International
IOR Rectifier

SMPS MOSFET

IRF7477

HEXFET® Power MOSFET

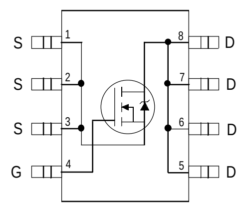
Applications

- High Frequency Synchronous Buck Converters for Computers and Communications

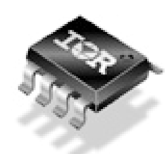
Benefits

- Ultra-Low Gate Impedance
- Very Low $R_{DS(on)}$
- Fully Characterized Avalanche Voltage and Current
- Low Charge Ratio to Eliminate False Turn On in High Frequency Circuits

V_{DSS}	$R_{DS(on)}$ max (mΩ)	I_D
30V	8.5@V_{GS} = 10V	14A
	10@V_{GS} = 4.5V	11A



Top View


SO-8

Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 20	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	14	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	11	
I_{DM}	Pulsed Drain Current①	110	
P_D @T_A = 25°C	Maximum Power Dissipation④	2.5	W
P_D @T_A = 70°C	Maximum Power Dissipation④	1.6	W
	Linear Derating Factor	0.02	mW/°C
T_J , T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead	—–	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ④	—–	50	

Notes ① through ④ are on page 8

6/26/01

Static @ T_J = 25°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 = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.029	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	6.5	8.5	mΩ	V_{GS} = 10V, I_D = 14A ③
		——	7.7	10		V_{GS} = 4.5V, I_D = 11A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.0	——	2.5	V	V_{DS} = V_{GS}, I_D = 250µA
I_{DSS}	Drain-to-Source Leakage Current	——	——	20	µA	V_{DS} = 24V, V_{GS} = 0V
		——	——	100		V_{DS} = 24V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	200	nA	V_{GS} = 16V
	Gate-to-Source Reverse Leakage	——	——	-200		V_{GS} = -16V

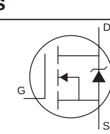
Dynamic @ T_J = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	35	——	——	S	V_{DS} = 15V, I_D = 11A
Q_g	Total Gate Charge	——	25	38	nC	I_D = 11A
Q_{gs}	Gate-to-Source Charge	——	6.5	——		V_{DS} = 15V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	8.2	——		V_{GS} = 4.5V
Q_{oss}	Output Gate Charge	——	30	——		V_{GS} = 0V, V_{DS} = 15V
$t_{d(on)}$	Turn-On Delay Time	——	12	——	ns	V_{DD} = 15V
t_r	Rise Time	——	9.8	——		I_D = 11A
$t_{d(off)}$	Turn-Off Delay Time	——	19	——		R_G = 1.8Ω
t_f	Fall Time	——	5.9	——		V_{GS} = 4.5V ③
C_{iss}	Input Capacitance	——	2710	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	1120	——		V_{DS} = 15V
C_{rss}	Reverse Transfer Capacitance	——	100	——		f = 1.0MHz

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	——	500	mJ
I_{AR}	Avalanche Current①	——	8.2	A

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	2.3	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	110		
V_{SD}	Diode Forward Voltage	——	0.80	1.3	V	T_J = 25°C, I_S = 11A, V_{GS} = 0V ③
		——	0.65	——		T_J = 125°C, I_S = 11A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	——	91	140	ns	T_J = 25°C, I_F = 11A, V_R=15V
Q_{rr}	Reverse Recovery Charge	——	130	200	nC	di/dt = 100A/µs ③
t_{rr}	Reverse Recovery Time	——	90	140	ns	T_J = 125°C, I_F = 11A, V_R=15V
Q_{rr}	Reverse Recovery Charge	——	140	210	nC	di/dt = 100A/µs ③

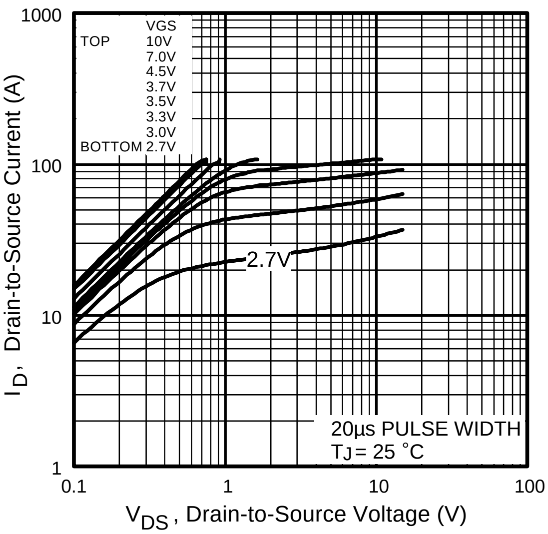


Fig 1. Typical Output Characteristics

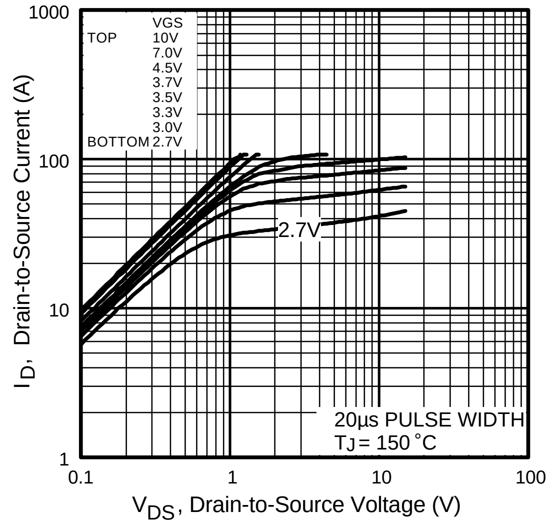


Fig 2. Typical Output Characteristics

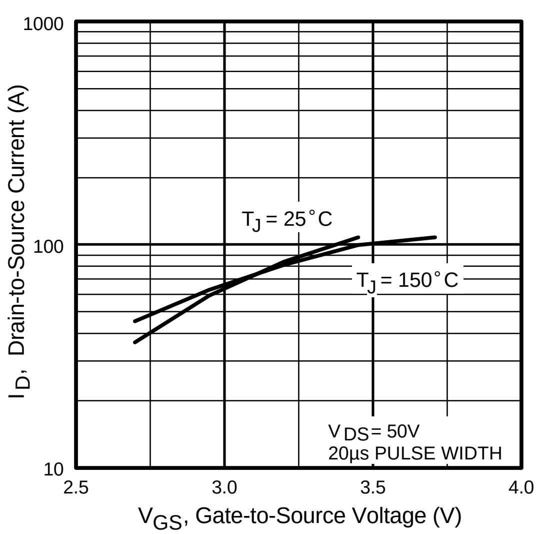


Fig 3. Typical Transfer Characteristics

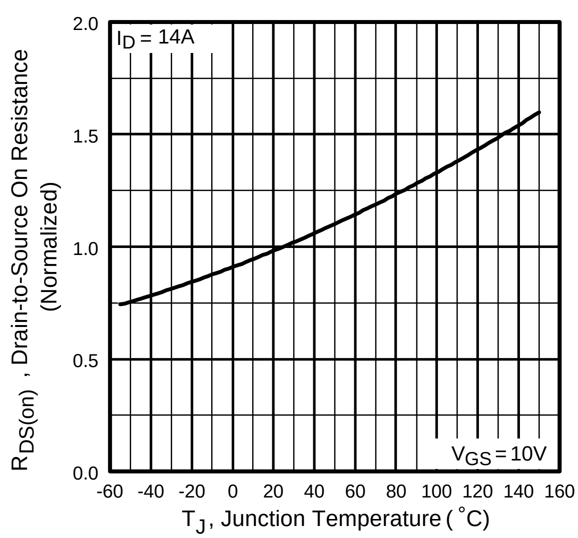


Fig 4. Normalized On-Resistance Vs. Temperature

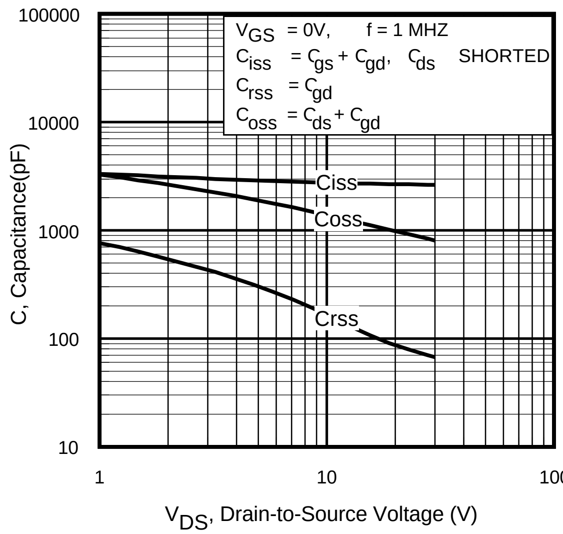


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

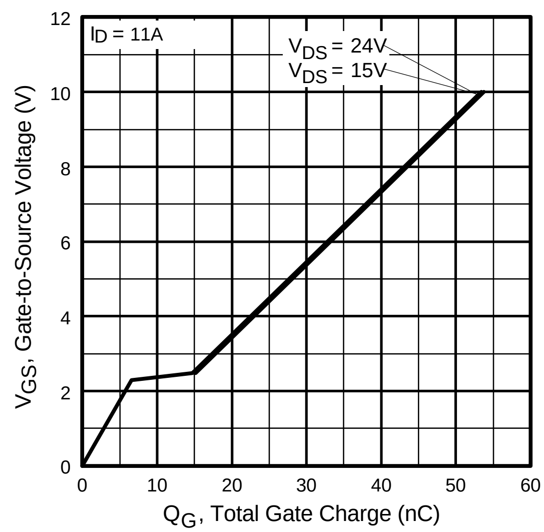


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

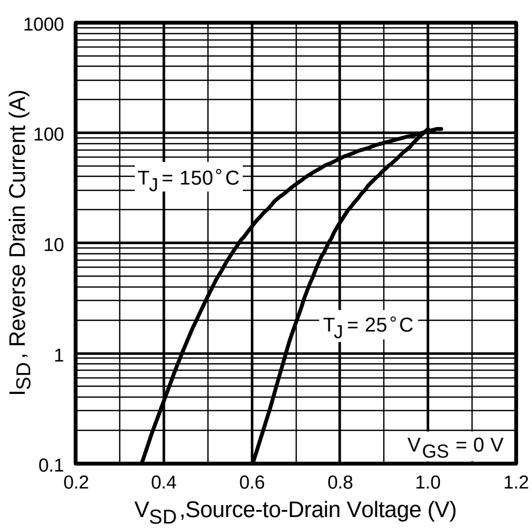


Fig 7. Typical Source-Drain Diode Forward Voltage

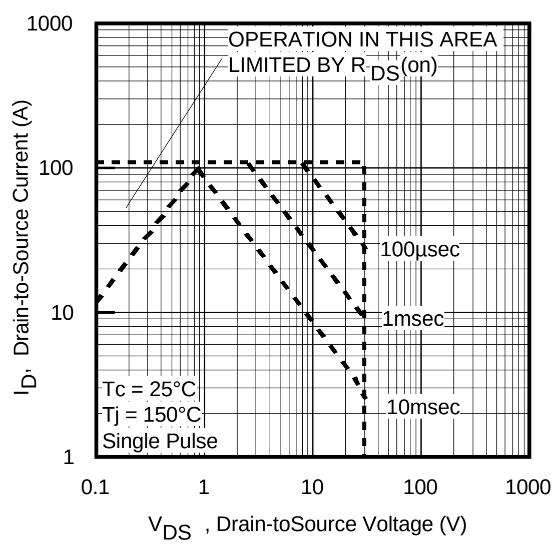


Fig 8. Maximum Safe Operating Area

Fig 6. On-Resistance Vs. Drain Current

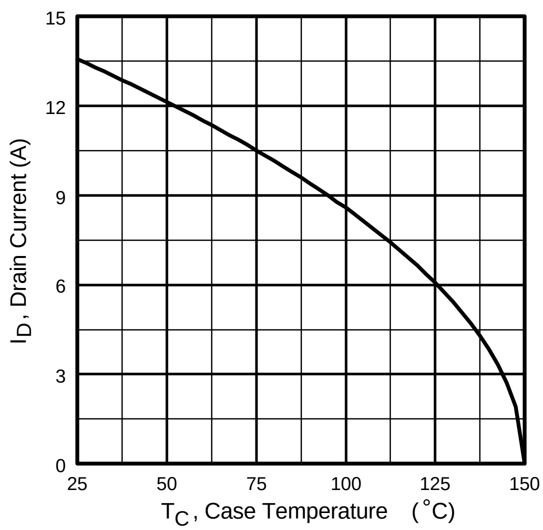


Fig 9. Maximum Drain Current Vs. Ambient Temperature

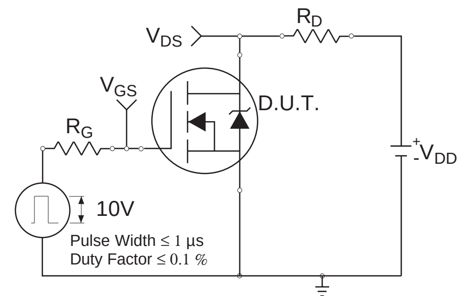


Fig 10a. Switching Time Test Circuit

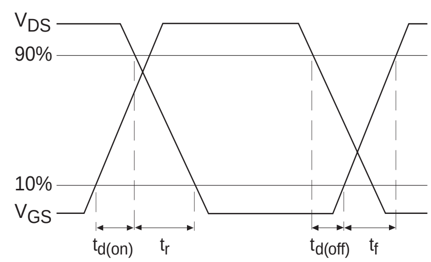


Fig 10b. Switching Time Waveforms

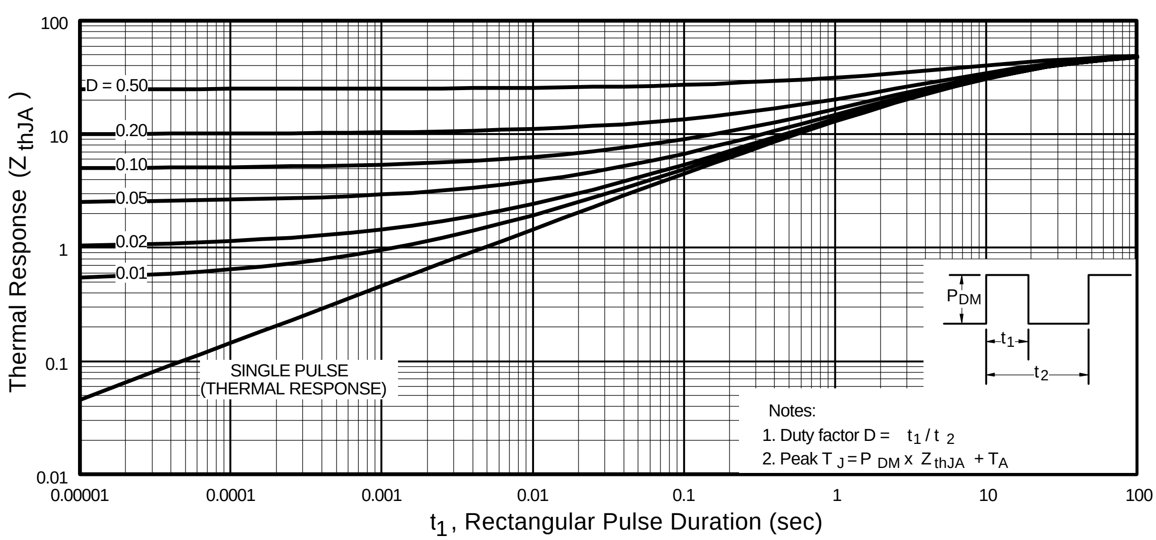


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

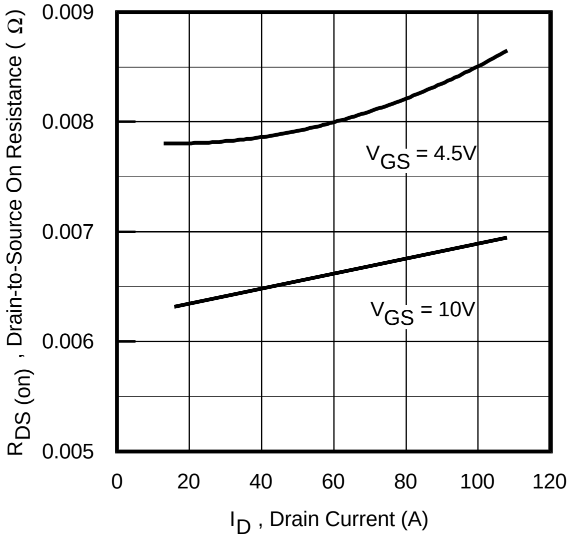


Fig 12. On-Resistance Vs. Drain Current

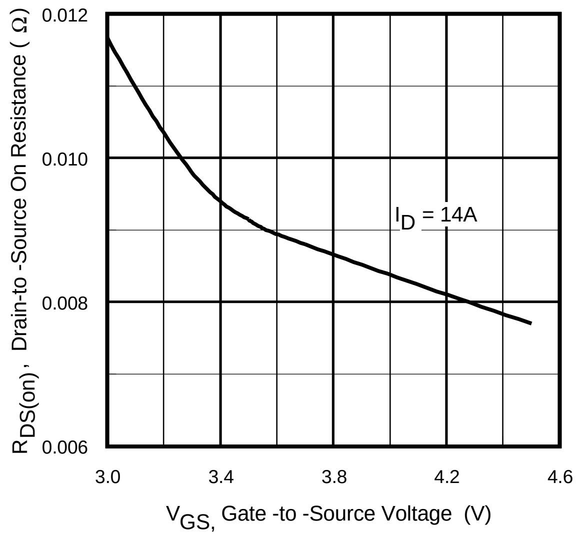


Fig 13. On-Resistance Vs. Gate Voltage

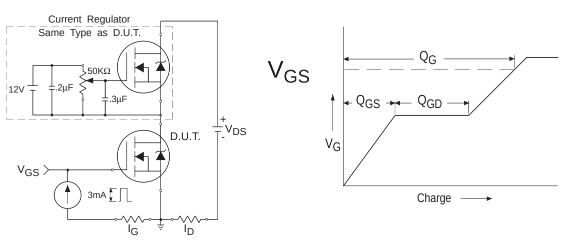


Fig 14a&b. Basic Gate Charge Test Circuit and Waveform

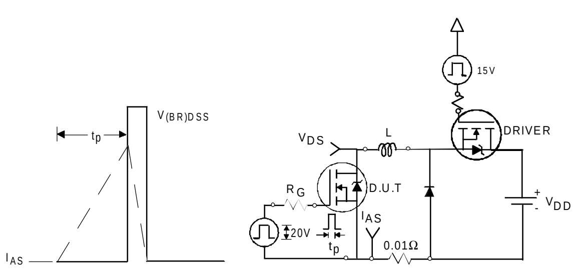


Fig 15a&b. Unclamped Inductive Test circuit and Waveforms

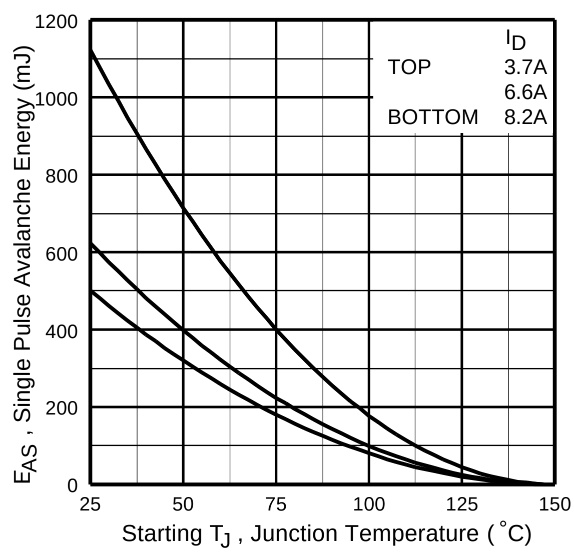
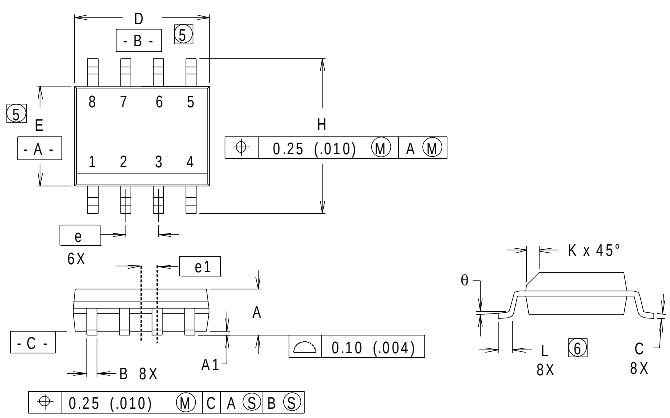


Fig 15c. Maximum Avalanche Energy Vs. Drain Current

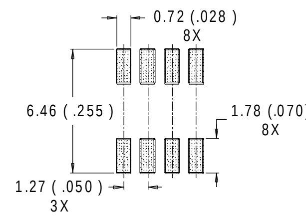
SO-8 Package Details



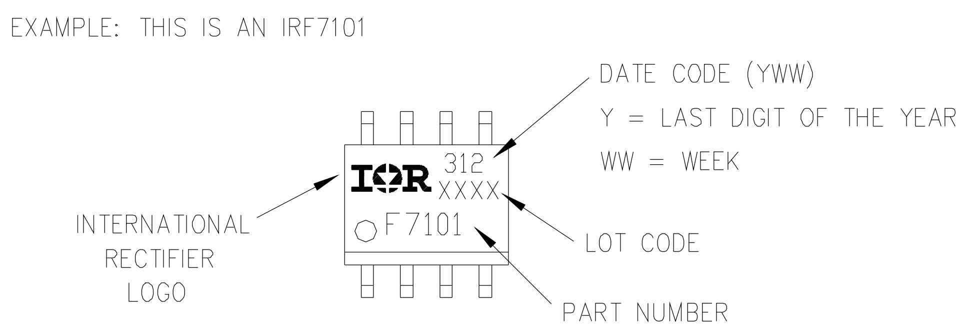
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
B	.014	.018	0.36	0.46
C	.0075	.0098	0.19	0.25
D	.189	.196	4.80	4.98
E	.150	.157	3.81	3.99
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.011	.019	0.28	0.48
L	0.16	.050	0.41	1.27
θ	0°	8°	0°	8°

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..

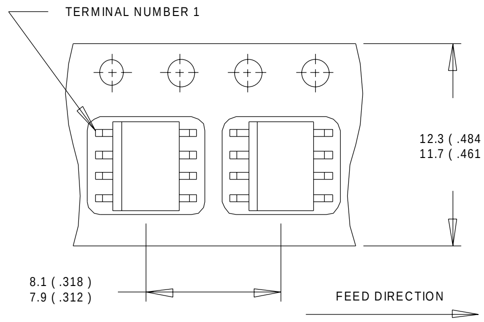
RECOMMENDED FOOTPRINT



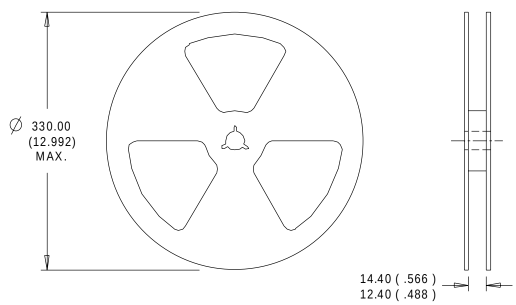
SO-8 Part Marking



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.

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting $T_J = 25°C$, L = 15mH $R_G = 25\Omega$, $I_{AS} = 8.2A$.

③ Pulse width ≤ 400µs; duty cycle ≤ 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 Industrial market.
Qualification Standards can be found on IR's Web site.

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