

**PRELIMINARY**

Notice: This is not a final specification.  
Some parametric limits are subject to change.

MITSUBISHI HVIGBT MODULES

# CM1200HA-34H

HVIGBT (High Voltage Insulated Gate Bipolar Transistor) Modules

HIGH POWER SWITCHING USE  
INSULATED TYPE

## CM1200HA-34H

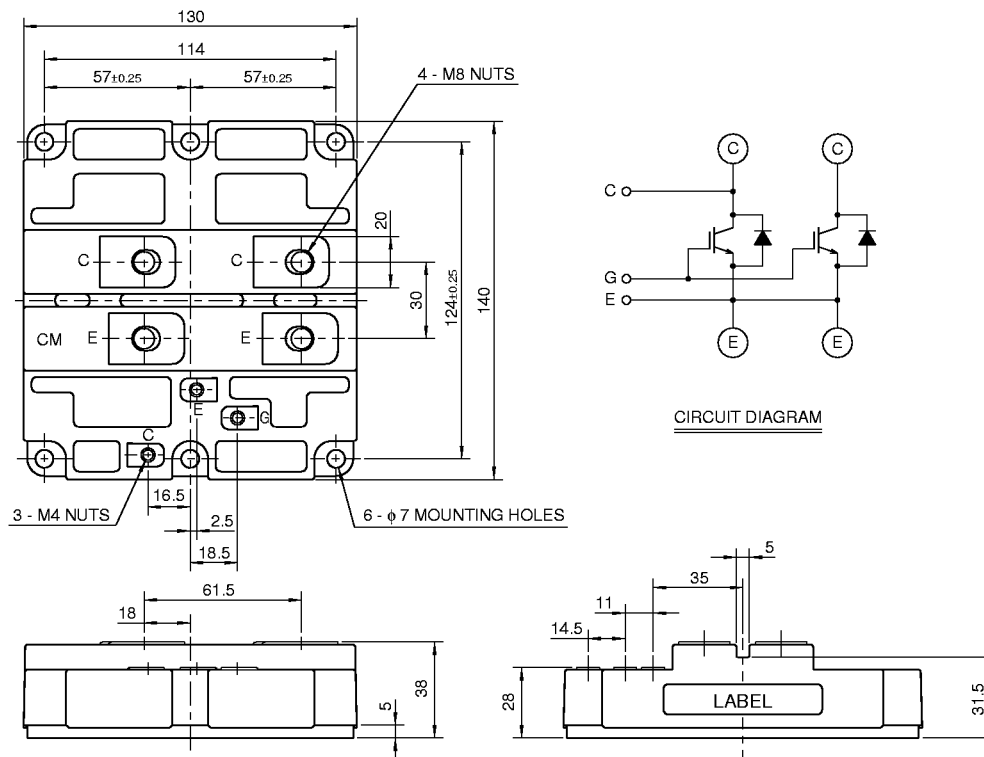
- $I_C$  ..... 1200A
- $V_{CES}$  ..... 1700V
- Insulated Type
- 1-element in a pack

## APPLICATION

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

## OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



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Feb.1999

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## MAXIMUM RATINGS (T<sub>J</sub> = 25°C)

| Symbol                   | Parameter                     | Conditions                             | Ratings      | Unit |
|--------------------------|-------------------------------|----------------------------------------|--------------|------|
| V <sub>CES</sub>         | Collector-emitter voltage     | G-E Short                              | 1700         | V    |
| V <sub>GES</sub>         | Gate-emitter voltage          | C-E Short                              | ±20          | V    |
| I <sub>C</sub>           | Collector current             | T <sub>C</sub> = 25°C                  | 1200         | A    |
| I <sub>CM</sub>          |                               | Pulse (Note 2)                         | 2400         | A    |
| I <sub>E</sub> (Note 1)  | Emitter current               | T <sub>C</sub> = 25°C                  | 1200         | A    |
| I <sub>EM</sub> (Note 1) |                               | Pulse (Note 2)                         | 2400         | A    |
| P <sub>C</sub> (Note 3)  | Maximum collector dissipation | T <sub>C</sub> = 25°C                  | 12500        | W    |
| T <sub>J</sub>           | Junction temperature          |                                        | -40 ~ +150   | °C   |
| T <sub>stg</sub>         | Storage temperature           |                                        | -40 ~ +125   | °C   |
| V <sub>iso</sub>         | Isolation voltage             | Main terminal to Base, AC for 1 minute | 4000         | 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  |
| —                        | Weight                        | Typical value                          | 1.5          | kg   |

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C)

| Symbol                   | Parameter                            | Test conditions                                                       | Limits |       |       | Unit |
|--------------------------|--------------------------------------|-----------------------------------------------------------------------|--------|-------|-------|------|
|                          |                                      |                                                                       | Min    | Typ   | Max   |      |
| I <sub>CES</sub>         | Collector cutoff current             | V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0V             | —      | —     | 10    | mA   |
| V <sub>GE(th)</sub>      | Gate-emitter threshold voltage       | I <sub>C</sub> = 120mA, V <sub>CE</sub> = 10V                         | 4.5    | 6.0   | 7.5   | V    |
| I <sub>GES</sub>         | Gate-leakage current                 | V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0V             | —      | —     | 0.5   | μA   |
| V <sub>CE(sat)</sub>     | Collector-emitter saturation voltage | T <sub>J</sub> = 25°C                                                 | —      | 2.75  | 3.58  | V    |
|                          |                                      | T <sub>J</sub> = 125°C                                                | —      | 3.30  | —     |      |
| C <sub>ies</sub>         | Input capacitance                    | V <sub>CE</sub> = 10V<br>V <sub>GE</sub> = 0V                         | —      | 140   | —     | nF   |
| C <sub>oes</sub>         | Output capacitance                   |                                                                       | —      | 20.0  | —     | nF   |
| C <sub>res</sub>         | Reverse transfer capacitance         |                                                                       | —      | 7.5   | —     | nF   |
| Q <sub>G</sub>           | Total gate charge                    | V <sub>CC</sub> = 850V, I <sub>C</sub> = 1200A, V <sub>GE</sub> = 15V | —      | 12    | —     | μC   |
| t <sub>d(on)</sub>       | Turn-on delay time                   | V <sub>CC</sub> = 850V, I <sub>C</sub> = 1200A                        | —      | —     | 1.20  | μs   |
| t <sub>r</sub>           | Turn-on rise time                    | V <sub>GE1</sub> = V <sub>GE2</sub> = 15V                             | —      | —     | 1.50  | μs   |
| t <sub>d(off)</sub>      | Turn-off delay time                  | R <sub>G</sub> = 1.6Ω                                                 | —      | —     | 2.00  | μs   |
| t <sub>f</sub>           | Turn-off fall time                   | Resistive load switching operation                                    | —      | —     | 0.60  | μs   |
| V <sub>EC</sub> (Note 1) | Emitter-collector voltage            | I <sub>E</sub> = 1200A, V <sub>GE</sub> = 0V                          | —      | 2.40  | 3.12  | V    |
| t <sub>rr</sub> (Note 1) | Reverse recovery time                | I <sub>E</sub> = 1200A                                                | —      | —     | 2.00  | μs   |
| Q <sub>rr</sub> (Note 1) | Reverse recovery charge              | die / dt = -2400A / μs                                                | —      | 200   | —     | μC   |
| R <sub>th(j-c)Q</sub>    | Thermal resistance                   | IGBT part                                                             | —      | —     | 0.010 | °C/W |
| R <sub>th(j-c)R</sub>    |                                      | FWDi part                                                             | —      | —     | 0.032 | °C/W |
| R <sub>th(c-f)</sub>     | Contact thermal resistance           | Case to fin, conductive grease applied                                | —      | 0.008 | —     | °C/W |

Note 1. I<sub>E</sub>, V<sub>EC</sub>, t<sub>rr</sub>, Q<sub>rr</sub> & die/dt represent characteristics of the anti-parallel, emitter to collector free-wheel diode.  
 2. Pulse width and repetition rate should be such that the device junction temp. (T<sub>J</sub>) does not exceed T<sub>Jmax</sub> rating.  
 3. Junction temperature (T<sub>J</sub>) should not increase beyond 150°C.  
 4. Pulse width and repetition rate should be such as to cause negligible temperature rise.