

# 1MBC05-060, 1MBC05D-060, 1MBG05D-060

Molded IGBT

## 600V / 5A

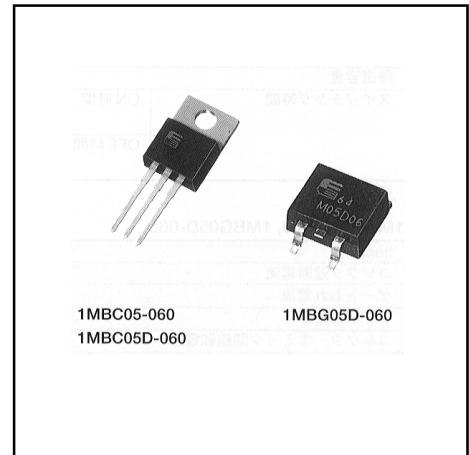
## Molded Package

### ■ Features

- Small molded package
- Low power loss
- Soft switching with low switching surge and noise
- High reliability, high ruggedness (RBSOA, SCSOA etc.)
- Comprehensive line-up

### ■ Applications

- Inverter for Motor drive
- AC and DC Servo drive amplifier
- Uninterruptible power supply



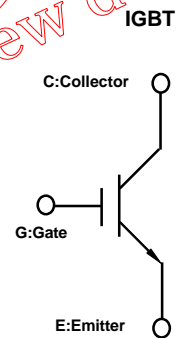
### ■ Maximum ratings and characteristics

- Absolute maximum ratings (at Tc=25°C unless otherwise specified)

#### 1MBC05-060 / IGBT

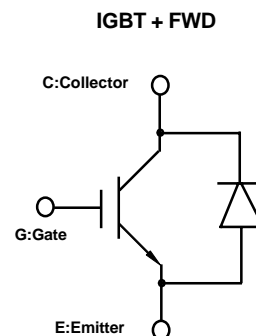
| Item                         | Symbol           | Rating                | Unit                  |
|------------------------------|------------------|-----------------------|-----------------------|
| Collector-Emitter voltage    | V <sub>CES</sub> | 600                   | V                     |
| Gate-Emitter voltage         | V <sub>GES</sub> | ±20                   | V                     |
| Collector current            | DC               | T <sub>c</sub> =25°C  | I <sub>c25</sub> 13 A |
|                              |                  | T <sub>c</sub> =100°C | I <sub>c100</sub> 5 A |
|                              | 1ms              | T <sub>c</sub> =25°C  | I <sub>cp</sub> 52 A  |
| Max. power dissipation(IGBT) | P <sub>c</sub>   | 50                    | W                     |
| Operating temperature        | T <sub>j</sub>   | +150                  | °C                    |
| Storage temperature          | T <sub>stg</sub> | -40 to +150           | °C                    |
| Screw torque                 | -                | 40                    | N·m                   |

### ■ Equivalent Circuit Schematic



#### 1MBC05D-060, 1MBG05D-060 / IGBT+FWD

| Item                          | Symbol           | Rating                | Unit                  |
|-------------------------------|------------------|-----------------------|-----------------------|
| Collector-Emitter voltage     | V <sub>CES</sub> | 600                   | V                     |
| Gate-Emitter voltage          | V <sub>GES</sub> | ±20                   | V                     |
| Collector current             | DC               | T <sub>c</sub> =25°C  | I <sub>c25</sub> 13 A |
|                               |                  | T <sub>c</sub> =100°C | I <sub>c100</sub> 5 A |
|                               | 1ms              | T <sub>c</sub> =25°C  | I <sub>cp</sub> 52 A  |
| Max. power dissipation (IGBT) | P <sub>c</sub>   | 50                    | W                     |
| Max. power dissipation (FWD)  | P <sub>c</sub>   | 25                    | W                     |
| Operating temperature         | T <sub>j</sub>   | +150                  | °C                    |
| Storage temperature           | T <sub>stg</sub> | -40 to +150           | °C                    |
| Screw torque                  | -                | 40                    | N·m                   |



● Electrical characteristics (at Tj=25°C unless otherwise specified)

1MBC05-060 / IGBT

| Item                                 | Symbol   | Characteristics |      |      | Conditions       | Unit |
|--------------------------------------|----------|-----------------|------|------|------------------|------|
|                                      |          | Min.            | Typ. | Max. |                  |      |
| Zero gate voltage collector current  | ICES     | -               | -    | 1.0  | VGE=0V, VCE=600V | mA   |
| Gate-Emitter leakage current         | IGES     | -               | -    | 20   | VCE=0V, VGE=±20V | µA   |
| Gate-Emitter threshold voltage       | VGE(th)  | 5.5             | -    | 8.5  | VCE=20V, Ic=5mA  | V    |
| Collector-Emitter saturation voltage | VCE(sat) | -               | -    | 3.0  | VGE=15V, Ic=5A   | V    |
| Input capacitance                    | Cies     | -               | 400  | -    | VGE=0V           | pF   |
| Output capacitance                   | Coes     | -               | 85   | -    | VCE=10V          |      |
| Reverse transfer capacitance         | Cres     | -               | 15   | -    | f=1MHz           |      |
| Turn-on time                         | ton      | -               | -    | 1.2  | VCC=300V Ic=5A   | µs   |
|                                      | tr       | -               | -    | 0.6  | VGE=±15V         |      |
| Turn-off time                        | toff     | -               | -    | 1.0  | RG=330 ohm       | µs   |
|                                      | tf       | -               | -    | 0.35 | (Half Bridge)    |      |

1MBC05D-060, 1MBG05D-060 / IGBT+FWD

| Item                                 | Symbol   | Characteristics |      |      | Conditions                     | Unit |
|--------------------------------------|----------|-----------------|------|------|--------------------------------|------|
|                                      |          | Min.            | Typ. | Max. |                                |      |
| Zero gate voltage collector current  | ICES     | -               | -    | 1.0  | VGE=0V, VCE=600V               | mA   |
| Gate-Emitter leakage current         | IGES     | -               | -    | 20   | VCE=0V, VGE=±20V               | µA   |
| Gate-Emitter threshold voltage       | VGE(th)  | 5.5             | -    | 8.5  | VCE=20V, Ic=5mA                | V    |
| Collector-Emitter saturation voltage | VCE(sat) | -               | -    | 3.0  | VGE=15V, Ic=5A                 | V    |
| Input capacitance                    | Cies     | -               | 400  | -    | VGE=0V                         | pF   |
| Output capacitance                   | Coes     | -               | 85   | -    | VCE=10V                        |      |
| Reverse transfer capacitance         | Cres     | -               | 15   | -    | f=1MHz                         |      |
| Turn-on time                         | ton      | -               | -    | 1.2  | VCC=300V, Ic=5A                | µs   |
|                                      | tr       | -               | -    | 0.6  | VGE=±15V                       |      |
| Turn-off time                        | toff     | -               | -    | 1.0  | RG=330 ohm                     | µs   |
|                                      | tf       | -               | -    | 0.35 | (Half Bridge)                  |      |
| FWD forward on voltage               | VF       | -               | -    | 3.0  | IF=5A, VGE=0V                  | V    |
| Reverse recovery time                | trr      | -               | -    | 0.3  | IF=5A, VGE=-10V, di/dt=100A/µs | µs   |

● Thermal resistance characteristics

1MBC05-060 / IGBT

| Item               | Symbol   | Characteristics |      |      | Conditions | Unit |
|--------------------|----------|-----------------|------|------|------------|------|
|                    |          | Min.            | Typ. | Max. |            |      |
| Thermal resistance | Rth(j-c) | -               | -    | 2.50 | IGBT       | °C/W |

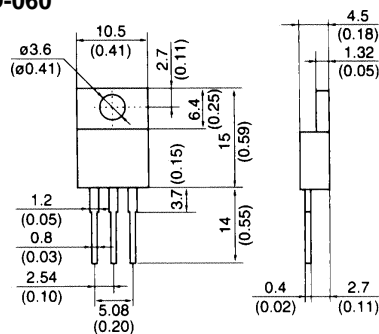
1MBC05D-060, 1MBG05D-060 / IGBT+FWD

| Item               | Symbol   | Characteristics |      |      | Conditions | Unit |
|--------------------|----------|-----------------|------|------|------------|------|
|                    |          | Min.            | Typ. | Max. |            |      |
| Thermal resistance | Rth(j-c) | -               | -    | 2.50 | IGBT       | °C/W |
|                    | Rth(j-c) | -               | -    | 5.00 | FWD        | °C/W |

■ Outline drawings, mm

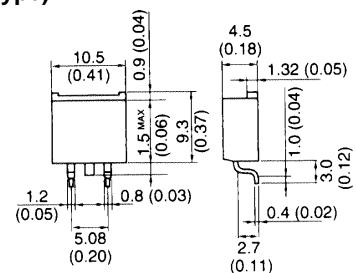
1MBC05-060, 1MBC05D-060

TO-220AB



1MBG05D-060

T pack-S (SMD type)

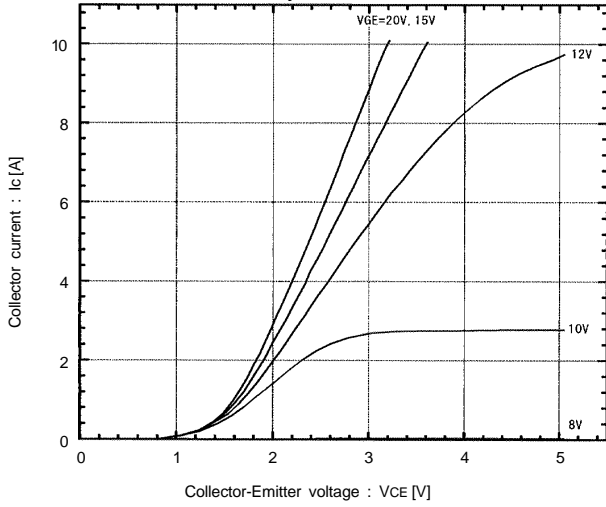


Characteristics

1MBC05-060, 1MBC05D-060, 1MBG05D-060

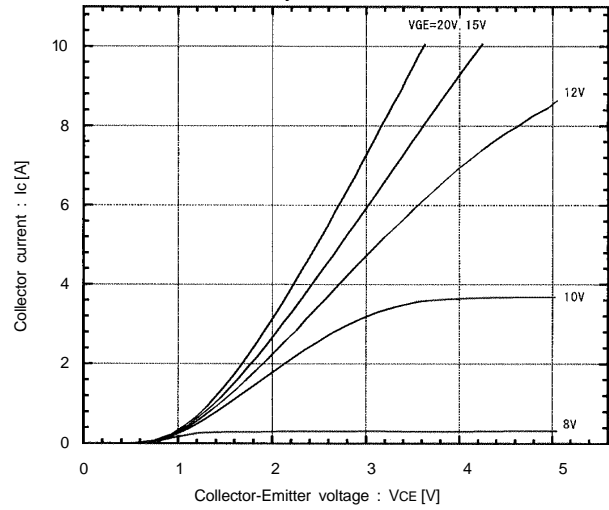
Collector current vs. Collector-Emitter voltage

T<sub>j</sub>=25°C



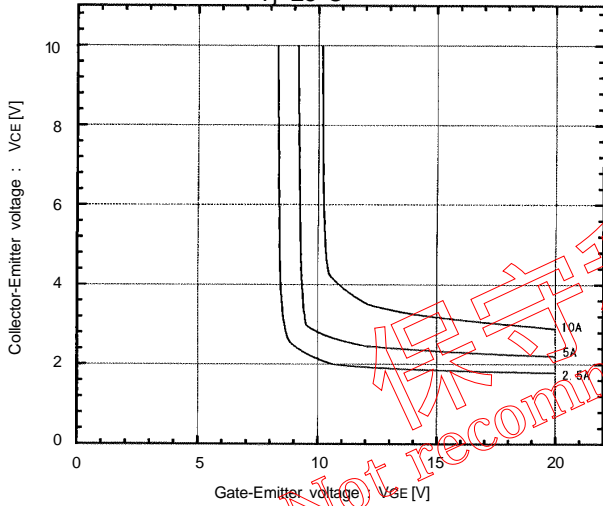
Collector current vs. Collector-Emitter voltage

T<sub>j</sub>=125°C



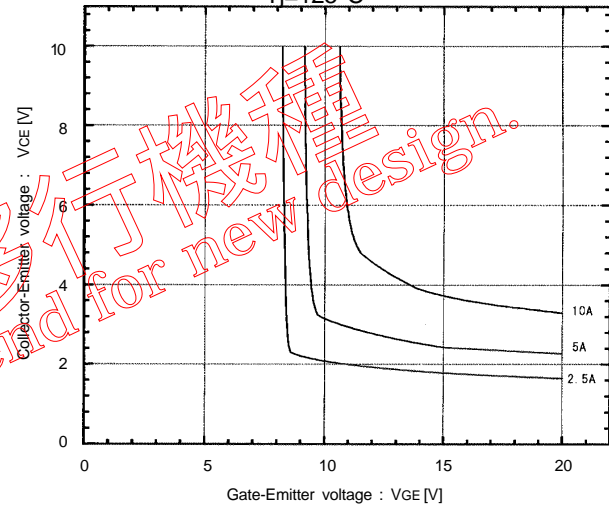
Collector-Emitter vs. Gate-Emitter voltage

T<sub>j</sub>=25°C



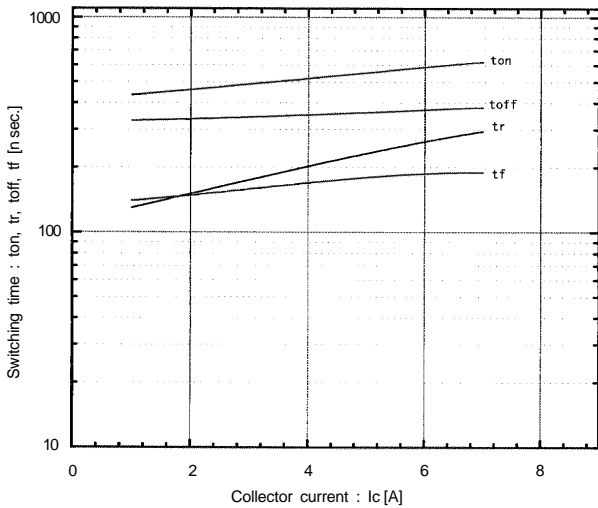
Collector-Emitter vs. Gate-Emitter voltage

T<sub>j</sub>=125°C



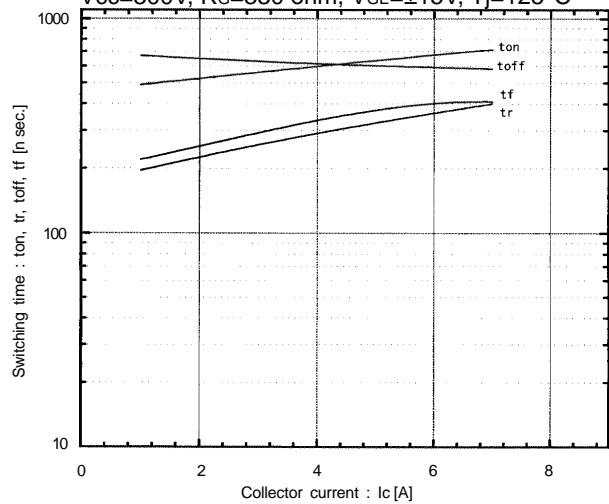
Switching time vs. Collector current

V<sub>CC</sub>=300V, R<sub>G</sub>=330 ohm, V<sub>GE</sub>=±15V, T<sub>j</sub>=25°C



Switching time vs. Collector current

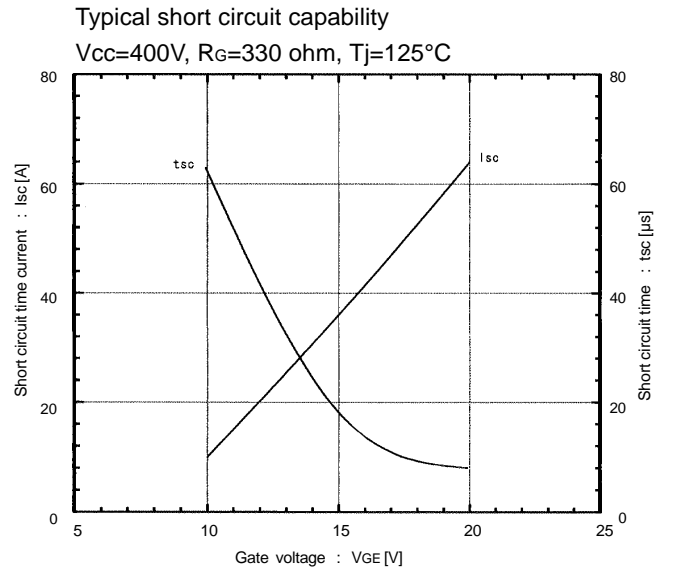
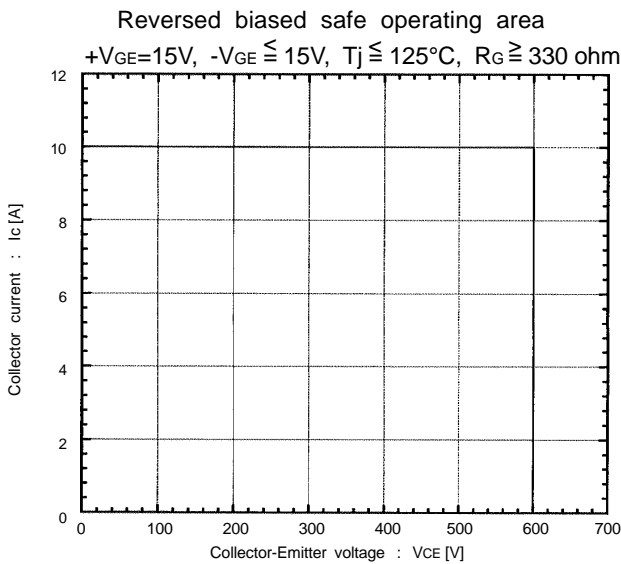
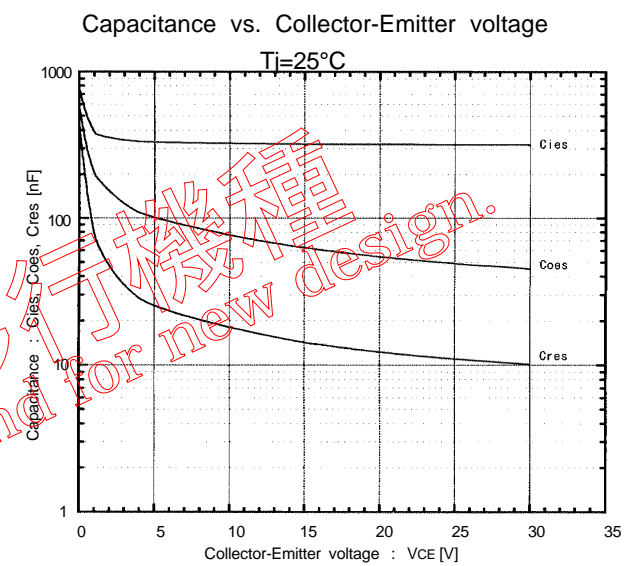
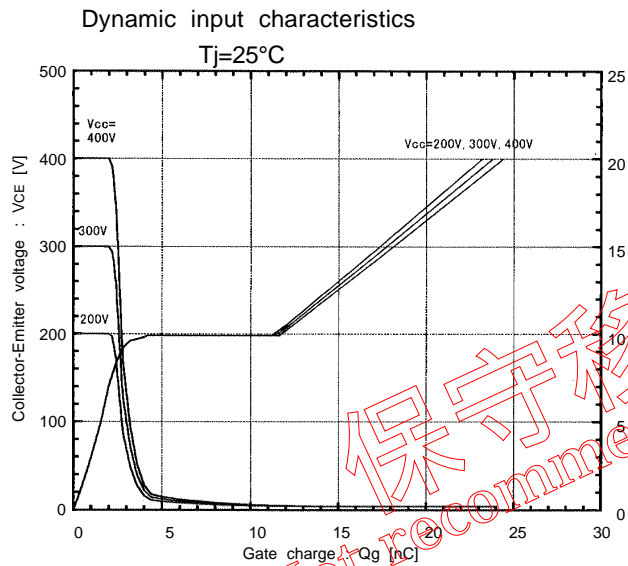
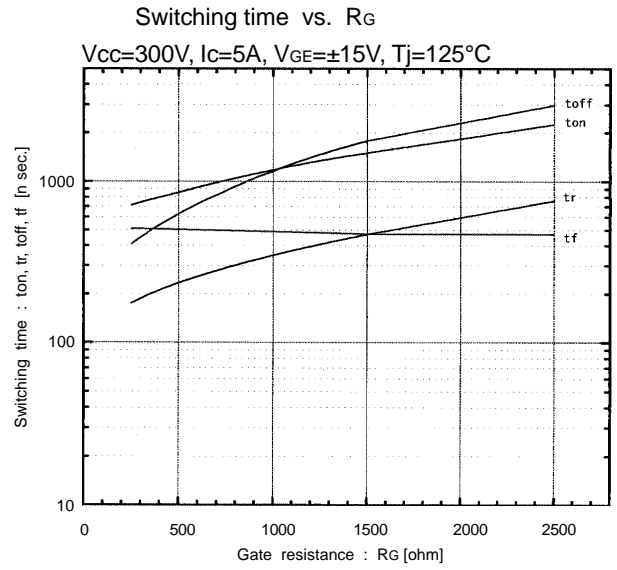
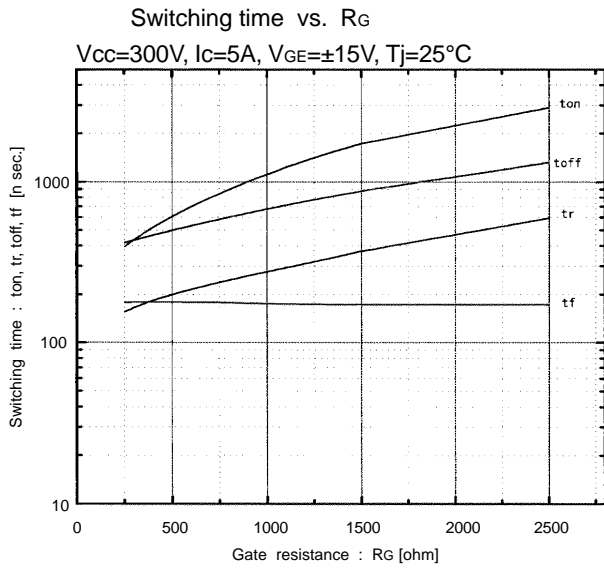
V<sub>CC</sub>=300V, R<sub>G</sub>=330 ohm, V<sub>GE</sub>=±15V, T<sub>j</sub>=125°C



Not recommend for new design.

Characteristics

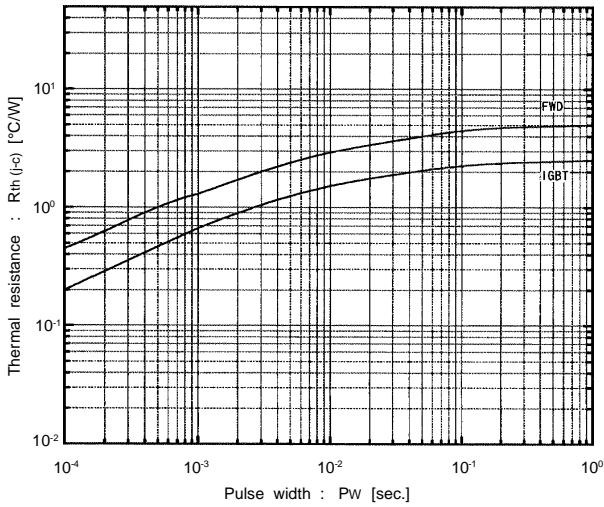
1MBC05-060, 1MBC05D-060, 1MBG05D-060



■ Characteristics

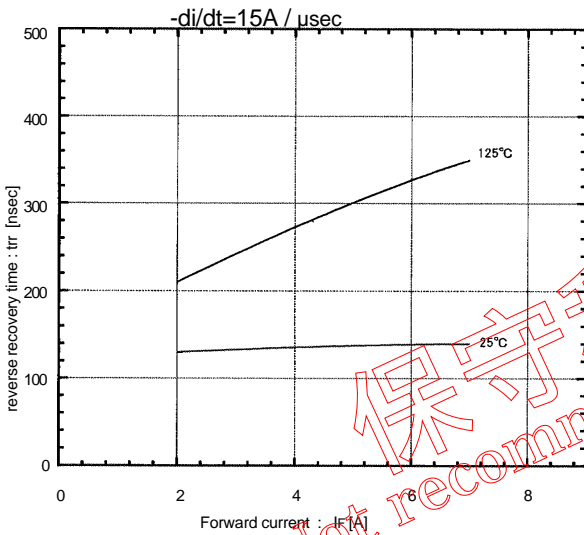
1MBC05-060, 1MBC05D-060, 1MBG05D-060

Transient thermal resistance

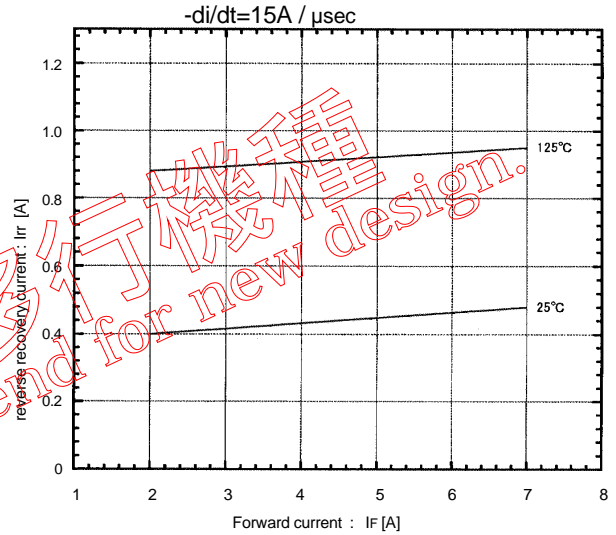


1MBC05D-060, 1MBG05D-060

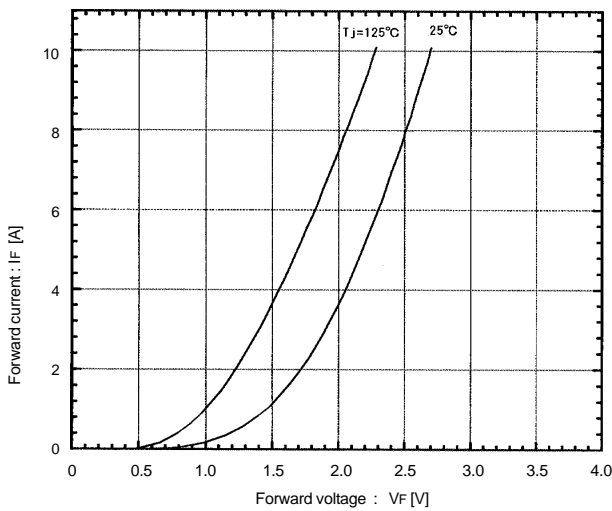
Reverse recovery time vs. Forward current



Reverse recovery current vs. Forward current



Forward current vs. Forward voltage



Reverse recovery time characteristics vs. -di/dt

