

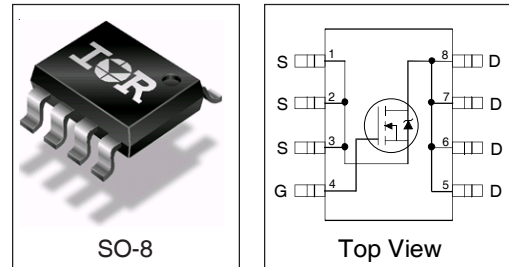
- N-Channel Application-Specific MOSFETs
- Ideal for CPU Core DC-DC Converters
- Low Conduction Losses
- Low Switching Losses
- Minimizes Parallel MOSFETs for high current applications
- 100% Tested for Rg
- Lead-Free

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 particularly 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 CHARACTERISTICS^⑤

	IRF7809AV
$R_{DS(on)}$	7.0m Ω
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 Current ($V_{GS} \geq 4.5V$)	$T_A = 25^\circ C$	I_D	13.3
	$T_L = 90^\circ C$		14.6
Pulsed Drain Current ^①	I_{DM}	100	A
Power Dissipation	$T_A = 25^\circ C$	P_D	2.5
	$T_L = 90^\circ C$		3.0
Junction & Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ C$
Continuous Source Current (Body Diode)	I_S	2.5	A
Pulsed Source Current ^①	I_{SM}	50	

Thermal Resistance

Parameter		Max.	Units
Maximum Junction-to-Ambient ^③	$R_{\theta JA}$	50	$^\circ C/W$
Maximum Junction-to-Lead	$R_{\theta JL}$	20	$^\circ C/W$

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Electrical Characteristics

Parameter		Min	Typ	Max	Units	Conditions
Drain-to-Source Breakdown Voltage	BV_{DSS}	30	-	-	V	$V_{GS} = 0V, I_D = 250\mu A$
Static Drain-Source on Resistance	$R_{DS(on)}$		7.0	9.0	m Ω	$V_{GS} = 4.5V, I_D = 15A$ Ⓞ
Gate Threshold Voltage	$V_{GS(th)}$	1.0			V	$V_{DS} = V_{GS}, I_D = 250\mu A$
Drain-Source Leakage Current	I_{DSS}			30	μA	$V_{DS} = 24V, V_{GS} = 0$
				150		$V_{DS} = 24V, V_{GS} = 0,$ $T_j = 100^\circ C$
Gate-Source Leakage Current*	I_{GSS}			± 100	nA	$V_{GS} = \pm 12V$
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	$I_S = 15A$ Ⓞ, $V_{GS} = 0V$
Reverse Recovery ChargeⓄ	Q_{rr}		120		nC	$di/dt \sim 700A/\mu s$ $V_{DS} = 16V, V_{GS} = 0V, I_S = 15A$
Reverse Recovery Charge (with Parallel Schottky)Ⓞ	$Q_{rr(s)}$		150		nC	$di/dt = 700A/\mu s$ (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 $\leq 400 \mu s$; duty cycle $\leq 2\%$.
 - ③ When mounted on 1 inch square copper board, $t < 10$ sec.
 - ④ Typ = measured - Q_{oss}
 - ⑤ Typical values measured at $V_{GS} = 4.5V, I_F = 15A$.

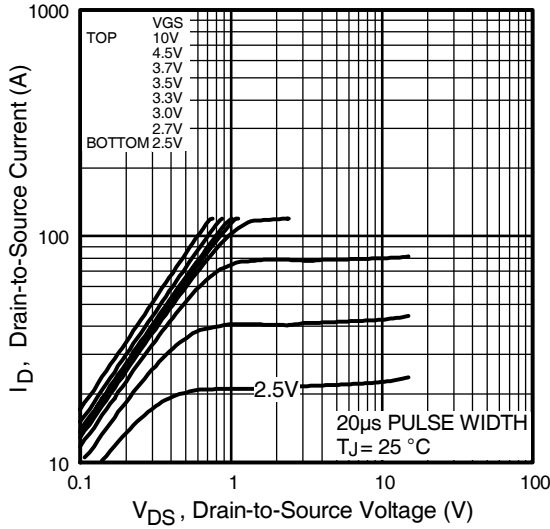


Fig 1. Typical Output Characteristics

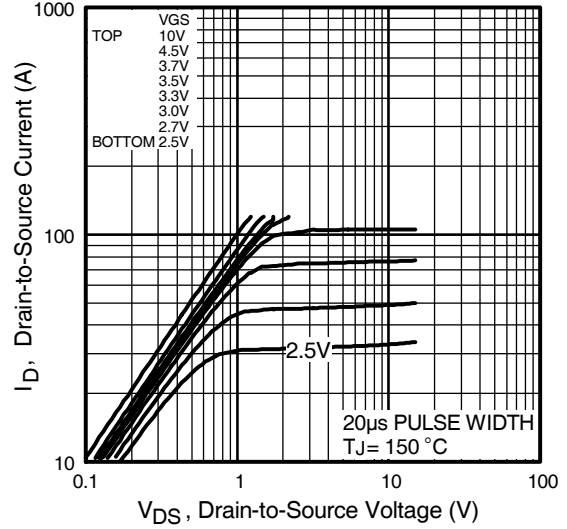


Fig 2. Typical Output Characteristics

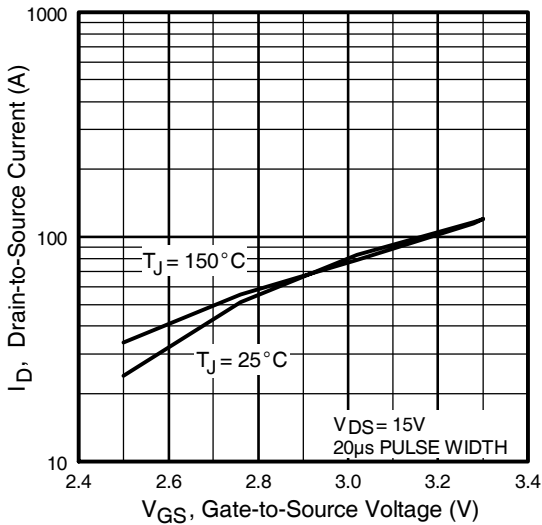


Fig 3. Typical Transfer Characteristics

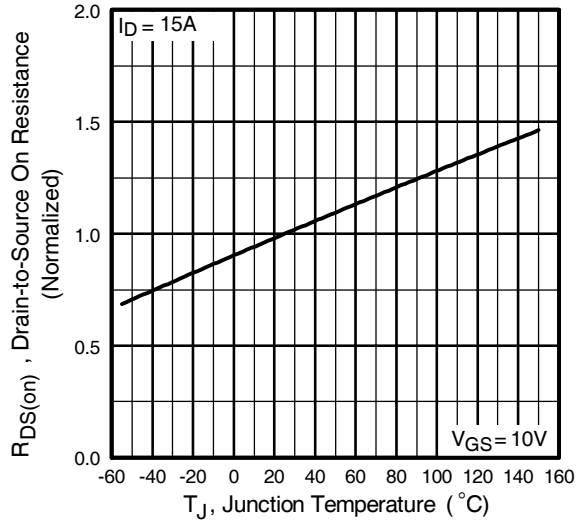


Fig 4. Normalized On-Resistance Vs. Temperature

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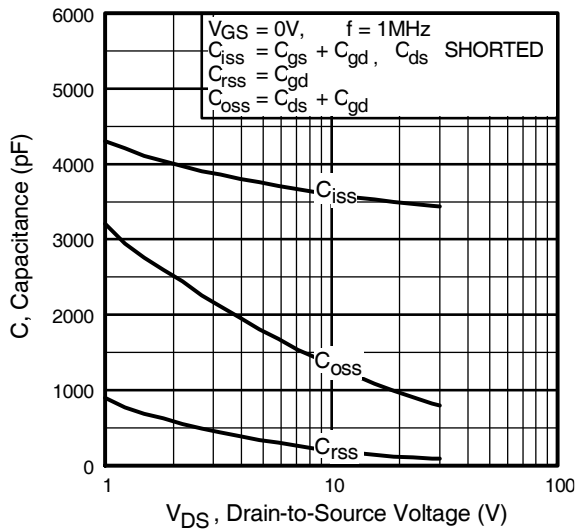


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

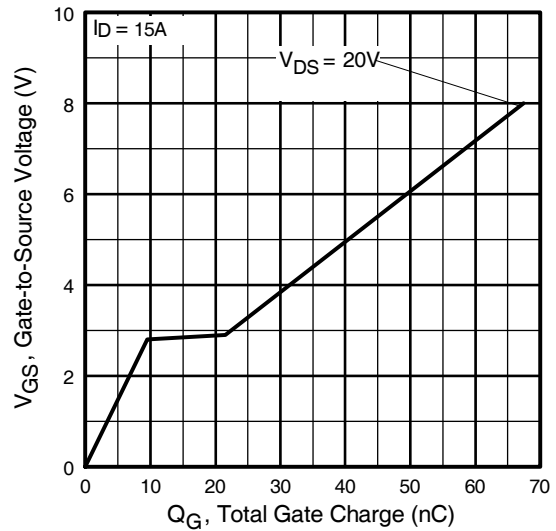


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

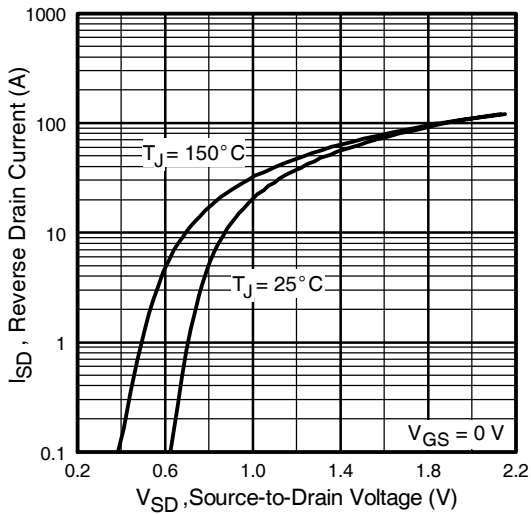


Fig 7. Typical Source-Drain Diode Forward Voltage

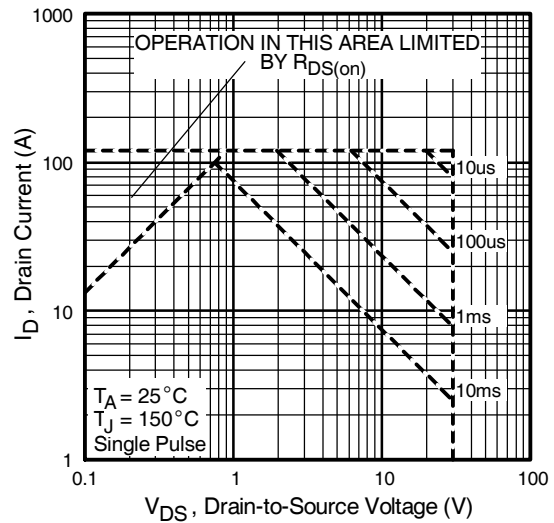


Fig 8. Maximum Safe Operating Area

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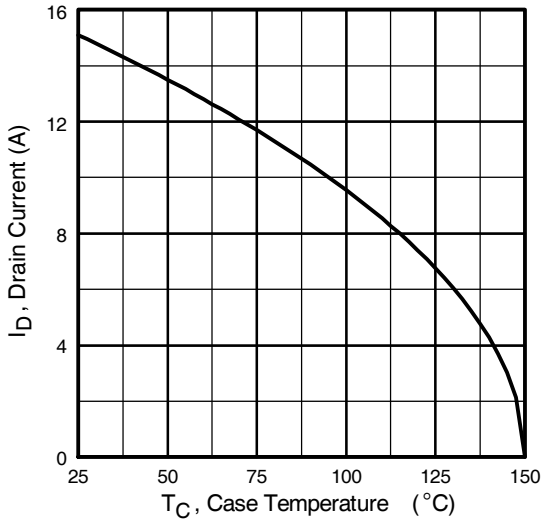


Fig 9. Maximum Drain Current Vs. Case Temperature

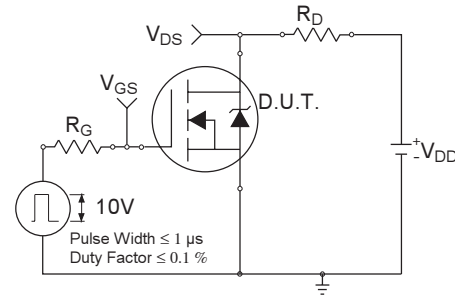


Fig 10a. Switching Time Test Circuit

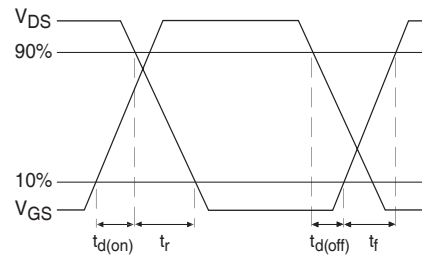


Fig 10b. Switching Time Waveforms

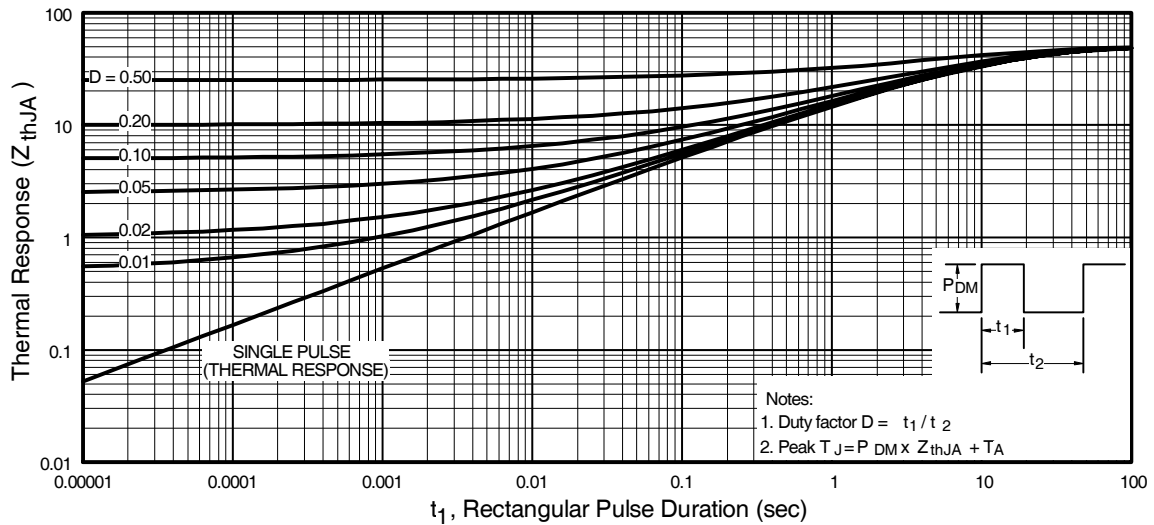


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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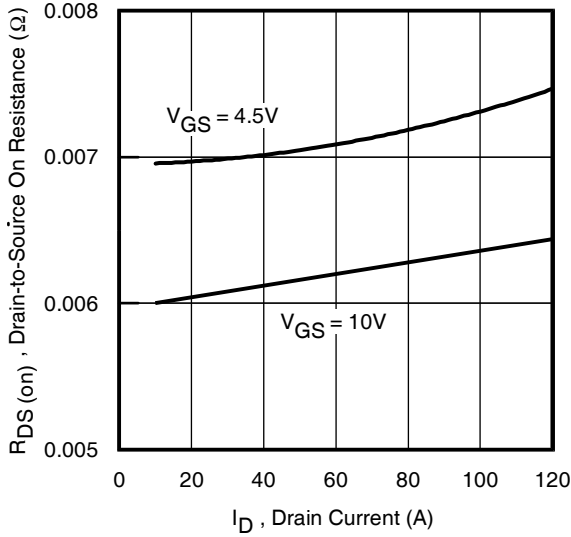


Fig 12. On-Resistance Vs. Drain Current

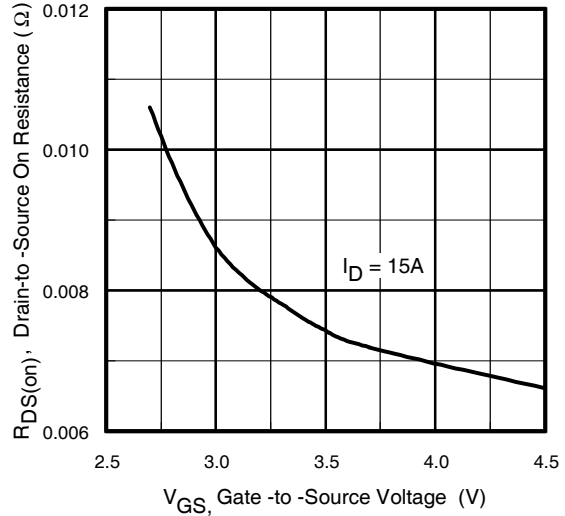


Fig 13. On-Resistance Vs. Gate Voltage

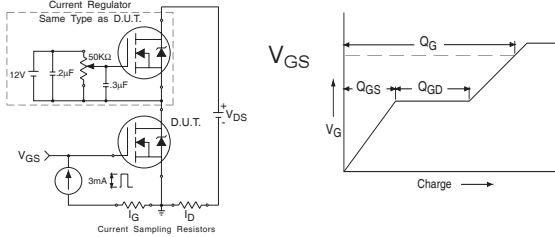


Fig 13a&b. Basic Gate Charge Test Circuit and Waveform

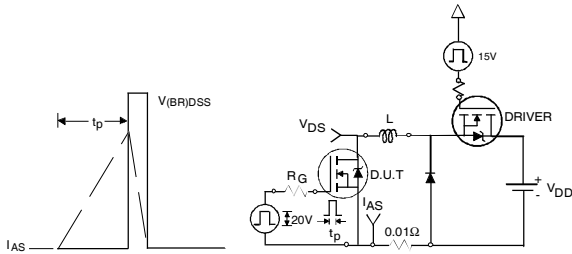


Fig 14a&b. Unclamped Inductive Test circuit and Waveforms

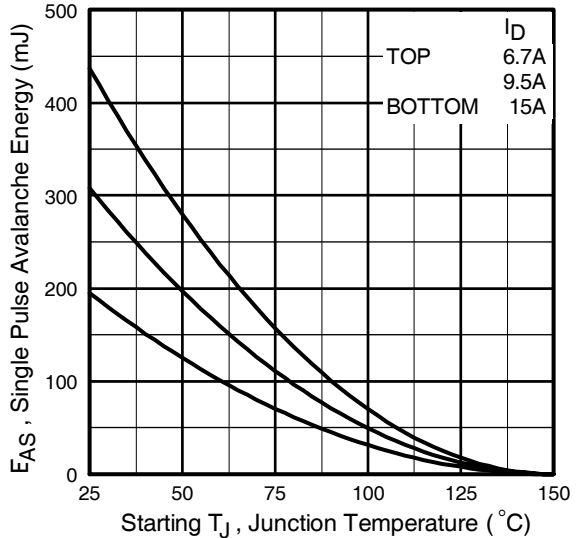


Fig 14c. Maximum Avalanche Energy Vs. Drain Current

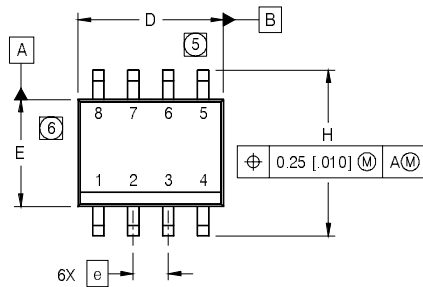
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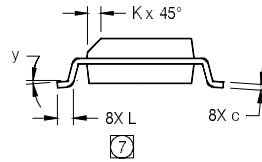
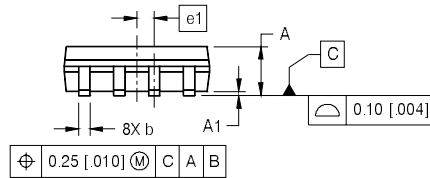
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SO-8 Package Outline

Dimensions are shown in millimeters (inches)



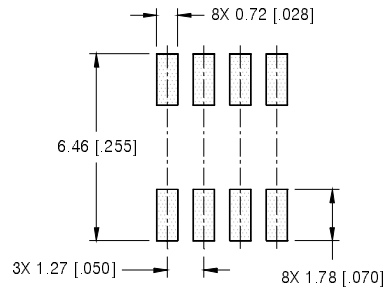
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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



NOTES:

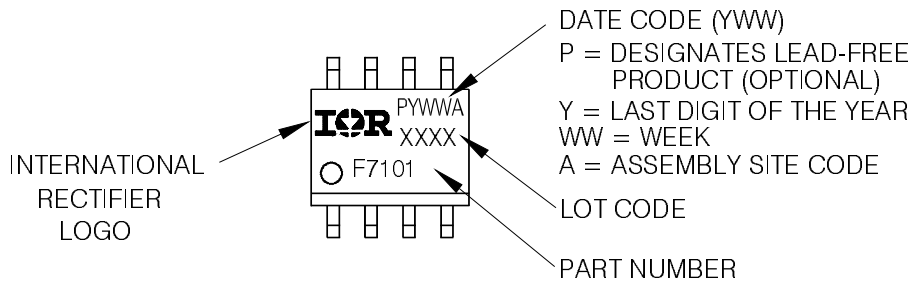
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
- ⑤ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
- ⑥ DIMENSION DOES NOT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

EXAMPLE: THIS IS AN IRF7101 (MOSFET)



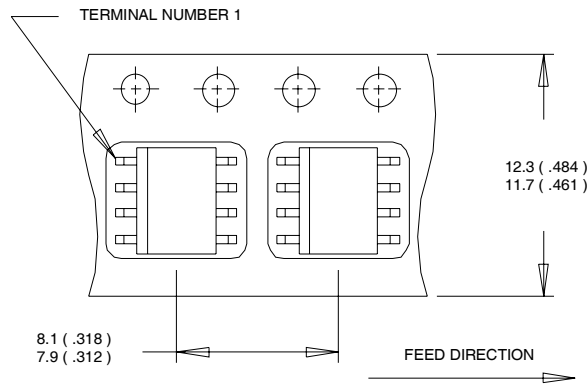
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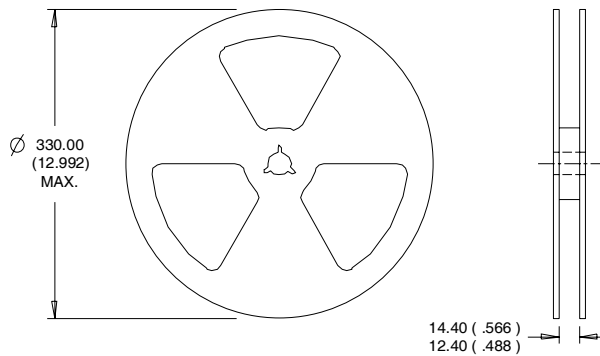
SO-8 Tape and Reel

Dimensions are shown in millimeters (inches)

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- 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.

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.

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