

# 7MBR30VKC060-50

IGBT Modules

**Power Module (V series)**  
**600V / 30A / PIM**

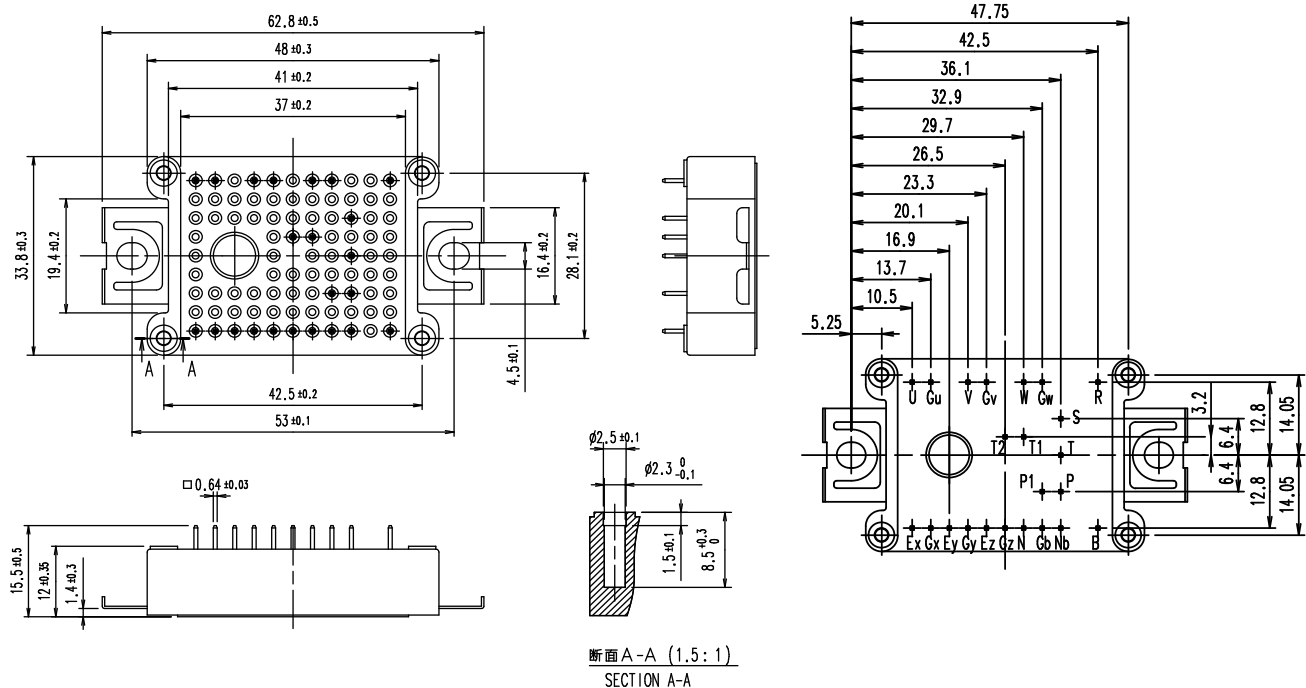
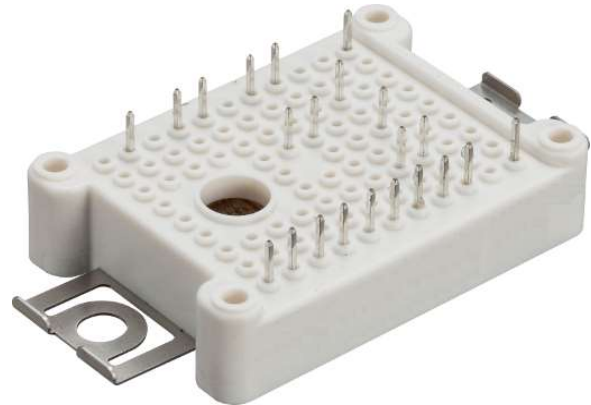
## ■ Features

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

## ■ Applications

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

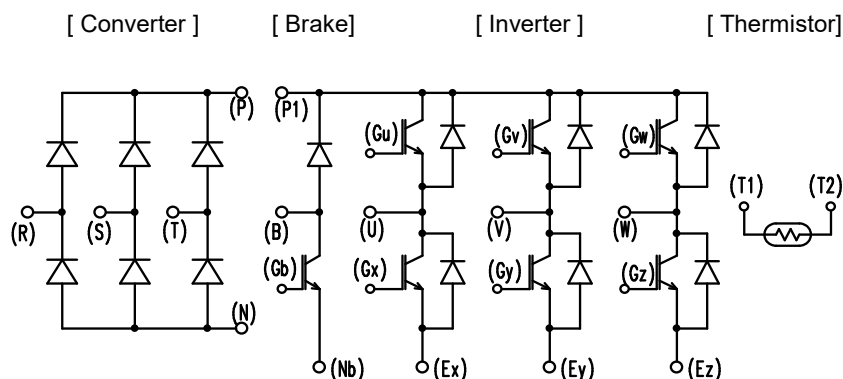
## ■ Outline drawing ( Unit : mm )



ALL DIMENSION IN THE LEFT FIGURE ARE REFERENCE  
PIN POSITION TO DESIGNED CENTER OF MODULE  $\oplus \phi 0.8$   
PIN-GRID SPACING 3.2mm

Weight: 25g (typ.)

## ■ Equivalent Circuit



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

| Items                                                       |                                                                              | Symbols      | Conditions                      |                           | Maximum ratings | Units                |
|-------------------------------------------------------------|------------------------------------------------------------------------------|--------------|---------------------------------|---------------------------|-----------------|----------------------|
| Inverter                                                    | Collector-Emitter voltage                                                    | $V_{CES}$    |                                 |                           | 600             | V                    |
|                                                             | Gate-Emitter voltage                                                         | $V_{GES}$    |                                 |                           | $\pm 20$        | V                    |
|                                                             | Collector current                                                            | $I_C$        | Continuous                      | $T_C = 100^\circ\text{C}$ | 30              | A                    |
|                                                             |                                                                              | $I_{CP}$     | 1ms                             | $T_C = 80^\circ\text{C}$  | 60              |                      |
|                                                             |                                                                              | $-I_C$       |                                 |                           | 30              |                      |
|                                                             |                                                                              | $-I_C$ pulse | 1ms                             |                           |                 | 60                   |
|                                                             | Collector power dissipation                                                  | $P_C$        | 1 device                        |                           | 125             | W                    |
| Brake                                                       | Collector-Emitter voltage                                                    | $V_{CES}$    |                                 |                           | 600             | V                    |
|                                                             | Gate-Emitter voltage                                                         | $V_{GES}$    |                                 |                           | $\pm 20$        | V                    |
|                                                             | Collector current                                                            | $I_C$        | Continuous                      | $T_C = 80^\circ\text{C}$  | 30              | A                    |
|                                                             |                                                                              |              | 1ms                             | $T_C = 80^\circ\text{C}$  | 60              |                      |
|                                                             | Collector power dissipation                                                  | $P_C$        | 1 device                        |                           | 125             |                      |
| Converter                                                   | Repetitive peak reverse voltage (Diode)                                      | $V_{RRM}$    |                                 |                           | 600             | V                    |
|                                                             | Repetitive peak reverse voltage                                              | $V_{RRM}$    |                                 |                           | 800             | V                    |
|                                                             | Average output current                                                       | $I_O$        | 50Hz/60Hz, sine wave            |                           | 30              | A                    |
|                                                             | Surge current (Non-Repetitive)                                               | $I_{FSM}$    | 10ms, $T_j = 150^\circ\text{C}$ |                           | 360             | A                    |
|                                                             | $I^2t$ (Non-Repetitive)                                                      | $I^2t$       | half sine wave                  |                           | 660             | $\text{A}^2\text{s}$ |
| Junction temperature                                        |                                                                              | $T_j$        | Inverter, Brake                 |                           | 175             | $^\circ\text{C}$     |
|                                                             |                                                                              |              | Converter                       |                           | 150             |                      |
| Operating junction temperature (under switching conditions) |                                                                              | $T_{jop}$    | Inverter, Brake                 |                           | 150             |                      |
|                                                             |                                                                              |              | Converter                       |                           | 150             |                      |
| Case temperature                                            |                                                                              | $T_C$        |                                 |                           | 125             |                      |
| Storage temperature                                         |                                                                              | $T_{stg}$    |                                 |                           | $-40 \sim +125$ |                      |
| Isolation voltage                                           | between terminal and copper base (*1)<br>between temperature and others (*2) | $V_{iso}$    | AC : 1min.                      |                           | 2500            | VAC                  |
| Screw torque                                                | Mounting (*3)                                                                | -            | M4                              |                           | 1.7             | N m                  |

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

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

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

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

|            | Items                                | Symbols                     | Conditions                                                              | Characteristics |              |           | Units         |
|------------|--------------------------------------|-----------------------------|-------------------------------------------------------------------------|-----------------|--------------|-----------|---------------|
|            |                                      |                             |                                                                         | min.            | typ.         | max.      |               |
| Inverter   | Zero gate voltage collector current  | $I_{CES}$                   | $V_{GE} = 0\text{V}$<br>$V_{CE} = 600\text{V}$                          | -               | -            | 1.0       | mA            |
|            | Gate-Emitter leakage current         | $I_{GES}$                   | $V_{CE} = 0\text{V}$<br>$V_{GE} = \pm 20\text{V}$                       | -               | -            | 200       | nA            |
|            | Gate-Emitter threshold voltage       | $V_{GE(th)}$                | $V_{CE} = 20\text{V}$<br>$I_C = 30\text{mA}$                            | 6.2             | 6.7          | 7.2       | V             |
|            | Collector-Emitter saturation voltage | $V_{CE(sat)}$<br>(terminal) | $V_{GE} = 15\text{V}$<br>$I_C = 30\text{A}$<br>$T_j = 25^\circ\text{C}$ | -               | 1.95         | 2.35      | V             |
|            |                                      |                             | $T_j = 125^\circ\text{C}$                                               | -               | 2.30         | -         |               |
|            |                                      |                             | $T_j = 150^\circ\text{C}$                                               | -               | 2.40         | -         |               |
|            |                                      | $V_{CE(sat)}$<br>(chip)     | $V_{GE} = 15\text{V}$<br>$I_C = 30\text{A}$<br>$T_j = 25^\circ\text{C}$ | -               | 1.70         | 2.10      |               |
|            |                                      |                             | $T_j = 125^\circ\text{C}$                                               | -               | 2.05         | -         |               |
|            |                                      |                             | $T_j = 150^\circ\text{C}$                                               | -               | 2.15         | -         |               |
|            | Internal gate resistance             | $R_{g(int)}$                | -                                                                       | -               | 0            | -         | $\Omega$      |
|            | Input capacitance                    | $C_{ies}$                   | $V_{CE} = 10\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$              | -               | 1.6          | -         | nF            |
|            | Turn-on time                         | $t_{on}$                    | $V_{CC} = 300\text{V}$<br>$I_C = 30\text{A}$                            | -               | 0.08         | 1.20      | $\mu\text{s}$ |
|            |                                      | $t_r$                       | $V_{GE} = \pm 15\text{V}$                                               | -               | 0.06         | 0.60      |               |
|            |                                      | $t_{r(l)}$                  | $R_G = 15\Omega$                                                        | -               | 0.02         | -         |               |
|            | Turn-off time                        | $t_{off}$                   | -                                                                       | -               | 0.14         | 1.20      |               |
|            |                                      | $t_f$                       | -                                                                       | -               | 0.02         | 0.45      |               |
|            | Forward on voltage                   | $V_F$<br>(terminal)         | $I_F = 30\text{A}$<br>$T_j = 25^\circ\text{C}$                          | -               | 2.25         | 2.65      | V             |
|            |                                      |                             | $T_j = 125^\circ\text{C}$                                               | -               | 2.30         | -         |               |
|            |                                      |                             | $T_j = 150^\circ\text{C}$                                               | -               | 2.30         | -         |               |
|            |                                      | $V_F$<br>(chip)             | $I_F = 30\text{A}$<br>$T_j = 25^\circ\text{C}$                          | -               | 2.00         | 2.40      |               |
|            |                                      |                             | $T_j = 125^\circ\text{C}$                                               | -               | 2.05         | -         |               |
|            |                                      |                             | $T_j = 150^\circ\text{C}$                                               | -               | 2.05         | -         |               |
|            | Reverse recovery time                | $t_{rr}$                    | $I_F = 30\text{A}$                                                      | -               | -            | 0.35      | $\mu\text{s}$ |
| Brake      | Zero gate voltage collector current  | $I_{CES}$                   | $V_{GE} = 0\text{V}$<br>$V_{CE} = 600\text{V}$                          | -               | -            | 1.0       | mA            |
|            | Gate-Emitter leakage current         | $I_{GES}$                   | $V_{CE} = 0\text{V}$<br>$V_{GE} = \pm 20\text{V}$                       | -               | -            | 200       | nA            |
|            | Collector-Emitter saturation voltage | $V_{CE(sat)}$<br>(terminal) | $V_{GE} = 15\text{V}$<br>$I_C = 30\text{A}$<br>$T_j = 25^\circ\text{C}$ | -               | 1.95         | 2.35      | V             |
|            |                                      |                             | $T_j = 125^\circ\text{C}$                                               | -               | 2.30         | -         |               |
|            |                                      |                             | $T_j = 150^\circ\text{C}$                                               | -               | 2.40         | -         |               |
|            |                                      | $V_{CE(sat)}$<br>(chip)     | $V_{GE} = 15\text{V}$<br>$I_C = 30\text{A}$<br>$T_j = 25^\circ\text{C}$ | -               | 1.70         | 2.10      |               |
|            |                                      |                             | $T_j = 125^\circ\text{C}$                                               | -               | 2.05         | -         |               |
|            |                                      |                             | $T_j = 150^\circ\text{C}$                                               | -               | 2.15         | -         |               |
|            | Internal gate resistance             | $R_{g(int)}$                | -                                                                       | -               | 0            | -         | $\Omega$      |
|            | Turn-on time                         | $t_{on}$                    | $V_{CE} = 300\text{V}$<br>$I_C = 30\text{A}$                            | -               | 0.08         | 1.20      | $\mu\text{s}$ |
|            |                                      | $t_r$                       | $V_{GE} = +15/-15\text{V}$                                              | -               | 0.06         | 0.60      |               |
|            | Turn-off time                        | $t_{off}$                   | $R_G = 15\Omega$                                                        | -               | 0.14         | 1.20      |               |
|            |                                      | $t_f$                       | -                                                                       | -               | 0.02         | 0.45      |               |
|            | Reverse current                      | $I_{RRM}$                   | $V_R = 600\text{V}$                                                     | -               | -            | 1.00      | mA            |
| Converter  | Forward on voltage                   | $V_{FM}$                    | $I_F = 30\text{A}$<br>terminal<br>chip                                  | -               | 1.40<br>1.15 | 1.85<br>- | V             |
|            | Reverse current                      | $I_{RRM}$                   | $V_R = 800\text{V}$                                                     | -               | -            | 1.0       | mA            |
| Thermistor | Resistance                           | $R$                         | $T = 25^\circ\text{C}$<br>$T = 100^\circ\text{C}$                       | -<br>465        | 5000<br>495  | -<br>520  | $\Omega$      |
|            | B value                              | $B$                         | $T = 25/50^\circ\text{C}$                                               | 3305            | 3375         | 3450      | K             |

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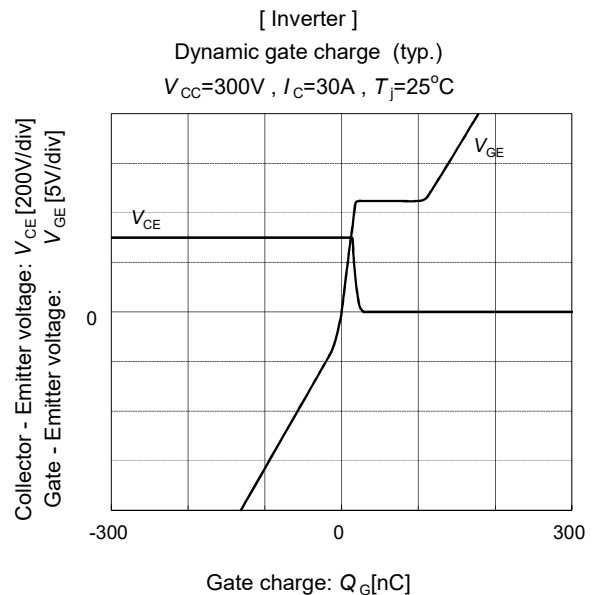
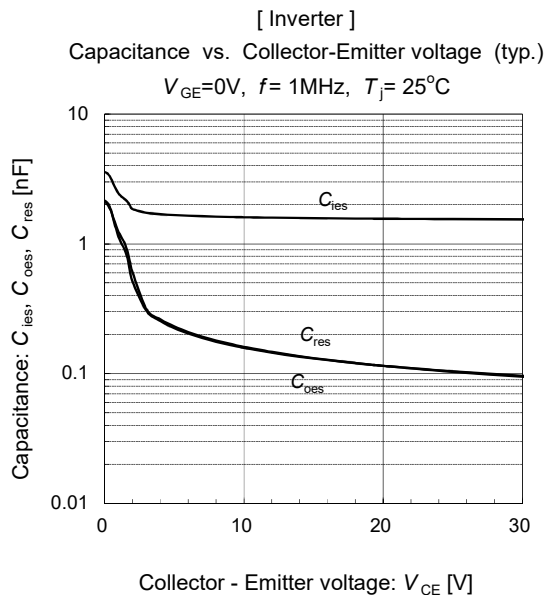
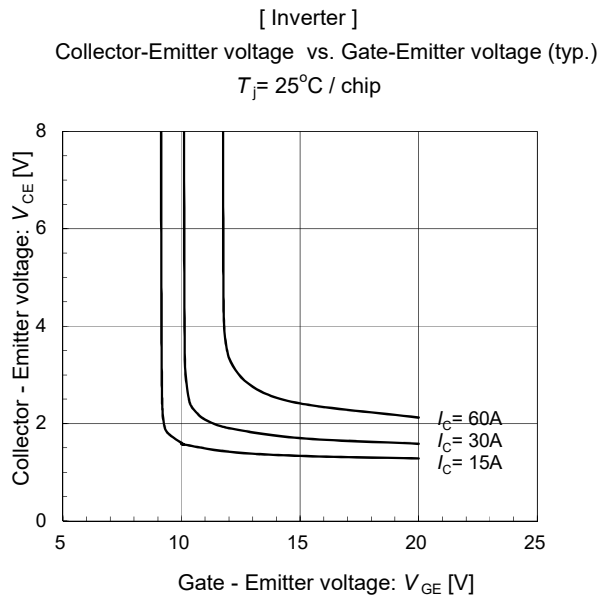
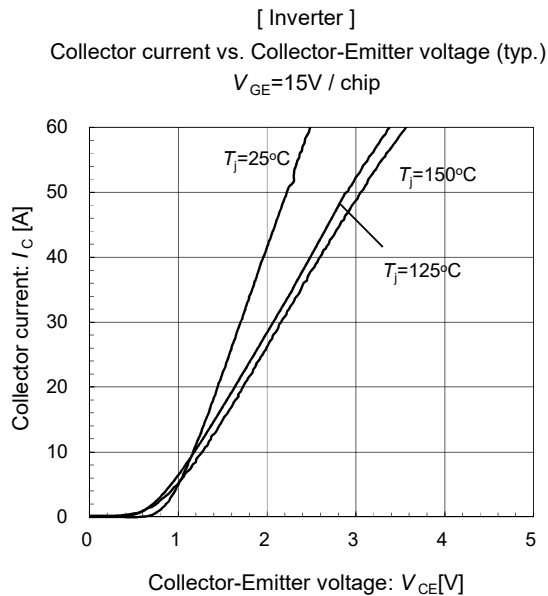
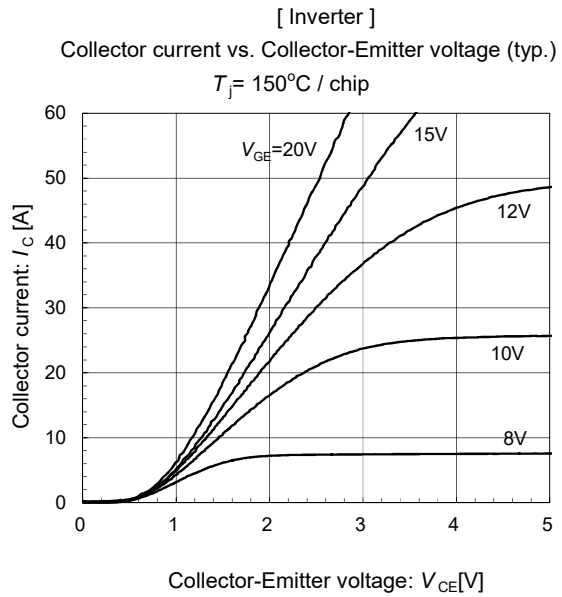
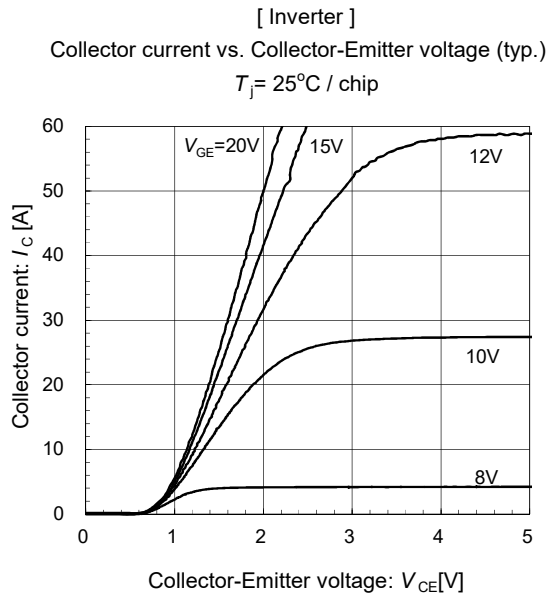
## ■ Thermal resistance characteristics

| Items                                       | Symbols       | Conditions      | Characteristics |      |      | Units |
|---------------------------------------------|---------------|-----------------|-----------------|------|------|-------|
|                                             |               |                 | min.            | typ. | max. |       |
| Thermal resistance(1device)                 | $R_{th(j-c)}$ | Inverter IGBT   | -               | -    | 1.24 | °C/W  |
|                                             |               | Inverter FWD    | -               | -    | 1.78 |       |
|                                             |               | Brake IGBT      | -               | -    | 1.24 |       |
|                                             |               | Converter Diode | -               | -    | 1.35 |       |
| Contact thermal resistance(*4)<br>(1device) | $R_{th(c-f)}$ | Inverter IGBT   | -               | 0.71 | -    |       |
|                                             |               | Inverter FWD    | -               | 0.88 | -    |       |
|                                             |               | Brake IGBT      | -               | 0.75 | -    |       |
|                                             |               | Converter Diode | -               | 0.77 | -    |       |

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

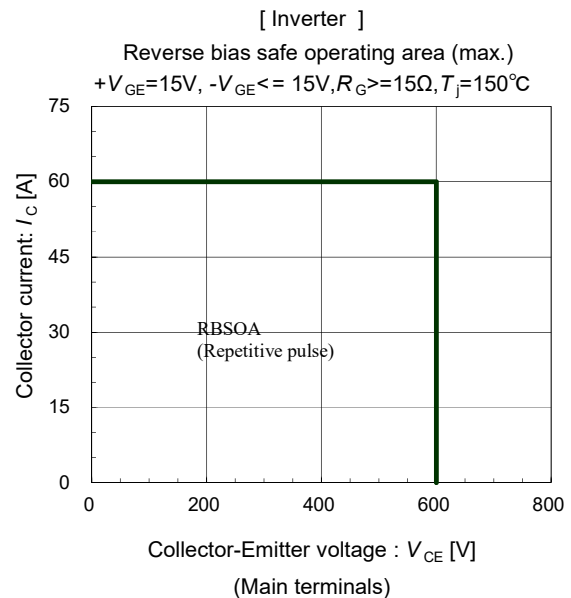
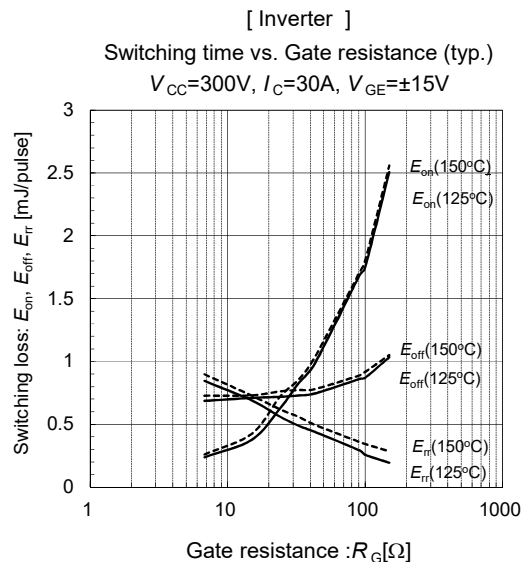
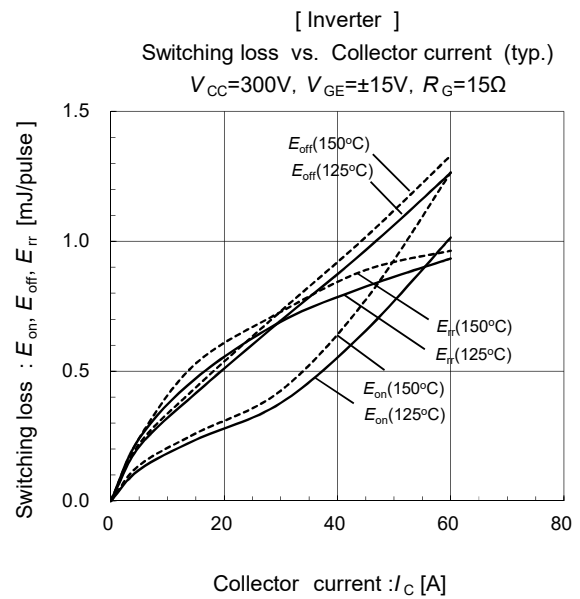
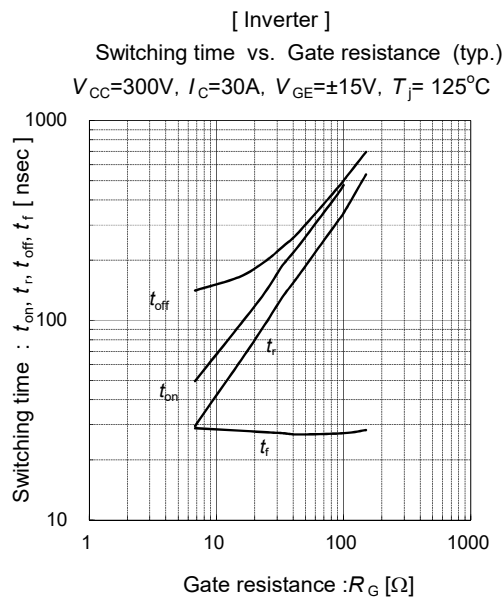
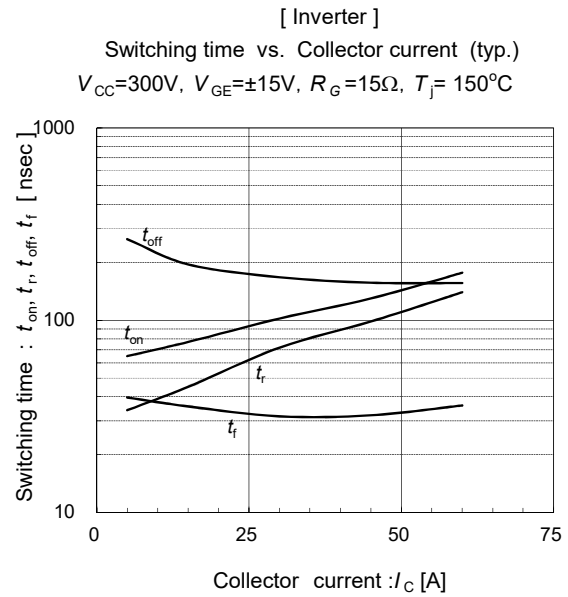
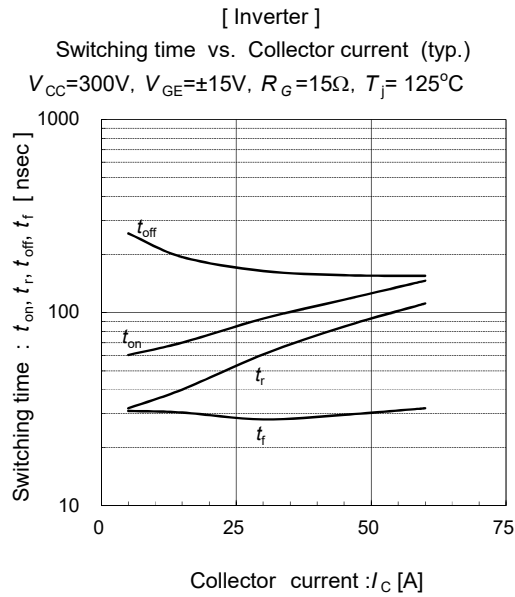
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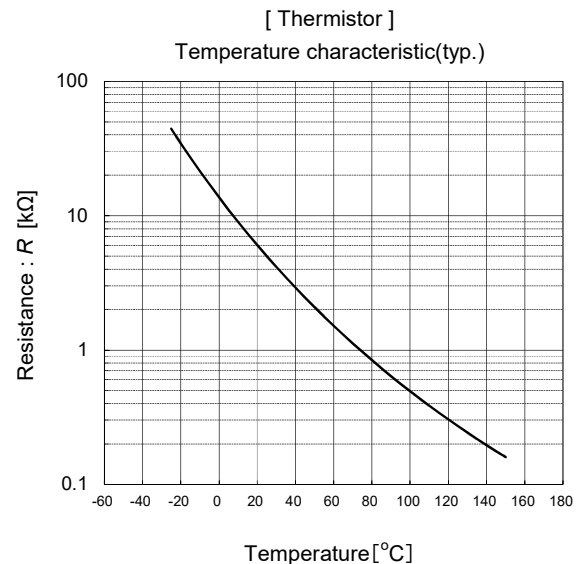
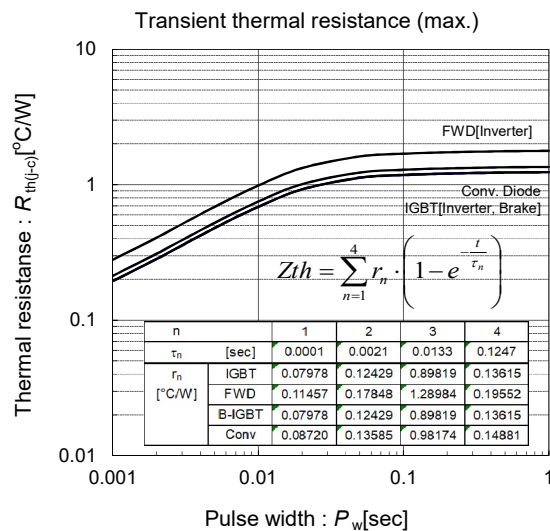
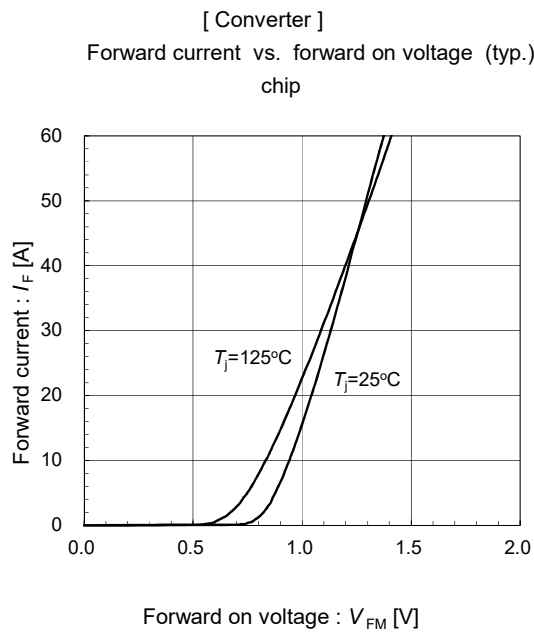
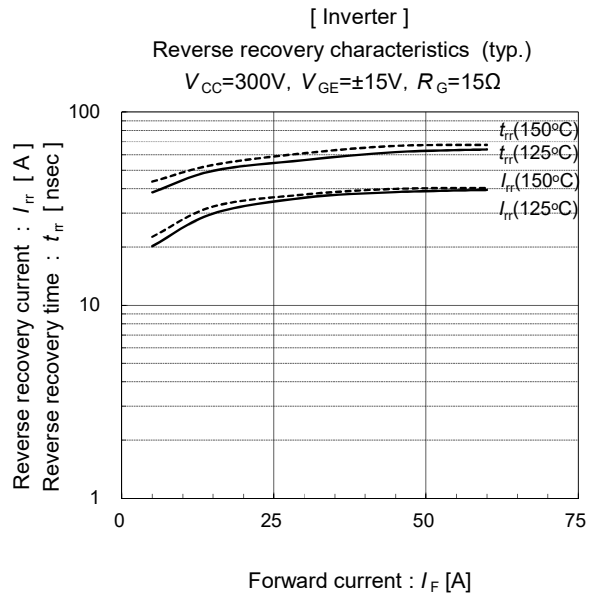
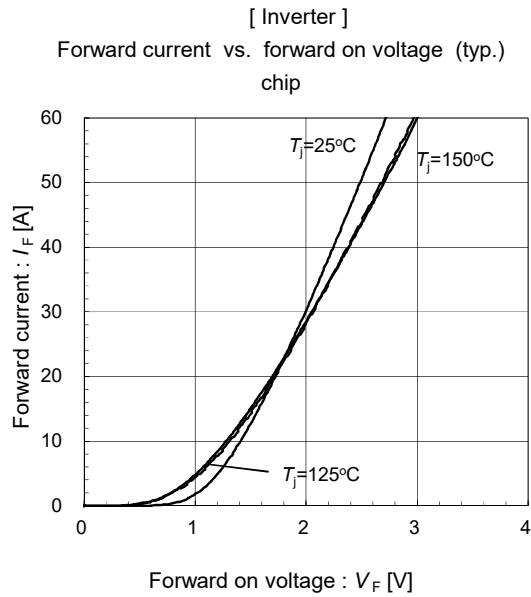
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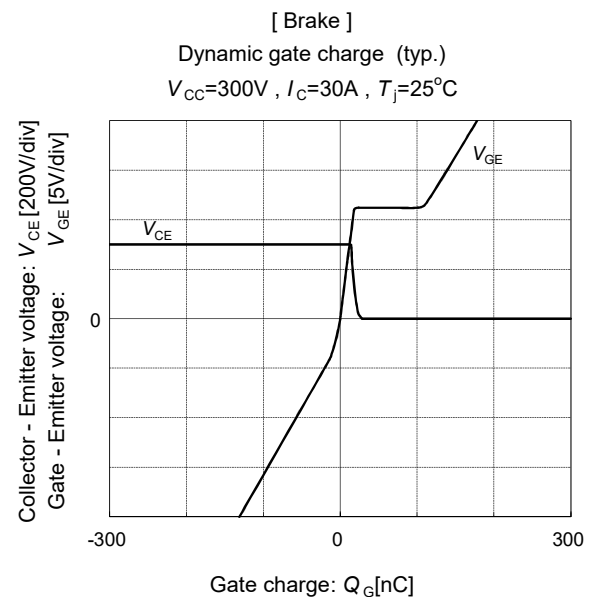
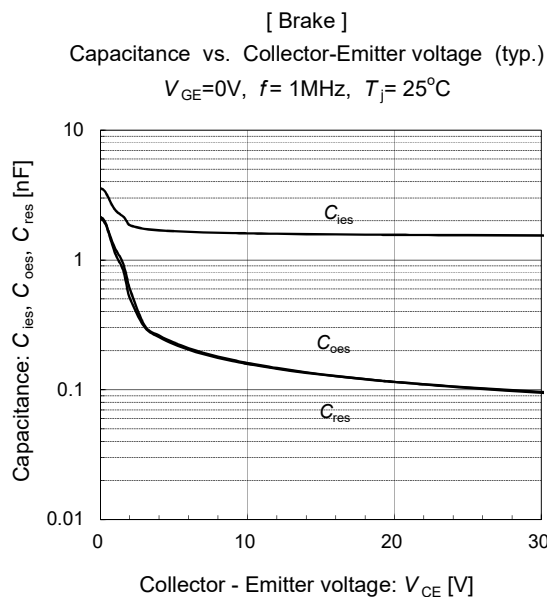
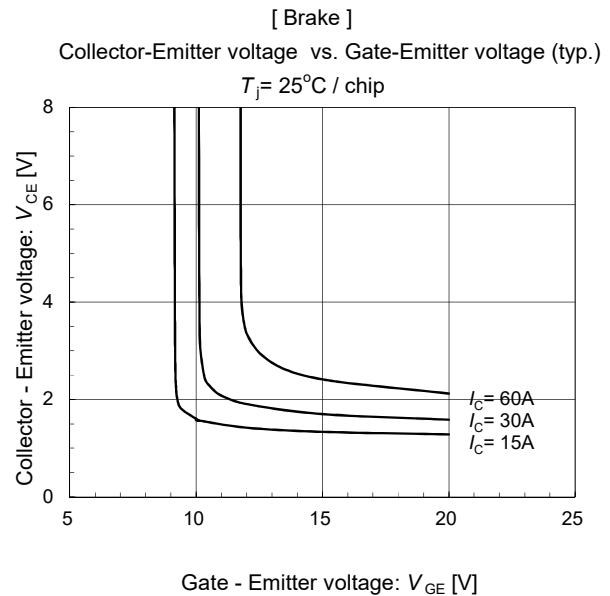
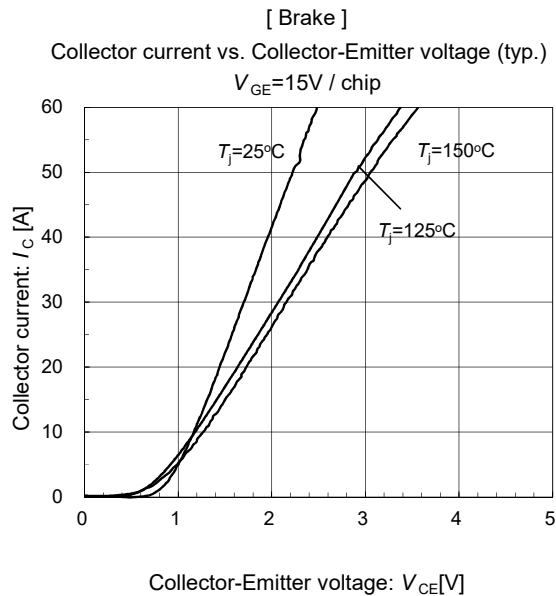
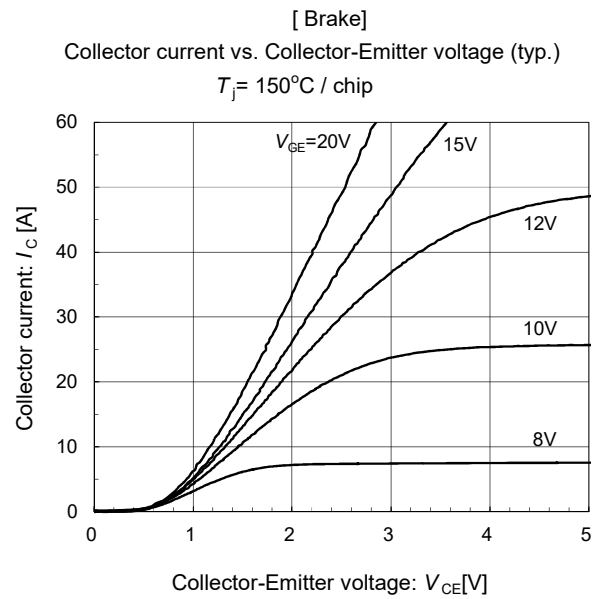
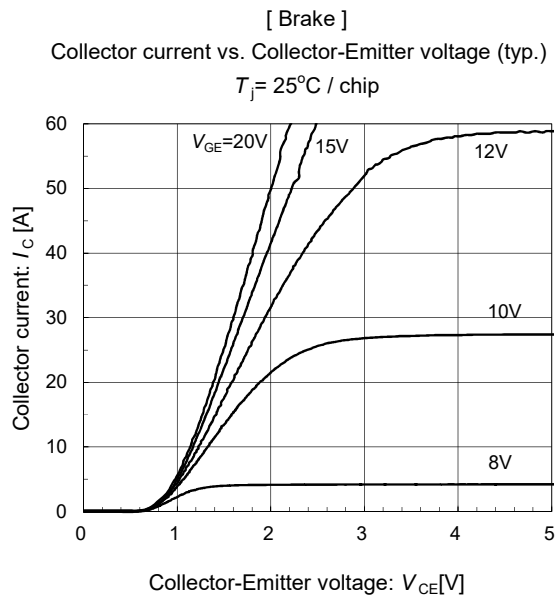
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## IGBT Modules

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| 4 デザインサポート           | <a href="http://www.fujielectric.co.jp/products/semiconductor/model/igbt/technical/">www.fujielectric.co.jp/products/semiconductor/model/igbt/technical/</a>     |
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| 6 IGBT 損失シミュレーションソフト | <a href="http://www.fujielectric.co.jp/products/semiconductor/model/igbt/simulation/">www.fujielectric.co.jp/products/semiconductor/model/igbt/simulation/</a>   |
| 7 富士電機技報             | <a href="http://www.fujielectric.co.jp/products/semiconductor/journal/">www.fujielectric.co.jp/products/semiconductor/journal/</a>                               |
| 8 製品のお問い合わせ          | <a href="http://www.fujielectric.co.jp/products/semiconductor/contact/">www.fujielectric.co.jp/products/semiconductor/contact/</a>                               |
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| 2 Product Information                          | <a href="http://www.fujielectric.com/products/semiconductor/model/">www.fujielectric.com/products/semiconductor/model/</a>                                   |
| 3 Application Manuals                          | <a href="http://www.fujielectric.com/products/semiconductor/model/igbt/application/">www.fujielectric.com/products/semiconductor/model/igbt/application/</a> |
| 4 Design Support                               | <a href="http://www.fujielectric.com/products/semiconductor/model/igbt/technical/">www.fujielectric.com/products/semiconductor/model/igbt/technical/</a>     |
| 5 Mounting Instructions                        | <a href="http://www.fujielectric.com/products/semiconductor/model/igbt/mounting/">www.fujielectric.com/products/semiconductor/model/igbt/mounting/</a>       |
| 6 IGBT Loss Simulation Software                | <a href="http://www.fujielectric.com/products/semiconductor/model/igbt/simulation/">www.fujielectric.com/products/semiconductor/model/igbt/simulation/</a>   |
| 7 Fuji Electric Journal                        | <a href="http://www.fujielectric.com/products/semiconductor/journal/">www.fujielectric.com/products/semiconductor/journal/</a>                               |
| 8 Contact                                      | <a href="http://www.fujielectric.com/contact/">www.fujielectric.com/contact/</a>                                                                             |
| 9 Revised and discontinued product information | <a href="http://www.fujielectric.com/products/semiconductor/discontinued/">www.fujielectric.com/products/semiconductor/discontinued/</a>                     |

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| 1 半导体综合目录     | <a href="http://www.fujielectric.com.cn/products/semiconductor/catalog/">www.fujielectric.com.cn/products/semiconductor/catalog/</a>                               |
| 2 产品信息        | <a href="http://www.fujielectric.com.cn/products/semiconductor/model/">www.fujielectric.com.cn/products/semiconductor/model/</a>                                   |
| 3 应用手册        | <a href="http://www.fujielectric.com.cn/products/semiconductor/model/igbt/application/">www.fujielectric.com.cn/products/semiconductor/model/igbt/application/</a> |
| 4 技术信息        | <a href="http://www.fujielectric.com.cn/products/semiconductor/model/igbt/technical/">www.fujielectric.com.cn/products/semiconductor/model/igbt/technical/</a>     |
| 5 安装说明书       | <a href="http://www.fujielectric.com.cn/products/semiconductor/model/igbt/mounting/">www.fujielectric.com.cn/products/semiconductor/model/igbt/mounting/</a>       |
| 6 IGBT 损耗模拟软件 | <a href="http://www.fujielectric.com.cn/products/semiconductor/model/igbt/simulation/">www.fujielectric.com.cn/products/semiconductor/model/igbt/simulation/</a>   |
| 7 富士电机技报      | <a href="http://www.fujielectric.com.cn/products/semiconductor/journal/">www.fujielectric.com.cn/products/semiconductor/journal/</a>                               |
| 8 产品咨询        | <a href="http://www.fujielectric.com/contact/">www.fujielectric.com/contact/</a>                                                                                   |
| 9 产品更改和停产信息   | <a href="http://www.fujielectric.com.cn/products/semiconductor/discontinued/">www.fujielectric.com.cn/products/semiconductor/discontinued/</a>                     |