# 2MBI150VH-170-50

**IGBT Modules**

## Power Module (V series)
## 1700V / 150A / 2-in-1 package

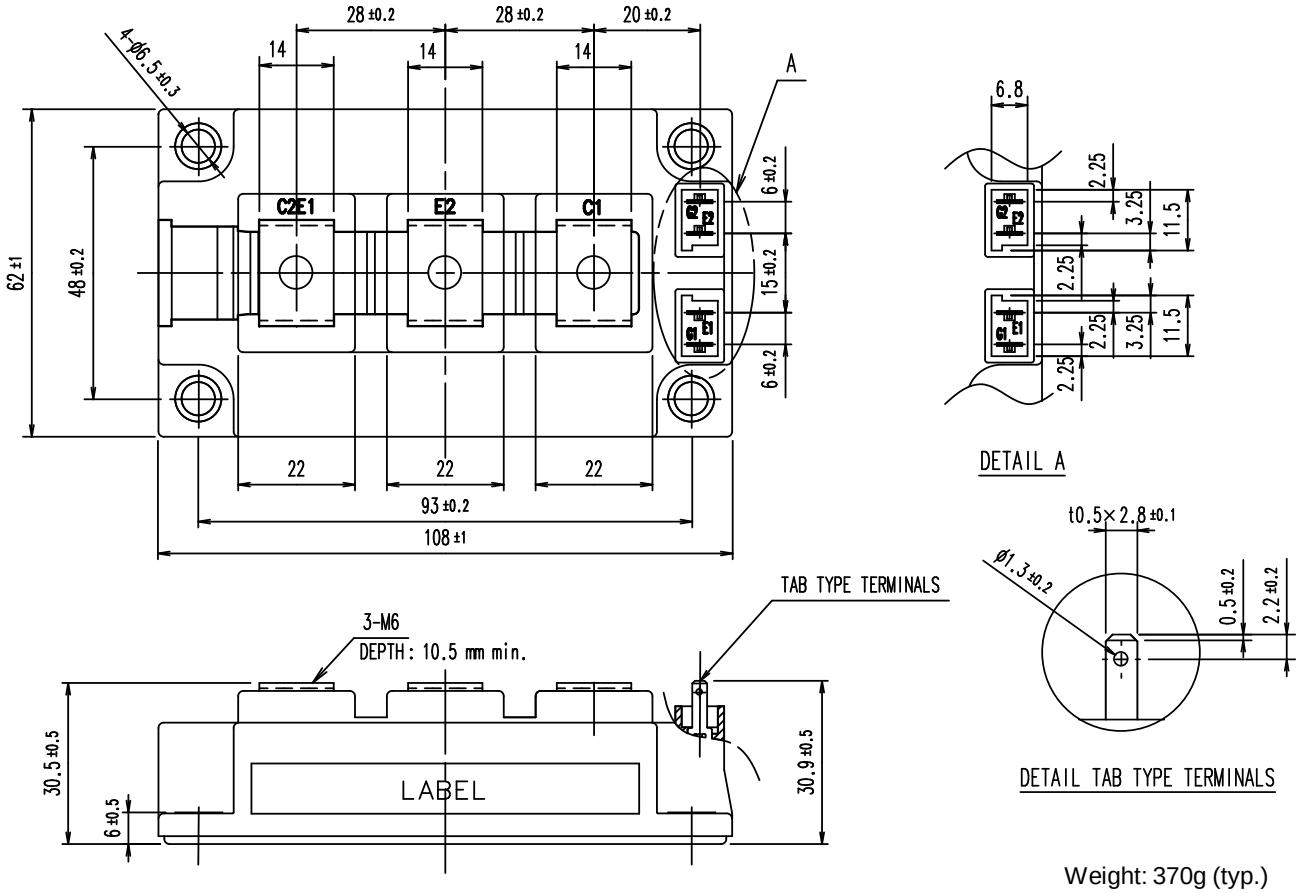
### ■ Features

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

### ■ Applications

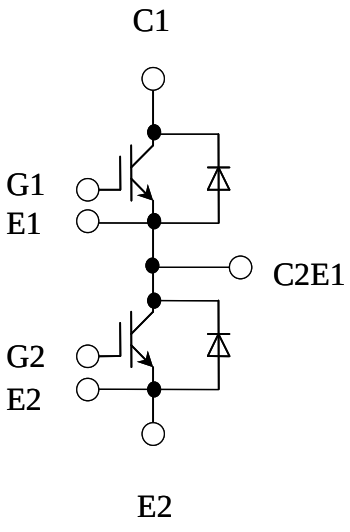
AC-switch for UPS,PCS and etc.

### ■ Outline drawing ( Unit : mm )




Weight: 370g (typ.)

### ■ Equivalent circuit



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## ■ Absolute maximum ratings (at $T_C$= 25°C unless otherwise specified)

| Items | | Symbols | Conditions | | Maximum ratings | Units |
|---|---|---|---|---|---|---|
| Collector-Emitter voltage | | $V_{CES}$ | | | 1700 | V |
| Gate-Emitter voltage | | $V_{GES}$ | | | ±20 | V |
| Collector current | | $I_C$ | Continuous | $T_c$=100°C | 150 | A |
| | | | | $T_c$=25°C | 250 | |
| | | $I_C$ pulse | 1ms | | 300 | |
| | | $-I_C$ | | | 150 | |
| | | $-I_C$ pulse | 1ms | | 300 | |
| Collector power dissipation | | $P_C$ | 1 device | | 1110 | W |
| Junction temperature | | $T_j$ | | | 175 | °C |
| Operating junction temperature (under switching conditions) | | $T_{jop}$ | | | 150 | |
| Case temperature | | $T_C$ | | | 125 | |
| Storage temperature | | $T_{stg}$ | | | -40 ~ 125 | |
| Isolation voltage | Between terminal and copper base (*1) | $V_{iso}$ | AC: 1min. | | 4000 | VAC |
| Screw torque | Mounting | - | M5 or M6 | | 3.0～6.0 | N m |
| | Terminals | - | M6 | | 2.5～5.0 | |

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

## ■ Electrical characteristics (at $T_j$= 25°C unless otherwise specified)

**NOTICE:**
The external gate resistance ($R_{g\_on}$,$R_{g\_off}$) shown below is one of our recommend value for the purpose of minimum switching loss. However the optimum $R_g$ depends on circuit configuration and/or environment. We recommend that the $R_g$ has to be carefully chosen based on consideration if IGBT module matches design criteria, for example, switching loss, EMC/EMI, spike voltage, surge current and no unexpected oscillation and so on.Especially,we recommend to choose $R_{g\_on}$ value shown in below or more. Otherwise it might be exceeded the FWD safe operating area.

| Items | Symbols | Conditions | | Characteristics min. | Characteristics typ. | Characteristics max. | Units |
|---|---|---|---|---|---|---|---|
| Zero gate voltage collector current | $I_{CES}$ | $V_{GE}$=0V, $V_{CE}$=1700V | | - | - | 2.0 | mA |
| Gate-Emitter leakage current | $I_{GES}$ | $V_{CE}$=0V, $V_{GE}$=±20V | | - | - | 400 | nA |
| Gate-Emitter threshold voltage | $V_{GE(th)}$ | $V_{CE}$=20V,$I_C$=150mA | | 6.0 | 6.5 | 7.0 | V |
| Collector-Emitter saturation voltage | $V_{CE(sat)}$ (terminal) | $V_{GE}$=15V, $I_C$=150A | $T_j$=25°C | - | 2.20 | 2.65 | V |
| | | | $T_j$=125°C | - | 2.60 | - | |
| | | | $T_j$=150°C | - | 2.65 | - | |
| | $V_{CE(sat)}$ (chip) | $V_{GE}$=15V, $I_C$=150A | $T_j$=25°C | - | 2.00 | 2.45 | |
| | | | $T_j$=125°C | - | 2.40 | - | |
| | | | $T_j$=150°C | - | 2.45 | - | |
| Internal gate resistance | $R_{g(int)}$ | - | | - | 5.0 | - | Ω |
| Input capacitance | $C_{ies}$ | $V_{CE}$=10V, $V_{GE}$=0V, $f$=1MHz | | - | 16 | - | nF |
| Turn-on time | $t_{on}$ | $V_{CC}$=900V,$I_C$=150A,$V_{GE}$=±15V, $R_{g\_on}$=$R_{g\_off}$=4.8Ω $T_j$=150°C、$L_s$=30nH | | - | 950 | - | nsec |
| | $t_r$ | | | - | 350 | - | |
| | $t_{r(i)}$ | | | - | 60 | - | |
| Turn-off time | $t_{off}$ | | | - | 1050 | - | |
| | $t_f$ | | | - | 140 | - | |
| Forward on voltage | $V_F$ (terminal) | $V_{GE}$=0V,$I_F$=150A | $T_j$=25°C | - | 1.95 | 2.40 | V |
| | | | $T_j$=125°C | - | 2.20 | - | |
| | | | $T_j$=150°C | - | 2.20 | - | |
| | $V_F$ (chip) | $V_{GE}$=0V,$I_F$=150A | $T_j$=25°C | - | 1.80 | 1.95 | |
| | | | $T_j$=125°C | - | 2.05 | - | |
| | | | $T_j$=150°C | - | 2.05 | - | |
| Reverse recovery time | $t_{rr}$ | $I_F$=150A | | - | 220 | - | nsec |

## ■ Thermal resistance characteristics

| Items | Symbols | Conditions | Characteristics min. | Characteristics typ. | Characteristics max. | Units |
|---|---|---|---|---|---|---|
| Thermal resistance (1device) | $R_{th(j-c)}$ | IGBT | - | - | 0.135 | °C/W |
| | | FWD | - | - | 0.200 | |
| Contact thermal resistance (1device) (*1) | $R_{th(c-f)}$ | with thermal compound | - | 0.0250 | - | |

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

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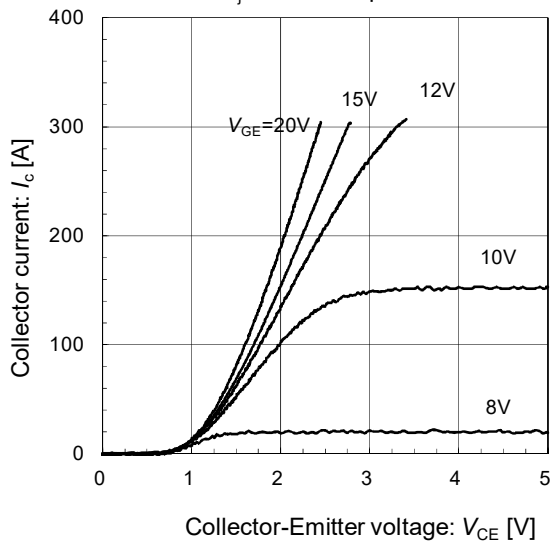
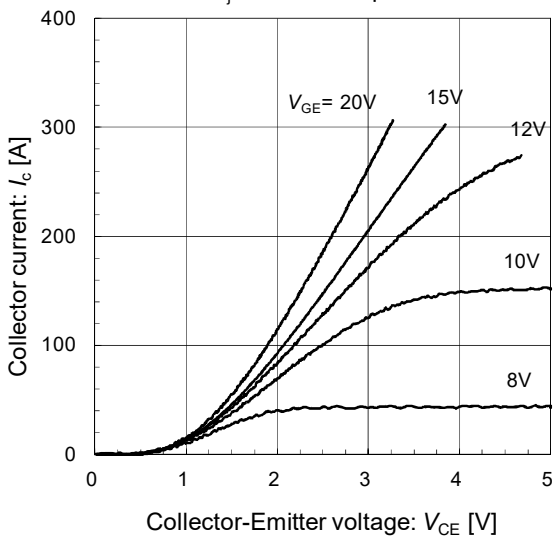
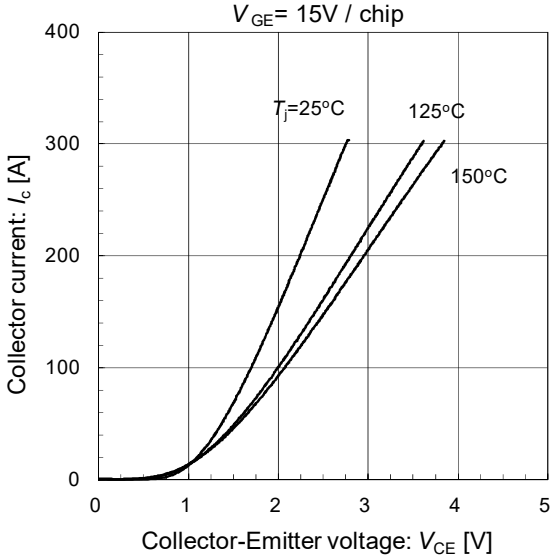
Collector current vs. Collector-Emitter voltage (typ.)
$T_j$= 25°C / chip



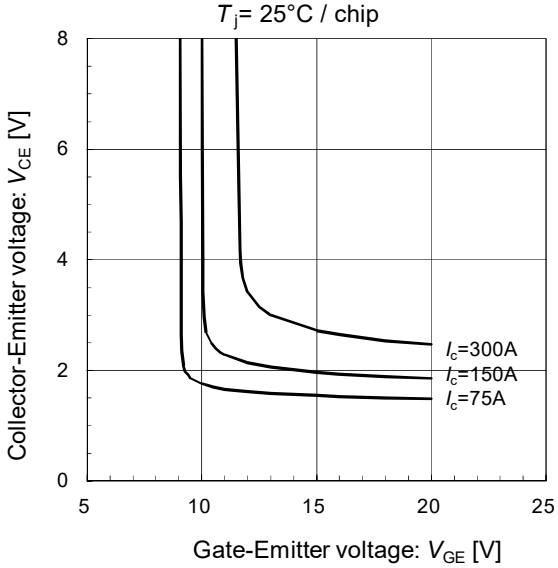

Collector current vs. Collector-Emitter voltage (typ.)
$T_j$= 150°C / chip



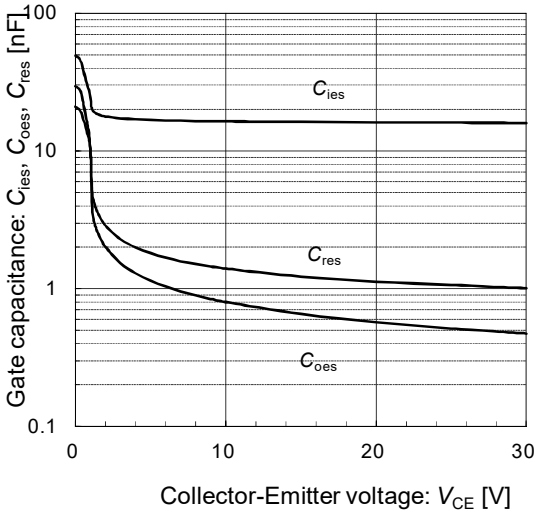

Collector current vs. Collector-Emitter voltage (typ.)
$V_{GE}$= 15V / chip



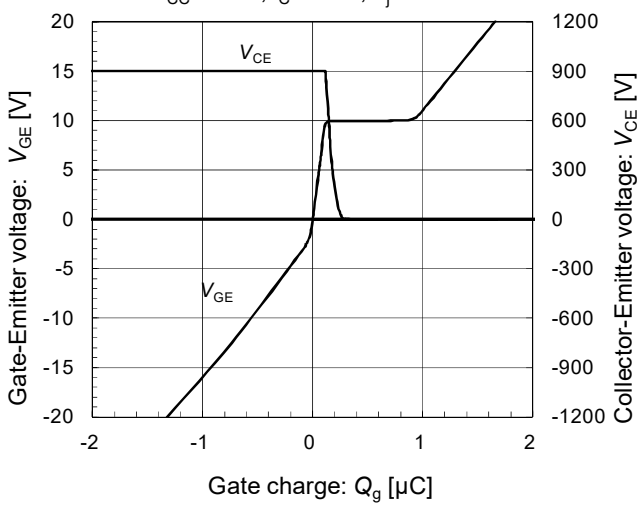

Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
$T_j$= 25°C / chip




Gate capacitance vs. Collector-Emitter Voltage (typ.)
$V_{GE}$= 0V, $f$= 1MHz, $T_j$= 25°C




Dynamic gate charge (typ.)
$V_{CC}$=900V, $I_C$=150A, $T_j$=25°C



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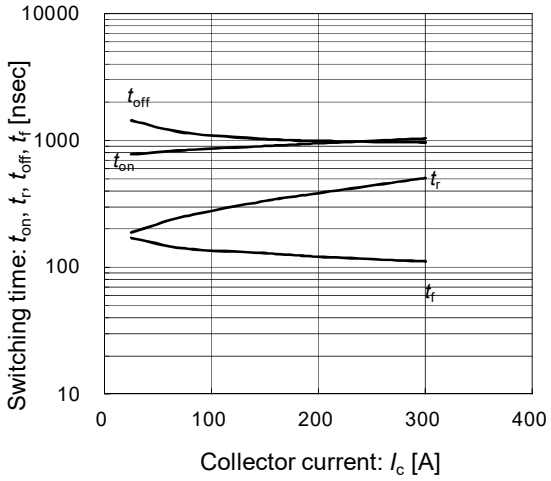
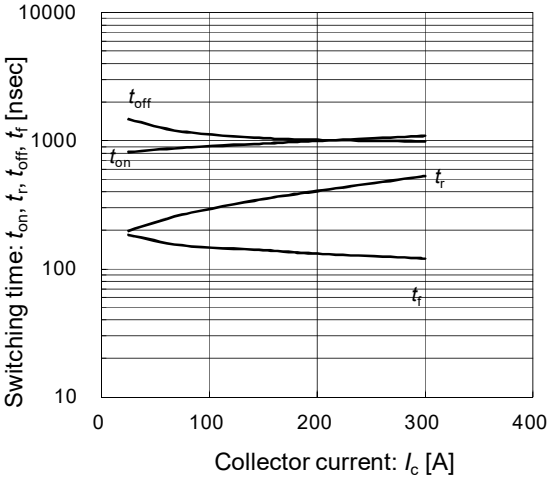
Switching time vs. Collector current (typ.)

$V_{CC}$=900V, $V_{GE}$=±15V, $R_{g\_on}$=$R_{g\_off}$=4.8Ω, $T_j$=125°C



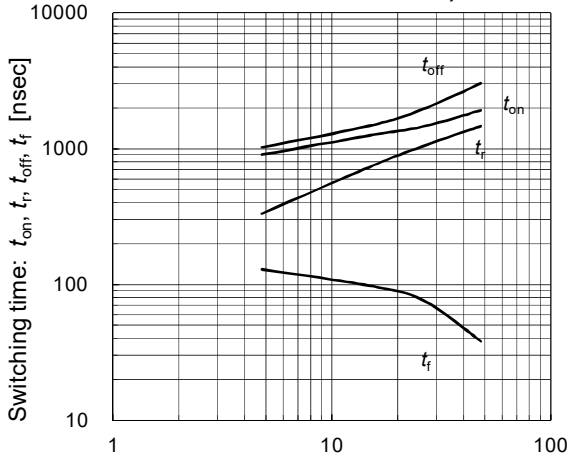

Switching time vs. Collector current (typ.)

$V_{CC}$=900V, $V_{GE}$=±15V, $R_{g\_on}$= $R_{g\_off}$=4.8Ω, $T_j$=150°C



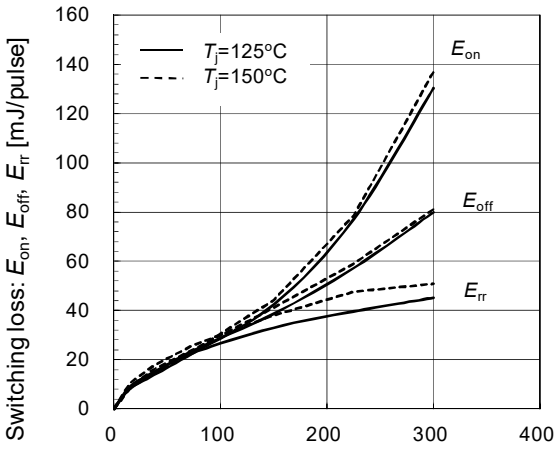

Switching time vs. Gate resistance (typ.)

$V_{CC}$=900V, $I_C$=150A, $V_{GE}$=±15V, $T_j$=125°C



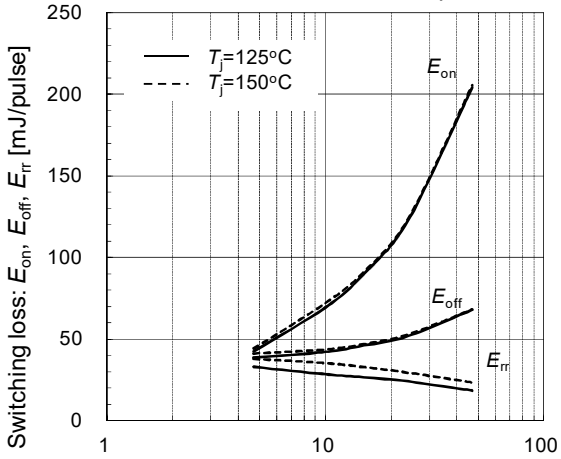

Switching loss vs. Collector current (typ.)

$V_{CC}$=900V, $V_{GE}$=±15V, $R_{g\_on}$=$R_{g\_off}$=4.8Ω, $T_j$=125,150°C



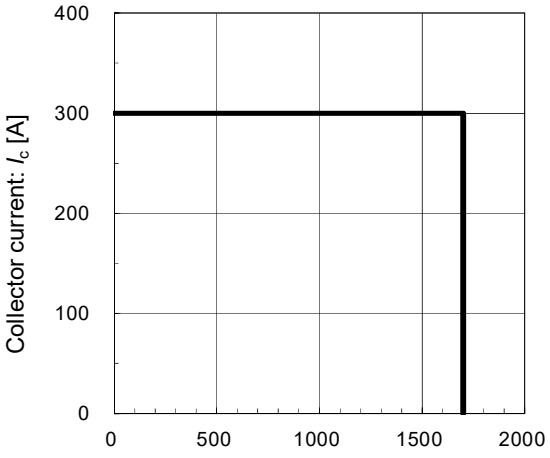

Switching loss vs. Gate resistance (typ.)

$V_{CC}$=900V, $I_C$=150A, $V_{GE}$=±15V, $T_j$=125,150°C




Reverse bias safe operating area (max.)

+$V_{GE}$=15V, -$V_{GE}$=15V, $R_{g\_off}$=4.8Ω, $T_j$=150°C



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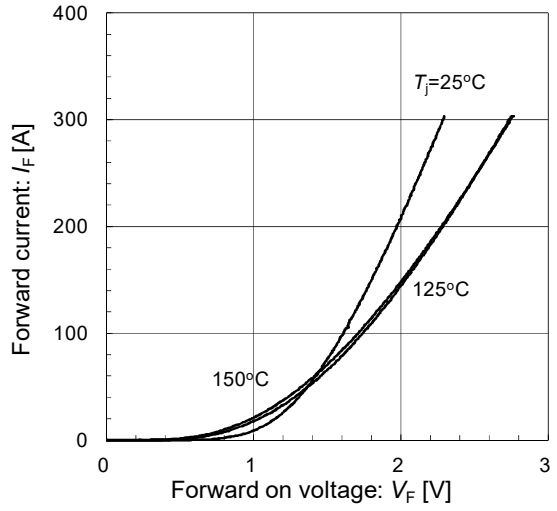
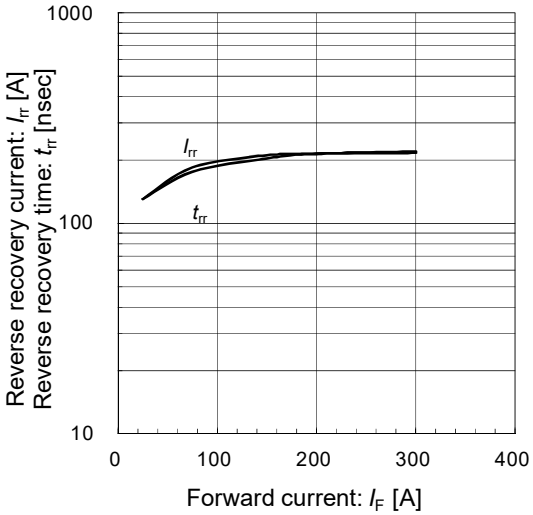
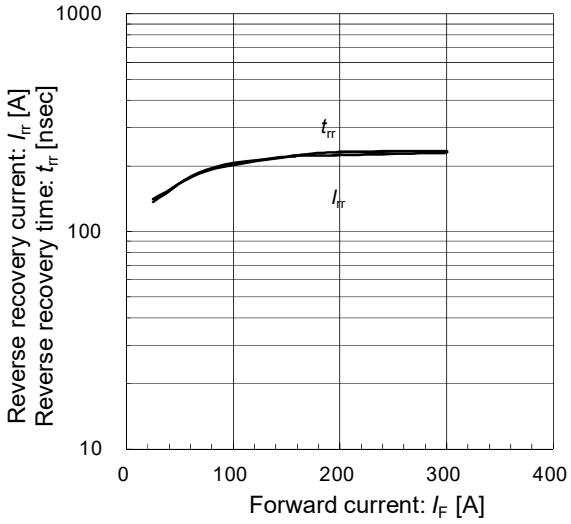
Forward current vs. Forward voltage (typ.)
chip



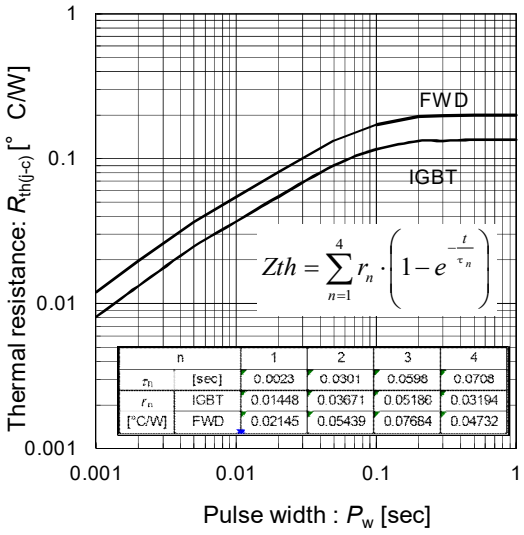

Reverse recovery characteristics (typ.)
$V_{CC}$=900V, $V_{GE}$=±15V, $R_{g\_on}$=4.8Ω, $T_j$=125°C




Reverse recovery characteristics (typ.)
$V_{CC}$=900V, $V_{GE}$=±15V, $R_{g\_on}$=4.8Ω, $T_j$=150°C

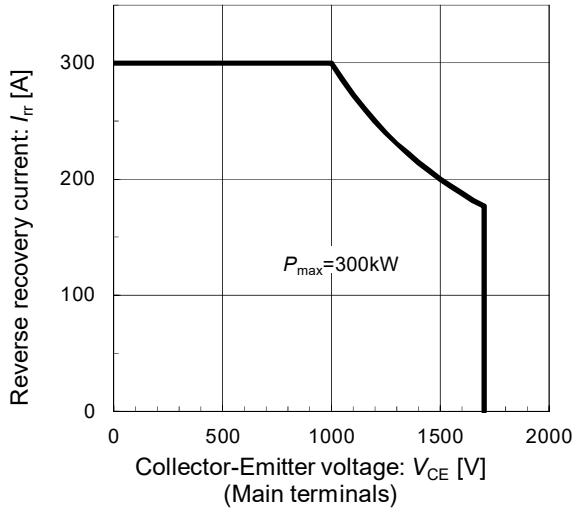



Transient thermal resistance (max.)




| n | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| τn | [sec] | 0.0023 | 0.0301 | 0.0598 | 0.0708 |
| rn | IGBT | 0.01448 | 0.03671 | 0.05186 | 0.03194 |
| [°C/W] | FWD | 0.02145 | 0.05439 | 0.07684 | 0.04732 |

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



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IGBT Modules

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