**TOSHIBA** SEMICONDUCTOR
TECHNICAL DATA

TOSHIBA GTR MODULE

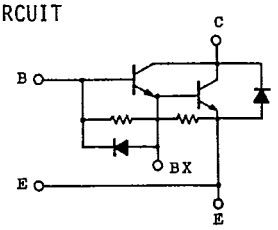
# MG300G1UL1

SILICON NPN TRIPLE DIFFUSED TYPE

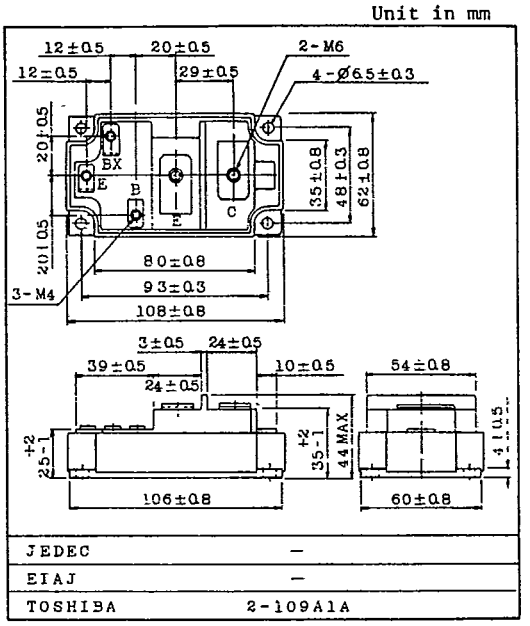
HIGH POWER SWITCHING APPLICATIONS.
MOTOR CONTROL APPLICATIONS.

- The Collector is Isolated from Case.
- With Built-in Free Wheeling Diode
- High DC Current Gain
  : $h_{FE}$=100(Min.) ($I_C$=300A)
- Low Saturation Voltage
  : $V_{CE(sat)}$=2V(Max.) ($I_C$=300A)

EQUIVALENT CIRCUIT




Unit in mm




| | |
|---|---|
| JEDEC | — |
| EIAJ | — |
| TOSHIBA | 2-109A1A |

Weight : 490g

MAXIMUM RATINGS (Ta=25°C)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Collector-Base Voltage | | $V_{CBO}$ | 600 | V |
| Collector-Emitter Sustaining Voltage | | $V_{CEX(SUS)}$ | 600 | V |
| | | $V_{CEO(SUS)}$ | 450 | |
| Emitter-Base Voltage | | $V_{EBO}$ | 6 | V |
| Collector Current | DC | $I_C$ | 300 | A |
| | 1ms | $I_{CP}$ | 600 | |
| Forward Current | DC | $I_F$ | 300 | A |
| | 1ms | $I_{FM}$ | 600 | |
| Base Current | | $I_B$ | 40 | A |
| Collector Power Dissipation (Tc=25°C) | | $P_C$ | 1400 | 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 (M4/M6) | - | 20/30 | kg·cm |
| | Mounting | - | 30 | |



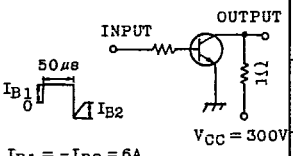
EGA-MG300G1UL1-1

TOSHIBA CORPORATION

**TOSHIBA** SEMICONDUCTOR
TECHNICAL DATA

MG300G1UL1

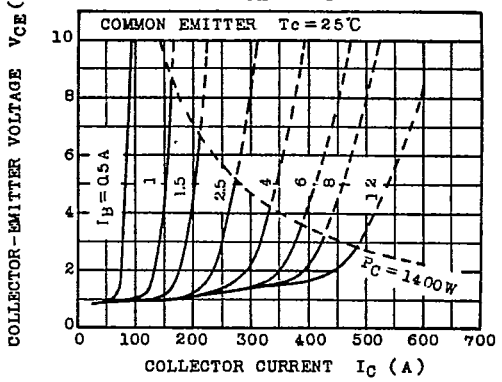
ELECTRICAL CHARACTERISTICS (Ta=25°C)

| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Collector Cut-off Current | | $I_{CBO}$ | $V_{CB}$=600V, $I_E$=0 | - | - | 4 | mA |
| Emitter Cut-iff Current | | $I_{EBO}$ | $V_{EB}$=6V, $I_C$=0 | - | - | 800 | mA |
| Collector-Emitter Sustaining Voltage | | $V_{CEO(SUS)}$ | $I_C$=0.5A, L=40mH | 450 | - | - | V |
| DC Current Gain | | $h_{FE}$ | $V_{CE}$=5V, $I_C$=300A | 100 | - | - | |
| Collector-Emitter Saturation Voltage | | $V_{CE(sat)}$ | $I_C$=300A, $I_B$=6A | - | - | 2.0 | V |
| Base-Emitter Saturation Voltage | | $V_{BE(sat)}$ | | - | - | 2.7 | V |
| Switching Time | Turn-on Time | $t_{on}$ |  $I_{B1}=-I_{B2}=6A$ DUTY CYCLE=0.5% | - | - | 4 | μs |
| | Storage Time | $t_{stg}$ | | - | 6 | 12 | |
| | Fall Time | $t_f$ | | - | 0.5 | 2 | |
| Forward Voltage | | $V_F$ | $I_F$=300A, $I_B$=0 | - | - | 1.7 | V |
| Reverse Recovery Time | | $t_{rr}$ | $I_F$=300A, $V_{BE}$=-3V di/dt=200A/μs | - | - | 1.5 | μs |
| Thermal Resistance | | $R_{th(j-c)}$ | Transistor | - | - | 0.089 | °C/W |
| | | | Diode | - | - | 0.325 | |

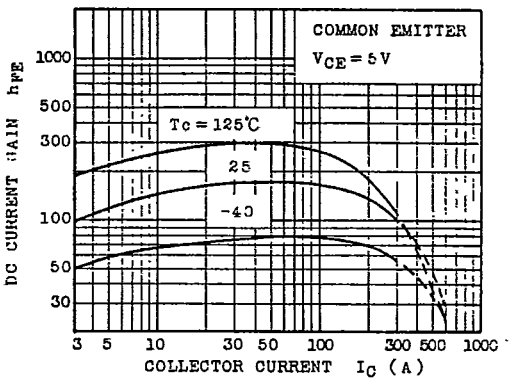
**TOSHIBA** SEMICONDUCTOR
TECHNICAL DATA

MG300G1UL1

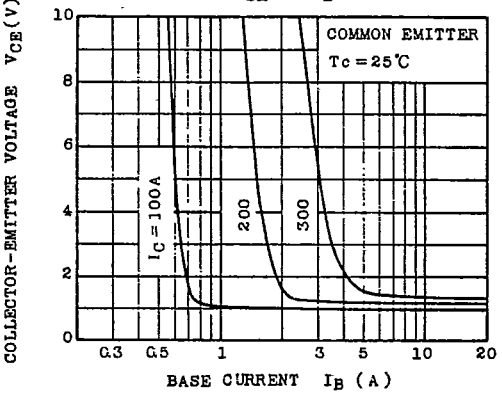
$V_{CE}$ – $I_C$



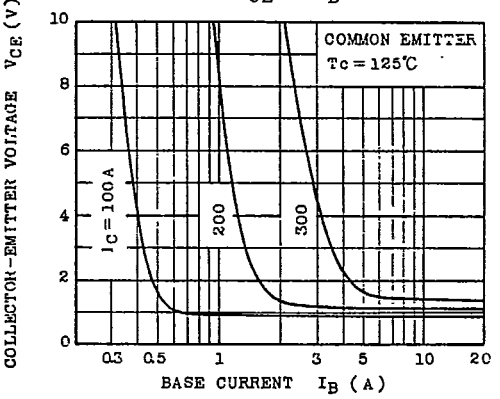

$h_{FE}$ – $I_C$



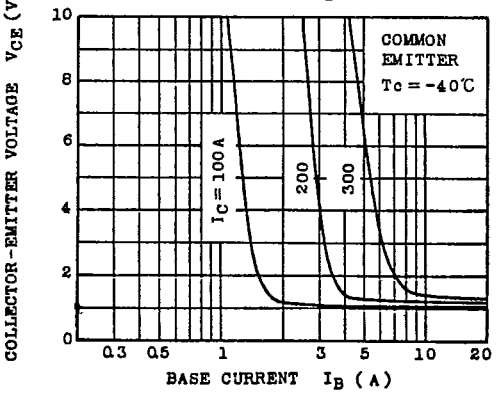

$V_{CE}$ – $I_B$



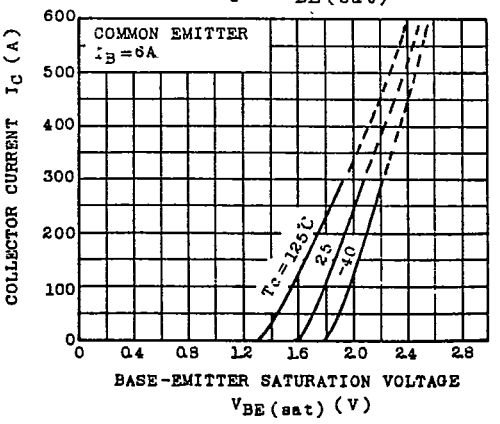

$V_{CE}$ – $I_B$




$V_{CE}$ – $I_B$




$I_C$ – $V_{BE(sat)}$



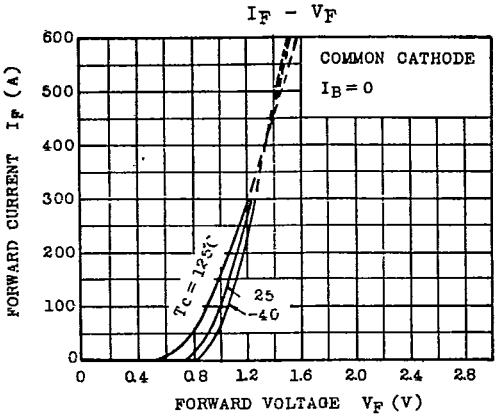

EGA-MG300G1UL1-3

TOSHIBA CORPORATION

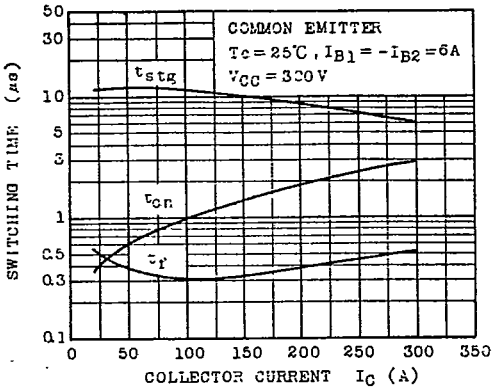
**TOSHIBA** SEMICONDUCTOR
TECHNICAL DATA

MG300G1UL1

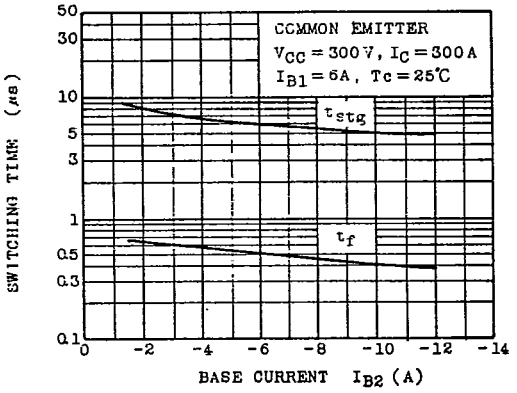
$I_F - V_F$



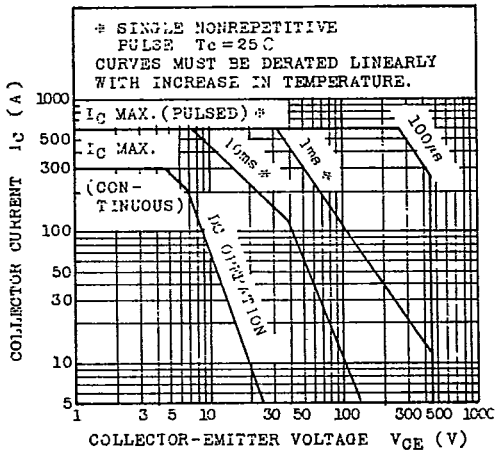

SWITCHING TIME - $I_C$



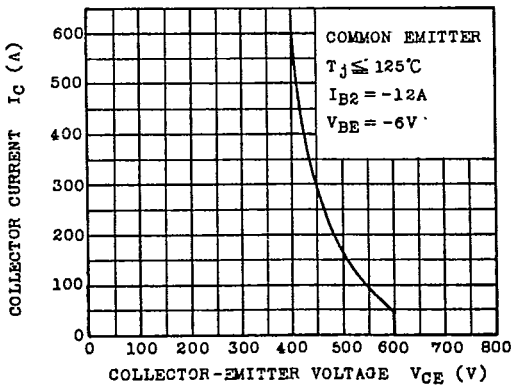

SWITCHING TIME - $I_{B2}$



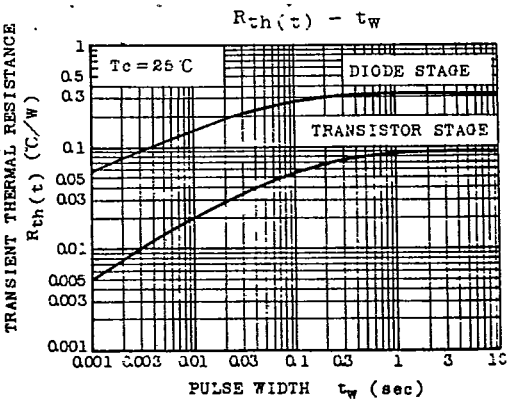

SAFE OPERATING AREA




REVERSE BIAS SOA




$R_{th(t)} - t_w$




EGA-MG300G1UL1-4 *

TOSHIBA CORPORATION

**TOSHIBA** SEMICONDUCTOR
TECHNICAL DATA

TOSHIBA GTR MODULE

# MG300H1UL1

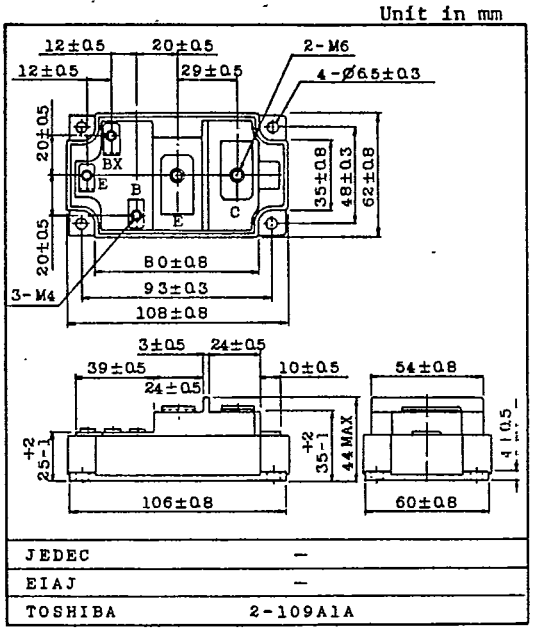
SILICON NPN TRIPLE DIFFUSED TYPE

HIGH POWER SWITCHING APPLICATIONS.
MOTOR CONTROL APPLICATIONS.

FEATURES:

- The Collector is Isolated from Case.
- With Built-in Free Wheeling Diode
- High DC Current Gain: $h_{FE}$=80(Min.)($I_C$=300A)
- Low Saturation Voltage
  : $V_{CE(sat)}$=2V(Max.) ($I_C$=300A)

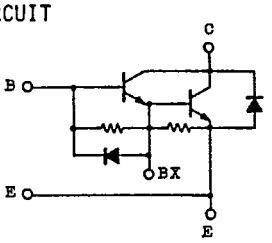
Unit in mm




| | |
|---|---|
| JEDEC | — |
| EIAJ | — |
| TOSHIBA | 2-109A1A |

Weight : 490g

EQUIVALENT CIRCUIT



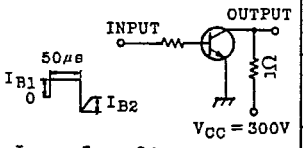

MAXIMUM RATINGS (Ta=25°C)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Collector-Base Voltage | | $V_{CBO}$ | 600 | V |
| Collector-Emitter Sustaining Voltage | | $V_{CEX(SUS)}$ | 600 | V |
| | | $V_{CEO(SUS)}$ | 550 | |
| Emitter-Base Voltage | | $V_{EBO}$ | 6 | V |
| Collector Current | DC | $I_C$ | 300 | A |
| | 1ms | $I_{CP}$ | 600 | |
| Forward Current | DC | $I_F$ | 300 | A |
| | 1ms | $I_{FM}$ | 600 | |
| Base Current | | $I_B$ | 40 | A |
| Collector Power Dissipation (Tc=25°C) | | $P_C$ | 1400 | 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 (M4/M6) | - | 20/30 | kg·cm |
| | Mounting | - | 30 | |

**TOSHIBA** SEMICONDUCTOR
TECHNICAL DATA

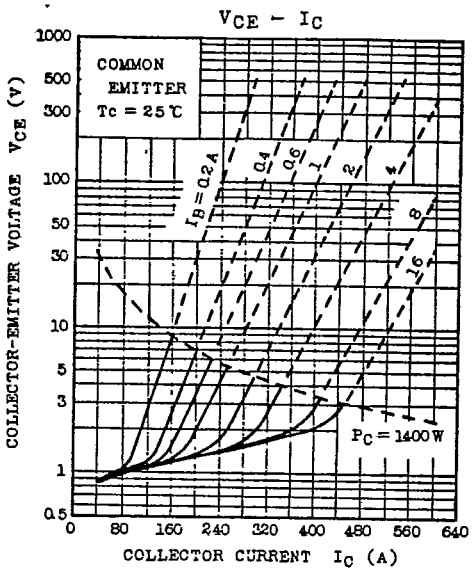
MG300H1UL1

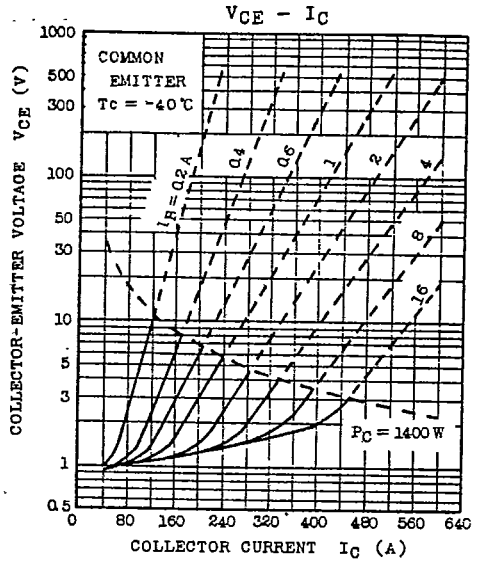
ELECTRICAL CHARACTERISTICS (Ta=25°C)

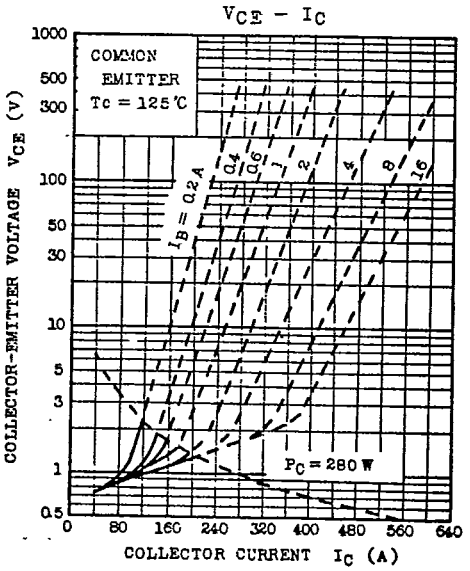
| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Collector Cut-off Current | | $I_{CBO}$ | $V_{CB}$=600V, $I_E$=0 | - | - | 4 | mA |
| Emitter Cut-off Current | | $I_{EBO}$ | $V_{EB}$=6V, $I_C$=0 | - | - | 800 | mA |
| Collector-Emitter Sustaining Voltage | | $V_{CEO(SUS)}$ | $I_C$=0.5A, L=40mH | 550 | - | - | V |
| DC Current Gain | | $h_{FE}$ | $V_{CE}$=5V, $I_C$=300A | 80 | - | - | |
| Collector-Emitter Saturation Voltage | | $V_{CE(sat)}$ | $I_C$=300A, $I_B$=8A | - | - | 2.0 | V |
| Base-Emitter Saturation Voltage | | $V_{BE(sat)}$ | | - | - | 2.7 | V |
| Switching Time | Turn-on Time | $t_{on}$ |  | - | - | 2.0 | μs |
| | Storage Time | $t_{stg}$ | | - | - | 12 | |
| | Fall Time | $t_f$ | $I_{B1}$ = -$I_{B2}$ = 8A<br>DUTY CYCLE = 0.5% | - | - | 5 | |
| Forward Voltage | | $V_F$ | $I_F$=300A, $I_B$=0 | - | - | 1.7 | V |
| Reverse Recovery Time | | $t_{rr}$ | $I_F$=300A, $V_{BE}$=-3V<br>di/dt=200A/μs | - | - | 1.5 | μs |
| Thermal Resistance | | $R_{th(j-c)}$ | Transisotr | - | - | 0.089 | °C/W |
| | | | Diode | - | - | 0.325 | |

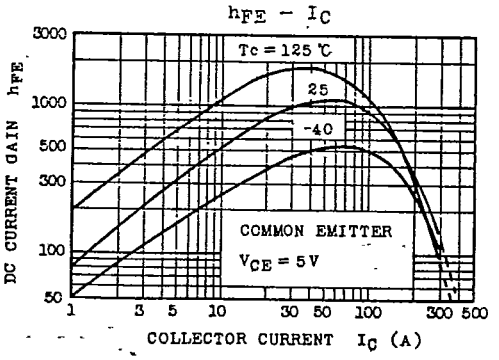
**TOSHIBA** SEMICONDUCTOR
TECHNICAL DATA

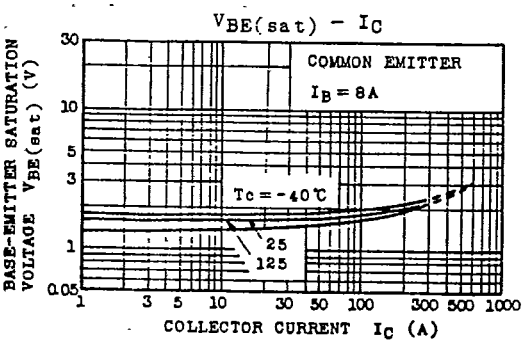
MG300H1UL1



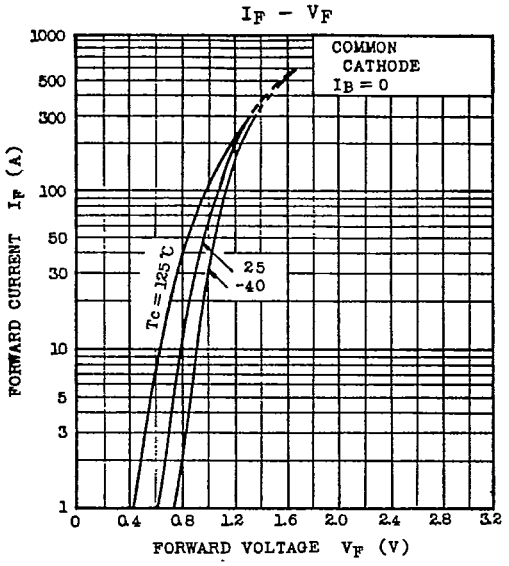



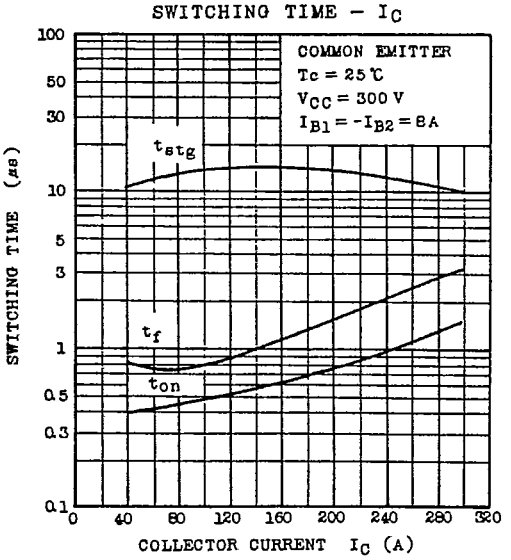
**TOSHIBA** SEMICONDUCTOR
TECHNICAL DATA

MG300H1UL1

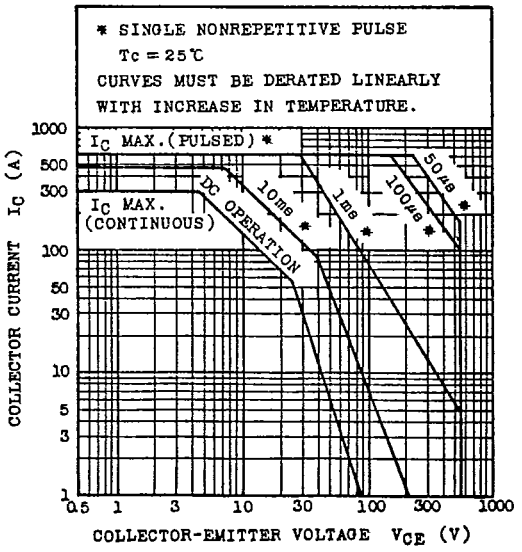
$I_F - V_F$




SWITCHING TIME – $I_C$




SAFE OPERATING AREA




REVERSE BIAS SOA