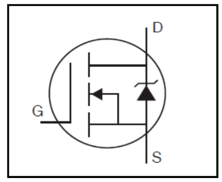
# IRFL4105PbF

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

HEXFET® Power MOSFET




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

SOT-223

| 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°C | Continuous Drain Current, $V_{GS}$ @ 10V ⑥ | 5.2 | A |
| $I_D$ @ $T_A$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V ⑤ | 3.7 | |
| $I_D$ @ $T_A$ = 70°C | Continuous Drain Current, $V_{GS}$ @ 10V ⑤ | 3.0 | |
| $I_{DM}$ | Pulsed Drain Current ① | 30 | |
| $P_D$ @$T_A$ = 25°C | Maximum Power Dissipation (PCB Mount) ⑥ | 2.1 | W |
| $P_D$ @$T_A$ = 25°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 |
| $T_J$<br>$T_{STG}$ | Operating Junction and<br>Storage Temperature Range | -55 to + 150 | °C |

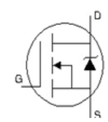
**Thermal Resistance**

| 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°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | 55 | —— | —— | V | $V_{GS}$ = 0V, $I_D$ = 250μA |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | —— | 0.058 | —— | V/°C | Reference to 25°C, $I_D$ = 1mA |
| $R_{DS(on)}$ | 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 | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| gfs | Forward Trans conductance | 3.8 | —— | —— | S | $V_{DS}$ = 25V, $I_D$ = 1.9A |
| $I_{DSS}$ | Drain-to-Source Leakage Current | —— | —— | 25 | μA | $V_{DS}$ = 55 V, $V_{GS}$ = 0V |
| | | —— | —— | 250 | | $V_{DS}$ = 44V,$V_{GS}$ = 0V,$T_J$ =150°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 | —— | | $R_G$= 6.0Ω |
| $t_f$ | Fall Time | —— | 12 | —— | | $R_D$= 7.5Ω, 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 | —— | | $f$ = 1.0MHz, 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°C,$I_S$ = 3.7A,$V_{GS}$ = 0V ④ |
| $t_{rr}$ | Reverse Recovery Time | —— | 55 | 82 | ns | $T_J$ = 25°C ,$I_F$ = 3.7A |
| $Q_{rr}$ | Reverse Recovery Charge | —— | 120 | 170 | nC | di/dt = 100A/μs ④ |

**Notes:**

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

② starting $T_J$ = 25°C, L = 16mH, $R_G$ = 25Ω, $I_{AS}$ = 3.7A (See fig. 12)

③ $I_{SD} \leq$ 3.7A, di/dt $\leq$ 110A/μs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 150°C.

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

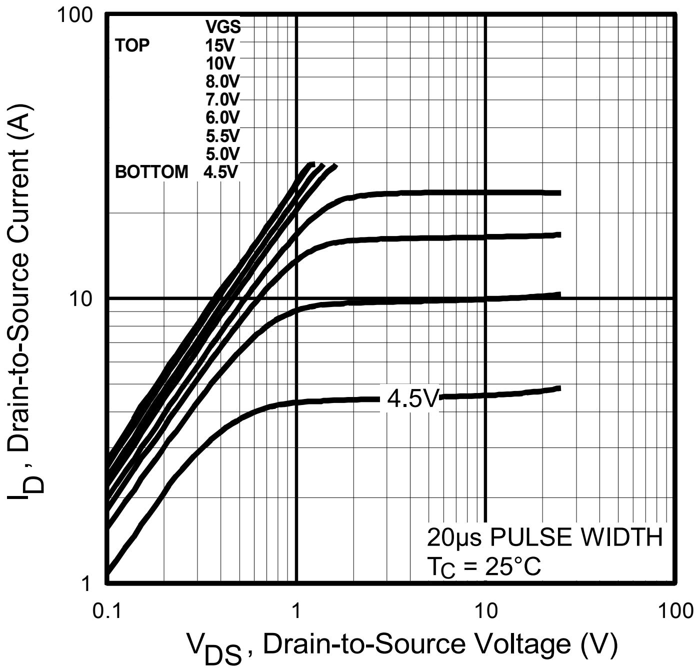



**Fig. 1** Typical Output Characteristics

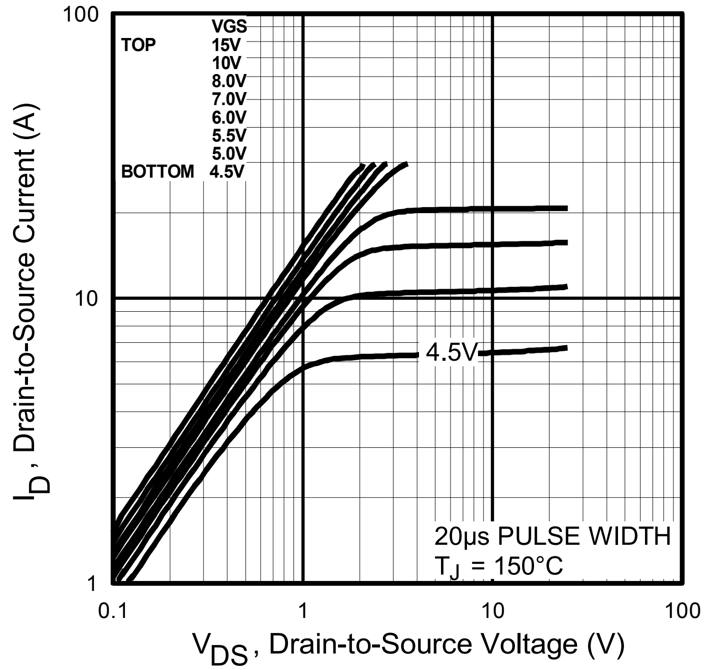



**Fig. 2** Typical Output Characteristics

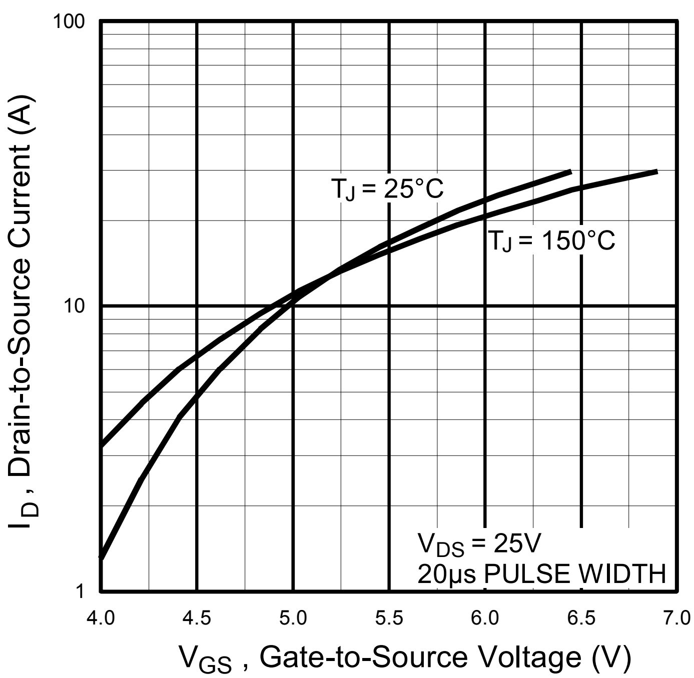



**Fig. 3** Typical Transfer Characteristics

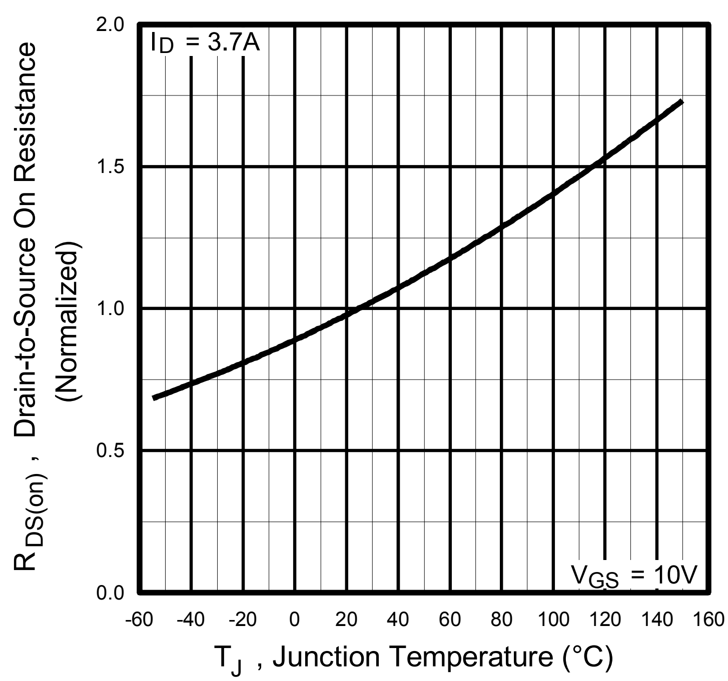



**Fig. 4** Normalized On-Resistance vs. Temperature

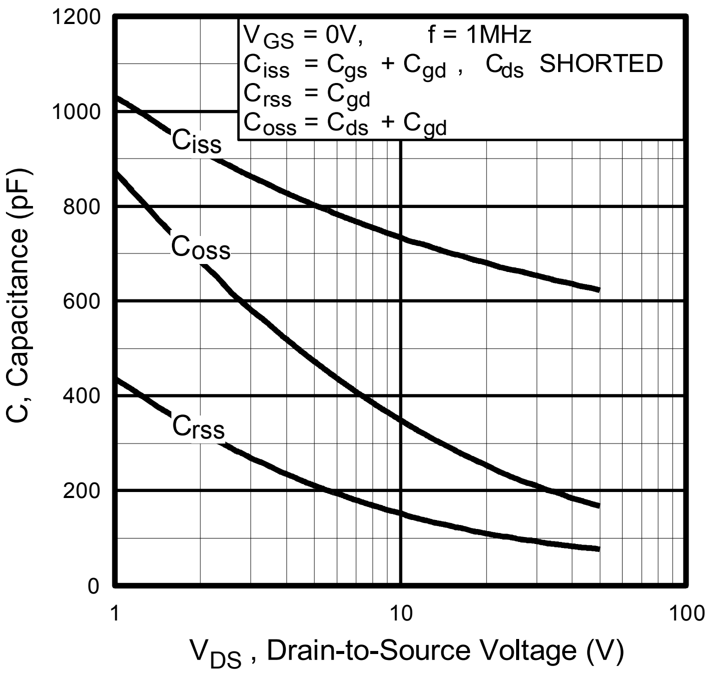



**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage

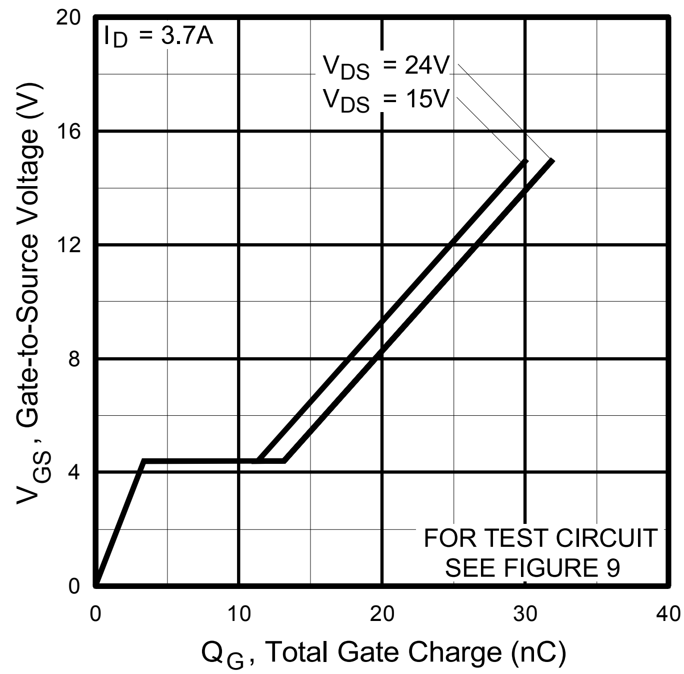



**Fig 6.** Typical Gate Charge vs. Gate-to-Source Voltage

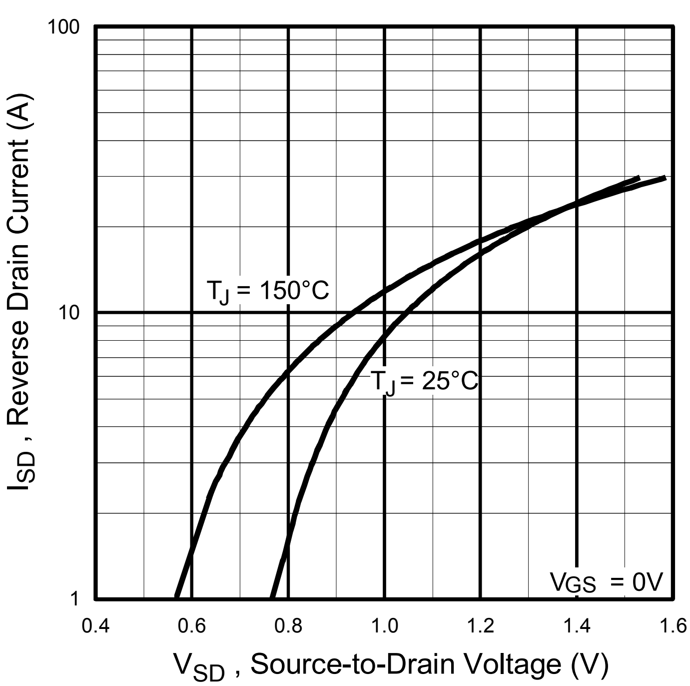



**Fig. 7** Typical Source-to-Drain Diode Forward Voltage

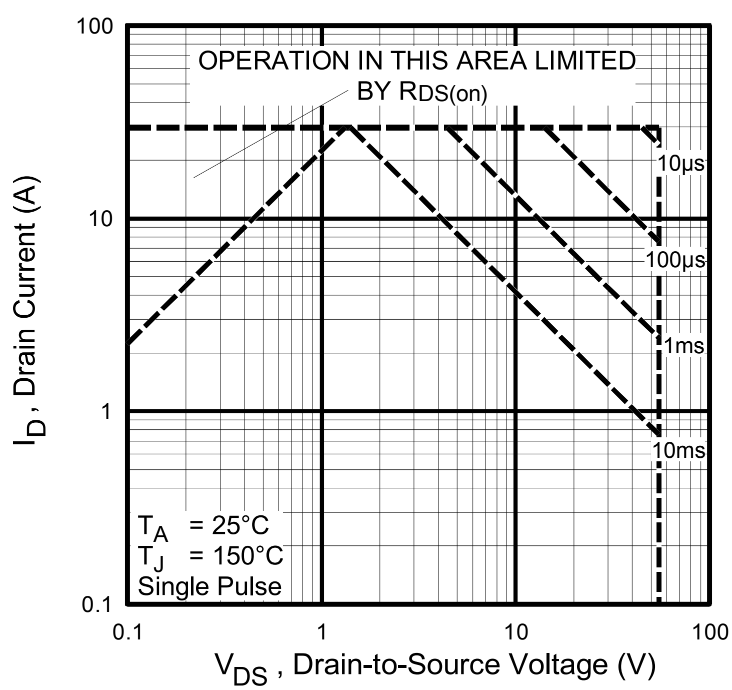



**Fig 8.** Maximum Safe Operating Area

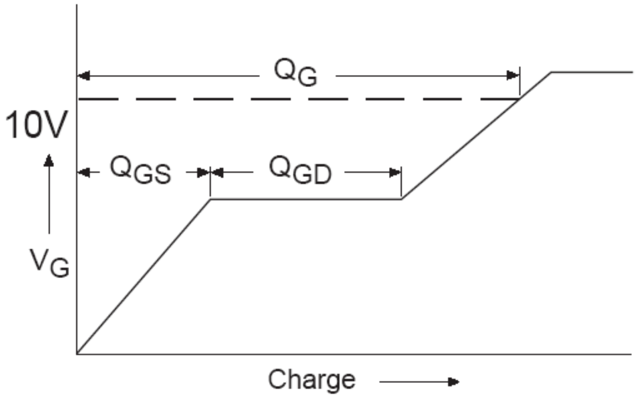



**Fig 9a.** Basic Gate Charge Waveform

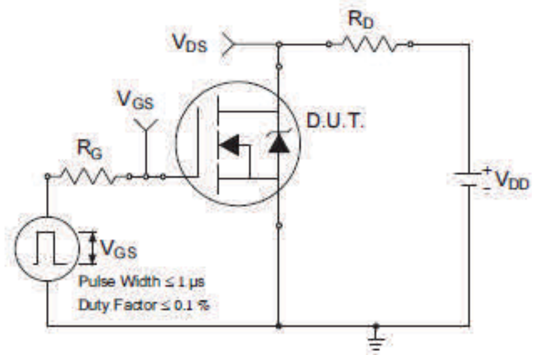



**Fig 10a.** Switching Time Test Circuit

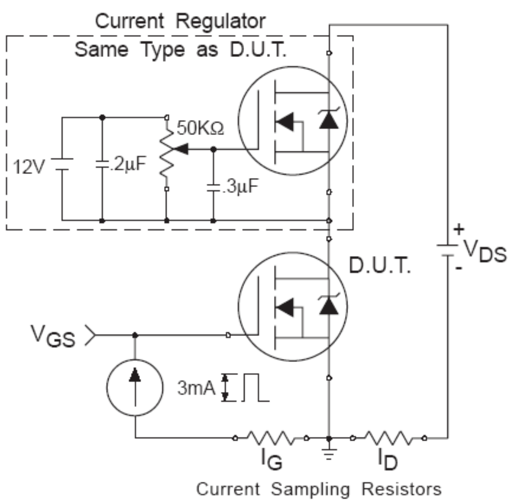



**Fig 9b.** Gate Charge Test Circuit

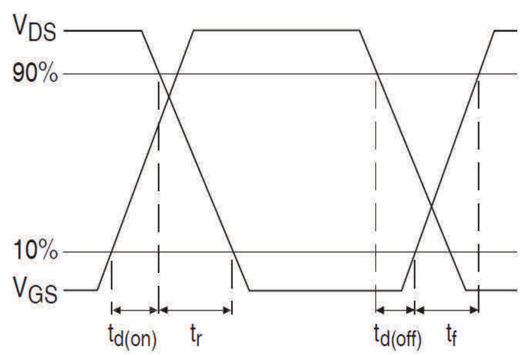



**Fig 10b.** Switching Time Waveforms

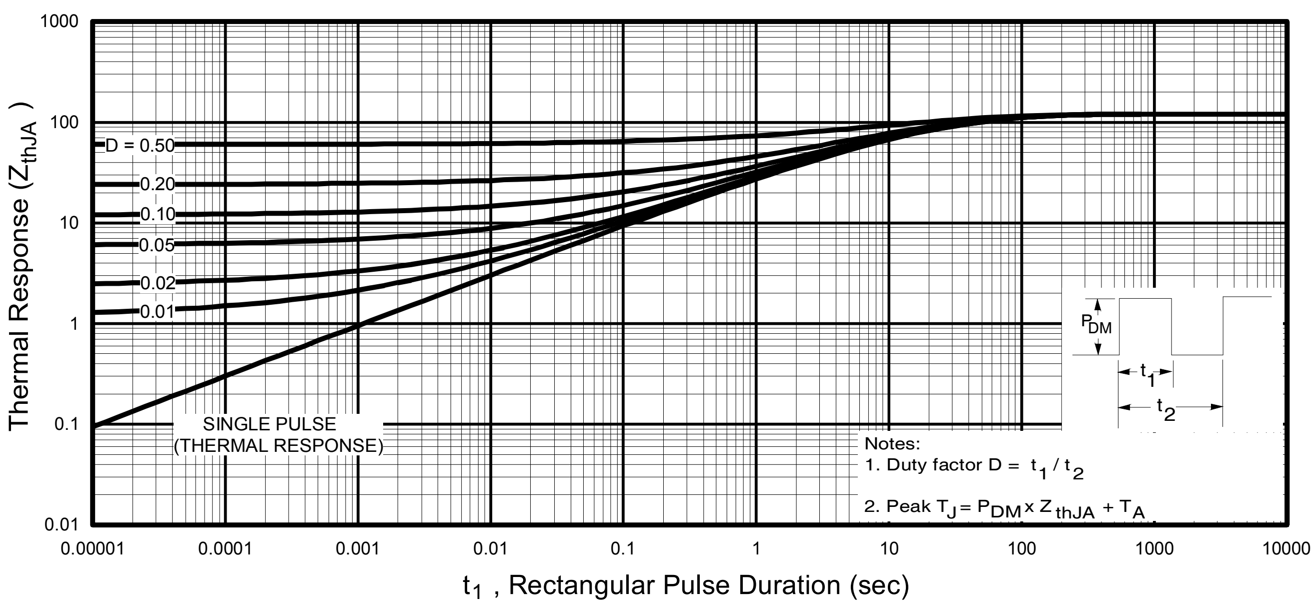



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

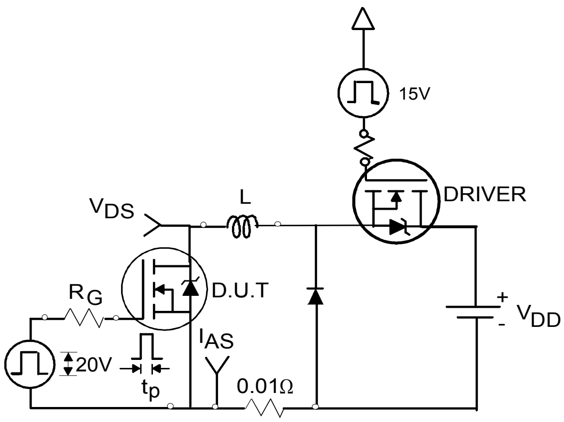



**Fig 12a.** Unclamped Inductive Test Circuit

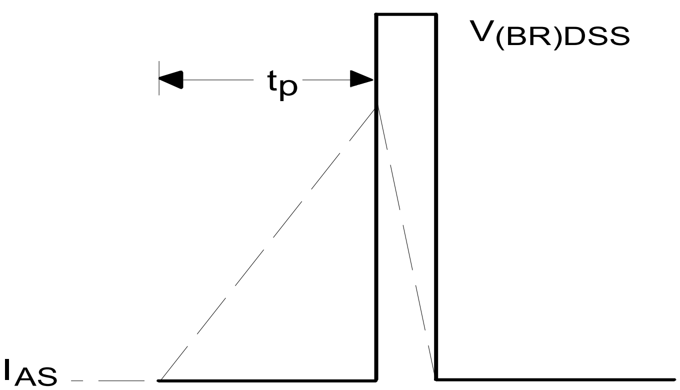



**Fig 12b.** Unclamped Inductive Waveforms

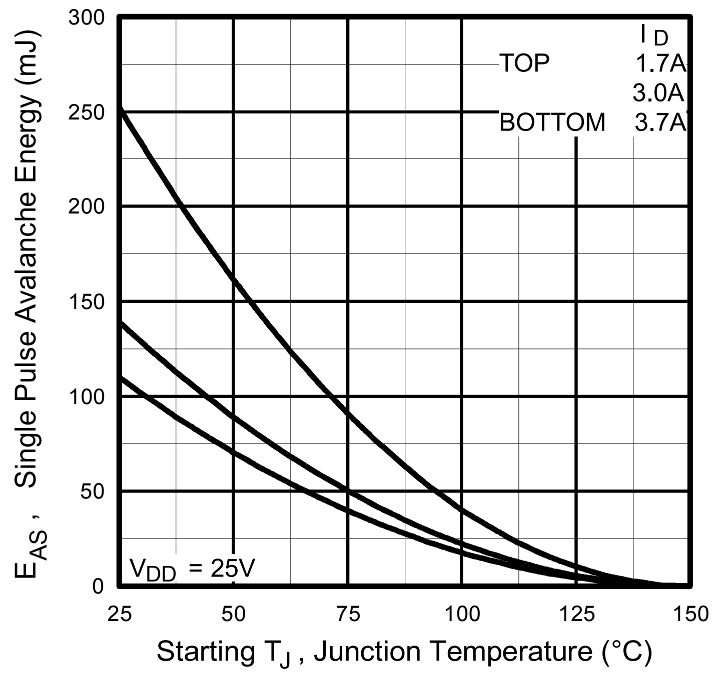



**Fig 12c.** Maximum Avalanche Energy
vs. Drain Current

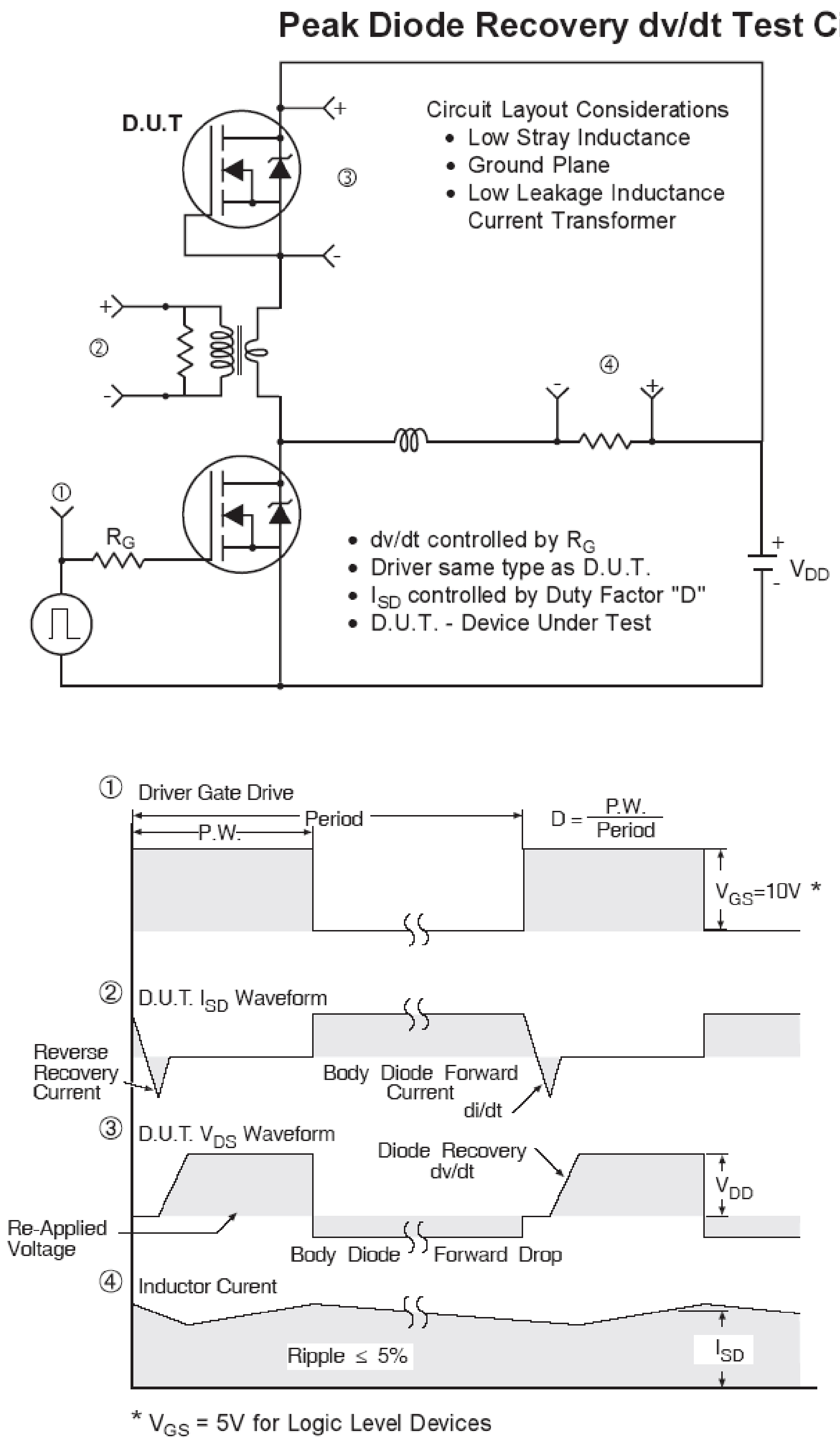
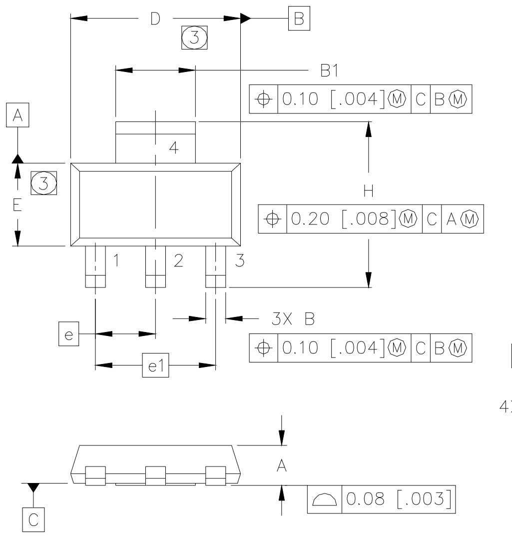
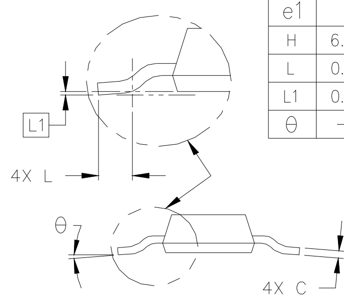



**Fig 13.** Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

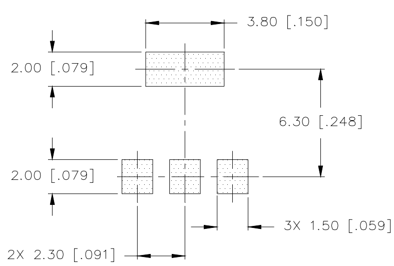
## SOT-223 (TO-261AA) Package Outline (Dimensions are shown in millimeters (inches)




| 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° |

MINIMUM RECOMMENDED FOOTPRINT



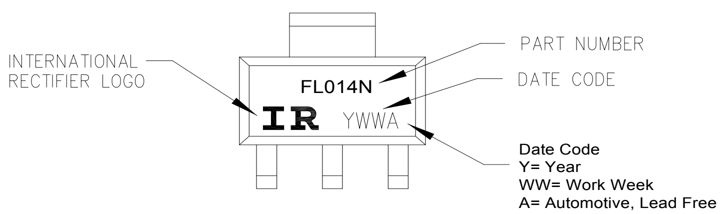

LEAD ASSIGNMENTS

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

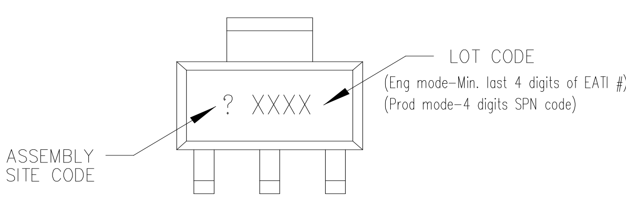
NOTES:

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



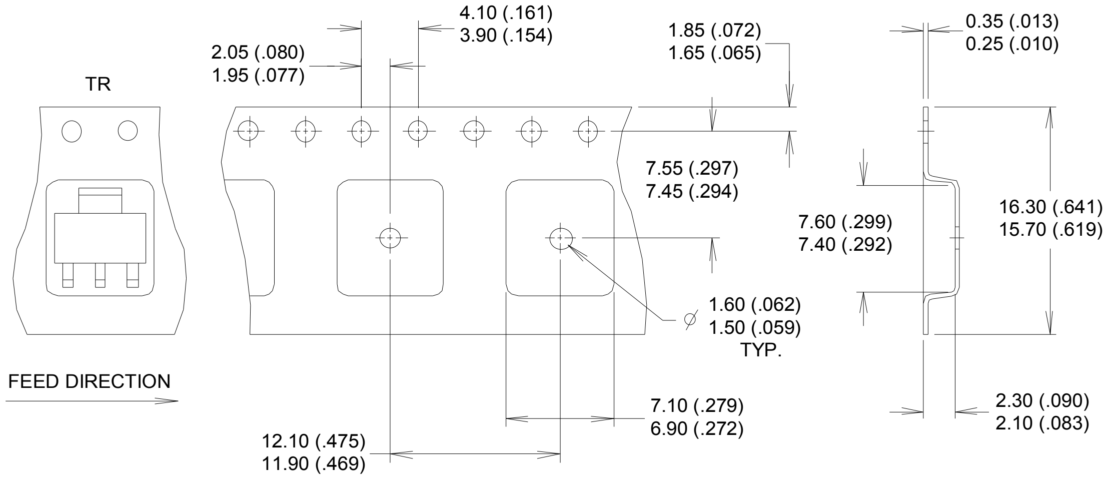

TOP MARKING



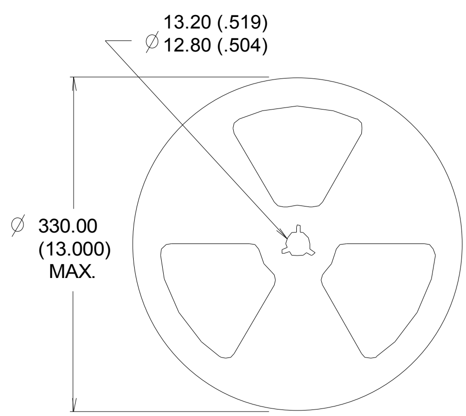

BOTTOM MARKING

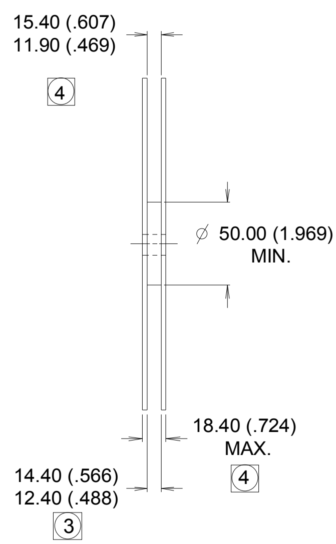
Note: For the most current drawing please refer to Infineon's web site www.infineon.com

**SOT-223(TO-261AA) Tape and Reel** (Dimensions are shown in millimeters (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 :
1. OUTLINE CONFORMS TO EIA-418-1.
2. CONTROLLING DIMENSION: MILLIMETER..
3. DIMENSION MEASURED @ HUB.
4. INCLUDES FLANGE DISTORTION @ OUTER EDGE.

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

## 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.<br>• Added disclaimer on last page. |



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**Document reference**

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