# HGS220N10SL P-1

## 100V N-Ch Power MOSFET

Feature

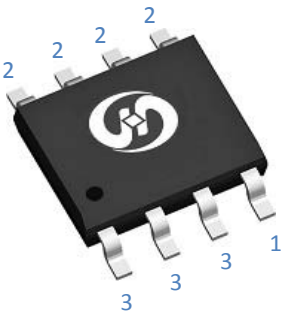
◇ High Speed Power Switching, Logic Level.
◇ Enhanced Body diode dv/dt capability
◇ Enhanced Avalanche Ruggedness
◇ 100% UIS Tested, 100% Rg Tested
◇ Lead Free, Halogen Free

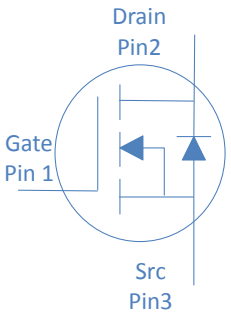
| | | | |
|---|---|---|---|
| $V_{DS}$ | | 100 | V |
| $R_{DS(on),typ}$ | $V_{GS}$=10V | 16.5 | mΩ |
| $R_{DS(on),typ}$ | $V_{GS}$=4.5V | 20.6 | mΩ |
| $I_D$ | | 8 | A |

Application

◇ Synchronous Rectification in SMPS
◇ Hard Switching and High Speed Circuit
◇ DC/DC in Telecoms and Inductrial

SOIC-8




| Part Number | Package | Marking |
|---|---|---|
| HGS220N10SL | SOIC-8 | GS220N10SL |

### Absolute Maximum Ratings at $T_j$=25℃ (unless otherwise specified)

| Parameter | Symbol | Conditions | Value | Unit |
|---|---|---|---|---|
| Continuous Drain Current | $I_D$ | $T_C$=25℃ | 8 | A |
| | | $T_C$=100℃ | 6.2 | |
| Drain to Source Voltage | $V_{DS}$ | - | 100 | V |
| Gate to Source Voltage | $V_{GS}$ | - | ±20 | V |
| Pulsed Drain Current | $I_{DM}$ | - | 34 | A |
| Avalanche Energy, Single Pulse | $E_{AS}$ | L=0.1mH, $T_C$=25℃ | 12 | mJ |
| Power Dissipation | $P_D$ | $T_C$=25℃ | 3 | W |
| Operating and Storage Temperature | $T_J$, $T_{stg}$ | - | -55 to150 | ℃ |

### Absolute Maximum Ratings

| Parameter | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance Junction-Lead | $R_{\theta JL}$ | 25 | ℃/W |
| Thermal Resistance Junction-Ambient (t≤10s) | $R_{\theta JA}$ | 40 | ℃/W |
| Thermal Resistance Junction-Ambient (steady state) | | 75 | ℃/W |

## Electrical Characteristics at $T_j$=25℃ (unless otherwise specified)

### Static Characteristics

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=250μA | 100 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}$=$V_{DS}$, $I_D$=250μA | 1.4 | 2.0 | 2.4 | |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{GS}$=0V, $V_{DS}$=100V, $T_j$=25℃ | - | - | 1 | μA |
| | | $V_{GS}$=0V, $V_{DS}$=100V, $T_j$=100℃ | - | - | 100 | |
| Gate to Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V, $V_{DS}$=0V | - | - | ±100 | nA |
| Drain to Source on Resistance | $R_{DS(on)}$ | $V_{GS}$=10V, $I_D$=8A | - | 16.5 | 22 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=6A | - | 20.6 | 26 | |
| Transconductance | $g_{fs}$ | $V_{DS}$=5V, $I_D$=8A | - | 32 | - | S |
| Gate Resistance | $R_G$ | $V_{GS}$=0V, $V_{DS}$ Open, f=1MHz | - | 1.5 | - | Ω |

### Dynamic Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=50V, f=1MHz | - | 1350 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 104 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 7 | - | |
| Total Gate Charge | $Q_g$(10V) | $V_{DD}$=50V, $I_D$=8A, $V_{GS}$=10V | - | 19.9 | - | nC |
| Total Gate Charge | $Q_g$(4.5V) | | - | 8.5 | - | |
| Gate to Source Charge | $Q_{gs}$ | | - | 4.8 | - | |
| Gate to Drain (Miller) Charge | $Q_{gd}$ | | - | 3.0 | - | |
| Turn on Delay Time | $t_{d(on)}$ | $V_{DD}$=50V, $I_D$=8A, $V_{GS}$=10V, $R_G$=10Ω, | - | 7 | - | ns |
| Rise time | $t_r$ | | - | 2 | - | |
| Turn off Delay Time | $t_{d(off)}$ | | - | 17 | - | |
| Fall Time | $t_f$ | | - | 2 | - | |

### Reverse Diode Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_F$=8A | - | 0.9 | 1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $V_R$=50V, $I_F$=8A, $dI_F/dt$=500A/μs | - | 21 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 92 | - | nC |

Fig 1. Typical Output Characteristics

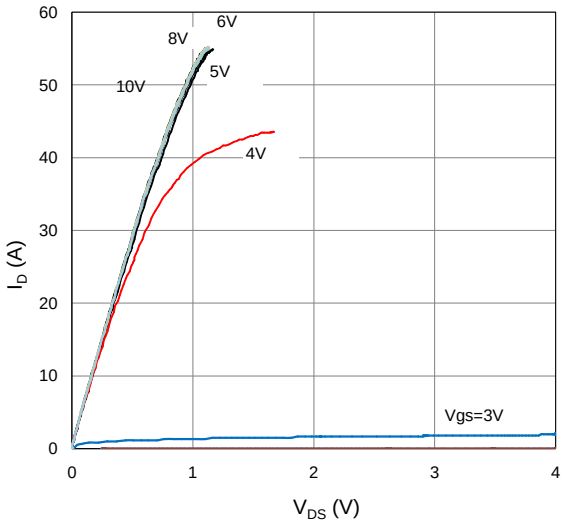



Figure 2. On-Resistance vs. Gate-Source Voltage

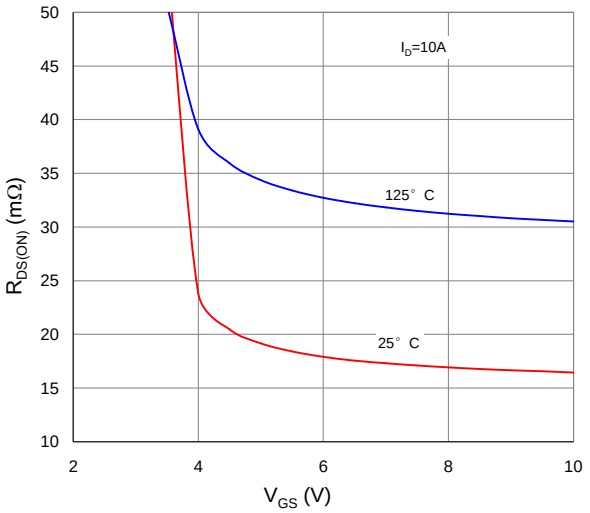



Figure 3. On-Resistance vs. Drain Current and Gate Voltage

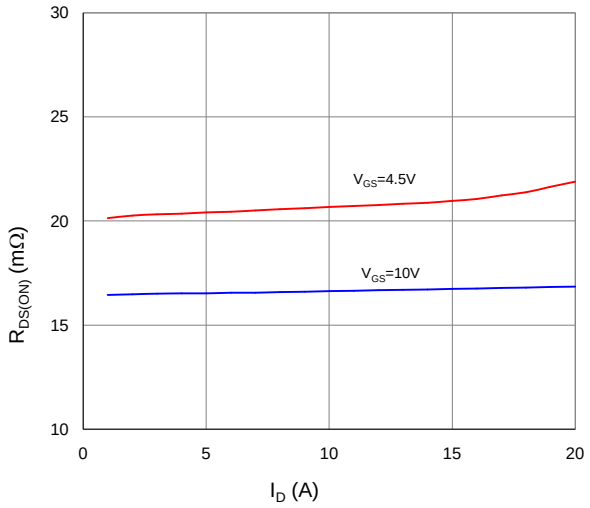



Figure 4. Normalized On-Resistance vs. Junction Temperature

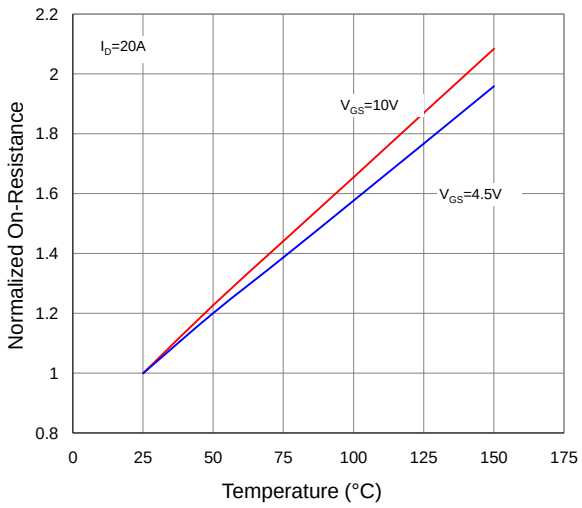



Figure 5. Typical Transfer Characteristics

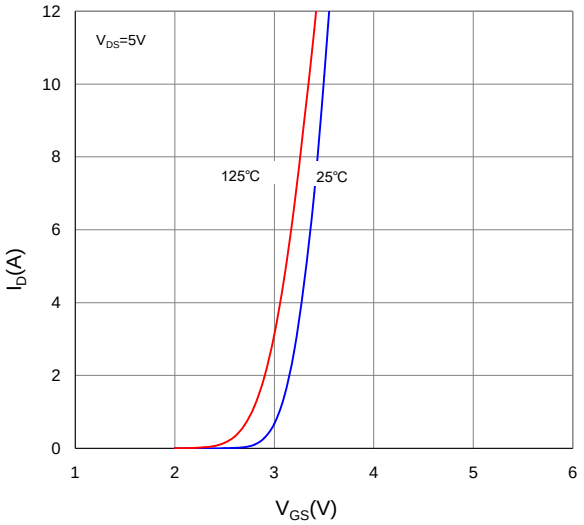



Figure 6. Typical Source-Drain Diode Forward Voltage

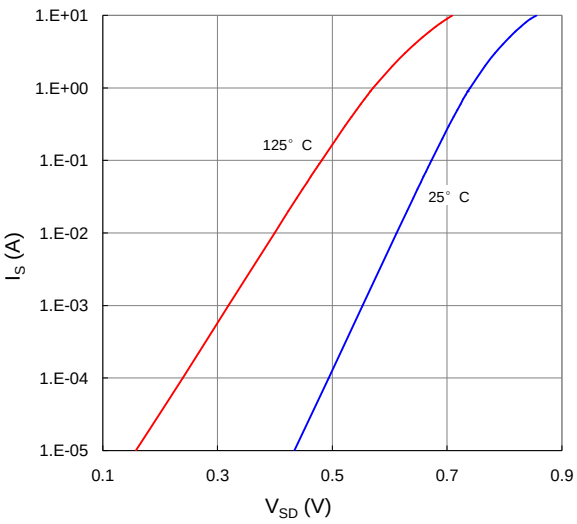


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

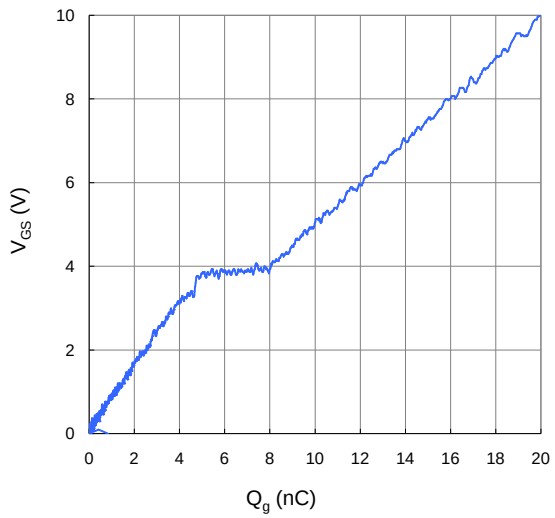



Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

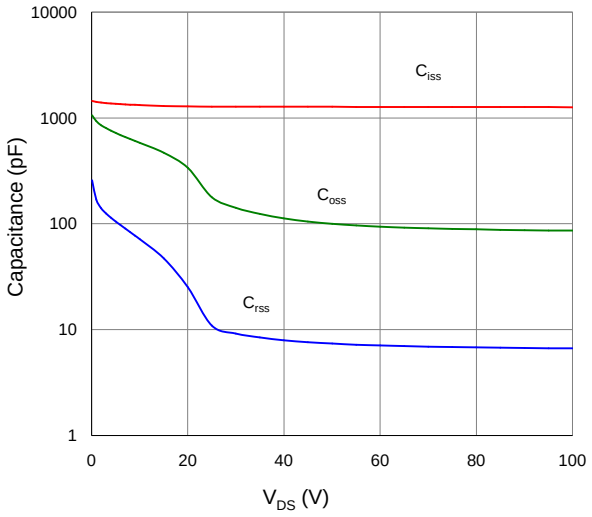



Figure 9. Maximum Safe Operating Area

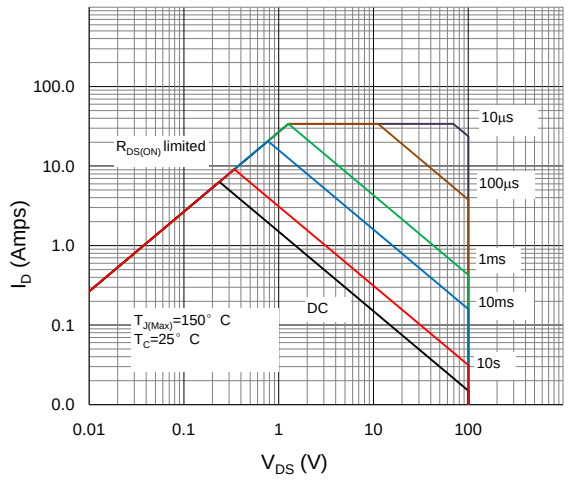



Figure 10. Maximun Drain Current vs. Case Temperature

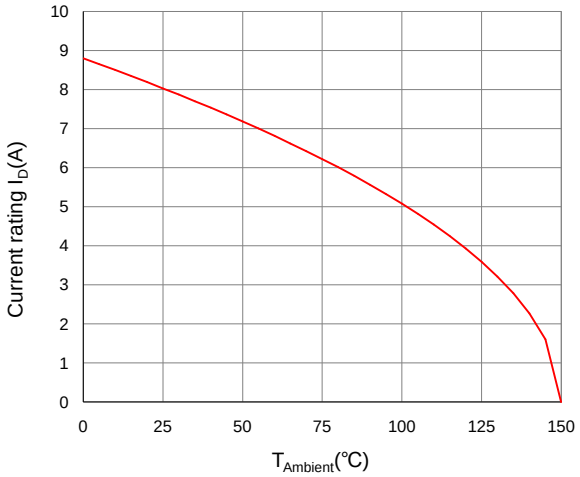
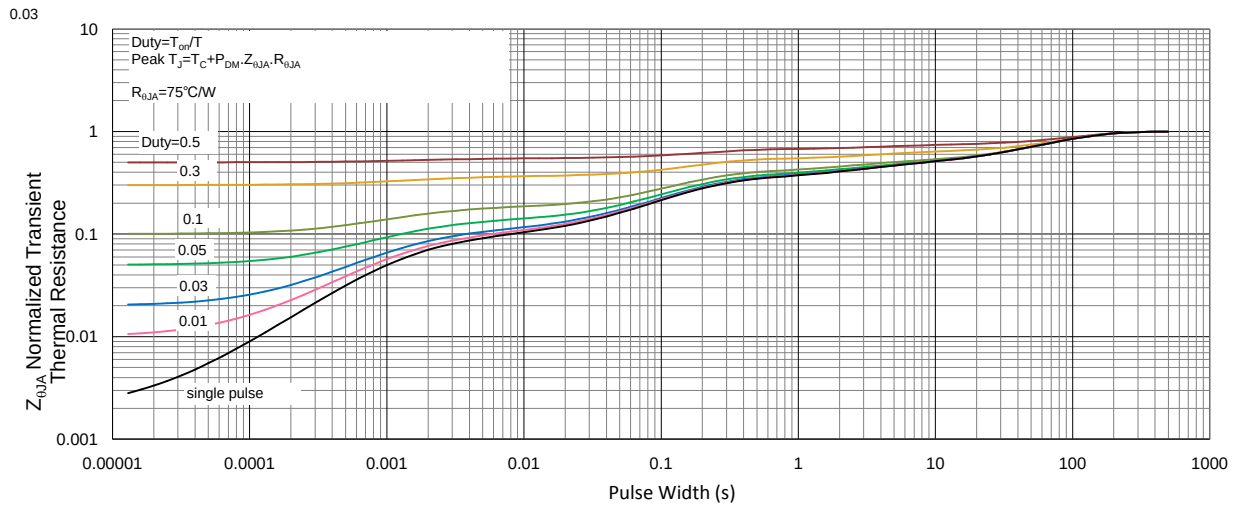
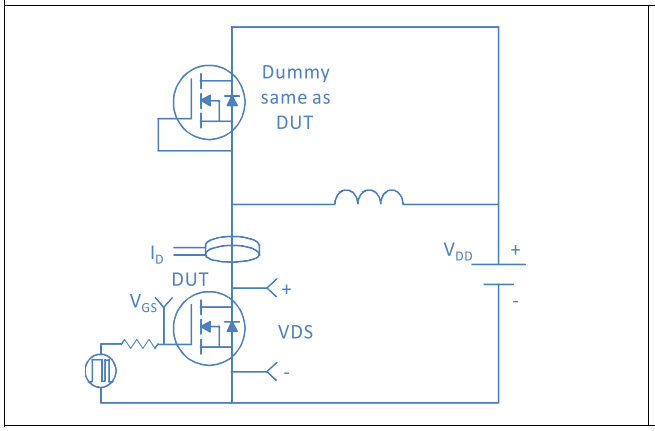
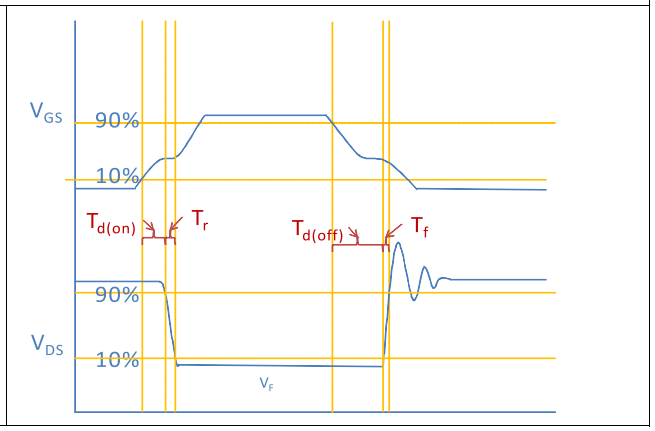



Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient

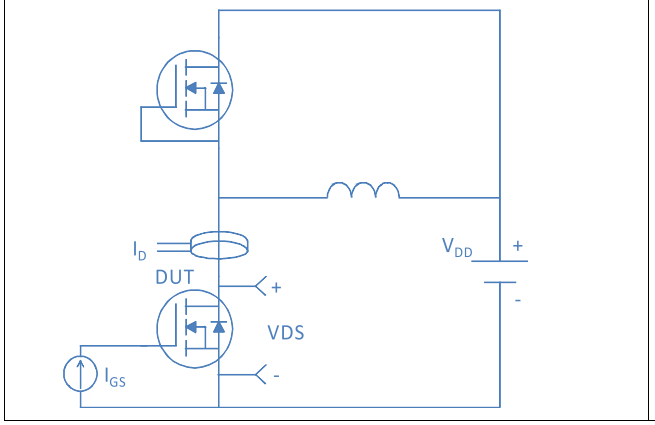


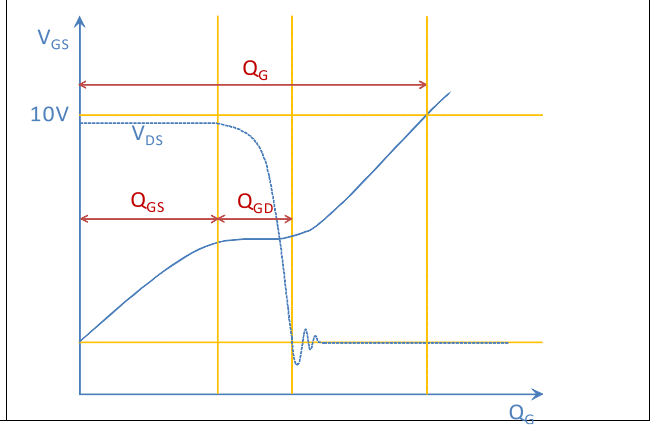
## Inductive switching Test



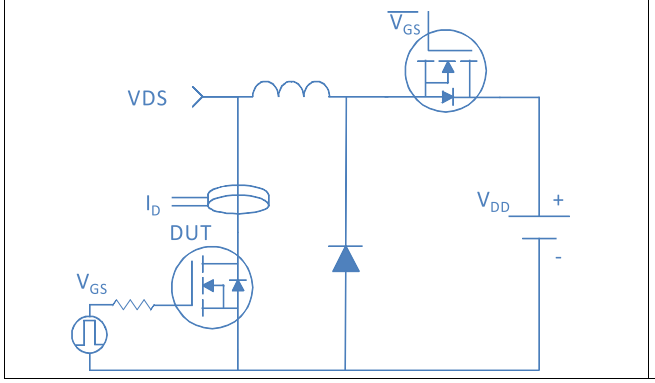



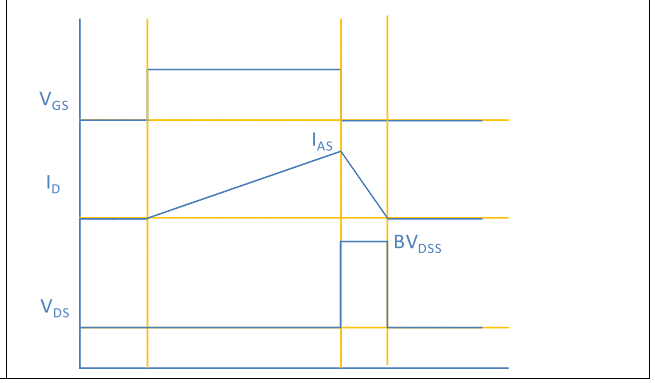

## Gate Charge Test



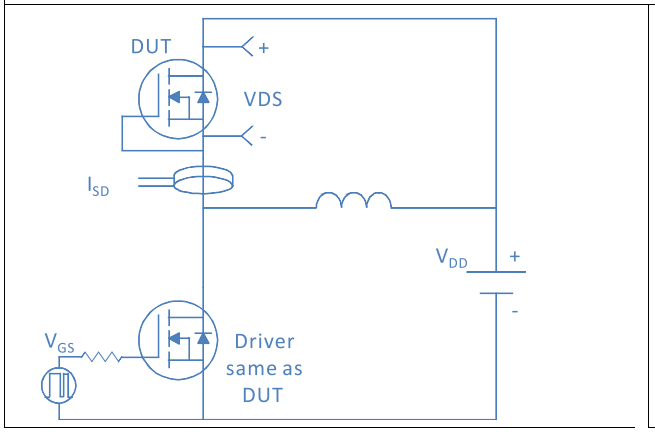



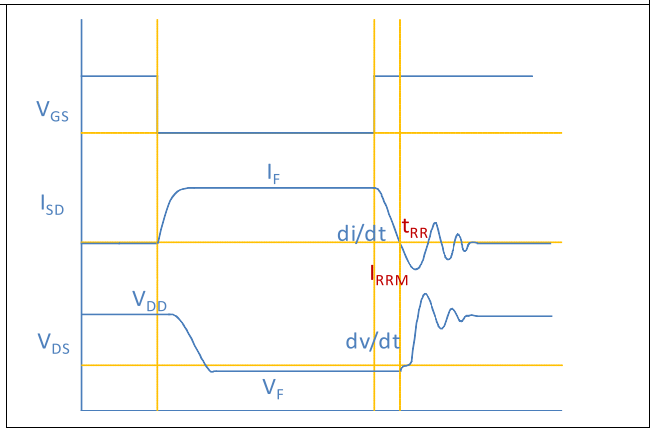

## Uclamped Inductive Switching (UIS) Test



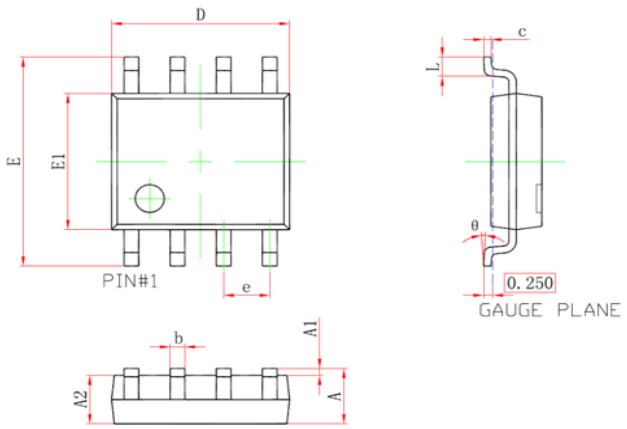

## Diode Recovery Test



Package Outline

## SOIC-8, 8 leads




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.250 | 1.650 | 0.049 | 0.065 |
| b | 0.310 | 0.510 | 0.012 | 0.020 |
| c | 0.170 | 0.250 | 0.007 | 0.010 |
| D | 4.800 | 5.000 | 0.189 | 0.197 |
| e | 1.270 (BSC) | | 0.050 (SBC) | |
| E | 5.800 | 6.200 | 0.228 | 0.244 |
| E1 | 3.800 | 4.000 | 0.150 | 0.157 |
| L | 0.400 | 1.270 | 0.016 | 0.031 |
| θ | 0° | 8° | 0° | 8° |