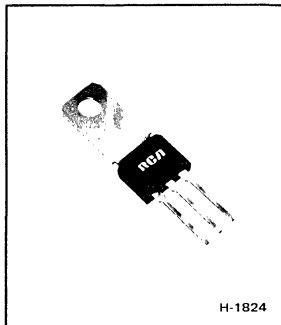




Power Transistors

RCP700, RCP702, RCP704, RCP706 Series



General-Purpose, Medium-Power Silicon P-N-P Planar Transistors

For Large-Signal Applications

h_{FE} $V_{CE(sus)}$ (V)	At $V_{CE} = 4$ V, $I_C = 500$ mA			
	50–250	30–150	50 min.	20 min.
100	RCP700D	RCP702D	—	—
80	RCP700C	RCP702C	—	—
60	RCP700B	RCP702B	RCP704B	RCP706B
40	RCP700A	RCP702A	—	—
30	—	—	RCP704	RCP706

Features

- Maximum safe-area-of-operation curves specified for dc operation
- Planar construction for low noise and low leakage
- High gain at high current
- Fast switching time
- Thermal-cycling ratings
- P-N-P complements of n-p-n types in RCP701, RCP703, RCP705, and RCP707 series

The RCP700—, RCP702—, RCP704—, and RCP706—series power transistors are double-diffused, epitaxial-planar silicon p-n-p transistors. They are intended for a wide variety of large-signal, general-purpose applications such as complementary vertical deflection, TV sound output, regulators, and driver and output stages of audio amplifiers. They are the p-n-p complements of the n-p-n devices in the RCP701, RCP703, RCP705, and RCP707 series*. These devices are supplied in a molded plastic package.

* See bulletin File No. 820 for data for the RCP701—, RCP703—, RCP705—, and RCP707—series devices.

MAXIMUM RATINGS, Absolute-Maximum Values:

	RCP700D RCP702D	RCP700C RCP702C	RCP700B RCP702B	RCP700A RCP702A	RCP704B RCP706B	RCP704 RCP706	
COLLECTOR-TO-BASE VOLTAGE V_{CBO}	—125	—105	—85	—55	—85	—45	V
COLLECTOR-TO-EMITTER SUSTAINING VOLTAGE: With base open $V_{CE(sus)}$	—100	—80	—60	—40	—60	—30	V
EMITTER-TO-BASE VOLTAGE V_{EBO}	—7	—7	—7	—7	—5.5	—5.5	V
CONTINUOUS COLLECTOR CURRENT I_C	—2	—2	—2	—2	—2	—2	A
CONTINUOUS BASE CURRENT I_B	—1	—1	—1	—1	—1	—1	A
TRANSISTOR DISSIPATION: At case temperatures up to 25°C P_T	10	10	10	10	10	10	W
At ambient temperatures up to 25°C	1.75	1.75	1.75	1.75	1.75	1.75	W
At case temperatures above 25°C	Derate linearly 0.08 W/°C						
At ambient temperatures above 25°C	Derate linearly 0.014 W/°C						
TEMPERATURE RANGE: Storage & Operating (Junction)	—65 to +150						°C
PIN TEMPERATURE (During Soldering) At distances $\geq 1/8$ in. (3.17 mm) from seating plane for 10 s max	230						°C

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS					LIMITS				UNITS
		VOLTAGE V dc			CURRENT mA dc		RCP700D		RCP700C		
		V _{CB}	V _{CE}	V _{BE}	I _C	I _B	Min.	Max.	Min.	Max.	
Collector Cutoff Current: With emitter open	I _{CBO}	-105 -85					— —	-0.5 —	— —	— -0.5	μA
With base open	I _{CEO}		-75 -60				— —	-100 —	— —	— -100	μA
With base-emitter junction reverse-biased	I _{CEV}		-125 -105	1.5 1.5			— —	-100 —	— —	— -100	μA
Emitter Cutoff Current	I _{EBO}			7	0		—	-100	—	-100	μA
DC Forward-Current Transfer Ratio	h _{FE}		-4 -4		-500 ^a -1000 ^a		50 10	250 —	50 10	250 —	
Collector-to-Emitter Sustaining Voltage: With base open ^b	V _{CEO(sus)}				-100 ^a	0	-100	—	-80	—	V
Base-to-Emitter Saturation Voltage	V _{BE(sat)}				-500 ^a	-50	—	-1.2	—	-1.2	V
Base-to-Emitter Voltage	V _{BE}		-4		-500 ^a		—	-1.1	—	-1.1	V
Collector-to-Emitter Saturation Voltage	V _{CE(sat)}				-500 ^a	-50	—	-0.8	—	-0.8	V
Magnitude of Common- Emitter, Small-Signal, Short-Circuit, Forward- Current Transfer Ratio: f = 10 MHz	h _{fe}		-4		-50		5	—	5	—	
Gain-Bandwidth Product	f _T		-4		-50		50	—	50	—	MHz
Second-Breakdown Collector Current: With base forward- biased and t = 50 ms	I _{S/b}		-50				-150	—	-150	—	mA
Output Capacitance : f = 1 MHz	C _{obo}	-10					20	40	20	40	pF
Saturated Switching Time (V _{CC} = 30 V, I _{B1} = I _{B2}): Turn-on (t _d + t _r)	t _{ON}				-500	-50	—	100	—	100	ns
Turn-off (t _s + t _f)	t _{OFF}				-500	-50	—	1000	—	1000	
Thermal Resistance: Junction-to-case	R _{θJC}						—	12.5	—	12.5	°C/W
Junction-to-ambient	R _{θJA}						—	71.4	—	71.4	

^a Pulsed, pulse duration = 300 μs, duty factor ≤ 2%.^b CAUTION: Sustaining voltage, V_{CEO(sus)}, MUST NOT be measured on a curve tracer.

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS					LIMITS				UNITS
		VOLTAGE V dc			CURRENT mA dc		RCP700B		RCP700A		
		V _{CB}	V _{CE}	V _{BE}	I _C	I _B	Min.	Max.	Min.	Max.	
Collector Cutoff Current: With emitter open	I _{CBO}	-70 -50					- -	-0.5 -	- -	- -0.5	μA
With base open	I _{CEO}		-45 -30			0 0	- -	-100 -	- -	- -100	μA
With base-emitter junction reverse-biased	I _{CEV}		-85 -55	1.5 1.5			- -	-100 -	- -	- -100	μA
Emitter Cutoff Current	I _{EBO}			7	0		-	-100	-	-100	μA
DC Forward-Current Transfer Ratio	h _{FE}		-4 -4		-500 ^a -1000 ^a		50 10	250 -	50 10	250 -	
Collector-to-Emitter Sustaining Voltage: With base open ^b	V _{CEO(sus)}				-100 ^a	0	-60	-	-40	-	V
Base-to-Emitter Saturation Voltage	V _{BE(sat)}				-500 ^a	-50	-	-1.2	-	-1.2	V
Base-to-Emitter Voltage	V _{BE}		-4		-500 ^a		-	-1.1	-	-1.1	V
Collector-to-Emitter Saturation Voltage	V _{CE(sat)}				-500 ^a	-50	-	-0.8	-	-0.8	V
Magnitude of Common- Emitter, Small-Signal, Short-Circuit, Forward- Current Transfer Ratio: f = 10 MHz	h _{fe}		-4		-50		5	-	5	-	
Gain-Bandwidth Product	f _T		-4		-50		50	-	50	-	MHz
Second-Breakdown Collector Current: With base forward- biased and t = 50 ms	I _{S/b}		-50 -35				-150 -	- -	- -285	- -	mA
Output Capacitance : f = 1 MHz	C _{obo}	-10					20	40	20	40	pF
Saturated Switching Time (V _{CC} = 30 V, I _{B1} = I _{B2}): Turn-on (t _d + t _r)	t _{ON}				-500	-50	-	100	-	100	ns
Turn-off (t _s + t _f)	t _{OFF}				-500	-50	-	1000	-	1000	
Thermal Resistance: Junction-to-case	R _{θJC}						-	12.5	-	12.5	°C/W
Junction-to-ambient	R _{θJA}						-	71.4	-	71.4	

^a Pulsed, pulse duration = 300 μs, duty factor ≤ 2%.^b CAUTION: Sustaining voltage, V_{CEO(sus)}, MUST NOT be measured on a curve tracer.

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS						LIMITS				UNITS
		VOLTAGE V dc			CURRENT mA dc		RCP702D		RCP702C			
		V _{CB}	V _{CE}	V _{BE}	I _C	I _B	Min.	Max.	Min.	Max.		
Collector Cutoff Current: With emitter open	I _{CBO}	-105 -85					- -	-0.5 -	- -	- -0.5	μA	
With base open	I _{CEO}		-75 -60			0 0	- -	-100 -	- -	- -100	μA	
With base-emitter junction reverse-biased	I _{CEV}		-125 -105	1.5 1.5			- -	-100 -	- -	- -100	μA	
Emitter Cutoff Current	I _{EBO}			7	0		-	-100	-	-100	μA	
DC Forward-Current Transfer Ratio	h _{FE}		-4 -4		-500 ^a -1000 ^a		30 10	150 -	30 10	150 -		
Collector-to-Emitter Sustaining Voltage: With base open ^b	V _{CEO(sus)}				-100 ^a	0	-100	-	-80	-	V	
Base-to-Emitter Saturation Voltage	V _{BE(sat)}				-500 ^a	-50	-	-1.2	-	-1.2	V	
Base-to-Emitter Voltage	V _{BE}		-4		-500 ^a		-	-	-	-	V	
Collector-to-Emitter Saturation Voltage	V _{CE(sat)}				-500 ^a	-50	-	-0.8	-	-0.8	V	
Magnitude of Common- Emitter, Small-Signal, Short-Circuit, Forward- Current Transfer Ratio: f = 10 MHz	h _{fe}		-4		-50		5	-	5	-		
Gain-Bandwidth Product	f _T		-4		-50		50	-	50	-	MHz	
Second-Breakdown Collector Current: With base forward- biased and t = 50 ms	I _{S/b}		-50				-150	-	-150	-	mA	
Output Capacitance : f = 1 MHz	C _{obo}	-10					20	40	20	40	pF	
Saturated Switching Time (V _{CC} = 30 V, I _{B1} = I _{B2}): Turn-on (t _d + t _r)	t _{ON}				-500	-50	-	100	-	100	ns	
Turn-off (t _s + t _f)	t _{OFF}				-500	-50	-	1000	-	1000		
Thermal Resistance: Junction-to-case	R _{θJC}						-	12.5	-	12.5	°C/W	
Junction-to-ambient	R _{θJA}						-	71.4	-	71.4		

^a Pulsed, pulse duration = 300 μs, duty factor ≤ 2%.^b CAUTION: Sustaining voltage, V_{CEO(sus)}, MUST NOT be measured on a curve tracer.

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS					LIMITS				UNITS
		VOLTAGE V dc			CURRENT mA dc		RCP702B		RCP702A		
		V _{CB}	V _{CE}	V _{BE}	I _C	I _B	Min.	Max.	Min.	Max.	
Collector Cutoff Current: With emitter open	I _{CBO}	-70 -50					— —	-0.5 —	— —	-0.5 -0.5	μA
With base open	I _{CEO}		-45 -30			0 0	— —	-100 —	— —	-100 -100	μA
With base-emitter junction reverse-biased	I _{CEV}		-85 -55	1.5 1.5			— —	-100 —	— —	-100 -100	μA
Emitter Cutoff Current	I _{EBO}			7	0		— -100	-100	— -100	-100	μA
DC Forward-Current Transfer Ratio	h _{FE}		-4 -4		-500 ^a -1000 ^a		30 10	150 —	30 10	150 —	
Collector-to-Emitter Sustaining Voltage: With base open ^b	V _{CEO(sus)}				-100 ^a	0	-60	—	-40	—	V
Base-to-Emitter Saturation Voltage	V _{BE(sat)}				-500 ^a	-50	—	-1.2	—	-1.2	V
Base-to-Emitter Voltage	V _{BE}		-4		-500 ^a		—	-1.1	—	-1.1	V
Collector-to-Emitter Saturation Voltage	V _{CE(sat)}				-500 ^a	-50	—	-0.8	—	-0.8	V
Magnitude of Common- Emitter, Small-Signal, Short-Circuit, Forward- Current Transfer Ratio: f = 10 MHz	h _{fe}		-4		-50		5	—	5	—	
Gain-Bandwidth Product	f _T		-4		-50		50	—	50	—	MHz
Second-Breakdown Collector Current: With base forward- biased and t = 50 ms	I _{S/b}		-50 -35			— —	-150 —	— —	— -285	— —	mA
Output Capacitance: f = 1 MHz	C _{obo}	-10					20	40	20	40	pF
Saturated Switching Time (V _{CC} = 30 V, I _{B1} = I _{B2}): Turn-on (t _d + t _r)	t _{ON}				-500	-50	—	100	—	100	ns
Turn-off (t _s + t _f)	t _{OFF}				-500	-50	—	1000	—	1000	
Thermal Resistance: Junction-to-case	R _{θJC}						—	12.5	—	12.5	°C/W
Junction-to-ambient	R _{θJA}						—	71.4	—	71.4	

^a Pulsed, pulse duration = 300 μs, duty factor ≤ 2%.^b CAUTION: Sustaining voltage, V_{CEO(sus)}, MUST NOT be measured on a curve tracer.

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

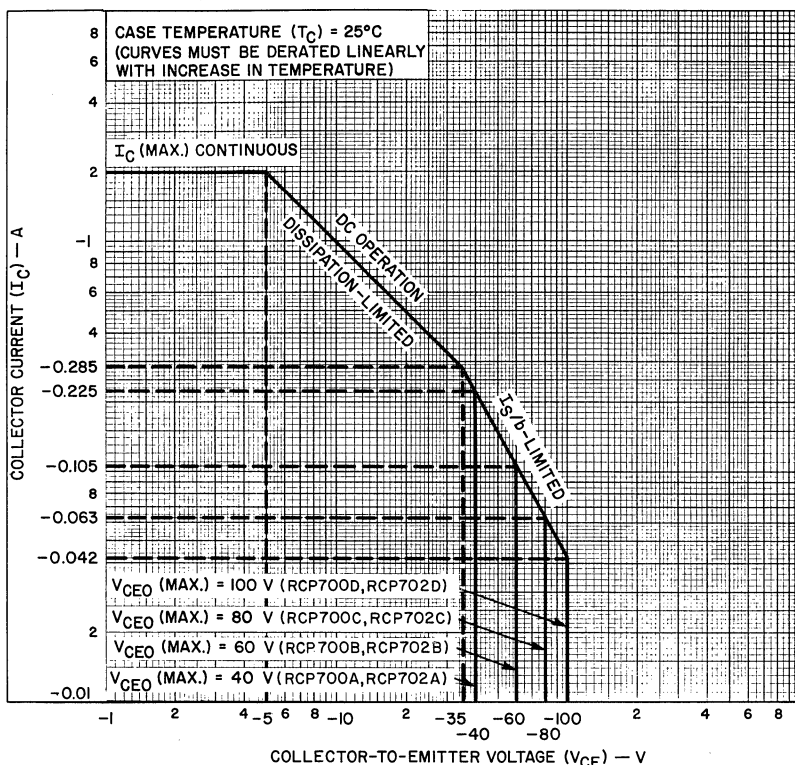
CHARACTERISTIC	SYMBOL	TEST CONDITIONS					LIMITS				UNITS
		VOLTAGE V dc			CURRENT mA dc		RCP704B		RCP704		
		V _{CB}	V _{CE}	V _{BE}	I _C	I _B	Min.	Max.	Min.	Max.	
Collector Cutoff Current: With emitter open	I _{CBO}	-70 -40					-	-5 -	-	- -5	μA
With base open	I _{CEO}		-45 -22				-	-1000 -	-	- -1000	μA
With base-emitter junction reverse-biased	I _{CEV}		-85 -45	1.5 1.5			-	-100 -	-	- -100	μA
Emitter Cutoff Current	I _{EBO}			5.5	0		-	-100	-	-100	μA
DC Forward-Current Transfer Ratio	h _{FE}		-4		-500 ^a		50	-	50	-	
Collector-to-Emitter Sustaining Voltage: With base open ^b	V _{CEO(sus)}				-100 ^a	0	-60	-	-30	-	V
Base-to-Emitter Saturation Voltage	V _{BE(sat)}				-500 ^a	-50	-	-1.6	-	-1.6	V
Base-to-Emitter Voltage	V _{BE}		-4		-500 ^a		-	-1.5	-	-1.5	V
Collector-to-Emitter Saturation Voltage	V _{CE(sat)}				-500 ^a	-50	-	-1.2	-	-1.2	V
Magnitude of Common- Emitter, Small-Signal, Short-Circuit, Forward- Current Transfer Ratio: f = 10 MHz	h _{fe}		-4		-50		5	-	5	-	
Gain-Bandwidth Product	f _T		-4		-50		50	-	50	-	MHz
Second-Breakdown Collector Current: With base forward- biased and t = 50 ms	I _{S/b}		-50 -20				-100 -	- -	- -500	- -	mA
Output Capacitance : f = 1 MHz	C _{obo}	-10					20	40	20	40	pF
Saturated Switching Time (V _{CC} = 30 V, I _{B1} = I _{B2}): Turn-on (t _d + t _r)	t _{ON}				-500	-50	-	100	-	100	ns
Turn-off (t _s + t _f)	t _{OFF}				-500	-50	-	1000	-	1000	
Thermal Resistance: Junction-to-case	R _{θJC}						-	12.5	-	12.5	°C/W
Junction-to-ambient	R _{θJA}						-	71.4	-	71.4	

^a Pulsed, pulse duration = 300 μs, duty factor ≤ 2%.^b CAUTION: Sustaining voltage, V_{CEO(sus)}, MUST NOT be measured on a curve tracer.

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

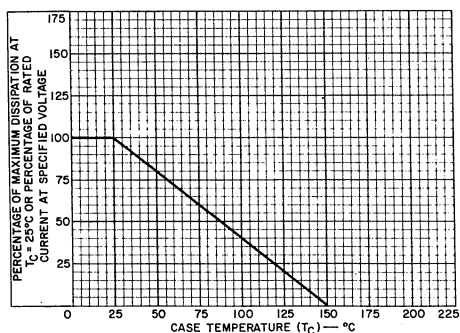
CHARACTERISTIC	SYMBOL	TEST CONDITIONS					LIMITS				UNITS
		VOLTAGE V dc			CURRENT mA dc		RCP706B		RCP706		
		V _{CB}	V _{CE}	V _{BE}	I _C	I _B	Min.	Max.	Min.	Max.	
Collector Cutoff Current: With emitter open	I _{CBO}	-70 -40					— —	-5 —	— —	— -5	μA
With base open	I _{CEO}		-45 -22			0 0	— —	-1000 —	— —	— -1000	μA
With base-emitter junction reverse-biased	I _{CEV}		-85 -45	1.5 1.5			— —	-100 —	— —	— -100	μA
Emitter Cutoff Current	I _{EBO}			5.5	0		—	-100	—	-100	μA
DC Forward-Current Transfer Ratio	h _{FE}		-4		-500 ^a		20	—	20	—	
Collector-to-Emitter Sustaining Voltage: With base open ^b	V _{CEO(sus)}				-100 ^a	0	-60	—	-30	—	V
Base-to-Emitter Saturation Voltage	V _{BE(sat)}				-500 ^a	-50	—	-1.6	—	-1.6	V
Base-to-Emitter Voltage	V _{BE}		-4		-500 ^a		—	-1.5	—	-1.5	V
Collector-to-Emitter Saturation Voltage	V _{CE(sat)}				-500 ^a	-50	—	-1.2	—	-1.2	V
Magnitude of Common- Emitter, Small-Signal, Short-Circuit, Forward- Current Transfer Ratio: f = 10 MHz	h _{fe}		-4		-50		5	—	5	—	
Gain-Bandwidth Product	f _T		-4		-50		50	—	50	—	MHz
Second-Breakdown Collector Current: With base forward- biased and t = 50 ms	I _{S/b}		-50 -20				-100 —	— —	— -500	— —	mA
Output Capacitance: f = 1 MHz	C _{obo}	-10					20	40	20	40	pF
Saturated Switching Time (V _{CC} = 30 V, I _{B1} = I _{B2}): Turn-on (t _d + t _r)	t _{ON}				-500	-50	—	100	—	100	ns
Turn-off (t _s + t _f)	t _{OFF}				-500	-50	—	1000	—	1000	
Thermal Resistance: Junction-to-case	R _{θJC}						—	12.5	—	12.5	°C/W
Junction-to-ambient	R _{θJA}						—	71.4	—	71.4	

^a Pulsed, pulse duration = 300 μs, duty factor ≤ 2%.^b **CAUTION:** Sustaining voltage, V_{CEO(sus)}, MUST NOT be measured on a curve tracer.



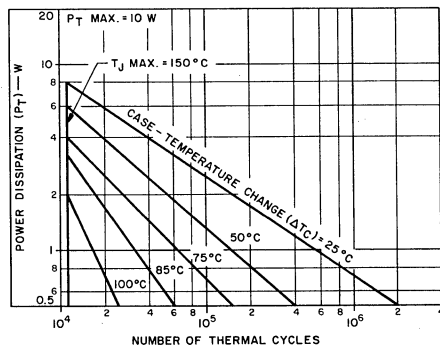
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Fig. 1 — Maximum operating areas for RCP700A — RCP700D and RCP702A — RCP702D.



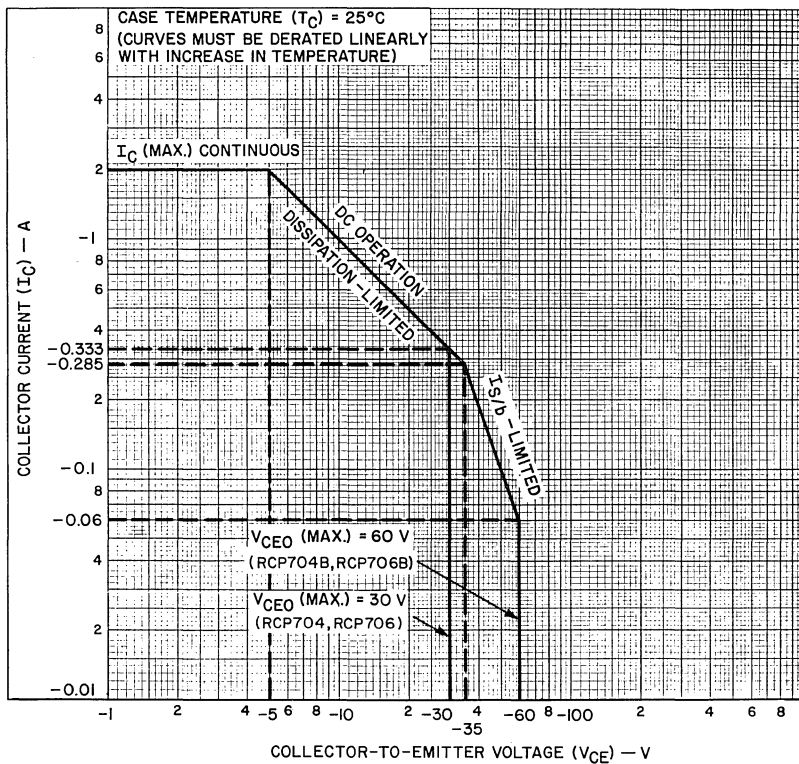
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Fig. 2 — Dissipation derating curve for all types.



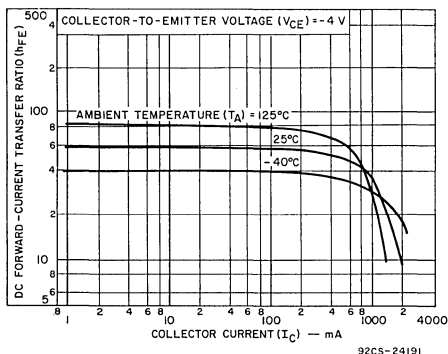
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Fig. 3 — Thermal-cycling rating chart for all types.



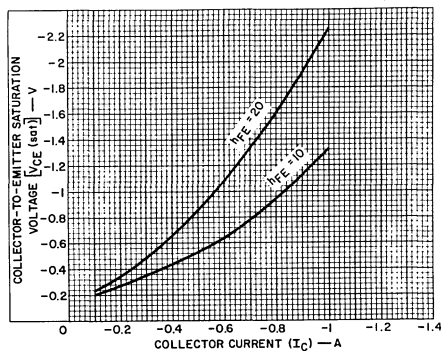
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Fig. 4 — Maximum operating areas for RCP704, RCP704B, RCP706, and RCP706B.



92CS-24191

Fig. 5 — Typical static beta characteristics for all types.



92CS-24192

Fig. 6 — Typical saturation-voltage characteristics for all types.

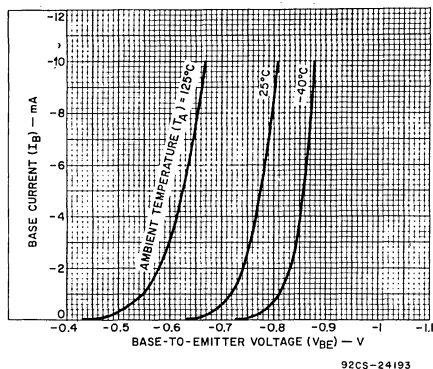


Fig. 7 — Typical input characteristics for all types.

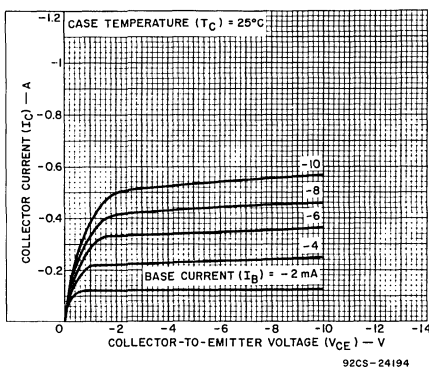


Fig. 8 — Typical output characteristics for all types.

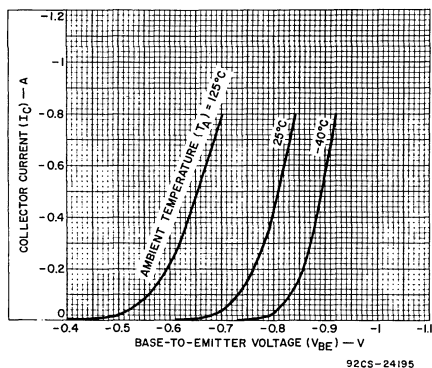


Fig. 9 — Typical transfer characteristics for all types.

TERMINAL CONNECTIONS

Terminal No. 1 — Emitter
 Terminal No. 2 — Base
 Terminal No. 3 — Collector
 Terminal No. 4 — Collector