NEC

SILICON POWER TRANSISTOR
2SC4813

NPN SILICON EPITAXIAL TRANSISTOR FOR HIGH-SPEED SWITCHING

The 2SC4813 is a power transistor developed for high-speed switching and features high h_{FE} and low $V_{CE(sat)}$. This transistor is ideal for use as a driver in DC/DC converters and actuators.

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

FEATURES

- Low $V_{CE(sat)}$: $V_{CE(sat)} \leq 0.3$ V @I_C = 3.0 A, I_B = 30 mA
- High h_{FE}: h_{FE} = 450 to 2,000 @V_{CE} = 2.0 V, I_C = 3.0 A
- On-chip dumper-diode
- Auto-mounting possible in radial taping specifications

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Parameter	Symbol	Conditions	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)	$I_{C(DC)}$		±7.5	A
Collector current (pulse)	$I_{C(pulse)}$	PW ≤ 10 ms, duty cycle ≤ 2%	±10	A
Base current (DC)	$I_{B(DC)}$		2.0	A
Total power dissipation	P_T	Ta = 25°C	1.8	W
Junction temperature	T_j		150	°C
Storage temperature	T_{stg}		−55 to +150	°C

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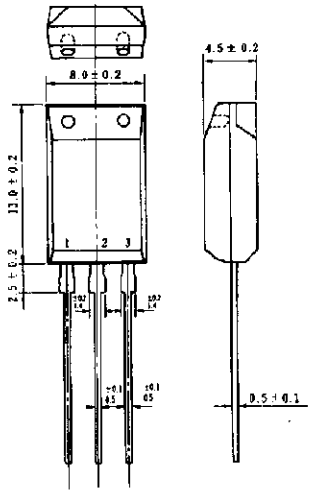
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I_{CBO}	V_{CB} = 100 V, I_E = 0			10	μA
Emitter cutoff current	I_{EBO}	V_{EB} = 5.0 V, I_C = 0			17	mA
DC current gain	h_{FE1}*	V_{CE} = 2.0 V, I_C = 3.0 A	450		2,000	–
DC current gain	h_{FE2}*	V_{CE} = 2.0 V, I_C = 5.0 A	150			–
Collector saturation voltage	$V_{CE(sat)1}$*	I_C = 3.0 A, I_B = 60 mA		0.1	0.2	V
Collector saturation voltage	$V_{CE(sat)2}$*	I_C = 3.0 A, I_B = 30 mA		0.15	0.3	V
Collector saturation voltage	$V_{CE(sat)3}$*	I_C = 5.0 A, I_B = 100 mA			0.4	V
Collector saturation voltage	$V_{CE(sat)4}$*	I_C = 5.0 A, I_B = 50 mA			0.55	V
Base saturation voltage	$V_{BE(sat)}$*	I_C = 5.0 A, I_B = 50 mA			1.2	V
Gain bandwidth product	f_T	V_{CE} = 5.0 V, I_C = 1.0 A		150		MHz
Collector capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0 , f = 1 MHz		110		pF
Turn-on time	t_{on}	I_C = 5.0 A, I_{B1} = $-I_{B2}$ = 100 mA R_L = 3.0 Ω, V_{CC} ≅ 16 V		0.5		μs
Storage time	t_{stg}			2.0		μs
Fall time	t_f			0.5		μs
Diode order voltage	V_{DF}	I_{DF} = 5.0 A		1.4		V

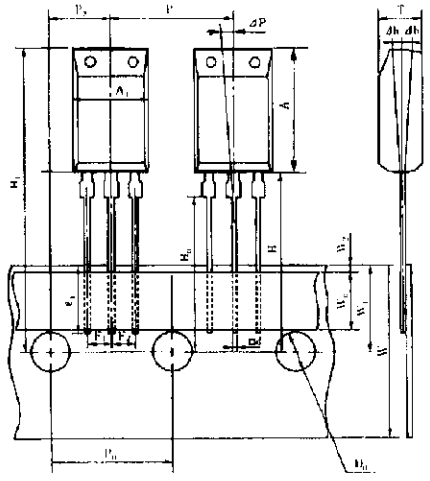
* Pulse test PW ≤ 350 μs, duty cycle ≤ 2%

PACKAGE DRAWING (UNIT: mm)



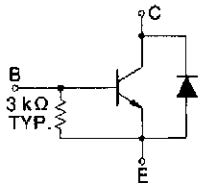
Electrode Connection
1. Base 2. Collector 3. Emitter

TAPING SPECIFICATION



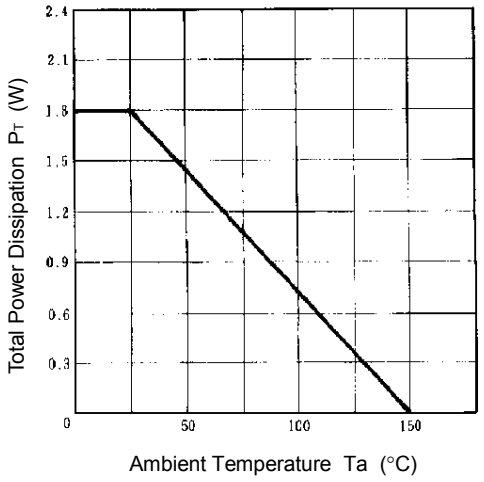
A_1	8.0±0.2
A	13.0±0.2
D_0	φ4.0±0.2
d	0.5±0.1
F_1	$2.5^{+0.4}_{-0.1}$
F_2	$2.5^{+0.4}_{-0.1}$
H	20.0 MAX.
H_0	16.0±0.5
H_1	32.2 MAX.
Δh	0±1.0
ℓ_1	2.5 MIN.
P	12.7±1.0
P_0	12.7±0.3
P_2	6.35±0.5
ΔP	0±1.3
T	4.5±0.2
W	$18.0^{+1.0}_{-0.5}$
W_0	5.0 MIN.
W_1	9.0±0.5
W_2	0.7 MAX.

EQUIVALENT CIRCUIT

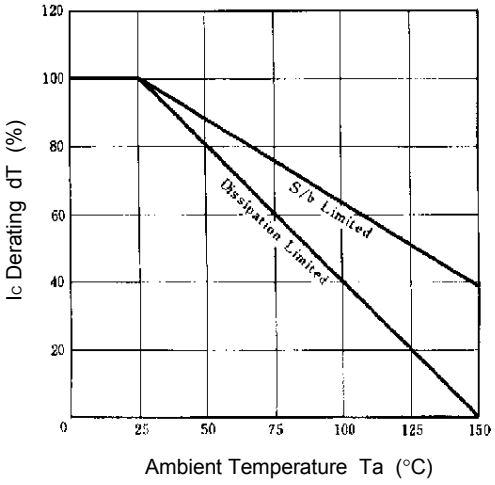


TYPICAL CHARACTERISTICS (Ta = 25°C)

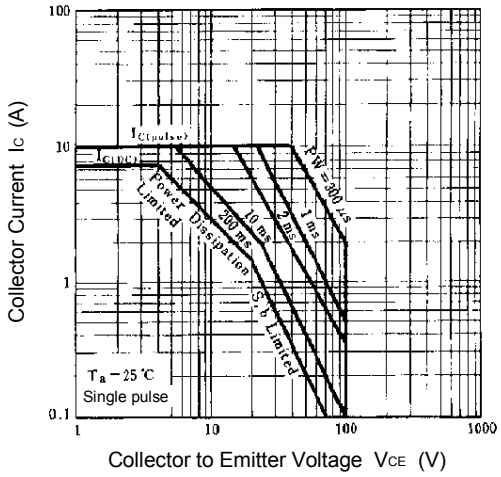
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



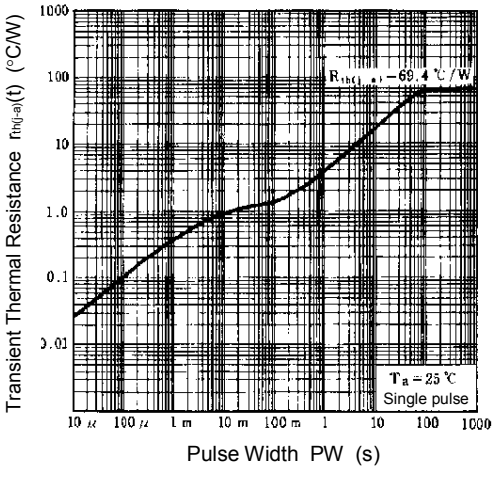
DERATING CURVE OF SAFE OPERATING AREA



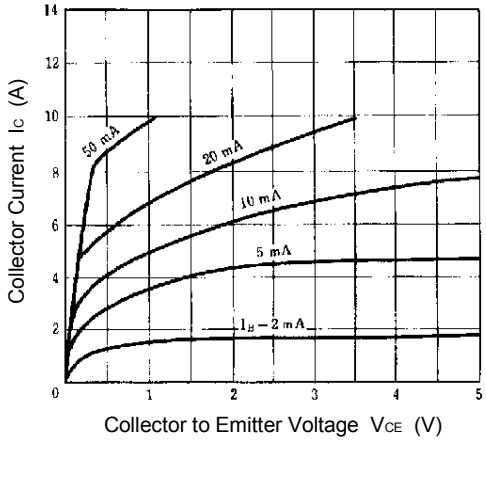
FORWARD BIAS SAFE OPERATING AREA



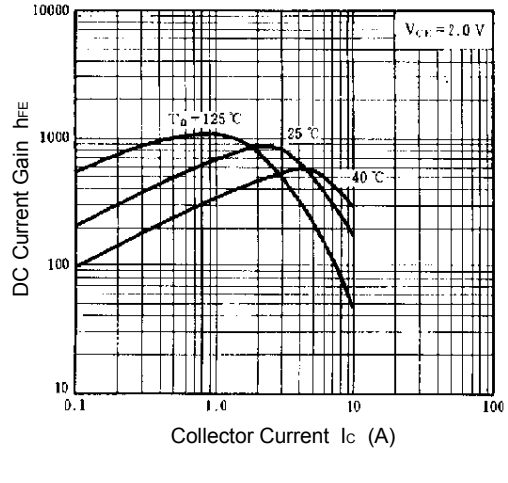
TRANSIENT THERMAL RESISTANCE



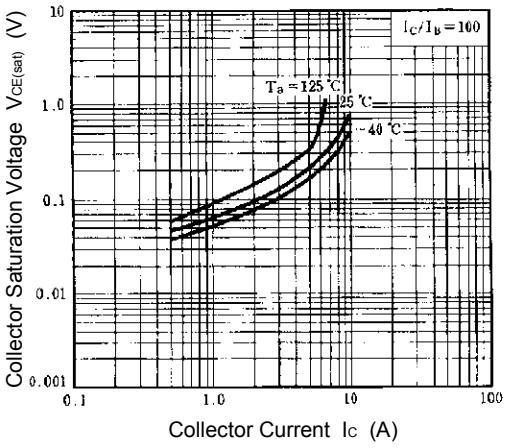
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



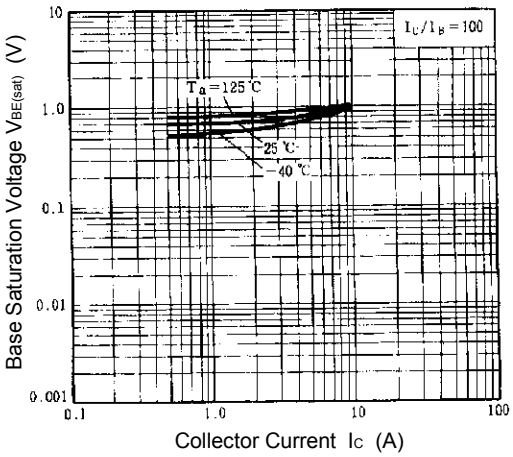
DC CURRENT GAIN vs. COLLECTOR CURRENT



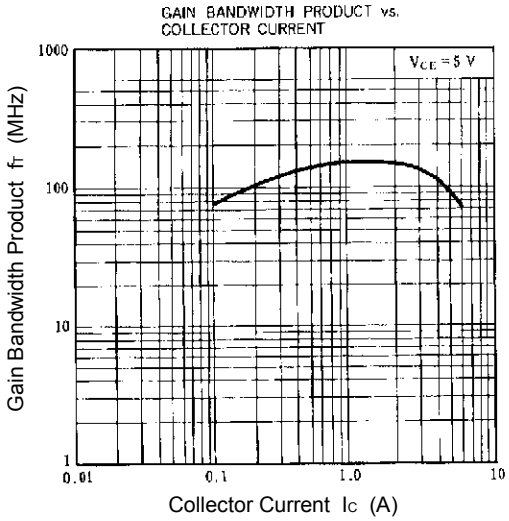
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



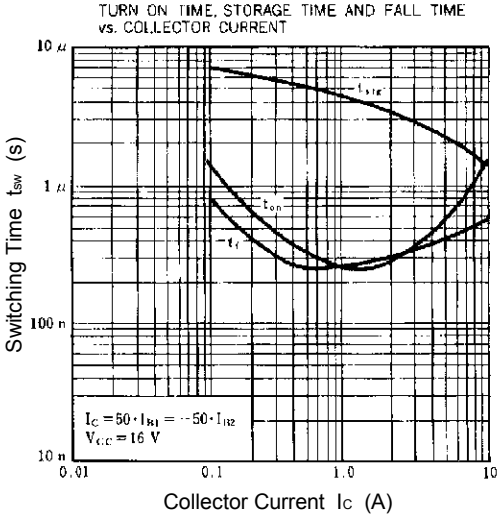
BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



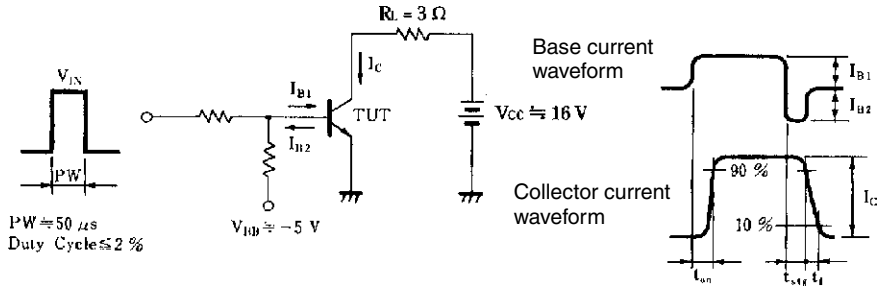
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



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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