PD- 91330F

International
IOR Rectifier

SMPS MOSFET

IRF7413

HEXFET® Power MOSFET

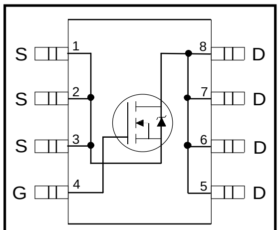
Applications

- High frequency DC-DC converters

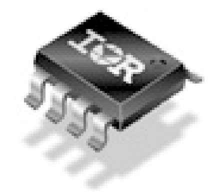
V_{DSS}	$R_{DS(on)}$ max(mΩ)	I_D
30V	**11@V_{GS} = 10V**	**12A**

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



Top View


SO-8

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	12	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	9.6	
I_{DM}	Pulsed Drain Current ①	96	
P_D @T_A = 25°C	Power Dissipation④	2.5	W
	Linear Derating Factor	0.02	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery dv/dt ⑥	1.0	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

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 ⑥ are on page 8

3/19/02

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

Symbol	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	——	0.03	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	——	11	mΩ	V_{GS} = 10V, I_D = 7.2A ③
		——	——	18		V_{GS} = 4.5V, I_D = 6.0A
$V_{GS(th)}$	Gate Threshold Voltage	1.0	——	——	V	V_{DS} = V_{GS}, I_D = 250µA
I_{DSS}	Drain-to-Source Leakage Current	——	——	1.0	µA	V_{DS} = 24V, V_{GS} = 0V
		——	——	25		V_{DS} = 24V, 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

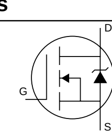
Dynamic @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	16	——	——	S	V_{DS} = 10V, I_D = 7.2A
Q_g	Total Gate Charge	——	44	66	nC	I_D = 7.2A
Q_{gs}	Gate-to-Source Charge	——	7.9	——		V_{DS} = 24V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	9.2	——		V_{GS} = 10V,
$t_{d(on)}$	Turn-On Delay Time	——	8.8	——	ns	V_{DD} = 100V
t_r	Rise Time	——	8.0	——		I_D = 7.2A
$t_{d(off)}$	Turn-Off Delay Time	——	35	——		R_G = 6.2Ω
t_f	Fall Time	——	14	——		V_{GS} = 10V ③
C_{iss}	Input Capacitance	——	1670	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	670	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	100	——		f = 1.0MHz
C_{oss}	Output Capacitance	——	2290	——		V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz
C_{oss}	Output Capacitance	——	680	——		V_{GS} = 0V, V_{DS} = 24V, f = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	——	1020	——		V_{GS} = 0V, V_{DS} = 0V to 24V ⑤

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	——	120	mJ
I_{AR}	Avalanche Current①	——	7.2	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	3.1	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	96		
V_{SD}	Diode Forward Voltage	——	——	1.0	V	T_J = 25°C, I_S = 7.2A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	——	50	75	ns	T_J = 25°C, I_F = 7.2A
Q_{rr}	Reverse RecoveryCharge	——	74	110	nC	di/dt = 100A/µs ③

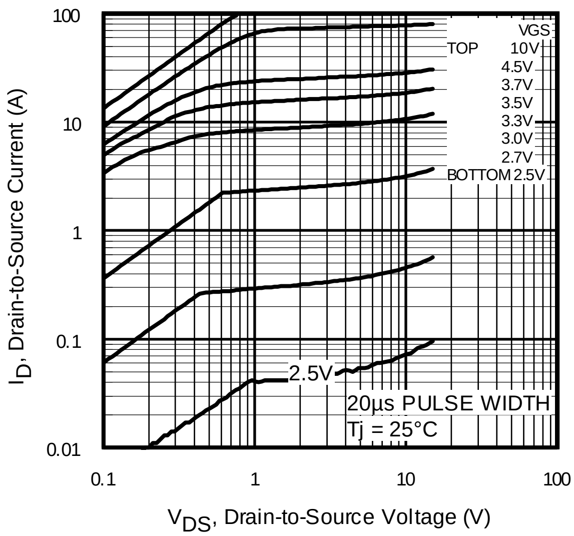


Fig 1. Typical Output Characteristics

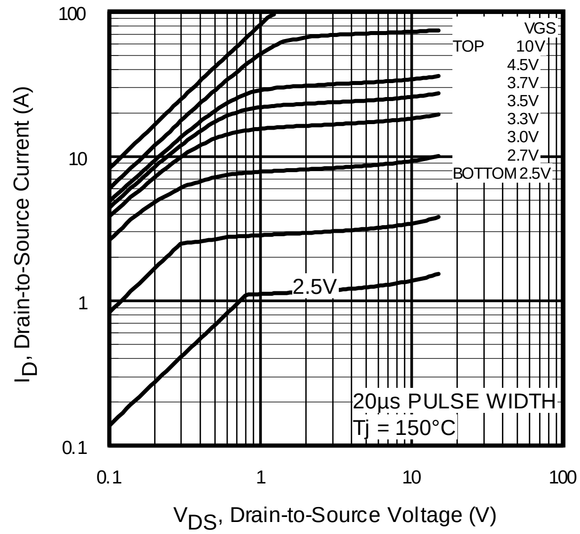


Fig 2. Typical Output Characteristics

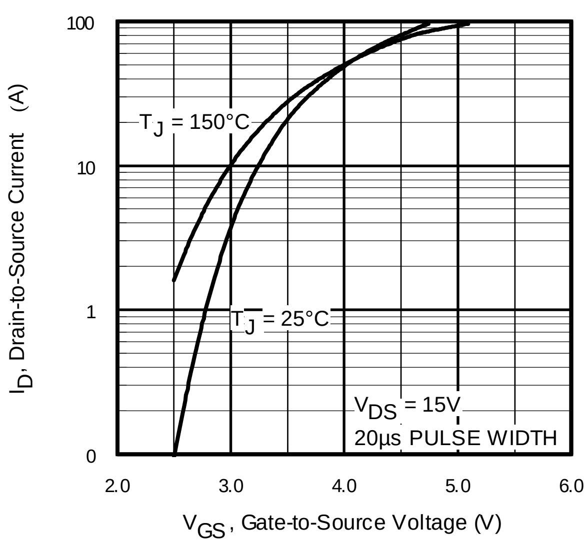


Fig 3. Typical Transfer Characteristics

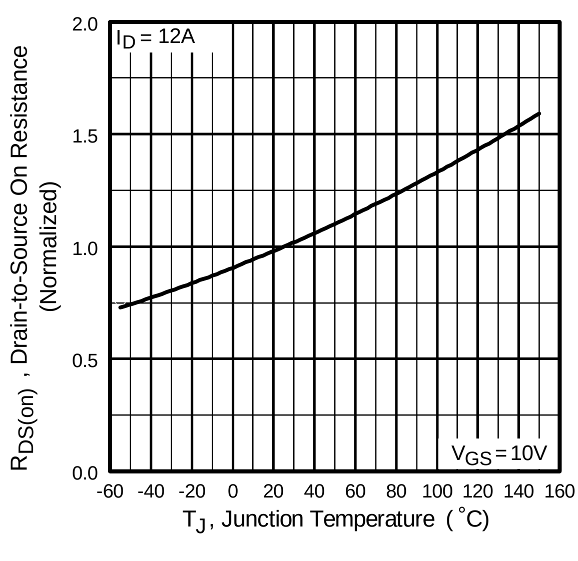


Fig 4. Normalized On-Resistance Vs. Temperature

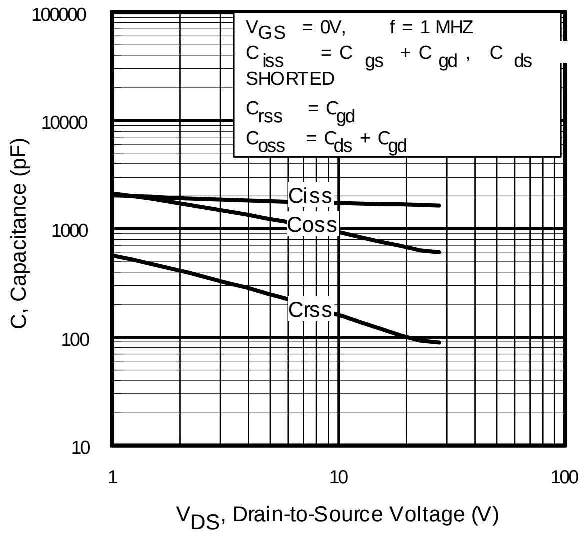


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

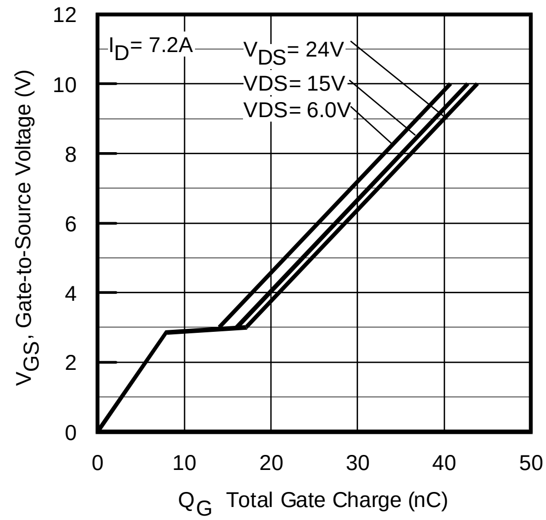


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

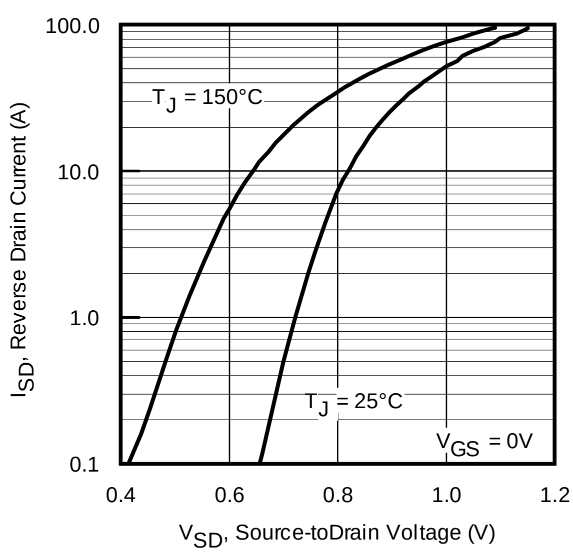


Fig 7. Typical Source-Drain Diode Forward Voltage

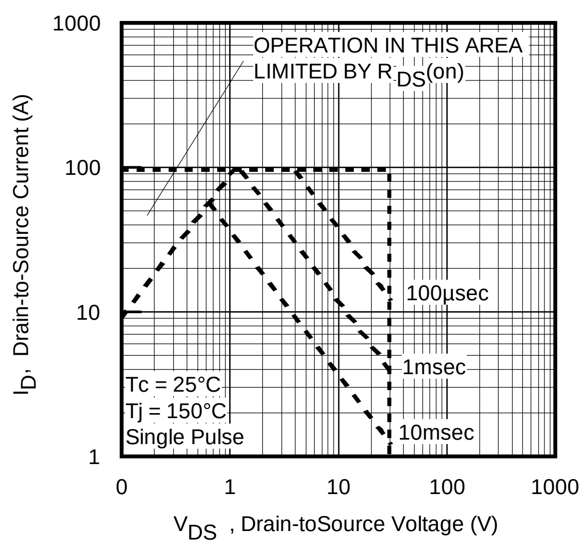


Fig 8. Maximum Safe Operating Area

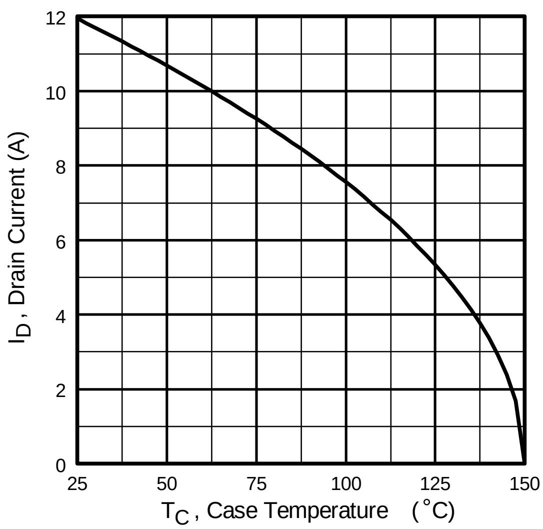


Fig 9. Maximum Drain Current Vs. Ambient Temperature

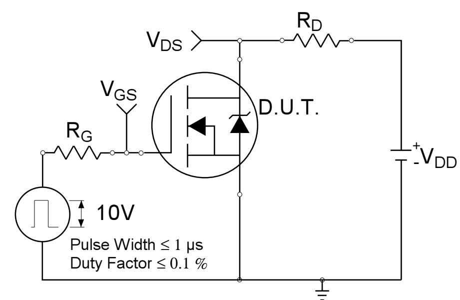


Fig 10a. Switching Time Test Circuit

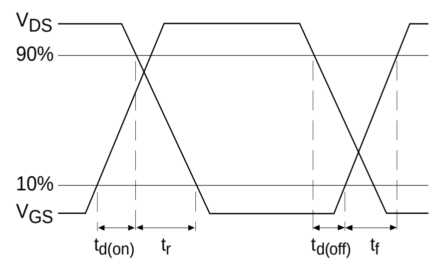


Fig 10b. Switching Time Waveforms

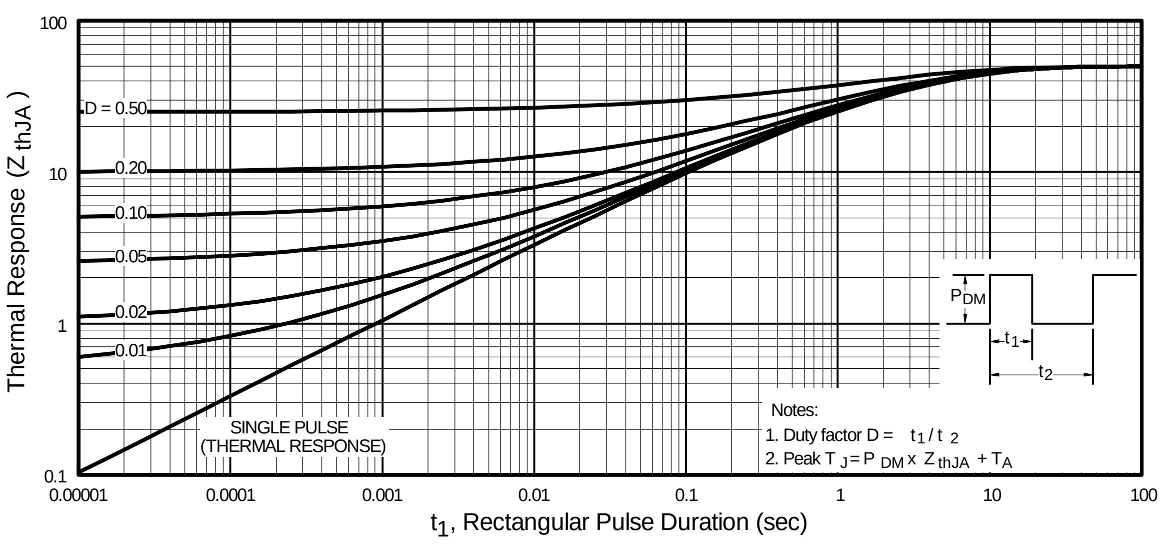


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

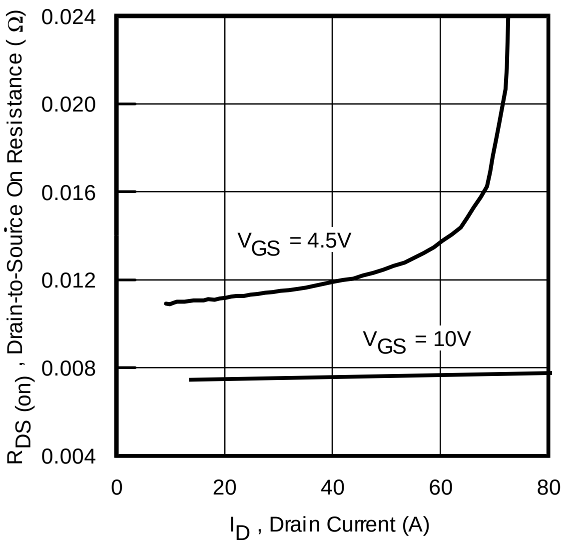


Fig 12. On-Resistance Vs. Drain Current

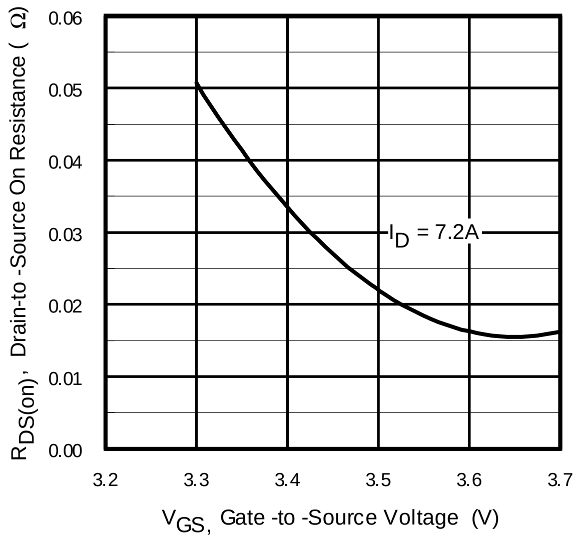


Fig 13. On-Resistance Vs. Gate Voltage

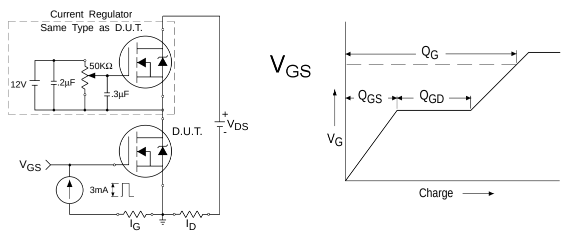


Fig 14a&b. Basic Gate Charge Test Circuit and Waveform

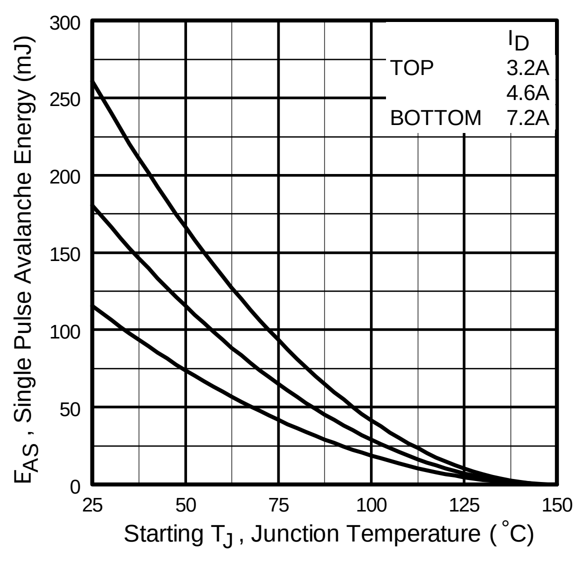


Fig 15c. Maximum Avalanche Energy Vs. Drain Current

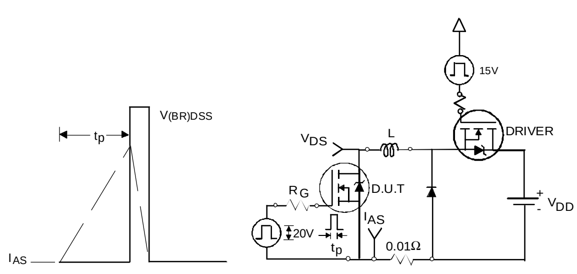
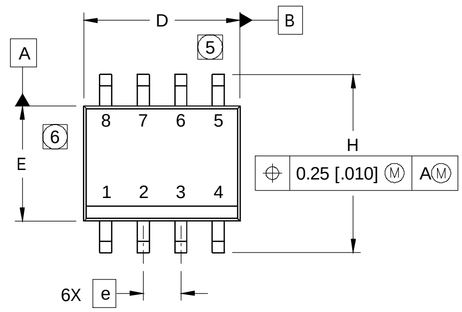
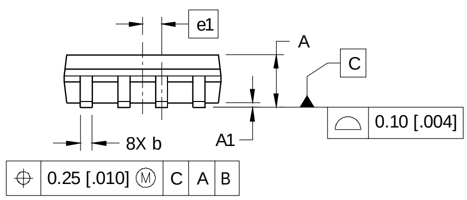


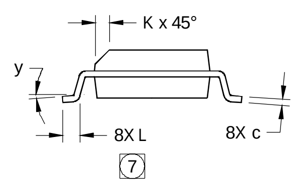
Fig 15a&b. Unclamped Inductive Test circuit and Waveforms

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°

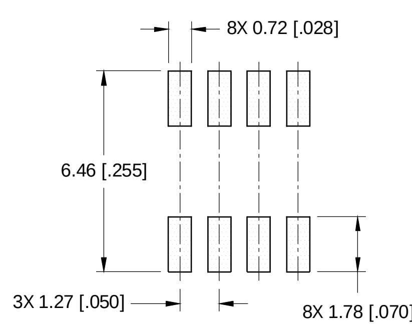




NOTES:

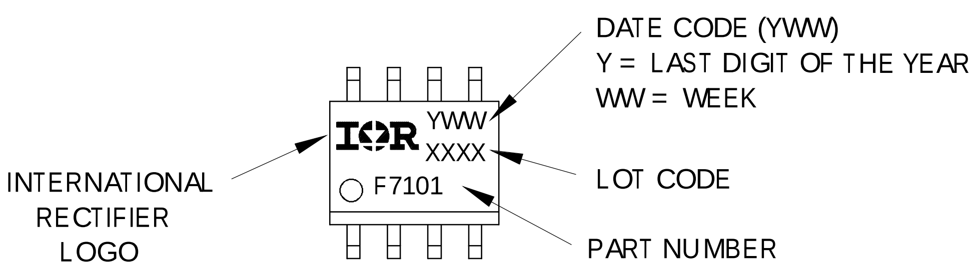
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].
6. DIMENSION DOES NOT INCLUDE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

FOOTPRINT

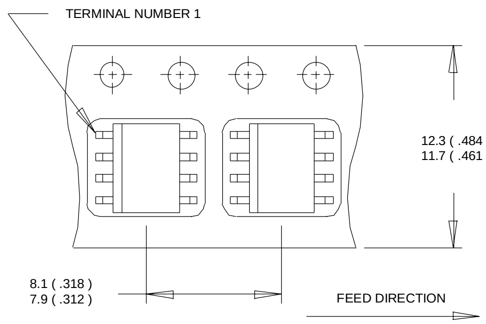


SO-8 Part Marking

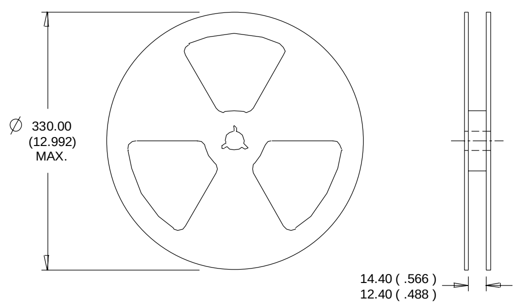
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



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.

Notes:

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

② Starting $T_J = 25°C$, $L = 4.4mH$ $R_G = 25\Omega$, $I_{AS} = 7.2A$.

③ Pulse width $\leq$ 300µs; duty cycle $\leq$ 2%.

④ When mounted on 1 inch square copper board

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 $I_{SD} \leq 7.2A$, $di/dt \leq 120A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150°C$

Data and specifications subject to change without notice.
This product has been designed and qualified for the Automotive [Q101] market.
Qualification Standards can be found on IR's Web site.

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