PD - 97172

International Rectifier

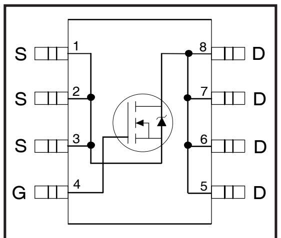
IRF7854PbF

HEXFET® Power MOSFET

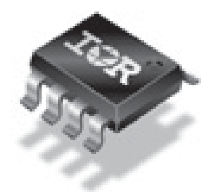
V_{DSS}	$R_{DS(on)}$ max	I_D
80V	13.4mΩ@VGS = 10V	10A

Applications

- Primary Side Switch in Bridge or two-switch forward topologies using 48V (±10%) or 36V to 60V ETSI range inputs.
- Secondary Side Synchronous Rectification Switch for 12Vout
- Suitable for 48V Non-Isolated Synchronous Buck DC-DC Applications



Top View


SO-8

Benefits

- Low Gate to Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective C_{OSS} to Simplify Design, (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	80	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	10	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	7.9	
I_{DM}	Pulsed Drain Current ①	79	
P_D @T_A = 25°C	Maximum Power Dissipation	2.5	W
	Linear Derating Factor	0.02	W/°C
dv/dt	Peak Diode Recovery dv/dt ⑥	11	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead	——	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount) ③⑦	——	50	

Notes ① through ⑦ are on page 8

01/05/06

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	80	——	——	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.095	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	11	13.4	mΩ	V_{GS} = 10V, I_D = 10A ④
$V_{GS(th)}$	Gate Threshold Voltage	3.0	——	4.9	V	V_{DS} = V_{GS}, I_D = 100µA
I_{DSS}	Drain-to-Source Leakage Current	——	——	20	µA	V_{DS} = 80V, V_{GS} = 0V
		——	——	250		V_{DS} = 80V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	——	——	-100		V_{GS} = -20V

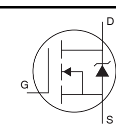
Dynamic @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
gfs	Forward Transconductance	12	——	——	S	V_{DS} = 25V, I_D = 6.0A
Q_g	Total Gate Charge	——	27	41	nC	I_D = 6.0A
Q_{gs}	Gate-to-Source Charge	——	7.7	——		V_{DS} = 40V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	8.7	——		V_{GS} = 10V ④
$t_{d(on)}$	Turn-On Delay Time	——	9.4	——	ns	V_{DD} = 40V
t_r	Rise Time	——	8.5	——		I_D = 6.0A
$t_{d(off)}$	Turn-Off Delay Time	——	15	——		R_G = 6.2Ω
t_f	Fall Time	——	8.6	——		V_{GS} = 10V ④
C_{iss}	Input Capacitance	——	1620	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	350	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	86	——		f = 1.0MHz
C_{oss}	Output Capacitance	——	1730	——		V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz
C_{oss}	Output Capacitance	——	230	——		V_{GS} = 0V, V_{DS} = 64V, f = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	——	410	——		V_{GS} = 0V, V_{DS} = 0V to 64V ⑤

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	——	110	mJ
I_{AR}	Avalanche Current ①	——	6.0	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	2.3	A	MOSFET symbol showing the
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	79		integral reverse p-n junction diode. 
V_{SD}	Diode Forward Voltage	——	——	1.3	V	T_J = 25°C, I_S = 6.0A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	43	65	ns	T_J = 25°C, I_F = 6.0A, V_{DD} = 25V
Q_{rr}	Reverse Recovery Charge	——	76	110	nC	di/dt = 100A/µs ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

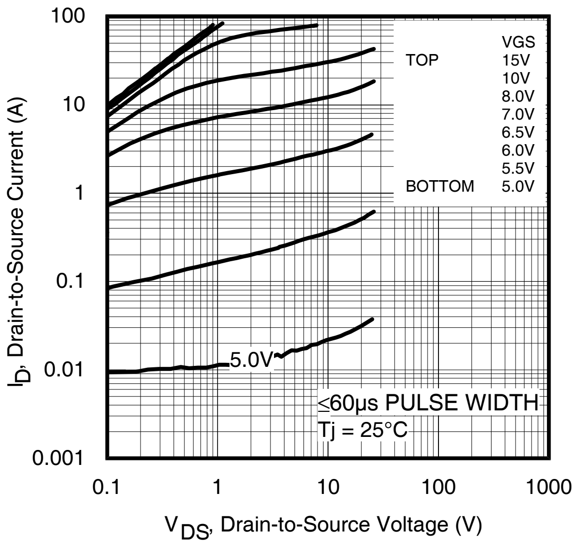


Fig 1. Typical Output Characteristics

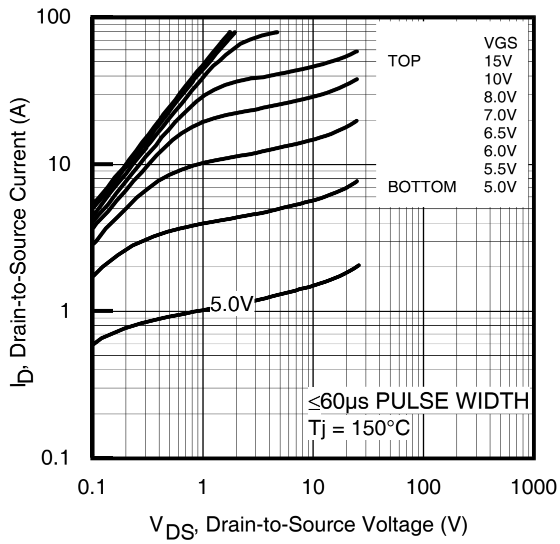


Fig 2. Typical Output Characteristics

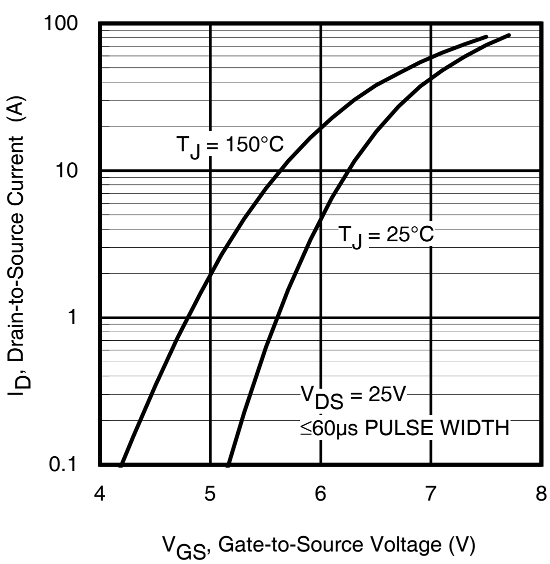


Fig 3. Typical Transfer Characteristics

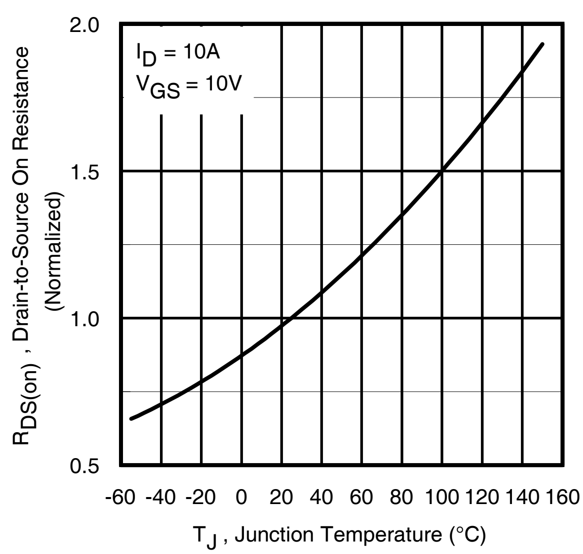


Fig 4. Normalized On-Resistance vs. Temperature

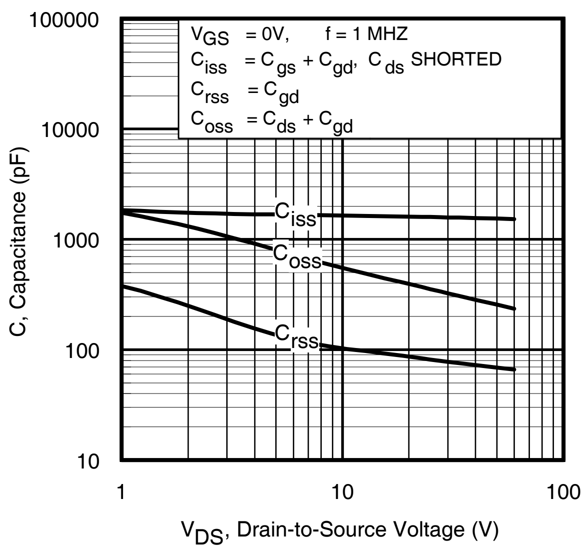


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

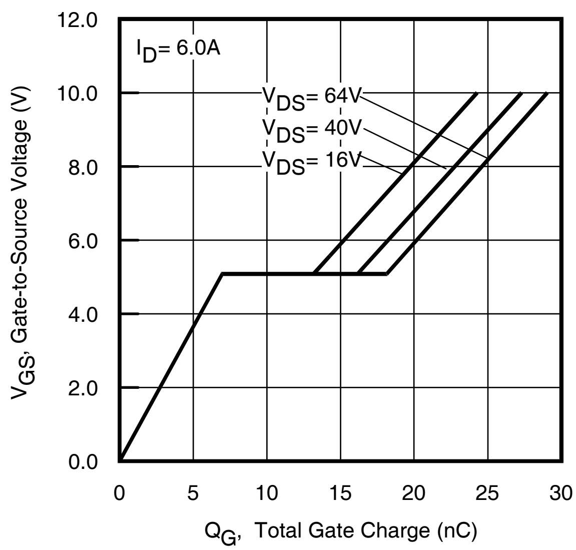


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

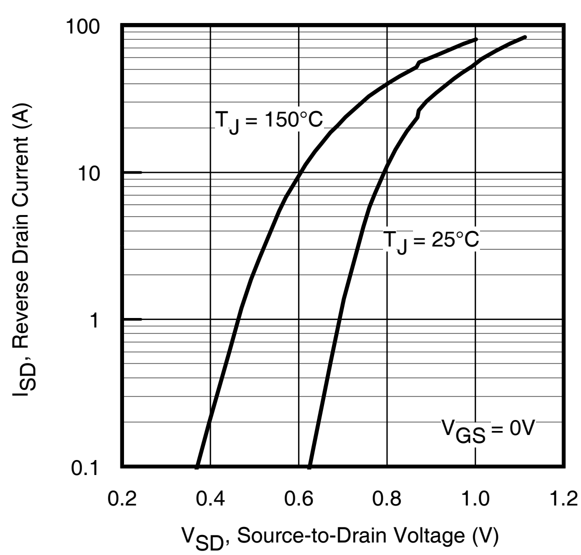


Fig 7. Typical Source-Drain Diode Forward Voltage

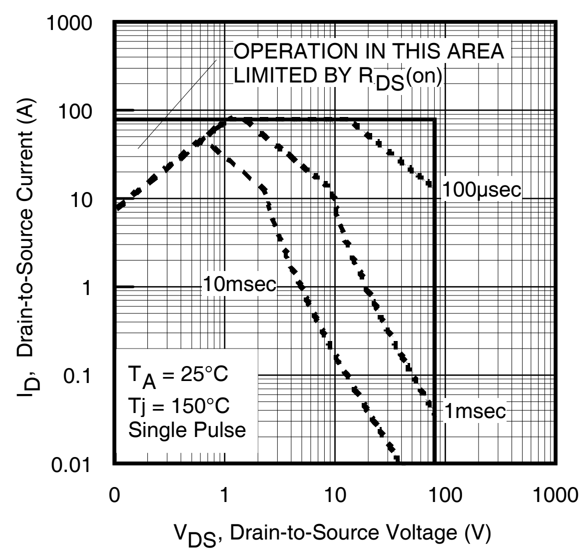


Fig 8. Maximum Safe Operating Area

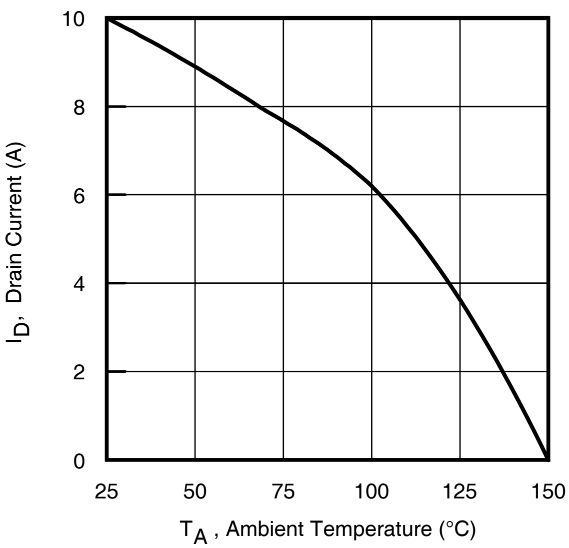


Fig 9. Maximum Drain Current vs. Ambient Temperature

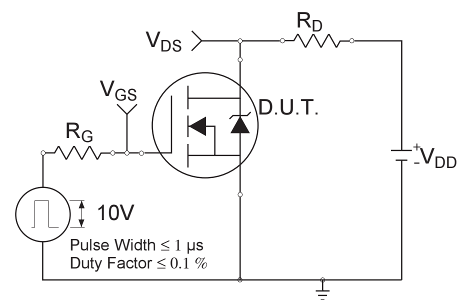


Fig 10a. Switching Time Test Circuit

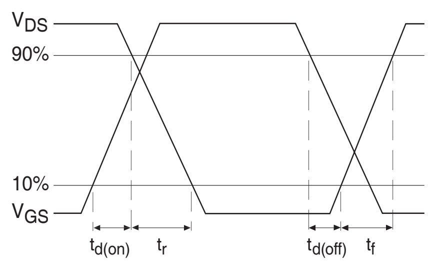
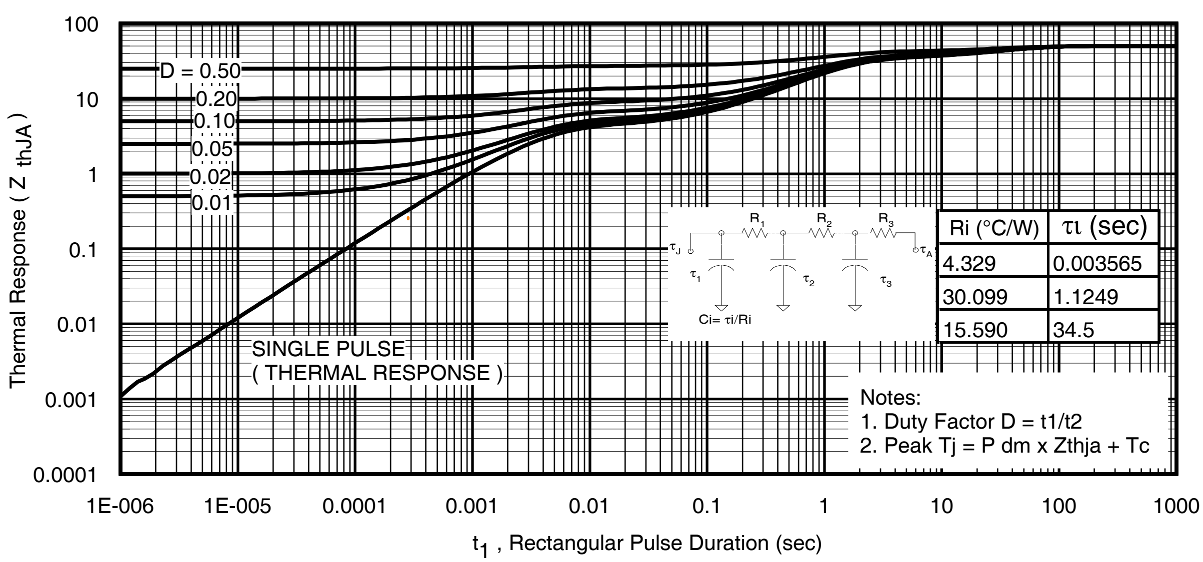


Fig 10b. Switching Time Waveforms



Ri (°C/W)	τι (sec)
4.329	0.003565
30.099	1.1249
15.590	34.5

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

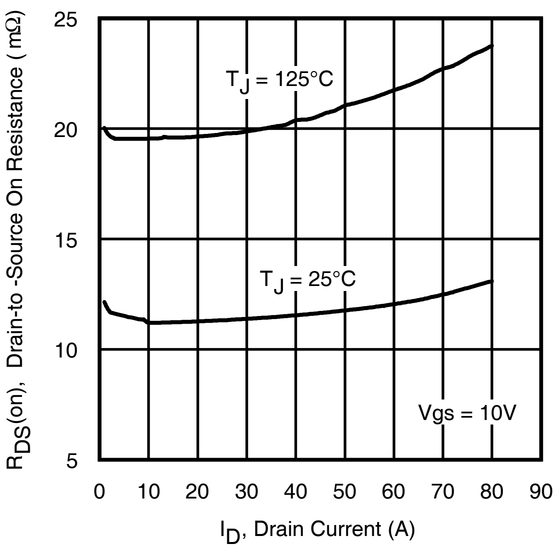


Fig 12. On-Resistance vs. Drain Current

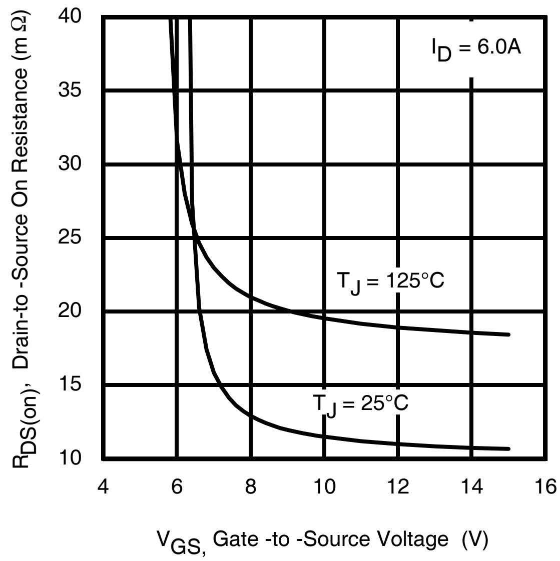


Fig 13. On-Resistance vs. Gate Voltage

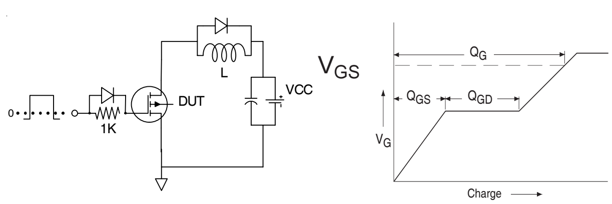
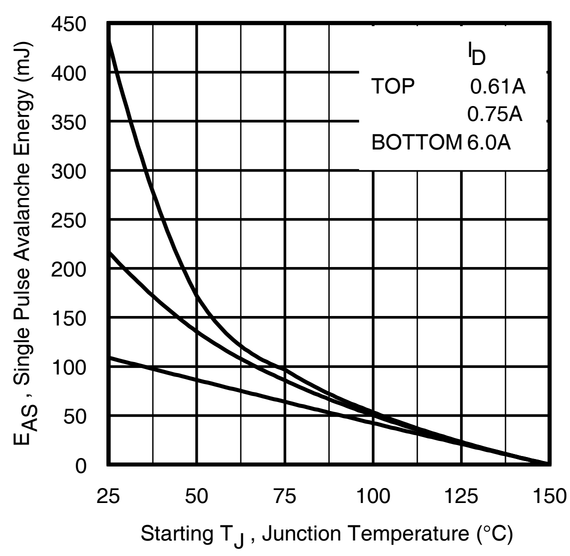


Fig 14a&b. Basic Gate Charge Test Circuit and Waveform



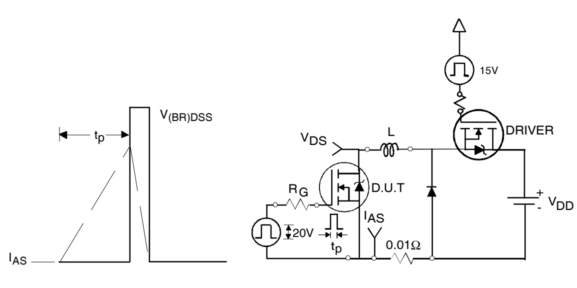
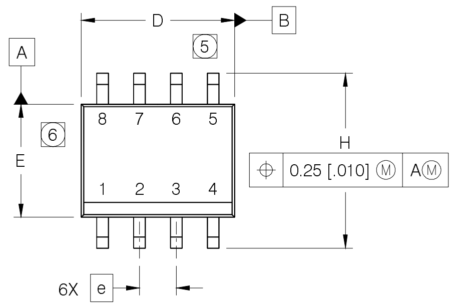


Fig 15a&b. Unclamped Inductive Test circuit and Waveforms

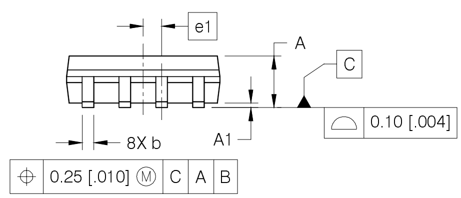
Fig 15c. Maximum Avalanche Energy vs. Drain Current

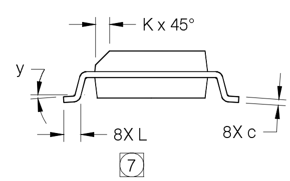
SO-8 Package Outline

Dimensions are shown in milimeters (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	
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:

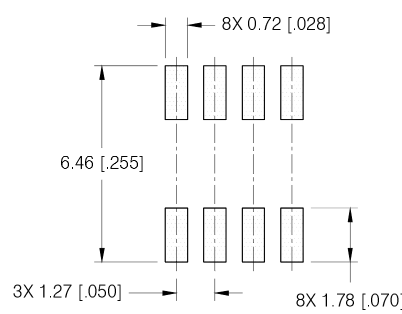
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.

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].

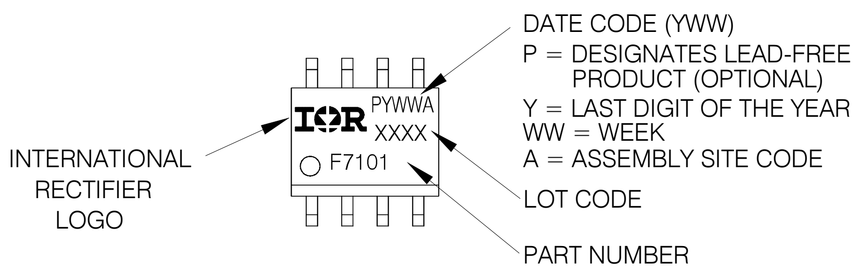
7 DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT

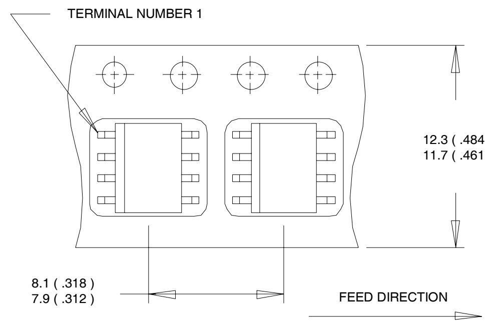


SO-8 Part Marking Information

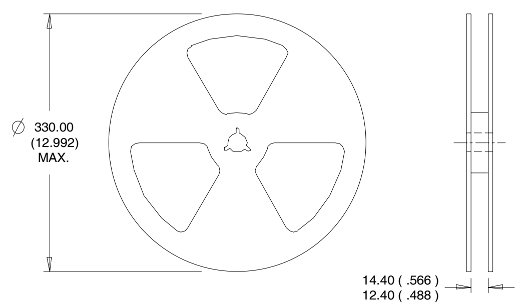
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



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.

Notes:

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

② Starting $T_J = 25°C$, L = 6.0mH, $R_G = 25\Omega$, $I_{AS} = 6.0A$.

③ When mounted on 1 inch square copper board, t ≤ 10 sec.

④ Pulse width ≤ 400μs; duty cycle ≤ 2%.

⑤ C_{oss} eff. is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}.

⑥ $I_{SD} \leq 6.0A$, di/dt ≤ 350A/μs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150°C$.

⑦ R_θ is measured at T_J of approximately 90°C.

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.

International
IOR Rectifier

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