



No. 3806A

LA7451M

**Two-channel, Noise Reduction Processor
for 8-mm VCR PCM**

Overview

The LA7451M is a two-channel, noise reduction processor IC for 8-mm video recorder, pulse code modulation (PCM) circuits.

The LA7451M incorporates two filters, one per channel, comprising emphasis circuits, weighting compensators, voltage-controlled amplifiers (VCA) and detectors. Filter control circuitry sets the emphasis and weighting of each filter.

The LA7451M operates from a 4.75 V supply and is available in 30-pin MFPs.

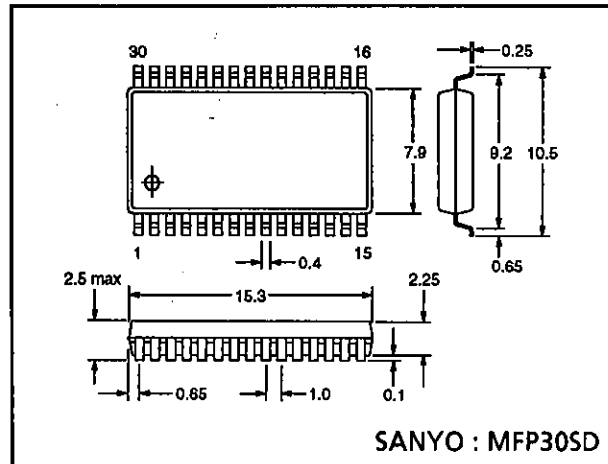
Features

- Filter control
- Emphasis circuits
- Weighting compensators
- Voltage-controlled amplifiers (VCA)
- 4.75 V supply
- 30-pin MFP

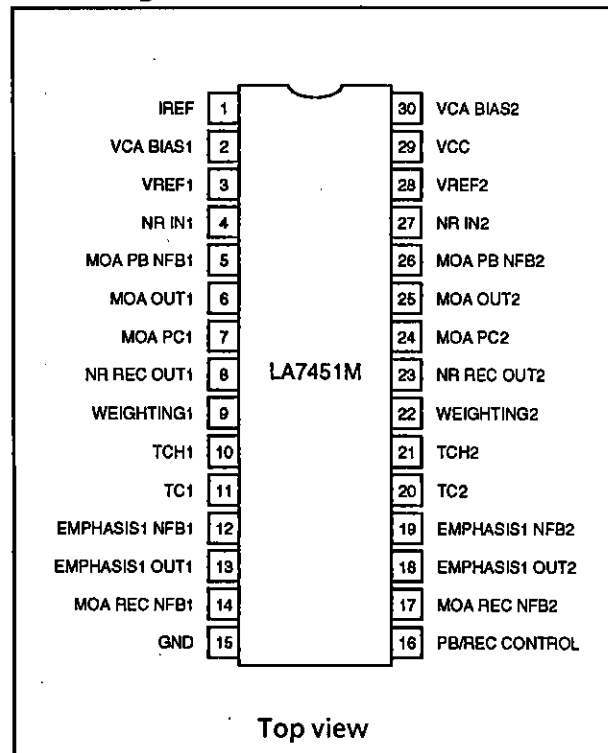
Package Dimensions

unit : mm

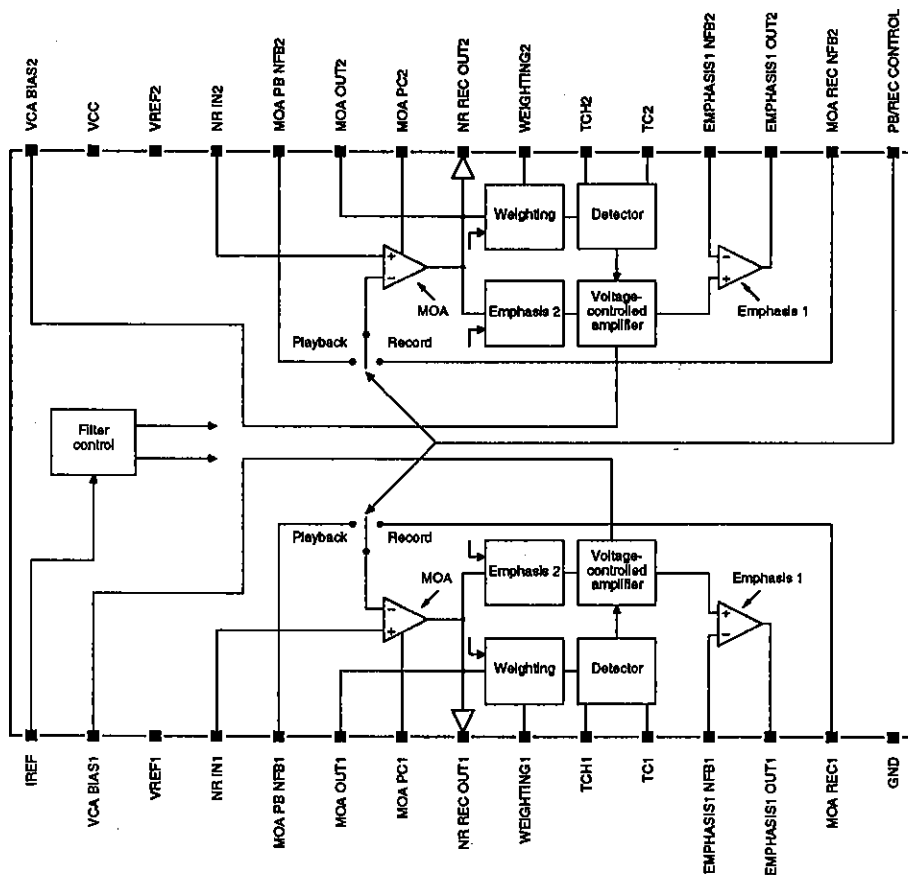
3073A-MFP30SD



Pin Assignment



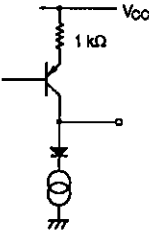
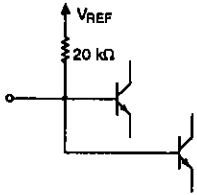

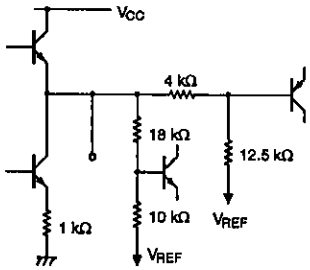
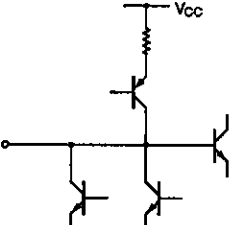
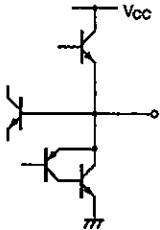
Block Diagram



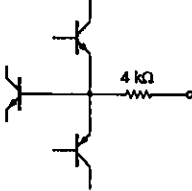
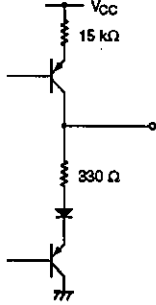
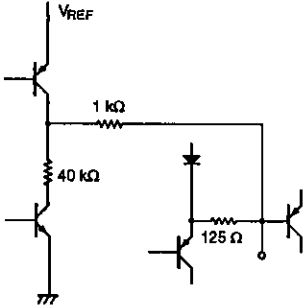

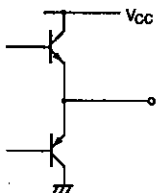
Pin Functions

Number	Name	Equivalent circuit	Function
1	IREF		Filter reference current resistor connection. The external IREF-to-GND resistance determines the reference current. Nominal voltage is 3 V.
2	VCA BIAS1		VCA DC offset capacitor connection. Input impedance is 10 kΩ and nominal voltage is 2.4 V.

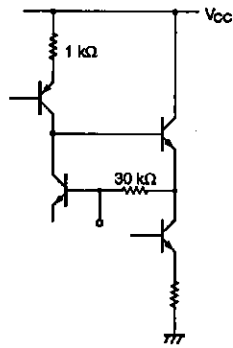
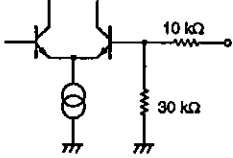
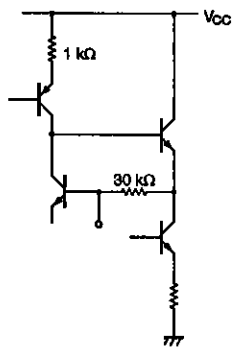
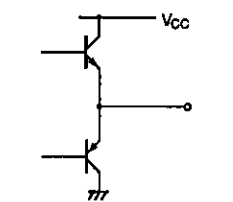
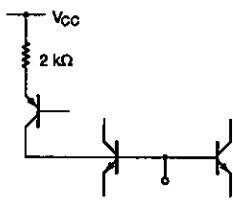
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Number	Name	Equivalent circuit	Function
3	VREF1		<p>Channel 1 reference voltage output. Output impedance is 90 Ω and nominal voltage is 2.4 V (0.5V_{cc}).</p>
4	NR IN1		<p>Channel 1 input. Input impedance is 20 kΩ and nominal voltage is 2.4 V.</p>
5	MOA PB NFB1		<p>Main operating amplifier playback-mode negative feedback input 1. Used for aperture compensation. Nominal voltage is 2.4 V.</p>
6	MOA OUT1		<p>Main operating amplifier output 1. Nominal voltage is 2.4 V.</p>
7	MOA PC1		<p>Main operating amplifier phase compensation capacitor connection 1. Nominal voltage is 3.1 V.</p>
8	NR REC OUT1		<p>Recording-mode output 1. Low-impedance output buffer</p>

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Number	Name	Equivalent circuit	Function
9	WEIGHTING1		<p>Weighting compensator 1 full-wave rectifier capacitor connection. Input impedance is 4 kΩ and nominal voltage is 2.4 V.</p>
10	TCH1		<p>Detector hold time adjustment capacitor connection 1. Nominal voltage is 2.6 V.</p>
11	TC1		<p>Detector attack and recovery time adjustment capacitor connection 1. Nominal voltage is 2 V.</p>
12	EMPHASIS1 NFB1		<p>Emphasis amplifier negative feedback input 1. Nominal voltage is 2.4 V.</p>
13	EMPHASIS1 OUT1		<p>Emphasis amplifier output 1. Nominal voltage is 2.4 V.</p>

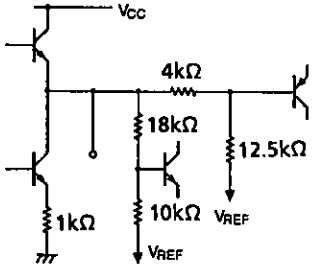

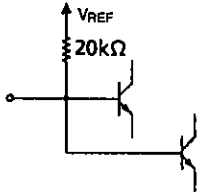
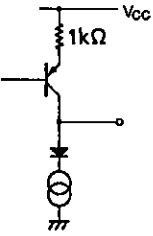
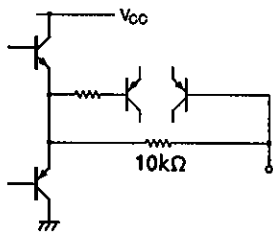
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Number	Name	Equivalent circuit	Function
14	MOA REC NFB1		Main operating amplifier recording-mode negative feedback input 1. Nominal voltage is 2.4 V.
15	GND		Ground
16	PB/REC CONTROL		Playback/recording select input. Recording when LOW or open, playback, when HIGH
17	MOA REC NFB2		Main operating amplifier recording-mode negative feedback input 2. Nominal voltage is 2.4 V.
18	EMPHASIS1 OUT2		Emphasis amplifier output 2. Nominal voltage is 2.4 V.
19	EMPHASIS1 NFB2		Emphasis amplifier negative feedback input 2. Nominal voltage is 2.4 V.

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Number	Name	Equivalent circuit	Function
20	TC2		<p>Detector attack and recovery time adjustment capacitor connection 2. Nominal voltage is 2 V.</p>
21	TCH2		<p>Detector hold time adjustment capacitor connection 2. Nominal voltage is 2.6 V.</p>
22	WEIGHTING2		<p>Weighting compensator 2 full-wave rectifier capacitor connection. Input impedance is 4 kΩ and nominal voltage is 2.4 V.</p>
23	NR REC OUT2		<p>Recording-mode output 2. Low-impedance output buffer</p>
24	MOA PC2		<p>Main operating amplifier phase compensation capacitor connection 2. Nominal voltage is 3.1 V.</p>

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Number	Name	Equivalent circuit	Function
25	MOA OUT2		Main operating amplifier output 2. Nominal voltage is 2.4 V.
26	MOA PB NFB2		Main operating amplifier playback-mode negative feedback input 2. Used for aperture compensation. Nominal voltage is 2.4 V.
27	NR IN2		Channel 2 input. Input impedance is 20 kΩ and nominal voltage is 2.4 V.
28	VREF2		Channel 2 reference voltage output. Output impedance is 90 Ω and nominal voltage is 2.4 V (0.5V _{CC}).
29	VCC		5 V supply
30	VCA BIAS2		VCA DC offset capacitor connection. Input impedance is 10 kΩ and nominal voltage is 2.4 V.

Specifications

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Supply voltage	V_{CC}	7	V
Power dissipation	P_D	300	mW
Operating temperature range	T_{opr}	-20 to 75	°C
Storage temperature range	T_{stg}	-40 to 150	°C

Recommended Operating Conditions

$T_a = 25\text{ °C}$

Parameter	Symbol	Ratings	Unit
Supply voltage	V_{CC}	4.75	V
Supply voltage range	V_{CC}	4.5 to 5.5	V

Electrical Characteristics

$V_{CC} = 4.75\text{ V}$, $T_a = 25\text{ °C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Reference voltage	V_{REF}		2.290	2.375	2.455	V
Recording-mode quiescent current	I_{CCR}		10.0	13.0	16.0	mA
Playback-mode quiescent current	I_{CCP}		10.0	13.0	16.0	mA
Recording-mode select voltage	V_R	Measured at PB/REC CONTROL	0.0	-	1.0	V
Playback-mode select voltage	V_P	Measured at PB/REC CONTROL	3.0	-	V_{CC}	V

Recording mode

$V_{CC} = 4.75\text{ V}$, $T_a = 25\text{ °C}$

Parameter	Symbol	Conditions	Ratings			Unit	
			min	typ	max		
Maximum input level	V_{IMR}	THD = 1%, $f = 400\text{ Hz}$, $R_L = 2\text{ k}\Omega$	0.0	3.0	-	dBs	
Maximum output noise level	V_{ONR}	$R_0 = 1\text{ k}\Omega$, JIS-A filter	-	-66	-60	dBs	
Total harmonic distortion	$THDR$	$V_I = -16\text{ dBs}$, $f = 400\text{ Hz}$, $R_L = 2\text{ k}\Omega$	-	0.2	0.5	%	
Output level	V_{OR}	$f = 400\text{ Hz}$, $R_L = 2\text{ k}\Omega$	$V_I = -16\text{ dBs}$	-17.0	-16.0	-15.0	dBs
			$V_I = -36\text{ dBs}$	-27.5	-26.0	-24.5	
			$V_I = -56\text{ dBs}$	-37.5	-36.0	-34.5	
		$f = 7\text{ kHz}$, $R_L = 2\text{ k}\Omega$	$V_I = -16\text{ dBs}$	-13.4	-11.9	-10.4	
			$V_I = -36\text{ dBs}$	-23.4	-21.9	-20.4	
			$V_I = -56\text{ dBs}$	-33.4	-31.9	-30.4	
Channel crosstalk rejection	CR	$V_I = -6\text{ dBs}$, $f = 1\text{ kHz}$	45	-	-	dB	

Note

JIS = Japanese Industrial Standard

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Playback mode

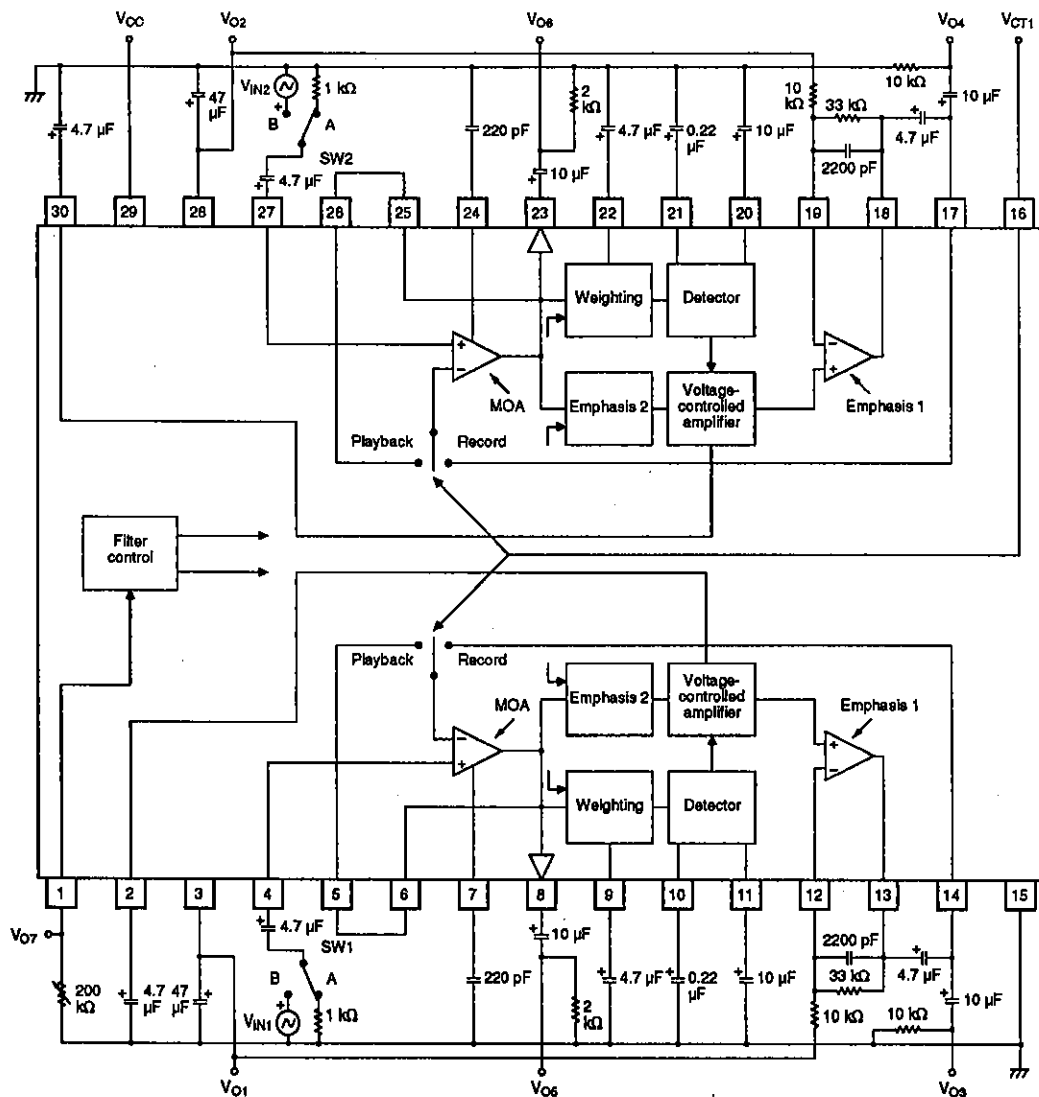
$V_{CC} = 4.75 \text{ V}$, $T_a = 25 \text{ }^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output level	V_{OP}	$V_I = -16 \text{ dBs}$, $f = 400 \text{ Hz}$, $R_L = 10 \text{ k}\Omega$	-18.0	-16.0	-14.0	dBs
Channel output level differential	V_{OCH}	$V_I = -16 \text{ dBs}$, $f = 400 \text{ Hz}$, $R_L = 10 \text{ k}\Omega$	-1	0	1	dB
Maximum output level	V_{OMP}	THD = 1%, $f = 400 \text{ Hz}$, $R_L = 10 \text{ k}\Omega$	0.0	3.0	-	dBs
Maximum output noise level	V_{ONP}	$R_g = 1 \text{ k}\Omega$, JIS-A filter	-	-103	-96	dBs
Total harmonic distortion	THD _P	$V_I = -16 \text{ dBs}$, $f = 400 \text{ Hz}$, $R_L = 10 \text{ k}\Omega$	-	0.1	0.5	%

Note

JIS = Japanese Industrial Standard

Test Circuit



Test Condition Switch Positions

Parameter	Symbol	SW1	SW2	V _{CT1}	Input	Test point
Recording-mode quiescent current	I _{CCR}	A	A	GND	–	A
Playback-mode quiescent current	I _{CCP}	A	A	V _{CC}	–	A
Reference voltage	V _{REF}	A	A	GND	–	V _{O1}
		A	A	GND	–	V _{O2}
Recording-mode select voltage	V _R	B	A	–	V _{CT1} , V _{IN1}	V _{CT1} , V _{O1}
Playback-mode select voltage	V _P	B	A	–	V _{CT1} , V _{IN1}	V _{CT1} , V _{O1}

Recording mode

Parameter	Symbol	SW1	SW2	V _{CT1}	Input	Test point
Output level	V _{OR}	B	A	GND	V _{IN1}	V _{O5}
		A	B	GND	V _{IN2}	V _{O6}
Total harmonic distortion	THD _R	B	A	GND	V _{IN1}	V _{O5}
		A	B	GND	V _{IN2}	V _{O6}
Maximum input level	V _{IMR}	B	A	GND	V _{IN1}	V _{O5} , V _{IN1}
		A	B	GND	V _{IN2}	V _{O6} , V _{IN2}
Output noise level	V _{ONR}	A	A	GND	–	V _{O5}
		A	A	GND	–	V _{O6}
Channel crosstalk rejection	CR	A	B	GND	V _{IN2}	V _{O5}
		B	A	GND	V _{IN1}	V _{O6}

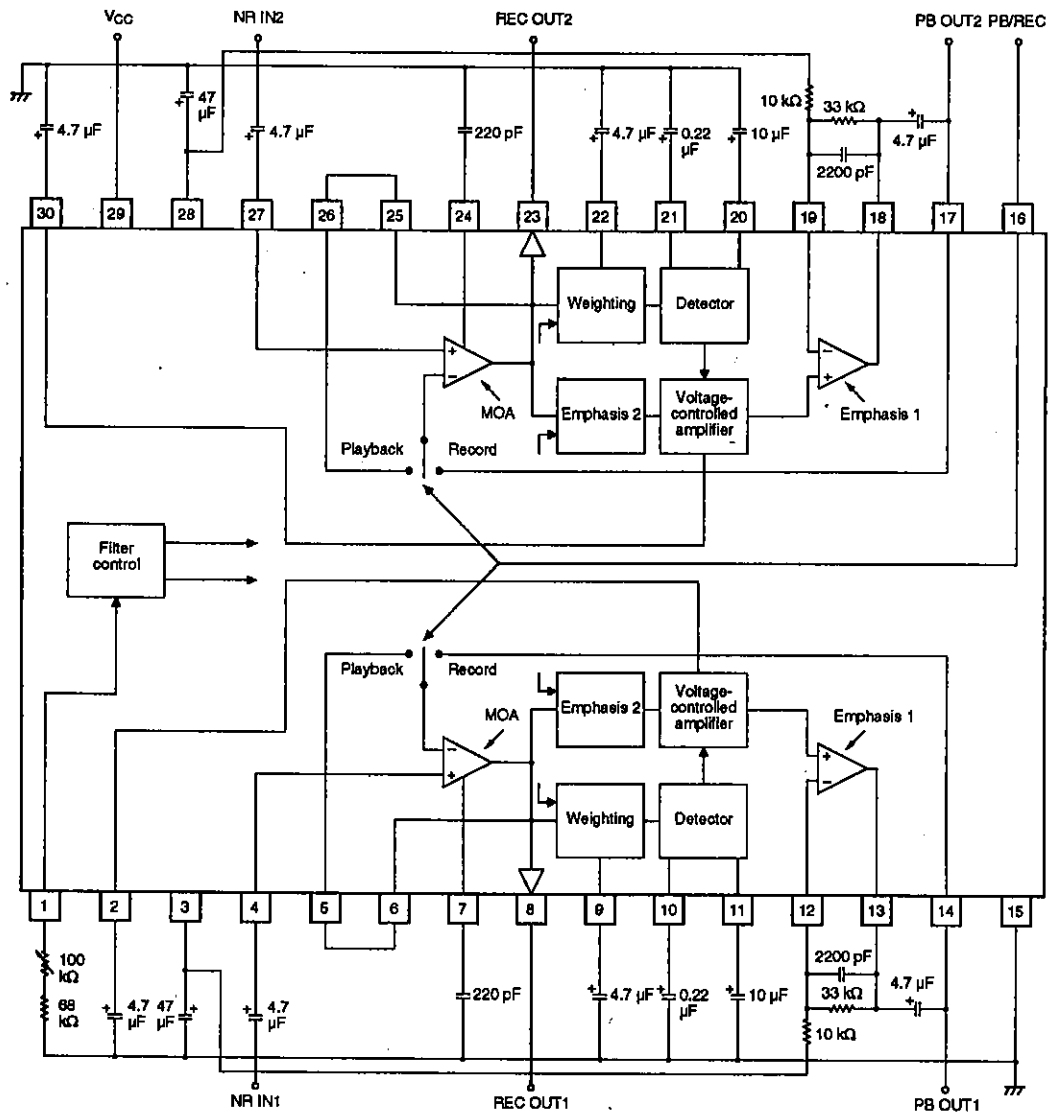
Playback mode

Parameter	Symbol	SW1	SW2	V _{CT1}	Input	Test point
Output level	V _{OP}	B	A	V _{CC}	V _{IN1}	V _{O3}
		A	B	V _{CC}	V _{IN2}	V _{O4}
Output level differential	V _{OCH}	B/A	A/B	V _{CC}	V _{IN1} /V _{IN2}	V _{O3} /V _{O4}
Total harmonic distortion	THD _P	B	A	V _{CC}	V _{IN1}	V _{O3}
		A	B	V _{CC}	V _{IN2}	V _{O4}
Maximum output level	V _{COMP}	B	A	V _{CC}	V _{IN1}	V _{O3}
		A	B	V _{CC}	V _{IN2}	V _{O4}
Output noise level	V _{ONP}	A	A	V _{CC}	–	V _{O3}
		A	A	V _{CC}	–	V _{O4}

Test Setup Procedure

1. Select playback mode.
2. Apply a 400 Hz, –16 dBs input signal, V_{IN1}, and measure the AC voltage across the 4.7 μF capacitor connected to VCA BIAS1, V₁.
3. Apply a 7 kHz, –16 dBs input signal, V_{IN1}, and measure the AC voltage, V₂, again as in step 2.
4. Adjust the volume control variable resistor so that V₁ – V₂ becomes –6.8 dB.

Typical Application



■ No products described or contained herein are intended for use in surgical implants, life-support systems, aerospace equipment, nuclear power control systems, vehicles, disaster/crime-prevention equipment and the like, the failure of which may directly or indirectly cause injury, death or property loss.

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