

Video/audio signal processor for VHS VCRs (single chip for Y/C/A)

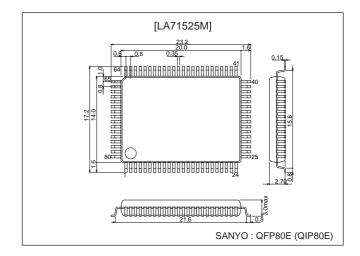
Overview

The LA71525M is a video/audio signal processor IC for VHS VCRs. It handles recording and playback of PAL/GBI, MESECAM, and 4.43 NTSC signals. NTSC software tapes can be converted to PAL for monitoring, and the IC realizes high picture and sound quality. The IC requires no adjustments and minimizes the peripheral component count, making it possible to implement efficient signal handling at low cost.

Package Dimensions

unit: mm

3174-QFP80E



Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CC} max	pin 36, 41, 47	7.0	V
	V _{CC} max	pin 76	9.0	V
Allowable power dissipation	Pd max	Ta ≤ 65°C	1400	mW
		114.3 x 76.1 x 1.6 mm ³ with paper phenol substrate		
Operating temperature	Topr		-10 to +65	°C
Storage temperature	Tstg		-40 to +150	°C

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V _{CC} 1	pin 36, 41, 47	5.0	V
	V _{CC} 2	pin 76	6.8	V
	(V _{CC} 2)	(pin 76)	(7.5)	V
Recommended operating supply	V _{CC} 1 opg		4.8 to 5.5	V
voltage range	V _{CC} 2 opg		6.4 to 7.9	V

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Operating Characteristics at $Ta=25^{\circ}C,\,V_{CC}=5V$

Dorometer	Cumhal	الم مر مرا	044	Conditions		Ratings		المنا ا
Parameter	Symbol	Input	Output	Conditions	min	typ	max	Unit
[REC mode Y]	•		•					
Current drain (POWER SAVE MODE)	I _{CCS}			Influx current measured at pin 41 in power save mode	20	22	24	mA
Current drain (REC)	I _{CCR}			Sum of influx current at pins 36, 41, 47, 76 measured; 5V: pins 36, 41, 47; 7V: pin 76	130	145	160	mA
EE output level 1	V _{EE} 1	T28A	T38	T38 output level measured with V _{IN} = 1.0 Vp-p video signal (PAL)	2.0	2.1	2.2	Vp-p
EE output level 2	V _{EE} 2	T28A	T38	T38 output level measured with V _{IN} = 1.0 Vp-p video signal (NTSC)	2.0	2.1	2.2	Vp-p
AGC characteristics 1	AGC1	T28A	T38	Ratio of V_{EE} and T38 output level with $V_{IN} = 2.0$ Vp-p video signal	0	0.6	1.2	dB
AGC characteristics 2	AGC2	T28A	T38	Ratio of V _{EE} and T38 output level with V _{IN} = 0.5 Vp-p video signal	-1.2	-0.2	0	dB
AGC characteristics 3	AGC3	T28A	T38	T38 SYNC level measured with V _{IN} = 700 mVp-pLUMI, 600 mVp-p SYNC	550	650	750	mVp-p
AGC characteristics 4	AGC4	T28A	T38	T38 SYNC level measured with V _{IN} = 700 mVp-pLUMI, 150 mVp-p SYNC	370	420	470	mVp-p
Sync separation output level	V _{SYR}	T28A	T37	T37 output pulse crest value measured with V _{IN} = 1.0 Vp-p video signal	4.0	4.2	4.4	Vp-p
Sync separation output pulse width	PW _{SYR}	T28A	T37	T37 output pulse width measured with V _{IN} = 1.0 Vp-p video signal	4.2	4.5	4.8	μs
Sync separation output Pre-delay time	ΔT _{SYR}	T28A	T37	Delay of output SYNC vs. input SYNC measured with V _{IN} = 1.0 Vp-p video signal	0.6	0.8	1.0	μs
Sync separation output Threshold level	TH _{SYR}	T28A	T37	Input level gradually attenuated and measured when output pulse width becomes larger than PW _{SYR} by 1 μs		-20	-15	dB
Sync tip level Pedestal level White level measurement	L _{VOR}	T28A	T38	Potential measured with V_{IN} = 1.0 Vp-p video signal, under following conditions. T38 sync tip level: L_{SYN} Pedestal level: L_{PED} White peak level: L_{WHT}	700	800	900	mV
Simulated H insertion level	ΔHDR	T28A	T38	T38 DC level measured with 2.7V DC applied to T33. Using this as L_{HDR} , differential to L_{PED} (see above) is calculated.	-150	0	+150	mV
White insertion level	ΔWHR	T28A	T38	T38 DC level measured with 1.3V DC applied to T33. Using this as L_{WHR} , differential to L_{WHT} (see above) is calculated.	-150	0	+150	mV
REC YNR operation	R _{YNR}	T28A	T25	T25 YNR characteristics measured with Serial V _{IP} = 1 Vp-p standard color bar signal 00 OFF input 10 (weak) 01 (medium) 11 (strong)	0 1.7 4.2	0 2.7 5.7	0 3.7 7.2	dB
Y _{LPF} frequency response characteristics 1	Y _{LPF} 1	T28A	T25	1 MHz response of T25 vs. 500 kHz with V_{IN} = 1 Vp-p standard multiburst signal	-0.3	+0.2	+0.7	dB
Y _{LPF} frequency response characteristics 2	Y _{LPF} 2	T28A	T25	2 MHz response of T25 vs. 500 kHz with V_{IN} = 1 Vp-p standard multiburst signal	-1.4	-0.4	+0.6	dB
Y _{LPF} frequency response characteristics 3	Y _{LPF} 3	T28A	T25	3 MHz response of T25 vs. 500 kHz with $V_{\rm IN}$ = 1 Vp-p standard multiburst signal	-4	-2	0	dB
Y _{LPF} frequency response characteristics 4	Y _{LPF} 4	T28A	T25	4.43 MHz response of T25 vs. 500 kHz with V_{IN} = 1 Vp-p standard multiburst signal			-25	dB
REC-FM output level	V_{FM}		T18	T18 output level measured in no-signal input condition	304	320	336	mVp-p
Carrier frequency 1 (PAL) Carrier frequency 2 (NTSC)	F _{FM} 1		T18	T18 output frequency measured in no-signal input condition	3.725 3.325	3.8 3.4	3.875 3.475	MHz MHz
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Parameter	Symbol	Input	Output	Conditions		Ratings		Unit
			·		min	typ	max	
REC-FM output level	H _{MOD}		T18	Secondary distortion measured in no-signal input condition		-40	-35	dB
Secondary distortion								
Deviation 1 (PAL)	DEV1	T28A	T18	T18 deviation measured with V _{IN} = white 100% 1 Vp-p	0.95	1.00	1.05	MHz
Deviation 2 (NTSC)	DEV2	T28A	T18	T18 deviation measured with V _{IN} = white 100% 1 Vp-p	0.95	1.00	1.05	MHz
FM modulator linearity	L _{MOD}	T26	T18	Output frequency set to f2.85 with 2.85V DC applied to T26	-2	0	+2	%
1/2f _H carrier shift	CS		T18	Output frequency shift	6.5	7.8	9.1	kHz
Emphasis gain	G _{EMP} 24	T26A	T24	Level difference of T26A and T37 measured with	-0.75	-0.25	+0.25	dB
	G _{EMP} 37		T37	V _{IN} = 500 mVp-p, 10 kHz sine wave input				
Detail	G _{ENH} 1	T26A	T24	Level difference of T26A and T37 measured with	0.1	0.6	1.1	dB
enhancer characteristics 1				V_{IN} = 158 mVp-p, 2 MHz sine wave input Differential with G_{EMP} 24				
Detail	G _{ENH} 2	T26A	T24	Level difference of T26A and T24 measured with	1.3	2.3	3.3	dB
enhancer characteristics 2	LINIT			V_{IN} = 50 mVp-p, 2 MHz sine wave input Differential with G_{EMP} 24				
Detail	G _{ENH} 3	T26A	T24	Level difference of T26A and T24 measured with	1.8	3.3	4.8	dB
enhancer characteristics 3				V_{IN} = 15.8 mVp-p, 2 MHz sine wave input Differential with G_{EMP} 24				
Nonlinear	G _{NLEMP} 1	T26A	T24	Level difference of T26A and T24 measured with	0.3	1.2	2.1	dB
emphasis characteristics 1	NEEW			V_{IN} = 500 mVp-p, 2 MHz sine wave input Differential with G_{EMP} 24				
Nonlinear	G _{NLEMP} 2	T26A	T24	Level difference of T26A and T24 measured with	2.5	3.8	5.0	dB
emphasis characteristics 2	IVEENII			V _{IN} = 158 mVp-p, 2 MHz sine wave input				
,				Differential with G _{EMP} 24				
Nonlinear	G _{NLEMP} 3	T26A	T24	Level difference of T26A and T24 measured Serial 1	6.5	8.0	9.5	
emphasis characteristics 3	INCLIVII			with V _{IN} = 50 mVp-p, 2 MHz sine wave input 2	4.5	6.0	7.5	
				Differential with G _{EMP} 24 3	2.5	4.0	5.5	dB
Main linear	G _{ME} 1	T26A	T37	Level difference of T26A and T37 measured with	10.5	11.0	11.5	dB
emphasis characteristics 1	- ME			V_{IN} = 50 mVp-p, 500 kHz sine wave input Differential with G _{EMP} 37				
Main linear	G _{ME} 2	T26A	T37	Level difference of T26A and T37 measured with	12.5	13.0	13.5	dB
emphasis characteristics 2	- IVIE			V _{IN} = 50 mVp-p, 2 MHz sine wave input Differential with G _{EMP} 37				
White clip level	L _{WC}	T28A	T37	White clip level at T37 measured with CTL 1	185	195	205	
,	****			V _{IN} = white 100% 1.0 Vp-p 2	176	185	194	%
Dark clip level	L _{DC}	T28A	T37	Dark clip level at T37 measured with CTL 1	-57.5	-52.5	-47.5	
·				V _{IN} = white 100% 1.0 Vp-p 2	-52.0	-47.0	-42.0	%
Video output linearity	LINY	T28A	T38	T38 stair levels measured with video signal 1.0 Vp-p	-0.5	0	+0.5	dB
. ,				(linearity unit, 5 stairs) input. Stair linearity determined by				
				arithmetic processing.				
[PB mode Y]			l	. •	[
Current drain PB	I _{CCP}			5V: pins 36, 41, 47; 7V: pin 76	153	170	187	mA
	001			Sum of influx current at pins 36, 41, 47, 76 measured				
Dropout compensation time	T _{DOC}	T15	T38	T20: 4 MHz, 300 mVp-p sine wave	10.5	12.5	14.5	Н
,	500	T26A		T26A: revert time for T38 output from when 0.5 Vp-p video				
				signal T15 input is set to 0				
DOC characteristics	G _{DOC}	T15	T38	T15: 4 MHz, 300 mVp-p sine wave	-1.5	0	+1.5	dB
	500	T26A		T26A: 0.5 Vp-p video signal		-		
		0, 1		Input/output response 5H after setting T15 input to 0				
PB Y level	V-Y _{OUT}	T15	T38	Playback Y level with DEV = 1.0 MHz FM signal input	2.00	2.10	2.20	Vp-p
Self-recording/playback Y level	R/P- _{OUT}		T38	Playback Y level for self-recording/playback	1.93	2.10	2.27	Vp-p

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Parameter	Symbol	Input	Output	Conditions		Ratings		Unit
- aramotor	-,	mput	Output	Containone	min	typ	max	OTIL
FM demodulator linearity	L _{DEM}	T15	T25	$L_{DEM} = \frac{V_{DEM}^4 - (V_{DEM}^2 + V_{DEM}^6)/2}{V_{DEM}^6 - V_{DEM}^2} \times 100$	-3.5	0	+3.5	%
Carrier leak	CL	T15	T25	Ratio of T25 4 MHz component and SDEM with V_{IN} = 300 mVp-p f = 4 MHz			-35	dB
Playback YNR characteristics	P _{YNR}	T26A	T38	V _{IN} = white 50% + CW (15.8 mVp-p) Serial 00 OFF Ratio of 32 fH component and 10 (weak) 32.5 fH component 01 (medium) 11 (strong)	0 -3.7 -9.2	0 -3.2 -8.2	0 -2.7 -7.2	dB
NI P	0 4	T001	T00	1 29	-13.3	-11.8	-10.3	ID.
Nonlinear deemphasis characteristics 1	G _{NLDE} 1	T26A	T38	Input/output response measured with V _{IN} = white 50% + sine wave f = 2 MHz 158 mVp-p	-3.5	-2.5	-1.5	dB
Nonlinear deemphasis characteristics 2	G _{NLDE} 2	T26A	T38	f=2MHz, 50 mVp-p CTL 1 2 3 4	4.5 2.5 0.5	6.0 4.0 2.0 0	7.5 5.5 3.5	dB
Double noise	G _{WNC} 1	T26A	T38	f = 1.2 MHz, 158 mVp-p, pin 69 open	-4	-3	0 -2	dB
canceler characteristics 1	-WNC 1	1200	100	Gr2 bit 8/7 = "10", Gr5 bit 1 = "1"	-4	-3	-2	עט
Double noise	G _{WNC} 2	T26A	T38	f = 1.2 MHz, 50 mVp-p, pin 69 open	-16.5	-15.0	-13.5	dB
canceler characteristics 2				Gr2 bit 8/7 = "10", Gr5 bit 1 = "1"				L
Double noise canceler characteristics 3	G _{WNC} 3	T26A	T38	f = 1.2 MHz, 15.8 mVp-p, pin 69 open Gr2 bit 8/7 = "10", Gr5 bit 1 = "1"	-32	-30	-28	dB
Double noise	G _{WNC} 4	T26A	T38	f = 2.5 MHz, 15.8 mVp-p, pin 69 open	-9	-8	-7	dB
canceler characteristics 4				Gr2 bit 8/7 = "10", Gr5 bit 1 = "1"				ì
Double noise canceler characteristics 5	G _{WNC} 5	T26A	T38	f = 2.5 MHz, 15.8 mVp-p, pin 69 open Gr2 bit 8/7 = "10", Gr5 bit 1 = "1"	-17	-15	-13	dB
PIC-CTL hard response characteristics 1	G _{PH} 1	T26A	T38	f = 1 MHz, 158 mVp-p, Gr5 bit 6/5/4 = "1/0/0"	2.5	3.5	4.5	dB
PIC-CTL hard response characteristics 2	G _{PH} 2	T26A	T38	f = 2 MHz, 158 mVp-p, Gr5 bit 6/5/4 = "1/0/0"	6	7	8	dB
PIC-CTL soft response characteristics 1	G _{PH} 3	T26A	T38	f = 1 MHz, 158 mVp-p, Gr5 bit 6/5/4 = "0/0/0"	6	7	8	dB
PIC-CTL soft response characteristics 2	G _{PH} 4	T26A	T38	f = 2 MHz, 158 mVp-p, Gr5 bit 6/5/4 = "0/0/0"	-8	-7	-6	dB
Sync tip level Pedestal level White level measurement	L _{VOR}	T26A	T38	T38 video output sync tip (L_{SYN}), pedestal (L_{PED}), white level (L_{WHT}) potential measured with V_{IN} = white 100% 0.5 Vp-p		-		
Simulated V insertion level	ΔVDP	T26A	T38	DC voltage at T38 is measured when 5V is applied to T33. Taking this as L_{VDP} , differential with L_{SYN} above is calculated.	-50	0	+50	mV
Simulated H insertion level	ΔHDP	T26A	T38	DC voltage at T38 is measured when 2.7V is applied to T33. Taking this as $L_{\mbox{\scriptsize HDP}}$, differential with $L_{\mbox{\scriptsize PED}}$ above is calculated.	-100	0	+100	mV
White insertion level	ΔWHP	T26A	T38	DC voltage at T38 is measured when 1.3V is applied to T33. Taking this as L_{WHP} , differential with L_{WHT} above is calculated.	-100	0	+100	mV
Sync separation output level	V _{SYP}	T26A	T37	Pin 37 output pulse crest value measured with V _{IN} = 0.5 Vp-p video signal	4.0	4.2	4.4	Vp-p
Sync separation output pulse width	P _{WSYP}	T26A	T37	Pin 37 output pulse width measured with V _{IN} = 0.5 Vp-p video signal	4.35	4.65	4.95	μs
Sync separation output	ΔT _{SYP}	T26A	T37	Delay of output SYNC vs. input SYNC measured with	0.7	0.9	1.1	μs
Pre-delay time	\/	T00:	T0-	V _{IN} = 0.5 Vp-p video signal		, ,		.,
4V regulator	V _{REG}	T26A	T37	T31 DC level measured	3.8	4.0	4.2	V
FMAGC output level	VF _{AGC}	T15	T17	Pin 17 signal amplitude measured with V _{IN} = 150, 300, 600 mVp-p 4 MHz CW	325	350	375	mVp-p

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Parameter	Symbol	Input	Output	Conditions		Ratings		Unit
	- ,		Jaiput		min	typ	max	2
[REC mode chroma]								
REC chroma	V _{OR} -14	T28A	T14A	T14A burst level measured with V _{IN} = 1 Vp-p CTL 0	215	225	235	mVp-p
low-range converter output level				standard color bar signal 1	180	190	200	
REC chroma/FM ratio	C/FM	T28A	T14A	Down-converted chroma level/FM level ratio with 100%	-3.7	-3.0	-2.3	dB
			T18	chroma input				
				(R _L : 5.1 kΩ)				
Burst emphasis amount	G _{BE}	T28A	T14A	SP/EP and LP T14A burst level ratio with V _{IN} = 1 Vp-p	5.5	6.0	6.5	dB
(NTSC mode)				standard color bar signal				
VXO oscillation level	V _{VXO-RP}	T28A	T56	T56 output amplitude measured with FET probe at	300	500	700	mVp-p
(PAL mode)				V _{IN} = 1 Vp-p standard color bar signal				
VXO oscillation level	V _{VXO-RN}	T28A	T56	T56 output amplitude measured with FET probe at	300	500	700	mVp-p
(NTSC mode)				V _{IN} = 1 Vp-p standard color bar signal				
REC ACC characteristics 1	ACC _R 1	T28A	T14A	V _{IN} = 1 Vp-p standard color bar signal and chroma		0.2	0.5	dB
				signal only boosted by +6 dB				
				T14A burst level measured and compared to VOR-14				
REC ACC characteristics 2	ACC _R 2	T28A	T14A	V _{IN} = 1 Vp-p standard color bar signal and chroma	-0.5	-0.1		dB
				signal only boosted by –6 dB				
				T14A burst level measured and compared to VOR-14				
REC ACC	V _{ACCK-ON}	T28A	T14A	T14A input burst level measured when output goes off		-26		dB
Killer input level				and compared to standard input level, with V _{IN} = 1 Vp-p				
				standard color bar signal and chroma signal being				
				gradually attenuated.				
REC ACC	VOACCK	T28A	T14A	T14A output level measured with spectrum analyzer and		-60	-50	dB
Killer output level	0/10011			compared to VOR-14, in killer condition as described				
·				above.				
REC ACC	V _{ACCK-OFF}	T28A	T14A	From killer condition as described above, T14A input		-20		dB
Demodulator input level				burst level is measured when output goes on with input				
·				chroma level being gradually increased. This is				
				compared to standard input level.				
REC APC	∆f _{APC} 1	T28A	T14A	Input signal: 50% white signal superimposed with	350			Hz
Pull-in range 1				4.4336 MHz 300 mVp-p CW. After checking that T14A				
<u> </u>				output is on, CW frequency is raised until T14A output				
				goes off. Frequency then is gradually reduced.				
REC APC	Af 2	T28A	T14A	CW frequency when T14A output goes on: f1			-350	Hz
	∆f _{APC} 2	1204	1144	Same as above, CW frequency is lowered until T14A			-330	112
Pull-in range 2				output goes off. Then frequency is gradually raised.				
DEC AEC	Af 1	T00 A	T.C.4	CW frequency when T14A output goes on: f2	.10			ld l=
REC AFC	∆f _{AFC} 1	T28A	T51	300 mVp-p, 15.6 kHz pulse train with 5 μs pulse width	+1.0			kHz
Pull-in range 1				is input. Pulse train frequency is raised until T51 output				
				waveform is impaired. Then frequency is lowered.				
				Pulse train frequency when T51 waveform becomes				
	A.f. ^			normal: f1				
REC AFC	∆f _{AFC} 2	T28A	T51	Same as above, pulse train frequency is lowered until T51			-1.0	kHz
Pull-in range 2				output waveform is impaired. Then frequency is raised.				
				Pulse train frequency when T51 waveform becomes				
				normal: f2				
BGP delay time	t _D	T28	T37	T37 and T60 waveforms are observed with standard color	3.1	3.4	3.7	μs
			T60	bar input to T28A				
BGP width	t _W			T60 —	4.7	4.9	5.1	μs
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Doromotor	Cumbal	Innut	Output	Conditions		Ratings		Lloit
Parameter	Symbol	Input	Output	Conditions	min	typ	max	Unit
2 fsc output level	V2 _{fsc}	T28A	T58	T58 level measured in no-signal input condition	360	400	440	mVp-p
2 fsc duty	D2 _{fsc}	T28A	T58	T58 duty measured in no-signal input condition	40	50	60	%
[PB mode chroma chroma]								
PB chroma video	P _{Vop-38}	T15A	T38	From T15A in PB and SP mode, a chroma signal	490	580	670	mVp-p
Output level		T26A		down-converted from the PAL chroma noise test signal				
(PAL mode)				(SP mode, burst 80 mVp-p) and mixed with a 4 MHz				
				300 mVp-p sine wave is input.				
				From T26A, a 50% white signal is input.				
				Burst level is measured at T38.				
PB chroma video	N _{Vop-38}	T15A	T38	From T15A in PB and SP mode, a chroma signal	490	580	670	mVp-p
Output level		T26A		down-converted from the NTSC chroma noise test signal				
(NTSC mode)				(SP mode, burst 160 mVp-p) and mixed with a 4 MHz				
				300 mVp-p sine wave is input.				
				From T26A, a 50% white signal is input.				
				Burst level is measured at T38.				
PB chroma	Vop-46	T15A		Under same conditions as for P _{Vop-38} , T46 burst level is	170	200	230	mVp-p
Pin 46 output level		T26A	T46	measured.				
PB ACC characteristics 1	ACC _P 1	T15A		Under same conditions as for P _{Vop-38} , input chroma		0.5	0.8	dB
		T26A	T46	level is raised by +6 dB. T46 burst level is measured				
				and compared to P _{Vop-46} .				
PB ACC characteristics 2	ACC _P 2	T15A	T46	Under same conditions as for P _{Vop-38} , input chroma	-0.5	-0.2		dB
		T26A		level is raised by –6 dB. T46 burst level is measured				
				and compared to P _{Vop-38} .				
PB killer input level	V _{ACK-P}	T15A	T46	Under same conditions as for P _{Vop-38} , input chroma			-25	dB
		T26A		level is attenuated and input burst level is measured				
				when chroma output at T46 goes off (compared to				
				standard input 80 mVp-p)				
Chroma output level in PPB killer	V _{OACK-P}	T15A	T38	T38 measured with spectrum analyzer and compared to		-44	-40	dB
condition		T26A		P _{Vop-38} in killer condition as described above.				
PB main converter carrier leak	C _{LP}	T15A	T38	Under same conditions as for P _{Vop-38} , T38 is measured		-40	-33	dB
		T26A		with spectrum analyzer and 4.43 MHz component is				
				compared to 5.06 MHz component.				
Burst deemphasis	G _{BD}	T15A	T46	629 kHz, 160 mVp-p CW is mixed with 4 MHz, 300 mVp-p	-5.75	-5.50	-5.25	dB
(NTSC mode)		T26A		CW and input to T15A.				
				50% white signal is input from T26A.				
				Output level during T46 burst interval and during other				
				times is compared.				
PB XO output level	V _{XO-PP}		T59	T59 output level measured with FET probe in PB mode	300	500	700	mVp-p
(PAL mode)								
PB XO oscillator frequency	Δf_{XOP}		T59	T59 frequency measured in PB mode: f	-9	0	+9	Hz
deviation (PAL mode)								
NTSC -> PAL conversion	V _{BNAP}	T15A		From T15A, down-converted chroma noise test signal	-1	0	+1	dB
V axis burst level		T26A	T38	mixed with 4 MHz, 300 mVp-p CW is input.				
				From T26A, 50% white signal is input.				
				-45° burst level at T38 is measured and compared to				
				P _{Vop-38}				
NTOO DAI '		T15A		Under same conditions as above, +45° burst level is	-2	0	+2	dB
NTSC -> PAL conversion	ΔB-NAP	110/1		Officer same conditions as above, ++5 burst level is	-1	0		

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Parameter	Symbol	Input	Output	Conditions		Ratings		Unit
i didilicici	Symbol	input	Juiput	Conditions	min	typ	max	Oint
NTSC -> PAL conversion chroma	P-NAP	T15A		4 MHz, 300 mVp-p CW and 100% chroma signal phase	160	180	200	deg
phase		T26A	T38	shifted by –90° from burst are mixed and input to T15A.				
				50% white signal is input to T26A.				
				Chroma phase when pin 67 is 0V is measured and taken				
				as $\theta 1$. Chroma phase when pin 67 is 5V is measured and				
				taken as θ 2. P-NAP = θ 1 – θ 2				
[REC mode/EQ]								
REC EQ characteristics 1	G _{REQ1}	T22	T18	$V_{IN} = 500 \text{ mVp-p}, f = 4 \text{ MHz}$	-3	-2	-1	dB
				Input/output response measured				
REC EQ secondary distortion	H _{REQ}	T22	T18	Under same conditions as above, secondary harmonics		-40	-35	dB
				are measured.				
REC EQ characteristics 2	G _{REQ2}	T22	T18	V _{IN} = 500 mVp-p, f = 627 kHz			-20	dB
				Input/output response measured				
REC EQ characteristics 3	G _{REQ3}	T22	T18	V _{IN} = 500 mVp-p, f = 1.07 MHz			-20	dB
				Input/output response measured				
REC EQ characteristics 4	G _{REQ4}	T22	T18	V _{IN} = 500 mVp-p, f = 4.5 MHz	-3.3	-2.3	-1.3	dB
				Input/output response measured				
REC EQ characteristics 5	G _{REQ5}	T22	T18	$V_{IN} = 500 \text{ mVp-p, f} = 2.0 \text{ MHz}$	-1	0	+1	dB
				Input/output response measured				
[PB mode/EQ]	•				•		•	
PB EQ characteristics 1	G _{PEQ1}	T15A	T17	$V_{IN} = 400 \text{ mVp-p}, f = 4 \text{ MHz}$	-2.5	-1.1	0.0	dB
				Input/output response measured				
PB EQ secondary distortion	H _{PEQ}	T15A	T17	Under same conditions as above, secondary harmonics		-40	-30	dB
				are measured.				
PB EQ characteristics 2	G _{PEQ2}	T15A	T17	V _{IN} = 400 mVp-p, f = 627 kHz			-30	dB
				Input/output response measured				
PB EQ characteristics 3	G _{PEQ3}	T15A	T17	V _{IN} = 400 mVp-p		7.8		MHz
				High-range trap frequency and gain measured			-25	dB
PB EQ characteristics 4	G _{PEQ4}	T15A	T17	V _{IN} = 400 mVp-p, f = 1.07 MHz			-30	dB
				Input/output response measured				
PB EQ characteristics 5	G _{PEQ5}	T15A	T17	V _{IN} = 400 mVp-p, f = 4.5 MHz	-1	0	+1	dB
	- 40			Input/output response measured				
PB EQ characteristics 6	G _{PEQ6}	T15A	T17	V _{IN} = 400 mVp-p, f = 2.0 MHz	-11	-10	-9	dB
	1 2 30		l	Input/output response measured				

Electrical Characteristics of Audio System

Parameter	Symbol	lmm4	Output	Conditions		Ratings		Llmit
Farameter	Symbol	Input	Output	Conditions	min	typ	max	Unit
LINE AMP voltage gain (PB)	V_{GLP}	T11	T77	$V_{IN} = -30 \text{ dBV}$	23.0	23.5	24.0	dB
LINE AMP voltage gain	V_{GLR}	T71	T77	$V_{IN} = -30 \text{ dBV}$	23.0	23.5	24.0	dB
(A1, A2, A3)		T73						
		T75						
LINE AMP distortion (PB)	THD_L	T11	T77	$V_{IN} = -30 \text{ dBV}$	0.01	0.1	0.4	%
LINE AMP	V_{NOL}	_	T77	Rg = 1 k Ω , DIN audio filter	-80.0	-74.0	-70.5	dBV
Output noise voltage (PB)								
LINE AMP	V _{OML}	T11	T77	Output voltage for 1% THD : V _{CC} = 6.8V	1.3	1.5	1.7	Vrms
Maximum output voltage (PB)				: V _{CC} = 7.5V	1.5	1.7	1.9	VIIIIS
Output voltage with	V_{OA}	T73	T77	$V_{IN} = -28 \text{ dBV}$	-7	-6	-5	dBV
LINE AMP ALC								
LINE AMP ALC effect	ALC	T73	T77	T73 input level reduced from -28 dBV to -8 dBV	0	1	3	dB
LINE AMP ALC distortion	THD _A	T73	T77	$V_{IN} = -28 \text{ dBV}$	0.01	0.1	0.5	%
MUTE attenuation	M _{PB}	T11	T77	-10 dBV signals applied to all inputs and MUTE enabled.				
	M _A 1	T71			80	90	120	dB
	M _A 2	T73			80	90	120	uБ
	M _A 3	T75						
EQ AMP open circuit voltage gain	VG _{OE}	T7	T10	$V_{IN} = -66 \text{ dBV}$	58	64	70	dB
EQ AMP input converted noise	V _{NIE}	_	T10	Rg = 620Ω , DIN audio filter	0.1	0.8	1.8	μVrms
voltage								
REC AMP voltage gain	VG _R	T79	T1	$V_{IN} = -20 \text{ dBV}$	13.6	14.1	14.6	dB
REC AMP distortion	THD _R	T79	T1	$V_{IN} = -20 \text{ dBV}$	0.001	0.1	0.4	%
REC AMP	V_{OMR}	T79	T1	Output voltage for 1% THD : V _{CC} = 6.8V	1.3	1.5	1.7	\
Maximum output voltage				Output voltage for 1% THD : V _{CC} = 7.5V	1.5	1.7	1.9	Vrms
Current drain (REC)	I _{CCRA}	_	_	Influx current measured at pin 76 : V _{CC} = 6.8V	8.8	11.0	13.2	mA
				(no-signal condition) : $V_{CC} = 7.5V$	9.2	11.5	13.8	IIIA
Current drain (PB)	I _{CCPA}	_	_	Influx current measured at pin 76 : V _{CC} = 6.8V	7.6	9.5	11.4	0
				(no-signal condition) : $V_{CC} = 7.5V$	8.0	10.0	12.0	mA
DC offset voltage (PB) in MUTE	MT _{DCO}	_	T77	DC offset voltage at pin 77 measured for MUTE ON	0	30	50	mV
condition				(no-signal condition)				

Pin Function

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
1	A-REC-OUT	3.3V	CW, 3.2 Vp-p	Power ON/OFF ΔVCC 1 100kΩ 15kΩ A10277
2	A-GND	ov		
3	A-EQ-SW1	3.3V	REC MODE SP-CW LP, EP-0V REC MODE NONE	REC-LP, EP (H) 3 55kΩ \$\frac{1}{2} 50kΩ A10278
4	A-EQ-SW2	ov	REC MODE NONE PB, EP MODE SP, LP-CW EP-0V	PB-EP (H)
5	A-REC-SW	3.3V	REC MODE DC V _{REF} PB MODE CW 1 mVp-p	REC 5 VREF A10280
6	A-HEAD SW-CTL	REC 7V	- DC	PB ⊕ 6 50kΩ ₹
7	A-EQ-IN	3.3V	REC DC 3.3V PB CW, 1 mVp-p	↑ ^V REF
8	A-EQ-NFB	3.3V	REC DC 3.3V PB CW, 1 mVp-p	100µA 8 A10282

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
9	A-EQ-SW1	3.3V	REC DC 3.3V	SL/LP (H)
10	A-EQ-OUT	3.3V	CW, 95 mVp-p REC DC 3.3V PB CW, 95 mVp-p	100µA A10283
11	AJ INE DRJIN	3.3V	REC DC 3.3V	120kΩ 120kΩ 500Ω 11) W
11 A-LINE-PB-IN	A-LINE-F D-IIN	5.50	PB CW 95 mVp-p	500Ω 100μA A10284
12	AGC-TC1	REC 2.3V	DC	200Ω \$1kΩ \$200Ω 200Ω \$500Ω 500Ω \$500Ω
	Carrier Leak Balancer	PB 2.3V	DC	500Ω 1 1kΩ 12 1kΩ 50μA(REC)
13	ACC-FILT	REC 1.8V	, DC	13) ≥200Ω 2kΩ 1kΩ W
		PB 1.8V		250Ω 50kΩ ₹ A10286
14	REC-C-OUT	REC 2.8V	200mVp-p 627kHz ↓	₹200Ω 14
14		PB 0V	A10287	650μA(REC)

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
15	PB Y-FM/C-IN	REC 4.2V	PB-Y-FM 400 mVp-p	200Ω 15 500Ω 10kΩ 3.70V
15	C-IN (FROM Pre)	PB 3.2V	A10289	500Ω 10kΩ 10pF 100μA
16	16 PM (R03)	REC 1.6V	DC	\$1kΩ \$1kΩ REG
		PB 1.6V		300Ω 1kΩ A10291
17	PB-EQ-OUT	REC 2.6V	FM 730 mVp-p	₹200Ω 100Ω
		PB 2.6V	PB Y-FM 340 mVp-p	180μA(PB) A10293
18	REC-Y FM-OUT	REC 1.9V	PEC Y-FM 730 mVp-p	≥200Ω 100Ω
10	TWOOT	PB 1.9V	A10294	(18)
		REC 4.2V		4+ 4+
19	REC-H-OUT	REC PAUSE 2.5V	DC	\$22k\Omega \
		EE or PB 0V		50kΩ ₹ 30kΩ A10296

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
		REC 4.7V	FM 700 mVp-p	20 8kΩ 500Ω L W W
20	PB-Y-FM-IN (FROM EQ)	PB 2.5V	PB-Y FM 320 mVp-p	3.25V 8κΩ 500Ω 100μA(PB) A10298
21	AGC-TC2	REC 1.6V	DC	125μA 2kΩ \$ \$ \$ 500Ω 200Ω 500Ω 1kΩ \$
		PB 1.7V		21 \$30kΩ REC-ON A10299
22	PB-EMITTER	REC 0V	DC	₹200Ω × × × × × × × × × × × × × × × × × × ×
	-PEAKING	PB 2.6V	340mVp-p	200Ω (22) ≥50kΩ A10301
23	MAIN-EMPH	REC 2.1V	500 mV 2.1V	24 ≥200Ω ≥2kΩ ≥2kΩ
20	OUT	PB 0V		23 - M - 1kΩ - 2pF - A10303
24	MAIN-EMPH FILTER	REC 2.1V	00 mVp-p 2.1V	24) \$200Ω \$2kΩ \$2kΩ \$200Ω \$2kΩ
		PB 0V	DC	500Ω

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
25	REC-Y	REC 1.6V	500mVp-p A10306	640µA
23	MAIN-DE-EMPH. OUT	PB 1.2V	500mVp-p A10307	2.5kΩ A10308
26	CLAMP-IN	REC 2.9V	500mVp-p 	\$30kΩ \$ \$15kΩ \$200Ω
20	CLAWIT-IIV	PB 2.8V	500mVp-p A10310	\$20kΩ 26 400μA A10311
27	Y-GND	0V		
28	VIDEO-IN1	REC VSYNC 1.7V	1.0Vp-p	288 200Ω \$50ΚΩ]10ΚΩ \$2.3V T
		PB 0V	DC	22µA 24µA 24µA A10313
29	FBC-FILT (Feed Back Clamp)	REC 2.6V	DC	7.5kΩ \$ 500Ω \$ 29 \$ 500Ω \$ 50
	(Lect Back Gramp)	PB 2.6V		300kΩ \$20kΩ 130μA A10314
30	VIDEO-IN2	REC VSYNC 1.7V	1.0Vp-p	30 200Ω 50kΩ 10kΩ
		PB 0V		2.3V 22µA 24µA 24µA A10316

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
31	REG	REC 4.1V	DC	31
		PB 4.1V		₹10kΩ A10317
32	VIDEO-IN3	REC V _{SYNC} 1.7V	1.0Vp-p	32) 200Ω \$50kΩ 10kΩ 2.3V 7
		PB 0V		22µA 24µA A10319
33	QV/QH-INS CHARA-INS		0 to 0.8V : Through 1.0 to 2.2V : Character Ins. 2.5 to 3.2V : QH Ins. 3.8 to V _{CC} V : QV Ins.	50μA 50μA 1κΩ 1κΩ 10κΩ 10κΩ 330κΩ 330κΩ 410320
34	VPS-OUT	REC VSYNC 1.7V	1.0Vp-p	₹200Ω - (34)
		PB 0V		470µA A10322
35 VIDEO	VIDEO-AGC-IN	REC 2.3V	1.0Vp-p	4V 35 7.5kΩ ₹ 7.5kΩ ₹
		PB 3.1V		₹17kΩ

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
36	Y-V _{CC}	5V	DC	
37	SYNC-OUT		4.2V	20kΩ \$500Ω \$500Ω 20kΩ \$500Ω 20kΩ \$500Ω 37 \$50kΩ
38	VIDEO-OUT	V _{SYNC} 0.8V	2.1Vp-p 	100Ω \$ 100Ω \$ REG \$200Ω \$ 15.5kΩ \$ 38 11kΩ \$ 26kΩ \$ 1.8μA A10328
39	VCA-FILT	REC 3.1V PB 3.1V	DC	\$1kΩ \$1kΩ 39 9kΩ\$
40	VCA-IN (CLAMP)	REC 2.8V	350 mVp-p A10330	200μΑ Α10329
		PB 2.8V	350mVp-p	100μA A10332
41	V _{CC} 2	5V	DC	

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
10		REC 1.8V	350mVp-p 	≥ 350Ω ► 350Ω
42	Y-CCD-DRIVE	PB 1.8V	370mVp-p 	42) 370µА ////////////////////////////////////
43	NTSC-HOUT	NTSC MODE 4.2V	DC	≥ 200Ω
40	43 NTSC-H OUT	WITHOUT NTSC MODE 0V		43 \$50kΩ \$50kΩ A10336
44	PQ 2 (RO2)	REC 1.7V	DC	%1kΩ ₹1kΩ REG
	. 42 ((62)	PB 1.8V		\$300Ω \$\frac{1}{44}\$\$\frac{1}{2}\$\$\kΩ\$\$\frac{1}{2}\$\$\kΩ\$\$\ldots\$\$\A10337\$\$
45	PB CHROMA IN	REC 1.8V	210mVp-p	\$4kΩ \$1kΩ \$65kΩ
		PB 1.9V	A10338	45) \$35kΩ A10339
	PB CHROMA OUT	REC 0V	210mVp-p	₹100Ω ———————————————————————————————————
		PB 2.0V	A10340	46 400µA (PB)

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
47	C-V _{CC}	5V	DC	
40	C CCD DDIVES	REC 2.8V	150mVp-p	
48	C-CCD-DRIVE2	PB 2.8V	130mVp-p ↓	440µA (PB)
49	SLD-FILT	REC 4.0V	38	\$5000\\$2000\\$5000
	49 SLD-FILI	PB 4.1V		22kΩ \$ \$1kΩ \$2kΩ 51 A10345
50	C-CCD-DRIVE 1	REC 2.9V	150mVp-p	\$250Ω
		PB 2.9V	130mVp-p	440µA A10348
51	AFC/APC-FILT	REC 4.0V	→ ↓ ↓ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑	500kΩ \$ 200Ω \$ 500kΩ
or Are	7.1 67.1 67.1	PB 4.0V	Field A10350	22kΩ \$1kΩ (51)
52	C-CCD-IN	3.2V	140mVp-p	97µA 52 10kΩ A10353

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
53	PA STOP-TR-SW	ov	DC	P.A.STOP (53) A10354
54	REC-APC-FILTER	2.1V	H A10355	50kΩ 70kΩ 70kΩ A10356
55	VXO/XO-IN	REC 4.0V PB 3.9V	600mVp-p A10358	(55) 2000 50000 2kg
	VXO/XO-OUT	REC 2.5V	A10358 A10360	62μA 90μA 650μA 340μA (XO) (YXO) 100Ω ₹ 200Ω ₹ 900Ω ₹ 2kΩ 100Ω ₹ 100Ω
56 VXO/XO-OUT	VXG/XG-GG1	PB 2.5V	500mVp-p	300kΩ 900μΑ 100μΑ 500μΑ (XO) (XO)
57	C-GND	ov	DC	
58	2 fsc/PB-H OUT	REC 1.5V	400mVp-p	5kΩ 200Ω -
		PB 2.8V	400mVp-p	200Ω 58 ₹500Ω A10365

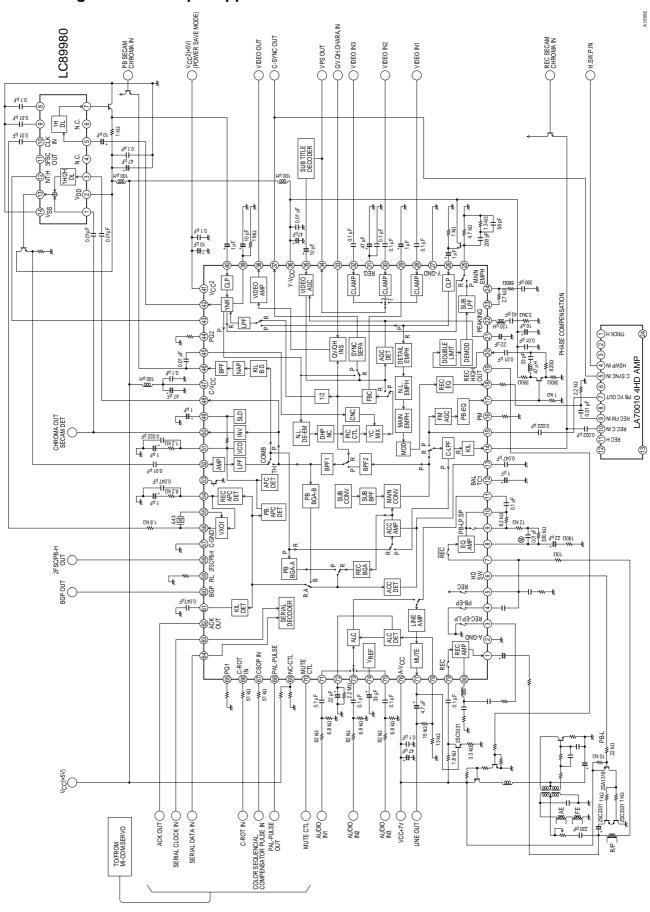
Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit	
59	RL	REC 1.5V	DC	kΩ ≥1kΩ REG	
	(RO4)	PB 1.5V	DC	\$300Ω \$1kΩ \$1kΩ A10366	
60	BGP-OUT		SYNC+BGP SYNC 1.4V (typ) BGP 4.0V or MORE	50kΩ \$20kΩ A10367	
61	KILL-FILT	Color 2.0V	DC	1kΩ ₹ \$200Ω 5kΩ	
		killer 3.0V		1kΩ \$ 260Ω \$ 72.5V 61	
62	ACK/SLD OUT	ACK-OUT MODE	KILLER MODE 4V or MORE COLOR MODE 0V	200Ω \$ \$2kΩ \$2kΩ KIL H \$\frac{1}{200}\$	
	V2 ACIVISED COT	SLD-OUT MODE	0µА	SLD PULSE 62)	
63	SERIAL- CLOCK-IN		3.0V 5V 1.6V 0V	50μA 515kΩ 25kΩ 25kΩ 63 300Ω 60kΩ	

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
64	SERIAL- DATA-IN		3.0V 5V 1.5V 0V	50μA \$\bigset\$15k\\Omega\$25k\\Omega\$30\\Omega\$30\\Omega\$ACK\$\$\bigset\$60k\\Omega\$410374
65	PQ1 (RO1)	REC 1.6V PB 1.6V	DC	300Ω REG 31kΩ REG 31kΩ REG 31kΩ REG
66	C-ROTARY- PULSE-IN		0.8V 0 A10376	85kΩ 1kΩ 1kΩ 20kΩ A10377
67	CSC-PULSE-IN		0.8V 0 A10378	67 1kΩ 20kΩ A10379
68	PAL-PULSE	+45° 4V or MORE +45° 1V or LESS		50kΩ (68)
69	NC-CTL	REC 2.1V PB 2.1V	DC	40kΩ \$ \$17kΩ 40kΩ \$ \$22kΩ \$ \$00Ω 40kΩ \$ \$ \$23kΩ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$

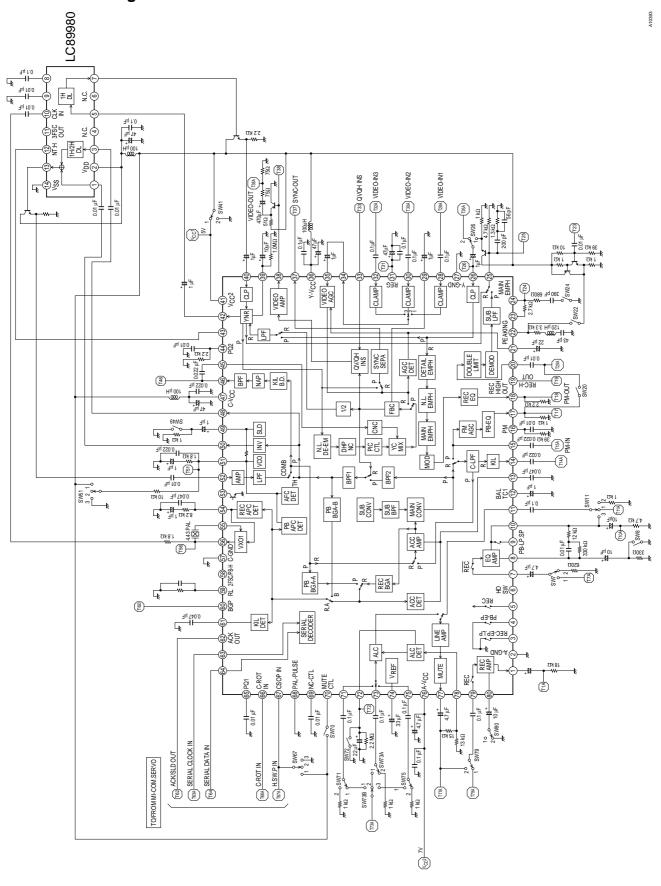
Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
70	A-MUTE- ON/OFF	MUTE 3V or MORE	DC	10kΩ \$ 2.5V 45kΩ \$ A10382
71	A-LINE-IN1	3.3V	REC CW, 95 mVp-p	VREF ↑ 120kΩ≱ 71
		3.30	PB DC 3.3V	100µA A10383
72	A-ALC-DET	ov	REC: ADAPTIVE	VCC 200Ω\$ 150Ω\$ 2kΩ 10kΩ\$ A10384
			PB DC 0V	
73	A-LINE-IN2	3.3V	REC CW, 95 mVp-p	
73	A-LINE-IIVZ		PB DC 3.3V	100µA A10385
74	A-V _{REF-} FILTER	3.3V	DC	24kΩ 500Ω 500Ω 500Ω 500Ω 500Ω 500Ω 500Ω A10386

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
75	A-LINE-IN3	3.3V	REC CW, 95 mVp-p	V _{REF} 120kΩ 75
73	A-LINE-INS	5.50	PB DC 3.3V	100µA A10387
76	A-V _{CC}	7V	DC	
77	A-LINE-OUT	3.3V	CW, 1.4 Vp-p	Power ON/OFF (H) VCC 77 75kΩ §10kΩ A10388
78	A-ALC DET-IN	ΟV	CW, 1.0 Vp-p	78 - W - A10389
79	A-REC-IN	3.3V	REC CW, 745 mVp-p	V _{REF} 120kΩ \$ 79 - W - 500Ω
	AREO		PB DC 3.3V	100µA A10390
80	A-REC-NFB	3.3V	REC CW 745 mVp-p	VREF VREF ↑ 1.8kΩ \$ \$120kΩ 1.8kΩ \$ √ 500Ω (80)
	A-NEO-INFD	. J.J.V	PB DC 3.3V	7.3kΩ ₹ 100μA A10391

Block Diagram and Sample Application Circuit



Test Circuit Diagram



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