



BIPOLAR ANALOG INTEGRATED CIRCUIT

μ PC1480CA

US TV SOUND MPX DECODER IC

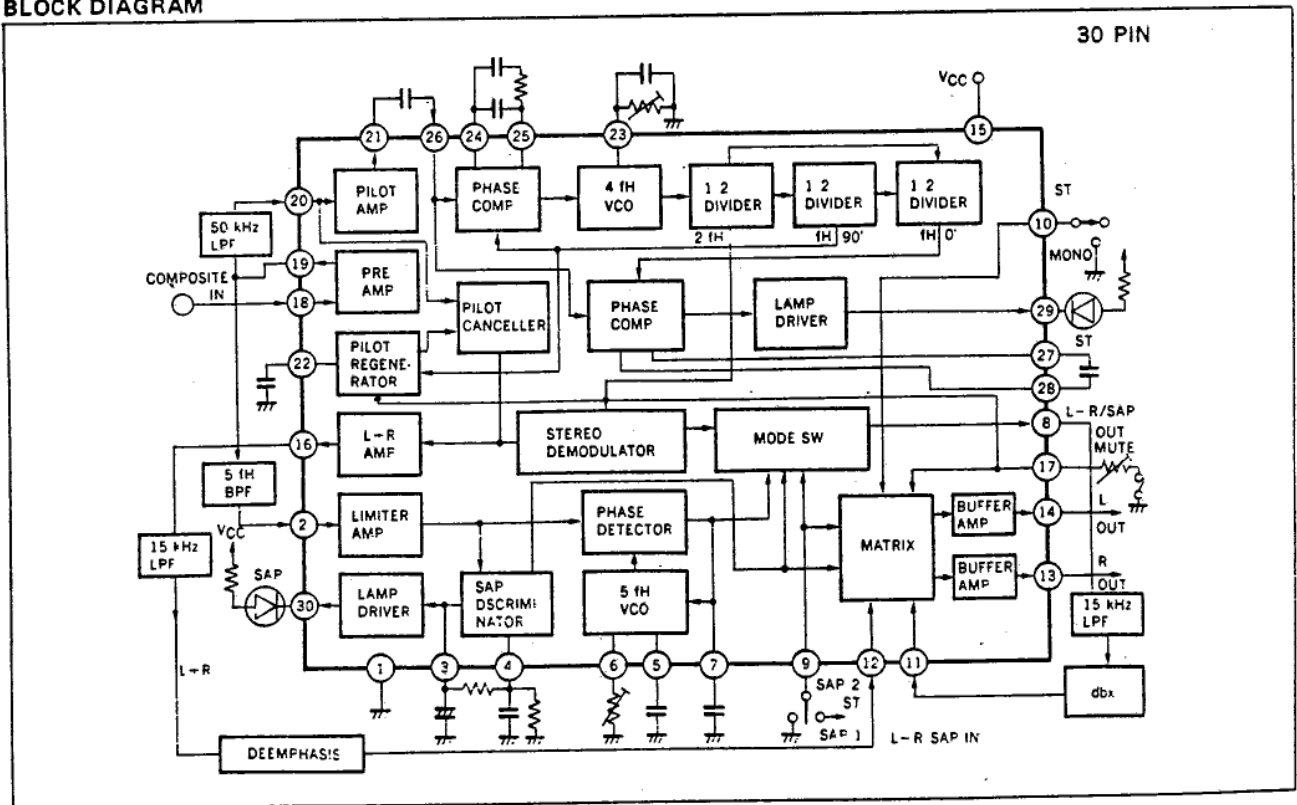
DESCRIPTION

This IC, μ PC1480CA contains all function STEREO SUBCHANNEL DECODER, L.R. MATRIX etc., which is necessary to decode US SOUND MPX SIGNAL.
It's contained in a 30 PIN shrink DIP

FEATURES

- It's easy to combine with the dbx NR decoder IC (μ PC1481CA).
- Mode changing is convenient for remote control.
- It includes muting function and PILOT cancel circuit.

BLOCK DIAGRAM



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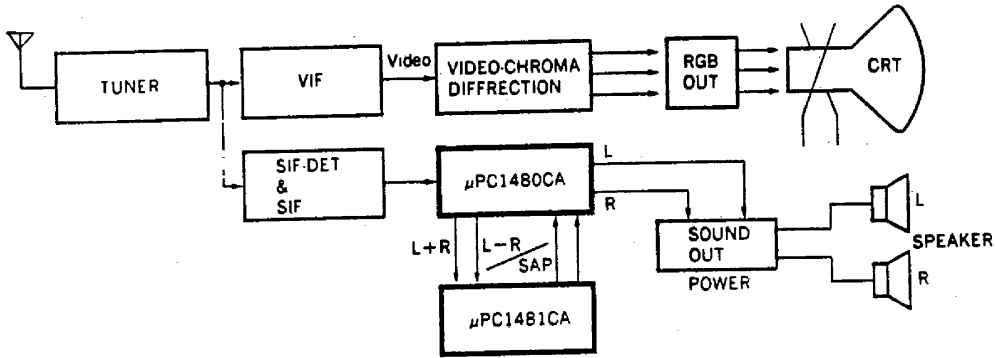
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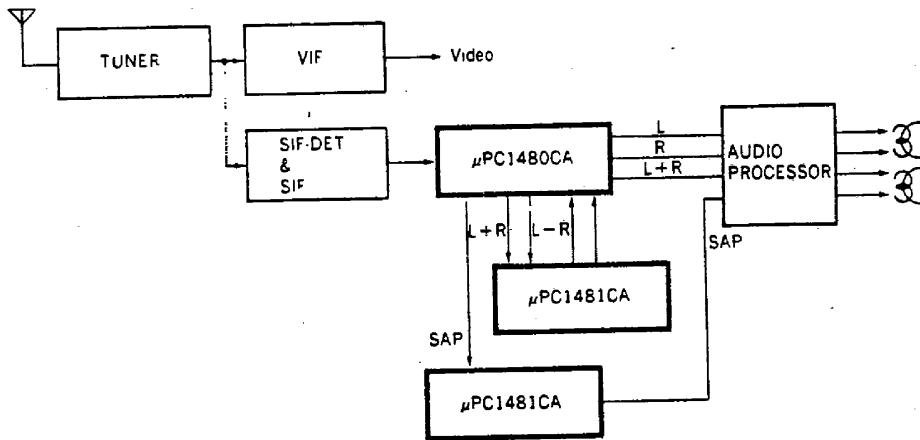
μPC1480CA

NEC ELECTRON DEVICE

APPLICATION FOR TV



APPLICATION FOR VCR



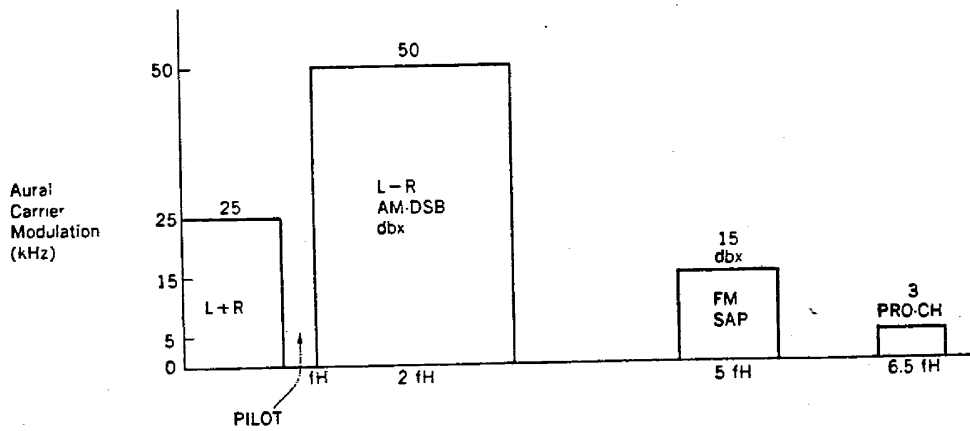
ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

Operating Voltage	V _{CC}	15	V
Input Voltage	V _{in}	5.0	V _{p-p}
Control Voltage	V _{cont}	V _{CC}	V
Package Dissipation	P _d	640 (T _a = 70 °C)	mW
Operating Temperature	T _{opt}	-20 to +70	°C
Storage Temperature	T _{stg}	-40 to +125	°C
Lamp Driver Current	I _{imp}	30	mA

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V _{CC}	8.0	12.0	13.2	V
Composite Input Signal Voltage (MONO)	V _{in}		300		mV _{r.m.s.}

US SOUND MPX SYSTEM



μ PC1480CA

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ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$, RH = 70%, $V_{CC} = 12\text{V}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
Operating Current	I_{CC}	27	39	52	mA	$V_{CC} = 12\text{V}$ NO Signal
Stereo Phase Detector Capture Range	CC_1	± 1.5	± 3.0		%	Stereo Decoder Input Terminal Pilot Level 30 $mV_{r.m.s.}$
Stereo SW Input Sensitivity	SW_{sense}	12	18	22	$mV_{r.m.s.}$	Measure Pilot Level at Stereo Input Terminal OFF \rightarrow ON
Stereo SW Hysterisys	H_{y1}	5	7	9	dB	Measure Pilot Level at Stereo Input Terminal OFF \rightarrow ON ON \rightarrow OFF
Stereo Decoder L-R Output Voltage	$V_o L-R$	380	430	480	$mV_{r.m.s.}$	Stereo Decoder Input Voltage 150 $mV_{r.m.s.}$ (MONO)
L+R Output Voltage	$V_o L+R$	380	430	480	$mV_{r.m.s.}$	Stereo Decoder Input Voltage 150 $mV_{r.m.s.}$ (MONO)
L+R Output Voltage to Pilot Leak Voltage Ratio	f_{HREJ}	30	35		dB	Stereo Decoder Input Voltage 150 $mV_{r.m.s.}$ (MONO)
L-R Distortion	THD_{L-R}	-	0.2	0.7	%	Stereo Decoder Input Voltage 150 $mV_{r.m.s.}$ (MONO) $f = 1\text{kHz}$
L+R Distortion	THD_{L+R}	-	0.2	0.5	%	Stereo Decoder Input Voltage 150 $mV_{r.m.s.}$ (MONO) $f = 1\text{kHz}$
SAP Phase Detector Capture Range	CC_2	± 19	± 25		%	SAP Input Voltage 90 $mV_{r.m.s.}$
SAP Input Sensitivity	SAP_{sense}	25	35	45	$mV_{r.m.s.}$	Measure SAP Input Level at SAP Input Terminal Lamp OFF \rightarrow ON
SAP SW Hysterisys	H_{y2}	2.5	4.5	6.5	dB	Measure SAP Input Level at SAP Input Terminal Lamp OFF \rightarrow ON ON \rightarrow OFF
SAP Output Distortion	THD_{SAP}	-	0.3	1.0	%	SAP Input Voltage 90 $mV_{r.m.s.}$ $f = 1\text{kHz}$ $\Delta f = 10\text{kHz}$
SAP Output Voltage	$V_o SAP$	380	430	480	$mV_{r.m.s.}$	SAP Input Voltage 90 $mV_{r.m.s.}$ $f = 1\text{kHz}$ $\Delta f = 10\text{kHz}$
Mode SW Cross Talk	CT	45	60	-	dB	Stereo Input 150 $mV_{r.m.s.}$ (MONO) SAP Input 90 $mV_{r.m.s.}$
L.R. Separation	SEP	30	40	-	dB	Composite Input 150 $mV_{r.m.s.}$ (MONO)
Matrix Output Voltage (MONO)	$V_o MONO$	450	500	550	$mV_{r.m.s.}$	Matrix Input 215 $mV_{r.m.s.}$ IN-PHASE
Matrix Output Voltage (STEREO)	V_o	450	500	550	$mV_{r.m.s.}$	Matrix Input 215/2 $mV_{r.m.s.}$ IN-PHASE
Matrix Output Voltage (STEREO)	V_o	450	500	550	$mV_{r.m.s.}$	Matrix Input 215/2 $mV_{r.m.s.}$ ANTI-PHASE
Matrix Output Voltage (SAP)	$V_{om SAP}$	450	500	550	$mV_{r.m.s.}$	Matrix Input 215 $mV_{r.m.s.}$
Matrix Output Voltage (MUTE)	MUTE		-70	-60	dB	Pin 17 Should be open.

MATRIX MODE STATE DIAGRAM

MODE	ST/SAP ₁ /SAP ₂	MONO/ST	MUTE	L	R
MONO	-	L	L	L+R	L+R
ST	-	-	L	L	R
SAP ₁	L	-	L	SAP	SAP
SAP ₂	H	-	L	L+R	SAP
MUTE			-	NO Signal	NO Signal

H: V_{CC}, L: GND, -: OPEN

MATRIX MODE TABLE

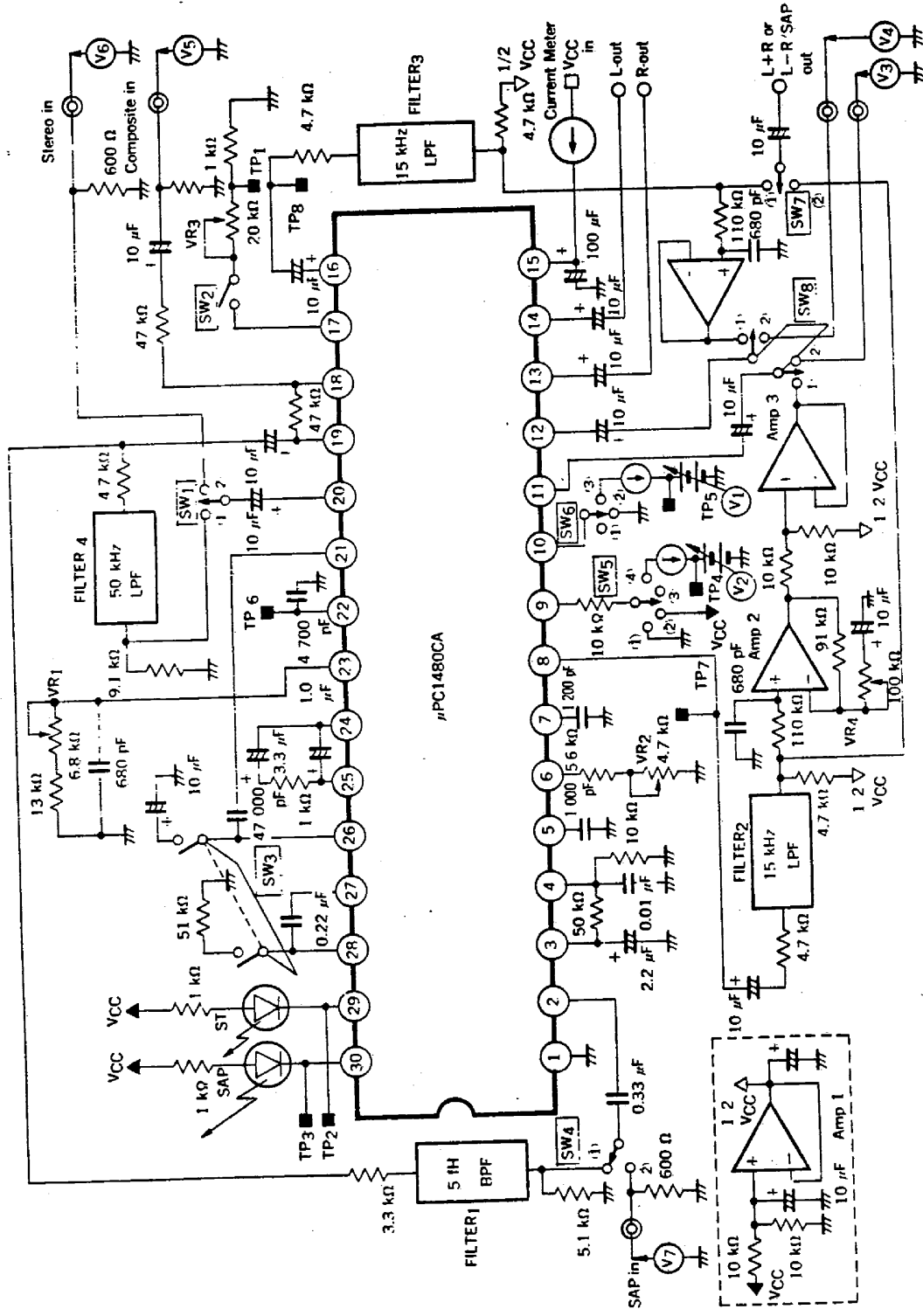
BROADCASTING MODE	SELECT MODE		OUTPUT	
	PIN 10	PIN 9	L	R
STEREO : ON SAP : ON	•	SAP ₁	SAP	SAP
	•	SAP ₂	MAIN	SAP
	ST	ST	L	R
	MONO	ST	MAIN	MAIN
STEREO : OFF SAP : ON	•	SAP ₁	SAP	SAP
	•	SAP ₂	MAIN	SAP
	ST	ST	MAIN	MAIN
	MONO	ST	MAIN	MAIN
STEREO : ON SAP : OFF	•	SAP ₁	L	R
	•	SAP ₂	L	R
	ST	ST	L	R
	MONO	ST	MAIN	MAIN
STEREO : OFF SAP : OFF	•	SAP ₁	MAIN	MAIN
	•	SAP ₂	MAIN	MAIN
	ST	ST	MAIN	MAIN
	MONO	ST	MAIN	MAIN

• : Either is good.

The state of pilot lamp, STEREO and SAP, should be based on broad-casting mode in spite of select mode.
(eg. If broadcasting mode is SAP and STEREO ON, SAP and STEREO lamp turn on in spite of select mode.)

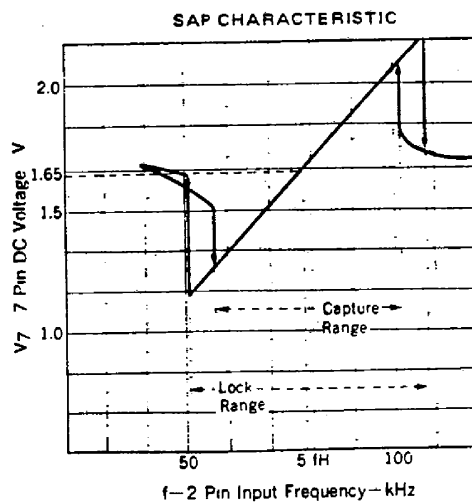
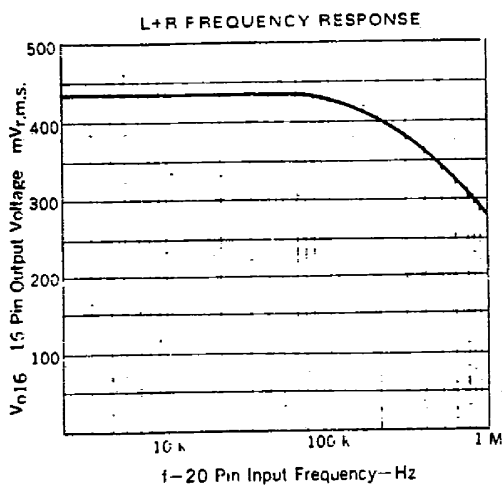
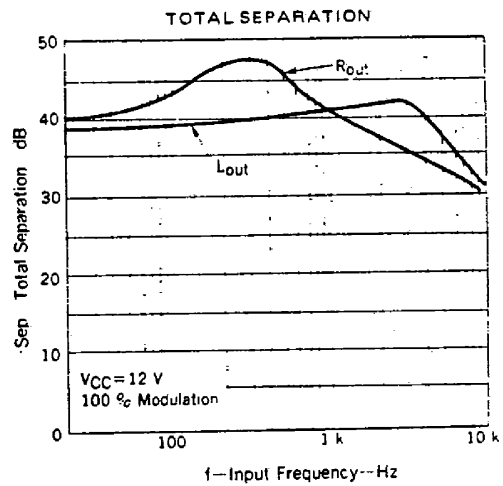
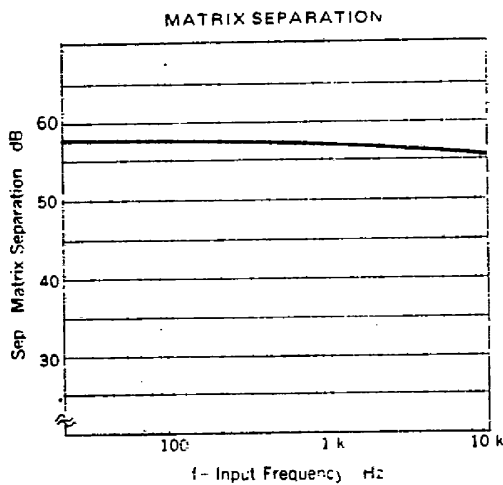
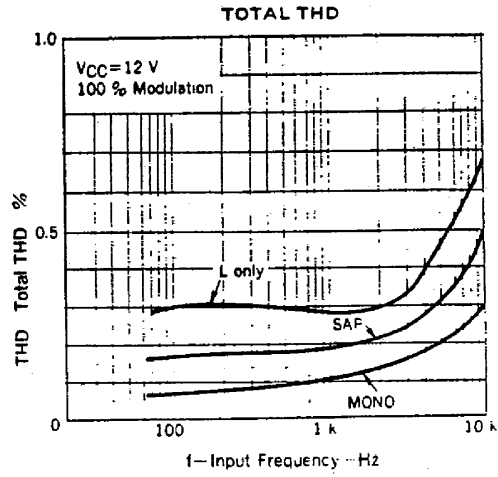
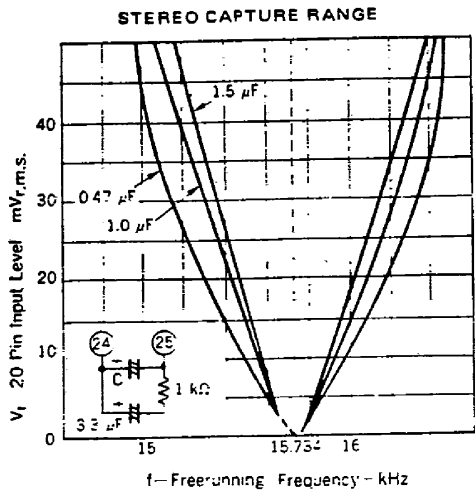
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TEST CIRCUIT



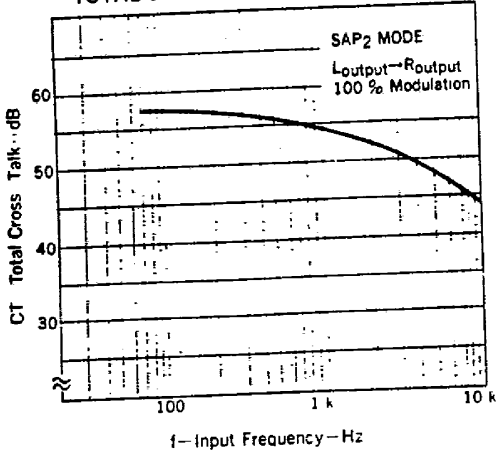
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TYPICAL CHARACTERISTICS (T_a = 25 °C)

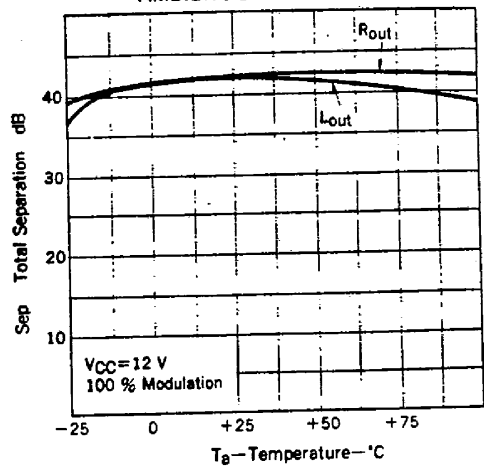


μPC1480CA

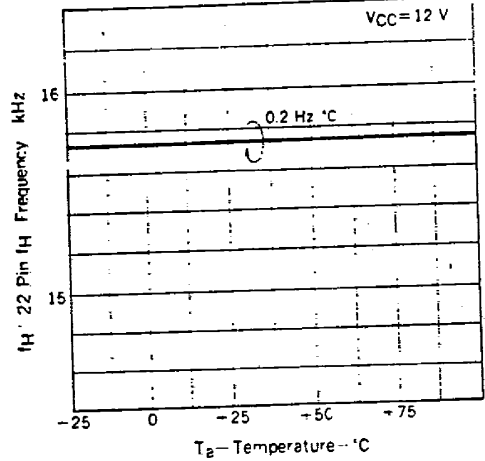
TOTAL CROSS TALK CHARACTERISTIC



TOTAL SEPARATION AMBIENT CHARACTERISTIC



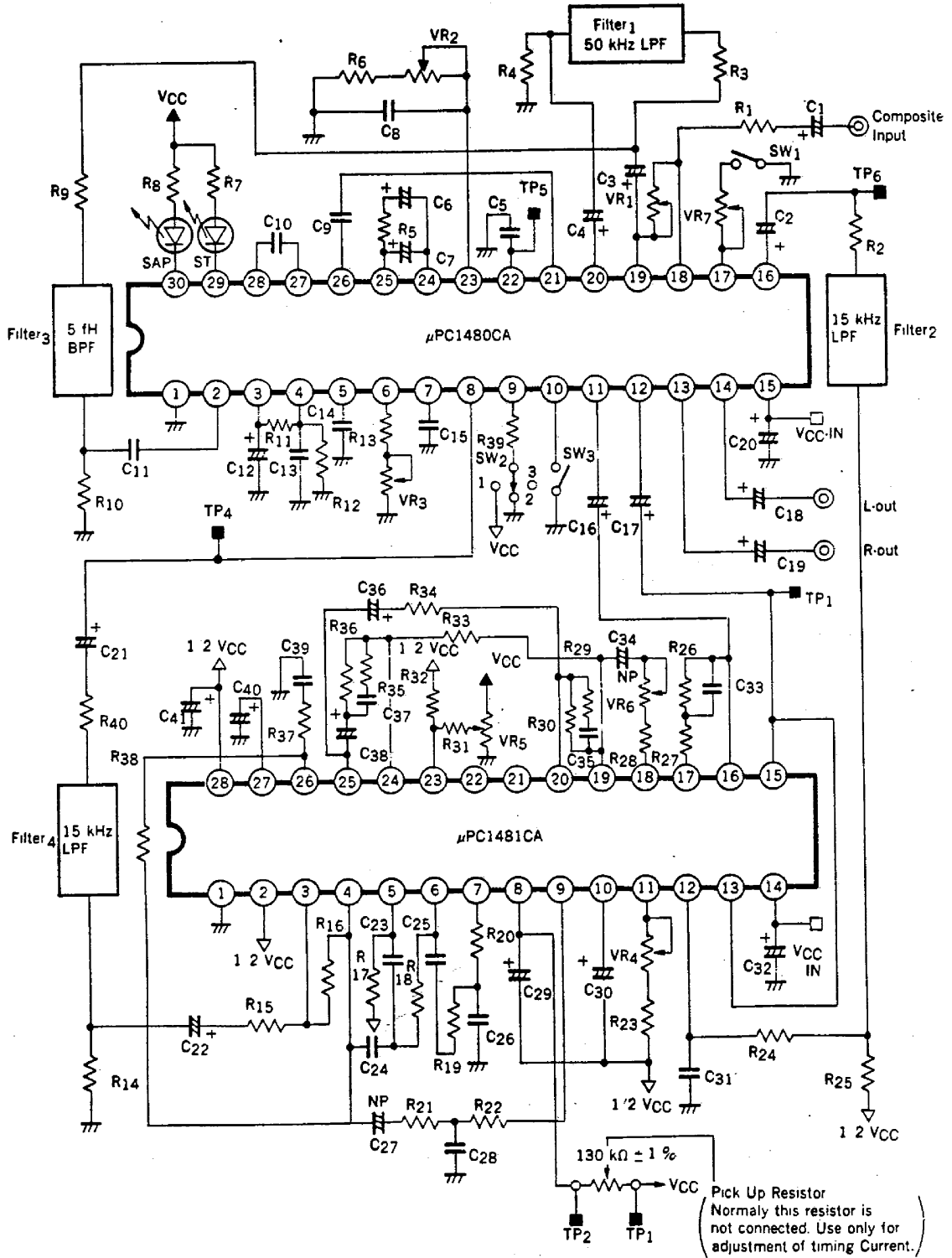
STEREO FREE RUNNING FREQUENCY AMBIENT CHARACTERISTIC



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APPLICATION CIRCUIT



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US SOUND MPX APPLICATION PARTS LIST

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PARTS NO.	VALUE	PRECISION	NOTE
R1	22 kΩ		LPF Matching
R2	4.7 kΩ		LPF Matching
R3	4.7 kΩ		LPF Matching
R4	9.1 kΩ		PLL Loop Filter
R5	1.0 kΩ		4 fH VCO
R6	13 kΩ	±5 %	LED Load
R7	1.0 kΩ		LED Load
R8	1.0 kΩ		BPF Matching
R9	3.3 kΩ		BPF Matching
R10	5.1 kΩ		SAP Discriminator Filter
R11	50 kΩ		SAP Discriminator Filter
R12	110 kΩ		SAP 5 fH VCO
R13	6.2 kΩ	±5 %	LPF Matching
R14	4.7 kΩ		
R15	100 kΩ		Feed Back
R16	330 kΩ		Spectral Control Filter
R17	12 kΩ		Spectral Control Filter
R18	3.3 kΩ		Spectral Control Filter
R19	4.7 kΩ		Spectral Control Filter
R20	4.7 kΩ		Wide Band Input Filter
R21	4.7 kΩ		Wide Band Input Filter
R22	4.7 kΩ		Timing Current Set
R23	150 kΩ	±1 %	L+R De Emphasis
R24	110 kΩ		LPF Matching
R25	4.7 kΩ		De Emphasis
R26	12 kΩ		De Emphasis
R27	1.0 kΩ		
R28	39 kΩ		Variable Emphasis
R29	3.6 kΩ		Variable Emphasis
R30	180 kΩ		
R31	1 kΩ		
R32	33 Ω		Variable Emphasis
R33	180 kΩ		Variable Emphasis
R34	180 kΩ		Variable Emphasis
R35	3.6 kΩ		Variable Emphasis
R36	180 kΩ		De Emphasis
R37	1.2 kΩ		De Emphasis
R38	33 kΩ		
*R39	10 kΩ	10 kΩ (SAP ₁) 18 kΩ (SAP ₂)	
R40	4.7 kΩ		LPF Matching
VR1	50 kΩ		Input Level Adjust
VR2	6.8 kΩ		4 fH VCO Adjust
VR3	5 kΩ		5 fH VCO Adjust
VR4	200 kΩ		Timing Current Adjust
VR5	10 kΩ		Spectral Control

PARTS NO.	VALUE	PRECISION	NOTE
VR6	50 kΩ		Wide Band Control
VR7	20 kΩ		Pilot Cancel Level Adj.
C1	10 μF (EL)		Coupling
C2	10 μF (EL)		Coupling
C3	10 μF (EL)		Coupling
C4	10 μF (EL)		Coupling
C5	4 700 pF		Coupling
C6	3.3 μF (EL)		Coupling
C7	1.0 μF (EL)		Coupling
C8	680 pF	Polystyrol, ±5 % Temperature Coefficient is minus.	4 fH VCO
C9	47 000 pF		Coupling
C10	0.22 μF		Pilot Detect Filter
C11	0.33 μF		Coupling
C12	2.2 μF (EL)		SAP Discriminator Filter
C13	0.01 μF		SAP Discriminator Filter
C14	1 000 pF	Film Capacitor, ±5 % Temperature Coefficient is plus.	SAP 5 fH VCO
C15	1 000 pF		PLL Filter
C16	10 μF (EL)		Coupling
C17	10 μF (EL)		Coupling
C18	10 μF (EL)		Coupling
C19	10 μF (EL)		Coupling
C20	100 μF (EL)		Bypass Capacitor
C21	10 μF (EL)		Coupling
C22	1.0 μF (EL)		Coupling
C23	0.003 3 μF	±5 %	Spectral Control Filter
C24	0.003 3 μF	±5 %	Spectral Control Filter
C25	0.003 3 μF	±5 %	Spectral Control Filter
C26	0.003 3 μF	±5 %	Spectral Control Filter
C27	0.47 μF	Nonpolar, ±20 %	Wide Band Input Filter
C28	0.033 μF	±5 %	Wide Band Input Filter
C29	10 μF	Tantalum, ±5 %	Time Constant
C30	10 μF	Tantalum, ±5 %	Time Constant
C31	680 pF	±5 %	L+R De Emphasis
C32	100 μF (EL)		Bypass Capacitor
C33	0.033 μF	±5 %	De Emphasis
C34	22 μF	Nonpolar, ±20 %	Coupling
C35	2 200 pF	±5 %	Variable Emphasis
C36	1.0 μF (EL)	±20 %	Variable Emphasis
C37	2 200 pF	±5 %	Variable Emphasis
C38	1.0 μF (EL)	±20 %	Variable Emphasis
C39	2 200 pF	±5 %	De Emphasis

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PARTS NO.	VALUE	PRECISION	NOTE
C40	100 μF (EL)		Bypass Capacitor
C41	22 μF (EL)		Bypass Capacitor
Filter 1	A257BLT-4670N or 257BLR-4835N	TOKO	50 kHz LPF
Filter 2	257BLR-3666N or 3890N	TOKO	15 kHz LPF
Filter 3	258BBV-4808N	TOKO	5 fH (78.67 kHz) BPF
Filter 4	257BLR-3666N or 3890N	TOKO	15 kHz LPF

All tolerances which are not specified are ±5 %
 * This value is at the time V_{CC} = 12.0 V

US MULTIPLEX ALIGNMENT MANUAL

1. 4 fH VCO: (μPC1480CA)

Without inputting signal, grounding pin 28 (μPC1480CA) with 50 kΩ.
 Then grounding pin 26 (μPC1480CA) with 10 μF capacitor. Connecting a frequency counter with pin 22, and fix the frequency at 15.734 kHz by adjusting the variable resistor at pin 23.

2. 5 fH VCO: (μPC1480CA)

Inputting 5 fH (78.67 kHz) nonmodulation signal and checking sap lamp turn on situation. Then making pin 9 (μPC1480CA) open or stereo mode.
 In measuring the output DC voltage on pin 8, making pin 9 high or low mode (SAP MODE). Then making pin 8 output DC voltage equal to the output DC voltage in stereo mode by adjusting the variable resistor at pin 6.

3. Pilot cancel level: (μPC1480CA)

Inputting pilot signal (V_{in} = 60 mV_{r.m.s.}) into Composite input terminal and monitoring the output level on L+R output terminal (pin 16), and then minimizing the output power by adjusting the variable resistor at pin 17. in this case, SW₁ shall be short.

4. dbx Timing adjustment: (μPC1481CA)

Inputting the signal, 300 Hz, 100 mV_{r.m.s.}, at pin 4 (μPC1481CA). Then pulling up pin 8 with 130 kΩ resistor, and monitoring the voltage between pin 8 and V_{CC}. Then making it 2.964 V (130 kΩ 22.8 μA) by adjusting the variable resistor at pin 11 (μPC1481CA).

5. Separation adjustment: (μPC1481CA)

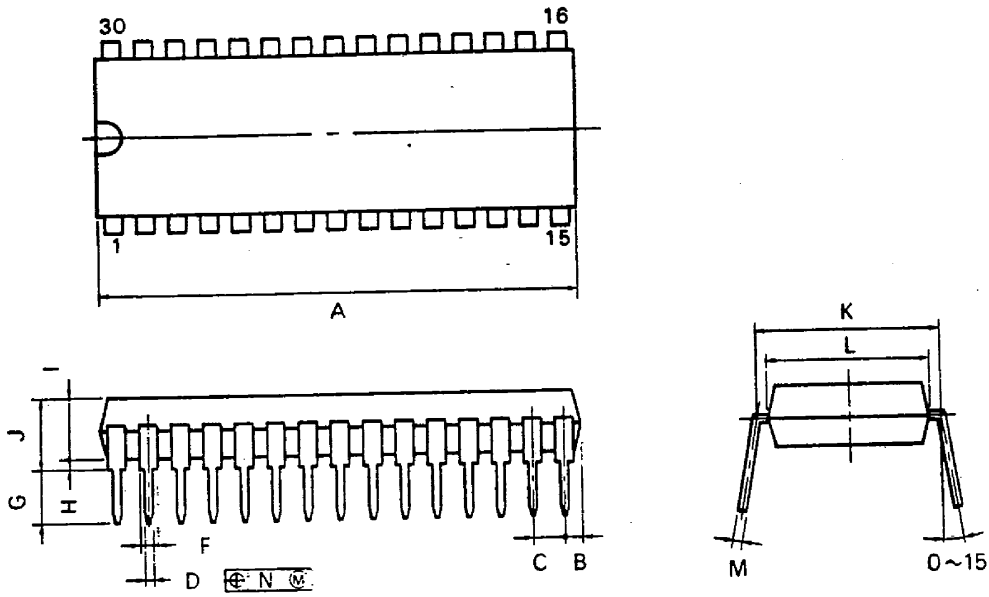
Inputting composite L only signal (300 Hz, 20 % modulation) from Composite input terminal, dbx NR on.
 Adjusting VR₁ to make L+R signal level on pin 12 (μPC1480CA) into 21.5 mV_{r.m.s.}. Then, monitoring R output terminal and adjusting VR₆ in order to minimize the L signal leakage.
 In the above setting, making the input frequency 3 kHz and adjusting VR₅ in order to minimize the L signal leakage.

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μPC1480CA

6427525 N E C ELECTRONICS INC
30PIN PLASTIC SHRINK DIP (400 mil)

98D 18394 D T-77-07-07



S30C-70-400B

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	28.46 MAX.	1.121 MAX.
B	1.78 MAX.	0.070 MAX.
C	1.778 (T.P.)	0.070 (T.P.)
D	0.50 ^{0.10}	0.020 ^{0.004} _{0.003}
F	0.85 MIN.	0.033 MIN.
G	3.2 ^{0.3}	0.126 ^{0.012}
H	0.51 MIN.	0.020 MIN.
I	4.31 MAX.	0.170 MAX.
J	5.08 MAX.	0.200 MAX.
K	10.16 (T.P.)	0.400 (T.P.)
L	8.6	0.339
M	0.25 ^{0.10} _{0.08}	0.010 ^{0.004} _{0.003}
N	0.17	0.007