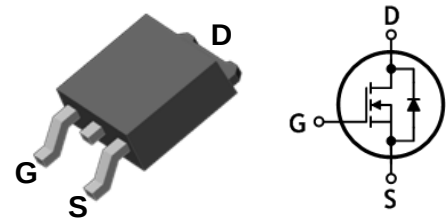


## N-Channel Super Junction MOSFET

### Features

- Drain-Source voltage:  $V_{DS}=700V$  ( $@T_J=150^{\circ}C$ )
- Low drain-source On resistance:  $R_{DS(on)}=0.6\Omega$  (Max.)
- Ultra low gate charge:  $Q_g=13.5nC$  (Typ.)
- RoHS compliant device
- 100%avalanche tested

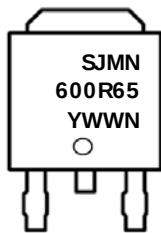


### Ordering Information

| Part Number | Marking    | Package |
|-------------|------------|---------|
| SJMN600R65D | SJMN600R65 | TO-252  |

TO-252

### Marking Information



Column 1, 2: Device Code  
Column 3: Production Information  
e.g.) YWWN  
-. YWW: Date Code (year, week)  
-. N: Management Code

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

| Characteristic                                     | Symbol           |                       | Rating  | Unit  |
|----------------------------------------------------|------------------|-----------------------|---------|-------|
| Drain-source voltage                               | V <sub>DSS</sub> |                       | 650     | V     |
| Gate-source voltage                                | V <sub>GSS</sub> |                       | ±30     | V     |
| Drain current (DC) <sup>(Note 1)</sup>             | I <sub>D</sub>   | T <sub>c</sub> =25°C  | 7       | A     |
|                                                    |                  | T <sub>c</sub> =100°C | 4.4     | A     |
| Drain current (Pulsed) <sup>(Note 1)</sup>         | I <sub>DM</sub>  |                       | 28      | A     |
| Single pulsed avalanche energy <sup>(Note 2)</sup> | E <sub>AS</sub>  |                       | 158     | mJ    |
| Repetitive avalanche current <sup>(Note 1)</sup>   | I <sub>AR</sub>  |                       | 7       | A     |
| Repetitive avalanche energy <sup>(Note 1)</sup>    | E <sub>AR</sub>  |                       | 6.3     | mJ    |
| Power dissipation                                  | P <sub>D</sub>   |                       | 63      | W     |
| Diode dv/ dt ruggedness <sup>(Note 3)</sup>        | dv/ dt           |                       | 15      | V/ ns |
| MOSFET dv/ dt ruggedness <sup>(Note 4)</sup>       | dv/ dt           |                       | 50      | V/ ns |
| Junction temperature                               | T <sub>J</sub>   |                       | 150     | °C    |
| Storage temperature range                          | T <sub>stg</sub> |                       | -55~150 | °C    |

**Thermal Characteristics**

| Characteristic                          | Symbol        | Rating    | Unit  |
|-----------------------------------------|---------------|-----------|-------|
| Thermal resistance, junction to case    | $R_{th(j-c)}$ | Max. 1.98 | °C/ W |
| Thermal resistance, junction to ambient | $R_{th(j-a)}$ | Max. 62.5 |       |

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

| Characteristic                 | Symbol       | Test Condition                                                  | Min. | Typ. | Max.      | Unit          |
|--------------------------------|--------------|-----------------------------------------------------------------|------|------|-----------|---------------|
| Drain-source breakdown voltage | $BV_{DSS}$   | $I_D=250\mu\text{A}$ , $V_{GS}=0$                               | 650  | -    | -         | V             |
| Gate threshold voltage         | $V_{GS(th)}$ | $I_D=250\mu\text{A}$ , $V_{DS}=V_{GS}$                          | 2    | 3    | 4         | V             |
| Drain-source cut-off current   | $I_{DSS}$    | $V_{DS}=650\text{V}$ , $V_{GS}=0\text{V}$                       | -    | -    | 1         | $\mu\text{A}$ |
|                                |              | $V_{DS}=650\text{V}$ , $T_J=125^{\circ}\text{C}$                | -    | -    | 100       | $\mu\text{A}$ |
| Gate leakage current           | $I_{GSS}$    | $V_{DS}=0\text{V}$ , $V_{GS}=\pm 30\text{V}$                    | -    | -    | $\pm 100$ | nA            |
| Drain-source on-resistance     | $R_{DS(ON)}$ | $V_{GS}=10\text{V}$ , $I_D=3.5\text{A}$                         | -    | 0.5  | 0.6       | $\Omega$      |
| Internal gate resistance       | $R_g$        | $f=1\text{MHz}$ , Open drain                                    | -    | 21   | -         | $\Omega$      |
| Input capacitance              | $C_{iss}$    | $V_{DS}=25\text{V}$ , $V_{GS}=0\text{V}$ ,<br>$f=1\text{MHz}$   | -    | 557  | -         | pF            |
| Output capacitance             | $C_{oss}$    |                                                                 | -    | 294  | -         |               |
| Reverse transfer capacitance   | $C_{rss}$    |                                                                 | -    | 17   | -         |               |
| Turn-on delay time (Note 5)    | $t_{d(on)}$  | $V_{DS}=350\text{V}$ , $I_D=7\text{A}$ ,<br>$R_G=25\Omega$      | -    | 16   | -         | ns            |
| Rise time (Note 5)             | $t_r$        |                                                                 | -    | 13   | -         |               |
| Turn-off delay time (Note 5)   | $t_{d(off)}$ |                                                                 | -    | 35   | -         |               |
| Fall time (Note 5)             | $t_f$        |                                                                 | -    | 7    | -         |               |
| Total gate charge (Note 6)     | $Q_g$        | $V_{DS}=400\text{V}$ , $V_{GS}=10\text{V}$ ,<br>$I_D=7\text{A}$ | -    | 13.5 | -         | nC            |
| Gate-source charge (Note 6)    | $Q_{gs}$     |                                                                 | -    | 4.5  | -         |               |
| Gate-drain charge (Note 6)     | $Q_{gd}$     |                                                                 | -    | 3.5  | -         |               |

**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<br>in the MOSFET                                     | -    | -    | 7    | A             |
| Source current (Pulsed)             | $I_{SM}$ |                                                                             | -    | -    | 28   | A             |
| Forward voltage                     | $V_{SD}$ | $V_{GS}=0\text{V}$ , $I_S=7\text{A}$                                        | -    | -    | 1.2  | V             |
| Reverse recovery time (Note 5, 6)   | $t_{rr}$ | $I_S=7\text{A}$ , $V_{GS}=0\text{V}$ ,<br>$dI_S/dt=100\text{A}/\mu\text{s}$ | -    | 278  | -    | ns            |
| Reverse recovery charge (Note 5, 6) | $Q_{rr}$ |                                                                             | -    | 2    | -    | $\mu\text{C}$ |

Note:

1. Calculated continuous current based on maximum allowable junction temperature
2.  $L=7\text{mH}$ ,  $I_{AS}=7\text{A}$ ,  $V_{DD}=50\text{V}$ , Starting  $T_J=25^{\circ}\text{C}$
3.  $I_S \leq 7\text{A}$ ,  $V_{DS} \leq 400\text{V}$ ,  $dI_S/dt \leq 100\text{A}/\mu\text{s}$ ,  $T_J=25^{\circ}\text{C}$
4.  $V_{DS} \leq 400\text{V}$ ,  $I_S \leq 7\text{A}$
5. Guaranteed by design, not subject to production testing
6. Pulse test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$

## Typical Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

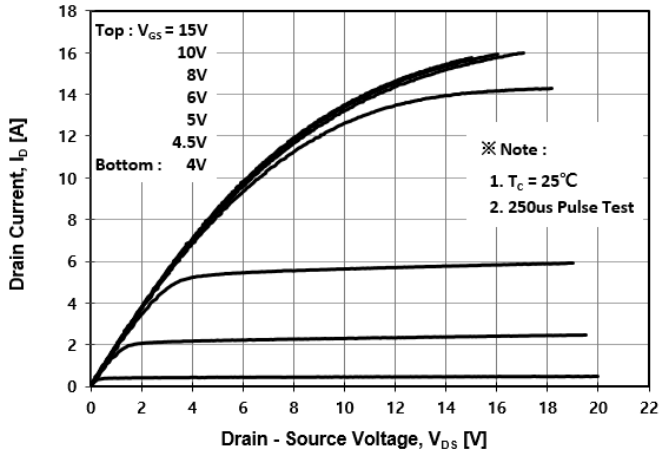


Fig. 2 Typical Transfer Characteristics

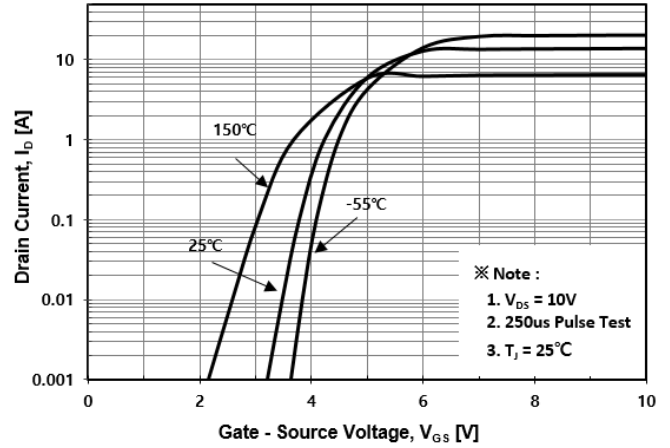


Fig.3 On-Resistance Variation with Drain Current and Gate Voltage

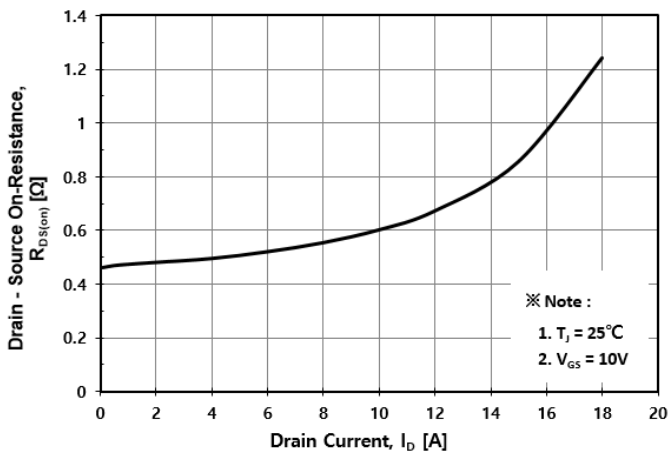


Fig. 4 Body Diode Forward Voltage Variation with Source Current

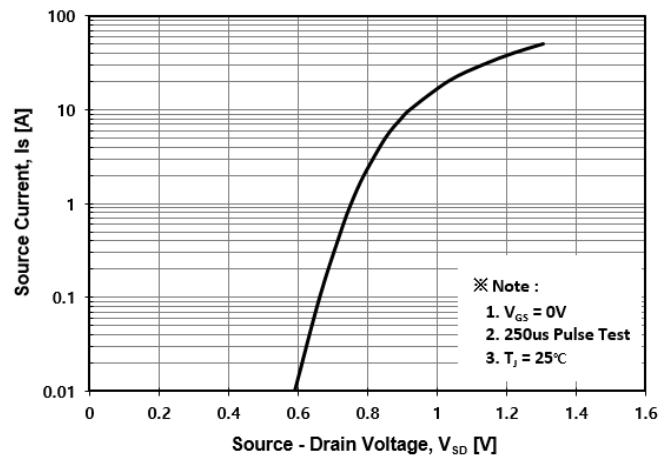


Fig. 5 Typical Capacitance Characteristics

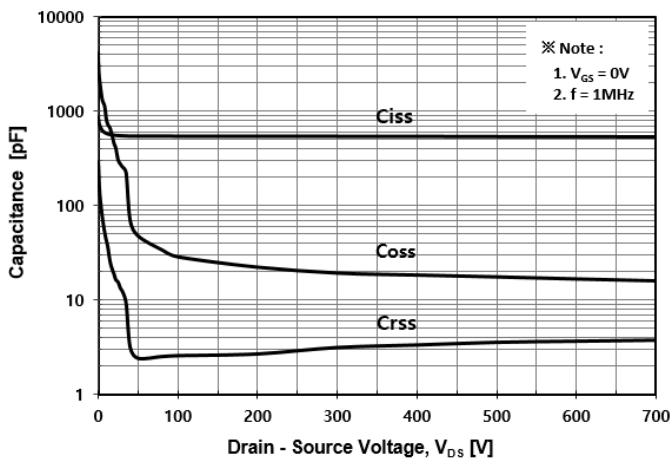


Fig. 6 Typical Total Gate Charge Characteristics

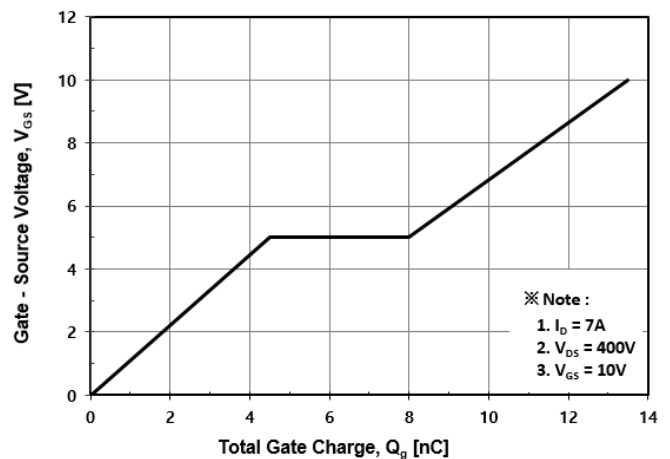


Fig. 7 Breakdown Voltage Variation vs. Temperature

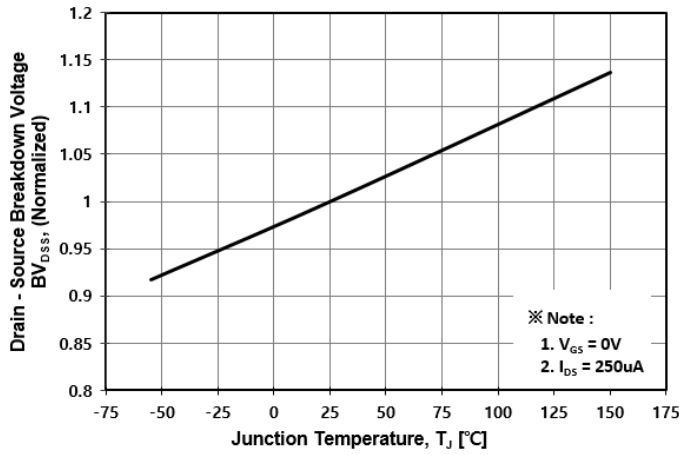


Fig. 8 On-Resistance Variation vs. Temperature

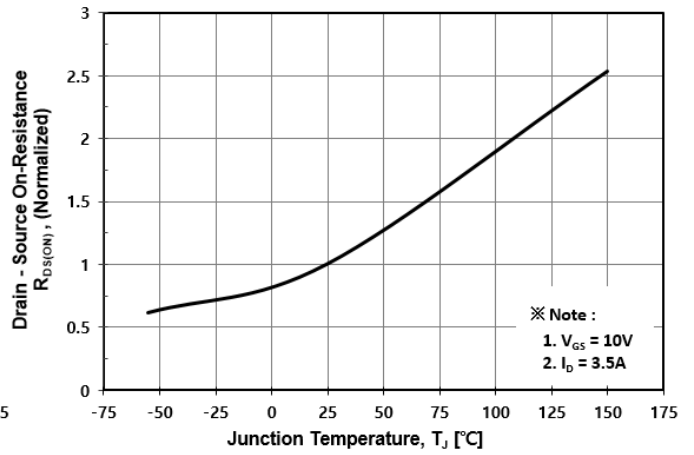


Fig. 9 Maximum Drain Current vs. Case Temperature

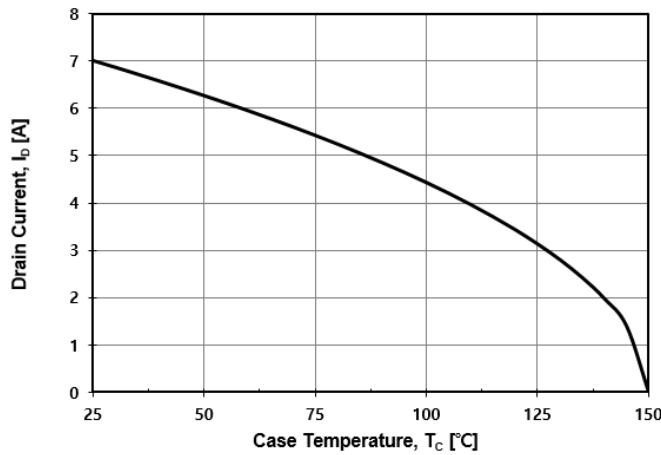


Fig. 10 Maximum Safe Operating Area

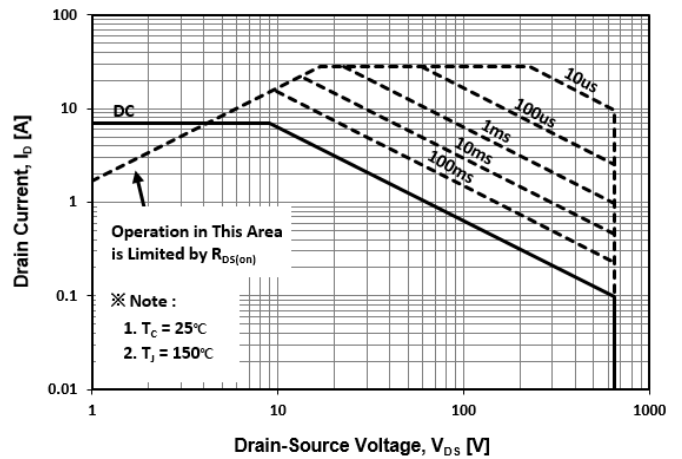


Fig. 11 Transient Thermal Impedance

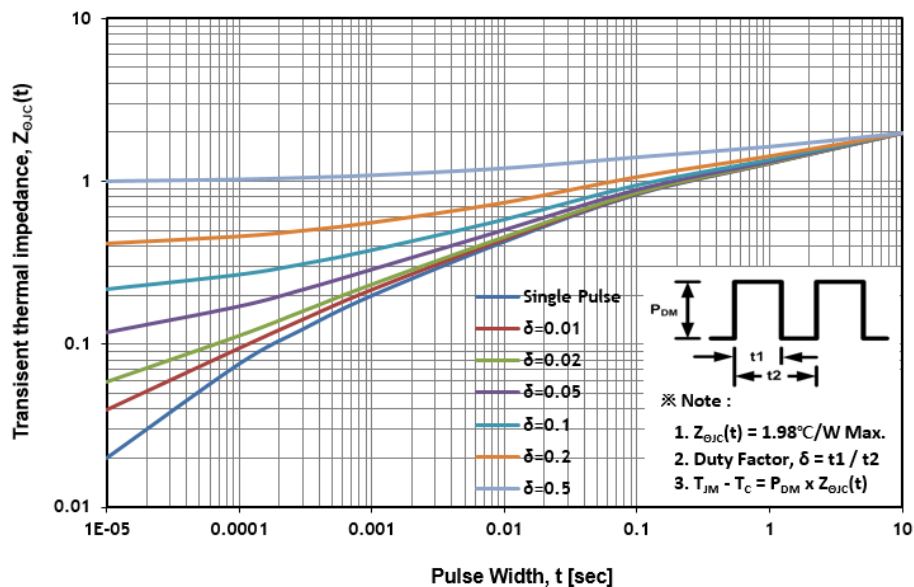


Fig. 12 Gate Charge Test Circuit & Waveform

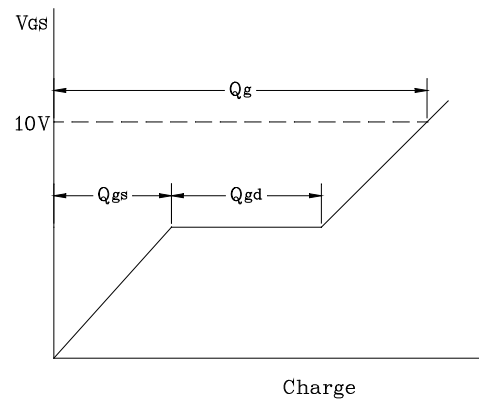
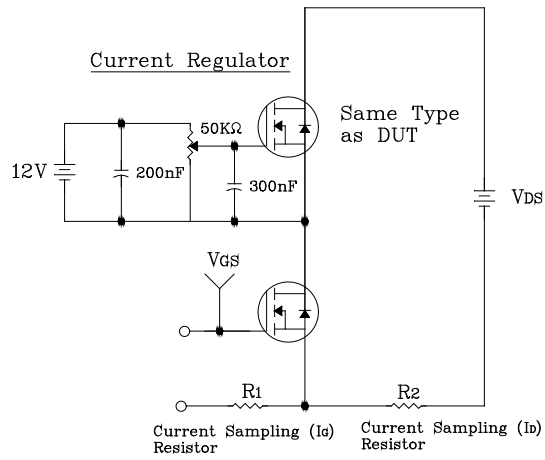


Fig. 13 Resistive Switching Test Circuit & Waveform

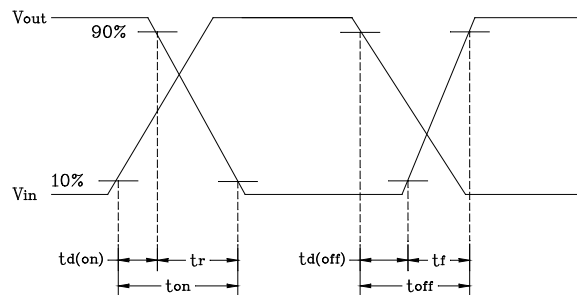
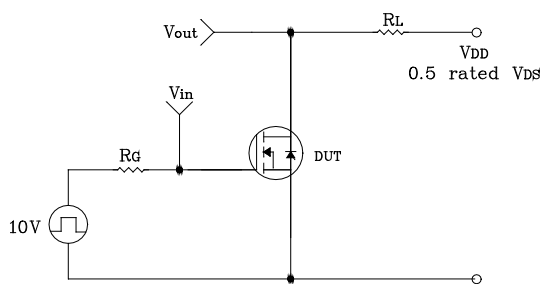


Fig. 14  $E_{AS}$  Test Circuit & Waveform

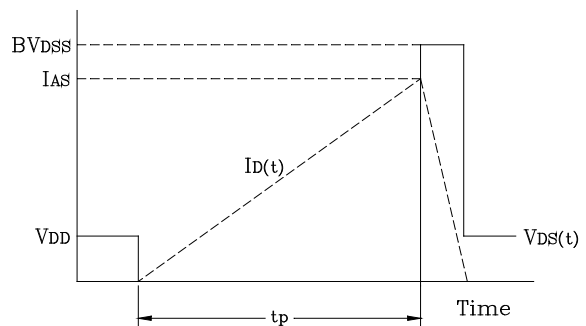
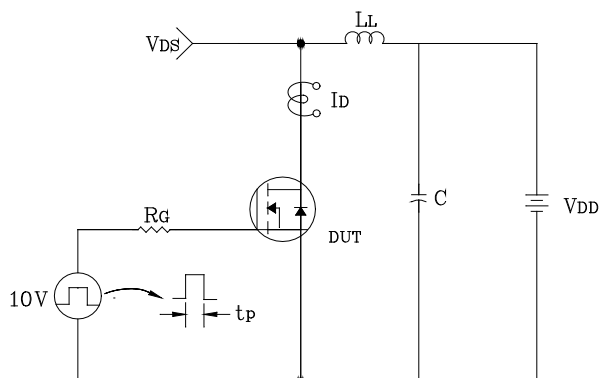
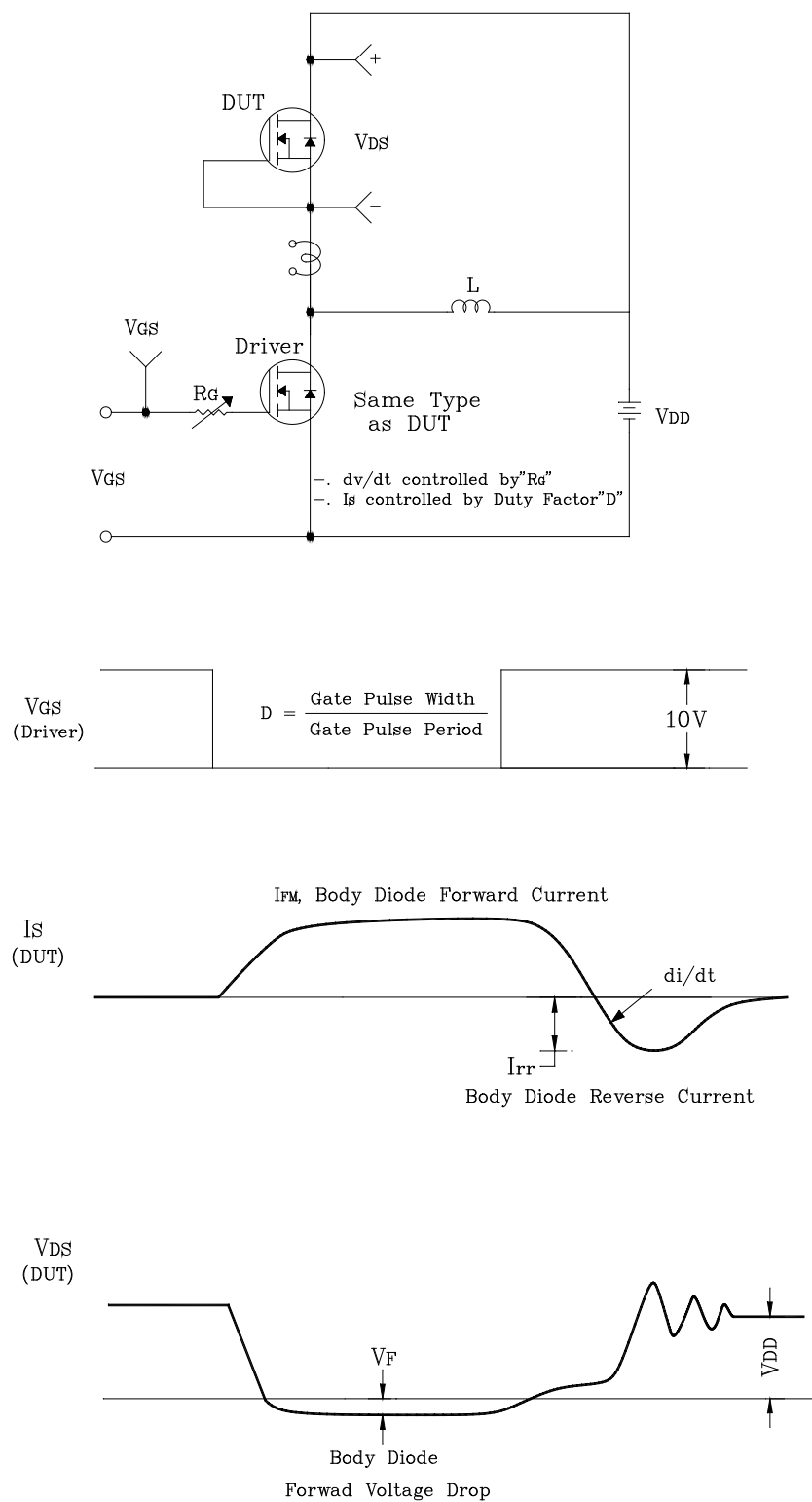
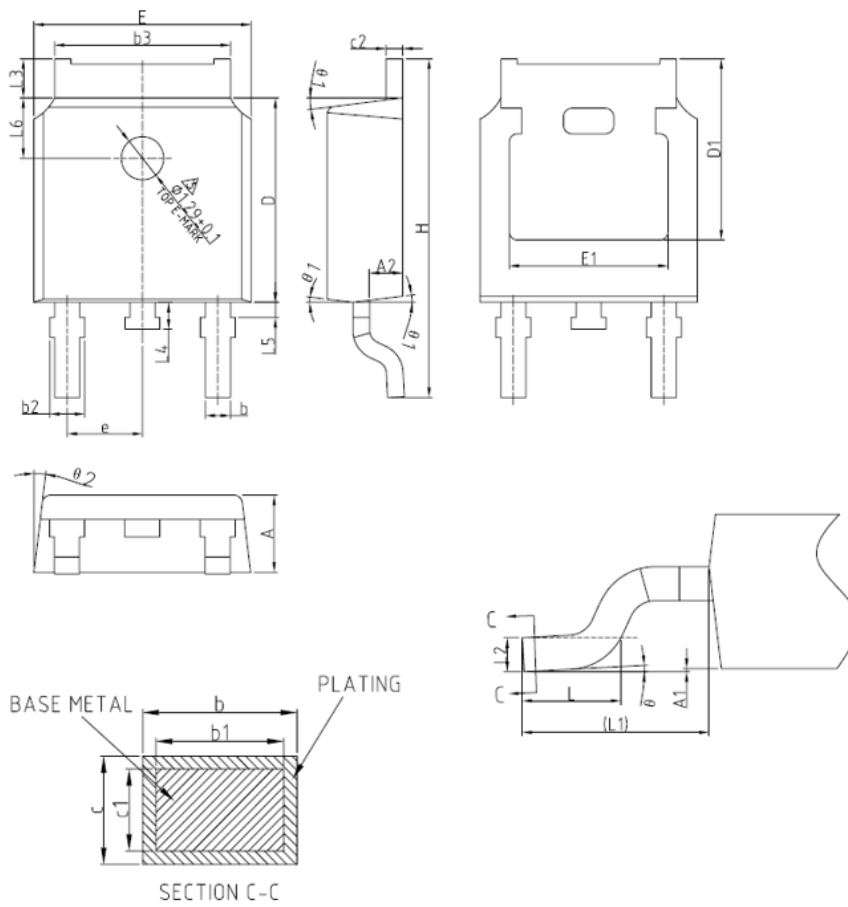


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform



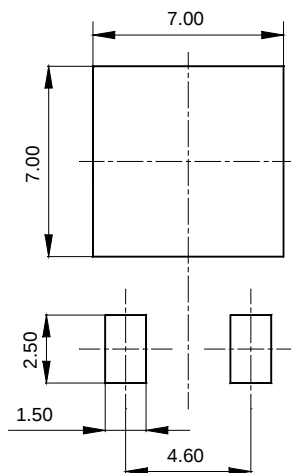
## Package Outline Dimensions



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

| SYMBOL | MIN     | NOM   | MAX   |
|--------|---------|-------|-------|
| A      | 2.20    | 2.30  | 2.38  |
| A1     | 0       | —     | 0.10  |
| A2     | 0.90    | 1.01  | 1.10  |
| b      | 0.72    | —     | 0.85  |
| b1     | 0.71    | 0.76  | 0.81  |
| b2     | 0.72    | —     | 0.90  |
| b3     | 5.13    | 5.33  | 5.46  |
| c      | 0.47    | —     | 0.60  |
| c1     | 0.46    | 0.51  | 0.56  |
| c2     | 0.47    | —     | 0.60  |
| D      | 6.00    | 6.10  | 6.20  |
| D1     | 5.25    | —     | —     |
| E      | 6.50    | 6.60  | 6.70  |
| E1     | 4.70    | —     | —     |
| e      | 2.186   | 2.286 | 2.386 |
| H      | 9.80    | 10.10 | 10.40 |
| L      | 1.40    | 1.50  | 1.70  |
| L1     | 2.90REF |       |       |
| L2     | 0.51BSC |       |       |
| L3     | 0.90    | —     | 1.25  |
| L4     | 0.60    | 0.80  | 1.00  |
| L5     | 0.15    | —     | 0.75  |
| L6     | 1.80REF |       |       |
| θ      | 0°      | —     | 8°    |
| θ 1    | 5°      | 7°    | 9°    |
| θ 2    | 5°      | 7°    | 9°    |

## Recommended Land Pattern [unit: mm]



The AUK Corp. products are intended for the use as components in general electronic equipment (Office and communication equipment, measuring equipment, home appliance, etc.).

Please make sure that you consult with us before you use these AUK Corp. products in equipments which require high quality and / or reliability, and in equipments which could have major impact to the welfare of human life(atomic energy control, airplane, spaceship, transportation, combustion control, all types of safety device, etc.). AUK Corp. cannot accept liability to any damage which may occur in case these AUK Corp. products were used in the mentioned equipments without prior consultation with AUK Corp..

Specifications mentioned in this publication are subject to change without notice.