DATA SHEET

NEC

# DARLINGTON POWER TRANSISTOR

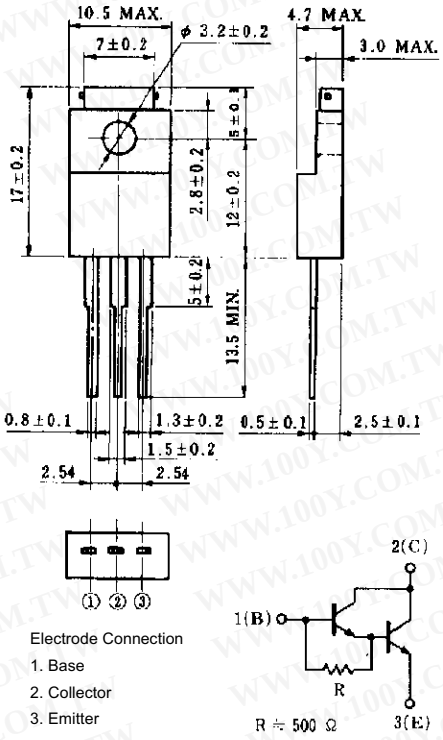
# 2SD1592

## NPN SILICON TRIPLE DIFFUSED TRANSISTOR (DARLINGTON CONNECTION) FOR HIGH-VOLTAGE LOW-SPEED SWITCHING

### FEATURES

- High DC current gain due to Darlington connection
- Low collector saturation
- Reverse deterrence type
- Ideal for use in devices such as pulse motor drivers and relay drivers of PC terminals, and ignitors of general-purpose engines.
- Mold package that does not require an insulating board or insulation bushing

### PACKAGE DRAWING (UNIT: mm)




### ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Collector to base voltage | $V_{CBO}$ | 500 | V |
| Collector to emitter voltage | $V_{CEO}$ | +300, −10 | V |
| Emitter to base voltage | $V_{EBO}$ | 10 | V |
| Collector current | $I_{C(DC)}$ | 5.0 | A |
| Collector current | $I_{C(pulse)}$* | 10 | A |
| Base current | $I_{B(DC)}$ | 0.5 | A |
| Total power dissipation | $P_T$ (Tc = 25°C) | 30 | W |
| Total power dissipation | $P_T$ (Ta = 25°C) | 1.5 | 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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## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Collector cutoff current | $I_{CBO}$ | $V_{CB}$ = 400 V, $I_E$ = 0 | | | 10 | μA |
| DC current gain | $h_{FE1}$* | $V_{CE}$ = 2.0 V, $I_C$ = 2.0 A | 400 | | 3,000 | |
| DC current gain | $h_{FE2}$* | $V_{CE}$ = 2.0 V, $I_C$ = 3.0 A | 100 | | | |
| Collector saturation voltage | $V_{CE(sat)}$* | $I_C$ = 2 A, $I_B$ = 5 mA | | 1.0 | 1.5 | V |
| Base saturation voltage | $V_{BE(sat)}$* | $I_C$ = 2 A, $I_B$ = 5 mA | | 1.6 | 2.0 | V |
| Turn-on time | $t_{on}$ | $I_C$ = 3.0 A, $I_{B1}$ = −$I_{B2}$ = 30 mA<br>$R_L$ = 50 Ω, $V_{CC}$ ≅ 150 V | | 1.0 | | μs |
| Storage time | $t_{stg}$ | | | 12 | | μs |
| Fall time | $t_f$ | | | 6 | | μs |

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

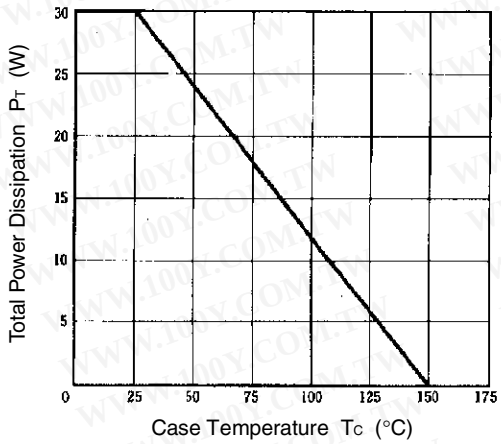
## $h_{FE}$ CLASSIFICATION

| Marking | M | L | K |
|---|---|---|---|
| $h_{FE}$ | 400 to 800 | 600 to 1,200 | 1,000 to 3,000 |

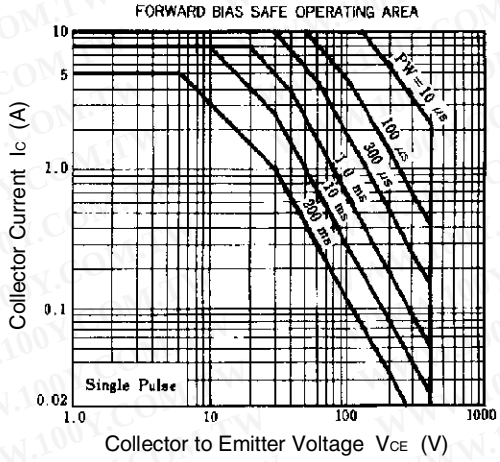


## TYPICAL CHARACTERISTICS (Ta = 25°C)

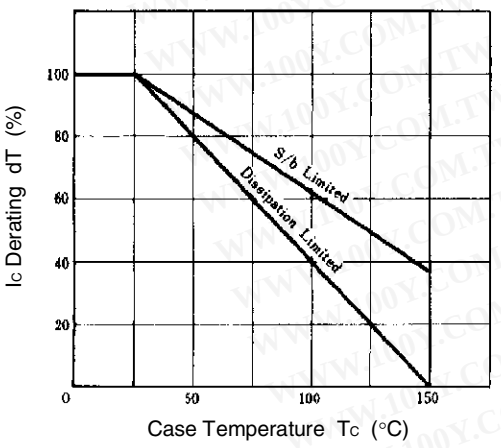
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



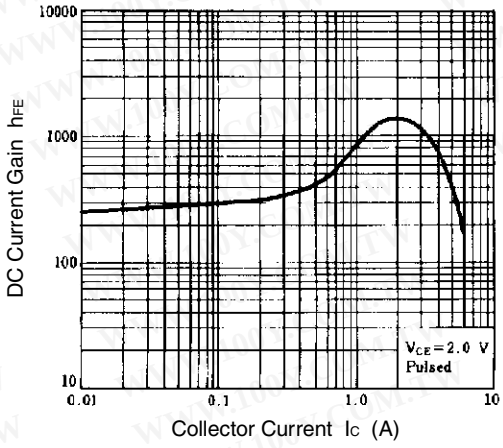

FORWARD BIAS SAFE OPERATING AREA



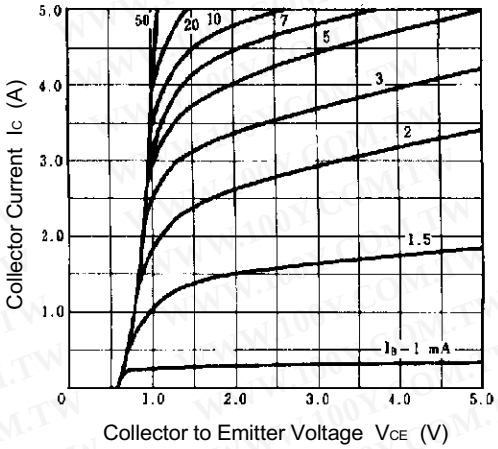

DERATING CURVE OF SAFE OPERATING AREA



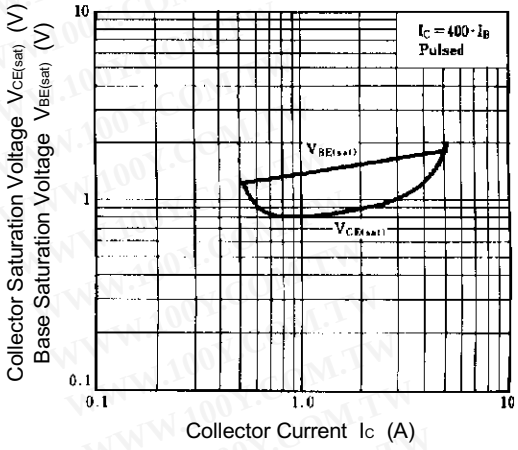

DC CURRENT GAIN vs. COLLECTOR CURRENT



COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE




BASE AND COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



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