

# SILICON POWER TRANSISTOR 2SB1431

### PNP SILICON EPITAXIAL TRANSISTOR (DARLINGTON CONNECTION) FOR LOW-FREQUENCY POWER AMPLIFIERS AND LOW-SPEED SWITCHING

The 2SB1431 is a Darlington power transistor that can directly drive from the IC output. This transistor is ideal for motor drivers and solenoid drivers in such as OA and FA equipment.

In addition, a small resin-molded insulation type package contributes to high-density mounting and reduction of mounting cost.

#### FEATURES

- High  $h_{FE}$  due to Darlington connection:  
 $h_{FE} \geq 2,000$  ( $V_{CE} = -2$  V,  $I_C = -3$  A)
- Mold package that does not require an insulating board or insulation bushing

#### QUALITY GRADES

- Standard  
Please refer to "Quality Grades on NEC Semiconductor Devices" (Document No. C11531E) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

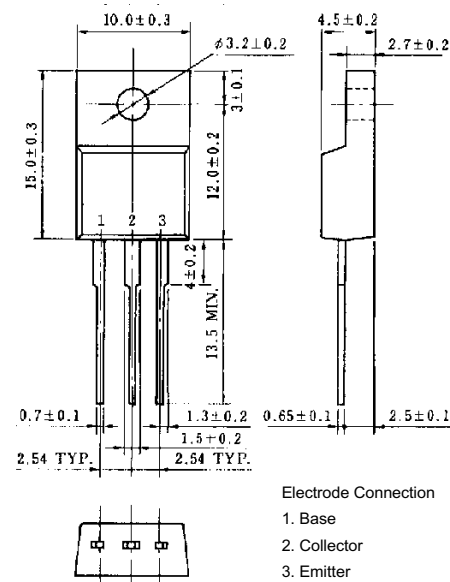
#### ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

| Parameter                    | Symbol                             | Ratings     | Unit             |
|------------------------------|------------------------------------|-------------|------------------|
| Collector to base voltage    | $V_{CBO}$                          | -100        | V                |
| Collector to emitter voltage | $V_{CEO}$                          | -100        | V                |
| Emitter to base voltage      | $V_{EBO}$                          | -7.0        | V                |
| Collector current (DC)       | $I_{C(DC)}$                        | -8.0        | A                |
| Collector current (pulse)    | $I_{C(pulse)^*}$                   | -12         | A                |
| Base current (DC)            | $I_{B(DC)}$                        | -0.8        | A                |
| Total power dissipation      | $P_T$ ( $T_C = 25^\circ\text{C}$ ) | 25          | W                |
| Total power dissipation      | $P_T$ ( $T_a = 25^\circ\text{C}$ ) | 2.0         | W                |
| Junction temperature         | $T_j$                              | 150         | $^\circ\text{C}$ |
| Storage temperature          | $T_{stg}$                          | -55 to +150 | $^\circ\text{C}$ |

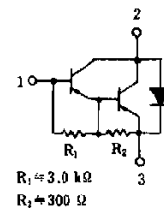
\*  $PW \leq 10$  ms, duty cycle  $\leq 50\%$

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#### PACKAGE DRAWING (UNIT: mm)



#### EQUIVALENT CIRCUIT



**ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

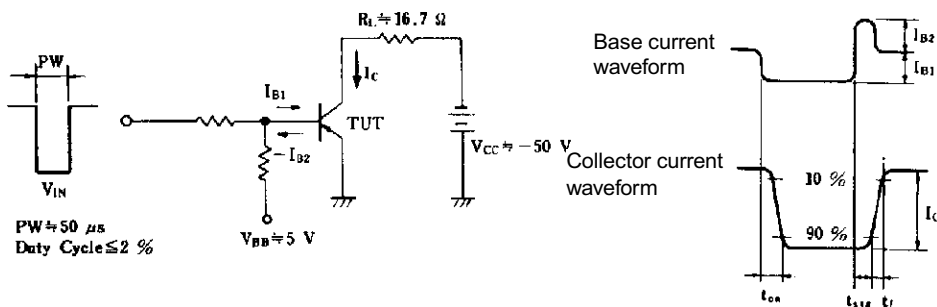
| Parameter                    | Symbol          | Conditions   | MIN.  | TYP. | MAX.   | Unit          |
|------------------------------|-----------------|--|-------|------|--------|---------------|
| Collector cutoff current     | $I_{CBO}$       | $V_{CB} = -100\text{ V}, I_E = 0$  |       |      | -1.0   | $\mu\text{A}$ |
| DC current gain              | $h_{FE1}^*$     | $V_{CE} = -2.0\text{ V}, I_C = -3.0\text{ A}$  | 2,000 |      | 15,000 |               |
| DC current gain              | $h_{FE2}^*$     | $V_{CE} = -2.0\text{ V}, I_C = -5.0\text{ A}$  | 500   |      |        |               |
| Collector saturation voltage | $V_{CE(sat)}^*$ | $I_C = -3.0\text{ A}, I_B = -3.0\text{ mA}$  |       | -0.9 | -1.5   | V             |
| Base saturation voltage      | $V_{BE(sat)}^*$ | $I_C = -3.0\text{ A}, I_B = -3.0\text{ mA}$  |       | -1.6 | -2.0   | V             |
| Gain bandwidth product       | $f_T$           | $V_{CE} = -5.0\text{ V}, I_C = -0.8\text{ A}$  |       | 80   |        | MHz           |
| Collector capacitance        | $C_{ob}$        | $V_{CB} = -10\text{ V}, I_E = 0, f = 1.0\text{ MHz}$   |       | 80   |        | pF            |
| Turn-on time                 | $t_{on}$        | $I_C = -3.0\text{ A}, I_{B1} = -I_{B2} = -3.0\text{ mA},$<br>$R_L = 16.7\ \Omega, V_{CC} \cong -50\text{ V}$<br>Refer to the test circuit. |       | 0.5  |        | $\mu\text{s}$ |
| Storage time                 | $t_{stg}$       |  |       | 1.0  |        | $\mu\text{s}$ |
| Fall time                    | $t_f$           |  |       | 1.0  |        | $\mu\text{s}$ |

\* Pulse test  $PW \leq 350\ \mu\text{s}$ , duty cycle  $\leq 2\%$

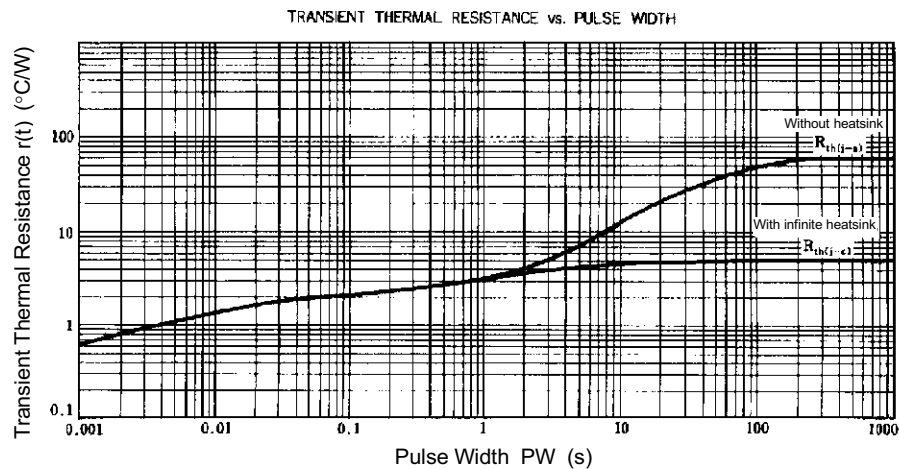
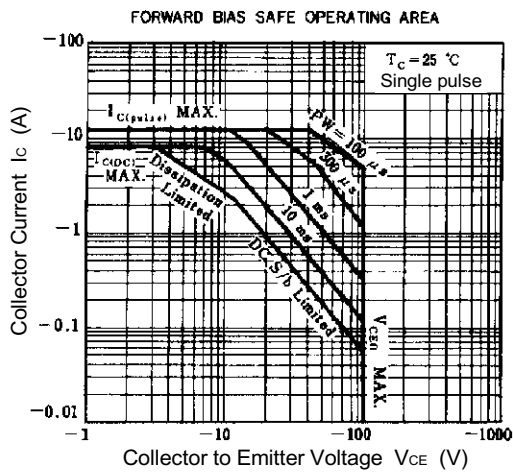
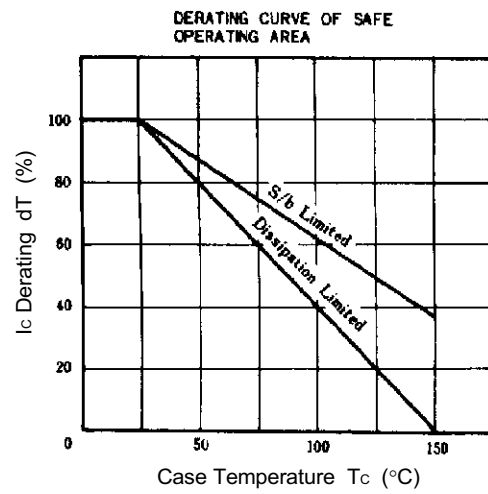
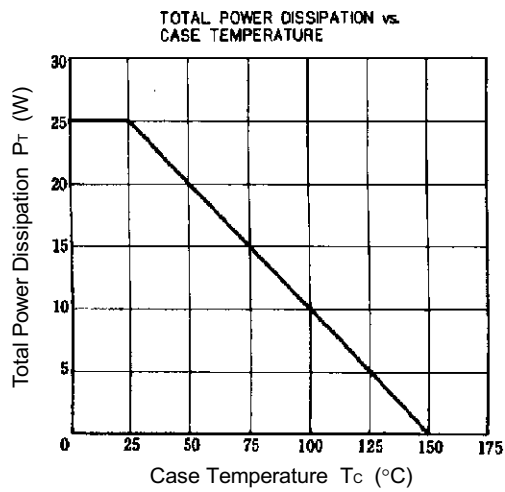
**$h_{FE}$  CLASSIFICATION**

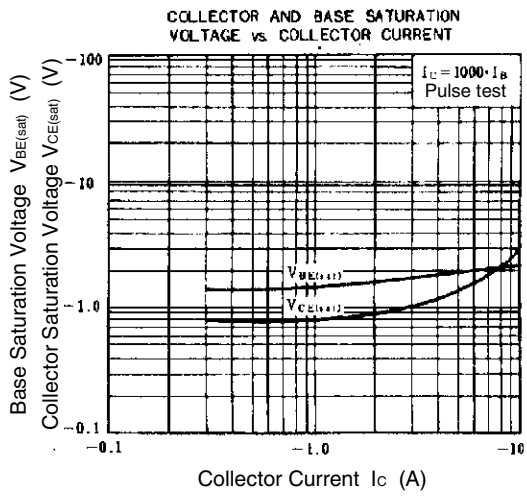
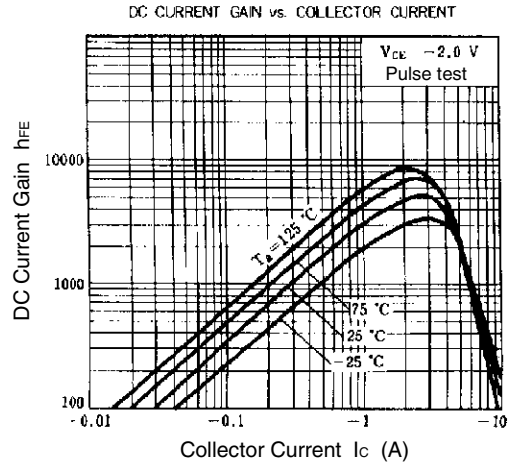
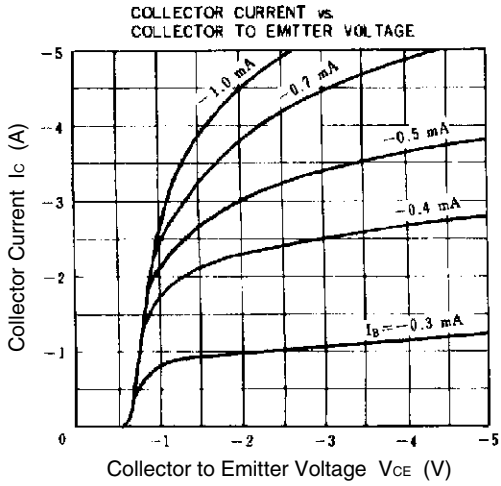
| Marking   | M              | L              | K               |
|-----------|----------------|----------------|-----------------|
| $h_{FE1}$ | 2,000 to 5,000 | 3,000 to 7,000 | 5,000 to 15,000 |

**SWITCHING TIME ( $t_{on}$ ,  $t_{stg}$ ,  $t_f$ ) TEST CIRCUIT**



TYPICAL CHARACTERISTICS (Ta = 25°C)





[MEMO]

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