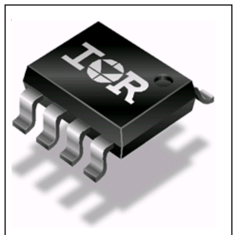
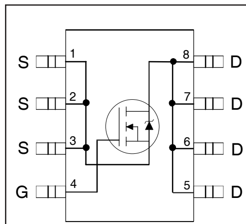
PD-90010A

IRF7809AV

- N-Channel Application-Specific MOSFETs
- Ideal for CPU Core DC-DC Converters
- Low Conduction Losses
- Low Switching Losses
- Minimizes Parallel MOSFETs for high current applications
- 100% Tested for R_G



SO-8



Top View

Description

This new device employs advanced HEXFET Power MOSFET technology to achieve an unprecedented balance of on-resistance and gate charge. The reduced conduction and switching losses make it ideal for high efficiency DC-DC converters that power the latest generation of microprocessors.

The IRF7809AV has been optimized for all parameters that are critical in synchronous buck converters including $R_{DS(on)}$, gate charge and Cdv/dt-induced turn-on immunity. The IRF7809AV offers particulary low $R_{DS(on)}$ and high Cdv/dt immunity for synchronous FET applications.

The package is designed for vapor phase, infra-red, convection, or wave soldering techniques. Power dissipation of greater than 2W is possible in a typical PCB mount application.

DEVICE CHARACTERISTICS⑤

	IRF7809AV
$R_{DS(on)}$	7.0mΩ
Q_G	41nC
Q_{sw}	14nC
Q_{oss}	30nC

Absolute Maximum Ratings

Parameter		Symbol	IRF7809A V	Units
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±12	
Continuous Drain or Source	$T_A = 25°C$	I_D	13.3	A
Current ($V_{GS} \geq 4.5V$)	$T_L = 90°C$		14.6	
Pulsed Drain Current①		I_{DM}	100	
Power Dissipation	$T_A = 25°C$	P_D	2.5	W
	$T_L = 90°C$		3.0	
Junction & Storage Temperature Range		T_J, T_{STG}	–55 to 150	°C
Continuous Source Current (Body Diode)		I_S	2.5	A
Pulsed Source Current①		I_{SM}	50	

Thermal Resistance

Parameter		Max.	Units
Maximum Junction-to-Ambient③	$R_{\theta JA}$	50	°C/W
Maximum Junction-to-Lead	$R_{\theta JL}$	20	°C/W

8/23/05

Electrical Characteristics

Parameter		Min	Typ	Max	Units	Conditions
Drain-to-Source Breakdown Voltage	BV_{DSS}	30	–	–	V	V_{GS} = 0V, I_D = 250μA
Static Drain-Source on Resistance	$R_{DS(on)}$		7.0	9.0	mΩ	V_{GS} = 4.5V, I_D = 15A②
Gate Threshold Voltage	$V_{GS(th)}$	1.0			V	V_{DS} = V_{GS},I_D = 250μA
Drain-Source Leakage Current	I_{DSS}			30	μA	V_{DS} = 24V, V_{GS} = 0
				150		V_{DS} = 24V, V_{GS} = 0, Tj = 100°C
Gate-Source Leakage Current*	I_{GSS}			±100	nA	V_{GS} = ±12V
Total Gate Chg Cont FET	Q_G		41	62	nC	V_{GS}=5V, I_D=15A, V_{DS}=20V
Total Gate Chg Sync FET	Q_G		36	54		V_{GS} = 5V, V_{DS}< 100mV
Pre-Vth Gate-Source Charge	Q_{GS1}		7.0			V_{DS} = 20V, I_D = 15A
Post-Vth Gate-Source Charge	Q_{GS2}		2.3			
Gate to Drain Charge	Q_{GD}		12			I_D=15A, V_{DS}=16V
Switch Chg(Q_{gs2} + Q_{gd})	Q_{sw}		14	21		
Output Charge*	Q_{oss}		30	45		V_{DS} = 16V, V_{GS} = 0
Gate Resistance	R_G		1.5	3.0	Ω	
Turn-on Delay Time	$t_{d\ (on)}$		14		ns	V_{DD} = 16V, I_D = 15A
Rise Time	t_r		36			V_{GS} = 5V
Turn-off Delay Time	$t_{d\ (off)}$		96			Clamped Inductive Load
Fall Time	t_f		10			
Input Capacitance	C_{iss}	–	3780	–	pF	V_{DS} = 16V, V_{GS} = 0
Output Capacitance	C_{oss}	–	1060	–		
Reverse Transfer Capacitance	C_{rss}	–	130	–		

Source-Drain Rating & Characteristics

Parameter		Min	Typ	Max	Units	Conditions
Diode Forward Voltage*	V_{SD}			1.3	V	I_S = 15A②, V_{GS} = 0V
Reverse Recovery Charge④	Q_{rr}		120		nC	di/dt ~ 700A/μs V_{DS} = 16V, V_{GS} = 0V, I_S = 15A
Reverse Recovery Charge (with Parallel Schottky)④	$Q_{rr(s)}$		150		nC	di/dt = 700A/μs (with 10BQ040) V_{DS} = 16V, V_{GS} = 0V, I_S = 15A

Notes:
① Repetitive rating; pulse width limited by max. junction temperature.
② Pulse width ≤ 400 μs; duty cycle ≤ 2%.
③ When mounted on 1 inch square copper board, t < 10 sec.
④ Typ = measured - Q_{oss}
⑤ Typical values measured at V_{GS} = 4.5V, I_F = 15A.

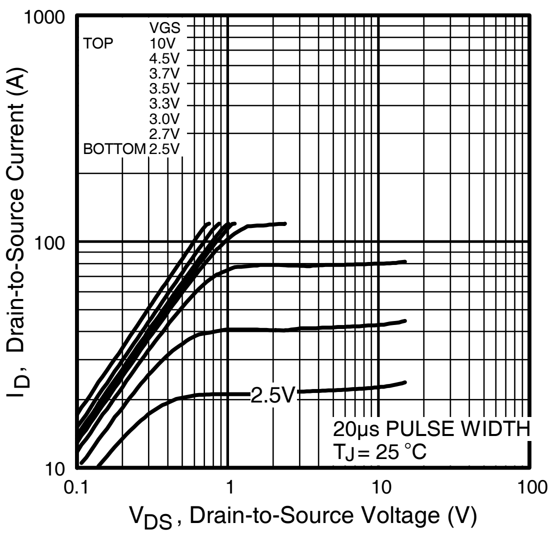


Fig 1. Typical Output Characteristics

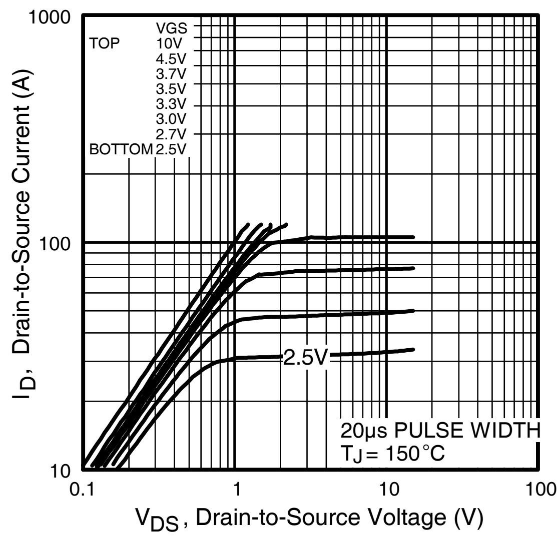


Fig 2. Typical Output Characteristics

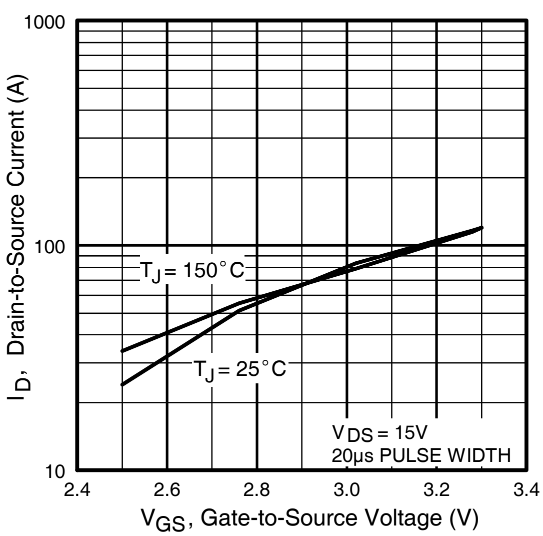


Fig 3. Typical Transfer Characteristics

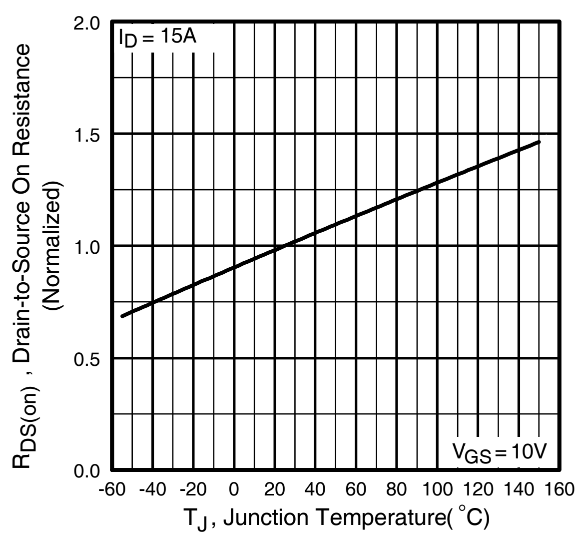


Fig 4. Normalized On-Resistance Vs. Temperature

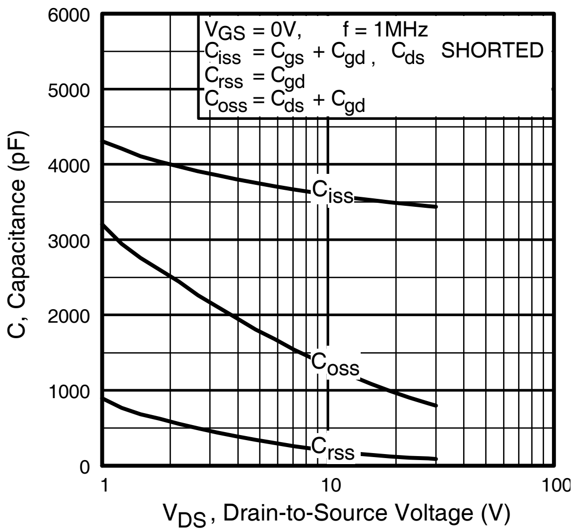


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

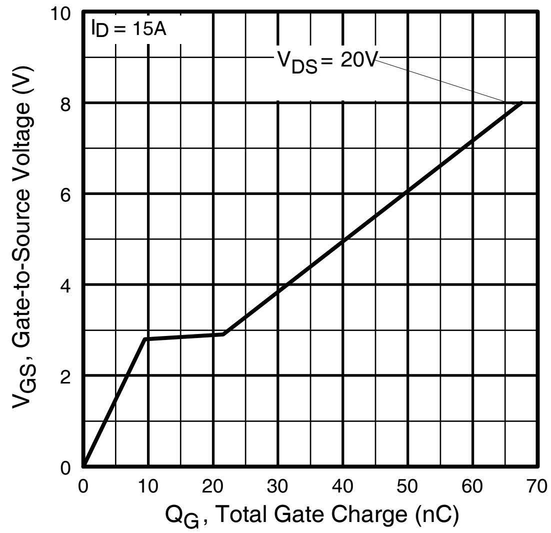


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

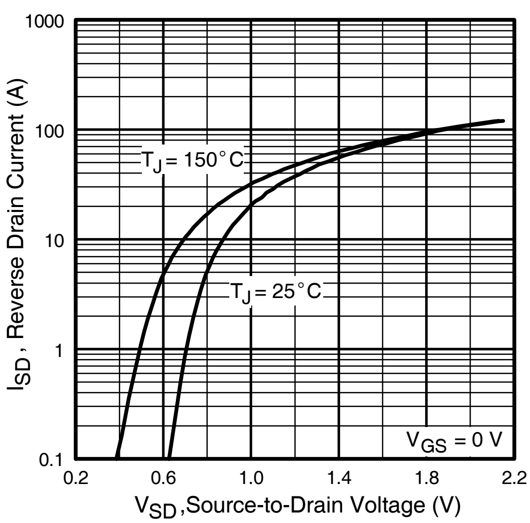


Fig 7. Typical Source-Drain Diode Forward Voltage

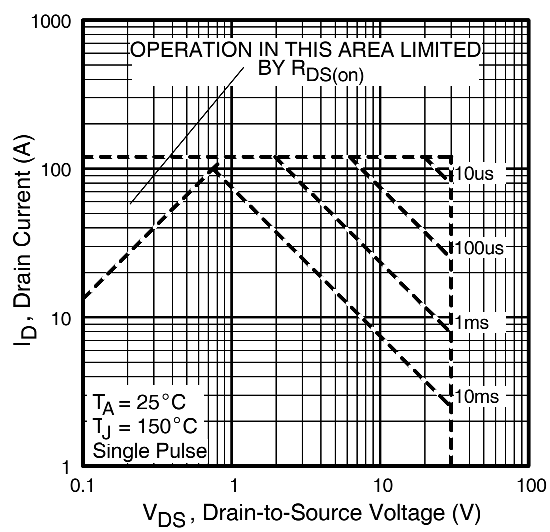


Fig 8. Maximum Safe Operating Area

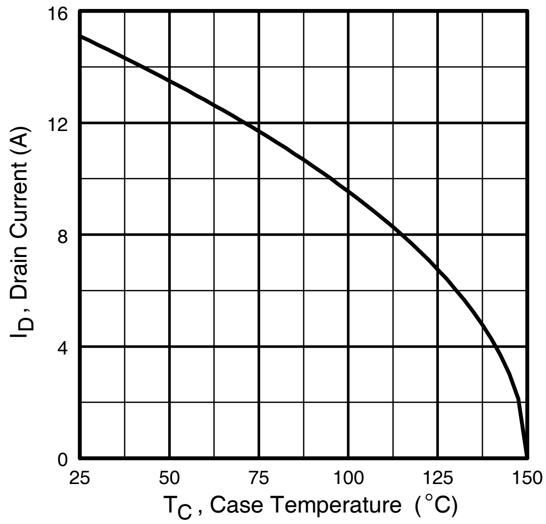


Fig 9. Maximum Drain Current Vs. Case Temperature

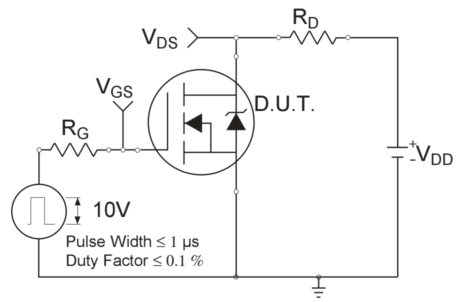


Fig 10a. Switching Time Test Circuit

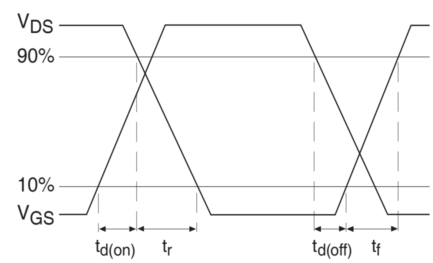


Fig 10b. Switching Time Waveforms

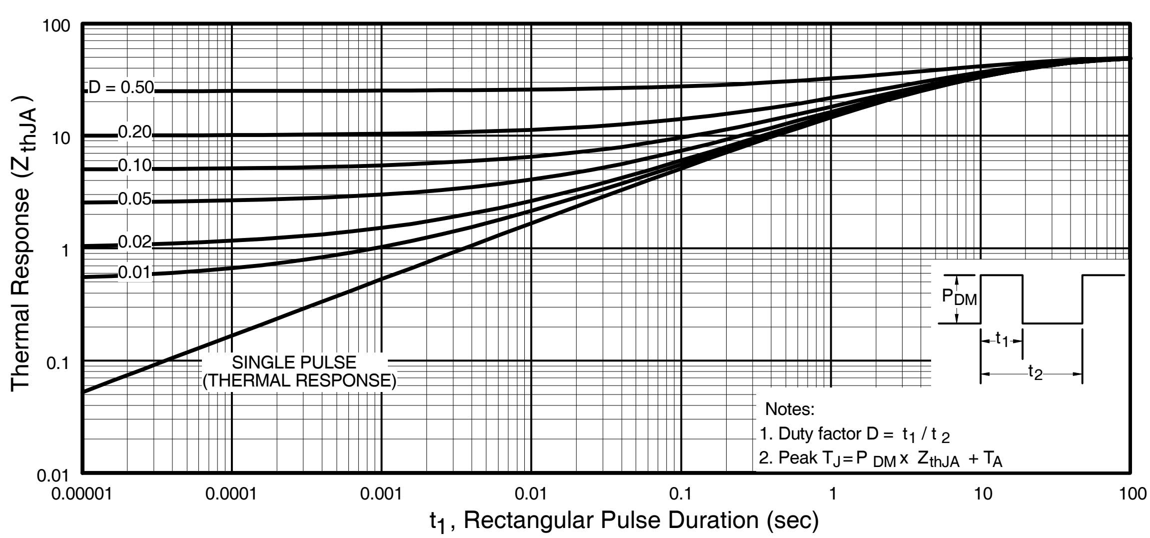


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

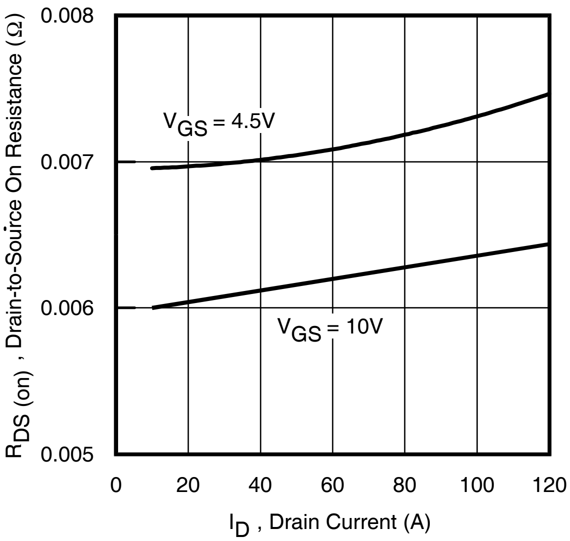


Fig 12. On-Resistance Vs. Drain Current

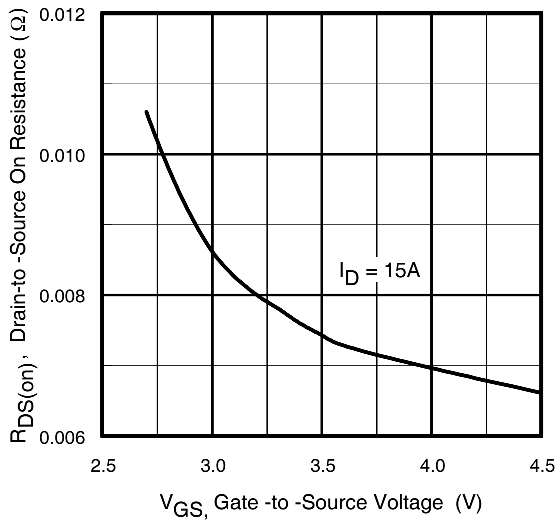


Fig 13. On-Resistance Vs. Gate Voltage

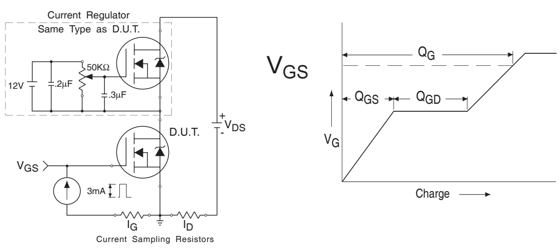


Fig 13a&b. Basic Gate Charge Test Circuit and Waveform

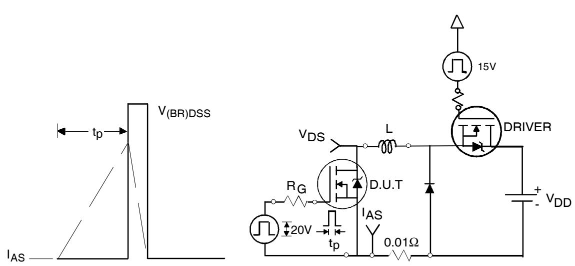


Fig 14a&b. Unclamped Inductive Test circuit and Waveforms

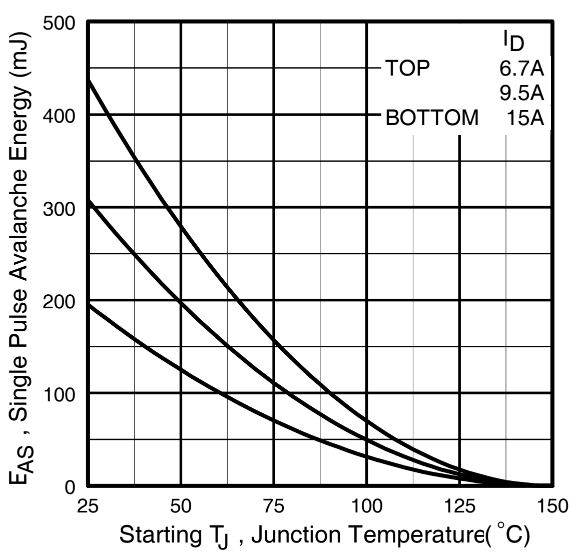
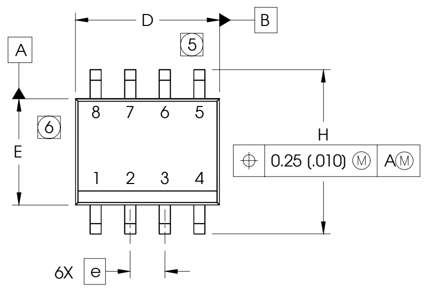
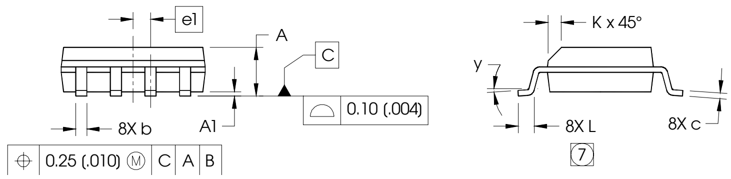


Fig 14c. Maximum Avalanche Energy Vs. Drain Current

SO-8 Package Details

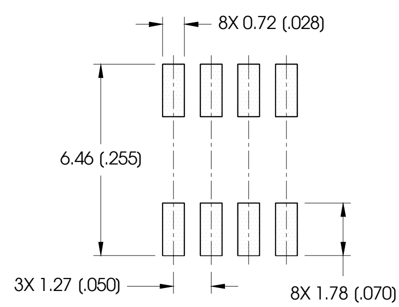


DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e 1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°



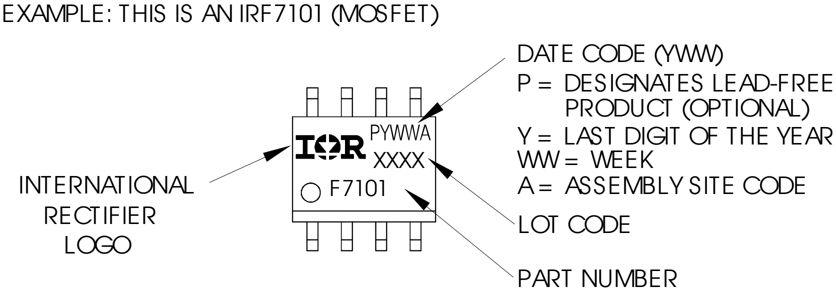
NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.010].
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT

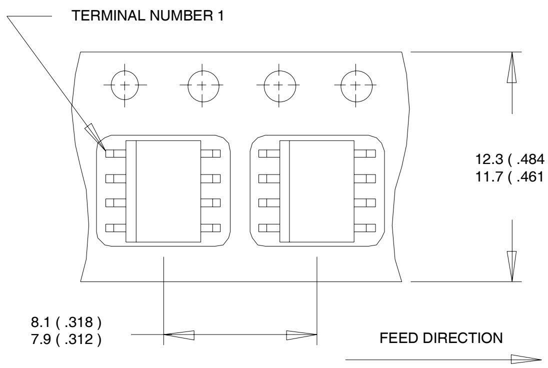


SO-8 Part Marking

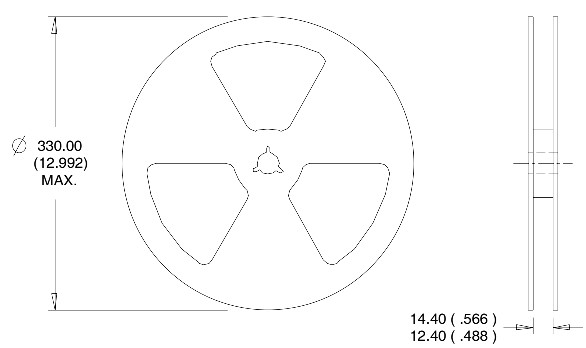
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



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.

International
IOR 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 for sales contact information. 08/05