

TOSHIBA Transistor Silicon NPN Epitaxial Type (Darlington Power Transistor)

2SD1509

Micro-Motor Drive, Hammer Drive Applications

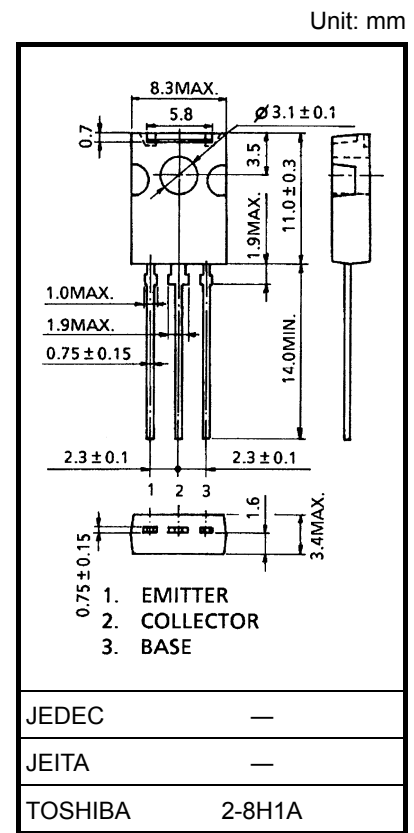
Switching Applications

Power Amplifier Applications

- High DC current gain: $h_{FE} = 2000$ (min) ($V_{CE} = 2\text{ V}$, $I_C = 1\text{ A}$)
- Low saturation voltage: $V_{CE(sat)} = 1.5\text{ V}$ (max) ($I_C = 1\text{ A}$, $I_B = 1\text{ mA}$)

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

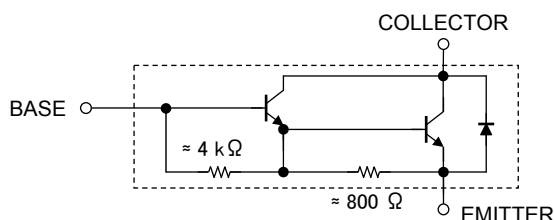
| Characteristics | | Symbol | Rating | Unit |
|-----------------------------|--------------------------|-----------|------------|------------------|
| Collector-base voltage | | V_{CBO} | 80 | V |
| Collector-emitter voltage | | V_{CEO} | 80 | V |
| Emitter-base voltage | | V_{EBO} | 8 | V |
| Collector current | | I_C | 2 | A |
| Base current | | I_B | 0.5 | A |
| Collector power dissipation | $T_a = 25^\circ\text{C}$ | P_C | 1.5 | W |
| | $T_c = 25^\circ\text{C}$ | | 10 | |
| Junction temperature | | T_j | 150 | $^\circ\text{C}$ |
| Storage temperature range | | T_{stg} | -55 to 150 | $^\circ\text{C}$ |



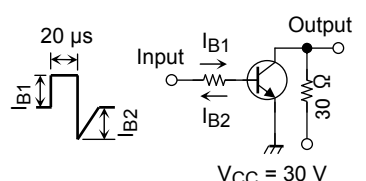
Weight: 0.82 g (typ.)

Note1: 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).

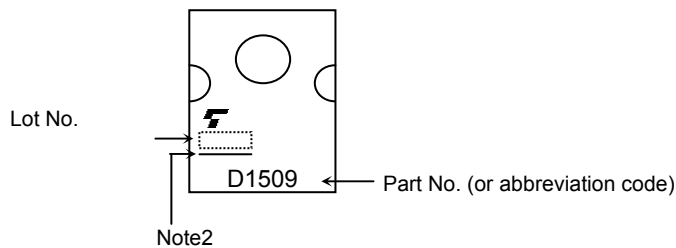
Equivalent Circuit



Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|--------------|---------------|--|--|------|-----|---------------|
| Collector cut-off current | | I_{CBO} | $V_{CB} = 80\text{ V}, I_E = 0$ | — | — | 10 | μA |
| Emitter cut-off current | | I_{EBO} | $V_{EB} = 8\text{ V}, I_C = 0$ | — | — | 4 | mA |
| Collector-emitter breakdown voltage | | $V_{(BR)CEO}$ | $I_C = 10\text{ mA}, I_B = 0$ | 80 | — | — | V |
| DC current gain | | h_{FE} | $V_{CE} = 2\text{ V}, I_C = 1\text{ A}$ | 2000 | — | — | |
| Collector-emitter saturation voltage | | $V_{CE(sat)}$ | $I_C = 1\text{ A}, I_B = 1\text{ mA}$ | — | — | 1.5 | V |
| Base-emitter saturation voltage | | $V_{BE(sat)}$ | $I_C = 1\text{ A}, I_B = 1\text{ mA}$ | — | — | 2.0 | V |
| Transition frequency | | f_T | $V_{CE} = 2\text{ V}, I_C = 0.5\text{ A}$ | — | 100 | — | MHz |
| Collector output capacitance | | C_{ob} | $V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$ | — | 20 | — | pF |
| Switching time | Turn-on time | t_{on} |  | — | 0.4 | — | μs |
| | Storage time | t_{stg} | | — | 4.0 | — | |
| | Fall time | t_f | | $I_{B1} = 1\text{ mA}, I_{B2} = 1\text{ mA},$ duty cycle $\leq 1\%$ | — | 0.6 | |

Marking

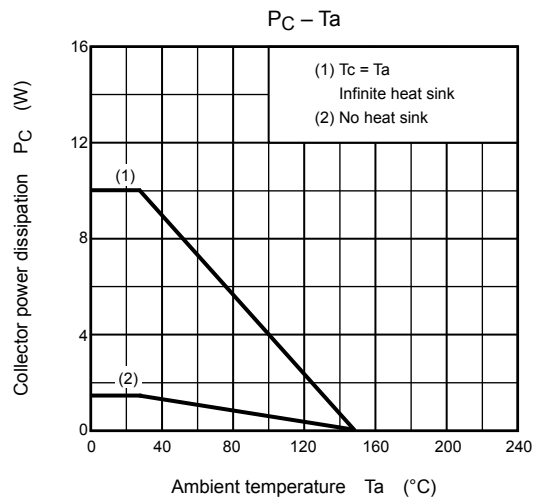
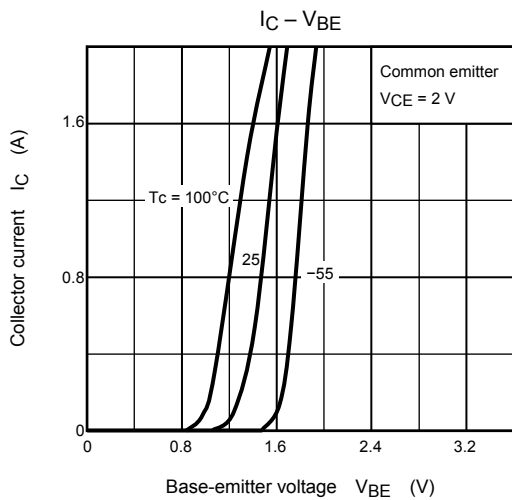
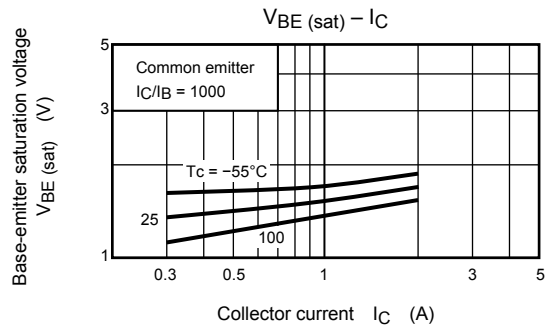
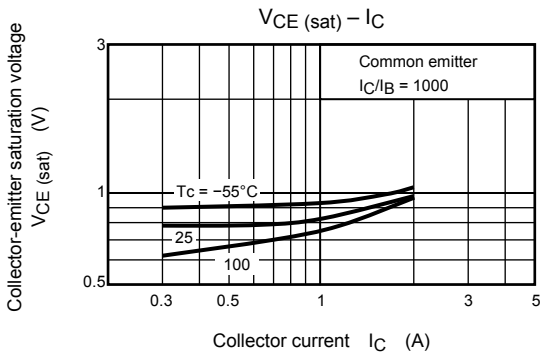
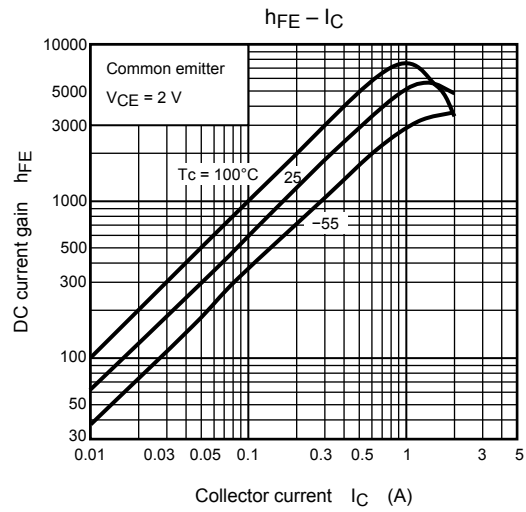
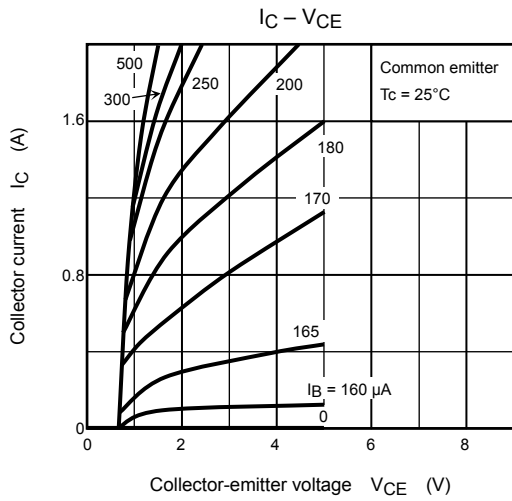


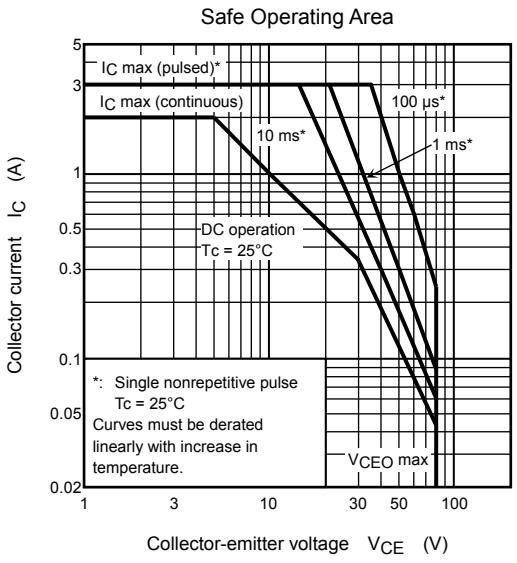
Note2: A line under a Lot No. identifies the indication of product Labels.

Not underlined: $[[Pb]]/INCLUDES > MCV$

Underlined: $[[G]]/RoHS\ COMPATIBLE$ or $[[G]]/RoHS\ [[Pb]]$

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.





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