TOSHIBA POWER TRANSISTOR MODULE SILICON PNP TRIPLE DIFFUSED TYPE (DARLINGTON POWER TRANSISTOR 4 IN 1)

# MP4508

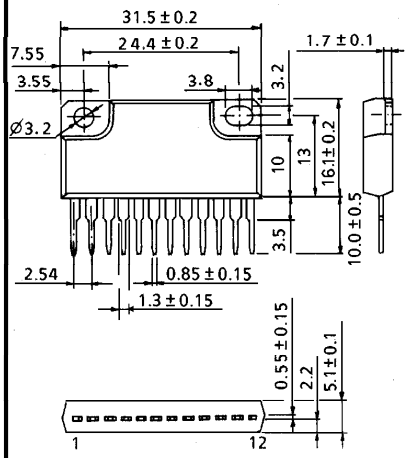
HIGH POWER SWITCHING APPLICATIONS.

HAMMER DRIVE, PULSE MOTOR DRIVE AND INDUCTIVE LOAD SWITCHING.

INDUSTRIAL APPLICATIONS

- Package with Heat Sink Isolated to Lead (SIP 12 Pin)
- High Collector Power Dissipation (4 Devices Operation) : $P_T = 5W$ (Ta = 25°C)
- High Collector Current : $I_{C\,(DC)} = -5A$ (Max.)
- High DC Current Gain : $h_{FE} = 1000$ (Min.) ($V_{CE} = -3V$, $I_C = -3A$)

Unit in mm




| | |
|---|---|
| 1, 5, 8, 12 | BASE |
| 2, 4, 9, 11 | COLLECTOR |
| 3, 6, 7, 10 | EMITTER |

| | |
|---|---|
| JEDEC | — |
| EIAJ | — |
| TOSHIBA | 2-32B1B |

Weight : 6.0g

MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Collector-Base Voltage | | $V_{CBO}$ | −100 | V |
| Collector-Emitter Voltage | | $V_{CEO}$ | −100 | V |
| Emitter-Base Voltage | | $V_{EBO}$ | −5 | V |
| Collector Current | DC | $I_C$ | −5 | A |
| | Pulse | $I_{CP}$ | −8 | |
| Continuous Base Current | | $I_B$ | −0.1 | A |
| Collector Power Dissipation (1 Device Operation) | | $P_C$ | 3.0 | W |
| Collector Power Dissipation (4 Devices Operation) | Ta = 25°C | $P_T$ | 5.0 | W |
| | Tc = 25°C | | 25 | |
| Isolation Voltage | | $V_{Isol}$ | 1000 | V |
| Junction Temperature | | $T_j$ | 150 | °C |
| Storage Temperature Range | | $T_{stg}$ | −55~150 | °C |

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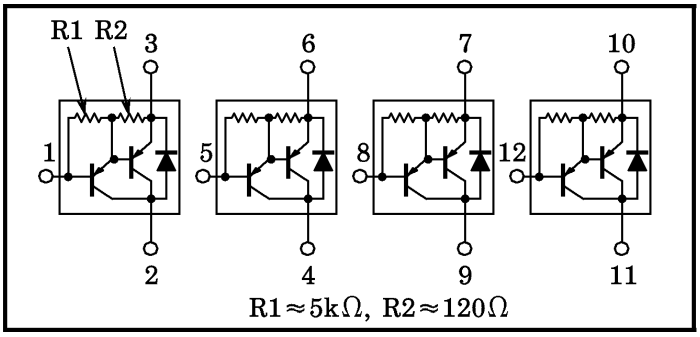
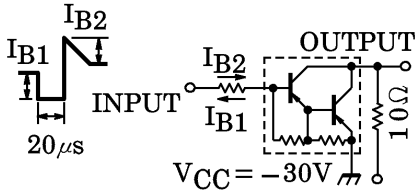
ARRAY CONFIGURATION




THERMAL CHARACTERISTICS

| CHARACTERISTIC | SYMBOL | MAX. | UNIT |
|---|---|---|---|
| Thermal Resistance of Junction to Ambient (4 Devices Operation, Ta = 25°C) | $\Sigma R_{th\ (j\text{-}a)}$ | 25 | °C / W |
| Thermal Resistance of Junction to Case (4 Devices Operation, Tc = 25°C) | $\Sigma R_{th\ (j\text{-}c)}$ | 5.0 | °C / W |
| Maximum Lead Temperature for Soldering Purposes (3.2mm from Case for 10s) | $T_L$ | 260 | °C |

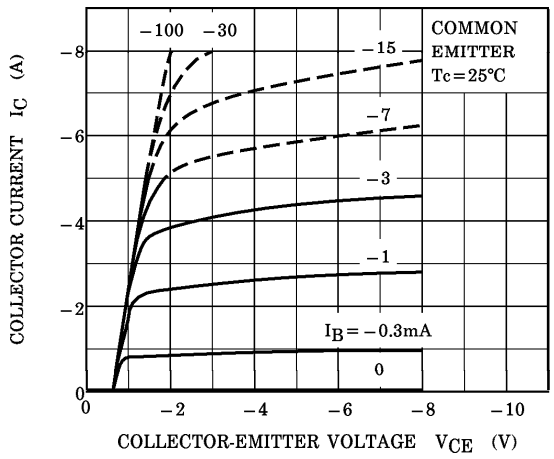
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Collector Cut-off Current | | $I_{CBO}$ | $V_{CB} = -100V$, $I_E = 0$ | — | — | −10 | μA |
| Collector Cut-off Current | | $I_{CEO}$ | $V_{CE} = -100V$, $I_B = 0$ | — | — | −10 | μA |
| Emitter Cut-off Current | | $I_{EBO}$ | $V_{EB} = -5V$, $I_C = 0$ | −0.3 | — | −2.0 | mA |
| Collector-Base Breakdown Voltage | | $V_{(BR)\ CBO}$ | $I_C = -1mA$, $I_E = 0$ | −100 | — | — | V |
| Collector-Emitter Breakdown Voltage | | $V_{(BR)\ CEO}$ | $I_C = -30mA$, $I_B = 0$ | −100 | — | — | V |
| DC Current Gain | | $h_{FE\ (1)}$ | $V_{CE} = -3V$, $I_C = -0.5A$ | 1000 | — | — | |
| | | $h_{FE\ (2)}$ | $V_{CE} = -3V$, $I_C = -3A$ | 1000 | — | — | |
| Saturation Voltage | Collector-Emitter | $V_{CE\ (sat)}$ | $I_C = -3A$, $I_B = -12mA$ | — | — | −2.0 | V |
| | Base-Emitter | $V_{BE\ (sat)}$ | $I_C = -3A$, $I_B = -12mA$ | — | — | −2.5 | |
| Transition Frequency | | $f_T$ | $V_{CE} = -3V$, $I_C = -0.5A$ | 3 | — | — | MHz |
| Collector Output Capacitance | | $C_{ob}$ | $V_{CB} = -50V$, $I_E = 0$, f = 1MHz | — | 40 | — | pF |
| Switching Time | Turn-on Time | $t_{on}$ |  | — | 0.5 | — | μs |
| | Storage Time | $t_{stg}$ | | — | 3.0 | — | |
| | Fall Time | $t_f$ | $-I_{B1} = I_{B2} = 12mA$, DUTY CYCLE ≦ 1% | — | 2.0 | — | |

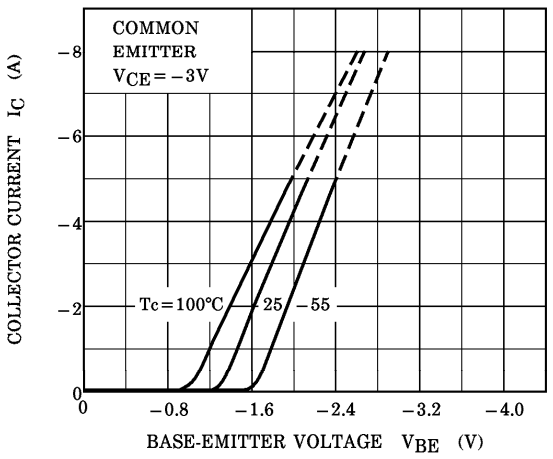
EMITTER-COLLECTOR DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Forward Current | $I_{FM}$ | — | — | — | 5 | A |
| Surge Current | $I_{FSM}$ | t = 1s, 1 shot | — | — | 8 | A |
| Forward Voltage | $V_F$ | $I_F$ = 1A, $I_B$ = 0 | — | — | 2.0 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$ = 5A, $V_{BE}$ = 3V, $dI_F/dt$ = 50A/μs | — | 1.0 | — | μs |
| Reverse Recovery Charge | Qrr | | — | 8 | — | μC |

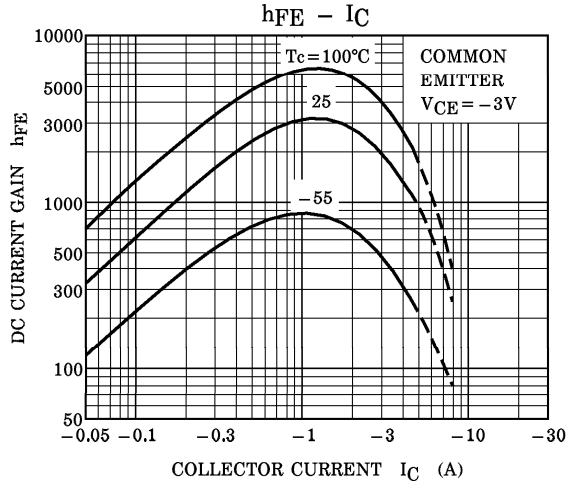
$I_C$ – $V_{CE}$



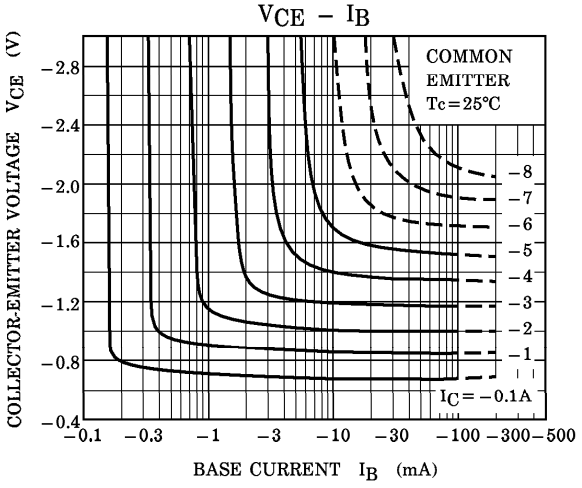

$I_C$ – $V_{BE}$



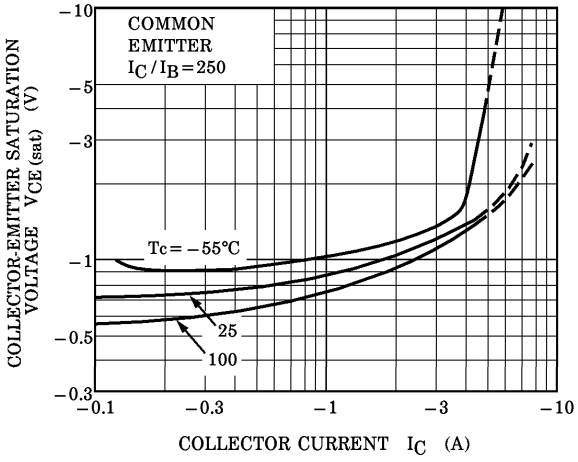

$h_{FE}$ – $I_C$



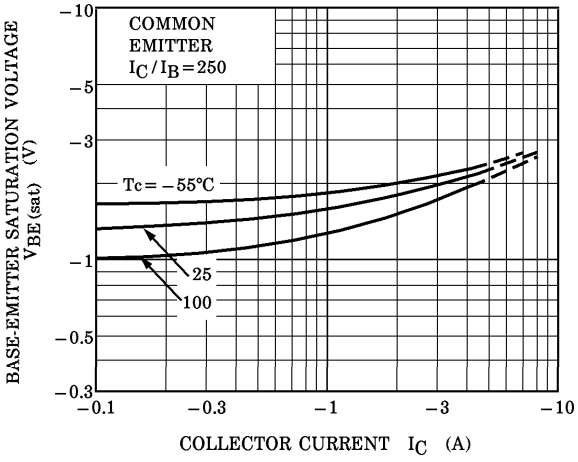

$V_{CE}$ – $I_B$



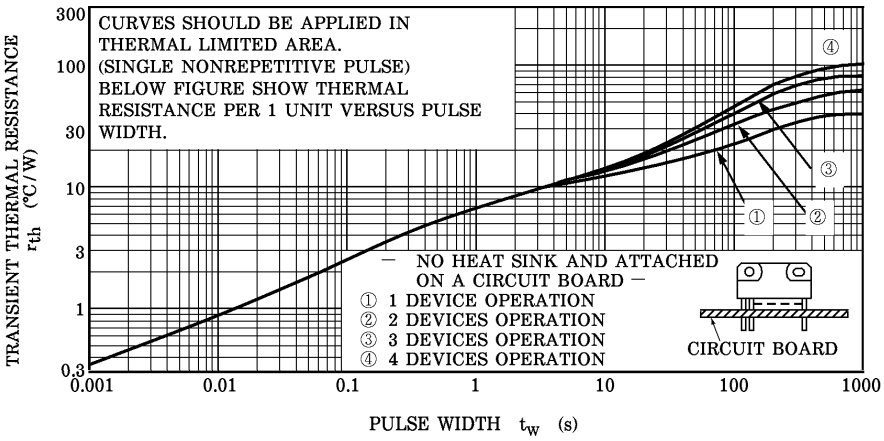

$V_{CE\,(sat)}$ – $I_C$



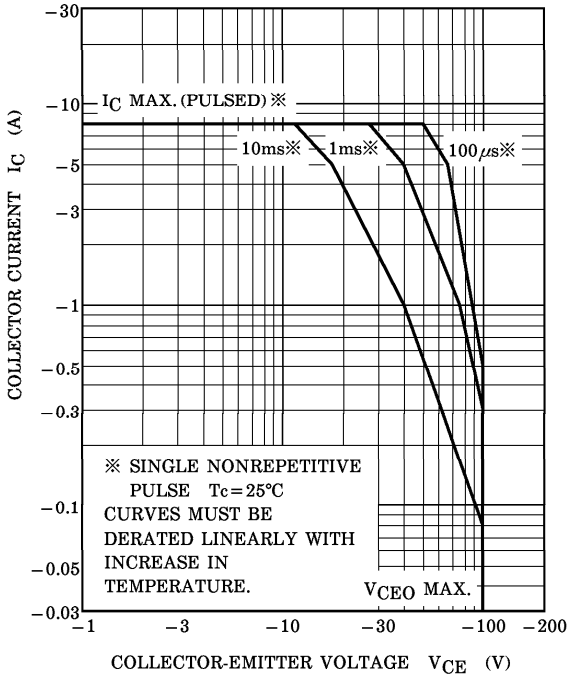

$V_{BE\,(sat)}$ – $I_C$



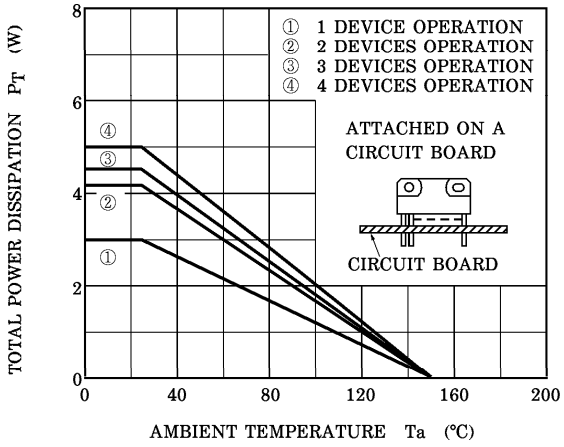
$r_{th} - t_w$




SAFE OPERATING AREA




$P_T - Ta$




$\Delta T_j - P_T$