RCA Solid State Division

Power Transistors

43104

JEDEC TO-3

H-1570

Hometaxial-Base High-Current Silicon N-P-N Transistor

Rugged High-Voltage Device for Applications in Industrial and Commercial Equipment

Features:

- High dissipation capability — 150 W
- 8-A specification for h_{FE}, V_{BE}, and $V_{CE}(sat)$
- V_{CEX} — 160 V min.
- Low saturation voltage with high beta

RCA-43104* is a hometaxial-base silicon n-p-n transistor intended for a wide variety of high-voltage high-current applications. Typical applications include power-switching circuits, audio amplifiers, series- and shunt-regulator driver and output stages, dc-to-dc converters, inverters, and solenoid (hammer)/relay driver service. The 43104 employs the popular JEDEC TO-3 package.

* Formerly type RCA508.

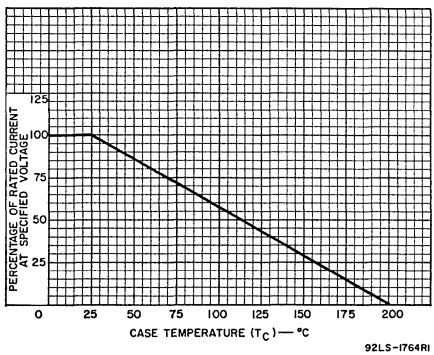

Fig. 1 — Current derating curve.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	160	V
COLLECTOR-TO-EMITTER VOLTAGE:			
With base open	V_{CEO}	140	V
With reverse bias (V_{BE}) of −1.5 V	V_{CEX}	160	V
EMITTER-TO-BASE VOLTAGE	V_{EBO}	7	V
COLLECTOR CURRENT:	I_C		
Continuous		16	A
Peak		30	A
BASE CURRENT:	I_B		
Continuous		4	A
Peak		15	A
TRANSISTOR DISSIPATION:	P_T		
At case temperatures up to 25°C		150	W
At case temperatures above 25°C		*See Fig. 1*	
TEMPERATURE RANGE:			
Storage & Operating (Junction)		−65 to +200	°C
PIN TEMPERATURE (During Soldering):			
At distances ≥ 1/32 in. (0.8 mm) from case for 10 s max.		230	°C

ELECTRICAL CHARACTERISTICS, *At Case Temperature (T_C) = 25°C Unless Otherwise Specified*

CHARACTERISTIC	SYMBOL	TEST CONDITIONS							LIMITS		UNITS
		VOLTAGE V dc				CURRENT A dc			43104		
		V_{CB}	V_{CE}	V_{EB}	V_{BE}	I_C	I_E	I_B	Min.	Max.	
Collector-Cutoff Current: With emitter open	I_{CBO}	140					0		–	2	mA
With base-emitter junction reverse-biased	I_{CEX}		140		–1.5				–	2	mA
With base-emitter junction reverse-biased and T_C = 150°C	I_{CEX}		140		–1.5				–	10	mA
With base open	I_{CEO}		120					0	–	10	mA
Emitter-Cutoff Current	I_{EBO}			7		0			–	5	mA
DC Forward-Current Transfer Ratio	h_{FE}		4 4			8[a] 16[a]			15 5	60 –	
Collector-to-Emitter Sustaining Voltage: With base-emitter junction reverse-biased (R_{BE} = 100 Ω)	$V_{CEX(sus)}$				–1.5	0.1			160	–	V
With external base-to-emitter resistance (R_{BE}) = 100 Ω	$V_{CER(sus)}$					0.2[a]			150	–	V
With base open	$V_{CEO(sus)}$					0.2[a]		0	140	–	V
Base-to-Emitter Voltage	V_{BE}		4			8[a]			–	2.2	V
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$					8[a] 16[a]		0.8 3.2	– –	1.4 4	V
Second-Breakdown Collector Current: With base forward-biased and 1-s nonrepetitive pulse	$I_{S/b}$[b]		60						2.5	–	A
Second-Breakdown Energy: With base reverse-biased and L = 40 mH, R_{BE} = 100 Ω	$E_{S/b}$[c]				–1.5	2.5			0.125	–	J
Magnitude of Common-Emitter, Small-Signal, Short-Circuit, Forward-Current Transfer Ratio (f = 50 kHz)	$\lvert h_{fe} \rvert$		4			1			4	–	
Common-Emitter, Small-Signal, Short-Circuit, Forward-Current Transfer Ratio (f = 1 kHz)	h_{fe}		4			1			40	–	
Thermal Resistance: Junction-to-Case	$R_{\theta JC}$								–	1.17	°C/W

[a] Pulsed; pulse duration = 300 μs, rep. rate = 60 Hz, duty factor ⩽ 2%.

[b] $I_{S/b}$ is defined as the current at which second breakdown occurs at a specified collector voltage with the emitter-base junction forward-biased for transistor operation in the active region.

[c] $E_{S/b}$ is defined as the energy at which second breakdown occurs under specified reverse-bias conditions. $E_{S/b} = 1/2LI^2$ where L is a series load or leakage inductance and I is the peak collector current.

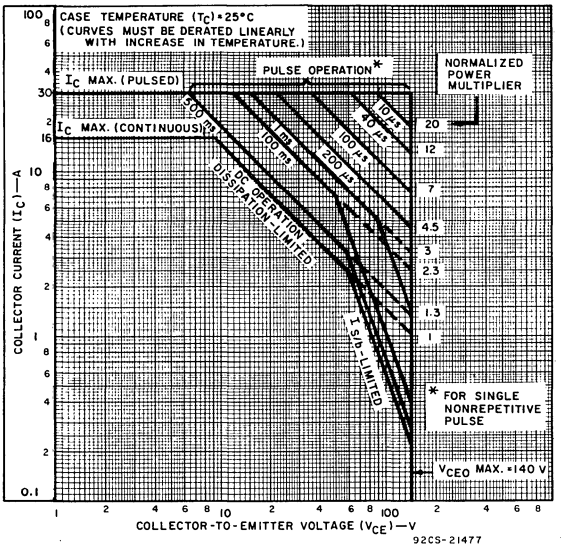

Fig. 2 – Maximum operating areas.

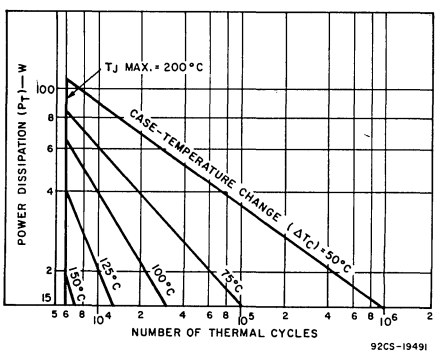

Fig. 3—Thermal-cycling rating chart.

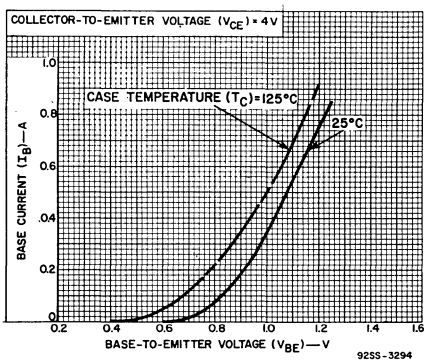

Fig. 4 – Typical input characteristics.

TERMINAL CONNECTIONS

Pin 1 – Base
Pin 2 – Emitter
Case – Collector
Mounting Flange – Collector

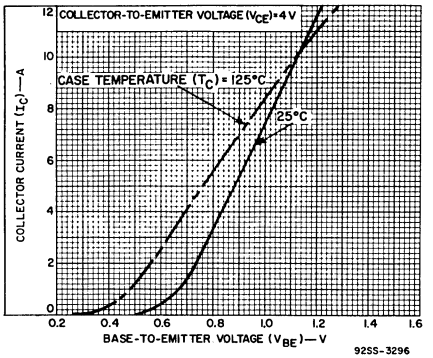

Fig. 5 — Typical transfer characteristics.

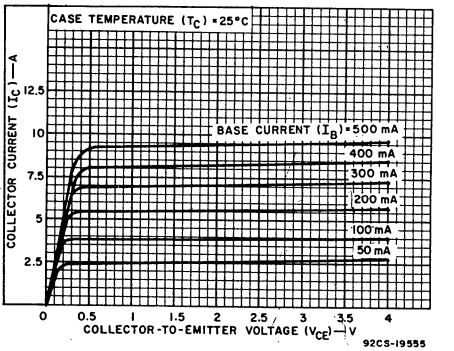

Fig. 6 — Typical output characteristics.

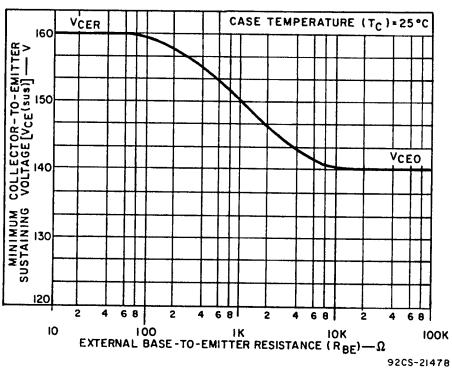

Fig. 7 — Sustaining voltage vs. base-to-emitter resistance.

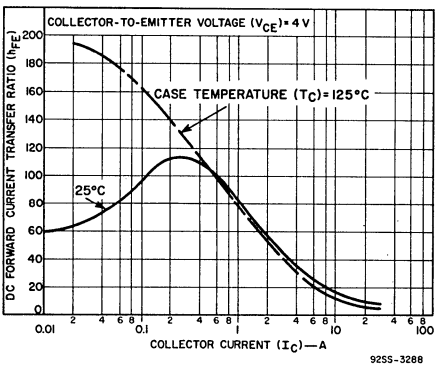

Fig. 8 — Typical dc beta characteristics.

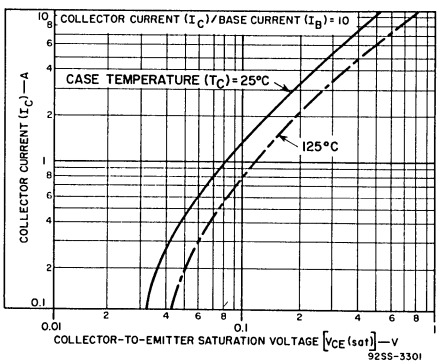

Fig. 9 — Typical saturation-voltage characteristics.

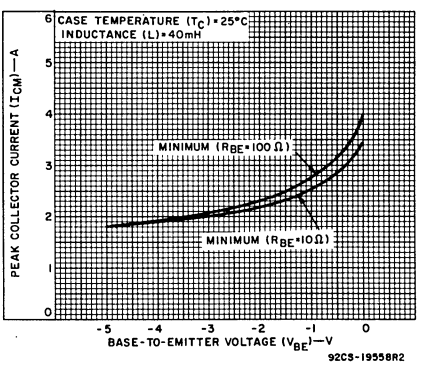

Fig. 10 — Reverse-bias second-breakdown characteristics.