

HEXFET® Power MOSFET

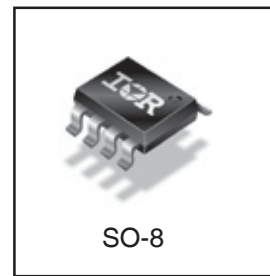
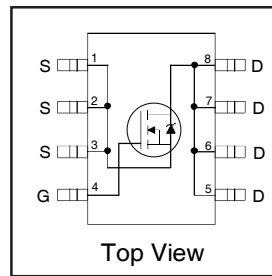
**Applications**

- High Frequency DC-DC Converters with Synchronous Rectification
- Lead-Free

<b>V<sub>DSS</sub></b>	<b>R<sub>DS(on)</sub> max</b>	<b>I<sub>D</sub></b>
<b>20V</b>	<b>0.0065Ω</b>	<b>16A</b>

**Benefits**

- Ultra-Low R<sub>DS(on)</sub> at 4.5V V<sub>GS</sub>
- Low Charge and Low Gate Impedance to Reduce Switching Losses
- Fully Characterized Avalanche Voltage and Current



**Absolute Maximum Ratings**

Symbol	Parameter	Max.	Units
V <sub>DS</sub>	Drain-Source Voltage	20	V
V <sub>GS</sub>	Gate-to-Source Voltage	± 12	V
I <sub>D</sub> @ T <sub>A</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	16	A
I <sub>D</sub> @ T <sub>A</sub> = 70°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	13	
I <sub>DM</sub>	Pulsed Drain Current <sup>①</sup>	130	
P <sub>D</sub> @ T <sub>A</sub> = 25°C	Maximum Power Dissipation <sup>③</sup>	2.5	W
P <sub>D</sub> @ T <sub>A</sub> = 70°C	Maximum Power Dissipation <sup>③</sup>	1.6	W
	Linear Derating Factor	0.02	W/°C
T <sub>J</sub> , T <sub>STG</sub>	Junction and Storage Temperature Range	-55 to + 150	°C

**Thermal Resistance**

	Parameter	Max.	Units
R <sub>θJA</sub>	Maximum Junction-to-Ambient <sup>④</sup>	50	°C/W

**Typical SMPS Topologies**

- Telecom 48V Input Converters with Logic-Level Driven Synchronous Rectifiers

Notes ① through ④ are on page 8

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# IRF7456PbF

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## Static @ 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	20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	0.024	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	0.0047	0.0065	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 16A ③
		—	0.0057	0.0075		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 13A ③
		—	0.011	0.020		V <sub>GS</sub> = 2.8V, I <sub>D</sub> = 3.5A ③
V <sub>GS(th)</sub>	Gate Threshold Voltage	0.6	—	2.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	20	μA	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V
		—	—	100		V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	200	nA	V <sub>GS</sub> = 12V
	Gate-to-Source Reverse Leakage	—	—	-200		V <sub>GS</sub> = -12V

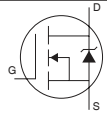
## Dynamic @ T<sub>J</sub> = 25°C (unless otherwise specified)

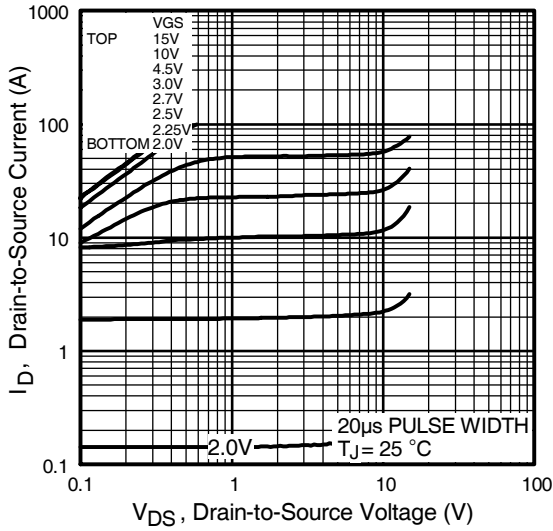
	Parameter	Min.	Typ.	Max.	Units	Conditions
g <sub>fs</sub>	Forward Transconductance	44	—	—	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = 16A
Q <sub>g</sub>	Total Gate Charge	—	41	62	nC	I <sub>D</sub> = 16A
Q <sub>gs</sub>	Gate-to-Source Charge	—	9.7	15		V <sub>DS</sub> = 16V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge	—	18	27		V <sub>GS</sub> = 5.0V, ③
t <sub>d(on)</sub>	Turn-On Delay Time	—	20	—	ns	V <sub>DD</sub> = 10V
t <sub>r</sub>	Rise Time	—	25	—		I <sub>D</sub> = 1.0A
t <sub>d(off)</sub>	Turn-Off Delay Time	—	50	—		R <sub>G</sub> = 6.0Ω
t <sub>f</sub>	Fall Time	—	52	—		V <sub>GS</sub> = 4.5V ③
C <sub>iss</sub>	Input Capacitance	—	3640	—	pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance	—	1570	—		V <sub>DS</sub> = 15V
C <sub>rss</sub>	Reverse Transfer Capacitance	—	330	—		f = 1.0MHz

## Avalanche Characteristics

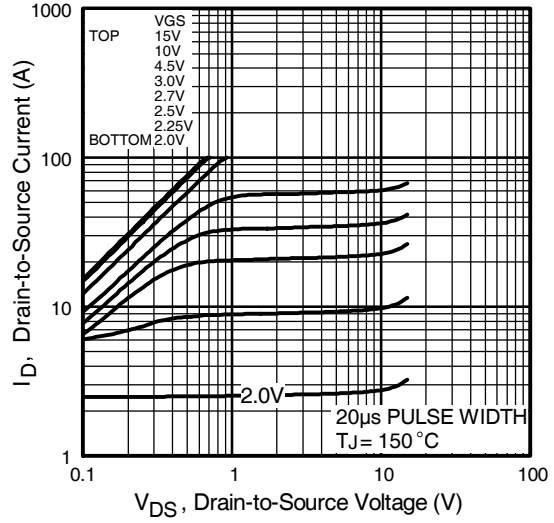
	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy②	—	250	mJ
I <sub>AR</sub>	Avalanche Current①	—	16	A
E <sub>AR</sub>	Repetitive Avalanche Energy①	—	0.25	mJ

## Diode Characteristics

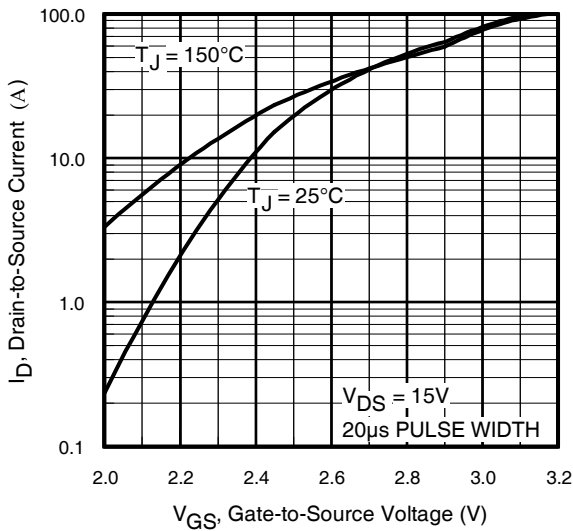
	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	2.5	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	130		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.2	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 2.5A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	48	72	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 2.5A
Q <sub>rr</sub>	Reverse Recovery Charge	—	74	110	nC	di/dt = 100A/μs ③



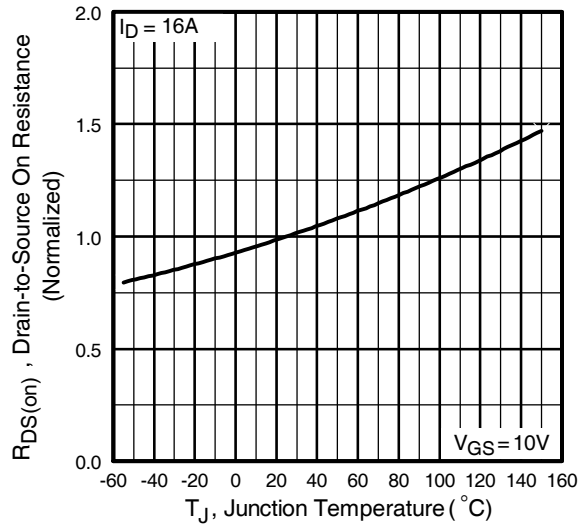
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics

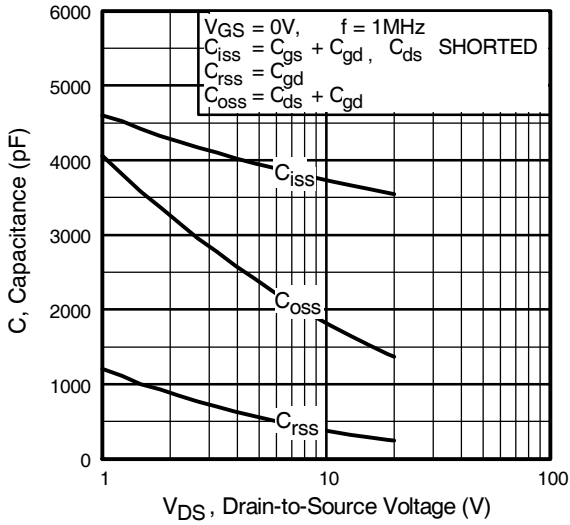


**Fig 3.** Typical Transfer Characteristics

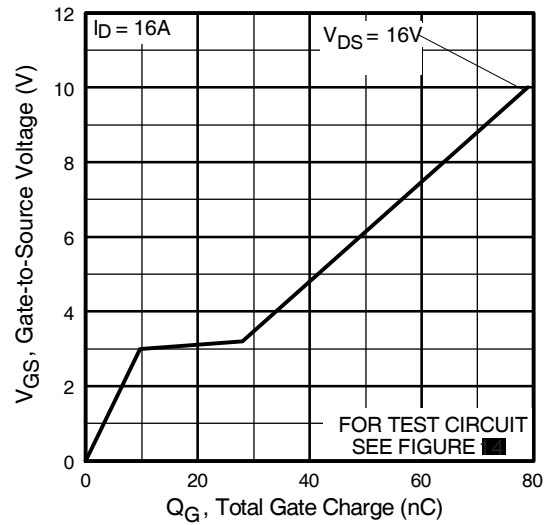


**Fig 4.** Normalized On-Resistance Vs. Temperature

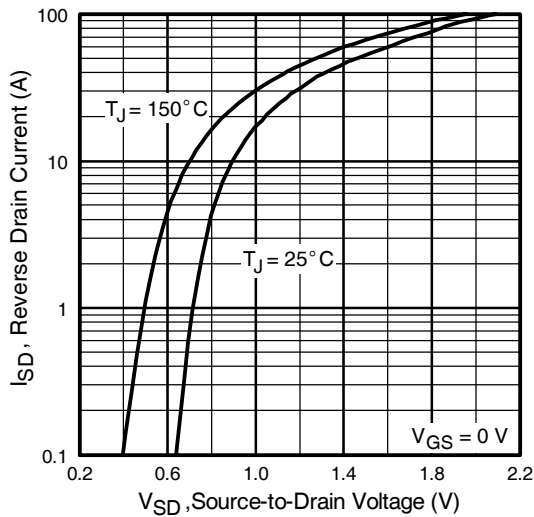
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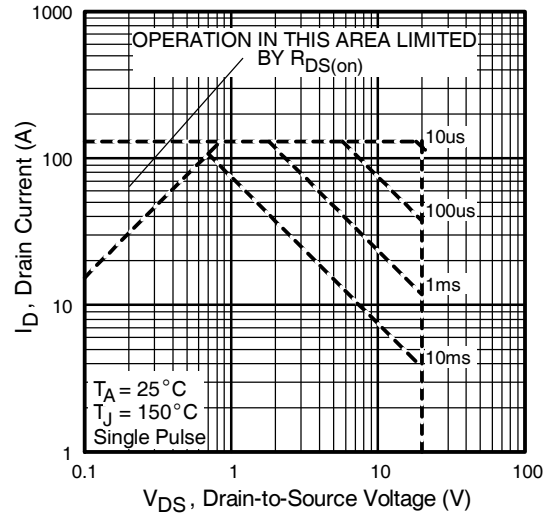
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



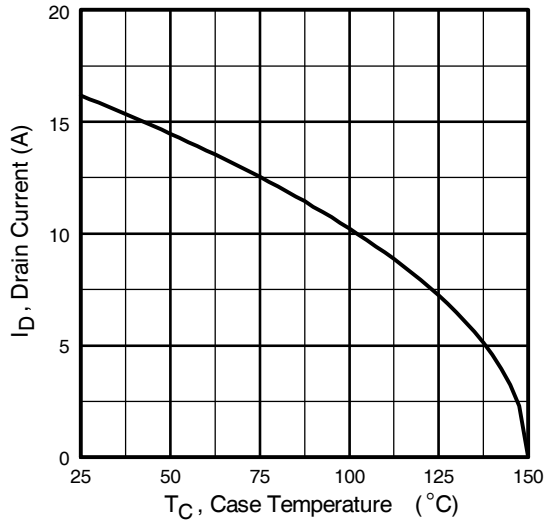
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



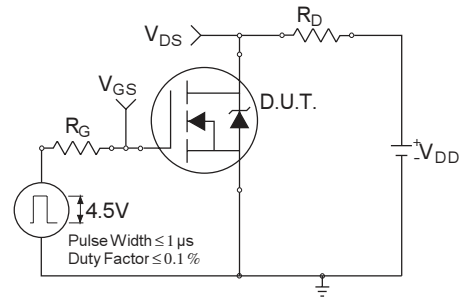
**Fig 7.** Typical Source-Drain Diode Forward Voltage



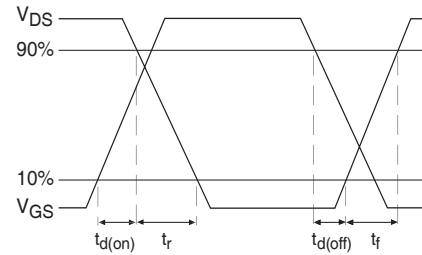
**Fig 8.** Maximum Safe Operating Area



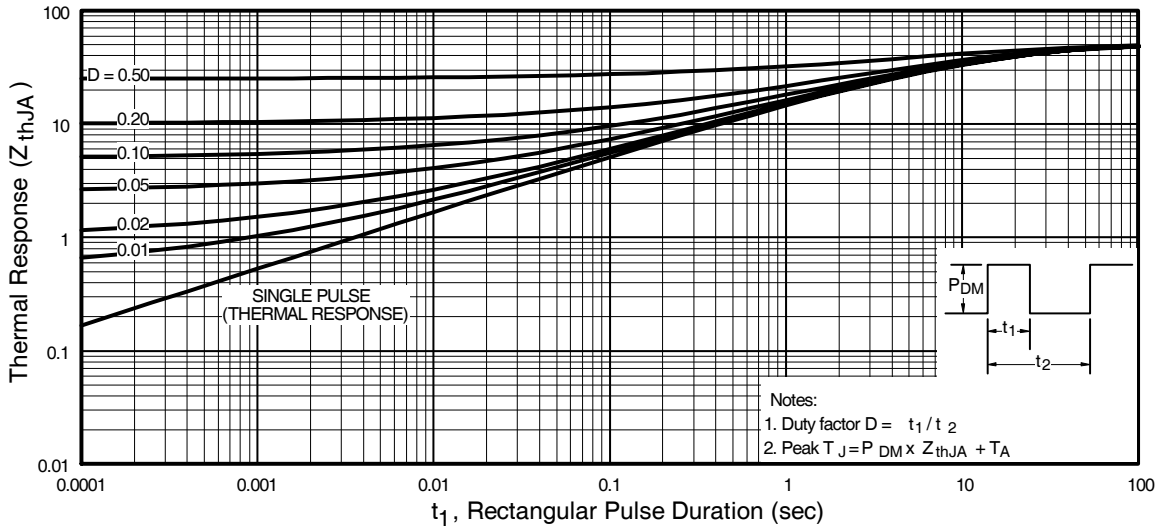
**Fig 9.** Maximum Drain Current Vs. Case Temperature



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



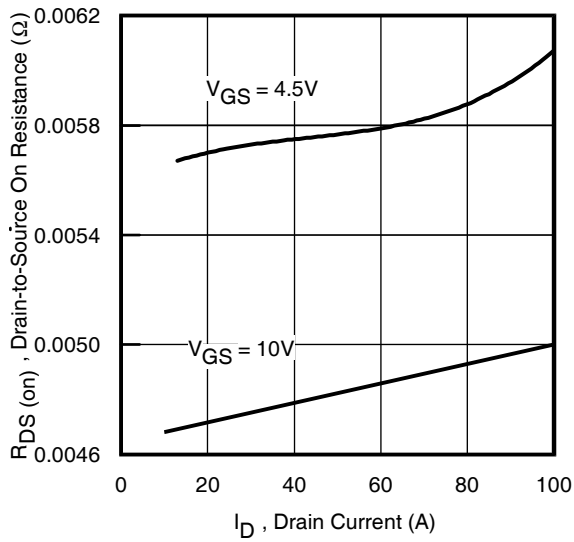
**Fig 10b.** Switching Time Waveforms



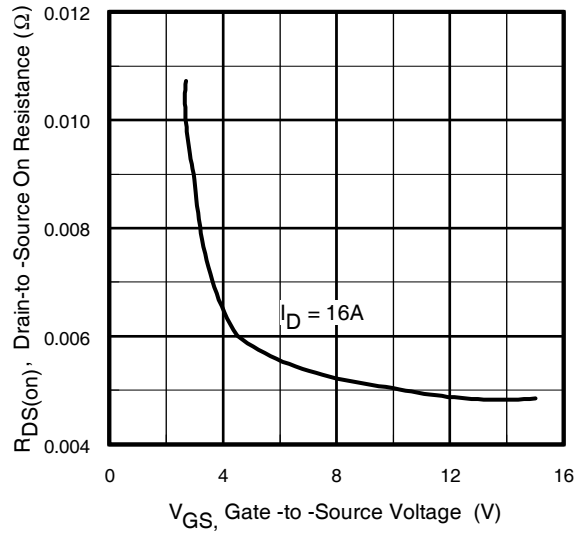
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case

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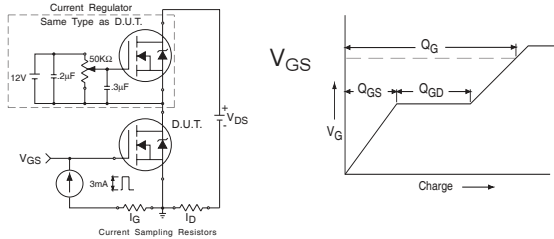
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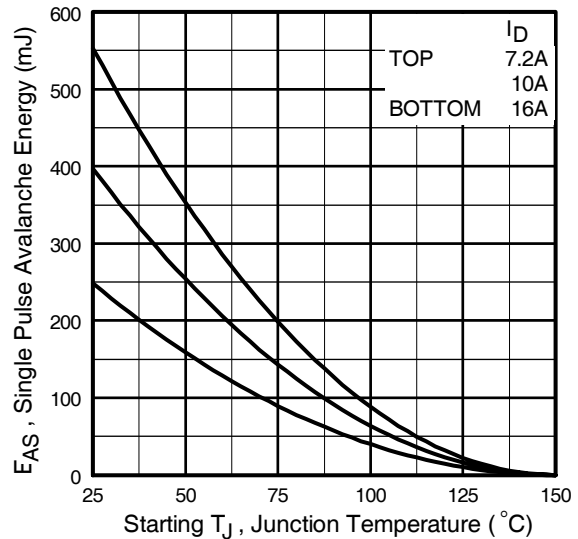
**Fig 12.** On-Resistance Vs. Drain Current



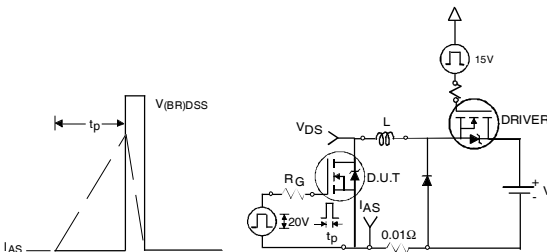
**Fig 13.** On-Resistance Vs. Gate Voltage



**Fig 14a&b.** Basic Gate Charge Test Circuit and Waveform



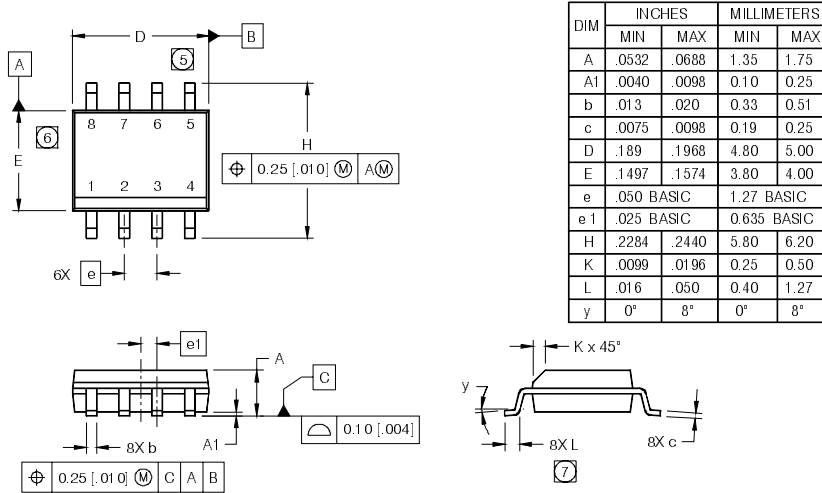
**Fig 15c.** Maximum Avalanche Energy Vs. Drain Current



**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms

## SO-8 Package Outline (MOSFET & Fetky)

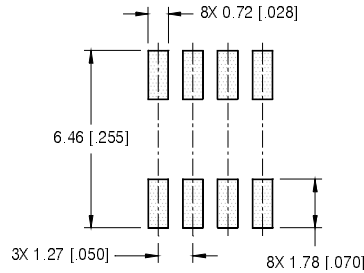
Dimensions are shown in millimeters (inches)



**NOTES:**

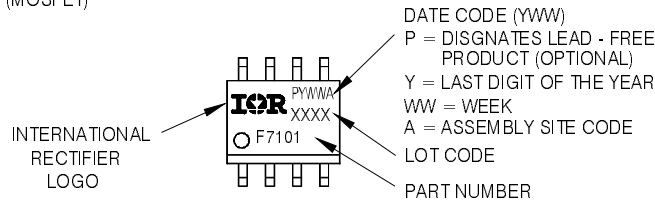
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE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

EXAMPLE: THIS IS AN IRF7101 (MOSFET)



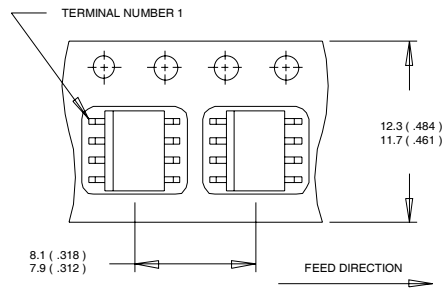
Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

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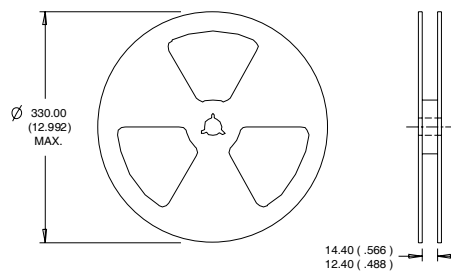
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## SO-8 Tape and Reel

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.

### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 2.0\text{mH}$   
 $R_G = 25\Omega$ ,  $I_{AS} = 16\text{A}$ .
- ③ Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board,  $t < 10$  sec

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 Consumer market.  
Qualifications Standards can be found on IR's Web site.

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