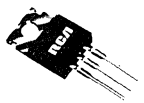
RCA
Solid State
Division

Power Transistors

RCA29 RCA29B RCA29A RCA29C



JEDEC TO-220 AB H-1535

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

For Power-Amplifier and
High-Speed-Switching Applications

Features:

- **30 W at 25°C case temperature**
- **3 A rated collector current**
- **Min. f_T of 3 MHz at 10 V, 200 mA**
- **Designed for complementary use with RCA30, RCA30A, RCA30B, and RCA30C p-n-p types***

RCA29, RCA29A, RCA29B, and RCA29C are epitaxial-base, silicon n-p-n transistors. They are intended for a wide variety of switching and amplifier applications, such as series and shunt regulators and driver and output stages of high-fidelity amplifiers. These new plastic power transistors are designed for complementary use with devices in the RCA30 series. They differ from each other in voltage ratings.

* Technical data for the RCA30-series devices are given in RCA data bulletin File 584.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

		RCA29	RCA29A	RCA29B	RCA29C	
COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	40	60	80	100	V
COLLECTOR-TO-EMITTER VOLTAGE: With base open	V_{CEO}	40	60	80	100	V
EMITTER-TO-BASE VOLTAGE	V_{EBO}	5	5	5	5	V
CONTINUOUS COLLECTOR CURRENT	I_C	3	3	3	3	A
CONTINUOUS BASE CURRENT	I_B	1	1	1	1	A
TRANSISTOR DISSIPATION:	P_T					
At case temperatures up to 25°C		30	30	30	30	W
At ambient temperatures up to 25°C		2	2	2	2	W
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, *At Case Temperature (T_C) = 25°C*

CHARACTERISTIC	SYMBOL	TEST CONDITIONS				LIMITS								UNITS
		DC VOLTAGE (V)		DC CURRENT (A)		RCA29		RCA29A		RCA29B		RCA29C		
		V_{CE}	V_{BE}	I_C	I_B	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
Collector-Cutoff Current: With base open	I_{CEO}	30 60			0 0	– –	0.3 –	– –	0.3 –	– –	– 0.3	– –	– 0.3	mA
With base-emitter junction short-circuited	I_{CES}	40 60 80 100	0 0 0 0			– – – –	0.2 – – –	– – – –	– 0.2 – –	– – – –	– – 0.2 –	– – – –	– – – 0.2	
Emitter-Cutoff Current	I_{EBO}		–5	0		–	1	–	1	–	1	–	1	mA
Collector-to-Emitter Sustaining Voltage: With base open	$V_{CEO}(sus)$			0.03[a]	0	40	–	60	–	80	–	100	–	V
DC Forward-Current Transfer Ratio	h_{FE}	4 4		0.2[a] 1[a]		40 15	– 150	40 15	– 150	40 15	– 150	40 15	– 150	
Base-to-Emitter Voltage	V_{BE}	4		1[a]		–	1.3	–	1.3	–	1.3	–	1.3	V
Collector-to-Emitter Saturation Voltage	$V_{CE}(sat)$			1[a]	0.125	–	0.7	–	0.7	–	0.7	–	0.7	V
Common-Emitter, Small-Signal, Short-Circuit, Forward Current Transfer Ratio: (f = 1 kHz)	h_{fe}	10		0.2		20	–	20	–	20	–	20	–	
Magnitude of Common Emitter, Small-Signal, Short-Circuit, Forward Current Transfer Ratio (f = 1 MHz)	$\|h_{fe}\|$	10		0.2		3	–	3	–	3	–	3	–	
Saturated Switching Time (V_{CC} = 30 V, R_L = 30 Ω, $I_{B1} = I_{B2}$): Turn-on time $t_d + t_r$	t_{ON}	(V_{CC}) 30		1	0.1	0.4 (typ.)		0.4 (typ.)		0.4 (typ.)		0.4 (typ.)		µs
Turn-off time $t_s + t_f$	t_{OFF}	(V_{CC}) 30		1	0.1	1.2 (typ.)		1.2 (typ.)		1.2 (typ.)		1.2 (typ.)		
Thermal Resistance: Junction-to-Case	$R_{\theta JC}$					–	4.17	–	4.17	–	4.17	–	4.17	°C/W
Junction-to-Ambient	$R_{\theta JA}$					–	62.5	–	62.5	–	62.5	–	62.5	

[a]Pulsed: Pulse duration = 300 µs, duty factor = 2%

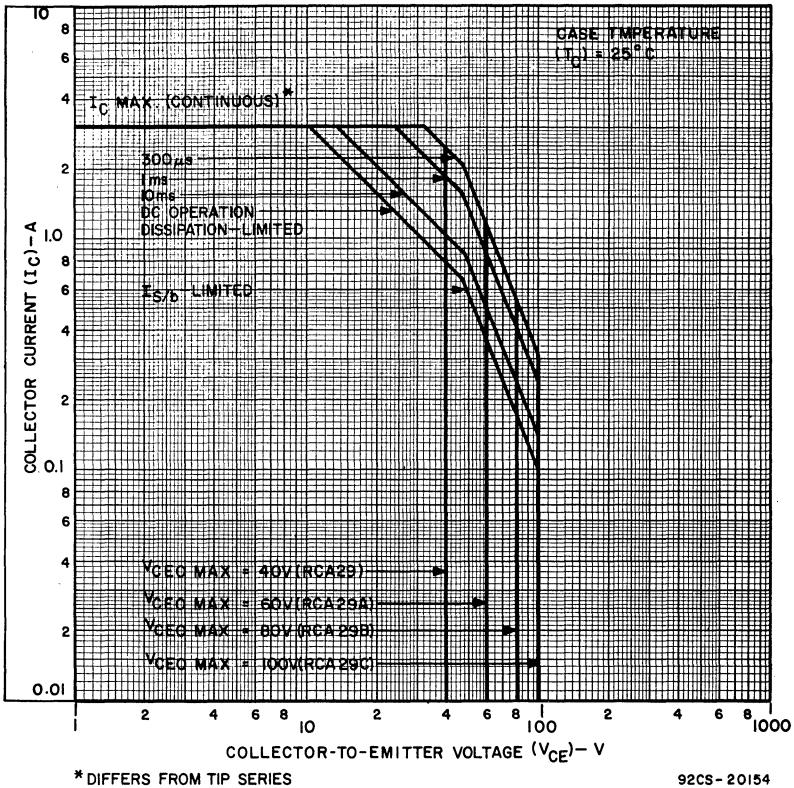


Fig. 1 — Maximum safe operating areas for all types.

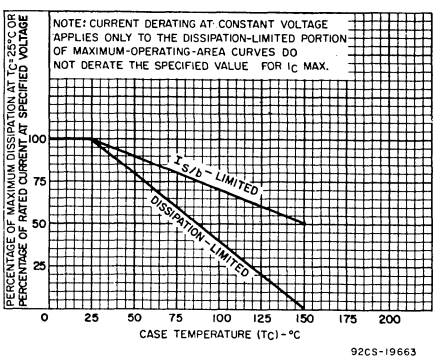


Fig. 2 — Derating curves for all types.

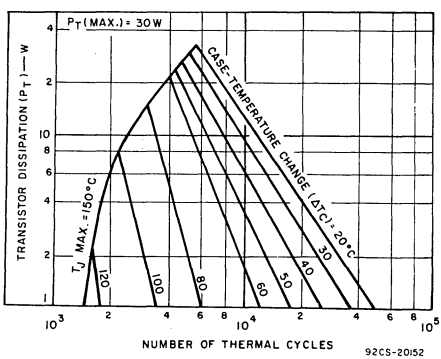


Fig. 3 — Thermal-cycling ratings for all types.

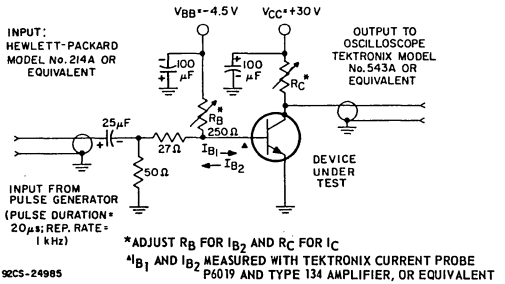


Fig. 4 – Circuit used to measure saturated switching times for all types.

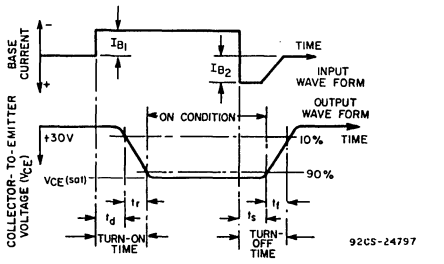


Fig. 5 – Oscilloscope display for measurement of switching times.

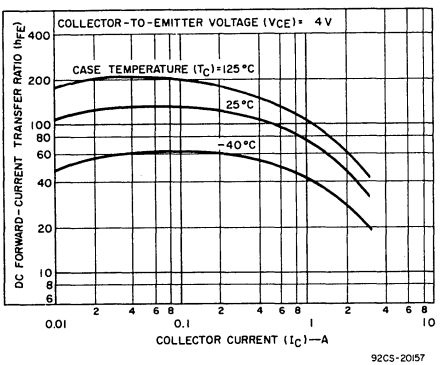


Fig. 6 – Typical dc beta characteristics for RCA29, RCA29A, and RCA29B.

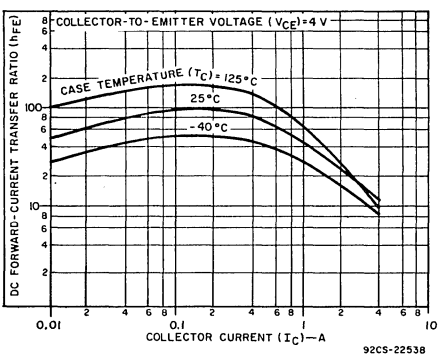


Fig. 7 – Typical dc beta characteristics for RCA29C.

TERMINAL CONNECTIONS

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