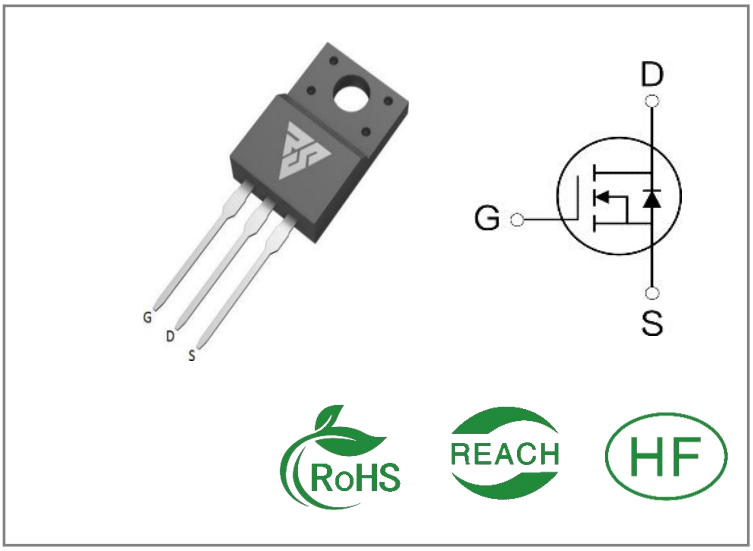
| ID | $R_{DS}$(ON)(Typ ) | VDSS |
|---|---|---|
| 9A | 1.2Ω | 900V |




## 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. |
|---|---|---|---|---|
| RS9N90F | T0-220F | RS9N90F | Tube | 50 PCS |

## Absolute Maximun Ratings Tc= 2 5℃ unless otherwise specified

| Symbol | Parameter | RS9N90F | Units |
|---|---|---|---|
| VDSS | Drain-to-Source Voltage | 900 | V |
| ID | Continuous Drain Current TC=25℃ | 9 | A |
| IDM | Pulsed Drain Current (Note*1) | 36 | |
| PD | Power Dissipation | 68 | W |
| VGS | Gate- to- Source Voltage | ±30 | V |
| EAS | Single Pulse Avalanche Engergy<br>L = 10mH, VDD = 50V, RG = 25 Ω | 245 | mJ |
| TL TPKG | Maximum Temperature for Soldering | 300<br>260 | ℃ |
| | Leads at 0.063in(1.6mm)from Case for 10 seconds<br>Package Body for 10 seconds | | |
| 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 | RS9N90F | Units | Test Conditions |
|---|---|---|---|---|
| RθJC | Junction-to-Case | 1.84 | ℃/ W | Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 1 5 0 ℃ |
| RθJA | Junction-to-Ambient | 62.5 | | 1 cubic foot chamber,free air. |

## OFF Characteristics TJ= 25℃ unless otherwise specified

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

## ON Characteristics TJ=25℃ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| RDS(on) | Static Drain- to- Source On-Resistance(Note*2) | -- | 1.2 | 1.55 | Ω | VGS=10V,ID=4.5A |
| VGS(TH) | Gate Threshold Voltage | 3 | -- | 4 | V | VGS=VDS,ID=250μA |

## Resistive Switching Characteristics Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| td(ON) | Turn- on Delay Time | -- | 46 | -- | nS | VDS=450V<br>ID=9A<br>RG=25Ω |
| trise | Rise Time | -- | 35 | -- | | |
| td(OFF) | Turn- OFF Delay Time | -- | 317 | -- | | |
| tfall | Fall Time | -- | 56 | -- | | |

**Dynamic Characteristics** Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| Ciss | Input Capacitance | -- | 1514 | -- | pF | VGS=0V VDS=25V f=1.0MHz |
| Coss | Output Capacitance | -- | 150 | -- | | |
| Crss | Reverse Transfer Capacitance | -- | 32 | -- | | |
| Qg | Total Gate Charge | -- | 64 | -- | nC | VDS=720V ID=9A VGS=15V |
| Qgs | Gate- to- Source Charge | -- | 7 | -- | | |
| Qgd | Gate-to-Drain(" Miller") Charge | -- | 34 | -- | | |

**Source- Drain Diode Characteristics**

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| IS | Continuous Source Current | -- | -- | 9 | A | Integral pn- diode in MOSFET |
| ISM | Maximum Pulsed Current | -- | -- | 36 | A | |
| VSD | Diode Forward Voltage | -- | -- | 1.4 | V | IS=4.5A,VGS=0V |
| trr | Reverse Recovery Time | -- | 298 | -- | nS | VGS=0V IS=9A,di/dt=100A /μs |
| Qrr | Reverse Recovery Charge | -- | 1.7 | -- | μC | |

**Notes:**

* 1. Repetitive rating, pulse width limited by maximum junction temperature.
* 2. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%

## Typical Feature Curve

**Figure 1. Output Characteristics ($T_J$ = 25ºC)**

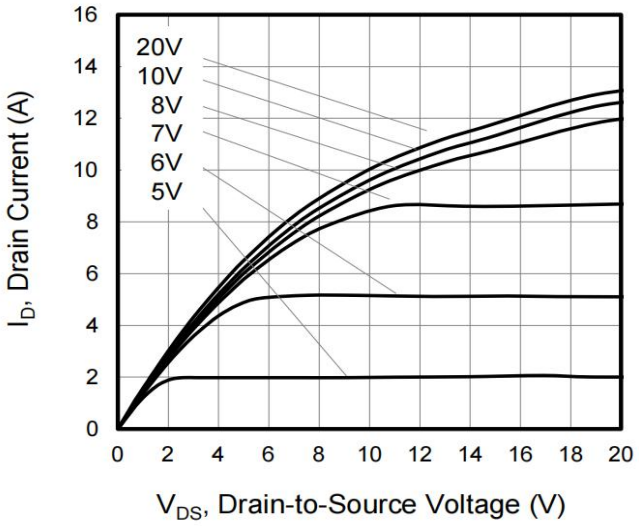



**Figure 2. Body Diode Forward Voltage**

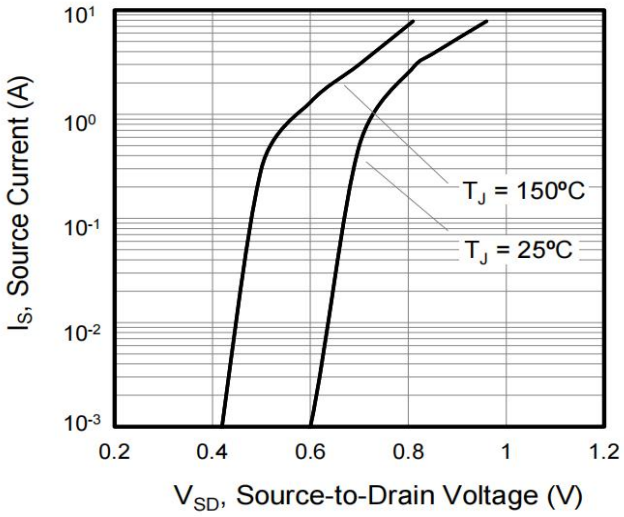



**Figure 3. Drain Current vs. Temperature**

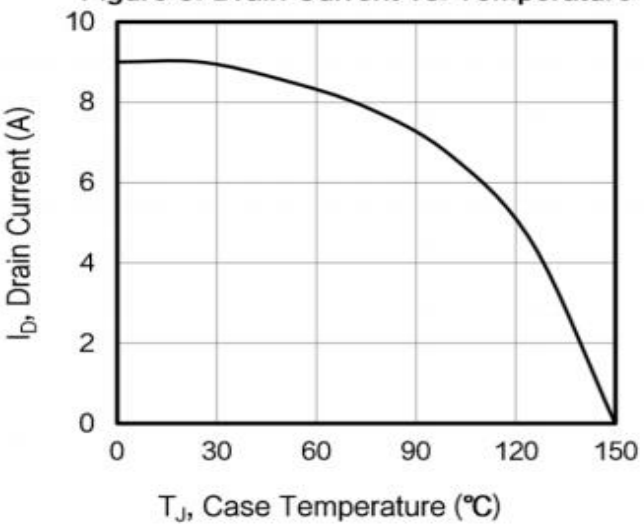



**Figure 4. $BV_{DSS}$ Variation vs. Temperature**

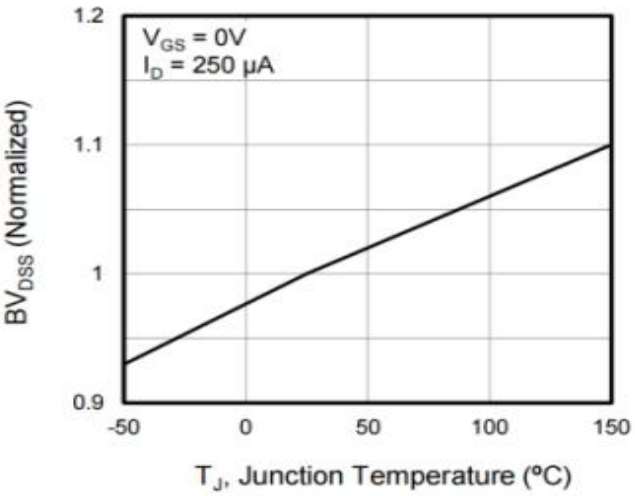



**Figure 5. Transfer Characteristics**

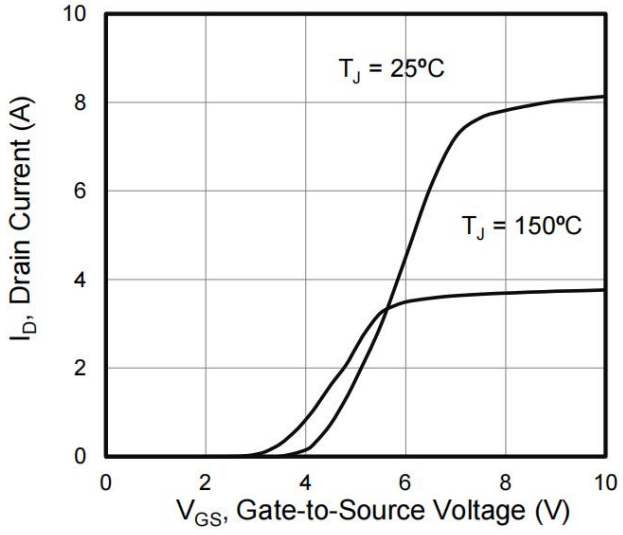



**Figure 6. On-Resistance vs. Temperature**

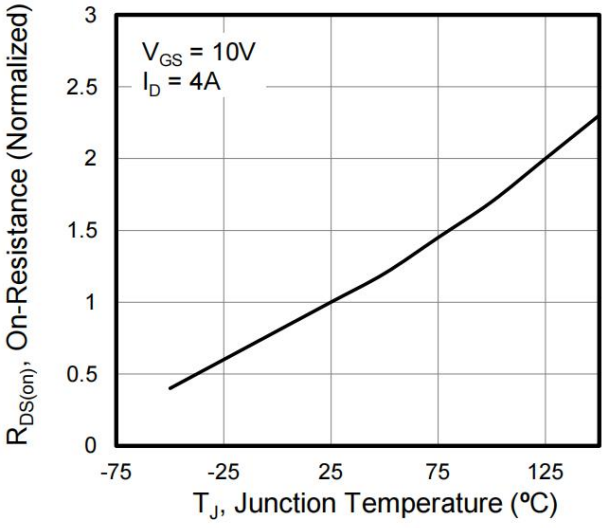


**Figure 7. Capacitance**

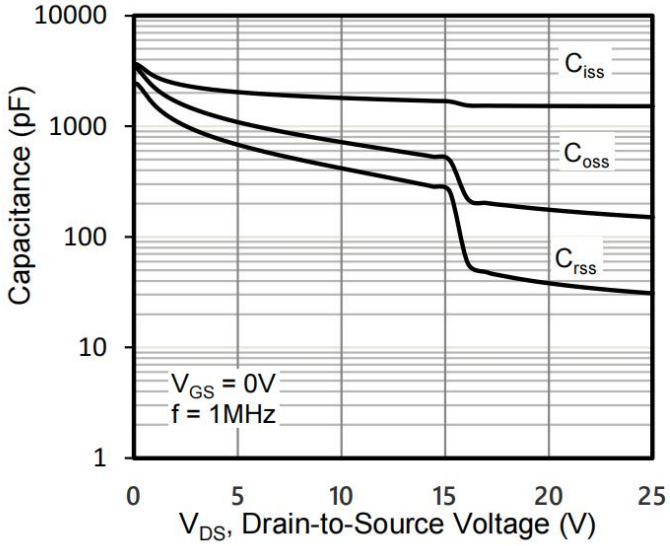



**Figure 8. Gate Charge**

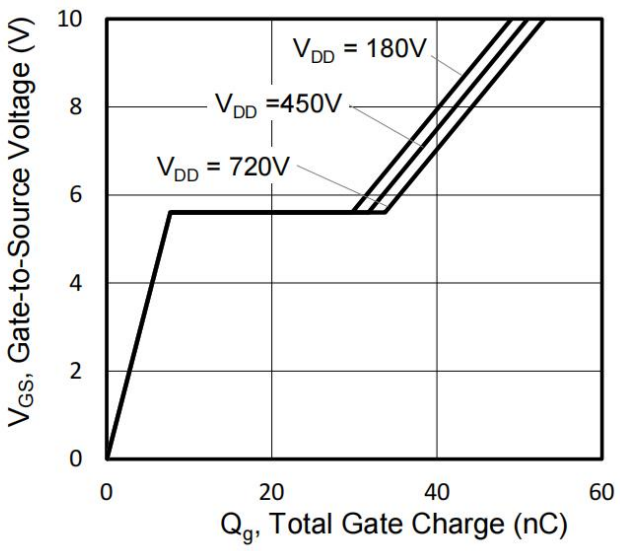
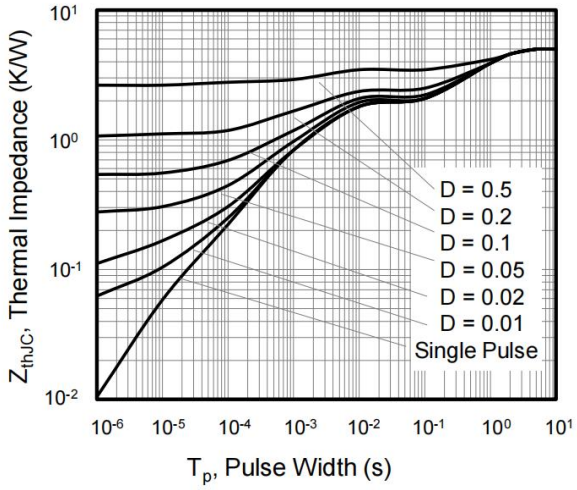



**Figure 9. Transient Thermal Impedance**



## Test Circuits and Waveforms

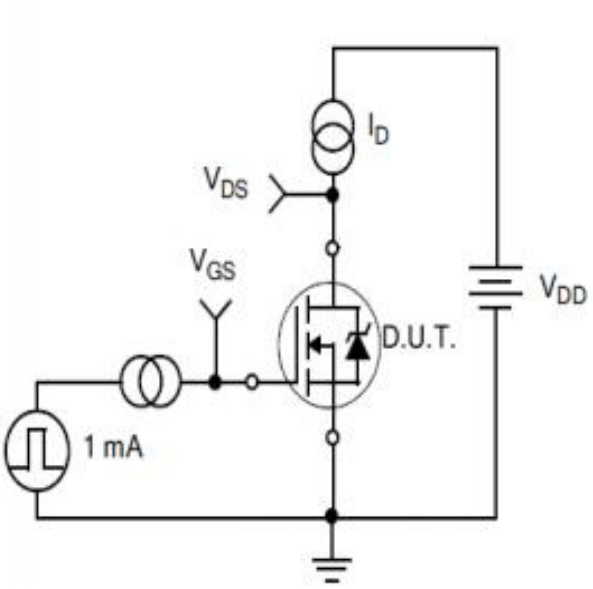



Figure10.
Gate Charge Test Circuit

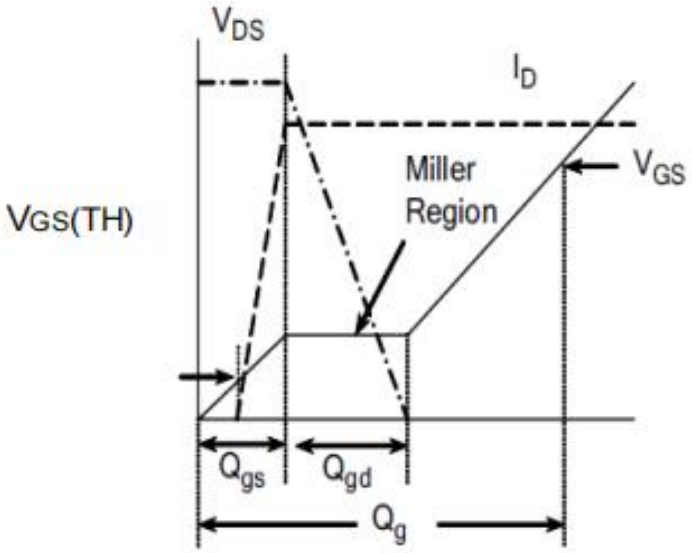



Figure11.
Gate Charge Waveform

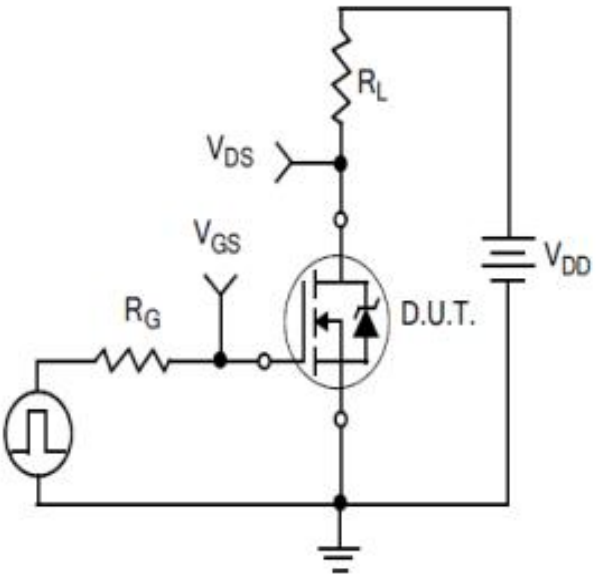



Figure12.
Resistive Switching Test Circuit

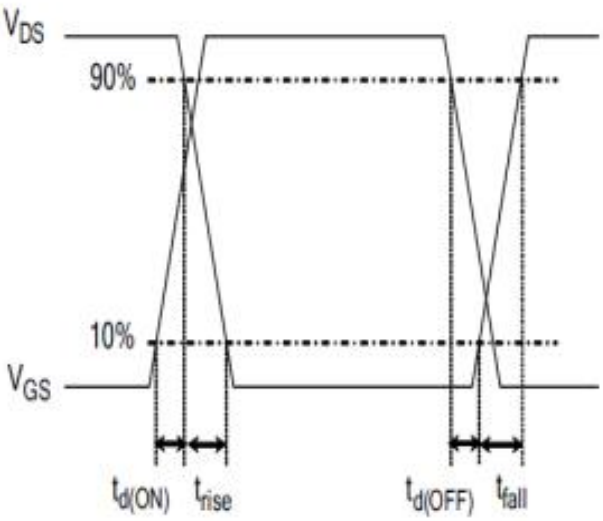



Figure13.
Resistive Switching Waveforms

## Test Circuits and Waveforms

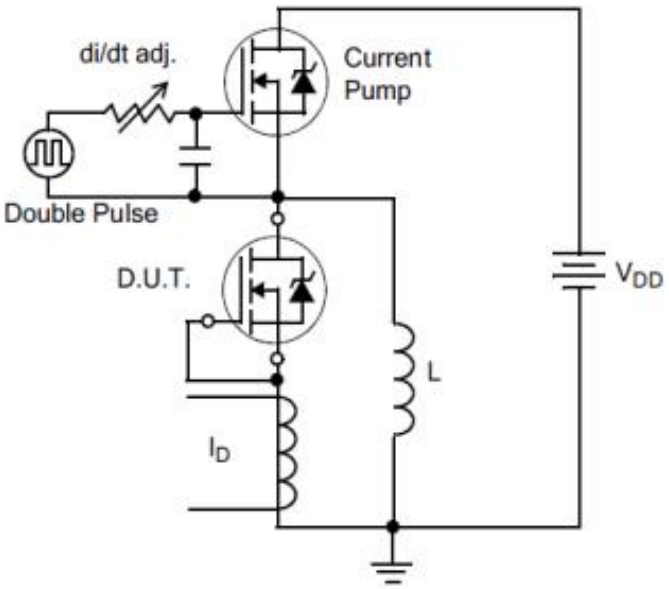



Figure14.Diode Reverse Recovery Test Circuit

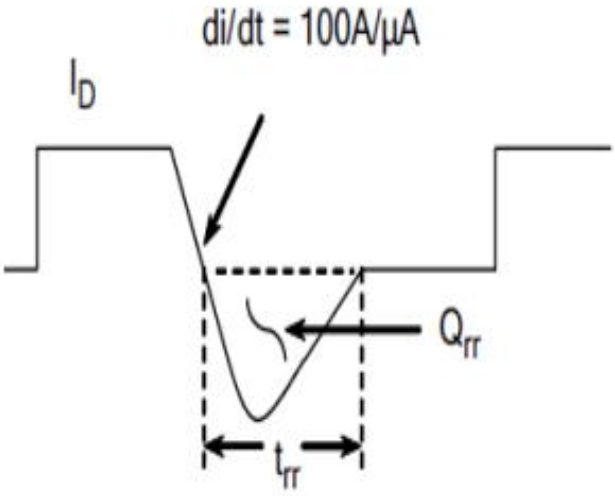



Figure15.Diode Reverse Recovery Waveform

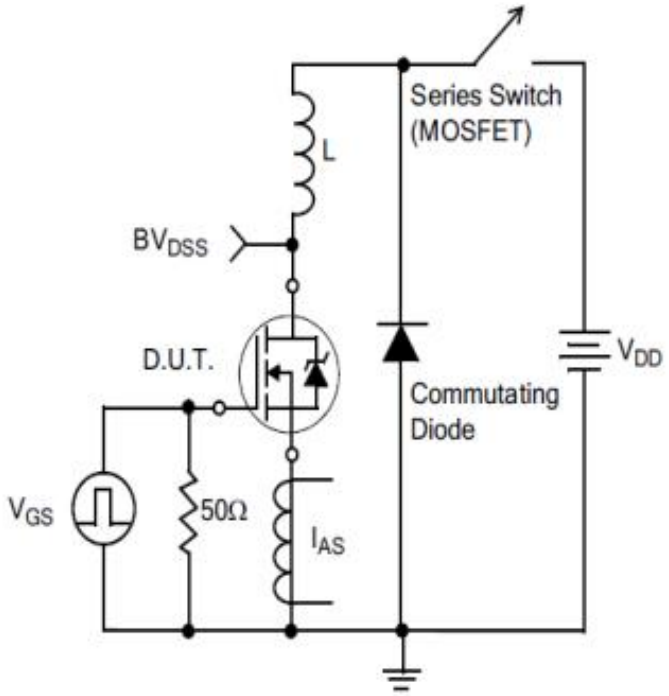
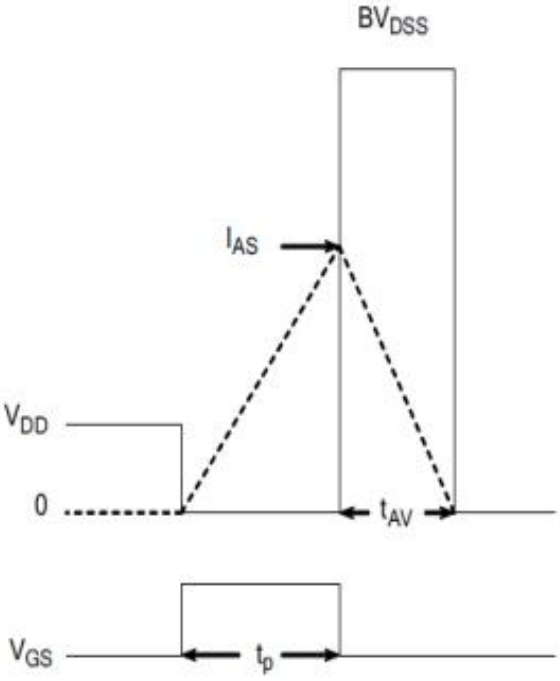


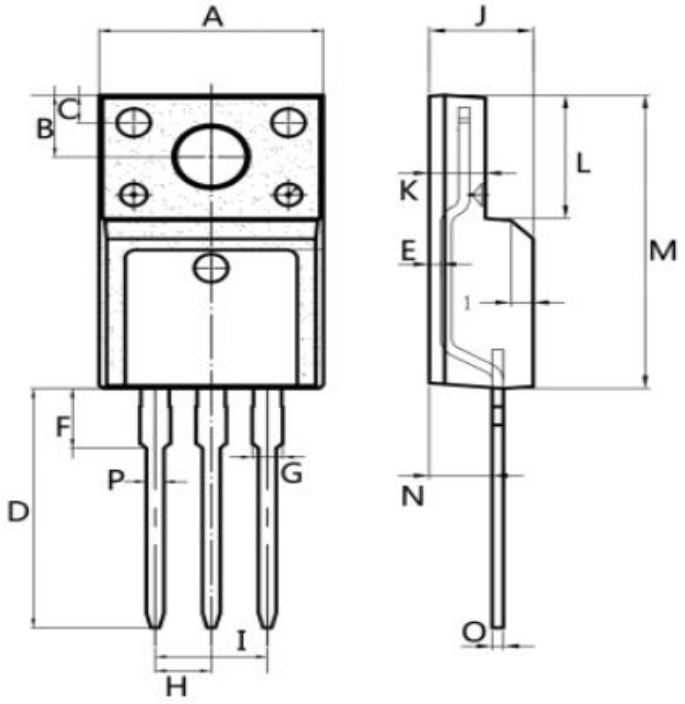

Figure16.Unclamped Inductive Switching Test Circuit




$$E_{AS}=\frac{I_{AS}^2 L}{2}$$

Figure17.Unclamped Inductive Switching Waveforms

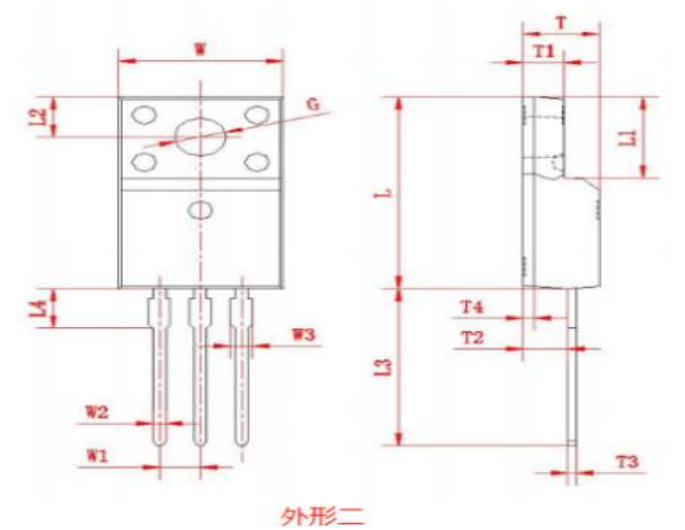
## Package outline drawing(TO-220F Unit: mm )




外形一

| Dim. | Min. | Max. |
|---|---|---|
| A | 9.95 | 10.36 |
| A1 | 4.5 | 5.0 |
| B | 2.95 | 3.25 |
| C | 1.25 | 1.45 |
| D | 12.60 | 13.60 |
| E | 0.40 | 0.60 |
| F | 2.8 | 3.5 |
| G | 1.30 | 1.45 |
| H | (2.54) | |
| I | (5.08) | |
| J | 4.60 | 4.75 |
| K | 2.45 | 2.65 |
| L | 6.5 | 6.8 |
| M | 15.4 | 16.0 |
| N | 2.25 | 3.05 |
| O | 0.45 | 0.55 |
| P | 0.70 | 0.90 |

All Dimensions in millimeter




外形二

| Dim. | Min. | Max. |
|---|---|---|
| W | 9.95 | 10.36 |
| W1 | (2.54) | |
| W2 | 0.70 | 0.90 |
| W3 | 1.25 | 1.47 |
| L | 15.67 | 16.07 |
| L1 | 6.48 | 6.88 |
| L2 | 3.2 | 3.4 |
| L3 | 12.6 | 13.6 |
| L4 | (3.23) | |
| T | 4.50 | 4.90 |
| T1 | 2.34 | 2.74 |
| T2 | 2.25 | 2.95 |
| T3 | 0.45 | 0.60 |
| T4 | (0.70) | |
| G | 3.08 | 3.28 |

All Dimensions in millimeter

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