

## PRODUCT FEATURES

- High short circuit capability, self limiting short circuit current
- IGBT CHIP(Highly rugged SPT+ design)
- $V_{CE(sat)}$  with positive temperature coefficient
- Ultra Low Loss, High Ruggedness
- Free wheeling diodes with fast and soft reverse recovery

## APPLICATIONS

- AC motor control
- Motion/servo control
- Inverter and power supplies
- Photovoltaic/Fuel cell



### IGBT-inverter

#### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise specified)

| Symbol    | Parameter/Test Conditions         | Values  | Unit |
|-----------|-----------------------------------|---|------|
| $V_{CES}$ | Collector Emitter Voltage         | $T_J = 25^\circ\text{C}$                                | V    |
| $V_{GES}$ | Gate Emitter Voltage              |   |      |
| $I_C$     | DC Collector Current              | $T_C = 25^\circ\text{C}, T_{Jmax} = 175^\circ\text{C}$  | A    |
|           |                                   | $T_C = 100^\circ\text{C}, T_{Jmax} = 175^\circ\text{C}$ |      |
| $I_{CM}$  | Repetitive Peak Collector Current | $t_p = 1\text{ms}$                                      | W    |
| $P_{tot}$ | Power Dissipation Per IGBT        | $T_{Jmax} = 175^\circ\text{C}$                          |      |

### Diode-inverter

#### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise specified)

| Symbol      | Parameter/Test Conditions       | Values  | Unit                 |
|-------------|---------------------------------|---|----------------------|
| $V_{RRM}$   | Repetitive Reverse Voltage      | $T_J = 25^\circ\text{C}$                                    | V                    |
| $I_{F(AV)}$ | Average Forward Current         |   | A                    |
| $I_{FRM}$   | Repetitive Peak Forward Current | $t_p = 1\text{ms}$  |                      |
| $I^2t$      |                                 | $T_J = 150^\circ\text{C}, t = 10\text{ms}, V_R = 0\text{V}$ | $\text{A}^2\text{S}$ |

MacMic Science & Technology Co., Ltd.

Add: #18, Hua Shan Zhong Lu, New District, Changzhou City, Jiangsu Province, P. R. of China

# MMG200D170B

## IGBT-inverter

### ELECTRICAL CHARACTERISTICS ( $T_C=25^\circ\text{C}$ unless otherwise specified)

| Symbol        | Parameter/Test Conditions                        |   | Min.                    | Typ. | Max. | Unit          |
|---------------|--|---|-------------------------|------|------|---------------|
| $V_{GE(th)}$  | Gate Emitter Threshold Voltage                   | $V_{CE}=V_{GE}, I_C=8\text{mA}$   | 5.4                     | 6.2  | 7.4  | V             |
| $V_{CE(sat)}$ | Collector Emitter Saturation Voltage             | $I_C=200\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$  |                         | 2.5  | 2.75 |               |
|               |  | $I_C=200\text{A}, V_{GE}=15\text{V}, T_J=150^\circ\text{C}$   |                         | 3.1  |      |               |
| $I_{CES}$     | Collector Leakage Current                        | $V_{CE}=1700\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$   |                         |      | 1    | mA            |
|               |  | $V_{CE}=1700\text{V}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$  |                         |      | 10   | mA            |
| $I_{GES}$     | Gate Leakage Current                             | $V_{CE}=0\text{V}, V_{GE}=\pm 15\text{V}, T_J=25^\circ\text{C}$                                       | -500                    |      | 500  | nA            |
| $Q_g$         | Gate Charge                                      | $V_{CE}=900\text{V}, I_C=200\text{A}, V_{GE}=\pm 15\text{V}$  |                         | 1.54 |      | $\mu\text{C}$ |
| $C_{ies}$     | Input Capacitance                                | $V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$  |                         | 13.5 |      | nF            |
| $C_{res}$     | Reverse Transfer Capacitance                     |   |                         | 0.46 |      | nF            |
| $t_{d(on)}$   | Turn on Delay Time                               | $V_{CC}=900\text{V}, I_C=200\text{A}$<br>$R_G=6\Omega,$<br>$V_{GE}=\pm 15\text{V},$<br>Inductive Load | $T_J=25^\circ\text{C}$  |      | 240  | ns            |
|               |  |   | $T_J=150^\circ\text{C}$ |      | 260  | ns            |
| $t_r$         | Rise Time  |   | $T_J=25^\circ\text{C}$  |      | 120  | ns            |
|               |  |   | $T_J=150^\circ\text{C}$ |      | 130  | ns            |
| $t_{d(off)}$  | Turn off Delay Time                              |   | $T_J=25^\circ\text{C}$  |      | 450  | ns            |
|               |  |   | $T_J=150^\circ\text{C}$ |      | 550  | ns            |
| $t_f$         | Fall Time  | $T_J=25^\circ\text{C}$  |                         | 160  | ns   |               |
|               |  | $T_J=150^\circ\text{C}$   |                         | 180  | ns   |               |
| $E_{on}$      | Turn on Energy                                   | $V_{CC}=900\text{V}, I_C=200\text{A}$<br>$R_G=6\Omega,$<br>$V_{GE}=\pm 15\text{V},$<br>Inductive Load | $T_J=25^\circ\text{C}$  |      | 48   | mJ            |
|               |  |   | $T_J=125^\circ\text{C}$ |      | 63   | mJ            |
|               |  |   | $T_J=150^\circ\text{C}$ |      | 70   | mJ            |
| $E_{off}$     | Turn off Energy                                  |   | $T_J=25^\circ\text{C}$  |      | 38   | mJ            |
|               |  |   | $T_J=125^\circ\text{C}$ |      | 58   | mJ            |
|               |  |   | $T_J=150^\circ\text{C}$ |      | 64   | mJ            |
| $I_{SC}$      | Short Circuit Current                            | $t_{psc} \leq 10\mu\text{s}, V_{GE}=15\text{V}$<br>$T_J=150^\circ\text{C}, V_{CC}=1300\text{V}$       |                         | 620  |      | A             |
| $R_{thJC}$    | Junction to Case Thermal Resistance ( Per IGBT ) |   |                         |      | 0.11 | K /W          |

## Diode-inverter

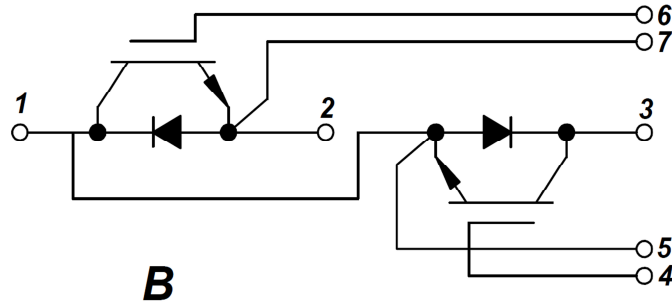
### ELECTRICAL CHARACTERISTICS ( $T_C=25^\circ\text{C}$ unless otherwise specified)

| Symbol      | Parameter/Test Conditions                         |  | Min. | Typ. | Max. | Unit          |
|-------------|---|--|------|------|------|---------------|
| $V_F$       | Forward Voltage                                   | $I_F=200\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$  |      | 1.8  | 2.25 | V             |
|             |   | $I_F=200\text{A}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$ |      | 1.9  |      |               |
| $t_{rr}$    | Reverse Recovery Time                             | $I_F=200\text{A}, V_R=900\text{V}$                         |      | 880  |      | ns            |
| $I_{RRM}$   | Max. Reverse Recovery Current                     | $di_F/dt=-2100\text{A}/\mu\text{s}$                        |      | 220  |      | A             |
| $Q_{RR}$    | Reverse Recovery Charge                           | $T_J=150^\circ\text{C}$                                    |      | 106  |      | $\mu\text{C}$ |
| $E_{rec}$   | Reverse Recovery Energy                           |  |      | 65   |      | mJ            |
| $R_{thJCD}$ | Junction to Case Thermal Resistance ( Per Diode ) |  |      |      | 0.2  | K /W          |

# MMG200D170B

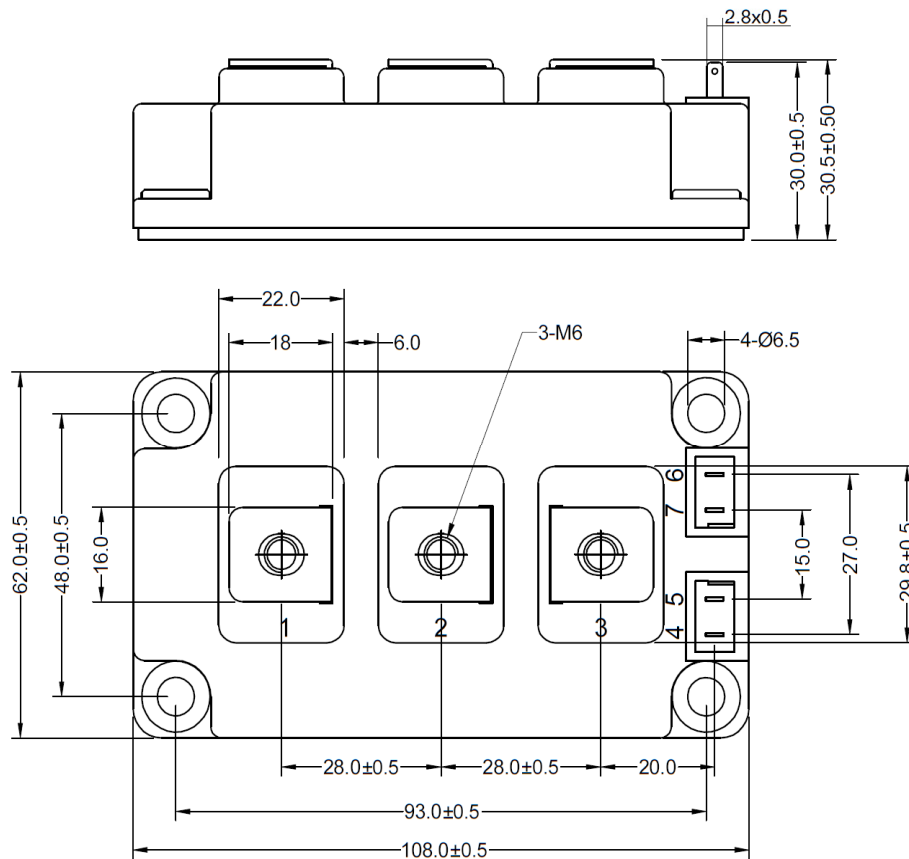
MODULE CHARACTERISTICS ( $T_c=25^{\circ}\text{C}$  unless otherwise specified)

| Symbol     | Parameter/Test Conditions   | Values                     | Unit  |    |
|------------|-----------------------------|----------------------------|-------|----|
| $T_{Jmax}$ | Max. Junction Temperature   | 175                        | °C    |    |
| $T_{Jop}$  | Operating Temperature       | -40~150                    |       |    |
| $T_{stg}$  | Storage Temperature         | -40~125                    |       |    |
| $V_{isol}$ | Isolation Breakdown Voltage | AC, 50Hz(R.M.S), t=1minute | 4000  | V  |
| CTI        | Comparative Tracking Index  |                            | > 225 |    |
| Torque     | to heatsink                 | Recommended (M6)           | 3~5   | Nm |
|            | to terminal                 | Recommended (M6)           | 2.5~5 | Nm |
| Weight     |                             |                            | 300   | g  |



**B**

Figure 1. Circuit Diagram



Dimensions in (mm)

Figure 2. Package Outline