

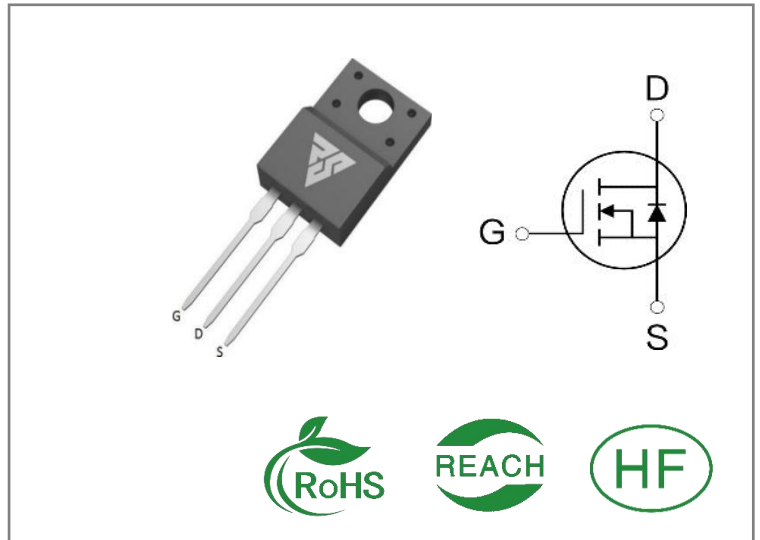
| ID | $R_{DS(ON)}$ (Typ) | VDSS |
|----|--------------------|------|
| 6A | 1.7Ω | 900V |

Applications:

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

Features:

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



Ordering Information

| Part Number | Package | Marking | Packing | Qty. |
|-------------|---------|---------|---------|--------|
| RS6N90F | T0-220F | RS6N90F | Tube | 50 PCS |

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

| Symbol | Parameter | RS6N90F | Units |
|-------------|--|------------|-------|
| VDSS | Drain-to-Source Voltage | 900 | V |
| ID | Continuous Drain Current $T_C = 25^\circ\text{C}$ | 6 | A |
| IDM | Pulsed Drain Current (Note*1) | 24 | |
| PD | Power Dissipation | 54 | W |
| VGS | Gate- to- Source Voltage | ±30 | V |
| EAS | Single Pulse Avalanche Energy L = 10mH, VDD = 50V, RG = 25 Ω | 180 | mJ |
| TL TPKG | Maximum Temperature for Soldering | 300 | °C |
| | Leads at 0.063in(1.6mm)from Case for 10 seconds Package Body for 10 seconds | 260 | |
| TJ and TSTG | Operating Junction and Storage Temperature Range | -55 to 150 | |

* Drain Current Limited by Maximum Junction Temperature

Caution: Stresses greater than those listed in the " Absolute Maximum Ratings" Table may cause permanent damage to the device.

Thermal Resistance

| Symbol | Parameter | RS6N90F | Units | Test Conditions |
|---------------|----------------------|---------|-------------------------------|---|
| R θ JC | Junction-to-Case | 2.3 | $^{\circ}\text{C} / \text{W}$ | Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 1 5 0 $^{\circ}\text{C}$ |
| R θ JA | Junction-to- Ambient | 62.5 | | 1 cubic foot chamber,free air. |

OFF Characteristics TJ= 25 $^{\circ}\text{C}$ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|--------|-------------------------------------|------|------|------|---------------|-----------------------------|
| BVDSS | Drain- to- source Breakdown Voltage | 900 | -- | -- | V | VGS=0V,ID=250 μA |
| IDSS | Drain- to- Source Leakage Current | -- | -- | 1 | μA | VDS=900V,VGS=0 V |
| IGSS | Gate- to- Source Forward Leakage | -- | -- | 100 | nA | VGS=30V ,VDS=0V |
| | Gate- to- Source Reverse Leakage | -- | -- | -100 | | VGS=-30V ,VDS=0 V |

ON Characteristics TJ=25 $^{\circ}\text{C}$ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---------|--|------|------|------|----------|------------------------------|
| RDS(on) | Static Drain- to- Source On-Resistance(Note*2) | -- | 1.7 | 2.05 | Ω | VGS=10V,ID=3A |
| VGS(TH) | Gate Threshold Voltage | 3 | -- | 4 | V | VGS=VDS,ID=250 μA |

Resistive Switching Characteristics Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---------|----------------------|------|------|------|-------|-------------------------------------|
| td(ON) | Turn- on Delay Time | -- | 43 | -- | nS | VDS=450V ID=6A RG=25 Ω |
| trise | Rise Time | -- | 26 | -- | | |
| td(OFF) | Turn- OFF Delay Time | -- | 208 | -- | | |
| tfall | Fall Time | -- | 47 | -- | | |

Dynamic Characteristics Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|--------|---------------------------------|------|------|------|-------|-------------------------------|
| Ciss | Input Capacitance | -- | 1215 | -- | pF | VGS=0V VDS=25V f=1.0MHz |
| Coss | Output Capacitance | -- | 115 | -- | | |
| Crss | Reverse Transfer Capacitance | -- | 21 | -- | | |
| Qg | Total Gate Charge | -- | 48 | -- | nC | VDS=720V ID=6A VGS=15V |
| Qgs | Gate- to- Source Charge | -- | 4.8 | -- | | |
| Qgd | Gate-to-Drain(" Miller") Charge | -- | 27 | -- | | |

Source- Drain Diode Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|--------|---------------------------|------|------|------|-------|-----------------------------------|
| IS | Continuous Source Current | -- | -- | 6 | A | Integral pn- diode in MOSFET |
| ISM | Maximum Pulsed Current | -- | -- | 24 | A | |
| VSD | Diode Forward Voltage | -- | -- | 1.4 | V | IS=3A,VGS=0V |
| trr | Reverse Recovery Time | -- | 567 | -- | nS | VGS=0V IS=6A,di/dt=100A/ μs |
| Qrr | Reverse Recovery Charge | -- | 1.6 | -- | μC | |

Notes:

- * 1. Repetitive rating, pulse width limited by maximum junction temperature.
- * 2. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

Typical Feature Curve

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

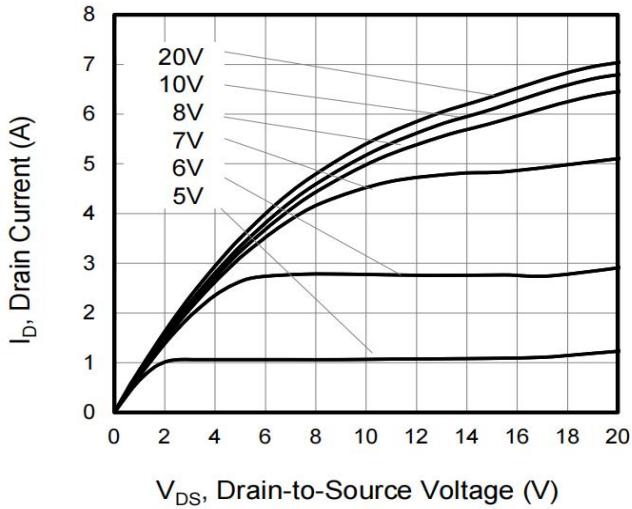


Figure 2. Body Diode Forward Voltage

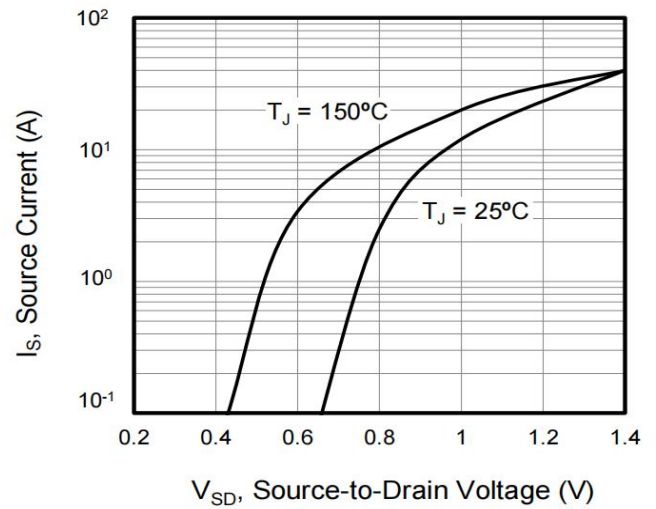


Figure 3. Drain Current vs. Temperature

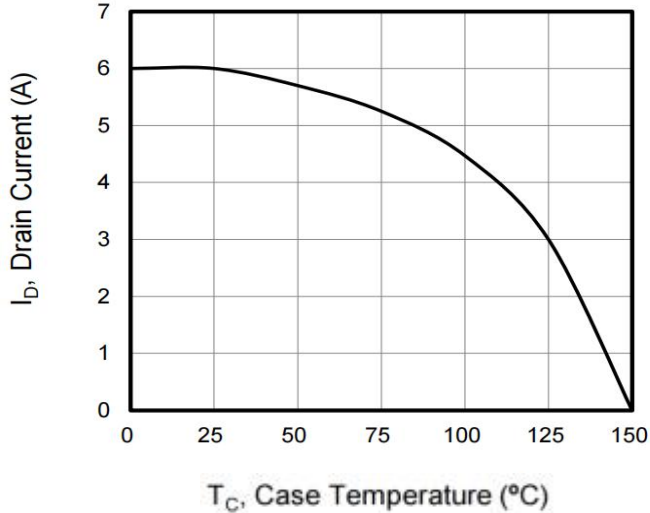


Figure 4. BV_{DSS} Variation vs. Temperature

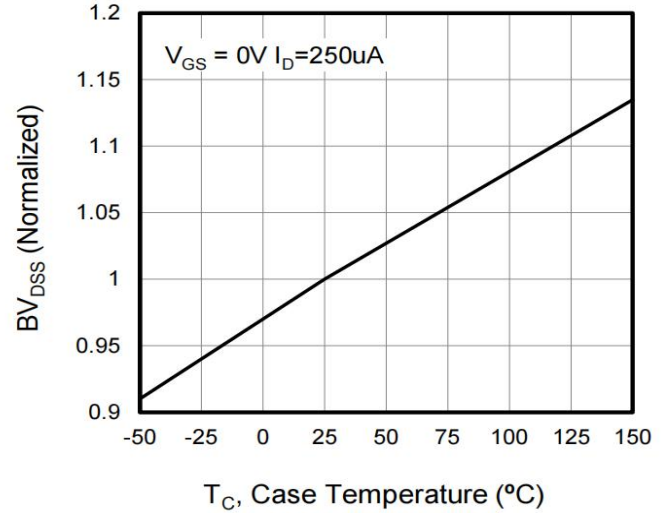


Figure 5. Transfer Characteristics

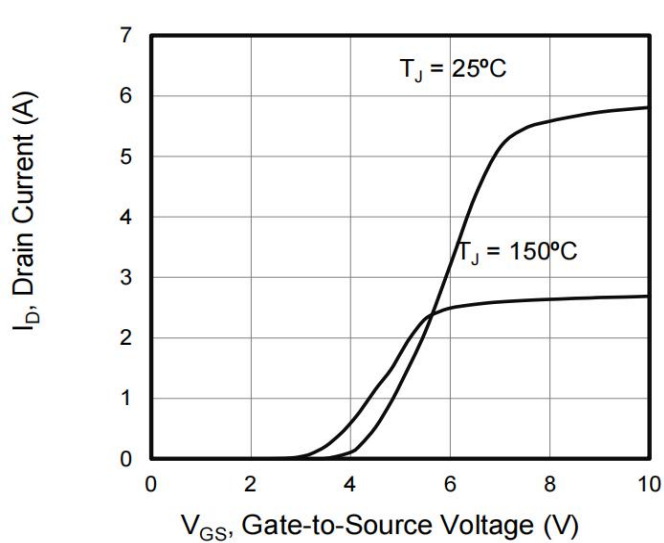


Figure 6. On-Resistance vs. Temperature

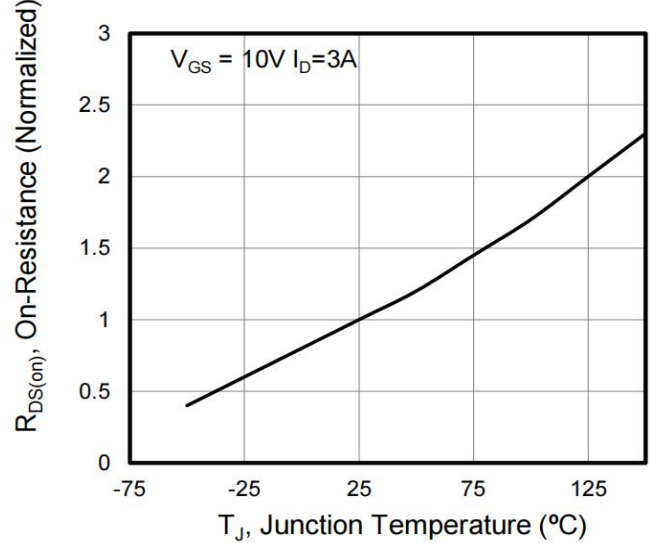


Figure 7. Capacitance

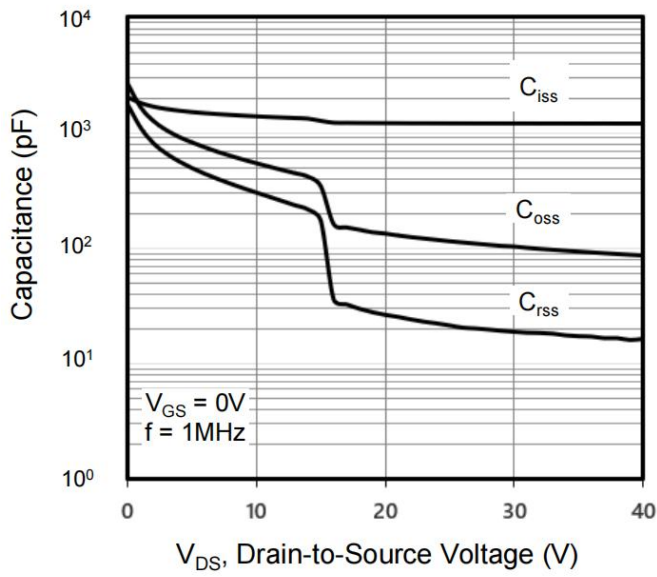


Figure 8. Gate Charge

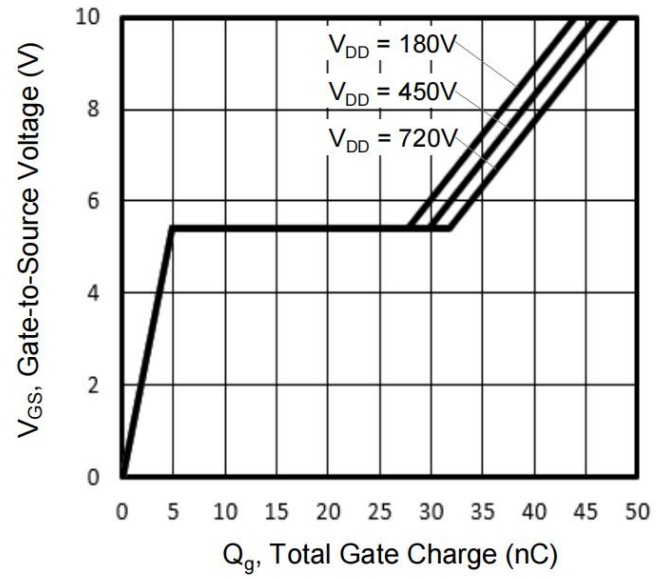
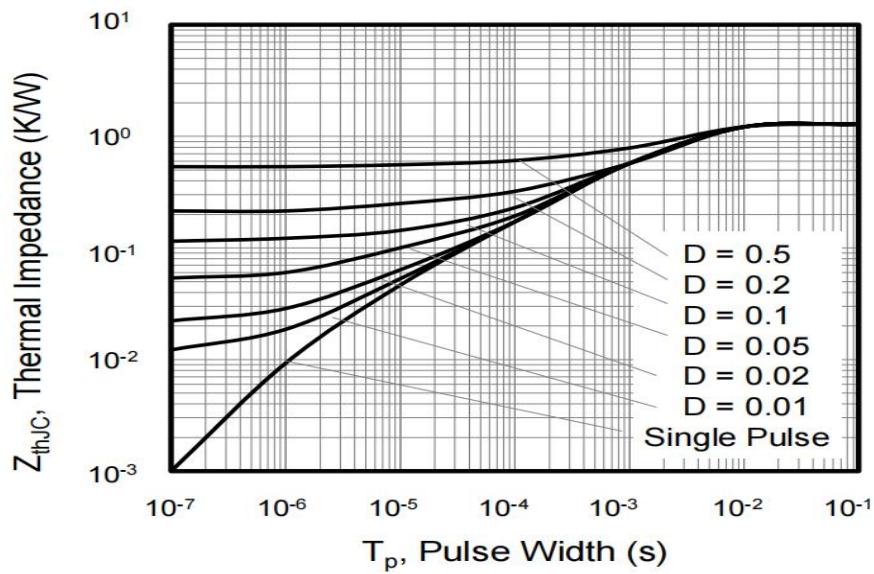


Figure 9. Transient Thermal Impedance



Test Circuits and Waveforms

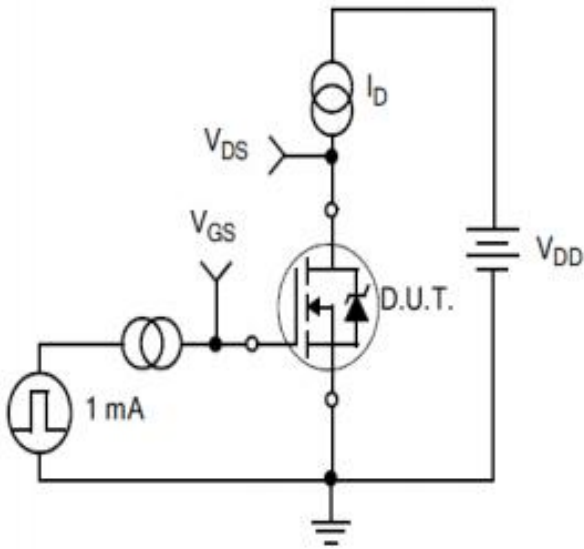


Figure10.
Gate Charge Test Circuit

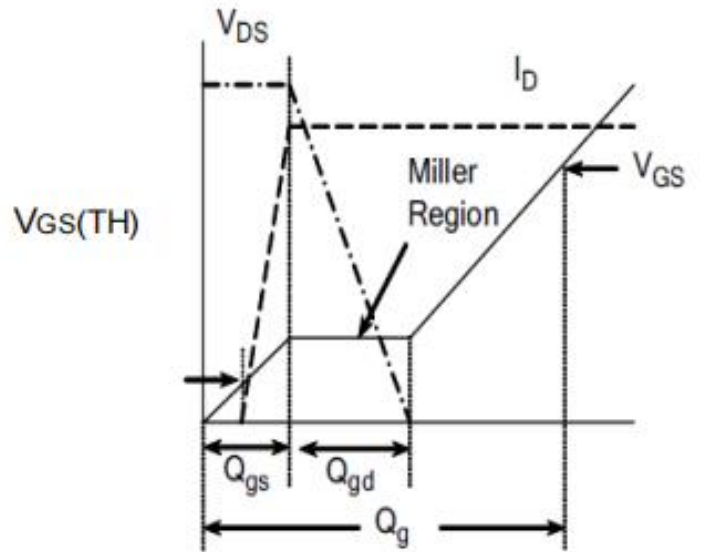


Figure11.
Gate Charge Waveform

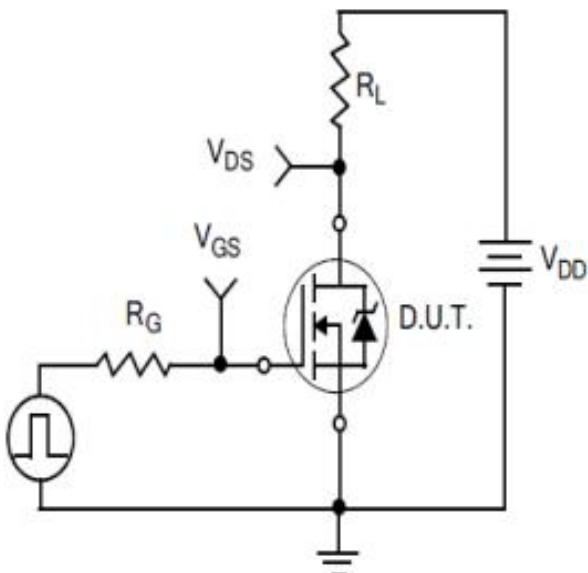


Figure12.
Resistive Switching Test Circuit

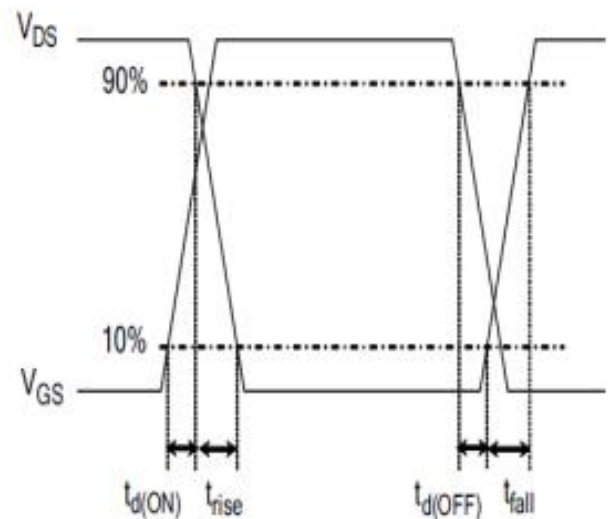


Figure13.
Resistive Switching Waveforms

Test Circuits and Waveforms

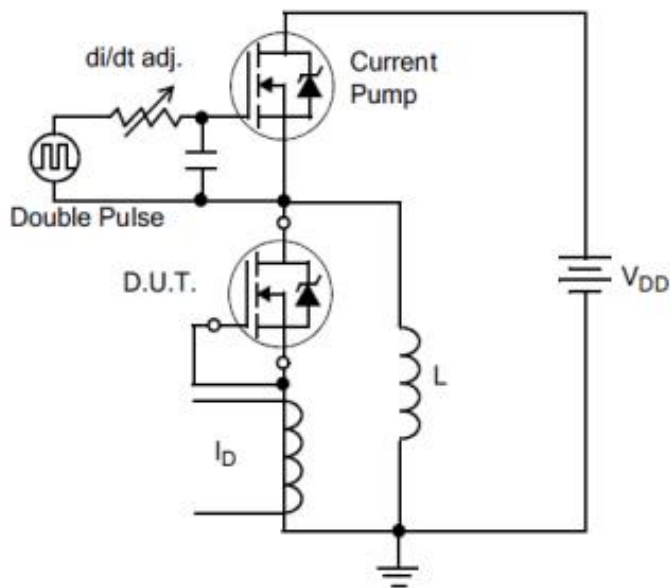


Figure14.Diode Reverse Recovery Test Circuit

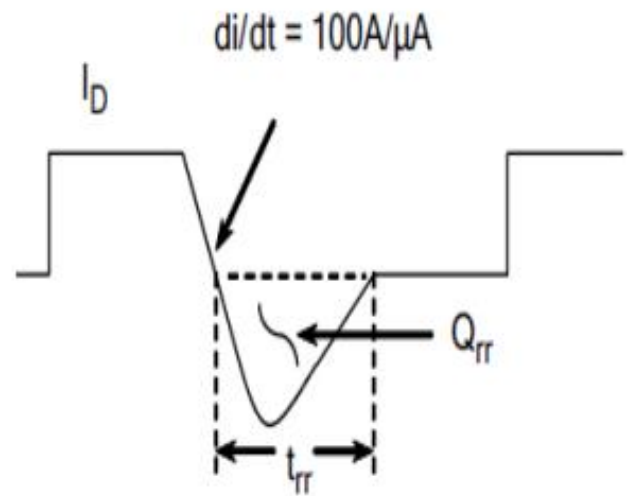


Figure15.Diode Reverse Recovery Waveform

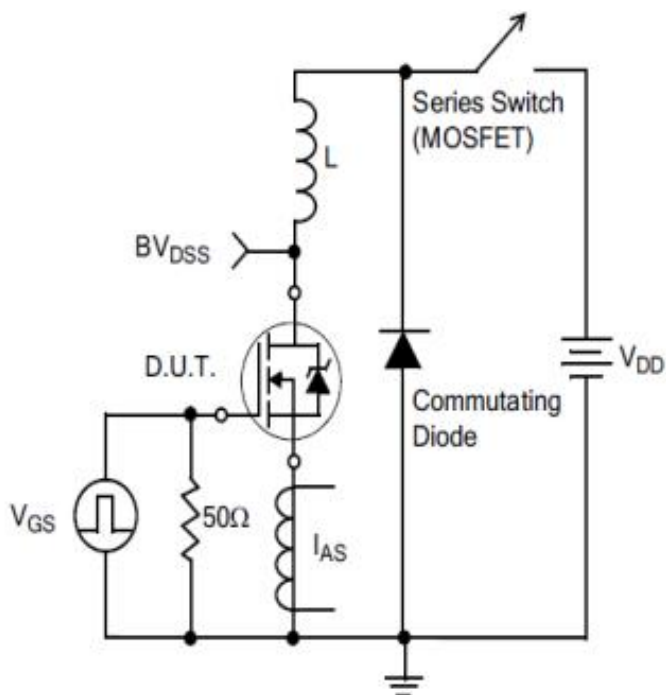
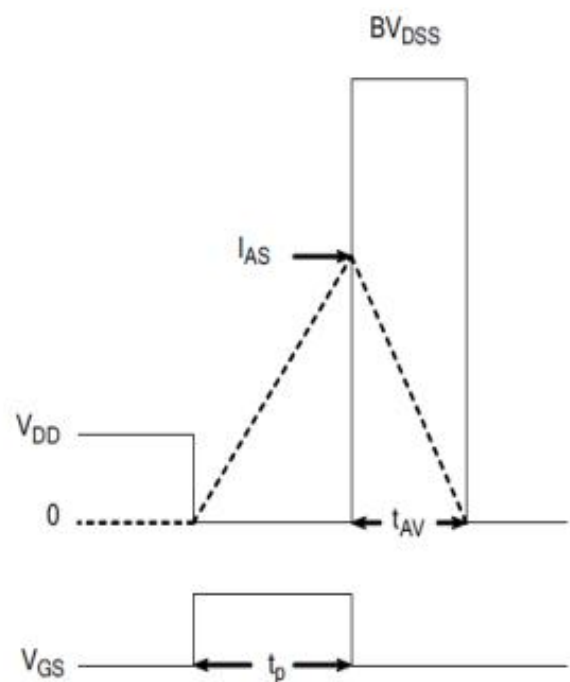


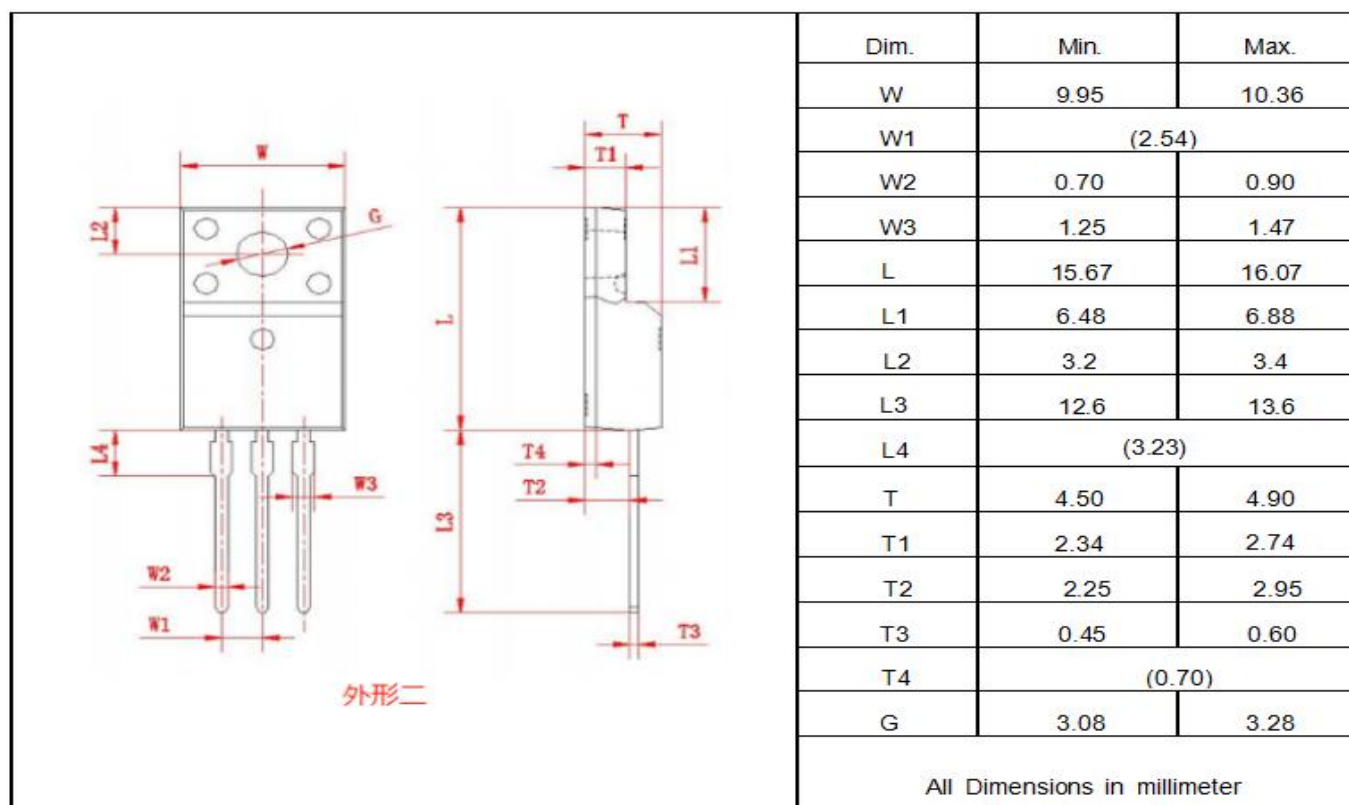
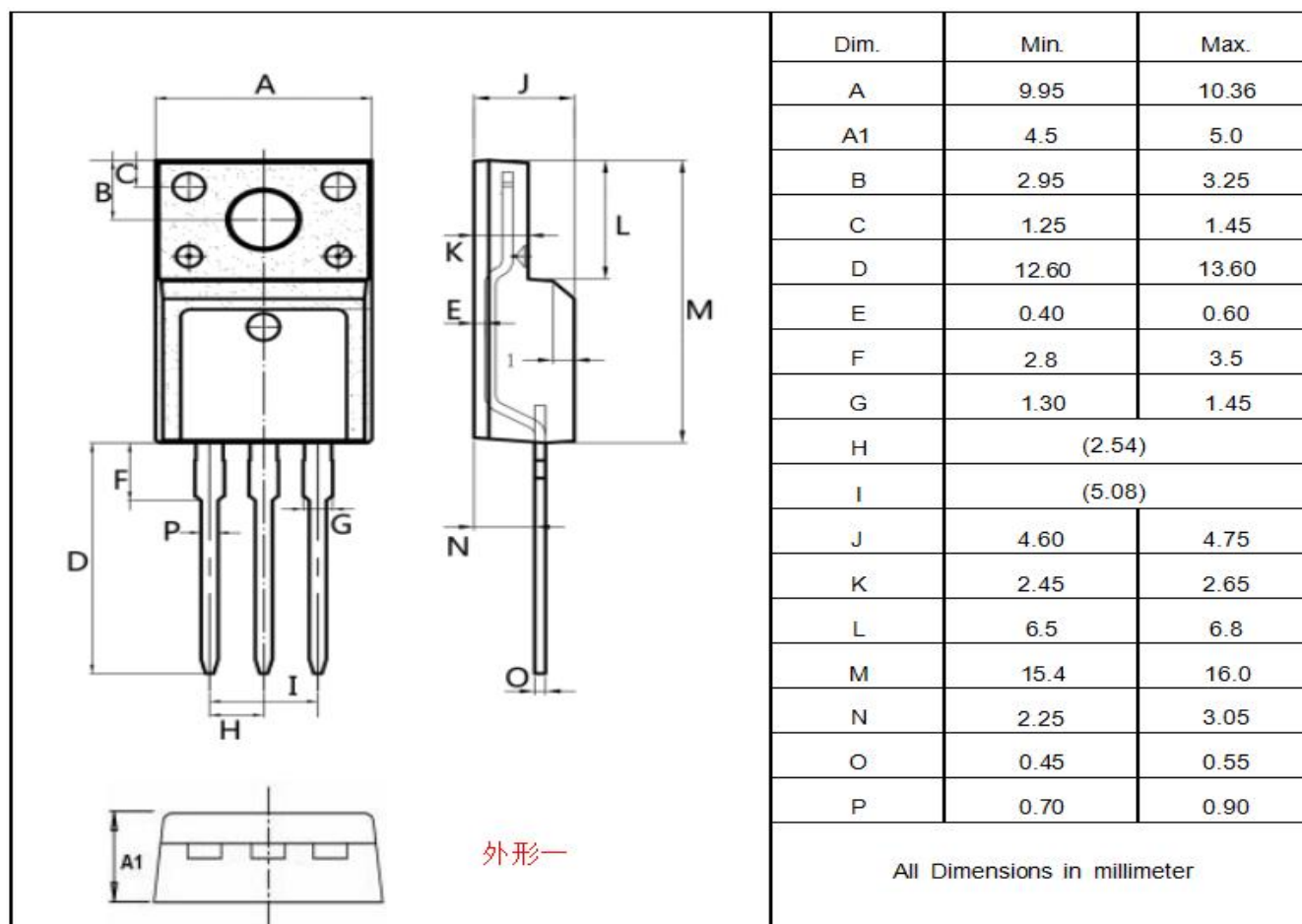
Figure16.Unclamped Inductive Switching Test Circuit



$$EAS = \frac{IAS^2 L}{2}$$

Figure17.Unclamped Inductive Switching Waveforms

Package outline drawing (TO-220F Unit: mm)



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