

# M51413ASP

## PAL/NTSC VIDEO CHROMA DEFLECTION

### DESCRIPTION

The M51413ASP is a semiconductor integrated circuit for video, chroma, and deflection signal processing. Combined with IC component M51346AP for VIF/SIF, it realizes practical color television using only two IC components.

Circuit configuration includes built-in sync separation, horizontal AFC, horizontal oscillator, horizontal count-down, vertical count-down, contrast control, luminance control, picture quality control, ACC/killer detector, ident detector, APC detector, chroma oscillator, NTSC tint control, and chroma demodulator functions.

### FEATURES

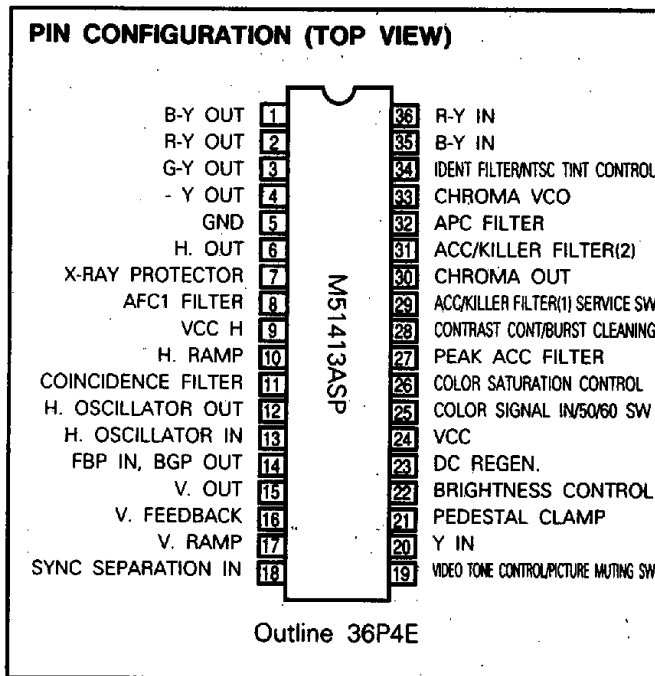
- By combining with IC components M51498SP, M52026SP for SECAM chroma signals, a multi-system capable of handling PAL, NTSC, and SECAM signals can be constructed.
- Large-scale, single-chip construction enhances practicality and reliability of the television set itself while contributing to lower power consumption.
- Places of adjustment and number of external components are minimized.
- NTSC system switch enables construction of a PAL/NTSC system with a minimal amount of peripheral components. (Switches demodulator axis, demodulation ratio, PAL matrix, and tint control.)
- Employs a sync detector system for ACC/killer detector; realizes superior weak electric field killer level.
- Double AFC in the horizontal circuit effectively reduces weak electric field horizontal "jitter", and "bending" on the screen is minimized thanks to luminance alteration. VTR switch improves skew distortion. Sync sensor circuit not only expands pull-in range, but can be used as a sensor signal for sound muting, automatic channel selection, etc.
- Contains built-in service switch. (Contrast minimum killer on, vertical output off)

### APPLICATION

PAL/SECAM Dual System, PAL/SECAM/NTSC System Color Television Receiver

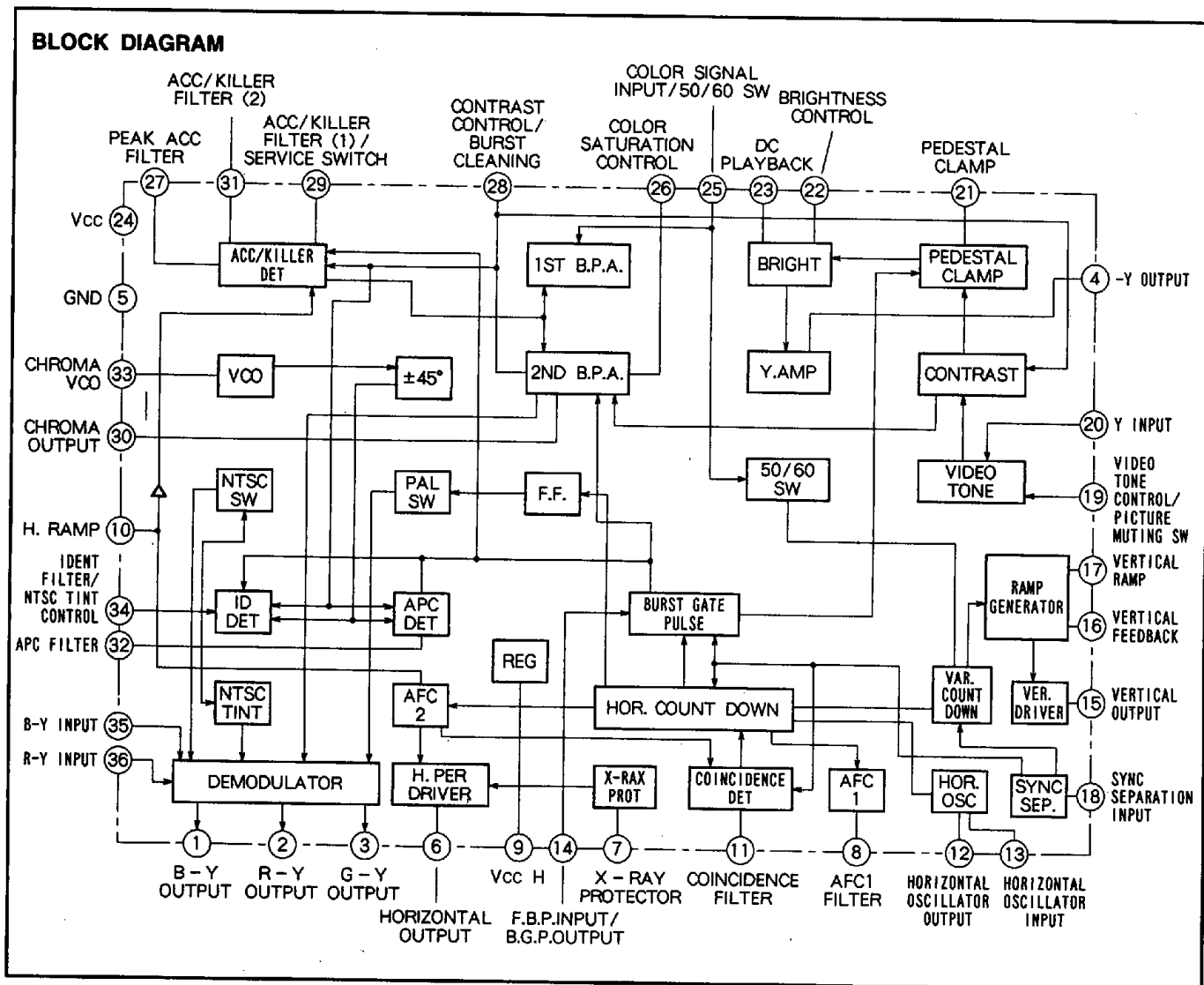
### RECOMMENDED OPERATING CONDITION

Supply Voltage Range ..... 10.0 ~ 12.5V (Pin②)  
 Rated Supply Voltage ..... 11V (Pin②)  
 Rated Supply Current ..... 33mA (Pin⑨)



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### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V <sub>cc</sub>	Supply voltage	13.5	V
P <sub>d</sub>	Power dissipation	1.25	W
Surge	Surge voltage resistance	$\pm 200$	V
V <sub>16</sub>	Pin ⑩ voltage	$0.28V_{cc} + 6$	V
I <sub>17</sub>	Pin ⑩ input current	+ 6	mA
I <sub>14</sub>	Pin ⑭ input current	- 1.0	mA
T <sub>opr</sub>	Operating temperature	- 20~65	°C
T <sub>stg</sub>	Storage temperature	- 40~125	°C

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## ELECTRICAL CHARACTERISTICS (Ta = 25°C, unless otherwise noted)

## VIDEO SECTION

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
Icc - YC	Circuit current		46	60	74	mA
Ymax	Maximum output		6.9	8.0		V <sub>P-P</sub>
GY	Video amplifier gain		18	21	24	dB
GYmid	Contrast control characteristics - 1		0.65	0.95	1.35	V <sub>P-P</sub>
GYmin	Contrast control characteristics - 2			-39	-29	dB
GYmax	Contrast control characteristics - 3		4.3	7.3	10.3	dB
YTmid	Video tone control characteristics-1		0.95	1.35	1.85	V <sub>P-P</sub>
YTmin	Video tone control characteristics-2		-11	-8	-5	dB
YTmax	Video tone control characteristics-3		1.6	4.6	7.6	dB
YBRTmid	Brightness control characteristics-1		3.4	4.0	4.6	V
YBRTmin	Brightness control characteristics-2		7.4	8.0	8.6	V
YBRTmax	Brightness control characteristics-3			0.8	1.4	V
Yf	Frequency characteristics		-2	2	6	dB
H.BLKTH	Horizontal blanking threshold voltage		8.9	9.5	10.1	V
YV.BLK	Vertical blanking voltage		8.3	8.9	9.5	V

## CHROMA SECTION

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
Cmax	Maximum output		1.6	2.2	2.8	V <sub>P-P</sub>
GC	Chroma maximum gain		35	40	45	dB
Acc1	ACC characteristics - 1		-8	-2.5	0	dB
Acc2	ACC characteristics - 2		-2	0.4	3	dB
KIL	Killer operation input		-34	-28	-22	dB
D.KIL	Killer color residual				200	mV <sub>P-P</sub>
CCmid	Color control characteristics - 1		0.65	0.95	1.35	V <sub>P-P</sub>
CCmin	Color control characteristics - 2			-40	-36	dB
CCmax	Color control characteristics - 3		5	9	13	dB
UCmid	Color tracking characteristics - 1		0.45	1.1	1.75	V <sub>P-P</sub>
UCmin	Color tracking characteristics - 2			-40	-36	dB
UCmax	Color tracking characteristics - 3		1	5	8	dB
APC1	APC pull-in range - 1		500	900		Hz
APC2	APC pull-in range - 2		870	1500		Hz
D <sub>DC</sub>	Demodulated output DC voltage		5.9	6.4	6.9	V
D <sub>offset</sub>	Demodulated DC offset				0.3	V
D <sub>max</sub>	Demodulated output maximum amplitude		5.5	6.5	7.5	V <sub>P-P</sub>
D <sub>B-Y</sub>	B - Y demodulation sensitivity		2.5	3.0	3.5	V <sub>P-P</sub>
R/B	Demodulation ratio - 1		0.53	0.60	0.67	-
G/B	Demodulation ratio - 2		0.30	0.36	0.42	-
V <sub>26</sub>	Pin <sup>⊗</sup> voltage(killer on)			0.13	1.00	V
NTSC B	Demodulated output(NTSC)		2.25	3.25	4.55	V <sub>P-P</sub>
NTSC R/B	Demodulation ratio(NTSC) - 1		0.60	0.70	0.80	-
NTSC G/B	Demodulation ratio(NTSC) - 2		0.20	0.31	0.36	-
D <sub>BW</sub>	Demodulated output high-pass amplitude		0.8	1.0		MHz
CD	Chroma input dynamic range		1.0	1.4		V <sub>P-P</sub>
∠R-Y-P	PAL demodulated phase angle			90		deg.
∠R-Y-N	NTSC demodulated phase angle			100		deg.
T <sub>min</sub>	NTSC TINT		27	-47	67	deg.
T <sub>max</sub>			20	+40	60	deg.

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**PAL/NTSC VIDEO CHROMA DEFLECTION**

**DEFLECTION SECTION**

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I <sub>CC - J</sub>	Circuit current		26	35	44	mA
V <sub>gmin</sub>	Horizontal oscillator starting voltage			6	7.2	V
f <sub>H</sub>	Horizontal free run frequency		15.45	15.625	15.8	kHz
f <sub>PHIL</sub>	Horizontal pull-in range - 1			- 970	- 600	Hz
f <sub>PHIH</sub>			+ 550	+ 900		Hz
V <sub>9H</sub>	Coincidence detection maximum voltage		8.5	9.1		V
V <sub>9L</sub>	Coincidence detection minimum voltage				0.5	V
τ <sub>H</sub>	Horizontal output pulse amplitude		22	25	28	μ sec
V <sub>Hmin</sub>	Horizontal output voltage			0.04	0.16	V
V <sub>Hmax</sub>			3.1	3.9	4.8	V
t <sub>GP</sub>	Burst gate pulse position		4.1	5.0	5.9	μ sec
f <sub>V50</sub>	Vertical free run frequency 50(Hz)		45.6	47	48.6	Hz
f <sub>V60</sub>	Vertical free run frequency 60(Hz)		52.7	55	57.2	Hz
f <sub>PV50</sub>	Vertical pull-in range 50(Hz)		54	55.7	58	Hz
f <sub>PV60</sub>	Vertical pull-in range 60(Hz)		65	66.3	69	Hz
τ <sub>V50</sub>	Vertical output pulse amplitude 50(Hz)		474	544	614	μ sec
τ <sub>V60</sub>	Vertical output pulse amplitude 60(Hz)		474	544	614	μ sec
V <sub>vmax</sub>	Vertical output maximum voltage		3.2	4.2		V <sub>O-P</sub>
V <sub>vmin</sub>	Vertical output minimum voltage				0.3	V
P <sub>Ramp</sub>	Ramp peak voltage		5.6	6.05	6.5	V
V <sub>Ramp</sub>	Ramp amplitude		1.5	1.8	2.1	V <sub>P-P</sub>
G <sub>VV</sub>	Vertical close loop gain		16	20	24	dB
I <sub>SS</sub>	Sync separation input sensitivity current		0.07	0.1	0.15	mA
T <sub>BGP1</sub>	Burst gata pulse timing - 1		0.35	0.5	0.7	μ sec
T <sub>BGP2</sub>	Burst gata pulse timing - 2		3.2	3.6	4.1	μ sec
V <sub>FBP</sub>	Flyback pulse clamp voltage		4.3	4.8	5.3	V
V <sub>BGP</sub>	Burst gate pulse voltage		9.5	10.0	10.5	V

PAL/NTSC VIDEO CHROMA DEFLECTION

**ELECTRICAL CHARACTERISTICS TEST METHOD**

**Maximum output (Ymax)**

1. Measure amplitude of parts except V blanking, where the waveform is distorted.

**Video amplifier gain (GY)**

1. Measure amplitude of parts except V blanking, which is  $V_{CO}$ .
2.  $G_Y = 20 \times \log \frac{V_{CO}(mV_{p-p})}{200(mV_{p-p})}$  (dB)

**Contrast control characteristic 1 (GYmid)**

1.  $G_{Ymid} = V_{CO}$  (Vp-p)

**Contrast control characteristic 2 (GYmin)**

1. Measure amplitude of parts except V blanking, which is  $V_{C1}$ .
2.  $G_{Ymin} = 20 \times \log \frac{V_{C1}}{V_{CO}}$  (dB)

**Contrast control characteristic 3 (GYmax)**

1. Measure amplitude of parts except V blanking, which is  $V_{C2}$ .
2.  $G_{Ymax} = 20 \times \log \frac{V_{C2}}{V_{CO}}$  (dB)

**Video tone control characteristic 1 (YTmid)**

1. Measure amplitude of parts except V blanking, which is  $V_{T0}$
2.  $Y_{Tmid} = V_{T0}$  (Vp-p)

**Video tone control characteristic 2 (YTmin)**

1. Measure amplitude of parts except V blanking, which is  $V_{T1}$ .
2.  $Y_{Tmin} = 20 \times \log \frac{V_{T1}}{V_{T0}}$  (dB)

**Video tone control characteristic 3 (YTmax)**

1. Measure amplitude of parts except V blanking, which is  $V_{T2}$ .
2.  $Y_{Tmax} = 20 \times \log \frac{V_{T2}}{V_{T0}}$  (dB)

**Brightness control characteristic 1 (YBRTmid)**

1. Measure DC voltage of parts except V blanking.

**Brightness control characteristic 2 (YBRTmin)**

1. Same as Y9.

**Brightness control characteristic 3 (YBRTmax)**

1. Same as Y9.

**Frequency response (YF)**

1. Measure amplitude of parts except V blanking.
2.  $V_{f1}$  when SG2 is input.
3.  $V_{f2}$  when SG4 is input.
4.  $Y_f = 20 \times \log \frac{V_{f2}}{V_{f1}}$  (dB)

**Differential gain (DG)**

1. Measure amplitude of parts except V blanking.
2.  $V_{G1}$  when ① is 2.4V.
3.  $V_{G2}$  when ① is 1.8V.
4.  $DG = \frac{V_{G1} - V_{G2}}{V_{G2}} \times 100$  (%)

**Horizontal blanking threshold voltage (H.BLK TH)**

1. Apply voltage to ④ and increase from 8V.
2. Measure voltage of ④ when signal output to ⑩ disappears.

**Vertical blanking voltage (YV.BLK)**

1. Measure DC voltage in V blanking.

**Chroma maximum gain (GC)**

1. Measure output amplitude (p-p), which is  $V_{GC}$ .
2.  $GC = 20 \times \log \frac{V_{GC}(mV_{p-p})}{\text{Input amplitude } (=7.94mV_{p-p})}$  (dB)

**ACC characteristic 1 (ACC1)**

1. Measure output amplitude (p-p).
2.  $V_{A0}$  when SG5 0dB is input.
3.  $V_{A1}$  when SG5 -2dB is input.
4.  $ACC_1 = 20 \times \log \frac{V_{A1}}{V_{A0}}$  (dB)

**ACC characteristic 2 (ACC2)**

1. Same as C3.  $V_{A2}$  when SG5 + 6dB is input.
2.  $ACC_2 = 20 \times \log \frac{V_{A2}}{V_{A0}}$  (dB)

**Killer operation input (KIL)**

1. Attenuate SG5 level gradually.
2. Observe DC voltage at ②. It is the SG5 input level when decreased to 1V or less.

**Residual color in killer (D.KIL)**

1. Measure output amplitude in 1H section.  
Color control characteristic-1 (CCmid)
1. Measure output amplitude (p-p), which is  $V_{CL0}$ .
2.  $CC_{mid} = V_{CL0}$  (Vp-p).

**Color control characteristic-2 (CCmin)**

1. Measure output amplitude (p-p), which is  $V_{CL1}$ .
2.  $CC_{min} = 20 \times \log \frac{V_{CL1}}{V_{CL0}}$  (dB)

**Color control characteristic-3 (CCmax)**

1. Measure output amplitude (p-p), which is  $V_{CL2}$ .
2.  $CC_{max} = 20 \times \log \frac{V_{CL2}}{V_{CL0}}$  (dB)

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**Color tracking characteristic-1 (UCmid)**

1. Measure output amplitude (p-p), which is  $V_{U0}$ .
2.  $UC_{mid} = V_{U0}$  (V<sub>p-p</sub>)

**Color tracking characteristic-2 (UCmin)**

1. Measure output amplitude (p-p), which is  $V_{U1}$ .
2.  $UC_{min} = 20 \times \log \frac{V_{U1}}{V_{U0}}$  (dB)

**Color tracking characteristic-3 (UCmax)**

1. Measure output amplitude (p-p), which is  $V_{U2}$ .
2.  $UC_{max} = 20 \times \log \frac{V_{U2}}{V_{U0}}$  (dB)

**APC pull-in range-1 (APC<sub>1</sub>)**

1. Set frequency of SG6 below 4.433MHz so that voltage at ② becomes Lo.
2. Increase frequency of SG6.
3. Measure frequency at which voltage at ② changes from Lo to Hi, which is  $F_{AU}$ .
4.  $APC_1 = 4.433619(\text{Hz}) - F_{AU}(\text{Hz})$

**APC pull-in range-2 (APC<sub>2</sub>)**

1. Set frequency of SG6 higher than 4.434MHz so that voltage at ② becomes Lo.
2. Decrease frequency of SG6.
3. Measure frequency at which voltage at ② changes from Lo to Hi, which is  $F_{Ad}$ .
4.  $APC_2 = F_{Ad}(\text{Hz}) - 4.433619(\text{Hz})$

**Demodulated output DC voltage (DDC)**

1. Measure each DC voltage of ①A, ②A, and ③A.

**Demodulated output DC offset (D offset)**

1. Calculate each voltage difference between ①A and ②A, ②A and ③A, and ③A and ①A using the measured values in C15.

**Demodulation ratio-1 (R/B)**

1. Measure output amplitude, which is  $D_{R-Y}$ .
2.  $R/B = \frac{D_{R-Y}}{D_{B-Y}}$  (measured value in C18)

**Demodulation ratio-2 (G/B)**

1. Measure output amplitude, which is  $D_{G-Y}$ .
2.  $G/B = \frac{D_{G-Y}}{D_{B-Y}}$  (measured value in C18)

**Demodulated output 1H level difference (DDH)**

1. Measure both AC and DC level differences every 1H.

**Demodulated output carrier leak (CL)**

1. Measure carrier components output to ①A, ②A and ③A.

**NTSC operation control voltage (VN)**

1. Decrease voltage of ④ from around 8V.
2. Measure voltage of ④ at which signal output to ①A disappears.

**Demodulation ratio in NTSC-1 (NTSC R/B)**

1. Measure output amplitude, which is  $NTSC_R$ .
2.  $NTSC R/B = \frac{NTSC_R}{NTSC_B}$  (measured value in C25)

**Demodulation ratio in NTSC-2 (NTSC G/B)**

1. Measure output amplitude, which is  $NTSC_G$ .
2.  $NTSC R/B = \frac{NTSC_G}{NTSC_B}$  (measured value in C25)

**PAL/NTSC demodulated output DC voltage difference (V P/N)**

1. Measure DC voltage difference between S34 ON and OFF.

**Service SW operation (SS)**

1. Signal is not output to ④.
2. Vertical synchronization pulse is not output to ⑤.
3. Voltage at ② drops below 1V.
4. Verify 1, 2, and 3.

**Demodulated output bandwidth (DBW)**

1. Set frequency of SG8 at 4.5MHz and measure output amplitude of ①, ②, and ③.
2. Increase frequency of SG8.
3. Measure output frequency of ①, ②, and ③ when each output amplitude becomes 3dB lower than when SG8 of 4.5MHz is input.

**Chroma input dynamic range (CD)**

1. Increase level of SG5 and measure input amplitude at which output begins to distort.

**PAL demodulation phase angle (RYP, GYP)**

1. Phase difference between ①A and ②A is  $\angle R-Y-P$ .
2. Phase difference between ①A and ③A is  $\angle G-Y-P$ .

**NTSC demodulation phase angle (RYN, GYN)**

1. Phase difference between ①A and ②A is  $\angle R-Y-P$ .
2. Phase difference between ①A and ③A is  $\angle G-Y-N$ .

**NTSC TINT (Tmin, Tmax)**

1. Set an oscilloscope in X-Y mode and connect X to ①A and Y to ②A.
2. Set ④ OPEN and frequency of SG6 at 4.433619MHz.
3. Here, a waveform on the oscilloscope shows 180°.
4. Subtract 180° from the angle when ④ is 4V, which is  $T_{min}$ .
5. Subtract 180° from the angle when ④ is 1V, which is  $T_{max}$ .

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**Horizontal oscillation start voltage (V9min)**

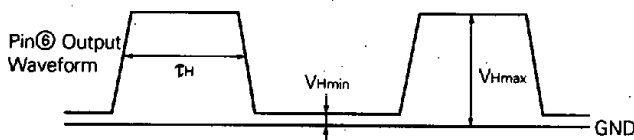
1. Increase ⑥ from 0V.
2. Measure ⑥ voltage when the output waveform cycle is approximately 64μsec.

**Horizontal pull-in range-1 (FPHL, FPHH)**

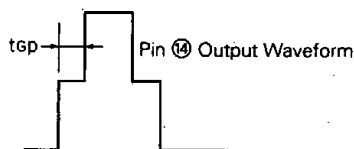
1. Decrease input signal frequency beforehand so that SGB and output waveform of ⑥ step out.
2. Increase frequency of SG6.
3. Measure frequency of SGB and output waveform of ⑥ synchronize, which is fL1.
4. FPHL=fL1-fH (measure value in J3)
5. Measure upper pull-in range likewise and frequency of SGB at which they synchronize, which is fH1.
6. FPHH=fH1-fH (measured value in J3)

**Horizontal output pulse width (TH)**

**Horizontal output voltage (VHmin, VHmax)**



**Burst gate pulse position (tgp)**



**Vertical pull-in range (50) (fpv 50)**

1. Increase frequency of SGC beforehand so that input signal SGC and output waveform of ⑮ step out.
2. Decrease frequency of SGC and measure frequency of SGC at which SGC and output waveform of ⑮ synchronize.

**Vertical pull-in range (60) (fpv 60)**

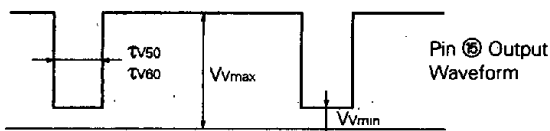
1. Same as J12.

**Vertical output pulse width (50) (τv50)**

**Vertical output pulse width (60) (τv60)**

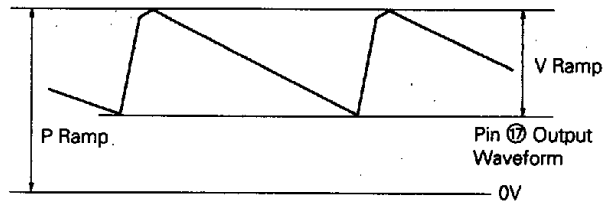
**Vertical output maximum voltage (Vvmax)**

**Vertical output minimum voltage (Vvmin)**



**Ramp peak voltage (P Ramp)**

**Ramp amplitude (V Ramp)**



**Vertical open loop gain (Gw)**

1. Measure output amplitude of ⑱, which is Vvo.
2.  $Gw = 20 \times \log \frac{V_{vo}(mV_{p-p})}{\text{Input amplitude}(=50mV_{p-p})}$  (dB)

**Sync separation input sensitivity current (Iss)**

1. Increase is from 0mA.
2. Measure is when burst gate pulse output to ⑭ disappears.

**Burst gate pulse timing 1 (TGP1)**

1. Measure the time from rising of SGA till rising of burst gate pulse.

**Burst gate pulse timing 2 (TGP2)**

1. Measure burst gate pulse width.

**Flyback pulse clamp voltage (Vfcp)**

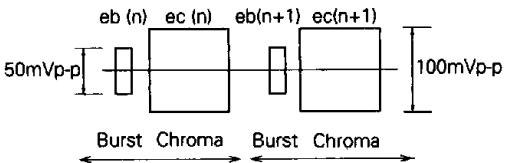
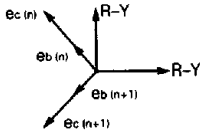
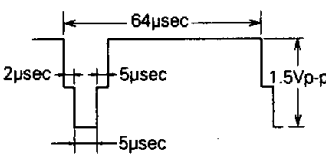
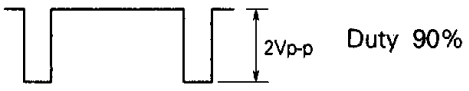
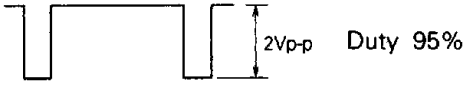
**Burst gate pulse voltage (Vbcp)**

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INPUT SIGNAL

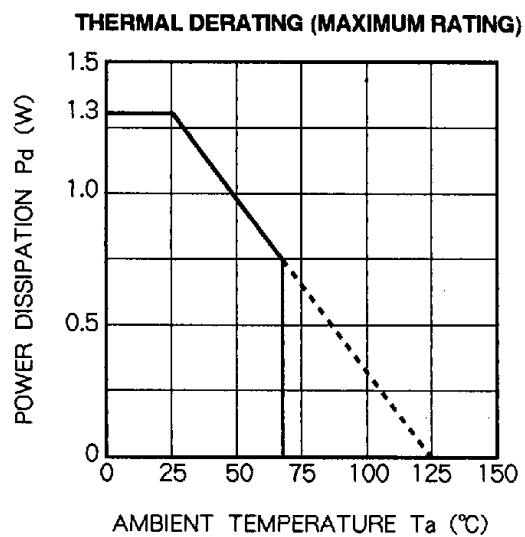
Input level is a value at a pin of this IC.

SG No.	Signal detail
SG1	100kHz CW 3V <sub>p-p</sub>
SG2	100kHz CW 200mV <sub>p-p</sub>
SG3	2MHz CW 200mV <sub>p-p</sub>
SG4	5MHz CW 200mV <sub>p-p</sub>
SG5	<p>PAL simple chroma signal 0dB</p>  <p><math>fsb(n)=fsc(n)=4.433619\text{MHz}</math> (Equal phase)</p> <p>Phase relation of the above signal is as shown in the figure on the right.</p> <p>Phase relation with burst of <math>ec(n)</math> and <math>ec(n+1)</math> must not always be as shown in the figure on the right.</p> <p>It is necessary that the phase is variable, especially in measurements associated with phase as indicated in the conditions.</p> 
SG6	Chroma signal whose burst and chroma have equal phase for chroma signal SG5 and whose frequency is variable.
SG7	4.42MHz CW 0.2~0.5V <sub>p-p</sub>
SG8	4~6MHz CW
SG9	It is SG5 whose $fsb(\text{burst})=4.433619\text{MHz}$ and $fsc(\text{chroma})=4.53\text{MHz}$ .
SGa	<p>Input for sync separation is APL 100% reference composite image signal 1.5V<sub>p-p</sub> of PAL system as shown in the figure on the right.</p> 
SGb	 <p>2V<sub>p-p</sub> Duty 90%</p>
SGc	 <p>2V<sub>p-p</sub> Duty 95%</p>
SGd	2KHz CW 500mV <sub>p-p</sub> =0dB





**TYPICAL CHARACTERISTICS**





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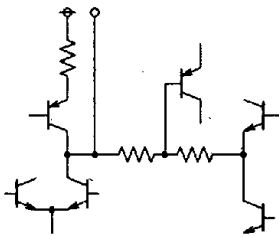

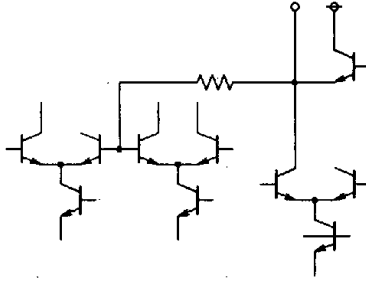
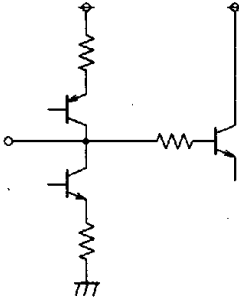

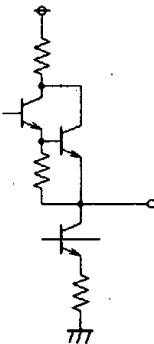
DESCRIPTION OF PIN

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
① ②	B-Y output R-Y output	<ul style="list-style-type: none"> <li>• Chroma output B - Y</li> <li>• R - Y</li> </ul>		6.4
③	G-Y output	<ul style="list-style-type: none"> <li>• Chroma output G - Y</li> <li>• If color tracking switch external resistor (emitter resistor) is removed, color tracking is ineffectual.</li> </ul>		6.4
④	-Y output	<ul style="list-style-type: none"> <li>• -Y output</li> <li>• Horizontal blanking input</li> </ul>		—
⑤	GND	—	—	0
⑥	Horizontal output	<p>Approx. 4V</p> <p>0V 25 μ sec</p> <p>Horizontal pre-driver output</p>		—
⑦	X - RAY protector	X - RAY protector is actuated when pin voltage exceeds approx. 0.75V.		—

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## PAL/NTSC VIDEO CHROMA DEFLECTION


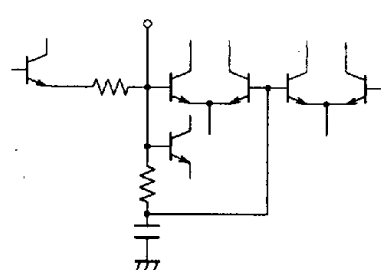
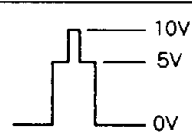
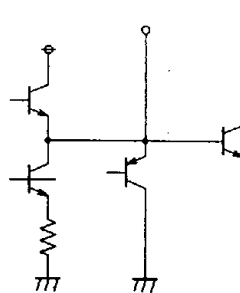
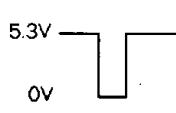
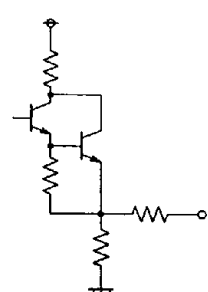
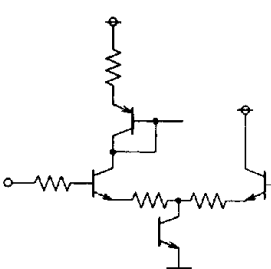
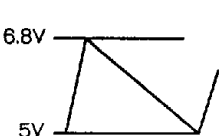
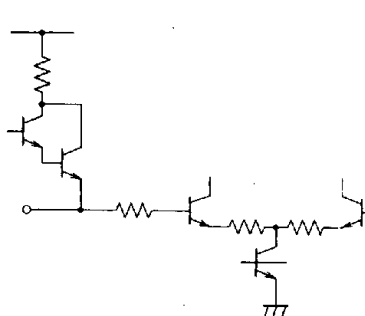
### DESCRIPTION OF PIN (cont.)

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
⑧	AFC1 filter	 <p>When VCO frequency becomes high...</p>  <p>...filter voltage decreases causing VCO frequency to drop. Operates oppositely when frequency becomes high.</p>		6.6
⑨	Vcc H	Built-in regulator	—	.10
⑩	Horizontal ramp	 <p>Generates horizontal ramp. Horizontal output pulse is created according to this ramp.</p>		—
⑪	Coincidence detection filter	High when horizontal sync and horizontal output are synchronized, low when not synchronized.		Low 0.2 High 9.1
⑫	Horizontal oscillator output	 <p>f = Approx. 500kHz Output to external phase shifter.</p>		9.5

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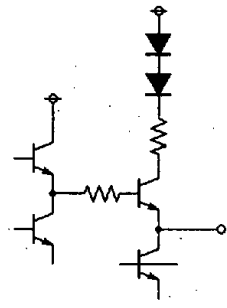
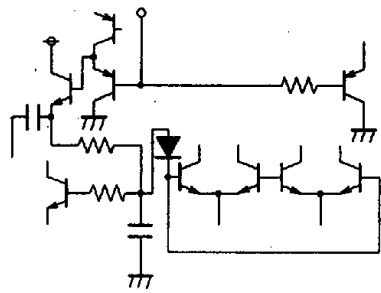
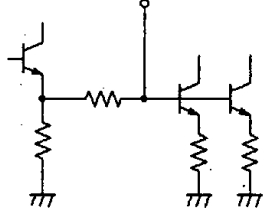
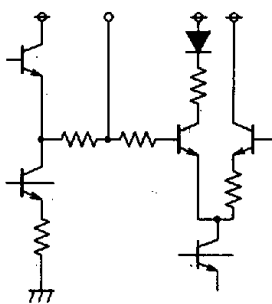
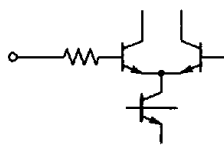
**PAL/NTSC VIDEO CHROMA DEFLECTION**

**DESCRIPTION OF PIN (cont.)**

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
⑬	Horizontal oscillator input	 f = Approx. 500kHz Input from external phase shifter.		5.2
⑭	F.B.P. input/ B.G.P. output	4.3 μ sec  B.G.P. and F.B.P. output as sand castle.		—
⑮	Vertical output			—
⑯	Vertical return	AC/DC return input pin		—
⑰	Vertical ramp	 Vertical ramp generation		—

PAL/NTSC VIDEO CHROMA DEFLECTION

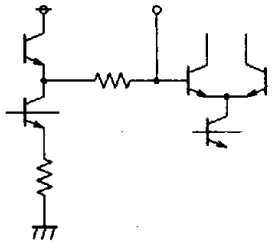
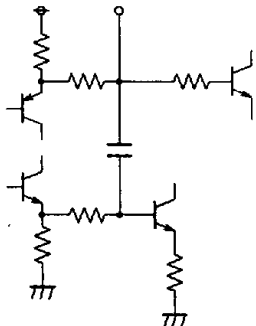
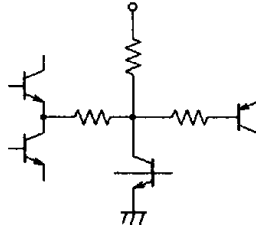
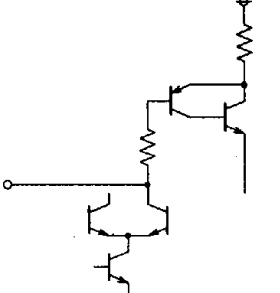
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage (V)
18	Sync separation input	Sync separation of emitter input		8.4
19	Picture quality control/picture muting switch	<ul style="list-style-type: none"> <li>Picture quality control High-pass increases as pin voltage is decreased.</li> <li>Picture muting If voltage is less than 2V, picture muting is actuated and -Y output becomes BLK level.</li> <li>Built-in buffer</li> </ul>		—
20	Y input	Y signal input		1.3
21	Pedestal clamp	Pedestal DC voltage of -Y output is determined by this clamp voltage.		2
22	Luminance control	Luminance control Becomes brighter as voltage is increased.		—

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PAL/NTSC VIDEO CHROMA DEFLECTION

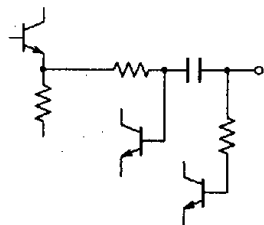
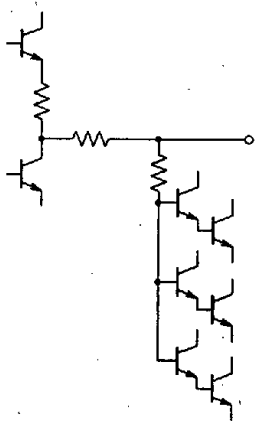
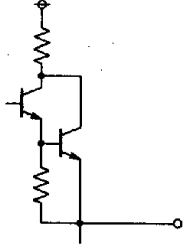
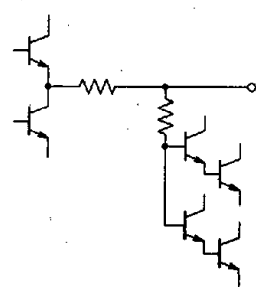
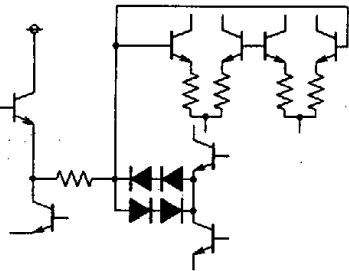
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
24	DC playback	DC playback ratio can be changed by external CR. 100% when open.		—
24	Vcc	—	—	11
25	Color signal input 50/60 SW	· Chroma input · 50/60 switching Vertical countdown toggles between 50Hz and 60Hz. When voltage exceeds 5.6V, toggles to 60Hz.		2.7
26	Color saturation control	Changes amplitude of chroma difference output. Amplitude increases with voltage going up.		—
27	Peak ACC filter	Gain of chroma amp is controlled by this filter in order to maintain a constant chroma amplitude.		—



PAL/NTSC VIDEO CHROMA DEFLECTION

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
⑳	Contrast control/ Burst cleaning	Burst cleaning Coil connection Contrast control Changes amplitude of -Y output. Amplitude increases as voltage is increased.		—
㉑	ACC/killer filter (1) service switch	Sync ACC/killer filter ACC and killer are operated according to voltage differential between this pin and pin ㉒. When this pin is connected to GND, the service switch is on. (Vertical stop and contrast min. killer on.)		7.3
㉒	Chroma output	PAL system ACC chroma signals are output. NTSC Low DC chroma signals are output.		7.1 4.2
㉓	ACC/killer filter (2)	Sync ACC/killer filter ACC and killer are operated according to voltage differential between this pin and pin ㉑.		7.3
㉔	APC filter	Chroma VCO phase is controlled by this voltage in order to check burst.		9.1

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PAL/NTSC VIDEO CHROMA DEFLECTION

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
33	Chroma VCO	Generates carrier for chroma.		8
34	Ident filter NTSC tint control	PAL system Functions as ident filter. When voltage drops below reference voltage, F.F. is stopped. NTSC system (Less than 5V) Tint control is carried out at 2~4V. If NTSC switch is less than 5V, switches to NTSC mode.		8
35	B - Y input	PAL system Synthesized B - Y chroma signal input		6
36	R - Y input	PAL system Synthesized R - Y chroma signal input		2

Part name	Specifications
Delay line transformer T <sub>1</sub>	Bobbin : 10k type Pot Core : CT-31 Screw Core : CT-2 Wire : 0.09 φ 2UEW no load Q : 40 ④~⑥ 18 Turns ①~② 21 Turns bified ②~③ 21 Turns
Burst cleaning coil L <sub>1</sub>	Bobbin : 10k type Pot Core : CT-31 Screw Core : CT-2 Wire : 0.1 φ 2UEW no load Q : 56 ①~③ 18 Turns Capacitor ; 82pF RH type