

**SANYO**

No.2898

**LA7323, 7323M**

Monolithic Linear IC

Single-Chip  
HQ Luminance Signal Processor

The LA7323,7323M are single-chip HQ (High Quality) VTR luminance signal processor ICs that contain a detail enhancer, a line noise canceler, etc. The LA7323,7323M can be used in conjunction with preamp/recording amp ICs LA7320 (2-head use) or LA7321 (4-head use) to perform all the functions of luminance signal processing.

**Features**

- Very streamlined ICs that are placed in very small-sized packages (LA7323:DIP30S, LA7323M:MFP30S) and use a minimum number of external parts. (There are no other ICs of this type that use less external parts than those the LA7323,7323M use.)
- Adjustment-free E/E level, white/dark clip level
- On-chip 75Ω video driver
- On-chip edit control function
- The video AGC range is so wide and satisfactory as to be suitable for copy guard.
- Excellent picture stability at the special PB mode because of on-chip PB dark clip circuit

**Functions****REC section**

Video AGC, detail enhancer, nonlinear preemphasis, main preemphasis, white clip, dark clip, FM modulation  $1/2f_H$  carrier shift

**PB section**

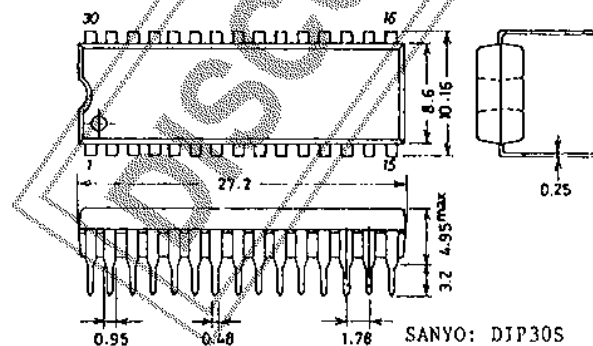
FM AGC, dropout compensation (base band), double limiter, FM demodulation, dynamic de-emphasis, line noise canceler, noise canceler, sync expansion, Y/C mix, muting, pseudo V insertion, pseudo H insertion, white peak clip, picture control, PB dark clip

**REC/PB**

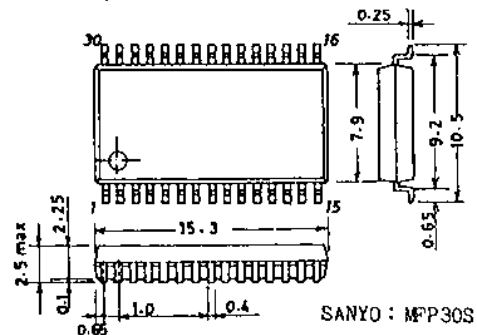
Sync separation, sync chip clamp, feedback clamp, video amp, 75Ω video driver

Note) The specifications for the LA7323M are not final. When ordering the LA7323M, check the delivery specification.

Case Outline 3061-D30SIC [LA7323]  
(unit: mm)



Case Outline 3073A-M30IC [LA7323M]  
(unit: mm)



Specifications and information herein are subject to change without notice.

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N228TA.TS No.2898-1/13

## LA7323,7323M

Maximum Ratings at  $T_a = 25^\circ\text{C}$ 

Maximum Supply Voltage	$V_{CC \text{ max}}$	7.0	V
Allowable Power Dissipation	$P_d \text{ max}$	600	mW
Operating Temperature	$T_{opg}$	-10 to +65	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 to +125	$^\circ\text{C}$

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

Supply Voltage	$V_{CC}$	5.0	V
Operating Voltage Range	$V_{CC \text{ op}}$	4.8 to 5.5	V

Operating Characteristics at  $T_a = 25^\circ\text{C}, V_{CC} = 5.0\text{V}$ 

No.	Characteristic	Symbol	Test Conditions		min	typ	max	unit	
			Input	Output					
	(REC Mode)								
1	Current Dissipation REC	$I_{CCR}$	T22		Pin 22 flow-in current at $V_{CC} = 5.0\text{V}$	50	65	80	mA
2	AGC Control	$C_{AGC}$	T24	T6	$V_i$ : 1.0Vp-p video (0dB) Adjust VR2 so that output 0.5 Vp-p is obtained.				
3	AGC Control Voltage	$V_{AGC}$	T24	T19	$V_i$ : 1.0Vp-p video, output DC level	4.3	4.5	4.7	V
4	AGC Detection Voltage	$V_{AD}$	T24	T27	$V_i$ : 1.0Vp-p video, output DC level	1.3	1.45	1.6	V
5	EE Output Level-1	$V_{EE1}$	T24	T21A	$V_i$ : 1.0Vp-p video, output level	0.95	1.00	1.05	Vp-p
6	EE Output Level-2	$V_{EE2}$	T24	T21A	$V_i$ : 4.0Vp-p video, output level	1.00	1.15	1.30	Vp-p
7	AGC Control Characteristic-1	AGC1	T24	T7	(+12dB) $V_i$ : 4.0Vp-p video, output level	1.07	1.17	1.27	Vp-p
8	AGC Control Characteristic-2	AGC2	T24	T7	(+6dB) $V_i$ : 2.0Vp-p video, output level	1.01	1.05	1.07	Vp-p
9	AGC Control Characteristic-3	AGC3	T24	T7	(-6dB) $V_i$ : 0.5Vp-p video, output level	0.93	0.95	0.99	Vp-p
10	AGC Control Characteristic-4	AGC4	T24	T7	$V_i$ : 0.7Vp-p lumi (+12dB sync) $V_i$ : 1.2Vp-p sync sync level	280	350	420	mV pp
11	AGC Control Characteristic-5	AGC5	T24	T7	$V_i$ : 0.7Vp-p lumi (+6dB sync) $V_i$ : 0.6Vp-p sync sync level	240	310	380	mV pp
12	AGC Control Characteristic-6	AGC6	T24	T7	$V_i$ : 0.7Vp-p lumi (-6dB sync) $V_i$ : 0.15Vp-p sync sync level	150	200	250	mV p-p

Note) The AGC characteristics must meet the copy guard test tape (VAG-1) requirements. (AGC level 40% or less)

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No.	Characteristic	Symbol	Test Conditions		min	typ	max	unit	
			Input	Output					
	(REC Mode)								
13	Sync Separation Output Level	$V_{SY}$	T24	T17	$V_i$ : 1.0V <sub>p-p</sub> video, output pulse peak	3.5	3.8	4.4	V <sub>p-p</sub>
14	Sync Separation Pulse Width	$P_{WSY}$	T24	T17	$V_i$ : 1.0V <sub>p-p</sub> video, output pulse width	4.0	4.3	4.6	μs
15	Sync Separation Leading Edge Delay Time	$\Delta t_{ey}$	T24	T17	$V_i$ : 1.0V <sub>p-p</sub> video	1.0	1.4	1.8	μs
16	Sync Separation Threshold Level	$T_{HSY}$	T24	T17	Input level 1.0V <sub>p-p</sub> : 0dB when input level is attenu- ated and output pulse width becomes wider than sync separation pulse width by 1μs.		-16	-14	dB
17	Preemphasis Voltage Gain	$G_{PE}$	T6A	T2	$V_i$ : 500mV <sub>p-p</sub> (0dB) f: 10kHz	-1.0	0	0.5	dB
18	Detail Enhancer Response Characteristic-1	$G_{DE1}$	T6A	T2	$V_i$ : 500mV <sub>p-p</sub> (0dB) f: 2MHz $G_{PE}$ : 0dB	0	0.15	0.5	dB
19	Detail Enhancer Response Characteristic-2	$G_{DE2}$	T6A	T2	$V_i$ : 158mV <sub>p-p</sub> (-10dB) f: 2MHz $G_{PE}$ : 0dB	0.3	0.6	0.9	dB
20	Detail Enhancer Response Characteristic-3	$G_{DE3}$	T6A	T2	$V_i$ : 50mV <sub>p-p</sub> (-20dB) f: 2MHz $G_{PE}$ : 0dB	1.3	1.9	2.5	dB
21	Detail Enhancer Response Characteristic-4	$G_{DE4}$	T6A	T2	$V_i$ : 15.8μV <sub>p-p</sub> (-30dB) f: 2MHz $G_{PE}$ : 0dB	1.9	2.5	3.1	dB
22	Detail Enhancer Response Characteristic-5	$G_{DE5}$	T6A	T2	$V_i$ : 5mV <sub>p-p</sub> (-40dB) f: 2MHz $G_{PE}$ : 0dB	1.9	2.7	3.5	dB
23	Nonlinear Emphasis Response Characteristic-1	$G_{NE1}$	T6A	T2	$V_i$ : 500mV <sub>p-p</sub> (0dB) f: 2MHz $G_{PE}$ : 0dB	0.5	1.4	2.3	dB
24	Nonlinear Emphasis Response Characteristic-2	$G_{NE2}$	T6A	T2	$V_i$ : 158mV <sub>p-p</sub> (-10dB) f: 2MHz $G_{PE}$ : 0dB	2.6	3.8	5.2	dB
25	Nonlinear Emphasis Response Characteristic-3	$G_{NE3}$	T6A	T2	$V_i$ : 50mV <sub>p-p</sub> (-20dB) f: 2MHz $G_{PE}$ : 0dB	4.9	6.4	7.9	dB
26	Nonlinear Emphasis Response Characteristic-4	$G_{NE4}$	T6A	T2	$V_i$ : 158mV <sub>p-p</sub> (-10dB) f: 200kHz $G_{PE}$ : 0dB	0.7	1.4	2.1	dB
27	Main Emphasis Response Characteristic-1	$G_{ME1}$	T6A	T2	$V_i$ : 50mV <sub>p-p</sub> (-20dB) f: 200kHz $G_{PE}$ : 0dB	4.9	5.2	5.5	dB
28	Main Emphasis Response Characteristic-2	$G_{ME2}$	T6A	T2	$V_i$ : 50mV <sub>p-p</sub> (-20dB) f: 2MHz $G_{PE}$ : 0dB	13.1	13.6	14.1	dB
29	White Clip Level	$L_{WC}$	T6A	T2	$V_i$ : 0.5V <sub>p-p</sub> video	187	195	203	%
30	Dark Clip Level	$L_{DC}$	T6A	T2	$V_i$ : 0.5V <sub>p-p</sub> video	-48	-55	-62	%

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No.	Characteristic	Symbol	Test Conditions		min	typ	max	unit	
			Input	Output					
(REC Mode)									
31	FM Modulator Output Level	$V_{FM}$	—	T30	Output level when output frequency is set to 4MHz with VR1 at no load mode	1.3	1.5	1.7	Vp-p
32	FM Modulator 2nd Distortion	$i_{MOD}$	T6	T30	8MHz component / 4MHz component ratio obtained in above-mentioned state		-40	-35	dB
33	FM Modulator Modulation Sensitivity	$S_{MOD}$	T6	T30	Output frequency change $2 \times (f_{4.0} - f_{3.5})$ when DC 3.5V, 4.5V are applied to pin 6	1.6	2.0	2.4	MHz
34	FM Modulator Linearity	$L_{MOD}$	T6	T30	Output frequency when 3.75V DC is applied to pin 6 : $f_{3.75}$ $L_{MOD} = \frac{f_{3.75} - (f_{4.0} + f_{3.5}) / 2}{S_{MOD}} \times 100$	3.0	0	3.0	%
35	EP 1/2 Carrier Shift-1	$C_{S1}$	T6	T2	Output frequency change at SW12 : 1 SW13 : 1→2	6.0	7.5	9.0	kHz
(PB Mode)									
1	Current Dissipation	$I_{CCP}$	T22		Pin 22 flow-in current at $V_{CC} : 5.0V$	65	80	95	mA
2	FM AGC Detection Voltage-1	$V_{FD1}$	T26	T27	$V_i : 200mVp-p (0dB)$ $f : 4MHz$	0.80	0.90	1.00	V
3	FM AGC Detection Voltage-2	$V_{FD2}$	T26	T27	$V_i : 400mVp-p (+6dB)$ $f : 4MHz$	1.05	1.15	1.25	V
4	FM AGC Detection Voltage-3	$V_{FD3}$	T26	T27	$V_i : 50mVp-p (-12dB)$ $f : 4MHz$	0.69	0.69	0.79	V
5	Dropout Detection Level	$L_{DDC1}$	T26	T28	Input level when T28 Low→High is caused by input $f : 4MHz$ High→Low	4.0	5.0	6.0	mV pp
6	Dropout Reset Level	$L_{DDC2}$	T26	T28	Input level when T28 High→Low is caused by input $f : 4MHz$ High→Low	4.8	6.0	7.2	mV pp
7	Dropout Detection Pulse Output Level	$V_{DDC}$	—	T28	Output DC level at no input mode	3.5	3.9	4.4	Vp-p
8	FM Demodulation Voltage-1	$V_{DEM4}$ (1)	T26	T7A	$V_i : 200mVp-p (0dB)$ $f : 4MHz$ output voltage	1.1	1.30	1.5	V
9	FM Demodulation Voltage-2	$V_{DEM4}$ (2)	T26	T7A	$V_i : 400mVp-p (+6dB)$ $f : 4MHz$ output voltage	1.1	1.30	1.5	V
10	FM Demodulation Voltage-3	$V_{DEM4}$ (3)	T26	T7A	$V_i : 50mVp-p (-12dB)$ $f : 4MHz$ output voltage	1.1	1.30	1.5	V

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No.	Characteristic	Symbol	Test Conditions		min	typ	max	unit	
			Input	Output					
	(PB Mode)								
11	FM Demodulation Sensitivity-1	$S_{DEM(1)}$	T26	T7A	$V_i$ : 200mVp-p,f: 2MHz output voltage $V_{DEM2(1)}$ $V_i$ : 200mVp-p,f: 6MHz output voltage $V_{DEM6(1)}$ Calculate using $S_{DEM(1)} = (V_{DEM2(1)} - V_{DEM6(1)})/4$	0.16	0.20	0.24	V/ MHz
12	FM Demodulation Sensitivity-2	$S_{DEM(2)}$	T26	T7A	$V_i$ : 400mVp-p,f: 2MHz output voltage $V_{DEM2(2)}$ $V_i$ : 400mVp-p,f: 6MHz output voltage $V_{DEM6(2)}$ Calculate using $S_{DEM(2)} = (V_{DEM2(2)} - V_{DEM6(2)})/4$	0.16	0.20	0.24	V/ MHz
13	FM Demodulation Sensitivity-3	$S_{DEM(3)}$	T26	T7A	$V_i$ : 50mVp-p,f: 2MHz output voltage $V_{DEM2(3)}$ $V_i$ : 50mVp-p,f: 6MHz output voltage $V_{DEM6(3)}$ Calculate using $S_{DEM(3)} = (V_{DEM2(3)} - V_{DEM6(3)})/4$	0.16	0.20	0.24	V/ MHz
14	FM Demodulation Linearity-1	$L_{DEM(1)}$	-	-	$L_{DEM(1)} = \frac{V_{DEM4(1)} - (V_{DEM2(1)} + V_{DEM6(2)})/2}{V_{DEM2(1)} - V_{DEM6(1)}} \times 100$	-3.5	0	3.5	%
15	FM Demodulation Linearity-2	$L_{DEM(2)}$	-	-	$L_{DEM(1)} = \frac{V_{DEM4(1)} - (V_{DEM2(1)} + V_{DEM6(2)})/2}{V_{DEM2(2)} - V_{DEM6(2)}} \times 100$	-3.5	0	3.5	%
16	FM Demodulation Linearity-3	$L_{DEM(3)}$	-	-	$L_{DEM(1)} = \frac{V_{DEM4(1)} - (V_{DEM2(1)} + V_{DEM6(2)})/2}{V_{DEM2(3)} - V_{DEM6(3)}} \times 100$	-3.5	0	3.5	%
17	Carrier Leak-1	$C_L(1)$	T26	T7	$V_i$ : 200mVp-p,f: 4MHz Output frequency 4MHz component/8MHz component ratio		-40	-35	dB
18	Carrier Leak-2	$C_L(2)$	T26	T7	$V_i$ : 400mVp-p,f: 4MHz Output frequency 4MHz component/8MHz component ratio		-40	-35	dB
19	Carrier Leak-3	$C_L(3)$	T26	T7	$V_i$ : 50mVp-p,f: 4MHz Output frequency 4MHz component/8MHz component ratio		-40	-35	dB

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No.	Characteristic	Symbol	Test Conditions		min	typ	max	unit	
			Input	Output					
	(PB Mode)								
20	PB Output Level (Through Gain)	$V_{PB}$	T9.10	T21A	$V_i$ : 300mVp-p (0dB) f: 10kHz	4.8	5.8	6.8	dB
21	PB Output Frequency Characteristic	$F_{PB}$	T9.10	T21A	$V_i$ : 300mVp-p, f: 3MHz Output level / $V_{PB}$ (10kHz)	-0.6	-0.3	0	dB
22	Noise Limiter Level	$N_{LIM}$	T10	T21A	$V_i$ : 100mVp-p f: 100kHz	45	60	72	mV PP
23	Noncorrelation Detection Level	$L_H$		T11	T10: 3.9V, T9: 3.9V, $\Delta V$ when voltage only applied to T9 is increased and T11 output level is changed from Low to High	65	80	95	mV
24	Noncorrelation Detection Pulse Output Level	$V_H$		T11	Output level when above mentioned T11 output is at High	3.5	3.8	4.4	Vp-p
25	De-emphasis Response Characteristic-2	$G_{D2}$	T9.10	T21A	$V_i$ : 158mVp-p (-10dB) f: 2MHz $V_{PB}$ : 0dB	-3.1	-2.2	-1.3	dB
26	De-emphasis Response Characteristic-3	$G_{D3}$	T9.10	T21A	$V_i$ : 50mVp-p (-20dB) f: 2MHz $V_{PB}$ : 0dB	-4.7	-3.8	-2.9	dB
27	De-emphasis Response Characteristic-4	$G_{D4}$	T9.10	T21A	$V_i$ : 158mVp-p (-10dB) f: 200kHz $V_{PB}$ : 0dB	-1.2	-0.7	-0.2	dB
28	HP-noise Canceler Response Characteristic-1	$G_{N1}$	T9.10	T21A	$V_i$ : 158mVp-p (-10dB) f: 1MHz $V_{PB}$ : 0dB	-1.7	-1.2	-0.7	dB
29	HP-noise Canceler Response Characteristic-2	$G_{N2}$	T9.10	T21A	$V_i$ : 50mVp-p (-20dB) f: 1MHz $V_{PB}$ : 0dB	-4.3	-3.3	-2.3	dB
30	HP-noise Canceler Response Characteristic-3	$G_{N3}$	T9.10	T21A	$V_i$ : 15.8mVp-p (-30dB) f: 1MHz $V_{PB}$ : 0dB	-10.0	-8.5	-7.0	dB
31	PIC-cont Hardware Response Characteristic-1	$G_{PH1}$	T9.10	T21A	$V_i$ : 150mVp-p f: 1MHz $V_{PB}$ : 0dB	2.7	3.7	4.7	dB
32	PIC-cont Hardware Response Characteristic-2	$G_{PH2}$	T9.10	T21A	$V_i$ : 150mVp-p f: 2MHz $V_{PB}$ : 0dB	4.9	5.9	6.9	dB
33	PIC-cont Software Response Characteristic-1	$G_{PS1}$	T9.10	T21A	$V_i$ : 150mVp-p f: 1MHz $V_{PB}$ : 0dB	-4.0	-3.0	-2.0	dB
34	PIC-cont Software Response Characteristic-2	$G_{PS2}$	T9.10	T21A	$V_i$ : 150mVp-p f: 2MHz $V_{PB}$ : 0dB	-7.6	-6.6	-5.6	dB
35	Chroma Amp Voltage Gain	$G_C$	T19A	T21	$V_i$ : 100mVp-p f: 3MHz	11.0	12.0	13.0	dB

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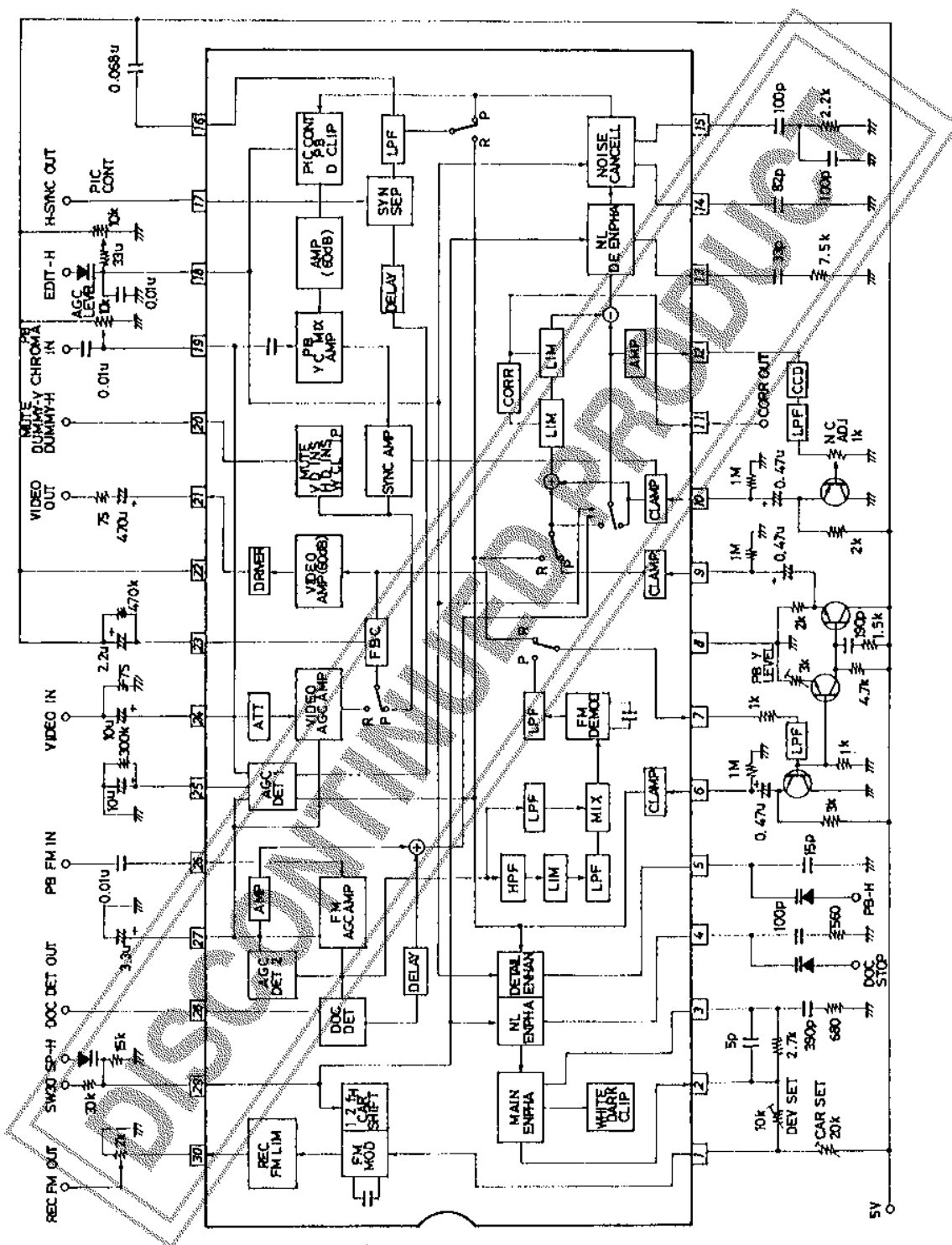
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No.	Characteristic	Symbol	Test Conditions		min	typ	max	unit	
			Input	Output					
	(PB Mode)								
36	Chroma Amp Frequency Characteristic	$F_C$	T19A	T21	$V_i$ : 100mVp-p, f: 4MHz, output level / $G_C$ (3MHz) output ratio	-0.5	0	dB	
37	Sync Expansion Ratio	$L_{SYNC}$	T9.10	T21	$V_i$ : 0.5Vp-p video (lumi: 0.35, sync: 0.15) Sync / output peak ratio	30.0	31.5	33.0	%
38	Pseudo V Insertion Level	$L_{VD}$	T9.10	T21	$V_i$ : 0.5Vp-p video Output DC difference between output sync chip potential at S11:1 and output sync chip potential at S11:3	-80	0	+80	mV
39	Pseudo H Insertion Level	$L_{HD}$	T9.10	T21	$V_i$ : 0.5Vp-p video Output DC difference between output pedestal potential at S11:1 and output pedestal potential at S11:2	0	75	150	mV
40	PB Peak Clip Level	$P_C$	T9.10	T21	$V_i$ : 0.75Vp-p video Output peak	2.4	2.5	2.6	Vp-p
41	DS Amp Voltage Gain	$G_{DS}$	T9	T12	$V_i$ : 500mVp-p f: 10kHz	-0.5	0	0.5	dB

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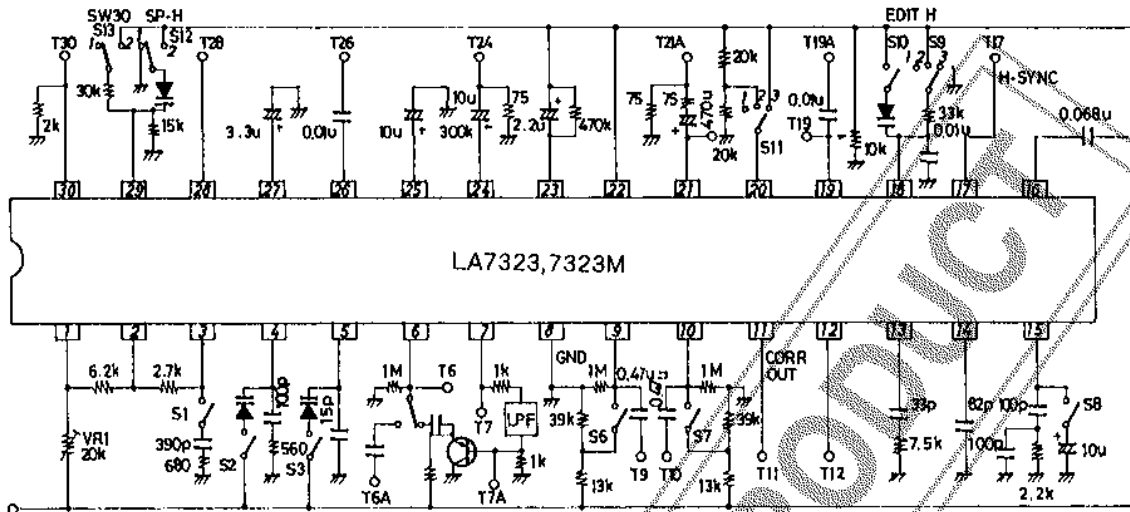
LA7323,7323M

LA7323,7323M Block Diagram





LA7323,7323M Test Circuit,




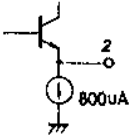
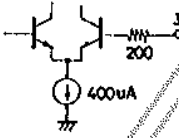
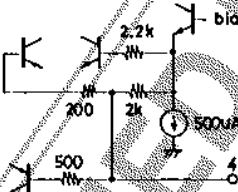
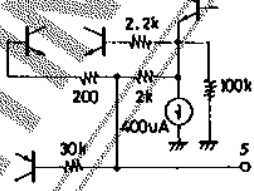
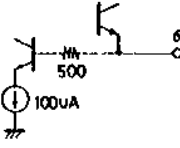
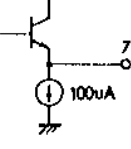
Description of Control Pins  
(Control Voltage Mode)

Item	L	M	H
I/P mode Pin 5	REC mode		3.9V or greater PB mode
DOC stop Pin 4	DOC ON		3.6V or greater DOC OFF
Edit mode Pin 18	EDIT OFF		3.6V or greater EDIT ON
Mute, VD, HD Pin 21	1.5V or less Normal	1.9V to 3.2V Pedestal mute	3.6V or greater Sync chip mute
SW30 y2fH carrier shift Pin 29	0.9V or less 1ch (+2.5kHz)		1.2V to 1.8V Hch
SP mode Pin 29	1.8V or less EP mode		2.0V or greater SP mode

(Mode Description)

Mode	EDIT	Detail	NL PreEmpha	LINE NOICAN	NL DeEmpha	PIC Control
SP	ON	OFF	OFF	OFF	OFF	OFF
	OFF	ON	OFF	ON	OFF	ON
EDIT	ON	OFF	ON	OFF	ON	OFF
	OFF	ON	ON	ON	ON	ON

Pin Description

Pin No.	Pin Function	Interface	Typical DC	Remarks
1	FM MOD-IN		2.4 (3.4)	
2	PRE-MEPH OUT		2.4 (2.5)	
3	MAIN-EMPH FEEDBACK IN		2.4 (2.2)	
4	NL-EMPH FIL DOC STOP		2.95 (2.75)	
5	DETAIL-FIL PB-H		2.55	
6	REC CLAMP IN		3.2	
7	REC AGC OUT PB DEMOD OUT		Vsync 2.35	
8	GND			

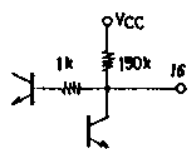
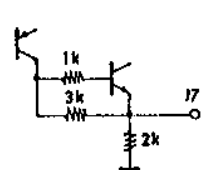

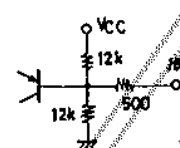
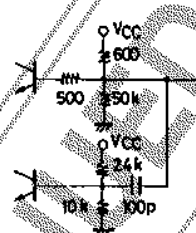

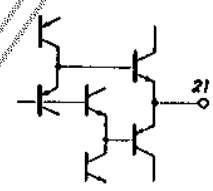
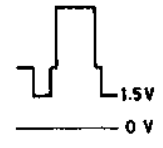
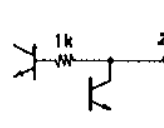
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Pin No.	Pin Function	Interface	Typical DO	Remarks
9	PB CLAMP-IN		3.2	
10	YD CLAMP-IN		3.2 3.2	
11	CORR DET. OUT			
12	CCD DRIVE		2.75 2.75	
13	N.L DE-EMPHA FIL		(4.5) 2.8	
14	NOICAN FIL - 1		(4.5) 2.8	
15	NOICAN FIL - 2		(4.5) 4.15	

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Pin No.	Pin Function	Interface	Typical DC	Remarks
16	SYNC SEP FIL		3.5 3.5	
17	H-SYNC-OUT	 		
18	PIC-CONT			
19	PB CHROMA IN		3.7 3.7	
20	MUTE DUMMY-V DUMMY-H			
21	VIDEO-OUT	 		
22	Vcc			
23	F.B.C-FIL		3.2 3.2	

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Pin No.	Pin Function	Interface	Typical DC	Remarks
24	VIDEO-IN		$\frac{3.3}{3.3}$	
25	AGC-FIL-1		$\frac{3.1}{4.0}$	
26	PB-FM-IN		$\frac{(3.6)}{3.7}$	
27	AGC-FIL-2		$\frac{1.4}{0.9}$	
28	DOC DET OUT			
29	SP-H SW-30			
30	REC-FM OUT			

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.