

SANYO	No.2899	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_{pp})

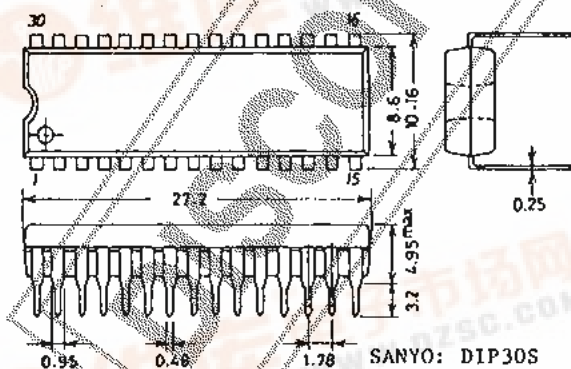
Maximum Ratings at Ta = 25°C

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

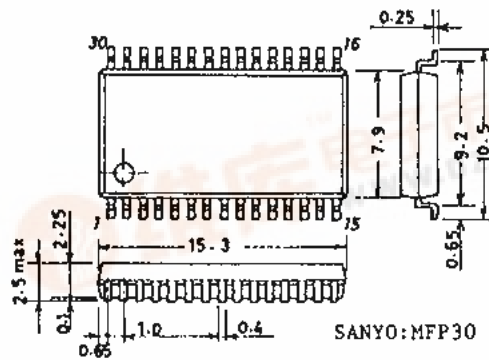
Operating Conditions at Ta = 25°C

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



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 _{ccp}		Pin 1 flow-in current	1	1	1	1	18	24	30	mA	
Voltage Gain	CH1	VG (1)	T28	T7	Vi: 38mVpp f: 1MHz	2	2	2	2	56.5	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	* $\frac{V_{out}}{VG(1),(2),(3),(4)}$ 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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LA7321,7321M

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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 : 38mVpp f: 4MHz Vout	2	2	2	1		-40	-35	dB
	CH2	V_{CH1} (2)	T28 T23 T21	T7	VG (1),(2) output ratio	1	2	2	1				
Cross-talk 2 (EP)	CH3	V_{CR2} (3)	T21 T28 T27	T7	V_i : 38mVpp f: 4MHz Vout	2	1	1	1		-40	-35	dB
	CH4	V_{CR2} (4)	T23 T28 T27	T7	VG (3),(4) output ratio	1	1	1	1				
Output DC Offset		ΔV_{ODC1}		Pin 7	CH1 - CH2	2→1	2		1	-100	0	100	mV
		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				
		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 : 200mVpp, 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	T6	After setting T7 output to f: 4MHz, V_i : 200mVpp, 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 : 38mVpp f: 4MHz, T9 output DC	2	2		1	0	0.1	0.2	V
Comparator Output Waveform 2		V_{9DC2}	T23	T9	V_i : 38mVpp 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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LA7321,7321M

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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: 1M1Hz			1	2				
	EP Y	VG(EY)	T11	T18	Vi: 300mVpp f: 4M1Hz			1	2				
	SP C	VG(SC)	T10	T16	Vi: 300mVpp f: 1M1Hz			2	2	-4.0	-6.0	-4.0	dB
	SP Y	VG(SY)	T11	T16	Vi: 300mVpp f: 4M1Hz			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: 1M1Hz, 7M1Hz 7M component			1	2	-2.0	-0.5	-1.0	dB
	EP Y	ΔV_{R} (EY)	T11	T18	1M component			1	2				
	SP C	ΔV_{R} (SC)	T10	T16	output ratio			2	2				
	SP Y	ΔV_{R} (SY)	T11	T16				2	2				
2nd Harmonic Distortion	EP C	ΔV_{HDR} (EC)	T10	T18	Vout: 30mApp (150mVpp)			1	2	-45	-40	dB	
	EP Y	ΔV_{HDR} (EY)	T11	T18	f: 4M1Hz 8M component			1	2				
	SP C	ΔV_{HDR} (SC)	T10	T16	4M component			2	2				
	SP Y	ΔV_{HDR} (SY)	T11	T16	output ratio			2	2				
Max. Output Level	EP C	V_{OMR} (EC)	T10	T18	f: 4M1Hz Output level when 2nd harmonic distortion is -40dB.			1	2	30	40	mV pp	
	EP Y	V_{OMR} (EY)	T11	T18				1	2				
	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)			1	1	-50	-45	dB	
	EP Y	V_{MR} (EY)	T11	T18	$\frac{V_{out}}{VG(EC),(EY)}$			1	1				
	SP C	V_{MR} (SC)	T10	T16	(SC),(SY)			2	1				
	SP Y	V_{MR} (SY)	T11	T16	output ratio			2	1				

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LA7321,7321M

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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			1	2				
	SP Y	V _{cy} (SP)	T10 T11	T16	$4M \pm 629kHz$ 4MHz output ratio			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		9	12	Ω
	CH3	R _{PON 23}		T23				2	2				
	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}		T9	REC mode Difference between DC voltage at 1mA flow-in and DC voltage at 2mA flow-in *1			2			7	10	Ω

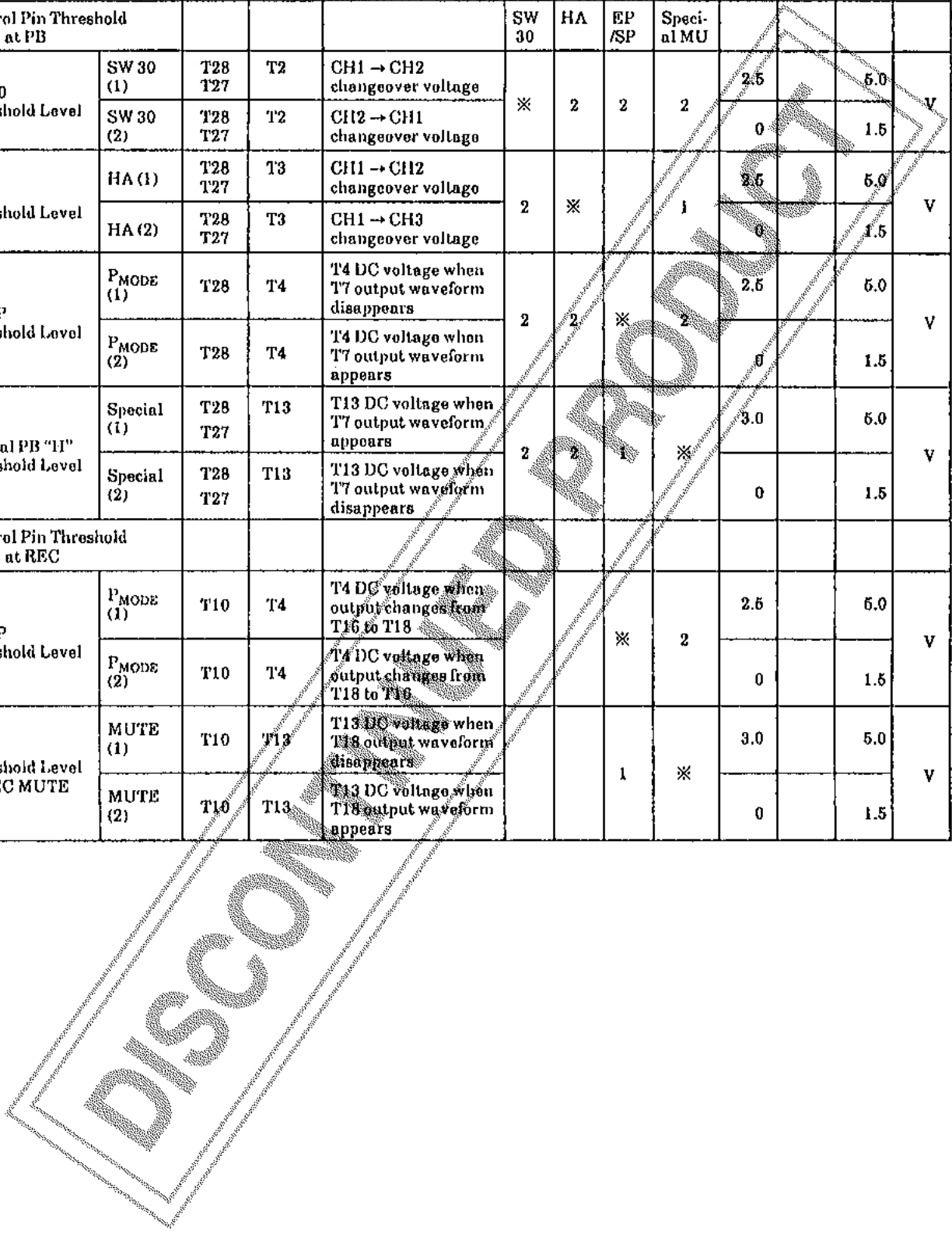
Note) *1 Let the ON resistance to be obtained be x (Ω),
 2 x (mV) at 2mA flow-in
 1 x (mV) at 1mA flow-in
 Therefore, difference 2 x - 1 x = x is the ON resistance.

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LA7321,7321M

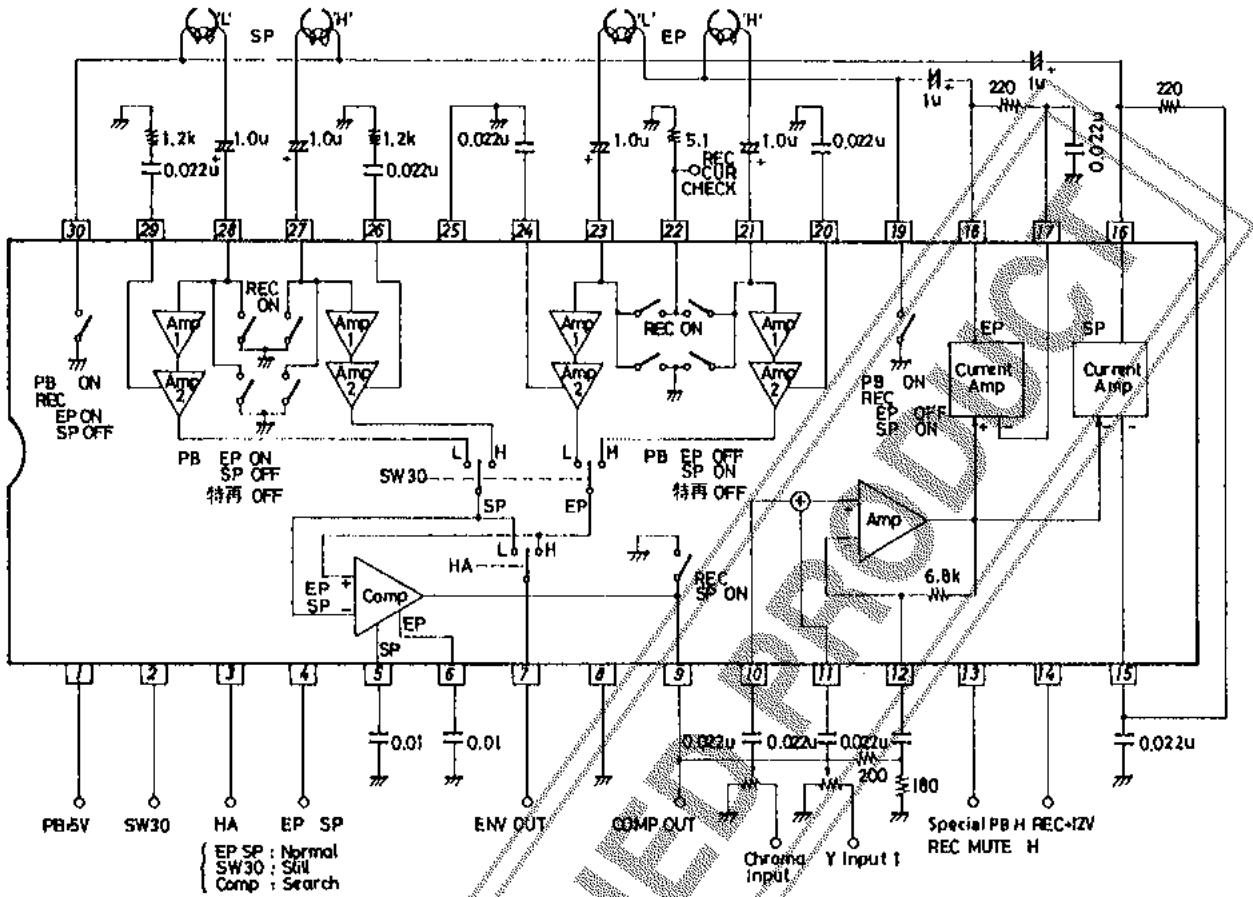
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Characteristic	Symbol	Test Conditions		SW				min	typ	max	unit
		Input	Output	1	2	3	4				
Control Pin Threshold Level at PB					SW 30	HA	EP /SP	Special MU			
SW 30 Threshold Level	SW 30 (1)	T28 T27	T2	CH1 → CH2 changeover voltage	*	2	2	2	2.5	5.0	V
	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	

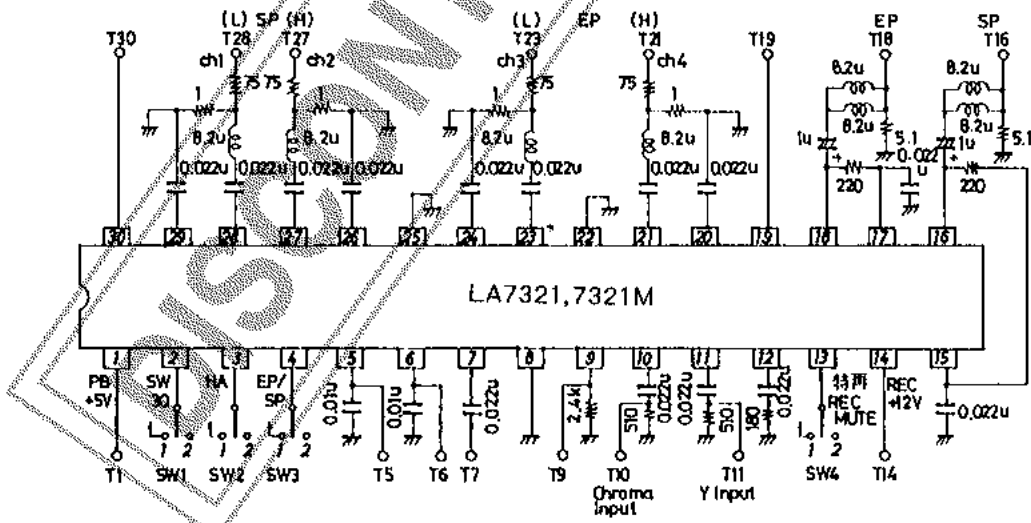


LA7321,7321M

LA7321,7321M Block Diagram



LA7321,7321M Test Circuit



LA7321,7321M

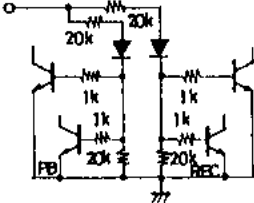
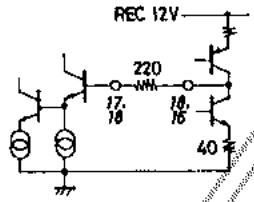



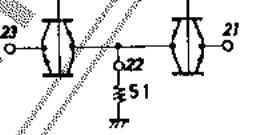
LA7321,7321M Pin Description

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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LA7321,7321M

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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	REC	5.9 (V)		· Maximum REC current 40mA _{pp}
16	Amp output			
17	Amp feedback pin			
18				
19	PB ON SW Tr			On resistance 6 to 10Ω
30	REC mode select SW Tr			
20	Preamp bypass capacitor pin	1.9 (V)		· The gain depends on R1. R1 : 0 = 0dB : 820 = -3dB : 1.2k = -4dB
24				
26				
29				
21	Preamp input	0.7 (V)		· Rin ≅ 400Ω · Cin ≅ 40 to 50p
23				
27				
28				
22	REC circuit check pin			ON resistance 6 to 10Ω
25	Pre GND			

DISCONTINUED PRODUCT