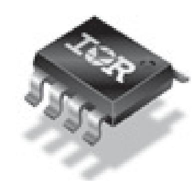
International
IOR Rectifier

PD – 96031

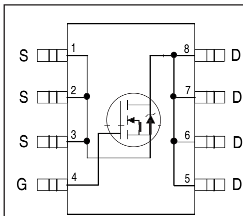
IRF7805PbF

HEXFET® Chip-Set for DC-DC Converters

- N Channel Application Specific MOSFETs
- Ideal for Mobile DC-DC Converters
- Low Conduction Losses
- Low Switching Losses
- Lead-Free



SO-8



Top View

Description

This new device employs advanced HEXFET Power MOSFET technology to achieve an unprecedented balance of on-resistance and gate charge. The reduced conduction and switching losses make this device ideal for high efficiency DC-DC Converters that power the latest generation of mobile microprocessors.

The IRF7805PbF offers maximum efficiency for mobile CPU core DC-DC converters.

Device Features

	IRF7805PbF
V_{DS}	30V
$R_{DS(on)}$	11mΩ
Qg	31nC
Qsw	11.5nC
Qoss	36nC

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 12	
I_D @ $T_A = 25°C$	Continuous Drain Current, V_{GS} @ 10V ③	13	A
I_D @ $T_A = 70°C$	Continuous Drain Current, V_{GS} @ 10V ③	10	
I_{DM}	Pulsed Drain Current ①	100	
P_D @$T_A = 25°C$	Power Dissipation ③	2.5	W
P_D @$T_A = 70°C$	Power Dissipation ③	1.6	
	Linear Derating Factor	0.02	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

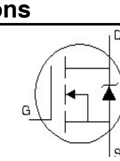
	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑤	—	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ③⑤	—	50	

9/28/05

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage ⑥	30	—	—	V	V_{GS} = 0V, I_D = 250μA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance ⑥	—	9.2	11	mΩ	V_{GS} = 4.5V, I_D = 7.0A ②
$V_{GS(th)}$	Gate Threshold Voltage ⑥	1.0	—	3.0	V	V_{DS} = V_{GS}, I_D = 250μA
I_{DSS}	Drain-to-Source Leakage Current	—	—	50	μA	V_{DS} = 30V, V_{GS} = 0V
		—	—	30		V_{DS} = 24V, V_{GS} = 0V
		—	—	150		V_{DS} = 24V, V_{GS} = 0V, T_J = 100°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V_{GS} = 12V
	Gate-to-Source Reverse Leakage	—	—	-100		V_{GS} = -12V
Q_g	Total Gate Charge ⑥	—	22	31		V_{GS} = 5.0V
Q_{gs1}	Pre-Vth Gate-to-Source Charge	—	3.7	—		V_{DS} = 16V
Q_{gs2}	Post-Vth Gate-to-Source Charge	—	1.4	—	nC	I_D = 7.0A
Q_{gd}	Gate-to-Drain Charge	—	6.8	—		
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd}) ⑥	—	8.2	11.5		
Q_{oss}	Output Charge ⑥	—	3.0	3.6	nC	V_{DS} = 16V, V_{GS} = 0V
R_G	Gate Resistance	0.5	—	1.7	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	16	—		V_{DD} = 16V, V_{GS} = 4.5V ③
t_r	Rise Time	—	20	—		I_D = 7.0A
$t_{d(off)}$	Turn-Off Delay Time	—	38	—	ns	R_G = 2Ω
t_f	Fall Time	—	16	—		Resistive Load

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode) ①	—	—	2.5	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	106		
V_{SD}	Diode Forward Voltage ⑥	—	—	1.2	V	T_J = 25°C, I_S = 7.0A, V_{GS} = 0V
Q_{rr}	Reverse Recovery Charge ④	—	88	—	nC	di/dt = 700A/μs V_{DS} = 16V, V_{GS} = 0V, I_S = 7.0A
$Q_{rr(s)}$	Reverse Recovery Charge (with Parallel Schottky) ④	—	55	—	nC	di/dt = 700A/μs (with 10BQ040) V_{DS} = 16V, V_{GS} = 0V, I_S = 7.0A

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.
② Pulse width ≤ 300 μs; duty cycle ≤ 2%.
③ When mounted on 1 inch square copper board, t < 10 sec.
④ Typ = measured - Q_{oss}
⑤ R_θ is measured at T_J of approximately 90°C.
⑥ Devices are 100% tested to these parameters.

Typical Characteristics

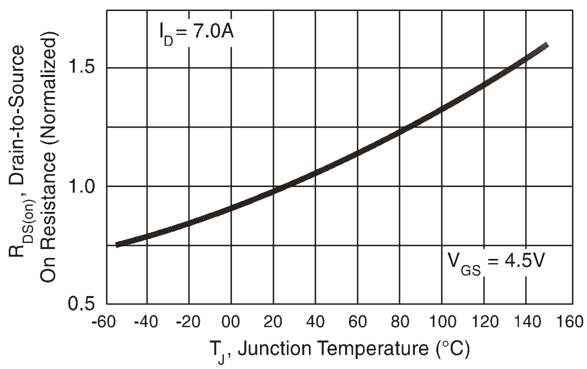


Fig 1. Normalized On-Resistance vs. Temperature

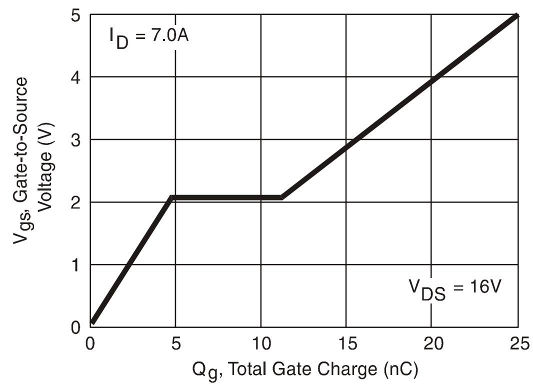


Fig 2. Typical Gate Charge vs. Gate-to-Source Voltage

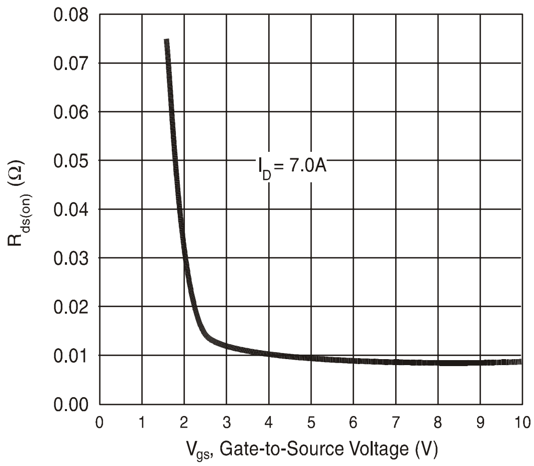


Fig 3. Typical Rds(on) vs. Gate-to-Source Voltage

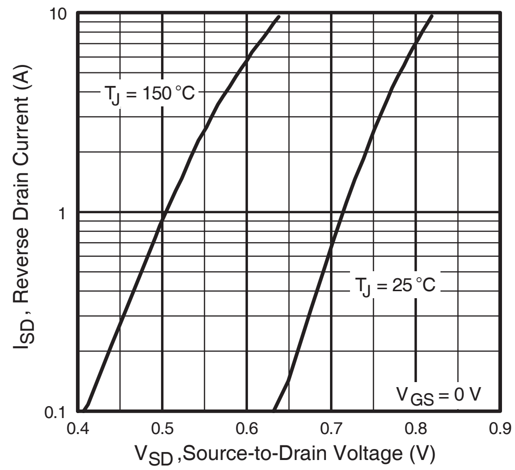


Fig 4. Typical Source-Drain Diode Forward Voltage

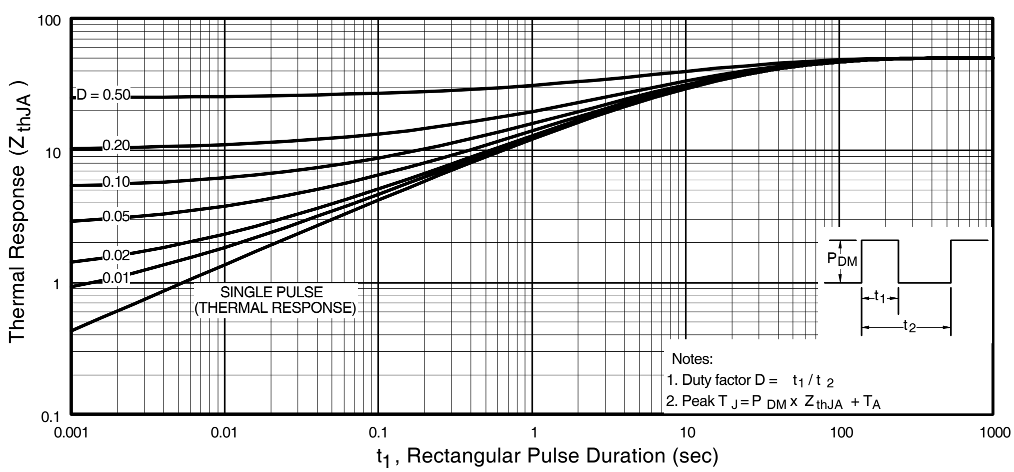
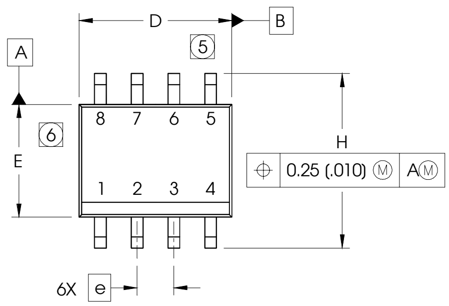
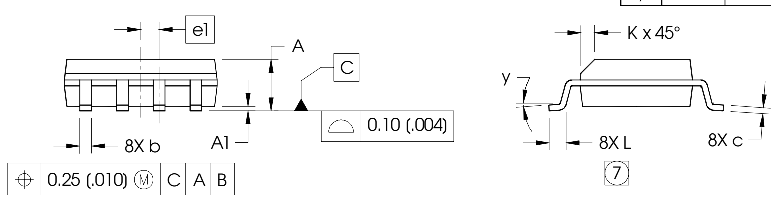


Figure 5. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

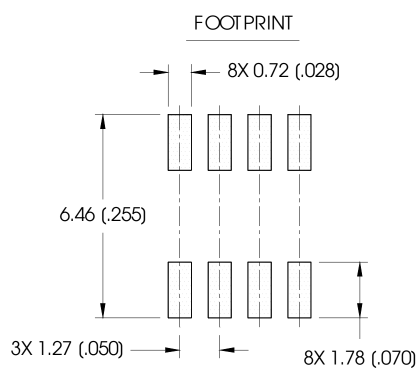
SO-8 Package Details



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°

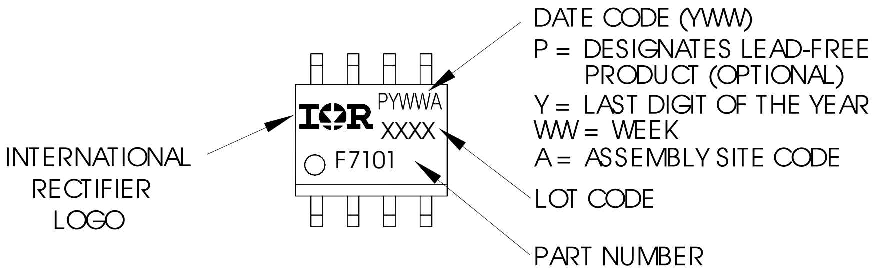


NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].
6. DIMENSION DOES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

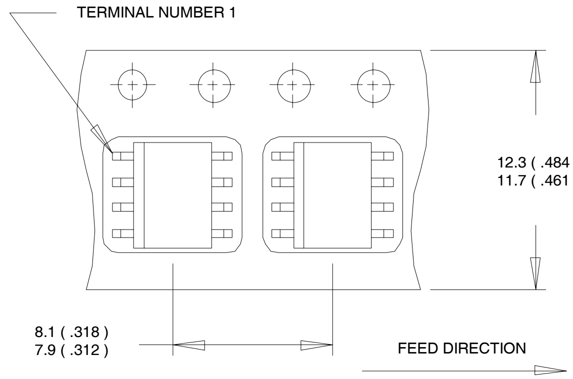


SO-8 Part Marking

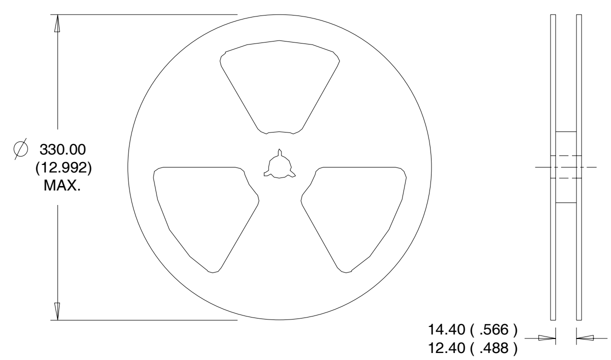
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



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.

International
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IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903
Visit us at www.irf.com for sales contact information.9/05