μA783

9 WATT AUDIO POWER AMPLIFIER

FAIRCHILD LINEAR INTEGRATED CIRCUIT

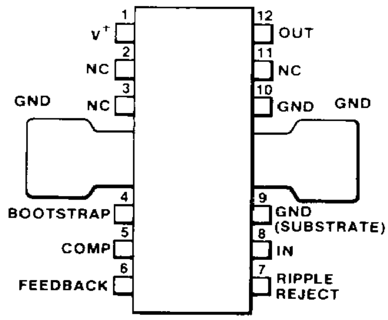
GENERAL DESCRIPTION — The μA783 is high-voltage monolithic integrated circuit in a 12-pin power package. It is constructed using the Fairchild Planar* epitaxial process. It is designed for use as a low frequency Class B power amplifier and is intended primarily for 8 Ω and 16 Ω applications. It typically provides 9 W into 8 ohms and 5 W into 16 ohms from a 24 V supply.

The μA783 is provided with two pin configurations (P3 and P4). Both devices are identical electrically.

The μA783 is pin for pin compatible with the TBA810S and TCA940.

- **THERMAL SHUTDOWN**
- **WIDE SUPPLY VOLTAGE RANGE (4 V to 30 V)**
- **HIGH CURRENT CAPABILITY (2.5 A)**
- **12-PIN POWER PACKAGE**

CONNECTION DIAGRAM
12-PIN POWER PACKAGE
(TOP VIEW)
PACKAGE OUTLINE 9W
PACKAGE CODES P3, P4



ABSOLUTE MAXIMUM RATINGS

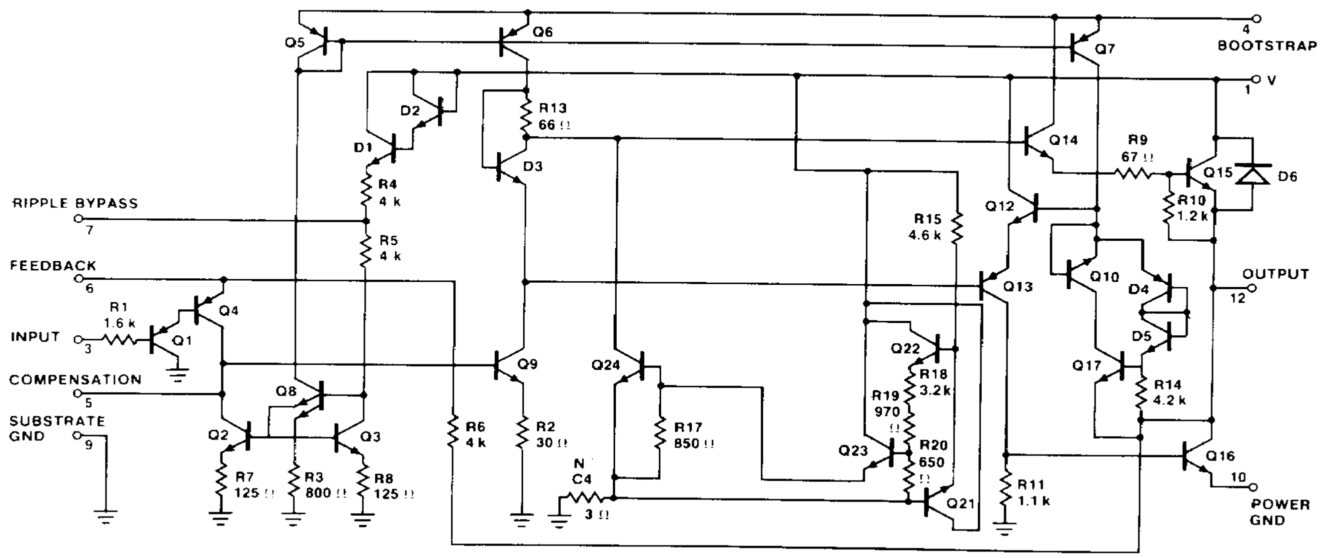
Supply Voltage	30 V
Output Peak Current (Non-Repetitive)	3.5 A
Output Current (Repetitive)	2.5 A
Input Voltage	220 mVrms
Power Dissipation: at $T_A = 70°C$	1.0 W
at $T_C = 90°C$	6.0 W
Storage and Junction Temperature	-40 to 150°C
Pin Temperature (Soldering, 10 s)	260C

*Planar is a patented Fairchild process.

ORDER INFORMATION

TYPE	PART NO.
μA783C	μA783P3C
μA783C	μA783P4C

EQUIVALENT CIRCUIT



ELECTRICAL CHARACTERISTICS: Refer to the test circuit: $T_A = 25°C$

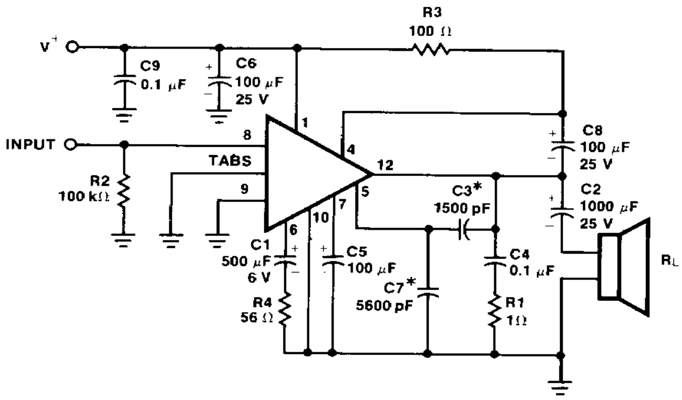
CHARACTERISTICS	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Quiescent Output Voltage (Pin 12)	V+ = 24.0 V	11.2	12.0	12.8	V
Quiescent Drain Current (Pin 1)	V+ = 24.0 V		20.0	30.0	mA
Bias Current (Pin 8)	V+ = 24.0 V		0.4		μA
Power Output	THD = 10% f = 1.0 kHz				
	V+ = 24.0 V, R_L = 16 Ω		5.0		W
	V+ = 24.0 V, R_L = 8 Ω	8.0	9.0		W
	V+ = 14.4 V, R_L = 4 Ω		5.2		W
	V+ = 6.0 V, R_L = 4 Ω		0.9		W
Input Sensitivity	P_{OUT} = 9 W, V+ = 24.0 V R_L = 8.0 Ω, f = 1.0 kHz				
	R_f = 56 Ω		147.0	200.0	mV
	R_f = 22 Ω		60.0		mV
Input Resistance (Pin 8)			5.0		MΩ
Frequency Response (-3.0 dB)	V+ = 24.0 V, R_L = 8.0 Ω				
	C3 = 820 pF		20-30000		Hz
	C3 = 1500 pF		20-20000		Hz
Total Harmonic Distortion	P_{OUT} = 50 mW to 5 W, V+ = 24.0 V R_L = 8.0 Ω, f = 1.0 kHz		0.3		%
Voltage Gain (Open Loop)	V+ = 24.0 V, R_L = 8.0 Ω, f = 1.0 kHz		70.0		dB
Voltage Gain (Closed Loop)	V+ = 24.0 V, R_L = 8.0 Ω, f = 1.0 kHz	34.0	36.0	40.0	dB
Input Noise Voltage	V+ = 24.0 V, R_g = 0, BW (-3.0 dB) = 20 Hz to 20,000 Hz		3.0		μV
Input Noise Current	V+ = 24.0 V, BW (-3.0 dB) = 20 Hz to 20,000 Hz		0.15		nA
Efficiency	P_{OUT} = 9 W, V+ = 24.0 V, R_L = 8.0 Ω, f = 1.0 kHz		70.0		%
Supply Voltage Rejection	V+ = 24.0 V, R_L = 8.0 Ω f_{ripple} = 100 Hz		45.0		dB

THERMAL DATA

			μA783P3	μA783P4
θ_{JC}	Thermal Resistance Junction to Case (tab)	MAX	12° C/W	10° C/W
θ_{JA}	Thermal Resistance Junction to Ambient	MAX	70° C/W**	80° C/W

**Obtained with tabs soldered to print circuit with minimized copper area.

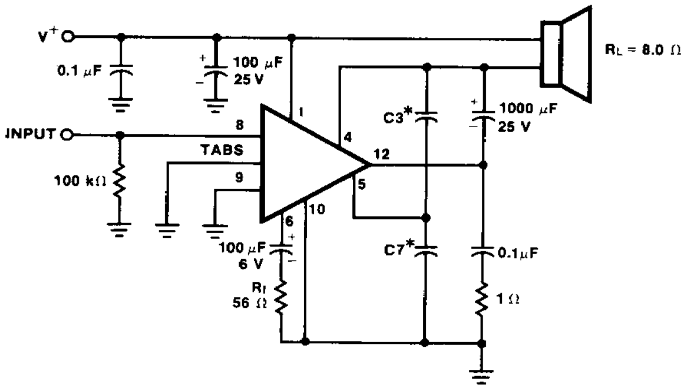
TEST AND APPLICATION CIRCUIT



*C3 and C7 See Figure 3

Figure 1

TYPICAL CIRCUIT WITH LOAD CONNECTED TO THE SUPPLY VOLTAGE



*C3 and C7 See Figure 3

Figure 2

TYPICAL VALUE OF C3 AS A FUNCTION OF Rf FOR VARIOUS VALUES OF BANDWIDTH

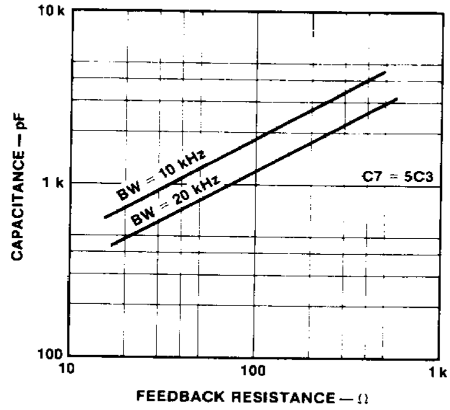


Figure 3

POWER OUTPUT AS A FUNCTION OF SUPPLY VOLTAGE

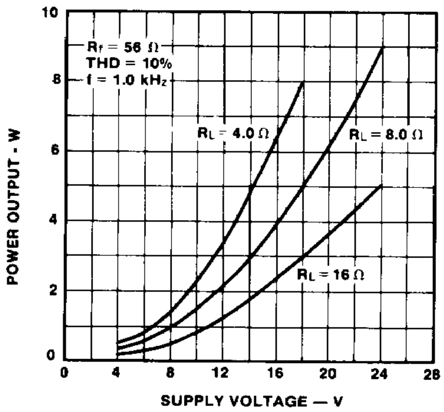


Figure 4

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

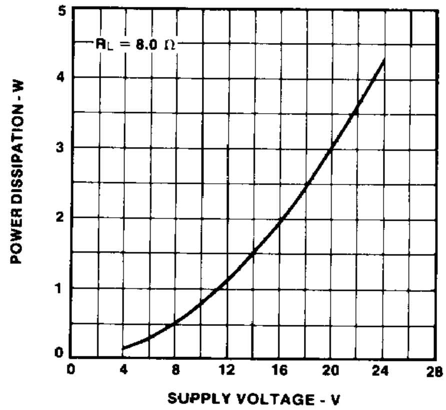


Figure 5

TOTAL HARMONIC DISTORTION AS A FUNCTION OF POWER OUTPUT

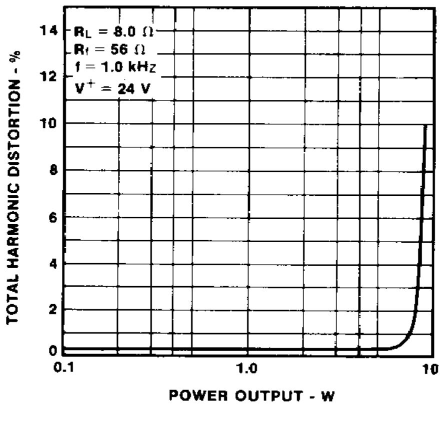


Figure 6

TOTAL HARMONIC DISTORTION AS A FUNCTION OF FREQUENCY

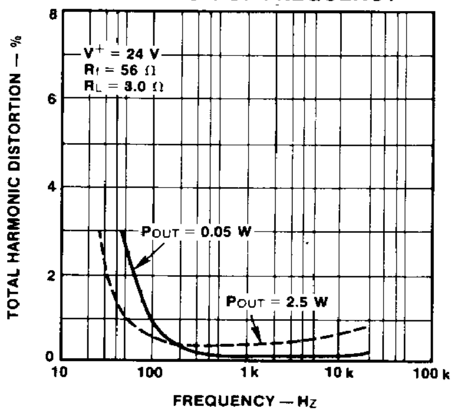


Figure 7

INPUT VOLTAGE AND VOLTAGE GAIN (CLOSED LOOP) AS A FUNCTION OF FEEDBACK RESISTANCE

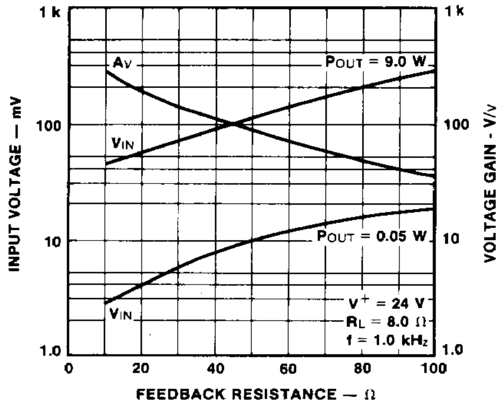


Figure 8

POWER DISSIPATION AND EFFICIENCY AS A FUNCTION OF POWER OUTPUT

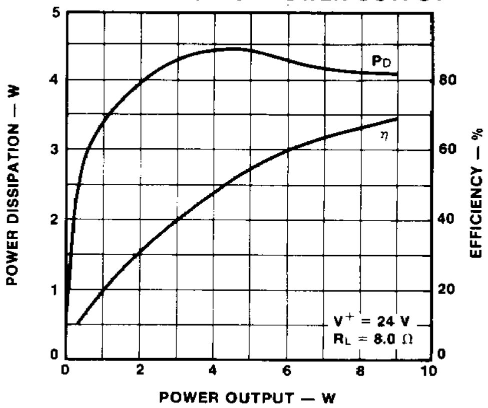


Figure 9

OUTPUT VOLTAGE AS A FUNCTION OF SUPPLY VOLTAGE

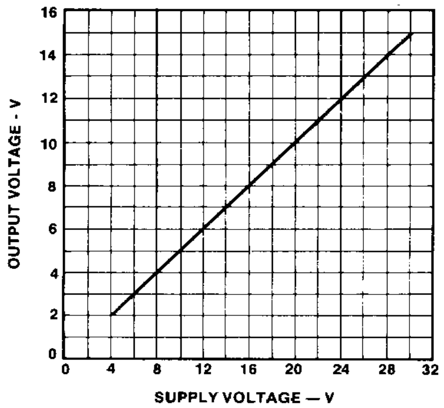


Figure 10

QUIESCENT CURRENT AS A FUNCTION OF SUPPLY VOLTAGE

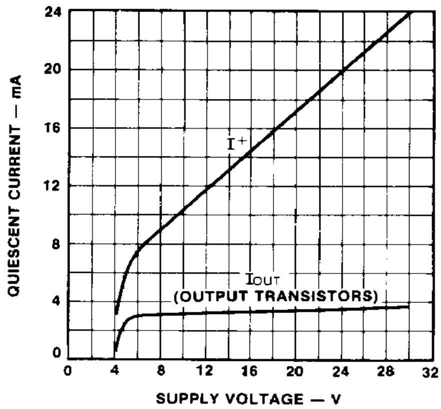


Figure 11

SUPPLY VOLTAGE REJECTION AS A FUNCTION OF FEEDBACK RESISTANCE

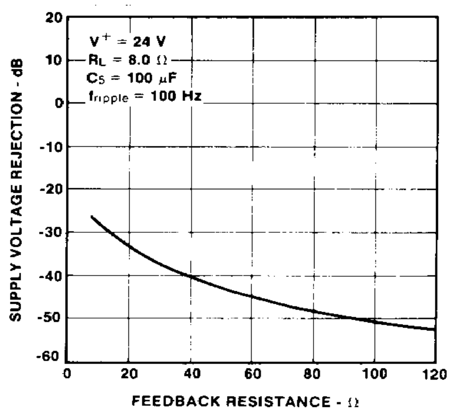


Figure 12

SUPPLY VOLTAGE REJECTION AS A FUNCTION OF FEEDBACK RESISTANCE IN CIRCUIT OF FIGURE 2

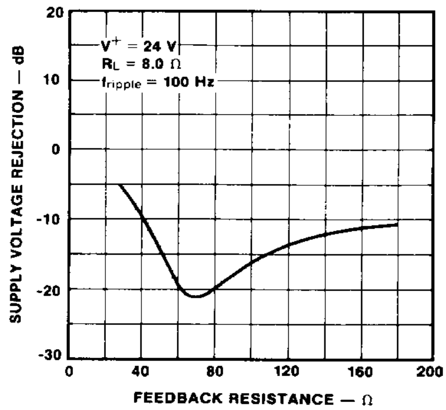


Figure 13

MOUNTING INSTRUCTIONS

The thermal power dissipated in the circuit may be removed by connecting the tabs to an external heat sink (μA783P4C, Figure 14) or by soldering them to an area of copper on the printed circuit. (μA783P3C, Figure 15). During soldering, the tabs temperature must not exceed 230°C and the soldering time must not be longer than 12 seconds. Figures 16a and 16b show two ways that can be used for mounting the device.

MAXIMUM POWER DISSIPATION AS A FUNCTION OF AMBIENT TEMPERATURE (μA783P4C)

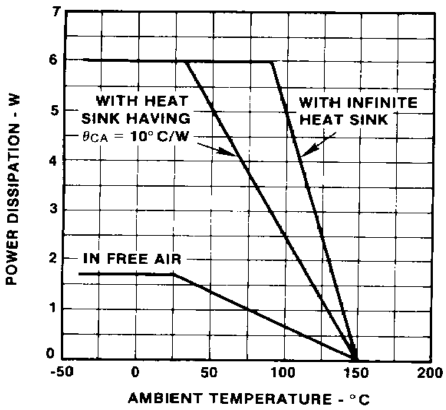


Figure 14

MAXIMUM POWER DISSIPATION AND TOTAL THERMAL RESISTANCE AS A FUNCTION OF COPPER AREA OF PC BOARD (μA783P3C)

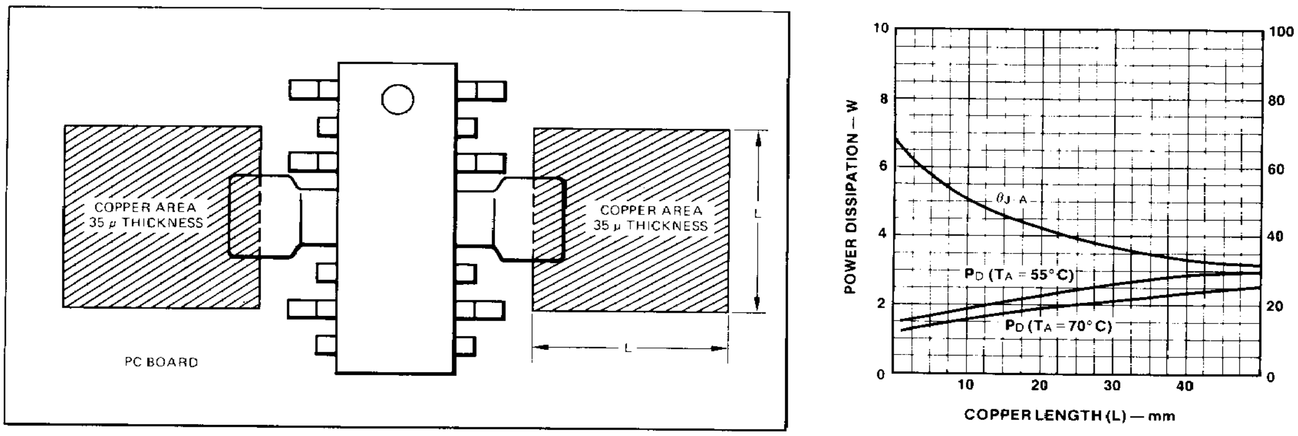


Figure 15

Figure 16a shows a method of mounting the μA783P3C that is satisfactory both from the point of view of heat dissipation and from mechanical considerations. For the μA783P4C, the desired thermal resistance is obtained attaching the hardware shown in Figure 16b, to a bracket with proper dimensions. This bracket can also act as a support for the whole printed circuit board.

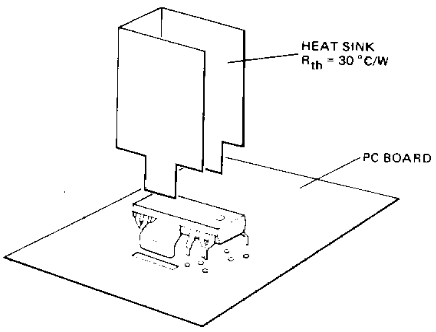


FIGURE 16a

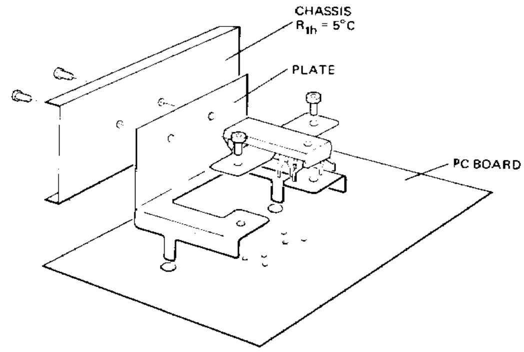


Figure 16b

THERMAL SHUTDOWN

The on chip design of the thermal limiting circuit offers the following advantages:

1. An overload on the output (even if permanent) or an above-limit ambient temperature can be easily handled.
2. The heat sink can have a smaller factor of safety compared with that of a conventional circuit. In case of too high a junction temperature, power output, power dissipation and the supply current decrease (Figure 17) thus protecting the device.

OUTPUT POWER AND SUPPLY CURRENT AS A FUNCTION OF CASE TEMPERATURE

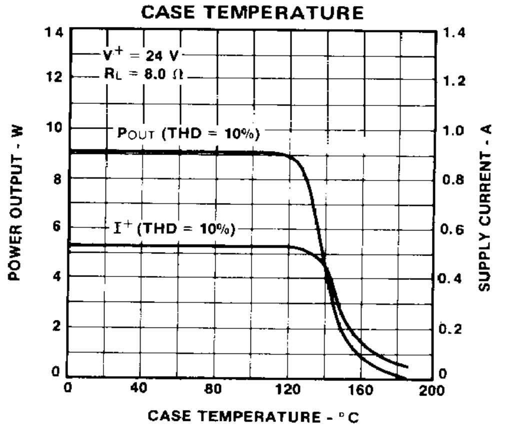


Figure 17