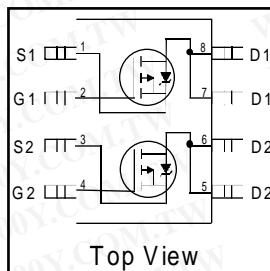


- Generation V Technology
- Ultra Low On-Resistance
- Dual P-Channel MOSFET
- Surface Mount
- Very Low Gate Charge and Switching Losses
- Fully Avalanche Rated



$$V_{DSS} = -30V$$

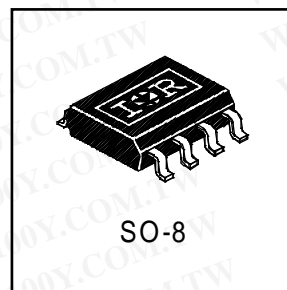
$$R_{DS(on)} = 0.25\Omega$$

### Description

Fifth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET Power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of applications.

The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, infra red, or wave soldering techniques.

Recommended upgrade: IRF7306 or IRF7316  
 Lower profile/smaller equivalent: IRF7506



### Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>⑤</sup>	$I_D$	$T_A = 25^\circ\text{C}$	A
		$T_A = 70^\circ\text{C}$	
Pulsed Drain Current	$I_{DM}$	-10	
Continuous Source Current (Diode Conduction)	$I_S$	1.6	
Maximum Power Dissipation <sup>⑤</sup>	$P_D$	$T_A = 25^\circ\text{C}$	W
		$T_A = 70^\circ\text{C}$	
Single Pulse Avalanche Energy	$E_{AS}$	57	mJ
Avalanche Current	$I_{AR}$	-1.3	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	$^\circ\text{C}$

### Thermal Resistance Ratings

Parameter	Symbol	Limit	Units
Maximum Junction-to-Ambient <sup>⑤</sup>	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

# IRF9953

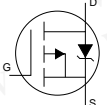
勝特力材料 886-3-5753170  
 勝特力电子(上海) 86-21-54151736  
 勝特力电子(深圳) 86-755-83298787  
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International  
**IR** Rectifier

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

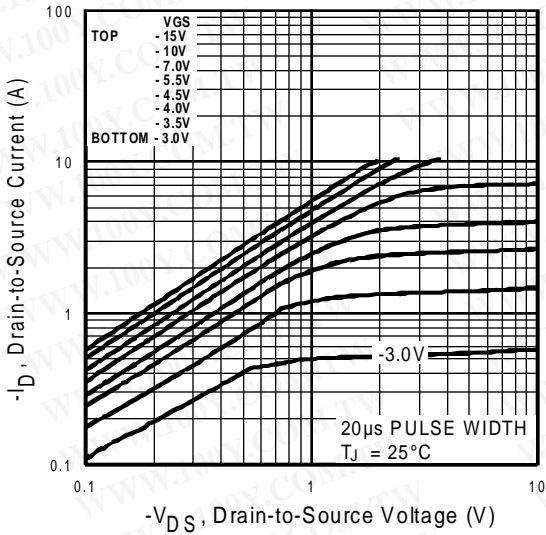
	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-30	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.015	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}$ , $I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	0.165	0.250	$\Omega$	$V_{GS} = 10V, I_D = -1.0A$ ④
		—	0.290	0.400		$V_{GS} = 4.5V, I_D = -0.50A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	-1.0	—	—	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
$g_{fs}$	Forward Transconductance	—	-2.4	—	S	$V_{DS} = -15V, I_D = -2.3A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	-2.0	$\mu A$	$V_{DS} = 24V, V_{GS} = 0V$
		—	—	-25		$V_{DS} = 24V, V_{GS} = 0V, T_J = 55^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = -20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = 20V$
$Q_g$	Total Gate Charge	—	6.1	12	nC	$I_D = -2.3A$
$Q_{gs}$	Gate-to-Source Charge	—	1.7	3.4		$V_{DS} = -10V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	1.1	2.2		$V_{GS} = -10V$ , See Fig. 10 ④
$t_{d(on)}$	Turn-On Delay Time	—	9.7	19	ns	$V_{DD} = -10V$
$t_r$	Rise Time	—	14	28		$I_D = -1.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	20	40		$R_G = 6.0\Omega$
$t_f$	Fall Time	—	6.9	14		$R_D = 10\Omega$ ④
$C_{iss}$	Input Capacitance	—	190	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	120	—		$V_{DS} = -15V$
$C_{rss}$	Reverse Transfer Capacitance	—	61	—		$f = 1.0\text{MHz}$ , See Fig. 5

## Source-Drain Ratings and Characteristics

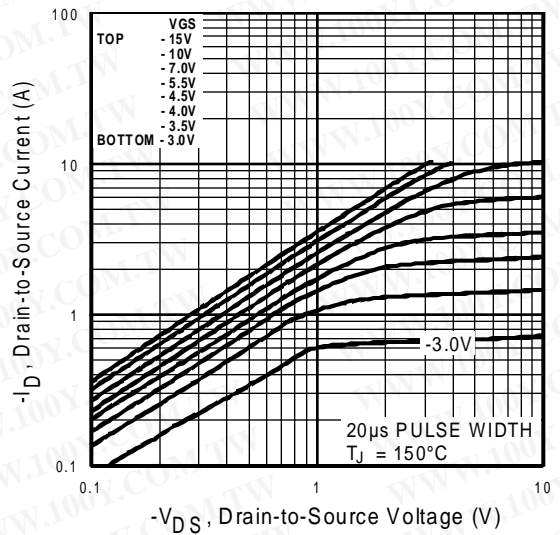
	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	1.3	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	16		
$V_{SD}$	Diode Forward Voltage	—	0.82	1.2	V	$T_J = 25^\circ\text{C}, I_S = -1.25A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	27	54	ns	$T_J = 25^\circ\text{C}, I_F = -1.25A$
$Q_{rr}$	Reverse Recovery Charge	—	31	62	nC	$di/dt = -100A/\mu s$ ③

### Notes:

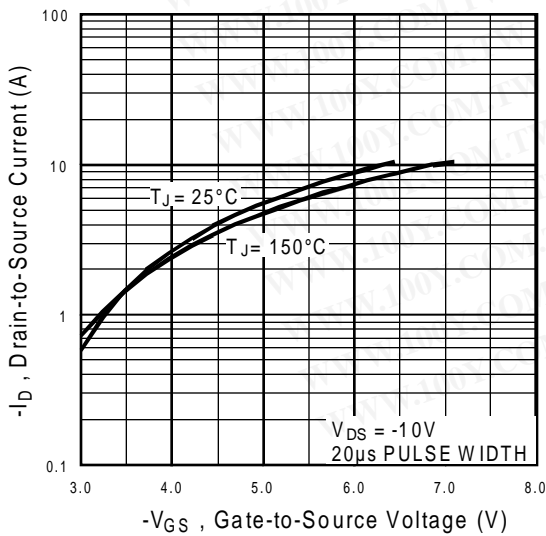
- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 67\text{mH}$   
 $R_G = 25\Omega, I_{AS} = -1.3A$ .
- ③  $I_{SD} \leq -1.3A, di/dt \leq -92A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$
- ④ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
- ⑤ Surface mounted on FR-4 board,  $t \leq 10\text{sec}$ .



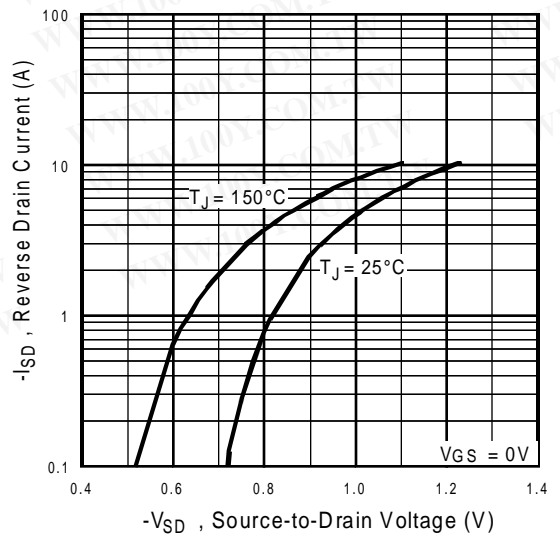
**Fig 1.** Typical Output Characteristics



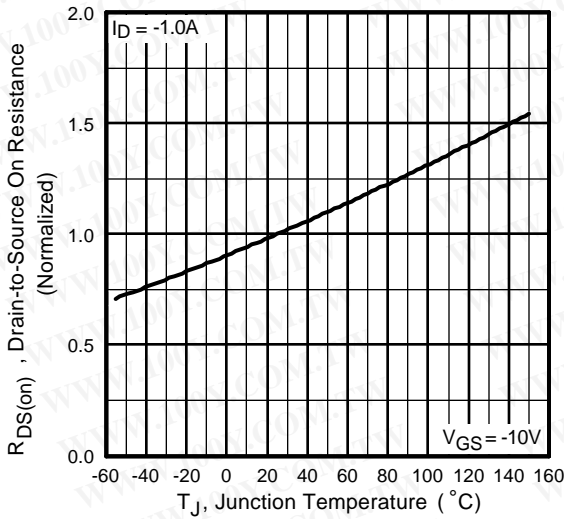
**Fig 2.** Typical Output Characteristics



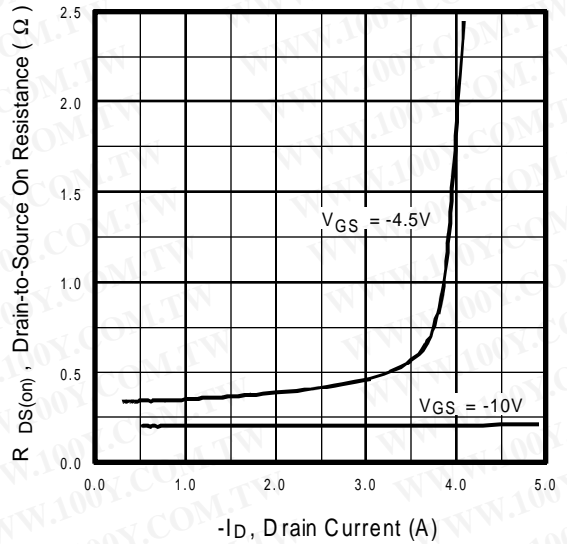
**Fig 3.** Typical Transfer Characteristics



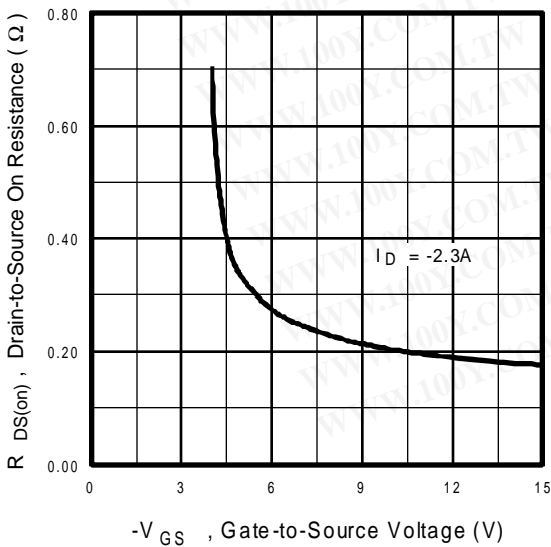
**Fig 4.** Typical Source-Drain Diode Forward Voltage



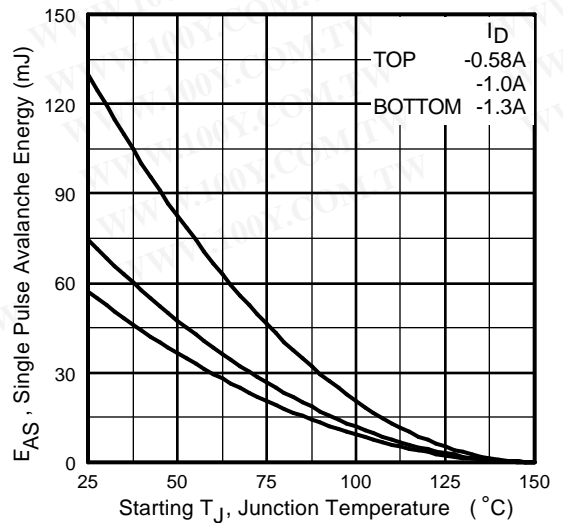
**Fig 5.** Normalized On-Resistance Vs. Temperature



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



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



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

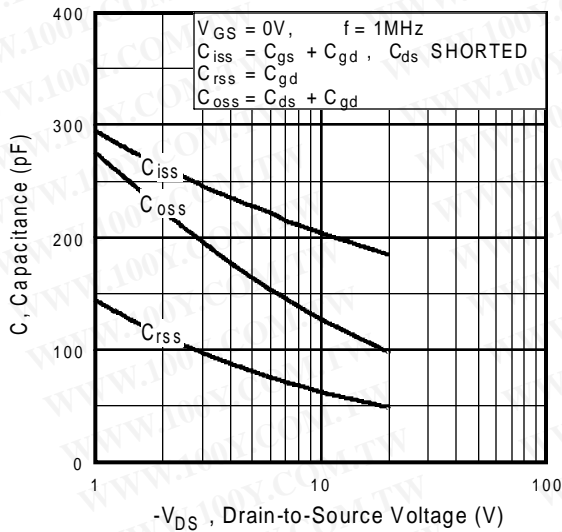


Fig 9. Typical Capacitance Vs. Drain-to-Source Voltage

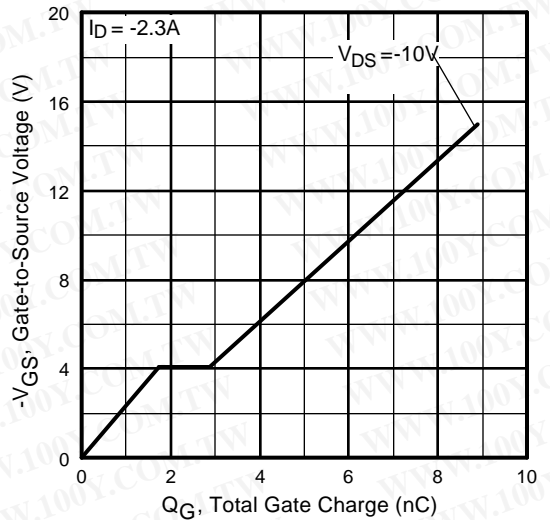


Fig 10. Typical Gate Charge Vs. Gate-to-Source Voltage

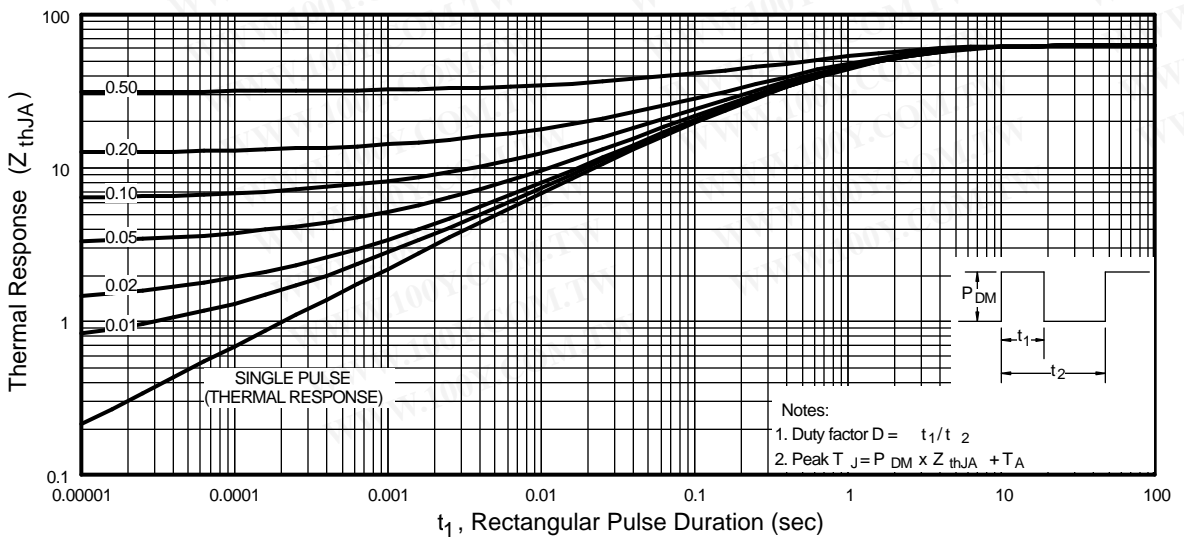


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

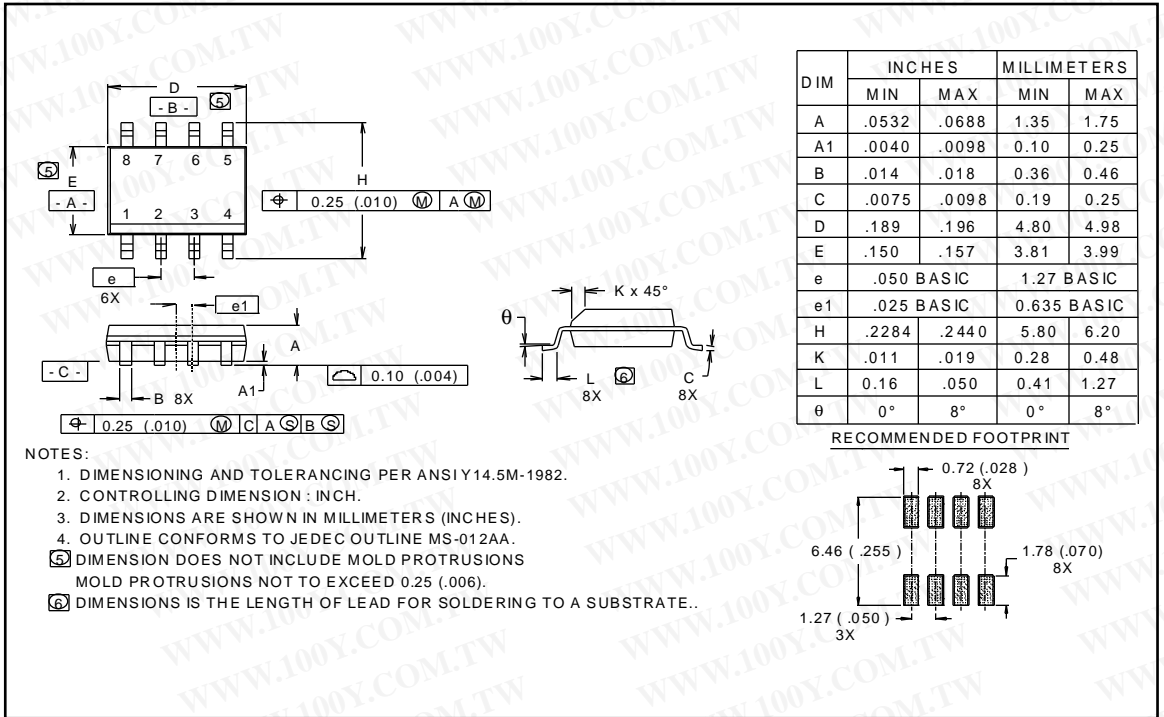
# IRF9953

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 勝特力电子(深圳) 86-755-83298787  
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International  
**IR** Rectifier

## Package Outline

### SO8 Outline



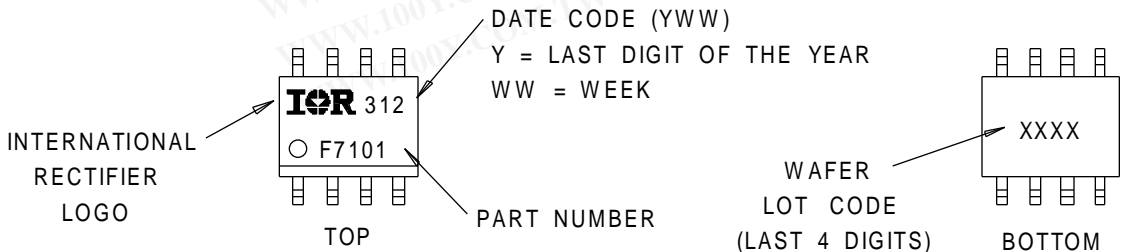
**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.
  2. CONTROLLING DIMENSION : INCH.
  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 0.25 (.006).  
 (6) DIMENSIONS IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE..

## Part Marking Information

### SO8

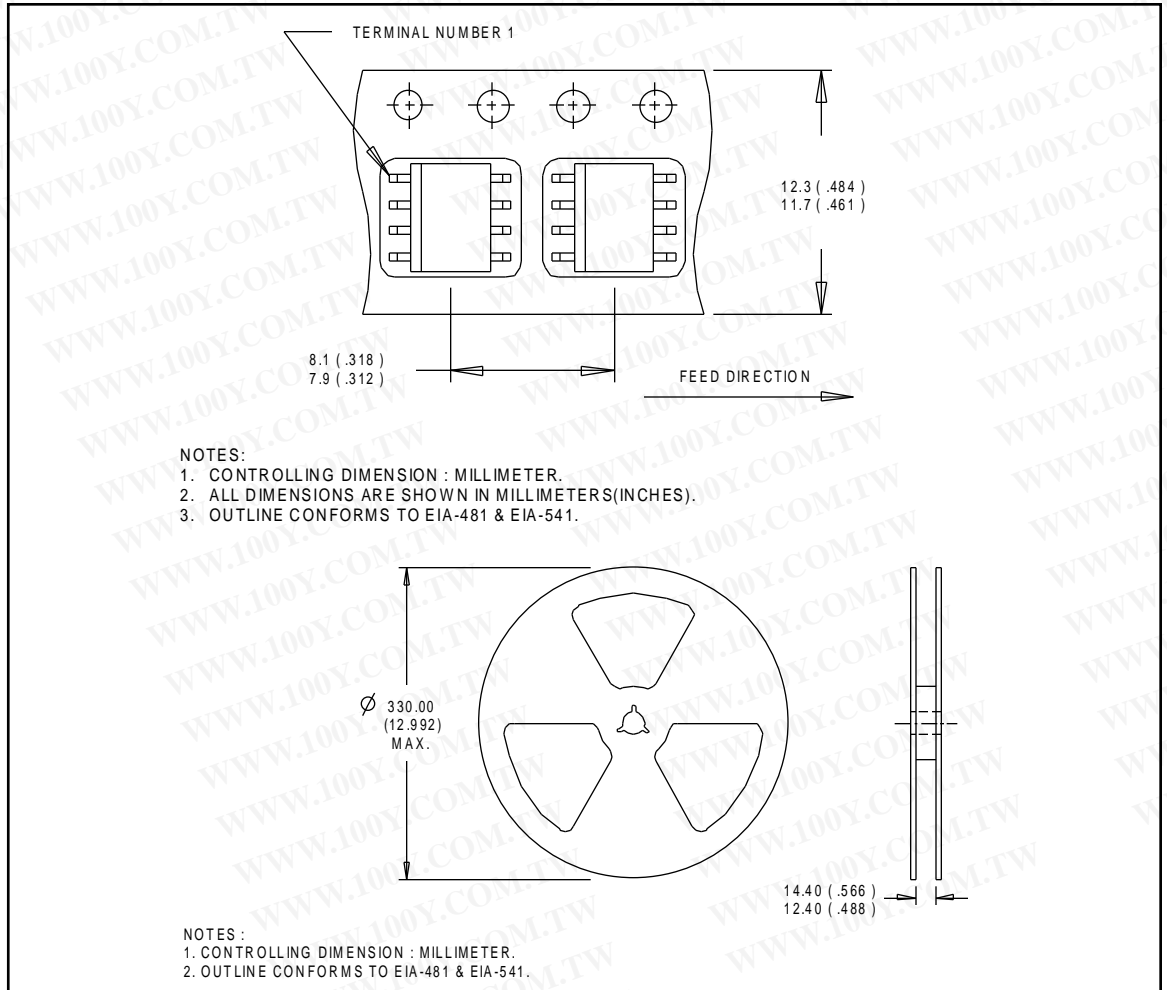
EXAMPLE : THIS IS AN IRF7101



## Tape & Reel Information

**S08**

Dimensions are shown in millimeters (inches)



International  
**IOR** Rectifier

**WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, Tel: (310) 322 3331

**EUROPEAN HEADQUARTERS:** Hurst Green, Oxted, Surrey RH8 9BB, UK Tel: ++ 44 1883 732020

**IR CANADA:** 7321 Victoria Park Ave., Suite 201, Markham, Ontario L3R 2Z8, Tel: (905) 475 1897

**IR GERMANY:** Saalburgstrasse 157, 61350 Bad Homburg Tel: ++ 49 6172 96590

**IR ITALY:** Via Liguria 49, 10071 Borgaro, Torino Tel: ++ 39 11 451 0111

**IR FAR EAST:** K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo Japan 171 Tel: 81 3 3983 0086

**IR SOUTHEAST ASIA:** 315 Outram Road, #10-02 Tan Boon Liat Building, Singapore 0316 Tel: 65 221 8371

<http://www.irf.com/>

Data and specifications subject to change without notice.

8/97