

# 2MBI100HJ-120-50

IGBT Modules

**Power Module (V series)**  
**1200V / 100A / 2-in-1 package**

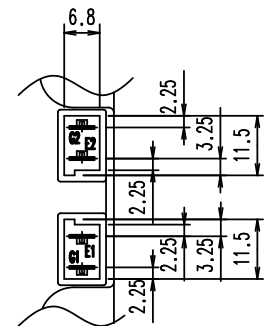
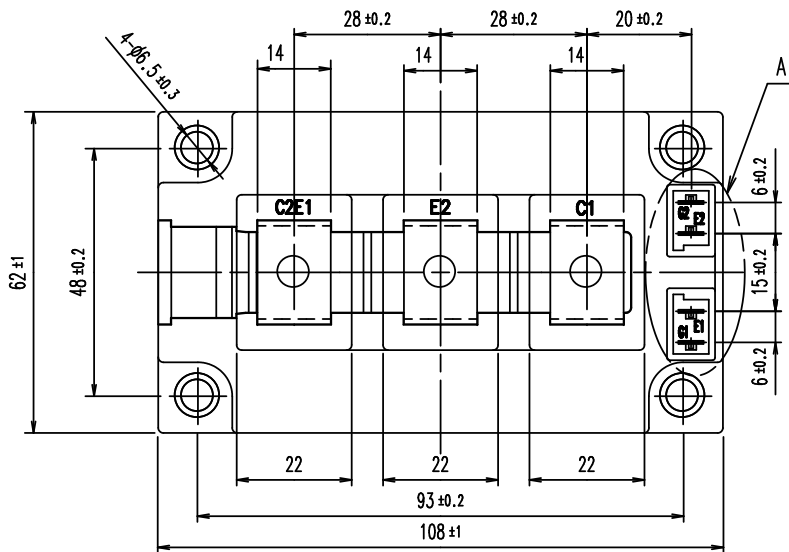
■ **Features**

- High speed switching
- Voltage drive
- Low Inductance module structure

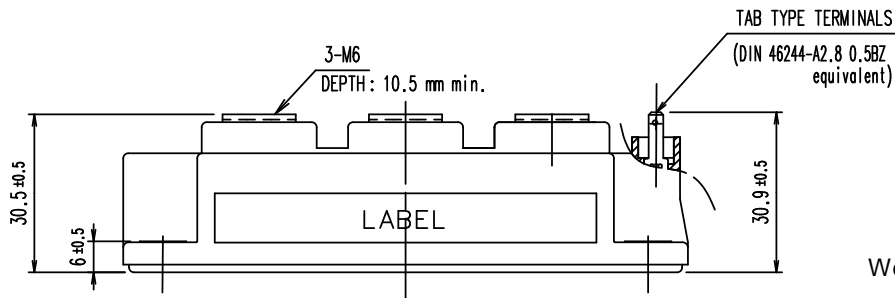
■ **Applications**

- Soft-switching Application
- Industrial machines, such as Welding machines

■ **Outline drawing ( Unit : mm )**

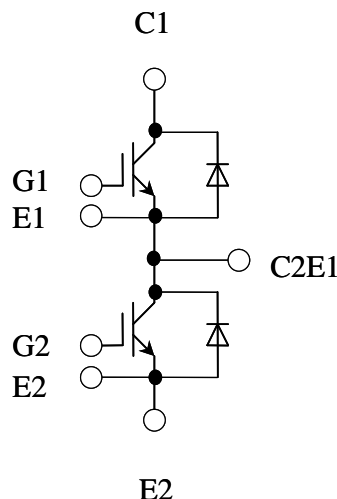


DETAIL A



Weight: 370g (typ.)

■ **Equivalent Circuit**



# 2MBI100HJ-120-50

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

| Items                       |                                       | Symbols    | Conditions               | Maximum Ratings | Units            |
|-----------------------------|---------------------------------------|------------|--------------------------|-----------------|------------------|
| Collector-Emitter voltage   |                                       | $V_{CES}$  |                          | 1200            | V                |
| Gate-Emitter voltage        |                                       | $V_{GES}$  |                          | $\pm 20$        | V                |
| Collector current           | $I_C$                                 | Continuous | $T_c = 60^\circ\text{C}$ | 100             | A                |
|                             |                                       |            | $T_c = 25^\circ\text{C}$ | 150             |                  |
|                             | $I_C$ pulse                           | 1ms        |                          | 200             |                  |
|                             | $-I_C$                                |            |                          | 400             |                  |
|                             | $-I_C$ pulse                          | 1ms        |                          | 800             |                  |
| Collector power dissipation |                                       | $P_C$      | 1 device                 | 655             | W                |
| Junction temperature        |                                       | $T_j$      |                          | 150             | $^\circ\text{C}$ |
| Case temperature            |                                       | $T_c$      |                          | 125             |                  |
| Storage temperature         |                                       | $T_{stg}$  |                          | -40 ~ 125       |                  |
| Isolation voltage           | between terminal and copper base (*1) | $V_{iso}$  | AC: 1min.                | 2500            | VAC              |
| Screw Torque                | Mounting (*2)                         | -          |                          | 6.0             | N m              |
|                             | Terminals (*3)                        | -          |                          | 5.0             |                  |

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

(\*2) Recommendable Value : 3.0-6.0 Nm (M5 or M6)

(\*3) Recommendable Value : 2.5-5.0 Nm (M6)

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■ Electrical characteristics (at T<sub>j</sub>= 25°C unless otherwise specified)

| Items                                | Symbols                         | Conditions   | Characteristics       |      |      | Units |   |
|--------------------------------------|---------------------------------|--|-----------------------|------|------|-------|---|
|                                      |                                 |  | min.                  | typ. | max. |       |   |
| Zero gate voltage Collector current  | I <sub>CEs</sub>                | V <sub>GE</sub> =0V, V <sub>CE</sub> =1200V  | -                     | -    | 4.0  | mA    |   |
| Gate-Emitter leakage current         | I <sub>GES</sub>                | V <sub>CE</sub> =0V, V <sub>GE</sub> =±20V   | -                     | -    | 800  | nA    |   |
| Gate-Emitter threshold voltage       | V <sub>GE(th)</sub>             | V <sub>CE</sub> =20V, I <sub>c</sub> =100mA  | 5.7                   | 6.2  | 6.7  | V     |   |
| Collector-Emitter saturation voltage | V <sub>CE(sat)</sub> (terminal) | V <sub>GE</sub> =15V, I <sub>c</sub> =100A   | T <sub>j</sub> =25°C  | -    | 3.60 | 3.90  | V |
|                                      |                                 |  | T <sub>j</sub> =125°C | -    | 4.50 | -     |   |
|                                      | V <sub>CE(sat)</sub> (chip)     | V <sub>GE</sub> =15V, I <sub>c</sub> =100A   | T <sub>j</sub> =25°C  | -    | 3.20 | 3.50  |   |
|                                      |                                 |  | T <sub>j</sub> =125°C | -    | 4.10 | -     |   |
| Internal gate resistance             | R <sub>G(int)</sub>             | -  | -                     | 1.5  | -    | Ω     |   |
| Input capacitance                    | C <sub>ies</sub>                | V <sub>CE</sub> =10V, V <sub>GE</sub> =0V, f=1MHz  | -                     | 7.6  | -    | nF    |   |
| Turn-on time                         | t <sub>on</sub>                 | V <sub>CC</sub> = 600V I <sub>C</sub> = 100A<br>V <sub>GE</sub> = ±15V R <sub>G</sub> = 9.1Ω<br>T <sub>j</sub> = 125°C L <sub>s</sub> = 30nH | -                     | 250  | -    | nsec  |   |
|                                      | t <sub>r</sub>                  |  | -                     | 180  | -    |       |   |
|                                      | t <sub>r(i)</sub>               |  | -                     | 40   | -    |       |   |
| Turn-off time                        | t <sub>off</sub>                |  | -                     | 300  | -    | nsec  |   |
|                                      | t <sub>f</sub>                  |  | -                     | 50   | -    |       |   |
| Forward on voltage                   | V <sub>F</sub> (terminal)       | V <sub>GE</sub> =0V, I <sub>F</sub> =150A  | T <sub>j</sub> =25°C  | -    | 2.10 | 2.35  | V |
|                                      |                                 |  | T <sub>j</sub> =125°C | -    | 2.25 | -     |   |
|                                      | V <sub>F</sub> (chip)           | V <sub>GE</sub> =0V, I <sub>F</sub> =150A  | T <sub>j</sub> =25°C  | -    | 1.70 | 1.95  |   |
|                                      |                                 |  | T <sub>j</sub> =125°C | -    | 1.85 | -     |   |
| Reverse recovery time                | t <sub>rr</sub>                 | I <sub>F</sub> =100A   | -                     | 130  | -    | nsec  |   |

5. Thermal resistance characteristics

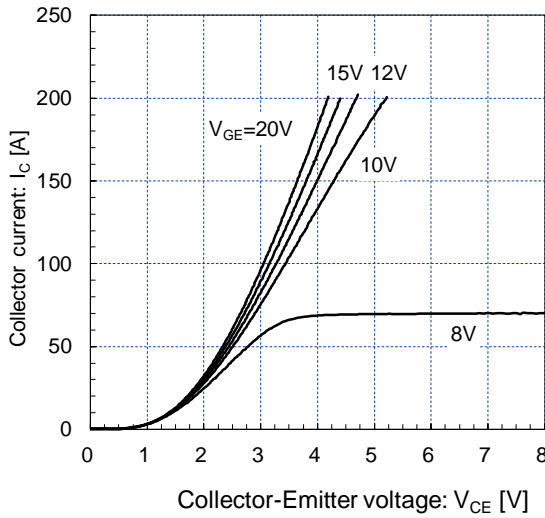
| Items                                     | Symbols              | Conditions            | Characteristics |       |       | Units |
|---|----------------------|-----------------------|-----------------|-------|-------|-------|
|   |                      |                       | min.            | typ.  | max.  |       |
| Thermal resistance (1device)              | R <sub>th(j-c)</sub> | IGBT                  | -               | -     | 0.160 | °C/W  |
|   |                      | FWD                   | -               | -     | 0.260 |       |
| Contact thermal resistance (1device) (*1) | R <sub>th(c-f)</sub> | with thermal compound | -               | 0.025 | -     |       |

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

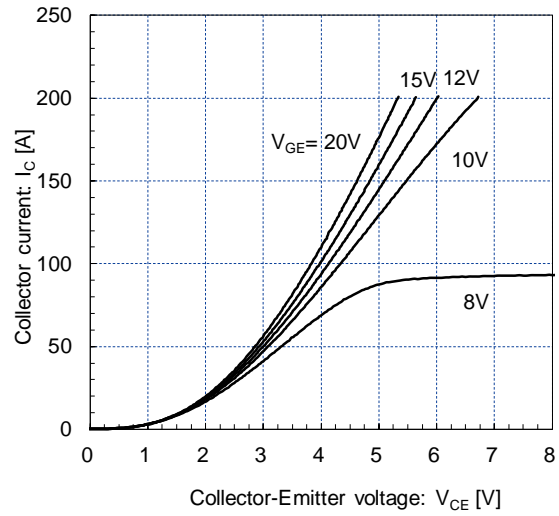
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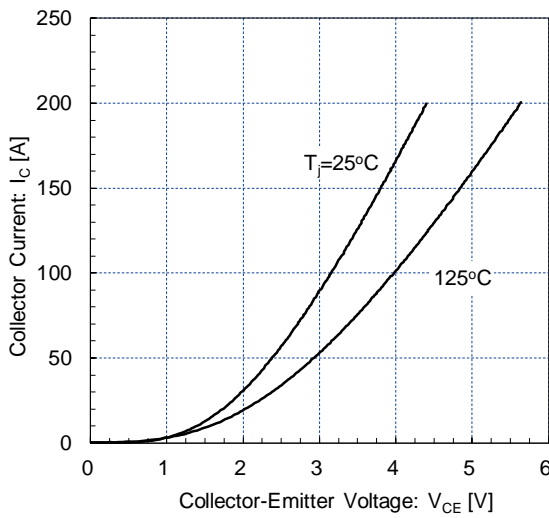
Collector current vs. Collector-Emittor voltage  
 $T_j = 25^\circ\text{C} / \text{chip}$



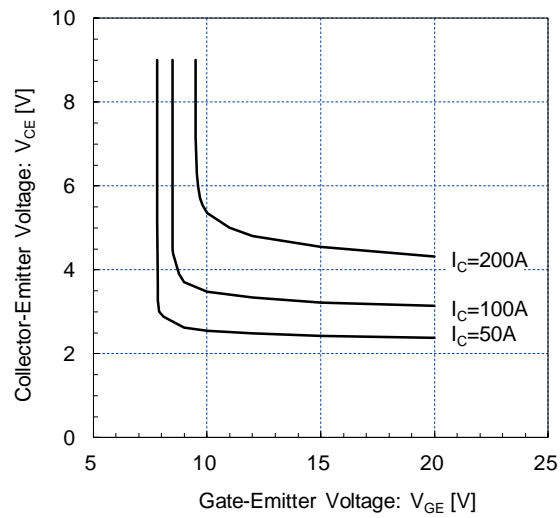
Collector current vs. Collector-Emittor voltage (typ.)  
 $T_j = 125^\circ\text{C} / \text{chip}$



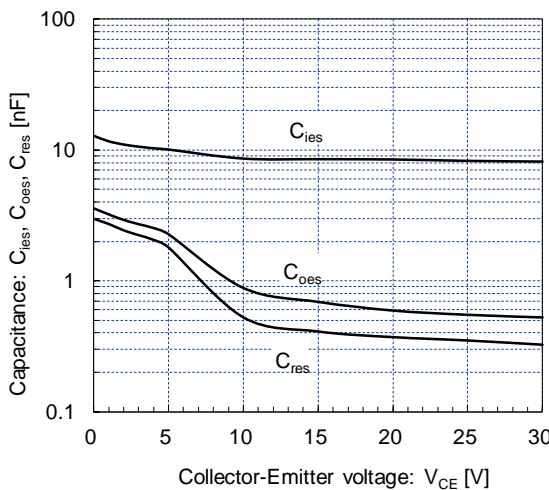
Collector current vs. Collector-Emittor voltage  
 $V_{GE} = 15\text{V} / \text{chip}$



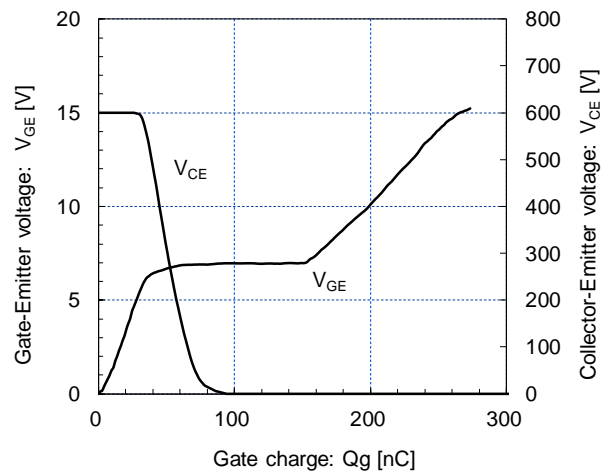
Collector-Emittor voltage vs. Gate-Emittor voltage  
 $T_j = 25^\circ\text{C} / \text{chip}$



Capacitance vs. Collector-Emittor Voltage  
 $V_{GE} = 0\text{V}, f = 1\text{MHz}, T_j = 25^\circ\text{C}$



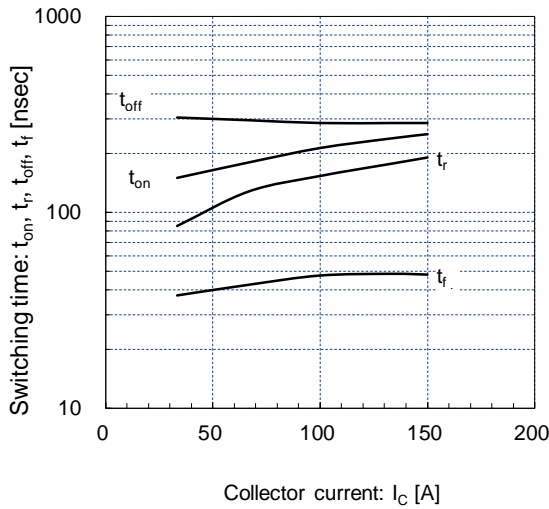
Dynamic Gate Charge (typ.)  
 $V_{CC} = 600\text{V}, I_C = 100\text{A}, T_j = 25^\circ\text{C}$



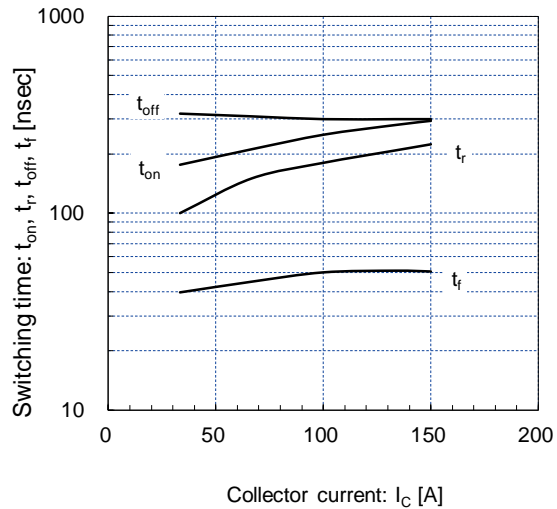
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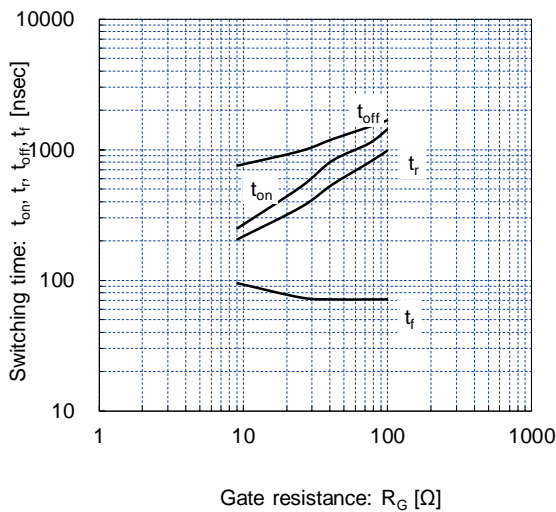
Switching time vs. Collector current (typ.)  
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=9.1\Omega, T_j=25^\circ C$



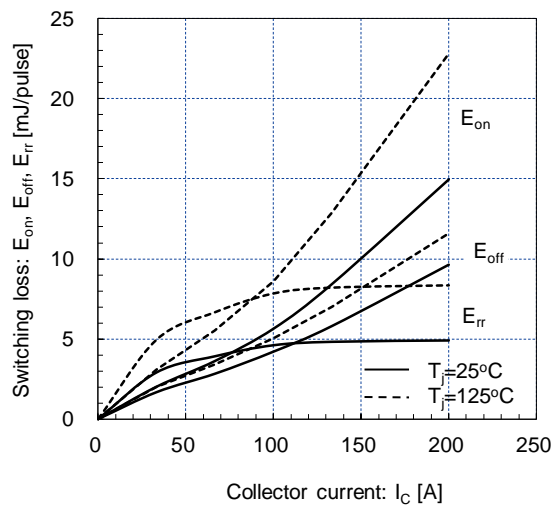
Switching time vs. Collector current (typ.)  
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=9.1\Omega, T_j=125^\circ C$



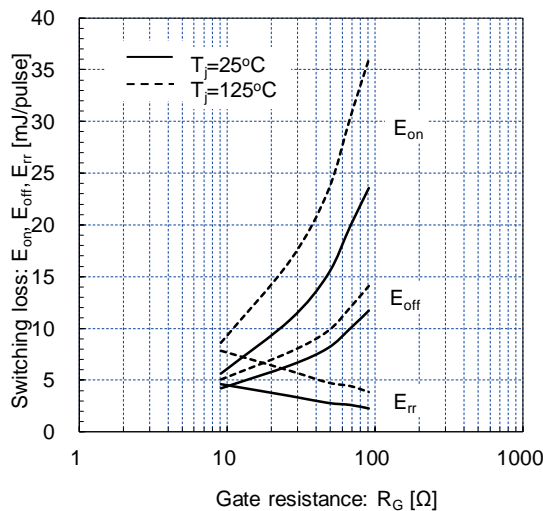
Switching time vs. Gate resistance (typ.)  
 $V_{cc}=600V, I_c=100A, V_{GE}=\pm 15V, T_j=125^\circ C$



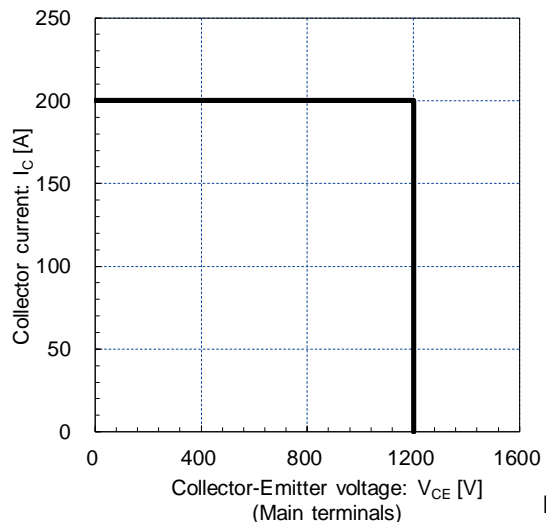
Switching loss vs. Collector current (typ.)  
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=9.1\Omega, T_j=25, 125^\circ C$



Switching loss vs. Gate resistance (typ.)  
 $V_{cc}=600V, I_c=100A, V_{GE}=\pm 15V, T_j=25, 125^\circ C$



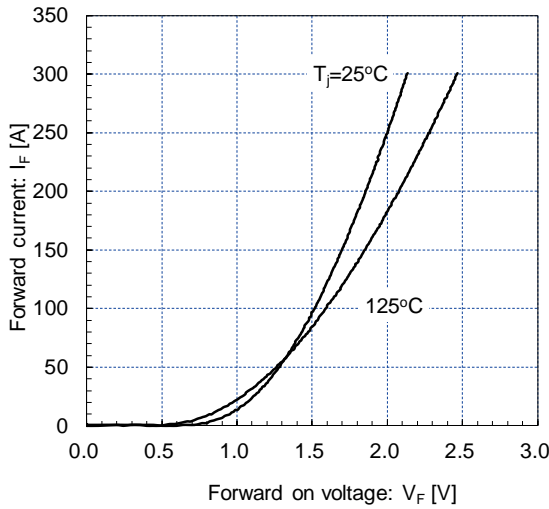
Reverse bias safe operating area (max.)  
 $+V_{GE}=15V, -V_{GE}=15V, R_g=9.1\Omega, T_j=125^\circ C$



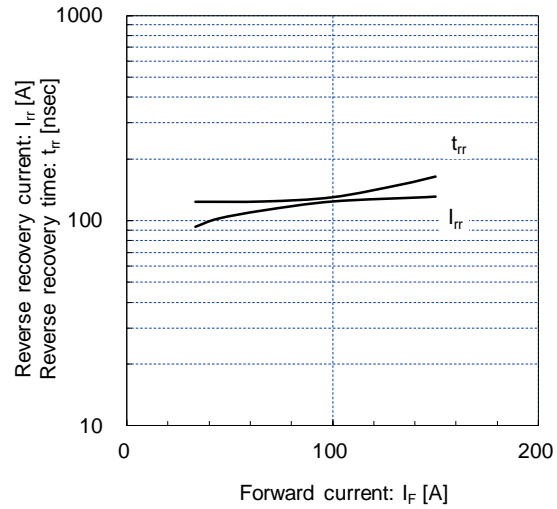
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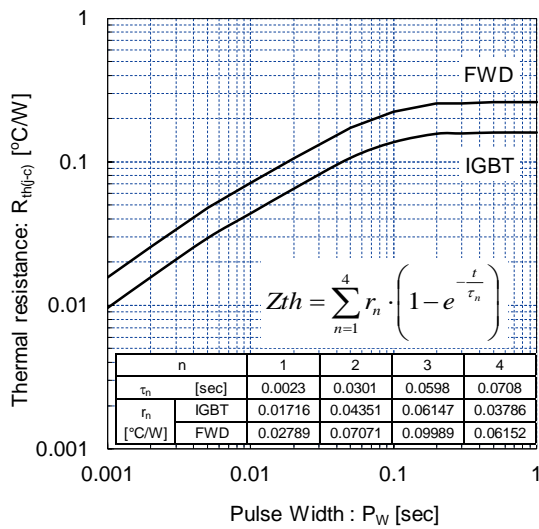
Forward current vs. Forward vltage (typ.)  
chip



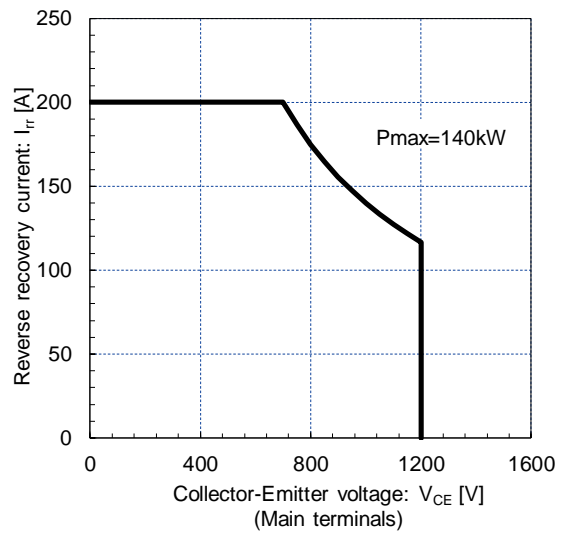
Reverse recovery characteristics (typ.)  
V<sub>cc</sub>=600V, V<sub>GE</sub>=±15V, R<sub>g</sub>=9.1Ω, T<sub>J</sub>=125°C



Transient thermal resistance (max.)



FWD safe operating area (max.)  
T<sub>J</sub> = 125°C



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**IGBT Modules**

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