

# 2SD1511

## Silicon NPN epitaxial planer type darlington

For low-frequency output amplification

### ■ Features

- Forward current transfer ratio  $h_{FE}$  is designed high, which is appropriate to the driver circuit of motors and printer bammer:  $h_{FE} = 4000$  to  $2000$ .
- A shunt resistor is omitted from the driver.
- Mini Power type package, allowing downsizing of the equipment and automatic insertion through the tape packing and the magazine packing.

### ■ Absolute Maximum Ratings (Ta=25°C)

| Parameter                    | Symbol    | Ratings    | Unit |
|------------------------------|-----------|------------|------|
| Collector to base voltage    | $V_{CBO}$ | 100        | V    |
| Collector to emitter voltage | $V_{CEO}$ | 80         | V    |
| Emitter to base voltage      | $V_{EBO}$ | 5          | V    |
| Peak collector current       | $I_{CP}$  | 1.5        | A    |
| Collector current            | $I_C$     | 1          | A    |
| Collector power dissipation  | $P_C^*$   | 1          | W    |
| Junction temperature         | $T_j$     | 150        | °C   |
| Storage temperature          | $T_{stg}$ | -55 ~ +150 | °C   |

\* Printed circuit board: Copper foil area of 1cm<sup>2</sup> or more, and the board thickness of 1.7mm for the collector portion

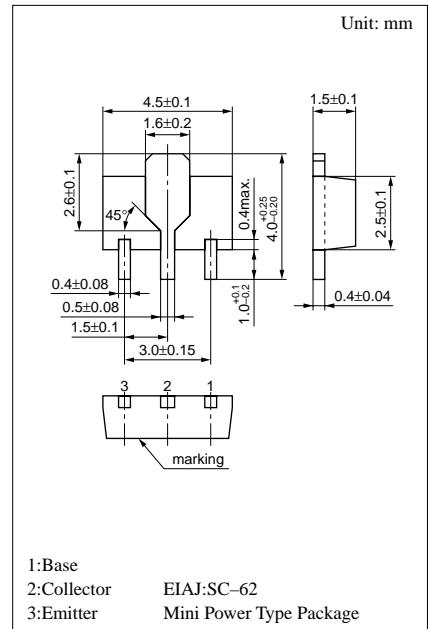
### ■ Electrical Characteristics (Ta=25°C)

| Parameter                               | Symbol        | Conditions                              | min  | typ | max   | Unit |
|---|---------------|---|------|-----|-------|------|
| Collector cutoff current                | $I_{CBO}$     | $V_{CB} = 25V, I_E = 0$                 |      |     | 100   | nA   |
| Emitter cutoff current                  | $I_{EBO}$     | $V_{EB} = 4V, I_C = 0$                  |      |     | 100   | nA   |
| Collector to base voltage               | $V_{CBO}$     | $I_C = 100\mu A, I_E = 0$               | 100  |     |       | V    |
| Collector to emitter voltage            | $V_{CEO}$     | $I_C = 1mA, I_B = 0$                    | 80   |     |       | V    |
| Emitter to base voltage                 | $V_{EBO}$     | $I_E = 100\mu A, I_C = 0$               | 5    |     |       | V    |
| Forward current transfer ratio          | $h_{FE}^{*1}$ | $V_{CE} = 10V, I_C = 1A^{*2}$           | 4000 |     | 40000 |      |
| Collector to emitter saturation voltage | $V_{CE(sat)}$ | $I_C = 1.0A, I_B = 1.0mA^{*2}$          |      |     | 1.8   | V    |
| Base to emitter saturation voltage      | $V_{BE(sat)}$ | $I_C = 1.0A, I_B = 1.0mA^{*2}$          |      |     | 2.2   | V    |
| Transition frequency                    | $f_T$         | $V_{CB} = 10V, I_E = -50mA, f = 200MHz$ |      | 150 |       | MHz  |

<sup>\*2</sup> Pulse measurement

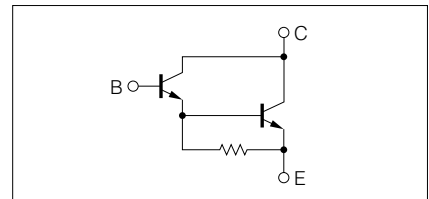
<sup>\*1</sup> $h_{FE}$  Rank classification

| Rank           | Q            | R            | S             |
|----------------|--------------|--------------|---------------|
| $h_{FE}$       | 4000 ~ 10000 | 8000 ~ 20000 | 16000 ~ 40000 |
| Marking Symbol | PQ           | PR           | PS            |

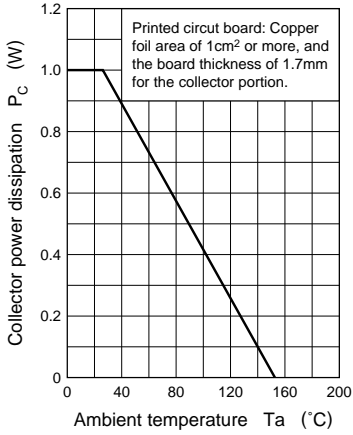


Marking symbol : P

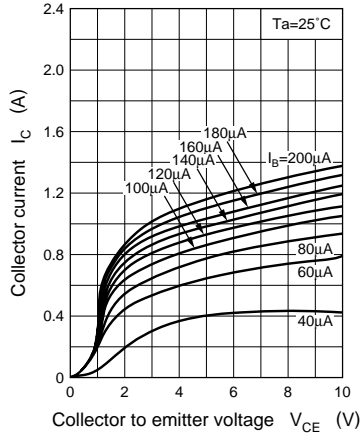
Internal Connection



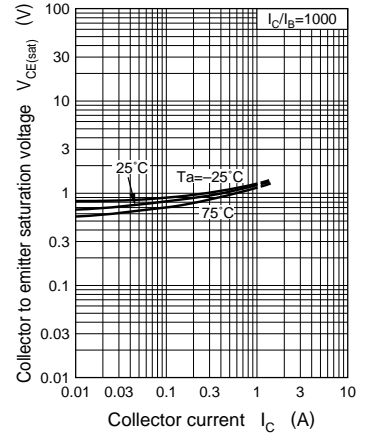
$P_C - T_a$



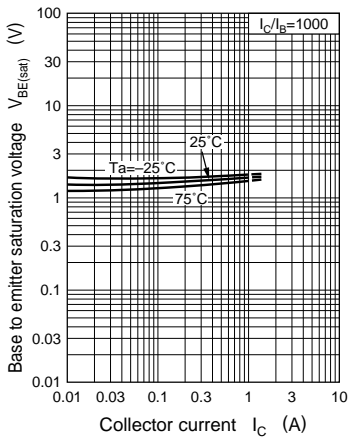
$I_C - V_{CE}$



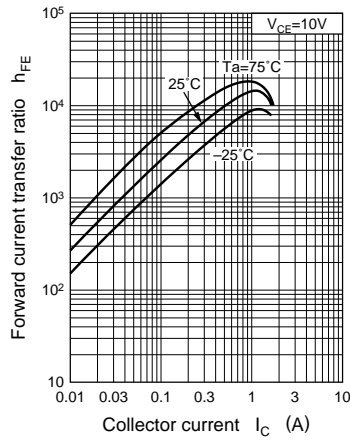
$V_{CE(sat)} - I_C$



$V_{BE(sat)} - I_C$



$h_{FE} - I_C$



$C_{ob} - V_{CB}$

