

# BIPOLAR ANALOG INTEGRATED CIRCUIT

## $\mu$ PC1297

### INTEGRATED CIRCUIT FOR DOLBY HX PRO SYSTEM



#### DESCRIPTION

The  $\mu$ PC1297 is a monolithic integrated circuit specifically designed to realize the Dolby HX PRO system.

Dolby HX PRO optimizes the recording process by adjusting the level of applied ultrasonic bias in accordance with the self-biasing effect of program material, thus maintaining a constant level of effective bias.

The IC is encapsulated in 18 pin shrink dual-in-line plastic package. Available only to licensees of Dolby Laboratories Licensing Corporation, San Francisco, from whom licensing and application information must be obtained.

"Dolby", the Double-D symbol, and "HX PRO" are trade marks of Dolby Laboratories Licensing Corporation.

#### FEATURES

- Wide operating voltage.  $V_{CC}=8$  to 15 to 18 V
- 2ch. system requires only one chip.
- Low 2nd harmonic distortion.  $-70$  dB TYP.
- Independent of variations in erase voltage.
- Regulated voltage for VCA is provided internally.
- Internal thermal protection circuit.

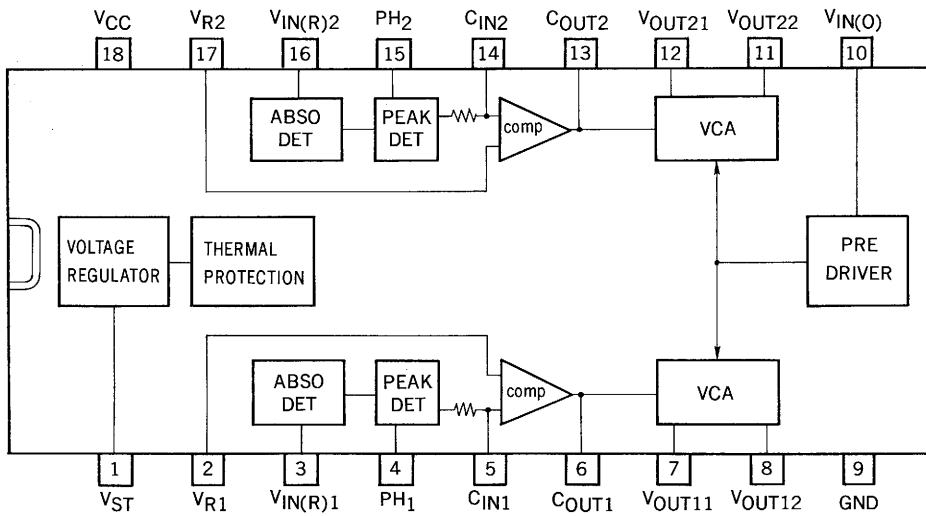
#### ORDERING INFORMATION

PART NUMBER	PACKAGE	QUALITY GRADE
$\mu$ PC1297CA	18 PIN PLASTIC SHRINK DIP (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.

The information in this document is subject to change without notice.

**BLOCK DIAGRAM**



**CONNECTION DIAGRAM**

NO.	CONNECTION
1	VOLTAGE REGULATOR
2	COMP REF <sub>1</sub>
3	SIGNAL INPUT <sub>1</sub>
4	PEAK HOLD <sub>1</sub>
5	COMP INPUT <sub>1</sub>
6	COMP OUTPUT <sub>1</sub>
7	VCA OUTPUT <sub>11</sub>
8	VCA OUTPUT <sub>12</sub>
9	GND
10	BIAS OSC INPUT
11	VCA OUTPUT <sub>21</sub>
12	VCA OUTPUT <sub>22</sub>
13	COMP OUTPUT <sub>2</sub>
14	COMP INPUT <sub>2</sub>
15	PEAK HOLD <sub>2</sub>
16	SIGNAL INPUT <sub>2</sub>
17	COMP REF <sub>2</sub>
18	V <sub>CC</sub>

**ABSOLUTE MAXIMUM RATINGS (T<sub>a</sub> = 25 °C)**

Supply Voltage	V <sub>CC</sub>	20	V
Power Dissipation	P <sub>D</sub>	500*	mW
Operating Temperature Range	T <sub>opt</sub>	-25 to +75	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +125	°C

\* Value at T<sub>a</sub> = 75 °C

**RECOMMENDED OPERATING CONDITIONS (T<sub>a</sub> = 25 °C)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V <sub>CC</sub>	8	15	18	V
Bias OSC Input Voltage	V <sub>in (o)</sub>	0.4	0.8	4.0	V <sub>p-p</sub>
Signal Input Voltage	V <sub>in (R)</sub>	0.2	-	4.0	V <sub>p-p</sub>

**ELECTRICAL CHARACTERISTICS** ( $T_a = 25\text{ }^\circ\text{C}$ ,  $V_{CC} = 15\text{ V}$ ,  $f_{BIAS} = 100\text{ kHz}$ ,  $V_{in(o)} = 800\text{ mV}_{p-p}$ )

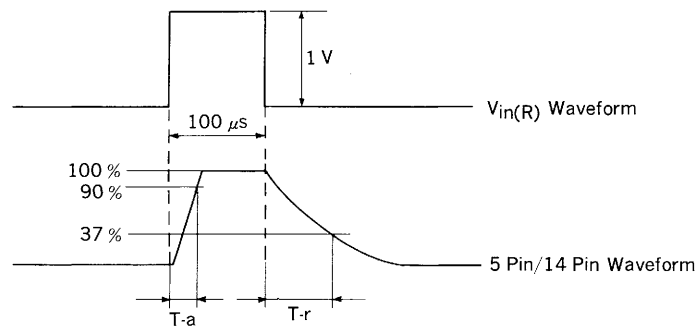
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Supply Current	$I_{CC}$		7		mA	$I_{b1} = I_{b2} = 0$
Bias Current	$I_{BIAS1}$			10	μA	$V_{ref} = 0$
	$I_{BIAS2}$	12	16	20	mA	$V_{ref} = V_{st}$
2nd Harmonic Distortion	2nd Harm		-70	-46	dB	$V_{ref} = V_{st}$
Attack Time	t-a		2.6	5.0	μs	$C_1 = 22\text{ nf} \pm 1\%$ (Note 1)
Release Time	t-r	0.4	0.7	1.1	ms	$C_1 = 22\text{ nf} \pm 1\%$ (Note 1)
Step Response	$T_s$	0.8	1.3	1.7	ms	$V_{ref} = 1/3, 2/3 V_{st}$ (Note 1)
Stabilized Voltage	$V_{st}$	4.1	4.4	4.7	V	Pin 1
Temperature Characteristic	$dV_{st}/dt_a$	-1	0	+1	mV/°C	Pin 1, $t_a = -25\text{ to }+75\text{ }^\circ\text{C}$
Output Current	$I_{out}$	3			mA	Form $V_{st}$ Pin
Comparator Input Bias Current	$I_{b1}$	-0.5	-	0	μA	
Input Resistance	$R_{in}$	2.3	3.3	4.3	kΩ	Pin 10

**Note 1** t-a, t-r : approx. +0.28 %/°C  
 $T_s$  : approx. +0.56 %/°C

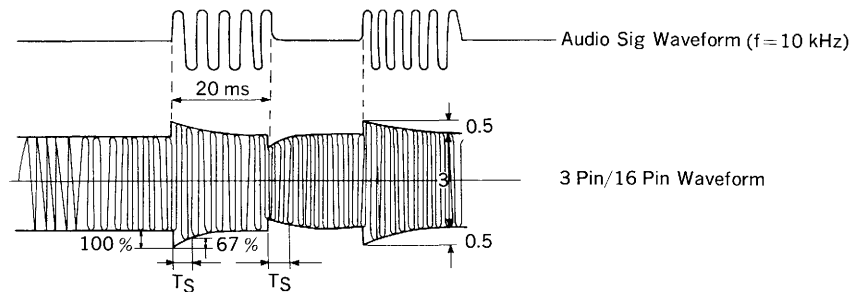
**Note 2** Attack and Release Time characteristics are tested by circuit 2, and other characteristics are tested by circuit 1.

**TIMING CHART**

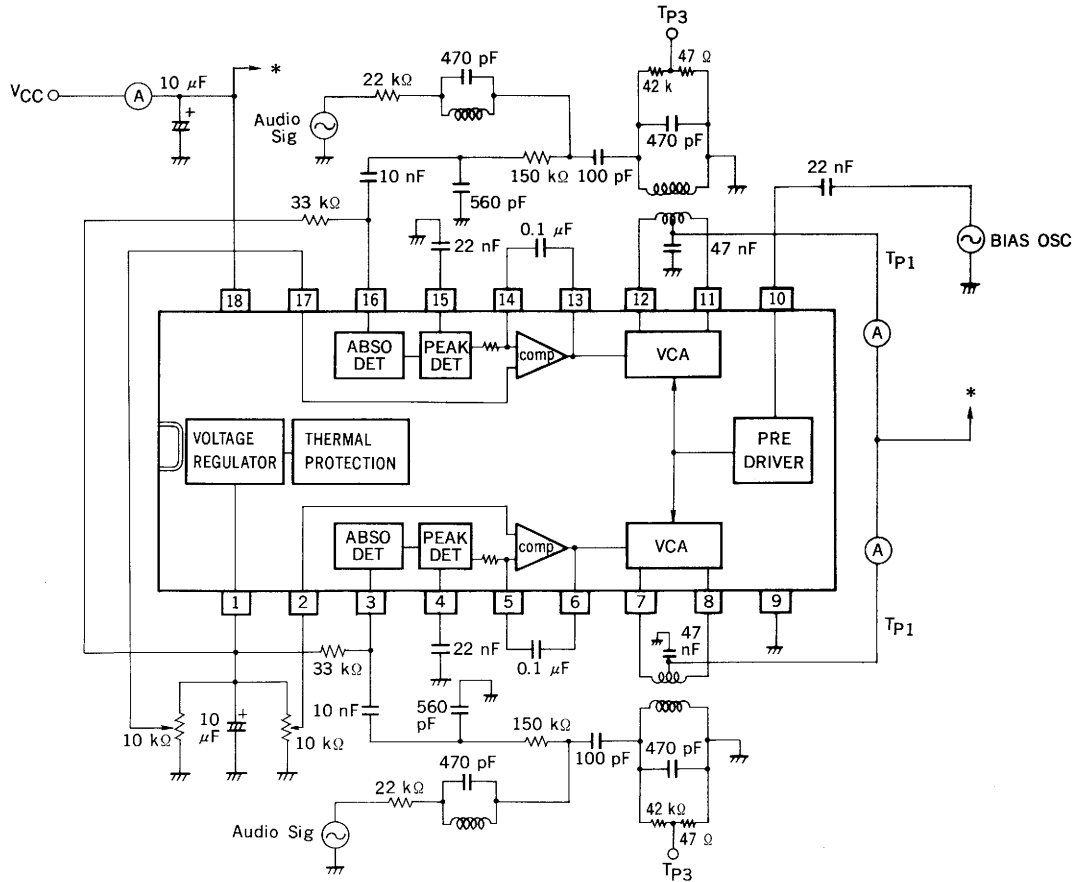
(1) t-a, t-r



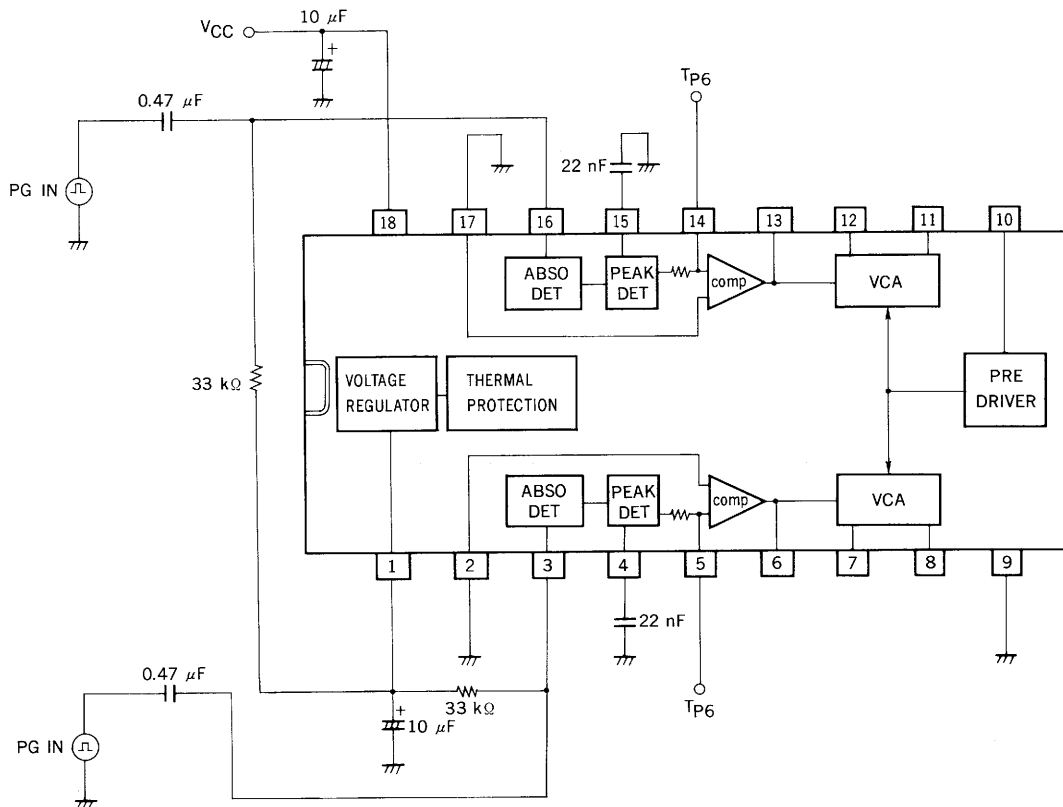
(2)  $T_s$



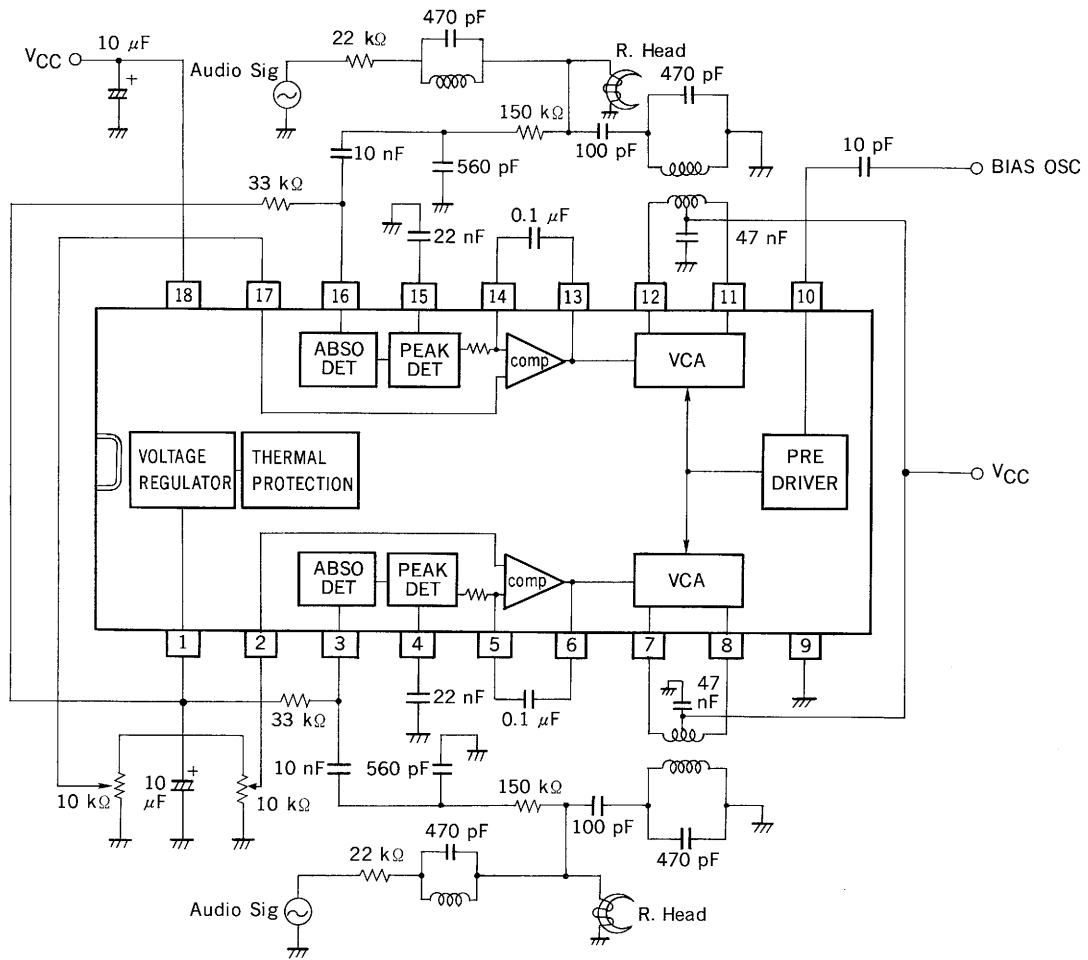
TEST CIRCUIT 1



TEST CIRCUIT 2

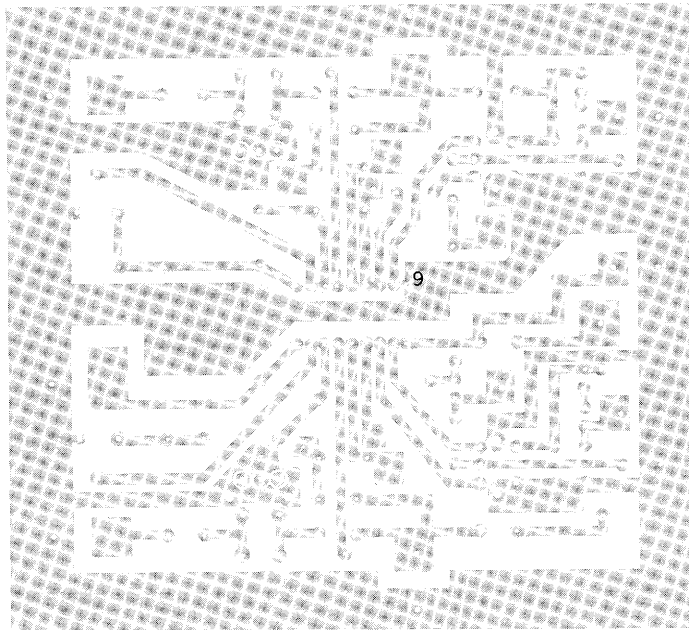


Application Circuit

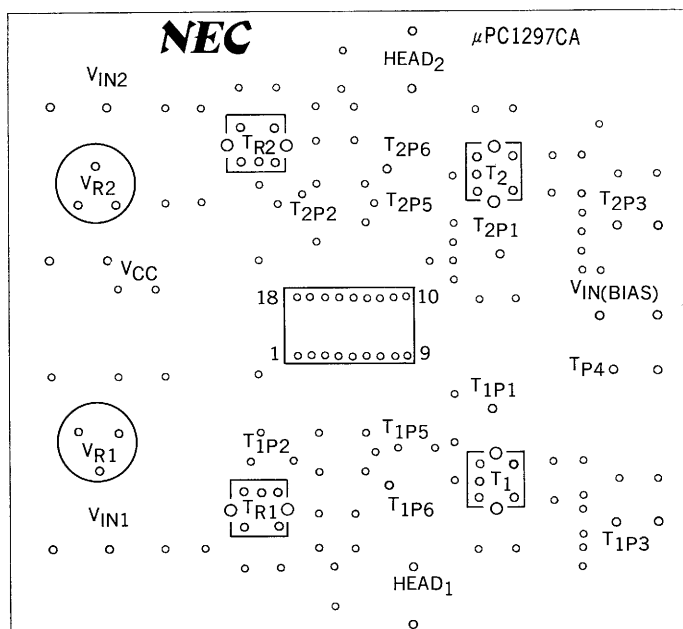


Coil (TOKO, INC)  
126ANS-6750ACM

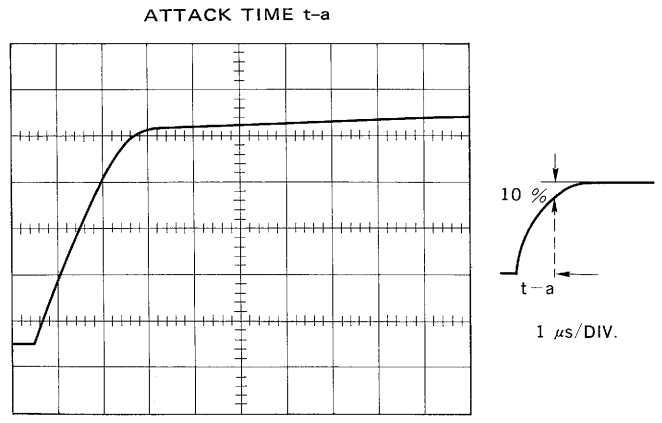
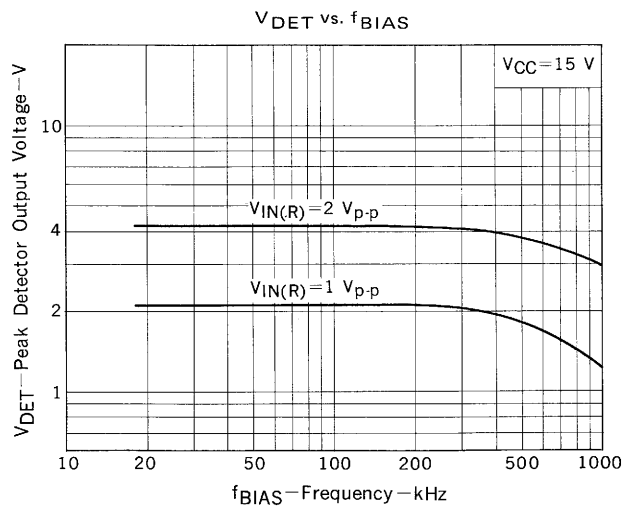
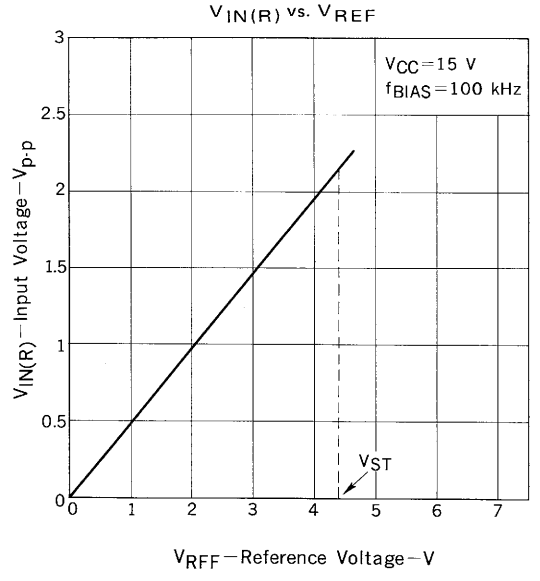
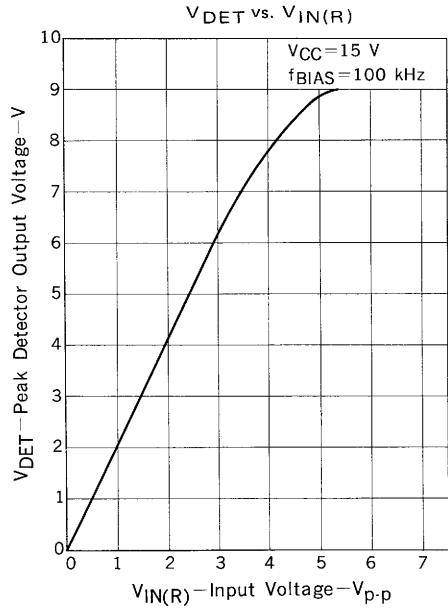
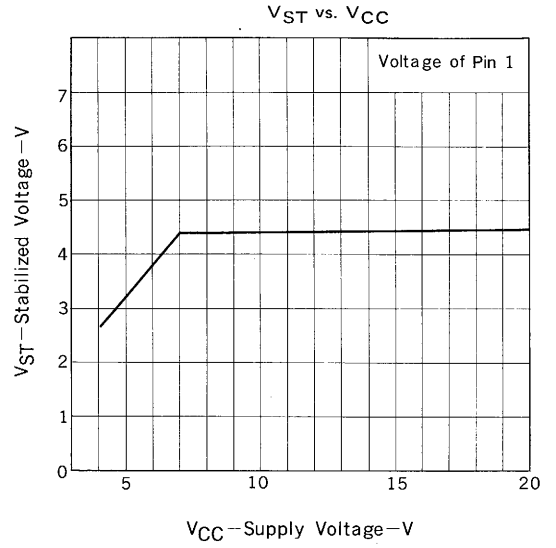
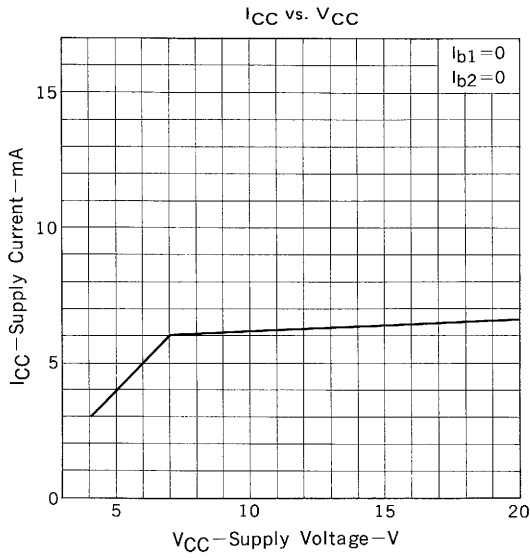
PRINTED CIRCUIT BOARD (Copper foil side)



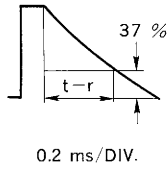
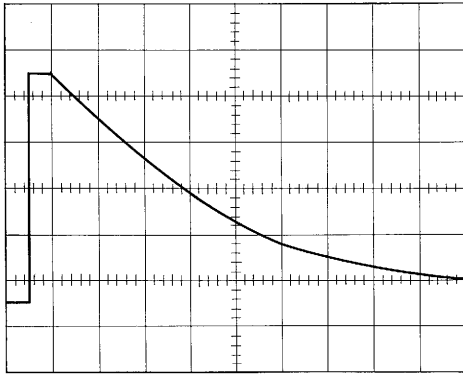
COMPONENT LAYOUT (Component layout side)



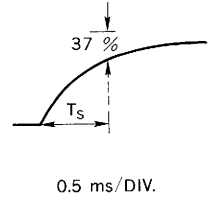
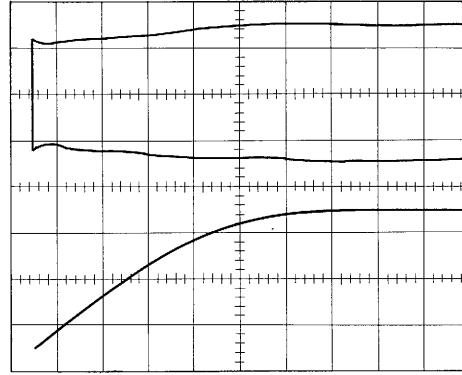
TYPICAL CHARACTERISTICS



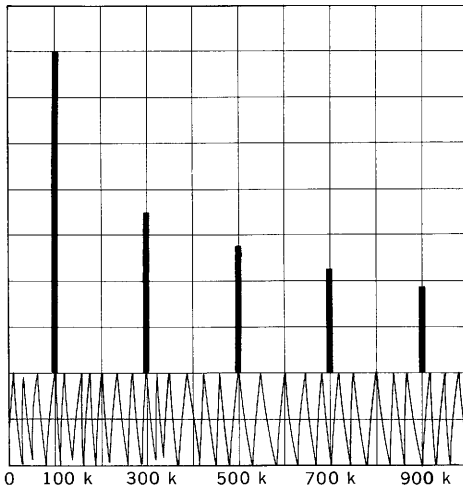
RELEASE TIME  $t-r$



STEP RESPONSE  $T_s$



2ND HARMONIC DISTORTION



RBW=300 Hz  
VBW=300 Hz  
10 dB/DIV.

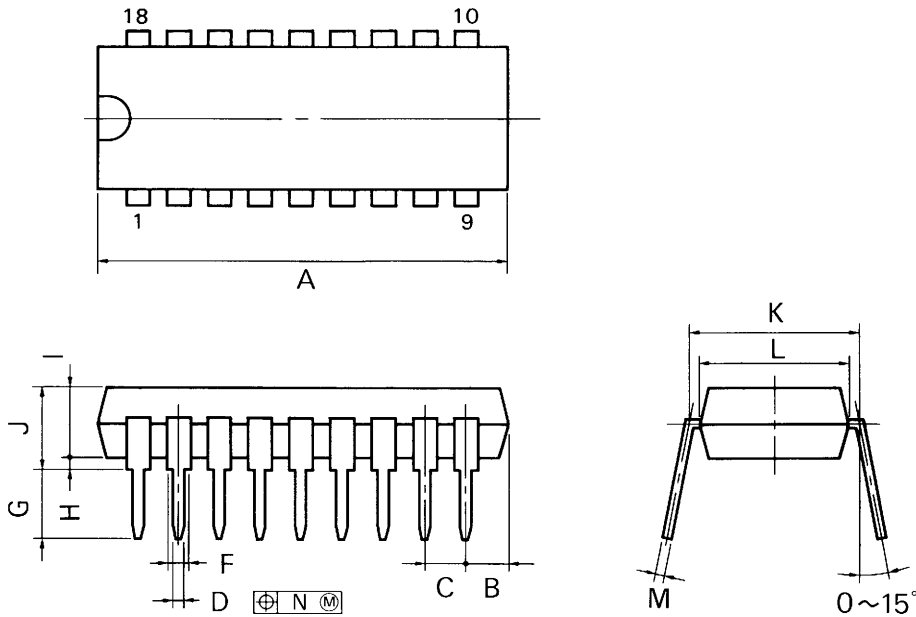
f—Frequency—Hz

**Note for use**

- $\mu$ PC1297 was designed with the help of Bang and Olufsen and Dolby Laboratories Licensing Corporation.
- If you plan to use the  $\mu$ PC1297 for applications other than Dolby HX PRO, please inform NEC as soon as possible.
- NEC cannot assume any responsibility for any circuits shown or represent that are free from patent infringement.



18PIN PLASTIC SHRINK DIP (300 mil)



P18C-70-300B

NOTES

- 1) Each lead centerline is located within 0.17 mm (0.007 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	19.57 MAX.	0.771 MAX.
B	2.67 MAX.	0.106 MAX.
C	1.778 (T.P.)	0.070 (T.P.)
D	0.50 <sup>+0.10</sup>	0.020 <sup>+0.004</sup> <sub>-0.003</sub>
F	0.85 MIN.	0.033 MIN.
G	3.2 <sup>+0.3</sup>	0.126 <sup>+0.012</sup>
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	6.5	0.256
M	0.25 <sup>+0.10</sup> <sub>-0.05</sub>	0.010 <sup>+0.004</sup> <sub>-0.003</sub>
N	0.17	0.007

★ **RECOMMENDED SOLDERING CONDITIONS**

The following conditions (see table below) must be met when soldering this product.

For more details, refer to our document "SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL" (IEI-1207).

Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

**Type of Through Hole Device**

μPC1297CA: 18 pin plastic shrink DIP (300 mil)

Soldering Process	Soldering Conditions
Wave Soldering (For leads only)	Solder temperature: 260 °C or lower. Flow time: 10 seconds or less.
Partial Heating Method	Pin temperature: 260 °C or lower. Time: 10 seconds or less.

**Caution: Do not jet molten solder on the surface of package.**

[MEMO]

[MEMO]

The application circuits and their parameters are for references only and are not intended for use in actual design-in's.

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.

NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or others.

The devices listed in this document are not suitable for use in aerospace equipment, submarine cables, nuclear reactor control systems and life support systems. If customers intend to use NEC devices for above applications or they intend to use "Standard" quality grade NEC devices for applications not intended by NEC, please contact our sales people in advance.

Application examples recommended by NEC Corporation

Standard: Computer, Office equipment, Communication equipment, Test and Measurement equipment, Machine tools, Industrial robots, Audio and Visual equipment, Other consumer products, etc.

Special: Automotive and Transportation equipment, Traffic control systems, Antidisaster systems, Anticrime systems, etc.

M4 92.6