

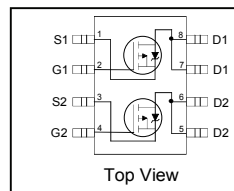
## Features

- Advanced Planar Technology
- Low On-Resistance
- Dual P Channel MOSFET
- Dynamic dv/dt Rating
- Logic Level
- 150°C Operating Temperature
- Fast Switching
- Lead-Free, RoHS Compliant
- Automotive Qualified \*

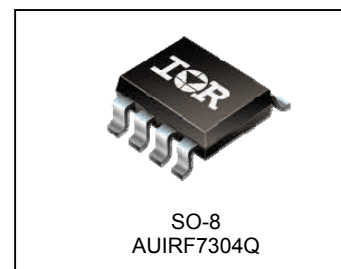
## Description

Specifically designed for Automotive applications, this cellular design of HEXFET® Power MOSFETs utilizes the latest processing techniques to achieve 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 Automotive and a wide variety of other applications.

## HEXFET® Power MOSFET



|                   |               |
|-------------------|---------------|
| $V_{DSS}$         | <b>-20V</b>   |
| $R_{DS(on)}$ max. | <b>0.090Ω</b> |
| $I_D$             | <b>-4.3A</b>  |



|          |          |          |
|----------|----------|----------|
| <b>G</b> | <b>D</b> | <b>S</b> |
| Gate     | Drain    | Source   |

| Base part number | Package Type | Standard Pack |          | Orderable Part Number |
|------------------|--------------|---------------|----------|-----------------------|
|                  |              | Form          | Quantity |                       |
| AUIRF7304Q       | SO-8         | Tape and Reel | 4000     | AUIRF7304QTR          |

## Absolute Maximum Ratings

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only; and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature (TA) is 25°C, unless otherwise specified.

| Symbol                           | Parameter                                           | Max.         | Units |
|----------------------------------|-----------------------------------------------------|--------------|-------|
| $I_D$ @ $T_A = 25^\circ\text{C}$ | Continuous Drain Current, $V_{GS}$ @ -4.5V          | -4.7         | A     |
| $I_D$ @ $T_A = 25^\circ\text{C}$ | Continuous Drain Current, $V_{GS}$ @ -4.5V          | -4.3         |       |
| $I_D$ @ $T_A = 70^\circ\text{C}$ | Continuous Drain Current, $V_{GS}$ @ -4.5V          | -3.4         |       |
| $I_{DM}$                         | Pulsed Drain Current ①                              | -17          |       |
| $P_D$ @ $T_A = 25^\circ\text{C}$ | Maximum Power Dissipation ③                         | 2.0          | W     |
|                                  | Linear Derating Factor                              | 0.016        | W/°C  |
| $V_{GS}$                         | Gate-to-Source Voltage                              | ± 12         | V     |
| dv/dt                            | Peak Diode Recovery dv/dt ②                         | -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 ④ | —    | 62.5 | °C/W  |

HEXFET® is a registered trademark of Infineon.

\*Qualification standards can be found at [www.infineon.com](http://www.infineon.com)

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

|                                 | Parameter                            | Min.  | Typ.   | Max.  | Units               | Conditions                                            |
|---------------------------------|--------------------------------------|-------|--------|-------|---------------------|-------------------------------------------------------|
| $V_{(BR)DSS}$                   | Drain-to-Source Breakdown Voltage    | -20   | —      | —     | V                   | $V_{GS} = 0V, I_D = -250\mu A$                        |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —     | -0.012 | —     | V/ $^\circ\text{C}$ | Reference to $25^\circ\text{C}$ , $I_D = -1\text{mA}$ |
| $R_{DS(on)}$                    | Static Drain-to-Source On-Resistance | —     | —      | 0.090 | $\Omega$            | $V_{GS} = -4.5V, I_D = -2.2A$ ③                       |
|                                 |                                      | —     | —      | 0.140 |                     | $V_{GS} = -2.7V, I_D = -1.8A$ ③                       |
| $V_{GS(th)}$                    | Gate Threshold Voltage               | -0.70 | —      | -1.5  | V                   | $V_{DS} = V_{GS}, I_D = -250\mu A$                    |
| $g_{fs}$                        | Forward Trans conductance            | 4.0   | —      | —     | S                   | $V_{DS} = -16V, I_D = -2.2A$                          |
| $I_{DSS}$                       | Drain-to-Source Leakage Current      | —     | —      | -1.0  | $\mu A$             | $V_{DS} = -16V, V_{GS} = 0V$                          |
|                                 |                                      | —     | —      | -25   |                     | $V_{DS} = -16V, V_{GS} = 0V, T_J = 125^\circ\text{C}$ |
| $I_{GSS}$                       | Gate-to-Source Forward Leakage       | —     | —      | -100  | nA                  | $V_{GS} = -12V$                                       |
|                                 | Gate-to-Source Reverse Leakage       | —     | —      | 100   |                     | $V_{GS} = 12V$                                        |

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

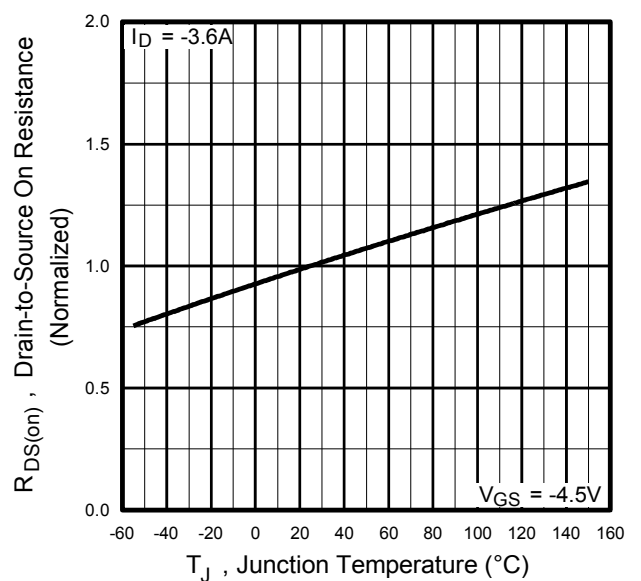
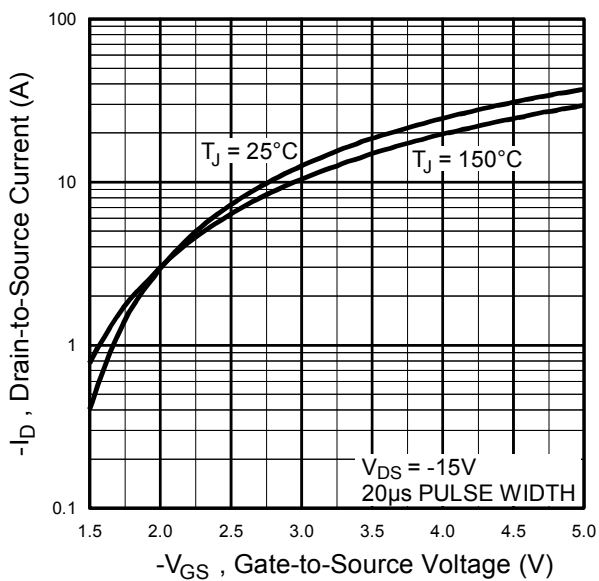
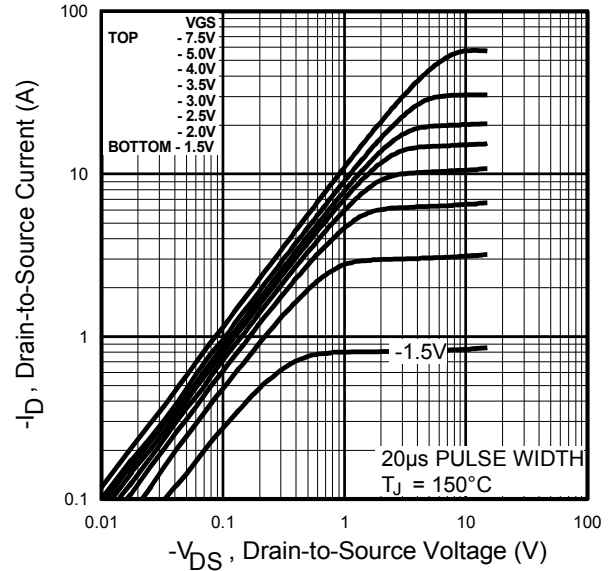
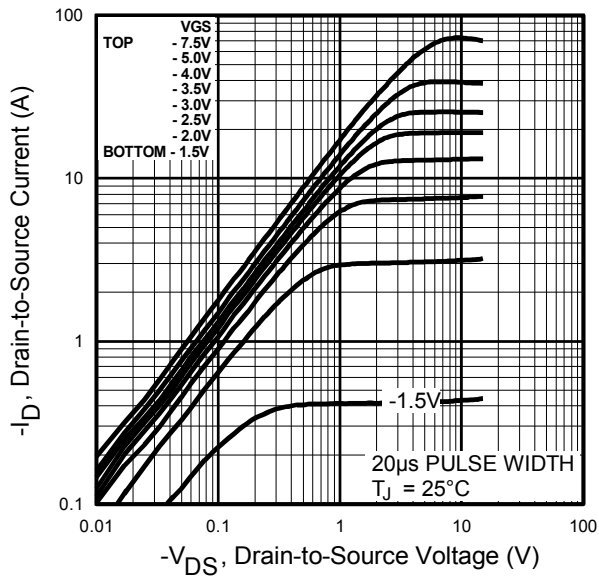
|              |                              |   |     |     |    |                                                                    |
|--------------|------------------------------|---|-----|-----|----|--------------------------------------------------------------------|
| $Q_g$        | Total Gate Charge            | — | —   | 22  | nC | $I_D = -2.2A$                                                      |
| $Q_{gs}$     | Gate-to-Source Charge        | — | —   | 3.3 |    | $V_{DS} = -16V$                                                    |
| $Q_{gd}$     | Gate-to-Drain Charge         | — | —   | 9.0 |    | $V_{GS} = -4.5V$ , See Fig.6 & 12 ③                                |
| $t_{d(on)}$  | Turn-On Delay Time           | — | 8.4 | —   | ns | $V_{DD} = -10V$                                                    |
| $t_r$        | Rise Time                    | — | 26  | —   |    | $I_D = -2.2A$                                                      |
| $t_{d(off)}$ | Turn-Off Delay Time          | — | 51  | —   |    | $R_G = 6.0\Omega$                                                  |
| $t_f$        | Fall Time                    | — | 33  | —   |    | $R_D = 4.5\Omega$ , See Fig.10 ③                                   |
| $L_D$        | 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            | — | 610 | —   | pF | $V_{GS} = 0V$                                                      |
| $C_{oss}$    | Output Capacitance           | — | 310 | —   |    | $V_{DS} = -15V$                                                    |
| $C_{rss}$    | Reverse Transfer Capacitance | — | 170 | —   |    | $f = 1.0\text{MHz}$ , See Fig.5                                    |

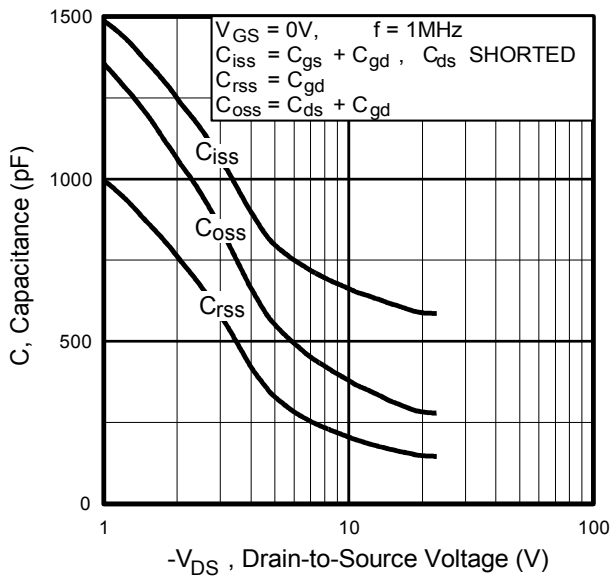
**Diode Characteristics**

|          | Parameter                              | Min.                                                                        | Typ. | Max. | Units | Conditions                                                                                                                                           |
|----------|----------------------------------------|-----------------------------------------------------------------------------|------|------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| $I_S$    | Continuous Source Current (Body Diode) | —                                                                           | —    | -2.5 | A     | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ①   | —                                                                           | —    | -17  |       |                                                                                                                                                      |
| $V_{SD}$ | Diode Forward Voltage                  | —                                                                           | —    | -1.0 | V     | $T_J = 25^\circ\text{C}, I_S = -1.8A, V_{GS} = 0V$ ③                                                                                                 |
| $t_{rr}$ | Reverse Recovery Time                  | —                                                                           | 56   | 84   | ns    | $T_J = 25^\circ\text{C}, I_F = -2.2A$ ,                                                                                                              |
| $Q_{rr}$ | Reverse Recovery Charge                | —                                                                           | 71   | 110  | nC    | $di/dt = 100A/\mu s$ ③                                                                                                                               |
| $t_{on}$ | Forward Turn-On Time                   | Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$ ) |      |      |       |                                                                                                                                                      |

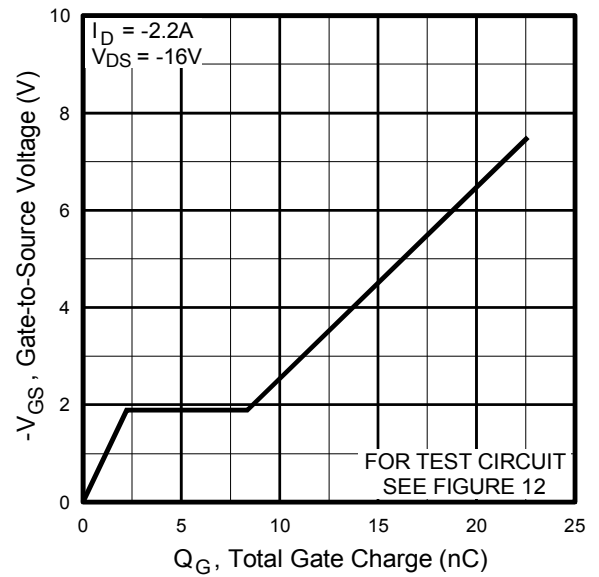
**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature. (See Fig. 11)
- ②  $I_{SD} \leq -2.2A$ ,  $di/dt \leq 50A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$ .
- ③ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board,  $t \leq 10\text{sec}$ .

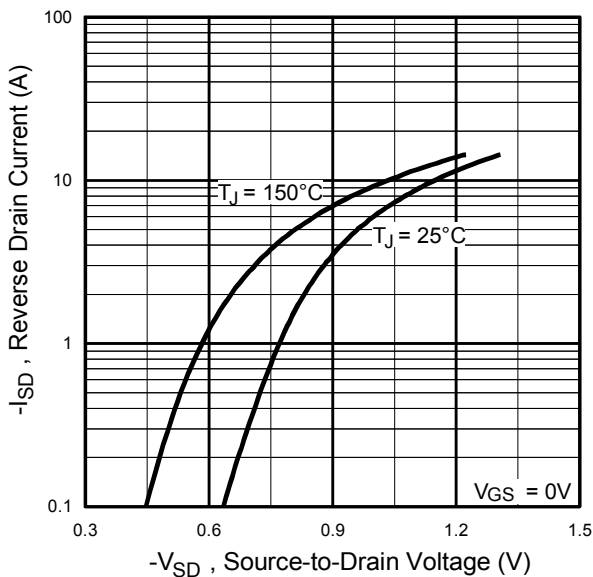




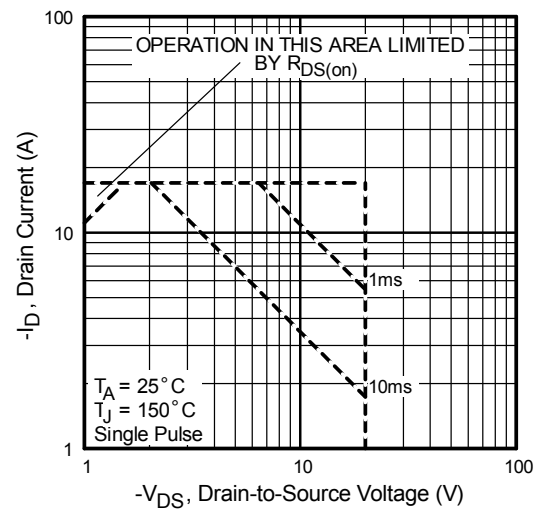
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



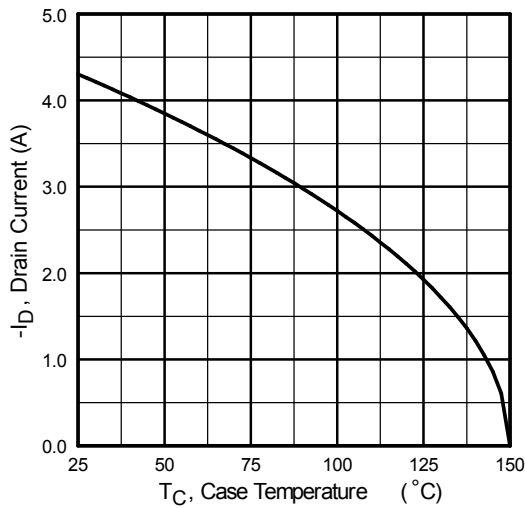
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



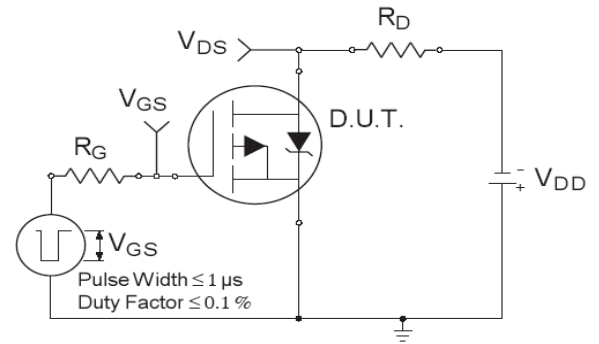
**Fig. 7** Typical Source-Drain Diode Forward Voltage



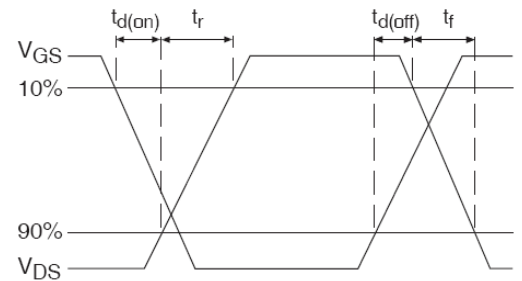
**Fig 8.** Maximum Safe Operating Area



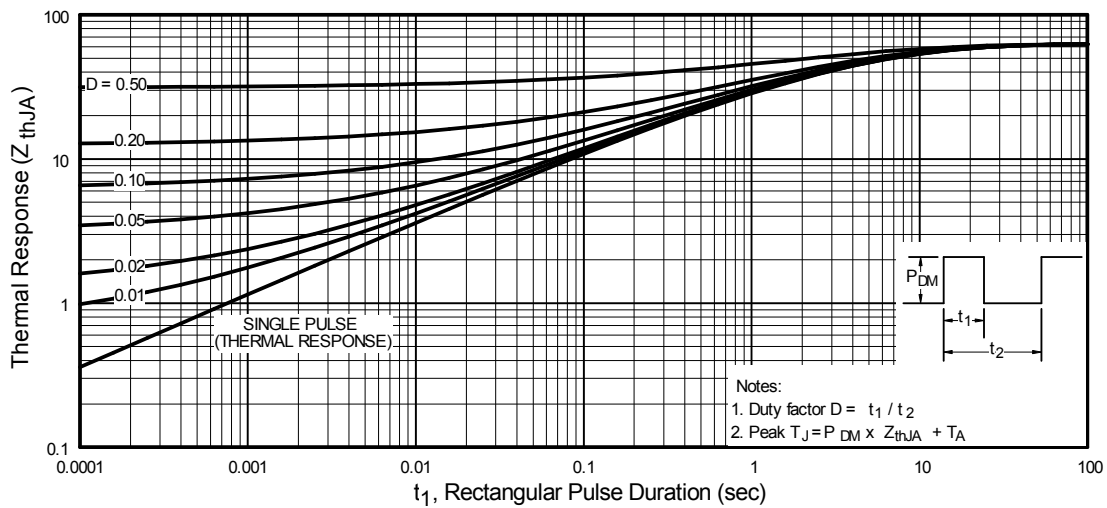
**Fig 9.** Maximum Drain Current Vs. Ambient Temperature



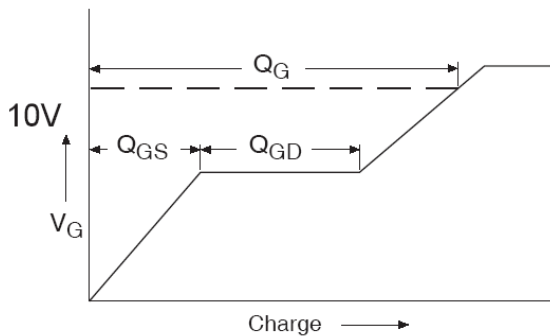
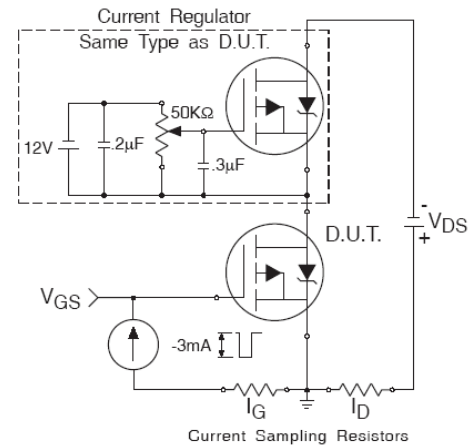
**Fig 10a.** Switching Time Test Circuit



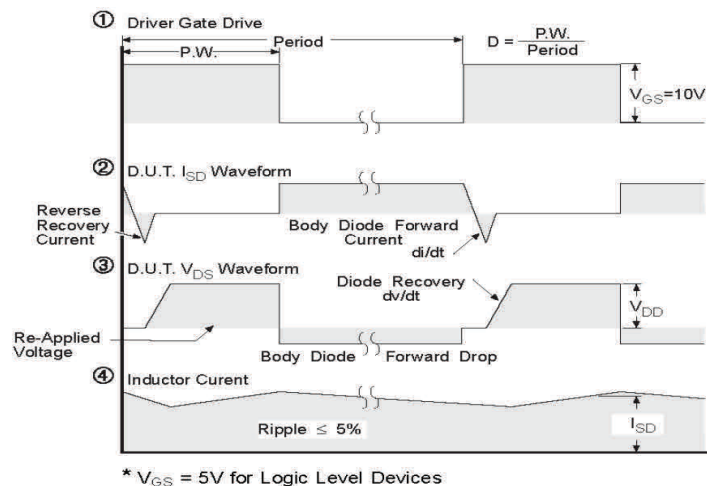
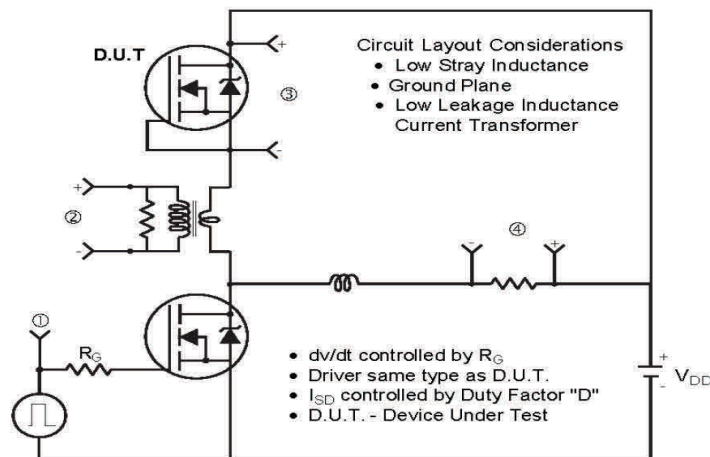
**Fig 10b.** Switching Time Waveforms



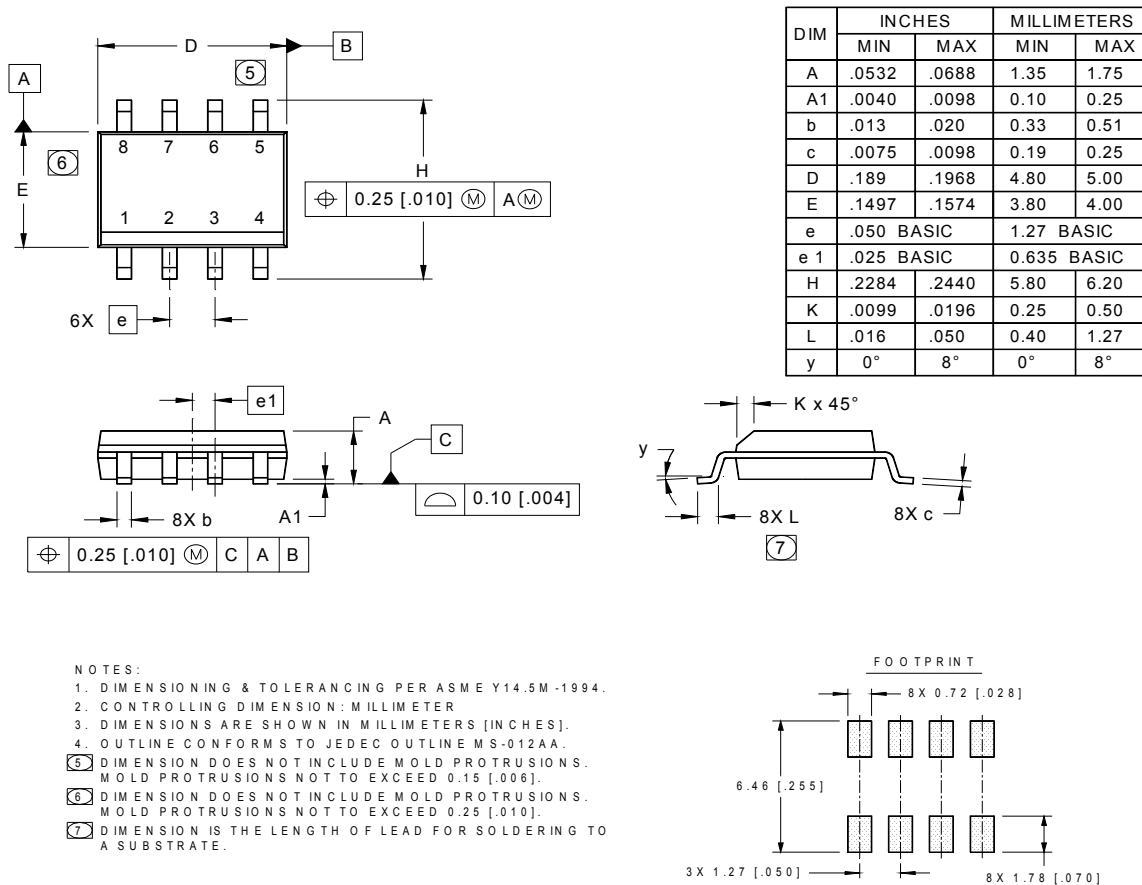
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient


**Fig 12a. Basic Gate Charge Waveform**

**Fig 12b. Gate Charge Test Circuit**

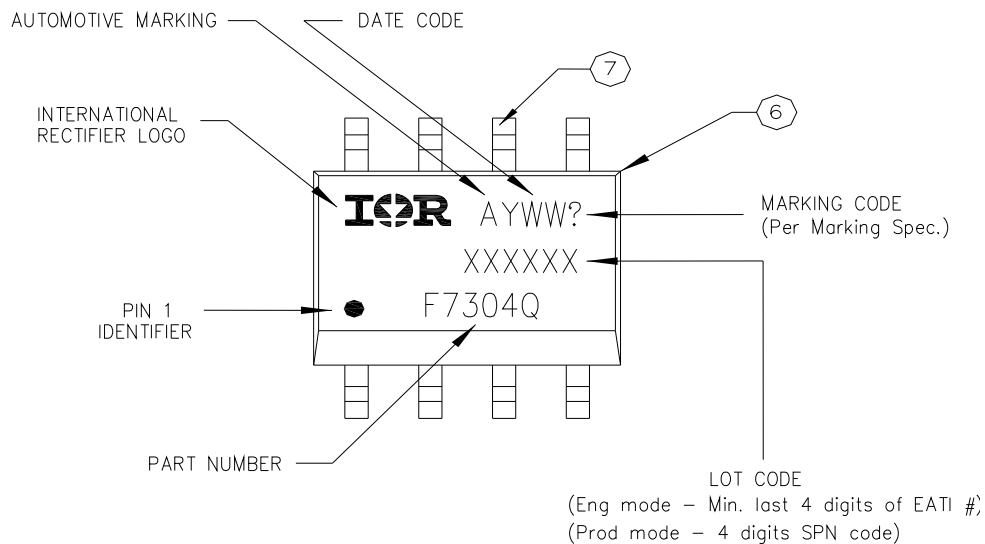
### Peak Diode Recovery $dv/dt$ Test Circuit


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

## SO-8 Package Outline (Dimensions are shown in millimeters (inches))



## SO-8 Part Marking Information



Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

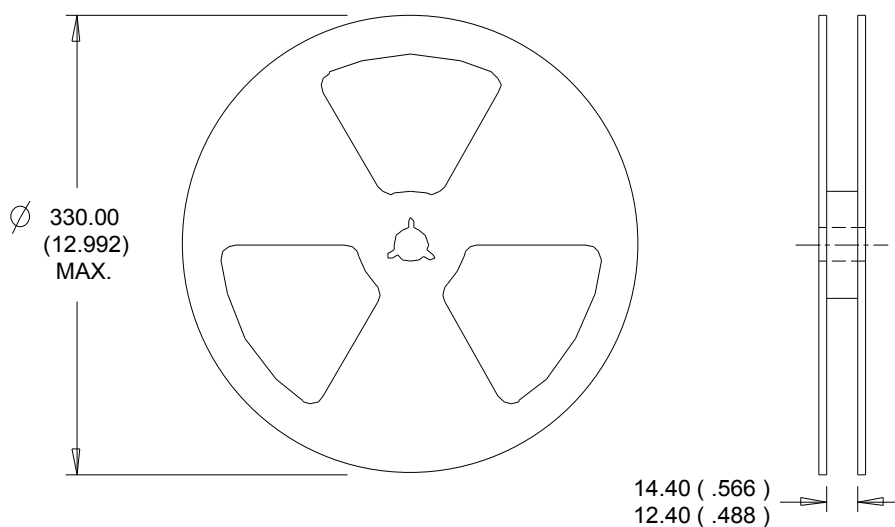
TERMINAL NUMBER 1

8.1 ( .318 )  
7.9 ( .312 )

12.3 ( .484 )  
11.7 ( .461 )

FEED DIRECTION

1. CONTROLLING DIMENSION : MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS(INCHES).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



1. CONTROLLING DIMENSION : MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

2015-11-16



**Qualification Information**

|                                   |                      |                                                                                                                                                                               |      |
|-----------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| <b>Qualification Level</b>        |                      | Automotive<br>(per AEC-Q101)                                                                                                                                                  |      |
|                                   |                      | Comments: This part number(s) passed Automotive qualification. Infineon's Industrial and Consumer qualification level is granted by extension of the higher Automotive level. |      |
| <b>Moisture Sensitivity Level</b> |                      | SO-8                                                                                                                                                                          | MSL1 |
| <b>ESD</b>                        | Machine Model        | Class M1B (+/- 100V) <sup>†</sup><br>AEC-Q101-002                                                                                                                             |      |
|                                   | Human Body Model     | Class H0 (+/- 250V) <sup>†</sup><br>AEC-Q101-001                                                                                                                              |      |
|                                   | Charged Device Model | Class C5 (+/- 2000V) <sup>†</sup><br>AEC-Q101-005                                                                                                                             |      |
| <b>RoHS Compliant</b>             |                      | Yes                                                                                                                                                                           |      |

† Highest passing voltage.

**Revision History**

| Date       | Comments                                                                                                                                 |
|------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 11/16/2015 | <ul style="list-style-type: none"> <li>Updated datasheet with corporate template</li> <li>Corrected ordering table on page 1.</li> </ul> |

**Published by**  
**Infineon Technologies AG**  
**81726 München, Germany**  
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