

7MBR10VKC120-50

IGBT Modules

Power Module (V series)
1200V / 10A / PIM

Features

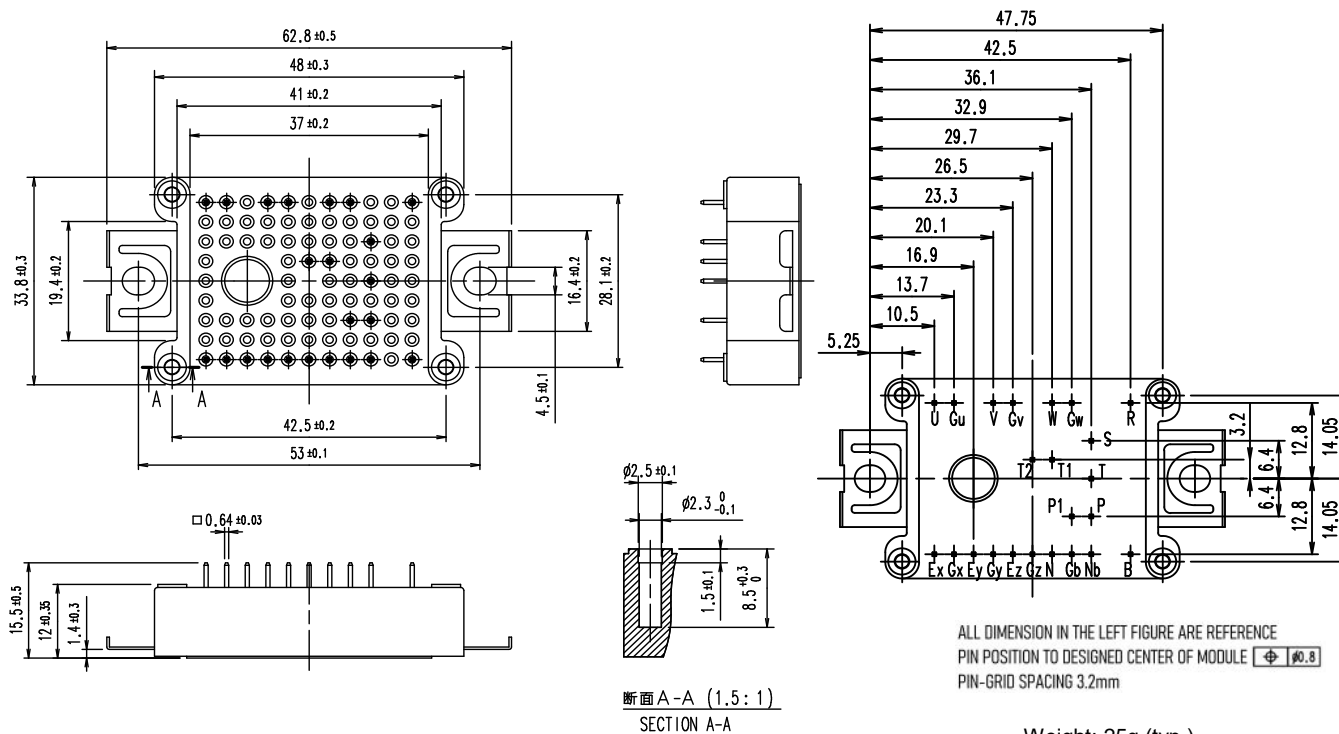
- LOW $V_{CE(sat)}$
- Compact Package
- P.C.Board Mount Module
- Converter Diode Bridge Dynamic Brake Circuit
- RoHS compliant product

Applications

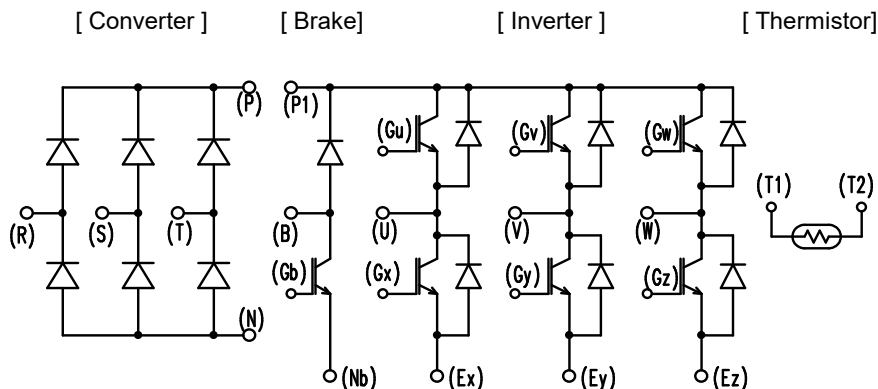
- Inverter for Motor Drives
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply



Outline drawing (Unit : mm)



Equivalent Circuit



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■ Absolute Maximum ratings (at $T_C=25^{\circ}\text{C}$ unless otherwise specified)

| Items | | Symbols | Conditions | | Maximum ratings | Units |
|---|--|--------------|---------------------------------|---------------------------|-----------------|----------------------|
| Inverter | Collector-Emitter voltage | V_{CES} | | | 1200 | V |
| | Gate-Emitter voltage | V_{GES} | | | ± 20 | V |
| | Collector current | I_C | Continuous | $T_C=100^{\circ}\text{C}$ | 10 | A |
| | | I_{CP} | 1ms | $T_C=80^{\circ}\text{C}$ | 20 | |
| | | $-I_C$ | | | 10 | |
| | | $-I_C$ pulse | 1ms | | | |
| Collector power dissipation | P_C | 1 device | | 110 | W | |
| Brake | Collector-Emitter voltage | V_{CES} | | | 1200 | V |
| | Gate-Emitter voltage | V_{GES} | | | ± 20 | V |
| | Collector current | I_C | Continuous | $T_C=80^{\circ}\text{C}$ | 10 | A |
| | | | 1ms | $T_C=80^{\circ}\text{C}$ | 20 | |
| | Collector power dissipation | P_C | 1 device | | 110 | W |
| | Repetitive peak reverse voltage (Diode) | V_{RRM} | | | 1200 | V |
| Converter | Repetitive peak reverse voltage | V_{RRM} | | | 1600 | A |
| | Average output current | I_O | 50Hz/60Hz, sine wave | | 10 | A |
| | Surge current (Non-Repetitive) | I_{FSM} | 10ms, $T_j=150^{\circ}\text{C}$ | | 245 | A |
| | I^2t (Non-Repetitive) | I^2t | half sine wave | | 300 | A^2s |
| Junction temperature | | T_j | Inverter, Brake | 175 | | $^{\circ}\text{C}$ |
| | | | Converter | 150 | | |
| Operating junction temperature (under switching conditions) | | T_{jop} | Inverter, Brake | | 150 | |
| Case temperature | | T_C | | | 125 | |
| Storage temperature | | T_{stg} | | | $-40 \sim +125$ | |
| Isolation voltage | between terminal and copper base (*1) between temperature and others (*2) | V_{iso} | AC : 1min. | | 2500 | |
| Screw torque | Mounting (*3) | - | M4 | | 1.7 | N m |

(*1) All terminals should be connected together during the test.

(*2) Two thermistor terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.

(*3) Recommendable value : 1.3-1.7 Nm (M4)

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IGBT Modules
■ Electrical characteristics (at $T_j = 25^\circ\text{C}$ unless otherwise specified)

| Items | Symbols | Conditions | Characteristics | | | Units | | |
|-----------------------|--------------------------------------|---------------------------|--|---------------------------|--------------------|---------|----------|---------|
| | | | min. | typ. | max. | | | |
| Inverter | Zero gate voltage collector current | I_{CES} | $V_{GE} = 0V$ $V_{CE} = 1200V$ | - | - | 1.0 | mA | |
| | Gate-Emitter leakage current | I_{GES} | $V_{CE} = 0V$ $V_{GE} = \pm 20V$ | - | - | 200 | nA | |
| | Gate-Emitter threshold voltage | $V_{GE(th)}$ | $V_{CE} = 20V$ $I_C = 10mA$ | 6.0 | 6.5 | 7.0 | V | |
| | Collector-Emitter saturation voltage | $V_{CE(sat)}$ (terminal) | $V_{GE} = 15V$ $I_C = 10A$ | $T_j = 25^\circ\text{C}$ | - | 1.95 | 2.40 | V |
| | | | | $T_j = 125^\circ\text{C}$ | - | 2.30 | - | |
| | | | | $T_j = 150^\circ\text{C}$ | - | 2.35 | - | |
| | | $V_{CE(sat)}$ (chip) | $V_{GE} = 15V$ $I_C = 10A$ | $T_j = 25^\circ\text{C}$ | - | 1.85 | 2.25 | |
| | | | | $T_j = 125^\circ\text{C}$ | - | 2.20 | - | |
| | | | | $T_j = 150^\circ\text{C}$ | - | 2.25 | - | |
| | Internal gate resistance | $R_{g(int)}$ | - | - | 0 | - | Ω | |
| | Input capacitance | C_{ies} | $V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$ | - | 0.8 | - | nF | |
| | Turn-on time | t_{on} | $V_{CC} = 600V$ $I_C = 10A$ | t_{on} | - | 0.18 | 1.20 | μs |
| | | | | t_r | - | 0.14 | 0.60 | |
| | | | | $t_{r(l)}$ | $V_{GE} = \pm 15V$ | - | 0.02 | |
| Turn-off time | t_{off} | $R_G = 47 \Omega$ | t_{off} | - | 0.29 | 1.20 | μs | |
| | | | t_f | - | 0.06 | 0.45 | | |
| Forward on voltage | V_F (terminal) | $I_F = 10A$ | $T_j = 25^\circ\text{C}$ | - | 1.75 | 2.20 | V | |
| | | | $T_j = 125^\circ\text{C}$ | - | 1.85 | - | | |
| | | | $T_j = 150^\circ\text{C}$ | - | 1.85 | - | | |
| | V_F (chip) | $I_F = 10A$ | $T_j = 25^\circ\text{C}$ | - | 1.65 | 2.10 | | |
| | | | $T_j = 125^\circ\text{C}$ | - | 1.75 | - | | |
| | | | $T_j = 150^\circ\text{C}$ | - | 1.75 | - | | |
| Reverse recovery time | t_{rr} | $I_F = 10A$ | - | - | 0.35 | μs | | |
| Brake | Zero gate voltage collector current | I_{CES} | $V_{GE} = 0V$ $V_{CE} = 1200V$ | - | - | 1.0 | mA | |
| | Gate-Emitter leakage current | I_{GES} | $V_{CE} = 0V$ $V_{GE} = \pm 20V$ | - | - | 200 | nA | |
| | Collector-Emitter saturation voltage | $V_{CE(sat)}$ (terminal) | $V_{GE} = 15V$ $I_C = 10A$ | $T_j = 25^\circ\text{C}$ | - | 1.95 | 2.40 | V |
| | | | | $T_j = 125^\circ\text{C}$ | - | 2.30 | - | |
| | | | | $T_j = 150^\circ\text{C}$ | - | 2.35 | - | |
| | | $V_{CE(sat)}$ (chip) | $V_{GE} = 15V$ $I_C = 10A$ | $T_j = 25^\circ\text{C}$ | - | 1.85 | 2.25 | |
| | | | | $T_j = 125^\circ\text{C}$ | - | 2.20 | - | |
| | | | | $T_j = 150^\circ\text{C}$ | - | 2.25 | - | |
| | Internal gate resistance | $R_{g(int)}$ | - | - | 0 | - | Ω | |
| | Turn-on time | t_{on} | $V_{CE} = 600V$ $I_C = 10A$ | t_{on} | - | 0.18 | 1.20 | μs |
| | | | | t_r | - | 0.14 | 0.60 | |
| | Turn-off time | t_{off} | $V_{GE} = +15/-15V$ $R_G = 47 \Omega$ | t_{off} | - | 0.29 | 1.00 | μs |
| | | | | t_f | - | 0.06 | 0.30 | |
| | Reverse current | I_{RRM} | $V_R = 1200V$ | - | - | 1.00 | mA | |
| Forward on voltage | V_{FM} | $I_F = 10A$ | terminal | - | 1.05 | 1.50 | V | |
| | | | chip | - | 0.95 | - | | |
| Reverse current | I_{RRM} | $V_R = 1600V$ | - | - | 1.0 | mA | | |
| Thermistor | Resistance | R | $T = 25^\circ\text{C}$ | - | 5000 | - | Ω | |
| | | | $T = 100^\circ\text{C}$ | 465 | 495 | 520 | | |
| B value | B | $T = 25/50^\circ\text{C}$ | 3305 | 3375 | 3450 | K | | |

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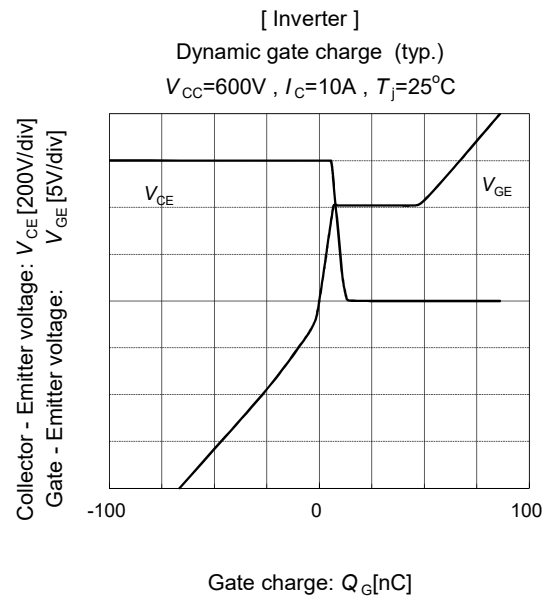
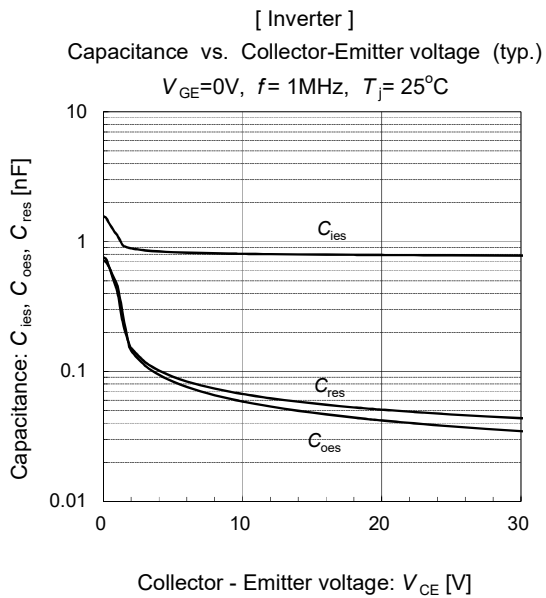
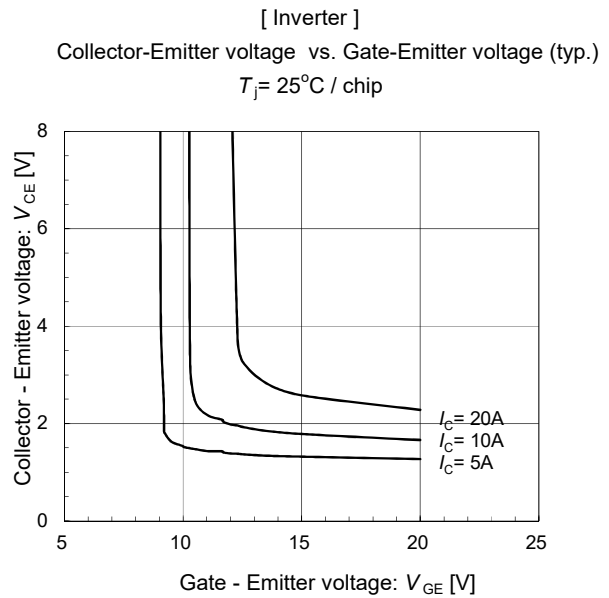
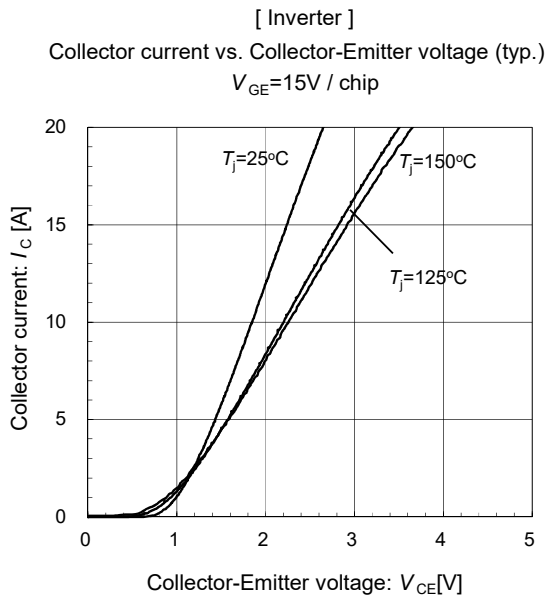
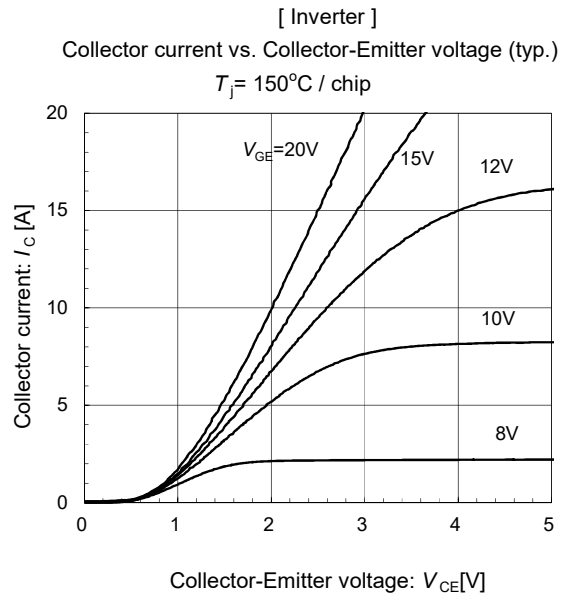
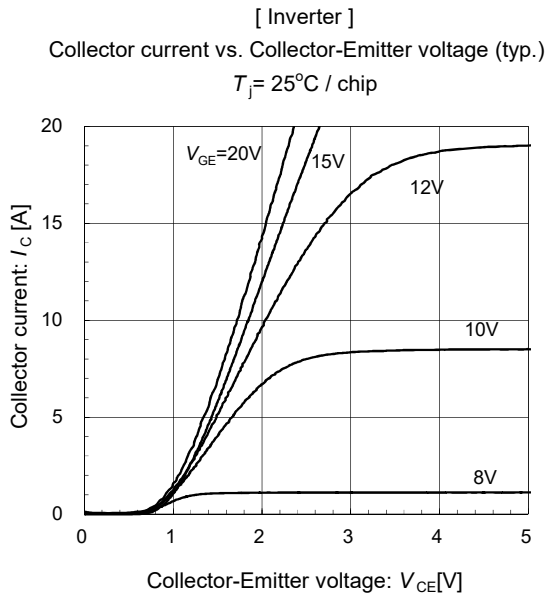
■ Thermal resistance characteristics

| Items | Symbols | Conditions | Characteristics | | | Units |
|---|---------------|-----------------|-----------------|------|------|-------|
| | | | min. | typ. | max. | |
| Thermal resistance(1device) | $R_{th(j-c)}$ | Inverter IGBT | - | - | 1.4 | °C/W |
| | | Inverter FWD | - | - | 2.16 | |
| | | Brake IGBT | - | - | 1.40 | |
| | | Converter Diode | - | - | 1.35 | |
| Contact thermal resistance(*4) (1device) | $R_{th(c-f)}$ | Inverter IGBT | - | 0.74 | - | |
| | | Inverter FWD | - | 0.88 | - | |
| | | Brake IGBT | - | 0.77 | - | |
| | | Converter Diode | - | 0.75 | - | |

(*4) This is the value which is defined mounting on the additional cooling fin with thermal compound.

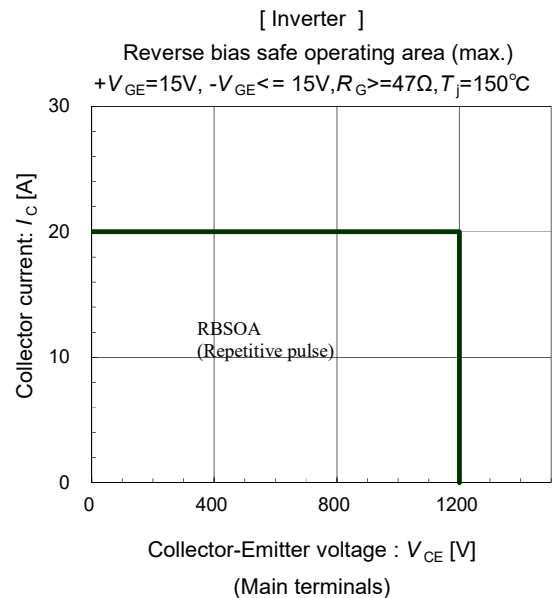
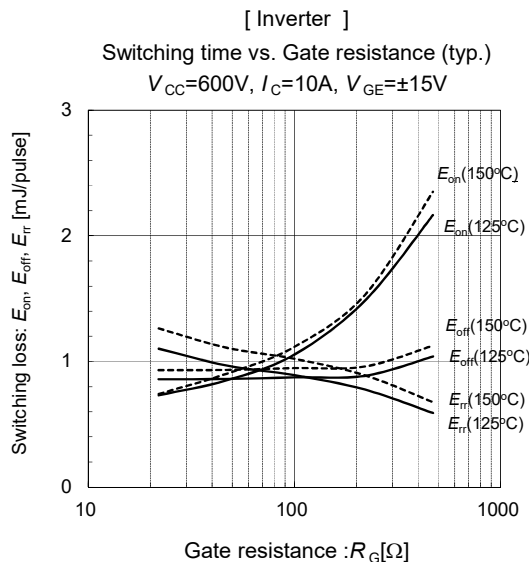
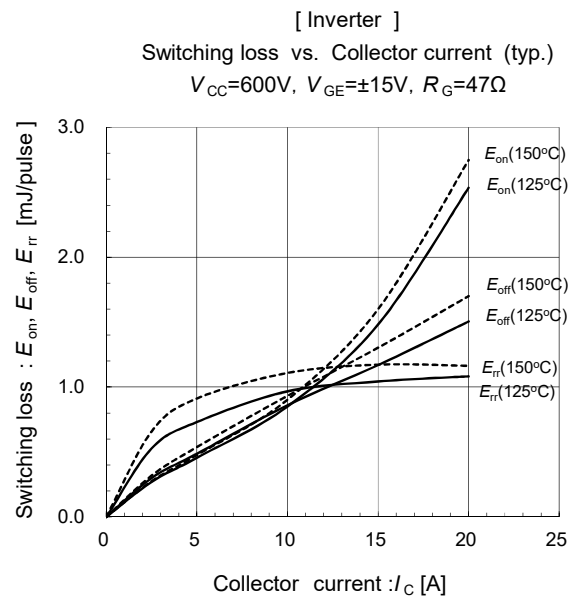
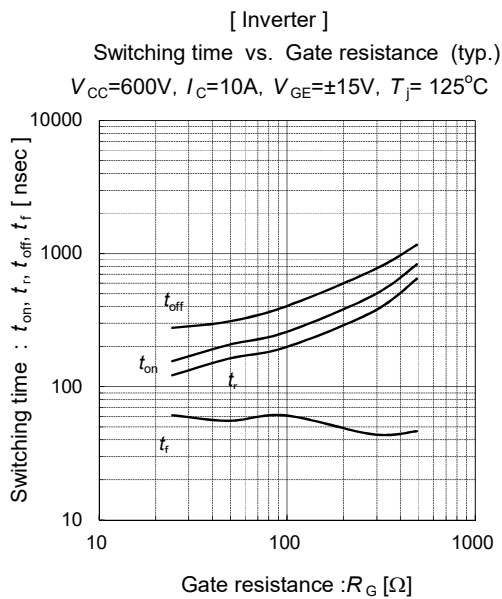
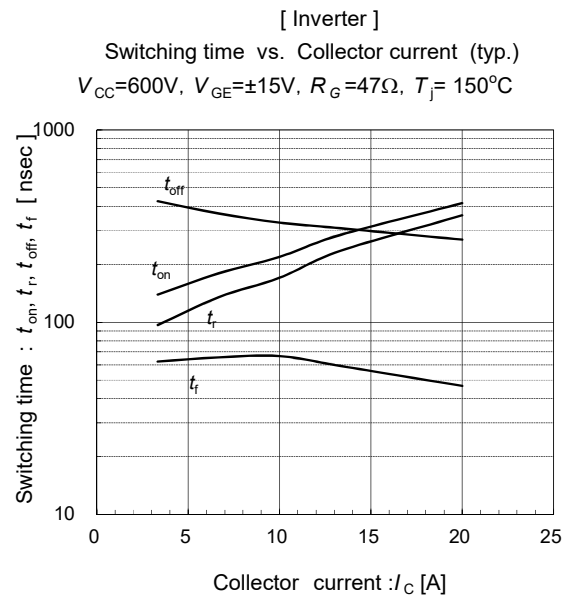
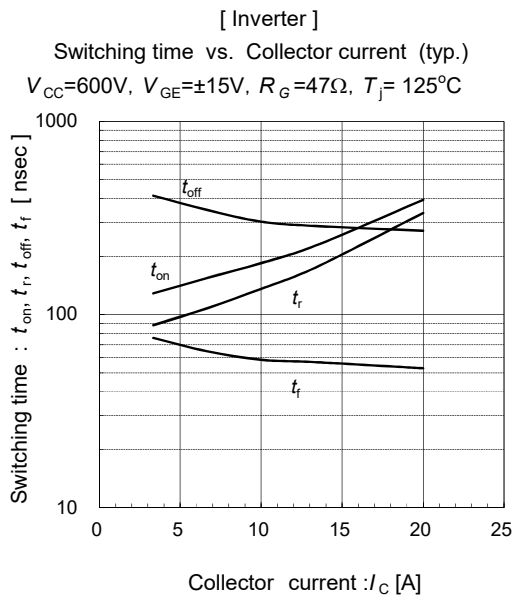
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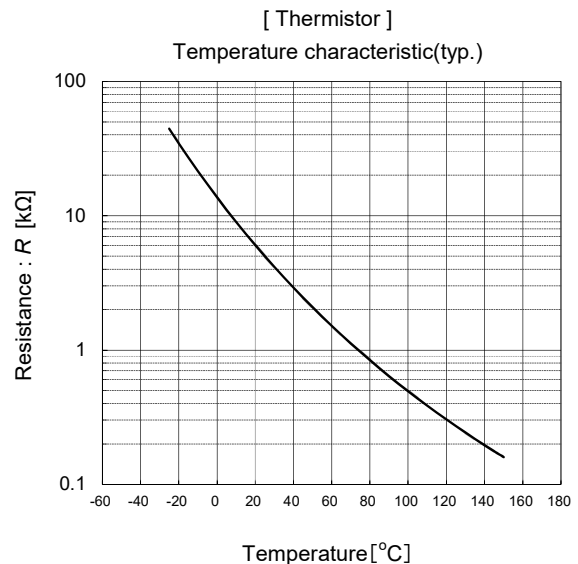
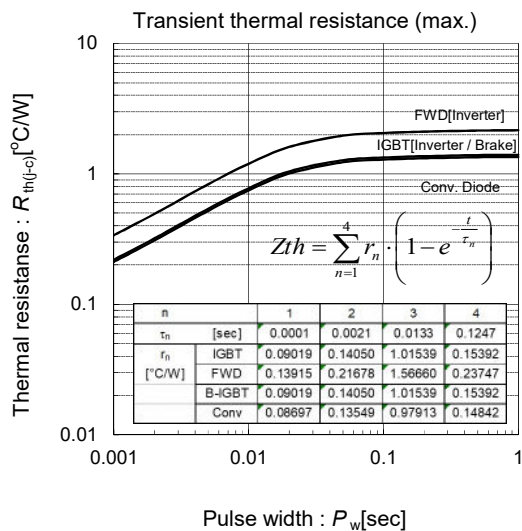
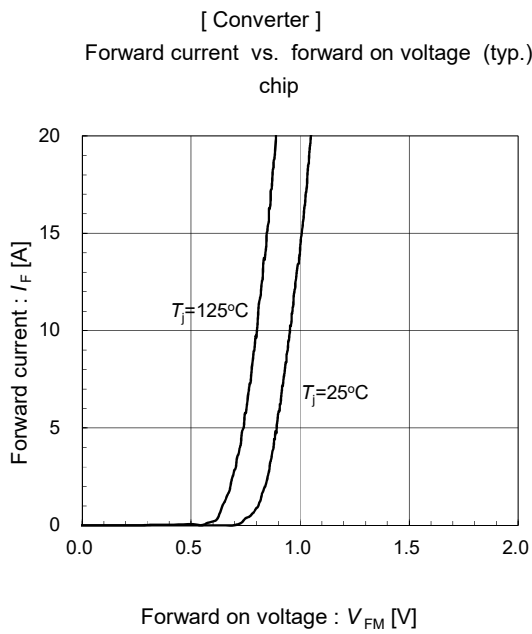
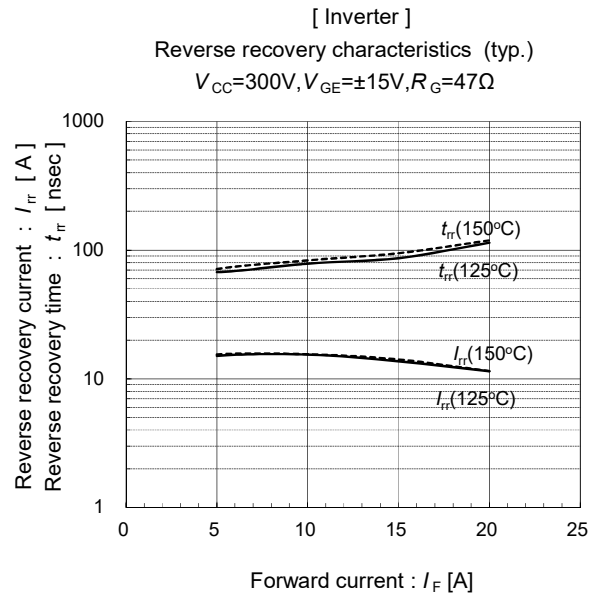
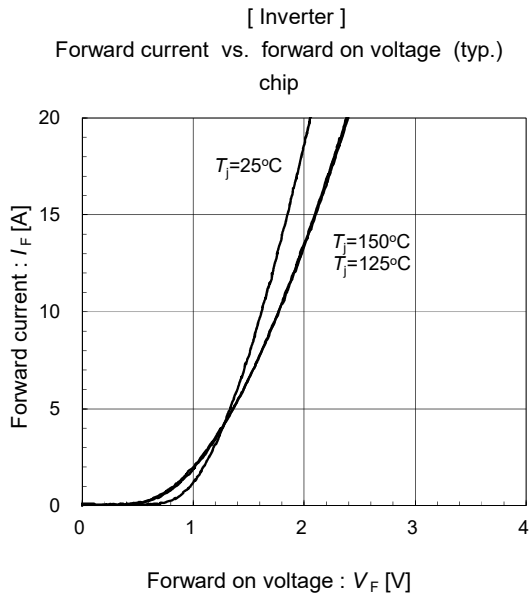
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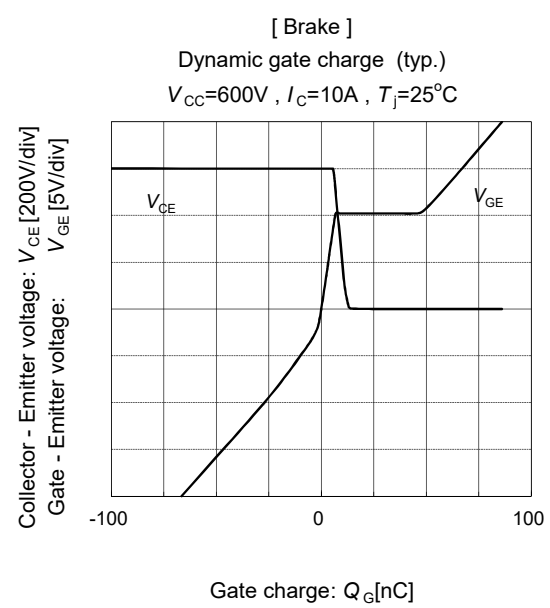
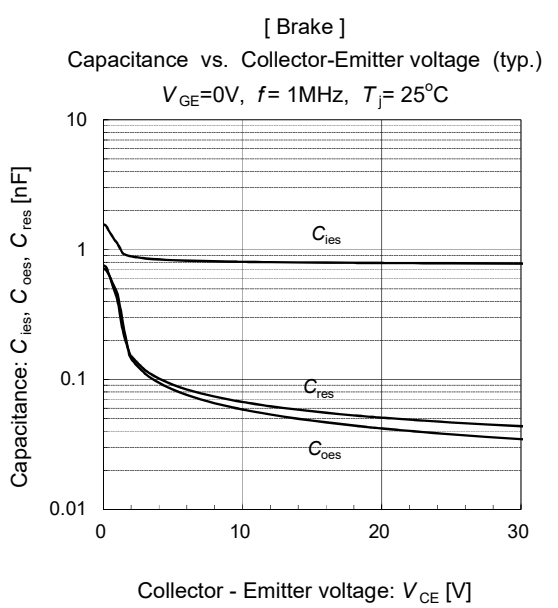
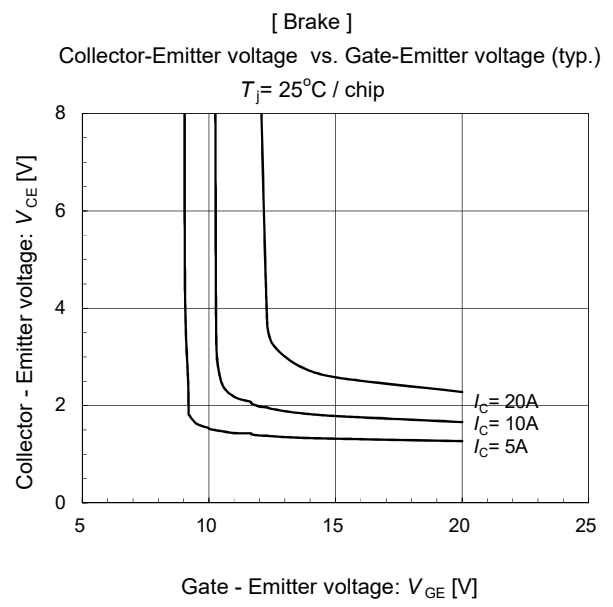
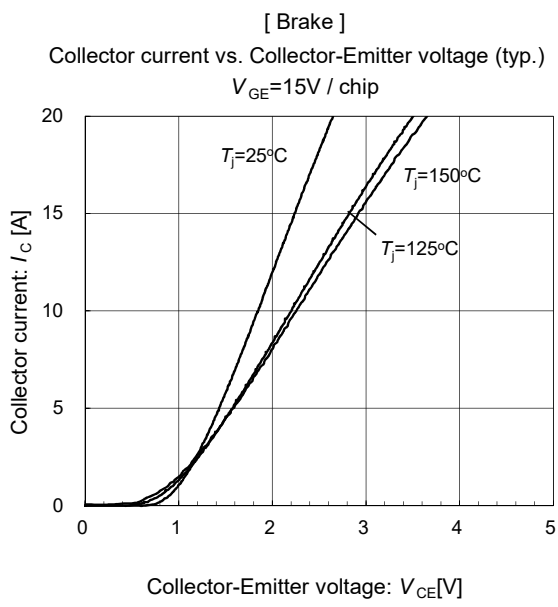
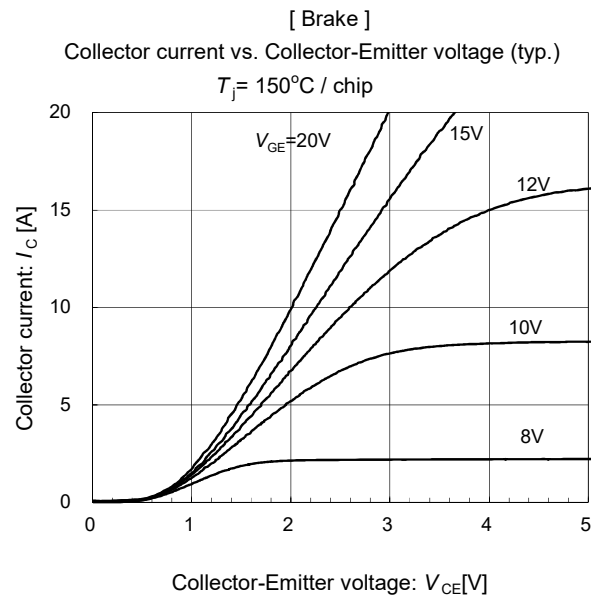
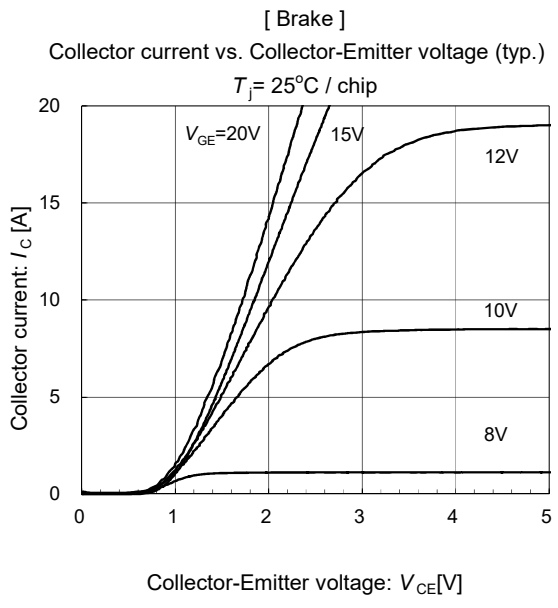
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