

# IRF7476

HEXFET® Power MOSFET

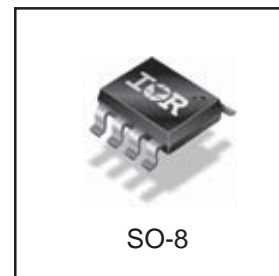
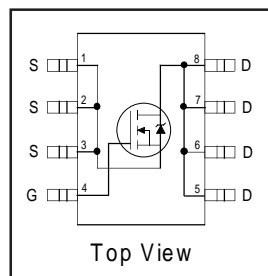
## Applications

- High Frequency 3.3V and 5V input Point-of-Load Synchronous Buck Converters for Netcom and Computing Applications.
- Power Management for Netcom, Computing and Portable Applications.

## Benefits

- Ultra-Low Gate Impedance
- Very Low  $R_{DS(on)}$
- Fully Characterized Avalanche Voltage and Current

$V_{DSS}$	$R_{DS(on)}$ max	$I_D$
12V	8.0m $\Omega$ @ $V_{GS} = 4.5V$	15A



## Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
$V_{DS}$	Drain-Source Voltage	12	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 12$	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	15	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	12	
$I_{DM}$	Pulsed Drain Current <sup>①</sup>	120	
$P_D @ T_A = 25^\circ C$	Maximum Power Dissipation <sup>④</sup>	2.5	W
$P_D @ T_A = 70^\circ C$	Maximum Power Dissipation <sup>④</sup>	1.6	W
	Linear Derating Factor	0.02	W/ $^\circ C$
$T_J, T_{STG}$	Junction and Storage Temperature Range	-55 to + 150	$^\circ C$

## Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead	—	20	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient <sup>④</sup>	—	50	

Notes <sup>①</sup> through <sup>④</sup> are on page 8  
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## Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	12	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.014	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	6.0	8.0	m $\Omega$	$V_{GS} = 4.5V, I_D = 15A$ ③
		—	12	30		$V_{GS} = 2.8V, I_D = 12A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	0.6	—	1.9	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	100	$\mu A$	$V_{DS} = 9.6V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 9.6V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	200	nA	$V_{GS} = 12V$
	Gate-to-Source Reverse Leakage	—	—	-200		$V_{GS} = -12V$

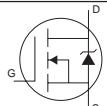
## Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$g_{fs}$	Forward Transconductance	31	—	—	S	$V_{DS} = 6.0V, I_D = 12A$
$Q_g$	Total Gate Charge	—	26	40	nC	$I_D = 12A$
$Q_{gs}$	Gate-to-Source Charge	—	4.6	—		$V_{DS} = 10V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	11	—		$V_{GS} = 4.5V$
$Q_{oss}$	Output Gate Charge	—	17	—		$V_{GS} = 0V, V_{DS} = 5.0V$
$t_{d(on)}$	Turn-On Delay Time	—	11	—	ns	$V_{DD} = 6.0V$
$t_r$	Rise Time	—	29	—		$I_D = 12A$
$t_{d(off)}$	Turn-Off Delay Time	—	19	—		$R_G = 1.8\Omega$
$t_f$	Fall Time	—	8.3	—		$V_{GS} = 4.5V$ ③
$C_{iss}$	Input Capacitance	—	2550	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	2190	—		$V_{DS} = 6.0V$
$C_{riss}$	Reverse Transfer Capacitance	—	450	—		$f = 1.0\text{MHz}$

## Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy②	—	160	mJ
$I_{AR}$	Avalanche Current①	—	12	A

## Diode Characteristics

Symbol	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	—	—	120		
$V_{SD}$	Diode Forward Voltage	—	0.87	1.2	V	$T_J = 25^\circ\text{C}, I_S = 12A, V_{GS} = 0V$ ③
		—	0.73	—		$T_J = 125^\circ\text{C}, I_S = 12A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	55	82	ns	$T_J = 25^\circ\text{C}, I_F = 12A, V_R = 12V$
$Q_{rr}$	Reverse Recovery Charge	—	59	89	nC	$di/dt = 100A/\mu s$ ③
$t_{rr}$	Reverse Recovery Time	—	54	81	ns	$T_J = 125^\circ\text{C}, I_F = 12A, V_R = 12V$
$Q_{rr}$	Reverse Recovery Charge	—	60	90	nC	$di/dt = 100A/\mu s$ ③

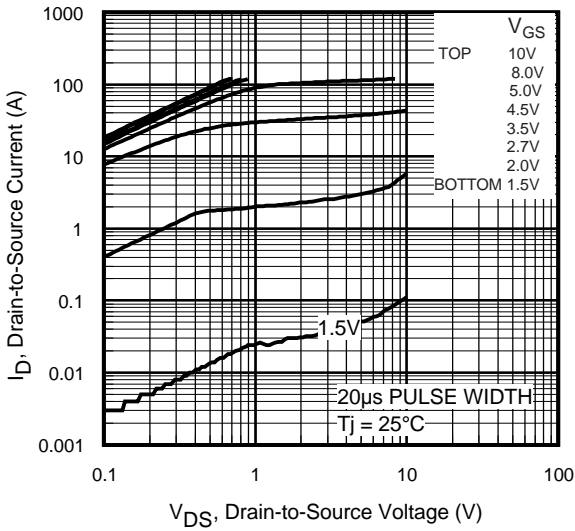


Fig 1. Typical Output Characteristics

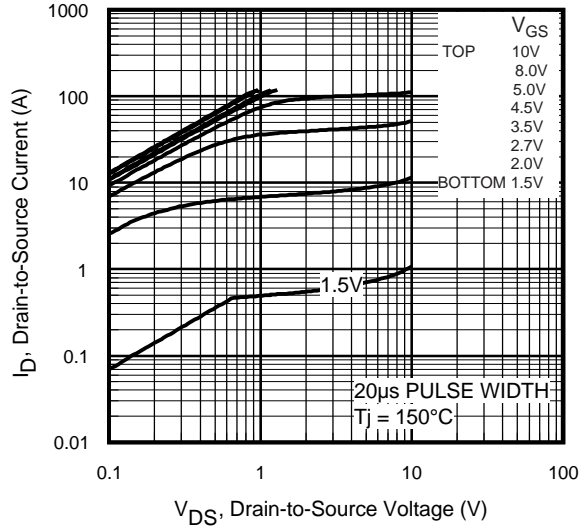


Fig 2. Typical Output Characteristics

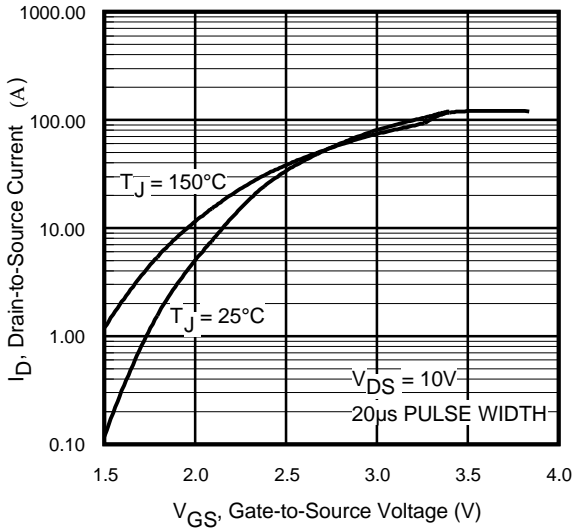


Fig 3. Typical Transfer Characteristics

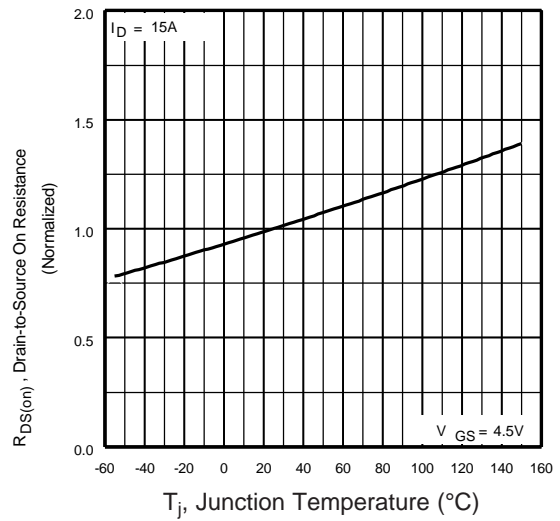
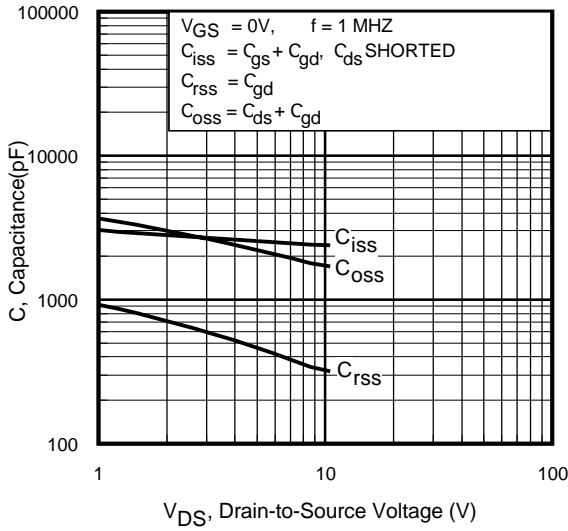
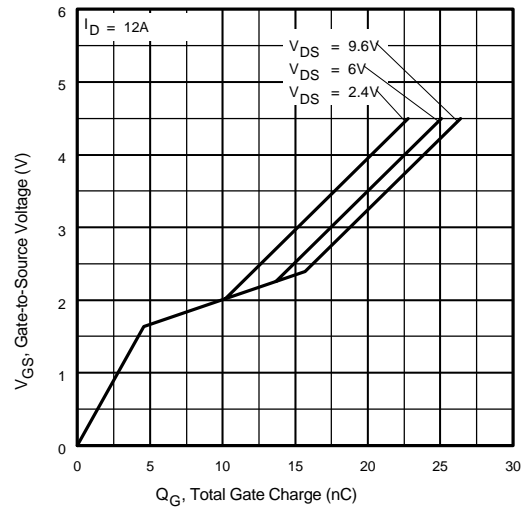


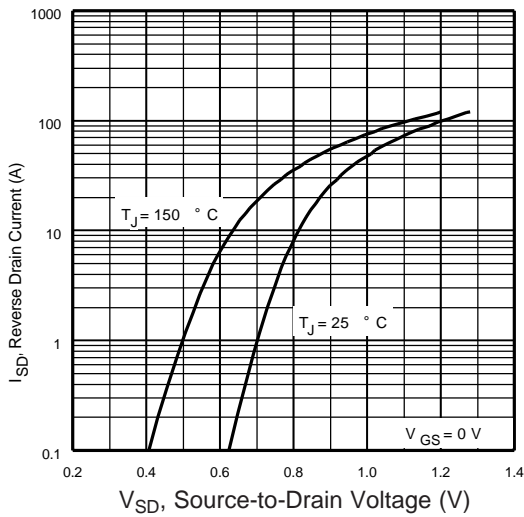
Fig 4. Normalized On-Resistance Vs. Temperature



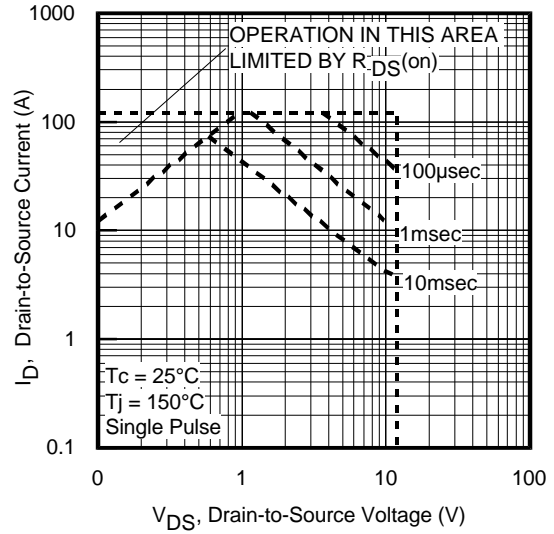
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



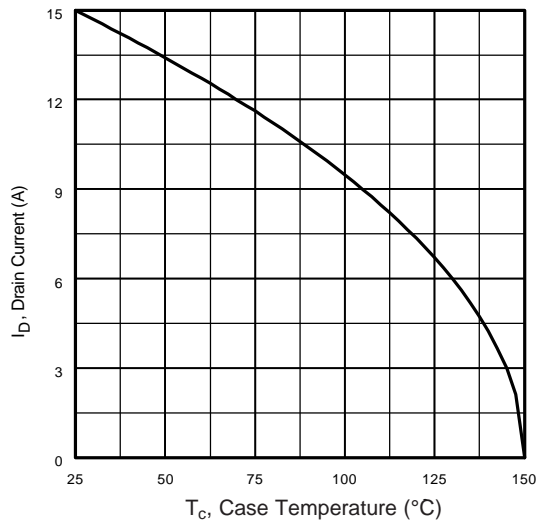
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



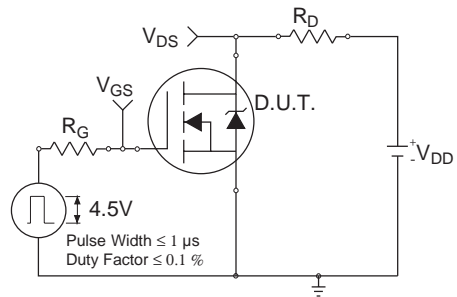
**Fig 7.** Typical Source-Drain Diode Forward Voltage



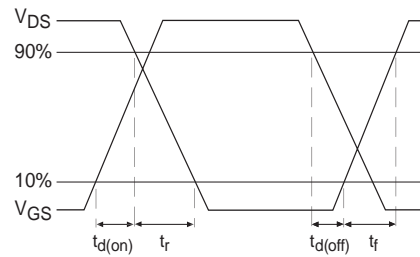
**Fig 8.** Maximum Safe Operating Area



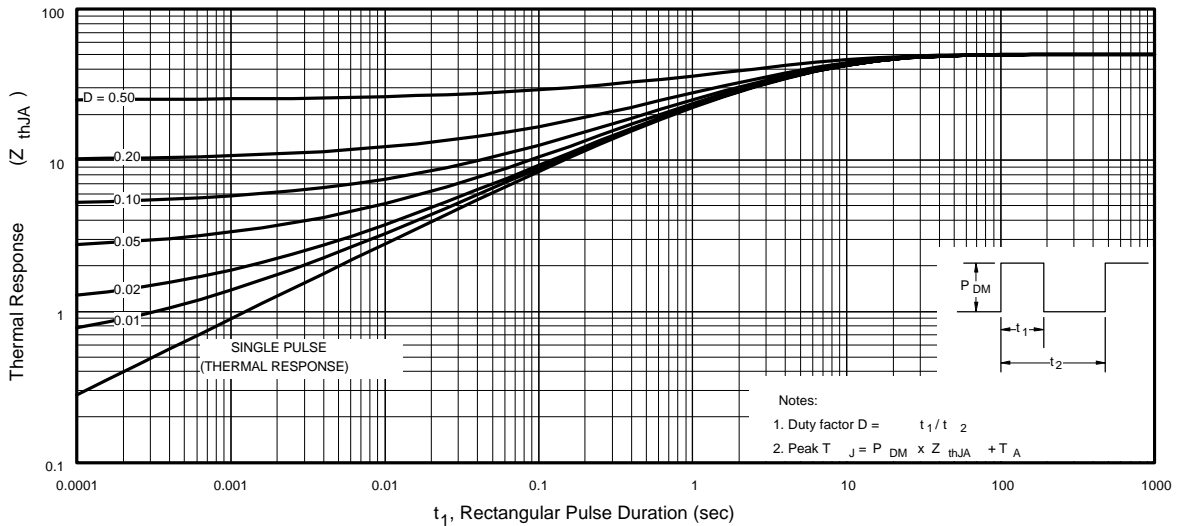
**Fig 9.** Maximum Drain Current Vs. Case Temperature



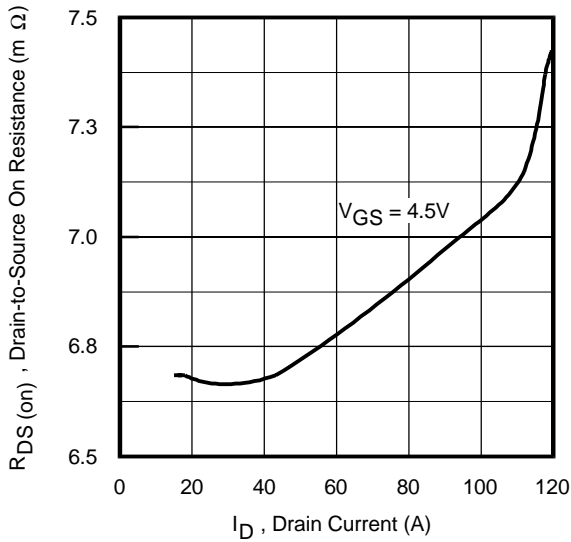
**Fig 10a.** Switching Time Test Circuit



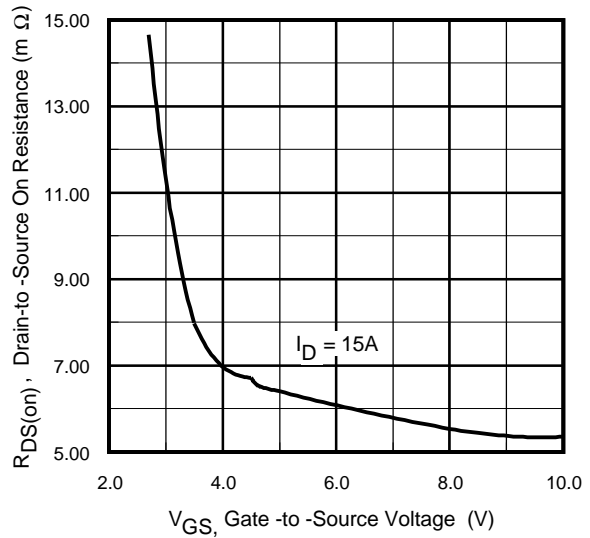
**Fig 10b.** Switching Time Waveforms



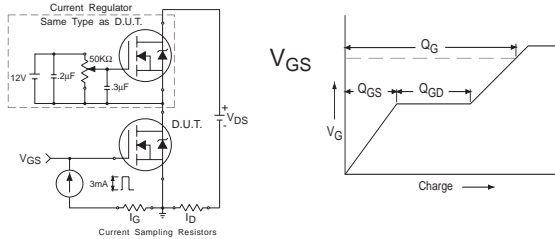
**Fig 10.** Maximum Effective Transient Thermal Impedance, Junction-to-Case



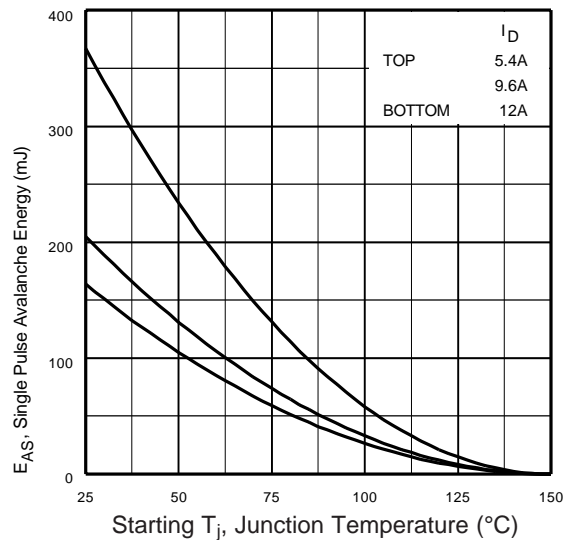
**Fig 12.** On-Resistance Vs. Drain Current



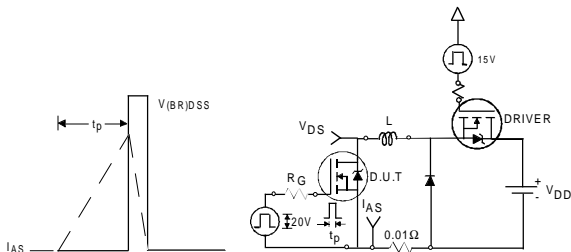
**Fig 13.** On-Resistance Vs. Gate Voltage



**Fig 13a&b.** Basic Gate Charge Test Circuit and Waveform

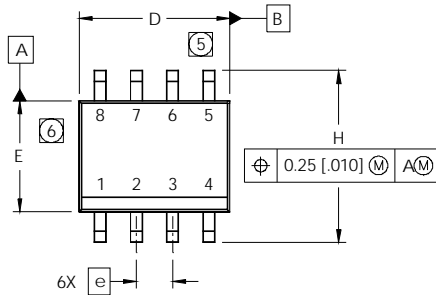


**Fig 14c.** Maximum Avalanche Energy Vs. Drain Current

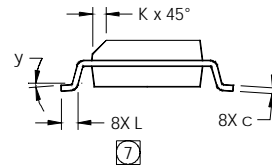
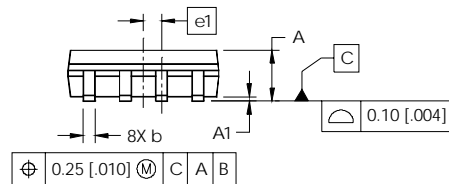


**Fig 14a&b.** Unclamped Inductive Test circuit and Waveforms

## SO-8 Package Details



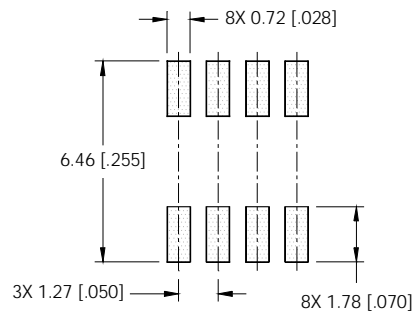
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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



**NOTES:**

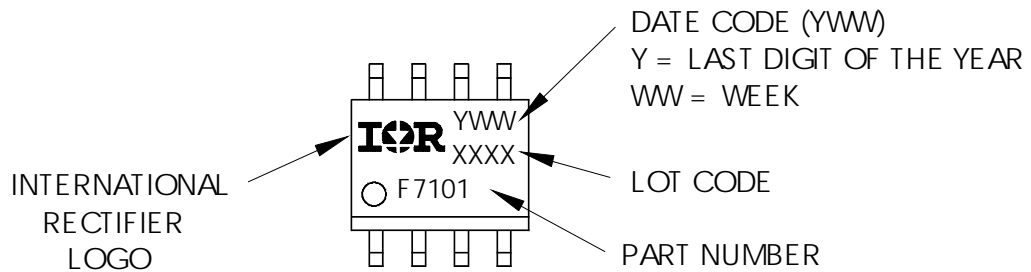
- DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
- CONTROLLING DIMENSION: MILLIMETER
- DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
- OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
- 5** DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
- 6** DIMENSION DOES NOT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

**FOOT PRINT**



## SO-8 Part Marking

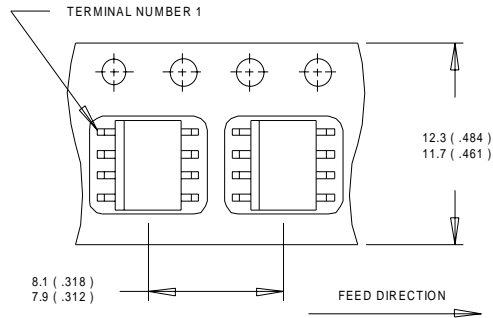
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



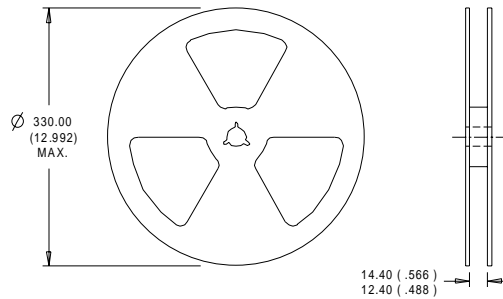
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## SO-8 Tape and Reel



- 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  $T_J = 25^\circ\text{C}$ ,  $L = 2.3\text{mH}$   
 $R_G = 25\Omega$ ,  $I_{AS} = 12\text{A}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board.

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

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**IR WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105  
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