

# 7MBR75XRA120-50

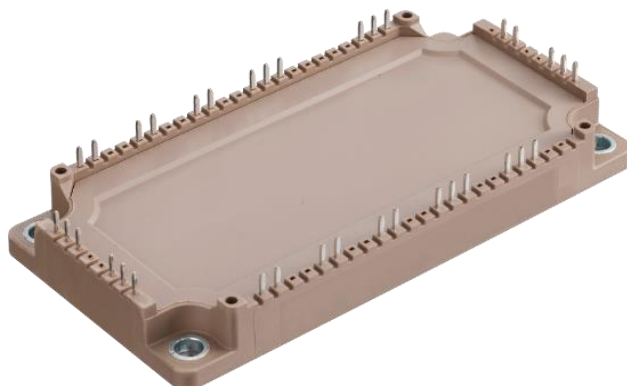
IGBT Modules

**Power Module(X series)**  
1200V / 75A / PIM

## ■ Features

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

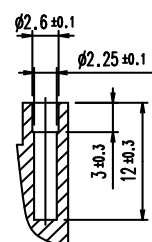
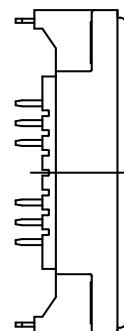
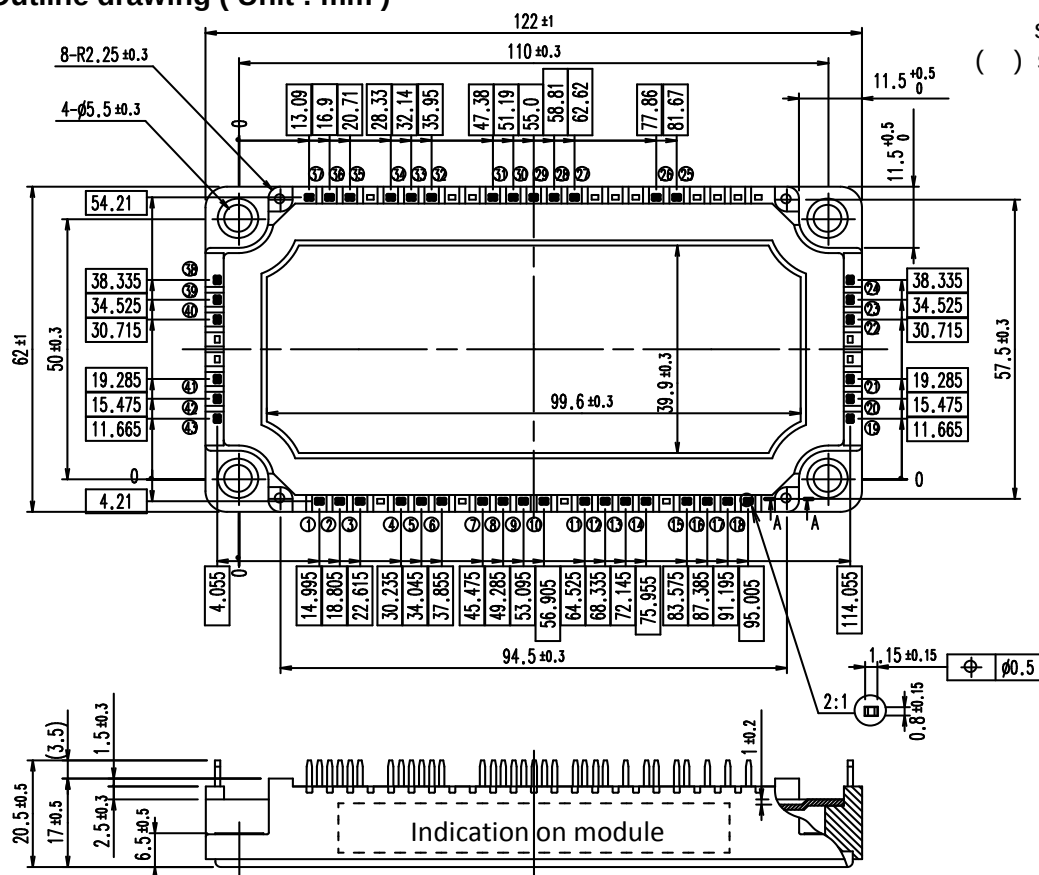
## ■ Typical appearance



## ■ Applications

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

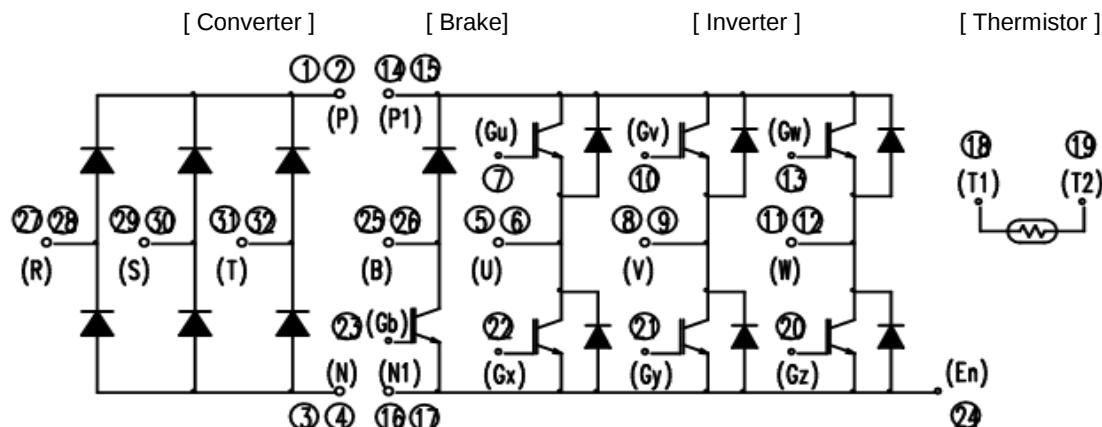
## ■ Outline drawing ( Unit : mm )



Section A-A

Weight: 310 g (typ.)

## ■ Equivalent circuit



# 7MBR75XRA120-50

**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                              | $T_c=100^{\circ}\text{C}$   | 75               | A     |
|                                                             |                                        |                                     | $I_C$ pulse                  | 1ms                                     |                             | 150              |       |
|                                                             | Forward current                        |                                     | $I_F$                        | Continuous                              |                             | 75               |       |
|                                                             |                                        |                                     | $I_F$ pulse                  | 1ms                                     |                             | 150              |       |
| Collector power dissipation                                 |                                        | $P_C$                               | 1 device                     |                                         | 335                         | W                |       |
| Brake IGBT                                                  | Collector-Emitter voltage              |                                     | $V_{CES}$                    |                                         |                             | 1200             | V     |
|                                                             | Gate-Emitter voltage                   |                                     | $V_{GES}$                    |                                         |                             | ±20              | V     |
|                                                             | Collector current                      |                                     | $I_C$                        | Continuous                              | $T_c=100^{\circ}\text{C}$   | 50               | A     |
|                                                             |                                        |                                     | $I_C$ pulse                  | 1ms                                     |                             | 100              |       |
|                                                             | Collector power dissipation            |                                     | $P_C$                        | 1 device                                |                             | 250              | W     |
| Brake FWD                                                   | Forward current                        |                                     | $I_F$                        | Continuous                              |                             | 25               | A     |
|                                                             |                                        |                                     | $I_{FRM}$                    | 1ms                                     |                             | 50               |       |
|                                                             | 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 | $T_c=80^{\circ}\text{C}$    | 75               | A     |
|                                                             |                                        | Surge current (Non-Repetitive) (*1) | $I_{FSM}$                    | $t=10\text{ms}$ , 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)

# 7MBR75XRA120-50

**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>$I_{\text{C}} = 75\text{mA}$                                               |                                     | 6.0             | 6.5  | 7.0           | V             |
|                                     | Collector-Emitter saturation voltage | $V_{\text{CE(sat)}}$<br>(terminal)                                                                                                                                            | $V_{\text{GE}} = 15\text{V}$<br>$I_{\text{C}} = 75\text{A}$                                                | $T_{\text{vj}}=25^{\circ}\text{C}$  | -               | 1.70 | 2.20          | V             |
|                                     |                                      | $V_{\text{CE(sat)}}$<br>(chip)                                                                                                                                                |                                                                                                            | $T_{\text{vj}}=25^{\circ}\text{C}$  | -               | 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             | $r_{\text{g}}$                                                                                                                                                                | -                                                                                                          |                                     | -               | 7.50 | -             | $\Omega$      |
|                                     | Capacitance                          | $C_{\text{ies}}$                                                                                                                                                              | $V_{\text{CE}} = 10\text{V}$ , $V_{\text{GE}} = 0\text{V}$ , $f = 1\text{MHz}$                             |                                     | -               | TBD  | -             | nF            |
|                                     |                                      | $C_{\text{oes}}$                                                                                                                                                              |                                                                                                            |                                     | -               | TBD  | -             |               |
|                                     |                                      | $C_{\text{res}}$                                                                                                                                                              |                                                                                                            |                                     | -               | TBD  | -             |               |
|                                     | Gate charge                          | $Q_{\text{G}}$                                                                                                                                                                | $V_{\text{CC}} = 600\text{V}$ $V_{\text{GE}} = -15 \rightarrow +15\text{V}$<br>$I_{\text{C}} = 75\text{A}$ |                                     | -               | 510  | -             | nC            |
|                                     | Forward voltage                      | $V_{\text{F}}$ (terminal)                                                                                                                                                     | $I_{\text{F}} = 75\text{A}$                                                                                | $T_{\text{vj}}=25^{\circ}\text{C}$  | -               | 2.00 | 2.50          | V             |
|                                     |                                      | $V_{\text{F}}$<br>(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>$I_{\text{C}}, I_{\text{F}} = 75\text{A}$ $L_{\text{S}} = 30\text{nH}$<br>$V_{\text{GE}} = +15/-15\text{ V}$<br>$R_{\text{G}} = 5.1\ \Omega$ | $T_{\text{vj}}=25^{\circ}\text{C}$                                                                         | -                                   | TBD             | -    | $\mu\text{s}$ |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=125^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=150^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=175^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
|                                     | $t_{\text{r}}$                       | $V_{\text{CC}} = 600\text{V}$<br>$I_{\text{C}}, I_{\text{F}} = 75\text{A}$ $L_{\text{S}} = 30\text{nH}$<br>$V_{\text{GE}} = +15/-15\text{ V}$<br>$R_{\text{G}} = 5.1\ \Omega$ | $T_{\text{vj}}=25^{\circ}\text{C}$                                                                         | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=125^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=150^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=175^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
|                                     | $t_{\text{d(off)}}$                  | $V_{\text{CC}} = 600\text{V}$<br>$I_{\text{C}}, I_{\text{F}} = 75\text{A}$ $L_{\text{S}} = 30\text{nH}$<br>$V_{\text{GE}} = +15/-15\text{ V}$<br>$R_{\text{G}} = 5.1\ \Omega$ | $T_{\text{vj}}=25^{\circ}\text{C}$                                                                         | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=125^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=150^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=175^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
|                                     | $t_{\text{f}}$                       | $V_{\text{CC}} = 600\text{V}$<br>$I_{\text{C}}, I_{\text{F}} = 75\text{A}$ $L_{\text{S}} = 30\text{nH}$<br>$V_{\text{GE}} = +15/-15\text{ V}$<br>$R_{\text{G}} = 5.1\ \Omega$ | $T_{\text{vj}}=25^{\circ}\text{C}$                                                                         | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=125^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=150^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=175^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
| Reverse recovery time               | $t_{\text{rr}}$                      | $V_{\text{CC}} = 600\text{V}$<br>$I_{\text{C}}, I_{\text{F}} = 75\text{A}$ $L_{\text{S}} = 30\text{nH}$<br>$V_{\text{GE}} = +15/-15\text{ V}$<br>$R_{\text{G}} = 5.1\ \Omega$ | $T_{\text{vj}}=25^{\circ}\text{C}$                                                                         | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=125^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=150^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |
|                                     |                                      |                                                                                                                                                                               | $T_{\text{vj}}=175^{\circ}\text{C}$                                                                        | -                                   | TBD             | -    |               |               |

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

# 7MBR75XRA120-50

**IGBT Modules**

| Items                               |                                      | Symbols                      | Conditions                             |                       | Characteristics |      |      | Units    |          |
|-------------------------------------|--------------------------------------|------------------------------|----------------------------------------|-----------------------|-----------------|------|------|----------|----------|
|                                     |                                      |                              |                                        |                       | min.            | typ. | max. |          |          |
| Inverter                            | Switching loss<br>(per pulse)        | $E_{on}$                     | $V_{CC} = 600V$                        | $T_{vj}=25^{\circ}C$  | -               | TBD  | -    | mJ       |          |
|                                     |                                      |                              | $I_C, I_F = 75A \quad L_s = 30nH$      | $T_{vj}=125^{\circ}C$ | -               | TBD  | -    |          |          |
|                                     |                                      |                              | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | TBD  | -    |          |          |
|                                     |                                      |                              | $R_G = 5.1 \Omega$                     | $T_{vj}=175^{\circ}C$ | -               | TBD  | -    |          |          |
|                                     |                                      | $E_{off}$                    | $V_{CC} = 600V$                        | $T_{vj}=25^{\circ}C$  | -               | TBD  | -    |          |          |
|                                     |                                      |                              | $I_C, I_F = 75A \quad L_s = 30nH$      | $T_{vj}=125^{\circ}C$ | -               | TBD  | -    |          |          |
|                                     |                                      |                              | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | TBD  | -    |          |          |
|                                     |                                      |                              | $R_G = 5.1 \Omega$                     | $T_{vj}=175^{\circ}C$ | -               | TBD  | -    |          |          |
|                                     |                                      | $E_{rr}$                     | $V_{CC} = 600V$                        | $T_{vj}=25^{\circ}C$  | -               | TBD  | -    |          |          |
|                                     |                                      |                              | $I_C, I_F = 75A \quad L_s = 30nH$      | $T_{vj}=125^{\circ}C$ | -               | TBD  | -    |          |          |
|                                     |                                      |                              | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | TBD  | -    |          |          |
|                                     |                                      |                              | $R_G = 5.1 \Omega$                     | $T_{vj}=175^{\circ}C$ | -               | TBD  | -    |          |          |
| 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       |          |
| Brake                               | Collector-Emitter saturation voltage | $V_{CE(sat)}$<br>(terminal)  | $V_{GE} = 15V$<br>$I_C = 50A$          | $T_{vj}=25^{\circ}C$  | -               | 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             |                              | $r_g$                                  | -                     |                 | -    | 0.0  | -        | $\Omega$ |
|                                     | Switching time (*1)                  | $t_{d(on)}$                  | $V_{CC} = 600V$                        | $T_{vj}=25^{\circ}C$  | -               | 0.09 | -    | $\mu s$  |          |
|                                     |                                      |                              | $I_C = 50A \quad L_s = 30nH$           | $T_{vj}=125^{\circ}C$ | -               | 0.09 | -    |          |          |
|                                     |                                      |                              | $V_{GE} = +15/-15 V$                   | $T_{vj}=150^{\circ}C$ | -               | 0.09 | -    |          |          |
|                                     |                                      |                              | $R_G = 18 \Omega$                      | $T_{vj}=175^{\circ}C$ | -               | 0.10 | -    |          |          |
| $t_r$                               |                                      | $V_{CC} = 600V$              | $T_{vj}=25^{\circ}C$                   | -                     | 0.04            | -    |      |          |          |
|                                     |                                      | $I_C = 50A \quad L_s = 30nH$ | $T_{vj}=125^{\circ}C$                  | -                     | 0.04            | -    |      |          |          |
|                                     |                                      | $V_{GE} = +15/-15 V$         | $T_{vj}=150^{\circ}C$                  | -                     | 0.04            | -    |      |          |          |
|                                     |                                      | $R_G = 18 \Omega$            | $T_{vj}=175^{\circ}C$                  | -                     | 0.04            | -    |      |          |          |
| $t_{d(off)}$                        |                                      | $V_{CC} = 600V$              | $T_{vj}=25^{\circ}C$                   | -                     | 0.24            | -    |      |          |          |
|                                     |                                      | $I_C = 50A \quad L_s = 30nH$ | $T_{vj}=125^{\circ}C$                  | -                     | 0.27            | -    |      |          |          |
|                                     |                                      | $V_{GE} = +15/-15 V$         | $T_{vj}=150^{\circ}C$                  | -                     | 0.27            | -    |      |          |          |
|                                     |                                      | $R_G = 18 \Omega$            | $T_{vj}=175^{\circ}C$                  | -                     | 0.28            | -    |      |          |          |
| $t_f$                               |                                      | $V_{CC} = 600V$              | $T_{vj}=25^{\circ}C$                   | -                     | 0.11            | -    |      |          |          |
|                                     | $I_C = 50A \quad L_s = 30nH$         | $T_{vj}=125^{\circ}C$        | -                                      | 0.17                  | -               |      |      |          |          |
|                                     | $V_{GE} = +15/-15 V$                 | $T_{vj}=150^{\circ}C$        | -                                      | 0.20                  | -               |      |      |          |          |
|                                     | $R_G = 18 \Omega$                    | $T_{vj}=175^{\circ}C$        | -                                      | 0.21                  | -               |      |      |          |          |
| Reverse current                     |                                      | $I_{RRM}$                    | $V_R = 1200V$                          |                       | -               | -    | 50   | $\mu A$  |          |
| Forward voltage                     | $V_F$ (terminal)                     | $I_F = 25A$                  | $T_{vj}=25^{\circ}C$                   | -                     | 1.95            | 2.40 | V    |          |          |
|                                     | $V_F$<br>(chip)                      | $I_F = 25A$                  | $T_{vj}=25^{\circ}C$                   | -                     | 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                     | $V_{FM}$                             | $I_F = 75A$                  | terminal                               | -                     | 1.35            | 1.85 | V    |          |          |
|                                     |                                      |                              | chip                                   | -                     | 1.15            | 1.60 |      |          |          |
| 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 ( $t_{off}$ ) =  $t_{d(off)} + t_f$ 
**FM6M01720**

# 7MBR75XRA120-50

**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                 | -               | -    | 0.45 | °C/W  |
|                                                   |               | Inverter FWD                  | -               | -    | 0.55 |       |
|                                                   |               | Brake IGBT                    | -               | -    | 0.59 |       |
|                                                   |               | Brake FWD                     | -               | -    | 1.00 |       |
|                                                   |               | 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 | -    |       |

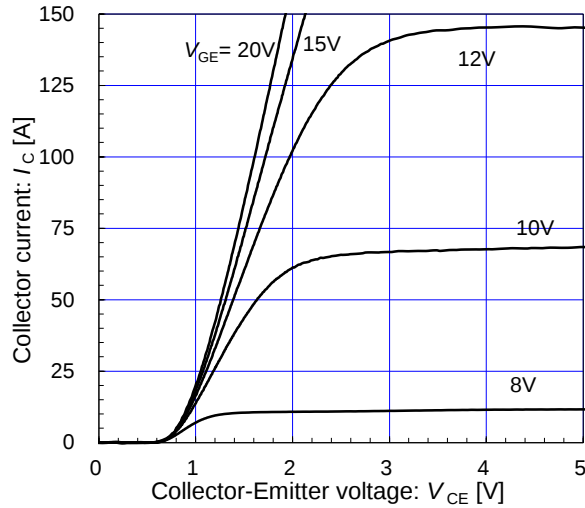
(\*1) This is the value which is defined mounting on the additional cooling fin with thermal grease.

# 7MBR75XRA120-50

IGBT Modules

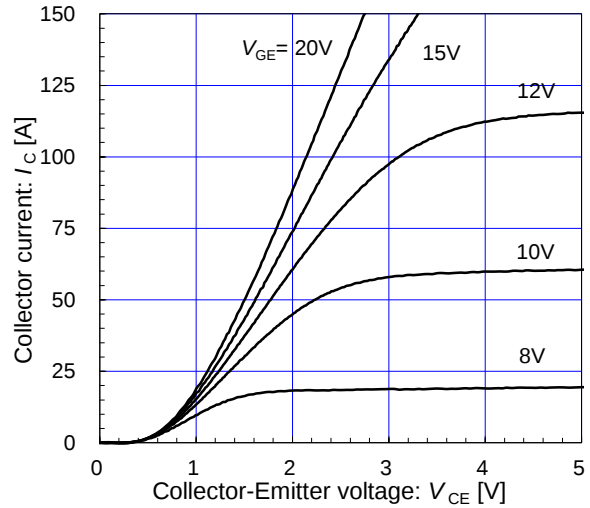
[ Inverter ]

Collector current vs. Collector-Emittor voltage (typ.)  
 $T_{vj} = 25^{\circ}\text{C}$  / chip



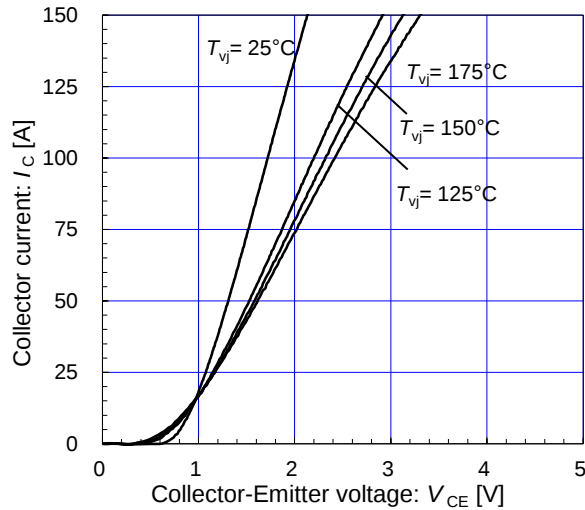
[ Inverter ]

Collector current vs. Collector-Emittor voltage (typ.)  
 $T_{vj} = 175^{\circ}\text{C}$  / chip



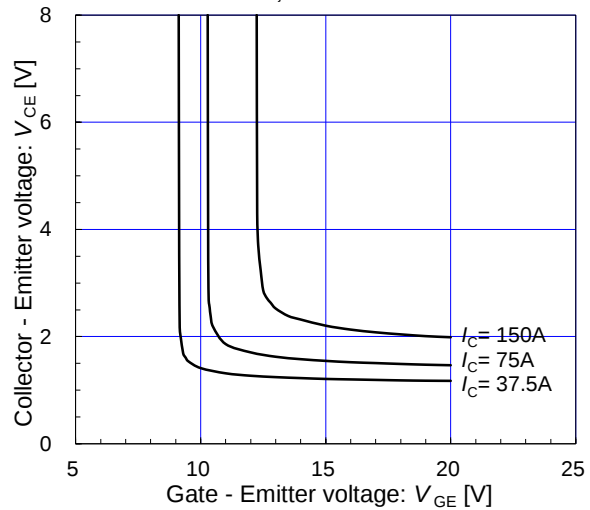
[ Inverter ]

Collector current vs. Collector-Emittor voltage (typ.)  
 $V_{GE} = 15\text{V}$  / chip



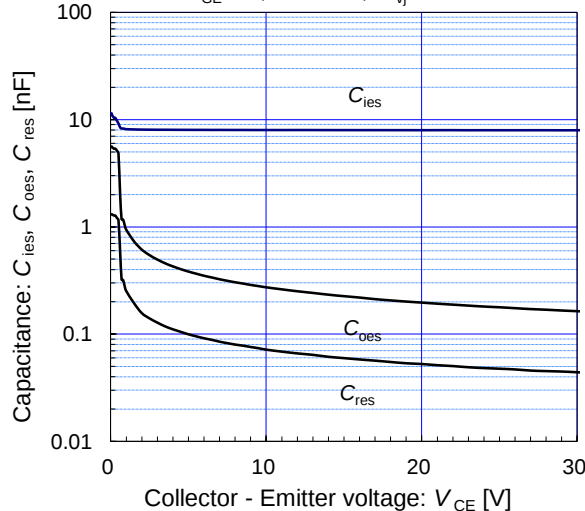
[ Inverter ]

Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)  
 $T_{vj} = 25^{\circ}\text{C}$  / chip



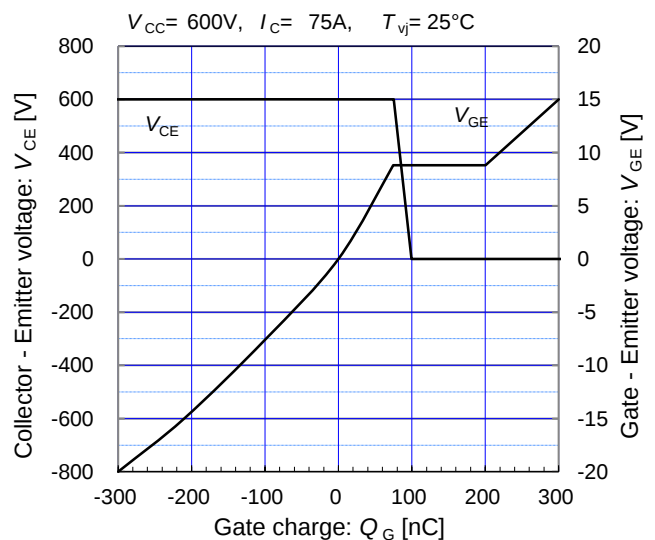
[ Inverter ]

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.)



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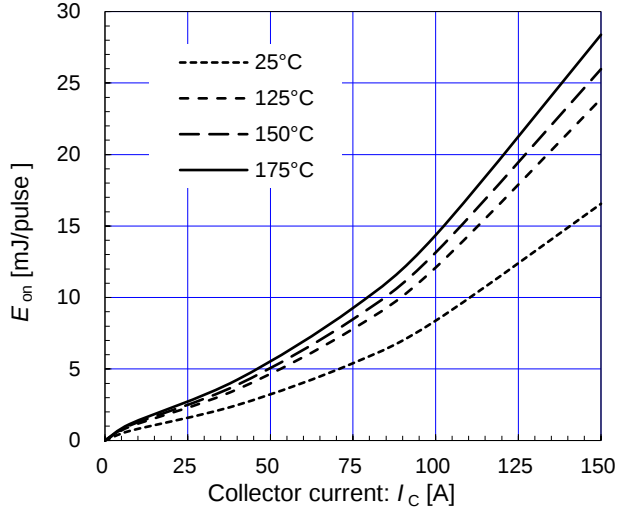
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[ Inverter ]

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

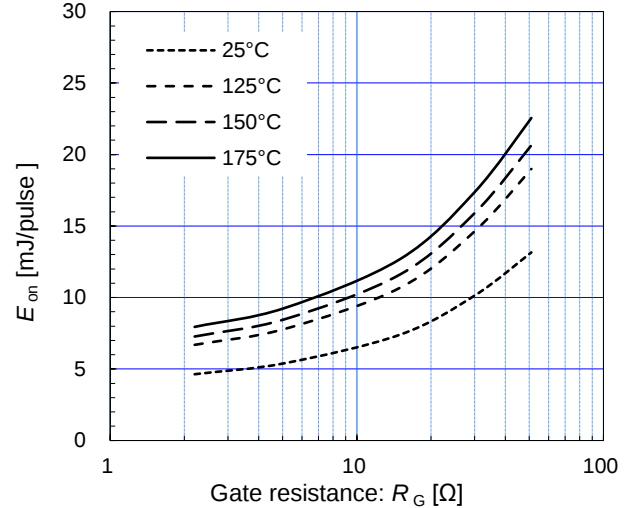
$V_{CC}=600V$ ,  $V_{GE}=+15/-15V$ ,  $R_G=5.1\Omega$



[ Inverter ]

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

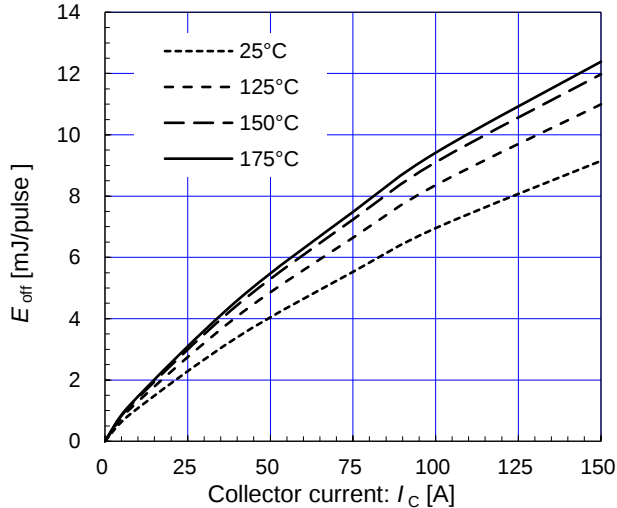
$V_{CC}=600V$ ,  $V_{GE}=+15/-15V$ ,  $I_C=75A$



[ Inverter ]

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

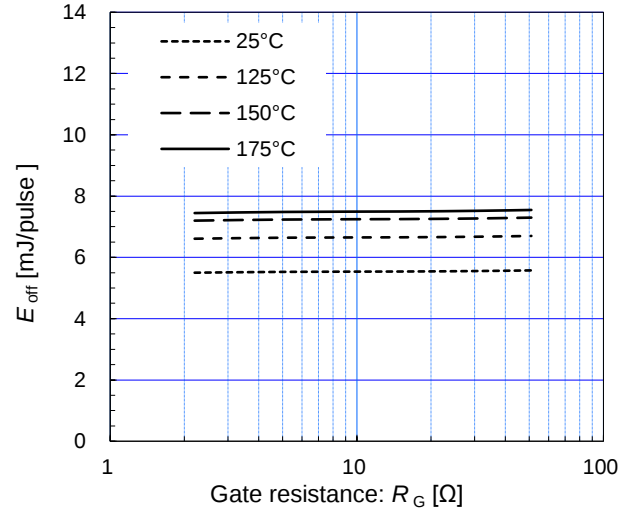
$V_{CC}=600V$ ,  $V_{GE}=+15/-15V$ ,  $R_G=5.1\Omega$



[ Inverter ]

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

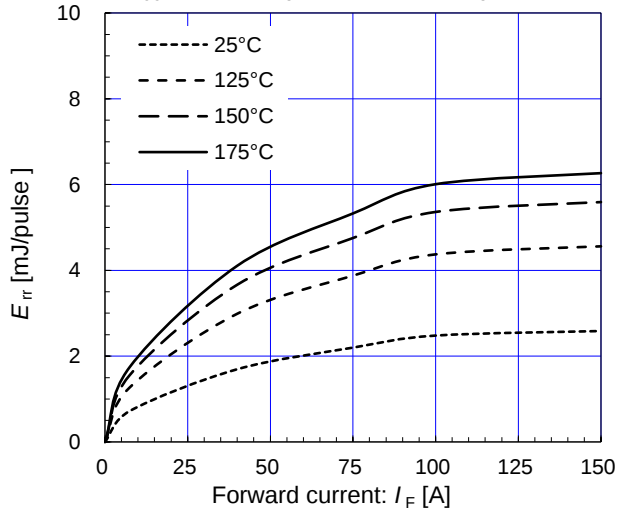
$V_{CC}=600V$ ,  $V_{GE}=+15/-15V$ ,  $I_C=75A$



[ Inverter ]

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

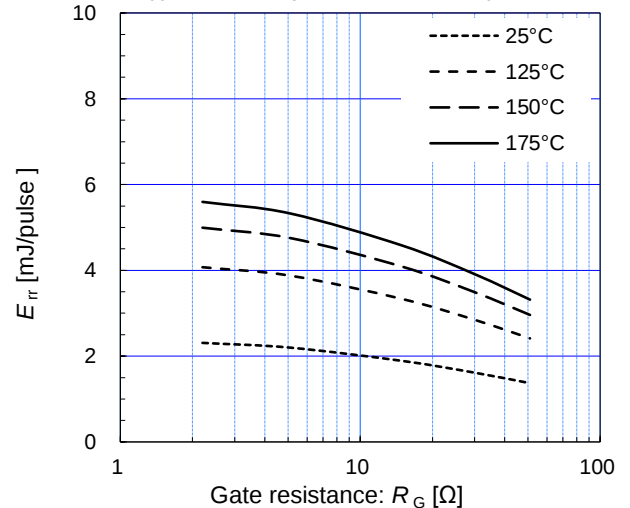
$V_{CC}=600V$ ,  $V_{GE}=+15/-15V$ ,  $R_G=5.1\Omega$



[ Inverter ]

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

$V_{CC}=600V$ ,  $V_{GE}=+15/-15V$ ,  $I_C=75A$



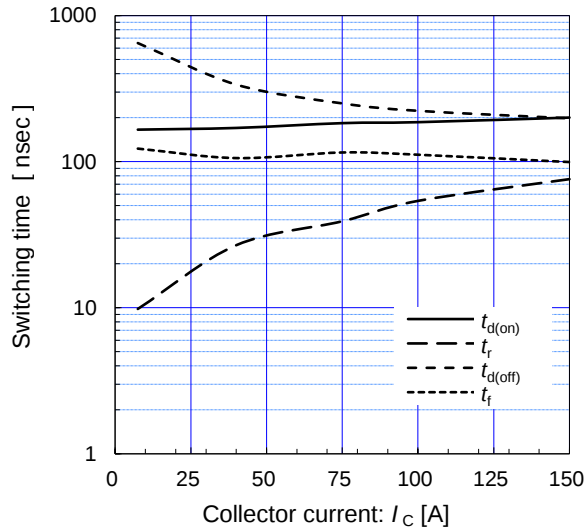
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IGBT Modules

[ Inverter ]

Switching time vs. Collector current (typ.)

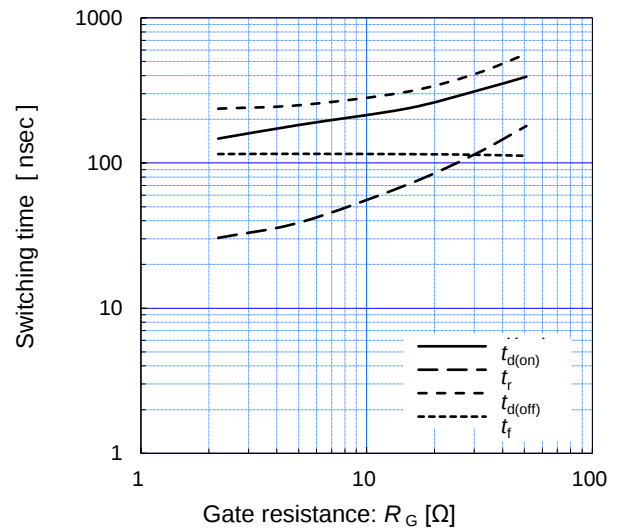
$V_{CC}=600V$ ,  $R_G=5.1\Omega$   $V_{GE}=+15/-15V$ ,  $T_{vj}=25^\circ C$



[ Inverter ]

Switching time vs. Gate resistance (typ.)

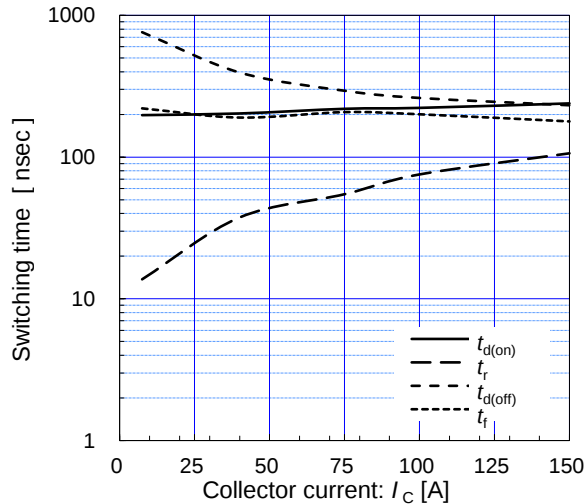
$V_{CC}=600V$ ,  $I_C=75A$ ,  $V_{GE}=+15/-15V$ ,  $T_{vj}=25^\circ C$



[ Inverter ]

Switching time vs. Collector current (typ.)

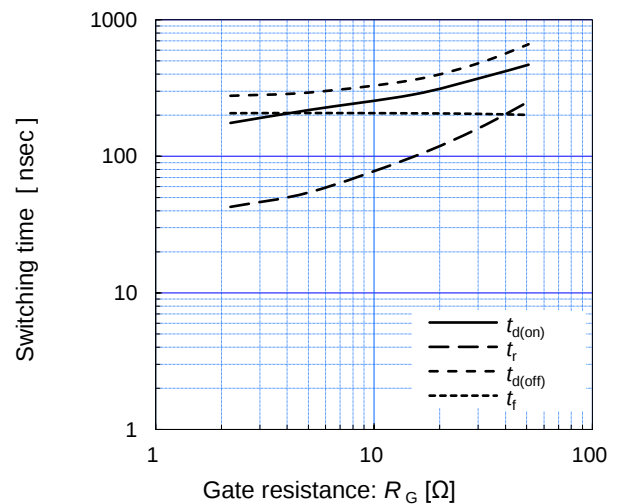
$V_{CC}=600V$ ,  $R_G=5.1\Omega$   $V_{GE}=+15/-15V$ ,  $T_{vj}=175^\circ C$



[ Inverter ]

Switching time vs. Gate resistance (typ.)

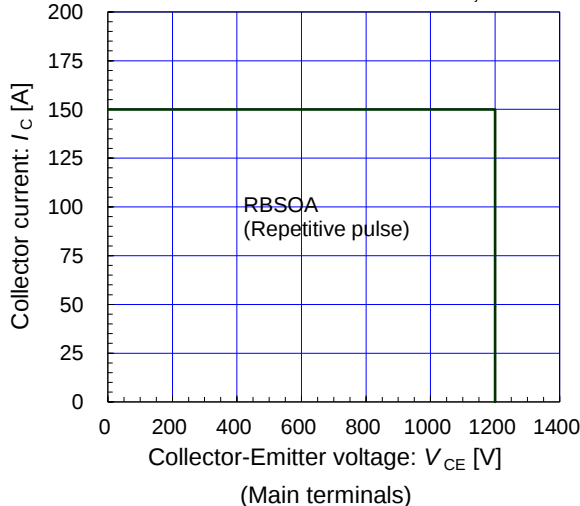
$V_{CC}=600V$ ,  $I_C=75A$ ,  $V_{GE}=+15/-15V$ ,  $T_{vj}=175^\circ C$



[ Inverter ]

Reverse bias safe operating area (max.)

$V_{GE}=+15/-15V$ ,  $R_G \geq 5.1\Omega$   $T_{vj}=175^\circ C$

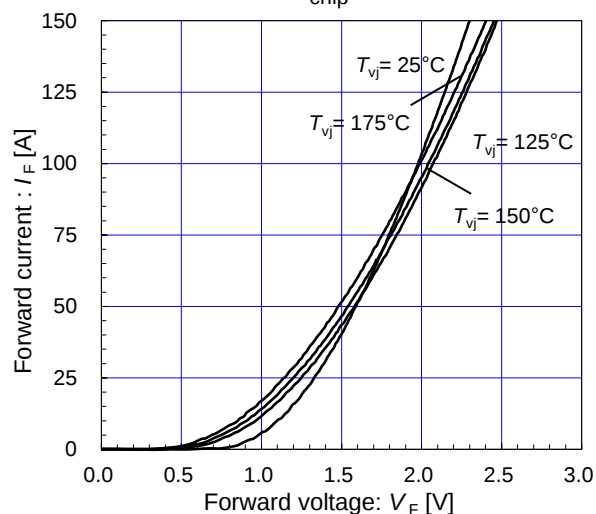


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IGBT Modules

[ Inverter ]

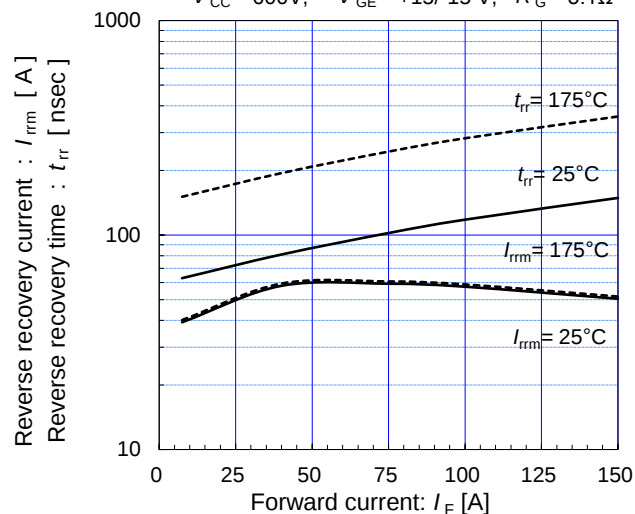
Forward current vs. Forward voltage (typ.)  
chip



[ Inverter ]

Reverse recovery characteristics (typ.)

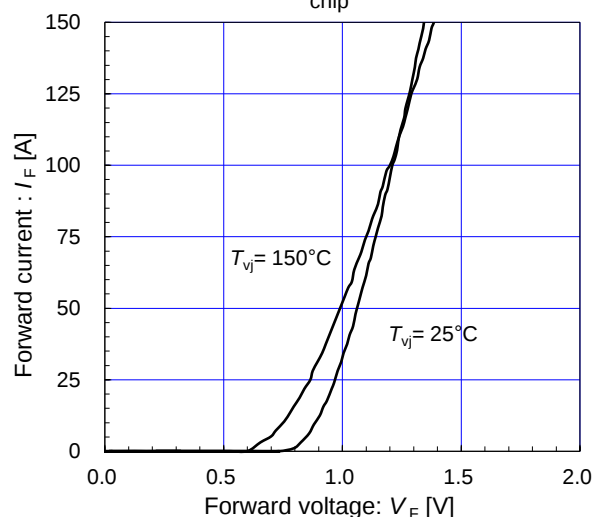
$V_{CC} = 600V$ ,  $V_{GE} = +15/-15V$ ,  $R_G = 5.1\Omega$



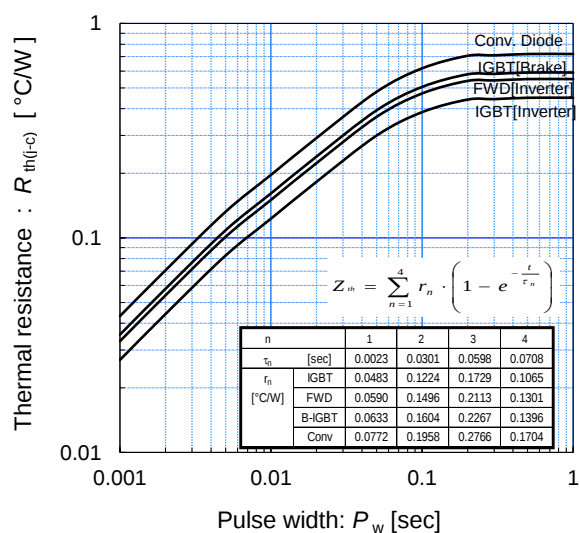
[ Converter ]

Forward current vs. Forward voltage (typ.)

chip

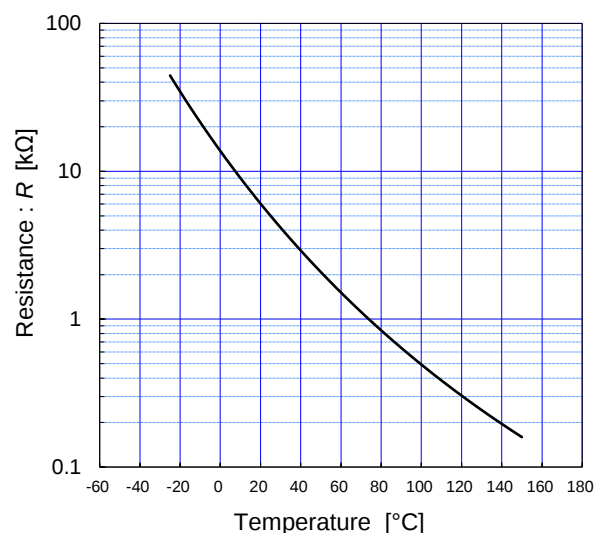


Transient thermal resistance (max.)



[ Thermistor ]

Temperature characteristic (typ.)



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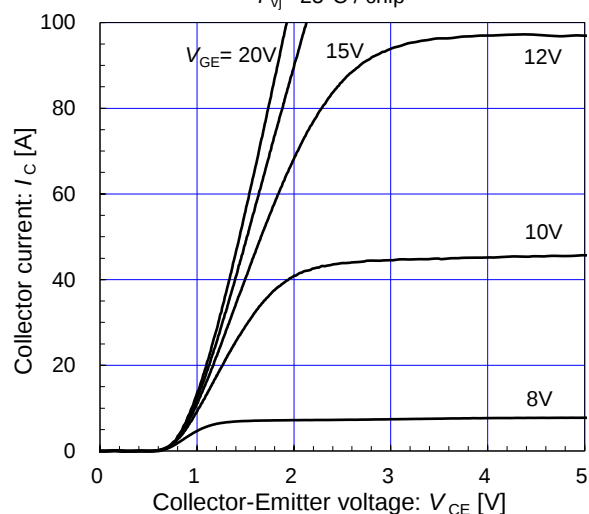
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IGBT Modules

[ Brake ]

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

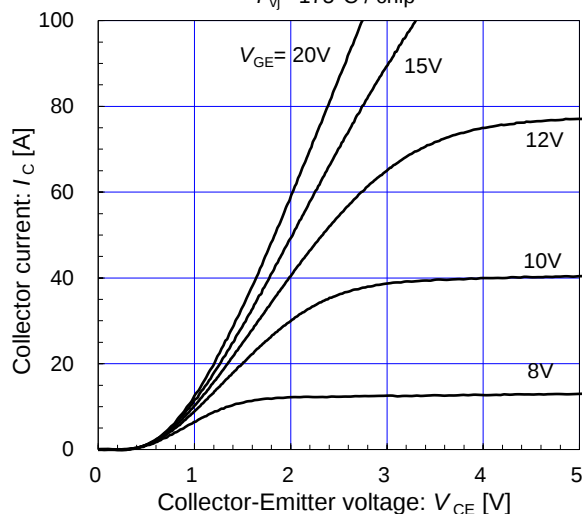
$T_{vj} = 25^\circ\text{C} / \text{chip}$



[ Brake ]

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

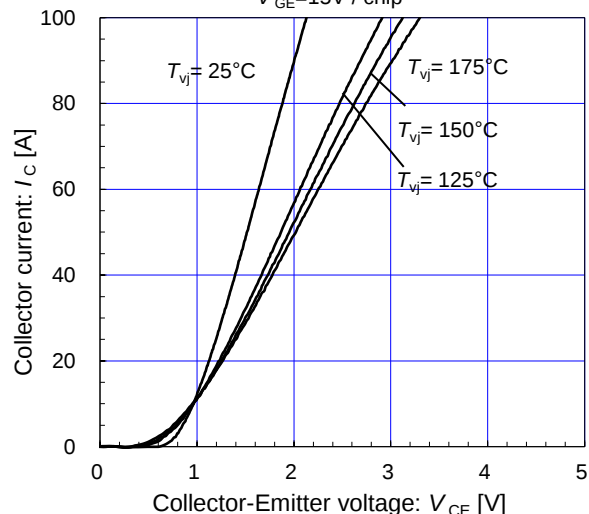
$T_{vj} = 175^\circ\text{C} / \text{chip}$



[ Brake ]

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

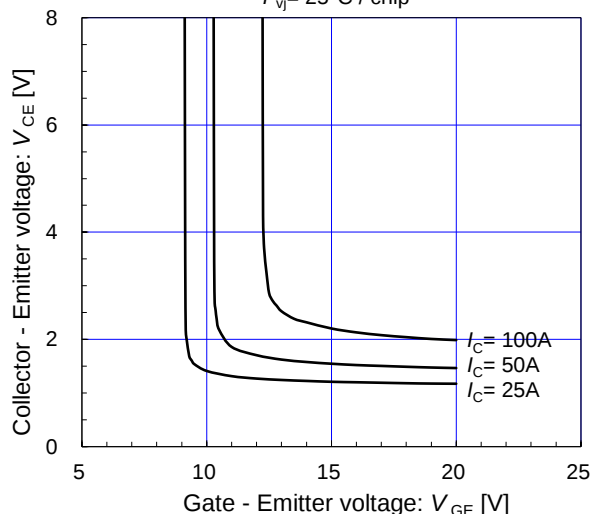
$V_{GE} = 15\text{V} / \text{chip}$



[ Brake ]

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

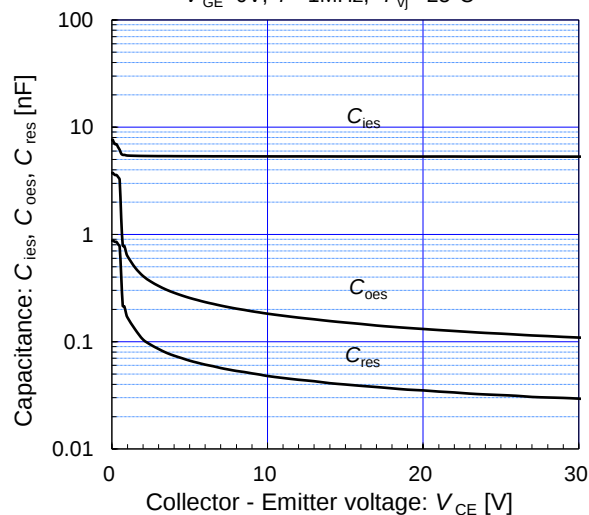
$T_{vj} = 25^\circ\text{C} / \text{chip}$



[ Brake ]

Capacitance vs. Collector-Emmitter voltage (typ.)

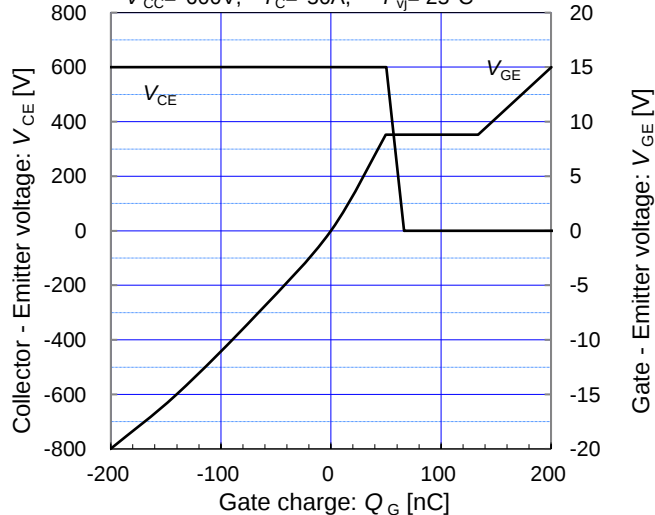
$V_{GE} = 0\text{V}, f = 1\text{MHz}, T_{vj} = 25^\circ\text{C}$



[ Brake ]

Dynamic Gate charge (typ.)

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



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## IGBT Modules

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