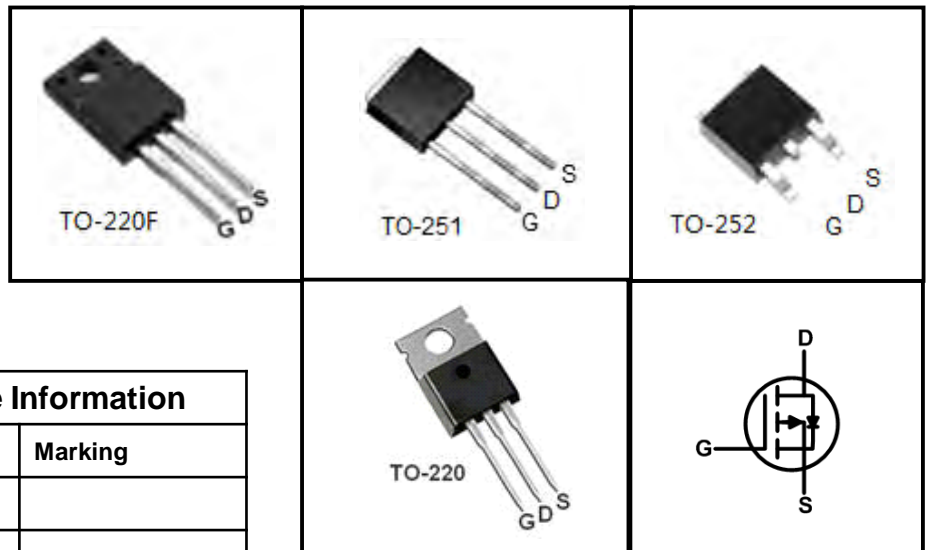


### FEATURES

- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

### APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



| Device Marking and Package Information |         |         |
|----------------------------------------|---------|---------|
| Device                                 | Package | Marking |
| LM8P20F                                | TO-220F |         |
| LM8P20P                                | TO-220  |         |
| LM8P20U                                | TO-251  |         |
| LM8P20D                                | TO-252  |         |

| Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted |                |          |         |        |        |                  |
|----------------------------------------------------------------------------|----------------|----------|---------|--------|--------|------------------|
| Parameter                                                                  | Symbol         | Value    |         |        |        | Unit             |
|                                                                            |                | TO-220   | TO-220F | TO-251 | TO-252 |                  |
| Drain-Source Voltage ( $V_{GS} = 0V$ )                                     | $V_{DSS}$      | -200     |         |        |        | V                |
| Continuous Drain Current                                                   | $I_D$          | -8       |         |        |        | A                |
| Pulsed Drain Current (note1)                                               | $I_{DM}$       | -32      |         |        |        | A                |
| Gate-Source Voltage                                                        | $V_{GSS}$      | $\pm 30$ |         |        |        | V                |
| Single Pulse Avalanche Energy (note2)                                      | $E_{AS}$       | 115      |         |        |        | mJ               |
| Avalanche Current (note1)                                                  | $I_{AS}$       | 5        |         |        |        | A                |
| Repetitive Avalanche Energy (note1)                                        | $E_{AR}$       | 69       |         |        |        | mJ               |
| Power Dissipation ( $T_C = 25^\circ\text{C}$ )                             | $P_D$          | 54       | 83      |        |        | W                |
| Operating Junction and Storage Temperature Range                           | $T_J, T_{stg}$ | -55~+150 |         |        |        | $^\circ\text{C}$ |

| Thermal Resistance                      |            |        |        |        |         |      |
|-----------------------------------------|------------|--------|--------|--------|---------|------|
| Parameter                               | Symbol     | Value  |        |        |         | Unit |
|                                         |            | TO-220 | TO-251 | TO-252 | TO-220F |      |
| Thermal Resistance, Junction-to-Case    | $R_{thJC}$ | 2.3    | 1.5    |        |         | K/W  |
| Thermal Resistance, Junction-to-Ambient | $R_{thJA}$ | 62.5   | 60     |        |         |      |

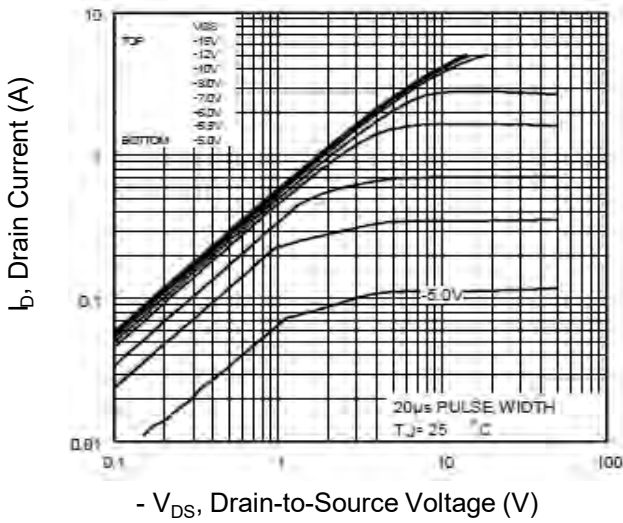
| Specifications $T_J = 25^{\circ}\text{C}$ , unless otherwise noted |               |                                                           |       |      |           |          |
|--------------------------------------------------------------------|---------------|-----------------------------------------------------------|-------|------|-----------|----------|
| Parameter                                                          | Symbol        | Test Conditions                                           | Value |      |           | Unit     |
|                                                                    |               |                                                           | Min.  | Typ. | Max.      |          |
| <b>Static</b>                                                      |               |                                                           |       |      |           |          |
| Drain-Source Breakdown Voltage                                     | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = -250\mu A$                            | -200  | --   | --        | V        |
| Zero Gate Voltage Drain Current                                    | $I_{DSS}$     | $V_{DS} = -200V, V_{GS} = 0V, T_J = 25^{\circ}\text{C}$   | --    | --   | 1         | $\mu A$  |
| Gate-Source Leakage                                                | $I_{GSS}$     | $V_{GS} = \pm 30V$                                        | --    | --   | $\pm 100$ | nA       |
| Gate-Source Threshold Voltage                                      | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = -250\mu A$                        | -4.0  | --   | -2.0      | V        |
| Drain-Source On-Resistance (Note3)                                 | $R_{DS(on)}$  | $V_{GS} = -10V, I_D = -4.0A$                              | --    | 0.4  | 0.75      | $\Omega$ |
| <b>Dynamic</b>                                                     |               |                                                           |       |      |           |          |
| Input Capacitance                                                  | $C_{iss}$     | $V_{GS} = 0V,$<br>$V_{DS} = -25V,$<br>$f = 1.0\text{MHz}$ | --    | 503  | --        | pF       |
| Output Capacitance                                                 | $C_{oss}$     |                                                           | --    | 104  | --        |          |
| Reverse Transfer Capacitance                                       | $C_{rss}$     |                                                           | --    | 59   | --        |          |
| Total Gate Charge                                                  | $Q_g$         | $V_{DD} = -160V, I_D = -8A,$<br>$V_{GS} = -10V$           | --    | 31   | --        | nC       |
| Gate-Source Charge                                                 | $Q_{gs}$      |                                                           | --    | 3.3  | --        |          |
| Gate-Drain Charge                                                  | $Q_{gd}$      |                                                           | --    | 16.5 | --        |          |
| Turn-on Delay Time                                                 | $t_{d(on)}$   | $V_{DD} = -100V, I_D = -8A,$<br>$R_G = 25\Omega$          | --    | 35   | --        | ns       |
| Turn-on Rise Time                                                  | $t_r$         |                                                           | --    | 20   | --        |          |
| Turn-off Delay Time                                                | $t_{d(off)}$  |                                                           | --    | 150  | --        |          |
| Turn-off Fall Time                                                 | $t_f$         |                                                           | --    | 36   | --        |          |
| <b>Drain-Source Body Diode Characteristics</b>                     |               |                                                           |       |      |           |          |
| Continuous Body Diode Current                                      | $I_S$         | $T_C = 25^{\circ}\text{C}$                                | --    | --   | -8        | A        |
| Pulsed Diode Forward Current                                       | $I_{SM}$      |                                                           | --    | --   | -32       |          |
| Body Diode Voltage                                                 | $V_{SD}$      | $T_J = 25^{\circ}\text{C}, I_{SD} = 4.0A, V_{GS} = 0V$    | --    | --   | 1.4       | V        |

**Notes**

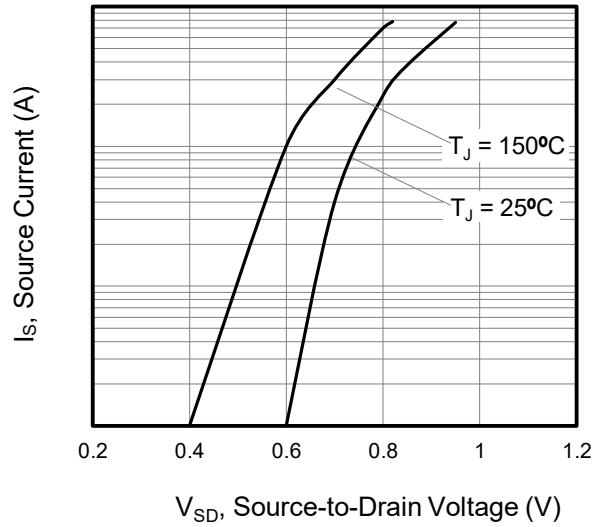
1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $L = 10\text{mH}, V_{DD} = 30V, R_G = 25\Omega, \text{Starting } T_J = 25^{\circ}\text{C}$
3. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 1\%$

## Typical Characteristics $T_J = 25^\circ\text{C}$ , unless otherwise noted

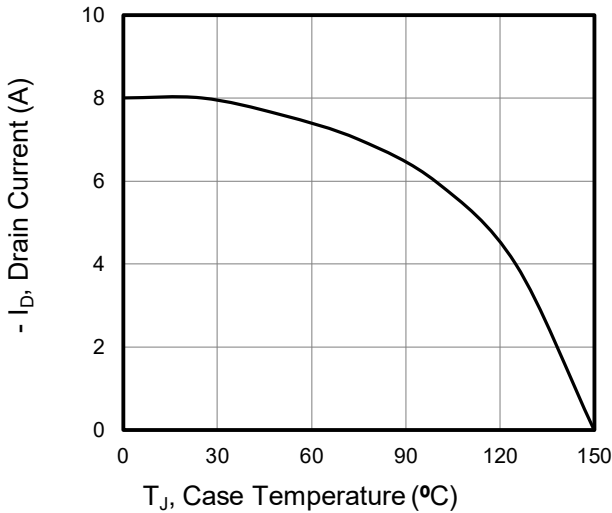
**Figure 1. Output Characteristics ( $T_J = 25^\circ\text{C}$ )**



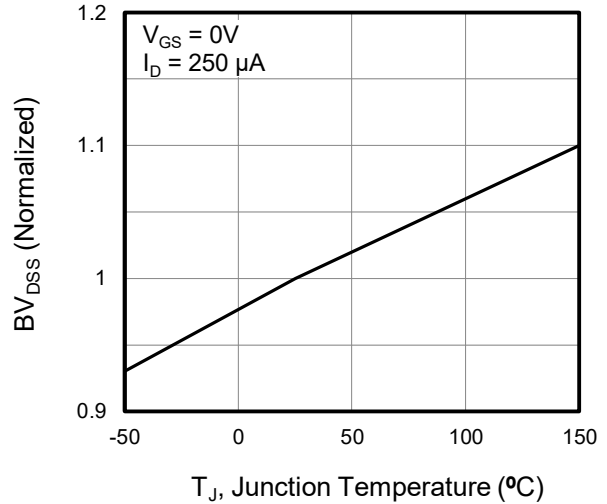
**Figure 2. Body Diode Forward Voltage**



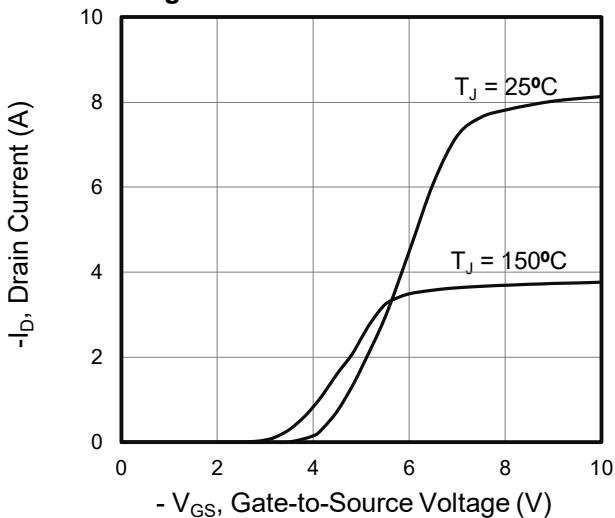
**Figure 3. Drain Current vs. Temperature**



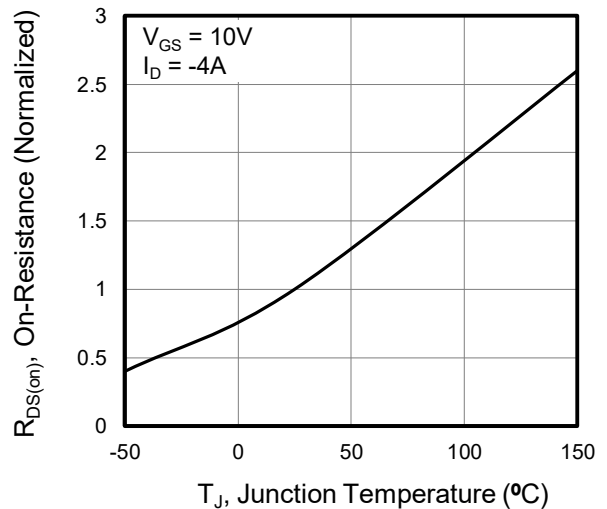
**Figure 4.  $BV_{DSS}$  Variation vs. Temperature**



**Figure 5. Transfer Characteristics**

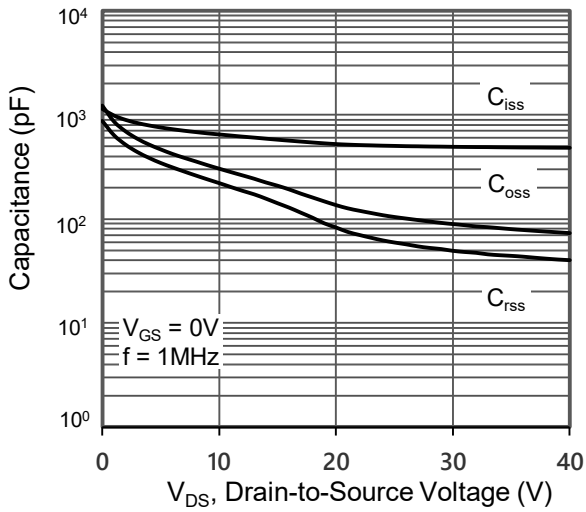


**Figure 6. On-Resistance vs. Temperature**

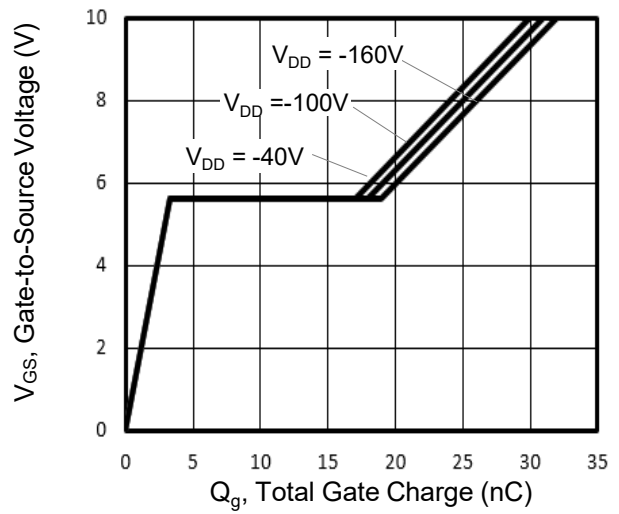


**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

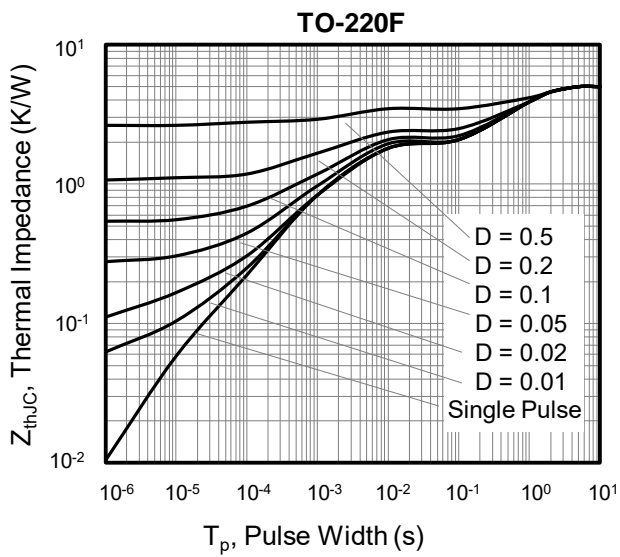
**Figure 7. Capacitance**



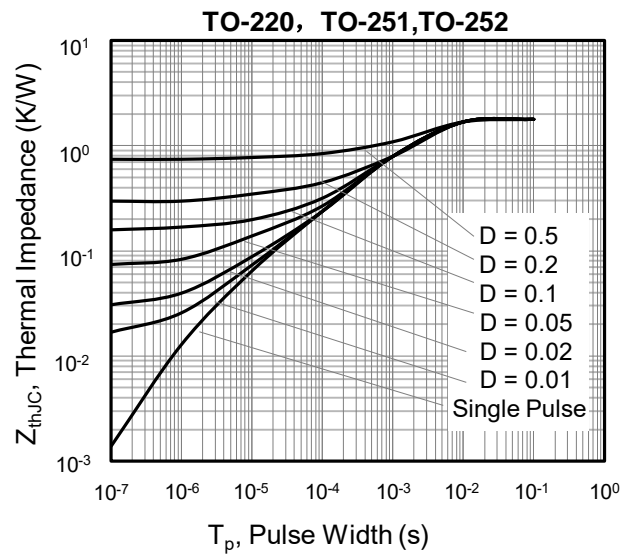
**Figure 8. Gate Charge**



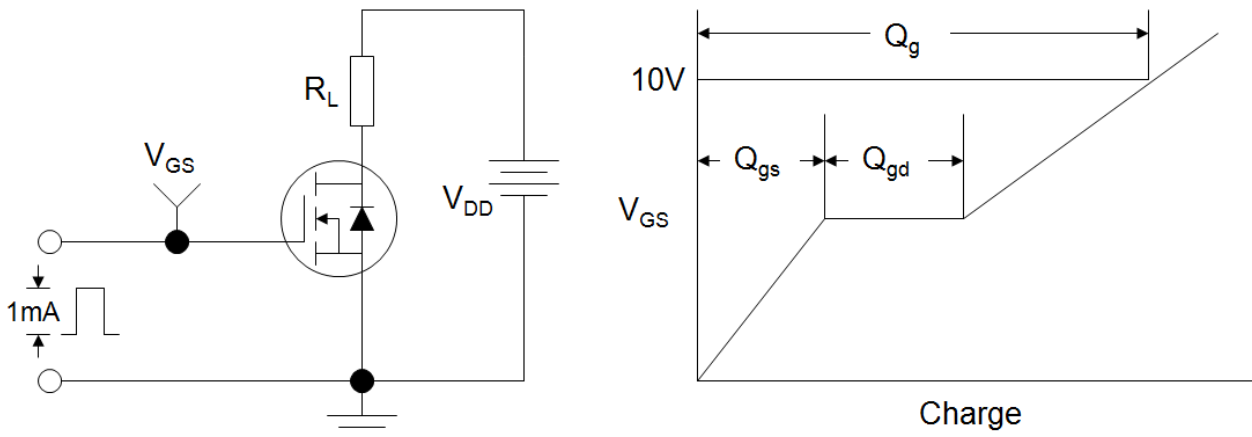
**Figure 9. Transient Thermal Impedance**



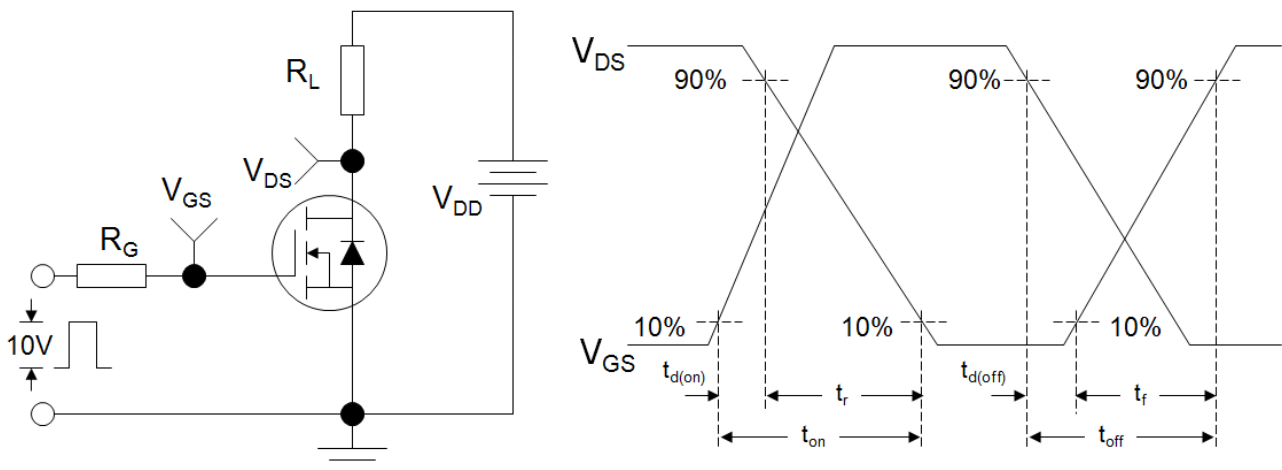
**Figure 10. Transient Thermal Impedance**



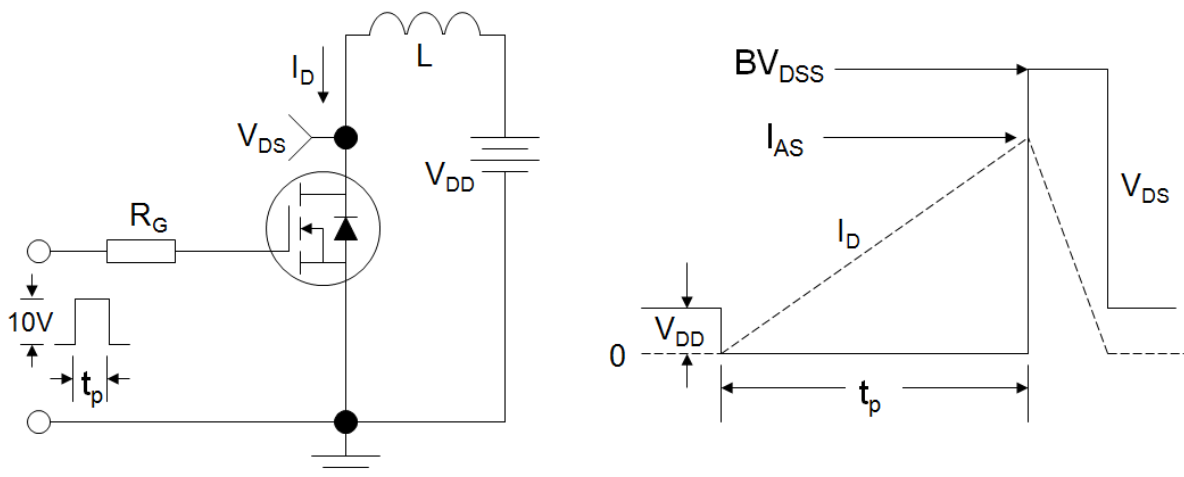
**Figure A: Gate Charge Test Circuit and Waveform**



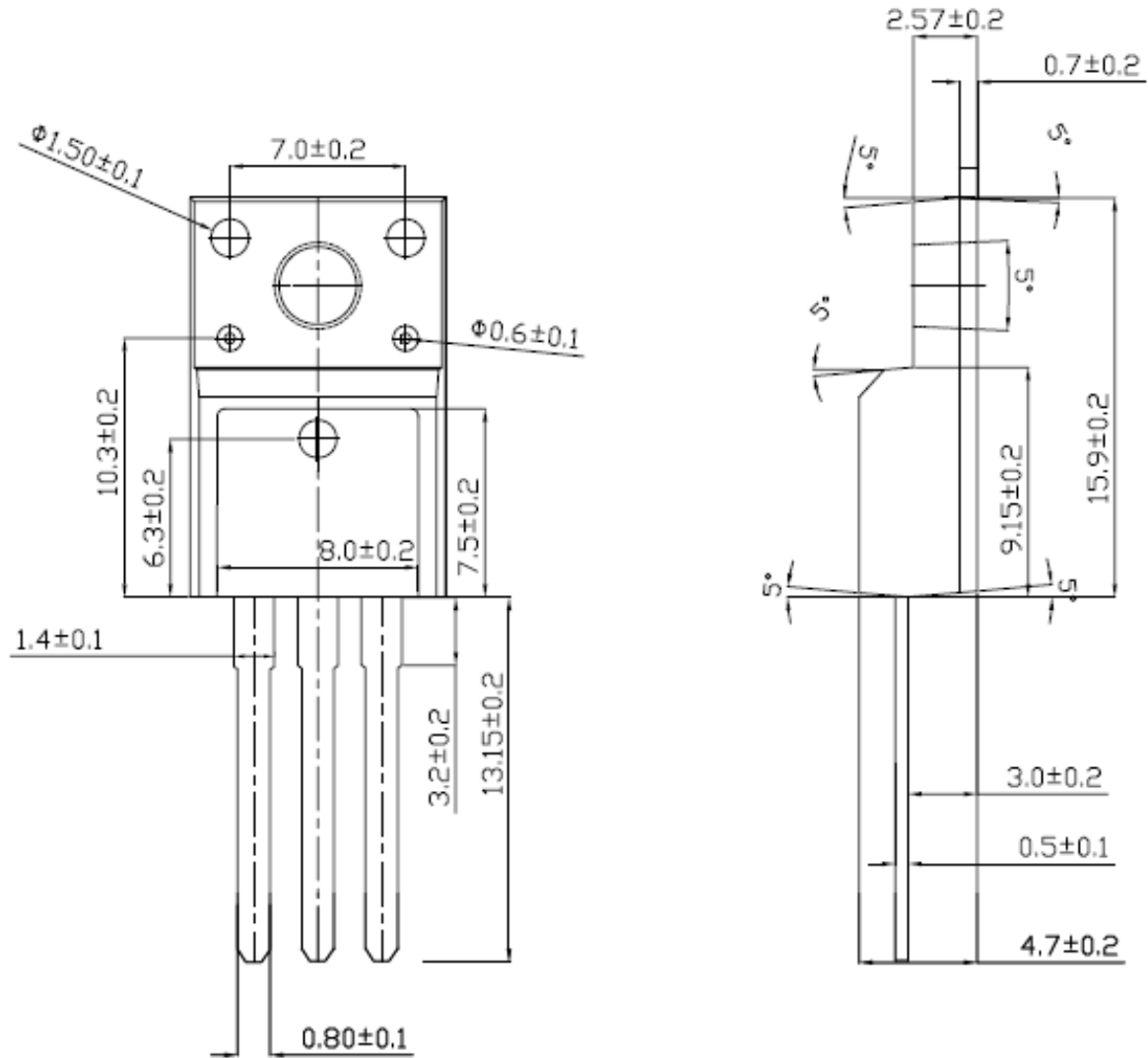
**Figure B: Resistive Switching Test Circuit and Waveform**



**Figure C: Unclamped Inductive Switching Test Circuit and Waveform**

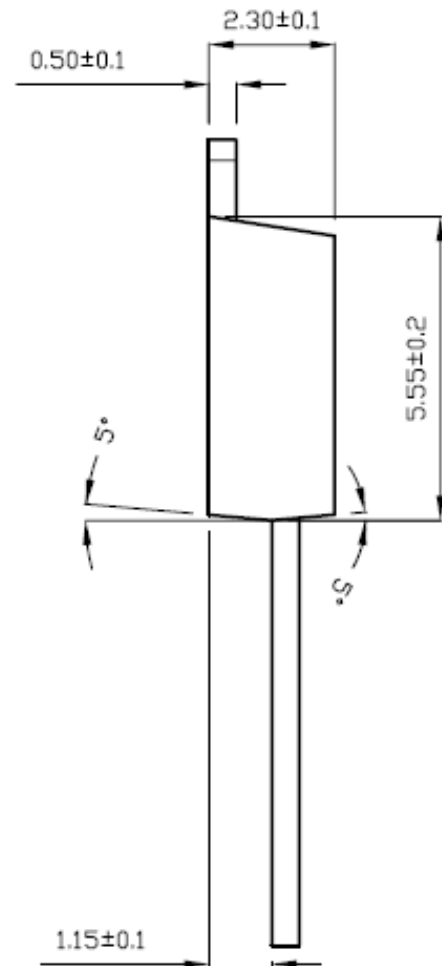
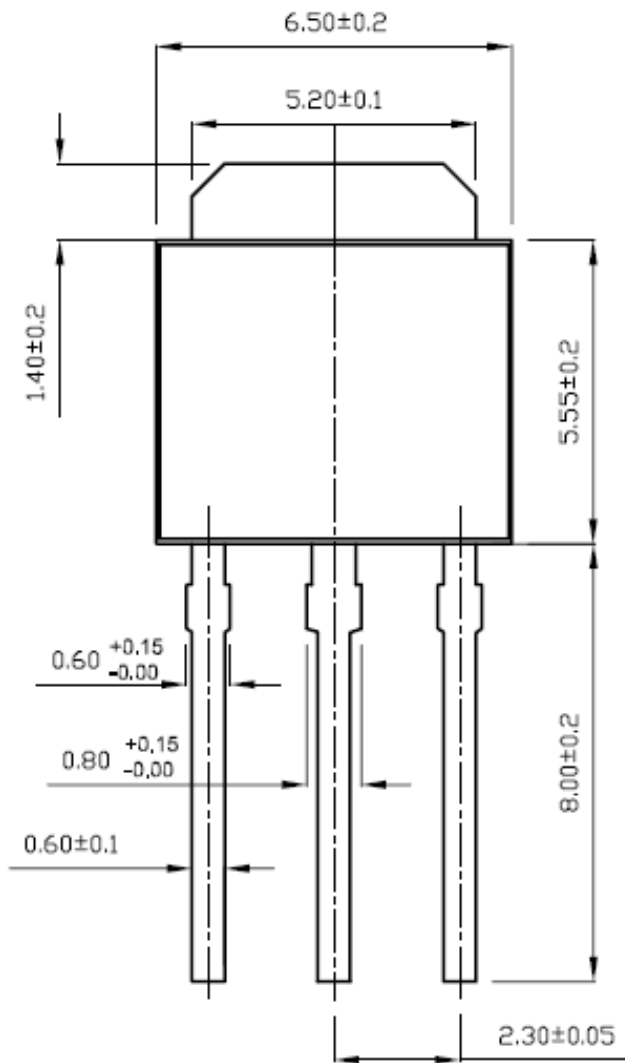


TO-220F





# TO-251





TO-252

