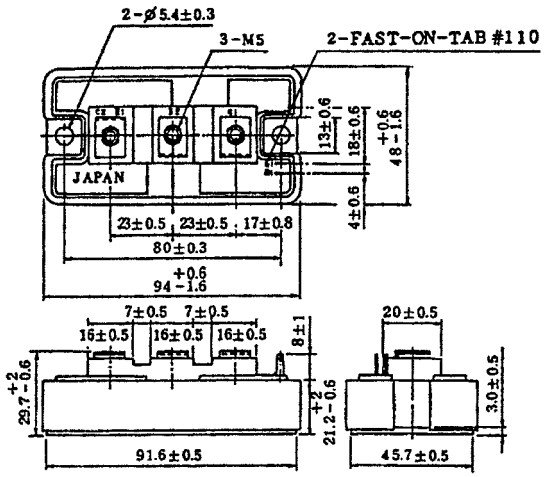
TOSHIBA GTR Module Silicon N Channel IGBT

# MG150J1JS50

High Power Switching Applications
Motor Control Applications

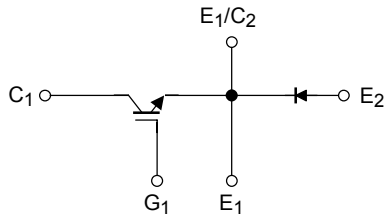
- The electrodes are isolated from case.
- High input impedance
- Includes a complete half bridge in one package.
- Enhancement-mode
- High speed : $t_f$ = 0.30 μs (max) ($I_C$ = 150 A)
  $t_{rr}$ = 0.15 μs (max) ($I_F$ = 150 A)
- Low saturation voltage
  : $V_{CE\ (sat)}$ = 2.70 V (max) ($I_C$ = 150 A)

Unit: mm




| | |
|---|---|
| JEDEC | — |
| JEITA | — |
| TOSHIBA | 2-95A2A |

## Equivalent Circuit



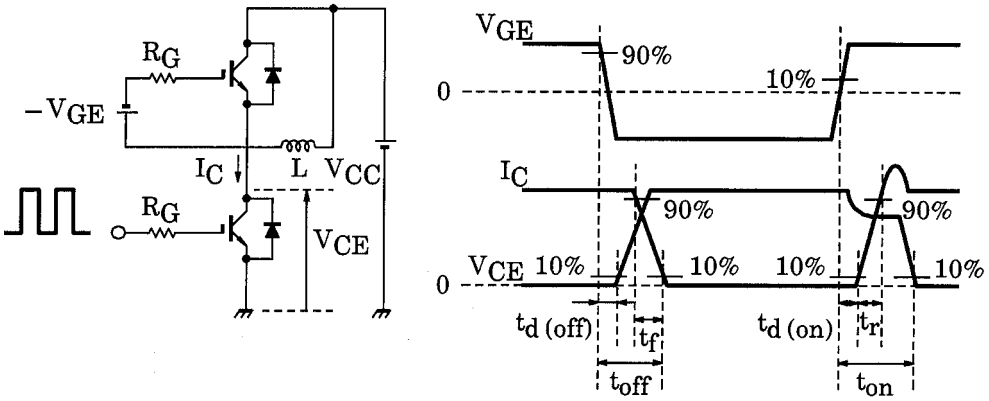

## Maximum Ratings (Ta = 25°C)

| Characteristics | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Collector-emitter voltage | | $V_{CES}$ | 600 | V |
| Gate-emitter voltage | | $V_{GES}$ | ±20 | V |
| Reverse voltage | | $V_R$ | 600 | V |
| Collector current | DC | $I_C$ | 150 | A |
| | 1 ms | $I_{CP}$ | 300 | |
| Forward current | DC | $I_F$ | 150 | A |
| | 1 ms | $I_{FM}$ | 300 | |
| Collector power dissipation (Tc = 25°C) | | $P_C$ | 780 | W |
| Junction temperature | | $T_j$ | 150 | °C |
| Storage temperature range | | $T_{stg}$ | −40 to 125 | °C |
| Isolation voltage | | $V_{Isol}$ | 2500 (AC 1 min.) | V |
| Screw torque (Terminal/mounting) | | — | 3/3 | N·m |

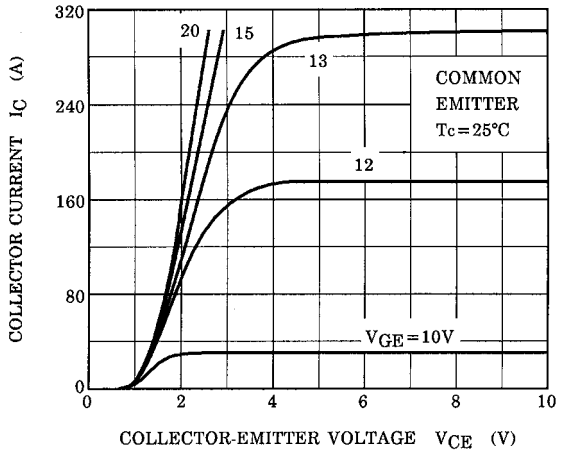
## Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Gate leakage current | | $I_{GES}$ | $V_{GE}$ = ±20 V, $V_{CE}$ = 0 | — | — | ±500 | nA |
| Collector cut-off current | | $I_{CES}$ | $V_{CE}$ = 600 V, $V_{GE}$ = 0 | — | — | 2.0 | mA |
| Gate-emitter cut-off voltage | | $V_{GE\ (off)}$ | $I_C$ = 15 mA, $V_{CE}$ = 5 V | 5.0 | 7.0 | 8.0 | V |
| Collector-emitter saturation voltage | | $V_{CE\ (sat)}$ | $I_C$ = 150 A,$V_{GE}$ = 15 V | — | 2.10 | 2.70 | V |
| Input capacitance | | $C_{ies}$ | $V_{CE}$ = 10 V, $V_{GE}$ = 0, f = 1 MHz | — | 14200 | — | pF |
| Switching time | Turn-on delay time | $t_{d\ (on)}$ | Inductive load<br>$V_{CC}$ = 300 V<br>$I_C$ = 150 A<br>$V_{GE}$ = ±15 V<br>$R_G$ = 6.2 Ω<br>(Note 1) | — | 0.15 | 0.30 | μs |
| | Rise time | $t_r$ | | — | 0.15 | 0.30 | |
| | Turn-on time | $t_{on}$ | | — | 0.50 | 1.00 | |
| | 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 | |
| Reverse current | | $I_R$ | $V_R$ = 600 V | — | — | 1.0 | mA |
| Forward voltage | | $V_F$ | $I_F$ = 150 A, $V_{GE}$ = 0 | — | 2.30 | 3.00 | V |
| Reverse recovery time | | $t_{rr}$ | $I_F$ = 150 A, $V_{GE}$ = −10 V<br>di/dt = 200 A/μs | — | 0.08 | 0.15 | μs |
| Thermal resistance | | $R_{th\ (j-c)}$ | Transistor stage | — | — | 0.16 | °C/W |
| | | | Diode stage | — | — | 0.35 | |

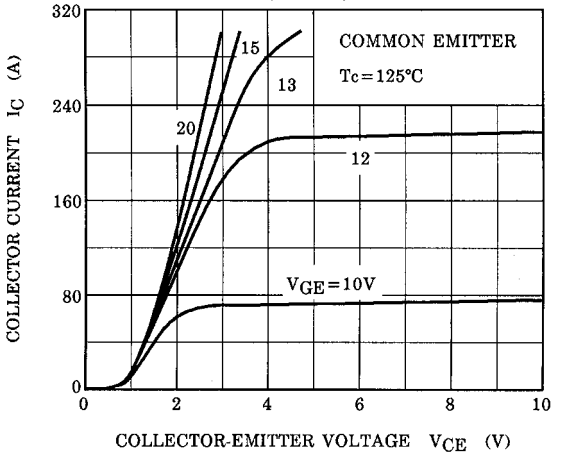
Note 1: Switching time test circuit & timing chart



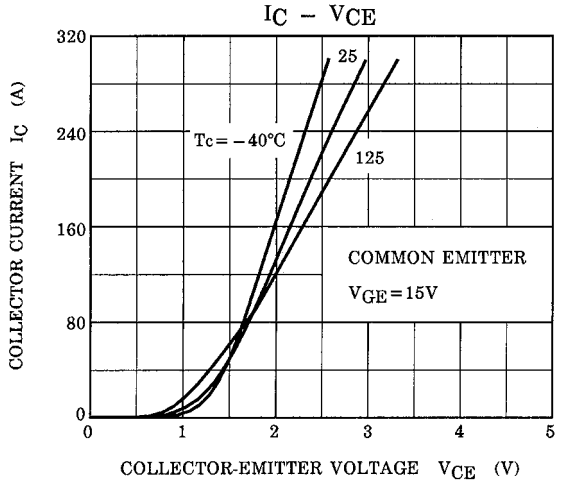
$I_C$ – $V_{CE}$



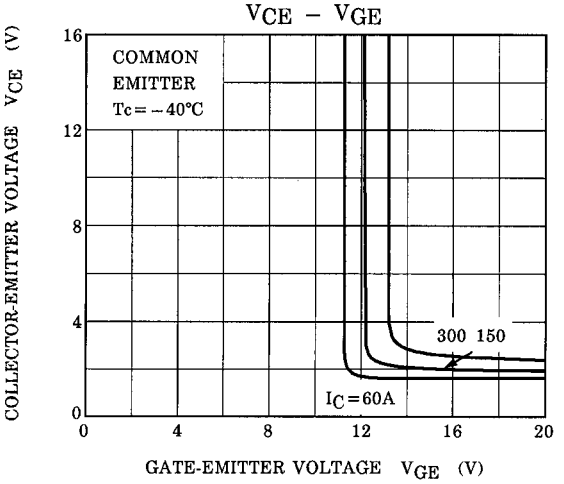

$I_C$ – $V_{CE}$



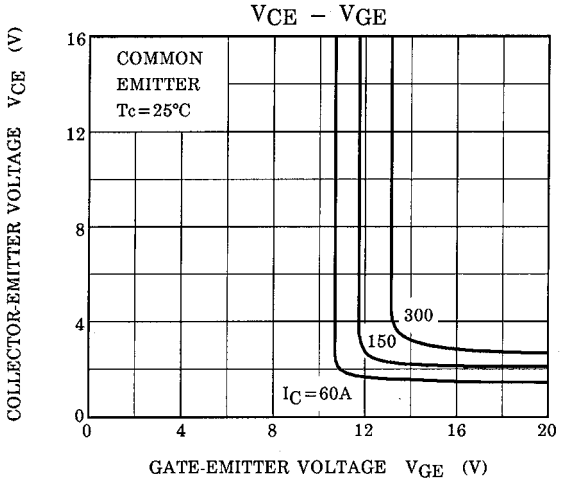

$I_C$ – $V_{CE}$



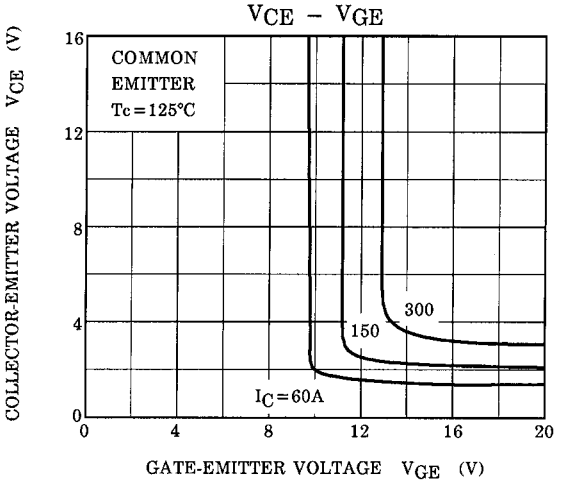

$V_{CE}$ – $V_{GE}$



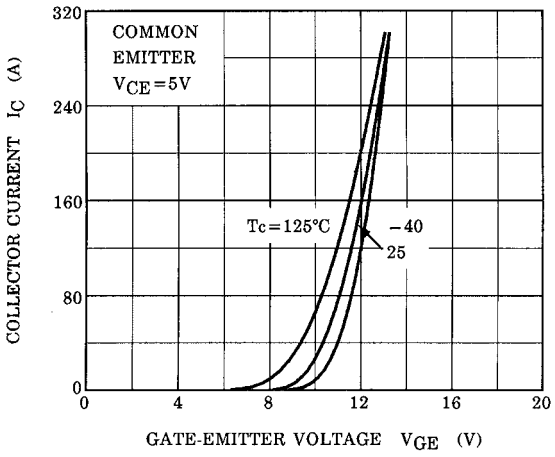

$V_{CE}$ – $V_{GE}$



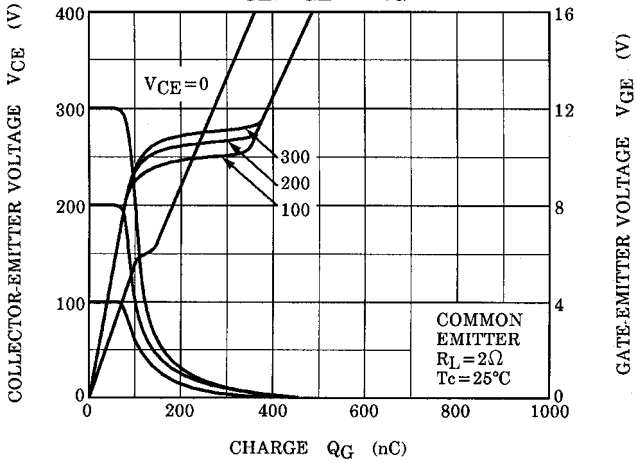

$V_{CE}$ – $V_{GE}$



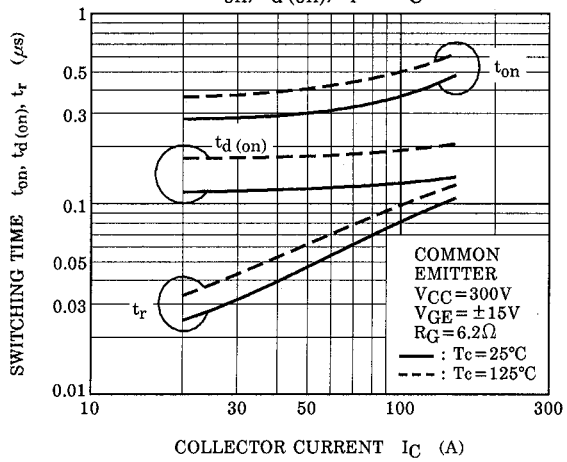
$I_C$ – $V_{GE}$



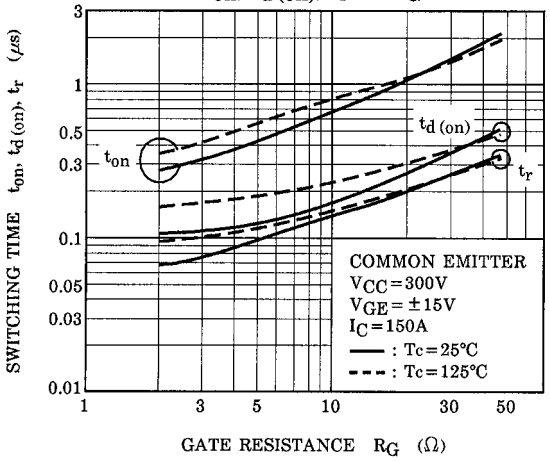

$V_{CE}$, $V_{GE}$ – $Q_G$



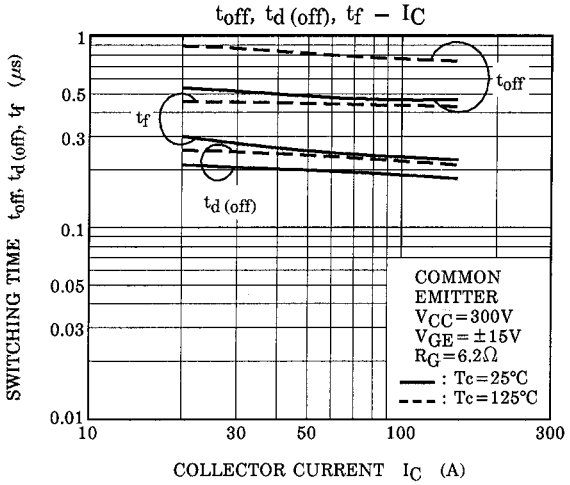

$t_{on}$, $t_{d\,(on)}$, $t_r$ – $I_C$



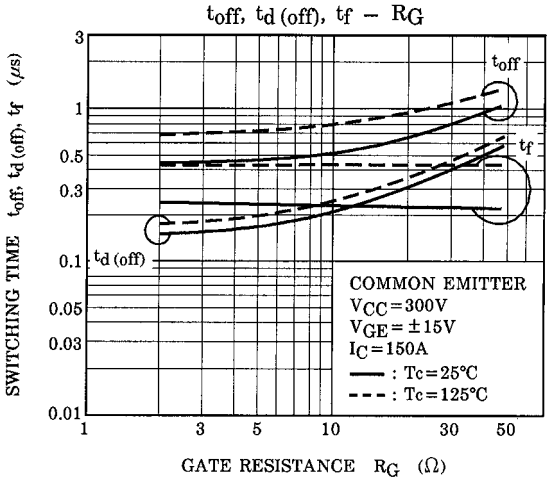

$t_{on}$, $t_{d\,(on)}$, $t_r$ – $R_G$



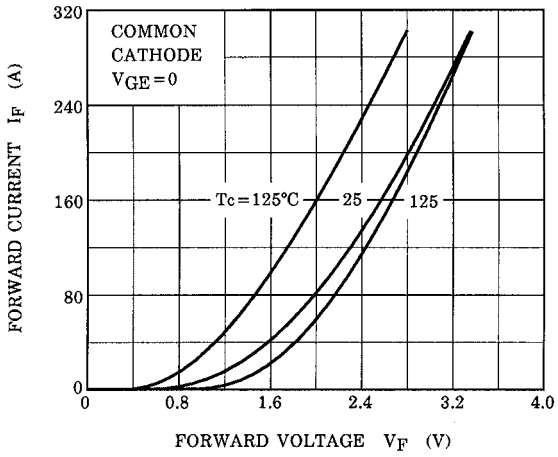

$t_{off}$, $t_{d\,(off)}$, $t_f$ – $I_C$



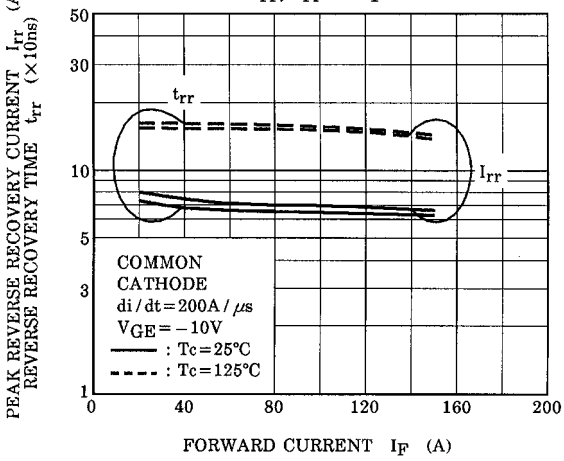

$t_{off}$, $t_{d\,(off)}$, $t_f$ – $R_G$



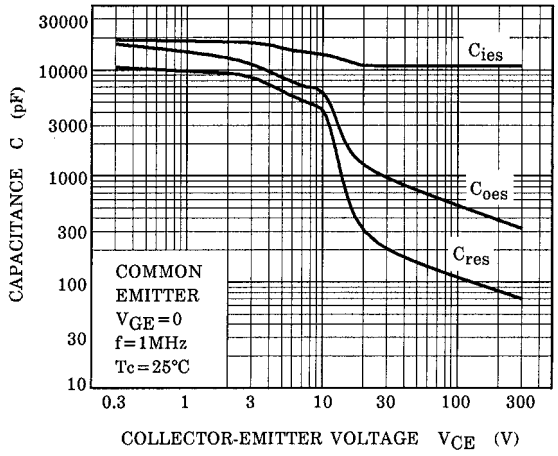
$I_F - V_F$



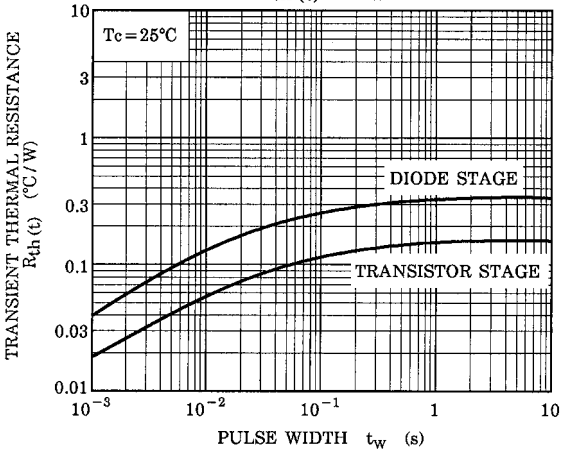

$t_{rr}, I_{rr} - I_F$



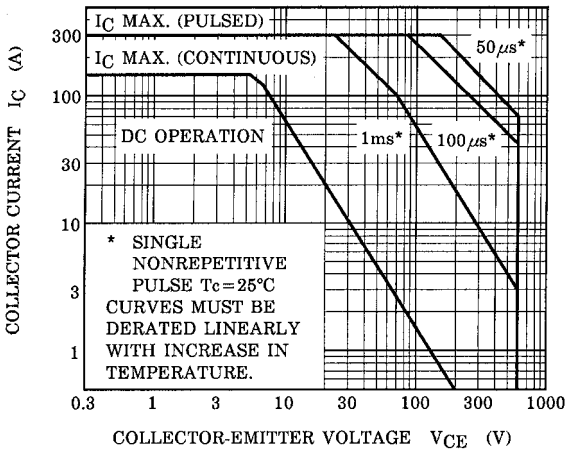

$C - V_{CE}$



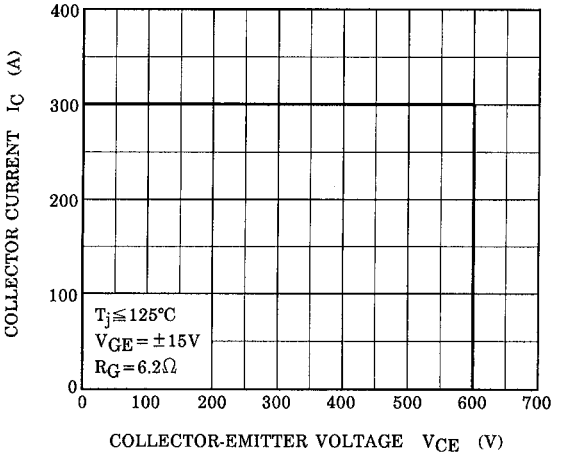

$R_{th(t)} - t_w$




SAFE OPERATING AREA




REVERSE BIAS SOA



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