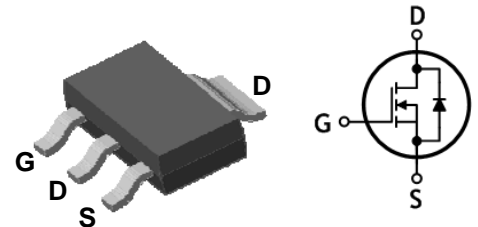


100V, 3A N-Channel Power Trench MOSFET

Features

- Max. $R_{DS(ON)} = 150m\Omega$ at $V_{GS} = 10V$, $I_D = 2A$
- Low gate charge: $Q_g = 18nC$ (Typ.)
- High performance trench technology for extremely low $R_{DS(on)}$
- 100% avalanche tested
- Halogen free and RoHS compliant device

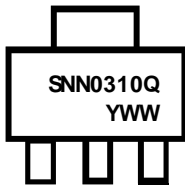


Ordering Information

| Part Number | Marking | Package |
|-------------|----------|---------|
| SNN0310Q | SNN0310Q | SOT-223 |

SOT-223

Marking Information



Column 1: Device Code
 Column 2: Production Information
 e.g.) YWW
 -. Y: Year Code
 -. WW: Week Code

Absolute maximum ratings ($T_C = 25^\circ C$ unless otherwise noted)

| Characteristic | Symbol | Rating | Unit | |
|--|-----------|---------------------|------------|---|
| Drain-source voltage | V_{DSS} | 100 | V | |
| Gate-source voltage | V_{GSS} | ± 20 | V | |
| Drain current (DC) * | I_D | $T_C = 25^\circ C$ | 3 | A |
| | | $T_C = 100^\circ C$ | 1.89 | A |
| Drain current (Pulsed) * | I_{DM} | 12 | A | |
| Single pulsed avalanche energy ^(Note 2) | E_{AS} | 79 | mJ | |
| Repetitive avalanche current ^(Note 1) | I_{AR} | 3 | A | |
| Repetitive avalanche energy ^(Note 1) | E_{AR} | 0.18 | mJ | |
| Power dissipation | P_D | 1.8 | W | |
| Junction temperature | T_J | 150 | $^\circ C$ | |
| Storage temperature range | T_{stg} | -55-150 | $^\circ C$ | |

* Limited only maximum junction temperature

Thermal Characteristics

| Characteristic | Symbol | Rating | Unit |
|---|---------------|---------|------|
| Thermal resistance, junction to ambient | $R_{th(j-a)}$ | Max. 69 | °C/W |

* When mounted on the minimum pad size recommended (PCB).

Electrical Characteristics ($T_j=25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---------------------------------------|--------------|---|------|------|-----------|------------------|
| Drain-source breakdown voltage | BV_{DSS} | $I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$ | 100 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $I_D=250\mu\text{A}$, $V_{DS}=V_{GS}$ | 2 | - | 4 | V |
| Drain-source cut-off current | I_{DSS} | $V_{DS}=30\text{V}$, $V_{GS}=0\text{V}$ | - | - | 1 | μA |
| | | $V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$, $T_j=150^\circ\text{C}$ | - | - | 10 | μA |
| Gate leakage current | I_{GSS} | $V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$ | - | - | ± 100 | nA |
| Drain-source on-resistance | $R_{DS(ON)}$ | $V_{GS}=10\text{V}$, $I_D=2\text{A}$ | - | 90 | 150 | $\text{m}\Omega$ |
| Forward transfer conductance (Note 3) | g_{fs} | $V_{DS}=10\text{V}$, $I_D=2\text{A}$ | - | 8 | - | S |
| Input capacitance | C_{iss} | $V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1\text{MHz}$ | - | 750 | 975 | pF |
| Output capacitance | C_{oss} | | - | 60 | 81 | |
| Reverse transfer capacitance | C_{rss} | | - | 38 | 51 | |
| Turn-on delay time (Note 3,4) | $t_{d(on)}$ | $V_{DD}=50\text{V}$, $I_D=9.2\text{A}$, $R_G=18\Omega$ | - | 12 | 40 | ns |
| Rise time (Note 3,4) | t_r | | - | 12 | 40 | |
| Turn-off delay time (Note 3,4) | $t_{d(off)}$ | | - | 33 | 85 | |
| Fall time (Note 3,4) | t_f | | - | 26 | 68 | |
| Total gate charge (Note 3,4) | Q_g | $V_{DS}=80\text{V}$, $V_{GS}=10\text{V}$, $I_D=9.2\text{A}$ | - | 18 | 22 | nC |
| Gate-source charge (Note 3,4) | Q_{gs} | | - | 2.7 | - | |
| Gate-drain charge (Note 3,4) | Q_{gd} | | - | 7.8 | - | |

Source-Drain Diode Ratings and Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|------------------------------------|----------|---|------|------|------|---------------|
| Source current (DC) | I_S | Integral reverse diode in the MOSFET | - | - | 3 | A |
| Source current (Pulsed) | I_{SM} | | - | - | 12 | A |
| Forward voltage | V_{SD} | $V_{GS}=0\text{V}$, $I_S=3\text{A}$ | - | - | 1.3 | V |
| Reverse recovery time (Note 3,4) | t_{rr} | $I_F=9.2\text{A}$, $V_{GS}=0\text{V}$ $di_F/dt=100\text{A}/\mu\text{s}$ | - | 98 | - | ns |
| Reverse recovery charge (Note 3,4) | Q_{rr} | | - | 0.34 | - | μC |

Note:

1. Repeated rating: Pulse width limited by safe operating area
2. $L=30\text{mH}$, $I_{AS}=2.3\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_j=25^\circ\text{C}$
3. Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty cycles $\leq 2\%$
4. Essentially independent of operating temperature typical characteristics

Electrical Characteristics Curves

Fig. 1 $I_D - V_{DS}$

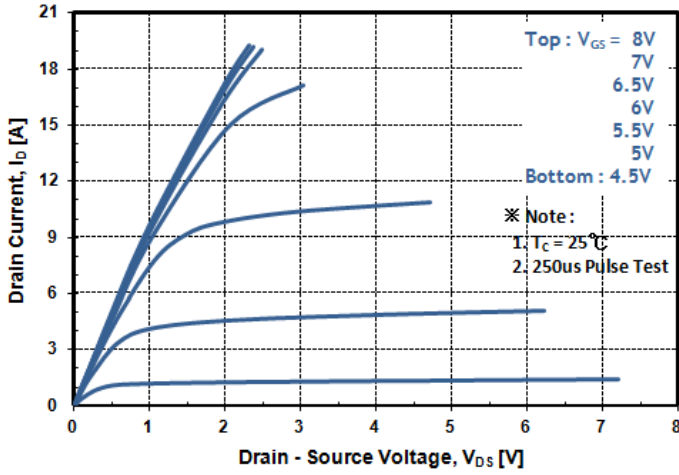


Fig. 2 $I_D - V_{GS}$

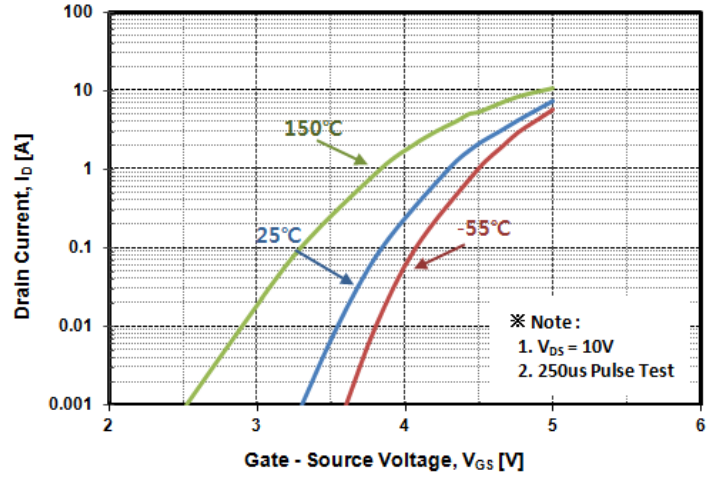


Fig. 3 $R_{DS(ON)} - I_D$

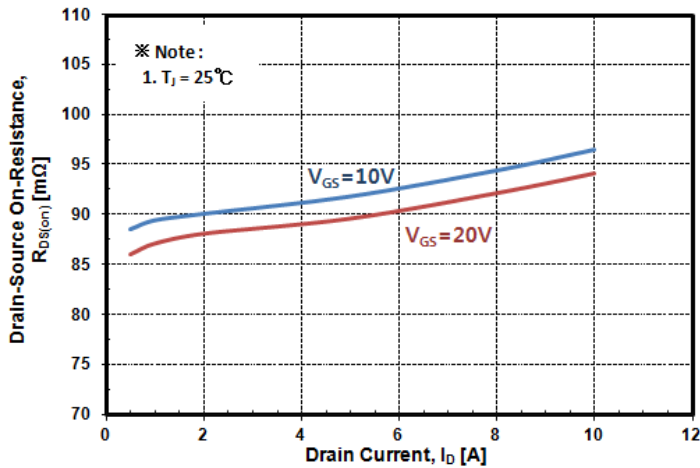


Fig. 4 $I_S - V_{SD}$

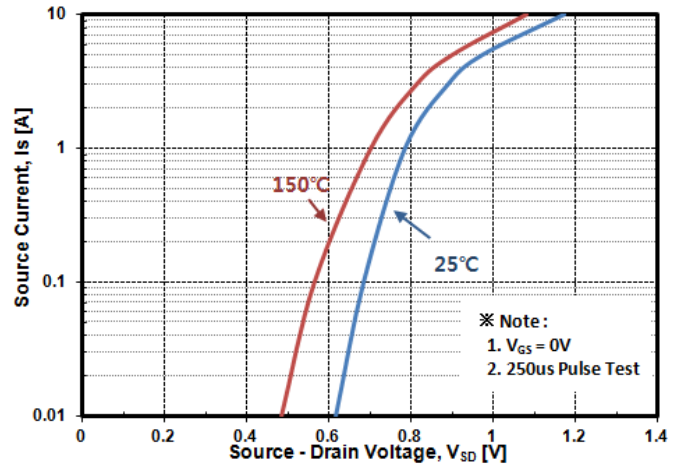


Fig. 5 Capacitance - V_{DS}

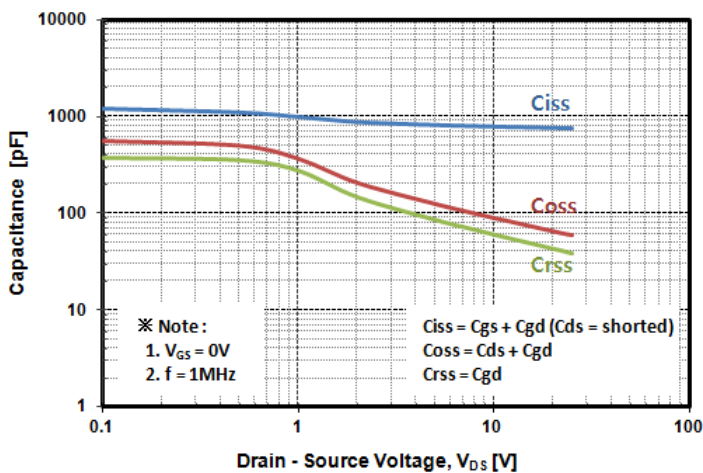


Fig. 6 $V_{GS} - Q_G$

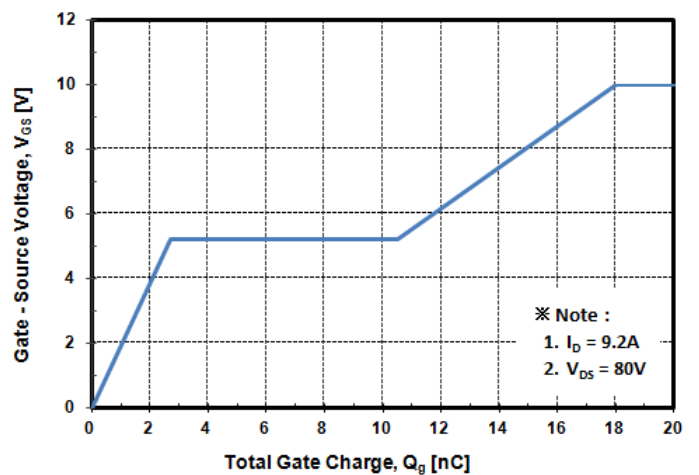


Fig. 7 $BV_{DSS} - T_J$

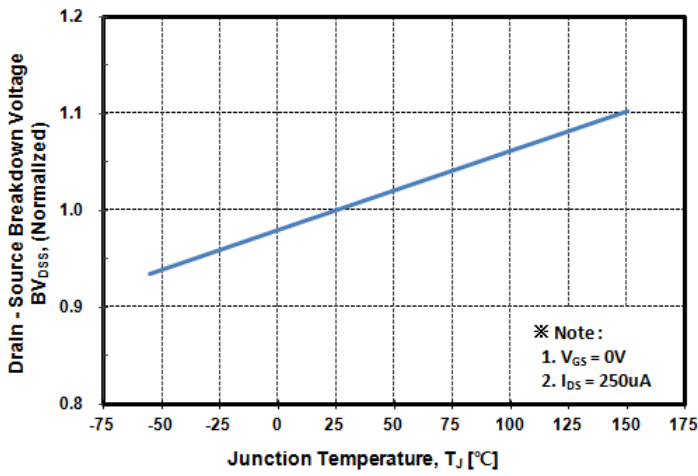


Fig. 8 $R_{DS(on)} - T_J$

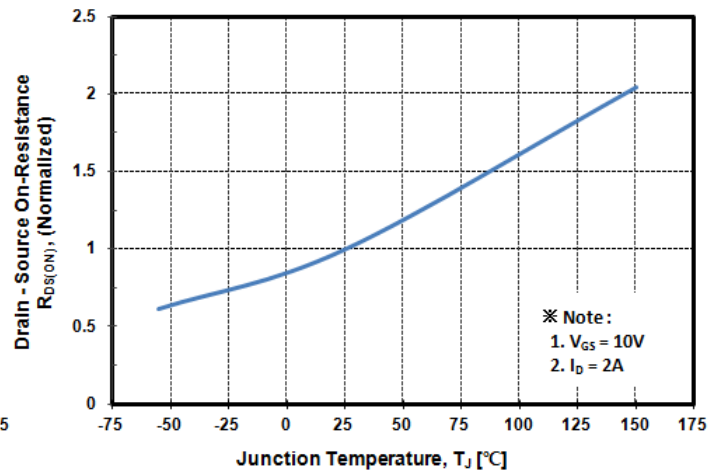


Fig. 9 $I_D - T_C$

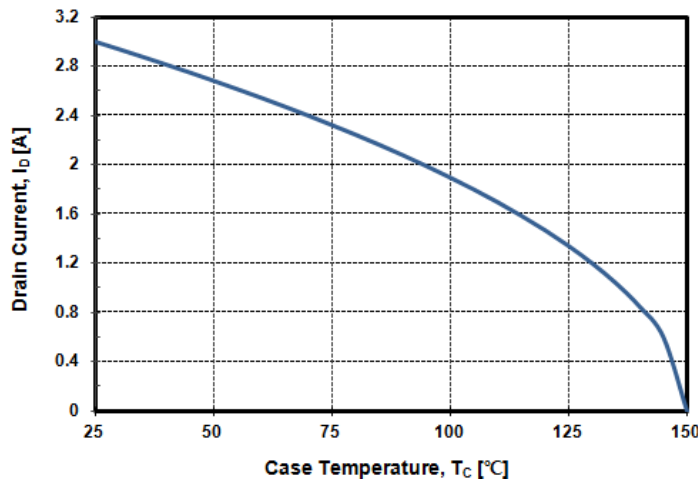


Fig. 10 Safe Operating Area

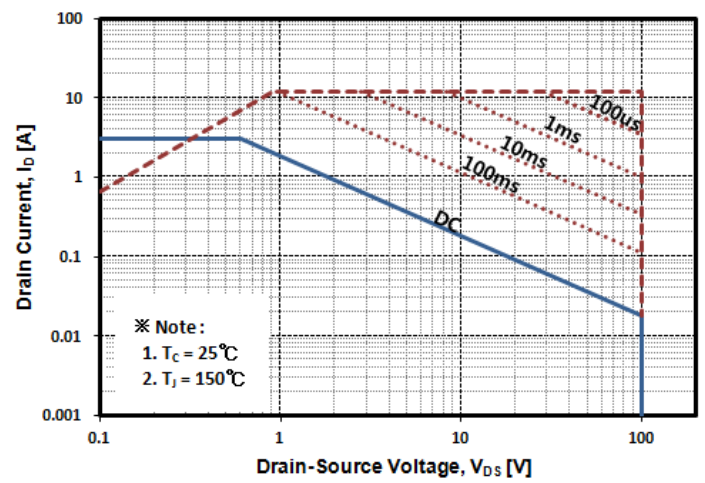


Fig. 11 Transient Thermal Impedance

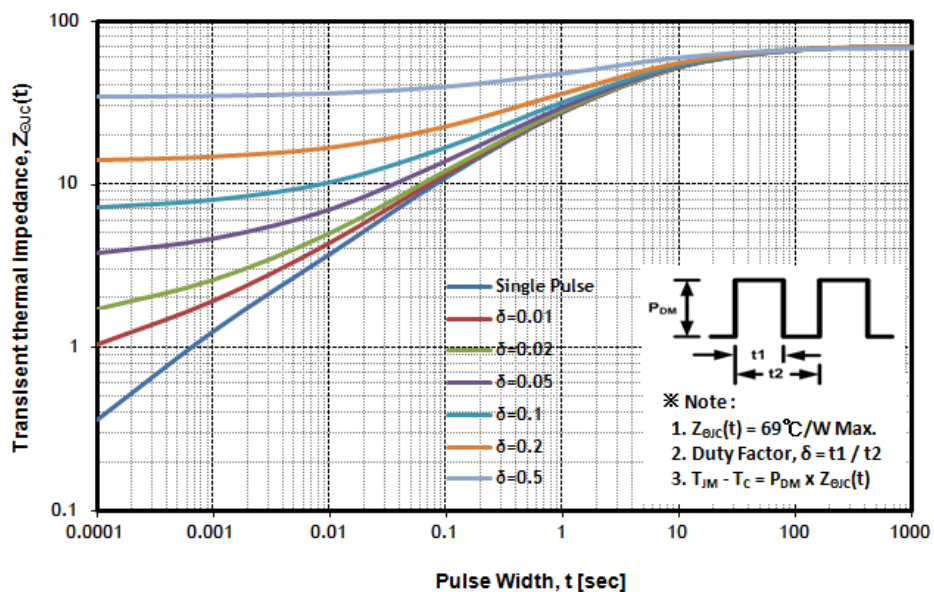


Fig. 12 Gate Charge Test Circuit & Waveform

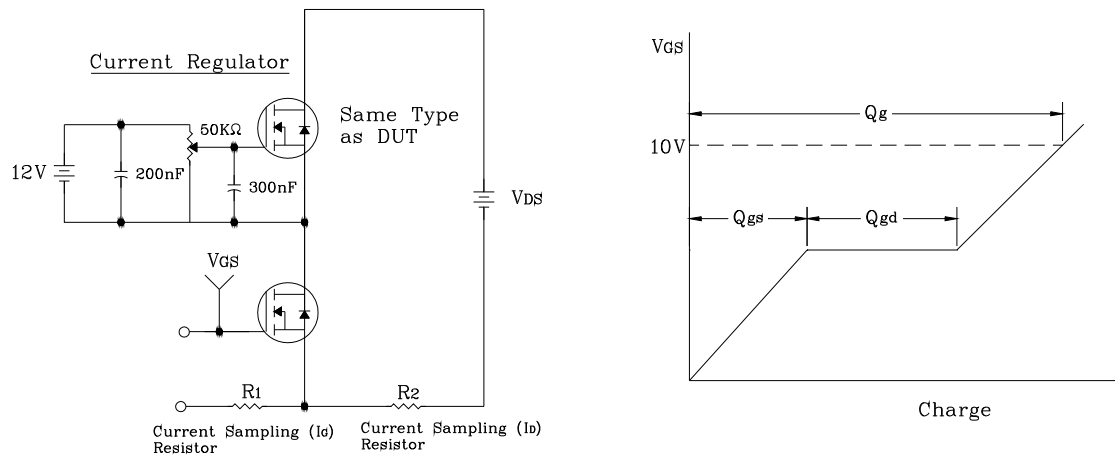


Fig. 13 Resistive Switching Test Circuit & Waveform

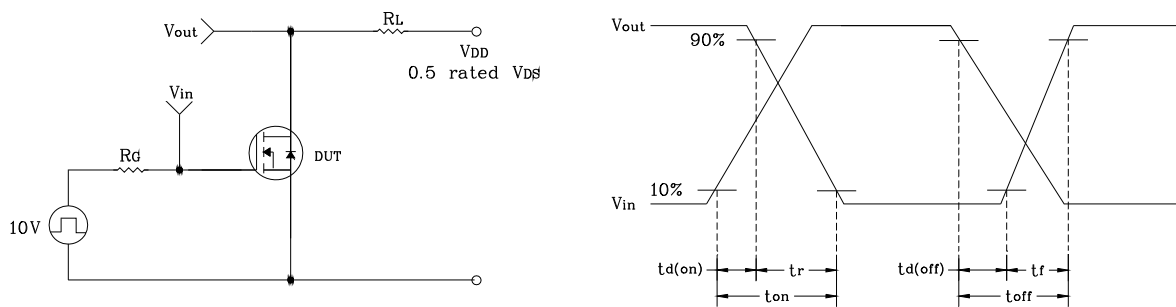


Fig. 14 E_{AS} Test Circuit & Waveform

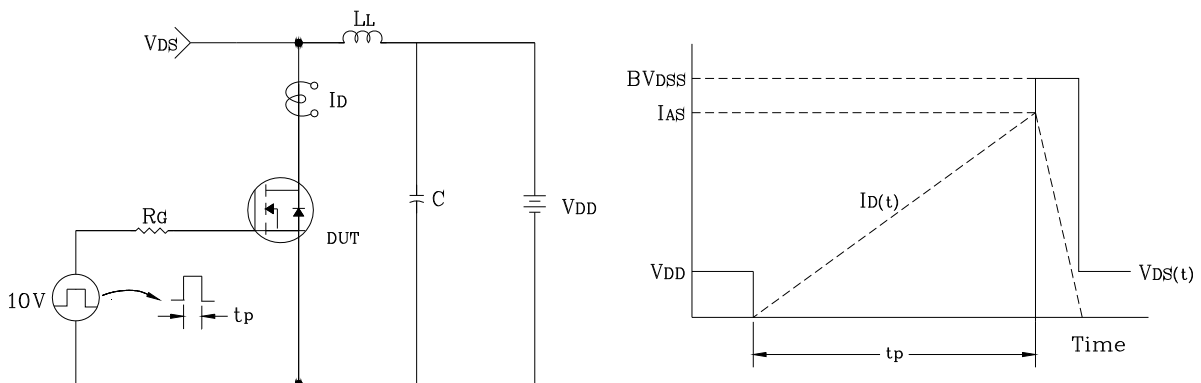
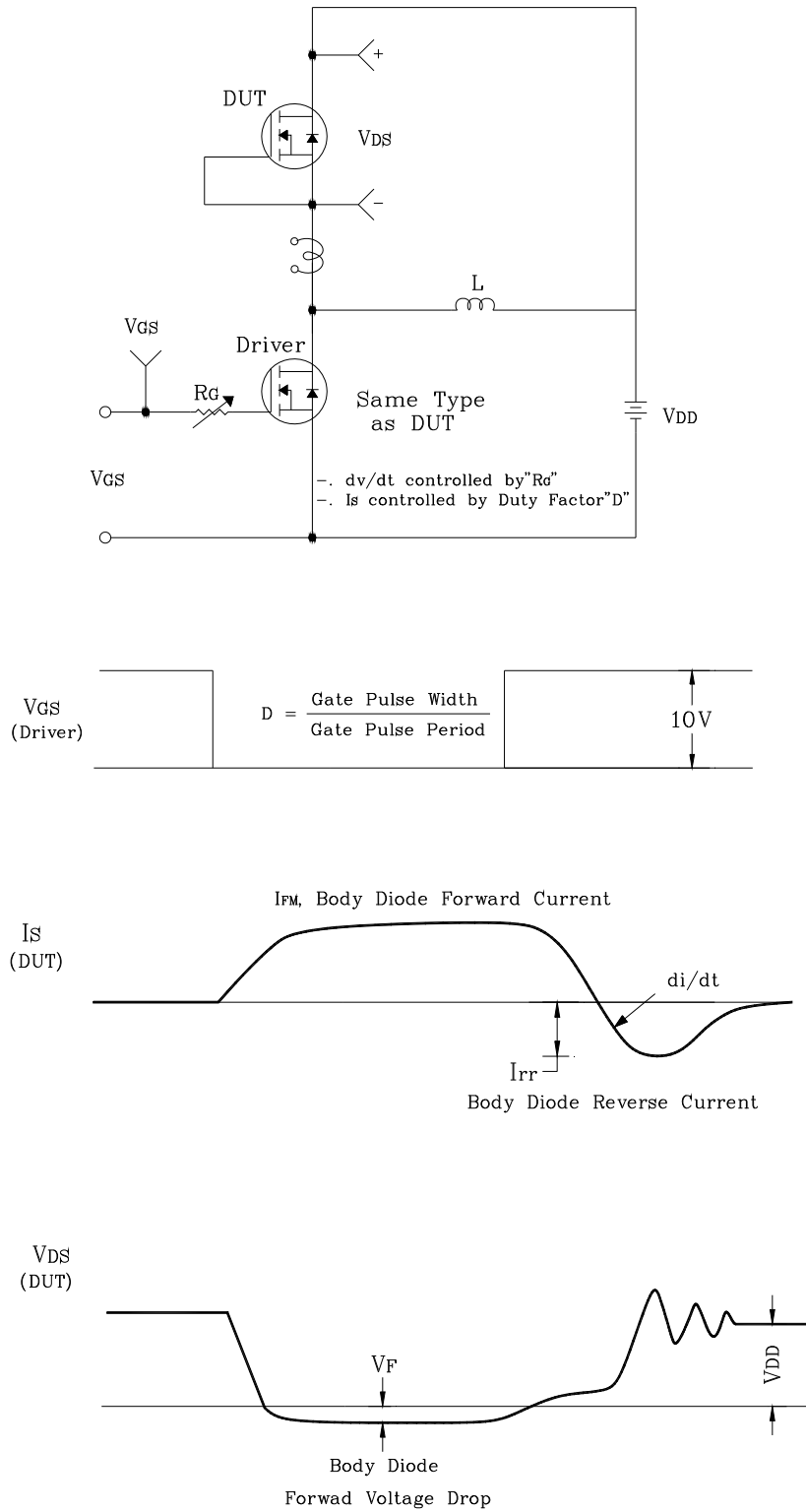
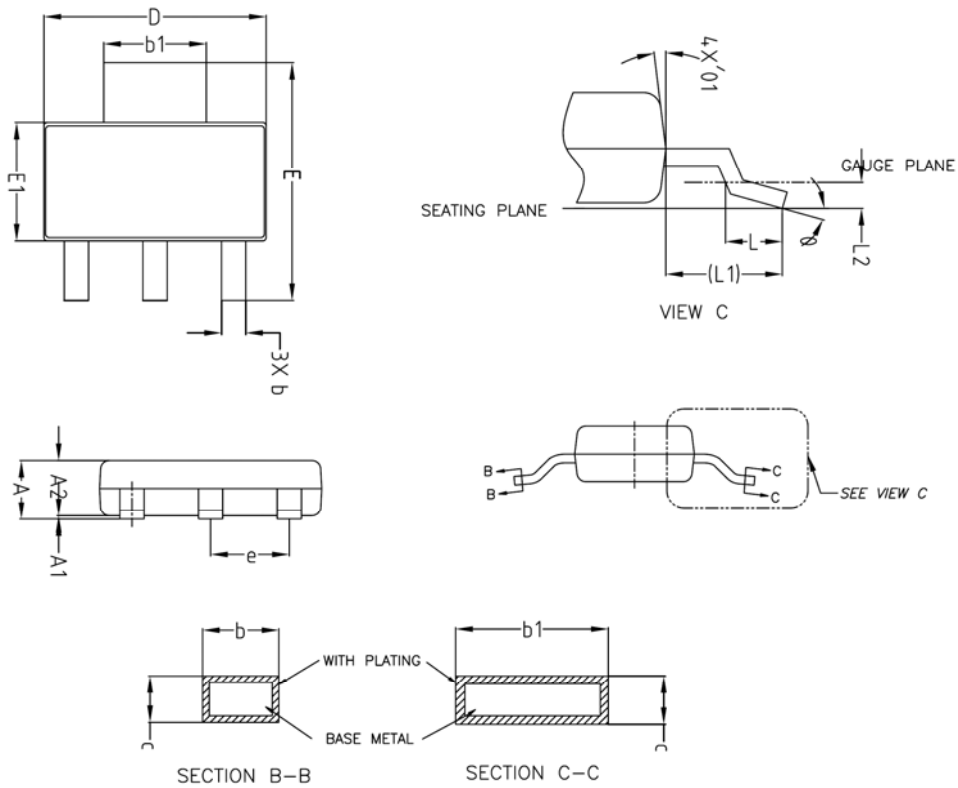


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform

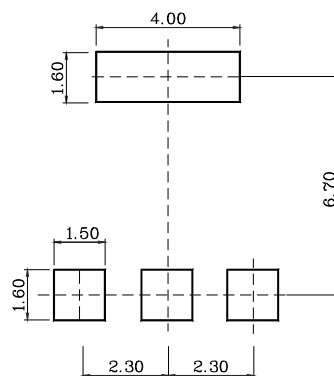


Package Outline Dimensions



| SYMBOL | MILLIMETERS | | | NOTE |
|------------|-------------|---------|---------|------|
| | MINIMUM | NOMINAL | MAXIMUM | |
| A | — | — | 1.80 | |
| A1 | 0.00 | — | 0.10 | |
| A2 | 1.60 | 1.65 | 1.70 | |
| b | 0.68 | — | 0.76 | |
| b1 | 2.95 | — | 3.07 | |
| c | 0.23 | — | 0.28 | |
| D | 6.40 | 6.50 | 6.60 | |
| E | 6.80 | 7.00 | 7.20 | |
| E1 | 3.40 | 3.50 | 3.60 | |
| e | 2.30 BSC | | | |
| L | 0.45 | — | 0.65 | |
| L1 | 1.75 REF | | | |
| L2 | 0.10 BSC | | | |
| θ | 0° | — | 10° | |
| θ 1 | 5° | — | 10° | |

※ Recommended Land Pattern (unit: mm)



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