

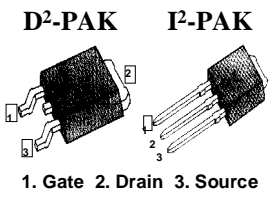
**FEATURES**

- ◆ Avalanche Rugged Technology
- ◆ Rugged Gate Oxide Technology
- ◆ Lower Input Capacitance
- ◆ Improved Gate Charge
- ◆ Extended Safe Operating Area
- ◆ 175°C Operating Temperature
- ◆ Lower Leakage Current: 10μA (Max.) @  $V_{DS} = 100V$
- ◆ Lower  $R_{DS(ON)}$ : 0.336Ω (Typ.)

$$BV_{DSS} = 100 V$$

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

$$I_D = 5.6 A$$

**Absolute Maximum Ratings**

| Symbol         | Characteristic  | Value        | Units |
|----------------|---|--------------|-------|
| $V_{DSS}$      | Drain-to-Source Voltage   | 100          | V     |
| $I_D$          | Continuous Drain Current ( $T_C=25^\circ\text{C}$ )                     | 5.6          | A     |
|                | Continuous Drain Current ( $T_C=100^\circ\text{C}$ )                    | 4.0          |       |
| $I_{DM}$       | Drain Current-Pulsed (1)  | 20           | A     |
| $V_{GS}$       | Gate-to-Source Voltage  | $\pm 20$     | V     |
| $E_{AS}$       | Single Pulsed Avalanche Energy (2)                                      | 62           | mJ    |
| $I_{AR}$       | Avalanche Current (1)   | 5.6          | A     |
| $E_{AR}$       | Repetitive Avalanche Energy (1)   | 3.7          | mJ    |
| $dv/dt$        | Peak Diode Recovery $dv/dt$ (3)   | 6.5          | V/ns  |
| $P_D$          | Total Power Dissipation ( $T_A=25^\circ\text{C}$ ) *                    | 3.8          | W     |
|                | Total Power Dissipation ( $T_C=25^\circ\text{C}$ )                      | 37           | W     |
|                | Linear Derating Factor  | 0.25         | W/°C  |
| $T_J, T_{STG}$ | Operating Junction and Storage Temperature Range                        | - 55 to +175 | °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      | --   | 4.1  | °C/W  |
| $R_{\theta JA}$ | Junction-to-Ambient * | --   | 40   |       |
| $R_{\theta JA}$ | Junction-to-Ambient   | --   | 62.5 |       |

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

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Rev. B

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

| Symbol                 | Characteristic                          | Min. | Typ. | Max. | Units               | Test Condition  |
|------------------------|---|------|------|------|---------------------|---|
| $BV_{DSS}$             | Drain-Source Breakdown Voltage          | 100  | --   | --   | V                   | $V_{GS}=0V, I_D=250\mu A$   |
| $\Delta BV/\Delta T_J$ | Breakdown Voltage Temp. Coeff.          | --   | 0.1  | --   | V/ $^\circ\text{C}$ | $I_D=250\mu A$ <b>See Fig 7</b>   |
| $V_{GS(th)}$           | Gate Threshold Voltage                  | 1.0  | --   | 2.0  | V                   | $V_{DS}=5V, I_D=250\mu A$   |
| $I_{GSS}$              | Gate-Source Leakage, Forward            | --   | --   | 100  | nA                  | $V_{GS}=20V$  |
|                        | Gate-Source Leakage, Reverse            | --   | --   | -100 |                     | $V_{GS}=-20V$   |
| $I_{DSS}$              | Drain-to-Source Leakage Current         | --   | --   | 10   | $\mu A$             | $V_{DS}=100V$   |
|                        |   | --   | --   | 100  |                     | $V_{DS}=80V, T_C=150^\circ\text{C}$   |
| $R_{DS(on)}$           | Static Drain-Source On-State Resistance | --   | --   | 0.44 | $\Omega$            | $V_{GS}=5V, I_D=2.8A$ (4)   |
| $g_{fs}$               | Forward Transconductance                | --   | 3.2  | --   | $\text{S}$          | $V_{DS}=40V, I_D=2.8A$ (4)  |
| $C_{iss}$              | Input Capacitance                       | --   | 180  | 235  | pF                  | $V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$<br><b>See Fig 5</b>                      |
| $C_{oss}$              | Output Capacitance                      | --   | 50   | 65   |                     |   |
| $C_{rss}$              | Reverse Transfer Capacitance            | --   | 20   | 25   |                     |   |
| $t_{d(on)}$            | Turn-On Delay Time                      | --   | 8    | 25   | ns                  | $V_{DD}=50V, I_D=5.6A,$<br>$R_G=12\Omega$<br><b>See Fig 13</b> (4) (5)          |
| $t_r$                  | Rise Time                               | --   | 10   | 30   |                     |   |
| $t_{d(off)}$           | Turn-Off Delay Time                     | --   | 17   | 45   |                     |   |
| $t_f$                  | Fall Time                               | --   | 8    | 25   |                     |   |
| $Q_g$                  | Total Gate Charge                       | --   | 5.5  | 8    | nC                  | $V_{DS}=80V, V_{GS}=5V,$<br>$I_D=5.6A$<br><b>See Fig 6 &amp; Fig 12</b> (4) (5) |
| $Q_{gs}$               | Gate-Source Charge                      | --   | 0.9  | --   |                     |   |
| $Q_{gd}$               | Gate-Drain (. Miller. ) Charge          | --   | 3.5  | --   |                     |   |

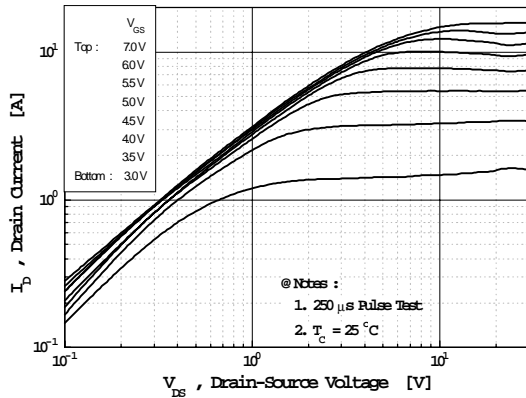
**Source-Drain Diode Ratings and Characteristics**

| Symbol   | Characteristic            | Min. | Typ. | Max. | Units         | Test Condition                              |
|----------|---------------------------|------|------|------|---------------|---|
| $I_S$    | Continuous Source Current | --   | --   | 5.6  | A             | Integral reverse pn-diode in the MOSFET     |
| $I_{SM}$ | Pulsed-Source Current (1) | --   | --   | 20   |               |   |
| $V_{SD}$ | Diode Forward Voltage (4) | --   | --   | 1.5  | V             | $T_J=25^\circ\text{C}, I_S=5.6A, V_{GS}=0V$ |
| $t_{rr}$ | Reverse Recovery Time     | --   | 85   | --   | ns            | $T_J=25^\circ\text{C}, I_F=5.6A$            |
| $Q_{rr}$ | Reverse Recovery Charge   | --   | 0.23 | --   | $\mu\text{C}$ | $di_F/dt=100A/\mu\text{s}$ (4)              |

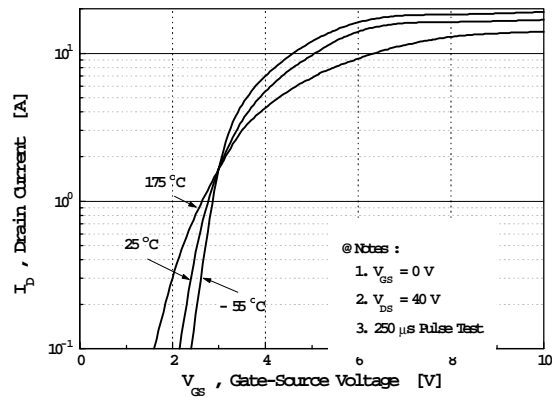
**Notes;**

- (1) Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- (2)  $L=3\text{mH}, I_{AS}=5.6A, V_{DD}=25V, R_G=27\Omega$ , Starting  $T_J=25^\circ\text{C}$
- (3)  $I_{SD} \leq 5.6A, di/dt \leq 250A/\mu\text{s}, V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$
- (4) Pulse Test: Pulse Width =  $250\mu\text{s}$ , Duty Cycle  $\leq 2\%$
- (5) Essentially Independent of Operating Temperature

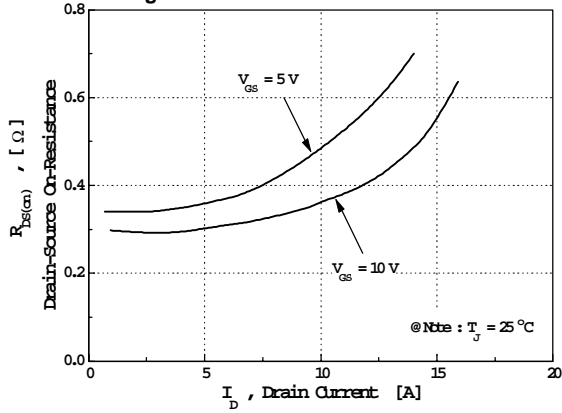
**Fig 1. Output Characteristics**



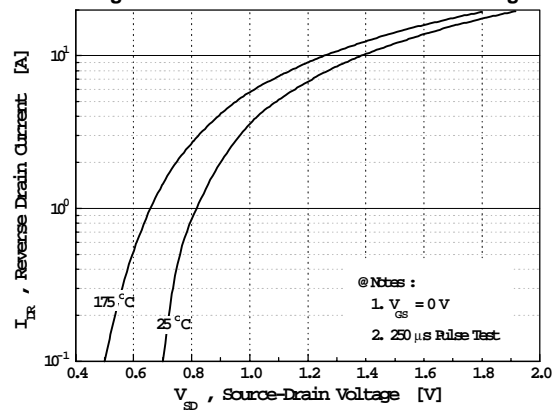
**Fig 2. Transfer Characteristics**



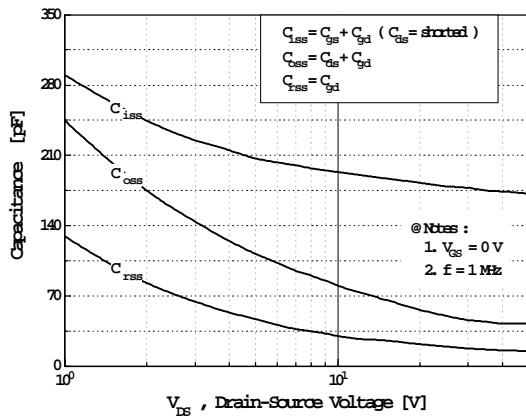
**Fig 3. On-Resistance vs. Drain Current**



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



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



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

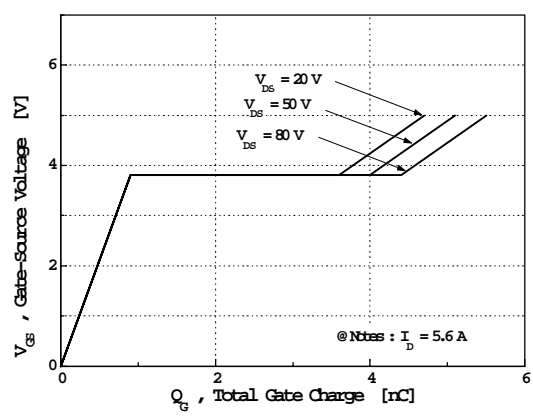


Fig 7. Breakdown Voltage vs. Temperature

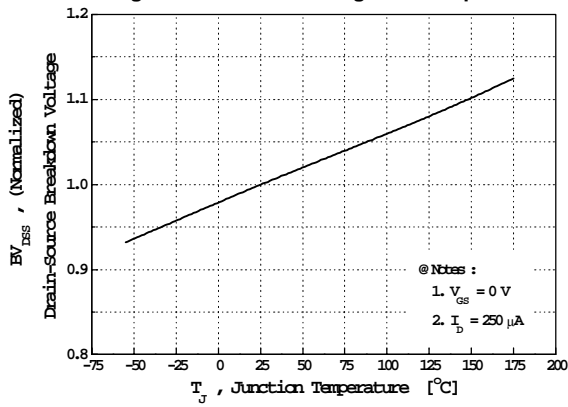


Fig 8. On-Resistance vs. Temperature

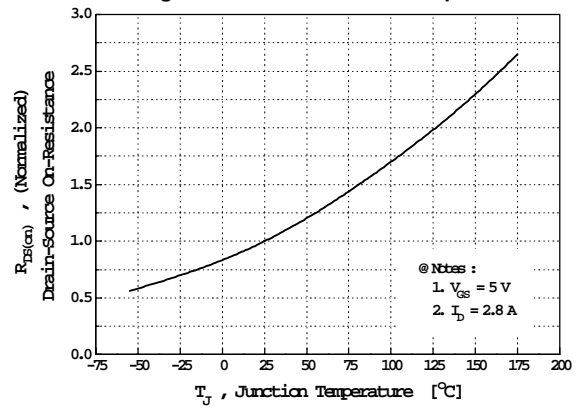


Fig 9. Max. Safe Operating Area

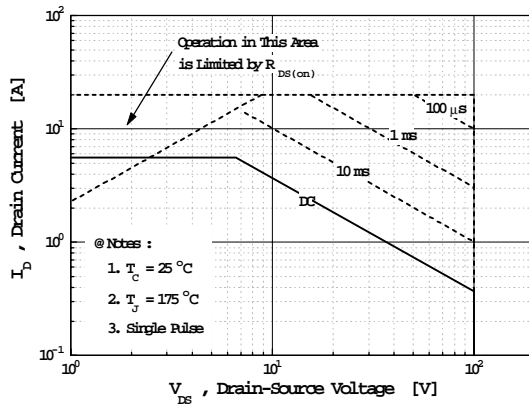


Fig 10. Max. Drain Current vs. Case Temperature

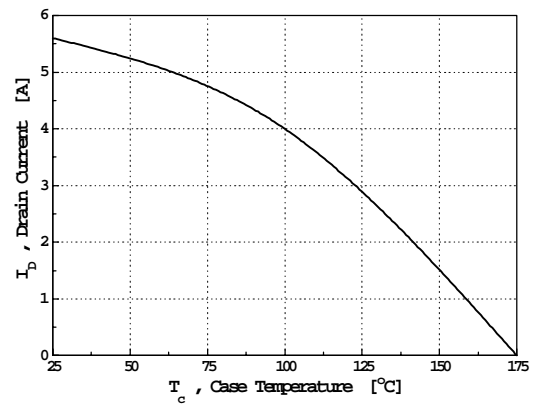
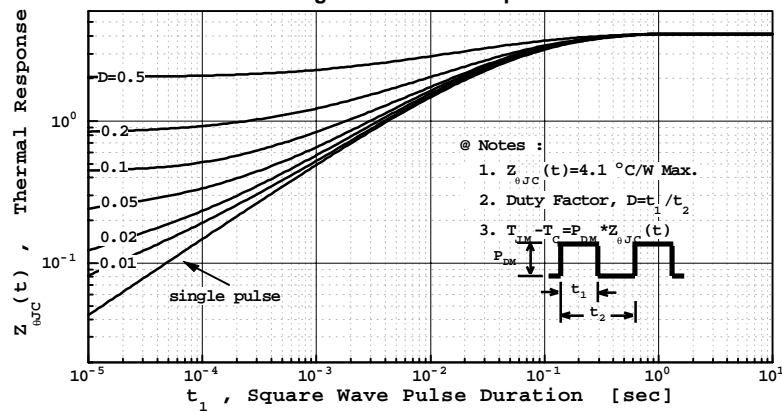
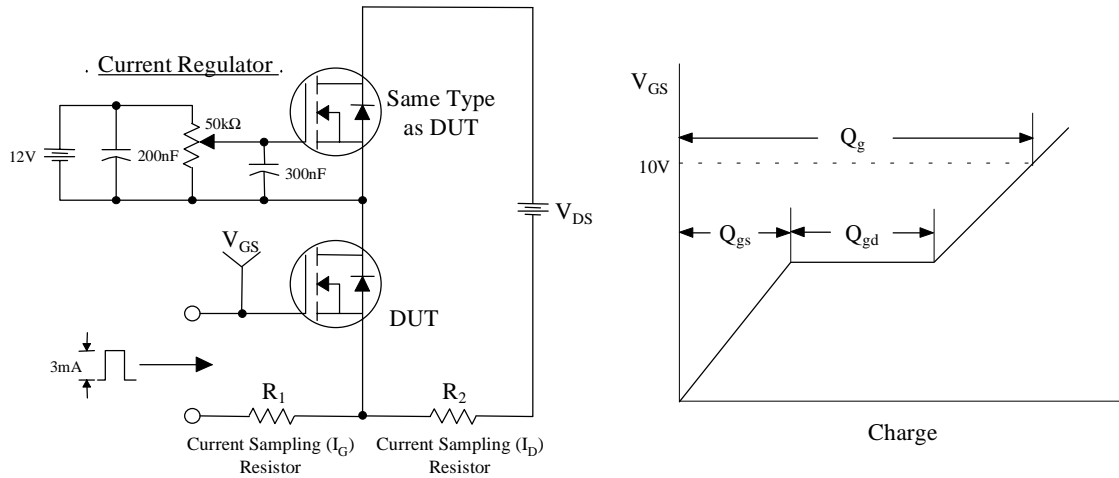


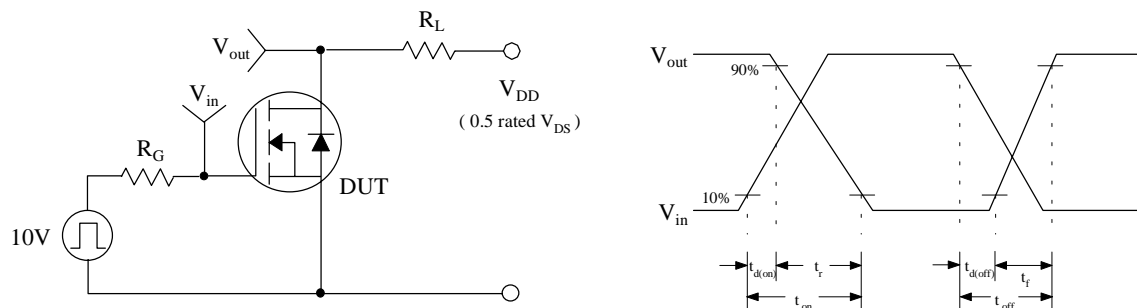
Fig 11. Thermal Response



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



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



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

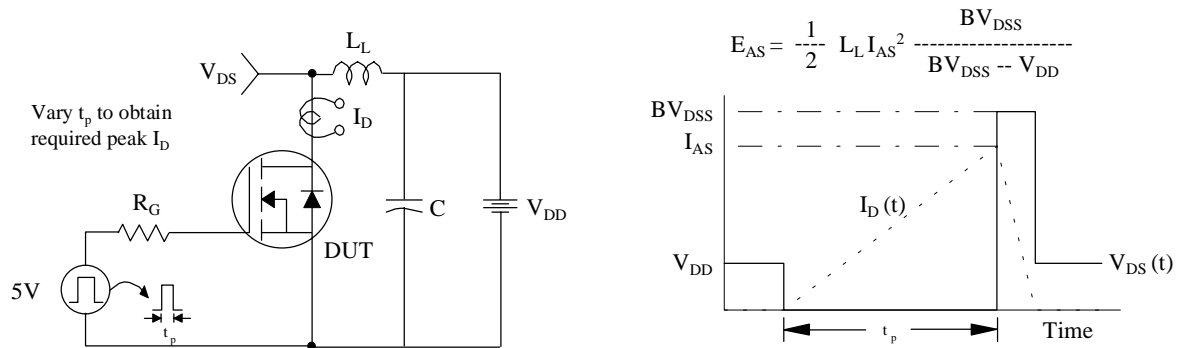
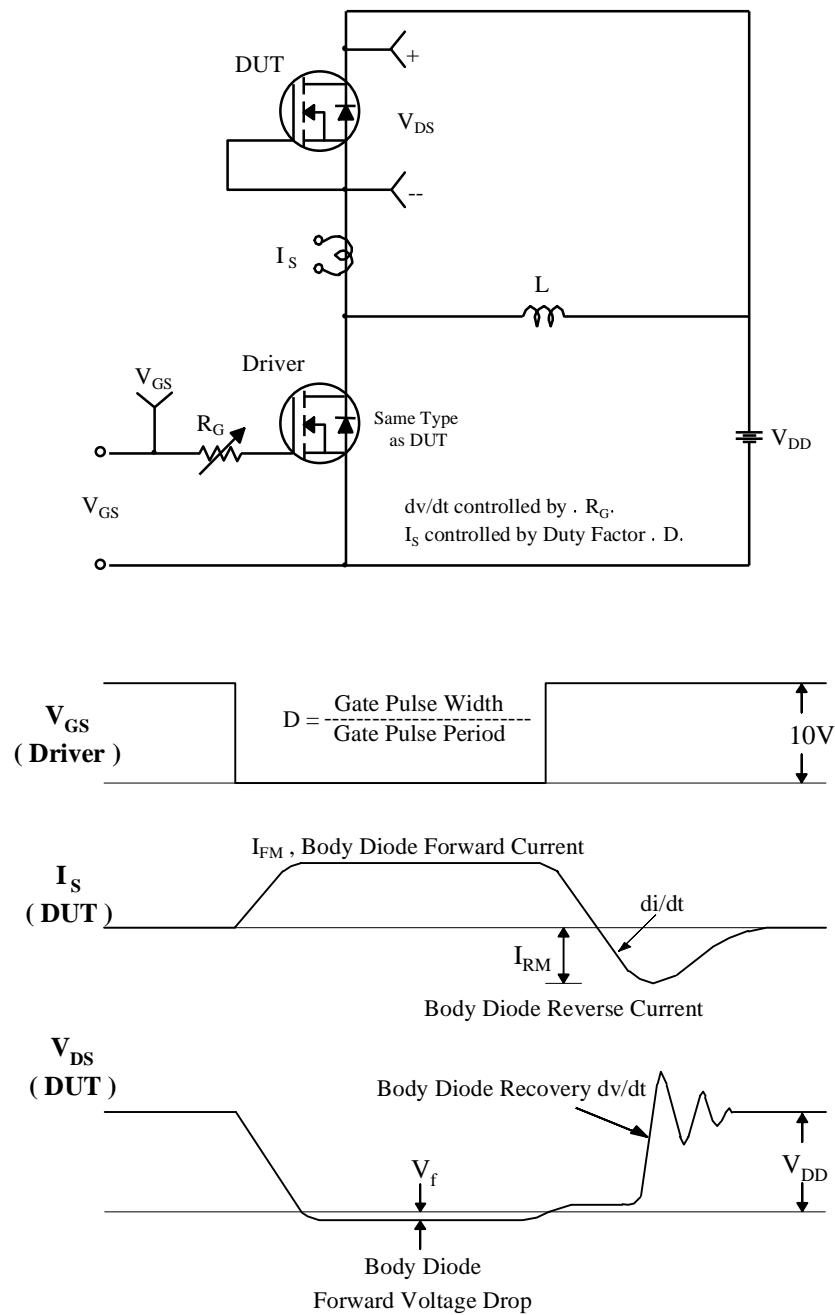


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



Technical drawing of a 12-pin D-sub connector showing front, side, and top views with dimensions in millimeters.

**Front View (Top Left):**

- Overall width:  $9.90 \pm 0.20$
- Pin pitch (center-to-center):  $2.54 \text{ TYP}$
- Pin diameter:  $1.27 \pm 0.10$
- Pin length (from body):  $1.40 \pm 0.20$
- Body height (excluding pins):  $1.20 \pm 0.20$
- Body height (including pins):  $9.20 \pm 0.20$
- Overall height:  $15.30 \pm 0.30$
- Pin length (from body, alternative):  $4.90 \pm 0.20$
- Pin length (from body, alternative):  $0.80 \pm 0.10$

**Side View (Top Right):**

- Overall width:  $4.50 \pm 0.20$
- Pin length (from body):  $1.30^{+0.10}_{-0.05}$
- Body height (excluding pins):  $0.10 \pm 0.15$
- Body height (including pins):  $2.40 \pm 0.20$
- Overall height:  $2.54 \pm 0.30$
- Pin length (from body):  $2.00 \pm 0.10$
- Pin length (from body, alternative):  $(0.75)$
- Pin length (from body, alternative):  $0.50^{+0.10}_{-0.05}$
- Pin length (from body, alternative):  $0^\circ \sim 3^\circ$

**Top View (Bottom Left):**

- Overall width:  $10.00 \pm 0.20$

**Bottom View (Bottom Right):**

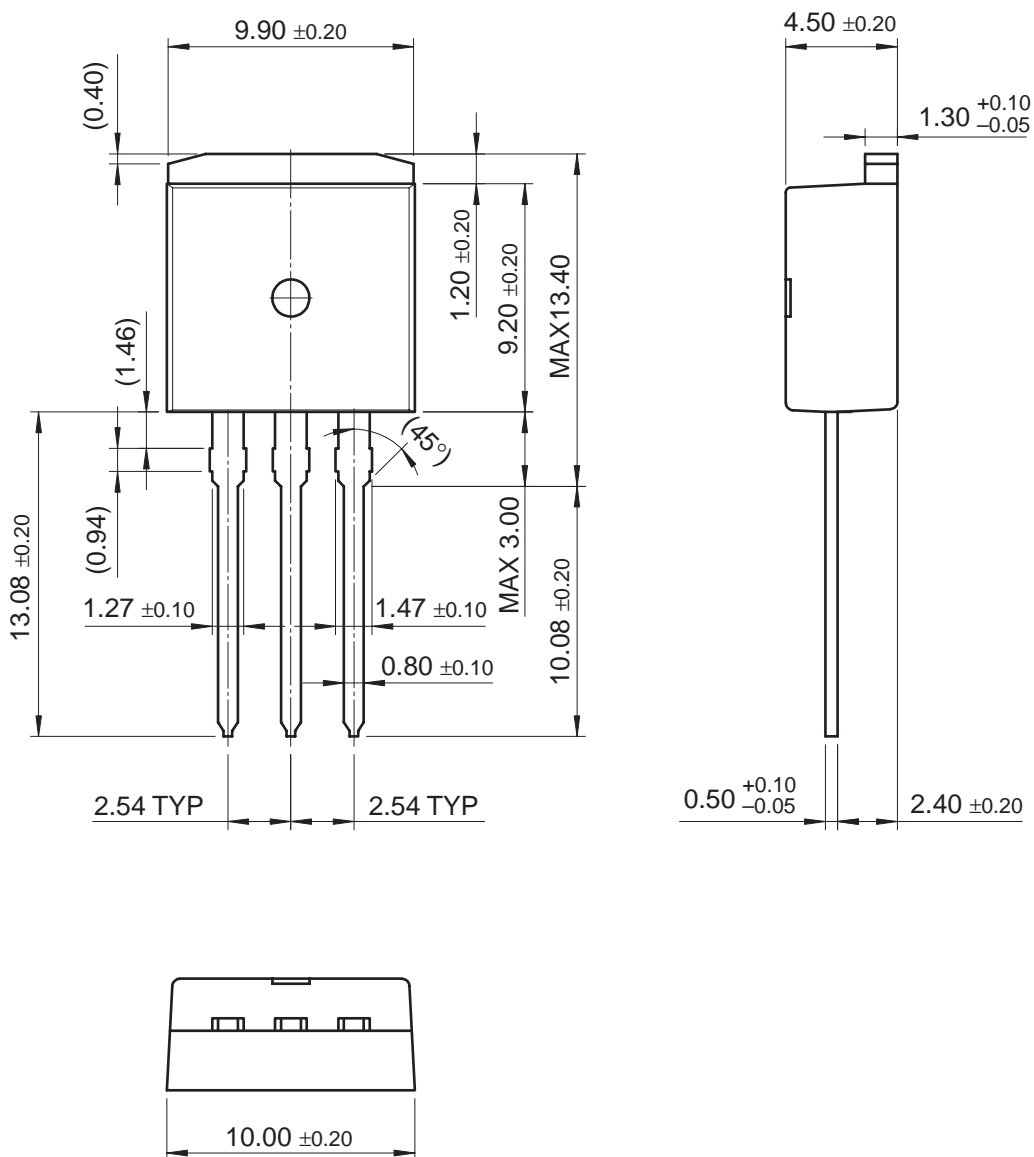
- Overall width:  $10.00 \pm 0.20$
- Pin pitch (center-to-center):  $(8.00)$
- Pin pitch (center-to-center):  $(4.40)$
- Pin length (from body):  $(1.75)$
- Body height (excluding pins):  $(7.20)$
- Body height (including pins):  $9.20 \pm 0.20$
- Pin length (from body):  $4.90 \pm 0.20$
- Pin length (from body, alternative):  $0.80 \pm 0.10$
- Pin length (from body, alternative):  $(2XR0.45)$

### Dimensions in Millimeters

# I<sup>2</sup>PAK Package Dimensions



## I<sup>2</sup>PAK (FS PKG CODE AO)



Dimensions in Millimeters

September 1999, Rev B



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