

**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<sub>pp</sub>)

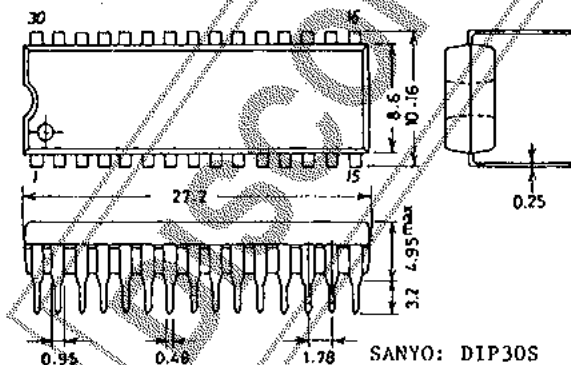
**Maximum Ratings at Ta = 25°C**

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

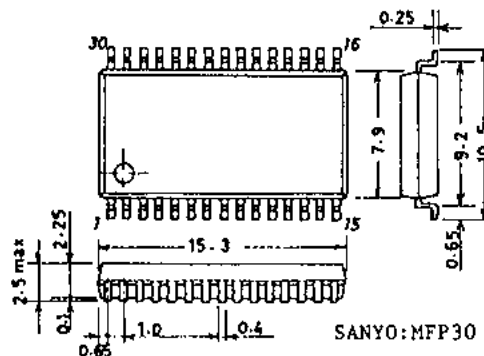
**Operating Conditions at Ta = 25°C**

Parameter	Symbol	Value	Unit
Supply Voltage	V <sub>CC</sub>	(PB) 5.0 (REC) 12.0	V
Operating Voltage Range	V <sub>CC</sub> opg	(PB) 4.75 to 5.5 (REC) 10 to 13	V

Case Outline 3061-D30S1C [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.

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N078TA, TS No.2899-1/9

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 <sub>cep</sub>			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 <sub>NIN</sub> (1)		T7	* V <sub>out</sub> VG(1),(2),(3),(4) after 1.1MHz L.P.F.	2	2	2	2	1.1	1.5	μV <sub>rms</sub>	
	CH2	V <sub>NIN</sub> (2)		T7		1	2	2	2				
	CH3	V <sub>NIN</sub> (3)		T7		2	1	1	2				
	CH4	V <sub>NIN</sub> (4)		T7		1	1	1	2				
Frequency Characteristic	CH1	ΔV <sub>fp</sub> (1)	T28	T7	Vi : 38mVpp f : 100kHz, 7MHz 7MHz 100kHz output ratio	2	2	2	2	-2.5	0	dB	
	CH2	ΔV <sub>fp</sub> (2)	T27	T7		1	2	2	2				
	CH3	ΔV <sub>fp</sub> (3)	T23	T7		2	1	1	2				
	CH4	ΔV <sub>fp</sub> (4)	T21	T7		1	1	1	2				
2nd Harmonic Distortion	CH1	V <sub>NIN</sub> (1)	T28	T7	Vi : 38mVpp f : 4MHz 8M component 4M component output ratio	2	2	2	2	-40	-35	dB	
	CH2	V <sub>NIN</sub> (2)	T27	T7		1	2	2	2				
	CH3	V <sub>NIN</sub> (3)	T23	T7		2	1	1	2				
	CH4	V <sub>NIN</sub> (4)	T21	T7		1	1	1	2				
Max. Output Level	CH1	V <sub>OMP</sub> (1)	T28	T7	f : 1MHz Output level when 3rd distortion is -30dB.	2	2	2	2	0.8	1.0	V <sub>p-p</sub>	
	CH2	V <sub>OMP</sub> (2)	T27	T7		1	2	2	2				
	CH3	V <sub>OMP</sub> (3)	T23	T7		2	1	1	2				
	CH4	V <sub>OMP</sub> (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		$\Delta V_{ODC1}$		Pin 7	CH1 - CH2	2→1	2		1				
		$\Delta V_{ODC2}$		Pin 7	CH3 - CH4	2→1	1		1				
		$\Delta V_{ODC3}$		Pin 7	CH1 - CH3	2	2→1		1				
		$\Delta V_{ODC4}$		Pin 7	CH2 - CH4	1	2→1		1	-100	0	100	mV
		$\Delta V_{ODC5}$		Pin 7	CH1 - CH4	2→1	2→1		1				
		$\Delta V_{ODC6}$		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		$\Delta VG$ (EP)			VG(EC) - VG(EY)					-1.0	0	1.0	dB
Voltage Gain Difference 2		$\Delta VG$ (SP)			VG(SC) - VG(SY)					-1.0	0	1.0	dB
Intermode Gain Difference		$\Delta VG$ EP-SP			VG(EC) - VG(SC)					-1.0	0	1.0	dB
Frequency Characteristic	EP C	$\Delta V_{R}$ (EC)	T10	T18	Vi: 300mVpp f: 1Mhz, 7Mhz 7M component 1M component output ratio			1	2	-2.0	-0.5	-1.0	dB
	EP Y	$\Delta V_{R}$ (EY)	T11	T18				1	2				
	SP C	$\Delta V_{R}$ (SC)	T10	T16				2	2				
	SP Y	$\Delta V_{R}$ (SY)	T11	T16				2	2				
2nd Harmonic Distortion	EP C	$\Delta V_{HDR}$ (EC)	T10	T18	Vout: 30mApp (150mVpp) f: 4Mhz 8M component 4M component output ratio			1	2	-45	-40	dB	
	EP Y	$\Delta V_{HDR}$ (EY)	T11	T18				1	2				
	SP C	$\Delta V_{HDR}$ (SC)	T10	T16				2	2				
	SP Y	$\Delta V_{HDR}$ (SY)	T11	T16				2	2				
Max. Output Level	EP C	V <sub>OMR</sub> (EC)	T10	T18	f: 4Mhz Output level when 2nd harmonic distortion is -40dB.			1	2	30	40	mV pp	
	EP Y	V <sub>OMR</sub> (EY)	T11	T18				1	2				
	SP C	V <sub>OMR</sub> (SC)	T10	T16				2	2				
	SP Y	V <sub>OMR</sub> (SY)	T11	T16				2	2				
Muting Attenuation	EP C	V <sub>MR</sub> (EC)	T10	T18	Vi: 300mVpp f: 1M(C), 4M(Y) Vout VG(EC), (EY) (SC), (SY) output ratio			1	1	-50	-45	dB	
	EP Y	V <sub>MR</sub> (EY)	T11	T18				1	1				
	SP C	V <sub>MR</sub> (SC)	T10	T16				2	1				
	SP Y	V <sub>MR</sub> (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 <sub>CY</sub> (EP)	T10 T11	T18	Input T10, V <sub>out</sub> = 40mV <sub>pp</sub> , f = 629kHz Input T11, V <sub>out</sub> = 150mV <sub>pp</sub> , f = 4MHz 4M ± 629kHz output ratio			1	2			
	SP Y	V <sub>CY</sub> (SP)	T10 T11	T16				2	2			45
Switch Tr ON Resistance												
ON Resistance of SW Tr Turned ON at PB	SP	R <sub>PON 30</sub>		T30	PB mode Difference between DC voltage at 1mA flow-in and DC voltage at 2mA flow-in ×1						5	8 Ω
	EP	R <sub>PON 19</sub>		T19								
ON Resistance of Mode Select SW Tr at PB	CH1	R <sub>PON 28</sub>		T28	PB mode Difference between DC voltage at 1mA flow-in and DC voltage at 2mA flow-in ×1			1	2			
	CH2	R <sub>PON 27</sub>		T27				1	2			
	CH3	R <sub>PON 23</sub>		T23				2	2		9	12 Ω
	CH4	R <sub>PON 21</sub>		T21				2	2			
ON Resistance of SW Tr Turned ON at REC	SP	R <sub>PON 30</sub>		T30	REC mode Difference between DC voltage at 1mA flow-in and DC voltage at 2mA flow-in			1			6	10 Ω
	EP	R <sub>PON 19</sub>		T19				2				
Leak Current of Mode Select SW Tr at REC	SP	I <sub>L 30</sub>		T30	REC mode Flow-in current when ±5V is applied			2			-4	0 4 μA
	EP	I <sub>L 19</sub>		T19				1				
ON Resistance of SW Tr Turned ON at REC	CH1	R <sub>PON 28</sub>		T28	REC mode Difference between DC voltage at 1mA flow-in and DC voltage at 2mA flow-in ×1						6	10 Ω
	CH2	R <sub>PON 27</sub>		T27								
	CH3	R <sub>PON 23</sub>		T23								
	CH4	R <sub>PON 21</sub>		T21								
ON Resistance of Gain Select SW Tr at REC (SP)		R <sub>SP</sub>		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.

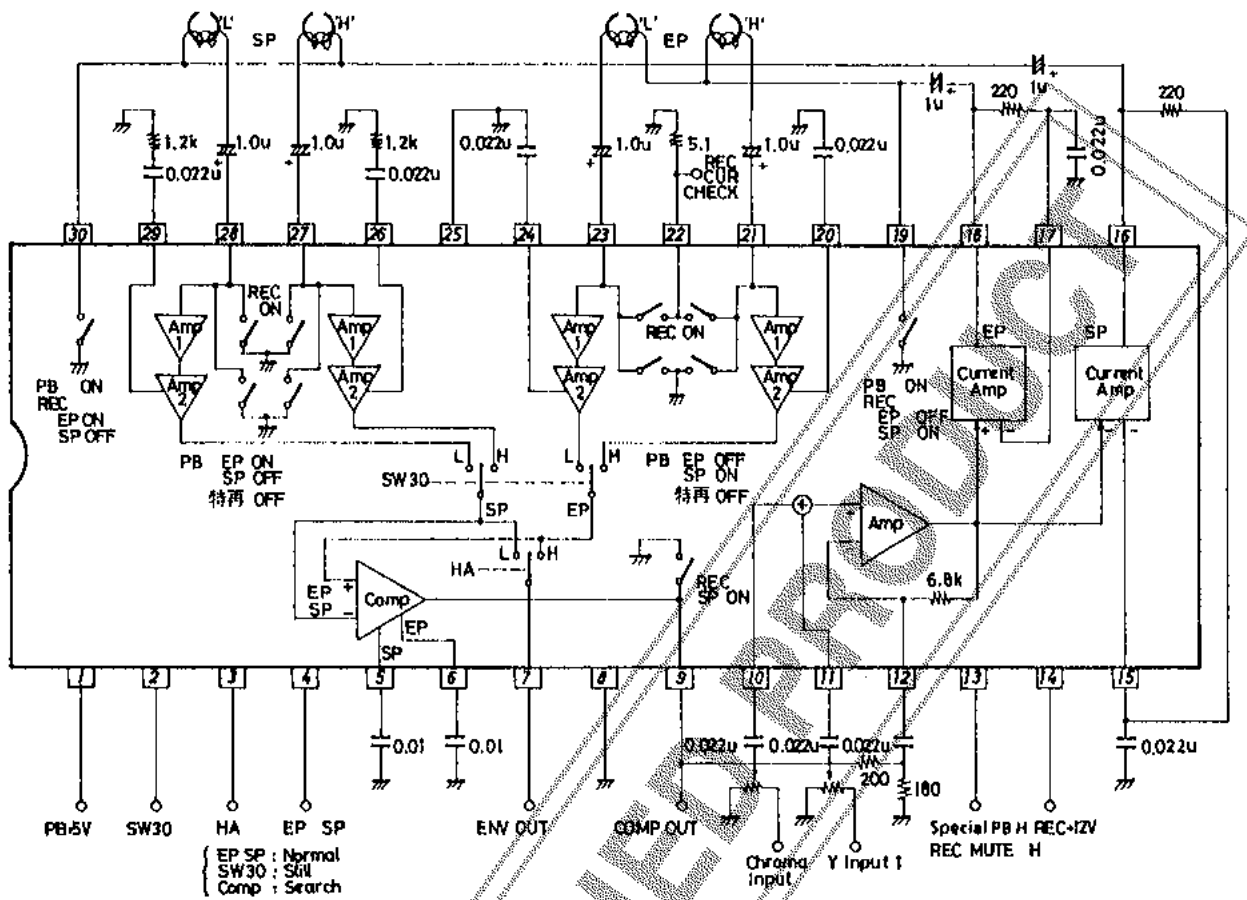
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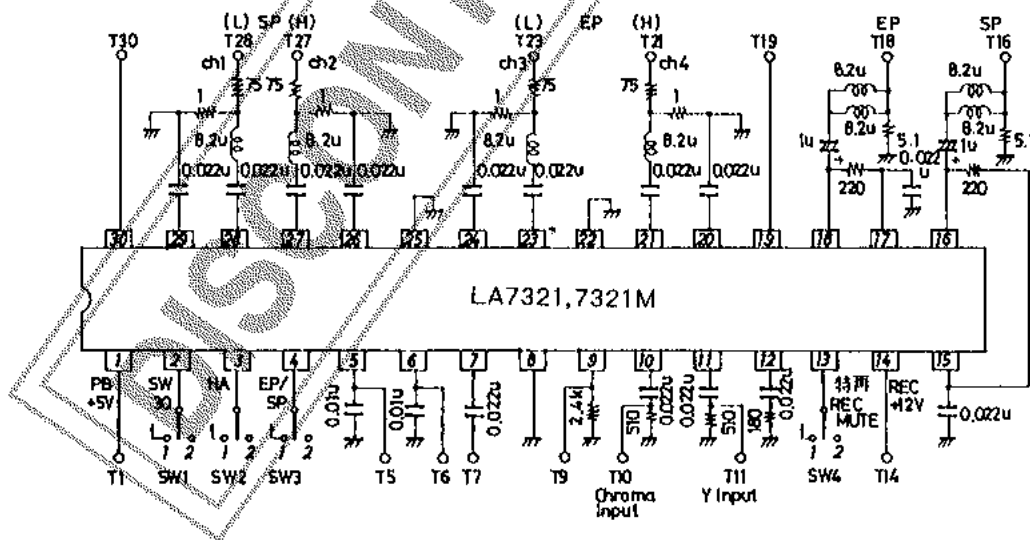
Characteristic	Symbol	Test Conditions		SW				min	typ	max	unit	
		Input	Output	1	2	3	4					
Control Pin Threshold Level at PB						SW 30	HA	EP /SP	Special MU			
SW 30 Threshold Level	SW 30 (1)	T28 T27	T2	CH1 → CH2 changeover voltage	※	2	2	2	2.5	5.0	V	
	SW 30 (2)	T28 T27	T2	CH2 → CH1 changeover voltage				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 <sub>MODE</sub> (1)	T28	T4	T4 DC voltage when T7 output waveform disappears	2	2	※	2	2.5	5.0	V	
	P <sub>MODE</sub> (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 <sub>MODE</sub> (1)	T10	T4	T4 DC voltage when output changes from T16 to T18			※	2	2.5	5.0	V	
	P <sub>MODE</sub> (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			

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LA7321,7321M Block Diagram

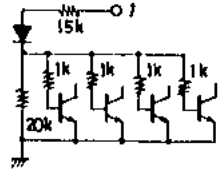
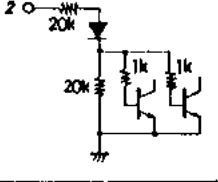
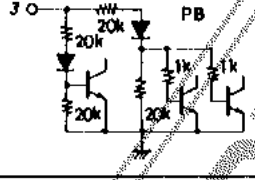
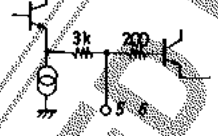
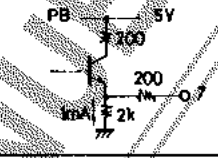
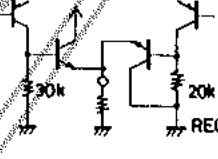
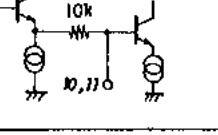
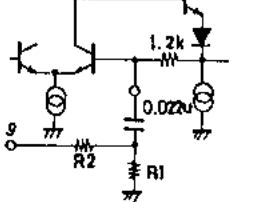


LA7321,7321M Test Circuit



LA7321,7321M

LA7321,7321M Pin Description

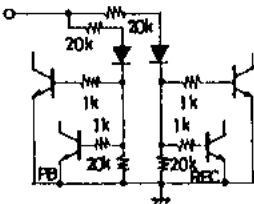
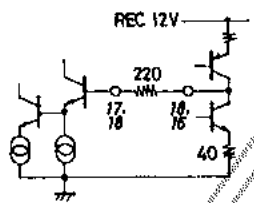
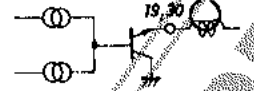
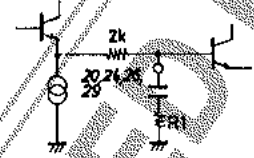

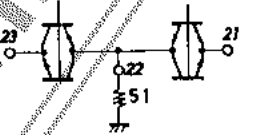
Pin No.	Function	Standard DC Voltage	Input/Output Configuration	Remarks
1	PB + 5V			24mA typ.
2	SW30 control pin			L : 0 to 1.5V H : 2.5 to 5.0V
3	H · A control pin			L : 0 to 1.5V H : 2.5 to 5.0V
4	control pin			L : 0 to 1.5V H : 2.5 to 5.0V
5 · 6	Envelope detection pin	2.4 (V)		
7	Preamp output	2.3 (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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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