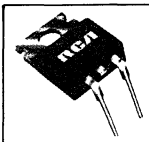
RCA Solid State Division

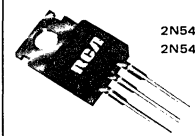
Power Transistors

2N5490 2N5491
2N5492 2N5493
2N5494 2N5495
2N5496 2N5497



2N5491, 2N5493
2N5495, 2N5497
For TO-68 Sockets

JEDEC TO-220AA H1534R1



2N5490, 2N5492
2N5494, 2N5496

JEDEC TO-220AB H1535R1

Hometaxial-Base, Silicon N-P-N VERSAWATT Transistors

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

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)
- VERSAWATT package (molded silicone plastic)
- Maximum safe-area-of-operation curves specified for DC and pulse operation

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

Types 2N5491, 2N5493, 2N5495, and 2N5497 have formed emitter and base leads for insertion into TO-66 sockets. Types 2N5490, 2N5492, 2N5494, and 2N5496 are electrically identical to the 2N5491, 2N5493, 2N5495, and 2N5497 but have straight leads.

These new plastic 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.

OPTIONAL LEAD CONFIGURATION

An additional lead forming for printed-circuit-board mounting is also available.

Please submit requirements to your RCA Technical Sales Representative, or write to RCA Low-Frequency Power Marketing, Somerville, N. J. 08876.

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

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 (See Figs.15 and 17)	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 (See Figs.15 and 17)	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	

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

[a] I_{B1} value (turn-on base current). [b] I_{B2} value (turn-off base current). [c] Pulsed, pulse duration = 300 μs, duty factor = .018.

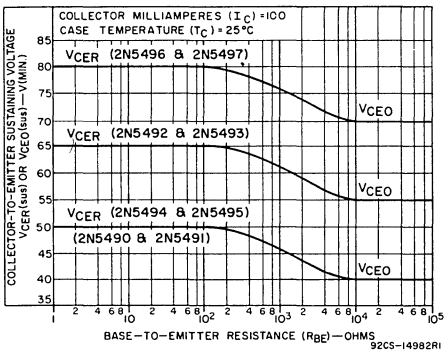


Fig.1 - Collector-to-emitter sustaining voltage characteristics for types 2N5490 through 2N5497 inclusive.

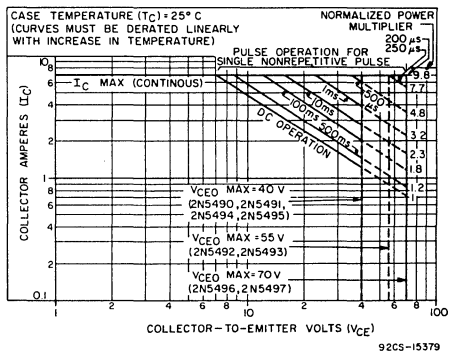


Fig.2 - Maximum operating areas for types 2N5490 through 2N5497 inclusive.

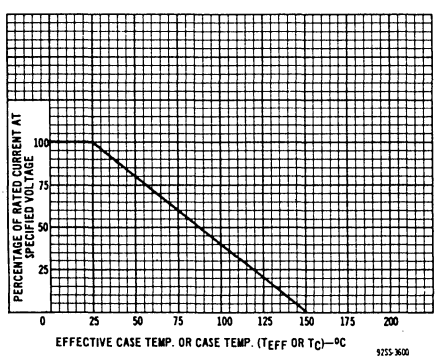


Fig.3 - Derating curve for types 2N5490 through 2N5497 inclusive.

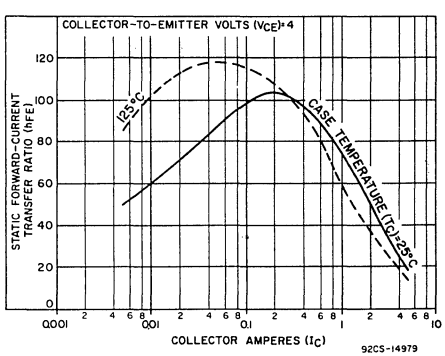


Fig.4 - Typical static beta characteristics for types 2N5496 and 2N5497.

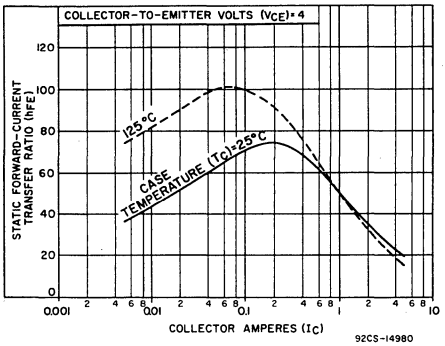


Fig.5 - Typical static beta characteristics for types 2N5494 and 2N5495.

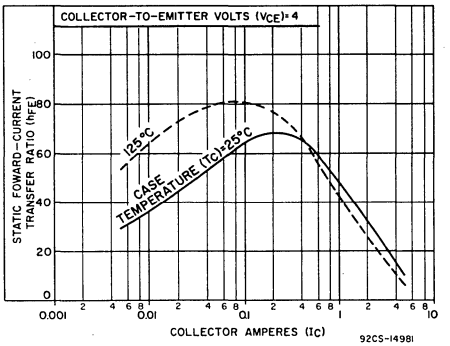


Fig.6 - Typical static beta characteristics for types 2N5490 through 2N5493 inclusive.

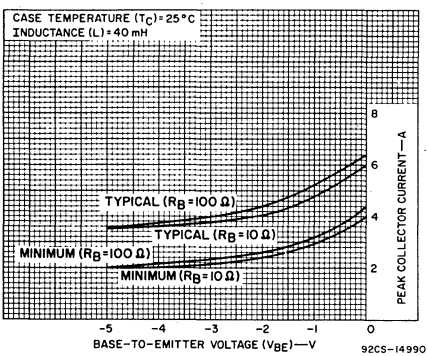


Fig.7 - Reverse-bias, second-breakdown characteristics for types 2N5490 through 2N5497 inclusive.

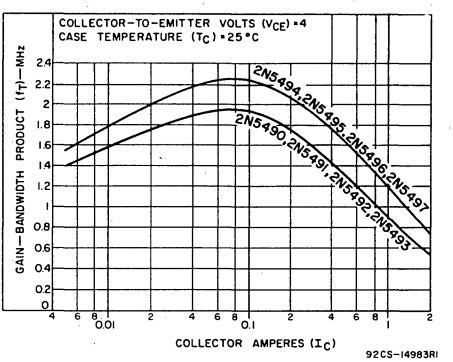


Fig.8 - Typical gain-bandwidth product for types 2N5490 through 2N5497 inclusive.

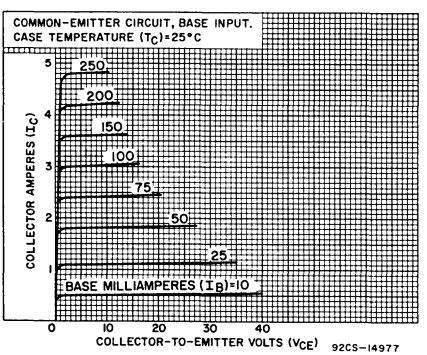


Fig.9 - Typical output characteristics for types 2N5494 through 2N5497 inclusive.

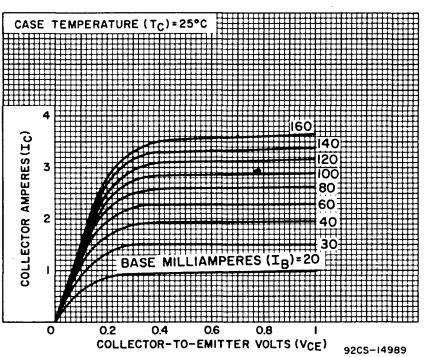


Fig.10 - Typical output characteristics for types 2N5494 and 2N5495.

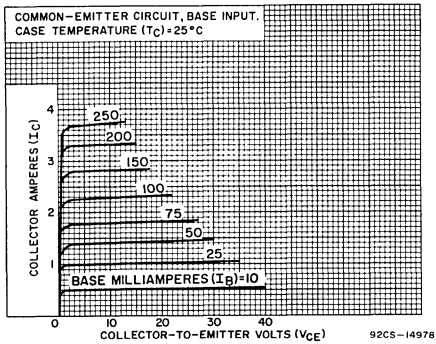


Fig.11 - Typical output characteristics for types 2N5490 through 2N5493 inclusive.

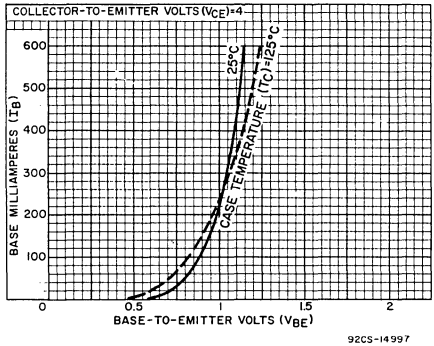


Fig.12 - Typical input characteristics for types 2N5494 through 2N5497 inclusive.

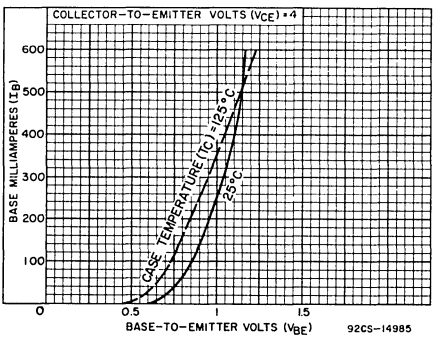


Fig.13 - Typical input characteristics for types 2N5490 through 2N5493 inclusive.

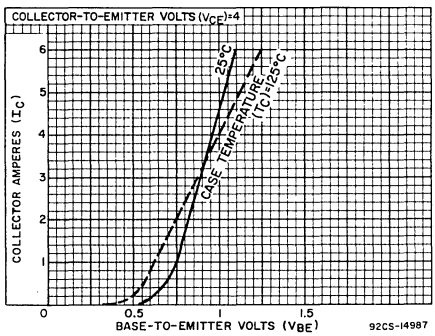


Fig.14 - Typical transfer characteristics for types 2N5494 through 2N5497 inclusive.

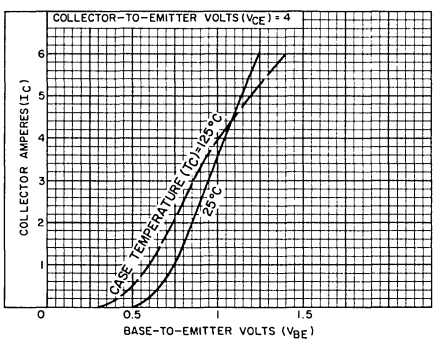


Fig.15 - Typical transfer characteristics for types 2N5490 through 2N5493 inclusive.

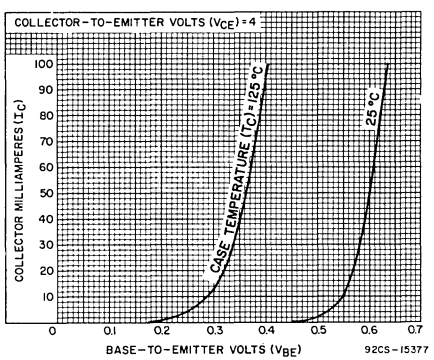


Fig.16 - Typical transfer characteristics for types 2N5490 through 2N5497 inclusive.

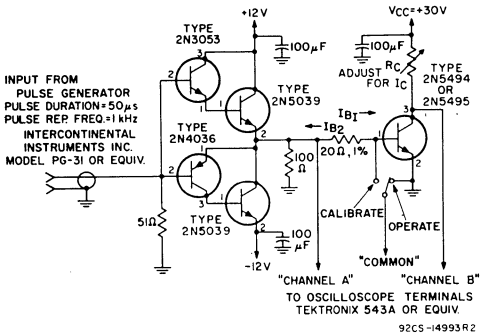


Fig.17 - Circuit used to measure switching times for types 2N5494 and 2N5495.

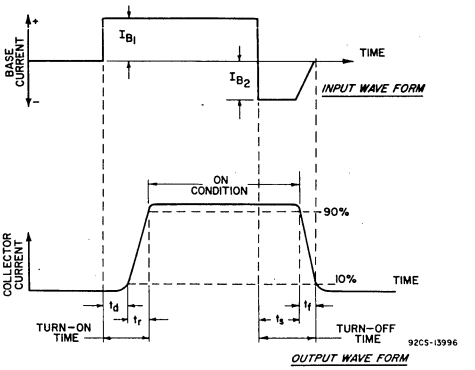


Fig.18 - Oscilloscope display for measurement of switching times (test circuit shown in Fig.17).

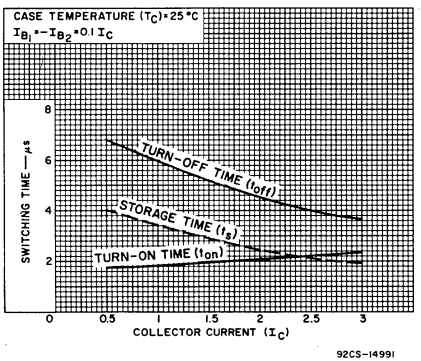


Fig.19 - Typical saturated switching characteristics for types 2N5494 and 2N5495.

TERMINAL CONNECTIONS FOR TYPES 2N5490, 2N5492, 2N5494, & 2N5496

Terminal No. 1-Base
Terminal No. 3-Emitter
Terminal No. 4-Collector

TERMINAL CONNECTIONS FOR TYPES 2N5491, 2N5493, 2N5495, & 2N5497

Terminal No. 1-Base
Terminal No. 2-Collector
Terminal No. 3-Emitter
Terminal Nc. 4-Collector