

HEXFET® Power MOSFET

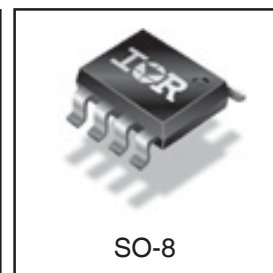
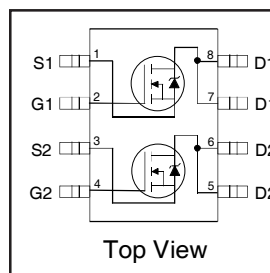
### Applications

- High frequency DC-DC converters
- Lead-Free

$V_{DS}$	$R_{DS(on)}$ max	$I_D$
80V	73mΩ @ $V_{GS} = 10V$	3.6A

### Benefits

- Low Gate to Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective  $C_{OSS}$  to Simplify Design, (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current



### Absolute Maximum Ratings

	Parameter	Max.	Units
$V_{DS}$	Drain-to-Source Voltage	80	V
$V_{GS}$	Gate-to-Source Voltage	± 20	
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	3.6	A
$I_D @ T_A = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	2.9	
$I_{DM}$	Pulsed Drain Current ①	29	
$P_D @ T_A = 25^\circ C$	Maximum Power Dissipation	2.0	W
	Linear Derating Factor	0.02	W/°C
dv/dt	Peak Diode Recovery dv/dt ②	2.3	V/ns
$T_J$	Operating Junction and	-55 to + 150	°C
$T_{STG}$	Storage Temperature Range		

### Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead	—	42	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount) ④	—	62.5	

Notes ① through ⑥ are on page 8

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	80	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.09	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	61	73	mΩ	$V_{GS} = 10V, I_D = 2.2A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	20	μA	$V_{DS} = 80V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 64V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	200	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-200		$V_{GS} = -20V$

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

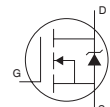
	Parameter	Min.	Typ.	Max.	Units	Conditions
gfs	Forward Transconductance	4.3	—	—	S	$V_{DS} = 25V, I_D = 2.2A$
$Q_g$	Total Gate Charge	—	15	23		$I_D = 2.2A$
$Q_{gs}$	Gate-to-Source Charge	—	2.9	—	nC	$V_{DS} = 40V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	4.5	—		$V_{GS} = 10V$ ③
$t_{d(on)}$	Turn-On Delay Time	—	9.0	—		$V_{DD} = 40V$
$t_r$	Rise Time	—	10	—		$I_D = 2.2A$
$t_{d(off)}$	Turn-Off Delay Time	—	41	—	ns	$R_G = 24\Omega$
$t_f$	Fall Time	—	17	—		$V_{GS} = 10V$ ③
$C_{iss}$	Input Capacitance	—	660	—		$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	110	—		$V_{DS} = 25V$
$C_{rss}$	Reverse Transfer Capacitance	—	15	—	pF	$f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	710	—		$V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	72	—		$V_{GS} = 0V, V_{DS} = 64V, f = 1.0\text{MHz}$
$C_{oss\text{ eff.}}$	Effective Output Capacitance	—	140	—		$V_{GS} = 0V, V_{DS} = 0V \text{ to } 64V$ ③

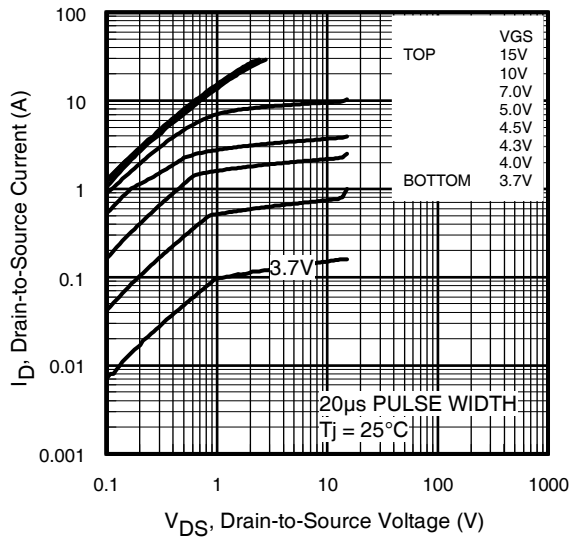
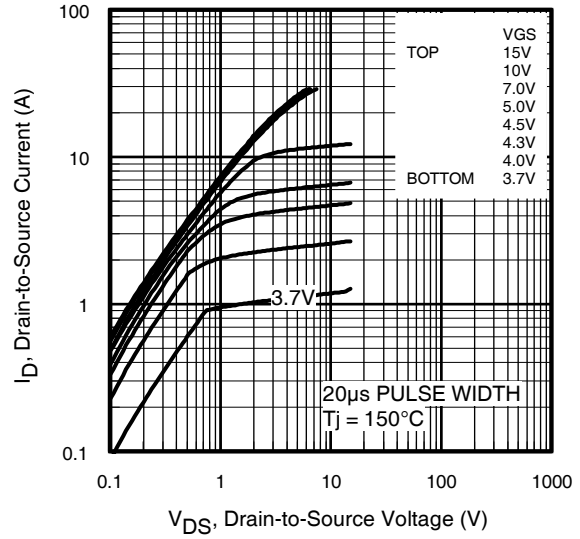
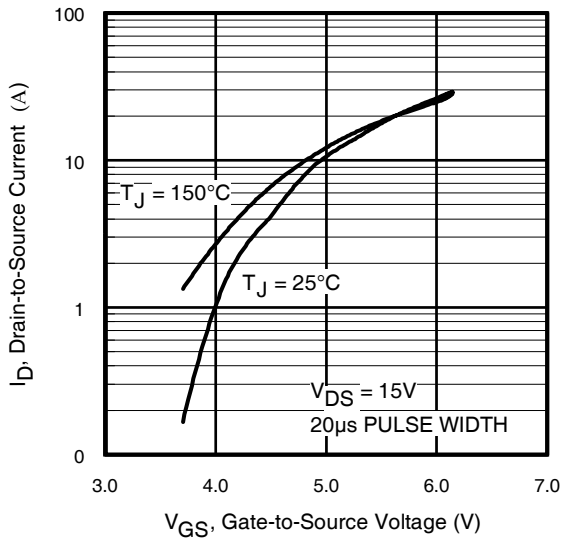
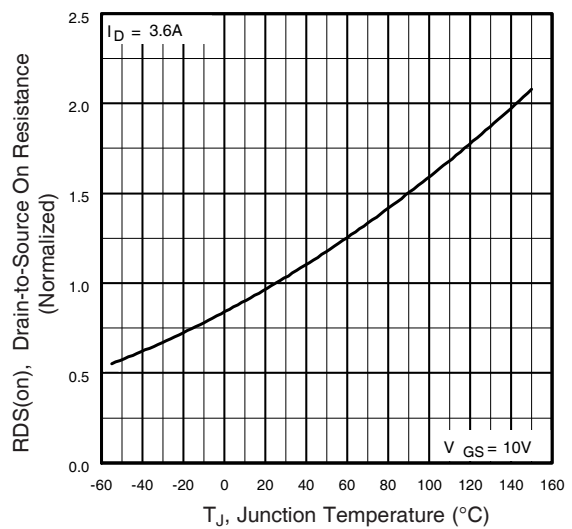
**Avalanche Characteristics**

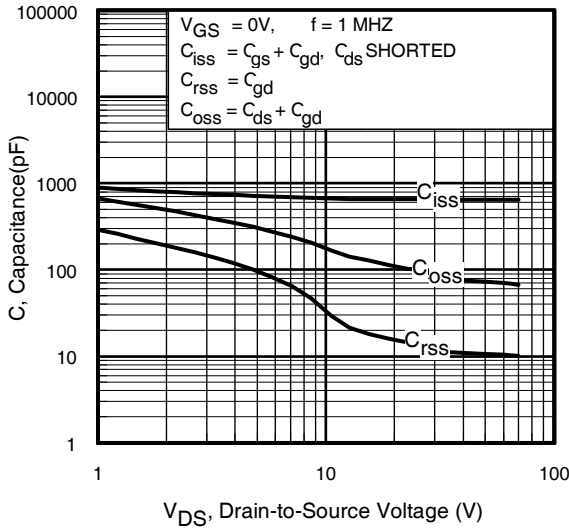
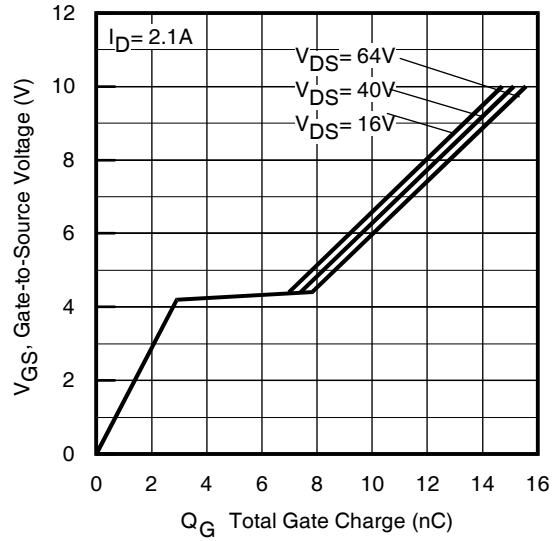
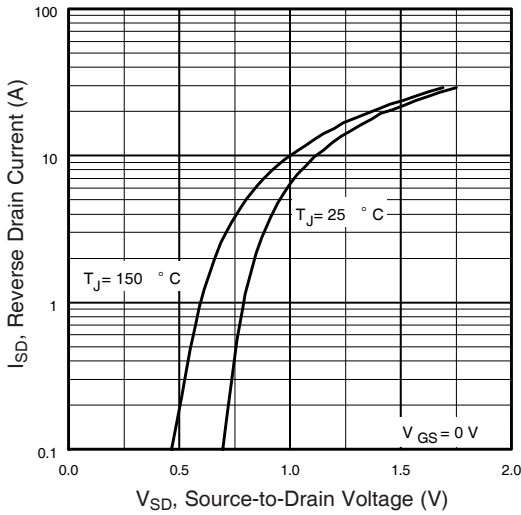
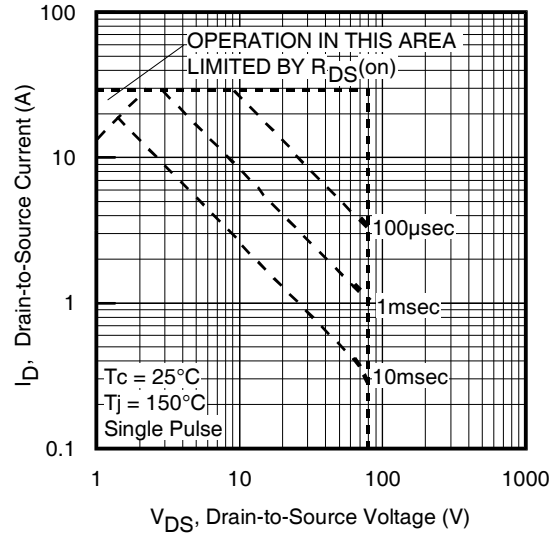
	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy ①②	—	75	mJ
$I_{AR}$	Avalanche Current ①	—	2.2	A

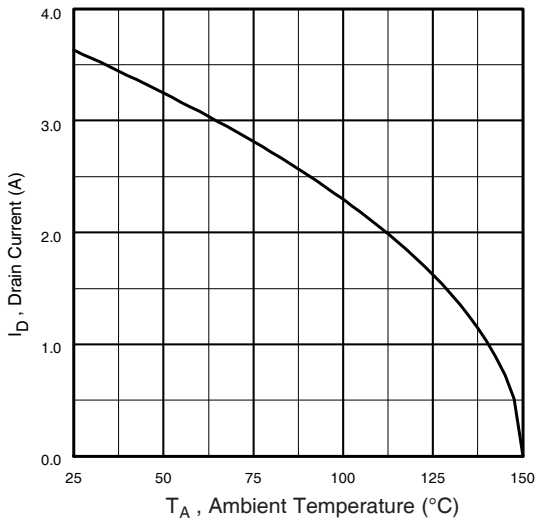
**Diode Characteristics**

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	3.6	A	MOSFET symbol showing the integral reverse p-n junction diode.
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	29	A	
$V_{SD}$	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 2.2A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	50	—	ns	$T_J = 25^\circ\text{C}, I_F = 2.2A, V_{DD} = 40V$
$Q_{rr}$	Reverse Recovery Charge	—	110	—	nC	$di/dt = 100A/\mu s$ ③

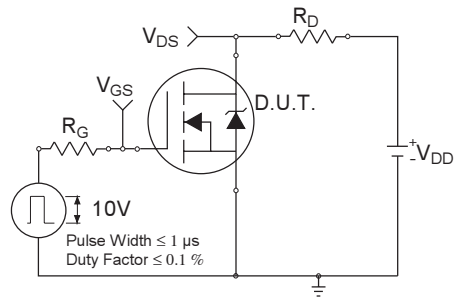



**Fig 1.** Typical Output Characteristics

**Fig 2.** Typical Output Characteristics

**Fig 3.** Typical Transfer Characteristics

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

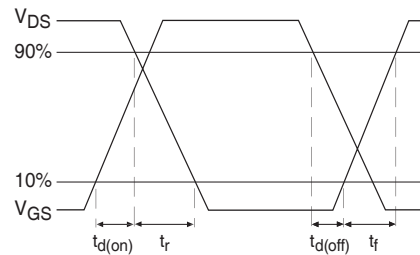

**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage

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

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

**Fig 8.** Maximum Safe Operating Area



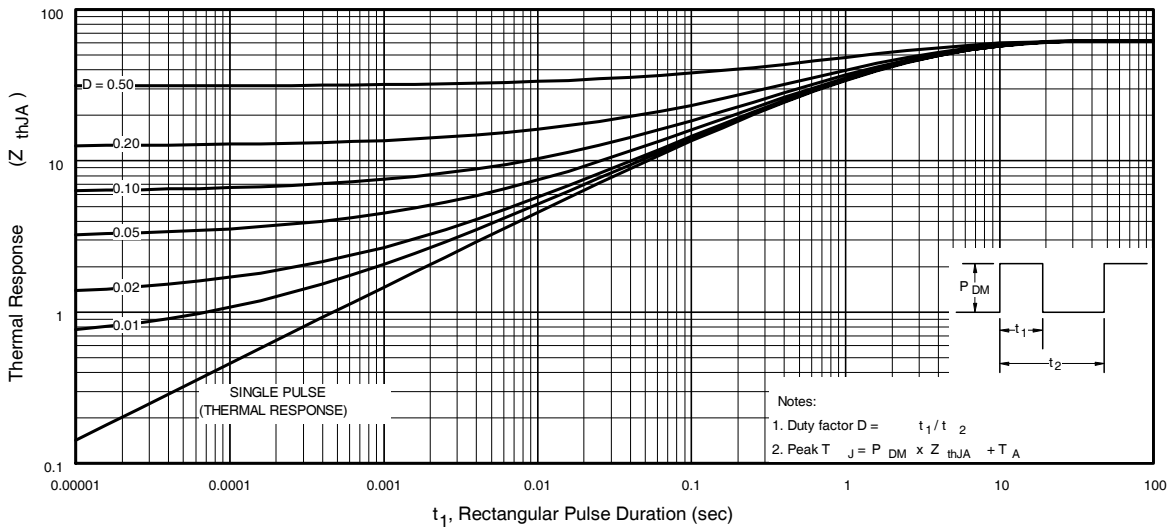
**Fig 9.** Maximum Drain Current Vs. Ambient Temperature



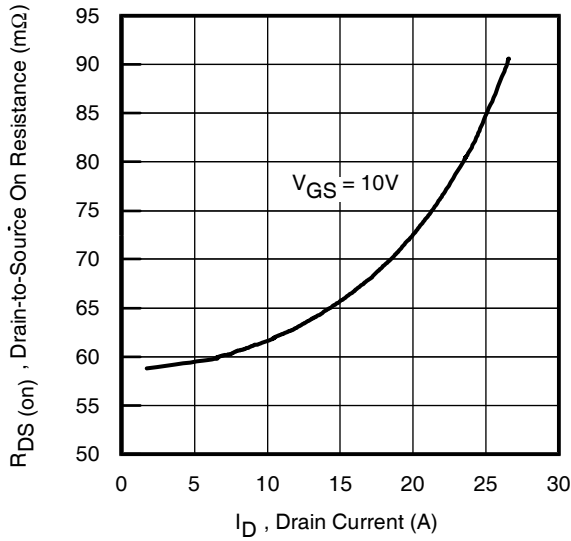
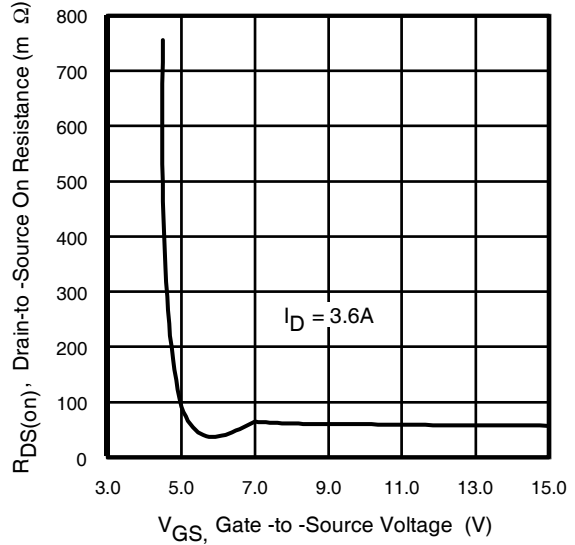
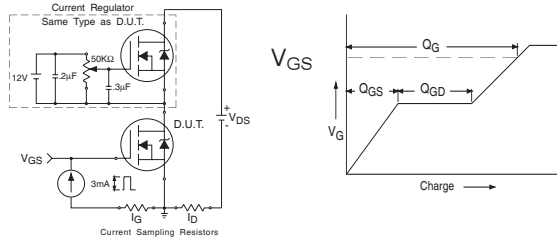
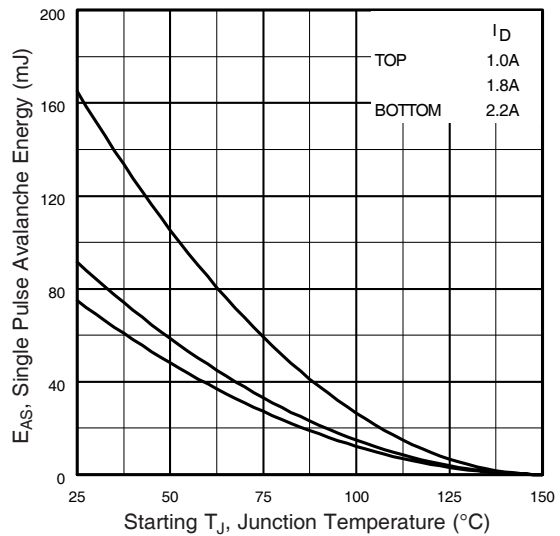
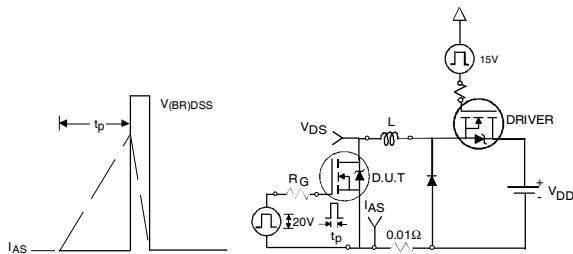
**Fig 10a.** Switching Time Test Circuit



**Fig 10b.** Switching Time Waveforms

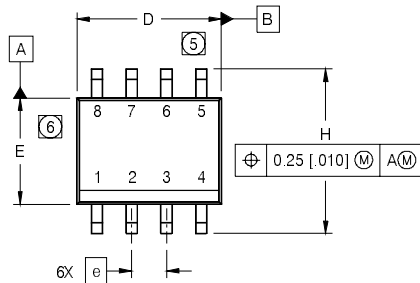


**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case

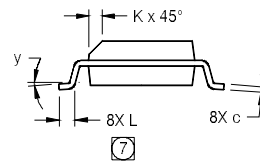
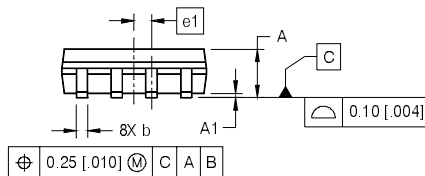

**Fig 12. On-Resistance Vs. Drain Current**

**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)



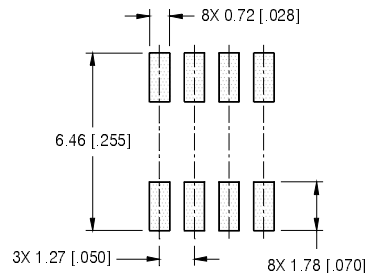
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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



**NOTES:**

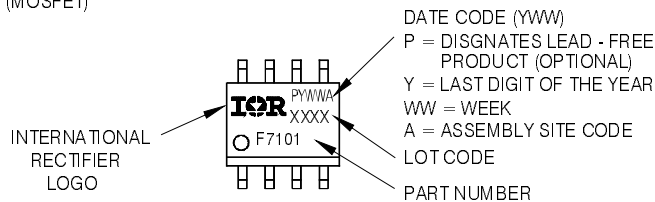
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
- ⑤ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
- ⑥ DIMENSION DOES NOT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

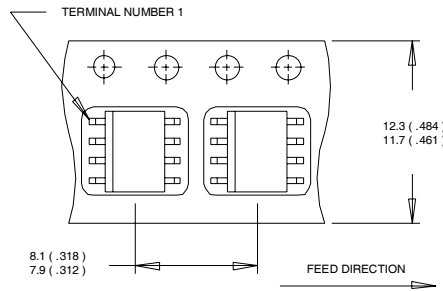
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



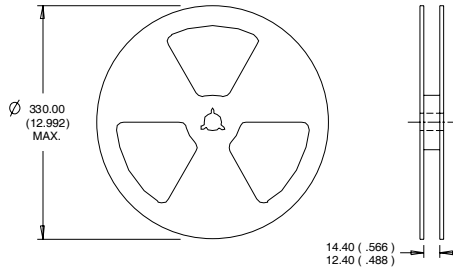
Note: For the most current drawing please refer to IR website at: <http://www.irf.com/package/>

**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/>
**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 31\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 2.2\text{A}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board.
- ⑤  $C_{oss}$  eff. is a fixed capacitance that gives the same charging time as  $C_{oss}$  while  $V_{DS}$  is rising from 0 to 80%  $V_{DSS}$ .
- ⑥  $I_{SD} \leq 2.2\text{A}$ ,  $di/dt \leq 220\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$ .

**Revision History**

Date	Comments
09/16/2013	<ul style="list-style-type: none"> <li>• Updated the <math>R_{thja}</math> from <math>50^\circ\text{C}/\text{W}</math> to <math>62.5^\circ\text{C}/\text{W}</math>, on page 1.</li> <li>• Converted the data sheet to IR Corporate Template.</li> </ul>

 International  
 Rectifier

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