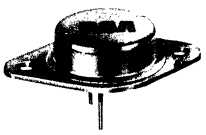
RCA
Solid State
Division

# Power Transistors

## RCA1B06



JEDEC TO-3 H-1570

# Silicon Transistor for 70-Watt Quasi-Complementary-Symmetry Audio Amplifiers with Pi-Nu Output Transistors

RCA1B06 is an n-p-n pi-nu silicon transistor in a JEDEC TO-3 package. This device is especially characterized for audio-amplifier applications, and can be driven by either RCA1C03 or RCA1C04, n-p-n and p-n-p types, respectively.

The 70-watt amplifier shown in Figs. 1 and 5 uses the RCA1B06 output device in conjunction with eleven other discrete transistors, thirteen diodes, and a 90-volt split power supply. The amplifier output is directly coupled to an 8-ohm speaker. The high-frequency RCA1B06 output transistors used in the amplifier circuit produce excellent transient response at a high power level.

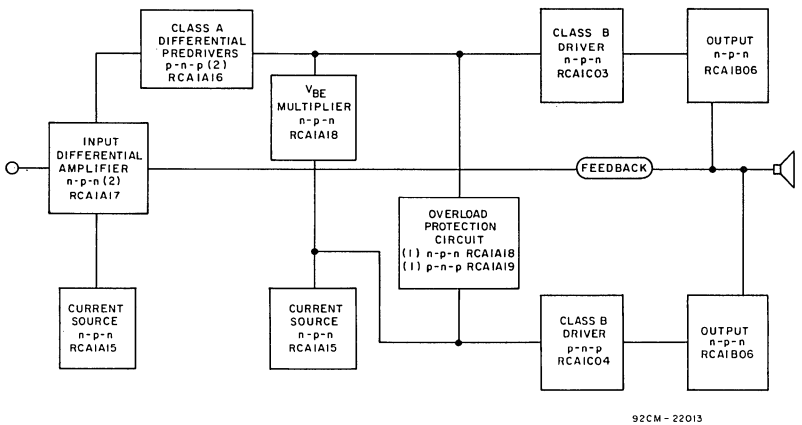



*Fig. 1—Block diagram and transistor complement for 70-watt quasi-complementary-symmetry audio amplifier with pi-nu output transistors.*

| MAXIMUM RATINGS, *Absolute-Maximum Values:* | | RCA1B06 | |
|---|---|---|---|
| COLLECTOR-TO-BASE VOLTAGE | $V_{CBO}$ | 120 | V |
| COLLECTOR-TO-EMITTER VOLTAGE: | | | |
| With base open | $V_{CEO}$ | 100 | V |
| With external base-to-emitter resistance ($R_{BE}$) = 100Ω | $V_{CER}$ | 120 | V |
| EMITTER-TO-BASE VOLTAGE | $V_{EBO}$ | 6 | V |
| COLLECTOR CURRENT | $I_C$ | 7 | A |
| BASE CURRENT | $I_B$ | 2 | A |
| TRANSISTOR DISSIPATION: | $P_T$ | | |
| At case temperatures up to 25°C | | 150 | 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 |

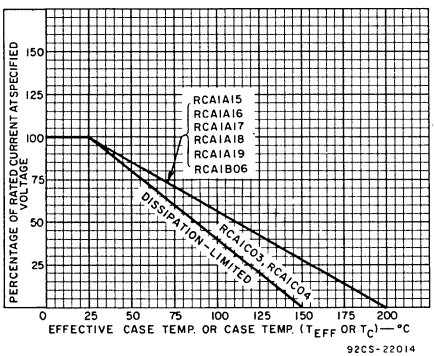



*Fig.2—Derating curves for all types.*

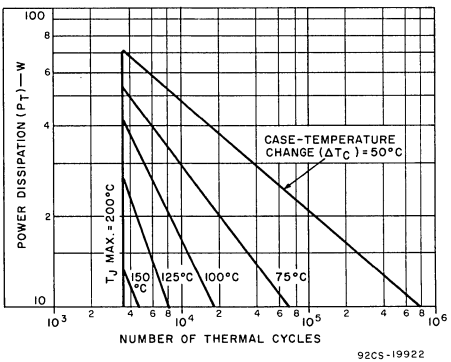



*Fig.3—Thermal-cycling ratings for RCA1B06*

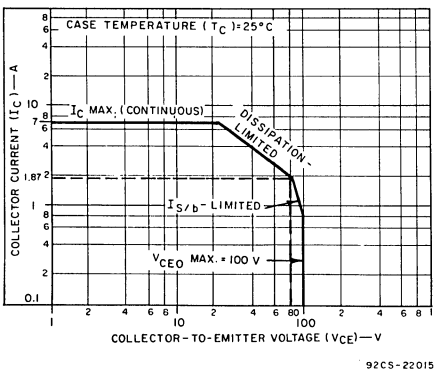
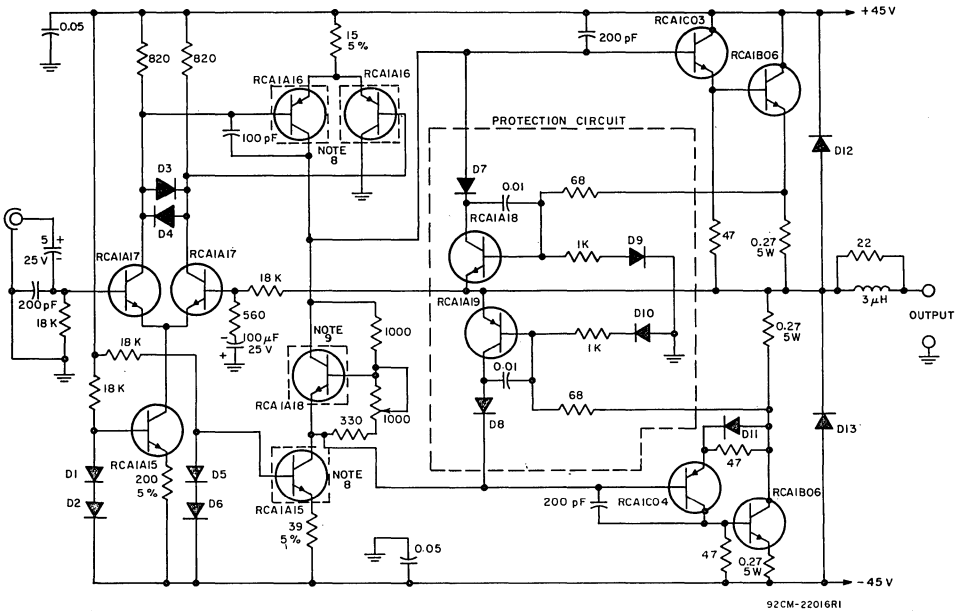



*Fig.4—Maximum operating areas for RCA1B06.*

**TERMINAL CONNECTIONS**

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




NOTES:

1. 90°C thermal cutout attached to heat sink for output transistors.
2. Power transformer: Signal 120-2 (parallel secondary), Signal Transformer Co., 1 Junius St., Brooklyn, N.Y. 11212, or equivalent.
3. Resistors are 1/2-watt unless otherwise specified; values are in ohms.
4. Capacitances are in μF unless otherwise specified.
5. Non-inductive resistors.
6. D1-D8, D11-1N5391
   D9, D10, D12, D13-1N5393.
7. Provide approx. 1°C/W heat sinking per output device based on mounting with mica washer and ZnO thermal compound (Dow Corning No. 340°) with $T_A$ = 45°C max.
8. Mount on heat sink, Wakefield No. 209-AB, or equivalent. (Alternatively, this type may be obtained with a factory-attached integral heat sink.)
9. Attach heat sink cap (Wakefield No. 260-6SH5E, or equivalent) on device and mount on same heat sink with output transistor.

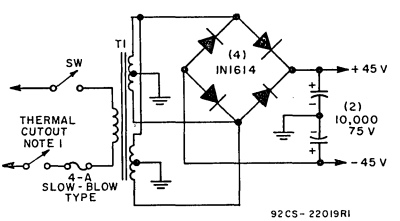



*Fig.5—70-Watt amplifier circuit featuring quasi-complementary-symmetry output employing pi-nu construction output transistors.*

## TYPICAL PERFORMANCE DATA
### For 70-Watt Audio Amplifier

*Measured at a line voltage of 120 V, $T_A = 25^oC$, 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) ..... 50 W

Total Harmonic Distortion:
- Rated distortion ..... 0.5%

IM Distortion:
- 10 dB below continuous power output at 60 Hz and 7 kHz (4:1) ..... <0.2%

IHF Power Bandwidth:
- 3 dB below rated continuous power at rated distortion ..... 5 Hz to 50 kHz
- Bandwidth at 1 W ..... 5 Hz to 100 kHz

Sensitivity:
- At continuous power-output rating ..... 600 mV

Hum and Noise:
- Below continuous power output:
  - Input shorted ..... 100 dB
  - Input open ..... 85 dB
  - With 2 kΩ resistance on 20-ft. cable on input ..... 97 dB

Input Resistance ..... 18 kΩ

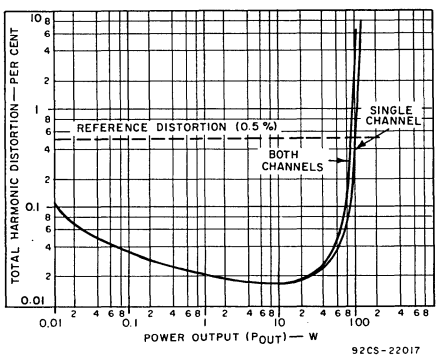



*Fig.6—Typical total harmonic distortion vs. power output at 1 kHz.*

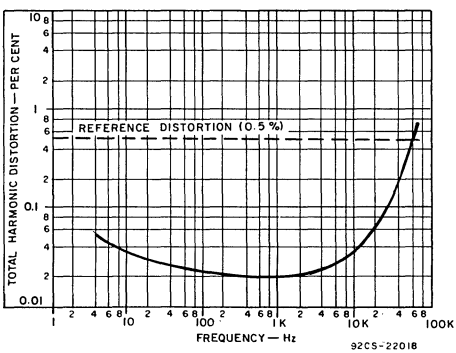



*Fig.7—Typical total harmonic distortion vs. frequency at 35 W.*