TOSHIBA GTR MODULE SILICON N CHANNEL IGBT

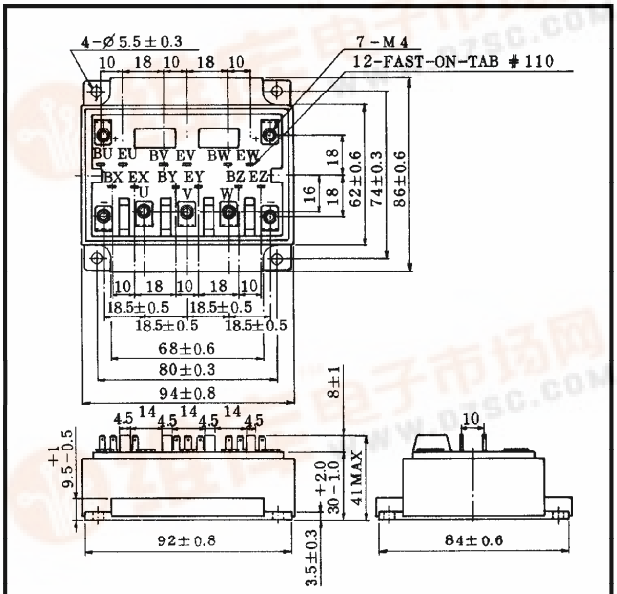
# MG50J6ES50

HIGH POWER SWITCHING APPLICATIONS.

MOTOR CONTROL APPLICATIONS.

- The Electrodes are Isolated from Case.
- High Input Impedance.
- 6 IGBTs Built Into 1 Package.
- Enhancement-Mode.
- High Speed : $t_f = 0.30\mu s$ (Max.) ($I_C = 50A$)
  $t_{rr} = 0.15\mu s$ (Max.) ($I_F = 50A$)
- Low Saturation Voltage
  : $V_{CE\,(sat)} = 2.70V$ (Max.) ($I_C = 50A$)

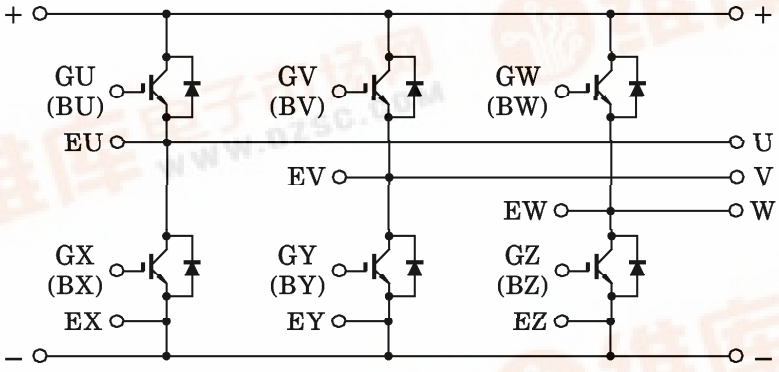
Unit in mm




| | |
|---|---|
| JEDEC | — |
| EIAJ | — |
| TOSHIBA | 2-94A2A |

Weight : 505g (Typ.)

EQUIVALENT CIRCUIT




961001EAA2

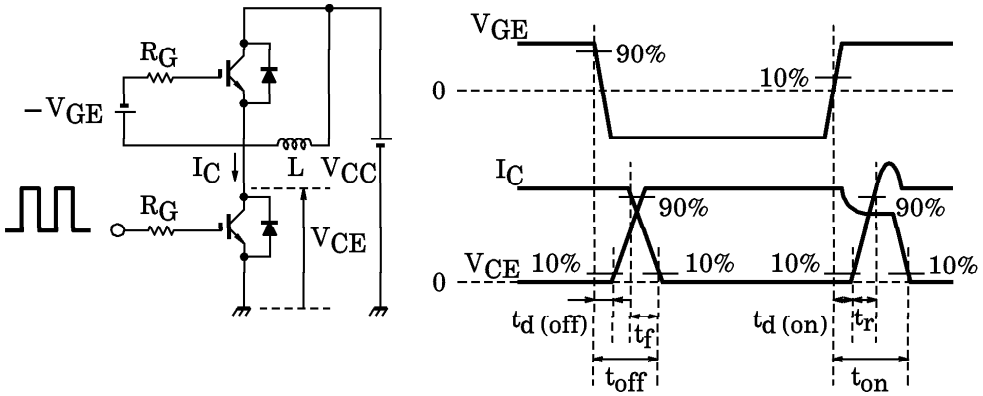
MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Collector-Emitter Voltage | | $V_{CES}$ | 600 | V |
| Gate-Emitter Voltage | | $V_{GES}$ | ±20 | V |
| Collector Current | DC | $I_C$ | 50 | A |
| | 1ms | $I_{CP}$ | 100 | |
| Forward Current | DC | $I_F$ | 50 | A |
| | 1ms | $I_{FM}$ | 100 | |
| Collector Power Dissipation (Tc = 25°C) | | $P_C$ | 280 | 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 / Mounting) | | — | 2 / 3 | N·m |

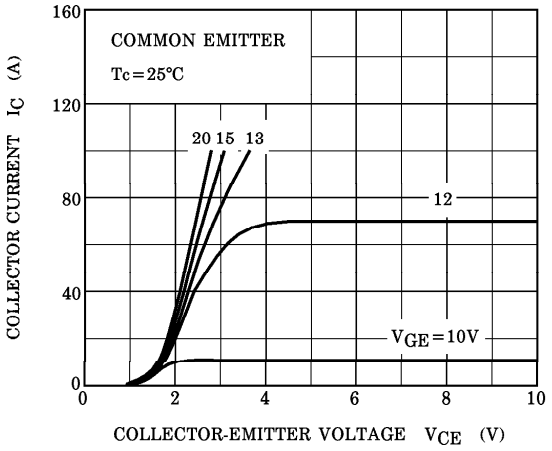
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Gate Leakage Current | | $I_{GES}$ | $V_{GE}$ = ±20V, $V_{CE}$ = 0 | — | — | ±500 | nA |
| Collector Cut-off Current | | $I_{CES}$ | $V_{CE}$ = 600V, $V_{GE}$ = 0 | — | — | 1.0 | mA |
| Gate-Emitter Cut-off Voltage | | $V_{GE\ (off)}$ | $I_C$ = 5mA, $V_{CE}$ = 5V | 5.0 | 7.0 | 8.0 | V |
| Collector-Emitter Saturation Voltage | | $V_{CE\ (sat)}$ | $I_C$ = 50A, $V_{GE}$ = 15V | — | 2.10 | 2.70 | V |
| Input Capacitance | | $C_{ies}$ | $V_{CE}$ = 10V, $V_{GE}$ = 0, f = 1MHz | — | 4950 | — | pF |
| Switching Time | Turn-on Delay Time | $t_{d\ (on)}$ | Inductive Load<br>$V_{CC}$ = 300V<br>$I_C$ = 50A<br>$V_{GE}$ = ±15V<br>$R_G$ = 24Ω<br>(Note 1) | — | 0.08 | 0.16 | μs |
| | Rise Time | $t_r$ | | — | 0.12 | 0.24 | |
| | Turn-on Time | $t_{on}$ | | — | 0.40 | 0.80 | |
| | 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 | | $V_F$ | $I_F$ = 50A, $V_{GE}$ = 0 | — | 2.30 | 3.00 | V |
| Reverse Recovery Time | | $t_{rr}$ | $I_F$ = 50A, $V_{GE}$ = −10V<br>di / dt = 100A / μs | — | 0.08 | 0.15 | μs |
| Thermal Resistance | | $R_{th\ (j-c)}$ | Transistor | — | — | 0.45 | °C / W |
| | | | Diode | — | — | 0.90 | |

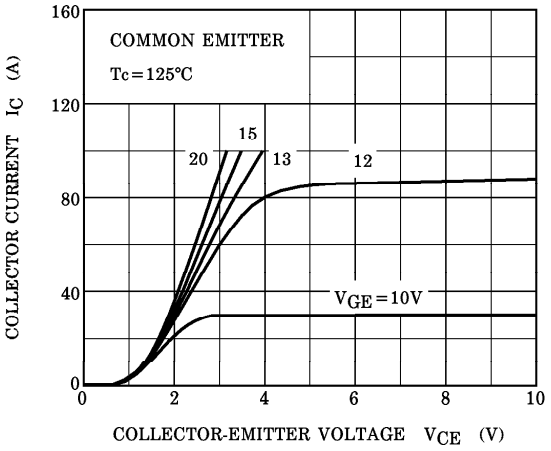
Note 1 Switching Time Test Circuit & Timing Chart



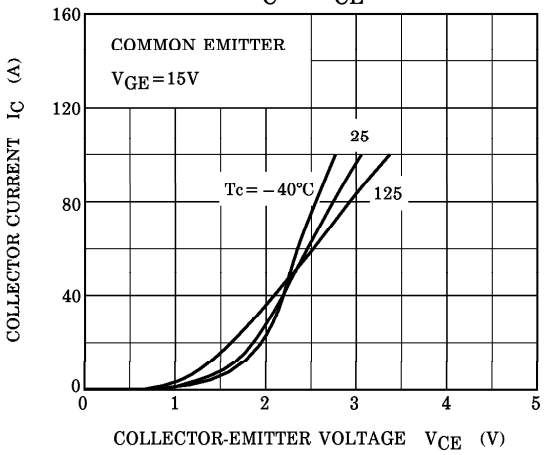
$I_C$ – $V_{CE}$



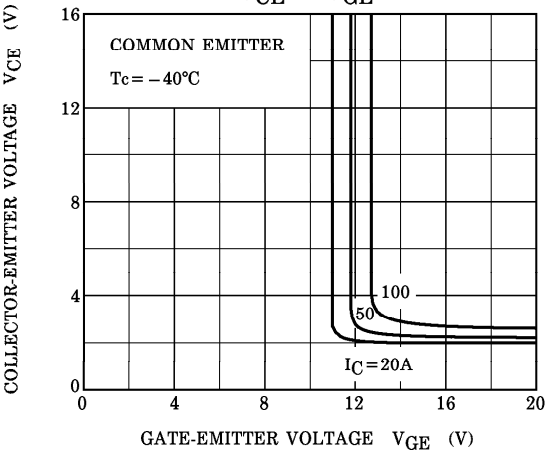

$I_C$ – $V_{CE}$



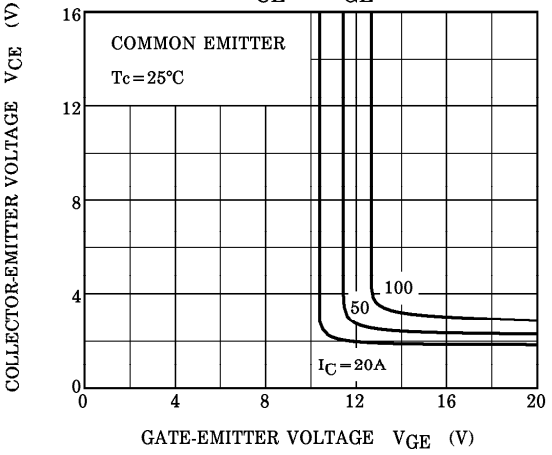

$I_C$ – $V_{CE}$



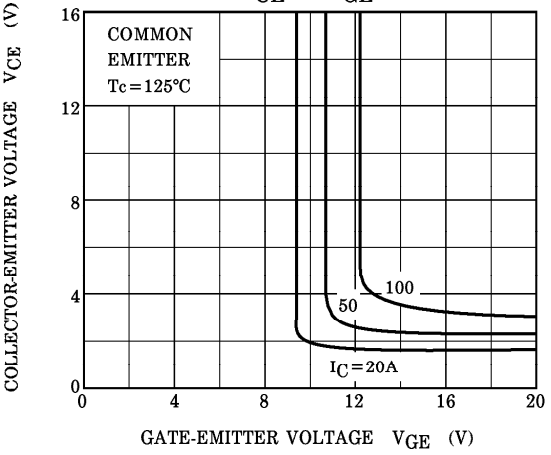

$V_{CE}$ – $V_{GE}$



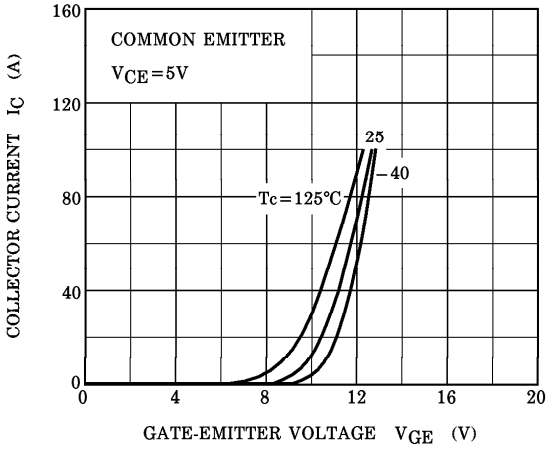

$V_{CE}$ – $V_{GE}$



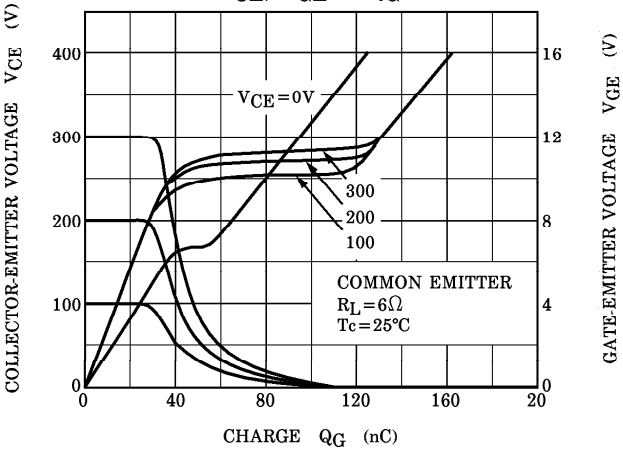

$V_{CE}$ – $V_{GE}$



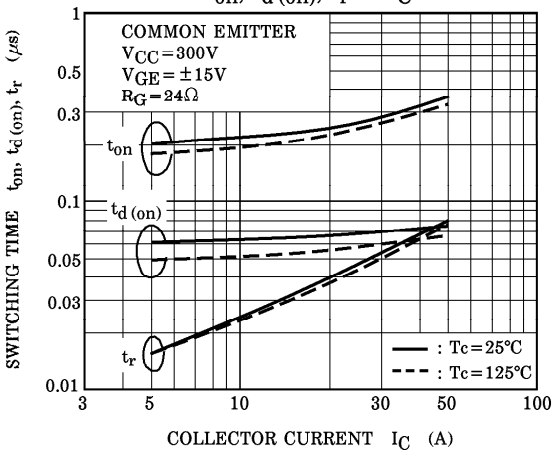
$I_C$ – $V_{GE}$



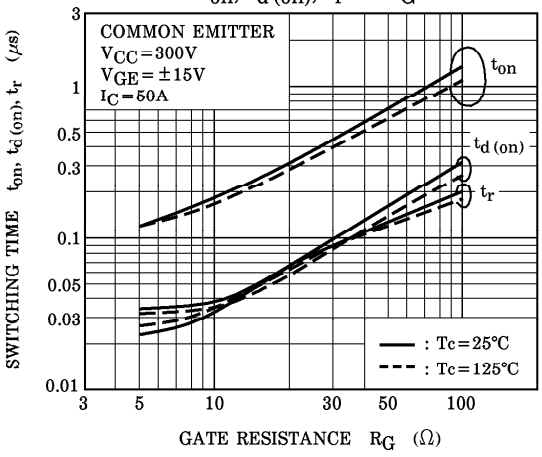

$V_{CE}$, $V_{GE}$ – $Q_G$



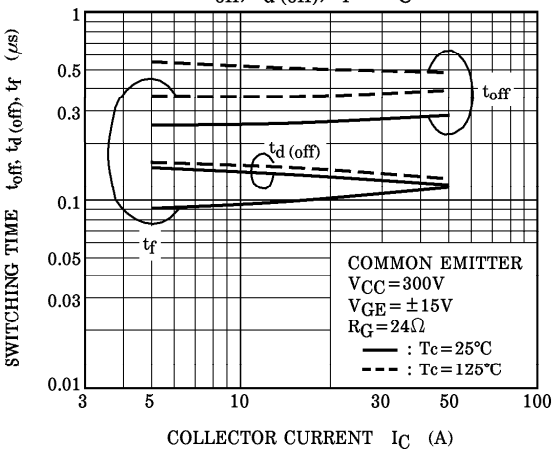

$t_{on}$, $t_{d\,(on)}$, $t_r$ – $I_C$



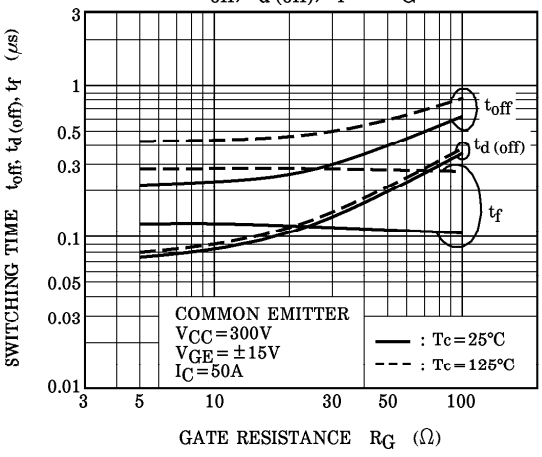

$t_{on}$, $t_{d\,(on)}$, $t_r$ – $R_G$



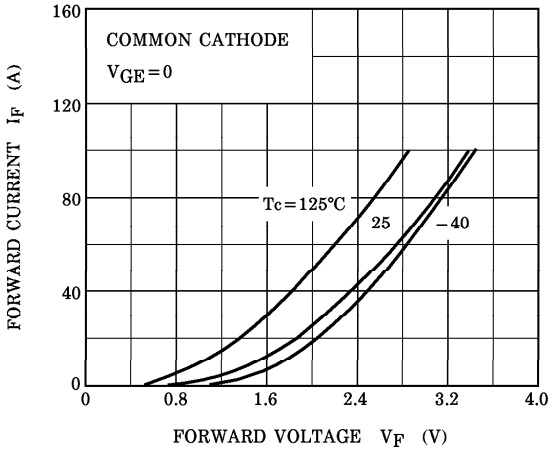

$t_{off}$, $t_{d\,(off)}$, $t_f$ – $I_C$



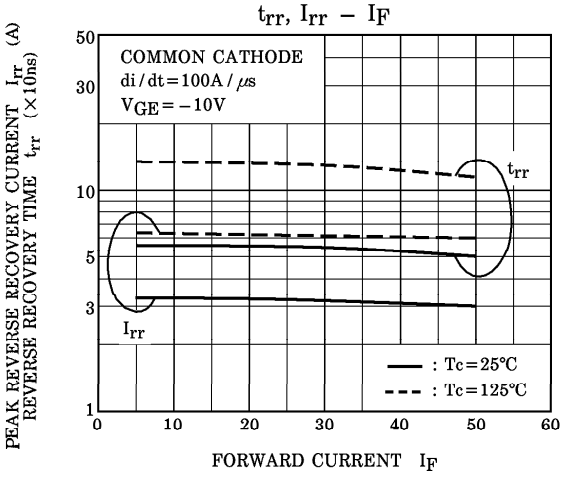

$t_{off}$, $t_{d\,(off)}$, $t_f$ – $R_G$



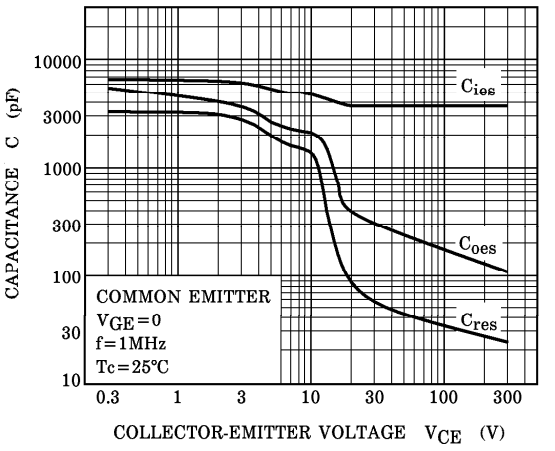
$I_F - V_F$



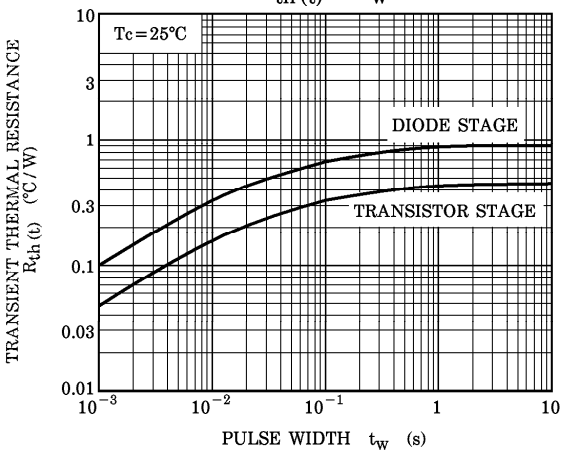

$t_{rr}, I_{rr} - I_F$



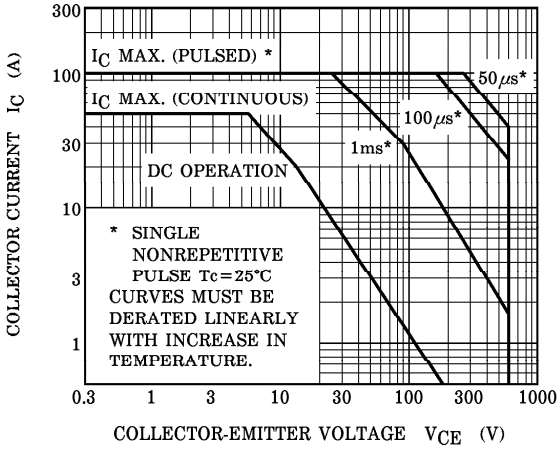

$C - V_{CE}$




$R_{th\,(t)} - t_w$




SAFE OPERATING AREA




REVERSE BIAS SOA