

# AUIRF7316Q

HEXFET® Power MOSFET

## Features

- Advanced Planar Technology
- Low On-Resistance
- Dual P Channel MOSFET
- Surface Mount
- Available in Tape & Reel
- 150°C Operating Temperature
- Automotive [Q101] Qualified
- Lead-Free, RoHS Compliant

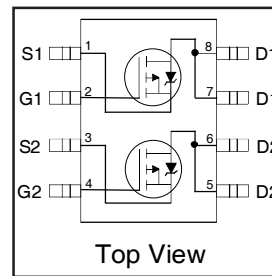
## Description

Specifically designed for Automotive applications, these HEXFET® Power MOSFET's in a Dual SO-8 package utilize the latest processing techniques to achieve extremely low on-resistance per silicon area. Additional features of these Automotive qualified HEXFET Power MOSFET's are a 150°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.

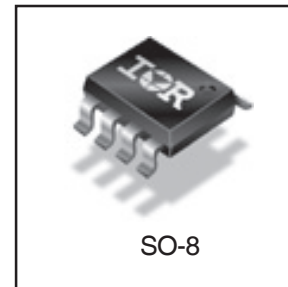
The efficient SO-8 package provides enhanced thermal characteristics and dual MOSFET die capability making it ideal in a variety of power applications. This dual, surface mount SO-8 can dramatically reduce board space and is also available in Tape & Reel.

## 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.



$V_{(BR)DSS}$		<b>-30V</b>
$R_{DS(on)}$ typ.		<b>0.042Ω</b>
	max.	<b>0.058Ω</b>
$I_D$		<b>-4.9A</b>



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

	Parameter	Max.	Units
$V_{DS}$	Drain-Source Voltage	-30	V
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V$ ⑤	-4.9	A
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V$ ⑤	-3.9	
$I_{DM}$	Pulsed Drain Current ①	-30	
$I_S$	Continuous Source Current (Diode Conduction)	-2.5	
$P_D @ T_A = 25^\circ\text{C}$	Power Dissipation ⑤	2.0	W
$P_D @ T_A = 70^\circ\text{C}$	Power Dissipation ⑤	1.3	
$V_{GS}$	Gate-to-Source Voltage	± 20	V
$E_{AS}$	Single Pulse Avalanche Energy	140	mJ
$I_{AR}$	Avalanche Current	-2.8	A
$E_{AR}$	Repetitive Avalanche Energy	0.20	mJ
dv/dt	Peak Diode Recovery dv/dt ③	-5.0	V/ns
$T_J$	Operating Junction and	-55 to + 150	°C
$T_{STG}$	Storage Temperature Range		

## Thermal Resistance

	Parameter	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient ⑤	62.5	°C/W

HEXFET® is a registered trademark of International Rectifier.

\*Qualification standards can be found at <http://www.irf.com/>

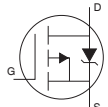
### Static Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-30	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.022	—	V/°C	Reference to $25^\circ\text{C}, I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	0.042	0.058	$\Omega$	$V_{GS} = -10V, I_D = -4.9A$ ④
		—	0.076	0.098		$V_{GS} = -4.5V, I_D = -3.6A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	-1.0	—	-3.0	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
$g_{fs}$	Forward Transconductance	—	7.7	—	S	$V_{DS} = -15V, I_D = -4.9A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	-1.0	$\mu A$	$V_{DS} = -24V, V_{GS} = 0V$
		—	—	-25		$V_{DS} = -24V, V_{GS} = 0V, T_J = 55^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = -20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = 20V$

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$Q_g$	Total Gate Charge	—	23	34	nC	$I_D = -4.9A$
$Q_{gs}$	Gate-to-Source Charge	—	3.8	5.7		$V_{DS} = -15V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	5.9	8.9		$V_{GS} = -10V$ , See Fig.10 ④
$t_{d(on)}$	Turn-On Delay Time	—	13	19	ns	$V_{DD} = -15V$
$t_r$	Rise Time	—	13	20		$I_D = -1.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	34	51		$R_G = 6.0\Omega$
$t_f$	Fall Time	—	32	48		$R_D = 15\Omega$ ④
$C_{iss}$	Input Capacitance	—	710	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	380	—		$V_{DS} = -25V$
$C_{rss}$	Reverse Transfer Capacitance	—	180	—		$f = 1.0\text{MHz}$ , 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	—	—	-30		
$V_{SD}$	Diode Forward Voltage	—	-0.78	-1.0	V	$T_J = 25^\circ\text{C}, I_S = -1.7A, V_{GS} = 0V$ ④
$t_{rr}$	Reverse Recovery Time	—	44	66	ns	$T_J = 25^\circ\text{C}, I_F = -1.7A$
$Q_{rr}$	Reverse Recovery Charge	—	42	63	nC	$di/dt = 100A/\mu s$ ⑤

### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 35\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = -2.8A$ .
- ③  $I_{SD} \leq -2.8A$ ,  $di/dt \leq 150A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$
- ④ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
- ⑤ Surface mounted on FR-4 board,  $t \leq 10\text{sec}$ .

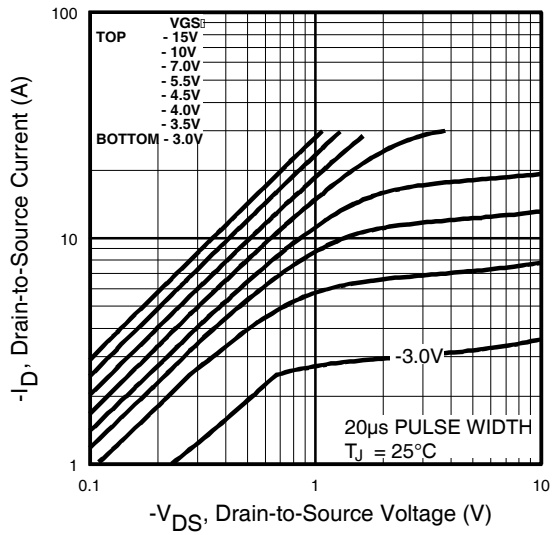
**Qualification Information<sup>†</sup>**

<b>Qualification Level</b>		Automotive (per AEC-Q101) <sup>††</sup>	
		Comments: This part number(s) passed Automotive qualification. IR'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 M2(+/- 200V) <sup>†††</sup> (per AEC-Q101-002)	
	Human Body Model	Class H1A(+/- 500V) <sup>†††</sup> (per AEC-Q101-001)	
	Charged Device Model	Class C5(+/- 2000V) <sup>†††</sup> (per AEC-Q101-005)	
<b>RoHS Compliant</b>		Yes	

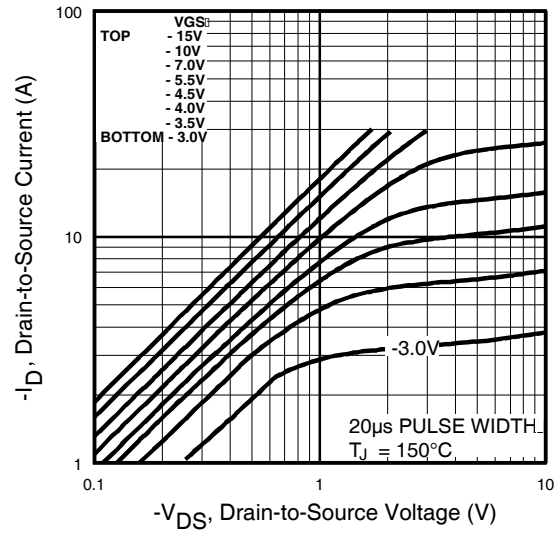
† Qualification standards can be found at International Rectifier's web site: <http://www.irf.com/>

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

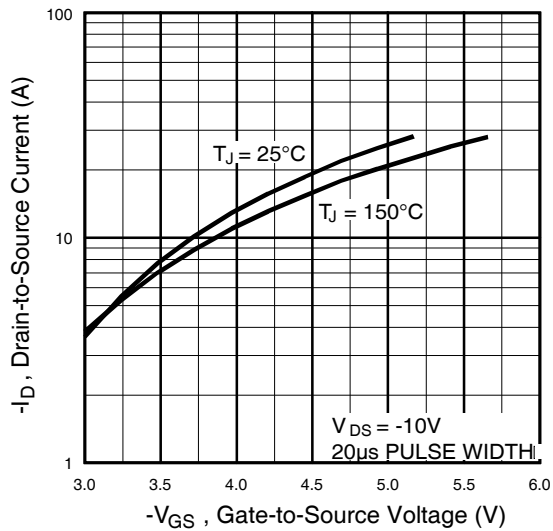
††† Highest passing voltage



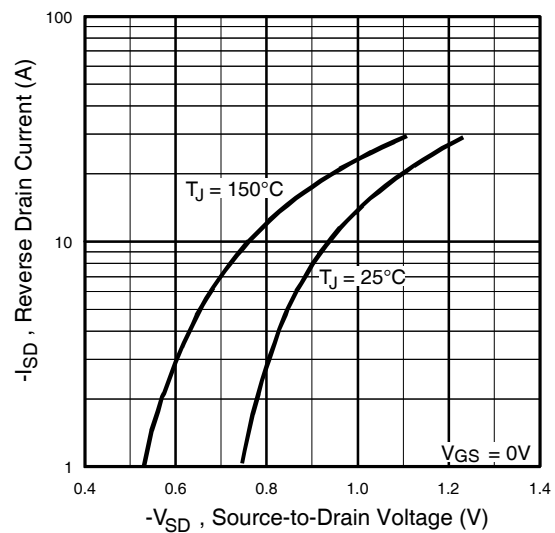
**Fig 1.** Typical Output Characteristics



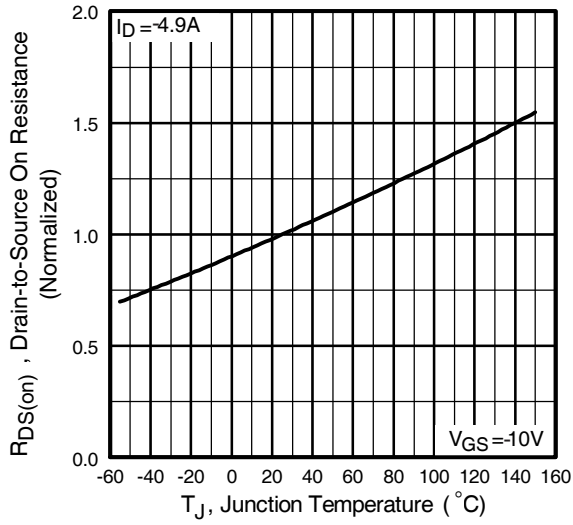
**Fig 2.** Typical Output Characteristics



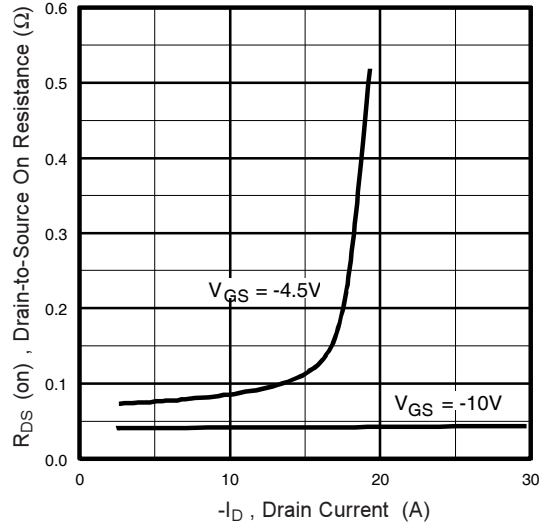
**Fig 3.** Typical Transfer Characteristics



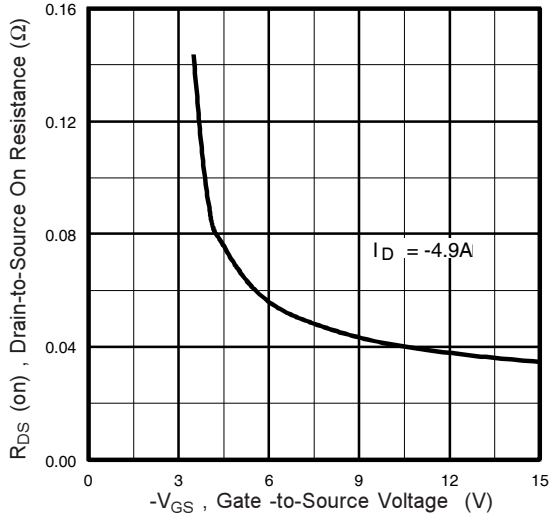
**Fig 4.** Typical Source-Drain Diode Forward Voltage



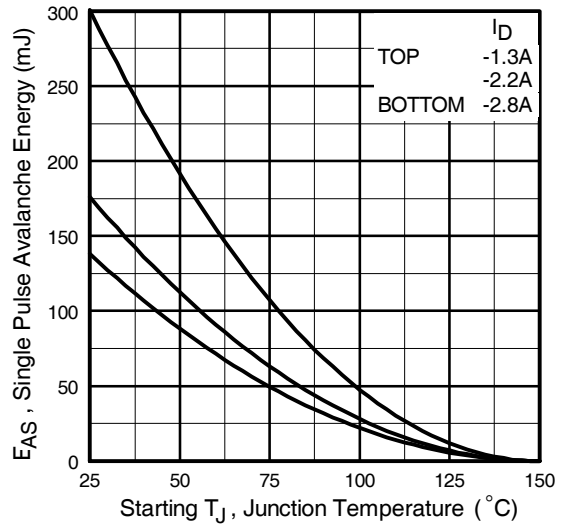
**Fig 5.** Normalized On-Resistance Vs. Temperature



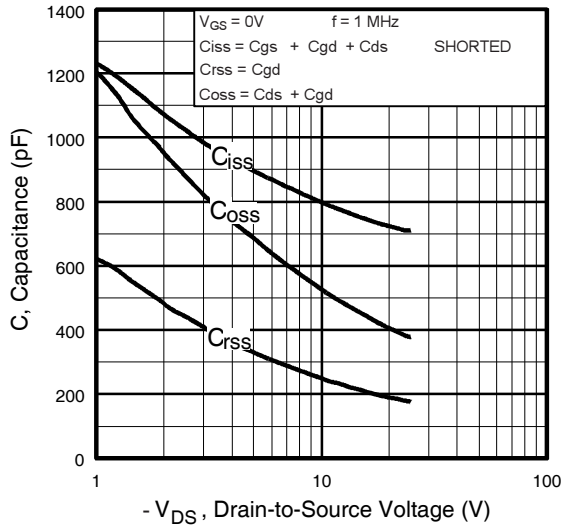
**Fig 6.** Typical On-Resistance Vs. Drain Current



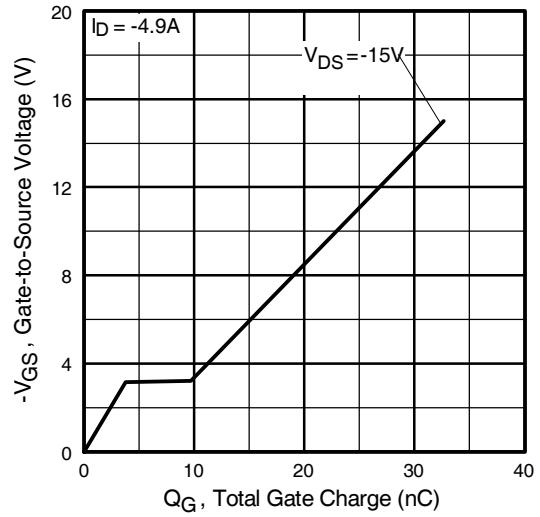
**Fig 7.** Typical On-Resistance Vs. Gate Voltage



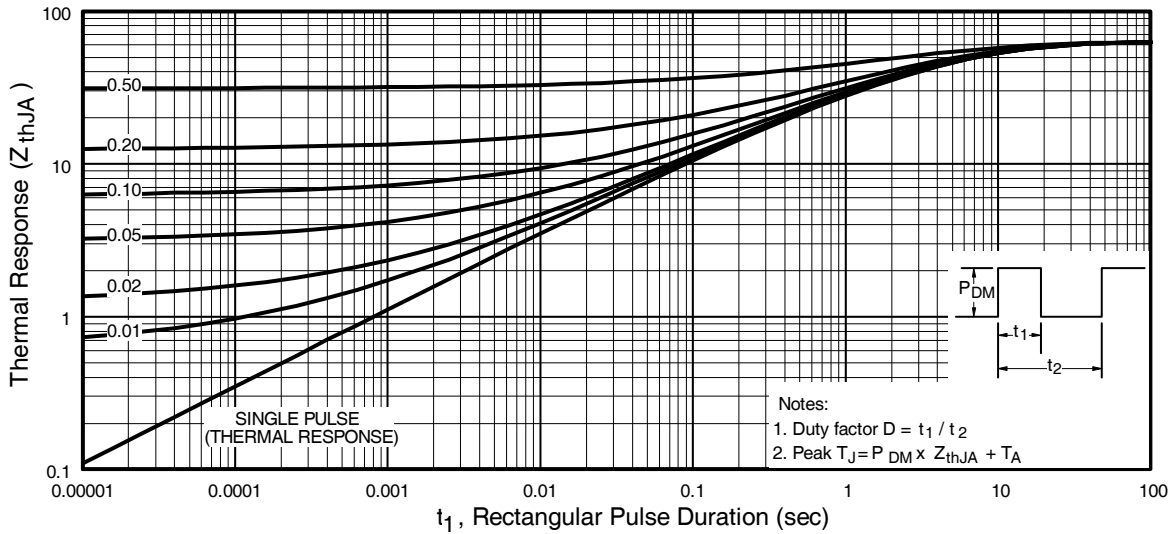
**Fig 8.** Maximum Avalanche Energy Vs. Drain Current



**Fig 9.** Typical Capacitance Vs. Drain-to-Source Voltage



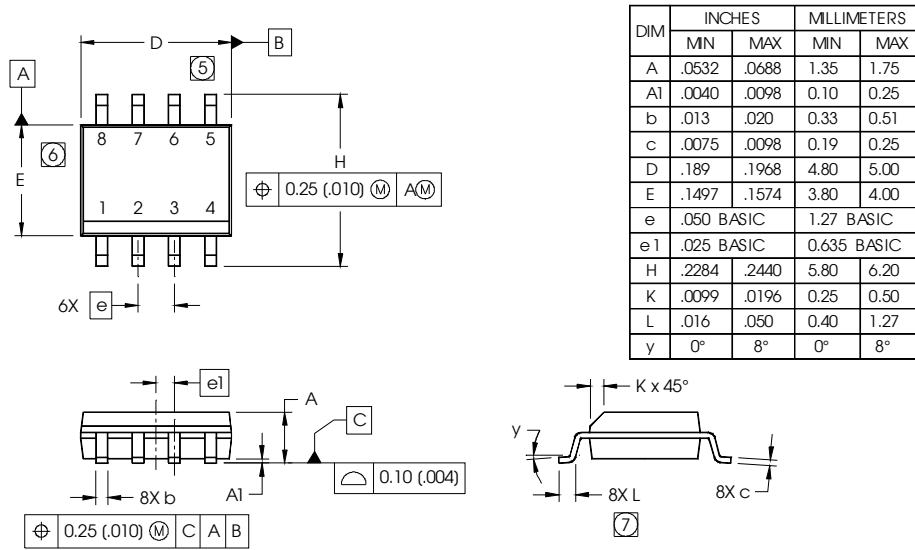
**Fig 10.** Typical Gate Charge Vs. Gate-to-Source Voltage



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

## SO-8 Package Outline

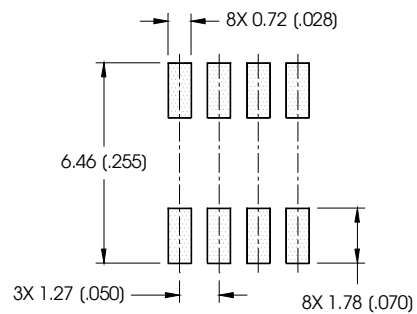
Dimensions are shown in millimeters (inches)



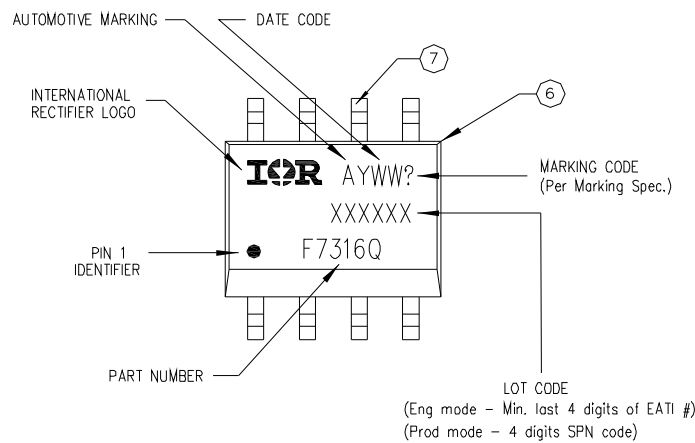
**NOTES:**

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

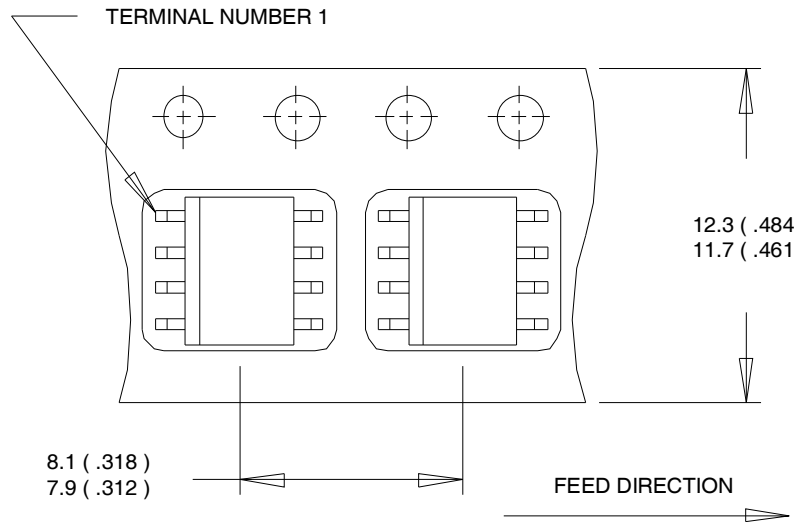


TOP MARKING (LASER)

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

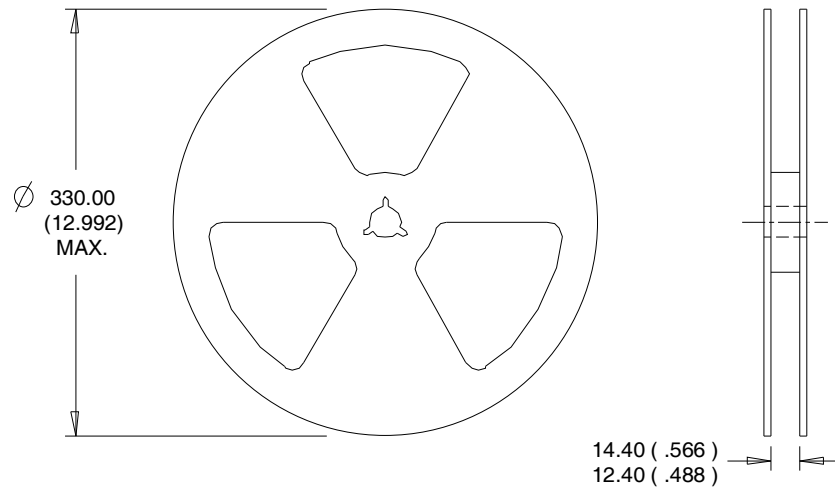
## SO-8 Tape and Reel

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	
AUIRF7316Q	SO-8	Tube	95	AUIRF7316Q
		Tape and Reel	4000	AUIRF7316QTR

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