M51404AFP

SECAM SYSTEM CHROMA SIGNAL PROCESSOR

DESCRIPTION

The M51404AFP is a semiconductor integrated circuit for SECAM system chroma signal processing.
This IC contains a limiter amplifier, PAL/SECAM system switch and detector circuit.

FEATURES

- Low power dissipation
- PAL/SECAM dual system can be produced by combination with M51403FP (PAL video chroma IC).

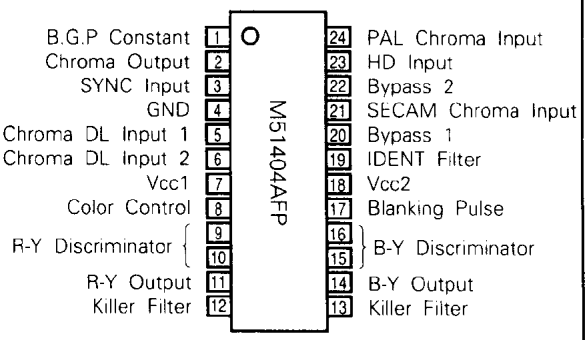
APPLICATION

SECAM system LCD TV

RECOMMENDED OPERATING CONDITION

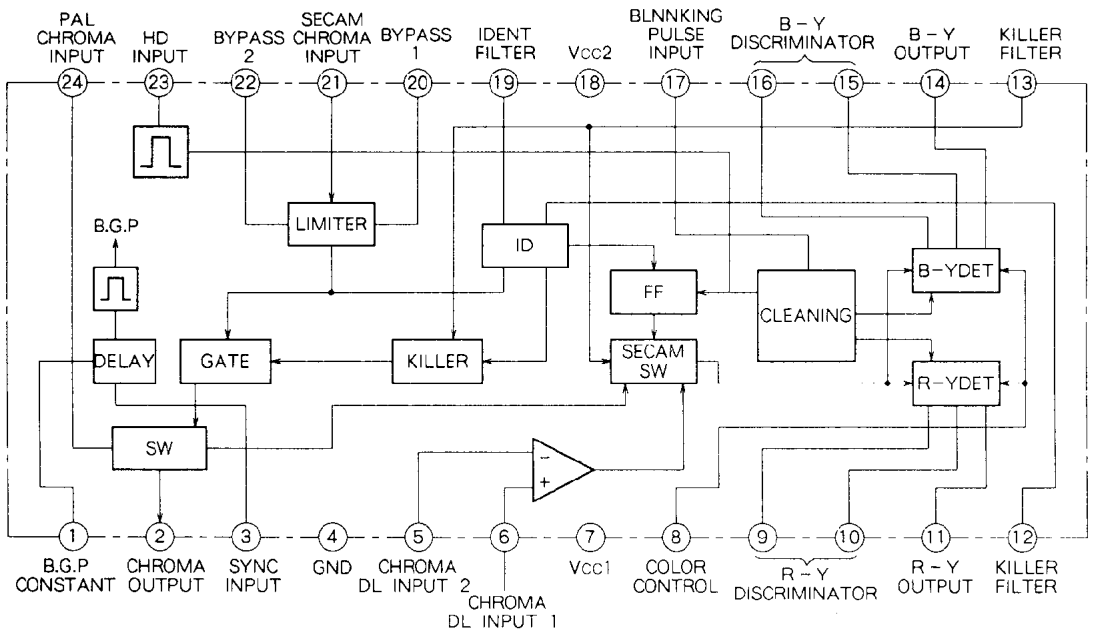
Supply voltage range ..... 4.0 ~ 5.0V
Rated supply voltage 4.5V

PIN CONFIGURATION (TOP VIEW)



Outline 24P2-C

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	5.0	V
Surge	Surge withstand voltage (200pF)	± 300*	V
I_{OUT} ⑬	Outflow current at pin ⑬	800	mA
V_{IN} ③	Input voltage at pin ③	V_{CC} + 0.3	V
V_{IN} ⑰	Input voltage at pin ⑰	V_{CC} + 0.3	V
V_{IN} ㉓	Input voltage at pin ㉓	V_{CC} + 0.3	V
I_{OUT} ⑪ ⑭	Outflow current at pins ⑪, ⑭	900	mA
P_d	Internal power dissipation	550	mW
T_{opr}	Operating temperature	− 20~75	℃
T_{stg}	Storage temperature	− 40~125	℃

* : The voltage at pins ⑪, ⑭ is ± 200V.

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

Symbol	Parameter	Test No.	Test conditions (The numbers in circle below indicate Pin No.)	Limits Min.	Limits Typ.	Limits Max.	Unit
Icc	Circuit current	1	Measure the inflow current when 4.5V DC voltage is applied to pins ⑦ and ⑱.	14.0	20.0	26.0	mA
LIM	Limiter output	2	Input 4.3MHz sine wave of 0.1VP-P to pin ㉑, and measure the output amplitude at pin ② when the voltage at pin ⑫ is 4.5VDC.	0.7	1.0	1.3	VP-P
GLIM	Limiter gain	3	Calculate the ratio between the input amplitude when the input amplitude at ㉑ is reduced until the output amplitude at pin ② reaches 0.7LIM from the condition in Test No. ② above and the input amplitude in Test No. 2.	− 40	− 37	− 32	dB
ID	IDENT DISC output	4	When 4.328MHz sine wave of 0.2VP-P is input to pin ㉑, measure the output amplitude at pin ⑲. (See Note 1)	0.14	0.25	0.36	VP-P
RY	Demodulated output characteristics 1	5	Input SECAM chroma signal 0.1VP-P to pin ㉑, and measure the output amplitude at pin ⑪ when the voltage at pin ⑧ is 3.5VDC. (See Note 1)	0.20	0.33	0.46	VP-P
BY	Demodulated output characteristics 2	6	Input SECAM chroma signal 0.1VP-P to pin ㉑ and measure the output amplitude at pin ⑭ when the voltage at pin ⑧ is 3.5VP-P. (See Note 1)	0.15	0.28	0.41	VP-P
R/B	Demodulated output ratio	7	Calculate the ratio of output amplitude in Test No. 5 above to that in Test No. 6 above.	1.0	1.2	1.4	−
MOD1	Amplitude modulation suppression ratio 1	8	Input 4.406MHz sine wave of 0.2VP-P to pin ㉑, and measure the output amplitude at pin ⑪ when the voltage at pin ⑧ is 3.0VDC. (See Note 2)		− 36	− 30	dB
MOD2	Amplitude modulation suppression ratio 2	9	Input 4.25MHz sine wave of 0.2VP-P to pin ㉑, and measure the output amplitude at pin ⑭ when the voltage at pin ⑧ is 3.0VDC. (See Note 2)		− 33	− 30	dB
SW	System switch (SW) operation characteristics	10	Input 4.3MHz sine wave of 2.0VP-P to pin ㉓, and measure the output amplitude at pin ② when the voltage at ⑫ is 0VDC. (See Note 3)	0.6	1.0	1.4	VP-P
V_{13L}	"L" voltage at killer pin	11	Measure the output DC voltage at pin ⑬ when the voltage at pin ⑫ is 0VDC.		0.025	0.30	VDC
V_{13H}	"H" voltage at killer pin	12	Measure the output DC voltage at pin ⑬ when the voltage at pin ⑫ is 4.5VDC.	3.40	3.80		VDC
COL1	Color control characteristics 1	13	Input SECAM chroma signal 0.1VP-P to pin ㉑, and measure the output amplitude at pin ⑪ when the voltage at pins ⑫, ⑧ is 4.5VDC. (See Note 1)	0.34	0.50	0.66	VP-P
COL2	Color control characteristics 2	14	Input SECAM chroma signal 0.1VP-P to pin ㉑, and measure the output amplitude at pin ⑪ when the voltage at pins ⑫ and ⑧ are 4.5 and 2.3VDC respectively. (See Note 1)	0.10	0.16	0.22	VP-P
COL3	Color control characteristics 3	15	Input SECAM chroma signal 0.1VP-P to pin ㉑, and measure the output amplitude at pin ⑭ when the voltage at pins ⑫, ⑧ is 4.5VDC. (See Note 1)	0.28	0.42	0.56	VP-P
COL4	Color control characteristics 4	16	Input SECAM chroma signal 0.1VP-P to pin ㉑, and measure the output amplitude at pin ⑭ when the voltages at pins ⑫ and ⑧ are 4.5 and 2.3VDC respectively. (See Note 1)	0.08	0.13	0.20	VP-P
KIL	Killer operation input	17	Input SECAM chroma signal 0.1VP-P to pin ㉑ and reduce the amplitude, then measure the input amplitude when the voltage at pin ⑬ exceed 2.9V, and calculate the ratio between the measured amplitude and input amplitude. (To be continued)		− 38	− 34	dB

ELECTRICAL CHARACTERISTICS (cont)

Symbol	Parameter	Test No.	Test conditions The numbers in circle below indicate Pin No.	Limits Min.	Typ.	Max.	Unit
DKIL	Killer color residual	18	Input SECAM chroma signal 0.1VP-P to pin ㉑, and measure the output amplitude at pin ⑪ when the voltage at pins ⑫ and ⑧ are 0 and 3.5VDC respectively.	0	15	30	mVP-P
Dleak1	Demodulated output carrier leak 1	19	Input 4.406MHz sine wave of 0.2VP-P to pin ㉑, and measure the amplitude of 8.8MHz element during output at pin ⑪ when the voltage at pins ⑧, ⑫ is 0VDC.	0	5	25	mVP-P
Dleak2	Demodulated output carrier leak 2	20	Input 4.25MHz sine wave of 0.2VP-P to pin ㉑, and measure the amplitude of 8.5MHz element during pin ⑭ output when the voltage at pins ⑧, ⑫ is 0VDC.	0	5	25	mVP-P

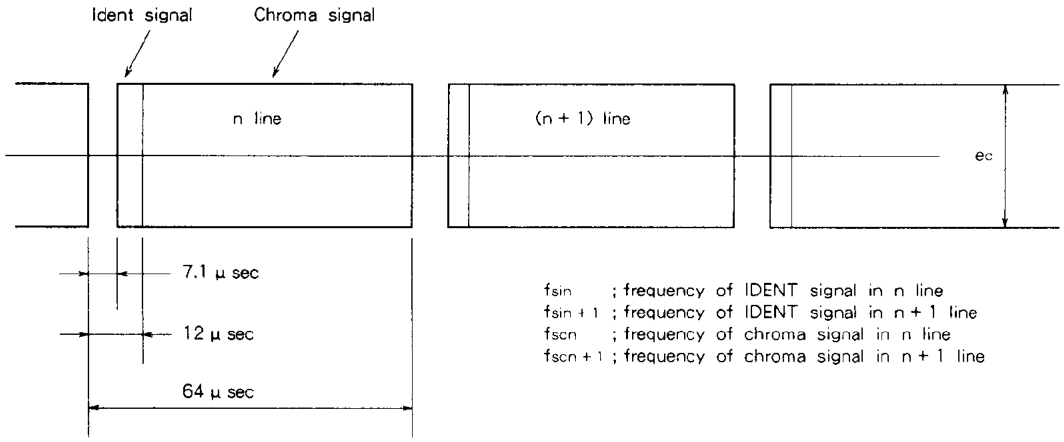
Notes 1. Adjust with L4 so that DC voltage at pin ⑫ when SW12 is "b" becomes maximum.

2. Apply a frequency modulation signal of fm = 400Hz and modulation rate 75kHz from SG2 of no SYNC pulse, input signal 0.2VP-P, 4.406MHz (at pin ⑪ measurement) and 4.25MHz (at pin ⑭ measurement), and measure the output voltage : this voltage shall be VF. Next, apply an amplitude modulation signal of fm = 400Hz and modulation rate 30% and measure the output voltage : this voltage shall be VA.

$$\text{Amplitdue modulation suppression ratio} = 20 \log \frac{VA}{VF} \text{ (dB)}$$

3. Measure the output voltage with no SYNC pulse inputted.

INPUT SIGNAL



The fundamental input 0dB shall be "ec = 100mVP-P".
fsc and fsl should be as given on the table below.

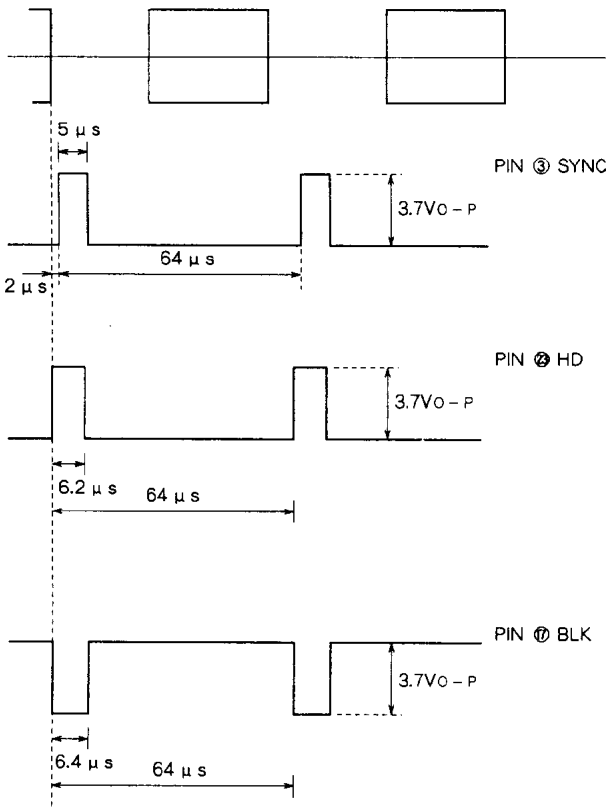
FREQUENCY OF REFERENCE INPUT SIGNAL (MHz)

		n line	n + 1 line
fsi		4.250	4.406
fsc	WHITE = fo	4.250	4.406
	YELLOW	4.020	4.3605
	CYAN	4.3276	4.686
	GREEN	4.0976	4.6345
	MAGENTA	4.4024	4.1715
	RED	4.1724	4.126
	BLUE	4.480	4.4515
	BLACK	4.250	4.406

The chroma signal is divided into 8 equal parts.

Remark : Standard color bar can be used in place of the above signal.

GATE PULSE AND F.F. TRIGGER PULSE



PULSE INPUT TERMINAL THRESHOLD

Pin ㉓	HD pulse	H / L	Vth = 2.3V
Pin ③	Sync pulse		Vth = 2.3V
Pin ⑰	BLK pulse	H / L	Vth = 2.3V

Note For the HD pulse polarity, standard input is as shown above, but the downward pulse (⊓) may be input.
Conditions :
Rise position : Within the fly-back period.
Fall position : Within the fly-back period.

TEST CIRCUIT SWITCHING CONDITIONS

Test No.	Pin voltage (VDC)					SW							
	A	1	8	12	21a	S1	S5	S6	S12	S21	S24	S25	S26
1	4.5	4.5	3.0	4.5	4.5	a	a	a	a	OFF	OFF	OFF	OFF
2	4.5	4.5	3.0	4.5	4.5	b	b	b	a	OFF	OFF	OFF	OFF
3	4.5	4.5	3.0	4.5	4.5	b	b	b	a	OFF	OFF	OFF	OFF
4	4.5	4.5	3.0	4.5	4.5	b	b	b	b	OFF	OFF	OFF	OFF
5	4.5	4.5	3.5	4.5	4.5	a	a	a	b	OFF	OFF	OFF	OFF
6	4.5	4.5	3.5	4.5	4.5	a	a	a	b	OFF	OFF	OFF	OFF
7	4.5	4.5	3.5	4.5	4.5	a	a	a	b	OFF	OFF	OFF	OFF
8	4.5	4.5	3.0	4.5	4.5	b	a	a	b	OFF	OFF	OFF	OFF
9	4.5	4.5	3.0	4.5	4.5	b	a	a	b	OFF	OFF	OFF	OFF
10	4.5	4.5	3.0	4.5	4.5	a	a	a	a	OFF	ON	OFF	OFF
11	4.5	4.5	3.0	4.5	4.5	a	a	a	c	OFF	OFF	OFF	OFF
12	4.5	4.5	3.0	4.5	4.5	a	a	a	a	OFF	OFF	OFF	OFF
13	4.5	4.5	4.5	4.5	4.5	a	a	a	b	OFF	OFF	OFF	OFF
14	4.5	4.5	2.3	4.5	4.5	a	a	a	b	OFF	OFF	OFF	OFF
15	4.5	4.5	4.5	4.5	4.5	a	a	a	b	OFF	OFF	OFF	OFF
16	4.5	4.5	2.3	4.5	4.5	a	a	a	b	OFF	OFF	OFF	OFF
17	4.5	4.5	3.5	4.5	4.5	a	a	a	b	OFF	OFF	OFF	OFF
18	4.5	4.5	3.5	4.5	4.5	a	a	a	c	OFF	OFF	OFF	OFF
19	4.5	4.5	0	4.5	4.5	a	a	a	c	OFF	OFF	OFF	OFF
20	4.5	4.5	0	4.5	4.5	a	a	a	c	OFF	OFF	OFF	OFF

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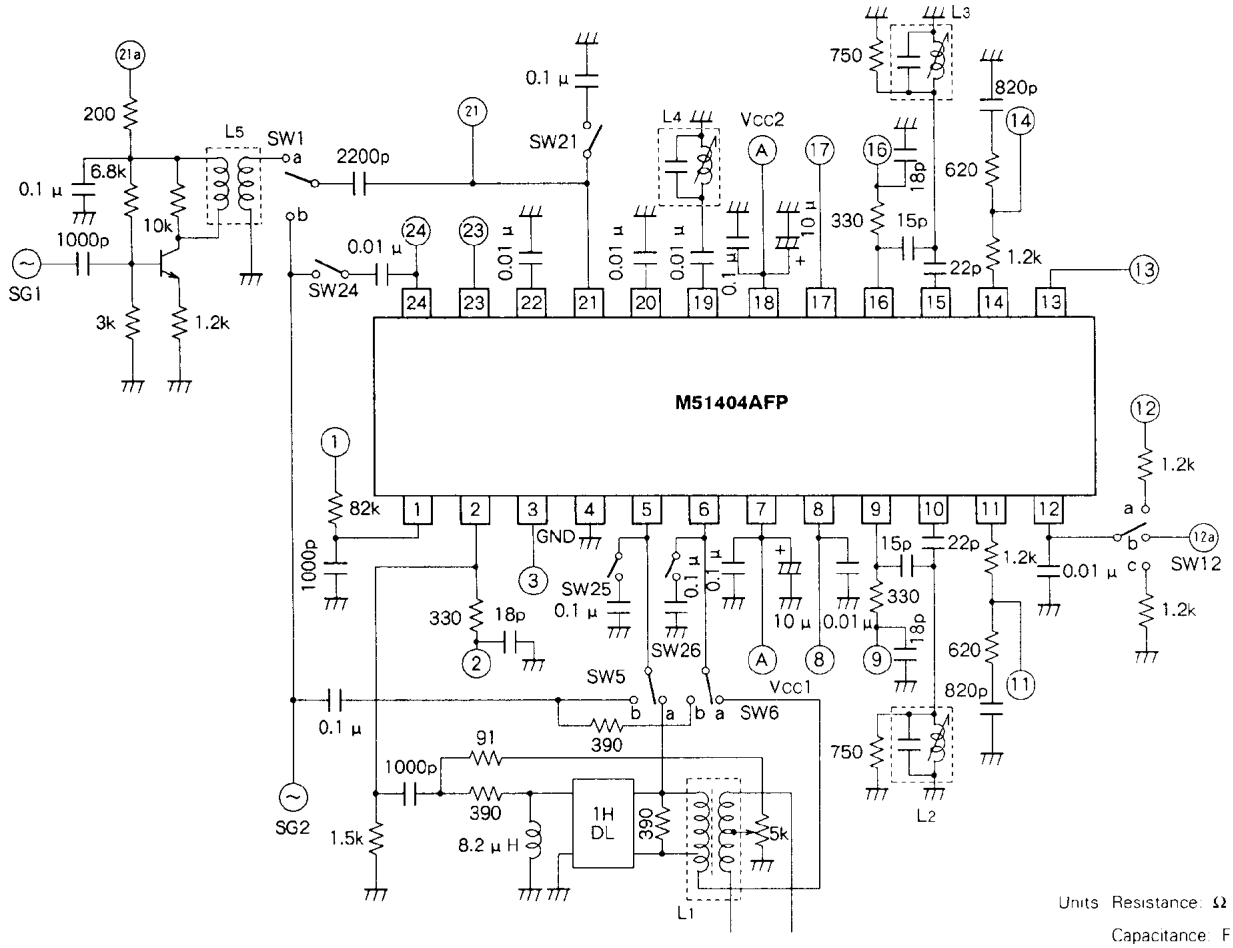
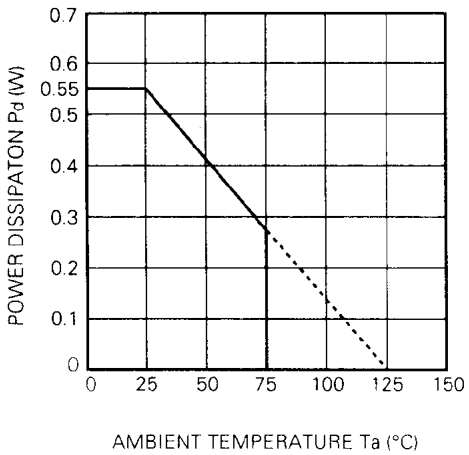
TEST CIRCUIT



TYPICAL CHARACTERISTICS

THERMAL DERATING (MAXIMUM RATING)



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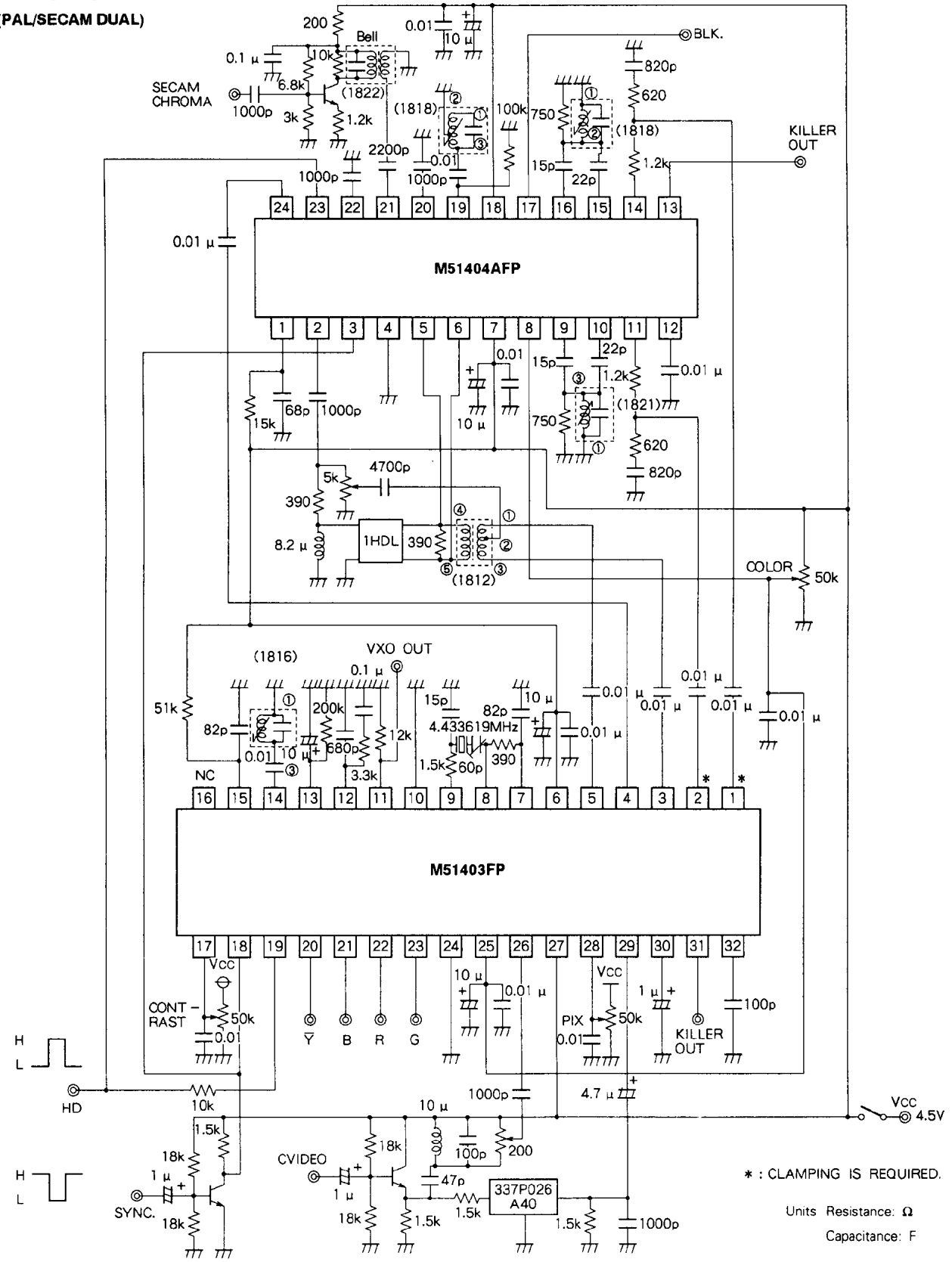
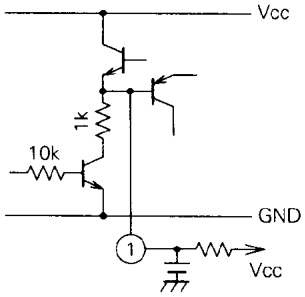
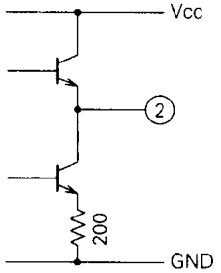
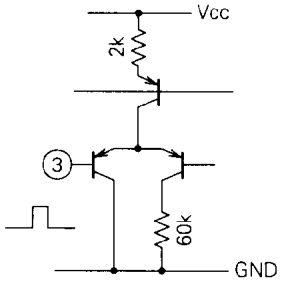
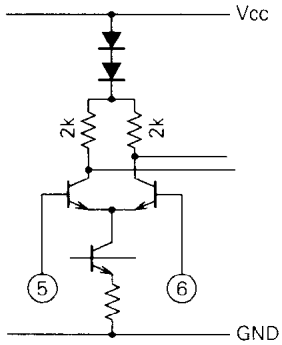
APPLICATION EXAMPLE

(PAL/SECAM DUAL)

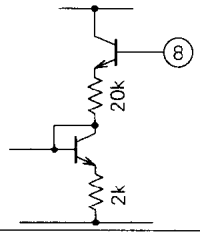
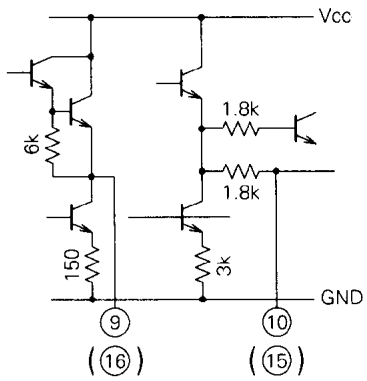
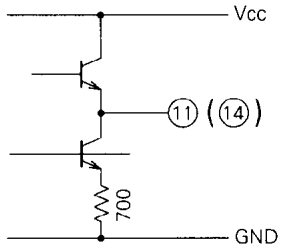
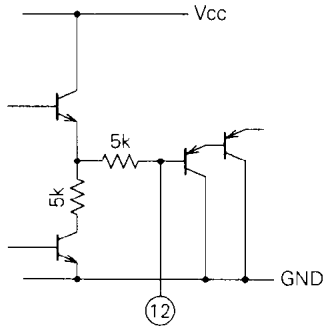


MITSUBISHI ELECTRIC

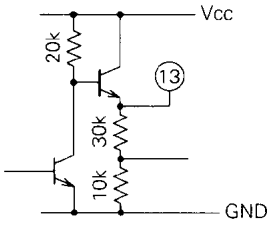
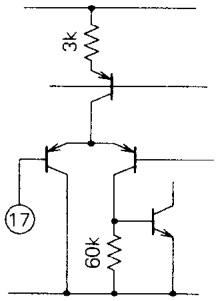
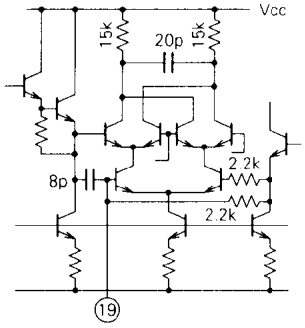
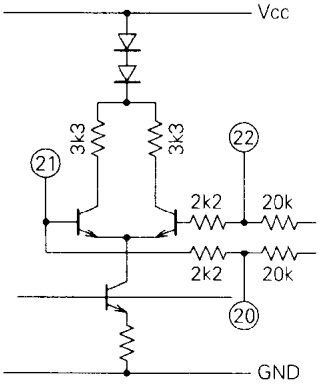
DESCRIPTION OF PIN

Pin No.	Name	Peripheral circuit of pins
①	B .G . P time constant	
②	Chroma Input	
③	SYNC Input	
④	GND	—
⑤	Chroma DL Input 1	
⑥	Chroma DL Input 2	

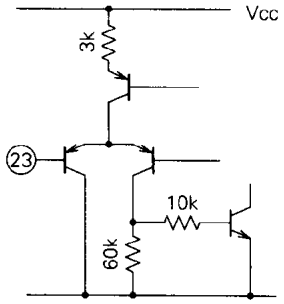
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Peripheral circuit of pins
⑦	Vcc 1	
⑧	Color control	
⑨ ⑩	R – Y Discriminator	
⑯ ⑮	B – Y Discriminator	
⑪	R – Y OUT	
⑭	B – Y OUT	
⑫	Killer filter	

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Peripheral circuit of pins
⑬	Killer OUT	
⑰	Blanking pulse Input	
⑱	Vcc 2	
⑲	IDENT filter	
⑳	Bypass 1	
㉒	Bypass 2	
㉑	SECAM chroma Input	

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Peripheral circuit of pins
㉓	HD Input	
㉔	PAL chroma Input