

|                     |       |
|---------------------|-------|
| $V_{DSS}$           | 1200V |
| $R_{DS(on)}$ (Typ.) | 62mΩ  |
| $I_D^{*1}$          | 26A   |
| $P_D$               | 115W  |

### ● Features

- 1) Low on-resistance
- 2) Fast switching speed
- 3) Fast reverse recovery
- 4) Easy to parallel
- 5) Simple to drive
- 6) Pb-free lead plating ; RoHS compliant

### ● Application

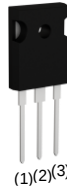
- Solar inverters
- DC/DC converters
- Switch mode power supplies
- Induction heating
- Motor drives

### ● Absolute maximum ratings ( $T_c = 25^\circ\text{C}$ )

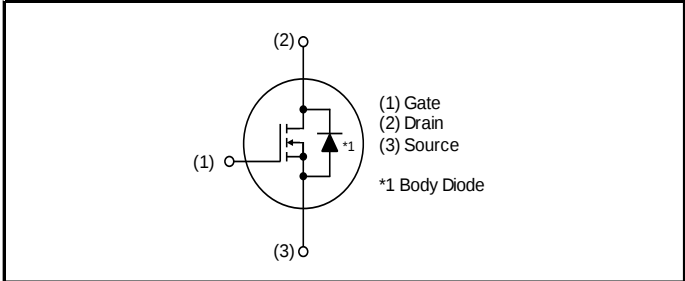
| Parameter                                                        |                       | Symbol                | Value       | Unit             |
|------------------------------------------------------------------|-----------------------|-----------------------|-------------|------------------|
| Drain - source voltage                                           |                       | $V_{DSS}$             | 1200        | V                |
| Continuous drain and source current<br>$T_c = 100^\circ\text{C}$ | $V_{GS} = V_{GS\_on}$ | $I_D, I_S^{*1}$       | 26          | A                |
|                                                                  |                       |                       | 18          | A                |
| Pulsed drain current                                             | $V_{GS} = V_{GS\_on}$ | $I_{D,pulse}^{*2}$    | 52          | A                |
| Body diode pulsed forward current                                | $V_{GS} = 0\text{ V}$ | $I_{S,pulse}^{*3}$    | 26          | A                |
| Body diode surge forward current                                 | $V_{GS} = 0\text{ V}$ | $I_{S,pulse}^{*4}$    | 52          | A                |
| Gate - source voltage (DC)                                       |                       | $V_{GSS\_DC}$         | -4 to +21   | V                |
| Gate - source surge voltage ( $t_{surge} < 300\text{ns}$ )       |                       | $V_{GSS\_surge}^{*5}$ | -4 to +23   | V                |
| Recommended turn-on gate - source drive voltage                  |                       | $V_{GS\_on}^{*6}$     | +15 to +18  | V                |
| Recommended turn-off gate - source drive voltage                 |                       | $V_{GS\_off}$         | 0           | V                |
| Virtual junction temperature                                     |                       | $T_{vj}$              | 175         | $^\circ\text{C}$ |
| Range of storage temperature                                     |                       | $T_{stg}$             | -40 to +175 | $^\circ\text{C}$ |

### ● Outline

TO-247N



### ● Inner circuit



### ● Packaging specifications

|      |                           |           |
|------|---------------------------|-----------|
| Type | Packing                   | Tube      |
|      | Reel size (mm)            | -         |
|      | Tape width (mm)           | -         |
|      | Basic ordering unit (pcs) | 30        |
|      | Taping code               | C11       |
|      | Marking                   | SCT4062KE |

**●Electrical characteristics** ( $T_{vj} = 25^{\circ}\text{C}$  unless otherwise specified)

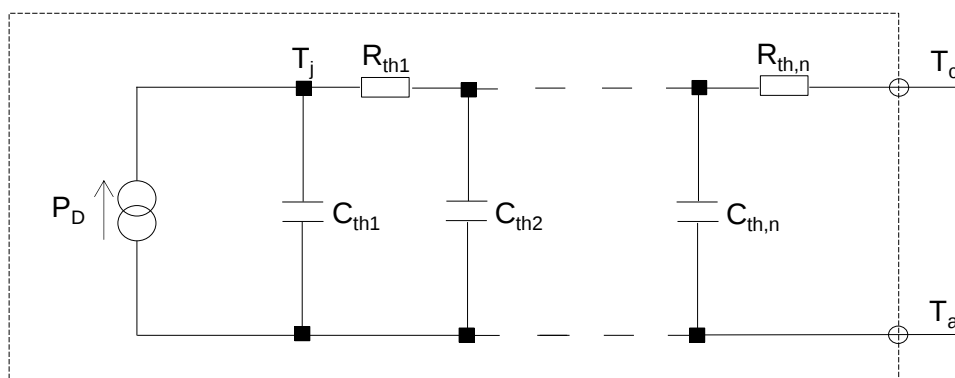
| Parameter                                   | Symbol            | Conditions                                                                       | Values |      |      | Unit          |
|---------------------------------------------|-------------------|----------------------------------------------------------------------------------|--------|------|------|---------------|
|                                             |                   |                                                                                  | Min.   | Typ. | Max. |               |
| Drain - Source breakdown voltage            | $V_{(BR)DSS}$     | $V_{GS} = 0\text{ V}$ , $I_D = 5.3\text{mA}$<br>$T_{vj} = 25^{\circ}\text{C}$    | 1200   | -    | -    | V             |
| Zero Gate voltage Drain current             | $I_{DSS}$         | $V_{GS} = 0\text{ V}$ , $V_{DS} = 1200\text{V}$<br>$T_{vj} = 25^{\circ}\text{C}$ | -      | 1    | 80   | $\mu\text{A}$ |
|                                             |                   | $T_{vj} = 150^{\circ}\text{C}$                                                   | -      | 10   | -    |               |
| Gate - Source leakage current               | $I_{GSS+}$        | $V_{GS} = +21\text{V}$ , $V_{DS} = 0\text{V}$                                    | -      | -    | 100  | nA            |
| Gate - Source leakage current               | $I_{GSS-}$        | $V_{GS} = -4\text{V}$ , $V_{DS} = 0\text{V}$                                     | -      | -    | -100 | nA            |
| Gate threshold voltage                      | $V_{GS(th)}^{*7}$ | $V_{DS} = 10\text{V}$ , $I_D = 6.45\text{mA}$                                    | 2.8    | -    | 4.8  | V             |
| Static Drain - Source on - state resistance | $R_{DS(on)}^{*8}$ | $V_{GS} = 18\text{V}$ , $I_D = 12\text{A}$<br>$T_{vj} = 25^{\circ}\text{C}$      | -      | 62   | 81   | m $\Omega$    |
|                                             |                   | $T_{vj} = 150^{\circ}\text{C}$                                                   | -      | 124  | -    |               |
| Gate input resistance                       | $R_G$             | $f = 1\text{MHz}$ , open drain                                                   | -      | 4    | -    | $\Omega$      |

**●Thermal resistance**

| Parameter                           | Symbol          | Values |      |      | Unit |
|-------------------------------------|-----------------|--------|------|------|------|
|                                     |                 | Min.   | Typ. | Max. |      |
| Thermal resistance, junction - case | $R_{thJC}^{*9}$ | -      | 0.98 | 1.3  | K/W  |

**●Typical Transient Thermal Characteristics**

| Symbol    | Value                | Unit | Symbol    | Value                | Unit |
|-----------|----------------------|------|-----------|----------------------|------|
| $R_{th1}$ | $1.7 \times 10^{-1}$ | K/W  | $C_{th1}$ | $3.6 \times 10^{-4}$ | Ws/K |
| $R_{th2}$ | $4.1 \times 10^{-1}$ |      | $C_{th2}$ | $1.5 \times 10^{-3}$ |      |
| $R_{th3}$ | $4.0 \times 10^{-1}$ |      | $C_{th3}$ | $6.5 \times 10^{-3}$ |      |



●Electrical characteristics ( $T_{vj} = 25^{\circ}\text{C}$  unless otherwise specified)

| Parameter                                    | Symbol            | Conditions                                                                                                                                                                                                                                           | Values |      |      | Unit          |
|----------------------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|------|---------------|
|                                              |                   |                                                                                                                                                                                                                                                      | Min.   | Typ. | Max. |               |
| Transconductance                             | $g_{fs}^{*8}$     | $V_{DS} = 10\text{V}, I_D = 12\text{A}$                                                                                                                                                                                                              | -      | 6.5  | -    | S             |
| Input capacitance                            | $C_{iss}$         | $V_{GS} = 0\text{V}$<br>$V_{DS} = 800\text{V}$<br>$f = 1\text{MHz}$                                                                                                                                                                                  | -      | 1498 | -    | pF            |
| Output capacitance                           | $C_{oss}$         |                                                                                                                                                                                                                                                      | -      | 45   | -    |               |
| Reverse transfer capacitance                 | $C_{rss}$         |                                                                                                                                                                                                                                                      | -      | 3    | -    |               |
| Effective output capacitance, energy related | $C_{o(er)}$       | $V_{GS} = 0\text{V}$<br>$V_{DS} = 0\text{V to } 800\text{V}$                                                                                                                                                                                         | -      | 54   | -    | pF            |
| Total Gate charge                            | $Q_g^{*8}$        | $V_{DS} = 800\text{V}$<br>$I_D = 12\text{A}$<br>$V_{GS} = 18\text{V}$<br>See Fig. 1-1, 1-2.                                                                                                                                                          | -      | 64   | -    | nC            |
| Gate - Source charge                         | $Q_{gs}^{*8}$     |                                                                                                                                                                                                                                                      | -      | 14   | -    |               |
| Gate - Drain charge                          | $Q_{gd}^{*8}$     |                                                                                                                                                                                                                                                      | -      | 17   | -    |               |
| Turn - on delay time                         | $t_{d(on)}^{*8}$  | $V_{DS} = 800\text{V}$<br>$I_D = 12\text{A}$<br>$V_{GS} = +18\text{V} / 0\text{V}$<br>$R_G = 0\Omega, L = 250\mu\text{H}$<br>$E_{on}$ includes diode reverse recovery<br>$L_\sigma = 50\text{nH}, C_\sigma = 10\text{pF}$<br>See Fig. 2-1, 2-2, 2-3. | -      | 6    | -    | ns            |
| Rise time                                    | $t_r^{*8}$        |                                                                                                                                                                                                                                                      | -      | 20   | -    |               |
| Turn - off delay time                        | $t_{d(off)}^{*8}$ |                                                                                                                                                                                                                                                      | -      | 25   | -    |               |
| Fall time                                    | $t_f^{*8}$        |                                                                                                                                                                                                                                                      | -      | 11   | -    |               |
| Turn - on switching loss                     | $E_{on}^{*8}$     |                                                                                                                                                                                                                                                      | -      | 250  | -    | $\mu\text{J}$ |
| Turn - off switching loss                    | $E_{off}^{*8}$    |                                                                                                                                                                                                                                                      | -      | 15   | -    |               |

**●Body diode electrical characteristics (Source-Drain) ( $T_{vj} = 25^{\circ}\text{C}$  unless otherwise specified)**

| Parameter                     | Symbol         | Conditions                                                                 | Values |      |      | Unit |
|-------------------------------|----------------|----------------------------------------------------------------------------|--------|------|------|------|
|                               |                |                                                                            | Min.   | Typ. | Max. |      |
| Forward voltage               | $V_{SD}^{*8}$  | $V_{GS} = 0\text{V}, I_D = 12\text{A}$                                     | -      | 3.3  | -    | V    |
| Reverse recovery time         | $t_{rr}^{*8}$  | $I_F = 12\text{A}$<br>$V_R = 800\text{V}$                                  | -      | 16   | -    | ns   |
| Reverse recovery charge       | $Q_{rr}^{*8}$  | $di/dt = 2600\text{A}/\mu\text{s}$                                         | -      | 82   | -    | nC   |
| Peak reverse recovery current | $I_{rrm}^{*8}$ | $L_{\sigma} = 50\text{nH}, C_{\sigma} = 10\text{pF}$<br>See Fig. 3-1, 3-2. | -      | 10   | -    | A    |

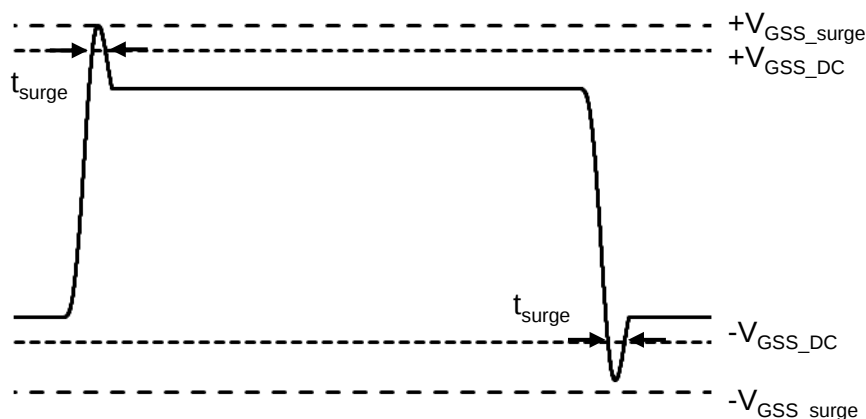
\*1 Limited by maximum  $T_{vj}$  and for Max.  $R_{thJC}$ .

\*2  $PW \leq 10\mu\text{s}$ , Duty cycle  $\leq 1\%$

\*3 Only for body-diode, Repetitive pulse,  $PW \leq 500\text{ns}$ , Duty cycle  $\leq 5\%$

\*4 When used as a protective function,  $PW \leq 10\mu\text{s}$

\*5 Example of acceptable  $V_{GS}$  waveform



\*6 Please be advised not to use SiC-MOSFETs with  $V_{GS}$  below 10V as doing so may cause thermal runaway.

\*7 Tested after applying  $V_{GS} = 21\text{V}$  for 100ms.

\*8 Pulsed

\*9 Measured conformable to JESD51-14.

See the application note "rthjc\_measurement\_and\_usage\_an-e.pdf". [Link](#)

URL: [https://fscdn.rohm.com/en/products/databook/applinote/discrete/common/rthjc\\_measurement\\_and\\_usage\\_an-e.pdf](https://fscdn.rohm.com/en/products/databook/applinote/discrete/common/rthjc_measurement_and_usage_an-e.pdf)

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

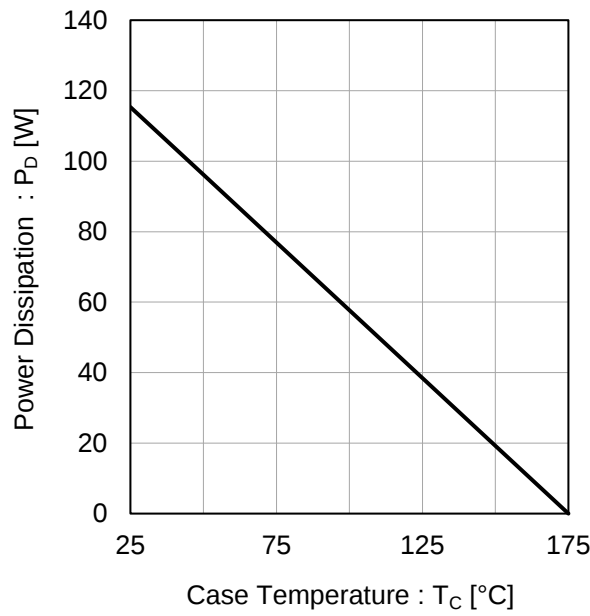


Fig.2 Maximum Safe Operating Area

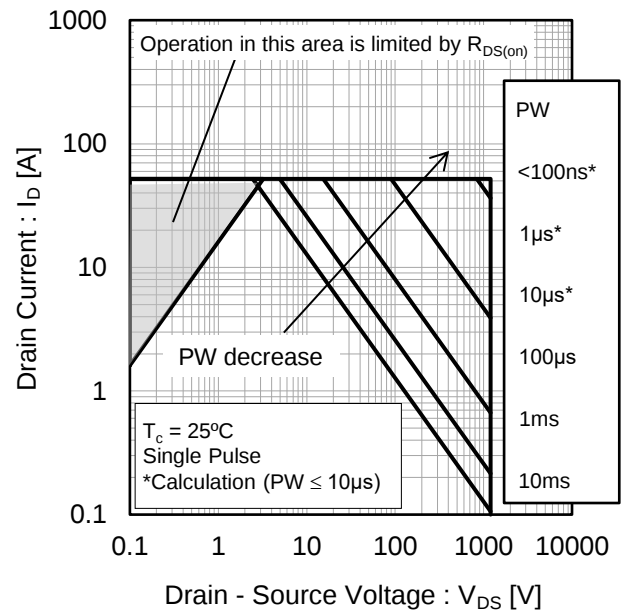
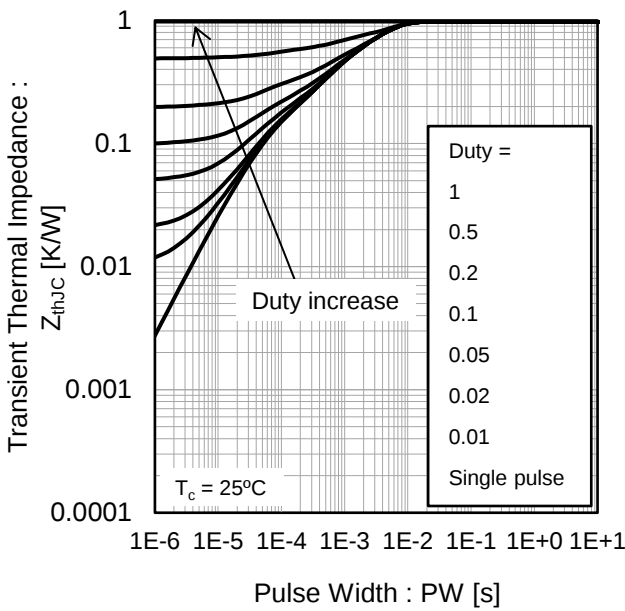


Fig.3 Typical Transient Thermal Impedance vs. Pulse Width



# ●Electrical characteristic curves

Fig.4  $T_{vj} = 25^{\circ}\text{C}$  Typical Output Characteristics(I)

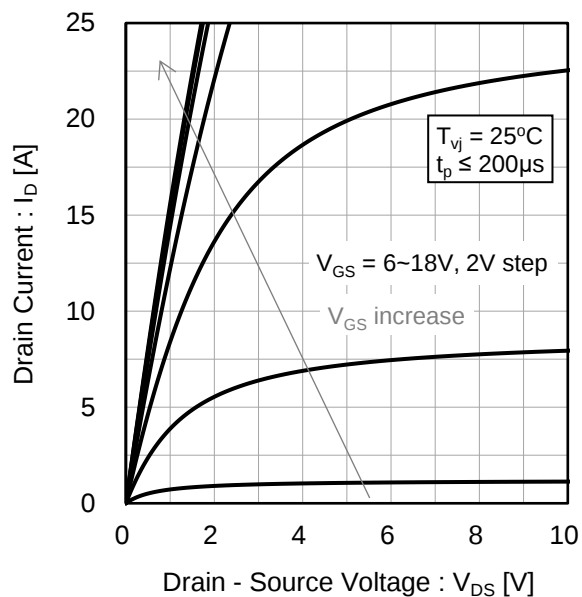


Fig.5  $T_{vj} = 25^{\circ}\text{C}$  Typical Output Characteristics(II)

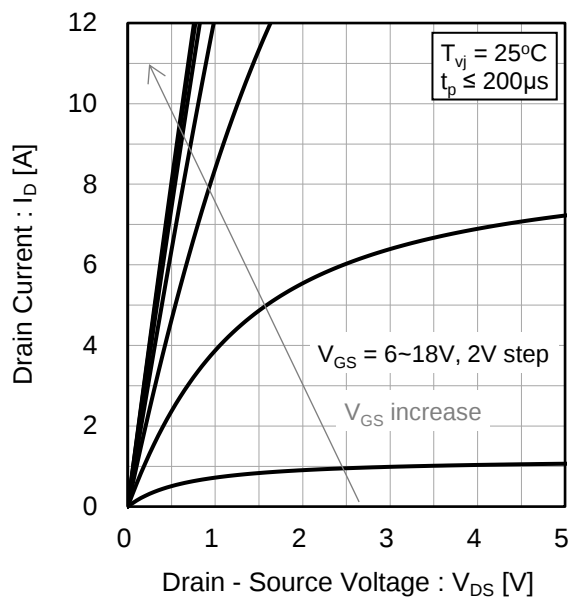
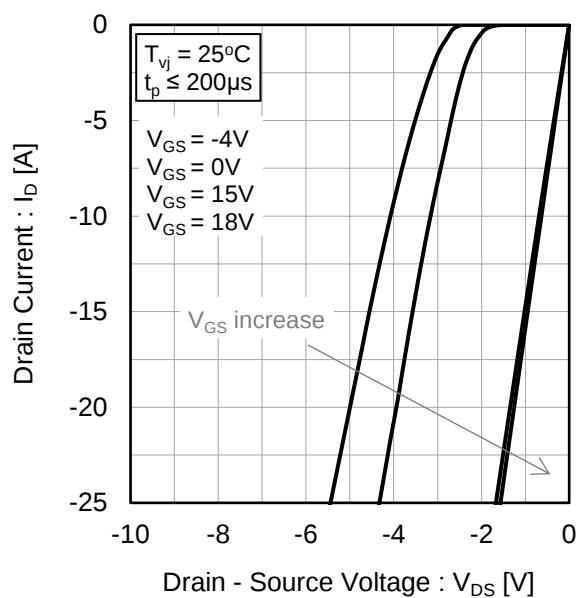


Fig.6  $T_{vj} = 25^{\circ}\text{C}$  3rd Quadrant Characteristics



# ●Electrical characteristic curves

Fig.7  $T_{vj} = 150^{\circ}\text{C}$  Typical Output Characteristics(I)

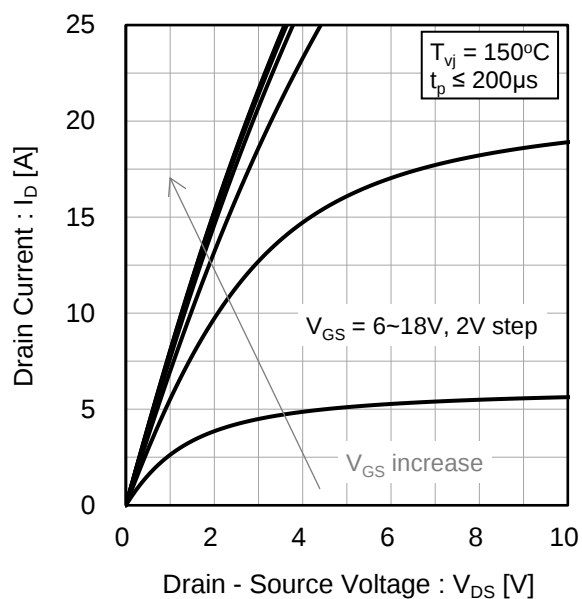


Fig.8  $T_{vj} = 150^{\circ}\text{C}$  Typical Output Characteristics(II)

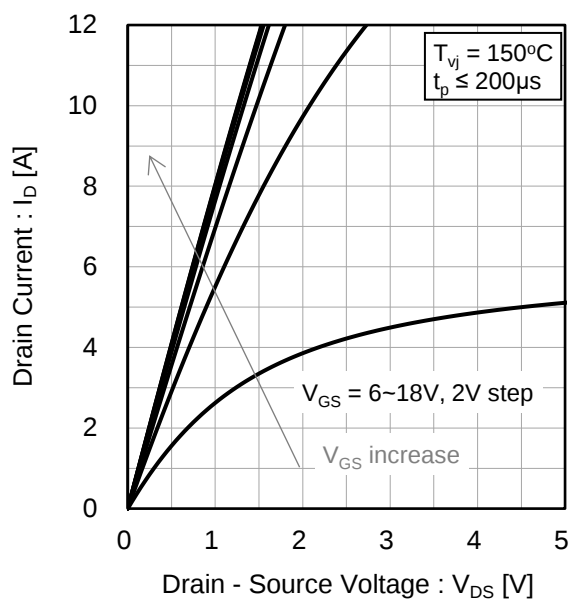


Fig.9  $T_{vj} = 150^{\circ}\text{C}$  3rd Quadrant Characteristics

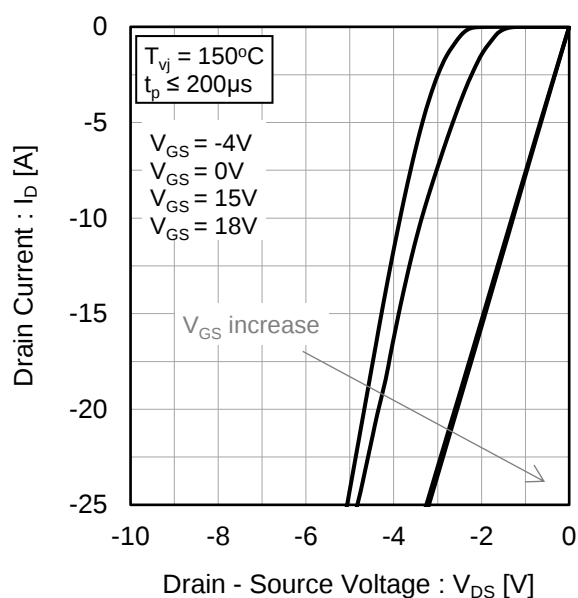
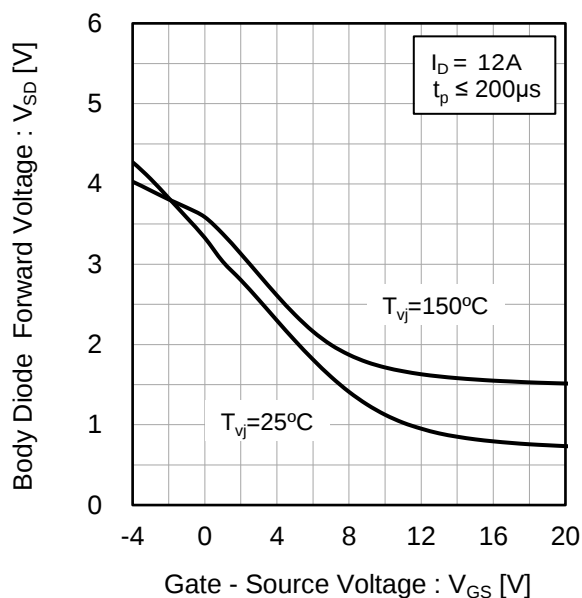


Fig.10 Body Diode Forward Voltage vs. Gate - Source Voltage



●Electrical characteristic curves

Fig.11 Typical Transfer Characteristics (I)

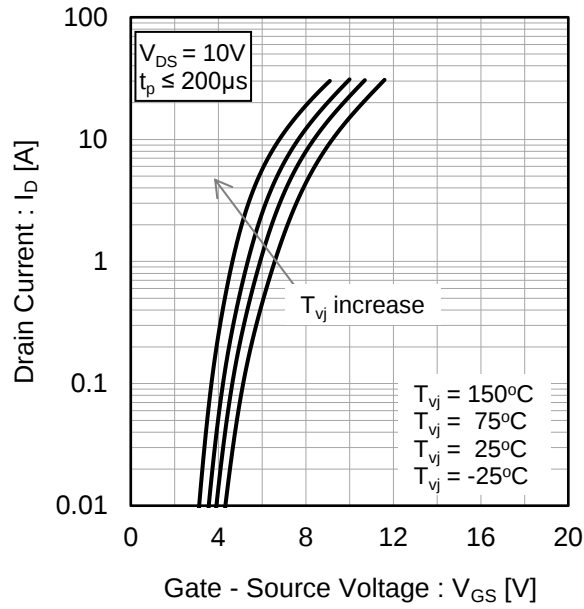


Fig.12 Typical Transfer Characteristics (II)

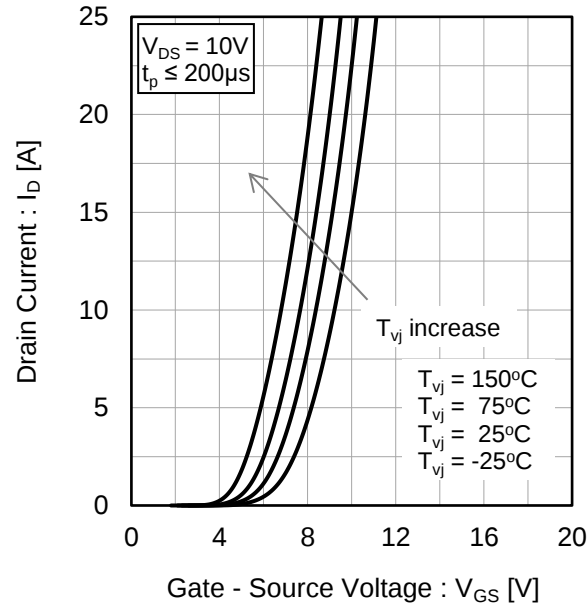


Fig.13 Gate Threshold Voltage vs. Virtual Junction Temperature

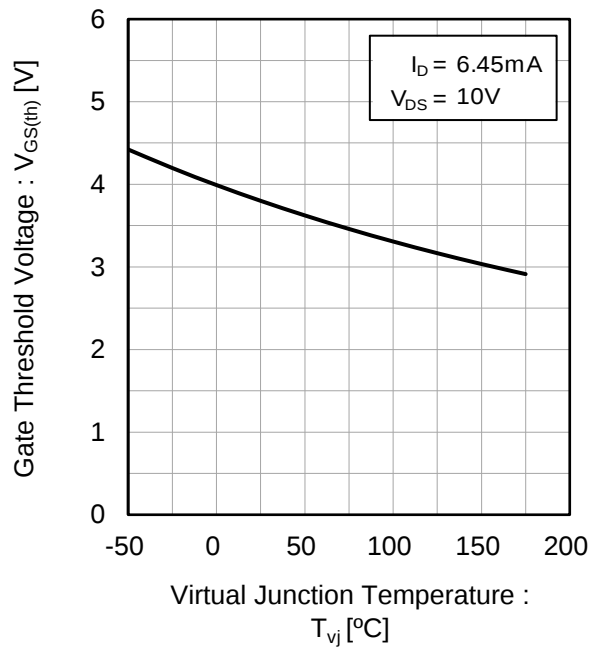
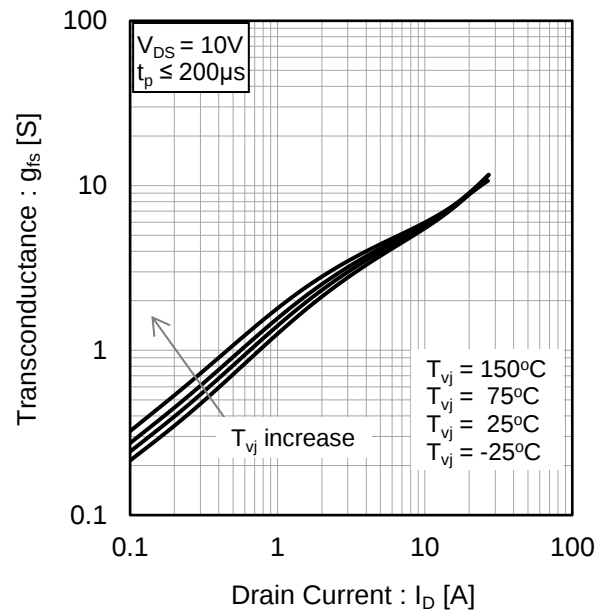


Fig.14 Transconductance vs. Drain Current



●Electrical characteristic curves

Fig.15 Static Drain - Source On - State Resistance vs. Gate - Source Voltage

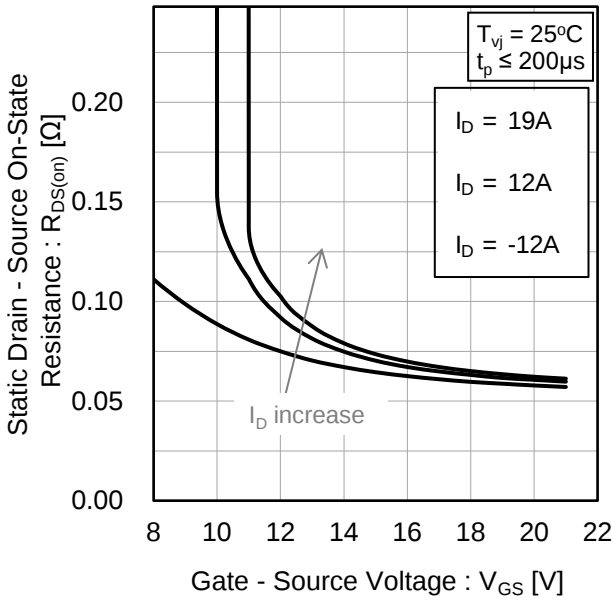


Fig.16 Static Drain - Source On - State Resistance vs. Virtual Junction Temperature

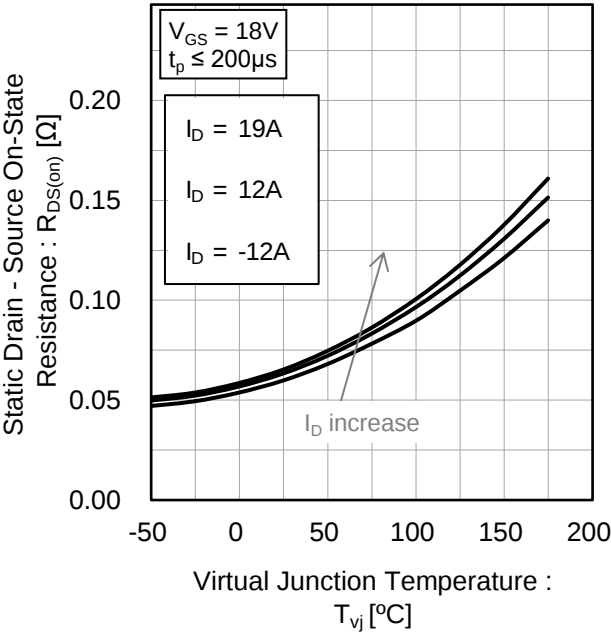


Fig.17 Static Drain - Source On - State Resistance vs. Drain Current

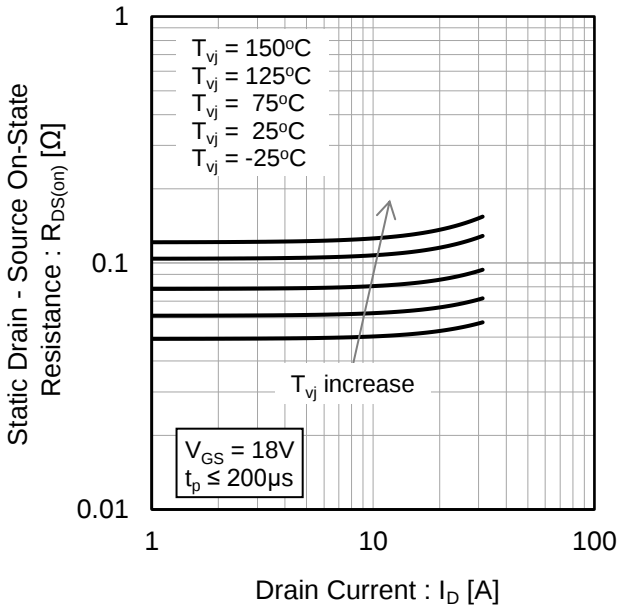
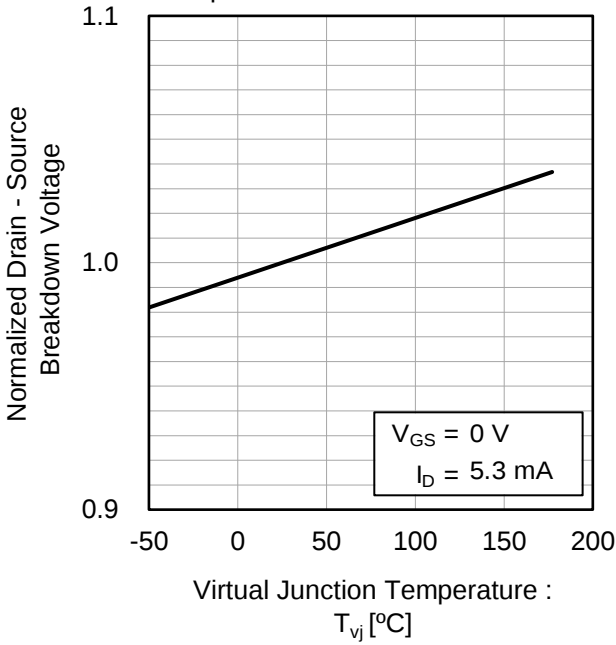


Fig.18 Normalized Drain - Source Breakdown Voltage vs. Virtual Junction Temperature



●Electrical characteristic curves

Fig.19 Typical Capacitance vs. Drain - Source Voltage

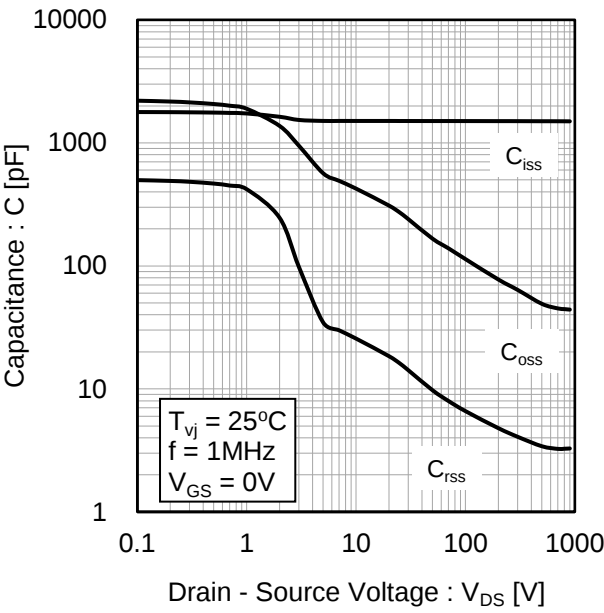


Fig.20  $C_{oss}$  Stored Energy

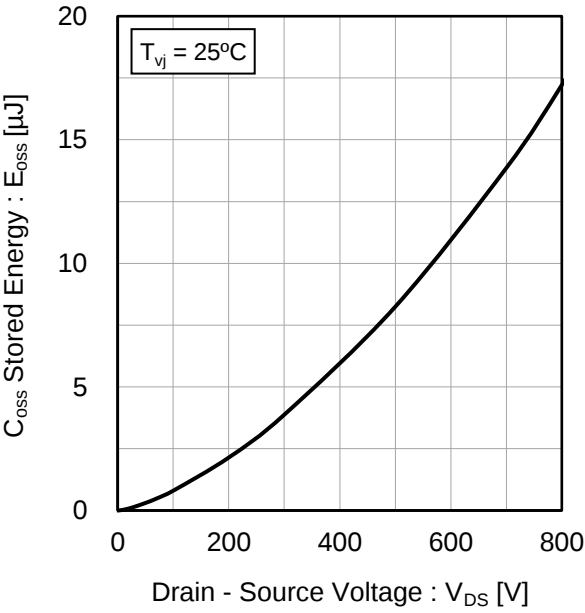
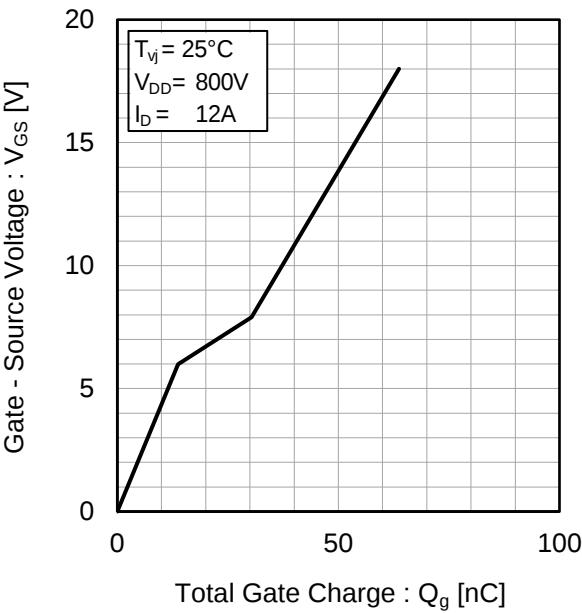


Fig.21 Dynamic Input Characteristics



●Electrical characteristic curves

Fig.22 Typical Switching Time vs. External Gate Resistance

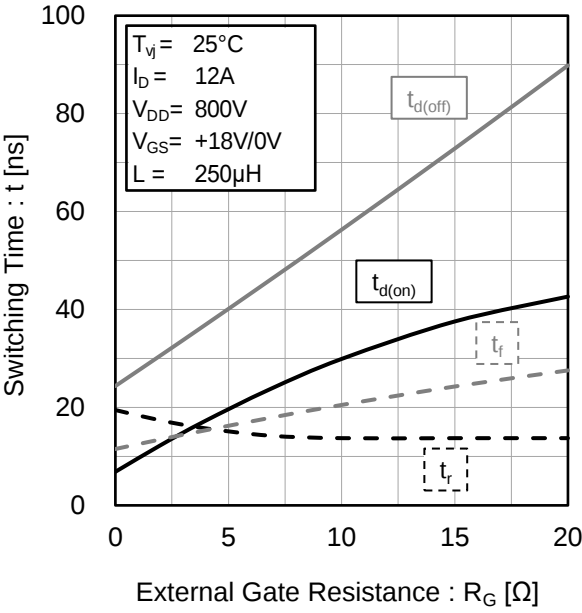


Fig.23 Typical Switching Loss vs. Drain - Source Voltage

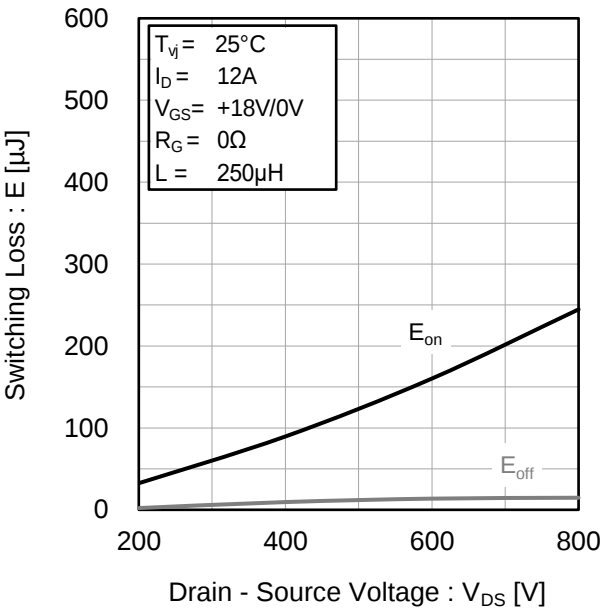


Fig.24 Typical Switching Loss vs. Drain Current

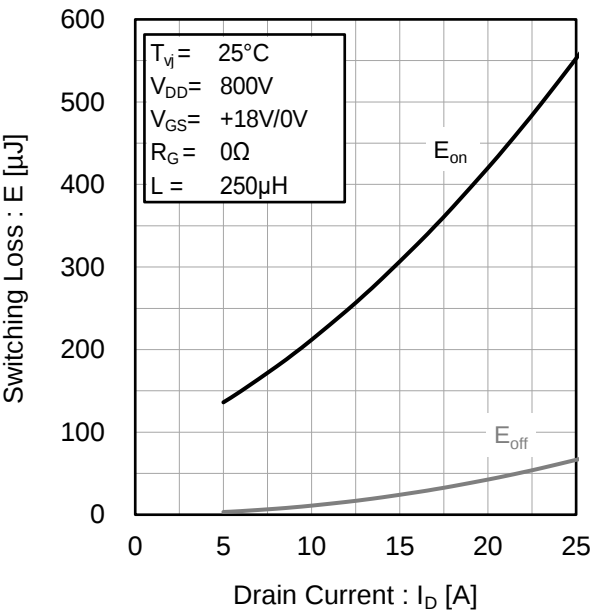
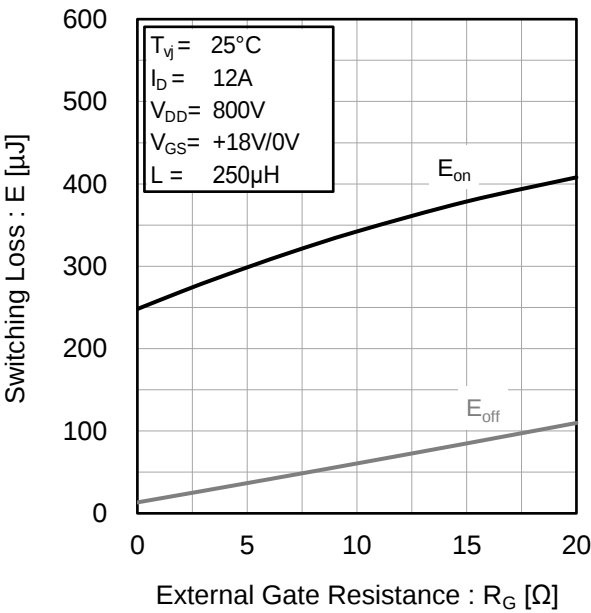


Fig.25 Typical Switching Loss vs. External Gate Resistance



## ● Measurement circuits and waveforms

Fig.1-1 Gate Charge Measurement Circuit

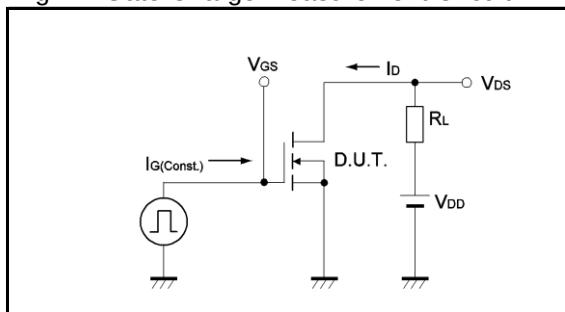


Fig.1-2 Gate Charge Waveform

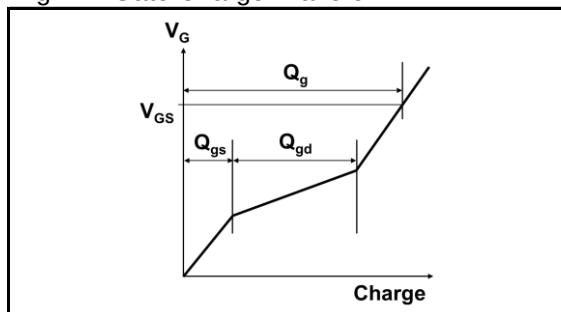


Fig.2-1 Switching Characteristics Measurement Circuit

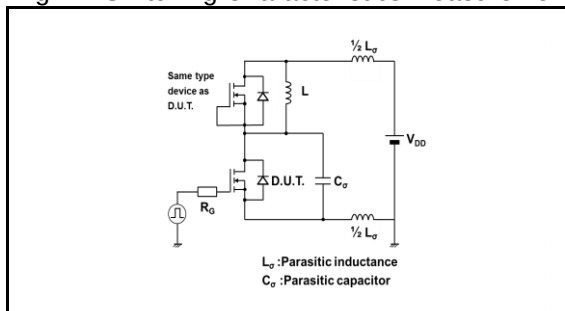


Fig.2-2 Waveforms for Switching Time

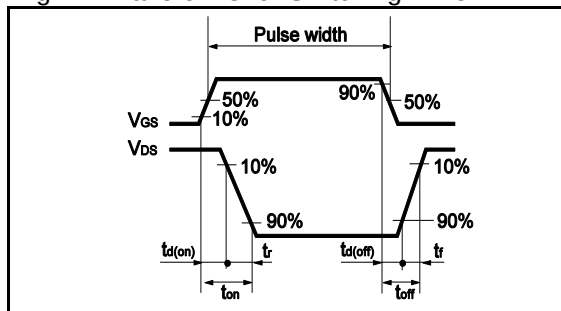


Fig.2-3 Waveforms for Switching Energy Loss

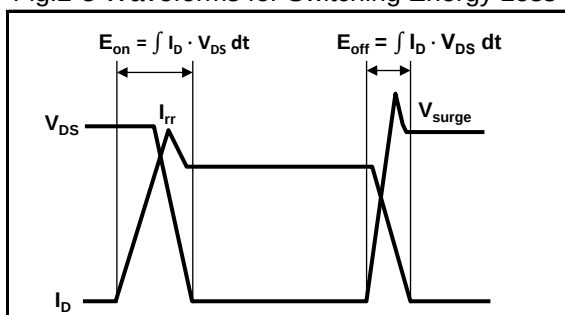


Fig.3-1 Reverse Recovery Time Measurement Circuit

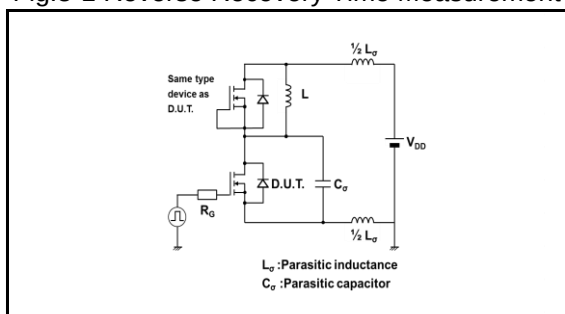
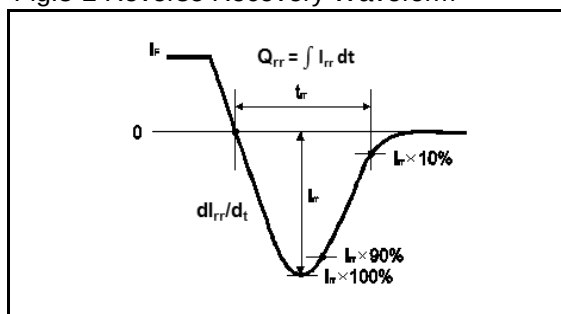
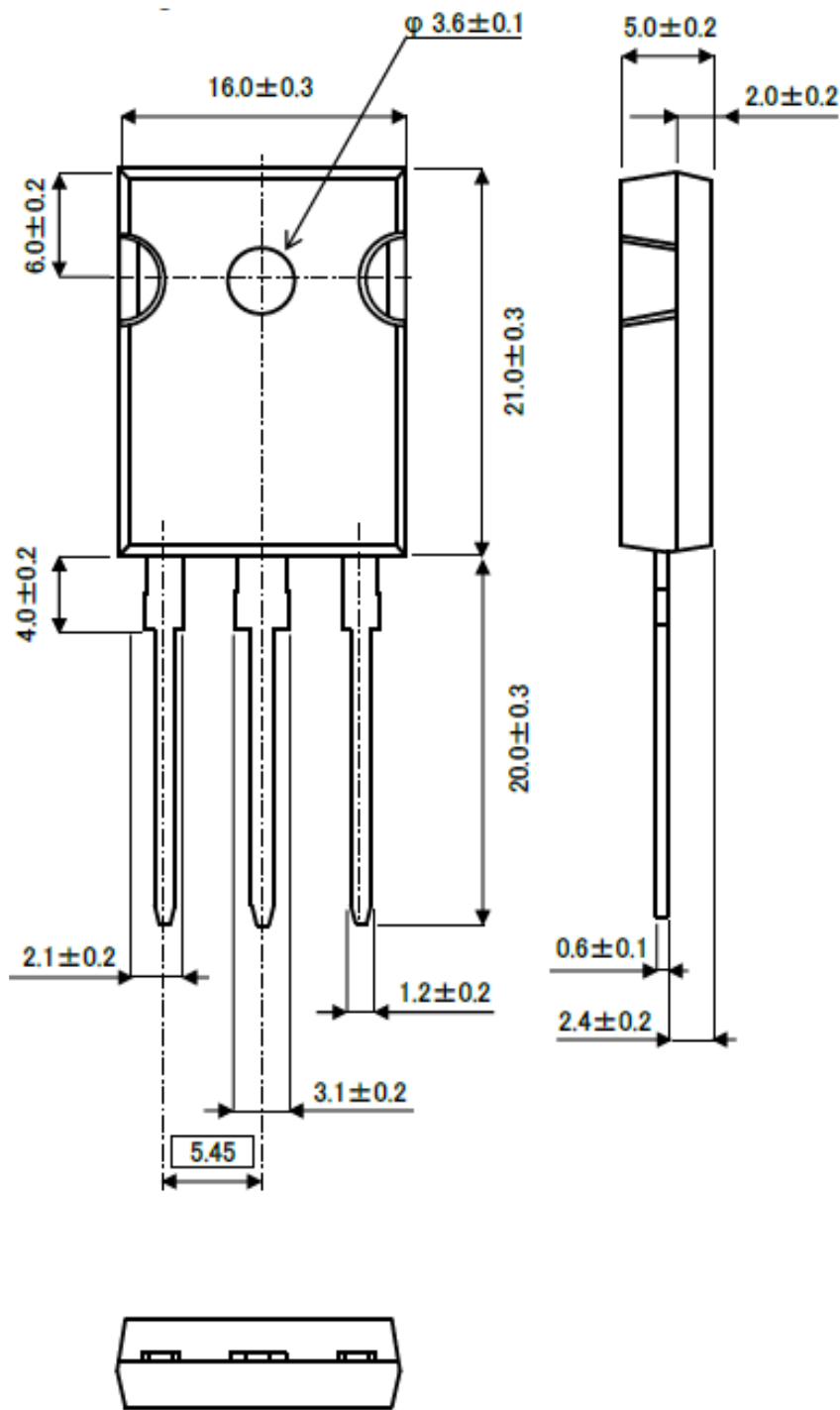


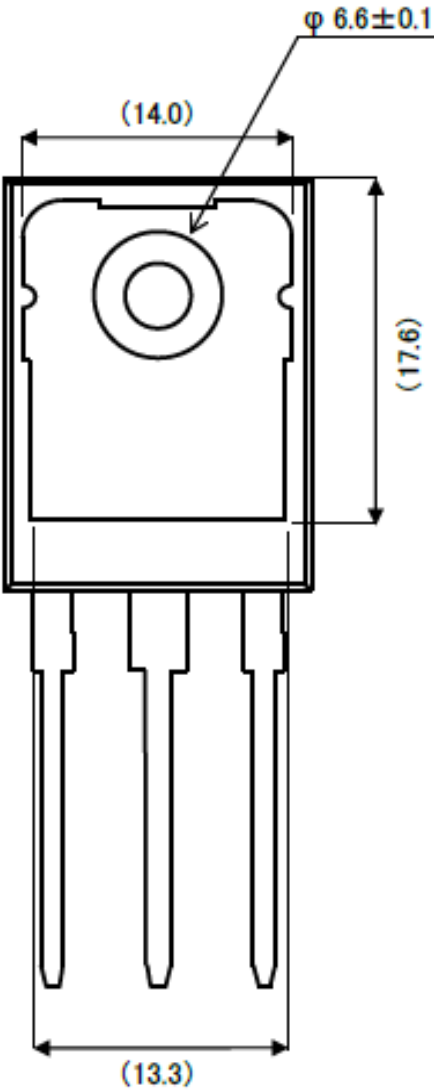
Fig.3-2 Reverse Recovery Waveform



●Package Dimensions

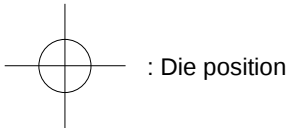
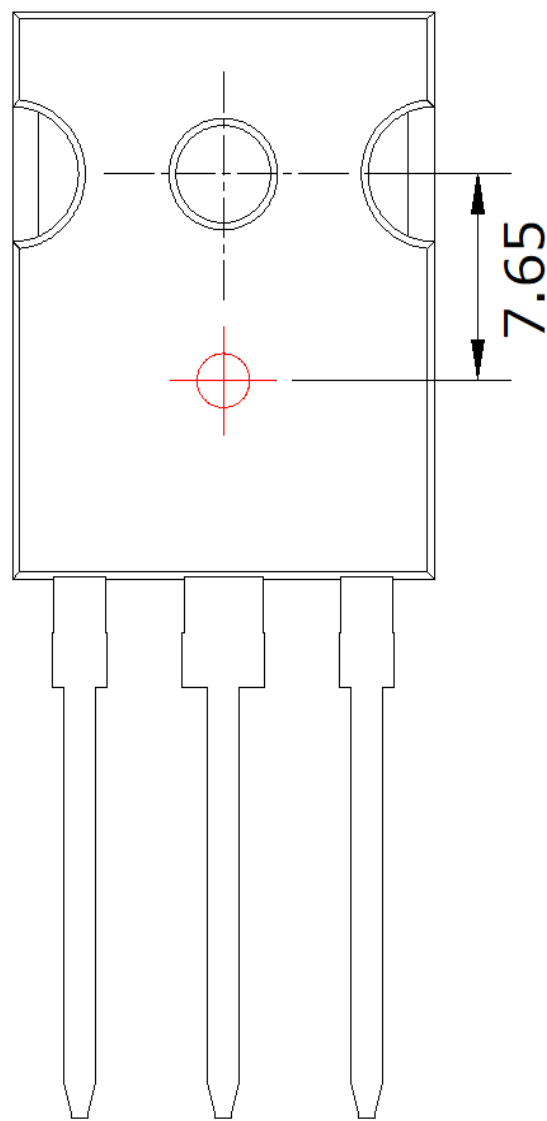


Unit: mm



Unit: mm

●Die Bonding Layout



- Front view of the packaging.
- Dimensions are design values.
- If the heat sink is to be installed, it should be in contact with the die bonding point.

Unit: mm