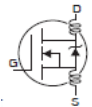


**Static @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

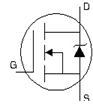
|                                 | Parameter                            | Min. | Typ.  | Max. | Units               | Conditions  |
|---------------------------------|--------------------------------------|------|-------|------|---------------------|---|
| $V_{(BR)DSS}$                   | Drain-to-Source Breakdown Voltage    | 150  | —     | —    | V                   | $V_{GS} = 0V, I_D = 250\mu A$                         |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —    | 0.187 | —    | V/ $^\circ\text{C}$ | Reference to $25^\circ\text{C}$ , $I_D = 1mA$         |
| $R_{DS(on)}$                    | Static Drain-to-Source On-Resistance | —    | —     | 82   | m $\Omega$          | $V_{GS} = 10V, I_D = 12A$ ④                           |
| $V_{GS(th)}$                    | Gate Threshold Voltage               | 2.0  | —     | 4.0  | V                   | $V_{DS} = V_{GS}, I_D = 250\mu A$                     |
| $I_{DSS}$                       | Drain-to-Source Leakage Current      | —    | —     | 25   | $\mu A$             | $V_{DS} = 150V, V_{GS} = 0V$                          |
|                                 |                                      | —    | —     | 250  |                     | $V_{DS} = 120V, V_{GS} = 0V, T_J = 125^\circ\text{C}$ |
| $I_{GSS}$                       | Gate-to-Source Forward Leakage       | —    | —     | 100  | nA                  | $V_{GS} = 20V$  |
|                                 | Gate-to-Source Reverse Leakage       | —    | —     | -100 |                     | $V_{GS} = -20V$                                       |

**Dynamic Electrical Characteristics @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

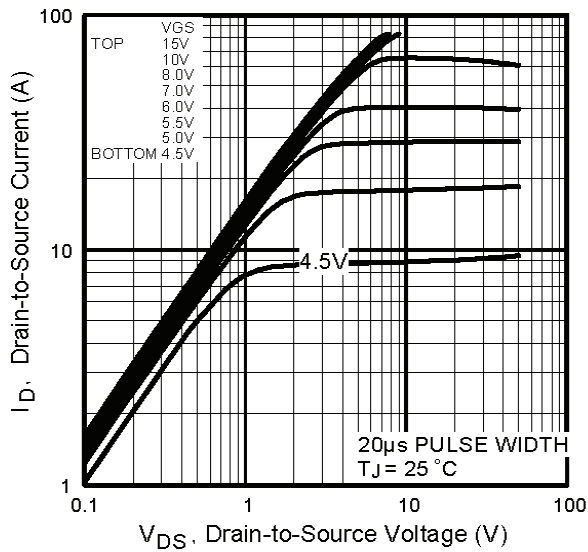
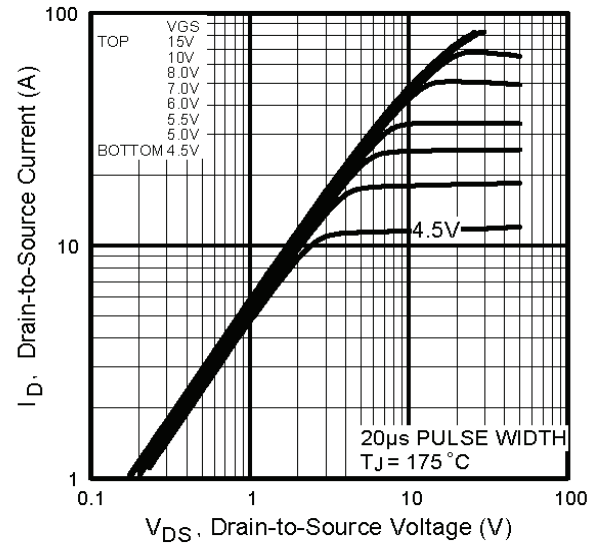
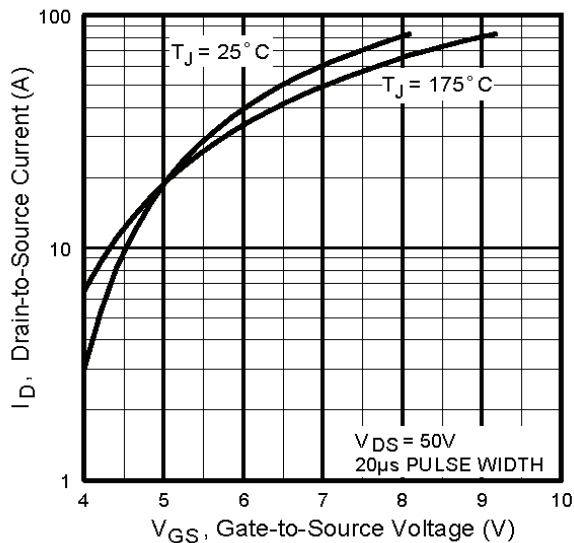
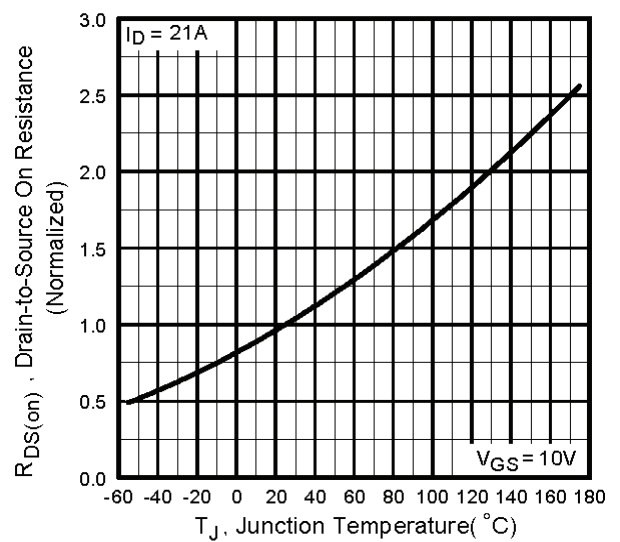
|              |                              |   |      |    |    |   |
|--------------|------------------------------|---|------|----|----|---|
| $Q_g$        | Total Gate Charge            | — | —    | 95 | nC | $I_D = 12A$<br>$V_{DS} = 120V$<br>$V_{GS} = 10V$ ④                            |
| $Q_{gs}$     | Gate-to-Source Charge        | — | —    | 11 |    |   |
| $Q_{gd}$     | Gate-to-Drain Charge         | — | —    | 47 |    |   |
| $t_{d(on)}$  | Turn-On Delay Time           | — | 9.6  | —  | ns | $V_{DD} = 75V$<br>$I_D = 12A$<br>$R_G = 5.1\Omega$ ,<br>$R_D = 5.9\Omega$ , ④ |
| $t_r$        | Rise Time                    | — | 32   | —  |    |   |
| $t_{d(off)}$ | Turn-Off Delay Time          | — | 49   | —  |    |   |
| $t_f$        | Fall Time                    | — | 38   | —  |    |   |
| $L_D$        | Internal Drain Inductance    | — | 4.5  | —  | nH | Between lead,<br>6mm (0.25in.)<br>from package<br>and center of die contact.  |
| $L_S$        | Internal Source Inductance   | — | 7.5  | —  |    |   |
| $C_{iss}$    | Input Capacitance            | — | 1300 | —  | pF | $V_{GS} = 0V$<br>$V_{DS} = 25V$<br>$f = 1.0MHz$ , See Fig.5                   |
| $C_{oss}$    | Output Capacitance           | — | 300  | —  |    |   |
| $C_{rss}$    | Reverse Transfer Capacitance | — | 160  | —  |    |   |

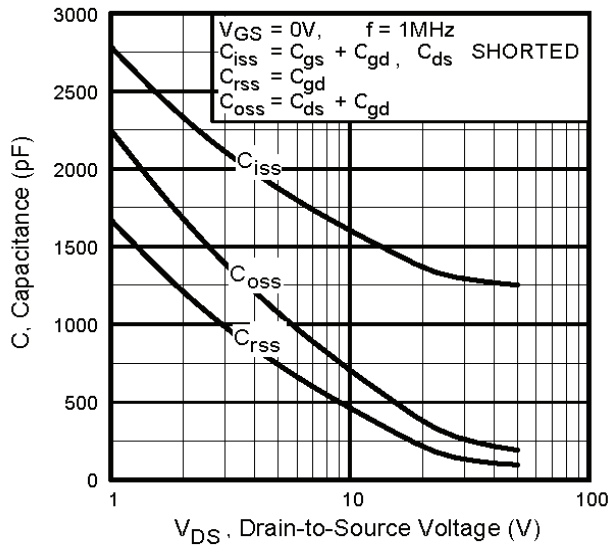
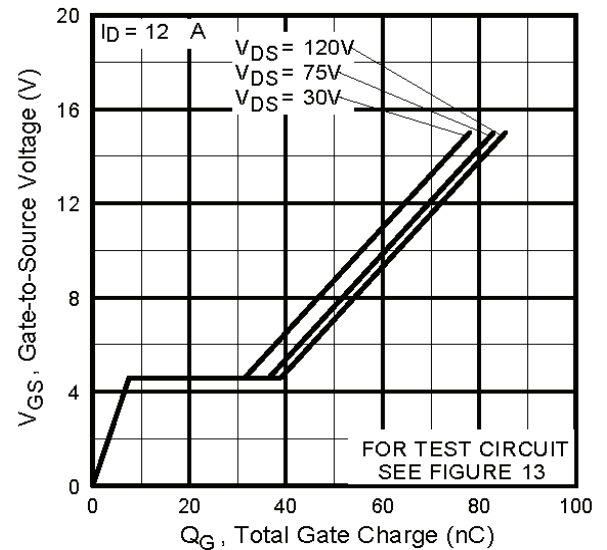
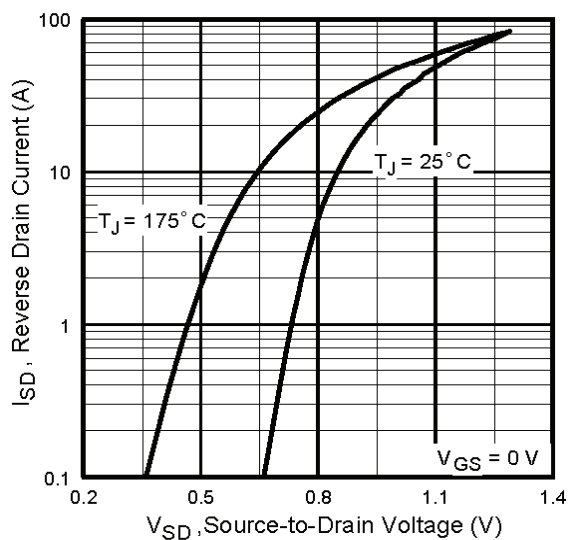
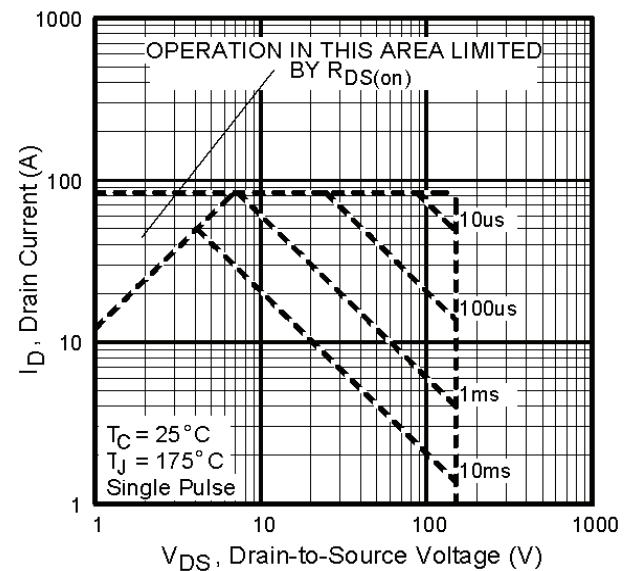

**Diode Characteristics**

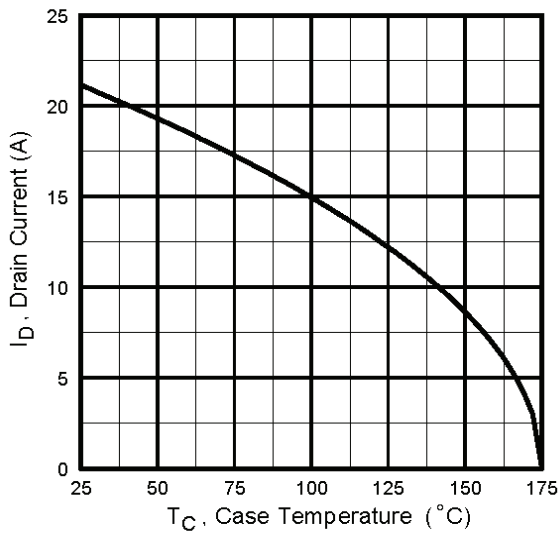
|          | Parameter                              | Min.  | Typ. | Max. | Units   | Conditions   |
|----------|--|---|------|------|---------|--|
| $I_S$    | Continuous Source Current (Body Diode) | —   | —    | 21   | A       | MOSFET symbol showing the integral reverse p-n junction diode. |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ①   | —   | —    | 84   |         |  |
| $V_{SD}$ | Diode Forward Voltage                  | —   | —    | 1.3  | V       | $T_J = 25^\circ\text{C}, I_S = 12A, V_{GS} = 0V$ ④             |
| $t_{rr}$ | Reverse Recovery Time                  | —   | 174  | 260  | ns      | $T_J = 25^\circ\text{C}, I_F = 12A$                            |
| $Q_{rr}$ | Reverse Recovery Charge                | —   | 1.2  | 1.7  | $\mu C$ | $di/dt = 100A/\mu s$ ④   |
| $t_{on}$ | Forward Turn-On Time                   | Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$ ) |      |      |         |  |


**Notes:**

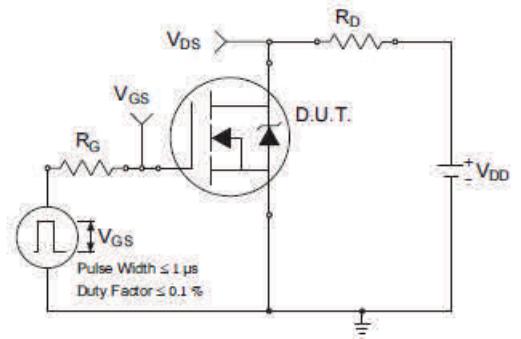
- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig.11)
- ② Limited by  $T_{Jmax}$ , starting  $T_J = 25^\circ\text{C}$ ,  $L = 4.9mH$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 12A$ . (See fig.12)
- ③  $I_{SD} \leq 12A$ ,  $di/dt \leq 140A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 175^\circ\text{C}$ .
- ④ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
- ⑤ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994
- ⑥  $R_\theta$  is measured at  $T_J$  of approximately  $90^\circ\text{C}$


**Fig. 1** Typical Output Characteristics

**Fig. 2** Typical Output Characteristics

**Fig. 3** Typical Transfer Characteristics

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

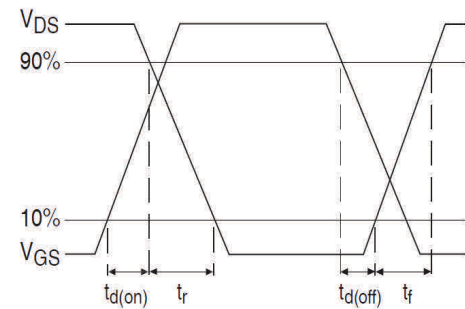

**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage

**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



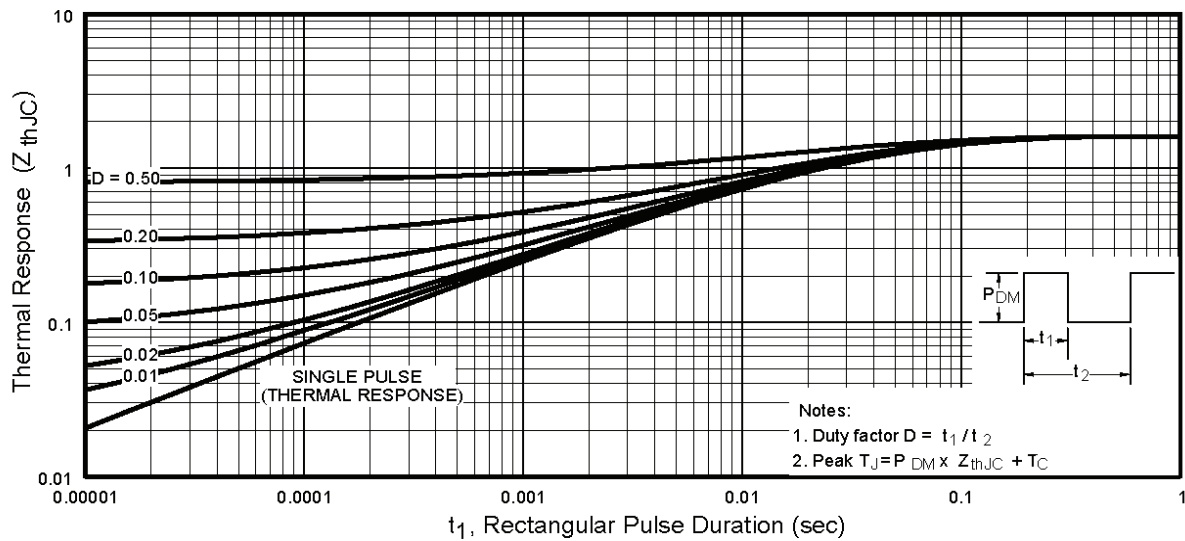
**Fig 9.** Maximum Drain Current vs. Case Temperature



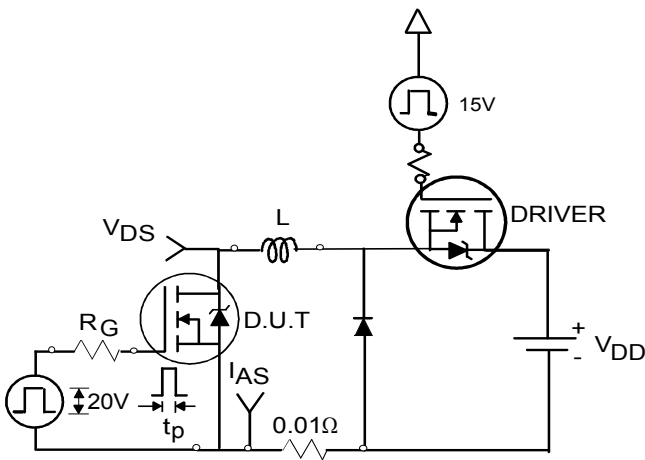
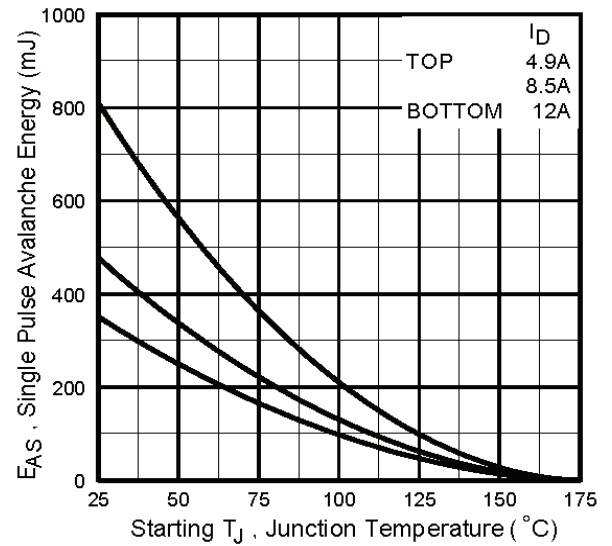
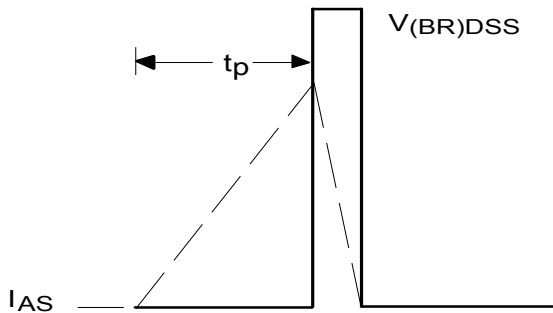
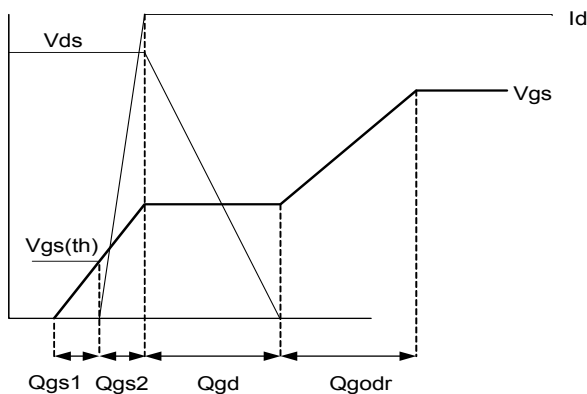
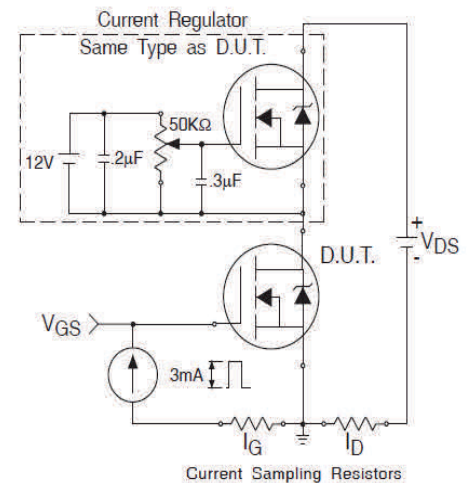
**Fig 10a.** Switching Time Test Circuit



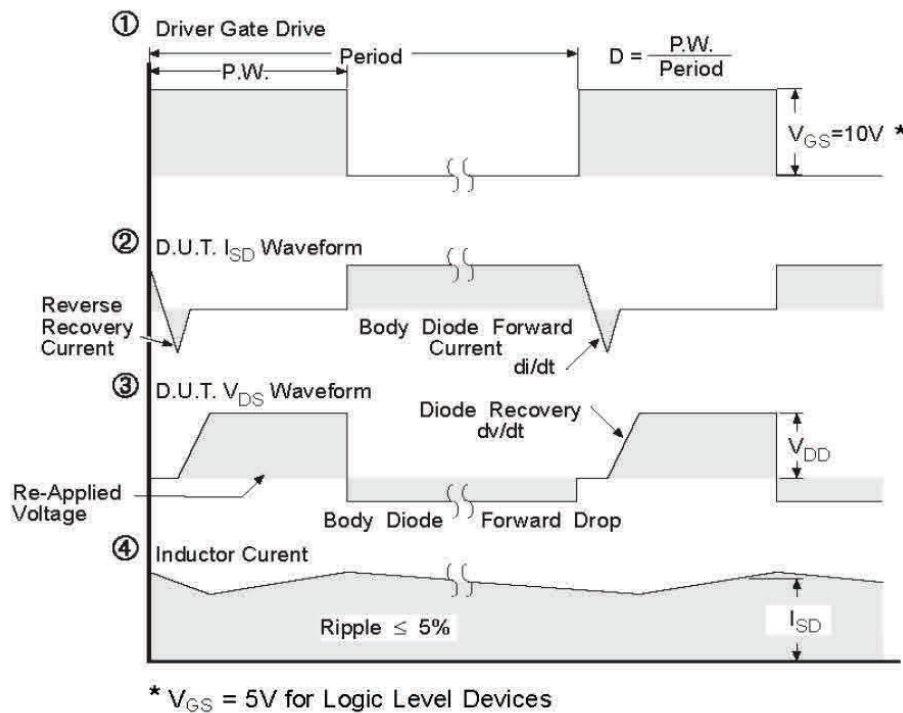
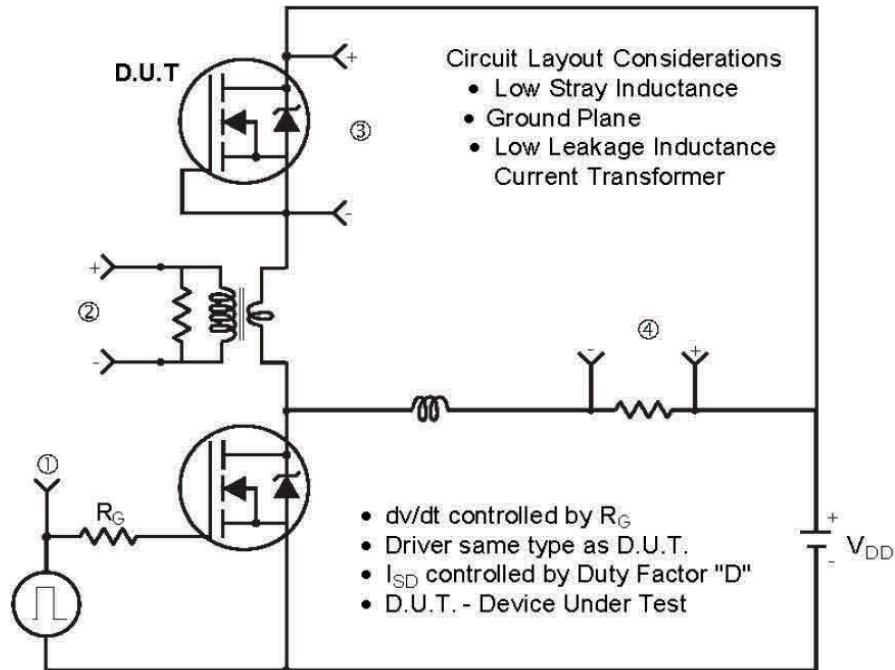
**Fig 10b.** Switching Time Waveforms



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

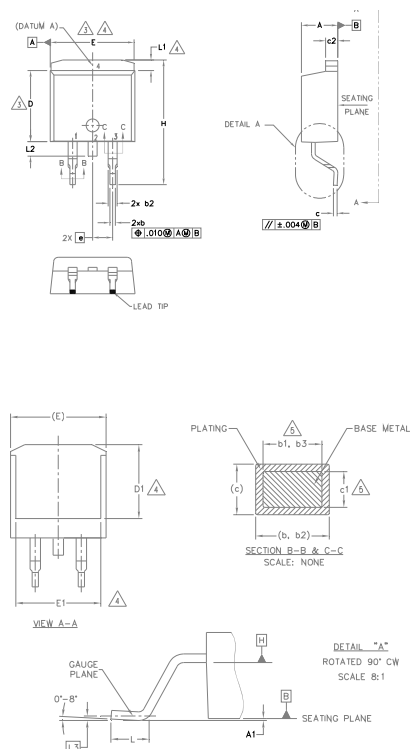

**Fig 12a.** Unclamped Inductive Test Circuit

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

**Fig 12b.** Unclamped Inductive Waveforms

**Fig 13a.** Gate Charge Waveform

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

## Peak Diode Recovery dv/dt Test Circuit



**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 | 5     |     |
| b3     | 1.14        | 1.73  | .045     | .068 |       |     |
| c      | 0.38        | 0.74  | .015     | .029 |       |     |
| c1     | 0.38        | 0.58  | .015     | .023 |       | 5   |
| c2     | 1.14        | 1.65  | .045     | .065 | 3     |     |
| D      | 8.38        | 9.65  | .330     | .380 |       |     |
| 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 |      | 4     |     |
| H      | 14.61       | 15.88 | .575     | .625 |       |     |
| L      | 1.78        | 2.79  | .070     | .110 |       |     |
| L1     | —           | 1.68  | —        | .066 |       |     |
| L2     | —           | 1.78  | —        | .070 |       |     |
| L3     | 0.25 BSC    |       | .010 BSC |      |       |     |

### LEAD ASSIGNMENTS

#### DIODES

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

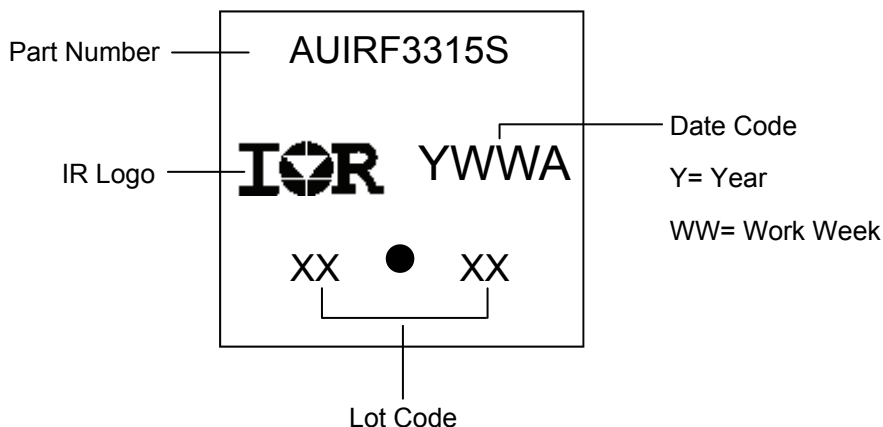
#### HEXFET

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

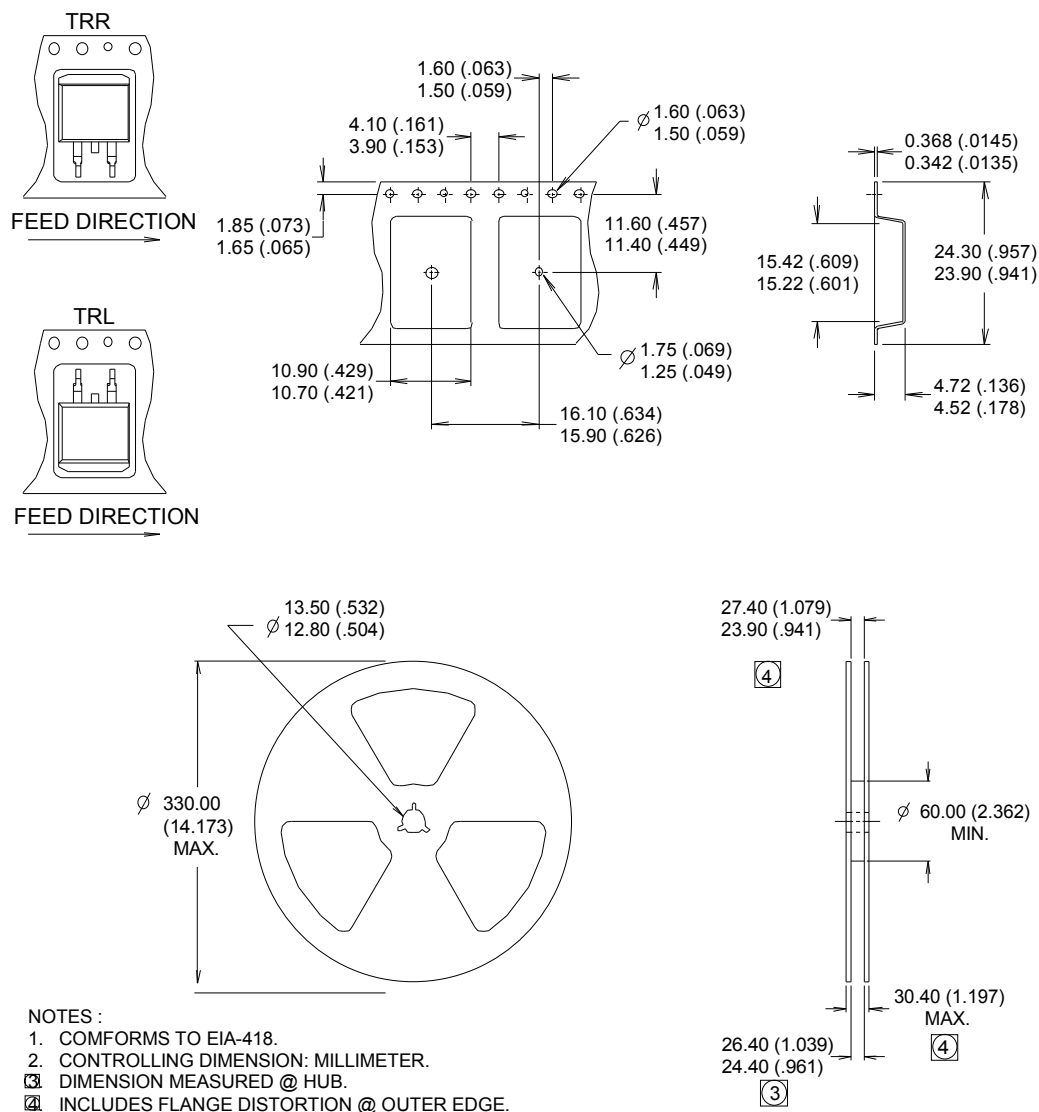
#### IGBTs, CoPACK

- 1.- GATE
- 2.- 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/>

**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 |
| <b>ESD</b>                        | Machine Model        | Class M4 (+/- 600V) <sup>†</sup><br>AEC-Q101-002  |      |
|                                   | Human Body Model     | Class H1C (+/- 2000V) <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  |
|------------|---|
| 11/13/2015 | <ul style="list-style-type: none"> <li>Updated datasheet with corporate template</li> <li>Corrected ordering table on page 1.</li> <li>Corrected typo in test condition current from "43A" to "12A" for VSD and trr/Qrr on page 2.</li> </ul> |

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