M51414BSP

NTSC VIDEO CHROMA DEFLECTION

DESCRIPTION

The M51414BSP is a semiconductor integrated circuit that processes video, color, and vertical/horizontal sync signals for NTSC system television sets of average class to top of the line.

FEATURES

- Equipped with delay-line contour adjustment for sharper images.
- Features improved 9MHz (–3dB) video signal circuit frequency characteristics for higher picture quality.
- Employs RGB primary color output; with 9V supply voltage, achieves dynamic range equivalent to that of 12V model. It also has a built-in, on-screen character display circuit and features easy connection with external RGB input, dramatically reducing required peripheral components such as switch circuits, etc.
- Vertical/horizontal count-down by 32fH oscillator eliminates need for adjustment.
- Enables toggling between digital and linear output by vertical output count-down.

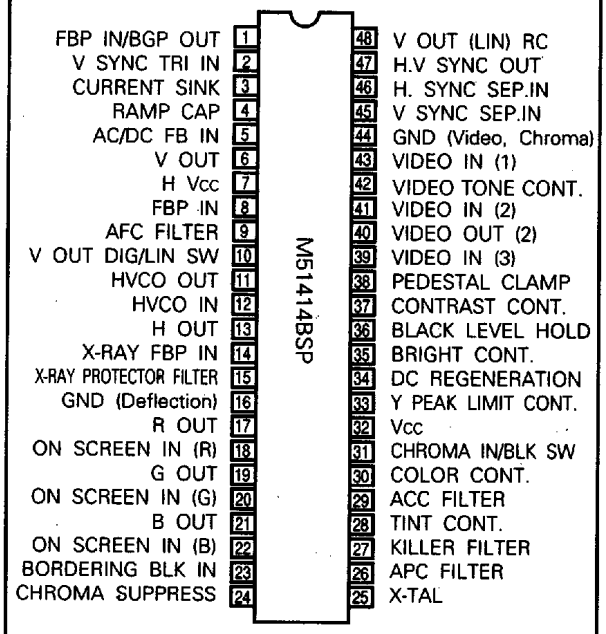
APPLICATION

NTSC System Color Televisions

RECOMMENDED OPERATING CONDITION

Supply Voltage Range ..... 8.5~9.5V
Rated Supply Voltage ..... 9.0V(Pin㉘)
Rated Input Current ..... 20mA(Pin⑦)

PIN CONFIGURATION (TOP VIEW)



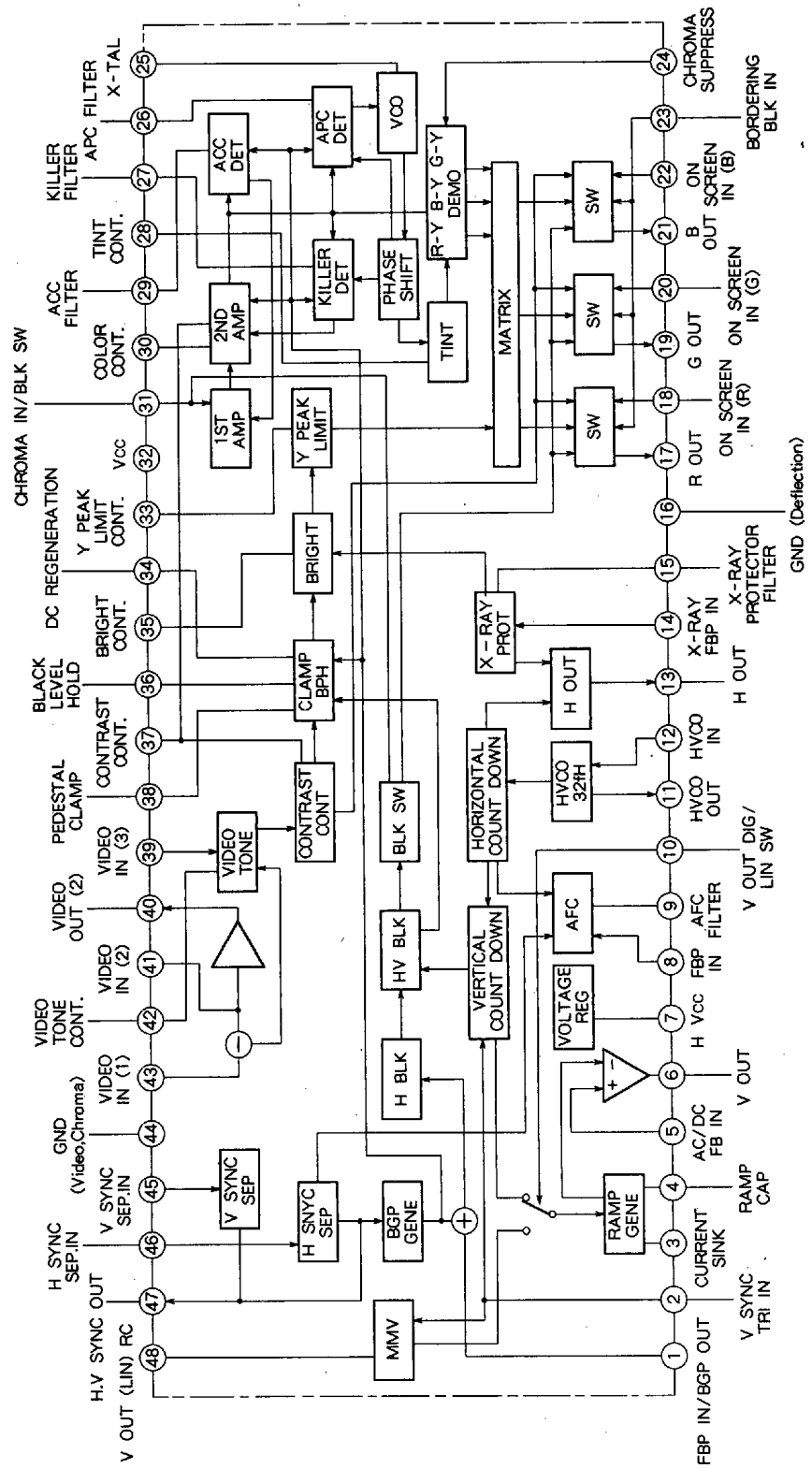
Outline 48P4B

MITSUBISHI ELECTRIC

M51414BSP

NTSC VIDEO CHROMA DEFLECTION

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply Voltage	12	V
P_d	Power Dissipation	1.4	W
Surge	Surge Voltage Resistance	±200	V
T_{opr}	Operating Temperature	−20~65	°C
T_{stg}	Storage Temperature	−40~125	°C

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

VIDEO/CHROMA SECTION

Symbol	Parameter	Test point	Input	Test conditions ("−" indicates OPEN.)																								Limits			Unit
				18	20	22	23	28 A	30 A	31	32 A	33	35 A	36	37 A	38	42 A	S 24	S 27	S 34	S 36	S 38	S 39	S 41	S 43	SD	1A	Min.	Typ.	Max.	
I_{32}	Circuit Current	A1	—	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	29	42	55	mA
Ymax	Video Maximum Output	21	SG1 +20dB	0V	0V	0V	0V	—	—	—	9V	—	—	—	9V	3V	—	ON	OFF	OFF	2	1	1	2	2	1	9V	4.0	5.0		V_{P-P}
GY	Video Standard Gain	21	SG1	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	3V	—	ON	OFF	OFF	2	1	1	2	2	1	9V	11.5	14.5	17.5	dB
GYmid	Video Gain Variation Characteristics-1	21	SG1	0V	0V	0V	0V	—	—	—	9V	—	—	—	4.5V	3V	—	ON	OFF	OFF	2	1	1	2	2	1	9V	−3	0	+3	dB
GYmin	Video Gain Variation Characteristics-2	21	SG1	0V	0V	0V	0V	—	—	—	9V	—	—	—	0V	3V	—	ON	OFF	OFF	2	1	1	2	2	1	9V		−40	−30	dB
GYmax	Video Gain Variation Characteristics-3	21	SG1	0V	0V	0V	0V	—	—	—	9V	—	—	—	9V	3V	—	ON	OFF	OFF	2	1	1	2	2	1	9V	3	6	9	dB
Y_{BRTmid}	Brightness Variation Characteristics-1	21	—	0V	0V	0V	0V	—	—	—	9V	—	3V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	1.2	1.5	1.8	V_{O-P}
Y_{BRTmin}	Brightness Variation Characteristics-2	21	—	0V	0V	0V	0V	—	—	—	9V	—	1V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	0.4	0.65	1.0	V_{O-P}
Y_{BRTmax}	Brightness Variation Characteristics-3	21	—	0V	0V	0V	0V	—	—	—	9V	—	6V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	2.5	2.9	3.3	V_{O-P}
Y_H	Video Output Maximum Voltage	21	SG2	0V	0V	0V	0V	—	—	—	9V	—	—	—	9V	—	—	ON	OFF	OFF	2	1	1	2	2	1	9V	4.7	5.2	5.7	V_{O-P}
Y_{BLC} 1	Black Level Correction Variation Characteristics-1	21	—	0V	0V	0V	0V	—	—	—	9V	—	—	3.5V	—	—	—	ON	OFF	OFF	1	1	2	2	2	1	9V	1.5	1.8	2.1	V_{O-P}
Y_{BLC} 2	Black Level Correction Variation Characteristics-2	21	—	0V	0V	0V	0V	—	—	—	9V	—	—	5.4V	—	—	—	ON	OFF	OFF	1	1	2	2	2	1	9V	0.8	1.1	1.4	V_{O-P}
DG	Video Differential Gain Characteristics	21	SG1	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	3.1V 2.9V	—	ON	OFF	OFF	2	1	1	2	2	1	9V			10	%
GY_{Hi}	Video High-Range Standard Gain	21	SG13	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	3V	—	ON	OFF	OFF	2	1	2	2	1	1	9V	20	23	26	dB
GTmid	Video Tone Control Characteristics-1	21	SG3	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	3V	— 4.5V	ON	OFF	OFF	2	1	3	1	2	1	9V	−3	0	+3	dB
GTmin	Video Tone Control Characteristics-2	21	SG3	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	3V	9V	ON	OFF	OFF	2	1	3	1	2	1	9V	−21	−18	−15	dB

VIDEO/CHROMA SECTION (cont.)

Symbol	Parameter	Test point	Input	Test conditions ("–" indicates OPEN.)																									Limits			Unit
				18	20	22	23	28 A	30 A	31	32 A	33	35 A	36	37 A	38	42 A	S 24	S 27	S 34	S 36	S 38	S 39	S 41	S 43	SD	1A	Min.	Typ.	Max.	
GTmax	Video Tone Control Characteristics-3	21	SG3	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	3V	0V	ON	OFF	OFF	2	1	3	1	2	1	9V	1.0	4.0	7.0	dB
Gf	Video Frequency Characteristics	21	SG1 SG4	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	3V	—	ON	OFF	OFF	2	1	1	2	2	1	9V	7	9		MHz
Y_{HBLK}	Horizontal Blanking Voltage	21 1A	—	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	Variable	2.9	3.3	3.7	V
Y_{VBLK}	Vertical Blanking Voltage	21	—	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V		0.3	0.6	V_{O-P}
Y_{DCREG}	DC Playback Ratio Correction Alteration Characteristics	21	SG2	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	ON ↓ OFF	2	1	1	2	2	1	9V	0.05	0.1	0.2	V
Y_{PLmid}	Video Peak Limiter Characteristics-1	21	SG2	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	1	2	2	1	9V	3.1	3.6	4.1	V_{O-P}
Y_{PLmax}	Video Peak Limiter Characteristics-2	21	SG2	0V	0V	0V	0V	—	—	—	9V	7V	—	—	—	—	—	ON	OFF	OFF	2	1	1	2	2	1	9V	2.0	2.5	3.0	V_{O-P}
V_{37}	Pin ㊲ Voltage	37	—	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	4.1	4.5	4.9	V
V_{42}	Pin ㊷ Voltage	42	—	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	4.1	4.5	4.9	V
$T_{BLK\ V}$	V Blanking Amplitude	21	—	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	0.95	1.10	1.25	ms
Y_{BTH}	Black Level Replacement Threshold Voltage	21	—	0V	0V	0V	0V	—	—	Variable	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	4.0	4.4	4.8	V
Cmax	Demodulated Maximum Output	21	SG5	0V	0V	0V	0V	—	9V	—	9V	—	Variable	—	9V	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	5.4	6.0	6.6	V_{P-P}
Cnorm	Demodulated Standard Output	21	SG5	0V	0V	0V	0V	—	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	2.0	2.5	3.0	V_{P-P}
ACC 1	ACC Characteristics-1	21	SG5 –21dB	0V	0V	0V	0V	—	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	–6	–3	0	dB
ACC 2	ACC Characteristics-2	21	SG5 +6dB	0V	0V	0V	0V	—	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	–2	0	+2	dB
Ccmid	Color Control Variation Characteristics-1	21	SG5	0V	0V	0V	0V	—	4.5V	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	–3	0	+3	dB
Ccmin	Color Control Variation Characteristics-2	21	SG5	0V	0V	0V	0V	—	0V	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V		–40	–30	dB
Ccmax	Color Control Variation Characteristics-3	21	SG5	0V	0V	0V	0V	—	9V	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	3	6	9	dB
Cumid	Color Tracking Variation Characteristics-1	21	SG5	0V	0V	0V	0V	—	—	—	9V	—	7V	—	4.5V	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	–3	0	+3	dB
Cumin	Color Tracking Variation Characteristics-2	21	SG5	0V	0V	0V	0V	—	—	—	9V	—	7V	—	0V	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V		–40	–30	dB
Cumax	Color Tracking Variation Characteristics-3	21	SG5	0V	0V	0V	0V	—	—	—	9V	—	7V	—	9V	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	3	6	9	dB
fpc 1	APC Pull-In Range-1	21	SG7	0V	0V	0V	0V	—	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	500	1000		Hz
fpc 2	APC Pull-In Range-2	21	SG7	0V	0V	0V	0V	—	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	–700	–1400		Hz

VIDEO/CHROMA SECTION (cont.)

Symbol	Parameter	Test point	Input	Test conditions ("–" indicates OPEN.)																									Limits			Unit
				18	20	22	23	28 A	30 A	31	32 A	33	35 A	36	37 A	38	42 A	S 24	S 27	S 34	S 36	S 38	S 39	S 41	S 43	SD	1A	Min.	Typ.	Max.	
KIL	Killer Operation Input Level	21	SG6 Variable	0V	0V	0V	0V	—	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	–45	–39	–33	dB
D_{KIL}	Killer Color Residual	21	SG6 No burst	0V	0V	0V	0V	—	9V	—	9V	—	7V	—	9V	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V			60	mV_{P-P}
R/B	Demodulated Output Amplitude Ratio-1	17 21	SG8	0V	0V	0V	0V	—	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	0.8	0.9	1.0	—
G/B	Demodulated Output Amplitude Ratio-2	19 21	SG8	0V	0V	0V	0V	—	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	0.25	0.3	0.35	—
R_{DC} G_{DC} B_{DC}	R, G, B Output DC Voltage	17 19 21	—	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	1.3	1.7	2.1	V
Doffet	R, G, B Output DC Offset	17 19 21	—	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V			0.3	V
Cleak	Demodulated Output Carrier Leak	17 19 21	SG5	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V			200	mV_{P-P}
T	Tint Control Variance	17 21	SG6	0V	0V	0V	0V	0V ↓ 9V	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	66	86	106	deg.
Tmin	Tint Control Characteristics-1	17 21	SG6	0V	0V	0V	0V	0V	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	–23	–43	–63	deg.
Tmax	Tint Control Characteristics-2	17 21	SG6	0V	0V	0V	0V	9V	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	+23	+43	+63	deg.
R/Ta G/Ta B/Ta	R, G, B Output Pin Voltage Temperature Coefficient	17 19 21	—	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V		–0.75		mV/°C
D_{offset}/Ta	Voltage Difference Temperature Coefficient Between R, G, B Output Pins	17 19 21	—	0V	0V	0V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V		0		mV/°C
θ_{R-Y}	Demodulated Phase Angle-1	17 21	SG8	0V	0V	0V	0V	—	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V		106		deg.
θ_{G-Y}	Demodulated Phase Angle-2	19 21	SG8	0V	0V	0V	0V	—	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V		240		deg.
ΔV_{Y-C}	Color Tracking Characteristics	21	SG1(B) / SG5	0V	0V	0V	0V	—	—	—	9V	—	7V	—	4.0V / 4.5V	3V / —	—	ON	OFF	OFF	2	1	1/2	2	2	1	9V	–3	0	+3	dB
V_{28}	Pin ㉘ Voltage	28	—	0V	0V	0V	0V	—	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	1/2	2	2	1	9V	4.1	4.5	4.9	V
V_{30}	Pin ㉚ Voltage	30	—	0V	0V	0V	0V	—	—	—	9V	—	7V	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	4.1	4.5	4.9	V
CS	Color Signal Suppression Characteristics	21	A: SG5 B: SG14	0V	0V	0V	0V	—	—	—	9V	—	7V	—	—	—	—	OFF	OFF	OFF	2	1	1	2	2	1	9V	–4.5	–3.3	–1.5	dB

VIDEO/CHROMA SECTION (cont.)

Symbol	Parameter	Test point	Input	Test conditions ("—" indicates OPEN.)																						Limits			Unit
				18	20	22	23	28 A	30 A	31	32 A	33	35 A	36	37 A	38	42 A	S 24	S 27	S 34	S 36	S 38	S 39	S 41	S 43	SD	1A	Min.	Typ.	Max.	
OS	On-Screen Characteristics	17 19 21	—	0V → 3V	0V → 3V	0V → 3V	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	1.2	1.6	2.0	V
BLKON	On-Screen Blanking Threshold Voltage	17 19 21	—	Variable	Variable	Variable	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	1	9V	0.6	1.0	1.4	V
B-BLK	Trim-Blanking Threshold Voltage	17 19 21	—	0V	0V	0V	Variable	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	2	9V	0.6	1.0	1.4	V
TBLK-F	On-Screen Blanking Amplitude-1	21	D: SG15	0V	0V	—	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	2	9V	280	340	400	ns
TBLK-B	On-Screen Blanking Amplitude-2	21	D: SG15	0V	0V	—	0V	—	—	—	9V	—	—	—	—	—	—	ON	OFF	OFF	2	1	2	2	2	2	9V	330	390	450	ns

DEFLECTION SECTION

Symbol	Parameter	Test point	Input	Test conditions ("–" indicates OPEN.)																		Limits			Unit
				1 A	5 A	7 A	8 A	10	14	S1	S 4	S 5	S 6	S 8	S 9	S 10	S 13	S 14	S 45	S 46	32 A	Min.	Typ.	Max.	
I_7	Pin ⑦ Recommended Input Current	A2	SG9	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	1	1	9V		25		mA
V_7	Pin ⑦ Voltage	7	SG9	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	1	1	9V	8.9	9.2	9.5	V
V_{OSHV}	Horizontal/Vertical Sync Output Amplitude	47	SG10	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	1	1	9V	5.2	5.7	6.2	V_{P-P}
f_H	Oscillator Frequency	13	—	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	3	3	9V	15.55	15.80	16.05	kHz
$f_{H/Ta}$	Oscillator Frequency Temperature Coefficient	13	—	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	3	3	9V		–0.8		Hz/°C
V_{7min}	Oscillator Starting Pin ⑦ Voltage	7	—	9V	—	Variable	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	3	3	—		3.6	4.5	V
f_{PH-1}	Pull-in Range 1	13	SG11	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	1	1	9V	300 –1800	520 –1200		Hz
T_H	H. Pulse Amplitude	13	SG9	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	1	1	9V	21	25	29	µs
V_{Hmin}	H. Output Voltage	13	SG9	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	OFF	ON	1	1	9V		0	0.3	V
V_{Hmax}																						5.5	6.1	6.7	V
f_V	Oscillator Frequency (Vertical Free Run)	6	—	9V	—	12V	9V	—	—	ON	ON	2	ON	ON	ON	ON	ON	ON	3	3	9V	51.5	53.1	55.5	Hz
T_{V1}	V. Pulse Amplitude-1	6	SG9	9V	5V	12V	9V	—	—	ON	OFF	3	OFF	ON	ON	ON	ON	ON	1	1	9V	600	670	730	µs
T_{V2}	V. Pulse Amplitude-2	6	SG9	9V	5V	12V	9V	5V	—	ON	OFF	3	OFF	ON	ON	OFF	ON	ON	1	1	9V	660	730	800	µs
$V_{OD/LV}$	VOUT Digital/Linear Switching Voltage	48	SG9	9V	5V	12V	9V	Variable	—	ON	OFF	3	OFF	ON	ON	OFF	ON	ON	1	1	9V	1.0	2.1	3.0	V
f_{PV}	Pull-In Range	6	SG12	9V	—	12V	9V	—	—	ON	ON	2	ON	ON	ON	ON	ON	ON	1	1	9V	71	73.5	76	Hz
V_{OH4}	Ramp Maximum Output Voltage	4	—	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	3	3	9V	5.8	6.3	6.8	V_{O-P}
V_{OL4}	Ramp Minimum Output Voltage	4	—	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	3	3	9V	3.5	4.0	4.5	V_{O-P}
V_3	Pin ③ Voltage	3	—	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	3	3	9V	2.4	2.8	3.2	V
T_{GP}	Burst Gate Pulse Position	1	SG9	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	1	1	9V	6.4	6.9	7.4	µs
T_{BGP1}	Burst Gate Pulse Timing-1	1	SG9	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	1	1	9V	0.4	0.7	1.0	µs
T_{BGP2}	Burst Gate Pulse Timing-2	1	SG9	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	1	1	9V	1.0	1.4	1.8	µs
V_{FBP}	FBP Clamp Voltage	1	SG9	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	1	1	9V	3.6	4.1	4.6	V_{O-P}
V_{BGP}	Burst Gate Pulse Voltage	1	SG9	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	1	1	9V	7.5	8.0	8.5	V_{O-P}
V_{THAFC}	AFC Detector Voltage	1	SG9	9V	—	12V	Variable	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	1	1	9V		0.4	1.0	V
V_{Vmax}	Vertical Output Maximum Voltage	1	SG9	9V	5V	12V	9V	—	—	ON	ON	3	OFF	ON	ON	ON	ON	ON	1	1	9V	4.0	4.7	5.4	V_{O-P}

DEFLECTION SECTION (cont.)

Symbol	Parameter	Test point	Input	Test conditions ("–" indicates OPEN.)																		Limits			Unit
				1 A	5 A	7 A	8 A	10	14	S1	S 4	S 5	S 6	S 8	S 9	S 10	S 13	S 14	S 45	S 46	32 A	Min.	Typ.	Max.	
I_{SSH}	Sync Separation Input Sensitivity Current (Horizontal)	47	—	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	3	2	9V	10	40	100	μA
I_{SSV}	Sync Separation Input Sensitivity Current (Vertical)	47	—	9V	—	12V	9V	—	—	ON	ON	1	OFF	ON	ON	ON	ON	ON	2	3	9V	10	40	100	μA
V_{14P}	Overvoltage Protector Circuit Operating Voltage	14, 21 13, 6	—	9V	—	12V	9V	—	Vari-able	ON	ON	2	ON	ON	ON	ON	ON	OFF	3	3	9V	0.4	0.7	1.0	V
V_{32P1}	Supply Voltage Detector Circuit Operating Voltage-1	32A, 21 13, 6	—	32A	—	12V	32A	—	—	ON	ON	2	ON	ON	ON	ON	ON	ON	3	3	Vari-able	11.3	11.65	12.0	V
V_{32P2}	Supply Voltage Detector Circuit Operating Voltage-2	32A 6	—	32A	—	12V	32A	—	—	ON	ON	2	ON	ON	ON	ON	ON	ON	3	3	Vari-able	1.5	2.0	2.5	V

ELECTRICAL CHARACTERISTICS TEST METHOD

Y_{max} Video Maximum Output

1. Make SG1 input level +20dB.
2. Test amplitude of ㉑ when not blanking.

GY Video Standard Gain

1. Test amplitude of ㉑ when not blanking and make V_{CO} the obtained value.
2. $GY=20 \log \frac{V_{CO}(mV_{p\text{-}p})}{200(mV_{p\text{-}p})}$ (dB)

GY_{mid} Video Gain Variation Characteristics-1
GY_{min} Video Gain Variation Characteristics-2
GY_{max} Video Gain Variation Characteristics-3

1. Make V_{C1}, V_{C2}, and V_{C3} the output amplitude of ㉑ when 37A is 4.5V, 0V, and 9V.
2. $GY_{mid}=20 \log \frac{V_{C1}}{V_{C0}}$ (dB),

   $GY_{min}=20 \log \frac{V_{C2}}{V_{C0}}$ (dB),

   $GY_{max}=20 \log \frac{V_{C3}}{V_{C0}}$ (dB)

Y_{BRTmid} Brightness Variation Characteristics-1
Y_{BRTmin} Brightness Variation Characteristics-2
Y_{BRTmax} Brightness Variation Characteristics-3

1. Test DC voltage of ㉑ when not blanking.

Y_H Video Output Maximum Voltage

1. Test DC voltage of ㉑ when not blanking.

Y_{BLC1} Black Level Correction Variation Characteristics-1
Y_{BLC2} Black Level Correction Variation Characteristics-2

1. Test DC voltage of ㉑ when not blanking.

DG Video Differential Gain Characteristics

1. Make V_{G1} and V_{G2} the output amplitude of ㉑ when ㊳ is 3.2V and 2.9V.
2. $DG=\frac{|V_{G1}-V_{G2}|}{V_{G2}} \times 100$ (%)

G_{YHi} Video High-Pass Standard Gain

1. Test amplitude of ㉑ when not blanking and make V_{Hi} the obtained value.
2. $GY_{Hi}=20 \log \frac{V_{Hi}(mV_{p\text{-}p})}{100(mV_{p\text{-}p})}$ (dB)

GT_{mid} Video Tone Variation Characteristics-1
GT_{min} Video Tone Variation Characteristics-2
GT_{max} Video Tone Variation Characteristics-3

1. Make V_{T0}, V_{T1}, V_{T2}, and V_{T3} the output amplitude of ㉑ when 42A is changed to open, 4.5V, 9V, and 0V.
2. $GT_{mid}=20 \log \frac{V_{T1}}{V_{T0}}$ (dB),

   $GT_{min}=20 \log \frac{V_{T2}}{V_{T0}}$ (dB),

   $GT_{max}=20 \log \frac{V_{T3}}{V_{T0}}$ (dB)

Gf Video Frequency Characteristics

1. Input SG4 and change the frequency. Make SG4 input frequency the frequency when ㉑ output amplitude is –3dB less than when SG1 was being input.

Y_{HBLK} Horizontal Blanking Operation Voltage

1. Make voltage of 1A the voltage where horizontal blanking for ㉑ ceases as the voltage of 1A is gradually dropped below 9V.

Y_{VBLK} Vertical Blanking Voltage

1. Test DC voltage during vertical blanking of ㉑.

Y_{DCREG} DC Playback Ratio Correction Variation Characteristics

1. Test DC voltage variance when ㉑ is not blanking and switch 34 is turned from ON to OFF.

Y_{PLmid} Video Peak Limiter Variation Characteristics-1
Y_{PLmax} Video Peak Limiter Variation Characteristics-2

1. Test DC voltage of ㉑ when not blanking.

T_{BLKV} V Blanking Amplitude

1. Test DC voltage during vertical blanking of ㉑.

Y_{BTH} Black Level Replacement Threshold Voltage

1. Increase voltage of ㉛ from 2.5V.
2. Make Y_{BTH} the voltage of ㉛ when blanking of ㉑ is replaced by black level voltage.

C_{max} Demodulated Maximum Output

1. Test demodulated output amplitude $(P\text{-}P)$ of ㉑. (Maximize the output with 35A.)

C_{norm} Demodulated Typical Output

1. Test demodulated output amplitude $(P\text{-}P)$ of ㉑.

ACC1 ACC Characteristics-1
ACC2 ACC Characteristics-2

1. Make V_{A0}, V_{A1}, and V_{A2} the demodulated output amplitude of ㉑ when SG5 input level is 0dB, −21dB, and +6dB.

2. $ACC1=20 \log \frac{V_{A1}}{V_{A0}}$ (dB),

   $ACC2=20 \log \frac{V_{A2}}{V_{A0}}$ (dB)

C_{cmid} Color Control Variation Characteristics-1
C_{cmin} Color Control Variation Characteristics-2
C_{cmax} Color Control Variation Characteristics-3

1. Make V_{CL0}, V_{CL1}, V_{CL2}, and V_{CL3} the demodulated output amplitude of ㉑ when 30A is open, 4.5V, 0V, and 9V.

C_{Umid} Color Tracking Variation Characteristics-1

2. $C_{cmid}=20 \log \frac{V_{CL1}}{V_{CL0}}$ (dB),

   $C_{cmin}=20 \log \frac{V_{CL2}}{V_{CL0}}$ (dB),

   $C_{cmax}=20 \log \frac{V_{CL3}}{V_{CL0}}$ (dB)

C_{Umin} Color Tracking Variation Characteristics-2
C_{Umax} Color Tracking Variation Characteristics-3

1. Make V_{U0}, V_{U1}, V_{U2} and V_{U3} the demodulated output amplitude ㉑ when 37A is open, 4.5V, 0V, 9V.

2. $C_{Umid}=20 \log \frac{V_{U1}}{V_{U0}}$ (dB),

   $C_{Umin}=20 \log \frac{V_{U2}}{V_{U0}}$ (dB),

   $C_{Umax}=20 \log \frac{V_{U3}}{V_{U0}}$ (dB)

f_{PC1} APC Pull-In Range-1
f_{PC2} APC Pull-In Range-2

1. Frequency range where the ㉑ output signal changes from off to on as the burst and chroma frequency (f_{SB}=fsc) are altered during SG7 input. The standard value is 3.579545MHz.

KIL Killer Operation Input Level

1. SG6 input level where the ㉑ output signal changes from off on as SG6 input level is gradually decreased.

D_{KIL} Killer Color Residual

1. Output signal amplitude for ㉑ when e_b=0mV$_{P\text{-}P}$, e_c=100mV$_{P\text{-}P}$, and frequency f_{SC}=3.579545MHz during SG6 input.

R/B Demodulated Output Amplitude Ratio-1
G/B Demodulated Output Amplitude Ratio-2

1. Make $D_{B\text{-}Y}$, $D_{R\text{-}Y}$, and $D_{G\text{-}Y}$ the output amplitude of ㉑, ⑰, and ⑲.

2. $R/B=\frac{D_{R\text{-}Y}}{D_{B\text{-}Y}}$, $G/B=\frac{D_{G\text{-}Y}}{D_{B\text{-}Y}}$

R_{DC}, G_{DC}, B_{DC}
R, G, B Output DC Voltage

1. Test DC voltage for ⑰, ⑲, and ㉑ when not blanking.

D_{offset} R, G, B Output DC Offset

1. Calculate the electric potential differences of ⑰ and ⑲, ⑲ and ㉑, and ㉑ and ⑰, using the testing values obtained in C-17.

C_{leak} Demodulated Output Carrier Leak

1. Test the carrier element output by ⑰, ⑲, and ㉑.

T Tint Control Variance

1. Using an oscilloscope (X-Y display), test the variation of amplitude phase of the ⑲ and ㉑ output signals when 28A is 0V and 9V.

T_{min} Tint Control Characteristics-1

T_{max} Tint Control Characteristics-2

1. Using an oscilloscope (X-Y display), test the variation of amplitude phase of the ⑲ and ㉑ output signals when 28A is 4.5V, 0V, and 9V. Use the phase at 4.5V as reference.

R/T_a, G/T_a, B/T_a
R, G, B Output Pin Voltage Temperature Coefficient

D_{offset}/T_a Voltage Difference Temperature Coefficient Between R, G, B Output Pins

1. The temperature variation range should be of −20 ~ +65°C.

θ_{R-Y} Demodulated Phase Angle-1

1. Make θ_{R-Y} the phase difference of ⑰ and ㉑.

θ_{G-Y} Demodulated Phase Angle-2

2. Make θ_{G-Y} the phase difference of ⑲and ㉑.

ΔV_{Y-C} Color Tracking Characteristics

1. Input SG1 from B, and make V_{CT1} and V_{CT2} the output amplitude of ㉑ when 37A is 4.0V and 4.5V.
2. Input SG5 from A, and make V_{CT3} and V_{CT4} the output amplitude of ㉑ when 37A is 4.0V and 4.5V

3. $\Delta V_{Y-C}=20 \log \frac{V_{CT1}}{V_{CT2}} - 20 \log \frac{V_{CT3}}{V_{CT4}}$ (dB)

CS Color Signal Suppression Characteristics

1. Input APL 10% SG14 from B, and make V_{CS1} the demodulated output amplitude of ㉑.
2. Input APL 35% SG14 from B, and make V_{CS2} the demodulated output amplitude of ㉑.

3. $CS=20 \log \frac{V_{CS1}}{V_{CS2}}$ (dB)

OS On-Screen Characteristics

1. DC voltage variance of ⑰, ⑲, and ㉑ when not blanking and when the voltages of ⑱, ⑳, and ㉒ are changed from 0V to 3V.

BLK_{ON} On-Screen Blanking Threshold Voltage

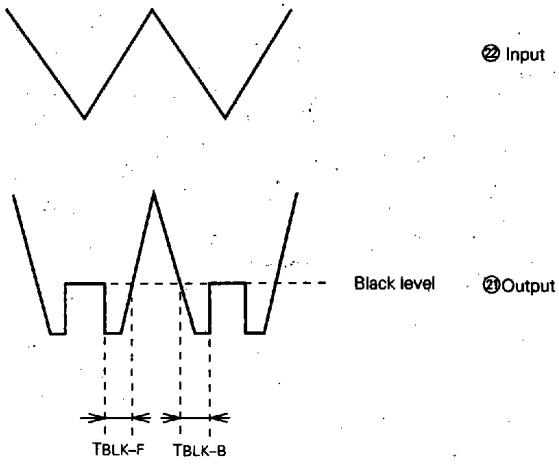
B-BLK Trim-Blanking Threshold Voltage

1. Applied voltage of each pin when ⑰, ⑲, and ㉑ are engaged in the full period of blanking as voltage of ⑱, ⑳, ㉒, and ㉓ is increased from 0V.

T_{BLK-F} On-Screen Blanking Amplitude-1

T_{BLK-B} On-Screen Blanking Amplitude-2

1. Input SG15 from D.



V_{OSHV} Horizontal/Vertical Sync Output Amplitude

f_H/T_a Oscillator Frequency Temperature Coefficient

1. The temperature variation range should be of −20~+65°C.

V_{7min} Oscillator Starting Pin ⑦ Voltage

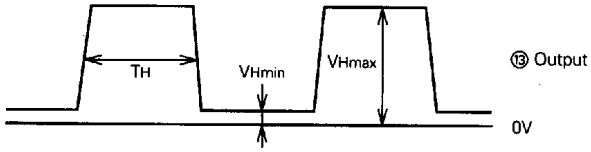
1. Gradually increase the applied voltage of 7A.
2. V7min is the voltage of ⑦ when the cycle of ⑬ output waveform becomes approx. 63.5μs.

f_{PH-1} Pull-in Range 1

1. Increase the SG11 input signal frequency gradually so that the input signal and ⑬ output become unsynchronized.
2. Decreasing the input signal frequency, make this the difference between the input signal frequency and oscillator frequency (f_H) precisely when the input signal and ⑬ output become synchronized.
3. Perform the same procedure for the lower side pull-in range.

T_H H. Pulse Amplitude

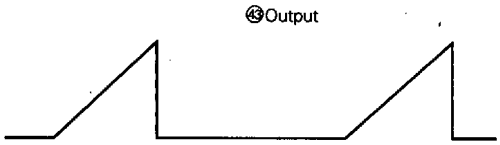
V_{Hmin}, V_{Hmax} H. Output Voltage



T_{V1} V. Pulse Amplitude-1
T_{V2} V. Pulse Amplitude-2

$V_{OD/LV}$ V_{OUT} Digital/Linear Switching Voltage

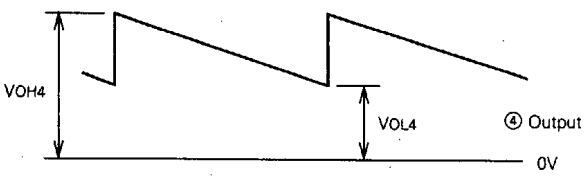
1. Set voltage of ⑩ to 0V.
2. Make $V_{OD/LV}$ the applied voltage of ⑩ precisely when waveform shown on the right is obtained from ㊽ output as voltage of ⑩ is increased.



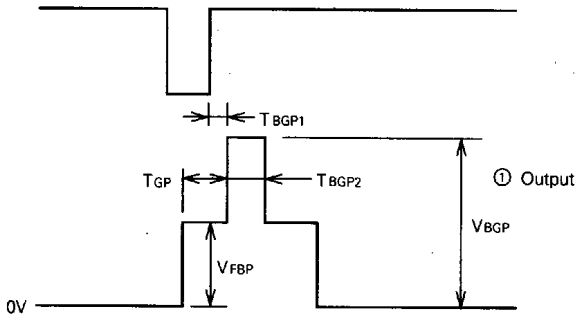
f_{PV} Pull-In Range

1. Increase the input signal frequency so that the SG12 input signal and ⑥ output become unsynchronized.
2. Decrease the input signal gradually and make f_{PV} the input signal frequency precisely when input signal and ⑥ output become synchronized.

V_{OH4} Ramp Maximum Output Voltage
V_{OL4} Ramp Minimum Output Voltage



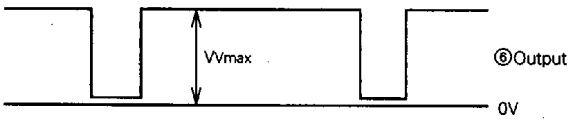
T_{GP} Burst Gate Pulse Position
T_{BGP1} Burst Gate Pulse Timing-1
T_{BGP2} Burst Gate Pulse Timing-2
V_{FBP} FBP Clamp Voltage
V_{BGP} Burst Gate Pulse Voltage



V_{THAFC} AFC Detector Voltage

1. Set voltage of 8A to 9V.
2. Make V_{THAFC} the applied voltage of 8A precisely when AFC begins to behave abnormally as voltage of 8A is gradually increased.

V_{Vmax} Vertical Output Maximum Voltage



I_{SSH} Sync Separation Input Sensitivity Current (Horizontal)

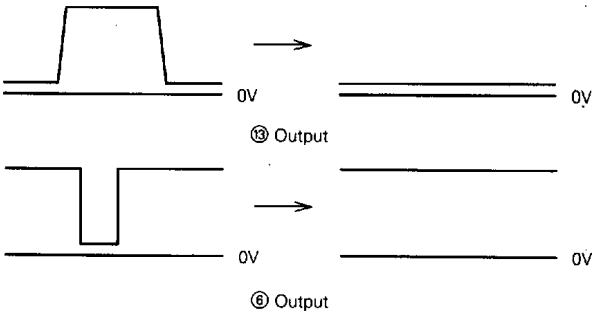
1. Set I_{SI} to 0mA.
2. Make I_{SSH} the value of I_{SI} when the voltage of ㊼ is in the area of 3V as I_{SI} is gradually increased.

I_{SSV} Sync Separation Input Sensitivity Current (Vertical)

1. Same as I_{SSH}.

V_{14P} Overvoltage Protector Circuit Operating Voltage

1. Set voltage of ⑭ to 0V.
2. As voltage of ⑭ is gradually increased, ㉑ begins blanking and output waveform of ⑬ ceases. Make V_{14P} the applied voltage of ⑭ when output waveform of ⑥ ceases.



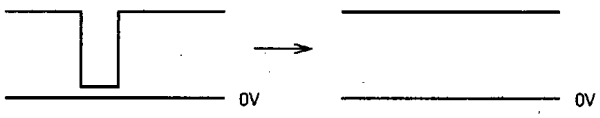
3. In order to perform the following test, first turn off all applied voltages.

V_{32P1} Supply Voltage Detector Circuit Operating Voltage-1

1. Set voltage of 32A to 9V.
2. Gradually increase voltage of 32A and make V_{32P1} the applied voltage of 32A when status becomes as described in step 2 of item V_{14P}.
3. In order to perform the following test, first turn OFF all applied voltages.

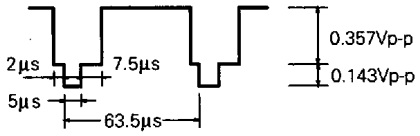
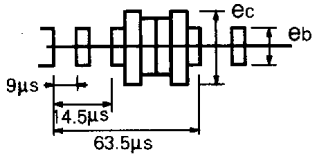
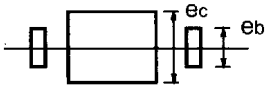
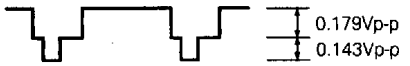
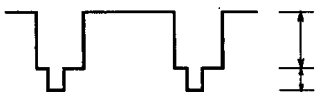
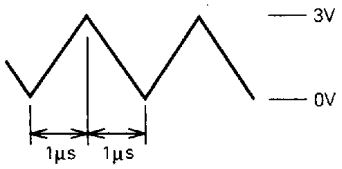
V_{32P2} Supply Voltage Detector Circuit Operating Voltage-2

1. Set voltage of 32A to 9V.
2. As voltage of 32A is gradually decreased, ⑥ output ceases. Make V_{32P2} the applied voltage of 32A when DC voltage becomes approx. 1.3V.

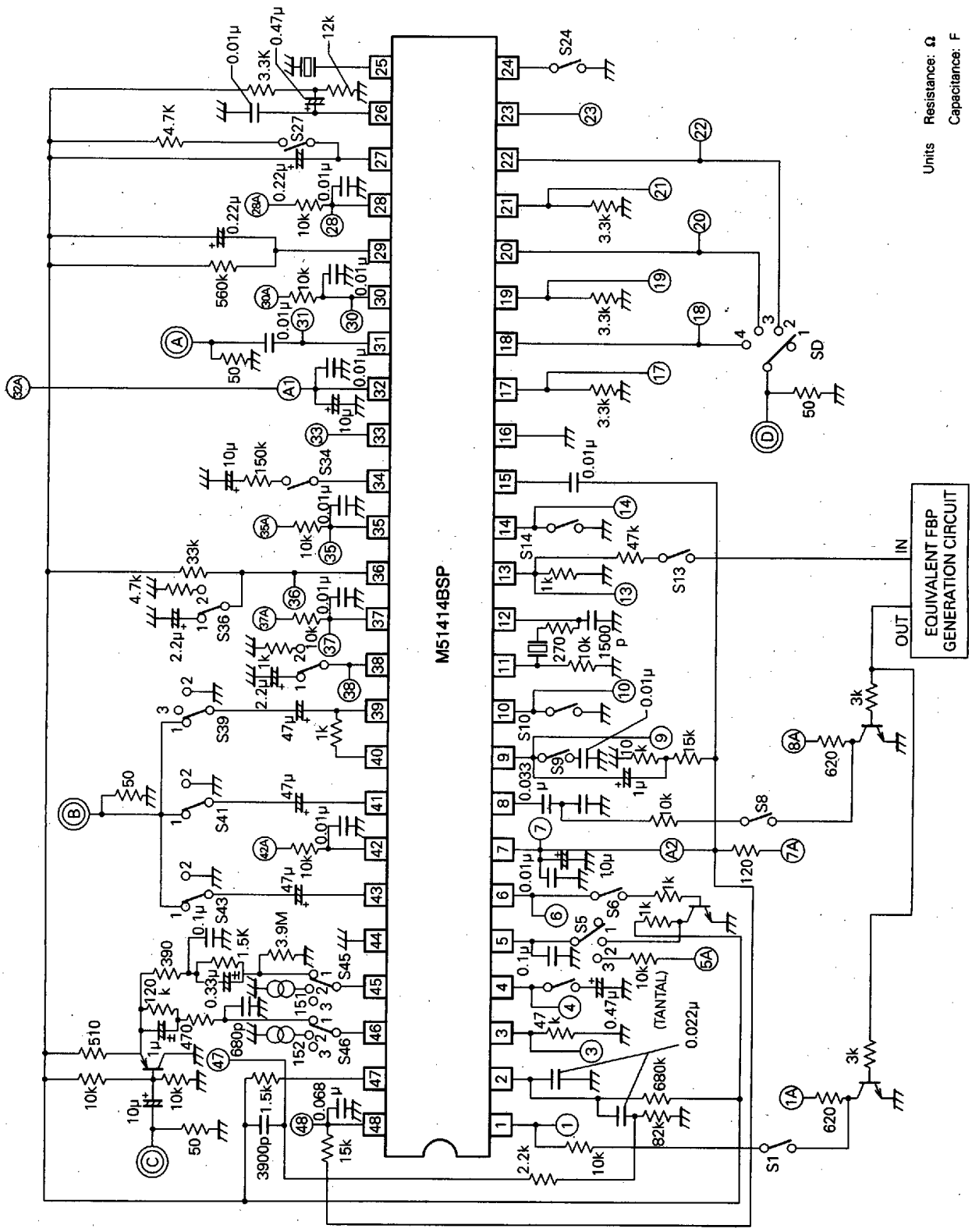


⑥ Output

INPUT SIGNAL

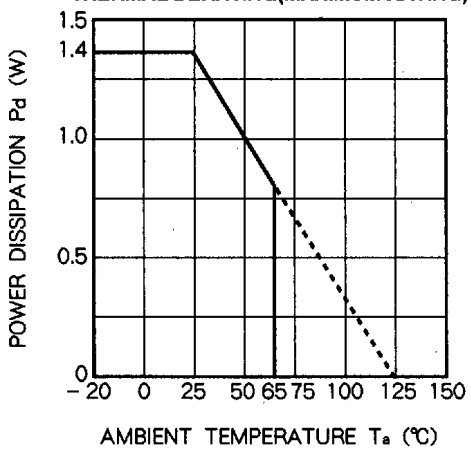
SG No.	Signal Name	Signals
SG1	200 kHz Sine Wave	Establish 0 dB as 200 mVP-P.
SG2	APL 100% Standard Signal	
SG3	2 MHz Sine Wave	Establish 0 dB as 100 mVP-P.
SG4	Sine Wave	Sine wave with variable frequency where 0 dB is set to 200 mVP-P.
SG5	Chroma Standard Signal (Color Bar)	 fSB: Burst Signal Frequency fSC: Chroma Signal Frequency fSB = fSC = 3.579545 MHz 0 dB: eb = 50 mVP-P ec = 100 mVP-P
SG6	Chroma Signal 1	 fSB = fSC = 3.579545 MHz (Same Phase) 0 dB: eb = 50 mVP-P ec = 100 mVP-P
SG7	Chroma Signal 2	Chroma signal with variable frequency where all burst and chroma signals are the same phase with respect to chroma signal 1 of SG6.
SG8	Chroma Signal 3	Chroma signal where fSB = 3.579545 MHz, fSC = 3.529545 MHz (fsb – 50 kHz) with respect to chroma signal 1 of SG6.
SG9	Standard Sync Signal	
SG10	APL 50% Standard Signal	
SG11	Sync Signal 1	 Duty 90% Pulse Signal
SG12	Sync Signal 2	 Duty 95% Pulse Signal
SG13	5MHz Sine Wave	Establish 0 dB as 100 mVP-P.
SG14	Variable APL Standard Signal	 Variable (0.357 VP-P should be APL 100%.)
SG15	Delta Wave (Input signal for on-screen character display)	

TEST CIRCUIT



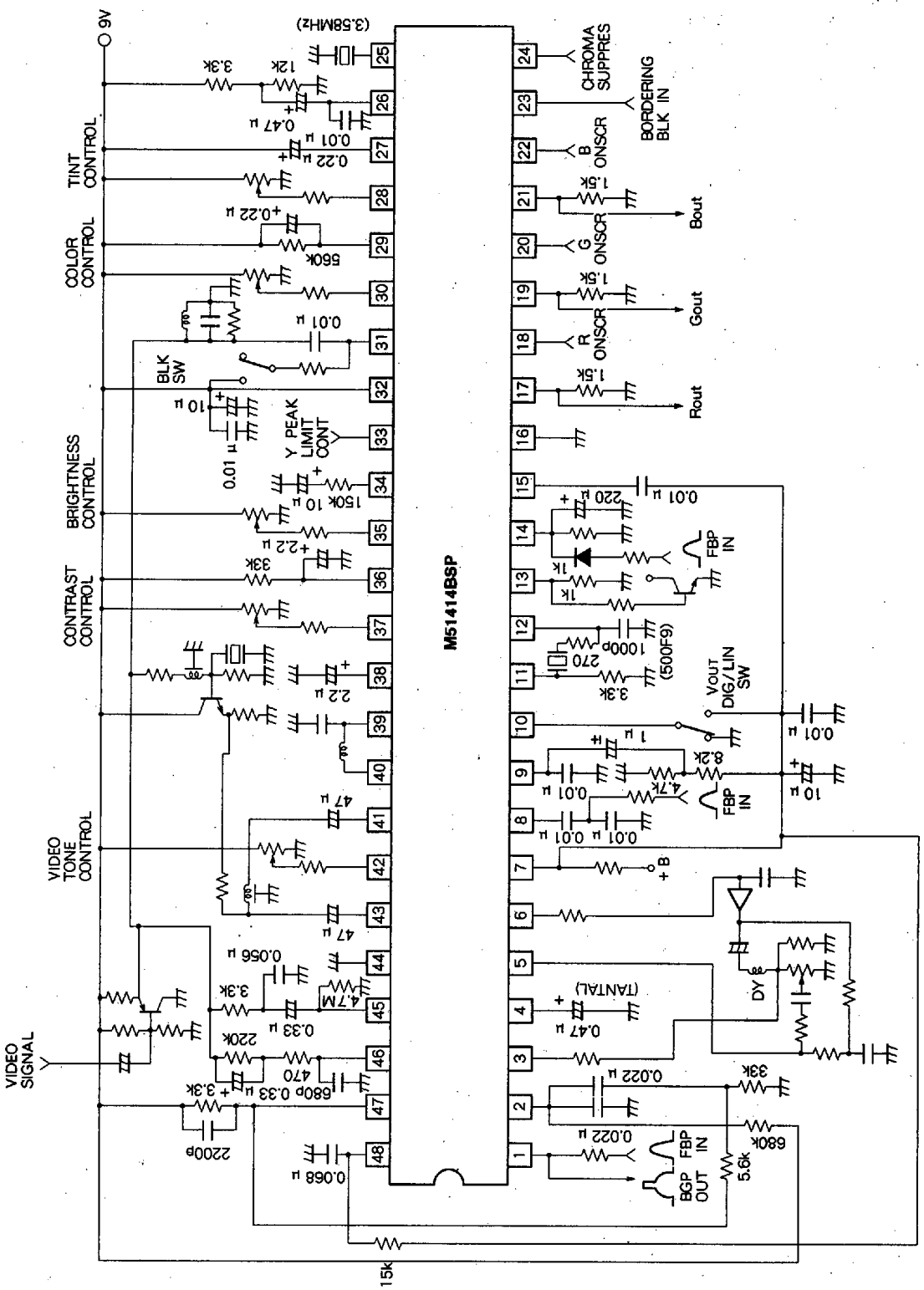
TYPICAL CHARACTERISTICS

THERMAL DERATING(MAXIMUM RATING)

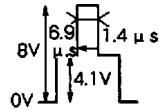
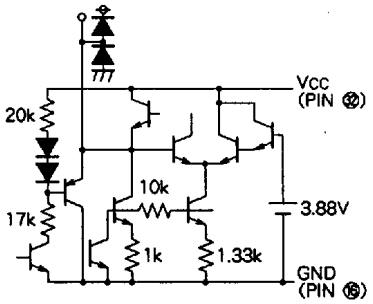
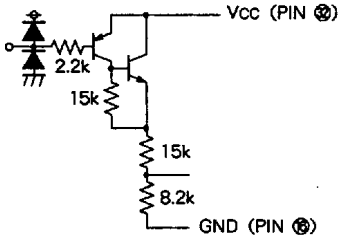
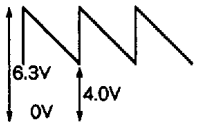
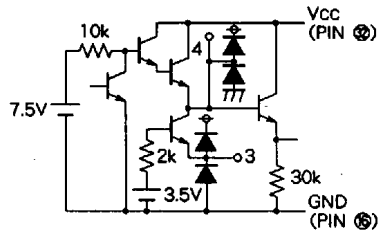
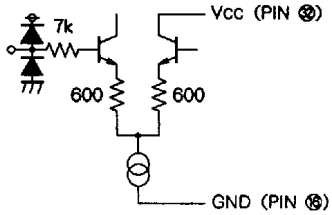
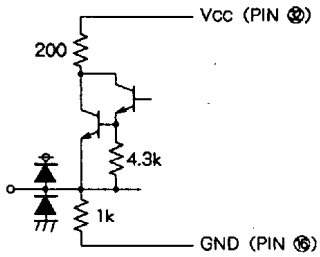


APPLICATION EXAMPLE

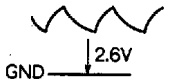
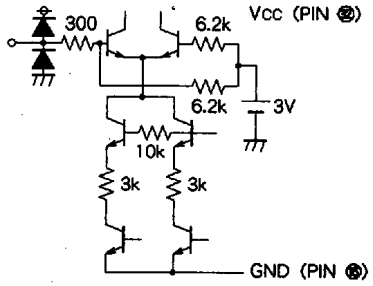
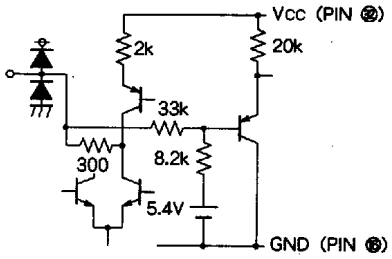
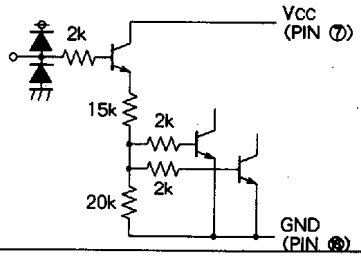
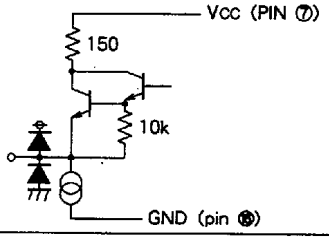
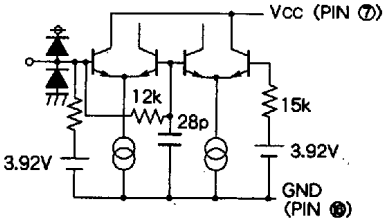
Units Resistance: Ω
Capacitance: F



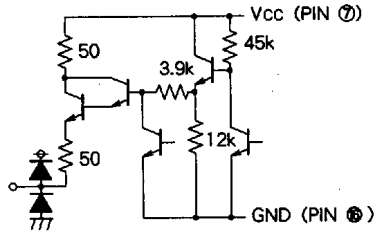
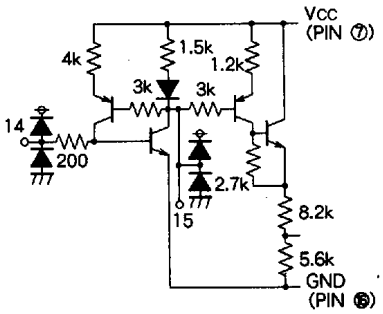
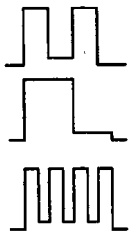
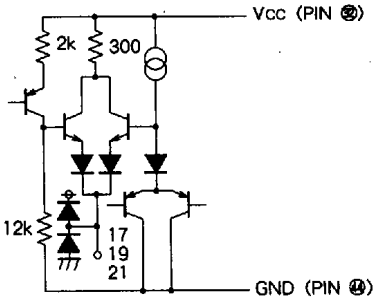
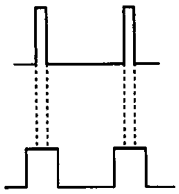
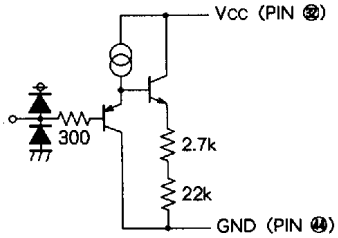
DESCRIPTION OF PIN

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
①	FBP IN/ BGP OUT	 Output as sand castle of BGP and FBP.		—
②	V SYNC TRI IN			—
③ ④	CURRENT SINK RAMP CAP	Amplitude of ramp is altered by external R. 		2.75 —
⑤	AC/DC FB IN	—		—
⑥	V OUT			—

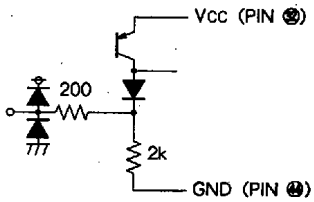
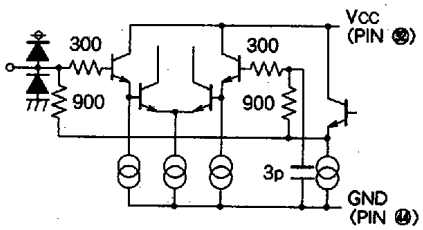
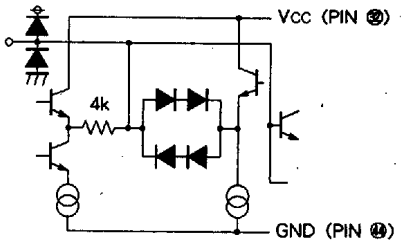
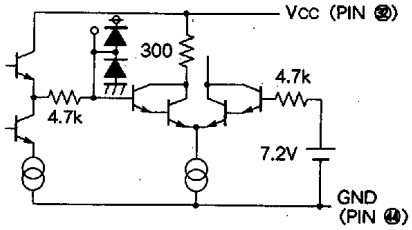
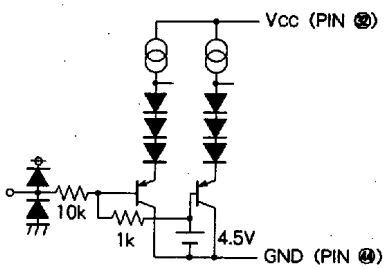
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage (V)
⑦	H Vcc	Set external r so that 25 mA is input to ic component.	–	–
⑧	FBP IN			3.0
⑨	AFC FILTER	——		5.4
⑩	V OUT DIG/LIN SW	2.1V or higher : lin operation 2.1V or lower : dig operation		——
⑪	HVCO OUT	——		7
⑫	HVCO IN	——		3.9

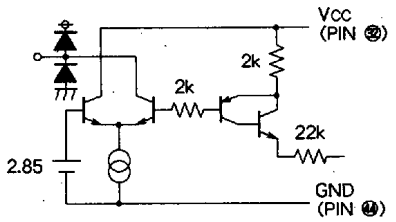
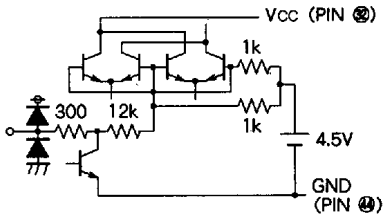
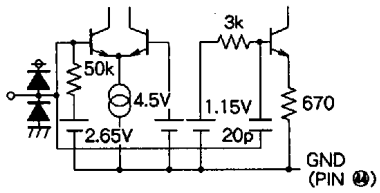
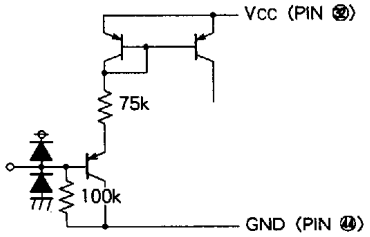
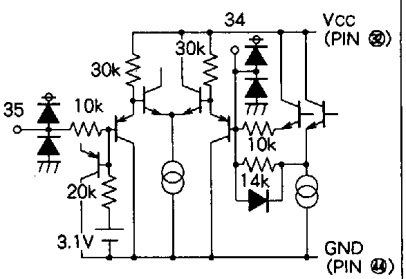
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
⑬	H OUT			—
⑭ ⑮	X – RAY PROTECTOR X – RAY PROTECTOR FILTER	—		— —
⑯	GND (Deflection)	—	—	—
⑰ ⑲ ㉑	R OUT G OUT B OUT			— — —
⑱ ⑳ ㉒ ㉓	ON SCREEN IN (R) ON SCREEN IN (G) ON CSREEN IN (B) BORDERING BLK IN			— — — —

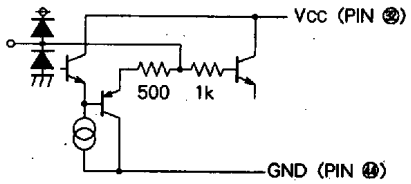
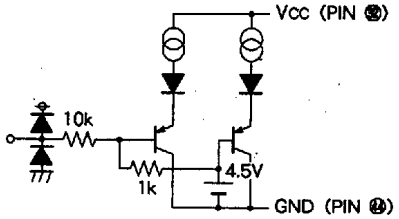
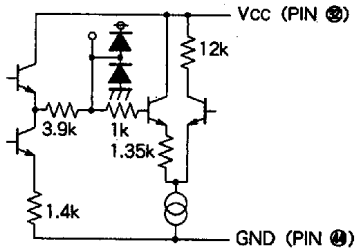
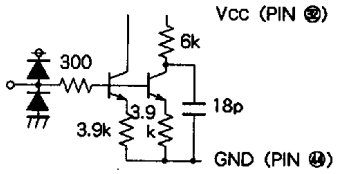
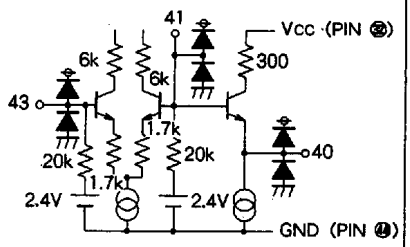
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
㉔	CHROMA SUPPRESS	With pin open and low lominance, color saturation becomes – 3dB. There is no suppression if grounded.		—
㉕	X-TAL	Connect to 3.58MHz X'tal.		—
㉖	APC FILTER	—		—
㉗	KILLER FILTER	—		—
㉘	TINT CONT.	Tint control pin		4.5

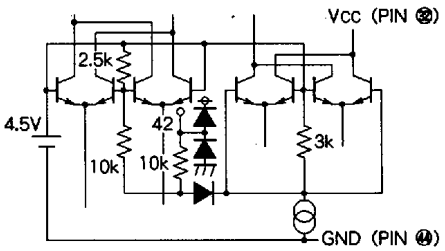
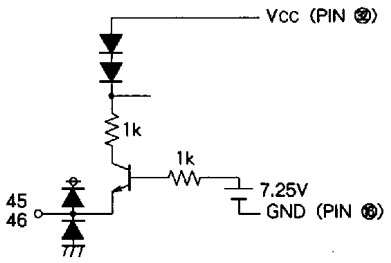
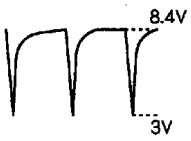
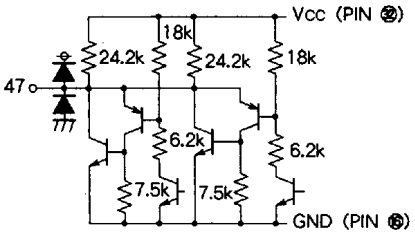
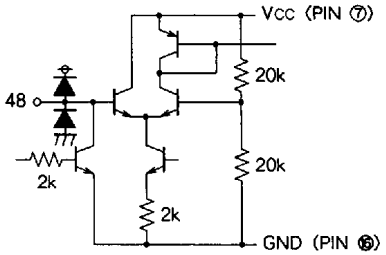
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Description	Periphera circuit of pins	DC voltage(V)
㉙	ACC FILTER	——		——
㉚	COLOR CONT.	Color contorol pin		4.5
㉛	CHROMA IN/BLK SW	If pin voltage is raised above 4.5V, BLK is not engaged for RGB output.		2.65
㉜	Vcc	——	——	——
㉝	Y PEAK LIMIT CONT.	Controls peak of Y. If pin voltage is increased, limiter is engaged on the black side.		0 ㉟ 8
㉞ ㉟	DC REGENER-ATION BRIGHT CONT.	Dc playback ratio can be variated by external CR. Bright control pin		—— 3.1

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage (V)
㊴	BLACK LEVEL HOLD	Detects the blackest part of image.		—
㊲	CONTRAST CONT.	Contrast control pin		4.5
㊳	PEDESTAL CLAMP	—		—
㊱	VIDEO IN (3)			—
㊵ ㊶ ㊸	VIDEO OUT (2) VIDEO IN (2) VIDEO IN (1)	—		1.6 2.4 2.4

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Description	Perupheral circuit of pins	DC voltage(V)
㊷	VIDEO TONE CONT.	If voltage of tone control pin is decreased, high frequency increases.		4.5
㊹	GND (Video, Chroma)	——	——	——
㊺ ㊻	Y SYNC SEP.IN H SYNC SEP.IN	——		6.5
㊼	H.V SYNC OUT			——
㊽	V OUT (LIN) RC	Vout pulse amplitude is determined by external CR.		——