

N Channel MOSFET

 Lead Free Package and Finish

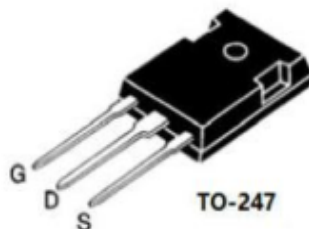
Applications:

- Uninterruptible Power Supply(UPS)
- Power Factor Correction(PFC)
- SMPS Power
- DC-AC Inverter

| | | |
|-------|---------------------|-----------|
| I_D | $R_{DS(ON)}$ (Typ.) | V_{DSS} |
| 25A | 0.13Ω | 500V |

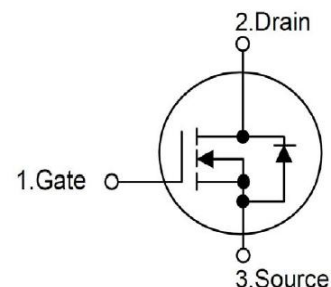
Features:

- Low On Resistance
- Fast switching
- Improved dv/dt capability
- RoHS Compliant



TO-247

Not to Scale



Ordering Information:

| Part Number | Package | Marking |
|-------------|---------|----------|
| RS25N50W | TO-247 | RS25N50W |

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

| Symbol | Parameter | RS25N50W | Units |
|---------------------|--|------------|-------|
| V_{DSS} | Drain-to-Source Voltage (Note*1) | 500 | V |
| I_D | Continuous Drain Current | 25 | A |
| I_{DM} | Pulsed Drain Current (Note*2) | 100 | |
| PD | Power Dissipation | 230 | W |
| V_{GS} | Gate-to-Source Voltage | ±30 | V |
| EAS | Single Pulse Avalanche Energy $L=10\text{mH}$ | 2500 | mJ |
| TL TPKG | Maximum Temperature for Soldering | 300 260 | °C |
| | Leads at 0.063in(1.6mm)from Case for 10 seconds | | |
| | Package Body for 10 seconds | | |
| T_J and T_{STG} | 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 | RS25N50W | Units | Test Conditions |
|-----------------|---------------------|----------|-------|--|
| $R_{\theta JC}$ | Junction-to-Case | 0.29 | °C/W | Drain lead soldered to water cooled heatsink,PD adjusted for a peak junction temperature of +150°C. |
| $R_{\theta JA}$ | Junction-to-Ambient | 62 | | 1 cubic foot chamber,free air. |

OFF Characteristics TJ=25°C unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|--------|-----------------------------------|------|------|------|-------|--|
| BVDSS | Drain-to-source Breakdown Voltage | 500 | -- | -- | V | V _{GS} =0V, I _D =250μA |
| IDSS | Drain-to-Source Leakage Current | -- | -- | 1.0 | μA | V _{DS} =500V, V _{GS} =0V |
| IGSS | Gate-to-Source Forward Leakage | -- | -- | 100 | μA | V _{GS} =+30V V _{DS} =0V |
| | Gate-to-Source Reverse Leakage | -- | -- | -100 | | V _{GS} =-30V V _{DS} =0V |

ON Characteristics TJ=25°C unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---------|---|------|------|------|-------|--|
| RDS(on) | Static Drain-to-Source On-Resistance (Note*3) | -- | 0.13 | 0.18 | Ω | V _{GS} =10V, I _D =12.5A |
| VGS(TH) | Gate Threshold Voltage | 3.0 | -- | 4.0 | V | V _{GS} =V _{DS} , I _D =250μA |

Resistive Switching Characteristics Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---------|---------------------|------|------|------|-------|---|
| td(ON) | Turn-on Delay Time | -- | 66 | -- | ns | V _{DS} =250V I _D =25A R _G =25Ω (Note:3,4) |
| trise | Rise Time | -- | 59 | -- | | |
| td(OFF) | Turn-OFF Delay Time | -- | 427 | -- | | |
| tfall | Fall Time | -- | 108 | -- | | |

Dynamic Characteristics Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|--------|--------------------------------|------|------|------|-------|---|
| Ciss | Input Capacitance | -- | 4295 | -- | pF | V _{GS} =0V V _{DS} =25V f=1.0MHz |
| Coss | Output Capacitance | -- | 450 | -- | | |
| Crss | Reverse Transfer Capacitance | -- | 32 | -- | | |
| Qg | Total Gate Charge | -- | 22 | -- | nC | V _{DS} =250V I _D =25A V _{GS} =10V (Note:3,4) |
| Qgs | Gate-to-Source Charge | -- | 4 | -- | | |
| Qgd | Gate-to-Drain("Miller") Charge | -- | 13 | -- | | |

Source-Drain Diode Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|----------|---------------------------|------|------|------|---------|--|
| I_S | Continuous Source Current | -- | -- | 25 | A | Integral pn-diode in MOSFET |
| I_{SM} | Maximum Pulsed Current | -- | -- | 100 | A | |
| V_{SD} | Diode Forward Voltage | -- | -- | 1.4 | V | $I_S=25A, V_{GS}=0V$ |
| t_{rr} | Reverse Recovery Time | -- | 482 | -- | nS | $V_{GS}=0V$ $I_S=25A, di/dt=100A/\mu s$ |
| Q_{rr} | Reverse Recovery Charge | -- | 7.6 | -- | μC | |

Notes:

- *1. $T_J = \pm 25^\circ C$ to $+150^\circ C$.
- *2. Repetitive rating; pulse width limited by maximum junction temperature.
- *3. Pulse width $\leq 300\mu s$; duty cycle $\leq 1\%$.

Typical Feature curve ($T_J = 25^\circ C$, unless otherwise noted)

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

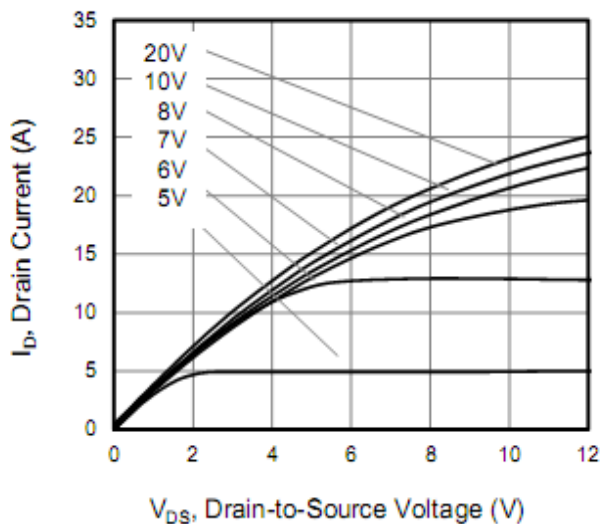


Figure 2. Body Diode Forward Voltage

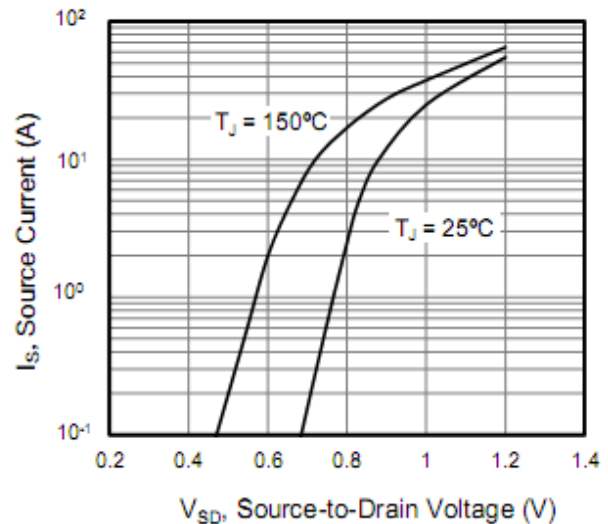


Figure 3. Drain Current vs. Temperature

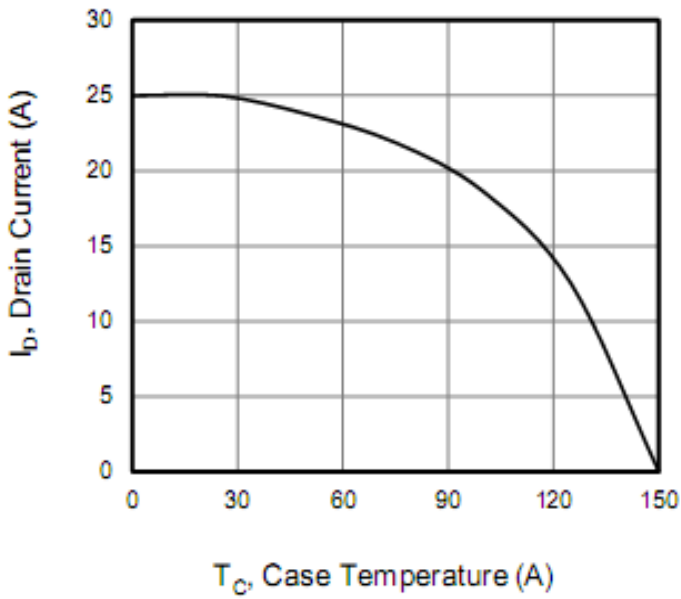


Figure 4. BV_{DSS} Variation vs. Temperature

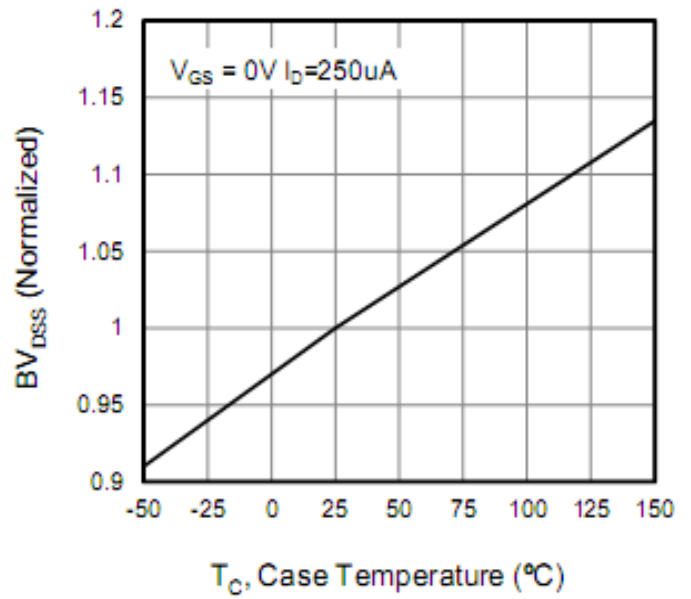


Figure 5. Transfer Characteristics

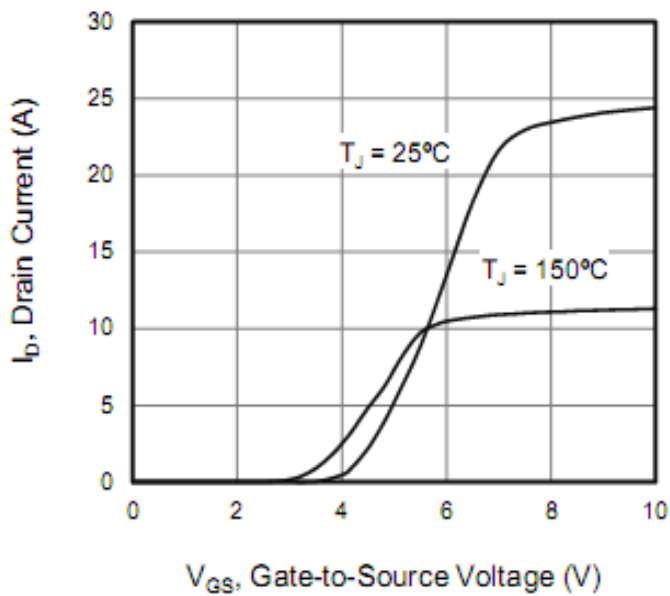


Figure 6. On-Resistance vs. Temperature

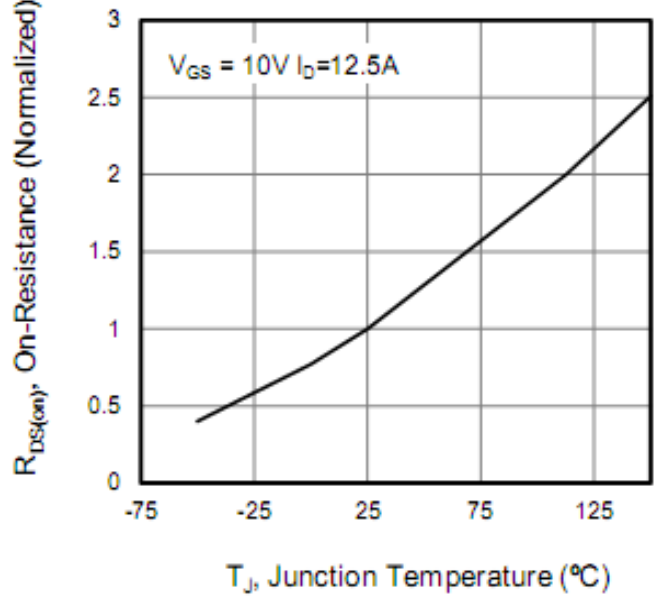


Figure 7. Capacitance

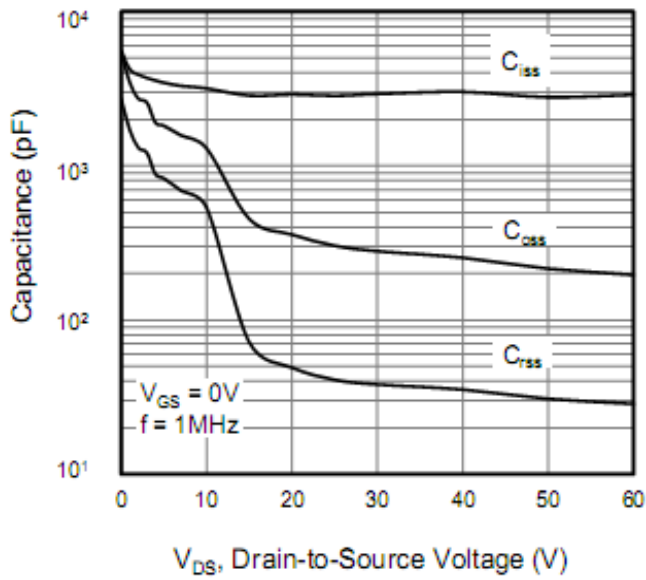


Figure 8. Gate Charge

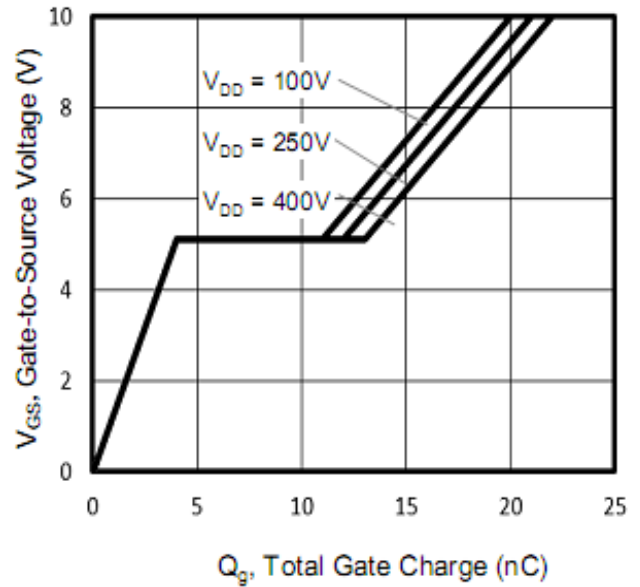
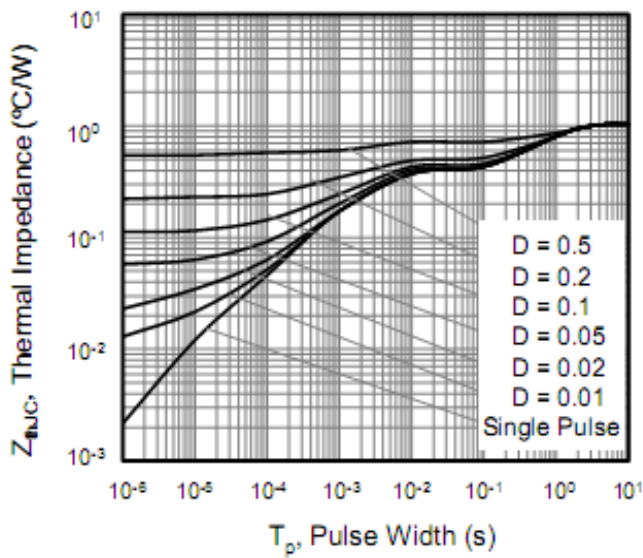


Figure 9. Transient Thermal Impedance

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Test Circuits and Waveforms

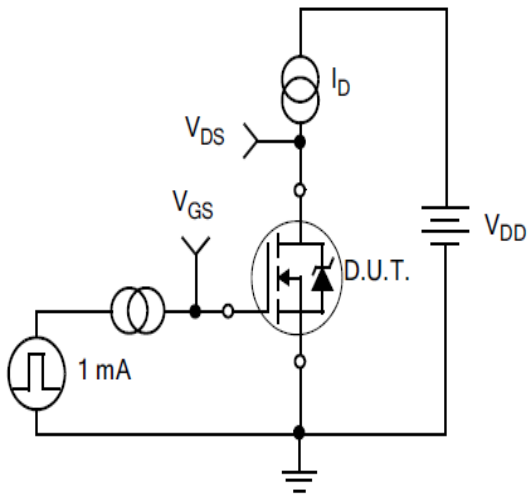


Figure10.
Gate Charge Test Circuit

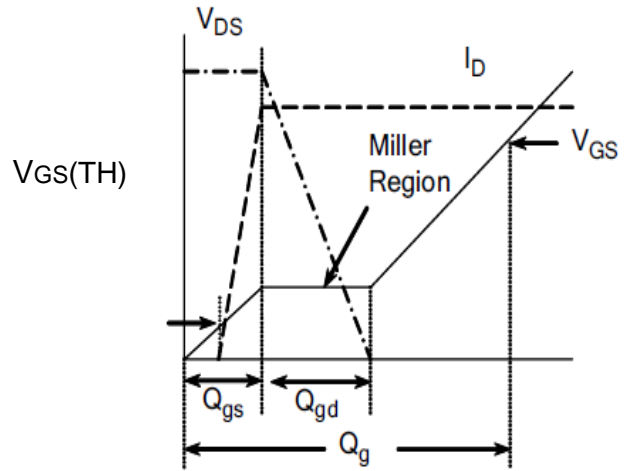


Figure11.
Gate Charge Waveform

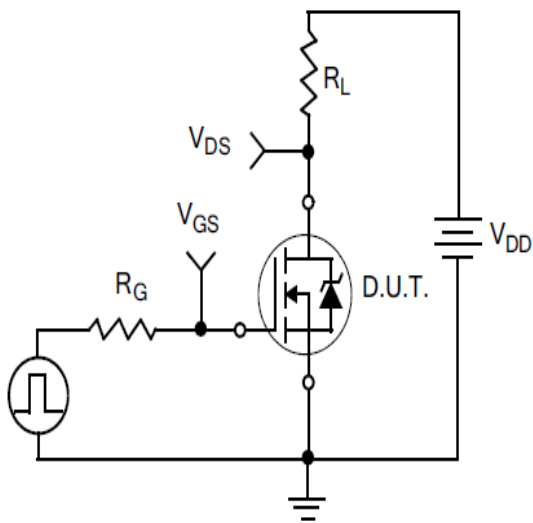


Figure12.
Resistive Switching Test Circuit

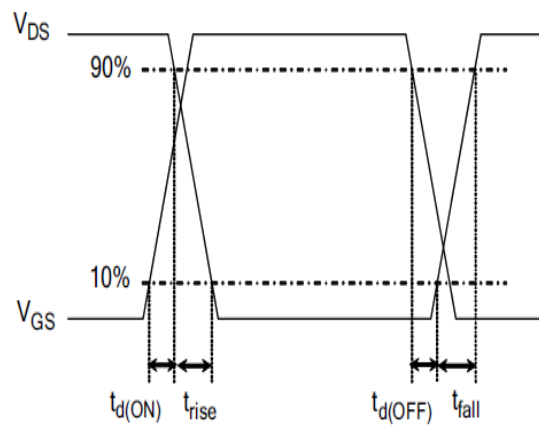


Figure13.
Resistive Switching Waveforms

Test Circuits and Waveforms

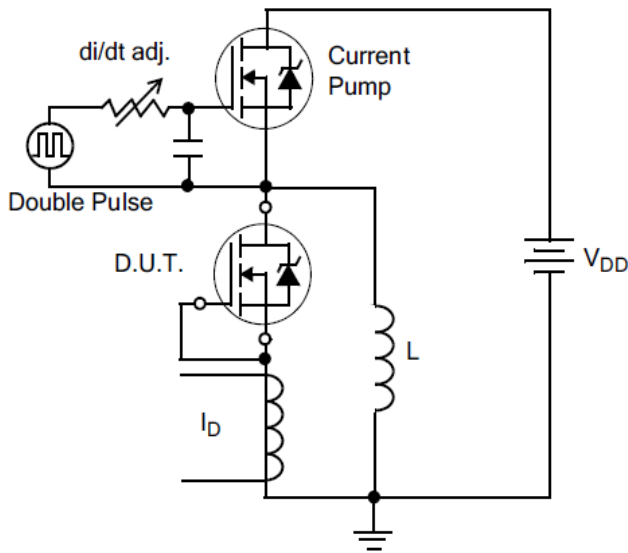


Figure14.Diode Reverse Recovery Test Circuit

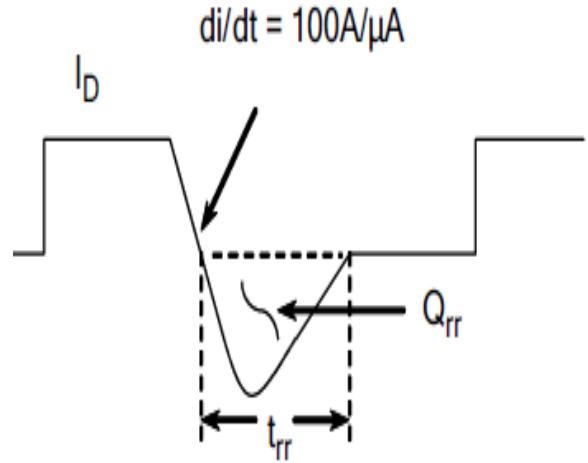


Figure15.Diode Reverse Recovery Waveform

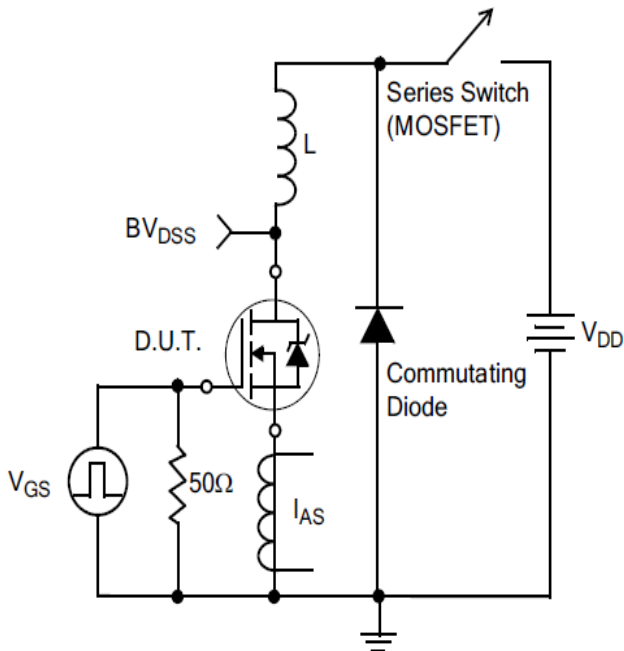
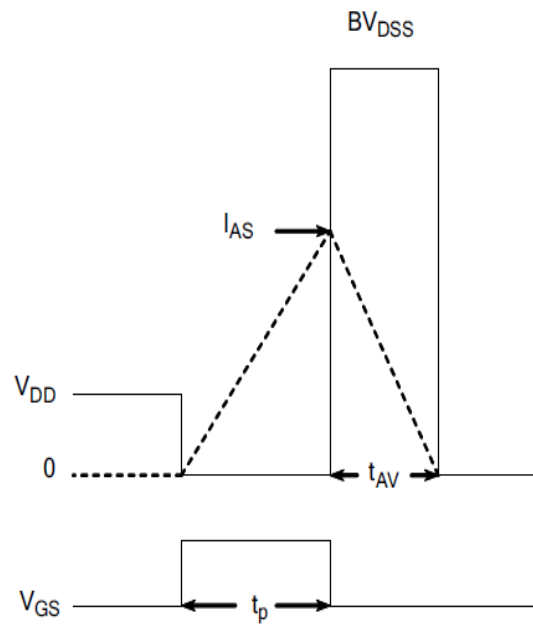


Figure16.Unclamped Inductive Switching Test Circuit

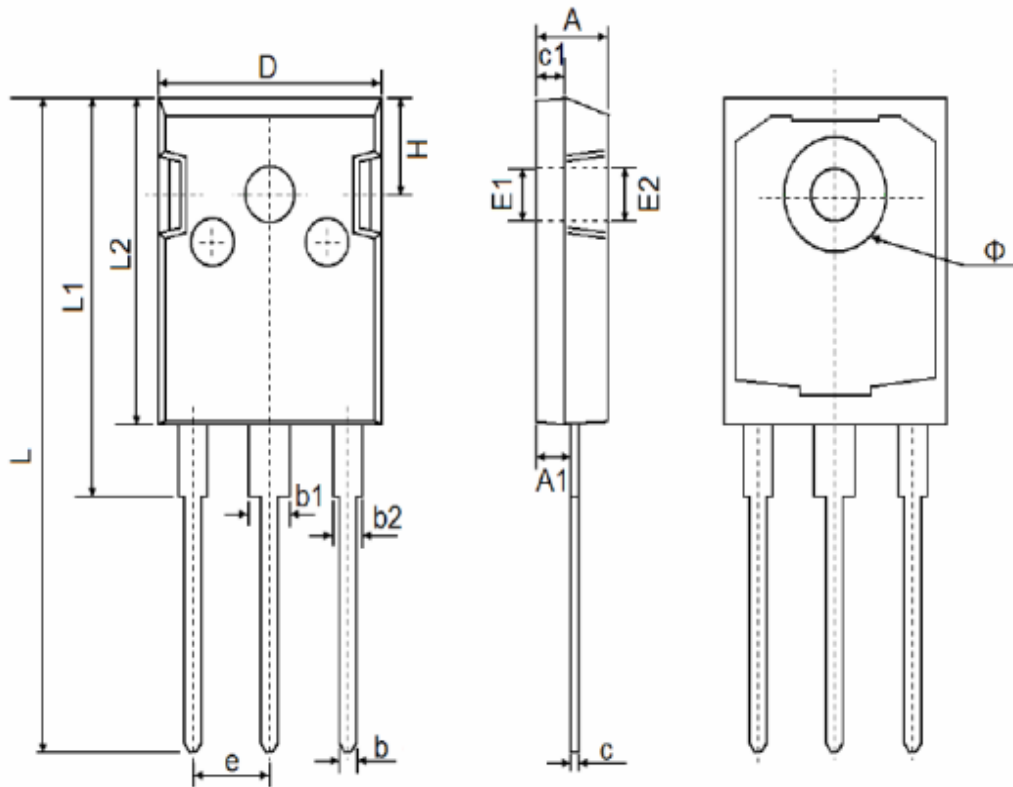


$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Figure17.Unclamped Inductive Switching Waveforms

Package outline drawing

Unit:mm



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| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.850 | 5.150 | 0.191 | 0.200 |
| A1 | 2.200 | 2.600 | 0.087 | 0.102 |
| b | 1.000 | 1.400 | 0.039 | 0.055 |
| b1 | 2.800 | 3.200 | 0.110 | 0.126 |
| b2 | 1.800 | 2.200 | 0.071 | 0.087 |
| c | 0.500 | 0.700 | 0.020 | 0.028 |
| c1 | 1.900 | 2.100 | 0.075 | 0.083 |
| D | 15.450 | 15.750 | 0.608 | 0.620 |
| E1 | 3.500 REF | | 0.138 REF | |
| E2 | 3.600 REF | | 0.142 REF | |
| L | 40.900 | 41.300 | 1.610 | 1.626 |
| L1 | 24.800 | 25.100 | 0.976 | 0.988 |
| L2 | 20.300 | 20.600 | 0.799 | 0.811 |
| φ | 7.100 | 7.300 | 0.280 | 0.287 |
| e | 5.450 TYP | | 0.215 TYP | |
| H | 5.980 REF | | 0.235 REF | |

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