

# $\mu$ A7307

## 1.6 WATT AUDIO AMPLIFIER FAIRCHILD LINEAR INTEGRATED CIRCUITS

**GENERAL DESCRIPTION** — The  $\mu$ A7307 is an integrated monolithic audio amplifier in an 8-pin plastic 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) and is primarily designed for low voltage portable radios and industrial applications where limited space and power consumption are important.

- **MINIMUM WORKING VOLTAGE OF 3 V**
- **LOW QUIESCENT CURRENT**
- **LOW NUMBER OF EXTERNAL COMPONENTS**
- **GOOD RIPPLE REJECTION**
- **NO CROSS-OVER DISTORTION**
- **TYPICAL OUTPUT POWER:**

|           |                    |
|-----------|--------------------|
| 1.6 W AT  | 9 V - 4 $\Omega$   |
| 1.2 W AT  | 9 V - 8 $\Omega$   |
| 0.75 W AT | 6 V - 4 $\Omega$   |
| 0.5 W AT  | 6 V - 8 $\Omega$   |
| 0.22 W AT | 3.5 V - 4 $\Omega$ |
| 0.09 W AT | 3 V - 4 $\Omega$   |

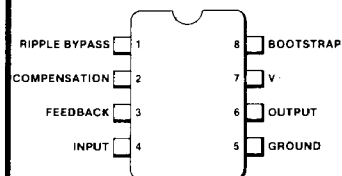
### ABSOLUTE MAXIMUM RATINGS

|                                                      |                                            |
|------------------------------------------------------|--------------------------------------------|
| Peak Voltage (Pin 8)                                 | 24 V                                       |
| Supply Voltage                                       | 16 V                                       |
| Output Peak Current                                  | 1.0 A                                      |
| Power Dissipation at $T_{amb} \leq 50^\circ\text{C}$ | 1.05 W                                     |
| Storage and Junction Temperature                     | $-40^\circ\text{C}$ to $150^\circ\text{C}$ |
| Lead Temperature (Soldering 10 s)                    | 260 $^\circ\text{C}$                       |

### THERMAL DATA

|                                                                         |                       |
|-------------------------------------------------------------------------|-----------------------|
| $\theta_{j-amb}$ Thermal Resistance Junction-Ambient (copper frame) max | 95 $^\circ\text{C/W}$ |
|-------------------------------------------------------------------------|-----------------------|

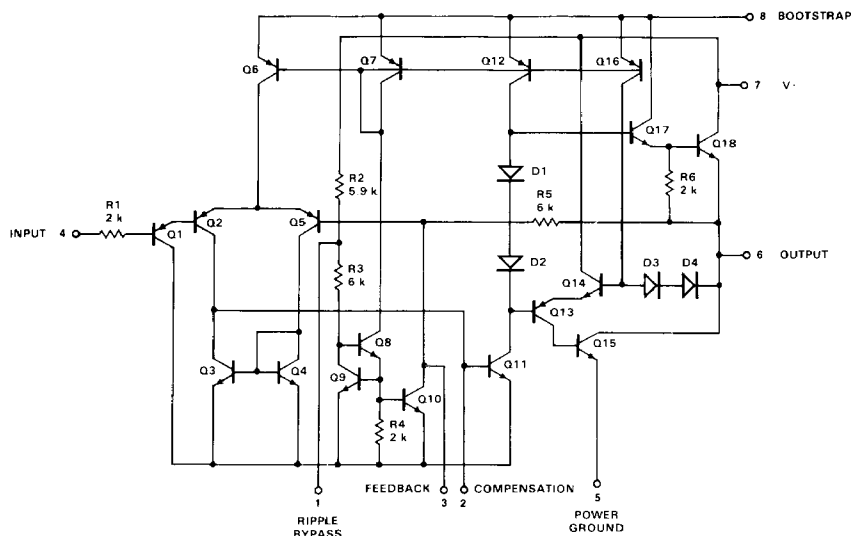
**CONNECTION DIAGRAM**  
**8-PIN MINI-DIP**  
(TOP VIEW)  
PACKAGE OUTLINE 9T  
PACKAGE CODE T



### ORDER INFORMATION

| TYPE  | PART NO.      |
|-------|---------------|
| 7307C | $\mu$ A7307TC |

### EQUIVALENT CIRCUIT



\*Planar is a patented Fairchild process.

**ELECTRICAL CHARACTERISTICS:** Power output measured at pin 6,  $T_A = 25^\circ\text{C}$  unless otherwise specified.

| CHARACTERISTICS                        | TEST CONDITIONS                                                                                                                                                                                                                                                                                                         | MIN | TYP                                       | MAX      | UNITS                      |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------|----------|----------------------------|
| Supply Voltage                         |                                                                                                                                                                                                                                                                                                                         | 3   |                                           | 16       | V                          |
| Quiescent Output Voltage (Pin 6)       | $V^+ = 9\text{ V}$                                                                                                                                                                                                                                                                                                      | 4   | 4.5                                       | 5        | V                          |
| Quiescent Drain Current                | $V^+ = 9\text{ V}$                                                                                                                                                                                                                                                                                                      |     | 4                                         | 9        | mA                         |
| Bias Current (Pin 4)                   | $V^+ = 9\text{ V}$                                                                                                                                                                                                                                                                                                      |     | 0.1                                       | 0.7      | $\mu\text{A}$              |
| Power Output, Figure 1                 | THD = 10%, $R_{FB} = 120\ \Omega$ , $f = 1\text{ kHz}$ ,<br>$V^+ = 12\text{ V}$ , $R_L = 8\ \Omega$<br>$V^+ = 9\text{ V}$ , $R_L = 4\ \Omega$<br>$V^+ = 9\text{ V}$ , $R_L = 8\ \Omega$<br>$V^+ = 6\text{ V}$ , $R_L = 4\ \Omega$<br>$V^+ = 3.5\text{ V}$ , $R_L = 4\ \Omega$<br>$V^+ = 3\text{ V}$ , $R_L = 4\ \Omega$ | 0.9 | 2.0<br>1.6<br>1.2<br>0.75<br>0.22<br>0.09 |          | W<br>W<br>W<br>W<br>W<br>W |
| Input Sensitivity, Figure 1            | $P_{OUT} = 1.2\text{ W}$ , $R_L = 8\ \Omega$ , $V^+ = 9\text{ V}$ , $f = 1\text{ kHz}$<br>$R_{FB} = 33\ \Omega$<br>$R_{FB} = 120\ \Omega$                                                                                                                                                                               |     | 16<br>60                                  | 24<br>82 | mV<br>mV                   |
| Input Sensitivity, Figure 1            | $P_{OUT} = 50\text{ mW}$ , $R_L = 8\ \Omega$ , $V^+ = 9\text{ V}$ , $f = 1\text{ kHz}$<br>$R_{FB} = 33\ \Omega$<br>$R_{FB} = 120\ \Omega$                                                                                                                                                                               |     | 3.5<br>12                                 |          | mV<br>mV                   |
| Input Resistance                       |                                                                                                                                                                                                                                                                                                                         |     | 5                                         |          | M $\Omega$                 |
| Frequency Response (-3 dB)<br>Figure 1 | $V^+ = 9\text{ V}$ , $R_L = 8\ \Omega$ , $R_{FB} = 120\ \Omega$<br>$C_{FB} = 680\text{ pF}$<br><br>$C_{FB} = 220\text{ pF}$                                                                                                                                                                                             |     | 25-<br>7000<br>25-<br>20,000              |          | Hz<br>Hz                   |
| Total Harmonic Distortion<br>Figure 1  | $P_{OUT} = 500\text{ mW}$ , $R_L = 8\ \Omega$ , $V^+ = 9\text{ V}$ , $f = 1\text{ kHz}$<br>$R_{FB} = 33\ \Omega$<br>$R_{FB} = 120\ \Omega$                                                                                                                                                                              |     | 0.8<br>0.4                                |          | %<br>%                     |
| Voltage Gain (Open Loop)               | $V^+ = 9\text{ V}$ , $R_L = 8\ \Omega$ , $f = 1\text{ kHz}$                                                                                                                                                                                                                                                             |     | 75                                        |          | dB                         |
| Voltage Gain (Closed Loop)             | $V^+ = 9\text{ V}$ , $R_L = 8\ \Omega$ , $f = 1\text{ kHz}$<br>$R_{FB} = 33\ \Omega$<br>$R_{FB} = 120\ \Omega$                                                                                                                                                                                                          | 31  | 45<br>34                                  | 37       | dB<br>dB                   |
| Input Noise Voltage                    | $V^+ = 9\text{ V}$ , BW (-3.0 dB) = 25-20,000 Hz                                                                                                                                                                                                                                                                        |     | 3.5                                       |          | $\mu\text{V}$              |
| Input Noise Current                    | $V^+ = 9\text{ V}$ , BW (-3.0 dB) = 25-20,000 Hz                                                                                                                                                                                                                                                                        |     | 0.4                                       |          | nA                         |
| Signal Plus Noise to Noise Ratio       | $V^+ = 9\text{ V}$ , $R_L = 8\ \Omega$ , $R_{FB} = 120\ \Omega$<br>BW (-3.0 dB) = 25-20,000 Hz<br>$R_1 = 100\text{ k}\Omega$ , $P_{OUT} = 1.2\text{ W}$                                                                                                                                                                 |     | 70                                        |          | dB                         |
| Supply Voltage Rejection, Figure 2     | $V = 9\text{ V}$ , $R_L = 8\ \Omega$ , $f$ (ripple) = 100 Hz,<br>$C_6 = 50\ \mu\text{F}$ , $R_{FB} = 120\ \Omega$                                                                                                                                                                                                       |     | 42                                        |          | dB                         |

**APPLICATIONS INFORMATION**

Two typical application circuits are shown in *Figures 1* and *2*. The ripple bypass capacitor  $C_6$  may be omitted in most battery operated applications or where high ripple rejection is not required.

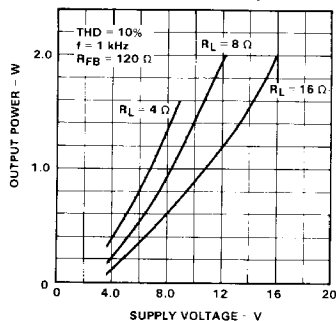
Resistor  $R_2$  must be included in series with  $C_3$  to assure stable operation of the  $\mu A7307$ .

A PC board layout for the circuit of *Figure 1* is shown to scale in *Figure 3*. A photograph of a finished module is shown in *Figure 4*.

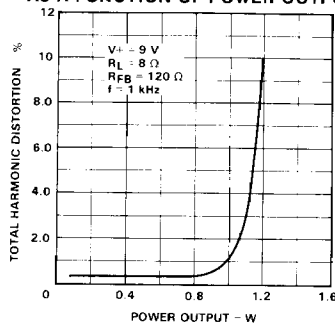
The PC board layout for the circuit of *Figure 2* is shown to scale in *Figure 5*, and a photograph is shown in *Figure 6*.

## TYPICAL PERFORMANCE CURVES

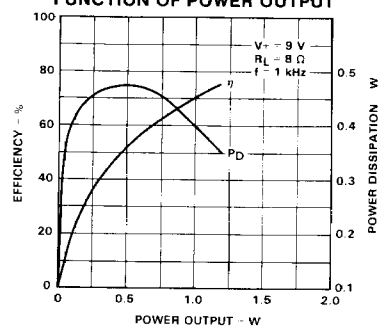
OUTPUT POWER  
AS A FUNCTION OF  
SUPPLY VOLTAGE



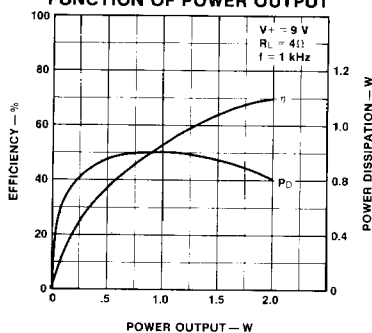
TOTAL HARMONIC DISTORTION  
AS A FUNCTION OF POWER OUTPUT



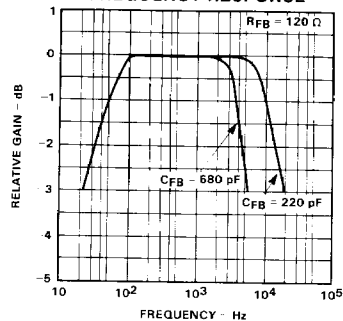
POWER DISSIPATION  
AND EFFICIENCY AS A  
FUNCTION OF POWER OUTPUT



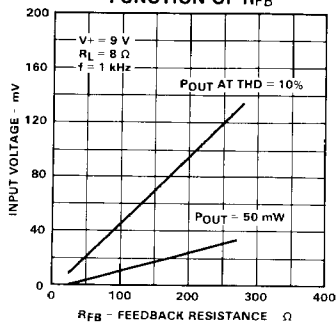
POWER DISSIPATION  
AND EFFICIENCY AS A  
FUNCTION OF POWER OUTPUT



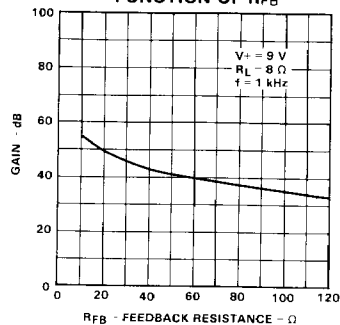
TYPICAL RELATIVE  
FREQUENCY RESPONSE



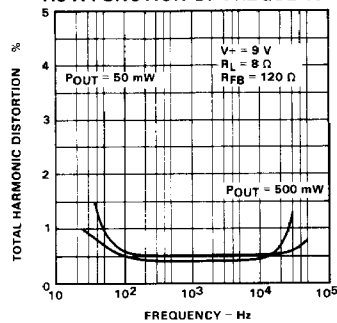
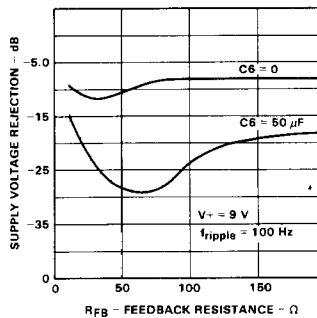
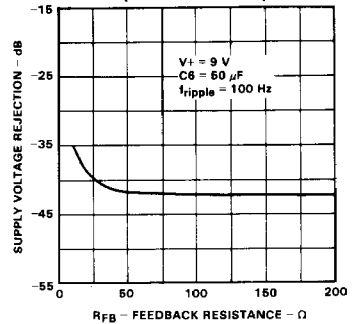
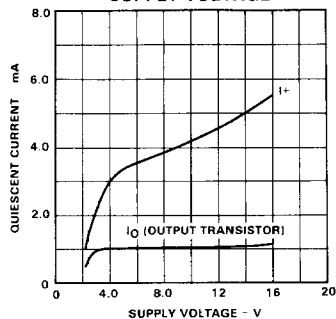
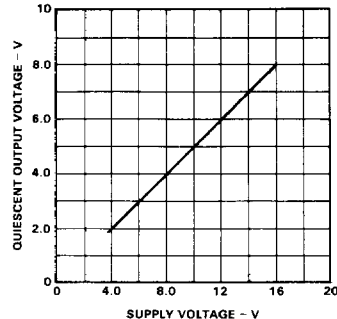
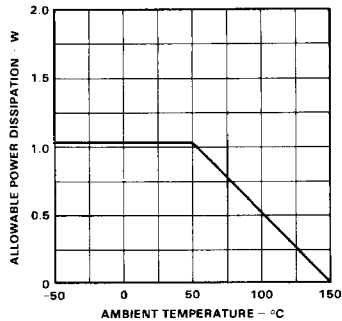
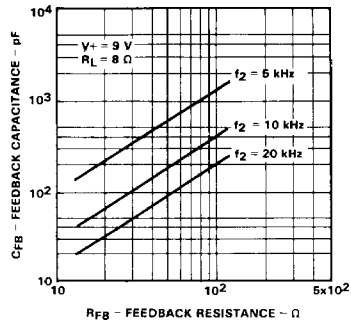
INPUT SENSITIVITY AS A  
FUNCTION OF  $R_{FB}$



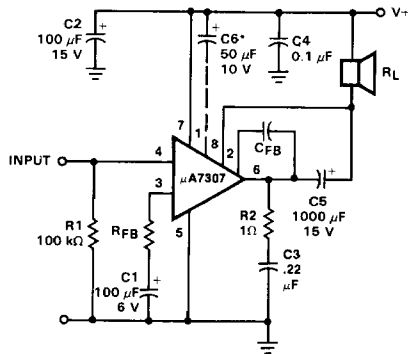
TYPICAL VOLTAGE GAIN  
(CLOSED LOOP) AS A  
FUNCTION OF  $R_{FB}$



## TYPICAL PERFORMANCE CURVES

TOTAL HARMONIC DISTORTION  
AS A FUNCTION OF FREQUENCYSUPPLY VOLTAGE REJECTION  
AS A FUNCTION OF  $R_{FB}$  FOR  
FIG. 1 CIRCUITSUPPLY VOLTAGE REJECTION  
AS A FUNCTION OF  $R_{FB}$   
(FIG. 2 CIRCUIT)QUIESCENT CURRENT  
AS A FUNCTION OF  
SUPPLY VOLTAGEQUIESCENT OUTPUT VOLTAGE  
AT PIN 12 AS A FUNCTION OF  
SUPPLY VOLTAGEPOWER RATING CHART  
AS A FUNCTION OF  
AMBIENT TEMPERATURETYPICAL VALUE OF  $C_{FB}$   
AS A FUNCTION OF  $R_{FB}$ 

TEST AND APPLICATION CIRCUITS



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

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

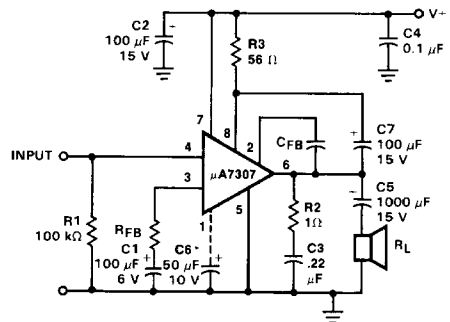


Fig. 2 Circuit Diagram with Load Connected to Ground



Bottom View

Fig. 3 1:1 Scale P.C. Board Layout for Circuit of Figure 1

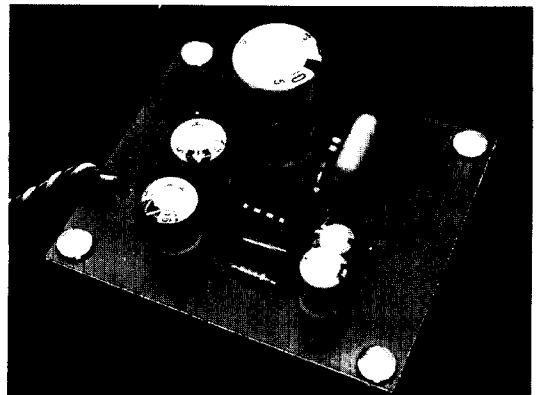
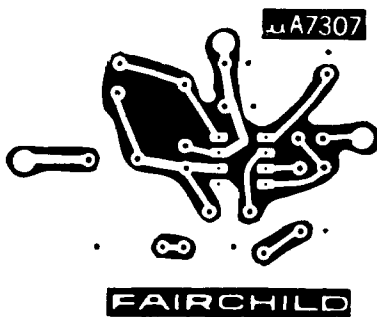


Fig. 4 Photograph of Assembled Board for Figure 1



Bottom View

Fig. 5 1:1 Scale P.C. Board Layout for Circuit of Figure 2

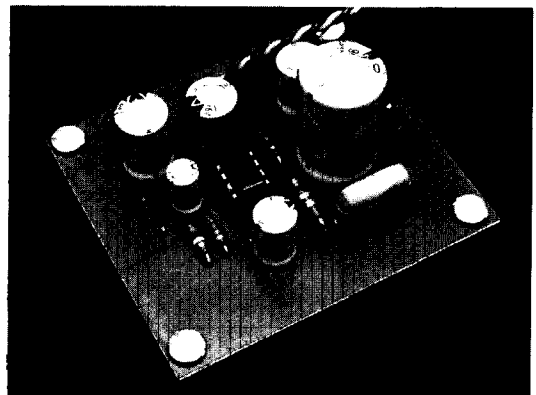


Fig. 6 Photograph of Assembled Board for Figure 2