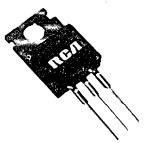
RCA Solid State Division

Power Transistors

RCA3054 RCA3055



RCA3054
RCA3055

JEDEC TO-220AB H-1535R1

Hometaxial-Base Silicon N-P-N VERSAWATT Transistors

Designed for Medium-Power Linear and Switching Service in Consumer, Automotive, and Industrial Applications

Features:
- Maximum safe-area-of-operation curves
- Low saturation voltages
- High dissipation ratings
- Thermal-cycle rating curves

Applications:
- Series and shunt regulators
- High-fidelity amplifiers
- Power-switching circuits
- Solenoid drivers

RCA3054 and RCA3055 are silicon n-p-n transistors intended for a wide variety of high-current applications. The hometaxial-base construction of these devices renders them highly resistant to second breakdown over a wide range of operating conditions.

The VERSAWATT case has a proven thermal-cycle capability. This capability is assured by real-time quality controls in our manufacturing locations. The RCA3054 and RCA3055 are supplied in the JEDEC TO-220AB straight-lead version of the package. They are also available on special order in a variety of lead-form configurations. Two popular variations have leads formed to fit TO-66 sockets (specify formed lead No. 6201) or printed-circuit boards (specify formed lead No. 6207). Detailed information on these and other VERSAWATT outlines is contained in "RCA's Lineup of Power Transistors" (PSP-704).

MAXIMUM RATINGS, *Absolute-Maximum Values:*

		RCA3054	RCA3055	
COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	90	100	V
COLLECTOR-TO-EMITTER SUSTAINING VOLTAGE:				
With external base-to-emitter resistance (R_{BE}) = 100 Ω	$V_{CER}(sus)$	60	70	V
With base open	$V_{CEO}(sus)$	55	60	V
With base reverse-biased V_{BE} = −1.5 V	$V_{CEV}(sus)$	90	90	V
EMITTER-TO-BASE VOLTAGE	V_{EBO}	7	7	V
CONTINUOUS COLLECTOR CURRENT	I_C	4	15	A
CONTINUOUS BASE CURRENT	I_B	2	4	A
TRANSISTOR DISSIPATION:	P_T			
At case temperatures up to 25°C		36	75	W
At case temperatures above 25°C		See Fig.3		
TEMPERATURE RANGE:				
Storage and Operating (Junction)		−65 to +150		°C
PIN TEMPERATURE (During Soldering):				
At distances ≥ 1/32 in. (0.8 mm) from seating plane for 10 s max.		235		°C

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS				LIMITS				UNITS
		VOLTAGE V dc		CURRENT A dc		RCA3054		RCA3055		
		V_{CE}	V_{BE}	I_C	I_B	MIN.	MAX.	MIN.	MAX.	
Collector-Cutoff Current: With base open	I_{CEO}	30			0	–	0.5	–	0.7	mA
With base-emitter junction reverse-biased	I_{CEX}	90 100	−1.5 −1.5			– –	1 –	– –	– 5	mA
At T_C = 150°C	I_{CEX}	90 100	−1.5 −1.5			– –	6 –	– –	– 30	mA
Emitter-Cutoff Current	I_{EBO}		−7	0		–	1.0	–	5	mA
Collector-to-Emitter Sustaining Voltage: With base open	$V_{CEO(sus)}$			0.1[a] 0.2[a]	0 0	55 –	– –	– 60	– –	V
With external base-to-emitter resistance (R_{BE}) = 100 Ω	$V_{CER(sus)}$			0.1[a] 0.2[a]		60 –	– –	– 70	– –	V
With base-emitter junction reverse-biased	$V_{CEV(sus)}$		−1.5	0.1[a]		90	–	90	–	V
DC Forward-Current Transfer Ratio	h_{FE}	4 4 4 4		3[a] 10[a] 0.5[a] 4[a]		5 – 25 –	– – 100 –	– 5 – 20	– – – 70	
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$			0.5[a] 4[a]	0.05[a] 0.4[a]	– –	1.0 –	– –	– 1.1	V
Base-to-Emitter Voltage	V_{BE}	4 4		0.5[a] 4[a]		– –	1.7 –	– –	– 1.8	V
Common-Emitter, Small-Signal, Short-Circuit, Forward Current Transfer Ratio Cutoff Frequency	f_{hfe}	4 4		0.1 1		30 –	– –	– 10	– –	kHz
Magnitude of Common-Emitter, Small-Signal Short-Circuit Forward Current Transfer Ratio (f = 0.4 MHz)	$\lvert h_{fe} \rvert$	4 4		0.1 1		2 –	– –	– 2	– –	
Common-Emitter, Small-Signal, Short-Circuit Forward Current Transfer Ratio (f = 1 kHz)	h_{fe}	4 4		0.1 1		25 –	– –	– 15	– 120	
Forward-Bias Second Breakdown Collector Current[b] (t ≥ 1 s)	$I_{S/b}$	55 60				0.65 –	– –	– 1.2	– –	A
Thermal Resistance: Junction-to-Case	$R_{\theta JC}$					–	3.5	–	1.67	°C/W
Junction-to-Ambient	$R_{\theta JA}$					–	70	–	70	

[a] Pulsed: Pulse duration = 300 μs, duty factor = 1.8%.
[b] Pulsed: 1-second non-repetitive pulse.

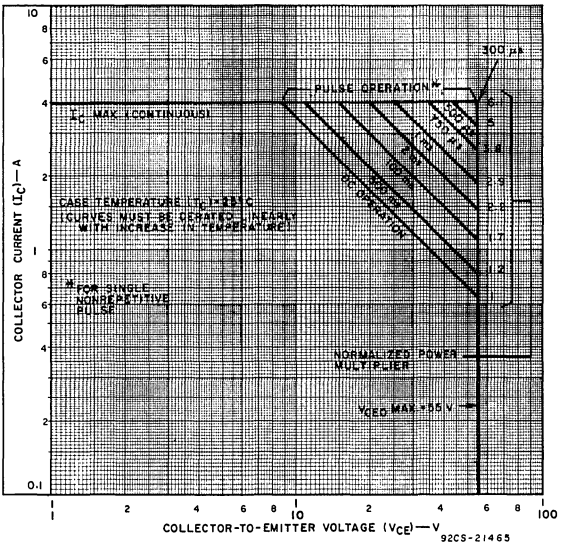


Fig.1—Maximum operating areas for RCA3054.

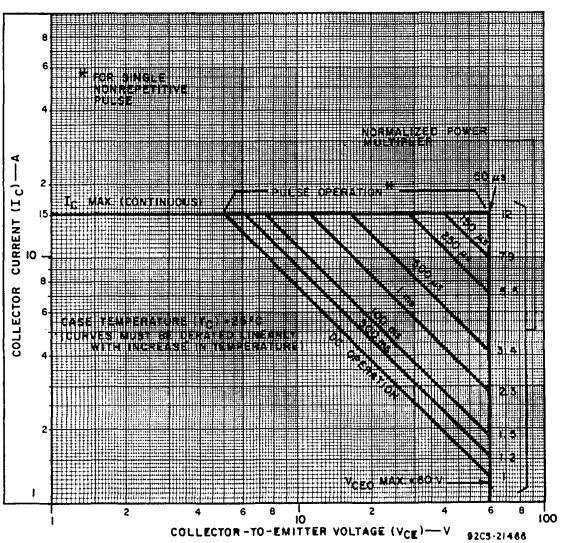


Fig.2—Maximum operating areas for RCA3055.

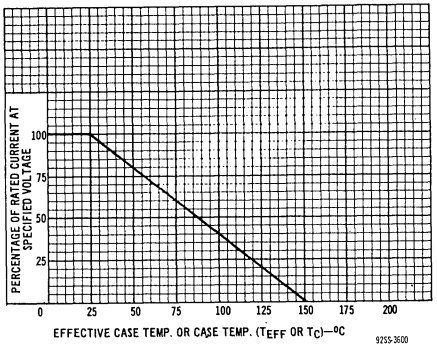


Fig.3 – Derating curve for both types.

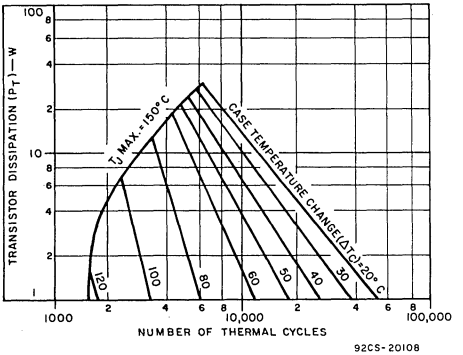


Fig.4 – Thermal-cycling rating chart for RCA3054.

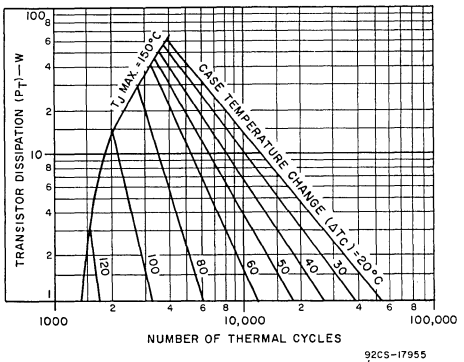


Fig.5 – Thermal-cycling rating chart for RCA3055.

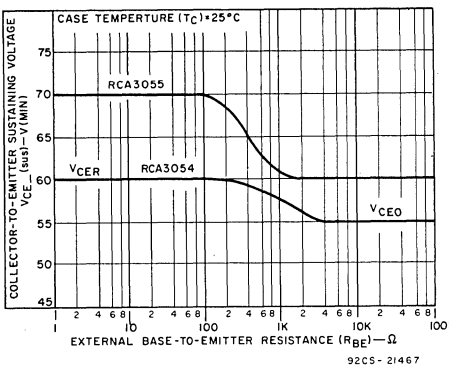


Fig.6 – Sustaining voltage vs. base-to-emitter resistance for both types.

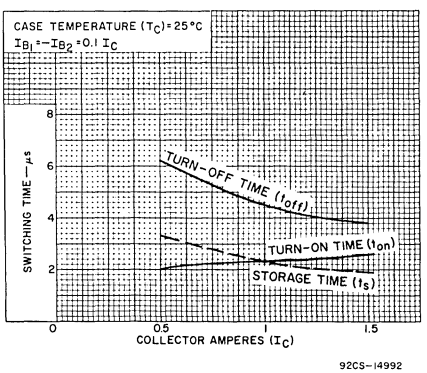


Fig.7 – Typical saturated switching characteristics for RCA3054.

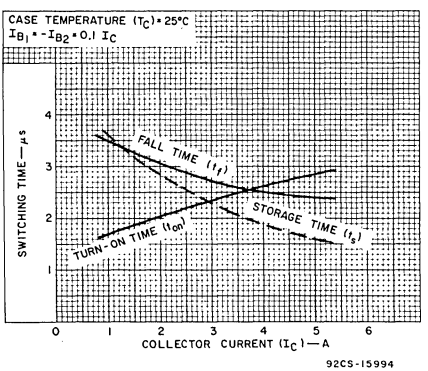


Fig.8 – Typical saturated switching characteristics for RCA3055.

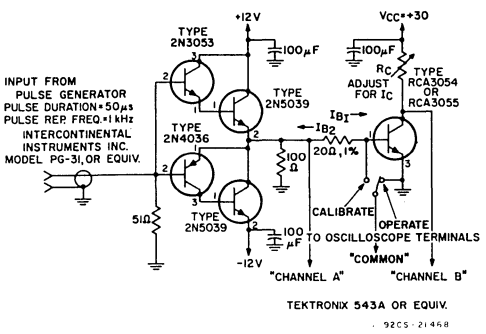


Fig.9 – Circuit used to measure switching times.

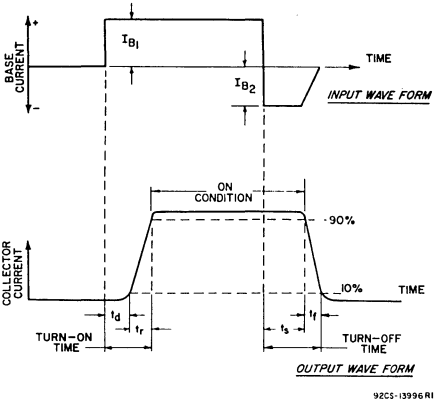


Fig.10 – Phase relationship between input current and output current showing reference points for specification of switching times. (Test circuit shown in Fig.9).

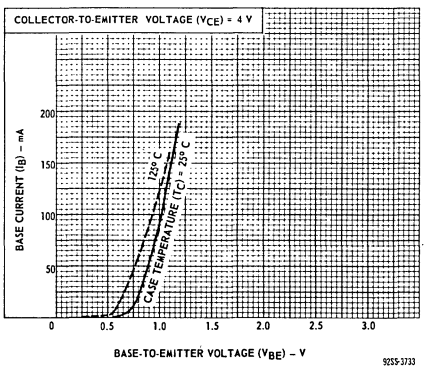


Fig.11 – Typical input characteristics for RCA3054.

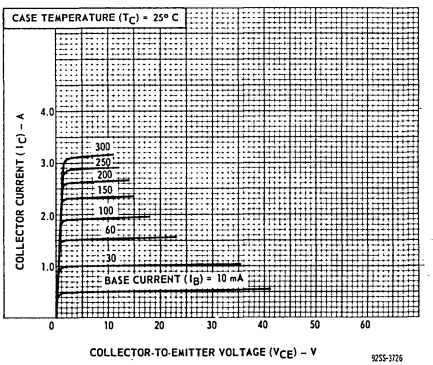


Fig.12 – Typical output characteristics for RCA3054.

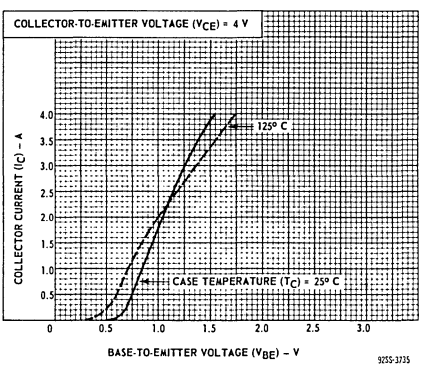


Fig.13 – Typical transfer characteristics for RCA3054.

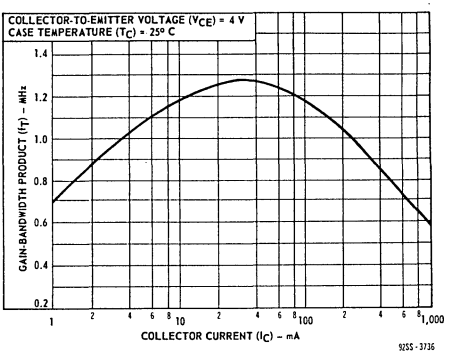


Fig.14 – Typical gain-bandwidth product for RCA3054.

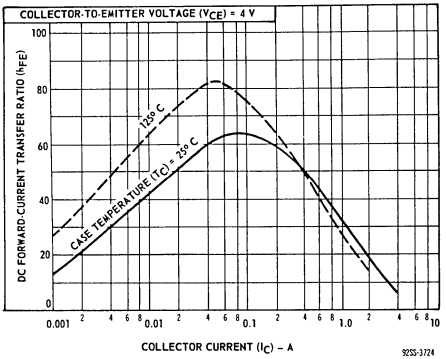


Fig.15 – Typical dc beta characteristics for RCA3054.

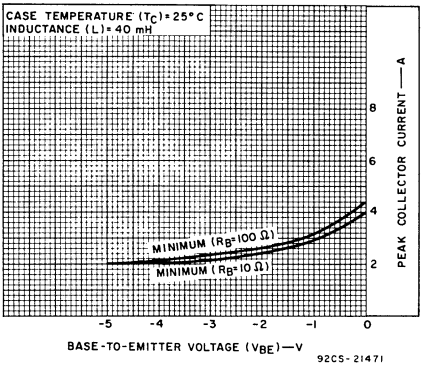


Fig.16 – Reverse-bias second breakdown characteristics for RCA3054.

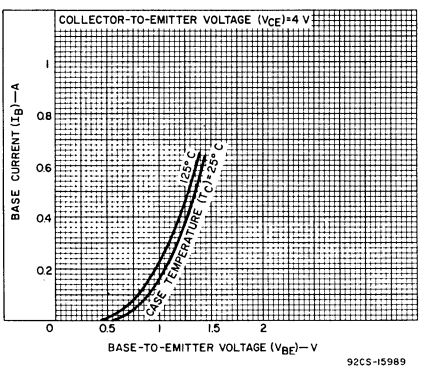


Fig.17 – Typical input characteristics for RCA3055.

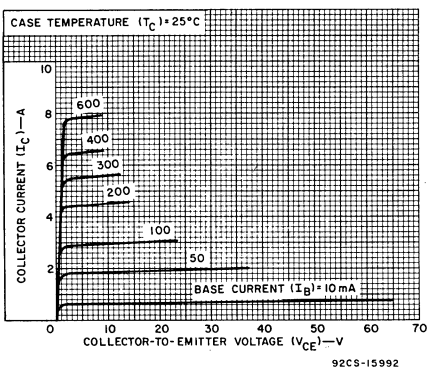


Fig.18 – Typical output characteristics for RCA3055.

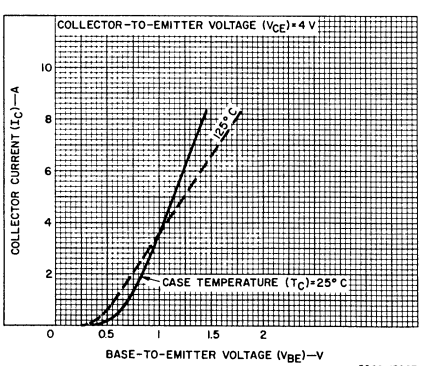


Fig.19 – Typical transfer characteristics for RCA3055.

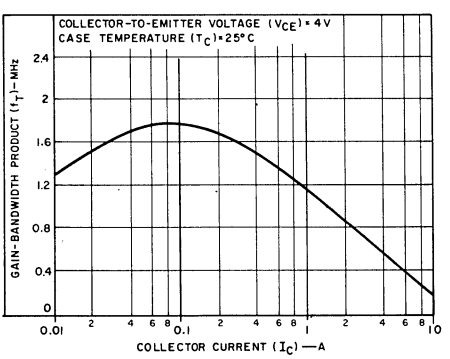


Fig.20 – Typical gain-bandwidth product for RCA3055.

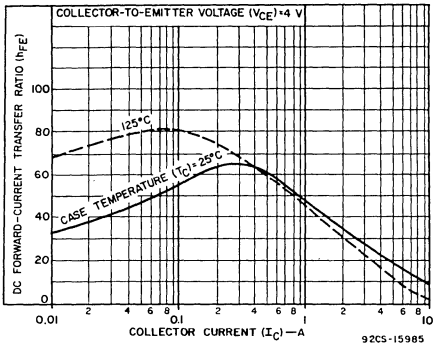


Fig.21 – Typical dc beta characteristics for RCA3055.

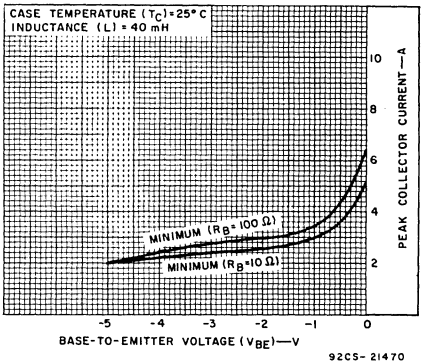


Fig.22 – Reverse-bias second-breakdown characteristics for RCA3055.

TERMINAL CONNECTIONS

JEDEC TO-220AB

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