2N5490-2N5497

File Number **353**

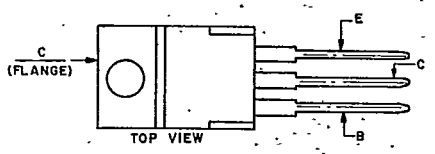
Silicon N-P-N VERSAWATT Transistors

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

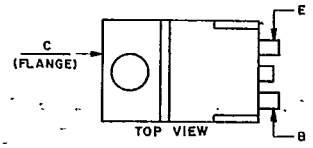
Features:

- *Low saturation voltage —*
  V_{CE}(sat) = 1 V max. at I_C = 2 A (2N5490, 2N5491)
  1 V max. at I_C = 2.5 A (2N5492, 2N5493)
  1 V max. at I_C = 3 A (2N5494, 2N5495)
  1 V max. at I_C = 3.5 A (2N5496, 2N5497)

TERMINAL DESIGNATIONS



JEDEC TO-220AB



JEDEC TO-220AA

The 2N5490, 2N5491, 2N5492, 2N5493, 2N5494, 2N5495, 2N5496 and 2N5497* are 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 driver and output stages of high-fidelity amplifiers.

Types 2N5491, 2N5493, 2N5494, and 2N5497 have formed emitter and base leads for insertion into TO-213AA sockets. Types 2N5490, 2N5492, 2N5494, and 2N5496 are electrically identical to the 2N5491, 2N5493, 2N5495, and 2N5497 but have straight leads.

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

*Formerly RCA Dev. Nos. TA7317, TA7318, TA7315, TA7316, TA7313, TA7314, TA7311, TA7312, respectively.

Maximum Ratings, *Absolute-Maximum Values:*		2N5490 2N5491 2N5494 2N5495	2N5492 2N5493	2N5496 2N5497	
COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	60	75	90	V
COLLECTOR-TO-EMITTER SUSTAINING VOLTAGE:					
With -1.5 volts (V_{BE}) of reverse bias	V_{CEV}(sus)	60	75	90	V
With external base-to-emitter resistance (R_{BE}) = 100Ω	V_{CER}(sus)	50	65	80	V
With base open	V_{CEO}(sus)	40	55	70	V
EMITTER-TO-BASE VOLTAGE	V_{EBO}	5	5	5	V
COLLECTOR CURRENT	I_C	7	7	7	A
BASE CURRENT	I_B	3	3	3	A
TRANSISTOR DISSIPATION	P_T				
At case temperatures up to 25°C		50	50	50	W
At ambient temperatures up to 25°C		1.8	1.8	1.8	W
At case temperatures above 25°C		Derate linearly at 0.4 W/°C or see Figs. 2 & 3.			
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

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

Characteristic	Symbol	TEST CONDITIONS				LIMITS								Units
		DC Voltage (V)		DC Current (A)		Types 2N5496 2N5497		Types 2N5494 2N5495		Types 2N5492 2N5493		Types 2N5490 2N5491		
		V_{CE}	V_{BE}	I_C	I_B	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Collector-Cutoff Current With base-emitter junction reverse biased	I_{CEV}	85	-1.5			-	1	-	-	-	-	-	-	mA
		55	-1.5			-	-	-	1	-	-	-	-	
		70	-1.5			-	-	-	-	-	1	-	-	
	I_{CEV} (T_C = 150°C)	85	-1.5			-	5	-	-	-	-	-	-	mA
		55	-1.5			-	-	-	5	-	-	-	-	
		70	-1.5			-	-	-	-	-	5	-	-	
Collector-Cutoff Current With external base-to-emitter resistance (R_{BE}) = 100 Ω	I_{CER}	70				-	0.5	-	-	-	-	-	-	mA
		40				-	-	-	0.5	-	-	-	2	
		55				-	-	-	-	-	0.5	-	-	
	I_{CER} (T_C = 150°C)	70				-	3.5	-	-	-	-	-	-	mA
		40				-	-	-	3.5	-	-	-	5	
		55				-	-	-	-	-	3.5	-	-	
Emitter-Cutoff Current	I_{EBO}		-5			-	1	-	1	-	1	-	1	mA
DC Forward-Current Transfer Ratio	h_{FE}[c]	4		3.5		20	100	-	-	-	-	-	-	
		4		3		-	-	20	100	-	-	-	-	
		4		2.5		-	-	-	-	20	100	-	-	
		4		2		-	-	-	-	-	-	20	100	
Collector-to-Emitter Sustaining Voltage: With base open	$V_{CEO(sus)}$[c]			0.1	0	70	-	40	-	55	-	40	-	V
With external base-to-emitter resistance (R_{BE}) = 100 Ω	$V_{CER(sus)}$[c]			0.1		80	-	50	-	65	-	50	-	V
With base-emitter junction reverse biased	$V_{CEV(sus)}$[c]		-1.5	0.1		90	-	60	-	75	-	60	-	V
Base-to-Emitter Voltage	V_{BE}[c]	4		3.5		-	1.7	-	-	-	-	-	-	V
		4		3		-	-	-	1.5	-	-	-	-	
		4		2.5		-	-	-	-	-	1.3	-	-	
		4		2		-	-	-	-	-	-	-	1.1	
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$[c]			3.5	0.35	-	1	-	-	-	-	-	-	V
				3	0.3	-	-	-	1	-	-	-	-	
				2.5	0.25	-	-	-	-	-	1	-	-	
				2	0.2	-	-	-	-	-	-	-	1	
Gain-Bandwidth Product	f_T	4		0.5		0.8	-	0.8	-	0.8	-	0.8	-	MHz
Sat. Switching Time: Turn-On	t_{on}	V_{CC} = 30		3.5	0.35[a]	-	5	-	-	-	-	-	-	μs
				3	0.3[a]	-	-	-	5	-	-	-	-	
				2.5	0.25[a]	-	-	-	-	-	5	-	-	
				2	0.2	-	-	-	-	-	-	-	5	
Turn-Off	t_{off}	V_{CC} = 30		3.5	0.35[b]	-	15	-	-	-	-	-	-	μs
				3	0.3[b]	-	-	-	15	-	-	-	-	
				2.5	0.25[b]	-	-	-	-	-	15	-	-	
				2	0.2	-	-	-	-	-	-	-	15	

[a] I_{B1} value (turn-on base current). [b] I_{B2} value (turn-off base current). [c] Pulsed, pulse duration = 300 μs

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

Characteristic	Symbol	TEST CONDITIONS				LIMITS								Units
		DC Voltage (V)		DC Current (A)		Types 2N5496 2N5497		Types 2N5494 2N5495		Types 2N5492 2N5493		Types 2N5490 2N5491		
		V_{CE}	V_{BE}	I_C	I_B	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Thermal Resistance: Junction-to-Case	θ_{J-C}					-	2.5	-	2.5	-	2.5	-	2.5	°C/W
Junction-to-Ambient	θ_{J-A}					-	70	-	70	-	70	-	70	°C/W

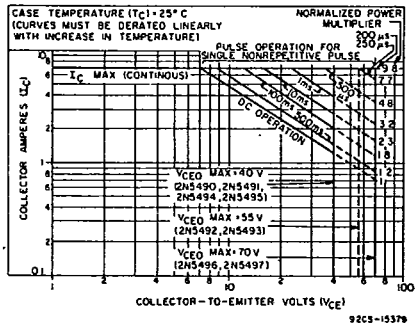

Fig. 1— Maximum operating areas for types 2N5490 through 2N5497 inclusive.

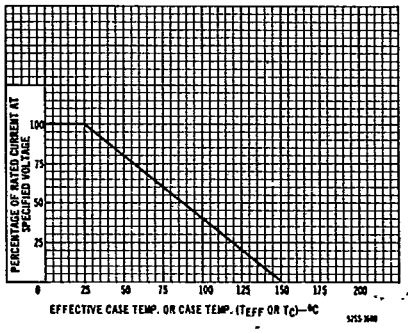

Fig. 2 — Derating curve for all types.

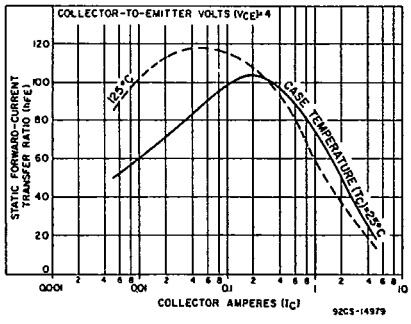

Fig. 3 — Typical static beta characteristics for types 2N5496 and 2N5497.

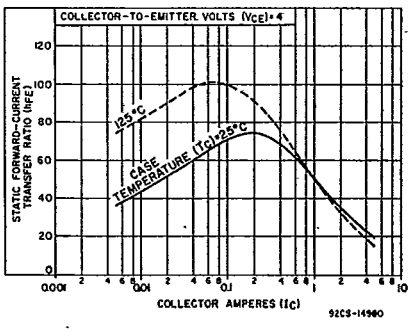

Fig. 4 — Typical static beta characteristics for types 2N5494 and 2N5495.

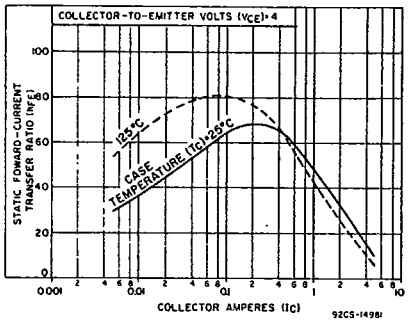

Fig. 5 — Typical static beta characteristics for types 2N5490 through 2N5493 inclusive.

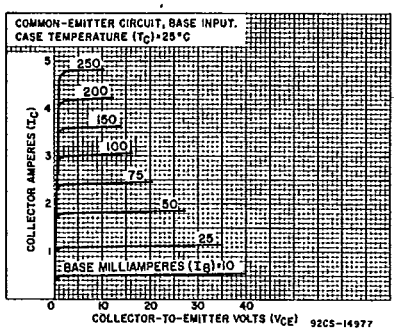

Fig.6 — Typical output characteristics for types 2N5494 through 2N5497 inclusive.

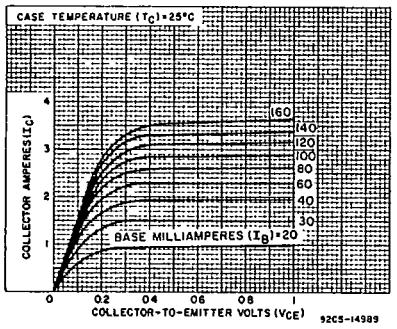

Fig. 7 — Typical output characteristics for types 2N5494 and 2N5495.

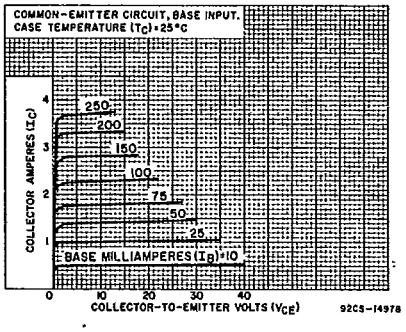

Fig. 8 — Typical output characteristics for types 2N5490 through 2N5493 inclusive.

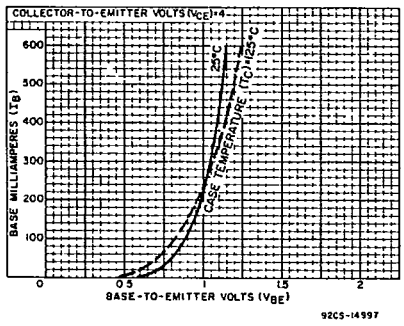

Fig. 9 — Typical input characteristics for types 2N5494 through 2N5497 inclusive.

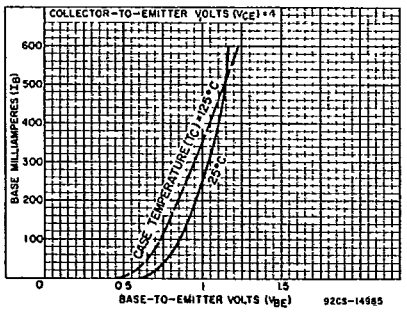

Fig. 10 — Typical input characteristics for types 2N5490 through 2N5493 inclusive.

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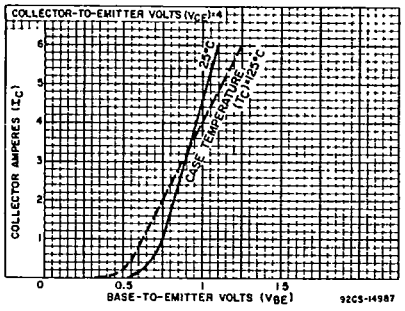

Fig. 11 — Typical transfer characteristics for types 2N5494 through 2N5497 inclusive.

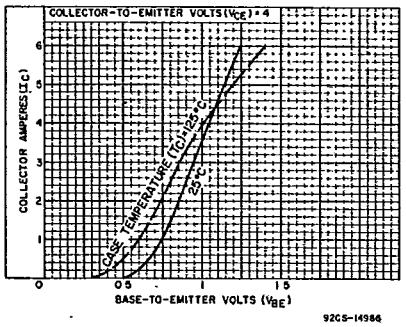

Fig. 12 — Typical transfer characteristics for types 2N5490 through 2N5493 inclusive.

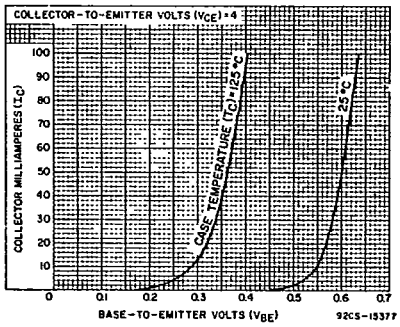

Fig. 13 — Typical transfer characteristics for types 2N5490 through 2N5497 inclusive.