TOSHIBA GTR Module Silicon N Channel IGBT

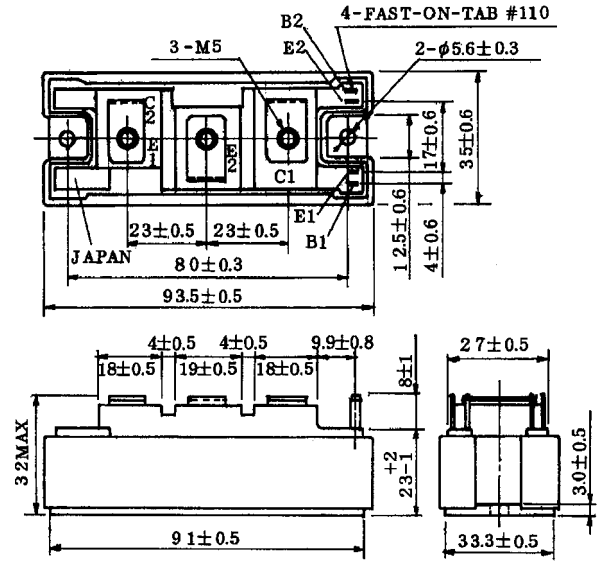
# MG75J2YS50

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 : $t_f$ = 0.30μs(Max) ($I_C$ = 75A)
  $t_{rr}$ = 0.15μs(Max) ($I_F$ = 75A)
- Low saturation voltage
  : $V_{CE\ (sat)}$ = 2.70V (Max) ($I_C$ = 75A)

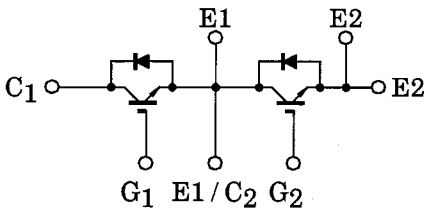
Unit: mm




| | |
|---|---|
| JEDEC | — |
| EIAJ | — |
| TOSHIBA | 2-94D1A |

Weight: 202g (Typ.)

## Equivalent Circuit




## 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 | $I_C$ | 75 | A |
| | 1ms | $I_{CP}$ | 150 | |
| Forward current | DC | $I_F$ | 75 | A |
| | 1ms | $I_{FM}$ | 150 | |
| Collector power dissipation ($T_c$ = 25°C) | | $P_C$ | 390 | 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 / mounting) | | — | 3 / 3 | N·m |

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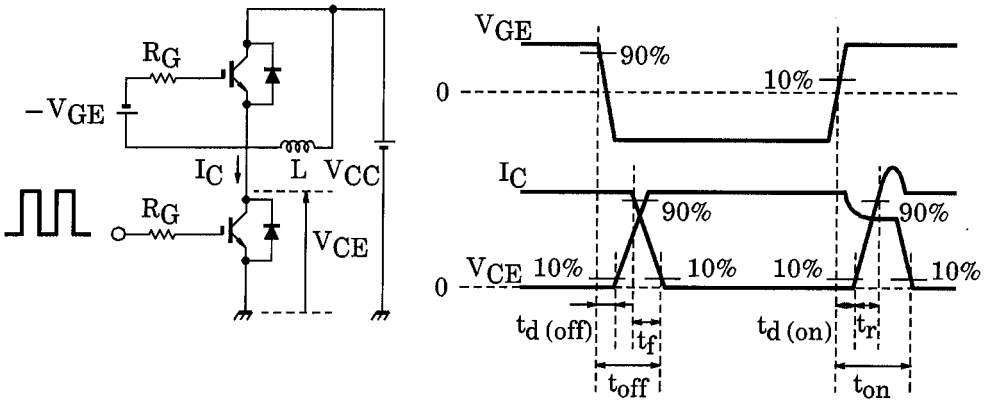
## Electrical Characteristics (Ta = 25°C)

| Characteristic | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Gate leakage current | | $I_{GES}$ | $V_{GE}$ = ±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 | | $V_{GE\ (off)}$ | $I_C$ = 7.5mA, $V_{CE}$ = 5V | 5.0 | 7.0 | 8.0 | V |
| Collector-emitter saturation voltage | | $V_{CE\ (sat)}$ | $I_C$ = 75A, $V_{GE}$ = 15V | — | 2.10 | 2.70 | V |
| Input capacitance | | $C_{ies}$ | $V_{CE}$ = 10V, $V_{GE}$ = 0, f = 1MHz | — | 7100 | — | pF |
| Switching time | Turn-on delay time | $t_{d\ (on)}$ | Inductive load<br>$V_{CC}$ = 300V<br>$I_C$ = 75A<br>$V_{GE}$ = ±15V<br>$R_G$ = 18Ω<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 | | $V_F$ | $I_F$ = 75A, $V_{GE}$ = 0 | — | 2.10 | 2.80 | V |
| Reverse recovery time | | $t_{rr}$ | $I_F$ = 75A, $V_{GE}$ = −10V<br>di / dt = 100A / μs | — | 0.08 | 0.15 | μs |
| Thermal resistance | | $R_{th\ (j-c)}$ | Transistor stage | — | — | 0.32 | °C / W |
| | | | Diode stage | — | — | 0.69 | |

Note 1: Switching time test circuit & timing chart

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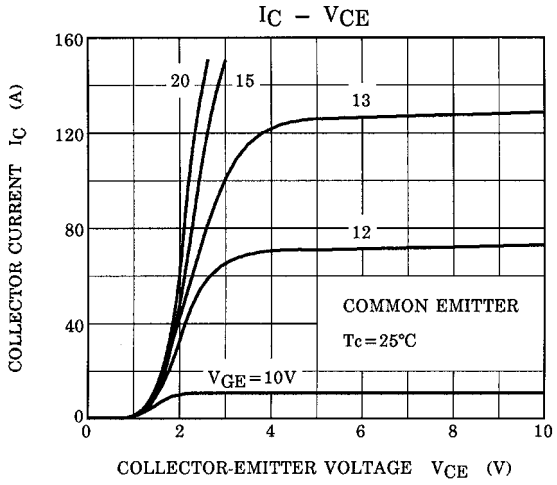
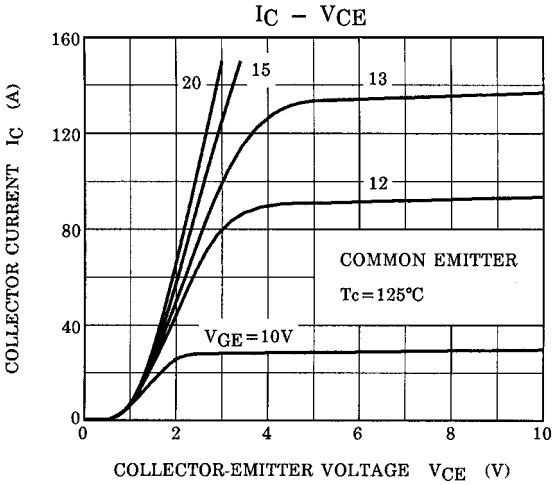
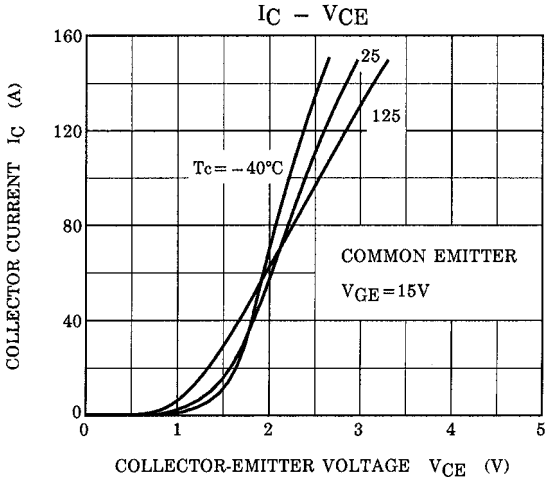
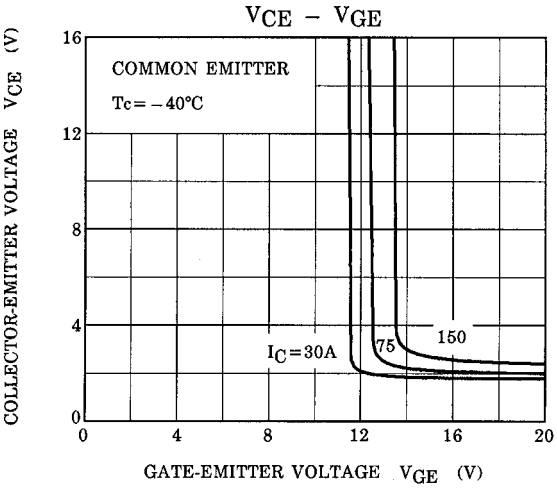
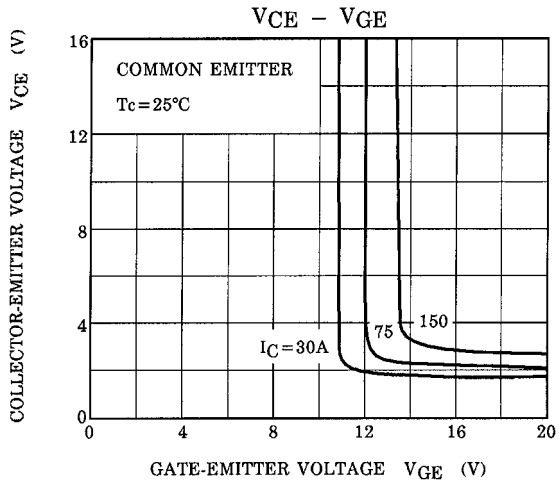
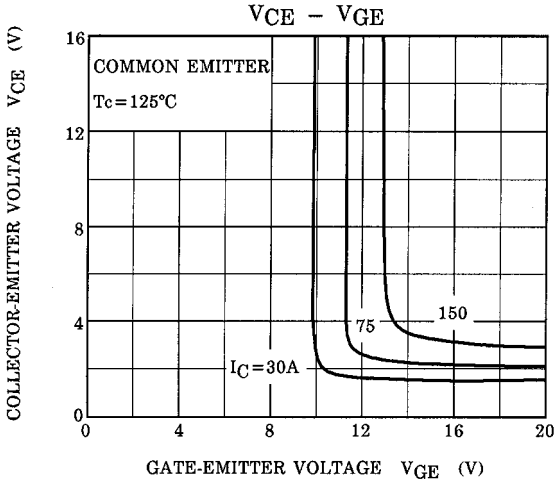

$I_C$ – $V_{CE}$
COLLECTOR CURRENT $I_C$ (A)
COLLECTOR-EMITTER VOLTAGE $V_{CE}$ (V)
COMMON EMITTER
Tc=25°C
$V_{GE}$=10V
20
15
13
12
0
40
80
120
160
0
2
4
6
8
10


$I_C$ – $V_{CE}$
COLLECTOR CURRENT $I_C$ (A)
COLLECTOR-EMITTER VOLTAGE $V_{CE}$ (V)
COMMON EMITTER
Tc=125°C
$V_{GE}$=10V
20
15
13
12
0
40
80
120
160
0
2
4
6
8
10

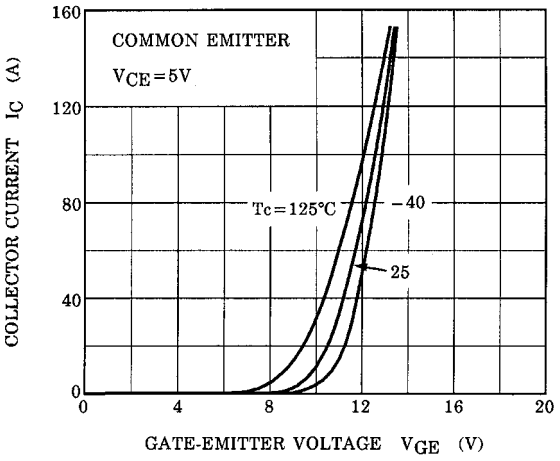

$I_C$ – $V_{CE}$
COLLECTOR CURRENT $I_C$ (A)
COLLECTOR-EMITTER VOLTAGE $V_{CE}$ (V)
COMMON EMITTER
$V_{GE}$=15V
Tc=–40°C
25
125
0
40
80
120
160
0
1
2
3
4
5


$V_{CE}$ – $V_{GE}$
COLLECTOR-EMITTER VOLTAGE $V_{CE}$ (V)
GATE-EMITTER VOLTAGE $V_{GE}$ (V)
COMMON EMITTER
Tc=–40°C
$I_C$=30A
75
150
0
4
8
12
16
0
4
8
12
16
20

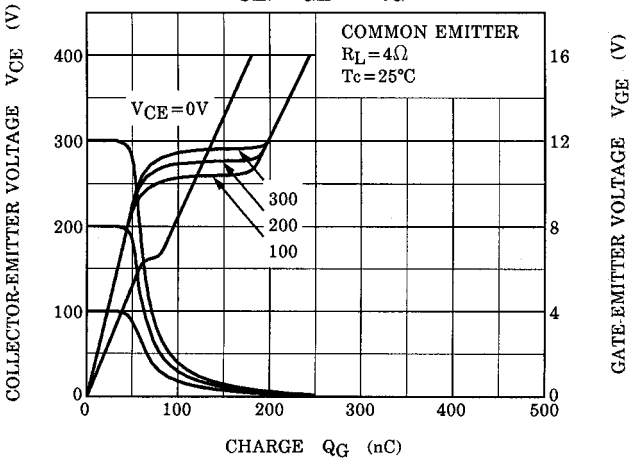

$V_{CE}$ – $V_{GE}$
COLLECTOR-EMITTER VOLTAGE $V_{CE}$ (V)
GATE-EMITTER VOLTAGE $V_{GE}$ (V)
COMMON EMITTER
Tc=25°C
$I_C$=30A
75
150
0
4
8
12
16
0
4
8
12
16
20


$V_{CE}$ – $V_{GE}$
COLLECTOR-EMITTER VOLTAGE $V_{CE}$ (V)
GATE-EMITTER VOLTAGE $V_{GE}$ (V)
COMMON EMITTER
Tc=125°C
$I_C$=30A
75
150
0
4
8
12
16
0
4
8
12
16
20

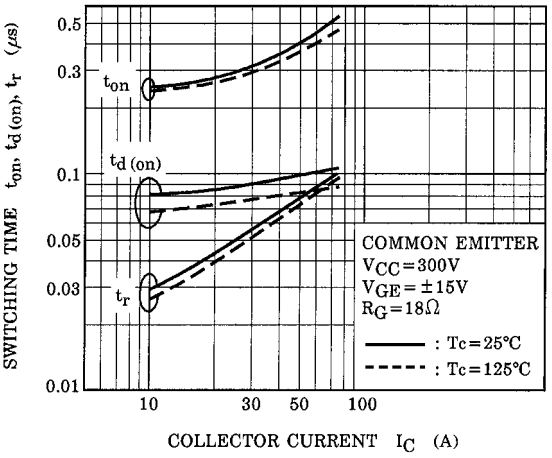
$I_C$ – $V_{GE}$



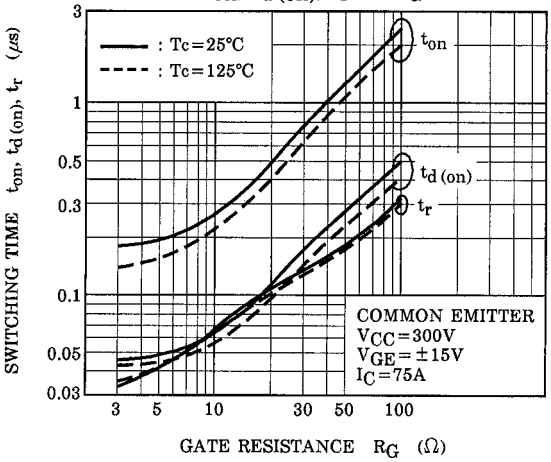

$V_{CE}$, $V_{GE}$ – $Q_G$



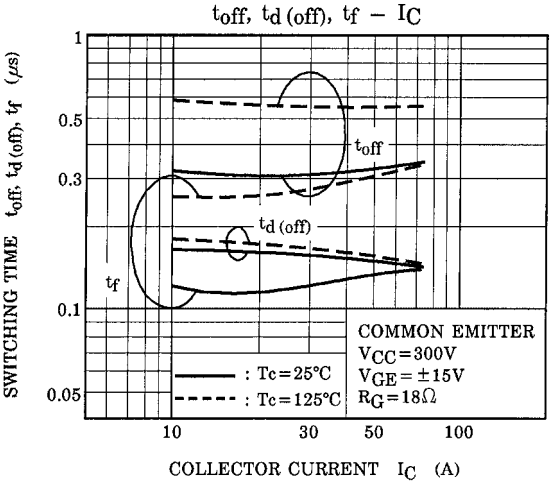

$t_{on}$, $t_{d\,(on)}$, $t_r$ – $I_C$



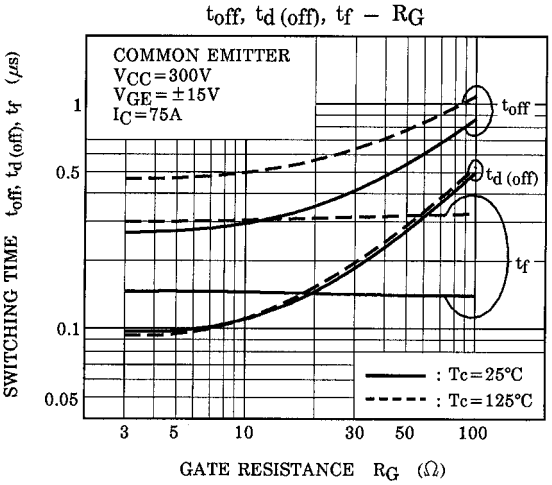

$t_{on}$, $t_{d\,(on)}$, $t_r$ – $R_G$



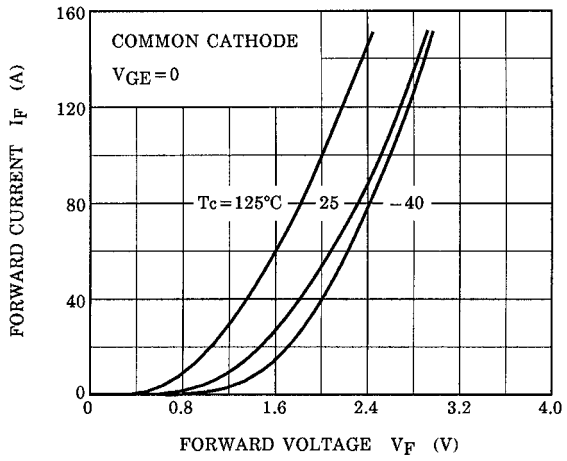

$t_{off}$, $t_{d\,(off)}$, $t_f$ – $I_C$



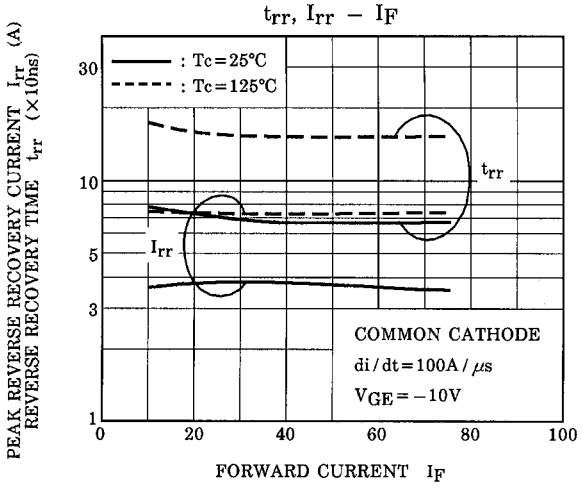

$t_{off}$, $t_{d\,(off)}$, $t_f$ – $R_G$



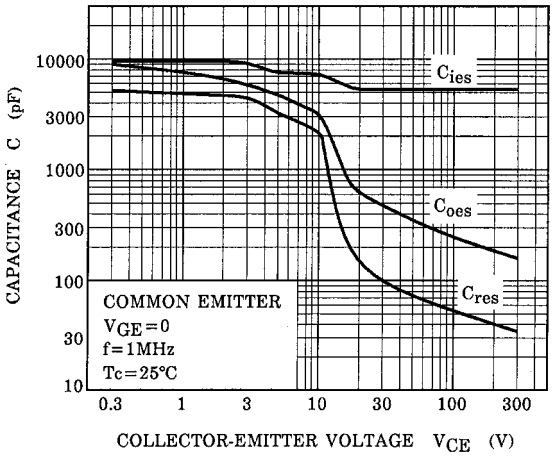
$I_F - V_F$



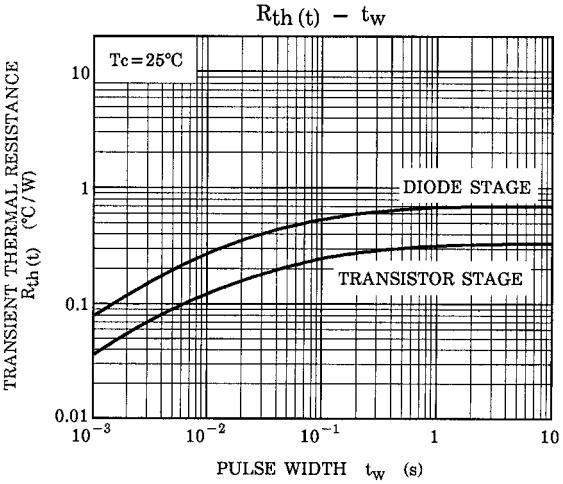

$t_{rr}, I_{rr} - I_F$



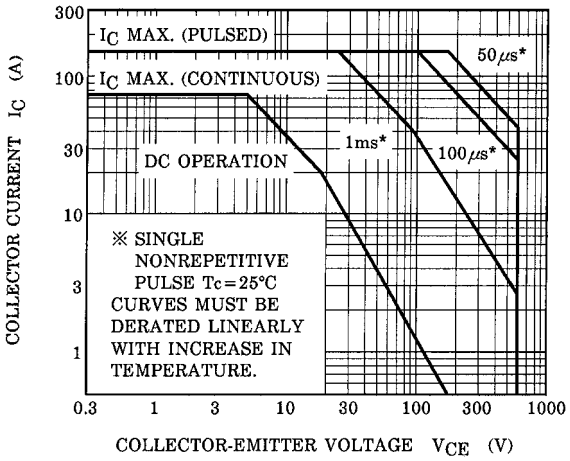

$C - V_{CE}$




$R_{th}(t) - t_w$




SAFE OPERATING AREA




REVERSE BIAS SOA