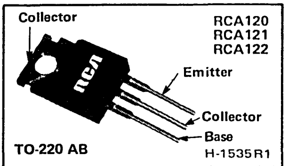
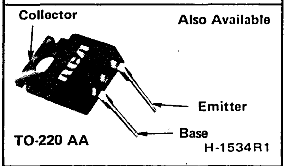
RCA Solid State Division

Power Transistors
RCA120 RCA121 RCA122





8-Ampere N-P-N Darlington Power Transistors

60-80-100 Volts, 60 Watts
Gain of 500 at 0.5 A
Gain of 1000 at 3 A

Features:

- Operates from IC without predriver
- Low leakage at high temperature
- High reverse second-breakdown capability

Applications:

- Power switching
- Audio amplifiers
- Hammer drivers
- Series and shunt regulators

The RCA120, RCA121, and RCA122 are monolithic n-p-n silicon Darlington transistors designed for low- and medium-frequency power applications. The double epitaxial construction of these devices provides good forward and reverse second-breakdown capability; their high gain makes it possible for them to be driven directly from integrated circuits.

These devices are supplied in the JEDEC TO-220AB straight-lead version of the VERSAWATT package. Optional lead configurations are available upon request. For information, contact your nearest RCA Sales Office.

The RCA120 and RCA121 are n-p-n complements of the RCA125 and RCA126 described in File 841.

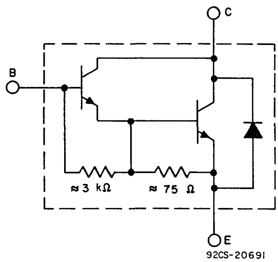


Fig. 1—Schematic diagram for all types.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

		RCA120	RCA121	RCA122	
COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	60	80	100	V
COLLECTOR-TO-EMITTER VOLTAGE:					
With external base-to-emitter resistance (R_{BE}) = 100 Ω, sustaining	$V_{CER}(sus)$	60	80	100	V
With base open, sustaining	$V_{CEO}(sus)$	60	80	100	V
With base reverse-biased V_{BE} = −1.5 V	V_{CEX}	60	80	100	V
EMITTER-TO-BASE VOLTAGE	V_{EBO}	5	5	5	V
CONTINUOUS COLLECTOR CURRENT	I_C	8	8	8	A
PEAK COLLECTOR CURRENT	I_{CM}	10	10	10	A
CONTINUOUS BASE CURRENT	I_B	0.25	0.25	0.25	A
TRANSISTOR DISSIPATION:	P_T				
At case temperatures up to 25°C		60	60	60	W
At case temperatures above 25°C			See Fig. 3		
TEMPERATURE RANGE:					
Storage and Operating (Junction)			−65 to +150		°C
LEAD TEMPERATURE (During Soldering):					
At distances ≥1/8 in (3.17 mm) from case for 10 s max.			235		°C

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

CHARACTERISTICS	SYMBOL	TEST CONDITIONS VOLTAGE V dc V_{CE}	V_{BE}	CURRENT A dc I_C	I_B	LIMITS RCA120 MIN.	MAX.	RCA121 MIN.	MAX.	RCA122 MIN.	MAX.	UNITS
Collector-Cutoff Current: With emitter open	I_{CBO}	60 80 100				– – –	0.2 – –	– – –	– 0.2 –	– – –	– – 0.2	mA
With base open	I_{CEO}	30 40 50			0 0 0	– – –	0.5 – –	– – –	– 0.5 –	– – –	– – 0.5	mA
Emitter-Cutoff Current	I_{EBO}		−5	0		–	3	–	3	–	3	mA
Collector-to-Emitter Sustaining Voltage: With base open	$V_{CEO}(sus)$			0.2[a]	0	60	–	80	–	100	–	V
DC Forward Current Transfer Ratio	h_{FE}	3 3		3[a] 0.5[a]		1000 500	– –	1000 500	– –	1000 500	– –	
Base-to-Emitter Voltage	V_{BE}	3		3[a]		–	2.5	–	2.5	–	2.5	V
Collector-to-Emitter Saturation Voltage	$V_{CE}(sat)$			3[a] 5[a]	0.012 0.02	– –	2 3	– –	2 3	– –	2 3	V
Common-Emitter, Small-Signal, Short-Circuit Forward Current Transfer Ratio: f = 1 kHz	h_{fe}	5		1		1000	–	1000	–	1000	–	
Magnitude of Common-Emitter, Small-Signal, Short-Circuit, Forward Current Transfer Ratio: f = 1.0 MHz	$\lvert h_{fe} \rvert$	5		1		20	–	20	–	20	–	
Common Base Output Capacitance: V_{CB} = 10 V, f = 1 MHz	C_{ob}					–	200	–	200	–	200	pF
Second Breakdown Energy: With base reverse-biased and L = 12 mH, R_{BE} = 100 Ω	$E_{S/b}$[b]		−1.5	4.5		120	–	120	–	120	–	mJ
Forward-Bias Second Breakdown Collector Current: t = 0.5-s nonrepetitive	$I_{S/b}$	26.5				2.25	–	2.25	–	2.25	–	A
Thermal Resistance: Junction-to-Case	$R_{\theta JC}$					–	2.1	–	2.1	–	2.1	°C/W

[a] Pulsed: Pulse duration = 300 μs, duty factor = 1.8%.

[b] $E_{S/b}$ 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.

TERMINAL CONNECTIONS

Lead No. 1 – Base
Lead No. 2 – Collector
Lead No. 3 – Emitter
Mounting Flange, Lead No. 4 – Collector

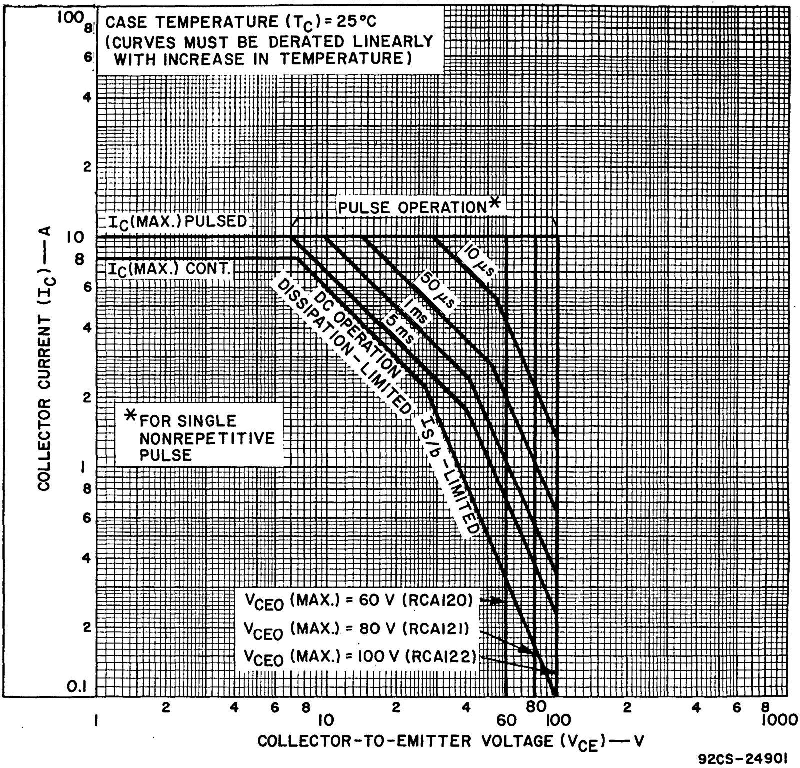

Fig. 2—Maximum operating areas for all types.

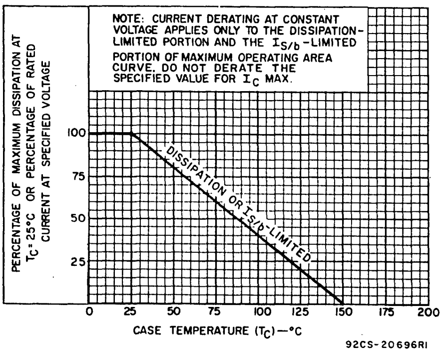

Fig. 3—Dissipation derating curve for all types.

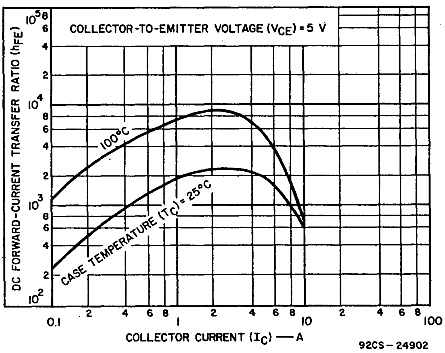

Fig. 4—Typical dc beta characteristics for all types.

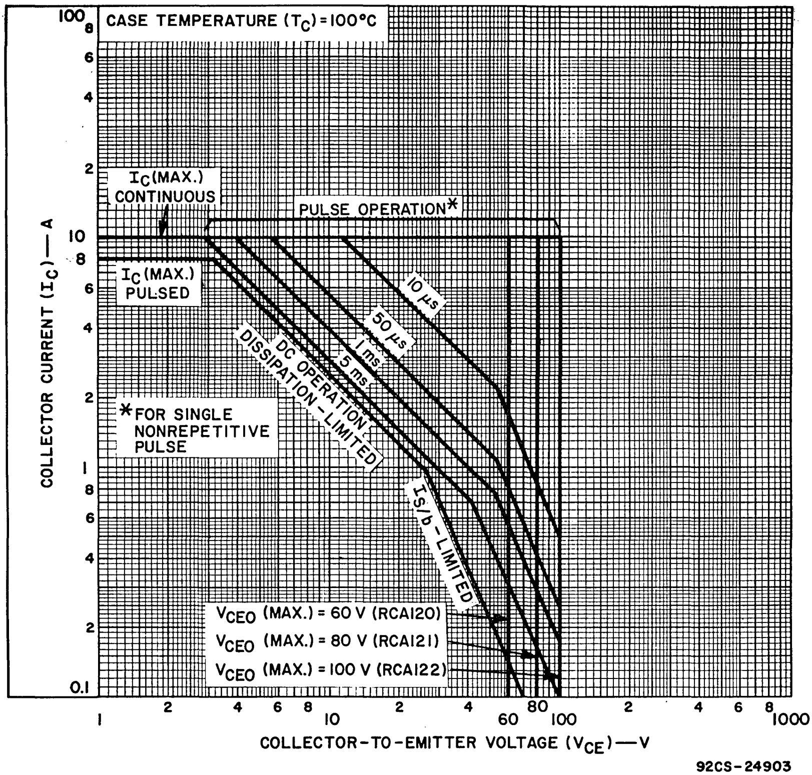

Fig. 5—Maximum operating areas for all types at T_C = 100°C.

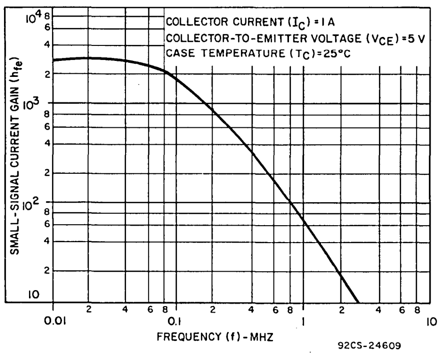

Fig. 6—Typical small-signal current gain for all types.

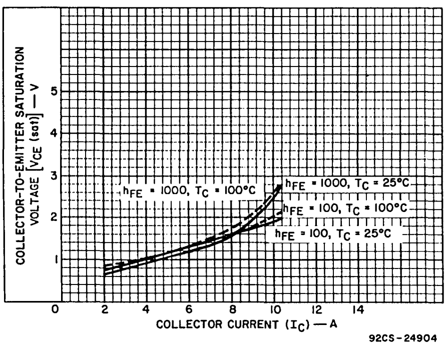

Fig. 7—Typical saturation characteristics for all types.

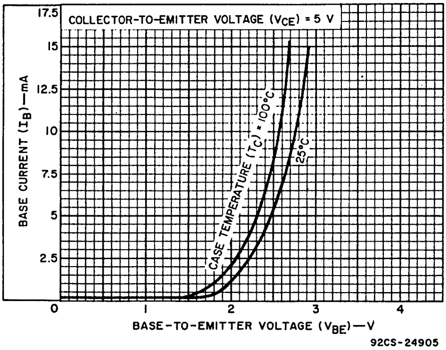

Fig. 8—Typical input characteristics for all types.

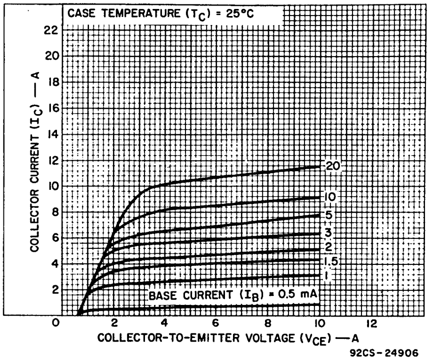

Fig. 9—Typical output characteristics for all types.

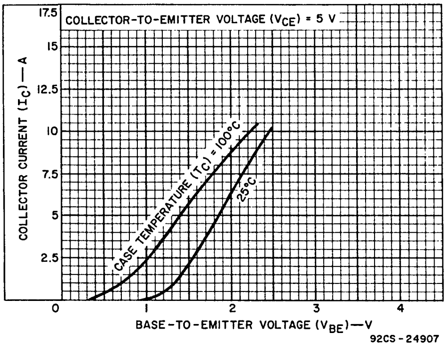

Fig. 10—Typical transfer characteristics for all types.

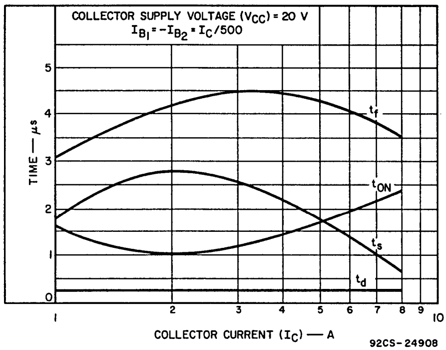

Fig. 11—Typical saturated switching-time characteristics for all types.

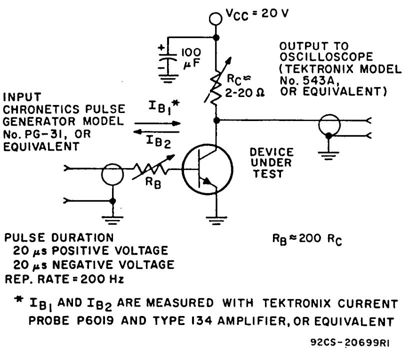

Fig. 12—Circuit used to measure saturated switching times.

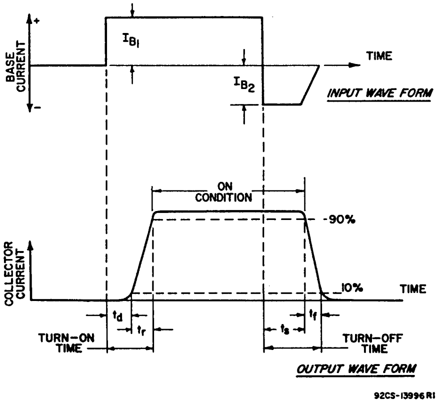

Fig. 13—Phase relationship between input current and output current showing reference points for specification of switching times (test circuit shown in Fig. 12).