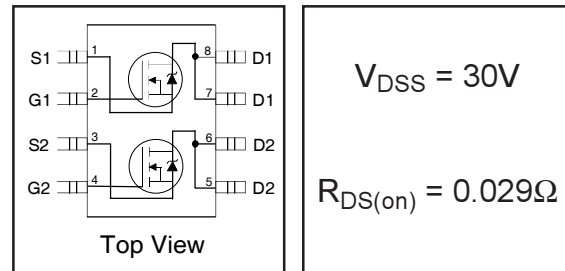


# IRF7313QPbF

HEXFET® Power MOSFET

- Advanced Process Technology
- Ultra Low On-Resistance
- Dual N- Channel MOSFET
- Surface Mount
- Available in Tape & Reel
- 150°C Operating Temperature
- Automotive [Q101] Qualified
- Lead-Free

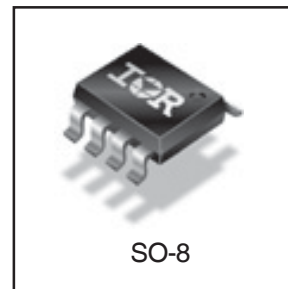


$V_{DSS} = 30V$   
 $R_{DS(on)} = 0.029\Omega$

## 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.



SO-8

## Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>①</sup>	$I_D$	$T_A = 25^\circ\text{C}$	A
		$T_A = 70^\circ\text{C}$	
Pulsed Drain Current	$I_{DM}$	30	
Continuous Source Current (Diode Conduction)	$I_S$	2.5	
Maximum Power Dissipation <sup>②</sup>	$P_D$	$T_A = 25^\circ\text{C}$	W
		$T_A = 70^\circ\text{C}$	
Single Pulse Avalanche Energy <sup>③</sup>	$E_{AS}$	82	mJ
Avalanche Current	$I_{AR}$	4.0	A
Repetitive Avalanche Energy	$E_{AR}$	0.20	mJ
Peak Diode Recovery $dv/dt$ <sup>③</sup>	$dv/dt$	5.8	V/ ns
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to + 150	$^\circ\text{C}$

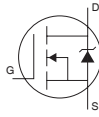
## Thermal Resistance Ratings

Parameter	Symbol	Limit	Units
Maximum Junction-to-Ambient <sup>①</sup>	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

## Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	0.022	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	0.023	0.029	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 5.8A ④
		—	0.032	0.046		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 4.7A ④
V <sub>GS(th)</sub>	Gate Threshold Voltage	1.0	—	—	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
g <sub>fs</sub>	Forward Transconductance	—	14	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 5.8A
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	1.0	μA	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V
		—	—	25		V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 55°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	100	nA	V <sub>GS</sub> = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V <sub>GS</sub> = -20V
Q <sub>g</sub>	Total Gate Charge	—	22	33	nC	I <sub>D</sub> = 5.8A
Q <sub>gs</sub>	Gate-to-Source Charge	—	2.6	3.9		V <sub>DS</sub> = 15V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge	—	6.4	9.6		V <sub>GS</sub> = 10V, See Fig. 10 ④
t <sub>d(on)</sub>	Turn-On Delay Time	—	8.1	12	ns	V <sub>DD</sub> = 15V
t <sub>r</sub>	Rise Time	—	8.9	13		I <sub>D</sub> = 1.0A
t <sub>d(off)</sub>	Turn-Off Delay Time	—	26	39		R <sub>G</sub> = 6.0Ω
t <sub>f</sub>	Fall Time	—	17	26		R <sub>D</sub> = 15Ω ④
C <sub>iss</sub>	Input Capacitance	—	650	—	pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance	—	320	—		V <sub>DS</sub> = 25V
C <sub>rss</sub>	Reverse Transfer Capacitance	—	130	—		f = 1.0MHz, See Fig. 9

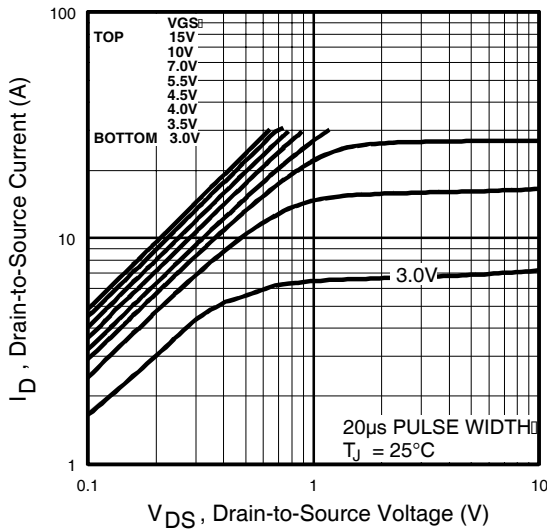
## Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	2.5	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	30		
V <sub>SD</sub>	Diode Forward Voltage	—	0.78	1.0	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 1.7A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	45	68	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 1.7A
Q <sub>rr</sub>	Reverse Recovery Charge	—	58	87	nC	di/dt = 100A/μs ③

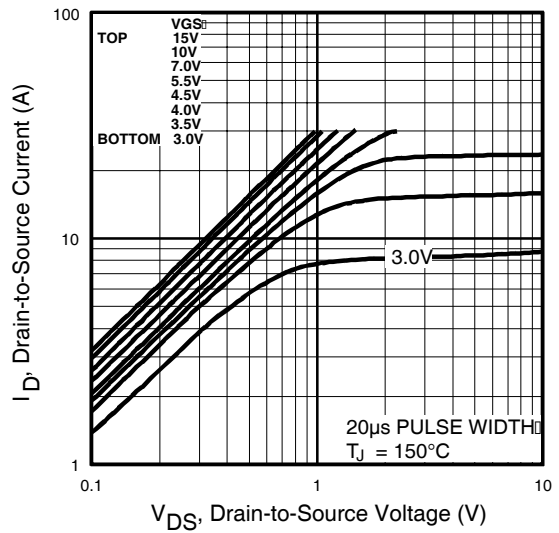
### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )
- ② Starting T<sub>J</sub> = 25°C, L = 10mH  
R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 4.0A.

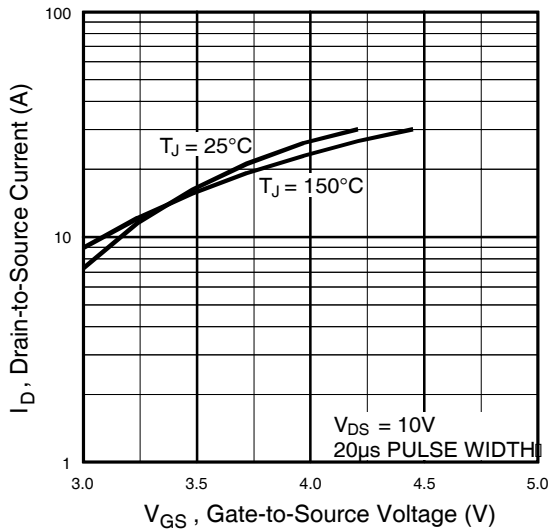
- ③ I<sub>SD</sub> ≤ 4.0A, di/dt ≤ 74A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 150°C
- ④ Pulse width ≤ 300μs; duty cycle ≤ 2%.
- ⑤ Surface mounted on FR-4 board, t ≤ 10sec.



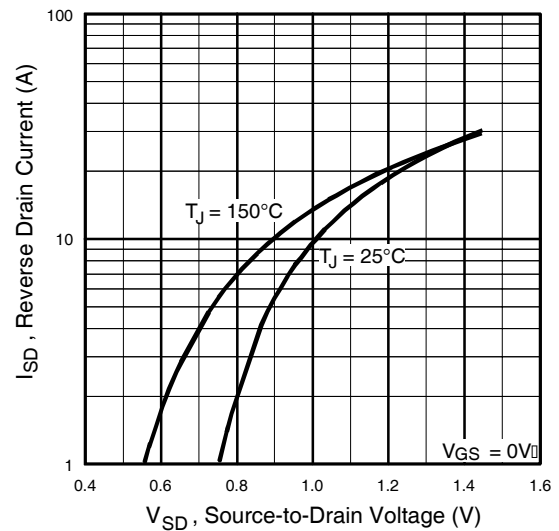
**Fig 1.** Typical Output Characteristics



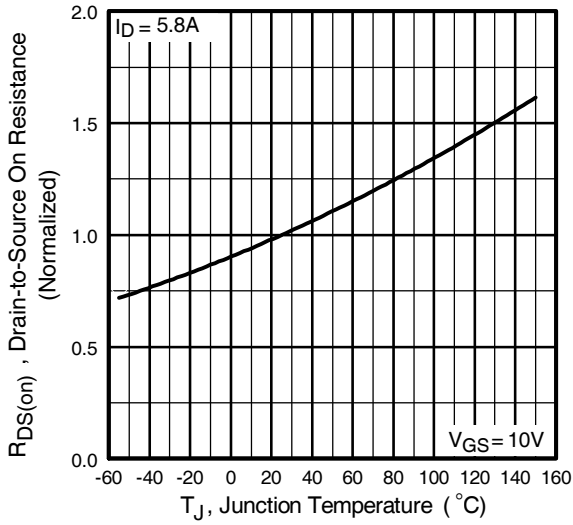
**Fig 2.** Typical Output Characteristics



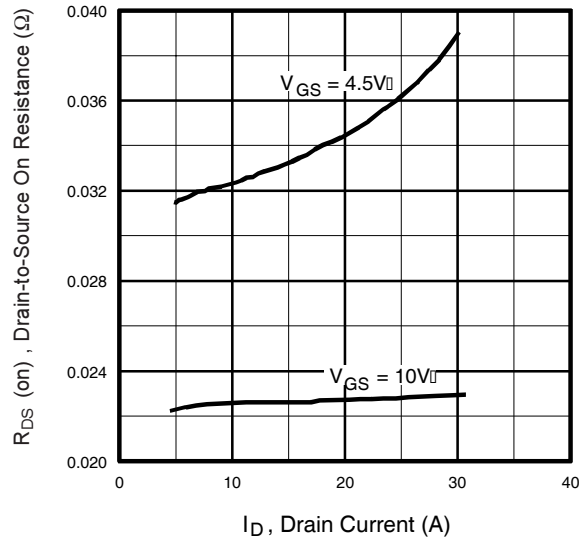
**Fig 3.** Typical Transfer Characteristics



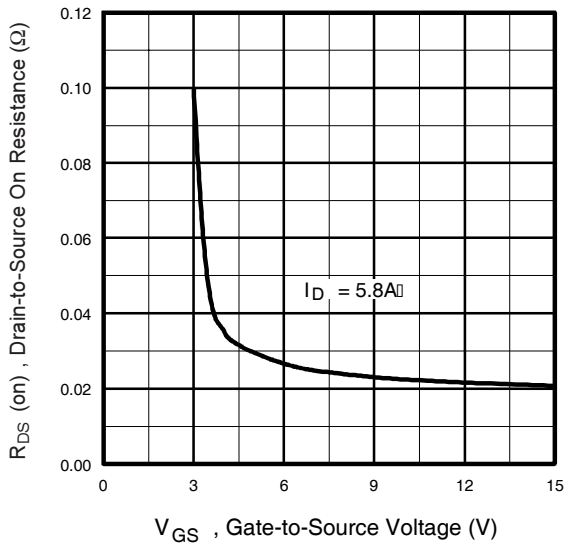
**Fig 4.** Typical Source-Drain Diode Forward Voltage



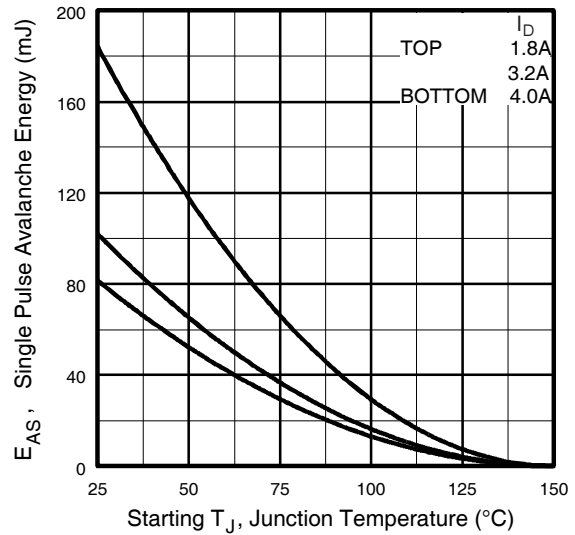
**Fig 5.** Normalized On-Resistance Vs. Temperature



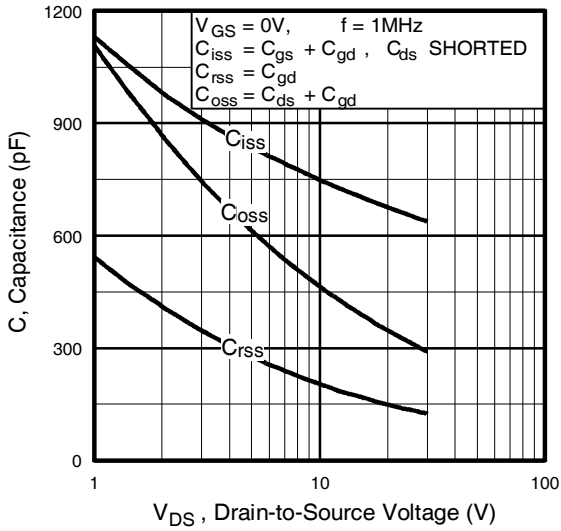
**Fig 6.** Typical On-Resistance Vs. Drain Current



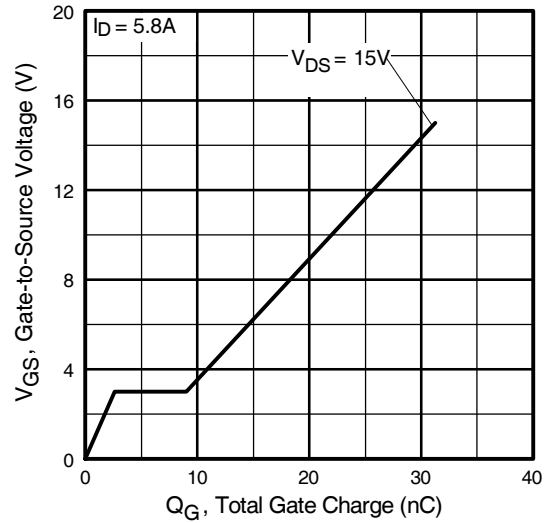
**Fig 7.** Typical On-Resistance Vs. Gate Voltage



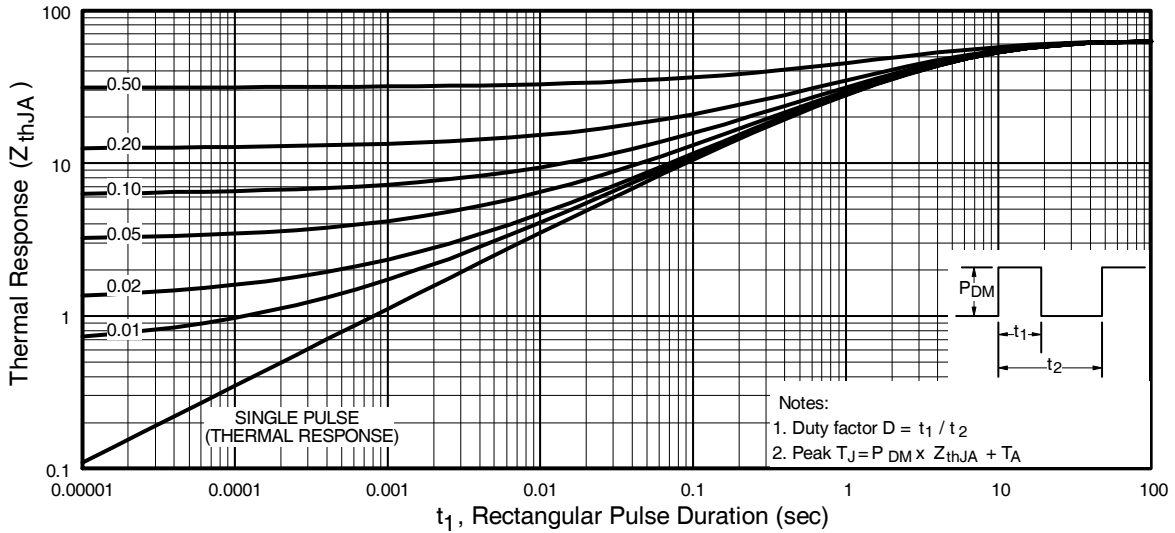
**Fig 8.** Maximum Avalanche Energy Vs. Drain Current



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



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

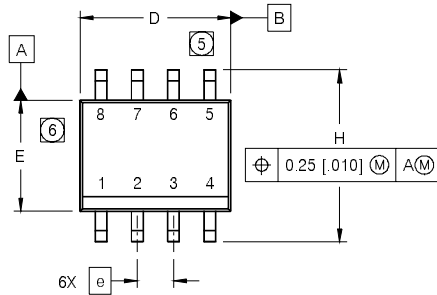


**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

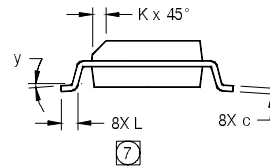
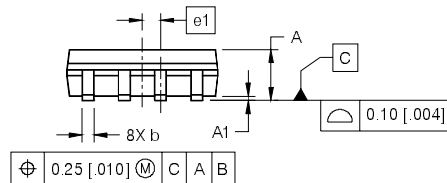
# IRF7313QPbF

## SO-8 Package Outline

Dimensions are shown in millimeters (inches)



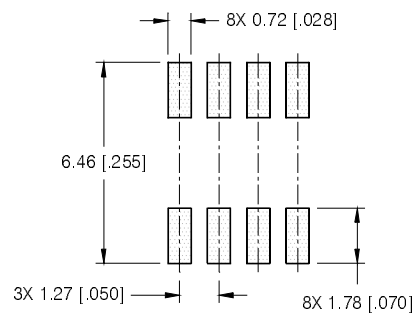
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°



### NOTES:

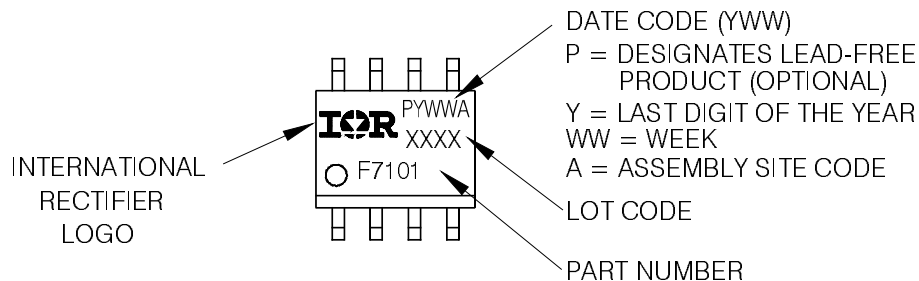
- DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
- CONTROLLING DIMENSION: MILLIMETER
- DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
- OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
- (5)** DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
- (6)** DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [0.010].
- (7)** DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

### FOOTPRINT



## SO-8 Part Marking

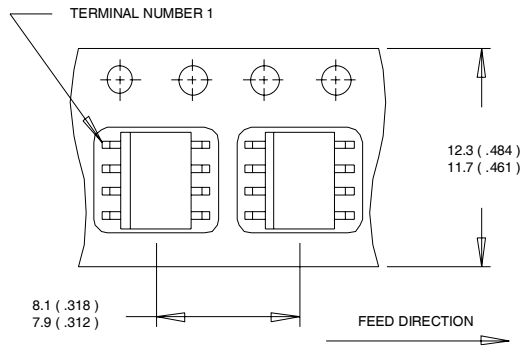
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



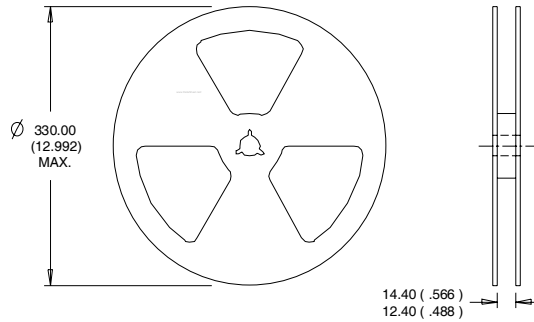
Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

## 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/>

Data and specifications subject to change without notice.  
 This product has been designed and qualified for the Automotive [Q101] market.  
 Qualification Standards can be found on IR's Web site.