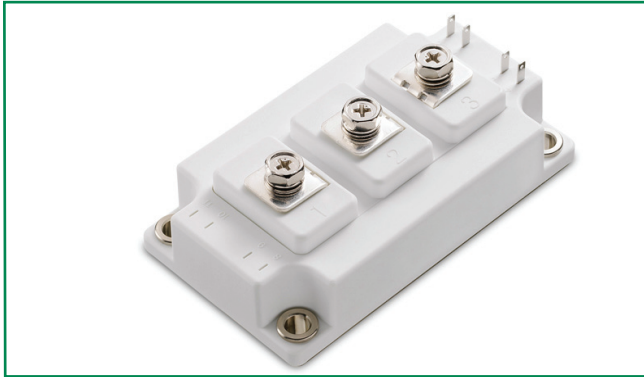


MG12300D-BN2MM Series 300A Dual IGBT



Features

- High short circuit capability, self limiting short circuit current
- IGBT³ CHIP(Trench+Field Stop technology)
- $V_{CE(sat)}$ 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

| AGENCY | AGENCY FILE NUMBER |
|---|--------------------|
|  | E71639 |

Module Characteristics ($T_c = 25^\circ\text{C}$, unless otherwise specified)

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Unit |
|--------------|----------------------------|---|-----|------|-----|------------------|
| $T_{J(max)}$ | Max. Junction Temperature | | | | 150 | $^\circ\text{C}$ |
| $T_{J(op)}$ | Operating Temperature | | -40 | | 125 | $^\circ\text{C}$ |
| T_{stg} | Storage Temperature | | -40 | | 125 | $^\circ\text{C}$ |
| V_{isol} | Insulation Test Voltage | AC, t=1min | | 3000 | | V |
| CTI | Comparative Tracking Index | Module case exposed to 0.1% ammonium chloride solution per UL and IEC standards | 350 | | | V |
| Torque | Module-to-Sink | Recommended (M6) | 3 | | 5 | N·m |
| Torque | Module Electrodes | Recommended (M6) | 2.5 | | 5 | N·m |
| Weight | | | | 320 | | g |

Absolute Maximum Ratings ($T_c = 25^\circ\text{C}$, unless otherwise specified)

| Symbol | Parameters | Test Conditions | Values | Unit |
|--------------|-----------------------------------|---|----------|----------------------|
| IGBT | | | | |
| V_{CES} | Collector - Emitter Voltage | $T_J=25^\circ\text{C}$ | 1200 | V |
| V_{GES} | Gate - Emitter Voltage | | ± 20 | V |
| I_C | DC Collector Current | $T_c=25^\circ\text{C}$ | 480 | A |
| | | $T_c=80^\circ\text{C}$ | 300 | A |
| I_{CM} | Repetitive Peak Collector Current | $t_p=1\text{ms}$ | 600 | A |
| P_{tot} | Power Dissipation Per IGBT | | 1450 | W |
| Diode | | | | |
| V_{RRM} | Repetitive Reverse Voltage | $T_J=25^\circ\text{C}$ | 1200 | V |
| $I_{F(AV)}$ | Average Forward Current | $T_c=25^\circ\text{C}$ | 480 | A |
| | | $T_c=80^\circ\text{C}$ | 300 | A |
| I_{FRM} | Repetitive Peak Forward Current | $t_p=1\text{ms}$ | 600 | A |
| I^2t | | $T_J = 125^\circ\text{C}, t=10\text{ms}, V_R=0\text{V}$ | 18000 | A^2s |

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 ($T_c = 25^\circ\text{C}$, unless otherwise specified)

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Unit |
|---------------|---|---|-------------------------|------|-------|---------------|
| IGBT | | | | | | |
| $V_{GE(th)}$ | Gate - Emitter Threshold Voltage | $V_{CE}=V_{GE}, I_C=12\text{mA}$ | 5.0 | 5.8 | 6.5 | V |
| $V_{CE(sat)}$ | Collector - Emitter Saturation Voltage | $I_C=300\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$ | | 1.7 | | V |
| | | $I_C=300\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$ | | 1.9 | | V |
| I_{CES} | Collector Leakage Current | $V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$ | | | 1 | mA |
| | | $V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$ | | | 5 | mA |
| I_{GES} | Gate Leakage Current | $V_{CE}=0\text{V}, V_{GE}=\pm 15\text{V}, T_J=125^\circ\text{C}$ | -400 | | 400 | μA |
| R_{Gint} | Intergrated Gate Resistor | | | 2.5 | | Ω |
| Q_{ge} | Gate Charge | $V_{CE}=600\text{V}, I_C=300\text{A}, V_{GE}=\pm 15\text{V}$ | | 2.8 | | μC |
| C_{ies} | Input Capacitance | $V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$ | | 21 | | nF |
| C_{res} | Reverse Transfer Capacitance | | | 0.85 | | nF |
| $t_{d(on)}$ | Turn - on Delay Time | $V_{CC}=600\text{V}$ $I_C=300\text{A}$ $R_G=2.4\Omega$ $V_{GE}=\pm 15\text{V}$ Inductive Load | $T_J=25^\circ\text{C}$ | | 160 | ns |
| | | | $T_J=125^\circ\text{C}$ | | 170 | ns |
| t_r | Rise Time | | $T_J=25^\circ\text{C}$ | | 40 | ns |
| | | | $T_J=125^\circ\text{C}$ | | 45 | ns |
| $t_{d(off)}$ | Turn - off Delay Time | | $T_J=25^\circ\text{C}$ | | 450 | ns |
| | | | $T_J=125^\circ\text{C}$ | | 520 | ns |
| t_f | Fall Time | | $T_J=25^\circ\text{C}$ | | 100 | ns |
| | | | $T_J=125^\circ\text{C}$ | | 160 | ns |
| E_{on} | Turn - on Energy | | $T_J=25^\circ\text{C}$ | | 16.5 | mJ |
| | | | $T_J=125^\circ\text{C}$ | | 25 | mJ |
| E_{off} | Turn - off Energy | $T_J=25^\circ\text{C}$ | | 24.5 | mJ | |
| | | $T_J=125^\circ\text{C}$ | | 37 | mJ | |
| I_{SC} | Short Circuit Current | $t_{psc} \leq 10\mu\text{s}, V_{GE}=15\text{V}$ | | 1200 | | A |
| | | $T_J=125^\circ\text{C}, V_{CC}=900\text{V}$ | | | | |
| R_{thJC} | Junction-to-Case Thermal Resistance (Per IGBT) | | | | 0.085 | K/W |
| Diode | | | | | | |
| V_F | Forward Voltage | $I_F=300\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$ | | 1.65 | | V |
| | | $I_F=300\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$ | | 1.65 | | V |
| I_{RRM} | Max. Reverse Recovery Current | $I_F=300\text{A}, V_R=600\text{V}$ | | 270 | | A |
| Q_{rr} | Reverse Recovery Charge | $d_{IF}/dt=-6000\text{A}/\mu\text{s}$ | | 56 | | μC |
| E_{rec} | Reverse Recovery Energy | $T_J=125^\circ\text{C}$ | | 26 | | mJ |
| R_{thJCD} | Junction-to-Case Thermal Resistance (Per Diode) | | | 0.15 | | K/W |

Figure 1: Typical Output Characteristics

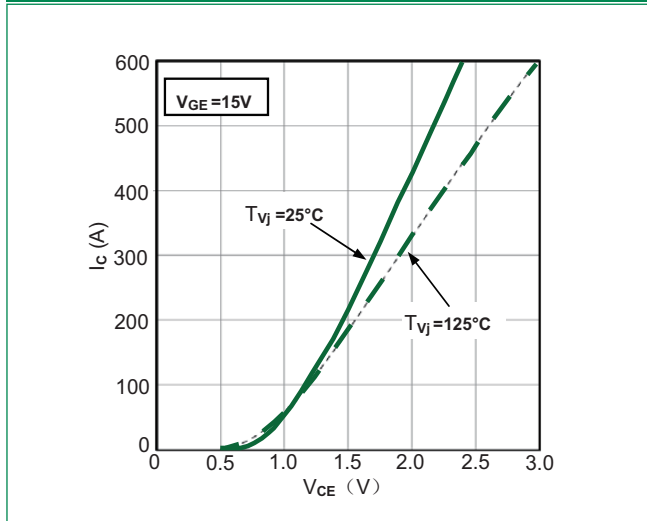


Figure 2: Typical Output Characteristics

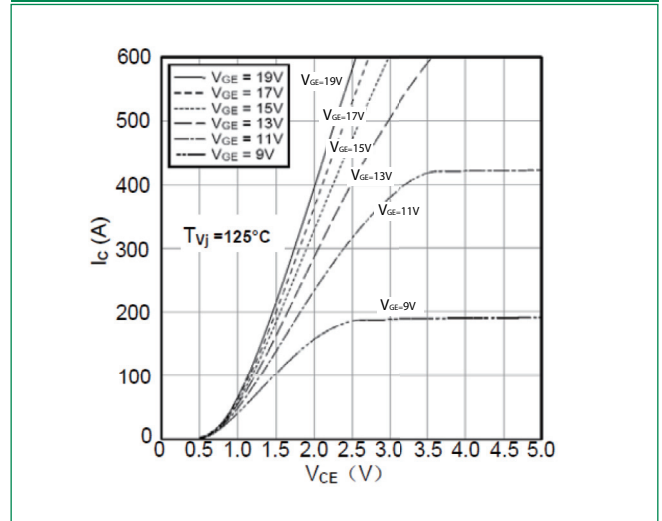


Figure 3: Typical Transfer characteristics

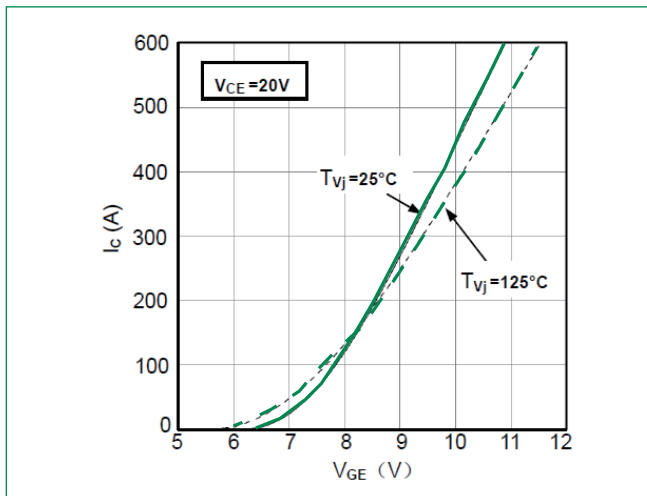


Figure 4: Switching Energy vs. Gate Resistor

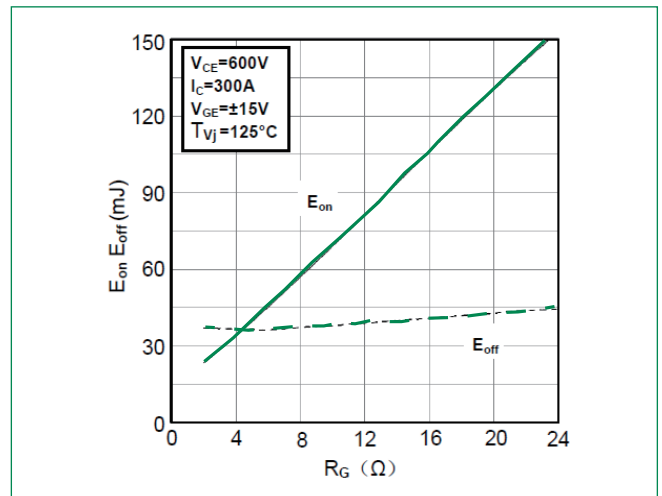


Figure 5: Switching Energy vs. Collector Current

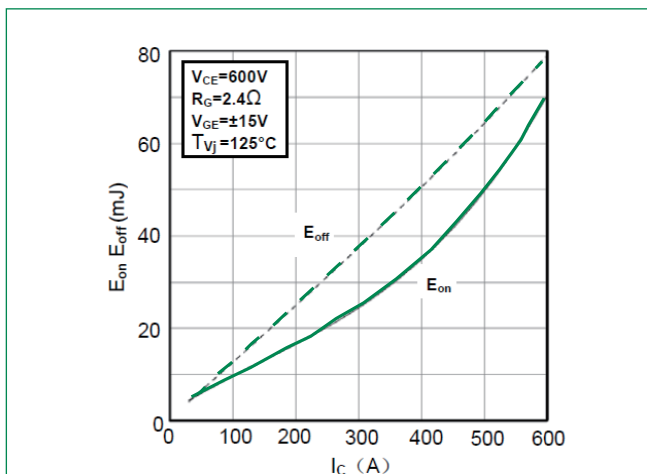


Figure 6: Reverse Biased Safe Operating Area

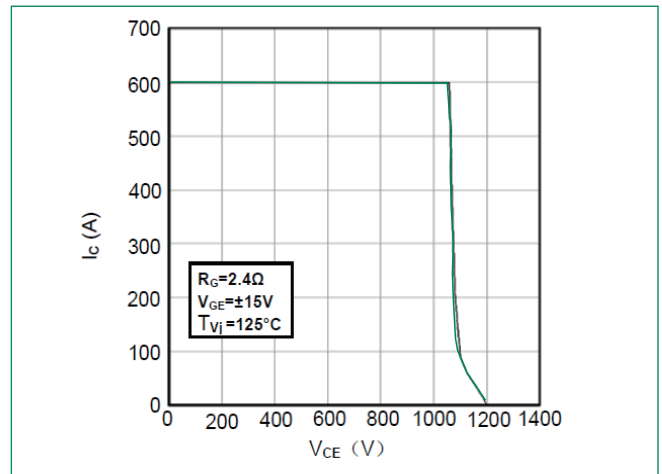


Figure 7: Diode Forward Characteristics

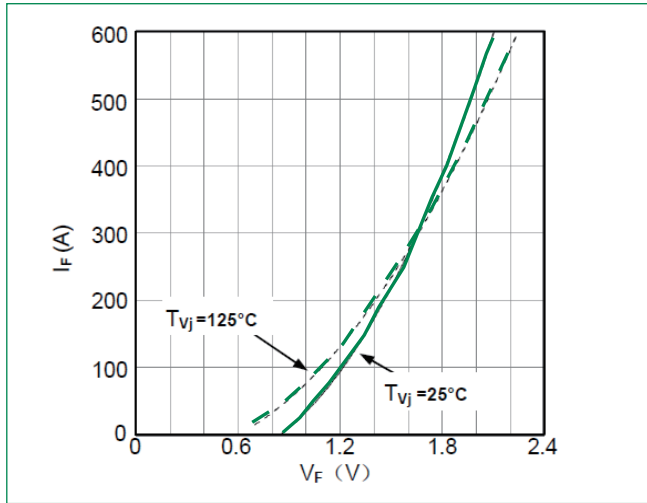


Figure 8: Switching Energy vs. Gate Resistort

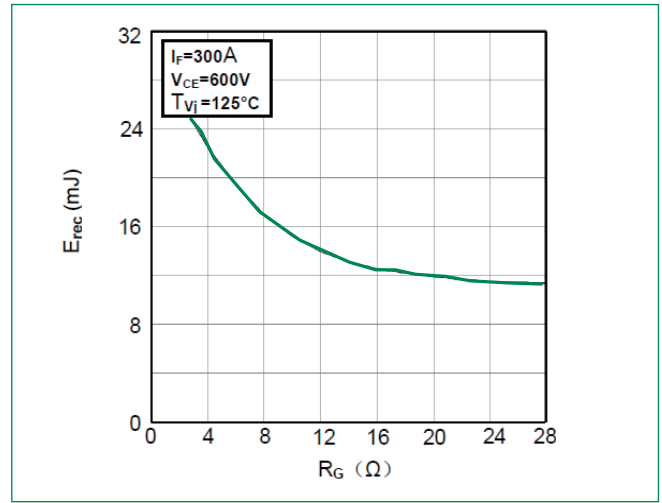


Figure 9: Switching Energy vs. Forward Current

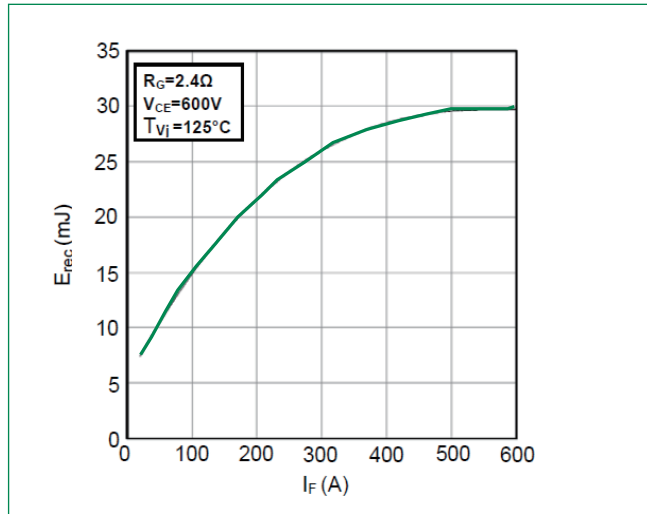
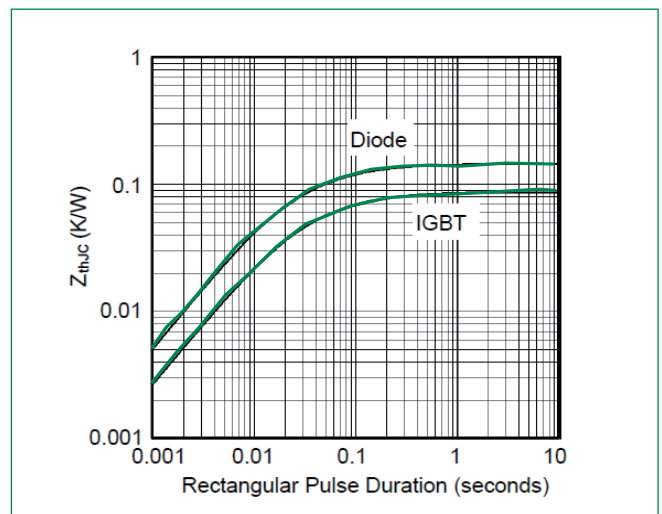
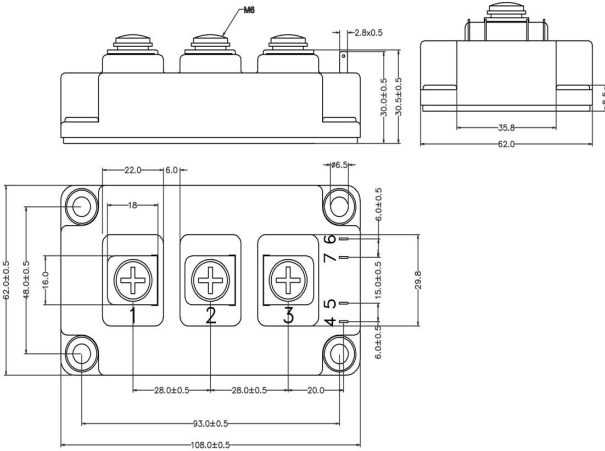


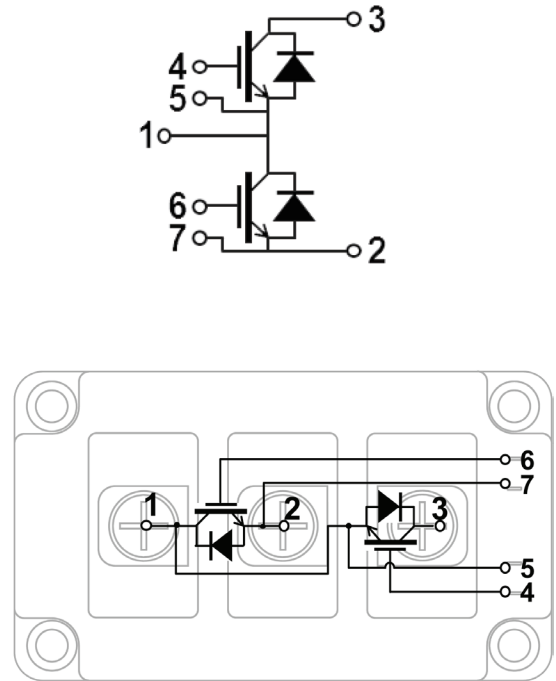
Figure 10: Transient Thermal Impedance



Dimensions-Package D



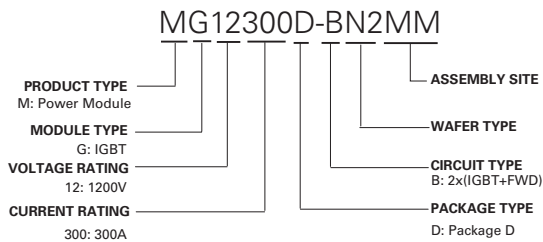
Circuit Diagram and Pin Assignment



Packing Options

| Part Number | Marking | Weight | Packing Mode | M.O.Q |
|----------------|----------------|--------|--------------|-------|
| MG12300D-BN2MM | MG12300D-BN2MM | 320g | Bulk Pack | 60 |

Part Numbering System



Part Marking System

