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 : 40mAp-p)

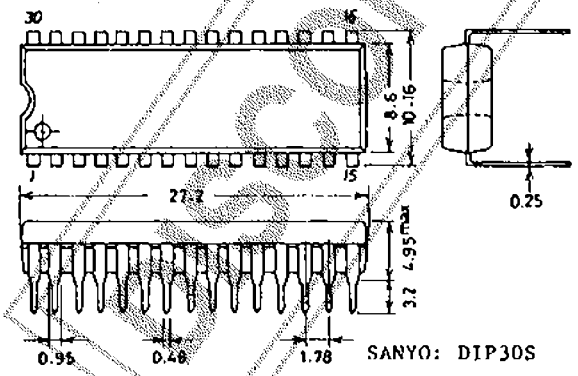
Maximum Ratings at Ta = 25°C

					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	Topg			−10 to +65	°C
Storage Temperature	Tstg			−40 to +125	°C

Operating Conditions at Ta = 25°C

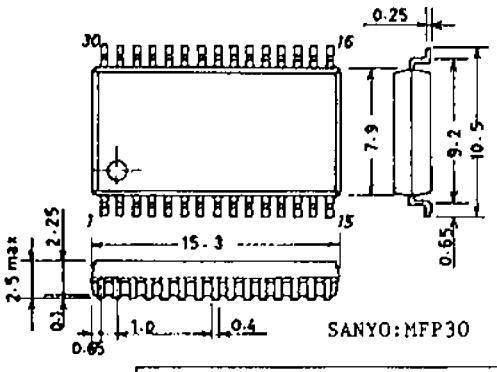
				unit
Supply Voltage	V_{CC}	(PB)	5.0	V
		(REC)	12.0	V
Operating Voltage Range	V_{CC} opg	(PB)	4.75 to 5.5	V
		(REC)	10 to 13	V

Case Outline 3061-D30S1C [LA7321]
(unit : mm)



SANYO: DIP30S

Case Outline 3073A-M30IC [LA7321M]
(unit : mm)



SANYO: MFP30

SANYO Electric Co.,Ltd. Semiconductor Overseas Marketing Div.
Natsume Bldg., 18-6, 2-chome, Yushima, Bunkyo-ku, TOKYO 113 JAPAN

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		Iccp			Pin 1 flow-in current	1	1	1	1	16	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	※ Vout / VG(1),(2),(3),(4) after 1.1MHz L.P.F.	2	2	2	2		1.1	1.6	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		Vp-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+6V	SW 30	HA	EP /SP	Special MU				
Cross-talk 1 (SP)	CH1	$V_{CR1}(1)$	T27 T23 T21	T7	Vi: 38mVpp f: 4MHz Vout / VG(1),(2) output ratio	2	2	2	1		−40	−35	dB
	CH2	$V_{CR1}(2)$	T28 T23 T21	T7		1	2	2	1				
Cross-talk 2 (EP)	CH3	$V_{CR2}(3)$	T21 T28 T27	T7	Vi: 38mVpp f: 4MHz Vout / VG(3),(4) output ratio	2	1	1	1		−40	−35	dB
	CH4	$V_{CR2}(4)$	T23 T28 T27	T7		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, Vi: 200mVpp, measure the difference between T5 output DC and T5 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, Vi: 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	Vi: 38mVpp f: 4MHz, T9 output DC	2	2		1	0	0.1	0.2	V
Comparator Output Waveform 2		V_{9DC2}	T23	T9	Vi: 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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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	−8.0	−6.0	−4.0	dB
	EP Y	VG(EY)	T11	T18	Vi:300mVpp f:4MHz			1	2				
	SP C	VG(SC)	T10	T16	Vi:300mVpp f:1MHz			2	2				
	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_{fR} (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	ΔV_{fR} (EY)	T11	T18				1	2				
	SP C	ΔV_{fR} (SC)	T10	T16				2	2				
	SP Y	ΔV_{fR} (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		−45	−40	dB
	EP Y	ΔV_{HDR} (EY)	T11	T18				1	2				
	SP C	ΔV_{HDR} (SC)	T10	T16				2	2				
	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	30	40		mVpp
	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) Vout / VG(EC),(EY) (SC),(SY) output ratio			1	1		−60	−45	dB
	EP Y	V_{MR} (EY)	T11	T18				1	1				
	SP C	V_{MR} (SC)	T10	T16				2	1				
	SP Y	V_{MR} (SY)	T11	T16				2	1				

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Characteristic		Symbol	Test Conditions Input	Output		SW 1	2	3	4	min	typ	max	unit
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, Vout = 40mVpp, f = 629kHz Input T11, Vout = 150mVpp, f = 4MHz $\frac{4M \pm 629kHz}{4MHz}$ output ratio			1	2		−45	−40	dB
	SP Y	V_{CY} (SP)	T10 T11	T16				2	2				
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		9	12	Ω
	CH2	R_{PON} 27		T27				1	2				
	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_{RSP}		T9	REC mode Difference between DC voltage at 1mA flow-in and DC voltage at 2mA flow-in ※1			2			7	10	Ω

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

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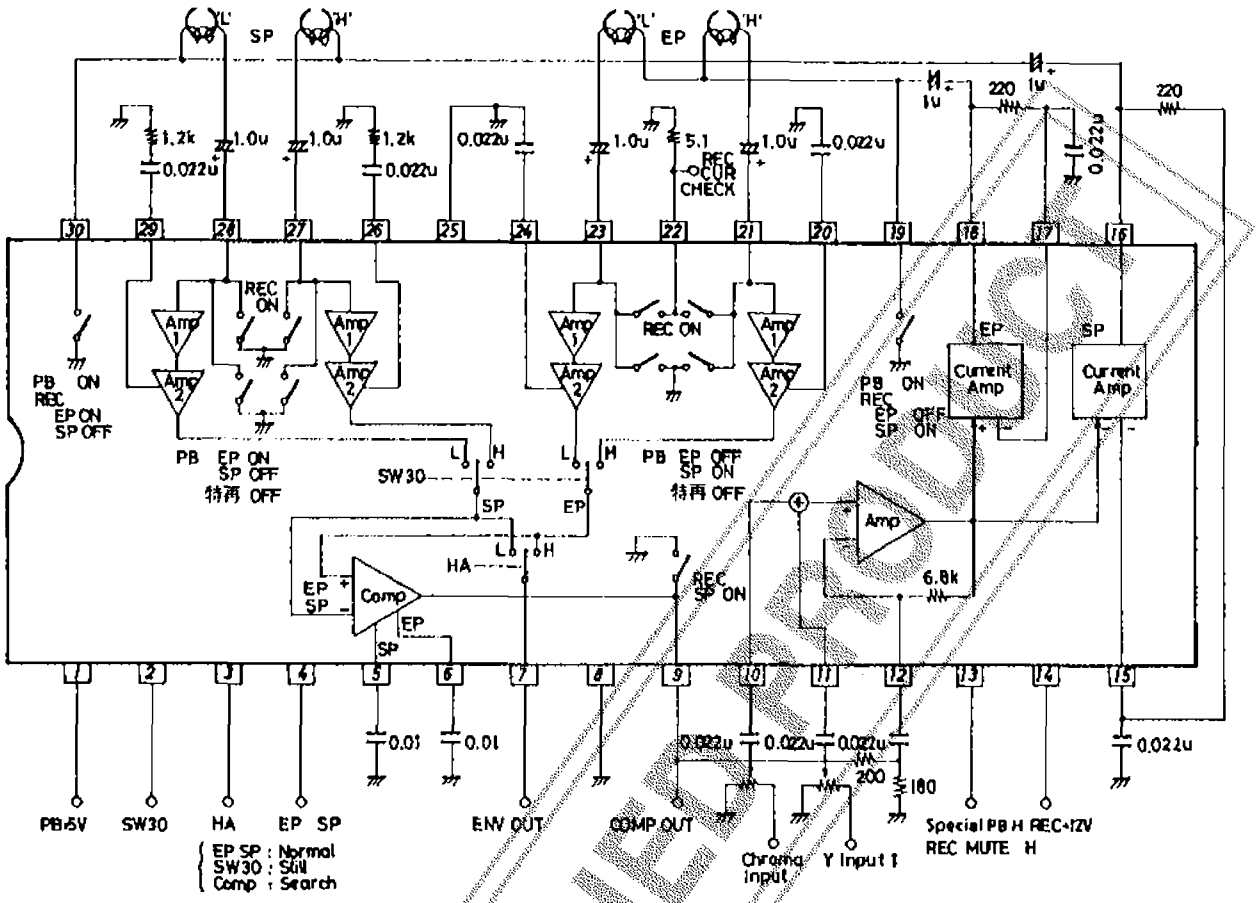
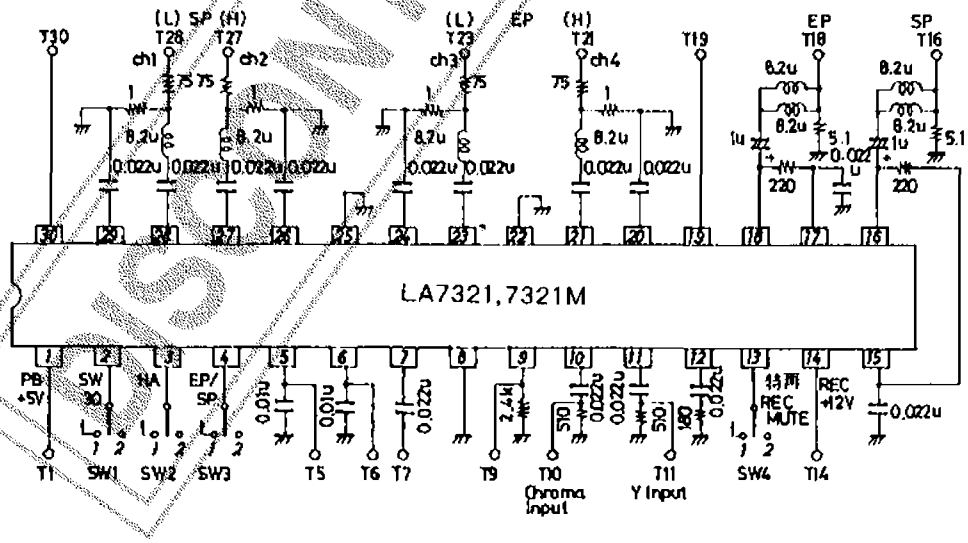
Characteristic	Symbol	Test Conditions			SW				min	typ	max	unit
		Input	Output		1	2	3	4				
Control Pin Threshold Level at PB					SW 30	HA	EP /SP	Special MU				
SW 30 Threshold Level	SW 30 (1)	T28 T27	T2	CH1 → CH2 changeover voltage	※	2	2	2	2.5		5.0	V
	SW 30 (2)	T28 T27	T2	CH2 → CH1 changeover voltage					0		1.5	
HA Threshold Level	HA (1)	T28 T27	T3	CH1 → CH2 changeover voltage	2	※	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 "II" 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	

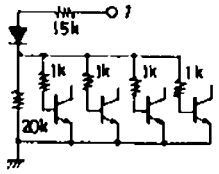
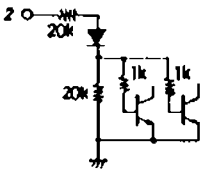
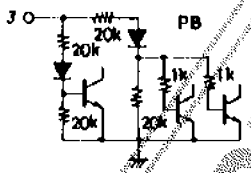
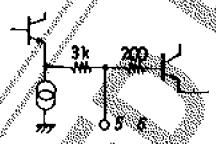
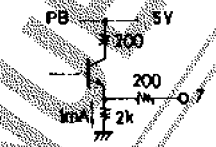
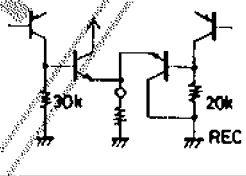
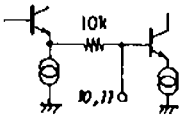
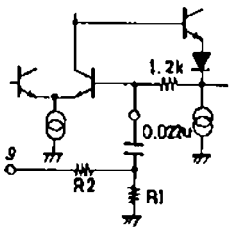
LA7321,7321M Block Diagram



LA7321,7321M Test Circuit



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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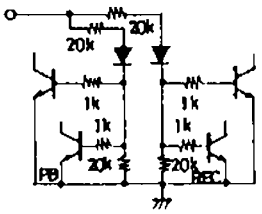
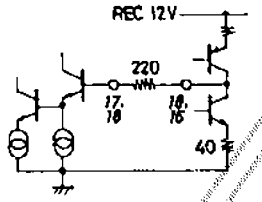
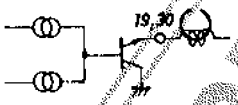
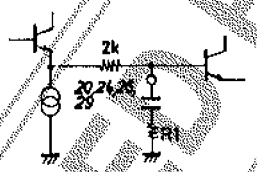
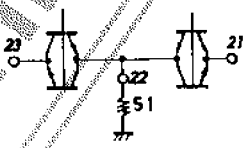
Pin No.	Function	Standard DC Voltage	Input/Output Configuration	Remarks
13	(PB) Special PB control pin (REC) REC MUTE control pin			L : 0 to 1.5V H : 3.0 to 5.0V
14	REC+12V			
15 16 17 18	REC Amp output Amp feedback pin	5.9 (V)		· Maximum REC current 40mApp
19 30	PB ON SW Tr REC mode select SW Tr			On 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			