



SANYO Semiconductors

DATA SHEET

LA7321/7321M — Monolithic Linear IC
VHS VTR Playback Head Amp, Recording Amp

Functions and Features

- (Functions) · 4-channel playback head amp
 · 2-channel recording amp
 · 13 head select switches (PB, REC)
 · 1 recording amp gain select switch
 · Envelope detector for special playback (for GT-4)
- (Features) · Designed for 4 heads (for GT-4)
 · On-chip head select switches, recording amp gain select switch, envelope detector for GT-4 making it possible to perform signal processing for the head section on a single chip.
 · Load variations cause less recording current variations because of recording amp of constant-current type.
 (Maximum recording current : 40mA_{p-p})

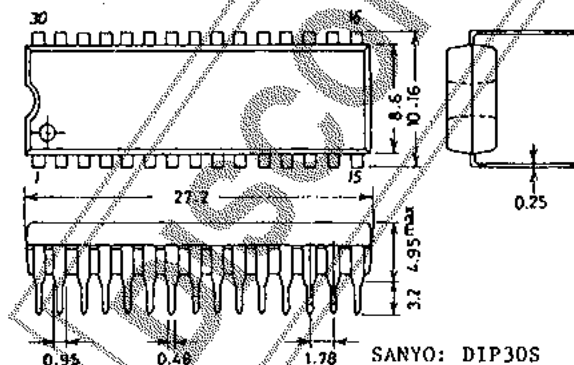
Maximum Ratings at Ta = 25°C

Parameter	Symbol	Value	unit
Maximum Supply Voltage	V _{CC max}	(PB)	7.0 V
		(REC)	14.0 V
Allowable Power Dissipation	Pd max	(65°C) LA7321	920 mW
		LA7321M	850 mW
Operating Temperature	T _{opg}	-10 to +65	°C
Storage Temperature	T _{stg}	-40 to +125	°C

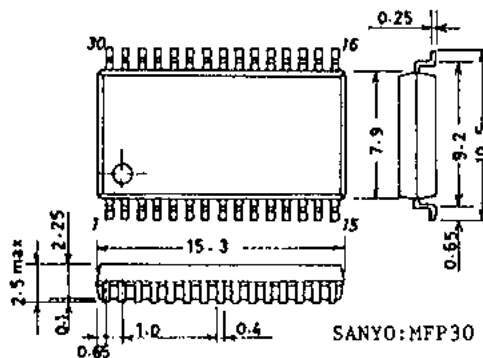
Operating Conditions at Ta = 25°C

Parameter	Symbol	Value	unit
Supply Voltage	V _{CC}	(PB)	5.0 V
		(REC)	12.0 V
Operating Voltage Range	V _{CC opg}	(PB)	4.75 to 5.5 V
		(REC)	10 to 13 V

Case Outline 3061-D30SIC [LA7321]
(unit : mm)



Case Outline 3073A-M301C [LA7321M]
(unit : mm)



The application circuit diagrams and circuit constants herein are included as an example and provide no guarantee for designing equipment to be mass-produced. The information herein is believed to be accurate and reliable. However, no responsibility is assumed by SANYO for its use; nor for any infringements of patents or other rights of third parties which may result from its use.

Specifications and information herein are subject to change without notice.

LA7321,7321M

Operating Characteristics at Ta = 25°C

Characteristic	Symbol	Test Conditions				SW				min	typ	max	unit
		Input	Output	1	2	3	4						
PB (Preamp Section)		T1		PB + 5V	SW 30	HA	EP /SP	Special MU					
Current Dissipation	I _{cep}			Pin 1 flow-in current	1	1	1	1	15	24	30	mA	
Voltage Gain	CH1	VG (1)	T28	T7	Vi : 38mVpp f : 1MHz	2	2	2	2	50.0	59.5	62.5	dB
	CH2	VG (2)	T27	T7		1	2	2	2				
	CH3	VG (3)	T23	T7		2	1	1	2				
	CH4	VG (4)	T21	T7		1	1	1	2				
Voltage Gain Difference 1	ΔVG (1)			VG (1) - VG (2)					-1.0	0	1.0	dB	
Voltage Gain Difference 2	ΔVG (2)			VG (3) - VG (4)					-1.0	0	1.0	dB	
Intermode Gain Difference	ΔVG SP-EP			VG (1) - VG (3)					-1.0	0	1.0	dB	
Equivalent Input Noise Voltage	CH1	V _{NIN} (1)		T7	* V _{out} VG(1),(2),(3),(4) after 1.1MHz L.P.F.	2	2	2	2	1.1	1.5	μV _{rms}	
	CH2	V _{NIN} (2)		T7		1	2	2	2				
	CH3	V _{NIN} (3)		T7		2	1	1	2				
	CH4	V _{NIN} (4)		T7		1	1	1	2				
Frequency Characteristic	CH1	ΔV _{fp} (1)	T28	T7	Vi : 38mVpp f : 100kHz, 7MHz 7MHz 100kHz output ratio	2	2	2	2	-2.5	0	dB	
	CH2	ΔV _{fp} (2)	T27	T7		1	2	2	2				
	CH3	ΔV _{fp} (3)	T23	T7		2	1	1	2				
	CH4	ΔV _{fp} (4)	T21	T7		1	1	1	2				
2nd Harmonic Distortion	CH1	V _{NIN} (1)	T28	T7	Vi : 38mVpp f : 4MHz 8M component 4M component output ratio	2	2	2	2	-40	-35	dB	
	CH2	V _{NIN} (2)	T27	T7		1	2	2	2				
	CH3	V _{NIN} (3)	T23	T7		2	1	1	2				
	CH4	V _{NIN} (4)	T21	T7		1	1	1	2				
Max. Output Level	CH1	V _{OMP} (1)	T28	T7	f : 1MHz Output level when 3rd distortion is -30dB.	2	2	2	2	0.8	1.0	V _{p-p}	
	CH2	V _{OMP} (2)	T27	T7		1	2	2	2				
	CH3	V _{OMP} (3)	T23	T7		2	1	1	2				
	CH4	V _{OMP} (4)	T21	T7		1	1	1	2				

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Characteristic		Symbol	Test Conditions		SW				min	typ	max	unit	
			Input	Output	1	2	3	4					
PB (Preamp Section)			T1		PB + 5V	SW 30	HA	EP /SP	Special MU				
Cross-talk 1 (SP)	CH1	$V_{CR1(1)}$	T27 T23 T21	T7	$V_i: 38mV_{pp}$ $f: 4MHz$ V_{out}	2	2	2	1				
	CH2	$V_{CR1(2)}$	T28 T23 T21	T7	$V_G(1),(2)$ output ratio	1	2	2	1	-40	-35	dB	
Cross-talk 2 (EP)	CH3	$V_{CR2(3)}$	T21 T28 T27	T7	$V_i: 38mV_{pp}$ $f: 4MHz$ V_{out}	2	1	1	1				
	CH4	$V_{CR2(4)}$	T23 T28 T27	T7	$V_G(3),(4)$ output ratio	1	1	1	1	-40	-35	dB	
Output DC Offset		ΔV_{ODC1}		Pin 7	CH1 - CH2	2→1	2		1				
		ΔV_{ODC2}		Pin 7	CH3 - CH4	2→1	1		1				
		ΔV_{ODC3}		Pin 7	CH1 - CH3	2	2→1		1				
		ΔV_{ODC4}		Pin 7	CH2 - CH4	1	2→1		1	-100	0	100	mV
		ΔV_{ODC5}		Pin 7	CH1 - CH4	2→1	2→1		1				
		ΔV_{ODC6}		Pin 7	CH2 - CH3	1→2	2→1		1				
PB (Envelope Detector)			T1		PB + 5V								
Detection Pin DC Offset		$\Delta V_{5,6}$		T5 T6	T5(DC) - T6(DC)				1	-50	0	50	mV
Detection Characteristic 1 (SP)		V_{5DC}	T28	T5	After setting T7 output to f: 4MHz, $V_i: 200mV_{pp}$, measure the difference between T5 output DC and T6 output DC at no input mode.	2	2		1	800	900	1000	mV
Detection Characteristic 2 (EP)		V_{6DC}	T23	T5	After setting T7 output to f: 4MHz, $V_i: 200mV_{pp}$, measure the difference between T5 output DC and T6 output DC at no input mode.	2	1		1	800	900	1000	mV
Comparator Output Waveform 1		V_{9DC1}	T28	T9	$V_i: 38mV_{pp}$ $f: 4MHz$, T9 output DC	2	2		1	0	0.1	0.2	V
Comparator Output Waveform 2		V_{9DC2}	T23	T9	$V_i: 38mV_{pp}$ $f: 4MHz$, T9 output DC	2	1		1	3.8	4.0	4.2	V
REC			T14		REC + 12V								
Current Dissipation		I_{CCR}	T14		Pin 14 flow-in current				2	38	51	64	mA

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Characteristic		Symbol	Test Conditions		SW				min	typ	max	unit	
			Input	Output	1	2	3	4					
REC			T14		REC+12V	SW 30	HA	EP /SP	Special MU				
Voltage Gain	EP C	VG(EC)	T10	T18	Vi: 300mVpp f: 1Mhz			1	2				
	EP Y	VG(EY)	T11	T18	Vi: 300mVpp f: 4Mhz			1	2				
	SP C	VG(SC)	T10	T16	Vi: 300mVpp f: 1Mhz			2	2	-8.0	-6.0	-4.0	dB
	SP Y	VG(SY)	T11	T16	Vi: 300mVpp f: 4Mhz			2	2				
Voltage Gain Difference 1		ΔVG (EP)			VG(EC) - VG(EY)					-1.0	0	1.0	dB
Voltage Gain Difference 2		ΔVG (SP)			VG(SC) - VG(SY)					-1.0	0	1.0	dB
Intermode Gain Difference		ΔVG EP-SP			VG(EC) - VG(SC)					-1.0	0	1.0	dB
Frequency Characteristic	EP C	ΔV_{R} (EC)	T10	T18	Vi: 300mVpp f: 1Mhz, 7Mhz 7M component 1M component output ratio			1	2				
	EP Y	ΔV_{R} (EY)	T11	T18				1	2				
	SP C	ΔV_{R} (SC)	T10	T16				2	2	-2.0	-0.5	-1.0	dB
	SP Y	ΔV_{R} (SY)	T11	T16				2	2				
2nd Harmonic Distortion	EP C	ΔV_{HDR} (EC)	T10	T18	Vout: 30mVpp (150mVpp) f: 4Mhz 8M component 4M component output ratio			1	2				
	EP Y	ΔV_{HDR} (EY)	T11	T18				1	2				
	SP C	ΔV_{HDR} (SC)	T10	T16				2	2	-45	-40		dB
	SP Y	ΔV_{HDR} (SY)	T11	T16				2	2				
Max. Output Level	EP C	V _{OMR} (EC)	T10	T18	f: 4Mhz Output level when 2nd harmonic distortion is -40dB.			1	2				
	EP Y	V _{OMR} (EY)	T11	T18				1	2	30	40		mV pp
	SP C	V _{OMR} (SC)	T10	T16				2	2				
	SP Y	V _{OMR} (SY)	T11	T16				2	2				
Muting Attenuation	EP C	V _{MR} (EC)	T10	T18	Vi: 300mVpp f: 1M(C), 4M(Y) Vout VG(EC),(EY) (SC),(SY) output ratio			1	1				
	EP Y	V _{MR} (EY)	T11	T18				1	1				
	SP C	V _{MR} (SC)	T10	T16				2	1	-50	-45		dB
	SP Y	V _{MR} (SY)	T11	T16				2	1				

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Characteristic		Symbol	Test Conditions		SW				min	typ	max	unit		
			Input	Output	1	2	3	4						
REC			T14		REC+12V	SW 30	HA	EP /SP	Special MU					
Cross Modulation Relative Level	SP C	V _{CY} (EP)	T10 T11	T18	Input T10, V _{out} = 40mV _{pp} , f = 629kHz Input T11, V _{out} = 150mV _{pp} , f = 4MHz 4M ± 629kHz output ratio			1	2					
	SP Y	V _{CY} (SP)	T10 T11	T16				2	2		45	-40	dB	
Switch Tr ON Resistance														
ON Resistance of SW Tr Turned ON at PB	SP	R _{PON 30}		T30	PB mode Difference between DC voltage at 1mA flow-in and DC voltage at 2mA flow-in ×1						5	8	Ω	
	EP	R _{PON 19}		T19										
ON Resistance of Mode Select SW Tr at PB	CH1	R _{PON 28}		T28	PB mode Difference between DC voltage at 1mA flow-in and DC voltage at 2mA flow-in ×1			1	2					
	CH2	R _{PON 27}		T27				1	2					
	CH3	R _{PON 23}		T23				2	2		9	12	Ω	
	CH4	R _{PON 21}		T21				2	2					
ON Resistance of SW Tr Turned ON at REC	SP	R _{PON 30}		T30	REC mode Difference between DC voltage at 1mA flow-in and DC voltage at 2mA flow-in			1			6	10	Ω	
	EP	R _{PON 19}		T19				2						
Leak Current of Mode Select SW Tr at REC	SP	I _{L 30}		T30	REC mode Flow-in current when ±5V is applied			2			-4	0	4	μA
	EP	I _{L 19}		T19				1						
ON Resistance of SW Tr Turned ON at REC	CH1	R _{PON 28}		T28	REC mode Difference between DC voltage at 1mA flow-in and DC voltage at 2mA flow-in ×1						6	10	Ω	
	CH2	R _{PON 27}		T27										
	CH3	R _{PON 23}		T23										
	CH4	R _{PON 21}		T21										
ON Resistance of Gain Select SW Tr at REC (SP)		R _{SP}		T19	REC mode Difference between DC voltage at 1mA flow-in and DC voltage at 2mA flow-in ×1			2			7	10	Ω	

Note) *1 Let the ON resistance to be obtained be x (Ω),
 2 x (mV) at 2mA flow-in
 1 x (mV) at 1mA flow-in
 Therefore, difference 2 x - 1 x = x is the ON resistance.

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Characteristic	Symbol	Test Conditions		SW				min	typ	max	unit	
		Input	Output	1	2	3	4					
Control Pin Threshold Level at PB						SW 30	HA	EP /SP	Special MU			
SW 30 Threshold Level	SW 30 (1)	T28 T27	T2	CH1 → CH2 changeover voltage	※	2	2	2	2.5	5.0	V	
	SW 30 (2)	T28 T27	T2	CH2 → CH1 changeover voltage					0	1.5		
HA Threshold Level	HA (1)	T28 T27	T3	CH1 → CH2 changeover voltage	2	※		1	2.5	5.0	V	
	HA (2)	T28 T27	T3	CH1 → CH3 changeover voltage					0	1.5		
EP/SP Threshold Level	P _{MODE} (1)	T28	T4	T4 DC voltage when T7 output waveform disappears	2	2	※	2	2.5	5.0	V	
	P _{MODE} (2)	T28	T4	T4 DC voltage when T7 output waveform appears					0	1.5		
Special PB "H" Threshold Level	Special (1)	T28 T27	T13	T13 DC voltage when T7 output waveform appears	2	2	1	※	3.0	5.0	V	
	Special (2)	T28 T27	T13	T13 DC voltage when T7 output waveform disappears					0	1.5		
Control Pin Threshold Level at REC												
EP/SP Threshold Level	P _{MODE} (1)	T10	T4	T4 DC voltage when output changes from T16 to T18			※	2	2.5	5.0	V	
	P _{MODE} (2)	T10	T4	T4 DC voltage when output changes from T18 to T16					0	1.5		
Threshold Level at REC MUTE	MUTE (1)	T10	T13	T13 DC voltage when T18 output waveform disappears			1	※	3.0	5.0	V	
	MUTE (2)	T10	T13	T13 DC voltage when T18 output waveform appears					0	1.5		

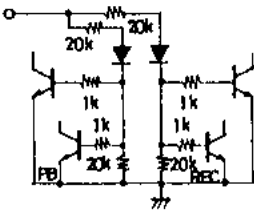
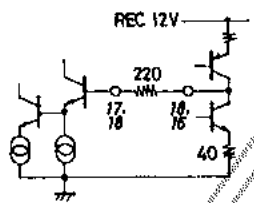
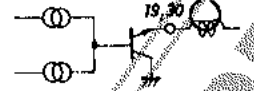
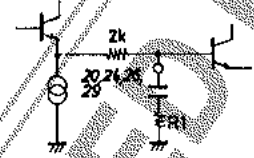

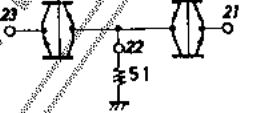
LA7321,7321M

LA7321,7321M Pin Description

Pin No.	Function	Standard DC Voltage	Input/Output Configuration	Remarks
1	PB + 5V			24mA typ.
2	SW30 control pin			L : 0 to 1.5V H : 2.5 to 5.0V
3	H · A control pin			L : 0 to 1.5V H : 2.5 to 5.0V
4	control pin			L : 0 to 1.5V H : 2.5 to 5.0V
5 · 6	Envelope detection pin	2.4 (V)		
7	Preamp output	2.3 (V)		· Connect R = 2kΩ externally when the output line is routed around.
8	GND			
9	(PB) Comparator output (REC) SW pin for gain change			※ SW Tr ON resistance 7 to 10Ω ※ For gain change, refer to pin 12.
10 · 11	REC amp input chroma. Y	6.7 (V)		Rin = 10kΩ
12	REC Y/CMIX amp feedback pin	5.9 (V)		※ The gain depends on R1. R1 : 180 = 10.5dB ※ R2 can be used to change the gain. R2 : 500 = +2.0 : 200 = +3.7dB (R : 1.2kΩ)

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Pin No.	Function	Standard DC Voltage	Input/Output Configuration	Remarks
13	(PB) Special PB control pin (REC) REC MUTE control pin			L : 0 to 1.5V H : 3.0 to 5.0V
14	REC +12V			
15 16 17 18	REC Amp output Amp feedback pin	5.9 (V)		· Maximum REC current 40mApp
19 30	PB ON SW Tr REC mode select SW Tr			On resistance 6 to 10Ω
20 24 26 29	Preamp bypass capacitor pin	1.9 (V)		· The gain depends on R1. R1 : 0 = 0dB : 820 = -3dB : 1.2k = -4dB
21 23 27 28	Preamp input	0.7 (V)		· Rin ≅ 400Ω · Cin ≅ 40 to 50p
22	REC circuit check pin			ON resistance 6 to 10Ω
25	Pre GND			

DISCONTINUED PRODUCT