



LA71521M

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

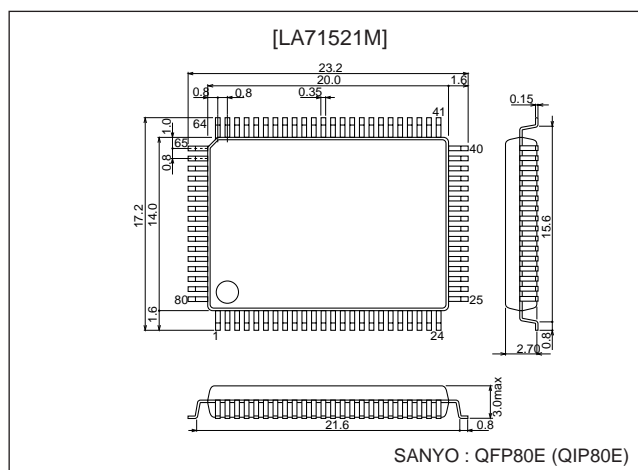
Overview

The LA71521M 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. 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 $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$		7	V
Allowable power dissipation	$P_d \text{ max}$	$T_a \leq 65^\circ\text{C}$ 114.3 x 76.1 mm ² x 1.6 mm ³ with paper phenol substrate	1400	mW
Operating temperature	T_{opr}		-10 to +65	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +150	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		5	V
Recommended operating supply voltage range	$V_{CC \text{ opg}}$		4.8 to 5.2	V

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Operating Characteristics at Ta = 25°C, VCC = 5V

Parameter	Symbol	Input	Output	Conditions	Ratings			Unit	
					min	typ	max		
[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 _{EE1}	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 _{EE2}	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-p LUMI, 600 mVp-p SYNC	550	650	750	mVp-p	
AGC characteristics 4	AGC4	T28A	T38	T38 SYNC level measured with V _{IN} = 700 mVp-p LUMI, 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 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 V _{IP} = 1 Vp-p standard color bar signal input	Serial 00 OFF 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 _{LPF1}	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 _{LPF2}	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 _{LPF3}	T28A	T25	3 MHz response of T25 vs. 500 kHz with V _{IN} = 1 Vp-p standard multiburst signal	-4	-2	0	dB	
Y _{LPF} frequency response characteristics 4	Y _{LPF4}	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)	F _{FM1}		T18	T18 output frequency measured in no-signal input condition	3.725	3.8	3.875	MHz	
Carrier frequency 2 (NTSC)	F _{FM2}				3.325	3.4	3.475	MHz	

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Parameter	Symbol	Input	Output	Conditions	Ratings			Unit	
					min	typ	max		
REC-FM output level Secondary distortion	H _{MOD}		T18	Secondary distortion measured in no-signal input condition		-40	-35	dB	
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 f _{2.85} 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 _{EMP24} G _{EMP37}	T26A	T24 T37	Level difference of T26A and T37 measured with V _{IN} = 500 mVp-p, 10 kHz sine wave input	-0.75	-0.25	+0.25	dB	
Detail enhancer characteristics 1	G _{ENH1}	T26A	T24	Level difference of T26A and T37 measured with V _{IN} = 158 mVp-p, 2 MHz sine wave input Differential with G _{EMP24}	0.1	0.6	1.1	dB	
Detail enhancer characteristics 2	G _{ENH2}	T26A	T24	Level difference of T26A and T24 measured with V _{IN} = 50 mVp-p, 2 MHz sine wave input Differential with G _{EMP24}	1.3	2.3	3.3	dB	
Detail enhancer characteristics 3	G _{ENH3}	T26A	T24	Level difference of T26A and T24 measured with V _{IN} = 15.8 mVp-p, 2 MHz sine wave input Differential with G _{EMP24}	1.8	3.3	4.8	dB	
Nonlinear emphasis characteristics 1	G _{NLEMP1}	T26A	T24	Level difference of T26A and T24 measured with V _{IN} = 500 mVp-p, 2 MHz sine wave input Differential with G _{EMP24}	0.3	1.2	2.1	dB	
Nonlinear emphasis characteristics 2	G _{NLEMP2}	T26A	T24	Level difference of T26A and T24 measured with V _{IN} = 158 mVp-p, 2 MHz sine wave input Differential with G _{EMP24}	2.5	3.8	5.0	dB	
Nonlinear emphasis characteristics 3	G _{NLEMP3}	T26A	T24	Level difference of T26A and T24 measured with V _{IN} = 50 mVp-p, 2 MHz sine wave input Differential with G _{EMP24}	Serial 1 2 3 4	6.5 4.5 2.5 0	8.0 6.0 4.0 0	9.5 7.5 5.5 0	dB
Main linear emphasis characteristics 1	G _{ME1}	T26A	T37	Level difference of T26A and T37 measured with V _{IN} = 50 mVp-p, 500 kHz sine wave input Differential with G _{EMP37}	10.5	11.0	11.5	dB	
Main linear emphasis characteristics 2	G _{ME2}	T26A	T37	Level difference of T26A and T37 measured with V _{IN} = 50 mVp-p, 2 MHz sine wave input Differential with G _{EMP37}	12.5	13.0	13.5	dB	
White clip level	L _{WC}	T28A	T37	White clip level at T37 measured with V _{IN} = white 100% 1.0 Vp-p	CTL 1 2	185 176	195 185	205 194	%
Dark clip level	L _{DC}	T28A	T37	Dark clip level at T37 measured with V _{IN} = white 100% 1.0 Vp-p	CTL 1 2	-57.5 -52.0	-52.5 -47.0	-47.5 -42.0	%
Video output linearity	L _{INY}	T28A	T38	T38 stair levels measured with video signal 1.0Vp-p (linearity unit, 5 stairs) input. Stair linearity determined by arithmetic processing.		-0.5	0	+0.5	dB
[PB mode Y]									
Current drain PB	I _{CCP}			5V: pins 36, 41, 47; 7V: pin 76 Sum of influx current at pins 36, 41, 47, 76 measured		153	170	187	mA
Dropout compensation time	T _{DOC}	T15 T26A	T38	T20: 4 MHz, 300 mVp-p sine wave T26A: revert time for T38 output from when 0.5 Vp-p video signal T15 input is set to 0		10.5	12.5	14.5	H
DOC characteristics	G _{DOC}	T15 T26A	T38	T15: 4 MHz, 300 mVp-p sine wave T26A: 0.5Vp-p video signal Input/output response 5H after setting T15 input to 0		-1.5	0	+1.5	dB
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
					min	typ	max	
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	V _{IN} = 300 mVp-p f = 4 MHz Ratio of T25 4 MHz component and SDEM			-35	dB
Playback YNR characteristics	P _{YNR}	T26A	T38	Ratio of 3 fH component and 32.5 fH component with V _{IN} = white 50% + CW (15.8 mVp-p) Serial 00 OFF 10 (weak) 01 (medium) 11 (strong)	0 -3.7 -9.2 -13.3	0 -3.2 -8.2 -11.8	0 -2.7 -7.2 -10.3	dB
Nonlinear deemphasis characteristics 1	G _{NLDE1}	T26A	T38	Input/output response measured with V _{IN} = white 50% video + sine wave f = 2 MHz 158 mVp-p	-3.5	-2.5	-1.5	dB
Nonlinear deemphasis characteristics 2	G _{NLDE2}	T26A	T38	f = 2 MHz, 50 mVp-p CTL 1 2 3 4	4.5 2.5 0.5 0	6.0 4.0 2.0 0	7.5 5.5 3.5 0	dB
Double noise canceler characteristics 1	G _{WNC1}	T26A	T38	f = 1.2 MHz, 158 mVp-p, pin 69 open Gr2 bit 8/7 = "10", Gr5 bit 1 = "0"	-3	-2	-1	dB
Double noise canceler characteristics 2	G _{WNC2}	T26A	T38	f = 1.2 MHz, 50 mVp-p, pin 69 open Gr2 bit 8/7 = "10", Gr5 bit 1 = "0"	-7.5	-6.0	-4.5	dB
Double noise canceler characteristics 3	G _{WNC3}	T26A	T38	f = 1.2 MHz, 15.8 mVp-p, pin 69 open Gr2 bit 8/7 = "10", Gr5 bit 1 = "0"	-14	-12	-10	dB
Double noise canceler characteristics 4	G _{WNC4}	T26A	T38	f = 2.5 MHz, 15.8 mVp-p, pin 69 open Gr2 bit 8/7 = "10", Gr5 bit 1 = "0"	-6	-5	-4	dB
Double noise canceler characteristics 5	G _{WNC5}	T26A	T38	f = 2.5 MHz, 15.8 mVp-p, pin 69 open Gr2 bit 8/7 = "10", Gr5 bit 1 = "0"	-9.5	-8.0	-6.5	dB
PIC-CTL hard response characteristics 1	G _{PH1}	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 _{PH2}	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 _{PH3}	T26A	T38	f = 1 MHz, 158 mVp-p, Gr5 bit 6/5/4 = "0/0/0"	-4.5	-3.5	-2.5	dB
PIC-CTL soft response characteristics 2	G _{PH4}	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	700	800	900	mV
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 _{HDP} , differential with L _{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 Pre-delay time	ΔT _{SYP}	T26A	T37	Delay of output SYNC vs. input SYNC measured with V _{IN} = 0.5 Vp-p video signal	0.7	0.9	1.10	μs
4V regulator	V _{REG}		T31	T31 DC level measured	3.8	4.0	4.2	V
FMAGC output level	V _{FAGC}	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
					min	typ	max	
[REC mode chroma]								
REC chroma low-range converter output level	V_{OR-14}	T28A	T14A	T14A burst level measured with $V_{IN} = 1$ Vp-p CTL 0 standard color bar signal	215 180	225 190	235 200	mVp-p
REC chroma/FM ratio	C/FM	T28A	T14A T18	Down-converted chroma level/FM level ratio with 100% chroma input ($R_L: 5.1$ k Ω)	-3.7	-3.0	-2.3	dB
Burst emphasis amount (NTSC mode)	G_{BE}	T28A	T14A	SP/EP and LP T14A burst level ratio with $V_{IN} = 1$ Vp-p standard color bar signal	5.5	6.0	6.5	dB
VXO oscillation level (PAL mode)	V_{VXO-RP}	T28A	T56	T56 output amplitude measured with FET probe at $V_{IN} = 1$ Vp-p standard color bar signal	300	500	700	mVp-p
VXO oscillation level (NTSC mode)	V_{VXO-RN}	T28A	T56	T56 output amplitude measured with FET probe at $V_{IN} = 1$ Vp-p standard color bar signal	300	500	700	mVp-p
REC ACC characteristics 1	ACC_{R1}	T28A	T14A	T14A burst level measured and compared to VOR-14 with $V_{IN} = 1$ Vp-p standard color bar signal and chroma signal only boosted by +6 dB		+0.2	+0.5	dB
REC ACC characteristics 2	ACC_{R2}	T28A	T14A	T14A burst level measured and compared to VOR-14 with $V_{IN} = 1$ Vp-p standard color bar signal and chroma signal only boosted by -6 dB	-0.5	-0.1		dB
REC ACC Killer input level	V_{ACK-ON}	T28A	T14A	T14A input burst level measured when output goes off and compared to standard input level, with $V_{IN} = 1$ Vp-p standard color bar signal and chroma signal being gradually attenuated.		-26		dB
REC ACC Killer output level	V_{OACK}	T28A	T14A	T14A output level measured with spectrum analyzer and compared to VOR-14, in killer condition as described above.		-60	-50	dB
REC ACC Demodulator input level	$V_{ACK-OFF}$	T28A	T14A	From killer condition as described above, T14A input burst level is measured when output goes on with input chroma level being gradually increased. This is compared to standard input level.		-20		dB
REC APC Pull-in range 1	Δf_{APC1}	T28A	T14A	Input signal: 50% white signal superimposed with 4.4336 MHz 300 mVp-p CW. After checking that T14A output is on, CW frequency is raised until T14A output goes off. Frequency then is gradually reduced. CW frequency when T14A output goes on: f1	350			Hz
REC APC Pull-in range 2	Δf_{APC2}	T28A	T14A	Same as above, CW frequency is lowered until T14A output goes off. Then frequency is gradually raised. CW frequency when T14A output goes on: f2			-350	Hz
REC AFC Pull-in range 1	Δf_{AFC1}	T28A	T51	300 mVp-p, 15.6 kHz pulse train with 5 μ s pulse width is input. Pulse train frequency is raised until T51 output waveform is impaired. Then frequency is lowered. Pulse train frequency when T51 waveform becomes normal: f1	+1			kHz
REC AFC Pull-in range 2	Δf_{AFC2}	T28A	T51	Same as above, pulse train frequency is lowered until T51 output waveform is impaired. Then frequency is raised. Pulse train frequency when T51 waveform becomes normal: f2			-1	kHz
BGP delay time	t_D	T28	T37 T60	T37 and T60 waveforms are observed with standard color bar input to T28A	3.1	3.4	3.7	μ s
BGP width	t_W				4.7	4.9	5.1	μ s

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Parameter	Symbol	Input	Output	Conditions	Ratings			Unit
					min	typ	max	
2 fsc output level	V_{2fsc}	T28A	T58	T58 level measured in no-signal input condition	360	400	440	mVp-p
2 fsc duty	D_{2fsc}	T28A	T58	T58 duty measured in no-signal input condition	40	50	60	%
[PB mode chroma chroma]								
PB chroma video Output level (PAL mode)	P_{Vop-38}	T15A T26A	T38	From T15A in PB and SP mode, a chroma signal down-converted from the PAL chroma noise test signal (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.	490	580	670	mVp-p
PB chroma video Output level (NTSC mode)	N_{Vop-38}	T15A T26A	T38	From T15A in PB and SP mode, a chroma signal down-converted from the NTSC chroma noise test signal (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.	490	580	670	mVp-p
PB chroma Pin 46 output level	V_{op-46}	T15A T26A	T46	Under same conditions as for P_{Vop-38} , T46 burst level is measured.	170	200	230	mVp-p
PB ACC characteristics 1	ACC_{p1}	T15A T26A	T46	Under same conditions as for P_{Vop-38} , input chroma level is raised by +6 dB. T46 burst level is measured and compared to P_{Vop-38} .		0.5	0.8	dB
PB ACC characteristics 2	ACC_{p2}	T15A T26A	T46	Under same conditions as for P_{Vop-38} , input chroma level is raised by -6 dB. T46 burst level is measured and compared to P_{Vop-38} .	-0.5	-0.2		dB
PB killer input level	V_{ACK-P}	T15A T26A	T46	Under same conditions as for P_{Vop-38} , input chroma level is attenuated and input burst level is measured when chroma output at T46 goes off (compared to standard input 80 mVp-p)			-25	dB
Chroma output level in PPB killer condition	V_{OACK-P}	T15A T26A	T38	T38 measured with spectrum analyzer and compared to P_{Vop-38} in killer condition as described above.		-44	-40	dB
PB main converter carrier leak	C_{LP}	T15A T26A	T38	Under same conditions as for P_{Vop-38} , T38 is measured with spectrum analyzer and 4.43 MHz component is compared to 5.06 MHz component.		-40	-33	dB %
Burst deemphasis (PAL mode)	G_{BD}	T15A T26A	T46	629 kHz, 160 mVp-p CW is mixed with 4 MHz, 300 mVp-p CW and input to T15A. 50% white signal is input from T26A. Output level during T46 burst interval and during other times is compared.	-5.75	-5.50	-5.25	dB
PB XO output level (NTSC mode)	V_{XO-PP}		T59	T59 output level measured with FET probe in PB mode	300	500	700	mVp-p
PB XO oscillator frequency deviation (PAL mode)	Δf_{XOP}		T59	T59 frequency measured in PB mode: f	-9	0	+9	Hz
NTSC -> PAL conversion V axis burst level	V_{BNAP}	T15A T26A	T38	From T15A, down-converted chroma noise test signal 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}	-1	0	+1	dB
NTSC -> PAL conversion Burst level ratio	$\Delta B-NAP$	T15A T26A	T38	Under same conditions as above, +45° burst level is measured and compared to V_{BNAP}	-2	0	+2	dB

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Parameter	Symbol	Input	Output	Conditions	Ratings			Unit
					min	typ	max	
NTSC -> PAL conversion chroma phase	P-NAP	T15A T26A	T38	4 MHz, 300 mVp-p CW and 100% chroma signal phase 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 θ_1 . Chroma phase when pin 67 is 5V is measured and taken as θ_2 . P-NAP = $\theta_1 - \theta_2$	160	180	200	deg
[REC mode/EQ]								
REC EQ characteristics 1	G _{REQ1}	T23	T18	Input/output response measured with $V_{IN} = 500$ mVp-p, $f = 4$ MHz	-3	-2	-1	dB
REC EQ secondary distortion	H _{REQ}	T23	T18	Under same conditions as above, secondary harmonics are measured.		-40	-35	dB
REC EQ characteristics 2	G _{REQ2}	T23	T18	Input/output response measured with $V_{IN} = 500$ mVp-p, $f = 627$ kHz			-20	dB
REC EQ characteristics 3	G _{REQ3}	T23	T18	Input/output response measured with $V_{IN} = 500$ mVp-p, $f = 1.07$ MHz			-20	dB
REC EQ characteristics 4	G _{REQ4}	T23	T18	Input/output response measured with $V_{IN} = 500$ mVp-p, $f = 4.5$ MHz	-3.3	-2.3	-1.3	dB
REC EQ characteristics 5	G _{REQ5}	T23	T18	Input/output response measured with $V_{IN} = 500$ mVp-p, $f = 2.0$ MHz	-1	0	+1	dB
[PB mode/EQ]								
PB EQ characteristics 1	G _{PEQ1}	T15A	T17	Input/output response measured with $V_{IN} = 400$ mVp-p, $f = 4$ MHz	-2.5	-1.1	0.0	dB
PB EQ secondary distortion	H _{PEQ}	T15A	T17	Under same conditions as above, secondary harmonics are measured.		-40	-30	dB
PB EQ characteristics 2	G _{PEQ2}	T15A	T17	Input/output response measured with $V_{IN} = 400$ mVp-p, $f = 627$ kHz			-30	dB
PB EQ characteristics 3	G _{PEQ3}	T15A	T17	High-range trap frequency and gain measured with $V_{IN} = 400$ mVp-p		7.8		MHz
							-25	dB
PB EQ characteristics 4	G _{PEQ4}	T15A	T17	Input/output response measured with $V_{IN} = 400$ mVp-p, $f = 1.07$ MHz			-30	dB
PB EQ characteristics 5	G _{PEQ5}	T15A	T17	Input/output response measured with $V_{IN} = 400$ mVp-p, $f = 4.5$ MHz	-1	0	+1	dB
PB EQ characteristics 6	G _{PEQ6}	T15A	T17	Input/output response measured with $V_{IN} = 400$ mVp-p, $f = 2.0$ MHz	-11	-10	-9	dB

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Parameter	Symbol	Input	Output	Conditions	Ratings			Unit
					min	typ	max	
[REC/PB mode]								
LINE AMP voltage gain (PB)	V_{GLP}	T11	T77	$V_{IN} = -30$ dBV	23.0	23.5	24.0	dB
LINE AMP voltage gain (A1, A2, A3)	V_{GLR}	T71 T73 T75	T77	$V_{IN} = -30$ dBV	23.0	23.5	24.0	dB
LINE AMP distortion (PB)	THD_L	T11	T77	$V_{IN} = -30$ dBV		0.1	0.4	%
LINE AMP Output noise voltage (PB)	V_{NOL}	—	T77	$R_g = 1$ k Ω , DIN audio filter		-74.0	-70.5	dBV
LINE AMP Maximum output voltage (PB)	V_{OML}	T11	T77	Output voltage for 1% THD	1.0	1.2		Vrms
Output voltage with LINE AMP ALC	V_{OA}	T73	T77	-28 dBV input to T73	-7	-6	-5	dBV
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	-28 dBV input to T73		0.1	0.5	%
MUTE attenuation	M_{PB} M_{A1} M_{A2} M_{A3}	T11 T71 T73 T75	T77		80	90		dB
EQ AMP open circuit voltage gain	V_{GOE}	T7	T10	$V_{IN} = -66$ dBV	58	64		dB
EQ AMP input converted noise voltage	V_{NIE}	—	T10	$R_g = 620\Omega$, DIN audio filter		1.0	1.8	μ Vrms
REC AMP voltage gain	V_{GR}	T79	T1	$V_{IN} = -20$ dBV	14.0	14.5	15.0	dB
REC AMP distortion	THD_R	T79	T1	$V_{IN} = -20$ dBV		0.1	0.4	%
REC AMP Maximum output voltage	V_{OMR}	T79	T1	Output voltage for 1% THD	1.0	1.2		Vrms
REC BIAS voltage	V_{BIAS}	—	T3	Head impedances must be in the middle of the range.	297	330	363	mVrms
REC BIAS control voltage	V_{CTL}	—	T5	No-signal condition.	1.66	1.85	2.03	V

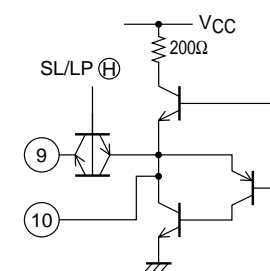
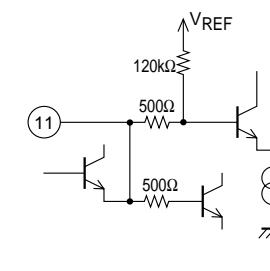
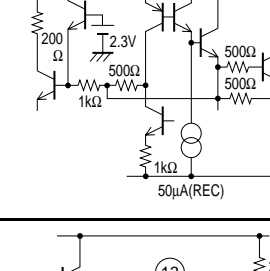
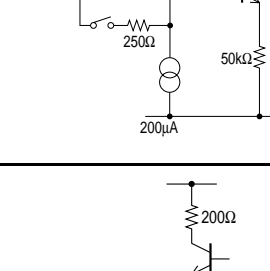
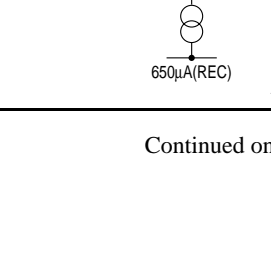
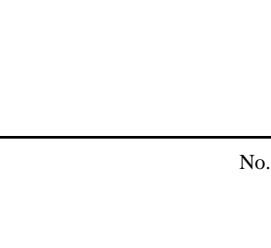
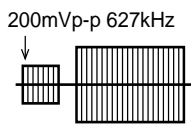
Pin Function

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
1	A-REC-OUT	2.3V	CW, 1.4 Vp-p	
2	A-GND	0V		
3	A-AUTO-BIAS-IN	2.3V	REC MODE CW 1.4 Vp-p 70 kHz, 1.0 Vp-p	
			PB MODE DC 2.3V	
4	A-EQ-SW2	2.3V	REC MODE CW, 1.4 Vp-p 70 kHz, 1.1 Vp-p	
			PB, EP MODE DC 2.3V PB, EP MODE CW 1.4 mVp-p	
5	A-AUTO-BIAS-IN	REC ADAPTIVE	DC (1.7 to 2.0V)	
		PB VCC	DC 5V	
6	A-AUTO-BIAS-B	REC 0.7V	DC 0.7V	
		PB 0V	DC 0V	
7	A-EQ-IN	2.3V	REC DC 2.3V	
			PB CW, 1.4 mVp-p	
8	A-EQ-NFB	2.3V	REC DC 2.3V	
			PB CW, 1 mVp-p	

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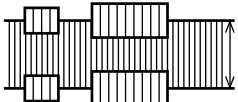
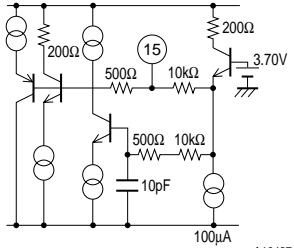
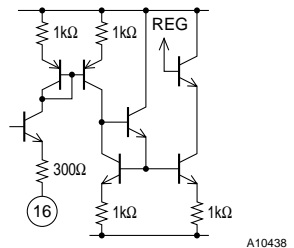
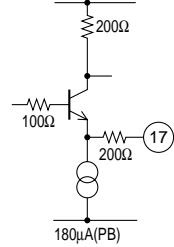

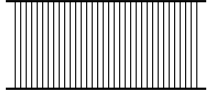
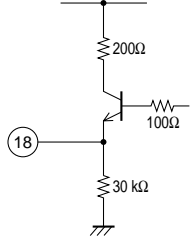
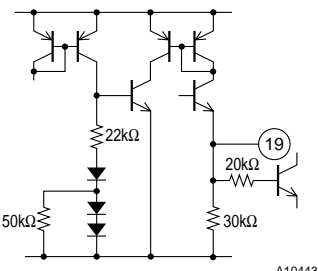
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
9	A-EQ-SW1	2.3V	REC DC 2.3V	
			PB CW, 2.2 Vp-p	
10	A-EQ-OUT	2.3V	REC DC 2.3V	
			PB CW, 2.2 Vp-p	
11	A-LINE-PB-IN	2.3V	REC HALF RECTIFICATION 70 kHz	
			PB CW 95 mVp-p	
12	AGC-TC1	REC 2.3V	DC	
	Carrier Leak Balancer	PB 2.3V	DC	
13	ACC-FILT	REC 1.8V	DC	
		PB 1.8V		
14	REC-C-OUT	REC 2.8V	200 mVp-p 627 kHz	
		PB 0V		

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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
15	PB Y-FM/C-IN C-IN (FROM Pre)	REC 4.2V	PB Y-FM 400 mVp-p  A10436	 A10437
		PB 3.2V		
16	PM (R03)	REC 1.6V	DC	 A10438
		PB 1.6V		
17	PB-EQ-OUT	REC 2.6V	FM 730 mVp-p	 A10440
		PB 2.6V	PB Y-FM 340 mVp-p  A10439	
18	REC-Y FM-OUT	REC 1.9V	PEC Y-FM 730 mVp-p  A10441	 A10442
		PB 1.9V		
19	REC-H-OUT	REC 4.2V	DC	 A10443
		REC PAUSE 2.5V		
		EE or PB 0V		

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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
20	PB Y-FM-IN (FROM EQ)	REC 4.7V	FM 700 mVp-p	<p style="text-align: right;">A10445</p>
		PB 2.5V	PB-Y•FM 320 mVp-p <p style="text-align: right;">A10444</p>	
21	TRICK-HOUT	TRICK MODE WITHOUT TRICK MODE	DC 4.5V 0V	<p style="text-align: right;">A10446</p>
22	AGC-TC2	REC 1.6V	DC	<p style="text-align: right;">A10447</p>
		PB 1.7V		
23	PB-EMITTER -PEAKING	REC 0V	DC	<p style="text-align: right;">A10449</p>
		PB 2.6V	<p style="text-align: right;">A10448</p>	
24	MAIN-EMPH FILTER	REC 2.2V	<p style="text-align: right;">A10450</p>	<p style="text-align: right;">A10451</p>
		PB 0V	DC	

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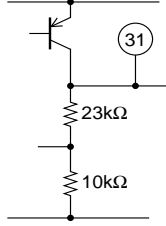
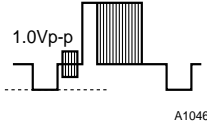
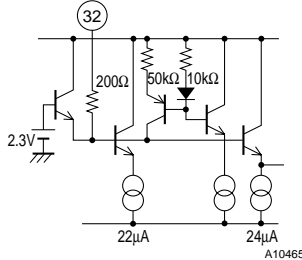
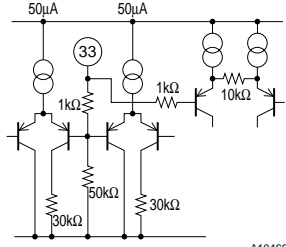
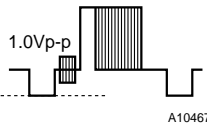
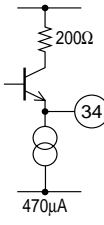
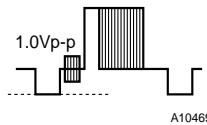
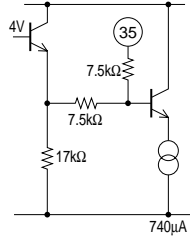
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
25	REC-Y	REC 1.6V		
	MAIN-DE-EMPH. OUT	PB 1.2V		
26	CLAMP-IN	REC 2.9V		
		PB 2.8V		
27	Y-GND	0V		
28	VIDEO-IN1	REC VSYNC 1.7V		
		PB 0V	DC	
29	FBC-FILT (Feed Back Clamp)	REC 2.6V	DC	
		PB 2.6V		
30	VIDEO-IN2	REC VSYNC 1.7V		
		PB 0V		

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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
31	REG	REC 4.1V	DC	 <p style="text-align: right;">A10463</p>
		REC 4.1V		
32	VIDEO-IN3	REC VSYNC 1.7V	 <p style="text-align: right;">A10464</p>	 <p style="text-align: right;">A10465</p>
		PB 0V		
33	QV/QH-INS CHARA-INS		<p>0 to 0.8V : Through</p> <p>1.0 to 2.2V : Character Ins.</p> <p>2.5 to 3.2V : QV Ins.</p> <p>3.8 to V_{CC}V : QV Ins.</p>	 <p style="text-align: right;">A10466</p>
34	VPS-OUT	REC VSYNC 1.7V	 <p style="text-align: right;">A10467</p>	 <p style="text-align: right;">A10468</p>
		PB 0V		
35	VIDEO-AGC-IN	REC 2.3V	 <p style="text-align: right;">A10469</p>	 <p style="text-align: right;">A10470</p>
		PB 3.1V		
36	Y-V _{CC}	5V	DC	

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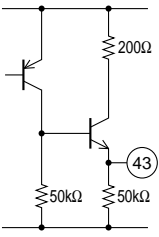
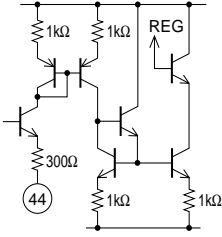
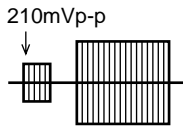
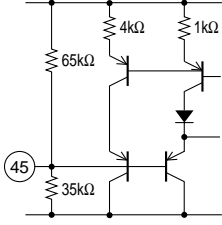
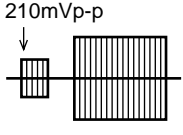
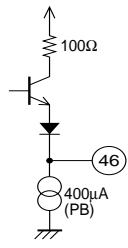
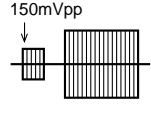
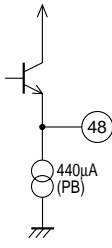
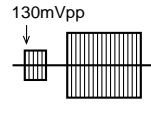
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
37	SYNC-OUT			
38	VIDEO-OUT	VSYNC 0.8V		
39	VCA-FILT	REC 3.1V	DC	
		PB 3.1V		
40	VCA-IN (CLAMP)	REC 2.8V		
		PB 2.8V		
41	VCC2	5V	DC	
42	Y-CCD-DRIVE	REC 1.8V		
		PB 1.8V		

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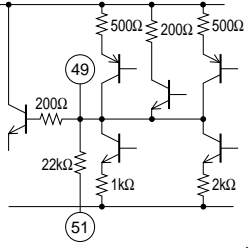
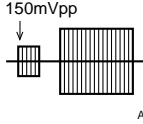
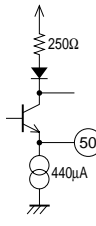
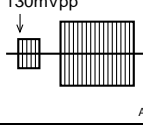
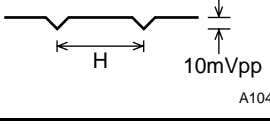
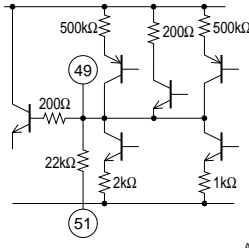
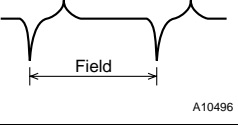
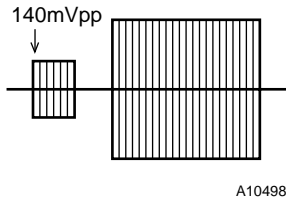
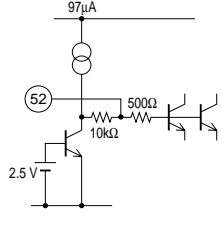
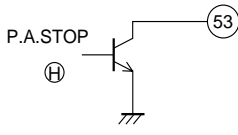
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
43	NTSC-H OUT	NTSC MODE 4.2V	DC	 <p style="text-align: right;">A10482</p>
		WITHOUT NTSC MODE 0V		
44	PQ 2 (RO2)	REC 1.7V	DC	 <p style="text-align: right;">A10483</p>
		PB 1.8V		
45	PB CHROMA IN	REC 1.8V	 <p style="text-align: center;">A10484</p>	 <p style="text-align: right;">A10485</p>
		PB 1.9V		
46	PB CHROMA OUT	REC 0V	 <p style="text-align: center;">A10486</p>	 <p style="text-align: right;">A10487</p>
		PB 2.0V		
47	C-VCC	5V	DC	
48	C-CCD-DRIVE2	REC 2.8V	 <p style="text-align: center;">A10488</p>	 <p style="text-align: right;">A10490</p>
		PB 2.8V	 <p style="text-align: center;">A10489</p>	

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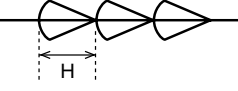
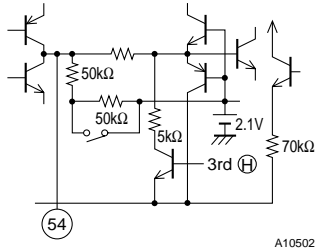
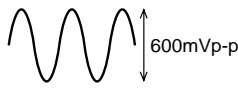
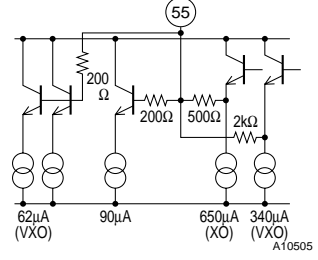
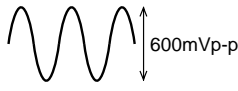
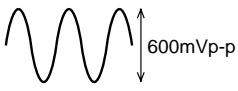
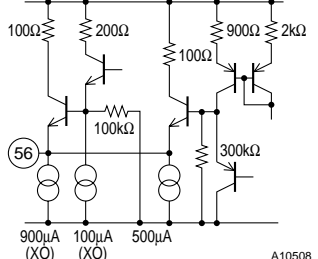
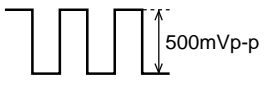
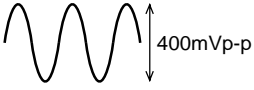
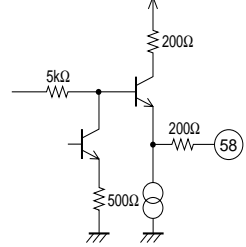
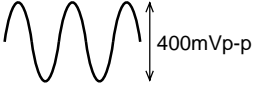
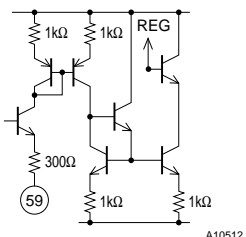
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
49	SLD-FILT	REC 4.0V	DC	 <p style="text-align: right;">A10491</p>
		PB 4.1V		
50	C-CCD-DRIVE 1	REC 2.9V	 <p style="text-align: right;">A10492</p>	 <p style="text-align: right;">A10494</p>
		PB 2.9V	 <p style="text-align: right;">A10493</p>	
51	AFC/APC-FILT	REC 4.0V	 <p style="text-align: right;">A10495</p>	 <p style="text-align: right;">A10497</p>
		PB = 4.0V	 <p style="text-align: right;">A10496</p>	
52	C-CCD-IN	3.2V	 <p style="text-align: right;">A10498</p>	 <p style="text-align: right;">A10499</p>
53	PA STOP-TR-SW	0V	DC	 <p style="text-align: right;">A10500</p>

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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
54	REC-APC-FILTER	2.1V	 <p style="text-align: right;">A10501</p>	 <p style="text-align: right;">A10502</p>
55	VXO/XO-IN	REC 4.0	 <p style="text-align: right;">A10503</p>	 <p style="text-align: right;">A10505</p>
		PB 3.9V	 <p style="text-align: right;">A10504</p>	
56	VXO/XO-OUT	REC 2.5V	 <p style="text-align: right;">A10506</p>	 <p style="text-align: right;">A10508</p>
		PB 2.5V	 <p style="text-align: right;">A10507</p>	
57	C-GND	0V	DC	
58	2Fsc/PB-H OUT	REC 1.5V	 <p style="text-align: right;">A10509</p>	 <p style="text-align: right;">A10511</p>
		PB 2.8V	 <p style="text-align: right;">A10510</p>	
59	RL (RO4)	REC 1.5V	DC	 <p style="text-align: right;">A10512</p>
		PB 1.5V	DC	

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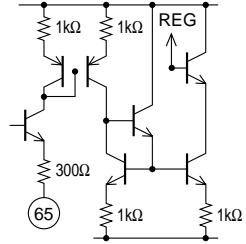
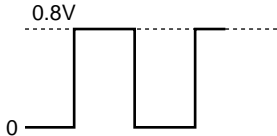
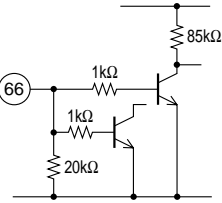
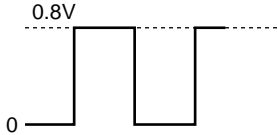
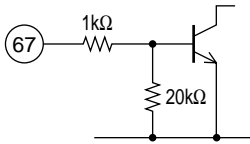
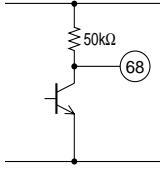
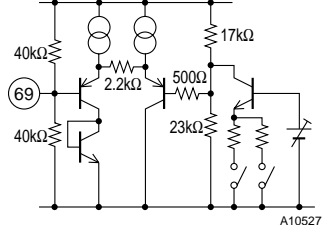
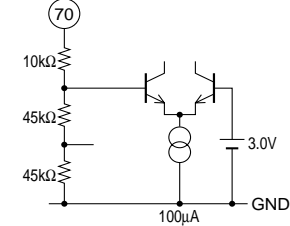
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
60	BGP-OUT		SYNC+BGP SYNC 1.4V (TYP) BGP 4.0V or MORE	<p style="text-align: right;">A10513</p>
61	KILL-FILT	Color 2.0V killer 3.0V	DC	<p style="text-align: right;">A10514</p>
62	ACK/SLD OUT	ACK-OUT MODE	KILLER MODE 4V or MORE COLOR MODE 0V	<p style="text-align: right;">A10515</p>
		SLD-OUT MODE		
63	SERIAL-CLOCK-IN		<p style="text-align: right;">A10517</p>	<p style="text-align: right;">A10518</p>
64	SERIAL-DATA-IN		<p style="text-align: right;">A10519</p>	<p style="text-align: right;">A10520</p>

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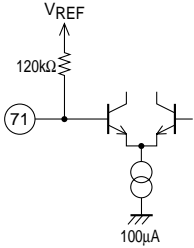
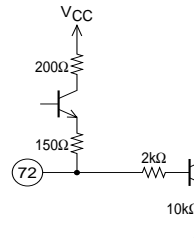
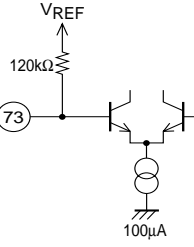
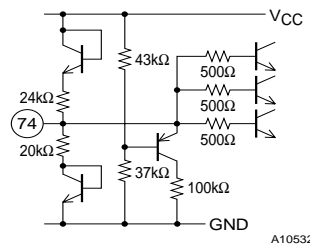
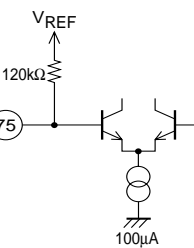
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
65	PQ1 (RO1)	REC 1.6V	DC	 <p style="text-align: right;">A10521</p>
		PB 1.6V		
66	C-ROTARY-PULSE-IN		 <p style="text-align: right;">A10522</p>	 <p style="text-align: right;">A10523</p>
67	CSC-PULSE-IN		 <p style="text-align: right;">A10524</p>	 <p style="text-align: right;">A10525</p>
68	PAL-PULSE	+45° 1V or MORE		 <p style="text-align: right;">A10526</p>
		+45° 1V or LESS		
69	NC-CTL	REC 2.1V	DC	 <p style="text-align: right;">A10527</p>
		PB 2.1V		
70	A. MUTE-ON/OFF	0V	DC MUTE OFF : under 2.7V MUTE ON : over 3.3V	 <p style="text-align: right;">A10528</p>

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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
71	A. LINE-IN1	2.3V	REC CW, 95 mVp-p	 <p style="text-align: right;">A10529</p>
			PB DC 2.3V	
72	A-ALC-DET	0V	REC: ADAPTIVE	 <p style="text-align: right;">A10530</p>
			PB DC 0V	
73	A-LINE-IN2	2.3V	REC CW, 95 mVp-p	 <p style="text-align: right;">A10531</p>
			PB DC 2.3V	
74	A-V _{REF} -FILTER	2.3V	DC	 <p style="text-align: right;">A10532</p>
75	A. LINE-IN3	2.3V	REC CW, 95 mVp-p	 <p style="text-align: right;">A10533</p>
			PB DC 2.3V	
76	A-V _{CC}	5V	DC	

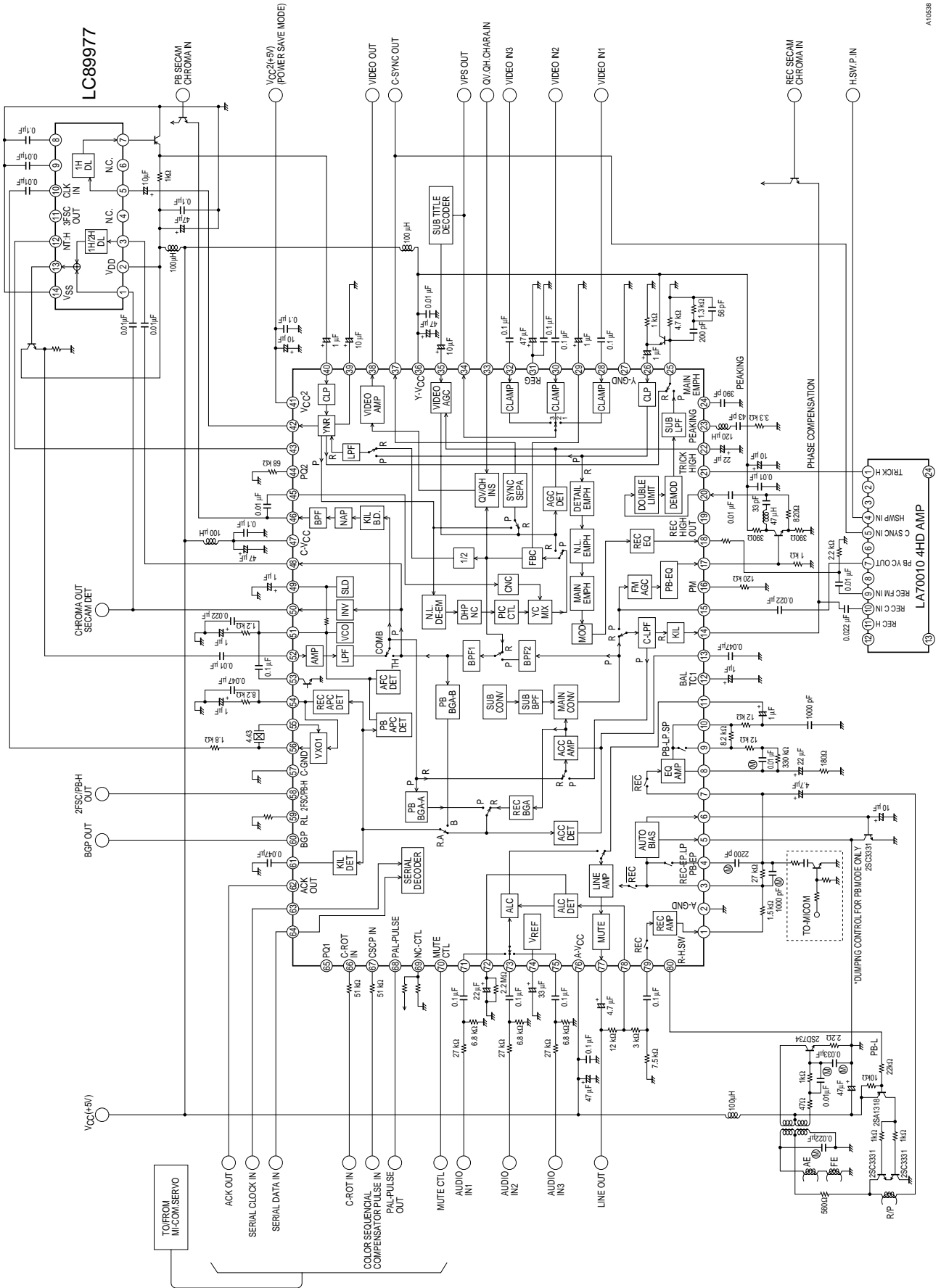
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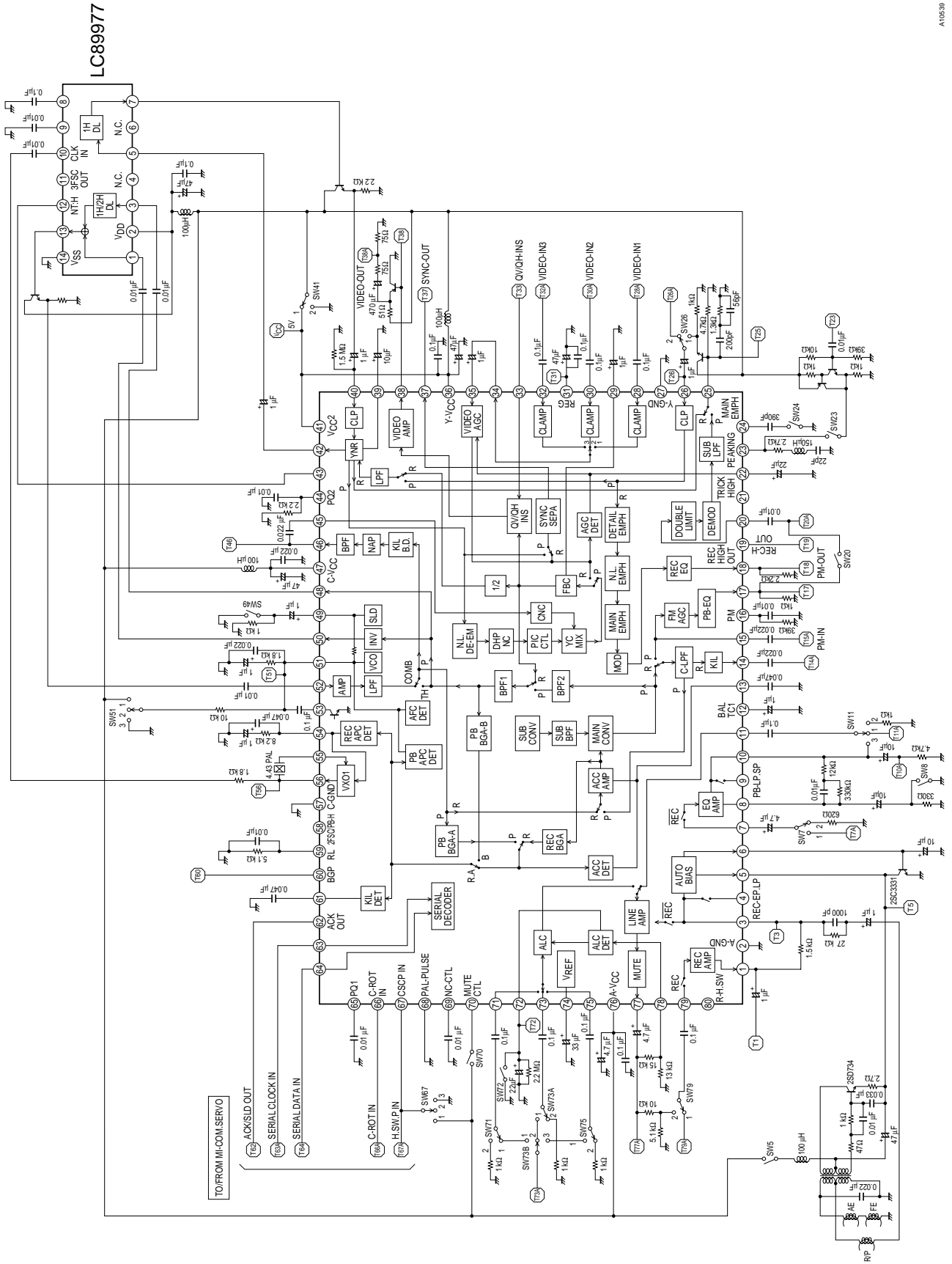
Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
77	A-LINE-OUT	2.3V	CW, 1.4 Vp-p	
78	A-ALC-DET-IN	0V	CW, 0.6 Vp-p	
79	A-REC-IN	2.3V	REC CW, 283 mVp-p	
			PB DC 2.3V	
80	A-AUDIO-HEAD-SW-OUT	REC 5V	REC DC 5V (SW/OFF)	
		PB 0V	PB DC 0V (SW/ON)	

Block Diagram and Sample Application Circuit



A10538

Test Circuit Diagram



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