### Features
- High short circuit capability, self-limiting short circuit current
- IGBT® CHIP (Trench + Field Stop technology)
- $V_{CES}$ with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Low switching losses

### Applications
- High frequency switching application
- Motion/servo control
- Medical applications
- UPS systems

---

#### Absolute Maximum Ratings ($T_C = 25^\circ$C, unless otherwise specified)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameters</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_{J,\text{max}}$</td>
<td>Max. Junction Temperature</td>
<td>$T_J=25^\circ$C</td>
<td>150</td>
<td></td>
<td></td>
<td>°C</td>
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<tr>
<td>$T_{J,\text{op}}$</td>
<td>Operating Temperature</td>
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<td>-40</td>
<td>125</td>
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<td>°C</td>
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<tr>
<td>$T_{J,\text{stg}}$</td>
<td>Storage Temperature</td>
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<td>-40</td>
<td>125</td>
<td></td>
<td>°C</td>
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<tr>
<td>$V_{RRM}$</td>
<td>Insulation Test Voltage</td>
<td>$AC, t=1\min$</td>
<td>3000</td>
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<td></td>
<td>V</td>
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<tr>
<td>CTI</td>
<td>Comparative Tracking Index</td>
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<td>350</td>
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<tr>
<td>Torque</td>
<td>Module-to-Sink</td>
<td>Recommended (M6)</td>
<td>3</td>
<td>5</td>
<td></td>
<td>N·m</td>
</tr>
<tr>
<td>Torque</td>
<td>Module Electrodes</td>
<td>Recommended (M5)</td>
<td>2.5</td>
<td>5</td>
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<td>N·m</td>
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<tr>
<td>Weight</td>
<td></td>
<td></td>
<td>160</td>
<td></td>
<td></td>
<td>g</td>
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</tbody>
</table>

---

**Life Support Note:**

Not Intended for Use in Life Support or Life Saving Applications

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.
## Electrical and Thermal Specifications (Tc = 25°C, unless otherwise specified)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameters</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{GE(th)} )</td>
<td>Gate - Emitter Threshold Voltage</td>
<td>( V_{GE}=V_{GE} ), ( I_c=4,mA )</td>
<td>5.0</td>
<td>5.8</td>
<td>6.5</td>
<td>V</td>
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<tr>
<td>( V_{CE(sat)} )</td>
<td>Collector - Emitter Saturation Voltage</td>
<td>( I_c=100,A, V_{GE}=15V, T_J=25°C )</td>
<td>1.7</td>
<td>1.9</td>
<td>V</td>
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<tr>
<td>( I_{CES} )</td>
<td>Collector Leakage Current</td>
<td>( V_{GE}=1200V, V_{GE}=0V, T_J=25°C )</td>
<td>1</td>
<td>mA</td>
<td></td>
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<tr>
<td>( I_{GDS} )</td>
<td>Gate Leakage Current</td>
<td>( V_{GE}=0V, V_{GE}=\pm 15V, T_J=125°C )</td>
<td>-400</td>
<td>400</td>
<td>nA</td>
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<tr>
<td>( R_{gint} )</td>
<td>Integrated Gate Resistor</td>
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<td>7.5</td>
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<td>Ω</td>
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<tr>
<td>( Q_{ss} )</td>
<td>Gate Charge</td>
<td>( V_{CC}=600V, I_c=100A, V_{GE}=\pm 15V )</td>
<td>0.9</td>
<td></td>
<td>μC</td>
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<tr>
<td>( C_{iss} )</td>
<td>Input Capacitance</td>
<td>( V_{CC}=25V, V_{GE}=0V, f=1MHz )</td>
<td>7.1</td>
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<td>nF</td>
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<tr>
<td>( C_{res} )</td>
<td>Reverse Transfer Capacitance</td>
<td>( V_{CC}=25V, V_{GE}=0V, f=1MHz )</td>
<td>0.3</td>
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<td>nF</td>
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<td>( t_{on} )</td>
<td>Turn - on Delay Time</td>
<td>( T_J=25°C )</td>
<td>260</td>
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<td>ns</td>
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<td>( t_{on} )</td>
<td>Rise Time</td>
<td>( T_J=125°C )</td>
<td>290</td>
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<td>ns</td>
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<td>( t_{on} )</td>
<td>Turn - off Delay Time</td>
<td>( I_c=100A )</td>
<td>30</td>
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<td>( t_{off} )</td>
<td>Fall Time</td>
<td>( R_G=3.9Ω )</td>
<td>50</td>
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<td>ns</td>
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<tr>
<td>( E_{on} )</td>
<td>Turn - on Energy</td>
<td>( V_{CE}=\pm 15V )</td>
<td>7.8</td>
<td></td>
<td>mJ</td>
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<tr>
<td>( E_{off} )</td>
<td>Turn - off Energy</td>
<td>Inductive Load</td>
<td>10</td>
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<td>mJ</td>
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<tr>
<td>( I_{SC} )</td>
<td>Short Circuit Current</td>
<td>( t_{psc}\leq 10,μS, V_{GE}=15V )</td>
<td>400</td>
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<td>A</td>
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<tr>
<td>( R_{thJC} )</td>
<td>Junction-to-Case Thermal Resistance (Per IGBT)</td>
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<td>0.28</td>
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<td>( V_f )</td>
<td>Forward Voltage</td>
<td>( I_c=100A, V_{GE}=0V, T_J=25°C )</td>
<td>1.65</td>
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<td>V</td>
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<tr>
<td>( I_{RM} )</td>
<td>Max. Reverse Recovery Current</td>
<td>( I_c=100A, V_{GE}=600V )</td>
<td>140</td>
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<td>( Q_r )</td>
<td>Reverse Recovery Charge</td>
<td>( di/dt=2500A/\mu s )</td>
<td>20.0</td>
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<td>μC</td>
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<tr>
<td>( E_{rec} )</td>
<td>Reverse Recovery Energy</td>
<td>( T_J=125°C )</td>
<td>9</td>
<td></td>
<td>mJ</td>
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<td>( R_{thJCD} )</td>
<td>Junction-to-Case Thermal Resistance (Per Diode)</td>
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<td>0.5</td>
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<td>K/W</td>
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</tbody>
</table>
Figure 1: Typical Output Characteristics

![Typical Output Characteristics](image1)

- $V_{GE} = 15V$
- $T_J = 25°C$
- $T_J = 125°C$

Figure 2: Typical Output Characteristics

![Typical Output Characteristics](image2)

- $V_{GE} = 15V$
- $V_{GE} = 17V$
- $V_{GE} = 15V$
- $V_{GE} = 13V$
- $V_{GE} = 11V$
- $V_{GE} = 9V$
- $T_J = 125°C$

Figure 3: Typical Transfer Characteristics

![Typical Transfer Characteristics](image3)

- $V_{CE} = 20V$
- $T_J = 25°C$
- $T_J = 125°C$

Figure 4: Switching Energy vs. Gate Resistor

![Switching Energy vs. Gate Resistor](image4)

- $V_{CE} = 600V$
- $I_C = 100A$
- $V_{GE} = ±15V$
- $T_J = 125°C$
- $E_{on}$
- $E_{off}$
- $R_G = 3.9Ω$

Figure 5: Switching Energy vs. Collector Current

![Switching Energy vs. Collector Current](image5)

- $V_{CE} = 600V$
- $R_G = 3.9Ω$
- $I_C = 100A$
- $V_{GE} = ±15V$
- $T_J = 125°C$
- $E_{on}$
- $E_{off}$

Figure 6: Reverse Biased Safe Operating Area

![Reverse Biased Safe Operating Area](image6)

- $V_{CE}$
- $I_C$
- $R_G = 3.9Ω$
- $V_{GE} = ±15V$
- $T_J = 125°C$
**Figure 7: Diode Forward Characteristics**

![Diode Forward Characteristics Graph](image)

**Figure 8: Switching Energy vs. Gate Resistor**

![Switching Energy vs. Gate Resistor Graph](image)

**Figure 9: Switching Energy vs. Forward Current**

![Switching Energy vs. Forward Current Graph](image)

**Figure 10: Transient Thermal Impedance**

![Transient Thermal Impedance Graph](image)
**Power Module**

**1200V 100A IGBT Module**

### Dimensions-Package S

![Dimensions-Package S Diagram]

### Circuit Diagram

![Circuit Diagram]

### Packing Options

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Marking</th>
<th>Weight</th>
<th>Packing Mode</th>
<th>M.O.Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>MG12100S-BN2MM</td>
<td>MG12100S-BN2MM</td>
<td>160g</td>
<td>Bulk Pack</td>
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</tr>
</tbody>
</table>

### Part Numbering System

- **MG12100S-BN2MM**
  - PRODUCT TYPE: M: Power Module
  - MODULE TYPE: G: IGBT
  - VOLTAGE RATING: 12: 1200V
  - CURRENT RATING: 100: 100A
  - ASSEMBLY SITE:  
  - WAVER TYPE: B: 2x(IGBT+FWD)
  - CIRCUIT TYPE:  
  - PACKAGE TYPE: S: Package S

### Part Marking System

- **MG12100S-BN2MM**
  - Space reserved for QR code