2N5293-2N5298, RCA3054
Hometaxial-Base, Silicon N-P-N VERSAWATT Transistors

General-Purpose Types for Medium-Power Switching and Amplifier Applications in Military, Industrial, and Commercial Equipment

RCA-2N5293, 2N5294, 2N5295, 2N5296, 2N5297, 2N5298, and RCA3054 are hometaxial-base silicon n-p-n transistors. They are intended for a wide variety of medium-power switching and amplifier applications such as series and shunt regulators, and in driver and output stages of high-fidelity amplifiers. Types 2N5293, 2N5295, and 2N5297 have formed emitter and base leads for easy insertion into TO-66 sockets. Types 2N5294, 2N5296, and 2N5298 are electrically identical to the 2N5293, 2N5295, and 2N5297, respectively, but have straight leads. The RCA3054 is supplied with straight leads.

These plastic power transistors differ in voltage ratings and in the currents at which the parameters are controlled.

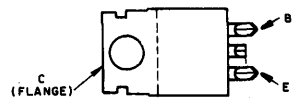
Features:

- Low saturation voltage—
  $V_{CE}(sat)$ = 1 V max. at I_C = 0.5 A (2N5293, 2N5294)
  = 1 V max. at I_C = 1 A (2N5295, 2N5296)
  = 1 V max. at I_C = 1.5 A (2N5297, 2N5298)
- VERSAWATT package (molded-silicone plastic)
- Maximum safe-area-of-operation curves

MAXIMUM RATINGS, *Absolute-Maximum Values:*

		2N5293 2N5294	2N5295 2N5296	2N5297 2N5298	RCA3054	
COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	80	60	80	90	V
COLLECTOR-TO-EMITTER SUSTAINING VOLTAGE:						
With −1.5 volts (V_{BE}) of reverse bias	$V_{CEV}(sus)$	80	60	80	90	V
With external base-to-emitter resistance (R_{BE}) = 100 Ω	$V_{CER}(sus)$	75	50	70	60	V
With base open	$V_{CEO}(sus)$	70	40	60	55	V
EMITTER-TO-BASE VOLTAGE	V_{EBO}	7	5	5	7	V
COLLECTOR CURRENT	I_C	4	4	4	4	A
BASE CURRENT	I_B	2	2	2	2	A
TRANSISTOR DISSIPATION:	P_T					
At case temperatures up to 25°C		36	36	36	36	W
At case temperatures above 25°C		Derate linearly at 0.288				W/°C
At ambient temperatures up to 25°C		1.8	1.8	1.8	1.8	W
At ambient temperatures above 25°C		Derate linearly at 0.0144				W/°C
TEMPERATURE RANGE:						
Storage and Operating (Junction)		−65 to +150				°C
LEAD TEMPERATURE (During soldering):						
At distance ≥ 1/8 in. (3.17 mm) from case for 10 s max.		235				°C

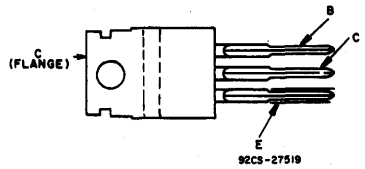
TERMINAL DESIGNATIONS



92CS-27520

BOTTOM VIEW

JEDEC TO-220AA
2N5293, 2N5295, 2N5297



92CS-27519

BOTTOM VIEW

JEDEC TO-220AB
2N5294, 2N5296, 2N5298, RCA3054

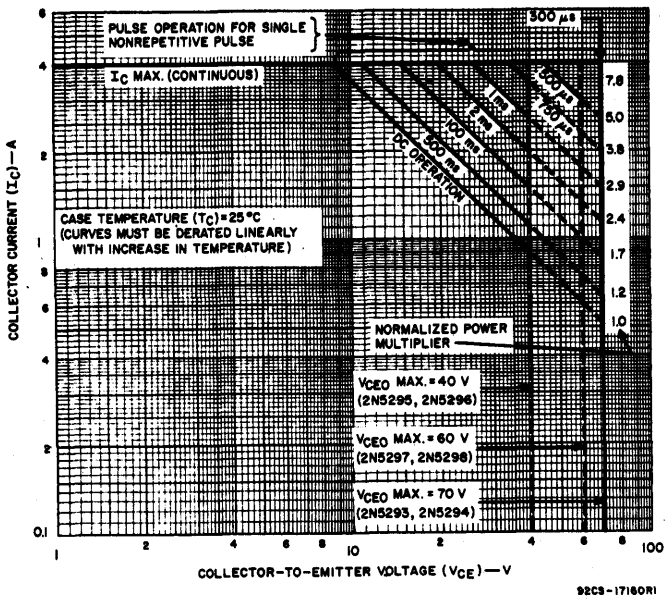


Fig. 1 – Maximum operating areas for 2N5293–2N5298.

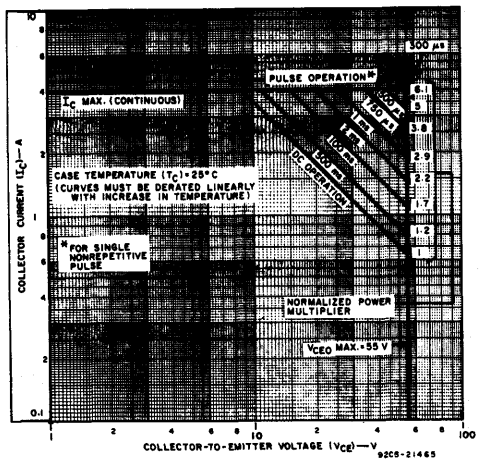


Fig. 2 – Maximum operating areas for RCA3054.

2N5293-2N5298, RCA3054

ELECTRICAL CHARACTERISTICS, *At Case Temperature (T_C) = 25°C, unless otherwise specified.*

CHARACTERISTIC SYMBOL	TEST CONDITIONS VOLTAGE V dc		CURRENT A dc		LIMITS 2N5293 2N5294		2N5295 2N5296		2N5297 2N5298		RCA3054		UNITS
	V_{CE}	V_{BE}	I_C	I_B	MIN.	MAX.	MIN.	MAX.	MIN.	MAX	MIN.	MAX.	
I_{CEV} •	90	-1.5			–	–	–	–	–	–	–	1	mA
	65	-1.5			–	0.5	–	–	–	0.5	–	–	
	35	-1.5			–	–	–	2	–	–	–	–	
I_{CEV} • (T_C = 150°C)	90	-1.5			–	–	–	–	–	–	–	6	
	65	-1.5			–	3	–	–	–	3	–	–	
	35	-1.5			–	–	–	5	–	–	–	–	
I_{CER} (R_{BE} = 100 Ω)	50				–	0.5	–	–	–	0.5	–	–	mA
	20				–	–	–	–	–	–	–	–	
I_{CER} (T_C = 150°C)	50				–	2	–	–	–	2	–	–	mA
I_{EBO}		-7	0		–	1	–	–	–	–	–	1	mA
		-5	0		–	–	–	1	–	1	–	–	
		-4	0		–	–	–	–	–	–	–	–	
h_{FE}[c]	4		0.5		30	120	–	–	–	–	25	100	
	4		1		–	–	30	120	–	–	–	–	
	4		1.5		–	–	–	–	20	80	–	–	
$V_{CEO(sus)}$[c]			0.1	0	70	–	–	–	–	–	55	–	V
			0.1	0	–	–	40	–	–	–	–	–	
			0.1	0	–	–	–	–	60	–	–	–	
$V_{CER(sus)}$[c] (R_{BE} = 100 Ω)			0.1		75	–	–	–	–	–	–	–	V
			0.1		–	–	50	–	–	–	–	–	
			0.1		–	–	–	–	70	–	60	–	
$V_{CEV(sus)}$[c]		-1.5	0.1		80	–	–	–	–	–	–	–	V
		-1.5	0.1		–	–	60	–	–	–	–	–	
		-1.5	0.1		–	–	–	–	80	–	90	–	
V_{BE}[c]	4		0.5		–	1.1	–	–	–	–	–	1.7	V
	4		1		–	–	–	1.3	–	–	–	–	
	4		1.5		–	–	–	–	–	1.5	–	–	
$V_{CE(sat)}$[c]			0.5	0.05	–	1	–	–	–	–	–	1	V
			1	0.05	–	–	–	–	–	–	–	–	
			1	0.1	–	–	–	1	–	–	–	–	
			1.5	0.15	–	–	–	–	–	1	–	–	
f_T	4		0.2		0.8	–	0.8	–	0.8	–	0.8	–	MHz
t_{ON}	V_{CC} = 30		0.5	0.05[a]	–	5	–	–	–	–	–	–	µs
			1	0.1[a]	–	–	–	5	–	–	–	–	
			1.5	0.15[a]	–	–	–	–	–	5	–	–	
t_{OFF}	V_{CC} = 30		0.5	-0.5[a]	–	15	–	–	–	–	–	–	µs
			1	-0.1[b]	–	–	–	15	–	–	–	–	
			1.5	-0.15[b]	–	–	–	–	–	15	–	–	
$R_{\theta JC}$					–	3.5	–	3.5	–	3.5	–	3.5	°C/W
$R_{\theta JA}$					–	70	–	70	–	70	–	70	°C/W

[a] I_{B_1} value (turn-on base current). [b] I_{B_2} value (turn-off base current). [c] Pulsed, pulse duration = 300 µs, duty factor = .018.

• I_{CEX} for RCA3054.

2N5293-2N5298, RCA3054

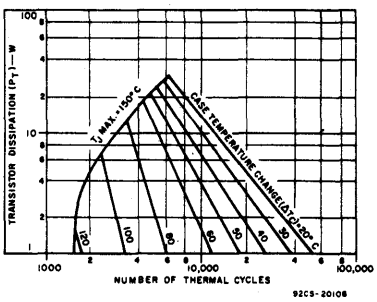


Fig. 3 — Thermal-cycling rating chart for all types.

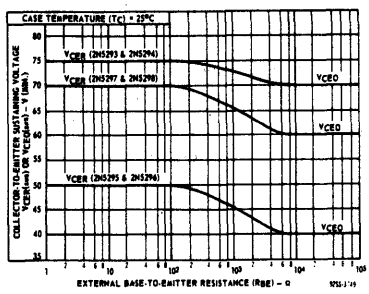


Fig. 4 — Sustaining voltage vs. base-to-emitter resistance for 2N5293–2N5298.

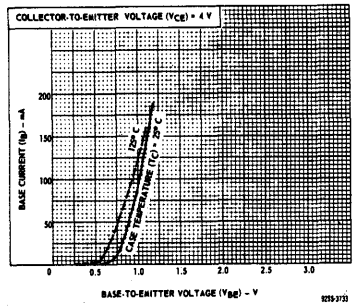


Fig. 5 — Typical input characteristics for 2N5293, 2N5294, and RCA3054.

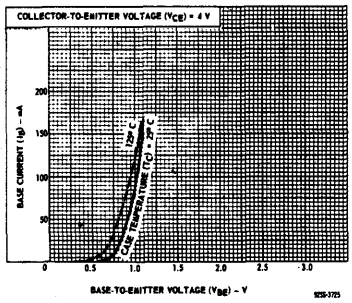


Fig. 6 — Typical input characteristics for 2N5295 and 2N5296.

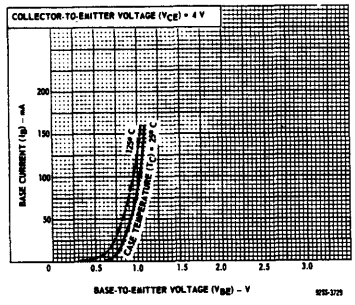


Fig. 7 — Typical input characteristics for types 2N5297 and 2N5298.

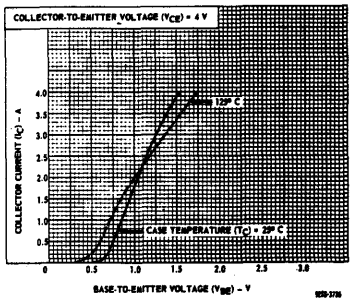


Fig. 8 — Typical transfer characteristics for 2N5293, 2N5294, and RCA3054.

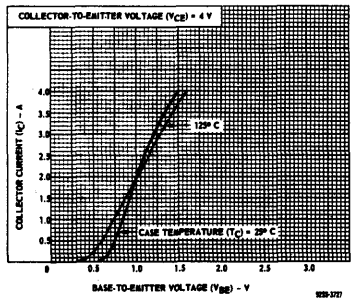


Fig. 9 — Typical transfer characteristics for 2N5295 and 2N5296.

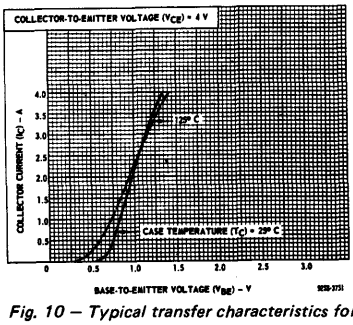


Fig. 10 — Typical transfer characteristics for 2N5297 and 2N5298.

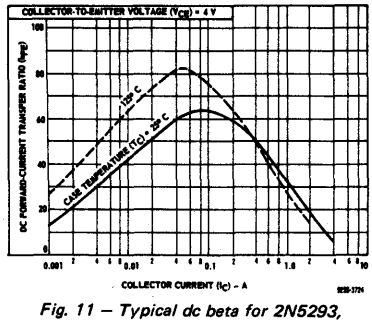


Fig. 11 — Typical dc beta for 2N5293, 2N5294, and RCA3054.

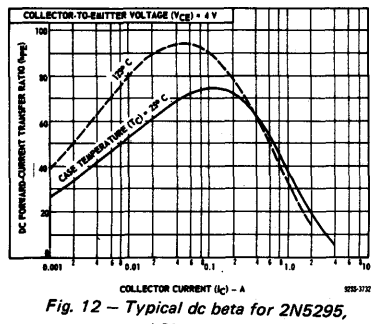


Fig. 12 — Typical dc beta for 2N5295, and 2N5296.

2N5293-2N5298, RCA3054

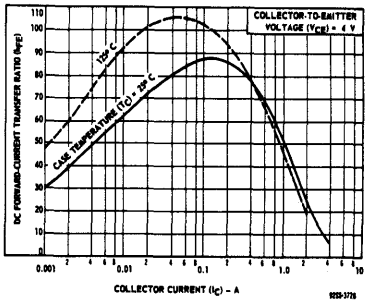


Fig. 13—Typical dc beta for 2N5297 and 2N5298.

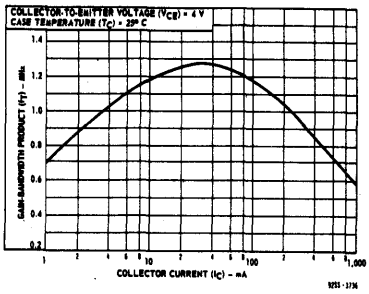


Fig. 14—Typical gain-bandwidth product for 2N5293, 2N5294, and RCA3054.

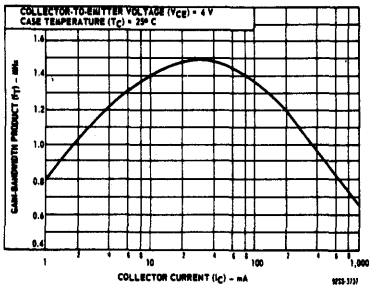


Fig. 15—Typical gain-bandwidth product for 2N5295 and 2N5296.

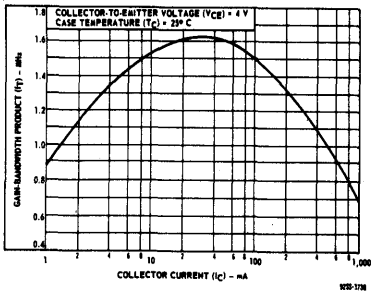


Fig. 16—Typical gain-bandwidth product for 2N5297 and 2N5298.

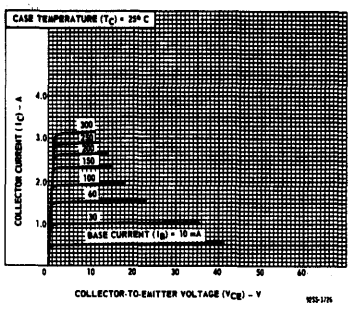


Fig. 17—Typical output characteristics for 2N5293, 2N5294, and RCA3054.

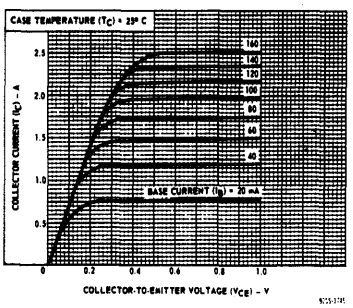


Fig. 18—Typical output characteristics for 2N5295 and 2N5296.

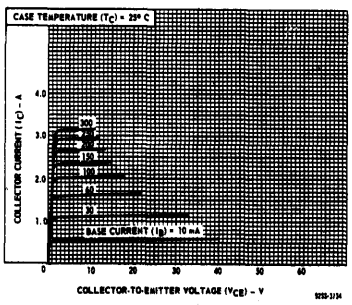


Fig. 19—Typical output characteristics for 2N5295 and 2N5296.

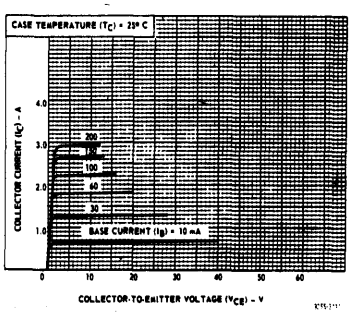


Fig. 20—Typical output characteristics for 2N5297 and 2N5298.

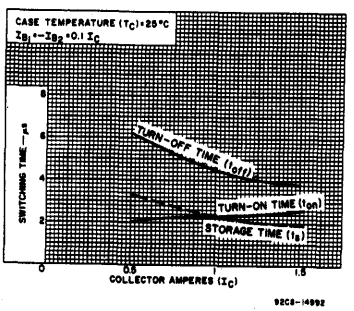


Fig. 21—Typical saturated switching characteristics for 2N5295, 2N5296, and RCA3054.