

**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 $T_a = 25^\circ\text{C}$

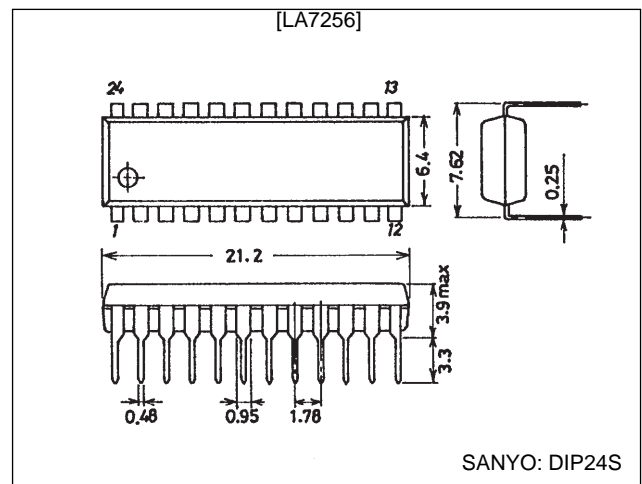
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$		7.0	V
Allowable power dissipation	$P_d \text{ max}$	$T_a \leq 65^\circ\text{C}$	700	mW
Operating temperature	$T_{opr}$		-10 to +65	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

#### Operating Conditions at $T_a = 25^\circ\text{C}$

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	$\Delta G_{VP}$	$G_{VP1} - G_{VP2}$	-2	0	2	dB
EP gain emphasis	$\Delta G_{EP}$	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 $1.0\text{ MHz}$	-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 $1.0\text{ MHz}$	-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 $0.01\ \mu\text{F}$ and $1\ \Omega$ , pin 1 = low: the pin 3 noise in input equivalent*1		0.8	1.0	$\mu\text{Vrms}$
Equivalent input noise voltage CH2	$V_{NP2}$	With pin 17 grounded through $0.01\ \mu\text{F}$ and $1\ \Omega$ , pin 1 = high: the pin 3 noise in input equivalent*1		0.8	1.0	$\mu\text{Vrms}$
Second harmonic distortion CH1	$2\text{THD}_1$	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	$2\text{THD}_2$	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	$\Delta V_{ODC1}$	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	$\Delta V_{ODC2}$	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	$\Omega$
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 <sub>p-p</sub>
AGC control characteristics 1	$\Delta V_{AGC1}$	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	$\Delta V_{AGC2}$	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	$\text{CMD}_{04}$	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	$\text{CMD}_{09}$	For a pin 9 input*2, the 0.9 MHz spurious signal in the pin 16 output current			-40	dB

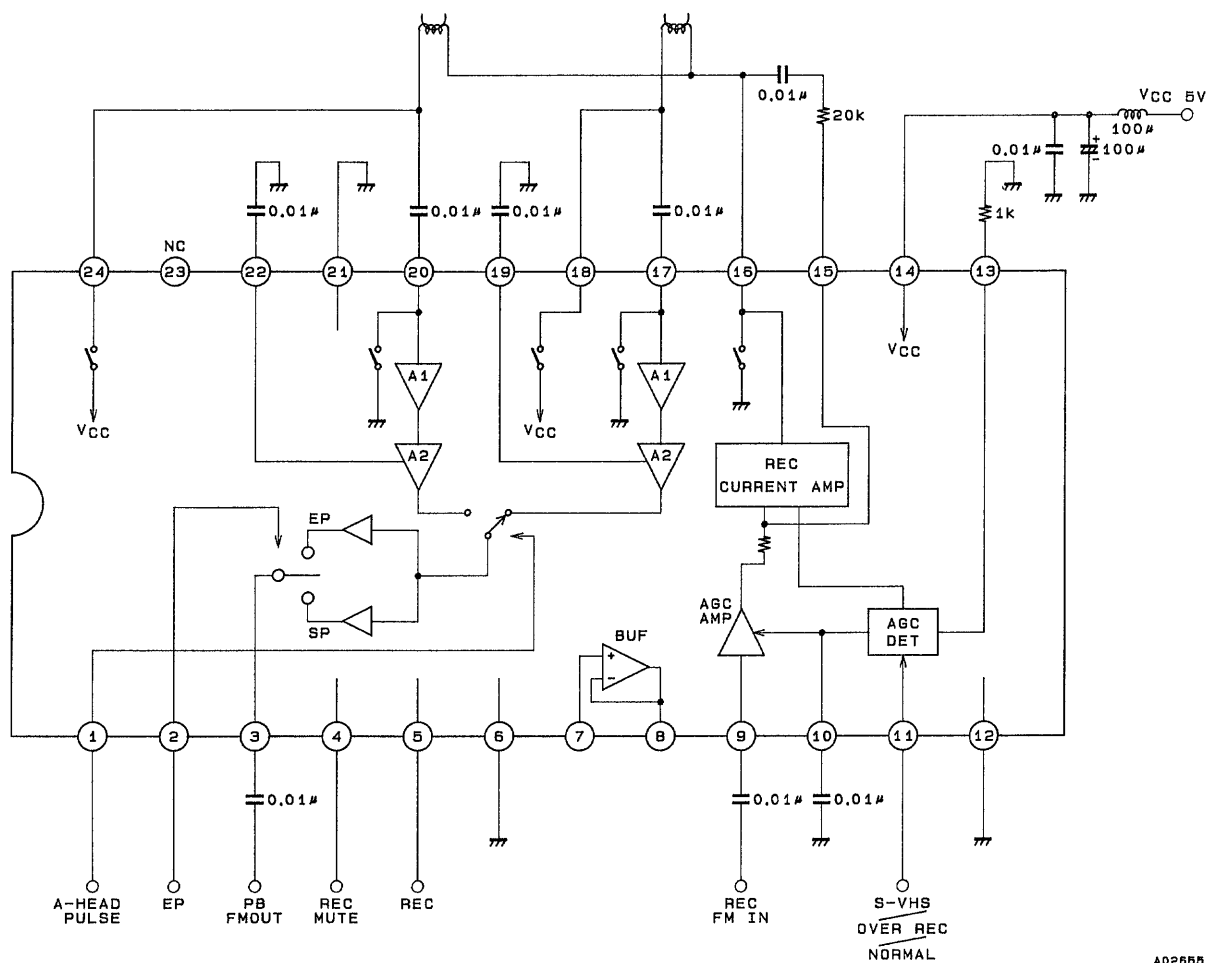
Note: 1. Measure the input noise voltage after passing the pin 3 output (playback FM output) through a 1.1 MHz low-pass filter.  
 2. 1.3 MHz (70 mVp-p) + 1.7 MHz (180 mVp-p)

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Application Circuit Block Diagram



A02655

Unit (resistance: Ω, capacitance: F)

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## Pin Functions

Pin No.	Symbol	Pin internal equivalent circuit	Function
1	A-HEAD PULSE	<p style="text-align: right;">A02656</p>	Low: 0 to 1.0 V → CH1 High: 3.0 to V <sub>CC</sub> → CH2
2	ES/SP	<p style="text-align: right;">A02657</p>	Low: 0 to 1.0 V → SP High: 3.0 to V <sub>CC</sub> → EP
3	PB-FM OUT	<p style="text-align: right;">A02658</p>	
4	REC MUTE	<p style="text-align: right;">A02659</p>	Low: 0 to 1.0 V → Mute off High: 3.0 to V <sub>CC</sub> → Mute on
5	REC	<p style="text-align: right;">A02660</p>	Low: 0 to 1.0 V → PB High: 3.0 to V <sub>CC</sub> → 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	<p style="text-align: right;">A02661</p>	
8	BUFF OUT	<p style="text-align: right;">A02662</p>	DC voltage = $1/2 V_{CC}$
9	REC FM IN	<p style="text-align: right;">A02663</p>	Record amplifier input
10	AGC FILT	<p style="text-align: right;">A02664</p>	Detects the record amplifier AGC detector output
11	REC MODE	<p style="text-align: right;">A02665</p>	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 style="text-align: right;">A02666</p>	Converts the record output current output to a voltage.
14	V <sub>CC</sub>		
15	REC BIAS	<p style="text-align: right;">A02667</p>	Input block for the record current amplifier
16	REC OUT	<p style="text-align: right;">A02668</p>	Switch for record current output and playback mode on On in PB mode
17	CH2-IN	<p style="text-align: right;">A02669</p>	Playback amplifier CH2 input
18	PSW2	<p style="text-align: right;">A02670</p>	CH2 head current supply

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Pin No.	Symbol	Pin internal equivalent circuit	Function
19	FILT2		Generates the playback amplifier CH2 DC bias.
20	CH1-IN		Playback amplifier CH1 input
21	PB GND		Ground for the playback amplifier
22	FILT1		Generates the playback amplifier CH1 DC bias.
23	NC		
24	PSW1		Record amplifier CH2 head current supply



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