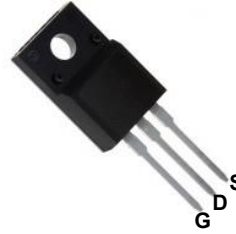
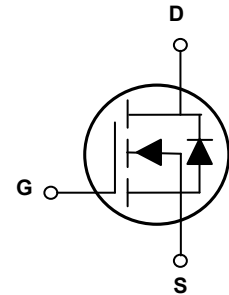


### Main Product Characteristics

|              |               |
|--------------|---------------|
| $BV_{DSS}$   | 650V          |
| $R_{DS(ON)}$ | 140m $\Omega$ |
| $I_D$        | 28A           |



TO-220F



Schematic Diagram

### Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



### Description

The GSJU6528 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supply and a wide variety of other applications.

### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise specified)

| Parameter                                                         | Symbol          | Max.        | Unit                      |
|-------------------------------------------------------------------|-----------------|-------------|---------------------------|
| Drain-Source Voltage ( $V_{GS}=0V$ )                              | $V_{DS}$        | 650         | V                         |
| Gate-Source Voltage ( $V_{DS}=0V$ ) AC ( $f>1$ Hz)                | $V_{GS}$        | $\pm 30$    | V                         |
| Drain Current-Continuous ( $T_C=25^\circ\text{C}$ ) <sup>3</sup>  | $I_D$           | 28          | A                         |
| Drain Current-Continuous ( $T_C=100^\circ\text{C}$ ) <sup>3</sup> |                 | 18          |                           |
| Drain Current-Pulsed <sup>1,3</sup>                               | $I_{DM}$        | 112         | A                         |
| Single Pulse Avalanche Energy <sup>2</sup>                        | $E_{AS}$        | 676         | mJ                        |
| Repetitive Avalanche Energy, $t_{AR}$ Limited by $T_{jmax}^1$     | $E_{AR}$        | 3.2         | mJ                        |
| Avalanche Current <sup>2</sup>                                    | $I_{AR}$        | 5.2         | A                         |
| Maximum Power Dissipation ( $T_C=25^\circ\text{C}$ )              | $P_D$           | 35          | W                         |
| Maximum Power Dissipation-Derate above $25^\circ\text{C}$         |                 | 0.28        |                           |
| Drain Source Voltage Slope, $V_{DS} \leq 480V$ ,                  | $dv/dt$         | 50          | V/ns                      |
| Reverse Diode $dv/dt$ , $V_{DS} \leq 480V$ , $I_{SD} < I_D$       | $dv/dt$         | 50          | V/ns                      |
| Thermal Resistance, Junction-to-Ambient                           | $R_{\theta JA}$ | 80          | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case                              | $R_{\theta JC}$ | 3.57        | $^\circ\text{C}/\text{W}$ |
| Operating Junction Temperature Range                              | $T_J$           | -55 To +150 | $^\circ\text{C}$          |
| Storage Temperature Range                                         | $T_{STG}$       | -55 To +150 | $^\circ\text{C}$          |

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

| Parameter                                     | Symbol       | Conditions                                                  | Min. | Typ. | Max.      | Unit       |
|-----------------------------------------------|--------------|-------------------------------------------------------------|------|------|-----------|------------|
| <b>On/Off Characteristics</b>                 |              |                                                             |      |      |           |            |
| Drain-Source Breakdown Voltage                | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                                   | 650  | -    | -         | V          |
| Zero Gate Drain-Source Leakage Current        | $I_{DSS}$    | $V_{DS}=650V, V_{GS}=0V, T_C=25^\circ\text{C}$              | -    | -    | 3         | $\mu A$    |
|                                               |              | $V_{DS}=650V, V_{GS}=0V, T_C=125^\circ\text{C}$             | -    | -    | 100       | $\mu A$    |
| Gate-Body Leakage Current                     | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                                 | -    | -    | $\pm 100$ | nA         |
| Static Drain-Source On-Resistance             | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=14A$                                       | -    | 110  | 140       | m $\Omega$ |
| Gate Threshold Voltage                        | $V_{GS(th)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$                               | 3    | 3.5  | 4         | V          |
| <b>Dynamic and Switching Characteristics</b>  |              |                                                             |      |      |           |            |
| Total Gate Charge                             | $Q_g$        | $V_{DS}=480V, I_D=28A, V_{GS}=10V$                          | -    | 37.5 | -         | nC         |
| Gate-Source Charge                            | $Q_{gs}$     |                                                             | -    | 13.0 | -         |            |
| Gate-Drain Charge                             | $Q_{gd}$     |                                                             | -    | 11.5 | -         |            |
| Turn-On Delay Time                            | $t_{d(on)}$  | $V_{DD}=380V, R_G=2.3\Omega, V_{GS}=10V, I_D=14A$           | -    | 14   | -         | nS         |
| Turn-On Rise Time                             | $t_r$        |                                                             | -    | 12   | -         |            |
| Turn-Off Delay Time                           | $t_{d(off)}$ |                                                             | -    | 65   | -         |            |
| Turn-Off Fall Time                            | $t_f$        |                                                             | -    | 11   | -         |            |
| Input Capacitance                             | $C_{iss}$    | $V_{DS}=50V, V_{GS}=0V, F=1\text{MHz}$                      | -    | 2070 | -         | pF         |
| Output Capacitance                            | $C_{oss}$    |                                                             | -    | 120  | -         |            |
| Effective Output Capacitance, Energy Related  | $C_{o(er)}$  | $V_{GS}=0V, V_{DS}=0 \text{ to } 480V$                      | -    | 60   | -         |            |
| Effective Output Capacitance, Time Related    | $C_{o(tr)}$  | $I_D=\text{constant}, V_{GS}=0V, V_{DS}=0 \text{ to } 480V$ | -    | 311  | -         |            |
| <b>Source- Drain Diode Characteristics</b>    |              |                                                             |      |      |           |            |
| Source-Drain Current (Body Diode)             | $I_{SD}$     | $T_C=25^\circ\text{C}$                                      | -    | -    | 28        | A          |
| Pulsed Source-Drain Current (Body Diode)      | $I_{SDM}$    |                                                             | -    | -    | 112       | A          |
| Forward on Voltage ( $T_J=25^\circ\text{C}$ ) | $V_{SD}$     | $V_{GS}=0V, I_{SD}=28A$                                     | -    | 0.9  | 1.2       | V          |
| Reverse Recovery Time                         | $t_{rr}$     | $I_F=14A, di/dt=100A/\mu s, T_J=25^\circ\text{C}$           | -    | 190  | -         | nS         |
| Reverse Recovery Charge                       | $Q_{rr}$     |                                                             | -    | 2    | -         | $\mu C$    |
| Peak Reverse Recovery Current                 | $I_{rrm}$    |                                                             | -    | 21   | -         | A          |

Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=50V, V_G=10V, R_G=25\Omega$ , starting  $T_J=25^\circ\text{C}$ .
3. Limited by maximum junction temperature

### Typical Electrical and Thermal Characteristic Curves

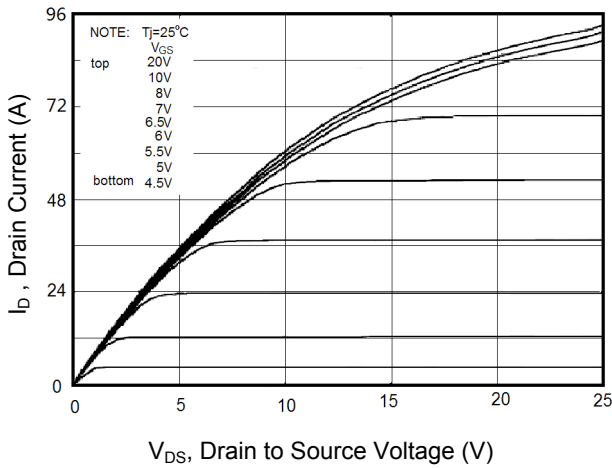


Figure 1. Output Characteristics

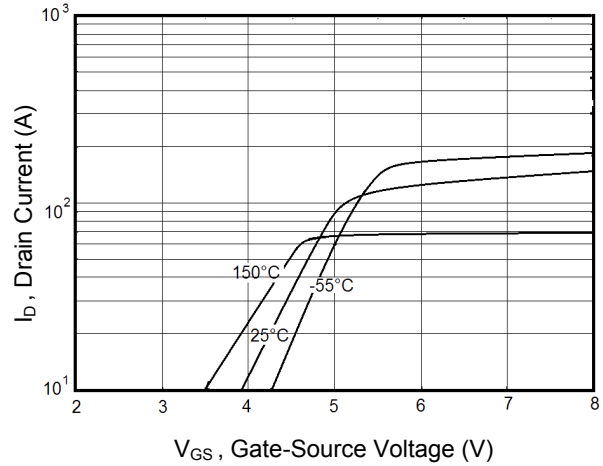


Figure 2. Transfer Characteristics

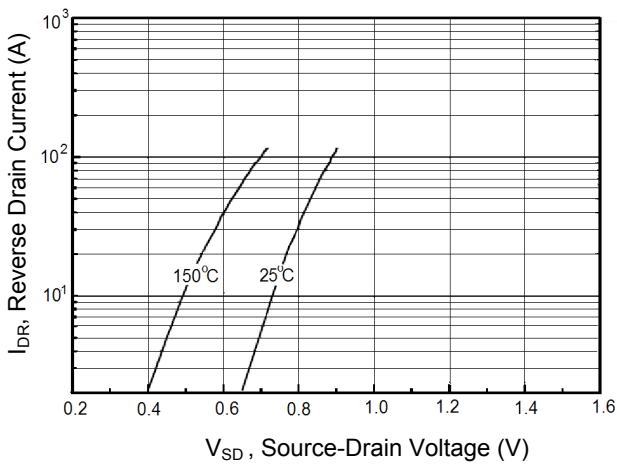


Figure 3. Source-Drain Diode Forward Voltage

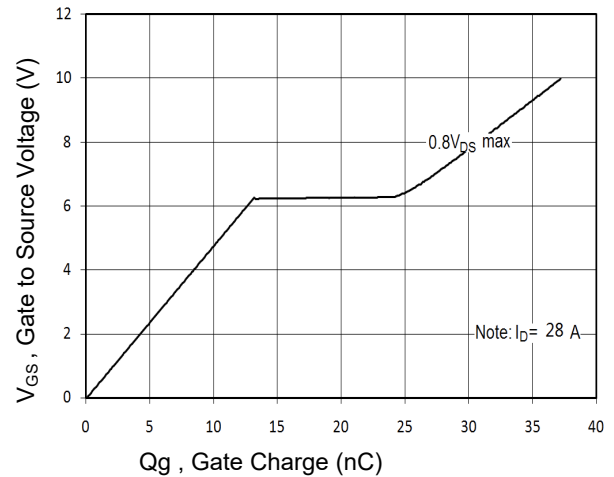


Figure 4. Gate Charge Waveform

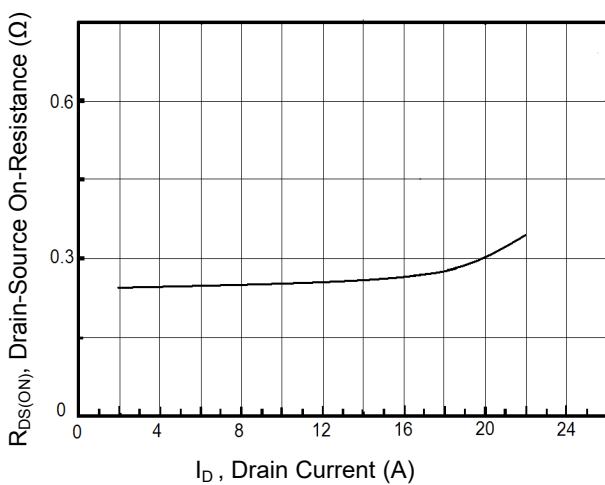


Figure 5. Static Drain-Source on Resistance

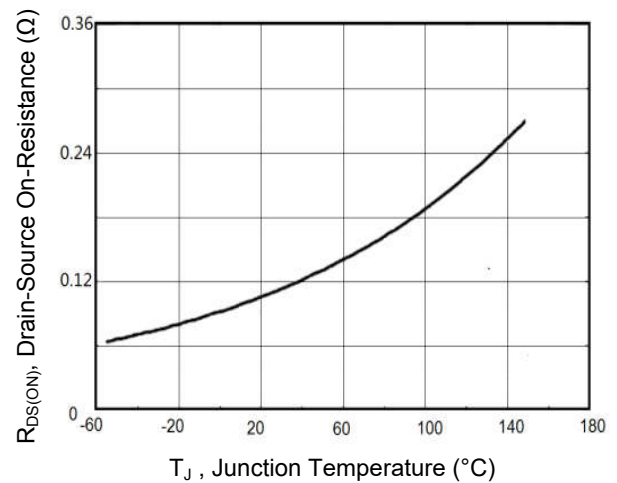
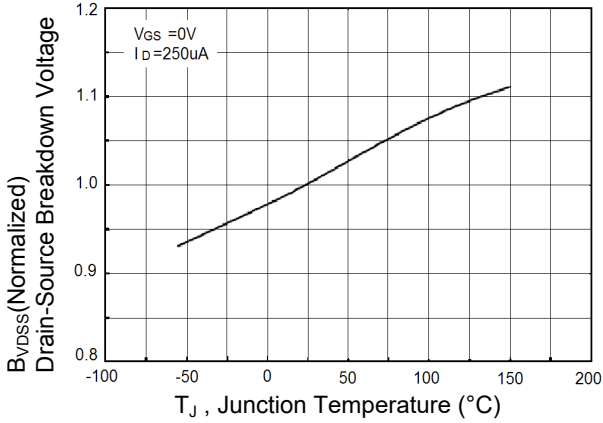
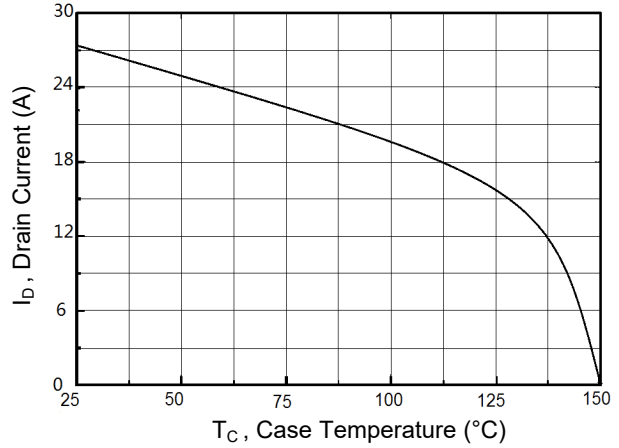


Figure 6.  $R_{DS(ON)}$  vs Junction Temperature

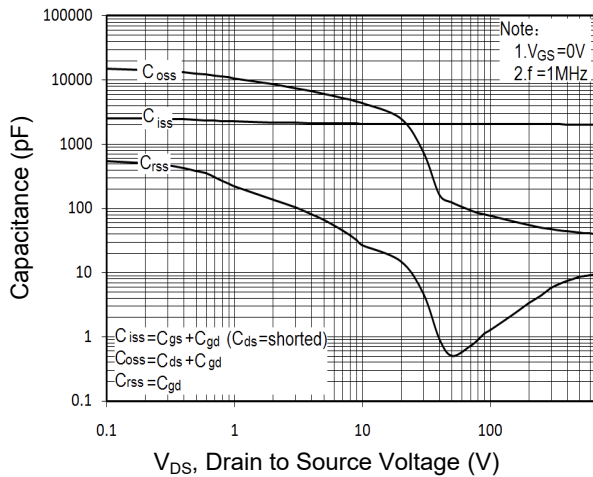
**Typical Electrical and Thermal Characteristic Curves**



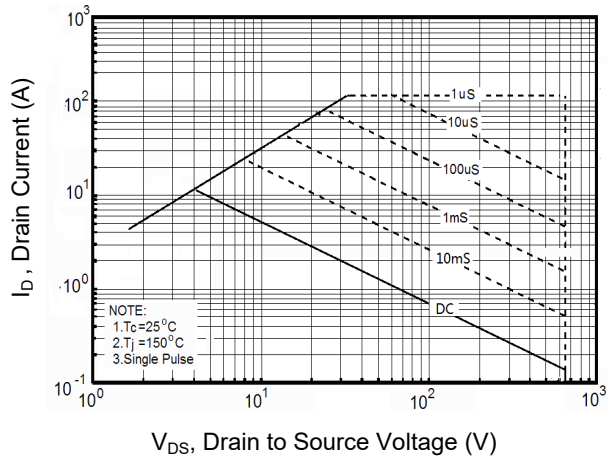
**Figure 7.  $BV_{DSS}$  vs Junction Temperature**



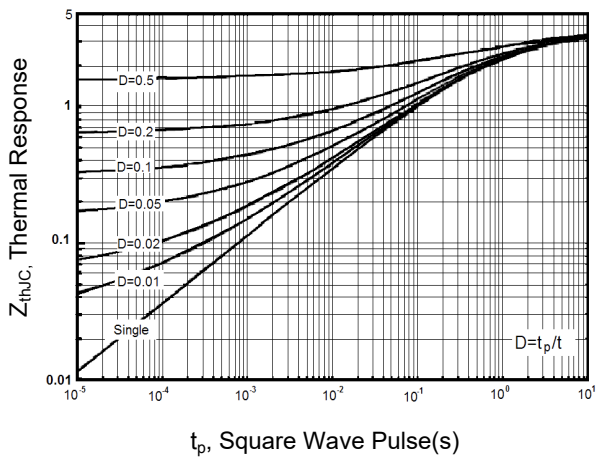
**Figure 8. Drain Current vs.  $T_C$**



**Figure 9. Capacitance**

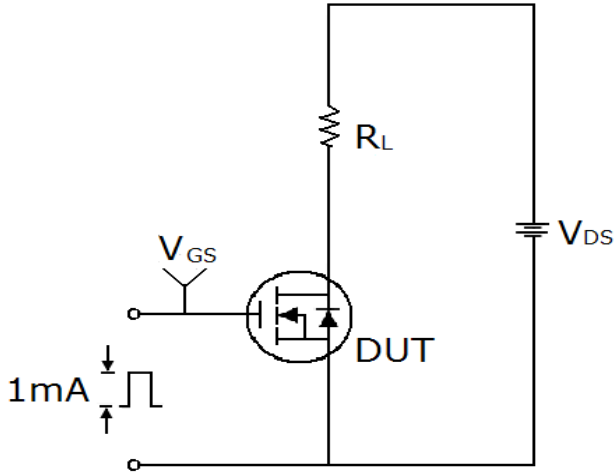


**Figure 10. Safe Operation Area**

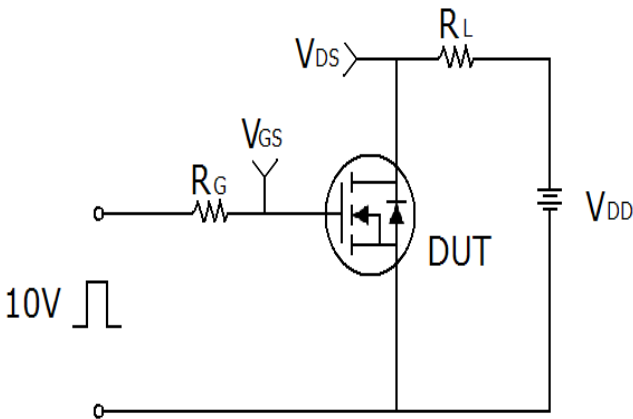
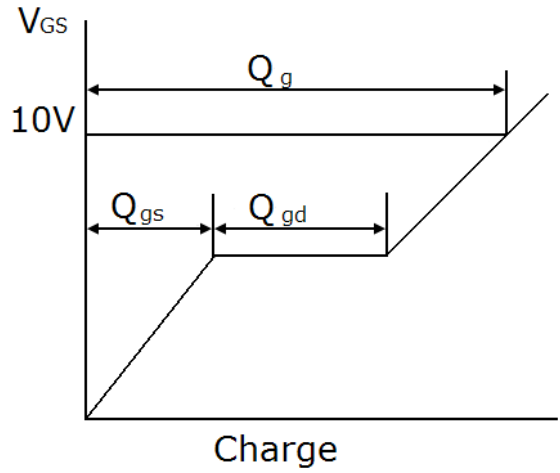


**Figure 11. Transient Thermal Impedance**

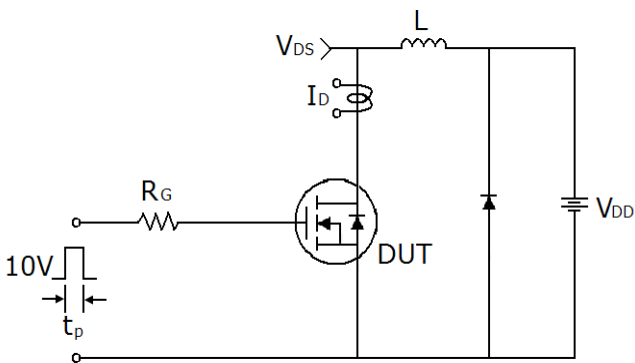
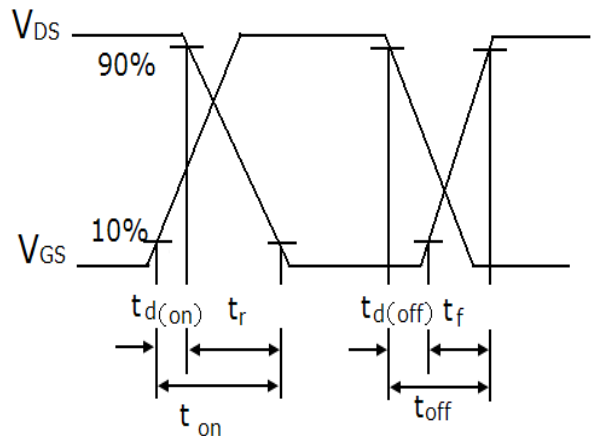
**Typical Electrical and Thermal Characteristic Curves**



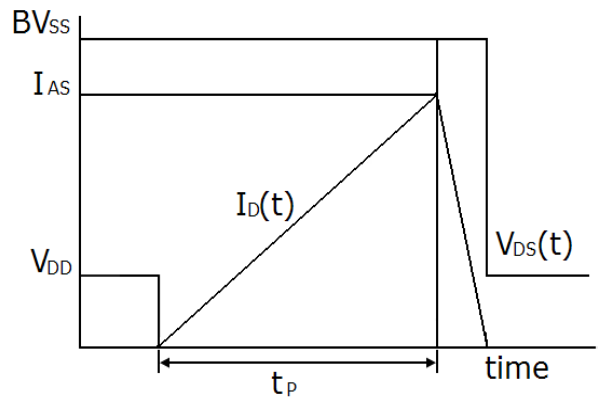
**Figure 12. Gate Charge Test Circuit & Waveform**



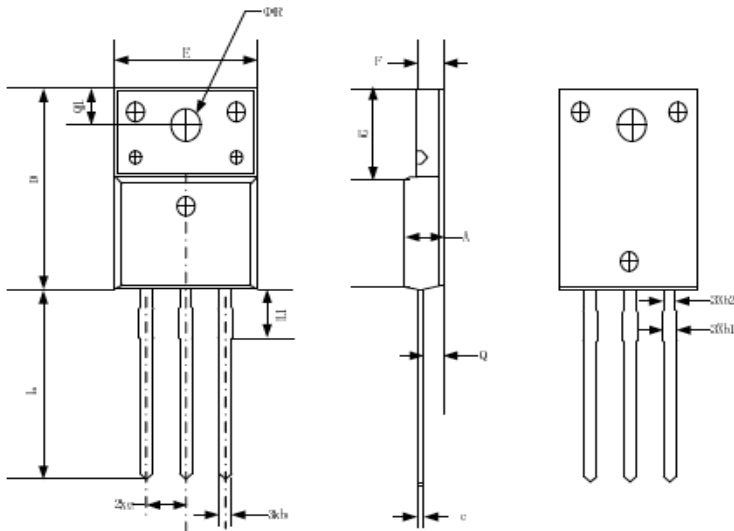
**Figure 13. Switching Time Waveform**



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



## Package Outline Dimensions (TO-220F)



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |      |
|--------|---------------------------|-------|----------------------|------|
|        | Min.                      | Max.  | Min.                 | Max. |
| A      | 4.50                      | 4.83  | 0.18                 | 0.19 |
| b      | 0.70                      | 0.91  | 0.03                 | 0.04 |
| b1     | 1.20                      | 1.47  | 0.05                 | 0.06 |
| b2     | 1.10                      | 1.38  | 0.04                 | 0.05 |
| c      | 0.45                      | 0.63  | 0.02                 | 0.02 |
| D      | 15.67                     | 16.07 | 0.62                 | 0.63 |
| e      | 2.54 BSC                  |       | 0.10 BSC             |      |
| E      | 9.96                      | 10.36 | 0.39                 | 0.41 |
| F      | 2.34                      | 2.74  | 0.09                 | 0.11 |
| G      | 6.48                      | 6.90  | 0.26                 | 0.27 |
| L      | 12.68                     | 13.30 | 0.50                 | 0.52 |
| L1     | 3.13                      | 3.50  | 0.12                 | 0.14 |
| Q      | 2.56                      | 2.93  | 0.10                 | 0.12 |
| Q1     | 3.20                      | 3.40  | 0.13                 | 0.13 |
| ΦR     | 3.08                      | 3.28  | 0.12                 | 0.13 |