

Monolithic Linear IC

**LA71525M****SANYO**

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

## Overview

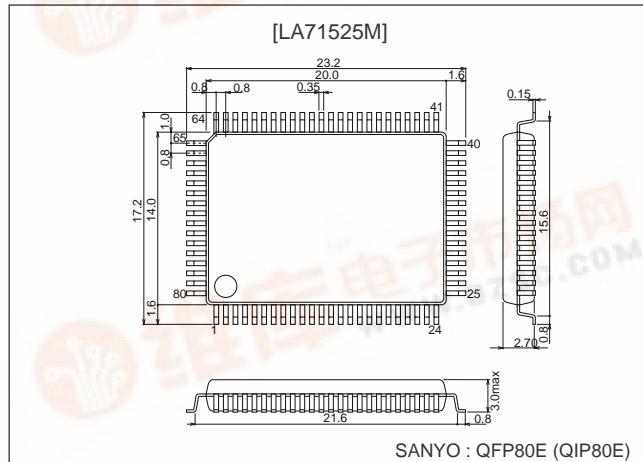
The LA71525M is a video/audio signal processor IC for VHS VCRs. It handles recording and playback of PAL/GBI, MESECAM, and 4.43 NTSC signals.

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 $T_a = 25^\circ\text{C}$

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	$P_d$ max	$T_a \leq 65^\circ\text{C}$ 114.3 x 76.1 x 1.6 mm <sup>3</sup> with paper phenol substrate	1400	mW
Operating temperature	$T_{opr}$		-10 to +65	°C
Storage temperature	$T_{stg}$		-40 to +150	°C

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC1}$	pin 36, 41, 47	5.0	V
	$V_{CC2}$	pin 76	6.8	V
	( $V_{CC2}$ )	(pin 76)	(7.5)	V
Recommended operating supply voltage range	$V_{CC1\ opg}$		4.8 to 5.5	V
	$V_{CC2\ opg}$		6.4 to 7.9	V

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

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 $V_{IN} = 1.0 \text{ Vp-p}$ video signal (PAL)	2.0	2.1	2.2	Vp-p	
EE output level 2	$V_{EE2}$	T28A	T38	T38 output level measured with $V_{IN} = 1.0 \text{ Vp-p}$ 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 $V_{IN} = 2.0 \text{ Vp-p}$ video signal	0	0.6	1.2	dB	
AGC characteristics 2	AGC2	T28A	T38	Ratio of $V_{EE}$ and T38 output level with $V_{IN} = 0.5 \text{ Vp-p}$ video signal	-1.2	-0.2	0	dB	
AGC characteristics 3	AGC3	T28A	T38	T38 SYNC level measured with $V_{IN} = 700 \text{ mVp-p LUMI}$ , 600 mVp-p SYNC	550	650	750	mVp-p	
AGC characteristics 4	AGC4	T28A	T38	T38 SYNC level measured with $V_{IN} = 700 \text{ mVp-p LUMI}$ , 150 mVp-p SYNC	370	420	470	mVp-p	
Sync separation output level	$V_{SYR}$	T28A	T37	T37 output pulse crest value measured with $V_{IN} = 1.0 \text{ Vp-p}$ 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 $V_{IN} = 1.0 \text{ Vp-p}$ video signal	4.2	4.5	4.8	$\mu\text{s}$	
Sync separation output Pre-delay time	$\Delta T_{SYR}$	T28A	T37	Delay of output SYNC vs. input SYNC measured with $V_{IN} = 1.0 \text{ Vp-p}$ video signal	0.6	0.8	1.0	$\mu\text{s}$	
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 $\mu\text{s}$		-20	-15	dB	
Sync tip level Pedestal level White level measurement	$L_{VOR}$	T28A	T38	Potential measured with $V_{IN} = 1.0 \text{ Vp-p}$ 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	$\Delta HDR$	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	$\Delta WHR$	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 $V_{IP} = 1 \text{ Vp-p}$ standard color bar signal input	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 $V_{IN} = 1 \text{ Vp-p}$ 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 $V_{IN} = 1 \text{ Vp-p}$ 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 $V_{IN} = 1 \text{ Vp-p}$ 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 $V_{IN} = 1 \text{ Vp-p}$ 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 <sub>MOD</sub>		T18	Secondary distortion measured in no-signal input condition		-40	-35	dB	
Deviation 1 (PAL)	DEV1	T28A	T18	T18 deviation measured with V <sub>IN</sub> = white 100% 1 Vp-p	0.95	1.00	1.05	MHz	
Deviation 2 (NTSC)	DEV2	T28A	T18	T18 deviation measured with V <sub>IN</sub> = white 100% 1 Vp-p	0.95	1.00	1.05	MHz	
FM modulator linearity	L <sub>MOD</sub>	T26	T18	Output frequency set to f2.85 with 2.85V DC applied to T26	-2	0	+2	%	
1/2f <sub>H</sub> carrier shift	CS		T18	Output frequency shift	6.5	7.8	9.1	kHz	
Emphasis gain	G <sub>EMP24</sub> G <sub>EMP37</sub>	T26A	T24	Level difference of T26A and T37 measured with V <sub>IN</sub> = 500 mVp-p, 10 kHz sine wave input	-0.75	-0.25	+0.25	dB	
Detail enhancer characteristics 1	G <sub>ENH1</sub>	T26A	T24	Level difference of T26A and T37 measured with V <sub>IN</sub> = 158 mVp-p, 2 MHz sine wave input Differential with G <sub>EMP24</sub>	0.1	0.6	1.1	dB	
Detail enhancer characteristics 2	G <sub>ENH2</sub>	T26A	T24	Level difference of T26A and T24 measured with V <sub>IN</sub> = 50 mVp-p, 2 MHz sine wave input Differential with G <sub>EMP24</sub>	1.3	2.3	3.3	dB	
Detail enhancer characteristics 3	G <sub>ENH3</sub>	T26A	T24	Level difference of T26A and T24 measured with V <sub>IN</sub> = 15.8 mVp-p, 2 MHz sine wave input Differential with G <sub>EMP24</sub>	1.8	3.3	4.8	dB	
Nonlinear emphasis characteristics 1	GNLEMP1	T26A	T24	Level difference of T26A and T24 measured with V <sub>IN</sub> = 500 mVp-p, 2 MHz sine wave input Differential with G <sub>EMP24</sub>	0.3	1.2	2.1	dB	
Nonlinear emphasis characteristics 2	GNLEMP2	T26A	T24	Level difference of T26A and T24 measured with V <sub>IN</sub> = 158 mVp-p, 2 MHz sine wave input Differential with G <sub>EMP24</sub>	2.5	3.8	5.0	dB	
Nonlinear emphasis characteristics 3	GNLEMP3	T26A	T24	Level difference of T26A and T24 measured with V <sub>IN</sub> = 50 mVp-p, 2 MHz sine wave input Differential with G <sub>EMP24</sub>	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 <sub>ME1</sub>	T26A	T37	Level difference of T26A and T37 measured with V <sub>IN</sub> = 50 mVp-p, 500 kHz sine wave input Differential with G <sub>EMP37</sub>	10.5	11.0	11.5	dB	
Main linear emphasis characteristics 2	G <sub>ME2</sub>	T26A	T37	Level difference of T26A and T37 measured with V <sub>IN</sub> = 50 mVp-p, 2 MHz sine wave input Differential with G <sub>EMP37</sub>	12.5	13.0	13.5	dB	
White clip level	L <sub>WC</sub>	T28A	T37	White clip level at T37 measured with V <sub>IN</sub> = white 100% 1.0 Vp-p	CTL 1 2	185 176	195 185	205 194	%
Dark clip level	L <sub>DC</sub>	T28A	T37	Dark clip level at T37 measured with V <sub>IN</sub> = 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 <sub>INY</sub>	T28A	T38	T38 stair levels measured with video signal 1.0 Vp-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 <sub>CCP</sub>			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 <sub>DOC</sub>	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 <sub>DOC</sub>	T15 T26A	T38	T15: 4 MHz, 300 mVp-p sine wave T26A: 0.5 Vp-p video signal Input/output response 5H after setting T15 input to 0	-1.5	0	+1.5	dB	
PB Y level	V-Y <sub>OUT</sub>	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- <sub>OUT</sub>		T38	Playback Y level for self-recording/playback	1.93	2.10	2.27	Vp-p	

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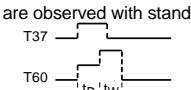
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Parameter	Symbol	Input	Output	Conditions	Ratings			Unit	
					min	typ	max		
FM demodulator linearity	$L_{DEM}$	T15	T25	$L_{DEM} = \frac{V_{DEM}^4 - (V_{DEM}^2 + V_{DEM}^6)/2}{V_{DEM}^6 - V_{DEM}^2} \times 100$	-3.5	0	+3.5	%	
Carrier leak	CL	T15	T25	Ratio of T25 4 MHz component and SDEM with $V_{IN} = 300 \text{ mVp-p}$ $f = 4 \text{ MHz}$			-35	dB	
Playback YNR characteristics	$P_{YNR}$	T26A	T38	$V_{IN} = \text{white 50\% + CW}$ (15.8 mVp-p) Ratio of 32 fH component and 32.5 fH component	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 $V_{IN} = \text{white 50\% + sine wave } f = 2 \text{ MHz } 158 \text{ mVp-p}$	-3.5	-2.5	-1.5	dB	
Nonlinear deemphasis characteristics 2	$G_{NLDE2}$	T26A	T38	$f = 2 \text{ MHz, } 50 \text{ mVp-p}$	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	$f = 1.2 \text{ MHz, } 158 \text{ mVp-p, pin 69 open}$ Gr2 bit 8/7 = "10", Gr5 bit 1 = "1"	-4	-3	-2	dB	
Double noise canceler characteristics 2	$G_{WNC2}$	T26A	T38	$f = 1.2 \text{ MHz, } 50 \text{ mVp-p, pin 69 open}$ Gr2 bit 8/7 = "10", Gr5 bit 1 = "1"	-16.5	-15.0	-13.5	dB	
Double noise canceler characteristics 3	$G_{WNC3}$	T26A	T38	$f = 1.2 \text{ MHz, } 15.8 \text{ mVp-p, pin 69 open}$ Gr2 bit 8/7 = "10", Gr5 bit 1 = "1"	-32	-30	-28	dB	
Double noise canceler characteristics 4	$G_{WNC4}$	T26A	T38	$f = 2.5 \text{ MHz, } 15.8 \text{ mVp-p, pin 69 open}$ Gr2 bit 8/7 = "10", Gr5 bit 1 = "1"	-9	-8	-7	dB	
Double noise canceler characteristics 5	$G_{WNC5}$	T26A	T38	$f = 2.5 \text{ MHz, } 15.8 \text{ mVp-p, pin 69 open}$ Gr2 bit 8/7 = "10", Gr5 bit 1 = "1"	-17	-15	-13	dB	
PIC-CTL hard response characteristics 1	$G_{PH1}$	T26A	T38	$f = 1 \text{ MHz, } 158 \text{ mVp-p, Gr5 bit 6/5/4 = "1/0/0"}$	2.5	3.5	4.5	dB	
PIC-CTL hard response characteristics 2	$G_{PH2}$	T26A	T38	$f = 2 \text{ MHz, } 158 \text{ mVp-p, Gr5 bit 6/5/4 = "1/0/0"}$	6	7	8	dB	
PIC-CTL soft response characteristics 1	$G_{PH3}$	T26A	T38	$f = 1 \text{ MHz, } 158 \text{ mVp-p, Gr5 bit 6/5/4 = "0/0/0"}$	6	7	8	dB	
PIC-CTL soft response characteristics 2	$G_{PH4}$	T26A	T38	$f = 2 \text{ MHz, } 158 \text{ mVp-p, Gr5 bit 6/5/4 = "0/0/0"}$	-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 $V_{IN} = \text{white 100\% 0.5 Vp-p}$	-	-	-		
Simulated V insertion level	$\Delta VDP$	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	$\Delta HDP$	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	$\Delta WHP$	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 $V_{IN} = 0.5 \text{ Vp-p}$ 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 $V_{IN} = 0.5 \text{ Vp-p}$ video signal	4.35	4.65	4.95	μs	
Sync separation output Pre-delay time	$\Delta T_{SYP}$	T26A	T37	Delay of output SYNC vs. input SYNC measured with $V_{IN} = 0.5 \text{ Vp-p}$ video signal	0.7	0.9	1.1	μs	
4V regulator	$V_{REG}$	T26A	T37	T31 DC level measured	3.8	4.0	4.2	V	
FMAGC output level	$V_{FAGC}$	T15	T17	Pin 17 signal amplitude measured with $V_{IN} = 150, 300, 600 \text{ mVp-p}$ 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 <sub>OR-14</sub>	T28A	T14A	T14A burst level measured with V <sub>IN</sub> = 1 Vp-p 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 <sub>L</sub> : 5.1 kΩ)	-3.7	-3.0	-2.3	dB
Burst emphasis amount (NTSC mode)	G <sub>BE</sub>	T28A	T14A	SP/EP and LP T14A burst level ratio with V <sub>IN</sub> = 1 Vp-p standard color bar signal	5.5	6.0	6.5	dB
VXO oscillation level (PAL mode)	V <sub>VXO-RP</sub>	T28A	T56	T56 output amplitude measured with FET probe at V <sub>IN</sub> = 1 Vp-p standard color bar signal	300	500	700	mVp-p
VXO oscillation level (NTSC mode)	V <sub>VXO-RN</sub>	T28A	T56	T56 output amplitude measured with FET probe at V <sub>IN</sub> = 1 Vp-p standard color bar signal	300	500	700	mVp-p
REC ACC characteristics 1	ACC <sub>R1</sub>	T28A	T14A	V <sub>IN</sub> = 1 Vp-p standard color bar signal and chroma signal only boosted by +6 dB T14A burst level measured and compared to VOR-14		0.2	0.5	dB
REC ACC characteristics 2	ACC <sub>R2</sub>	T28A	T14A	V <sub>IN</sub> = 1 Vp-p standard color bar signal and chroma signal only boosted by -6 dB T14A burst level measured and compared to VOR-14	-0.5	-0.1		dB
REC ACC Killer input level	V <sub>ACCK-ON</sub>	T28A	T14A	T14A input burst level measured when output goes off and compared to standard input level, with V <sub>IN</sub> = 1 Vp-p standard color bar signal and chroma signal being gradually attenuated.		-26		dB
REC ACC Killer output level	V <sub>OACCK</sub>	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 <sub>ACCK-OFF</sub>	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 <sub>APC1</sub>	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: f <sub>1</sub>	350			Hz
REC APC Pull-in range 2	Δf <sub>APC2</sub>	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: f <sub>2</sub>			-350	Hz
REC AFC Pull-in range 1	Δf <sub>AFC1</sub>	T28A	T51	300 mVp-p, 15.6 kHz pulse train with 5 μs 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: f <sub>1</sub>	+1.0			kHz
REC AFC Pull-in range 2	Δf <sub>AFC2</sub>	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: f <sub>2</sub>			-1.0	kHz
BGP delay time	t <sub>D</sub>	T28	T37 T60	T37 and T60 waveforms are observed with standard color bar input to T28A	3.1	3.4	3.7	μs
BGP width	t <sub>W</sub>				4.7	4.9	5.1	μs

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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 $P_{Vop-46}$ .		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 (NTSC 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 (PAL 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)	$\Delta f_{XOP}$		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 $-90^\circ$ 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 $\theta_2$ . P-NAP = $\theta_1 - \theta_2$	160	180	200	deg
<b>[REC mode/EQ]</b>								
REC EQ characteristics 1	$G_{REQ1}$	T22	T18	$V_{IN} = 500 \text{ mVp-p}, f = 4 \text{ MHz}$ Input/output response measured	-3	-2	-1	dB
REC EQ secondary distortion	$H_{REQ}$	T22	T18	Under same conditions as above, secondary harmonics are measured.		-40	-35	dB
REC EQ characteristics 2	$G_{REQ2}$	T22	T18	$V_{IN} = 500 \text{ mVp-p}, f = 627 \text{ kHz}$ Input/output response measured			-20	dB
REC EQ characteristics 3	$G_{REQ3}$	T22	T18	$V_{IN} = 500 \text{ mVp-p}, f = 1.07 \text{ MHz}$ Input/output response measured			-20	dB
REC EQ characteristics 4	$G_{REQ4}$	T22	T18	$V_{IN} = 500 \text{ mVp-p}, f = 4.5 \text{ MHz}$ Input/output response measured	-3.3	-2.3	-1.3	dB
REC EQ characteristics 5	$G_{REQ5}$	T22	T18	$V_{IN} = 500 \text{ mVp-p}, f = 2.0 \text{ MHz}$ Input/output response measured	-1	0	+1	dB
<b>[PB mode/EQ]</b>								
PB EQ characteristics 1	$G_{PEQ1}$	T15A	T17	$V_{IN} = 400 \text{ mVp-p}, f = 4 \text{ MHz}$ Input/output response measured	-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	$V_{IN} = 400 \text{ mVp-p}, f = 627 \text{ kHz}$ Input/output response measured			-30	dB
PB EQ characteristics 3	$G_{PEQ3}$	T15A	T17	$V_{IN} = 400 \text{ mVp-p}$ High-range trap frequency and gain measured		7.8		MHz
PB EQ characteristics 4	$G_{PEQ4}$	T15A	T17	$V_{IN} = 400 \text{ mVp-p}, f = 1.07 \text{ MHz}$ Input/output response measured			-30	dB
PB EQ characteristics 5	$G_{PEQ5}$	T15A	T17	$V_{IN} = 400 \text{ mVp-p}, f = 4.5 \text{ MHz}$ Input/output response measured	-1	0	+1	dB
PB EQ characteristics 6	$G_{PEQ6}$	T15A	T17	$V_{IN} = 400 \text{ mVp-p}, f = 2.0 \text{ MHz}$ Input/output response measured	-11	-10	-9	dB

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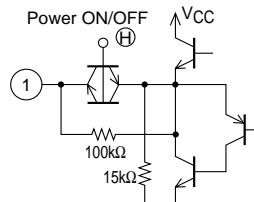
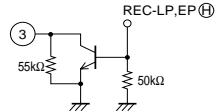
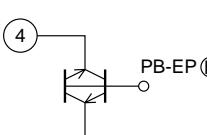
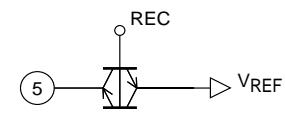
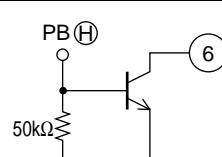
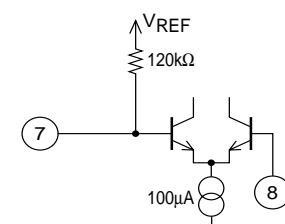
## LA71525M

### Electrical Characteristics of Audio System

Parameter	Symbol	Input	Output	Conditions	Ratings			Unit	
					min	typ	max		
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 (A1, A2, A3)	$V_{GLR}$	T71 T73 T75	T77	$V_{IN} = -30 \text{ dBV}$	23.0	23.5	24.0	dB	
LINE AMP distortion (PB)	$THD_L$	T11	T77	$V_{IN} = -30 \text{ dBV}$	0.01	0.1	0.4	%	
LINE AMP Output noise voltage (PB)	$V_{NOL}$	—	T77	$R_g = 1 \text{ k}\Omega$ , DIN audio filter	-80.0	-74.0	-70.5	dBV	
LINE AMP Maximum output voltage (PB)	$V_{OML}$	T11	T77	Output voltage for 1% THD : $V_{CC} = 6.8V$ : $V_{CC} = 7.5V$	1.3 1.5	1.5 1.7	1.7 1.9	Vrms	
Output voltage with LINE AMP ALC	$V_{OA}$	T73	T77	$V_{IN} = -28 \text{ dBV}$	-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	$V_{IN} = -28 \text{ dBV}$	0.01	0.1	0.5	%	
MUTE attenuation	$M_{PB}$ $M_{A1}$ $M_{A2}$ $M_{A3}$	T11 T71 T73 T75	T77	-10 dBV signals applied to all inputs and MUTE enabled.	80	90	120	dB	
EQ AMP open circuit voltage gain	$VG_{OE}$	T7	T10	$V_{IN} = -66 \text{ dBV}$	58	64	70	dB	
EQ AMP input converted noise voltage	$V_{NIE}$	—	T10	$R_g = 620\Omega$ , DIN audio filter	0.1	0.8	1.8	$\mu\text{Vrms}$	
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 Maximum output voltage	$V_{OMR}$	T79	T1	Output voltage for 1% THD : $V_{CC} = 6.8V$ Output voltage for 1% THD : $V_{CC} = 7.5V$	1.3 1.5	1.5 1.7	1.7 1.9	Vrms	
Current drain (REC)	$I_{CCRA}$	—	—	Influx current measured at pin 76 (no-signal condition)	: $V_{CC} = 6.8V$ : $V_{CC} = 7.5V$	8.8 9.2	11.0 11.5	13.2 13.8	mA
Current drain (PB)	$I_{CCPA}$	—	—	Influx current measured at pin 76 (no-signal condition)	: $V_{CC} = 6.8V$ : $V_{CC} = 7.5V$	7.6 8.0	9.5 10.0	11.4 12.0	mA
DC offset voltage (PB) in MUTE condition	$MT_{DCO}$	—	T77	DC offset voltage at pin 77 measured for MUTE ON (no-signal condition)	0	30	50	mV	

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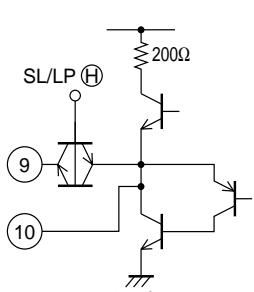
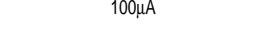
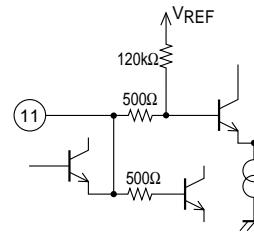
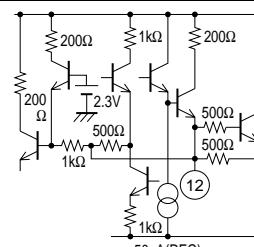
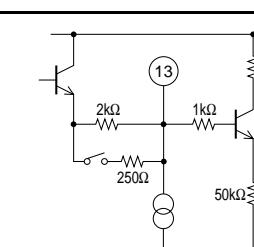
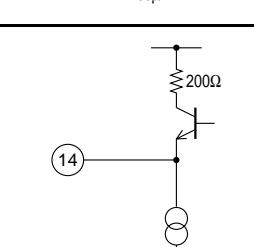
## Pin Function

Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
1	A-REC-OUT	3.3V	CW, 3.2 Vp-p	 A10277
2	A-GND	0V		
3	A-EQ-SW1	3.3V	REC MODE SP-CW LP, EP-0V	
			REC MODE NONE	 A10278
4	A-EQ-SW2	0V	REC MODE NONE	 A10279
			PB, EP MODE SP, LP-CW EP-0V	
5	A-REC-SW	3.3V	REC MODE DC $V_{REF}$	
			PB MODE CW 1 mVp-p	 A10280
6	A-HEAD SW-CTL	REC 7V DC PB 0V		 A10281
7	A-EQ-IN	3.3V	REC DC 3.3V	
			PB CW, 1 mVp-p	
8	A-EQ-NFB	3.3V	REC DC 3.3V	
			PB CW, 1 mVp-p	 A10282

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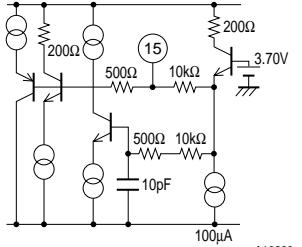
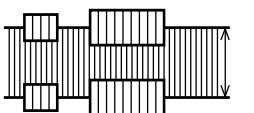
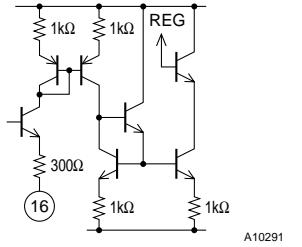
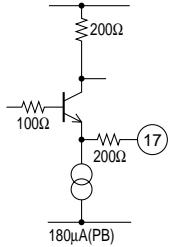
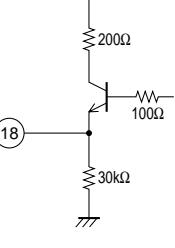
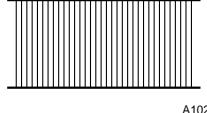
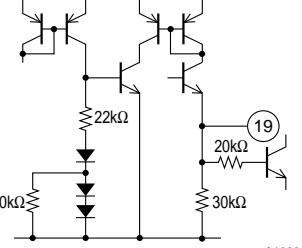
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
9	A-EQ-SW1	3.3V	REC DC 3.3V	
			PB CW, 95 mVp-p	
10	A-EQ-OUT	3.3V	REC DC 3.3V	
			PB CW, 95 mVp-p	
11	A-LINE-PB-IN	3.3V	REC DC 3.3V	
			PB CW 95 mVp-p	
12	AGC-TC1	REC 2.3V	DC	
	Carrier Leak Balancer	PB 2.3V	DC	
13	ACC-FILT	REC 1.8V	DC	
			PB 1.8V	
14	REC-C-OUT	REC 2.8V	200mVp-p 627kHz	
			PB 0V	

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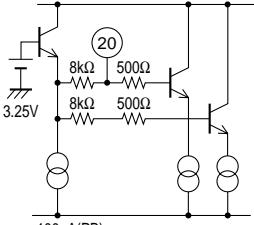
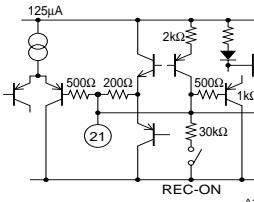
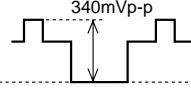
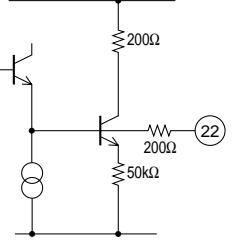
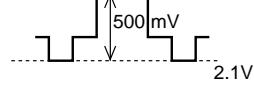
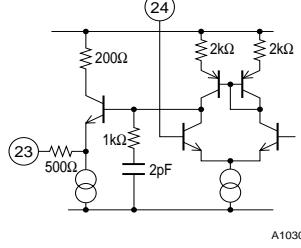
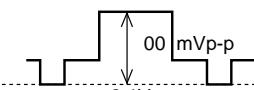
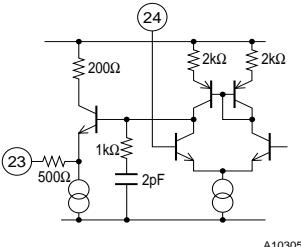
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
15	PB Y-FM/C-IN C-IN (FROM Pre)	REC 4.2V	PB-Y-FM 400 mVp-p	
		PB 3.2V		
16	PM (R03)	REC 1.6V	DC	
		PB 1.6V		
17	PB-EQ-OUT	REC 2.6V	FM 730 mVp-p	
		PB 2.6V	PB Y-FM 340 mVp-p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

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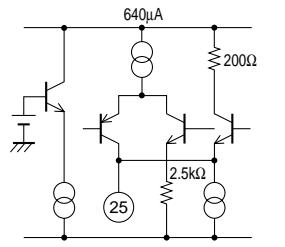
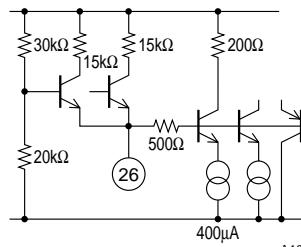
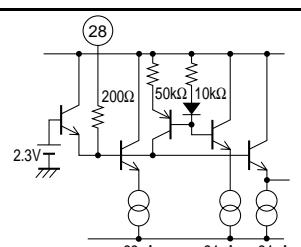
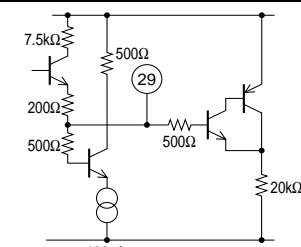
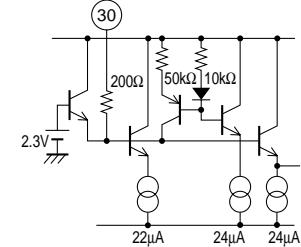
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
20	PB-Y-FM-IN (FROM EQ)	REC 4.7V	FM 700 mVp-p	
		PB 2.5V	PB-Y FM 320 mVp-p 	 A10297
21	AGC-TC2	REC 1.6V	DC	
		PB 1.7V		 A10299
22	PB-EMITTER -PEAKING	REC 0V	DC	
		PB 2.6V	 A10300	 A10301
23	MAIN-EMPH OUT	REC 2.1V	 A10302	
		PB 0V		 A10303
24	MAIN-EMPH FILTER	REC 2.1V	 A10304	
		PB 0V	DC	 A10305

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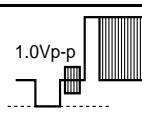
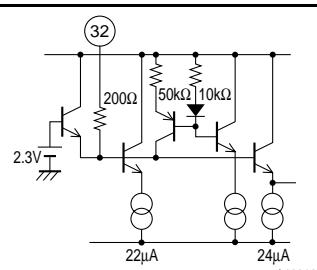
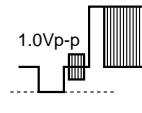
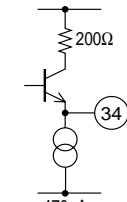
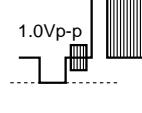
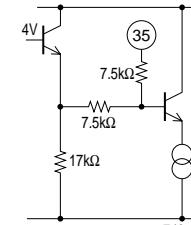
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
25	REC-Y	REC 1.6V	500mVp-p A10306	
	MAIN-DE-EMPH. OUT	PB 1.2V	500mVp-p A10307	
26	CLAMP-IN	REC 2.9V	500mVp-p A10309	
		PB 2.8V	500mVp-p A10310	
27	Y-GND	0V		
28	VIDEO-IN1	REC VSYNC 1.7V	1.0Vp-p A10312	
		PB 0V	DC	
29	FBC-FILT (Feed Back Clamp)	REC 2.6V		
		PB 2.6V	DC	
30	VIDEO-IN2	REC VSYNC 1.7V	1.0Vp-p A10315	
		PB 0V		

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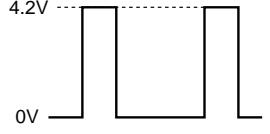
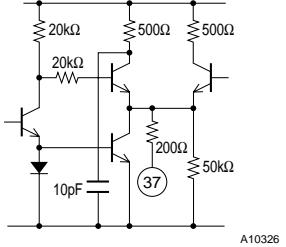
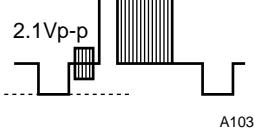
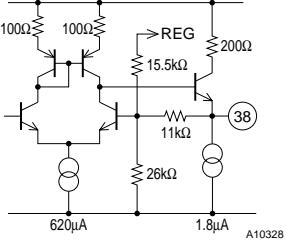
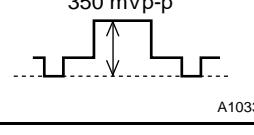
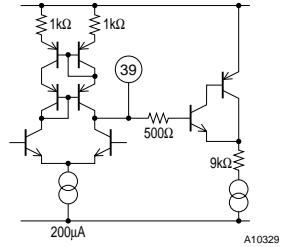
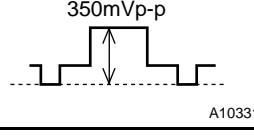
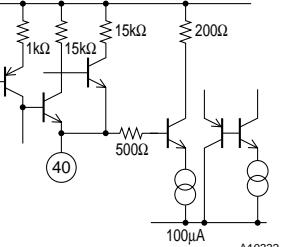
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
31	REG	REC 4.1V		
		DC		
32	VIDEO-IN3	PB 4.1V		
		REC V <sub>SYNC</sub> 1.7V		
33	QV/QH-INS CHARA-INS			
		0 to 0.8V : Through		
		1.0 to 2.2V : Character Ins.		
		2.5 to 3.2V : QH Ins.		
34	VPS-OUT	3.8 to V <sub>CC</sub> V : QV Ins.		
		REC V <sub>SYNC</sub> 1.7V		
		PB 0V		
				
35	VIDEO-AGC-IN	REC 2.3V		
		PB 3.1V		

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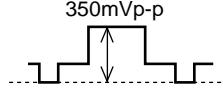
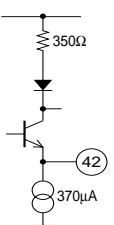
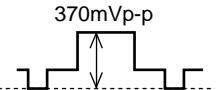
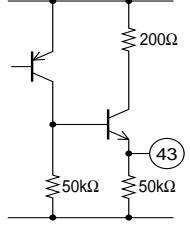
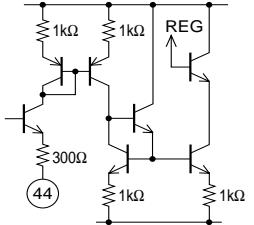
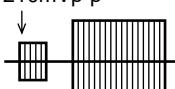
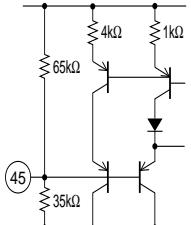
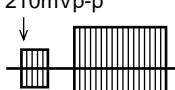
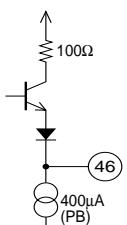
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
36	Y-V <sub>CC</sub>	5V	DC	
37	SYNC-OUT			
38	VIDEO-OUT	V <sub>SYNC</sub> 0.8V		
39	VCA-FILT	REC 3.1V		
		DC		
40	VCA-IN (CLAMP)	REC 2.8V		
		PB 2.8V		
41	V <sub>CC2</sub>	5V	DC	

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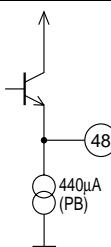
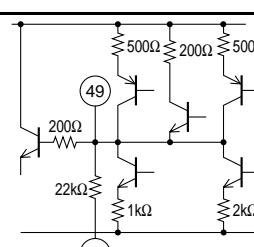
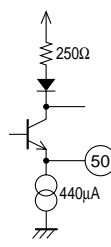
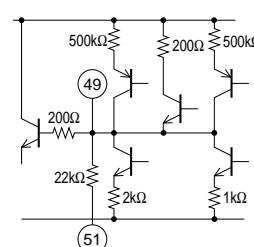
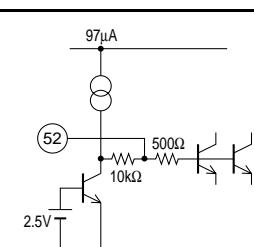
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
42	Y-CCD-DRIVE	REC 1.8V	<p>350mVp-p</p>  <p>A10333</p>	 <p>A10335</p>
		PB 1.8V	<p>370mVp-p</p>  <p>A10334</p>	
43	NTSC-H OUT	NTSC MODE 4.2V		 <p>A10336</p>
		WITHOUT NTSC MODE 0V	DC	
44	PQ 2 (RO2)	REC 1.7V		 <p>A10337</p>
		PB 1.8V	DC	
45	PB CHROMA IN	REC 1.8V	<p>210mVp-p</p>  <p>A10338</p>	 <p>A10339</p>
		PB 1.9V		
46	PB CHROMA OUT	REC 0V	<p>210mVp-p</p>  <p>A10340</p>	 <p>A10341</p>
		PB 2.0V		

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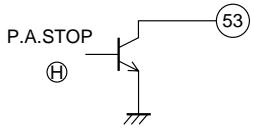
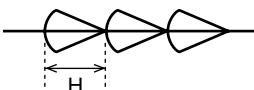
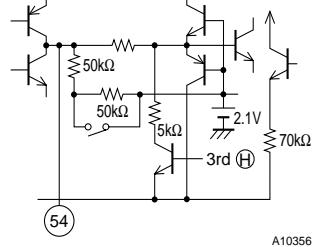
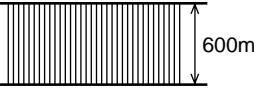
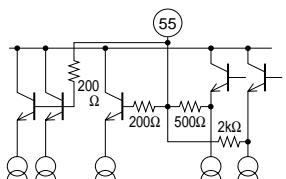
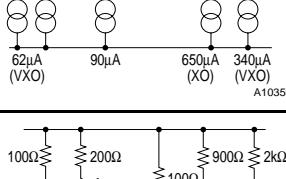
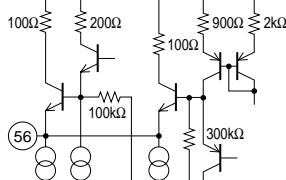
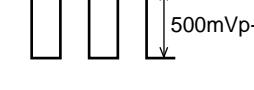
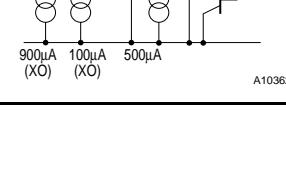
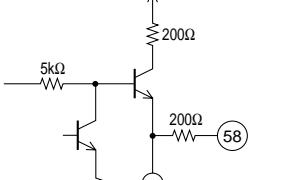
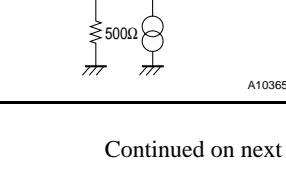
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
47	C-V <sub>CC</sub>	5V	DC	
48	C-CCD-DRIVE2	REC 2.8V	150mVp-p A10342	
		PB 2.8V	130mVp-p A10343	
49	SLD-FILT	REC 4.0V	DC	
		PB 4.1V	DC	
50	C-CCD-DRIVE 1	REC 2.9V	150mVp-p A10346	
		PB 2.9V	130mVp-p A10347	
51	AFC/APC-FILT	REC 4.0V	10mVp-p A10349	
		PB 4.0V	Field A10350	
52	C-CCD-IN	3.2V	140mVp-p A10352	

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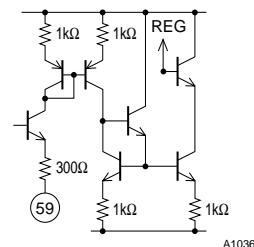
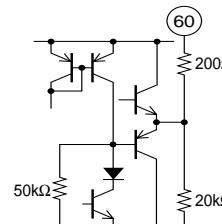
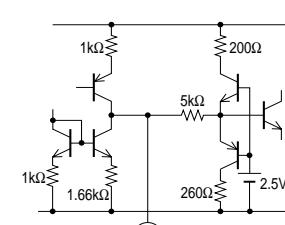
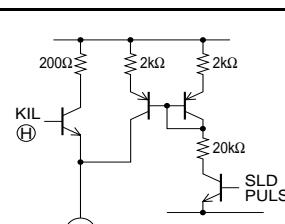
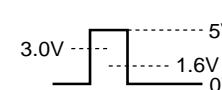
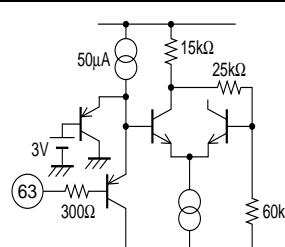
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
53	PA STOP-TR-SW	0V	DC	 <p>A10354</p>
54	REC-APC-FILTER	2.1V	 <p>A10355</p>	 <p>A10356</p>
55	VXO/XO-IN	REC 4.0V	 <p>A10358</p>	 <p>A10359</p>
		PB 3.9V	 <p>A10358</p>	 <p>A10359</p>
56	VXO/XO-OUT	REC 2.5V	 <p>A10360</p>	 <p>A10362</p>
		PB 2.5V	 <p>A10361</p>	 <p>A10362</p>
57	C-GND	0V	DC	
58	2 fsc/PB-H OUT	REC 1.5V	 <p>A10363</p>	 <p>A10365</p>
		PB 2.8V	 <p>A10364</p>	 <p>A10365</p>

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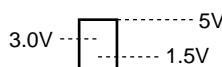
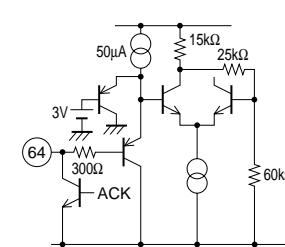
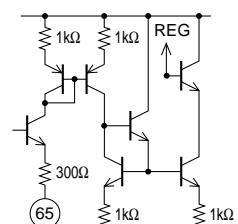
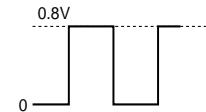
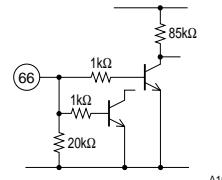
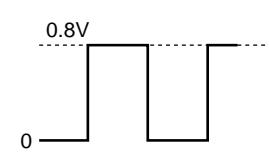
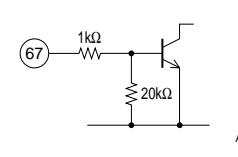
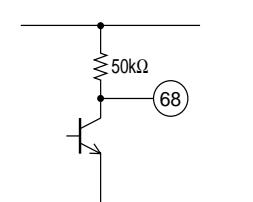
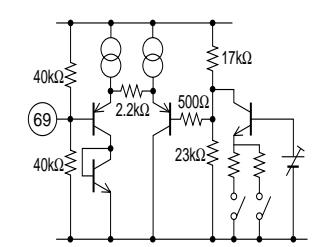
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
59	RL (RO4)	REC 1.5V	DC	
		PB 1.5V	DC	
60	BGP-OUT		SYNC+BGP SYNC 1.4V (typ) BGP 4.0V or MORE	
61	KILL-FILT	Color 2.0V	DC	
		killer 3.0V	DC	
62	ACK/SLD OUT	ACK-OUT MODE	KILLER MODE 4V or MORE COLOR MODE 0V	
		SLD-OUT MODE		
63	SERIAL-CLOCK-IN			

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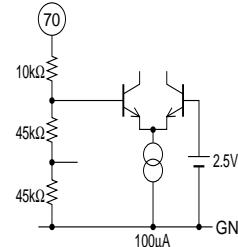
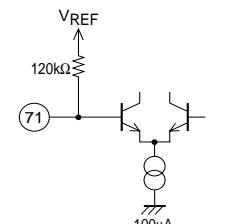
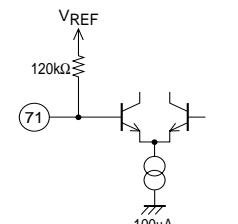
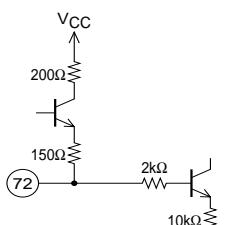
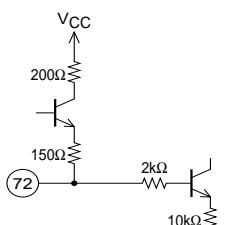
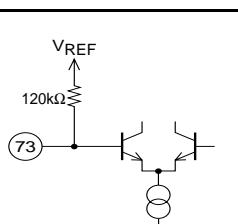
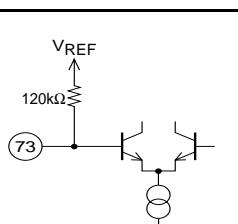
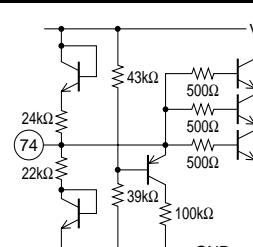
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
64	SERIAL-DATA-IN			
65	PQ1 (RO1)	REC 1.6V DC PB 1.6V		
66	C-ROTARY-PULSE-IN			
67	CSC-PULSE-IN			
68	PAL-PULSE	+45° 4V or MORE +45° 1V or LESS		
69	NC-CTL	REC 2.1V DC PB 2.1V		

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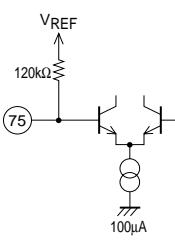
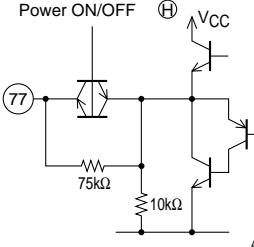
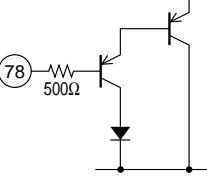
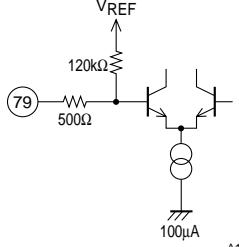
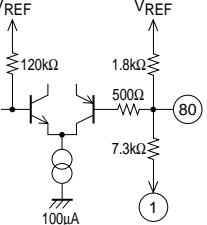
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
70	A-MUTE-ON/OFF	MUTE 3V or MORE	DC	 <p>A10382</p>
71	A-LINE-IN1	3.3V	REC CW, 95 mVp-p	 <p>A10383</p>
			PB DC 3.3V	 <p>A10383</p>
72	A-ALC-DET	0V	REC: ADAPTIVE	 <p>A10384</p>
			PB DC 0V	 <p>A10384</p>
73	A-LINE-IN2	3.3V	REC CW, 95 mVp-p	 <p>A10385</p>
			PB DC 3.3V	 <p>A10385</p>
74	A-V <sub>REF</sub> -FILTER	3.3V	DC	 <p>A10386</p>

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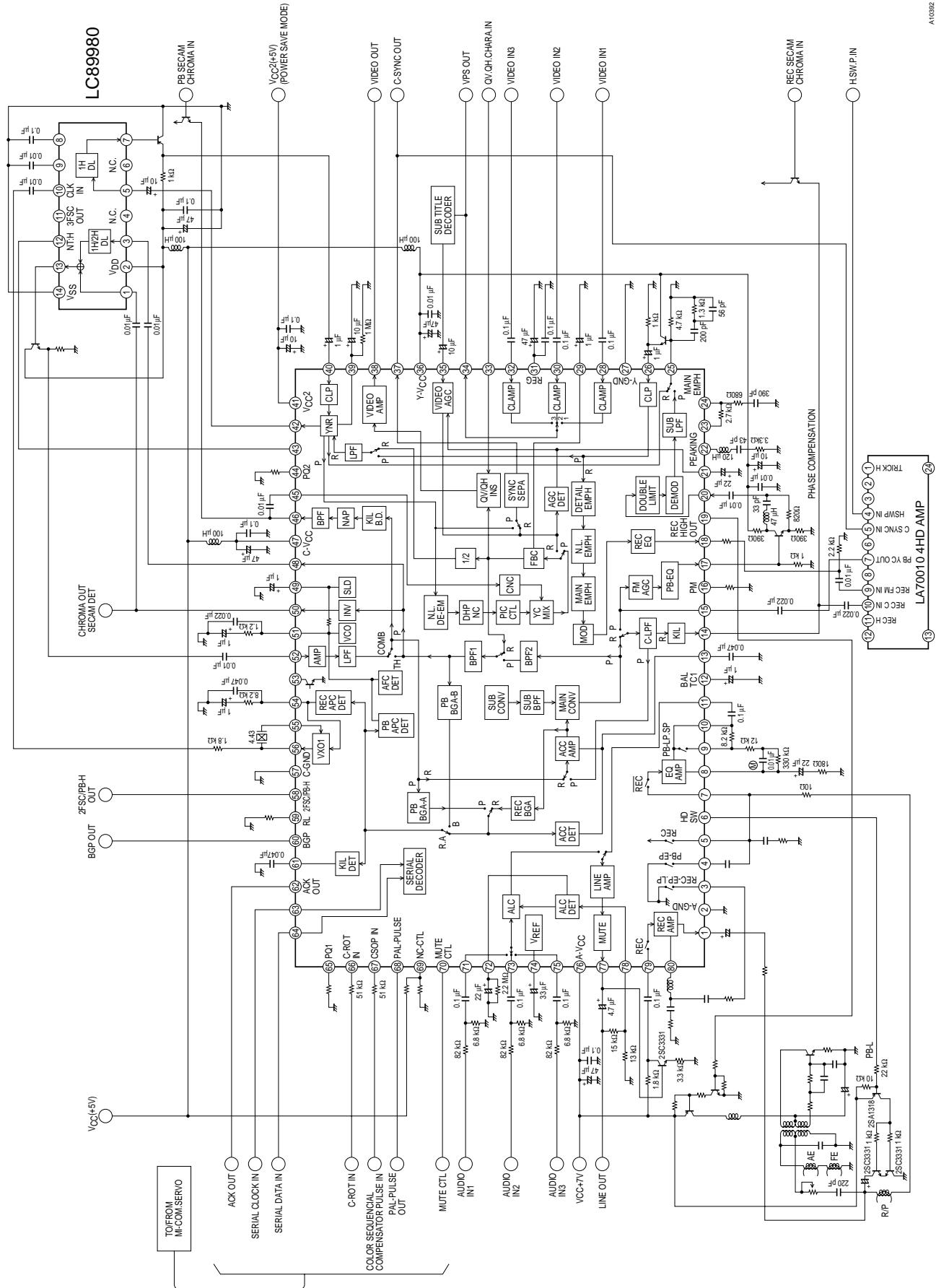
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Pin number	Pin name	Standard DC voltage	Signal waveform	Equivalent circuit
75	A-LINE-IN3	3.3V	REC CW, 95 mVp-p	 A10387
			PB DC 3.3V	
76	A-V <sub>CC</sub>	7V	DC	
77	A-LINE-OUT	3.3V	CW, 1.4 Vp-p	 A10388
78	A-ALC DET-IN	0V	CW, 1.0 Vp-p	 A10389
79	A-REC-IN	3.3V	REC CW, 745 mVp-p	 A10390
			PB DC 3.3V	
80	A-REC-NFB	3.3V	REC CW 745 mVp-p	 A10391
			PB DC 3.3V	

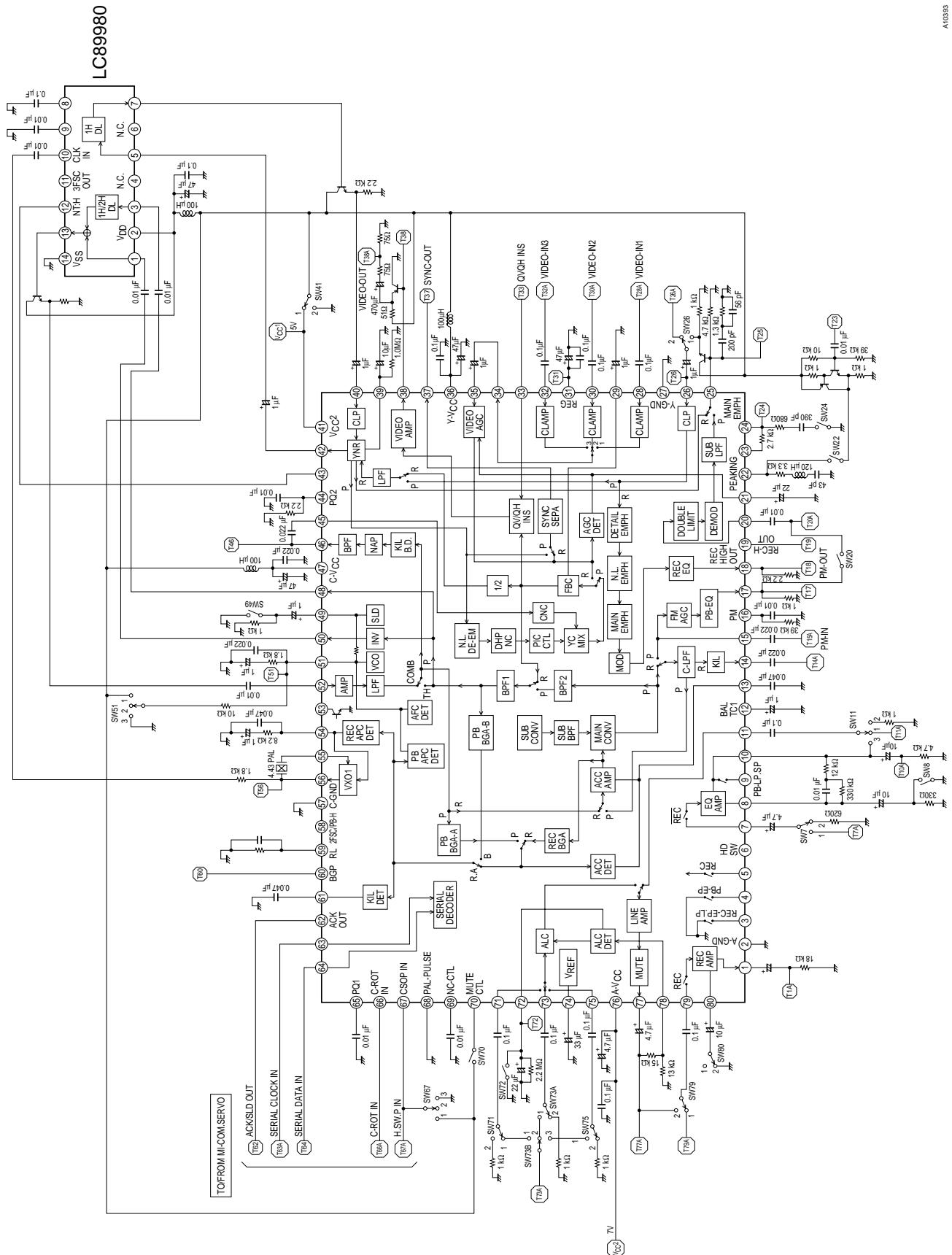
**LA71525M**

## Block Diagram and Sample Application Circuit



# LA71525M

## Test Circuit Diagram



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