

# 2SD1511

## Silicon NPN epitaxial planar 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 hammer:  $h_{FE} = 4\,000$  to  $20\,000$ .
- 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 $T_a = 25^\circ\text{C}$

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

Note) \*: Printed circuit board: Copper foil area of  $1\text{ cm}^2$  or more, and the board thickness of  $1.7\text{ mm}$  for the collector portion

### ■ Electrical Characteristics $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

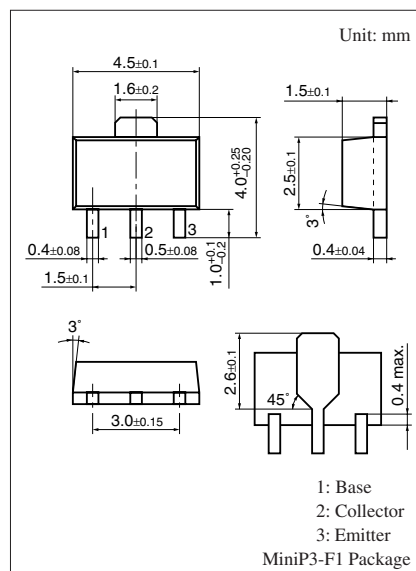
| Parameter                                    | Symbol        | Conditions                                                            | Min  | Typ | Max   | Unit |
|----------------------------------------------|---------------|-----------------------------------------------------------------------|------|-----|-------|------|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

Note) 1. Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

2. \*1: Pulse measurement

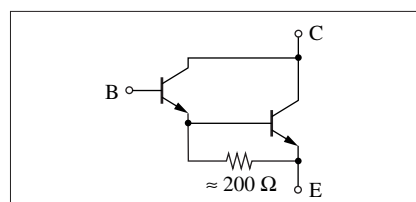
\*2: Rank classification

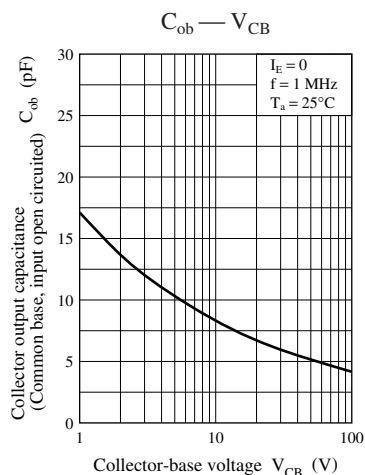
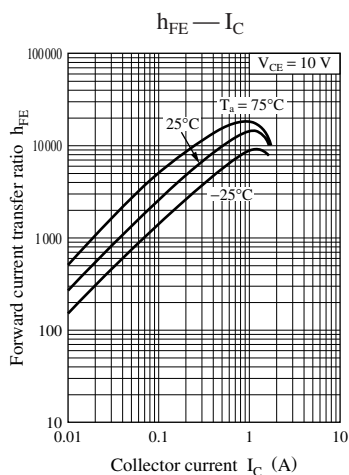
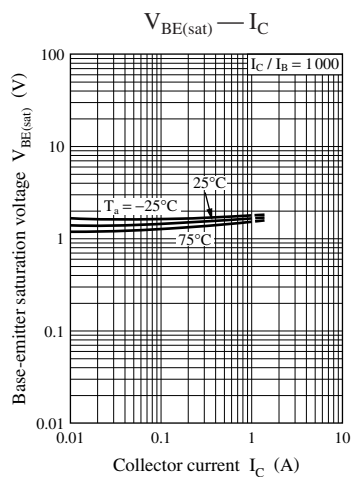
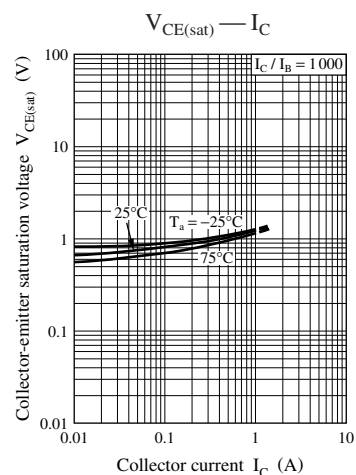
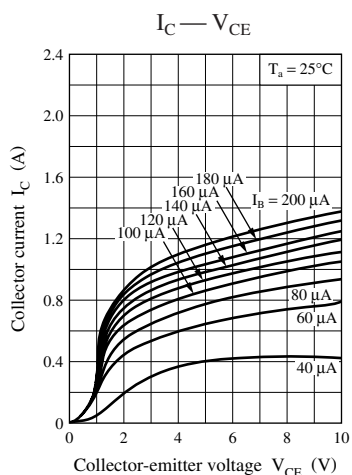
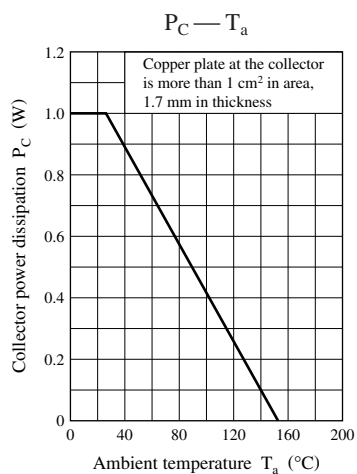
| Rank     | Q             | R             | S              |
|----------|---------------|---------------|----------------|
| $h_{FE}$ | 4000 to 10000 | 8000 to 20000 | 16000 to 40000 |



Marking Symbol: P

Internal Connection





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