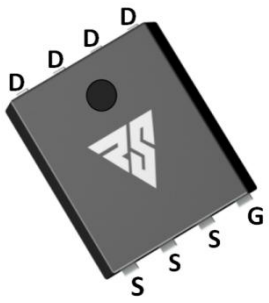
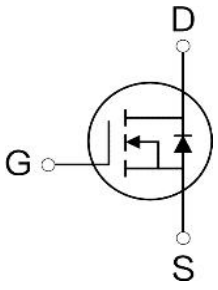
| $I_D$ | $R_{DS(ON)(Typ)}$ | $V_{DSS}$ |
|---|---|---|
| 90A | 3.6mΩ | 20V |




## 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. |
|---|---|---|---|---|
| RS20N90G | DFN5*6 | RS20N90G | Tape&reel | 5000 PCS |

## Absolute Maximun Ratings Tc= 25℃ unless otherwise specified

| Symbol | Parameter | RS20N90G | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage | 20 | V |
| $I_D$ | Continuous Drain Current $T_C$=25℃ | 90 | A |
| $I_D$ | Continuous Drain Current $T_C$=70℃ | 57 | |
| $I_{DM}$ | Pulsed Drain Current | 360 | |
| $P_D$ | Power Dissipation | 142 | W |
| $V_{GS}$ | Gate- to- Source Voltage | ±12 | V |
| $E_{AS}$ | Single Pulse Avalanche Engergy<br>L = 0.5mH, $V_{DD}$ = 15V, $R_G$ = 25Ω, $T_j$ = 25℃ | 60 | mJ |
| $T_L$ $T_{PKG}$ | Maximum Temperature for Soldering | 300<br>260 | ℃ |
| | Leads at 0.063in(1.6mm)from Case for 10 seconds<br>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.


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## Thermal Resistance

| Symbol | Parameter | RS20N90G | Units | Test Conditions |
|---|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-Case | 0.88 | ℃/W | Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 1 5 0 ℃ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient(3) | 40 | | 1 cubic foot chamber,free air. |

## OFF Characteristics TJ= 25℃ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain- to- source Breakdown Voltage | 20 | -- | -- | V | $V_{GS}$=0V,$I_D$=250μA |
| $I_{DSS}$ | Drain- to- Source Leakage Current | -- | -- | 1 | μA | $V_{DS}$=20V,$V_{GS}$=0V |
| $I_{GSS}$ | Gate- to- Source Forward Leakage | -- | -- | 100 | nA | $V_{GS}$=12V,$V_{DS}$=0V |
| | Gate- to- Source Reverse Leakage | -- | -- | -100 | | $V_{GS}$=-12V,$V_{DS}$=0V |

## ON Characteristics TJ=25℃ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $R_{DS(on)}$ | Static Drain- to- Source On-Resistance | -- | 3.6 | -- | mΩ | $V_{GS}$=4.5V,$I_D$=30A |
| | | -- | 4.8 | -- | mΩ | $V_{GS}$=2.5V,$I_D$=20A |
| $V_{GS(TH)}$ | Gate Threshold Voltage | 0.5 | 0.8 | 1.0 | V | $V_{GS}$=$V_{DS}$ $I_D$=250μA |

## Resistive Switching Characteristics Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $t_{d(ON)}$ | Turn- on Delay Time | -- | 8 | -- | nS | $V_{DS}$=10V $I_D$=30A $R_G$=3Ω $V_{GS}$=10V |
| $t_{rise}$ | Rise Time | -- | 20 | -- | | |
| $t_{d(OFF)}$ | Turn- OFF Delay Time | -- | 72 | -- | | |
| $t_{fall}$ | Fall Time | -- | 80 | -- | | |


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**Dynamic Characteristics** Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input Capacitance | -- | 3465 | -- | pF | $V_{GS}$=0V<br>$V_{DS}$=10V<br>f=1.0MHz |
| $C_{oss}$ | Output Capacitance | -- | 526 | -- | | |
| $C_{rss}$ | Reverse Transfer Capacitance | -- | 455 | -- | | |
| $Q_g$ | Total Gate Charge | -- | 65 | -- | nC | $V_{DS}$=10V<br>$I_D$=30A<br>$V_{GS}$=4.5V |
| $Q_{gs}$ | Gate- to- Source Charge | -- | 8 | -- | | |
| $Q_{gd}$ | Gate-to-Drain(" Miller") Charge | -- | 12 | -- | | |

**Source- Drain Diode Characteristics**

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | -- | -- | 90 | A | Integral pn- diode in MOSFET |
| $I_{SM}$ | Maximum Pulsed Current | -- | -- | 360 | A | |
| $V_{SD}$ | Diode Forward Voltage | -- | -- | 1.2 | V | $I_S$=30A,$V_{GS}$=0V |
| $t_{rr}$ | Reverse Recovery Time | -- | 16 | -- | nS | $V_{GS}$=0V<br>$I_S$=20A<br>di/dt=100A/μs |
| $Q_{rr}$ | Reverse Recovery Charge | -- | 5.5 | -- | nC | |

**Notes:**

* 1. Repetitive rating, pulse width limited by maximum junction temperature.
* 2. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 0.5%
* 3. $R_{\theta JA}$ is measured with the device mounted on a 1inch$^2$ pad of 2oz copper FR4 PCB


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## Typical Feature Curve

Figure 1: Output Characteristics

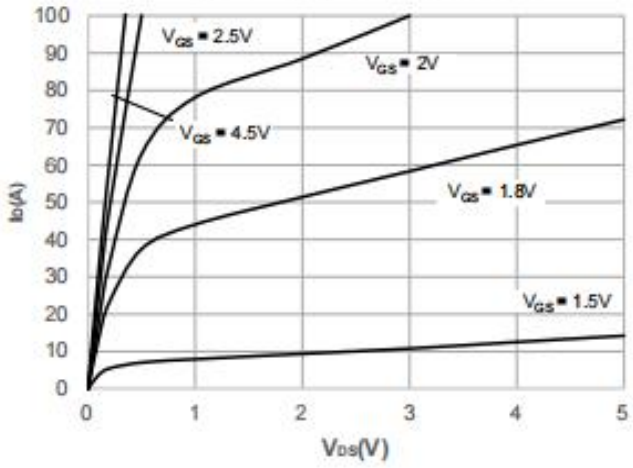



Figure 2: Typical Transfer Characteristics

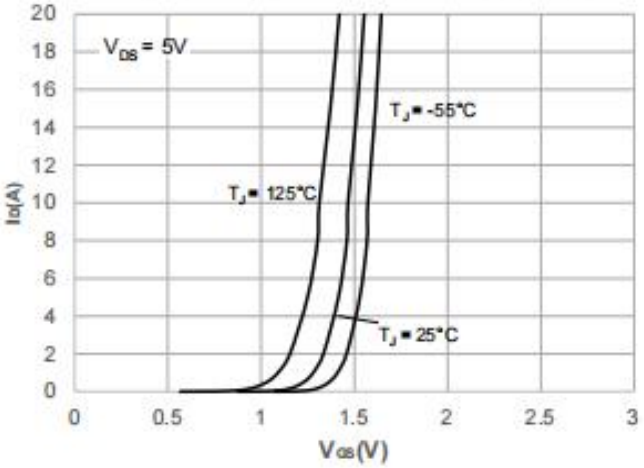



Figure 3: On-resistance vs. Drain Current

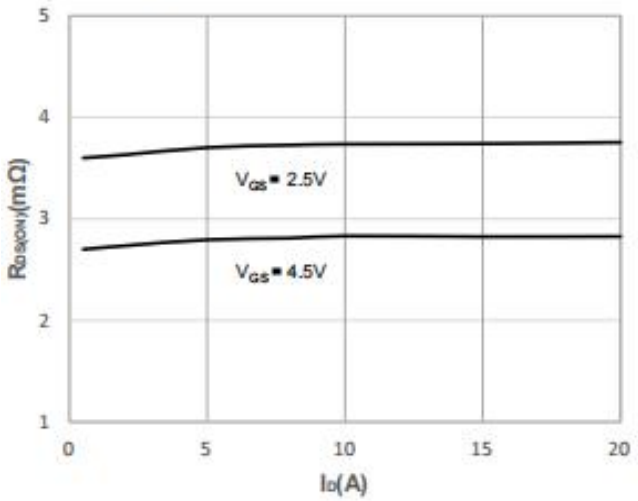



Figure 4: Body Diode Characteristics

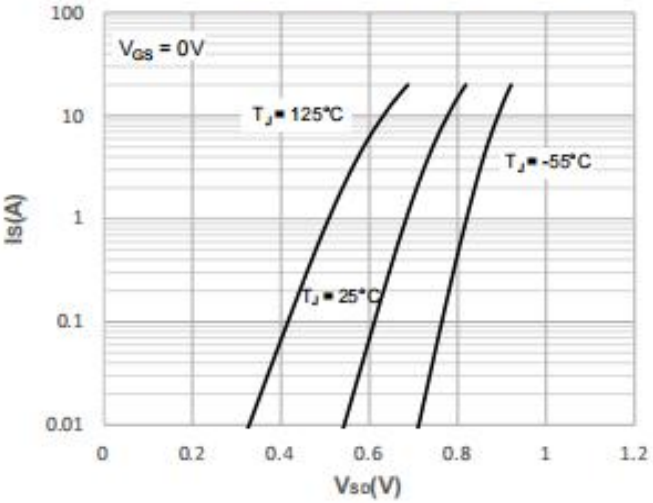



Figure 5: Gate Charge Characteristics

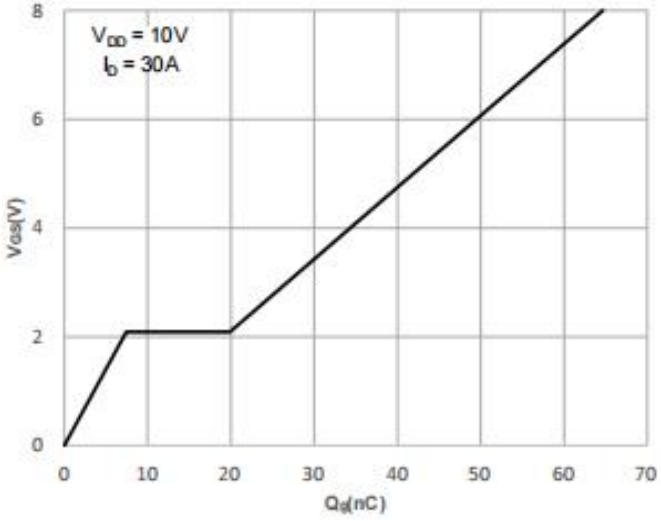
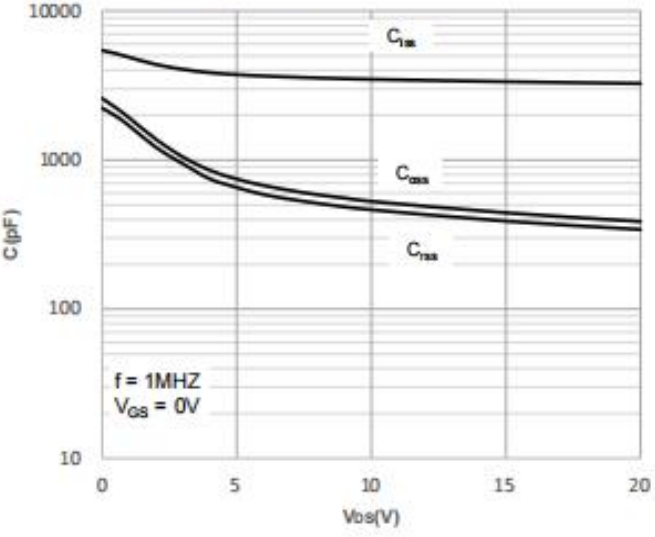



Figure 6: Capacitance Characteristics





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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

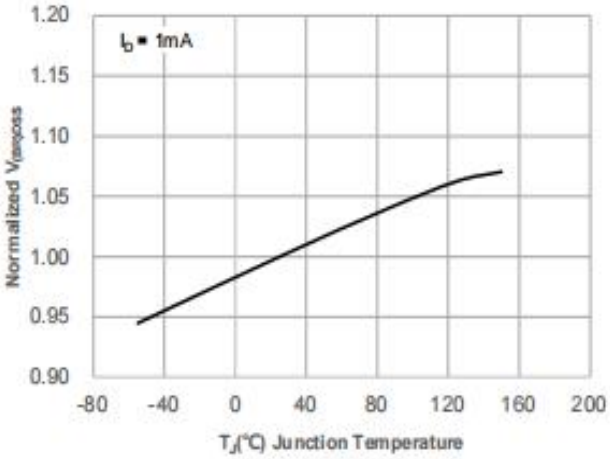



Figure 8: Normalized on Resistance vs. Junction Temperature

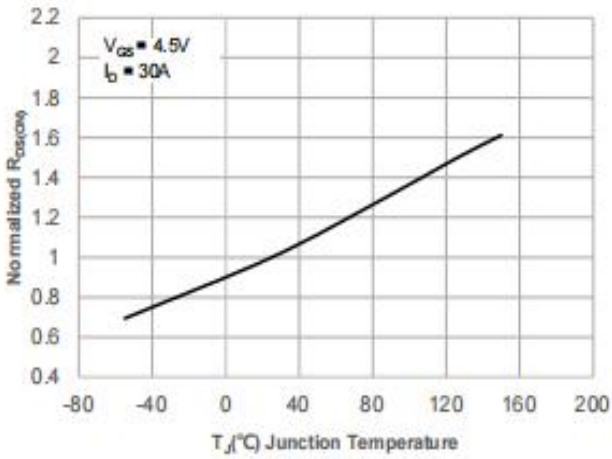



Figure 9: Maximum Safe Operating Area

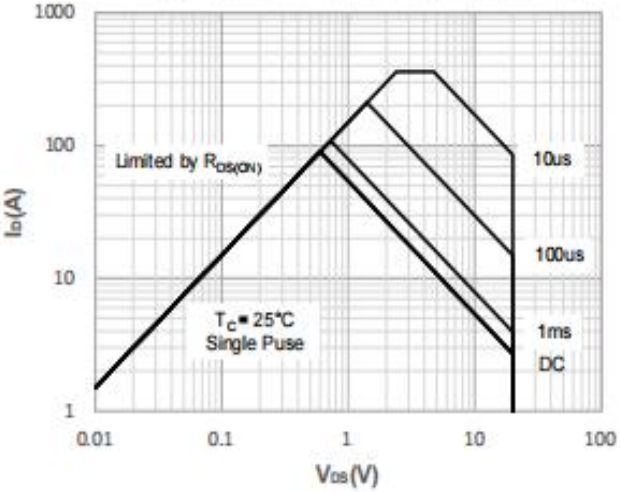



Figure 10: Maximum Continuous Drian Current vs. Case Temperature

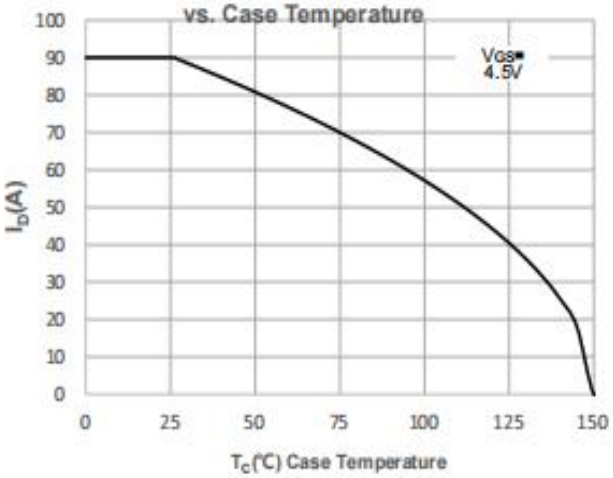



Figure 11: Normalized Maximum Transient Thermal Impedance

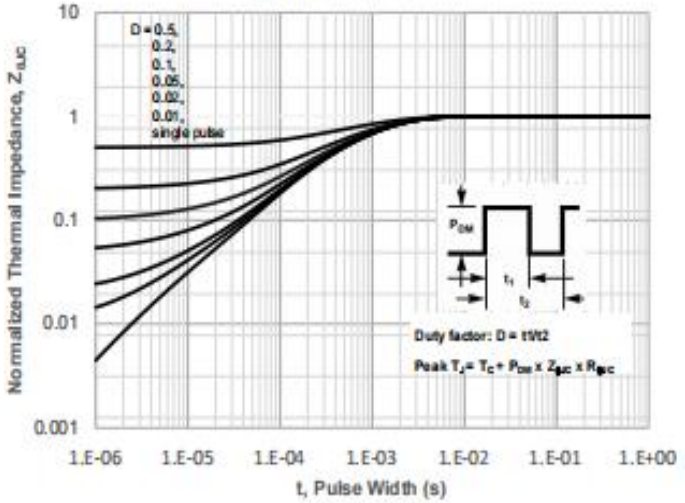
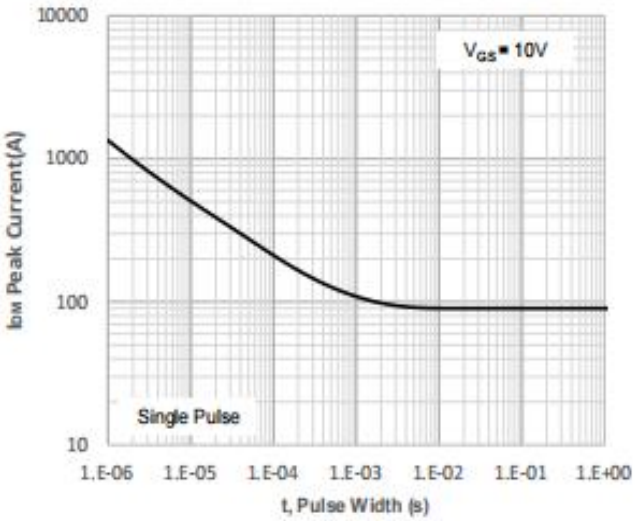



Figure 12: Peak Current Capacity





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## Test Circuits and Waveforms

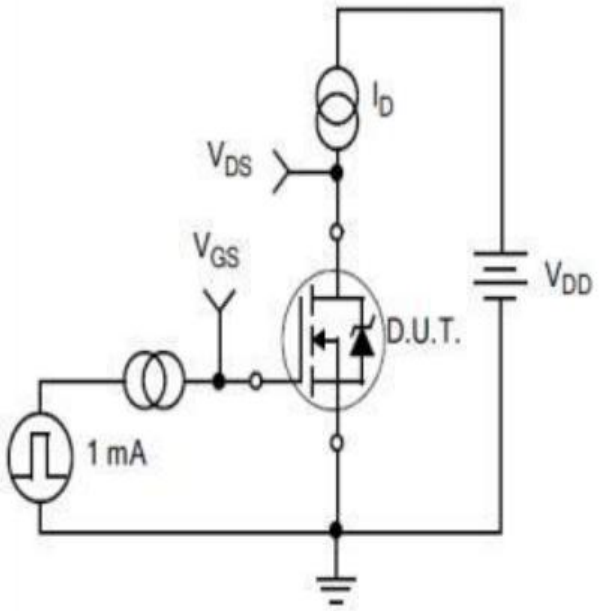



Figure A.
Gate Charge Test Circuit

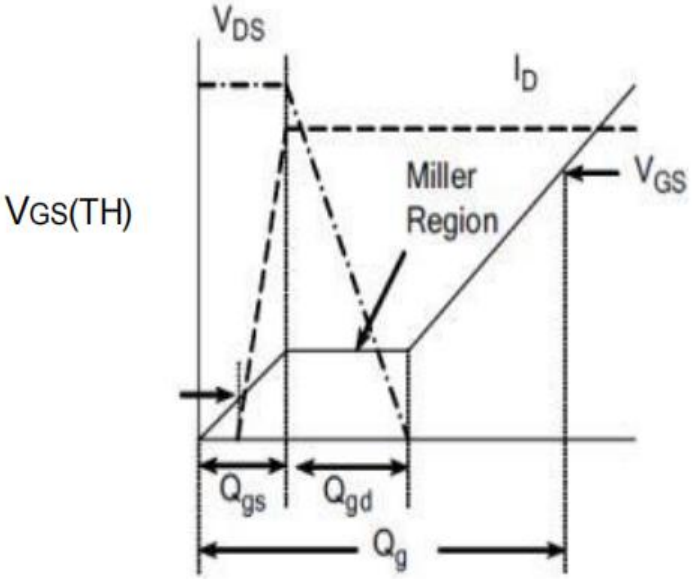



Figure B.
Gate Charge Waveform

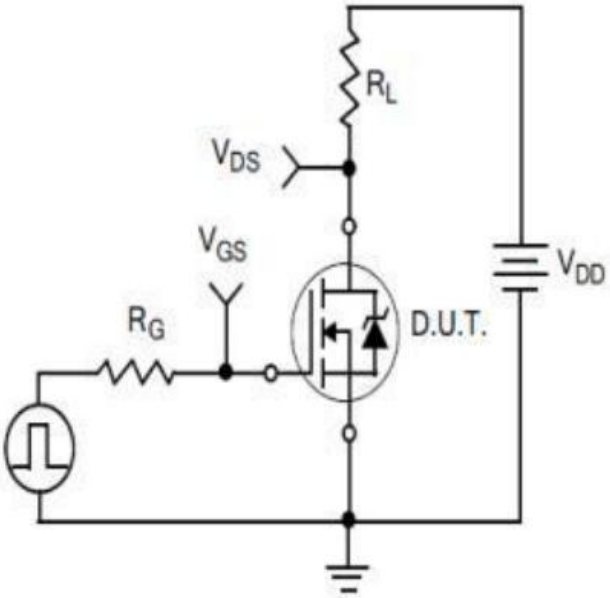



Figure C.
Resistive Switching Test Circuit

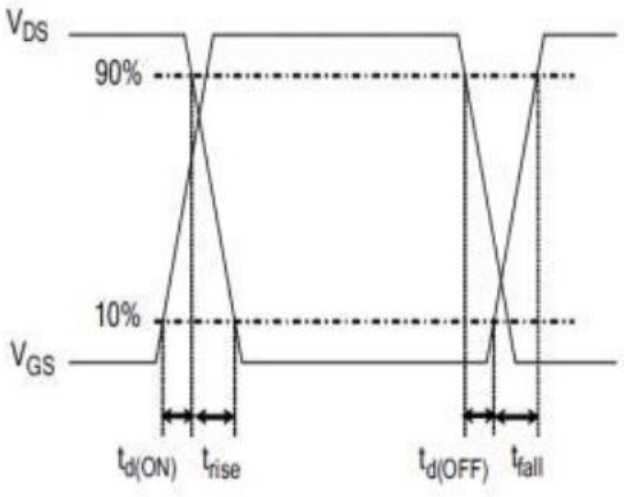



Figure D.
Resistive Switching Waveforms


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## Test Circuits and Waveforms

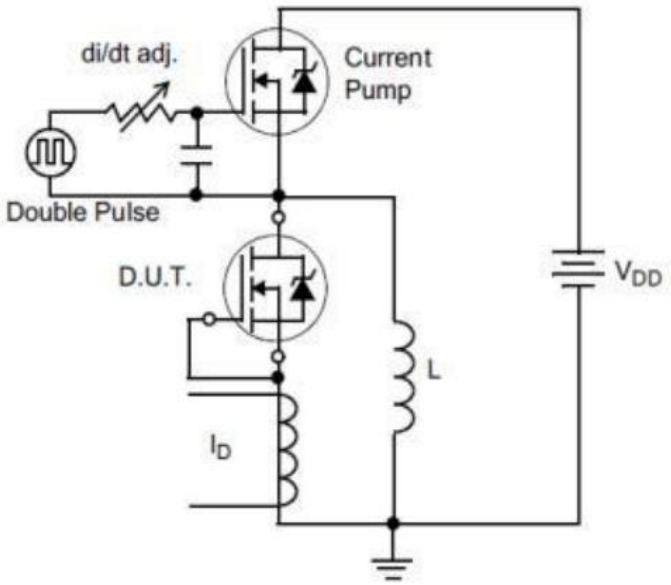



Figure E.Diode Reverse Recovery Test Circuit

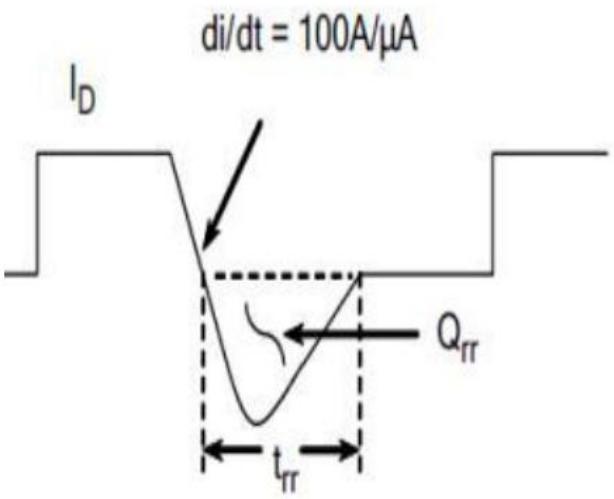



Figure F.Diode Reverse Recovery Waveform

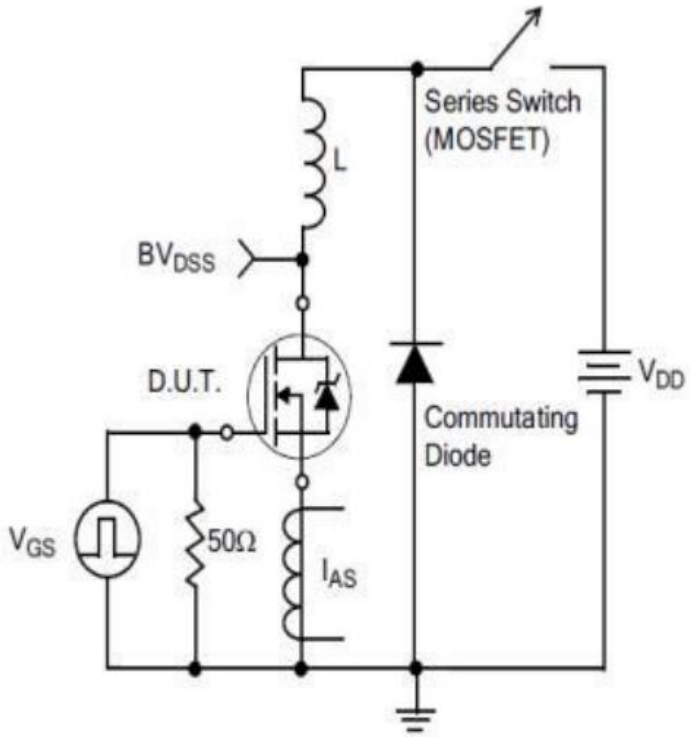
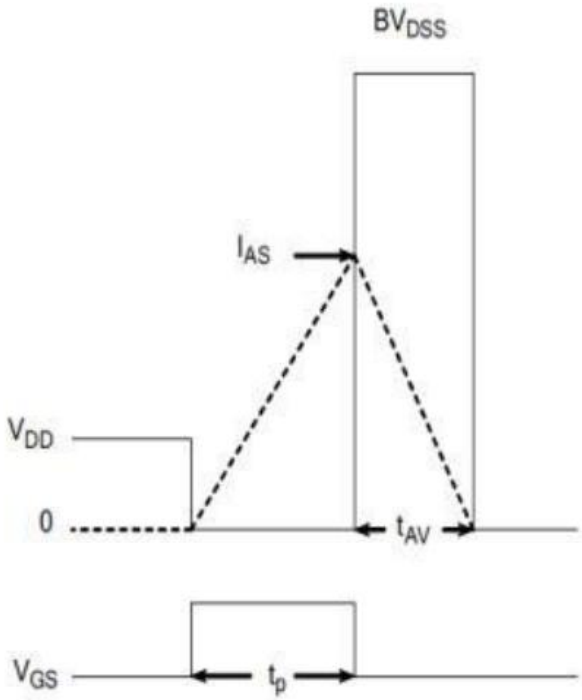



Figure G.Unclamped Inductive Switching Test Circuit

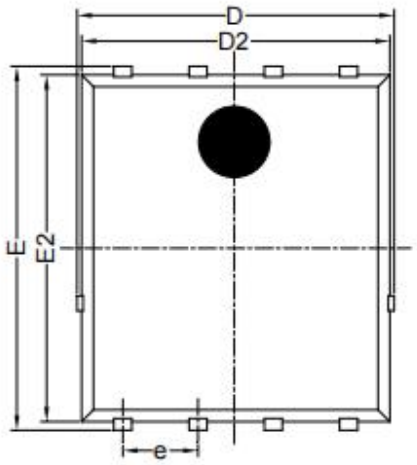



$$E_{AS}=\frac{I_{AS}^2 L}{2}$$

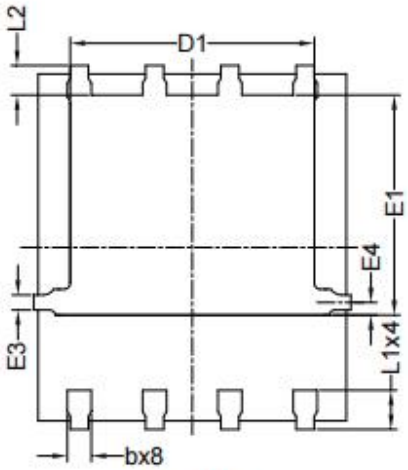
Figure H.Unclamped Inductive Switching Waveforms


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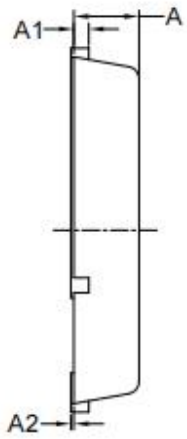
## Package outline drawing(DFN5*6 Unit: mm )



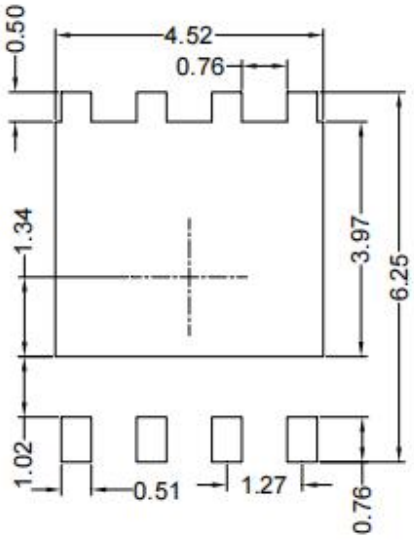

Top View
正面视图




Bottom View
背面视图




Side View
侧面视图




Suggested Solder Pad Layout
Top View

| SYMBOL | MILLIMETER | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| D | 5.15 | 5.35 | 5.55 |
| E | 5.95 | 6.15 | 6.35 |
| A | 1.00 | 1.10 | 1.20 |
| A1 | | 0.254 BSC | |
| A2 | | | 0.10 |
| D1 | 3.92 | 4.12 | 4.32 |
| E1 | 3.52 | 3.72 | 3.92 |
| D2 | 5.00 | 5.20 | 5.40 |
| E2 | 5.66 | 5.86 | 6.06 |
| E3 | | 0.254 REF | |
| E4 | | 0.21 REF | |
| L1 | 0.56 | 0.66 | 0.76 |
| L2 | | 0.50 BSC | |
| b | 0.31 | 0.41 | 0.51 |
| e | | 1.27 BSC | |

Note:
1.Controlling dimension:in millimeters.
2.General tolerance:±0.10mm.
3.The pad layout is for reference purposes only.


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2.A critical component is any component of a life support device or system whose failure to system whose failure to perform can be reasonably expected to cause the failure of the life support device or system,or to affect its safety or effectiveness.


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