NEC

DARLINGTON POWER TRANSISTOR
2SA1841

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

DESCRIPTION

The 2SA1841 is a high-speed Darlington power transistor.

This transistor is ideal for high-precision control such as PWM control for pulse motors 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.

★ ORDERING INFORMATION

PART NUMBER	PACKAGE
2SA1841	MP-10

FEATURES

- Auto-mounting possible in radial taping specifications
- Resin-molded insulation type package with power rating of 1.8 W in stand-alone conditions
- High DC current amplifiers due to Darlington connection
  h_{FE} = 4000 to 20000 (V_{CE} = –2.0 V, I_C = –4.0 A)
- On-chip C-to-E reverse diode
- Fast switching speed

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

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)	$I_{C(DC)}$	–8.0	A
Collector Current (pulse)	$I_{C(pulse)}$ **Note**	–16	A
Base Current (DC)	$I_{B(DC)}$	–0.8	A
Total Power Dissipation (T_A = 25°C)	P_T	1.8	W
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Note PW ≤ 10 ms, Duty Cycle ≤ 2%

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The mark ★ shows major revised points.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

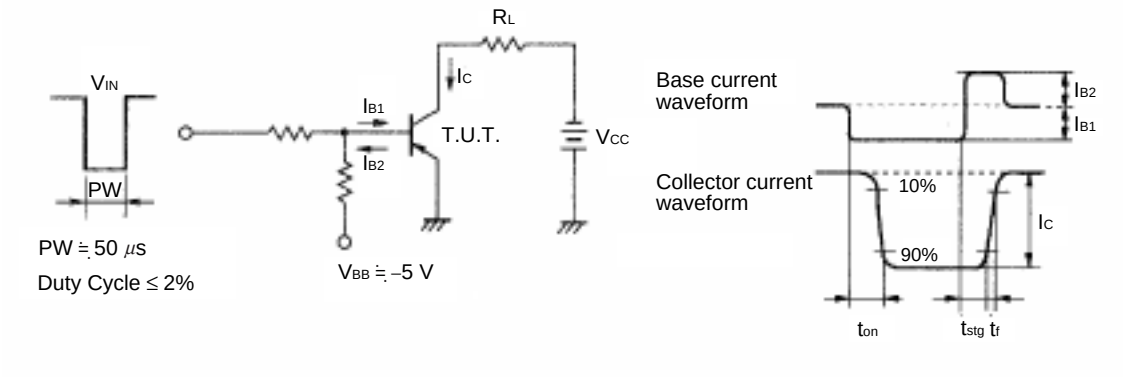
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	V_{CB} = –100 V, I_E = 0 A			–1.0	μA
Emitter Cut-off Current	I_{EBO}	V_{EB} = –5.0 V, I_C = 0 A			–5.0	mA
DC Current Gain **Note**	h_{FE1}	V_{CE} = –2.0 V, I_C = –4.0 A	4000		20000	
	h_{FE2}	V_{CE} = –2.0 V, I_C = –8.0 A	500			
Collector Saturation Voltage **Note**	$V_{CE(sat)}$	I_C = –4.0 A, I_B = –4.0 mA			–1.5	V
Base Saturation Voltage **Note**	$V_{BE(sat)}$	I_C = –4.0 A, I_B = –4.0 mA			–2.0	V
Turn-on Time	t_{on}	I_C = –4.0 A		0.2		μs
Storage Time	t_{stg}	I_{B1} = –I_{B2} = –4.0 mA		1.5		μs
Fall Time	t_f	R_L = 12.5 Ω, V_{CC} = –50 V		0.7		μs

Note Pulsed test PW ≤ 350 ms, Duty Cycle ≤ 2%

★ h_{FE} CLASSIFICATION

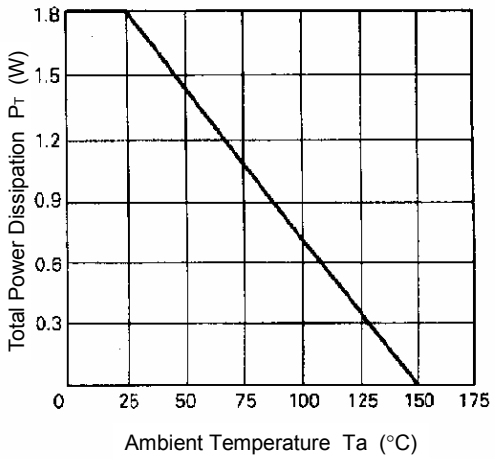
Marking	L	K
h_{FE1}	4000 to 10000	8000 to 20000

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

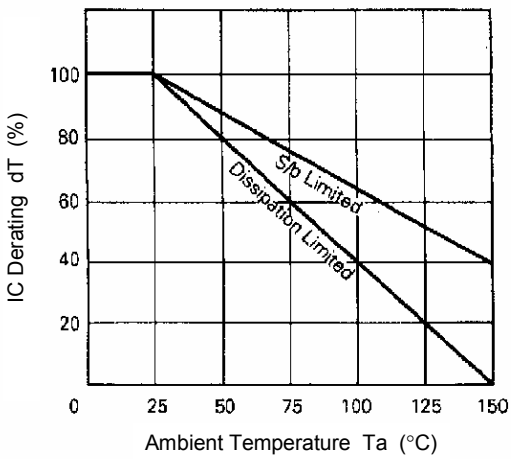


TYPICAL CHARACTERISTICS (T_A = 25°C)

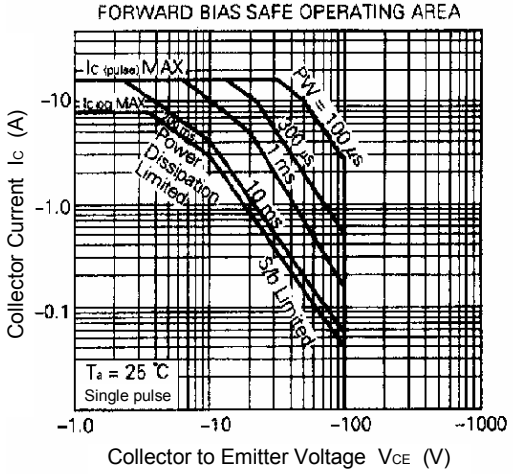
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



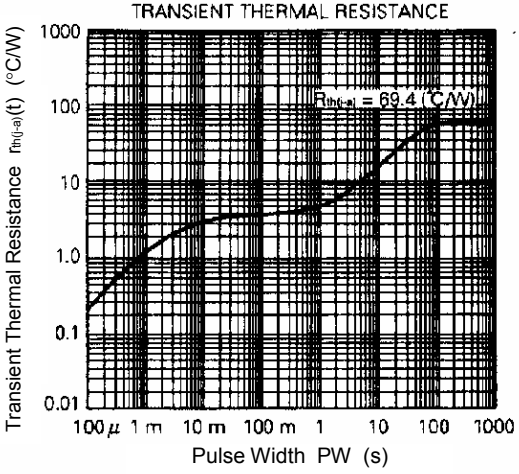
DERATING CURVE OF SAFE OPERATING AREA



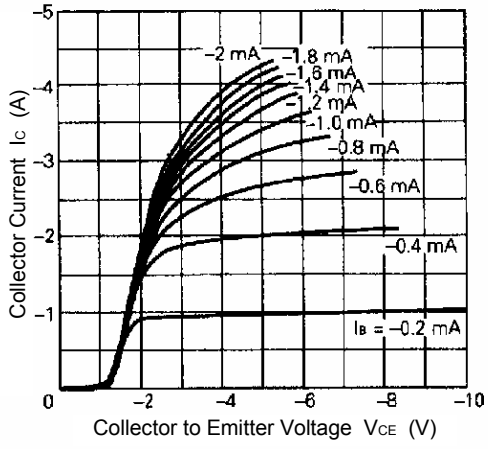
FORWARD BIAS SAFE OPERATING AREA



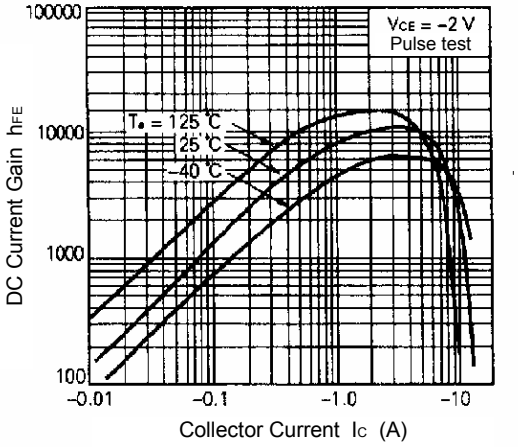
TRANSIENT THERMAL RESISTANCE



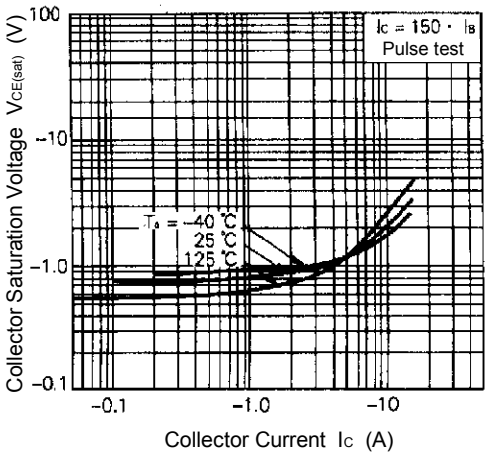
COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



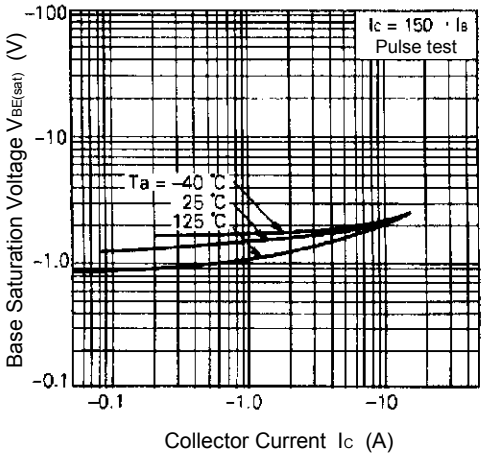
DC CURRENT GAIN vs. COLLECTOR CURRENT



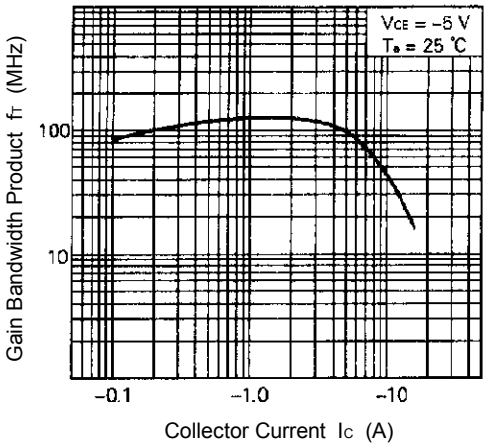
BASE AND COLLECTOR SATURATON VOLTAGE vs. COLLECTOR CURRENT



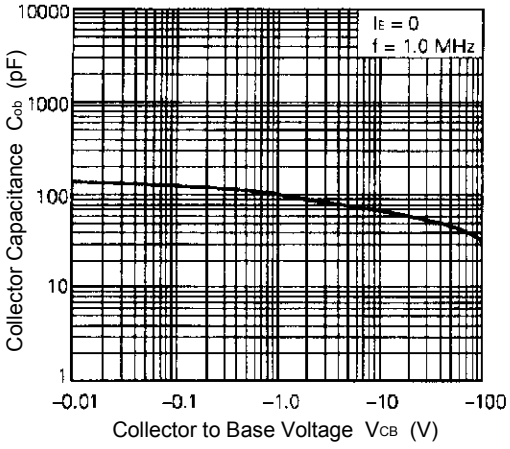
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

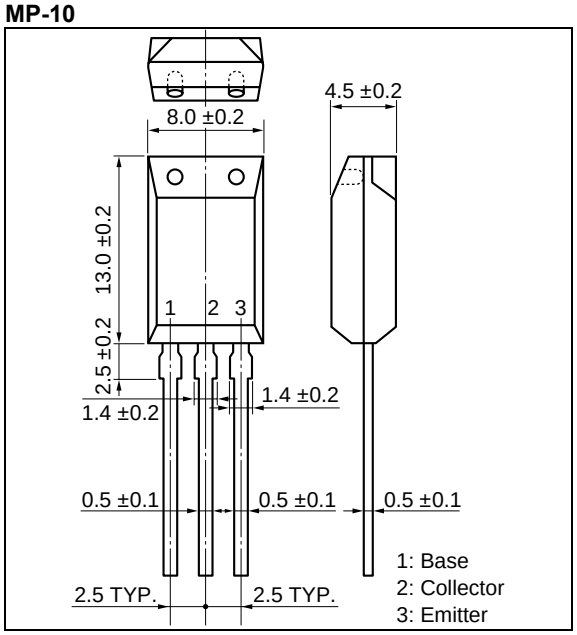


OUTPUT CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE

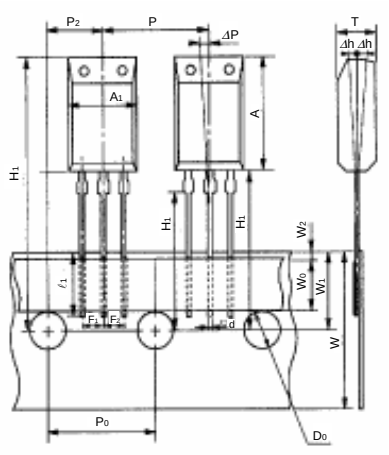


★ PACKAGE DRAWING (Unit: mm)

MP-10

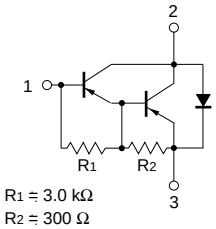


TAPING SPECIFICATION



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.

EQUIVALENT CIRCUIT



1. Base
2. Collector
3. Emitter

$R_1 \fallingdotseq 3.0\ k\Omega$
$R_2 \fallingdotseq 300\ \Omega$

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