

TOSHIBA GTR MODULE SILICON N CHANNEL IGBT

# MG400J1US51

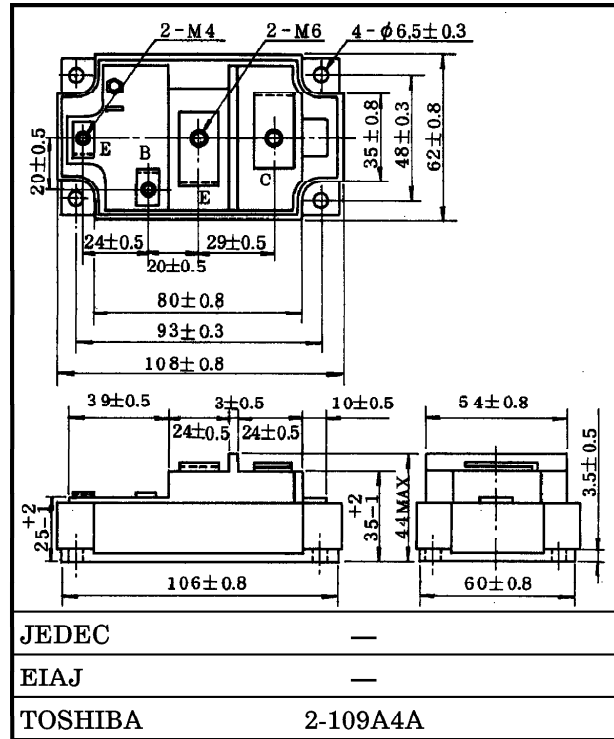
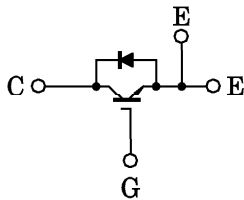
HIGH POWER SWITCHING APPLICATIONS.

Unit in mm

MOTOR CONTROL APPLICATIONS.

- The Electrodes are Isolated from Case.
- High Input Impedance
- Includes a Complete Half Bridge in One Package.
- Enhancement-Mode
- High Speed :  $t_f = 0.30 \mu s$  (Max.) ( $I_C = 400A$ )  
 $t_{rr} = 0.15 \mu s$  (Max.) ( $I_F = 400A$ )
- Low Saturation Voltage  
:  $V_{CE(sat)} = 2.70V$  (Max.) ( $I_C = 400A$ )

EQUIVALENT CIRCUIT



Weight : 465g (Typ.)

MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC                               | SYMBOL     | RATING           | UNIT |
|--|------------|------------------|------|
| Collector-Emitter Voltage                    | $V_{CES}$  | 600              | V    |
| Gate-Emitter Voltage                         | $V_{GES}$  | ±20              | V    |
| Collector Current                            | DC         | $I_C$            | A    |
|  | 1ms        | $I_{CP}$         |      |
| Forward Current                              | DC         | $I_F$            | A    |
|  | 1ms        | $I_{FM}$         |      |
| Collector Power Dissipation (Tc = 25°C)      | $P_C$      | 1500             | W    |
| Junction Temperature                         | $T_j$      | 150              | °C   |
| Storage Temperature Range                    | $T_{stg}$  | -40~125          | °C   |
| Isolation Voltage                            | $V_{Isol}$ | 2500 (AC 1 min.) | V    |
| Screw Torque (Terminal / M4 / M6 / Mounting) | —          | 2 / 3 / 3        | N·m  |

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ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC                       |                     | SYMBOL         | TEST CONDITION   | MIN. | TYP.  | MAX.      | UNIT            |
|--------------------------------------|---------------------|----------------|--|------|-------|-----------|-----------------|
| Gate Leakage Current                 |                     | $I_{GES}$      | $V_{GE} = \pm 20V, V_{CE} = 0$   | —    | —     | $\pm 500$ | nA              |
| Collector Cut-off Current            |                     | $I_{CES}$      | $V_{CE} = 600V, V_{GE} = 0$  | —    | —     | 4.0       | mA              |
| Gate-Emitter Cut-off Voltage         |                     | $V_{GE} (off)$ | $I_C = 40mA, V_{CE} = 5V$  | 5.0  | 7.0   | 8.0       | V               |
| Collector-Emitter Saturation Voltage |                     | $V_{CE} (sat)$ | $I_C = 400A, V_{GE} = 15V$   | —    | 2.10  | 2.70      | V               |
| Input Capacitance                    |                     | $C_{ies}$      | $V_{CE} = 10V, V_{GE} = 0, f = 1MHz$   | —    | 36000 | —         | pF              |
| Switching Time                       | Turn-on Delay Time  | $t_d (on)$     | Inductive Load<br>$V_{CC} = 300V$<br>$I_C = 400A$<br>$V_{GE} = \pm 15V$<br>$R_G = 2\Omega$<br>(Note 1) | —    | 0.20  | 0.40      | $\mu s$         |
|                                      | Rise Time           | $t_r$          |  | —    | 0.15  | 0.30      |                 |
|                                      | Turn-on Time        | $t_{on}$       |  | —    | 0.60  | 1.20      |                 |
|                                      | Turn-off Delay Time | $t_d (off)$    |  | —    | 0.20  | 0.40      |                 |
|                                      | Fall Time           | $t_f$          |  | —    | 0.15  | 0.30      |                 |
|                                      | Turn-off Time       | $t_{off}$      |  | —    | 0.50  | 1.00      |                 |
| Forward Voltage                      |                     | $V_F$          | $I_F = 400A, V_{GE} = 0$   | —    | 2.30  | 3.00      | V               |
| Reverse Recovery Time                |                     | $t_{rr}$       | $I_F = 400A, V_{GE} = -10V$<br>$di / dt = 400A / \mu s$  | —    | 0.08  | 0.15      | $\mu s$         |
| Thermal Resistance                   |                     | $R_{th} (j-c)$ | Transistor Stage   | —    | —     | 0.083     | $^{\circ}C / W$ |
|                                      |                     |                | Diode Stage  | —    | —     | 0.20      |                 |

Note 1 Switching Time Test Circuit & Timing Chart

