

8mm VCR Luminance Signal Processing

Description

The CXA1207AR/AQ is an IC for 8mm VCR luminance signal processing developed for use in consumer products. In combination with a CXA1208R/Q, it provides complete Y/C main signal processing capabilities.

Features

- Switchable between Hi8 and normal 8mm video.
- Suitable for camera recording.
- High picture quality, using two CCD delay lines.
- Switchable between one and two CCD delay lines.
- Single 5V power supply.
- BUS LINE compatible.
- NTSC/PAL compatible.

Structure

Bipolar silicon monolithic IC.

Functions

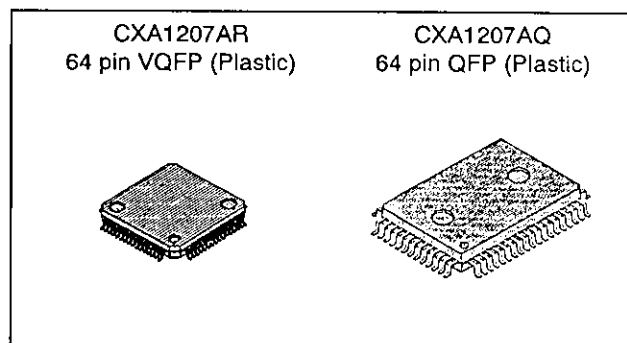
Y/C separation with comb type filter, Y/C crosstalk cancellation, Y drop-out compensation, 1H delay Y signal playback (Yd playback) switching, emphasis/deemphasis, MOD/DEMODO, HHS/HHS cancellation, white dark clip/clip compensation, noise cancellation, video AGC, DDS (Y signal superimposition), sync pulse separation, 75Ω video output drive, Y signal H correlation detection, RF AGC, RF drop-out detection, 4.2V regulator.

Operating Condition

Supply voltage	Vcc	5 ± 0.25	V
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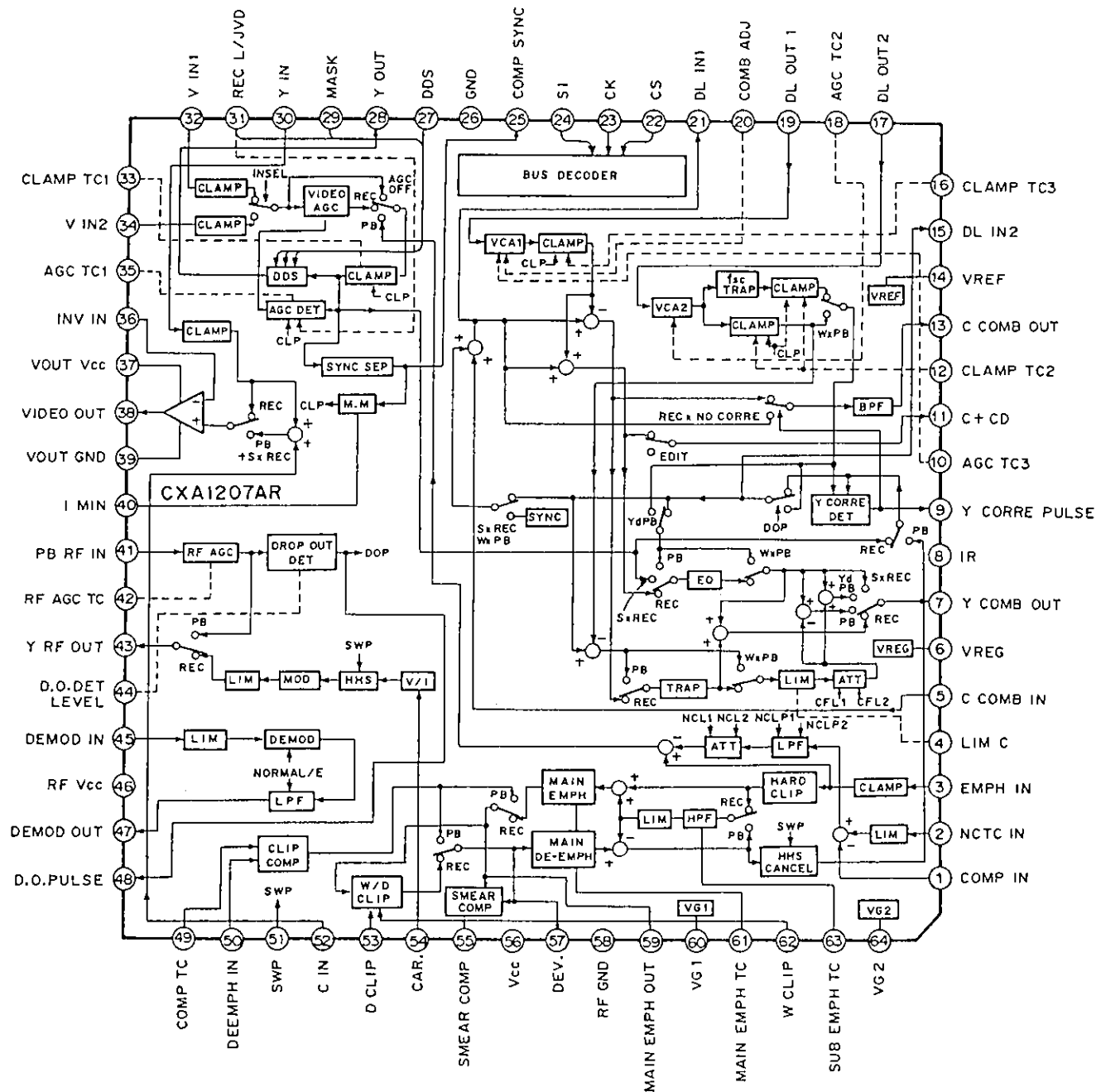
Absolute Maximum Ratings (Ta=25°C)

• Supply voltage	Vcc	7	V
• Operating temperature	Topr	-10 to +75	°C
• Storage temperature	Tstg	-55 to +150	°C
• Allowable power dissipation (when mounted on the board)			
	P _D (CXA1207AR)	1010	mW
	P _D (CXA1207AQ)	1050	mW

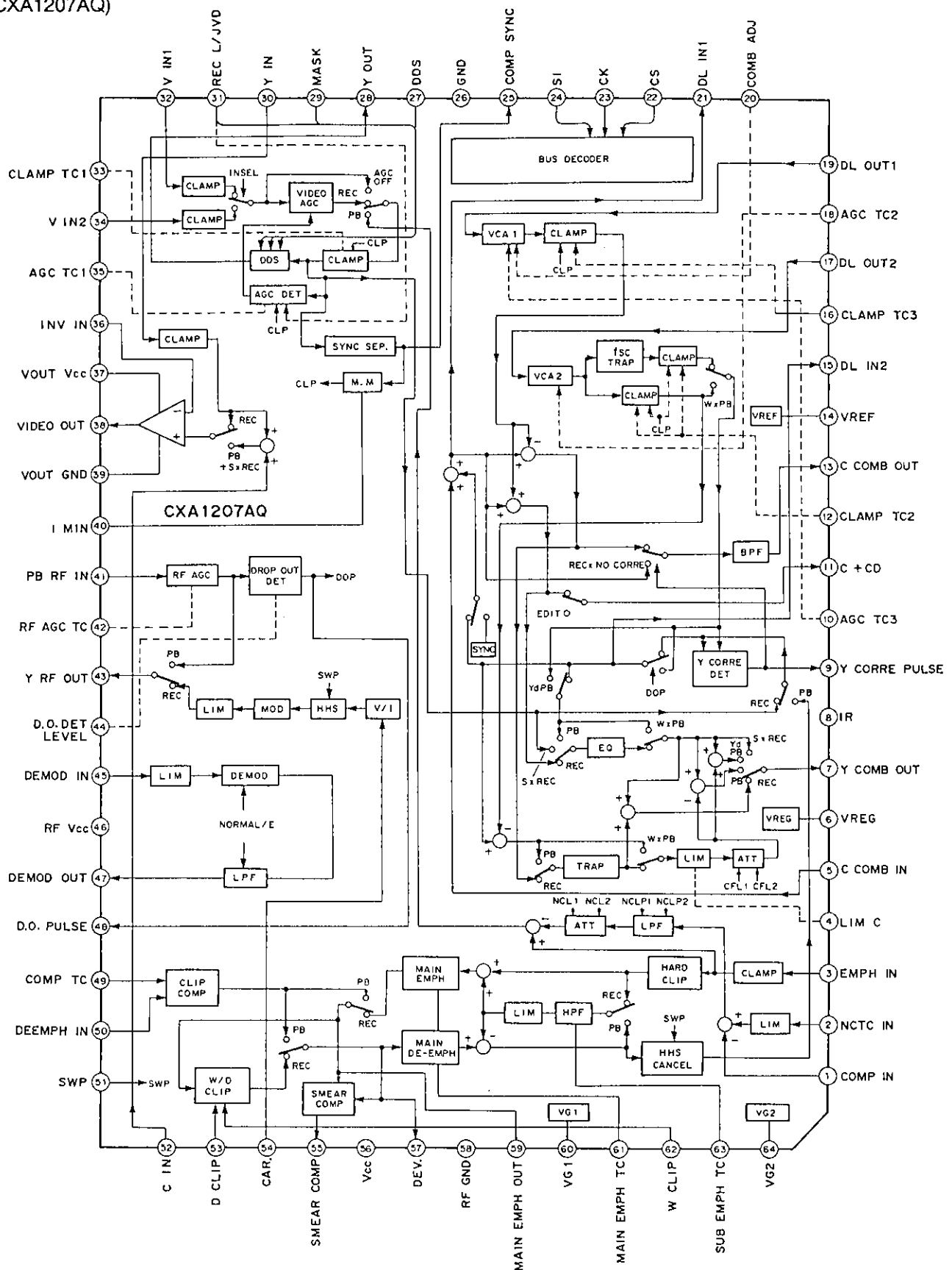


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Block Diagram and Pin Configuration (CXA1207AR)

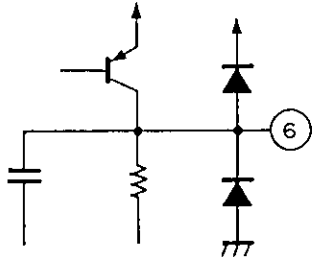
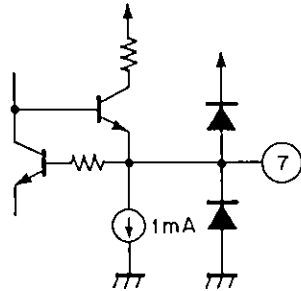
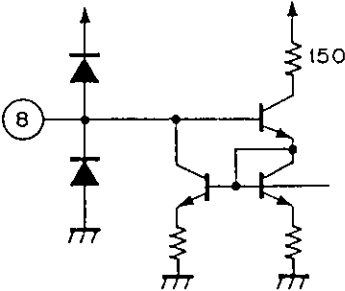
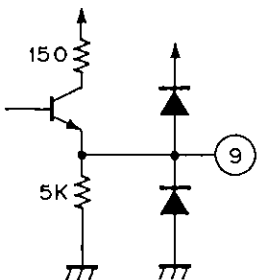
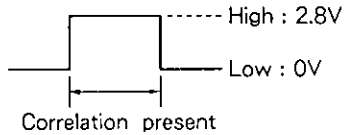


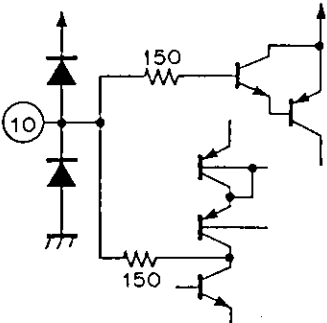
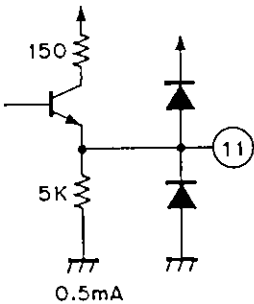
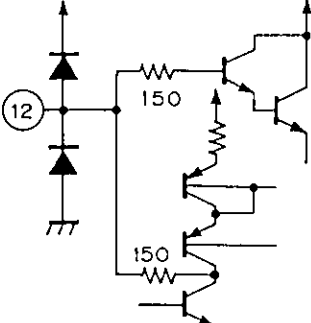
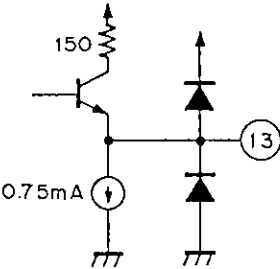
Block Diagram and Pin Configuration (CXA1207AQ)



Pin Description

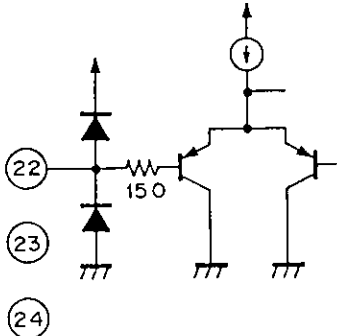
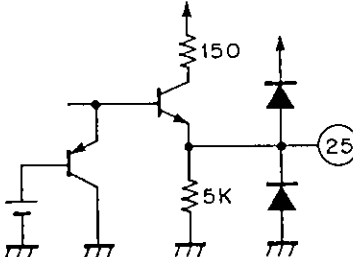
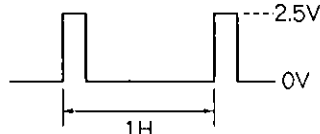
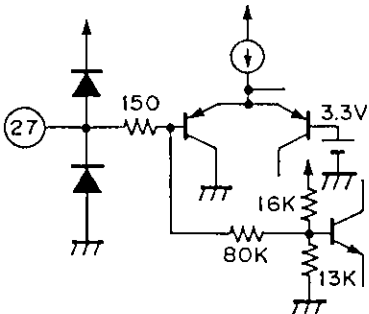
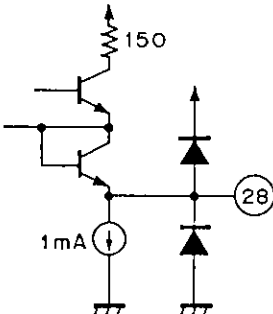
Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
1	COMP IN	2.1V (When time constant connected)	—		This pin provides the HPF external time constant for the noise canceller.
2	NCTC IN				
3	EMPH IN	2.1V (Sync Tip level)	 Y signal 500mVp-p input		Emphasis input pin for recording. During playback the main signal to the noise canceller is input. Diode clamp (sync tip clamp) is taken place; the clamp capacity is determined externally.
4	LIM C	2.5V	—		This pin is for connecting a decoupling capacitor for the limiter of playback Y Comb Black.
5	C COMB IN	—	C signal 200mVp-p input		C signal input pin to the comb filter.

Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
6	VREG	4.2V	—		Output pin from the 4.2V regulator. Connect capacitors for decoupling. Current for external load is approximately 1mA.
7	Y COMB OUT	2.6V	Y signal 500mVp-p output		Output pin for the Y signal processed by the comb filter. During recording, comb filter through output can be selected by mode switching.
8	IR	1.6V (When resistor connected)	—		Reference current control pin that determines the characteristics of the internal filters (BPF, TRAP, EQ, and DEMOD LPF) and the DEMOD circuit. Adjust with a variable resistor Rx between this and Pin 14. (Refer to Adjustment Procedures 3. "IR adjustment.") $I_R = \frac{V_{Q1} - V_{Q2} \text{ (mV)}}{R_X \text{ (k}\Omega\text{)}} = 54 \text{ (}\mu\text{A)}$ (standard value) Watch for pin interference.
9	Y CORRE PULSE	H: 2.8V L: 0V output	—		Outputs error pulse signal for Y signal H correlation detection. 

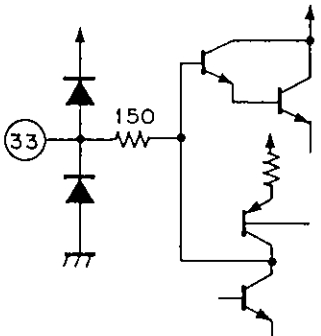
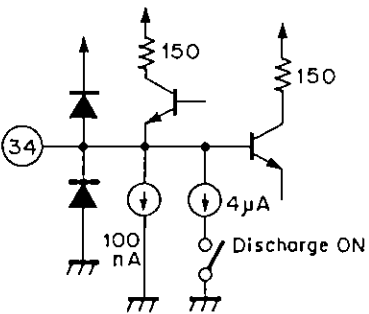
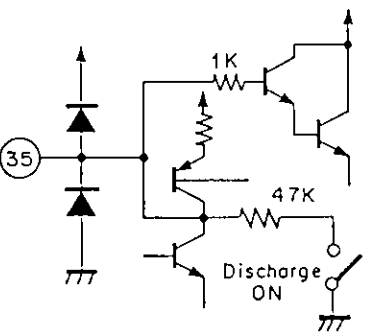
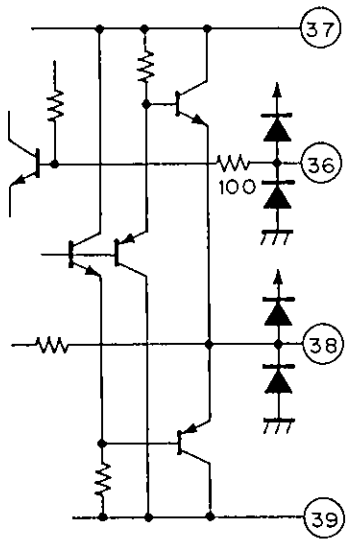
Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
10	AGC TC3	2.2 to 4.0V	—		Time constant pin for the VCA circuit within the comb filter block.
11	C+CD	2.5V	—		Output pin for the C signal and Y signal processed by the Y comb filter. It forms a feedback comb filter in the CXA1208 using only the crosstalk component of the C signal output by this pin, during playback. During editing the signal is not output.
12	CLAMP TC2	—	—		Time constant pin for the feedback clamp circuit within the comb filter block.
13	C COMB OUT	2.4V	C signal 200mVp-p output		Output pin for the C signal processed by the comb filter. The mode can also be selected so that comb filter processing is not carried out and the signal passes only through BPF.

Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
14	VREF	3.5V	—		Internal reference voltage source. Use by connecting a resistor between this pin and Pin 8. There is some temperature dependence.
15	DL IN2	2.2V (When resistor connected)	Video 500mVp-p output (When resistor connected)		In system using two CCD delay lines this output pin is for inputting the playback Y signal to the CCD delay line. When using this pin, a resistor (2.2kΩ) should be connected to ground. (open emitter output)
16	CLAMP TC3	—	—		Time constant pin for the feedback clamp circuit within the comb filter block.
17	DL OUT2	2.2V	Video 500mVp-p input		This pin is for inputting the output signal from the CCD delay line to the VCA circuit.

Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
18	AGC TC2	2.2 to 4.0V	—		Time constant pin for the VCA circuit within the comb filter block.
19	DL OUT1	2.2V	Video 500mVp-p input		This pin is for inputting the output signal from the CCD delay line to the VCA circuit.
20	COMB ADJ	3.0V	—		Gain control pin for VCA in the comb filter block. (Refer to Adjustment Procedures 2. "Y/C separation adjustment.")
21	DL IN1	2.2V	Video 500mVp-p output		Output pin for the input to the CCD delay line. Normally the Y+C signal is output. When using the CCD delay line connected to this pin with comb filter processing for the C signal only, a C signal with quasi sync is output.

Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
22	CS	H: 5V L: 0V input	—		These are the input pins to the bus decoder. CS is used for chip select, and the data is latched on a rising edge. CK is the input pin for the clock signal. The frequency fck of the clock signal used should not exceed 550kHz. SI is used to input serial data.
23	CK				
24	SI				
25	COMP SYNC	H: 2.5V L: 0V output	—		Output pin for the composite sync signal. 
26	GND	0V	—	—	Ground pin for blocks except RF block and video out block.
27	DDS	1.9V (When open circuit) H: 3.5 to 5V L: 0V input	—		Input pin for VOW signal (character level) of DDS (Date Display System). Changing the input DC level from 3.5 through 5.0V changes the character level. Refer to Description of Operation (4. Description of DDS).
28	Y OUT	0.9V (Sync Tip level)	Y signal (video signal 500mVp-p output)		Output pin for the I/O block signal.

Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
29	MASK	H: 5V L: 0V input	—		Input pin for the MASK timing pulse signal for VOB (character background) of the DDS. When the input is high, the Y signal is replaced by the pedestal level. Refer to Description of Operation (4. Description of DDS).
30	Y IN	1.6V (Sync Tip level)	Y signal (Video signal 500mVp-p input)		This pin is for inputting the Y signal or video signal to the video out circuit. Diode clamping (sync tip clamp) is carried out, and the clamping capacity is determined externally.
31	REC L/ JVD	2.5V	—		Level adjustment pin for recording. Adjustment voltage at pin 31 should be 3.0V and under. (Refer to Adjustment Procedures 1. "REC Y level adjustment.") During playback, this is the input pin for VD pulse in JOG PB (variable speed playback) and HD pulse in PCM after-recording. Threshold level; V_{TH} is 3.1V. H (Min. 3.6V): Sync tip level output L (Max. 2.6V): Normal output
32	V IN1	2.1V (Sync Tip level)	Video 500mVp-p input		Video signal input pin. Diode clamping (sync tip clamp) is carried out, and the clamping capacity is determined externally. In discharge ON mode, the clamping capacity charge is discharged.

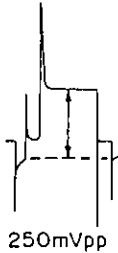
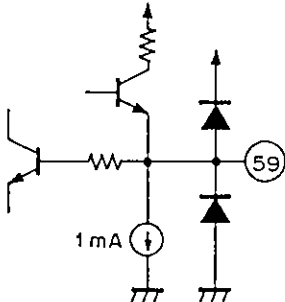
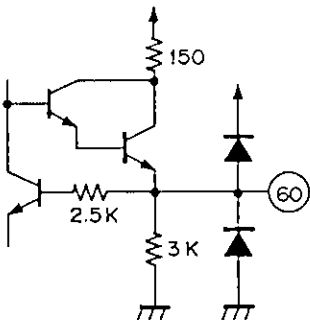
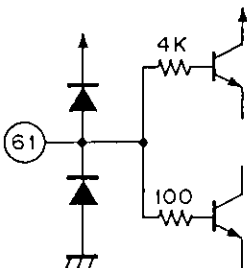
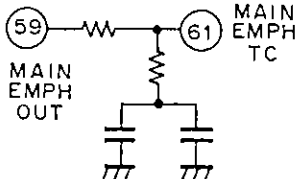
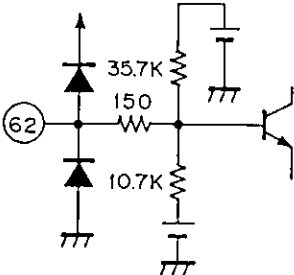
Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
33	CLAMP TC1	—	—		Time constant pin for the feedback clamp circuit in the I/O block.
34	V IN2	2.1V (Sync Tip level)	Video 500mVp-p input		Video signal input pin. Diode clamping (sync tip clamp) is carried out, and the clamping capacity is determined externally. In discharge ON mode, the clamping capacity charge is discharged.
35	AGC TC1	—	—		Time constant pin for the AGC circuit in the I/O block. In discharge ON mode, the external capacity is discharged.
36	INV IN	—	Video 1.0Vp-p input		Inverting input pin for V sag compensation for the video output 75Ω driver.
37	VOUT Vcc	5.0V	—		Dedicated power supply pin for the video output circuit.
38	VIDEO OUT	1.3V (Sync Tip level)	Video 2.0Vp-p output		Output pin for the video output 75Ω driver.
39	VOUT GND	0V	—		Dedicated ground pin for the video output circuit.

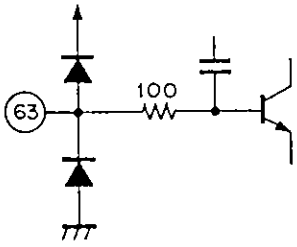
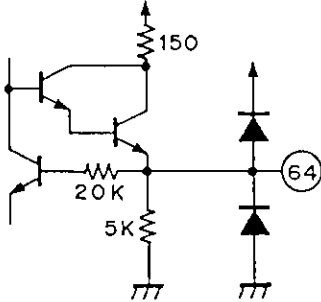
Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
40	I MIN	2.1V (When resistor connected)	—		External reference current supply pin. An external 100kΩ resistor must be connected to ground. Watch for pin interference.
41	PB RF IN	—	FM 100mVp-p input		Input pin for the RF AGC circuit. The playback RF (FM) signal is input.
42	RF AGC TC	—	—		Time constant pin for the RF AGC circuit.
43	Y RF OUT	2.5V	FM output 455mVp-p (when recording)		Output pin for the FM modulated Y signal during recording. During playback this is the output (approximately 440mVp-p) pin for the RF AGC circuit.

Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
44	D.O. DET LEVEL	3.3V (When open circuit)	—		This pin determines the Drop-out detection level.
45	DEMOD IN	—	FM 200mVp-p input		Input pin for the FM demodulation circuit. The output from Pin 43 should be input after passing through the soft limiter.
46	RF Vcc	5.0V	—		Power supply pin for the RF block.
47	DEMOD OUT	2.1V	 150mVp-p output (during normal playback)		This is the output pin for the Y signal after FM demodulation and passing through the DEMOD LPF. In Hi8 mode, an external combined EQ and LPF is required.
48	D.O. PULSE	H: 3.4V L: 0V output	—		Output pin for the drop-out detection signal. High when drop-out is detected. when drop-out is detected.

Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
49	COMP TC	2.1V (When time constant connected)	—		Pin for connecting the external time constant for the CLIP COMP (white-dark clip compensation) circuit HPF.
50	DEEMPH IN	2.1V	 170mVp-p input		Input pin for the deemphasis circuit. Input to the deemphasis circuit goes through the CLIP COMP circuit.
51	SWP	—	—		Input pin for the RF SWP (SWitching Pulse) and H CHG (Head Change) pulse signals. The Half H Shift and HHS Cancel circuits operate at High: 1.7V, Low: 0V. During playback, when carrying out 1H delay Y signal playback (Yd playback), set the bus decoder mode Yd=high, or apply 2.5V to 3.5V to Pin 51. For adjusting IR (internal filter other characteristics) apply external bias of 2.5V to 3.5V.
52	C IN	2.1V DC input	C signal 200mVp-p input		This pin is for inputting the chroma signal to the video output circuit. When the DC input is 0V to 0.3V, the monochrome mode is set, the comb filter through signal is output from Pin 7 during recording. In color mode, set the DC input to 1.0V to 3.5V.

Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
53	D CLIP	2.0V (When open circuit)	—		This pin determines the Dark CLIP level. When open circuit the typical dark clip level is 95%.
54	CAR.	2.1V (When recording)	—		This pin is for inputting the Y signal to the FM modulation circuit during recording. By attaching external resistors as shown below, the carrier frequency is set by RV119.
55	SMEAR COMP	2.1V (When recording)	—		Used for high brightness smear compensation; connect a resistor between this pin and Pin 54.
56	Vcc	5.0V	—	—	Power supply pin for blocks except RF block and video out block.
57	DEV.	2.1V			During recording this is the output pin for the signal after passing through the emphasis circuit and white-dark clip circuit. By attaching external resistors as shown below, the deviation frequency is set by RV120. During playback, this is the output pin for the signal after passing through the clip compensation circuit.

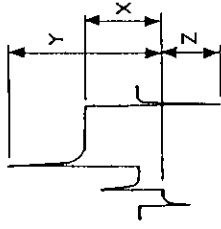
Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
58	RF GND	0V	—	—	Ground pin for the RF block.
59	MAIN EMPH OUT	2.1V			This pin is for the main emphasis and main deemphasis time constant. When recording, the Y signal is output with emphasis but before white-dark clipping.
60	VG1	2.1V	—		Internal reference voltage source.
61	MAIN EMPH TC	2.1V (When time constant connected)	—		Main emphasis and main deemphasis time constant pin. Connect the external time constant between this pin and Pin 59. 
62	W CLIP	2.6V (When open circuit)	—		This pin determines the white clip level. When open circuit, the typical white clip level is 235%.

Pin No.	Symbol	Voltage		Equivalent circuit	Description
		DC	AC		
63	SUB EMPH TC	2.1V (When time constant connected)	—		This pin is for the time constant of the HPF carrying out the sub-emphasis and sub-deemphasis. Connect a resistor between this pin and Pin 60. VG1 (60) ——— (63) SUB EMPH TC
64	VG2	2.5V	—		Internal reference voltage source.

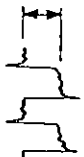
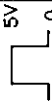
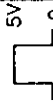
Electrical characteristics

- $V_{CC}=5.0V$, $T_a=25^{\circ}C$
- Refer to Electrical Characteristics Test Circuit diagrams.
- Refer to table of conditions in bus decoder mode.

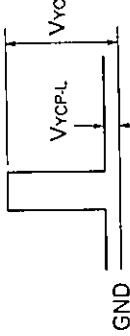
No.	Test item	Symbol	Input conditions				Switch to turn on	Mode conditions	Test point	Test method	Standard			Unit	
			Signal	Signal source	Amplitude	Frequency					Min.	Typ.	Max.		
<Current consumption and reference voltage source>															
1	Current consumption during recording	I _{REC0}	—	—	—	—	SW4	A	I ₁	V ₇ =2.9V (with FM MOD signal generation) IR (Pin 8 input) current=54 μA Measure the current consumption.	40	53	64	mA	
2	Current consumption 1 during camera recording	I _{REC1}	—	—	—	—		B			30	41	51	mA	
3	Current consumption 2 during camera recording	I _{REC2}	—	—	—	—		C			34	45	55	mA	
4	Current consumption 1 during playback	I _{PB1}	—	—	—	—	SW4	E	I ₁	IR (Pin 8 input) current=54 μA Measure the current consumption.	53	66	78	mA	
5	Current consumption 2 during playback	I _{PB2}	—	—	—	—		D			51	64	76	mA	
6	Internal reference voltage source 1	V _{REG}	—	—	—	—	—	A	P1	V _{CC} =5.0V, Pin 6 voltage: V _{REG}	4.09	4.23	4.38	V	
7	Internal reference voltage source 1 (V _{CC} -)	V _{REG-}	—	—	—	—				Pin 6 voltage when V _{CC} =4.5V: V _{REG1} Calculate V _{REG} -V _{REG1} -V _{REG}	- 11	- 2	0	mV	
8	Internal reference voltage source 1 (V _{CC} +))	V _{REG+}	—	—	—	—				Pin 6 voltage when V _{CC} =5.5V: V _{REG2} Calculate V _{REG} +V _{REG2} -V _{REG}	0	3	11	mV	
9	Internal reference voltage source 2	V _{REF}	—	—	—	—	—	A	P6	Voltage on Pin 14	3.35	3.55	3.75	V	
10	Internal reference voltage source 3	V _{G1}	—	—	—	—	—	A	P17	Voltage on Pin 60	2.04	2.13	2.22	V	
11	Internal reference voltage source 4	V _{G2}	—	—	—	—	—	A	P18	Voltage on Pin 64	2.39	2.54	2.64	V	

No.	Test item	Symbol	Input conditions			Switch to turn on	Mode conditions	Test point	Test method	Standard			Unit
			Signal	Amplitude	Frequency					Min.	Typ.	Max.	
<Recording system>													
12	Video AGC	SYNC AGC input low level	V _{AGC-L}	e ₁	—	—	F	P10	Input a SYNC -6dB signal and measure the output level.	143		mVp-p	
		SYNC AGC input high level	V _{AGC-H}	e ₂	—	—			143	mVp-p			
		PEAK AGC	V _{AGC-P}	f	—	—			560	mVp-p			
15	I/O frequency characteristics	With video AGC off	f _{1/01}	d	Sine wave 357 mVp-p	300kHz/5MHz	A	P10	Level ratio of a 300kHz sine wave superimposed on the Y signal to a 5MHz sine wave.	-1.5	0	1.5	dB
With video AGC on		f _{1/02}								-1.5	0	1.5	dB
17	Comb filter through mode gain	G _{1/03}	d	SG9	Sine wave 357 mVp-p	300kHz	B	P2	Measure the input/output gain of a 300kHz sine wave superimposed on the Y signal.		-0.5		dB
18	Hard clip amount	K _{H.c.}	b/c		500mV/647mV	—		P16	Measure the level ratio of this signal component in the output when the input is 500mV and 647mV.		115		%
19	White clip amount	K _{w.c.}	b	SG2	500mV Y signal	—	A	P15	 $K_{w.c.} = \frac{Y}{X} \times 100 (\%)$ $K_{d.c.} = \frac{Z}{X} \times 100 (\%)$	235		%	
20	Dark clip amount	K _{d.c.}											

No.	Test item	Symbol	Input conditions				Switch to turn on	Mode conditions	Test point	Test method	Standard			Unit	
			Signal	Signal source	Amplitude	Frequency					Min.	Typ.	Max.		
21	− 3dB, 500kHz	fE11	a	SG1	− 3dB (354 mVp-p)	10kHz/ 500kHz	SW1 SW2	A	P15	Shown with the input amplitude 500mVp-p=0dB. (These emphasis characteristics include W/D clip.)	$\frac{V(500kHz)}{V(10kHz)}$	10.7		11.7	dB
22	− 3dB, 2MHz	fE12			− 10dB (158 mVp-p)	10kHz/ 2MHz						11.8		15.8	dB
23	− 10dB, 2MHz	fE13			− 20dB (50 mVp-p)							15.0		19.0	dB
24	− 20dB, 2MHz	fE14										19.5		25.5	dB
25	− 3dB, 200kHz	fE21	a	SG1	− 3dB (354 mVp-p)	10kHz/ 200kHz	SW1 SW2 SW20	A	P16	Shown with the input amplitude 500mVp-p=0dB. (These emphasis characteristics do not include W/D chip.)	$\frac{V(200kHz)}{V(10kHz)}$	2.7		3.3	dB
26	− 3dB, 2MHz	fE22			− 10dB (158 mVp-p)	10kHz/ 2MHz						14.5		16.5	dB
27	− 10dB, 2MHz	fE23			− 20dB (50 mVp-p)							17.1		19.1	dB
28	− 20dB, 2MHz	fE24										19.5		23.5	dB

No.	Test item	Symbol	Input conditions				Switch to turn on	Mode conditions	Test point	Test method	Standard			Unit	
			Signal	Signal source	Amplitude	Frequency					Min.	Typ.	Max.		
29	Output level	V _{MOD}	—	—	—	—	A	P12	 Signal level when output is 4.2MHz When the output is 4.2MHz measure the ratio with the secondary high frequency components. V (8.4MHz)/V (4.2MHz) With switch 17 off, adjust to 4.2MHz, then measure the change in frequency when switch 17 is turned on. $G_{MOD} = \frac{f_1 - f_0}{f_1 - f_0}$ $L_{MOD} = \frac{f_2 - f_1}{f_1 - f_0}$ See test method detail 1.	420	455	490	mVp-p		
30	Secondary distortion	D _{MOD}	—	—	—	—				—	—	—	—	—	dB
31	Half H shift amount	f _{HHS}	—	—	—	—				SW17 ON/OFF	—	5.7	7.2	8.7	kHz
32	Gain	G _{MOD}	—	—	—	—	—	—		16.5	19.6	23.0	$\frac{\text{kHz}}{\mu\text{A}}$		
33	Linearity	L _{MOD}	—	—	—	—	—	—		0.93	1.00	1.05	—		
<Record/playback system>															
34	VOB	ΔV_{VOB}	h				SG6		—	Input b signal (100% white Y signal) to SG9. See test method detail 2.	DC difference based on pedestal level	— 20	6	30	mV
	VOW	ΔV_{VOW}	SG6	0, 5V	—	—	—	—	—			360	mV		
36	JOG VD	ΔV_{JOGV}	SG8		—	—	—	—	—	DC difference based on sync tip level	— 10	0	10	mV	

No.	Test item	Symbol	Input conditions				Switch to turn on	Mode conditions	Test point	Test method	Standard			Unit
			Signal	Signal source	Amplitude	Frequency					Min.	Typ.	Max.	
37	Composite Sync Pulse	Vcs-H	g	SG9	Sync with burst 143mV black Y signal	—	SW11	F	P9		2.3	2.5	2.7	V
		Vcs-L										0.02	0.1	V
		Wcs										4.5		μs
		Dcs							P9, P10		0.1	0.34	0.7	μs
41	Amplifier gain	G _{BUFF}	d	SG7	Sine wave 357 mVp-p	300kHz	SW9	A	P11	Measure the input/output gain of a 300kHz sine wave superimposed on the Y signal.	5.5	6.0	6.5	dB
42	Video Buffer 5MHz frequency characteristic	f _{BUFF}				300kHz/5MHz				Measure the level ratio of a 300kHz sine wave superimposed on the Y signal to a 5MHz sine wave.		0		dB
43	fsc trap 3.58MHz frequency characteristic	f _{TRAP}	d	SG4 SG9	Sine wave 357 mVp-p	3.58MHz	SW5, SW11, SW17, SW18	A	P2	Measure the input/output gain of a 3.58MHz sine wave superimposed on the Y signal.		-20	-14	dB

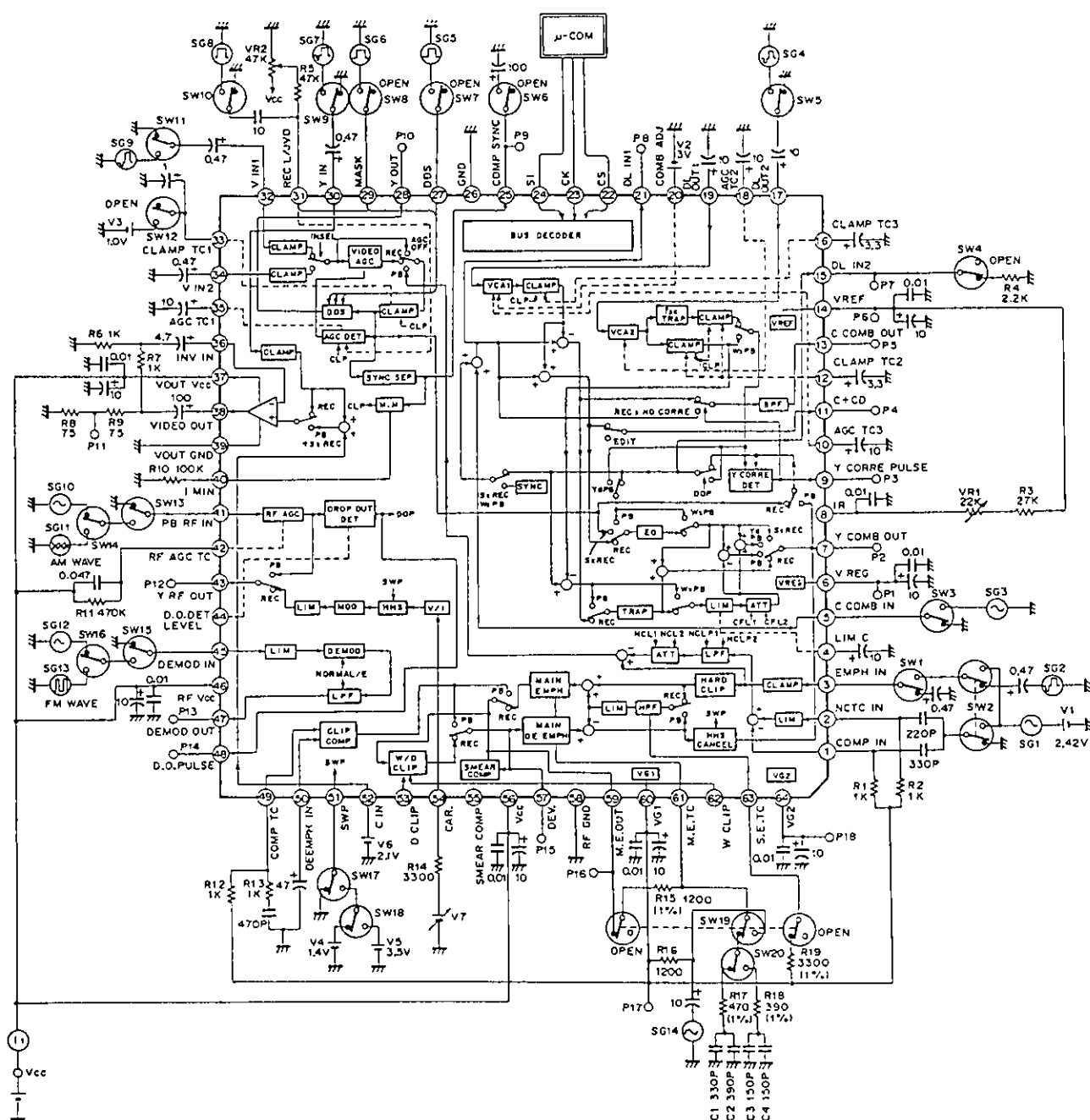
No.	Test item	Symbol	Input conditions				Switch to turn on	Mode conditions	Test point	Test method	Standard			Unit
			Signal	Signal source	Amplitude	Frequency					Min.	Typ.	Max.	
44	Band-pass filter frequency characteristics	GBPF	a	SG3	300 mVp-p	3.58MHz	SW3	G	P5	Measure the input/output gain at 3.58MHz.	-	4.3		dB
45		f _{BPF1}				2.0MHz				V(2.0MHz)/V(3.58MHz)		-13	-10	dB
46		f _{BPF2}				3.28MHz				V(3.28MHz)/V(3.58MHz)	-0.6	0	0.6	dB
47		f _{BPF3}				3.88MHz				V(3.88MHz)/V(3.58MHz)	-0.6	0	0.6	dB
48		f _{BPF4}				6.0MHz				V(6.0MHz)/V(3.58MHz)		-13	-10	dB
49	Y Correlation Pulse	V _{YCP-H}	b	SG9	100% white Y signal 500mV	—	SW11	A	P3	 (When CCD delay line is not connected, a Y correlation pulse arises for the sync position.)	2.6	2.8	3.0	V
50		V _{YCP-L}										0.2	0.4	V
<Playback system>														
51	PB Y Comb Filter ATT	K ₀	a	SG14	30 mVp-p	300kHz	SW19	H ₁	(P7) P2	Output level when the output at P7 (Pin 15 DL IN2) is 0dB. Measure it changing the mode conditions.	-13	-10	-7	dB
52		K ₁						H ₂			-14	-11	-8	dB
53		K ₂						H ₃			-27	-24	-21	dB
54		K ₃						H ₄				-46		dB
55	HHS Cancellor	V _{DEHHS}	—	—	—	—	SW17 ON/OFF	H ₁	P7	DC variation at P7 (Pin 15 DL IN2) with switch 17 on and off.		1.8		mV

No.	Test item	Symbol	Input conditions				Switch to turn on	Mode conditions	Test point	Test method	Standard			Unit
			Signal	Signal source	Amplitude	Frequency					Min.	Typ.	Max.	
56	– 3dB 1MHz frequency characteristic	f _{NC11}	a	SG1	– 3dB (354 mVp-p)	10kHz / 1MHz	SW1 SW2 SW12 SW6	J1	P10	Shown with the input amplitude 500mVp-p=0dB. Calculate V (1MHz)/V (10kHz) at each input level and mode conditions.		– 0.1		dB
57	– 20dB 1MHz frequency characteristic	f _{NC11}			– 20dB (50 mVp-p)							– 3.8		dB
58	– 30dB 1MHz frequency characteristic	f _{NC12}										– 9.9		dB
59	– 30dB 1MHz frequency characteristic	f _{NC2}						J2				– 13.0		dB
60	– 30dB 1MHz frequency characteristic	f _{NC3}			– 30dB (15.8 mVp-p)			J3				– 7.7		dB
61	– 30dB 1MHz frequency characteristic	f _{NC4}	a	SG12	200 mVp-p	3MHz, 5MHz, 7MHz	SW15	D	P13	When the fHz signal is input, the output DC value (mV) on P13 (Pin 47 DEMOD OUT) is shown as V(f).	104	116	128	mV / MHz
62	– 30dB 1MHz frequency characteristic	f _{NC5}									0.90	0.94	1.00	—
63	Gain 1	G _{DEM0D1}	a	SG12	200 mVp-p	4.2MHz	SW15	E		Level of the 4.2MHz component of the output. (With input as 0dB)		– 40		dB
64	Linearity 1	L _{DEM0D1}												
65	Carrier leak	CL _{DEM0D}												
66	Gain 2	G _{DEM0D2}									58	65	72	mV / MHz
67	Linearity 2	L _{DEM0D2}									0.9	1.0	1.05	—

No.	Test item	Symbol	Input conditions				Switch to turn on	Mode conditions	Test point	Test method	Standard			Unit
			Signal	Signal source	Amplitude	Frequency					Min.	Typ.	Max.	
68	Low band gain	GLPF11	Normal mode	i	SG13	300kHz	200 mVp-p	D	P13	(input/output gain at 300kHz)– (compensation Gc1)	– 1.5	* 0	1.5	dB
69	2.5MHz frequency characteristic	fLPF12				2.5MHz				$\frac{V(2.5\text{MHz})}{V(300\text{kHz})}$	– 2.5	– 1.1	0	dB
70	6.12MHz frequency characteristic	fLPF13				6.12MHz				$\frac{V(6.12\text{MHz})}{V(300\text{kHz})}$		– 39	– 32	dB
71	Low band gain	GLPF21	HiB mode	i	SG13	300kHz	200 mVp-p	E	P13	(input/output gain at 300kHz)– (compensation Gc2)	– 1.5	* 0	1.5	dB
72	4.5MHz frequency characteristic	fLPF22				4.5MHz				$\frac{V(4.5\text{MHz})}{V(300\text{kHz})}$	– 1.5	0	1.0	dB
73	7.8MHz frequency characteristic	fLPF23				7.8MHz				$\frac{V(7.8\text{MHz})}{V(300\text{kHz})}$		– 21	– 16	dB
74	Standard output	VRFAGC1	RF AGC	a	SG10	5MHz	100 mVp-p	D	P12	Measure the output level.	400	440	480	mV
75	Cover range (L)	VRFAGC2					25 mVp-p				375	420		mV
76	Cover range (H)	VRFAGC3					200 mVp-p					490	550	mV
77	Detection ON level.	KDO-ON	Drop-out detection	j	SG11	AM wave 5MHz 100mV 100µsec (10KHz)		D	P14	SG11 (Pin 41 PB RF IN) input	– 15.5	– 12.5	– 9.5	dB
78	Detection OFF level.	KDO-OFF								KDO-OFF and KDO-ON are computed as the ratios of p and q respectively to 100mV.	– 9	– 6	– 3	dB
79	Drop-out pulse high level	VdOP-H									3.2	3.4	3.6	V
80	Drop-out pulse low level	VdOP-L								P14 (Pin 48 D.O. PULSE) output		0.05	0.2	V

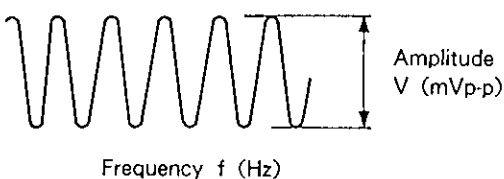
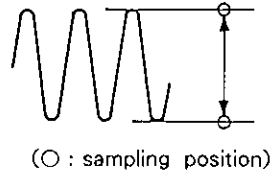
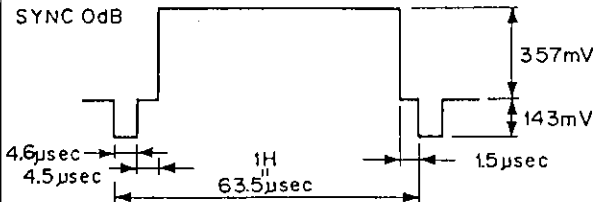
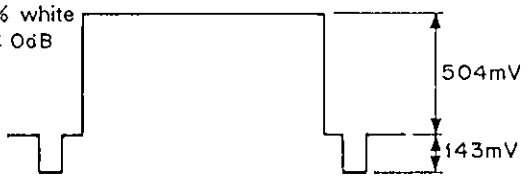
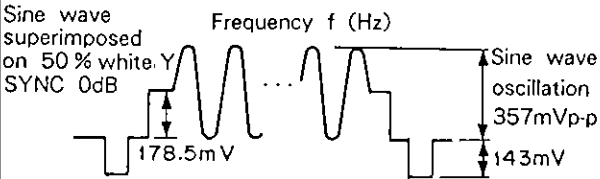
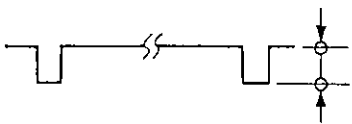
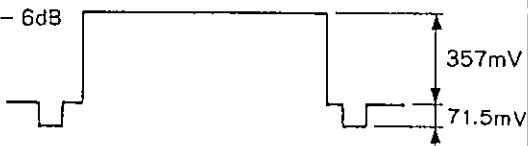
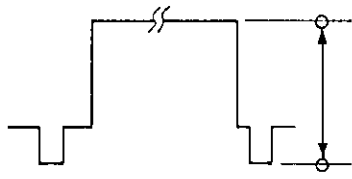
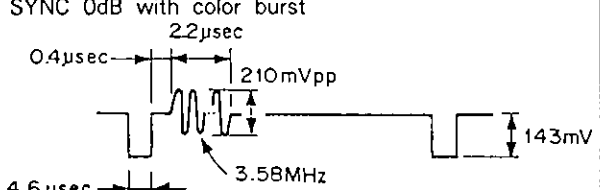
* GLPF11 and GLPF12 include unevenness in the FM demodulation gain GDEM01 and GDEM02.

Electrical Characteristics Test Circuit

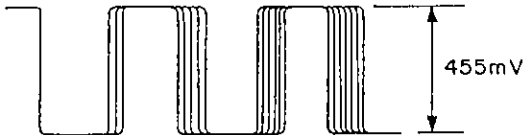
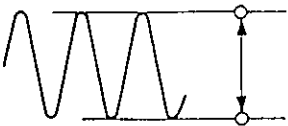
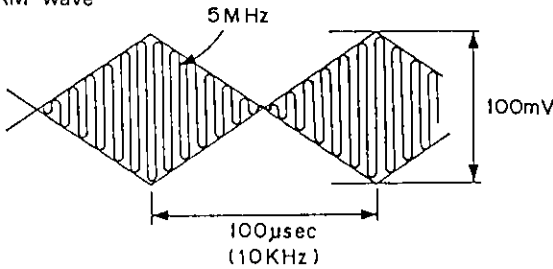


- The external fixed resistors R15, R17, R18 and R19 for determining the emphasis/deemphasis characteristics should be metal film resistors with tolerances of $\pm 1\%$. Capacitors C1, C2, C3 and C4 should be temperature compensated CH type.

Input Signals

Signal	Input signal waveform	Output signal waveform	Signal source
a		 (○ : sampling position)	SG1 SG3 SG10 SG12 SG14
b		Refer to test method.	SG2 SG9
c		Refer to test method. (Hard clip amount measurement)	SG2
d		 Measure the amplitude of the sine wave component.	SG4 SG7 SG9
e1		 (Sync AGC measurement)	SG9
e2			
f		 (Peak AGC measurement)	SG9
g		Refer to test method. (Composite Sync Pulse measurement)	SG7

a to g: Signals based on NTSC standard Y signal (H blanking period only shown; V blanking period omitted.)

Signal	Input signal waveform	Output signal waveform	Signal source
h	H synchronized rectangular wave. 	Refer to test method details: 2 "DDS".	SG5 SG6 SG8
i	FM wave Carrier frequency { : 5MHz (normal mode), 10MHz (Hi8 mode)  Refer to test method details Section 3.	 P13 (Pin 47 DEMOD OUT) output	SG13
j	AM wave 	Refer to test method. (drop-out detection)	SG11

Measuring method details

1. FM modulator measurement

Adjust V_7 so that the oscillation frequency f_0 on P12 (Pin 43 Y RF OUT) is 4200kHz. Taking the V_7 potential at this point as V_0 (mV), measure the frequencies f_1 and f_2 (kHz) when V_0+500 (mV) and V_0+1000 (mV) respectively is applied. Since the resistor used for R_{14} is $3.3\text{k}\Omega$, I_0 , I_1 and I_2 are given by the following expressions. Compute the gain and linearity as below.

$$I_0 = \frac{V_0 \text{ (mV)}}{3.3 \text{ (k}\Omega\text{)}} \text{ (}\mu\text{A)}$$

$$I_1 = \frac{V_0 + 500 \text{ (mV)}}{3.3 \text{ (k}\Omega\text{)}} \text{ (}\mu\text{A)}$$

$$I_2 = \frac{V_0 + 1000 \text{ (mV)}}{3.3 \text{ (k}\Omega\text{)}} \text{ (}\mu\text{A)}$$

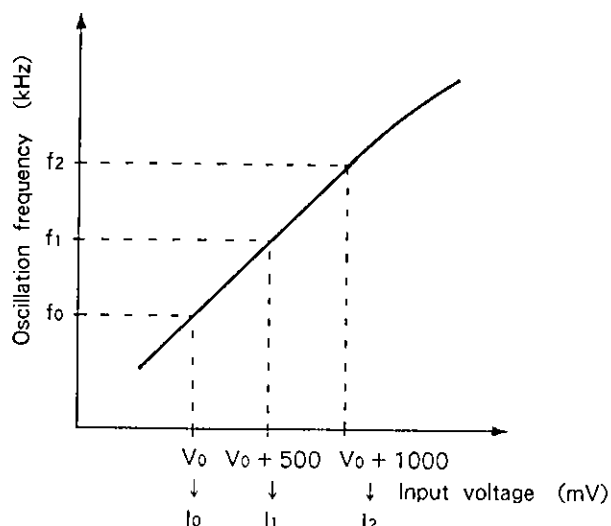
$$\text{FM MOD gain: } G_{\text{MOD}} = \frac{f_1 - f_0}{I_1 - I_0} \text{ (kHz/}\mu\text{A)}$$

$$\text{FM MOD linearity: } L_{\text{MOD}} = \frac{f_2 - f_1}{f_1 - f_0}$$

The actual input current to Pin 54 is not I_0 , but is given by the following expression:

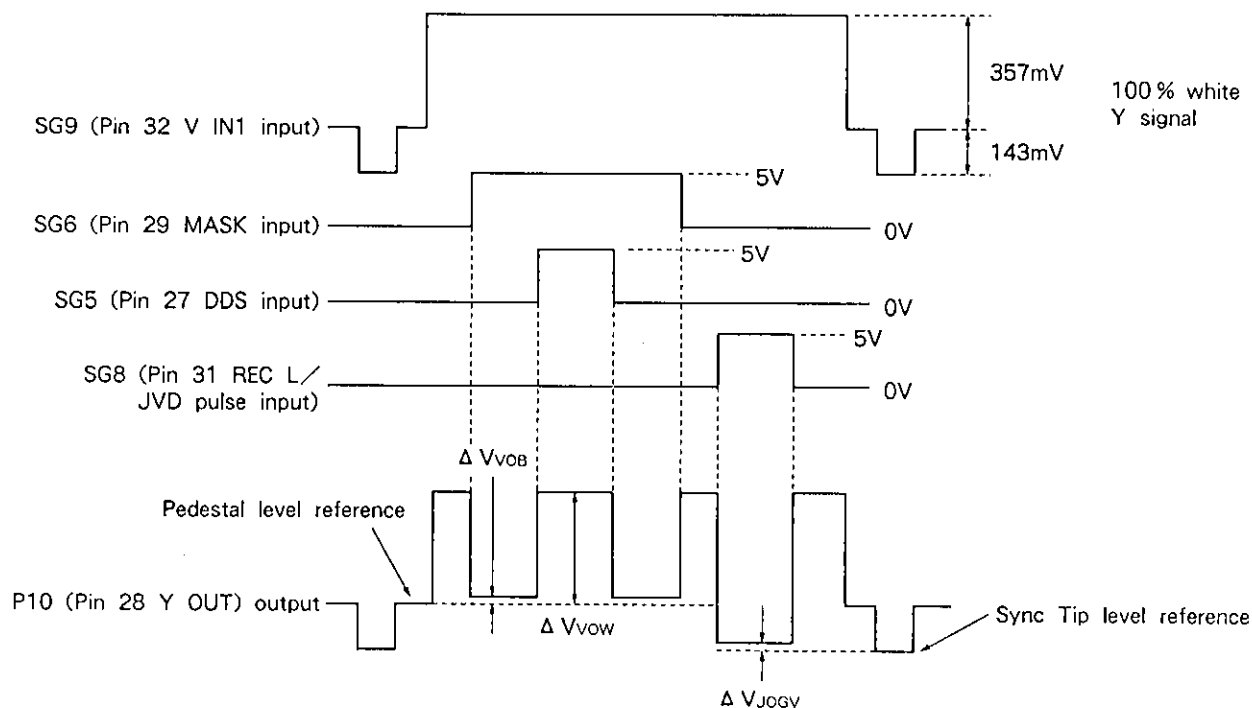
$$I_0' = \frac{V_0 - V_{(54)} \text{ (mV)}}{3.3 \text{ (k}\Omega\text{)}}$$

$V_{(54)}$: voltage on (54) CAR.



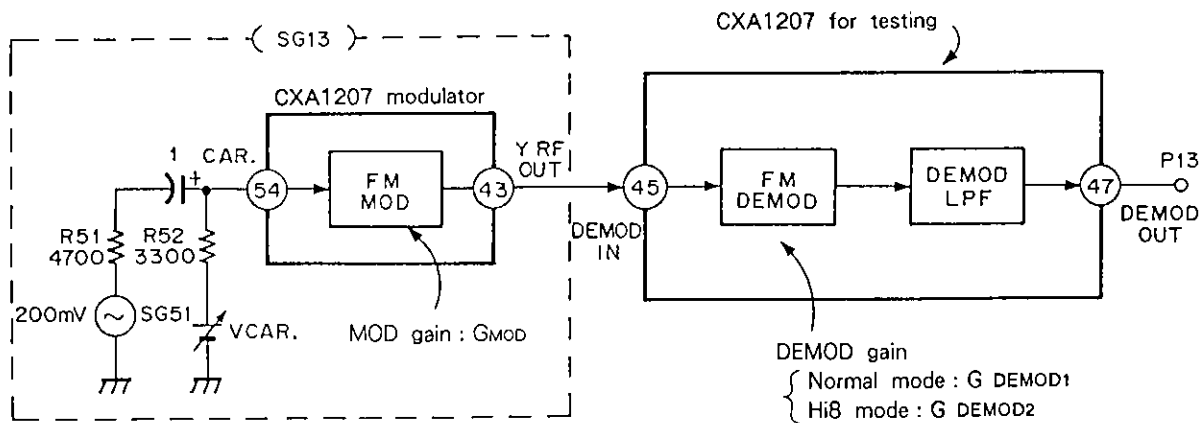
2. DDS measurement

When pulse signals are input according to the timing shown below, the output of P10 (Pin 28 Y OUT) is as shown in the diagram. Measure the various DC voltage differences.



3. DEMOD LPF frequency characteristics measurement

The SG13 configuration is as follows when a CXA1207 is used as the modulator.



First, with the SG51 input not applied, adjust $V_{CAR.}$ to set the carrier frequency ($= f_{CAR.}$) of SG13. In normal mode the carrier frequency $f_{CAR.}=5\text{MHz}$, and in Hi8 mode $f_{CAR.}=10\text{MHz}$.

In the above state, with 200mV, 300kHz input to SG51, measure the output gain on P13 (Pin 47 DEMOD OUT). This is $GLPF10$ in normal mode and $GLPF20$ in Hi8 mode. These values $GLPF10$ and $GLPF20$ are not the same as the design value of DEMOD LPF (low band gain approx. 0dB) because the MOD and DEMOD gain values must be taken into account. The compensation values required here are defined as follows.

$$\text{Normal mode compensation: } G_{C1} = 20 \log \frac{G_{MOD} (\text{kHz}/\mu\text{A}) \times G_{DEMOD1} (\text{mV/MHz})}{R_{51} (\Omega)} \quad (\text{dB})$$

$$\text{Hi8 mode compensation: } G_{C2} = 20 \log \frac{G_{MOD} (\text{kHz}/\mu\text{A}) \times G_{DEMOD2} (\text{mV/MHz})}{R_{51} (\Omega)} \quad (\text{dB})$$

Using these compensation values, obtain the DEMOD LPF low band gain ($GLPF11$ and $GLPF21$) as follows:

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

$$\text{Hi8 mode} : GLPF21 = GLPF20 - G_{C2} (\text{dB})$$

BUS DECODER mode condition table

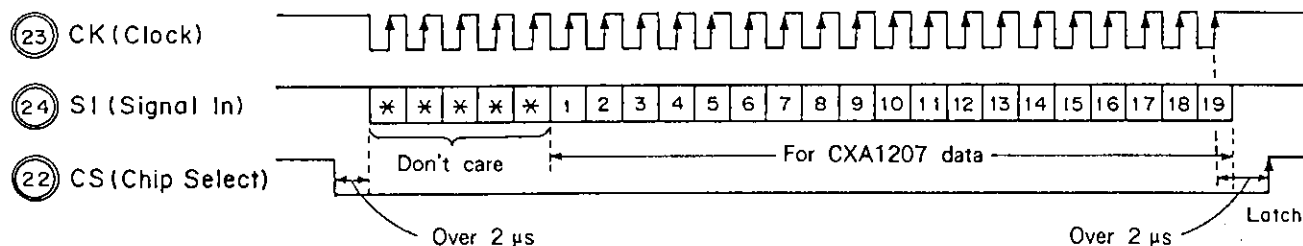
Mode condition	PB	S	INSEL	Video AGC	Discharge	W CCD	CCIR 443	EDIT	DOC OFF	Camera REC	E	CFL1	CFL2	NCL1	NCL2	NCLP1	NCLP2	Yd	CORRF OFF	Mode name
A	L	L	L	L	L	*	L	L	*	L	*	*	*	*	*	*	*	*	L	Video recording (Video AGC off)
B	L	H	L	L	L	*	L	L	*	L	*	*	*	*	*	*	*	*	L	Camera recording I (SREC I)
C	L	H	L	L	L	*	L	L	*	H	*	*	*	*	*	*	*	*	H	Camera recording II (SREC II)
D	H	*	*	*	L	*	L	*	*	*	L	*	*	*	*	*	*	*	L	Normal playback
E	H	*	*	*	L	*	L	*	*	*	H	*	*	*	*	*	*	*	L	Hi8 playback
F	L	L	L	H	L	*	L	L	*	L	*	*	*	*	*	*	*	*	L	Video recording (Video AGC on)
G	L	H	*	*	L	*	L	H	*	H	*	*	*	*	*	*	*	*	H	BPF measurement (EDIT ON)
H ₁	H	*	*	*	L	L	L	*	H	*	*	H	H	*	*	*	*	H	*	Playback Y comb filter ATT measurement
H ₂												L	H							
H ₃												H	L							
H ₄												L	L							
J ₁	H	*	*	*	L	*	*	*	*	*	*	*	*	H	H	H	L	*	*	Noise canceller measurement
J ₂														H	H	H	H			
J ₃														H	H	L	L			
J ₄														H	L	H	L			
J ₅														L	H	H	L			

* Don't care

Notes on Measurement

- Make the following adjustments before beginning the measurements.
 - Rec Level (Video AGC) adjustment
With the switches set as for Video AGC measurement, in mode condition F, input signal b (100% white 500mVp-p Y signal), and adjust VR2 so that the output on P10 (Pin 28 Y OUT) is 500mVp-p.
 - IR (reference current source) adjustment
Under exactly the same conditions as for measuring the fsc trap 3.58MHz frequency characteristics, adjust VR1 so that the sine wave 3.58MHz component is minimum.
- As shown in the measurement specification circuit diagram, set the switches to the normal closed position (•).
- Note that in the following measurements the characteristics vary depending on the floating capacitance:
White/dark clip amount
Pre-emphasis frequency characteristics (normal/Hi8)

BUS DECODER



Data Table

① CORRE OFF	H	Y correlation pulse signal is always low.	⑫ EDIT	H	Edit mode			
	L	Normal		L	Normal			
② Yd	H	During playback, uses Yd playback.	⑬ CCIR443	H	For fsc=4.43MHz			
	L	Normal		L	For fsc=3.58MHz			
③ NCLP2	During playback, changes noise canceller characteristics.		⑭ W CCD	H	Using two CCD delay lines for playback			
④ NCLP1				L	Using one CCD delay line for playback			
⑤ NCL2			⑮ Discahrge	H	The external clamping capacitance charge on Pins 32 and 34 is discharged.			
⑥ NCL1				L	Normal			
⑦ CFL2	PB Y comb filter depth standard value (low band input fine level)		⑯ Video AGC	H	Video AGC ON			
⑧ CFL1				CFL2 \ CFL1		L	Video AGC OFF	
			H	- 10dB	- 6dB	⑰ INSEL	H	For recording, Pin 34 V IN2 input
			L	- 1.5dB	0dB		L	For recording, Pin 32 V IN1 input
⑨ E	H	For Hi8 mode	⑱ S	H	For separate signals recording			
	L	For normal mode		L	For composite signal recording			
⑩ Camera REC	H	Camera recording mode	⑲ PB	H	Playback mode			
	L	Video recording mode		L	Recording mode			
⑪ DOC OFF	H	Drop-out compensation (D.O.C.) not carried out.						
	L	Normal						

Input Conditions

(Vcc=5.0V, Ta=25°C)

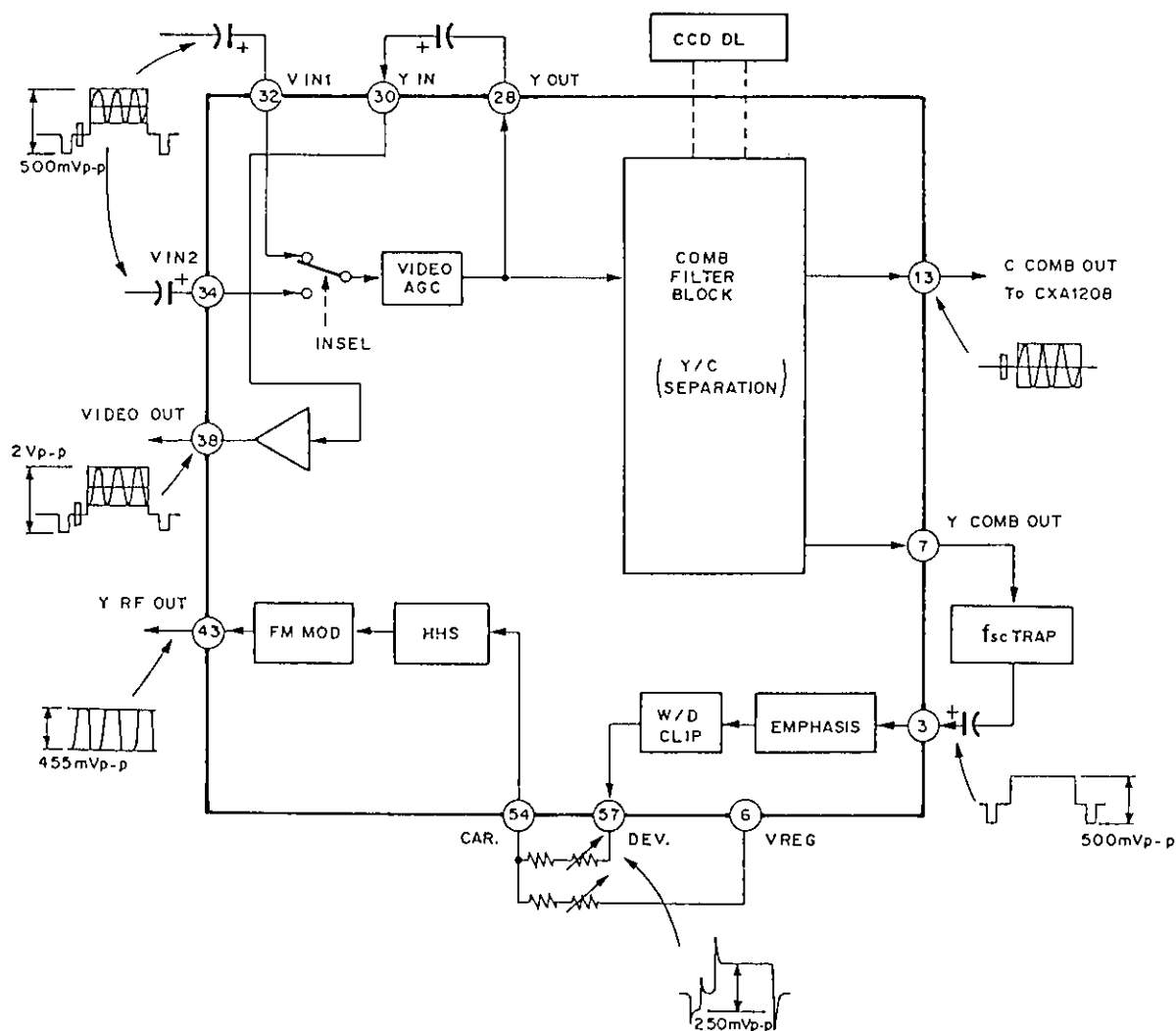
Item	Symbol	Min.	Typ.	Max.	Unit
Pins 22, 23 and 24 input high level	V _{B-H}	2.3			V
Pins 22, 23 and 24 input low level	V _{B-L}			1.9	V
Clock frequency	f _{CK}			550	kHz
SET UP Time	t _{su}	400			nsec
HOLD Time	t _{hld}	400			nsec
Time from CS dropping to SI starting	t ₁	2			μ sec
Time from last CK rising edge to CS rising	t ₂	2			μ sec

Description of Operation

1. Signal path during recording (example)

The video signal (composite signal) input to Pin 32 V IN1 and Pin 34 V IN2 is selected by the mode INSEL, and passes through the VIDEO AGC. Next, in the comb filter block Y/C separation is carried out, and the Y signal is output at Pin 7 Y COMB OUT, and the C signal at Pin 13 C COMB OUT. Next the Y signal is input to Pin 3 EMPH IN, and after undergoing emphasis, white/dark clip, half H shift and FM modulation, is output at Pin 43 Y RF OUT.

Again, the output from Pin 28 Y OUT is input to Pin 30 Y IN, and passes through the video output driver, and is output as a monitor signal.

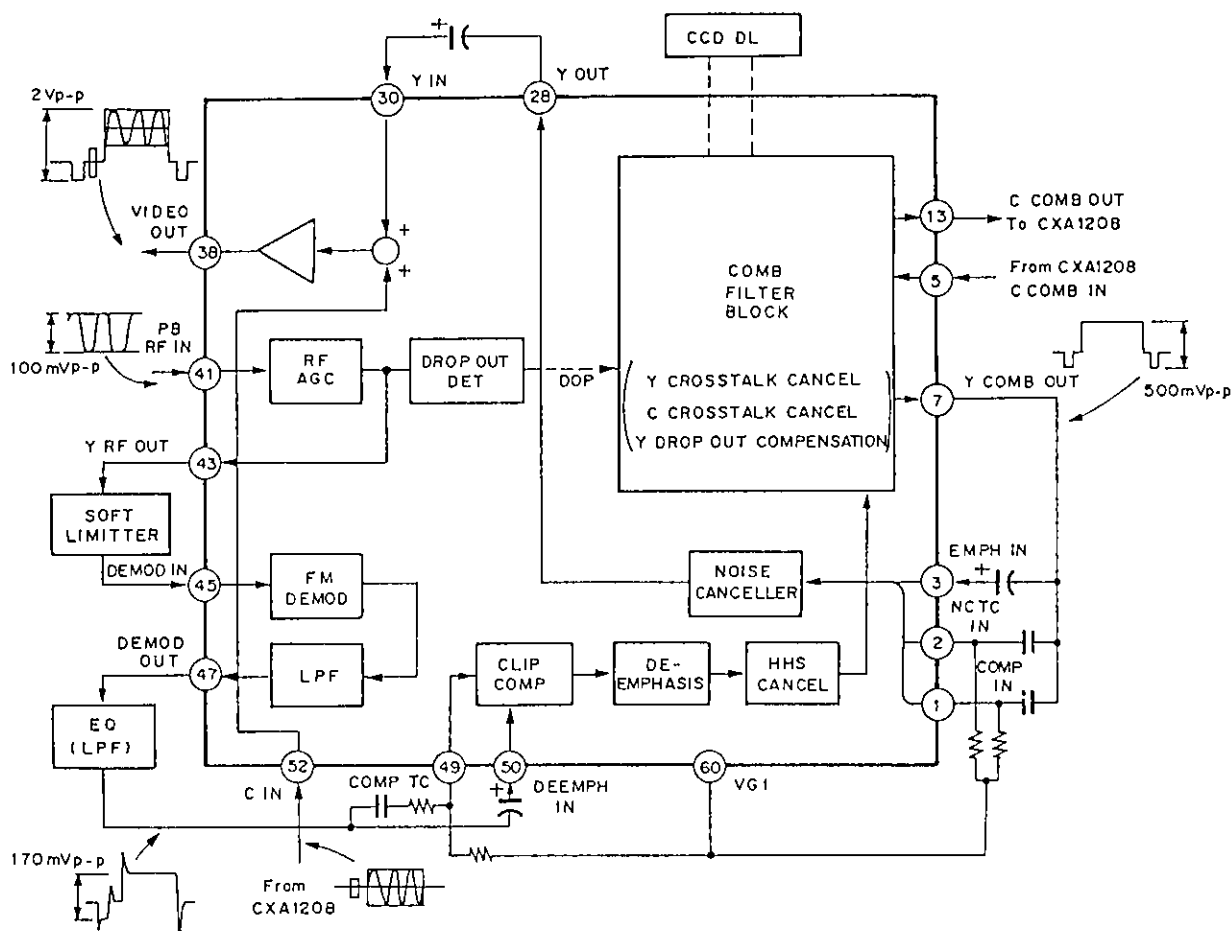


2. Signal path during playback (example)

The playback Y RF signal input to Pin 41 PB RF IN passes through RF AGC, and is output at Pin 43 Y RF OUT. After passing through the external soft limiter it is input to Pin 45 DEMOD IN, and is subject to FM demodulation. After FM demodulation, and passing through LPF, the output from Pin 47 DEMOD OUT passes through the external EQ (LPF) and is then input to Pin 50 DEEMPH IN; it is subject to clip compensation, deemphasis, and HHS cancel, and then is input to the comb filter block. The comb filter block carries out Y/C crosstalk cancellation, and the Y signal is output at Pin 7 Y COMB OUT. The C signal is input to Pin 5 C COMB IN, is subject to crosstalk cancellation, and is output at Pin 13 C COMB OUT.

RF drop-out detection is carried out, and when drop-out is detected, the Y drop-out compensation is applied within the comb filter block. The Y signal output of Pin 7 Y COMB OUT is input to Pin 3 EMPH IN, and passes through the noise canceller to be output at Pin 28 Y OUT.

When the playback Y signal (Pin 28 Y OUT) is input to Pin 30 Y IN, and the playback C signal is input to Pin 52 C IN, and passed through the Y/C mixing circuit to be output by the video output driver.



3. Settings for Normal/Hi8 Modes

	Item	Normal mode	Hi8 mode
1	Pre-emphasis frequency characteristics	Characteristics are changed by switching the external time constant.	
2	Y FM carrier frequency Deviation frequency	Both are adjusted by switching the respective external variable resistors.	
		Adjust to: carrier 4.2MHz deviation 1.2MHz	Adjust to: carrier 5.7MHz deviation 2.0MHz
3	White clip level	With Pin 62 W CLIP open circuit, will be 235% (typical value). *	Set the level by applying external bias to Pin 62.
4	Dark clip level	With Pin 53 D CLIP open circuit, will be 95% (typical value). *	Set the level by applying external bias to Pin 53.
5	FM demodulation	Characteristics are changed by switching the bus decoder mode (9) E).	
		Mode E=Low	Mode E=High
6	FM DEMODO LPF	Characteristics are changed by switching the bus decoder mode (9) E).	
		Mode E=Low Completely built-in to the IC.	Mode E=High An external LPF combined EQ is required.

* In normal mode also, by applying an external bias to Pin 62 or Pin 53, an arbitrary level can be set.

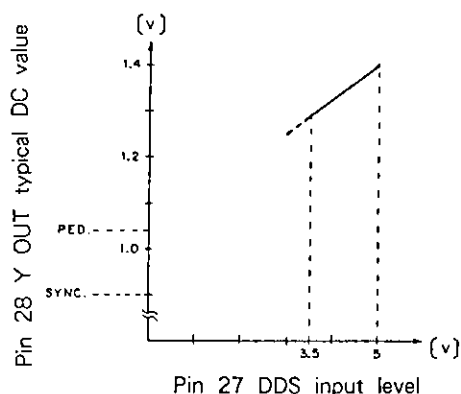
4. Description of DDS (Date Display System)

Logic for DDS, JOG VD Insert, and PCM After-recording HD Insert

Input			Output
Pin 31 REC L/JVD Common to JOG VD AR HD	Pin 29 MASK Common to MASK VOB	Pin 27 DDS VOW	Pin 28 Y OUT typical DC value
L	L	L	Normal
H	*	*	SYNC. 0.90V
L	H	L	PED. 1.04V
L	H	M	Gray 1.3V
L	H	H	White 1.4V

* Don't care

Input/output relationship



{ JOG VD : VD insert in JOG mode
 AR HD : HD insert in PCM After-recording
 MASK : Masking

{ PED. : Pedestal level
 SYNC. : Sync Tip level

Notes on Operation (See Application Circuit)

- The external fixed resistors R121, R122 and R123 for determining the emphasis/deemphasis characteristics should be metal film resistors with tolerances of $\pm 1\%$. Capacitor C132 should be a temperature compensated CH type.

Adjustment procedures for CXA1207AR/AQ and CXA1208R/Q (See Application Circuit)

1. REC Y level adjustment

Mode : Recording, 16 video AGC=high
 Input signal : Color bar 500mVp-p (CXA1207 Pin 32 V IN1)
 Adjustment method : With 75Ω connection to the CXA1207AR/AQ Pin 38 VIDEO OUT, adjust RV102 (EE LEVEL) to get 1Vp-p.

2. Y/C separation adjustment

Mode : Recording
 Input signal : Color bar 500mVp-p (CXA1207 Pin 32 V IN1)
 Adjustment method : Adjust in sequence RV113 (YC SEP), RV110 (COMB ADJ), RV113 (YC SEP), so that the CXA1207AR/AQ Pin 11 C+C₀ residual chroma component is minimum.

3. IR adjustment

Mode : Recording, with 2.5V to 3.5V applied to CXA1207AR/AQ Pin 51 SWP.
 Input signal : Color bar 500mVp-p (CXA1207 Pin 32 V IN1)
 Adjustment method : Adjust the IR adjustment variable resistor (RV109), so that the CXA1207AR/AQ Pin 7 Y COMB OUT residual chroma component is minimum. The residual chroma component is -20dB (Typ.) to the input chroma level.

4. Emphasis input Y level adjustment

Mode : Recording
 Input signal : Color bar 500mVp-p (CXA1207 Pin 32 V IN1)
 Adjustment method : Adjust RV115 (EMPH Y LEVEL), so that the CXA1207AR/AQ Pin 3 EMPH IN Y signal level is 500mVp-p.

5. YFM carrier adjustment

Mode : Recording, 9 E=Low (Normal mode), 9 E=High (Hi8 mode)
 Input signal : 100% white 500mVp-p (CXA1207 Pin 32 V IN1)
 Adjustment method : Watching the signal on the CXA1207AR/AQ Pin 43 Y RF OUT with a spectral analyzer, adjust RV119 (CAR) so that the H SYNC spectrum (carrier) is 4.2MHz in normal mode and 5.7MHz in Hi8 mode.

6. YFM deviation adjustment

Mode : Recording, 9 E=Low (Normal mode), 9 E=High (Hi8 mode)
 Input signal : 100% white 500mVp-p (CXA1207 Pin 32 V IN1)
 Adjustment method : Watching the signal on the CXA1207AR/AQ Pin 43 Y RF OUT with a spectral analyzer, adjust RV120 (DEV) so that the 100% white Y level spectrum is 5.4MHz in normal mode and 7.7MHz in Hi8 mode.

7. Playback Y level adjustment

Mode : Playback, 14 W CCD=Low (using 1 CCD delay line), 14 W CCD=High (using 2 CCD delay lines)
 Input signal : PB Y RF 100mVp-p (CXA1207 Pin 41 PB RF IN)
 Adjustment method : Adjust RV114 (PB Y LEVEL 1) to get 500mVp-p on the CXA1207AR/AQ Pin 21 DL IN1 when using one CCD delay line and on the CXA1207AR/AQ Pin 15 DL IN2 when using two CCD delay lines.

8. Playback Y level 2 adjustment

Mode : Playback
Input signal : PB Y RF 100mVp-p (CXA1207AR/AQ Pin 41 PB RF IN)
Adjustment method : With 75Ω connection to the CXA1207AR/AQ Pin 38 VIDEO OUT, adjust RV121 (PB Y LEVEL 2) to get 1Vp-p.

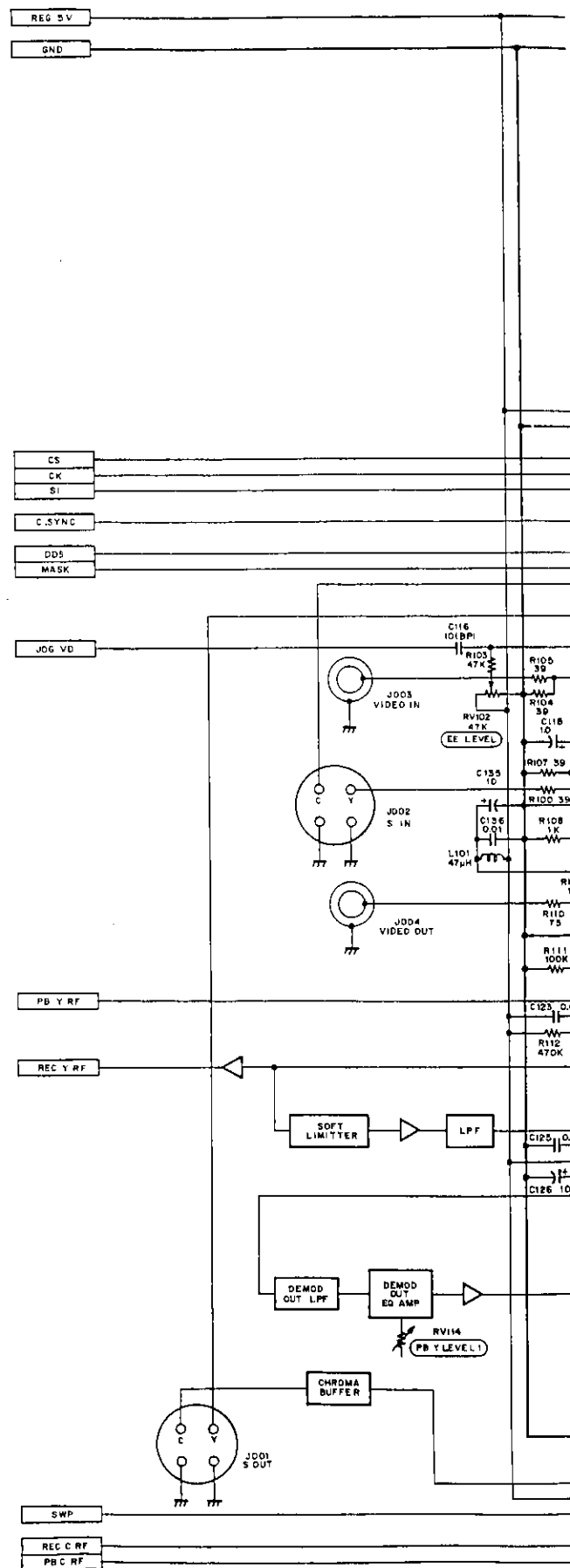
9. Chroma emphasis fo adjustment

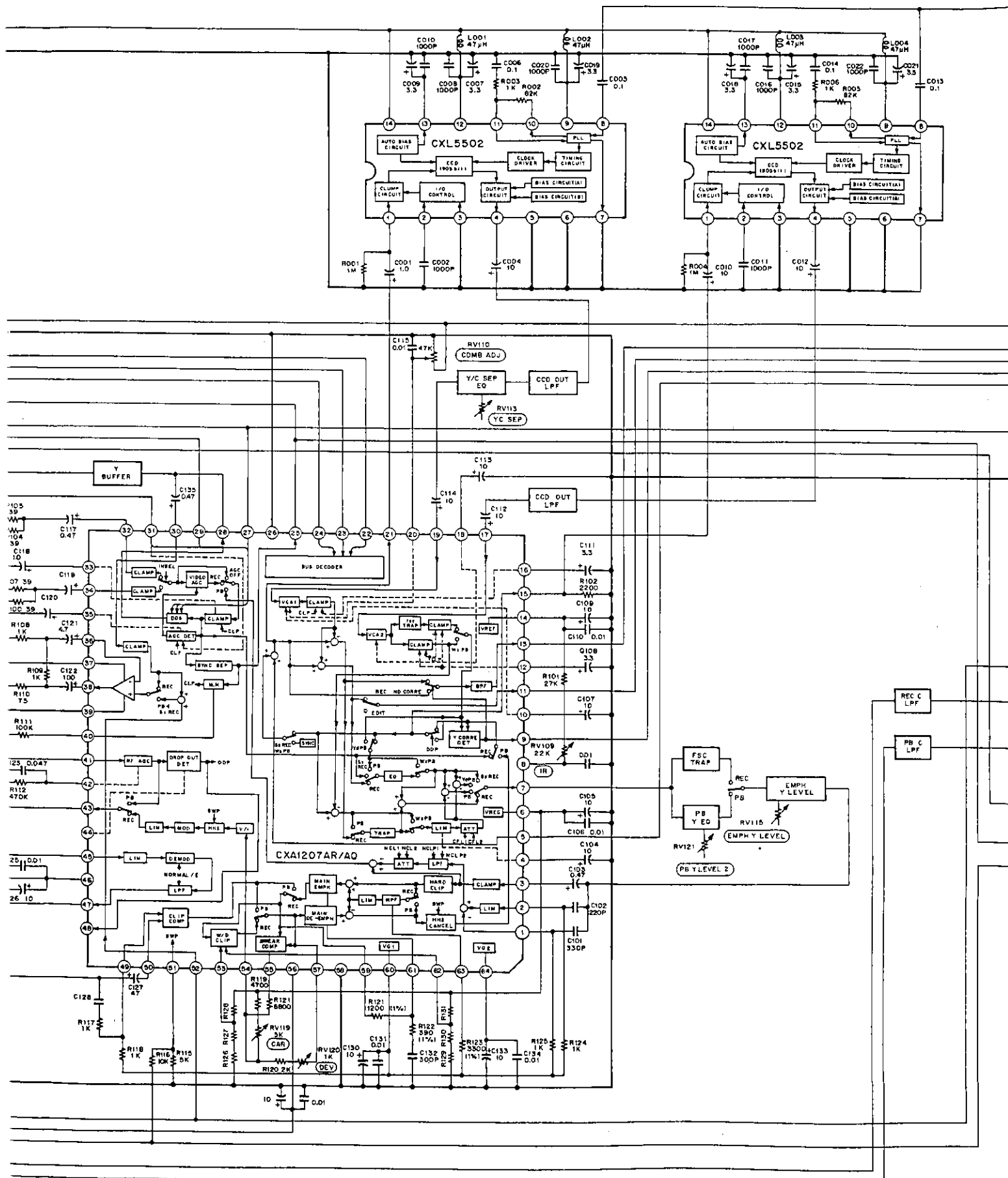
Mode : Recording
Input signal : Color bar 500mVp-p (CXA1207 Pin 32 V IN1)
Adjustment method : Adjust the core of the C EMPH FL107 attached to the CXA1208R/Q Pin 28 C EMPH 1, so that the level of the flat portion of the chroma signal on the CXA1208R/Q Pin 24 B EMPH OUT is minimum. (The CXA1208 Pin 24 should have 3.3kΩ connected to ground.)

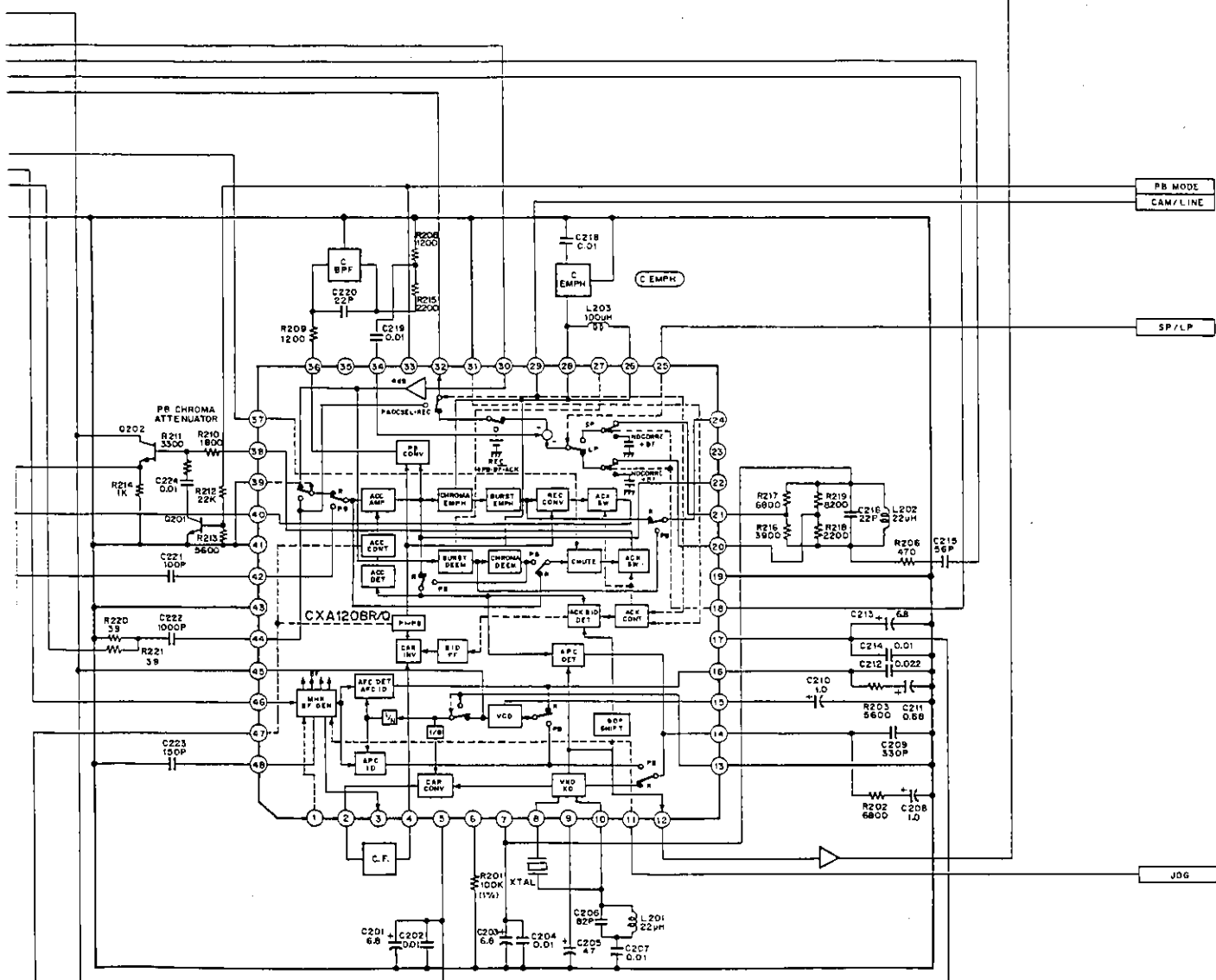
Adjustment sequence modes

- 16, 9, and 14 indicate the data value numbers of the CXA1207AR/AQ BUS DECODER.
- Recording: The CXA1207AR/AQ BUS DECODER 19 PB=Low, and the CXA1208R/Q Pin 33 (PB) is low.
- Playback: The CXA1207AR/AQ BUS DECODER 19 PB=High, and the CXA1208R/Q Pin 33 (PB) is high.

Application Circuit (NTSC, Hi8 mode)

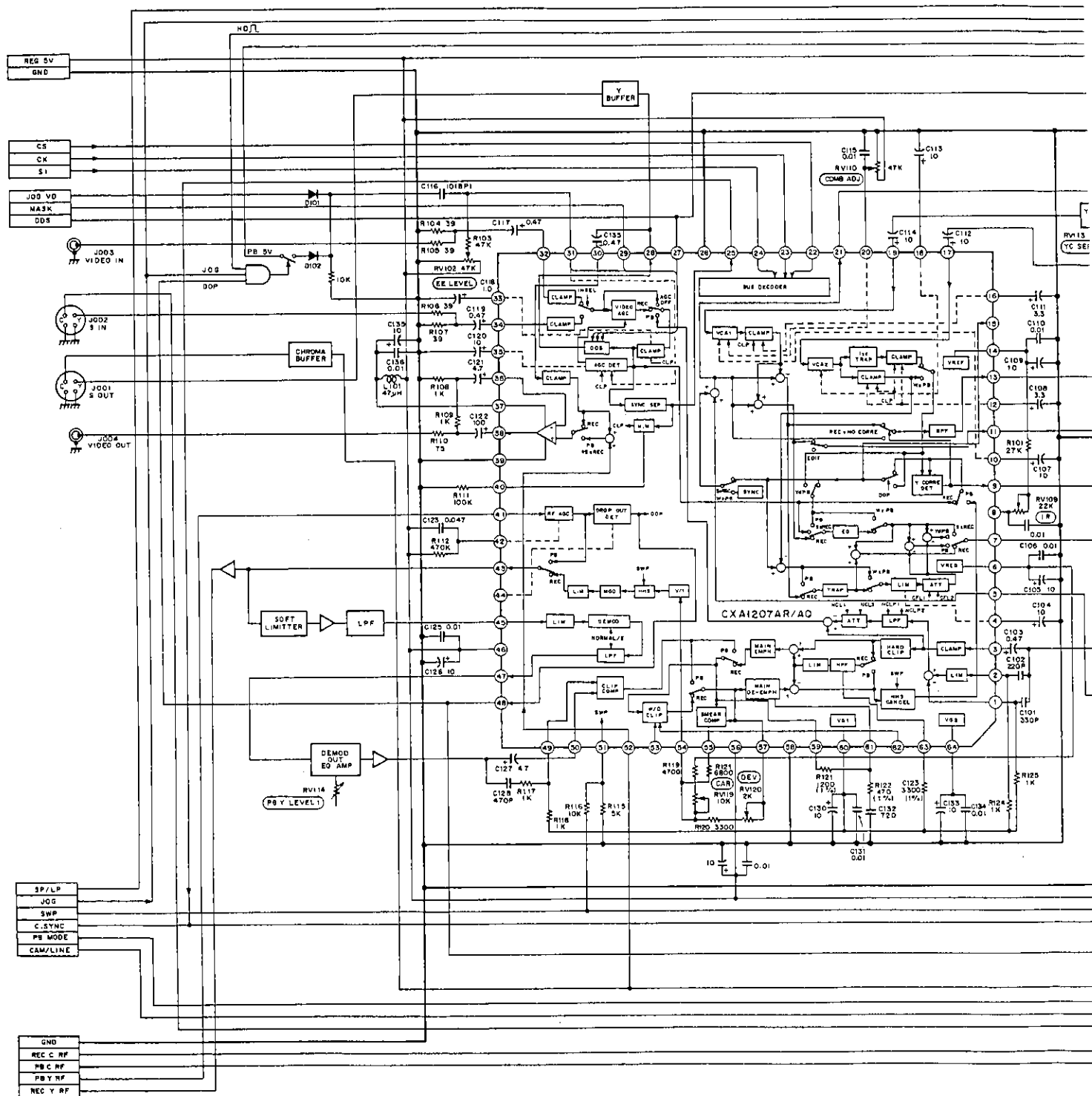


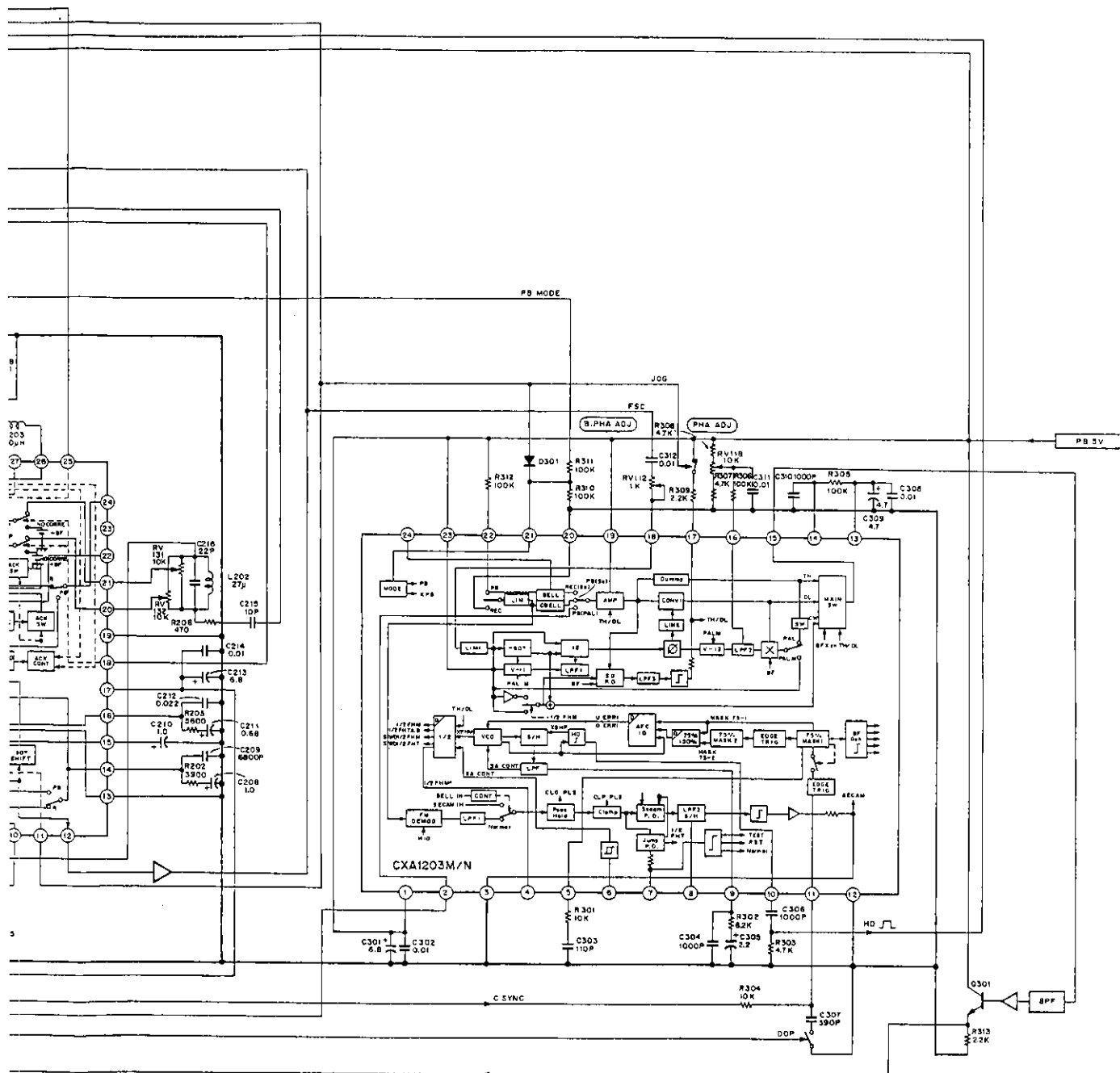




Application circuits shown are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

Application Circuit (PAL, normal mode)



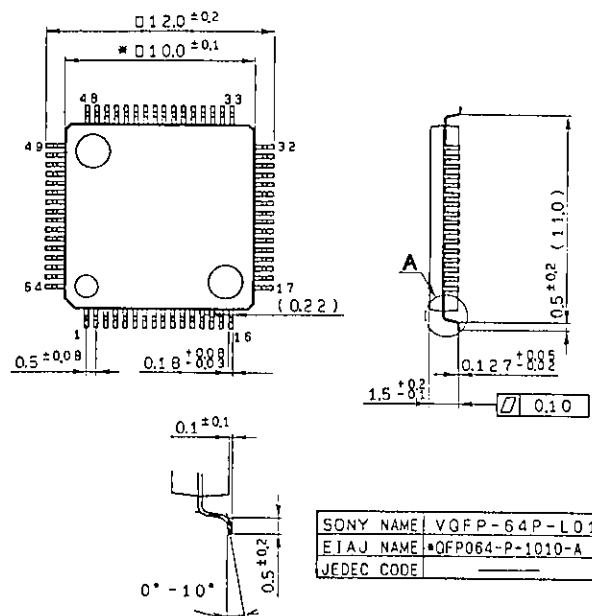


Application circuits shown are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

Package Outline Unit : mm

CXA1207AR

64pin VQFP (Plastic) 0.3g



Detailed diagram of A

Note) Dimensions marked with *
does not include resin residue.

CXA1207AQ

64pin QFP (Plastic) 1.5g

