

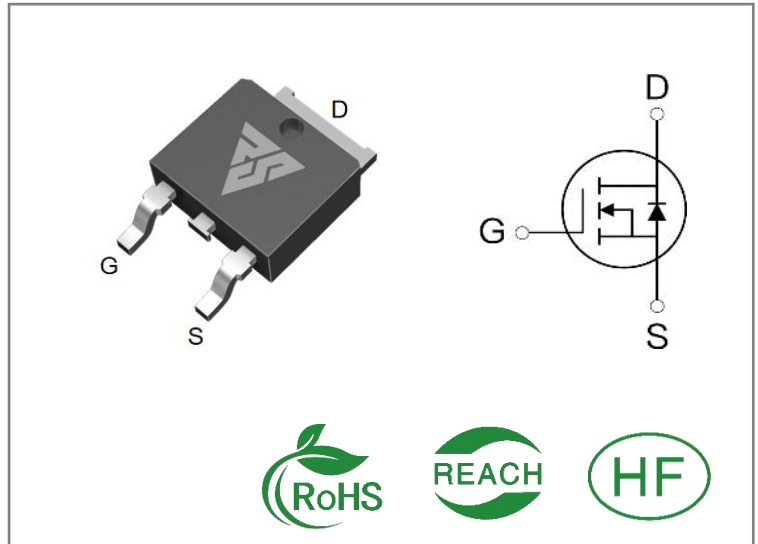
| ID | $R_{DS(ON)}$ (Typ) | VDSS |
|----|--------------------|------|
| 5A | 1.8Ω               | 650V |

**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.     |
|-------------|---------|---------|-----------|----------|
| RS5N65D     | T0-252  | RS5N65D | Tape&reel | 2500 PCS |

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

| Symbol      | Parameter  | RS5N65D    | Units              |
|-------------|--|------------|--------------------|
| VDSS        | Drain-to-Source Voltage  | 650        | V                  |
| ID          | Continuous Drain Current $T_C = 25^{\circ}\text{C}$  | 5          | A                  |
| IDM         | Pulsed Drain Current (Note*1)  | 20         |                    |
| PD          | Power Dissipation  | 90         | W                  |
| VGS         | Gate- to- Source Voltage   | $\pm 30$   | V                  |
| EAS         | Single Pulse Avalanche Engergy<br>$L = 10\text{mH}$ , $V_{DD} = 50\text{V}$ , $R_G = 25\ \Omega$ | 105        | mJ                 |
| TL TPKG     | Maximum Temperature for Soldering  | 300        | $^{\circ}\text{C}$ |
|             | 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.

REV:K-B02-04-2024

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**Thermal Resistance**

| Symbol        | Parameter            | RS5N65D | Units                         | Test Conditions   |
|---------------|----------------------|---------|-------------------------------|---|
| R $\theta$ JC | Junction-to-Case     | 1.27    | $^{\circ}\text{C} / \text{W}$ | Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 1 5 0 $^{\circ}\text{C}$ |
| R $\theta$ JA | Junction-to- Ambient | 62.5    |                               | 1 cubic foot chamber,free air.  |

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

| Symbol | Parameter                           | Min. | Typ. | Max. | Units         | Test Conditions                        |
|--------|-------------------------------------|------|------|------|---------------|--|
| BVDSS  | Drain- to- source Breakdown Voltage | 650  | --   | --   | V             | $V_{GS}=0\text{V}, I_D=250\mu\text{A}$ |
| IDSS   | Drain- to- Source Leakage Current   | --   | --   | 1    | $\mu\text{A}$ | $V_{DS}=650\text{V}, V_{GS}=0\text{V}$ |
| IGSS   | Gate- to- Source Forward Leakage    | --   | --   | 100  | nA            | $V_{GS}=30\text{V}, V_{DS}=0\text{V}$  |
|        | Gate- to- Source Reverse Leakage    | --   | --   | -100 |               | $V_{GS}=-30\text{V}, V_{DS}=0\text{V}$ |

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

| Symbol  | Parameter                                      | Min. | Typ. | Max. | Units    | Test Conditions                      |
|---------|--|------|------|------|----------|--------------------------------------|
| RDS(on) | Static Drain- to- Source On-Resistance(Note*2) | --   | 1.8  | 2.1  | $\Omega$ | $V_{GS}=10\text{V}, I_D=2.5\text{A}$ |
| VGS(TH) | Gate Threshold Voltage                         | 3    | --   | 4    | V        | $V_{GS}=V_{DS}, I_D=250\mu\text{A}$  |

**Resistive Switching Characteristics** Essentially independent of operating temperature

| Symbol  | Parameter            | Min. | Typ. | Max. | Units | Test Conditions   |
|---------|----------------------|------|------|------|-------|---|
| td(ON)  | Turn- on Delay Time  | --   | 35   | --   | nS    | $V_{DS}=325\text{V}$<br>$I_D=5\text{A}$<br>$R_G=25\Omega$ |
| trise   | Rise Time            | --   | 8    | --   |       |   |
| td(OFF) | Turn- OFF Delay Time | --   | 60   | --   |       |   |
| tfall   | Fall Time            | --   | 25   | --   |       |   |

**Dynamic Characteristics** Essentially independent of operating temperature

| Symbol | Parameter                       | Min. | Typ. | Max. | Units | Test Conditions               |
|--------|---------------------------------|------|------|------|-------|-------------------------------|
| Ciss   | Input Capacitance               | --   | 665  | --   | pF    | VGS=0V<br>VDS=25V<br>f=1.0MHz |
| Coss   | Output Capacitance              | --   | 64   | --   |       |                               |
| Crss   | Reverse Transfer Capacitance    | --   | 6.5  | --   |       |                               |
| Qg     | Total Gate Charge               | --   | 20   | --   | nC    | VDS=520V<br>ID=5A<br>VGS=10V  |
| Qgs    | Gate- to- Source Charge         | --   | 3    | --   |       |                               |
| Qgd    | Gate-to-Drain(" Miller") Charge | --   | 11.5 | --   |       |                               |

**Source- Drain Diode Characteristics**

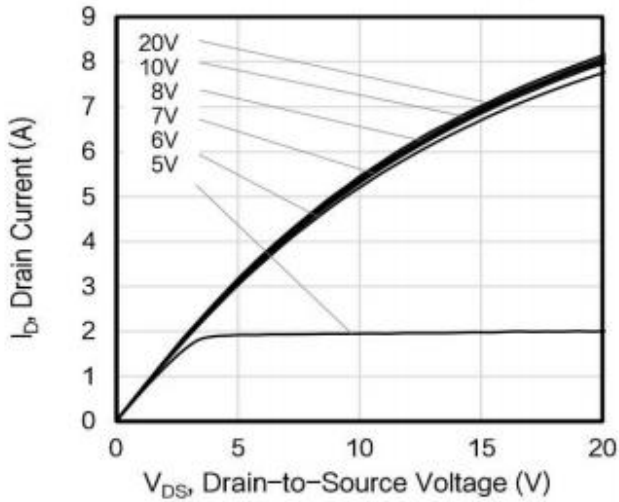
| Symbol | Parameter                 | Min. | Typ. | Max. | Units | Test Conditions                   |
|--------|---------------------------|------|------|------|-------|-----------------------------------|
| IS     | Continuous Source Current | --   | --   | 5    | A     | Integral pn- diode<br>in MOSFET   |
| ISM    | Maximum Pulsed Current    | --   | --   | 20   | A     |                                   |
| VSD    | Diode Forward Voltage     | --   | --   | 1.4  | V     | IS=2.5A,VGS=0V                    |
| trr    | Reverse Recovery Time     | --   | 320  | --   | nS    | VGS=0V<br>IS=5A,di/dt=100A/<br>μs |
| Qrr    | Reverse Recovery Charge   | --   | 2.74 | --   | μC    |                                   |

**Notes:**

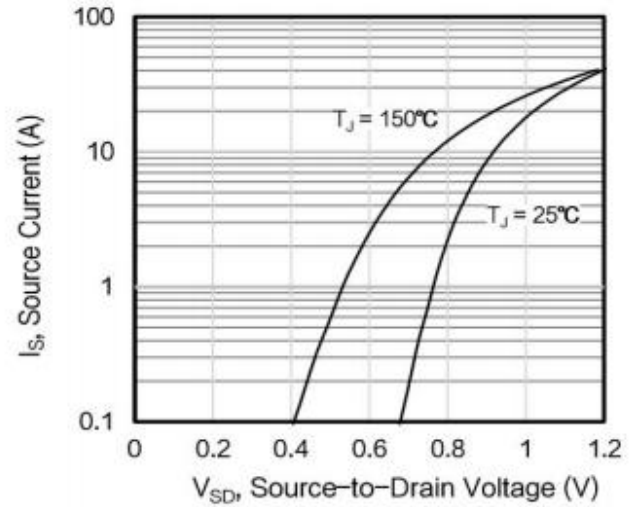
- \* 1. Repetitive rating, pulse width limited by maximum junction temperature.
- \* 2. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 1\%$

**Typical Feature Curve**

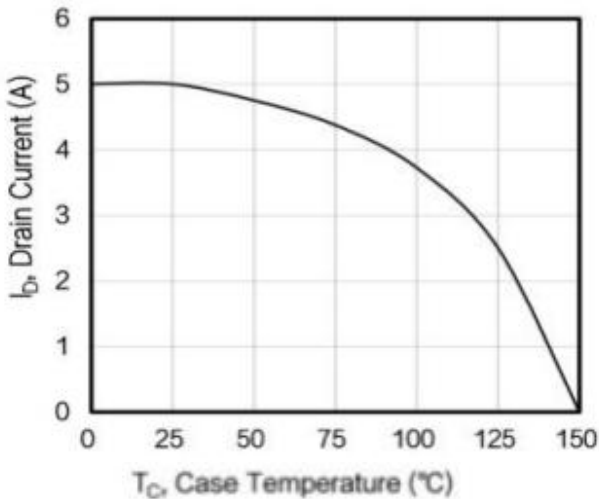
**Figure 1. Output Characteristics ( $T_J = 25^\circ\text{C}$ )**



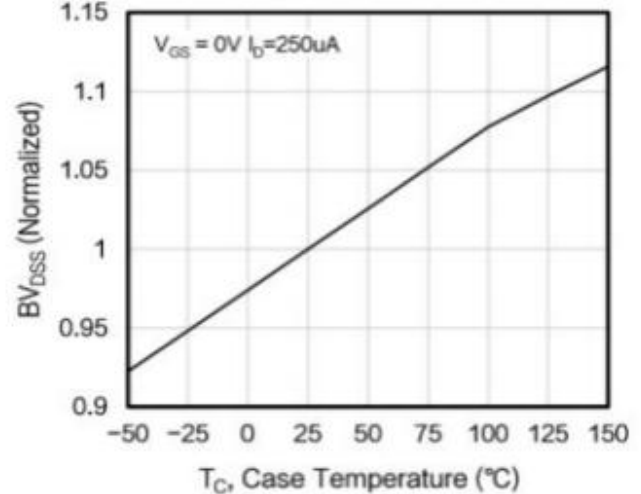
**Figure 2. Body Diode Forward Voltage**



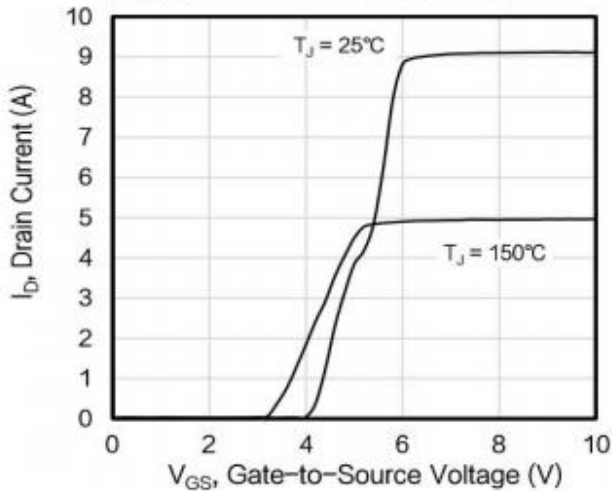
**Figure 3. Drain Current vs. Temperature**



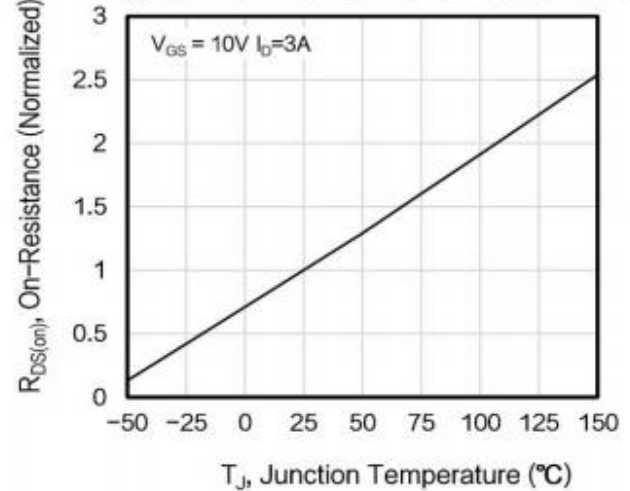
**Figure 4.  $BV_{DSS}$  Variation vs. Temperature**



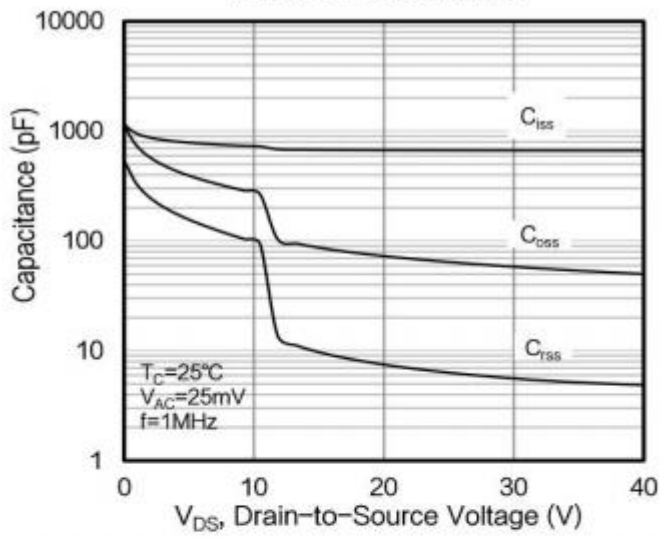
**Figure 5. Transfer Characteristics**



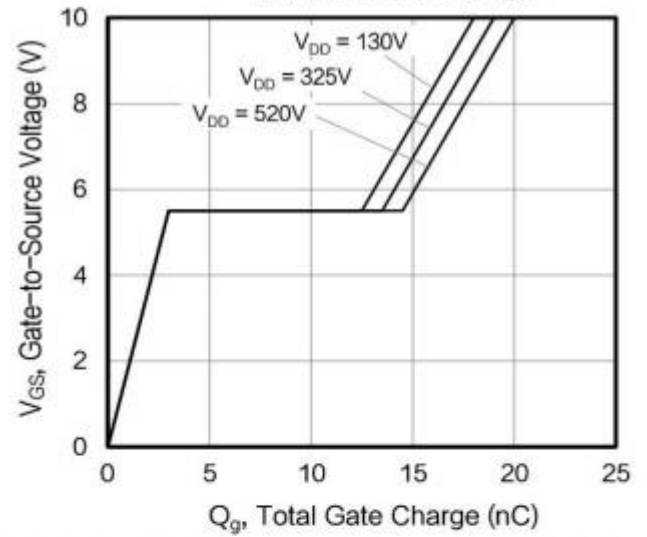
**Figure 6. On-Resistance vs. Temperature**



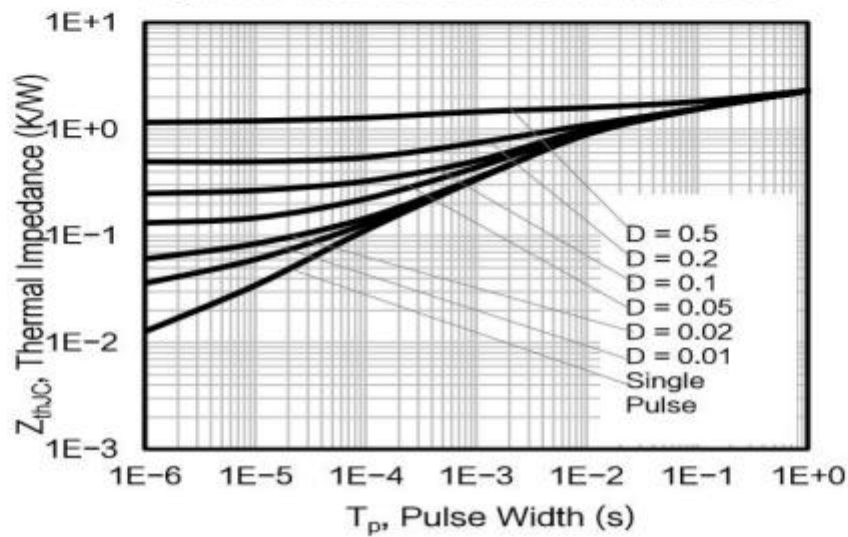
**Figure 7. Capacitance**



**Figure 8. Gate Charge**



**Figure 9. Transient Thermal Impedance**



## Test Circuits and Waveforms

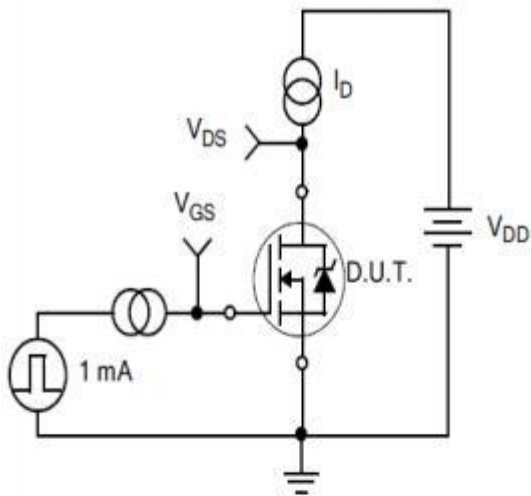


Figure10.  
Gate Charge Test Circuit

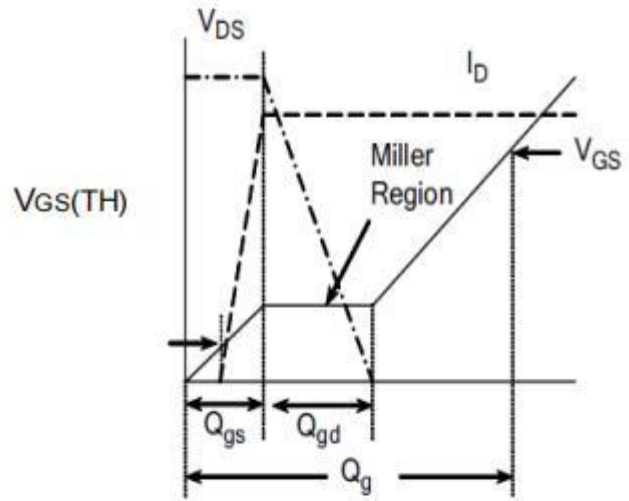


Figure11.  
Gate Charge Waveform

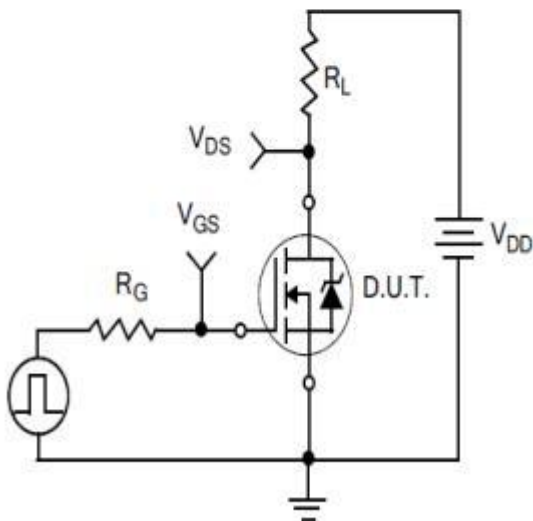


Figure12.  
Resistive Switching Test Circuit

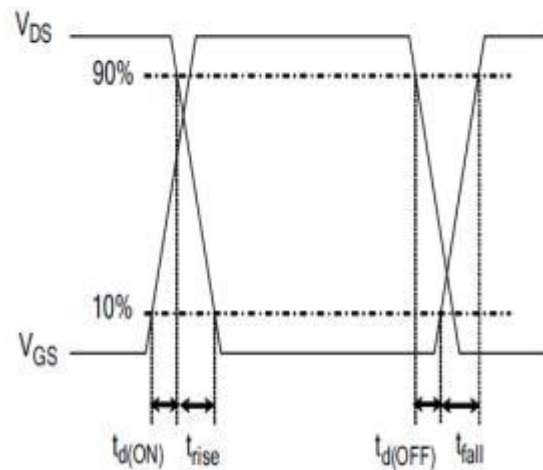


Figure13.  
Resistive Switching Waveforms

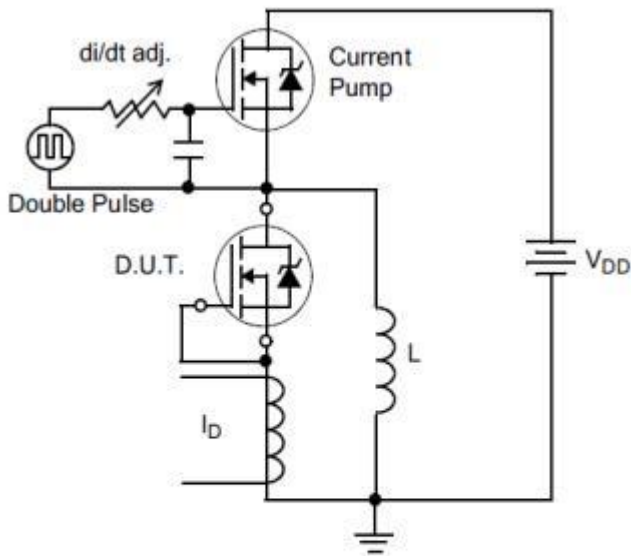


Figure14.Diode Reverse Recovery Test Circuit

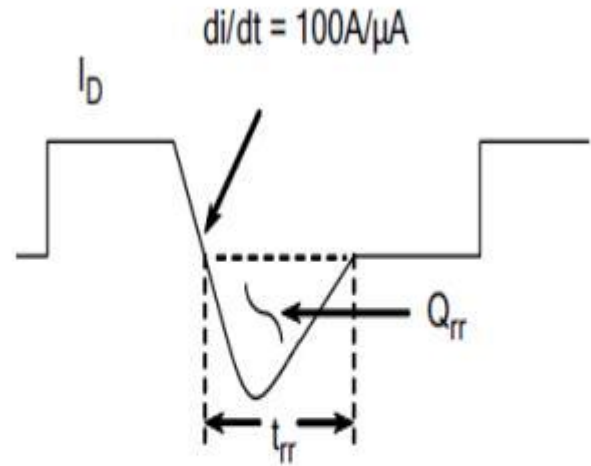


Figure15.Diode Reverse Recovery Waveform

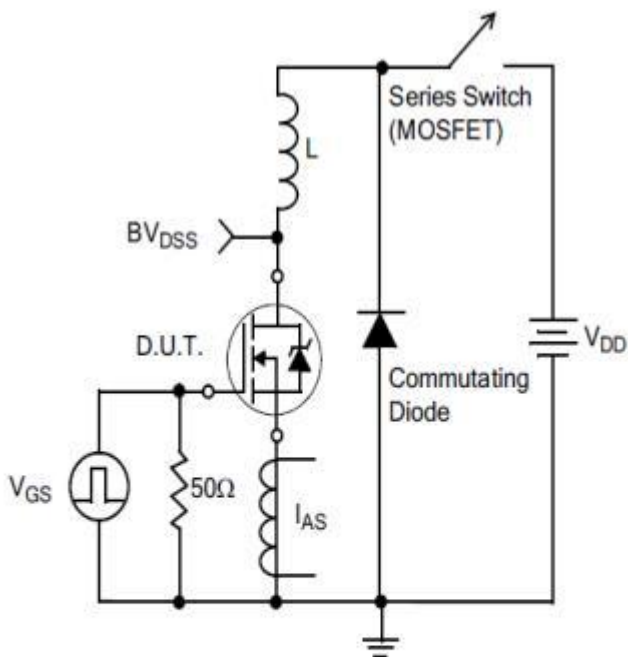
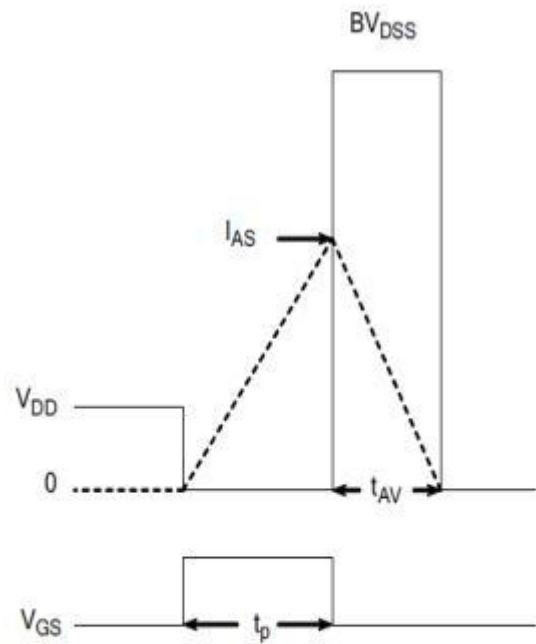


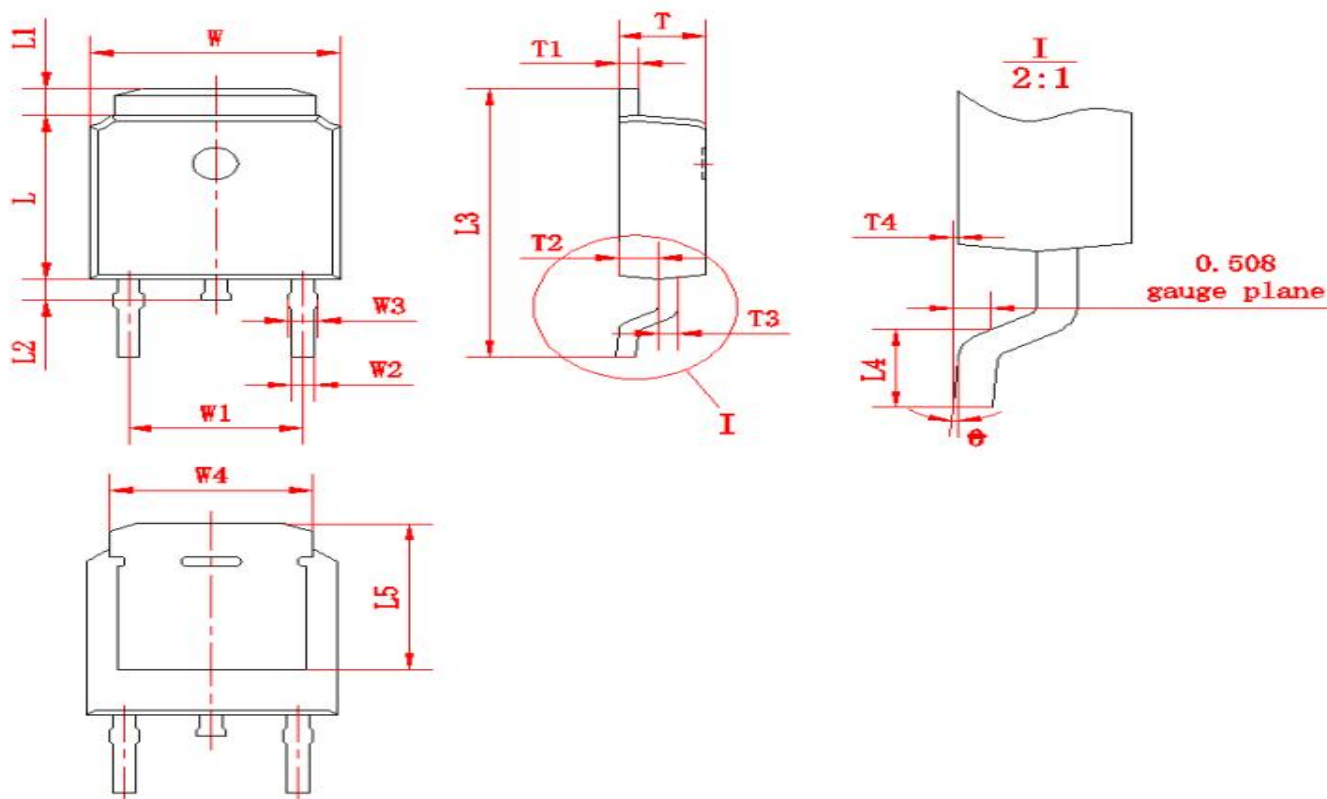
Figure16.Unclamped Inductive Switching Test Circuit



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

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) |       | Ø  | 0    | 8    |
| L  | 6.00    | 6.20 | T  | 2.20   | 2.40  |    |      |      |



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