# TBA820 • TBA820L

## 2-WATT AUDIO AMPLIFIER

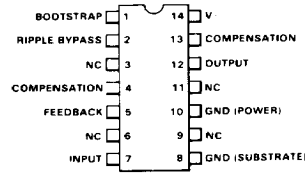
FAIRCHILD LINEAR INTEGRATED CIRCUITS

**GENERAL DESCRIPTION** – The TBA820 is an integrated monolithic audio amplifier in a 14-pin plastic power package. It is constructed on a single silicon chip using the Fairchild Planar* epitaxial process. It is intended for use as a low frequency class B amplifier with wide range of supply voltage (3 to 16 V).

The device is supplied in both the quad in-line (TBA820) and the standard dual in-line (TBA820L).

- **MINIMUM WORKING VOLTAGE OF 3 V**
- **LOW QUIESCENT CURRENT**
- **LOW NUMBER OF EXTERNAL COMPONENTS**
- **GOOD RIPPLE REJECTION**
- **NO CROSS-OVER DISTORTION**
- **TYPICAL OUTPUT POWER:**
  - **–2 W AT 12 V – 8 Ω**
  - **–1.6 W AT 9 V – 4 Ω**
  - **–1.2 W AT 9 V – 8 Ω**
  - **–0.75 W AT 6 V – 4 Ω**

**CONNECTION DIAGRAM**
**14-PIN POWER DIP**
(TOP VIEW)
PACKAGE OUTLINE 9A, 9C




**ORDER INFORMATION**

| TYPE | PART NO. |
|---|---|
| 820 (9C) | TBA820 |
| 820L (9A)* | TBA820L |

*Recommended for new designs.

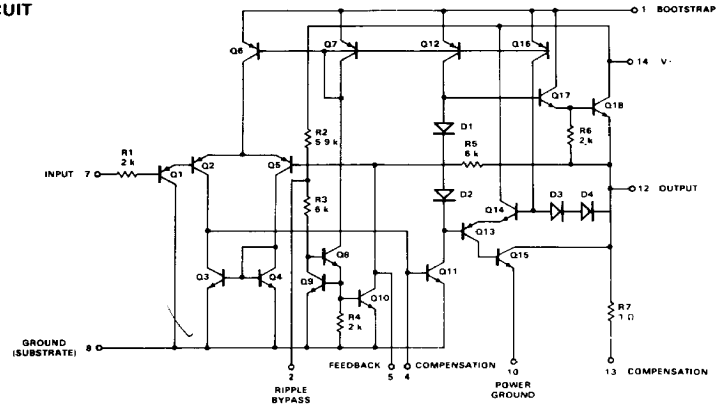
**ABSOLUTE MAXIMUM RATINGS**

| | |
|---|---|
| Supply Voltage | 16 V |
| Output Peak Current | 1.5 A |
| Power Dissipation at $T_{amb}$ = 50°C | 1.25 W |
| Storage and Junction Temperature | –40°C to 150°C |
| Pin Temperature (Soldering 10 s) | 260°C |

**Thermal Data**

$\theta_{j\text{-amb}}$ Thermal Resistance Junction-Ambient (copper frame) max 80°C/W

**EQUIVALENT CIRCUIT**



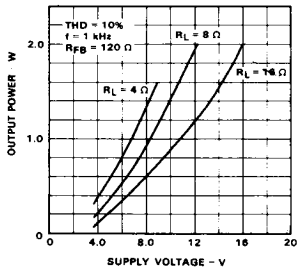

*Planar is a patented Fairchild process

**ELECTRICAL CHARACTERISTICS:** Power output measured at pin 12, TA = 25°C unless otherwise specified.

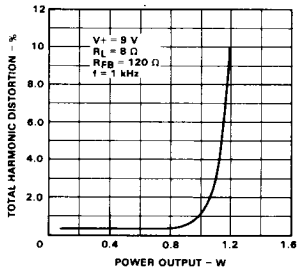
| CHARACTERISTICS | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|
| Supply Voltage | | 3 | | 16 | V |
| Quiescent Output Voltage (Pin 12) | V+ = 9 V | 4 | 4.5 | 5 | V |
| Quiescent Drain Current | V+ = 9 V | | 4 | 12 | mA |
| Bias Current (Pin 7) | V+ = 9 V | | 0.1 | 0.7 | μA |
| Power Output, Figure 1 | THD = 10%, $R_{FB}$ = 120 Ω, f = 1 kHz, | | | | |
| | V+ = 12 V, $R_L$ = 8 Ω | | 2 | | W |
| | V+ = 9 V, $R_L$ = 4 Ω | | 1.6 | | W |
| | V+ = 9 V, $R_L$ = 8 Ω | 0.9 | 1.2 | | W |
| | V+ = 6 V, $R_L$ = 4 Ω | | 0.75 | | W |
| | V+ = 3.5 V, $R_L$ = 4 Ω | | 0.22 | | W |
| Input Sensitivity, Figure 1 | $P_{OUT}$ = 1.2 W, $R_L$ = 8 Ω, V+ = 9 V, f = 1 kHz | | | | |
| | $R_{FB}$ = 33 Ω | | 16 | | mV |
| | $R_{FB}$ = 120 Ω | | 60 | | mV |
| Input Sensitivity, Figure 1 | $P_{OUT}$ = 50 mW, $R_L$ = 8 Ω, V+ = 9 V, f = 1 kHz | | | | |
| | $R_{FB}$ = 33 Ω | | 3.5 | | mV |
| | $R_{FB}$ = 120 Ω | | 12 | | mV |
| Input Resistance | | | 5 | | MΩ |
| Frequency Response (−3 dB) Figure 1 | V+ = 9 V, $R_L$ = 8 Ω, $R_{FB}$ = 120 Ω | | | | |
| | $C_{FB}$ = 680 pF | | 25 – 7000 | | Hz |
| | $C_{FB}$ = 220 pF | | 25 – 20,000 | | Hz |
| Total Harmonic Distortion Figure 1 | $P_{OUT}$ = 500 mW, $R_L$ = 8 Ω, V+ = 9 V, f = 1 kHz | | | | |
| | $R_{FB}$ = 33 Ω | | 0.8 | | % |
| | $R_{FB}$ = 120 Ω | | 0.4 | | % |
| Voltage Gain (Open Loop) | V+ = 9 V, $R_L$ = 8 Ω, f = 1 kHz | | 75 | | dB |
| Voltage Gain (Closed Loop) | V+ = 9 V, $R_L$ = 8 Ω, f = 1 kHz | | | | |
| | $R_{FB}$ = 33 Ω | | 45 | | dB |
| | $R_{FB}$ = 120 Ω | 31 | 34 | 37 | dB |
| Input Noise Voltage | V+ = 9 V, BW (−3.0 dB) = 25–20,000 Hz | | 3 | | μV |
| Input Noise Current | V+ = 9 V, BW (−3.0 dB) = 25–20,000 Hz | | 0.4 | | nA |
| Signal Plus Noise to Noise Ratio | V+ = 9 V, $R_L$ = 8 Ω, $R_{FB}$ = 120 Ω | | | | |
| | BW (−3.0 dB) = 25–20,000 Hz | | | | |
| | $R_1$ = 100 kΩ, $P_{OUT}$ = 1.2 W | | 70 | | dB |
| Supply Voltage Rejection, Figure 2 | V = 9 V, $R_L$ = 8 Ω, f (ripple) = 100 Hz, | | | | |
| | C6 = 50 μF, $R_{FB}$ = 120 Ω | | 42 | | dB |

## TYPICAL PERFORMANCE CURVES

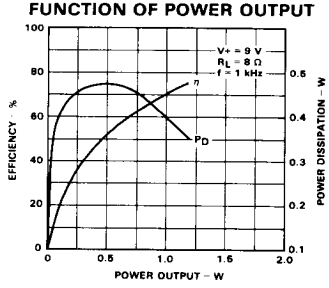
**OUTPUT POWER AS A FUNCTION OF SUPPLY VOLTAGE**




**TOTAL HARMONIC DISTORTION AS A FUNCTION OF FREQUENCY**

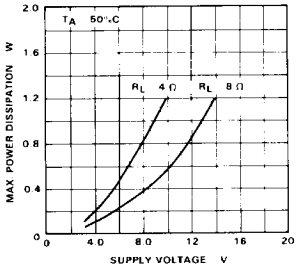



**POWER DISSIPATION AND EFFICIENCY AS A FUNCTION OF POWER OUTPUT**

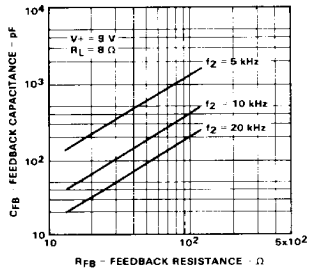


## TYPICAL PERFORMANCE CURVES (Cont'd)

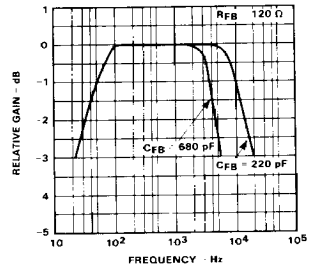
### MAXIMUM POWER DISSIPATION (SINE WAVE OPERATION) AS A FUNCTION OF SUPPLY VOLTAGE



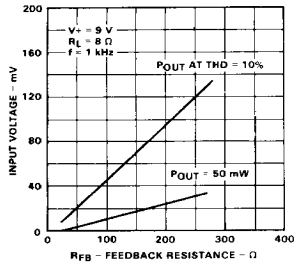

### TYPICAL VALUE OF $C_{FB}$ AS A FUNCTION OF $R_{FB}$



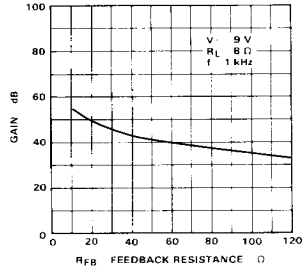

### TYPICAL RELATIVE FREQUENCY RESPONSE



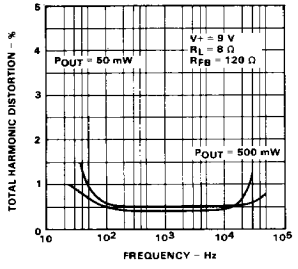

### INPUT SENSITIVITY AS A FUNCTION OF $R_{FB}$



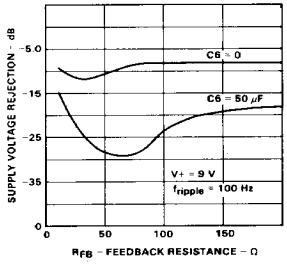

### TYPICAL VOLTAGE GAIN (CLOSED LOOP) AS A FUNCTION OF $R_{FB}$



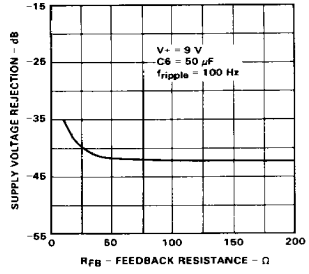

### TOTAL HARMONIC DISTORTION AS A FUNCTION OF FREQUENCY



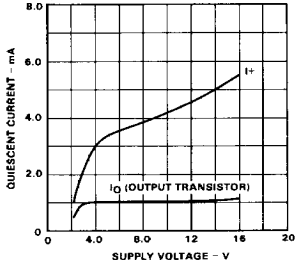

### SUPPLY VOLTAGE REJECTION AS A FUNCTION OF $R_{FB}$ FOR FIG. 1 CIRCUIT



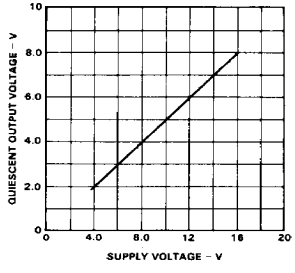

### SUPPLY VOLTAGE REJECTION AS A FUNCTION OF $R_{FB}$ (FIG. 2 CIRCUIT)



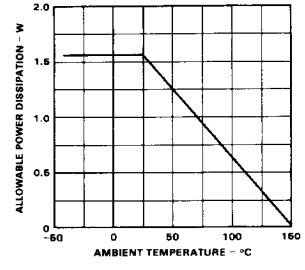

### QUIESCENT CURRENT AS A FUNCTION OF SUPPLY VOLTAGE




### QUIESCENT OUTPUT VOLTAGE AT PIN 12 AS A FUNCTION OF SUPPLY VOLTAGE




### POWER RATING CHART AS A FUNCTION OF AMBIENT TEMPERATURE



## TEST AND APPLICATION CIRCUITS

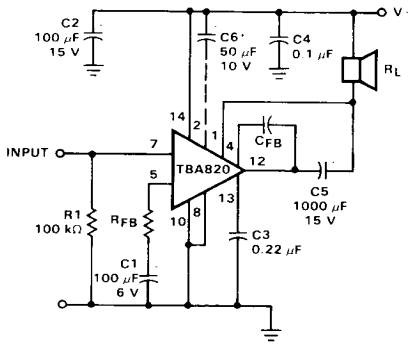



Fig. 1. Circuit Diagram with Load Connected to the Supply Voltage

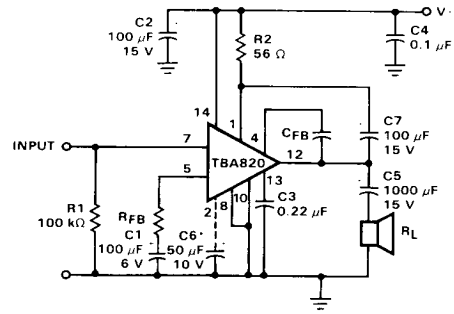



Fig. 2 Circuit Diagram with Load Connected to Ground

*Capacitor C6 must be used when high ripple rejection is desired.

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