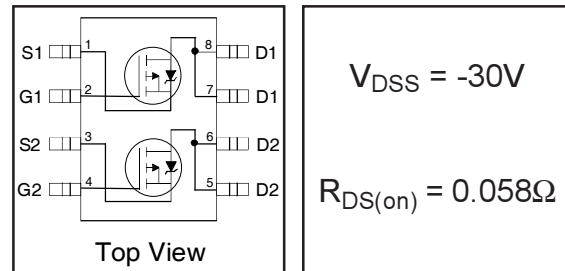


# IRF7316QPbF

HEXFET® Power MOSFET

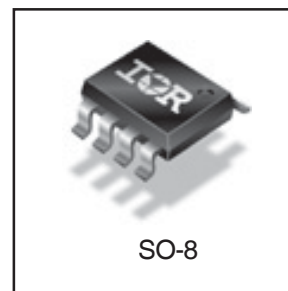
- Advanced Process Technology
- Ultra Low On-Resistance
- Dual P- Channel MOSFET
- Surface Mount
- Available in Tape & Reel
- 150°C Operating Temperature
- Automotive [Q101] Qualified
- Lead-Free



## 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 ( $T_A = 25^\circ C$ 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>	$T_A = 25^\circ C$	$I_D$	-4.9	A
	$T_A = 70^\circ C$		-3.9	
Pulsed Drain Current		$I_{DM}$	-30	
Continuous Source Current (Diode Conduction)		$I_S$	-2.5	
Maximum Power Dissipation <sup>②</sup>	$T_A = 25^\circ C$	$P_D$	2.0	W
	$T_A = 70^\circ C$		1.3	
Single Pulse Avalanche Energy		$E_{AS}$	140	mJ
Avalanche Current		$I_{AR}$	-2.8	A
Repetitive Avalanche Energy		$E_{AR}$	0.20	mJ
Peak Diode Recovery $dv/dt$ <sup>③</sup>		$dv/dt$	-5.0	V/ ns
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55 to + 150	$^\circ C$

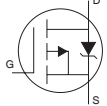
## Thermal Resistance Ratings

Parameter	Symbol	Limit	Units
Maximum Junction-to-Ambient <sup>④</sup>	$R_{\theta JA}$	62.5	$^\circ C/W$

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

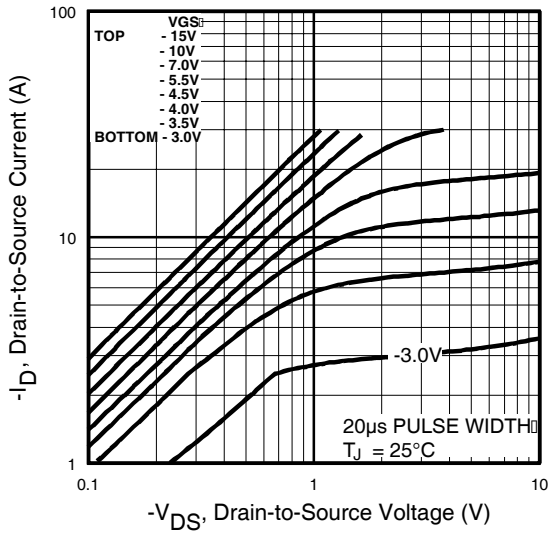
	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	-30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	0.022	—	V/°C	Reference to 25°C, I <sub>D</sub> = -1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	0.042	0.058	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -4.9A ④
		—	0.076	0.098		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.6A 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	—	7.7	—	S	V <sub>DS</sub> = -15V, I <sub>D</sub> = -4.9A
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	—	23	34	nC	I <sub>D</sub> = -4.9A
Q <sub>gs</sub>	Gate-to-Source Charge	—	3.8	5.7		V <sub>DS</sub> = -15V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge	—	5.9	8.9		V <sub>GS</sub> = -10V, See Fig. 10 ④
t <sub>d(on)</sub>	Turn-On Delay Time	—	13	19	ns	V <sub>DD</sub> = -15V
t <sub>r</sub>	Rise Time	—	13	20		I <sub>D</sub> = -1.0A
t <sub>d(off)</sub>	Turn-Off Delay Time	—	34	51		R <sub>G</sub> = 6.0Ω
t <sub>f</sub>	Fall Time	—	32	48		R <sub>D</sub> = 15Ω ④
C <sub>iss</sub>	Input Capacitance	—	710	—	pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance	—	380	—		V <sub>DS</sub> = -25V
C <sub>rss</sub>	Reverse Transfer Capacitance	—	180	—		f = 1.0MHz, See Fig. 5

## Source-Drain Ratings and Characteristics

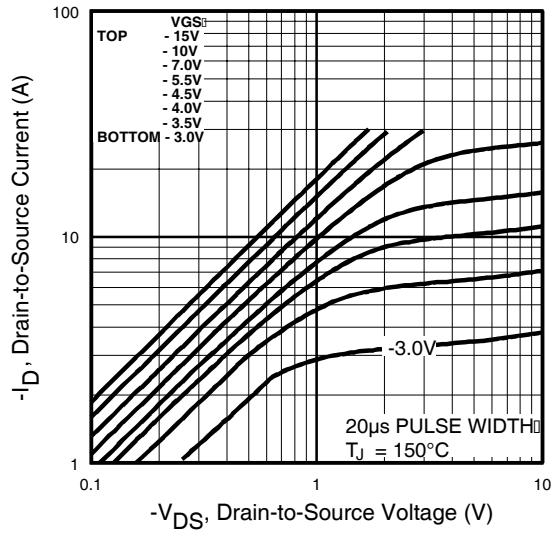
	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	-2.5	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	-30		
V <sub>SD</sub>	Diode Forward Voltage	—	-0.78	-1.0	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = -1.7A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	44	66	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = -1.7A
Q <sub>rr</sub>	Reverse Recovery Charge	—	42	63	nC	di/dt = 100A/μs ③

### Notes:

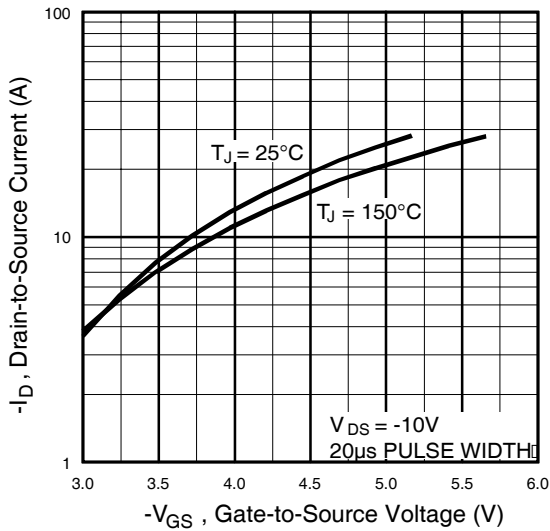
- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )
- ② Starting T<sub>J</sub> = 25°C, L = 35mH  
R<sub>G</sub> = 25Ω, I<sub>AS</sub> = -2.8A.
- ③ I<sub>SD</sub> ≤ -2.8A, di/dt ≤ 150A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 150°C
- ④ Pulse width ≤ 300μs; duty cycle ≤ 2%.
- ⑤ Surface mounted on FR-4 board, t ≤ 10sec.



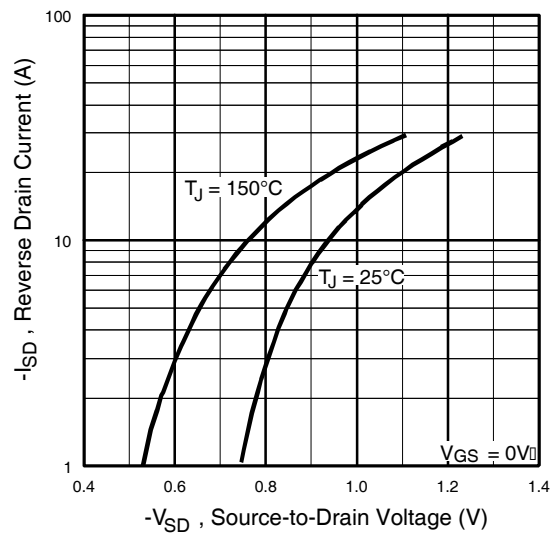
**Fig 1.** Typical Output Characteristics



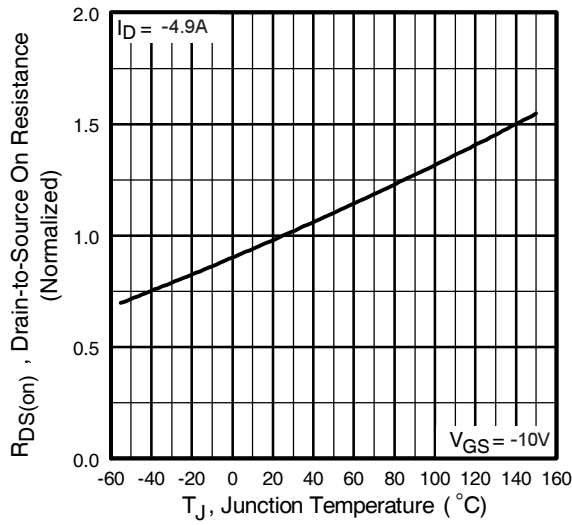
**Fig 2.** Typical Output Characteristics



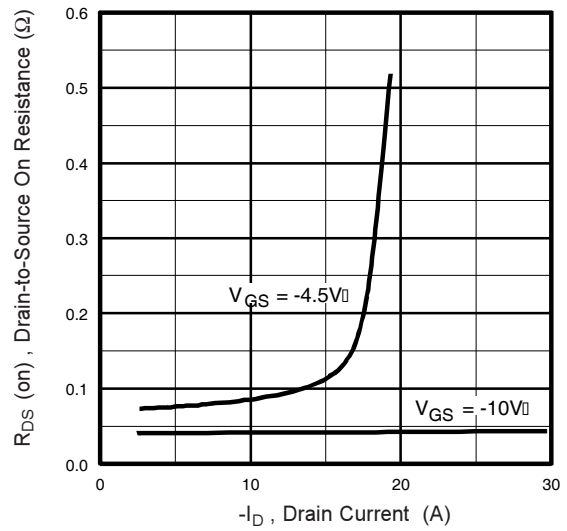
**Fig 3.** Typical Transfer Characteristics



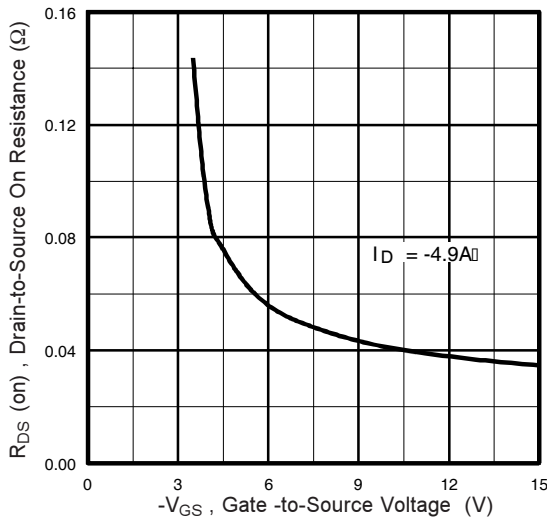
**Fig 4.** Typical Source-Drain Diode Forward Voltage



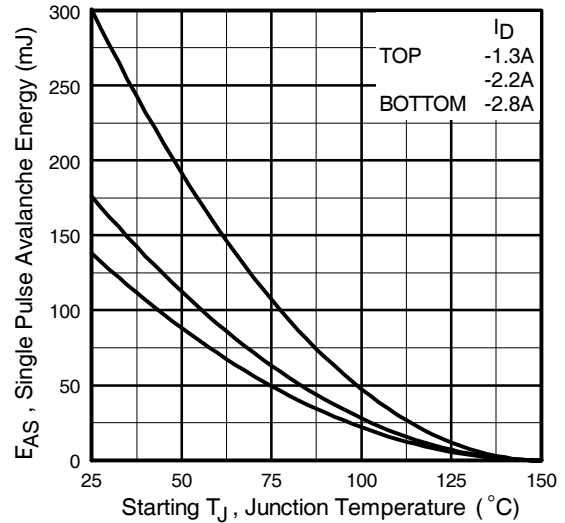
**Fig 5.** Normalized On-Resistance Vs. Temperature



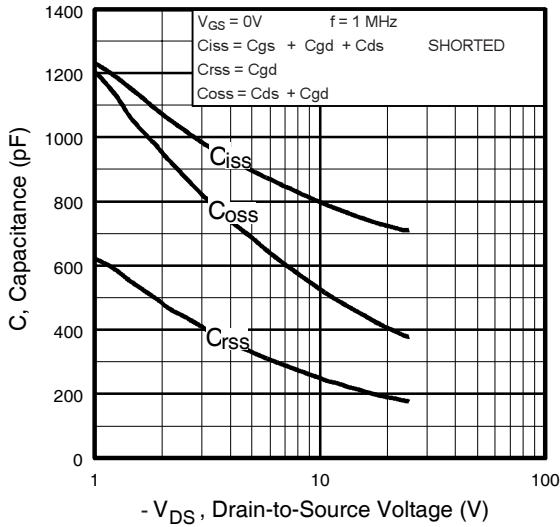
**Fig 6.** Typical On-Resistance Vs. Drain Current



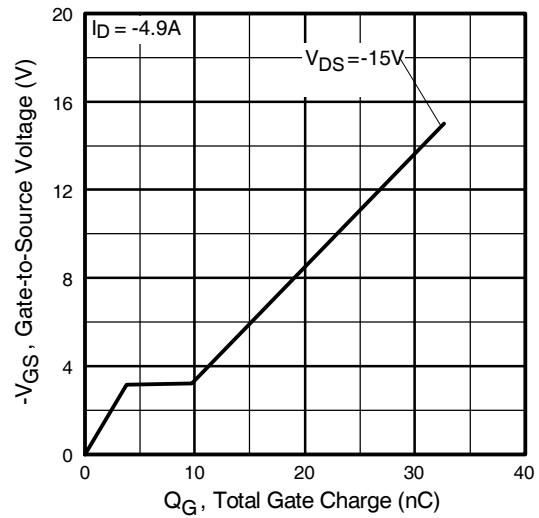
**Fig 7.** Typical On-Resistance Vs. Gate Voltage



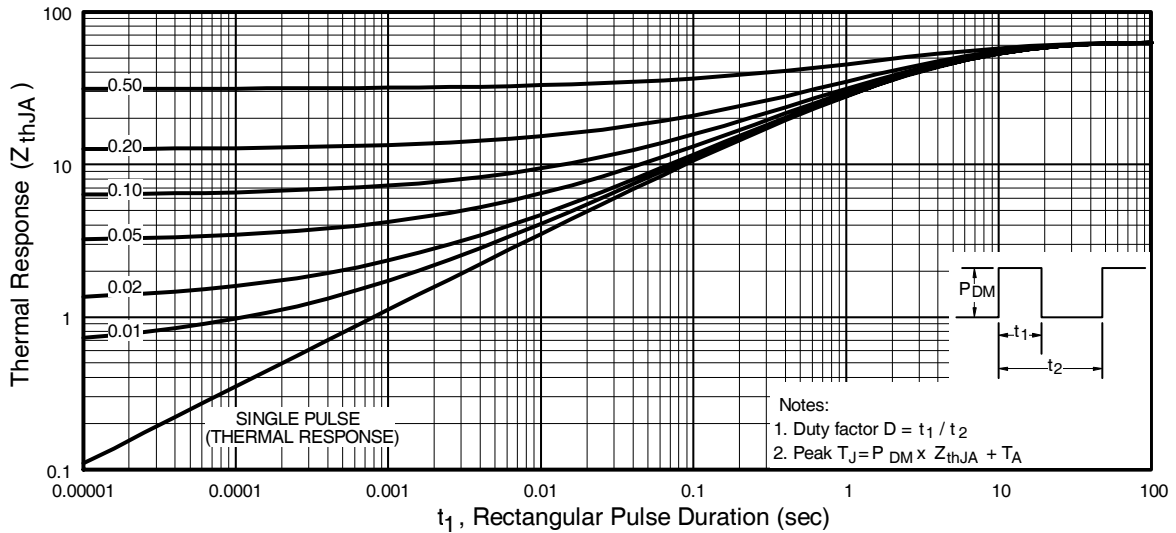
**Fig 8.** Maximum Avalanche Energy Vs. Drain Current



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



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

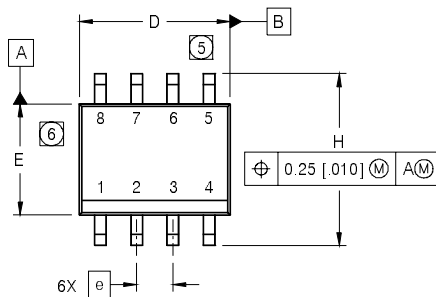


**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

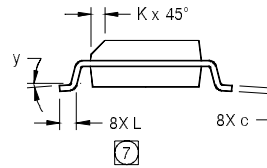
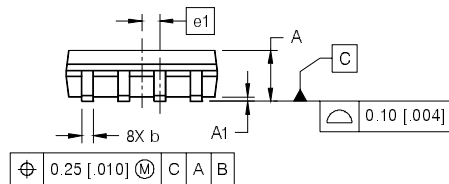
# IRF7316QPbF

## SO-8 Package Outline

Dimensions are shown in millimeters (inches)



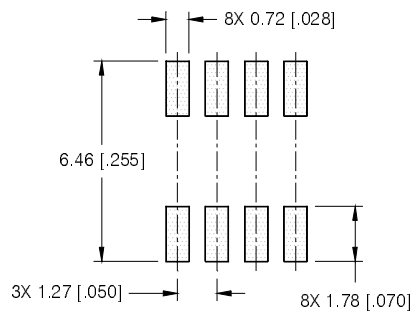
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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



### NOTES:

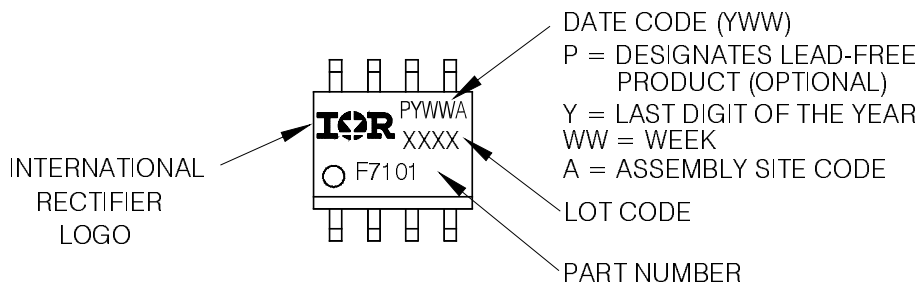
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE 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

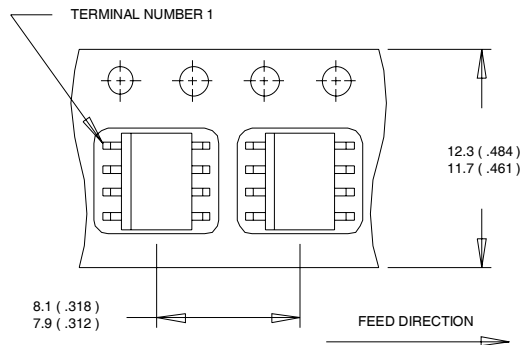
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



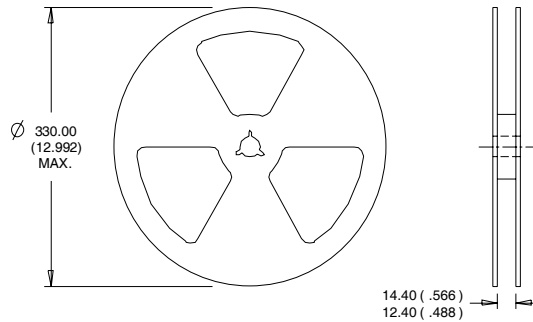
Note: For the most current drawing please refer to IR website at: <http://www.irf.com/package/>  
www.irf.com

## 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.