To our customers,

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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

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RENESAS

# SILICON POWER TRANSISTOR

Phase-out/Discontinued

# 2SB1430

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

The 2SB1430 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, this transistor features a small resin-molded insulation type package, thus contributing to high-density mounting and mounting cost reduction.

### FEATURES

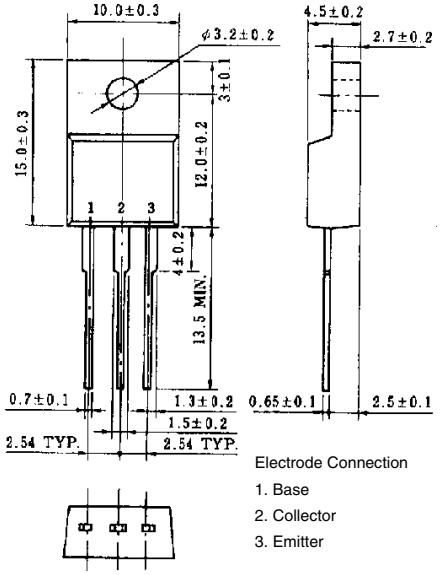
- High $h_{FE}$ due to Darlington connection:
  $h_{FE} \geq 2{,}000$ ($V_{CE}$ = 2 V, $I_C$ = 2 A)
- Mold package that does not require an insulating board or insulation bushing

### ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°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) | $I_{C(DC)}$ | −5.0 | A |
| Collector current (pulse) | $I_{C(pulse)}$* | −10 | A |
| Base current (DC) | $I_{B(DC)}$ | −0.5 | A |
| Total power dissipation | $P_T$ ($T_C$ = 25°C) | 20 | W |
| Total power dissipation | $P_T$ ($T_A$ = 25°C) | 2.0 | W |
| Junction temperature | $T_j$ | 150 | °C |
| Storage temperature | $T_{stg}$ | −55 to +150 | °C |

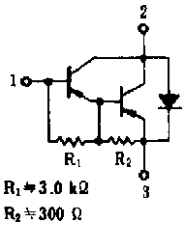
* PW ≤ 10 ms, duty cycle ≤ 50%

### PACKAGE DRAWING (UNIT: mm)




Electrode Connection
1. Base
2. Collector
3. Emitter

### EQUIVALENT CIRCUIT




$R_1 \fallingdotseq 3.0$ kΩ
$R_2 \fallingdotseq 300$ Ω

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Printed in Japan

## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C)

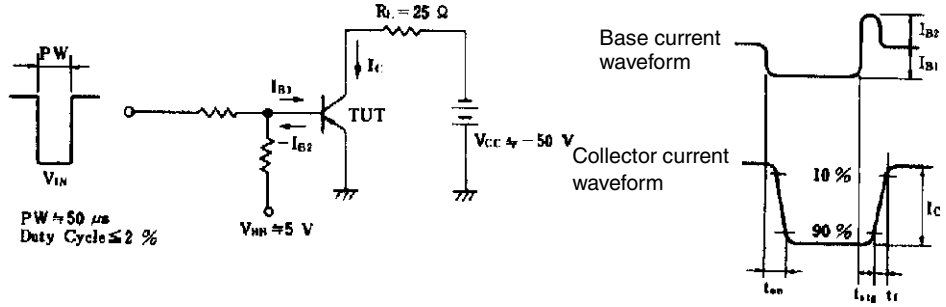
| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Collector cutoff current | $I_{CBO}$ | $V_{CB}$ = –100 V, $I_E$ = 0 | | | –1.0 | μA |
| DC current gain | $h_{FE1}$* | $V_{CE}$ = –2.0 V, $I_C$ = –2.0 A | 2,000 | | 20,000 | |
| DC current gain | $h_{FE2}$* | $V_{CE}$ = –2.0 V, $I_C$ = –4.0 A | 500 | | | |
| Collector saturation voltage | $V_{CE(sat)}$* | $I_C$ = –2.0 A, $I_B$ = –2.0 mA | | | –1.5 | V |
| Base saturation voltage | $V_{BE(sat)}$* | $I_C$ = –2.0 A, $I_B$ = –2.0 mA | | | –2.0 | V |
| Gain bandwidth product | $f_T$ | $V_{CE}$ = –5.0 V, $I_C$ = –0.5 A | | 80 | | MHz |
| Collector capacitance | $C_{ob}$ | $V_{CB}$ = –10 V, $I_E$ = 0, f = 1.0 MHz | | 60 | | pF |
| Turn-on time | $t_{on}$ | $I_C$ = –2.0 A, $I_{B1}$ = $-I_{B2}$ = –2.0 mA, $R_L$ = 25 Ω, $V_{CC}$ ≅ 50 V Refer to the test circuit. | | 0.5 | | μs |
| Storage time | $t_{stg}$ | | | 1.0 | | μs |
| Fall time | $t_f$ | | | 1.0 | | μs |

* Pulse test PW ≤ 350 μs, duty cycle ≤ 2%

## $h_{FE}$ CLASSIFICATION

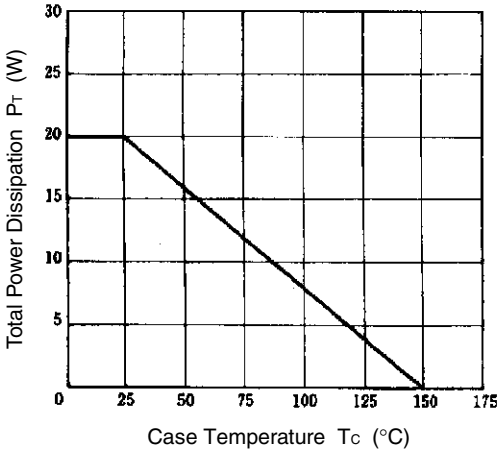
| Marking | M | L | K |
|---|---|---|---|
| $h_{FE1}$ | 2,000 to 5,000 | 4,000 to 10,000 | 8,000 to 20,000 |

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

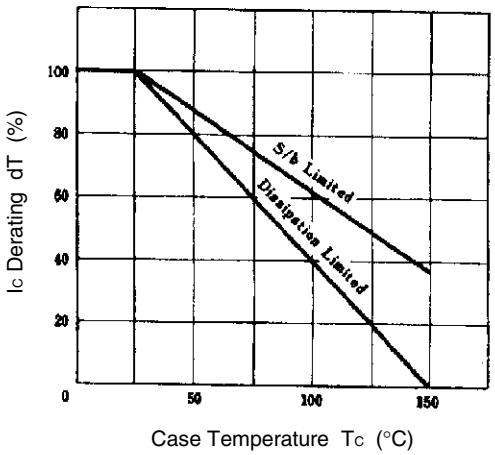


## TYPICAL CHARACTERISTICS ($T_A$ = 25°C)

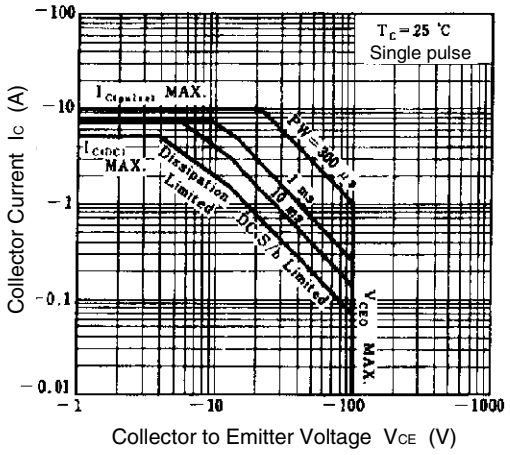
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



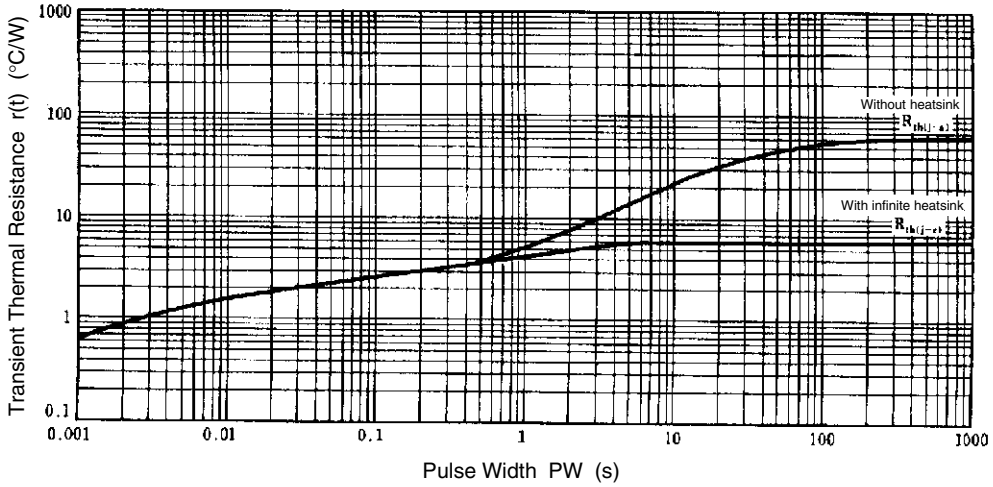

DERATING CURVE OF SAFE OPERATING AREA



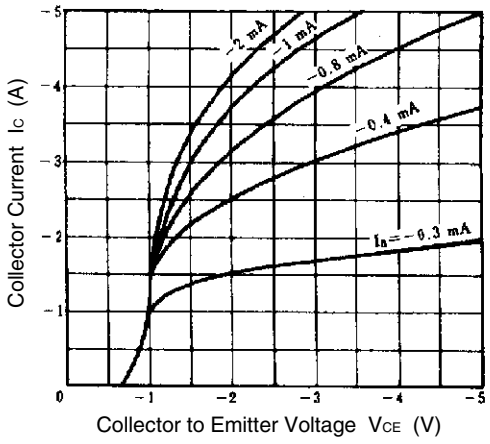

FORWARD BIAS SAFE OPERATING AREA



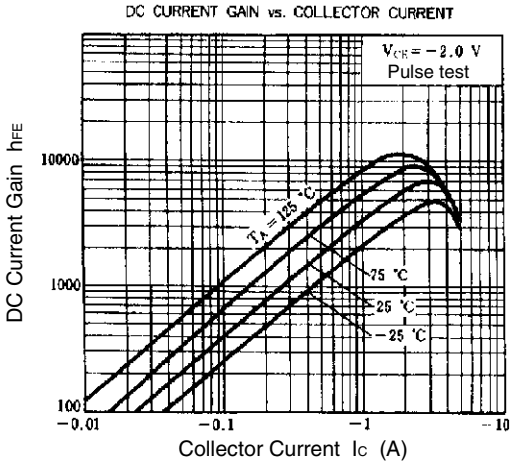

TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



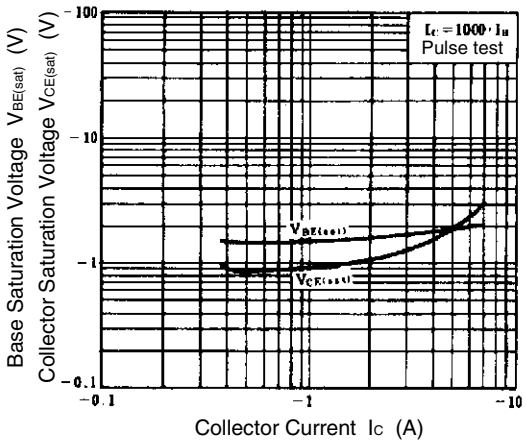
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE




DC CURRENT GAIN vs. COLLECTOR CURRENT




COLLECTOR AND BASE SATURATION VOLTAGE vs.
COLLECTOR CURRENT



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