

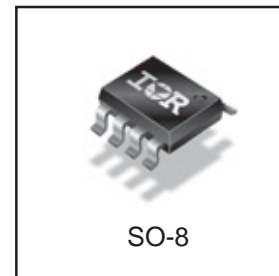
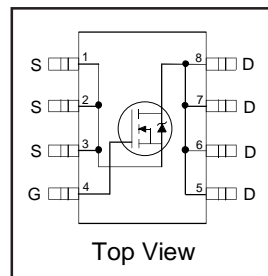
**Applications**

- High Frequency Synchronous Buck Converters for Computers and Communications
- Lead-Free

V <sub>DS</sub>	R <sub>DS(on)</sub> max (mΩ)	I <sub>D</sub>
30V	8.5@V <sub>GS</sub> = 10V	14A
	10@V <sub>GS</sub> = 4.5V	11A

**Benefits**

- Ultra-Low Gate Impedance
- Very Low R<sub>DS(on)</sub>
- Fully Characterized Avalanche Voltage and Current
- Low Charge Ratio to Eliminate False Turn On in High Frequency Circuits



**Absolute Maximum Ratings**

Symbol	Parameter	Max.	Units
V <sub>DS</sub>	Drain-Source Voltage	30	V
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	V
I <sub>D</sub> @ T <sub>A</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	14	A
I <sub>D</sub> @ T <sub>A</sub> = 70°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	11	
I <sub>DM</sub>	Pulsed Drain Current <sup>①</sup>	110	
P <sub>D</sub> @ T <sub>A</sub> = 25°C	Maximum Power Dissipation <sup>④</sup>	2.5	W
P <sub>D</sub> @ T <sub>A</sub> = 70°C	Maximum Power Dissipation <sup>④</sup>	1.6	W
	Linear Derating Factor	0.02	mW/°C
T <sub>J</sub> , T <sub>STG</sub>	Junction and Storage Temperature Range	-55 to + 150	°C

**Thermal Resistance**

Symbol	Parameter	Typ.	Max.	Units
R <sub>θJL</sub>	Junction-to-Drain Lead	—	20	°C/W
R <sub>θJA</sub>	Junction-to-Ambient <sup>④</sup>	—	50	

Notes ① through ④ are on page 8  
www.irf.com

# IRF7477PbF

International  
IR Rectifier

## 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	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	—	0.029	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	6.5	8.5	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 14A ③
		—	7.7	10		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 11A ③
V <sub>GS(th)</sub>	Gate Threshold Voltage	1.0	—	2.5	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> = 24V, V <sub>GS</sub> = 0V
		—	—	100		V <sub>DS</sub> = 24V, 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> = 16V
	Gate-to-Source Reverse Leakage	—	—	-200		V <sub>GS</sub> = -16V

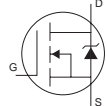
## Dynamic @ T<sub>J</sub> = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g <sub>fs</sub>	Forward Transconductance	35	—	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 11A
Q <sub>g</sub>	Total Gate Charge	—	25	38	nC	I <sub>D</sub> = 11A
Q <sub>gs</sub>	Gate-to-Source Charge	—	6.5	—		V <sub>DS</sub> = 15V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge	—	8.2	—		V <sub>GS</sub> = 4.5V
Q <sub>oss</sub>	Output Gate Charge	—	30	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 15V
t <sub>d(on)</sub>	Turn-On Delay Time	—	12	—	ns	V <sub>DD</sub> = 15V
t <sub>r</sub>	Rise Time	—	9.8	—		I <sub>D</sub> = 11A
t <sub>d(off)</sub>	Turn-Off Delay Time	—	19	—		R <sub>G</sub> = 1.8Ω
t <sub>f</sub>	Fall Time	—	5.9	—		V <sub>GS</sub> = 4.5V ③
C <sub>iss</sub>	Input Capacitance	—	2710	—	pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance	—	1120	—		V <sub>DS</sub> = 15V
C <sub>rss</sub>	Reverse Transfer Capacitance	—	100	—		f = 1.0MHz

## Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy②	—	500	mJ
I <sub>AR</sub>	Avalanche Current①	—	8.2	A

## Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	2.3	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	110		
V <sub>SD</sub>	Diode Forward Voltage	—	0.80	1.3	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 11A, V <sub>GS</sub> = 0V ③
		—	0.65	—		T <sub>J</sub> = 125°C, I <sub>S</sub> = 11A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	91	140	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 11A, V <sub>R</sub> = 15V
Q <sub>rr</sub>	Reverse Recovery Charge	—	130	200		di/dt = 100A/μs ③
t <sub>rr</sub>	Reverse Recovery Time	—	90	140	ns	T <sub>J</sub> = 125°C, I <sub>F</sub> = 11A, V <sub>R</sub> = 15V
Q <sub>rr</sub>	Reverse Recovery Charge	—	140	210		di/dt = 100A/μs ③

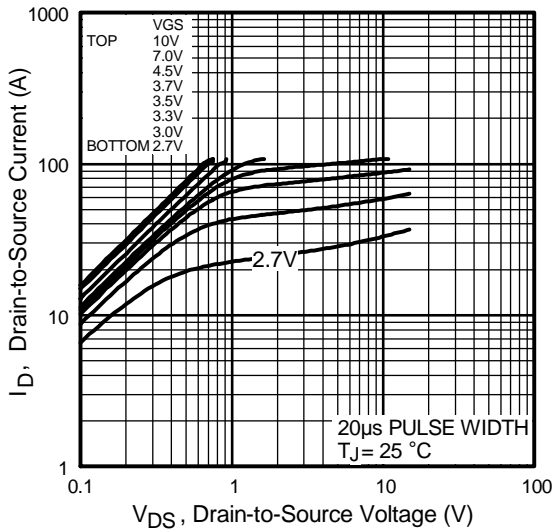


Fig 1. Typical Output Characteristics

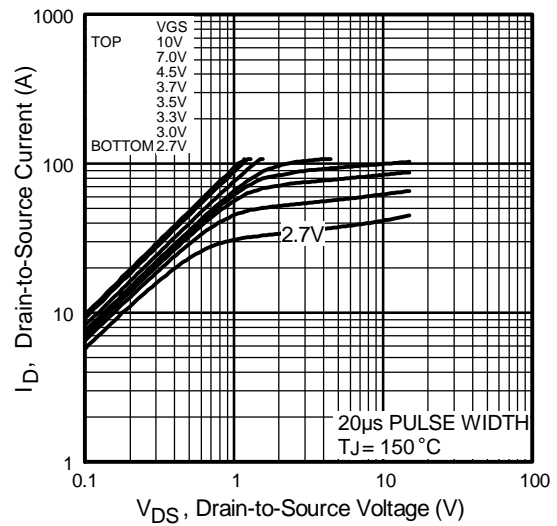


Fig 2. Typical Output Characteristics

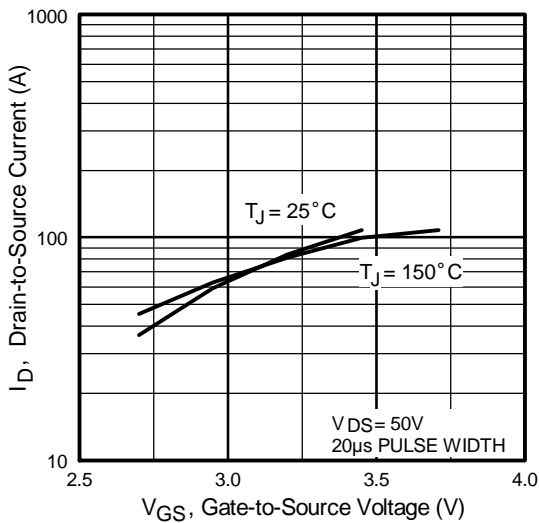


Fig 3. Typical Transfer Characteristics

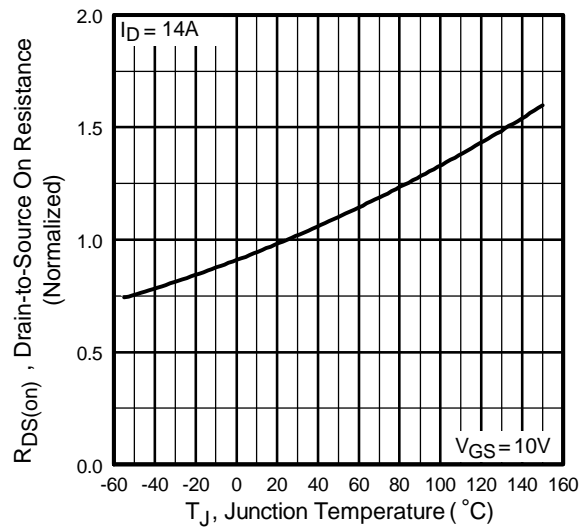
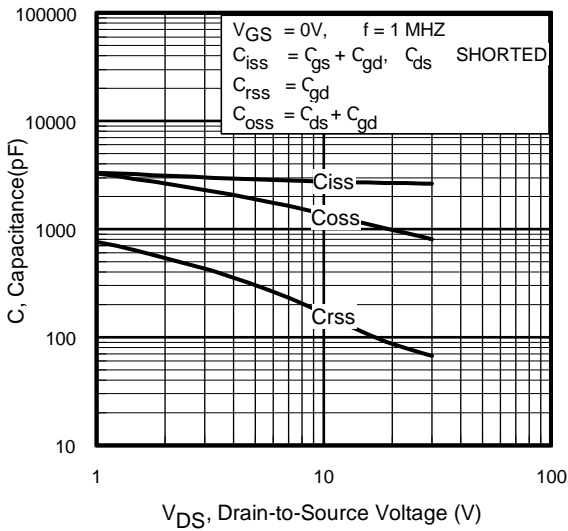
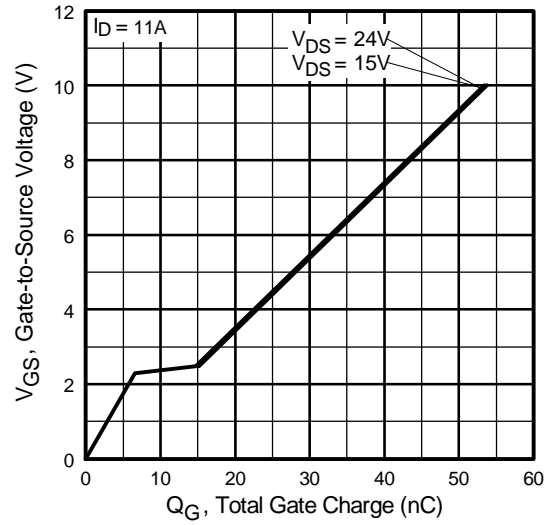


Fig 4. Normalized On-Resistance Vs. Temperature

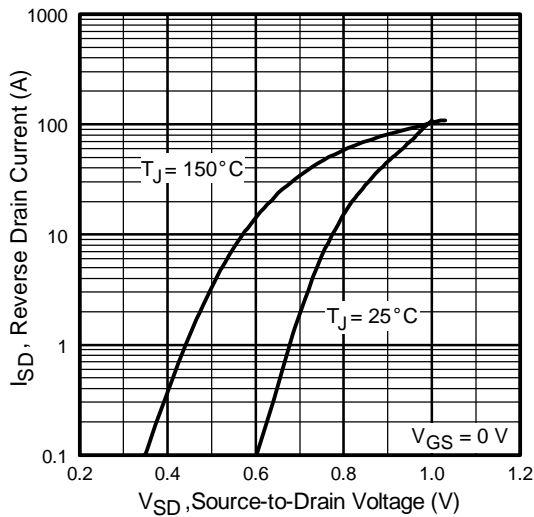
# IRF7477PbF



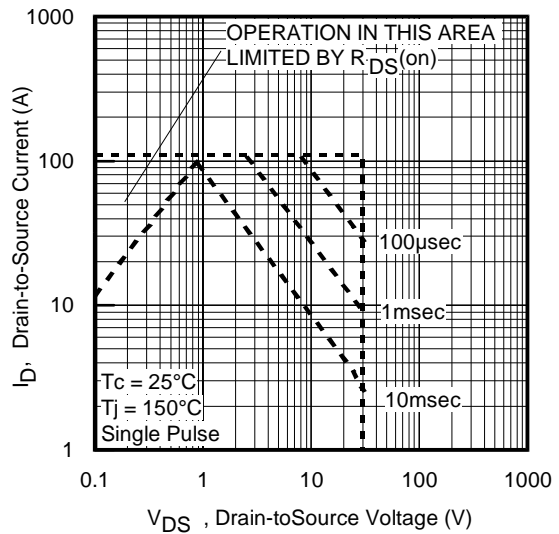
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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



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

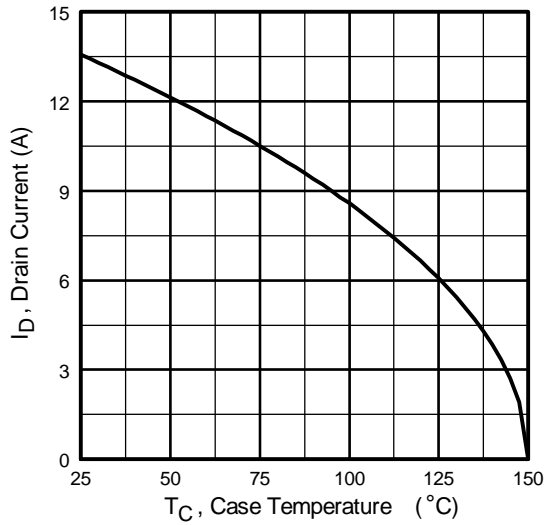


**Fig 8.** Maximum Safe Operating Area

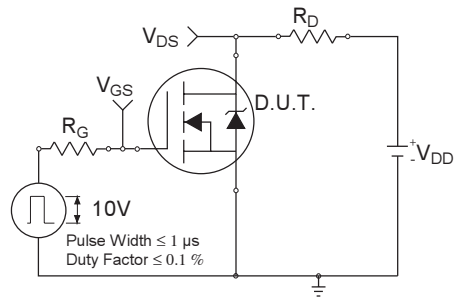
**Fig 6.** On-Resistance Vs. Drain Current

International  
IR Rectifier

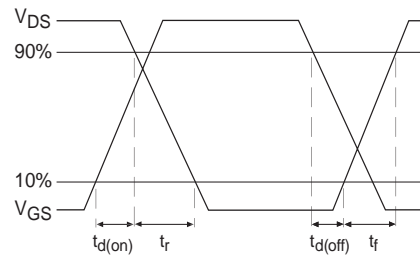
IRF7477PbF



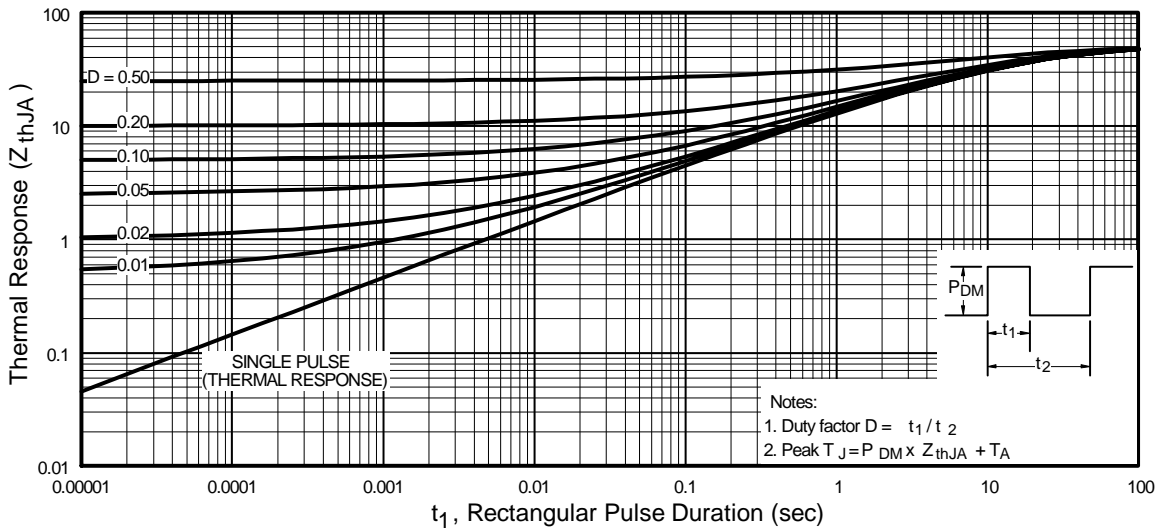
**Fig 9.** Maximum Drain Current Vs. Ambient Temperature



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



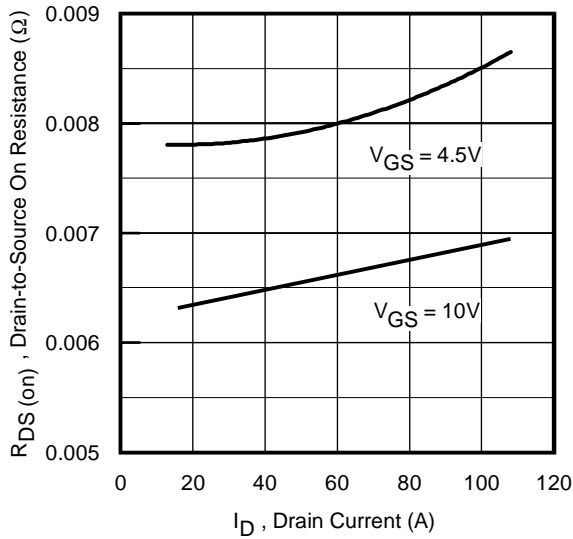
**Fig 10b.** Switching Time Waveforms



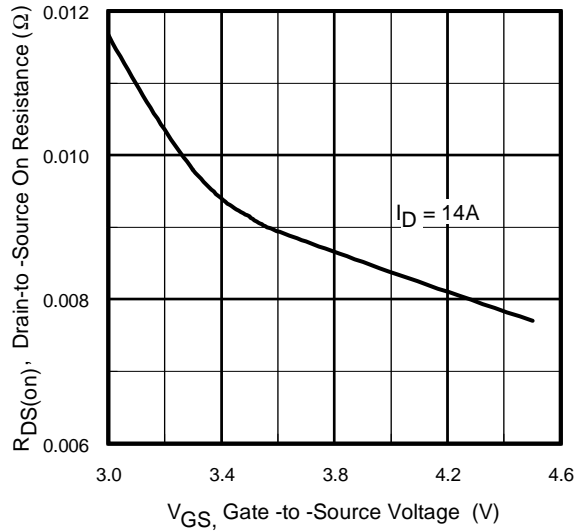
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

# IRF7477PbF

International  
**IR** Rectifier



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



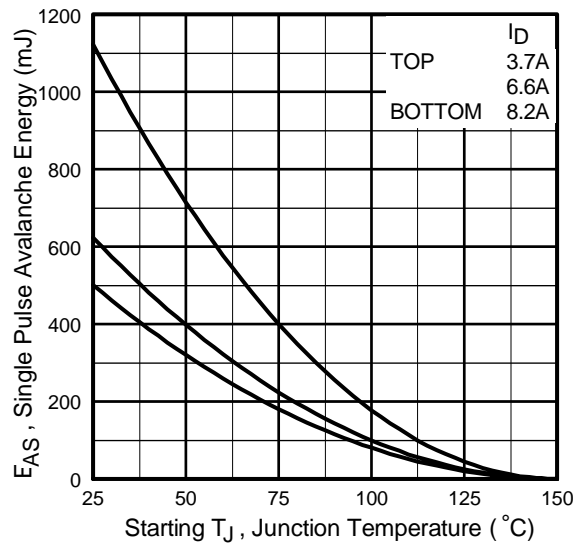
**Fig 13.** On-Resistance Vs. Gate Voltage



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



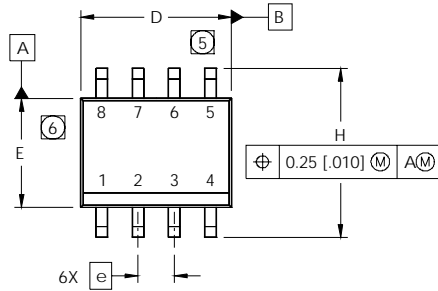
**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms



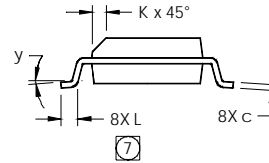
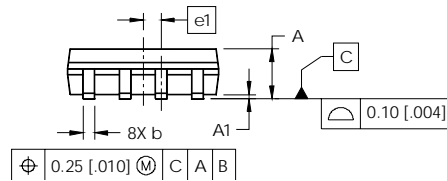
**Fig 15c.** Maximum Avalanche Energy Vs. Drain Current

## SO-8 Package Outline

Dimensions are shown in millimeters (inches)



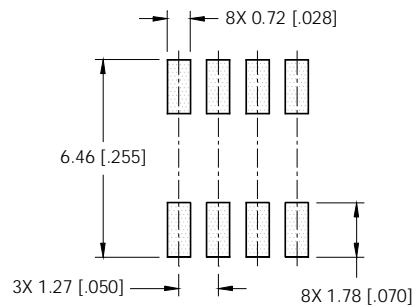
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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



**NOTES:**

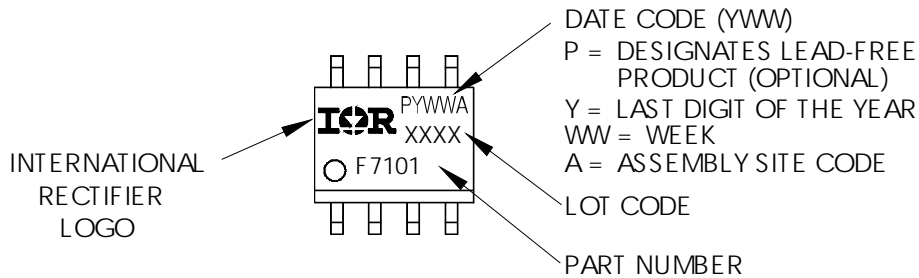
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA
- ⑤ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
- ⑥ DIMENSION DOES NOT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

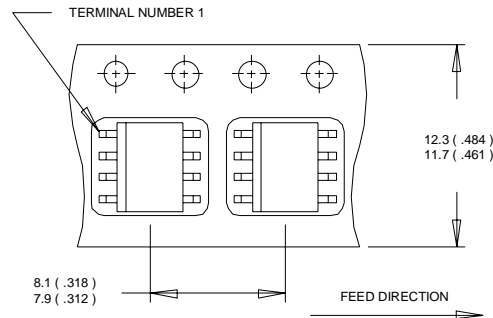


# IRF7477PbF

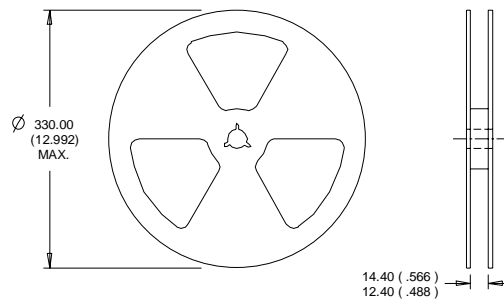
International  
**IR** Rectifier

## 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  $T_J = 25^\circ\text{C}$ ,  $L = 15\text{mH}$   
 $R_G = 25\Omega$ ,  $I_{AS} = 8.2\text{A}$ .
- 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 Consumer market.  
Qualifications Standards can be found on IR's Web site.

International  
**IR** Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105  
TAC Fax: (310) 252-7903

Visit us at [www.irf.com](http://www.irf.com) for sales contact information.09/04

[www.irf.com](http://www.irf.com)