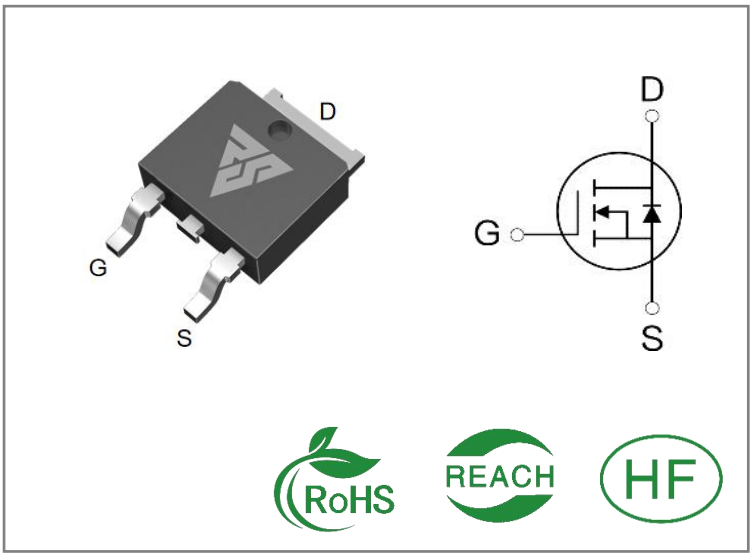
| ID | $R_{DS}$(ON)(Typ ) | VDSS |
|---|---|---|
| 4A | 3Ω | 900V |




## Applications:

- Switch Mode Power Supply(SMPS)
- Adapter & Charger
- AC-DC Switching Power Supply

## Features:

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

## Ordering Information

| Part Number | Package | Marking | Packing | Qty. |
|---|---|---|---|---|
| RS4N90D | T0-252 | RS4N90D | Tape&reel | 2500 PCS |

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

| Symbol | Parameter | RS4N90D | Units |
|---|---|---|---|
| VDSS | Drain-to-Source Voltage | 900 | V |
| ID | Continuous Drain Current TC=25℃ | 4 | A |
| IDM | Pulsed Drain Current (Note*1) | 16 | |
| PD | Power Dissipation | 70 | W |
| VGS | Gate- to- Source Voltage | ±30 | V |
| EAS | Single Pulse Avalanche Engergy<br>L = 10mH, VDD = 50V, RG = 25 Ω | 125 | mJ |
| TL TPKG | Maximum Temperature for Soldering | 300 | ℃ |
| | Leads at 0.063in(1.6mm)from Case for 10 seconds<br>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 | RS4N90D | Units | Test Conditions |
|---|---|---|---|---|
| RθJC | Junction-to-Case | 1.78 | ℃/ W | Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 1 5 0 ℃ |
| RθJA | Junction-to- Ambient | 60 | | 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=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℃ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| RDS(on) | Static Drain- to- Source On-Resistance(Note*2) | -- | 3 | 3.5 | Ω | VGS=10V,ID=2A |
| 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 | -- | 37 | -- | nS | VDS=450V ID=4A RG=25Ω |
| trise | Rise Time | -- | 15 | -- | | |
| td(OFF) | Turn- OFF Delay Time | -- | 144 | -- | | |
| tfall | Fall Time | -- | 36 | -- | | |

**Dynamic Characteristics** Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| Ciss | Input Capacitance | -- | 674 | -- | pF | VGS=0V<br>VDS=25V<br>f=1.0MHz |
| Coss | Output Capacitance | -- | 71 | -- | | |
| Crss | Reverse Transfer Capacitance | -- | 13 | -- | | |
| Qg | Total Gate Charge | -- | 27 | -- | nC | VDS=720V<br>ID=4A<br>VGS=10V |
| Qgs | Gate- to- Source Charge | -- | 3.5 | -- | | |
| Qgd | Gate-to-Drain(" Miller") Charge | -- | 14 | -- | | |

**Source- Drain Diode Characteristics**

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| IS | Continuous Source Current | -- | -- | 4 | A | Integral pn- diode in MOSFET |
| ISM | Maximum Pulsed Current | -- | -- | 16 | A | |
| VSD | Diode Forward Voltage | -- | -- | 1.4 | V | IS=2A,VGS=0V |
| trr | Reverse Recovery Time | -- | 1018 | -- | nS | VGS=0V<br>IS=4A,di/dt=100A/μs |
| Qrr | Reverse Recovery Charge | -- | 2.2 | -- | 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)**

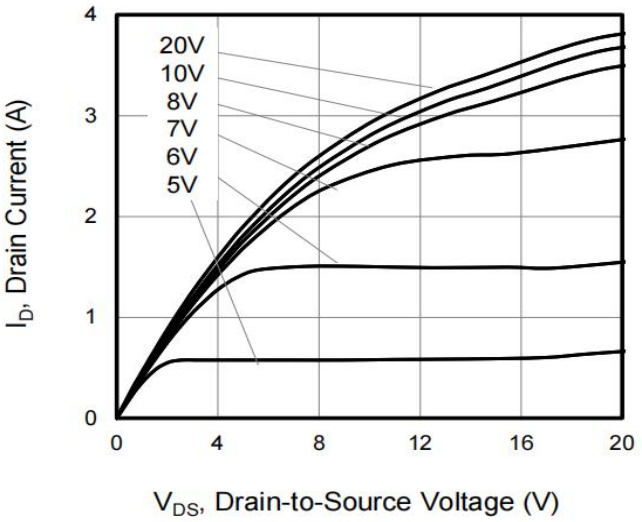



**Figure 2. Body Diode Forward Voltage**

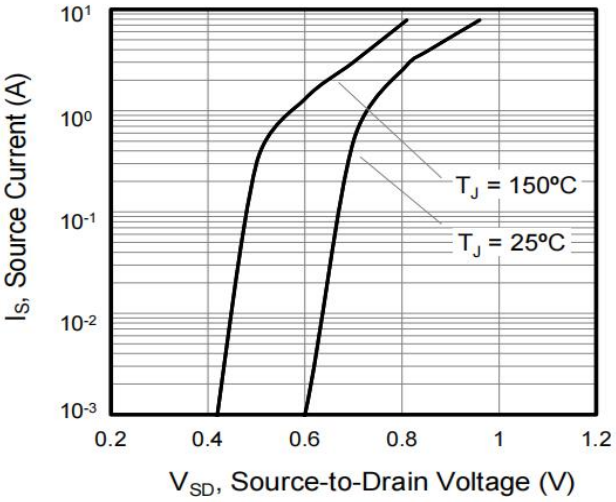



**Figure 3. Drain Current vs. Temperature**

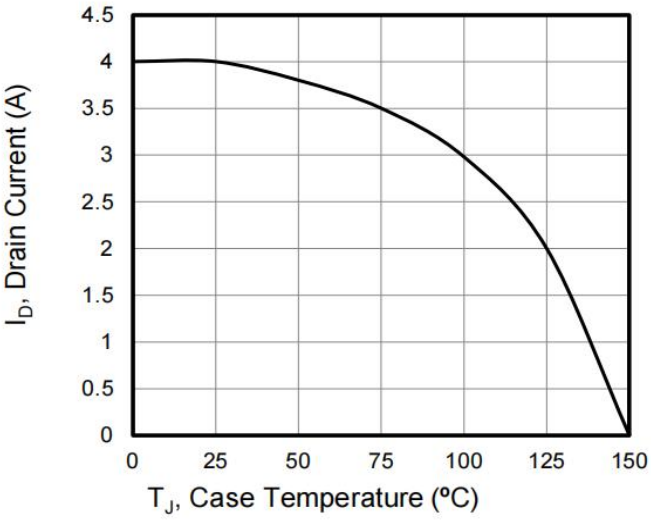



**Figure 4. $BV_{DSS}$ Variation vs. Temperature**

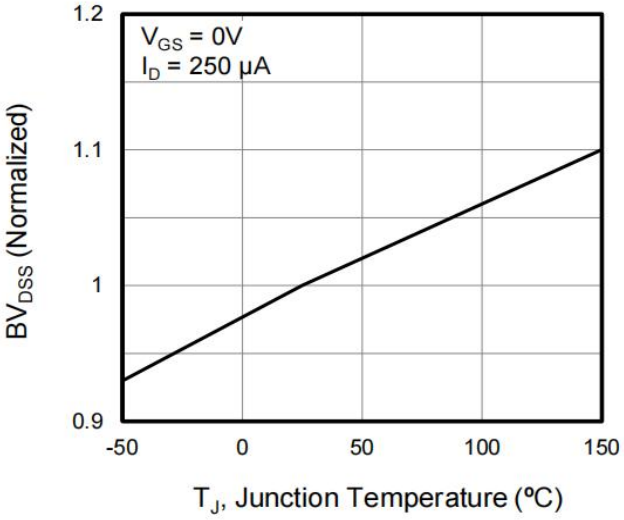



**Figure 5. Transfer Characteristics**

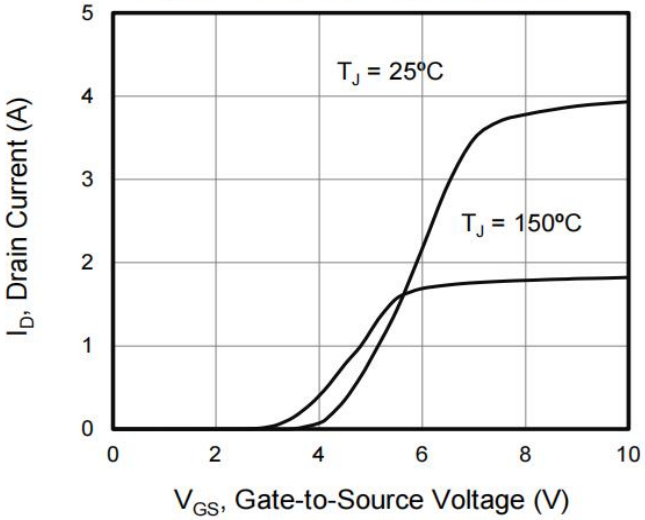



**Figure 6. On-Resistance vs. Temperature**

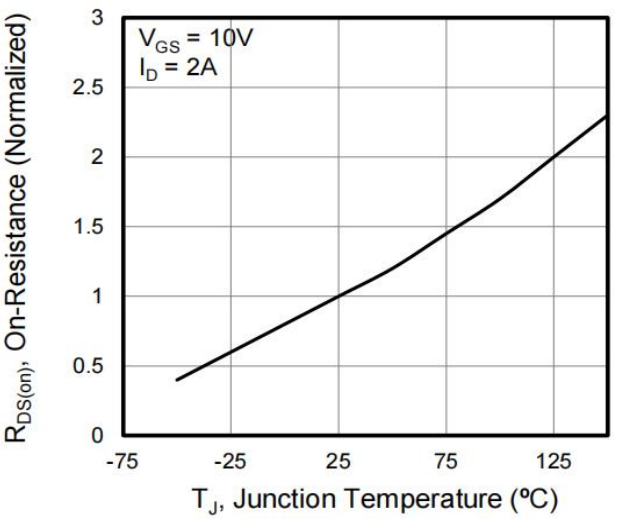


**Figure 7. Capacitance**

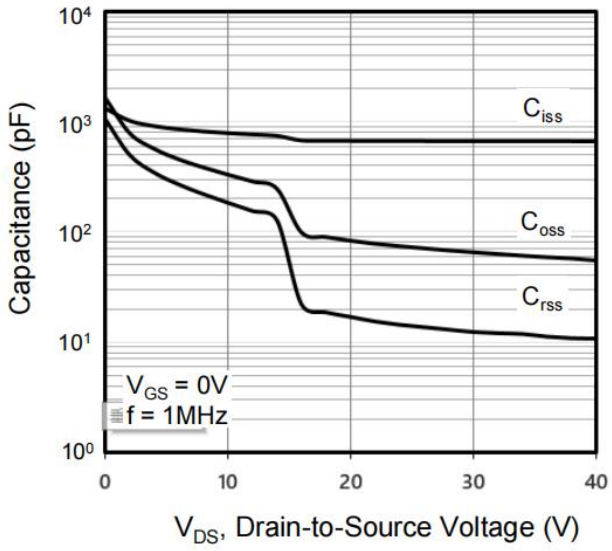



**Figure 8. Gate Charge**

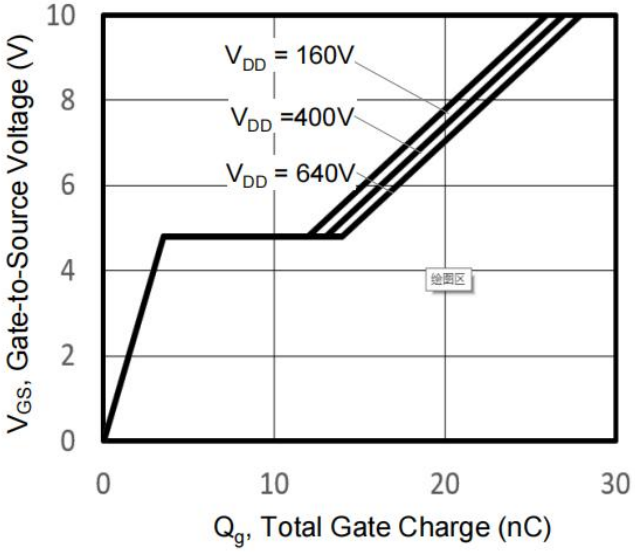
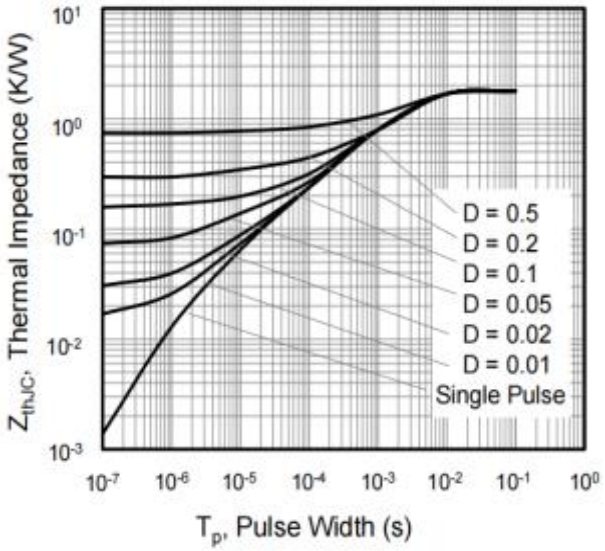



**Figure 9. Transient Thermal Impedance**



## Test Circuits and Waveforms

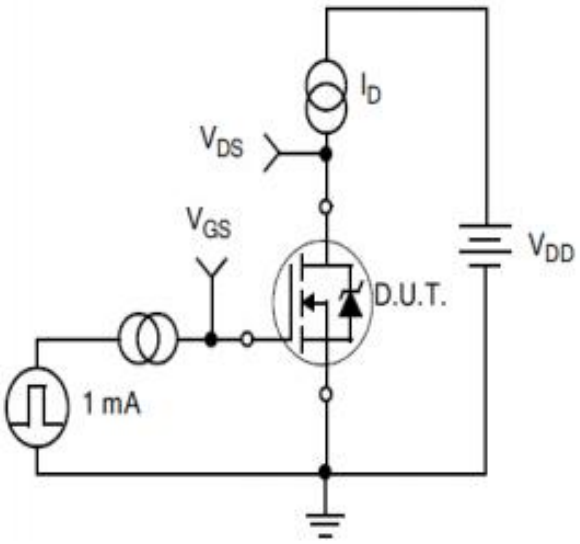



Figure10.
Gate Charge Test Circuit

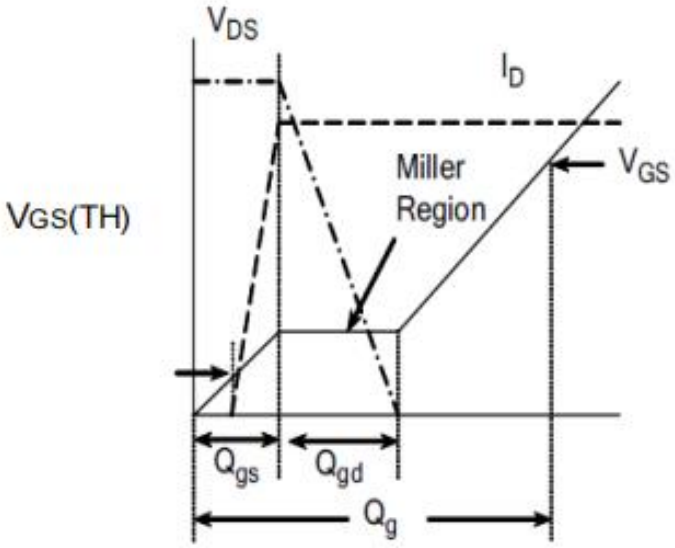



Figure11.
Gate Charge Waveform

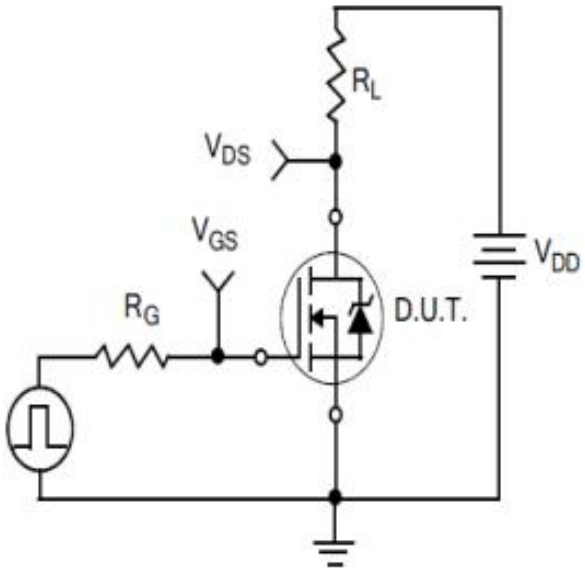



Figure12.
Resistive Switching Test Circuit

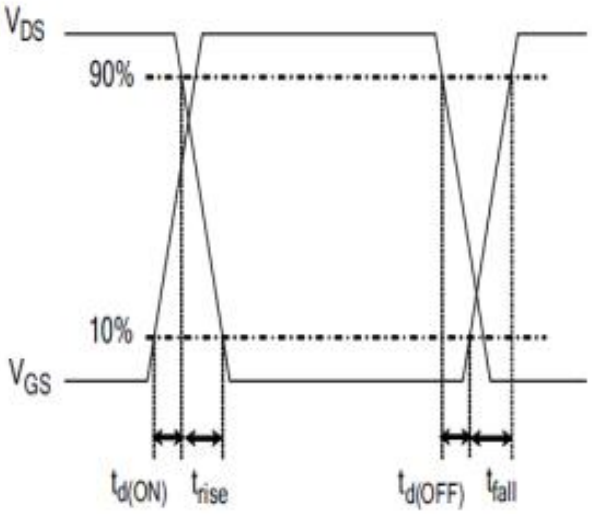



Figure13.
Resistive Switching Waveforms

## Test Circuits and Waveforms

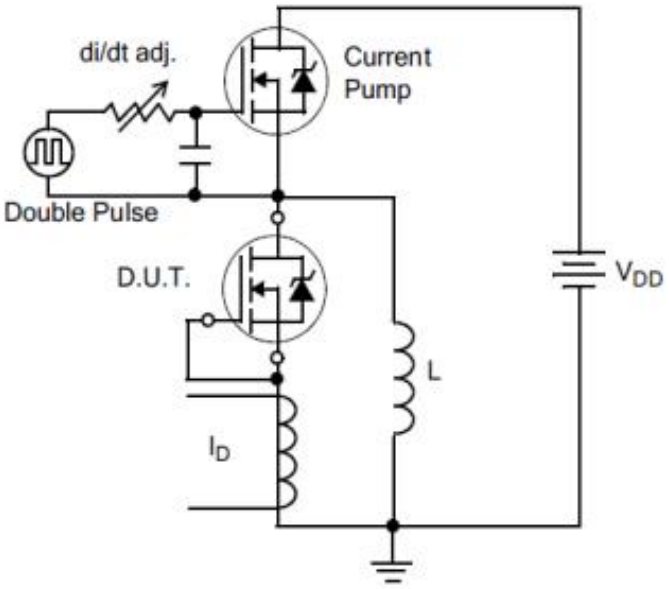



Figure14.Diode Reverse Recovery Test Circuit

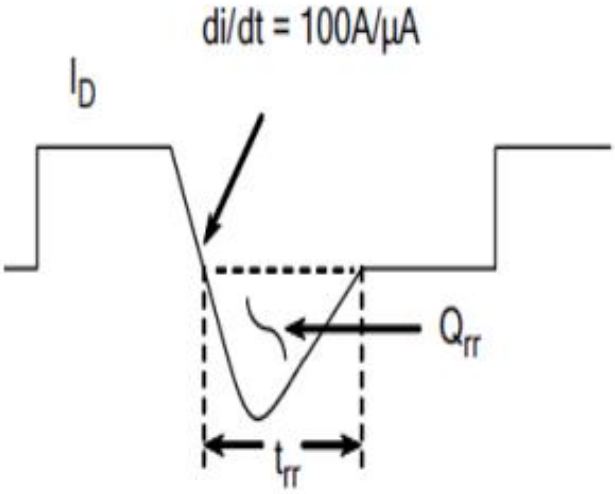



Figure15.Diode Reverse Recovery Waveform

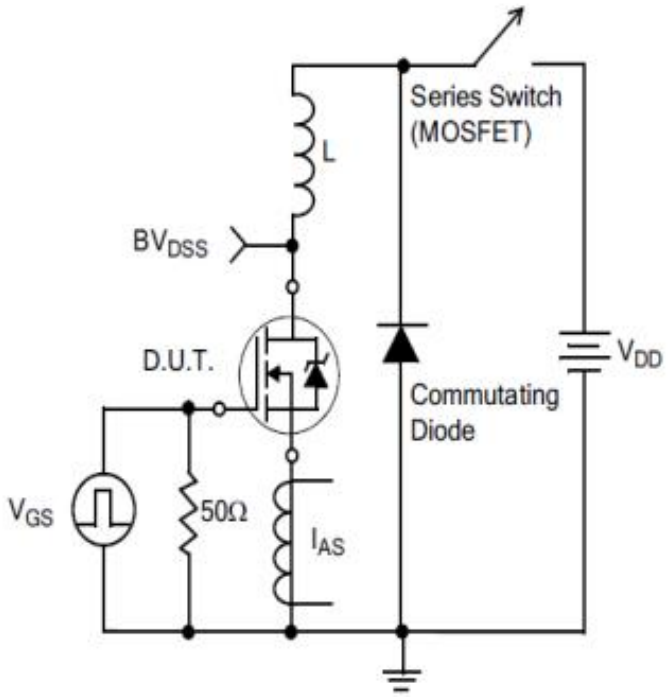
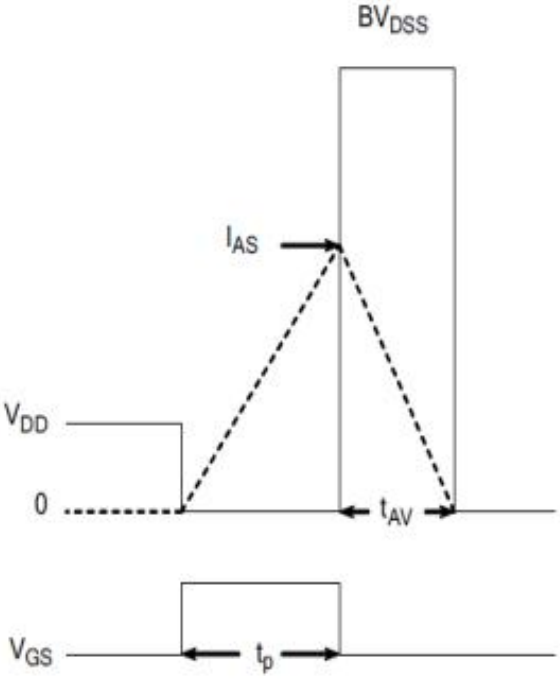


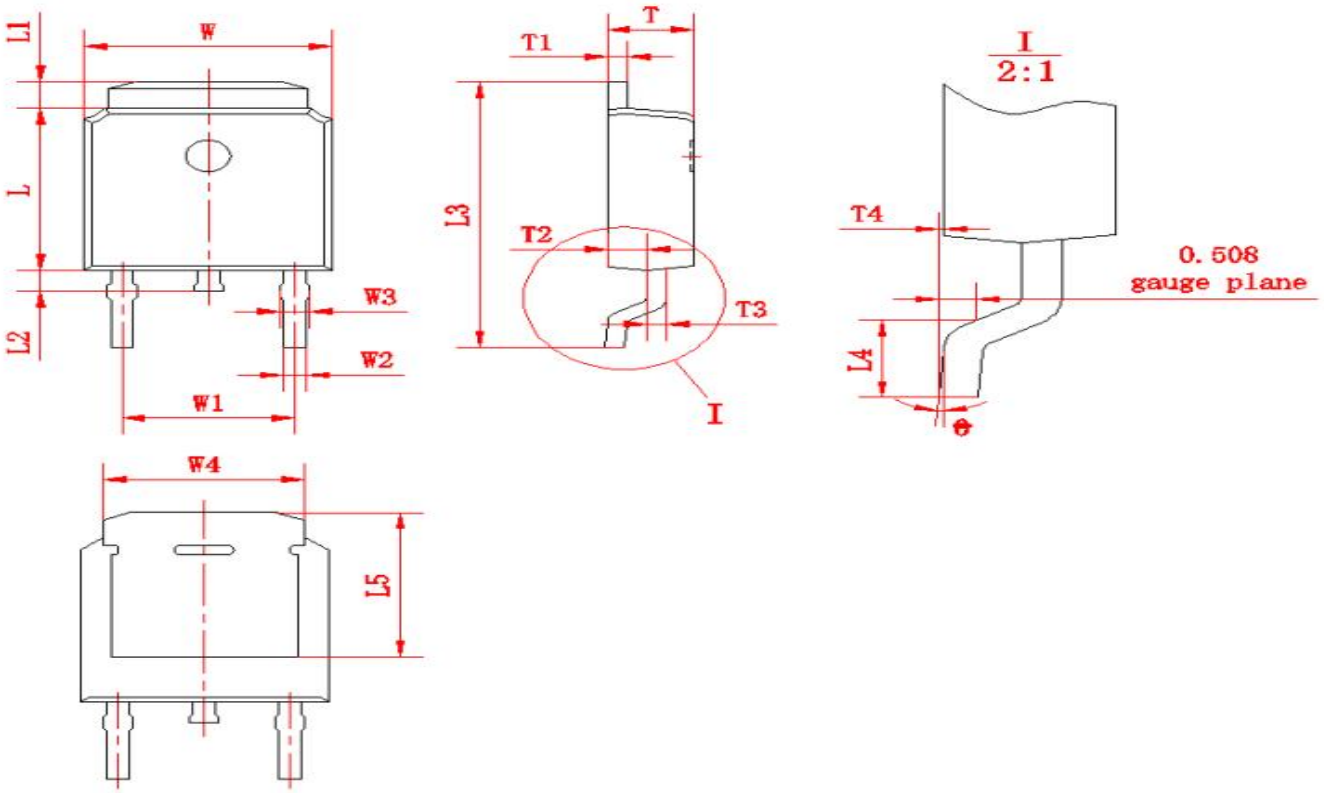

Figure16.Unclamped Inductive Switching Test Circuit




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

Figure17.Unclamped Inductive Switching Waveforms

## Package outline drawing(TO-252 Unit: mm )




| 符号 | 尺寸 | | 符号 | 尺寸 | | 符号 | 尺寸 | |
|---|---|---|---|---|---|---|---|---|
| | Min | Max | | Min | Max | | Min | Max |
| W | 6.50 | 6.70 | L1 | 0.80 | 1.20 | T1 | 0.48 | 0.58 |
| W1 | (4.572) | | L2 | 0.60 | 1.00 | T2 | 0.95 | 1.15 |
| W2 | 0.6 | 0.8 | L3 | 9.70 | 10.30 | T3 | 0.48 | 0.58 |
| W3 | 0.68 | 0.88 | L4 | 1.30 | 1.70 | T4 | 0.00 | 0.12 |
| W4 | (5.3) | | L5 | (5.20) | | 0 | 0 | 8 |
| L | 6.00 | 6.20 | T | 2.20 | 2.40 | | | |

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