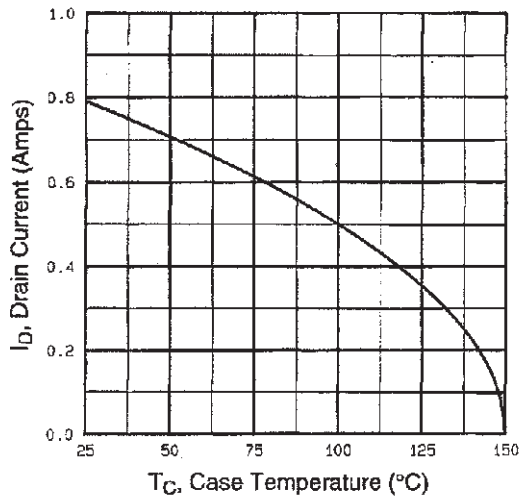
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



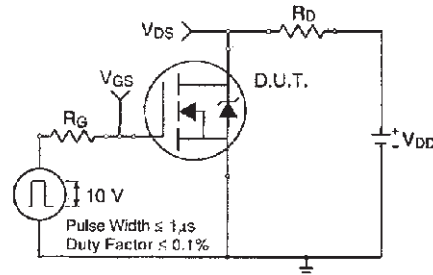
**Fig 7.** Typical Source-Drain Diode Forward Voltage



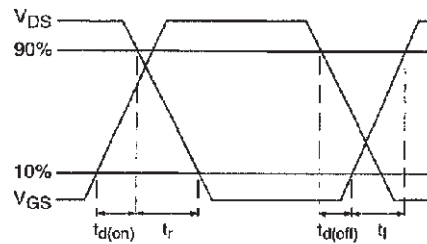
**Fig 8.** Maximum Safe Operating Area



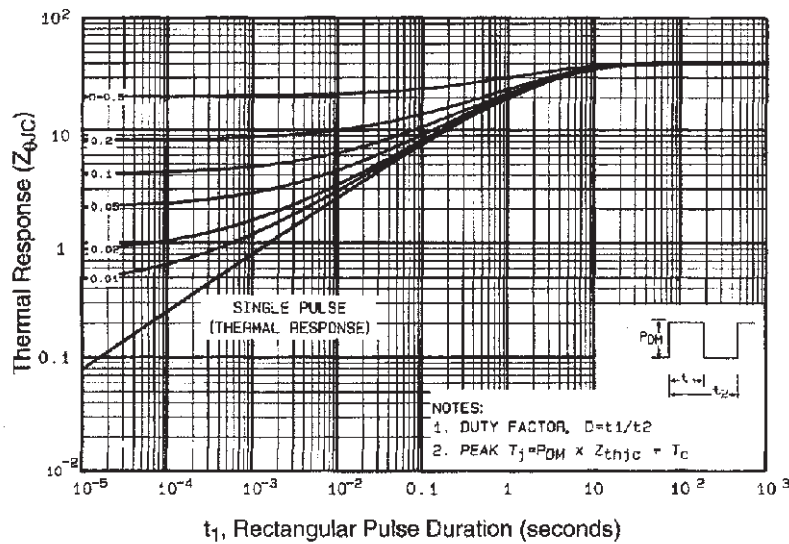
**Fig 9.** Maximum Drain Current Vs. Case Temperature



**Fig 10a.** Switching Time Test Circuit



**Fig 10b.** Switching Time Waveforms



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

# IRFL214PbF

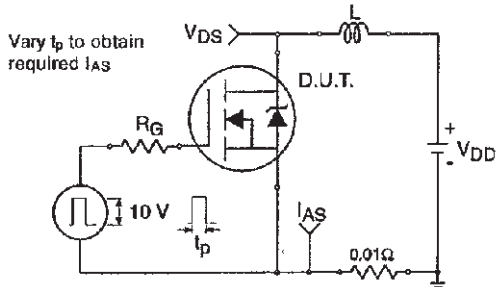


Fig 12a. Unclamped Inductive Test Circuit

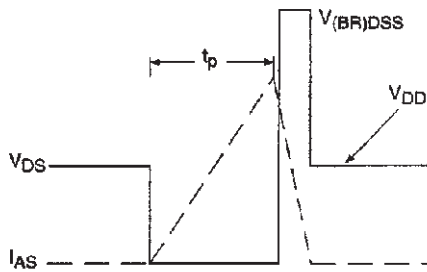


Fig 12b. Unclamped Inductive Waveforms

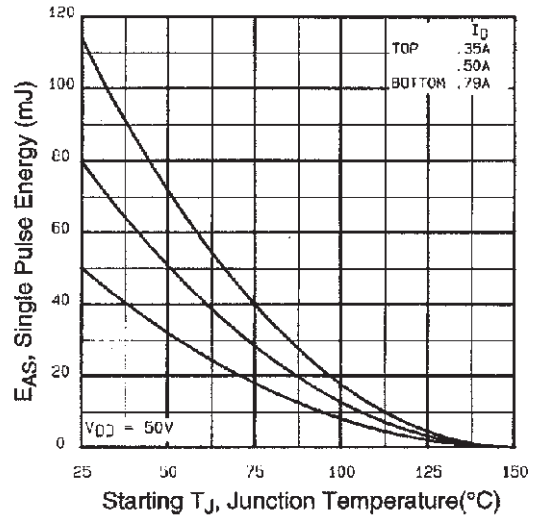


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

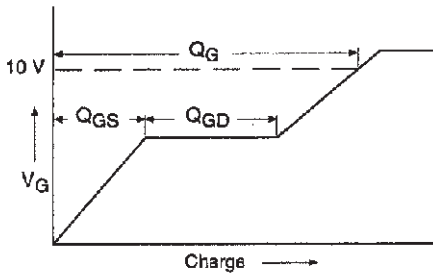


Fig 13a. Basic Gate Charge Waveform

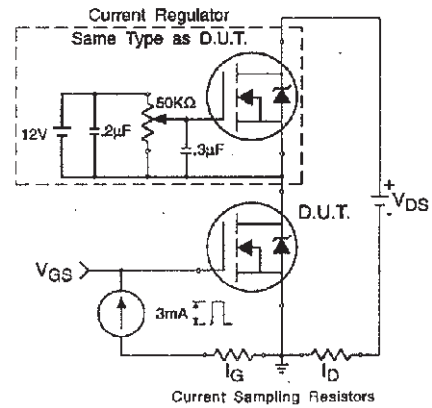
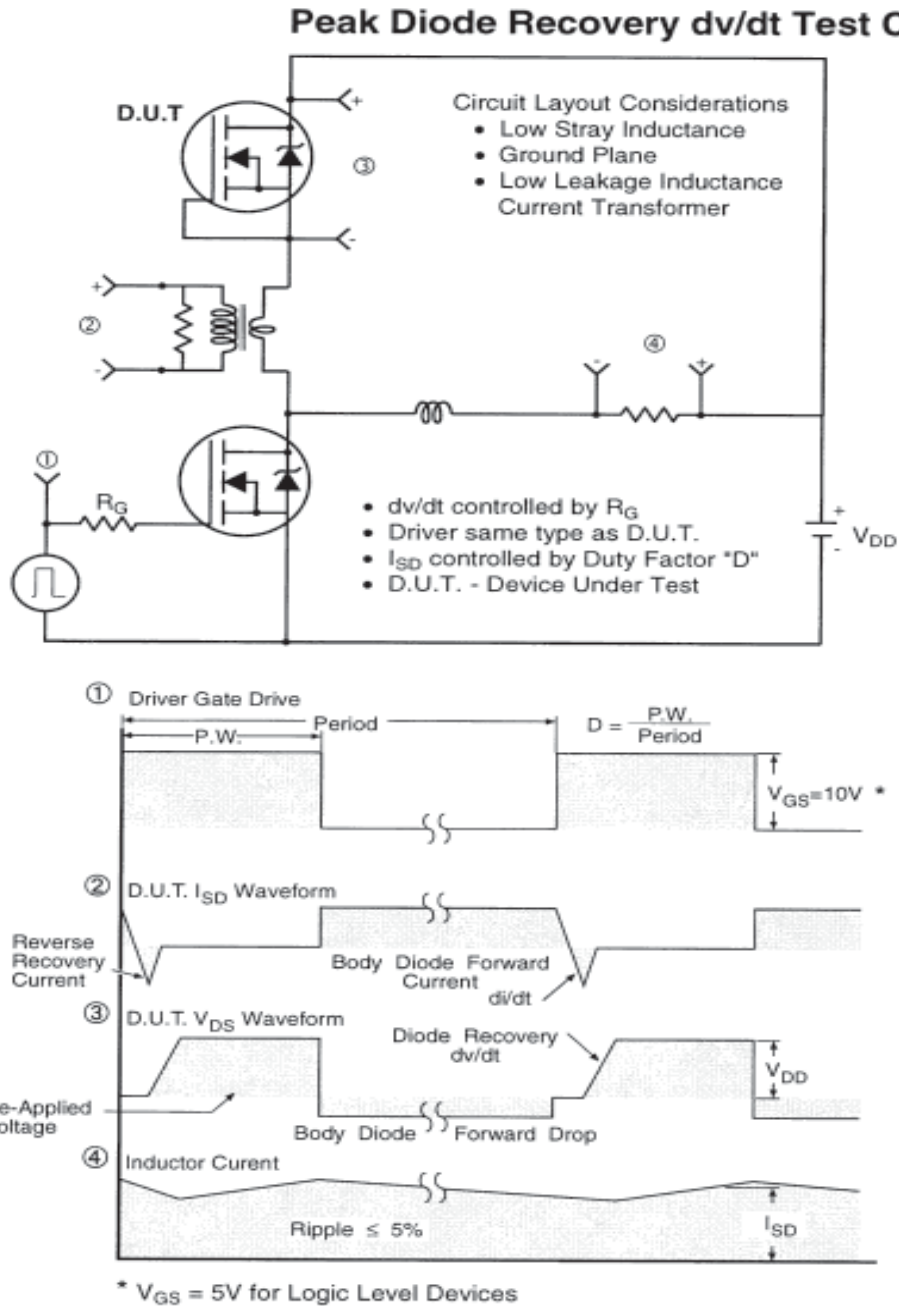


Fig 13b. Gate Charge Test Circuit



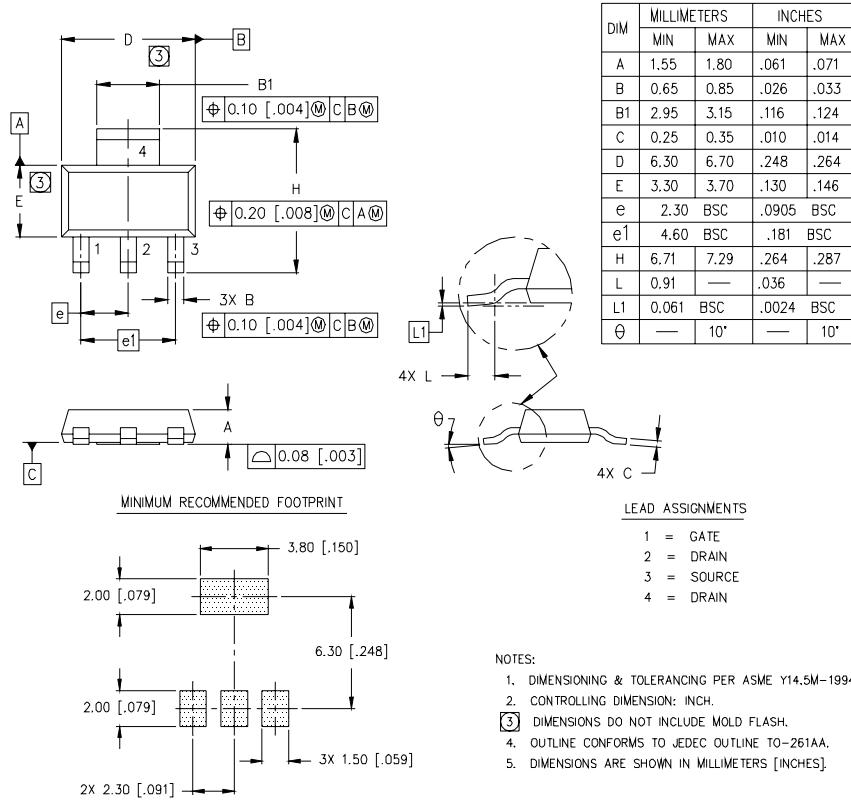
**Fig 14.** For N-Channel HEXFETS

# IRFL214PbF



## SOT-223 (TO-261AA) Package Outline

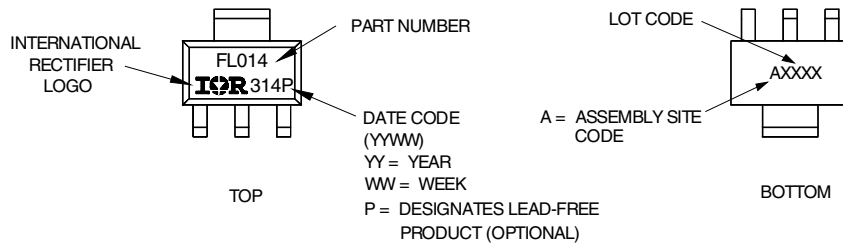
Dimensions are shown in millimeters (inches)



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

### HEXFET PRODUCT MARKING

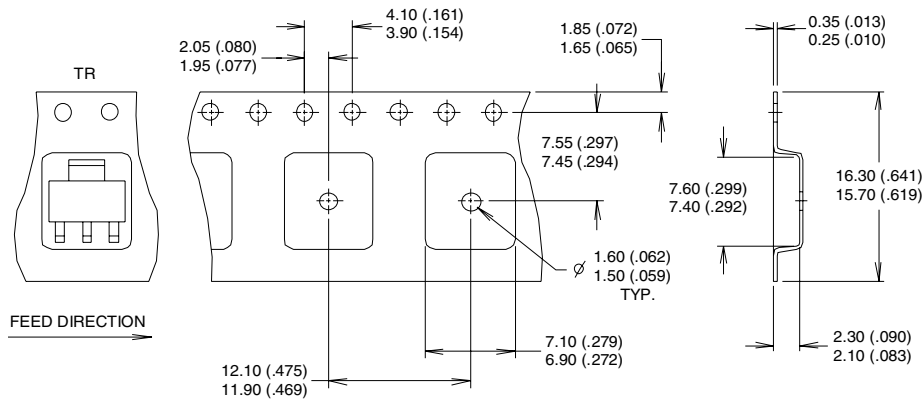
EXAMPLE: THIS IS AN IRFL014





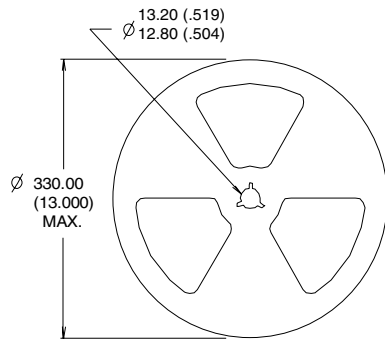
## SOT-223 (TO-261AA) Tape & Reel Information

Dimensions are shown in millimeters (inches)



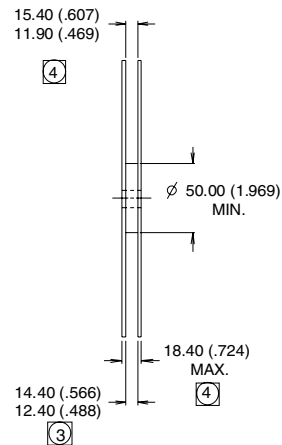
**NOTES :**

1. CONTROLLING DIMENSION: MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.
3. EACH  $\varnothing 330.00$  (13.00) REEL CONTAINS 2,500 DEVICES.



**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.



## Notice

The products described herein were acquired by Vishay Intertechnology, Inc., as part of its acquisition of International Rectifier's Power Control Systems (PCS) business, which closed in April 2007. Specifications of the products displayed herein are pending review by Vishay and are subject to the terms and conditions shown below.

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.

International Rectifier®, IR®, the IR logo, HEXFET®, HEXSense®, HEXDIP®, DOL®, INTERO®, and POWIRTRAIN® are registered trademarks of International Rectifier Corporation in the U.S. and other countries. All other product names noted herein may be trademarks of their respective owners.