International
IOR Rectifier

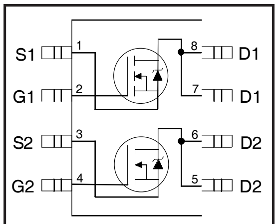
**AUTOMOTIVE MOSFET**

# AUIRF7341Q

HEXFET® Power MOSFET

## Features

- Advanced Planar Technology
- Ultra Low On-Resistance
- Dual N Channel MOSFET
- Surface Mount
- Available in Tape & Reel
- 175°C Operating Temperature
- Automotive [Q101] Qualified
- Lead-Free, RoHS Compliant



Top View

| | | |
|---|---|---|
| $V_{(BR)DSS}$ | | 55V |
| $R_{DS(on)}$ | typ. | 0.043Ω |
| | max. | 0.050Ω |
| $I_D$ | | 5.1A |


SO-8

| G | D | S |
|---|---|---|
| Gate | Drain | Source |

## Description

Specifically designed for Automotive applications, these HEXFET® Power MOSFET's in a Dual SO-8 package utilize the lastest processing techniques to achieve extremely low on-resistance per silicon area. Additional features of these Automotive qualified HEXFET Power MOSFET's are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These benefits combine to make this design an extremely efficient and reliable device for use in Automotive applications and a wide variety of other applications.
The efficient SO-8 package provides enhanced thermal characteristics and dual MOSFET die capability making it ideal in a variety of power applications. This dual, surface mount SO-8 can dramatically reduce board space and is also available in Tape & Reel.

## 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 ($T_A$) is 25°C, unless otherwise specified.

| | Parameter | Max. | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 55 | V |
| $I_D$ @ $T_A$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V | 5.1 | A |
| $I_D$ @ $T_A$ = 70°C | Continuous Drain Current, $V_{GS}$ @ 10V | 4.2 | |
| $I_{DM}$ | Pulsed Drain Current ① | 42 | |
| $P_D$ @$T_A$ = 25°C | Power Dissipation③ | 2.4 | W |
| $P_D$ @$T_A$ = 70°C | Power Dissipation③ | 1.7 | |
| | Linear Derating Factor | 16 | mW/°C |
| $V_{GS}$ | Gate-to-Source Voltage | ± 20 | V |
| $E_{AS}$ | Single Pulse Avalanche Energy② | 140 | mJ |
| $I_{AR}$ | Avalanche Current | 5.1 | A |
| $E_{AR}$ | Repetitive Avalanche Energy | See Fig. 16,17,14a, 14b | mJ |
| $T_J$<br>$T_{STG}$ | Operating Junction and<br>Storage Temperature Range | -55 to + 175 | °C |

### Thermal Resistance

| | Parameter | Max. | Units |
|---|---|---|---|
| $R_{\theta JA}$ | Junction-to-Ambient ④ | 62.5 | °C/W |

HEXFET® is a registered trademark of International Rectifier.
*****Qualification standards can be found at http://www.irf.com/



08/22/11

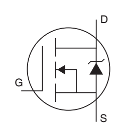
**Static Electrical Characteristics @ $T_J$ = 25°C (unless otherwise specified)**

| | 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 | —— | 0.052 | —— | V/°C | Reference to 25°C, $I_D$ = 1mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | —— | 0.043 | 0.050 | Ω | $V_{GS}$ = 10V, $I_D$ = 5.1A ③ |
| | | —— | 0.056 | 0.065 | | $V_{GS}$ = 4.5V, $I_D$ = 4.42A③ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 1.0 | —— | 3.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| gfs | Forward Transconductance | 10.4 | —— | —— | S | $V_{DS}$ = 10V, $I_D$ = 5.2A |
| $I_{DSS}$ | Drain-to-Source Leakage Current | —— | —— | 2.0 | μA | $V_{DS}$ = 44V, $V_{GS}$ = 0V |
| | | —— | —— | 25 | | $V_{DS}$ = 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 |

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

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge | —— | 29 | 44 | nC | $I_D$ = 5.2A |
| $Q_{gs}$ | Gate-to-Source Charge | —— | 2.9 | 4.4 | | $V_{DS}$ = 44V |
| $Q_{gd}$ | Gate-to-Drain ("Miller") Charge | —— | 7.3 | 11 | | $V_{GS}$ = 10V |
| $t_{d(on)}$ | Turn-On Delay Time | —— | 9.2 | —— | ns | $V_{DD}$ = 28V |
| $t_r$ | Rise Time | —— | 7.7 | —— | | $I_D$ = 1.0A |
| $t_{d(off)}$ | Turn-Off Delay Time | —— | 31 | —— | | $R_G$ = 6.0Ω |
| $t_f$ | Fall Time | —— | 12.5 | —— | | $V_{GS}$ = 10V ③ |
| $C_{iss}$ | Input Capacitance | —— | 780 | —— | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | —— | 190 | —— | | $V_{DS}$ = 25V |
| $C_{rss}$ | Reverse Transfer Capacitance | —— | 66 | —— | | ƒ = 1.0MHz |

## Diode Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | —— | —— | 2.4 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | —— | —— | 42 | | |
| $V_{SD}$ | Diode Forward Voltage | —— | —— | 1.2 | V | $T_J$ = 25°C, $I_S$ = 2.6A, $V_{GS}$ = 0V ③ |
| $t_{rr}$ | Reverse Recovery Time | —— | 51 | 77 | ns | $T_J$ = 25°C, $I_F$ = 2.6A |
| $Q_{rr}$ | Reverse Recovery Charge | —— | 76 | 114 | nC | di/dt = 100A/μs ③ |



**Notes:**

① Repetitive rating; pulse width limited by max. junction temperature.
② $V_{DD}$ = 25V, starting $T_J$ = 25°C, L = 10.7mH, $R_G$ = 25Ω, $I_{AS}$ = 5.2A.
③ Pulse width ≤ 300μs; duty cycle ≤ 2%.
④ Surface mounted on FR-4 board, t ≤ 10sec.

## Qualification Information†

<table>
<tr><td colspan="2" rowspan="2">Qualification Level</td><td colspan="2">Automotive<br>(per AEC-Q101) ††</td></tr>
<tr><td colspan="2">Comments: This part number(s) passed Automotive qualification. IR's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.</td></tr>
<tr><td colspan="2">Moisture Sensitivity Level</td><td>SO-8</td><td>MSL1</td></tr>
<tr><td rowspan="3">ESD</td><td>Machine Model</td><td colspan="2">Class M2(+/-200V )†††<br>(per AEC-Q101-002)</td></tr>
<tr><td>Human Body Model</td><td colspan="2">Class H1A(+/-500V )†††<br>(per AEC-Q101-001)</td></tr>
<tr><td>Charged Device Model</td><td colspan="2">Class C5(+/-1125V )†††<br>(per AEC-Q101-005)</td></tr>
<tr><td colspan="2">RoHS Compliant</td><td colspan="2">Yes</td></tr>
</table>

† Qualification standards can be found at International Rectifier's web site: http//www.irf.com/

†† Exceptions (if any) to AEC-Q101 requirements are noted in the qualification report.

††† Highest passing voltage

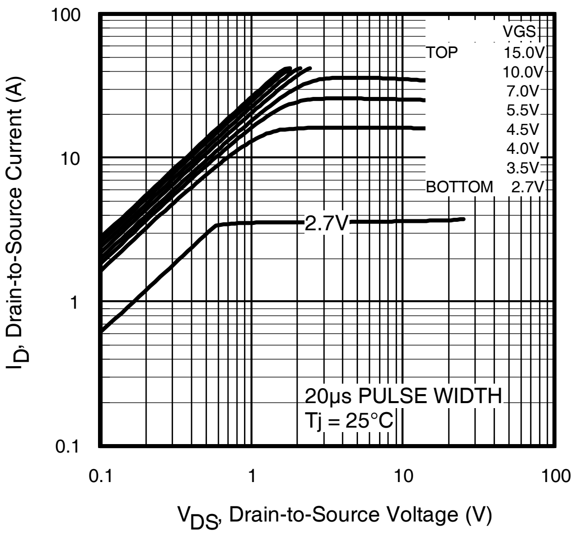



**Fig 1.** Typical Output Characteristics

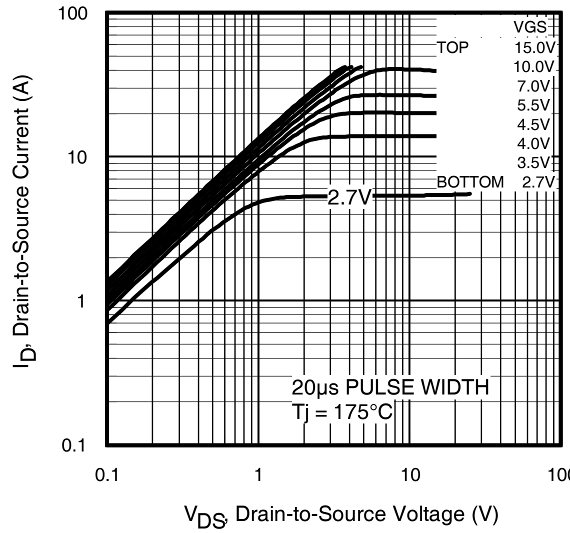



**Fig 2.** Typical Output Characteristics

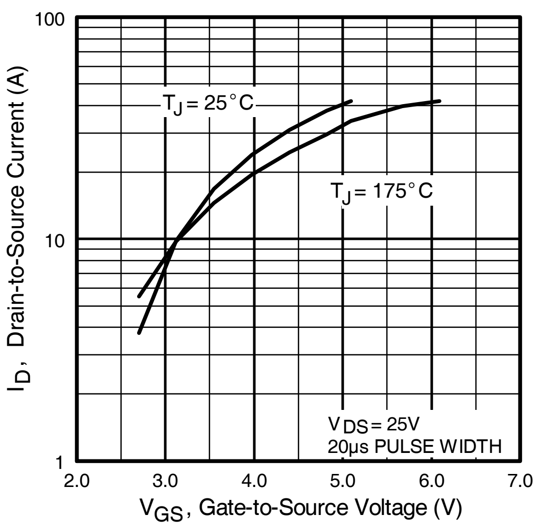



**Fig 3.** Typical Transfer Characteristics

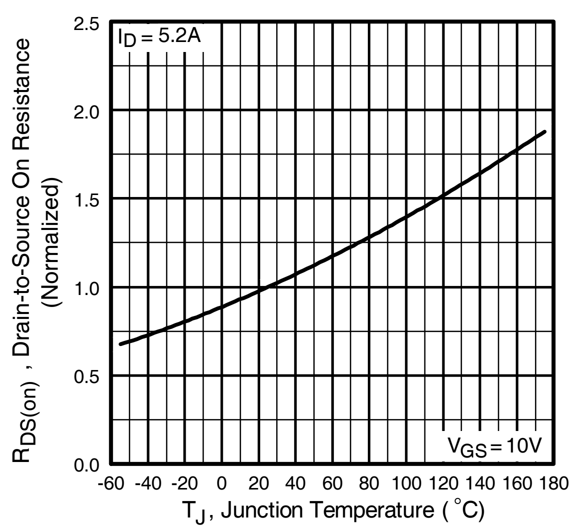



**Fig 4.** Normalized On-Resistance Vs. Temperature

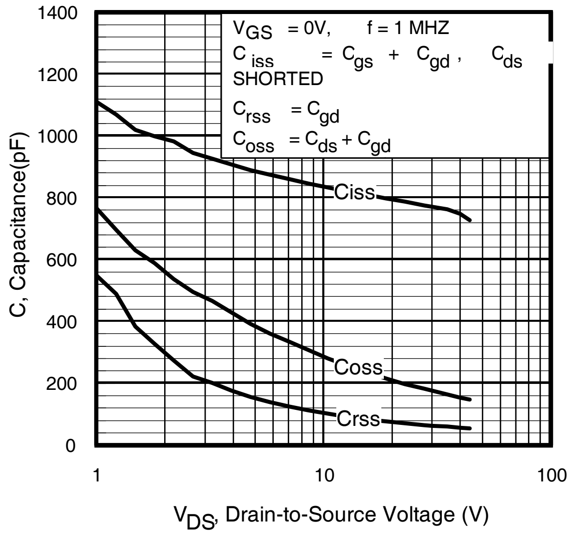



**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage

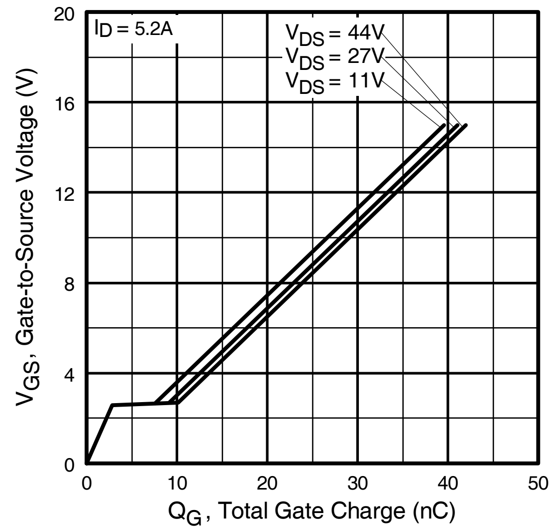



**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage

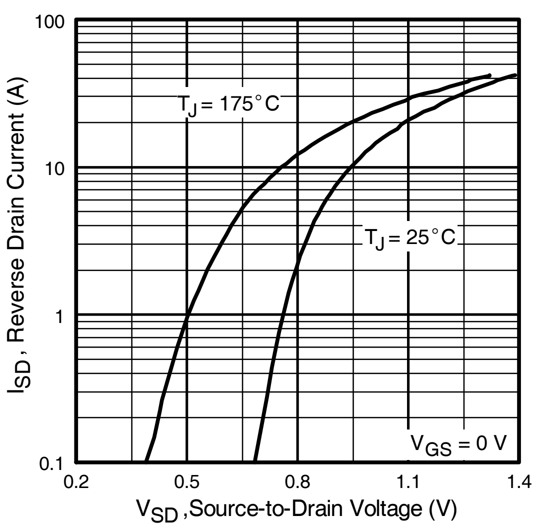



**Fig 7.** Typical Source-Drain Diode Forward Voltage

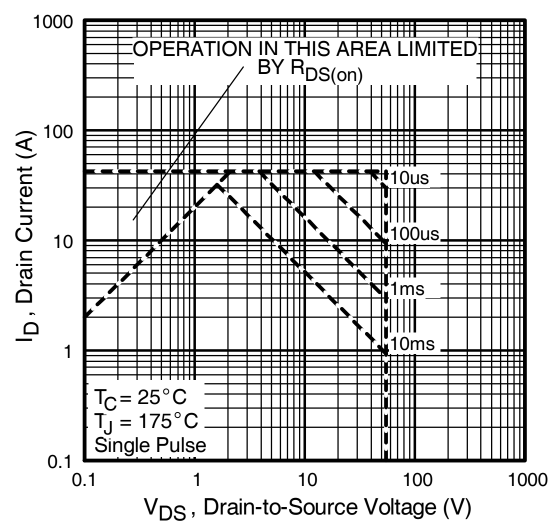



**Fig 8.** Maximum Safe Operating Area

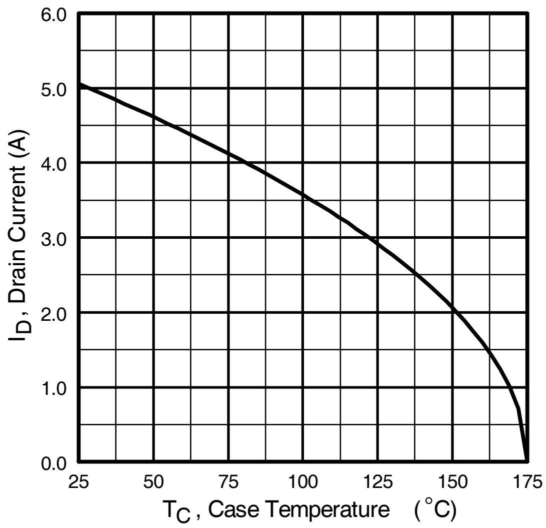



**Fig 9.** Maximum Drain Current Vs. Case Temperature

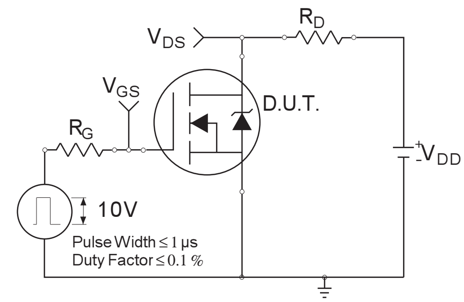



**Fig 10a.** Switching Time Test Circuit

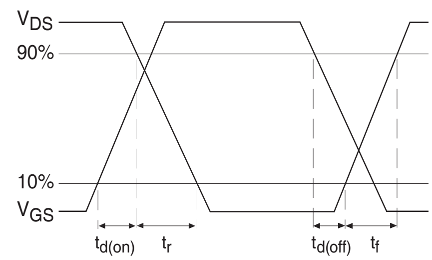



**Fig 10b.** Switching Time Waveforms

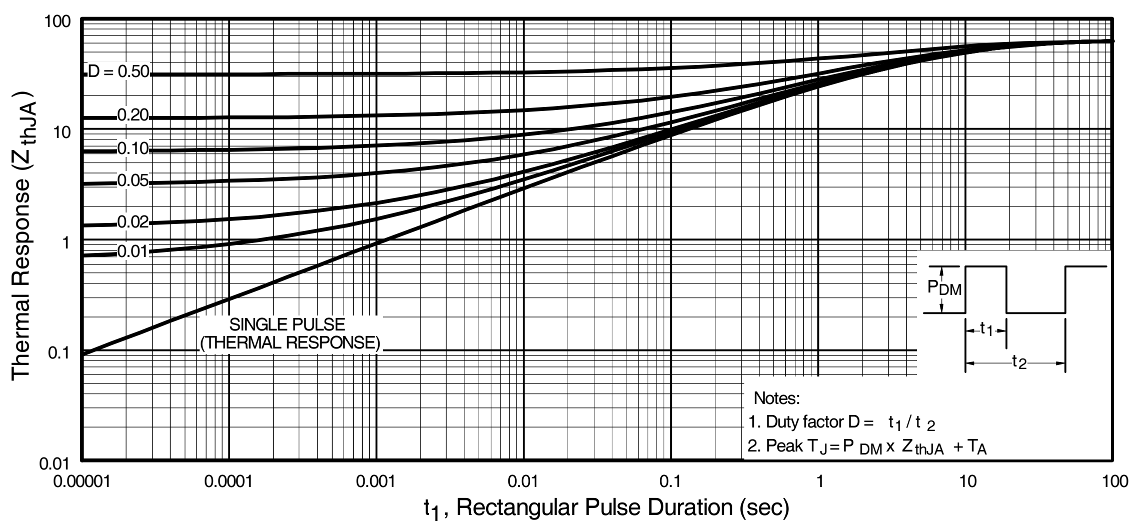



**Fig 10.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

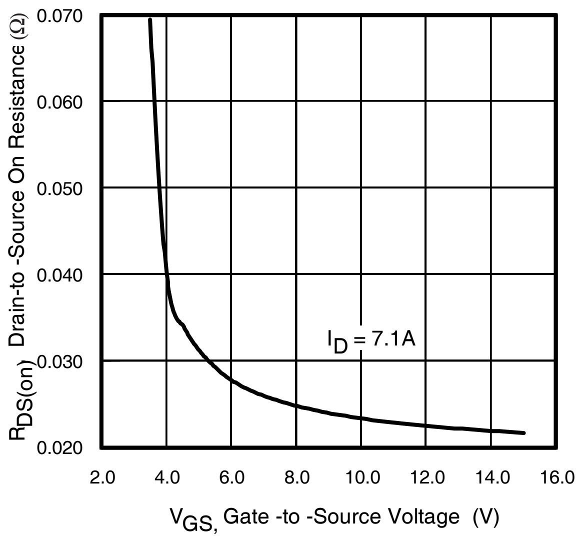



**Fig 11.** Typical On-Resistance Vs. Gate Voltage

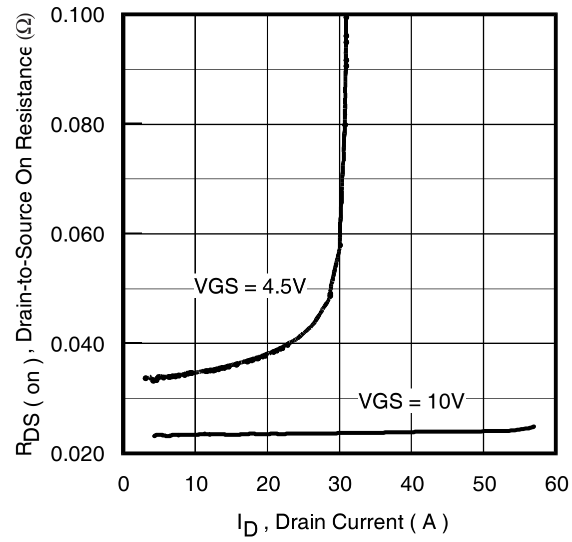



**Fig 12.** Typical On-Resistance Vs. Drain Current

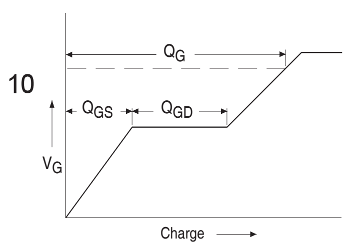



**Fig 13a.** Basic Gate Charge Waveform

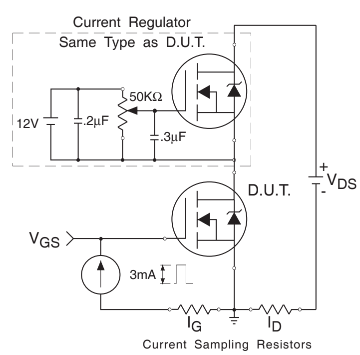



**Fig 13b.** Gate Charge Test Circuit

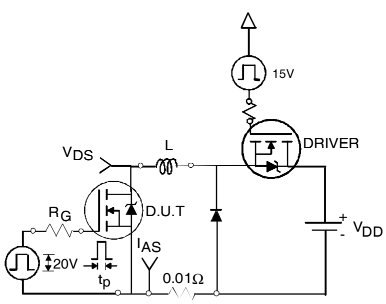



**Fig 14a.** Unclamped Inductive Test Circuit

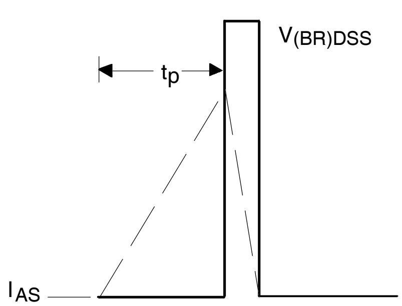



**Fig 14b.** Unclamped Inductive Waveforms

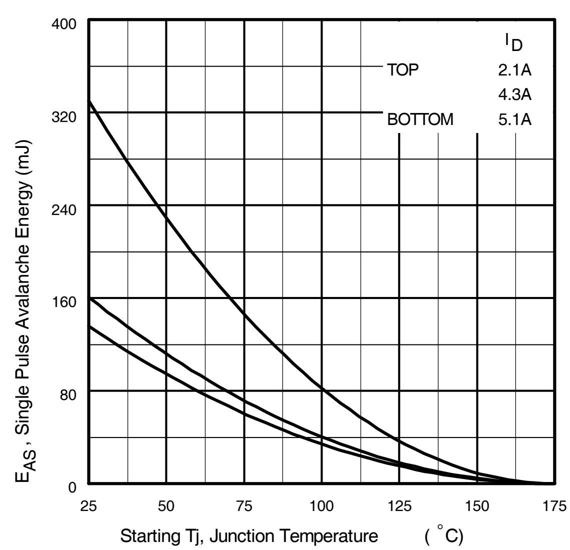



**Fig 15.** Maximum Avalanche Energy Vs. Drain Current

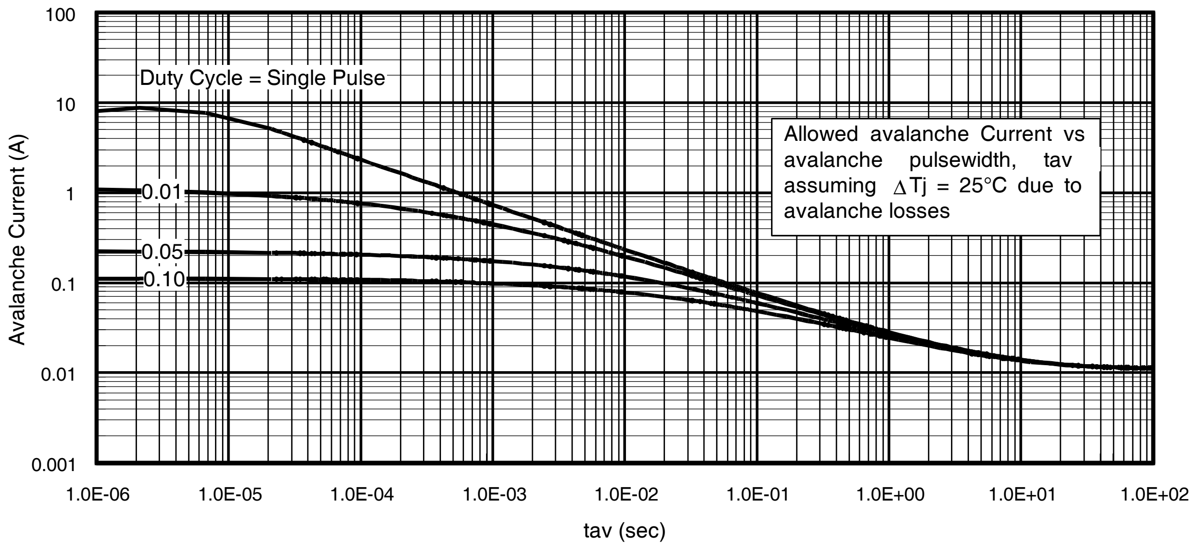



**Fig 16.** Typical Avalanche Current Vs.Pulsewidth

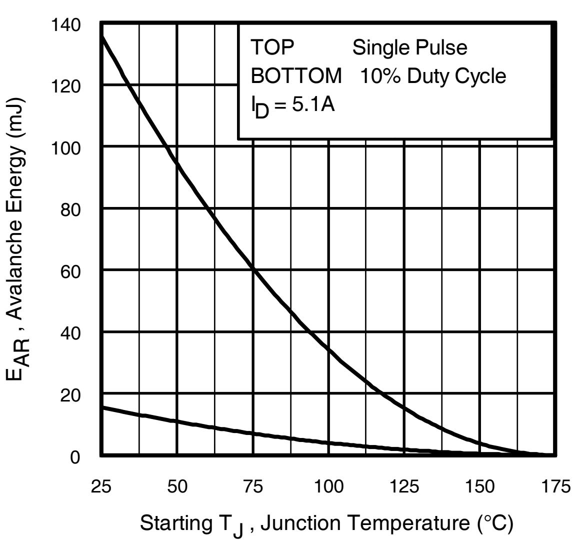



**Fig 17.** Maximum Avalanche Energy Vs. Temperature

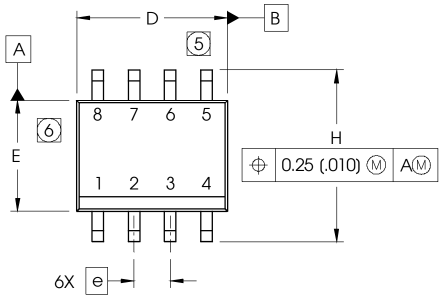
**Notes on Repetitive Avalanche Curves , Figures 16, 17:**
**(For further info, see AN-1005 at www.irf.com)**

1. Avalanche failures assumption:
   Purely a thermal phenomenon and failure occurs at a temperature far in excess of $T_{jmax}$. This is validated for every part type.
2. Safe operation in Avalanche is allowed as long as $T_{jmax}$ is not exceeded.
3. Equation below based on circuit and waveforms shown in Figures 14a, 14b.
4. $P_{D\ (ave)}$ = Average power dissipation per single avalanche pulse.
5. BV = Rated breakdown voltage (1.3 factor accounts for voltage increase during avalanche).
6. $I_{av}$ = Allowable avalanche current.
7. $\Delta T$ = Allowable rise in junction temperature, not to exceed $T_{jmax}$ (assumed as 25°C in Figure 15, 16).
   $t_{av}$ = Average time in avalanche.
   D = Duty cycle in avalanche = $t_{av} \cdot f$
   $Z_{thJC}(D, t_{av})$ = Transient thermal resistance, see figure 11)

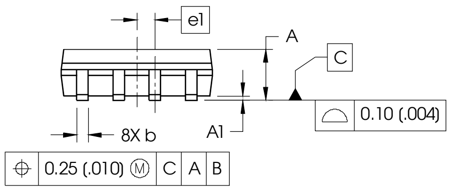
$$P_{D\ (ave)} = 1/2\ (1.3 \cdot BV \cdot I_{av}) = \Delta T / Z_{thJC}$$
$$I_{av} = 2\Delta T / [1.3 \cdot BV \cdot Z_{th}]$$
$$E_{AS\ (AR)} = P_{D\ (ave)} \cdot t_{av}$$

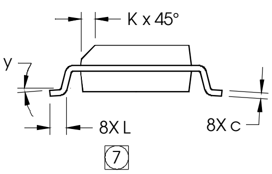
## SO-8 Package Outline

Dimensions are shown in millimeters (inches)




| DIM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | .0532 | .0688 | 1.35 | 1.75 |
| A1 | .0040 | .0098 | 0.10 | 0.25 |
| b | .013 | .020 | 0.33 | 0.51 |
| c | .0075 | .0098 | 0.19 | 0.25 |
| D | .189 | .1968 | 4.80 | 5.00 |
| E | .1497 | .1574 | 3.80 | 4.00 |
| e | .050 BASIC | | 1.27 BASIC | |
| e 1 | .025 BASIC | | 0.635 BASIC | |
| H | .2284 | .2440 | 5.80 | 6.20 |
| K | .0099 | .0196 | 0.25 | 0.50 |
| L | .016 | .050 | 0.40 | 1.27 |
| y | 0° | 8° | 0° | 8° |

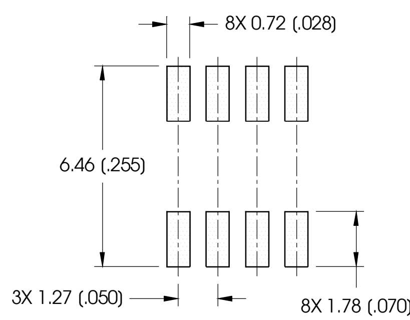


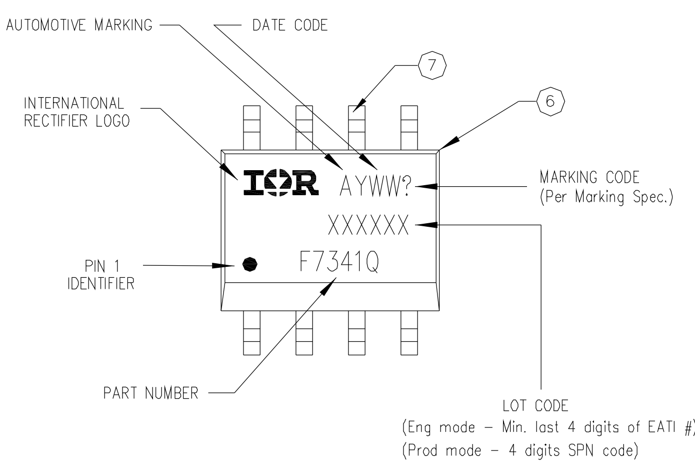

NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.010].
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT




## SO-8 Part Marking

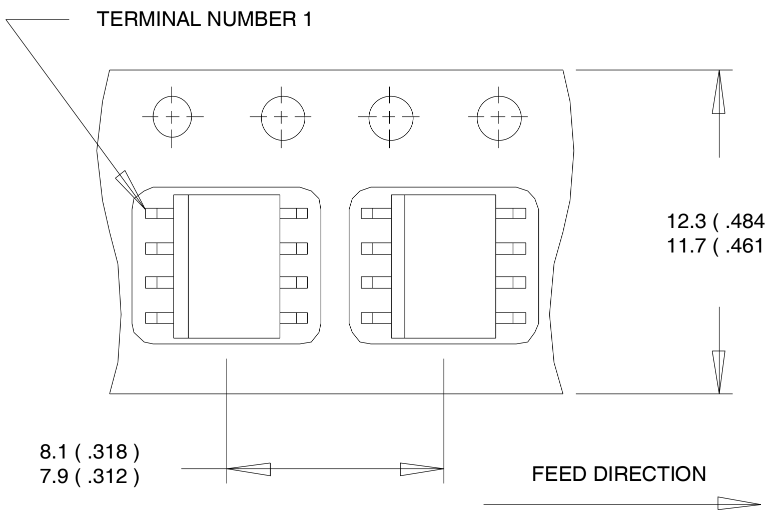



TOP MARKING (LASER)

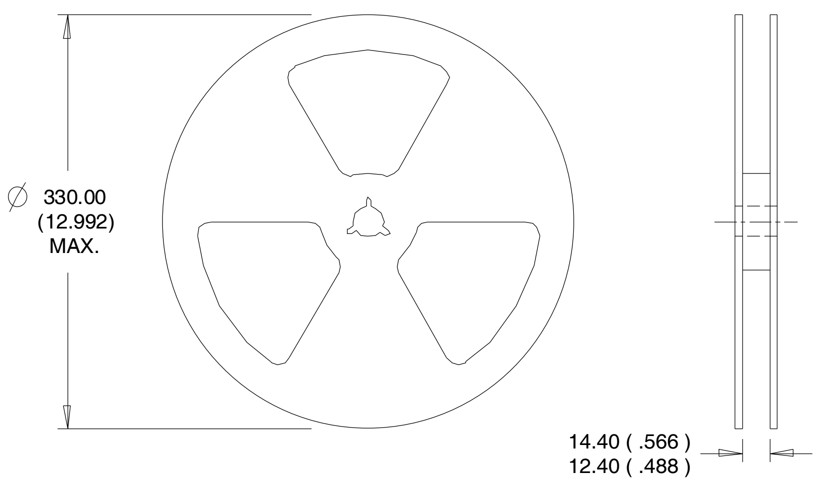
**Note: For the most current drawing please refer to IR website at http://www.irf.com/package/**

## SO-8 Tape and Reel

Dimensions are shown in millimeters (inches)




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




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

## Ordering Information

| Base part | Package Type | Standard Pack | | Complete Part Number |
|---|---|---|---|---|
| | | Form | Quantity | |
| AUIRF7341Q | SO-8 | Tube | 95 | AUIRF7341Q |
| | | Tape and Reel | 4000 | AUIRF7341QTR |

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IR products are neither designed nor intended for use in automotive applications or environments unless the specific IR products are designated by IR as compliant with ISO/TS 16949 requirements and bear a part number including the designation “AU”. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, IR will not be responsible for any failure to meet such requirements

For technical support, please contact IR’s Technical Assistance Center
http://www.irf.com/technical-info/

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Tel: (310) 252-7105