NEC

SILICON POWER TRANSISTOR
2SC4815

NPN SILICON EPITAXIAL TRANSISTOR FOR HIGH-SPEED SWITCHING

The 2SC4815 is a power transistor developed for high-speed switching and features low $V_{CE(sat)}$ and high h_{FE}. This transistor is ideal for use as a driver in DC/DC converters and actuators.

In addition, this transistor is available for the auto mount in the radial taping specifications and for mounting cost reduction.

FEATURES

- High h_{FE} and low $V_{CE(sat)}$:
  $V_{CE(sat)} \leq 0.3$ V @I_C = 3.0 A, I_B = 0.15 A
  $h_{FE} \geq 100$ @V_{CE} = 2.0 V, I_C = 1.0 A
- Available for auto mount in radial taping specifications

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Parameter	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	100	V
Collector to emitter voltage	V_{CEO}	60	V
Emitter to base voltage	V_{EBO}	7.0	V
Collector current (DC)	$I_{C(DC)}$	5.0	A
Collector current (pulse)	$I_{C(pulse)}$*	10	A
Base current (DC)	$I_{B(DC)}$	2.5	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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ELECTRICAL CHARACTERISTICS (Ta = 25°C)

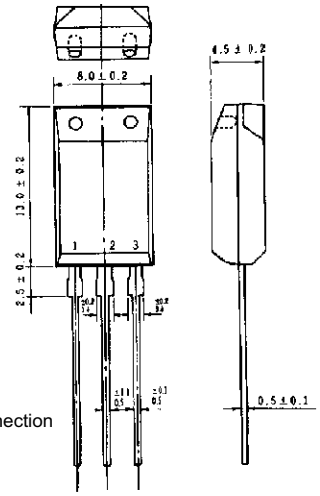
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to emitter voltage	$V_{CEO(SUS)}$	I_C = 5.0 A, I_B = 0.5 A, L = 1 mH	60			V
Collector to emitter voltage	$V_{CEX(SUS)}$	I_C = 2.5 A, I_{B1} = $-I_{B2}$ = 0.25 A $V_{BE(OFF)}$ = −1.5 V, L = 180 μH, Clamped	60			V
Collector cutoff current	I_{CBO}	V_{CB} = 100 V, I_E = 0			10	μA
Emitter cutoff current	I_{EBO}	V_{EB} = 7.0 V, I_C = 0			10	μA
DC current gain	h_{FE1}*	V_{CE} = 2.0 V, I_C = 0.5 A	100			
DC current gain	h_{FE2}*	V_{CE} = 2.0 V, I_C = 1.0 A	100	200	400	
DC current gain	h_{FE3}*	V_{CE} = 2.0 V, I_C = 3.0 A	60			
Collector saturation voltage	$V_{CE(sat)1}$*	I_C = 3.0 A, I_B = 0.15 A		0.15	0.3	V
Collector saturation voltage	$V_{CE(sat)2}$*	I_C = 4.0 A, I_B = 0.2 A		0.3	0.5	V
Base saturation voltage	$V_{BE(sat)1}$*	I_C = 3.0 A, I_B = 0.15 A		0.9	1.2	V
Base saturation voltage	$V_{BE(sat)2}$*	I_C = 4.0 A, I_B = 0.2 A		1.2	1.5	V
Collector capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0 , f = 1.0 MHz		70		pF
Gain bandwidth product	f_T	V_{CE} = 10 V, I_C = 0.5 A		150		MHz
Turn-on time	t_{on}	I_C = 3.0 A, R_L = 17 Ω, I_{B1} = $-I_{B2}$ = 0.15 A, V_{CC} ≅ 50 V Refer to the test circuit.		0.1		μs
Storage time	t_{stg}			1.0		μs
Fall time	t_f			0.25		μs

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

h_{FE} CLASSIFICATION

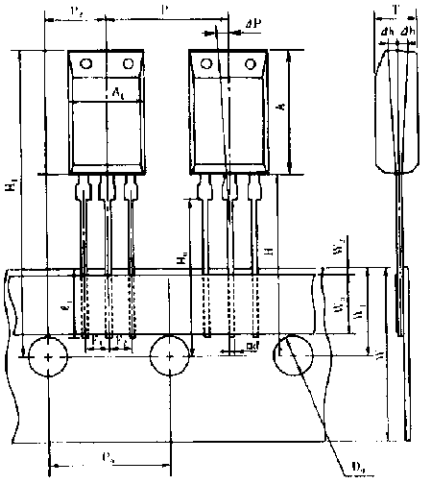
Marking	M	L	K
h_{FE2}	100 to 200	150 to 300	200 to 400

PACKAGE DRAWING (UNIT: mm)



Electrode Connection
1. Base
2. Collector
3. Emitter

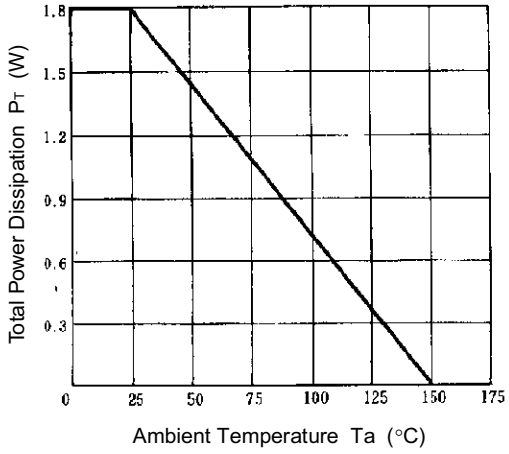
TAPING SPECIFICATION



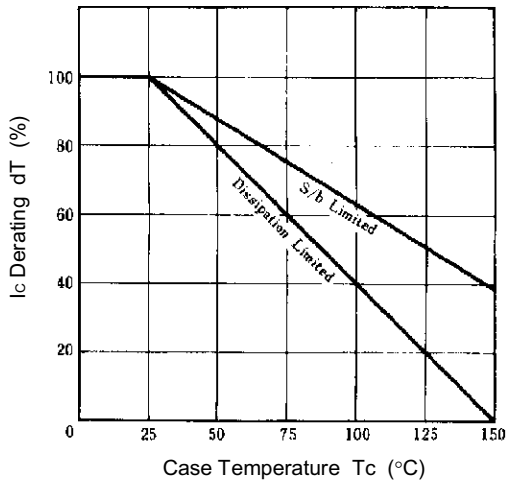
A_1	8.0±0.2
A	13.0±0.2
D_0	φ4.0±0.2
d	0.5±0.1
F_1	$2.5^{+0.4}_{-0.1}$
F_2	$2.5^{+0.4}_{-0.1}$
H	20.0 MAX.
H_0	16.0±0.5
H_1	32.2 MAX.
Δh	0±1.0
ℓ_1	2.5 MIN.
P	12.7±1.0
P_0	12.7±0.3
P_2	6.35±0.5
ΔP	0±1.3
T	4.5±0.2
W	$18.0^{+1.0}_{-0.5}$
W_0	5.0 MIN.
W_1	9.0±0.5
W_2	0.7 or less

TYPICAL CHARACTERISTICS (Ta = 25°C)

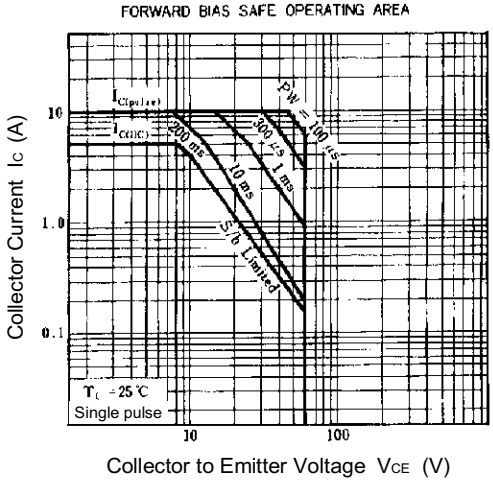
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



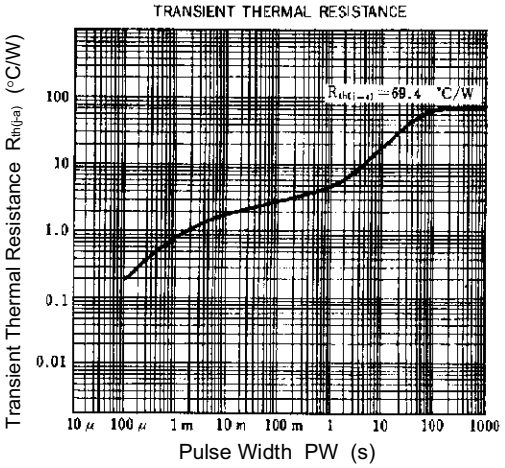
DERATING CURVE OF SAFE OPERATING AREA



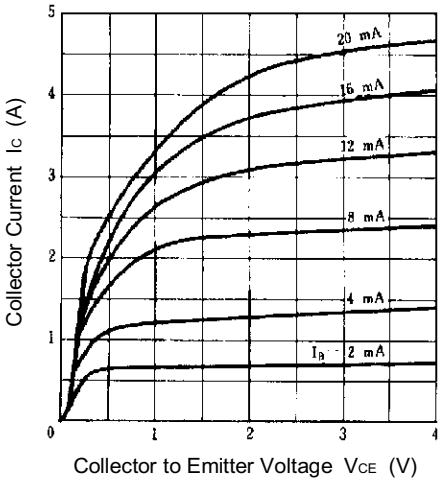
FORWARD BIAS SAFE OPERATING AREA



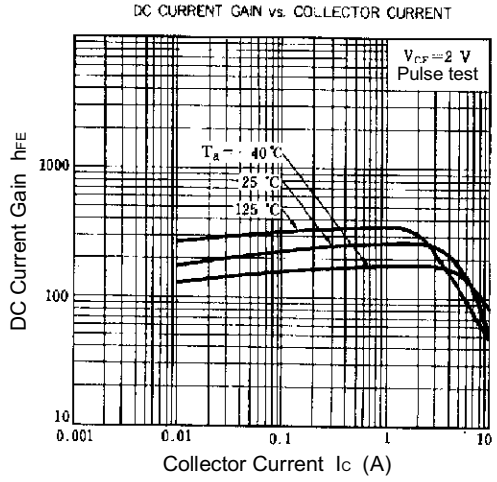
TRANSIENT THERMAL RESISTANCE



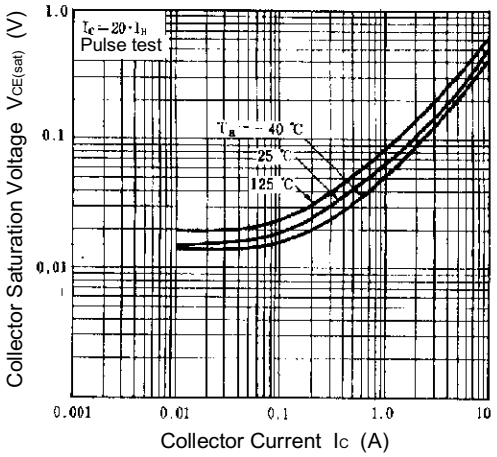
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



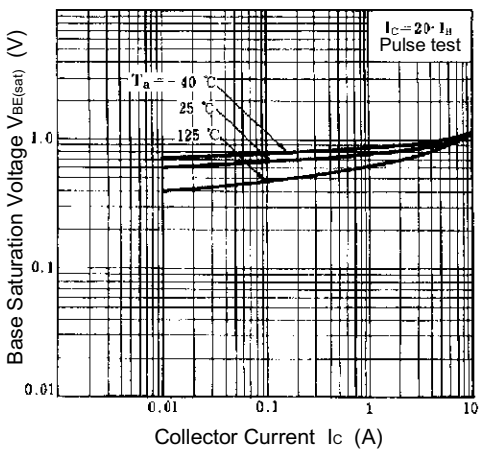
DC CURRENT GAIN vs. COLLECTOR CURRENT



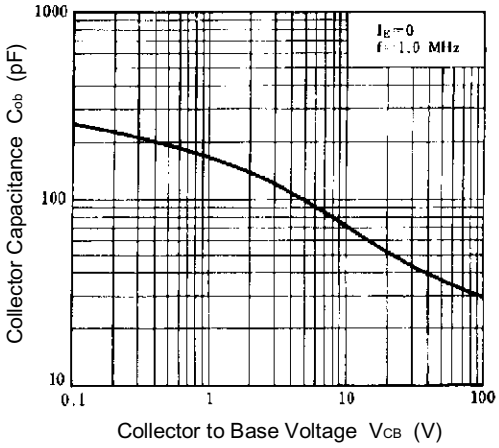
COLLECTOR SATURATION VOLTAGE vs. COLLECTOR CURRENT



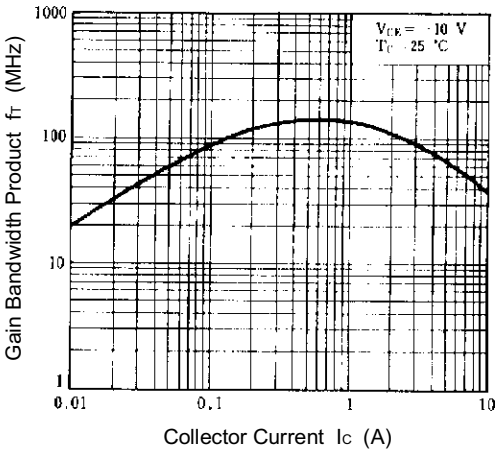
BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



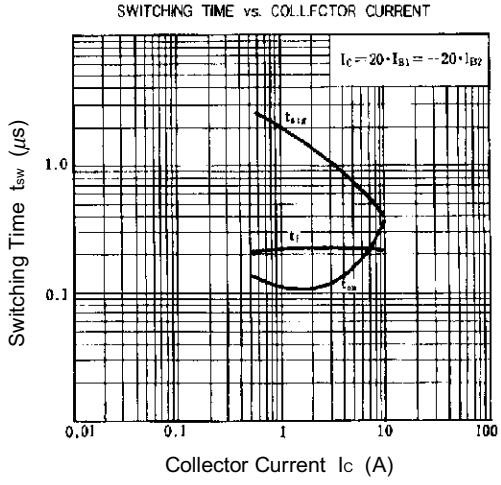
OUTPUT CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



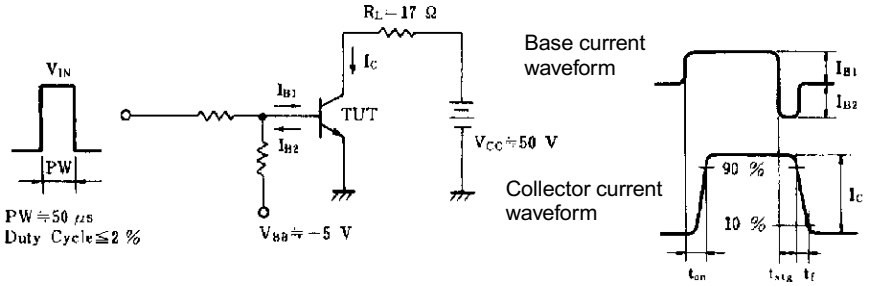
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



SWITCHING TIME vs. COLLECTOR CURRENT



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



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