

RCA9202A, RCA9202B, RCA9202C

File Number 1414

4-Ampere N-P-N Darlington Power Transistors

300, 350 and 400 Volts, 65 Watts, Gain of 750 at 2A

Features

- Direct IC input without predriver
- Low leakage at high temperature
- Hard glass passivation
- Wire bonded construction

Applications

- General purpose
- Small engine ignition
- Voltage regulator

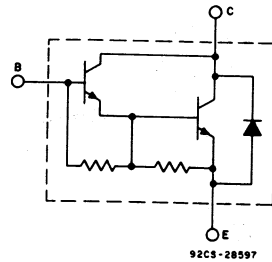
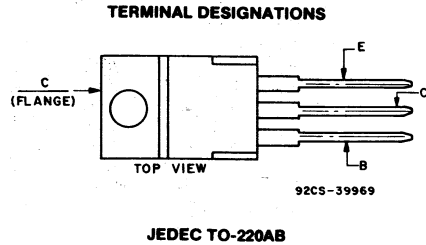


Fig. 1 - Schematic diagram for all types.

The RCA9202A, RCA9202B, and RCA9202C[•] are monolithic n-p-n silicon Darlington transistors designed for low- and medium-frequency power applications. The construction of these devices provides good forward-bias 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 (VER-SAWATT) plastic package.

[•]Formerly RCA Dev. No. TA9202A, TA9202B and TA9202C, respectively.

MAXIMUM RATINGS, Absolute-Maximum Values:

	RCA9202A	RCA9202B	RCA9202C	UNITS
V _{CB0}	300	350	400	V
V _{CEO(sus)}	300	350	400	V
V _{EB0}	5	5	5	V
I _C	4	4	4	A
I _{CM}	8	8	8	A
I _B	0.25	0.25	0.25	A
PT:				
T _c up to 25°C	65	65	65	W
T _c above 25°C	Derate linearly at			W/°C
T _{stg} , T _J	-65 to 150			°C
T _L	235			°C
At distance ≥ 1/8 in. (3.17 mm) from case for 10 s max.				

RCA9202A, RCA9202B, RCA9202C

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

CHARACTERISTIC	TEST CONDITIONS				LIMITS						UNITS	
	Voltage V dc		Current A dc		RCA9202A		RCA9202B		RCA9202C			
	V _{CE}	V _{BE}	I _c	I _b	Min.	Max.	Min.	Max.	Min.	Max.		
I _{cBO} I _E = 0	300 ^a 350 ^a 400 ^a	—	—	—	—	0.2	—	—	—	—	—	mA
I _{CEO}	250 300 350	—	—	0 0 0	—	0.5	—	—	0.5	—	—	
I _{EBO}	—	-5	0	—	—	10	—	10	—	10	—	
V _{CEO(sus)} ^c	—	—	.03 ^b	0	300	—	350	—	400	—	—	V
h _{FE}	3.0 3.0 3.0	—	2 ^b 3 ^b 4 ^b	—	750 — 500	—	750 — 500	—	750 500 250	—	—	—
V _{BE}	3.0	—	4 ^b	—	—	2.5	—	2.5	—	2.5	—	V
V _{CE(sat)}	—	—	2 ^b 3 ^b 4 ^b	.1 .15 .2	—	1.5 1.5 1.5	—	1.5 1.5 1.5	—	1.5 1.5 1.5	—	V
C _{obo} V _{CB} = 10 V f = 1 MHz	—	—	—	—	100 Typ.		100 Typ.		100 Typ.		—	pF
I _{s/b} t = 0.5 s non- rep. pulse	50	—	—	—	1.3	—	1.3	—	1.3	—	—	A
R _{θJC}	—	—	—	—	—	1.92	—	1.92	—	1.92	—	° C/W

^aV_{CB} value.

^bPulsed, pulse duration = 300 μs, duty factor ≤ 2%.

^cCaution: Sustaining voltage, V_{CEO(sus)}, must not be measured on a curve tracer.

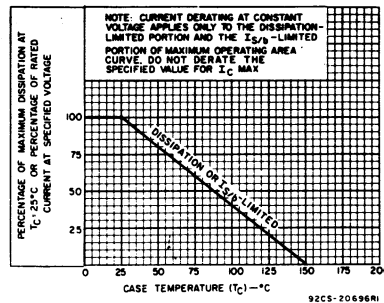


Fig. 2 - Derating curve for all types.

RCA9202A, RCA9202B, RCA9202C

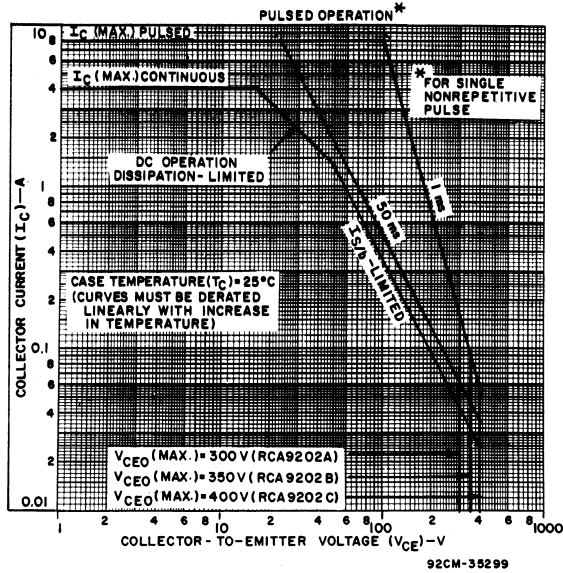


Fig. 3 - Maximum operating areas for all types.

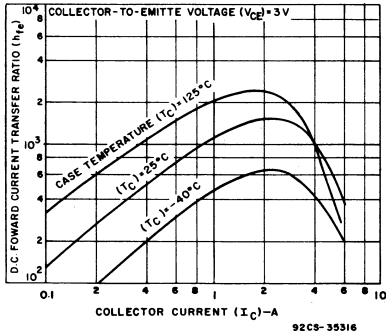


Fig. 4 - Typical dc beta characteristics for all types.

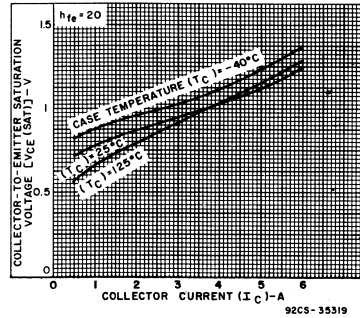


Fig. 5 - Typical saturation characteristics for all types.

RCA9202A, RCA9202B, RCA9202C

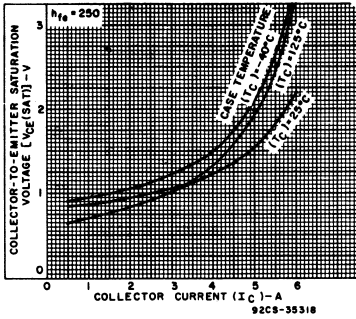


Fig. 6 - Typical saturation characteristics for all types.

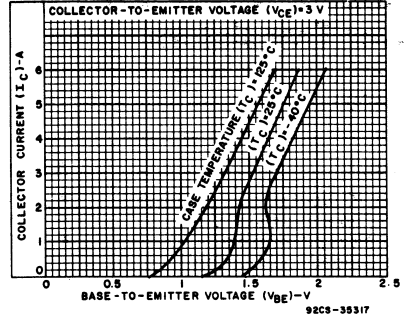


Fig. 7 - Typical transfer characteristics for all types.

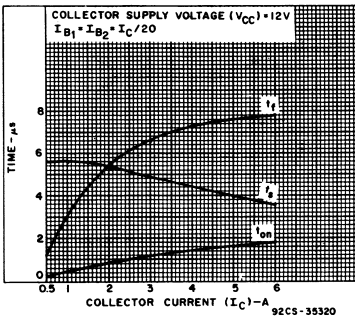


Fig. 8 - Typical saturated switching characteristics for all types.

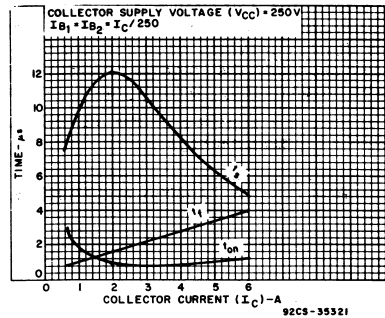


Fig. 9 - Typical saturated switching characteristics for all types.

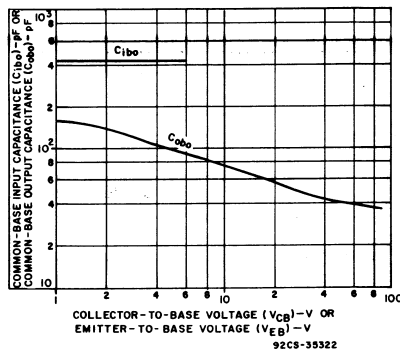


Fig. 10 - Typical common-base input (C_{ibo}) or output (C_{obo}) capacitance characteristics (all types).

RCA9203A, RCA9203B

File Number **1413**

4-Ampere N-P-N Darlington Power Transistors

250 and 300 Volts, 50 Watts
Gain of 500 at 2 A

Features

- Direct IC input without predriver
- No R_2 , no anti-parallel diode
- Hard glass passivation
- Wire bonded construction

Applications

- General purpose
- Small engine ignition
- Voltage regulator

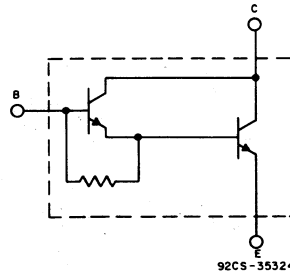
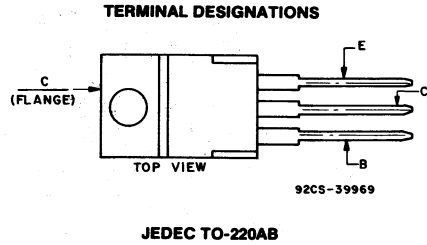


Fig. 1 - Schematic diagram for all types.

The RCA9203A, and RCA9203B* are monolithic n-p-n silicon Darlington transistors designed for low-and medium-frequency power applications. The construction of these devices provides good forward-bias 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 (VERSAWATT) plastic package.

*Formerly RCA Dev. No. TA9203A, and TA9203B.

MAXIMUM RATINGS, Absolute-Maximum Values:

	RCA9203A	RCA9203B	UNITS
V_{CE0}	250	300	V
$V_{CE0(SUS)}$	250	300	V
V_{EBO}	9	9	V
I_C	4	4	A
I_{CM}	6	6	A
I_B	0.25	0.25	A
P_T			
T_C up to 25°C	50	50	W
T_C above 25°C	Derate linearly at 0.4		W/°C
T_{stg}, T_J	-65 to 150		°C
T_L			
At distance $\geq 1/8$ in. (3.17 mm) from case for 10 s max.	235		°C

RCA9203A, RCA9203B

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

CHARACTERISTIC	TEST CONDITIONS				LIMITS				UNITS
	VOLTAGE V dc		CURRENT A dc		RCA9203A		RCA9203B		
	V_{CE}	V_{BE}	I_C	I_B	Min.	Max.	Min.	Max.	
I_{CBO} $I_E = 0$	250 ^a 300 ^a	—	—	—	—	0.2	—	—	mA
I_{CEO}	200 250	—	—	0 0	—	0.5	—	—	
I_{EBO}	—	-9	0	—	—	1	—	1	mA
$V_{CEO(sus)}^c$	—	—	.03 ^b	0	250	—	300	—	V
h_{FE}	3.0 3.0	—	2 ^b 4 ^b	—	500 100	—	500 100	—	
V_{BE}	3.0	—	4 ^b	—	—	2.5	—	2.5	V
$V_{CE(sat)}$	—	—	2 ^b 4 ^b	.1 .2	—	1.5 2.0	—	1.5 2.0	V
C_{obo} $V_{CB} = 10$ V $f = 1$ MHz	—	—	—	—	100 Typ.		100 Typ.		pF
$I_{s/b}$ $t = 0.5$ s non- rep. pulse	40	—	—	—	1.25	—	1.25	—	A
$R_{\theta JC}$	—	—	—	—	—	2.5	—	2.5	°C/W

^a V_{CB} value.

^bPulsed, pulse duration = 300 μ s, duty factor \leq 2%.

^cCaution: Sustaining voltage, $V_{CEO(sus)}$, must not be measured on a curve tracer.

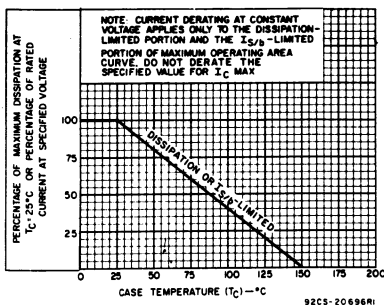


Fig. 2 - Derating curve for all types.

RCA9203A, RCA9203B

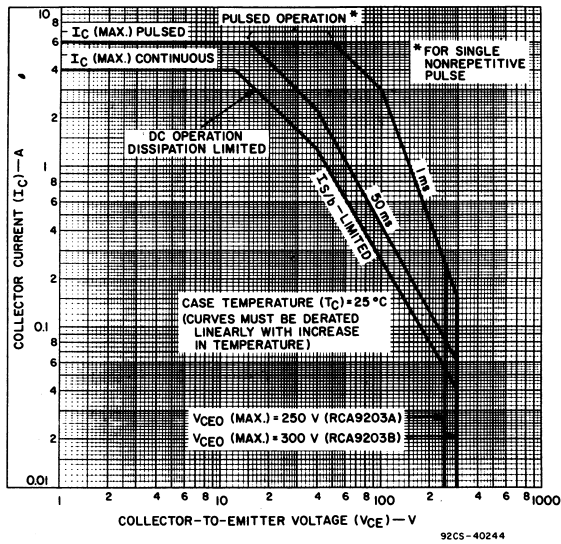


Fig. 3 - Maximum operating areas for all types.

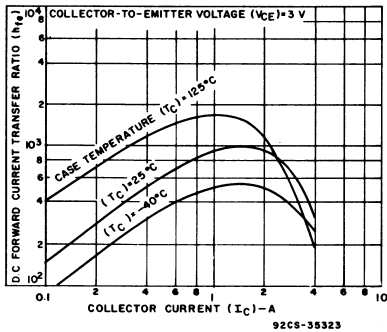


Fig. 4 - Typical dc beta characteristics for all types.

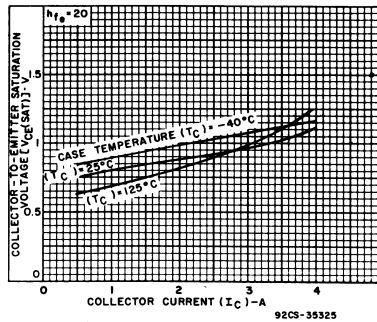


Fig. 5 - Typical saturation characteristics for all types.

RCA9203A, RCA9203B

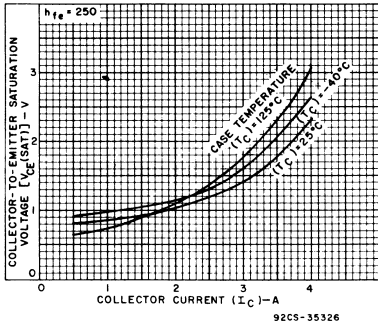


Fig. 6 - Typical saturation characteristics for all types.

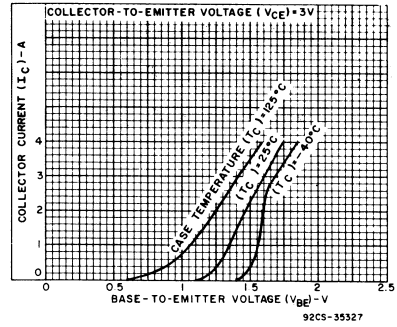


Fig. 7 - Typical transfer characteristics for all types.

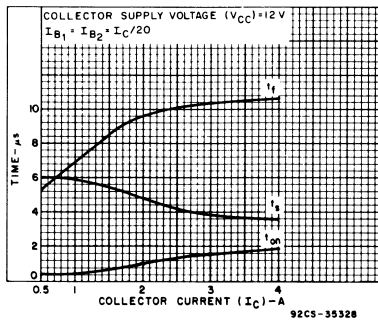


Fig. 8 - Typical saturated switching characteristics for all types.

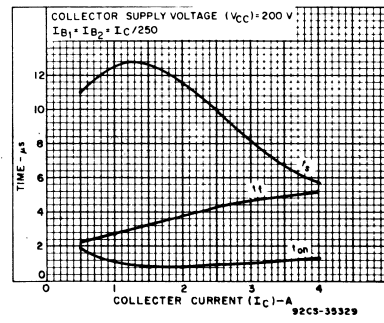


Fig. 9 - Typical saturated switching characteristics for all types.

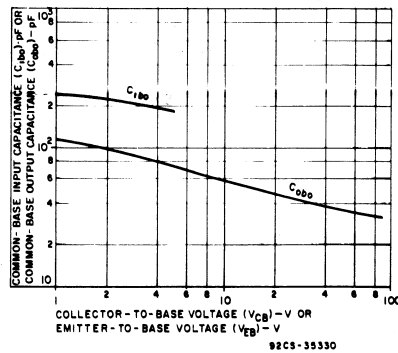


Fig. 10 - Typical common-base input (C_{ibo}) or output (C_{obo}) capacitance characteristics (all types).

**RCA9228A, RCA9228B, RCA9228C, RCA9228D
RCA9229A, RCA9229B, RCA9229C, RCA9229D**

**50-A Complementary High-Current,
Medium-Voltage N-P-N and P-N-P Silicon
Darlington Power Transistors**

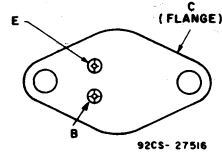
Features:

- 300 W at 25° C case temperature
- 50-A rated collector current
- Hard glass passivation
- Wire-bonded construction

Applications:

- General purpose
- Low-speed switching
- DC motor control

TERMINAL DESIGNATIONS



JEDEC TO-204AE

(141 mil diameter pin isolation)

The RCA9228A, RCA9228B, RCA9228C, RCA9228D and the RCA9229A*, RCA9229B*, RCA9229C*, RCA9229D* are complementary n-p-n and p-n-p silicon Darlington transistors designed for general-purpose amplifier and low-speed switching applications. The high gain of these devices makes it possible for them to be driven directly from integrated circuits.

These devices are supplied in the JEDEC TO-204AE hermetic steel package.

*The RCA9228A, RCA9228B, RCA9228C, RCA9228D and RCA9229A, RCA9229B, RCA9229C, RCA9229D were formerly RCA developmental nos. TA9228 and TA9229, respectively.

MAXIMUM RATINGS, Absolute-Maximum Values:

	RCA9228A RCA9229A*	RCA9228B RCA9229B*	RCA9228C RCA9229C*	RCA9228D RCA9229D*	
V _{CEO}	60	80	100	120	V
V _{CEO(SUS)}	60	80	100	120	V
V _{ESD}	5				V
I _C	50				A
I _B	1				A
P _T					
T _C ≤ 25° C	300				W
T _C > 25° C	Derate linearly				W/°C
T _{stg} , T _J	-65 to +150				°C
T _L					
At distances > 1/8 in. (3.17 mm) from case for 10 s max.	235				°C

* For p-n-p devices, voltage and current values are negative.

RCA9228A, RCA9228B, RCA9228C, RCA9228D RCA9229A, RCA9229B, RCA9229C, RCA9229D

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

CHARACTERISTIC	TEST CONDITIONS				LIMITS								UNITS
	VOLTAGE V dc		CURRENT A dc		RCA9228A RCA9229A*		RCA9228B RCA9229B*		RCA9228C RCA9229C*		RCA9228D RCA9229D*		
	V_{CE}	V_{BE}	I_c	I_B	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
I_{CEO}	50 70 90 110				—	0.5	—	0.5	—	—	—	—	mA
I_{EBO}		-5			—	5	—	5	—	5	—	5	mA
$V_{CEO(SUS)}$	a		0.1 ^b		60	—	80	—	100	—	120	—	V
h_{FE}	3 5		25 50		2000 400	—	2000 400	—	2000 400	—	2000 400	—	
$V_{BE(sat)}$			25 50	0.2 0.3	—	3 4.5	—	3 4.5	—	3 4.5	—	3 4.5	V
$V_{CE(sat)}$			25 50	0.25 0.5	—	2.5 3.5	—	2.5 3.5	—	2.5 3.5	—	2.5 3.5	V
$I_{s,b}$ $t = 0.5$ sec.	30				10	—	10	—	10	—	10	—	A
C_{obo} $V_{CB} = 10$ V RCA9228A,B,C,D RCA9229A,B,C,D					Typ. 300 Typ. 600	—	Typ. 300 Typ. 600	—	Typ. 300 Typ. 600	—	Typ. 300 Typ. 600	—	pF
$f_{\alpha e}$ at $f = 1$ MHz					Typ. 5	—	Typ. 5	—	Typ. 5	—	Typ. 5	—	
$R_{\theta JC}$					—	0.416	—	0.416	—	0.416	—	0.416	°C/W

• For p-n-p devices, voltage and current values are negative.

a CAUTION: Sustaining voltage $V_{CEO(SUS)}$ MUST NOT be measured on a curve tracer.

b Pulsed: Pulse duration = 300 μ s, duty factor < 2%.

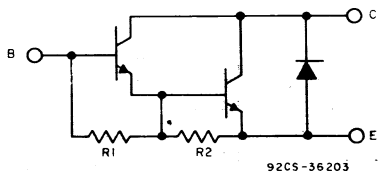


Fig. 1 - Schematic diagram for RCA9228A, RCA9228B, RCA9228C, RCA9228D.

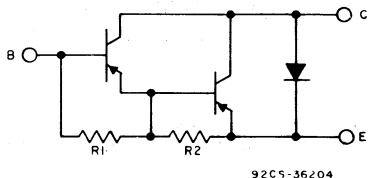
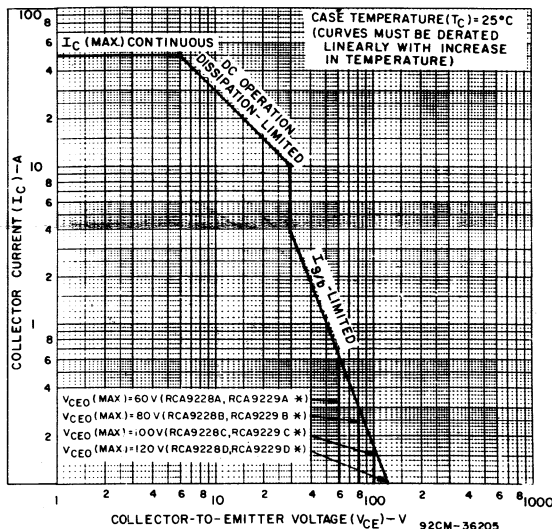


Fig. 2 - Schematic diagram for RCA9229A, RCA9229B, RCA9229C, RCA9229D.



*FOR P-N-P DEVICES, VOLTAGE AND CURRENT VALUES ARE NEGATIVE

Fig. 3 - Maximum operating areas for all types.

**RCA9228A, RCA9228B, RCA9228C, RCA9228D
RCA9229A, RCA9229B, RCA9229C, RCA9229D**

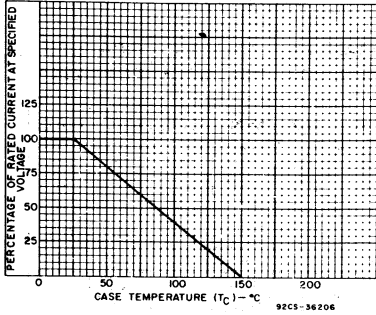


Fig. 4 - Current derating curve for all types.

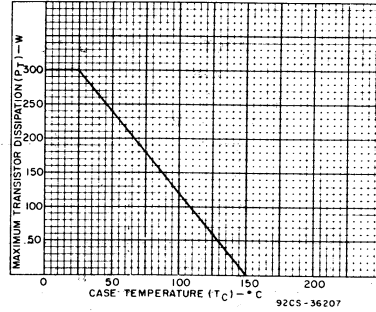


Fig. 5 - Power derating curve for all types.

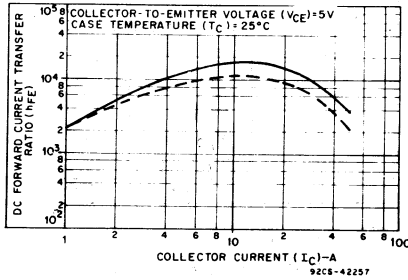


Fig. 6 - Typical dc beta characteristics for all types.

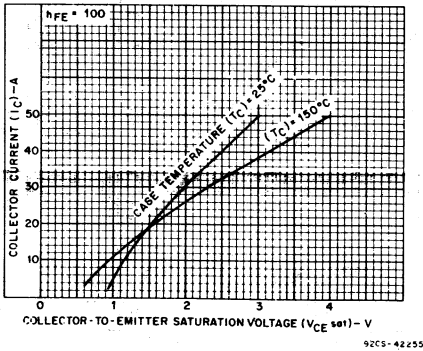


Fig. 7 - Typical collector-to-emitter saturation voltage characteristics for RCA9228A, RCA9228B, RCA9228C and RCA9228D.

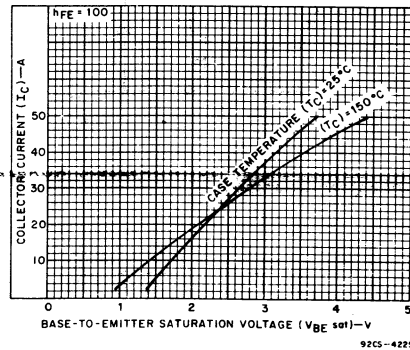


Fig. 8 - Typical base-to-emitter saturation voltage characteristics for RCA9228A, RCA9228B, RCA9228C and RCA9228D.