**MITSUBISHI HVIGBT MODULES**

# CM900HB-90H

**HIGH POWER SWITCHING USE**
**INSULATED TYPE**

2nd-Version HVIGBT (High Voltage Insulated Gate Bipolar Transistor) Modules

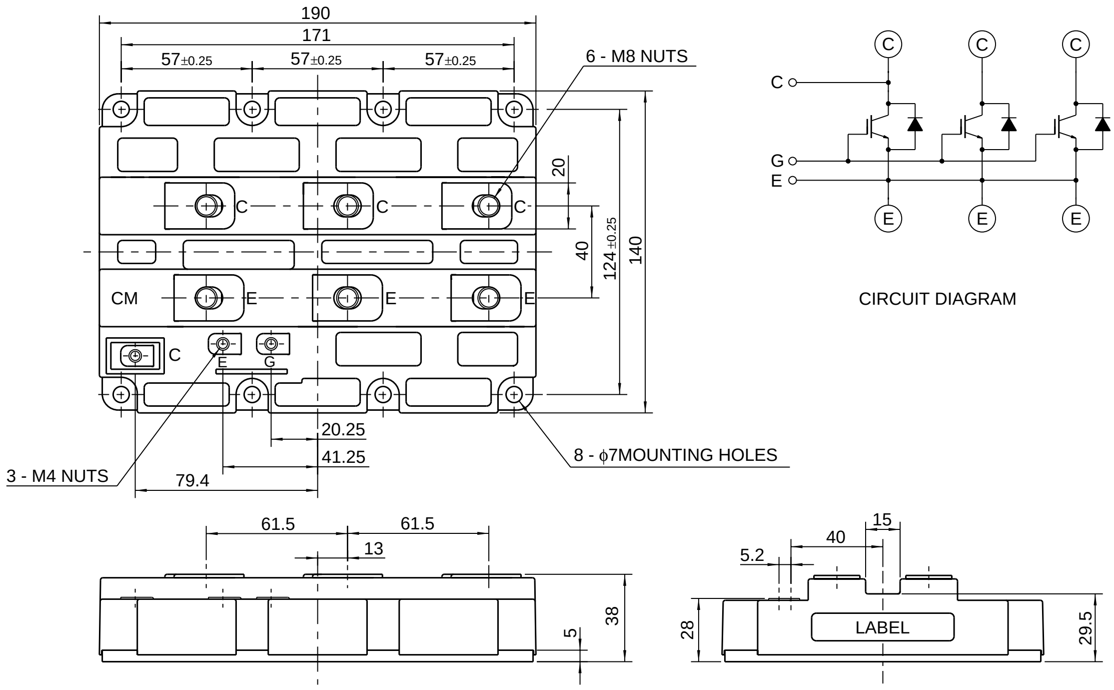
**CM900HB-90H**

- ● $I_C$ .................................................................. 900A
- ● $V_{CES}$ ..................................................... 4500V
- ● Insulated Type
- ● 1-element in a pack

## APPLICATION

Inverters, Converters, DC choppers, Induction heating, DC to DC converters.

**OUTLINE DRAWING & CIRCUIT DIAGRAM** **Dimensions in mm**



MITSUBISHI
ELECTRIC

### MAXIMUM RATINGS ($T_j$ = 25°C)

| Symbol | Item | Conditions | Ratings | Unit |
|---|---|---|---|---|
| $V_{CES}$ | Collector-emitter voltage | $V_{GE}$ = 0V | 4500 | V |
| $V_{GES}$ | Gate-emitter voltage | $V_{CE}$ = 0V | ±20 | V |
| $I_C$ | Collector current | DC, $T_C$ = 85°C | 900 | A |
| $I_{CM}$ | | Pulse (Note 1) | 1800 | A |
| $I_E$ (Note 2) | Emitter current | | 900 | A |
| $I_{EM}$ (Note 2) | | Pulse (Note 1) | 1800 | A |
| $P_C$ (Note 3) | Maximum collector dissipation | $T_C$ = 25°C, IGBT part | 11100 | W |
| $T_j$ | Junction temperature | — | –40 ~ +125 | °C |
| $T_{stg}$ | Storage temperature | — | –40 ~ +125 | °C |
| $V_{iso}$ | Isolation voltage | Charged part to base plate, rms, sinusoidal, AC 60Hz 1min. | 6000 | V |
| — | Mounting torque | Main terminals screw M8 | 6.67 ~ 13.00 | N·m |
| | | Mounting screw M6 | 2.84 ~ 6.00 | N·m |
| | | Auxiliary terminals screw M4 | 0.88 ~ 2.00 | N·m |
| — | Mass | Typical value | 2.2 | kg |

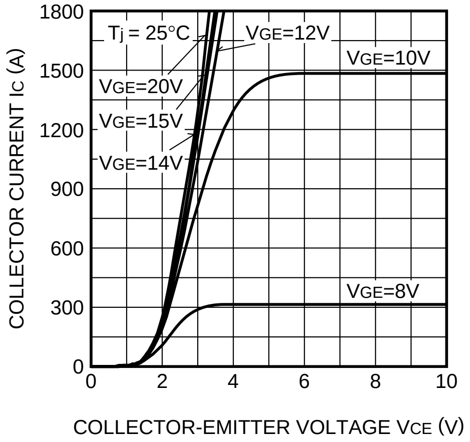
### ELECTRICAL CHARACTERISTICS ($T_j$ = 25°C)

| Symbol | Item | Conditions | | Limits | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min | Typ | Max | |
| $I_{CES}$ | Collector cutoff current | $V_{CE}$ = $V_{CES}$, $V_{GE}$ = 0V | | — | — | 18 | mA |
| $V_{GE(th)}$ | Gate-emitter threshold voltage | $I_C$ = 90mA, $V_{CE}$ = 10V | | 4.5 | 6.0 | 7.5 | V |
| $I_{GES}$ | Gate-leakage current | $V_{GE}$ = $V_{GES}$, $V_{CE}$ = 0V | | — | — | 0.5 | µA |
| $V_{CE(sat)}$ | Collector-emitter saturation voltage | $T_j$ = 25°C | $I_C$ = 900A, $V_{GE}$ = 15V (Note 4) | — | 3.00 | 3.90 | V |
| | | $T_j$ = 125°C | | — | 3.30 | — | |
| $C_{ies}$ | Input capacitance | $V_{CE}$ = 10V<br>$V_{GE}$ = 0V | | — | 162 | — | nF |
| $C_{oes}$ | Output capacitance | | | — | 12.0 | — | nF |
| $C_{res}$ | Reverse transfer capacitance | | | — | 3.6 | — | nF |
| $Q_G$ | Total gate charge | $V_{CC}$ = 2250V, $I_C$ = 900A, $V_{GE}$ = 15V | | — | — | — | µC |
| $t_{d\,(on)}$ | Turn-on delay time | $V_{CC}$ = 2250V, $I_C$ = 900A<br>$V_{GE1}$ = $V_{GE2}$ = 15V<br>$R_G$ = 10Ω<br>Resistive load switching operation | | — | — | 2.40 | µs |
| $t_r$ | Turn-on rise time | | | — | — | 2.40 | µs |
| $t_{d\,(off)}$ | Turn-off delay time | | | — | — | 6.00 | µs |
| $t_f$ | Turn-off fall time | | | — | — | 1.20 | µs |
| $V_{EC}$ (Note 2) | Emitter-collector voltage | $I_E$ = 900A, $V_{GE}$ = 0V | | — | 4.00 | 5.20 | V |
| $t_{rr}$ (Note 2) | Reverse recovery time | $I_E$ = 900A,<br>die / dt = –1800A / µs (Note 1) | | — | — | 1.80 | µs |
| $Q_{rr}$ (Note 2) | Reverse recovery charge | | | — | 360 | — | µC |
| $R_{th(j-c)Q}$ | Thermal resistance | Junction to case, IGBT part | | — | — | 0.009 | K/W |
| $R_{th(j-c)R}$ | | Junction to case, FWDi part | | — | — | 0.018 | K/W |
| $R_{th(c-f)}$ | Contact thermal resistance | Case to fin, conductive grease applied | | — | 0.007 | — | K/W |

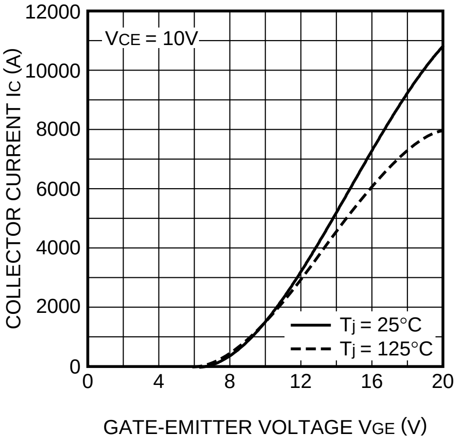
Note 1. Pulse width and repetition rate should be such that the device junction temp. ($T_j$) does not exceed $T_{jmax}$ rating.
2. $I_E$, $V_{EC}$, $t_{rr}$, $Q_{rr}$ & die/dt represent characteristics of the anti-parallel, emitter to collector free-wheel diode.
3. Junction temperature ($T_j$) should not increase beyond 125°C.
4. Pulse width and repetition rate should be such as to cause negligible temperature rise.

## PERFORMANCE CURVES

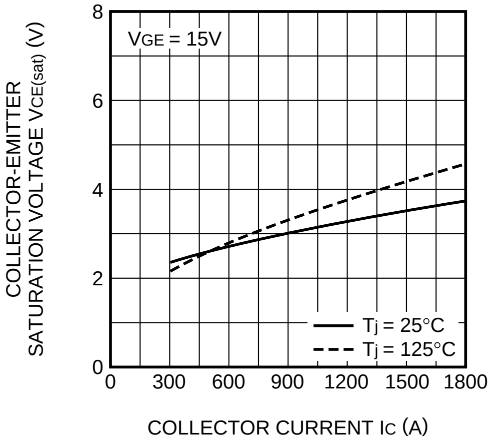
### OUTPUT CHARACTERISTICS (TYPICAL)



### TRANSFER CHARACTERISTICS (TYPICAL)



### COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



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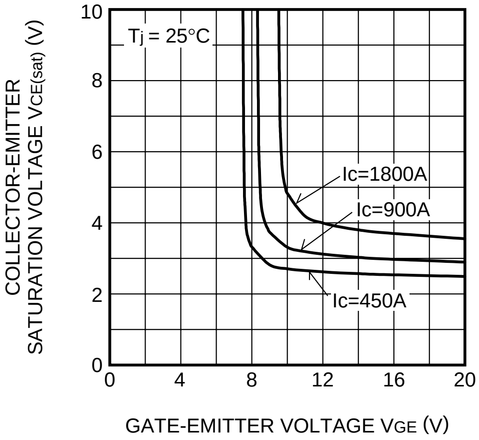
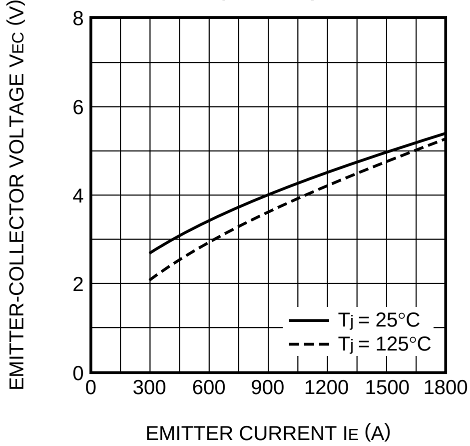
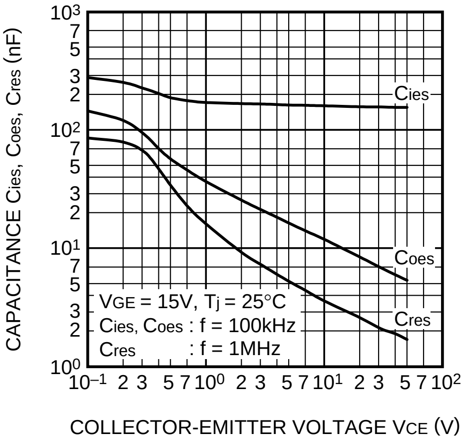


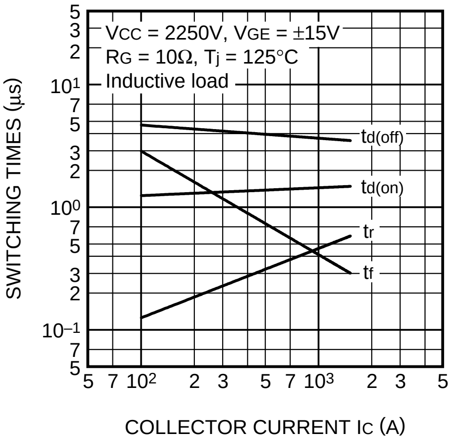
### FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



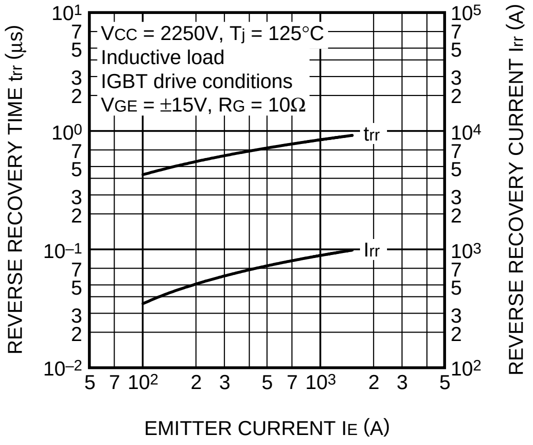
### CAPACITANCE CHARACTERISTICS (TYPICAL)



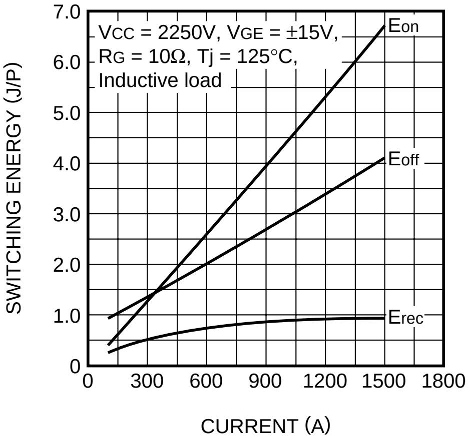
**HALF-BRIDGE
SWITCHING TIME CHARACTERISTICS
(TYPICAL)**



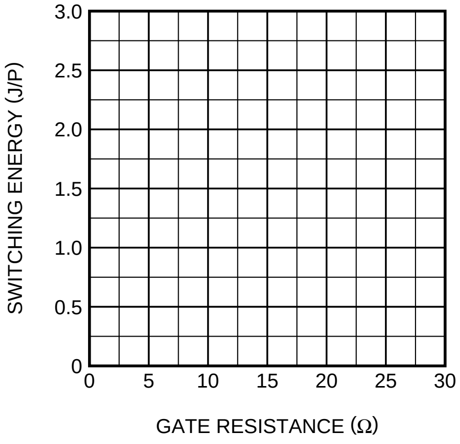
**REVERSE RECOVERY CHARACTERISTICS
OF FREE-WHEEL DIODE
(TYPICAL)**



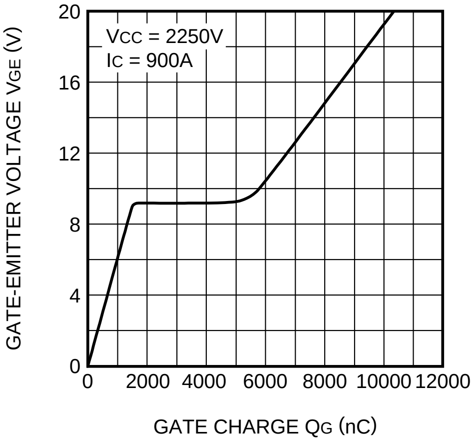
**HALF-BRIDGE
SWITCHING ENERGY CHARACTERISTICS
(TYPICAL)**



**HALF-BRIDGE
SWITCHING ENERGY CHARACTERISTICS
(TYPICAL)**



**GATE CHARGE CHARACTERISTICS
(TYPICAL)**



**TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS**