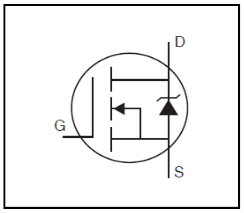
AUTOMOTIVE GRADE

# AUIRF2807

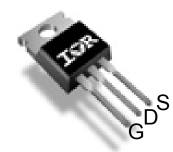
HEXFET® Power MOSFET

## Features

- Advanced Planar Technology
- Low On-Resistance
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Repetitive Avalanche Allowed up to Tjmax
- Lead-Free, RoHS Compliant
- Automotive Qualified *




| | |
|---|---|
| $V_{DSS}$ | 75V |
| $R_{DS(on)}$ max. | 13mΩ |
| $I_D$ (Silicon Limited) | 82A⑥ |
| $I_D$ (Package Limited) | 75A |




TO-220AB
AUIRF2807

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

## Description

Specifically designed for Automotive applications, this Stripe Planar design of HEXFET® Power MOSFETs utilizes the latest processing techniques to achieve low on-resistance per silicon area. This benefit combined with the fast switching speed and ruggedized device design that HEXFET power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in Automotive and a wide variety of other applications.

| Base part number | Package Type | Standard Pack | | Orderable Part Number |
|---|---|---|---|---|
| | | Form | Quantity | |
| AUIRF2807 | TO-220 | Tube | 50 | AUIRF2807 |

## 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 (TA) is 25°C, unless otherwise specified.

| Symbol | Parameter | Max. | Units |
|---|---|---|---|
| $I_D$ @ $T_C$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V (Silicon Limited) | 82⑥ | A |
| $I_D$ @ $T_C$ = 100°C | Continuous Drain Current, $V_{GS}$ @ 10V (Silicon Limited) | 58 | |
| $I_D$ @ $T_C$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V (Package Limited) | 75 | |
| $I_{DM}$ | Pulsed Drain Current ① | 280 | |
| $P_D$ @$T_C$ = 25°C | Maximum Power Dissipation | 230 | W |
| | Linear Derating Factor | 1.5 | W/°C |
| $V_{GS}$ | Gate-to-Source Voltage | ± 20 | V |
| $E_{AS}$ | Single Pulse Avalanche Energy (Thermally Limited) ②⑤ | 340 | mJ |
| $I_{AR}$ | Avalanche Current ① | 43 | A |
| $E_{AR}$ | Repetitive Avalanche Energy ① | 23 | mJ |
| dV/dt | Peak Diode Recovery dv/dt ③ | 5.9 | V/ns |
| $T_J$<br>$T_{STG}$ | Operating Junction and<br>Storage Temperature Range | -55 to + 175 | °C |
| | Soldering Temperature, for 10 seconds (1.6mm from case) | 300 | |
| | Mounting torque, 6-32 or M3 screw | 10 lbf•in (1.1N•m) | |

## Thermal Resistance

| Symbol | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-Case | —— | 0.65 | °C/W |
| $R_{\theta CS}$ | Case-to-Sink, Flat, Greased Surface | 0.50 | —— | |
| $R_{\theta JA}$ | Junction-to-Ambient | —— | 62 | |

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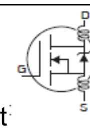
*Qualification standards can be found at www.infineon.com

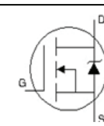
**Static @ $T_J$ = 25°C (unless otherwise specified)**

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | 75 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250μA |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | 0.074 | — | V/°C | Reference to 25°C, $I_D$ = 1mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | — | 13 | mΩ | $V_{GS}$ = 10V, $I_D$ = 43A ④ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 2.0 | — | 4.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| gfs | Forward Trans conductance | 38 | — | — | S | $V_{DS}$ = 50V, $I_D$ = 43A |
| $I_{DSS}$ | Drain-to-Source Leakage Current | — | — | 25 | μA | $V_{DS}$ = 75 V, $V_{GS}$ = 0V |
| | | — | — | 250 | | $V_{DS}$ = 60V,$V_{GS}$ = 0V,$T_J$ =150°C |
| $I_{GSS}$ | Gate-to-Source Forward Leakage | — | — | 100 | nA | $V_{GS}$ = 20V |
| | Gate-to-Source Reverse Leakage | — | — | -100 | | $V_{GS}$ = -20V |

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

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge | — | — | 160 | nC | $I_D$ = 43A |
| $Q_{gs}$ | Gate-to-Source Charge | — | — | 29 | | $V_{DS}$ = 60V |
| $Q_{gd}$ | Gate-to-Drain Charge | — | — | 55 | | $V_{GS}$ = 10V, See Fig.6 and 13 ④ |
| $t_{d(on)}$ | Turn-On Delay Time | — | 13 | — | ns | $V_{DD}$ = 38V |
| $t_r$ | Rise Time | — | 64 | — | | $I_D$ = 43A |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 49 | — | | $R_G$= 2.5Ω |
| $t_f$ | Fall Time | — | 48 | — | | $V_{GS}$ = 10V, See Fig. 10 ④ |
| $L_D$ | Internal Drain Inductance | — | 4.5 | — | nH | Between lead, 6mm (0.25in.) from package and center of die contact  |
| $L_S$ | Internal Source Inductance | — | 7.5 | — | | |
| $C_{iss}$ | Input Capacitance | — | 3820 | — | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | — | 610 | — | | $V_{DS}$ = 25V |
| $C_{rss}$ | Reverse Transfer Capacitance | — | 130 | — | | $f$ = 1.0MHz, See Fig. 5 |

**Diode Characteristics**

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | 82⑥ | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | — | — | 280 | | |
| $V_{SD}$ | Diode Forward Voltage | — | — | 1.2 | V | $T_J$ = 25°C,$I_S$ = 43A,$V_{GS}$ = 0V ④ |
| $t_{rr}$ | Reverse Recovery Time | — | 100 | 150 | ns | $T_J$ = 25°C ,$I_F$ = 43A |
| $Q_{rr}$ | Reverse Recovery Charge | — | 410 | 610 | nC | di/dt = 100A/μs ④ |
| $t_{on}$ | Forward Turn-On Time | Intrinsic turn-on time is negligible (turn-on is dominated by $L_S$+$L_D$) | | | | |

**Notes:**

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
② Starting $T_J$ = 25°C, L = 370μH, $R_G$ = 25Ω, $I_{AS}$ = 43A, $V_{GS}$ =10V (See fig. 12)
③ $I_{SD} \leq$ 43A, di/dt $\leq$ 300A/μs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 175°C.
④ Pulse width $\leq$ 400μs; duty cycle $\leq$ 2%.
⑤ This is a calculated value limited to $T_J$ = 175°C .
⑥ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

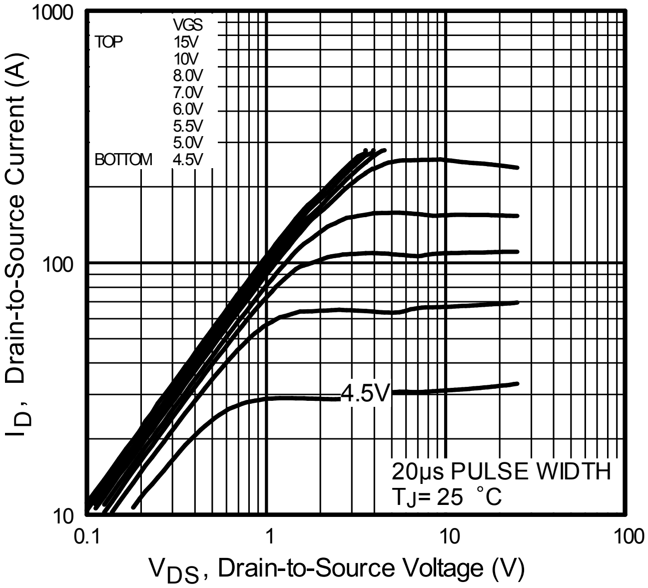



**Fig. 1** Typical Output Characteristics

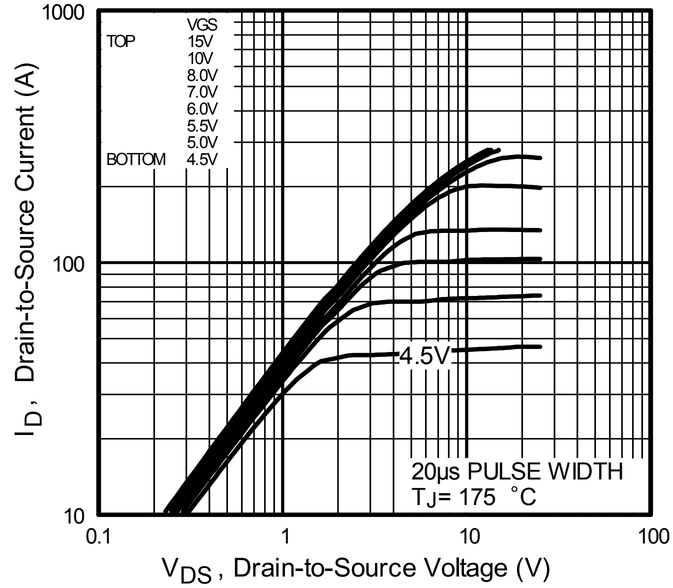



**Fig. 2** Typical Output Characteristics

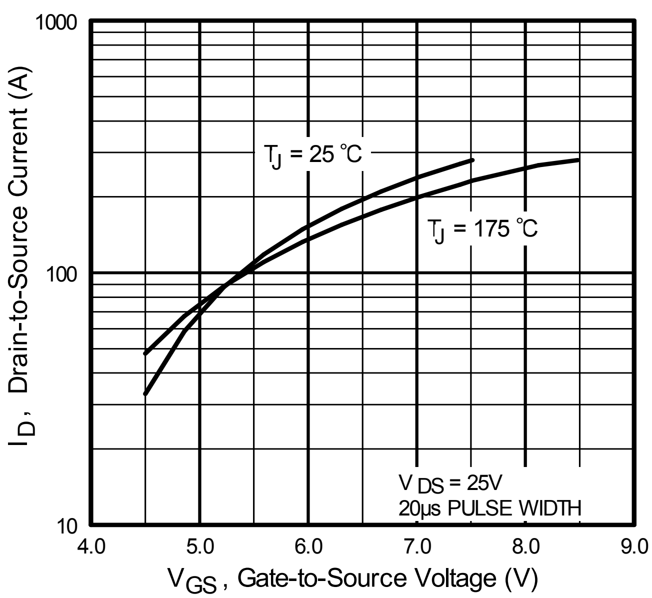



**Fig. 3** Typical Transfer Characteristics

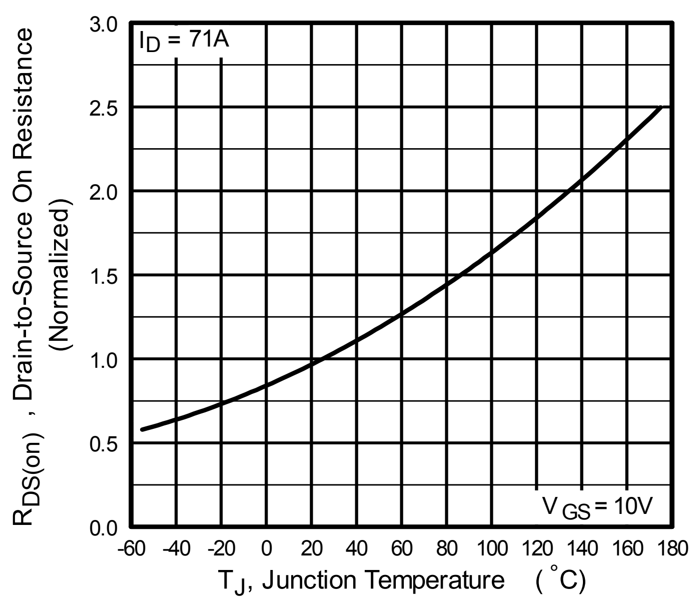



**Fig. 4** Normalized On-Resistance Vs. Temperature

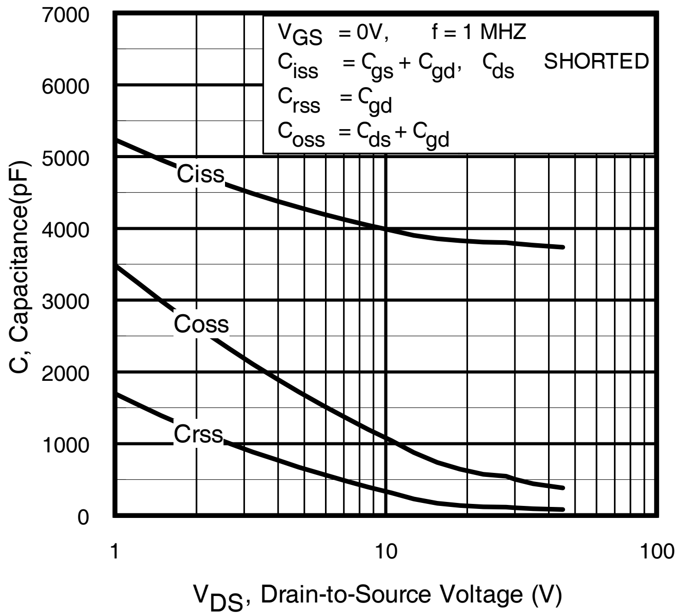



**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage

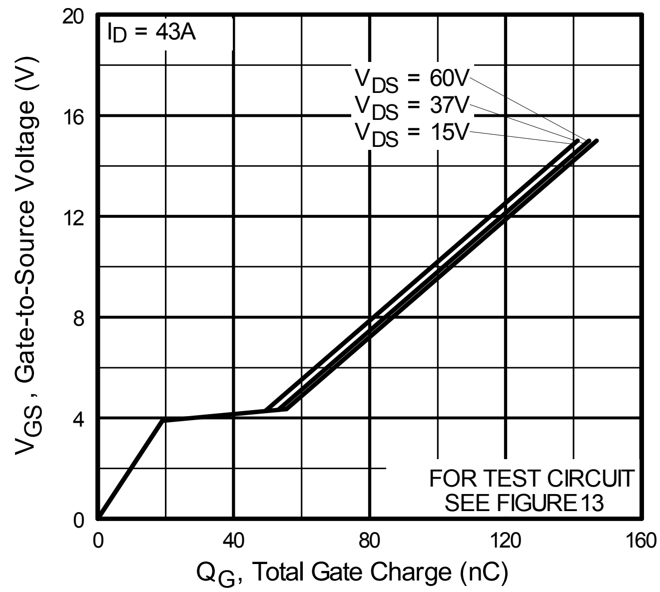



**Fig 6.** Typical Gate Charge vs. Gate-to-Source Voltage

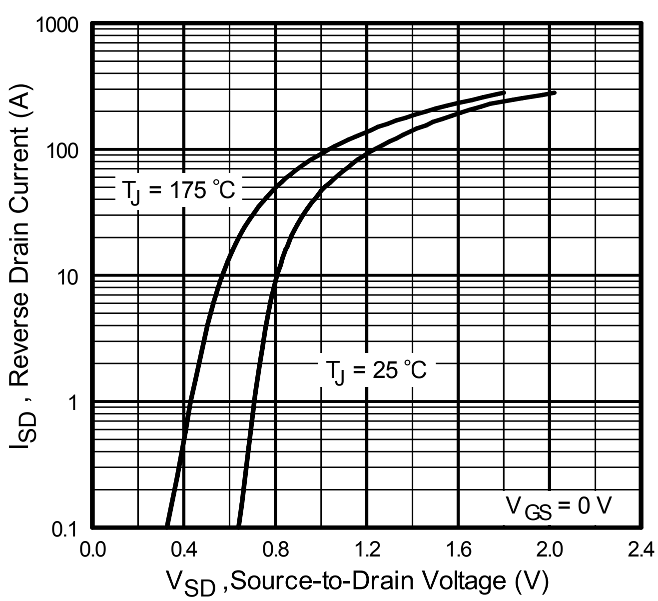



**Fig. 7** Typical Source-to-Drain Diode Forward Voltage

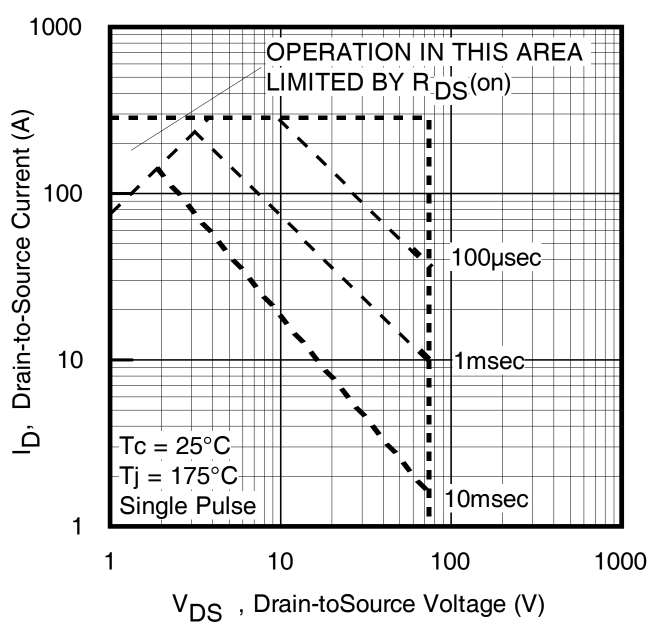



**Fig 8.** Maximum Safe Operating Area

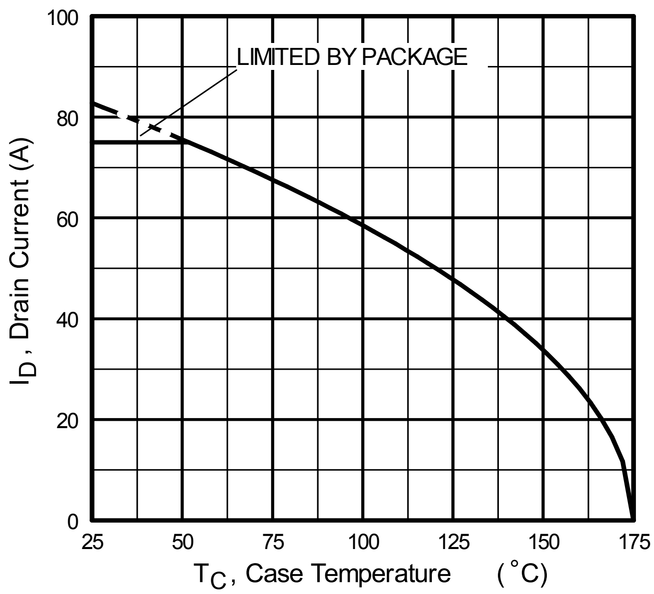



**Fig 9.** Maximum Drain Current vs. Case Temperature

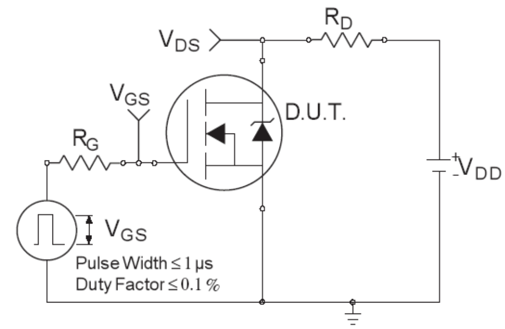



**Fig 10a.** Switching Time Test Circuit

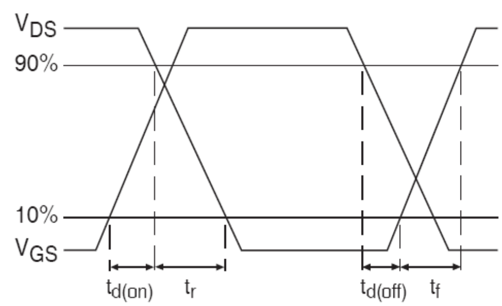



**Fig 10b.** Switching Time Waveforms

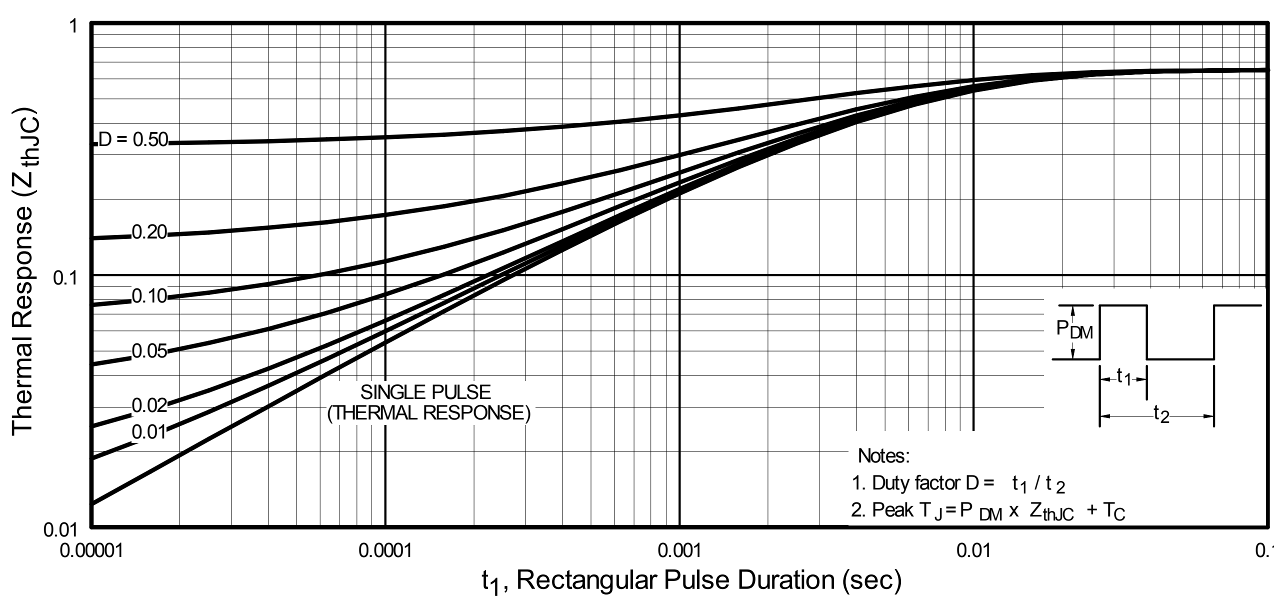



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case

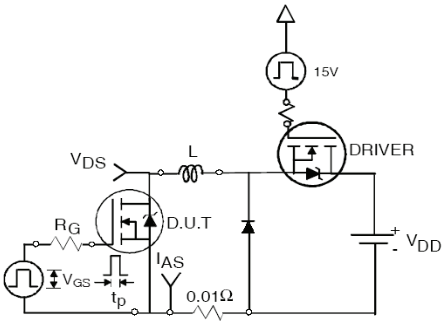



**Fig 12a.** Unclamped Inductive Test Circuit

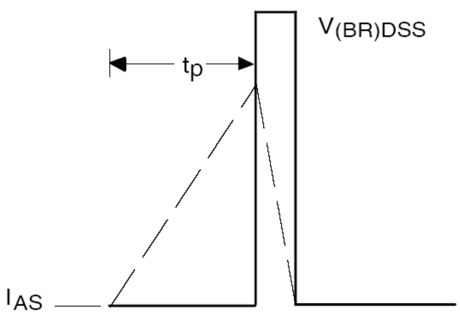



**Fig 12b.** Unclamped Inductive Waveforms

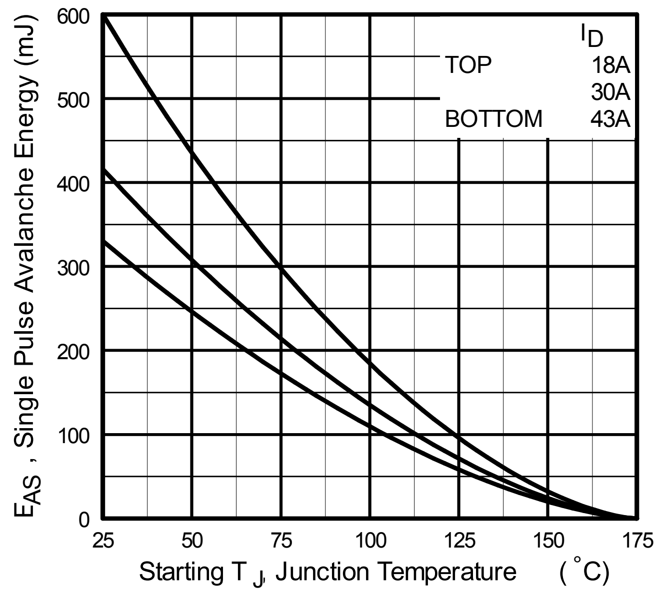



**Fig 12c.** Maximum Avalanche Energy vs. Drain Current

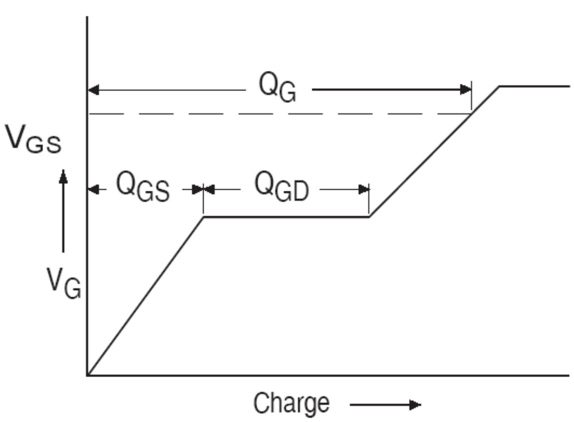



**Fig 13a.** Gate Charge Waveform

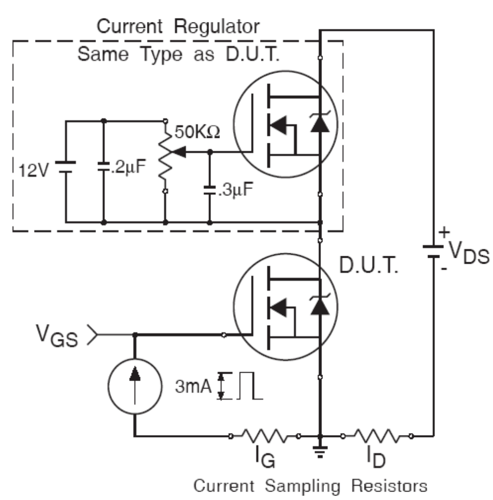



**Fig 13b.** Gate Charge Test Circuit

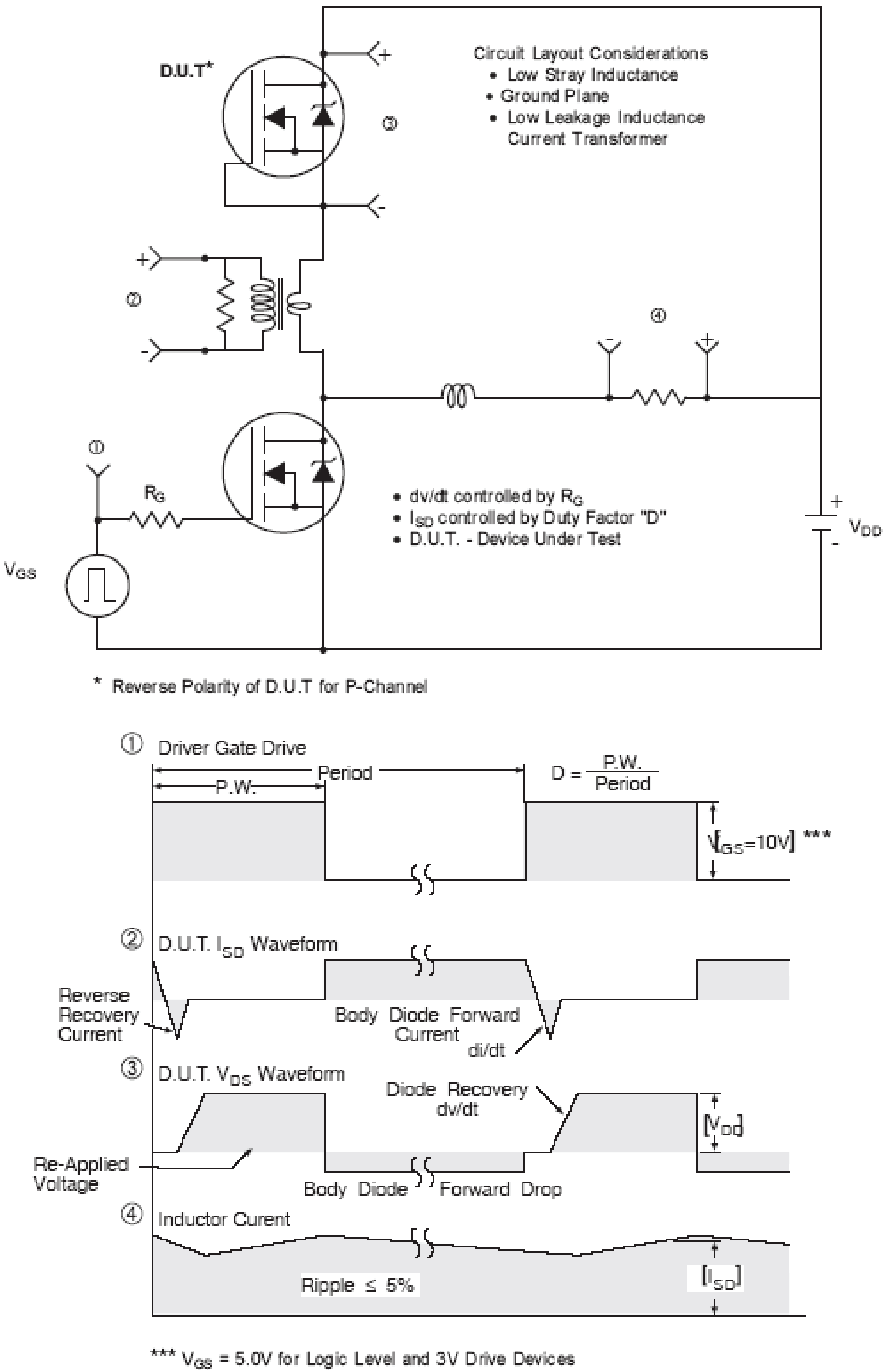
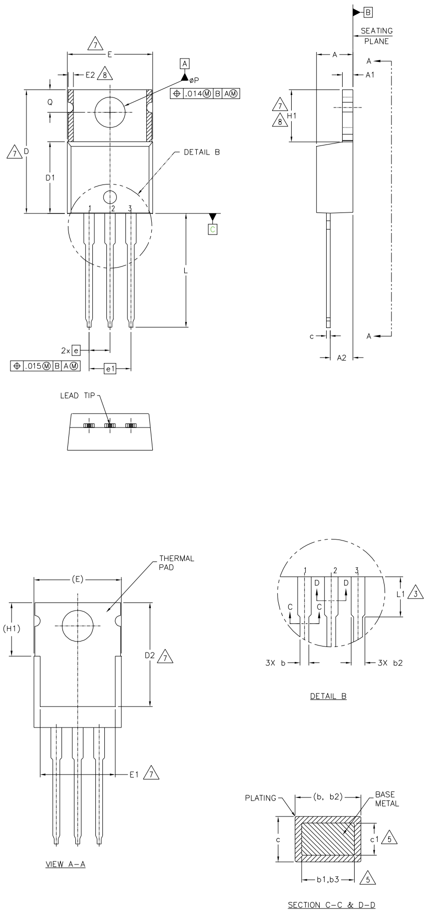



**Fig 14.** Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

**TO-220AB Package Outline** (Dimensions are shown in millimeters (inches))




NOTES:

1.– DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M– 1994.
2.– DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
3.– LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
4.– DIMENSION D, D1 & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
5.– DIMENSION b1, b3 & c1 APPLY TO BASE METAL ONLY.
6.– CONTROLLING DIMENSION : INCHES.
7.– THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E,H1,D2 & E1
8.– DIMENSION E2 X H1 DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.
9.– OUTLINE CONFORMS TO JEDEC TO–220, EXCEPT A2 (max.) AND D2 (min.) WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE.

| SYMBOL | DIMENSIONS | | | | NOTES |
|---|---|---|---|---|---|
| | MILLIMETERS | | INCHES | | |
| | MIN. | MAX. | MIN. | MAX. | |
| A | 3.56 | 4.83 | .140 | .190 | |
| A1 | 1.14 | 1.40 | .045 | .055 | |
| A2 | 2.03 | 2.92 | .080 | .115 | |
| b | 0.38 | 1.01 | .015 | .040 | |
| b1 | 0.38 | 0.97 | .015 | .038 | 5 |
| b2 | 1.14 | 1.78 | .045 | .070 | |
| b3 | 1.14 | 1.73 | .045 | .068 | 5 |
| c | 0.36 | 0.61 | .014 | .024 | |
| c1 | 0.36 | 0.56 | .014 | .022 | 5 |
| D | 14.22 | 16.51 | .560 | .650 | 4 |
| D1 | 8.38 | 9.02 | .330 | .355 | |
| D2 | 11.68 | 12.88 | .460 | .507 | 7 |
| E | 9.65 | 10.67 | .380 | .420 | 4,7 |
| E1 | 6.86 | 8.89 | .270 | .350 | 7 |
| E2 | – | 0.76 | – | .030 | 8 |
| e | 2.54 BSC | | .100 BSC | | |
| e1 | 5.08 BSC | | .200 BSC | | |
| H1 | 5.84 | 6.86 | .230 | .270 | 7,8 |
| L | 12.70 | 14.73 | .500 | .580 | |
| L1 | 3.56 | 4.06 | .140 | .160 | 3 |
| øP | 3.54 | 4.08 | .139 | .161 | |
| Q | 2.54 | 3.42 | .100 | .135 | |

LEAD ASSIGNMENTS

HEXFET

1.– GATE
2.– DRAIN
3.– SOURCE

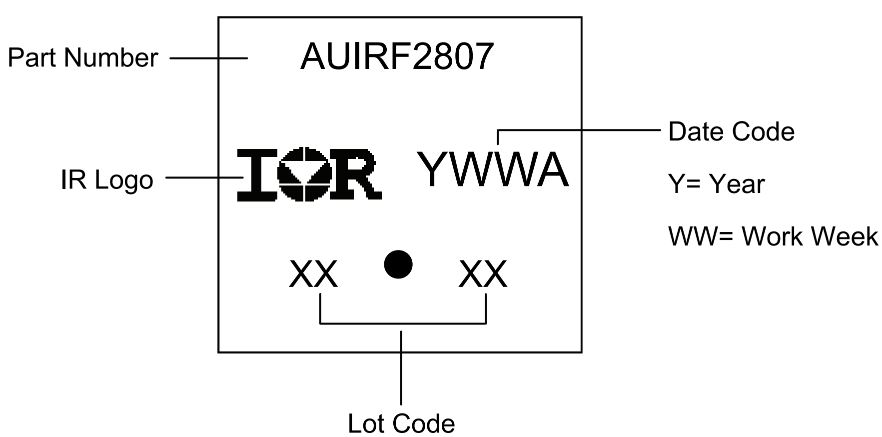
IGBTs, CoPACK

1.– GATE
2.– COLLECTOR
3.– EMITTER

DIODES

1.– ANODE
2.– CATHODE
3.– ANODE

**TO-220AB Part Marking Information**




TO-220AB package is not recommended for Surface Mount Application.

### Qualification Information

| | | | |
|---|---|---|---|
| **Qualification Level** | | Automotive<br>(per AEC-Q101)<br>Comments: This part number(s) passed Automotive qualification. Infineon's Industrial and Consumer qualification level is granted by extension of the higher Automotive level. | |
| **Moisture Sensitivity Level** | | 3L-TO-220AB | N/A |
| **ESD** | Machine Model | Class M4 (+/- 800V)†<br>AEC-Q101-002 | |
| | Human Body Model | Class H1C (+/- 2000V)†<br>AEC-Q101-001 | |
| | Charged Device Model | Class C5 (+/- 2000V)†<br>AEC-Q101-005 | |
| **RoHS Compliant** | | Yes | |

† Highest passing voltage.

### Revision History

| Date | Comments |
|---|---|
| 9/29/2017 | • Updated datasheet with corporate template.<br>• Corrected typo error on package outline and part marking on page 8. |

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