AN3501NFBP

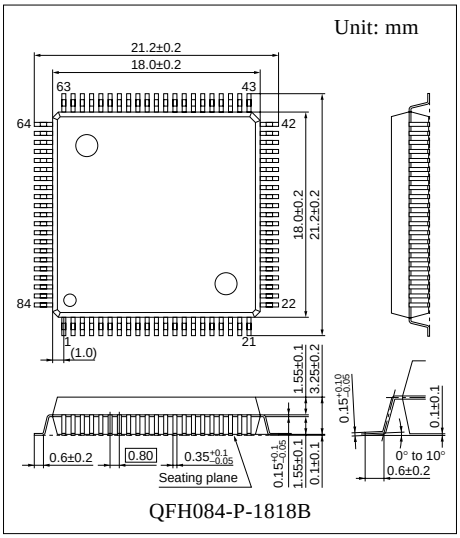
Luminance, chroma and linear audio signal processing IC for VCR

■ Overview

The AN3501NFBP is a luminance, chroma signal processing IC for VCR (PAL and NTSC). It also integrates a playback equalizer and an NTSC playback circuit.

A normal audio signal recording/playback circuit is added so as to design a signal processing PCB in common for both a HiFi and a normal model, resulting in space saving of equipment.

This IC is a completely adjustment-free device which has been realized by introducing a adjustment-free technology such as a Zener zap, and contributes to a more efficient design/development and production of an equipment.



QFH084-P-1818B

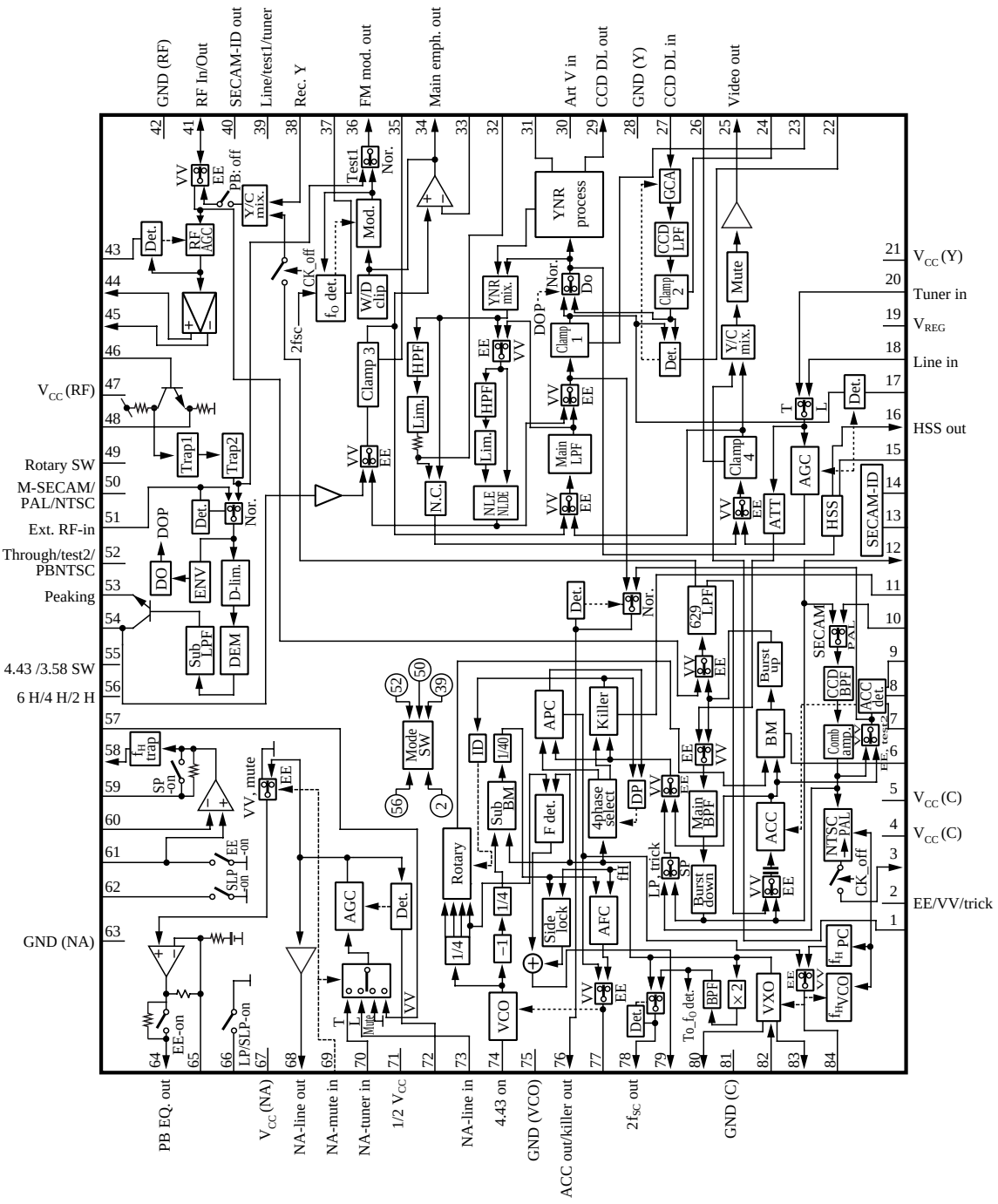
■ Features

- Supply voltage range 4.8 V to 5.2 V (600 mW typ.)
  - Usable for 4.43 MHz/3.58 MHz systems
  - 4.43 MHz system: PAL/NTSC/ME-SECAM
  - 3.58 MHz system: NTSC/PAL-N
- Adjustment-free
  - Video output level (recording mode)
  - Video output level (playback mode)
  - White clip level
  - f_O frequency: sync. tip frequency
  - FM deviation
  - FM level (recording mode)
  - Chroma level (recording mode)
- Normal audio circuit built in
- NTSC to PAL conversion by adopting a simplified NTSC playback circuit of a line skip method.
- ME-SECAM discrimination circuit built-in
- All filters built-in, including a CCD filter
- The upper part flicker suppression by adoption of an ACC circuit by the field and an adaptive APC circuit

■ Applications

- VCR, camera recorder, combined CTV/VCR set

■ Block Diagram



■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	Y/C mix. chroma input pin	38	Rec. Y-mix. in
2	EE/VV/trick changeover	39	Line/test1/tuner changeover
3	PB chroma output	40	SECAM-ID out
4	Chroma $V_{CC(1)}$	41	RF In/Out
5	Chroma $V_{CC(2)}$	42	RF GND
6	BM DC det.	43	RF AGC det./EE edit high
7	ACC det.	44	Phase shift pos.
8	F. ACC det. (ROT: high)	45	Phase shift neg.
9	F. ACC det. (ROT: low)	46	Phase shift in
10	C comb filter input	47	RF V_{CC}
11	Killer det.	48	RF EQ. peaking/SQPB high
12	C comb filter output	49	Rotary in
13	SECAM det. 1	50	M-SECAM/PAL/NTSC changeover
14	SECAM det. 2	51	Ext. RF in
15	Sync. sepa. det.	52	Through/test2/PBNTSC changeover
16	HSS out	53	Peaking
17	AGC det.	54	Main de-emphasis
18	Line in	55	4.43 MHz/3.58 MHz changeover
19	V_{REG} (2.0 V)	56	SLP/LP/SP changeover
20	Tuner in	57	NA-PB amp. in
21	Lumi. V_{CC}	58	NA-PB EQ. out
22	CCD AGC det.	59	NA-PB EQ. SW
23	Sub clamp det. 1	60	NA-PB NF
24	Sub clamp det. 2	61	NA-PB in
25	Video out	62	NA-PB in EQ./SLP
26	Sub clamp det. 4	63	NA GND
27	CCD DL in	64	NA-rec. out
28	Lumi. GND	65	NA-rec. EQ. NF
29	CCD DL out	66	NA-rec. EQ. LP/SLP
30	Quasi-sync. pulse input	67	NA V_{CC}
31	YNR lim. DC	68	NA-line out
32	N.C. LPF	69	NA-mute in
33	Main emph. FB in/VV edit high	70	NA-tuner in
34	Main emph. out	71	1/2 V_{CC}
35	Sub clamp det. 3	72	NA-AGC det.
36	FM mod. out	73	NA-line in
37	f_O det.	74	VCO f_O

■ Pin Descriptions (cntinued)

Pin No.	Description	Pin No.	Description
75	VCO GND	80	XO/VCXO out
76	ACC out/killer out	81	C GND
77	Rec. AFC/PB APC det.	82	XO/VCXO in
78	$2f_{SC}$ out	83	XO/VCXO out
79	Side lock det.	84	Rec. APC/f_H AFC det.

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	5.5	V
Supply current	I_{CC}	175	mA
Power dissipation *2	P_D	660	mW
Operating ambient temperature *1	T_{opr}	−20 to +70	°C
Storage temperature *1	T_{stg}	−25 to +125	°C

Note) 1. *1: Except for the operating ambient temperature and storage temperature, all ratings are for T_a = 25°C.
*2: The power dissipation shown is for the IC package at T_a = 70°C

■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V_{CC}	4.8 to 5.2	V

■ Electrical Characteristics at V_{CC} = 5 V, T_a = 25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
DC characteristics						
Supply current (EE)	I_{CCR}	V_{CC} = 5 V, EE mode	92	117	144	mA
Supply current (VV)	I_{CCP}	V_{CC} = 5 V, VV mode	105	133	164	mA
High mode hold voltage	V_H	Pin 2, pin 39, pin 50, pin 52, pin 56	3.5	—	5.0	V
Middle mode hold voltage	V_M	Pin 2, pin 39, pin 50, pin 52, pin 56	1.75	—	3.0	V
Low mode hold voltage	V_L	Pin 2, pin 39, pin 50, pin 52, pin 56	0	—	1.25	V
Sync. level insertion mode hold voltage	V_{30H}		3.5	—	5.0	V
Gray level insertion mode hold voltage	V_{30M}		1.5	—	3.0	V
Through mode hold voltage	V_{30L}		0	—	1.0	V
Rotary SWH hold voltage	V_{49H}		3.5	—	5.0	V
Rotary SWL hold voltage	V_{49L}		0	—	1.25	V
4.43 MHz mode hold voltage	V_{55H}		1.75	—	5.0	V
3.58 MHz mode hold voltage	V_{55L}		0	—	1.25	V

■ Electrical Characteristics at V_{CC} = 5 V, T_a = 25°C (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
DC characteristics (continued)						
Audio mute hold voltage	V_{69H}		3.5	—	5.0	V
Audio through hold voltage	V_{69L}		0	—	1.25	V
After-recording mode hold voltage	V_{70H}		4.0	—	5.0	V
Insertion mode hold voltage	V_{70L}		0	—	1.0	V
VV edit mode hold voltage	V_{33H}		4.0	—	5.0	V
EE edit mode hold voltage	V_{43H}		4.0	—	5.0	V
SQPB mode hold voltage	V_{48H}		3.25	—	5.0	V
Luminance recording system						
AGC characteristics	$\Delta V_{18\text{-}25}$	White 100%, V_{IN} = [2.0 V[p-p]]/[0.5 V[p-p]]	– 0.5	0.5	1.0	dB
EE out amplitude (PAL)	$V_{20\text{-}25P}$	White 100%, V: S = 7: 3, V_{IN} = 1 V[p-p]	1.995	2.1	2.205	V[p-p]
AGC frequency characteristics	$f_{20\text{-}25}$	f_{IN} = 5 MHz/1 MHz	–2.0	– 0.5	0.5	dB
AGC output level ratio	$\Delta V_{20\text{-}25}$	White 140%, 1.28 V[p-p], Ratio to $V_{20\text{-}25P}$	0.05	0.55	1.25	dB
EE out amplitude (NTSC)	$V_{20\text{-}25N}$	White 100%, V = 0.714 V[p-p], V_{IN} = 1 V[p-p]	1.9	2.1	2.3	V[p-p]
M LPF frequency characteristics 1	$f_{18\text{-}76(1)}$	4.43 MHz mode, V_{IN} = 100 mV[p-p] f_{IN} = 2 MHz/0.15 MHz	–1.7	0.1	0.9	dB
M LPF frequency characteristics 2	$f_{18\text{-}76(2)}$	4.43 MHz mode, V_{IN} = 100 mV[p-p] f_{IN} = 3 MHz/0.15 MHz	–4.2	–2.2	–0.7	dB
M LPF frequency characteristics 3	$f_{18\text{-}76(3)}$	4.43 MHz mode, V_{IN} = 100 mV[p-p] f_{IN} = 4.43 MHz/0.15 MHz	—	–35	–30	dB
M LPF frequency characteristics 4	$f_{18\text{-}76(4)}$	3.58 MHz mode, V_{IN} = 100 mV[p-p] f_{IN} = 2.2 MHz/0.15 MHz	–4.8	–1.8	0.2	dB
M LPF frequency characteristics 5	$f_{18\text{-}76(5)}$	3.58 MHz mode, V_{IN} = 100 mV[p-p] f_{IN} = 3.58 MHz/0.15 MHz	—	–39	–27	dB
Sync. separation minimum input sensitivity	S_{16}	White 100%, V_{IN} = 0.145 V[p-p], Pin 76 amplitude	23	30	37	%
Sync. separation output pulse front-edge delay	T_{16}	White 100%, V_{IN} = 1.0 V[p-p], including LPF	1.14	1.34	1.54	µs
Sync. separation low-level output pulse	V_{16L}	R_L (V_{CC}) = 10 kΩ	—	—	0.7	V
Sync. separation high-level output pulse	V_{16H}	R_L (GND) = 22 kΩ	4.5	—	—	V
Vertical emph. 1-K value gain 1	$G_{76\text{-}29(1)}$	V_{76} = 400 mV[p-p], LP, f_{IN} = 150 kHz	–3.0	–1.5	0	dB
Vertical emph. 1-K value gain 2	$G_{76\text{-}29(2)}$	V_{76} = 400 mV[p-p], LP, f_{IN} = 2 MHz	–1.5	0	1.5	dB
Vertical emph. difference signal amplitude	ΔV_{VE}	White 100%, 1 V[p-p]	—	30	100	mV[p-p]

■ Electrical Characteristics at V_{CC} = 5 V, T_a = 25°C (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Luminance recording system (continued)						
Vertical emph. X value gain	$G_{31\text{-}33}$	V_{IN} = 40 mV[p-p], f_{IN} = 150 kHz	−18.5	−15.0	−11.5	dB
CCD input output level	V_{29}	V_{IN} = 1 V[p-p], white 100%	375	405	440	mV[p-p]
NL emphasis/detail enhancer frequency characteristics 1	$G_{NE(1)}$	SP/edit: V_{76} = −20 dB, f_{IN} = 500 kHz/150 kHz	0.4	1.2	2.0	dB
NL emphasis/detail enhancer frequency characteristics 2	$G_{NE(2)}$	SP/edit: V_{76} = −20 dB, f_{IN} = 2 MHz/150 kHz	1.7	2.9	4.1	dB
NL emphasis/detail enhancer frequency characteristics 3	$G_{NE(3)}$	SP/normal: V_{76} = −20 dB, f_{IN} = 500 kHz/150 kHz	1.1	2.1	3.1	dB
NL emphasis/detail enhancer frequency characteristics 4	$G_{NE(4)}$	SP/normal: V_{76} = −20 dB, f_{IN} = 2 MHz/150 kHz	3.2	4.7	6.2	dB
NL emphasis/detail enhancer frequency characteristics 5	$G_{NE(5)}$	LP: V_{76} = −20 dB, f_{IN} = 500 kHz/150 kHz	2.54	3.84	5.14	dB
NL emphasis/detail enhancer frequency characteristics 6	$G_{NE(6)}$	LP: V_{76} = −20 dB, f_{IN} = 2 MHz/150 kHz	3.9	5.9	7.9	dB
NL emphasis/detail enhancer frequency characteristics 7	$G_{NE(7)}$	LP: V_{76} = 0 dB, f_{IN} = 2 MHz/150 kHz	0.2	0.9	1.6	dB
Main emphasis gain	G_{ME}	1 kΩ/220+0.1 µF, f_{IN} = 150 kHz	13	15	17	dB
Main emphasis standard output level	V_{ME}	White 100%, 1 V[p-p]	350	400	450	mV[p-p]
White clip level	LV_{WC}	White 100%	176	183	190	%
Dark clip level	LV_{DC}	White 100%	43	55	65	%
FM mod. output frequency (4.43 PAL)	f_{36P}	No input 4.43 MHz mode, PAL mode	3.75	3.81	3.85	MHz
FM mod. output frequency (4.43 NTSC)	$f_{36N(1)}$	No input 4.43 MHz mode, NTSC mode	3.37	3.47	3.57	MHz
FM mod. output frequency (3.58 NTSC)	$f_{36N(2)}$	No input 3.58 MHz mode, NTSC mode	3.29	3.39	3.49	MHz
FM mod. output secondary distortion (PAL)	$2f_{36P}$	No input PAL mode	—	−45	−35	dB
FM mod. deviation (PAL)	D_{36P}	White 100%	0.95	1.0	1.05	MHz
FM mod. deviation (NTSC)	D_{36N}	White 100%	0.9	1.0	1.1	MHz
Rec. FM total output amplitude (PAL)	V_{FM}	V_{36} /4 × $G_{38\text{-}41}$, V_{36}: pin 36 amplitude	332.5	350	367.5	mV[p-p]
Rec. FM amp. frequency characteristics	$f_{38\text{-}41}$	10 MHz/4 MHz	−2.5	− 0.5	0.5	dB
Luminance playback system						
FM demodulation sensitivity (VHS)	ΔV_{53V}	Pin 51 input, f_{IN} = 3.8 MHz, 4.8 MHz	0.13	0.175	0.22	V/MHz
FM demodulation sensitivity (SQPB)	ΔV_{53S}	Pin 51 input, f_{IN} = 5.4 MHz, 7.0 MHz	0.13	0.175	0.22	V/MHz

■ Electrical Characteristics at V_{CC} = 5 V, T_a = 25°C (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Luminance playback system (continued)						
PB output amplitude	V_{PB}	Pin 51 input, f_{IN} = 3.8 MHz, 4.8 MHz	1.995	2.1	2.205	V[p-p]
Drop out detect SW on level	S_{51}	f_{IN} = 4 MHz, 0 dB = 350 mV[p-p]	–22	–18	–14	dB
Drop out detect hysteresis	ΔS_{51}	f_{IN} = 4 MHz, 0 dB = 350 mV[p-p]	1.0	3.0	5.0	dB
Env. detect SW operating time	T_{ENV}	AM wave 1 kHz, V_{IN} = 350 mV, f_{IN} = 4 MHz	180	224	270	µs
NL de-emphasis frequency characteristics 1	$G_{ND(1)}$	SP: V_{IN} = –20 dB, f_{IN} = 500 kHz/150 kHz	–2.7	–1.7	– 0.7	dB
NL de-emphasis frequency characteristics 2	$G_{ND(2)}$	SP: V_{IN} = –20 dB, 2 MHz/150 kHz	–5.5	–4.2	–3.0	dB
NL de-emphasis frequency characteristics 3	$G_{ND(3)}$	LP: V_{IN} = –20 dB, f_{IN} = 500 kHz/150 kHz	–6.2	–3.9	–2.2	dB
NL de-emphasis frequency characteristics 4	$G_{ND(4)}$	LP: V_{IN} = –20 dB, 2 MHz/150 kHz	–9.0	–7.5	–6.2	dB
NL de-emphasis frequency characteristics 5	$G_{ND(5)}$	LP: V_{IN} = 0 dB, 2 MHz/150 kHz	–2.7	–2.0	–1.3	dB
YNR 1-K value gain EDNC	$G_{54\text{-}29E}$	White 100%, V_{IN} = 160 mV[p-p]	4.5	6.0	7.5	dB
YNR 1-K value gain VNC	$G_{54\text{-}29V}$	White 100%, V_{IN} = 160 mV[p-p]	1.8	3.3	4.8	dB
YNR difference element amplitude EDNC	ΔV_{EDNC}	Rectangular wave, V_{IN} = 160 mV[p-p]	—	30	100	mV[p-p]
YNR difference element amplitude VNC	ΔV_{VNC}	Rectangular wave, V_{IN} = 160 mV[p-p]	—	10	100	mV[p-p]
YNR X value gain EDNC	$G_{31\text{-}25E}$	V_{IN} = 40 mV[p-p], f_{IN} = 150 kHz	–4.9	–2.9	–1.3	dB
YNR X value gain VNC	$G_{31\text{-}25V}$	V_{IN} = 40 mV[p-p], f_{IN} = 150 kHz	0.6	2.1	3.6	dB
YNR lim. (VNC) output level 1	$V_{25YL(1)}$	V_{IN} = 800 mV[p-p], f_{IN} = 150 kHz	26	40	53	mV[p-p]
YNR lim. (VNC) output level 2	$V_{25YL(2)}$	V_{IN} = 300 mV[p-p], f_{IN} = 150 kHz	13.5	25.0	37.0	mV[p-p]
YNR lim. (VNC) output level 3	$V_{25YL(3)}$	V_{IN} = 100 mV[p-p], f_{IN} = 150 kHz	80	110	140	mV[p-p]
CCD AGC cover range	ΔV_{31}	V_{54} = 160 mV[p-p], rectangular wave, CCD Gain ±3 dB	0	30	100	mV[p-p]
Noise cancellar frequency characteristics 1	$G_{25N(1)}$	Normal mode, V_{27} = –30 dB, Including CCD LPF, f_{IN} = 1 MHz/150 kHz	–13.0	–8.0	–4.8	dB
Noise cancellar frequency characteristics 2	$G_{25N(2)}$	Normal mode, V_{27} = –30 dB, Including CCD LPF, f_{IN} = 2 MHz/150 kHz	–9.3	–4.5	–2.3	dB
Noise cancellar frequency characteristics 3	$G_{25N(3)}$	Normal mode, V_{27} = 0 dB, Including CCD LPF, f_{IN} = 2 MHz/150 kHz	– 0.8	1.2	2.7	dB
Noise cancellar frequency characteristics 4	$G_{25N(4)}$	Edit mode, V_{27} = –30 dB, Including CCD LPF, f_{IN} = 2 MHz/150 kHz	– 0.3	–1.0	0.5	dB
Video output sync. DC level	ΔV_{SYNC}	White 100%, V_{27} = 317 mV[p-p]	0.8	0.95	1.1	V
Video output quasi-V offset voltage	ΔV_{25A}	V_{30} = 5 V	–30	0	60	mV
Video output quasi-H offset voltage	ΔV_{25G}	V_{30} = 2.5 V	0.85	1.0	1.15	V

■ Electrical Characteristics at V_{CC} = 5 V, T_a = 25°C (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Luminance playback system (continued)						
Chroma mix. output gain	$G_{1\text{-}25}$	V_{IN} = 600 mV[p-p], f_{IN} = 5 MHz	4.9	6.6	8.3	dB
Chroma mix. frequency characteristics	$f_{1\text{-}25}$	V_{IN} = 600 mV[p-p], f_{IN} = 5 MHz/1 MHz	– 0.5	0.3	1.0	dB
RF-AGC output amplitude	$V_{41\text{-}45}$	V_{IN} = 200 mV[p-p], f = 4 MHz	170	215	265	mV[p-p]
RF-AGC sensitivity	S_{RF}	±6 dB input	—	0.5	3.0	dB
RF-AGC output distortion	D_{RF}	V_{IN} = 400 mV[p-p], f = 4 MHz	—	–44	–35	dB
RF-AGC maximum gain	G_{RFAGC}	V_{IN} = 20 mV[p-p], f = 4 MHz	8.5	10.5	12.5	dB
RF-EQ. frequency characteristics 2	GEQ2	V_{IN} = 20 mV[p-p], f = 1 MHz/5 MHz	–24.0	–15.0	–9.0	dB
RF-EQ. frequency characteristics 3	GEQ3	f = 2 MHz/5 MHz	–9.8	–5.3	–3.3	dB
RF-EQ. frequency characteristics 4	GEQ4	f = 630 kHz/5 MHz	—	–30	–15	dB
RF-EQ. frequency characteristics 5	GEQ5	f = 8 MHz/5 MHz	—	–30	–15	dB
RF-EQ. total characteristics	$V_{41\text{-}36}$	V_{IN} = 200 mV[p-p]	305	435	605	mV[p-p]
Chroma recording system						
Output DC for color	V_{76CO}	Color, V_{11} = 3.5 V	3.5	—	—	V
Output DC for killer	V_{76CK}	Killer, V_{11} = 1.5 V	—	—	0.5	V
Burst up gain	G_{BUP}	V_{IN} = 1: 1 (B = 300 mV[p-p])	5	6	7	dB
Rec. APC pull in range 1	$f_{APC(1)}$	4.43 MHz mode, $f_{IN} = f_{SC}$ +500 Hz	500	800	—	Hz
Rec. APC pull in range 2	$f_{APC(2)}$	4.43 MHz mode, $f_{IN} = f_{SC}$ –500 Hz	—	–800	–500	Hz
Rec. APC pull in range 3	$f_{APC(3)}$	3.58 MHz mode, $f_{IN} = f_{SC}$ +500 Hz	500	800	—	Hz
Rec. APC pull in range 4	$f_{APC(4)}$	3.58 MHz mode, $f_{IN} = f_{SC}$ –500 Hz	—	–800	–500	Hz
VXO free-run frequency 1	$f_{VXO(1)}$	4.43 MHz mode, SECAM mode	–100	0	100	Hz
VXO free-run frequency 2	$f_{VXO(2)}$	3.58 MHz mode, SECAM mode	–100	0	100	Hz
Rec. chroma output amplitude	V_{CR}	B: C = 1: 2 chroma level	75.6	82	88.4	mV[p-p]
ACC characteristics 1	ΔV_{ACC1}	V_{IN} = 1: 1, +9, –5 dB, V_{49} = 5 V	—	—	3	dB
ACC characteristics 2	ΔV_{ACC2}	V_{IN} = 1: 1, +9, –5 dB, V_{49} = 0 V	—	—	3	dB
630k LPF frequency characteristics 1	$f_{RL(1)}$	4.43 MHz mode, V_{IN} = 200 mV[p-p], 150 kHz/630 kHz	– 0.7	0.3	1.3	dB
630k LPF frequency characteristics 2	$f_{RL(2)}$	4.43 MHz mode, V_{IN} = 200 mV[p-p], 3 MHz/630 kHz	—	–25	–15	dB
630k LPF frequency characteristics 3	$f_{RL(3)}$	4.43 MHz mode, V_{IN} = 200 mV[p-p], 4.43 MHz/630 kHz	—	–35	–20	dB
630k LPF group delay	GD_{RL}	4.43 MHz mode, V_{IN} = 200 mV[p-p], f_{IN} = 630 kHz	310	360	410	ns
630k LPF frequency characteristics 4	$f_{RL(4)}$	3.58 MHz mode, V_{IN} = 200 mV[p-p], 2 MHz/630 kHz	–2.0	0	2.0	dB
SECAM discrimination output DC 1	$V_{40(1)}$	4.43 MHz mode, PAL mode, f_{IN} = 4.43 MHz	0	—	0.65	V
SECAM discrimination output DC 2	$V_{40(2)}$	4.43 MHz mode, SECAM mode, f_{IN} = 4.25 MHz, 4.41 MHz	4	—	5	V

■ Electrical Characteristics at V_{CC} = 5 V, T_a = 25°C (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Chroma playback system						
Comb amp. gain SP	G_{MB}	SP mode, f_{SC} = 4.43 MHz	1.3	3.3	5.3	dB
Comb amp. gain LP	ΔG_{MB}	Difference from EP mode and SP mode	0.6	1.6	2.6	dB
Burst down gain 1	$G_{BD(1)}$	V_{IN} = 1: 1 (B = 440 mV[p-p]), NTSC/SP mode	–6.2	–5.2	–4.2	dB
Main BM carrier leak	G_{CL}	V_{IN} = 250 mV[p-p], f_{IN} = 630 kHz without signal	—	–45	–38	dB
Main BM signal leak	G_{SL}	V_{IN} = 250 mV[p-p], f_{IN} = 630 kHz	—	–55	–38	dB
XO free-run frequency 1	$f_{XO(1)}$	4.43 MHz mode, 1/2 × f_{78}	–50	—	50	Hz
XO free-run frequency 2	$f_{XO(2)}$	3.58 MHz mode, 1/2 × f_{78}	–50	—	50	Hz
$2f_{SC}$ output level 1	$V_{2fsc(1)}$	4.43 MHz mode	240	370	500	mV[p-p]
$2f_{SC}$ output level 2	$V_{2fsc(2)}$	3.58 MHz mode	260	400	540	mV[p-p]
f_{SC} output level 1	$V_{fsc(1)}$	4.43 MHz mode	300	370	500	mV[p-p]
f_{SC} output level 2	$V_{fsc(2)}$	3.58 MHz mode	300	420	560	mV[p-p]
630 k BPF gain 1	$G_{PB(1)}$	4.43 MHz mode, V_{IN} = 10 mV[p-p], f_{IN} = 630 kHz	25	30	35	dB
630k BPF frequency characteristics 1	$f_{PB(1)}$	4.43 MHz mode, V_{IN} = 10 mV[p-p], f_{IN} = 150 kHz/630 kHz	–5.0	–2.0	– 0.5	dB
630k BPF frequency characteristics 2	$f_{PB(2)}$	4.43 MHz mode, V_{IN} = 10 mV[p-p], f_{IN} = 930 kHz/630 kHz	–4	–2.0	– 0.5	dB
630k BPF frequency characteristics 3	$f_{PB(3)}$	4.43 MHz mode, V_{IN} = 10 mV[p-p], f_{IN} = 2.4 MHz/630 kHz	—	–40	–30	dB
630k BPF gain 2	$G_{PB(2)}$	3.58 MHz mode, f_{IN} = 630 kHz, Difference from 4.43 MHz mode	–1.0	0	1.0	dB
630k BPF frequency characteristics 4	$f_{PB(4)}$	3.58 MHz mode, f_{IN} = 930 kHz, Difference from 4.43 MHz mode	–2.0	0	2.0	dB
f_{HVCO} pull-in range	f_{VCOmax}	f_{IN} = f_H +500 Hz	500	—	—	Hz
	f_{VCOmin}	f_{IN} = f_H –500 Hz	—	—	–500	
SECAM discrimination output DC 3	$V_{40(3)}$	4.43 MHz mode, SECAM mode, f_{IN} = 0.63 MHz	0	—	0.65	V
SECAM discrimination output DC 4	$V_{40(4)}$	4.43 MHz mode, PAL mode, f_{IN} = 0.63 MHz, 0.65 MHz	0	—	0.65	V
SECAM discrimination output DC 5	$V_{40(5)}$	4.43 MHz mode, SECAM mode, f_{IN} = 0.67 MHz, 0.81 MHz	4	—	5	V
SECAM discrimination output DC 6	$V_{40(6)}$	4.43 MHz mode, PAL mode, f_{IN} = 0.65 MHz, 0.81 MHz	4	—	5	V
Audio-system						
Line out gain	V_{EL}	f = 1 kHz, EE, –29 dBV	22.4	23.6	24.8	dB
Rec. out level ratio at SP	V_{ER1}	f = 1 kHz, EE, –29 dBV, ratio to VEL	– 0.2	0.8	1.8	dB
Rec. out level ratio at SLP	V_{ER2}	f = 1 kHz, EE, –29 dBV, ratio to SP	– 0.2	0.3	0.8	dB

■ Electrical Characteristics at T_a = 25°C (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Audio-system (continued)						
Rec. out distortion at LP	T_{ER1}	f = 1 kHz, EE, –29 dBV	—	0.3	1	%
Rec. out SN SLP	N_{ER2}	EE	—	–65	–59	dBV
AGC level ratio	V_{ELA}	f = 1 kHz, –9 dBV	—	0.3	3	dB
Line out distortion	T_{EL}	f = 1 kHz, –29 dBV	—	0.3	1	%
Rec. out max. level	V_{ERMAX}	f = 1 kHz, amplitude for distortion = 1%	– 0.5	—	—	dBV
PB gain SP	V_{VL1}	f = 1 kHz, –68.3 dBV	61	62	63	dB
PB level ratio SLP	V_{VL2}	f = 1 kHz, –70.8 dBV	—	2	—	dB
PB distortion SLP	T_{VL2}	f = 1 kHz, –70.8 dBV	—	0.5	1	%
Noise referred to input: SP	N_{VL1}	No input signal, R_g = 1.5 kΩ	—	—	1.8	μV[rms]
f_H attenuation	V_{TR1}	f = 15.625 kHz	—	–15	–5	dB
Line out max. level	V_{LMAX}	f = 1 kHz, amplitude for distortion = 1%	–1.5	—	—	dBV
Mute attenuation	V_{ML}	f = 1 kHz, PB mode	—	—	–80	dB

• Design reference data

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Luminance-system						
M LPF group delay 1	GD(1)	4.43 MHz mode, rec., f_{IN} = 0.15 MHz	655	705	755	ns
M LPF group delay 2	GD(2)	3.58 MHz mode, rec., f_{IN} = 0.15 MHz	670	750	830	ns
M LPF group delay difference	ΔGD	4.43 MHz mode, PB, f_{IN} = 1 MHz, SQPB/VHS mode difference	155	180	225	ns
CCD LPF frequency characteristics 1	$G_{27\text{-}29(1)}$	4.43 MHz mode, EDNC, V_{IN} = 312 mV[p-p], f_{IN} = 3 MHz/0.2 MHz	–2.0	0.5	1.5	dB
CCD LPF frequency characteristics 2	$G_{27\text{-}29(2)}$	4.43 MHz mode, EDNC, V_{IN} = 312 mV[p-p], f_{IN} = 13.3 MHz/0.2 MHz	—	–30	–25	dB
CCD LPF group delay 1	$GD_{29(1)}$	4.43 MHz mode, EDNC, V_{IN} = 312 mV[p-p], f_{IN} = 0.2 MHz	90	120	150	ns
CCD LPF frequency characteristics 3	$G_{27\text{-}29(3)}$	3.58 MHz mode, EDNC, V_{IN} = 312 mV[p-p], f_{IN} = 2 MHz/0.2 MHz	–3.0	0.7	2.0	dB
CCD LPF frequency characteristics 4	$G_{27\text{-}29(4)}$	3.58 MHz mode, EDNC, V_{IN} = 312 mV[p-p], f_{IN} = 7.2 MHz/0.2 MHz	—	–2.5	–20	dB
CCD LPF group delay 2	$GD_{29(2)}$	3.58 MHz mode, EDNC, V_{IN} = 312 mV[p-p], f_{IN} = 0.2 MHz	85	125	165	ns
FM carrier interleave	CI_{36}	EP mode, V_{37}: fixed	6.4	7.9	9.4	kHz
FM demod min. input level	V_{51MIN}	f_{IN} = 3.8 MHz, 4.8 MHz	10	—	—	mV[p-p]
FM demod linearity	L_{53V}	f_{IN} = 3 MHz, 4 MHz, 5 MHz	0.82	0.92	1.05	—
Sub LPF frequency characteristics 1	G_{SL1}	f_{IN} = 2 MHz/1.5 MHz, f_{OUT} = 4 MHz/3 MHz	–2.7	– 0.5	1.0	dB
Sub LPF frequency characteristics 2	G_{SL2}	f_{IN} = 3 MHz/1.5 MHz, f_{OUT} = 6 MHz/3 MHz	–16.5	–12.0	-8.4	dB

■ Electrical Characteristics at T_a = 25°C (continued)

• Design reference data (continued)

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Luminance-system (continued)						
DOC SW crosstalk	$CT_{25\text{-}54}$	V_{IN} = 160 mV[p-p], 1 MHz forced DOC	—	—	–40	dB
YNR lim. (VNC) output level 4	V_{25YL4}	V_{IN} = 300 mV[p-p], f_{IN} = 1 MHz	15	30	45	mV[p-p]
White noise compression level	V_{25WNS}	Trick mode, 3.8 MHz, 5.8 MHz	2.2	2.9	3.3	V[p-p]
Tune/line crosstalk	$CT_{20\text{-}18}$	f = 1 MHz	—	—	–40	dB
Line/tuner crosstalk	$CT_{18\text{-}20}$	f = 1 MHz	—	—	–40	dB
Chroma-system						
M BPF [4.43 MHz] frequency characteristics rec. 1	$f_{MR(1)\text{-}4}$	4.43 MHz mode, f_{IN} = 2.3 MHz/4.43 MHz	—	—	–15	dB
M BPF [4.43 MHz] frequency characteristics rec. 2	$f_{MR(2)\text{-}4}$	4.43 MHz mode, f_{IN} = 3.93 MHz/4.43 MHz	–3.5	–2.0	– 0.5	dB
M BPF [4.43 MHz] frequency characteristics rec. 3	$f_{MR(3)\text{-}4}$	4.43 MHz mode, f_{IN} = 4.93 MHz/4.43 MHz	–2.7	–1.2	0.6	dB
M BPF [4.43 MHz] frequency characteristics rec. 4	$f_{MR(4)\text{-}4}$	4.43 MHz mode, f_{IN} = 6.5 MHz/4.43 MHz	—	—	–10	dB
M BPF [4.43 MHz] group delay rec.	$GD_{MR\text{-}4}$	4.43 MHz mode, f_{IN} = 4.43 MHz	340	390	440	ns
M BPF [4.43 MHz] frequency characteristics PB 1	$f_{MP(1)\text{-}4}$	4.43 MHz mode, f_{IN} = 2.6 MHz/4.43 MHz	—	—	–15	dB
M BPF [4.43 MHz] frequency characteristics PB 2	$f_{MP(2)\text{-}4}$	4.43 MHz mode, f_{IN} = 3.93 MHz/4.43 MHz	–5.5	–3.7	–2.0	dB
M BPF [4.43 MHz] frequency characteristics PB 3	$f_{MP(3)\text{-}4}$	4.43 MHz mode, f_{IN} = 4.93 MHz/4.43 MHz	–6.4	–3.9	–1.4	dB
M BPF [4.43 MHz] frequency characteristics PB 4	$f_{MP(4)\text{-}4}$	4.43 MHz mode, f_{IN} = 5.69 MHz/4.43 MHz	—	—	–30	dB
M BPF [4.43 MHz] frequency characteristics PB 5	$f_{MP(5)\text{-}4}$	4.43 MHz mode, f_{IN} = 6.5 MHz/4.43 MHz	—	—	–15	dB
M BPF [4.43 MHz] group delay PB	$DG_{MP\text{-}4}$	4.43 MHz mode, f_{IN} = 4.43 MHz	530	580	630	ns
M BPF [3.58 MHz] frequency characteristics rec. 1	$f_{MR(1)\text{-}4}$	3.58 MHz mode, f_{IN} = 1.5 MHz/3.58 MHz	—	—	–15	dB
M BPF [3.58 MHz] frequency characteristics rec. 2	$f_{MR(2)\text{-}4}$	3.58 MHz mode, f_{IN} = 3.08 MHz/3.58 MHz	–5.5	–3.3	–15	dB
M BPF [3.58 MHz] frequency characteristics rec. 3	$f_{MR(3)\text{-}4}$	3.58 MHz mode, f_{IN} = 4.08 MHz/3.58 MHz	–3.5	–1.0	1.0	dB
M BPF [3.58 MHz] frequency characteristics rec. 4	$f_{MR(4)\text{-}4}$	3.58 MHz mode, f_{IN} = 6.5 MHz/3.58 MHz	—	—	–10	dB
M BPF [3.58 MHz] group delay rec.	$GD_{MR\text{-}4}$	3.58MHz mode, f_{IN} = 3.58 MHz	390	470	550	ns

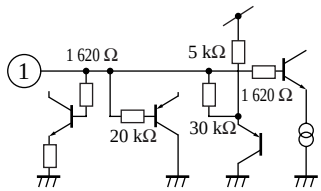
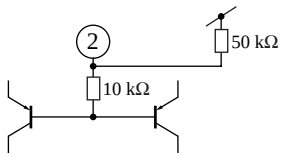
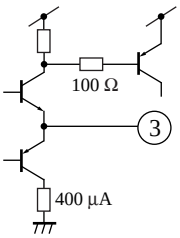
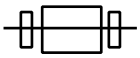
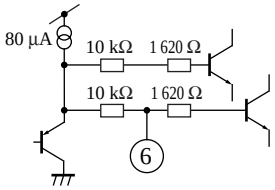
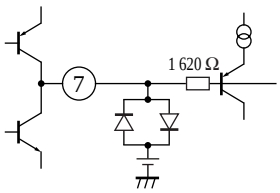
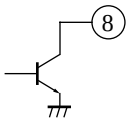
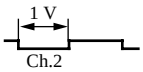
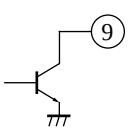
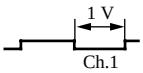
■ Electrical Characteristics at T_a = 25°C (continued)

• Design reference data (continued)

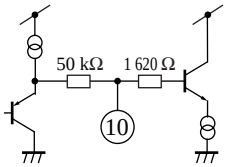
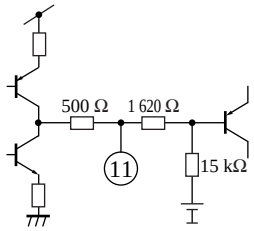
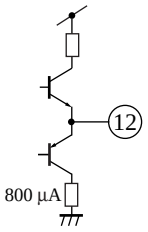
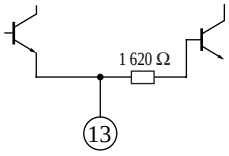
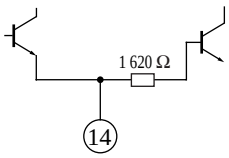
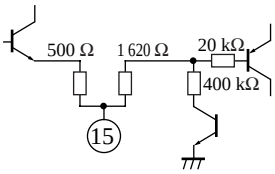
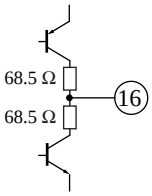
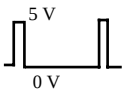
Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Chroma-system (continued)						
M BPF [3.58 MHz] frequency characteristics PB 1	$f_{MP(1)-4}$	3.58 MHz mode, f_{IN} = 1.5 MHz/3.58 MHz	—	—	–15	dB
M BPF [3.58 MHz] frequency characteristics PB 2	$f_{MP(2)-4}$	3.58 MHz mode, f_{IN} = 3.08 MHz/3.58 MHz	–7.4	–4.8	–2.9	dB
M BPF [3.58 MHz] frequency characteristics PB 3	$f_{MP(3)-4}$	3.58 MHz mode, f_{IN} = 4.08 MHz/3.58 MHz	–7.2	–3.7	–1.2	dB
M BPF [3.58 MHz] frequency characteristics PB 4	$f_{MP(4)-4}$	3.58 MHz mode, f_{IN} = 4.84 MHz/3.58 MHz	—	—	–15	dB
M BPF [3.58 MHz] frequency characteristics PB 5	$f_{MP(5)-4}$	3.58 MHz mode, f_{IN} = 6.5 MHz/3.58 MHz	—	—	–10	dB
M BPF [3.58 MHz] group delay PB	GD_{MP-4}	3.58 MHz mode, f_{IN} = 3.58 MHz	580	660	740	ns
CCD BPF frequency characteristics 1	$f_{CDB(1)}$	4.43 MHz mode, V_{IN} = 300 mV[p-p], f_{IN} = 3.93 MHz/4.43 MHz	–2.3	– 0.3	0.7	dB
CCD BPF frequency characteristics 2	$f_{CDB(2)}$	4.43 MHz mode, V_{IN} = 300 mV[p-p], f_{IN} = 4.93 MHz/4.43 MHz	–2.2	0.1	0.8	dB
CCD BPF frequency characteristics 3	$f_{CDB(3)}$	4.43 MHz mode, V_{IN} = 300 mV[p-p], f_{IN} = 8.86 MHz/4.43 MHz	—	–38	–25	dB
CCD BPF frequency characteristics 4	$f_{CDB(4)}$	4.43 MHz mode, V_{IN} = 300 mV[p-p], f_{IN} = 13.29 MHz/4.43 MHz	—	–40	–30	dB
CCD BPF frequency characteristics 5	$f_{CDB(5)}$	3.58 MHz mode, V_{IN} = 300 mV[p-p], f_{IN} = 3.08 MHz/3.58 MHz	–3.2	– 0.5	0.8	dB
CCD BPF frequency characteristics 6	$f_{CDB(6)}$	3.58 MHz mode, V_{IN} = 300 mV[p-p], f_{IN} = 4.08 MHz/3.58 MHz	–2.8	– 0.2	1.2	dB
CCD BPF frequency characteristics 7	$f_{CDB(7)}$	3.58 MHz mode, V_{IN} = 300 mV[p-p], f_{IN} = 7.16 MHz/3.58 MHz	—	–32	–20	dB
CCD BPF frequency characteristics 8	$f_{CDB(8)}$	3.58 MHz mode, V_{IN} = 300 mV[p-p], f_{IN} = 14.32 MHz/3.58 MHz	—	–48	–30	dB
Phase shifter +45° gain	G_{HPF}	V_{IN} = 300 mV[p-p], f_{IN} = 4.43 MHz	–7.0	–6.0	–5.0	dB
Phase shifter –45° gain	G_{LPF}	V_{IN} = 300 mV[p-p], f_{IN} = 4.43 MHz	–7.0	–6.0	–5.0	dB
Phase shifter +45° phase	P_{HPF}	V_{IN} = 300 mV[p-p], f_{IN} = 4.43 MHz	40	45	50	deg
Phase shifter –45° phase	P_{LPF}	V_{IN} = 300 mV[p-p], f_{IN} = 4.43 MHz	–50	–45	–40	deg
VXO control sensitivity 1	$\beta_{VXO(1)}$	V_{84} = 2.2 V/2.6 V, $(1/2 \times \Delta f_{78})$ /400 mV	1.0	2.2	4.0	Hz/mV
VXO control sensitivity 2	$\beta_{VXO(2)}$	V_{84} = 2.2 V/2.6 V, $(1/2 \times \Delta f_{78})$ /400 mV	0.7	1.7	3.1	Hz/mV

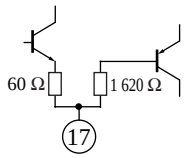
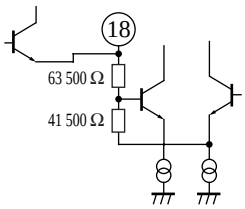
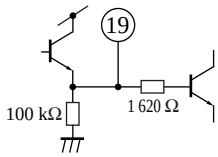
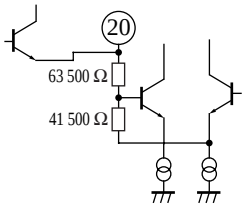
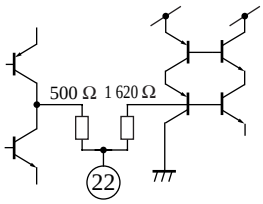
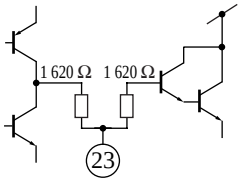
■ Terminal Equivalent Circuits

Pin No.	Equivalent circuit	Impedance (Z)	Description	Waveform		Voltage DC (V)
				EE mode	VV mode	
1		30 kΩ	Y/C mix. PB chroma input pin	—		4.5
2		50 kΩ	EE/VV/trick changeover pin	EE: 3.5 V to 5 V	VV: 1.75 V to 3.0 V Trick: 0 V to 1.25 V	—
3		EF	PB chroma output pin	—		2.0
4	—	—	V_{CC} pin (chroma main)	DC		5.0
5	—	—	V_{CC} pin (chroma APC)	DC		5.0
6		10 kΩ	BM balance capacitor pin	DC		2.7
7		High	ACC detection pin	DC		2.15
8		OC	Field AGC detection pin		 Note: off in trick mode	0.2 (on)
9		OC	Field AGC detection pin		 Note: off in trick mode	0.2 (on)

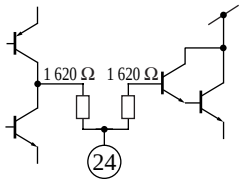
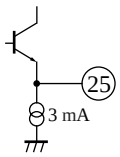
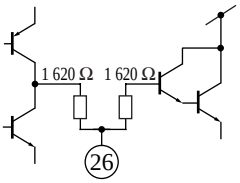
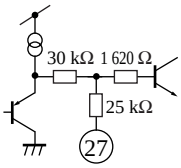
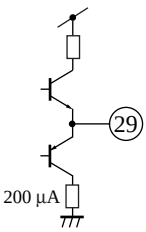
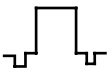
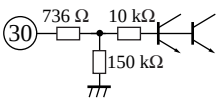
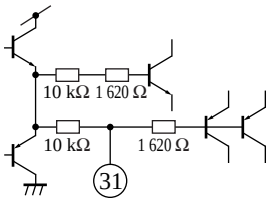
■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Impe-dance (Z)	Description	Waveform		Voltage DC (V)
				EE mode	VV mode	
10		50 kΩ	Comb-side chroma input pin	—		2.7
11		High	Color killer detection pin	Killer on at 2.13 V or below		2.4
12		EF	Comb filter driving output pin	—		2.0
13		EF	SECAM detection 1-pin	DC		—
14		EF	SECAM detection 2-pin	DC		—
15		500 Ω + VT/IE	Sync. separation det. pin	DC		1.4
16		Rc	Sync. separation pulse output pin			—

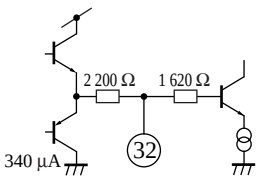
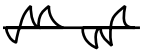
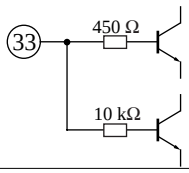
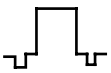
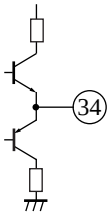
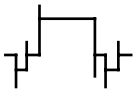
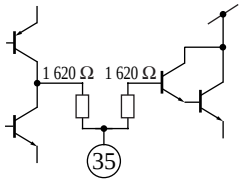
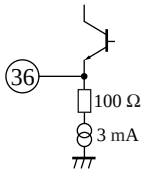
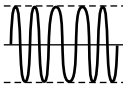
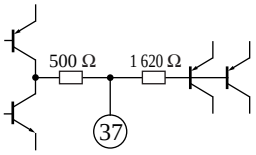
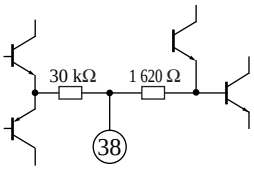
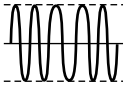
■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Impe-dance (Z)	Description	Waveform		Voltage DC (V)
				EE mode	VV mode	
17		60 Ω + VT/IE	AGC detection pin	DC	—	2.25
18		105 kΩ	Line input pin		—	3.0
19		EF	V_{REG}	DC		2.0
20		105 kΩ	Tuner input pin		—	3.0
21	—	—	V_{CC} pin (Y-system)	DC		5.0
22		High	CCD AGC detection pin	DC		Typ. 2.4
23		High	Clamp 1 detection pin	DC		2.3

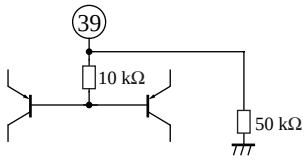
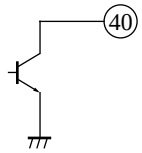
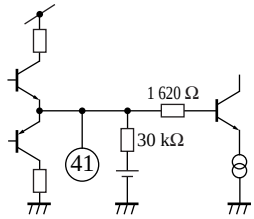
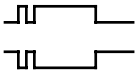
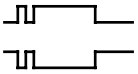
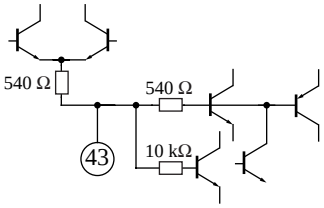
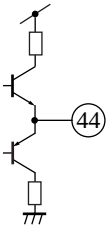
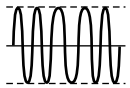
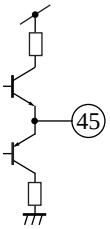
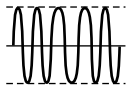
■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Impedance (Z)	Description	Waveform		Voltage DC (V)
				EE mode	VV mode	
24		High	Clamp 2 detection pin	DC		2.3
25		EF	Video signal output pin			Sync. 1.0
26		High	Clamp 4 detection pin	DC		2.3
27		55 kΩ	CCD output pin			2.0
28	—	—	GND (Y-system)	—	—	0
29		EF	CCD input pin			Sync. 1.7
30		150 kΩ	Quasi sync. pulse input pin	—	Single level: 3.5 V to 5 V Gray level: 1.5 V to 3 V Through: 0 V to 1 V	—
31		10 kΩ	Correlation detection DC pin	DC		—

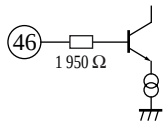
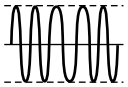
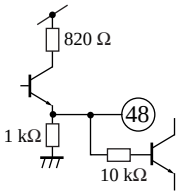
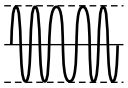
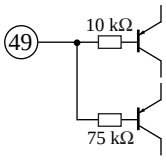
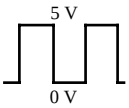
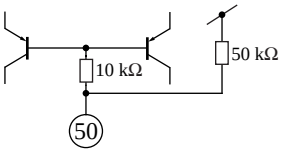
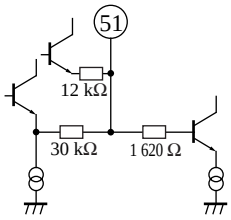
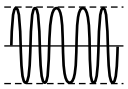
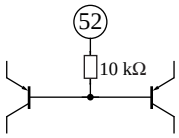
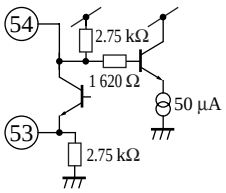
■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Impe-dance (Z)	Description	Waveform		Voltage DC (V)
				EE mode	VV mode	
32		2.2 kΩ	N.C. LPF pin	—		2.4
33		OB	Main emphasis feedback input pin/ VV edit changeover pin		VV edit: 4 V to 5 V	Sync. 1.7
34		EF	Main emphasis output pin		—	Sync. 1.7
35		High	Clamp 3 detection pin	DC		2.3
36		EF	MOD output pin		—	2.5
37		High	f_O detection pin	DC	—	2.2
38		30 kΩ	Rec. FM input pin		—	2.7

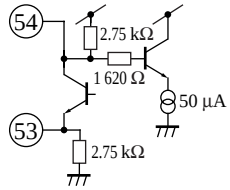
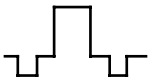
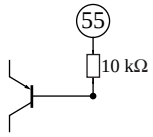
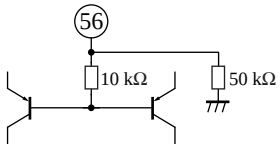
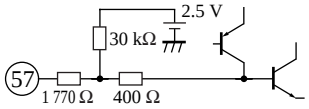
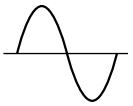
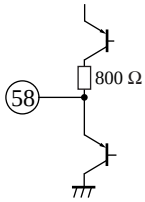
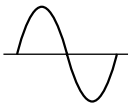
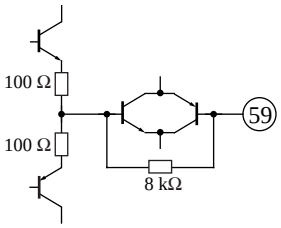
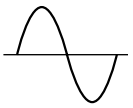
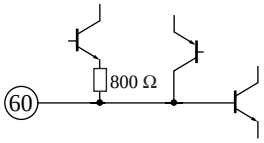
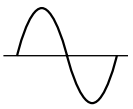
■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Impedance (Z)	Description	Waveform		Voltage DC (V)
				EE mode	VV mode	
39		High	Line/test1/tuner changeover pin	Line: 3.5 V to 5 V Test1: 1.75 V to 3 V Tuner: 0 V to 1.25 V	Test1: 1.75 V to 3 V	—
40		Rc	SECAM ID output pin	DC High at SECAM		—
41		EF/ 30 kΩ	Rec. YC output pin/ PB envelope input pin			2.7
42	—	—	GND pin Y (PF-system)	DC	DC	0
43		540 Ω + EF	RF AGC detection pin/ EE edit changeover pin	EE edit: 4 V to 5 V		2.5
44		EF	Phase shift (positive)	DC	2.5 	
45		EF	Phase shift (negative)	DC		2.5

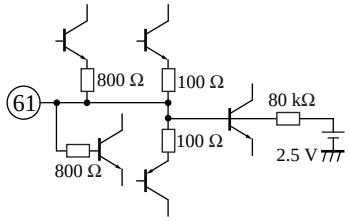
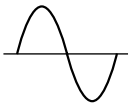
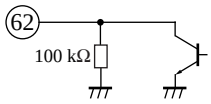
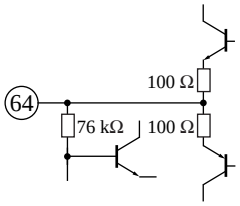
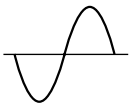
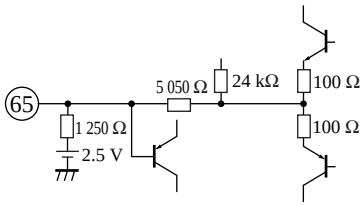
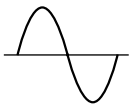
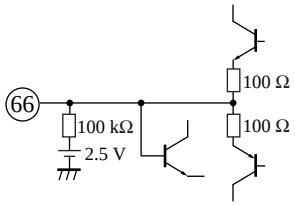
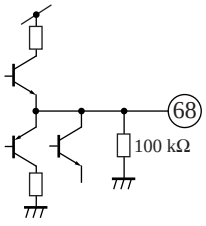
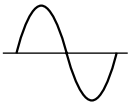
■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Impedance (Z)	Description	Waveform		Voltage DC (V)
				EE mode	VV mode	
46		OB	Phase shift in	DC		2.5
47	—	—	V_{CC} pin Y (MOD output block RF system)	DC	DC	5.0
48		R_E	RF peaking/SQPB changeover pin	DC	 SQPB: 3.25 V to 5 V	1.0
49		OB	Rotary pulse input pin			—
50		50 kΩ	MESECAM/PAL/ NTSC changeover pin	MESECAM: 3.5 V to 5 V PAL: 1.75 V to 3 V NTSC: 0 V to 1.25 V		—
51		30 kΩ	Y ext. PF FM input pin	—	Pin 51: open  Pin 51: 0 V to 1 V Internal RFEQ	3.0
52		High	PB NTSC changeover pin	PB NTSC: 3.5 V to 5 V Test2: 1.75 V to 3 V Through: 0 V to 1.25 V		—
53		VT/ IE	Main de-emphasis peaking pin	—		1.5

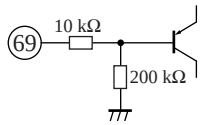
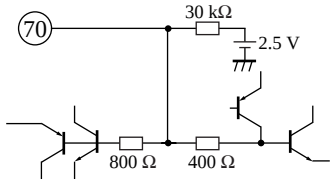
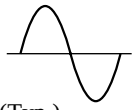
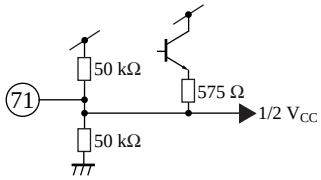
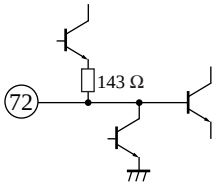
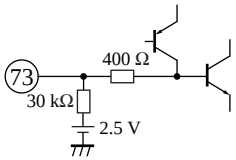
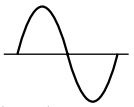
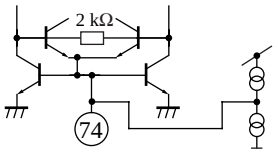
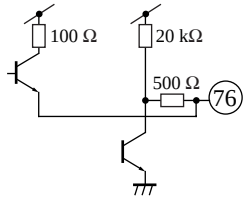
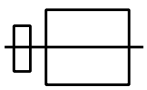
■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Impedance (Z)	Description	Waveform		Voltage DC (V)
				EE mode	VV mode	
54		OC	Main de-emphasis output pin	—		3.5
55		High	4.43 MHz/3.58 MHz changeover pin	4.43: 1.75 V to 5 V 3.58: 0 V to 1.25 V		—
56		High	EP/LP/SP changeover pin	EP: 3.5 V to 5 V LP: 1.75 V to 3 V SP: 0 V to 1.25 V		—
57		32 kΩ	NA-PB amp. in	—	 –2.95 dB = 94.7 mV[p-p]	2.5
58		EF	NA-PB out	—	 –2.95 dB = 94.7 mV[p-p]	3.2
59		SP SLP 8 kΩ	NA-PB EQ. SW	—		2.5
60		O.B.	NA-PB NF	—		2.5

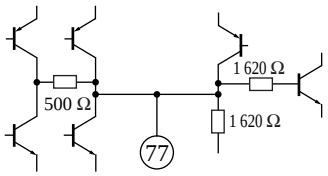
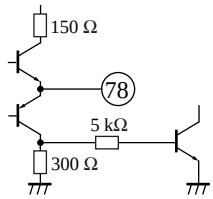
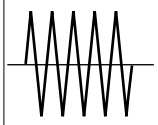
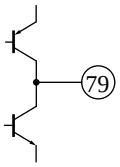
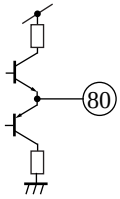
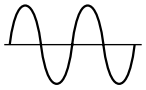
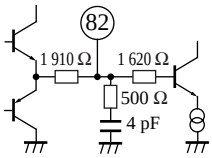
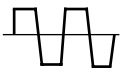
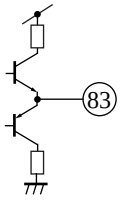
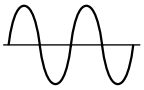
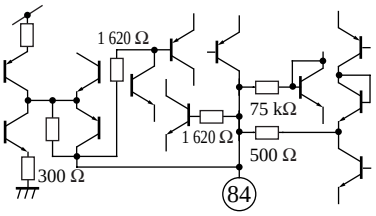
■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Impedance (Z)	Description	Waveform		Voltage DC (V)
				EE mode	VV mode	
61		EE P.P. VV 80 kΩ	NA-PB in	DC	 –68.3 dBV	2.5
62		SP/LP 100 kΩ SLP	NA-PB SLP SW	DC	←	0
63	—	—	GND	—	—	0
64		EE P.P. VV 100 kΩ	NA-rec. out		DC	2.5
65		1 kΩ	NA-rec. EQ. NF		—	2.5
66		SP 100 kΩ LP/ SLP P.P.	NA-rec. EQ. LP/ SLP SW	DC	←	2.5
67	—	—	V_{CC}	DC	←	5.0
68		P.P.	NA-line out	 (Typ.) –5.7 dBV = 1.47 V[p-p]	←	2.5

■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Impedance (Z)	Description	Waveform		Voltage DC (V)
				EE mode	VV mode	
69		210 kΩ	NA-mute in	DC Mute: 3.5 V to 5 V Through: 0 V to 1.25 V	←	—
70		30 kΩ	NA-tuner in	 (Typ.) –29 dBV = 100 mV[p-p]	—	2.5
71		25 kΩ	NA V_{REF}	DC	←	2.5
72		—	NA-AGC det.	DC	←	—
73		30 kΩ	NA-line in	 (Typ.) –29 dBV = 100 mV[p-p]	—	2.5
74		Low	f_{VCO} adjustment pin	DC	DC	0.6
75	—	—	GND (for VCO)	—	—	0
76		20 kΩ	ACC output pin Y LPF output pin Killer output pin	 Low at killer	←	2.7

■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Impedance (Z)	Description	Waveform		Voltage DC (V)
				EE mode	VV mode	
77		Rc	Rec. AFC, PB APC detection pin	DC	DC	2.1
78		EF	2f_{SC} output pin			2.7
79		High	Side lock detection pin	Side lock detection current		—
80		EF	Xtal output pin 3.58 MHz			3.6
81	—	—	GND (chroma-system)	—	—	0
82		1 910 Ω	Xtal input pin			2.7
83		EF	Xtal output pin 4.43 MHz			3.6
84		EE 75 kΩ VV 75 kΩ	Rec. APC, f_H AFC detection pin	DC		2.4

■ Application Circuit Example