M52042FP

NTSC VIDEO CHROMA SIGNAL PROCESSOR

DESCRIPTION

The M52042FP is a semiconductor integrated circuit (IC) for picture signal processing that has been developed for NTSC system LCD color TV.

This IC has a built-in luminance signal processing circuit and color signal processing circuit, which is employed to convert a composite video signal to an RGB signal.

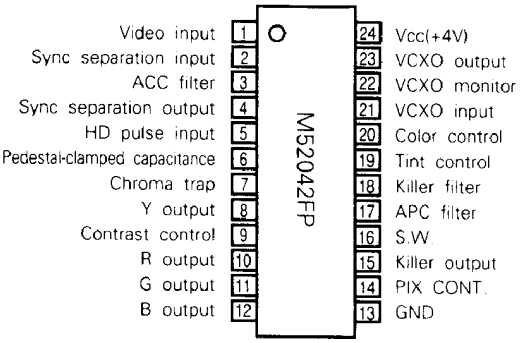
FEATURES

- Low voltage and low power dissipation design
- Built-in Y/C separation circuit and external chroma trap switchable (fc is nearly equal to 1.5MHz.)
- Built-in sync separation circuit
- Provided with Y-signal blanking function by HD pulse
- R.G.B signal output
- Tint, contrast, picture quality and color control linearly adjustable
- 24-pin, shrink pitch, flat package employed
- Same package as in PAL system video chroma IC M52045FP, pin perfectly compatible

APPLICATION

LCD color TV and LCD color view finder

PIN CONFIGURATION (TOP VIEW)

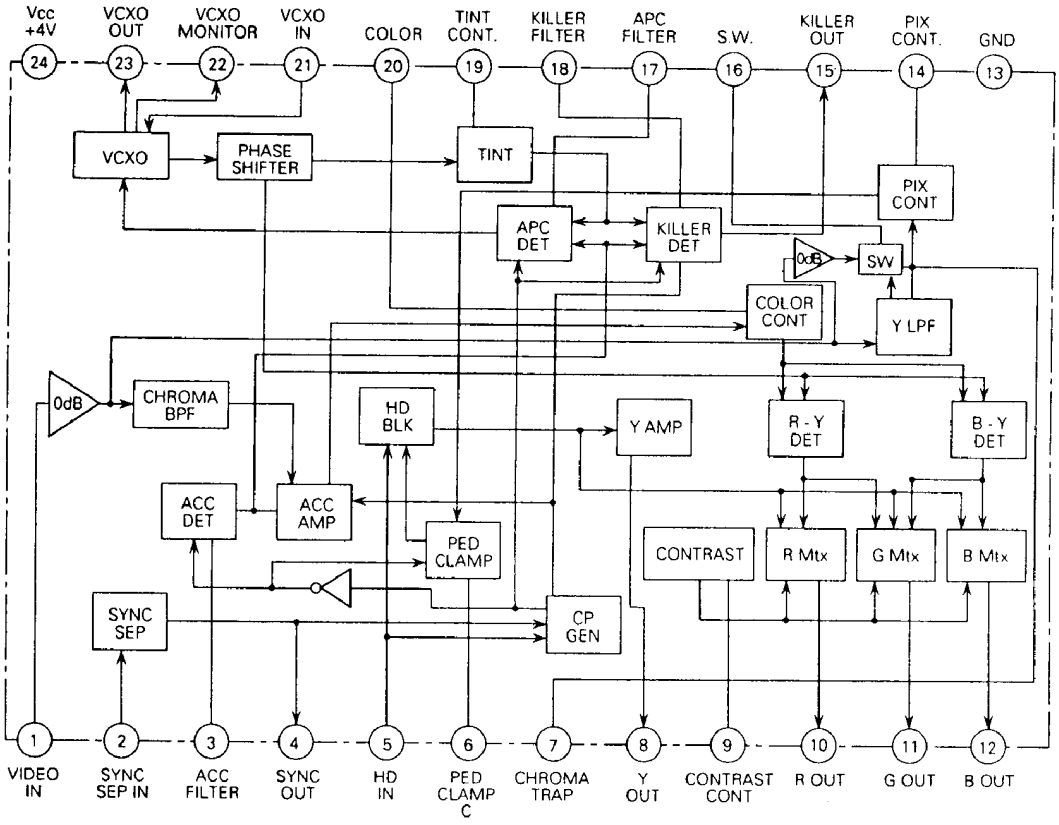


Outline 24P2Q-A

RECOMMENDED OPERATING CONDITION

Supply voltage range ..... 3.7~4.5V
Rated supply voltage 4.0V

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	4.8	V
P_d	Power dissipation	680	mW
T_{opr}	Operating temperature	−10~70	deg
T_{stg}	Storage temperature	−45~120	deg
k_θ	Thermal derating	5.4	mW/deg
V_{max}	Electrostatic capacity	±200 ※	V

※ Charging capacity : 200 pF

ELECTRICAL CHARACTERISTICS (Ta = 25℃, unless otherwise noted)

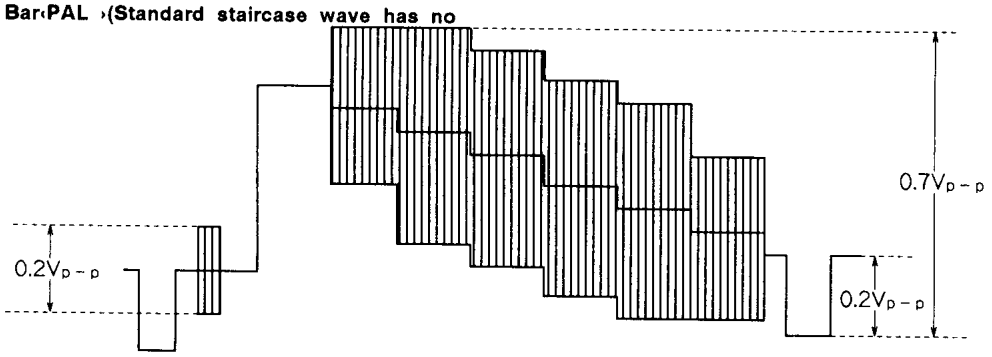
Symbol	Parameter	Test No	Test conditions	Limits Min.	Limits Typ.	Limits Max.	Unit
Icc	Circuit current	1	Input standard color bar signal of Vcc=4V.	−	17	21	mA
SYNC SEP Section							
Vsync 1	SYNC tip voltage	2	Measure each output signal SYNC tip voltage at pins ①, ⑦ when standard color bar signal of 0.7 Vp-p is input.	2.20	2.30	2.40	V
Vsync 7				1.25	1.40	1.50	
Vsync H	SYNC output amplitude	3	Input only SYNC pulse of pulse width 4.7 μ seconds to pin ①. Measure the output amplitude at pin ④ when the input SYNC pulse amplitudes are 0.2 and 0.05 Vp − p.	2.7	3.1	3.4	Vp − p
Vsync L				2.7	3.1	3.4	
Tsync H	SYNC output pulse width	4	Input only SYNC pulse of pulse width 4.7 μ seconds to pin ①. Measure the output amplitude at pin ④ when the input SYNC pulse amplitudes are 0.2 and 0.05 Vp − p.	3.7	4.7	5.7	μsec
Tsync L				3.7	4.7	5.7	
Dsync H	SYNC output pulse delay	5	Input only SYNC pulse of pulse width 4.7 μ seconds to pin ①. Measure the pulse width + delay time when the input SYNC pulse amplitudes are 0.2 and 0.05 Vp − p.	3.7	4.7	6.0	μsec
Dsync L				3.7	4.7	6.0	
Video Section							
YLPF(L)	YLPF frequency characteristics (Pin ⑦)	6	Measure the frequency at which the sine wave output amplitude is −3 dB when the input signal (↕0.2Vp-p) 0.2 Vp − p is input. Also measure the output gain at input sine wave 3.58 MHZ.	1.45	1.55	−	MHz
YLPF(H)				− 30	−24	−21	dB
YLPF through	YLPF frequency characteristics (through mode)	7'	Measure the frequency at which tke sine wave output amplitude is −3dB when the input signal(↕0.2Vp-p) 0.2Vpp is input, and V16 is 4.0Vpc input	5.0	7.0	10.0	MHz
Ymax	Maximum output	7	Input standard staircase wave of 0.7 Vp − p. Measure the output amplitude at pin ⑫ when V9 is 0 V.	1.1	1.7	1.7	Vp − p
GYmax	Video amplifier gain	8	Input standard staircase wave of 0.7 Vp − p. Calculate the ratio between the output amplitude at pin ⑫ and input amplitude when V9 is 1.7 V.	4.0	6.0	8.0	dB
Yctrast (1)	Contrast control characteristics	9	Input standard staircase wave of 0.7 Vp − p, and calculate the ratio of the input amplitude to the output amplitude in Test No. 8 above when V9 is changed 1 V, 2.5V and 3.5V.	1.20	2.45	4.50	dB
Yctrast (2.5)				−7.3	−5.0	−2.7	
Yctrast (3.5)				−	−30	−17	
XPIX(4)	PIX control characteristics	10	Input 1.5 MHz sine wave of 0.2 Vp-p to the input. Measure each output amplitude at pin ⑫ when V9 is 1.7 V, and V14 is changed to 2, 4 and 0 V and calculate the ratio between the input amplitude and the output amplitude when V14 = 2 V.	− 3.5	−2.0	−0.5	dB
XPIX(0)				10.0	12.0	14.0	dB
GYamp	Y AMP gain	11	Input standard staircase wave of 0.7 Vp-p and calculate the ratio between the output amplitude at pin ⑧ and input amplitude.	9.1	11.0	12.6	dB
Vped	PED offset level	12	With input SYNC pulse at 0.2 Vp-p, measure pin ⑫ output pedestal offset, and calculate ratio of the offset to that when 0.7 Vp-p standard staircase is input.	0.00	0.05	0.06	

ELECTRICAL CHARACTERISTICS (cont.)

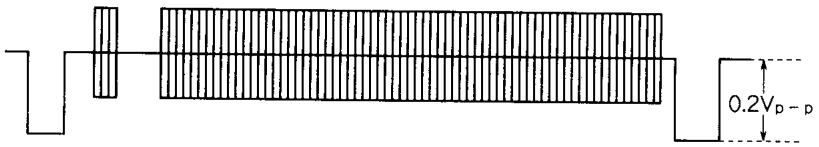
Symbol	Parameter	Test No	Test conditions	Limits			Unit
				Min.	Typ.	Max.	
Chroma Section							
Cacc (+4)	Acc control characteristics	14	Input burst 0.2 Vp-p+CW 4.33 MHz shall be 0 dB. Measure the output at pin ⑫ when the input is changed to +4 dB and −20 dB, and calculate the ratio of the measured amplitude to the output amplitude at 0 dB.	0	0.7	1.5	dB
Cacc (−20)				−6.0	−2.0	0	
Ckilr	Killer operation	15	Input a chroma signal of 0.2 Vp-p to the input. Reduce the amplitude and measure the amplitude ratio when the voltage at pin ⑮ exceeds 2.5 V.	−53	−49	−43	dB
Cast(4)	Color control characteristics	16	Input burst 0.2 Vp-p+CW 4.33 MHz: change V20 to 2V, 4V, 3V, 1V and 0.5V to measure each output (100kHz beat) amplitude at pin 12, and calculate the ratio between the measured amplitude and the output amplitude at V20 = 1V.	2	2.2	4.5	dB
Cast(3)				1.5	2.0	4.0	
Cast(1)				−8.5	−6	−4	
Cast(0.5)				−17	−13	−10	
Δ fapc	APC pull-in range	17	Input only SYNC, and after adjusting free run, input 0.2 Vp-p CW (0.2Vp-p), then change the frequency. Measure the frequency when VCXO oscillator is placed in a locked condition from the free-run condition.	+400	+600	−	Hz
				−	−300	−200	
DB	B demodulator sensitivity	18	Input CW 4.33 MHz of 0.2 Vp-p to the input, and measure the output amplitude at pin ⑫ when V20=1 V.	0.8	1.2	1.6	Vp-p
R(R/B)	Demodulated output voltage ratio	19	Input CW 4.33 MHz of 0.2 Vp-p to the input, measure the output amplitude at pins ⑩, ⑪ when V20 = 1 V, and calculate the ratio of the measured amplitude to the output amplitude in Test No. 18 above.	0.46	0.52	0.60	−
R(G/B)				0.20	0.30	0.40	
Vkiller H	Killer output voltage H	21	Measure DC voltage at pin ⑮ when 0V and 4V are applied to pin ⑱.	2.5	3.2	−	V
Vkiller L	Killer output voltage L			−	0.20	0.40	
T	TINT control variance	22	Input a chroma signal of 0.4 Vp-p to the input, and measure the phase variance at pin ⑫ when 0 V and 4 V are applied to V19.	75	85	100	deg
Topen	TINT control characteristics	23	Apply B monochromatic wave (variable phase) 0.4 Vp-p and burst 0.2 V p-p to the input. Measure the input phase in which the output at pin ⑫ becomes maximum with V19 open as burst phase −180 degrees.	−5	+5	+15	deg
Tmin			Apply B monochromatic wave (variable phase) 0.4 Vp-p and burst 0.2Vp-p to the input. Measure the input phase in which the output at pin ⑫ becomes "maximum" when V19 is 0 V and 4 V as burst phase −180 degrees.	−55	40	−25	deg
Tmax				+30	−40	+60	
Dhd	HD for chroma delay	24	Apply B monochromatic wave 0.4 Vp-p and burst 0.2 Vp-p to the input. Measure the delay time from HD pulse rise to thr chroma rise of pin ⑫ output.	−	2.0	2.2	μsec

INPUT SIGNAL

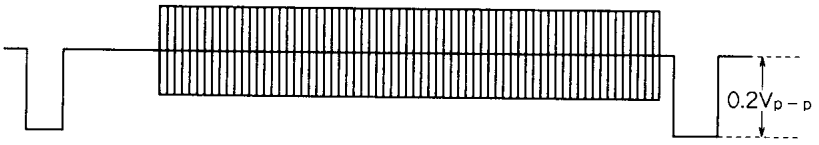
Standard Color Bar‹PAL ›(Standard staircase wave has no chroma signal)



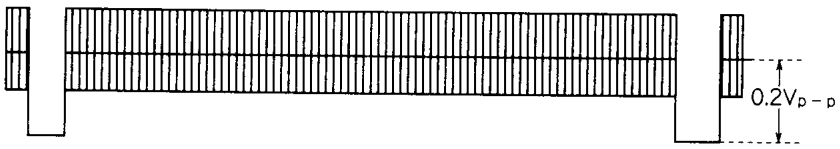
Burst+CW (B monochromatic wave, etc.) PAL



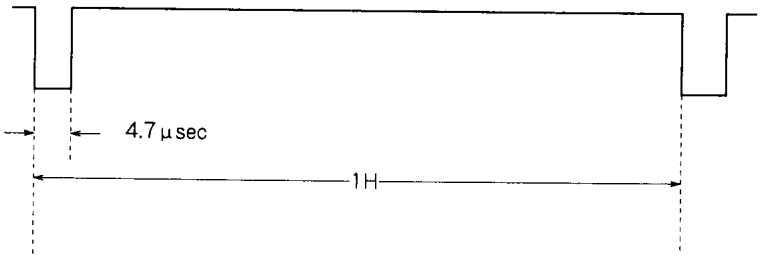
Sine wave



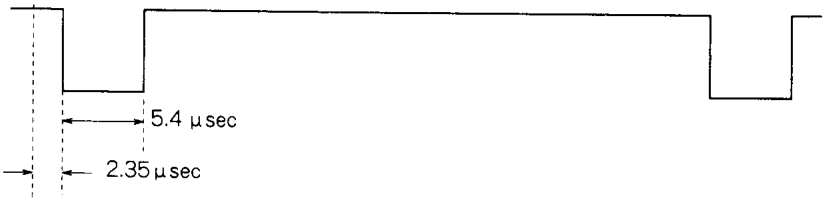
Continuous sine wave (CW)



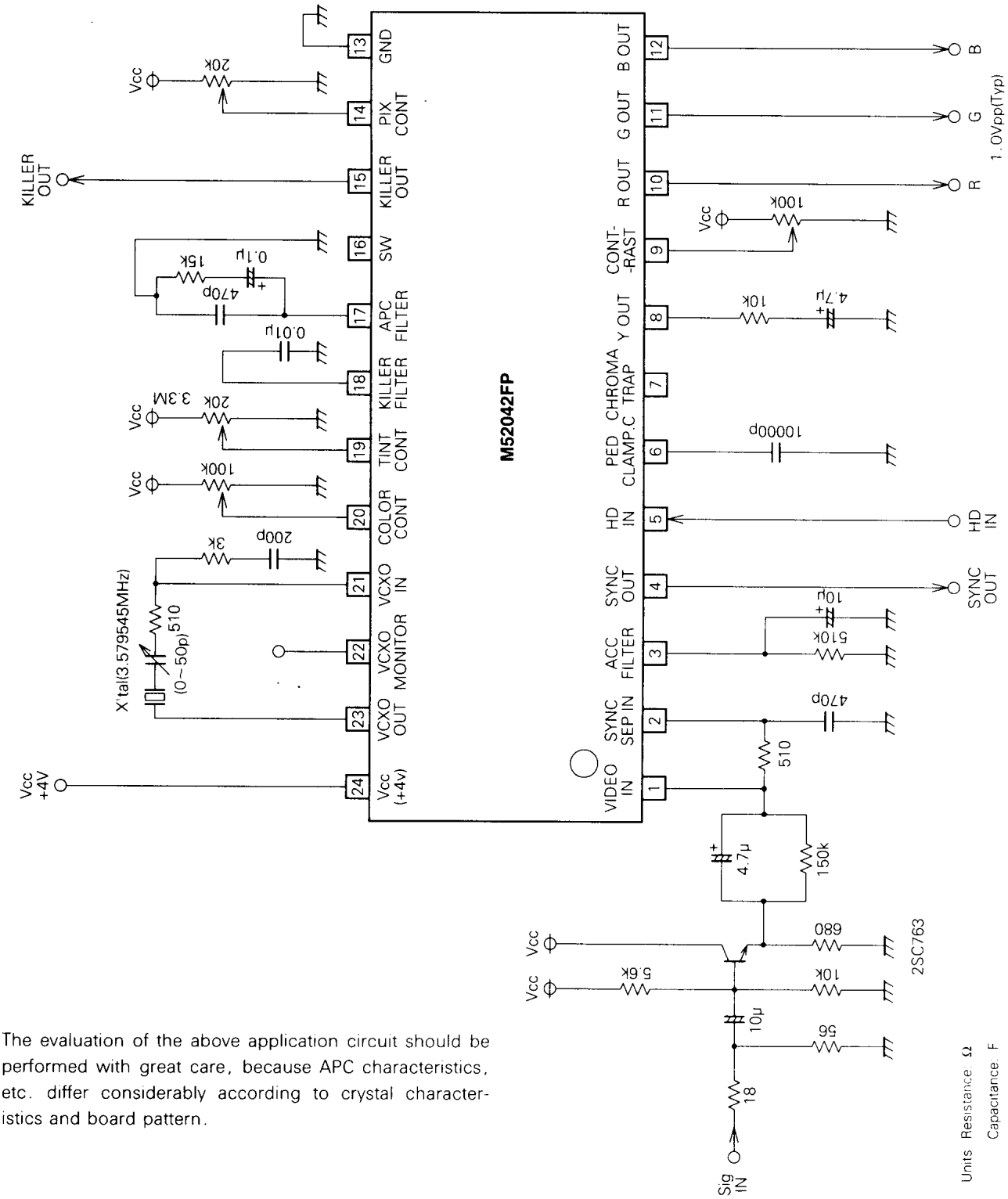
SYNC pulse



Standard HD signal



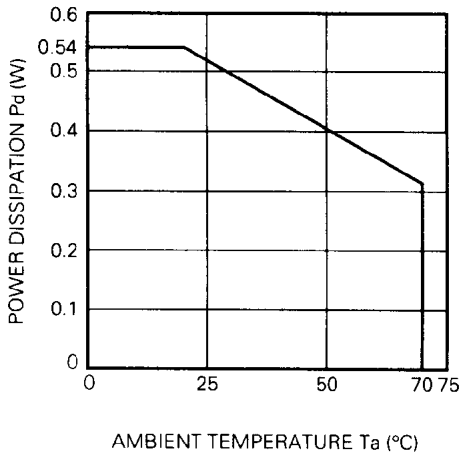
TEST CIRCUIT



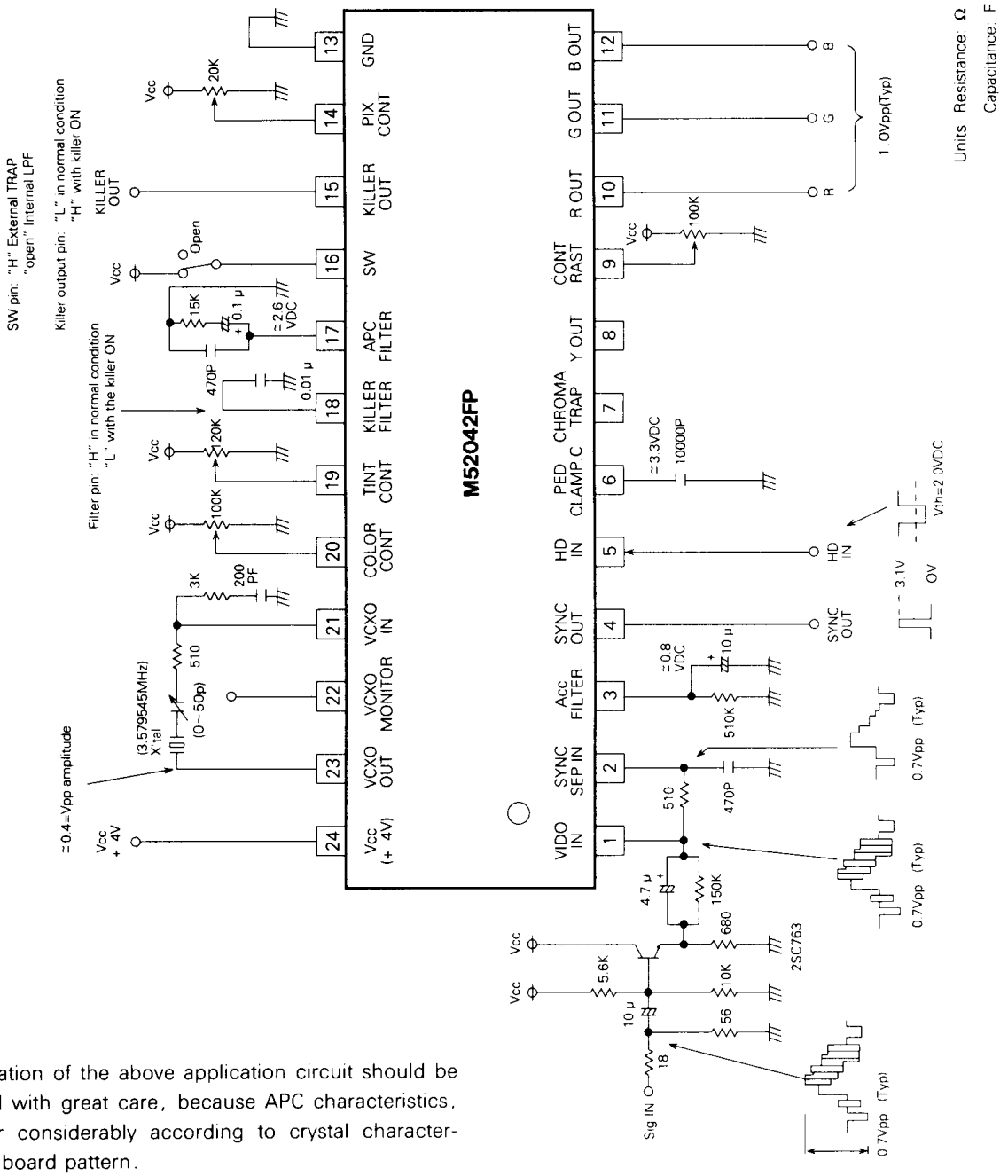
The evaluation of the above application circuit should be performed with great care, because APC characteristics, etc. differ considerably according to crystal characteristics and board pattern.

TYPICAL CHARACTERISTICS

THERMAL DERATING (MAXIMUM RATING)

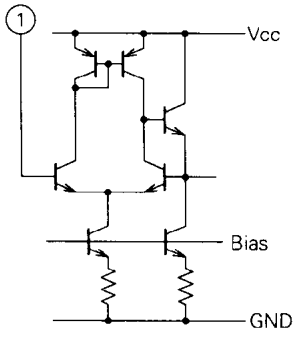
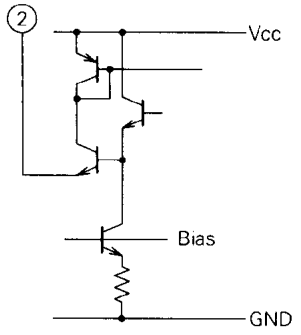
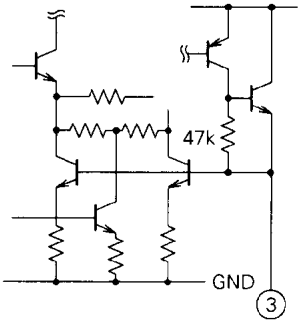
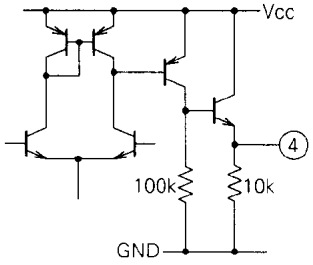


APPLICATION EXAMPLE

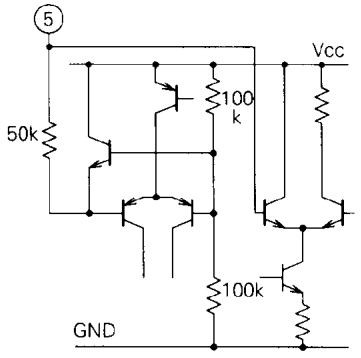
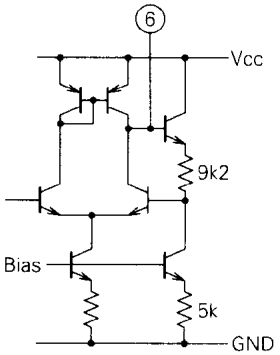
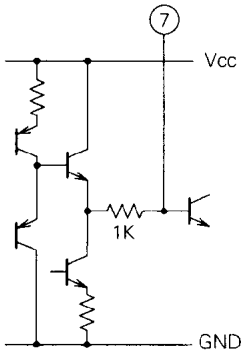
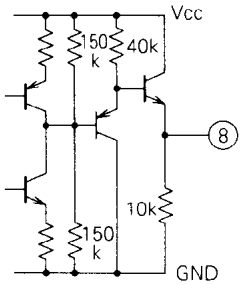


The evaluation of the above application circuit should be performed with great care, because APC characteristics, etc. differ considerably according to crystal characteristics and board pattern.

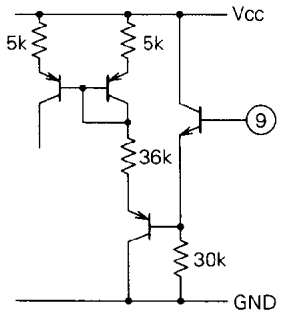
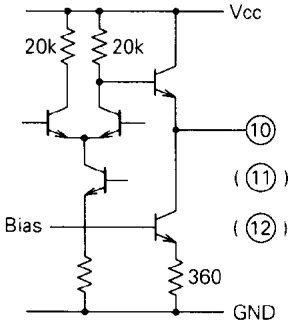
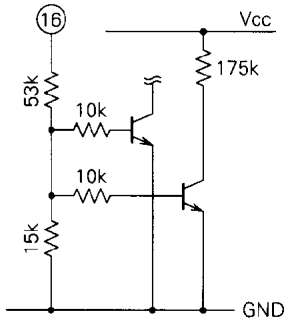
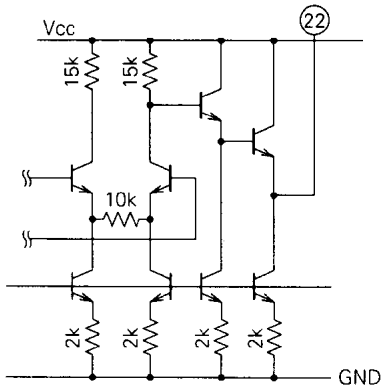
DESCRIPTION OF PIN

Pin No.	Name	Peripheral circuit of pins
①	VIDEO IN (Video input)	
②	SYNC SEP IN (SYNC separation input)	
③	ACC FILTER	
④	SYNC OUT (SYNC separation output)	

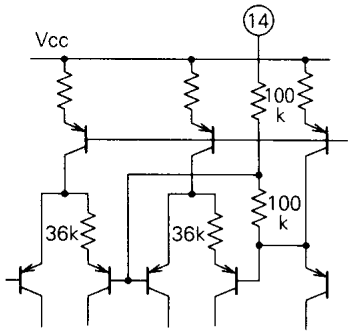
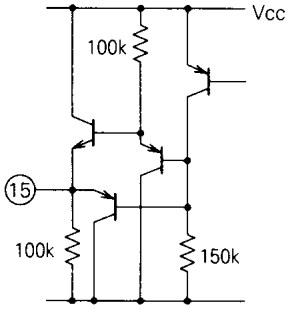
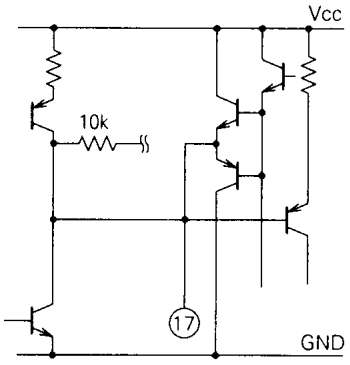
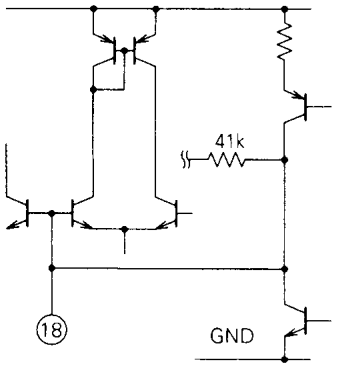
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Peripheral circuit of pins
⑤	HD IN (HD pulse input)	
⑥	PED CLAMP C (Pedestal-clamped capacitance)	
⑦	CHROMA TRAP	
⑧	Y OUT (Y output)	

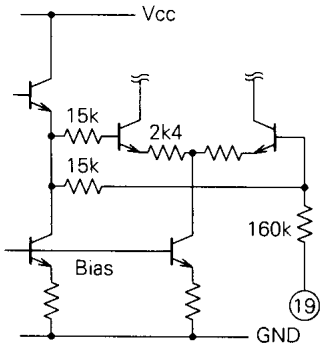
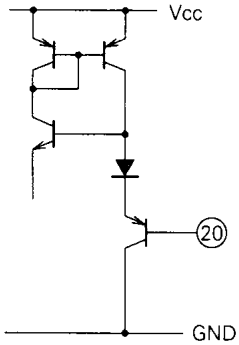
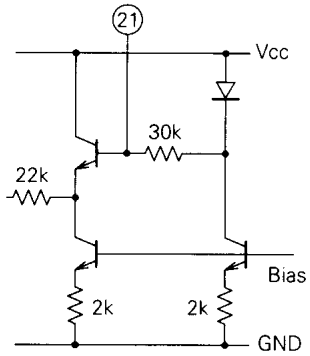
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Peripheral circuit of pins
⑨	CONTRAST CONT. (Contrast control)	
⑩	R OUT (R output)	
⑪	G OUT (G output)	
⑫	B OUT (B output)	
⑬	GND (Grounding)	—
㉔	Vcc + 4V (Power supply)	—
⑯	S.W. (Selector switch)	
㉒	VCXO MONITOR	

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Peripheral circuit of pins
⑭	PIX CONT. (Picture quality control)	
⑮	KILLER OUT (Killer output)	
⑰	APC FILTER	
⑱	KILLER FILTER	

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Peripheral circuit of pins
⑲	TINT CONT. (Tint control)	
⑳	COLOR (Color control)	
㉑	VCXO IN (VCXO input)	
㉓	VCXO OUT (VCXO output)