SONY

CXA1810AQ/AR

Luminance and Color Signal Processing for 8mm VCR

Description

The CXA1810AQ/AR is an IC designed for 8mm VCR Y/C main signal processing for consumer use.

Equipped with many built-in filters, the CXA1810AQ/AR is a one-chip main signal processing system that greatly reduces the number of external components.

Features

- Built-in auto-adjusting filters
- Supports Hi-8 video.
- Supports camera recording.
- Supports power saving mode.
  (140 mW for composite signal input
  250 mW for separate signal input)
- Supports electronic volume (EVR) control.
- Supports BUS LINE.
- Supports NTSC/PAL.

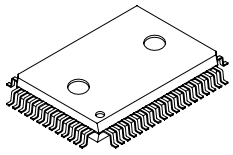
Functions

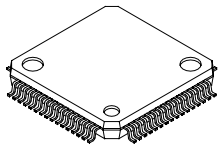
2-input INPUT SELECT, VIDEO AGC, DDS (Y signal superimposition), synchronous separation, 75 Ω VIDEO OUT DRIVE, Y/C mixing, Y/C separation comb filter, Y/C cross talk elimination, playback chroma feedback comb, Y dropout compensation, Yd playback switching, Y signal H correlation detection, Y pre-emphasis/de-emphasis, white/dark clipping, clipping compensation, MOD/DEMOD, HHS/HHS cancel, ACC, chroma emphasis/de-emphasis, burst emphasis/de-emphasis, XO/VXO, APC, AFC, APC ID, AFC ID, burst ID, ACK, APC compensation, HHK, PI/PS, frequency conversion system, PB C BPF, REC C LPF, PB C LPF, CARRIER BPF, 4.1 V regulator

Structure

Bipolar silicon monolithic IC

CXA1810AQ	CXA1810AR
64 pin QFP (Plastic)	64 pin LQFP (Plastic)





Absolute Maximum Ratings (Ta=25 °C)

• Supply voltage	V_{CC}	7	V
• Operating temperature	Topr	–10 to +75	°C
• Storage temperature	Tstg	–65 to +150	°C
• allowable power dissipation (when mounted on board)			
	P_D	CXA1810AQ 1050	mW
		CXA1810AR 1010	mW

Operating Condition

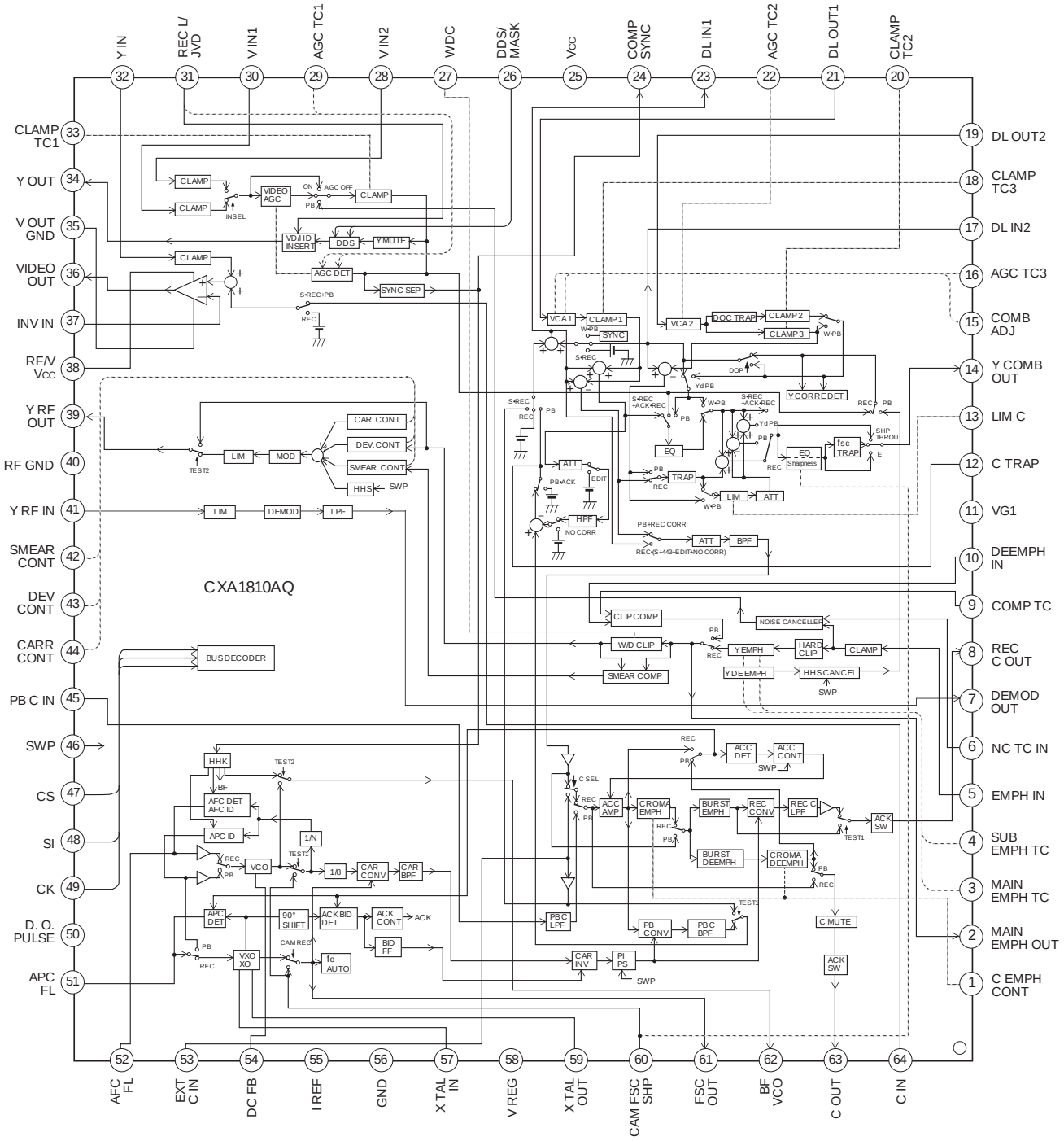
Supply voltage	V_{CC}	4.75+0.5 to 4.75–0.25	V

Sony reserves the right to change products and specifications without prior notice. This information does not convey any license by any implication or otherwise under any patents or other right. Application circuits shown, if any, are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits.

E94X24-TE

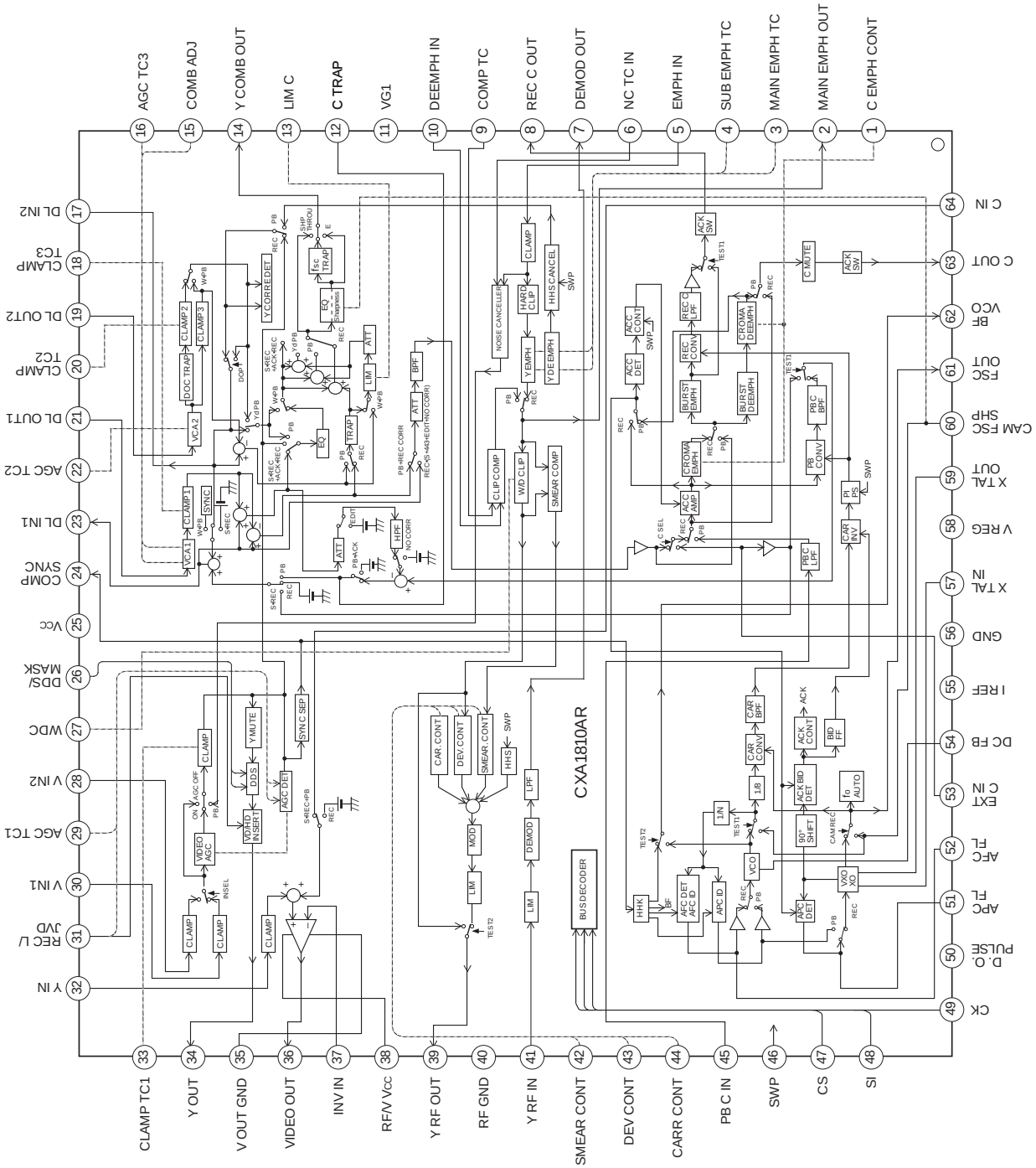
Block Diagram and Pin Configuration

(CXA1810AQ)

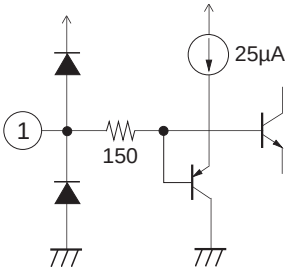
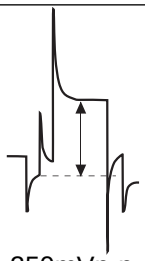
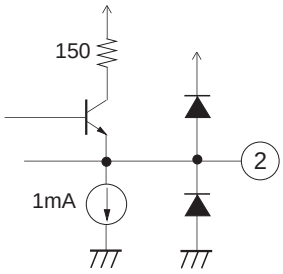
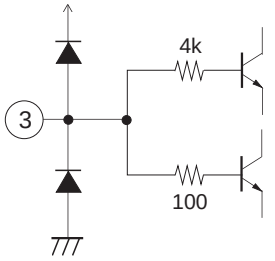
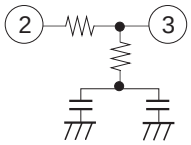
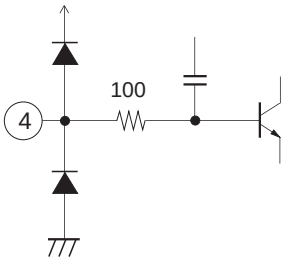
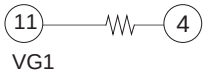
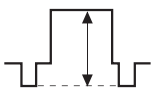
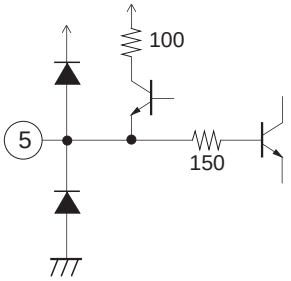


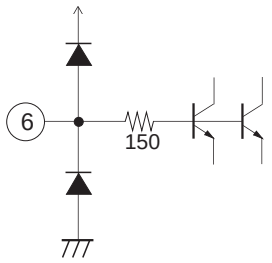
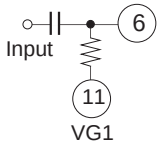
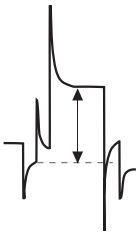
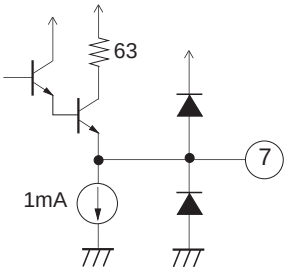
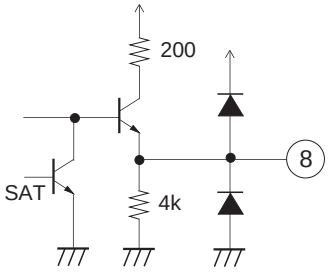
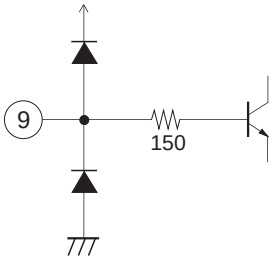
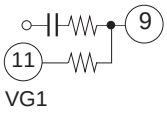
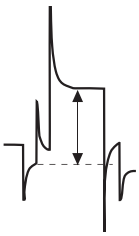
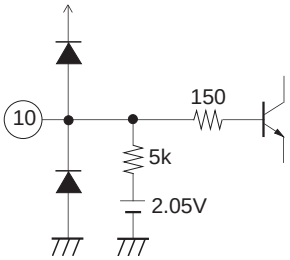
Block Diagram and Pin Configuration

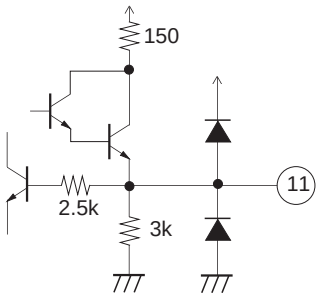
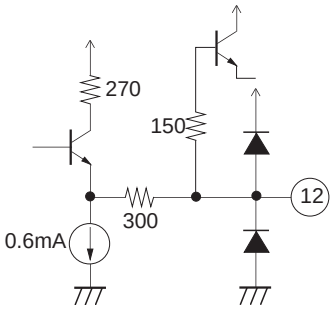
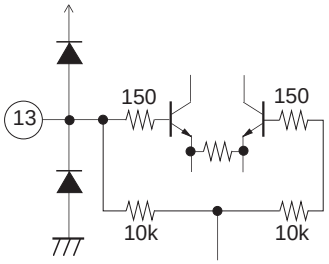
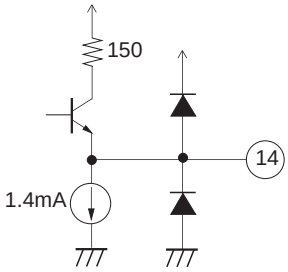
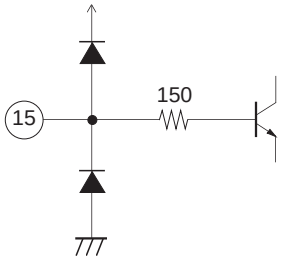
(CXA1810AR)

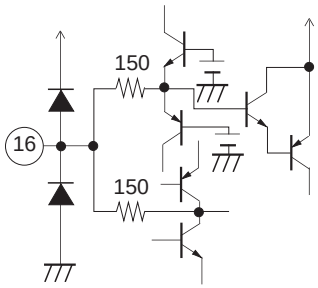
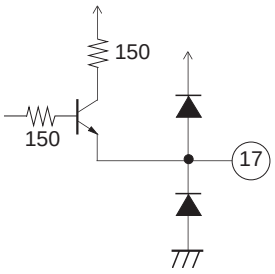
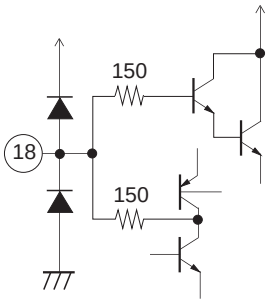
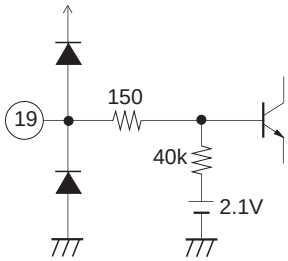
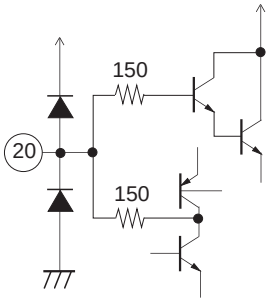


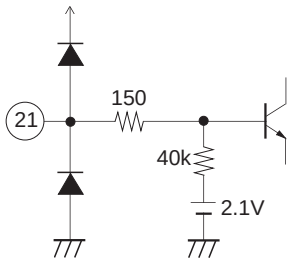
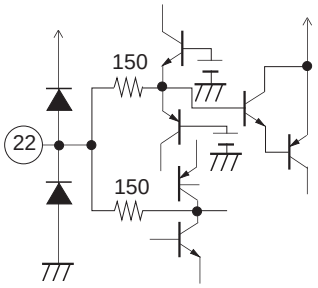
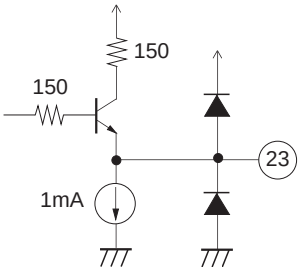
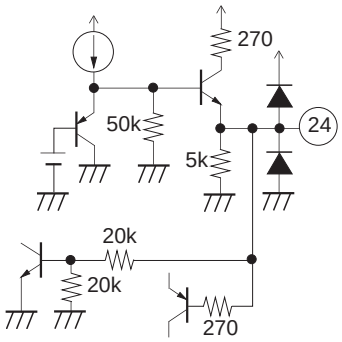
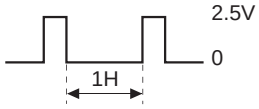
Pin Description

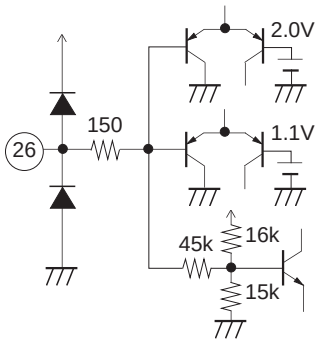
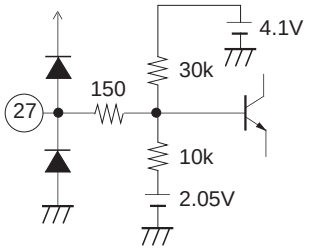
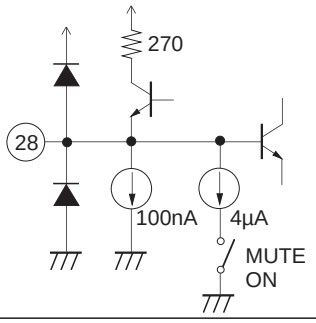
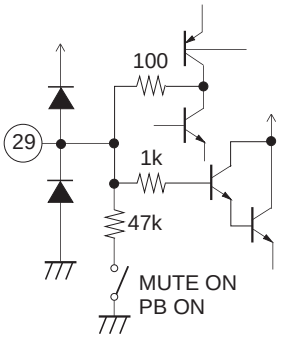
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
1	C EMPH CONT	Control range: 1.8V to 3.8V	—		Chroma emphasis fo (center frequency) adjustment. (Refer to item 7 on Description of Operation.)
2	MAIN EMPH OUT	2.05V (sync tip level)	 250mVp-p output		Main emphasis and main de-emphasis time constant. When recording, the emphasized Y signal prior to white/dark clipping is output.
3	MAIN EMPH TC	2.05V (when time constant connected)	—		Main emphasis and main de-emphasis time constant. Apply an external constant between this pin and Pin 2, as shown below. 
4	SUB EMPH TC	2.05V (when time constant connected)	—		HPF time constant that forms sub emphasis and sub de-emphasis. Add resistance between this pin and Pin 11. 
5	EMPH IN	2.05V (sync tip level)	 500mVp-p input		During recording, Y emphasis input. During playback, this signal to the noise canceler is input. Performs diode clamping (sync tip clamping), with the clamp capacitance attached externally.

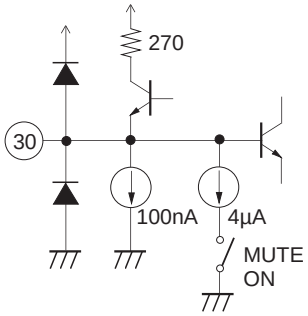
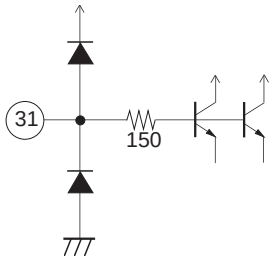
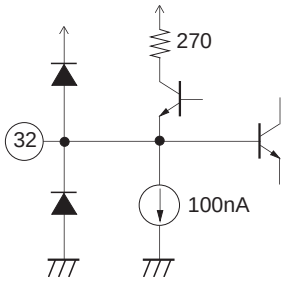
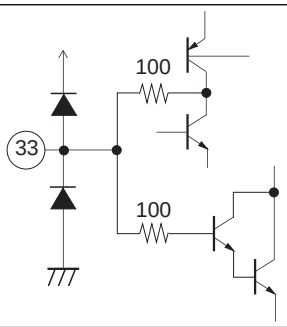
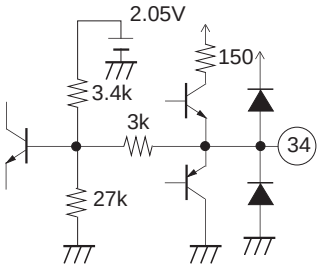
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
6	NCTC IN	2.05V (when time constant connected)	—		Connects external time constant for HPF of noise canceler. (Refer to item 11 on Description of Operation.) 
7	DEMOD OUT	1.6V	140mVp-p output during standard playback 		Y signal output that has been FM demodulated and has passed though the DEMOD LPF.
8	REC C OUT	2.0V	Low-frequency conversion chroma signal 300mVp-p output		During recording, a chroma signal that has been burst emphasized, chroma emphasized, and frequency converted is output. During ACK, the output DC goes to 0V. During recording, if TEST1 is High the burst emphasized signal is output.
9	COMP TC	2.05V (when time constant connected)	—		Connects external time constant for HPF of the white/dark clipping compensation circuit during playback. 
10	DEEMPH IN	2.05 V (center DC)	180mVp-p input during playback 		Input for de-emphasis circuit during playback. The signal is input to the de-emphasis circuit through the clipping compensation circuit.

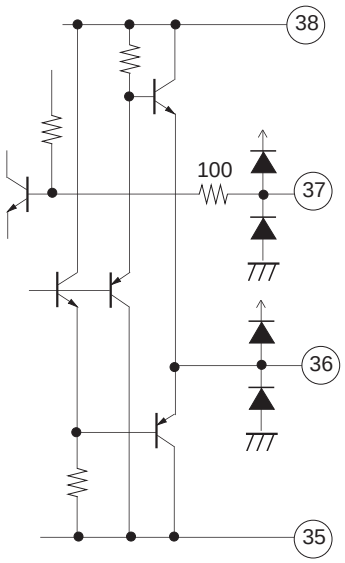
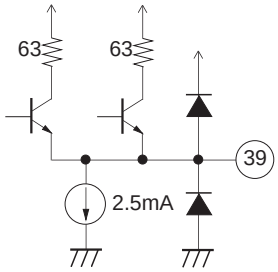
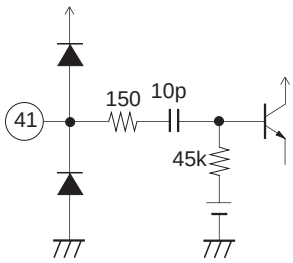
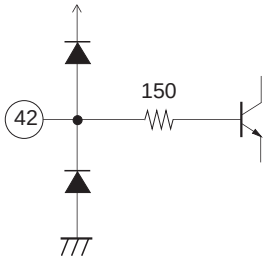
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
11	VG1	2.05V	—		Internal reference voltage source. (Can not be used as external bias for Pins other than 4, 6, and 9.)
12	C TRAP	2.05V	Chroma signal 300mVp-p output during playback		Outputs chroma signal that has passed through PB C BPF and chroma feedback comb filter subtracter after frequency conversion during playback.
13	LIM C	2.4V	—		Connects decoupling capacitor for limiter of the playback Y comb block.
14	Y COMB OUT	1.2V (sync tip level)	Y signal 500mVp-p output		Outputs Y signal processed by comb filter. During playback, the signal is output through the sharpness circuit. If mode E is set High, the signal is output without passing through the f sc Trap; if mode SHP THRU is set High, the signal is output without passing through the sharp -ness circuit.
15	COMB ADJ	Control range: 1.8V to Vcc	—		VCA gain adjustment in the comb filter block. (Refer to Adjustment Procedure.)

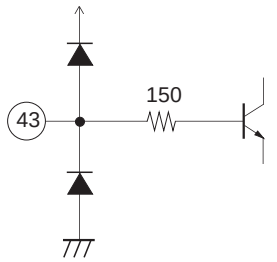
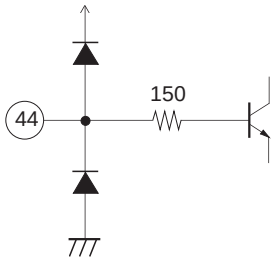
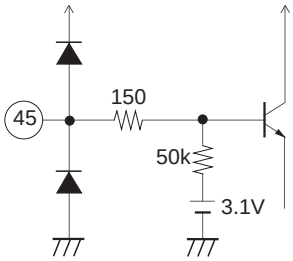
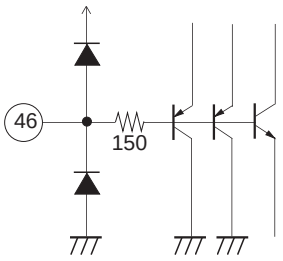
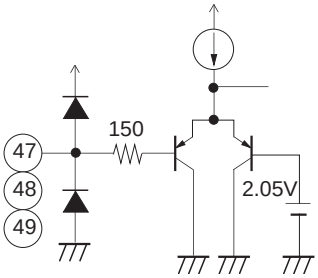
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
16	AGC TC3	2.2V to 4.0V	—		Time constant for VCA circuit in comb filter block. A DC limiter circuit with an upper limit of 4.0V and a lower limit of 2.2V is built in.
17	DL IN2	2.2V (when resistance connected)	Video 500mVp-p output		Connection for inputting the playback Y signal to the CCD DL in a system using two CCD delay lines. When using this pin, connect 2.2kΩ resistance to GND.
18	CLAMP TC3	—	—		Time constant for feedback clamp circuit in the comb filter block.
19	DL OUT2	2.1V (center DC)	Video 500mVp-p input		Inputs CCD DL (delay line) output signal to the VCA circuit.
20	CLAMP TC2	—	—		Time constant for feedback clamp circuit in the comb filter block.

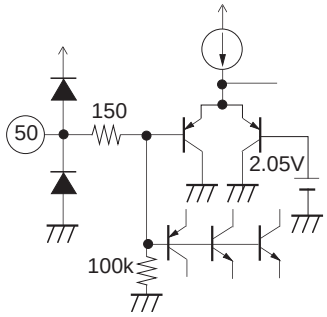
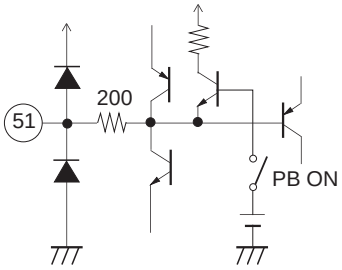
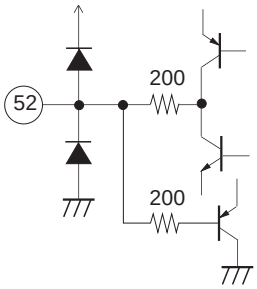
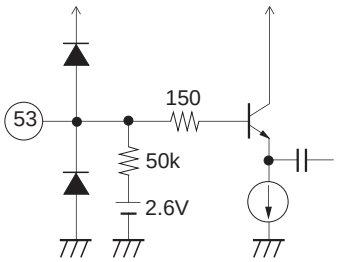
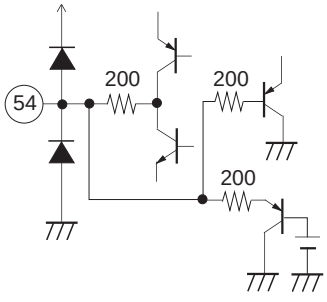
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
21	DL OUT1	2.1V (center DC)	Video 500mVp-p input		Inputs CCD DL (delay line) output signal to VCA circuit.
22	AGC TC2	2.2V to 4.0V	—		Time constant for VCA circuit in the comb filter block. A DC limiter circuit with an upper limit of 4.0V and a lower limit of 2.2V is built in.
23	DL IN1	2.2V	Video 500mVp-p output		Output for inputting a signal to the CCD DL (delay line). Normally, Y+C signal is output. During playback, when the CCD DL connected to this pin is used for comb filter processing of just the C signal, C signal with quasi sync is output.
24	COMP SYNC	High : 2.5V, Low : 0V output	—		Composite sync signal output. No output if mode SYNC SEP OFF is set High. 
25	Vcc	Vcc=4.75V	—		Main block power supply.

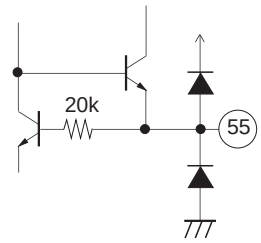
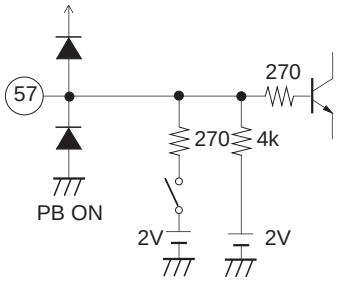
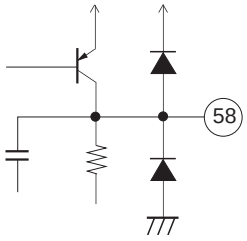
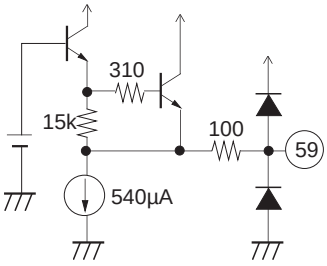
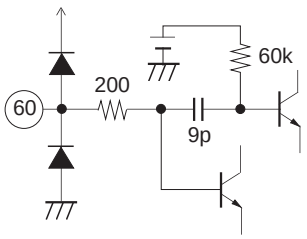
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
26	DDS/MASK	2.0V (when open) (MASK) 1.5V (DDS) 2.3 to 3.0V	—		Input for VOW (character level) signal, VOB (character background) timing pulse of DDS (date display system) and masking timing pulse. MASK : V_{TH} = 1.1V DDS : V_{TH} = 2.0V By varying the input DC for DDS over a range of 2.3V to 3.0V, the character level can be changed. (Refer to item 4 on Description of Operation.)
27	WDC	2.6V (when open)	—		Determines the white/dark clipping levels. During open, the standard white clipping level is 235%, and the dark clipping level is 95%. (Mode DC1, 2 = Low, High) (Refer to item 5 on Description of Operation.)
28	V IN2	2.05V (sync tip level)	Video 500mVp-p input		Video signal input. Performs diode clamping, with the clamp capacitance externally connected. If the mode MUTE is set High, the charge of the clamp capacitance is discharged.
29	AGC TC1	—	—		Time constant for the video AGC circuit in the I/O block. During mute and playback, the charge of the external capacitance is discharged.

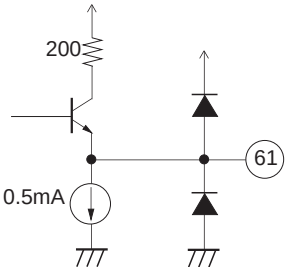
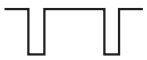
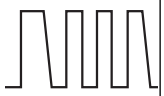
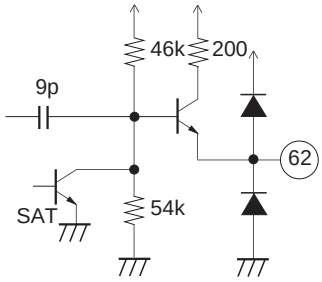
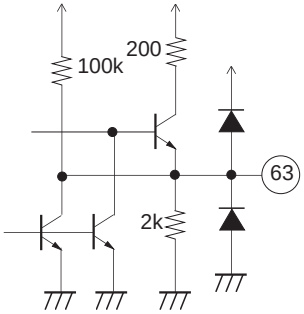
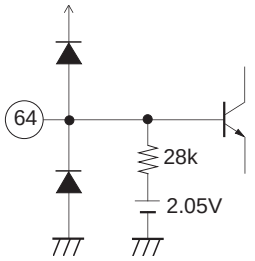
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
30	V IN1	2.05V (sync tip level)	Video 500mVp-p input		Video signal input. Performs diode clamping, with the clamp capacitance externally connected. If the mode MUTE is set High, the charge of the clamp capacitance is discharged.
31	REC L/JVD	1.9V (Typical value during REC LEVEL adjustment)	—		Level adjustment during recording. The adjustment range is 1.3V to 2.6V. During playback, serves as input for JOG (variable speed playback) VD pulse and HD pulse. V_{TH} = 2.7V (Refer to item 3 on Description of Operation.)
32	Y IN	1.6V (sync tip level)	Video 500mVp-p input		Video signal input for video out circuit. Performs diode clamping, with the clamp capacitance externally connected.
33	CLAMP TC1	—	—		Time constant for feedback clamp circuit in I/O block.
34	Y OUT	1.8V (sync tip level)	Video 500mVp-p output		I/O block signal output.

Pin No.	Symbol	Pin voltage DC	Pin voltage AC	Equivalent circuit	Description
35	VOUT GND	0V	—		GND for the video out circuit.
36	VIDEO OUT	1.6V (sync tip level)	Video 2.0Vp-p output		Video out 75Ω driver output.
37	INV IN	1.5V	Video 1.0Vp-p input		Inverted input for V sag compensation for the video out 75Ω driver.
38	RF/V Vcc	Vcc=4.75V	—		Video out circuit and RF system block power supply.
39	Y RF OUT	2.1V	Y FM output  500mVp-p		During recording, FM-modulated Y signal output. If mode TEST2 is set High during recording, the Y signal after white/dark clipping is output.
40	RF GND	0V	—		RF system block GND.
41	Y RF IN	—	YFM 200mVp-p input		During playback, inputs Y-RF signal to FM modulation circuit.
42	SMEAR CONT	Control range: 1.8V to Vcc	—		During recording, high luminance smear compensation, is performed. This pin also controls the signal level for FM modulation circuit.

Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
43	DEV CONT	Control range: 1.8V to Vcc	—		During recording, adjustment for deviation of Y-FM modulation.
44	CARR CONT	Control range: 1.8V to Vcc	—		During recording, adjustment for carrier of Y-FM modulation.
45	PB C IN	3.1V (during playback)	(PB Y RF) + (PB C RF 100mVp-p) input		During playback, chroma RF signal input. PB C LPF is built in, so that a signal with the AFM and ATF components (Y RF + C RF) eliminated can be input.
46	SWP	—	—		RF SWP (switching pulse) and HCHG (head change) pulse input. Half H shift, HHS cancel, ACC channel hold, and PI/PS switching operate at V_{TH} = 0.7V. Yd playback during playback operates at V_{TH} = 2.05V (same as when mode Yd is High).
47	CS	High : Vcc, Low : 0V input	—		Input to BUS DECODER. CS is used as chip select, and data is latched at rising edge. CK is the clock input. Use a clock frequency fck of less than 1.3MHz. SI is used as a serial input and serial data is input.
48	SI				
49	CK				

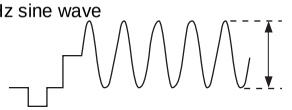
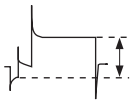
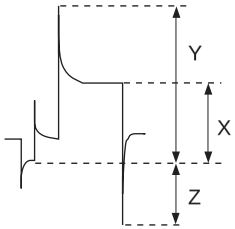
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
50	D.O.PULSE	High : 3.1V, Low : 0V input	—		Drop out pulse input. V_{TH} = 2.05V If the drop out pulse is input, the signal prior to 1H is output for the Y system and the APC and ACC system errors are held for the C system.
51	APC FL	2.25V (typ.) during lock	—		Connects an APC external filter.
52	AFC FL	2.25V (typ.) during lock	—		Connects an AFC external filter.
53	EXT C IN	2.6V	(Chroma signal 314mVp-p input		During recording, the chroma signal is input. When the typical level is 75% color bar input, the input signal is 314mVp-p.
54	DCFB	2.25V (typ.) during lock	—		Connects a DC feedback external filter for a non-adjustment VCO.

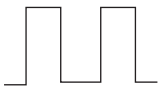
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
55	I REF	1.8V (when resistance connected)	—		External reference current source. Connect external resistance of 18kΩ to GND. Be careful concerning pin cross talk.
56	GND	0V	—		Main block GND.
57	XTAL IN	2.0V	260mVp-p (NTSC) during playback 		Crystal oscillation reference input. Be careful concerning pin cross talk and the floating capacitance.
58	VREG	4.1V	—		4.1V regulator output.
59	XTAL OUT	3.1V	340mVp-p (NTSC) during playback 		Crystal oscillation reference output. Connects the crystal between this pin and Pin 57.
60	CAM FSC SHP	Sharpness control range: 1.8V to V_{CC}	—		Subcarrier input during camera recording. 200mVp-p(min). Sharpness control during playback.

Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
61	FSC OUT	2.2V	NTSC 600mVp-p PAL 450mVp-p 		Subcarrier output. This subcarrier is used for the CCD delay line clock frequency.
62	BF VCO	During BF output  High : 1.8V, Low : 0V Low during BF interval	550mVp-p during VCO output 		Burst flag and VCO OUT output for testing. When using this pin, connect 3.3kΩ resistance to GND. Serves as VCO output when mode TEST2 is High.
63	C OUT	2.0V	Chroma signal 314mVp-p output (during recording)		During recording, outputs chroma signal after Y/C separation or for chroma signal input from Pin 53. During playback, the playback chroma signal is output. During ACK, the output DC becomes 0V.
64	C IN	2.05V	Chroma signal 314mVp-p input		Inputs chroma signal to Y/C MIX circuit in the I/O block. During component signal recording or playback, this signal is Y/C mixed and is then output from V OUT.

Electrical Characteristics ⟨ V_{CC} = 4.75V, Ta = 25°C, see Electrical Characteristics Measurement Circuit and BUS DECODER Mode Condition Table.
∗ Start measurements after adjustments in accordance with the Precautions Concerning Measurements. ⟩

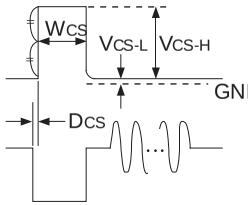
No.	Measurement item	Symbol	Input conditions				Control DC		SW set to ON	Mode conditions	Measurement point	Measurement method	Ratings			Unit
			Signal	Signal source	Amplitude	Frequency	Voltage source	Voltage					Min.	Typ.	Max.	
<Current consumption, reference bias source>																
1	Composite signal input Current consumption during recording	I_{REC1}	—	—	—	—	—	—	—	A	I_1		63	88	113	mA
2	Separate signal input Current consumption during recording	I_{REC2}	—	—	—	—	—	—	—	C	I_1		55	78	100	mA
3	Composite signal input Current consumption in power saving mode	I_{PS1}	—	—	—	—	—	—	—	D	I_1		20	30	40	mA
4	Separate signal input Current consumption in power saving mode	I_{PS2}	—	—	—	—	—	—	—	E	I_1		35	53	70	mA
5	Current consumption during playback	I_{PB}	—	—	—	—	—	—	—	F	I_1		68	94	120	mA
6	Internal reference voltage source 1	V_{REG}	—	—	—	—	—	—	—	A	P58	V_{CC}=4.75V, voltage at Pin 58 : V_{REG}	3.90	4.13	4.36	V
7	Internal reference voltage source 1 (V_{CC}–)	V_{REG-}	—	—	—	—	—	—	—	A	P58	V_{CC}=4.5V, voltage at Pin 58 : V_{REG1} V_{REG-}=V_{REG1}–V_{REG}	–12	–1		mV
8	Internal reference voltage source 1 (V_{CC}+)	V_{REG+}	—	—	—	—	—	—	—	A	P58	V_{CC}=5.25V, voltage at Pin 58 : V_{REG2} V_{REG+}=V_{REG2}–V_{REG}		+1	+12	mV
9	Internal reference voltage source 2	V_{G1}	—	—	—	—	—	—	—	A	P11	Voltage at Pin 11	1.95	2.08	2.21	V
10	Reference current source	I_{REF}	—	—	—	—	—	—	—	A	P55	IREF=(voltage at Pin 55)/18k	94	100	106	µA
<Y recording>																
11	Video AGC SYNC AGC input Low level	V_{AGCL}	e	SG30	—	—	—	—	SW30	B	P34	Measures the output SYNC level. 		143		mV
12	Video AGC SYNC AGC input High level	V_{AGCH}	f		—	—								143		mV
13	Video AGC PEAK AGC	V_{AGCP}	g		—	—						Measures the output amplitude level. 		550		mV

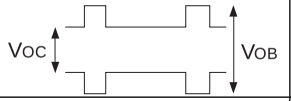
No.	Measurement item		Symbol	Input conditions				Control DC		SW set to ON	Mode condi-tions	Measu-rement point	Measurement method	Ratings			Unit
				Signal	Signal source	Amplitude	Frequency	Voltage source	Voltage					Min.	Typ.	Max.	
14	I/O frequency characteristics	For video AGC off	F_{IO1}	d	SG30	Sine wave 357mVp-p	300kHz /5MHz	—	—	SW30	A	P34	Level ratio between 300kHz sine wave and 5MHz sine wave 	–1.5	0	1.5	dB
15		For video AGC on	F_{IO2}								B			–1.5	0	1.5	dB
16	Y COMB OUT frequency characteristics	300kHz gain for TRAP off	G_{YC1}	d	SG30	Sine wave 357mVp-p	300kHz	—	—	SW30	G	P14	I/O gain of 300kHz sine wave (Refer to output waveform measurement Nos. 14 and 15.)		–0.3		dB
17		300kHz gain for TRAP on	G_{YC2}				300kHz				C				–0.6		dB
18		fsc TRAP 3.58MHz gain	G_{YC3}				3.58MHz						Level ratio between 300kHz sine wave and 3.58MHz sine wave (Refer to output waveform measurement Nos. 14 and 15.)		–23	–14	dB
19	Hard clip amount		$K_{H.C}$	b	SG5-1	500mVp-p	—	—	—	SW5-1	H	P39	Level ratio of this signal output with 500mVp-p input and with 647mVp-p input 		115		%
				c		647mVp-p											
20	White clip amount		$K_{W.C}$	b	SG5-1	500mVp-p	—	—	—	SW5-1	H	P39	 $K_{W.C} = \frac{Y}{X} \times 100$		235		%
21	Dark clip amount		$K_{D.C}$										$K_{D.C} = \frac{Z}{X} \times 100$		95		%
22	Pre-emphasis standard frequency characteristics	–3dB 500kHz	F_{E11}	a	SG5-2	–3dB (354mVp-p)	10kHz/ 500kHz	—	—	SW5-1 SW5-3	H	P39	Measures the level ratio of each output frequency component. (These emphasis characteristics include white/ dark clipping.)	$\frac{V\ (500kHz)}{V\ (10kHz)}$	10.7		11.7	dB
23		–3dB 2MHz	F_{E12}				10kHz/ 2MHz							$\frac{V\ (2MHz)}{V\ (10kHz)}$	11.8		15.8	dB
24		–10dB 2MHz	F_{E13}			–10dB (158mVp-p)									15.0		19.0	dB
25		–20dB 2MHz	F_{E14}			–20dB (50mVp-p)									19.5		25.5	dB

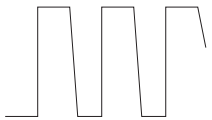
No.	Measurement item		Symbol	Input conditions				Control DC		SW set to ON	Mode condi-tions	Measu-rement point	Measurement method		Ratings			Unit
				Signal	Signal source	Amplitude	Frequency	Voltage source	Voltage						Min.	Typ.	Max.	
26	Hi-8 pre-emphasis	–3dB 200kHz	FE21	a	SG5-2	–3dB (354mVp-p)	10kHz/ 200kHz	—	—	SW5-1 SW5-3 SW3-2	A	P2	Measures the level ratio of each output frequency component. (These emphasis characteristics do not include white/dark clipping.)	V (200kHz) / V (10kHz)	2.7		3.3	dB
27		–3dB 2MHz	FE22				10kHz/ 2MHz							V (2MHz) / V (10kHz)	14.5		16.5	dB
28		–10dB 2MHz	FE23			–10dB (158mVp-p)									17.1		19.1	dB
29		–20dB 2MHz	FE24			–20dB (50mVp-p)									19.5		23.5	dB
30	FM modulator	Output level	VMOD	—	—	—	—	—	—	—	A	P39	 Signal level with 4.2MHz output		440	500	560	mVp-p
31		Secondary distortion	DMOD										Ratio to secondary higher harmonic components with 4.2M output V (8.4MHz)/V (4.2MHz)			–34		dB
32		Carrier control minimum frequency (L)	$f_{CL\ MIN}$					V44	1.8V				 Measures the output frequency.			3	4.2	MHz
33		Carrier control maximum frequency (L)	$f_{CL\ MAX}$					V44	4.75V						4.2	5.2		MHz
34		Carrier control minimum frequency (E)	$f_{CE\ MIN}$					V44	1.8V		I					4.7	5.7	MHz
35		Carrier control maximum frequency (E)	$f_{CE\ MAX}$					V44	4.75V						5.7	6.8		MHz
36		Deviation control minimum frequency (L)	$f_{DL\ MIN}$					V5-1	V_{G1}+0.5V	SW5-2	A		Makes initial setting of V44, applies test 9 measurement V_{G1}+0.5V to V5-1 and then measures the output frequency.			5.0	5.4	MHz
								V43	1.8V									
37		Deviation control maximum frequency (L)	$f_{DL\ MAX}$					V5-1	V_{G1}+0.5V						5.4	5.9		MHz
								V43	4.75V									
38		Deviation control minimum frequency (E)	$f_{DE\ MIN}$					V5-1	V_{G1}+0.5V		I		After setting V44 to mode condition I and adjusting the initial setting of the SW conditions so that the output frequency is 5.7MHz, applies test 9 measurement V_{G1}+0.5V to V5-1 and then measures the output frequency.			7.0	7.7	MHz
								V44	Adjusted value									
								V43	1.8V									
39		Deviation control maximum frequency (E)	$f_{DE\ MAX}$					V5-1	V_{G1}+0.5V						7.7	8.0		MHz
								V44	Adjusted value									
								V43	4.75V									

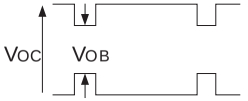
No.	Measurement item	Symbol	Input conditions: Signal	Signal source	Amplitude	Frequency	Control DC: Voltage source	Voltage	SW set to ON	Mode conditions	Measurement point	Measurement method	Ratings: Min.	Typ.	Max.	Unit
40	FM modulator: Linearity (L)	L_{MODL}	—	—	—	—	V5-1	V_{G1} V_{G1}+0.25V V_{G1}+0.5V	SW5-2	A	P39	Makes initial setting of V44, applies test 9 measurement V_{G1}, V_{G1}+0.25V and V_{G1}+0.5V to V5-1 and then calculates the following equation using the output frequency. $\frac{f(V_{G1}+0.5V)-f(V_{G1}+0.25V)}{f(V_{G1}+0.25V)-f(V_{G1})}$	0.9	1.0	1.1	—
41	FM modulator: Linearity (E)	L_{MODE}					V5-1	V_{G1} V_{G1}+0.25V V_{G1}+0.5V		I		After setting V44 to mode condition I and adjusting the initial setting of the SW conditions so that the output frequency is 5.7MHz, applies test 9 measurement, V_{G1}, V_{G1}+0.25V, and V_{G1}+0.5V to V5-1 and then calculates the following equation using the output frequency: $\frac{f(V_{G1}+0.5V)-f(V_{G1}+0.25V)}{f(V_{G1}+0.25V)-f(V_{G1})}$	0.9	1.0	1.1	—
							V44	Adjusted value								
<Y playback>																
42	PB Y comb filter ATT level	K_0	a	SG3	30mVp-p	300kHz	—	—	SW3-1 SW4	J_1	P14	Measures the I/O gain under all mode conditions.	–7.8	–4.8	–1.8	dB
43		K_1								J_2			–9.3	–6.3	–3.3	dB
44		K_2								J_3			–21	–18	–15	dB
45		K_3								J_4				–32		dB
46	HHS canceler	V_{DEHHS}	—	—	—	—	—	—	FW17 SW46-1 ON/OFF	F	P17	DC level difference at P17 (Pin 17 DL IN2) when SW46-1 is turned on and off		1.6		mV
47	PB sharpness frequency characteristics: EDIT	F_{SHP0}	a	SG3	175mVp-p	300kHz/ 2.15MHz	—	—	SW3-1 SW4	K	P14	Measures the level ratio of P14 (Pin 14 Y COMB OUT) output between 300kHz input and 2.15MHz input. $\frac{V\ (2.15MHz)}{V\ (300kHz)}$		–1.0		dB
48	PB sharpness frequency characteristics: MIN	F_{SHP1}					V60	1.8V		F				–10		dB
49	PB sharpness frequency characteristics: MAX	F_{SHP2}					V60	4.75V						7		dB

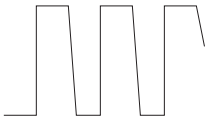
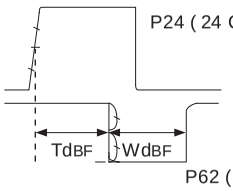
No.	Measurement item		Symbol	Input conditions				Control DC		SW set to ON	Mode condi-tions	Measu-rement point	Measurement method		Ratings			Unit
				Signal	Signal source	Amplitude	Frequency	Voltage source	Voltage						Min.	Typ.	Max.	
50	Noise canceler frequency characteristics	NC1 –3dB 1MHz	F_{NC10}	a	SG5-2	–3dB (354mVp-p)	10kHz/ 1MHz	—	—	SW5-1 SW5-3 SW6 SW24-1 SW33	L1	P34	Measures the level ratio of each output frequency component. $\frac{V\ (1MHz)}{V\ (10kHz)}$			0		dB
51		–20dB 1MHz	F_{NC11}			–20dB (50mVp-p)										–2.9		dB
52		–30dB 1MHz	F_{NC12}			–30dB (15.8mVp-p)										–6.3		dB
53		NC2 –30dB 1MHz	F_{NC2}								L2					–6.7		dB
54		NC3 –30dB 1MHz	F_{NC3}								L3					–5.0		dB
55		NC4 –30dB 1MHz	F_{NC4}								L4					–2.5		dB
56		NC5 –30dB 1MHz	F_{NC5}								L5					–4.6		dB
57	FM demodulation	Gain (L)	G_{DEMOD1}	a	SG41	200mVp-p	3MHz 5MHz	—	—	SW41	F	P7	Calculates the equations at right with the output DC at P7 (Pin 7 DEMOD OUT) for each input frequency.	$\frac{V\ (7M)–V\ (3M)}{7-3}$	90	115	140	$\frac{mV}{MHz}$
58		Linearity (L)	L_{DEMOD1}				7MHz							$\frac{V\ (7M)–V\ (5M)}{V\ (5M)–V\ (3M)}$	0.9	0.96	1.1	—
59		Gain (E)	G_{DEMOD2}				4MHz 7MHz				M			$\frac{V\ (10M)–V\ (4M)}{10–4}$	50	65	80	$\frac{mV}{MHz}$
60		Linearity (E)	L_{DEMOD2}				10MHz							$\frac{V\ (10M)–V\ (7M)}{V\ (7M)–V\ (4M)}$	0.9	1.02	1.1	—
61		Carrier leak	CL_{DEMOD}				4.2M				F		Ratio of 4.2M component of output to input			–40		dB
62	DOC Trap		G_{TRAP}	a	SG19	300mVp-p	300kHz/ 3.58MHz	—	—	SW17 SW19 SW20 SW22 SW50	T	P17 P23	Level ratio of P17 (Pin 17 DL IN2) and P23 (Pin 23 DL IN1) between 300kHz input and 3.58MHz input $\frac{V\ (3.58MHz)}{V\ (300kHz)}$			–28	–14	dB

No.	Measurement item			Symbol	Input conditions				Control DC		SW set to ON	Mode conditions	Measurement point	Measurement method		Ratings			Unit
					Signal	Signal source	Amplitude	Frequency	Voltage source	Voltage						Min.	Typ.	Max.	
63	Demodulation LPF frequency characteristics	Standard mode	300kHz gain	G_{LPF11}	Refer to Detailed Explanation (1).	SG41	200mVp-p	300kHz	—	—	SW41	F	P7	(300kHz I/O gain) – (compensation item G_{C1})	Calculates the equations at left using the output level of P7 (Pin 7 DEMOD OUT) for each input frequency.	–1.5	0	1.5	dB
64			2.5MHz frequency characteristic	F_{LPF12}				2.5MHz						$\frac{V\ (2.5MHz)}{V\ (300kHz)}$		–1.5	0	1.5	dB
65			6.12MHz frequency characteristic	F_{LPF13}				6.12MHz						$\frac{V\ (6.12MHz)}{V\ (300kHz)}$	Refer to Detailed Explanation of Measurement Method (1) for compensation values G_{C1} and G_{C2}. The amplitude frequency indicated for the input conditions is the value of SG54 in SG41.		–38	–32	dB
66		Hi-8 mode	300kHz gain	G_{LPF21}				300kHz				M		(300kHz I/O gain) – (compensation item G_{C2})		–1.5	0	1.5	dB
67			4.0MHz frequency characteristic	F_{LPF22}				4.0MHz						$\frac{V\ (4.0MHz)}{V\ (300kHz)}$		–0.5	1.0	2.0	dB
68			7.8MHz frequency characteristic	F_{LPF23}				7.8MHz						$\frac{V\ (7.8MHz)}{V\ (300kHz)}$			–16	–10	dB
<Y recording/playback>																			
69	DDS (Date display system)		VOB	ΔV_{VOB}	Refer to Detailed Explanation (2).	SG26 SG30	—	—	—	—	SW26 SW30	B	P34	Refer to Detailed Explanation of Measurement Method (2).	Measures the DC level difference with the pedestal level.	–10	15	40	mV
70			VOW	ΔV_{VOW}													340		mV
71			JOG VD	ΔJ_{OGVD}		SG30 SG31					SW30 SW31				Measures the DC level difference with the sync tip level.	–15	10	35	mV
72	Composite sync pulse		High level	V_{CS-H}	h	SG30	—	—	—	—	SW30	B	P24	P24 (24 COMP SYNC) 		2.3	2.5	2.7	V
73			Low level	V_{CS-L}													0.03	0.2	V
74			Pulse width	W_{CS}													4.5		µsec
75			Delay	D_{CS}									P24 P34	P34 (34 YOUT)		0.1	0.35	0.7	µsec
76	Video buffer		Amplifier gain	G_{BUFF}	d	SG32	Sine wave 357mVp-p	300kHz	—	—	SW32	A	P36	Measures the I/O gain for a 300kHz sine wave overlapping the Y signal.		5.5	6.0	6.5	dB
77			5MHz frequency characteristic	F_{BUFF}				300kHz /5MHz						Measures the level ratio for a 300kHz sine wave and 5MHz sine wave overlapping the Y signal.			0		dB

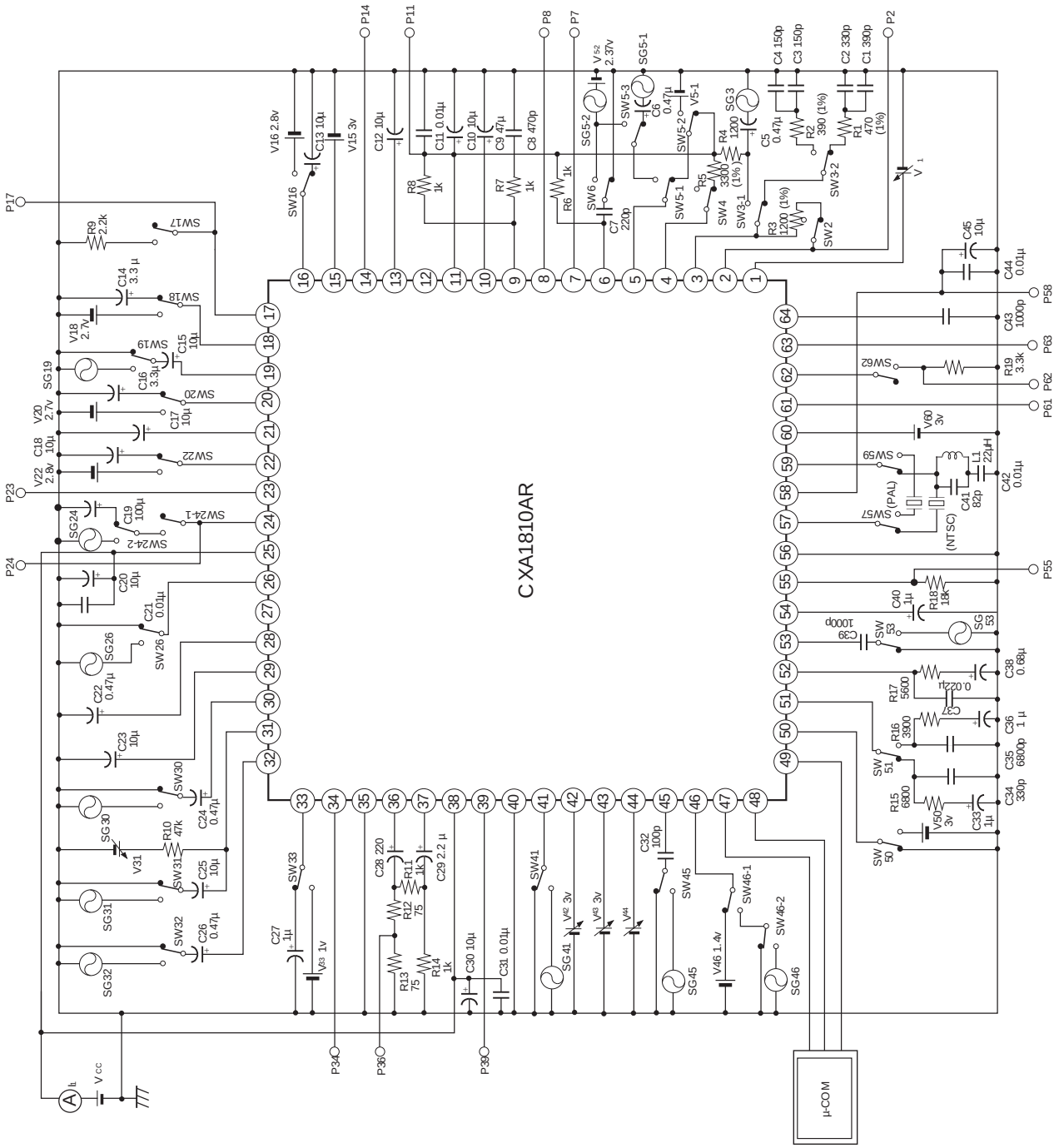
No.	Measurement item	Symbol	Input conditions: Signal	Signal source	Amplitude	Frequency	Control DC: Voltage source	Voltage	SW set to ON	Mode conditions	Measurement point	Measurement method	Ratings: Min.	Typ.	Max.	Unit
<C recording>																
78	C OUT LEVEL 1 (REC)	GCOUT1	d	SG30	Sine wave 314mVp-p	3.58MHz	—	—	SW30	N	P63	Measures the I/O level ratio for 3.58MHz sine wave.	–1.5	0	1.5	dB
79	C OUT LEVEL 2 (S•REC)	GCOUT2	a	SG53	314mVp-p	3.58MHz	—	—	SW53	O			–1.5	–0.3	1.5	dB
80	ACC AMP Gain	GCENACC	a	SG53	143mVp-p	3.58MHz	—	—	SW24-1 SW24-2 SW53	P	P8	Measures the I/O level ratio. (Until measurement No. 126, input signal 1 from SG24.)	–3.3	–1.3	0.7	dB
81	ACC AMP Maximum gain	GMAXACC			10mVp-p								14	18		dB
82	ACC AMP Minimum gain	GMINACC			363mVp-p									–9.5	–7	dB
83	Burst emphasis level	BE	a	SG53	143mVp-p	3.58MHz	—	—	SW24-1 SW24-2 SW53	P	P8	Measures the level ratio between the output burst interval and the chroma interval. VOB/VOC 	5.0	6.0	7.0	dB
84	Chroma emphasis characteristics 0dB fsc	VCE1	i	SG53	VC= 314mVp-p	3.58MHz	—	—	SW24-1 SW24-2 SW53	P	P8	Measures the output level for the input frequency of the chroma interval. VCE1	200	270	360	mVp-p
85	Chroma emphasis characteristics 0dB +500kHz	FCE11				4.08MHz						Measures the ratio between VCE1 and the output level for the input frequency of the chroma interval.	–1.4	1.0	2.6	dB
86	Chroma emphasis characteristics 0dB –500kHz	FCE12				3.08MHz							–1.4	1.0	2.6	dB
87	Chroma emphasis characteristics –10dB fsc	VCE2			VC= 99.3mVp-p	3.58MHz						Measures the output level for the input frequency of the chroma interval. VCE2	60	85	120	mVp-p
88	Chroma emphasis characteristics –10dB +500kHz	FCE21				4.08MHz						Measures the ratio between VCE2 and the output level for the input frequency of the chroma interval.	1.4	3.0	5.4	dB
89	Chroma emphasis characteristics –10dB –500kHz	FCE22				3.08MHz							1.4	3.0	5.4	dB
90	C OUT DC ACK OFF	VACK OFF	a	SG53	20mVp-p	3.58MHz	—	—	SW24-1 SW24-2	Q	P63	Measures the output DC level.	1.7	2.0	2.3	V
91	C OUT DC ACK ON	VACK ON			2mVp-p				SW53					80	200	mV

No.	Measurement item		Symbol	Input conditions				Control DC		SW set to ON	Mode condi-tions	Measu-rement point	Measurement method	Ratings			Unit
				Signal	Signal source	Amplitude	Frequency	Voltage source	Voltage					Min.	Typ.	Max.	
92	REC C RF level	REC C RF LEVEL	V_{RECC}	i	SG53	VC= 314mVp-p	3.58MHz	—	—	SW24-1 SW24-2 SW53	Q	P8	Measures the output level of the chroma interval. V_{RECC}	210	300	420	mVp-p
93		REC chroma band 1 (–750kHz)	F_{RECC1}				2.83MHz						Measures the ratio between V_{RECC} and the output level of the chroma interval. The output frequencies of 3.58MHz + ΔfkHz are converted to 743kHz–ΔfkHz for frequency conversion.		–40		dB
94		REC chroma band 2 (–300kHz)	F_{RECC2}				3.28MHz								–2.0		dB
95		REC chroma band 3 (+300kHz)	F_{RECC3}				3.88MHz								2.5		dB
96		REC chroma band 4 (+650kHz)	F_{RECC4}				4.23MHz								–1.0		dB
97	REC APC pull-in range (NTSC)	Upper pull-in range	f_{APCRN+}	a	SG53	143mVp-p	3.58MHz +ΔfHz	—	—	SW24-1 SW24-2 SW53	Q	P61	Upper input frequency pulled in within 2 seconds by the SG53 input frequency (3.58MHz+1kHz).	230			Hz
98		Lower pull-in range	$f_{APCRN–}$				3.58MHz –ΔfHz						Lower input frequency pulled in within 2 seconds by the SG53 input frequency (3.58MHz–3kHz).			–230	Hz
99	REC APC pull-in range (PAL)	Upper pull-in range	f_{APCRP+}	j			4.43MHz +ΔfHz			SW24-1 SW24-2 SW51	R		Upper input frequency pulled in within 2 seconds by the SG53 input frequency (4.43MHz + 1kHz).	200			Hz
100		Lower pull-in range	$f_{APCRP–}$				4.43MHz –ΔfHz			SW53 SW57 SW59			Lower input frequency pulled in within 2 seconds by the SG53 input frequency (4.43MHz–3kHz).			–200	Hz
101	REC AFC pull-in range (NTSC)	Upper pull-in range	f_{AFCN+}	I	SG24	—	16.206kHz (+3%)	—	—	SW24-1 SW24-2 SW62	$S_1 \rightarrow S_2$	P62	Measures the output frequency 1 second later after switching the mode conditions. 		6125979		Hz
102		Lower pull-in range	$f_{AFCN–}$				15.262kHz (–3%)								5769126		Hz
103	REC AFC pull-in range (PAL)	Upper pull-in range	f_{AFCP+}				16.094kHz (+3%)				$S_3 \rightarrow S_4$				6035156		Hz
104		Lower pull-in range	$f_{AFCP–}$				15.156kHz (–3%)								5683594		Hz

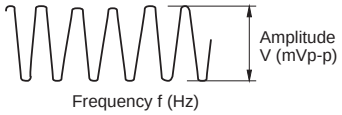
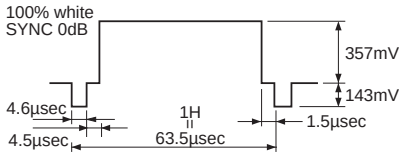
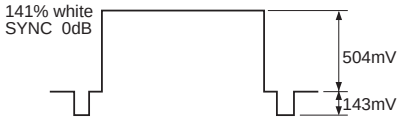
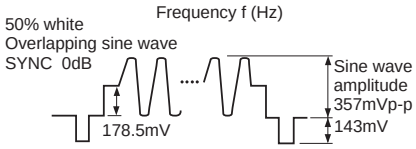
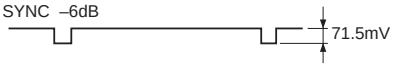
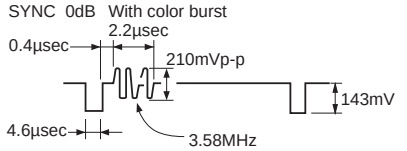
No.		Measurement item	Symbol	Input conditions: Signal	Signal source	Amplitude	Frequency	Control DC: Voltage source	Voltage	SW set to ON	Mode condi-tions	Measu-rement point	Measurement method	Ratings: Min.	Typ.	Max.	Unit
<C playback>																	
105	PB C OUT level	PB C OUT level	V_{PBCO}	n	SG45	VC= 200mVp-p	743kHz	—	—	SW16 SW18	T	P63	Measures the output level of the chroma interval. V_{PBCO}	130	200	300	mVp-p
106		PB chroma band 1 (–650kHz)	F_{PBC1}				100kHz			SW24-1 SW24-2			Measures the ratio between V_{PBCO} and the output level of the chroma interval.		–2.4		dB
107		PB chroma band 2 (–300kHz)	F_{PBC2}				443kHz			SW45					–0.5		dB
108		PB chroma band 3 (+300kHz)	F_{PBC3}				1043kHz						The output frequencies of 743kHz + Δf kHz are converted to 3.58MHz–Δf kHz for frequency conversion.		–2.3		dB
109		PB chroma band 4 (+1.2MHz)	F_{PBC4}				1.9MHz								–40		dB
110	PB ACC gain difference between channels	Gain difference between channels 1-2	ΔG_{CH12}	a/k	SG45	200mVp-p	743kHz	—	—	SW16 SW18	T	P63	Refer to Detailed Explanation of Measurement Method (3). Measures the gain difference between channels.	–0.5	0	0.5	dB
111		Gain difference between channels 1-3	ΔG_{CH13}	o	SG46	1.4Vo-p	50Hz			SW24-1 SW24-2				–0.5	0	0.5	dB
112		Gain difference between channels 1-4	ΔG_{CH14}							SW45 SW46-1 SW46-2				–0.5	0	0.5	dB
113		High-speed ACC compression ratio	F_{ACC}	m	SG53	—	—	—	—	SW24-1 SW24-2 SW53	U	P8	Refer to Detailed Explanation of Measurement Method (4).		0.6	3.0	dB
114		Burst de-emphasis level	B_{DE}	a	SG45	200mVp-p	743kHz	—	—	SW16 SW18 SW24-1 SW24-2 SW45	T	P63	Measures the level ratio between the burst interval and the chroma interval of output. $\frac{V_{OB}}{V_{OC}}$ 	–5.5	–4.5	–3.5	dB
115	XO characteristics (NTSC)	Frequency deviation	Δf_{XON}	—	—	—	—	—	—		F	P61	Difference between output frequency and f_{SCN}=3579545Hz. $\Delta f_{XON} = f_{XON} - f_{SCN}$	–50		50	Hz
116		Output level	V_{XON}										Measures the output level.	450	600	750	mVp-p
117		Secondary distortion	HD_{2XON}										Ratio with secondary higher harmonic component. V (7.16MHz)/V (3.58MHz)		–45	–25	dB

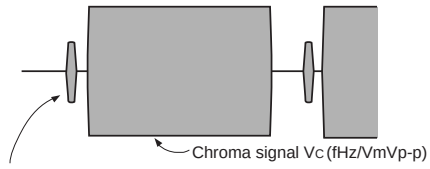
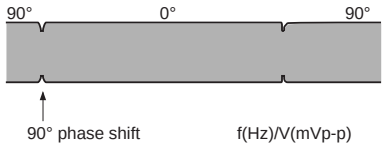
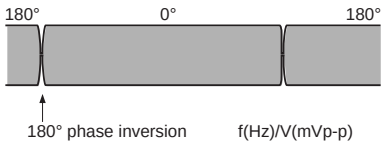
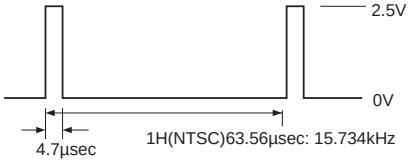
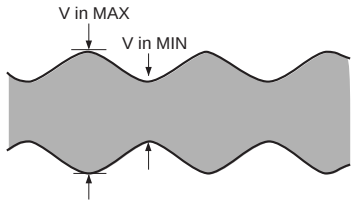
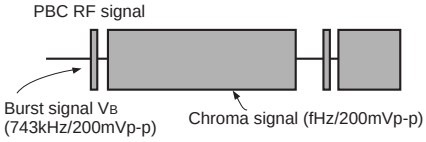
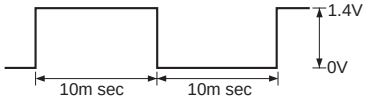
No.	Measurement item		Symbol	Input conditions				Control DC		SW set to ON	Mode conditions	Measurement point	Measurement method	Ratings			Unit
				Signal	Signal source	Amplitude	Frequency	Voltage source	Voltage					Min.	Typ.	Max	
118	XO characteristics (PAL)	Frequency deviation	Δf_{XOP}	—	—	—	—	—	—	SW57 SW59	F	P61	Difference between output frequency and f_{SCP} = 4433619Hz. $\Delta f_{XOP} = f_{XOP} - f_{SCP}$	–50		50	Hz
119		Output level	V_{XOP}										Measures the output level.	320	460	650	mVp-p
120		Secondary distortion	$HD2_{XOP}$										Ratio with secondary higher harmonic component V (8.86MHz)/V (4.43MHz)		–40	–25	dB
121	PB APC pull-in range (NTSC)	Upper pull-in range	f_{APCN+}	a	SG45	200mVp-p	765.747kHz (+3%)	—	—	SW16 SW18 SW24-1	$V_1 \rightarrow V_2$	P62	Measures the output frequency 1 second later after switching the mode conditions. 		6125979		Hz
				I	SG24	—	16.206kHz (+3%)										
122		Lower pull-in range	f_{APCN-}	a	SG45	200mVp-p	721.141kHz (–3%)	—	—	SW24-2 SW45 SW62					5769126		Hz
				I	SG24	—	15.262kHz (–3%)										
123	PB APC pull-in range (PAL)	Upper pull-in range	f_{APCP+}	a	SG45	200mVp-p	754.395kHz (+3%)	—	—	SW16 SW18 SW24-1 SW24-2	$V_3 \rightarrow V_4$				6035156		Hz
				I	SG24	—	16.094kHz (+3%)										
124		Lower pull-in range	f_{APCP-}	a	SG45	200mVp-p	710.449kHz (–3%)	—	—	SW45 SW51 SW57 SW59 SW62					5683594		Hz
				I	SG24	—	15.156kHz (–3%)										
125	Burst flag	Delay	Td_{BF}	b	SG5-1	—	—	—	—	SW5-1 SW24-1 SW24-2 SW62	F	P62		3.5	4.1	4.7	µsec
126		Pulse width	Wd_{BF}											3.3	4.3	5.3	µsec

Electrical Characteristics Measurement Circuit



Input Signal

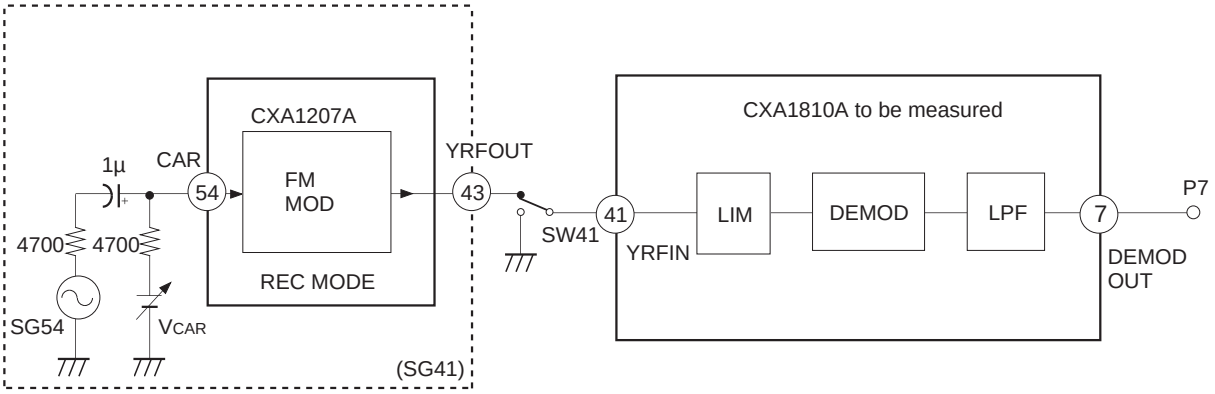
Signal	Input signal waveform	Signal source
a		SG3 SG5-2 SG19 SG41 SG45 SG53
b		SG5-1
c		SG5-1
d		SG30 SG32
e		SG30
f		SG30
g		SG30
h		SG30

Signal	Input signal waveform	Signal source
i		SG53
j		SG53
k		SG45
l		SG24
m	 fsc/143mVp-p: 60Hz, 35% AM modulated $\frac{\text{V in MAX} - \text{V in MIN}}{\text{V in MAX} + \text{V in MIN}} \times 100 = 35\%$	SG53
n		SG45
o		SG46

Detailed Explanation of Measurement Method

(1) DEMOD LPF frequency characteristics measurement

Using the CXA1207A as a modulator, the configuration for SG41 is shown below.



First, without inputting SG54, adjust V_{CAR} so that the Y RF OUT (Pin 43) output frequency of the CXA1207A is 5MHz. Use V_{CARO} for the V_{CAR} voltage. Next, apply V_{CARO} + 500mV, measure the Y RF OUT (Pin 43) output frequency fo of the CXA1207A, and then calculate the MOD gain using the following equation.

$$G_{MOD} = \frac{fo\ (MHz) - 5\ (MHz)}{500\ (mV)}$$

The compensation values are derived from GMOD and from GDEMOD1 and GDEMOD2 of measurement Nos. 57 and 59.

Standard mode compensation value : $G_{C1} = 20\log [G_{MOD}\ (MHz/mV) \times G_{DEMOD1}\ (mV/MHz)]$

Hi-8 mode compensation value : $G_{C2} = 20\log [G_{MOD}\ (MHz/mV) \times G_{DEMOD2}\ (mV/MHz)]$

Next, in order to set the SG41 carrier frequency, adjust V_{CAR} so that the Y RF OUT (Pin 43) output of the CXA1207A in standard mode is 4.8MHz and in Hi-8 mode is 6.7MHz.

In the above state, measure the I/O gain for the SG54 (200mVp-p/300kHz) input and P7 (Pin 7 DEMOD OUT), with the gain for standard mode being G_{LPF10} and for Hi-8 mode G_{LPF20}.

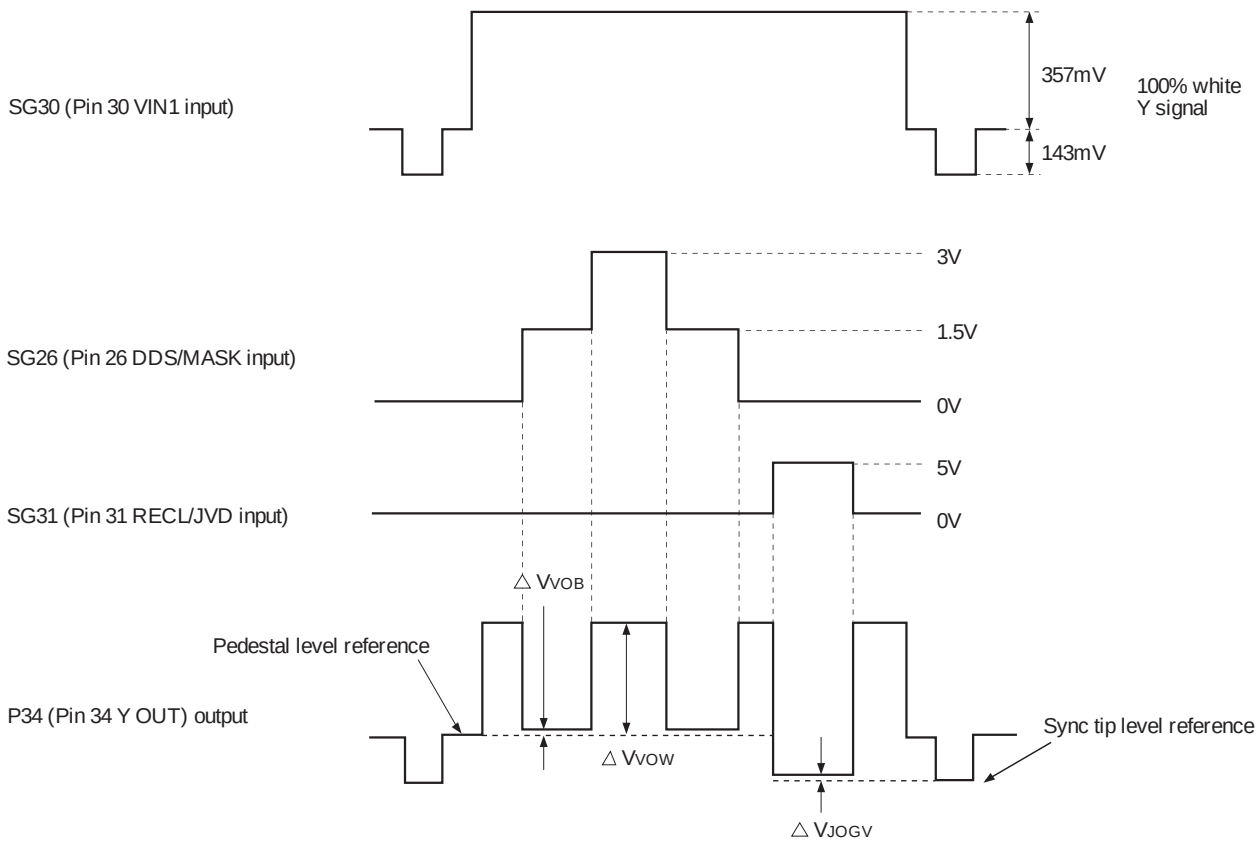
Using these measured values and compensation values, the low frequency gain for DEMOD LPF is determined using the following equations:

Standard mode : $G_{LPF11} = G_{LPF10} - G_{C1}$ (dB)

Hi-8 mode : $G_{LPF21} = G_{LPF20} - G_{C2}$ (dB)

(2) DDS measurement

When a pulse with the following timing is input, the output from P34 (Pin 34 Y OUT) becomes as shown below; measures each DC difference.



(3) Measurement of gain difference between PB ACC channels

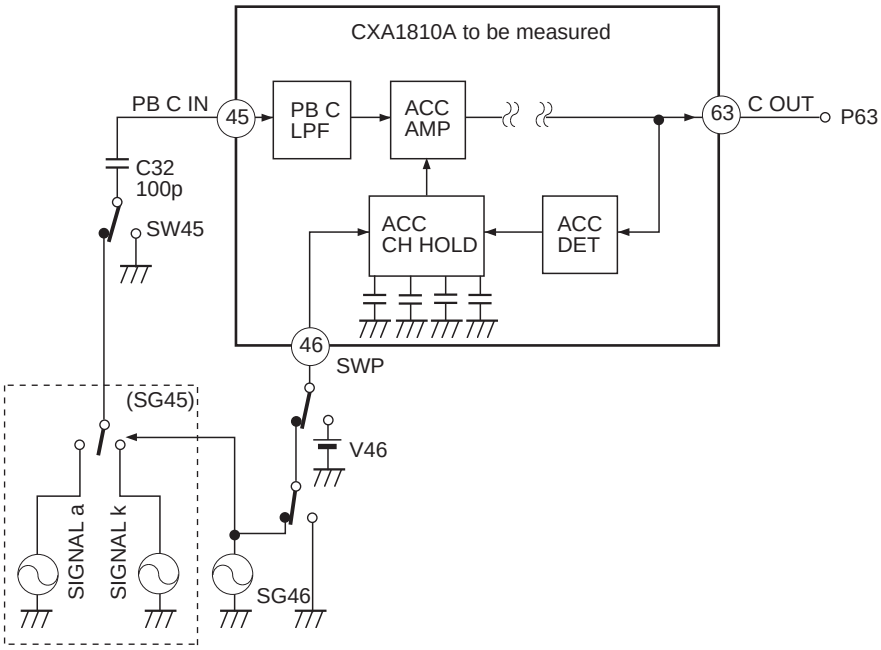
The ACC amplifier in the CXA1810A has a built-in 4-channel time constants, and those time constants can be switched by SWP (Pin 46) input. In addition, in NTSC playback chroma signal processing, PI return occurs in the SWP (Pin 46) input for Low interval. In this measurement, the signal k, that is phase-inverted each 1H, is input to PBC IN (Pin 45) for the Low interval of SWP; the continuous wave of the signal is input for the High interval of SWP.

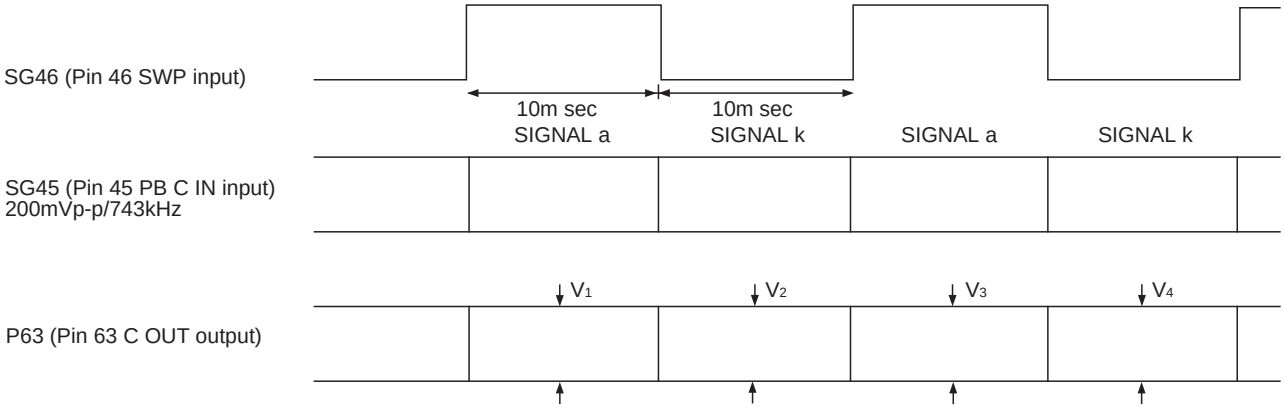
In this case, measure each channel level V_1, V_2, V_3, and V_4 of output P63 (Pin 63 C OUT) and calculate the gain difference between channels using the following equations:

$$\Delta GCH12 = \frac{V_2}{V_1}$$

$$\Delta GCH13 = \frac{V_3}{V_1}$$

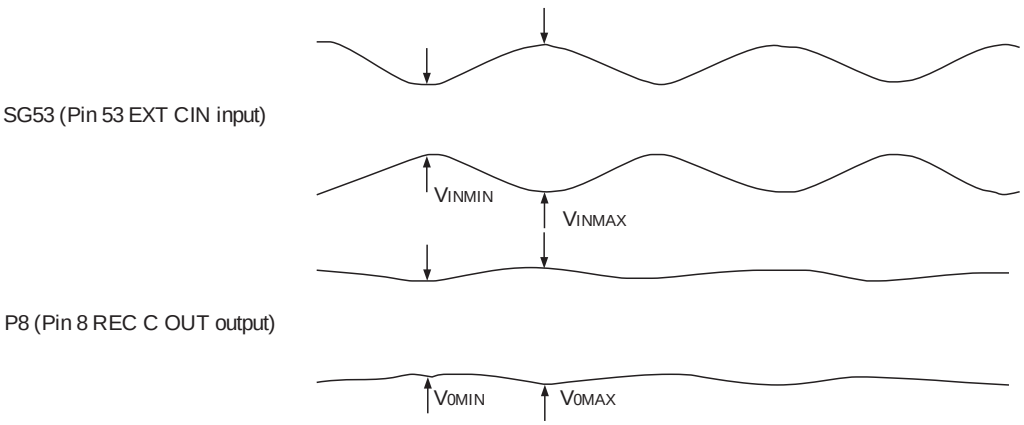
$$\Delta GCH14 = \frac{V_4}{V_1}$$





(4) High-speed ACC compression ratio measurement

Measure the high-speed ACC compression ratio in JOG mode by inputting a modulation wave as shown below.



$F_{ACC} = 20\log V_{OMAX}/V_{OMIN}$

BUS DECODER Mode Condition Table for Measuring Electrical Characteristics

(∗Blanks indicate Low)

Mode condition	TEST2	TEST1	SYNC OFF	CORRE H	SHP THROU	ACK OFF	FBC L2	C SEL	DC2	DC1	C MUTE OFF	PAL	CAMREC	PS	Yd	NCLP2	NCLP1	NCL2	NCL1	CFL2	CFL1	E	FBC L1	JOG	EDIT	CCIR	WCCD	MUTE	Video AGC	INSEL	S	PB	Description
A																																	Composite REC (Video AGC OFF)
B																												H				Composite REC (Video AGC ON)
C																														H		Separate REC
D														H																		Composite REC power save
E														H																H		Separate REC power save
F																															H	Normal PB
G					H																									H		Y comb OUT f characteristics
H	H								H																							Y pre-emphasis characteristics
I																						H										Hi-8 modulator characteristics
J_1					H										H					H	H										H	PB Y comb filter ATT level
J_2																				H												
J_3																					H											
J_4																																
K																									H						H	PB sharpness characteristics
L_1																	H	H	H												H	Noise canceler frequency characteristics
L_2																H	H	H	H													
L_3																		H	H													
L_4																	H		H													
L_5																	H	H														
M																						H									H	Hi-8 demodulation characteristics
N						H																			H							C OUT level (REC)
O						H																								H		C OUT level (S/REC)
P		H	H					H																								ACC, BE, CE characteristics
Q			H																											H		REC C measurement (NTSC)
R			H									H														H					H		REC C measurement (PAL)
S_1	H	H	H																													REC AFC pull-in range (NTSC)
S_2																																
S_3	H	H	H									H																				REC AFC pull-in range (PAL)
S_4																																
T			H																						H						H	PB C system measurement
U		H	H					H																H								High-speed ACC compression ratio
V_1	H	H	H																						H						H	PB APC pull-in range (NTSC)
V_2																																
V_3	H	H	H									H													H	H					H	PB APC pull-in range (PAL)
V_4																																

Precautions Concerning Measurements (Refer to Electrical Characteristics Measurement Circuit).

1. Start measurements after making the following adjustments.
   1) Recording level (video AGC) adjustment
      With the SW conditions (SW30: on) and the mode conditions: B the same as for measurement Nos. 11 to 13, adjust V31 so that the P34 (Pin 34 Y OUT) output is 500mVp-p when signal b (100% white, 500mVp-p Y signal) is input from SG30.
   2) CAR adjustment (normal)
      With the SW conditions at the initial settings and the mode conditions: A, adjust V44 so that the frequency of the P39 (Pin 39 Y RF OUT) output is 4.2MHz.
   3) Chroma emphasis adjustment
      With the SW conditions (SW24-1, SW24-2, SW53: on), and the mode conditions: P the same as for measurement Nos. 84 to 89, adjust V1 so that the signal level for the chroma interval of the P8 (Pin 8 REC C OUT) output is at a minimum when signal l is input from SG24 and signal i is input from SG53. (chroma interval 3.58MHz/99.3mVp-p)

2. Although no input conditions are indicated for C measurement Nos. 80 to 126, signal l is input from SG24. Unless otherwise specified in the input conditions, the frequency for SG24 is 15.734kHz.

3. Note that in regards to the measurements shown below, the characteristics change depending on the floating capacitance.
   1) White/dark clipping level
   2) Pre-emphasis characteristics
   3) REC APC pull-in range

4. When taking measurements, use metal film resistors with an allowable deviation of 1% for R1, R2, R3, and R5, and use temperature compensation CH types for C1, C2, C3, and C4.

BUS DECODER

1) Data contents

bit No.	Mode		Content
1	TEST2	H	TEST2 mode 1) Outputs VCO OUT signal to BF VCO (Pin 62). 2) Outputs white/dark-clipped Y signal to Y REF OUT (Pin 39).
		L	Normal
2	TEST1	H	TEST1 mode 1) Cuts APC loop and inputs signal from CAM FSC SHP (Pin 60) to VCO OUT. 2) During REC, outputs burst emphasis output to REC C OUT (Pin 8). 3) For the PB chroma feedback comb measurement, inputs signal from EXT C IN (pin 53) to the comb block without passing it through PB CONV.
		L	Normal
3	SYNC OFF	H	Sync separation does not operate. (External input to COMP SYNC (Pin 24) is possible).
		L	Normal
4	CORRE H	H	Fixes the correlation pulse High so that there is always correlation.
		L	Detects correlation.
5	SHP THRU	H	Sharpness block through (does not pass through fsc Trap, Sharpness, LPF and EQ)
		L	Normal
6	ACK OFF	H	ACK SW does not operate according to ACK DET; always fixed to color mode.
		L	ACK operation is performed according to ACK DET.
7	F.B.C. L2 (Feedback Comb)		Switches the feedback amount of the FBC (feedback comb). ∗ Refer to Table 1.
8	C SEL	H	During recording, the signal input to EXT C IN (Pin 53) is input directly to the ACC amplifier.
		L	Normal

bit No.	Mode		Content
9	DC 2 (Dark Clip)		The dark clipping level is switched as shown below. (when white clipping is 235% and WDC (Pin 27) is left open) (Unit : %) Switches the amount of the dark clipping level offset to the white clipping level, which can be varied in steps of 10%.
10	DC 1		
11	C MUTE OFF	H	Disables MUTE for the chroma signal by the MASK signal.
		L	Mutes the chroma signal by the MASK signal.
12	PAL	H	PAL (chroma function)
		L	NTSC
13	CAM REC	H	During recording, inputs fsc, locked to burst, from CAM FSC SHP (Pin 60) without performing APC with the input chroma signal, and then performs frequency conversion using this fsc. Recordable rise time can be reduced to 0.2 seconds or less from power saving mode with separate input.
		L	Normal
14	PS (Power Save)	H	1) $\overline{S}$•PS (31.S=Low) Changes to power saving mode with composite input. Power consumption: 140mW (V_{CC}=4.75V) 2) S•PS (31.S=High) Changes to power saving mode with separate input. Power consumption:250mW (V_{CC}=4.75V)
		L	Normal
15	Yd	H	Performs Yd playback during playback.
		L	Normal

DC 2 \ DC 1	High	Low
High	85	95
Low	105	115

bit No.	Mode		Content
16	NCLP2		During playback, switches the noise canceler characteristics.
17	NCLP1		
18	NCL2		
19	NCL1		
20	CFL2		The typical value of PB Y comb filter depth is switched as shown below. (Low frequency: insignificant level input)
21	CFL1		
22	E	H	Hi-8 mode
		L	Standard mode
23	F.B.C. L1		Switches the feedback amount of the chroma feedback comb. ∗ Refer to Table 1.
24	JOG	H	1) High-speed ACC mode. 2) During playback, is not performed dropout compensation.
		L	Normal
25	EDIT	H	EDIT mode 1) During recording, the chroma signal is Y/C separated by the BPF only without passing though the comb filter. 2) During playback, cuts the feedback loop of chroma feedback comb. 3) During playback, makes the sharpness characteristics flat.
		L	Normal
26	CCIR	H	For fsc = 4.43MHz
		L	For fsc = 3.58MHz
27	W CCD	H	For two CCD delay lines
		L	For one CCD delay line
28	MUTE	H	1) Mutes the Y and chroma signals. 2) Discharges the charge in the external clamp capacitance for VIN1 (Pin 30) and VIN2 (Pin 28) and in the external capacitance for AGC TC1 (Pin 29).
		L	Normal

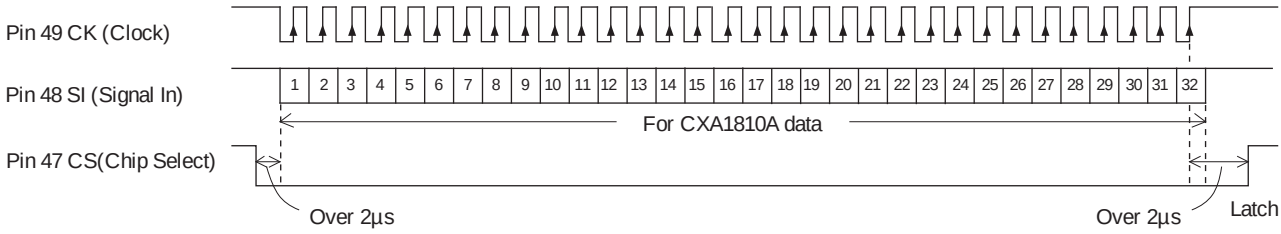
CFL2 \ CFL1	High	Low
High	–10dB	–6dB
Low	–1.5dB	0dB

bit No.	Mode		Content
29	Video AGC	H	Video AGC on
		L	Video AGC off
30	INSEL (INput SELection)	H	Selects VIN2 (Pin 28) input.
		L	Selects VIN1 (Pin 30) input.
31	S	H	For separate signals during recording.
		L	For composite signals during recording.
32	PB	H	Playback mode
		L	Recording mode

Table 1. Chroma Feedback Comb Loop Gain

		F.B.C.L1	
		Low	High
F.B.C. L2	Low	0dB	+1.9dB
	High	+4.8dB	+6.7dB

2) Timing chart



3) Input conditions

Item	Symbol	Min.	Typ.	Max.	Unit
Input high level for Pins 47, 48, and 49	V_{B-H}	2.0			V
Input low level for Pins 47, 48, and 49	V_{B-L}			1.0	V
Clock frequency	f_{CK}			1.3	MHz
Setup time	t_{SU}	400			nsec
Hold time	t_{HLD}	400			nsec
CS fall time to SI start time	t_1	2			µsec
Final CK rise time to CS rise time	t_2	2			µsec

BUS DECODER Mode Condition Table (NTSC)

					TEST2	TEST1	SYNC OFF	CORRE H	SHP THROU	ACK OFF	FBC L2	C SEL	DC2	DC1	C MUTE OFF	PAL	CAMREC	PS	Yd	NCLP2
CAMERA	STANDBY		Hi-8		L	L	L	L		L	*	L			L	L	H	H	L	*
			Standard		L	L	L	L		L	*	L			L	L	H	H	L	*
	REC		Hi-8		L	L	L	L		L	*	L			L	L	H	L	L	*
			Standard		L	L	L	L		L	*	L			L	L	H	L	L	*
	EDIT		Hi-8		L	L	L	L		L	*	L	*	*	L	L	L	L	L	
	SEARCH		Standard		L	L	L	L		L	*	L	*	*	L	L	L	L	L	
VCR	REC	S	Hi-8		L	L	L	L		L	*	L			L	L	L	L	L	*
			Standard		L	L	L	L		L	*	L			L	L	L	L	L	*
		RCA	Hi-8		L	L	L	L		L	*	L			L	L	L	L	L	*
			Standard		L	L	L	L		L	*	L			L	L	L	L	L	*
	PB	Normal PB	Hi-8	SP	L	L	L	L		L		*	*	*	L	L	L	L	L	
				LP	L	L	L	L		L		*	*	*	L	L	L	L	L	
			Standard	SP	L	L	L	L		L		*	*	*	L	L	L	L	L	
				LP	L	L	L	L		L		*	*	*	L	L	L	L	L	
		EDIT	Hi-8	SP	L	L	L	L		L	*	*	*	*	L	L	L	L	L	
				LP	L	L	L	L		L	*	*	*	*	L	L	L	L	L	
			Standard	SP	L	L	L	L		L	*	*	*	*	L	L	L	L	L	
				LP	L	L	L	L		L	*	*	*	*	L	L	L	L	L	

Note) "*" Don't care. In addition, select for the blank SHP THRU/W CCD column based on the system configuration; for other blanks according to the characteristics.

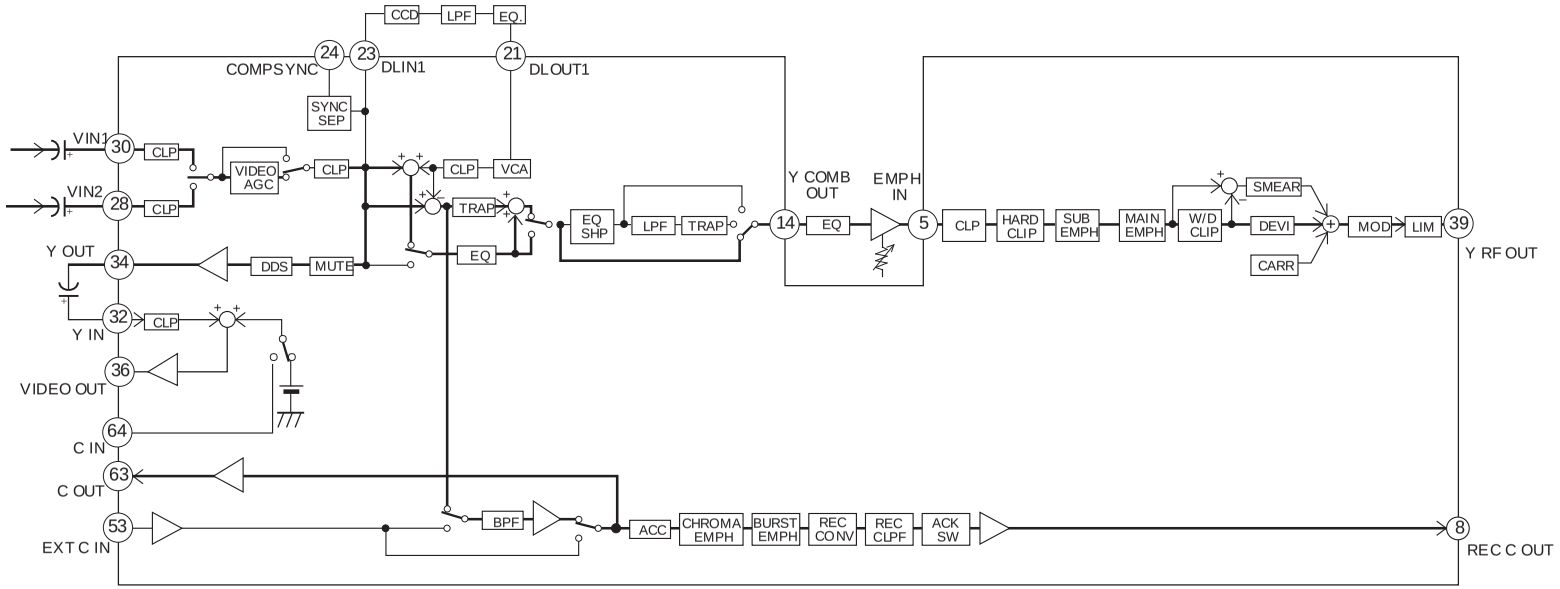
					NCLP1	NCL2	NCL1	CFL2	CFL1	E	FBCL1	JOG	EDIT	CCIR	WCCD	MUTE	Video AGC	INSEL	S	PB
CAMERA	STANDBY		Hi-8		*	*	*	*	*	H	*	L	L	L	*	L	H	H	H	L
			Standard		*	*	*	*	*	L	*	L	L	L	*	L	H	H	H	L
	REC		Hi-8		*	*	*	*	*	H	*	L	L	L	*	L	H	H	H	L
			Standard		*	*	*	*	*	L	*	L	L	L	*	L	H	H	H	L
	EDIT		Hi-8							H	*	H	H	L	H	L	*	*	*	H
	SEARCH		Standard							L	*	H	H	L		L	*	*	*	H
VCR	REC	S	Hi-8		*	*	*	*	*	H	*	L	L	L	*	L	H	H	H	L
			Standard		*	*	*	*	*	L	*	L	L	L	*	L	H	H	H	L
		RCA	Hi-8		*	*	*	*	*	H	*	L	L	L	*	L	H	L	L	L
			Standard		*	*	*	*	*	L	*	L	L	L	*	L	H	L	L	L
	PB	Normal PB	Hi-8	SP						H		L	L	L	H	L	*	*	*	H
				LP						H		L	L	L	H	L	*	*	*	H
			Standard	SP						L		L	L	L		L	*	*	*	H
				LP						L		L	L	L		L	*	*	*	H
		EDIT	Hi-8	SP						H	*	L	H	L	H	L	*	*	*	H
				LP						H	*	L	H	L	H	L	*	*	*	H
			Standard	SP						L	*	L	H	L		L	*	*	*	H
				LP						L	*	L	H	L		L	*	*	*	H

Description of Operation

1. Signal path during composite recording

Composite signals input from VIN1 (Pin 30) and VIN2 (Pin 28) are selected by mode INSEL, passed through the VIDEO AGC, and Y/C separated by the comb filter. The Y signal is output to Y COMB OUT (Pin 14). Next, level adjustment is performed externally and then the signal is input to EMPH IN (Pin 5), after which hard clipping, emphasis, white/dark clipping, and FM modulation are performed and then the signal is output from Y RF OUT (Pin 39). In addition, the Y OUT (Pin 34) signal is input to Y IN (Pin 32), and then the monitor signal is output from VIDEO OUT (Pin 36).

On the other hand, Y/C-separated C signal passes through the BPF and then along with being output to C OUT (Pin 63), the signal is also passed through ACC, chroma emphasis, and burst emphasis, low frequency converted, is passed though a LPF and then output from REC C OUT (Pin 8).



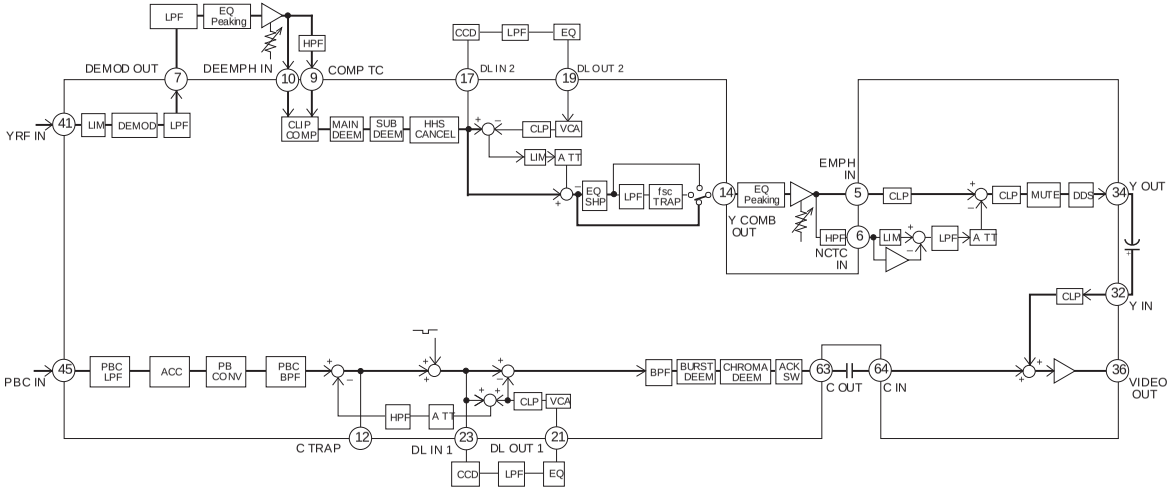
Pin No.	28 30 34 32 23 21	36	14 5	39	63	8
Signal waveform	0.5Vp-p	2.0Vp-p	0.5Vp-p	0.5Vp-p	0.32Vp-p	0.3Vp-p

2. Signal path during playback (W CCD)

The playback Y RF signal, after having passed though RF AGC and a soft limiter, is input to Y RF IN (Pin 41). After FM demodulation, the signal passes through the LPF and is then output from DEMOD OUT (Pin 7). After the waveform is formed and the level is adjusted by an external LPF, EQ, and peaking amplifier, the signal is input to DE EMPH IN (Pin 10), after which clipping compensation, de-emphasis and HHS cancellation are performed. Next, cross talk cancellation is performed by a comb filter and then the signal is output from Y COMB OUT (Pin 14). After the waveform is formed and the level is adjusted by an external EQ (LPF) and peaking amplifier, the signal is input to EMPH IN (Pin 5), where it passes through a noise canceler and is then output from Y OUT (Pin 34).

On the other hand, the playback RF signal, after passing through AFM and ATF TRAP, is input to PBC IN (Pin 45), after which the low-frequency C signal is separated by the PBC LPF. Next, the playback C signal, which has undergone level control by the ACC and frequency conversion by PB CONV and PBC BPF, is subjected to cross talk cancellation by the comb filter, and then after undergoing burst de-emphasis and chroma de-emphasis, the signal is output from C OUT (Pin 63).

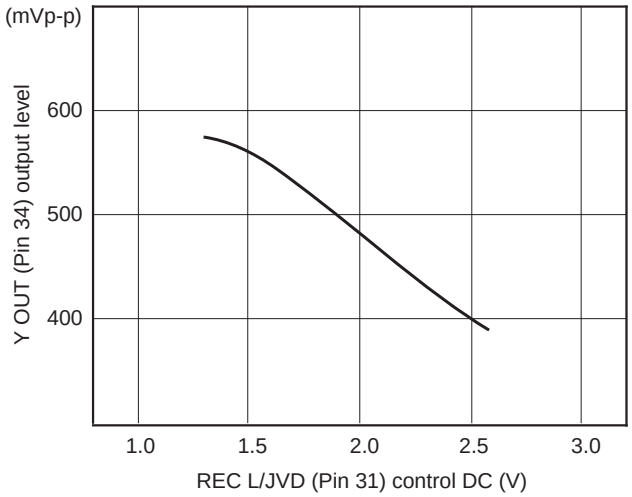
By inputting the playback Y signal (Y OUT (Pin 34) output) to Y IN (Pin 32) and the playback C signal (C OUT (Pin 63) output) to C IN (Pin 64), the Y/C mixed signal is output from VIDEO OUT (Pin 36).



Pin No.	㊶	⑦ ⑩	⑰ ⑲ ⑭ ⑤ ㉞ ㉜	㊺	⑫ (㉓ ㉑)	⑥③ ⑥④	㊱
Signal waveform	0.2Vp-p	0.17Vp-p	0.5Vp-p	0.5Vp-p	0.3Vp-p (Pins 23 and 21 are with pseudo sync)	0.3Vp-p	2Vp-p

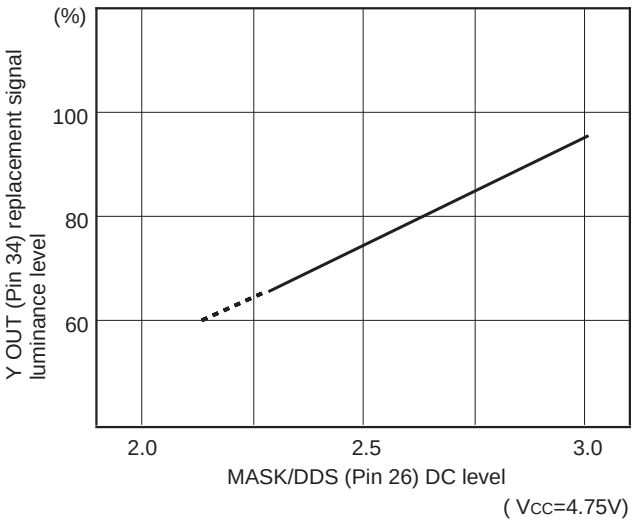
3. REC LEVEL adjustment

The video signal input to VIN1 (Pin 30) and VIN2 (Pin 28) is selected by mode INSEL, and when mode video AGC is High, the signal is passed through SYNC AGC and PEAK AGC and then is output from Y OUT (Pin 34). The output level can be adjusted by applying an external DC bias (1.3 to 2.6V [Vcc = 4.75V]) to RECL/JVD (Pin 31). In the case of 100% white , 500mVp-p input, the following are the standard characteristics.



4. MASK DDS

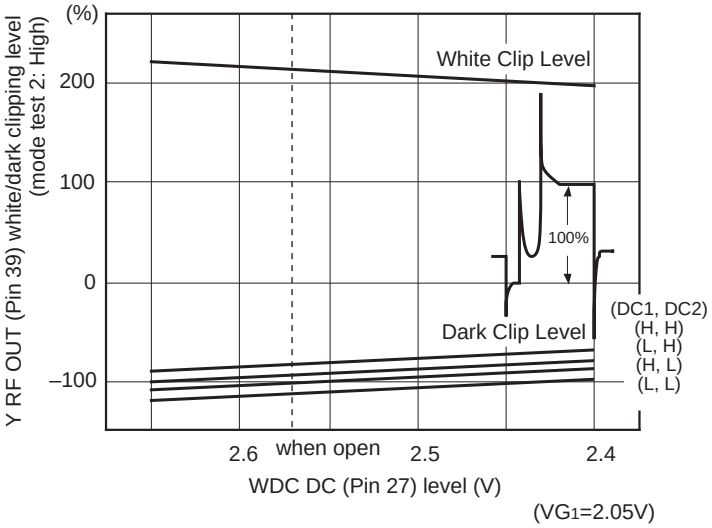
DDS/MASK (Pin 26) is the VOW (character level) signal and the VOB (character background) and masking timing pulse input pin. The threshold value for raw signal and VOB/masking is 1.1V, and the threshold value for VOB/masking and VOW is 2.0V (when Vcc = 4.75V). In addition, the VOW replacement signal level can be varied within the range of the DC level (2.3V to 3.0V) for this pin; those standard characteristics are shown below.



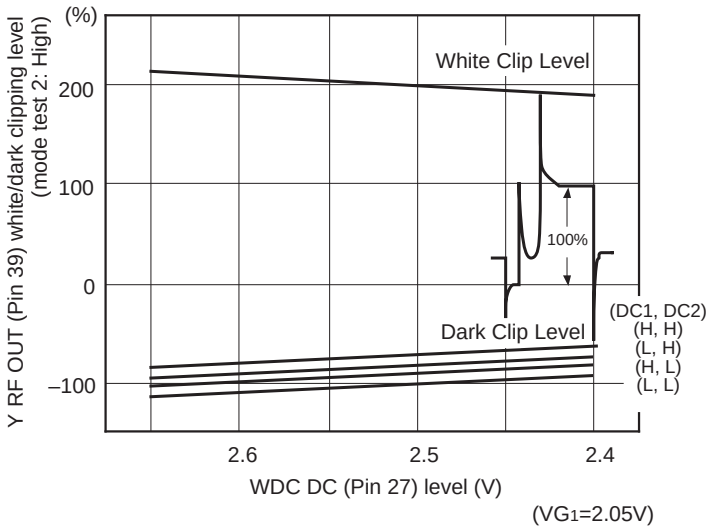
5. White/dark clipping adjustment

The white/dark clipping levels can be varied connectedly using the DC level of WDC (Pin 27). In addition, the dark clipping level is switched independently by DC1 and DC2 of the mode. The standard characteristics of standard/Hi-8 after Y pre-emphasis are shown below. (when 100% white, 500mVp-p input to Pin 5 EMPH IN)

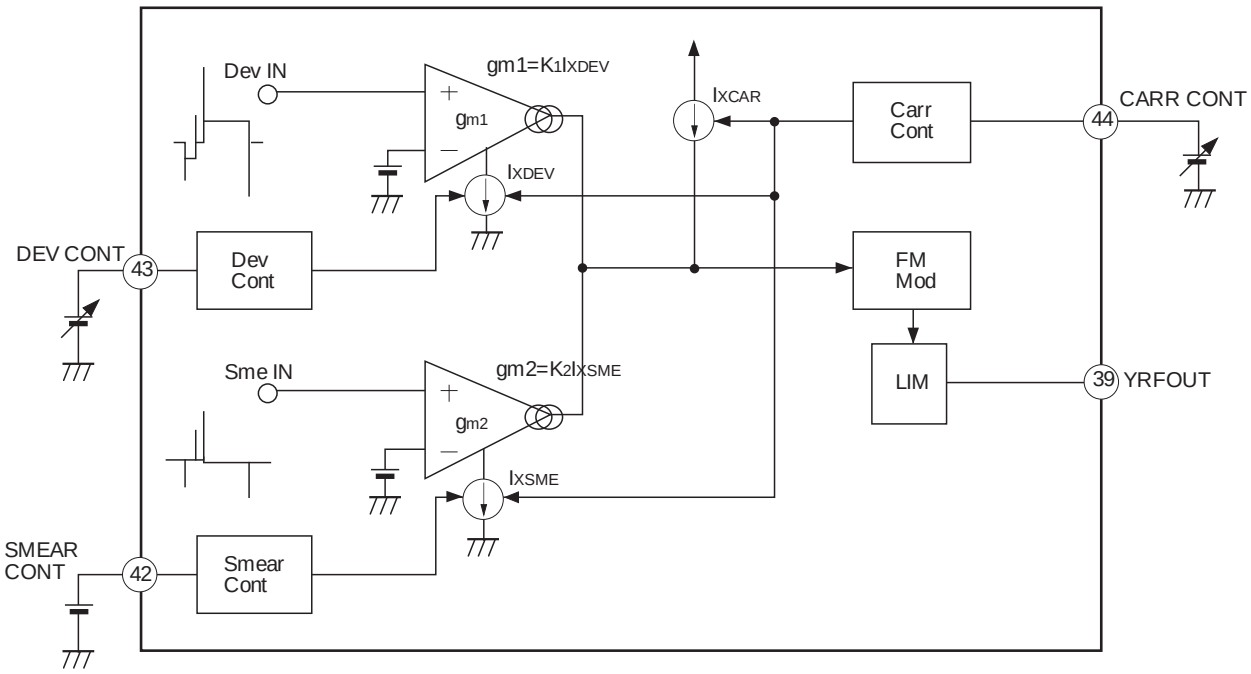
1) Standard mode



2) Hi-8 mode



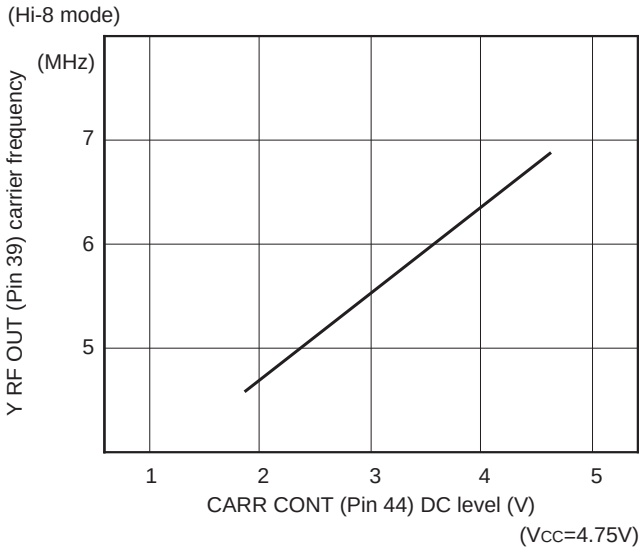
6. Carrier/deviation adjustment

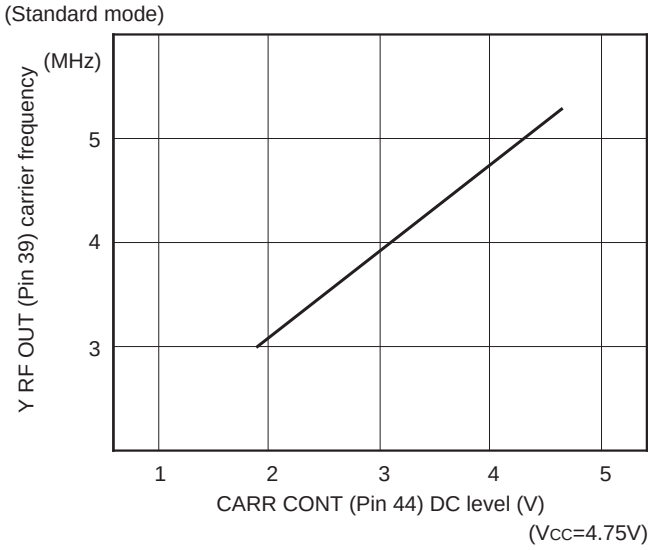


The Y FM modulation carrier frequency is adjusted by applying an external DC bias to CARR CONT (Pin 44). When carrier adjustment is performed, gm_1 and gm_2, the deviation/smear gain, change in proportion to I_{XCAR} at the same time. This results in the FM modulator sensitivity being roughly adjusted for the Dev IN/Sme IN signal level. Fine adjustment of the deviation frequency is accomplished by the DC bias applied to DEV CONT (Pin 43).

6-1. Carrier frequency adjustment

The standard characteristics of carrier frequency for the CARR CONT (Pin 44) DC bias (1.8V to Vcc) when bias was applied to EMPH IN (Pin 5) with VG1 are shown below.

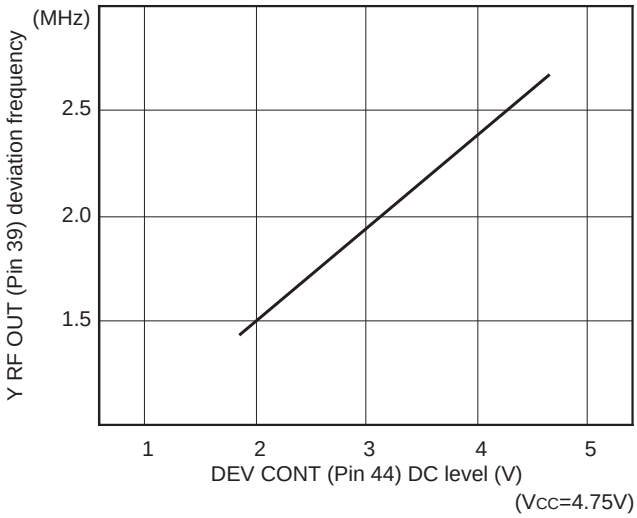




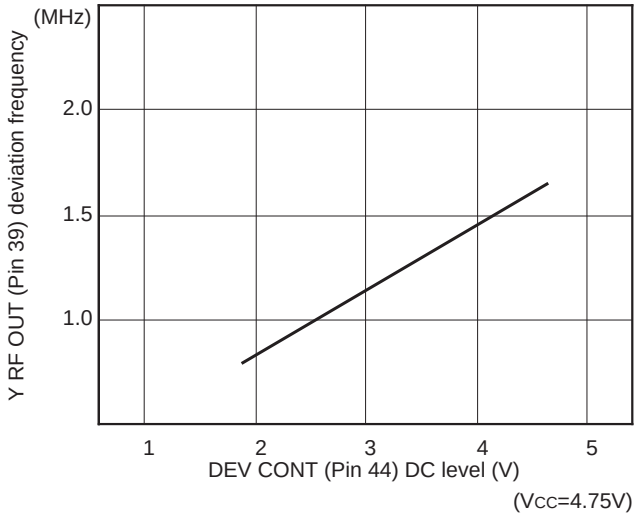
6-2. Deviation frequency adjustment

The standard characteristics of deviation frequency for the DEV CONT (Pin 43) DC bias (1.8V to Vcc) when bias was applied to EMPH IN (Pin 5) with V_{G1} + 0.5V after carrier frequency adjustment are shown below.

(Hi-8 mode)

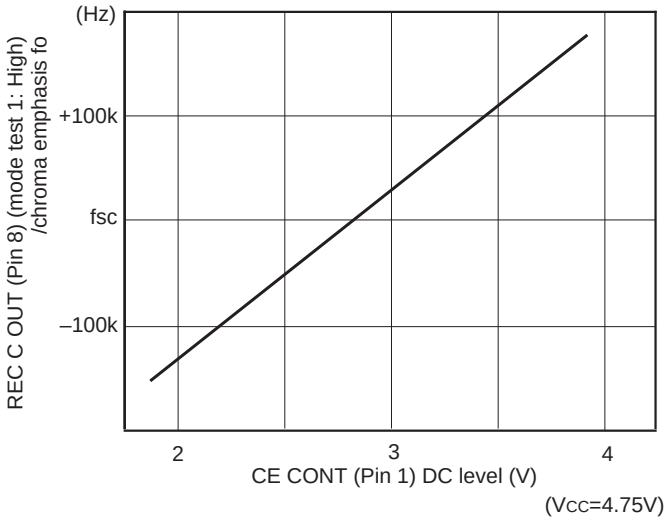


(Standard mode)

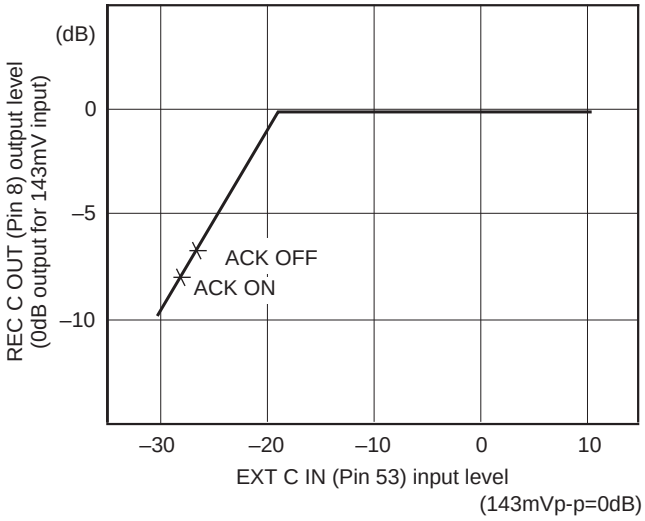


7. Chroma emphasis fo adjustment

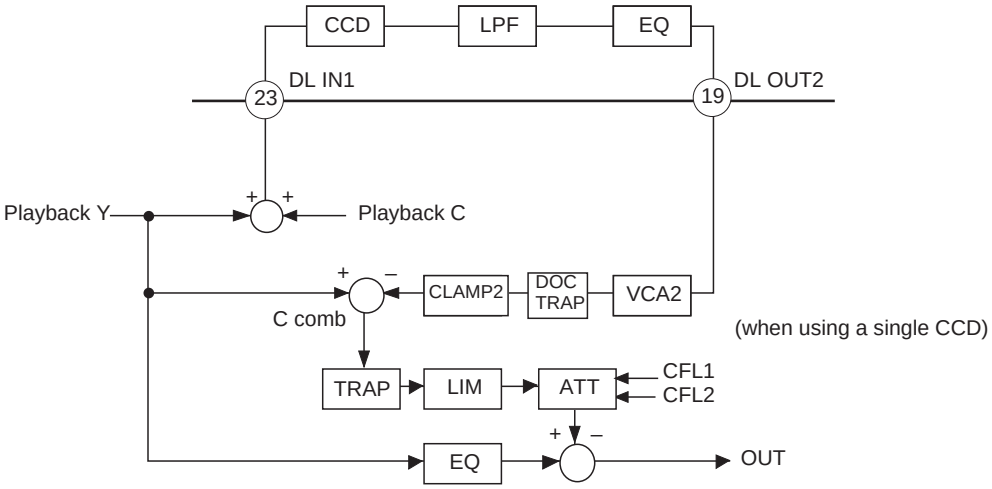
The center frequency of the chroma emphasis characteristics is adjusted by the DC bias (1.8V to 3.8V [Vcc = 4.75V]) applied to CE CONT (Pin 1). The standard characteristics of center frequency for the CE CONT (Pin 1) DC level are shown below.



8. ACC/ACK standard characteristics

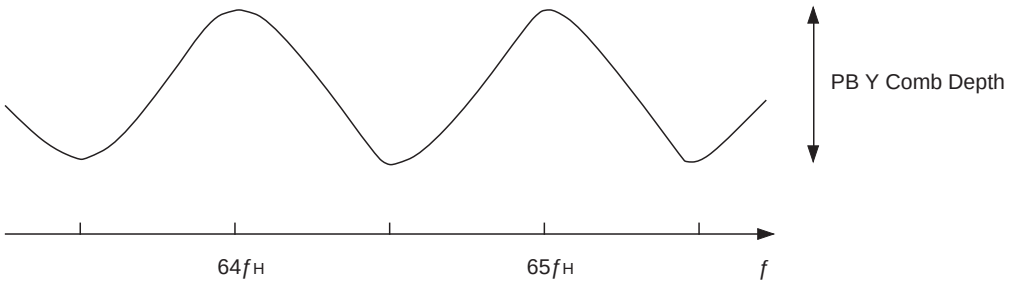


9. Y cross talk cancellation



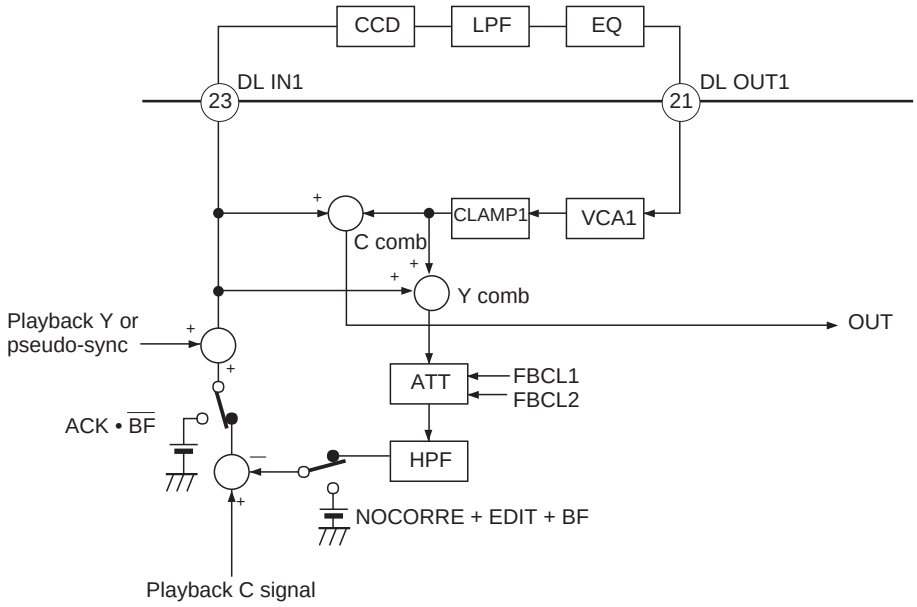
De-emphasized playback Y signal is input to the comb block. By passing the differential component of the nH signal and the (n+1) H signal through the limiter, the cross talk component, which is line noncorrelation, is extracted. Cross talk cancellation is accomplished by subtracting this cross talk component from the nH playback Y signal.

In addition, by switching modes CFL1 and CFL2, the comb depth characteristics of PBY cross talk cancellation can be changed. The standard characteristics of comb depth for low frequency (approximately 1MHz) and insignificant input level (MAIN EMPH TC (Pin 3) 7.9mVp-p = –30dB) input are shown below.

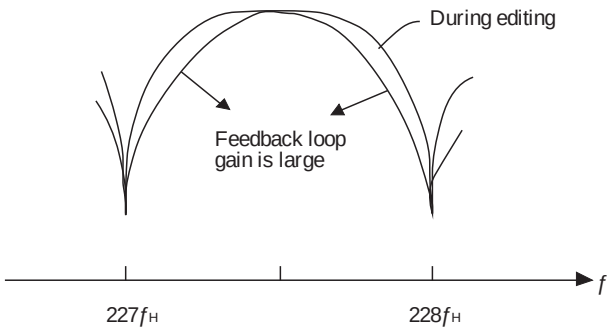


CFL1 / CFL2	High	Low
High	–10dB	–6dB
Low	–1.5dB	0dB

10. PB C cross talk cancellation



The playback C signal which passes through the BPF is input after frequency conversion. The feedback chroma comb filter is configured as shown above.
By switching modes FBCL1 and FBCL2, the feedback loop gain from the Y comb is changed as shown below.



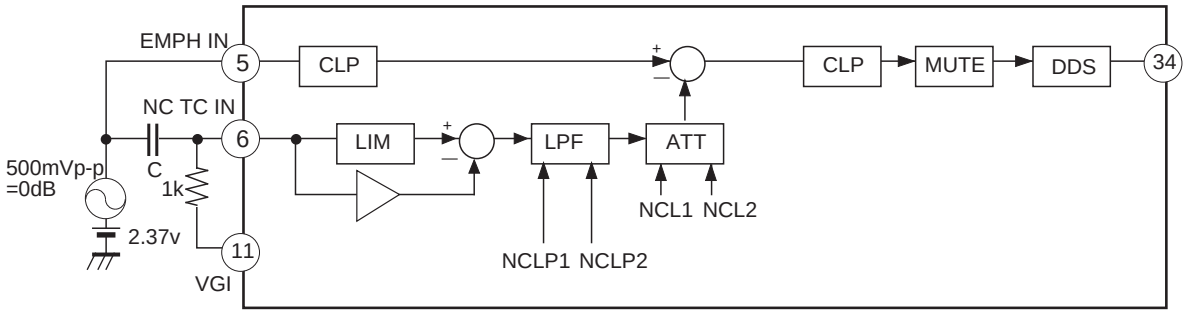
Feedback loop gain

FBCL1 / FBCL2	High	Low
High	6.7dB	4.8dB
Low	1.9dB	0dB

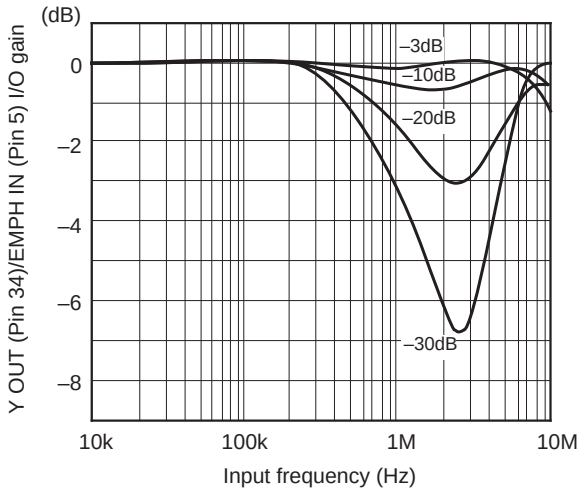
When the feedback loop gain is increased the S/N ratio can be improved, but note that color smear in the vertical direction and transient response are both worsen.

11. PB Y noise cancellation

When an external HPF is configured as shown below, the standard characteristics of PB Y noise cancellation are as shown below, depending on the switching of input signal level, mode NCL1/2, external HPF and mode NCLP1/2.

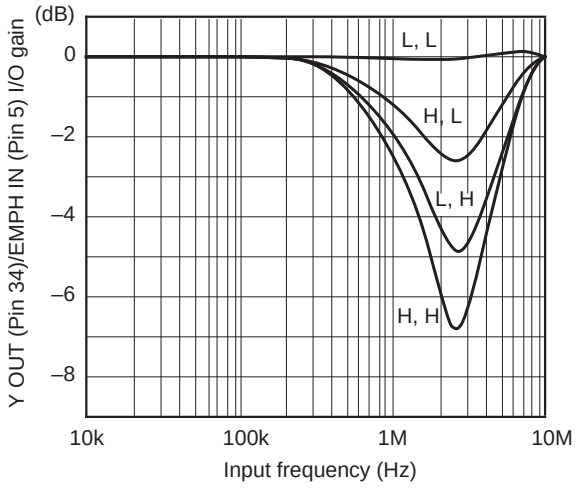


1) Changes in frequency characteristics due to the input level



NCL 1, 2 = H, H
NCLP 1, 2 = H, H
External HPF (1kΩ/82pF)

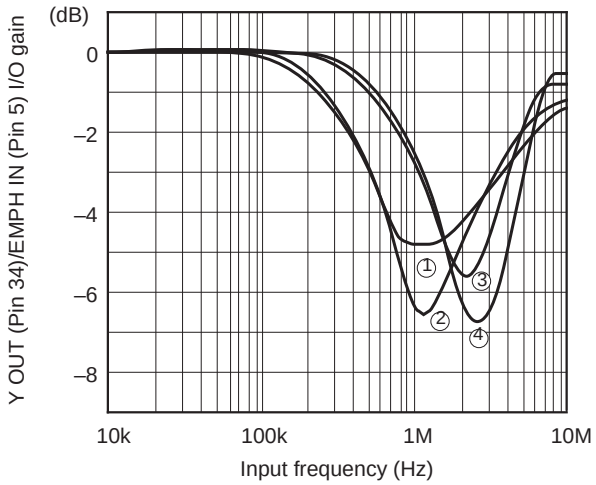
2) Changes in frequency characteristics due to switching of mode NCL1/2



NCLP 1, 2 = H, H

External HPF (1kΩ/82pF)

3) Changes in frequency characteristics due to switching of external HPF and mode NCLP1/2



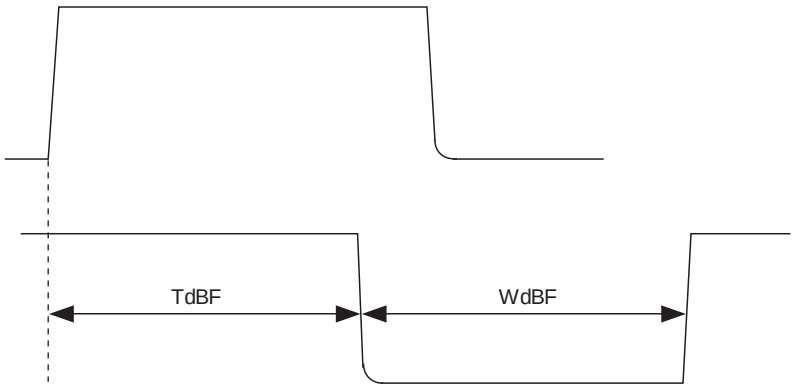
NCL 1, 2 = H, H

The following four conditions are compared:

	NCLP1	NCLP2	External HPF
①	Low	Low	1kΩ/220pF
②	High	Low	1kΩ/220pF
③	Low	High	1kΩ/82pF
④	High	High	1kΩ/82pF

12. BF OUT pulse

The timing for C.SYNC (Pin 24) output pulse and BF VCO (Pin 62) output pulse changes in each mode as shown below. Note that the BPF delay time between C OUT (Pin 63) and C IN (Pin 64) during PAL playback is designed to be 200nsec. In addition, the BF pulse width WdBF is constant.



PB : TdBF (PB)
NTSC • REC : TdBF (PB) + 250nsec
PAL • REC : TdBF (PB) + 390nsec

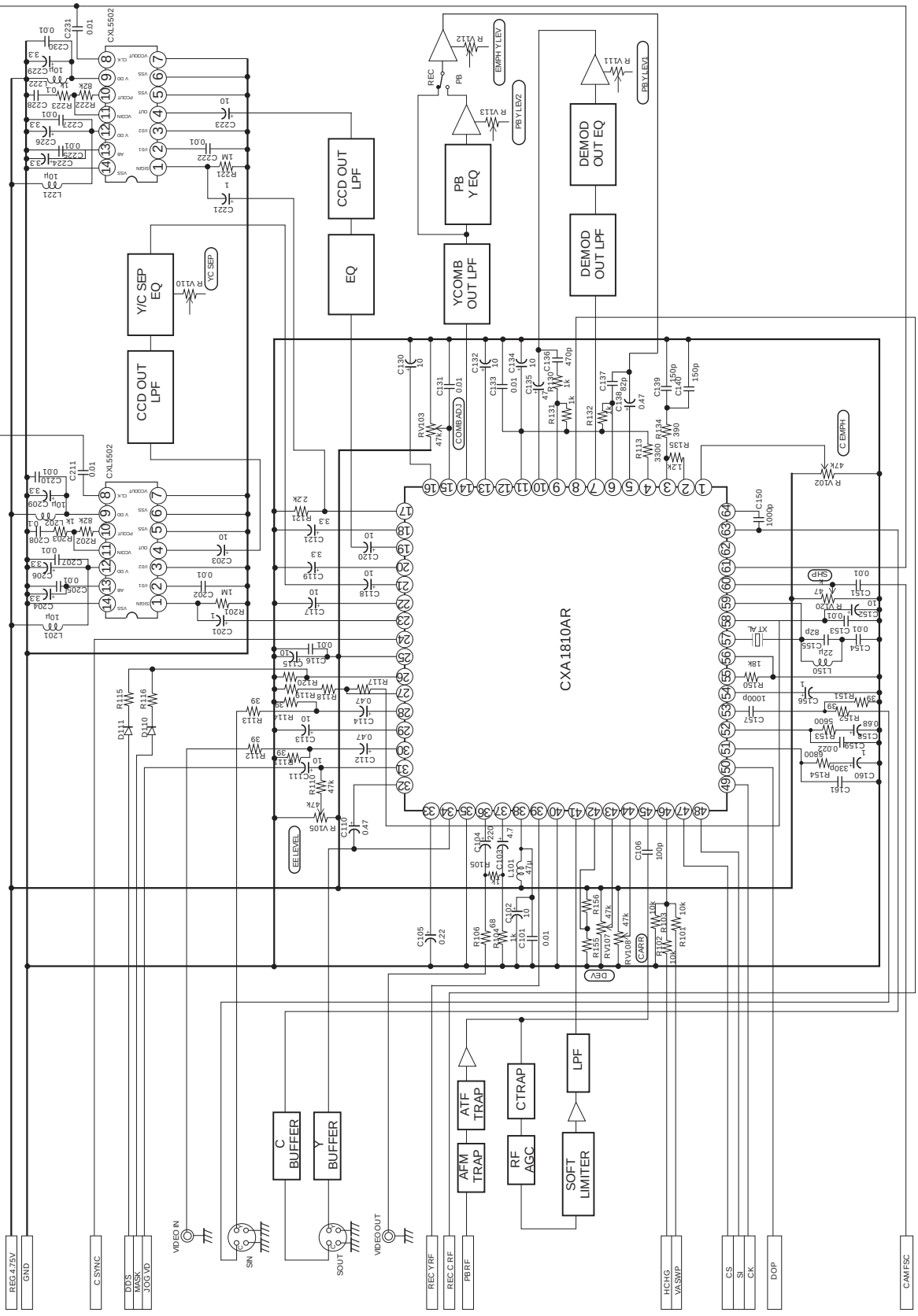
Adjustment Procedure (Refer to Application Circuit.)

1. REC Y level adjustment
   - Mode : REC, 29 video AGC = High
   - Input signal : color bar 500mVp-p (Pin 30 V IN1)
   - Adjustment method : When VIDEO OUT (Pin 36) is terminated with 75Ω, adjust RV105 (EE LEVEL) so that the output is 1Vp-p.
2. Y/C separation adjustment
   - Mode: REC, 5 SHP THRU = High
   - Input signal : color bar 500mVp-p (Pin 30 V IN1)
   - Adjustment method : Adjust RV110 (YC.SEP) → RV103 (COMB.ADJ) → RV110 (YC.SEP) in turn so that the residual chroma component at Y COMB OUT (Pin 14) is minimum.
3. Emphasis input Y level adjustment
   - Mode : REC
   - Input signal : color bar 500mVp-p (Pin 30 V IN1)
   - Adjustment method : Adjust RV112 (EMPH.Y.LEV) so that the Y signal level at EMPH IN (Pin 5) is 500mVp-p.
4. Y-FM carrier deviation adjustment
   - Mode : REC, 22 E = Low (standard mode); E = High (Hi-8 mode)
   - Input signal : 100% white, 500mVp-p (Pin 30 V IN1)
   - Adjustment method : While monitoring the Y RF OUT (Pin 39) signal with a spectrum analyzer, adjust RV108 (CARR) so that the H SYNC spectrum (carrier) is 4.2MHz in standard mode and 5.7MHz in Hi-8 mode, and adjust RV107 (DEV) so that the 100% white Y level spectrum is 5.4MHz in standard mode and 7.7MHz in Hi-8 mode.
5. Chroma emphasis fo adjustment
   - Mode : REC, 2 TEST1 = High
   - Input signal : color bar 500mVp-p (Pin 30 V IN1)
   - Adjustment method : Adjust RV102 (CEMPH) so that the level of the flat portion of the chroma signal after burst emphasis output to REC C OUT (Pin 8) is minimum.
6. PB Y level 1 adjustment
   - Mode : PB, 27 W CCD = Low (when using one CCD delay line)
     W CCD = High (when using two CCD delay lines)
   - Input signals : PB Y RF 200mVp-p (Pin 41 Y RF IN)
   - Adjustment method : Adjust RV111 (PB.Y.LEV1) so that (when using one CCD delay line) DL IN 1 (Pin 23) or (when using two CCD delay lines) DL IN 2 (Pin 17) is 500mVp-p respectively.
7. PB Y level 2 adjustment
   - Mode : PB
   - Input signal : PB Y RF 200mVp-p (Pin 41 Y RF IN)
   - Adjustment method : When VIDEO OUT (Pin 36) is terminated with 75Ω, adjust RV113 (PB.Y.LEV2) so that the output is 1Vp-p.

Note on Operation

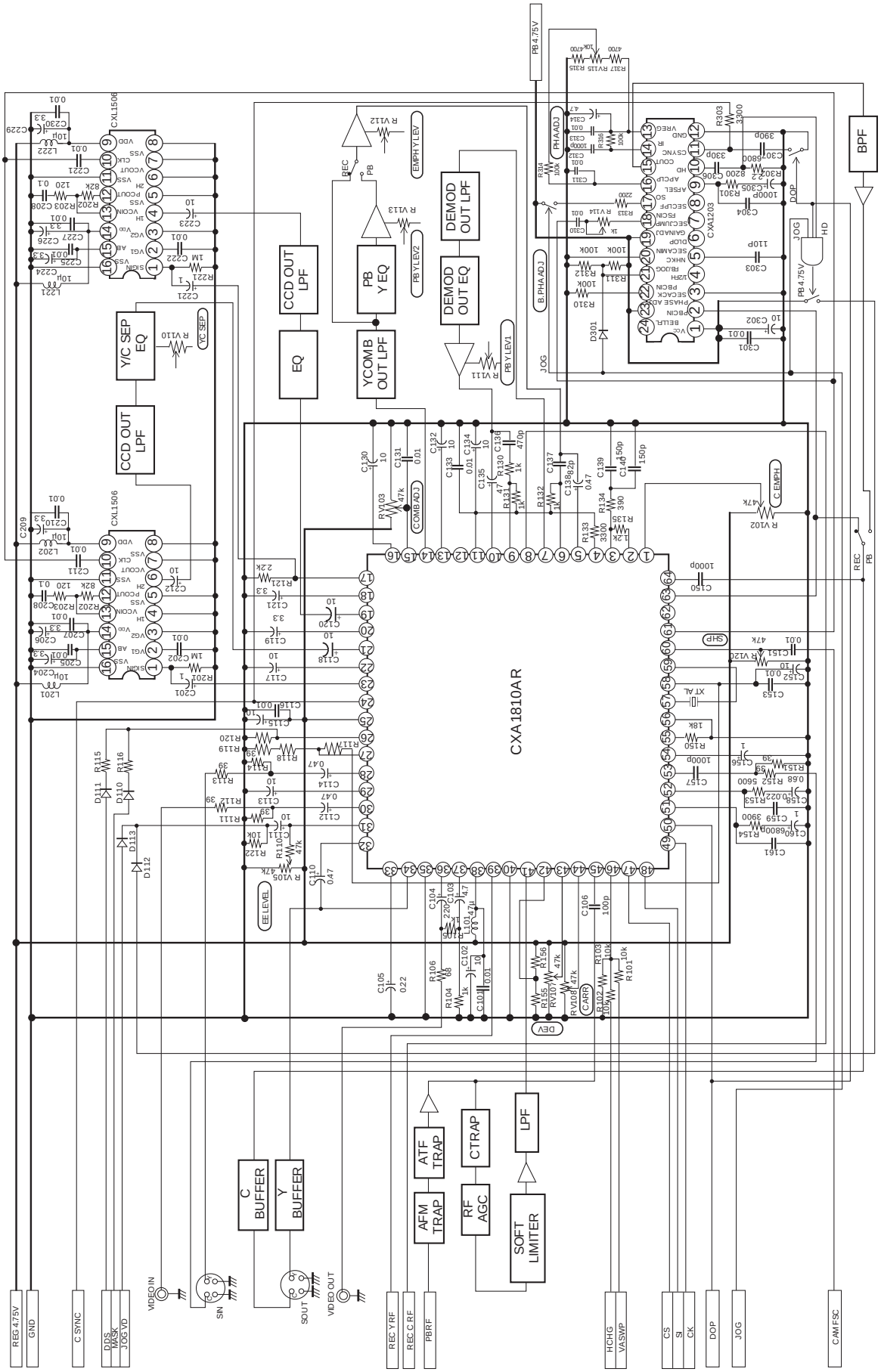
• I REF (Pin 55) resistance 18k determines the reference current. Employ a metallic film resistance and of allowable difference ±1%.

Application Circuit (NTSC Hi-8 mode)



Application circuits shown are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

Application Circuit (PAL Hi-8 mode)

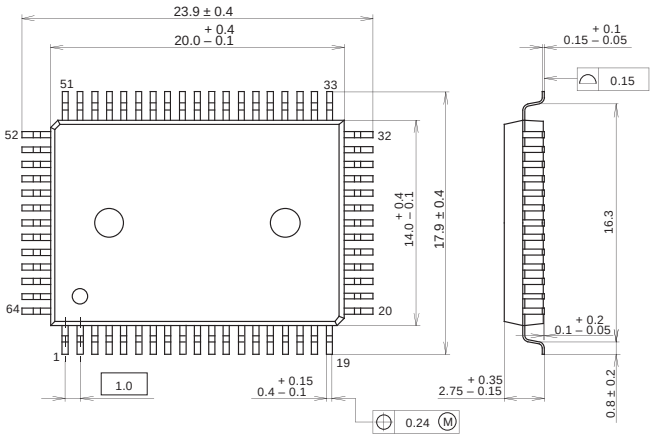


Application circuits shown are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

Package Outline Unit : mm

CXA1810AQ

64PIN QFP(PLASTIC)



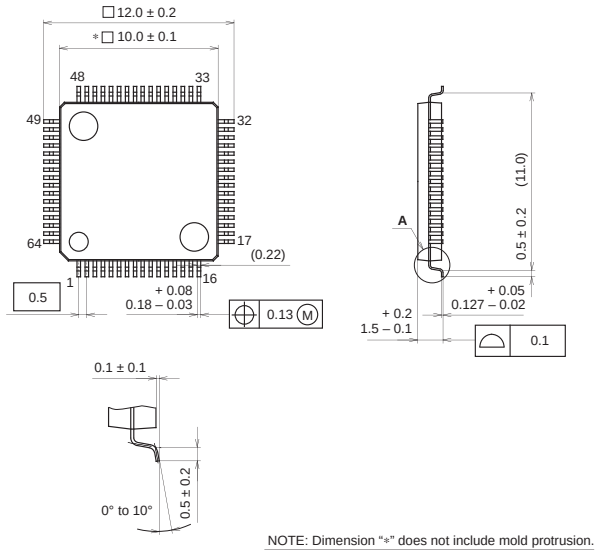
PACKAGE STRUCTURE

SONY CODE	QFP-64P-L01
EIAJ CODE	QFP064-P-1420
JEDEC CODE	————

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER/PALLADIUM PLATING
LEAD MATERIAL	42/COPPER ALLOY
PACKAGE MASS	1.5g

CXA1810AR

64PIN LQFP (PLASTIC)



NOTE: Dimension "*" does not include mold protrusion.

DETAIL **A**

PACKAGE STRUCTURE

SONY CODE	LQFP-64P-L01
EIAJ CODE	LQFP064-P-1010
JEDEC CODE	————

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER/PALLADIUM PLATING
LEAD MATERIAL	42/COPPER ALLOY
PACKAGE MASS	0.3g