NEC

SILICON POWER TRANSISTOR
2SA1744

PNP SILICON EPITAXIAL TRANSISTOR FOR HIGH-SPEED SWITCHING

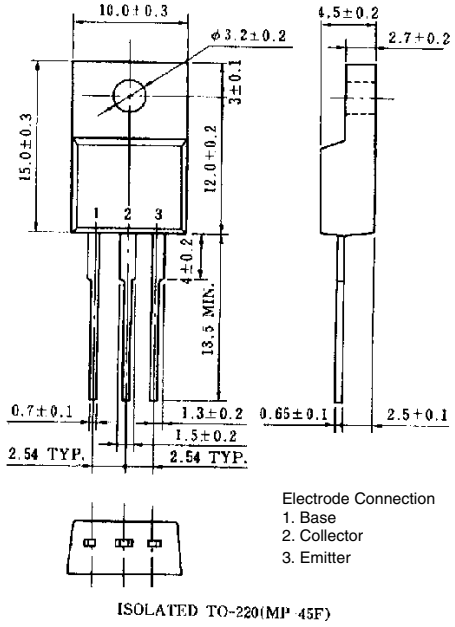
The 2SA1744 is a power transistor developed for high-speed switching and features a high h_{FE} at Low $V_{CE(sat)}$. This transistor is ideal for use as a driver in DC/DC converters and actuators.

In addition, a small resin-molded insulation type package contributes to high-density mounting and reduction of mounting cost.

FEATURES

- High h_{FE} and low $V_{CE(sat)}$:
  $h_{FE} \geq 100$ (V_{CE} = –2 V, I_C = –3 A)
  $V_{CE(sat)} \leq 0.3$ V (I_C = –8 A, I_B = –0.4 A)
- Full-mold package that does not require an insulating board or bushing

PACKAGE DRAWING (UNIT: mm)



ABSOLUTE MAXIMUM RATINGS (T_A = 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)	$I_{C(DC)}$	–15	A
Collector current (pulse)	$I_{C(pulse)}$*	–30	A
Base current (DC)	$I_{B(DC)}$	–7.5	A
Total power dissipation	P_T (Tc = 25°C)	30	W
Total power dissipation	P_T (Ta = 25°C)	2.0	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 (T_A = 25°C)

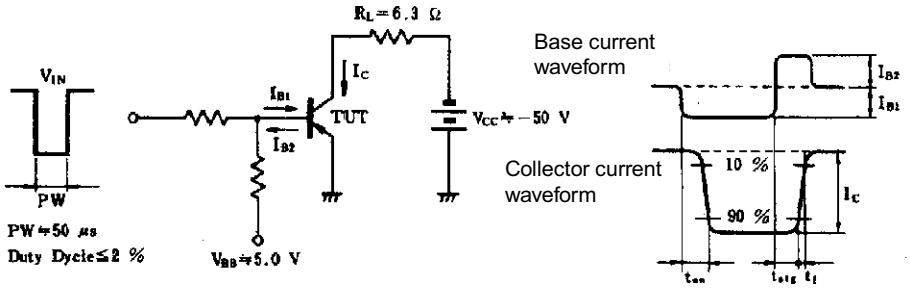
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to emitter voltage	$V_{CEO(SUS)}$	I_C = –8.0 A, I_B = –0.8 A, L = 1 mH	–60			V
Collector to emitter voltage	$V_{CEX(SUS)}$	I_C = –8.0 A, I_{B1} = –I_{B2} = –0.8 A, $V_{BE(OFF)}$ = 1.5 V, L = 180 μH, clamped	–60			V
Collector cutoff current	I_{CBO}	V_{CB} = –60 V, I_E = 0			–10	μA
Collector cutoff current	I_{CER}	V_{CE} = –60 V, R_{BE} = 50 Ω, T_A = 125°C			–1.0	mA
Collector cutoff current	I_{CEX1}	V_{CE} = –60 V, $V_{BE(OFF)}$ = 1.5 V			–10	μA
Collector cutoff current	I_{CEX2}	V_{CE} = –60 V, $V_{BE(OFF)}$ = 1.5 V, T_A = 125°C			–1.0	mA
Emitter cutoff current	I_{EBO}	V_{EB} = –5.0 V, I_C = 0			–10	μA
DC current gain	h_{FE1}*	V_{CE} = –2.0 V, I_C = –1.5 A	100			
DC current gain	h_{FE2}*	V_{CE} = –2.0 V, I_C = –3.0 A	100		400	
DC current gain	h_{FE3}*	V_{CE} = –2.0 V, I_C = –8.0 A	60			
Collector saturation voltage	$V_{CE(sat)1}$*	I_C = –8.0 A, I_B = –0.4 A			–0.3	V
Collector saturation voltage	$V_{CE(sat)2}$*	I_C = –12 A, I_B = –0.6 A			–0.5	V
Base saturation voltage	$V_{BE(sat)1}$*	I_C = –8.0 A, I_B = –0.4 A			–1.2	V
Base saturation voltage	$V_{BE(sat)2}$*	I_C = –12 A, I_B = –0.6 A			–1.5	V
Collector capacitance	C_{ob}	V_{CB} = –10 V, I_E = 0, f = 1.0 MHz		300		pF
Gain bandwidth product	f_T	V_{CE} = –10 V, I_C = –1.5 A		80		MHz
Turn-on time	t_{on}	I_C = –8.0 A, R_L = 6.3 Ω, I_{B1} = –I_{B2} = –0.4 A, V_{CC} ≅ –50 V Refer to the test circuit.			0.3	μs
Storage time	t_{stg}				1.5	μs
Fall time	t_f				0.3	μs

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

h_{FE} CLASSIFICATION

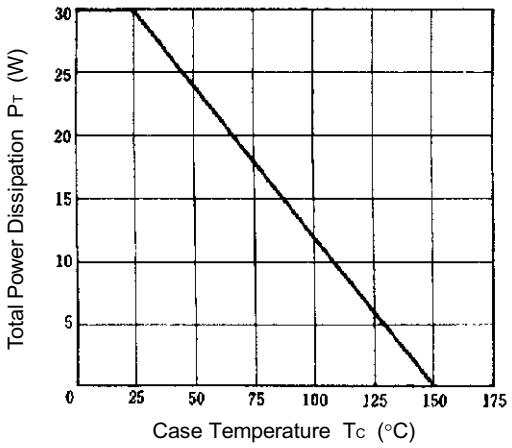
Marking	M	L	K
h_{FE2}	100 to 200	150 to 300	200 to 400

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

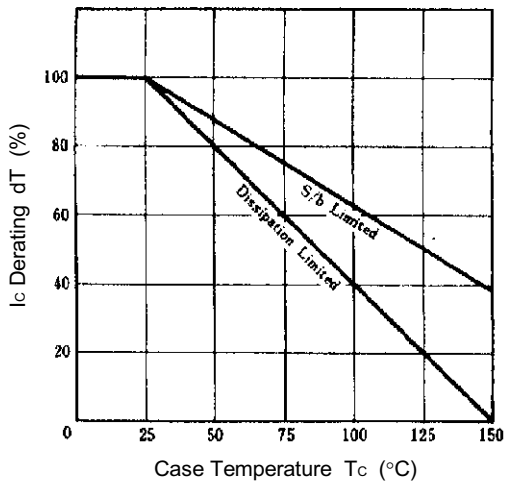


TYPICAL CHARACTERISTICS (T_A = 25°C)

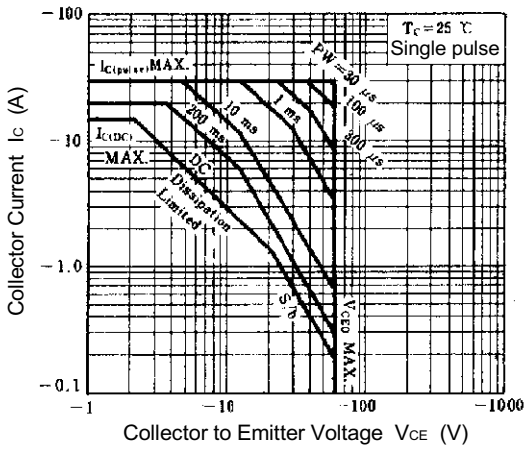
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



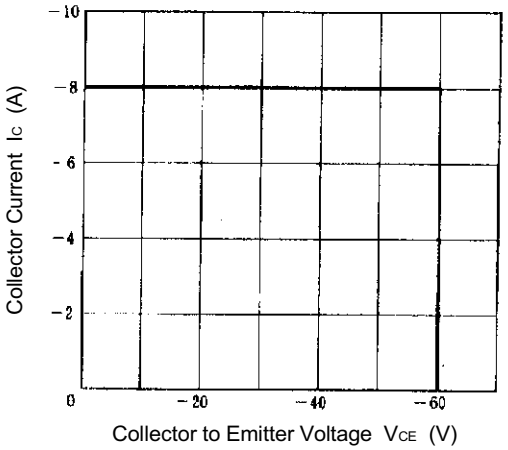
DERATING CURVE OF SAFE OPERATING AREA



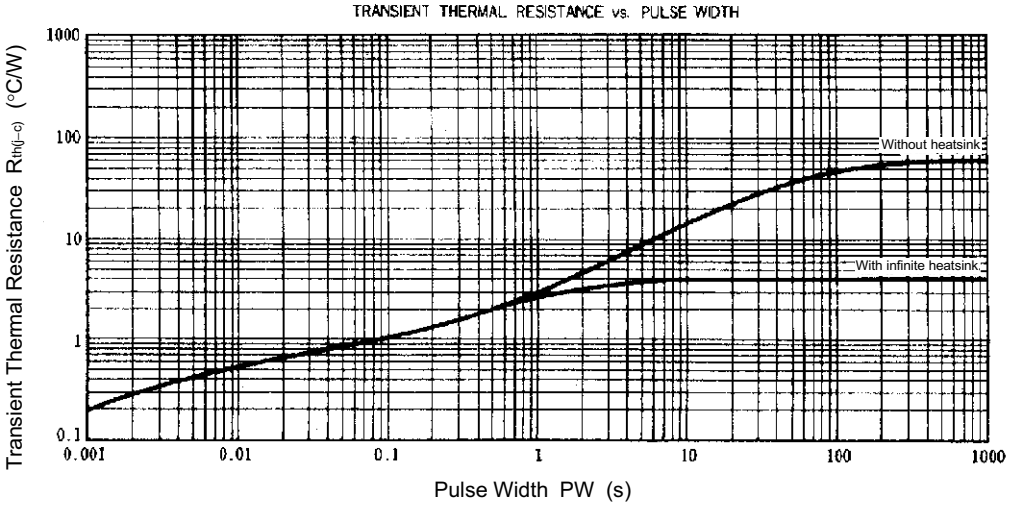
FORWARD BIAS SAFE OPERATING AREA



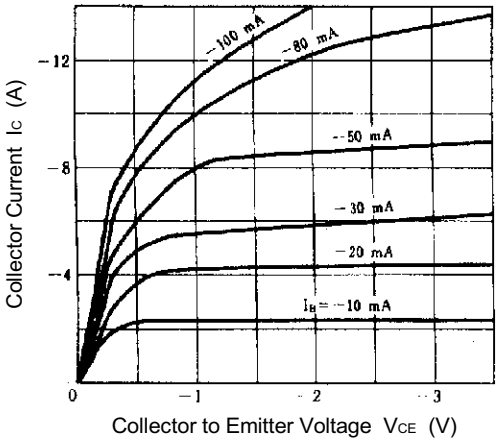
REVERSE BIAS SAFE OPERATING AREA



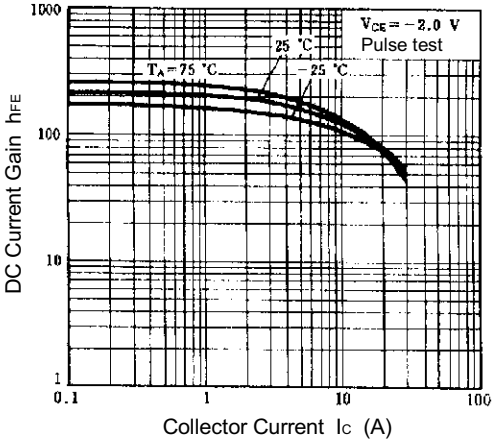
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



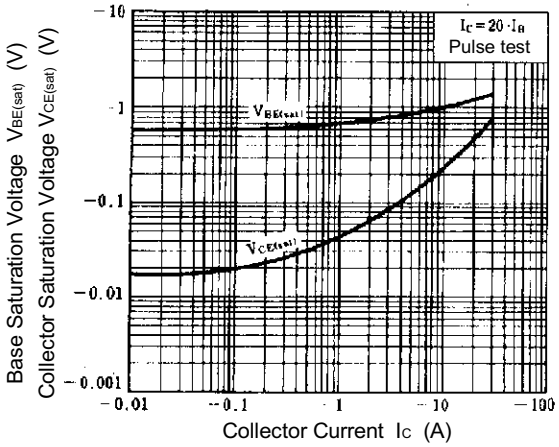
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



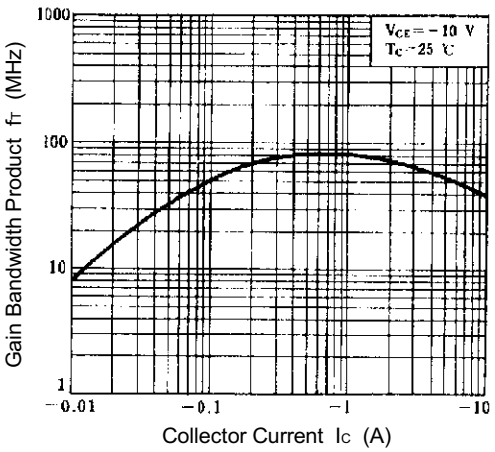
DC CURRENT GAIN vs. COLLECTOR CURRENT



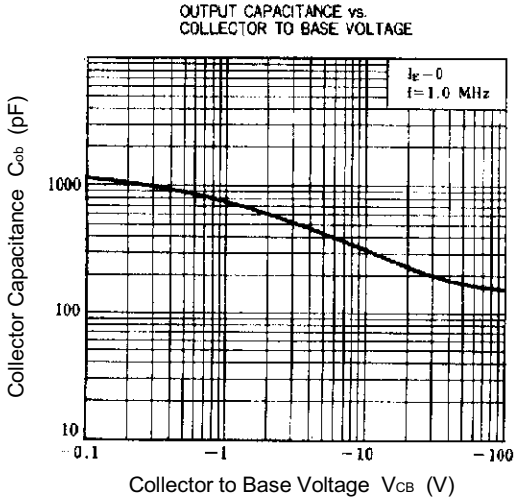
COLLECTOR AND BASE SATURATION VOLTAGE
vs. COLLECTOR CURRENT



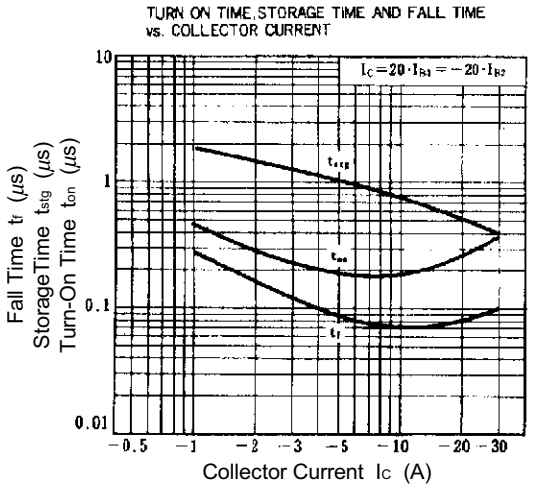
GAIN BANDWIDTH PRODUCT vs.
COLLECTOR CURRENT



OUTPUT CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



TURN ON TIME, STORAGE TIME AND FALL TIME
vs. COLLECTOR CURRENT



[MEMO]

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