TOSHIBA GTR MODULE SILICON N CHANNEL IGBT

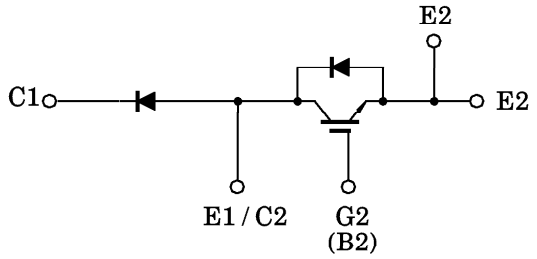
# MG100Q1ZS50

HIGH POWER SWITCHING APPLICATIONS

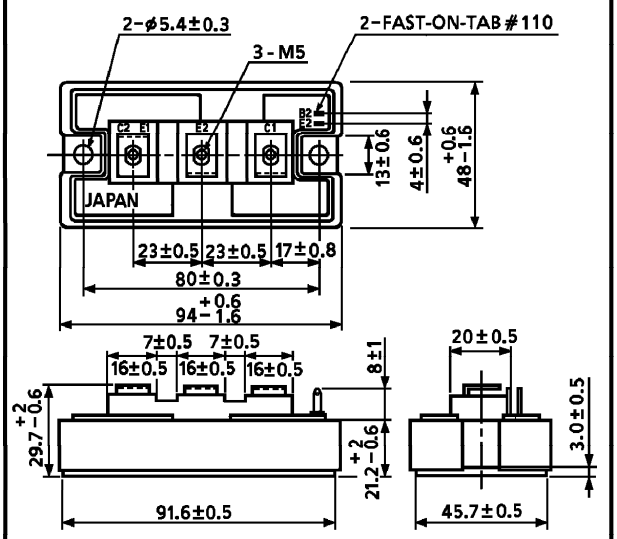
MOTOR CONTROL APPLICATIONS

- High Input Impedance
- High Speed : $t_f = 0.3\ \mu s$ (Max.)
  @Inductive Load
- Low Saturation Voltage
  : $V_{CE\,(sat)} = 3.6\ V$ (Max.)
- Enhancement-Mode
- The Electrodes are Isolated from Case.

EQUIVALENT CIRCUIT




Unit in mm




| | |
|---|---|
| JEDEC | — |
| EIAJ | — |
| TOSHIBA | 2-95A6A |

Weight : 255 g

MAXIMUM RATINGS (Ta = 25°C)

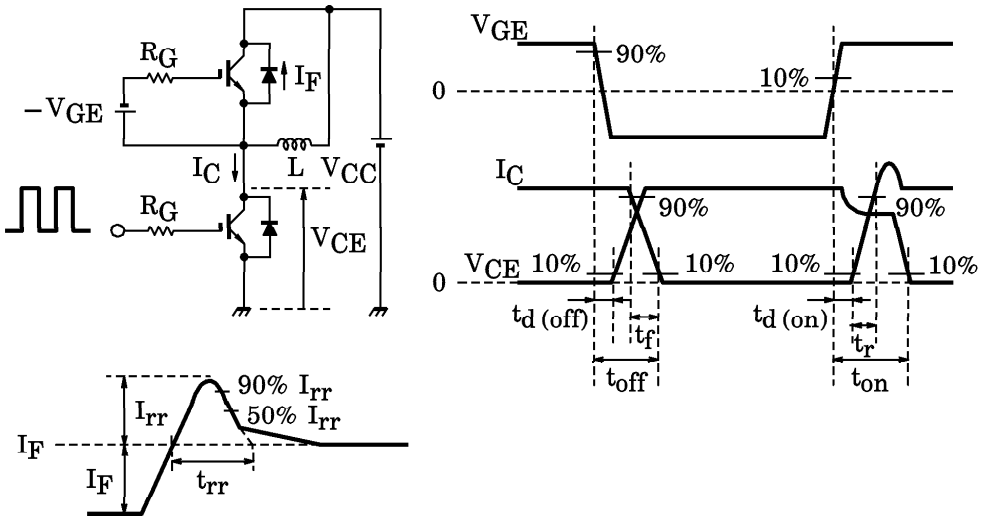
| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Collector-Emitter Voltage | | $V_{CES}$ | 1200 | V |
| Gate-Emitter Voltage | | $V_{GES}$ | ±20 | V |
| Collector Current | DC | $I_C$ (25°C / 80°C) | 150 / 100 | A |
| | 1 ms | $I_{CP}$ (25°C / 80°C) | 300 / 200 | |
| Forward Current | DC | $I_F$ | 100 | A |
| | 1 ms | $I_{FM}$ | 200 | |
| Collector Power Dissipation (Tc = 25°C) | | $P_C$ | 660 | W |
| Junction Temperature | | $T_j$ | 150 | °C |
| Storage Temperature Range | | $T_{stg}$ | −40~125 | °C |
| Isolation Voltage | | $V_{Isol}$ | 2500 (AC 1 minute) | V |
| Screw Torque (Terminal / Mounting) | | — | 3 / 3 | N·m |

961001EAA1

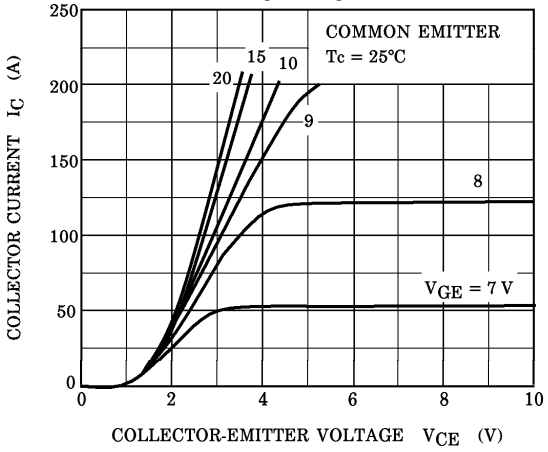
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC | | 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 | | $I_{CES}$ | $V_{CE}$ = 1200 V, $V_{GE}$ = 0 | | — | — | 2.0 | mA |
| Gate-Emitter Cut-off Voltage | | $V_{GE\ (off)}$ | $I_C$ = 100 mA, $V_{CE}$ = 5 V | | 3.0 | — | 6.0 | V |
| Collector-Emitter Saturation Voltage | | $V_{CE\ (sat)}$ | $I_C$ = 100 A, $V_{GE}$ = 15 V | $T_j$ = 25°C | — | 2.8 | 3.6 | V |
| | | | | $T_j$ = 125°C | — | 3.1 | 4.0 | |
| Input Capacitance | | $C_{ies}$ | $V_{CE}$ = 10 V, $V_{GE}$ = 0, f = 1 MHz | | — | 12.0 | — | nF |
| Switching Time | Turn-on Delay Time | $t_{d\ (on)}$ | Inductive Load | | — | 0.05 | — | μs |
| | Rise Time | $t_r$ | $V_{CC}$ = 600 V | | — | 0.05 | — | |
| | Turn-on Time | $t_{on}$ | $I_C$ = 100 A | | — | 0.2 | — | |
| | Turn-off Delay Time | $t_{d\ (off)}$ | $V_{GE}$ = ±15 V | | — | 0.5 | — | |
| | Fall Time | $t_f$ | $R_G$ = 9.1 Ω | | — | 0.1 | 0.3 | |
| | Turn-off Time | $t_{off}$ | (Note 1) | | — | 0.6 | — | |
| Forward Voltage | | $V_F$ | $I_F$ = 100 A, $V_{GE}$ = 0 | | — | 2.4 | 3.5 | V |
| Reverse Recovery Time | | $t_{rr}$ | $I_F$ = 100 A, $V_{GE}$ = −10 V, di / dt = 700 A / μs (Note 1) | | — | 0.1 | 0.25 | μs |
| Thermal Resistance | | $R_{th\ (j\text{-}c)}$ | Transistor Stage | | — | — | 0.16 | °C / W |
| | | | Diode Stage | | — | — | 0.47 | |

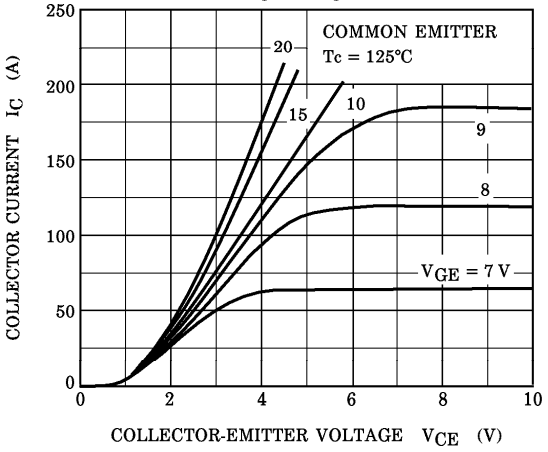
(Note 1) Switching Time and Reverse Recovery Time Test Circuit & Timing Chart



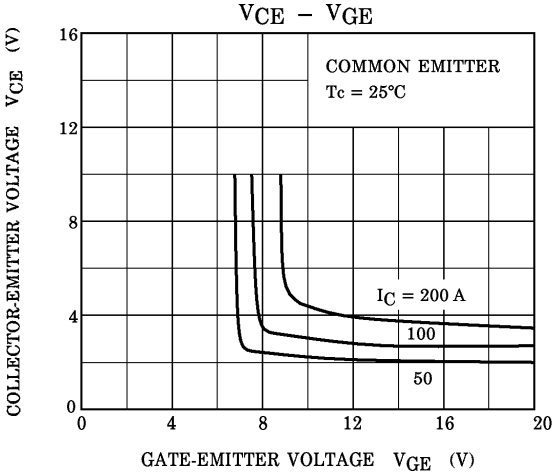
$I_C$ – $V_{CE}$



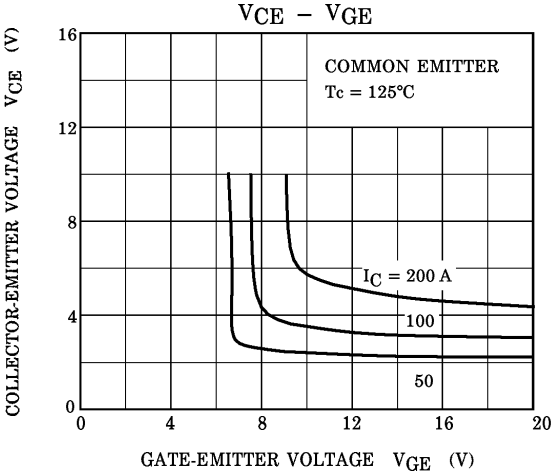

$I_C$ – $V_{CE}$



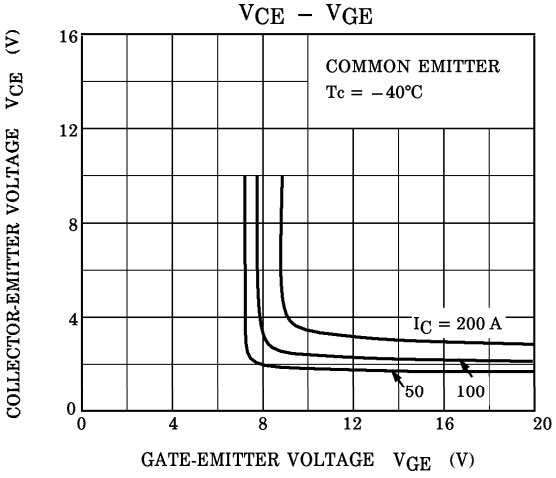

$V_{CE}$ – $V_{GE}$



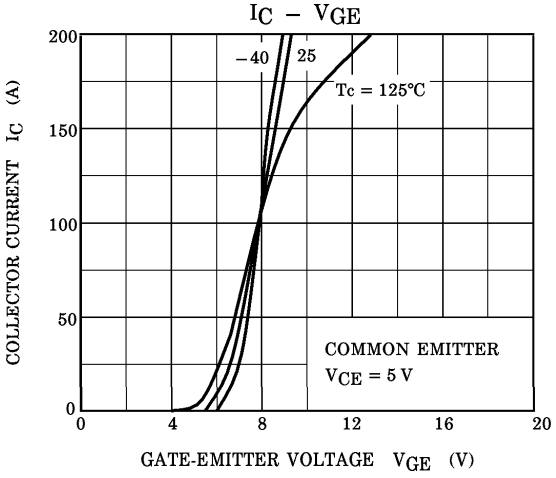

$V_{CE}$ – $V_{GE}$



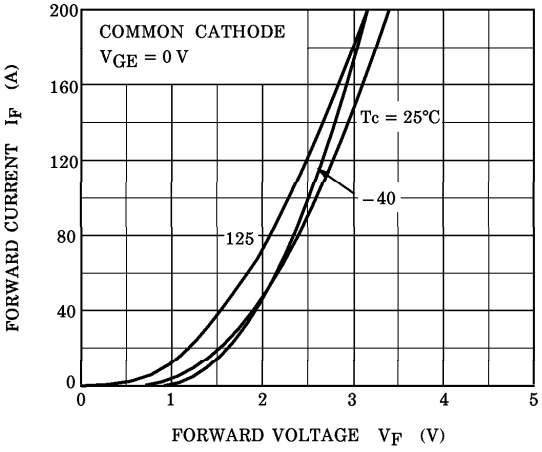

$V_{CE}$ – $V_{GE}$



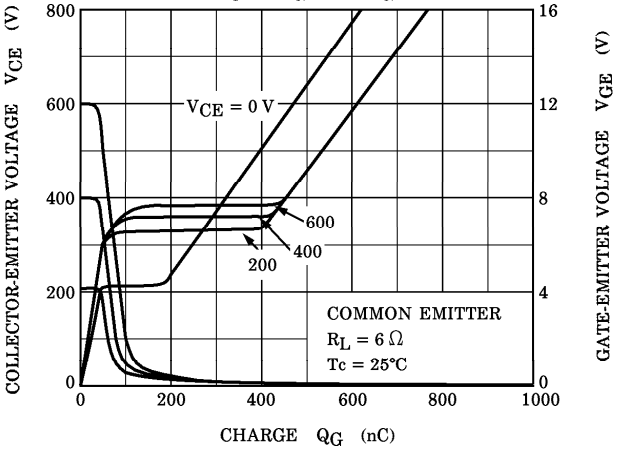

$I_C$ – $V_{GE}$



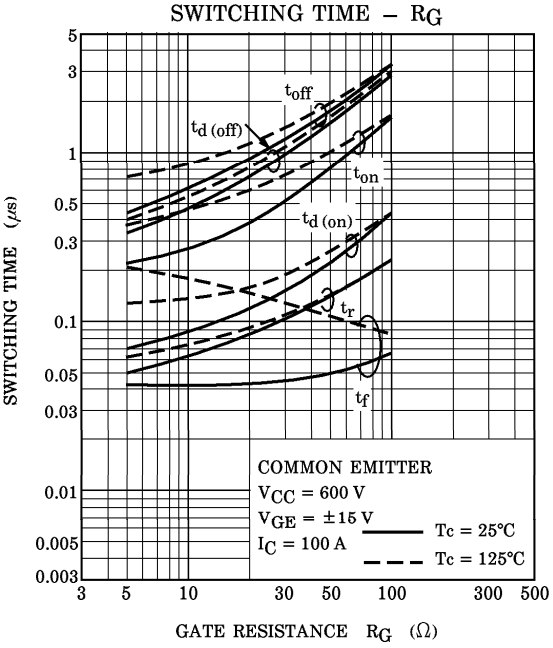
$I_F$ – $V_F$



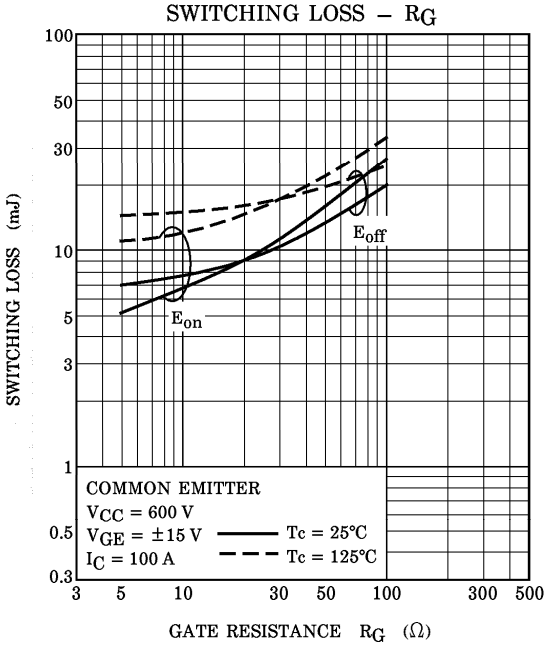

$V_{CE}$, $V_{GE}$ – $Q_G$



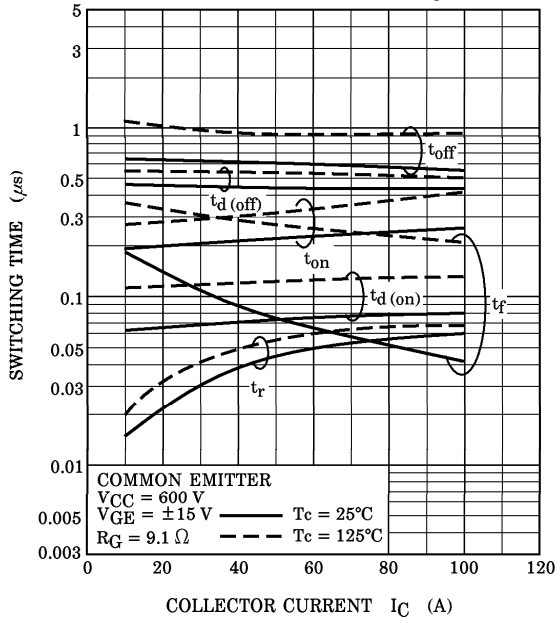

SWITCHING TIME – $R_G$



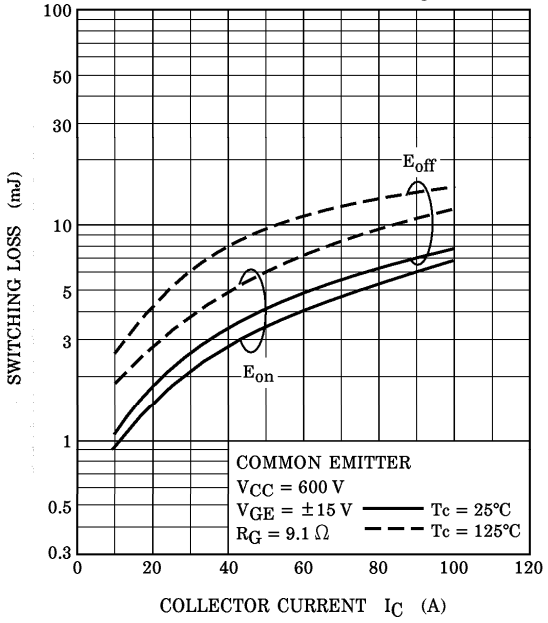

SWITCHING LOSS – $R_G$



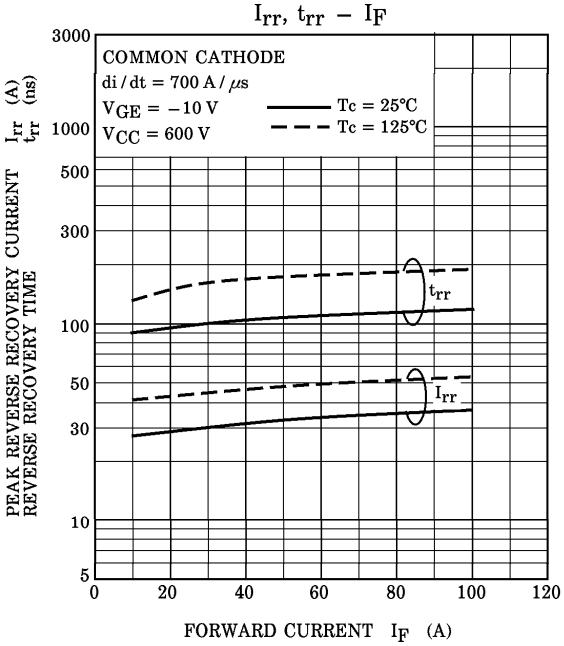
SWITCHING TIME – $I_C$



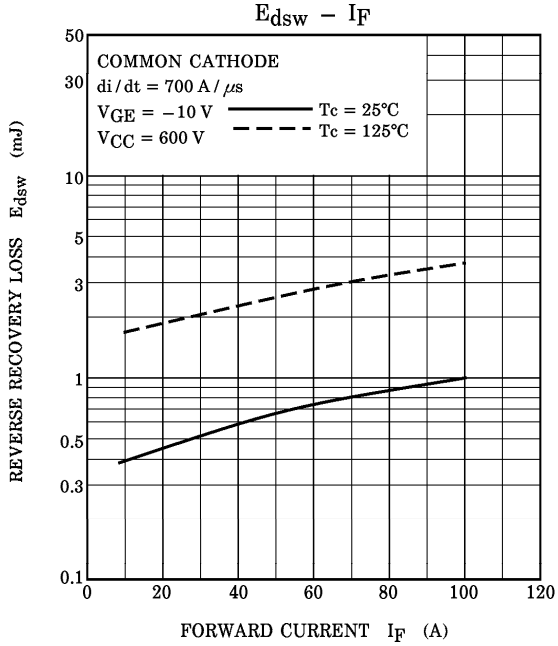

SWITCHING LOSS – $I_C$



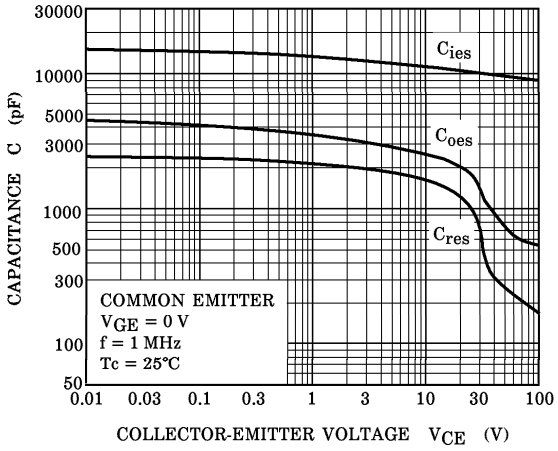

$I_{rr}$, $t_{rr}$ – $I_F$



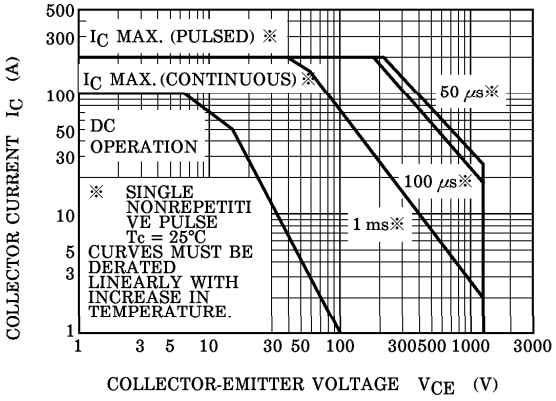

$E_{dsw}$ – $I_F$



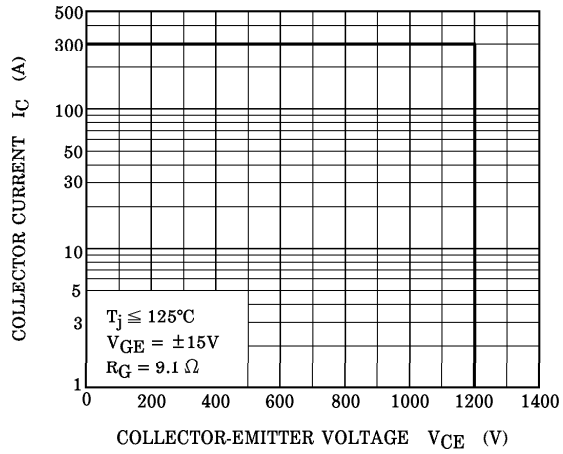
C – $V_{CE}$



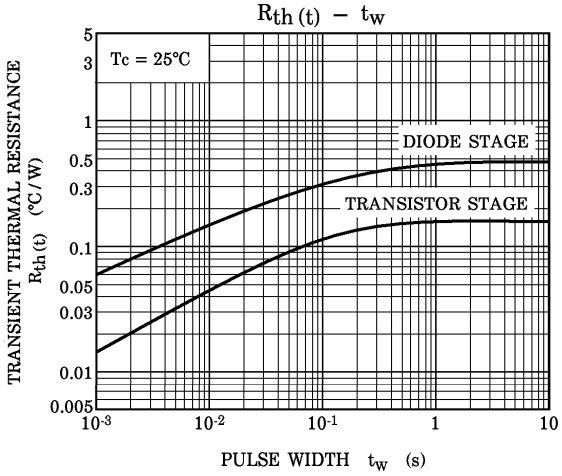

SAFE-OPERATING AREA




REVERSE BIAS SOA




$R_{th}$ (t) – $t_w$




SHORT CIRCUIT SOA