NEC
ELECTRON DEVICE

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC1316

DUAL AUDIO POWER AMPLIFIER

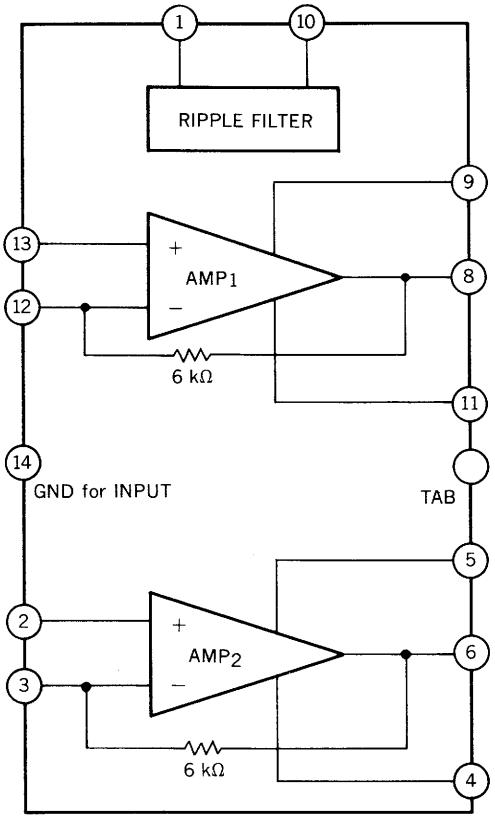
DESCRIPTION

The μPC1316 is a dual audio power amplifier designed for portable audio sets.

FEATURES

- Wide operating voltage range. V_{CC} = 3 to 16 V
- High output power. P_O = 2 W TYP. @ 12 V / 8 Ω / 10 %
  P_O = 1.6 W TYP. @ 9 V / 4 Ω / 10 %
  P_O = 1.2 W TYP. @ 9 V / 8 Ω / 10 %
  P_O = 0.7 W TYP. @ 6 V / 4 Ω / 10 %
  P_O = 0.5 W TYP. @ 6 V / 8 Ω / 10 %
  P_O = 80 mW @ 4.5 V / 32 Ω / 10 %
  (V_{CC} / R_L / THD)
- High supply voltage rejection. SVR = 45 dB
- Low quiescent current. I_{CC} = 12 mA
- Low pop noise at power switch on and off.

BLOCK DIAGRAM



CONNECTION DIAGRAM

PIN NO	CONNECTION
1	Filter
2	Input 2
3	NFB 2
4	Compensation 2
5	Bootstrap 2
6	Output 2
7	NC
TAB	GND
8	Output 1
9	Bootstrap 1
10	V_{CC}
11	Compensation 1
12	NFB 1
13	Input 1
14	GND

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ORDERING INFORMATION

PART NUMBER	PACKAGE	QUALITY GRADE
μPC1316C	14 PIN PLASTIC DIP WITH TAB (300 mil)	Standard

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

Supply Voltage (No Signal)	V_{CC1}	18	V
Supply Voltage (Operating)	V_{CC2}	16	V
Power Dissipation	P_D	2.4 *	W
Operating Temperature	T_{opt}	−20 to +70	°C
Storage Temperature	T_{stg}	−40 to +150	°C

* 50 x 50 x 0.035 mm Copper heat sink on PCB

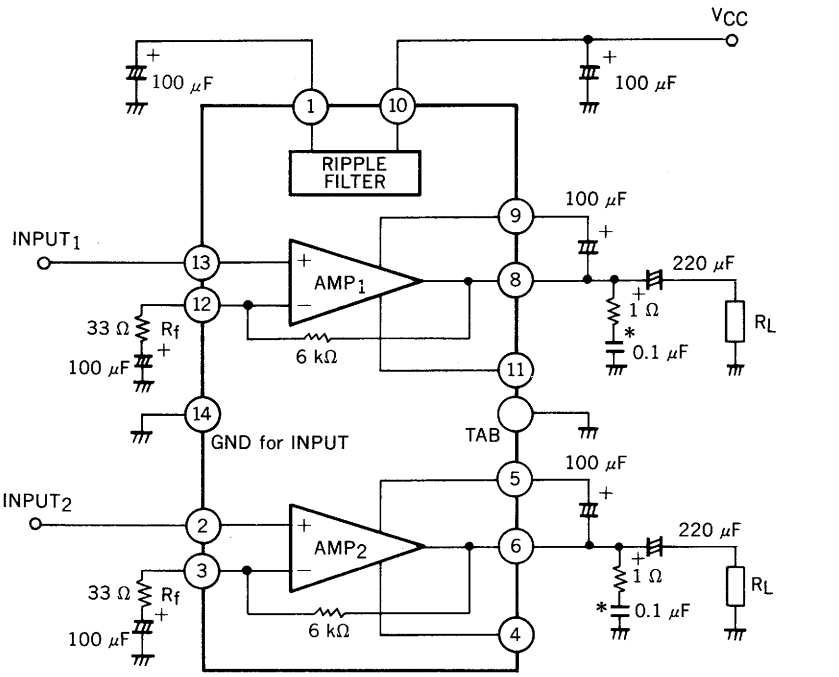
RECOMMENDED OPERATING CONDITIONS (T_a = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage (R_L=16 Ω)	V_{CC} (16)	3		16	V
Supply Voltage (R_L=8 Ω)	V_{CC} (8)	3		13	V
Supply Voltage (R_L=4 Ω)	V_{CC} (4)	3		9	V
Load Impedance	R_L	4	8		Ω
Voltage Gain	A_v	34	44		dB

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)
(V_{CC}=9 V, R_f=33 Ω, f=1 kHz, R_L=8 Ω)

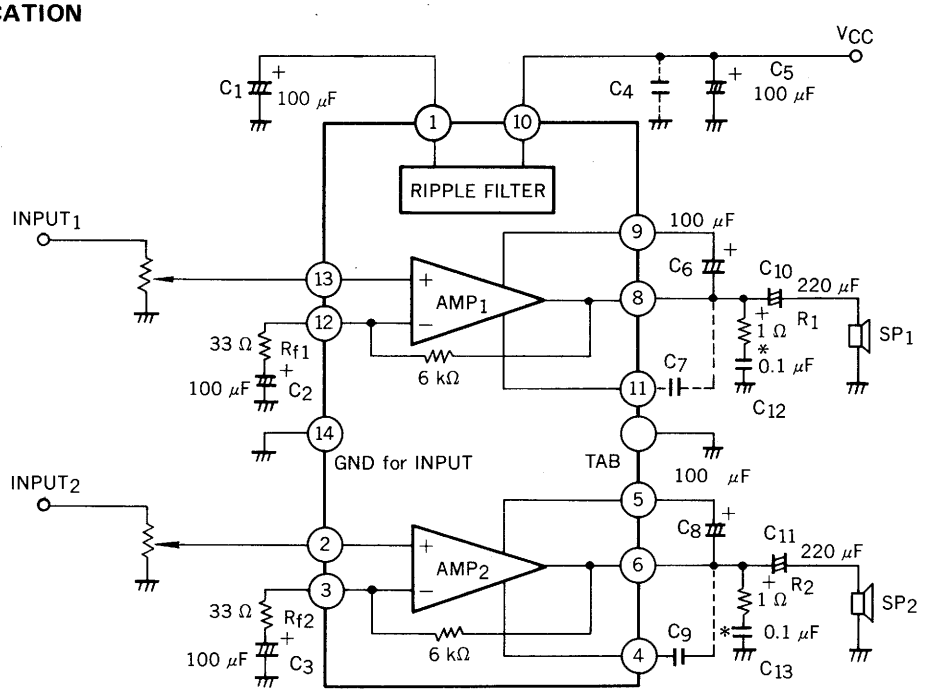
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
Circuit Current	I_{CC}		12	25	mA	No Signal
Voltage Gain	A_{v1}	41	44	47	dB	P_O=0.25 W, R_f=33 Ω
	A_{v2}		34		dB	P_O=0.25 W, R_f=120 Ω
Output Power	P_{O1}		2		W	V_{CC}=12 V, R_L=8 Ω, THD = 10 %
	P_{O2}		1.6		W	V_{CC}=9 V, R_L=4 Ω, THD = 10 %
	P_{O3}	0.9	1.2		W	V_{CC}=9 V, R_L=8 Ω, THD = 10 %
	P_{O4}		0.7		W	V_{CC}=6 V, R_L=4 Ω, THD = 10 %
	P_{O5}		0.5		W	V_{CC}=6 V, R_L=8 Ω, THD = 10 %
	P_{O6}		80		mW	V_{CC}=4.5 V, R_L=32 Ω, THD = 10 %
Total Harmonic Distortion	THD1		0.4	1.6	%	P_O=0.5 W, R_f=33 Ω
	THD2		0.3		%	P_O=0.5 W, R_f=120 Ω
Output Noise Voltage	NL		0.9	1.5	$mV_{r.m.s.}$	R_G=10 kΩ
Supply Voltage Rejection	SVR	36	45		dB	R_G=0, f(ripple)=100 Hz, V(ripple)=0.3 $V_{r.m.s.}$
Cross Talk	CT	40	55		dB	R_G=0, P_O=0.25 W
Channel Balance	ChB	−2	0	2	dB	P_O=0.25 W
Input Impedance	Z_{in}		5		MΩ	

TEST CIRCUIT



* Mylar Capacitor

TYPICAL APPLICATION



NOTE FOR USE

(1) Mylar capacitor is recommended as C_{12}, C_{13}.

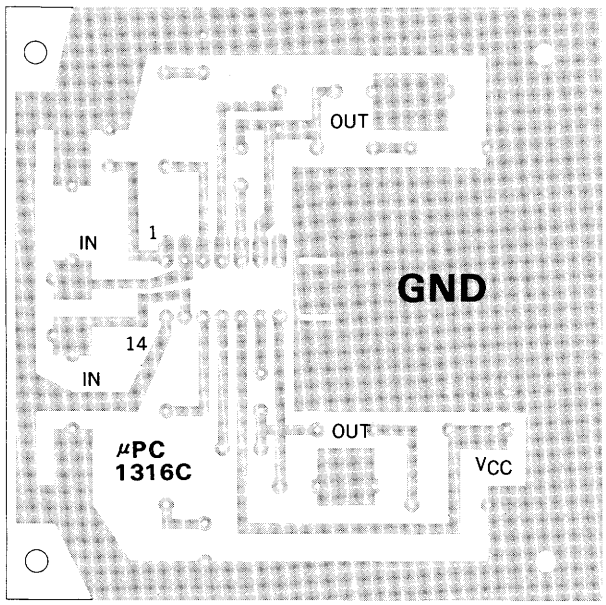
(2) Add C_7, C_9, in the case of reducing voltage gain at high frequency.

(3) Add C_4 or increase capacitance of C_{12}, C_{13} when a oscillation may occur due to the pattern layout on PCB.

(4) Voltage gain can be changed by value of R_{f1}, R_{f2}, The voltage gain should be set more than 34 dB.

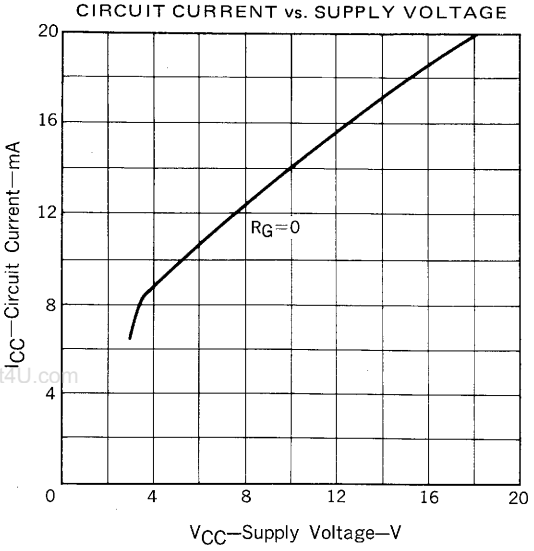
(5) When a input capacitor is connected the input terminal, a bias resistor should be connected between its terminal and GND.

EXAMPLE FOR PRINTED CIRCUIT BOARD (Copper foil side)

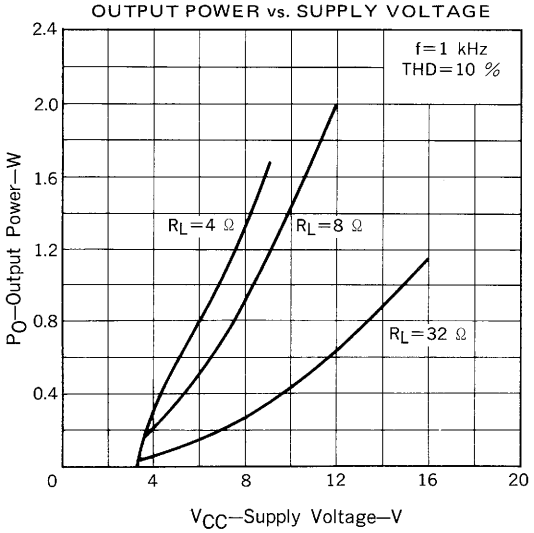


TYPICAL CHARACTERISTICS (T_a = 25 °C)

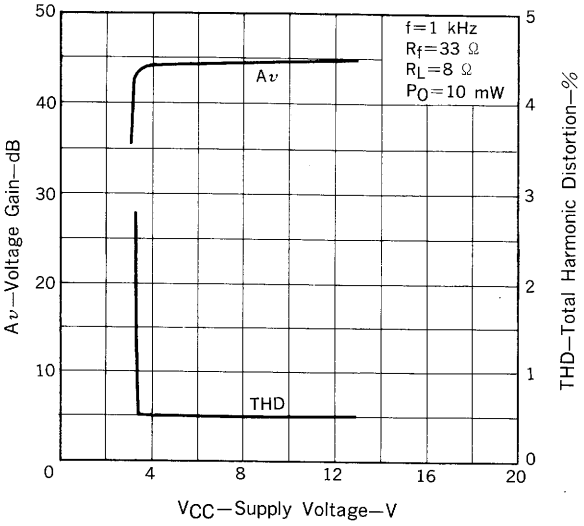
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



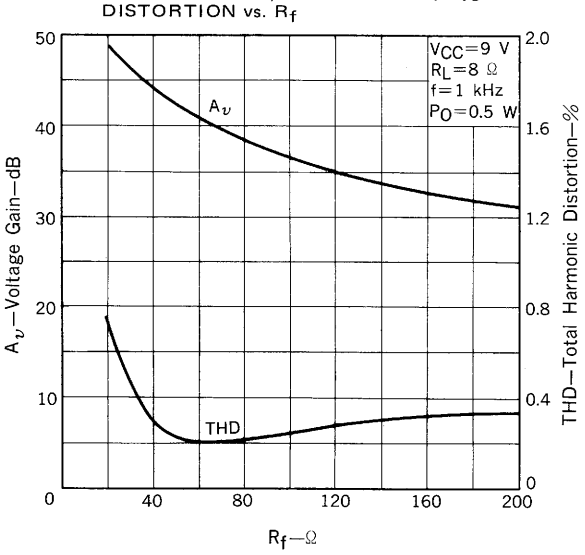
OUTPUT POWER vs. SUPPLY VOLTAGE



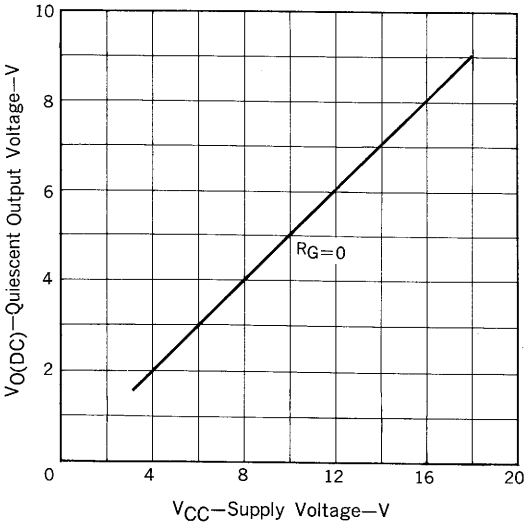
VOLTAGE GAIN, TOTAL HARMONIC DISTORTION vs. SUPPLY VOLTAGE



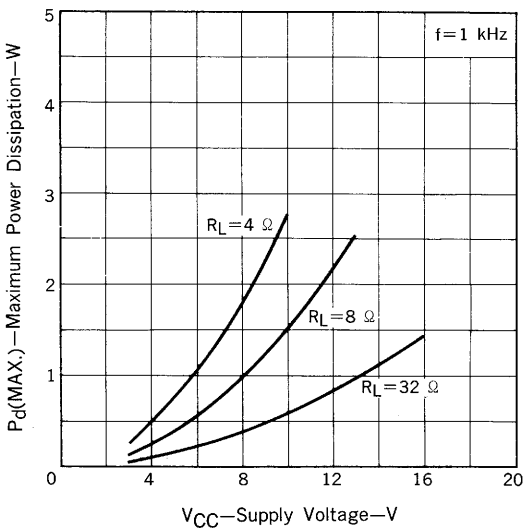
VOLTAGE GAIN, TOTAL HARMONIC DISTORTION vs. R_f



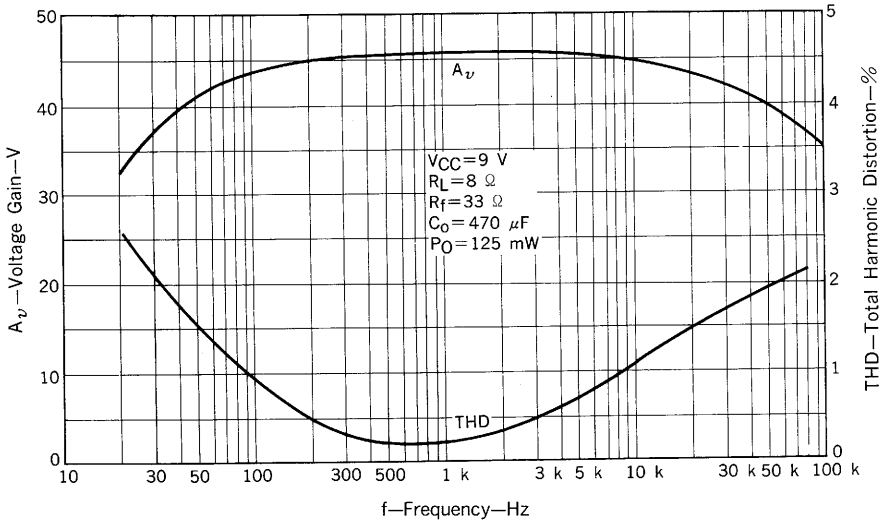
QUIESCENT OUTPUT VOLTAGE vs. SUPPLY VOLTAGE



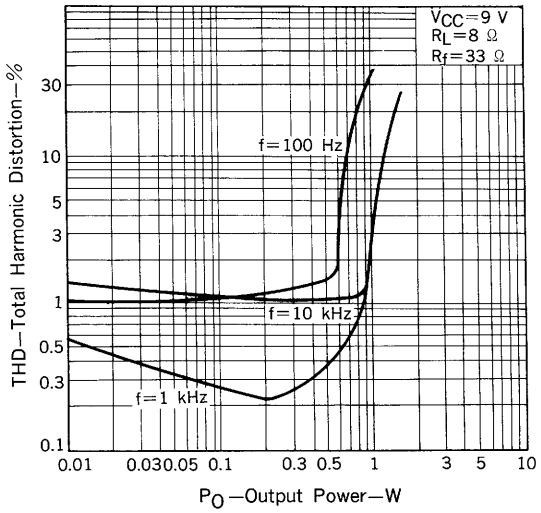
MAXIMUM POWER DISSIPATION vs. SUPPLY VOLTAGE



VOLTAGE GAIN, TOTAL HARMONIC DISTORTION vs. FREQUENCY



TOTAL HARMONIC DISTORTION vs. OUTPUT POWER



PACKAGE DISSIPATION vs. AMBIENT TEMPERATURE

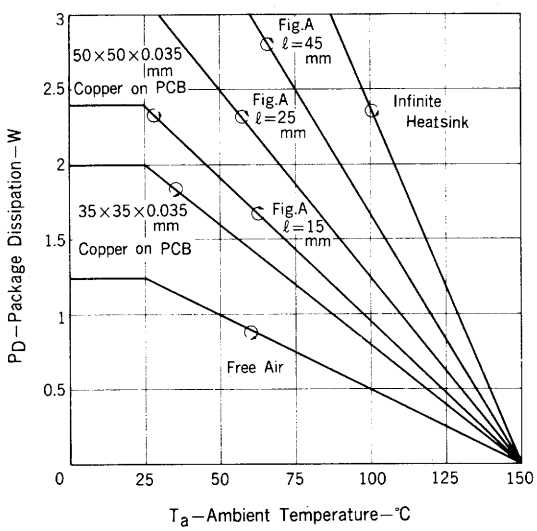
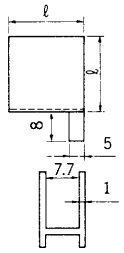
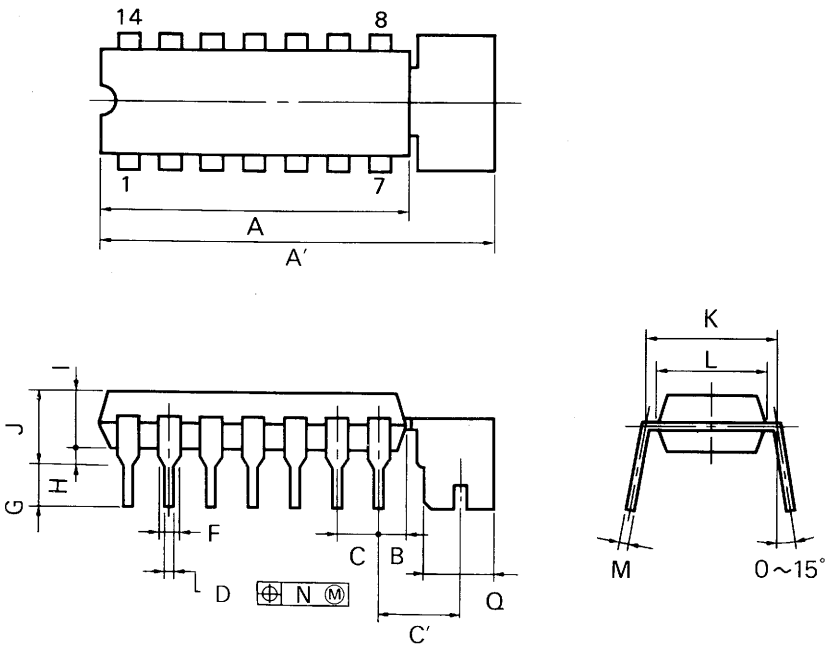


Fig.A



UNIT : mm

14PIN PLASTIC DIP WITH TAB (300 mil)



P14CT-100-300B

NOTES

1) Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.

2) Item "K" to center of leads when formed parallel.

ITEM	MILLIMETERS	INCHES
A	20.32 MAX.	0.800 MAX.
A'	24.60 MAX.	0.969 MAX.
B	2.54 MAX.	0.100 MAX.
C	2.54 (T.P.)	0.100 (T.P.)
C'	4.74	0.187
D	$0.50^{\pm 0.10}$	$0.020^{+0.004}_{-0.005}$
F	1.1 MIN.	0.043 MIN.
G	$3.4^{\pm 0.3}$	$0.134^{\pm 0.012}$
H	0.51 MIN.	0.020 MIN.
I	4.31 MAX.	0.170 MAX.
J	5.08 MAX.	0.200 MAX.
K	7.62 (T.P.)	0.300 (T.P.)
L	6.4	0.252
M	$0.30^{+0.10}_{-0.05}$	$0.012^{+0.004}_{-0.003}$
N	0.25	0.01
Q	$4.40^{\pm 0.50}$	$0.173^{\pm 0.020}$

[MEMO]