Ordering number : EN7949

SANYO Semiconductors
DATA SHEET

LA71207M

Monolithic Linear IC
For VHS VCR
Video Signal Processor IC (Y/C/A Single-Chip)

Overview

The LA71207M is a Video Signal Processor IC (Y/C/A single-chip) for VHS VCR.

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		7.0	V
Allowable power dissipation	Pd max	Ta ≤ 75°C *	1020*	mW
Operating temperature	Topr		-10 to +75	°C
Storage temperature	Tstg		-40 to +150	°C

*: When mounted on a 114.3×76.1×1.6mm^3 glass epoxy board.

Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions		Unit
Supply voltage	V_{CC}		5.0	V
Allowable operating voltage range	V_{CC} opg		4.8 to 5.2	V

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Electrical Characteristics at Ta = 25°C, V_{CC} = 5.0V

Recording Mode Head Amplifier Gr1, Bit6, 5, 2, 1 = 0, 0, 0, 0

Parameter	Symbol	In	Out	Conditions	RF T57B	HA T58A	Ratings min	Ratings typ	Ratings max	Unit
REC Amp output Level 1	V_RSP1 V_REP1	T70	T73A T66A	Gr3, Bit3: 0 Output level when V_{IN} = 300mVp-p, f = 4MHz		0 5.0	127	135	143	mVp-p
Difference of gain between mode 1	$\Delta G_{VR}1$			V_RSP1/V_REP1			1.3	1.8	2.30	dB
REC AGC Amp output Level 2	V_RSP2 V_REP2	T70	T73A T66A	Gr3, Bit3: 1 Output level when V_{IN} = 300mVp-p, f = 4MHz		0 5.0	104	110	119	mVp-p
Difference of gain between mode 2	$\Delta G_{VR}2$			V_RSP2/V_REP2			1.3	1.8	2.30	dB
REC AGC AMP frequency characteristics	ΔV_FRS ΔV_FRE	T70	T73A T66A	7MHz/1MHz As V_{IN} = 300mVp-p, The output ratio when f is 1M, 7MHz 7MHz/1MHz		0 5.0	-1.0	0.0	+1.0	dB
REC AGC AMP second harmonic distortion	ΔV_{HD}RS ΔV_{HD}RE	T70	T73A T66A	The ratio of the 8M (second component) V_{IN} = 300mVp-p, f = 4MHz output and 4M (first component)		0 5.0		-45	-40	dB
REC AGC AMP maximum output level	ΔV_{HD}RS ΔV_{HD}RE	T70	T73A T66A	The output level which become -35dB of f = 4MHz second distortion		0 5.0	20	22		mVp-p
REC AGC AMP attenuate volume of mute	ΔV_MRS ΔV_MRE	T70	T73A T66A	Output level/VRSP, EP When V_{IN} = 300mVp-p, f = 4MHz Gr1, Bit6, 5 = 1, 0		0 5.0		-45	-40	dB
REC AGC AMP mixed modulation relative level	ΔVCYS ΔVCYE	T70	T73A T66A	V_{IN} 1 = 300mVp-p, f = 4MHz, T10A: V_{IN} 2 = 300Vp-p, f = 629kHz (4M±629k)/ 4M ratio of output		0 5.0		-45	-40	dB

Note1: Use a resistor with a tolerance of ±1.0% between Pin 69 and 70.

PB Mode Head Amplifier Gr1, Bit6, 5, 2, 1 = 0, 1, 0, 1

Parameter		Symbol	In	Out	Conditions	RF T57B	HA T58A	Ratings min	Ratings typ	Ratings max	Unit
Voltage gain	SP-H CH1	Gvp1	T74A	T14	V_{IN} = 38mVp-p, f = 1MHz	0	0	56.0	59.0	62.0	dB
	SP-H CH2	Gvp2	T72A			5.0	0	56.0	59.0	62.0	
	EP-L CH3	Gvp3	T67A			0	5.0	56.0	59.0	62.0	
	EP-H CH4	Gvp4	T65A			5.0	5.0	56.0	59.0	62.0	
Difference of voltage gain 1		ΔGvp1			Gvp1 - Gvp2			-1	0	+1	dB
Difference of voltage gain 2		ΔGvp2			Gvp3 - Gvp4			-1	0	+1	dB
Difference of gain between mode		ΔGvp3			Gvp3 - Gvp1			-1	0	+1	dB
Input calculation noise voltage	CH1	V_NIN1	T74A	T14	As the same input condition of the voltage gain, the ratio of the output which pass the 1.1MHz LPF and output when no input.	0	0		0.7	1.0	μVrms
	CH2	V_NIN2	T72A			5.0	0				
	CH3	V_NIN3	T67A			0	5.0				
	CH4	V_NIN4	T65A			5.0	5.0				
Frequency characteristics	CH1	ΔVfp1	T74A	T14	The ratio of the V_{IN} = 38mVp-p, f = 7MHz output and Gvp1, 2, 3, 4.	0	0	-2.5	0		dB
	CH2	ΔVfp2	T72A			5.0	0				
	CH3	ΔVfp3	T67A			0	5.0				
	CH4	ΔVfp4	T65A			5.0	5.0				
Secondary harmonic distortion	CH1	V_HDP1	T74A	T14	The ratio of 8MHz (second component) of f = 4MHz output and 4MHz (first component).	0	0		-40	-35	dB
	CH2	V_HDP2	T72A			5.0	0				
	CH3	V_HDP3	T67A			0	5.0				
	CH4	V_HDP4	T65A			5.0	5.0				
Maximum output level	CH1	V_OMP1	T74A	T14	As f = 1MHz, the output level of which become -30dB as the ratio of output 3MHz (third component) and 1MHz (first component).	0	0	1.0	1.2		Vp-p
	CH2	V_OMP2	T72A			5.0	0				
	CH3	V_OMP3	T67A			0	5.0				
	CH4	V_OMP4	T65A			5.0	5.0				

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Parameter	Symbol	In	Out	Conditions	RF T57B	HA T58A	Ratings min	Ratings typ	Ratings max	Unit
Cross talk SP1 CH1	V_CR1	T72A T67A T65A	T74	The ratio of output of V_{IN} = 38mVp-p, f = 4MHz and Gvp1.	0	0		-40	-35	dB
Cross talk SP2 CH2	V_CR2	T74A T67A T65A	T74	The ratio of output of V_{IN} = 38mVp-p, f = 4MHz and Gvp2.	5.0	0		-40	-35	dB
Cross talk EP1 CH3	V_CR3	T74A T72A T65A	T74	The ratio of output of V_{IN} = 38mVp-p, f = 4MHz and Gvp3.	0	5.0		-40	-35	dB
Cross talk EP2 CH4	V_CR4	T74A T72A T67A	T74	The ratio of output of V_{IN} = 38mVp-p, f = 4MHz and Gvp4.	5.0	5.0		-40	-35	dB
Output DC offset	ΔV_ODC1		T74	CH1- CH2	0 5.0	0 0	-150	0	+150	mV
	ΔV_ODC2			CH3- CH4	0 5.0	5.0 5.0				
	ΔV_ODC3			CH1- CH3	0 0	0 5.0				
	ΔV_ODC4			CH2- CH4	5.0 5.0	0 5.0				
	ΔV_ODC5			CH1- CH4	0 5.0	0 5.0				
	ΔV_ODC6			CH2- CH3	0 5.0	0 5.0				

PB Mode Head Amplifier Gr1, Bit6, 5, 2, 1 = 0, 1, 0, 1

Parameter	Symbol	In	Out	Conditions	T13	T15	Ratings min	Ratings typ	Ratings max	Unit
Envelope detection output terminal voltage	V_{ENV}		T59	T59DC when no input.	0 5.0 0 5.0	0 0 5.0 5.0	0	0.8	1.3	V
Envelope detection output terminal voltage SP1	V_{ENV}SP1	T74A	T59	When input f = 4MHz, T59 DC as becomes 175mVp-p, for T14 output level.	0	0	2.0	2.5	3.0	V
Envelope detection output terminal voltage SP2	V_{ENV}SP2	T74A	T59	When input f = 4MHz, T59 DC as becomes 400mVp-p, for T14 output level.	0	0	4.0	4.5	5.0	V
Envelope detection output terminal voltage EP1	V_{ENV}EP1	T67A	T59	When input f = 4MHz, T59 DC as becomes 125mVp-p, for T14 output level.	0	5.0	2.0	2.5	3.0	V
Envelope detection output terminal voltage EP2	V_{ENV}EP2	T67A	T59	When input f = 4MHz, T59 DC as becomes 300mVp-p, for T14 output level.	0	5.0	4.0	4.5	5.0	V
Comparator output voltage 1	V_{COMP}1	T74A	T60	T60 DC voltage when V_{IN} = 38mVp-p, f = 4MHz.	0	0		0.4	0.7	V
Comparator output voltage 2	V_{COMP}2	T67A	T60	T60 DC voltage when V_{IN} = 38mVp-p, f = 4MHz.	5.0	0	4.5	4.8		V

REC Mode Y

Parameter	Symbol	In	Out	Conditions	Ratings			Unit
					min	typ	max	
Current dissipation (REC)	$I_{CC}R$			Measure the sum of currents flowing into pins 23, 44, 45, 52, 68, 77.	145	170	195	mA
EE output level 2	$V_{EE}2$	T32A	T26	With V_{IN} a 1Vp-p video signal (PAL), measure the output level on T26.	2.00	2.10	2.20	Vp-p
AGC characteristics 1	AGC1	T32A	T26	With V_{IN} a 2.0Vp-p video signal, measure the ratio of the output level on T26 and $V_{EE}1$.	0	0.6	1.2	dB
AGC characteristics 2	AGC2	T32A	T26	With V_{IN} a 0.5Vp-p video signal, measure the ratio of the output level on T26 and $V_{EE}1$.	-0.2	0.4	1.0	dB
AGC characteristics 3	AGC3	T32A	T26	With V_{IN} a 700mVp-p luminance, 600mVp-p sync, measure the sync level on T26.	550	650	750	mVp-p
AGC characteristics 4	AGC4	T32A	T26	With V_{IN} a 700mVp-p luminance, 150mVp-p sync, measure the sync level on T26.	330	380	430	mVp-p
V-Sync separator output level	VV_{SYR}	T32A	T25	With V_{IN} a 1.0Vp-p video signal, measure the output pulse wave height on T26.	4.0	4.2	4.4	Vp-p
V-Sync separator output pulse width	PWV_{SYR}	T32A	T25	With V_{IN} a 1.0Vp-p video signal, measure the output pulse width on T26.	180	190	200	μs
C-Sync separator output level	VC_{SYR}	T32A	T25	With V_{IN} a 1.0Vp-p video signal, measure the output pulse wave height on T25.	3.4	3.6	3.8	Vp-p
C-Sync separator output pulse width	PWC_{SYR}	T32A	T25	With V_{IN} a 1.0Vp-p video signal, measure the output pulse width on T25.	4.1	4.4	4.7	μs
C-Sync separator threshold level	THC_{SYR}	T32A	T25	Gradually reduce the input level, and measure the input level at the point that the output pulse width is 1μs or more wider than PWSYR.		-20	-15	dB
Y LPF frequency characteristics (1)	$Y_{LPF}1$	T32A	T21	With V_{IN} a standard multi-burst signal (1Vp-p), measure the 1MHz response to a 500kHz signal on T20.	-0.6	-0.1	0.4	dB
Y LPF frequency characteristics (2)	$Y_{LPF}2$	T32A	T21	With V_{IN} a standard multi-burst signal (1Vp-p), measure the 2MHz response to a 500kHz signal on T20.	-1.3	-0.3	0.7	dB
Y LPF frequency characteristics (3)	$Y_{LPF}3$	T32A	T21	With V_{IN} a standard multi-burst signal (1Vp-p), measure the 3MHz response to a 500kHz signal on T20.	-8.0	-6.0	-4.0	dB
Y LPF frequency characteristics (4)	$Y_{LPF}4$	T32A	T20	With V_{IN} a standard multi-burst signal (1Vp-p), measure the Trap point response to a 500kHz signal on T20.			-25	dB
REC-FM modulator output level	V_{FM}		T14	Measure the T14 output level with no input.	220	300	360	mVp-p
Carrier frequency	$F_{FM}2$		T14	Measure the output frequency on T14 with no input.	3.42	3.49	3.56	MHz
REC-FM output second distortion	HMOD		T14	Measure the second distortion with the above state.		-40	-35	dB
Deviation (M mode)	DEV2	T32A	T14	With V_{IN} a 100% white 1Vp-p signal, measure the deviation on T14.	0.95	1.00	1.05	MHz
FM modulator linearity	LMOD	T22	T14	Let f2.85 be the output frequency when 2.85VDC is applied to T22. $$LMOD = \frac{f2.85 - (f3.1 + f2.6)/2}{f3.1 - f2.6} \times 100$$	-2	0	2	%
Emphasis gain	GEMP	T22A	T17	With V_{IN} a 500mVp-p 10kHz sine wave, measure the ratio of the levels on T22A and T17.	-0.75	-0.25	0.25	dB
Detail enhancer characteristics (1)	$G_{ENH}1$	T22A	T17	With V_{IN} a 158mVp-p 2MHz sine wave, measure the ratio of the levels on T22A and T17, and take the difference with GEMP.	1.5	2.0	2.5	dB
Detail enhancer characteristics (2)	$G_{ENH}2$	T22A	T17	With V_{IN} a 50mVp-p 2MHz sine wave, measure the ratio of the levels on T22A and T17, and take the difference with GEMP.	4.5	5.5	6.5	dB
Detail enhancer characteristics (3)	$G_{ENH}3$	T22A	T17	With V_{IN} a 15.8mVp-p 2MHz sine wave, measure the ratio of the levels on T22A and T17, and take the difference with GEMP.	7.0	8.5	10.0	dB
Nonlinear emphasis characteristics (1)	$G_{NL}EMP1$	T22A	T17	With V_{IN} a 500mVp-p 2MHz signal measure the ratio of the levels on T22A and T17, and take the difference with GEMP.	1.0	2.0	3.0	dB
Nonlinear emphasis characteristics (2)	$G_{NL}EMP2$	T22A	T17	With V_{IN} a 158mVp-p 2MHz signal measure the ratio of the levels on T22A and T17, and take the difference with GEMP.	2.5	4.0	5.5	dB
Nonlinear emphasis characteristics (3)	$G_{NL}EMP3$	T22A	T17	With V_{IN} a 50mVp-p 2MHz signal measure the ratio of the levels on T22A and T17, and take the difference with GEMP.	6.0	7.5	9.0	dB

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Parameter	Symbol	In	Out	Conditions	Ratings			Unit
					min	typ	max	
Main linear emphasis characteristics (1)	G_ME1	T22A	T17	With V_{IN} a 50mVp-p 500kHz sine wave, measure the ratio of the levels on T22 and T17, and take the difference with GEMP.	10.0	11.5	12.0	dB
Main linear emphasis characteristics (2)	G_ME2	T22A	T17	With V_{IN} a 50mVp-p 2MHz signal measure the ratio of the levels on T22A and T17, and take the difference with GEMP.	14.5	16.0	17.5	dB
White clipping level	L_{WC}	T32A	T17	With V_{IN} a 1.0Vp-p 100% white video signal, measure the white clipping level on T17.	180	190	200	%
Dark clipping level	L_{DC}	T32A	T17	With V_{IN} a 1.0Vp-p 100% white video signal, measure the dark clipping level on T17.	-52	-50	-47	%

REC Mode EQ

Parameter	Symbol	In	Out	Conditions	Ratings			Unit
					min	typ	max	
REC EQ characteristics 1	$G_{REQ}1$	T12A	T14	With V_{IN} a CW 2MHz, 400mVp-p signal, measure the input/output response.	-5.7	-4.5	-3.3	dB
REC EQ characteristics 2	$G_{REQ}2$	T12A	T14	With V_{IN} a CW 4MHz, 400mVp-p signal, measure the input/output response.	-4.0	-2.7	-1.4	dB
REC EQ characteristics 3	$G_{REQ}3$	T12A	T14	With V_{IN} a CW 750kHz, 400mVp-p signal, measure the input/output response.			-20	dB
REC EQ 2'nd distortion	H_{REQ}	T12A	T14	Measure the second harmonic in the above conditions.		-40	-15	dB

PB Mode Y

Parameter	Symbol	In	Out	Conditions	Ratings			Unit
					min	typ	max	
Current dissipation (PB)	$I_{CC}P$			Measure the sum of the currents flowing into pins 3, 44, 45, 52, 68, 77.	145	170	195	mA
Dropout compensation Period *1H for one horizontal synchronization period	TDOC	T14A T22A	T26	T14A: 4MHz 300mVp-p sine wave +3.4VDC T22A: 0.5Vp-p video signal The time between the instant the T14A input level set to 0 and the point T26 output is restored.	10.0	13.0	15.0	H
DOC characteristics	GDOC	T14A T22A	T26	T14A: 4MHz 300mVp-p sine wave +3.4VDC T22A: 0.5Vp-p video signal The I/0 response 5H after the T14A input is set to 0.	-1.5	0	1.5	dB
PB Y level	V-YOUT	T14A	T26	DEV = 1.0MHz PB Y level when input FM signal.	2.00	2.10	2.20	Vp-p
Self R/P, PB-Y level	R/P-OUT	T14A	T26	Self R/P-Y, PB-Y level	1.93	2.10	2.27	Vp-p
FM demodulator linearity	LDEM	T14A	T20	$LEDM = \frac{VDEM4 - (VDEM3 + VDEM5)/2}{VDEM5 - VDEM3} \times 100$ *VDEM4 = DC: T20 (Input 4MHz, 300mVp-p)	-3.5	0	+3.5	%
Carrier leakage	CL	T14	T20	V_{IN} = 300mVp-p, f= 4MHg+3.4MHz Measure the ratio of the 4MHz component on T20 and SDEM.			-35	dB
PB YNR characteristics	P_{YNR}	T22A	T26	V_{IN} = White 50% +CW(15.8mVp-p) Measure the ratio of 32fH component and 32.5fH.	-7.0	-6.0	-5.0	dB
Nonlinear de-emphasis characteristics (1) *Serial-control	$G_{NL}DE1$	T22A	T26	With V_{IN} a 50% white video +2MHz 126mVpp sine wave, measure the I/O response.	-3.5	-2.5	-1.5	dB
Nonlinear de-emphasis characteristics (2)	$G_{NL}DE2$	T22A	T26	f = 2MHz, 50mVp-p	-6.0	-4.5	-3.0	dB

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Parameter	Symbol	In	Out	Conditions	Ratings			Unit
					min	typ	max	
Double noisecanceller characteristics (1)	$G_{WNC}1$	T22A	T26	f = 1.4MHz, 158mVp-p	-2.0	-1.0	0.0	dB
Double noisecanceller characteristics (2)	$G_{WNC}2$	T22A	T26	f = 1.4MHz, 50mVp-p	-7.0	-5.0	-3.0	dB
Double noisecanceller characteristics (3)	$G_{WNC}3$	T22A	T26	f = 1.4MHz, 15.8mVp-p	-15	-13	-11	dB
Sync separator output level	V_{SYP}	T22A	T25	With V_{IN} a 0.5Vp-p video signal, measure the output pulse wave height on T34.	4.0	4.2	4.4	Vp-p
Sync separator output pulse width	PW_{SYP}	T22A	T25	With V_{IN} a 0.5Vp-p video signal, measure the output pulse width on T34.	4.1	4.4	4.7	μs
Sync tip level Pedestal level White level	LVOR	T22A	T26	With V_{IN} a 100% white 0.5Vp-p signal, measure the sync tip and pedestal and white levels on T26 video output, and take these as LSYN LPED LWHT, respectively				
Quasi-V insertion level	ΔVDP	T22A	T26	Measure the T26 DC voltage with 4.0V applied to T24,and take this to be LVDP, and compute the difference with LSYN measured above. ΔVDP = LSYN-LVDP	-100	0	100	mV
4V regulator	V_{REG}		T31	Measure the T31 DC level.	3.9	4.0	4.3	V

Notes on PB-Y Measurement

When inputting a sine wave signal to pin 14, pull up the pin 14 DC level to 3.4 V.

When inputting a video signal to pin 22, also input a 4 MHz 300mVp-p sine wave to pin 14 so that the DOC function does not operate.

PB Mode EQ

Parameter	Symbol	In	Out	Conditions	Ratings			Unit
					min	typ	max	
PB EQ characteristics 1 *Serial-control	$G_{PEQ}1$	T14A	T17	With V_{IN} a CW 4MHz + 3.4VDC 300mVp-p signal, measure the input/output response.	1.5	3.0	4.5	dB
PB EQ 2'nd distortion	H_{PEQ}	T14A	T17	Measure the second harmonic in the above condition.		-40	-30	dB
PB EQ characteristics 2	$G_{PEQ}2$	T14A	T17	With V_{IN} a CW 750MHz 300mVp-p signal, measure the input/output response			-30	Vp-p
PB EQ Trap characteristics	f_{PEQ}	T14A	T17	High-band Trap frequency and measurement of Gain. (Using network analyzer)			-25	dB

PB Mode S Discrimination

Parameter	Symbol	In	Out	Conditions	Ratings			Unit
					min	typ	max	
Output voltage when normal VHS	$VN_{DET}N$	T14	T19	V_{IN} = 300mVp-p f: 4MHz +3.4VDC	0	0.2	0.5	V
Output voltage when S-VHS	$VS_{DET}S$	T14	T19	V_{IN} = 300mVp-p f: 6MHz +3.4VDC	4.4	4.7	5.0	V
S-discrimination input level	VS_{DET}	T14	T19	Input level which doesn't make a miss discrimination when changing T14 input level.	50			mVp-p
Normal-discrimination input level	VN_{DET}	T14	T19	Input level which doesn't make a miss discrimination when changing T14 input level.	50			mVp-p
Normal → S-discrimination threshold level	$FS_{DET}NS$	T14	T19	The frequency T19 become H when input to T14 sine wave, and increasing from f = 4MHz.	4.5	5.0	5.5	MHz
S → normal discrimination threshold level	$FS_{DET}SN$	T14	T19	The frequency T19 become L when input to T14 sine wave, and decreasing from f = 5MHz.	4.2	4.7	5.2	MHz

REC Mode Chroma

Parameter	Symbol	In	Out	Conditions	Ratings			Unit
					min	typ	max	
REC chroma low frequency conversion output level	VOR-46	T32A	T46	With V_{IN} the standard color bar signal (1Vp-p), measure the burst level on T46.	290	350	410	mVp-p
Burst emphasis	GBE	T32A	T46	With V_{IN} the standard color bar signal (1Vp-p), calculate the ratio of the T46 burst levels for SP/EP and LP modes.	5.5	6.0	6.5	dB
VXO oscillation level	V_{VXO}-RN	T32A	T50	With V_{IN} the standard color bar signal (1Vp-p), measure the T50 output amplitude with an FET probe.	290	430	690	mVp-p
REC ACC characteristics (1)	ACC_R1	T32A	T46	With V_{IN} the standard color bar signal (1Vp-p), increase only the chroma signal level by +6dB, measure the T46 burst level, and calculate its ratio with VOR-46.		+0.2	+0.5	dB
REC ACC characteristics (2)	ACC_R2	T32A	T46	With V_{IN} the standard color bar signal (1Vp-p), decrease only the chroma signal level by -6dB, measure the T46 burst level, and calculate its ratio with VOR-46.	-0.5	-0.1		dB
REC ACC killer-on input level	V_{ACCK}-ON	T32A	T46	With V_{IN} the standard color bar signal (1Vp-p), decrease the chroma signal and measure the input burst level at the point that T46 output ceases. Calculate the ratio of this value with the standard input level.		-26		dB
REC ACC killer-on output level	V_0ACCK	T32A	T46	Measure the T46 output level with a spectrum analyzer in the killer state of the above item and calculate its ratio with VOR-46.		-60	-50	dB
REC ACC killer restored input level	V_{ACCK}-OFF	T32A	T46	From the killer state of the above item gradually increase the input chroma level and T46 output reappears. Calculate its ratio with the standard input level.		-20		dB
REC APC pull-in range (1)	$\Delta f_{NAPC}1$	T32A	T46	Input a signal consisting of a 3.5795MHz CW added to a 50% white signal. After confirming that a signal is output from T46, increase the CW frequency until T46 output ceases. Now slowly reduce the CW frequency, and let f1 be the frequency at which T46 output reappears. ΔfAPC1 = f1-3579545 (Hz)	350			Hz
REC APC pull-in range (2)	$\Delta f_{APC}2$	T32A	T46	As in the previous item, decrease the CW frequency until T46 output ceases. Now slowly increase the CW frequency and let f2 be the frequency at which T46 output reappears. ΔfAPC2 = f2-3579545 (Hz)			-350	Hz
REC AFC pull-in range (1)	$\Delta f_{AFC}1$	T32A	T48	Input a 300mVp-p,15.7kHz,5μs width pulse train (negative polarity). After increasing the pulse train frequency until the T48 wave form is disrupted, decrease the frequency until the T48 wave form returns to normal and let f1 be that frequency. ΔfAFC1 = f1-15.734 (kHz)	1.0			kHz
REC AFC pull-in range (2)	$\Delta f_{AFC}2$	T32A	T48	With the initial conditions of the previous item, decrease the pulse train frequency until the output is disrupted, then increase the frequency until the output returns to normal, and let f2 be that frequency. ΔfAFC2 = f2-15.734 (kHz)			-1.0	kHz
The ratio of the REC chroma level and FM modulator output level	C/FM2	T32	T69	The ratio of 100% chroma's level which was converted to low band and FM modulator output level. (When Y/C Mix Ratio: FM -1.0dB)		-4.0		dB

PB Mode Chroma

Parameter	Symbol	In	Out	Conditions	Ratings			Unit
					min	typ	max	
PB chroma video output level	NVop-26	T14A T22A	T26	Mixes the SP mode chroma signal (SP mode, burst 100mVp-p) obtained by converting T14A and NTSC chroma noise test signal in the low range and the 4MHz, 300mVp-p sinosoidal wave and enters it to T14 via 3V bias. Enters the 50% white signal (321.5mVp-p) from T22A. Measures the T26A burst level.	490	580	670	mVp-p
PB chroma pin 46 output level	Vop-46	T14A T22A	T46	Measure the burst level with the same conditions as those for NVop-26.		200		mVp-p
PB ACC characteristics (1)	ACC_P1	T14A T22A	T46	With the conditions used for NVop-26, increase the input chroma level by +6dB, measure the burst level on T46, and calculate the ratio with Vop-46.		+0.5	+0.8	dB
PB ACC characteristics (2)	ACC_P2	T14A T22A	T46	With the conditions used for NVop-26, decrease the input chroma level by -6dB, measure the burst level on T46, and calculate the ratio with Vop-46.	-0.5	-0.2		dB
PB killer-on input level	V_{ACK}-P	T14A T22A	T46	With the conditions used for NVop-26, the input chroma level until output from T46 cease and measure the input burst level at that point. (Calculate the ratio with the standard input 100mVp-p signal)			-25	dB
PB killer-on chroma output level	V_OACK-P	T14A T22A	T26	Measure the T26 chroma output with a spectrum analyzer in the killer state of the previous item. Calculate its ratio with Nvop-26.		-44	-40	dB
PB main converter carrier leakage	CLP	T14A T22A	T26	With the conditions used for NVop-26, measure the T26A with a spectrum analyzer, and calculate the ratio of the 3.58MHz component and the 4.21MHz carrier leakage component.		-40	-33	dB
Burst de-emphasis	GBD	T14A T22A	T46	Combine a 629 kHz, 100mVp-p burst, 125mVp-p chrominance signal with a 4MHz 300mVp-p sine wave and input that mixture to T14A. Input a 50% white signal to T22A. Measure the burst amplitude and chroma amplitude in the T46 signal. Let B and C be those values, respectively. GBD = 20LOG(125*B)/(100*C)	-5.25	-5.00	-4.75	dB
PB XO output level	V_{XO}-PN		T50	Measure the output level on T50 with an FET probe.	230	380	600	mVp-p
PB XO oscillator frequency deviation	$\Delta f_{XO}N$		T50	In PB mode, let f be the measured frequency on T50. ΔFxon = f-3579545 (Hz)	-7	0	+7	Hz
PB Chroma 2'Fsc distortion	$P_{THD}2$	T14A T22A	T26	With the conditions used for NVOP-26, measure the T26 with a spectrum analyzer, and calculate the ratio of the 3.58MHz component and the 7.16MHz component. PTHD2 = 20 log ((7.16MHz component)/(3.58MHz component))			-25	dB

AUDIO REC Mode

Parameter	Symbol	In	Out	Conditions	Ratings			Unit
					min	typ	max	
REC amplifier voltage gain	V_{GR}	T76A	T9	V_{IN} = -28dBm V_{GR} = T9-T10A	3.5	4.0	4.5	dB
REC amplifier Distortion ratio	THD_R	T76A	T9	V_{IN} = -28dBm	0.01	0.1	0.5	%
REC amplifier maximum output voltage	V_{OMR}	T76A	T9	V_{OUT} = 0dBm over	0.1	0.5	1.0	%
voltage conversion REC bias current	V_{BIAS}		T8	Each head's impedance is TYP, No signal.	270	300	330	mVrms
REC bias current control voltage	V_{CTL}		T11A	Each head's impedance is TYP, No signal.	2.9	3.2	3.5	Vdc

AUDIO EE Mode

Parameter	Symbol	In	Out	Conditions	Ratings			Unit
					min	typ	max	
LINE amplifier Voltage gain (A1, A2, A3)	$V_{GLR}1$ $V_{GLR}2$ $V_{GLR}3$	T76A T78A T80A	T10A	V_{IN} = -28dBm	21.5	22.0	22.5	dB
LINE amplifier Output voltage when ALC	$V_{O}A$	T76A	T10A	V_{IN} = -26dBm	-4.8	-2.8	-0.8	dBm
LINE amplifier Effect of ALC	ALC	T76A	T10A	V_{IN} = -26 to -6dBm	-0.5	1.0	3.0	dB
LINE amplifier Distortion ratio of when ALC	THD_A	T76A	T10A	V_{IN} = -26dBm	0.01	0.1	0.5	%
MUTE attenuation (A1, A2, A3)	MA1 MA2 MA3	T76A T78A T80A	T10A	V_{IN} = -8dBm	80	90	120	dB

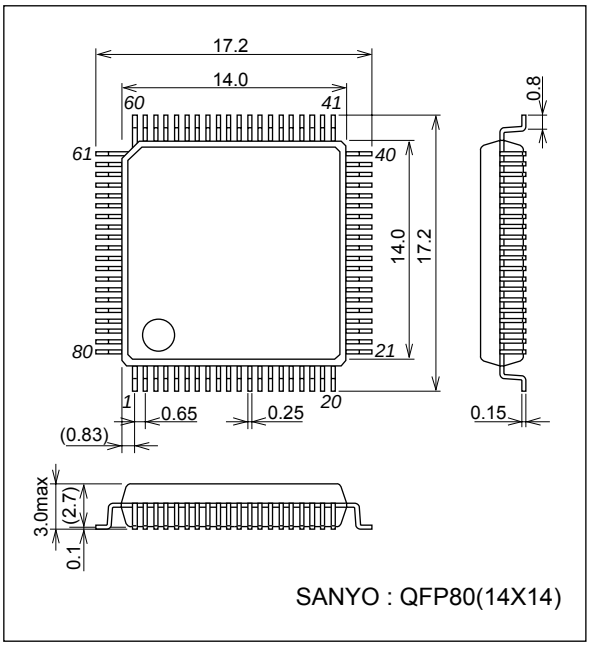
AUDIO PB Mode

Parameter	Symbol	In	Out	Conditions	Ratings			Unit
					min	typ	max	
LINE amplifier Voltage gain	V_{GLP}	T2A	T10A	V_{IN} = -28dBm	21.5	22.0	22.5	dB
LINE amplifier Distortion ratio	THD_L	T2A	T10A	V_{IN} = -28dBm	0.01	0.1	0.4	%
LINE amplifier Output noise voltage	$V_{N}OL$		T10A	Rg = 1kΩ, DIN Audio filter	100	200	300	μVrms
LINE amplifier Maximum output voltage	$V_{O}ML$	T2A	T10A	V_{OUT} = 0dBm over	0.1	0.5	1.0	%
MUTE attenuation (PB)	M_{PB}	T2A	T10A	V_{IN} = -8dBm	80	90	120	dB
EQ amplifier voltage gain (SP)	VG_{SP}	T6A	T3	V_{IN} = -64dBm	36.0	39.5	43.0	dB
EQ amplifier voltage gain (EP)	VG_{EP}	T6A	T3	V_{IN} = -64dBm	38.0	41.5	45.0	dB
EQ amplifier Input conversion noise voltage	V_{NIE}	T6A	T10	Rg = 600Ω, DIN Audio filter	0.1	1.5	3.0	μVrms

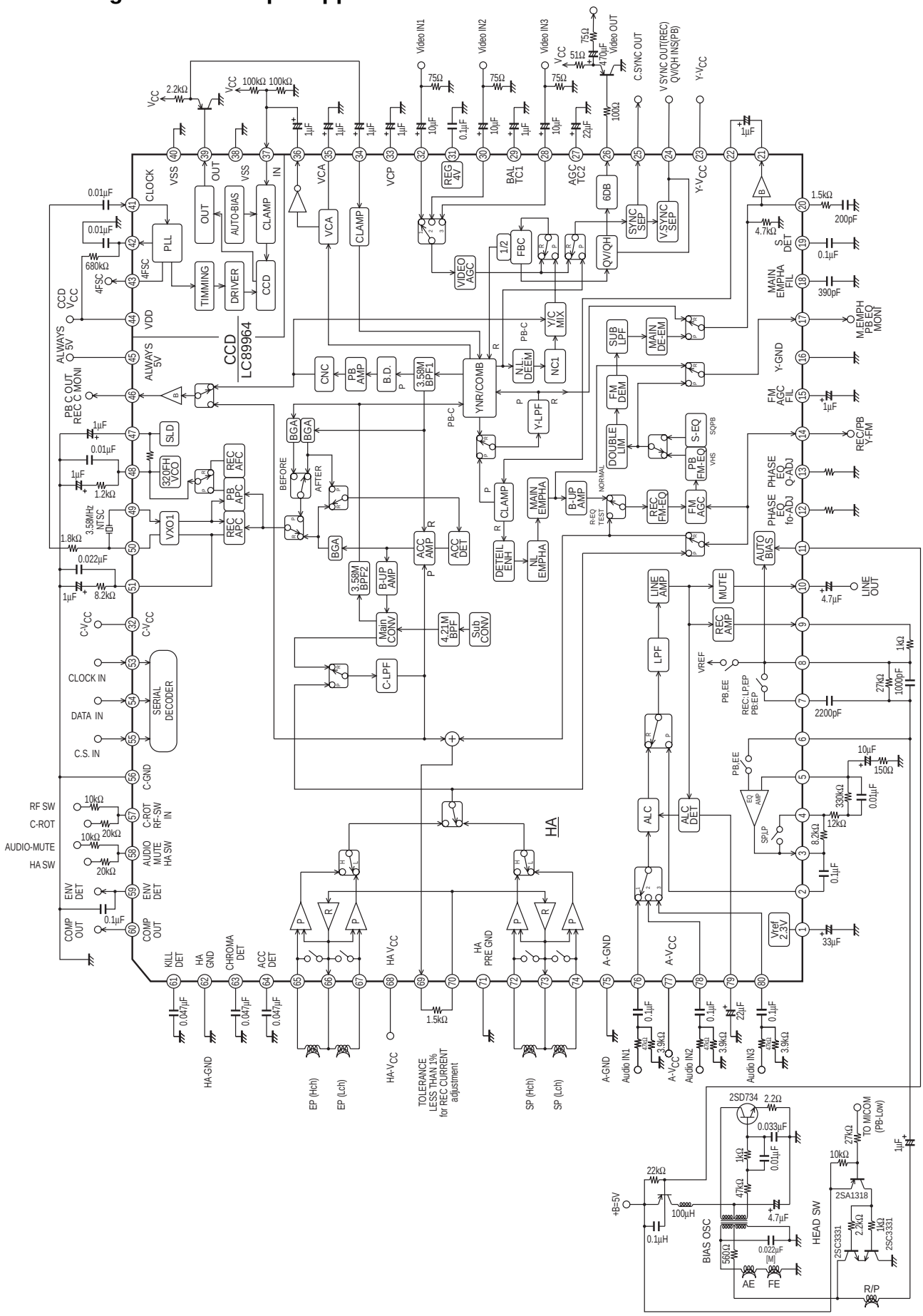
Package Dimensions

unit : mm

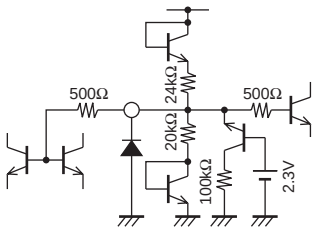
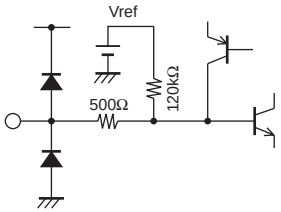
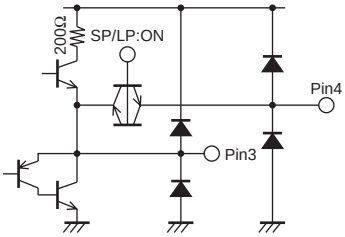
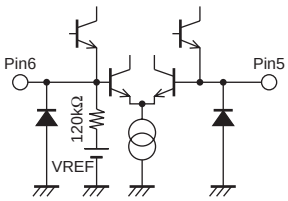
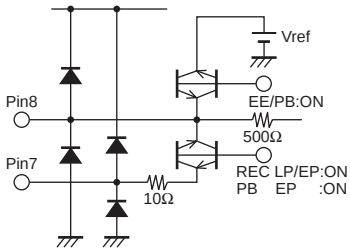
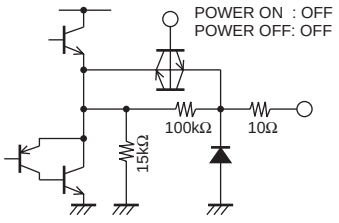
3255



Block Diagram and Sample Application Circuit



Pin Functions

Pin No.	Pin name	DC voltage	Signal wave form	Equivalent circuit form
1	AUDIO VREF	REC: 2.3V	DC	
		PB: 2.3V	DC	
2	AUDIO LINE AMP PB IN	REC: 2.3V	Half-wave rectified wave form	
		PB: 2.3V	CW 95mVp-p	
3	AUDIO EQ AMP OUT	REC: 2.3V	DC	
		PB: 2.3V	CW 95mVp-p	
4	AUDIO EQ SW2	REC: 2.3V	DC	
		PB: 2.3V	CW 95mVp-p	
5	AUDIO EQ AMP NFB	REC: 2.3V	DC	
		PB: 2.3V	CW 1mVp-p	
6	AUDIO EQ AMP IN	REC: 2.3V	DC	
		PB: 2.3V	CW 1mVp-p	
7	AUDIO EQ SW1	REC: 2.3V	DC	
		PB: 2.3V	SP/LP: AC GND EP: CW 1mVp-p	
8	AUDIO AUTO BIAS IN	REC: 2.3V	CW 1.4Vp-p +70kHz 850mVp-p	
		PB: 2.3V	DC	
9	AUDIO REC AMP OUT	REC: 2.3V	CW 1.4Vp-p	
		PB: 2.3V	DC	

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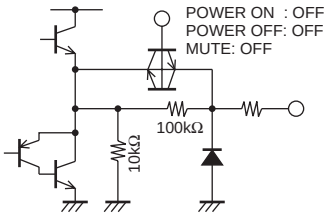
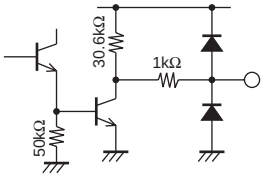
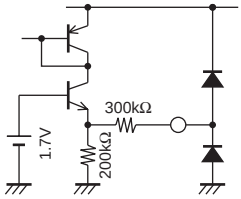
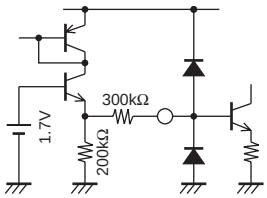
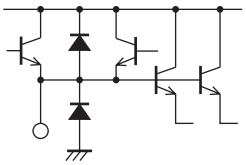
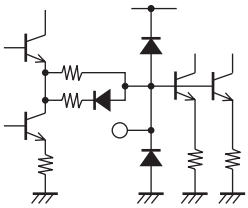
Pin No.	Pin name	DC voltage	Signal wave form	Equivalent circuit form
10	AUDIO LINE AMP OUT	REC: 2.3V	CW 1.4Vp-p	
		PB: 2.3V	CW 1.4Vp-p	
11	AUDIO AUTO BIAS OUT	REC: 4.3V	DC	
		PB: 5V	DC	
12	PHASE EQ f_0 CTL	REC: 1.0V	DC	
		PB: 1.0V	DC	
13	PHASE EQ Q CTL	REC: 1.0V	DC	
		PB: 1.0V	DC	
14	REC-EQ /PB-HA MONITOR	REC: 1.8V	FM: 300mVp-p	
		PB: 1.8V	FM: 300mVp-p to 800mVp-p	
15	FM AGC FILTER	REC: 1.8V	DC	
		PB: 1.8V	DC	
16	Y-GND	0V	GND	

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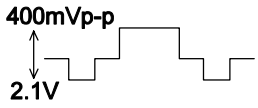
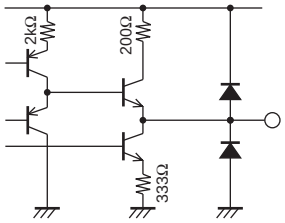
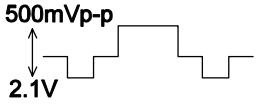
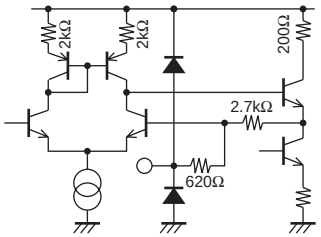
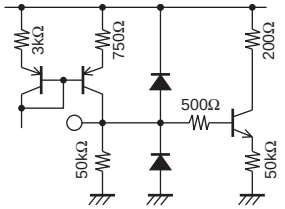
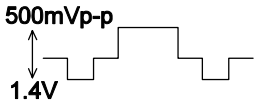
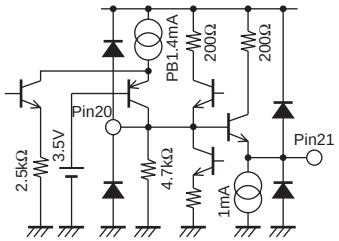
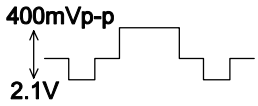
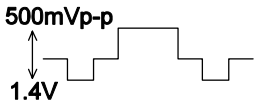
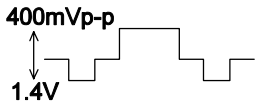
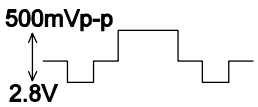
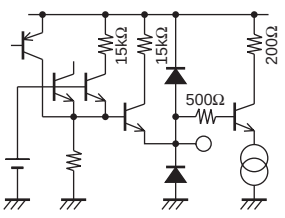
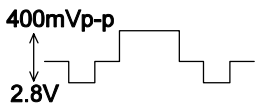
Pin No.	Pin name	DC voltage	Signal wave form	Equivalent circuit form
17	MAIN EMPHASIS OUTPUT /PB EQ MONITOR	REC: 2.1V		
		PB: 2.5V	FM: 300mVp-p	
18	MAIN EMPHASIS FILTER	REC: 2.1V		
		PB: 1.5V		
19	S DET	REC: 0V	DC	
		PB: 4.2/0.2V	DC SVHS: 4.2V VHS: 0.2V	
20	MAIN DE EMPHASIS FILETR	REC: 2.1V		
		PB: 2.1V		
21	MAIN DE EMPHASIS OUT	REC: 1.4V		
		PB: 1.4V		
22	CLAMP IN	REC: 2.8V		
		PB: 2.8V		

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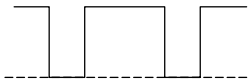
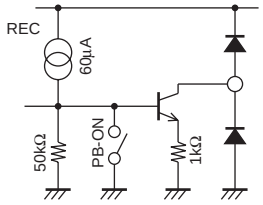
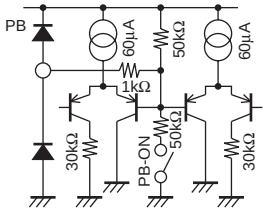
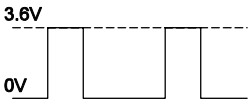
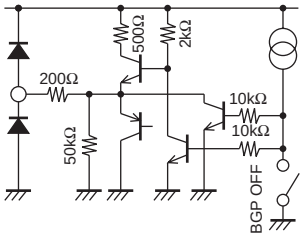
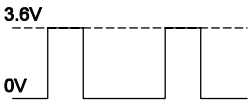
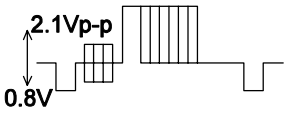
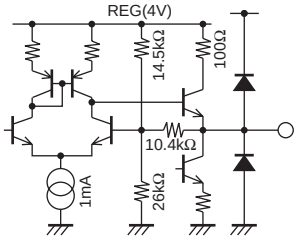
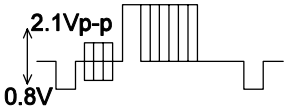
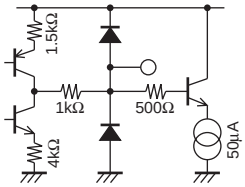
Pin No.	Pin name	DC voltage	Signal wave form	Equivalent circuit form
23	Y V_{CC}	5V	V_{CC}	
24	V SYNC OUT /QV QH INS When pin 17 is pulled up at 10kΩ, it becomes QVQH mode when EE/REC.	REC:	VSync period: Sink At other times: Open 	
		PB: 0 to 5V	0 to 1.7V: Through 1.7 to 3.8V : QH INS (Automatic insertion) 3.7 to 5.0V: Sync level	
25	C.SYNC OUT	REC:		
		PB:		
26	VIDEO OUT	REC: 0.8V		
		PB: 0.8V		
27	AGC TC2	REC: 2.0V	DC	
		PB: 2.0V	DC	

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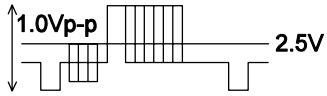
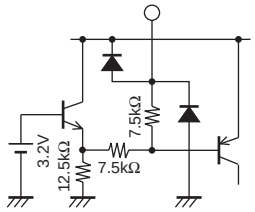
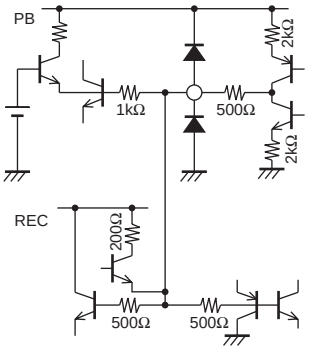
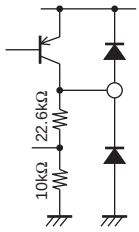
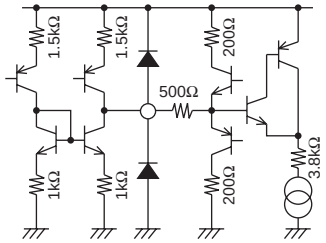
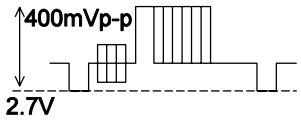
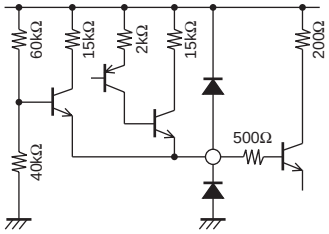
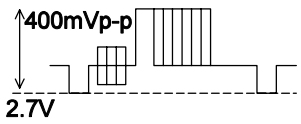
Pin No.	Pin name	DC voltage	Signal wave form	Equivalent circuit form
28 30 32	VIDEO IN3 IN2 IN1	REC: 2.5V		
		PB: 2.5V	DC	
29	AGC TC1 /BALANCER	REC: 2.3V	DC	
		PB: 2.3V	DC	
31	VIDEO VREG	REC: 4.0V		
		PB: 4.0V		
33	VCP FILTER	REC: 2.8V	DC	
		PB: 2.8V	DC	
34	VCA IN	REC: 2.7V		
		PB: 2.7V		

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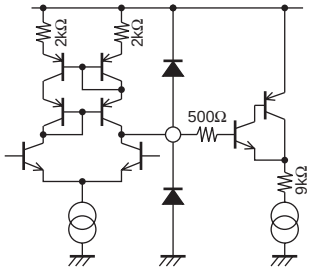
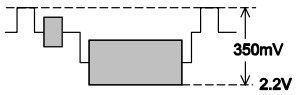
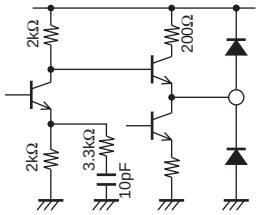
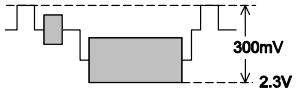
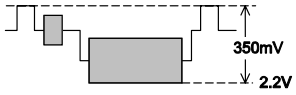
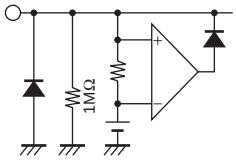
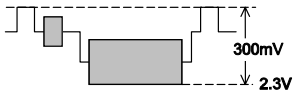
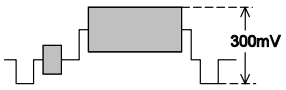
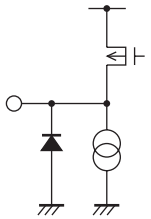
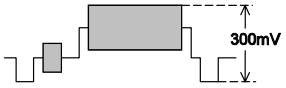
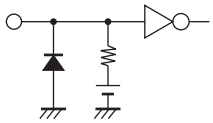
Pin No.	Pin name	DC voltage	Signal wave form	Equivalent circuit form
35	VCA FILTER	REC: 3.2V	DC	
		PB: 3.2V	DC	
36	CCD DRIVE	REC: 2.2V		
		PB: 2.3V		
37	CCD IN	REC: 2.2V		
		PB: 2.3V		
38	CCD V_{SS}	0V	V_{SS}	
39	DELEY OUT	REC:		
		PB:		
40	CCD V_{SS}	0V	V_{SS}	
41	CLOCK IN	REC: 0.7V	 3.579545MHz	
		PB: 0.7V	 3.579545MHz	

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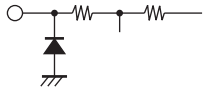
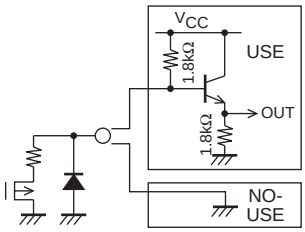
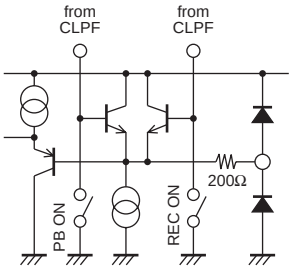
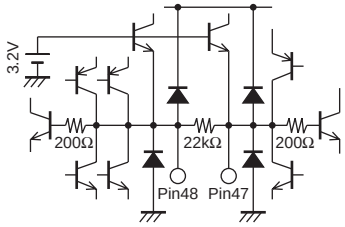
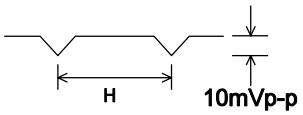
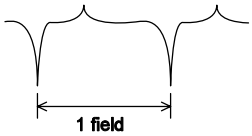
Pin No.	Pin name	DC voltage	Signal wave form	Equivalent circuit form
42	VCO FILTER	REC: 2.2V	DC	
		PB: 2.0V	DC	
43	4FSC OUT	REC: 1.5V		
		PB: 1.5V		
44	CCD V_{DD}	5V	V_{DD}	
45	ALWAYS V_{CC}	5V	V_{CC}	
46	PB CHROMA OUT/REC CHROMA MONITOR	REC: 2.5V	300mVp-p	
		PB: 3.2V	300mVp-p	
47	SLD FILTER	REC:	DC	
		PB:	DC	
48	AFC/APC FILTER	REC:		See Pin No. 47
		PB:		

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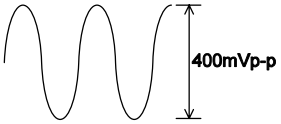
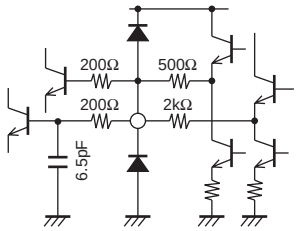
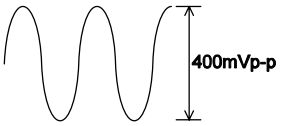
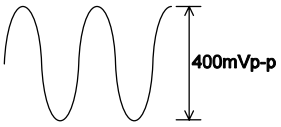
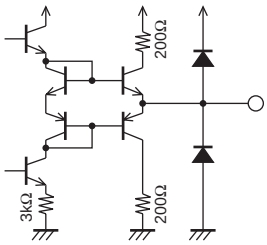
<table>
<tr><th>Pin No.</th><th>Pin name</th><th>DC voltage</th><th>Signal wave form</th><th>Equivalent circuit form</th></tr>
<tr><td>49</td><td>XO IN</td><td>REC: 4.0V</td><td> 
</td><td rowspan="2"> 
</td></tr>
<tr><td></td><td>PB: 4.0V</td><td> 
</td></tr>
<tr><td>50</td><td>XO OUT</td><td>REC: 2.5V</td><td> 
</td><td rowspan="2"> 
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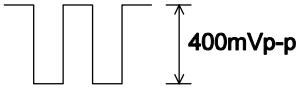
<tr><td></td><td>PB: 2.5V</td><td> 
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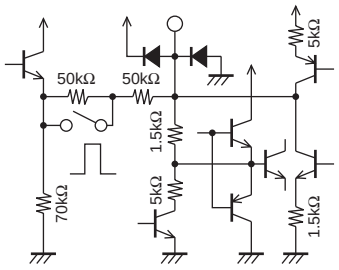
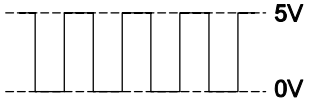
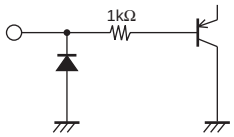
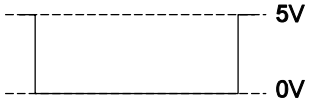
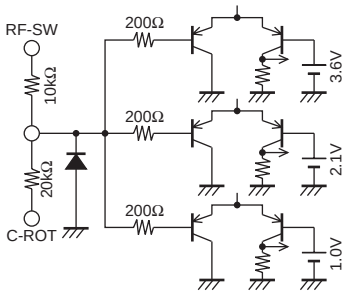
<tr><td>51</td><td>REC APC
FILTER</td><td>REC: 1.8V</td><td>DC</td><td rowspan="2"> 
</td></tr>
<tr><td></td><td>PB: 1.8V</td><td>DC</td></tr>
<tr><td>52</td><td>C V_{CC}</td><td>5V</td><td>V_{CC}</td><td></td></tr>
<tr><td>53</td><td>SERIAL
CLOCK
IN</td><td>0/5V</td><td> 
</td><td rowspan="2"> 
</td></tr>
<tr><td>54

55</td><td>SERIAL
DATA
IN
SERIAL
TIP SELECT
IN</td><td>0/5V</td><td> 
</td></tr>
<tr><td>56</td><td>C-GND</td><td>0V</td><td>GND</td><td></td></tr>
<tr><td>57</td><td>RF_SW/C_ROT
IN</td><td>0V/5V</td><td><table>
<tr><th>RF-SW</th><th>C-ROT</th><th>THRESH</th></tr>
<tr><td rowspan="2">HIGH</td><td>HIGH</td><td rowspan="2">3.6V</td></tr>
<tr><td>LOW</td></tr>
<tr><td rowspan="2">LOW</td><td>HIGH</td><td>2.1V</td></tr>
<tr><td>LOW</td><td>1.0V</td></tr>
</table></td><td> 
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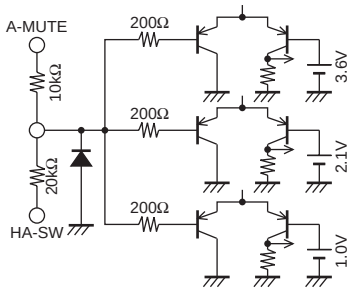
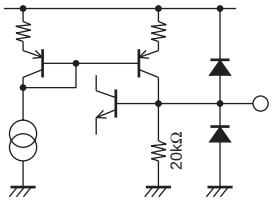
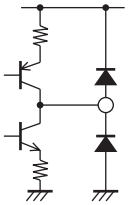
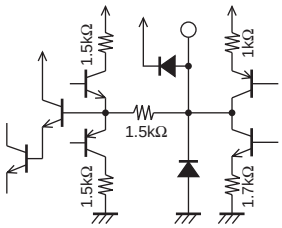
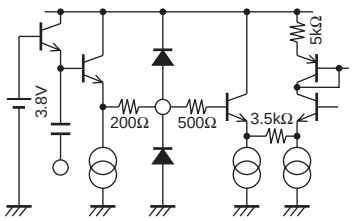
Pin No.	Pin name	DC voltage	Signal wave form	Equivalent circuit form
58	AUD_MUTE/ HA_SW IN	0V/5V	<table><tr><th>A-MUTE</th><th>HA-SW</th><th>THRESH</th></tr><tr><td rowspan="2">ON</td><td>HA-high</td><td rowspan="2">3.6V</td></tr><tr><td>HA-low</td></tr><tr><td rowspan="2">OFF</td><td>HA-high</td><td>2.1V</td></tr><tr><td>HA-low</td><td>1.0V</td></tr></table>	
59	ENV DET OUT	REC: OPEN		
		PB 0.5 to 4.8V	DC	
60	COMP OUT	REC: OPEN		
		PB: OPEN TRICK PB: 0.5V/4.5V	TRICK MODE HA SW OUT	
61	KILLER FILTER	REC:		
		PB: 1.8V		
62	HEAD AMP GND	0V	GND	
63	CHROMA DET	REC:	DC	
		PB:	DC	

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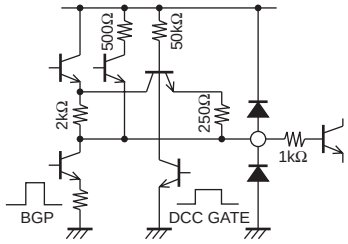
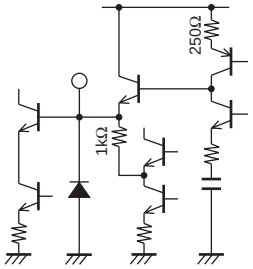
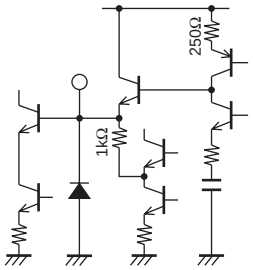
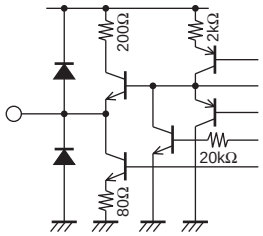
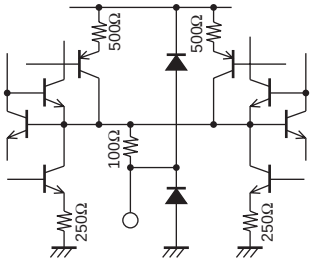
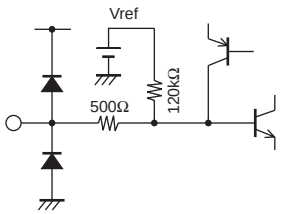
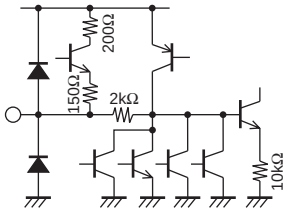
Pin No.	Pin name	DC voltage	Signal wave form	Equivalent circuit form
64	ACC DET	REC: 1.8V	DC	
		PB: 1.8V	DC	
65 67 72 74	PBEPH+ PBEPL+ PBSPH+ PBSPL+	REC: 4.1V		
		PB: 2.0V	FM 0.5mVp-p 	
66 73	EP COMMON SP COMMON	REC: 4.1V	SP 13mAp-p EP 10mAp-p	
		PB: 2.0V	FM 0.5mVp-p 	
68	HEAD AMP V_{CC}	5V	V_{CC}	
69	REC CURRENT ADJUST OUTPUT	REC: 1.8V	FM: 600mVp-p	
		PB: OPEN		
70	REC CURRENT ADJUST INPUT	REC: 1.8V	FM: 600mVp-p	
		PB: OPEN		
71	HEAD AMP PRE GND	0V	GND	

Continued on next page.

Continued from preceding page.

Pin No.	Pin name	DC voltage	Signal wave form	Equivalent circuit form
75	AUDIO GND	0V	GND	
76 78 80	AUDIO IN-1 IN-2 IN-3	REC: 2.3V	CW 95mVp-p	
		PB: 2.3V		
77	AUDIO V_{CC}	5.0V	V_{CC}	
79	ALC DET	REC	DC	
		PB: 0V	DC	

Serial Control Table

ADDRESS	8	7	6	5	4	3	2	1		
							0	0	VIDEO REC (Macro mask pulse trigger = RF switch pulse)	
							0	1	VIDEO PB	
							1	0	VIDEO EE (Macro mask pulse trigger = V.sync pulse)	*
							1	1	PROHIBIT	
Group 1					0	0			AUDIO REC	
					0	1			AUDIO PB	
					1	0			AUDIO EE	*
ALLWAYS					1	1			PROHIBIT (Y-TEST MODE)	
			0	0					HA REC	
			0	1					HA PB	*
			1	0					HA REC PAUSE	
			1	1					PROHIBIT (F-TEST MODE)	
	0	0							(VIDEO/AUDIO) SW INPUT 1	*
	0	1							(VIDEO/AUDIO) SW INPUT 2	
	1	0							(VIDEO/AUDIO) SW INPUT 3/PB YC-MIX OFF	
	1	1							PROHIBIT	

ADDRESS	8	7	6	5	4	3	2	1		
							0	0	(VIDEO/AUDIO) SP	*
							0	1	(VIDEO/AUDIO) LP	
							1	0	(VIDEO/AUDIO) EP	
							1	1	CARRIER SHIFT ON * SP	
Group 2					0	0			DETAIL WEAK/NC1 WEAK	*
					0	1			DETAIL MIDIUM/NC1 MIDIUM	
					1	0			DETAIL STRONG/NC1 STRONG	
SYSTEM					1	1			PROHIBIT	
			0	0					YNR OFF	
			0	1					YNR WEAK	*
			1	0					YNR MIDIUM	
			1	1					YNR STRONG	
		0							AUTO (VXO/XO)/DOC AUTO	*
		1							FORCED XO/DOC OFF	
	0								CG NORMAL/NORMAL PB	*
	1								CG STOP/TRICK PB	

ADDRESS	8	7	6	5	4	3	2	1		
							0	0	Y/C MIX RATIO Y-FM: 0dB/PB-EQ LOW-SIDE BAND: 1 (Low)	
							0	1	Y/C MIX RATIO Y-FM: -1dB/PB-EQ LOW-SIDE BAND: 2	*
							1	0	Y/C MIX RATIOY-FM: -2dB/PB-EQ LOW-SIDE BAND: 3	
							1	1	Y/C MIX RATIO Y-FM: -3dB/PB-EQ LOW-SIDE BAND: 4 (High)	
Group 3						0			REC CURRENT: 0dB/ENV DET SENSITIVITY: Low	*
						1			REC CURRENT: +2dB/ENV DET SENSITIVITY: High	
					0				REC EQ SLOPE: Gentle/PB-EQ HIGH-TRAP: 8.5MHz	*
SYSTEM					1				REC EQ SLOPE: Steep/PB-EQ HIGH-TRAP: 7.5MHz	
				0					Chroma DET OFF	*
				1					Chroma DET ON	
			0						AGC NORMAL	*
			1						AGC THROUGH	
		0							REC C-COMB ON	*
		1							REC C-COMB OFF	
	0								SIGNAL	*
	1								NO-SIGNAL	

Notes

- "*" mark shows initial condition.
- "PROHIBIT" mark shows prohibit condition.
- This LSI has "V-latch system", it is correspond to Grp.1-bit.5&6 and Grp.2-bit.8.
- This LSI is controlled by three lines serial data transfer system.

AUDIO SW Mode Table

(A) REC

No.	ITEM	SW2	SW5	SW6	SW79	SW0SC	GROUP1	GROUP2	GROUP3
1	REC AMP voltage gain	2	OFF	2	1	OFF	0001-0010	0001-0000	0000-0001
2	REC AMP distortion ratio	2	OFF	2	1	OFF	0001-0010	0001-0000	0000-0001
3	REC AMP maximum output voltage	2	OFF	2	1	OFF	0001-0010	0001-0000	0000-0001
4	Voltage conversion recording bias current	3	OFF	3	1	ON	0001-0010	0001-0000	0000-0001
5	Recording bias current control voltage	3	OFF	3	1	ON	0001-0010	0001-0000	0000-0001

(A) EE

No.	ITEM	SW2	SW5	SW6	SW79	SW0SC	GROUP1	GROUP2	GROUP3
1	LINE AMP voltage gain (A1)	2	OFF	2	2	OFF	0001-1010	0001-0000	0000-0001
2	LINE AMP output voltage when ALC	2	OFF	2	1	OFF	0001-1010	0001-0000	0000-0001
3	LINE AMP effect of ALC	2	OFF	2	1	OFF	0001-1010	0001-0000	0000-0001
4	LINE AMP distortion ratio of when ALC	2	OFF	2	1	OFF	0001-1010	0001-0000	0000-0001
5	MUTE attenuation (A1)	2	OFF	2	1	OFF	0001-1010	0001-0000	0000-0001
6	MUTE attenuation (A2)	2	OFF	2	1	OFF	0101-1010	0001-0000	0000-0001
7	MUTE attenuation (A3)	2	OFF	2	1	OFF	1001-1010	0001-0000	0000-0001

(A) PB

No.	ITEM	SW2	SW5	SW6	SW79	SW0SC	GROUP1	GROUP2	GROUP3
1	LINE AMP voltage gain	1	OFF	2	1	OFF	0001-0110	0001-0000	0000-0001
2	LINE AMP distortion ratio	1	OFF	2	1	OFF	0001-0110	0001-0000	0000-0001
3	LINE AMP output noise voltage	1	OFF	2	1	OFF	0001-0110	0001-0000	0000-0001
4	LINE AMP maximum output voltage	1	OFF	2	1	OFF	0001-0110	0001-0000	0000-0001
5	MUTE attenuation	1	OFF	2	1	OFF	0001-0110	0001-0000	0000-0001
6	EQ AMP voltage gain (SP)	2	OFF	1	1	OFF	0001-0110	0001-0000	0000-0001
7	EQ AMP voltage gain (EP)	2	OFF	1	1	OFF	0001-0110	0001-0010	0000-0001
8	EQ AMP input conversion noise voltage	2	OFF	2	1	OFF	0001-0110	0001-0000	0000-0001

CHROMA SW Mode Table

(C) REC

No.	ITEM	SW12A	SW12B	SW13	SW14	SW18A	SW18B	SW22	SW39	SW47	SW48	SW49	GROUP1	GROUP2	GROUP3
1	REC chroma low frequency conversion output level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	00000000	00000000
2	Burst emphasis	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	00000000	00000000
3	VXO oscillation level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	00000000	00000000
4	REC ACC characteristics (1)	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	00000000	00000000
5	REC ACC characteristics (2)	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	00000000	00000000
6	REC ACC killer-on input level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	00000000	00000000
7	REC ACC killer-on output level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	00000000	00000000
8	REC ACC killer restored input level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	00000000	00000000
9	REC APC pull-in range (1)	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	00000000	00000000
10	REC APC pull-in range (2)	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	00000000	00000000
11	REC AFC pull-in range (1)	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	00000000	00000000
12	REC AFC pull-in range (2)	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	00000000	00000000

*: See the test conditions for these items.

(C) PB

No.	ITEM	SW12A	SW12B	SW13	SW14	SW18A	SW18B	SW22	SW39	SW47	SW48	SW49	GROUP1	GROUP2	GROUP3
1	PB chroma video output level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	00000000	00000000
2	PB chroma pin 72 output level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	00000000	00000000
3	PB ACC characteristics (1)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	00000000	00000000
4	PB ACC characteristics (2)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	00000000	00000000
5	PB killer-on input level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	00000000	00000000
6	PB killer-on chroma output level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	00000000	00000000
7	PB main converter carrier leakage	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	00000000	00000000
8	Burst de-emphasis	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	00000000	00000000
9	PB XO output level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	00000000	00000000
10	PB XO oscillator frequency deviation	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	00000000	00000000
11	PB chroma 2'nd distortion	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	00000000	00000000

*: See the test conditions for these items.

HA SW Mode Table

(H) REC

No.	ITEM	SW65A	SW65B	SW66A	SW66B	SW67A	SW67B	SW72A	SW72B	SW73B	SW74A	SW74B	GROUP1	GROUP2	GROUP3
1	RECC AMP output Level 1	OFF	ON	ON	ON	OFF	ON	OFF	ON	ON	OFF	ON	00000000	00100000	00000001
2	Difference of gain between mode 1	OFF	ON	ON	ON	OFF	ON	OFF	ON	ON	OFF	ON	00000000	00100000	00000001
3	RECAMP output level 2	OFF	ON	ON	ON	OFF	ON	OFF	ON	ON	OFF	ON	00000000	00100000	00000001
4	Difference of gain between mode 2	OFF	ON	ON	ON	OFF	ON	OFF	ON	ON	OFF	ON	00000000	00100000	00000001
5	REC AGC AMP frequency characteristics	OFF	ON	ON	ON	OFF	ON	OFF	ON	ON	OFF	ON	00000000	00100000	00000001
6	REC AGC AMP second harmonic distortion	OFF	ON	ON	ON	OFF	ON	OFF	ON	ON	OFF	ON	00000000	00100000	00000001
7	REC AGC AMP maximum output level	OFF	ON	ON	ON	OFF	ON	OFF	ON	ON	OFF	ON	00000000	00100000	00000001
8	REC AGC AMP attenuate volume of mute	OFF	ON	ON	ON	OFF	ON	OFF	ON	ON	OFF	ON	00100000	00100000	00000001
9	REC AGC AMP Mixed modulation relative level	OFF	ON	ON	ON	OFF	ON	OFF	ON	ON	OFF	ON	00000000	00100000	00000001

*: See the test conditions for these items.

(H) PB

No.	ITEM	SW65A	SW65B	SW66A	SW66B	SW67A	SW67B	SW72A	SW72B	SW73B	SW74A	SW74B	GROUP1	GROUP2	GROUP3
1	Voltage Gain	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
2	Difference of voltage gain 1	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
3	Difference of voltage gain 2	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
4	Difference of gain between mode	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
5	Input calculation noise voltage	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
6	Frequency characteristics	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
7	Secondary harmonic distortion	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
8	Maximum output level	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
9	Cross talk SP1 CH1	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
10	Cross talk SP1 CH2	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
11	Cross talk SP1 CH3	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
12	Cross talk SP1 CH4	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
13	Output DC off set	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
14	Envelope detection output terminal voltage	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
15	Envelope detection output terminal voltage SP1	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
16	Envelope detection output terminal voltage SP2	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
17	Envelope detection output terminal voltage EP1	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
18	Envelope detection output terminal voltage EP2	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
19	Comparator output voltage 1	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	00100000	00000001
20	Comparator output voltage 2	ON	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	00010101	10100000	00000001

*: See the test conditions for these items.

Y-SW Mode Table

(Y) REC

No.	ITEM	SW12A	SW12B	SW13	SW14	SW18A	SW18B	SW22	SW39	SW47	SW48	SW49	GROUP1	GROUP2	GROUP3
1	Current dissipation (REC)	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
2	EE Output level 2	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
3	AGC characteristics 1	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
4	AGC characteristics 2	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
5	AGC characteristics 3	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
6	AGC characteristics 4	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
7	Sync separator output level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
8	Sync separator output pulse width	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
9	Sync separator threshold level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
10	Sync tip level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
11	Pedestal level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
12	White level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
13	Quasi V insertion level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
14	Quasi H insertion level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
15	White insertion level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
16	Edge insertion level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
17	Y LPF frequency characteristics (1)	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
18	Y LPF frequency characteristics (2)	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
19	Y LPF frequency characteristics (3)	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
20	Y LPF frequency characteristics (4)	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
21	FM modulator output level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
22	Carrier frequency	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
23	REC-FM output second distortion	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
24	Deviation (M mode)	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
25	FM modulator linearity	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00000000	0001000	00000001
26	1/2 f H carrier shift	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
27	Emphasis gain	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00000000	0001000	00000001
28	Detail enhancer characteristics (1)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00000000	0001000	00000001
29	Detail enhancer characteristics (2)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00000000	0001000	00000001
30	Detail enhancer characteristics (3)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00000000	0001000	00000001
31	Nonlinear emphasis characteristics (1)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00000000	0001000	00000001
32	Nonlinear emphasis characteristics (2)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00000000	0001000	00000001
33	Nonlinear emphasis characteristics (3)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00000000	0001000	00000001
34	Main linear emphasis characteristics (1)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00000000	0001000	00000001
35	Main linear emphasis characteristics (2)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00000000	0001000	00000001
36	White clipping level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
37	Dark clipping level	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
38	REC-EQ characteristics 1	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
39	REC-EQ characteristics 2	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
40	REC-EQ characteristics 3	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001
41	REC-EQ2'nd distortion	2	OFF	2	OFF	ON	2	1	2	ON	2	1	00000000	0001000	00000001

*: See the test conditions for these items.

Y-SW Mode Table

(Y) PB

No.	ITEM	SW12A	SW12B	SW13	SW14	SW18A	SW18B	SW22	SW39	SW47	SW48	SW49	GROUP1	GROUP2	GROUP3
1	Current dissipation (PB)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
2	Dropout compensation Period	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
3	DOC characteristics	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
4	PB Y level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
5	Self R/P, PB-Y level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
6	FM demodulator linearity	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
7	Carrier leakage	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
8	PB YNR characteristics	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
9	Nonlinear deemphasis characteristics (1)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00110101	00000000	00000001
10	Nonlinear deemphasis characteristics (2)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00110101	00000000	00000001
11	Double noisecanceller characteristics (1)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00110101	00000000	00000001
12	Double noisecanceller characteristics (2)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00110101	00000000	00000001
13	Double noisecanceller characteristics (3)	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00110101	00000000	00000001
14	Sync separator output level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
15	Sync separator output pulse width	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
16	Sync tip level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
17	Pedestal level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
18	White level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
19	Quasi-V insertion level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
20	Quasi-H insertion level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
21	White insertion level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
22	Edge insertion level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
23	4V regulator	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
24	PB-EQ characteristics 1	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
25	PB-EQ 2'nd distortion 1	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
26	PB-EQ characteristics 2	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
27	PB-EQ trap characteristics	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
28	Output voltage when normal VHS	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
29	Output voltage when S-VHS	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
30	S-discrimination input level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
31	Normal $\rightarrow$ S-discrimination threshold level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001
32	S $\rightarrow$ normal discrimination threshold level	2	OFF	2	OFF	ON	2	2	2	ON	2	1	00010101	0001000	00000001

*: See the test conditions for these items.