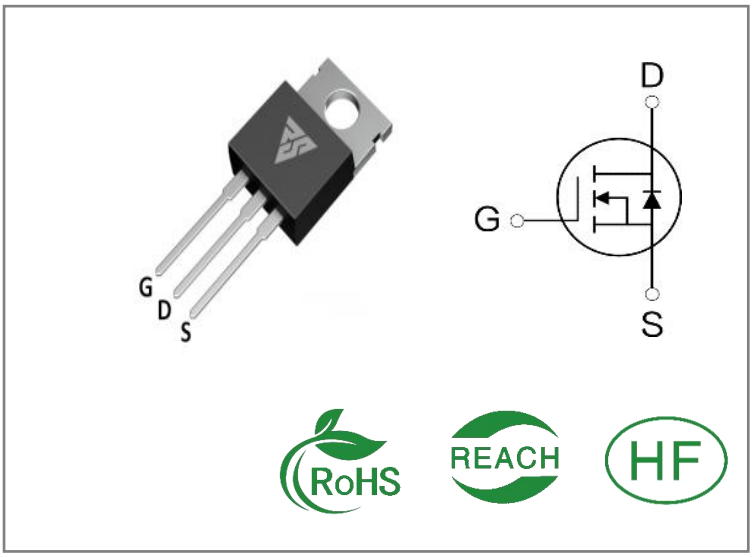
| ID | $R_{DS}$(ON)(Typ ) | VDSS |
|---|---|---|
| 120A | 4.3mΩ | 100V |




## Applications:
- Load Switch
- PWM Applications
- Power Managment

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

## Ordering Information

| Part Number | Package | Marking | Packing | Qty. |
|---|---|---|---|---|
| RS100N120T | T0-220 | RS100N120T | Tube | 50 PCS |

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

| Symbol | Parameter | RS100N120T | Units |
|---|---|---|---|
| VDSS | Drain-to-Source Voltage | 100 | V |
| ID | Continuous Drain Current TC=25℃ | 120 | A |
| ID | Continuous Drain Current TC=100℃ | 80 | |
| IDM | Pulsed Drain Current | 480 | |
| PD | Power Dissipation | 178 | W |
| VGS | Gate- to- Source Voltage | ±20 | V |
| EAS | Single Pulse Avalanche Engergy<br>L = 3.0mH,VDS = 50V, RG = 25Ω, Tj = 25℃ | 486 | 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 | RS100N120T | Units | Test Conditions |
|---|---|---|---|---|
| RθJC | Junction-to-Case | 0.7 | ℃/ W | Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 1 5 0 ℃ |
| RθJA | Junction-to-Ambient | 46 | | 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 | 100 | -- | -- | V | VGS=0V,ID=250μA |
| IDSS | Drain- to- Source Leakage Current | -- | -- | 1 | μA | VDS=80V,VGS=0V |
| IGSS | Gate- to- Source Forward Leakage | -- | -- | 100 | nA | VGS=20V ,VDS=0V |
| | Gate- to- Source Reverse Leakage | -- | -- | -100 | | VGS=-20V ,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 | -- | 4.3 | 5.3 | mΩ | VGS=10V,ID=20A |
| | | -- | 5.5 | 7.5 | mΩ | VGS=4.5V,ID=10A |
| VGS(TH) | Gate Threshold Voltage | **2** | **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 | -- | 18 | -- | nS | VDS=50V<br>ID=20A<br>RG=3Ω<br>VGS=10V |
| trise | Rise Time | -- | 23 | -- | | |
| td(OFF) | Turn- OFF Delay Time | -- | 37 | -- | | |
| tfall | Fall Time | -- | 16 | -- | | |

## Dynamic Characteristics Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| Ciss | Input Capacitance | -- | 4100 | -- | pF | VGS= 0V<br>VDS=50V<br>f=1MHz |
| Coss | Output Capacitance | -- | 590 | -- | | |
| Crss | Reverse Transfer Capacitance | -- | 20 | -- | | |
| Qg | Total Gate Charge | -- | 69 | -- | nC | VDS= 50V<br>ID=20A<br>VGS=10V |
| Qgs | Gate- to- Source Charge | -- | 24 | -- | | |
| Qgd | Gate-to-Drain(" Miller") Charge | -- | 19 | -- | | |

## Source- Drain Diode Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| IS | Continuous Source Current | -- | -- | 120 | A | Integral pn- diode in MOSFET |
| ISM | Maximum Pulsed Current | -- | -- | 480 | A | |
| VSD | Diode Forward Voltage | -- | -- | 1.0 | V | IS=20A,VGS=0V |
| trr | Reverse Recovery Time | -- | 64 | -- | nS | VGS=0V<br>IS=20A<br>di/dt=100A/μs |
| Qrr | Reverse Recovery Charge | -- | 126 | -- | nC | |

**Notes:**

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

## Typical Feature Curve

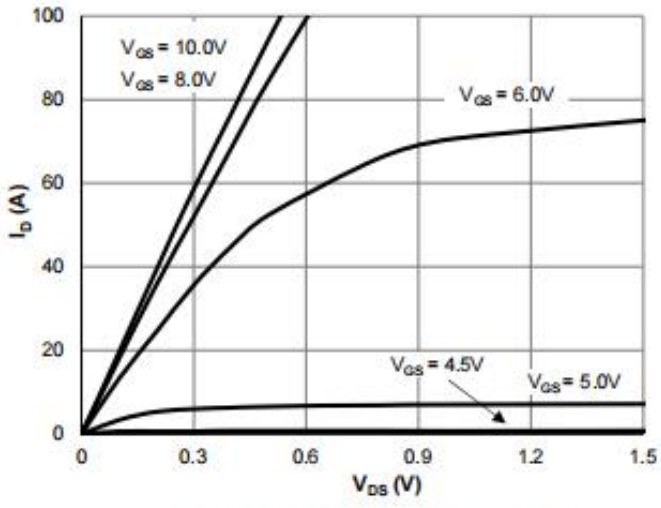



Figure 1: Saturation Characteristics

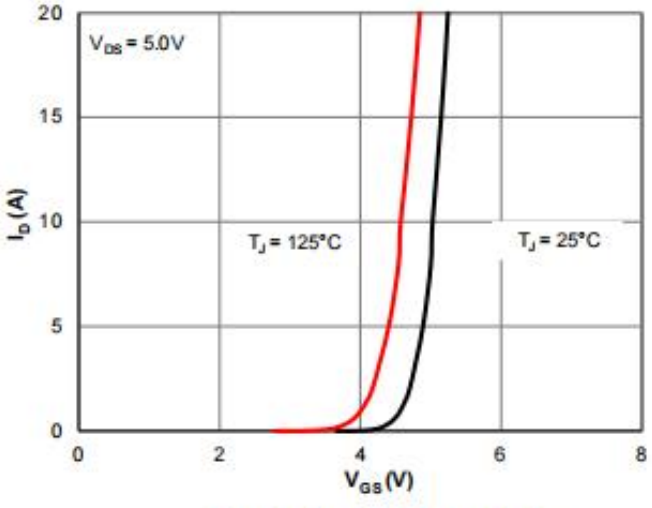



Figure 2: Transfer Characteristics

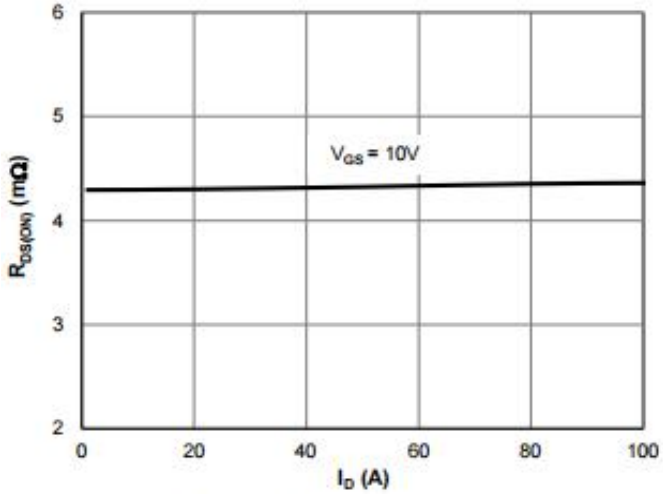



Figure 3: $R_{DS(ON)}$ vs. Drain Current

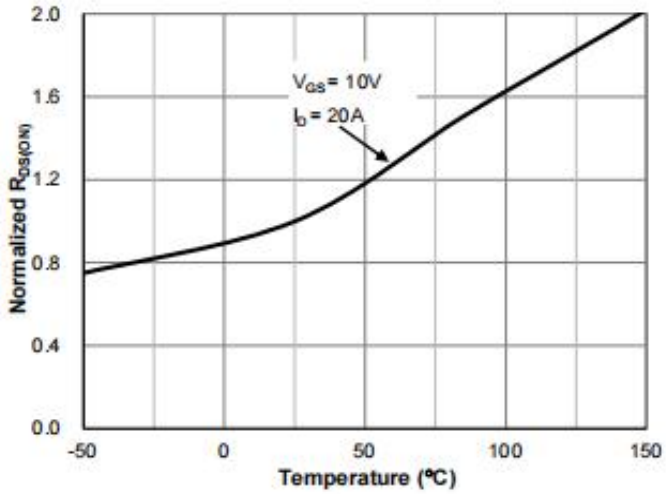



Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

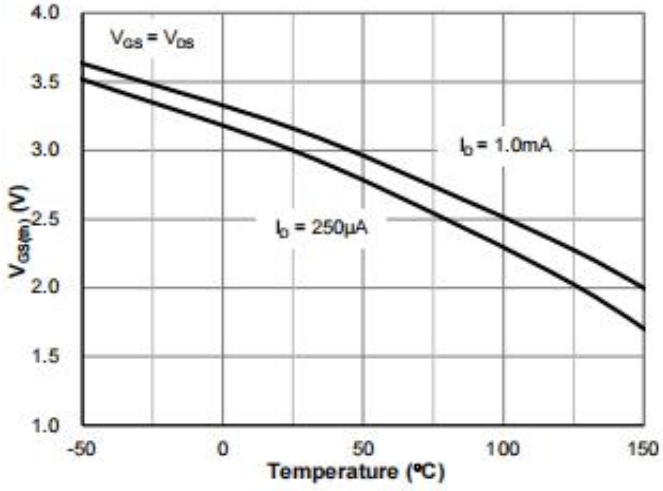



Figure 5: $V_{GS(th)}$ vs. Junction Temperature

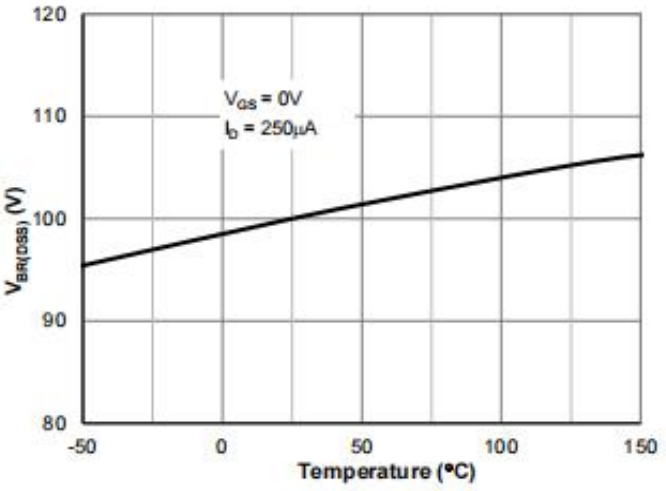



Figure 6: $V_{BR(DSS)}$ vs. Junction Temperature

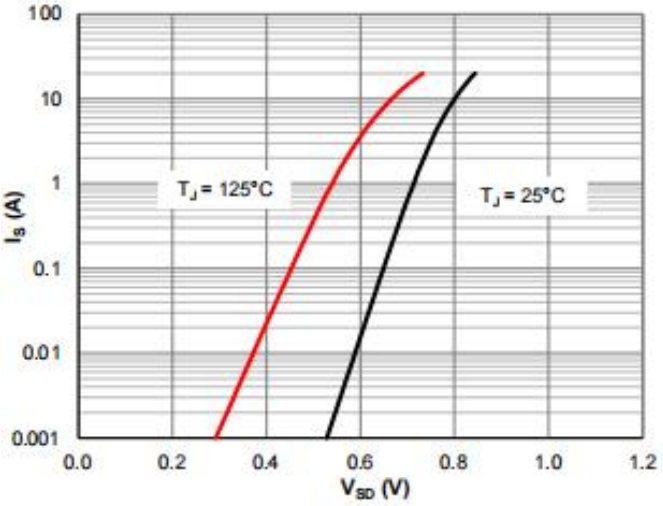



Figure 7: Body-Diode Characteristics

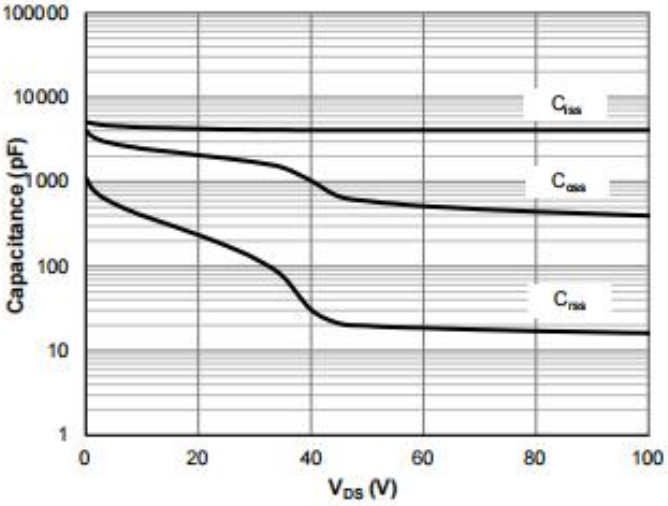



Figure 8: Capacitance Characteristics

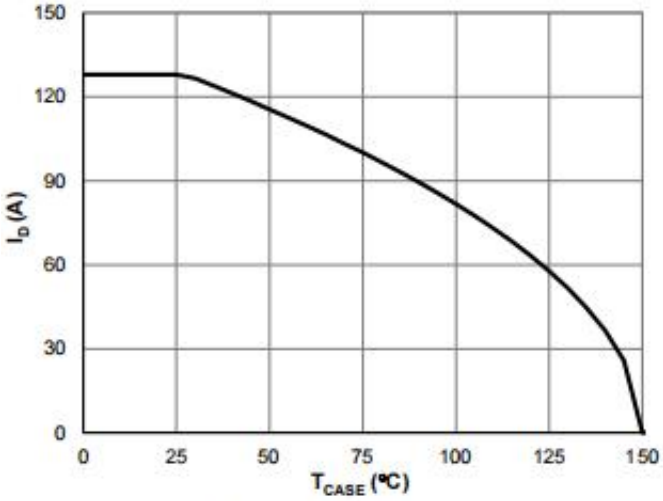



Figure 9: Current De-rating

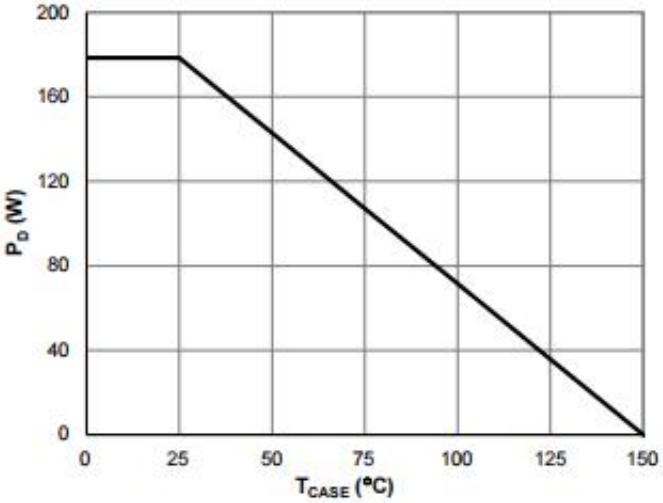



Figure 10: Power De-rating

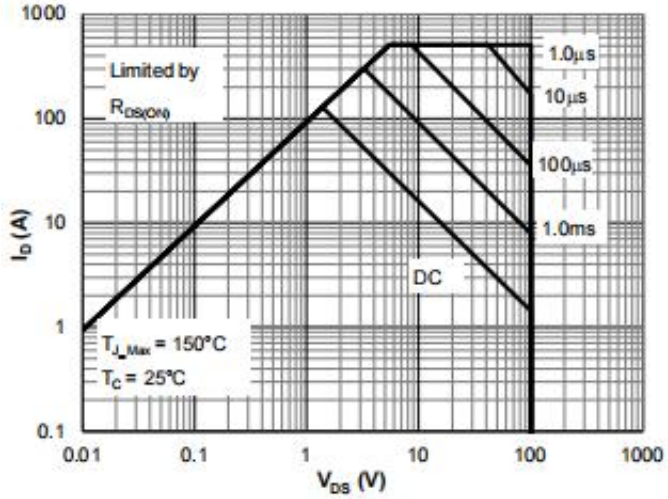



Figure 11: Maximum Safe Operating Area

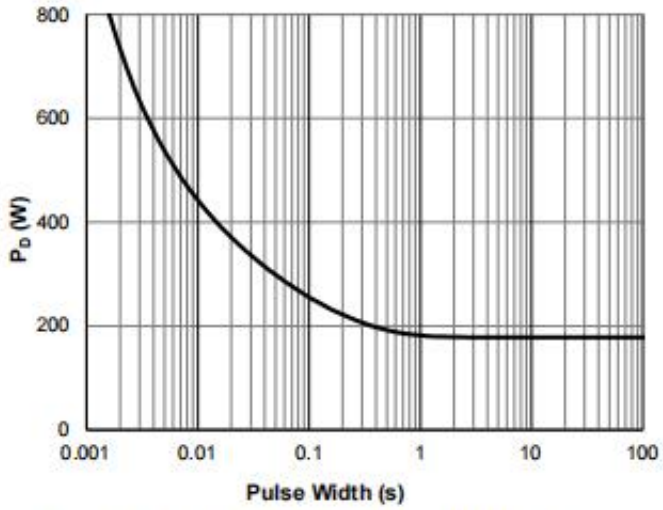



Figure 12: Single Pulse Power Rating, Junction-to-Case

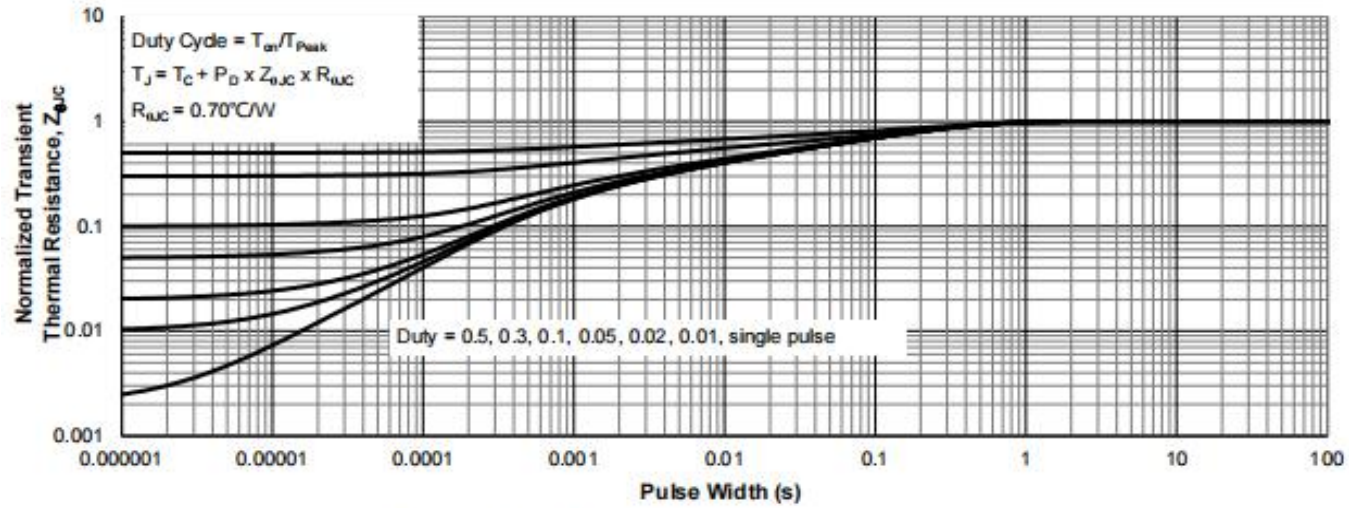



Figure 13: Normalized Maximum Transient Thermal Impedance

## Test ircuits and Waveforms

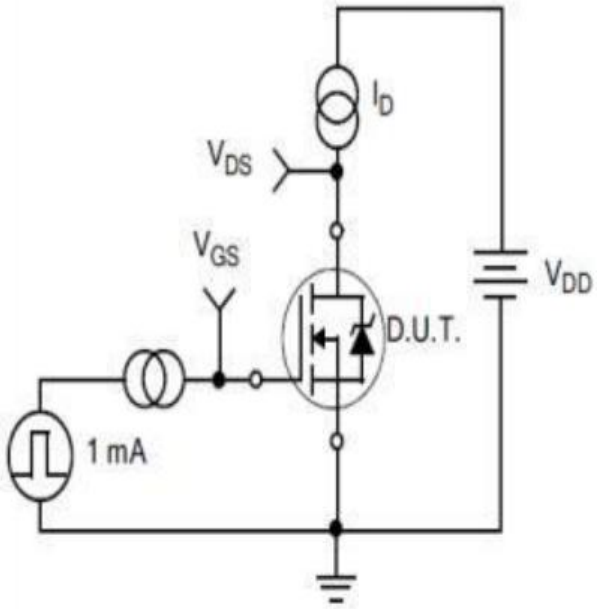



Figure A.
Gate Charge Test Circuit

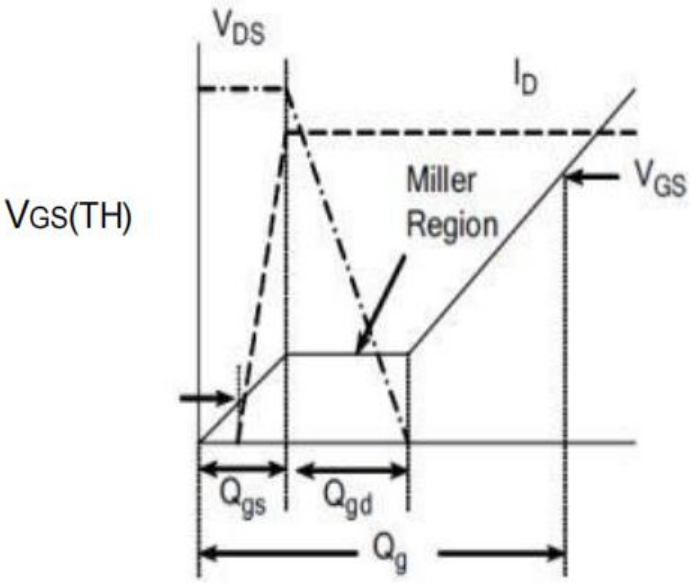



Figure B.
Gate Charge Waveform

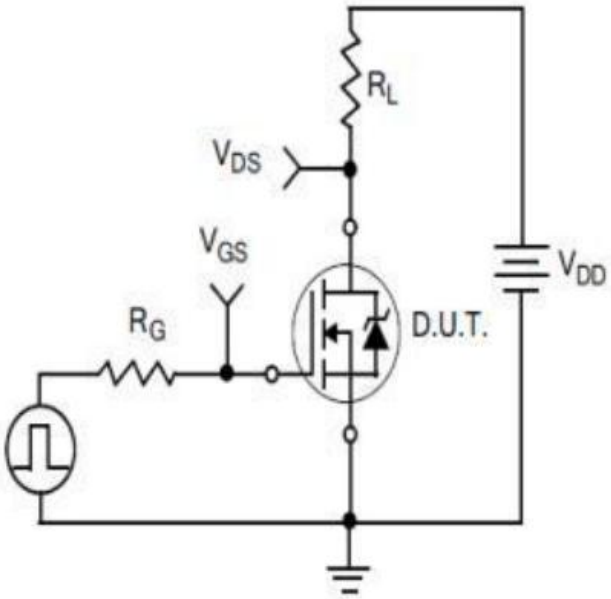



Figure C.
Resistive Switching Test Circuit

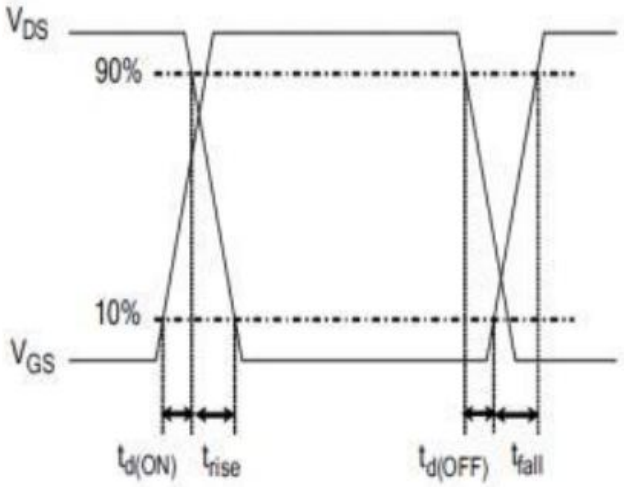



Figure D.
Resistive Switching Waveforms

## Test ircuits and Waveforms

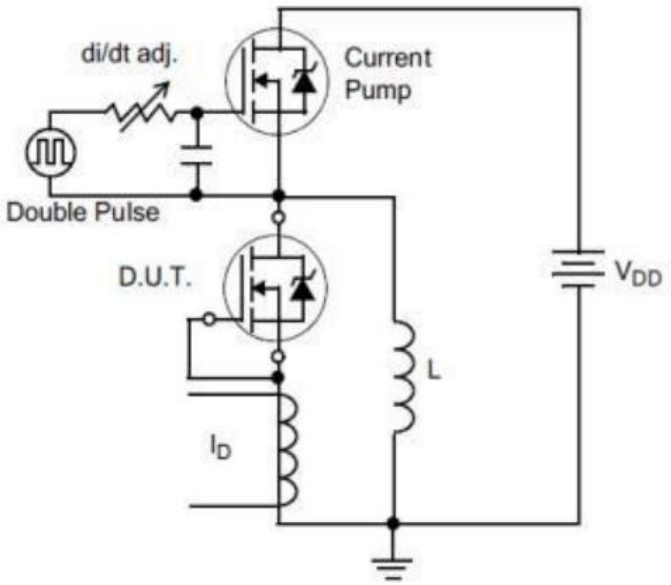



Figure E.Diode Reverse Recovery Test Circuit

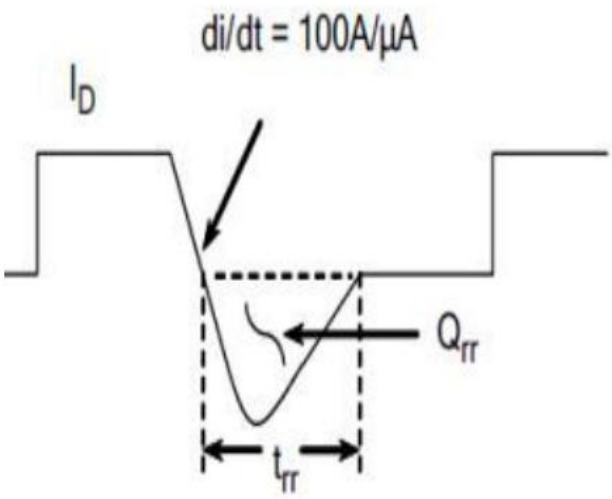



Figure F.Diode Reverse Recovery Waveform

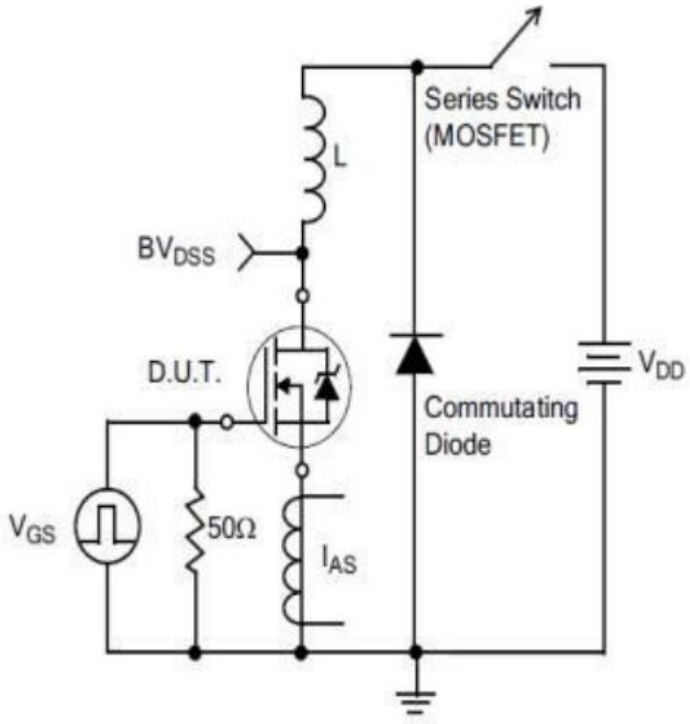
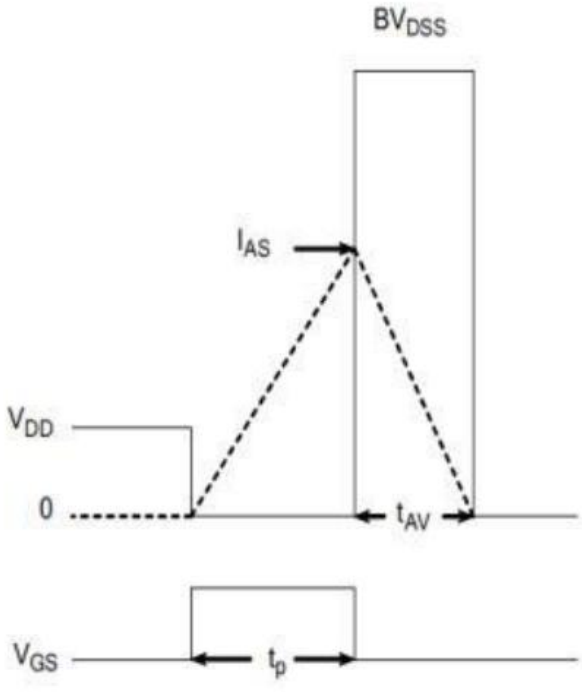


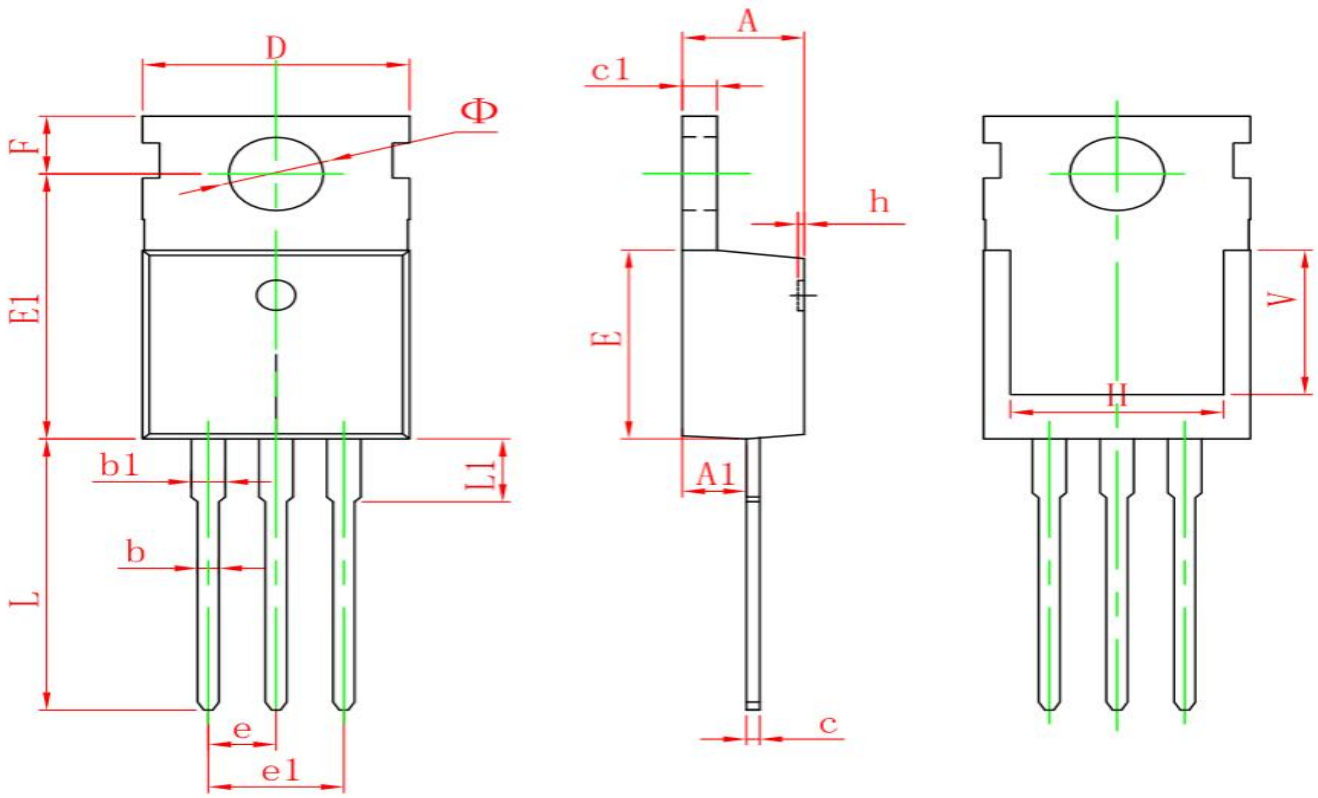

Figure G.Unclamped Inductive Switching Test Circuit




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

Figure H.Unclamped Inductive Switching Waveforms

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




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 4.400 | 4.600 | 0.173 | 0.181 |
| A1 | 2.250 | 2.550 | 0.089 | 0.100 |
| b | 0.710 | 0.910 | 0.028 | 0.036 |
| b1 | 1.170 | 1.370 | 0.046 | 0.054 |
| c | 0.330 | 0.650 | 0.013 | 0.026 |
| c1 | 1.200 | 1.400 | 0.047 | 0.055 |
| D | 9.910 | 10.250 | 0.390 | 0.404 |
| E | 8.950 | 9.750 | 0.352 | 0.384 |
| E1 | 12.650 | 13.050 | 0.498 | 0.514 |
| e | 2.540 TYP. | | 0.100 TYP. | |
| e1 | 4.980 | 5.180 | 0.196 | 0.204 |
| F | 2.650 | 2.950 | 0.104 | 0.116 |
| H | 7.900 | 8.100 | 0.311 | 0.319 |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| L | 12.900 | 13.400 | 0.508 | 0.528 |
| L1 | 2.850 | 3.250 | 0.112 | 0.128 |
| V | 6.900 REF. | | 0.276 REF. | |
| Φ | 3.400 | 3.800 | 0.134 | 0.150 |

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