

# SPECIFICATION

Device Name : IGBT Module

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Type Name : 7MBR50SB120-01

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Spec. No. : MS6M 0555

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Date : Jun. - 02 - 2000

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Matsumoto Factory

|         | DATE           | NAME                | APPROVED            | Fuji Electric Co., Ltd. |           |        |
|---------|----------------|---------------------|---------------------|-------------------------|-----------|--------|
| DRAWN   | Jun. - 2 - '00 | <i>T. Kobayashi</i> |                     | DWG. NO.                | MS6M 0555 | a      |
| CHECKED | June - 2 - 00  | <i>S. MATSUDA</i>   | <i>T. Kobayashi</i> |                         |           | 1 / 10 |

# Revised Records

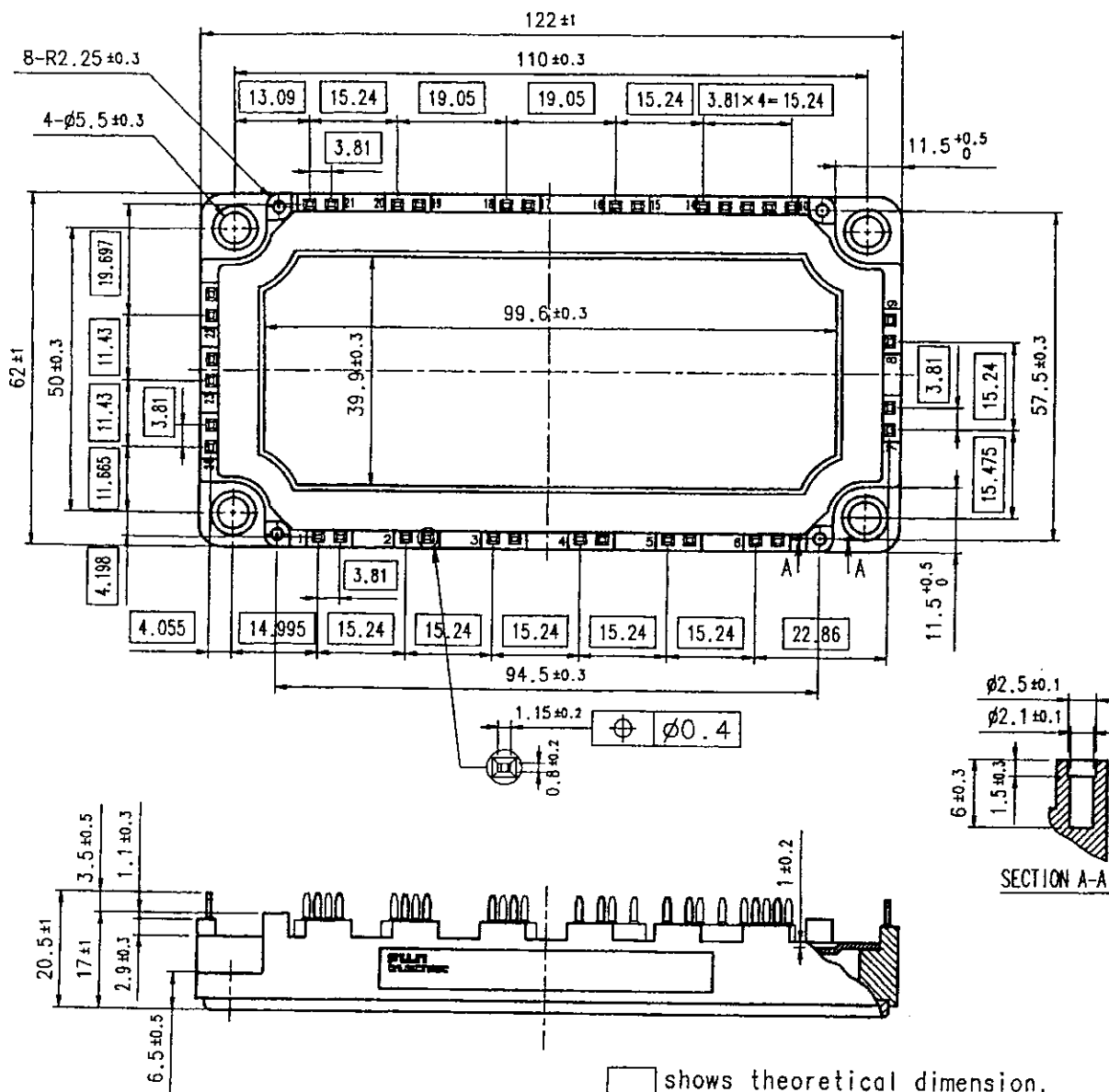
| Date        | Classi-<br>fication | Ind. | Content                      | Applied<br>date | Drawn        | Checked  | Approved    |
|-------------|---------------------|------|------------------------------|-----------------|--------------|----------|-------------|
| Jun.-2-'00  | enactment           | —    | —                            | Issued<br>date  | —            | S. Motta | J. Miyasaka |
| Jun.-14-'00 | Revision            | a    | Revised type miss<br>(P5/10) |                 | J. Kobayashi | S. Motta | J. Miyasaka |
|             |                     |      |                              |                 |              |          |             |
|             |                     |      |                              |                 |              |          |             |
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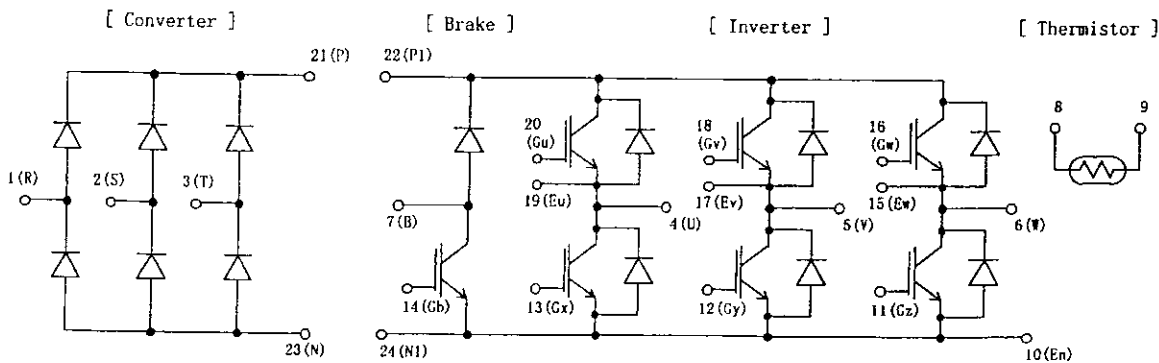
# 7MBR50SB120-01

## 1. Outline Drawing ( Unit : mm )



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## 2. Equivalent circuit



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3. Absolute Maximum Ratings ( at Tc= 25C unless otherwise specified )

| Items                                  |   | Symbols          | Conditions             | Maximum Ratings | Units            |   |
|--|---|------------------|------------------------|-----------------|------------------|---|
| Inverter                               | Collector-Emitter voltage                       | VCES             |                        | 1200            | V                |   |
|  | Gate-Emitter voltage                            | VGES             |                        | +20             | V                |   |
|  | Collector current                               | Ic               | Continuous             | Tc=25C          | 75               | A |
|  |   |                  |                        | Tc=80C          | 50               |   |
|  |   | Icp              | 1ms                    | Tc=25C          | 150              | A |
|  |   |                  |                        | Tc=80C          | 100              |   |
| -Ic                                    |   |                  | 50                     | A               |                  |   |
| Collector Power Dissipation            | Pc  | 1 device         | 360                    | W               |                  |   |
| Brake                                  | Collector-Emitter voltage                       | VCES             |                        | 1200            | V                |   |
|  | Gate-Emitter voltage                            | VGES             |                        | +20             | V                |   |
|  | Collector current                               | Ic               | Continuous             | Tc=25C          | 35               | A |
|  |   |                  |                        | Tc=80C          | 25               |   |
|  |   | Icp              | 1ms                    | Tc=25C          | 70               | A |
|  |   |                  |                        | Tc=80C          | 50               |   |
| Collector Power Dissipation            | Pc  | 1 device         | 180                    | W               |                  |   |
| Repetitive peak reverse Voltage(Diode) | VRRM  |                  | 1200                   | V               |                  |   |
| Converter                              | Repetitive peak reverse Voltage                 | VRRM             |                        | 1600            | V                |   |
|  | Average Output Current                          | Io               | 50Hz/60Hz<br>sine wave | 50              | A                |   |
|  | Surge Current (Non-Repetitive)                  | IFSM             | Tj=150C,10ms           | 520             | A                |   |
|  | I <sup>2</sup> t (Non-Repetitive)               | I <sup>2</sup> t | half sine wave         | 1352            | A <sup>2</sup> s |   |
|  | Junction temperature                            | Tj               |                        | 150             | C                |   |
| Storage temperature                    | Tstg  |                  | -40~ +125              | C               |                  |   |
| Isolation voltage                      | between terminal and copper base <sup>(*)</sup> | Viso             | AC : 1min.             | 2500            | V                |   |
|  | between thermistor and others <sup>(*)</sup>    |                  |                        | 2500            |                  |   |
| Mounting Screw Torque <sup>(*)</sup>   |   |                  |                        | 3.5             | Nm               |   |

(\*)1 All terminals should be connected together when isolation test will be done.

(\*)2 Terminal 8 and 9 should be connected together. Terminal 1 to 7 and 10 to 24 should be connected together and shorted to copper base.

(\*)3 Recommendable Value : 2.5~3.5 Nm (M5)

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4. Electrical characteristics ( at Tj= 25C unless otherwise specified)

| Items                 | Symbols                              | Conditions  | Characteristics                      |          |      | Units |      |   |
|-----------------------|--------------------------------------|-------------|--------------------------------------|----------|------|-------|------|---|
|                       |                                      |             | min.                                 | typ.     | Max. |       |      |   |
| Inverter              | Zero gate voltage Collector current  | ICES        | VGE = 0 V, VCE <sup>①</sup> = 1200 V |          | 1.0  | mA    |      |   |
|                       | Gate-Emitter leakage current         | IGES        | VCE = 0 V, VGE = +20 V               |          | 200  | nA    |      |   |
|                       | Gate-Emitter threshold voltage       | VGE(th)     | VCE = 20 V, Ic = 50 mA               |          | 5.5  | 7.2   | 8.5  | V |
|                       | Collector-Emitter saturation voltage | VCE(sat)    | VGE = 15 V, Ic = 50 A                | chip     | 2.1  |       | V    |   |
|                       |                                      |             |                                      | terminal | 2.3  | 2.7   |      |   |
|                       | Input capacitance                    | Cies        | VGE = 0 V, VCE = 10 V<br>f = 1 MHz   |          | 6000 |       | pF   |   |
|                       | Turn-on time                         | ton         | Vcc = 600 V                          |          | 0.35 | 1.2   | us   |   |
|                       |                                      | tr          | Ic = 50 A                            |          | 0.25 | 0.6   |      |   |
|                       |                                      | tr(0)       | VGE = +15 V                          |          | 0.1  |       |      |   |
|                       | Turn-off time                        | toff        | RG = 24 ohm                          |          | 0.45 | 1.0   | us   |   |
| tf                    |                                      |             |                                      | 0.08     | 0.3  |       |      |   |
| Forward on voltage    | VF                                   | IF = 50 A   | chip                                 | 2.3      |      | V     |      |   |
|                       |                                      |             | terminal                             | 2.5      | 3.3  |       |      |   |
| Reverse recovery time | trr                                  | IF = 50 A   |                                      |          | 350  | ns    |      |   |
| Brake                 | Zero gate voltage Collector current  | ICES        | VGE = 0 V, VCE <sup>①</sup> = 1200 V |          | 1.0  | mA    |      |   |
|                       | Gate-Emitter leakage current         | IGES        | VCE = 0 V, VGE = +20 V               |          | 200  | nA    |      |   |
|                       | Collector-Emitter saturation voltage | VCE(sat)    | VGE = 15 V, Ic = 25 A                | chip     | 2.1  |       | V    |   |
|                       |                                      |             |                                      | terminal | 2.25 | 2.7   |      |   |
|                       | Turn-on time                         | ton         | Vcc = 600 V                          |          | 0.35 | 1.2   | us   |   |
|                       |                                      | tr          | Ic = 25 A                            |          | 0.25 | 0.6   |      |   |
|                       | Turn-off time                        | toff        | VGE = +15 V                          |          | 0.45 | 1.0   | us   |   |
| tf                    |                                      | RG = 51 ohm |                                      | 0.08     | 0.3  |       |      |   |
| Reverse current       | IRRM                                 | VR = 1200 V |                                      |          | 1.0  | mA    |      |   |
| Converter             | Forward on voltage                   | VFM         | IF = 50 A                            | chip     | 1.1  |       | V    |   |
|                       |                                      |             |                                      | terminal | 1.2  | 1.5   |      |   |
| Reverse current       | IRRM                                 | VR = 1600 V |                                      |          | 1.0  | mA    |      |   |
| Thermistor            | Resistance                           | R           | T = 25C                              | 5000     |      | ohm   |      |   |
|                       |                                      |             | T = 100C                             | 465      | 495  |       | 520  |   |
|                       | B value                              | B           | T = 25/50C                           |          | 3305 | 3375  | 3450 | K |

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5. Thermal resistance characteristics

| Items                            | Symbols  | Conditions                | Characteristics |      |      | Units |
|----------------------------------|----------|---------------------------|-----------------|------|------|-------|
|                                  |          |                           | min.            | typ. | Max. |       |
| Thermal resistance<br>(1 device) | Rth(j-c) | Inverter IGBT             |                 |      | 0.35 | C/W   |
|                                  |          | Inverter FWD              |                 |      | 0.75 |       |
|                                  |          | Brake IGBT                |                 |      | 0.69 |       |
|                                  |          | Converter Diode           |                 |      | 0.50 |       |
| Contact Thermal resistance       | Rth(c-f) | with Thermal Compound (*) |                 | 0.05 |      | C/W   |

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

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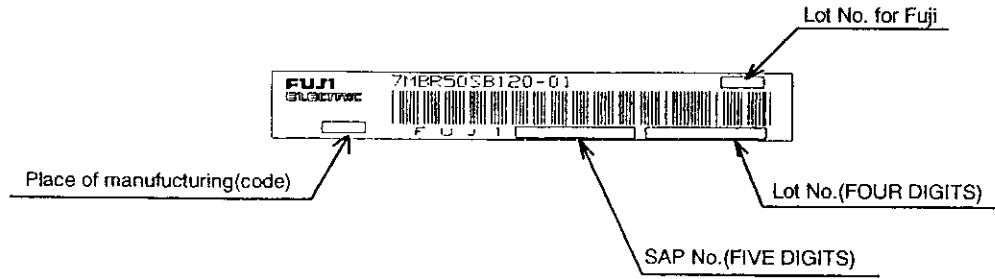
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6. Indication on module



7. Applicable category

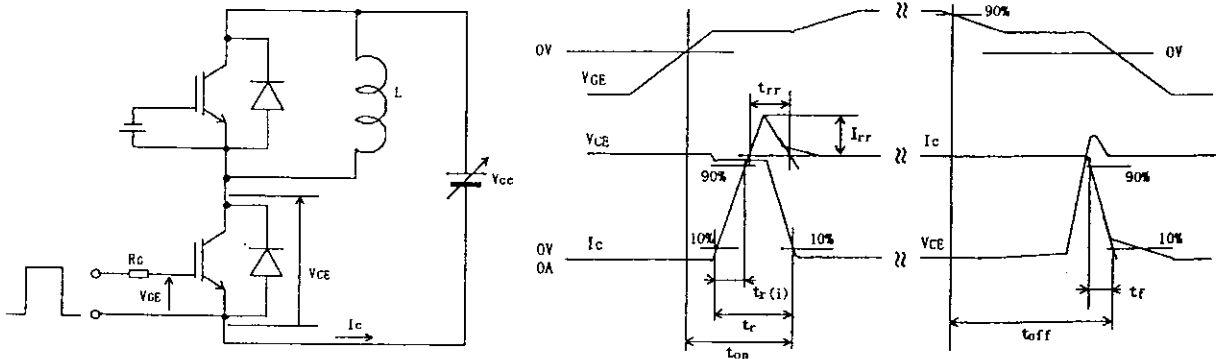
This specification is applied to Power Integrated Module named 7MBR50SB120-01 .

8. Storage and transportation notes

- The module should be stored at a standard temperature of 5 to 35°C and humidity of 45 to 75% .
- Store modules in a place with few temperature changes in order to avoid condensation on the module surface.
- Avoid exposure to corrosive gases and dust.
- Avoid excessive external force on the module.
- Store modules with unprocessed terminals.
- Do not drop or otherwise shock the modules when transporting.
- Please connect adequate fuse or protector of circuit between three-phase line and this product to prevent the equipment from causing secondary destruction.

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9. Definitions of switching time



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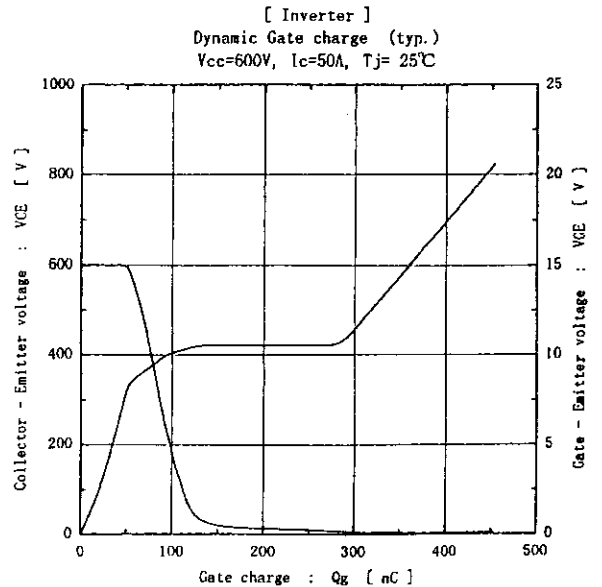
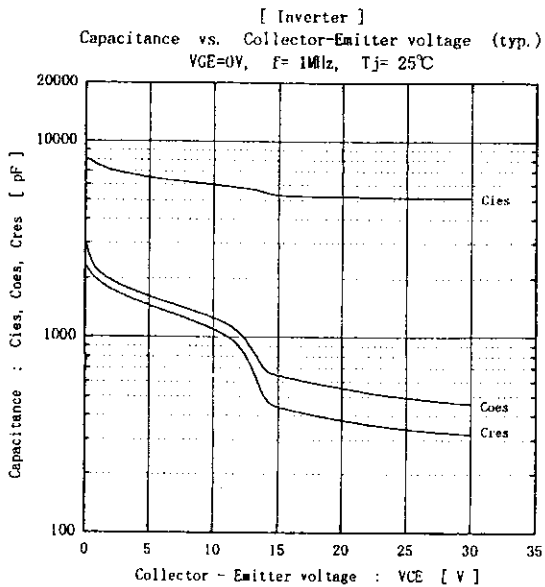
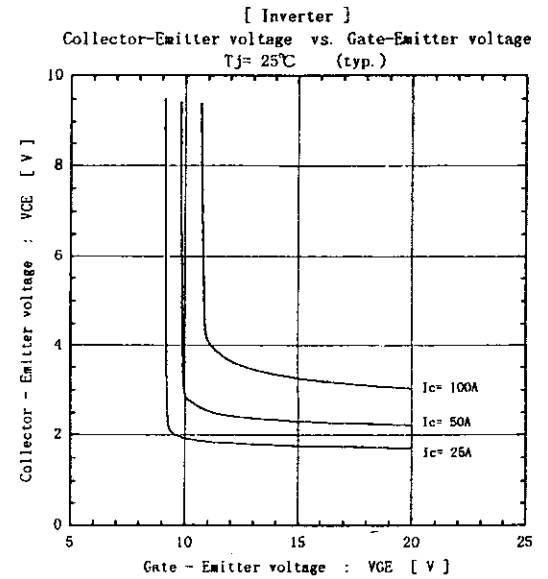
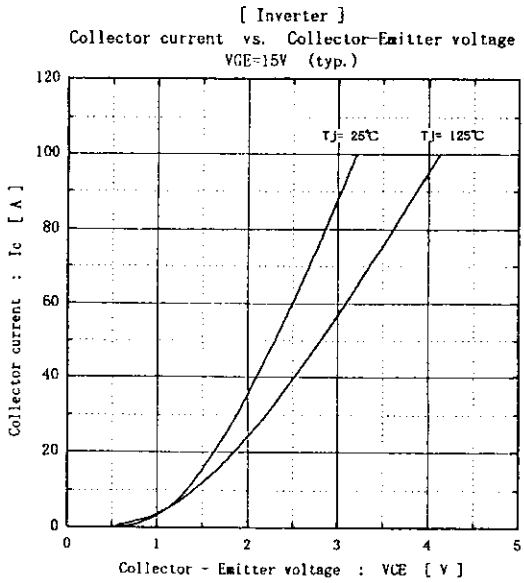
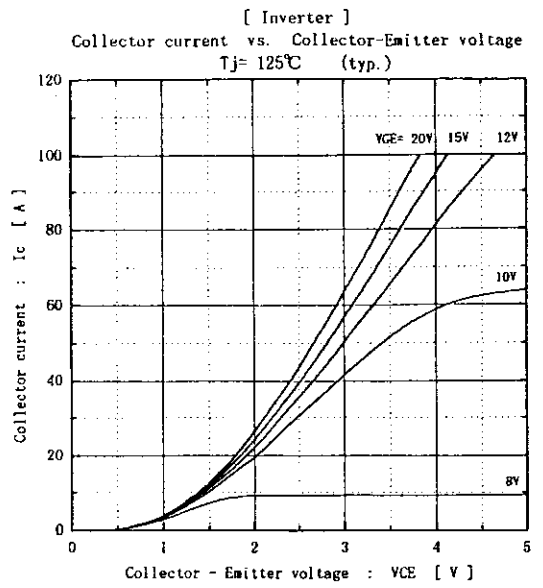
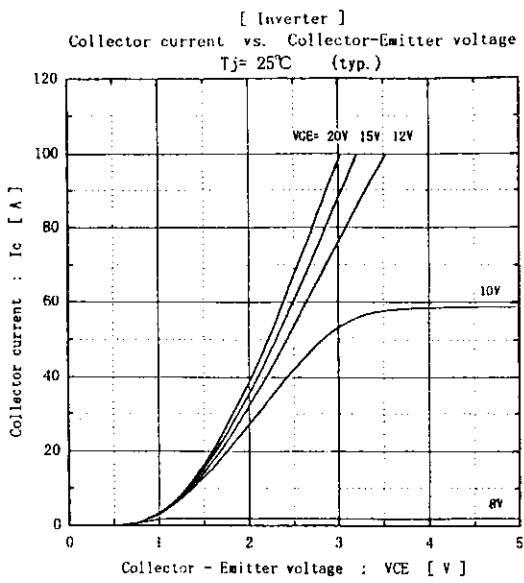
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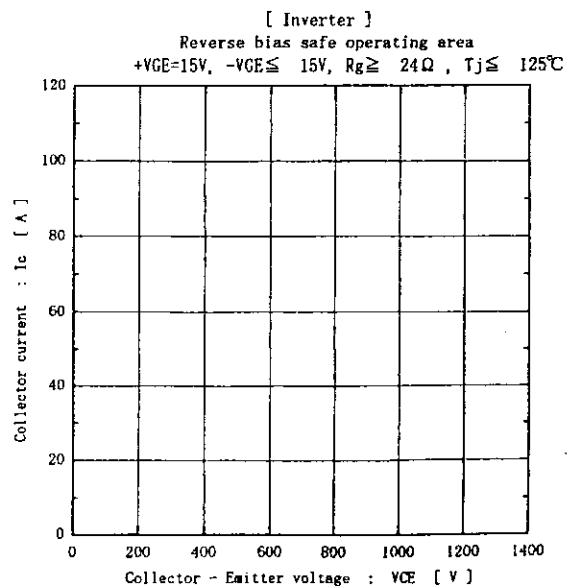
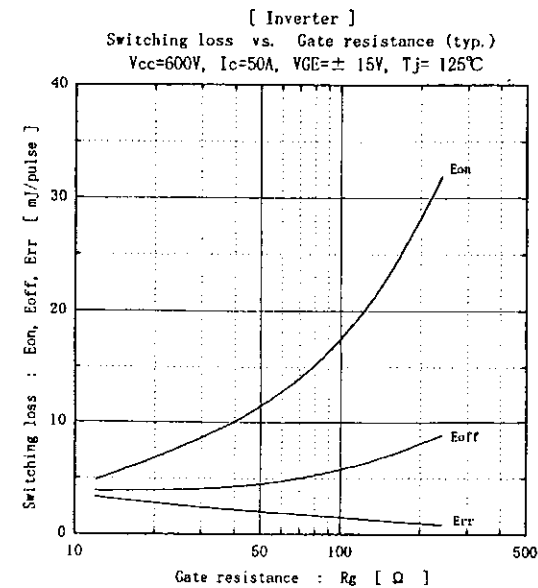
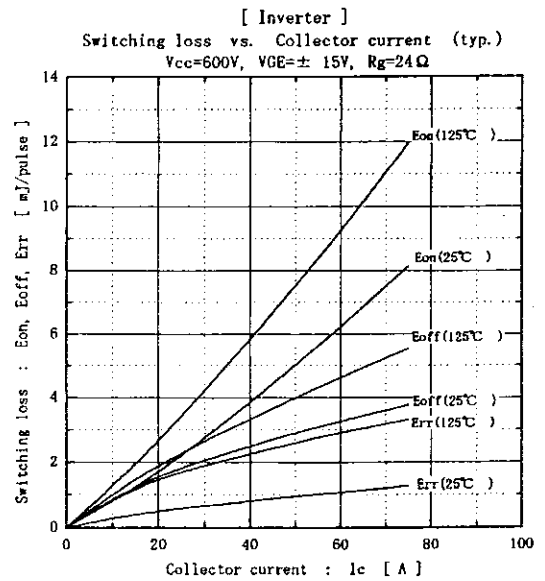
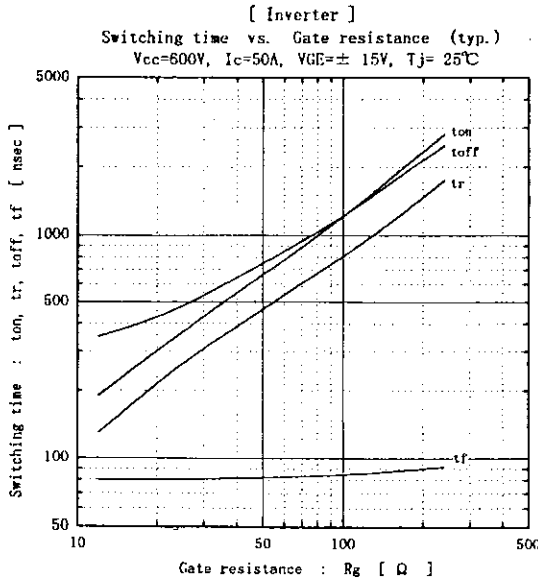
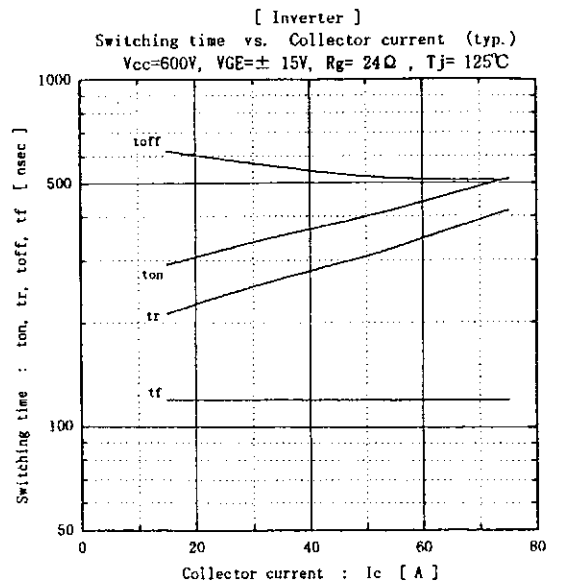
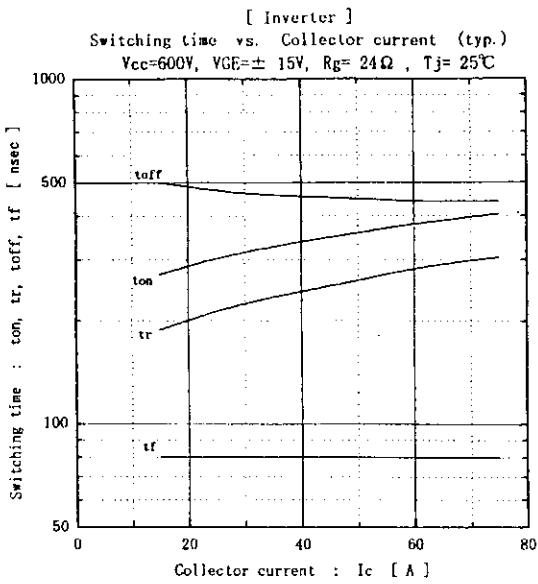
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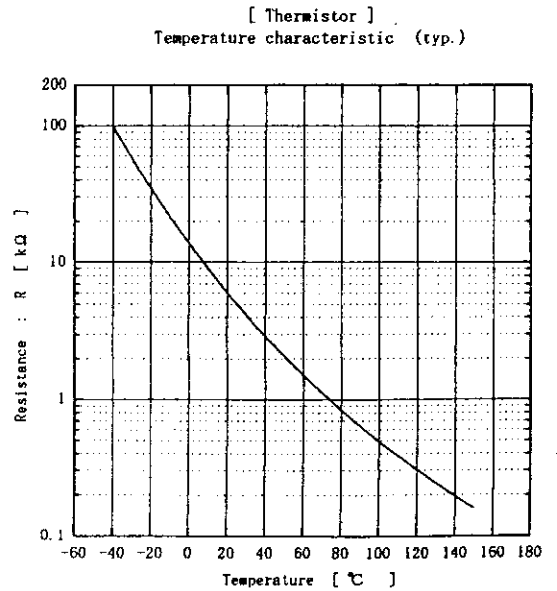
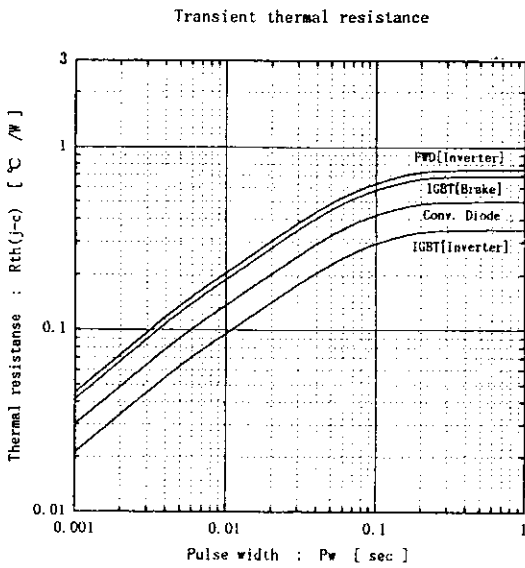
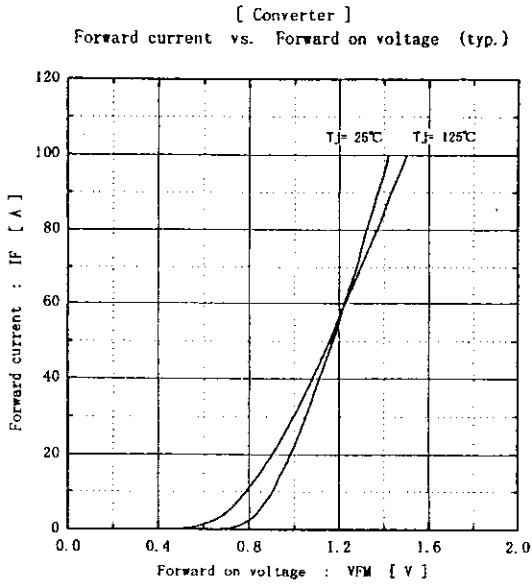
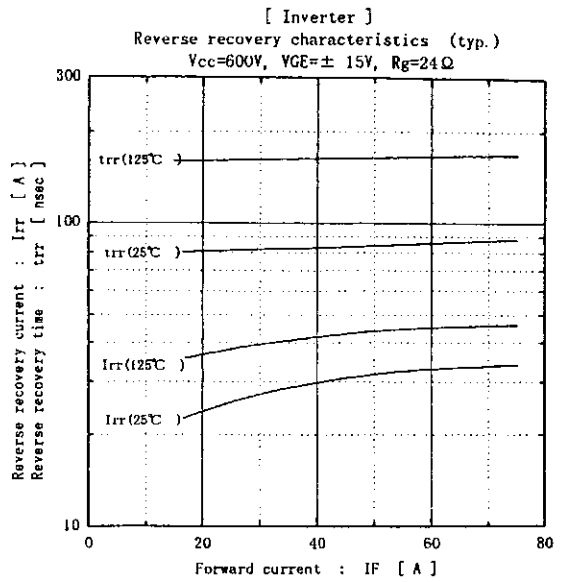
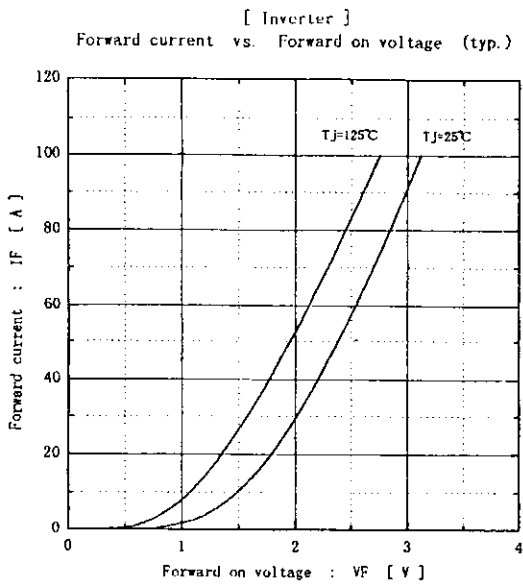
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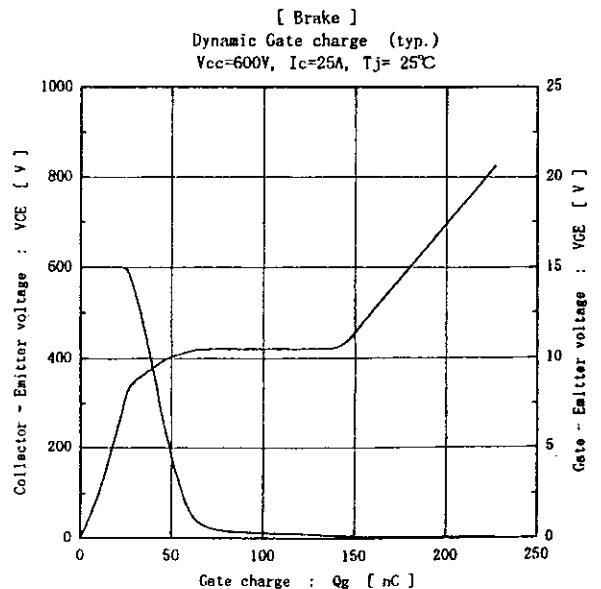
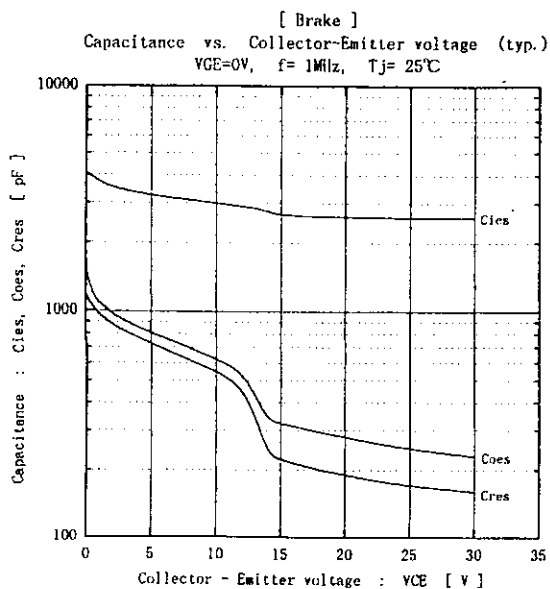
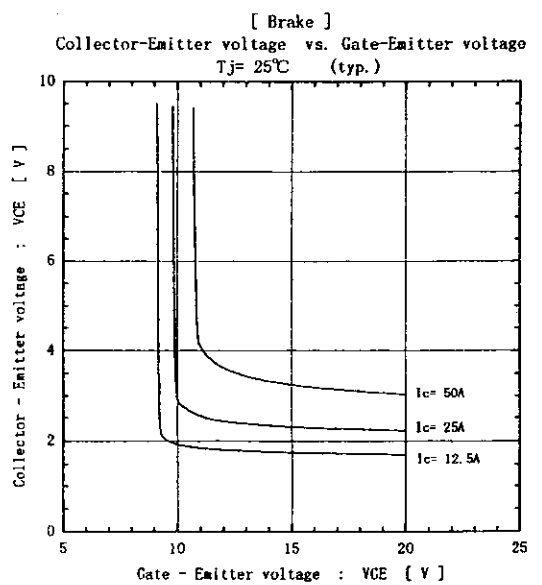
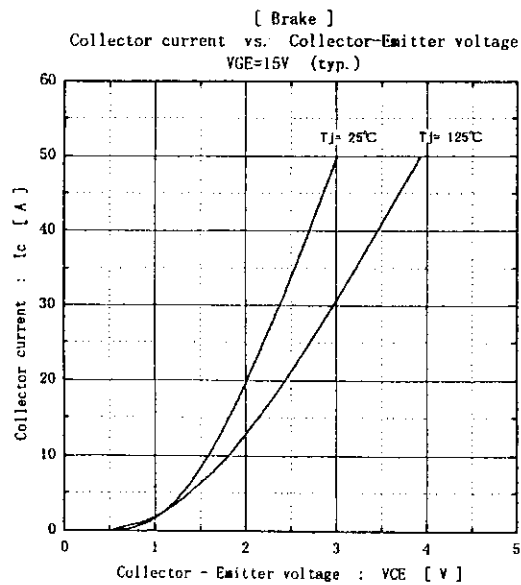
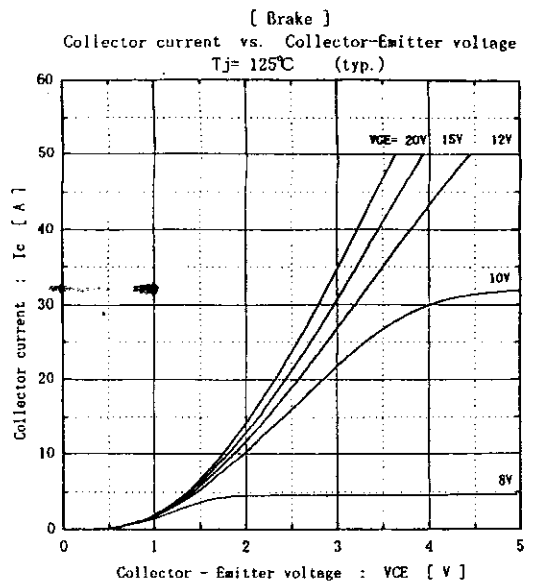
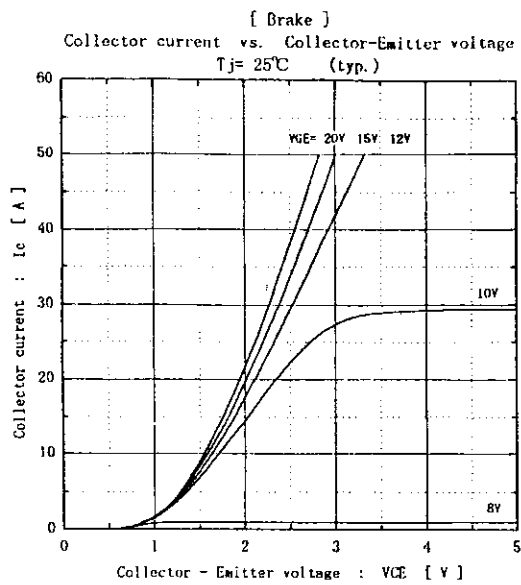
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