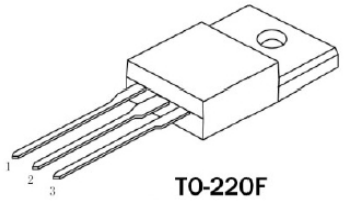
N Channel MOSFET

Lead Free Package and Finish

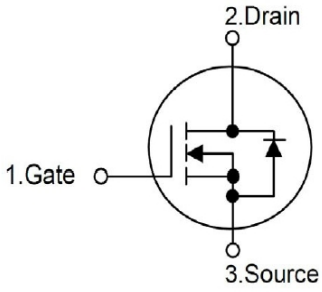
## Applications:

- •Adapter & Charger
- •SMPS Standby Power
- •AC-DC Switching Power Supply
- •LED driving power

| $I_D$ | $R_{DS(ON)}$ (Typ.) | $V_{DSS}$ |
|---|---|---|
| 8.0A | 0.96Ω | 600V |




Not to Scale




## Features:

- •Low On Resistance
- •Low Gate Charge
- •Peak Current vs Pulse Width Curve
- •RoHS Compliant

## Ordering Information

| Part Number | Package | Marking |
|---|---|---|
| RS8N60F | TO-220F | RS8N60F |

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

| Symbol | Parameter | RS8N60F | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage (Note*1) | 600 | V |
| $I_D$ | Continuous Drain Current | 8.0 | A |
| $I_D$@ 100 ℃ | Continuous Drain Current | 5.0 | |
| $I_{DM}$ | Pulsed Drain Current (Note*2) | 32.0 | |
| $P_D$ | Power Dissipation | 48 | W |
| | Derating Factor above 25℃ | 0.38 | W/℃ |
| $V_{GS}$ | Gate-to-Source Voltage | ±30 | V |
| EAS | Single Pulse Avalanche Engergy L=30mH $I_{AS}$=5.0A $V_{DD}$=110V $R_G$=25Ω $T_J$=25℃ | 450 | mJ |
| TL | Maximum Temperature for Soldering Leads at 0.063in(1.6mm)from Case for 10 seconds | 300 | ℃ |
| TPKG | Package Body for 10 seconds | 260 | |
| $T_J$ 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 | RS8N60F | Units | Test Conditions |
|---|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-Case | 2.6 | ℃/W | Drain lead soldered to water cooled heatsink, $P_D$ adjusted for a peak junction temperature of +150℃. |
| $R_{\theta JA}$ | Junction-to-Ambient | 120 | | 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 | 600 | -- | -- | V | $V_{GS}$=0V, $I_D$=250μA |
| $I_{DSS}$ | Drain-to-Source Leakage Current | -- | -- | 1.0 | μA | $V_{DS}$=600V, $V_{GS}$=0V |
| $I_{GSS}$ | Gate-to-Source Forward Leakage | -- | -- | 100 | nA | $V_{GS}$=+30V $V_{DS}$=0V |
| | Gate-to-Source Reverse Leakage | -- | -- | -100 | | $V_{GS}$=-30V $V_{DS}$=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 | -- | 0.96 | 1.2 | Ω | $V_{GS}$=10V, $I_D$=4A |
| $V_{GS(TH)}$ | Gate Threshold Voltage | 2.0 | -- | 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 |
|---|---|---|---|---|---|---|
| $t_{d(ON)}$ | Turn-on Delay Time | -- | 29.00 | -- | nS | $V_{DS}$=300V<br>$I_D$=8.0A<br>$R_G$=25Ω<br>(Note:3,4) |
| $t_{rise}$ | Rise Time | -- | 71.33 | -- | | |
| $t_{d(OFF)}$ | Turn-OFF Delay Time | -- | 34.93 | -- | | |
| $t_{fall}$ | Fall Time | -- | 32.80 | -- | | |

**Dynamic Characteristics** Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input Capacitance | -- | 910 | -- | pF | $V_{GS}$=0V<br>$V_{DS}$=25V<br>f=1.0MHz |
| $C_{oss}$ | Output Capacitance | -- | 105 | -- | | |
| $C_{rss}$ | Reverse Transfer Capacitance | -- | 2.43 | -- | | |
| $Q_g$ | Total Gate Charge | -- | 14.83 | -- | nC | $V_{DS}$=480V<br>$I_D$=8.0A<br>$V_{GS}$=10V<br>(Note:3,4) |
| $Q_{gs}$ | Gate-to-Source Charge | -- | 5.90 | -- | | |
| $Q_{gd}$ | Gate-to-Drain("Miller") Charge | -- | 4.00 | -- | | |

## Source-Drain Diode Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | -- | -- | 8.0 | A | Integral pn-diode in MOSFET |
| $I_{SM}$ | Maximum Pulsed Current | -- | -- | 32.0 | A | |
| $V_{SD}$ | Diode Forward Voltage | -- | -- | 1.4 | V | $I_S$=8.0A, $V_{GS}$=0V |
| $t_{rr}$ | Reverse Recovery Time | -- | 520.65 | -- | nS | $V_{GS}$=0V |
| $Q_{rr}$ | Reverse Recovery Charge | -- | 3.72 | -- | μC | $I_S$=8.0A, di/dt=100A/μs |

## Notes:

*1. TJ=±25℃ to +150℃.
*2. Repetitive rating;pulse width limited by maximum junction temperature.
*3. Pulse width≤300μs;duty cycle ≤2%.
*4. Basically not affected by temperature.

## Typical Feature curve

Figure1. Typical Output Characteristics

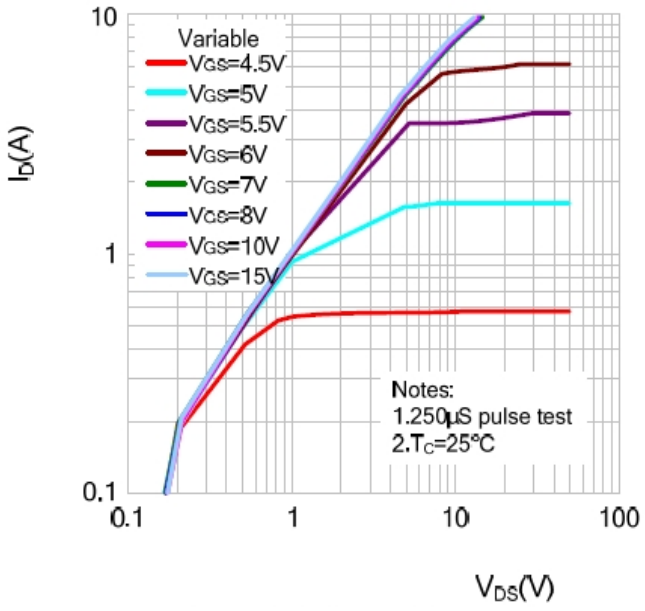
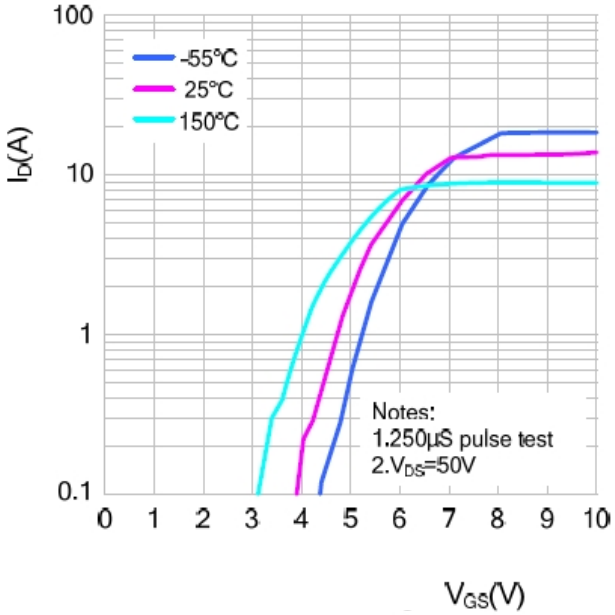
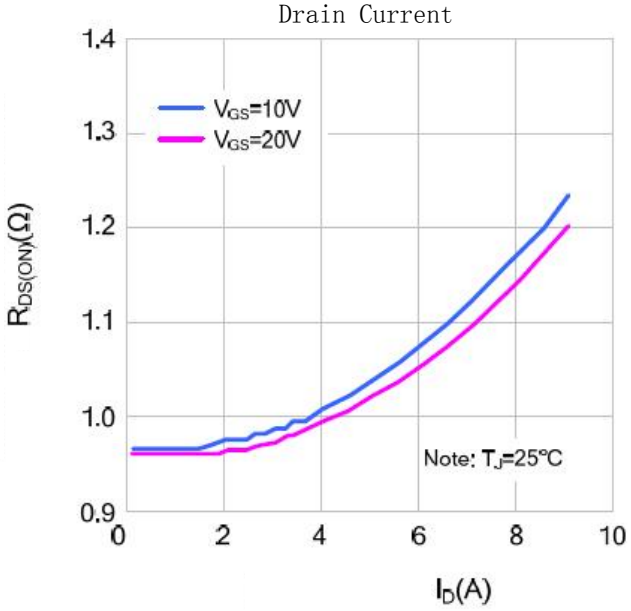



Figure2. Typical Transfer Characteristics



Figuer3. Typical ON Resistance vs Drain Current




Figuer4. Typical Body Diode Transfer Characteristics

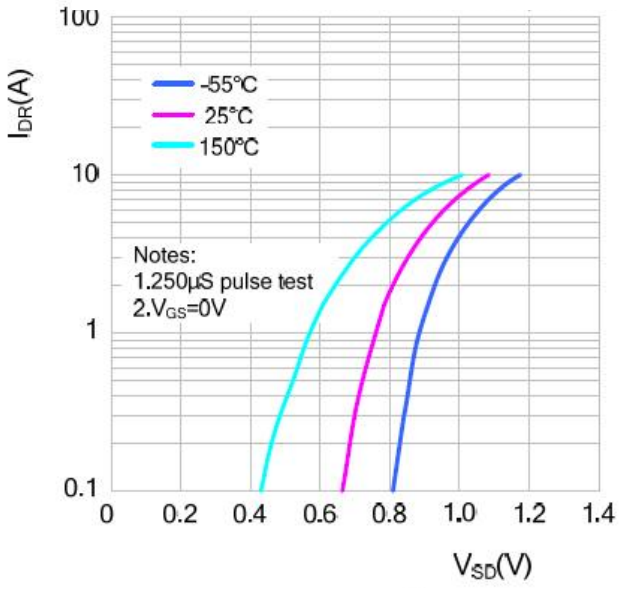



Figure5. Typical Capacitance vs Drain-to-Source Voltage

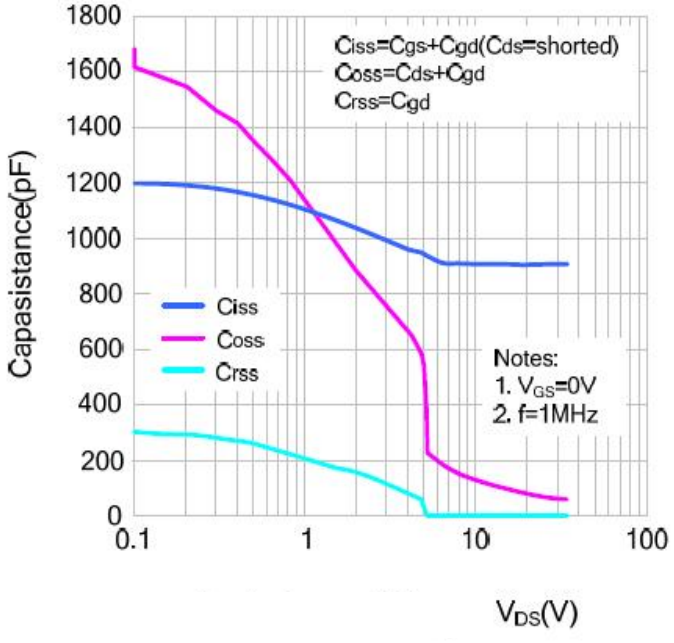



Figure6. Typical Gate Charge vs Gate-to-Source Voltage

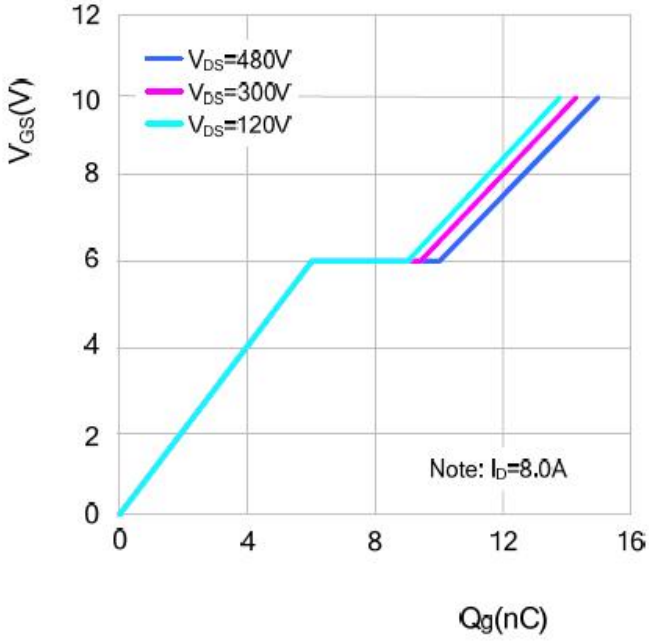


Figure7. Typical Breakdown Voltage vs Junation Temperature

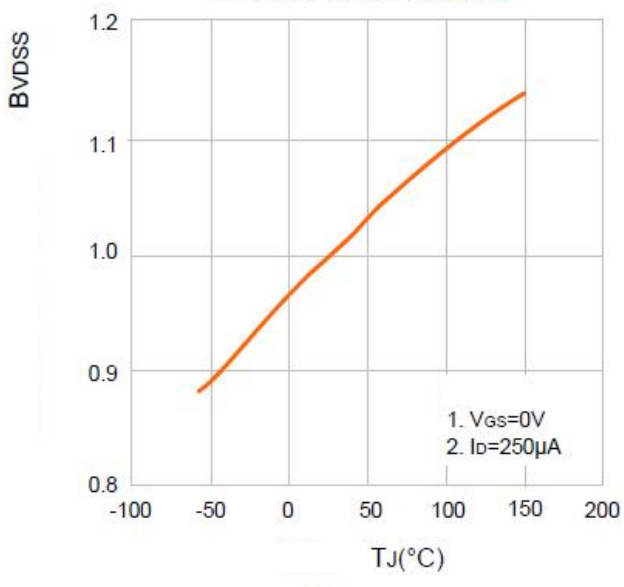



Figure8. Figure10.Typical Drain-to-Source ON Resistance vs Junction Temperature

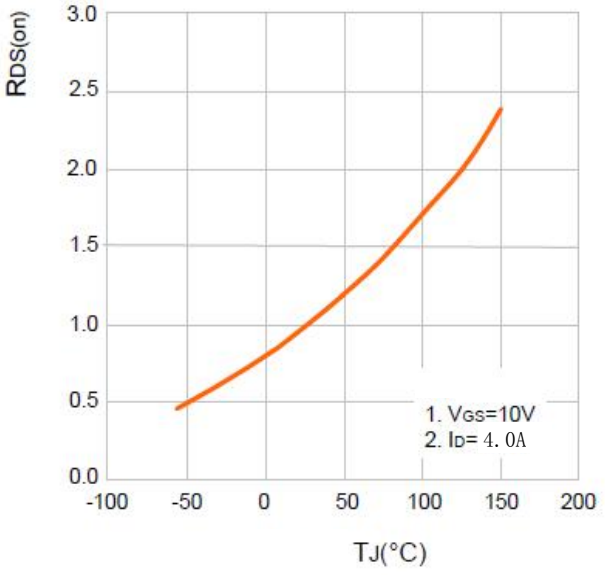



Figure9.Maximum Continuous Drain Current vs Case Temperature

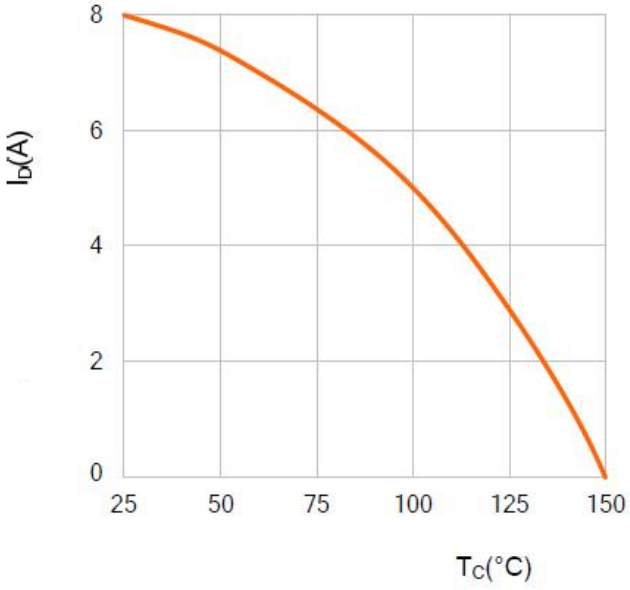
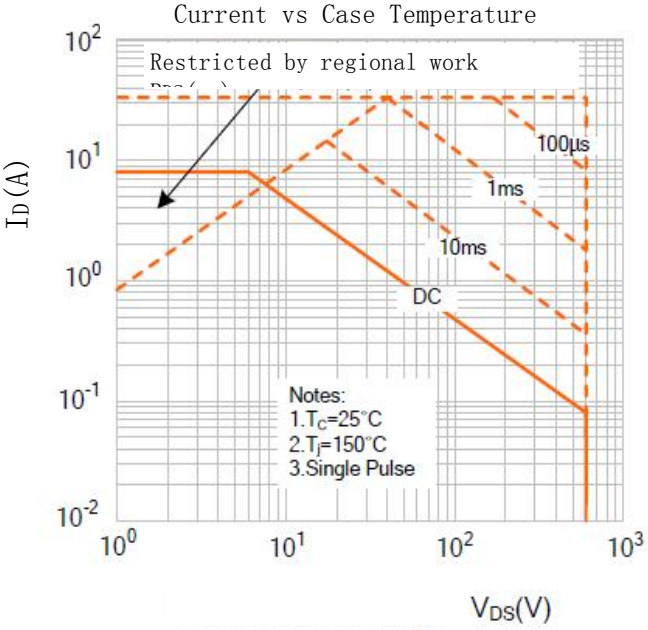



Figure10.Maximum Continuous Drain Current vs Case Temperature



## Test Circuits and Waveforms

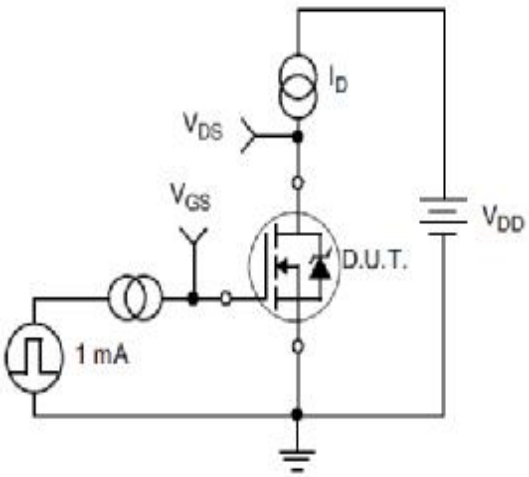



Figure11.
Gate Charge Test Circuit

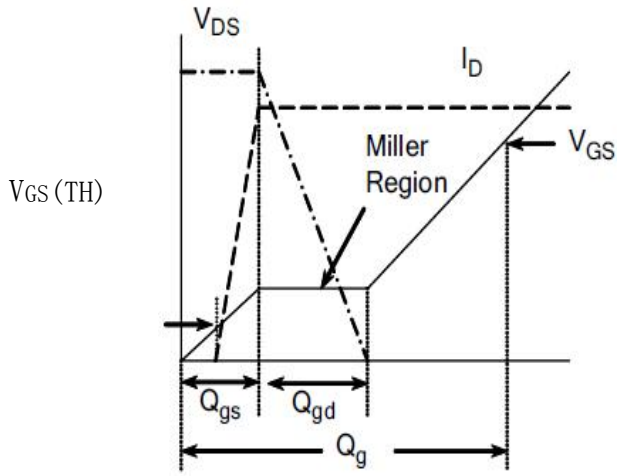



Figure12.
Gate Charge Waveform

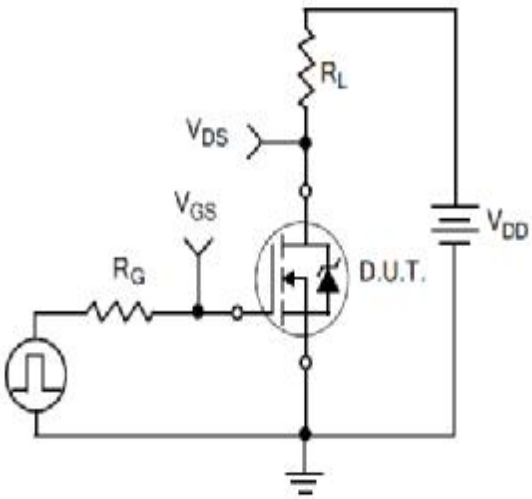



Figure13.
Resistive Switching Test Circuit

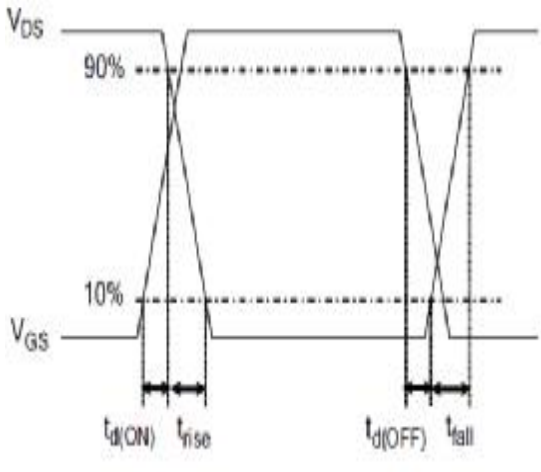



Figure14.
Resistive Switching Waveforms

## Test Circuits and Waveforms

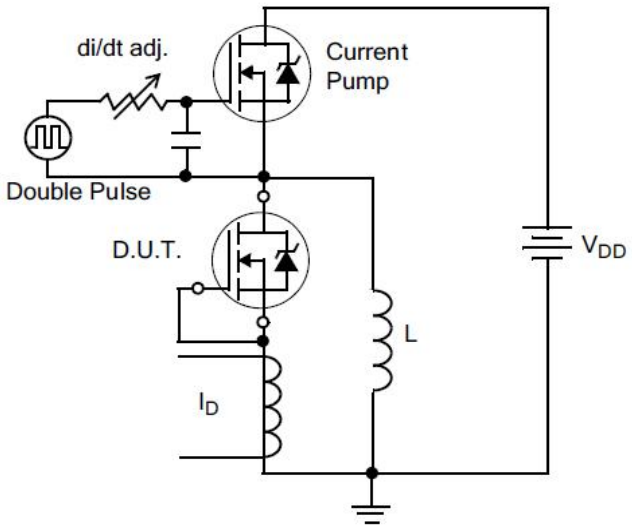



Figure15. Diode Reverse Recovery Test Circuit

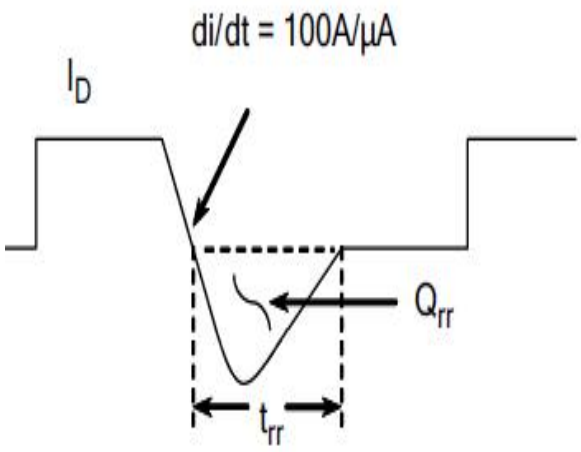



Figure16. Diode Reverse Recovery Waveform

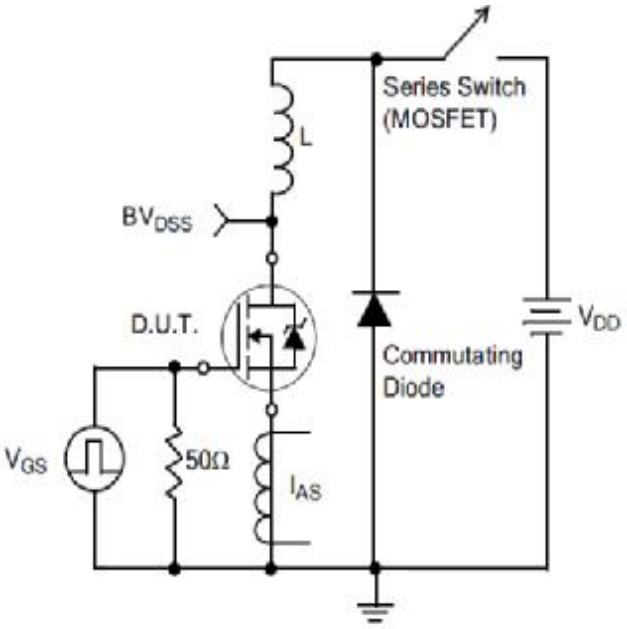
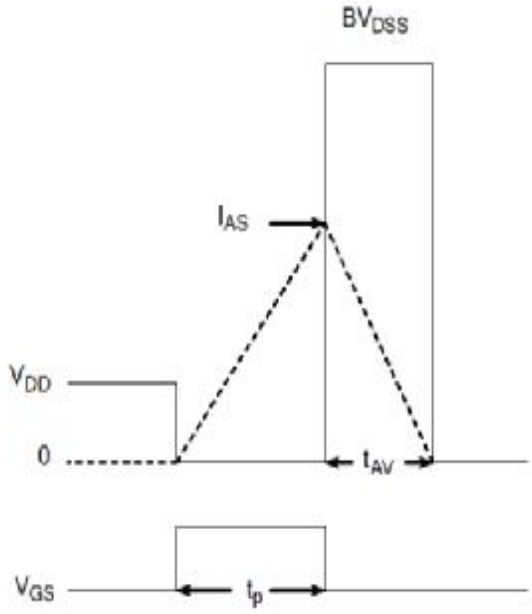


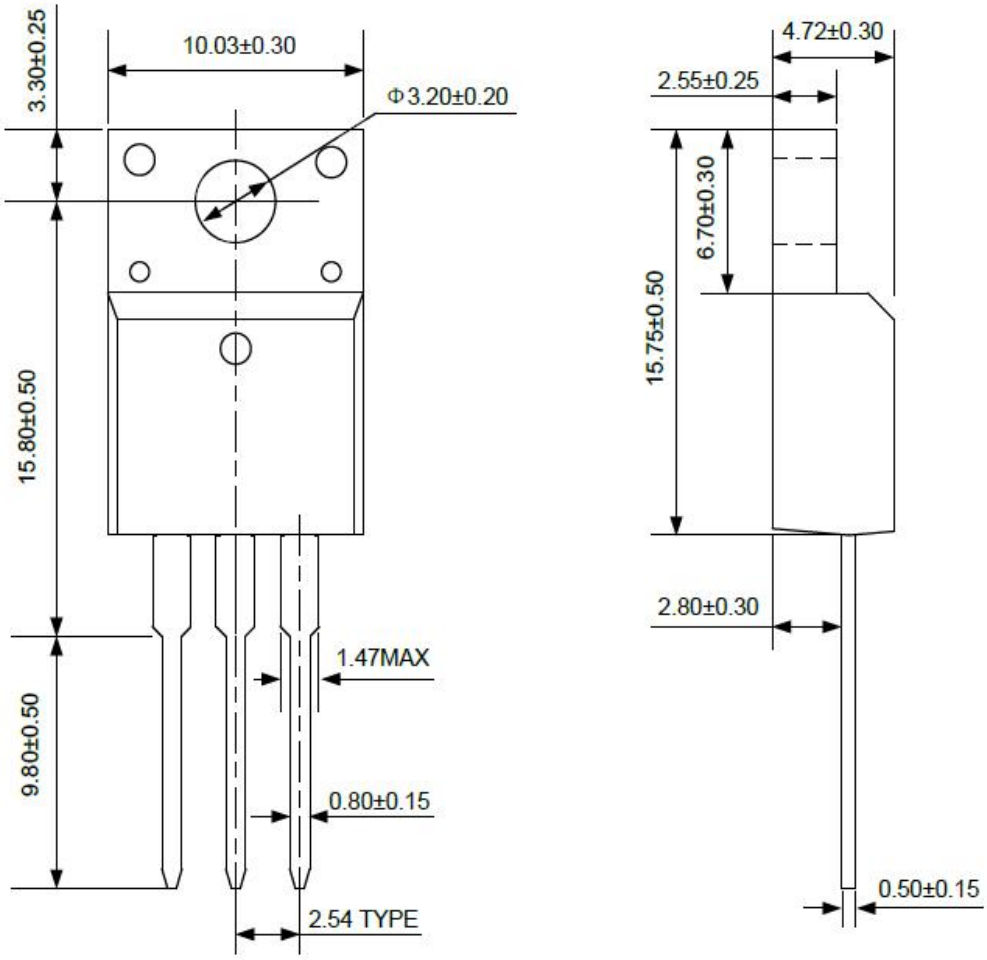

Figure17. Unclamped Inductive Switching Test Circuit




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

Figure18. Unclamped Inductive Switching Waveforms

Package outline drawing




TO-220F

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