

Monolithic Linear IC

SANYO

No. 4896

LA7256**High-Fidelity Audio Signal Record/Playback Processing Circuit for VCR Products****Overview**

The LA7256 provides the record and playback amplification functions required for high-fidelity audio signal processing in VCR systems. The record system supports S-VHS and over-recording, and also supports the provision of an adjustment-free record current by using a constant-current regulated output scheme incorporating an AGC circuit. The playback system consists of a high-gain preamplifier with a small DC offset, and includes a built-in EP gain increasing function.

Functions

- Preamplifier (two channels)
- RF switching between CH1 and CH2
- Record AGC amplifier (for over-recording and S-VHS)
- Constant-current regulated output record amplifier
- Buffer amplifier that can be used in both record and playback

Features

- Minimal number of required external components
- The playback amplifier output DC offset is small.
- Built-in EP mode gain emphasis
- Record AGC that handles three modes (for an adjustment-free record current)
- Built-in buffer amplifier that can be used to construct an active filter.

Specifications**Maximum Ratings at Ta = 25°C**

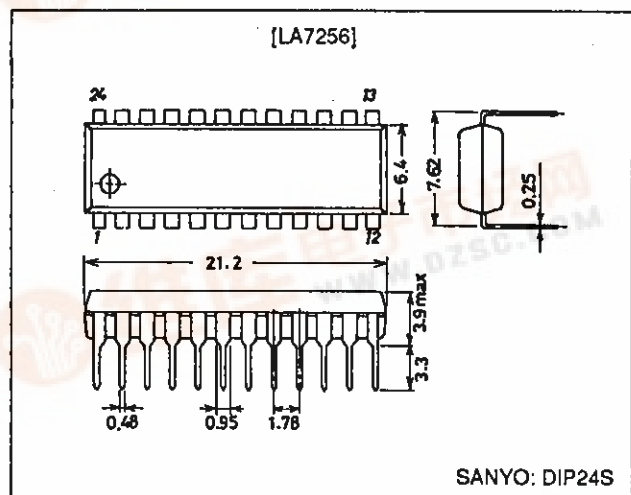
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \max}$		7.0	V
Allowable power dissipation	$P_d \max$	$T_a \leq 65^\circ\text{C}$	700	mW
Operating temperature	T_{opr}		-10 to +65	°C
Storage temperature	T_{stg}		-55 to +150	°C

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		5.0	V
Operating supply voltage range	$V_{CC \text{ op}}$		4.5 to 5.5	V

Package Dimensions

unit: mm

3067-DIP24S

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Operating Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{ V}$, in the specified test circuit

Parameter	Symbol	Conditions	min	typ	max	Unit
[Playback Mode]						
Circuit current	I_{CCP}	No input: the pin 14 influx current	13	18	23	mA
Voltage gain, CH1	G_{VP1}	Pin 20 input = 100 $\mu\text{Vp-p}$, $f = 1.5\text{ MHz}$, pin 1 = low: measure the pin 3 output.	72.5	75.5	78.5	dB
Voltage gain, CH2	G_{VP2}	Pin 17 input = 100 $\mu\text{Vp-p}$, $f = 1.5\text{ MHz}$, pin 1 = high: measure the pin 3 output.	72.5	75.5	78.5	dB
Voltage gain difference	ΔG_{VP}	$G_{VP1} - G_{VP2}$	-2	0	+2	dB
EP gain emphasis	ΔG_{EP}	Pin 20 input = 100 $\mu\text{Vp-p}$, $f = 1.5\text{ MHz}$, pin 1 = low: the ratio of the pin 3 outputs when pin 2 is high/low	1.7	2.4	3.1	dB
Frequency characteristics, CH1	f_{P1}	Pin 20 input = 100 $\mu\text{Vp-p}$, pin 1 = low: the difference in the levels on pin 3 when $f = 2.2\text{ MHz}$ and 1.0 MHz	-3.0	-1.0	0	dB
Frequency characteristics, CH2	f_{P2}	Pin 17 input = 100 $\mu\text{Vp-p}$, $f = 1.5\text{ MHz}$, pin 1 = high: the difference in the levels on pin 3 when $f = 2.2\text{ MHz}$ and 1.0 MHz	-3.0	-1.0	0	dB
Crosstalk CH1 to CH2	$CT_{1 \rightarrow 2}$	Pin 17 input = 0, pin 20 input = 100 $\mu\text{Vp-p}$, $f = 1.5\text{ MHz}$: the difference in the pin 3 output levels when pin 1 goes from low to high		-40	-35	dB
Crosstalk CH2 to CH1	$CT_{2 \rightarrow 1}$	Pin 20 input = 0, pin 17 output = 100 $\mu\text{Vp-p}$, $f = 1.5\text{ MHz}$: the difference in the pin 3 output levels when pin 1 goes from high to low		-40	-35	dB
Equivalent input noise voltage CH1	V_{NP1}	With pin 20 grounded through 0.01 μF and 1 Ω , pin 1 = low: the pin 3 noise in input equivalent*1		0.8	1.0	μVrms
Equivalent input noise voltage CH2	V_{NP2}	With pin 17 grounded through 0.01 μF and 1 Ω , pin 1 = high: the pin 3 noise in input equivalent*1		0.8	1.0	μVrms
Second harmonic distortion CH1	2THD_1	Pin 20 input = 100 $\mu\text{Vp-p}$, $f = 1.5\text{ MHz}$, pin 1 = low: the second harmonic in the pin 3 output		-50	-40	dB
Second harmonic distortion CH2	2THD_2	Pin 17 input = 100 $\mu\text{Vp-p}$, $f = 1.5\text{ MHz}$, pin 1 = high: the second harmonic in the pin 3 output		-50	-40	dB
Maximum output voltage CH1	V_{OMP1}	With the pin 20 input varying, $f = 1.5\text{ MHz}$, pin 1 = low: when the pin 3 third harmonic distortion is -30 dB	2.0			Vp-p
Maximum output voltage CH2	V_{OMP2}	With the pin 17 input varying, $f = 1.5\text{ MHz}$, pin 1 = high: when the pin 3 third harmonic distortion is -30 dB	2.0			Vp-p
Output DC offset 1	ΔV_{ODC1}	Pin 17 and 20 inputs = 0, pin 1 = low, pin 2 = low (SP): the difference in the pin 3 DC level when pin 1 goes from low to high	-30	0	+30	mV
Output DC offset 2	ΔV_{ODC2}	Pin 17 and 20 inputs = 0, pin 1 = low, pin 2 = high (EP): the difference in the pin 3 DC level when pin 1 goes from low to high	-50	0	+50	mV
Head switching: CH1 hold voltage	V_{HS1}	The pin 1 DC voltage required to operate CH1	0		1.0	V
Head switching: CH2 hold voltage	V_{HS2}	The pin 1 DC voltage required to operate CH2	3.0		V_{CC}	V
Playback mode switch on resistance	R_{SW}	Calculate from the voltage difference on pin 16 when the pin 16 influx current is 1 mA and 2 mA.		4.0	6.0	Ω
SP hold voltage	V_{2SP}	The pin 2 voltage required to hold SP mode	0		1.0	V
EP hold voltage	V_{2EP}	The pin 2 voltage required to hold EP mode	3.0		V_{CC}	V
PB hold voltage	V_{5L}	The pin 5 voltage required to hold PB mode	0		1.0	V
[Record Mode]						
Circuit current	I_{CCR}	No signal, the pin 14 influx current	45	63	81	mA
Output current	I_{OR}	Pin 9 input = 180 mVp-p, $f = 1.5\text{ MHz}$: measure the pin 16 output	48	53	58	mA _{p-p}
AGC control characteristics 1	ΔV_{AGC1}	Pin 9 input = 90 and 180 mVp-p, $f = 1.5\text{ MHz}$: the ratio of the pin 16 output levels	-0.5	-0.2		dB
AGC control characteristics 2	ΔV_{AGC2}	Pin 9 input = 360 and 180 mVp-p, $f = 1.5\text{ MHz}$: the ratio of the pin 16 output levels		0.2	0.5	dB
Cross modulation distortion 0.4 MHz component	CMD_{04}	For a pin 9 input*2, the 0.4 MHz spurious signal in the pin 16 output current			-40	dB
Cross modulation distortion 0.9 MHz component	CMD_{09}	For a pin 9 input*2, the 0.9 MHz spurious signal in the pin 16 output current			-40	dB

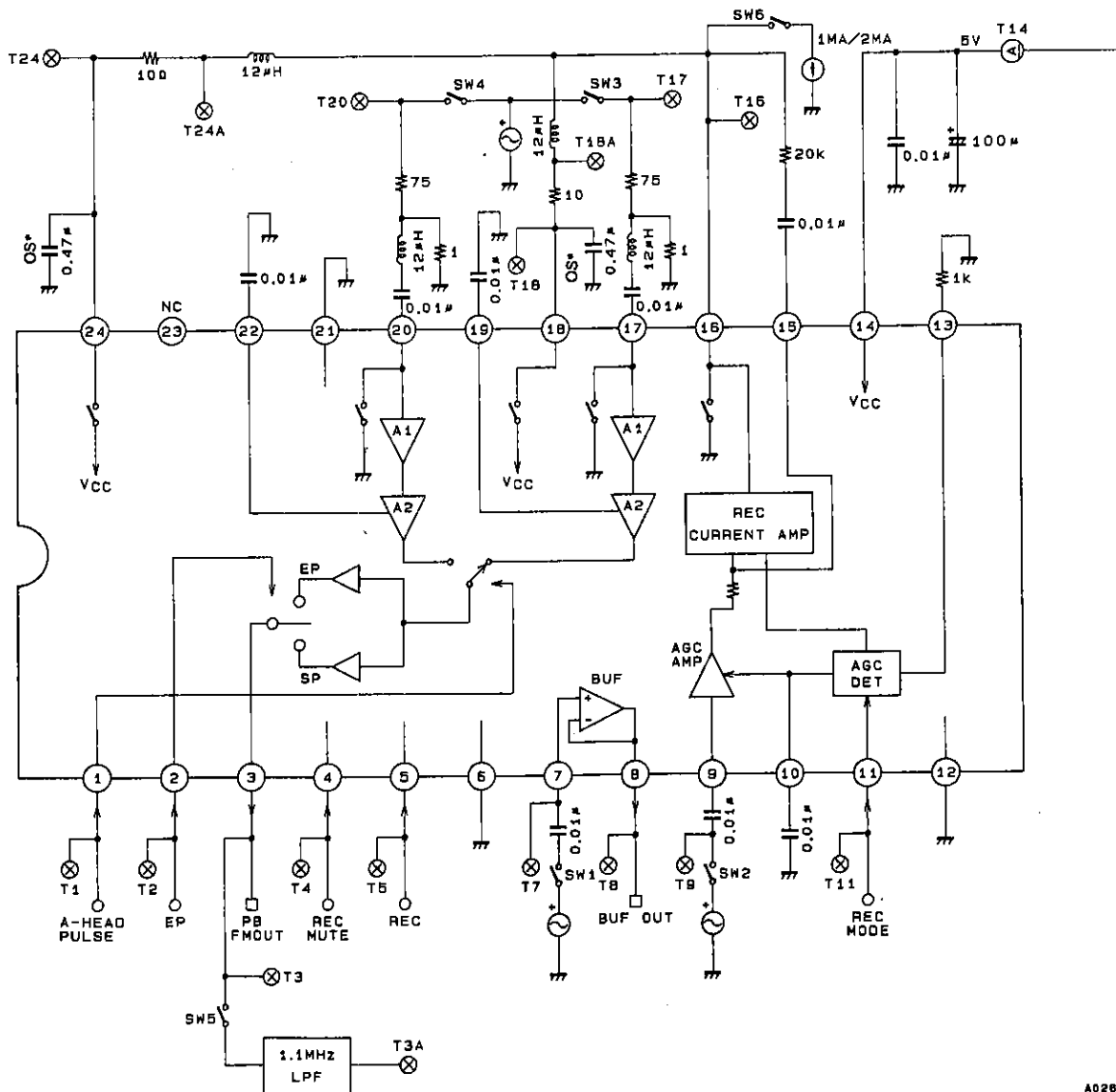
Note: 1. Measure the input noise voltage after passing the pin 3 output (playback FM output) through a 1.1 MHz low-pass filter.
 2. 1.3 MHz (70 mVp-p) + 1.7 MHz (180 mVp-p)

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Parameter	Symbol	Conditions	min	typ	max	Unit
Over-record hold voltage	V_{11M}	The pin 11 DC voltage for over-record mode	1.5		3.0	V
Over-record current ratio	I_{O-OV}	Pin 9 input = 180 mVp-p, $f = 1.5$ MHz, pin 11 = middle level: measure the pin 16 output current	1.7	2.2	2.7	dB
S-VHS hold voltage	V_{11H}	The pin 11 DC voltage for S-VHS mode	3.5		V_{CC}	V
S-VHS current ratio	I_{O-SV}	Pin 9 input = 180 mVp-p, $f = 1.5$ MHz, pin 11 = high: measure the pin 16 output current	-2.0	-2.6	-3.2	dB
Record mute hold voltage 1	V_{4L}	The pin 4 DC voltage when record muting is off	0		1.0	V
Record mute hold voltage 2	V_{4H}	The pin 4 DC voltage when record muting is on	3.0		V_{CC}	V
Mute attenuation	I_{OR}, M_U	Pin 9 input = 180 mVp-p, $f = 1.5$ MHz, pin 4 = high: measure the pin 16 output current			-40	dB
Record hold voltage	V_{5H}	The pin 5 voltage required to hold record mode	3.0		V_{CC}	V
[Built-in Buffer]						
Buffer I/O DC offset	ΔV_{BUF}		-10		+10	mV
Buffer frequency characteristics	f_{BUF}	Pin 9 input = 180 mVp-p, $f = 1/10$ MHz	-1		+1	dB

Test Circuit Diagram

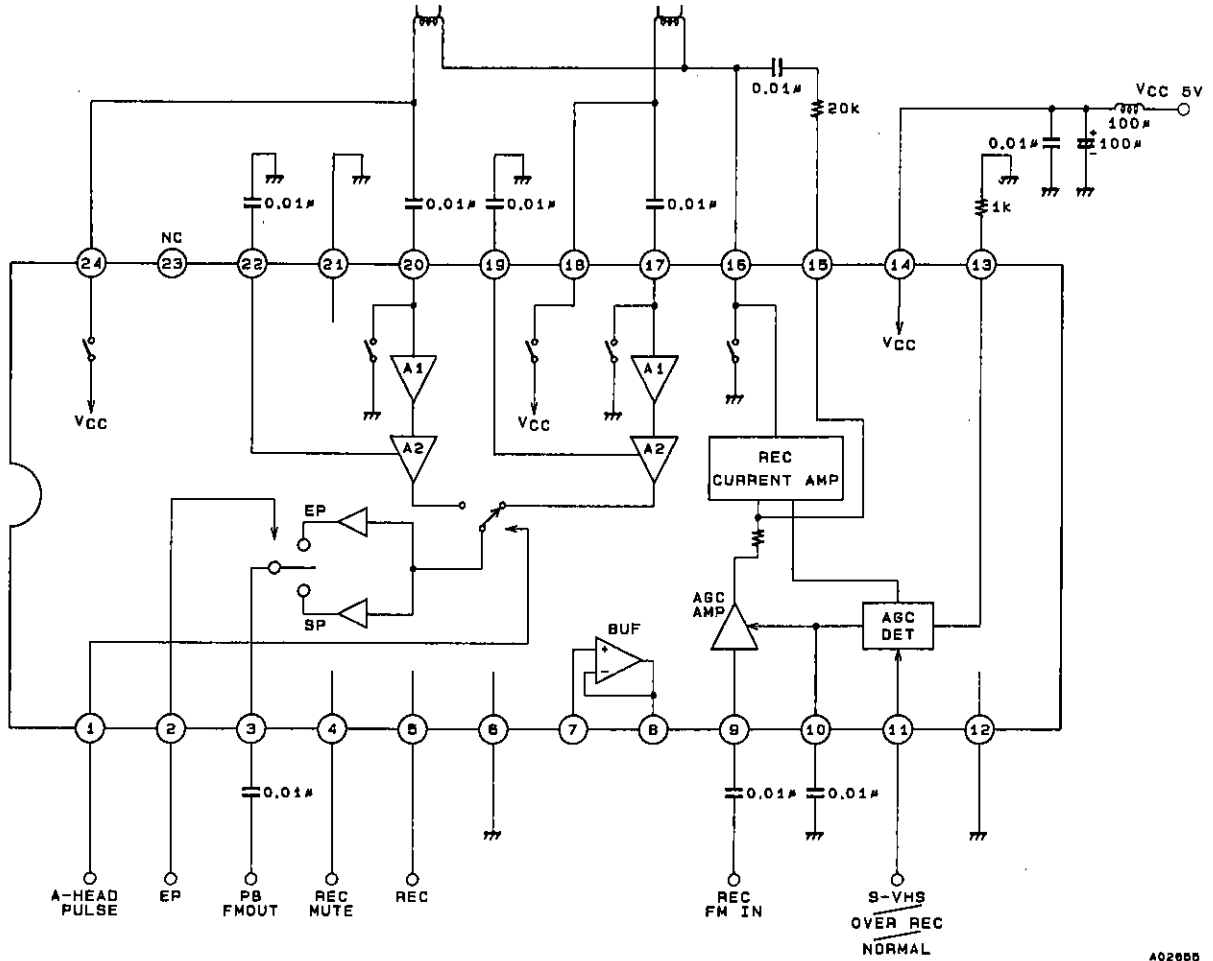


A02854

Unit (resistance: Ω , capacitance: F)
*: Organic Semiconductor

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Application Circuit Block Diagram



A02855

Unit (resistance: Ω, capacitance: F)

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Pin Functions

Pin No.	Symbol	Pin internal equivalent circuit	Function
1	A-HEAD PULSE	<p>A02656</p>	Low: 0 to 1.0 V → CH1 High: 3.0 to V _{CC} → CH2
2	ES/SP	<p>A02657</p>	Low: 0 to 1.0 V → SP High: 3.0 to V _{CC} → EP
3	PB-FM OUT	<p>A02658</p>	
4	REC MUTE	<p>A02659</p>	Low: 0 to 1.0 V → Mute off High: 3.0 to V _{CC} → Mute on
5	REC	<p>A02660</p>	Low: 0 to 1.0 V → PB High: 3.0 to V _{CC} → REC
6	GND		Ground for the playback output stage and record circuits

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Pin No.	Symbol	Pin internal equivalent circuit	Function
7	BUFF IN		
8	BUFF OUT		DC voltage = 1/2 V _{CC}
9	REC FM IN		Record amplifier input
10	AGC FILT		Detects the record amplifier AGC detector output
11	REC MODE		Low: 0 to 1.0 V → Normal Middle: 1.5 to 3.0 V → Over-record High: 3.5 V to V _{CC} → S-VHS
12	REC OUT GND		Ground for the record output circuits

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Pin No.	Symbol	Pin internal equivalent circuit	Function
13	REC-CURR-ADJ	<p>A02666</p>	Converts the record output current output to a voltage.
14	V _{CC}		
15	REC BIAS	<p>A02667</p>	Input block for the record current amplifier
16	REC OUT	<p>A02668</p>	Switch for record current output and playback mode on On in PB mode
17	CH2-IN	<p>A02669</p>	Playback amplifier CH2 input
18	PSW2	<p>A02670</p>	CH2 head current supply

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Pin No.	Symbol	Pin internal equivalent circuit	Function
19	FILT2	<p style="text-align: right;">A02671</p>	Generates the playback amplifier CH2 DC bias.
20	CH1-IN	<p style="text-align: right;">A02672</p>	Playback amplifier CH1 input
21	PB GND		Ground for the playback amplifier
22	FILT1	<p style="text-align: right;">A02673</p>	Generates the playback amplifier CH1 DC bias.
23	NC		
24	PSW1	<p style="text-align: right;">A02674</p>	Record amplifier CH2 head current supply

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