



# PFU70R360G / PFD70R360G

## N-Channel Super Junction MOSFET

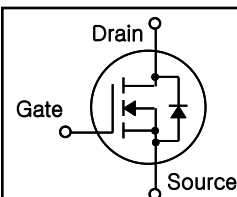
### FEATURES

- ❑ New technology for high voltage device
- ❑ Low  $R_{DS(on)}$  low conduction losses
- ❑ Small package
- ❑ Ultra low gate charge cause lower driving requirement
- ❑ 100% avalanche tested
- ❑ Halogen Free

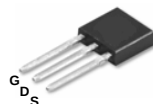
### APPLICATION

- ❑ Power Factor Correction(PFC)
- ❑ Switched mode power supply (SMPS)
- ❑ Uninterruptible Power Supply (UPS)

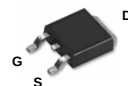
$BV_{DSS} = 700\text{ V}$   
 $R_{DS(on)} = 0.36\ \Omega$   
 $I_D = 11.0\text{ A}$



I-PAK(TO-251)



D-PAK(TO-252)



### Absolute Maximum Ratings

$T_c=25^\circ\text{C}$  unless otherwise specified

| Symbol          | Parameter                                                | Value       | Units               |
|-----------------|----------------------------------------------------------|-------------|---------------------|
| $V_{DS}$        | Drain-Source Voltage ( $V_{GS}=0\text{V}$ )              | 700         | V                   |
| $I_D$           | Drain Current – Continuous ( $T_c = 25^\circ\text{C}$ )  | 11          | A                   |
|                 | Drain Current – Continuous ( $T_c = 100^\circ\text{C}$ ) | 7.0         | A                   |
| $I_{DM(pulse)}$ | Drain Current – Pulsed * Note 1                          | 33          | A                   |
| $V_{GS}$        | Gate-Source Voltage ( $V_{DS}=0\text{V}$ )               | $\pm 30$    | V                   |
| $E_{AS}$        | Single Pulsed Avalanche Energy * Note 2                  | 60          | mJ                  |
| $I_{AR}$        | Avalanche Current * Note 1                               | 5.5         | A                   |
| $E_{AR}$        | Repetitive Avalanche Energy * Note 1                     | 12          | mJ                  |
| dv/dt           | Drain Source Voltage Slope, $V_{DS} \leq 480\text{V}$    | 50          | V/ns                |
|                 | Reverse Diode dv/dt, $V_{DS} \leq 480\text{V}$           | 15          | V/ns                |
| $P_D$           | Maximum Power Dissipation ( $T_c = 25^\circ\text{C}$ )   | 121         | W                   |
|                 | Derate above $25^\circ\text{C}$                          | 0.97        | W/ $^\circ\text{C}$ |
| $T_J, T_{STG}$  | Operating and Storage Temperature Range                  | -55 to +150 | $^\circ\text{C}$    |

\* Limited by maximum junction temperature

### Thermal Resistance Characteristics

| Symbol          | Parameter                     | Value | Units              |
|-----------------|-------------------------------|-------|--------------------|
| $R_{\theta JC}$ | Junction-to-Case (Maximum)    | 1.03  | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Junction-to-Ambient (Maximum) | 62    |                    |

PFU70R360G / PFD70R360G

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

| Symbol                                                 | Parameter                                     | Test Conditions                                                                                | Min | Typ | Max  | Units |
|--------------------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------|-----|-----|------|-------|
| On Characteristics                                     |                                               |                                                                                                |     |     |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                        | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 uA                                    | 2.5 | 3.0 | 4.5  | V     |
| R <sub>DS(ON)</sub>                                    | Static Drain-Source On-Resistance             | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 7.0 A                                                 | --  | 360 | 400  | m.ohm |
| Off Characteristics                                    |                                               |                                                                                                |     |     |      |       |
| BV <sub>DSS</sub>                                      | Drain-Source Breakdown Voltage                | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 uA                                                 | 700 | --  | --   | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current               | V <sub>DS</sub> = 700 V, V <sub>GS</sub> = 0 V                                                 | --  | --  | 1    | uA    |
|                                                        |                                               | V <sub>DS</sub> = 560 V, T <sub>C</sub> =125 °C                                                | --  | --  | 100  | uA    |
| I <sub>GSSF</sub>                                      | Gate-Body Leakage Current, Forward            | V <sub>GS</sub> = 30 V, V <sub>DS</sub> = 0 V                                                  | --  | --  | 100  | nA    |
| I <sub>GSSR</sub>                                      | Gate-Body Leakage Current, Reverse            | V <sub>GS</sub> = -30 V, V <sub>DS</sub> = 0 V                                                 | --  | --  | -100 | nA    |
| Dynamic Characteristics                                |                                               |                                                                                                |     |     |      |       |
| g <sub>FS</sub>                                        | Forward Transconductance                      | V <sub>DS</sub> = 20V, I <sub>D</sub> = 7.0A                                                   | --  | 8   | --   | S     |
| R <sub>G</sub>                                         | Intrinsic Gate Resistance                     | f = 1.0 MHz, open drain                                                                        | --  | 2   | --   | ohm   |
| C <sub>iss</sub>                                       | Input Capacitance                             | V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz                                     | --  | 950 | --   | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                            |                                                                                                | --  | 75  | --   | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                  |                                                                                                | --  | 5   | --   | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                             | V <sub>DS</sub> = 560 V, I <sub>D</sub> = 11.0 A, V <sub>GS</sub> = 10 V                       | --  | 24  | 36   | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                            |                                                                                                | --  | 6   | --   | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain Charge                             |                                                                                                | --  | 8.5 | --   | nC    |
| Switching Characteristics                              |                                               |                                                                                                |     |     |      |       |
| t <sub>d(on)</sub>                                     | Turn-On Time                                  | V <sub>DS</sub> = 380 V, I <sub>D</sub> = 5.5 A, R <sub>G</sub> = 6.8 Ω, V <sub>GS</sub> = 10V | --  | 9   | --   | ns    |
| t <sub>r</sub>                                         | Turn-On Rise Time                             |                                                                                                | --  | 4   | --   | ns    |
| t <sub>d(off)</sub>                                    | Turn-Off Delay Time                           |                                                                                                | --  | 40  | 60   | ns    |
| t <sub>f</sub>                                         | Turn-Off Fall Time                            |                                                                                                | --  | 4.5 | 7    | ns    |
| Source-Drain Diode Maximum Ratings and Characteristics |                                               |                                                                                                |     |     |      |       |
| I <sub>S</sub>                                         | Continuous Source-Drain Diode Forward Current |                                                                                                | --  | --  | 11   | A     |
| I <sub>SM</sub>                                        | Pulsed Source-Drain Diode Forward Current     |                                                                                                | --  | --  | 33   |       |
| V <sub>SD</sub>                                        | Source-Drain Diode Forward Voltage            | I <sub>S</sub> = 11.0 A, V <sub>GS</sub> = 0 V                                                 | --  | 0.9 | 1.2  | V     |
| t <sub>rr</sub>                                        | Reverse Recovery Time                         | I <sub>S</sub> = 11.0 A                                                                        | --  | 245 | --   | ns    |
| Q <sub>rr</sub>                                        | Reverse Recovery Charge                       | di/dt = 100 A/μs                                                                               | --  | 2.4 | --   | μC    |

**Notes ;**

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2.  $V_{DD}=50\text{ V}, R_G=25\text{ }\Omega$ , Starting  $T_J=25\text{ }^{\circ}\text{C}$

# Typical Characteristics

Figure1. On Region Characteristics

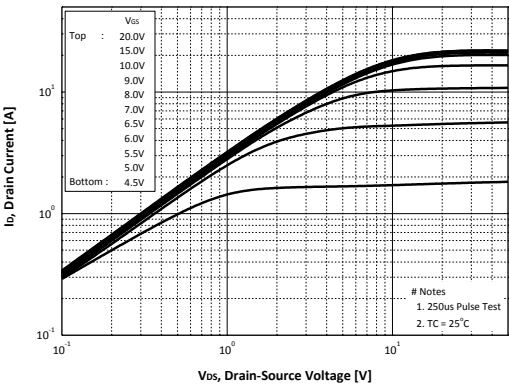


Figure 2. Transfer Characteristics

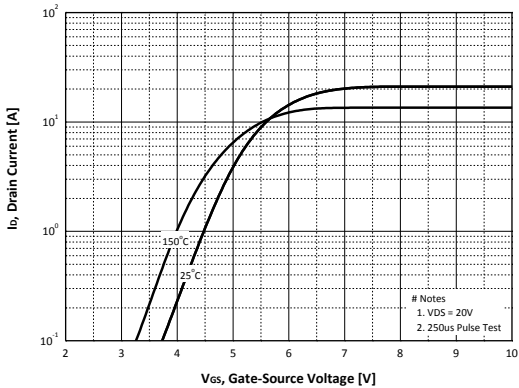


Figure 3. Static Drain-Source On Resistance

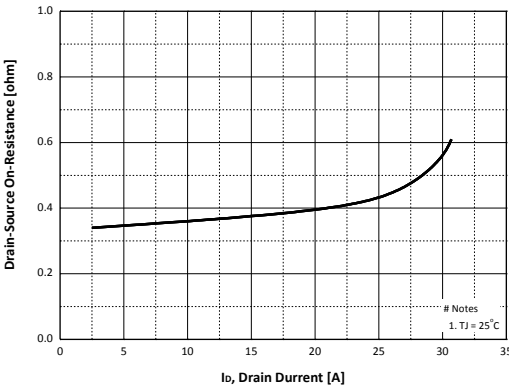


Figure 4. Body Diode Forward Voltage

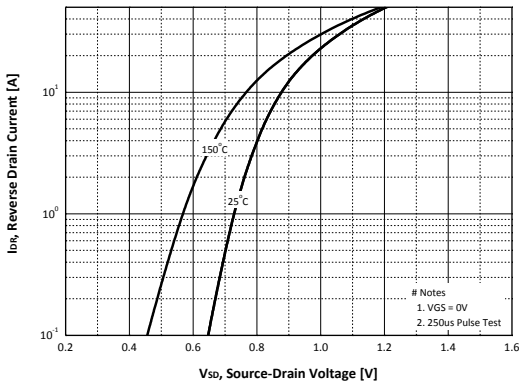


Figure 5. Capacitance Characteristics

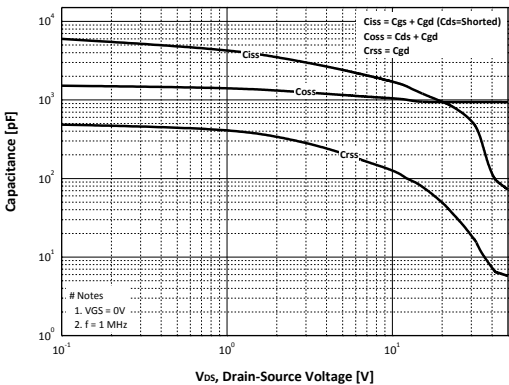
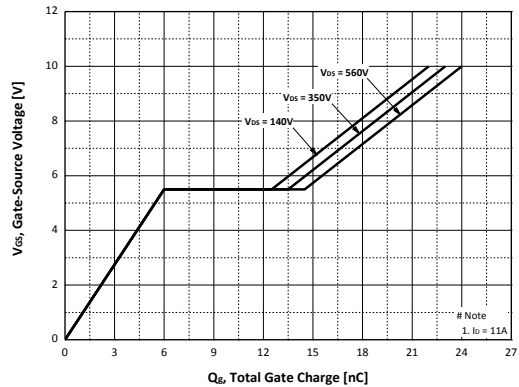


Figure 6. Gate Charge Characteristics



# Typical Characteristics (continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

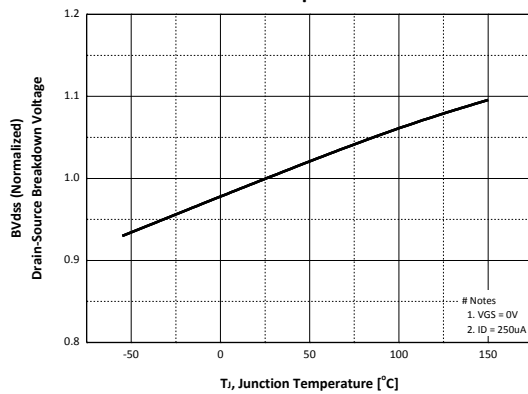


Figure 8. On-Resistance Variation vs. Temperature

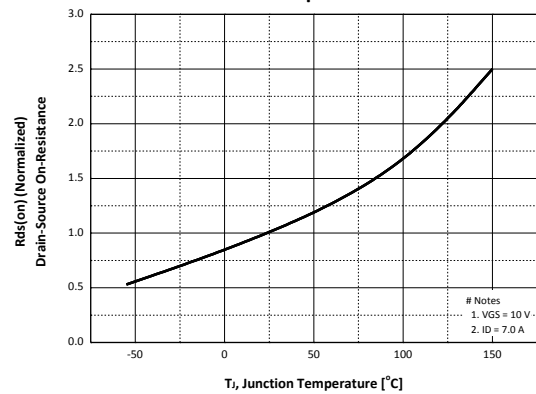


Figure 9. Safe Operation Area

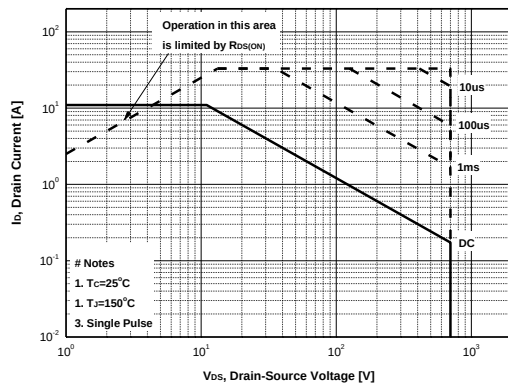


Figure 10. Maximum Drain Current vs. Case Temperature

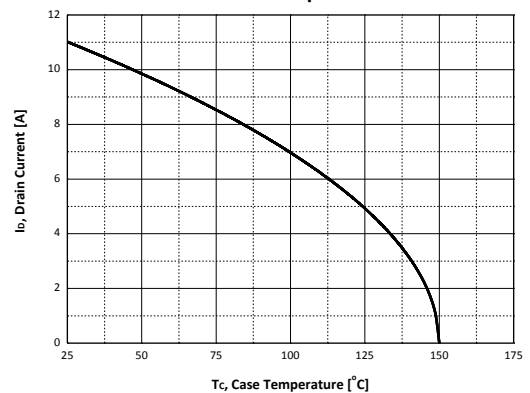
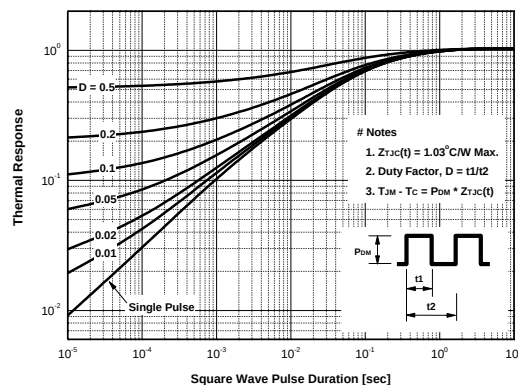
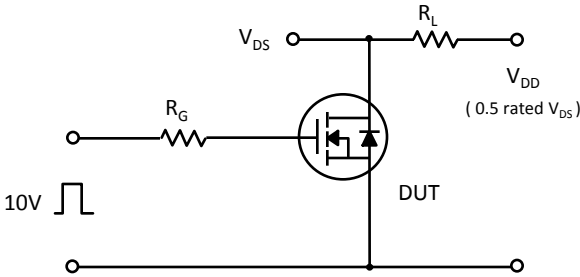


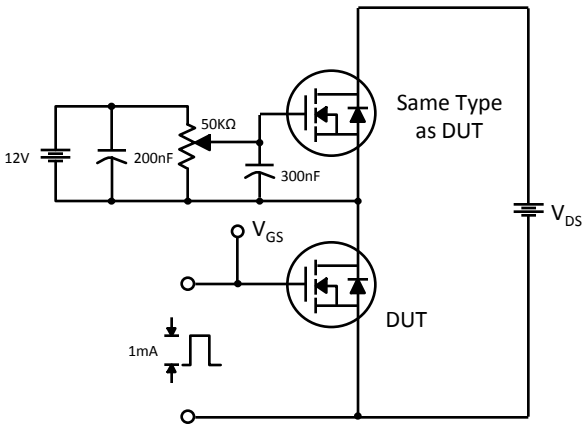
Figure 11. Transient Thermal Response Curve



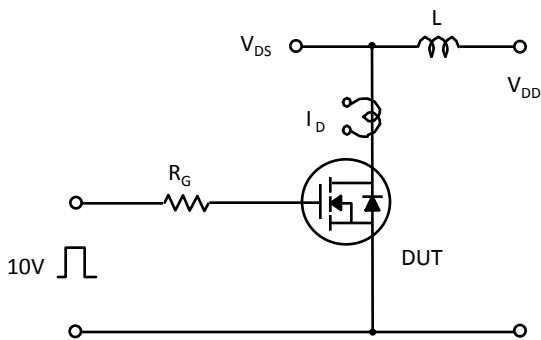
# Characteristics Test Circuit & Waveform



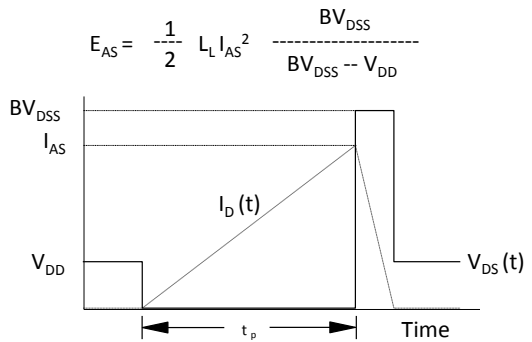
Switching Time Test Circuit & Waveforms



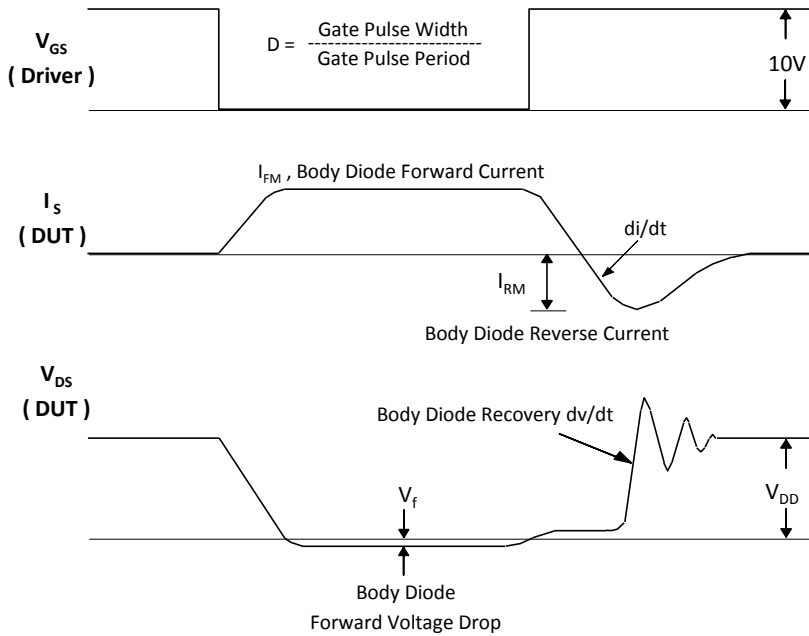
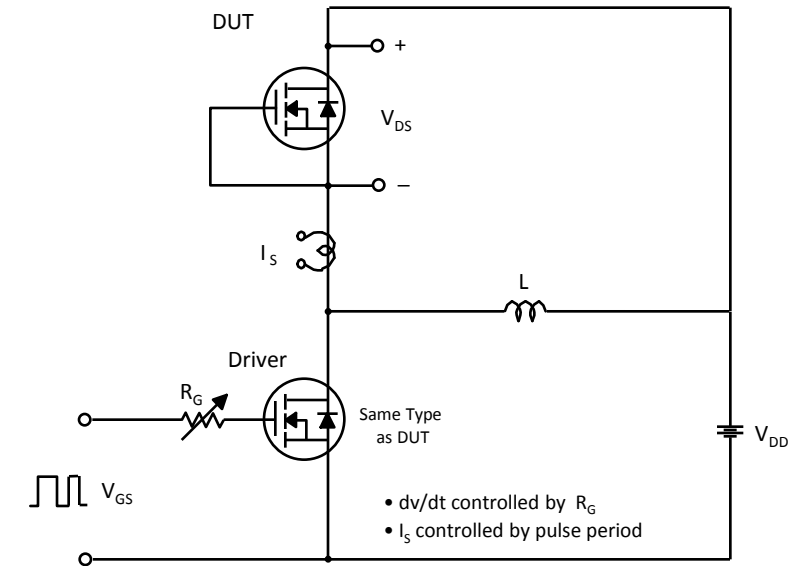
Gate Charge Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveforms



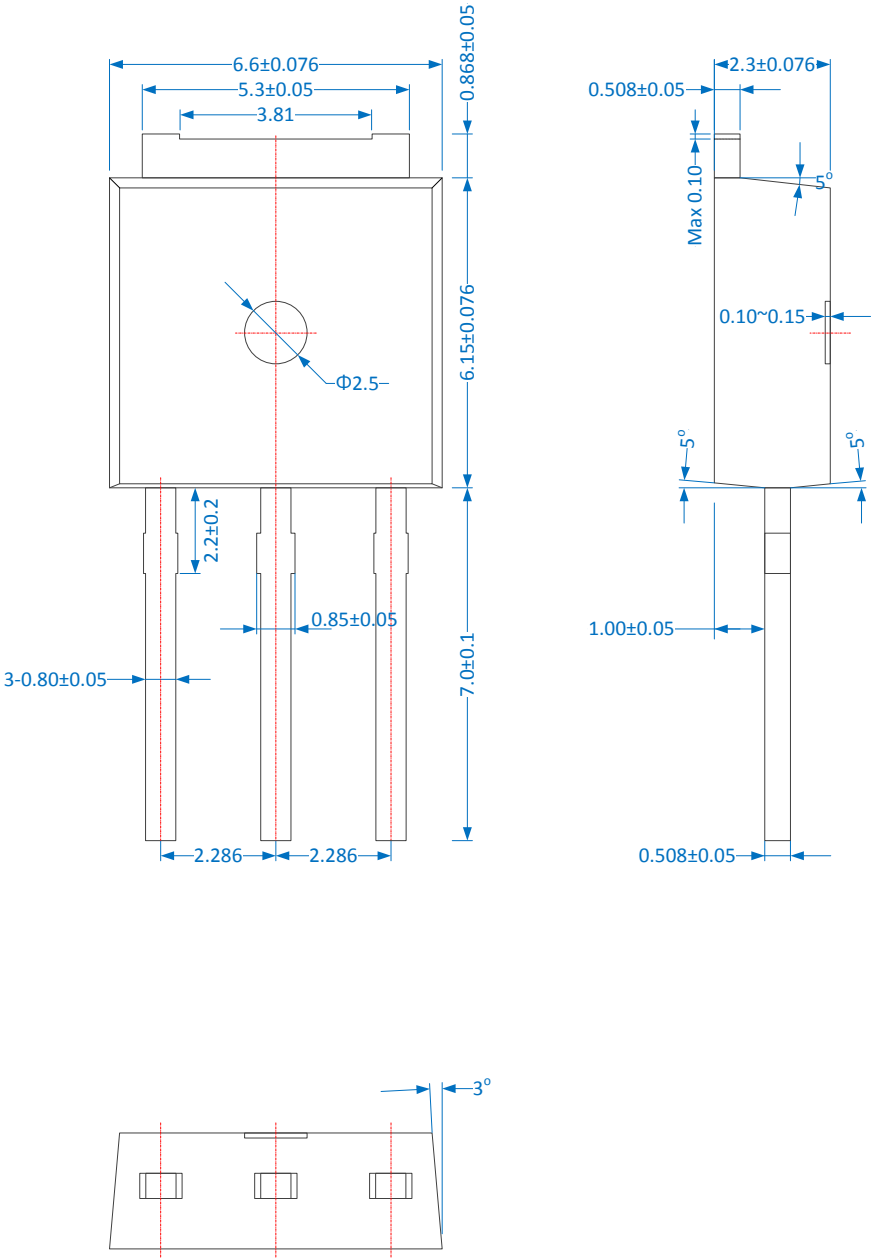
Characteristics Test Circuit & Waveform (continued)



Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms

Package Dimension

I-PAK(TO-251)



Package Dimension

D-PAK(TO-252)

