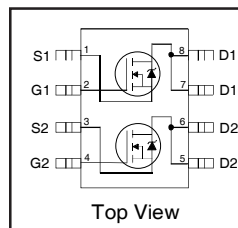


### Features

- Advanced Planar Technology
- Dual N Channel MOSFET
- Low On-Resistance
- Logic Level Gate Drive
- Dynamic  $dV/dt$  Rating
- 175°C Operating Temperature
- Fast Switching
- Lead-Free, RoHS Compliant
- Automotive Qualified\*

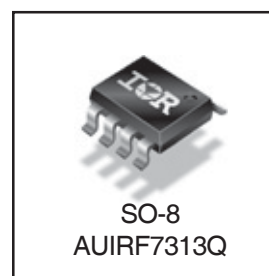


### HEXFET® Power MOSFET

$V_{(BR)DSS}$	30V
$R_{DS(on)}$ typ.	23mΩ
max.	29mΩ
$I_D$	6.9A

### 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.



Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
AUIRF7313Q	SO-8	Tube	95	AUIRF7313Q
		Tape and Reel	4000	AUIRF7313QTR

### 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	30	V
$I_D$ @ $T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	6.9	A
$I_D$ @ $T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	5.8	
$I_{DM}$	Pulsed Drain Current ①	58	
$P_D$ @ $T_A = 25^\circ\text{C}$	Power Dissipation	2.4	W
	Linear Derating Factor	0.02	W/°C
$V_{GS}$	Gate-to-Source Voltage	± 20	V
$E_{AS}$	Single Pulse Avalanche Energy②	450	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$ ③	3.6	V/ns
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to + 175	°C

### Thermal Resistance

	Parameter	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ⑤⑥	62.5	

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	—	0.03	—	V/°C	Reference to $25^\circ\text{C}$ , $I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	23	29	mΩ	$V_{GS} = 10V, I_D = 6.9A$ ④
		—	32	46		$V_{GS} = 4.5V, I_D = 5.5A$ 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	7.5	—	—	S	$V_{DS} = 15V, I_D = 3.5A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	1.0	μA	$V_{DS} = 24V, V_{GS} = 0V$
		—	—	25		$V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = -20V$

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

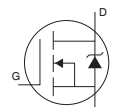
	Parameter	Min.	Typ.	Max.	Units	Conditions
$Q_g$	Total Gate Charge	—	22	33	nC	$I_D = 3.5A$
$Q_{gs}$	Gate-to-Source Charge	—	2.6	3.9		$V_{DS} = 15V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	6.8	10		$V_{GS} = 10V$ ④
$t_{d(on)}$	Turn-On Delay Time	—	3.7	—	ns	$V_{DD} = 15V$
$t_r$	Rise Time	—	7.3	—		$I_D = 3.5A$
$t_{d(off)}$	Turn-Off Delay Time	—	21	—		$R_G = 6.8\Omega$
$t_f$	Fall Time	—	11	—		$V_{GS} = 10V$ ④
$C_{iss}$	Input Capacitance	—	755	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	310	—		$V_{DS} = 25V$
$C_{rss}$	Reverse Transfer Capacitance	—	120	—		$f = 1.0\text{MHz}$

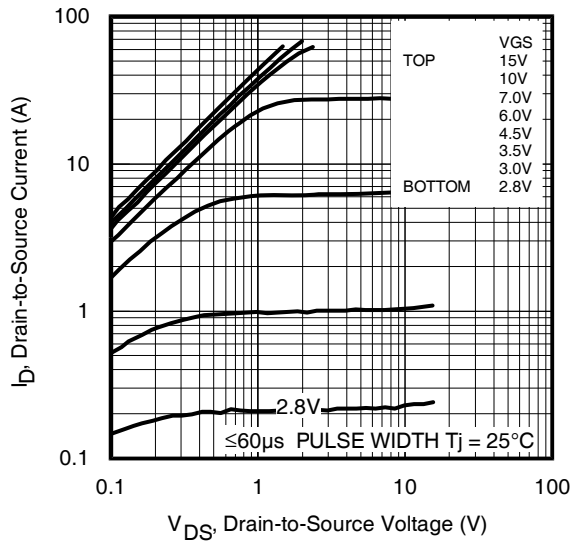
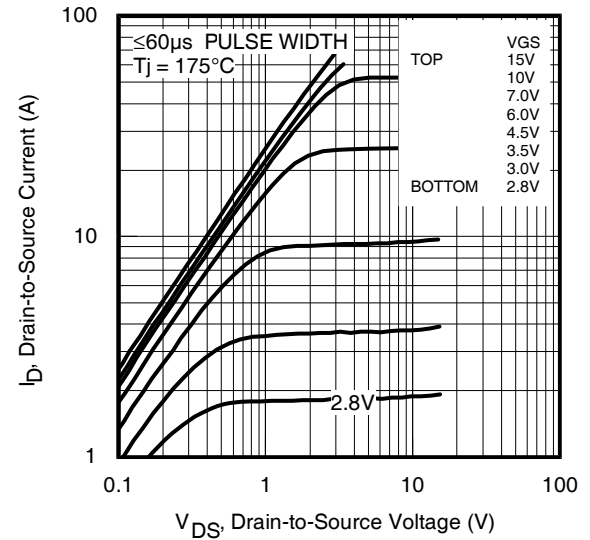
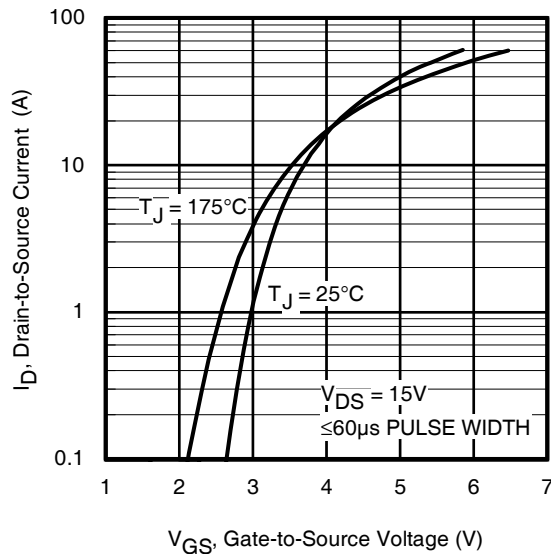
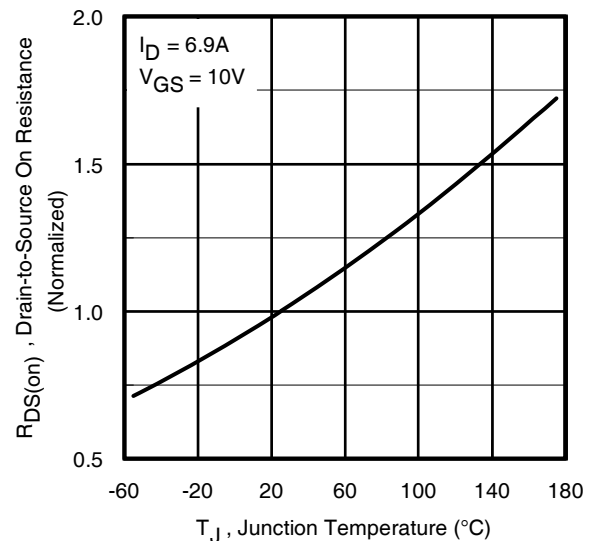
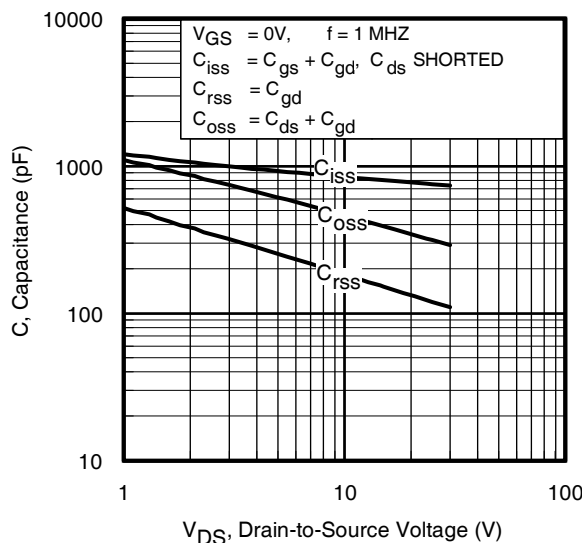
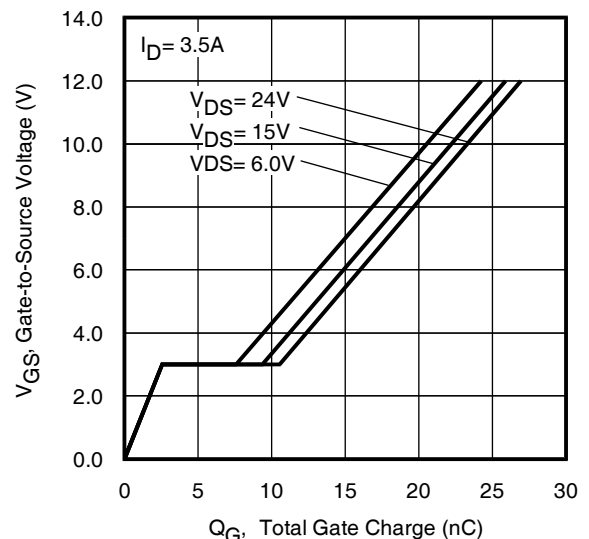
**Diode Characteristics**

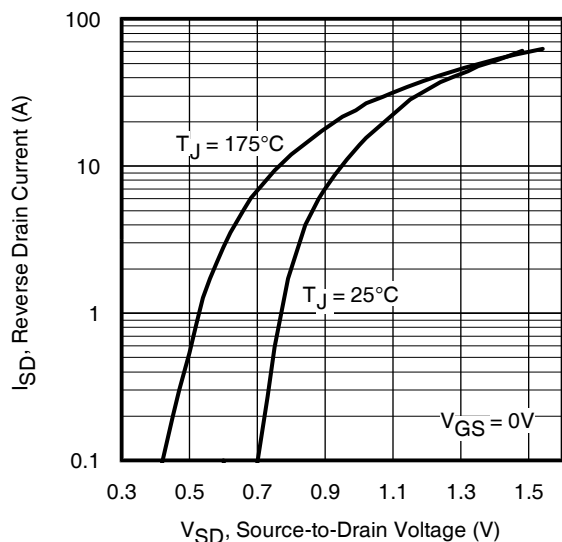
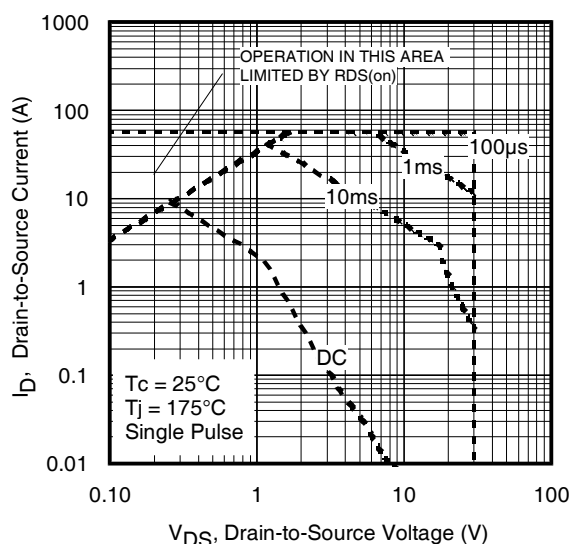
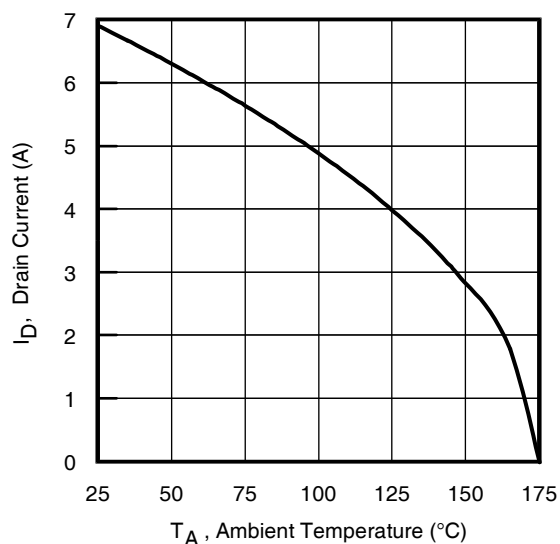
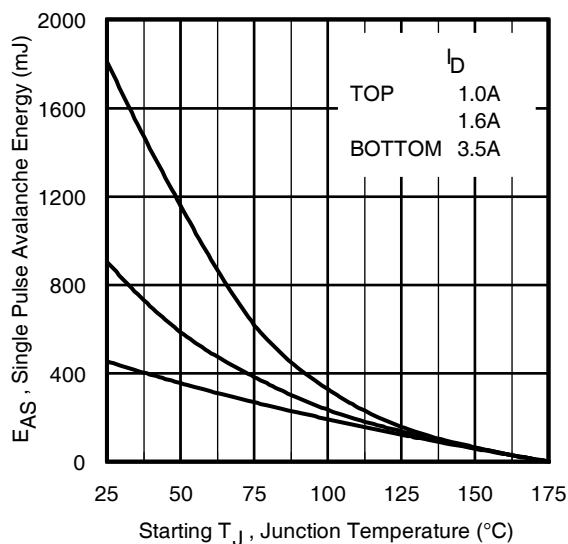
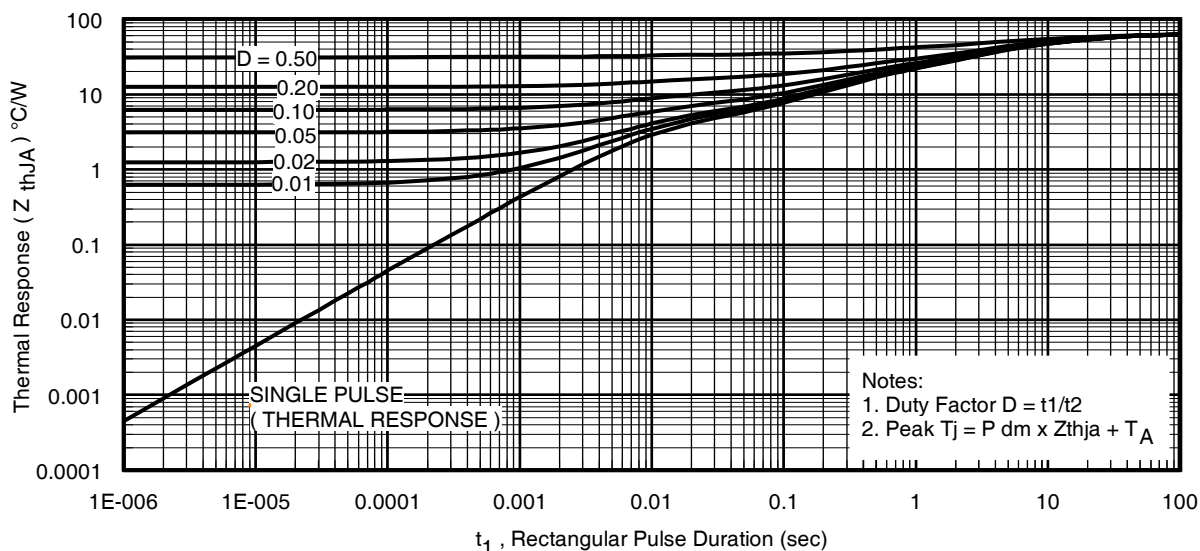
	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	3.0	A	MOSFET symbol showing the integral reverse p-n junction diode.
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	58		
$V_{SD}$	Diode Forward Voltage	—	—	1.0	V	$T_J = 25^\circ\text{C}, I_S = 3.5A, V_{GS} = 0V$ ④
$t_{rr}$	Reverse Recovery Time	—	27	40	ns	$T_J = 25^\circ\text{C}, I_F = 3.5A$
$Q_{rr}$	Reverse Recovery Charge	—	43	65	nC	$di/dt = 100A/\mu s$ ④

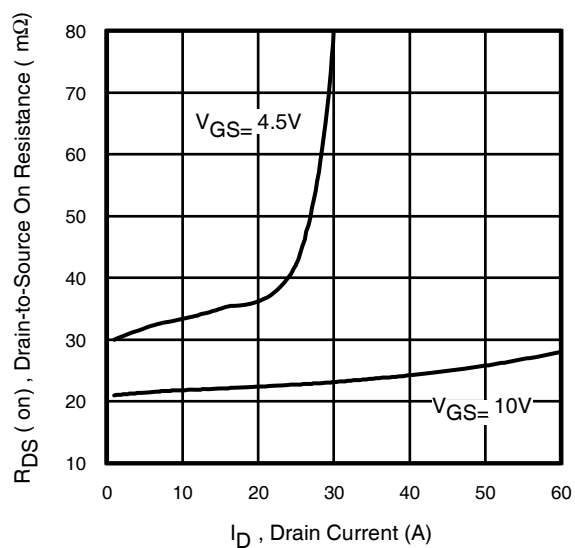
**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by  $T_{Jmax}$ , starting  $T_J = 25^\circ\text{C}$ ,  $L = 76\text{mH}$ ,  $R_G = 50\Omega$ ,  $I_{AS} = 3.5A$ ,  $V_{GS} = 10V$ . Part not recommended for use above this value.
- ③  $I_{SD} \leq 3.5A$ ,  $di/dt \leq 590A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 175^\circ\text{C}$ .
- ④ Pulse width  $\leq 400\mu s$ ; duty cycle  $\leq 2\%$ .
- ⑤ When mounted on 1 inch square copper board.
- ⑥  $R_{\theta}$  is measured at  $T_J$  of approximately  $90^\circ\text{C}$ .

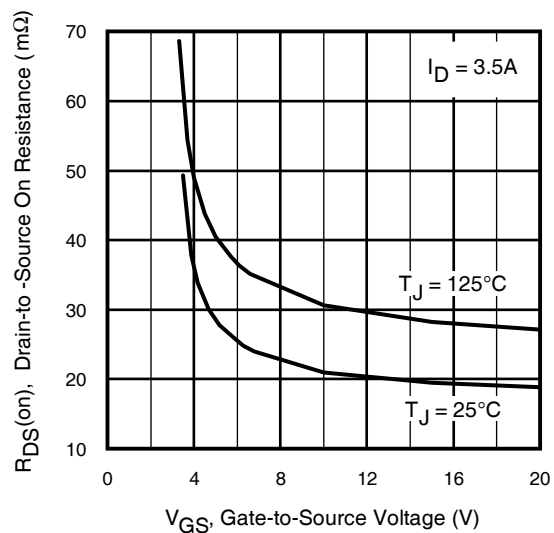



**Fig 1.** Typical Output Characteristics

**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

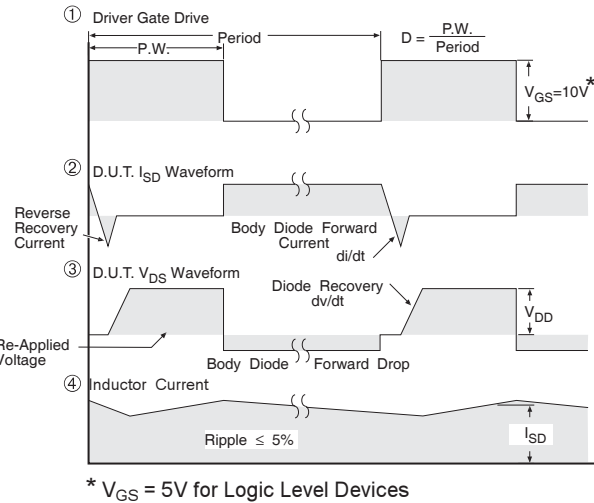
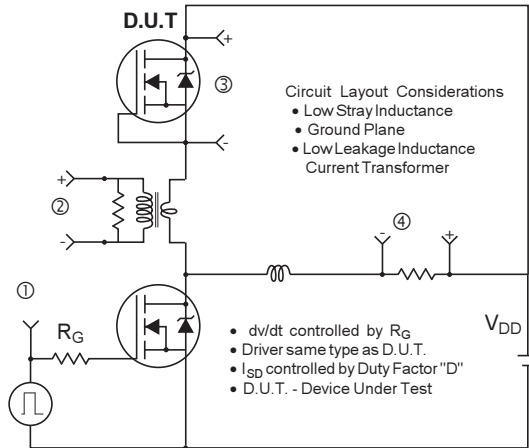

**Fig 7.** Typical Source-Drain Diode Forward Voltage

**Fig 8.** Maximum Safe Operating Area

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

**Fig 10.** Maximum Avalanche Energy vs. Drain Current

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



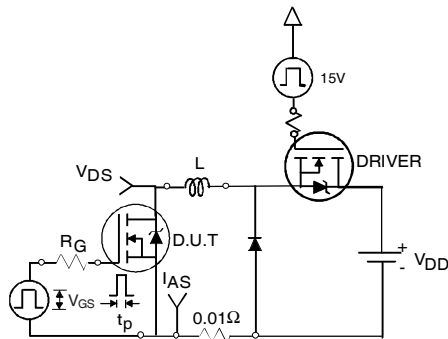
**Fig 12.** Typical On-Resistance Vs. Drain Current



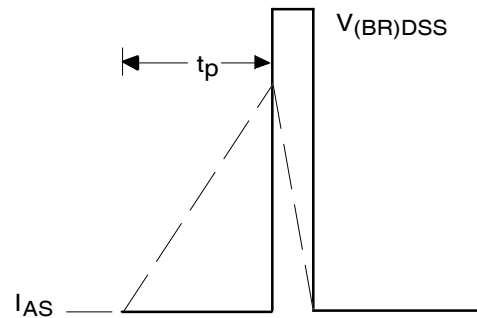
**Fig 13.** Typical On-Resistance Vs. Gate Voltage



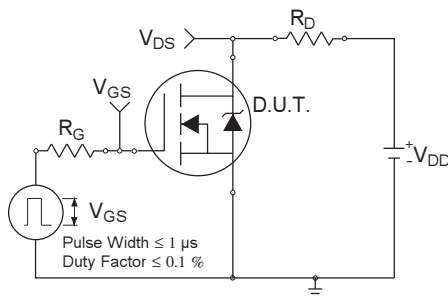
**Fig 14. Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET® Power MOSFETs**



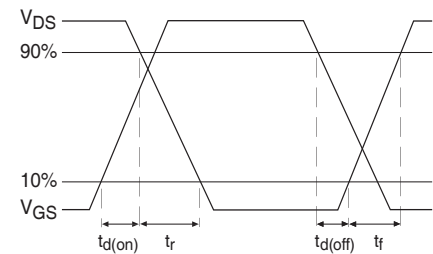
**Fig 15a. Unclamped Inductive Test Circuit**



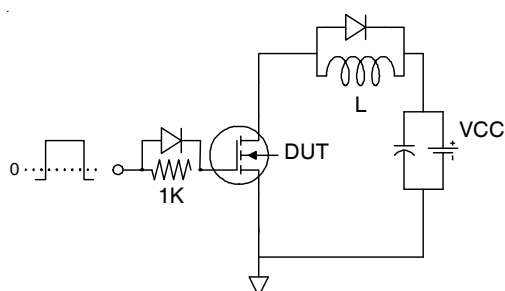
**Fig 15b. Unclamped Inductive Waveforms**



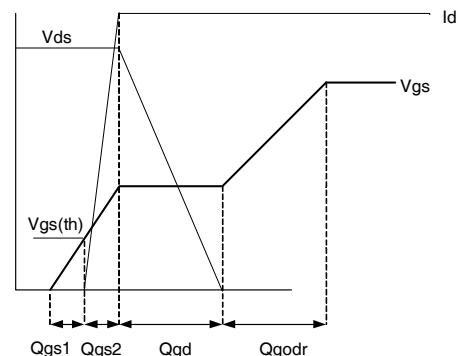
**Fig 16a. Switching Time Test Circuit**



**Fig 16b. Switching Time Waveforms**



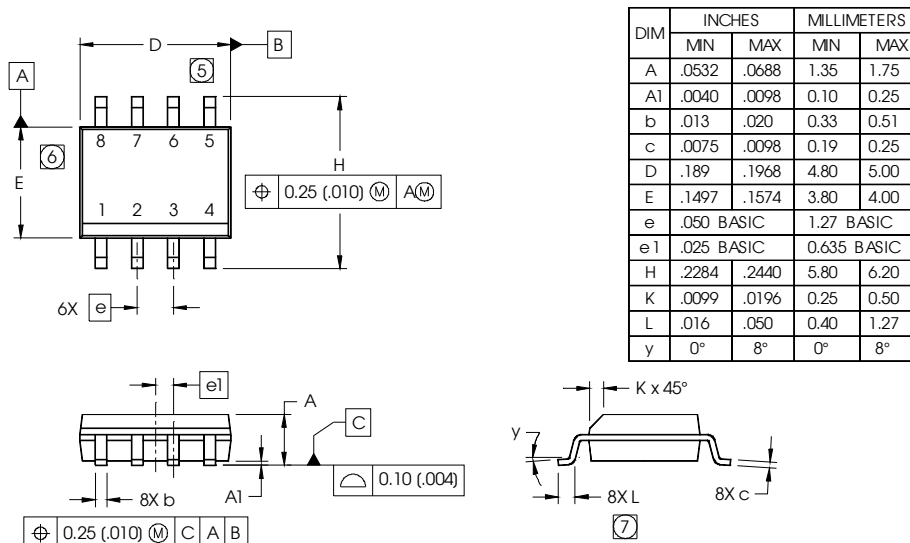
**Fig 17a. Gate Charge Test Circuit**



**Fig 17b. Gate Charge Waveform**

## SO-8 Package Outline

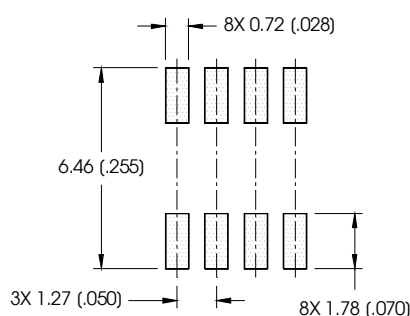
Dimensions are shown in millimeters (inches)



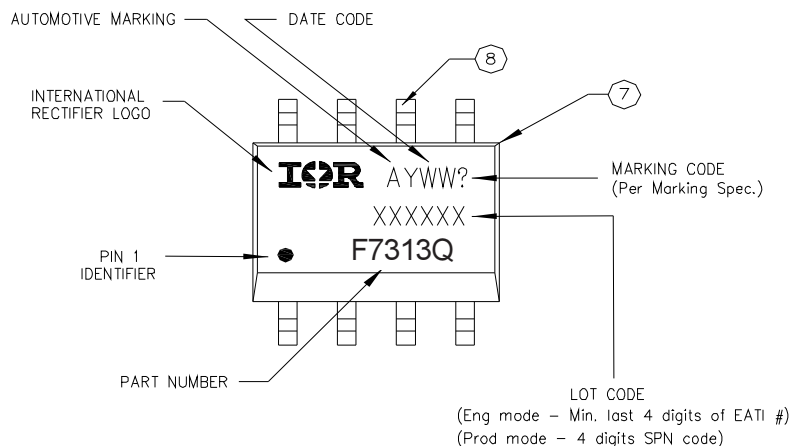
### NOTES:

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



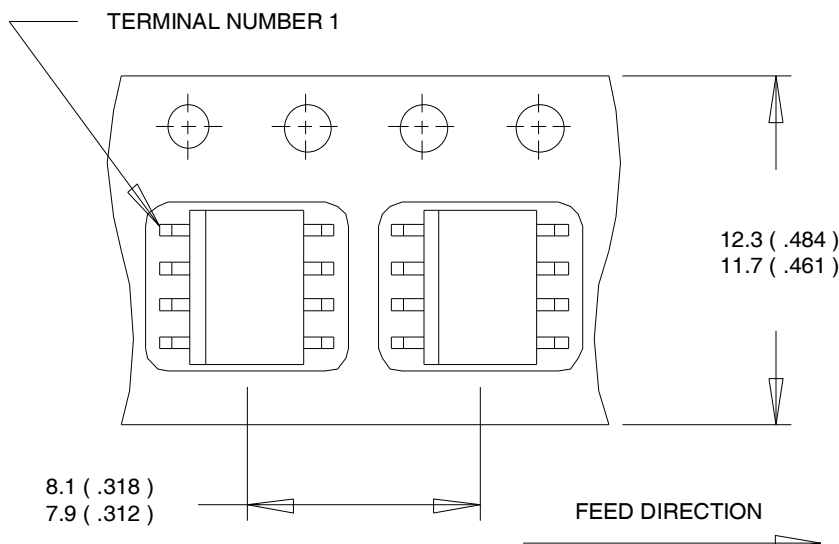
## SO-8 Part Marking



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

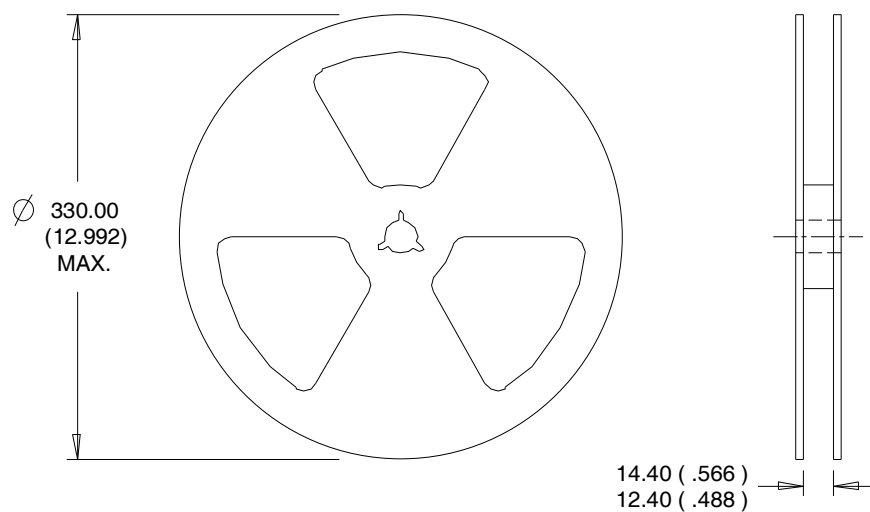
## SO-8 Tape and Reel

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.

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



## 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 M1B (+/- 100 V) <sup>†††</sup> AEC-Q101-002	
	Human Body Model	Class H1A (+/- 500 V) <sup>†††</sup> AEC-Q101-001	
	Charged Device Model	Class C5 (+/- 2000 V) <sup>†††</sup> AEC-Q101-005	
<b>RoHS Compliant</b>		Yes	

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

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

<sup>†††</sup> Highest passing voltage

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<http://www.irf.com/technical-info/>

### **WORLD HEADQUARTERS:**

101 N. Sepulveda Blvd., El Segundo, California 90245  
 Tel: (310) 252-7105

# Revision History

Date	Comments
3/27/2014	<ul style="list-style-type: none"> <li>Added "Logic Level Gate Drive" bullet in the features section on page 1</li> <li>Updated part marking on page 7</li> <li>Updated data sheet with new IR corporate template</li> </ul>