Power Module
600V IGBT Family

MG06400D-BN4MM Series 400A Dual IGBT

Features
- High short circuit capability, self limiting short circuit current
- V_{CE(sat)} with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Low switching losses

Applications
- Motor drives
- Inverter
- Converter
- SMPS and UPS
- Welder
- Induction Heating

Agency Approvals

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>AGENCY FILE NUMBER</th>
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<tr>
<td></td>
<td>E71839</td>
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Module Characteristics (T_c = 25°C, unless otherwise specified)

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<tr>
<th>Symbol</th>
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<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
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<tbody>
<tr>
<td>T_{J(max)}</td>
<td>Max. Junction Temperature</td>
<td></td>
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<td>175</td>
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<td>T_{J(op)}</td>
<td>Operating Temperature</td>
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<td>-40</td>
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<td>150</td>
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<tr>
<td>T_{stg}</td>
<td>Storage Temperature</td>
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<td>-40</td>
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<td>125</td>
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<td>V_{ES}</td>
<td>Collector - Emitter Voltage</td>
<td>AC, t=1min</td>
<td></td>
<td>600</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>I_C</td>
<td>DC Collector Current</td>
<td>T_{c}=25°C</td>
<td></td>
<td>500</td>
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<td>A</td>
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<tr>
<td>I_{CM}</td>
<td>Repetitive Peak Collector Current</td>
<td>t_{p}=1ms</td>
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<td>800</td>
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<td>A</td>
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<tr>
<td>P_{tot}</td>
<td>Power Dissipation Per IGBT</td>
<td></td>
<td></td>
<td>1250</td>
<td></td>
<td>W</td>
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<tr>
<td>V_{RRM}</td>
<td>Repetitive Reverse Voltage</td>
<td>T_{c}=25°C</td>
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<td>V</td>
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<tr>
<td>I_{F(avg)}</td>
<td>Average Forward Current</td>
<td>T_{c}=25°C</td>
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<td>I_{FRM}</td>
<td>Repetitive Peak Forward Current</td>
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<td>A</td>
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<tr>
<td>P_{t}</td>
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<td>T_{j}=125°C, t=10ms, V_{R}=0V</td>
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<td>10000</td>
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<td>A^2s</td>
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Absolute Maximum Ratings (T_c = 25°C, unless otherwise specified)

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<tr>
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<th>Test Conditions</th>
<th>Values</th>
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<tr>
<td>IGBT</td>
<td>Collector - Emitter Voltage</td>
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<td>V</td>
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<tr>
<td></td>
<td>Gate - Emitter Voltage</td>
<td></td>
<td>±20</td>
<td>V</td>
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<td>I_C</td>
<td>DC Collector Current</td>
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<td>A</td>
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<td></td>
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<td>T_{c}=70°C</td>
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<td>I_{CM}</td>
<td>Repetitive Peak Collector Current</td>
<td>t_{p}=1ms</td>
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<td>A</td>
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<td>P_{tot}</td>
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<td>1250</td>
<td>W</td>
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<tr>
<td>Diode</td>
<td>Repetitive Reverse Voltage</td>
<td>T_{c}=25°C</td>
<td>600</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>Average Forward Current</td>
<td>T_{c}=25°C</td>
<td>500</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T_{c}=70°C</td>
<td>400</td>
<td>A</td>
</tr>
<tr>
<td>I_{FRM}</td>
<td>Repetitive Peak Forward Current</td>
<td>t_{p}=1ms</td>
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<td>A</td>
</tr>
<tr>
<td>P_{t}</td>
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<td>T_{j}=125°C, t=10ms, V_{R}=0V</td>
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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.

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Revised 07/21/16
# Electrical and Thermal Specifications (TC = 25°C, unless otherwise specified)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameters</th>
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<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
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<td>$V_{GE(th)}$</td>
<td>Gate - Emitter Threshold Voltage</td>
<td>$V_{CE}=V_{GE}$, $I_c=6.4mA$</td>
<td>4.9</td>
<td>5.8</td>
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<td>$V_{CESat}$</td>
<td>Collector - Emitter Saturation Voltage</td>
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<td>V</td>
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<td>$I_{CES}$</td>
<td>Collector Leakage Current</td>
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<td></td>
<td>mA</td>
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<td></td>
<td>$I_{CES}=600V$, $V_{GE}=0V$, $T_J=125°C$</td>
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<td></td>
<td>mA</td>
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<td>$I_{GES}$</td>
<td>Gate Leakage Current</td>
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<td>-400</td>
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<td>400</td>
<td>μA</td>
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<td>$R_{qint}$</td>
<td>Integrated Gate Resistor</td>
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<td></td>
<td>Ω</td>
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<td>$Q_g$</td>
<td>Gate Charge</td>
<td>$V_{GE}=300V$, $I_c=400A$, $V_{GE}±15V$</td>
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<td></td>
<td>μC</td>
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<td>$C_{iss}$</td>
<td>Input Capacitance</td>
<td>$V_{CE}=25V$, $V_{GE}=0V$, $f=1MHz$</td>
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<td>nF</td>
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<td>$C_{res}$</td>
<td>Reverse Transfer Capacitance</td>
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<td>nF</td>
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<td>$t_{d(on)}$</td>
<td>Turn-on Delay Time</td>
<td>$V_{CC}=300V$</td>
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<td>$t_{r}$</td>
<td>Rise Time</td>
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<tr>
<td>$t_{d(off)}$</td>
<td>Turn-off Delay Time</td>
<td>$R_g=1.5\Omega$</td>
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<td>ns</td>
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<td>$t_i$</td>
<td>Fall Time</td>
<td>$V_{GE}=±15V$</td>
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<td>ns</td>
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<td>$E_{on}$</td>
<td>Turn-on Energy</td>
<td>Inductive Load</td>
<td>$V_{CC}=25\mu S$, $V_{GE}=15V$</td>
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<td>$E_{off}$</td>
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<td>$I_{SC}$</td>
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<td></td>
<td>V</td>
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<td>V</td>
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<td>$R_{thJC}$</td>
<td>Junction-to-Case Thermal Resistance (Per IGBT)</td>
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<td>K/W</td>
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<td><strong>Diode</strong></td>
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<td>$V_f$</td>
<td>Forward Voltage</td>
<td>$I_f=400A$, $V_{GE}=0V$, $T_J=25°C$</td>
<td>1.55</td>
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<td></td>
<td>V</td>
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<tr>
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<td>$I_f=400A$, $V_{GE}=0V$, $T_J=125°C$</td>
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<td>V</td>
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<td>$I_{fRM}$</td>
<td>Max. Reverse Recovery Current</td>
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Power Module
600V IGBT Family

Figure 1: Typical Output Characteristics

Figure 2: Typical Output Characteristics

Figure 3: Typical Transfer characteristics

Figure 4: Switching Energy vs. Gate Resistor

Figure 5: Switching Energy vs. Collector Current

Figure 6: Reverse Biased Safe Operating Area
Power Module
600V IGBT Family

**Dimensions-Package D**

**Circuit Diagram and Pin Assignment**

<table>
<thead>
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<th>Packing Options</th>
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**Part Numbering System**

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<tr>
<th>Product Type</th>
<th>Module Type</th>
<th>Circuit Type</th>
<th>Assembly Site</th>
<th>Wafer Type</th>
<th>Package Type</th>
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<tbody>
<tr>
<td>M: Power Module</td>
<td>G: IGBT</td>
<td>B: 2x(IGBT+FWD)</td>
<td>06: 600V</td>
<td>D: Package D</td>
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**Part Marking System**

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<tbody>
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<td>PRODUCT TYPE</td>
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<tr>
<td>MODULE TYPE</td>
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<tr>
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<td>CURRENT RATING</td>
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<td>ASSEMBLY SITE</td>
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<td>WAFER TYPE</td>
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<td>CIRCUIT TYPE</td>
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<td>PACKAGE TYPE</td>
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