

# 7MBR50XWA120-50

## IGBT Modules

## Power Module(X series)

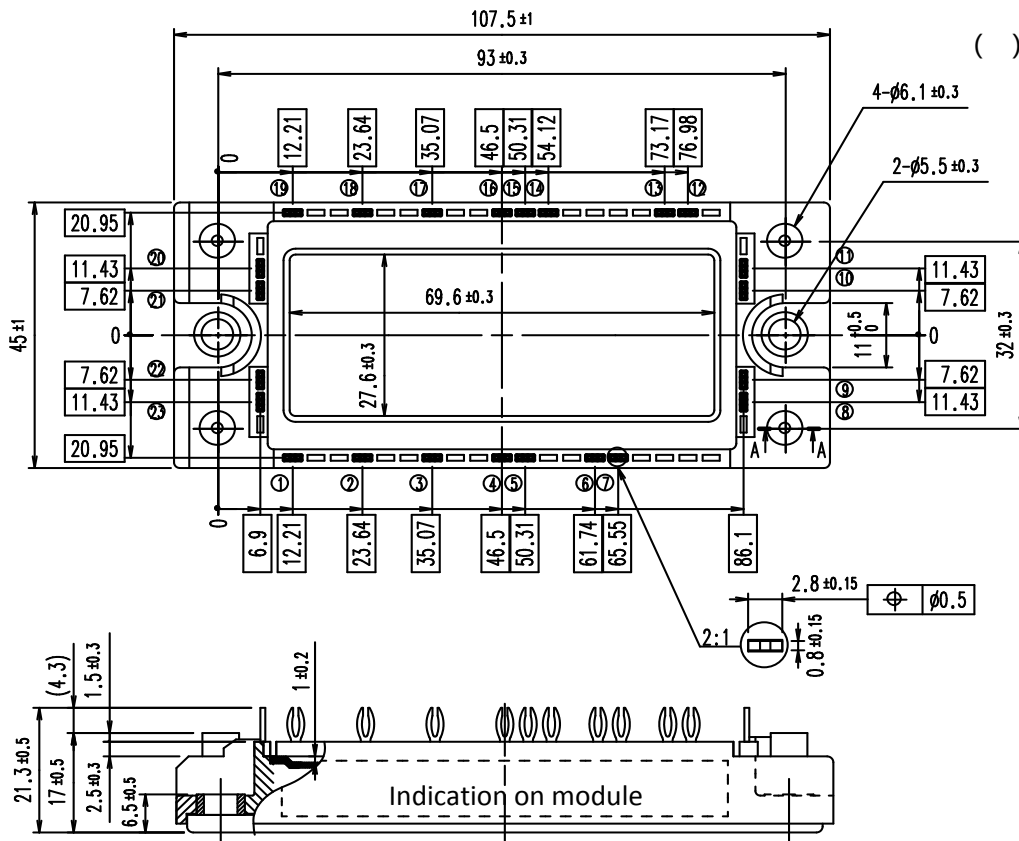
## ■ Features

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

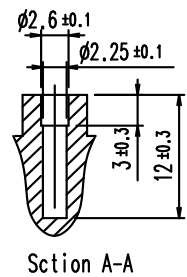
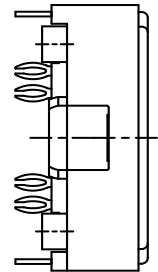
## ■ Applications

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

■ Outline drawing ( Unit : mm )



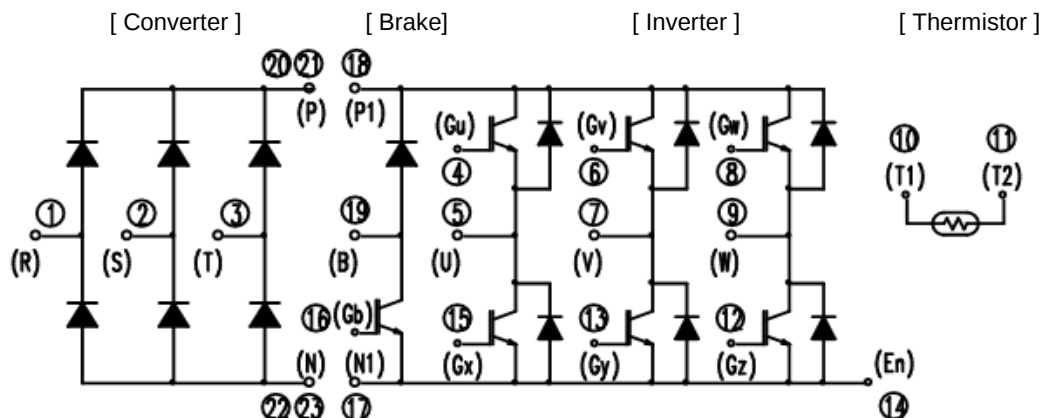
( ) shows reference dimension.



Section A-A

Weight: 200 g (typ.)

### ■ Equivalent circuit



# 7MBR50XWA120-50

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

| Items                                                       |                                        |       | Symbols                      | Conditions                               |                              | Maximum ratings | Units            |
|-------------------------------------------------------------|----------------------------------------|-------|------------------------------|------------------------------------------|------------------------------|-----------------|------------------|
| Inverter                                                    | Collector-Emitter voltage              |       | $V_{CES}$                    |                                          |                              | 1200            | V                |
|                                                             | Gate-Emitter voltage                   |       | $V_{GES}$                    |                                          |                              | ±20             | V                |
|                                                             | Collector current                      |       | $I_C$                        | Continuous                               | $T_c=100^{\circ}\text{C}$    | 50              | A                |
|                                                             |                                        |       | $I_C$ pulse                  | 1ms                                      |                              | 100             |                  |
|                                                             | Forward current                        |       | $I_F$                        | Continuous                               |                              | 50              |                  |
|                                                             |                                        |       | $I_F$ pulse                  | 1ms                                      |                              | 100             |                  |
| Collector power dissipation                                 |                                        | $P_C$ | 1 device                     |                                          | 250                          | W               |                  |
| Brake IGBT                                                  | Collector-Emitter voltage              |       | $V_{CES}$                    |                                          |                              | 1200            | V                |
|                                                             | Gate-Emitter voltage                   |       | $V_{GES}$                    |                                          |                              | ±20             | V                |
|                                                             | Collector current                      |       | $I_C$                        | Continuous                               | $T_c=100^{\circ}\text{C}$    | 35              | A                |
|                                                             |                                        |       | $I_C$ pulse                  | 1ms                                      |                              | 70              |                  |
|                                                             | Collector power dissipation            |       | $P_C$                        | 1 device                                 |                              | 200             | W                |
| Brake FWD                                                   | Forward current                        |       | $I_F$                        | Continuous                               |                              | 15              | A                |
|                                                             |                                        |       | $I_{FRM}$                    | 1ms                                      |                              | 30              |                  |
|                                                             | Repetitive peak reverse voltage        |       | $V_{RRM}$                    |                                          |                              | 1200            | V                |
| Converter                                                   | Repetitive peak reverse voltage        |       | $V_{RRM}$                    |                                          |                              | 1600            | V                |
|                                                             | Average output current                 |       | $I_O$                        | Three-phase full wave rectified current  | $T_c=80^{\circ}\text{C}$     | 50              | A                |
|                                                             |                                        |       |                              |                                          |                              |                 |                  |
|                                                             | Surge current (Non-Repetitive) (*1)    |       | $I_{FSM}$                    | $t=10\text{ms}$ ,<br>Half sine wave form | $T_{vj}=25^{\circ}\text{C}$  | 630             | A                |
|                                                             |                                        |       |                              |                                          | $T_{vj}=150^{\circ}\text{C}$ | 520             |                  |
|                                                             | $I^2t$ (Non-Repetitive) (*1)           |       | $I^2t$                       |                                          | $T_{vj}=25^{\circ}\text{C}$  | 2000            | A <sup>2</sup> s |
|                                                             |                                        |       | $T_{vj}=150^{\circ}\text{C}$ |                                          | 1350                         |                 |                  |
| Junction temperature                                        |                                        |       | $T_{vj}$                     | Inverter, Brake                          |                              | 175             | °C               |
|                                                             |                                        |       |                              | Converter                                |                              | 150             |                  |
| Operating junction temperature (under switching conditions) |                                        |       | $T_{vjop}$                   | Inverter, Brake                          |                              | 175             |                  |
|                                                             |                                        |       |                              | Converter                                |                              | 150             |                  |
| Case temperature                                            |                                        |       | $T_c$                        |                                          |                              | 125             |                  |
| Storage temperature                                         |                                        |       | $T_{stg}$                    |                                          |                              | -40 ~ 125       |                  |
| Isolation voltage                                           | between terminals and copper base (*2) |       | $V_{iso}$                    | A.C. : 1min.                             |                              | 2500            | Vrms             |
|                                                             | between thermistor and others (*3)     |       |                              |                                          |                              |                 |                  |
| Screw torque (*4)                                           | Mounting                               |       | -                            | M5                                       |                              | 6.0             | 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.

(\*4) Recommendable value : Mounting 2.5 ~ 6.0 N·m (M5)

# 7MBR50XWA120-50

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

| Items                               |                                      | Symbols                                                                                                                                                                      | Conditions                                                                                                                                                                   |                                     | Characteristics |      |      | Units         |
|-------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------|------|------|---------------|
|                                     |                                      |                                                                                                                                                                              |                                                                                                                                                                              |                                     | min.            | typ. | max. |               |
| Inverter                            | Zero Gate voltage collector current  | $I_{\text{CES}}$                                                                                                                                                             | $V_{\text{GE}} = 0\text{V}$<br>$V_{\text{CE}} = 1200\text{V}$                                                                                                                |                                     | -               | -    | 50   | $\mu\text{A}$ |
|                                     | Gate-Emitter leakage current         | $I_{\text{GES}}$                                                                                                                                                             | $V_{\text{CE}} = 0\text{V}$ $V_{\text{GE}} = +20/-20\text{V}$                                                                                                                |                                     | -               | -    | 100  | nA            |
|                                     | Gate-Emitter threshold voltage       | $V_{\text{GE(th)}}$                                                                                                                                                          | $V_{\text{CE}} = 20\text{V}$<br>$I_{\text{C}} = 50\text{mA}$                                                                                                                 |                                     | 6.0             | 6.5  | 7.0  | V             |
|                                     | Collector-Emitter saturation voltage | $V_{\text{CE(sat)}}$ (terminal)                                                                                                                                              | $V_{\text{GE}} = 15\text{V}$<br>$I_{\text{C}} = 50\text{A}$                                                                                                                  | $T_{\text{vj}}=25^{\circ}\text{C}$  | -               | 1.70 | 2.15 | V             |
|                                     |                                      |                                                                                                                                                                              |                                                                                                                                                                              | $T_{\text{vj}}=25^{\circ}\text{C}$  | -               | 1.50 | 1.95 |               |
|                                     |                                      | $T_{\text{vj}}=125^{\circ}\text{C}$                                                                                                                                          |                                                                                                                                                                              | -                                   | 1.85            | -    |      |               |
|                                     |                                      | $T_{\text{vj}}=150^{\circ}\text{C}$                                                                                                                                          |                                                                                                                                                                              | -                                   | 1.95            | -    |      |               |
|                                     |                                      | $T_{\text{vj}}=175^{\circ}\text{C}$                                                                                                                                          |                                                                                                                                                                              | -                                   | 2.00            | -    |      |               |
|                                     | Internal Gate resistance             | $r_{\text{g}}$                                                                                                                                                               | -                                                                                                                                                                            |                                     | -               | 0.0  | -    | $\Omega$      |
|                                     | Capacitance                          | $C_{\text{ies}}$                                                                                                                                                             | $V_{\text{CE}} = 10\text{V}$ , $V_{\text{GE}} = 0\text{V}$ , $f = 1\text{MHz}$                                                                                               |                                     | -               | 5.3  | -    | nF            |
|                                     |                                      | $C_{\text{oes}}$                                                                                                                                                             |                                                                                                                                                                              |                                     | -               | 0.18 | -    |               |
|                                     |                                      | $C_{\text{res}}$                                                                                                                                                             |                                                                                                                                                                              |                                     | -               | 0.05 | -    |               |
|                                     | Gate charge                          | $Q_{\text{G}}$                                                                                                                                                               | $V_{\text{CC}} = 600\text{V}$ $V_{\text{GE}} = -15 \rightarrow +15\text{V}$<br>$I_{\text{C}} = 50\text{A}$                                                                   |                                     | -               | 340  | -    | nC            |
|                                     | Forward voltage                      | $V_{\text{F}}$ (terminal)                                                                                                                                                    | $I_{\text{F}} = 50\text{A}$                                                                                                                                                  | $T_{\text{vj}}=25^{\circ}\text{C}$  | -               | 2.00 | 2.45 | V             |
|                                     |                                      | $V_{\text{F}}$ (chip)                                                                                                                                                        |                                                                                                                                                                              | $T_{\text{vj}}=25^{\circ}\text{C}$  | -               | 1.80 | 2.25 |               |
|                                     |                                      |                                                                                                                                                                              |                                                                                                                                                                              | $T_{\text{vj}}=125^{\circ}\text{C}$ | -               | 1.85 | -    |               |
|                                     |                                      |                                                                                                                                                                              |                                                                                                                                                                              | $T_{\text{vj}}=150^{\circ}\text{C}$ | -               | 1.80 | -    |               |
|                                     |                                      |                                                                                                                                                                              |                                                                                                                                                                              | $T_{\text{vj}}=175^{\circ}\text{C}$ | -               | 1.75 | -    |               |
|                                     | Switching time (*1)                  | $t_{\text{d(on)}}$                                                                                                                                                           | $V_{\text{CC}} = 600\text{V}$<br>$I_{\text{C}}, I_{\text{F}} = 50\text{A}$ $L_{\text{S}} = 30\text{nH}$<br>$V_{\text{GE}} = +15/-15\text{ V}$<br>$R_{\text{G}} = 18\ \Omega$ | $T_{\text{vj}}=25^{\circ}\text{C}$  | -               | 0.09 | -    | $\mu\text{s}$ |
|                                     |                                      |                                                                                                                                                                              |                                                                                                                                                                              | $T_{\text{vj}}=125^{\circ}\text{C}$ | -               | 0.09 | -    |               |
| $T_{\text{vj}}=150^{\circ}\text{C}$ |                                      |                                                                                                                                                                              |                                                                                                                                                                              | -                                   | 0.09            | -    |      |               |
| $T_{\text{vj}}=175^{\circ}\text{C}$ |                                      |                                                                                                                                                                              |                                                                                                                                                                              | -                                   | 0.10            | -    |      |               |
| $t_{\text{r}}$                      |                                      | $V_{\text{CC}} = 600\text{V}$<br>$I_{\text{C}}, I_{\text{F}} = 50\text{A}$ $L_{\text{S}} = 30\text{nH}$<br>$V_{\text{GE}} = +15/-15\text{ V}$<br>$R_{\text{G}} = 18\ \Omega$ | $T_{\text{vj}}=25^{\circ}\text{C}$                                                                                                                                           | -                                   | 0.04            | -    |      |               |
|                                     |                                      |                                                                                                                                                                              | $T_{\text{vj}}=125^{\circ}\text{C}$                                                                                                                                          | -                                   | 0.04            | -    |      |               |
|                                     |                                      |                                                                                                                                                                              | $T_{\text{vj}}=150^{\circ}\text{C}$                                                                                                                                          | -                                   | 0.04            | -    |      |               |
|                                     |                                      |                                                                                                                                                                              | $T_{\text{vj}}=175^{\circ}\text{C}$                                                                                                                                          | -                                   | 0.04            | -    |      |               |
| $t_{\text{d(off)}}$                 |                                      | $V_{\text{CC}} = 600\text{V}$<br>$I_{\text{C}}, I_{\text{F}} = 50\text{A}$ $L_{\text{S}} = 30\text{nH}$<br>$V_{\text{GE}} = +15/-15\text{ V}$<br>$R_{\text{G}} = 18\ \Omega$ | $T_{\text{vj}}=25^{\circ}\text{C}$                                                                                                                                           | -                                   | 0.24            | -    |      |               |
|                                     |                                      |                                                                                                                                                                              | $T_{\text{vj}}=125^{\circ}\text{C}$                                                                                                                                          | -                                   | 0.27            | -    |      |               |
|                                     |                                      |                                                                                                                                                                              | $T_{\text{vj}}=150^{\circ}\text{C}$                                                                                                                                          | -                                   | 0.27            | -    |      |               |
|                                     |                                      |                                                                                                                                                                              | $T_{\text{vj}}=175^{\circ}\text{C}$                                                                                                                                          | -                                   | 0.28            | -    |      |               |
| $t_{\text{f}}$                      |                                      | $V_{\text{CC}} = 600\text{V}$<br>$I_{\text{C}}, I_{\text{F}} = 50\text{A}$ $L_{\text{S}} = 30\text{nH}$<br>$V_{\text{GE}} = +15/-15\text{ V}$<br>$R_{\text{G}} = 18\ \Omega$ | $T_{\text{vj}}=25^{\circ}\text{C}$                                                                                                                                           | -                                   | 0.11            | -    |      |               |
|                                     |                                      |                                                                                                                                                                              | $T_{\text{vj}}=125^{\circ}\text{C}$                                                                                                                                          | -                                   | 0.17            | -    |      |               |
|                                     |                                      |                                                                                                                                                                              | $T_{\text{vj}}=150^{\circ}\text{C}$                                                                                                                                          | -                                   | 0.20            | -    |      |               |
|                                     |                                      |                                                                                                                                                                              | $T_{\text{vj}}=175^{\circ}\text{C}$                                                                                                                                          | -                                   | 0.21            | -    |      |               |
| Reverse recovery time               | $t_{\text{rr}}$                      | $V_{\text{CC}} = 600\text{V}$<br>$I_{\text{C}}, I_{\text{F}} = 50\text{A}$ $L_{\text{S}} = 30\text{nH}$<br>$V_{\text{GE}} = +15/-15\text{ V}$<br>$R_{\text{G}} = 18\ \Omega$ | $T_{\text{vj}}=25^{\circ}\text{C}$                                                                                                                                           | -                                   | 0.08            | -    |      |               |
|                                     |                                      |                                                                                                                                                                              | $T_{\text{vj}}=125^{\circ}\text{C}$                                                                                                                                          | -                                   | 0.14            | -    |      |               |
|                                     |                                      |                                                                                                                                                                              | $T_{\text{vj}}=150^{\circ}\text{C}$                                                                                                                                          | -                                   | 0.17            | -    |      |               |
|                                     |                                      |                                                                                                                                                                              | $T_{\text{vj}}=175^{\circ}\text{C}$                                                                                                                                          | -                                   | 0.19            | -    |      |               |

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

# 7MBR50XWA120-50

**IGBT Modules**

| Items           |                                      | Symbols                     | Conditions                             |                       | Characteristics |      |         | Units    |
|-----------------|--------------------------------------|-----------------------------|----------------------------------------|-----------------------|-----------------|------|---------|----------|
|                 |                                      |                             |                                        |                       | min.            | typ. | max.    |          |
| Inverter        | Switching loss<br>(per pulse)        | $E_{on}$                    | $V_{CC} = 600V$                        | $T_{vj}=25^{\circ}C$  | -               | 3.78 | -       | mJ       |
|                 |                                      |                             | $I_C, I_F = 50A \quad L_S = 30nH$      | $T_{vj}=125^{\circ}C$ | -               | 4.90 | -       |          |
|                 |                                      |                             | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 5.46 | -       |          |
|                 |                                      |                             | $R_G = 18 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 5.83 | -       |          |
|                 |                                      | $E_{off}$                   | $V_{CC} = 600V$                        | $T_{vj}=25^{\circ}C$  | -               | 3.36 | -       |          |
|                 |                                      |                             | $I_C, I_F = 50A \quad L_S = 30nH$      | $T_{vj}=125^{\circ}C$ | -               | 4.31 | -       |          |
|                 |                                      |                             | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 4.62 | -       |          |
|                 |                                      |                             | $R_G = 18 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 4.96 | -       |          |
|                 |                                      | $E_{rr}$                    | $V_{CC} = 600V$                        | $T_{vj}=25^{\circ}C$  | -               | 1.43 | -       |          |
|                 |                                      |                             | $I_C, I_F = 50A \quad L_S = 30nH$      | $T_{vj}=125^{\circ}C$ | -               | 2.52 | -       |          |
|                 |                                      |                             | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 3.27 | -       |          |
|                 |                                      |                             | $R_G = 18 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 3.72 | -       |          |
| Brake           | Zero Gate voltage collector current  | $I_{CES}$                   | $V_{GE} = 0V$<br>$V_{CE} = 1200V$      |                       | -               | -    | 50      | $\mu A$  |
|                 | Gate-Emitter leakage current         | $I_{GES}$                   | $V_{CE} = 0V, \quad V_{GE} = +20/-20V$ |                       | -               | -    | 100     | nA       |
|                 | Collector-Emitter saturation voltage | $V_{CE(sat)}$<br>(terminal) | $V_{GE} = 15V$<br>$I_C = 35A$          | $T_{vj}=25^{\circ}C$  | -               | 1.65 | 2.10    | V        |
|                 |                                      | $V_{CE(sat)}$<br>(chip)     |                                        | $T_{vj}=25^{\circ}C$  | -               | 1.50 | 1.95    |          |
|                 |                                      |                             |                                        | $T_{vj}=125^{\circ}C$ | -               | 1.85 | -       |          |
|                 |                                      |                             |                                        | $T_{vj}=150^{\circ}C$ | -               | 1.95 | -       |          |
|                 |                                      |                             |                                        | $T_{vj}=175^{\circ}C$ | -               | 2.00 | -       |          |
|                 | Internal Gate resistance             | $r_g$                       | -                                      |                       | -               | 0    | -       | $\Omega$ |
|                 | Switching time (*1)                  | $t_{d(on)}$                 | $V_{CC} = 600V$                        | $T_{vj}=25^{\circ}C$  | -               | 0.10 | -       | $\mu s$  |
|                 |                                      |                             | $I_C = 35A \quad L_S = 30nH$           | $T_{vj}=125^{\circ}C$ | -               | 0.10 | -       |          |
|                 |                                      |                             | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 0.11 | -       |          |
|                 |                                      |                             | $R_G = 30 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 0.11 | -       |          |
|                 |                                      | $t_r$                       | $V_{CC} = 600V$                        | $T_{vj}=25^{\circ}C$  | -               | 0.04 | -       |          |
|                 |                                      |                             | $I_C = 35A \quad L_S = 30nH$           | $T_{vj}=125^{\circ}C$ | -               | 0.05 | -       |          |
|                 |                                      |                             | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 0.05 | -       |          |
|                 |                                      |                             | $R_G = 30 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 0.05 | -       |          |
|                 |                                      | $t_{d(off)}$                | $V_{CC} = 600V$                        | $T_{vj}=25^{\circ}C$  | -               | 0.23 | -       |          |
|                 |                                      |                             | $I_C = 35A \quad L_S = 30nH$           | $T_{vj}=125^{\circ}C$ | -               | 0.27 | -       |          |
|                 |                                      |                             | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 0.27 | -       |          |
|                 |                                      |                             | $R_G = 30 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 0.27 | -       |          |
|                 |                                      | $t_f$                       | $V_{CC} = 600V$                        | $T_{vj}=25^{\circ}C$  | -               | 0.12 | -       |          |
|                 |                                      |                             | $I_C = 35A \quad L_S = 30nH$           | $T_{vj}=125^{\circ}C$ | -               | 0.18 | -       |          |
|                 |                                      |                             | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 0.20 | -       |          |
|                 |                                      |                             | $R_G = 30 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 0.21 | -       |          |
| Reverse current | $I_{RRM}$                            | $V_R = 1200V$               |                                        | -                     | -               | 50   | $\mu A$ |          |
| Forward voltage | $V_F$ (terminal)                     | $I_F = 15A$                 | $T_{vj}=25^{\circ}C$                   | -                     | 1.95            | 2.40 | V       |          |
|                 | $V_F$<br>(chip)                      | $I_F = 15A$                 | $T_{vj}=25^{\circ}C$                   | -                     | 1.80            | 2.25 |         |          |
|                 |                                      |                             | $T_{vj}=125^{\circ}C$                  | -                     | 1.85            | -    |         |          |
|                 |                                      |                             | $T_{vj}=150^{\circ}C$                  | -                     | 1.80            | -    |         |          |
|                 |                                      |                             | $T_{vj}=175^{\circ}C$                  | -                     | 1.75            | -    |         |          |
| Converter       | Reverse current                      | $I_{RRM}$                   | $V_R = 1600V$                          |                       | -               | -    | 50      | $\mu A$  |
|                 | Forward voltage                      | $V_{FM}$                    | $I_F = 50A$                            | 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 ( $t_{off}$ ) =  $t_{d(off)} + t_f$ 
**FM6M01806**
**2017/5**

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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 (1device)                      | $R_{th(j-c)}$ | Inverter IGBT                 | -               | -    | 0.59 | °C/W  |
|                                                   |               | Inverter FWD                  | -               | -    | 0.71 |       |
|                                                   |               | Brake IGBT                    | -               | -    | 0.74 |       |
|                                                   |               | Brake FWD                     | -               | -    | 1.85 |       |
|                                                   |               | Converter Diode               | -               | -    | 0.72 |       |
| Contact thermal resistance<br>(1 IGBT+1 FWD) (*1) | $R_{th(c-f)}$ | with 1 W/(m·K) thermal grease | -               | 0.05 | -    |       |

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

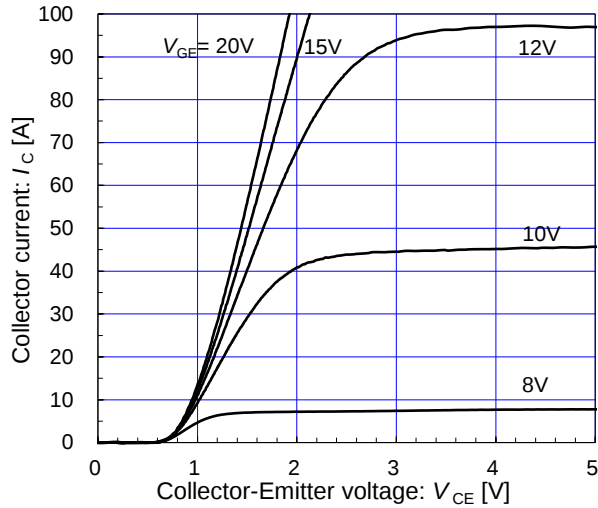
# 7MBR50XWA120-50

IGBT Modules

[ Inverter ]

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

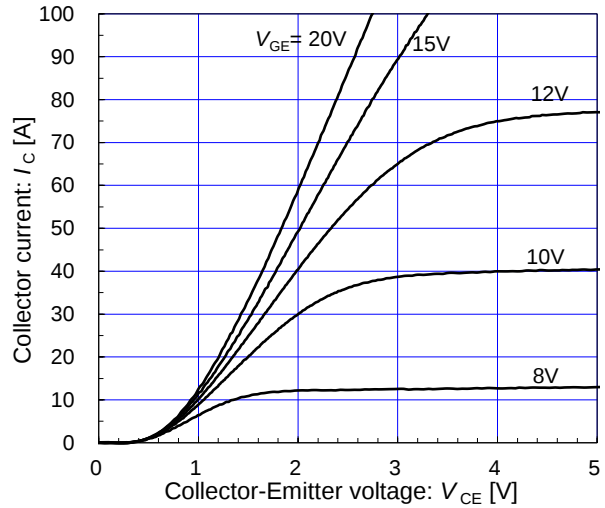
$T_{vj} = 25^{\circ}\text{C}$  / chip



[ Inverter ]

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

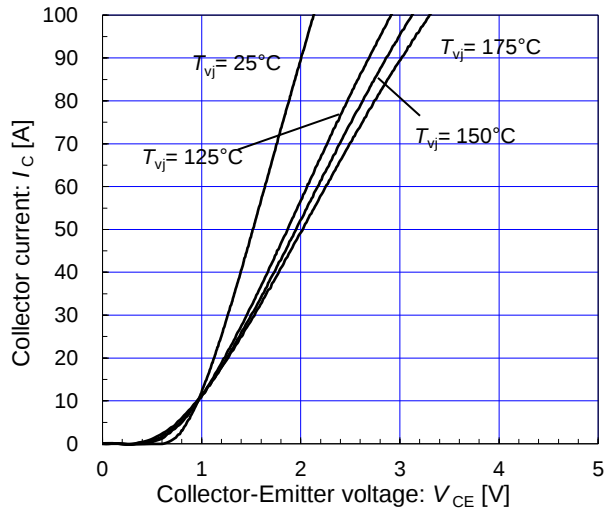
$T_{vj} = 175^{\circ}\text{C}$  / chip



[ Inverter ]

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

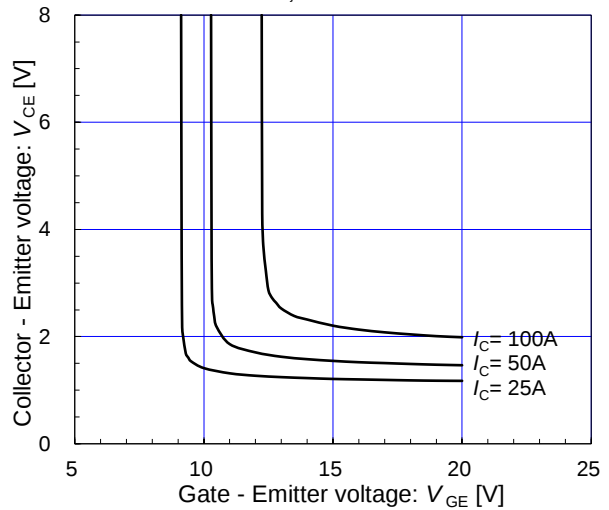
$V_{GE} = 15\text{V}$  / chip



[ Inverter ]

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

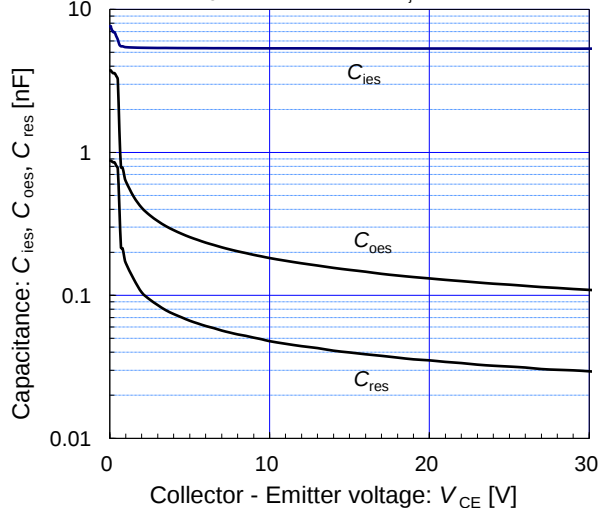
$T_{vj} = 25^{\circ}\text{C}$  / chip



[ Inverter ]

Capacitance vs. Collector-Emittor voltage (typ.)

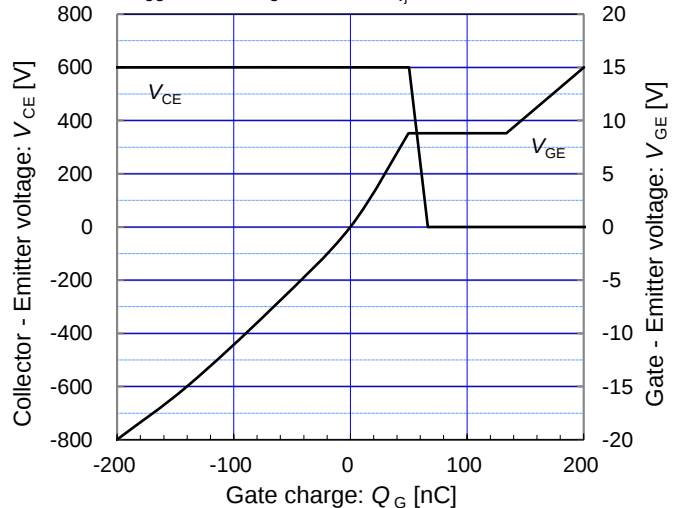
$V_{GE} = 0\text{V}$ ,  $f = 1\text{MHz}$ ,  $T_{vj} = 25^{\circ}\text{C}$



[ Inverter ]

Dynamic Gate charge (typ.)

$V_{CC} = 600\text{V}$ ,  $I_c = 50\text{A}$ ,  $T_{vj} = 25^{\circ}\text{C}$



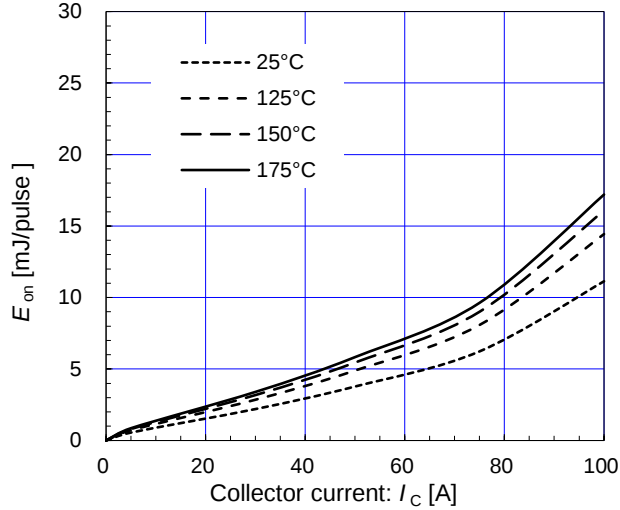
# 7MBR50XWA120-50

IGBT Modules

[ Inverter ]

$E_{on}$  vs. Collector current (typ.)

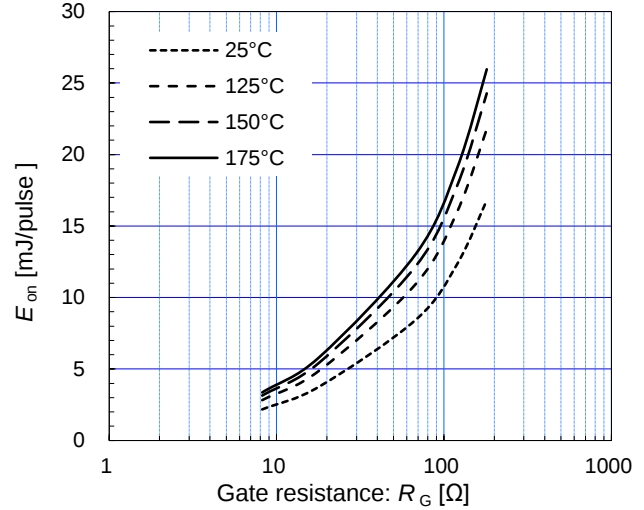
$V_{CC}=600V$ ,  $V_{GE}=+15/-15V$ ,  $R_G=18\Omega$



[ Inverter ]

$E_{on}$  vs. Gate resistance (typ.)

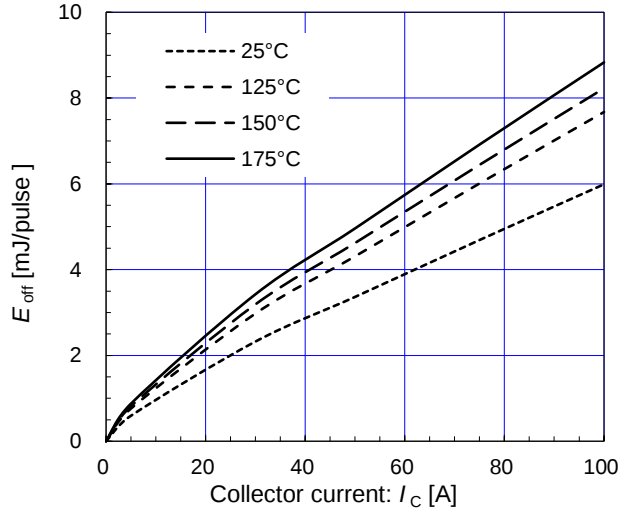
$V_{CC}=600V$ ,  $V_{GE}=+15/-15V$ ,  $I_C=50A$



[ Inverter ]

$E_{off}$  vs. Collector current (typ.)

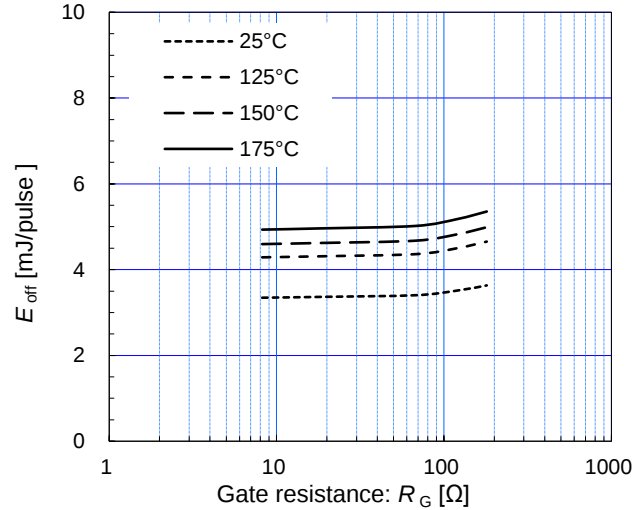
$V_{CC}=600V$ ,  $V_{GE}=+15/-15V$ ,  $R_G=18\Omega$



[ Inverter ]

$E_{off}$  vs. Gate resistance (typ.)

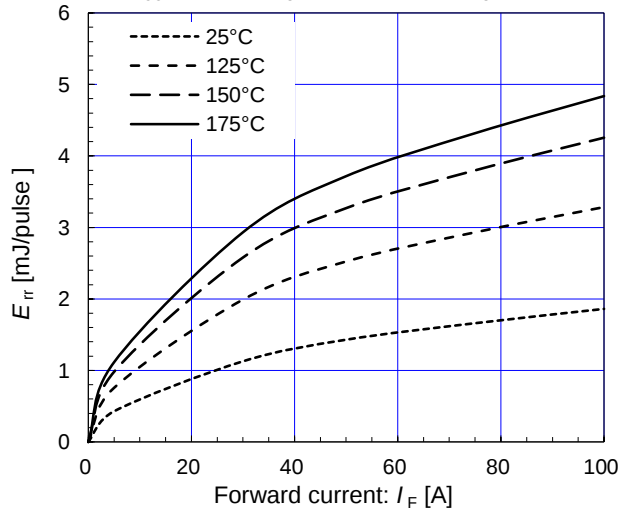
$V_{CC}=600V$ ,  $V_{GE}=+15/-15V$ ,  $I_C=50A$



[ Inverter ]

$E_{rr}$  vs. Forward current (typ.)

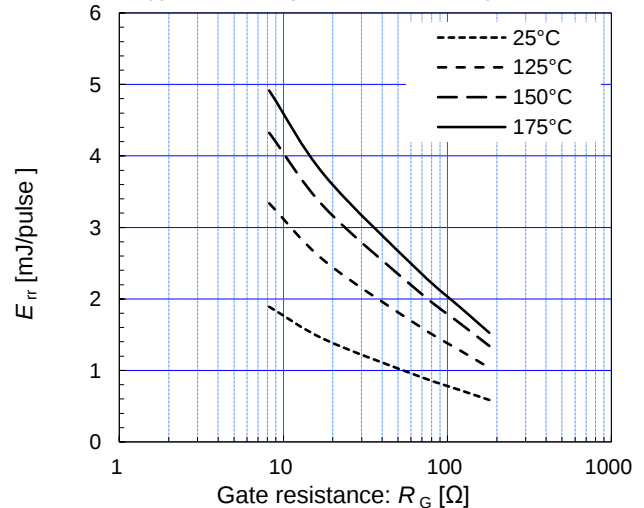
$V_{CC}=600V$ ,  $V_{GE}=+15/-15V$ ,  $R_G=18\Omega$



[ Inverter ]

$E_{rr}$  vs. Gate resistance (typ.)

$V_{CC}=600V$ ,  $V_{GE}=+15/-15V$ ,  $I_C=50A$



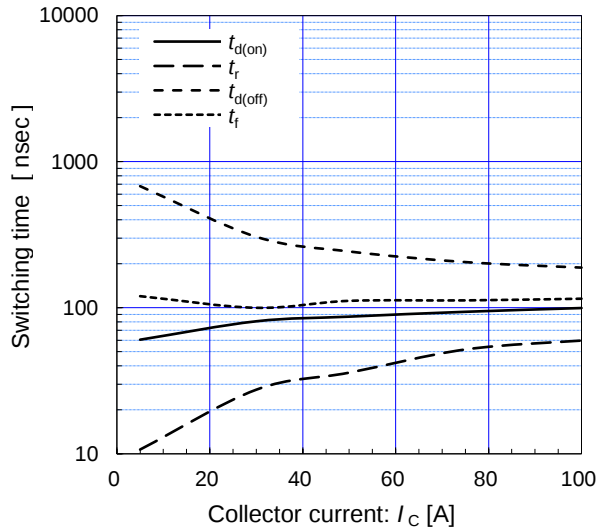
# 7MBR50XWA120-50

IGBT Modules

[ Inverter ]

Switching time vs. Collector current (typ.)

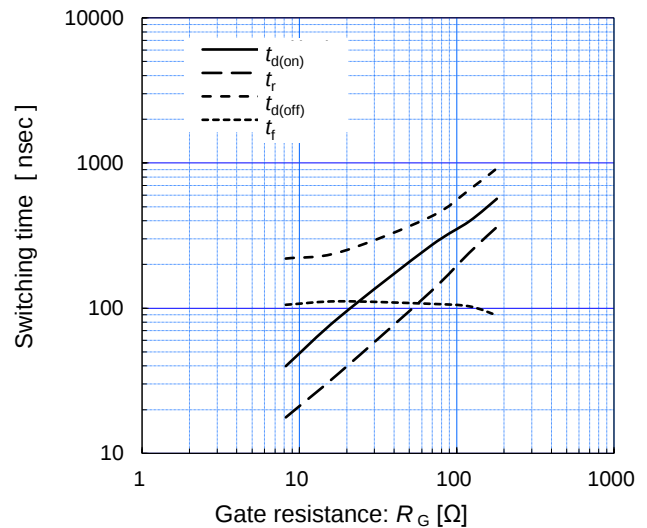
$V_{CC}=600V$ ,  $R_G=18\Omega$   $V_{GE}=+15/-15V$ ,  $T_{vj}=25^\circ C$



[ Inverter ]

Switching time vs. Gate resistance (typ.)

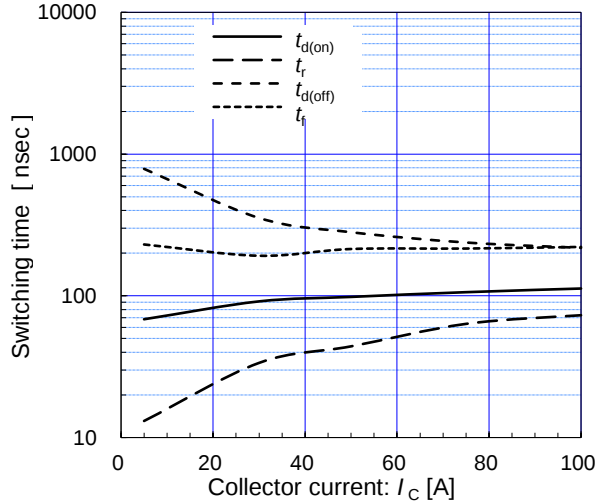
$V_{CC}=600V$ ,  $I_C=50A$ ,  $V_{GE}=+15/-15V$ ,  $T_{vj}=25^\circ C$



[ Inverter ]

Switching time vs. Collector current (typ.)

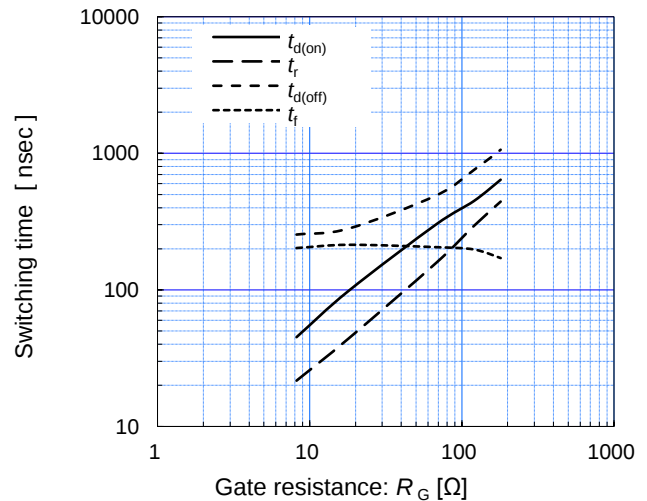
$V_{CC}=600V$ ,  $R_G=18\Omega$   $V_{GE}=+15/-15V$ ,  $T_{vj}=175^\circ C$



[ Inverter ]

Switching time vs. Gate resistance (typ.)

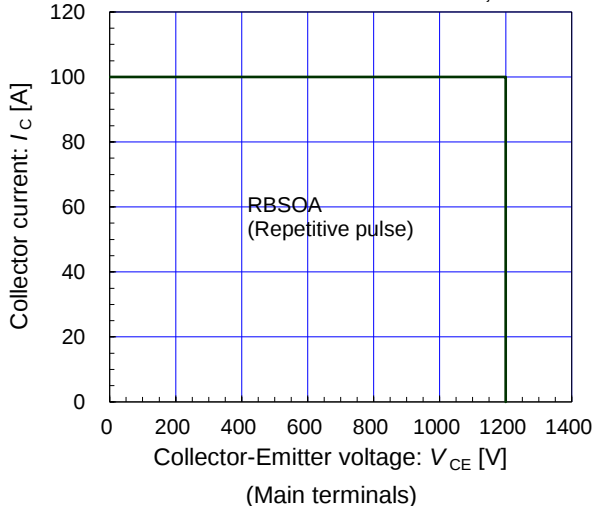
$V_{CC}=600V$ ,  $I_C=50A$ ,  $V_{GE}=+15/-15V$ ,  $T_{vj}=175^\circ C$



[ Inverter ]

Reverse bias safe operating area (max.)

$V_{GE}=+15/-15V$ ,  $R_G \geq 18\Omega$   $T_{vj}=175^\circ C$

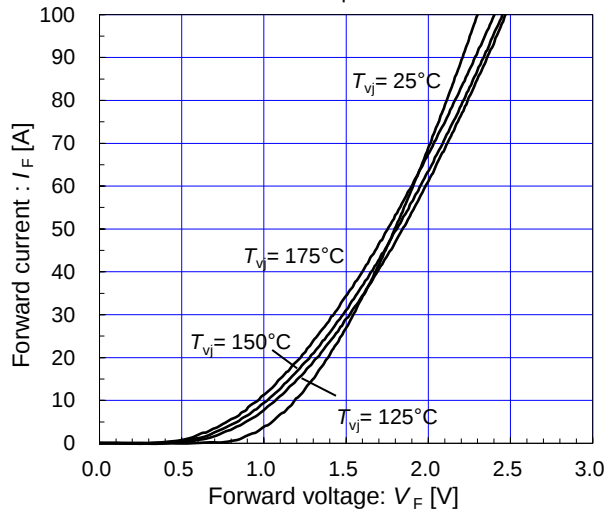


# 7MBR50XWA120-50

IGBT Modules

[ Inverter ]

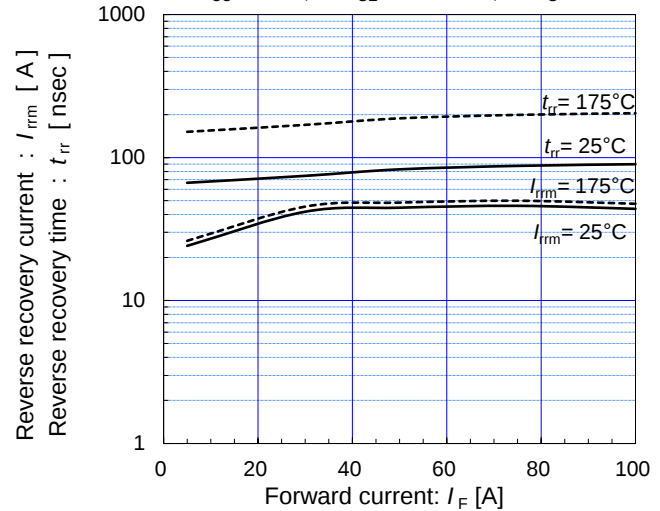
Forward current vs. Forward voltage (typ.)  
chip



[ Inverter ]

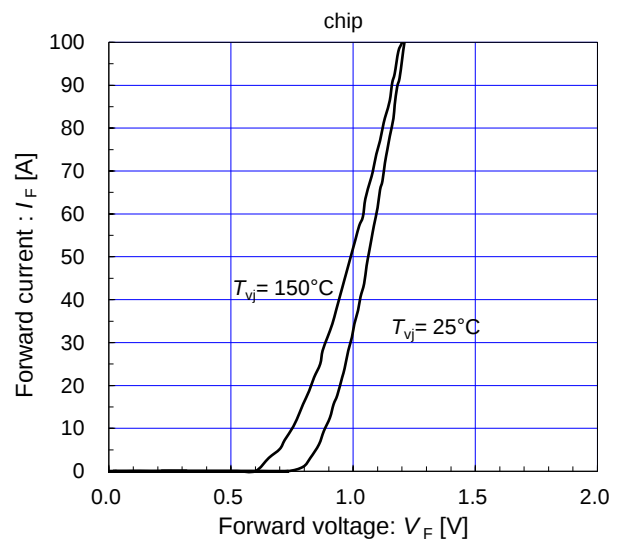
Reverse recovery characteristics (typ.)

$V_{CC} = 600V$ ,  $V_{GE} = +15/-15V$ ,  $R_G = 18\Omega$

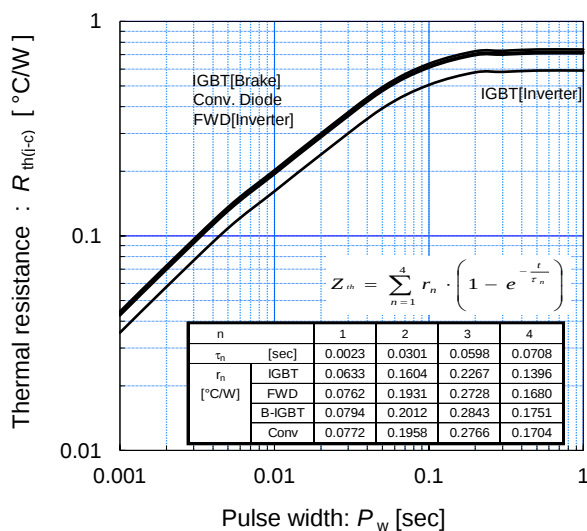


[ Converter ]

Forward current vs. Forward voltage (typ.)

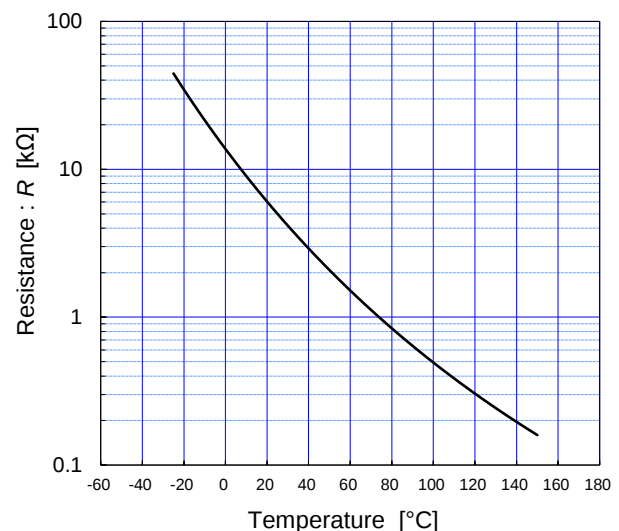


Transient thermal resistance (max.)



[ Thermistor ]

Temperature characteristic (typ.)



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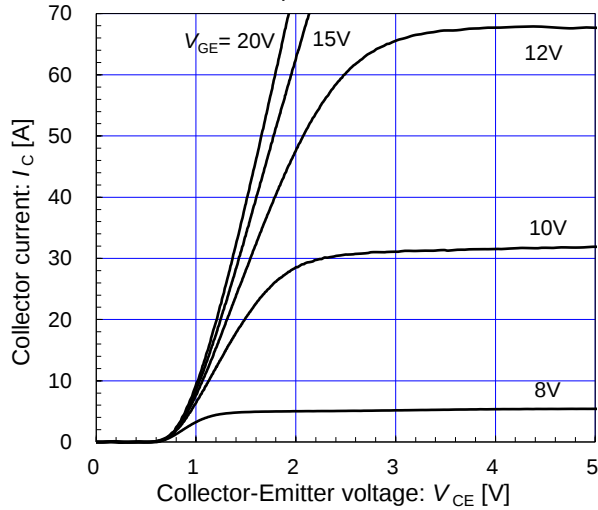
# 7MBR50XWA120-50

IGBT Modules

[ Brake ]

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

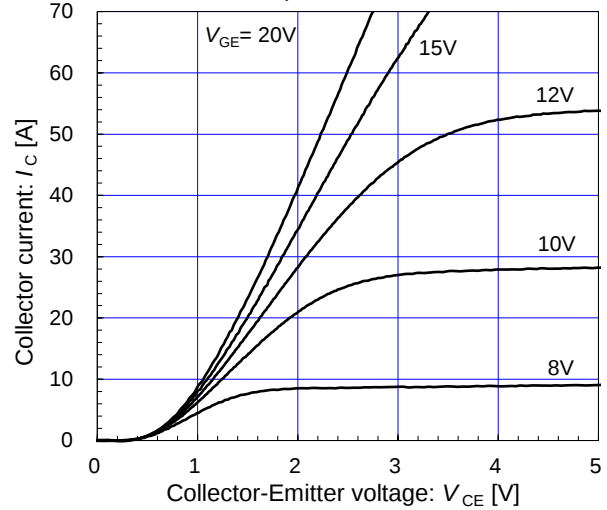
$T_{vj} = 25^{\circ}\text{C}$  / chip



[ Brake ]

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

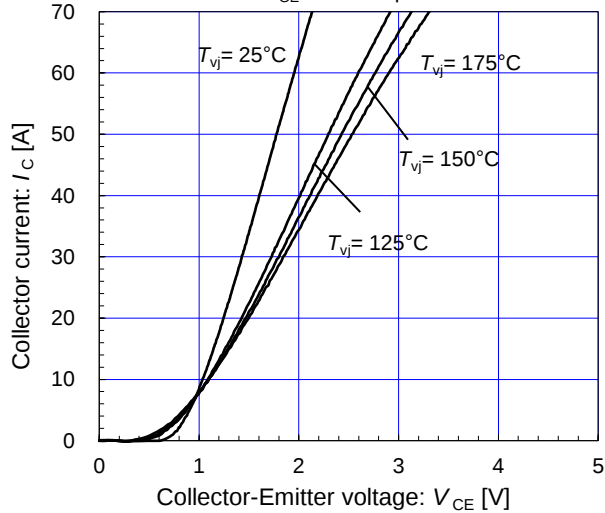
$T_{vj} = 175^{\circ}\text{C}$  / chip



[ Brake ]

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

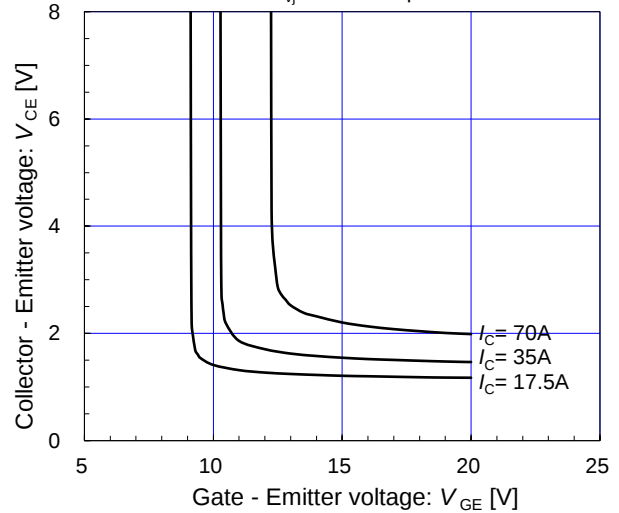
$V_{GE} = 15\text{V}$  / chip



[ Brake ]

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

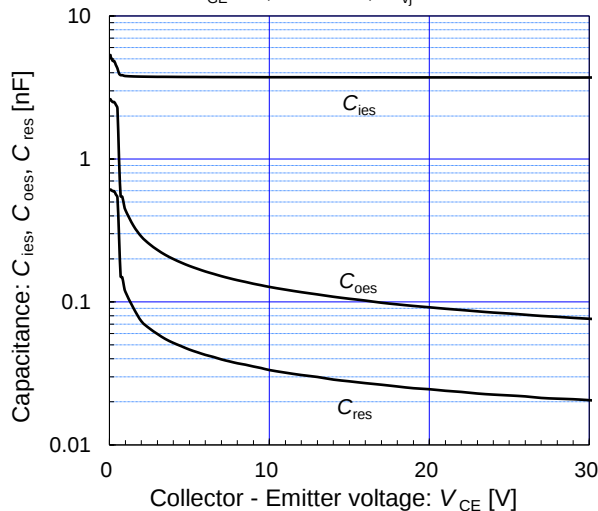
$T_{vj} = 25^{\circ}\text{C}$  / chip



[ Brake ]

Capacitance vs. Collector-Emittor voltage (typ.)

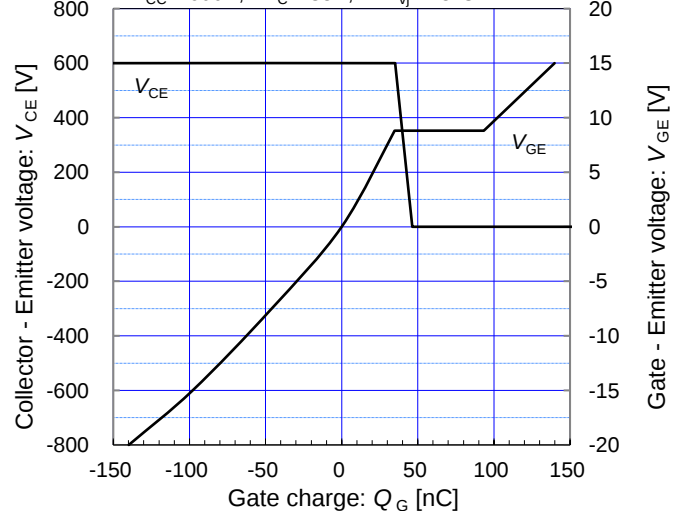
$V_{GE} = 0\text{V}$ ,  $f = 1\text{MHz}$ ,  $T_{vj} = 25^{\circ}\text{C}$



[ Brake ]

Dynamic Gate charge (typ.)

$V_{CC} = 600\text{V}$ ,  $I_C = 35\text{A}$ ,  $T_{vj} = 25^{\circ}\text{C}$



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## IGBT Modules

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| 3 アプリケーションマニュアル      | <a href="http://www.fujielectric.co.jp/products/semiconductor/model/igbt/application/">www.fujielectric.co.jp/products/semiconductor/model/igbt/application/</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/products/semiconductor/contact/">www.fujielectric.com/products/semiconductor/contact/</a>                               |
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