NEC

DARLINGTON POWER TRANSISTOR
2SA1840

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

The 2SA1840 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%

** T_a = 25°C

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ELECTRICAL CHARACTERISTICS (Ta = 25°C)

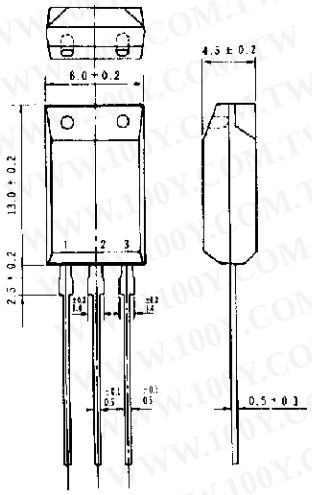
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	V_{CB} = –100 V, I_E = 0			–1.0	μA
Emitter cutoff current	I_{EBO}	V_{EB} = –5 V, I_C = 0			–5.0	mA
DC current gain	h_{FE1}*	V_{CE} = –2.0 V, I_C = –2.0 A	2,000		20,000	–
DC current gain	h_{FE2}*	V_{CE} = –2.0 V, I_C = –4.0 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 R_L = 25 Ω, V_{CC} ≅ –50 V Refer to the test circuit.		0.7		μs
Storage time	t_{stg}			1.7		μs
Fall time	t_f			0.7		μs
Collector capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz		45		pF

* Pulse test PW ≤ 350 μs, Duty Cycle ≤ 2%

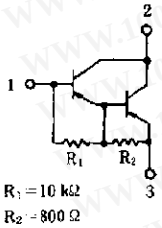
h_{FE} CLASSIFICATION

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

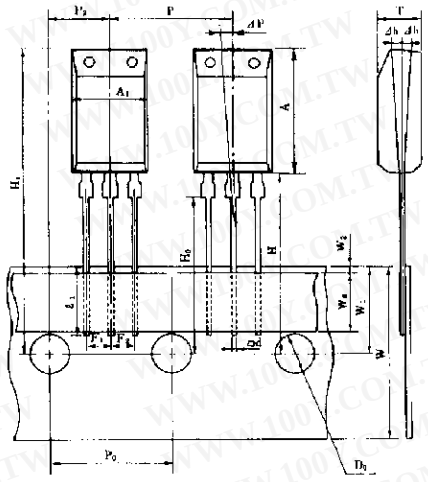
PACKAGE DRAWING (UNIT: mm)



Electrode Connection
1. Base
2. Collector
3. Emitter



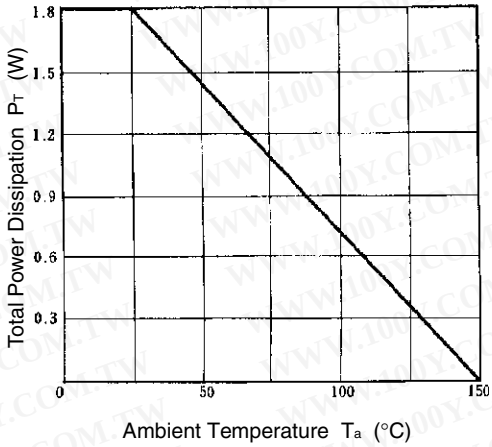
TAPING SPECIFICATION



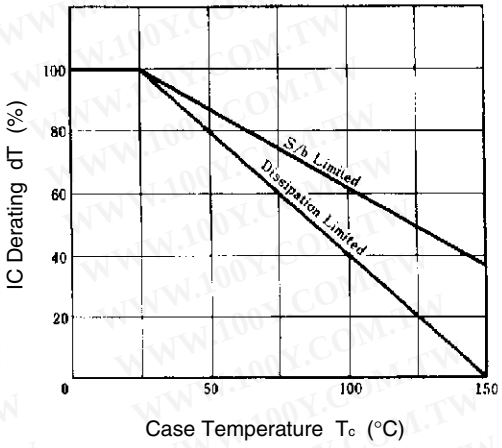
A_1	8.0 ± 0.2
A	13.0 + 0.2
D_0	φ4.0 + 0.2
d	0.5 ± 0.1
F_1	$2.5^{+0.4}_{0.1}$
F_2	$2.5^{+0.4}_{0.1}$
H	20.0 MAX.
H_0	16.0 ± 0.5
H_1	32.2 MAX.
Δh	0 + 1.0
ℓ_1	2.5 MIN.
P	12.7 ± 1.0
P_0	12.7 ± 0.3
P_2	6.35 ± 0.5
ΔP	0 ± 1.3
T	4.5 ± 0.2
W	$18.0^{+1.0}_{0.5}$
W_0	5.0 MIN.
W_1	9.0 ± 0.5
W_2	0.7 MIN.

TYPICAL CHARACTERISTICS (Ta = 25°C)

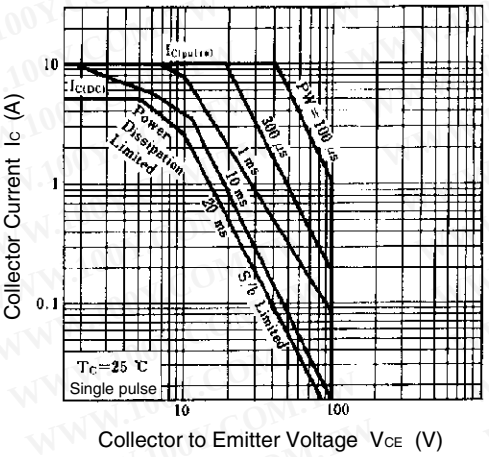
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



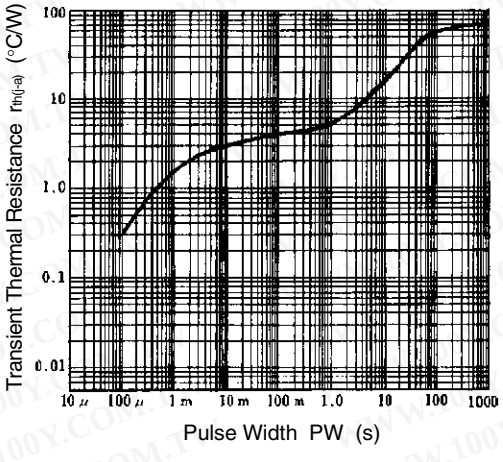
DERATING CURVE OF SAFE OPERATING AREA



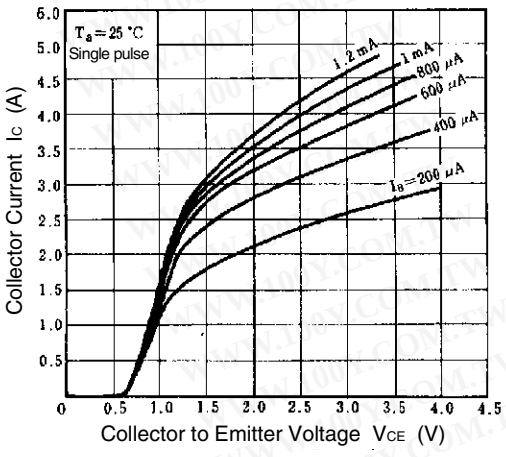
FORWARD BIAS SAFE OPERATING AREA



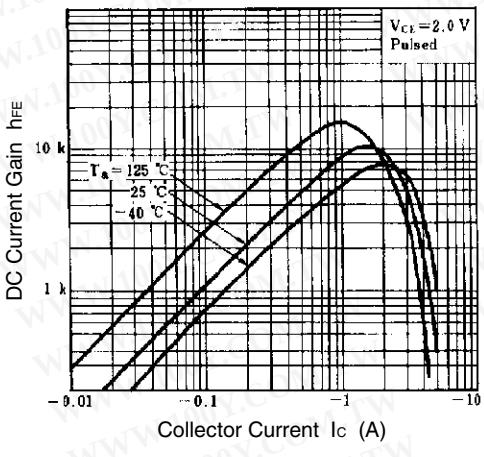
TRANSIENT THERMAL RESISTANCE



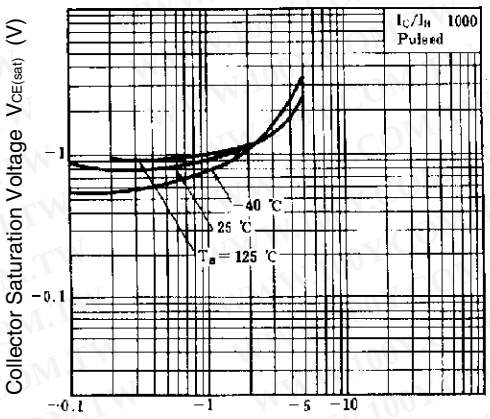
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



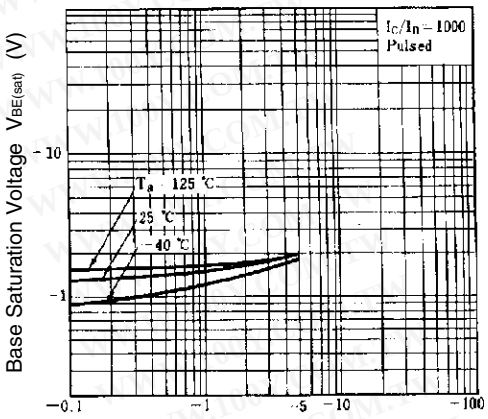
DC CURRENT GAIN vs. COLLECTOR CURRENT



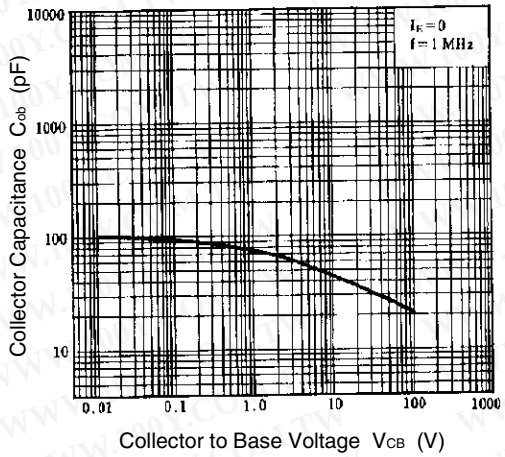
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



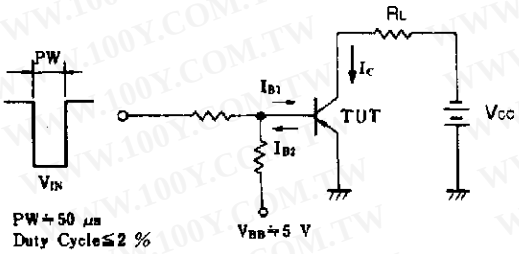
BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT

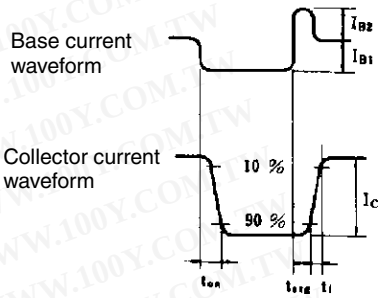


OUTPUT CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



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





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