NEC

# DARLINGTON POWER TRANSISTOR
# 2SC4810

## NPN SILICON EPITAXIAL TRANSISTOR (DARLINGTON CONNECTION) FOR HIGH-SPEED SWITCHING

The 2SC4810 is a high-speed Darlington power transistor. This transistor is ideal for high-precision control such as PWM control for pulse motors or brushless motors in OA and FA equipment.

In addition, this transistor features a package that can be auto-mounted in radial taping specifications, thus contributing to mounting cost reduction.

### FEATURES

- Auto-mounting possible in radial taping specifications
- Resin-molded insulation type package with power rating of 1.8 W in stand-alone conditions
- On-chip C-to-E reverse diode
- Fast switching speed

### ABSOLUTE MAXIMUM RATINGS (Ta = 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 | $V_{EBO}$ | 8.0 | 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 | $P_T$ | 1.8 | W |
| Junction temperature | $T_j$ | 150 | °C |
| Storage temperature | $T_{stg}$ | −55 to +150 | °C |

* PW ≤ 300 μs, duty cycle ≤ 10%

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Document No. D15601EJ2V0DS00 (2nd edition)
Date Published April 2002 N CP(K)
Printed in Japan

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## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

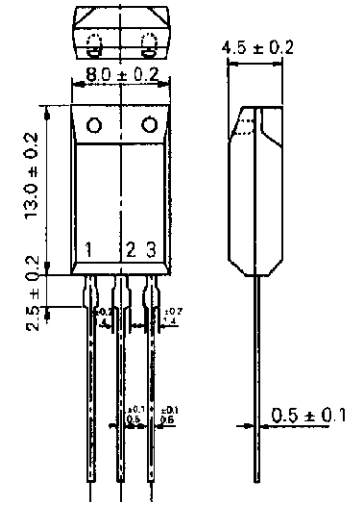
| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Collector to emitter voltage | $V_{CEO(SUS)}$ | $I_C$ = 5 A, $I_B$ = 5 mA, L = 180 μH | 100 | | | V |
| Collector to emitter voltage | $V_{CEX(SUS)}$ | $I_C$ = 5 A, $I_B$ = 5 mA<br>L = 180 μH, clamped | 100 | | | V |
| Collector cutoff current | $I_{CBO}$ | $V_{CB}$ = 100 V, $I_E$ = 0 | | | 1.0 | μA |
| Emitter cutoff current | $I_{EBO}$ | $V_{EB}$ = 5 V, $I_C$ = 0 | | | 5.0 | mA |
| 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 | | 0.9 | 1.5 | V |
| Base saturation voltage | $V_{BE(sat)}$* | $I_C$ = 2.0 A, $I_B$ = 2.0 mA | | 1.5 | 2.0 | V |
| Turn-on time | $t_{on}$ | $I_C$ = 2.0 A, $I_{B1}$ = $-I_{B2}$ = 2.0 mA<br>$R_L$ = 25 Ω, $V_{CC}$ ≅ 50 V<br>Refer to the test circuit. | | 0.5 | | μs |
| Storage time | $t_{stg}$ | | | 2.5 | | μs |
| Fall time | $t_f$ | | | 0.6 | | μs |

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

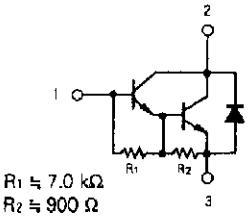
## $h_{FE}$ CLASSIFICATION

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

## PACKAGE DRAWING (UNIT: mm)

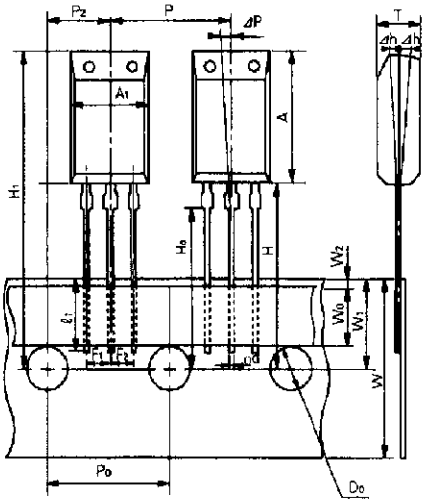



Electrode Connection
1. Base
2. Collector
3. Emitter




$R_1$ ≒ 7.0 kΩ
$R_2$ ≒ 900 Ω

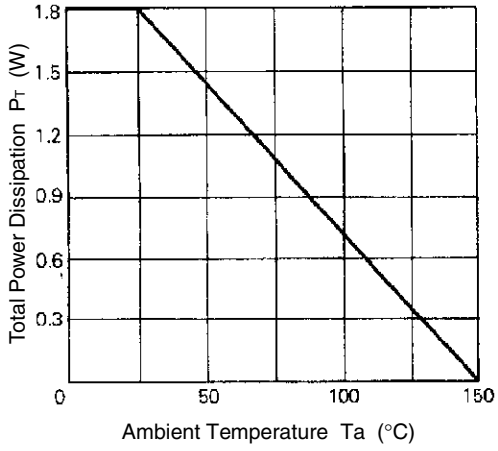
## TAPING SPECIFICATION



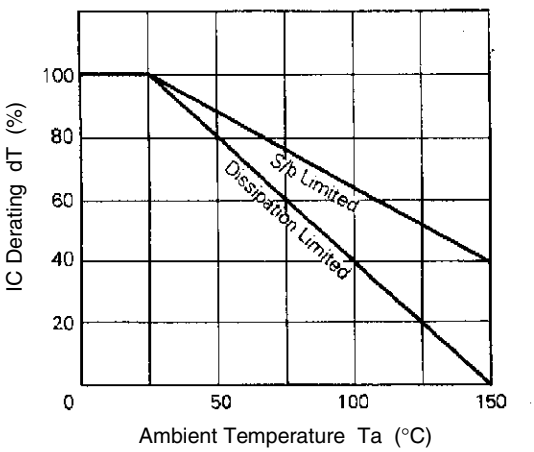

| | |
|---|---|
| $A_1$ | 8.0 ± 0.2 |
| A | 13.0 ± 0.2 |
| $D_0$ | φ4.0 ± 0.2 |
| d | 0.5 ± 0.1 |
| $F_1$ | $2.5^{+0.4}_{-0.1}$ |
| $F_2$ | $2.5^{+0.4}_{-0.1}$ |
| H | 20.0 MAX. |
| $H_0$ | 16.0 ± 0.5 |
| $H_1$ | 32.2 MAX. |
| Δh | 0 ± 1.0 |
| $\ell_1$ | 2.5 MIN. |
| P | 12.7 ± 1.0 |
| $P_0$ | 12.7 ± 0.3 |
| $P_2$ | 6.35 ± 0.5 |
| ΔP | 0 ± 1.3 |
| T | 4.5 ± 0.2 |
| W | $18.0^{+1.0}_{-0.5}$ |
| $W_0$ | 5.0 MIN. |
| $W_1$ | 9.0 ± 0.5 |
| $W_2$ | 0.7 MIN. |

## TYPICAL CHARACTERISTICS (Ta = 25°C)

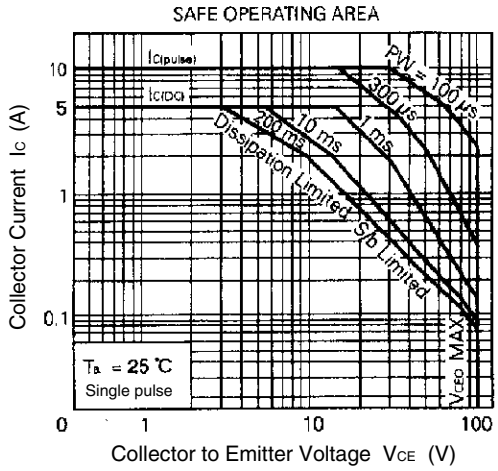
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



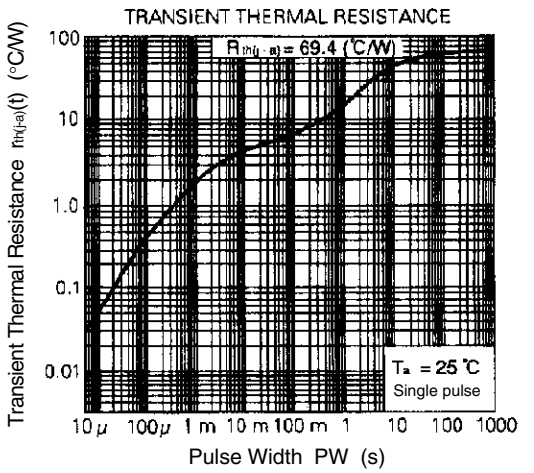

DERATING CURVE OF SAFE OPERATING AREA



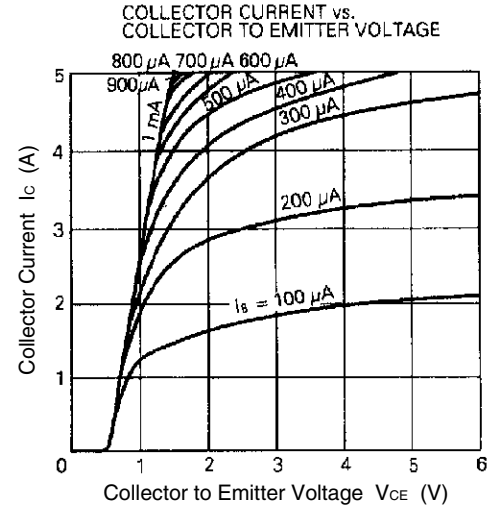

SAFE OPERATING AREA



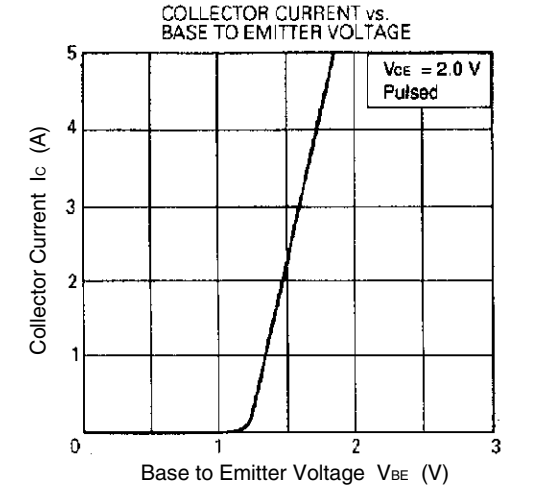

TRANSIENT THERMAL RESISTANCE



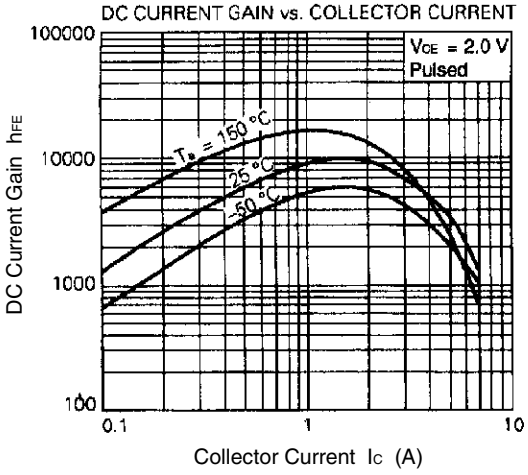

COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



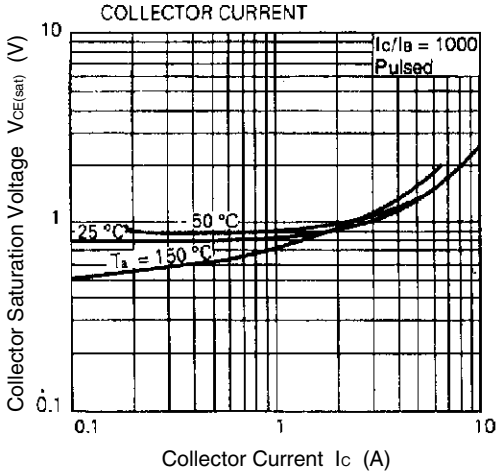

COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



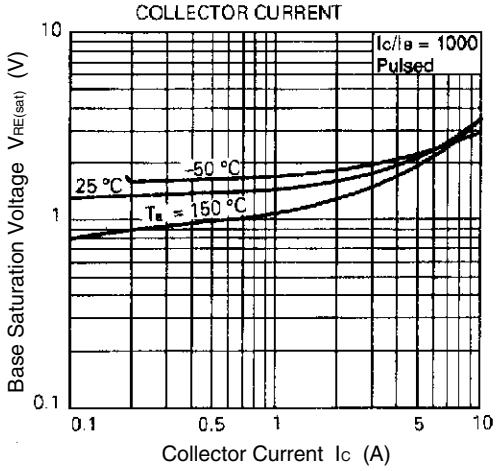
DC CURRENT GAIN vs. COLLECTOR CURRENT



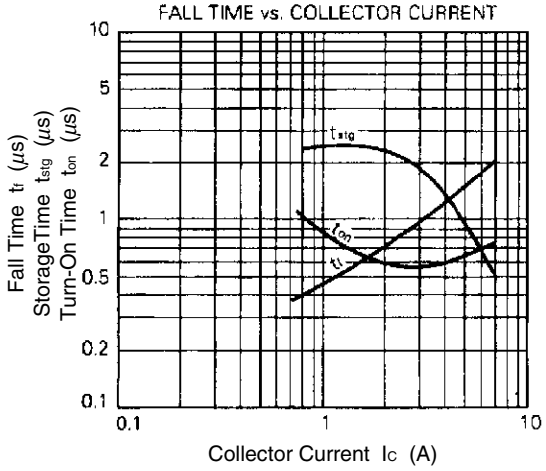

COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



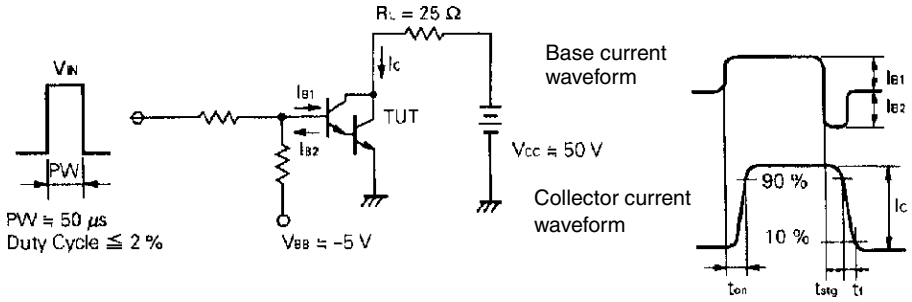

BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT




TURN ON TIME, STORAGE TIME AND FALL TIME vs. COLLECTOR CURRENT



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



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