

IRF7805PbF

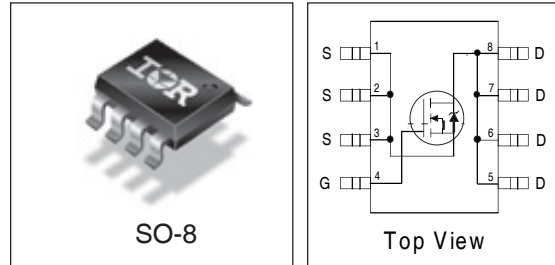
HEXFET® Chip-Set for DC-DC Converters

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

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 |
| $R_{DS(on)}$ | 11m Ω |
| Q_g | 31nC |
| Q_{sw} | 11.5nC |
| Q_{oss} | 36nC |

Absolute Maximum Ratings

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

Thermal Resistance

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

IRF7805PbF

International
IR Rectifier

Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|--------------|---|------|------|------|------------|---|
| BV_{DSS} | Drain-to-Source Breakdown Voltage ^⑥ | 30 | — | — | V | $V_{GS} = 0V, I_D = 250\mu A$ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance ^⑥ | — | 9.2 | 11 | m Ω | $V_{GS} = 4.5V, I_D = 7.0A$ ^② |
| $V_{GS(th)}$ | Gate Threshold Voltage ^⑥ | 1.0 | — | 3.0 | V | $V_{DS} = V_{GS}, I_D = 250\mu A$ |
| I_{DSS} | Drain-to-Source Leakage Current | — | — | 70 | μA | $V_{DS} = 30V, V_{GS} = 0V$ |
| | | — | — | 10 | | $V_{DS} = 24V, V_{GS} = 0V$ |
| | | — | — | 150 | | $V_{DS} = 24V, V_{GS} = 0V, T_J = 100^\circ\text{C}$ |
| 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 | nC | $V_{GS} = 5.0V$ $V_{DS} = 16V$ $I_D = 7.0A$ |
| Q_{gs1} | Pre-V _{th} Gate-to-Source Charge | — | 3.7 | — | | |
| Q_{gs2} | Post-V _{th} Gate-to-Source Charge | — | 1.4 | — | | |
| 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 | — | ns | $V_{DD} = 16V, V_{GS} = 4.5V$ ^③ $I_D = 7.0A$ $R_G = 2\Omega$ Resistive Load |
| t_r | Rise Time | — | 20 | — | | |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 38 | — | | |
| t_f | Fall Time | — | 16 | — | | |

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 | $T_J = 25^\circ\text{C}, I_S = 7.0A, V_{GS} = 0V$ |
| Q_{rr} | Reverse Recovery Charge ^④ | — | 88 | — | nC | $di/dt = 700A/\mu s$ $V_{DS} = 16V, V_{GS} = 0V, I_S = 7.0A$ |
| $Q_{rr(s)}$ | Reverse Recovery Charge (with Parallel Schottky) ^④ | — | 55 | — | nC | $di/dt = 700A/\mu s$ (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 $\leq 300 \mu s$; duty cycle $\leq 2\%$.
- 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

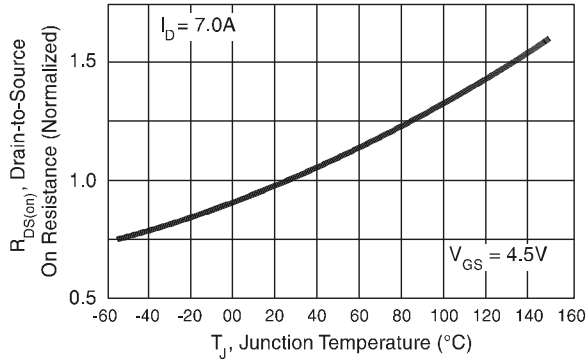


Fig 1. Normalized On-Resistance vs. Temperature

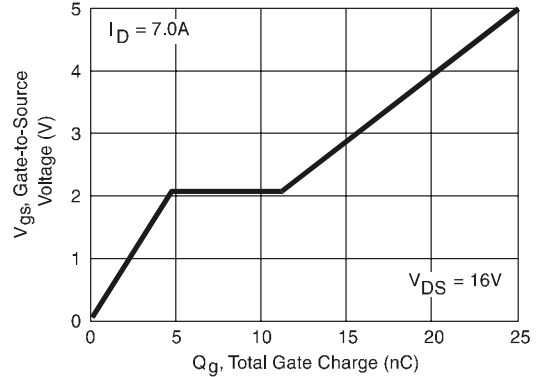


Fig 2. Typical Gate Charge vs. Gate-to-Source Voltage

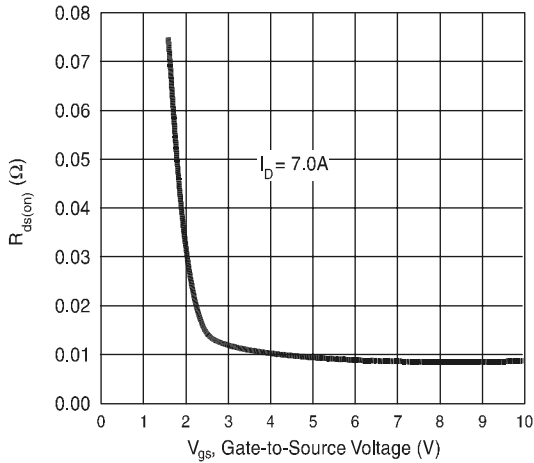


Fig 3. Typical $R_{DS(on)}$ vs. Gate-to-Source Voltage

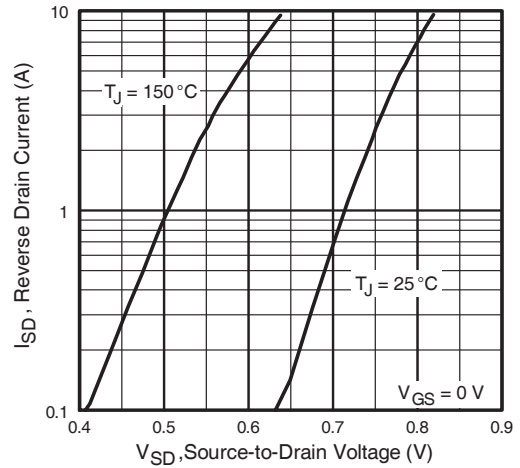


Fig 4. Typical Source-Drain Diode Forward Voltage

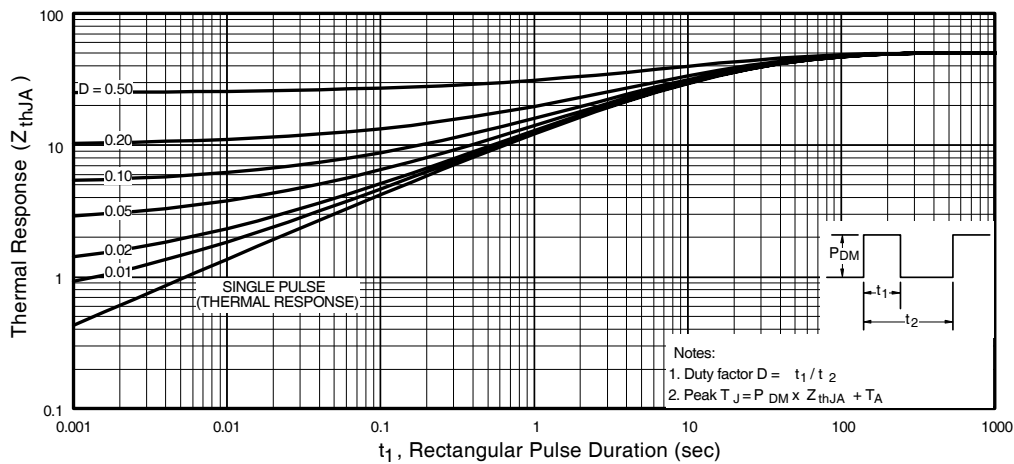
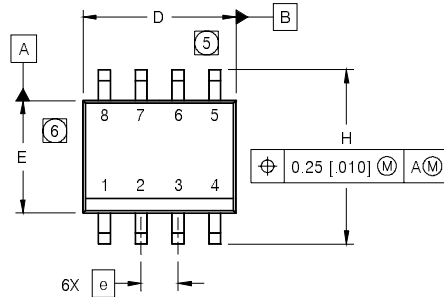


Figure 5. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

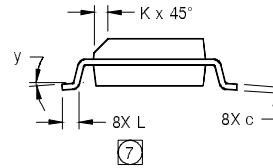
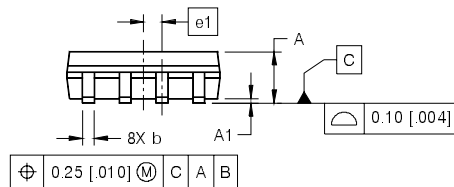
IRF7805PbF

SO-8 Package Details

International
IR Rectifier



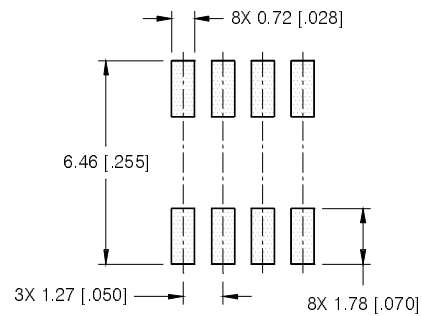
| DIM | INCHES | | MILLIMETERS | |
|-----|------------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | .0532 | .0688 | 1.35 | 1.75 |
| A1 | .0040 | .0098 | 0.10 | 0.25 |
| b | .013 | .020 | 0.33 | 0.51 |
| c | .0075 | .0098 | 0.19 | 0.25 |
| D | .189 | .1968 | 4.80 | 5.00 |
| E | .1497 | .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:

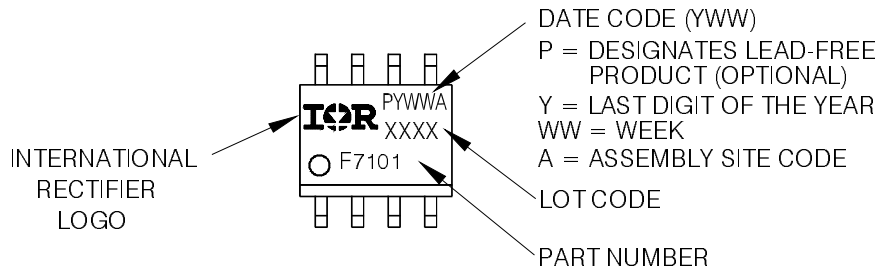
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [0.010].
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT



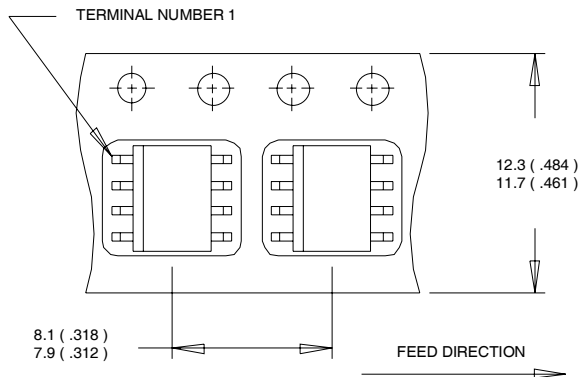
SO-8 Part Marking

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

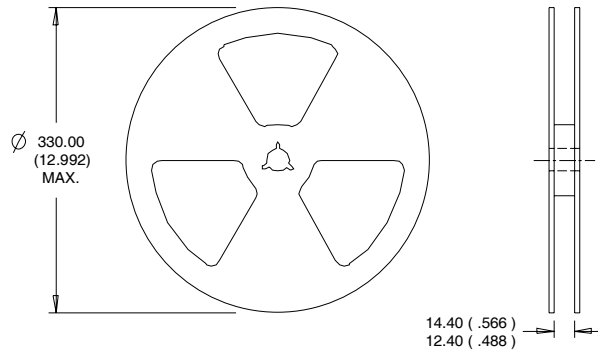


Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

SO-8 Tape and Reel



- 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.
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