

TOSHIBA Power Transistor Module Silicon NPN Epitaxial Type  
Four Darlingtons Power Transistors in One)

## MP4024

### High Power Switching Applications

Hammer Drive, Pulse Motor Drive and Inductive Load Switching

- Small package by full molding (SIP 10 pins)
- Built-in resistance ( $R_B$ ).
- Surge voltage is clamped by zener diode (C-B).
- Low  $V_{CE(sat)}$ :  $V_{CE(sat)} = 1.5 \text{ V (max)}$  ( $I_C = 1 \text{ A}$ ,  $V_{BH} = 4.2 \text{ V}$ )
- High DC current gain:  $h_{FE} = 2000 \text{ (min)}$  ( $V_{CE} = 2 \text{ V}$ ,  $I_C = 1 \text{ A}$ )

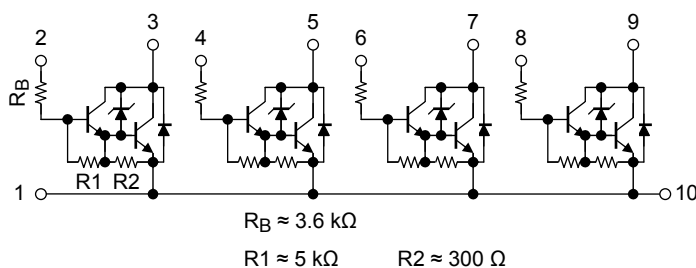
### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

| Characteristics                                     |       | Symbol    | Rating       | Unit             |
|---|-------|-----------|--------------|------------------|
| Collector-base voltage                              |       | $V_{CBO}$ | 85           | V                |
| Collector-emitter voltage                           |       | $V_{CEO}$ | $100 \pm 15$ | V                |
| Emitter-base voltage                                |       | $V_{EBO}$ | 6            | V                |
| Input voltage                                       |       | $V_B$     | 20           | V                |
| Collector current                                   | DC    | $I_C$     | 3            | A                |
|   | Pulse | $I_{CP}$  | 4            |                  |
| Collector power dissipation<br>(1-device operation) |       | $P_C$     | 2.0          | W                |
| Collector power dissipation<br>(4-device operation) |       | $P_T$     | 4.0          | W                |
| Junction temperature                                |       | $T_j$     | 150          | $^\circ\text{C}$ |
| Storage temperature range                           |       | $T_{stg}$ | -55 to 150   | $^\circ\text{C}$ |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

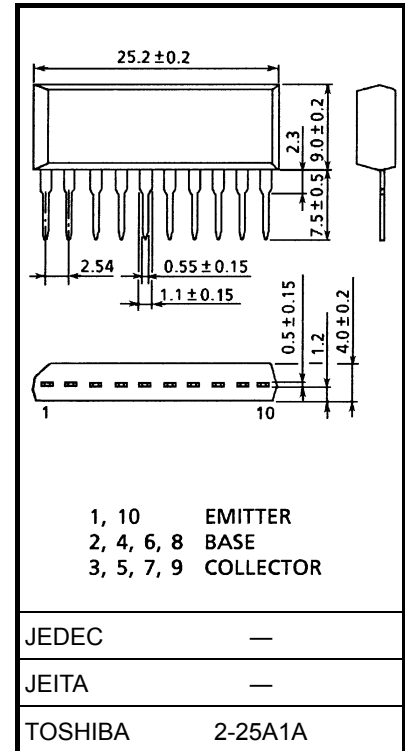
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

### Array Configuration



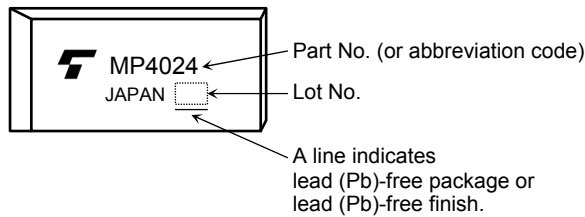
Industrial Applications

Unit: mm



Weight: 2.1 g (typ.)

## Marking



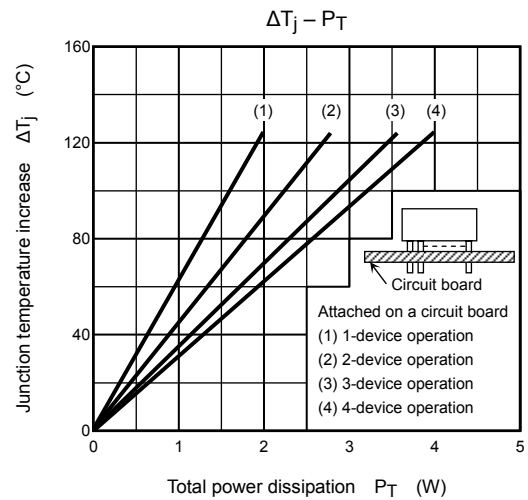
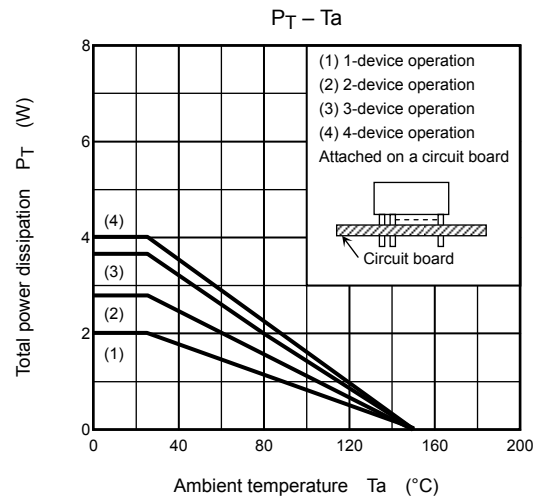
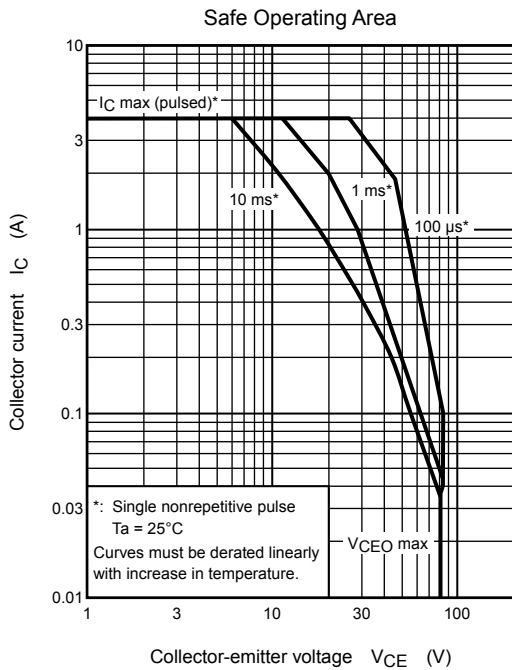
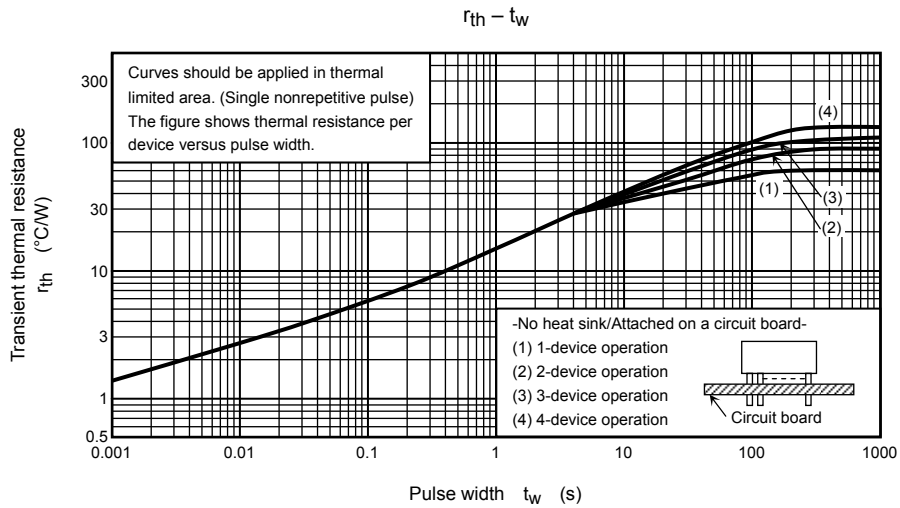
## Thermal Characteristics

| Characteristics  | Symbol               | Max  | Unit               |
|--|----------------------|------|--------------------|
| Thermal resistance from junction to ambient<br>(4-device operation, $T_a = 25^\circ\text{C}$ ) | $\Sigma R_{th(j-a)}$ | 31.3 | $^\circ\text{C/W}$ |
| Maximum lead temperature for soldering purposes<br>(3.2 mm from case for 10 s)                 | $T_L$                | 260  | $^\circ\text{C}$   |

## Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

| Characteristics                      | Symbol           | Test Condition                                       | Min  | Typ. | Max | Unit             |
|--------------------------------------|------------------|--|------|------|-----|------------------|
| Collector cut-off current            | $I_{CBO}$        | $V_{CB} = 80\text{ V}, I_E = 0\text{ A}$             | —    | —    | 10  | $\mu\text{A}$    |
| Collector cut-off current            | $I_{CEO}$        | $V_{CE} = 80\text{ V}, I_B = 0\text{ A}$             | —    | —    | 10  | $\mu\text{A}$    |
| Emitter cut-off current              | $I_{EBO}$        | $V_{EB} = 6\text{ V}, I_C = 0\text{ A}$              | 0.3  | —    | 1.5 | $\text{mA}$      |
| Collector-emitter breakdown voltage  | $V_{(BR)CEO}$    | $I_C = 10\text{ mA}, I_B = 0\text{ A}$               | 85   | 100  | 115 | $\text{V}$       |
| Resistance                           | $R_B$            | —  | 2.5  | 3.6  | 4.7 | $\text{k}\Omega$ |
| DC current gain                      | $h_{FE(1)}$      | $V_{CE} = 2\text{ V}, I_C = 1\text{ A}$              | 2000 | —    | —   | —                |
|                                      | $h_{FE(2)}$      | $V_{CE} = 2\text{ V}, I_C = 2\text{ A}$              | 1000 | —    | —   |                  |
| Collector-emitter saturation voltage | $V_{CE(sat)(1)}$ | $I_C = 1\text{ A}, V_{BH} = 4.2\text{ V}$            | —    | —    | 1.5 | $\text{V}$       |
|                                      | $V_{CE(sat)(2)}$ | $I_C = 1.5\text{ A}, V_{BH} = 9\text{ V}$            | —    | —    | 1.5 |                  |
| Input voltage (low)                  | $V_{BL}$         | $V_{CE} = 50\text{ V}, I_C = 100\text{ }\mu\text{A}$ | —    | —    | 0.7 | $\text{V}$       |
| Switching time                       | Turn-on time     | $t_{on}$   | —    | 0.3  | —   | $\mu\text{s}$    |
|                                      | Storage time     | $t_{stg}$  | —    | 4.0  | —   |                  |
|                                      | Fall time        | $t_f$  | —    | 0.6  | —   |                  |

Duty cycle  $\leq 1\%$



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20070701-EN

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