TOSHIBA GTR MODULE SILICON N CHANNEL IGBT

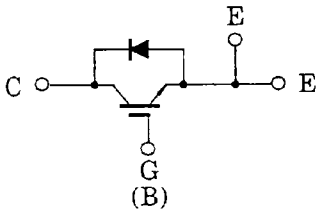
# MG500Q1US11

HIGH POWER SWITCHING APPLICATIONS

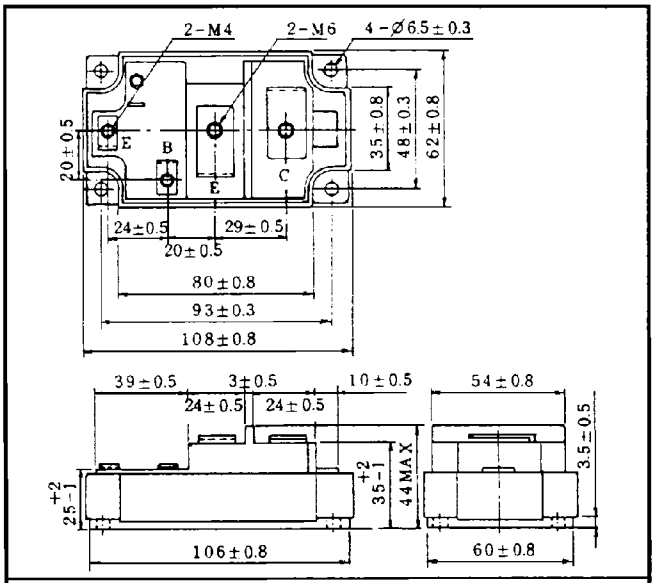
MOTOR CONTROL APPLICATIONS

- High Input Impedance
- High Speed : $t_f = 1.0\mu s$ (Max.)
  : $t_{rr} = 0.5\mu s$ (Max.)
- Low Saturation Voltage
  : $V_{CE\,(sat)} = 2.7V$ (Max.)
- Enhancement-Mode
- The Electrodes are Isolated from Case.

EQUIVALENT CIRCUIT




Unit in mm




| | |
|---|---|
| JEDEC | — |
| EIAJ | — |
| TOSHIBA | 2-109A4A |

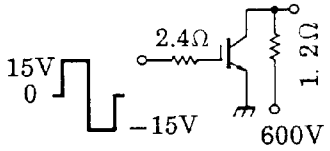
Weight : 465g

MAXIMUM RATINGS (Ta = 25°C)

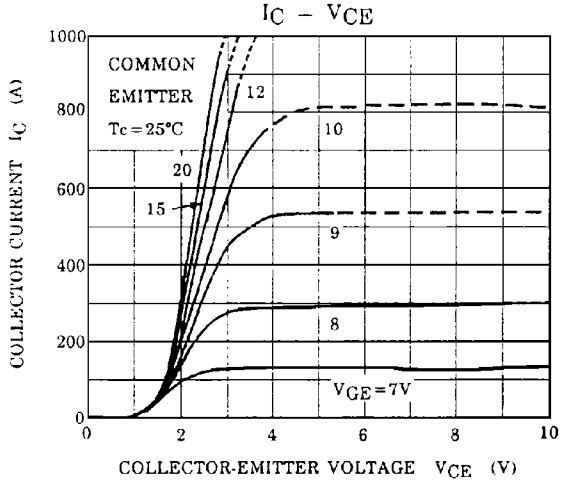
| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Collector-Emitter Voltage | | $V_{CES}$ | 1200 | V |
| Gate-Emitter Voltage | | $V_{GES}$ | ±20 | V |
| Collector Current | DC | $I_C$ | 500 | A |
| | 1ms | $I_{CP}$ | 1000 | |
| Forward Current | DC | $I_F$ | 500 | A |
| | 1ms | $I_{FM}$ | 1000 | |
| Collector Power Dissipation (Tc = 25°C) | | $P_C$ | 2400 | W |
| Junction Temperature | | $T_j$ | 150 | °C |
| Storage Temperature Range | | $T_{stg}$ | −40~125 | °C |
| Isolation Voltage | | $V_{Isol}$ | 2500 (AC, 1min.) | V |
| Screw Torque (Terminal : M4 / M6 / Mounting) | | — | 2 / 3 / 3 | N·m |

961001EAA2

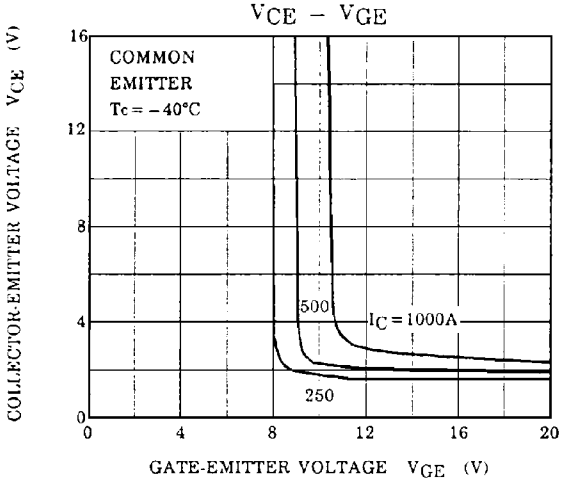
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Gate Leakage Current | | $I_{GES}$ | $V_{GE} = \pm 20V$, $V_{CE} = 0$ | — | — | ±500 | nA |
| Collector Cut-off Current | | $I_{CES}$ | $V_{CE} = 1200V$, $V_{GE} = 0$ | — | — | 4.0 | mA |
| Gate-Emitter Cut-off Voltage | | $V_{GE\ (OFF)}$ | $I_C = 500mA$, $V_{CE} = 5V$ | 3.0 | — | 6.0 | V |
| Collector-Emitter Saturation Voltage | | $V_{CE\ (sat)}$ | $I_C = 500A$, $V_{GE} = 15V$ | — | 2.2 | 2.7 | V |
| Input Capacitance | | $C_{ies}$ | $V_{CE} = 10V$, $V_{GE} = 0$, f = 1MHz | — | 80000 | — | pF |
| Switching Time | Rise Time | $t_r$ |  | — | 0.3 | 0.6 | μs |
| | Turn-on Time | $t_{on}$ | | — | 0.4 | 0.8 | |
| | Fall Time | $t_f$ | | — | 0.6 | 1.0 | |
| | Turn-off Time | $t_{off}$ | | — | 1.2 | 1.8 | |
| Forward Voltage | | $V_F$ | $I_F = 500A$, $V_{GE} = 0$ | — | 2.0 | 3.0 | V |
| Reverse Recovery Time | | $t_{rr}$ | $I_F = 500A$, $V_{GE} = -10V$<br>$di/dt = 300A/\mu s$ | — | 0.25 | 0.5 | μs |
| Thermal Resistance | | $R_{th\ (j-c)}$ | Transistor | — | — | 0.042 | °C / W |
| | | | Diode | — | — | 0.20 | |

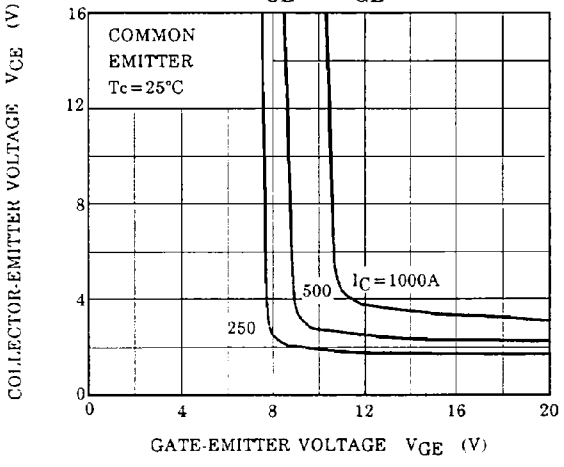
$I_C$ – $V_{CE}$



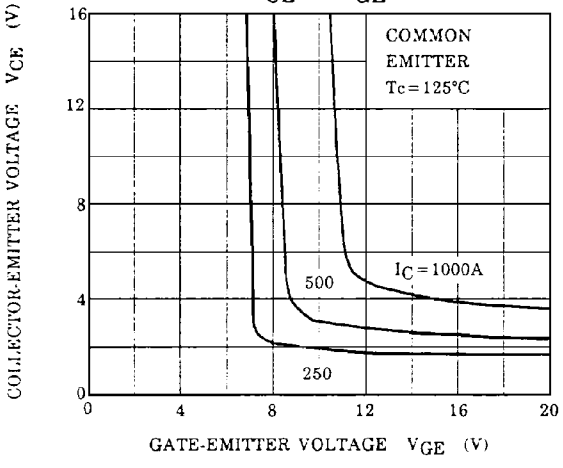

$V_{CE}$ – $V_{GE}$



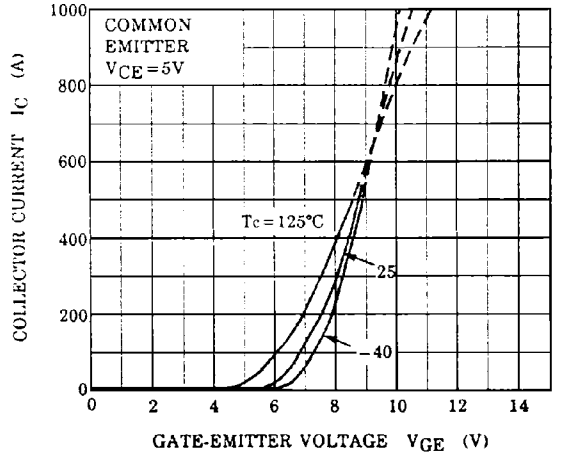

$V_{CE}$ – $V_{GE}$



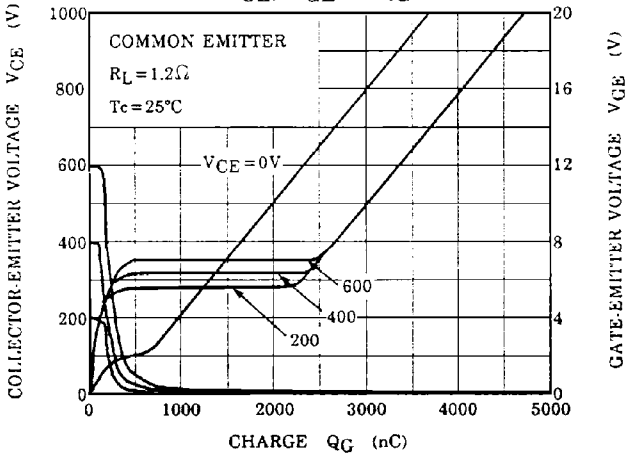

$V_{CE}$ – $V_{GE}$



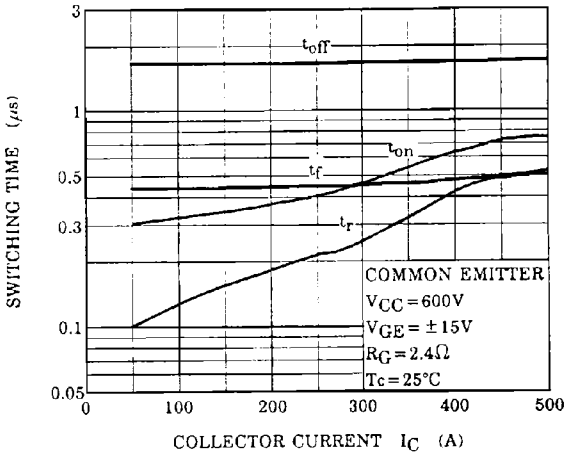

$I_C$ – $V_{GE}$



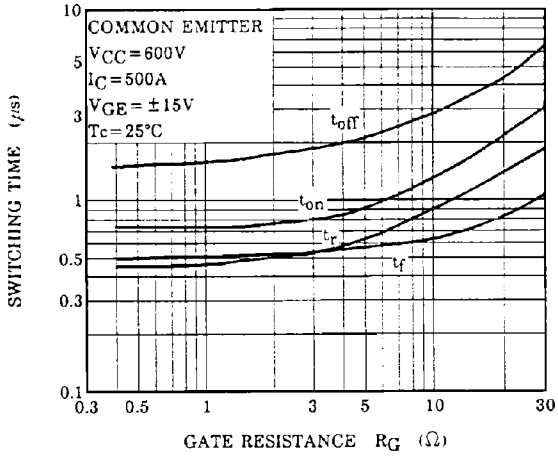

$V_{CE}$, $V_{GE}$ – $Q_G$



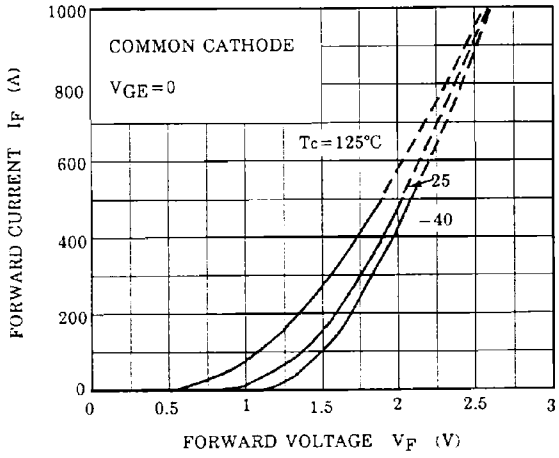
SWITCHING TIME – $I_C$



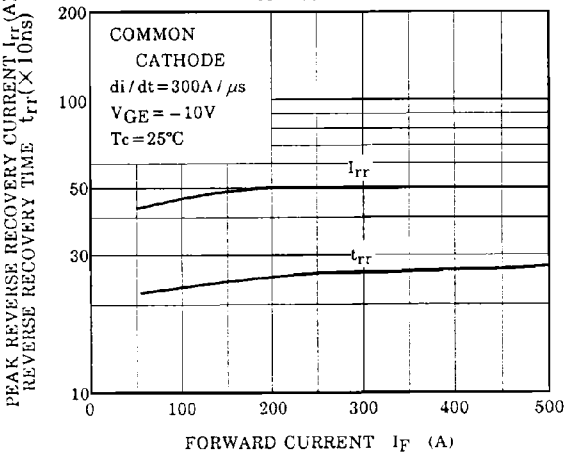

SWITCHING TIME – $R_G$



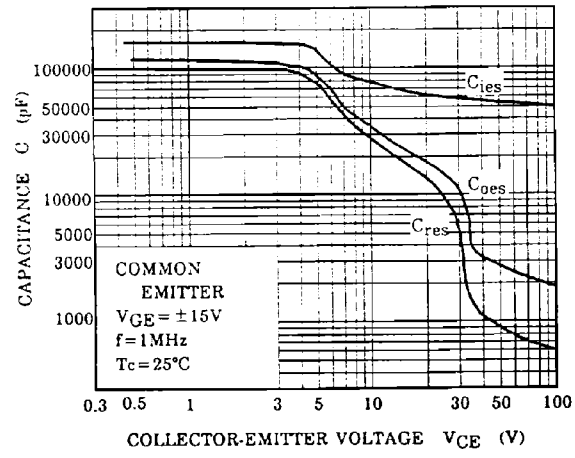

$I_F$ – $V_F$



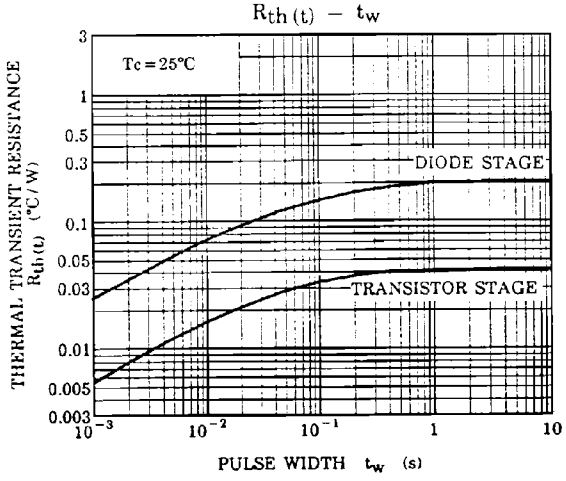

$t_{rr}$, $I_{rr}$ – $I_F$



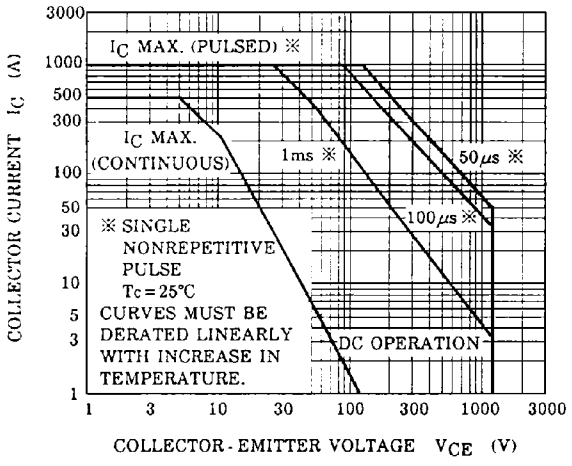

C – $V_{CE}$




$R_{th\,(t)}$ – $t_w$



SAFE OPERATING AREA




REVERSE BIAS SOA