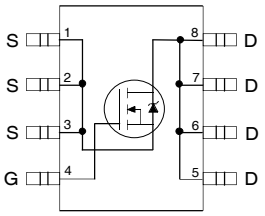
International
IOR Rectifier

PD - 96112

IRF7413QPbF

HEXFET® Power MOSFET

- Advanced Process Technology
- Ultra Low On-Resistance
- N Channel MOSFET
- Surface Mount
- Available in Tape & Reel
- 150°C Operating Temperature
- Automotive [Q101] Qualified
- Lead-Free



Top View

V_{DSS} = 30V

$R_{DS(on)}$ = 0.011Ω

Description

Specifically designed for Automotive applications, these HEXFET® Power MOSFET's in SO-8 package utilize the lastest processing techniques to achieve extremely low on-resistance per silicon area. Additional features of these Automotive qualified HEXFET Power MOSFET's are a 150°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These benefits combine to make this design an extremely efficient and reliable device for use in Automotive applications and a wide variety of other applications.

The efficient SO-8 package provides enhanced thermal characteristics making it ideal in a variety of power applications. This surface mount SO-8 can dramatically reduce board space and is also available in Tape & Reel.


SO-8

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

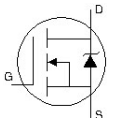
Symbol	Parameter	Typ	Max	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑥	——	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ⑤⑥	——	50	

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	1.2	—	3.7		
$t_{d(on)}$	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 $I_{SD} \leq$ 7.3A, di/dt ≤ 100A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 150°C

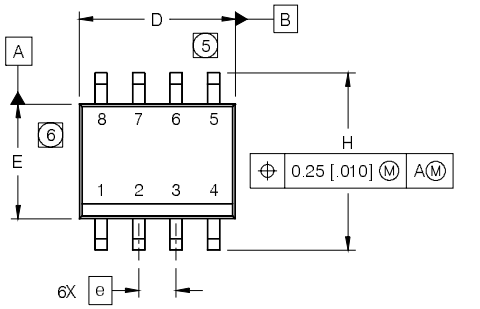
④ Pulse width ≤ 300µs; duty cycle ≤ 2%.

⑤ Surface mounted on FR-4 board

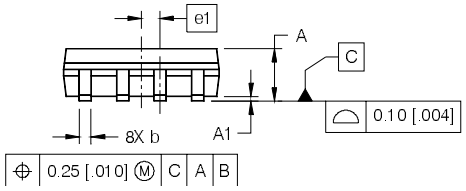
⑥ R_θ is measured at T_J approximately 90°C

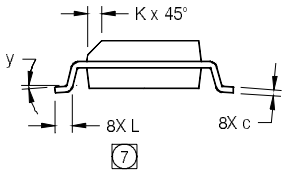
SO-8 Package Details

Dimensions are shown in milimeters (inches)



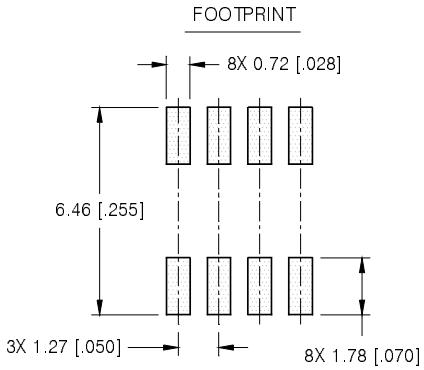
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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





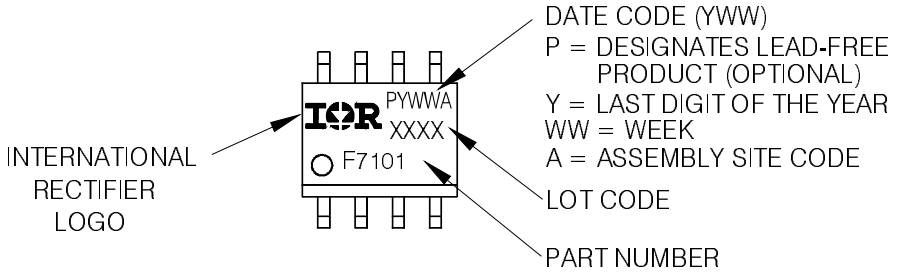
NOTES:

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.



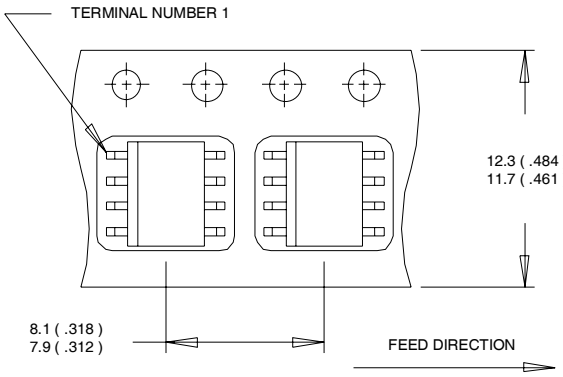
SO-8 Part Marking

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

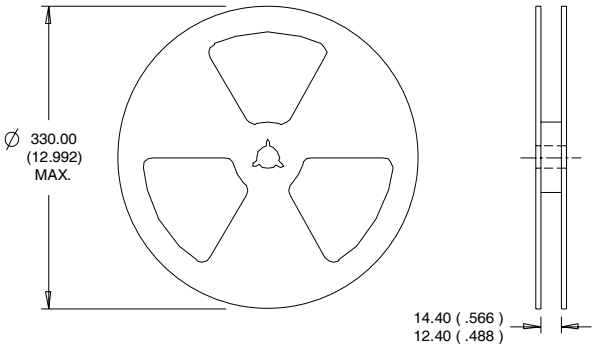


SO-8 Tape and Reel

Dimensions are shown in millimeters (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.

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.