μA706

5-WATT AUDIO AMPLIFIER

FAIRCHILD LINEAR INTEGRATED CIRCUITS

GENERAL DESCRIPTION – The μA706 monolithic 5.0 W Audio Amplifier is constructed using the Fairchild Planar* epitaxial process. It is ideally suited as an audio amplifier in automobile radios. Provided with adequate heat sinking, the circuit is optimized to provide 5.5 W (continuous output) into a 4.0 Ω speaker using a single 14 V supply. The circuit operates over the full automobile battery range of 6.0 V to 16 V. The μA706 incorporates such special features as self-centering bias, direct coupling to the input, low quiescent current, high input impedance and low distortion. Operation as a 5.0 W audio amplifier is achieved with minimal external components.

Other applications for the μA706 are home audio equipment, TV receivers and many industrial applications.

- **OUTPUT POWER 5.5 W (14 V – 4 Ω)**
- **LOW DISTORTION**
- **LOW QUIESCENT CURRENT**
- **SELF CENTERING BIAS**
- **HIGH INPUT IMPEDANCE**
- **HIGH PEAK OUTPUT CURRENT**
- **HIGH IMMUNITY TO DAMAGE FROM SHORT-CIRCUITED LOAD†**
- **PIN-FOR-PIN REPLACEMENT FOR TBA641B**

†The device will withstand repetitive short circuits across the speaker load if the absolute maximum junction temperature is not exceeded.

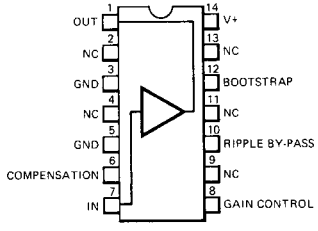
CONNECTION DIAGRAM

14-PIN DIP

(TOP VIEW)

PACKAGE OUTLINES 9H 9J

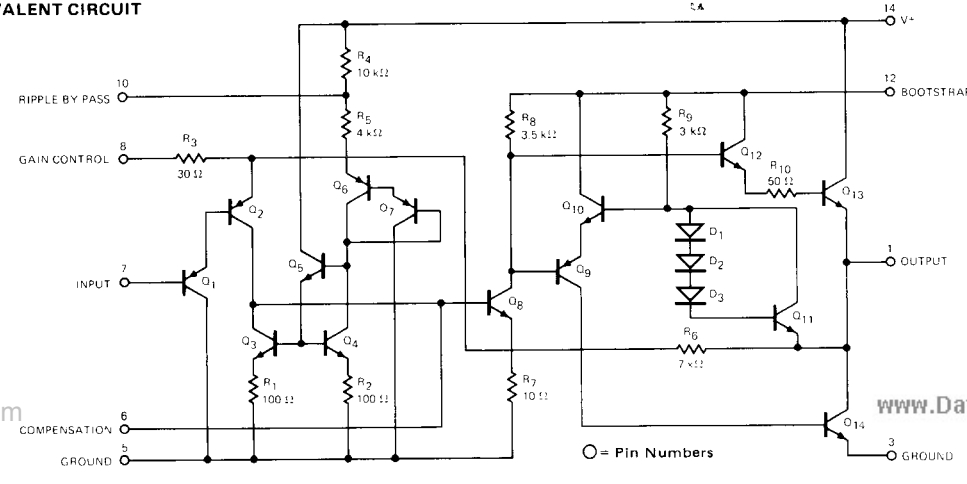
PACAKGE CODES AP BP



ORDER INFORMATION

TYPE	PART NO.
μA706AC	μA706APC
μA706BC	μA706BPC

EQUIVALENT CIRCUIT



*Planar is a patented Fairchild process.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage (No Signal)	25 V
Supply Voltage	16 V
Input Voltage	−0.5 V to V^+
Peak Output Current	2.5 A
Operating Temperature Range	−30°C to +85°C
Storage Temperature	−55°C to +125°C
Maximum Junction Temperature	150°C
Power Dissipation ($T_C \leq 85°C$)	5 W
Power Dissipation ($T_A \leq 25°C$)	
Package Type AP	1.7 W
Package Type BP	2.3 W
Power Dissipation ($T_A \leq 85°C$)	
Package Type AP	0.9 W
Package Type BP	1.2 W

PACKAGE THERMAL RESISTANCE

Thermal Resistance, Junction to Ambient	
Package Type AP	73°C/W
Package Type BP	55°C/W
Thermal Resistance, Junction to Case	
Package Type AP	11°C/W
Package Type BP	12°C/W

μA706C

ELECTRICAL CHARACTERISTICS: $V_+ = 14V$, $R_L = 4\ \Omega$, $T_A = 25°C$, $\theta_{C-A} = 13°C/W$, Test Circuit 1, unless otherwise specified

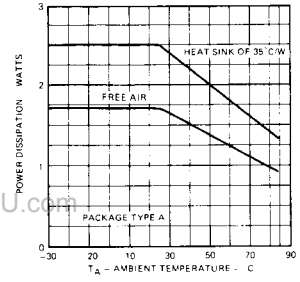
CHARACTERISTICS	CONDITIONS	MIN	TYP	MAX	UNITS
Total Supply Current	$P_{OUT} = 0$	10	18	30	mA
Quiescent Current in Output Transistors	$P_{OUT} = 0$	7	15	27	mA
Input Bias Current			200	950	nA
DC Output Level	$R_S = 22\ k\Omega$	6.55	7.0	7.45	V
Voltage Gain, A_V	$R_B = 0\ \Omega$	43	46	49	dB
Output Power, P_{OUT}	THD = 10%, f = 1 kHz, A_V = 46 dB	4.5	5.5		W
Total Harmonic Distortion	f = 1 kHz, A_V = 46 dB				
	P_{OUT} = 50 mW		0.3		%
	P_{OUT} = 2.0 W		0.5		%
	P_{OUT} = 4.5 W		3.0		%
Equivalent Input Noise Voltage	$R_S = 22\ k\Omega$, B.W. = 10 kHz		3.5		μV
Total Supply Current	P_{OUT} = 4.5 W		510		mA
Input Impedance	A_V = 46 dB, f = 1 kHz		3.0		MΩ

7

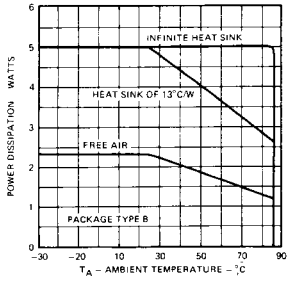
TYPICAL PERFORMANCE CURVES FOR μA706C

($T_A = 25°C$, $\theta_{C-A} = 13°C/W$, Test Circuit 1, A_V = 46 dB)

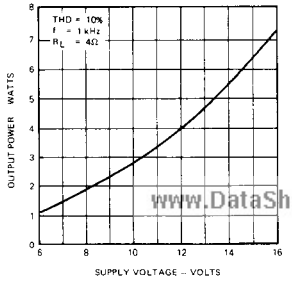
MAXIMUM ALLOWABLE POWER DISSIPATION AS A FUNCTION OF AMBIENT TEMPERATURE (FOR PACKAGE TYPE AP)



MAXIMUM ALLOWABLE POWER DISSIPATION AS A FUNCTION OF AMBIENT TEMPERATURE (FOR PACKAGE TYPE BP)

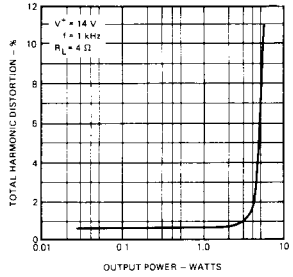


OUTPUT POWER AS A FUNCTION OF SUPPLY VOLTAGE

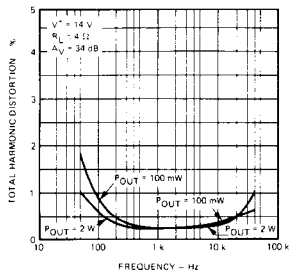


TYPICAL PERFORMANCE CURVES FOR μA706C (Cont'd)

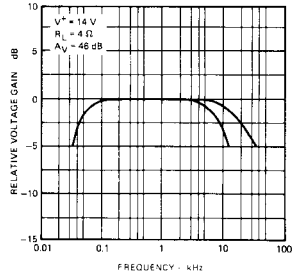
TOTAL HARMONIC DISTORTION AS A FUNCTION OF OUTPUT POWER



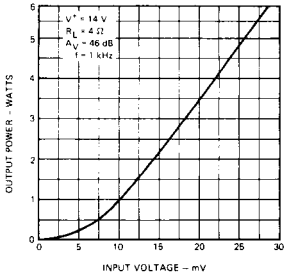
TOTAL HARMONIC DISTORTION AS A FUNCTION OF FREQUENCY



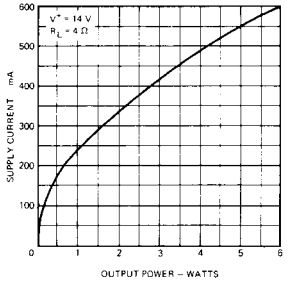
RELATIVE VOLTAGE GAIN AS A FUNCTION OF FREQUENCY



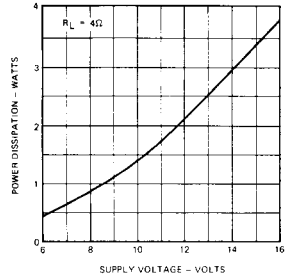
OUTPUT POWER AS A FUNCTION OF INPUT VOLTAGE



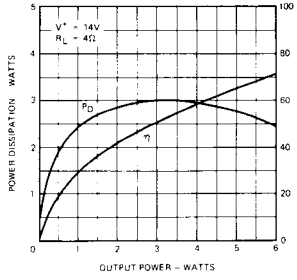
SUPPLY CURRENT AS A FUNCTION OF OUTPUT POWER



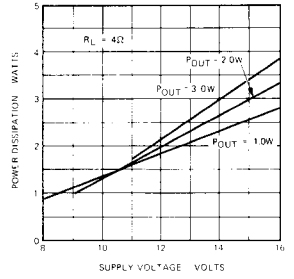
MAXIMUM POWER DISSIPATION BY THE INTEGRATED CIRCUIT AS A FUNCTION OF SUPPLY VOLTAGE



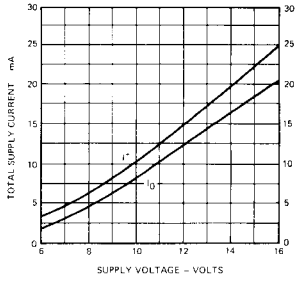
POWER DISSIPATION AND EFFICIENCY AS A FUNCTION OF OUTPUT POWER



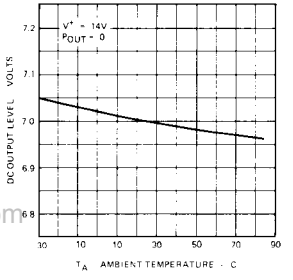
POWER DISSIPATION AS A FUNCTION OF SUPPLY VOLTAGE



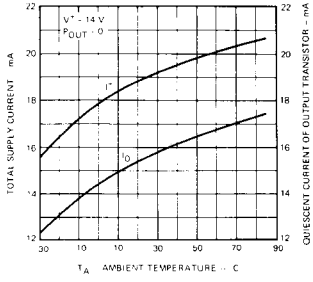
TOTAL SUPPLY CURRENT AND QUIESCENT CURRENT OF OUTPUT TRANSISTOR AS A FUNCTION OF SUPPLY VOLTAGE



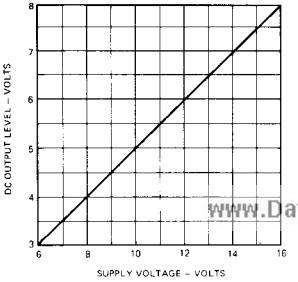
DC OUTPUT LEVEL AS A FUNCTION OF AMBIENT TEMPERATURE



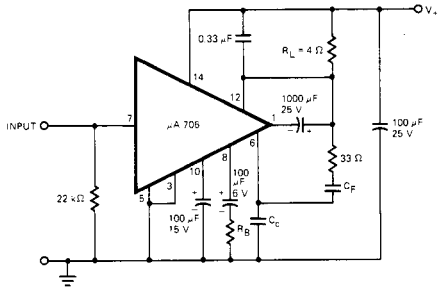
TOTAL SUPPLY CURRENT AND QUIESCENT CURRENT OF OUTPUT TRANSISTOR AS A FUNCTION OF AMBIENT TEMPERATURE



DC OUTPUT LEVEL AS A FUNCTION OF SUPPLY VOLTAGE

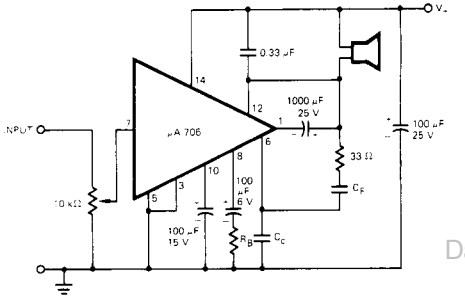


TEST CIRCUIT 1 (A_V = 46 dB, R_B = 0 Ω, C_C = 1.5 nF, C_F = 150 pF)



TYPICAL AUDIO APPLICATIONS

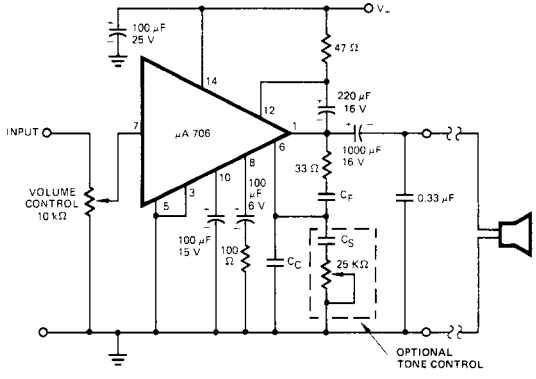
5 WATT AUDIO AMPLIFIER WITH MINIMUM COMPONENT COUNT



A_V	34 dB		46 dB	
BW	10 kHz	20 kHz	10 kHz	20 kHz
R_B	100 Ω	100 Ω	0 Ω	0 Ω
C_C	10 nF	6.8 nF	2.7 nF	1.5 nF
C_F	1 nF	470 pF	330 pF	150 pF

7

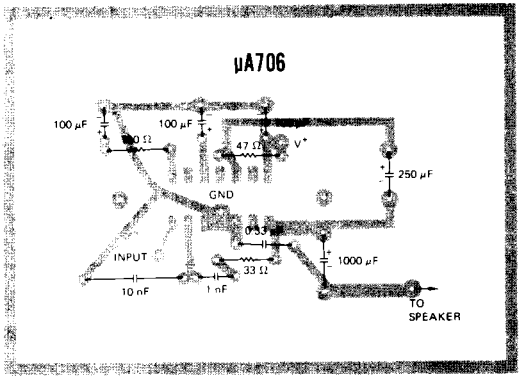
5 WATT AUDIO AMPLIFIER WITH LOAD CONNECTED TO GROUND



A_V	34 dB	46 dB
C_S	27 nF	5.6 nF

Note: C_S selected for 3 dB at 4 kHz.

A PC BOARD LAYOUT FOR THE 5 WATT AUDIO AMPLIFIER



PHOTOGRAPH OF THE μA706 IN A TYPICAL APPLICATION