2MBI550VN-170-50

IGBT MODULE (V series)
1700V / 550A / 2 in one package

**Features**
- High speed switching
- Voltage drive
- Low Inductance module structure

**Applications**
- Inverter for Motor Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply
- Industrial machines, such as Welding machines

**Maximum Ratings and Characteristics**

### Absolute Maximum Ratings (at Tj=25°C unless otherwise specified)

<table>
<thead>
<tr>
<th>Items</th>
<th>Symbols</th>
<th>Conditions</th>
<th>Maximum ratings</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector-Emitter voltage</td>
<td>Vces</td>
<td></td>
<td>1700</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Emitter voltage</td>
<td>Vges</td>
<td></td>
<td>220</td>
<td>V</td>
</tr>
<tr>
<td>Collector current</td>
<td>Ic</td>
<td>Continuous</td>
<td>Tj=25°C</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tj=100°C</td>
<td>550</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1ms</td>
<td></td>
<td>1100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1ms</td>
<td></td>
<td>550</td>
</tr>
<tr>
<td>Collector power dissipation</td>
<td>Pp</td>
<td></td>
<td>175</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 device</td>
<td></td>
<td>3750</td>
</tr>
<tr>
<td>Junction temperature</td>
<td>TJ</td>
<td>1 device</td>
<td></td>
<td>150</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td></td>
<td>-40 to 125</td>
<td></td>
</tr>
<tr>
<td>Isolation voltage between terminal and copper base (*1)</td>
<td>Viso</td>
<td>AC: 1 min.</td>
<td>3400</td>
<td></td>
</tr>
<tr>
<td></td>
<td>between thermistor and others (*2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screw torque Mounting (*3)</td>
<td></td>
<td></td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Terminals (*4)</td>
<td></td>
<td>4.5</td>
<td></td>
</tr>
</tbody>
</table>

Note *1: All terminals should be connected together during the test.
Note *2: Two thermistor terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.
Note *3: Recommendable Value : 2.5-3.5 Nm. (M5)
Note *4: Recommendable Value : 3.5-4.5 Nm (M6)

### Electrical characteristics (at Tj= 25°C unless otherwise specified)

<table>
<thead>
<tr>
<th>Items</th>
<th>Symbols</th>
<th>Conditions</th>
<th>Characteristics</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero gate voltage collector current</td>
<td>Ices</td>
<td>Vce = 0V, Vce = 1700V</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Gate-Emitter leakage current</td>
<td>Iges</td>
<td>Vce = 0V, Vce = 220V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal gate resistance</td>
<td>R ges</td>
<td></td>
<td></td>
<td>Ω</td>
</tr>
<tr>
<td>Input capacitance</td>
<td>Ciss</td>
<td>Vce = 10V, Vce = 0V, f = 1MHz</td>
<td></td>
<td>nF</td>
</tr>
<tr>
<td>Turn-on time</td>
<td>tσ</td>
<td></td>
<td></td>
<td>nsec</td>
</tr>
<tr>
<td>Turn-off time</td>
<td>tα</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward on voltage</td>
<td>Vf (terminal)</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>(chip)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reverse recovery time</td>
<td>trr</td>
<td></td>
<td></td>
<td>nsec</td>
</tr>
<tr>
<td>Resistance</td>
<td>R</td>
<td>T = 25°C</td>
<td></td>
<td>Ω</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T = 100°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T = 25-50°C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Thermal resistance characteristics

<table>
<thead>
<tr>
<th>Items</th>
<th>Symbols</th>
<th>Conditions</th>
<th>Characteristics</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal resistance (1 device)</td>
<td>Rθjc</td>
<td>Inverter IGBT</td>
<td></td>
<td>°C/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inverter FW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact thermal resistance (1 device) (*5)</td>
<td>Rθjc-w</td>
<td>with Thermal Compound</td>
<td></td>
<td>°C/W</td>
</tr>
</tbody>
</table>

Note *5: This is the value which is defined mounting on the additional cooling fin with thermal compound.
Characteristics (Representative)

- **Collector current vs. Collector-Emitter voltage (typ.)**
  - $T = 25°C / \text{chip}$
  - $V_{ce} = 20V, 15V, 12V, 10V, 8V$

- **Collector current vs. Collector-Emitter voltage (typ.)**
  - $T = 150°C / \text{chip}$
  - $V_{ce} = 20V, 15V, 12V, 10V, 8V$

- **Collector current vs. Collector-Emitter voltage (typ.)**
  - $V_{ce} = 15V / \text{chip}$
  - $T = 25°C, 125°C, 150°C$

- **Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)**
  - $T = 25°C / \text{chip}$
  - $V_{ce} = 0V, 15V$

- **Gate Capacitance vs. Collector-Emitter Voltage (typ.)**
  - $V_{ce} = 0V, f = 1MHz, T = 25°C$
  - $C_{ies}, C_{oes}, C_{res}$

- **Dynamic Gate Charge (typ.)**
  - $V_{ce} = 900V, I_c = 550A, T = 25°C$
  - $V_{ce} = 15V, 0V, -15V$
  - Gate charge: $Q_g [\mu\text{C}]$
Switching time vs. Collector current (typ.)
$V_{CC}=900V, V_{GE}=\pm15V, R_G=3.3\Omega, T_J=25^\circ C$

Collector current: $I_C$ [A]

Switching time vs. Gate resistance (typ.)
$V_{CC}=900V, I_C=550A, V_{GE}=\pm15V, T_J=125^\circ C, 150^\circ C$

Gate resistance: $R_G$ [Ω]

Switching loss vs. Collector current (typ.)
$V_{CC}=900V, V_{GE}=\pm15V, R_G=3.3\Omega, T_J=125^\circ C, 150^\circ C$

Collector current: $I_C$ [A]

Reverse bias safe operating area (max.)
$+V_{CE}=15V, -V_{CE}=15V, R_G=3.3\Omega, T_J=150^\circ C$

Gate resistance: $R_G$ [Ω]

Collector-Emitter voltage: $V_{CE}$ [V]

Notice)
Switching characteristics of $V_{CE}$ is defined between Sense C and Sense E1 for Upper arm and Sense E1 and Sense E2 for Lower arm.
IGBT Modules

Switching characteristics of \( V_{CE} \) is defined between Sense C and Sense E1 for Upper arm and Sense E1 and Sense E2 for Lower arm.

<table>
<thead>
<tr>
<th>T(j) [sec]</th>
<th>0.0023</th>
<th>0.0201</th>
<th>0.0598</th>
<th>0.0708</th>
</tr>
</thead>
<tbody>
<tr>
<td>RH</td>
<td>IGBT</td>
<td>0.00429</td>
<td>0.01088</td>
<td>0.01537</td>
</tr>
<tr>
<td>[°C/W]</td>
<td>FWD</td>
<td>0.00644</td>
<td>0.01632</td>
<td>0.02305</td>
</tr>
</tbody>
</table>

**Forward Current vs. Forward Voltage (typ.)**

**Reverse Recovery Characteristics (typ.)**

**Forward on voltage: \( V_i \) [V]**

**Forward current: \( I_i \) [A]**

**Reverse recovery current: \( I_{rr} \) [A]**

**Reverse recovery time: \( t_{rr} \) [nsec]**

**Pulse Width : \( P_w \) [sec]**

**Temperature characteristic (typ.)**

**FWD safe operating area (max.)**

Notice) Switching characteristics of \( V_{CE} \) is defined between Sense C and Sense E1 for Upper arm and Sense E1 and Sense E2 for Lower arm.
■ Outline Drawings, mm

[Diagram of outline drawings with measurements and labels]

Weight: 300g (typ.)

■ Equivalent Circuit Schematic

[Diagram of equivalent circuit with labels]

[Inverter]  [Thermistor]

P (2)  C

G1  E1

G2  E2

N (1)

out (3, 4)

T1  T2
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   - Electrical home appliances
   - Personal equipment
   - Measurement equipment
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