

# 7MBR30XKC065-50

IGBT Modules

**Power Module(X series)**  
**650V / 30A / PIM**

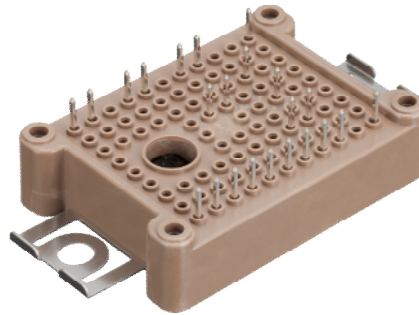
## ■ Features

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

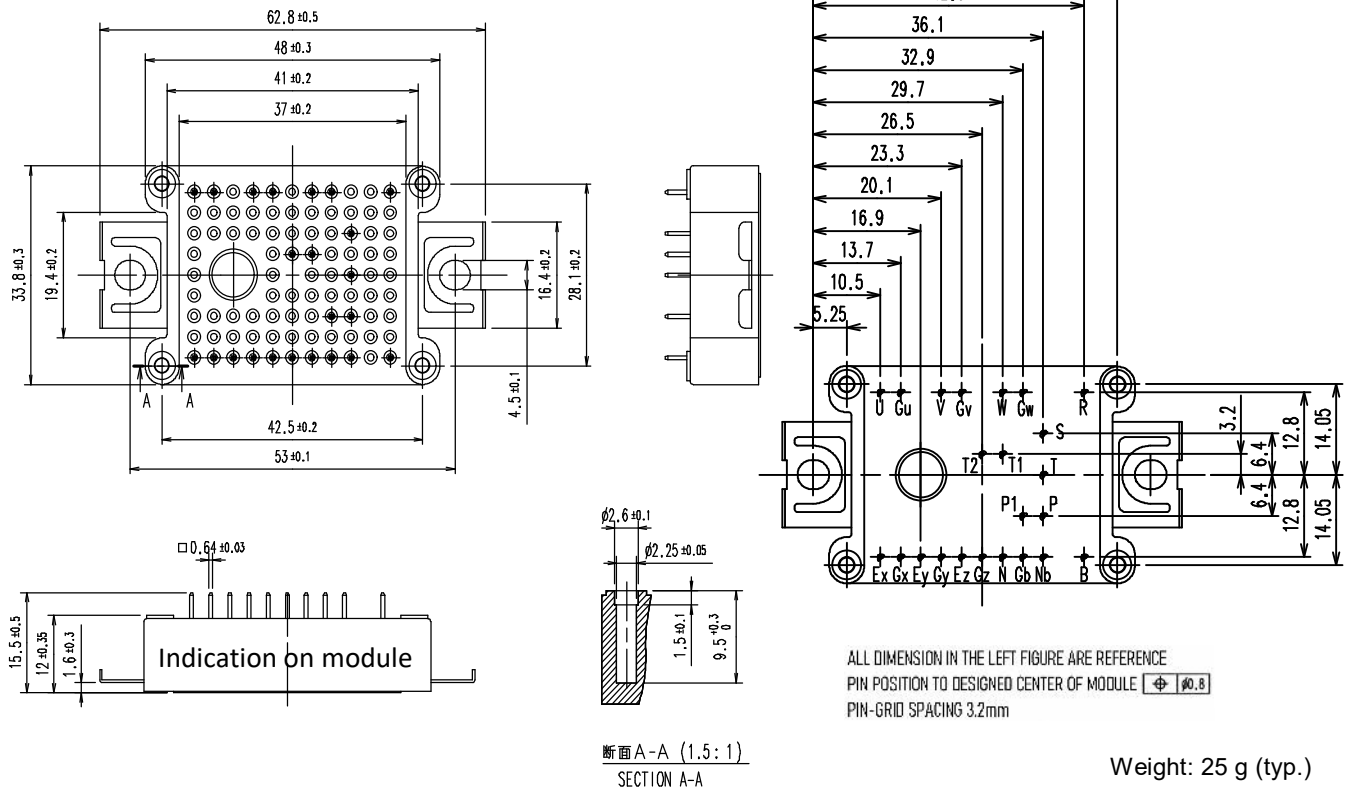
## ■ Applications

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

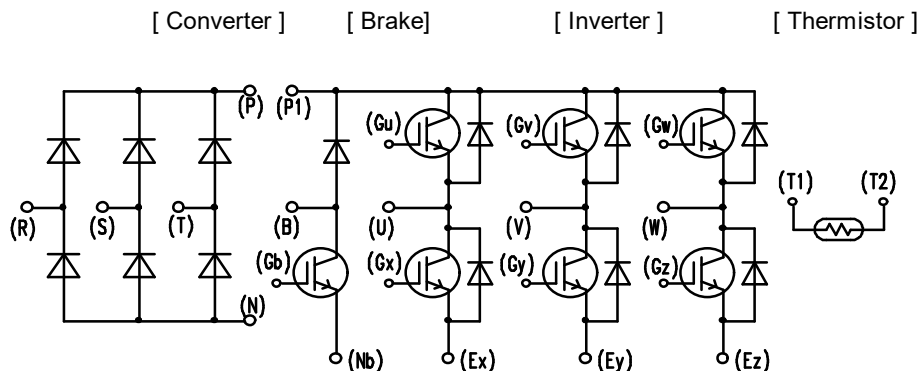
## ■ Typical appearance



## ■ Outline drawing ( Unit : mm )



## ■ Equivalent circuit



# 7MBR30XKC065-50

**IGBT Modules**
**■ Maximum ratings ( at  $T_c = 25^\circ\text{C}$  unless otherwise specified )**

| Items                                                               |                                                                              | Symbols    | Conditions                              |                              | Maximum ratings | Units                |
|---------------------------------------------------------------------|------------------------------------------------------------------------------|------------|-----------------------------------------|------------------------------|-----------------|----------------------|
| Inverter                                                            | Collector-Emitter voltage, Gate-Emitter short-circuited                      | $V_{CES}$  |                                         |                              | 650             | V                    |
|                                                                     | Gate-Emitter voltage, Collector-Emitter short-circuited                      | $V_{GES}$  |                                         |                              | $\pm 20$        | V                    |
|                                                                     | Collector current                                                            | $I_C$      | Continuous                              | $T_c = 100^\circ\text{C}$    | 30              | A                    |
|                                                                     | Repetitive peak collector current                                            | $I_{CRM}$  | 1ms                                     |                              | 60              |                      |
|                                                                     | Forward current                                                              | $I_F$      | Continuous                              |                              | 30              |                      |
|                                                                     | Repetitive peak forward current                                              | $I_{FRM}$  | 1ms                                     |                              | 60              |                      |
|                                                                     | Total power dissipation                                                      | $P_{tot}$  | 1 device                                |                              | 180             | W                    |
| Brake IGBT                                                          | Collector-Emitter voltage, Gate-Emitter short-circuited                      | $V_{CES}$  |                                         |                              | 650             | V                    |
|                                                                     | Gate-Emitter voltage, Collector-Emitter short-circuited                      | $V_{GES}$  |                                         |                              | $\pm 20$        | V                    |
|                                                                     | Collector current                                                            | $I_C$      | Continuous                              | $T_c = 100^\circ\text{C}$    | 30              | A                    |
|                                                                     | Repetitive peak collector current                                            | $I_{CRM}$  | 1ms                                     |                              | 60              |                      |
|                                                                     | Total power dissipation                                                      | $P_{tot}$  | 1 device                                |                              | 180             | W                    |
| Brake FWD                                                           | Forward current                                                              | $I_F$      | Continuous                              |                              | 10              | A                    |
|                                                                     | Repetitive peak forward current                                              | $I_{FRM}$  | 1ms                                     |                              | 20              |                      |
|                                                                     | Repetitive peak reverse voltage                                              | $V_{RRM}$  |                                         |                              | 650             | V                    |
| Converter                                                           | Repetitive peak reverse voltage                                              | $V_{RRM}$  |                                         |                              | 800             | V                    |
|                                                                     | Average output current                                                       | $I_O$      | Three-phase full wave rectified current | $T_c = 80^\circ\text{C}$     | 30              | A                    |
|                                                                     | Surge forward current (Non-Repetitive) (*1)                                  | $I_{FSM}$  | $t = 10\text{ms}$ , Half sine wave form | $T_{vj} = 25^\circ\text{C}$  | 390             | A                    |
|                                                                     |                                                                              |            |                                         | $T_{vj} = 150^\circ\text{C}$ | 340             |                      |
|                                                                     | $I^2t$ (Non-Repetitive) (*1)                                                 | $I^2t$     |                                         | $T_{vj} = 25^\circ\text{C}$  | 760             | $\text{A}^2\text{s}$ |
|                                                                     |                                                                              |            |                                         | $T_{vj} = 150^\circ\text{C}$ | 585             |                      |
| Virtual junction temperature                                        |                                                                              | $T_{vj}$   | Inverter, Brake                         |                              | 175             | $^\circ\text{C}$     |
|                                                                     |                                                                              |            | Converter                               |                              | 150             |                      |
| Operating virtual junction temperature (under switching conditions) |                                                                              | $T_{vjop}$ | Inverter, Brake                         |                              | 175             |                      |
|                                                                     |                                                                              |            | Converter                               |                              | 150             |                      |
| Case temperature                                                    |                                                                              | $T_c$      |                                         |                              | 125             |                      |
| Storage temperature                                                 |                                                                              | $T_{stg}$  |                                         |                              | $-40 \sim 125$  |                      |
| Isolation voltage                                                   | between terminals and copper base (*2)<br>between thermistor and others (*3) | $V_{isol}$ | A.C. : 1min.                            |                              | 2500            | Vrms                 |
| Screw torque                                                        | Mounting torque of screws to heat sink                                       | $M_s$      | M4                                      |                              | 1.3 ~ 1.7       | N·m                  |

(\*1)  $T_{vj}$  : Temperature at test start.

(\*2) All terminals should be connected together during the test.

(\*3) Two thermistor terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.

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

| Items                 |                                                                                                   | Symbols                                                                                           | Conditions                                                       |                       | Characteristics |      |         | Units    |
|-----------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-----------------------|-----------------|------|---------|----------|
|                       |                                                                                                   |                                                                                                   |                                                                  |                       | min.            | typ. | max.    |          |
| Inverter              | Collector-Emitter cut-off current, Gate-Emitter short-circuited                                   | $I_{CES}$                                                                                         | $V_{GE} = 0V$<br>$V_{CE} = 650V$                                 |                       | -               | -    | 50      | $\mu A$  |
|                       | Gate leakage current, Collector-Emitter short-circuited                                           | $I_{GES}$                                                                                         | $V_{CE} = 0V \quad V_{GE} = +20/-20V$                            |                       | -               | -    | 100     | nA       |
|                       | Gate-Emitter threshold voltage                                                                    | $V_{GE(th)}$                                                                                      | $V_{CE} = 20V$<br>$I_C = 30mA$                                   |                       | 6.0             | 6.5  | 7.0     | V        |
|                       | Collector-Emitter saturation voltage                                                              | $V_{CE(sat)}$ (terminal)                                                                          | $V_{GE} = 15V$<br>$I_C = 30A$                                    | $T_{vj}=25^{\circ}C$  | -               | 1.50 | 1.95    | V        |
|                       |                                                                                                   | $V_{CE(sat)}$ (chip)                                                                              |                                                                  | $T_{vj}=25^{\circ}C$  | -               | 1.30 | 1.75    |          |
|                       |                                                                                                   |                                                                                                   |                                                                  | $T_{vj}=125^{\circ}C$ | -               | 1.45 | -       |          |
|                       |                                                                                                   |                                                                                                   |                                                                  | $T_{vj}=150^{\circ}C$ | -               | 1.50 | -       |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=175^{\circ}C$                                            | -                     | 1.55            | -    |         |          |
|                       | Internal gate resistance                                                                          | $r_g$                                                                                             | -                                                                |                       | -               | 0    | -       | $\Omega$ |
|                       | Capacitance                                                                                       | $C_{ies}$                                                                                         | $V_{CE} = 10V, V_{GE}=0V, f = 1MHz$                              |                       | -               | 3.4  | -       | nF       |
|                       |                                                                                                   | $C_{oes}$                                                                                         |                                                                  |                       | -               | 0.13 | -       |          |
|                       |                                                                                                   | $C_{res}$                                                                                         |                                                                  |                       | -               | 0.05 | -       |          |
|                       | Gate charge                                                                                       | $Q_G$                                                                                             | $V_{CC} = 300V \quad V_{GE}=-15 \rightarrow +15V$<br>$I_C = 30A$ |                       | -               | 240  | -       | nC       |
|                       | Forward voltage                                                                                   | $V_F$ (terminal)                                                                                  | $I_F = 30A$                                                      | $T_{vj}=25^{\circ}C$  | -               | 2.05 | 2.50    | V        |
|                       |                                                                                                   | $V_F$ (chip)                                                                                      |                                                                  | $T_{vj}=25^{\circ}C$  | -               | 1.85 | 2.30    |          |
|                       |                                                                                                   |                                                                                                   |                                                                  | $T_{vj}=125^{\circ}C$ | -               | 1.90 | -       |          |
|                       |                                                                                                   |                                                                                                   |                                                                  | $T_{vj}=150^{\circ}C$ | -               | 1.85 | -       |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=175^{\circ}C$                                            | -                     | 1.85            | -    |         |          |
| Switching time (*1)   | $t_{d(on)}$                                                                                       | $V_{CC} = 300V$<br>$I_C, I_F = 30A \quad L_s = 30nH$<br>$V_{GE} = +15/-15 V$<br>$R_G = 15 \Omega$ | $T_{vj}=25^{\circ}C$                                             | -                     | 0.06            | -    | $\mu s$ |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=125^{\circ}C$                                            | -                     | 0.06            | -    |         |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=150^{\circ}C$                                            | -                     | 0.06            | -    |         |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=175^{\circ}C$                                            | -                     | 0.06            | -    |         |          |
|                       | $t_r$                                                                                             | $V_{CC} = 300V$<br>$I_C, I_F = 30A \quad L_s = 30nH$<br>$V_{GE} = +15/-15 V$<br>$R_G = 15 \Omega$ | $T_{vj}=25^{\circ}C$                                             | -                     | 0.02            | -    |         |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=125^{\circ}C$                                            | -                     | 0.03            | -    |         |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=150^{\circ}C$                                            | -                     | 0.03            | -    |         |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=175^{\circ}C$                                            | -                     | 0.03            | -    |         |          |
|                       | $t_{d(off)}$                                                                                      | $V_{CC} = 300V$<br>$I_C, I_F = 30A \quad L_s = 30nH$<br>$V_{GE} = +15/-15 V$<br>$R_G = 15 \Omega$ | $T_{vj}=25^{\circ}C$                                             | -                     | 0.16            | -    |         |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=125^{\circ}C$                                            | -                     | 0.18            | -    |         |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=150^{\circ}C$                                            | -                     | 0.19            | -    |         |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=175^{\circ}C$                                            | -                     | 0.19            | -    |         |          |
| $t_f$                 | $V_{CC} = 300V$<br>$I_C, I_F = 30A \quad L_s = 30nH$<br>$V_{GE} = +15/-15 V$<br>$R_G = 15 \Omega$ | $T_{vj}=25^{\circ}C$                                                                              | -                                                                | 0.04                  | -               |      |         |          |
|                       |                                                                                                   | $T_{vj}=125^{\circ}C$                                                                             | -                                                                | 0.04                  | -               |      |         |          |
|                       |                                                                                                   | $T_{vj}=150^{\circ}C$                                                                             | -                                                                | 0.04                  | -               |      |         |          |
|                       |                                                                                                   | $T_{vj}=175^{\circ}C$                                                                             | -                                                                | 0.04                  | -               |      |         |          |
| Reverse recovery time | $t_{rr}$                                                                                          | $V_{CC} = 300V$<br>$I_C, I_F = 30A \quad L_s = 30nH$<br>$V_{GE} = +15/-15 V$<br>$R_G = 15 \Omega$ | $T_{vj}=25^{\circ}C$                                             | -                     | 0.07            | -    |         |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=125^{\circ}C$                                            | -                     | 0.11            | -    |         |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=150^{\circ}C$                                            | -                     | 0.12            | -    |         |          |
|                       |                                                                                                   |                                                                                                   | $T_{vj}=175^{\circ}C$                                            | -                     | 0.14            | -    |         |          |

(\*1) Turn on time ( $t_{on}$ ) =  $t_{d(on)} + t_r$ , Turn off time ( $t_{off}$ ) =  $t_{d(off)} + t_f$

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| Items                                                           |                                     | Symbols                       | Conditions                             |                       | Characteristics |      |          | Units   |
|-----------------------------------------------------------------|-------------------------------------|-------------------------------|----------------------------------------|-----------------------|-----------------|------|----------|---------|
|                                                                 |                                     |                               |                                        |                       | min.            | typ. | max.     |         |
| Inverter                                                        | Switching loss<br>(per pulse)       | $E_{on}$                      | $V_{CC} = 300V$                        | $T_{vj}=25^{\circ}C$  | -               | 0.44 | -        | mJ      |
|                                                                 |                                     |                               | $I_C, I_F = 30A \quad L_s = 30nH$      | $T_{vj}=125^{\circ}C$ | -               | 0.63 | -        |         |
|                                                                 |                                     |                               | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 0.71 | -        |         |
|                                                                 |                                     |                               | $R_G = 15 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 0.78 | -        |         |
|                                                                 |                                     | $E_{off}$                     | $V_{CC} = 300V$                        | $T_{vj}=25^{\circ}C$  | -               | 0.82 | -        |         |
|                                                                 |                                     |                               | $I_C, I_F = 30A \quad L_s = 30nH$      | $T_{vj}=125^{\circ}C$ | -               | 1.04 | -        |         |
|                                                                 |                                     |                               | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 1.12 | -        |         |
|                                                                 |                                     |                               | $R_G = 15 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 1.15 | -        |         |
|                                                                 |                                     | $E_{rr}$                      | $V_{CC} = 300V$                        | $T_{vj}=25^{\circ}C$  | -               | 0.24 | -        |         |
|                                                                 |                                     |                               | $I_C, I_F = 30A \quad L_s = 30nH$      | $T_{vj}=125^{\circ}C$ | -               | 0.38 | -        |         |
|                                                                 |                                     |                               | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 0.42 | -        |         |
|                                                                 |                                     |                               | $R_G = 15 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 0.50 | -        |         |
| Collector-Emitter cut-off current, Gate-Emitter short-circuited |                                     | $I_{CES}$                     | $V_{GE} = 0V$<br>$V_{CE} = 650V$       | -                     | -               | 50   | $\mu A$  |         |
| Gate leakage current, Collector-Emitter short-circuited         |                                     | $I_{GES}$                     | $V_{CE} = 0V, \quad V_{GE} = +20/-20V$ | -                     | -               | 100  | nA       |         |
| Collector-Emitter saturation voltage                            | $V_{CE(sat)}$<br>(terminal)         | $V_{GE} = 15V$<br>$I_C = 30A$ | $T_{vj}=25^{\circ}C$                   | -                     | 1.50            | 1.95 | V        |         |
|                                                                 | $V_{CE(sat)}$<br>(chip)             |                               | $T_{vj}=25^{\circ}C$                   | -                     | 1.30            | 1.75 |          |         |
|                                                                 |                                     |                               | $T_{vj}=125^{\circ}C$                  | -                     | 1.45            | -    |          |         |
|                                                                 |                                     |                               | $T_{vj}=150^{\circ}C$                  | -                     | 1.50            | -    |          |         |
|                                                                 |                                     |                               | $T_{vj}=175^{\circ}C$                  | -                     | 1.55            | -    |          |         |
| Internal gate resistance                                        |                                     | $r_g$                         | -                                      | -                     | 0               | -    | $\Omega$ |         |
| Brake                                                           | Switching time (*1)                 | $t_{d(on)}$                   | $V_{CC} = 300V$                        | $T_{vj}=25^{\circ}C$  | -               | 0.06 | -        | $\mu s$ |
|                                                                 |                                     |                               | $I_C = 30A \quad L_s = 30nH$           | $T_{vj}=125^{\circ}C$ | -               | 0.06 | -        |         |
|                                                                 |                                     |                               | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 0.06 | -        |         |
|                                                                 |                                     |                               | $R_G = 15 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 0.06 | -        |         |
|                                                                 |                                     | $t_r$                         | $V_{CC} = 300V$                        | $T_{vj}=25^{\circ}C$  | -               | 0.02 | -        |         |
|                                                                 |                                     |                               | $I_C = 30A \quad L_s = 30nH$           | $T_{vj}=125^{\circ}C$ | -               | 0.03 | -        |         |
|                                                                 |                                     |                               | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 0.03 | -        |         |
|                                                                 |                                     |                               | $R_G = 15 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 0.03 | -        |         |
|                                                                 |                                     | $t_{d(off)}$                  | $V_{CC} = 300V$                        | $T_{vj}=25^{\circ}C$  | -               | 0.16 | -        |         |
|                                                                 |                                     |                               | $I_C = 30A \quad L_s = 30nH$           | $T_{vj}=125^{\circ}C$ | -               | 0.18 | -        |         |
|                                                                 |                                     |                               | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 0.19 | -        |         |
|                                                                 |                                     |                               | $R_G = 15 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 0.19 | -        |         |
|                                                                 |                                     | $t_f$                         | $V_{CC} = 300V$                        | $T_{vj}=25^{\circ}C$  | -               | 0.04 | -        |         |
|                                                                 |                                     |                               | $I_C = 30A \quad L_s = 30nH$           | $T_{vj}=125^{\circ}C$ | -               | 0.04 | -        |         |
|                                                                 |                                     |                               | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 0.04 | -        |         |
|                                                                 |                                     |                               | $R_G = 15 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 0.04 | -        |         |
| Reverse current                                                 |                                     | $I_{RRM}$                     | $V_R = 650V$                           | -                     | -               | 50   | $\mu A$  |         |
| Forward voltage                                                 | $V_F$ (terminal)                    | $I_F = 10A$                   | $T_{vj}=25^{\circ}C$                   | -                     | 1.75            | 2.20 | V        |         |
|                                                                 | $V_F$<br>(chip)                     | $I_F = 10A$                   | $T_{vj}=25^{\circ}C$                   | -                     | 1.55            | 2.00 |          |         |
|                                                                 |                                     |                               | $T_{vj}=125^{\circ}C$                  | -                     | 1.50            | -    |          |         |
|                                                                 |                                     |                               | $T_{vj}=150^{\circ}C$                  | -                     | 1.50            | -    |          |         |
|                                                                 |                                     |                               | $T_{vj}=175^{\circ}C$                  | -                     | 1.45            | -    |          |         |
| Converter                                                       | Reverse current                     | $I_{RRM}$                     | $V_R = 800V$                           | -                     | -               | 50   | $\mu A$  |         |
| Thermistor                                                      | Continuous (direct) forward voltage | $V_{FM}$                      | $I_F = 30A$                            | terminal              | -               | 1.25 | 1.70     | V       |
|                                                                 |                                     |                               |                                        | chip                  | -               | 1.05 | 1.50     |         |
| Thermistor                                                      | Resistance                          | $R$                           | $T = 25^{\circ}C$                      | -                     | 5000            | -    | $\Omega$ |         |
|                                                                 |                                     |                               | $T = 100^{\circ}C$                     | 465                   | 495             | 520  |          |         |
|                                                                 | B value                             | $B$                           | $T = 25/ 50^{\circ}C$                  | 3305                  | 3375            | 3450 | K        |         |

(\*1) Turn on time ( $t_{on}$ ) =  $t_{d(on)} + t_r$ , Turn off time ( $t_{off}$ ) =  $t_{d(off)} + t_f$

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**IGBT Modules**
**NOTICE:**

The external gate resistance ( $R_G$ ) shown above is one of our recommended value for the purpose of minimum switching loss. However the optimum  $R_G$  depends on circuit configuration and/or environment. We recommend that the  $R_G$  has to be carefully chosen based on consideration if IGBT module matches design criteria, for example, switching loss, EMC/EMI, spike voltage, surge current and no unexpected oscillation and so on.

**■ Thermal resistance characteristics**

| Items                                                  | Symbols       | Conditions      | Characteristics |      |      | Units |
|--------------------------------------------------------|---------------|-----------------|-----------------|------|------|-------|
|                                                        |               |                 | min.            | typ. | max. |       |
| Thermal resistance junction to case (1 device)         | $R_{th(j-c)}$ | Inverter IGBT   | -               | -    | 0.82 | K/W   |
|                                                        |               | Inverter FWD    | -               | -    | 1.50 |       |
|                                                        |               | Brake IGBT      | -               | -    | 0.82 |       |
|                                                        |               | Brake FWD       | -               | -    | 1.92 |       |
|                                                        |               | Converter Diode | -               | -    | 0.75 |       |
| Thermal resistance case to heat sink(*1)<br>(1 device) | $R_{th(c-f)}$ | Inverter IGBT   | -               | 0.75 | -    |       |
|                                                        |               | Inverter FWD    | -               | 0.92 | -    |       |
|                                                        |               | Brake IGBT      | -               | 0.78 | -    |       |
|                                                        |               | Brake FWD       | -               | 0.80 | -    |       |
|                                                        |               | Converter Diode | -               | 0.79 | -    |       |

(\*1) This is the value which is defined mounting on the additional cooling fin with 1 W/(m·K) thermal grease.

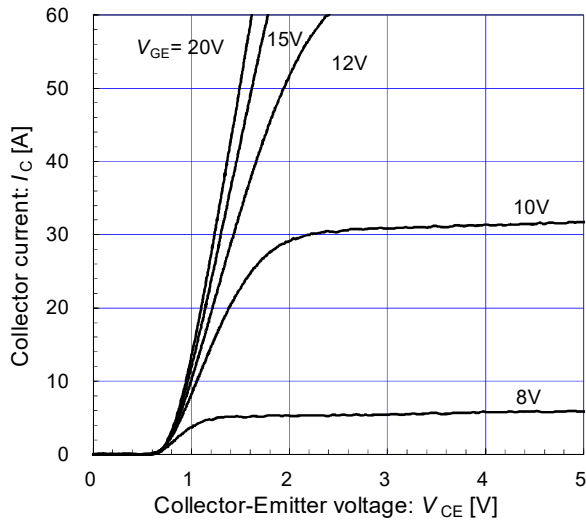
# 7MBR30XKC065-50

IGBT Modules

[ Inverter ]

Collector current vs. Collector-Emittor voltage (typ.)

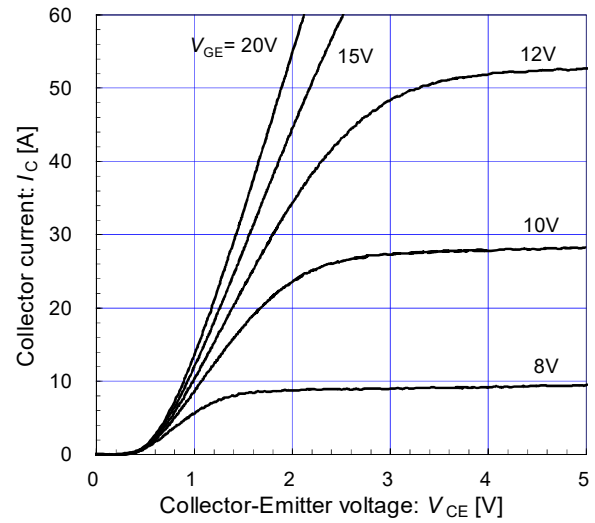
$T_{vj} = 25^{\circ}\text{C}$  / chip



[ Inverter ]

Collector current vs. Collector-Emittor voltage (typ.)

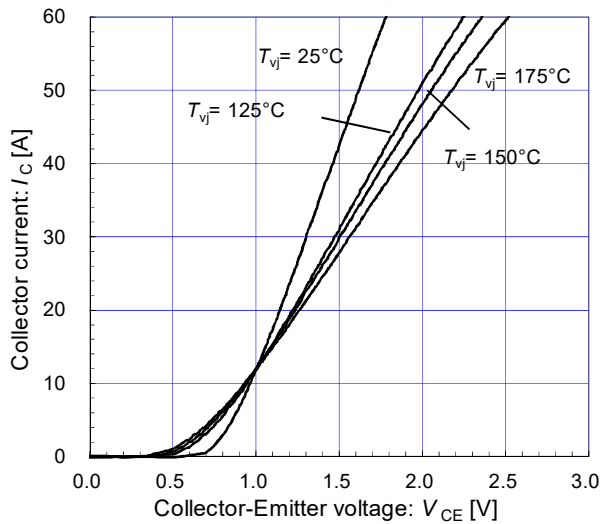
$T_{vj} = 175^{\circ}\text{C}$  / chip



[ Inverter ]

Collector current vs. Collector-Emittor voltage (typ.)

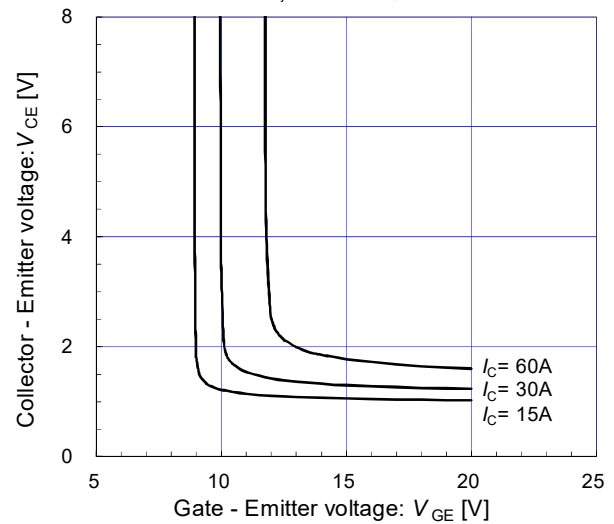
$V_{GE} = 15\text{V}$  / chip



[ Inverter ]

Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)

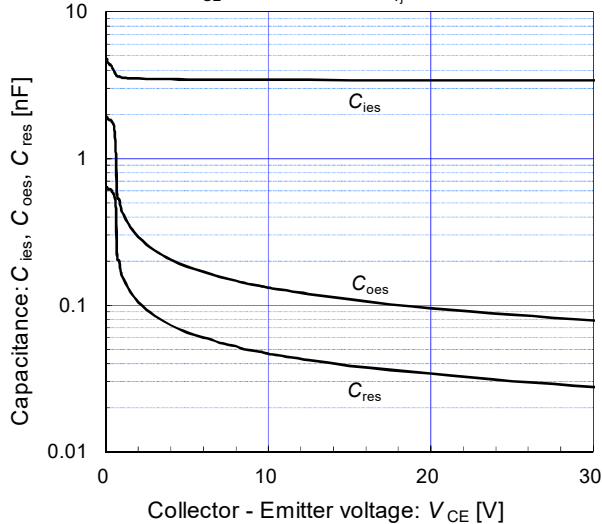
$T_{vj} = 25^{\circ}\text{C}$  / chip



[ Inverter ]

Capacitance vs. Collector-Emittor voltage (typ.)

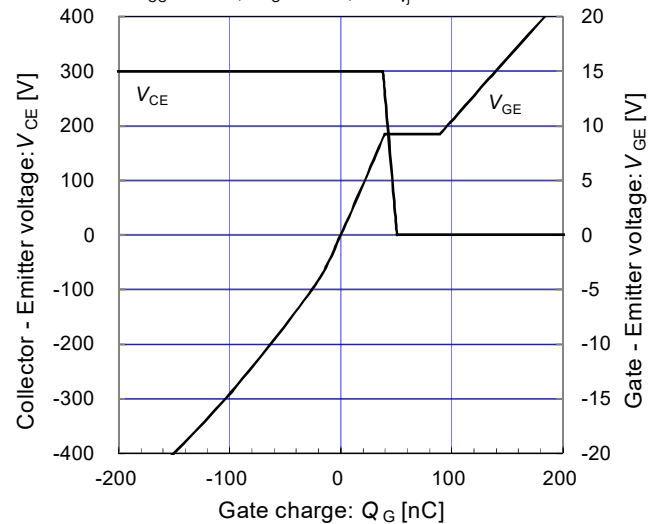
$V_{GE} = 0\text{V}$ ,  $f = 1\text{MHz}$ ,  $T_{vj} = 25^{\circ}\text{C}$



[ Inverter ]

Dynamic gate charge (typ.)

$V_{CC} = 300\text{V}$ ,  $I_C = 30\text{A}$ ,  $T_{vj} = 25^{\circ}\text{C}$

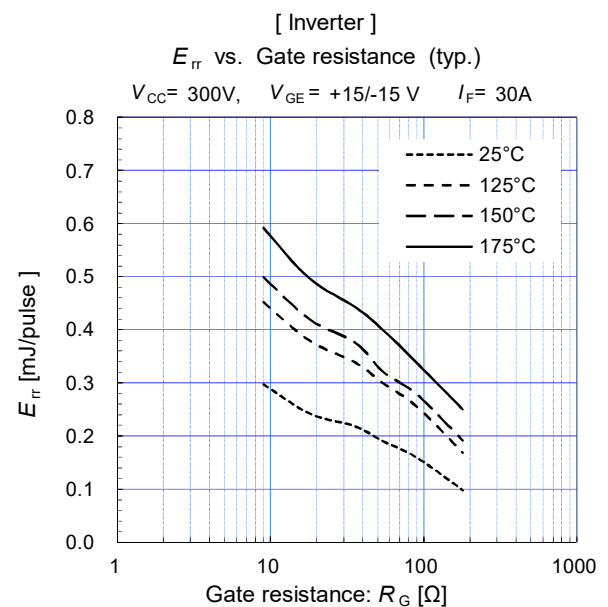
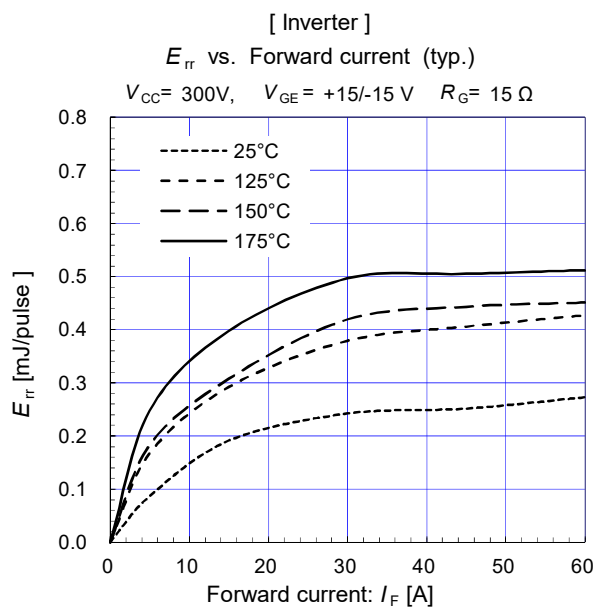
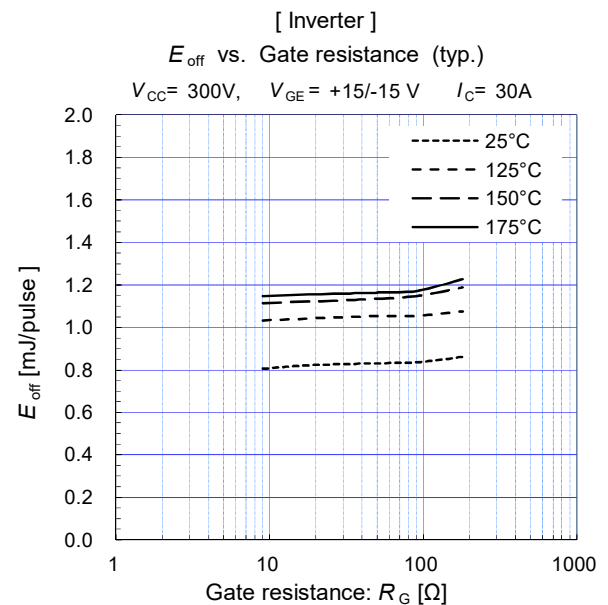
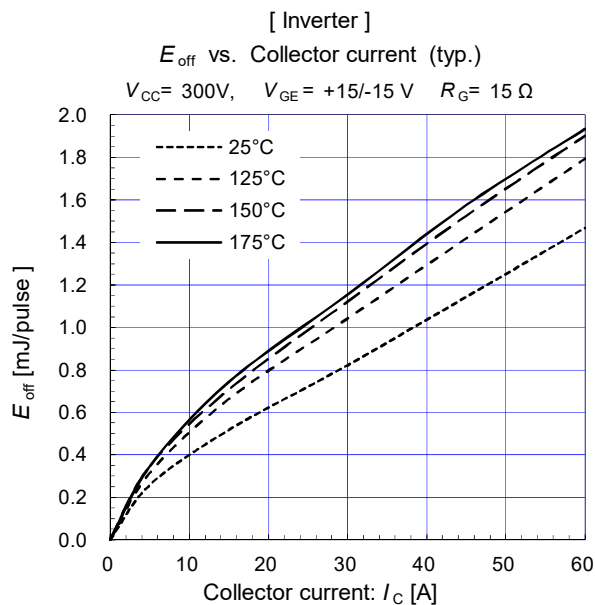
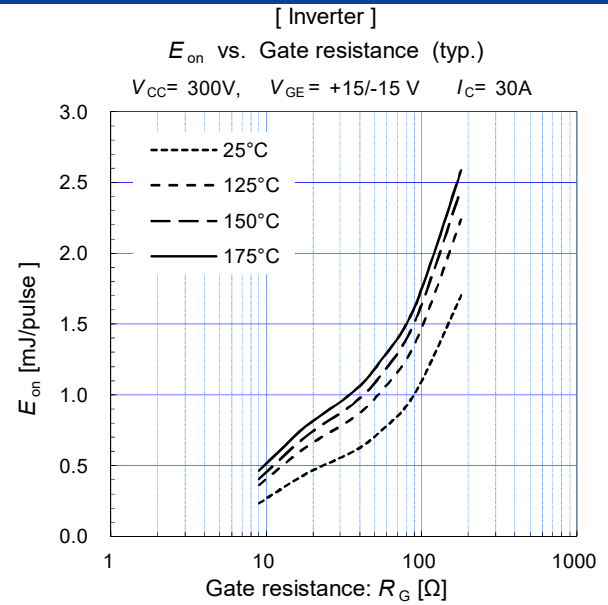
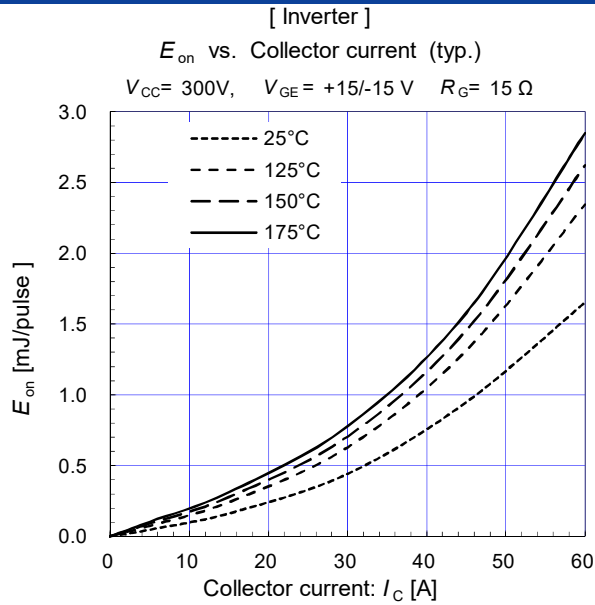


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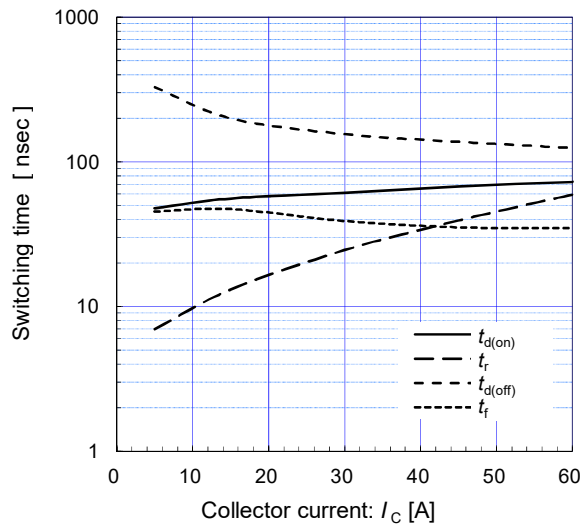
# 7MBR30XKC065-50

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[ Inverter ]

Switching time vs. Collector current (typ.)

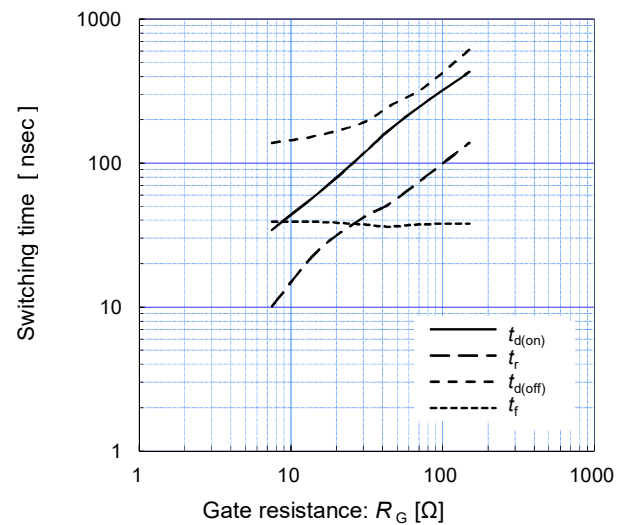
$V_{CC} = 300V$ ,  $R_G = 15\Omega$   $V_{GE} = +15/-15V$ ,  $T_{vj} = 25^\circ C$



[ Inverter ]

Switching time vs. Gate resistance (typ.)

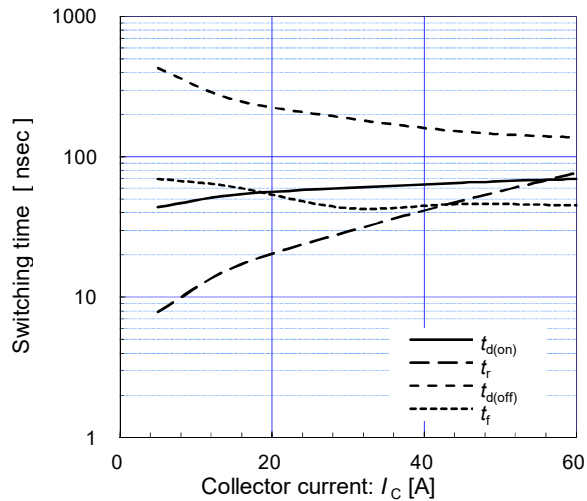
$V_{CC} = 300V$ ,  $I_C = 30A$ ,  $V_{GE} = +15/-15V$ ,  $T_{vj} = 25^\circ C$



[ Inverter ]

Switching time vs. Collector current (typ.)

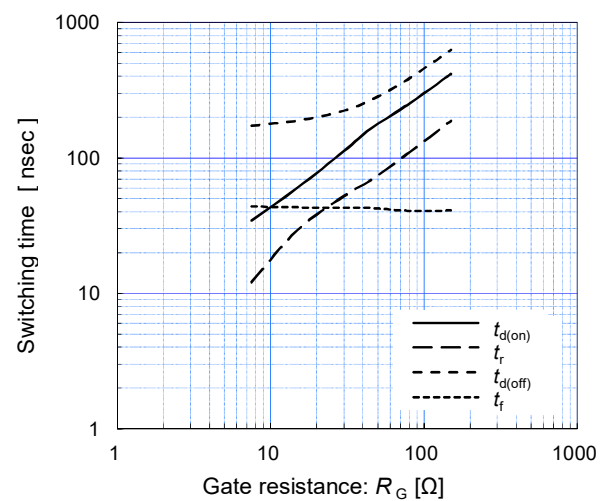
$V_{CC} = 300V$ ,  $R_G = 15\Omega$   $V_{GE} = +15/-15V$ ,  $T_{vj} = 175^\circ C$



[ Inverter ]

Switching time vs. Gate resistance (typ.)

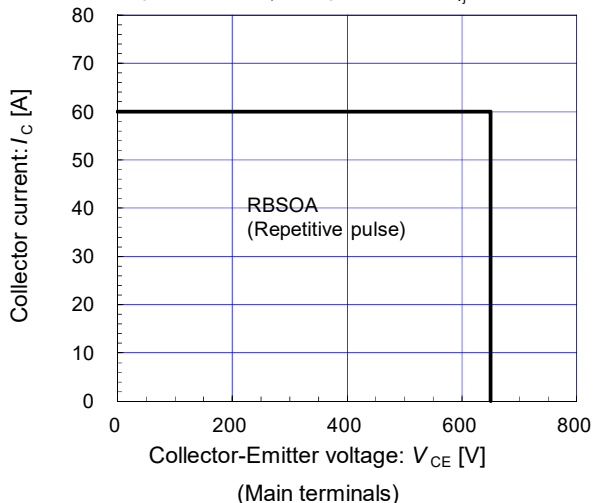
$V_{CC} = 300V$ ,  $I_C = 30A$ ,  $V_{GE} = +15/-15V$ ,  $T_{vj} = 175^\circ C$



[ Inverter ]

Reverse bias safe operating area (max.)

$V_{GE} = +15/-15V$ ,  $R_G \geq 15\Omega$   $T_{vj} = 175^\circ C$



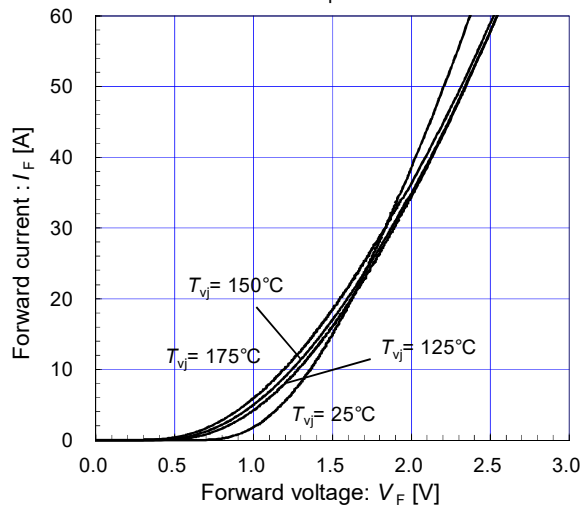


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[ Inverter ]

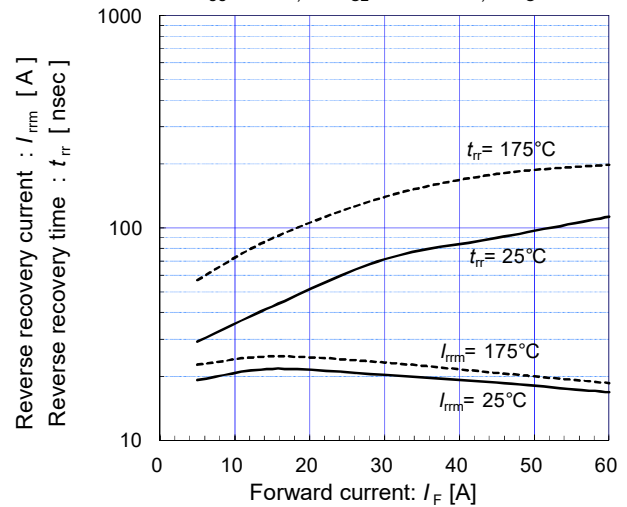
Forward current vs. Forward voltage (typ.)  
chip



[ Inverter ]

Reverse recovery characteristics (typ.)

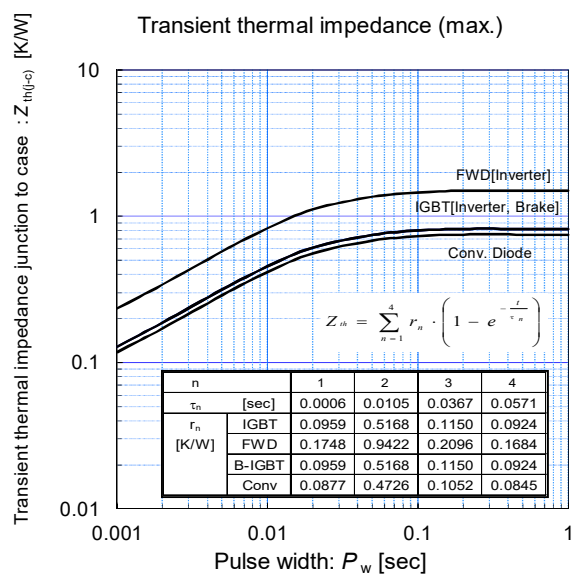
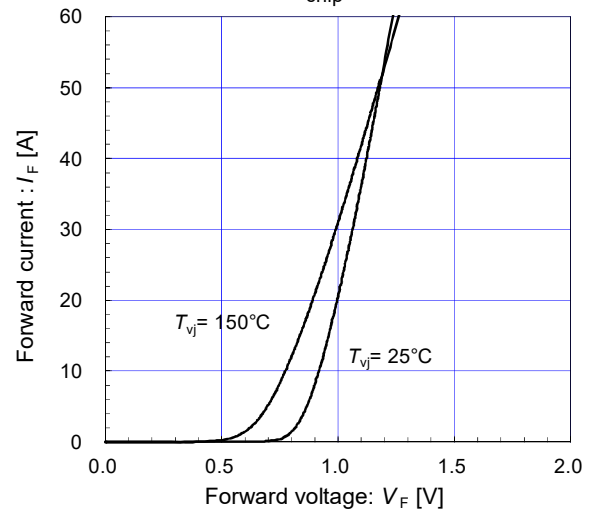
$V_{CC} = 300V$ ,  $V_{GE} = +15/-15V$ ,  $R_G = 15\Omega$



[ Converter ]

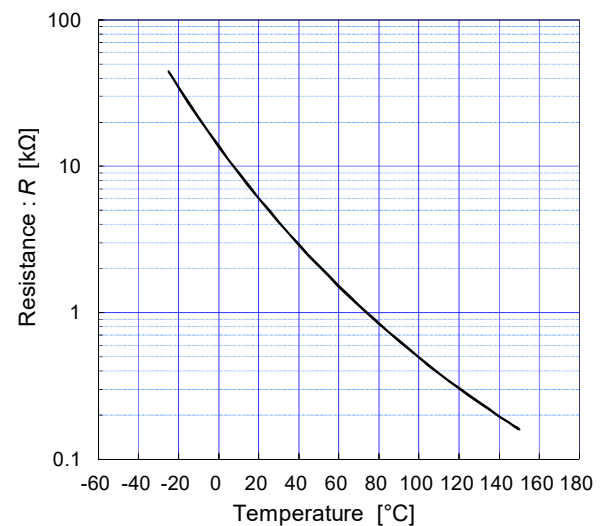
Forward current vs. Forward voltage (typ.)

chip



[ Thermistor ]

Temperature characteristic (typ.)

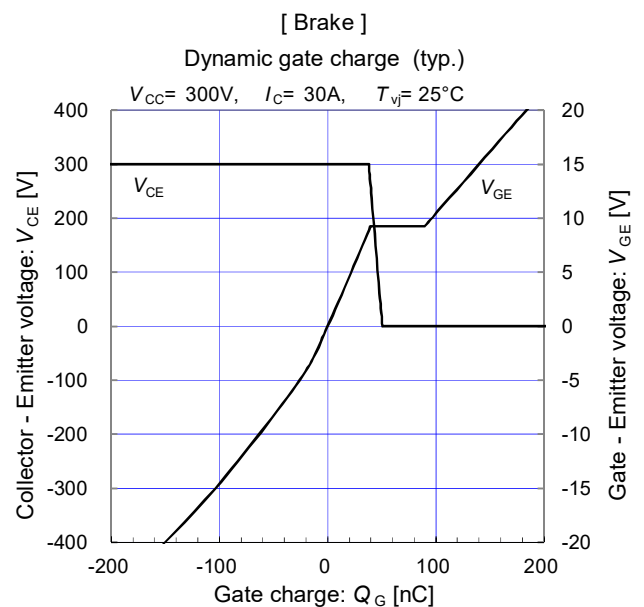
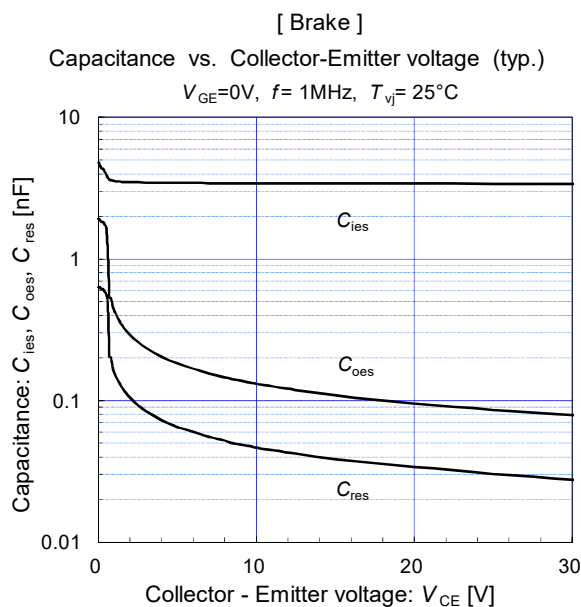
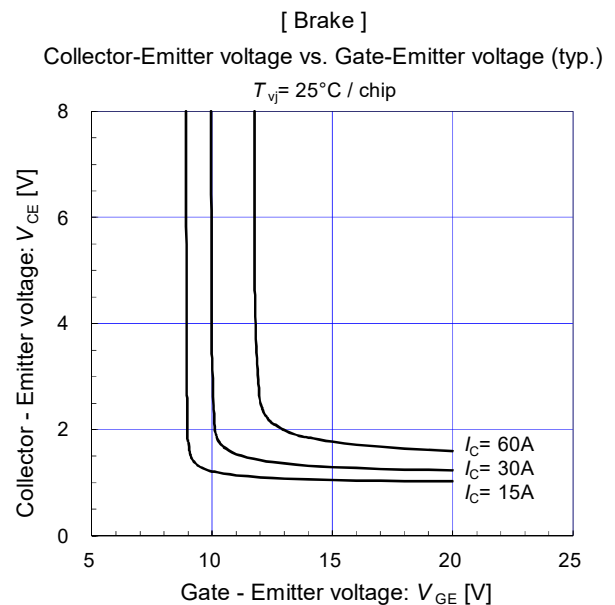
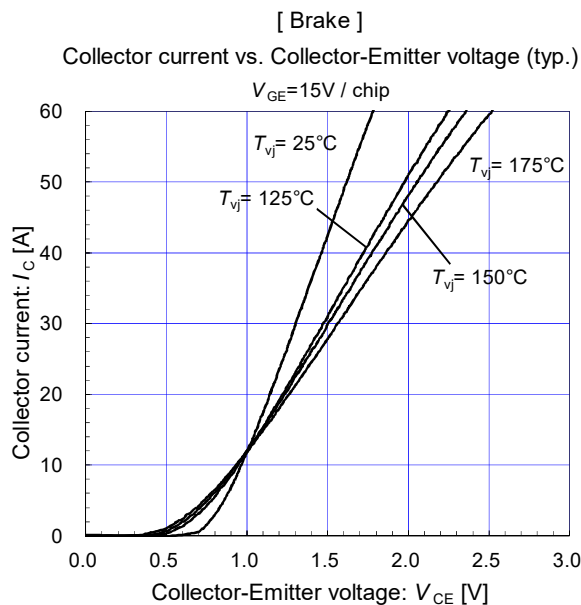
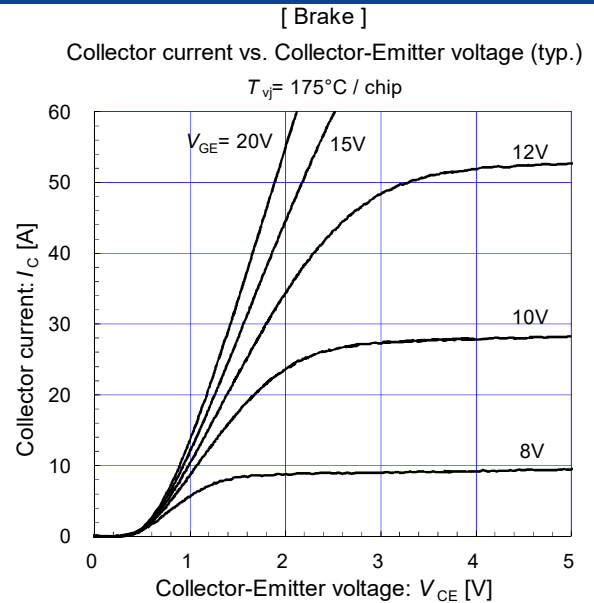
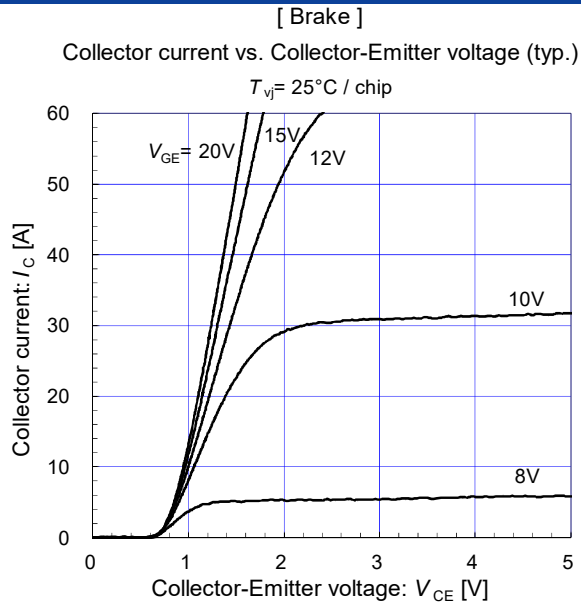


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## IGBT Modules

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| 6 IGBT 損失シミュレーションソフト | <a href="http://www.fujielectric.co.jp/products/semiconductor/model/igbt/simulation/">www.fujielectric.co.jp/products/semiconductor/model/igbt/simulation/</a>   |
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| 7 Fuji Electric Journal                        | <a href="http://www.fujielectric.com/products/semiconductor/journal/">www.fujielectric.com/products/semiconductor/journal/</a>                               |
| 8 Contact                                      | <a href="http://www.fujielectric.com/contact/">www.fujielectric.com/contact/</a>                                                                             |
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