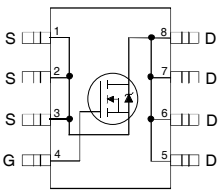
International
IOR Rectifier

# AUIRF7805Q

HEXFET® Power MOSFET

## Features

- Advanced Planar Technology
- Low On-Resistance
- Logic Level
- N Channel MOSFET
- Surface Mount
- Available in Tape & Reel
- 150°C Operating Temperature
- Automotive [Q101] Qualified
- Lead-Free, RoHS Compliant



Top View

| | | |
|---|---|---|
| $V_{(BR)DSS}$ | | 30V |
| $R_{DS(on)}$ | typ. | 9.2mΩ |
| | max. | 11mΩ |
| $I_D$ | | 13A |


SO-8

| G | D | S |
|---|---|---|
| Gate | Drain | Source |

## Description

Specifically designed for Automotive applications, these HEXFET® Power MOSFET's in a Dual 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 and dual MOSFET die capability making it ideal in a variety of power applications. This dual, surface mount SO-8 can dramatically reduce board space and is also available in Tape & Reel.

## Absolute Maximum Ratings

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only; and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature ($T_A$) is 25°C, unless otherwise specified.

| | 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 | 13 | A |
| $I_D$ @ $T_A$ = 70°C | Continuous Drain Current, $V_{GS}$ @ 10V | 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 |
| $T_J$<br>$T_{STG}$ | Operating Junction and<br>Storage Temperature Range | -55 to + 150 | °C |

## Thermal Resistance

| | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JL}$ | Junction-to-Drain Lead⑤ | ––– | 20 | °C/W |
| $R_{\theta JA}$ | Junction-to-Ambient ③ | ––– | 50 | |

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*Qualification standards can be found at http://www.irf.com/

## Static Electrical Characteristics @ $T_J$ = 25°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-to-Source Breakdown Voltage⑥ | 30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance⑥ | — | 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 | — | — | 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°C |
| $I_{GSS}$ | Gate-to-Source Forward Leakage | — | — | 100 | nA | $V_{GS}$ = 12V |
| | Gate-to-Source Reverse Leakage | — | — | -100 | | $V_{GS}$ = -12V |

## Dynamic Electrical Characteristics @ $T_J$ = 25°C (unless otherwise specified)

| | | | | | | |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge | — | 22 | 31 | nC | $V_{GS}$ = 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 | — | | $I_D$ = 7.0A |
| $Q_{gd}$ | Gate-to-Drain Charge | — | 6.8 | — | | |
| $Q_{sw}$ | Switch Charge ($Q_{gs2}$ + $Q_{gd}$) | — | 8.2 | 11.5 | | |
| $Q_{oss}$ | Output Charge | — | 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 ② |
| $t_r$ | Rise Time | — | 20 | — | | $I_D$ = 7.0A |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 38 | — | | $R_G$= 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 | — | ns | di/dt = 700A/µs<br>$V_{DS}$ = 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)<br>$V_{DS}$ = 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 $R_\theta$ is measured at $T_J$ of approximately 90°C.
⑥ Devices are 100% tested to these parameters.

## Qualification Information†

| | | | |
|---|---|---|---|
| **Qualification Level** | | Automotive (per AEC-Q101) †† | |
| | | Comments: This part number(s) passed Automotive qualification. IR's Industrial and Consumer qualification level is granted by extension of the higher Automotive level. | |
| **Moisture Sensitivity Level** | | SO-8 | MSL1 |
| **ESD** | Machine Model | Class M3(+/- 300V )††† (per AEC-Q101-002) | |
| | Human Body Model | Class H1B(+/- 1000V )††† (per AEC-Q101-001) | |
| | Charged Device Model | Class C5(+/- 2000V )††† (per AEC-Q101-005) | |
| **RoHS Compliant** | | Yes | |

† Qualification standards can be found at International Rectifier's web site: http//www.irf.com/

†† Exceptions (if any) to AEC-Q101 requirements are noted in the qualification report.

††† Highest passing voltage

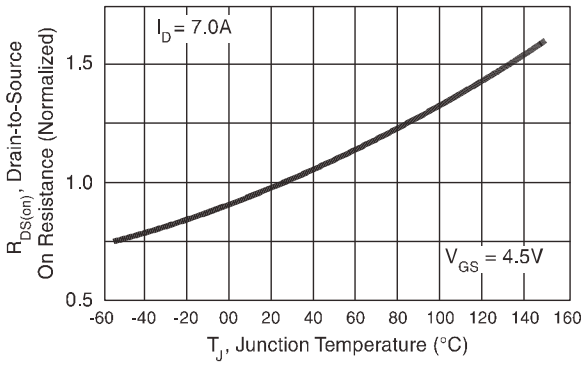



Fig 1. Normalized On-Resistance vs. Temperature

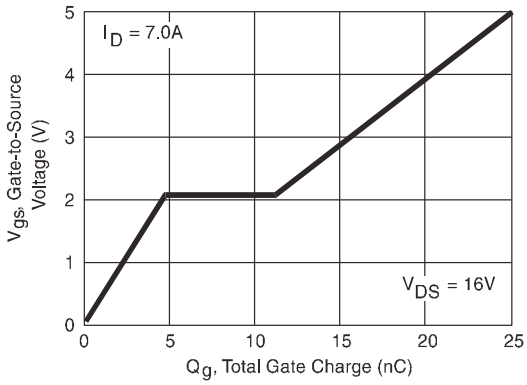



Fig 2. Typical Gate Charge vs. Gate-to-Source Voltage

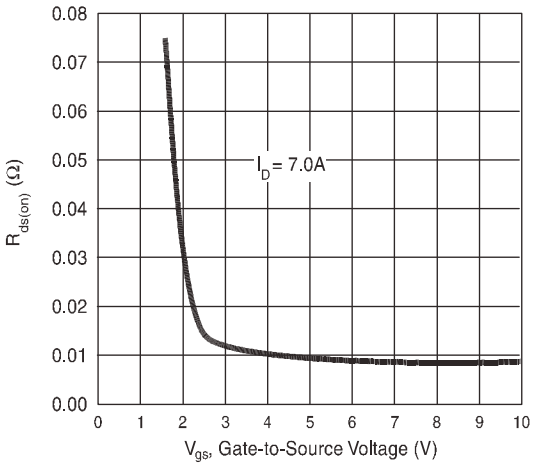



Fig 3. Typical Rds(on) vs. Gate-to-Source Voltage

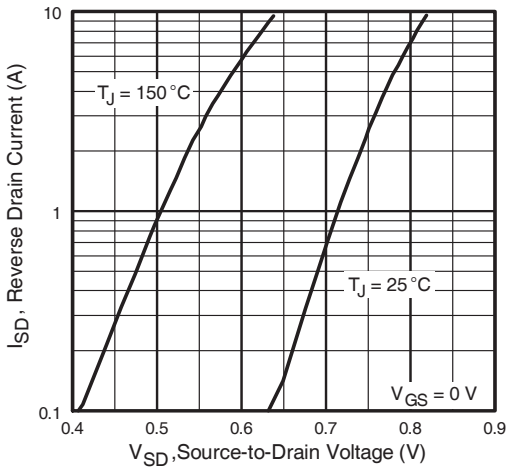



Fig 4. Typical Source-Drain Diode Forward Voltage

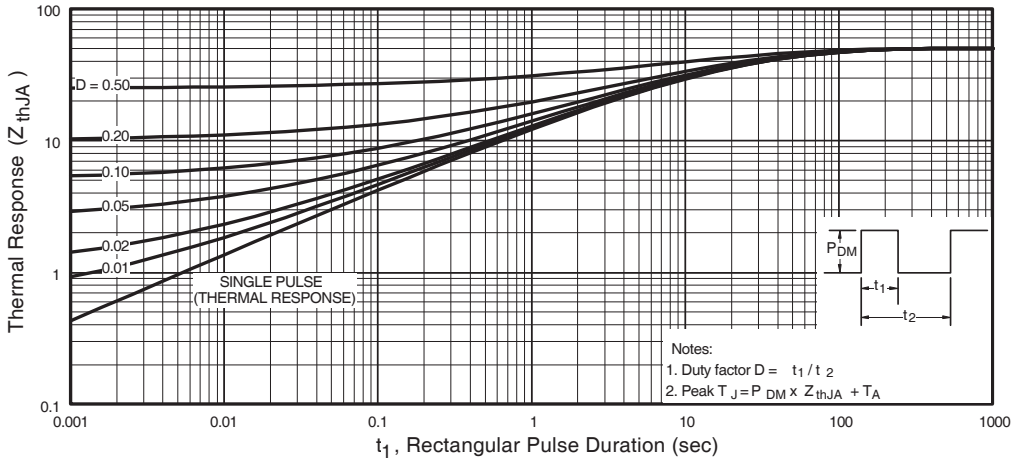
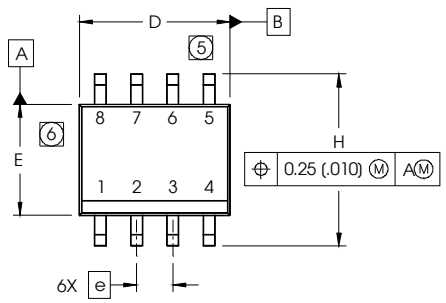


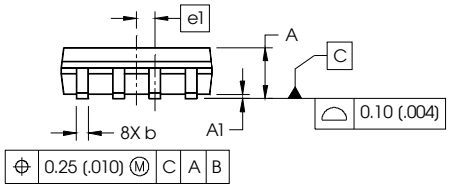

Figure 5. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

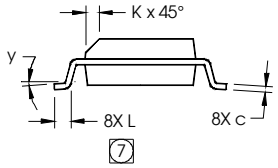
## SO-8 Package Outline

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° |



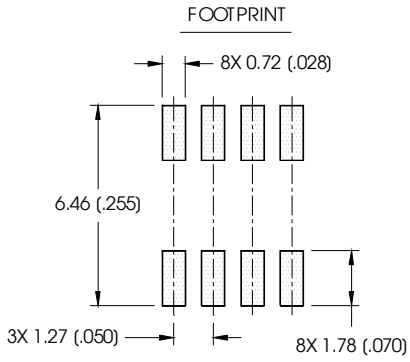

NOTES:

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.

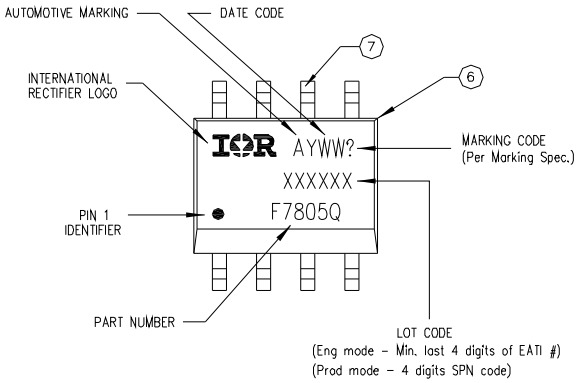
5 DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).

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.




## SO-8 Part Marking

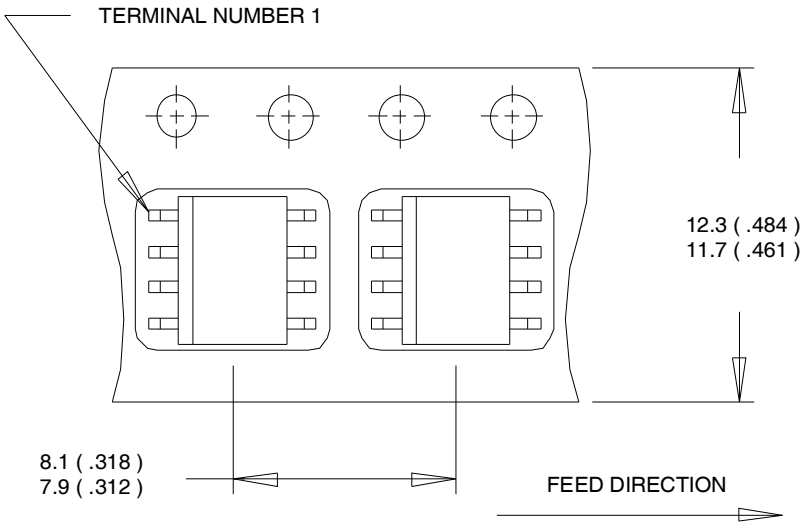



TOP MARKING (LASER)

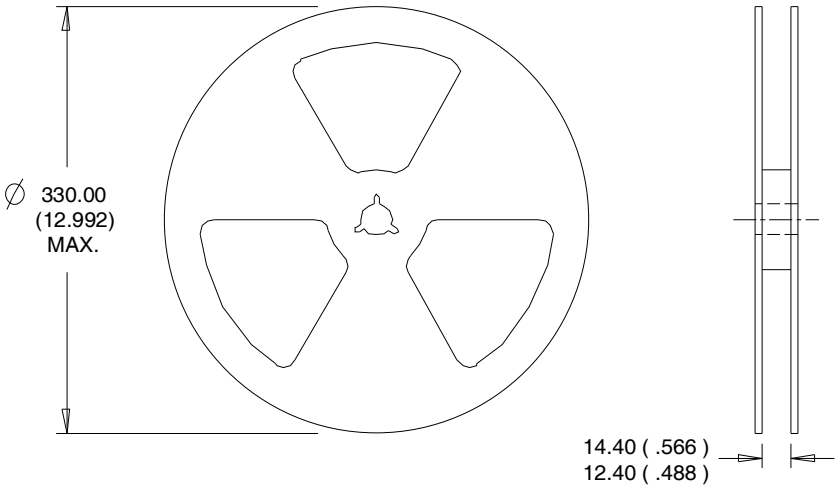
**Note: For the most current drawing please refer to IR website at http://www.irf.com/package/**

## SO-8 Tape and Reel

Dimensions are shown in 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.

## Ordering Information

| Base part | Package Type | Standard Pack | | Complete Part Number |
|---|---|---|---|---|
| | | Form | Quantity | |
| AUIRF7805Q | SO-8 | Tube | 95 | AUIRF7805Q |
| | | Tape and Reel | 4000 | AUIRF7805QTR |

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