RCA
Solid State
Division

Power Transistors

2N5954 2N6372 2N6467 40829
2N5955 2N6373 2N6468 40830
2N5956 2N6374 40831

JEDEC TO-66 H-1340

JEDEC TO-66
With Integral Heat Radiator H-1470A

Silicon N-P-N and P-N-P Medium-Power Transistors

General-Purpose Types for
Switching Applications in Military,
Industrial, and Commercial Equipment

Features

- 2N5954, 2N5955, 2N5956 complements to 2N6372, 2N6373, 2N6374
- Low saturation voltages
- Maximum-safe-area-of-operation curves
- Thermal-cycle ratings
- Hermetically-sealed JEDEC TO-66 package
- High gain at high current

RCA-2N5954, 2N5955, 2N5956, 2N6467, and 2N6468▲ are multiple-epitaxial p-n-p transistors. RCA-2N6372, 2N6373, and 2N6374● are multiple-epitaxial n-p-n transistors. They are complements to 2N5954, 2N5955, and 2N5956. These devices differ in voltage ratings and in the currents at which the parameters are controlled. All are supplied in the JEDEC TO-66 package.

Types 2N5954, 2N5955, and 2N5956 are available with factory-attached heat radiators as RCA types 40829, 40830, and 40831, respectively. The other devices may be obtained with heat radiators on special order. Radiator versions are intended for printed-circuit-board applications, and differ electrically from their basic counterparts only in device dissipation (5.8 W up to 25°C ambient) and thermal resistance (30°C/W max. at T_A = 25°C).

▲ Formerly RCA Dev. Nos. TA7264, TA7265, TA7266, TA8710, and TA8709, respectively.

● Formerly RCA Dev. Nos. TA8352, TA8353, and TA8354, respectively.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

		N-P-N	2N6374	2N6373	2N6372			
		P-N-P	2N5956♦ 40831♦	2N5955♦ 40830♦	2N5954♦ 40829♦	2N6467♦	2N6468♦	
*COLLECTOR-TO-BASE VOLTAGE		V_{CBO}	50	70	90	110	130	V
COLLECTOR-TO-EMITTER VOLTAGE:								
* With 1.5 volts (V_{BE}) of reverse bias, and external base-to-emitter resistance (R_{BE}) = 100 Ω		V_{CEX}	50	70	90	110	130	V
With external base-to-emitter resistance (R_{BE}) = 100 Ω		V_{CER}	45	65	85	105	125	V
With base open		V_{CEO}	40	60	80	100	120	V
*EMITTER-TO-BASE VOLTAGE		V_{EBO}	5	5	5	5	5	V
*CONTINUOUS COLLECTOR CURRENT		I_C	6	6	6	4	4	A
*CONTINUOUS BASE CURRENT		I_B	2	2	2	2	2	A
TRANSISTOR DISSIPATION:								
At case temperatures up to 25°C			40 (2N6374) (2N5956)	40 (2N6373) (2N5955)	40 (2N6372) (2N5954)	40 (2N6467)	40 (2N6468)	W
At ambient temperatures up to 25°C			5.8 (40831)	5.8 (40830)	5.8 (40829)	–	–	
At case temperatures above 25°C			See Figs. 1, 2, and 3.					
*TEMPERATURE RANGE:								
Storage and Operating (Junction)			◄ –65 to +200 ►					
*PIN TEMPERATURE (During Soldering):								
At distances ≥ 1/32 in. (0.8 mm) from seating plane for 10 s max.			◄ +235 ►					

* In accordance with JEDEC registration data format JS-6-RDF-2 (all types except 40829, 40830, and 40831)

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

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

	CHARACTERISTIC	SYMBOL	TEST CONDITIONS♦ VOLTAGE V dc		TEST CONDITIONS♦ CURRENT A dc		LIMITS 2N6374 2N5956♦ 40831♦		LIMITS 2N6373 2N5955♦ 40830♦		LIMITS 2N6372 2N5954♦ 40829♦		UNITS
			V_{CE}	V_{BE}	I_C	I_B	Min.	Max.	Min.	Max.	Min.	Max.	
*	Collector Cutoff Current: With external base-to-emitter resistance (R_{BE}) = 100 Ω	I_{CER}	35 55 75				– – –	100 – –	– – –	– 100 –	– – –	– – 100	μA
*	With base-emitter junction reverse-biased, (R_{BE}) = 100 Ω	I_{CEX}	45 65 85	–1.5 –1.5 –1.5			– – –	100 – –	– – –	– 100 –	– – –	– – 100	μA
*	With base-emitter junction reverse-biased (R_{BE}) = 100 Ω, and T_C = 150°C	I_{CEX}	45 65 85	–1.5 –1.5 –1.5			– – –	2 – –	– – –	– 2 –	– – –	– – 2	mA
*	With base open	I_{CEO}	25 45 65				– – –	1 – –	– – –	– 1 –	– – –	– – 1	mA
*	Emitter Cutoff Current	I_{EBO}		–5			–	0.1	–	0.1	–	0.1	mA
*	DC Forward-Current Transfer Ratio	h_{FE}	4 4 4 4		3[a] 2.5[a] 2[a] 6[a]		20 – – 5	100 – – –	– 20 – 5	– 100 – –	– – 20 5	– – 100 –	
*	Collector-to-Emitter Sustaining Voltage: With base open	$V_{CEO(sus)}$			0.1[a]		40[b]	–	60[b]	–	80[b]	–	V
	With external base-to-emitter resistance (R_{BE}) = 100 Ω	$V_{CER(sus)}$			0.1[a]		45[b]	–	65[b]	–	85[b]	–	V
	With base-emitter junction reverse-biased, (R_{BE}) = 100 Ω	$V_{CEX(sus)}$		–1.5	0.1[a]		50[b]	–	70[b]	–	90[b]	–	V
*	Base-to-Emitter Voltage: All types All types All types 2N6372-2N6374	V_{BE}	4 4 4 4		3[a] 2.5[a] 2[a] 6[a]		– – – –	2 – – 3	– – – –	– 2 – 3	– – – –	– – 2 3	V
*	Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$			3[a] 2.5[a] 2[a]	0.3 0.25 0.2	– – –	1 – –	– – –	– 1 –	– – –	– – 1	V
*	Magnitude of Forward-Current Transfer Ratio (f = 1 MHz): 2N6372-2N6374 2N5954-56, 40829-31	$\lvert h_{fe} \rvert$	4 –4		1 –1		4 5	– –	4 5	– –	4 5	– –	
*	Forward-Current Transfer Ratio (f = 1 kHz)	h_{fe}	4		0.5		25	–	25	–	25	–	
	Thermal Resistance: Junction-to-case, 2N5954-56, 2N6372-74	$R_{\theta JC}$					–	4.3	–	4.3	–	4.3	°C/W
	Junction-to-Ambient 40829-40831	$R_{\theta JA}$					–	30	–	30	–	30	

* In accordance with JEDEC registration data format JS-6 RDF-2.

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

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

[b] *CAUTION: Sustaining voltages $V_{CEO}(sus)$, $V_{CER}(sus)$, and $V_{CEX}(sus)$ MUST NOT be measured on a curve tracer. (See Figs. 19 & 20).*

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

	CHARACTERISTIC	SYMBOL	TEST CONDITIONS				LIMITS				UNITS
			VOLTAGE V dc		CURRENT A dc		2N6467		2N6468		
			V_{CE}	V_{BE}	I_C	I_B	Min.	Max.	Min.	Max.	
*	Collector Cutoff Current: With external base-to-emitter resistance (R_{BE}) = 100 Ω	I_{CER}	−95 −100				— —	−100 —	— —	— −100	μA
*	With base-emitter junction reverse-biased and external base-to-emitter resistance (R_{BE}) = 100 Ω	I_{CEX}	−100 −120	1.5 1.5			— —	−100 —	— —	— −100	μA
*	With base-emitter junction reverse-biased, R_{BE} = 100Ω, and T_C = 150°C		−100 −120	1.5 1.5			— —	−2 —	— —	— −2	mA
*	With base open	I_{CEO}	−50 −60				— —	−1 —	— —	— −1	mA
*	Emitter Cutoff Current	I_{EBO}		5			—	−0.1	—	−0.1	mA
*	DC Forward-Current Transfer Ratio	h_{FE}	−4 −4		−1.5[a] −4[a]		15 5	150 —	15 5	150 —	
*	Collector-to-Emitter Sustaining Voltage: With base open	$V_{CEO}(sus)$			−0.1[a]		−100[b]	—	−120[b]	—	V
	With external base-to-emitter resistance (R_{BE}) = 100 Ω	$V_{CER}(sus)$			−0.1[a]		−105[b]	—	−125[b]	—	
	With base-emitter junction reverse-biased and external base-to-emitter resistance (R_{BE}) = 100 Ω	$V_{CEX}(sus)$		1.5	−0.1[a]		−110[b]	—	−130[b]	—	
*	Base-to-Emitter Voltage	V_{BE}	−4 −4		−1.5[a] −4[a]		— —	−2 −3.5	— —	−2 −3.5	V
*	Collector-to-Emitter Saturation Voltage	$V_{CE}(sat)$			−1.5[a] −4[a]	−0.15 −0.8	— —	−1.2 −4	— —	−1.2 −4	V
*	Magnitude of Common Emitter, Small-Signal Short-Circuit, Forward-Current Transfer Ratio (f = 1 MHz)	$\|h_{fe}\|$	−4		−1		5	—	5	—	
*	Common-Emitter, Small-Signal, Short-Circuit, Forward-Current Transfer Ratio (f = 1 kHz)	h_{fe}	−4		−0.5		25	—	25	—	
	Thermal Resistance: Junction-to-case	$R_{\theta JC}$					—	4.3	—	4.3	°C/W

a Pulsed, pulse duration = 300 μs, duty factor = 1.8%.

b *CAUTION: Sustaining voltages $V_{CEO}(sus)$, $V_{CER}(sus)$, and $V_{CEX}(sus)$ MUST NOT be measured on a curve tracer. (See Figs. 19 and 20).*

* In accordance with JEDEC registration data format JS-6 RDF-2.

TERMINAL CONNECTIONS
ALL JEDEC DEVICES
Pin 1 — Base
Pin 2 — Emitter
Case, Mounting Flange — Collector

TERMINAL CONNECTIONS
40829, 40830, 40831
Pin 1 — Base
Pin 2 — Emitter
Heat Radiator — Collector

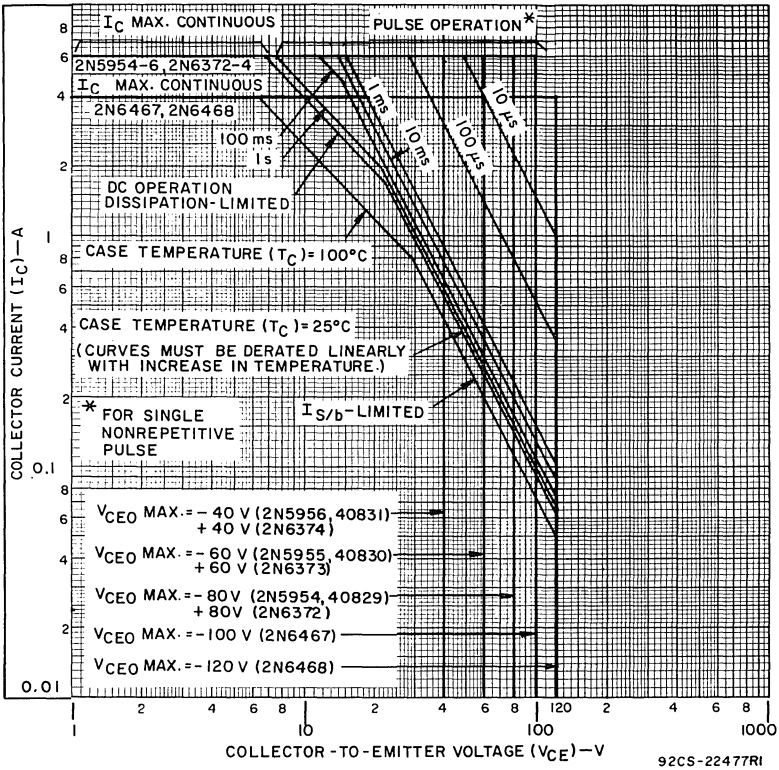


Fig. 1 — Maximum operating areas for all types.

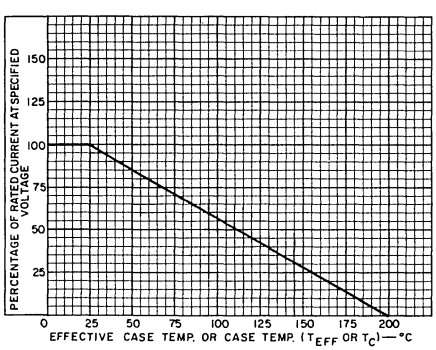


Fig. 2 — Current derating curve for all types.

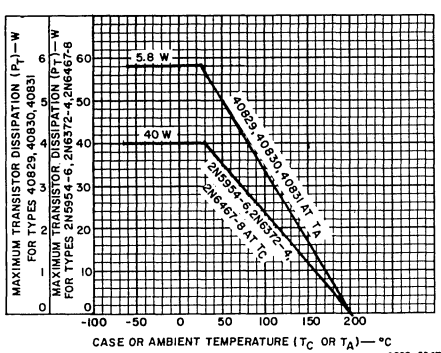


Fig. 3 — Dissipation derating curve for all types.

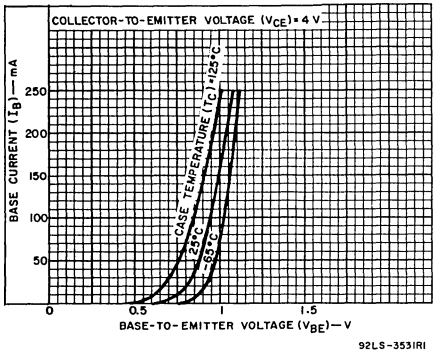


Fig. 4 — Typical input characteristics for all types.♦

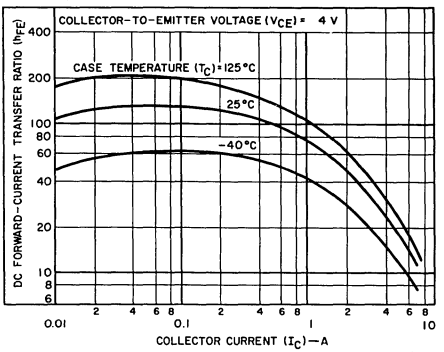


Fig. 5 — Typical dc beta characteristics for 2N6372, 2N6373, and 2N6374.

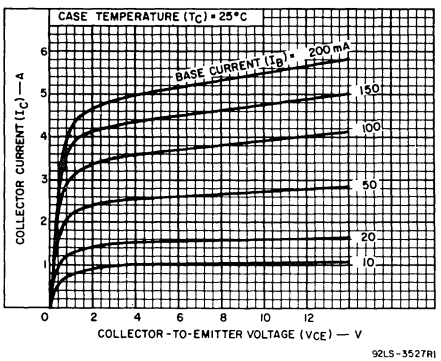


Fig. 6 — Typical output characteristics for all types.♦

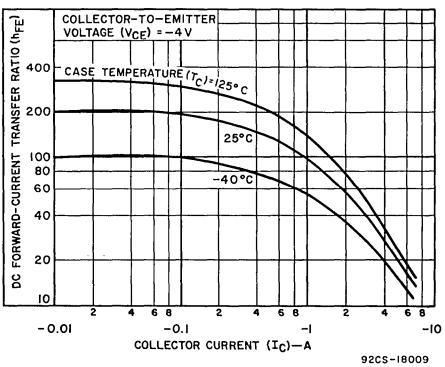


Fig. 7 — Typical dc beta characteristics for 2N5954 — 2N5956 and 40829 — 40831.

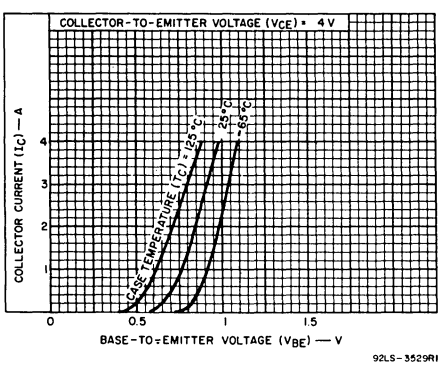


Fig. 8 — Typical transfer characteristics for all types.♦

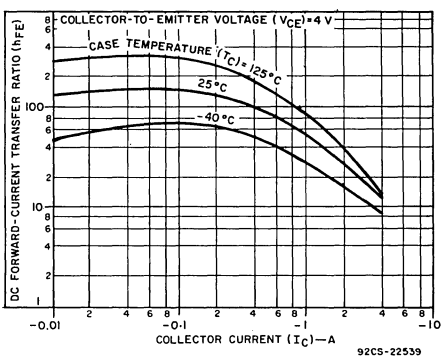


Fig. 9 — Typical dc beta characteristics for 2N6467 and 2N6468.

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

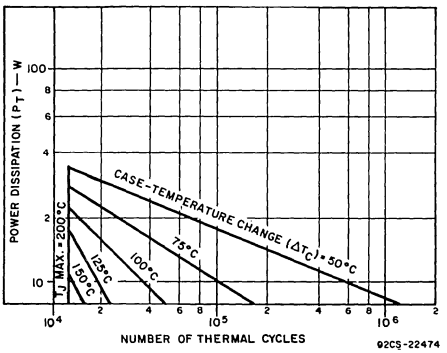


Fig. 10 — Thermal-cycling rating chart for all types.

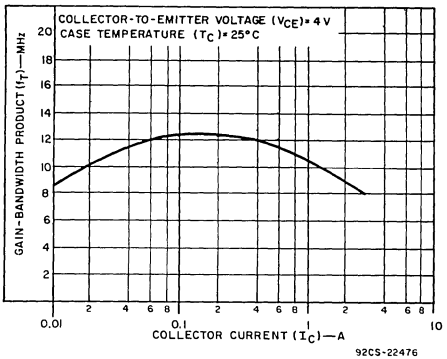


Fig. 11 — Typical gain-bandwidth product for all types.♦

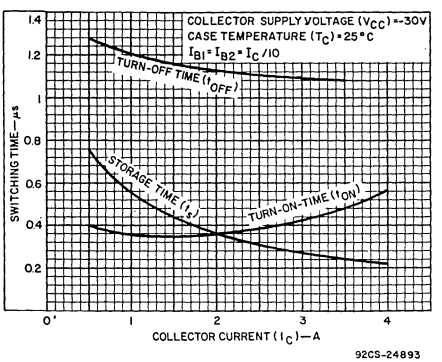


Fig. 12 — Typical saturated switching characteristics for 2N6372 — 2N6374.

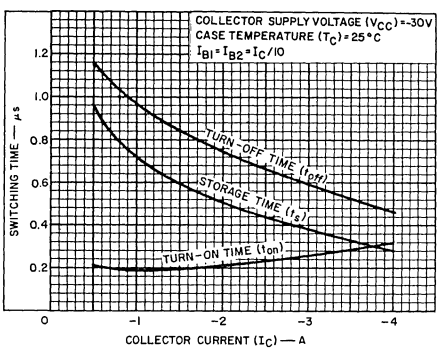


Fig. 13 — Typical saturated switching characteristics for 2N5954 — 2N5956, 2N6467 — 2N6468, and 40829 — 40831.

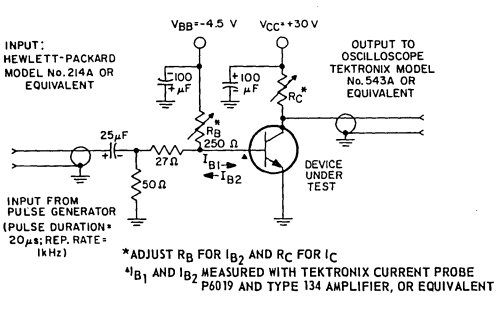


Fig. 14 — Circuit used to measure saturated switching times for n-p-n types.

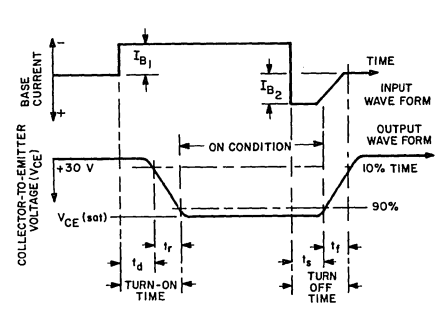
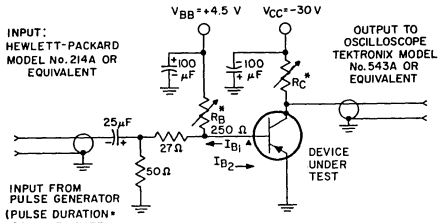


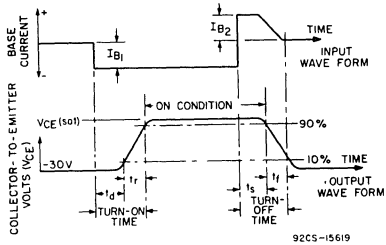
Fig. 15 — Oscilloscope display for measurement of switching times for n-p-n types.

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



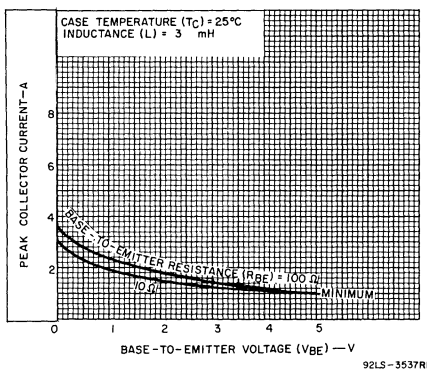
92CS-24894

Fig. 16 — Circuit used to measure saturated switching times for p-n-p types.



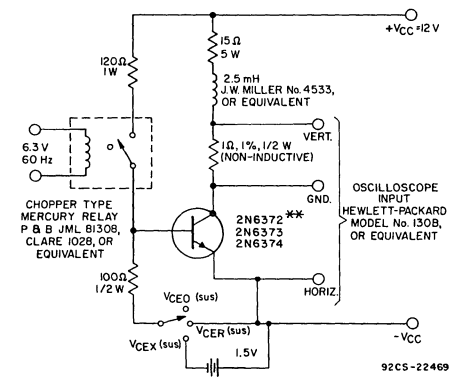
92CS-15619

Fig. 17 — Oscilloscope display for measurement of switching times for p-n-p types.



92LS-3537RI

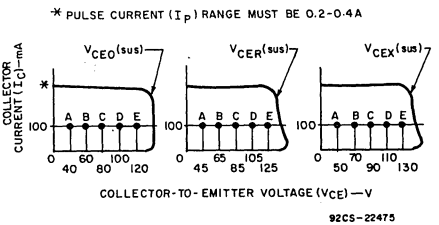
Fig. 18 — Minimum reverse-bias second-breakdwon characteristic for all types.♦



92CS-22469

**FOR P-N-P TYPES 2N5954, 2N5955, 2N5956, 2N6467, AND 2N6468, 40829, 40830, AND 40831, REVERSE POLARITY OF V_{CC} AND BATTERY.

Fig. 19 — Circuit used to measure sustaining voltages V_{CEO}(sus) V_{CER}(sus), and V_{CEX}(sus).



92CS-22475

Fig. 20 — Oscilloscope display for measurement for sustaining voltages (test circuit shown in Fig. 19).♦

The sustaining voltages, V_{CEO}(sus), V_{CER}(sus), and V_{CEX}(sus), are acceptable when the traces fall to the right of point "A" for types 2N5956, 40831, and 2N6374; point "B" for types 2N5955, 40830, and 2N6373; point "C" for types 2N5954, 40829, and 2N6372; point "D" for type 2N6467, and point "E" for type 2N6468.

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