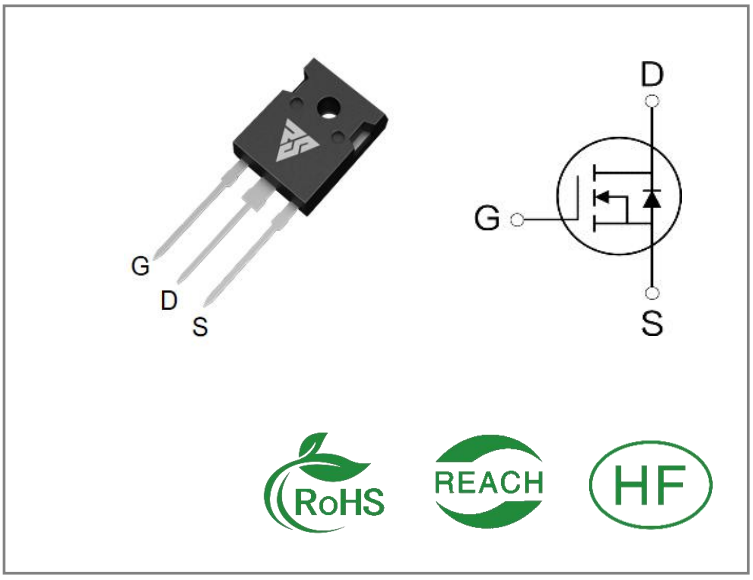
| ID | $R_{DS}$(ON)(Typ ) | VDSS |
|---|---|---|
| 45A | 0.08Ω | 500V |




## 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. |
|---|---|---|---|---|
| RS45N50W | T0-247-3 | RS45N50W | Tube | 30 PCS |

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

| Symbol | Parameter | RS45N50W | Units |
|---|---|---|---|
| VDSS | Drain-to-Source Voltage | 500 | V |
| ID | Continuous Drain Current TC=25℃ | 45 | A |
| IDM | Pulsed Drain Current (Note*1) | 180 | |
| PD | Power Dissipation | 260 | W |
| VGS | Gate- to- Source Voltage | ±30 | V |
| EAS | Single Pulse Avalanche Engergy<br>L = 10mH,,VDD = 50V, RG = 25 Ω | 3125 | 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 | RS45N50W | Units | Test Conditions |
|---|---|---|---|---|
| RθJC | Junction-to-Case | 0.48 | ℃/ 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 | 500 | -- | -- | V | VGS=0V,ID=250μA |
| IDSS | Drain- to- Source Leakage Current | -- | -- | 1 | μA | VDS=500V,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) | -- | 0.08 | 0.1 | Ω | VGS=10V,ID=22.5A |
| 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 | -- | 84 | -- | nS | VDS=250V<br>ID=45A<br>RG=25Ω |
| trise | Rise Time | -- | 87 | -- | | |
| td(OFF) | Turn- OFF Delay Time | -- | 508 | -- | | |
| tfall | Fall Time | -- | 176 | -- | | |

**Dynamic Characteristics** Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| Ciss | Input Capacitance | -- | 7000 | -- | pF | VGS=0V VDS=25V f=1.0MHz |
| Coss | Output Capacitance | -- | 740 | -- | | |
| Crss | Reverse Transfer Capacitance | -- | 25 | -- | | |
| Qg | Total Gate Charge | -- | 130 | -- | nC | VDS=400V ID=45A VGS=10V |
| Qgs | Gate- to- Source Charge | -- | 33 | -- | | |
| Qgd | Gate-to-Drain(" Miller") Charge | -- | 42 | -- | | |

## Source- Drain Diode Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| IS | Continuous Source Current | -- | -- | 45 | A | Integral pn- diode in MOSFET |
| ISM | Maximum Pulsed Current | -- | -- | 180 | A | |
| VSD | Diode Forward Voltage | -- | -- | 1.4 | V | IS=22.5A,VGS=0V |
| trr | Reverse Recovery Time | -- | 462 | -- | nS | VDD=250V IS=45A,di/dt=100 A/μs |
| Qrr | Reverse Recovery Charge | -- | 8.5 | -- | 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 ($T_J$ = 25°C)**

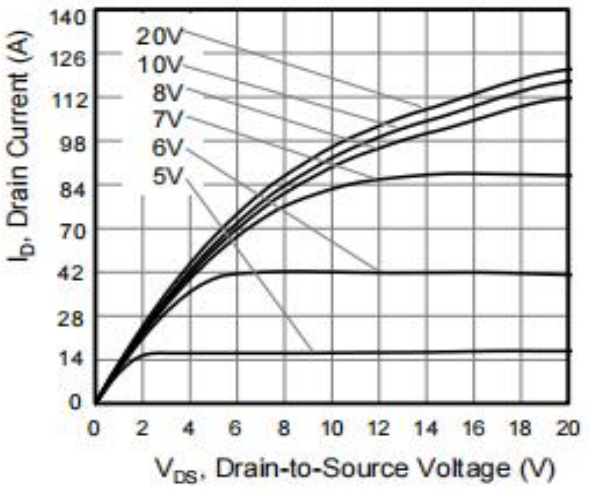



**Figure 2. Body Diode Forward Voltage**

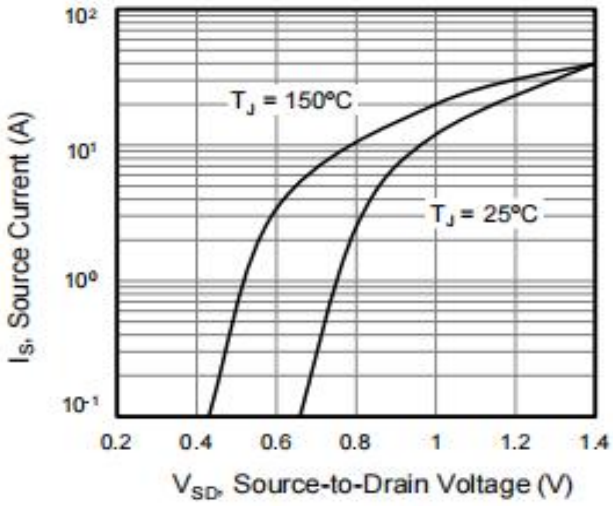



**Figure 3. Drain Current vs. Temperature**

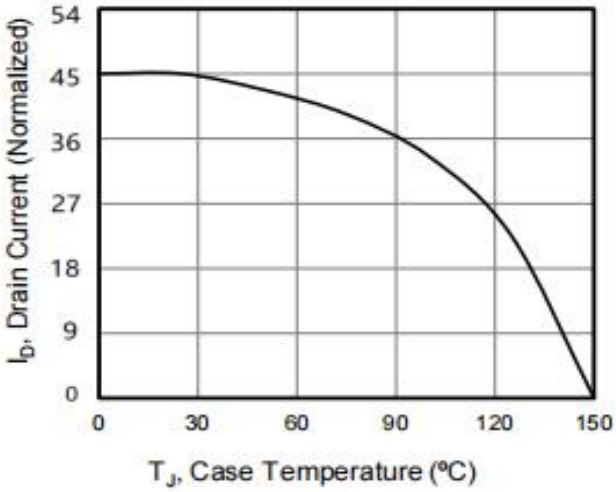



**Figure 4. $BV_{DSS}$ Variation vs. Temperature**

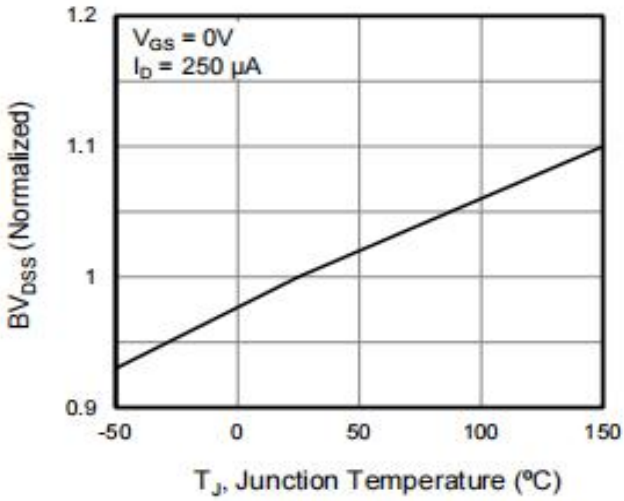



**Figure 5. Transfer Characteristics**

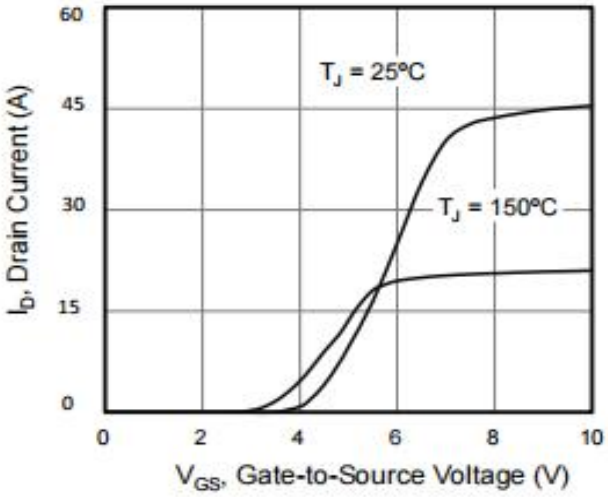



**Figure 6. On-Resistance vs. Temperature**

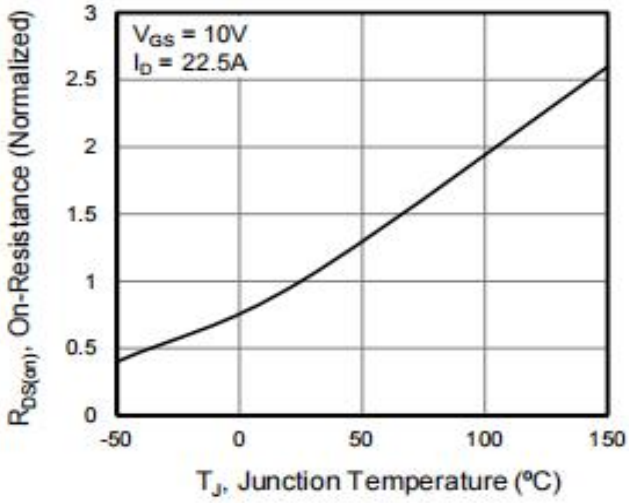


Figure 7. Capacitance

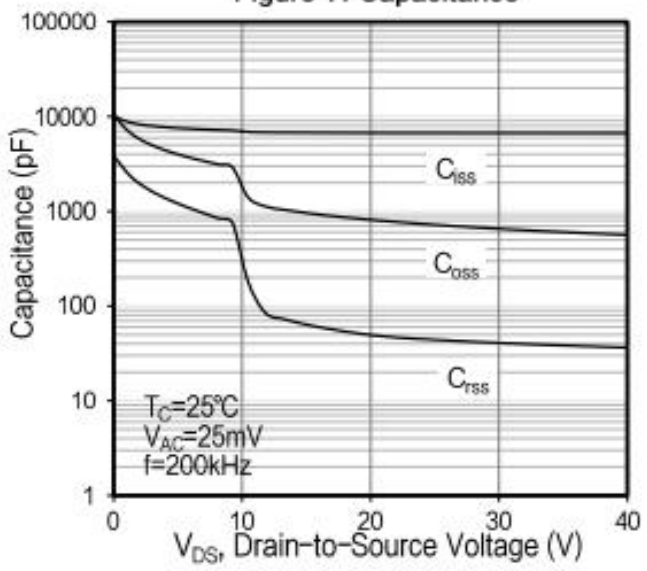



Figure 8. Gate Charge

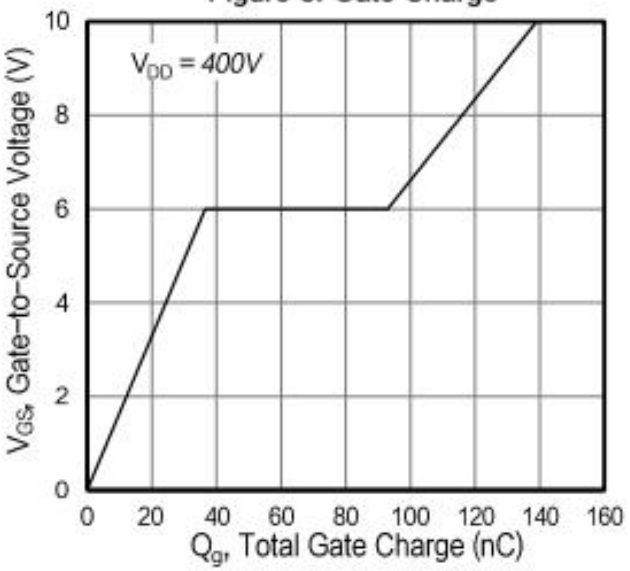



Figure 9. Transient Thermal Impedance

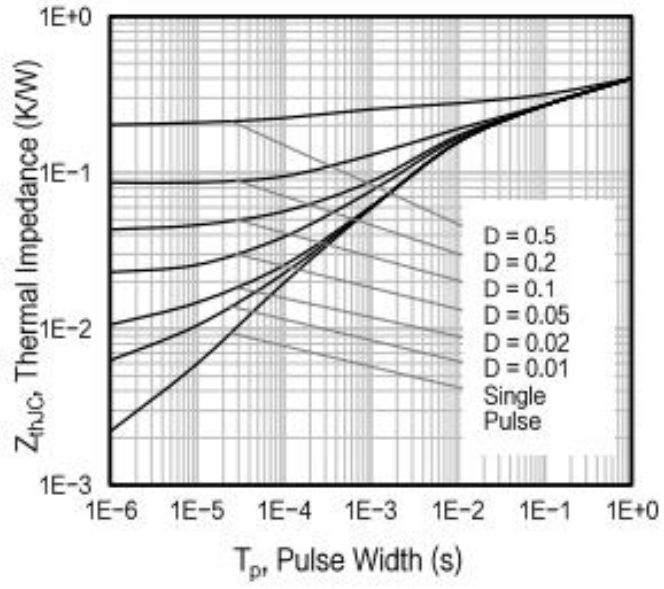
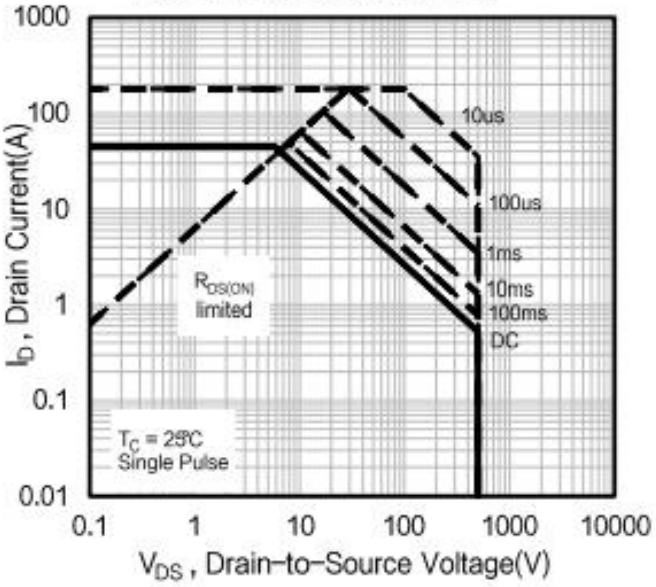



Fig. 10 Safe Operating Area



## Test Circuits and Waveforms

**Figure A: Gate Charge Test Circuit and Waveform**

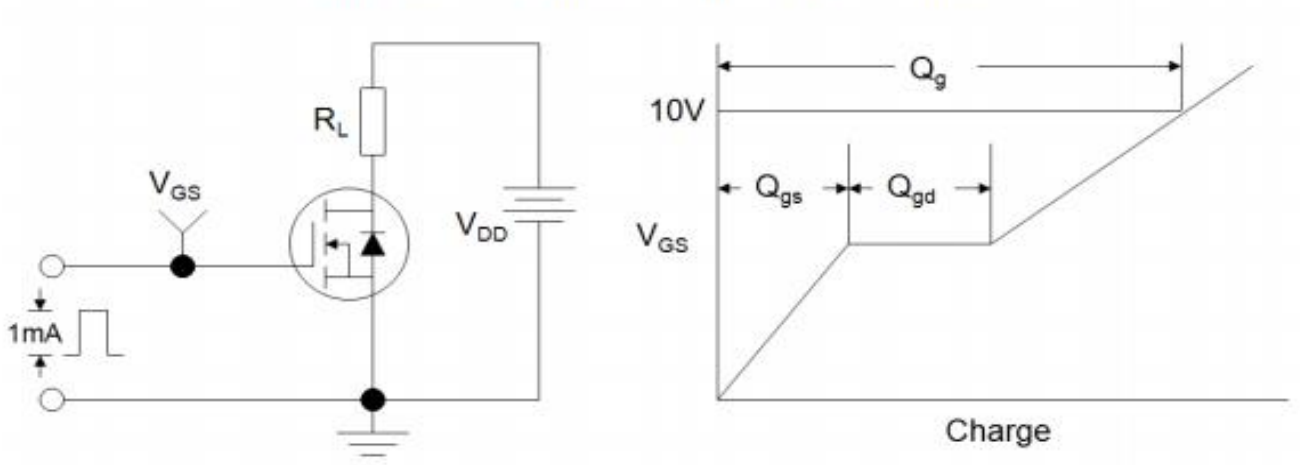



**Figure B: Resistive Switching Test Circuit and Waveform**

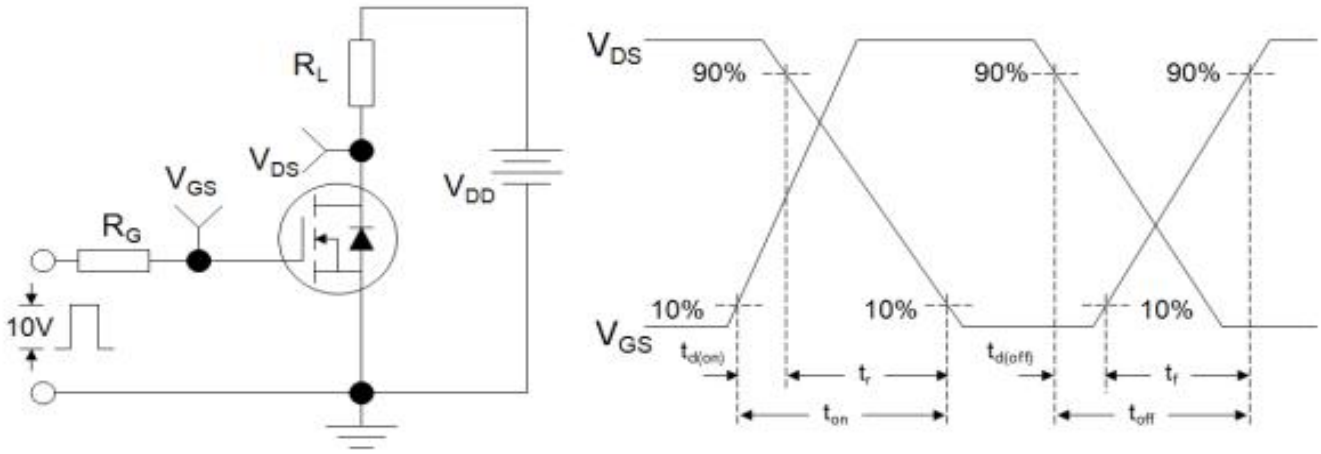
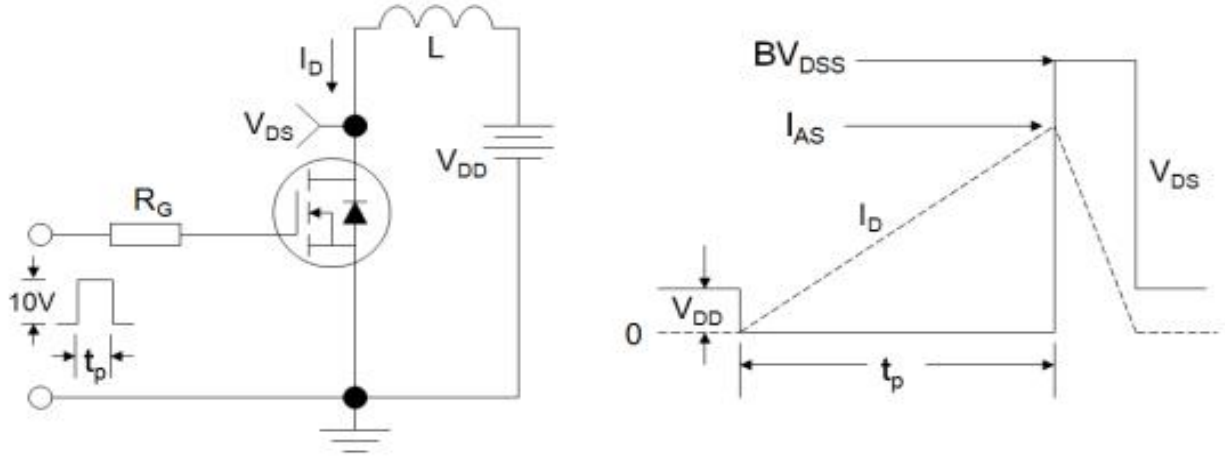
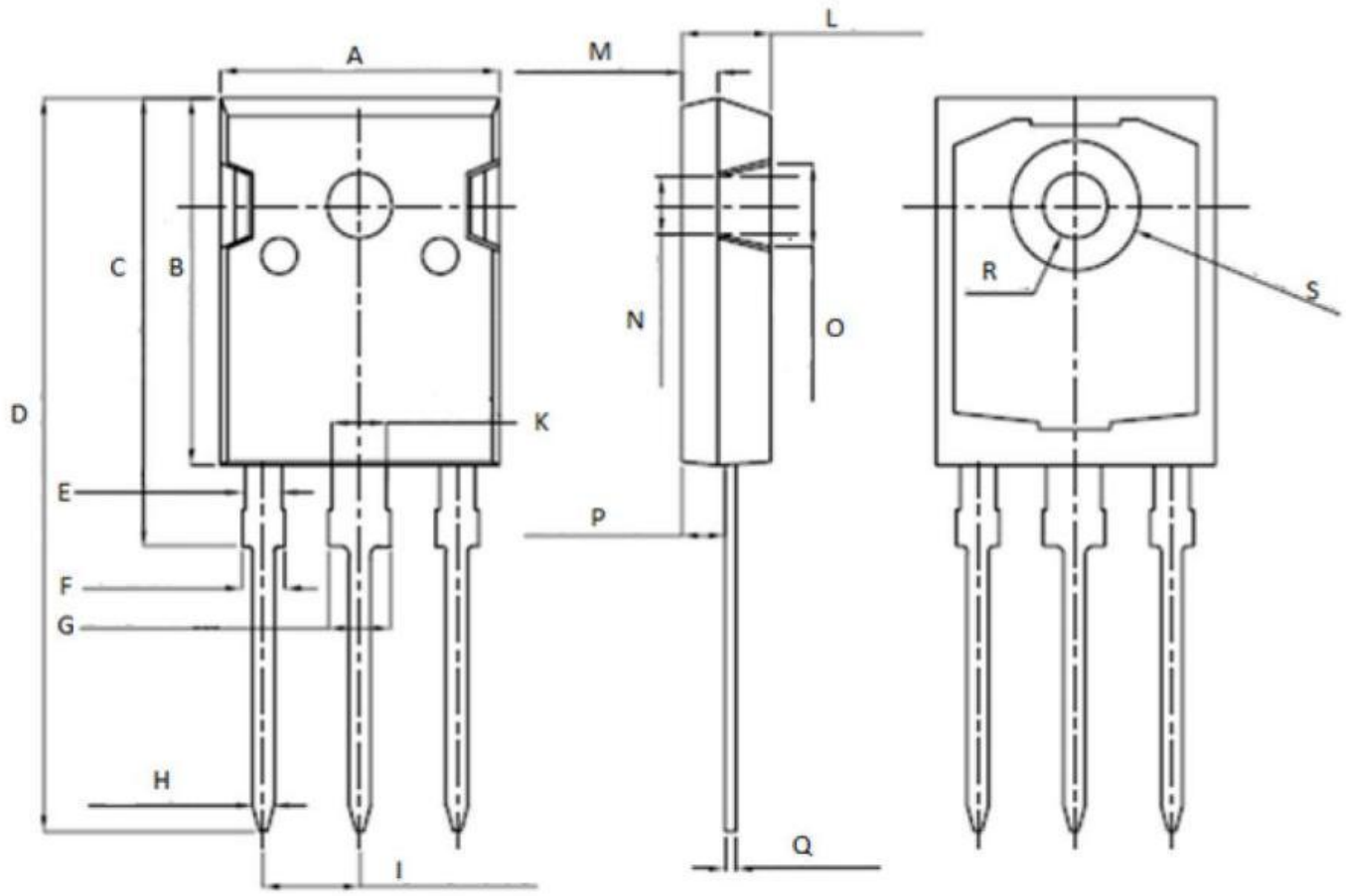



**Figure C: Unclamped Inductive Switching Test Circuit and Waveform**



## Package outline drawing(TO-247 Unit: mm )




| Unit: mm | | |
|---|---|---|
| Symbol | Min. | Max. |
| A | 15.95 | 16.25 |
| B | 20.85 | 21.25 |
| C | 20.95 | 21.35 |
| D | 40.5 | 40.9 |
| E | 1.9 | 2.1 |
| F | 2.1 | 2.25 |
| G | 3.1 | 3.25 |
| H | 1.1 | 1.3 |
| I | 5.40 | 5.50 |

| Unit: mm | | |
|---|---|---|
| Symbol | Min. | Max. |
| K | 2.90 | 3.10 |
| L | 4.90 | 5.30 |
| M | 1.90 | 2.10 |
| N | 4.50 | 4.70 |
| O | 5.40 | 5.60 |
| P | 2.29 | 2.49 |
| Q | 0.51 | 0.71 |
| R | ϕ3.5 | ϕ3.7 |
| S | ϕ7.1 | ϕ7.3 |

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