

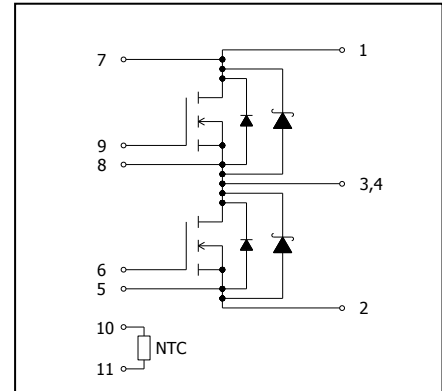
### ●Application

- Motor drive
- Inverter, Converter
- Photovoltaics, wind power generation.
- Induction heating equipment.

### ●Features

- 1) Low surge, low switching loss.
- 2) High-speed switching possible.
- 3) Reduced temperature dependence.

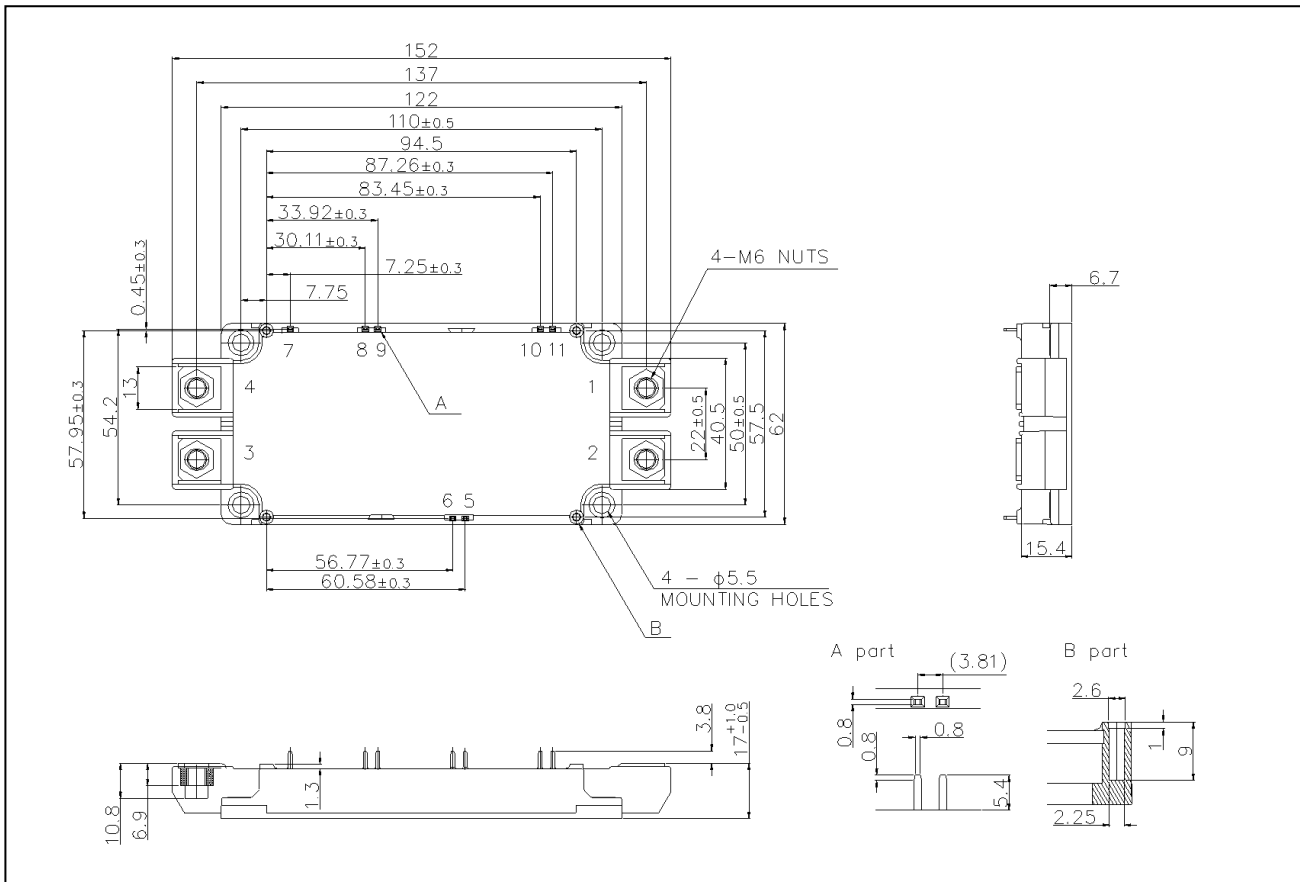
### ●Circuit diagram



### ●Construction

This product is a half bridge module consisting of SiC-DMOSFET and SiC-SBD from ROHM.

### ●Dimensions & Pin layout (Unit : mm)



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

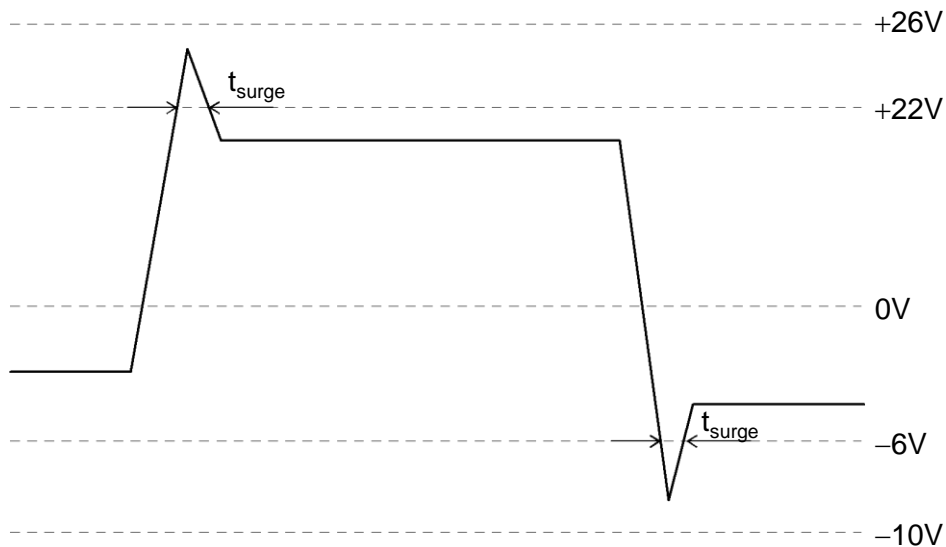
| Parameter   | Symbol                  | Conditions  | Limit      | Unit  |
|---|-------------------------|---|------------|-------|
| Drain-source voltage                                  | $V_{\text{DSS}}$        | G-S short   | 1200       | V     |
| Gate-source voltage(+)                                | $V_{\text{GSS}}$        | D-S short   | 22         |       |
| Gate-source voltage(-)                                |                         |   | -6         |       |
| G - S Voltage ( $t_{\text{surge}} < 300\text{nsec}$ ) | $V_{\text{GSS\_surge}}$ | D-S short   | -10 to 26  |       |
| Drain current *1                                      | $I_{\text{D}}$          | DC ( $T_c=60^\circ\text{C}$ )                               | 300        | A     |
|   | $I_{\text{DRM}}$        | Pulse ( $T_c=60^\circ\text{C}$ ) 1ms *2                     | 600        |       |
| Source current *1                                     | $I_{\text{S}}$          | DC ( $T_c=60^\circ\text{C}$ )                               | 300        |       |
|   | $I_{\text{SRM}}$        | Pulse ( $T_c=60^\circ\text{C}$ ) 1ms *2                     | 600        |       |
| Total power dissipation *3                            | $P_{\text{tot}}$        | $T_c=25^\circ\text{C}$                                      | 1875       | W     |
| Max Junction Temperature                              | $T_{\text{jmax}}$       |   | 175        | °C    |
| Operating junction temperature                        | $T_{\text{jop}}$        |   | -40 to 150 |       |
| Storage temperature                                   | $T_{\text{stg}}$        |   | -40 to 125 |       |
| Isolation voltage                                     | $V_{\text{isol}}$       | Terminals to baseplate,<br>$f=60\text{Hz AC } 1\text{min.}$ | 2500       | Vrms  |
| Mounting torque                                       | -                       | Main Terminals : M6 screw                                   | 4.5        | N · m |
|   |                         | Mounting to heat shink : M5 screw                           | 3.5        |       |

(\*1) Case temperature ( $T_c$ ) is defined on the surface of base plate just under the chips.

(\*2) Repetition rate should be kept within the range where temperature rise if die should not exceed  $T_{\text{jmax}}$ .

(\*3)  $T_j$  is less than  $175^\circ\text{C}$

Example of acceptable  $V_{\text{GS}}$  waveform



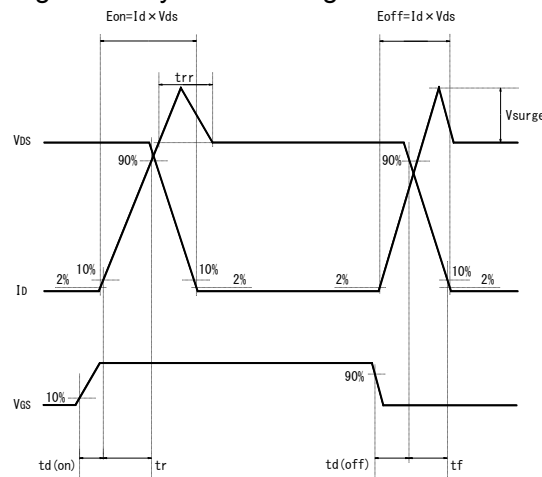
### ●Electrical characteristics (T<sub>j</sub>=25°C)

| Parameter                            | Symbol               | Conditions   | Min.                  | Typ.  | Max. | Unit |   |
|--------------------------------------|----------------------|--|-----------------------|-------|------|------|---|
| Static drain-source on-state voltage | V <sub>DS(on)</sub>  | I <sub>D</sub> =300A, V <sub>GS</sub> =18V                 | T <sub>j</sub> =25°C  | -     | 2.2  | 2.9  | V |
|                                      |                      |  | T <sub>j</sub> =125°C | -     | 3.0  | -    |   |
|                                      |                      |  | T <sub>j</sub> =150°C | -     | 3.4  | 4.5  |   |
| Drain cutoff current                 | I <sub>DSS</sub>     | V <sub>DS</sub> =1200V, V <sub>GS</sub> =0V                | -                     | -     | 3.2  | mA   |   |
| Source-drain voltage                 | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =300A                  | T <sub>j</sub> =25°C  | -     | 1.6  | 2.1  | V |
|                                      |                      |  | T <sub>j</sub> =125°C | -     | 2.2  | -    |   |
|                                      |                      |  | T <sub>j</sub> =150°C | -     | 2.4  | 3.2  |   |
|                                      |                      | V <sub>GS</sub> =18V, I <sub>S</sub> =300A                 | T <sub>j</sub> =25°C  | -     | 1.4  | -    |   |
|                                      |                      |  | T <sub>j</sub> =125°C | -     | 1.6  | -    |   |
|                                      |                      |  | T <sub>j</sub> =150°C | -     | 1.7  | -    |   |
| Gate-source threshold voltage        | V <sub>GS(th)</sub>  | V <sub>DS</sub> =10V, I <sub>D</sub> =68mA                 | 1.6                   | 2.7   | 4.0  | V    |   |
| Gate-source leakage current          | I <sub>GSS</sub>     | V <sub>GS</sub> =22V, V <sub>DS</sub> =0V                  | -                     | -     | 0.5  | μA   |   |
|                                      |                      | V <sub>GS</sub> =-6V, V <sub>DS</sub> =0V                  | -0.5                  | -     | -    |      |   |
| Switching characteristics            | t <sub>d(on)</sub>   | V <sub>GS(on)</sub> =18V, V <sub>GS(off)</sub> =0V         | -                     | 80    | -    | ns   |   |
|                                      | t <sub>r</sub>       | V <sub>DS</sub> =600V                                      | -                     | 70    | -    |      |   |
|                                      | t <sub>rr</sub>      | I <sub>D</sub> =300A                                       | -                     | 50    | -    |      |   |
|                                      | t <sub>d(off)</sub>  | R <sub>G</sub> =0.2Ω                                       | -                     | 250   | -    |      |   |
|                                      | t <sub>f</sub>       | inductive load   | -                     | 65    | -    |      |   |
| Input capacitance                    | C <sub>iss</sub>     | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, 100kHz          | -                     | 35    | -    | nF   |   |
| Gate Registance                      | R <sub>Gint</sub>    | T <sub>j</sub> =25°C                                       | -                     | 1.6   | -    | Ω    |   |
| NTC Rated Resistance                 | R25                  |  |                       | 5.0   |      | kΩ   |   |
| NTC B Value                          | B50/25               |  |                       | 3370  |      | K    |   |
| Stray Inductance                     | L <sub>s</sub>       |  |                       | 13    | -    | nH   |   |
| Creepage Distance                    | -                    | Terminal to heat sink                                      |                       | 14.5  | -    | mm   |   |
|                                      |                      | Terminal to terminal                                       |                       | 15.0  | -    | mm   |   |
| Clearance Distance                   | -                    | Terminal to heat sink                                      |                       | 12.0  | -    | mm   |   |
|                                      |                      | Terminal to terminal                                       |                       | 9.0   | -    | mm   |   |
| Junction-to-case thermal resistance  | R <sub>th(j-c)</sub> | DMOS (1/2 module) *4                                       | -                     | -     | 0.08 | K/W  |   |
|                                      |                      | SBD (1/2 module) *4  | -                     | -     | 0.11 |      |   |
| Case-to-heat sink Thermal resistance | R <sub>th(c-f)</sub> | Case to heat sink, per 1 module, Thermal grease applied *5 | -                     | 0.035 | -    |      |   |

(\*4) Measurement of T<sub>c</sub> is to be done at the point just beneath the chip.

(\*5) Typical value is measured by using thermally conductive grease of λ=0.9W/(m·K).

### ●Waveform for switching test



●Electrical characteristic curves (Typical)

Fig.1 Typical Output Characteristics [  $T_j=25^\circ\text{C}$  ]

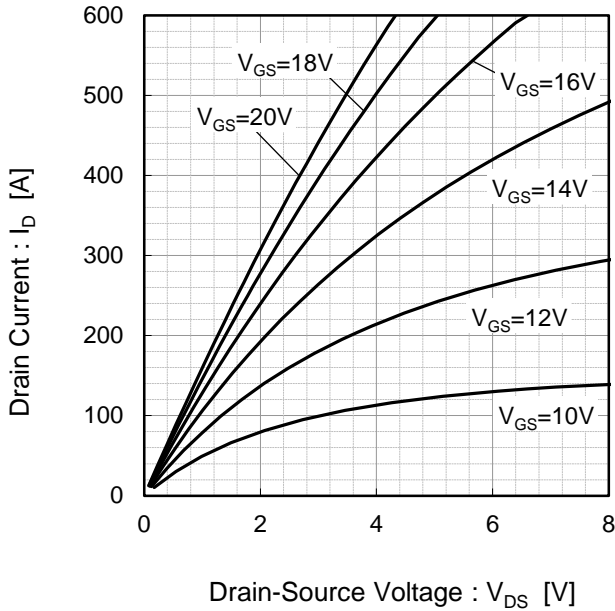


Fig.2 Drain-Source Voltage vs. Drain Current

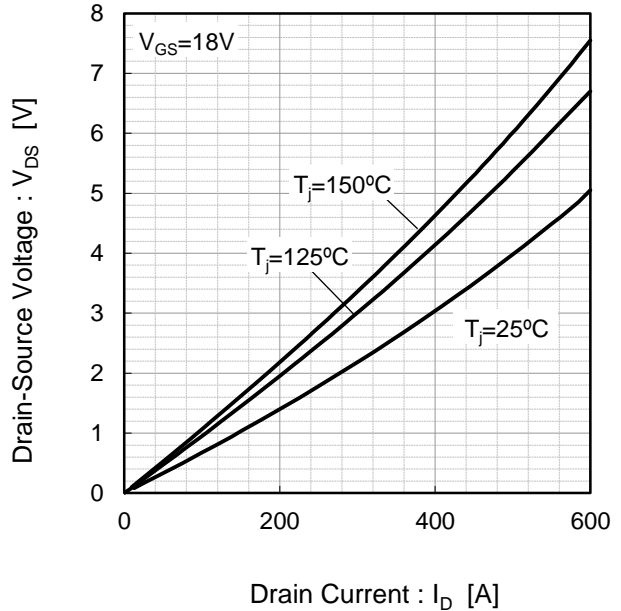


Fig.3 Drain-Source Voltage vs. Gate-Source Voltage [  $T_j=25^\circ\text{C}$  ]

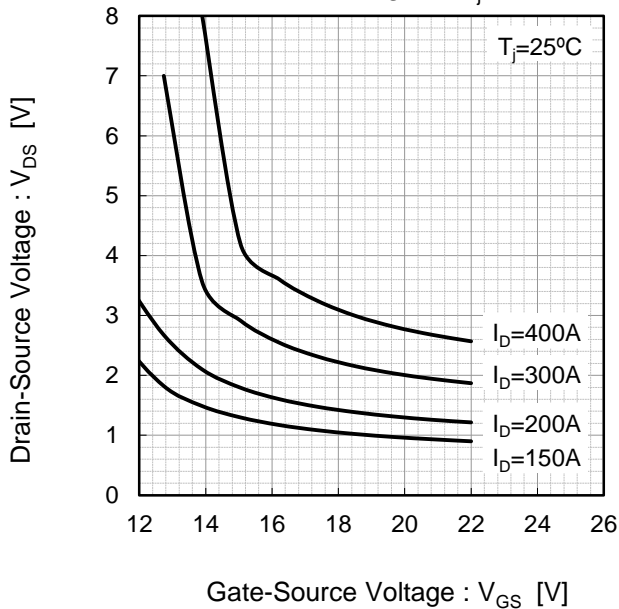
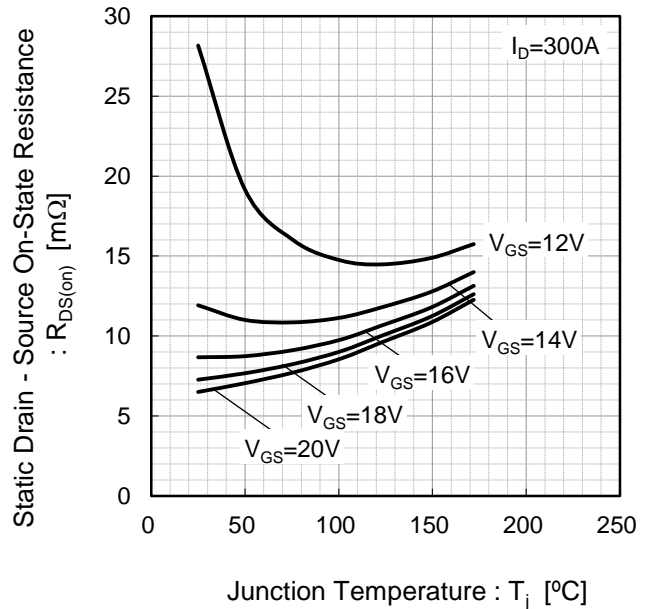


Fig.4 Static Drain - Source On-State Resistance vs. Junction Temperature



●Electrical characteristic curves (Typical)

Fig.5 Forward characteristic of Diode

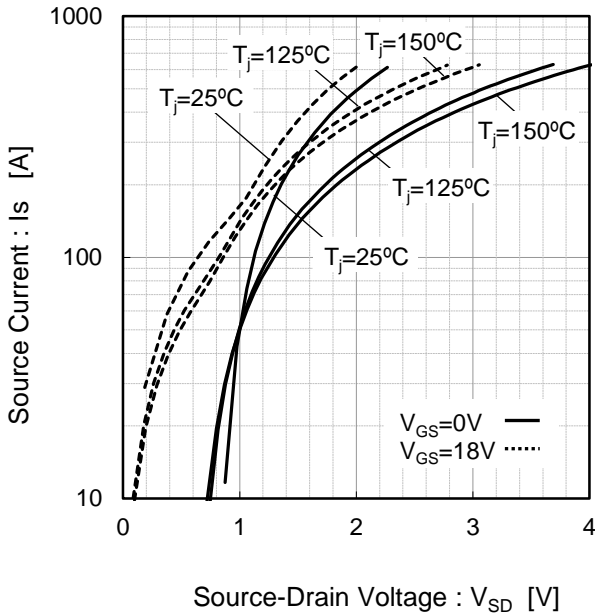


Fig.6 Forward characteristic of Diode

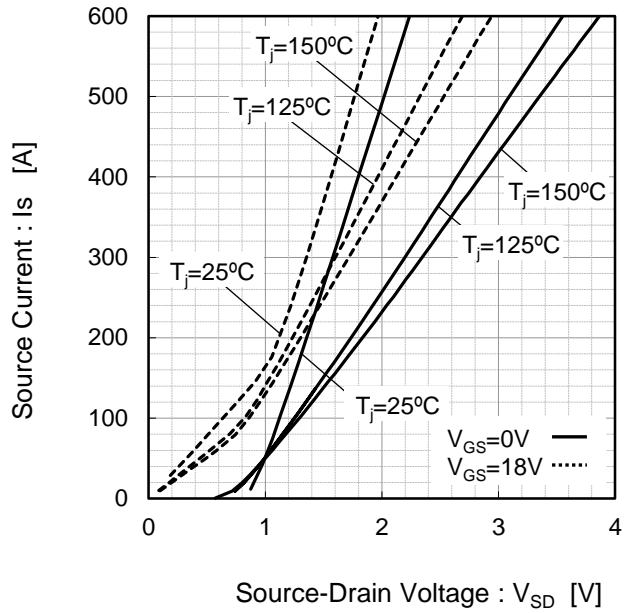


Fig.7 Drain Current vs. Gate-Source Voltage

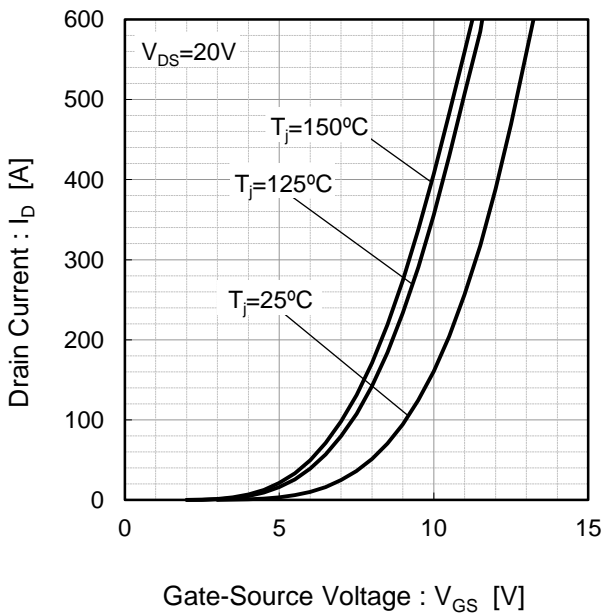
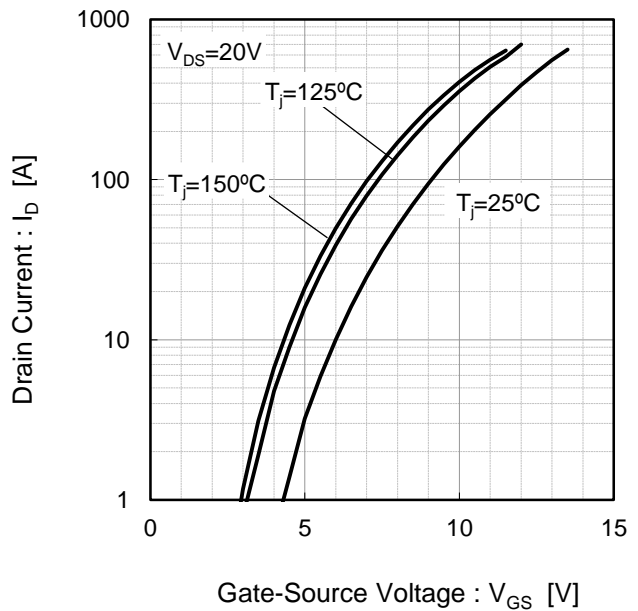


Fig.8 Drain Current vs. Gate-Source Voltage



●Electrical characteristic curves (Typical)

Fig.9 Switching Characteristics [  $T_j=25^\circ\text{C}$  ]

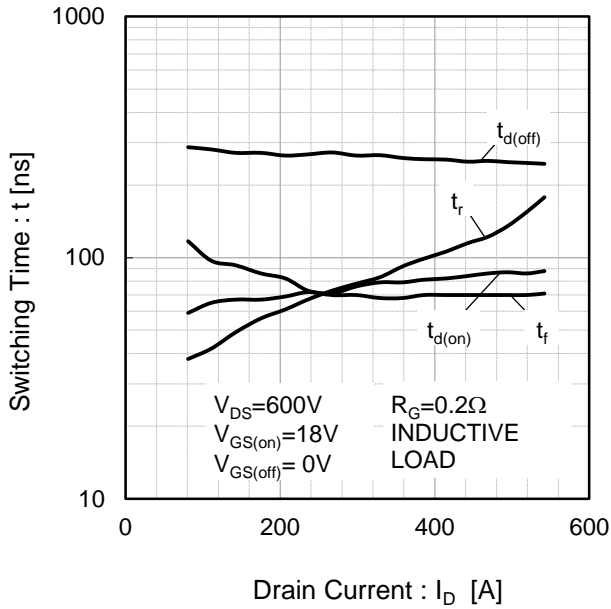


Fig.10 Switching Characteristics [  $T_j=150^\circ\text{C}$  ]

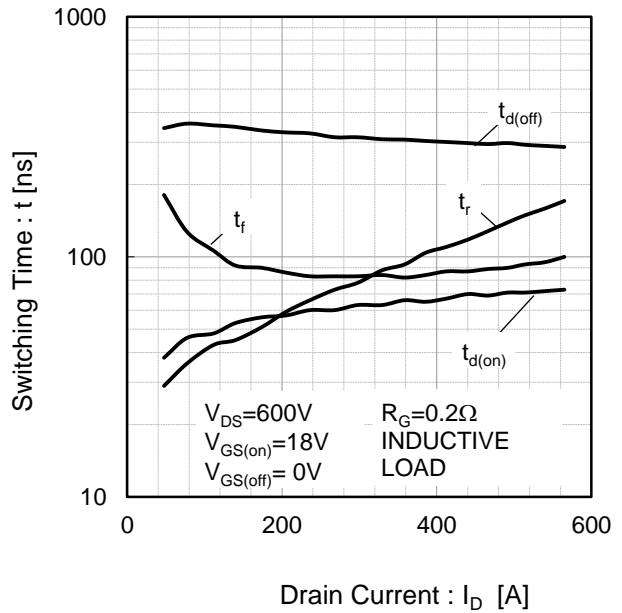


Fig.11 Switching Loss vs. Drain Current [  $T_j=25^\circ\text{C}$  ]

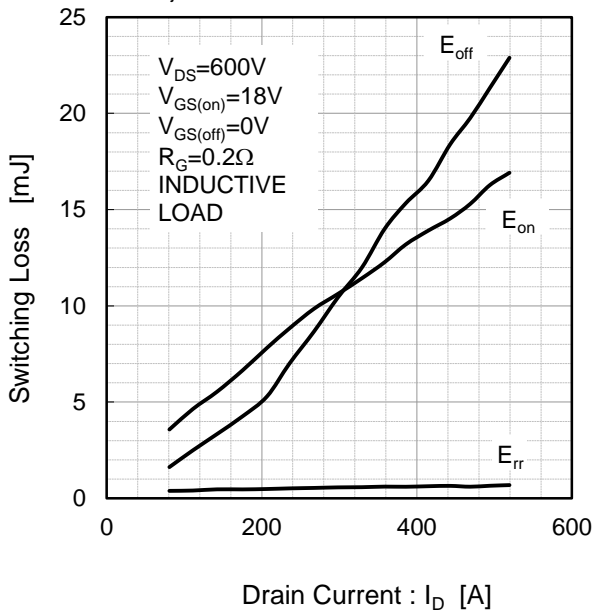
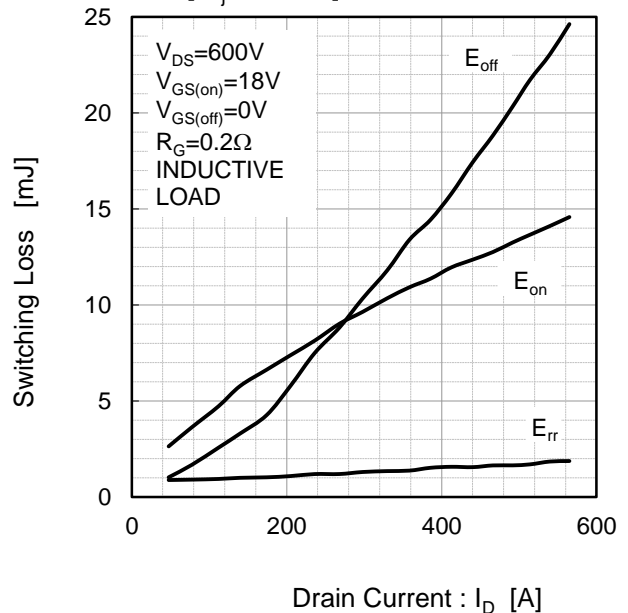


Fig.12 Switching Loss vs. Drain Current [  $T_j=150^\circ\text{C}$  ]



●Electrical characteristic curves (Typical)

Fig.13 Recovery Characteristics vs. Drain Current [  $T_j=25^{\circ}\text{C}$  ]

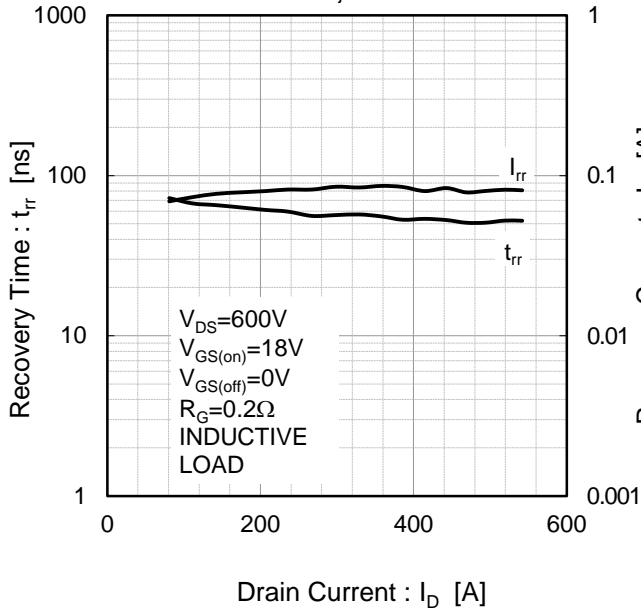


Fig.14 Recovery Characteristics vs. Drain Current [  $T_j=150^{\circ}\text{C}$  ]

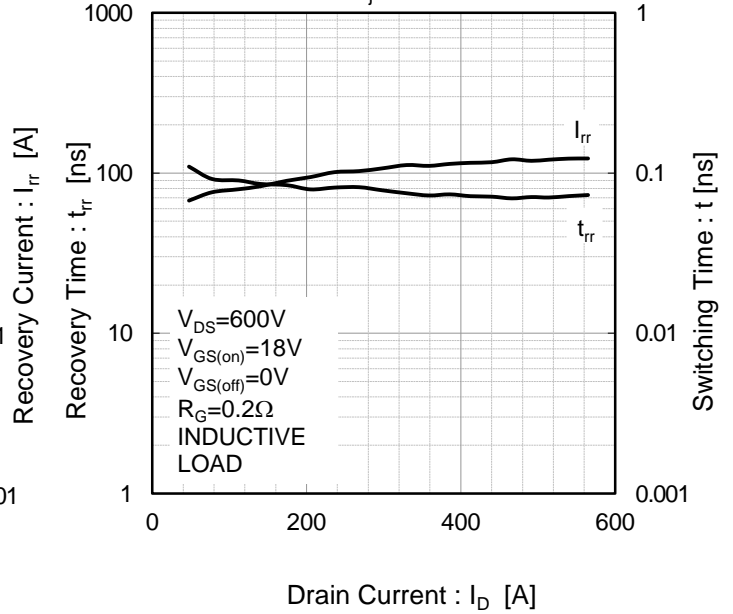


Fig.15 Switching Characteristics vs. Gate Resistance [  $T_j=25^{\circ}\text{C}$  ]

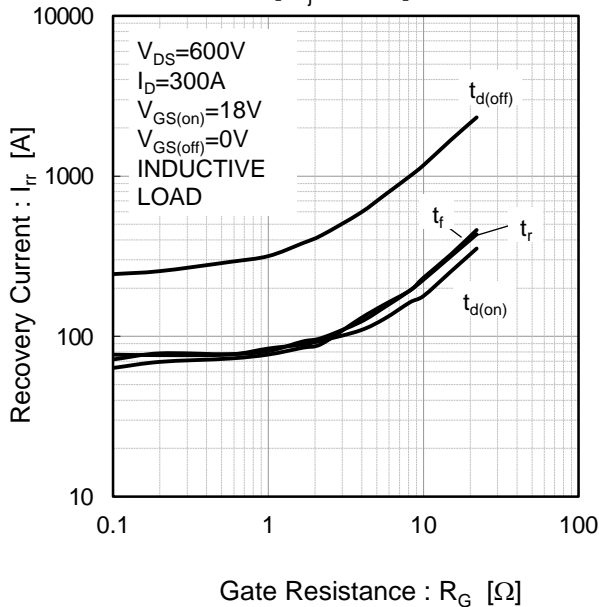
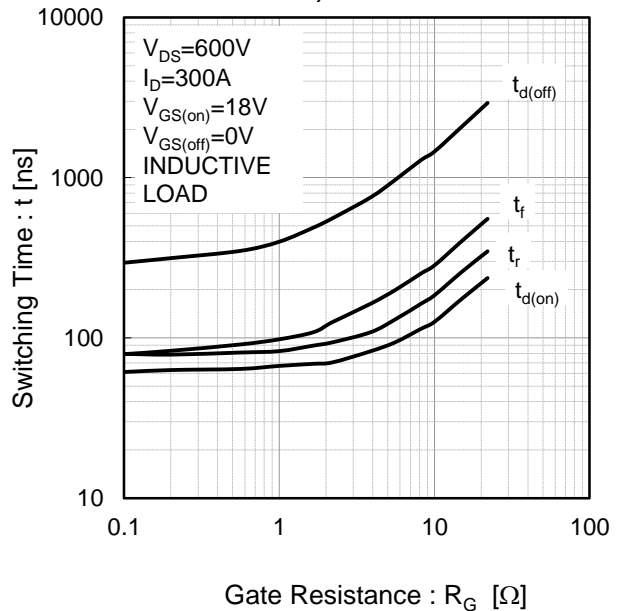


Fig.16 Switching Characteristics vs. Gate Resistance [  $T_j=150^{\circ}\text{C}$  ]



●Electrical characteristic curves (Typical)

Fig.17 Switching Loss vs. Gate Resistance [  $T_j=25^{\circ}\text{C}$  ]

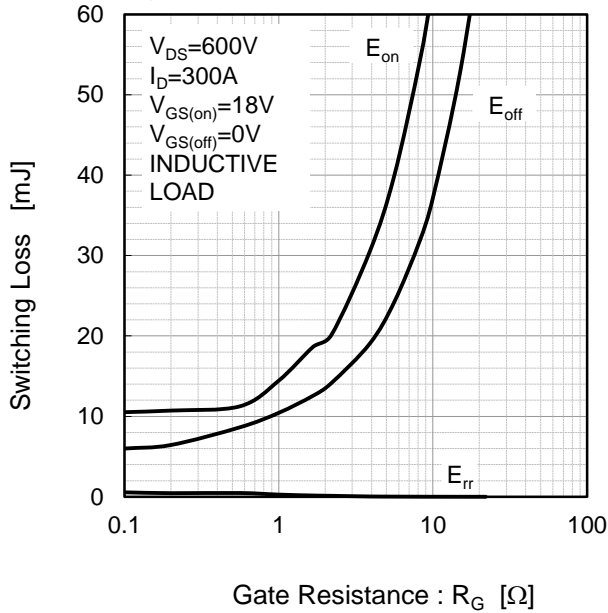


Fig.18 Switching Loss vs. Gate Resistance [  $T_j=150^{\circ}\text{C}$  ]

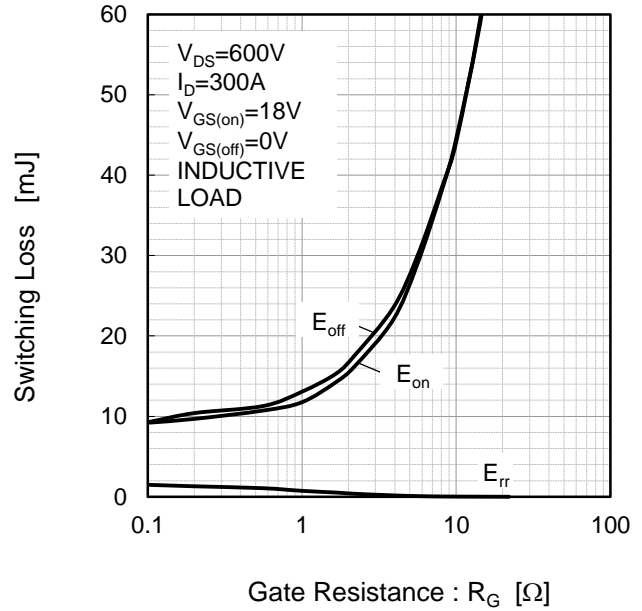


Fig.19 Typical Capacitance vs. Drain-Source Voltage

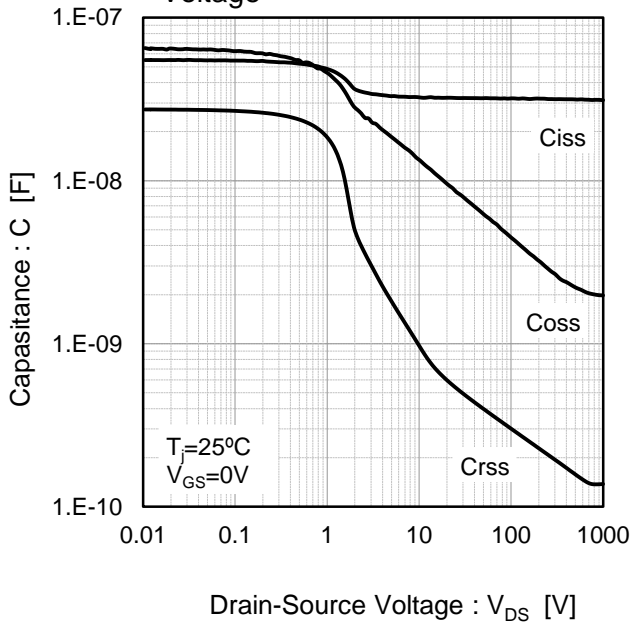
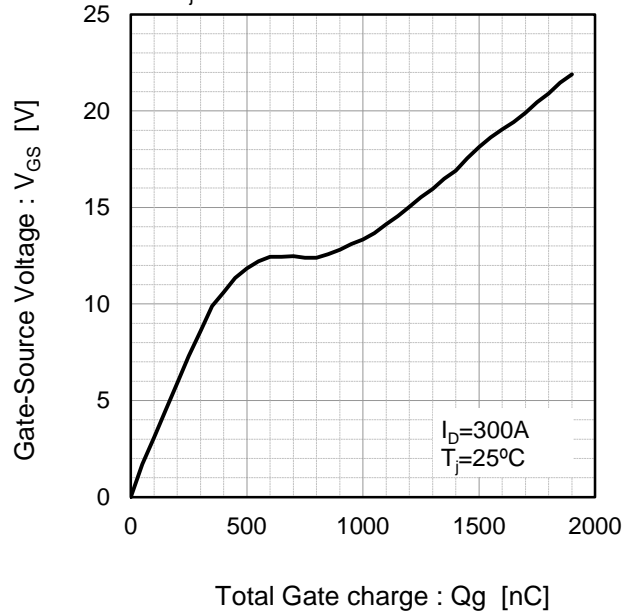


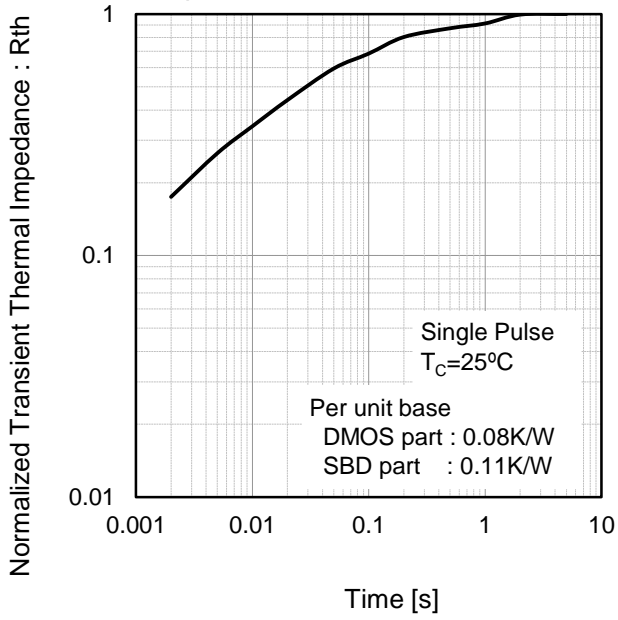
Fig.20 Gate Charge Characteristics [  $T_j=25^{\circ}\text{C}$  ]





●Electrical characteristic curves (Typical)

Fig.21 Normalized Transient Thermal Impedance



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| Unit Quantity               | 4               |
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| Packing Type                | Tray            |
| Constitution Materials List | inquiry         |
| RoHS                        | Yes             |