

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.
- $\left\{ \begin{array}{l} 140 \text{ mW for composite signal input} \\ 250 \text{ mW for separate signal input} \end{array} \right\}$
- Supports electronic volume (EVR) control.
- Supports BUS LINE.
- Supports NTSC/PAL.

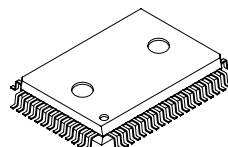
Functions

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

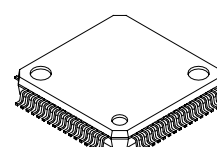
Structure

Bipolar silicon monolithic IC

CXA1810AQ
64 pin QFP (Plastic)



CXA1810AR
64 pin LQFP (Plastic)



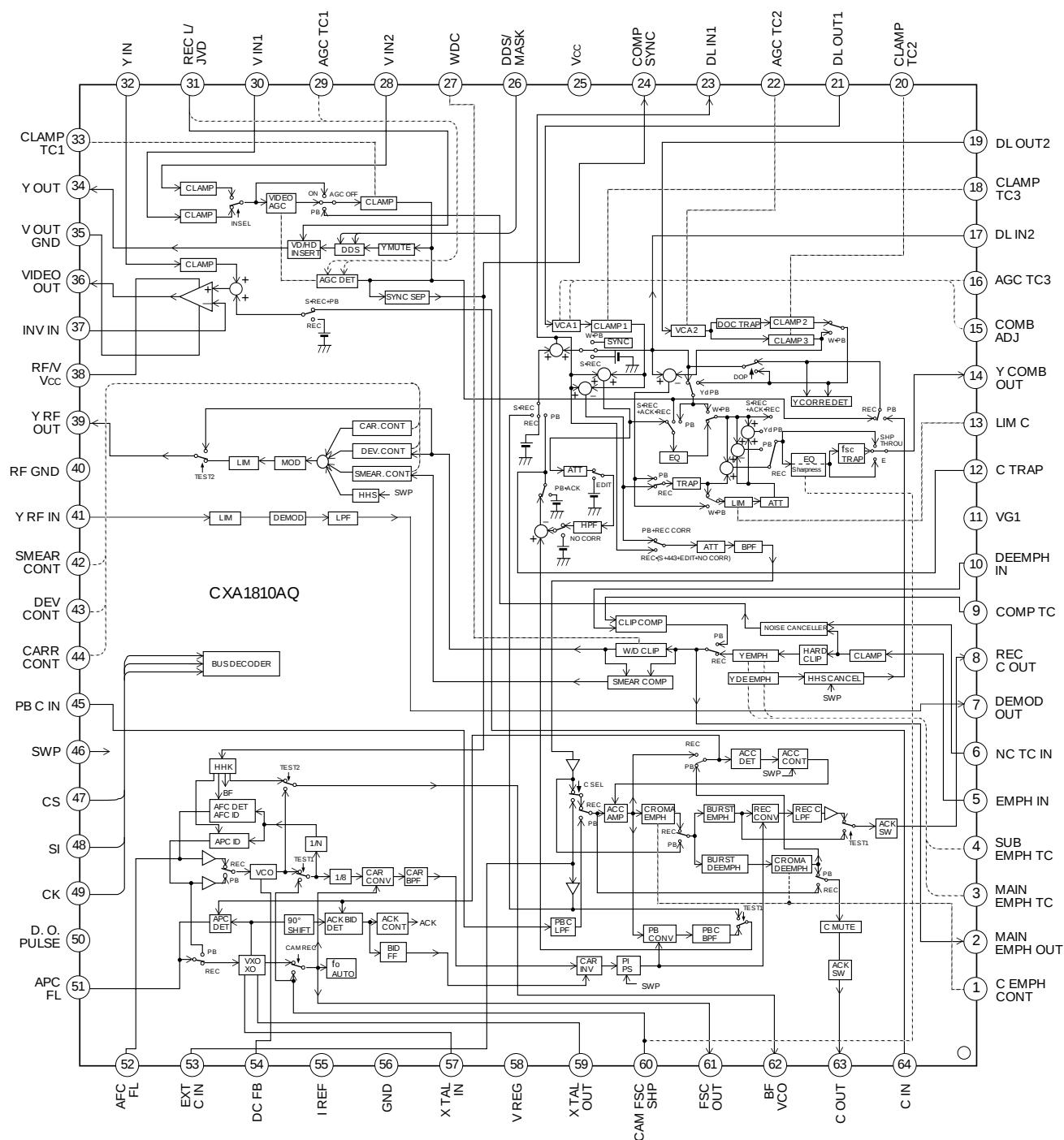
Absolute Maximum Ratings (Ta=25 °C)

• Supply voltage	V _{CC}	7	V
• Operating temperature	T _{opr}	−10 to +75	°C
• Storage temperature	T _{stg}	−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
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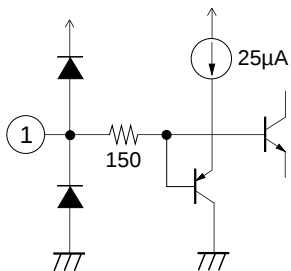
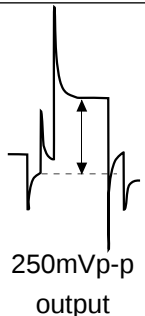
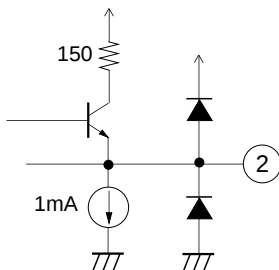
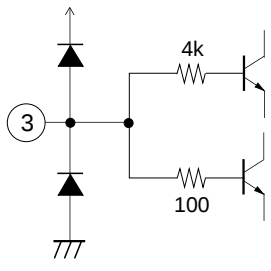
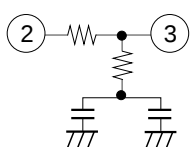
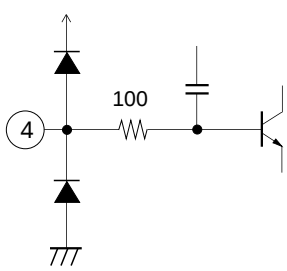
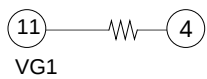
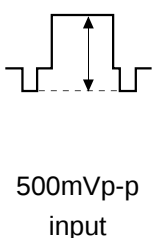
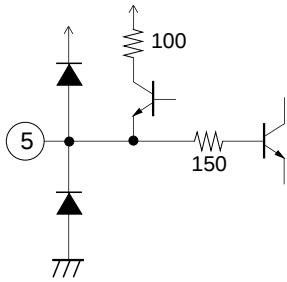
Block Diagram and Pin Configuration (CXA1810AQ)



(CXA1810AR)



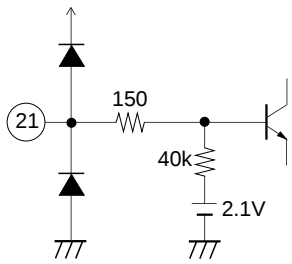
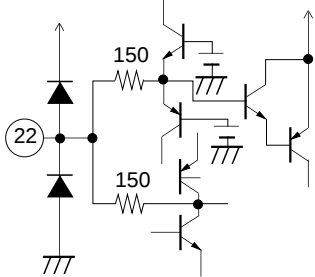
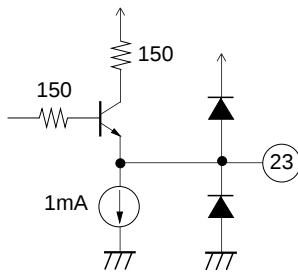
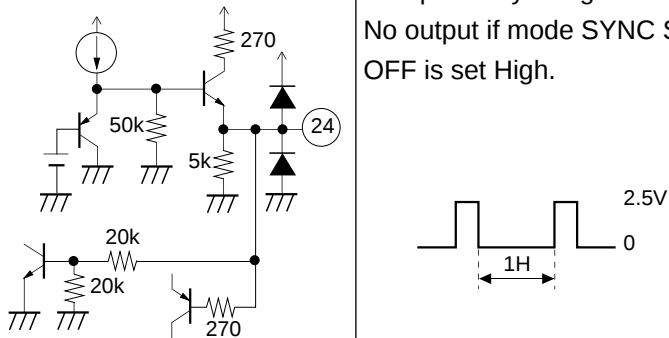
Pin Description

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	DEMODO OUT	1.6V	140mVp-p output during standard playback		Y signal output that has been FM demodulated and has passed through 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 sharpness circuit.
15	COMB ADJ	Control range: 1.8V to Vcc	—		VCA gain adjustment in the comb filter block. (Refer to Adjustment Procedure.)

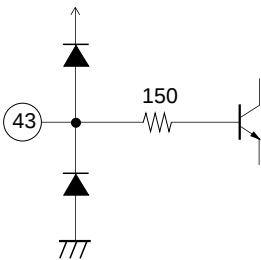
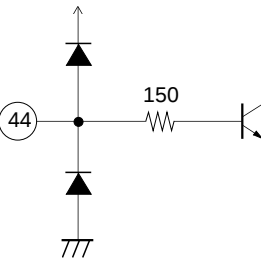
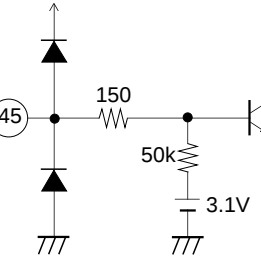
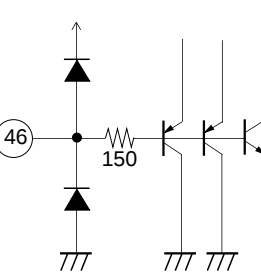
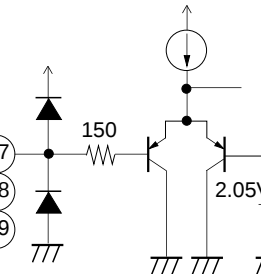
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
16	AGC TC3	2.2V to 4.0V	—		Time constant for VCA circuit in comb filter block. A DC limiter circuit with an upper limit of 4.0V and a lower limit of 2.2V is built in.
17	DL IN2	2.2V (when resistance connected)	Video 500mVp-p output		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.

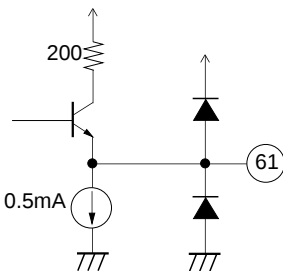
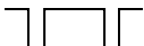
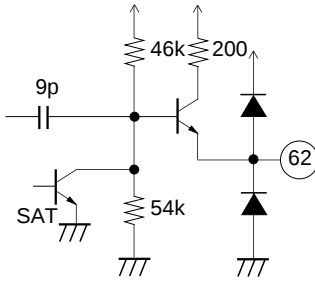
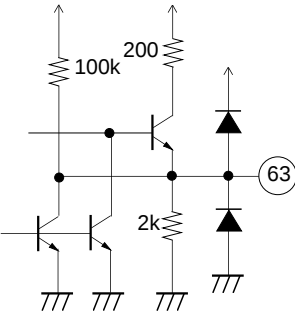
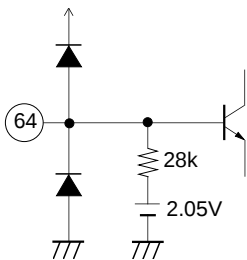
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
30	V IN1	2.05V (sync tip level)	Video 500mVp-p input		Video signal input. Performs diode clamping, with the clamp capacitance externally connected. If the mode MUTE is set High, the charge of the clamp capacitance is discharged.
31	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		Equivalent circuit	Description
		DC	AC		
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.

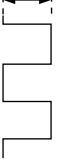
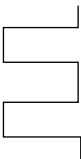
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
55	I REF	1.8V (when resistance connected)	—		External reference current source. Connect external resistance of 18kΩ to GND. Be careful concerning pin cross talk.
56	GND	0V	—		Main block GND.
57	XTAL IN	2.0V	260mVp-p (NTSC) during playback		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 Vcc	—		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 ($V_{CC} = 4.75V$, $T_a = 25^\circ C$, 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 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	I _{REF} =(voltage at Pin 55)/48k			94	100	106 μA	
<Y recording>																
11	SYNC AGC input Low level	V _{AGCL}	e	SG30		—	—	SW30	B	P34	Measures the output SYNC level.				143	mV
12	SYNC AGC input High level	V _{AGCH}	f			—	—								143	mV
13	PEAK AGC	V _{AGCP}	g			—	—				Measures the output amplitude level.				550	mV
																

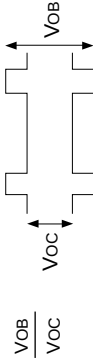
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			Signal	Signal source	Amplitude	Frequency	Voltage source	Voltage				Min.	Typ.	Max.
14	For video AGC off characteristics	Fio1	d	SG30	Sine wave	300kHz	—	—	A	P34	Level ratio between 300kHz sine wave and 5MHz sine wave	-1.5	0	1.5
15	For video AGC on	Fio2			357mVp-p	/5MHz			B			-1.5	0	1.5
16	300kHz gain for TRAP off	Gyc1	d	SG30	Sine wave	300kHz	—	—	G	P14	I/O gain of 300kHz sine wave (Refer to output waveform measurement Nos. 14 and 15.)		-0.3	
17	300kHz gain for TRAP on	Gyc2			357mVp-p	300kHz			C				-0.6	
18	fsc TRAP 3.58MHz gain	Gyc3				3.58MHz					Level ratio between 300kHz sine wave and 3.58MHz sine wave (Refer to output waveform measurement Nos. 14 and 15.)		-23	-14
19	Hard clip amount	K _{H.C}	b	SG5-1	500mVp-p	—	—	—	H	P39	Level ratio of this signal output with 500mVp-p input and with 647mVp-p input		115	
20	White clip amount	K _{w.C}	b	SG5-1	500mVp-p	—	—	—	H	P39			235	
21	Dark clip amount	K _{D.C}											95	
22	-3dB 500kHz	FE11	a	SG5-2	-3dB (354mVp-p)	10kHz/500kHz	—	—	H	P39	Measures the level ratio of each output frequency component.	10.7		11.7
23	-3dB 2MHz	FE12				10kHz/2MHz						11.8		15.8
24	-10dB 2MHz	FE13			-10dB (158mVp-p)							15.0		19.0
25	-20dB 2MHz	FE14			-20dB (50mVp-p)							19.5		25.5

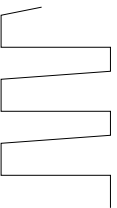
No.	Measurement item	Symbol	Input conditions				Control DC		SW set to ON	Mode conditions	Measurement point	Measurement method	Ratings							
			Signal	Signal source	Amplitude	Frequency	Voltage source	Voltage					Min.	Typ.	Max.	Unit				
26	Hi-8 pre-emphasis	FE21	a	SG5-2	−3dB	10kHz/	—	—	SW5-1	A	P2	Measures the level ratio of each output frequency component. (These emphasis characteristics do not include white/dark clipping.)	2.7		3.3	dB				
		200kHz			200kHz															
27		−3dB			10kHz/	2MHz														
		2MHz																		
28	−10dB	FE23	−10dB	(158mVp-p)	—	—	—	—	A	P39	Measures the output frequency.	4.2	5.2		MHz					
	2MHz	FE24	−20dB																	
29	−20dB		−20dB	(50mVp-p)																
	2MHz																			
30	Output level	V _{MOD}	—	—	—	—	—	—	—	A	P39	 Signal level with 4.2MHz output	440	500	560	mVp-p				
31	Secondary distortion	D _{MOD}											Ratio to secondary higher harmonic components with 4.2M output V (8.4MHz)/V (4.2MHz)	−34			dB			
32	Carrier control	f _{CL MIN}					V44	1.8V				 Measures the output frequency.		3	4.2	MHz				
	minimum frequency (L)																			
33	Carrier control	f _{CL MAX}					V44	4.75V						4.2	5.2		MHz			
	maximum frequency (L)																			
34	Carrier control	f _{CE MIN}					V44	1.8V		I		Measures the output frequency.		4.7	5.7	MHz				
	minimum frequency (E)																			
35	Carrier control	f _{CE MAX}					V44	4.75V						5.7	6.8		MHz			
	maximum frequency (E)																			
36	Deviation control	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				
	minimum frequency (L)					V43	1.8V													
37	Deviation control	f _{DL MAX}					V5-1	V _{G1} +0.5V									5.4	5.9		MHz
	maximum frequency (L)					V43	4.75V													
38	Deviation control	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				
	minimum frequency (E)					V44	Adjusted value													
						V43	1.8V													
						V5-1	V _{G1} +0.5V													
39	Deviation control	f _{DE MAX}					V44	Adjusted value				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.	7.7	8.0		MHz				
	maximum frequency (E)					V43	4.75V													

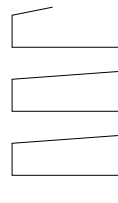
No.	Measurement item	Symbol	Input conditions			Control DC		SW set to ON	Mode conditions	Measurement point	Measurement method	Ratings		
			Signal	Signal source	Amplitude	Frequency	Voltage source	Voltage				Min.	Typ.	Max.
40	Linearity (L)	L _{MODL}	—	—	—	—	V5-1	V _{G1} V _{G1} +0.25V V _{G1} +0.5V	SW5-2	A	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	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
<Y playback>														
42	PB Y comb filter ATT level	K ₀	a	SG3	30mVp-p	300kHz	—	—	SW3-1	J ₁	Measures the I/O gain under all mode conditions.	−7.8	−4.8	−1.8
43		K ₁							SW4	J ₂		−9.3	−6.3	−3.3
44		K ₂								J ₃		−21	−18	−15
45		K ₃								J ₄			−32	
46	HHS canceler	V _{DEHHS}	—	—	—	—	—	—	FW17 SW46-1 ON/OFF	F	DC level difference at P17 (Pin 17 DL IN2) when SW46-1 is turned on and off		1.6	
47	EDIT	F _{SHP0}	a	SG3	175mVp-p	300kHz/ 2.15MHz	—	—	SW3-1 SW4	K	Measures the level ratio of P14 (Pin 14 Y COMB OUT) output between 300kHz input and 2.15MHz input. $\frac{V(2.15\text{MHz})}{V(300\text{kHz})}$		−1.0	
48	MIN	F _{SHP1}					V60	1.8V		F			−10	
49	MAX	F _{SHP2}					V60	4.75V					7	

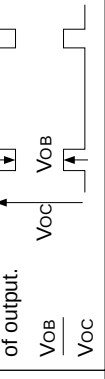
No.	Measurement item		Symbol	Input conditions			Control DC		SW set to ON	Mode conditions	Measurement point	Measurement method	Ratings			Unit										
				Signal source	Amplitude	Frequency	Voltage source	Voltage					Min.	Typ.	Max.											
50	NC1	-3dB	F _{NC10}	a	SG5-2	-3dB	10kHz/	—	SW5-1	L1	P34	Measures the level ratio of each output frequency component. $\frac{V(1\text{MHz})}{V(10\text{kHz})}$	0		dB											
51		1MHz				1MHz																				
52		-20dB				1MHz																				
	1MHz	-20dB																								
53	NC2	-30dB	F _{NC12}		(50mVp-p)	-30dB		SW6	L2							-2.9		dB								
54		1MHz			(15.8mVp-p)		SW24-1																			
55		-30dB				L3														SW33						
	1MHz			L4																						
56	NC5	-30dB	F _{NC5}						L5				-4.6		dB											
	1MHz																									
Noise canceler frequency characteristics																										
57	FM demodulation	Gain (L)	G _{DEM0D1}	a	SG41	200mVp-p	3MHz	—	SW41	F	P7	Calculates the equations at right with the output DC at P7 (Pin 7 DEMOD OUT) for each input frequency.	90	115	140	$\frac{\text{mV}}{\text{MHz}}$										
58		Linearity (L)	L _{DEM0D1}			5MHz	7MHz										$\frac{7-3}{V(7\text{M})-V(3\text{M})}$	0.9	0.96	1.1	—					
59		Gain (E)	G _{DEM0D2}			4MHz	7MHz															$\frac{10-4}{V(10\text{M})-V(4\text{M})}$	50	65	80	$\frac{\text{mV}}{\text{MHz}}$
60		Linearity (E)	L _{DEM0D2}			10MHz																				
61		Carrier leak	C _{LDEM0D}			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	T	P17 P23	Level ratio of P17 (Pin 17 DL IN2) and P23 (Pin 23 DL IN1) between 300kHz input and 3.58MHz input $\frac{V(3.58\text{MHz})}{V(300\text{kHz})}$	-28	-14	dB											

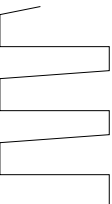
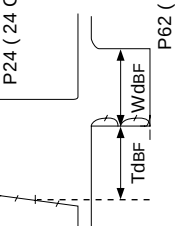
No.	Measurement item	Symbol	Input conditions			Control DC		SW set to ON	Mode conditions	Measurement point	Measurement method	Ratings			
			Signal source	Amplitude	Frequency	Voltage source	Voltage					Min.	Typ.	Max.	Unit
<Y recording/playback>															
63	Standard mode	300kHz gain	SG41	200mVp-p	300kHz	—	SW41	F	P7	(300kHz I/O gain) – (compensation item Gc1)	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
		2.5MHz characteristic			2.5MHz										
		6.12MHz frequency characteristic			6.12MHz										
64	Hi-8 mode	300kHz gain	Refer to Detailed Explanation (1).	300kHz	—	SW41	M	P7	(300kHz I/O gain) – (compensation item Gc1)	Refer to Detailed Explanation of Measurement Method (1) for compensation values Gc1 and Gc2. The amplitude frequency indicated for the input conditions is the value of SG41 in SG41.	–1.5	0	1.5	dB	
4.0MHz frequency characteristic		4.0MHz													
7.8MHz frequency characteristic		7.8MHz													
65	Demodulation LPF frequency characteristics	300kHz gain	SG26	—	—	—	SW26	B	P34	Refer to Detailed Explanation of Measurement Method (2).	Measures the DC level difference with the pedestal level.	–10	15	40	mV
2.5MHz frequency characteristic		SG30													
6.12MHz frequency characteristic		SG30													
66	DSD (Data display system)	VOB	SG30	—	—	—	SW30	B	P34	Refer to Detailed Explanation of Measurement Method (2).	Measures the DC level difference with the sync tip level.	–15	10	35	mV
VOW		SG31													
JOG VD		SG31													
67	Composite sync pulse	High level	h	—	—	—	SW30	B	P24	P24 (24 COMP SYNC)	Measures the DC level difference with the sync tip level.	2.3	2.5	2.7	V
Low level		SG30													
Pulse width		SG30													
68	Video buffer	Delay	SG32	Sine wave	300kHz	—	SW32	A	P36	P34 (34 YOUT)	Measures the I/O gain for a 300kHz sine wave overlapping the Y signal.	0.1	0.35	0.7	μsec
Amplifier gain		SG32													
5MHz frequency characteristic		SG32													

No.	Measurement item	Symbol	Input conditions			Control DC		Measu- re-ment point	Measurement method	Ratings				
			Signal source	Amplitude	Frequency	Voltage source	Voltage			Min.	Typ.	Max.	Unit	
<C recording>														
78	C OUT LEVEL 1 (REC)	G _{COUT1}	d	SG30	Sine wave 314mVp-p	3.58MHz	—	—	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)	G _{COUT2}	a	SG53	314mVp-p	3.58MHz	—	—	O		−1.5	−0.3	1.5	dB
80	ACC AMP	G _{CENACC}	a	SG53	143mVp-p	3.58MHz	—	—	P	Measures the I/O level ratio. ⌈ Until measurement No. 126, input signal 1 from SG24. ⌋	−3.3	−1.3	0.7	dB
81		G _{MAXACC}			10mVp-p						14	18		dB
82		G _{MINACC}			363mVp-p							−9.5	−7	dB
83	Burst emphasis level	BE	a	SG53	143mVp-p	3.58MHz	—	—	P	Measures the level ratio between the output burst interval and the chroma interval. 	5.0	6.0	7.0	dB
84	Chroma emphasis characteristics	V _{CE1}	i	SG53	VC= 314mVp-p	3.58MHz	—	—	P		Measures the output level for the input frequency of the chroma interval. V _{CE1}	200	270	360
85		F _{CE11}				4.08MHz				Measures the ratio between V _{CE1} and the output level for the input frequency of the chroma interval.	−1.4	1.0	2.6	dB
86		F _{CE12}				3.08MHz				−1.4	1.0	2.6	dB	
87		V _{CE2}			VC= 99.3mVp-p	3.58MHz				Measures the output level for the input frequency of the chroma interval. V _{CE2}	60	85	120	mVp-p
88		F _{CE21}				4.08MHz				Measures the ratio between V _{CE2} and the output level for the input frequency of the chroma interval.	1.4	3.0	5.4	dB
89		F _{CE22}				3.08MHz				1.4	3.0	5.4	dB	
90	ACK OFF	V _{ACK OFF}	a	SG53	20mVp-p	3.58MHz	—	—	Q	Measures the output DC level.	1.7	2.0	2.3	V
91	ACK ON	V _{ACK ON}			2mVp-p								80	200

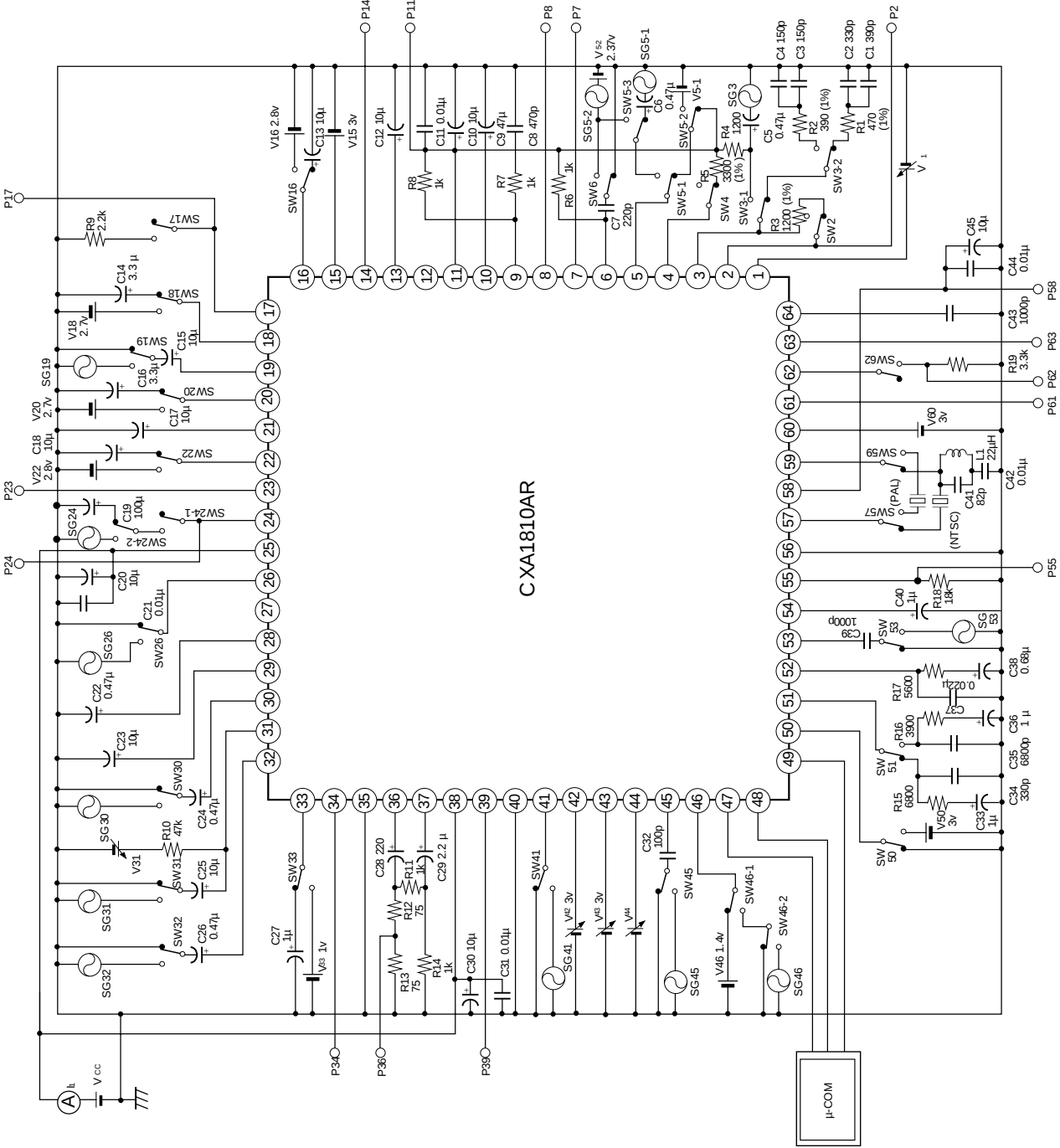
No.	Measurement item	Symbol	Input conditions				Control DC		SW set to ON	Mode conditions	Measurement point	Measurement method	Ratings			Unit	
			Signal source	Amplitude	Frequency	Voltage source	Voltage	Min.					Typ.	Max.			
92	REC C RF LEVEL	VRECC	i	SG53	VC=314mVp-p	3.58MHz	—	—	SW24-1	Q	P8	Measures the output level of the chroma interval. VRECC	210	300	420	mVp-p	
93	REC chroma band 1 (–750kHz)	FRECC1				2.83MHz			SW24-2			Measures the ratio between VRECC 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)	FRECC2				3.28MHz			SW53					–2.0		dB	
95	REC chroma band 3 (+300kHz)	FRECC3				3.88MHz								2.5		dB	
96	REC chroma band 4 (+650kHz)	FRECC4				4.23MHz								–1.0		dB	
97	REC APC pull-in range (NTSC)	fAPCRN+	a	SG53	143mVp-p	3.58MHz +Δf/Hz	—	—	SW24-1	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	fAPCRN–			3.58MHz –Δf/Hz			SW24-2			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)	fAPCRP+	j			4.43MHz +Δf/Hz			SW24-1	R		Upper input frequency pulled in within 2 seconds by the SG53 input frequency (4.43MHz + 1kHz).	200			Hz	
100		Lower pull-in range	fAPCRP–			4.43MHz –Δf/Hz			SW24-2			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)	fAFCN+	l	SG24	—	16.206kHz (+3%)	—	—	SW24-1	S1→S2	P62	Measures the output frequency 1 second later after switching the mode conditions. 	6125979			Hz	
102		Lower pull-in range	fAFCN–			15.262kHz (–3%)			SW24-2					5769126			Hz
103	REC AFC pull-in range (PAL)	fAFCP+			16.094kHz (+3%)			SW62	S3→S4					6035156			Hz
104		Lower pull-in range	fAFCP–			15.156kHz (–3%)									5683594		



No.	Measurement item	Symbol	Input conditions			Control DC		SW set to ON	Mode conditions	Measurement point	Measurement method	Ratings			Unit
			Signal source	Amplitude	Frequency	Voltage source	Voltage					Min.	Typ.	Max.	
<C playback>															
105	PB C OUT level	V _{PBCO}	n	SG45	VC= 200mVp-p	743kHz	—	—	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					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					The output frequencies of 743kHz + Δf kHz are converted to 3.58MHz–Δf kHz for frequency conversion.		–0.5		dB
108	PB chroma band 3 (+300kHz)	F _{PBC3}				1043kHz							–2.3		dB
109	PB chroma band 4 (+1.2MHz)	F _{PBC4}				1.9MHz							–40		dB
110	Gain difference between channels 1-2	ΔG _{CH12}	a/k	SG45	200mVp-p	743kHz	—	—	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}										–0.5	0	0.5	dB
112	Gain difference between channels 1-4	ΔG _{CH14}	o	SG46	1.4Vo-p	50Hz						–0.5	0	0.5	dB
113	High-speed ACC compression ratio	F _{ACC}	m	SG53	—	—	—	—	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	—	—	T	P63	Measures the level ratio between the burst interval and the chroma interval of output. 	–5.5	–4.5	–3.5	dB
115	Frequency deviation	Δf _{XON}	—	—	—	—	—	—	F	P61	Difference between output frequency and f _{SCN} =3579545Hz. Δf _{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		
			Signal	Signal source	Amplitude	Frequency	Voltage source	Voltage				Min.	Typ.	Max
118	Frequency deviation	Δf_{XOP}	—	—	—	—	—	—	F	P61	Difference between output frequency and $f_{SCP} = 4433619\text{Hz}$. $\Delta f_{XOP} = f_{XOP} - f_{SCP}$	—50	—	50
119	Output level	V_{XOP}	—	—	—	—	—	—	—	—	Measures the output level.	—	—	—
120	Secondary distortion	HD2XOP	—	—	—	—	—	—	—	—	Ratio with secondary higher harmonic component V (8.86MHz)/ V (4.43MHz)	320	460	650
121	PB APC pull-in range (NTSC)	f_{APCN+}	a	SG45	200mVp-p	765.747kHz (+3%)	—	—	$V_1 \rightarrow V_2$	P62	Measures the output frequency 1 second later after switching the mode conditions. 	6125979	—	—
122		f_{APCN-}	I	SG24	—	16.206kHz (+3%)	—	—	—	—		—	5769126	—
123	PB APC pull-in range (PAL)	f_{APCP+}	a	SG45	200mVp-p	754.395kHz (+3%)	—	—	$V_3 \rightarrow V_4$	—		—	6035156	—
124		f_{APCP-}	I	SG24	—	16.094kHz (+3%)	—	—	—	—		—	5683594	—
125	Delay	T_{dBF}	b	SG5-1	—	—	—	—	F	P62		3.5	4.1	4.7
126	Pulse width	W_{dBF}	—	—	—	—	—	—	—	—		3.3	4.3	5.3

Electrical Characteristics Measurement Circuit



Input Signal

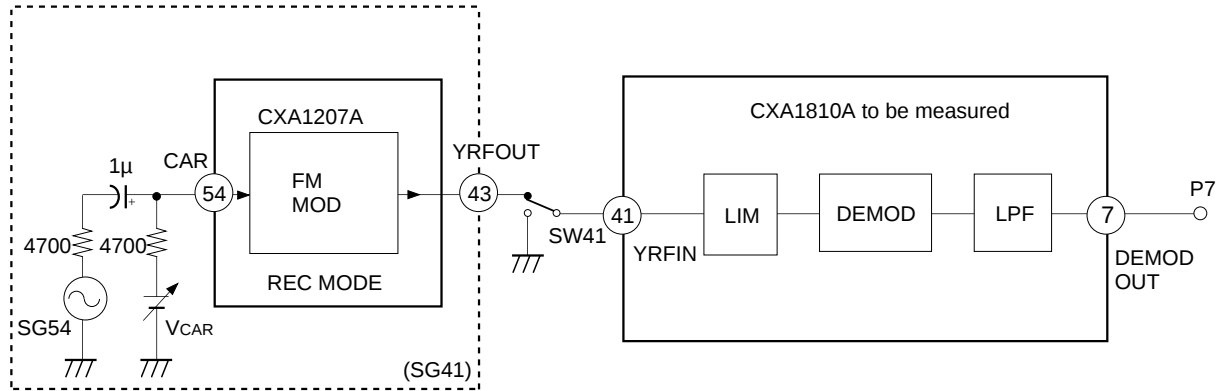
Signal	Input signal waveform	Signal source
a		SG3 SG5-2 SG19 SG41 SG45 SG53
b		SG5-1
c		SG5-1
d		SG30 SG32
e		SG30
f		SG30
g		SG30
h		SG30

Signal	Input signal waveform	Signal source
i		SG53
j		SG53
k		SG45
l		SG24
m		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 VCAR so that the Y RF OUT (Pin 43) output frequency of the CXA1207A is 5MHz. Use VCARO for the VCAR voltage. Next, apply VCARO + 500mV, measure the Y RF OUT (Pin 43) output frequency f_o of the CXA1207A, and then calculate the MOD gain using the following equation.

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

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

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

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

Next, in order to set the SG41 carrier frequency, adjust VCAR 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 GLPF10 and for Hi-8 mode GLPF20.

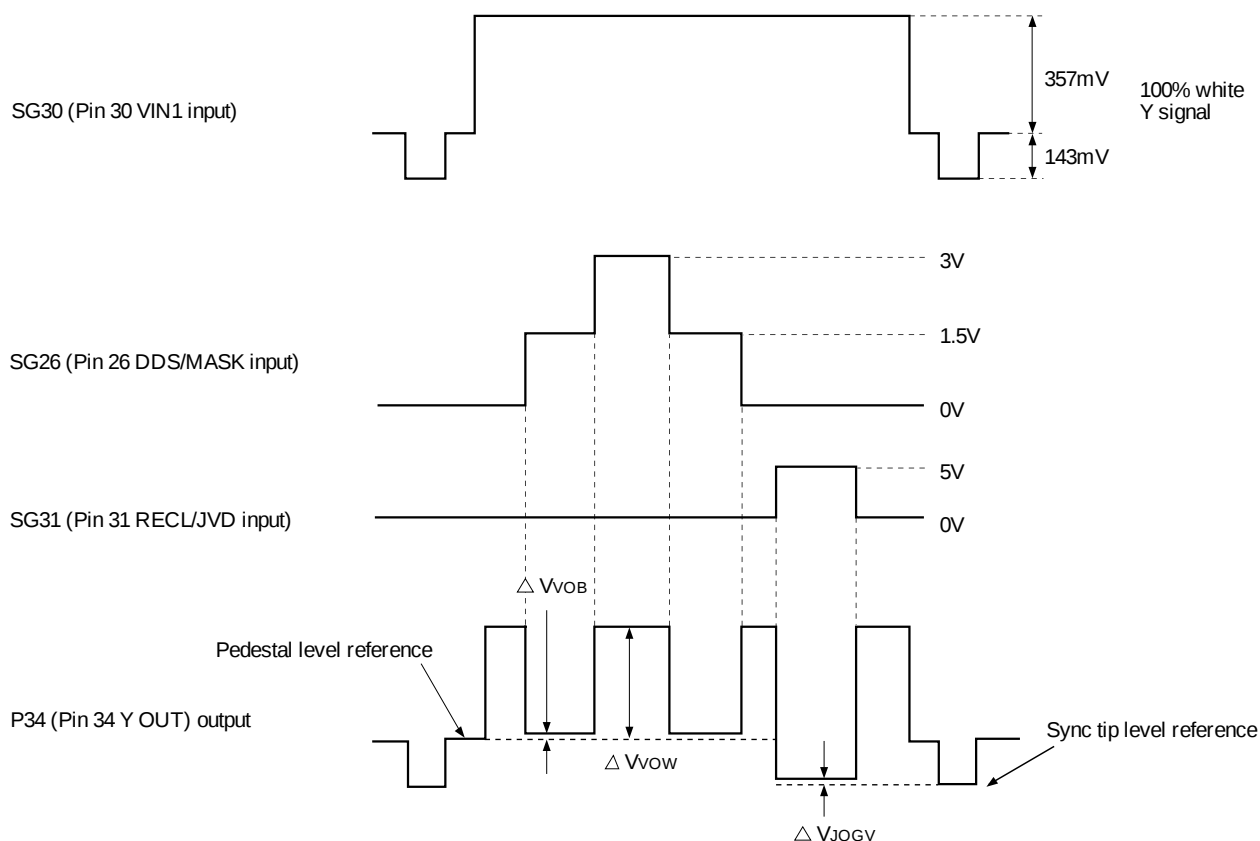
Using these measured values and compensation values, the low frequency gain for DEMOD LPF is determined using the following equations:

Standard mode : $GLPF11 = GLPF10 - G_{C1} \text{ (dB)}$

Hi-8 mode : $GLPF21 = GLPF20 - G_{C2} \text{ (dB)}$

(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

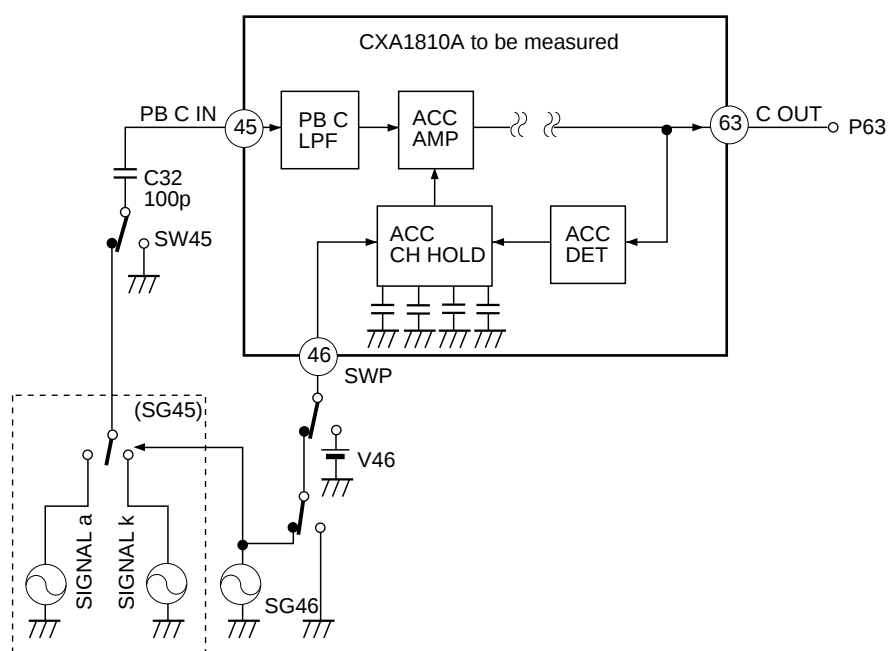
The ACC amplifier in the CXA1810A has a built-in 4-channel time constants, and those time constants can be switched by SWP (Pin 46) input. In addition, in NTSC playback chroma signal processing, PI return occurs in the SWP (Pin 46) input for Low interval. In this measurement, the signal k, that is phase-inverted 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:

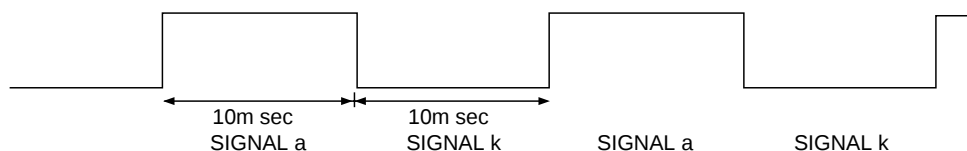
$$\Delta GCH12 = \frac{V_2}{V_1}$$

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

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



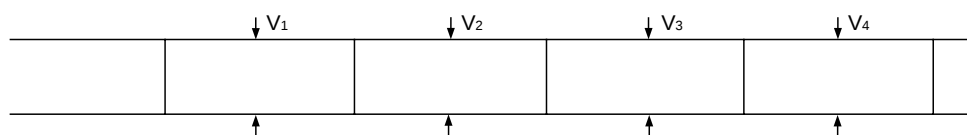
SG46 (Pin 46 SWP input)



SG45 (Pin 45 PB C IN input)
200mVp-p/743kHz



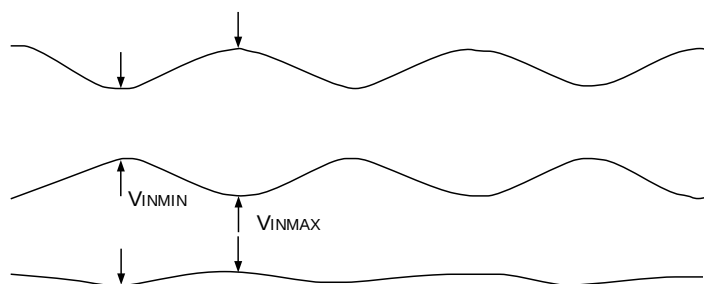
P63 (Pin 63 C OUT output)



(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.

SG53 (Pin 53 EXT CIN input)



P8 (Pin 8 REC C OUT output)



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

(*Blanks indicate Low)

BUS DECODER Mode Condition Table for Measuring Electrical Characteristics

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																												H				Composite REC (Video AGC OFF)	
B																														H		Composite REC (Video AGC ON)	
C																														H		Separate REC	
D														H																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																							Y pre-emphasis characteristics	
I	H																					H										Hi-8 modulator characteristics	
J1					H										H					H										H		PB Y comb filter ATT level	
J2																																	
J3																																	
J4																																	
K																																	
L1																																	PB sharpness characteristics
L2																									H						H		Noise canceler frequency characteristics
L3																																	
L4																																	
L5																																	
M																																	
N																																	
O																																	Hi-8 demodulation characteristics
P																																	C OUT level (REC)
Q																																	C OUT level (S/REC)
R																																	ACC, BE, CE characteristics
S1																																	REC C measurement (NTSC)
S2																																	REC C measurement (PAL)
S3																																	REC AFC pull-in range (NTSC)
S4																																	REC AFC pull-in range (PAL)
T																																	PB C system measurement
U																																	High-speed ACC compression ratio
V1																																	PB APC pull-in range (NTSC)
V2																																	
V3																																	PB APC pull-in range (PAL)
V4																																	

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

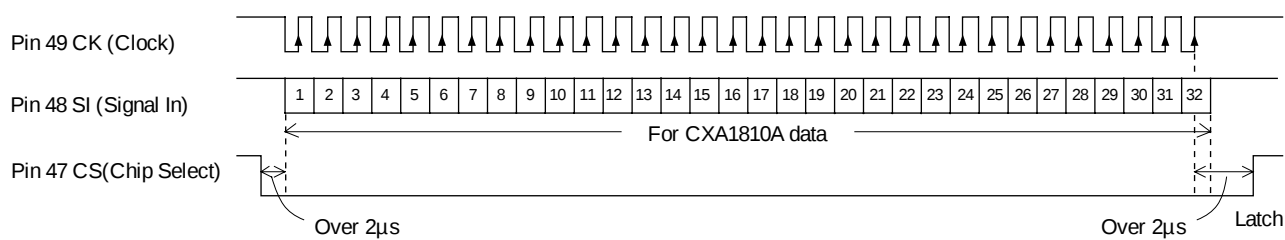
bit No.	Mode	Content		bit No.	Mode	Content										
1	TEST2	H	TEST2 mode 1) Outputs VCO OUT signal to BF VCO (Pin 62). 2) Outputs white/dark-clipped Y signal to Y REF OUT (Pin 39).	9	DC 2 (Dark Clip)	The dark clipping level is switched as shown below. (when white clipping is 235% and WDC (Pin 27) is left open) <table><tr><td>DC 1 DC 2</td><td>High</td><td>Low</td></tr><tr><td>High</td><td>85</td><td>95</td></tr><tr><td>Low</td><td>105</td><td>115</td></tr></table> (Unit : %) Switches the amount of the dark clipping level offset to the white clipping level, which can be varied in steps of 10%.		DC 1 DC 2	High	Low	High	85	95	Low	105	115
		DC 1 DC 2	High	Low												
High	85	95														
Low	105	115														
L	Normal	10	DC 1													
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.	11	C MUTE	H	Disables MUTE for the chroma signal by the MASK signal.									
		L	Normal		OFF	L	Mutes the chroma signal by the MASK signal.									
3	SYNC OFF	H	Sync separation does not operate. (External input to COMP SYNC (Pin 24) is possible).	12	PAL	H	PAL (chroma function)									
		L	Normal	13	CAM REC	L	NTSC									
4	CORRE H	H	Fixes the correlation pulse High so that there is always correlation.			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	Detects correlation.					L	Normal							
5	SHP THRU	H	Sharpness block through (does not pass through fsc Trap, Sharpness, LPF and EQ)	14	PS (Power Save)			H	1) $\overline{S} \cdot PS$ (31.S=Low) Changes to power saving mode with composite input. Power consumption: 140mW (Vcc=4.75V) 2) $S \cdot PS$ (31.S=High) Changes to power saving mode with separate input. Power consumption: 250mW (Vcc=4.75V)							
		L	Normal			L	Normal									
6	ACK OFF	H	ACK SW does not operate according to ACK DET; always fixed to color mode.			15	Yd			H	Performs Yd playback during playback.					
		L	ACK operation is performed according to ACK DET.	L	Normal											
7	F.B.C. L2 (Feedback Comb)	Switches the feedback amount of the FBC (feedback comb). * Refer to Table 1.		L				L	Normal							
8	C SEL	H	During recording, the signal input to EXT C IN (Pin 53) is input directly to the ACC amplifier.							L	Normal					
		L	Normal													

bit No.	Mode	Content	bit No.	Mode	Content														
16	NCLP2	During playback, switches the noise canceler characteristics.	29	Video AGC	H Video AGC on														
17	NCLP1				L Video AGC off														
18	NCL2		30	INSEL (INput SElection)	H Selects VIN2 (Pin 28) input.														
19	NCL1				L Selects VIN1 (Pin 30) input.														
20	CFL2	The typical value of PB Y comb filter depth is switched as shown below. (Low frequency: insignificant level input)	31	S	H For separate signals during recording.														
21	CFL1				<table><tr><td>CFL1 CFL2</td><td>High</td><td>Low</td></tr><tr><td>High</td><td>−10dB</td><td>−6dB</td></tr><tr><td>Low</td><td>−1.5dB</td><td>0dB</td></tr></table>	CFL1 CFL2	High	Low	High	−10dB	−6dB	Low	−1.5dB	0dB	L For composite signals during recording.				
		CFL1 CFL2	High	Low															
		High	−10dB	−6dB															
Low	−1.5dB	0dB																	
22	E	H	Hi-8 mode	32	PB	H Playback mode													
L		Standard mode	L Recording mode																
23	F.B.C. L1	Switches the feedback amount of the chroma feedback comb. * Refer to Table 1.	Table 1. Chroma Feedback Comb Loop Gain <table><tr><td colspan="2" rowspan="2"></td><td colspan="2">F.B.C.L1</td></tr><tr><td>Low</td><td>High</td></tr><tr><td rowspan="2">F.B.C. L2</td><td>Low</td><td>0dB</td><td>+1.9dB</td></tr><tr><td>High</td><td>+4.8dB</td><td>+6.7dB</td></tr></table>						F.B.C.L1		Low	High	F.B.C. L2	Low	0dB	+1.9dB	High	+4.8dB	+6.7dB
		F.B.C.L1																	
		Low					High												
F.B.C. L2	Low	0dB					+1.9dB												
	High	+4.8dB					+6.7dB												
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																

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	VB-H	2.0			V
Input low level for Pins 47, 48, and 49	VB-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	*
VCR			Standard	L	L	L	L		L	*	L			L	L	H	L	L	*
	EDIT SEARCH		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	
	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	
				LP	L	L	L		L		*	*	*	L	L	L	L	L	
		Standard		SP	L	L	L		L		*	*	*	L	L	L	L	L	
				LP	L	L	L		L		*	*	*	L	L	L	L	L	
		EDIT	Hi-8	SP	L	L	L		L	*	*	*	*	L	L	L	L	L	
				LP	L	L	L		L	*	*	*	*	L	L	L	L	L	
		Standard		SP	L	L	L		L	*	*	*	*	L	L	L	L	L	
				LP	L	L	L		L	*	*	*	*	L	L	L	L	L	

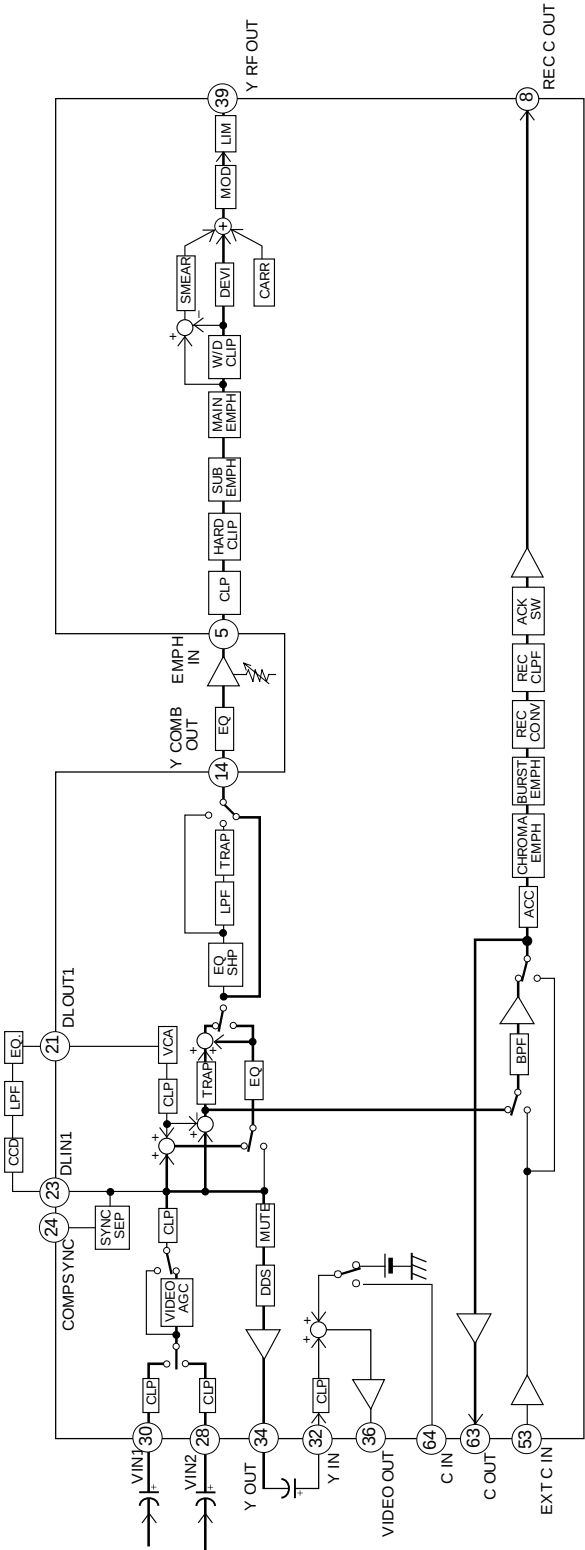
Note) “*” Don't care. In addition, select for the blank SHP THRU/W CCD column based on the system configuration; for other blanks according to the characteristics.

				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
VCR			Standard	*	*	*	*	*	L	*	L	L	L	*	L	H	H	H	L
	EDIT SEARCH		Hi-8						H	*	H	H	L	H	L	*	*	*	H
			Standard						L	*	H	H	L		L	*	*	*	H
	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, is passed through a LPF and then output from REC C OUT (Pin 8).



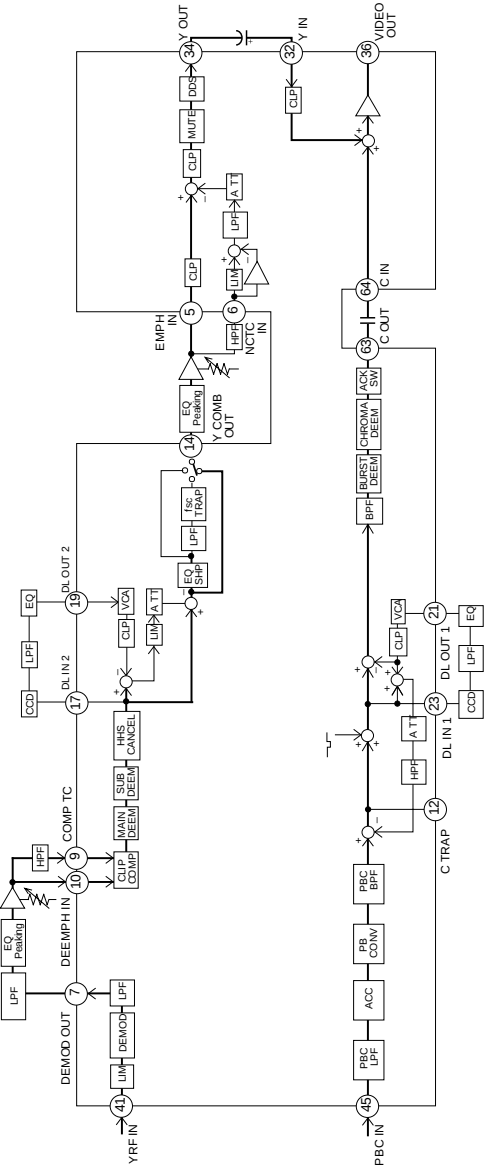
Pin No.	28	30	34	32	23	21	36	14	5	63	8
Signal waveform											
	0.5Vp-p	0.5Vp-p	2.0Vp-p	0.5Vp-p	0.5Vp-p	0.32Vp-p	0.3Vp-p				

2. Signal path during playback (W CCD)

The playback Y RF signal, after having passed through 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).

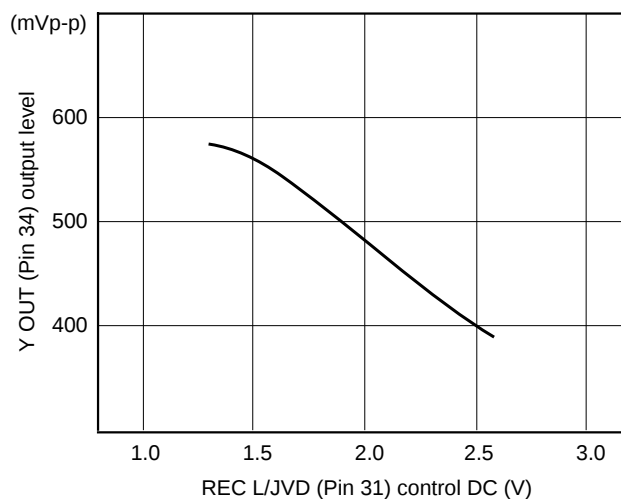
By inputting the playback Y signal (Y OUT (Pin 34) output) to Y IN (Pin 32) and the playback C signal (C OUT (Pin 63) output) to C IN (Pin 64), the Y/C mixed signal is output from VIDEO OUT (Pin 36).



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

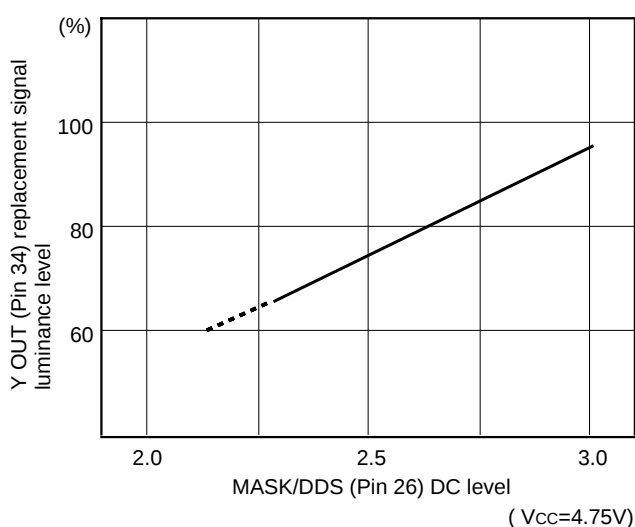
3. REC LEVEL adjustment

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 [$V_{CC} = 4.75V$]) to RECL/JVD (Pin 31). In the case of 100% white, 500mVp-p input, the following are the standard characteristics.



4. MASK DDS

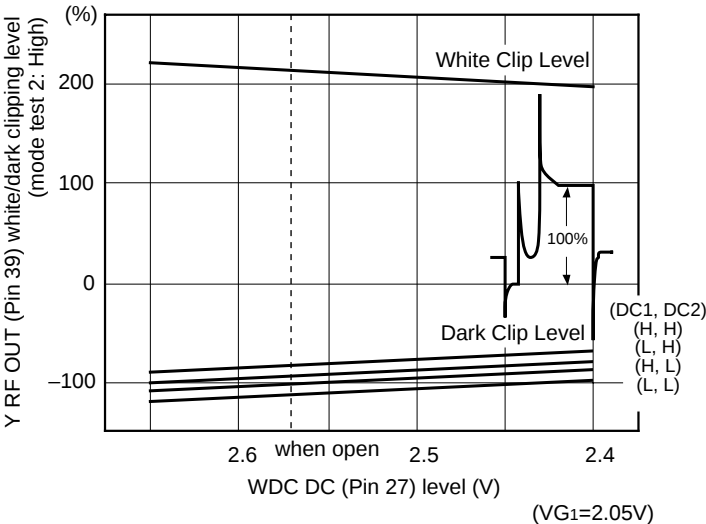
DDS/MASK (Pin 26) is the VOW (character level) signal and the VOB (character background) and masking timing pulse input pin. The threshold value for raw signal and VOB/masking is 1.1V, and the threshold value for VOB/masking and VOW is 2.0V (when $V_{CC} = 4.75V$). In addition, the VOW replacement signal 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.



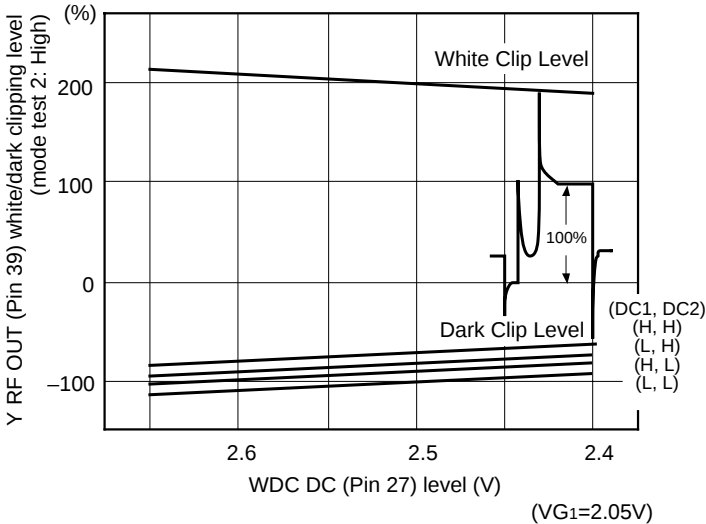
5. White/dark clipping adjustment

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)

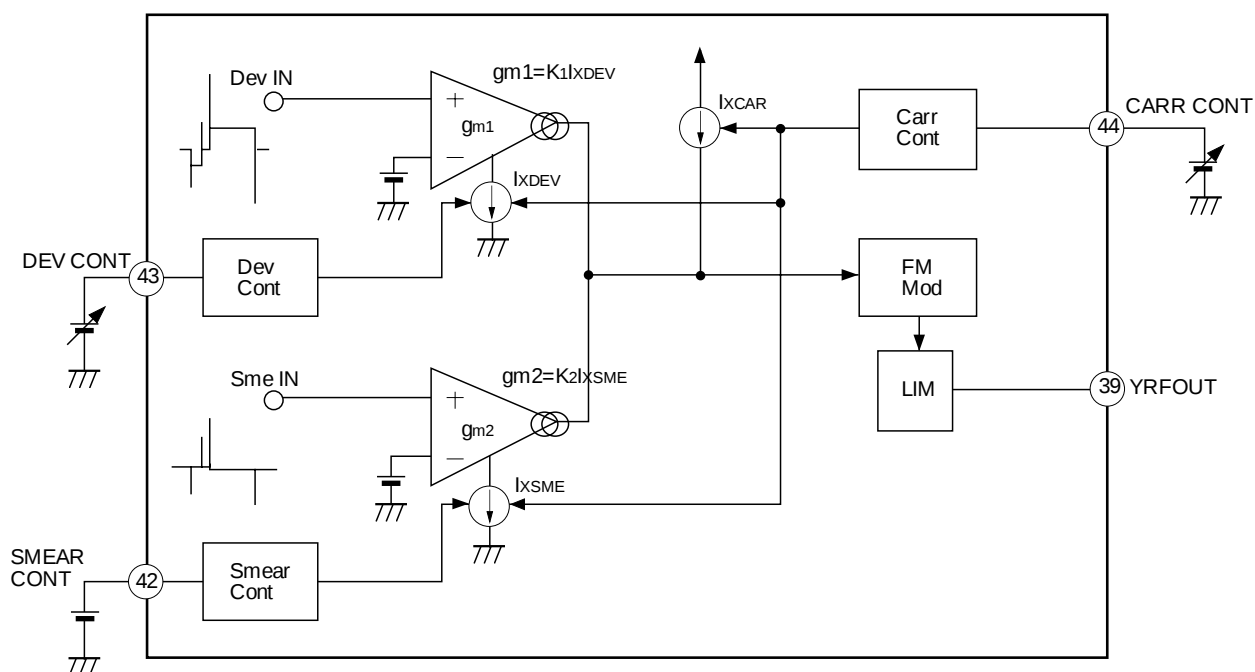
1) Standard mode



2) Hi-8 mode



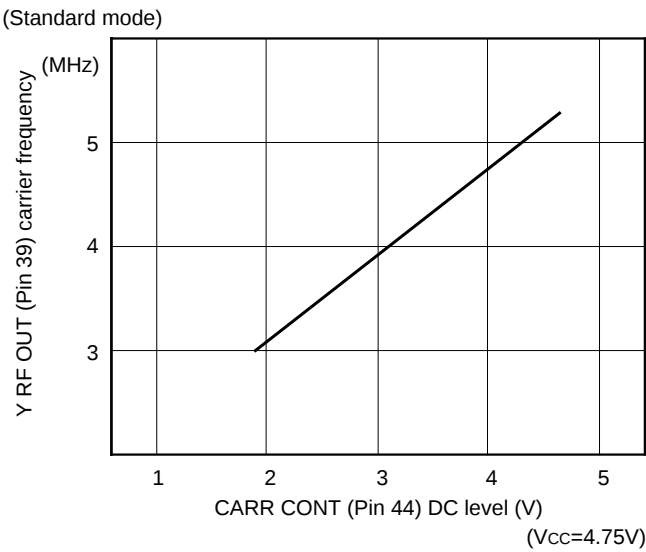
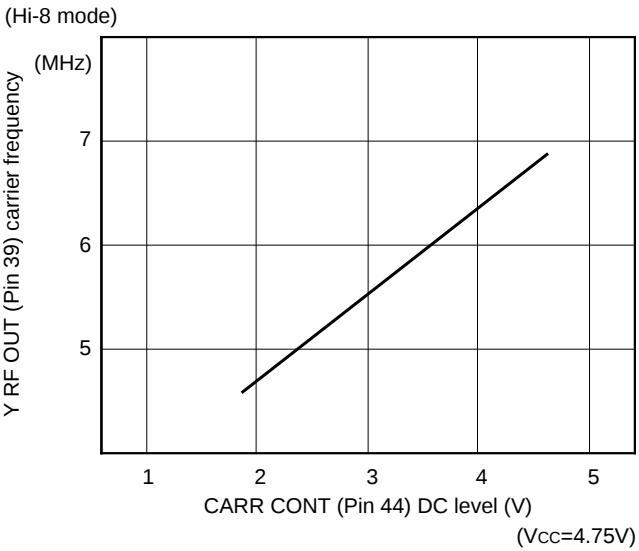
6. Carrier/deviation adjustment



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

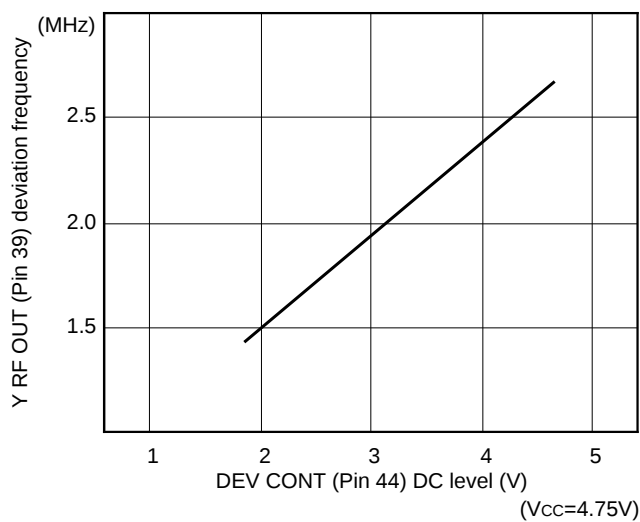
The standard characteristics of carrier frequency for the CARR CONT (Pin 44) DC bias (1.8V to Vcc) when bias was applied to EMPH IN (Pin 5) with VG1 are shown below.



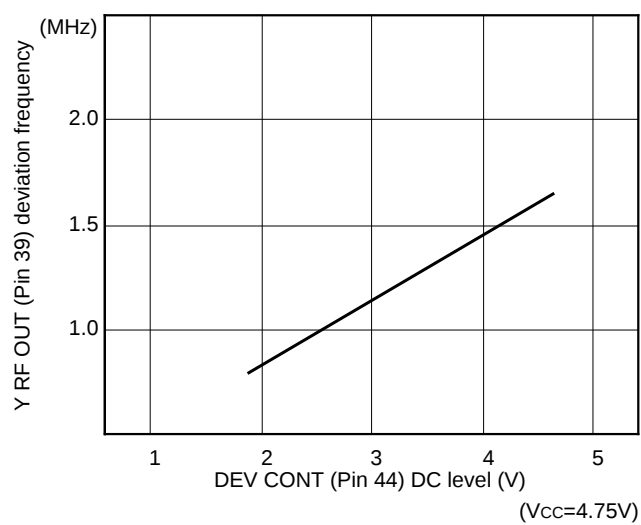
6-2. Deviation frequency adjustment

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

(Hi-8 mode)

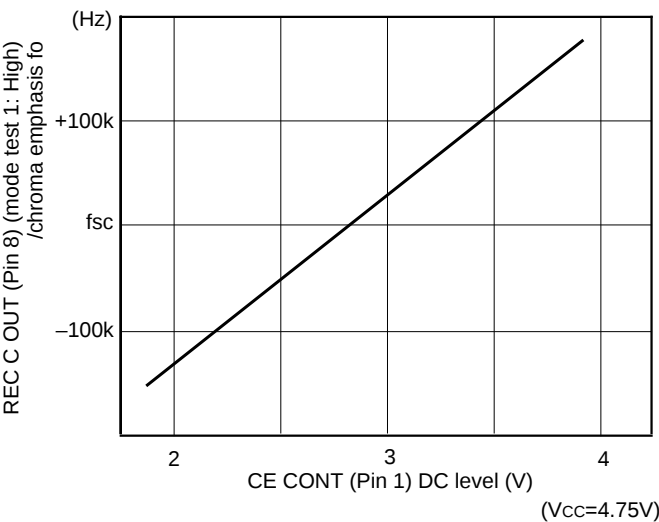


(Standard mode)

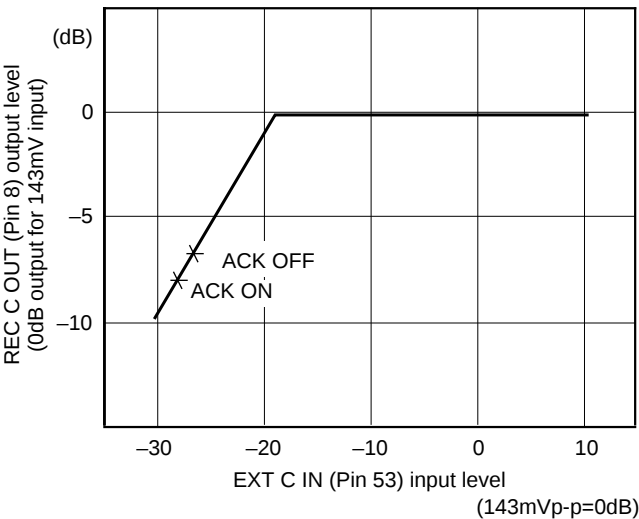


7. Chroma emphasis fo adjustment

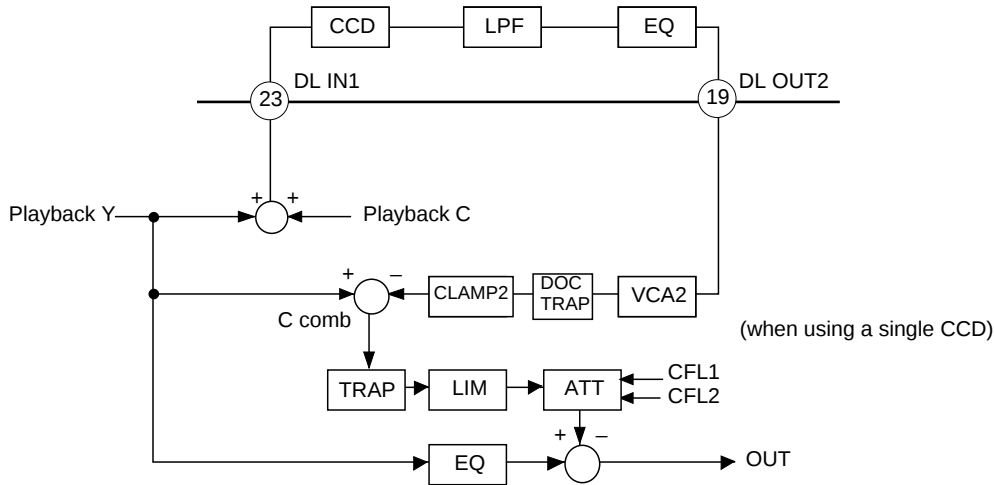
The center frequency of the chroma emphasis characteristics is adjusted by the DC bias (1.8V to 3.8V [Vcc = 4.75V]) applied to CE CONT (Pin 1). The standard characteristics of center frequency for the CE CONT (Pin 1) DC level are shown below.



8. ACC/ACK standard characteristics

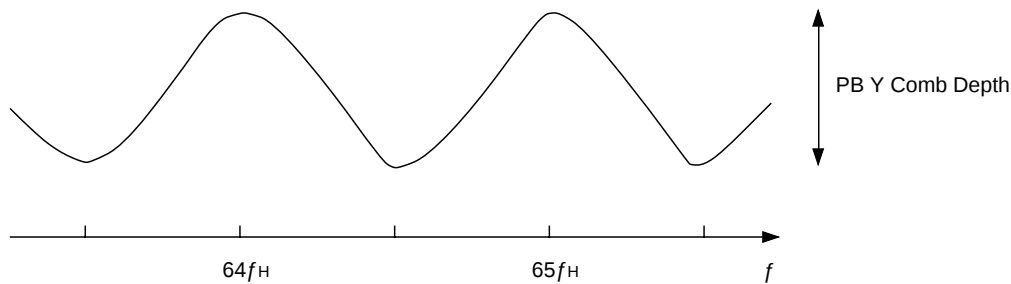


9. Y cross talk cancellation



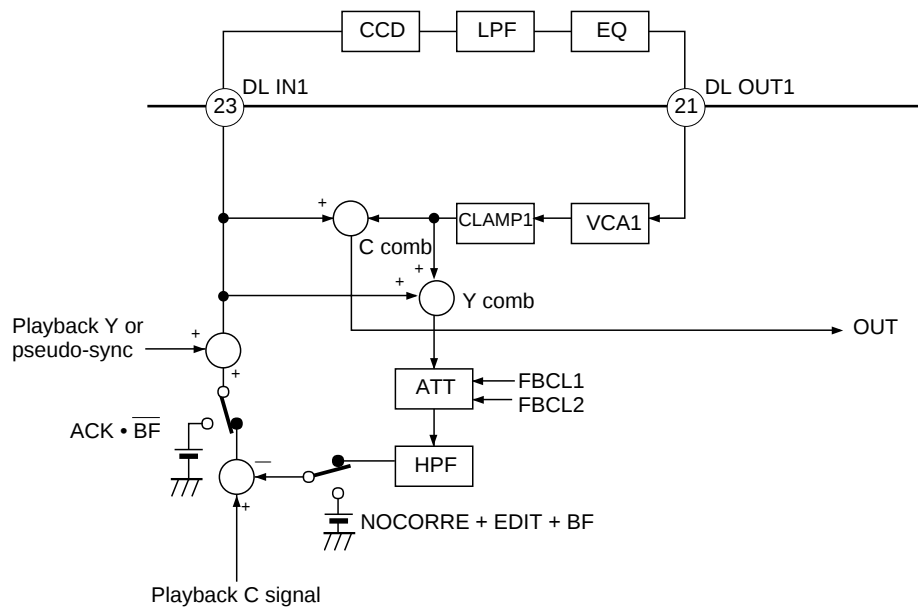
De-emphasized playback Y signal is input to the comb block. By passing the differential component of the nH signal and the (n+1) H signal through the limiter, the cross talk component, which is line noncorrelation, is extracted. Cross talk cancellation is accomplished by subtracting this cross talk component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

In addition, by switching modes CFL1 and CFL2, the comb depth characteristics of PB Y 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.



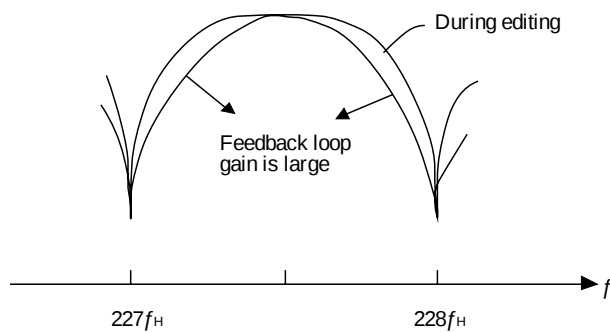
CFL2 \ CFL1	High	Low
	High	Low
High	-10dB	-6dB
Low	-1.5dB	0dB

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.



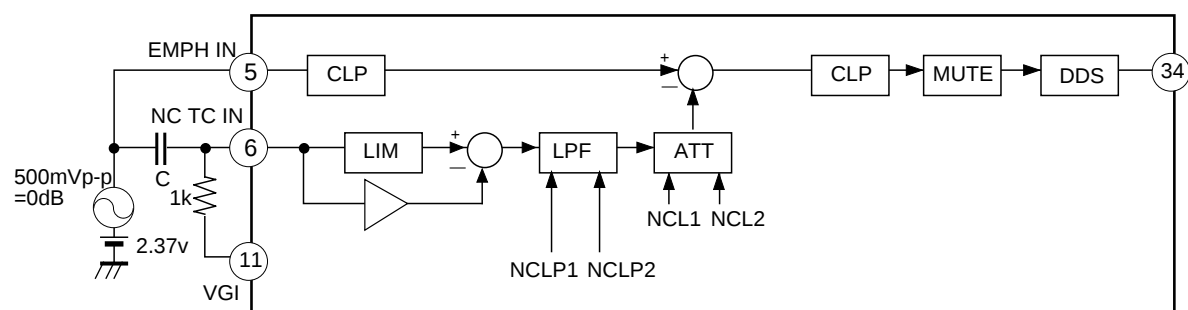
Feedback loop gain

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

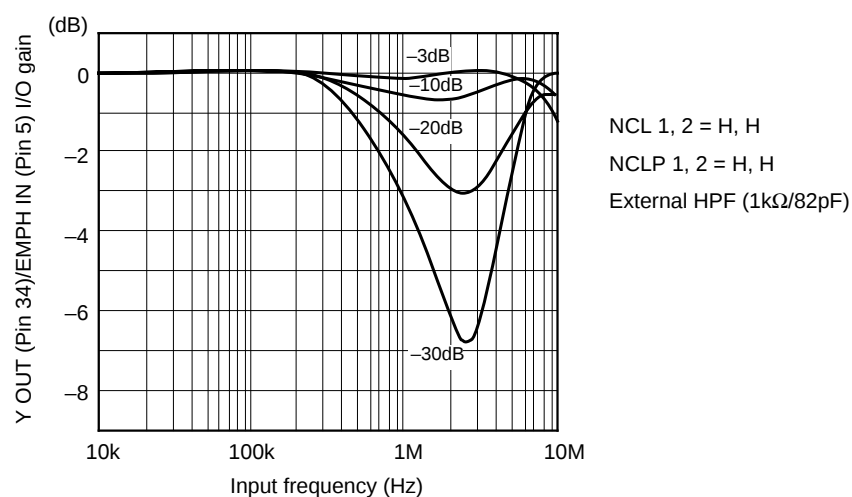
When the feedback loop gain is increased the S/N ratio can be improved, but note that color smear in the vertical direction and transient response are both worsen.

11. PB Y noise cancellation

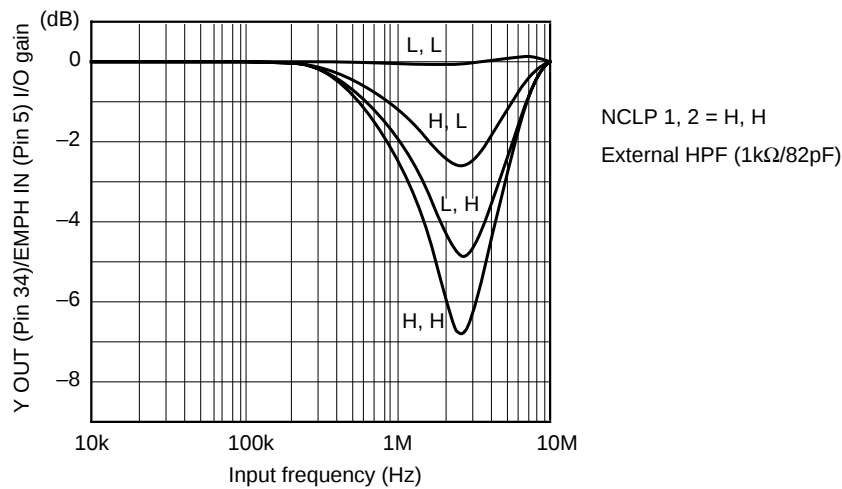
When an external HPF is configured as shown below, the standard characteristics of PB Y noise cancellation are as shown below, depending on the switching of input signal level, mode NCL1/2, external HPF and mode NCLP1/2.



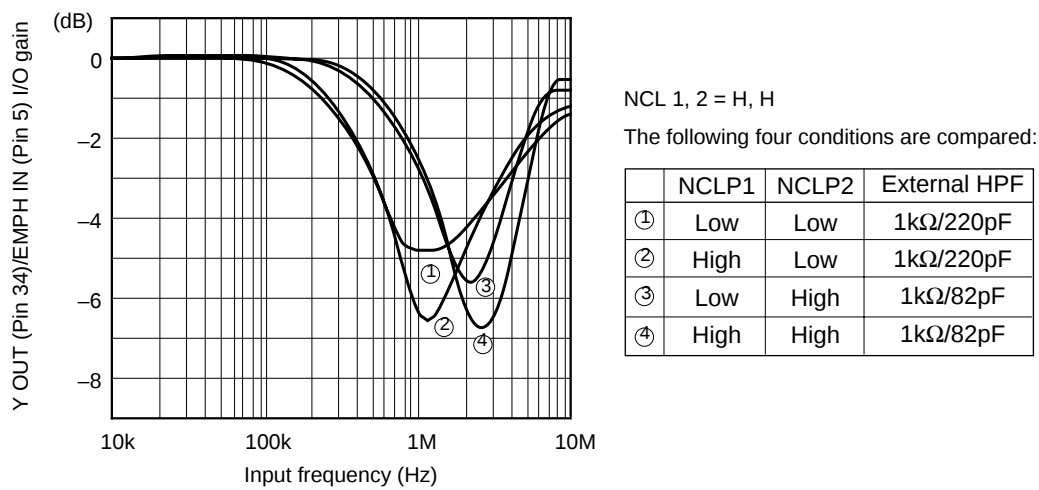
1) Changes in frequency characteristics due to the input level



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

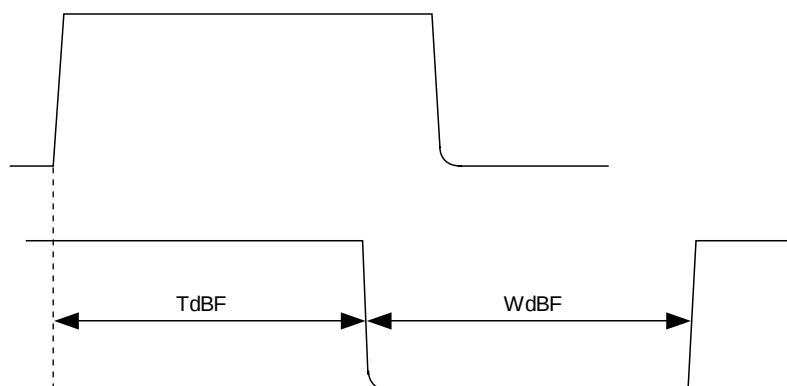


3) Changes in frequency characteristics due to switching of external HPF and mode NCLP1/2



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 W_{dBF} is constant.



PB	: $T_{dBF} (PB)$
NTSC • REC	: $T_{dBF} (PB) + 250nsec$
PAL • REC	: $T_{dBF} (PB) + 390nsec$

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%.

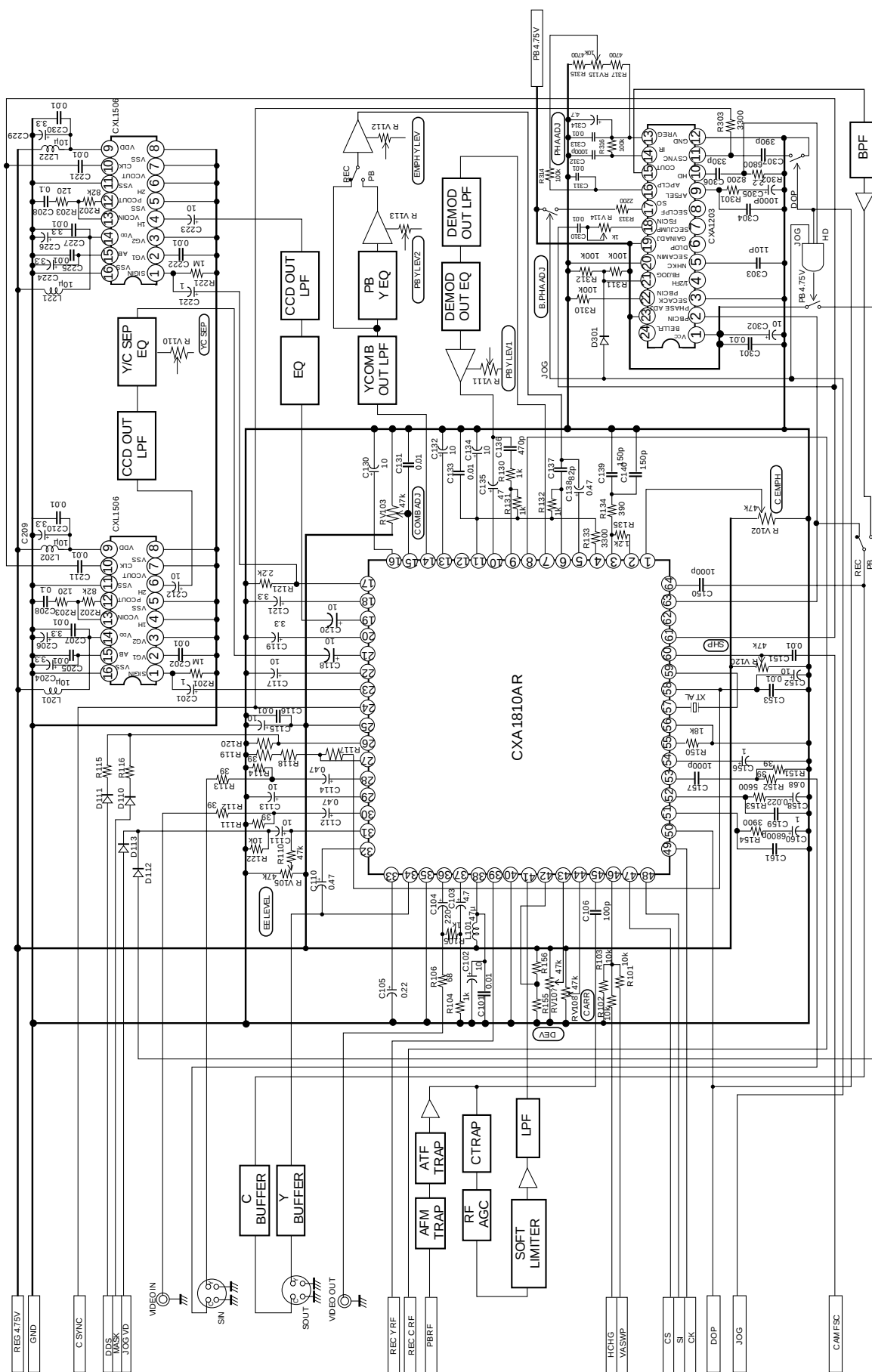
The diagram illustrates the internal architecture of the CXA1810AR, a monolithic video receiver IC. The circuit is organized into several functional blocks:

- Input Section:** Features a video input (VIDEO IN) and a Y/C separator (Y/C SEP) with an equalizer (EQ). The input signal is processed by a CCD output low-pass filter (CCD OUT LPF) and an equalizer (EQ) before being fed into the Y-comb filter (YCOMB OUT LPF).
- Demodulation Section:** The Y-comb filter output is processed by a demodulator (DEM) and a demodulator output low-pass filter (DEM OUT LPF). The demodulator output is then processed by a demodulator output equalizer (DEM OUT EQ).
- Output Section:** The demodulated signal is processed by a video output buffer (C BUFFER) and a video output low-pass filter (LPF). The output signal is then processed by a soft limiter (SOFT LIMITER) and a video output equalizer (EQ).
- Control and Power Section:** The circuit includes a power supply section (REG 4.75V, GND) and a control section (REC YRF, REC C RF, PERF, HUNG, VASWP, CS, SI, CK, DOP, CAMESC).

The diagram also shows the internal components of the CXA1810AR, including various resistors (R1 through R150), capacitors (C1 through C150), and other passive components. The IC is labeled CXA1810AR and is shown in a pin-out diagram at the bottom.

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)

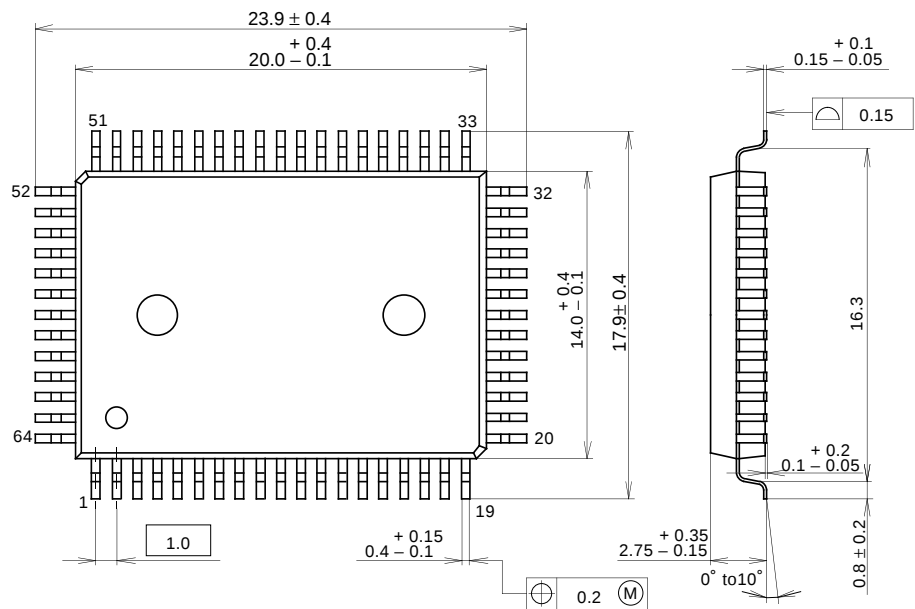


Application circuits shown are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

Package Outline Unit : mm

CXA1810AQ

64PIN QFP (PLASTIC)



PACKAGE STRUCTURE

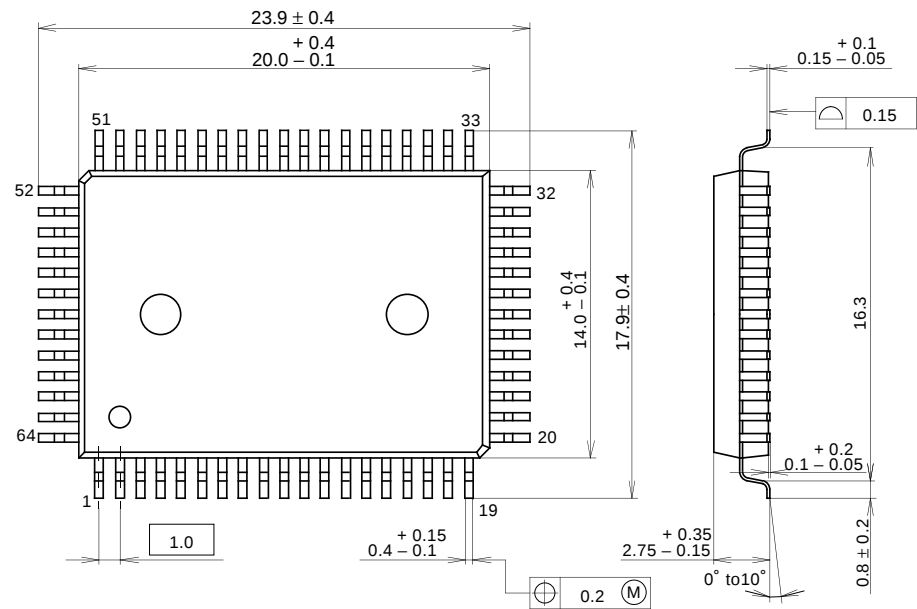
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EIAJ CODE	P-QFP64-14x20-1.0
JEDEC CODE	

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

CXA1810AQ

(PEC)

64PIN QFP (PLASTIC)



PACKAGE STRUCTURE

SONY CODE	QFP-64P-L01
EIAJ CODE	P-QFP64-14x20-1.0
JEDEC CODE	

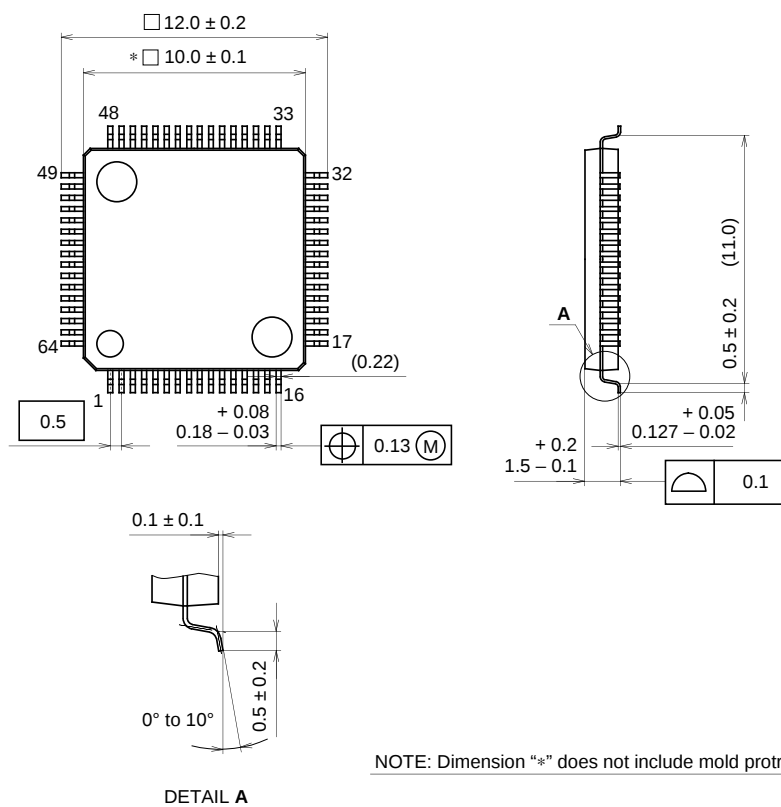
PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	42/COPPER ALLOY
PACKAGE MASS	1.5g

LEAD SPECIFICATIONS

ITEM	SPEC.
LEAD MATERIAL	ALLOY 42
LEAD TREATMENT	Sn-Pb 10%
LEAD TREATMENT THICKNESS	5-18μm

CXA1810AR

64PIN LQFP (PLASTIC)



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