



BIPOLAR ANALOG INTEGRATED CIRCUIT

μ PC1480CA

US TV SOUND MPX DECODER IC

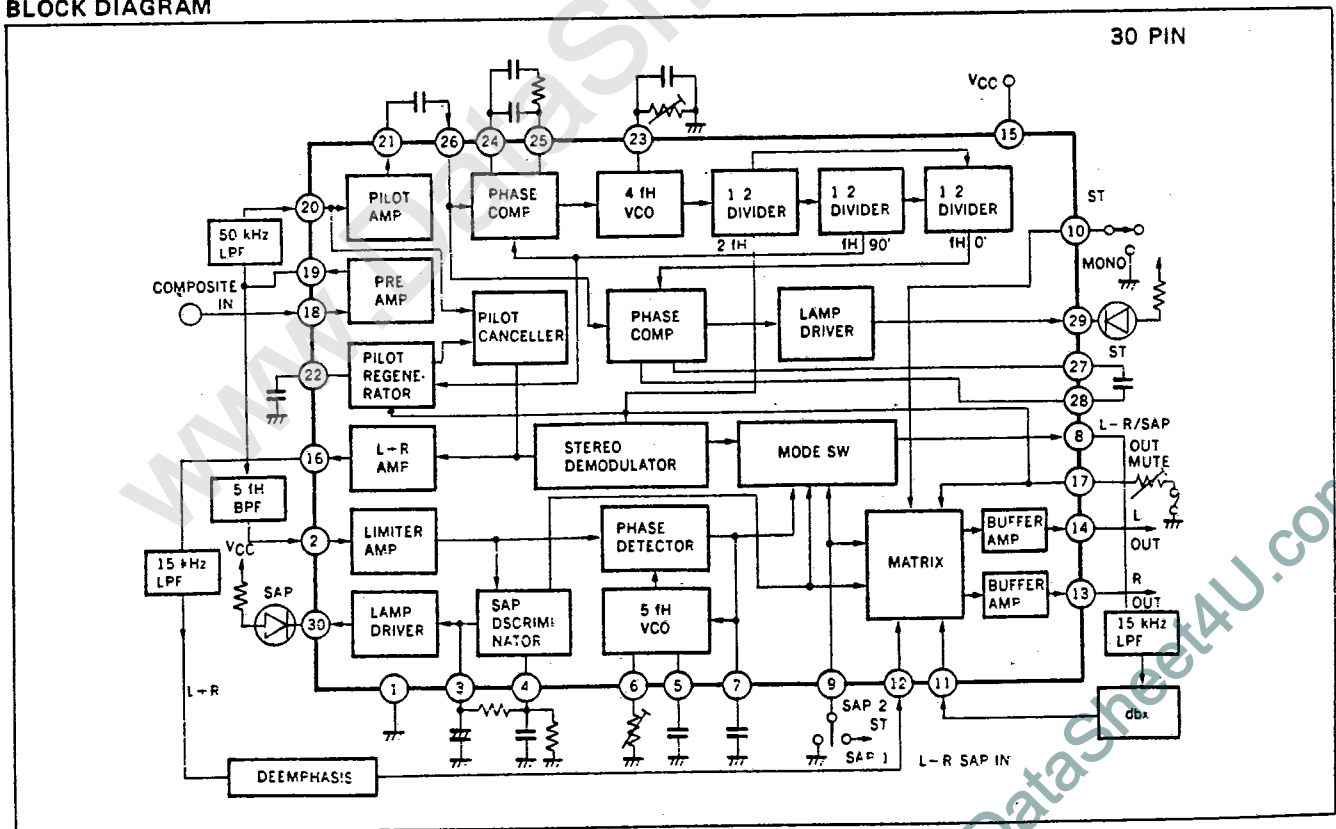
DESCRIPTION

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



NEC cannot assume any responsibility for any circuits shown or represent that they are free from patent infringement.

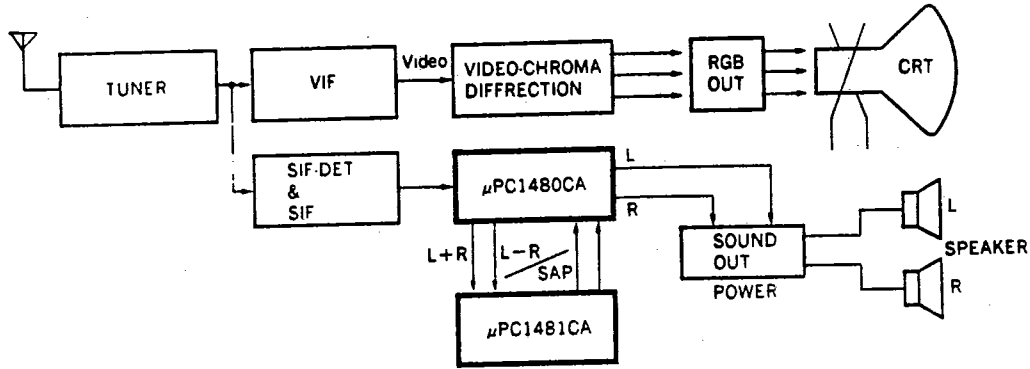
NEC Corporation

© 1985 NEC Corporation

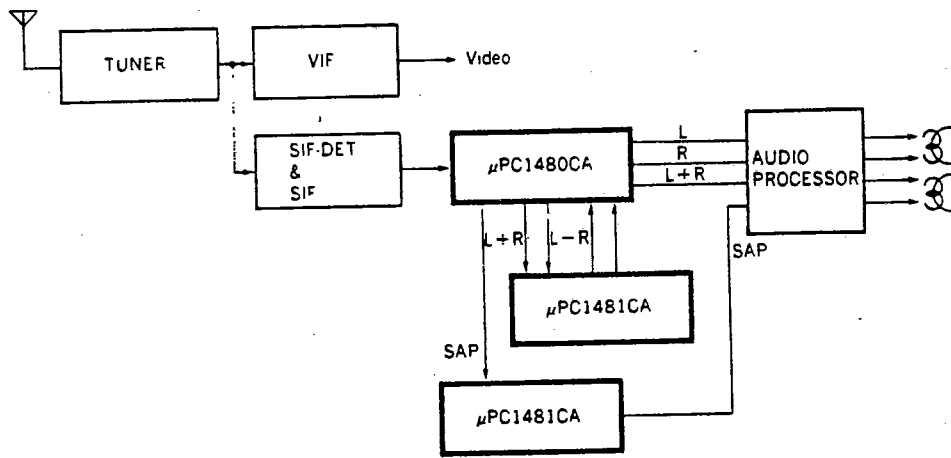
μPC1480CA

NEC ELECTRON DEVICE

APPLICATION FOR TV



APPLICATION FOR VCR



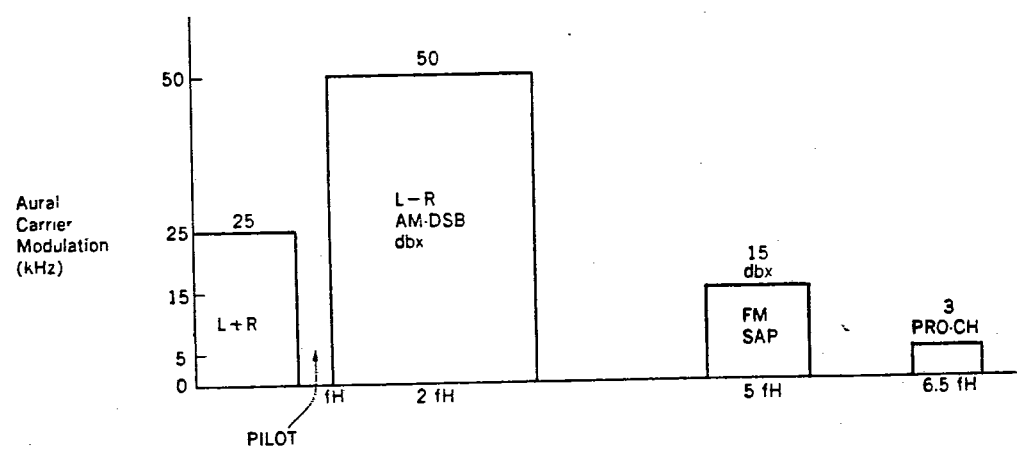
ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

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



μPC1480CA

NEC ELECTRON DEVICE

ELECTRICAL CHARACTERISTICS (T_a = 25 °C ± 3 °C, RH = 70 %, V_{CC} = 12 V)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
Operating Current	I _{CC}	27	39	52	mA	V _{CC} = 12 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 → ON
Stereo SW Hysterisys	Hy ₁	5	7	9	dB	Measure Pilot Level at Stereo Input Terminal OFF → ON ON → 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	fHREJ	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 kHz
L+R Distortion	THD _{L+R}	-	0.2	0.5	%	Stereo Decoder Input Voltage 150 mV _{r.m.s.} (MONO) f = 1 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 → ON
SAP SW Hysterisys	Hy ₂	2.5	4.5	6.5	dB	Measure SAP Input Level at SAP Input Terminal Lamp OFF → ON ON → OFF
SAP Output Distortion	THD _{SAP}	-	0.3	1.0	%	SAP Input Voltage 90 mV _{r.m.s.} f = 1 kHz Δf = 10 kHz
SAP Output Voltage	V _o SAP	380	430	480	mV _{r.m.s.}	SAP Input Voltage 90 mV _{r.m.s.} f = 1 kHz Δf = 10 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: VCC, L: GND, -: OPEN

MATRIX MODE TABLE

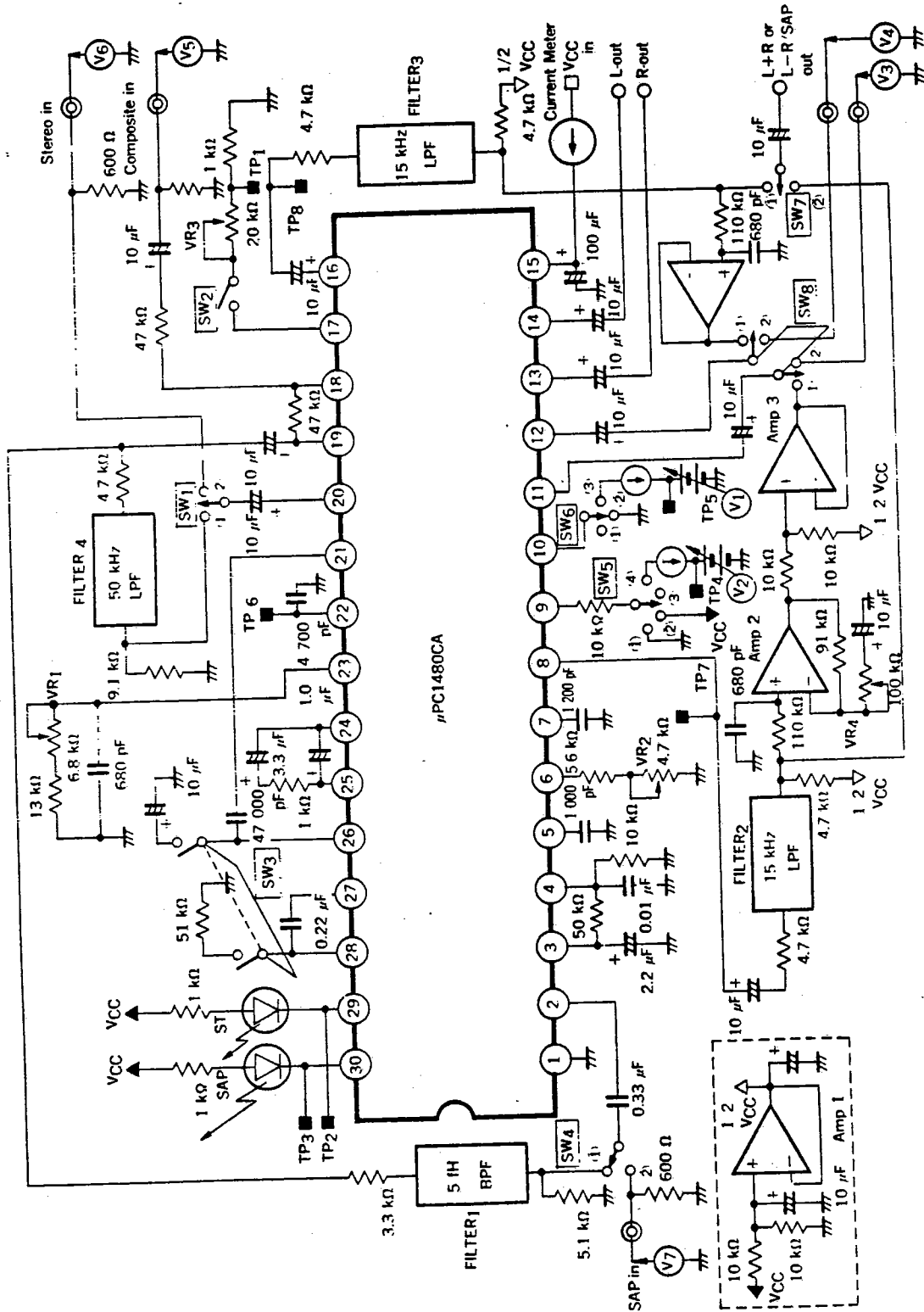
BROADCASTING MODE	SELECT MODE		OUTPUT	
	PIN 10	PIN 9	L	R
STEREO : ON SAP : ON	•	SAP ₁	SAP	SAP
	•	SAP ₂	MAIN	SAP
	ST	ST	L	R
	MONO	ST	MAIN	MAIN
STEREO : OFF SAP : ON	•	SAP ₁	SAP	SAP
	•	SAP ₂	MAIN	SAP
	ST	ST	MAIN	MAIN
	MONO	ST	MAIN	MAIN
STEREO : ON SAP : OFF	•	SAP ₁	L	R
	•	SAP ₂	L	R
	ST	ST	L	R
	MONO	ST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

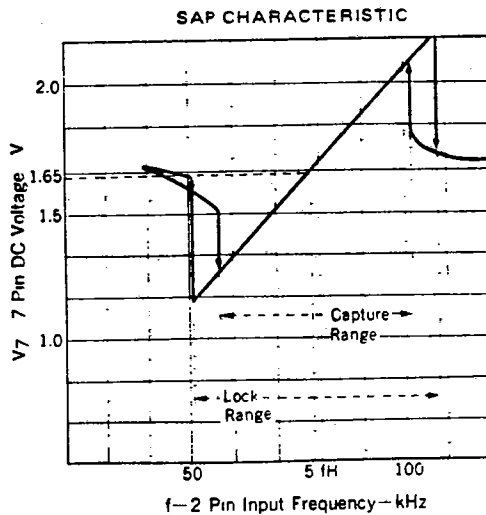
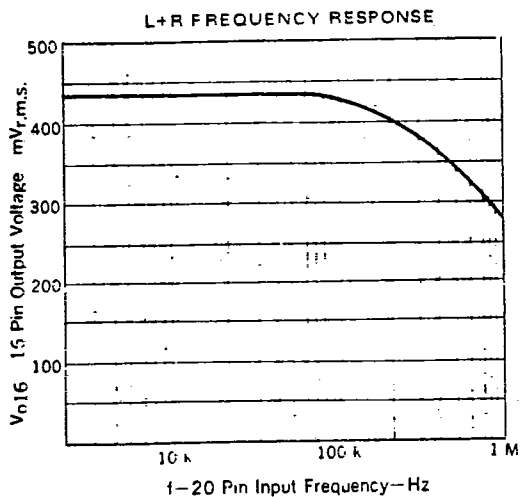
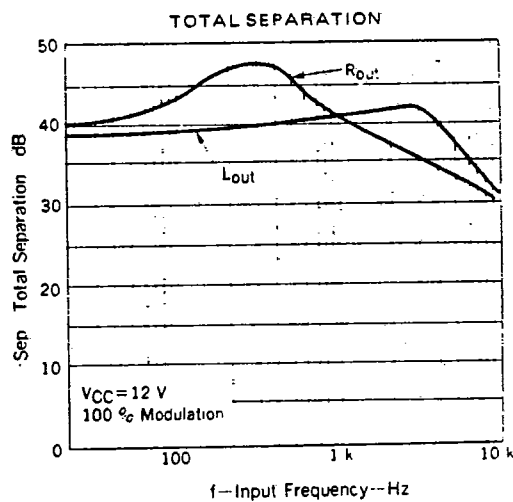
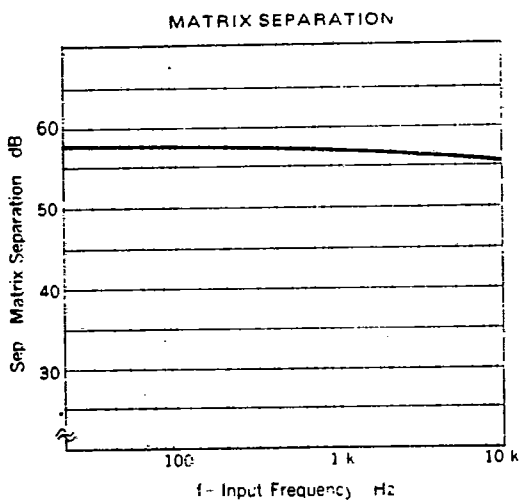
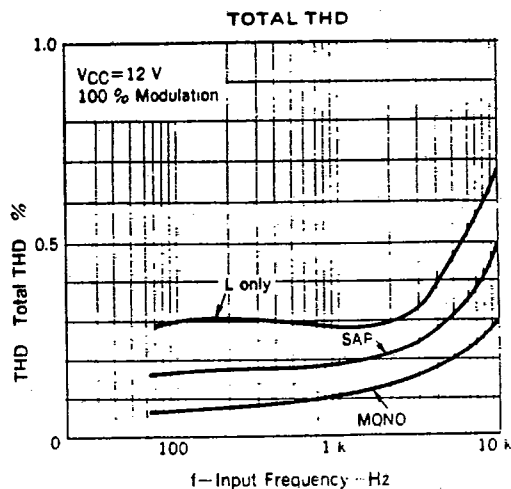
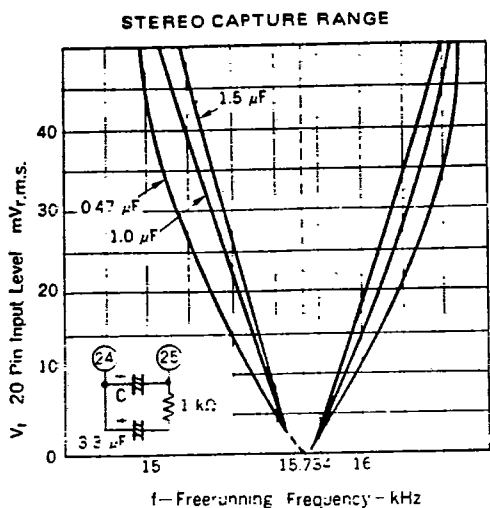
The state of pilot lamp, STEREO and SAP, should be based on broad-casting mode in spite of select mode.
(eg. If broadcasting mode is SAP and STEREO ON, SAP and STEREO lamp turn on in spite of select mode.)

μPC1480CA

TEST CIRCUIT

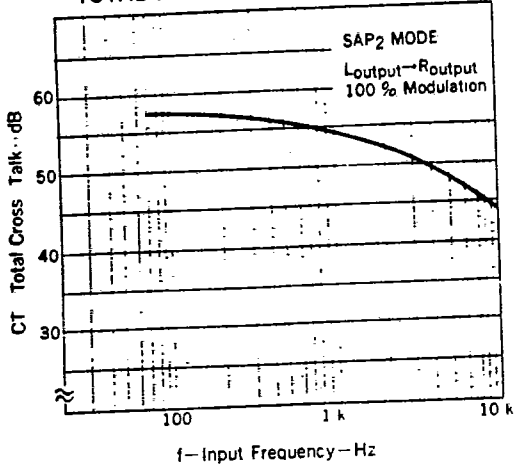


TYPICAL CHARACTERISTICS (T_a = 25 °C)

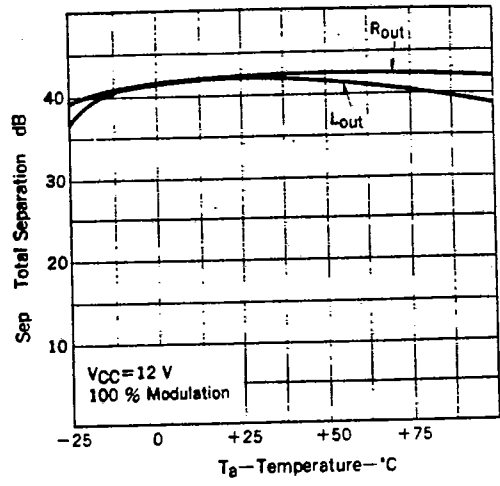


μPC1480CA

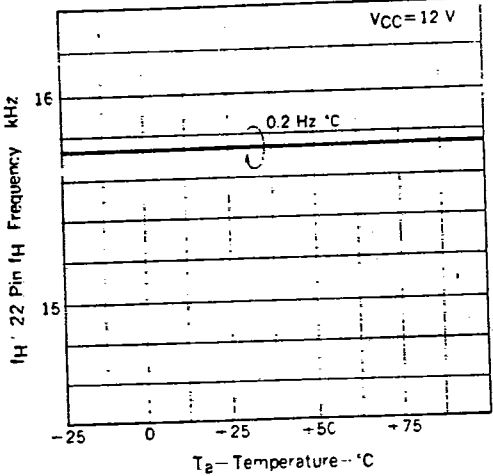
TOTAL CROSS TALK CHARACTERISTIC



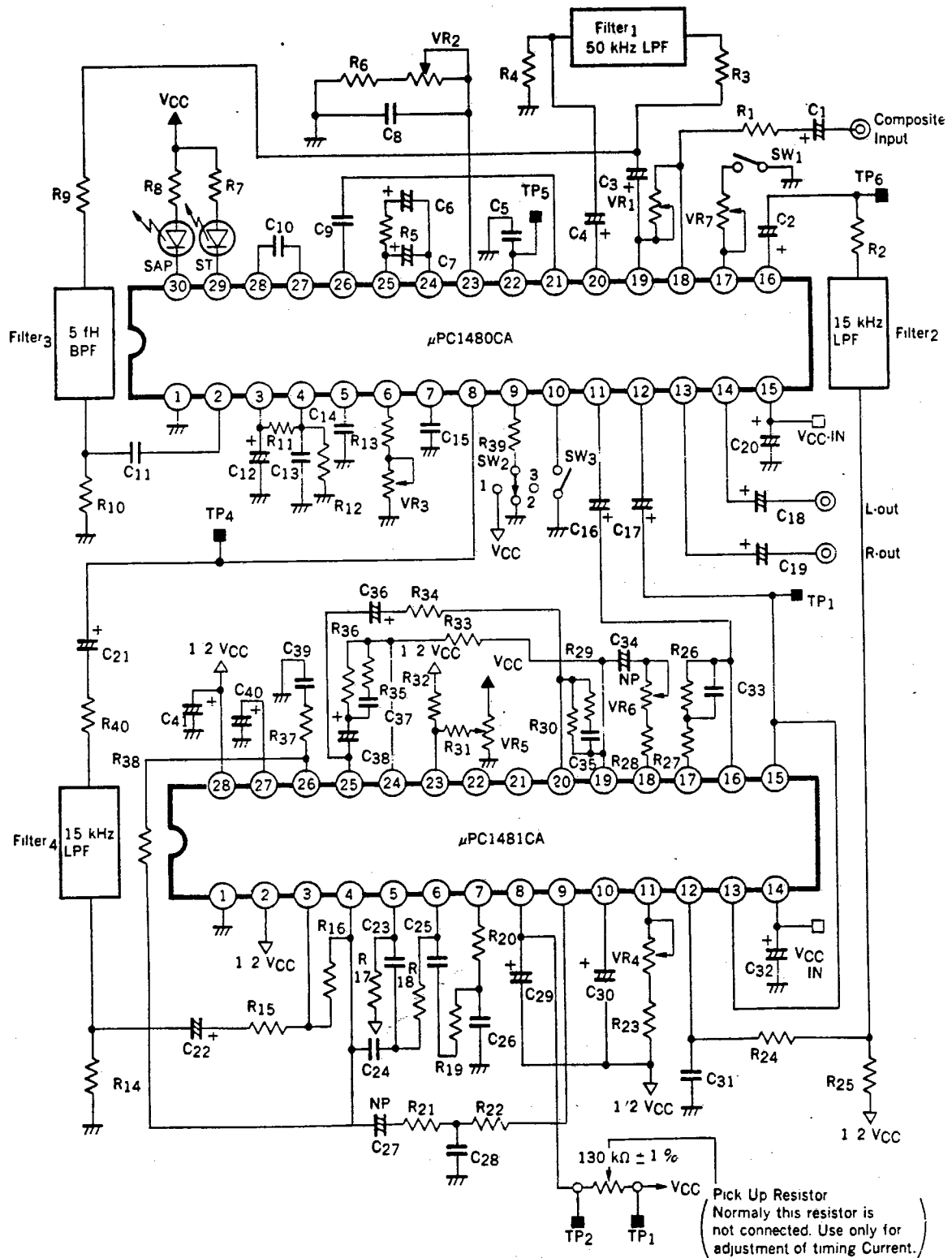
TOTAL SEPARATION AMBIENT CHARACTERISTIC



STEREO FREE RUNNING FREQUENCY AMBIENT CHARACTERISTIC



APPLICATION CIRCUIT



μ PC1480CA

NEC ELECTRON DEVICE

US SOUND MPX APPLICATION PARTS LIST

US SOUND MPX APPLICATION PARTS LIST

PARTS NO.	VALUE	PRECISION	NOTE
R ₁	22 k Ω		LPF Matching
R ₂	4.7 k Ω		LPF Matching
R ₃	4.7 k Ω		LPF Matching
R ₄	9.1 k Ω		PLL Loop Filter
R ₅	1.0 k Ω		4 fH VCO
R ₆	13 k Ω	$\pm 5\%$	LED Load
R ₇	1.0 k Ω		LED Load
R ₈	1.0 k Ω		BPF Matching
R ₉	3.3 k Ω		BPF Matching
R ₁₀	5.1 k Ω		SAP Discriminator Filter
R ₁₁	50 k Ω		SAP Discriminator Filter
R ₁₂	110 k Ω		SAP 5 fH VCO
R ₁₃	6.2 k Ω	$\pm 5\%$	LPF Matching
R ₁₄	4.7 k Ω		
R ₁₅	100 k Ω		Feed Back
R ₁₆	330 k Ω		Spectral Control Filter
R ₁₇	12 k Ω		Spectral Control Filter
R ₁₈	3.3 k Ω		Spectral Control Filter
R ₁₉	4.7 k Ω		Spectral Control Filter
R ₂₀	4.7 k Ω		Wide Band Input Filter
R ₂₁	4.7 k Ω		Wide Band Input Filter
R ₂₂	4.7 k Ω		Timing Current Set
R ₂₃	150 k Ω	$\pm 1\%$	L+R De Emphasis
R ₂₄	110 k Ω		LPF Matching
R ₂₅	4.7 k Ω		De Emphasis
R ₂₆	12 k Ω		De Emphasis
R ₂₇	1.0 k Ω		
R ₂₈	39 k Ω		Variable Emphasis
R ₂₉	3.6 k Ω		Variable Emphasis
R ₃₀	180 k Ω		
R ₃₁	1 k Ω		
R ₃₂	33 Ω		Variable Emphasis
R ₃₃	180 k Ω		Variable Emphasis
R ₃₄	180 k Ω		Variable Emphasis
R ₃₅	3.6 k Ω		Variable Emphasis
R ₃₆	180 k Ω		Variable Emphasis
R ₃₇	1.2 k Ω		De Emphasis
R ₃₈	33 k Ω		De Emphasis
*R ₃₉	10 k Ω	10 k Ω (SAP ₁) 18 k Ω (SAP ₂)	LPF Matching
R ₄₀	4.7 k Ω		
VR ₁	50 k Ω		Input Level Adjust
VR ₂	6.8 k Ω		4 fH VCO Adjust
VR ₃	5 k Ω		5 fH VCO Adjust
VR ₄	200 k Ω		Timing Current Adjust
VR ₅	10 k Ω		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

μPC1480CA**NEC** ELECTRON DEVICE

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.

