

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

Molded IGBT

600V / 5A

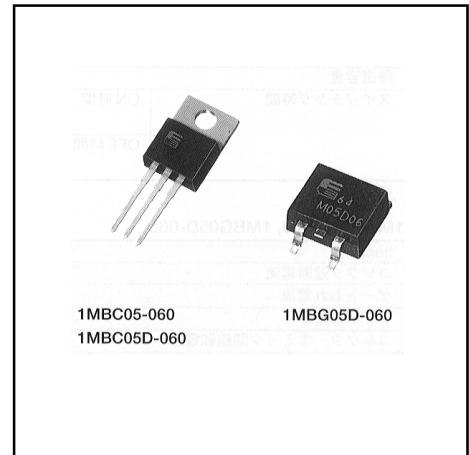
Molded Package

■ 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 $T_c=25^\circ\text{C}$ unless otherwise specified)

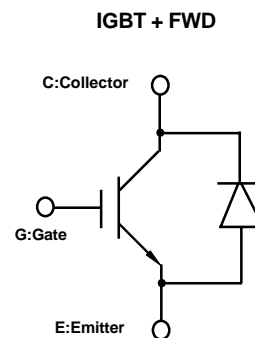
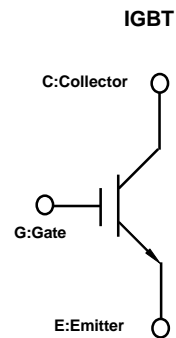
1MBC05-060 / IGBT

| Item | Symbol | Rating | Unit | | |
|------------------------------|-----------|-------------------------|------------------|----|---|
| Collector-Emitter voltage | V_{CES} | 600 | V | | |
| Gate-Emitter voltage | V_{GES} | ± 20 | V | | |
| Collector current | DC | $T_c=25^\circ\text{C}$ | I_{C25} | 13 | A |
| | | $T_c=100^\circ\text{C}$ | I_{C100} | 5 | A |
| | 1ms | $T_c=25^\circ\text{C}$ | I_{cp} | 52 | A |
| Max. power dissipation(IGBT) | P_c | 50 | W | | |
| Operating temperature | T_j | +150 | $^\circ\text{C}$ | | |
| Storage temperature | T_{stg} | -40 to +150 | $^\circ\text{C}$ | | |
| Screw torque | - | 40 | N·m | | |

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

| Item | Symbol | Rating | Unit | | |
|-------------------------------|-----------|-------------------------|------------------|----|---|
| Collector-Emitter voltage | V_{CES} | 600 | V | | |
| Gate-Emitter voltage | V_{GES} | ± 20 | V | | |
| Collector current | DC | $T_c=25^\circ\text{C}$ | I_{C25} | 13 | A |
| | | $T_c=100^\circ\text{C}$ | I_{C100} | 5 | A |
| | 1ms | $T_c=25^\circ\text{C}$ | I_{cp} | 52 | A |
| Max. power dissipation (IGBT) | P_c | 50 | W | | |
| Max. power dissipation (FWD) | P_c | 25 | W | | |
| Operating temperature | T_j | +150 | $^\circ\text{C}$ | | |
| Storage temperature | T_{stg} | -40 to +150 | $^\circ\text{C}$ | | |
| Screw torque | - | 40 | N·m | | |

■ Equivalent Circuit Schematic



● 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 | (Half Bridge) |
| | tf | – | – | 0.35 | | |

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 | (Half Bridge) |
| | tf | – | – | 0.35 | | |
| 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 |

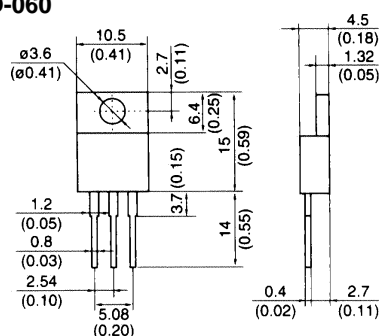
1MBC05D-060, 1MBG05D-060 / IGBT+FWD

| 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

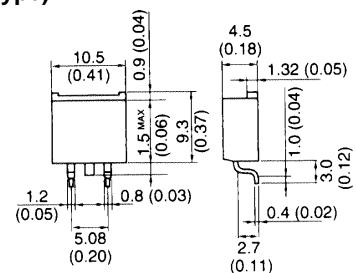
1MBC05-060, 1MBC05D-060

TO-220AB



1MBG05D-060

T pack-S (SMD type)

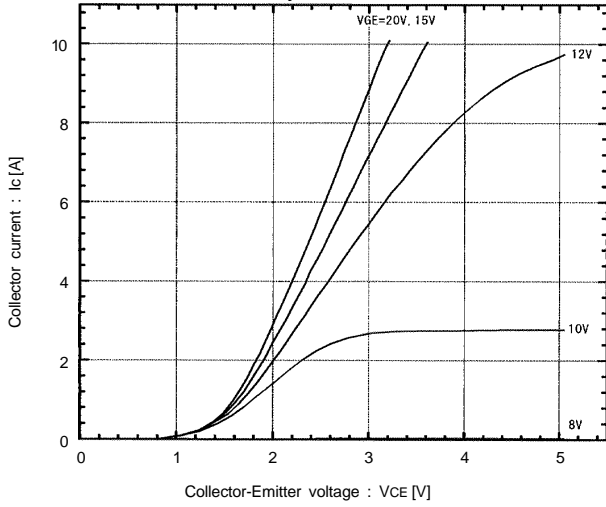


Characteristics

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

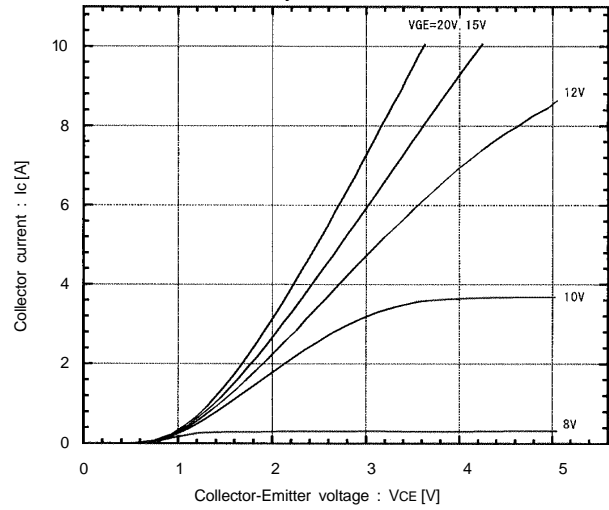
Collector current vs. Collector-Emmitter voltage

$T_j=25^\circ\text{C}$



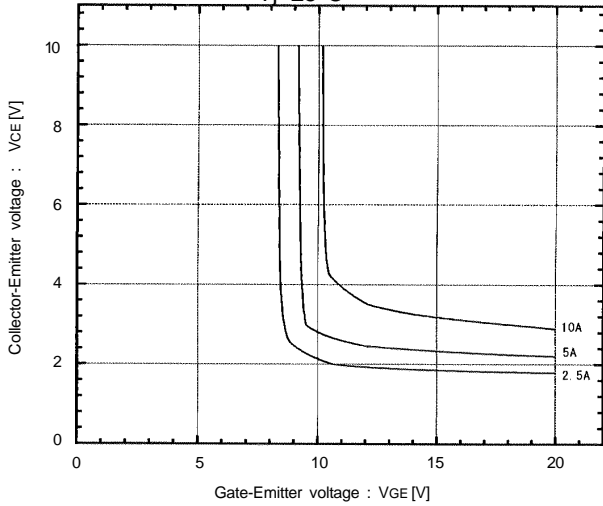
Collector current vs. Collector-Emmitter voltage

$T_j=125^\circ\text{C}$



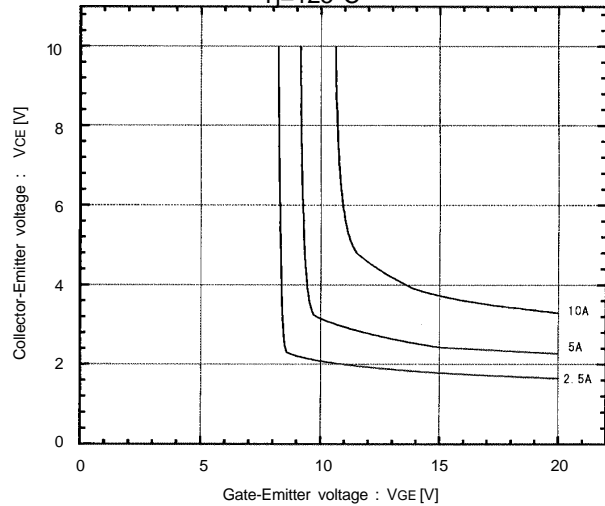
Collector-Emmitter vs. Gate-Emmitter voltage

$T_j=25^\circ\text{C}$



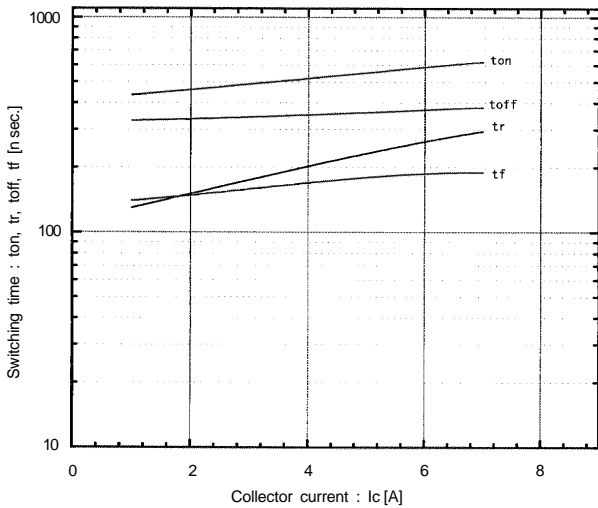
Collector-Emmitter vs. Gate-Emmitter voltage

$T_j=125^\circ\text{C}$



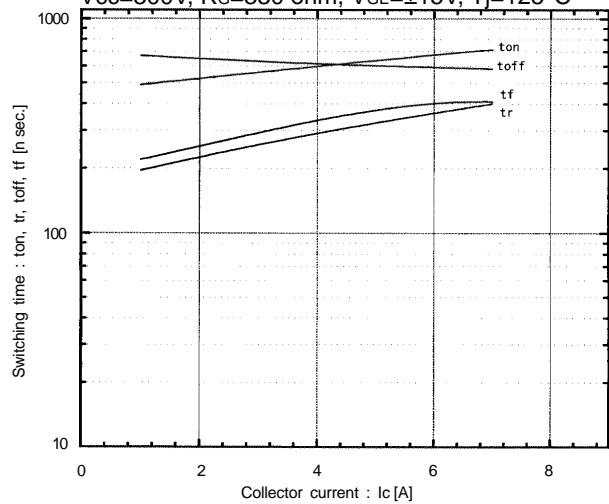
Switching time vs. Collector current

$V_{CC}=300\text{V}$, $R_G=330\text{ ohm}$, $V_{GE}=\pm 15\text{V}$, $T_j=25^\circ\text{C}$



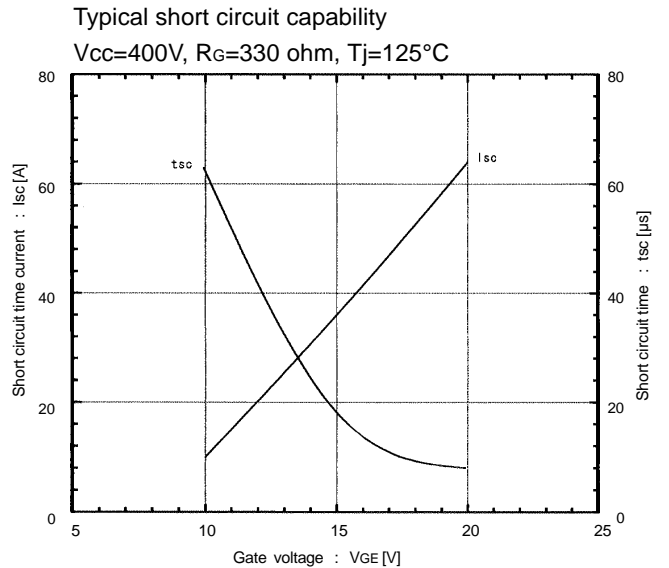
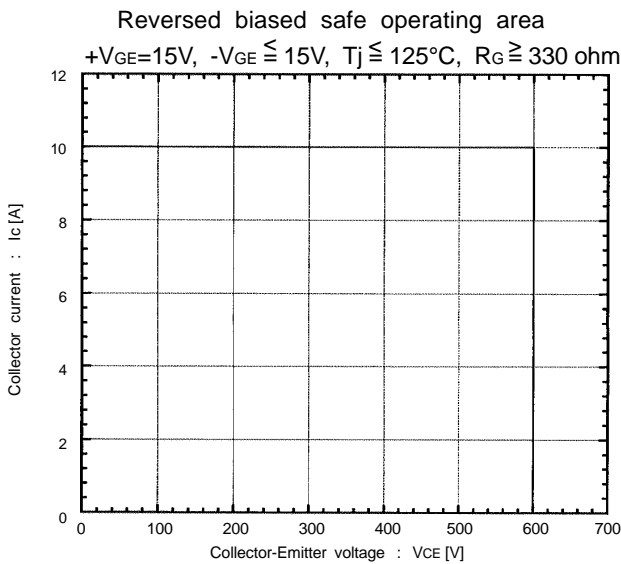
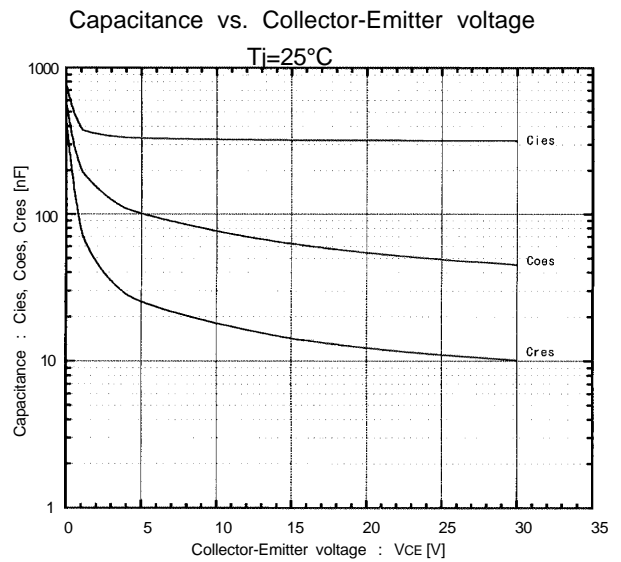
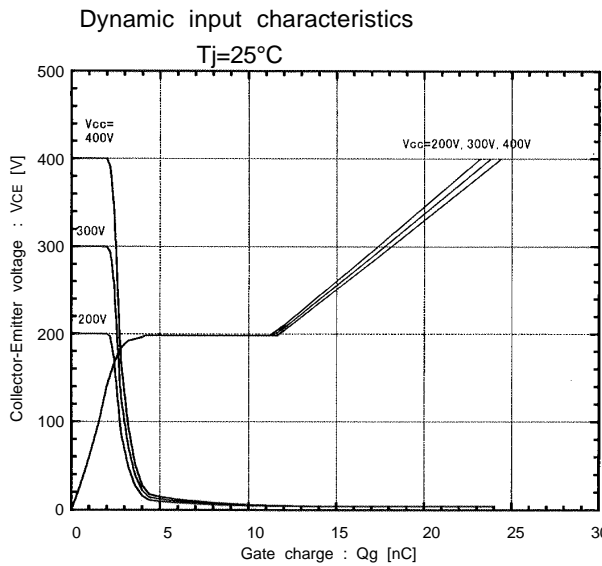
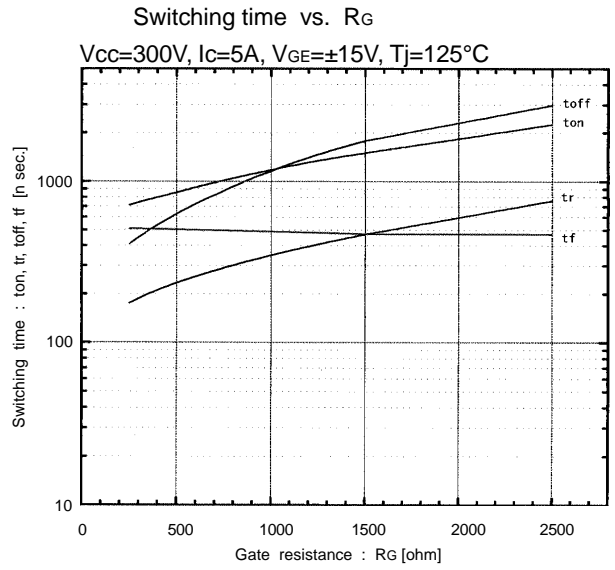
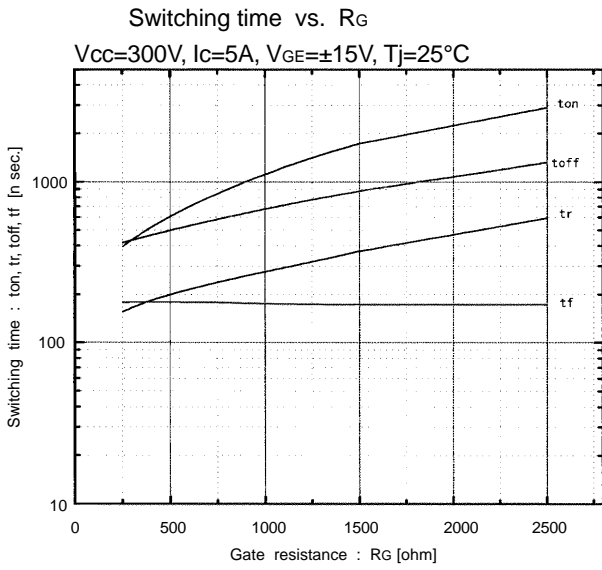
Switching time vs. Collector current

$V_{CC}=300\text{V}$, $R_G=330\text{ ohm}$, $V_{GE}=\pm 15\text{V}$, $T_j=125^\circ\text{C}$



Characteristics

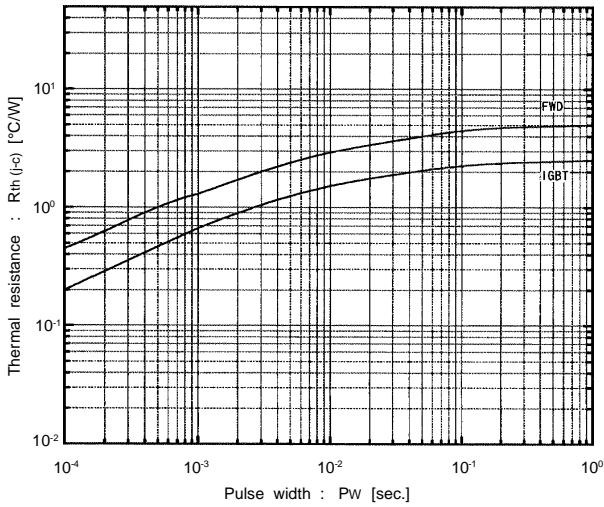
1MBC05-060, 1MBC05D-060, 1MBG05D-060



■ Characteristics

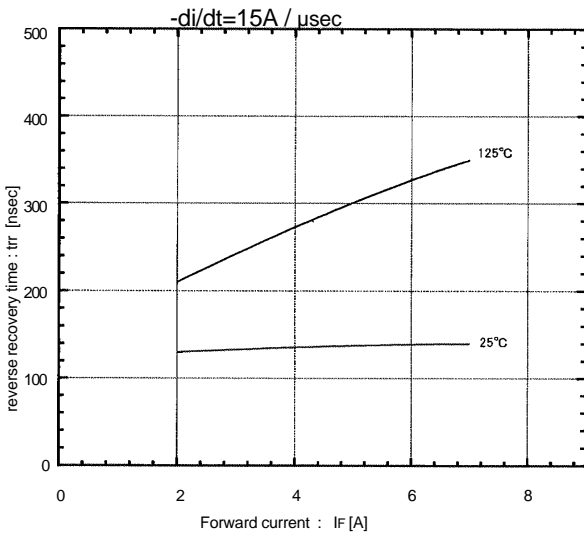
1MBC05-060,1MBC05D-060,1MBG05D-060

Transient thermal resistance

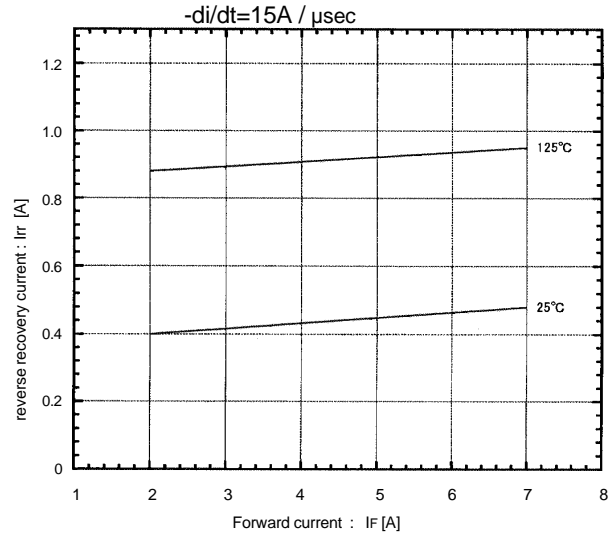


1MBC05D-060,1MBG05D-060

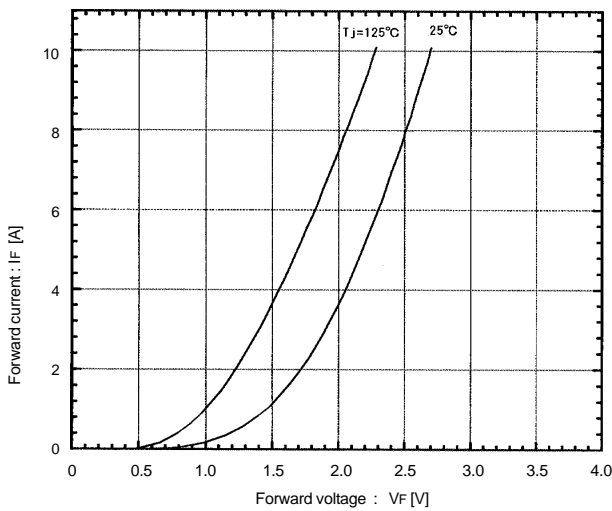
Reverse recovery time vs. Forward current



Reverse recovery current vs. Forward current



Forward current vs. Forward voltage



Reverse recovery time characteristics vs. -di/dt

