

MITSUBISHI HVIGBT MODULES
CM1200HC-50H

HIGH POWER SWITCHING USE
 INSULATED TYPE

HVIGBT (High Voltage Insulated Gate Bipolar Transistor) Modules

CM1200HC-50H



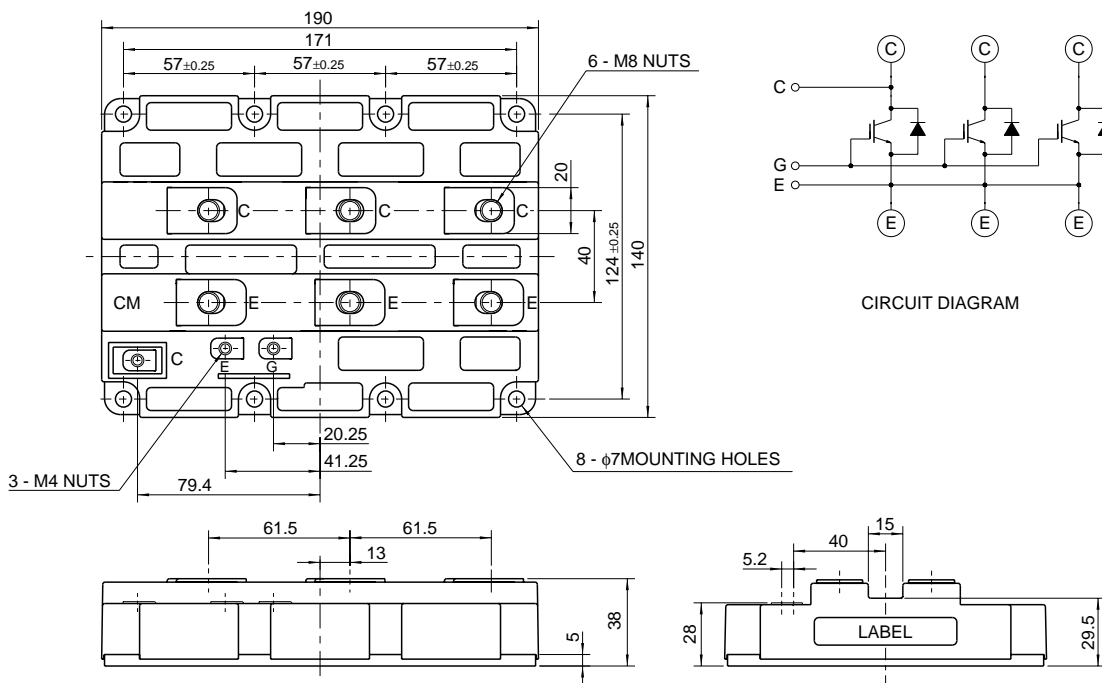
- IC 1200A
- VCES 2500V
- Insulated Type
- 1-element in a pack

APPLICATION

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

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



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Oct. 2002

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MAXIMUM RATINGS (Tj = 25°C)

| Symbol | Item | Conditions | Ratings | Unit |
|--------------------------|-------------------------------|--|--------------|------|
| V _{CES} | Collector-emitter voltage | V _{GE} = 0V | 2500 | V |
| V _{GES} | Gate-emitter voltage | V _{CE} = 0V | ±20 | V |
| I _C | Collector current | T _C = 25°C | 1200 | A |
| I _{CM} | | Pulse (Note 1) | 2400 | A |
| I _E (Note 2) | Emitter current | T _C = 25°C | 1200 | A |
| I _{EM} (Note 2) | | Pulse (Note 1) | 2400 | A |
| P _C (Note 3) | Maximum collector dissipation | T _C = 25°C, IGBT part | 15600 | W |
| T _j | Junction temperature | — | -40 ~ +150 | °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 (Tj = 25°C)

| Symbol | Item | Conditions | Limits | | | Unit |
|--------------------------|--------------------------------------|--|--------|-------|-------|------|
| | | | Min | Typ | Max | |
| I _{CES} | Collector cutoff current | V _{CE} = V _{CES} , V _{GE} = 0V | — | — | 15 | mA |
| V _{GE(th)} | Gate-emitter threshold voltage | I _C = 120mA, 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 | — | 2.80 | 3.64 | V |
| | | T _j = 125°C | — | 3.15 | — | |
| C _{ies} | Input capacitance | V _{CE} = 10V V _{GE} = 0V | — | 180 | — | nF |
| C _{oes} | Output capacitance | | — | 13.5 | — | nF |
| C _{res} | Reverse transfer capacitance | | — | 6.0 | — | nF |
| Q _G | Total gate charge | V _{CC} = 1250V, I _C = 1200A, V _{GE} = 15V | — | 8.1 | — | µC |
| t _{d (on)} | Turn-on delay time | V _{CC} = 1250V, I _C = 1200A | — | — | 1.60 | µs |
| t _r | Turn-on rise time | V _{GE1} = V _{GE2} = 15V | — | — | 2.00 | µs |
| t _{d (off)} | Turn-off delay time | R _G = 1.6Ω | — | — | 2.50 | µs |
| t _f | Turn-off fall time | Resistive load switching operation | — | — | 1.00 | µs |
| V _{EC} (Note 2) | Emitter-collector voltage | I _E = 1200A, V _{GE} = 0V | — | 2.50 | 3.25 | V |
| t _{rr} (Note 2) | Reverse recovery time | I _E = 1200A, | — | — | 1.20 | µs |
| Q _{rr} (Note 2) | Reverse recovery charge | die / dt = -2400A / µs (Note 1) | — | 350 | — | µC |
| R _{th(j-c)Q} | Thermal resistance | Junction to case, IGBT part | — | — | 0.010 | K/W |
| R _{th(j-c)R} | | Junction to case, FWDi part | — | — | 0.020 | K/W |
| R _{th(c-f)} | Contact thermal resistance | Case to fin, conductive grease applied | — | 0.008 | — | 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 150°C.
 4. Pulse width and repetition rate should be such as to cause negligible temperature rise.

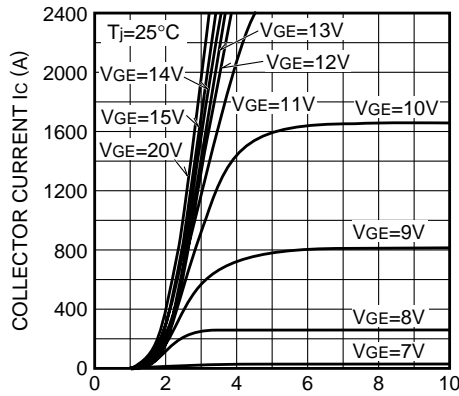
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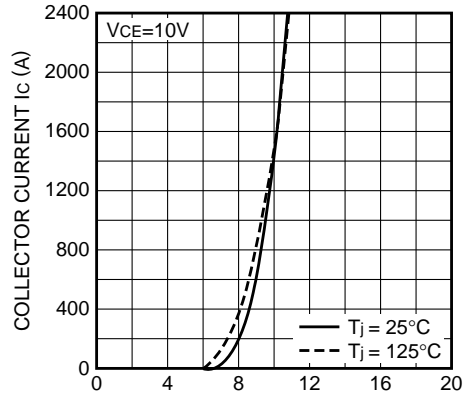
PERFORMANCE CURVES

OUTPUT CHARACTERISTICS
(TYPICAL)



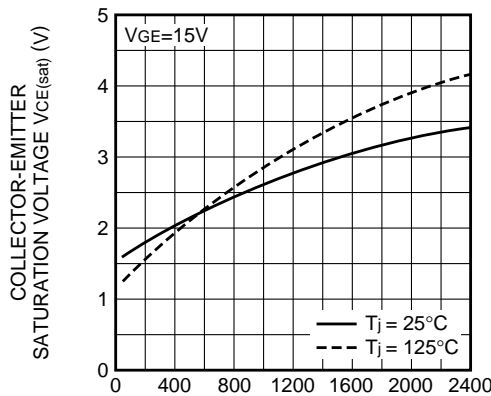
COLLECTOR-EMITTER SATURATION VOLTAGE $V_{ce(sat)}$ (V)

TRANSFER CHARACTERISTICS
(TYPICAL)



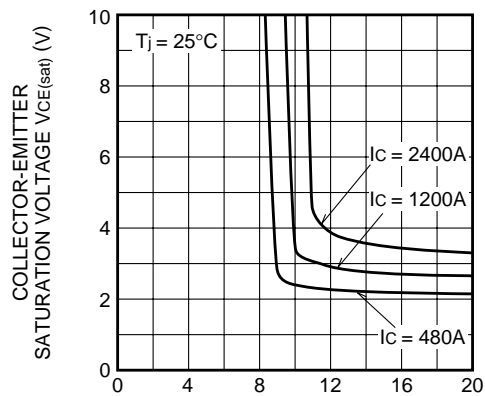
GATE-EMITTER VOLTAGE V_{GE} (V)

COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)



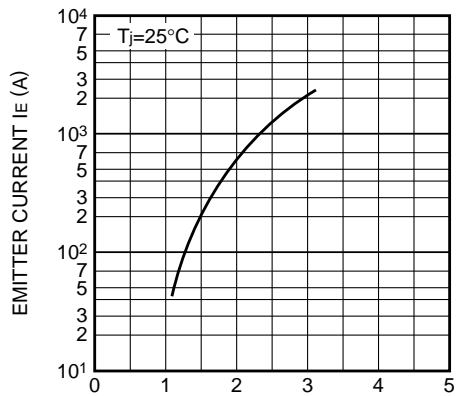
COLLECTOR CURRENT I_c (A)

COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)



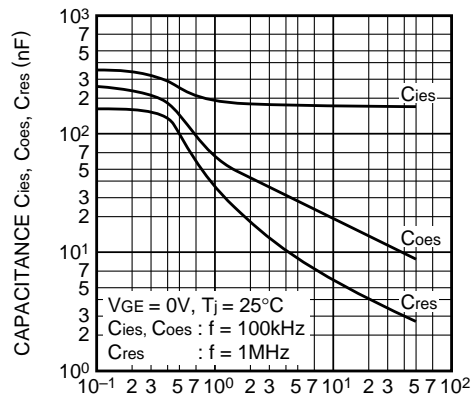
GATE-EMITTER VOLTAGE V_{GE} (V)

FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



EMITTER-COLLECTOR VOLTAGE V_{ec} (V)

CAPACITANCE VS. V_{CE}
(TYPICAL)



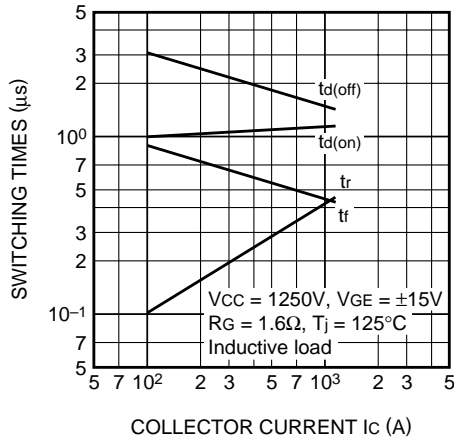
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)

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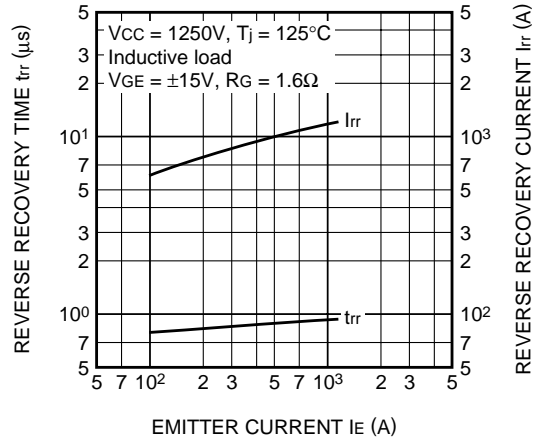
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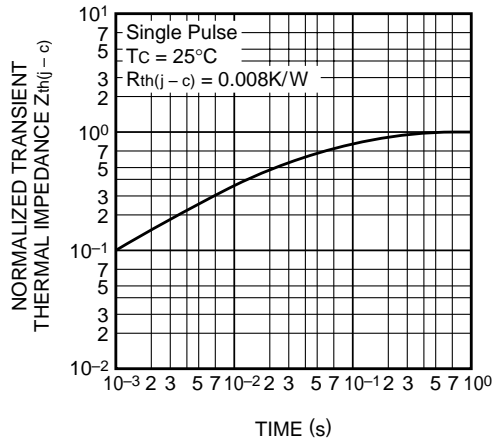
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



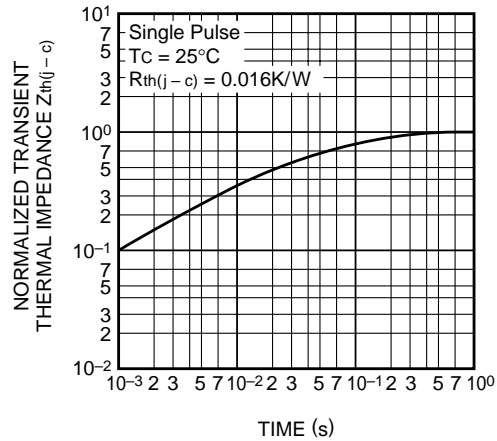
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi part)



V_{GE} - GATE CHARGE (TYPICAL)

