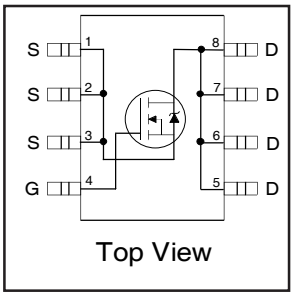
International
IOR Rectifier

IRF7413PbF-1

HEXFET® Power MOSFET

V_{DS}	30	V
$R_{DS(on)\ max}$ ($@V_{GS}$ = 10V)	0.011	Ω
$Q_{g\ (typical)}$	52	nC
I_D ($@T_A$ = 25°C)	13	A



Top View

SO-8

Features		Benefits
Industry-standard pinout SO-8 Package	⇒	Multi-Vendor Compatibility
Compatible with Existing Surface Mount Techniques		Easier Manufacturing
RoHS Compliant, Halogen-Free		Environmentally Friendlier
MSL1, Industrial qualification		Increased Reliability

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRF7413PbF-1	SO-8	Tube/Bulk	95	IRF7413PbF-1
		Tape and Reel	4000	IRF7413TRPbF-1

Absolute Maximum Ratings

Symbol	Parameter	Max	Units
V_{DS}	Drain-to-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	13	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	9.2	
I_{DM}	Pulsed Drain Current ①	58	
P_D @T_A = 25°C	Power Dissipation	2.5	W
	Linear Derating Factor	0.02	mW/°C
E_{AS}	Single Pulse Avalanche Energy ②	260	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to +150	°C

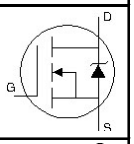
Thermal Resistance Ratings

Symbol	Parameter	Typ	Max	Units
$R_{\theta JL}$	Junction-to-Drain Lead	–––	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ⑤	–––	50	

Electrical Characteristics @ TJ = 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	—	0.034	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.011	Ω	V_{GS} = 10V, I_D = 7.3A ④
		—	—	0.018		V_{GS} = 4.5V, I_D = 3.7A ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	3.0	V	V_{DS} = V_{GS}, I_D = 250µA
g_{fs}	Forward Transconductance	10	—	—	S	V_{DS} = 10V, I_D = 3.7A
I_{DSS}	Drain-to-Source Leakage Current	—	—	12	µA	V_{DS} = 30V, 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
Q_g	Total Gate Charge	—	52	79	nC	I_D = 7.3A
Q_{gs}	Gate-to-Source Charge	—	6.1	9.2		V_{DS} = 24V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	16	23		V_{GS} = 10V, See Fig. 6 and 9 ④
R_G	Gate Resistance	—	—	3.7	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	8.6	—	ns	V_{DD} = 15V
t_r	Rise Time	—	50	—		I_D = 7.3A
$t_{d(off)}$	Turn-Off Delay Time	—	52	—		R_G = 6.2 Ω
t_f	Fall Time	—	46	—		R_G = 2.0Ω, See Fig. 10 ④
C_{iss}	Input Capacitance	—	1800	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	680	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	240	—		f = 1.0MHz, See Fig. 5

Source-Drain Ratings and Characteristics

Symbol	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	—	—	58		
V_{SD}	Diode Forward Voltage	—	—	1.0	V	T_J = 25°C, I_S = 7.3A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	—	74	110	ns	T_J = 25°C, I_F = 7.3A
Q_{rr}	Reverse Recovery Charge	—	200	300	nC	di/dt = 100A/µs ③

Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)

② Starting T_J = 25°C, L = 9.8mH R_G = 25Ω, I_{AS} =7.3A. (See Figure 12)

③ I_{SD} ≤ 7.3A, di/dt ≤ 100A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 150°C

④ Pulse width ≤ 300µs; duty cycle ≤ 2%.

⑤ Surface mounted on FR-4 board

⑥ R_θ is measured at T_J approximately 90°C

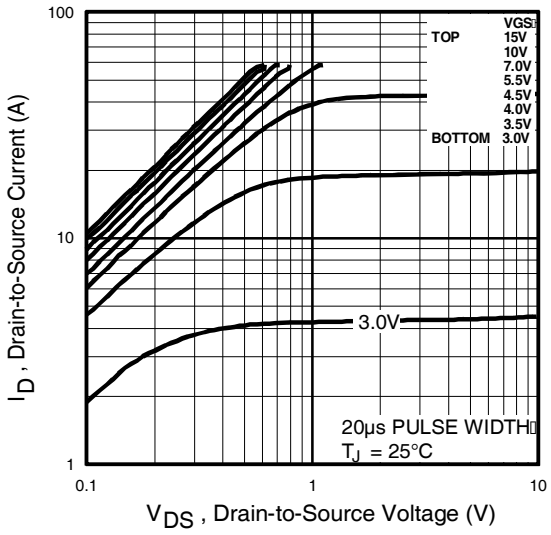


Fig 1. Typical Output Characteristics

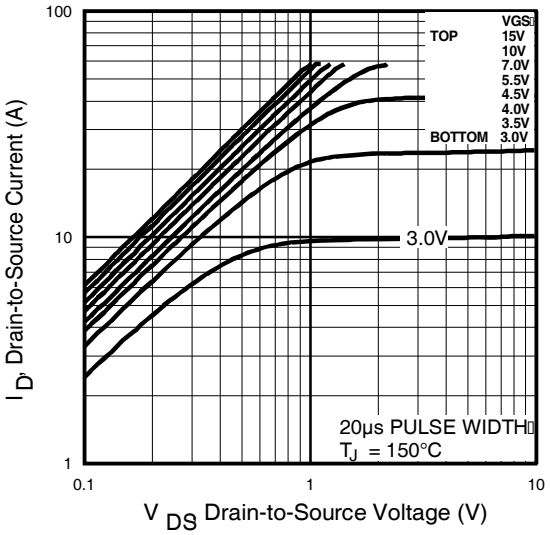


Fig 2. Typical Output Characteristics

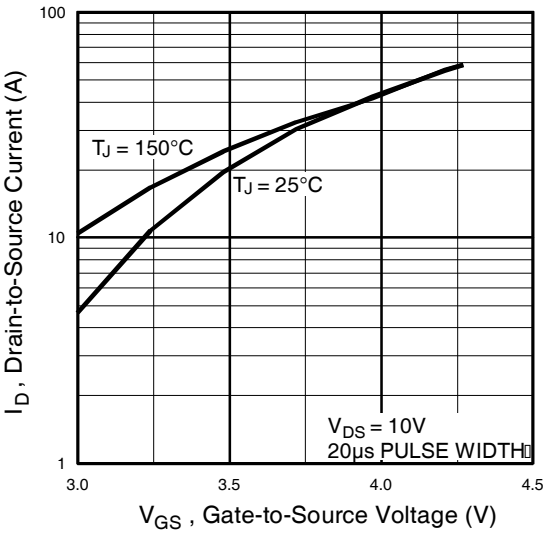


Fig 3. Typical Transfer Characteristics

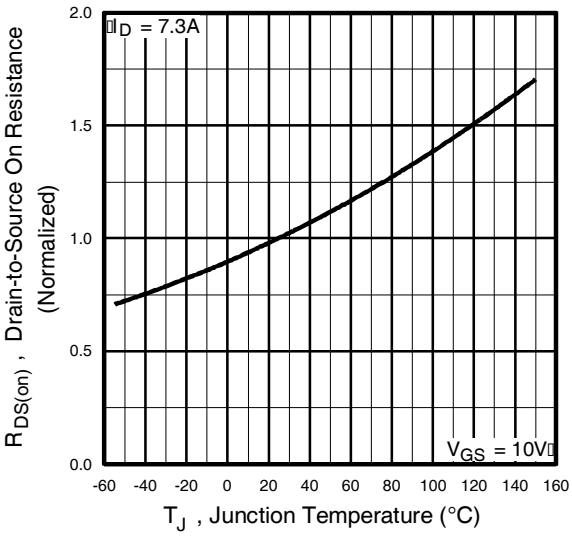


Fig 4. Normalized On-Resistance Vs. Temperature

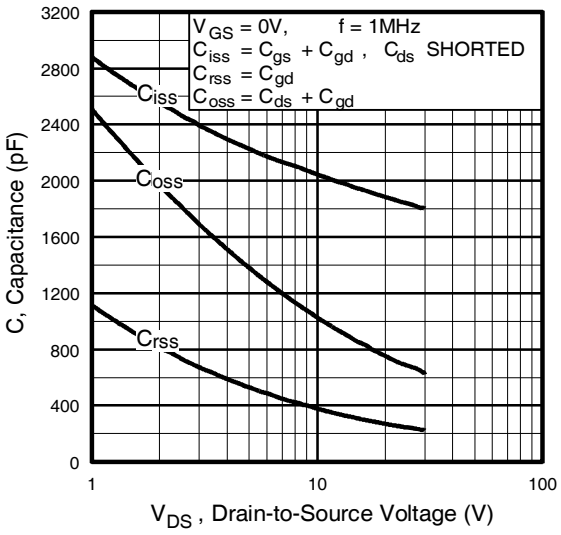


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

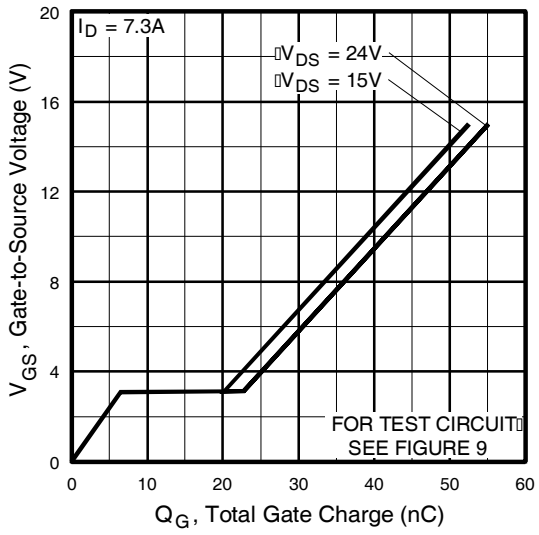


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

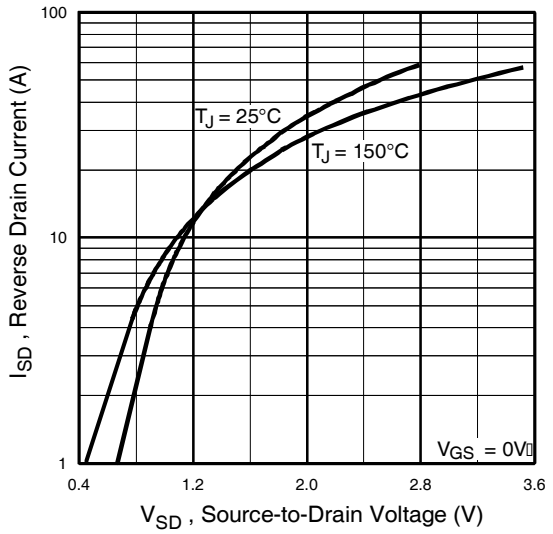


Fig 7. Typical Source-Drain Diode Forward Voltage

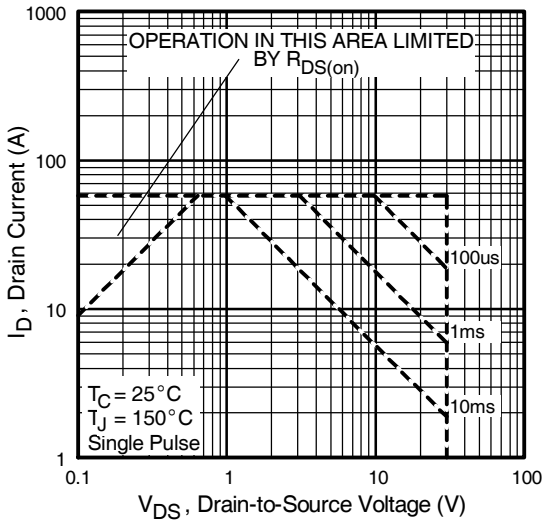


Fig 8. Maximum Safe Operating Area

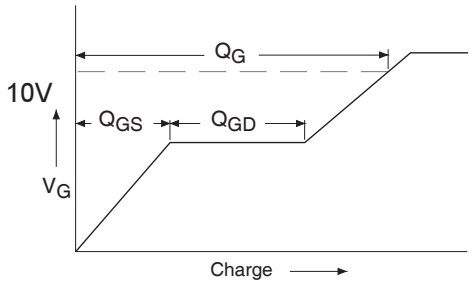


Fig 9a. Basic Gate Charge Waveform

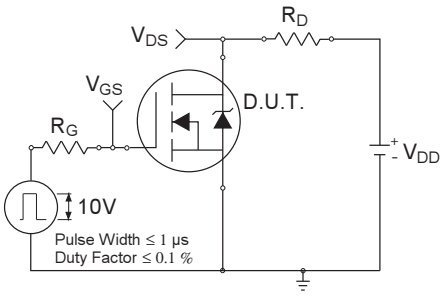


Fig 10a. Switching Time Test Circuit

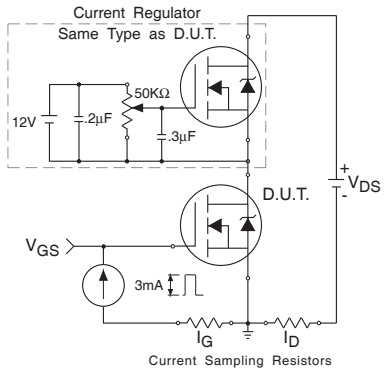


Fig 9b. Gate Charge Test Circuit

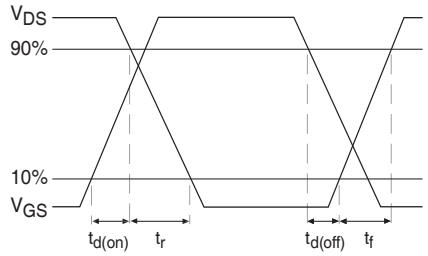


Fig 10b. Switching Time Waveforms

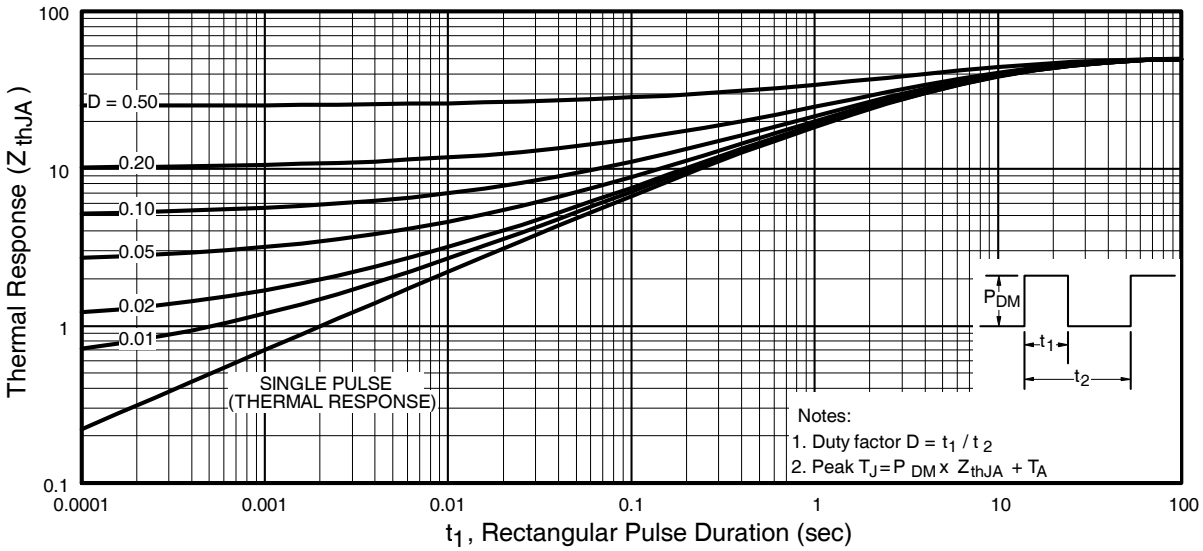


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

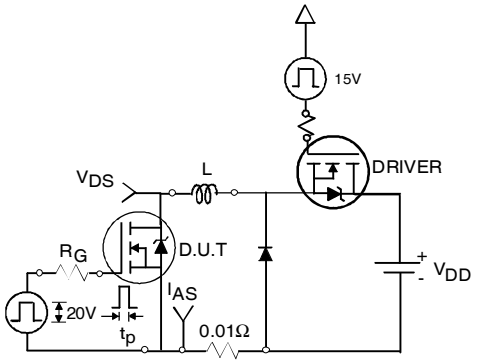


Fig 12a. Unclamped Inductive Test Circuit

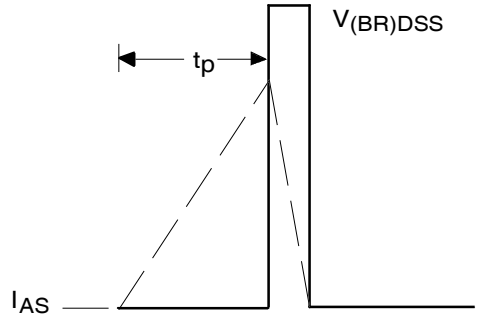


Fig 12b. Unclamped Inductive Waveforms

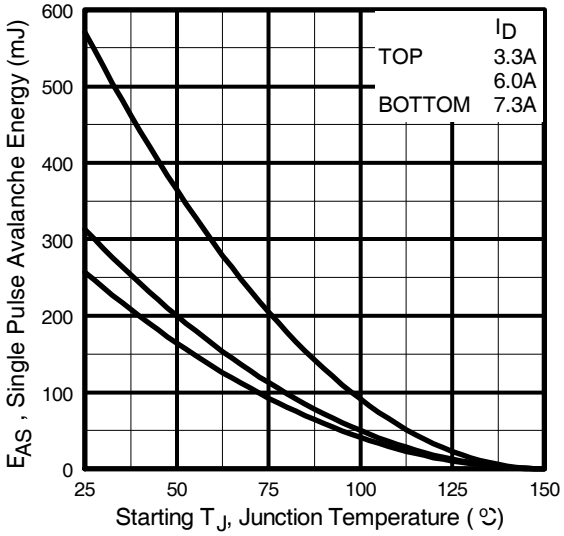
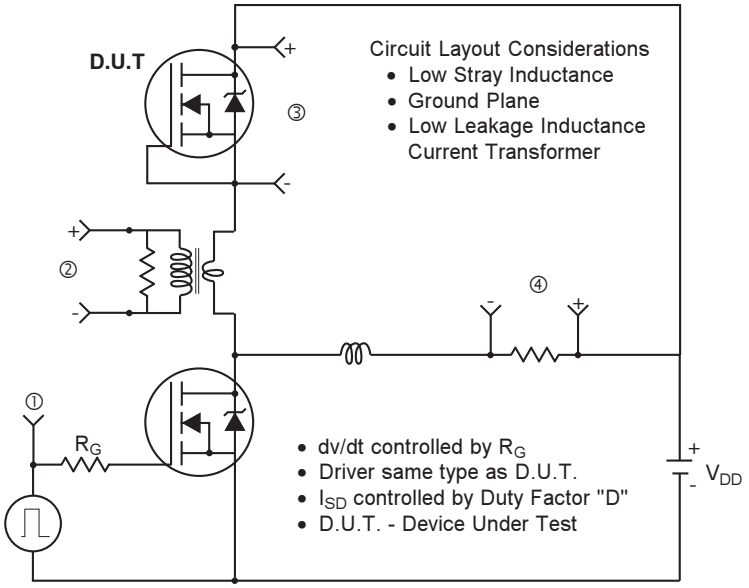


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

Peak Diode Recovery dv/dt Test Circuit



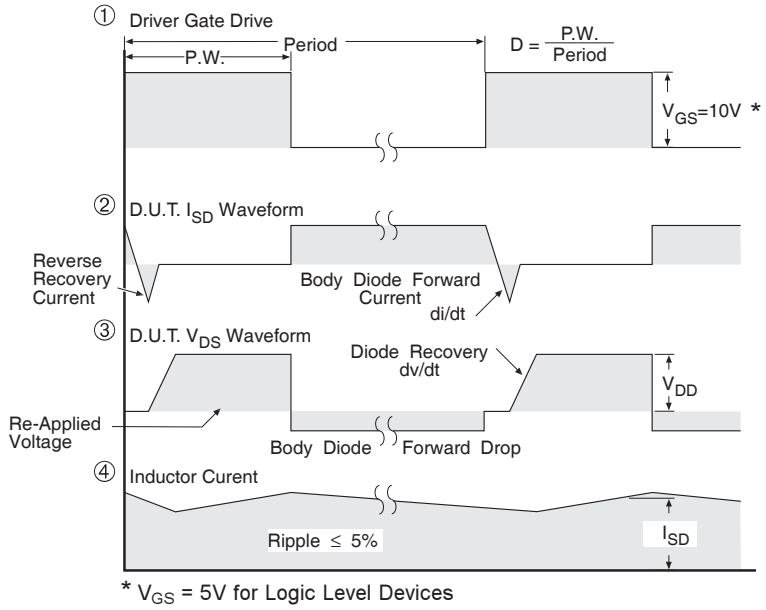
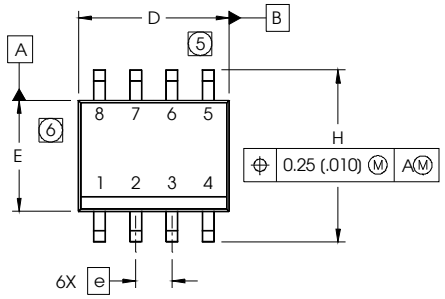


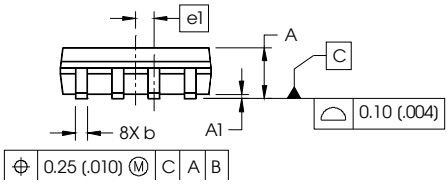
Fig 13. For N-Channel HEXFETS

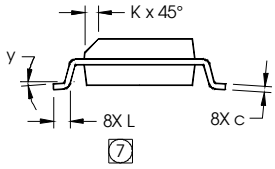
SO-8 Package Outline

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°

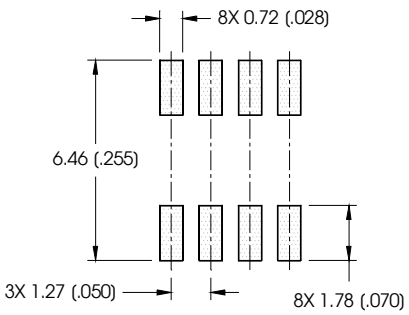




NOTES:

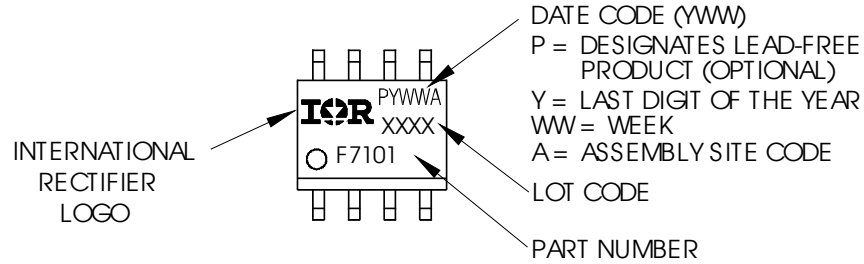
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).
6. DIMENSION DOES NOT INCLUDE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

FOOTPRINT



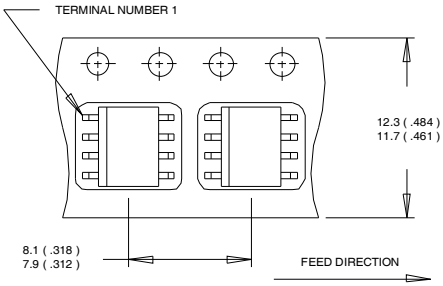
SO-8 Part Marking

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

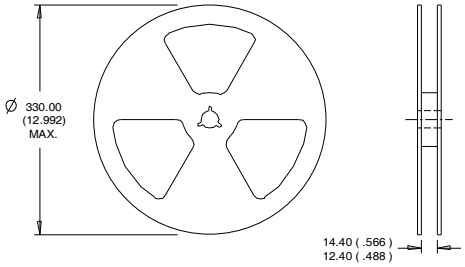


Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/

SO-8 Tape and Reel (Dimensions are shown in milimeters (inches))



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.

Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/

Qualification information†

Qualification level	Industrial (per JEDEC JESD47F†† guidelines)	
Moisture Sensitivity Level	SO-8	MSL1 (per JEDEC J-STD-020D††)
RoHS compliant	Yes	

† Qualification standards can be found at International Rectifier's web site: http://www.irf.com/product-info/reliability
†† Applicable version of JEDEC standard at the time of product release