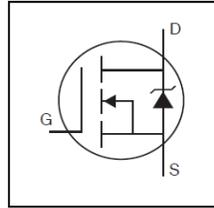
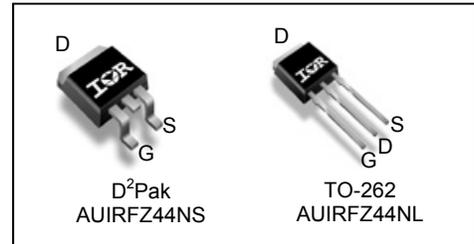


**Features**

- Advanced Planar Technology
- Low On-Resistance
- Dynamic dV/dT and dI/dT capability
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Repetitive Avalanche Allowed up to Tjmax
- Lead-Free, RoHS Compliant
- Automotive Qualified \*



|                                |               |
|--------------------------------|---------------|
| <b>V<sub>DSS</sub></b>         | <b>55V</b>    |
| <b>R<sub>DS(on)</sub> max.</b> | <b>17.5mΩ</b> |
| <b>I<sub>D</sub></b>           | <b>49A</b>    |



|          |          |          |
|----------|----------|----------|
| <b>G</b> | <b>D</b> | <b>S</b> |
| Gate     | Drain    | Source   |

**Description**

Specifically designed for Automotive applications, this HEXFET® Power MOSFET utilizes the latest processing techniques to achieve extremely low on-resistance per silicon area. Additional features of this design are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in Automotive applications and a wide variety of other applications

| Base part number | Package Type | Standard Pack      |          | Orderable Part Number |
|------------------|--------------|--------------------|----------|-----------------------|
|                  |              | Form               | Quantity |                       |
| AUIRFZ44NL       | TO-262       | Tube               | 50       | AUIRFZ44NL            |
| AUIRFZ44NS       | D²-Pak       | Tube               | 50       | AUIRFZ44NS            |
|                  |              | Tape and Reel Left | 800      | AUIRFZ44NSTRL         |

**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 <sub>D</sub> @ T <sub>C</sub> = 25°C  | Continuous Drain Current, V <sub>GS</sub> @ 10V         | 49           | A     |
| I <sub>D</sub> @ T <sub>C</sub> = 100°C | Continuous Drain Current, V <sub>GS</sub> @ 10V         | 35           |       |
| I <sub>DM</sub>                         | Pulsed Drain Current ①                                  | 160          |       |
| P <sub>D</sub> @ T <sub>A</sub> = 25°C  | Maximum Power Dissipation                               | 3.8          | W     |
| P <sub>D</sub> @ T <sub>C</sub> = 25°C  | Maximum Power Dissipation                               | 94           |       |
|   | Linear Derating Factor                                  | 0.63         |       |
| V <sub>GS</sub>                         | Gate-to-Source Voltage                                  | ± 20         | V     |
| E <sub>AS</sub> (Thermally Limited)     | Single Pulse Avalanche Energy (Thermally Limited) ⑥     | 150          | mJ    |
| E <sub>AS</sub> (Tested)                | Single Pulse Avalanche Energy (Tested Limited) ⑤        | 530          |       |
| I <sub>AR</sub>                         | Avalanche Current ①                                     | 25           | A     |
| E <sub>AR</sub>                         | Repetitive Avalanche Energy ①                           | 9.4          | mJ    |
| dv/dt                                   | Peak Diode Recovery ③                                   | 5.0          | V/ns  |
| T <sub>J</sub>                          | Operating Junction and                                  | -55 to + 175 | °C    |
| T <sub>STG</sub>                        | Storage Temperature Range                               |              |       |
|   | Soldering Temperature, for 10 seconds (1.6mm from case) | 300          |       |

**Thermal Resistance**

| Symbol           | Parameter                               | Typ. | Max. | Units |
|------------------|---|------|------|-------|
| R <sub>θJC</sub> | Junction-to-Case                        | —    | 1.5  | °C/W  |
| R <sub>θJA</sub> | Junction-to-Ambient (PCB Mount), D² Pak | —    | 40   |       |

HEXFET® is a registered trademark of Infineon.

\*Qualification standards can be found at [www.infineon.com](http://www.infineon.com)

**Static @ T<sub>J</sub> = 25°C (unless otherwise specified)**

|  | Parameter                            | Min. | Typ.  | Max. | Units | Conditions  |
|--|--------------------------------------|------|-------|------|-------|---|
| V <sub>(BR)DSS</sub>                   | Drain-to-Source Breakdown Voltage    | 55   | —     | —    | V     | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                        |
| ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub> | Breakdown Voltage Temp. Coefficient  | —    | 0.058 | —    | V/°C  | Reference to 25°C, I <sub>D</sub> = 1mA                             |
| R <sub>DS(on)</sub>                    | Static Drain-to-Source On-Resistance | —    | —     | 17.5 | mΩ    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 25A ④                       |
| V <sub>GS(th)</sub>                    | Gate Threshold Voltage               | 2.0  | —     | 4.0  | V     | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA          |
| g <sub>fs</sub>                        | Forward Trans conductance            | 19   | —     | —    | S     | V <sub>DS</sub> = 25V, I <sub>D</sub> = 25A                         |
| I <sub>DSS</sub>                       | Drain-to-Source Leakage Current      | —    | —     | 25   | μA    | V <sub>DS</sub> = 55V, V <sub>GS</sub> = 0V                         |
|  |                                      | —    | —     | 250  |       | V <sub>DS</sub> = 44V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 150°C |
| I <sub>GSS</sub>                       | Gate-to-Source Forward Leakage       | —    | —     | 100  | nA    | V <sub>GS</sub> = 20V   |
|  | Gate-to-Source Reverse Leakage       | —    | —     | -100 |       | V <sub>GS</sub> = -20V  |

**Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

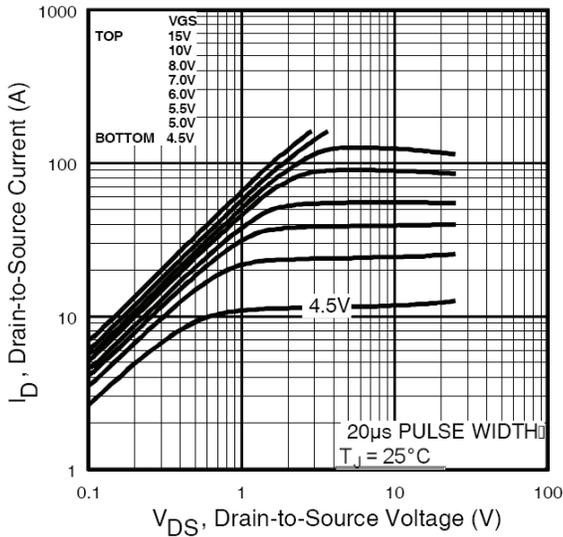
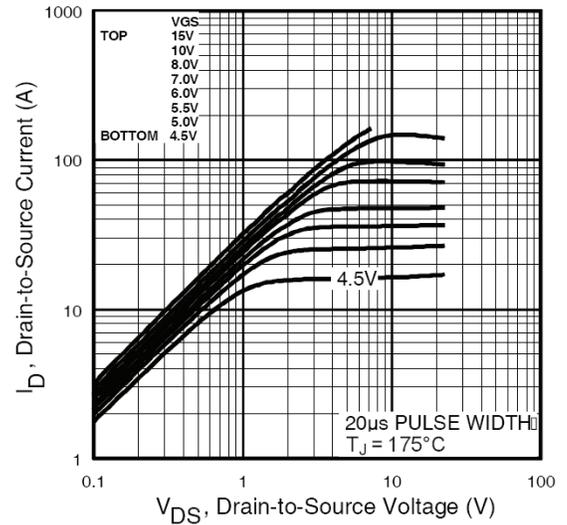
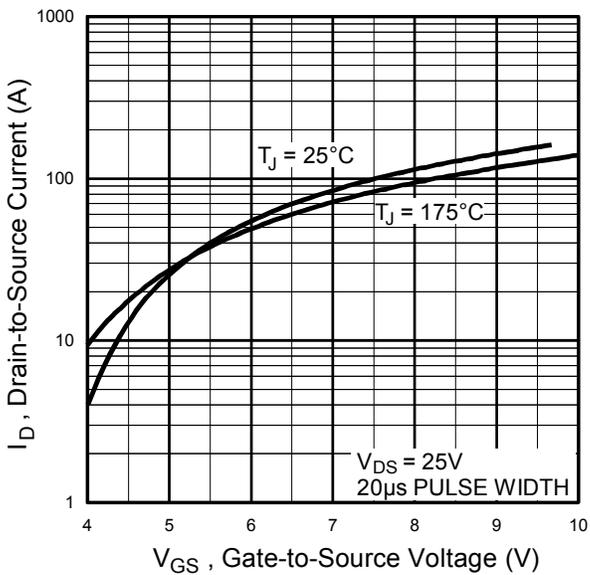
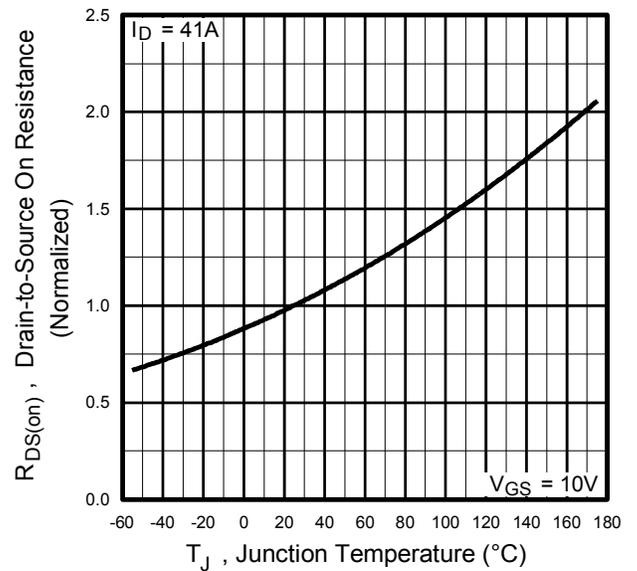
|                     |                              |   |      |    |    |   |
|---------------------|------------------------------|---|------|----|----|---|
| Q <sub>g</sub>      | Total Gate Charge            | — | —    | 63 | nC | I <sub>D</sub> = 25A<br>V <sub>DS</sub> = 44V<br>V <sub>GS</sub> = 10V, See Fig. 6 and 13 ④                   |
| Q <sub>gs</sub>     | Gate-to-Source Charge        | — | —    | 14 |    |   |
| Q <sub>gd</sub>     | Gate-to-Drain Charge         | — | —    | 23 |    |   |
| t <sub>d(on)</sub>  | Turn-On Delay Time           | — | 12   | —  | ns | V <sub>DD</sub> = 28V<br>I <sub>D</sub> = 25A<br>R <sub>G</sub> = 12Ω<br>V <sub>GS</sub> = 10V, See Fig. 10 ④ |
| t <sub>r</sub>      | Rise Time                    | — | 60   | —  |    |   |
| t <sub>d(off)</sub> | Turn-Off Delay Time          | — | 44   | —  |    |   |
| t <sub>f</sub>      | Fall Time                    | — | 45   | —  |    |   |
| L <sub>D</sub>      | Internal Drain Inductance    | — | 4.5  | —  | nH | Between lead,<br>6mm (0.25in.)<br>from package<br>and center of die contact                                   |
| L <sub>S</sub>      | Internal Source Inductance   | — | 7.5  | —  |    |   |
| C <sub>iss</sub>    | Input Capacitance            | — | 1470 | —  | pF | V <sub>GS</sub> = 0V<br>V <sub>DS</sub> = 25V<br>f = 1.0MHz, See Fig. 5                                       |
| C <sub>oss</sub>    | Output Capacitance           | — | 360  | —  |    |   |
| C <sub>rss</sub>    | Reverse Transfer Capacitance | — | 88   | —  |    |   |

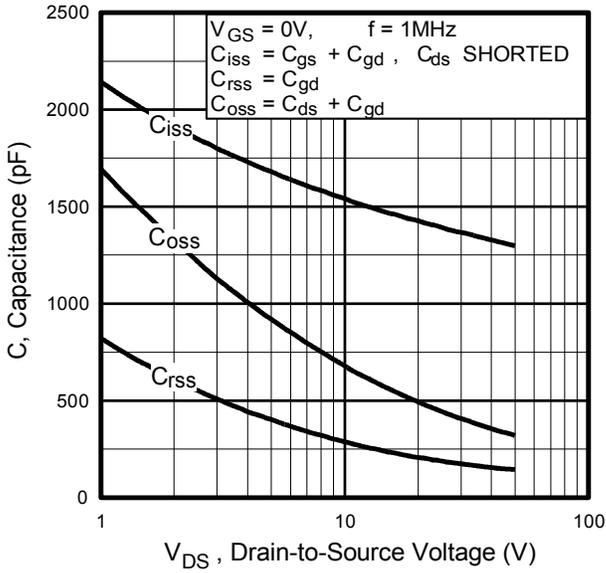
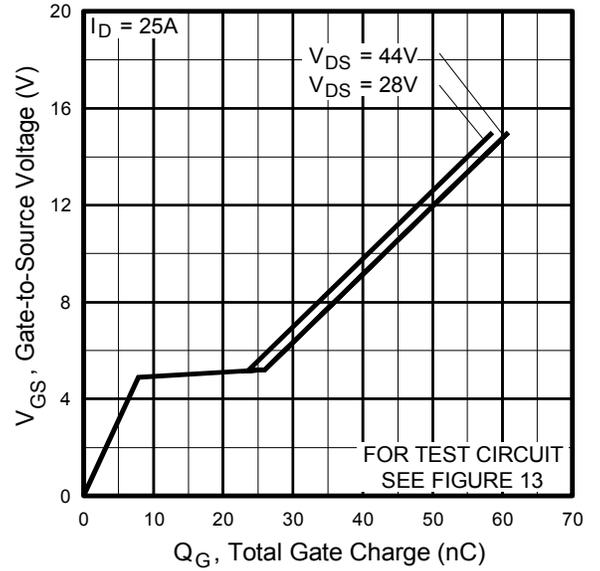
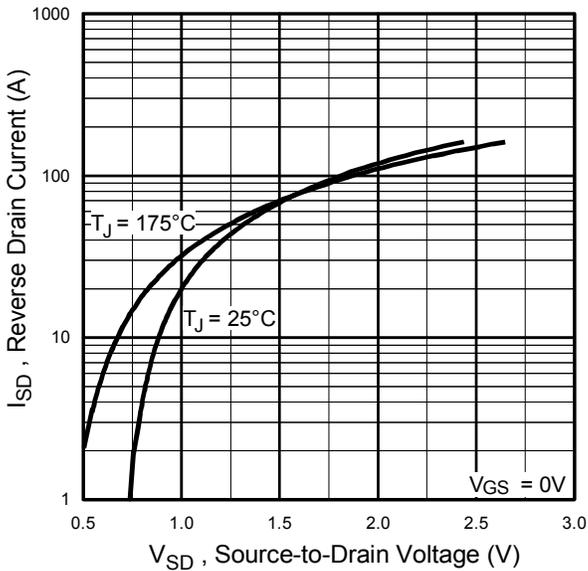
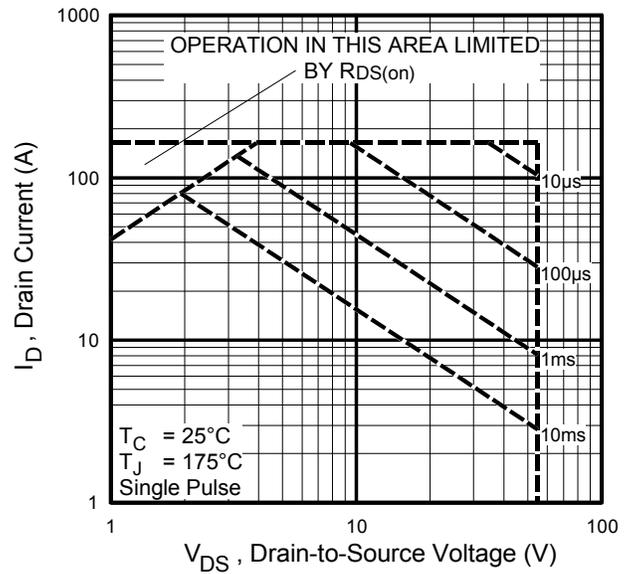
**Diode Characteristics**

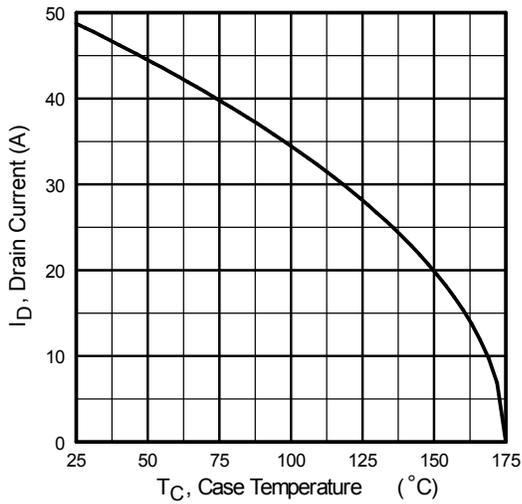
|                 | Parameter                              | Min.   | Typ. | Max. | Units | Conditions  |
|-----------------|--|--|------|------|-------|---|
| I <sub>S</sub>  | Continuous Source Current (Body Diode) | —  | —    | 49   | A     | MOSFET symbol showing the integral reverse p-n junction diode.      |
| I <sub>SM</sub> | Pulsed Source Current (Body Diode) ①   | —  | —    | 160  |       |   |
| V <sub>SD</sub> | Diode Forward Voltage                  | —  | —    | 1.3  | V     | T <sub>J</sub> = 25°C, I <sub>S</sub> = 25A, V <sub>GS</sub> = 0V ④ |
| t <sub>rr</sub> | Reverse Recovery Time                  | —  | 63   | 95   | ns    | T <sub>J</sub> = 25°C, I <sub>F</sub> = 25A                         |
| Q <sub>rr</sub> | Reverse Recovery Charge                | —  | 170  | 260  | nC    | di/dt = 100A/μs ④   |
| t <sub>on</sub> | Forward Turn-On Time                   | Intrinsic turn-on time is negligible (turn-on is dominated by L <sub>S</sub> +L <sub>D</sub> ) |      |      |       |   |

**Notes:**

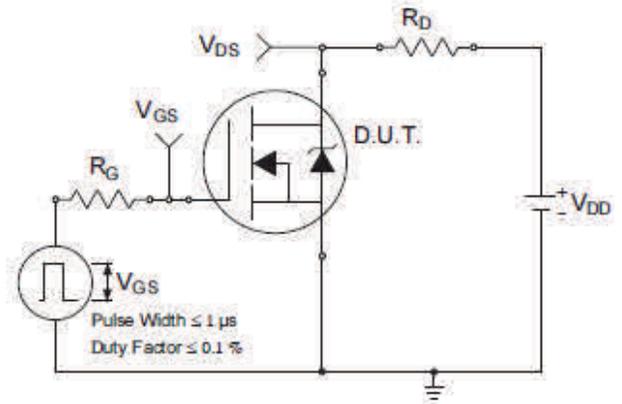
- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig.11)
- ② Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25°C, L = 0.48mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 25A, V<sub>GS</sub> = 10V. (See fig.12)
- ③ I<sub>SD</sub> ≤ 25A, di/dt ≤ 230A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 175°C.
- ④ Pulse width ≤ 400μs; duty cycle ≤ 2%.
- ⑤ This is a typical value at device destruction and represents operation outside rated limits.
- ⑥ This is a calculated value limited to T<sub>J</sub> = 175°C.


**Fig. 1** Typical Output Characteristics

**Fig. 2** Typical Output Characteristics

**Fig. 3** Typical Transfer Characteristics

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

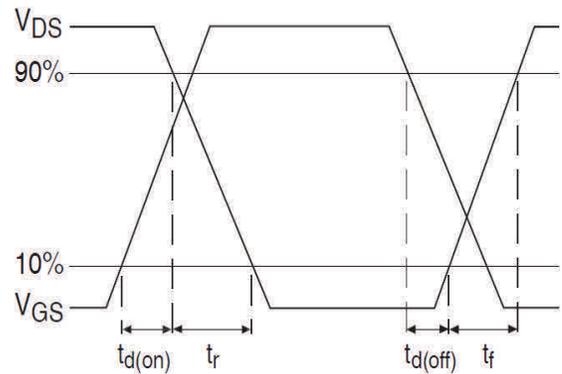

**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage

**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



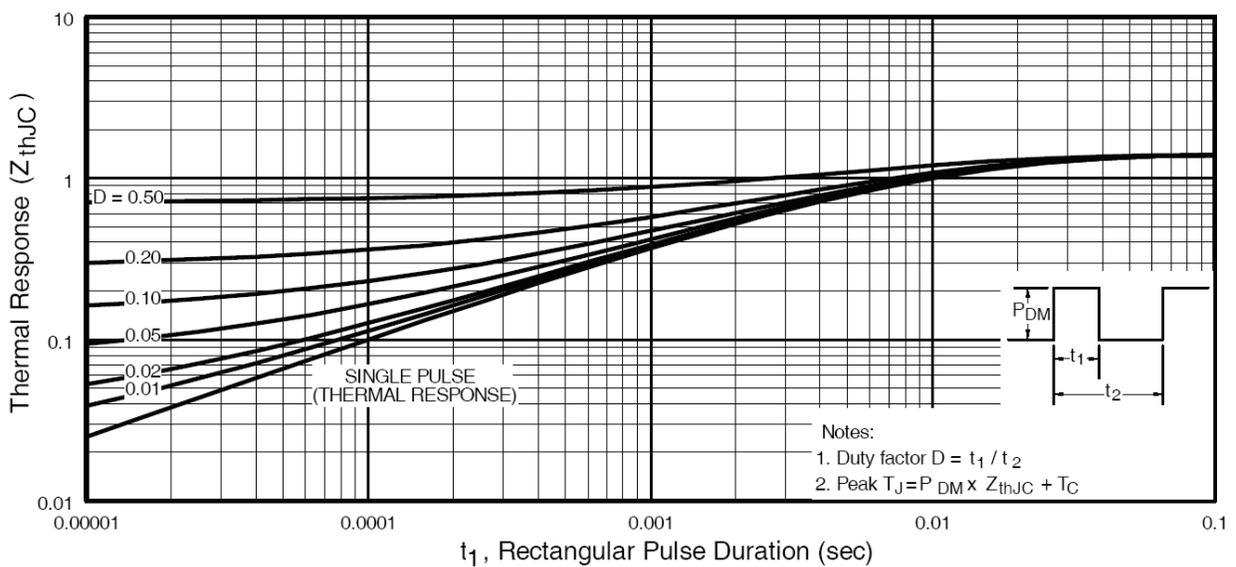
**Fig 9.** Maximum Drain Current vs. Case Temperature



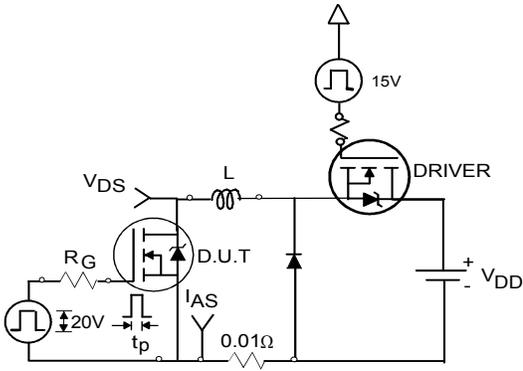
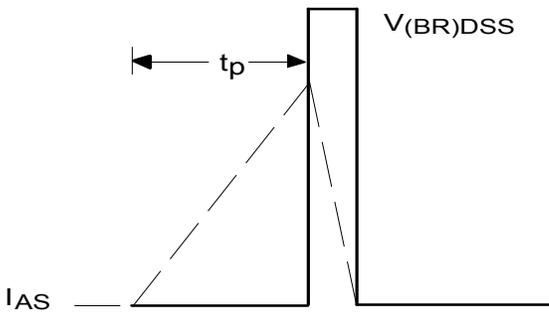
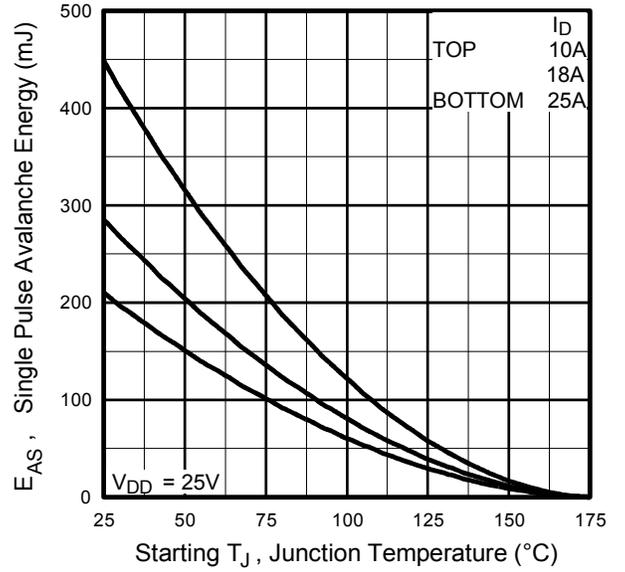
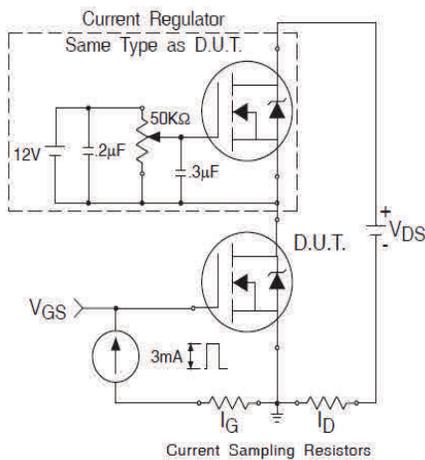
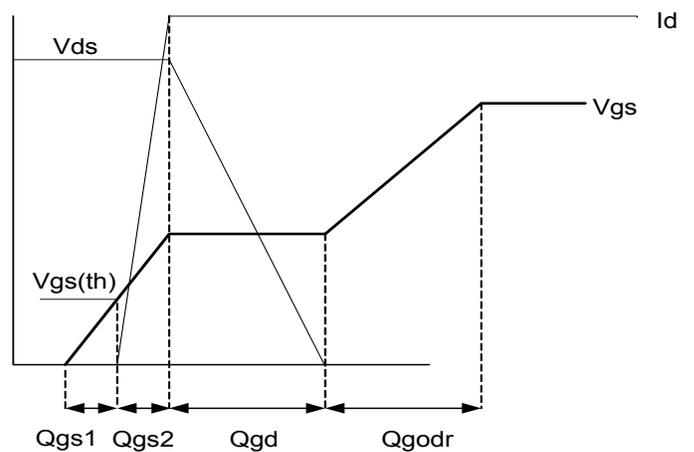
**Fig 10a.** Switching Time Test Circuit

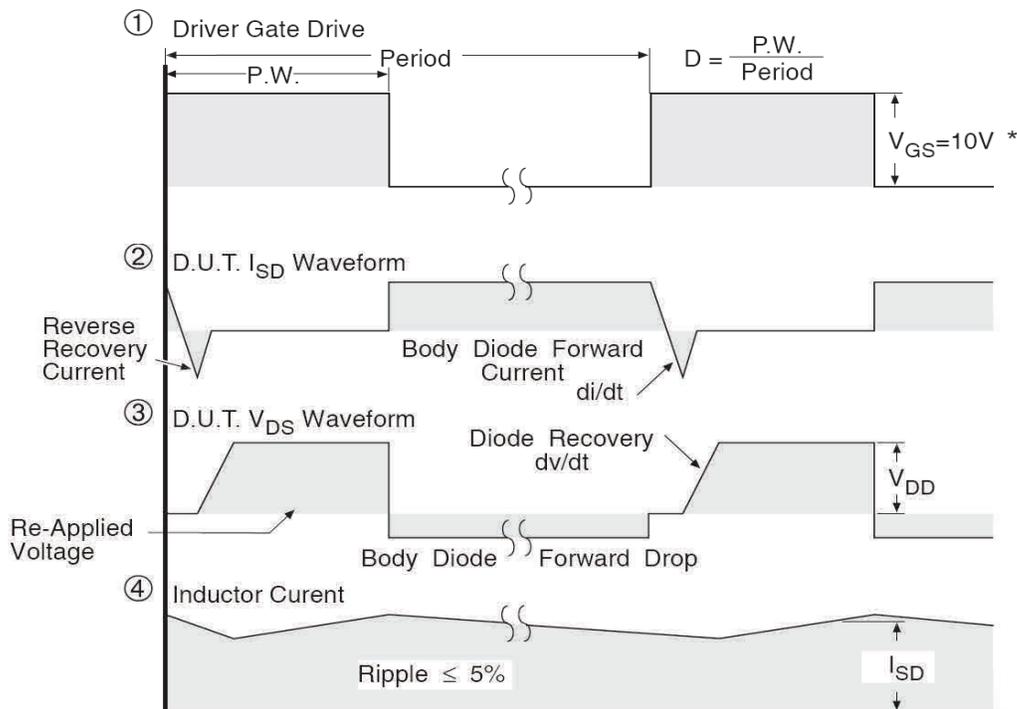
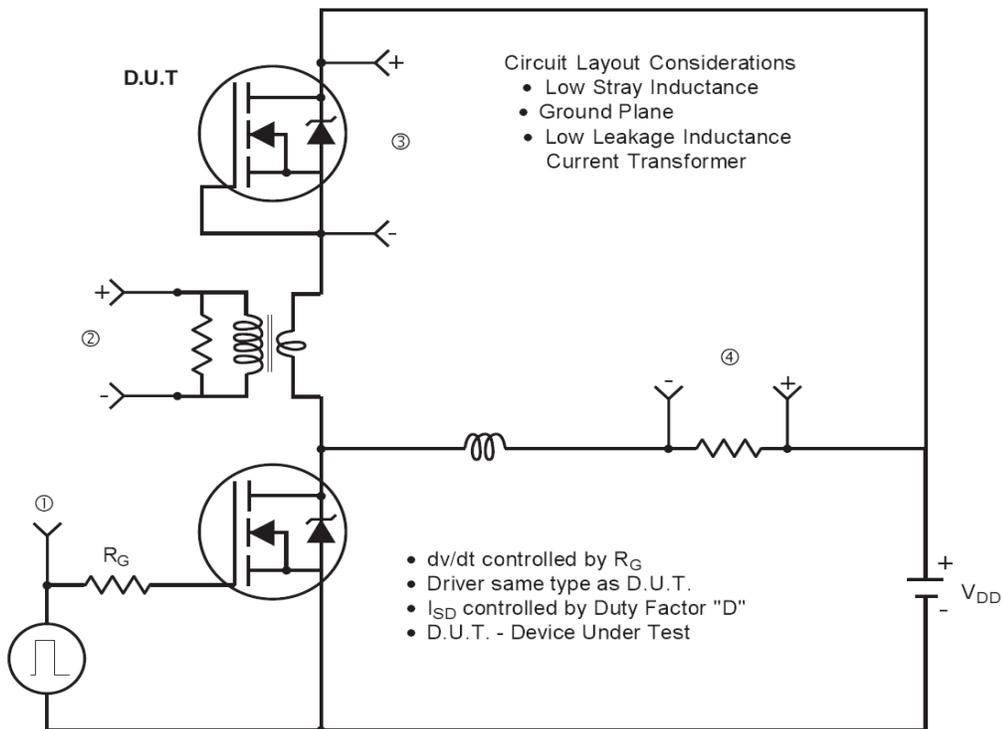


**Fig 10b.** Switching Time Waveforms



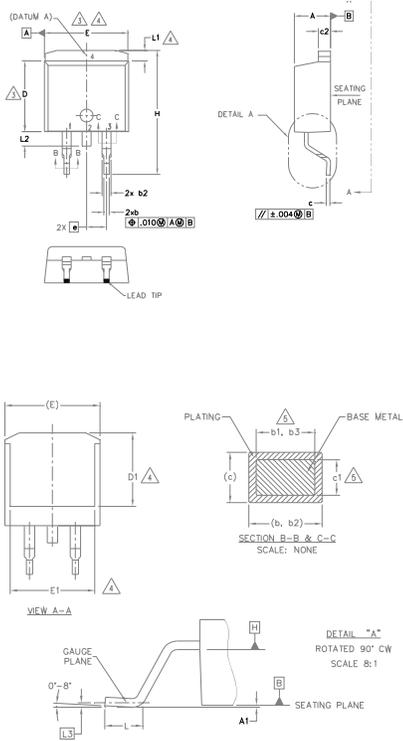
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case


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

**Fig 12b. Unclamped Inductive Waveforms**

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

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

**Fig 13b. Gate Charge Waveform**

**Peak Diode Recovery dv/dt Test Circuit**


\*  $V_{GS} = 5V$  for Logic Level Devices

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

**D<sup>2</sup>Pak (TO-263AB) Package Outline (Dimensions are shown in millimeters (inches))**


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
  2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
  3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
  4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
  5. DIMENSION b1, b3 AND c1 APPLY TO BASE METAL ONLY.
  6. DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
  7. CONTROLLING DIMENSION: INCH.
  8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-263AB.

| SYMBOL | DIMENSIONS  |       |          |      | NOTES |
|--------|-------------|-------|----------|------|-------|
|        | MILLIMETERS |       | INCHES   |      |       |
|        | MIN.        | MAX.  | MIN.     | MAX. |       |
| A      | 4.06        | 4.83  | .160     | .190 |       |
| A1     | 0.00        | 0.254 | .000     | .010 |       |
| b      | 0.51        | 0.99  | .020     | .039 |       |
| b1     | 0.51        | 0.89  | .020     | .035 | 5     |
| b2     | 1.14        | 1.78  | .045     | .070 |       |
| b3     | 1.14        | 1.73  | .045     | .068 | 5     |
| c      | 0.38        | 0.74  | .015     | .029 |       |
| c1     | 0.38        | 0.58  | .015     | .023 | 5     |
| c2     | 1.14        | 1.65  | .045     | .065 |       |
| D      | 8.38        | 9.65  | .330     | .380 | 3     |
| D1     | 6.86        | —     | .270     | —    | 4     |
| E      | 9.65        | 10.67 | .380     | .420 | 3,4   |
| E1     | 6.22        | —     | .245     | —    | 4     |
| e      | 2.54 BSC    |       | .100 BSC |      |       |
| H      | 14.61       | 15.88 | .575     | .625 |       |
| L      | 1.78        | 2.79  | .070     | .110 |       |
| L1     | —           | 1.68  | —        | .066 | 4     |
| L2     | —           | 1.78  | —        | .070 |       |
| L3     | 0.25 BSC    |       | .010 BSC |      |       |

**LEAD ASSIGNMENTS**
**DIODES**

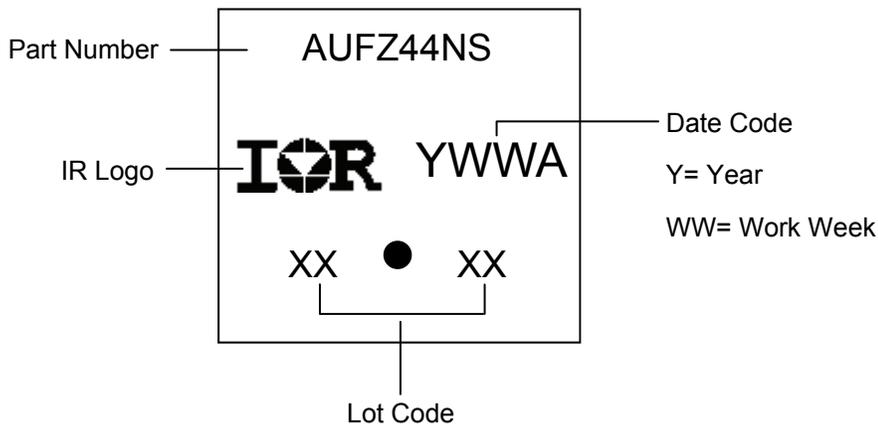
- 1.- ANODE (TWO DIE) / OPEN (ONE DIE)
- 2.- CATHODE
- 3.- ANODE

**HEXFET**

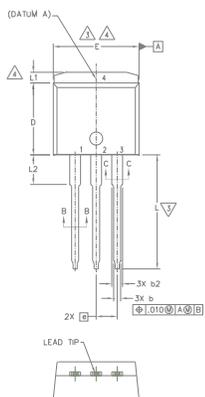
- 1.- GATE
- 2, 4.- DRAIN
- 3.- SOURCE

**IGBTs, CoPACK**

- 1.- GATE
- 2, 4.- COLLECTOR
- 3.- EMITTER

**D<sup>2</sup>Pak (TO-263AB) Part Marking Information**


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

**TO-262 Package Outline (Dimensions are shown in millimeters (inches))**


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
  2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
  3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
  4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
  5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
  6. CONTROLLING DIMENSION: INCH.
  7. OUTLINE CONFORM TO JEDEC TO-262 EXCEPT A1(max.), b(min.) AND D1(min.) WHERE DIMENSIONS DERIVED THE ACTUAL PACKAGE OUTLINE.

**LEAD ASSIGNMENTS**
**IGBTs, CoPACK**

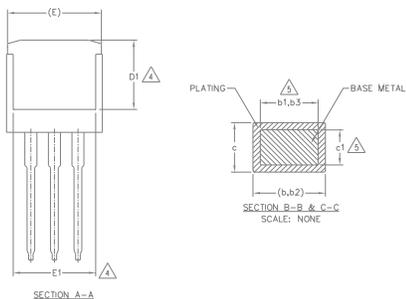
- 1.- GATE
- 2.- COLLECTOR
- 3.- EMITTER
- 4.- COLLECTOR

**HEXFET**

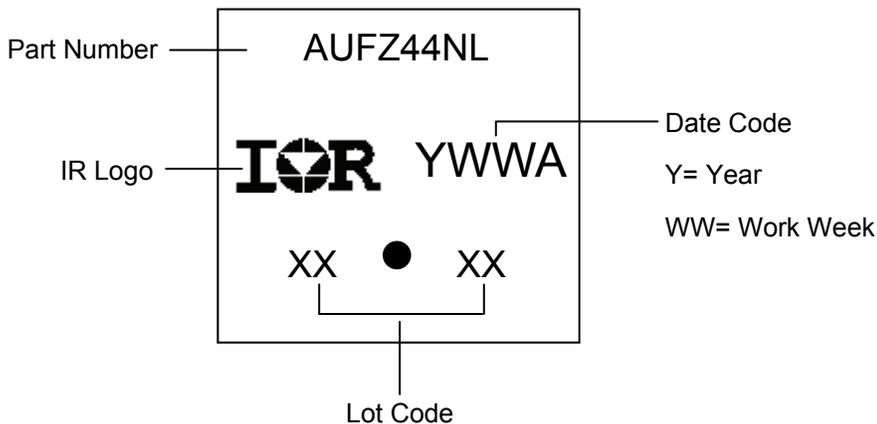
- 1.- GATE
- 2.- DRAIN
- 3.- SOURCE
- 4.- DRAIN

**DIODES**

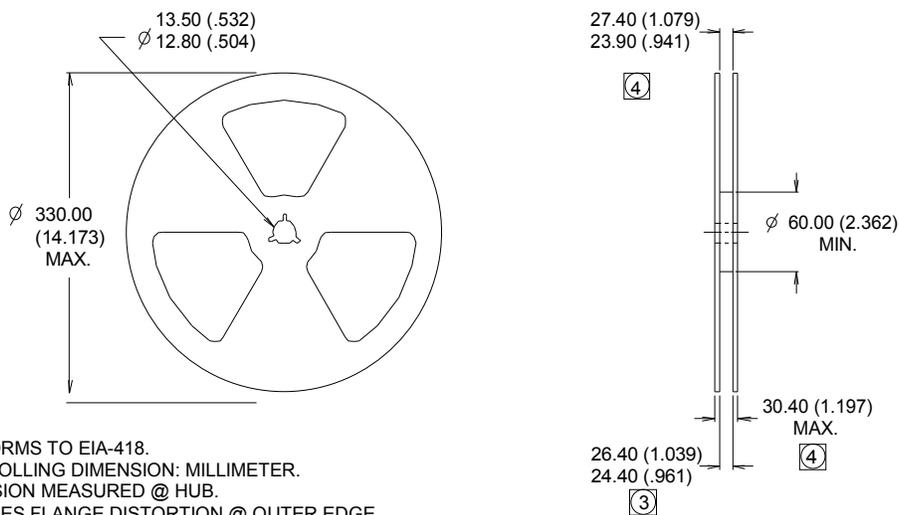
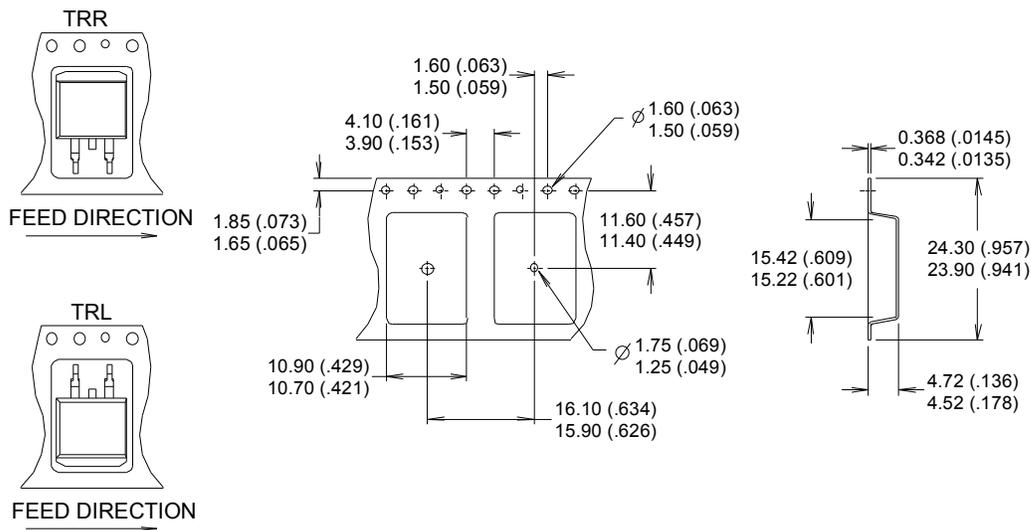
- 1.- ANODE (TWO DIE) / OPEN (ONE DIE)
- 2, 4.- CATHODE
- 3.- ANODE



| SYMBOL | DIMENSIONS  |       |          |      | NOTES |
|--------|-------------|-------|----------|------|-------|
|        | MILLIMETERS |       | INCHES   |      |       |
|        | MIN.        | MAX.  | MIN.     | MAX. |       |
| A      | 4.06        | 4.83  | .160     | .190 |       |
| A1     | 2.03        | 3.02  | .080     | .119 |       |
| b      | 0.51        | 0.99  | .020     | .039 |       |
| b1     | 0.51        | 0.89  | .020     | .035 | 5     |
| b2     | 1.14        | 1.78  | .045     | .070 |       |
| b3     | 1.14        | 1.73  | .045     | .068 | 5     |
| c      | 0.38        | 0.74  | .015     | .029 |       |
| c1     | 0.38        | 0.58  | .015     | .023 | 5     |
| c2     | 1.14        | 1.65  | .045     | .065 |       |
| D      | 8.38        | 9.65  | .330     | .380 | 3     |
| D1     | 6.86        | -     | .270     | -    | 4     |
| E      | 9.65        | 10.67 | .380     | .420 | 3,4   |
| E1     | 6.22        | -     | .245     | -    | 4     |
| e      | 2.54 BSC    |       | .100 BSC |      |       |
| L      | 13.46       | 14.10 | .530     | .555 |       |
| L1     | -           | 1.65  | -        | .065 | 4     |
| L2     | 3.56        | 3.71  | .140     | .146 |       |

**TO-262 Part Marking Information**


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

**D<sup>2</sup>Pak (TO-263AB) Tape & Reel Information (Dimensions are shown in millimeters (inches))**


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

**Qualification Information**

|                                   |                      |   |      |
|-----------------------------------|----------------------|---|------|
| <b>Qualification Level</b>        |                      | Automotive<br>(per AEC-Q101)  |      |
|                                   |                      | Comments: This part number(s) passed Automotive qualification. Infineon's Industrial and Consumer qualification level is granted by extension of the higher Automotive level. |      |
| <b>Moisture Sensitivity Level</b> |                      | D <sup>2</sup> -Pak   | MSL1 |
|                                   |                      | TO-262  |      |
| <b>ESD</b>                        | Machine Model        | Class M3 (+/- 400V) <sup>†</sup><br>AEC-Q101-002  |      |
|                                   | Human Body Model     | Class H1B (+/- 1000V) <sup>†</sup><br>AEC-Q101-001  |      |
|                                   | Charged Device Model | Class C5 (+/- 2000V) <sup>†</sup><br>AEC-Q101-005   |      |
| <b>RoHS Compliant</b>             |                      | Yes   |      |

† Highest passing voltage.

**Revision History**

| Date       | Comments   |
|------------|--|
| 10/27/2015 | <ul style="list-style-type: none"> <li>Updated datasheet with corporate template</li> <li>Corrected ordering table on page 1.</li> </ul> |

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