RCA
Solid State
Division

Power Transistors

RCA1B01

JEDEC TO-3 H-1570

Silicon Transistor for 70-Watt Quasi-Complementary-Symmetry Audio Amplifiers with Hometaxial-Base Output Transistors

RCA1B01 is an n-p-n hometaxial-base silicon transistor in a JEDEC TO-3 package. This device is particularly suitable for audio-output use, and can be driven by either the RCA1A03 n-p-n or RCA1A04 p-n-p transistor.

The 70-watt amplifier shown in Figs. 1 and 5 uses the RCA1B01 in conjunction with seven TO-39 transistors, eleven diodes, and an 84-volt split power supply. The amplifier output is directly coupled to an 8-ohm speaker. This amplifier is most useful for instrumentation applications where ruggedness and raw power are essential.

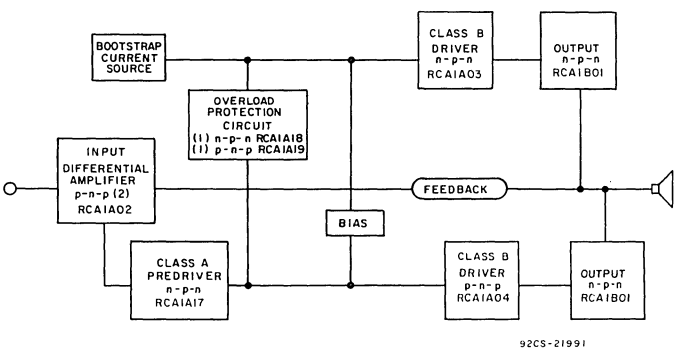


Fig. 1—Block diagram and transistor complement for 70-watt quasi-complementary-symmetry audio amplifier with hometaxial-base output transistors.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

		RCA1B01	
COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	95	V
COLLECTOR-TO-EMITTER VOLTAGE:			
With external base-to-emitter resistance (R_{BE}) = 100Ω	V_{CER}	95	V
EMITTER-TO-BASE VOLTAGE	V_{EBO}	7	V
COLLECTOR CURRENT	I_C	15	A
BASE CURRENT	I_B	7	A
TRANSISTOR DISSIPATION:	P_T		
At case temperatures up to 25°C		115	W
At case temperatures above 25°C		*See Fig. 2*	
TEMPERATURE RANGE:			
Storage & Operating (Junction)		−65 to 200	°C
PIN TEMPERATURE (During Soldering):			
At distances ≥ 1/32 in. (0.8 mm) from case for 10 s max		230	°C

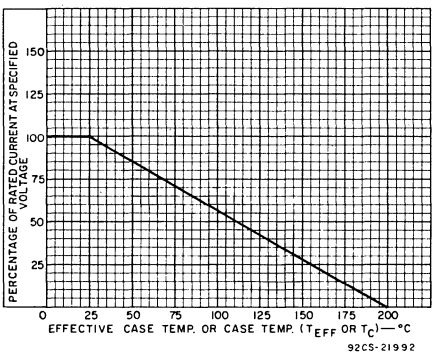


Fig.2—Derating curves for all types.

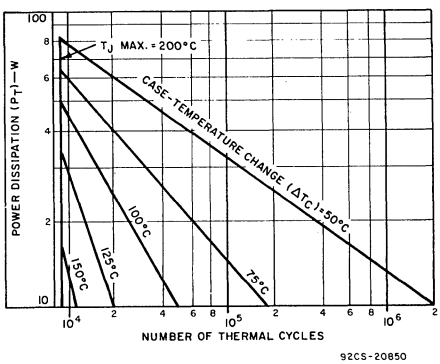


Fig.3—Thermal-cycling ratings for RCA1B01.

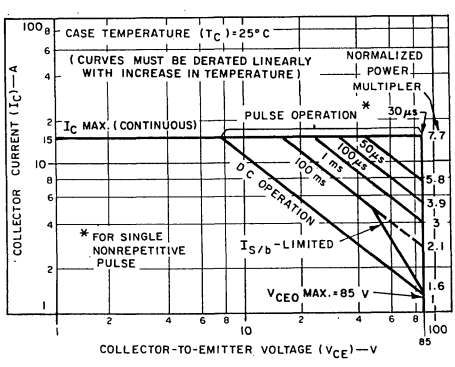
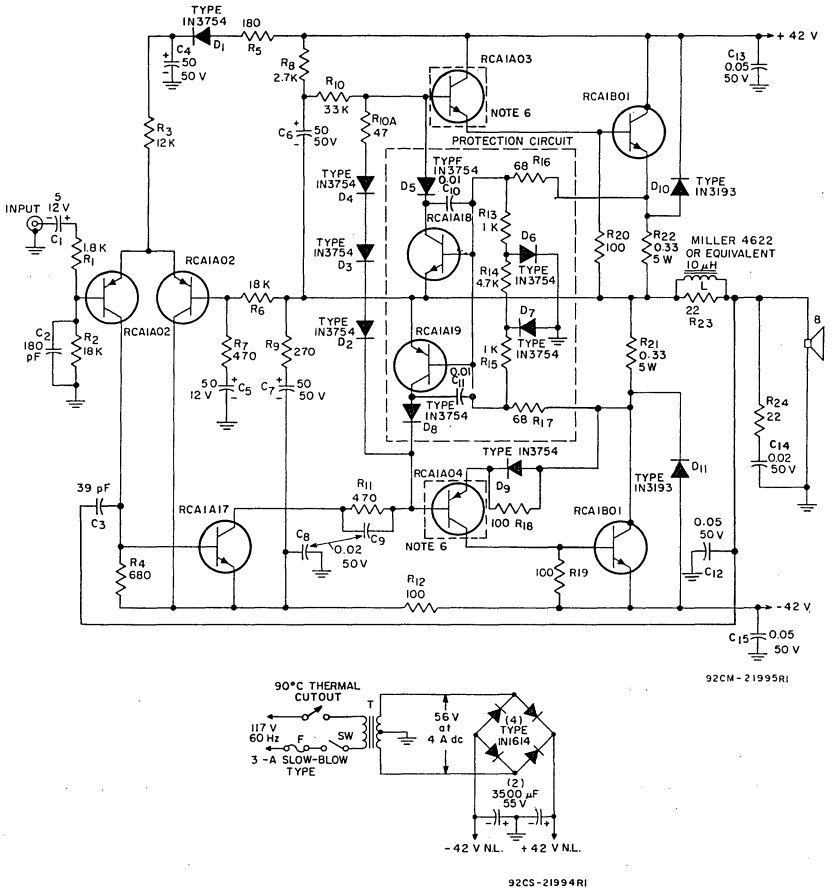


Fig.4—Maximum operating areas for RCA1B01.



NOTES:

1. T: Signal 56-4 (Signal Transformer Co., 1 Junius St., Brooklyn, N.Y. 11212), or equivalent.
2. Resistors are 1/2-watt unless otherwise specified; values are in ohms.
3. Capacitances are in μF unless otherwise specified.
4. Non-inductive resistors.
5. Provide approx. 1°C/W heat sinking per output device based on mounging with mica washer and ZnO thermal compound (Dow Corning No. 340, or equivalent) with T_A = 45°C max.
6. Mount on heat sink, Wakefield No. 209-AB, or equivalent. (Alternatively, this type may be obtained with a factory-attached integral heat sink.)

Fig. 5—70-Watt amplifier circuit featuring quasi-complementary-symmetry output employing hometaxial-base output transistors.

TYPICAL PERFORMANCE DATA
For 70-Watt Audio Amplifier

Measured at a line voltage of 120 V, T_A = 25°C, and a frequency of 1 kHz, unless otherwise specified.

Power:
- Rated power (8-Ω load, at rated distortion) ..... 70 W
- Typical power (4-Ω load) ..... 100 W
- Typical power (16-Ω load) ..... 40 W
- Music power (8-Ω load, at 5% THD with regulated supply) ..... 100 W
- Dynamic power (8-Ω load, at 1% THD with regulated supply) ..... 88 W

Total Harmonic Distortion:
- Rated distortion 1.0%

IM Distortion:
- 10 dB below continuous power output at 60 Hz and 7 kHz (4:1) 0.1%

Sensitivity:
- At continuous power-output rating ..... 700 mV

Hum and Noise:
- Below continuous power output:
  - Input shorted ..... 85 dB
  - Input open ..... 80 dB

Input Resistance ..... 20 kΩ

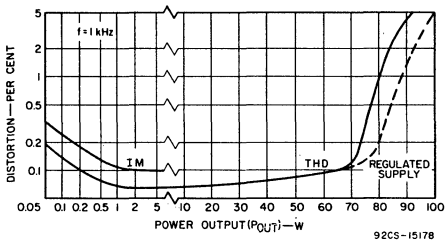


Fig.6—Distortion vs. power output.

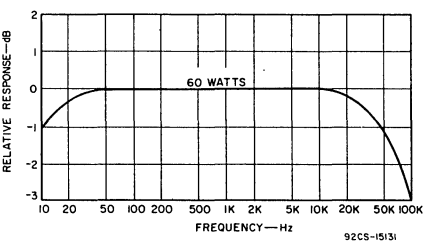


Fig.7—Response curve.

Type RCA1B01
Package: JEDEC TO-3
Construction: Silicon n-p-n, hometaxial base

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS		UNITS
			MIN.	MAX.	
Collector Cutoff Current: With external base-to-emitter resistance (R_{BE})	I_{CER}	V_{CE} = 85 V, R_{BE} = 100Ω	–	0.5	mA
Emitter Cutoff Current: With collector open	I_{EBO}	V_{EB} = 4 V, I_C = 0	–	1	mA
Collector-to-Emitter Voltage: With external base-to-emitter resistance (R_{BE})	V_{CER}	I_C = 0.2A, R_{BE} = 100Ω	95	–	V
Gain Bandwidth Product	f_T	V_{CE} = 4 V, I_C = 1 A	0.8	–	MHz
DC Forward-Current Transfer Ratio	h_{FE}	I_C = 4 A, V_{CE} = 4 V	20	70	
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 4 A, I_B = 0.4 A	–	1	V
Base-to-Emitter Voltage	V_{BE}	I_C = 4 A, V_{CE} = 4 V	–	1.4	V
Second-Breakdown Collector Current: With base forward biased	$I_{S/b}$	V_{CE} = 60 V, t = 1 s	1.95	–	A

For characteristics curves and test conditions, refer to published data for prototype 2N3055 (File 524).

TERMINAL CONNECTIONS FOR TYPE RCA1B01

Pin 1 — Base
Pin 2 — Emitter
Case — Collector
Mounting Flange — Collector