Silicon N-channel Side-gate HiGT and Ex-SFD 1700V G2 Version

**FEATURES**

- Superior thermal reliability by sintered Cu bonding
- Low power dissipation by side-gate HiGT
- Soft & fast response characteristic
- Low noise & easy drive through low Cies and Cres of side-gate HiGT
- High current density & half-bridge nHPD module
- Scalable large current easily handled by paralleling
- Low stray inductance & low Rth(j-c)
- Built in temperature sensor
- Equipped with current sensing terminals

**ABSOLUTE MAXIMUM RATINGS (Tc=25°C)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Unit</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector Emitter Voltage</td>
<td>VCES</td>
<td>V</td>
<td>1,700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gate Emitter Voltage</td>
<td>VGES</td>
<td>V</td>
<td>±20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector Current</td>
<td>IC</td>
<td>A</td>
<td>1,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1ms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward Current</td>
<td>IF</td>
<td>A</td>
<td>1,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1ms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junction Temperature</td>
<td>VJ</td>
<td>°C</td>
<td>-50</td>
<td>+175</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>TSTG</td>
<td>°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>VISO</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screw Torque</td>
<td>M</td>
<td>N·m</td>
<td>0.8/15</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M</td>
<td></td>
<td>6.0</td>
<td>(1)</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** (1) Recommended Value 5.5±0.5N·m

**ELECTRICAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Unit</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Test Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector Emitter Cut-Off Current</td>
<td>ICES</td>
<td>mA</td>
<td></td>
<td></td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>Gate Emitter Leakage Current</td>
<td>IGES</td>
<td>nA</td>
<td>500</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Collector Emitter Saturation Voltage</td>
<td>VCES</td>
<td>V</td>
<td>1.5</td>
<td>1.95</td>
<td>2.35</td>
<td>Ic=1200A, VGE=15V, Tj=25°C</td>
</tr>
<tr>
<td>Gate Emitter Threshold Voltage</td>
<td>VGES</td>
<td>V</td>
<td></td>
<td></td>
<td>70</td>
<td>Vc=10V, Ic=200mA, Tj=25°C</td>
</tr>
<tr>
<td>Input Capacitance</td>
<td>CIES</td>
<td>pF</td>
<td>50</td>
<td></td>
<td></td>
<td>0.05</td>
</tr>
<tr>
<td>Internal Gate Resistance</td>
<td>RGES</td>
<td>Ω</td>
<td>6.8</td>
<td></td>
<td></td>
<td>0.05</td>
</tr>
<tr>
<td>Rise Time</td>
<td>tr</td>
<td>μs</td>
<td>0.25</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Turn On Time</td>
<td>tON</td>
<td>μs</td>
<td>0.95</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Fall Time</td>
<td>tf</td>
<td>μs</td>
<td>0.55</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Turn Off Time</td>
<td>tOFF</td>
<td>μs</td>
<td>1.30</td>
<td></td>
<td></td>
<td>-</td>
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<tr>
<td>Peak Forward Voltage Drop</td>
<td>VF</td>
<td>V</td>
<td>1.40</td>
<td>1.85</td>
<td>2.30</td>
<td>Ic=1200A, VGE=0V, Tj=25°C</td>
</tr>
<tr>
<td>Reverse Recovery Time</td>
<td>tr</td>
<td>μs</td>
<td>0.75</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Turn-on Loss per Pulse</td>
<td>Eon</td>
<td>J/P</td>
<td>0.46</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Turn-off Loss per Pulse</td>
<td>Eoff</td>
<td>J/P</td>
<td>0.46</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Reverse Recovery Loss per Pulse</td>
<td>Eoff</td>
<td>J/P</td>
<td>0.47</td>
<td></td>
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<tr>
<td>Short Circuit Pulse Width</td>
<td>tscc</td>
<td>μs</td>
<td>6</td>
<td></td>
<td></td>
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<tr>
<td>Stray Inductance in Module</td>
<td>LSCC</td>
<td>nH</td>
<td>9</td>
<td></td>
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<td>-</td>
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<tr>
<td>NTC-Thermistor</td>
<td>R2S</td>
<td>kΩ</td>
<td>5</td>
<td></td>
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<td>-</td>
</tr>
<tr>
<td>Deviation</td>
<td>∆R/R</td>
<td>%</td>
<td>-5</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>B-constant</td>
<td>B25</td>
<td>K</td>
<td>3375</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Thermal Impedance</td>
<td>RTH(c)</td>
<td>KW</td>
<td>0.032</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Contact Thermal Impedance</td>
<td>RTH(c)</td>
<td>KW</td>
<td>0.053</td>
<td></td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: (2)(3) Ls and R0 are the test condition's values for evaluation of the switching times, not recommended value.

Please determine the suitable R0 value by measuring switching behavior and checking results with the respective SOA.

* Please contact our representatives at order.
* For improvement, specifications are subject to change without notice.
* For actual application, please confirm this spec sheet is the newest revision.
* ELECTRICAL CHARACTERISTIC values according to IEC 60747–2 IEC 60747–9
OUTLINE DRAWING

Weight: 770(g)
**IGBT Module**

**MBM1200GS17G2**

**Target Specification**

**Collector Current vs. Collector to Emitter Voltage**

- **Typical**
  - $V_{GE} = 15V$
  - $T_{vj} = 25^\circ C$
  - $9V$
  - $11V$
  - $13V$

**Collector Current vs. Collector to Emitter Voltage**

- **Typical**
  - $V_{GE} = 15V$
  - $T_{vj} = 175^\circ C$
  - $7V$
  - $9V$

**Forward Voltage of free-wheeling diode**

- **Typical**
  - $V_{cc} = 900V$
  - $I_C = 1200A$

**QG - VGE curve**

- **Conditions**
  - $T_{vj} = 25^\circ C$
  - $V_{cc} = 900V$
  - $I_C = 1200A$
  - $V_{GE} = \pm 15V$
**IGBT Module**

**MBM1200GS17G2**

**Target Specification**

**Turn-on Loss vs. Collector Current**

**Turn-off Loss vs. Collector Current**

**Recovery Loss vs. Forward Current**

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**Conditions**

$L_s=40\text{nH}$

$V_{CC}=900\text{V}$

$R_g=2.2\Omega/2.2\Omega$

$V_{GE}=\pm15\text{V}$

$T_{vj}=25^\circ\text{C}$

$y = 1.12\text{E-10}x^3 - 1.29\text{E-07}x^2 + 3.66\text{E-04}x + 1.28\text{E-02}$

$T_{vj}=175^\circ\text{C}$

$y = 6.60\text{E-11}x^3 - 7.70\text{E-08}x^2 + 2.90\text{E-04}x + 3.66\text{E-03}$

$T_{vj}=25^\circ\text{C}$

$y = -9.82\text{E-12}x^3 + 2.95\text{E-08}x^2 + 2.10\text{E-04}x + 3.07\text{E-02}$

$T_{vj}=175^\circ\text{C}$

$y = 1.09\text{E-12}x^3 - 2.57\text{E-08}x^2 + 3.58\text{E-04}x + 6.35\text{E-02}$
**MBM1200GS17G2**

**Target Specification**

**Turn-on Loss vs. Gate Resistance**

- **Conditions**
  - \( L_s = 40 \text{nH} \)
  - \( V_{cc} = 900 \text{V} \)
  - \( I_c = 1200 \text{A} \)
  - \( V_{ge} = \pm 15 \text{V} \)

**Turn-off Loss vs. Gate Resistance**

- **Conditions**
  - \( L_s = 40 \text{nH} \)
  - \( V_{cc} = 900 \text{V} \)
  - \( I_c = 1200 \text{A} \)
  - \( V_{ge} = \pm 15 \text{V} \)

**Recovery Loss vs. Gate Resistance**

- **Conditions**
  - \( L_s = 40 \text{nH} \)
  - \( V_{cc} = 900 \text{V} \)
  - \( I_c = 1200 \text{A} \)
  - \( V_{ge} = \pm 15 \text{V} \)
**RBSOA**

**Reverse bias safe operation area (RBSOA)**

![Graph showing RBSOA](image)

**Reverse Recovery SOA**

**Conditions:**
- $L_s \leq 40\, \text{nH}$
- $V_{cc} \leq 1200\, \text{V}$
- $I_c \leq 2400\, \text{A}$
- $R_{\text{ON}} \geq 2.2\, \Omega$
- $V_{GE} = \pm 15\, \text{V}$
- $T_{vj} = 175\, ^\circ\text{C}$
- On pulse width $\geq 10\, \mu\text{s}$

$P_{\text{max}} \leq 1.2\, \text{MW}$

**Definition of Recovery di/dt**

$$\frac{\Delta t}{0.5I_{\text{rm}}} = \frac{0.5I_{\text{rm}}}{\Delta t}$$

**Pmax $\leq 1.2\, \text{MW}$**

![Graph showing Reverse Recovery SOA](image)
MBM1200GS17G2

IGBT Module

Target Specification

Collector to Emitter Voltage, VCE (V)

Capacitance vs. Collector to Emitter Voltage

Typical

Thermistor Resistance vs. Temperature

Conditions:
Tj = 25°C
I = 100kHz
HITACHI POWER SEMICONDUCTORS

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