

## FEATURES

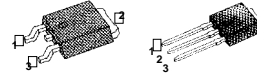
- ◆ Avalanche Rugged Technology
- ◆ Rugged Gate Oxide Technology
- ◆ Lower Input Capacitance
- ◆ Improved Gate Charge
- ◆ Extended Safe Operating Area
- ◆ Lower Leakage Current: 10µA (Max.) @  $V_{DS} = 100V$
- ◆ Lower  $R_{DS(ON)}$ : 0.336Ω (Typ.)

$$BV_{DSS} = 100 V$$

$$R_{DS(on)} = 0.44\Omega$$

$$I_D = 4.7 A$$

**D-PAK**      **I-PAK**



1. Gate 2. Drain 3. Source

## Absolute Maximum Ratings

| Symbol         | Characteristic  | Value        | Units         |
|----------------|---|--------------|---------------|
| $V_{DSS}$      | Drain-to-Source Voltage   | 100          | V             |
| $I_D$          | Continuous Drain Current ( $T_C=25^\circ C$ )                           | 4.7          | A             |
|                | Continuous Drain Current ( $T_C=100^\circ C$ )                          | 3            |               |
| $I_{DM}$       | Drain Current-Pulsed (1)  | 16           | A             |
| $V_{GS}$       | Gate-to-Source Voltage  | $\pm 20$     | V             |
| $E_{AS}$       | Single Pulsed Avalanche Energy (2)                                      | 58           | mJ            |
| $I_{AR}$       | Avalanche Current (1)   | 4.7          | A             |
| $E_{AR}$       | Repetitive Avalanche Energy (1)   | 2.2          | mJ            |
| dv/dt          | Peak Diode Recovery dv/dt (3)   | 6.5          | V/ns          |
| $P_D$          | Total Power Dissipation ( $T_A=25^\circ C$ ) *                          | 2.5          | W             |
|                | Total Power Dissipation ( $T_C=25^\circ C$ )                            | 22           | W             |
|                | Linear Derating Factor  | 0.18         | W/ $^\circ C$ |
| $T_J, T_{STG}$ | Operating Junction and Storage Temperature Range                        | - 55 to +150 | $^\circ C$    |
| $T_L$          | Maximum Lead Temp. for Soldering Purposes, 1/8. from case for 5-seconds | 300          |               |

## Thermal Resistance

| Symbol          | Characteristic        | Typ. | Max. | Units        |
|-----------------|-----------------------|------|------|--------------|
| $R_{\theta JC}$ | Junction-to-Case      | --   | 5.6  | $^\circ C/W$ |
| $R_{\theta JA}$ | Junction-to-Ambient * | --   | 50   |              |
| $R_{\theta JA}$ | Junction-to-Ambient   | --   | 110  |              |

\* When mounted on the minimum pad size recommended (PCB Mount).

Rev. B

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### Electrical Characteristics (T<sub>C</sub>=25°C unless otherwise specified)

| Symbol              | Characteristic                          | Min. | Typ. | Max. | Units | Test Condition  |
|---------------------|---|------|------|------|-------|---|
| BV <sub>DSS</sub>   | Drain-Source Breakdown Voltage          | 100  | --   | --   | V     | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA  |
| ΔBV/ΔT <sub>J</sub> | Breakdown Voltage Temp. Coeff.          | --   | 0.1  | --   | V/°C  | I <sub>D</sub> =250μA <b>See Fig 7</b>  |
| V <sub>GS(th)</sub> | Gate Threshold Voltage                  | 1.0  | --   | 2.0  | V     | V <sub>DS</sub> =5V, I <sub>D</sub> =250μA  |
| I <sub>GSS</sub>    | Gate-Source Leakage, Forward            | --   | --   | 100  | nA    | V <sub>GS</sub> =20V  |
|                     | Gate-Source Leakage, Reverse            | --   | --   | -100 |       | V <sub>GS</sub> =-20V   |
| I <sub>DSS</sub>    | Drain-to-Source Leakage Current         | --   | --   | 10   | μA    | V <sub>DS</sub> =100V   |
|                     |   | --   | --   | 100  |       | V <sub>DS</sub> =80V, T <sub>C</sub> =125°C   |
| R <sub>DS(on)</sub> | Static Drain-Source On-State Resistance | --   | --   | 0.44 | Ω     | V <sub>GS</sub> =5V, I <sub>D</sub> =2.35A (4)  |
| g <sub>fs</sub>     | Forward Transconductance                | --   | 3.2  | --   | Ū     | V <sub>DS</sub> =40V, I <sub>D</sub> =2.35A (4)   |
| C <sub>iss</sub>    | Input Capacitance                       | --   | 180  | 235  | pF    | V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz<br><b>See Fig 5</b>                                       |
| C <sub>oss</sub>    | Output Capacitance                      | --   | 50   | 65   |       |   |
| C <sub>rss</sub>    | Reverse Transfer Capacitance            | --   | 20   | 25   |       |   |
| t <sub>d(on)</sub>  | Turn-On Delay Time                      | --   | 8    | 25   | ns    | V <sub>DD</sub> =50V, I <sub>D</sub> =5.6A,<br>R <sub>G</sub> =12Ω<br><b>See Fig 13</b> (4) (5)             |
| t <sub>r</sub>      | Rise Time                               | --   | 10   | 30   |       |   |
| t <sub>d(off)</sub> | Turn-Off Delay Time                     | --   | 17   | 45   |       |   |
| t <sub>f</sub>      | Fall Time                               | --   | 8    | 25   |       |   |
| Q <sub>g</sub>      | Total Gate Charge                       | --   | 5.5  | 8    | nC    | V <sub>DS</sub> =80V, V <sub>GS</sub> =5V,<br>I <sub>D</sub> =5.6A<br><b>See Fig 6 &amp; Fig 12</b> (4) (5) |
| Q <sub>gs</sub>     | Gate-Source Charge                      | --   | 0.9  | --   |       |   |
| Q <sub>gd</sub>     | Gate-Drain (. Miller. ) Charge          | --   | 3.5  | --   |       |   |

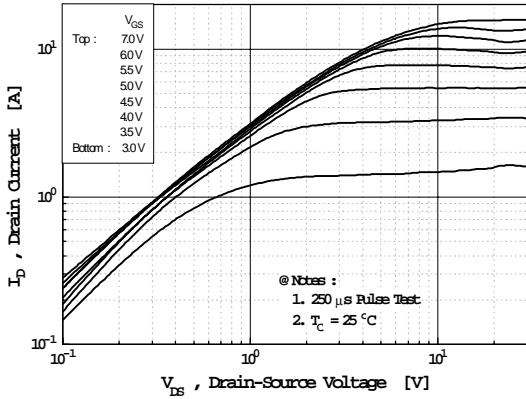
### Source-Drain Diode Ratings and Characteristics

| Symbol          | Characteristic            | Min. | Typ. | Max. | Units | Test Condition  |
|-----------------|---------------------------|------|------|------|-------|---|
| I <sub>S</sub>  | Continuous Source Current | --   | --   | 4.7  | A     | Integral reverse pn-diode in the MOSFET                         |
| I <sub>SM</sub> | Pulsed-Source Current (1) | --   | --   | 16   |       |   |
| V <sub>SD</sub> | Diode Forward Voltage (4) | --   | --   | 1.5  | V     | T <sub>J</sub> =25°C, I <sub>S</sub> =4.7A, V <sub>GS</sub> =0V |
| t <sub>rr</sub> | Reverse Recovery Time     | --   | 85   | --   | ns    | T <sub>J</sub> =25°C, I <sub>F</sub> =5.6A                      |
| Q <sub>rr</sub> | Reverse Recovery Charge   | --   | 0.23 | --   | μC    | di <sub>F</sub> /dt=100A/μs (4)                                 |

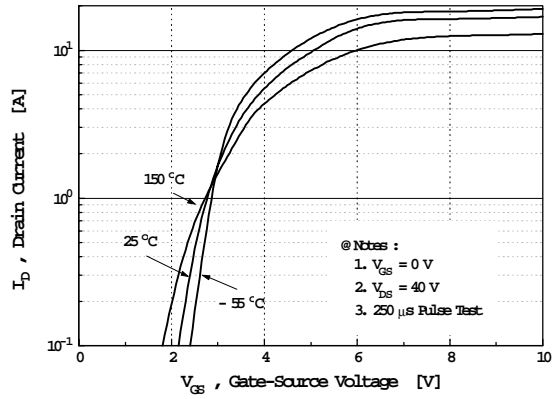
#### Notes;

- (1) Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- (2) L=4mH, I<sub>AS</sub>=4.7A, V<sub>DD</sub>=25V, R<sub>G</sub>=27Ω, Starting T<sub>J</sub>=25°C
- (3) I<sub>SD</sub> ≤ 5.6A, di/dt ≤ 250A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub>=25°C
- (4) Pulse Test: Pulse Width = 250μs, Duty Cycle ≤ 2%
- (5) Essentially Independent of Operating Temperature

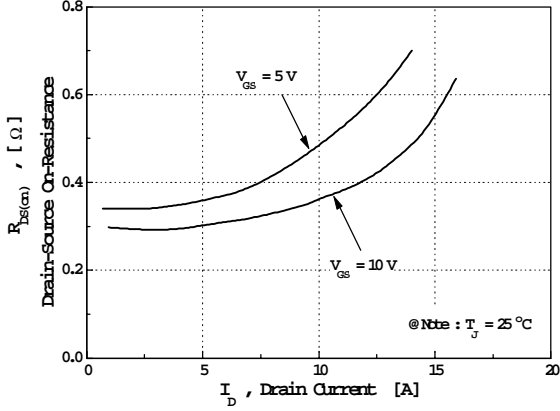
**Fig 1. Output Characteristics**



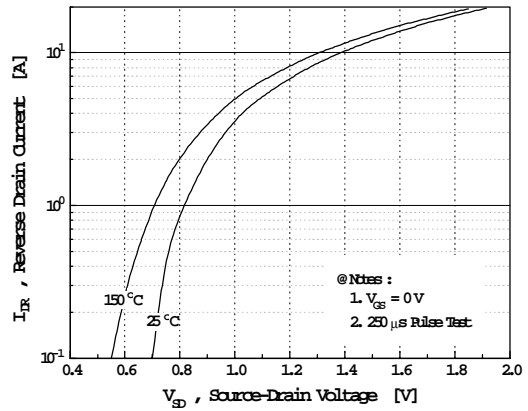
**Fig 2. Transfer Characteristics**



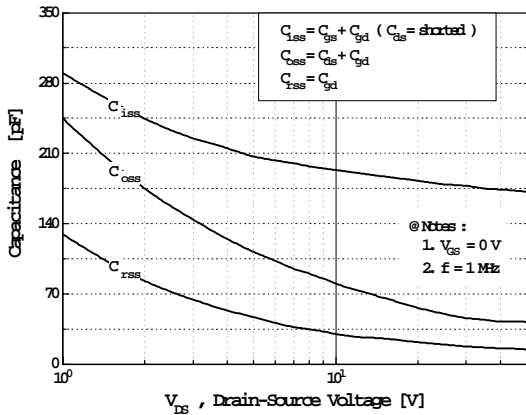
**Fig 3. On-Resistance vs. Drain Current**



**Fig 4. Source-Drain Diode Forward Voltage**



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



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

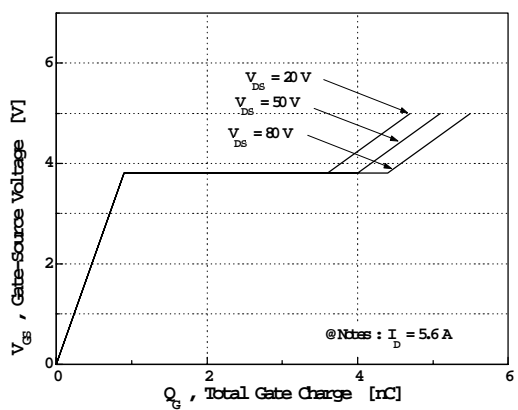


Fig 7. Breakdown Voltage vs. Temperature

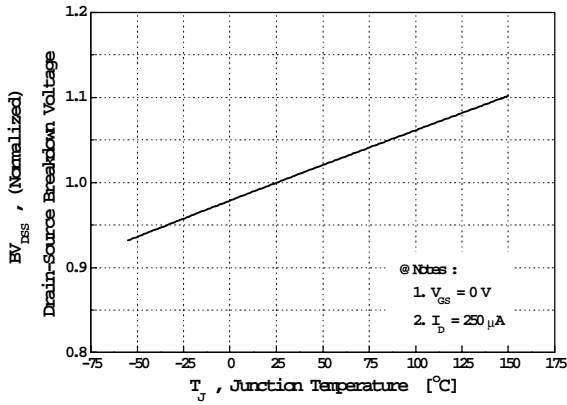


Fig 8. On-Resistance vs. Temperature

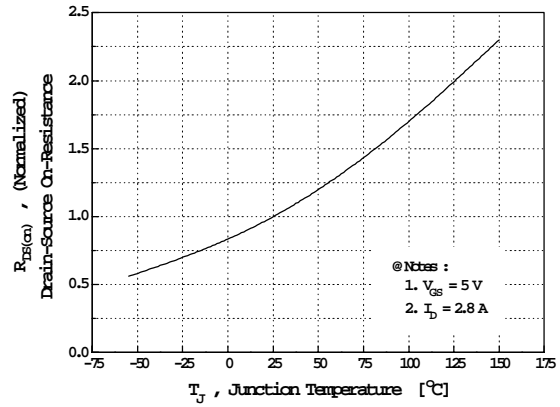


Fig 9. Max. Safe Operating Area

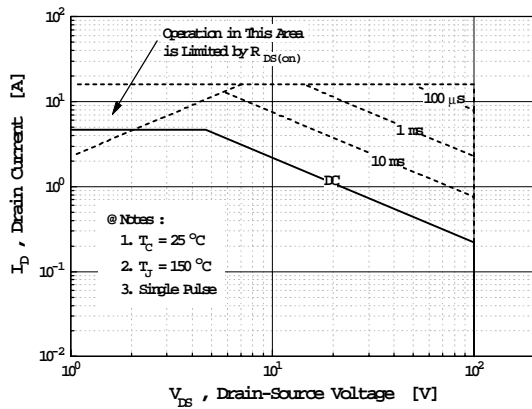


Fig 10. Max. Drain Current vs. Case Temperature

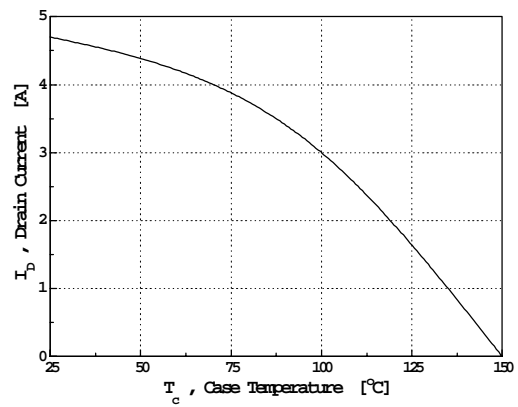
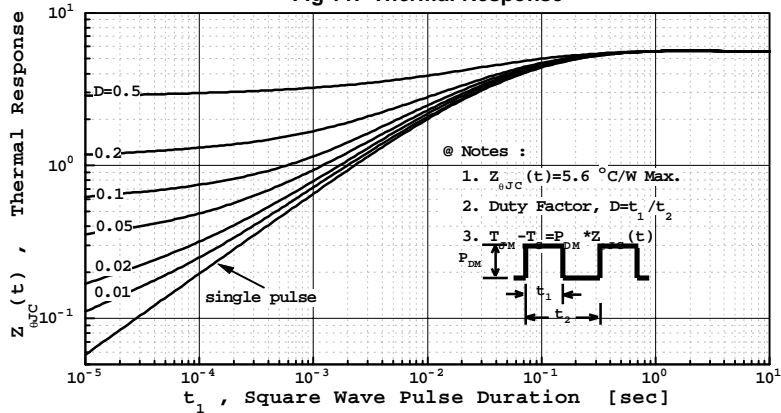
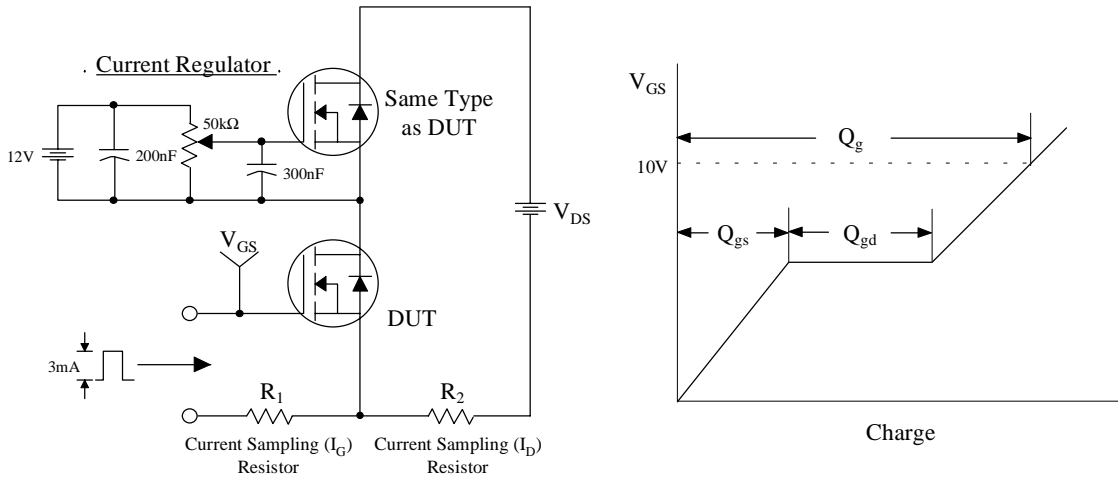


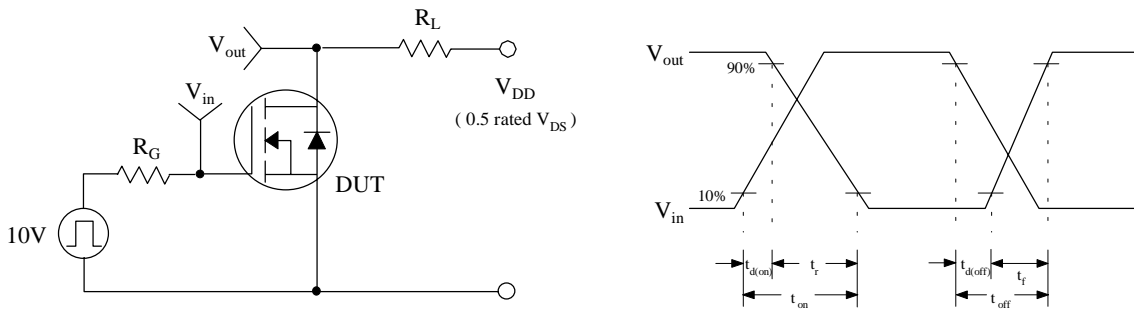
Fig 11. Thermal Response



**Fig 12. Gate Charge Test Circuit & Waveform**



**Fig 13. Resistive Switching Test Circuit & Waveforms**



**Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms**

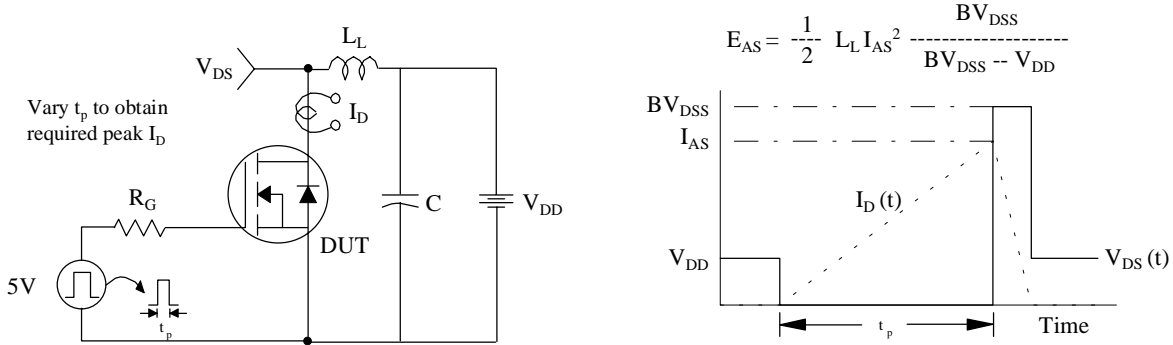
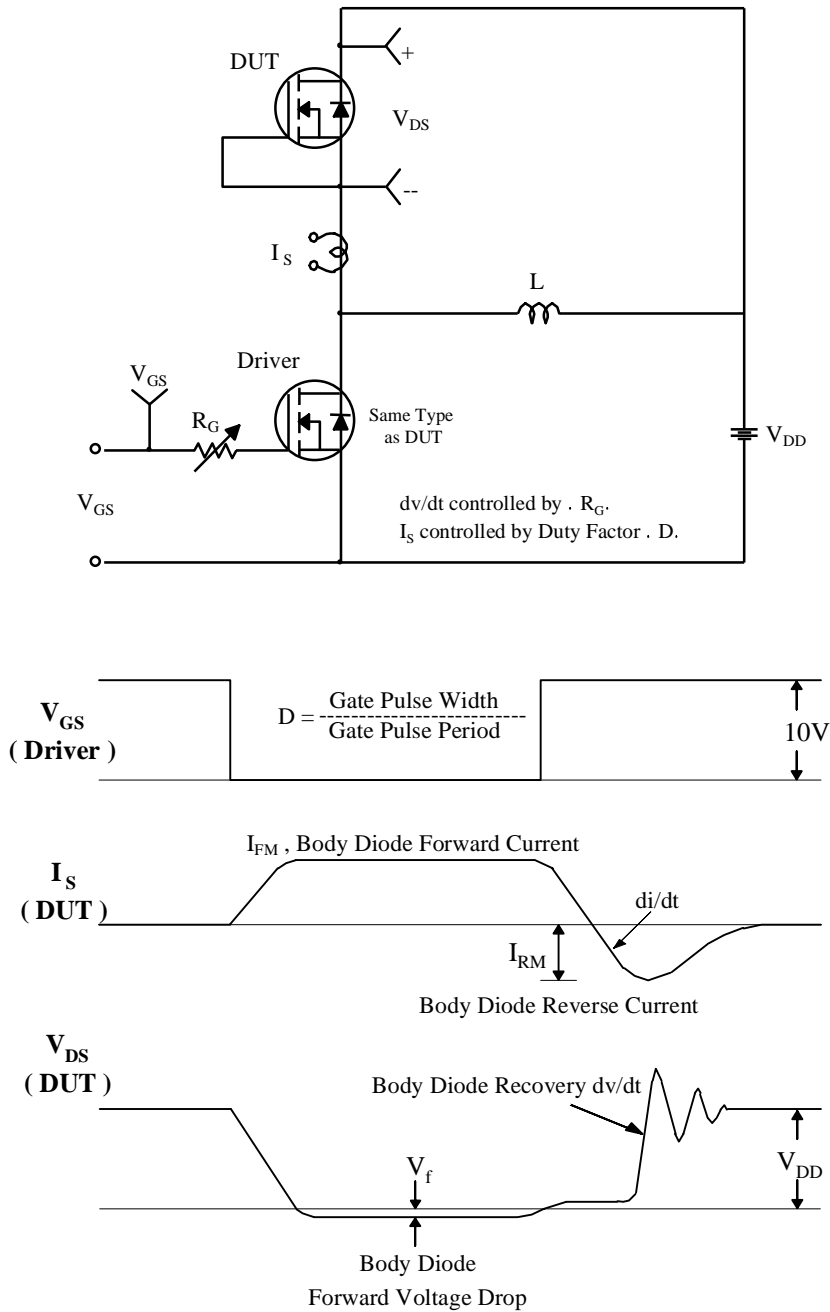


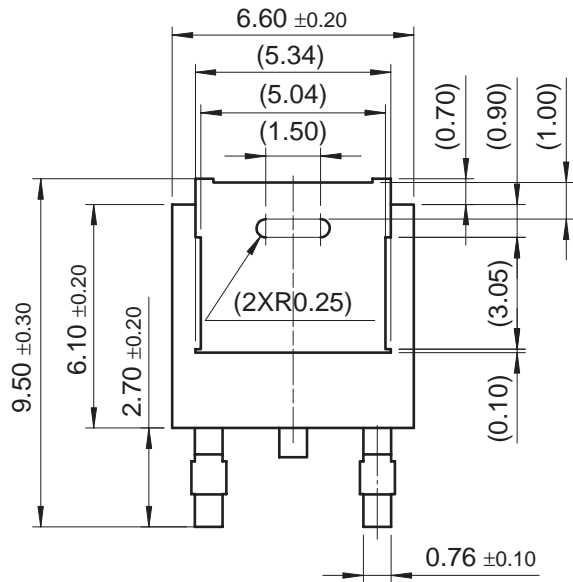
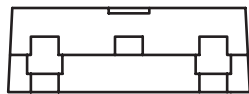
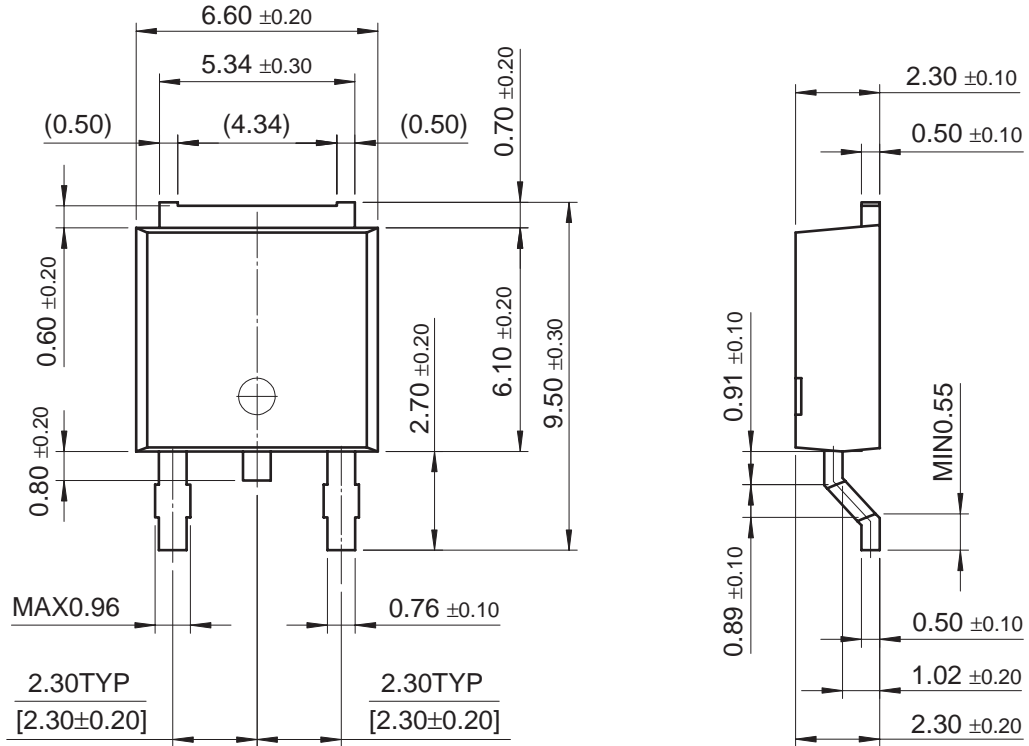
Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



DPAK Package Dimensions



DPAK (FS PKG CODE AA)

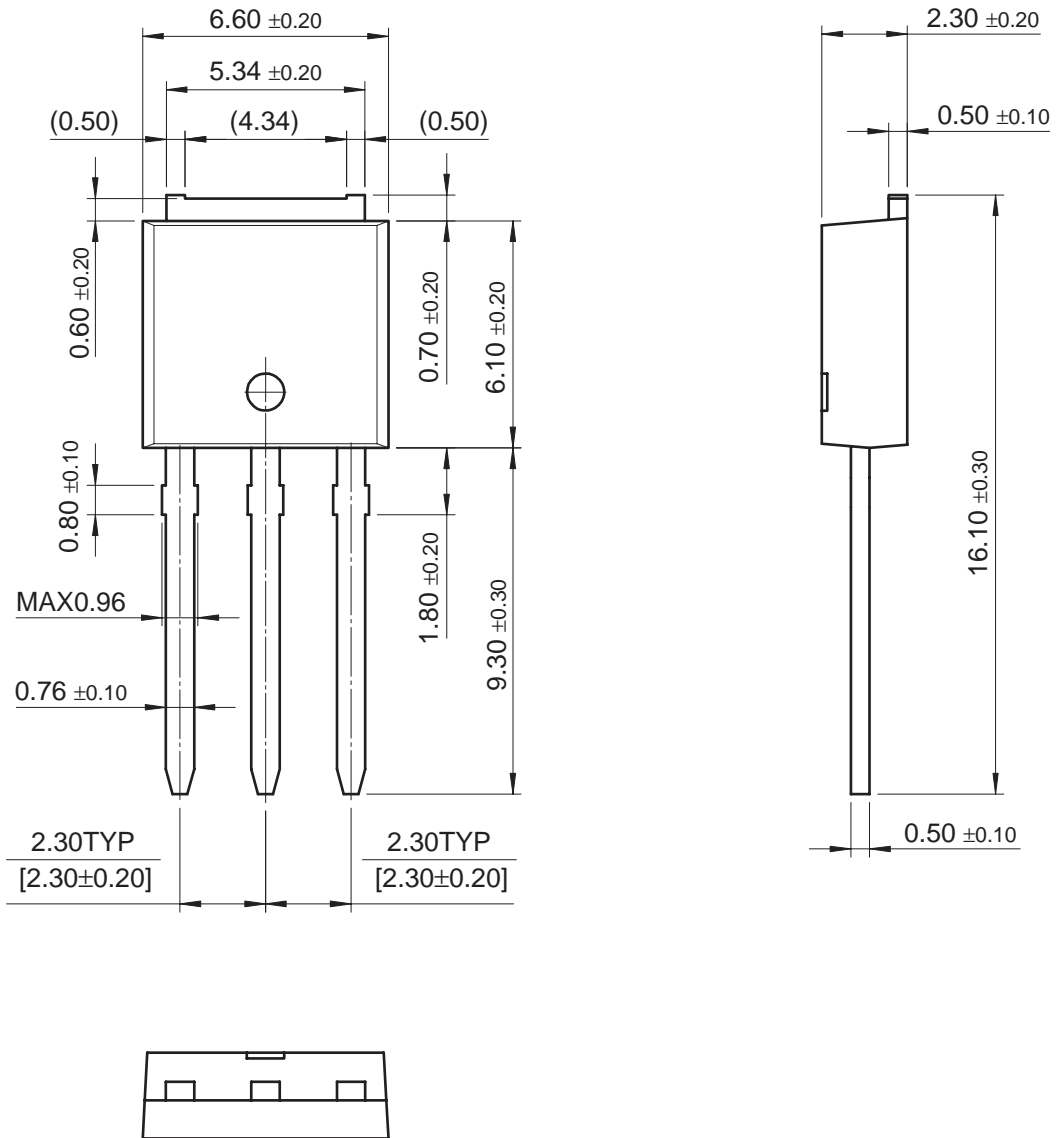


Dimensions in Millimeters

IPAK Package Dimensions



IPAK (FS PKG CODE AL)



Dimensions in Millimeters

September 1999, Rev B



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| FAST®                | Quiet Series™ |            |
| FASTr™               | SuperSOT™-3   |            |
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