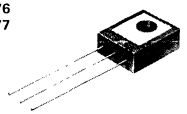
RCA
Solid State
Division

Power Transistors

2N6175 40885
2N6176 40886
2N6177 40887

2N6175
2N6176
2N6177



"Plastic TO-5" H-1642

40885
40886
40887

With Heat Chip H-1756

High-Voltage, Medium-Power Silicon N-P-N Transistors

For High-Speed Switching and Linear-Amplifier Applications

Features

- Thermal fatigue ratings
- High frequency response: f_T = 20 MHz
- Maximum area-of-operation curves for DC and pulse operation
- Designed to assure freedom from second breakdown in class A, B, and C operation at maximum ratings

RCA types 2N6175, 2N6176, and 2N6177* are silicon n-p-n transistors with high breakdown voltages, high frequency response, and fast switching speeds. Types 40885, 40886, and 40887 are electrically identical to the 2N6175–2N6177, respectively, but are supplied with factory-attached heat clips.

Typical applications for these devices include TV video output, RGB output, chroma output, TV blanking, solenoid drivers, off-line inverters, regulators, audio output, and electrostatic deflection in display circuits.

*Formerly Dev. Nos. TA7739, TA7740 and TA7134, respectively.

- High voltage ratings:
  $V_{CEO}(sus)$ = 350 V max. (2N6177, 40887)
  = 300 V max. (2N6176, 40886)
  = 250 V max. (2N6175, 40885)
- Low saturation voltage:
  $V_{CE}(sat)$ = 0.5 V max.

TERMINAL CONNECTIONS

Lead 1 – Emitter
Lead 2 – Base
Lead 3 – Collector

MAXIMUM RATINGS, Absolute-Maximum Values:

	2N6175 40885	2N6176 40886	2N6177 40887	
*COLLECTOR-TO-BASE VOLTAGE . . . . . V_{CBO}	300	350	450	V
*COLLECTOR-TO-EMITTER SUSTAINING VOLTAGE . . . . . $V_{CEO}(sus)$	250	300	350	V
*EMITTER-TO-BASE VOLTAGE . . . . . V_{EBO}	6	6	6	V
*COLLECTOR CURRENT . . . . . I_C	1.0	1.0	1.0	A
*BASE CURRENT . . . . . I_B	0.5	0.5	0.5	A
*TRANSISTOR DISSIPATION . . . . . P_T				
At case temperatures up to 25°C	20 (2N6175, 2N6176, 2N6177)			W
At case temperatures above 25°C	See Fig. 14			
At ambient temperatures up to 25°C	0.8 (2N6175, 2N6176, 2N6177)			W
	1.4 (40885, 40886, 40887)			W
At ambient temperatures above 25°C	See Fig. 15			
For pulse operation	See Figs. 1, 4, and 7			
*TEMPERATURE RANGE:				
Storage & Operating (Junction)	-65 to 135			°C
*LEAD TEMPERATURE (During soldering):				
At distance ≥1/16 in. (1.59 mm) from case for 10 s max.	230			°C

*Types 2N6175, 2N6176, and 2N6177 in accordance with JEDEC registration data format JS-9 RDF-8.

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

	CHARACTERISTIC	SYMBOL	TEST CONDITIONS				LIMITS						UNITS
			VOLTAGE V dc		CURRENT mA dc		2N6175 40885		2N6176 40886		2N6177 40887		
			V_{CB}	V_{CE}	I_C	I_B	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
	Collector-Cutoff Current: With base open	I_{CEO}		300 200		0 0	– –	– 50	– –	– 50	– –	20 –	
*	With emitter open	I_{CBO}	360 280 240				– – –	– – 50	– – –	– 50 –	– – –	20 – –	μA
	With base-emitter junction reverse-biased, V_{BE} = –1.5 V	I_{CEV}		450 300			– –	– 500	– –	– 500	– –	500 –	
*	Emitter-Cutoff Current. V_{BE} = –6 V	I_{EBO}			0		–	20	–	20	–	20	μA
	DC Forward-Current Transfer Ratio	h_{FE}		10 10 10 10	50[a] 20[a] 5[a] 1[a]		– 30* – 15	– 190 – –	– 30* 15 –	– 150 – –	30* – 15 –	150 – – –	
	Collector-to-Emitter Sustaining Voltage: With base open	$V_{CEO(sus)}$			50[a]	0	250[b]	–	300[b]	–	350[b]	–	V
	Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$			50[a]	4	–	1.3	–	1.3	–	1.3	V
	Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$			50[a]	4	–	0.5	–	0.5	–	0.5	V
*	Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$			1[a]		300		350		450		V
*	Low-Frequency, Common-Emitter, Small-Signal, Short-Circuit, Forward-Current Transfer Ratio f = 1 kHz	h_{fe}		10	5		25	–	25	–	25	–	
*	Magnitude of Common-Emitter, Small-Signal, Short-Circuit, Forward-Current Transfer Ratio f = 3 MHz	$\lvert h_{fe} \rvert$		20	20		7	–	7	–	7	–	
*	Real Part of Common-Emitter, Small-Signal, Short-Circuit Input Impedance: f = 1 MHz	$Re(h_{ie})$		20 10	20 5		– –	300 –	– –	– 300	– –	– 300	Ω
*	Output Capacitance: f = 1 MHz	C_{cb}	20				–	8	–	8	–	8	pF
	Second-Breakdown Collector Current: With base forward biased, t = 0.4 s nonrepetitive	$I_{S/b}$[b]		150			133	–	133	–	133	–	mA
	Thermal Resistance: Junction-to-Case	$R_{\theta JC}$					– 5.5 (2N6175)		– 5.5 (2N6176)		– 5.5 (2N6177)		
	Junction-to-Ambient	$R_{\theta JA}$					– 138 (2N6175) – 78.6 (40885)		– 138 (2N6176) – 78.6 (40886)		– 138 (2N6177) – 78.6 (40887)		°C/W

* Types 2N6175, 2N6176, and 2N6177 in accordance with JEDEC registration data format JS-9 RDF-8.

[a] Pulsed Pulse duration = 300 μs; duty factor ≤ 2%.

[b] CAUTION: The sustaining votlage V_{CEO}(sus) MUST NOT be measured on a curve tracer. The sustaining voltage should be measured by means of the test circuit shown in Fig. 10

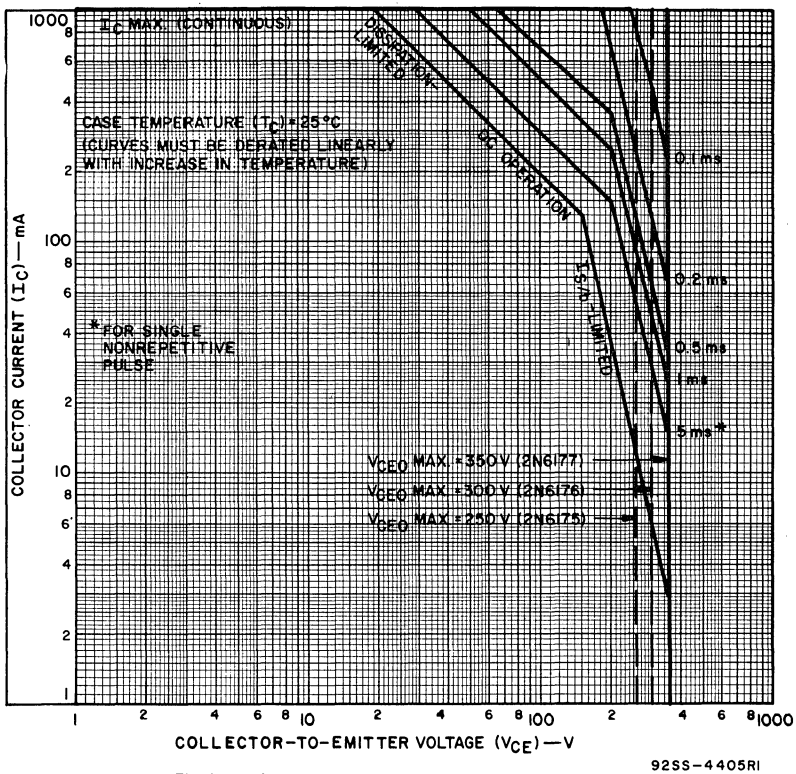


Fig. 1—Maximum safe-operation-areas for types 2N6175, 2N6176, and 2N6177.

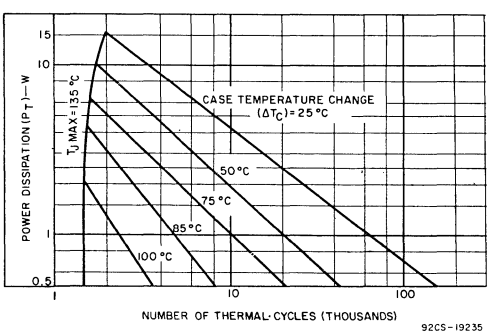


Fig.2—Thermal-cycling rating chart.

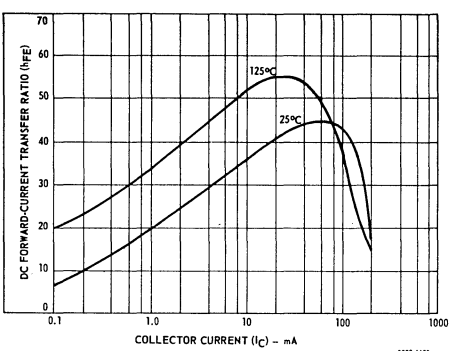


Fig.3—Typical DC-beta characteristics for all types.

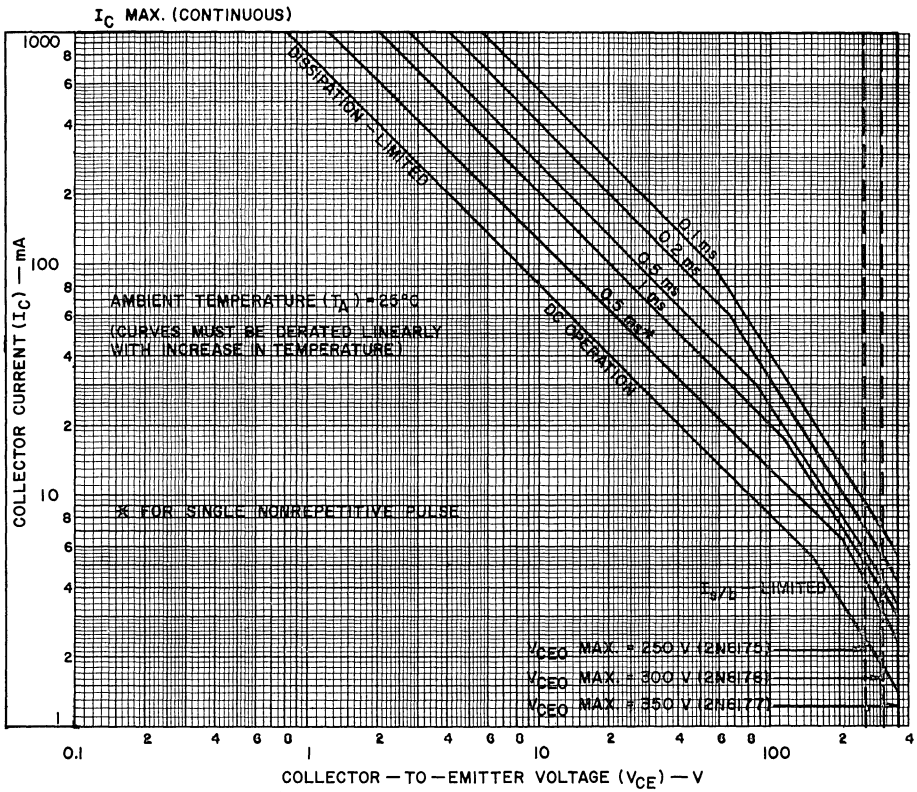


Fig. 4—Maximum safe area-of-operation at ambient temperature for types 2N6175, 2N6176, and 2N6177.

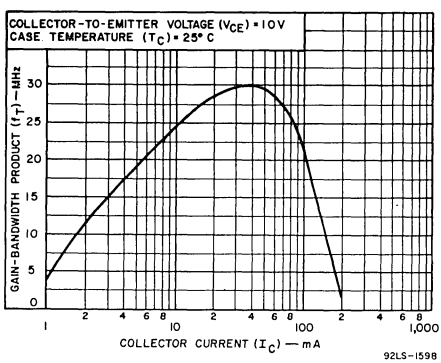


Fig.5—Typical gain-bandwidth product for all types.

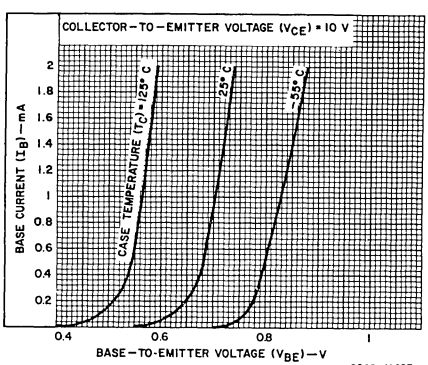


Fig.6—Typical input characteristics for all types.

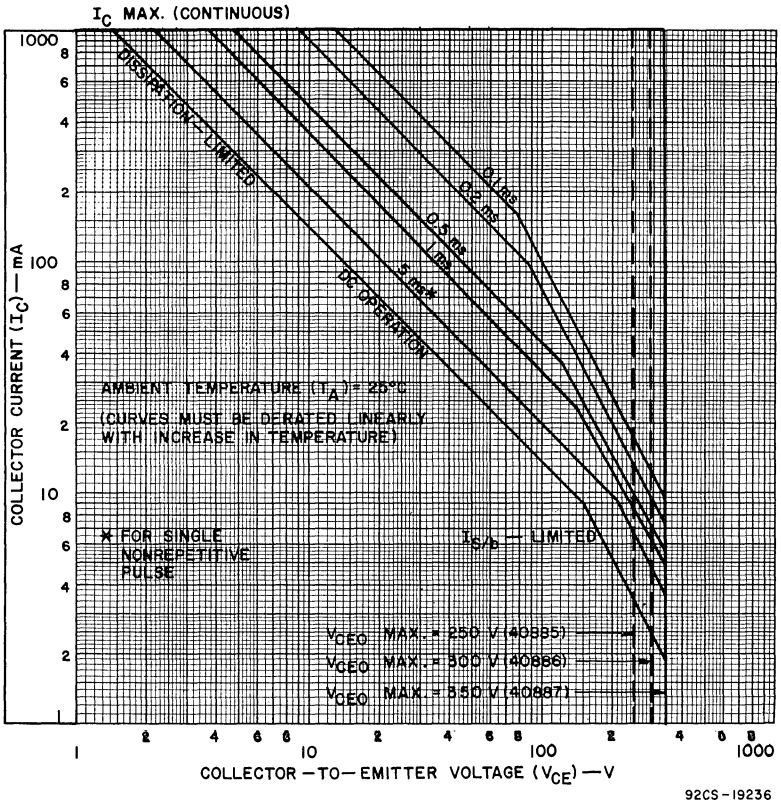


Fig.7–Maximum safe area-of-operation for types 40885, 40886, and 40887.

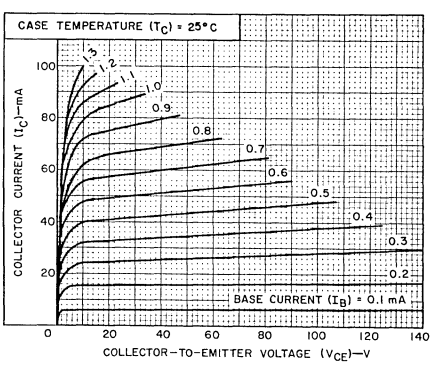


Fig. 8–Typical output characteristics for all types.

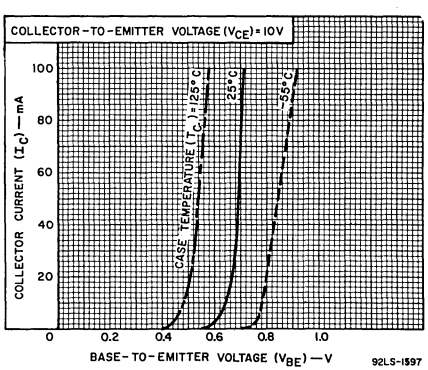


Fig.9–Typical transfer characteristics for all types.

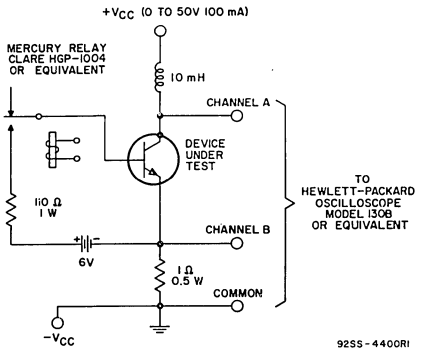
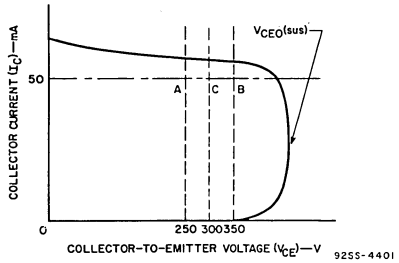


Fig.10–Circuit used to measure sustaining voltage, $V_{CEO}(sus)$.



The sustaining voltage $V_{CEO}(sus)$ is acceptable when the trace falls to the right and above point "A" for type 2N6175 or 40885. The trace must fall to the right and above point "B" for type 2N6177 or 40887 and above and to the right of point "C" for type 2N6176 or 40886.

Fig.11–Oscilloscope display for measurement of sustaining voltages (test circuit shown in Fig. 9).

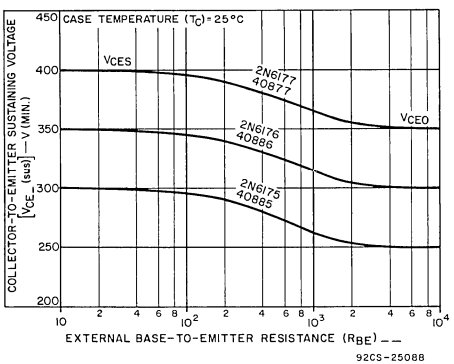


Fig. 12–Sustaining voltage vs. base-to-emitter resistance for all types.

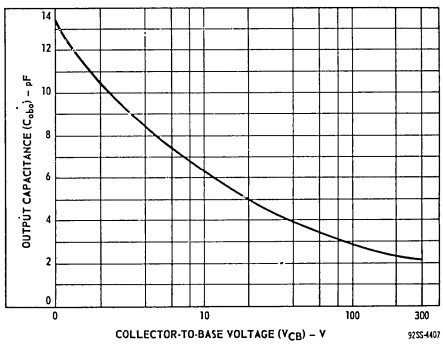


Fig.13–Typical output capacitance vs collector-to-base voltage for all types.

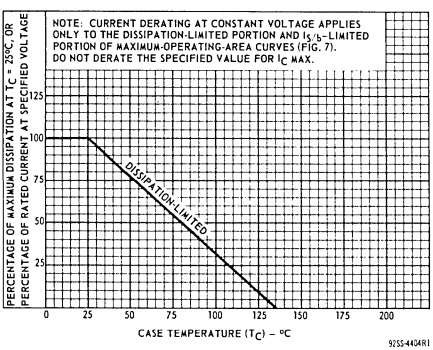


Fig.14–Dissipation derating curve for all types.

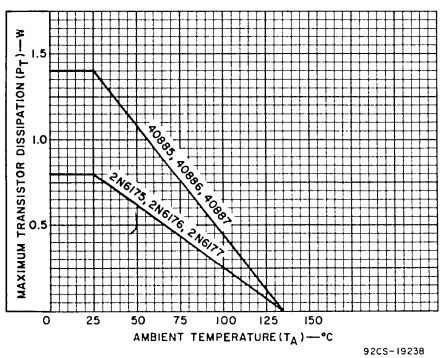


Fig.15–Dissipation derating curves for all types.