2N5294, 2N5296, 2N5298

File Number **322**

Silicon N-P-N Transistors

*General-Purpose Types for Medium-Power Switching and Amplifier Applications

Features:

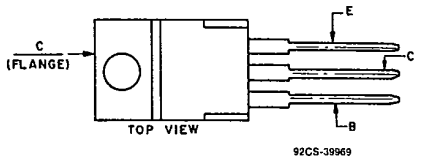
- *Low saturation voltage -*
  $V_{CE}(sat)$ = 1 V max. at I_C = 0.5 A (2N5294)
  = 1 V max. at I_C = 1 A (2N5296)
  = 1 V max. at I_C = 1.5 A (2N5298)
- *Maximum safe-area-of-operation curves specified for DC and pulse service*

RCA-2N5294, 2N5296, and 2N5298 are triple-diffused 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.

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

All types are supplied in the JEDEC TO-220AB (VERSAWATT) plastic package.

TERMINAL DESIGNATIONS



JEDEC TO-220AB

MAXIMUM RATINGS, *Absolute-Maximum Values:*

		2N5294	2N5296	2N5298	
*COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	80	60	80	V
COLLECTOR-TO-EMITTER SUSTAINING VOLTAGE:					
With -1.5 volts (V_{BE}) of reverse bias	$V_{CEV(SUS)}$	80	60	80	V
With external base-to-emitter resistance (R_{BE}) = 100 Ω	$V_{CER(SUS)}$	75	50	70	V
With base open	*$V_{CEO(SUS)}$	70	40	60	V
*EMITTER-TO-BASE VOLTAGE	V_{EBO}	7	5	5	V
*COLLECTOR CURRENT	I_C	4	4	4	A
*BASE CURRENT	I_B	2	2	2	A
*TRANSISTOR DISSIPATION, P_T					
At case temperatures up to 25°C		36	36	36	W
At case temperatures above 25°C		Derate linearly at 0.288 or see Figs. 1 & 2			W/°C
At ambient temperatures up to 25°C		1.8	1.8	1.8	W
At ambient temperatures above 25°C		Derate linearly at 0.0144			W/°C
*TEMPERATURE RANGE:					
Storage & 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

*In accordance with JEDEC registration data.

2N5294, 2N5296, 2N5298

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

Characteristic	Symbol	TEST CONDITIONS					LIMITS						Units
		DC Collector Voltage (V)	DC Emitter or Base Voltage (V)		DC Current (A)		2N5294		2N5296		2N5298		
		V_{CE}	V_{EB}	V_{BE}	I_C	I_B	Min.	Max.	Min.	Max.	Min.	Max.	
Collector-Cutoff Current With base-emitter junction reverse biased	I_{CEV}	65 35		-1.5 -1.5			– –	0.5 –	– –	– 2	– –	0.5 –	mA
	I_{CEV} (T_C = 150°C)	65 35		-1.5 -1.5			– –	3 –	– –	– 5	– –	3 –	mA
Collector-Cutoff Current With external base-to-emitter resistance (R_{BE}) = 100 Ω	I_{CER}	50					–	0.5	–	–	–	0.5	mA
	I_{CER} (T_C = 150°C)	50					–	2	–	–	–	2	mA
Emitter-Cutoff Current	I_{EBO}		7 5				– –	1 –	– –	– 1	– –	– 1	mA
DC Forward-Current Transfer Ratio	h_{FE}[c]	4 4 4			0.5 1 1.5		30 – –	120 – –	– 30 –	– 120 –	– – 20	– – 80	
Collector-to-Emitter Sustaining Voltage With base open	$V_{CEO(sus)}$[c]				0.1 0.1 0.1	0 0 0	70 – –	– – –	– 40 –	– – –	– – 60	– – –	V
With external base-to-emitter resistance (R_{BE}) = 100 Ω	$V_{CER(sus)}$[c]				0.1 0.1 0.1		75 – –	– – –	– 50 –	– – –	– – 70	– – –	V
With base-emitter junction reverse biased	$V_{CEV(sus)}$[c]			-1.5 -1.5 -1.5	0.1 0.1 0.1		80 – –	– – –	– 60 –	– – –	– – 80	– – –	V
Base-to-Emitter Voltage	V_{BE}[c]	4 4 4			0.5 1 1.5		– – –	1.1 – –	– – –	– 1.3 –	– – –	– – 1.5	V
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$[c]				0.5 1 1.5	0.05 0.1 0.15	– – –	1 – –	– – –	– 1 –	– – –	– – 1	V
Gain-Bandwidth Product	f_T	4			0.2		0.8	–	0.8	–	0.8	–	MHz
Sat. Switching Time Turn-On (See Figs. 22 - 24)	t_{on}	V_{CC} = 30			0.5 1 1.5	0.05[a] 0.1[a] 0.15[a]	– – –	5 – –	– – –	– 5 –	– – –	– – 5	μs
Turn-Off (See Figs. 22 - 24)	t_{off}	V_{CC} = 30			0.5 1 1.5	-0.05[a] -0.1[b] -0.15[b]	– – –	15 – –	– – –	– 15 –	– – –	– – 15	μs
Thermal Resistance (Junction-to-Case)	$\theta_{J\text{-}C}$						–	3.5	–	3.5	–	3.5	°C/W
(Junction-to-Ambient)	$\theta_{J\text{-}A}$						–	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.

*In accordance with JEDEC registration data.

2N5294, 2N5296, 2N5298

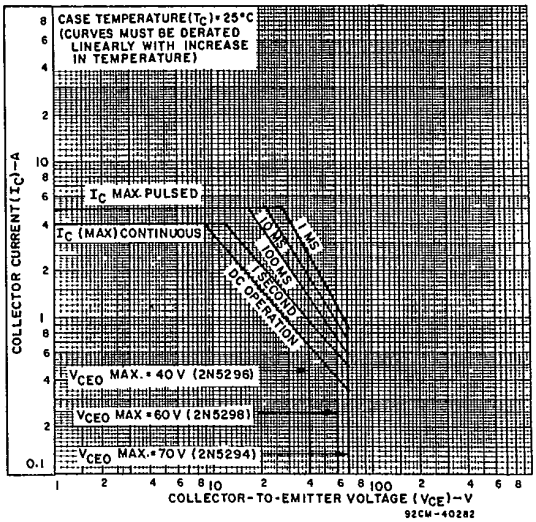


Fig. 1 - Maximum operating areas for all types.

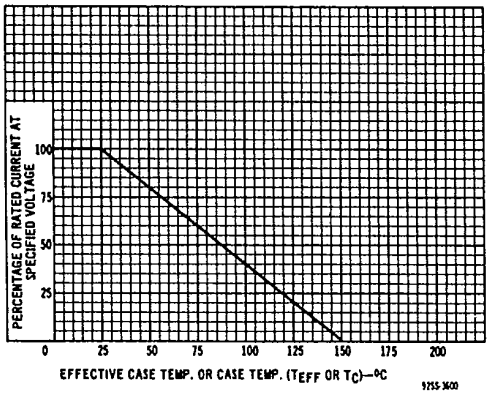


Fig. 2 - Derating curve for all types.

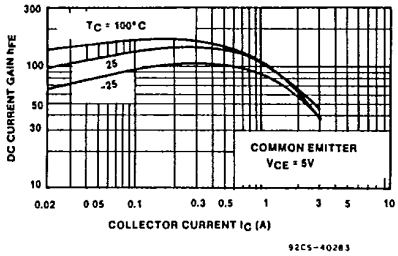


Fig. 3 - Typical DC beta characteristics for all types.

2N5294, 2N5296, 2N5298

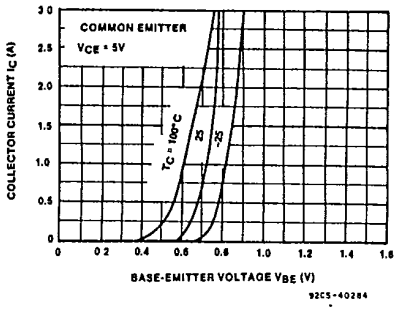


Fig. 4 - Typical input characteristics for all types.

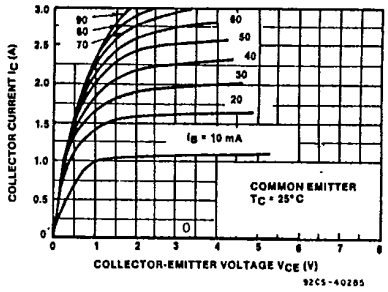


Fig. 5 - Typical output characteristics for all types.

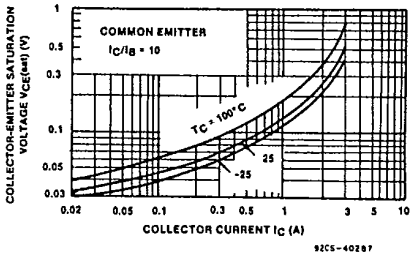


Fig. 6 - Typical collector-to-emitter saturation voltage as a function of collector current for all types.

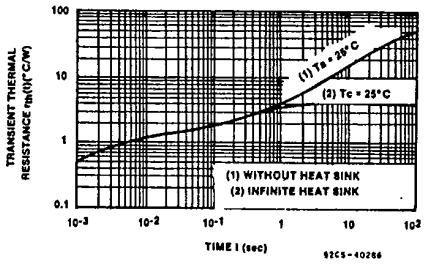


Fig. 7 - Transient thermal resistance characteristics for all types.