

2MBI600VG-120P

IGBT Modules

IGBT MODULE (V series) 1200V / 600A / 2 in one package

■ Features

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

■ Applications

- Inverter for Motor Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply
- Industrial machines, such as Welding machines



■ Maximum Ratings and Characteristics

● Absolute Maximum Ratings (at Tc= 25°C unless otherwise specified)

| Items | Symbols | Conditions | Maximum Ratings | Units | |
|--|-----------------------|------------|-----------------------|-------|---|
| Collector-Emitter voltage | V _{CEs} | | 1200 | V | |
| Gate-Emitter voltage | V _{GES} | | ±20 | V | |
| Collector current | I _c | Continuous | T _c =25°C | 800 | A |
| | | | T _c =100°C | 600 | |
| | I _{op} | 1ms | T _c =100°C | 1200 | |
| | -I _c | | | 600 | |
| | -I _{c pulse} | 1ms | | 1200 | |
| Collector Power Dissipation | P _c | 1 device | 3940 | W | |
| Junction temperature | T _j | | 175 | °C | |
| Operating junction temperature(under switching conditions) | T _{jop} | | 150 | | |
| Storage temperature | T _{stg} | | -40 ~ +150 | | |
| Isolation voltage between terminal and copper base *1 | V _{iso} | AC : 1min. | 4000 | VAC | |
| Screw Torque *2 | Mounting | M6 | 5.75 | N m | |
| | Main Terminals | M8 | 10 | | |
| | Sense Terminals | M4 | 2.5 | | |

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

(*2) Recommendable Value :Mounting 4.25~5.75 Nm (M6) , Main Terminals 8~10 Nm (M8) , Sense Terminals 1.7~2.5 Nm (M4)

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

| Items | Symbols | Conditions | Characteristics | | | Units | |
|--------------------------------------|---|--|------------------------|-------|------|-------|---|
| | | | min. | typ. | max. | | |
| Zero gate voltage Collector current | I _{CEs} | V _{GE} = 0V V _{CE} = 1200V | - | - | 1.0 | mA | |
| Gate-Emitter leakage current | I _{GES} | V _{CE} = 0V V _{GE} = ±20V | - | - | 1200 | nA | |
| Gate-Emitter threshold voltage | V _{GE(th)} | V _{CE} = 20V I _c = 600mA | 6.0 | 6.5 | 7.0 | V | |
| Collector-Emitter saturation voltage | V _{CE(sat)} (main terminal) | V _{GE} = 15V I _c = 600A | T _j = 25°C | - | 1.88 | 2.15 | V |
| | | | T _j = 125°C | - | 2.18 | - | |
| | T _j = 150°C | | - | 2.28 | - | | |
| | V _{CE(sat)} (chip) | | T _j = 25°C | - | 1.70 | 1.95 | |
| | | | T _j = 125°C | - | 2.00 | - | |
| T _j = 150°C | - | 2.10 | - | | | | |
| Internal gate resistance | I _{nt} R _g | - | - | 2.92 | - | Ω | |
| Input capacitance | C _{ies} | V _{CE} = 10V, V _{GE} = 0V, f = 1MHz | - | 53 | - | nF | |
| Turn-on | t _{on} | V _{CC} = 600V I _c = 600A | - | 1.86 | - | μs | |
| | t _r | L _m = 75nH | - | 0.65 | - | | |
| Turn-off | t _{off} | V _{GE} = ±15V, T _j = 125°C | - | 1.25 | - | | |
| | t _r | R _{gon} = 2.4 Ω R _{goff} = 0.22 Ω | - | 0.12 | - | | |
| Forward on voltage | V _F (main terminal) | V _{GE} = 0V I _F = 600A | T _j = 25°C | - | 1.88 | 2.15 | V |
| | | | T _j = 125°C | - | 2.03 | - | |
| | | | T _j = 150°C | - | 1.98 | - | |
| | V _F (chip) | | T _j = 25°C | - | 1.70 | 1.95 | |
| | | | T _j = 125°C | - | 1.85 | - | |
| T _j = 150°C | - | 1.80 | - | | | | |
| Reverse recovery | t _{rr} | I _F = 600A, T _j = 125°C | - | 0.26 | - | μs | |
| Lead resistance, terminal-chip | R _{lead} | - | - | 0.292 | - | mΩ | |

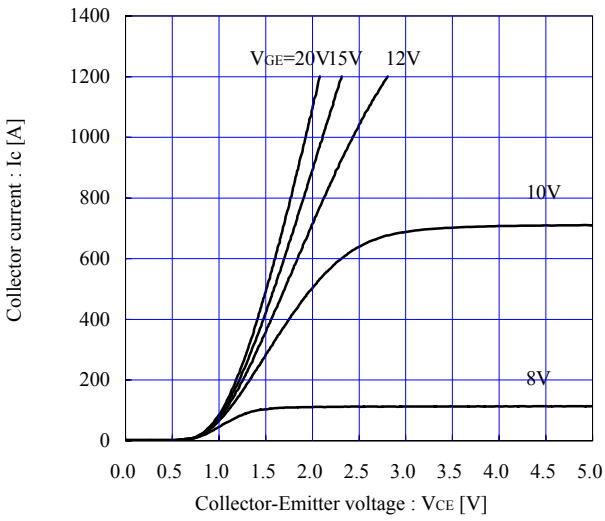
● Thermal resistance characteristics

| Items | Symbols | Conditions | Characteristics | | | Units |
|----------------------------|----------------------|---------------------------|-----------------|--------|--------|-------|
| | | | min. | typ. | max. | |
| Thermal resistance | R ^{th(j-c)} | IGBT | - | - | 0.0380 | °C/W |
| | | FWD | - | - | 0.0610 | |
| Contact thermal resistance | R ^{th(c-f)} | with Thermal Compound (*) | - | 0.0060 | - | |

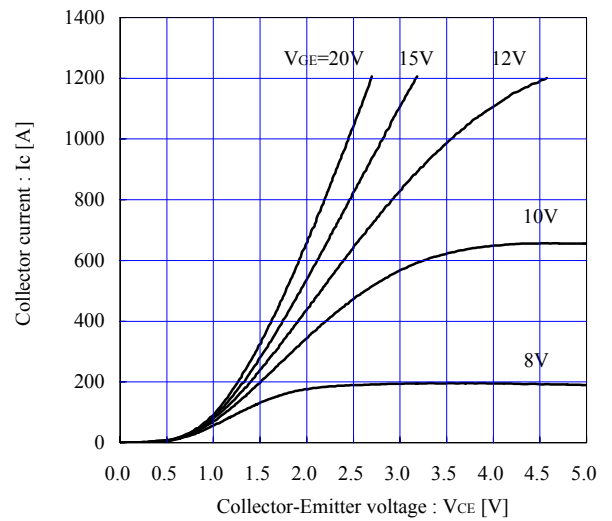
*This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

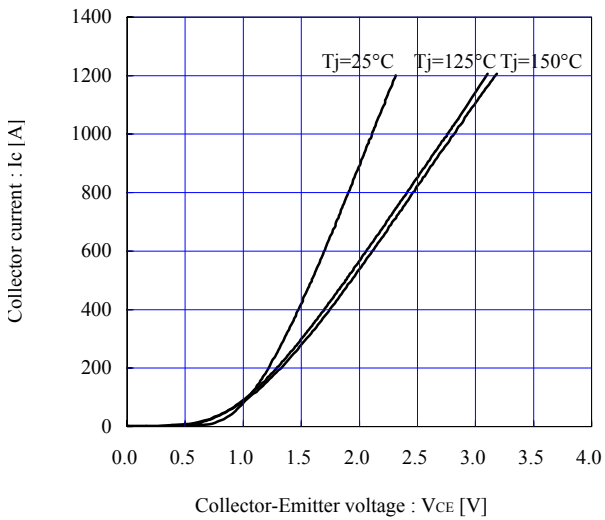
Collector current vs. Collector-Emitter voltage (typ.)
T_j=25°C, chip



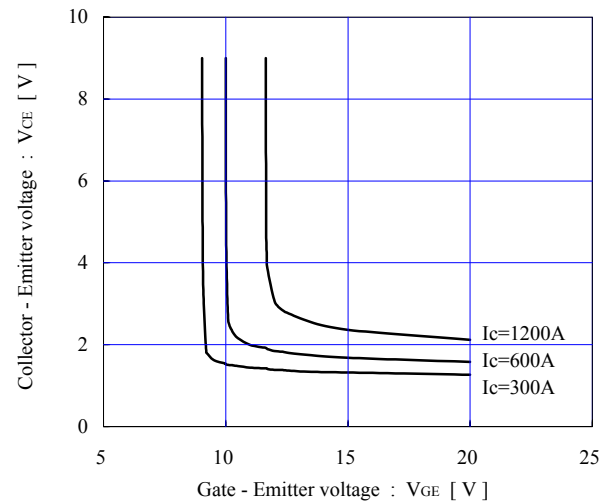
Collector current vs. Collector-Emitter voltage (typ.)
T_j= 150°C, chip



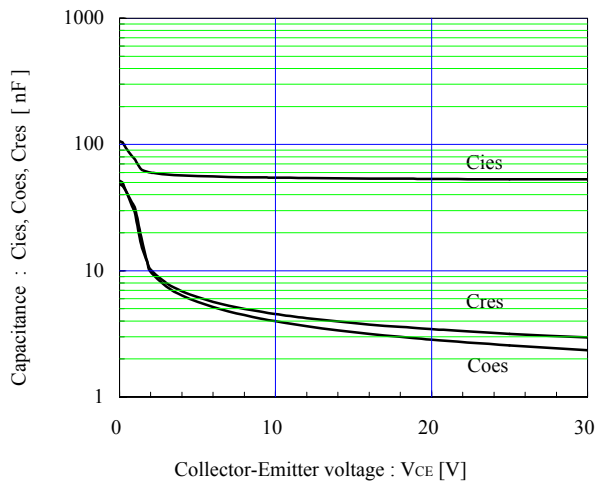
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
V_{GE}=+15V, chip



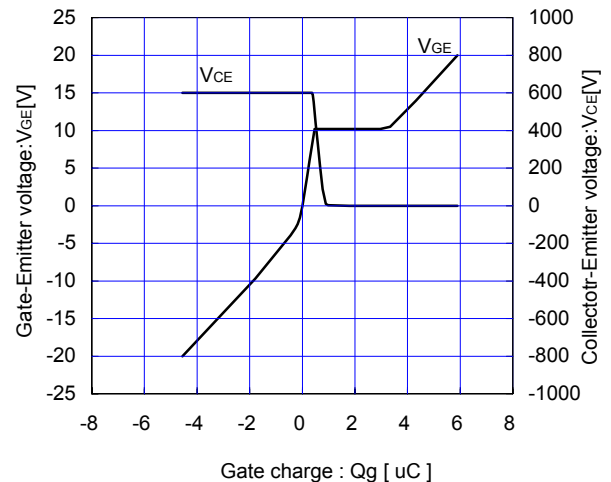
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
T_j=25°C, chip



Capacitance vs. Collector-Emitter voltage (typ.)
V_{GE}=0V, f= 1MHz, T_j= 25°C

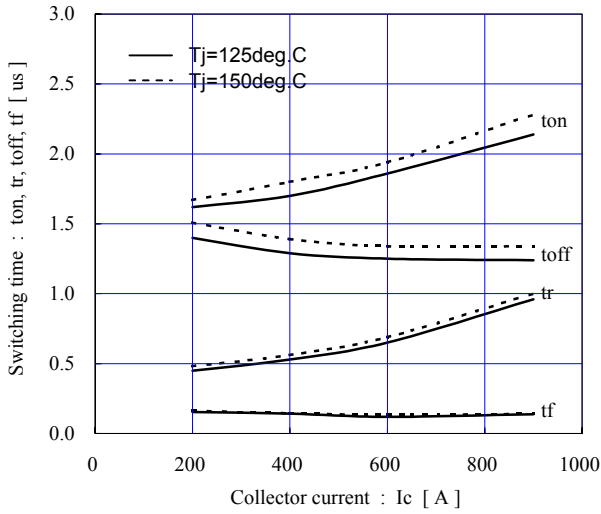


Dynamic Gate charge (typ.)
T_j= 25°C



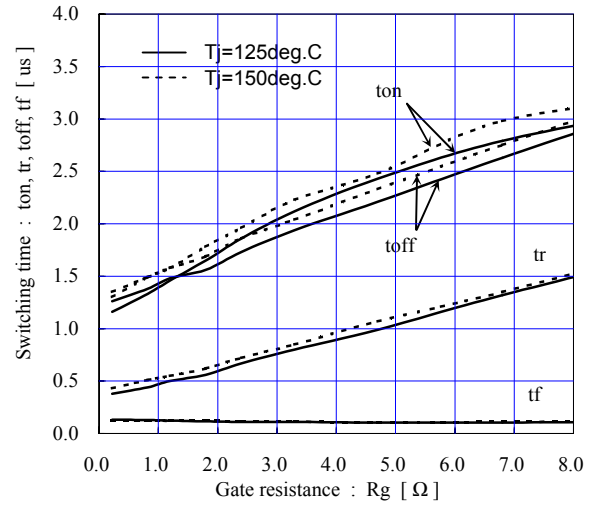
Switching time vs. Collector current (typ.)

V_{cc}=600V, V_{GE}=±15V, R_{gon}=2.4 Ω, R_{goff}=0.22 Ω



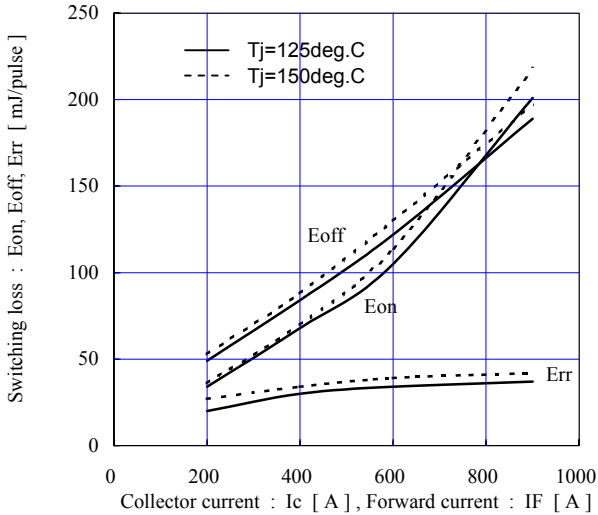
Switching time vs. Gate resistance (typ.)

V_{cc}=600V, I_c=600A, V_{GE}=±15V



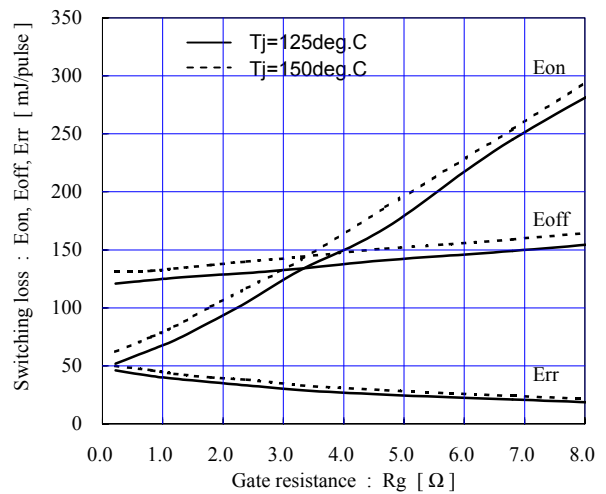
Switching loss vs. Collector current (typ.)

V_{cc}=600V, V_{GE}=±15V, R_{gon}=2.4 Ω, R_{goff}=0.22 Ω



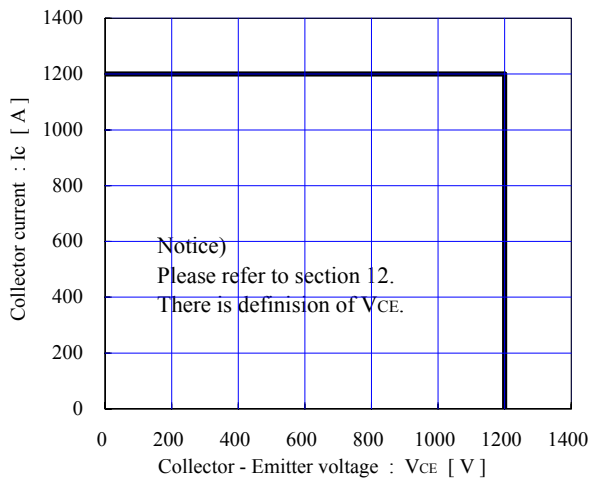
Switching loss vs. Gate resistance (typ.)

V_{cc}=600V, I_c=600A, V_{GE}=±15V

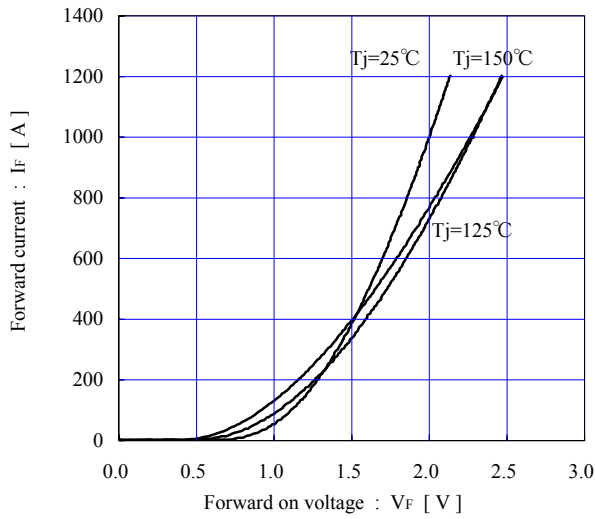


Reverse bias safe operating area (max.)

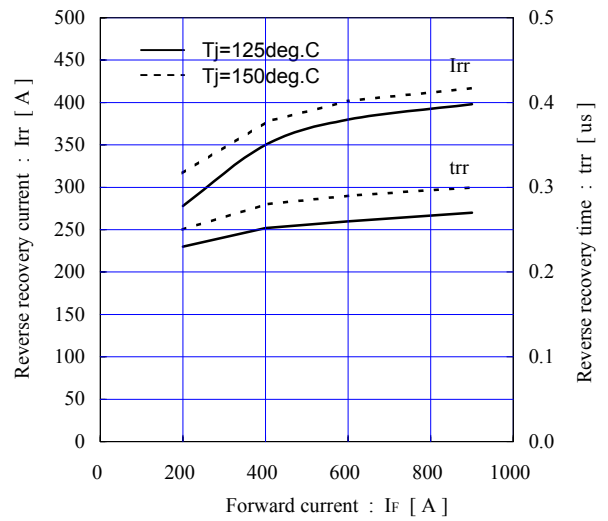
±V_{GE}=15V, T_j = 150°C



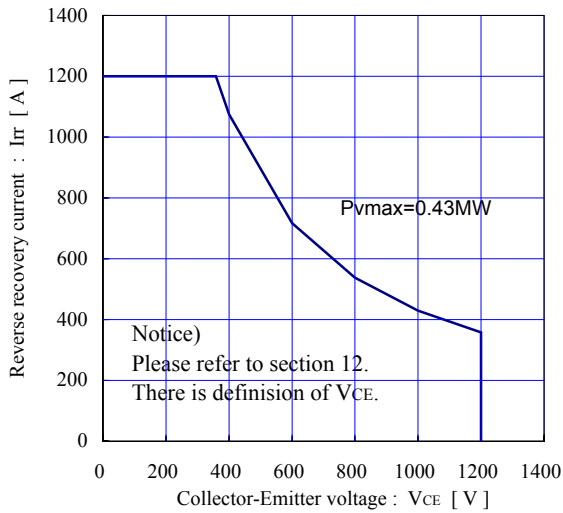
Forward current vs. Forward on voltage (typ.)
chip



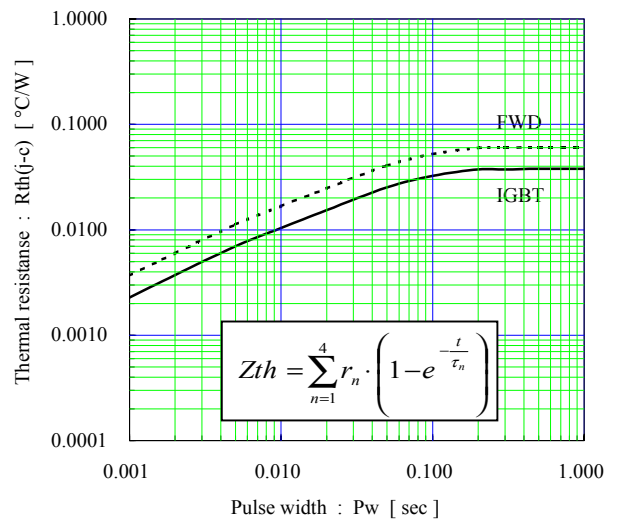
Reverse recovery characteristics (typ.)
V_{CC}=600V, V_{GE}=±15V, R_{gon}=2.4 Ω



FWD safe operating area (max.)
T_j=150°C

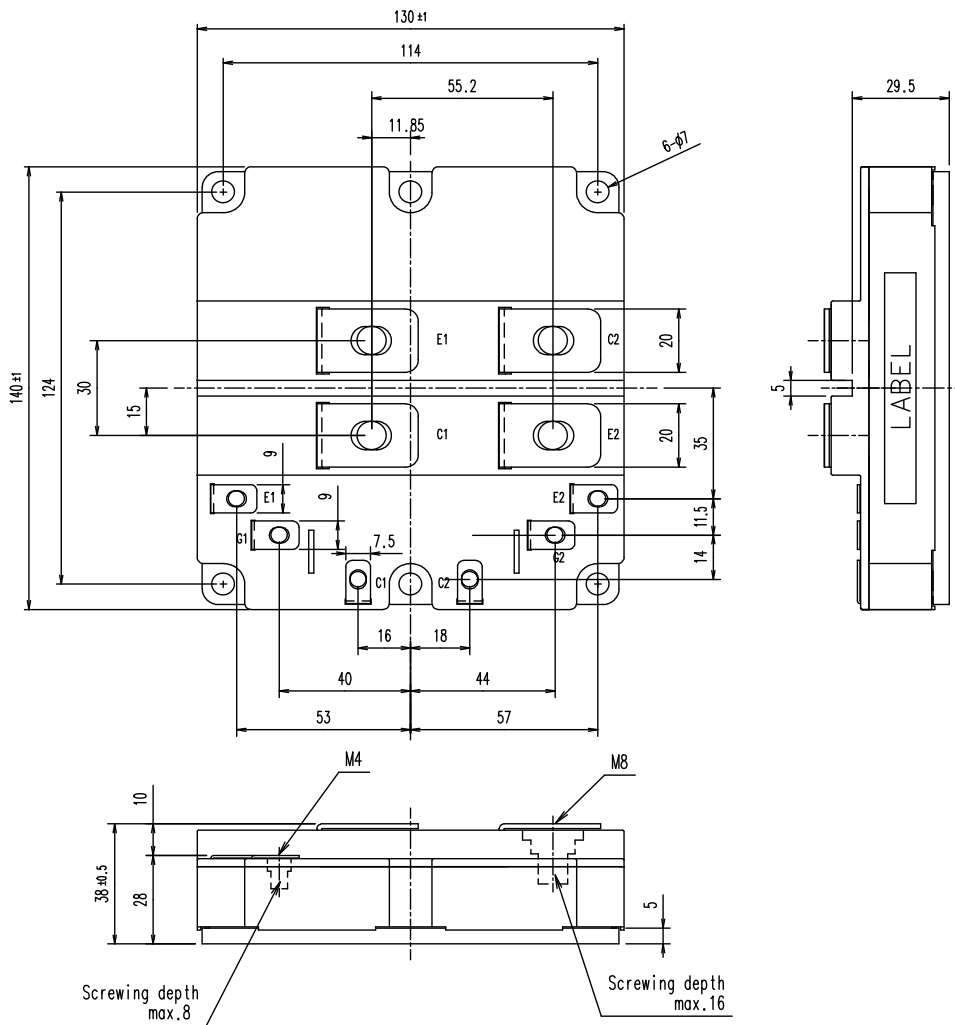


Transient thermal resistance (max.)

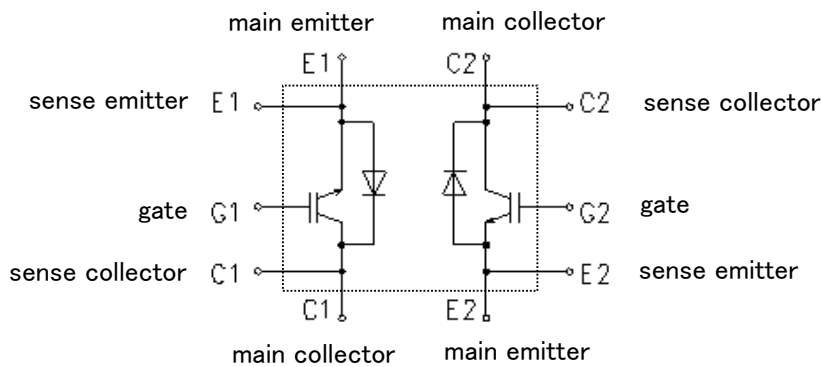


| | IGBT | FWD |
|----|---------|---------|
| r1 | 0.00408 | 0.00654 |
| r2 | 0.01115 | 0.01790 |
| r3 | 0.01347 | 0.02162 |
| r4 | 0.00931 | 0.01494 |
| τ1 | 0.0023 | 0.0023 |
| τ2 | 0.0310 | 0.0310 |
| τ3 | 0.0623 | 0.0623 |
| τ4 | 0.0682 | 0.0682 |

■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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