**CM200DY-24NF**

- **I_c** ................................................. 200A
- **V_CES** ........................................... 1200V
- Insulated Type
- 2-elements in a pack

**APPLICATION**

General purpose inverters & Servo controls, etc

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**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm

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**CIRCUIT DIAGRAM**

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**CM200DY-24NF**

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### MAXIMUM RATINGS (Tj = 25°C)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Ratings</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCES</td>
<td>Collector-emitter voltage</td>
<td>G-E Short</td>
<td>1200</td>
<td>V</td>
</tr>
<tr>
<td>VGES</td>
<td>Gate-emitter voltage</td>
<td>C-E Short</td>
<td>±20</td>
<td>V</td>
</tr>
<tr>
<td>IC</td>
<td>Collector current</td>
<td>DC, Tc' = 112°C&lt;sup&gt;3&lt;/sup&gt;</td>
<td>200</td>
<td>A</td>
</tr>
<tr>
<td>ICM</td>
<td>Pulse</td>
<td>(Note 2)</td>
<td>400</td>
<td>A</td>
</tr>
<tr>
<td>IE</td>
<td>Emitter current</td>
<td>Pulse</td>
<td>200</td>
<td>A</td>
</tr>
<tr>
<td>IEM</td>
<td>(Note 1)</td>
<td>Pulse</td>
<td>400</td>
<td>A</td>
</tr>
<tr>
<td>PC</td>
<td>(Note 3)</td>
<td>Maximum collector dissipation</td>
<td>Tc = 25°C</td>
<td>1130</td>
</tr>
<tr>
<td>Tj</td>
<td>Junction temperature</td>
<td>−40 ~ +150</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Tstg</td>
<td>Storage temperature</td>
<td>−40 ~ +125</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Viso</td>
<td>Isolation voltage</td>
<td>Main Terminal to base plate, AC 1 min.</td>
<td>2500</td>
<td>V</td>
</tr>
<tr>
<td>Tc</td>
<td>Torque strength</td>
<td>Main Terminal M6</td>
<td>3.5 ~ 4.5</td>
<td>N·m</td>
</tr>
<tr>
<td></td>
<td>Mounting holes M6</td>
<td>3.5 ~ 4.5</td>
<td>N·m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weight</td>
<td>Typical value</td>
<td>400</td>
<td>g</td>
</tr>
</tbody>
</table>

### ELECTRICAL CHARACTERISTICS (Tj = 25°C)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test conditions</th>
<th>Limits</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICES</td>
<td>Collector cutoff current</td>
<td>VCE = VCES, VGE = 0V</td>
<td>—</td>
<td>1</td>
</tr>
<tr>
<td>VGE(th)</td>
<td>Gate-emitter threshold voltage</td>
<td>IC = 20mA, VCE = 10V</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>IGES</td>
<td>Gate leakage current</td>
<td>VGE = VGES, VCE = 0V</td>
<td>—</td>
<td>0.5</td>
</tr>
<tr>
<td>VCE(sat)</td>
<td>Collector-emitter saturation voltage</td>
<td>Tj = 25°C</td>
<td>1.8</td>
<td>2.5</td>
</tr>
<tr>
<td>Cies</td>
<td>Input capacitance</td>
<td>VCE = 10V</td>
<td>—</td>
<td>47</td>
</tr>
<tr>
<td>Coes</td>
<td>Output capacitance</td>
<td>VGE = 0V</td>
<td>—</td>
<td>4</td>
</tr>
<tr>
<td>Cres</td>
<td>Reverse transfer capacitance</td>
<td>—</td>
<td>0.9</td>
<td>nF</td>
</tr>
<tr>
<td>Qgd</td>
<td>Total gate charge</td>
<td>VCC = 600V, IC = 200A, VGE = 15V</td>
<td>—</td>
<td>1350</td>
</tr>
<tr>
<td>td(on)</td>
<td>Turn-on delay time</td>
<td>—</td>
<td>500</td>
<td>ns</td>
</tr>
<tr>
<td>tr</td>
<td>Turn-on rise time</td>
<td>VCC = 600V, IC = 200A</td>
<td>—</td>
<td>150</td>
</tr>
<tr>
<td>td(off)</td>
<td>Turn-off delay time</td>
<td>VGE1 = VGE = 15V</td>
<td>—</td>
<td>600</td>
</tr>
<tr>
<td>tf</td>
<td>Turn-off fall time</td>
<td>RG = 1.6Ω, Inductive load switching operation</td>
<td>—</td>
<td>350</td>
</tr>
<tr>
<td>trr</td>
<td>Reverse recovery time</td>
<td>IC = 200A</td>
<td>—</td>
<td>250</td>
</tr>
<tr>
<td>Qrr</td>
<td>Reverse recovery charge</td>
<td>—</td>
<td>7.5</td>
<td>µC</td>
</tr>
<tr>
<td>VEC(Not 1)</td>
<td>Emitter-collector voltage</td>
<td>IC = 200A, VGE = 0V</td>
<td>—</td>
<td>3.2</td>
</tr>
<tr>
<td>Rnj(c/Q)</td>
<td>Thermal resistance&lt;sup&gt;1&lt;/sup&gt;</td>
<td>IGBT part (1/2 module)</td>
<td>—</td>
<td>0.11</td>
</tr>
<tr>
<td>Rnj(c/R)</td>
<td>FWDI part (1/2 module)</td>
<td>—</td>
<td>0.19</td>
<td>°C/W</td>
</tr>
<tr>
<td>Rnj(t)</td>
<td>Contact thermal resistance</td>
<td>Case to fin, Thermal compound Applied&lt;sup&gt;2&lt;/sup&gt; (1/2 module)</td>
<td>—</td>
<td>0.04</td>
</tr>
<tr>
<td>Rnj(c/Q)</td>
<td>Thermal resistance</td>
<td>Tc measured point is just under the chips</td>
<td>—</td>
<td>0.068&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>RG</td>
<td>External gate resistance</td>
<td>1.6</td>
<td>16</td>
<td>Ω</td>
</tr>
</tbody>
</table>

<sup>1</sup>: Tc measured point is shown in page OUTLINE DRAWING.
<sup>2</sup>: Typical value is measured by using Shin-etsu Silicone “G-746”.
<sup>3</sup>: Tc' measured point is just under the chips.

Note 1. IC, VCC, tr & Qgd represent characteristics of the anti-parallel, emitter to collector free-wheel diode (FWDI).
2. Pulse width and repetition rate should be such that the device junction temp. (Tj) does not exceed Tjmax rating.
3. Junction temperature (Tj) should not increase beyond 150°C.
MITSUBISHI IGBT MODULES
CM200DY-24NF
HIGH POWER SWITCHING USE

PERFORMANCE CURVES

OUTPUT CHARACTERISTICS
(TYPICAL)

COLLECTOR CURRENT \( I_C \) (A) vs.
COLLECTOR-EMITTER VOLTAGE \( V_{CE} \) (V)

COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)

COLLECTOR CURRENT \( I_C \) (A) vs.
COLLECTOR-EMITTER SATURATION VOLTAGE \( V_{CE\,sat} \) (V)

FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)

EMITTER CURRENT \( I_E \) (A) vs.
EMITTER-COLLECTOR VOLTAGE \( V_{EC} \) (V)

CAPACITANCE–\( V_{CE} \)
CHARACTERISTICS
(TYPICAL)

CAPACITANCE \( C_{ies}, C_{oex}, C_{res} \) (nF) vs.
COLLECTOR-EMITTER VOLTAGE \( V_{CE} \) (V)

HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)

SWITCHING TIME (\( t_{d} \)) vs.
COLLECTOR CURRENT \( I_C \) (A)

Conditions:
- \( V_{CC} = 600\,V \)
- \( V_{GE} = \pm 15\,V \)
- \( R_G = 1.6\,\Omega \)
- \( T_j = 125^\circ C \)
- Inductive load

\( t_{d(on)} \) and \( t_{d(off)} \)
MITSUBISHI IGBT MODULES
CM200DY-24NF
HIGH POWER SWITCHING USE

REVERSE RECOVERY CHARACTERISTICS
OF FREE-WHEEL DIODE
(TYPICAL)

EMITTER CURRENT Ie (A)

REVERSE RECOVERY TIME trr (ns)

REVERSE RECOVERY CURRENT lrr (A)

Conditions:
VCC = 600V
VGE = ±15V
Rg = 1.6Ω
Tj = 25°C
Inductive load

TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS
(IGBT part & FWDi part)

NORMALIZED TRANSIENT THERMAL IMPEDANCE Zth (°C/W)

IGBT part:
Per unit base = Rth(jc) = 0.11° C/W

FWDi part:
Per unit base = Rth(jc) = 0.19° C/W

GATE CHARGE CHARACTERISTICS
(TYPICAL)

GATE-EMITTER VOLTAGE VGE (V)

GATE CHARGE QG (nC)

VCC = 600V
VCC = 400V
IC = 200A

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MITSUBISHI ELECTRIC