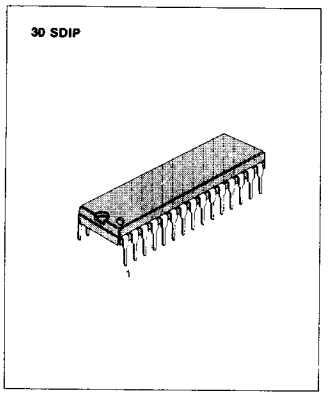
CHROMINANCE PROCESSOR

The KA8104 is a monolithic integrated circuit designed for the chrominance processor in a VCR system, which includes all functions necessary for chrominance processing.



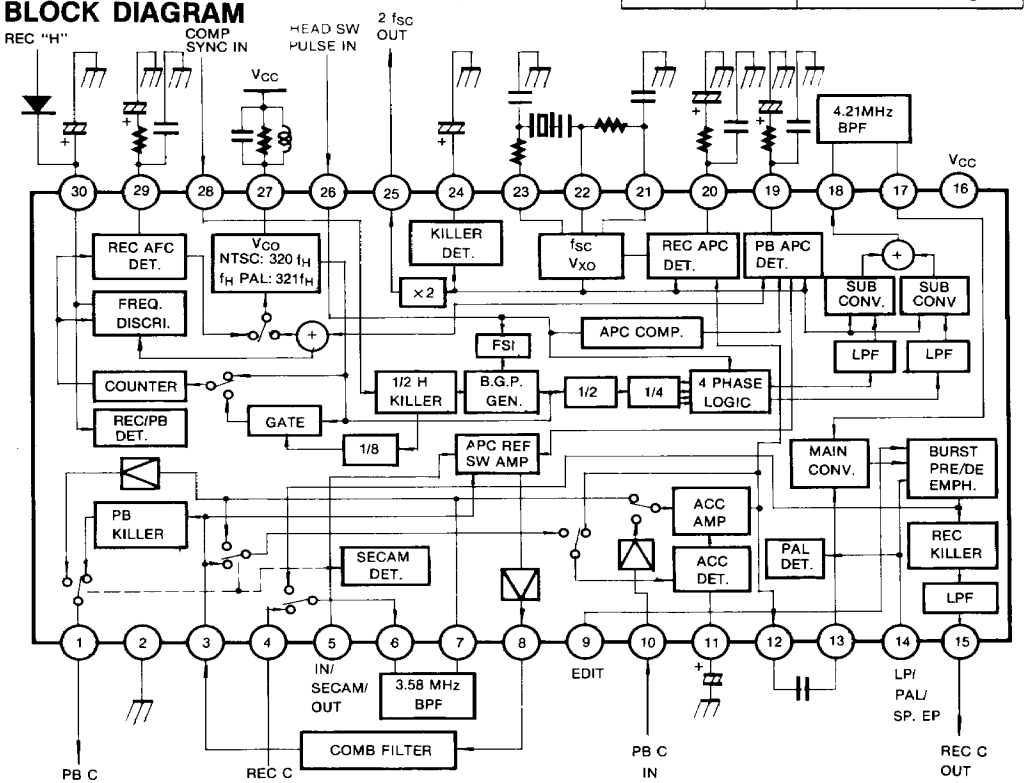
FEATURES

- **Supply voltage: 5V (typ.)**
- **Corresponded to NTSC, PAL, Quasi SECAM mode**
- **1X-tal only for PAL mode application**
- **Includes REC LPF**
- **Edit control**
- **PB chroma input level compensator**
- **f_{SC} multiplier (2 f_{SC})**
- **Field start inhibit**
- **High speed APC circuit**
- **APC reference control**
- **Operational type of subconverter for spurious reduction**
- **Combined with the KA8102, write & read amplifier and the KA8113, luminance processor, the compact video processing system is available.**
- **30-pin shrink dual-in-line package.**

ORDERING INFORMATION

Device	Package	Operating Temperature
KA8104	30 SDIP	− 10 ~ + 75°C

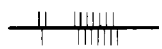
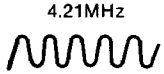
BLOCK DIAGRAM



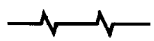
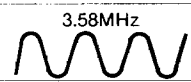
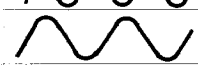
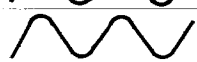
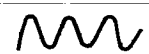
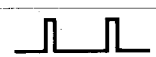
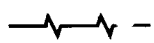
PIN FUNCTION

Pin No.	Function	Waveform	Outline
1	PB Chroma Output		PB chroma signal output
2	GND		GND
3	PB Killer Amp Input		PB killer amp input signal is crosstalk cancelled signal
4	REC Chroma Input		REC chroma signal input
5	APC REF. SW/ SECAM SETTING		Reference signal switching for PB APC DET & SECAM mode control Pin 5 DC Level / Mode: 3.6 ~ 5.0V — APC IN 1.7 ~ 3.2V — SECAM 0 ~ 1.3V — APC OUT *APC IN: Indicates APC REF signal is picked out before comb filter (Pin 8) APC OUT: Indicates after comb filter (Pin 3)
6	REC/PB SW Amp Output		Composite signal output at REC mode & converter output at PB mode. Drives 3.58MHz (4.43MHz) BFP.
7	REC/PB 3.58MHz Chroma Input		ACC amp input at REC mode & comb filter driving amp input at PB mode. 3.58MHz (4.43MHz) BPF is necessary between Pin 6 and Pin 7.
8	Comb Filter Amp Output		Chroma signal output at PB mode. Drives comb filter for cross-talk cancell. In case of using Y/C separate circuit as cross-talk canceller, connect to KA8103 Pin 17 through capacitor.

PIN FUNCTION (Continued)

Pin No.	Function	Waveform	Outline
9	Edit Control		Burst De-emphasis level control as edit mode function Pin 9 DC Level: 3.6 ~ 5.0V → Burst De-empha. Level: −6dB 1.7 ~ 3.2V → −5.5dB 0 ~ 1.3V → −5dB
10	PB Chroma Input		PB chroma signal ($40f_H$) is taken out from pre-amplifier output by LPF.
11	ACC DET Filter		ACC loop filter. Grounded by a capacitor.
12	ACC Amp Output		ACC amp output at REC/PB mode. 3.58MHz at REC mode, $40f_H$ (=629KHz) at PB mode.
13	Main Converter Input		Main converter input (at REC/PB mode). A capacitor is necessary between Pin 12 and Pin 13.
14	SP, LP Mode SW/PAL Setting		SP, LP, EP (NTSC) & PAL mode function control. Pin 14 DC Level: 3.6 ~ 5.0V → Mode: NTSC LP 1.7 ~ 3.2V → PAL 0 ~ 1.3V → NTSC SP/ED
15	REC Chroma Output		REC chroma signal (converted to low freq.) output. This signal is obtained through LPF (cut-off freq. = 1.7MHz).
16	V_{CC}		V_{CC} = 4.5 ~ 5.5V
17	Main Converter Carrier Input	4.21MHz 	Conversion carrier input for main converter function. 4.21MHz (5.06MHz) BPF is necessary between Pin 17 and Pin 18.
18	Sub-converter Output		Low spurious characteristics by employing an operational type of sub converter.

PIN FUNCTION (Continued)

Pin No.	Function	Waveform	Outline
19	PB APC DET Filter		PB APC loop filter
20	REC APC DET Filter		REC APC loop filter. In need of accurater V_{XO} free-running frequency at PB mode, adjust DC level through resistor.
21	f_{SC} V_{XO} Input 2	3.58MHz 	V_{XO} feed back input. Delayed phase signal input (90° from Pin 22)
22	f_{SC} V_{XO} Input 1		V_{XO} feed back input.
23	f_{SC} V_{XO} Output		V_{XO} Output
24	Killer DET Filter		Color killer DET loop filter.
25	2 f_{SC} Output		
26	Head Switching Pulse Input		Head switching pulse input for chroma phase rotation Pin 26 DC Level: H → NTSC: +90, PAL: STOP, SECAM: STOP; L → NTSC: −90, PAL: −90, SECAM: STOP
27	320 f_H V_{CO} Filter		By using specified tank coil, non-adjustment of 320 f_H V_{CO} is possible.
28	Composite Sync Pulse Input		Input level L: GND ~ 1.5V H: 3.5 ~ V_{CC}
29	REC AFC DET Filter		REC AFC loop filter
30	PB Discri Filter REC/PB SW Setting		PB AFC loop (freq. discri.) filter. At REC mode, set up level to high mode.

ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	7	V
Power Dissipation	P_D	590	mW
Operating Temperature	T_{opr}	−10 ~ +75	°C
Storage Temperature	T_{stg}	−40 ~ +125	°C

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
REC Supply Current	I_{CCR}	At Pin 30: H (REC mode) Measure Pin 16 input current. No signal input.	41.0	54.0	77.0	mA
PB Supply Current	I_{CCP}	At PB mode Measure Pin 16 input current. No signal input.	42.0	55.0	79.0	mA
REC Chroma Signal Output Amplitude	V_{OR}	Supply a 3.58MHz chroma signal (burst = 140mV_{p-p}) to Pin 4. Measure an output burst level at Pin 15. (burst emphasis: on)	0.35	0.47	0.60	V_{p-p}
REC ACC Covering Range +6dB	ACC_{R+6}	Burst = 280mV_{p-p} at Pin 4 Measure an output burst level at Pin 15 (0dB = V_{OR})	−0.5	0	+1.0	dB
REC ACC Covering Range −15dB	ACC_{R-15}	Burst = 25mV_{p-p} at Pin 4 Measure an output burst level at Pin 15 (0dB = V_{OR})	−1.0	−0.2	0.5	dB
PB Chroma Signal Output Amplitude	V_{OP}	Supply a 629KHz chroma signal (burst = 100mV_{p-p}) to Pin 10. Measure an output burst level at Pin 1. (burst De-empha: on)	0.3	0.4	0.5	V_{p-p}
PB ACC Covering Range +6dB	ACC_{P+6}	Burst = 200mV_{p-p} at Pin 10. Measure an output burst level at Pin 1. (0dB = V_{OP})	−0.5	0	+1.0	dB
PB ACC Covering Range −15dB	ACC_{P-15}	Burst = 18mV_{p-p} at Pin 10. Measure an output burst level at Pin 1. (0dB = V_{OP})	−1.0	−0.2	0.5	dB
Burst Emphasis Quantity	Q_{BE}	Supply a sine wave (3.58MHz, 140mV_{p-p}) to Pin 4. Measure a differential level. ratio between burst gate period & chroma period at Pin 15.	5.0	6.0	7.5	dB
Burst Emphasis DC Offset	Q_{SBE}	Measure a differential DC voltage level between burst gate period & chroma period at Pin 15.	−60	0	60	mV
Burst De-emphasis Quantity (−6dB)	Q_{BD}	Supply a sine wave (629KHz, 100mV_{p-p}) to Pin 10. Measure a differential level ratio between burst gate period & chroma period at Pin 1. (Pin 9: H)	−7.0	−6.0	−5.0	dB

ELECTRICAL CHARACTERISTICS (Continued)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Burst De-emphasis Quantity Variation (−6— −5.5dB)	BD_1	Same as above. (Pin 9: H − M)	0.1	0.5	0.9	dB
Burst De-emphasis Quantity Variation (−5.5— −5dB)	BD_2	Same as above. (Pin 9: M − L)	0.1	0.5	0.9	dB
Burst De-emphasis DC Offset	OS_{BD}	Measure a differential DC voltage level between burst gate period & chroma period at Pin 9.	−50	0	50	mV
REC Chroma Output Carrier Leakage 1	CL_{R1}	Supply a sine wave (3.58MHz, $400mV_{p-p}$) to Pin 13, (4.21MHz, $400mV_{p-p}$) to Pin 17. Measure a differential level ratio between 629KHz component level & 3.58MHz component level at Pin 15.	—	−59	−40	dB
REC Chroma Output Carrier Leakage 2	CL_{R2}	Same as above condition. Measure a differential level ratio between 629KHz & 4.21MHz components level at Pin 15.	—	−62	−40	dB
PB Main Converter Carrier Leakage 1	CL_{P1}	Supply a sine wave (629KHz, $200mV_{p-p}$) to Pin 13, (4.21MHz, $400mV_{p-p}$) to Pin 17. Measure a differential level ratio between 3.58MHz & 629KHz components level at Pin 15.	—	−40	−30	dB
PB Main Converter Carrier Leakage 2	CL_{P2}	Same as above condition. Measure a differential level ratio between 3.58MHz & 4.21MHz components level at Pin 15.	—	−40	−30	dB
REC Video Amplifier Gain	G_R	Supply a sine wave (3.58MHz, $140mV_{p-p}$) to Pin 4. Measure a differential level ratio between Pin 4 & Pin 6.	−1.0	0	1.0	dB
Comb Filter Input Amplifier Gain	G_{COMB}	Supply a sine wave (629KHz, $200mV_{p-p}$) to Pin 13, (4.21MHz, $400mV_{p-p}$) to Pin 17. Measure a differential level ratio between Pin 8 & Pin 7.	5.0	6.0	7.0	dB

ELECTRICAL CHARACTERISTICS (Continued)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
PB Killer Gain	G_{PK}	Same as above condition. Measure a differential level ratio between Pin 1 & Pin 3.	5.0	6.0	7.0	dB
SECAM Output Amplifier Gain	G_{SECAM}	Same as above condition. Measure a differential level ratio between Pin 1 & Pin 7.	10.0	12.5	15.0	dB
REC LPF Cut-off Frequency	f_C	Supply a variable frequency sine wave ($400mV_{p-p}$) to Pin 13. Measure a cut-off frequency at Pin 15.	1.0	1.4	2.2	MHz
REC Killer Cross-talk Level	C_{TRK}	Supply a 3.58MHz chroma signal (burst = $140mV_{p-p}$) to Pin 4. Measure a differential level ratio of 629KHz component at Pin 15. (killer sw: ON/OFF)	—	—	−35	dB
PB Killer Cross-talk Level	C_{TPK}	Supply a 629KHz chroma signal (burst = $100mV_{p-p}$) to Pin 10. Measure a differential level ratio of 3.58MHz component at Pin 1. (killer sw: ON/OFF)	—	—	−35	dB
REC Killer Threshold Level	T_{HRK}	Supply a 3.58MHz chroma signal to Pin 4. (0dB = $140mV_{p-p}$) Measure a maximum burst level supressed by color killer.	—	—	−30	dB
Sub Converter Carrier Leakage 1	CL_{SCL}	Supply a 3.58MHz chroma signal (burst = $140mV_{p-p}$) to Pin 4. Measure a differential level ratio between 4.21MHz & 3.58MHz components level at Pin 18.	—	−47	−30	dB
Sub Converter Carrier Leakage 2	CL_{SC2}	Same as above condition. Measure a differential level ratio between 4.21MHz & 629KHz components level at Pin 18.	—	−45	−30	dB
Sub Converter Spurious 1	S_{SC1}	Same as above condition. Measure a differential level ratio between 4.21MHz & 2.95MHz components level at Pin 18.	—	—	−20	dB
Sub Converter Spurious 2	S_{SC2}	Same as above condition. Measure a differential level ratio between 4.21MHz & 5.47MHz components level at Pin 18.	—	—	−30	dB

ELECTRICAL CHARACTERISTICS (Continued)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Sub Converter Output Amplitude	V_{SC}	Same as above condition. Measure an output amplitude level at Pin 18.	1.5	1.9	2.3	V_{P-P}
320 f_H V_{CO} Sensitivity	S_{VCO}	Supply a valiable DC voltage level to Pin 29. Measure an output frequency at Pin 18.	—	300	—	Hz/mV
REC APC Phase Detect Sensitivity	S_{RP}	Supply a 3.58MHz variable phase sine wave to Pin 4. Measure a DC voltage level at Pin 20.	3.5	10	—	mV/deg
PB APC Phase Detect Sensitivity	S_{PP}	Supply a 3.58MHz valiable phase sine wave to Pin 3. Measure a DC voltage level at Pin 19.	2	6	—	mV/deg
f_{SC} V_{XO} Sensitivity	S_{VXO}	Measure an output frequency at Pin 23 in case of changing a DC voltage level of Pin 20.	—	9	—	Hz/mV
f_{SC} V_{XO} Output Amplitude	V_X	Measure an output amplitude at Pin 23	0.7	1.0	1.3	V_{P-P}
f_{SC} Free Run Control Voltage	V_{CFSC}	Pin 23: 3.579545MHz Measure Pin 20 DC level at PB mode.	2.2	2.75	3.3	V

TEST CIRCUIT