M52039SP

PAL/NTSC VIDEO CHROMA DEFLECTION

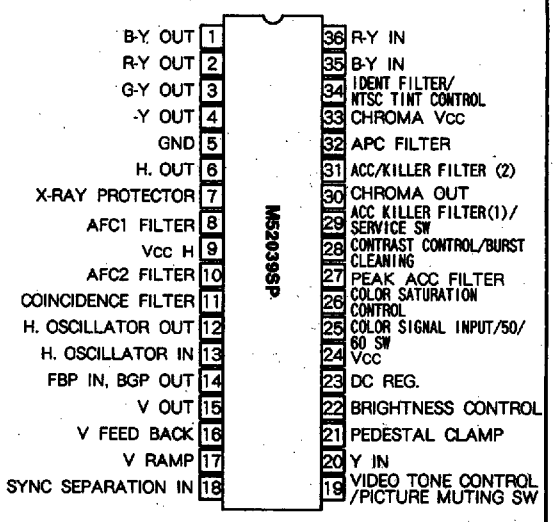
DESCRIPTION

The M52039SP is a semiconductor integrated circuit for video, chroma, and deflection signal processing. Combined with integrated 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, video tone control, ACC/killer detector, ident detector, APC detector, chroma oscillator, NTSC tint control, and chroma demodulator functions.

FEATURES

- PAL/NTSC/SECAM multi-system processing can be realized by adding IC component M52026SP for processing SECAM chroma signals.
- 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.)
- Double AFC in the horizontal circuit effectively reduces weak electric field horizontal "jitter," and minimizes "bending" on the screen caused by luminance alteration.
  Coincidence detector circuit not only expands horizontal 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)

PIN CONFIGURATION (TOP VIEW)



Outline 36P4E

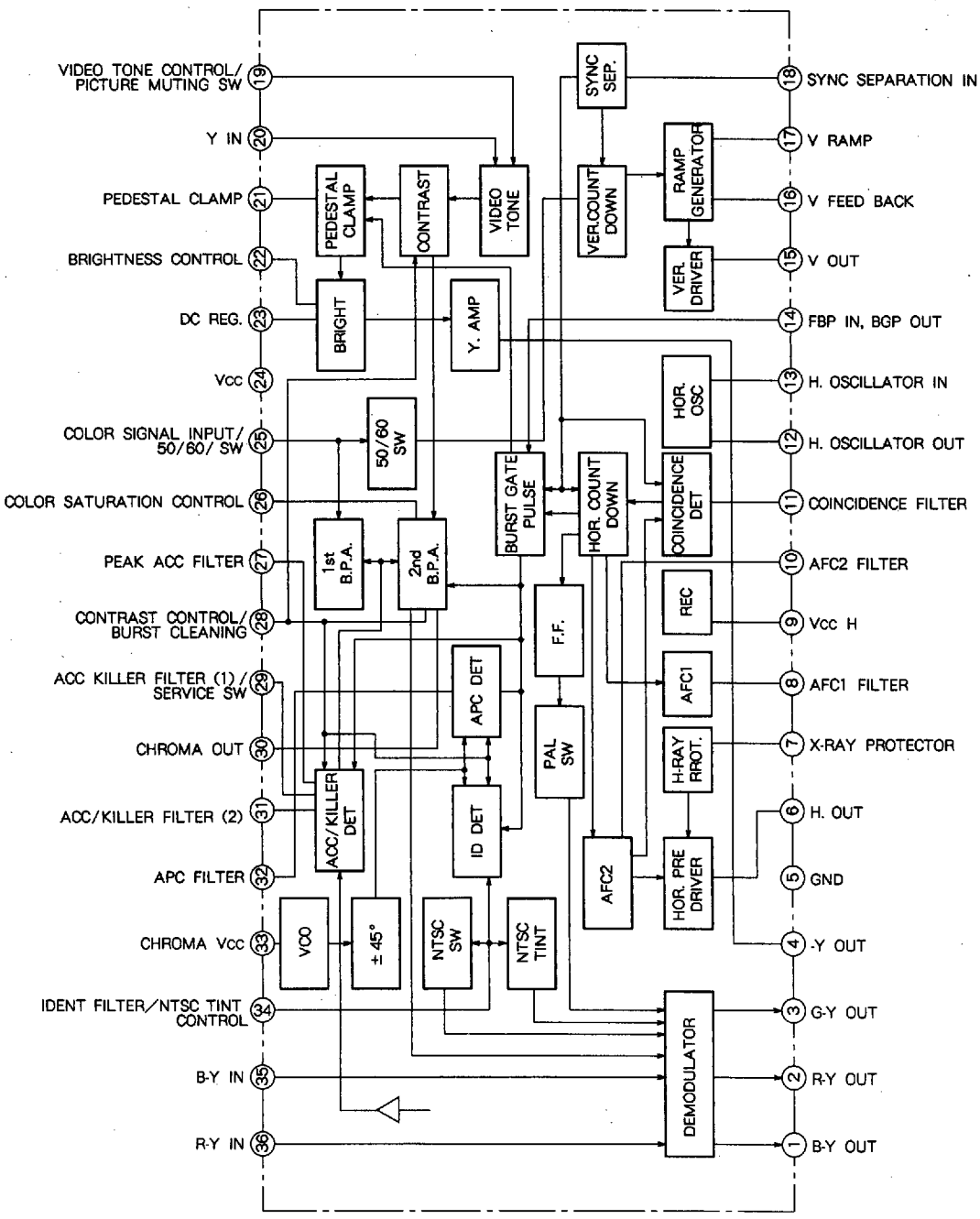
APPLICATION

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

RECOMMENDED OPERATING CONDITION

Supply voltage range ..... 10.0~12.5V
Rated supply voltage 12V

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	13.5	V
P_d	Power dissipation	1.25	W
T_{opr}	Operating temperature	−20~65	℃
T_{stg}	Storage temperature	−40~125	℃
Surge	Surge voltage resistance	200	V
L_{atch}	Latch-up voltage resistance	300	V
V_{16}	Pin⑯ voltage	0.28V_{CC} + 6	V
I_{17}	Pin⑰ input current	+ 6	mA
I_{14}	Pin⑭ input current	− 1.0	mA

ELECTRICAL CHARACTERISTICS (Ta = 25℃ unless otherwise noted)

Symbol	Parameter	Test point	Input	Test conditions ("○" in the table below denotes switched "ON".)																													Limits			Unit
				V 7	Vcc 9A	V 14A	V 16A	V 17A	V 19A	V 21	V 22A	Vcc 24	V 25A	V 26A	V 28A	V 34A	V 35	V 36	S 3	S 6	S 8	S 16	S 17	S 18	S 23	S 25	S 29A	S 29B	S 31	S 34	S 35	Min.	Typ.	Max.	
ICCO	Circuit current	AI	–		15V	11V	8V					11V								○	○			1			○				1	46	60	74	mA
YMAX	Video maximum input	4	SG1		15V	11V	8V					11V			11V					○	○			1			○				1	6.9	8.0	–	VPP
GY	Video amplifier gain	4	SG2		15V	11V	8V				2V	11V			11V					○	○			1			○					18	21	24	dB
GYMID1	Contrast control characteristics-1	4	SG2		15V	11V	8V				2V	11V			5.5 V					○	○			1			○				1	0.65	0.95	1.35	VPP
GYMAX															11V																4.3	7.3	10.3	dB
GYMIN	Contrast control characteristics-2	4	SG2		15V	11V	8V				2V	11V			0V					○	○			1			○				1	–	– 39	– 29	dB
GYMID2	Contrast control characteristics-3	4	SG3		15V	11V	8V				2V	11V			5.5 V					○	○			1			○				1	– 9	– 6	– 3	dB
YTMID	Video tone control characteristics-1	4	SG3		15V	11V	8V		5.5 V		2V	11V			5.5 V					○	○			1			○				1	0.95	1.35	1.85	VPP
YTMIN	Video tone control characteristics-2	4	SG3		15V	11V	8V		11V		2V	11V			5.5 V					○	○			1			○				1	– 11	– 8	– 5	dB
YTMAX	Video tone control characteristics-3	4	SG3		15V	11V	8V		1.5 V		2V	11V			5.5 V					○	○			1			○				1	1.6	4.6	7.6	dB
YBRTMID	Luminance control characteristics-1	4	–		15V	11V	8V				5.5 V	11 V			5.5 V					○	○			1			○				1	4.8	5.2	5.6	V
YBRTMIN	Luminance control characteristics-2	4	–		15V	11V	8V				11 V	11 V			5.5 V					○	○			1			○				1	7.4	8.0	8.6	V
YBRTMAX	Luminance control characteristics-3	4	–		15V	11V	8V				0V	11V			5.5 V					○	○			1			○				1	–	0.8	1.4	V
Yf	Frequency characteristics	4	C SG2 SG4		15V	11V	8V			2V		11V			5.5 V					○	○			1			○				1	– 2	2	6	dB
DG	Differential gain	4	C SG2		15V	11V	8V			2.4 V 1.8 V		11V			5.5 V					○	○			1			○				1	–	10	20	%
H. BLK TH	Horizontal blanking threshold voltage	4	D SG5		15V	11V	8V			2V		11V			5.5 V					○	○			1			○				1	8.9	9.5	10.1	V
YDCREG	DC playback ratio control characteristics	4	C SGa		15V	11V	8V				5.5 V	11V			5.5 V					○	○			1	○↓×		○				1	– 0.2	0	0.2	V
YM	Video muting threshold voltage	4	–		15V	11V	8V					11V			5.5 V					○	○			1			○				1	8.3	8.9	9.5	V
YPL	Peak limiter characteristics	4	–		15V	11V	8V					11V			5.5 V			5V		○	○			1			○				1	1.6	2.1	2.6	V
CMAX	Chroma maximum output	30	SG5 0dB		15V	11V	8V					11V		11V	11V					○	○			1			○				1	2.1	2.7	3.3	VPP
GC	Chroma maximum gain	30	SG5 Variabl		15V	11V	8V					11V		11V	11V					○	○			1			○					32	37	42	dB

ELECTRICAL CHARACTERISTICS (Cont.)

Symbol	Parameter	Test point	Input	Test conditions ("O" in the table below denotes switched "ON".)																														Limits			Unit
				V 7	Vcc 9A	V 14A	V 16A	V 17A	V 19A	V 21	V 22A	Vcc 24	V 25A	V 26A	V 28A	V 34A	V 35	V 36	S 3	S 6	S 8	S 16	S 17	S 18	S 23	S 25	S 29A	S 29B	S 31	S 34	S 35	Min.	Typ.	Max.	
ACC 1	ACC characteristics-1	30	SG5 0dB -20dB		15V	11V	8V					11V			5.5 V					O	O			1			O				1	−16	−10	−8	dB
ACC 2	ACC characteristics-2	30	SG5 +6dB		15V	11V	8V					11V			5.5 V					O	O			1			O					−1.9	0.5	3.1	dB
KIL	Killer operation input	SG5 26	SG5		15V	11V	8V					11V			5.5 V					O	O			1			O		O			−28	−22	−16	dB
DKIL	Killer color residual	30	SG5 0dB		15V	11V	8V					11V			5.5 V					O	O			1			O					−	−	200	mVPP
CCMID1	Color control characteristics-1	30	SG5 0dB		15V	11V	8V					11V		5.5 V / 11V	11V					O	O			1			O					0.86	1.16	1.56	VPP
CCMAX																																		5.0	9.0	13	dB
CCMIN	Color control characteristics-2	30	SG5 0dB		15V	11V	8V					11V		0V	11V					O	O			1			O					−	−44	−40	dB
CCMID2	Color control characteristics-3	30	SG5 0dB		15V	11V	8V					11V		5V	11V					O	O			1			O					−5.0	−3.3	−1.3	dB
UCMID1	Color tracking characteristics-1	30	D SG5 0dB		15V	11V	8V					11V			5.5 V / 11V					O	O			1			O				1	0.65	1.30	1.95	VPP
UCMAX																																		2	6	9	dB
UCMIN	Color tracking characteristics-2	30	D SG5 0dB		15V	11V	8V					11V			0V					O	O			1			O				1	−	−37	−27	dB
UCMID2	Color tracking characteristics-3	30	D SG5 0dB		15V	11V	8V					11V			5.0 V					O	O			1			O				1	−7	−3	0	dB
APC 1	APC pull-in range-1	26 SG6	D SG6		15V	11V	8V					11V			5.0 V					O	O			1			O				1	500	900	−	Hz
APC 2	APC pull-in range-2	26 SG6	D SG6		15V	11V	8V					11V			5.0 V					O	O			1			O				1	870	1500	−	Hz
DDC	Demodulated output DC voltage	1A 2A 3A	−		15V	11V	8V					11V			5.0 V					O	O			1			O				1	5.9	6.4	6.9	V
DOFF	Demodulated output DC offset	−	−		15V	11V	8V					11V			5.0 V					O	O			1			O				1	−	−	0.3	V
DMAX	Demodulated output maximum amplitude	1A	E SG7 0.5VPP		15V	11V	8V					11V			5.0 V					O	O			1							2	5.5	6.5	7.5	VPP
DBY	B-Y demodulated sensitivity	1A	E SG7 0.2VPP		15V	11V	8V					11V			5.0 V					O	O			1							2	2.8	3.3	3.8	VPP
RB	Demodulation ratio-1	2A	E SG7 0.2VPP		15V	11V	8V					11V			5.5 V					O	O			1							2	0.53	0.60	0.67	−
GB	Demodulation ratio-2	3A	E SG7 0.2VPP		15V	11V	8V					11V			5.5 V					O	O			1							2	0.30	0.36	0.42	−

ELECTRICAL CHARACTERISTICS (Cont.)

Symbol	Parameter	Test point	Input	Test conditions ("○" in the table below denotes switched "ON".)																																	Limits			Unit
				V 7	Vcc 9A	V 14A	V 16A	V 17A	V 19A	V 21	V 22A	Vcc 24	V 25A	V 26A	V 28A	V 34A	V 35	V 36	S 3	S 6	S 8	S 16	S 17	S 18	S 23	S 25	S 29A	S 29B	S 31	S 34	S 35	Min.	Typ.	Max.	
DDH	Demodulated output 1H level difference	2A	E SG7 0.2VPP		15V	11V	8V					11V		0V	5.5 V					○	○			1							2	–	–	35	mVPP
CL	Demodulated output carrier leak	1A 2A 3A	–		15V	11V	8V					11V			5.5 V					○	○			1			○				1	–	–	0.2	VPP
V 26	Pin 26 voltage (Killer on)	26	–		15V	11V	8V					11V			5.5 V					○	○			1			○		○		1	–	0.13	1.00	V
VN	NTSC operation control voltage	1A 34A	E SG7 0.2VPP		15V	11V	8V					11V			5.5 V					○	○			1						○	2	4.9	5.35	5.6	V
NB	NTSC demodulated output	1A	D SG9 0dB		15V	11V	8V					11V		5.5 V	5.5 V					○	○			1			○			○	1	2.15	3.15	4.45	VPP
NTSC R/B	NTSC demodulation ratio-1	2A	D SG9 0dB		15V	11V	8V					11V			5.5 V					○	○			1			○			○	1	0.60	0.70	0.80	–
NTSC G/B	NTSC demodulation ratio-2	3A	D SG9 0dB		15V	11V	8V					11V			5.5 V					○	○			1			○			○	1	0.26	0.31	0.36	–
V P/N	PAL/NTSC Demodulated output DC voltage difference	1A 2A 3A	–		15V	11V	8V					11V			5.5 V	2V				○	○			1			○			○→×※	1	–	–	300	mV
DDK	Killer ON/OFF Demodulated output DC voltage difference	1A 2A 3A	–		15V	11V	8V					11V			5.5 V					○	○			1			○		○→×		1	–	–	50	mV
SS	Service switch operation	1A 4 15	C SG2		15V	11V	8V					11V			5.5 V					○	○			1			○	○			1	–	–	–	–
DBW	Demodulated output bandwidth	1A 2A 3A	E SG8		15V	11V	8V					11V			5.5 V					○	○			1							2	0.8	1.0	–	MHz
CD	Chroma input dynamic range	25 30	D SG5		15V	11V	8V					11V			5.5 V					○	○			1			○				1	1.0	1.4	–	VPP
RYP	PAL demodulated phase angle	1A 2A 3A	E SG8 4.53MHz 0.2VPP		15V	11V	8V					11V			5.5 V					○	○			1							2	–	90	–	deg.
GYP																																–	240	–	
RYN	NTSC demodulated phase angle	1A 2A 3A	D SG9 0dB		15V	11V	8V					11V			5.5 V	2V				○	○			1			○			○	1	–	100	–	deg.
GYN																																–	240	–	
TMIN	NTSC TINT	1A 2A 3A	D SG6 0dB		15V	11V	8V					11V			5.5 V	Variable				○	○			1			○			○	1	47	67	87	deg.
TMAX																																32	52	72	
TS	Tracking switch	1A 2A 3A	D SG5 0dB		15V	11V	8V					11V			5.5 V				○→×	○	○			1			○				1	–	6.0	–	dB
ICCH	Horizontal circuit current	A1	SGa		11V	11V	5V	0V			5.5 V				5.5 V					○	○			1			○				1	26	35	44	mA
V9MIN	Horizontal oscillator starting voltage	6	-		Variable	11V	5V	0V			5.5 V				5.5 V					○	○			3			○				1	–	6	7.2	V

ELECTRICAL CHARACTERISTICS (Cont.)

Symbol	Parameter	Test point	Input	Test conditions ("O" in the table below denotes switched "ON".)																																			Limits			Unit
				V 7	Vcc 9A	V 14A	V 16A	V 17A	V 19A	V 21	V 22A	Vcc 24	V 25A	V 26A	V 28A	V 34A	V 35	V 36	S 3	S 6	S 8	S 16	S 17	S 18	S 23	S 25	S 29A	S 29B	S 31	S 34	S 35	Min.	Typ.	Max.	
FH	Horizontal freerun frequency	6	–		11V	11V	5V	0V			5.5 V				5.5 V					O	O			3			O				1	15.45	15.625	15.8	kHz
FPHL	Horizontal pull-in range	6	SGb		11V	11V	5V	0V			5.5 V				5.5 V					O	O			1			O				1	–	– 970	– 600	Hz
FPHH																																+ 550	+ 700	–	
V11H	Coincidence detection maximum voltage	11	SGa		11V	11V	5V	0V			5.5 V				5.5 V					O	O			1			O				1	8.5	9.1	–	V
V11L	Coincidence detection minimum voltage	11	–		11V	11V	5V	0V			5.5 V				5.5 V					O	O			3			O				1	–	–	0.5	V
TH	Horizontal output pulse amplitude	6	SGa		11V	11V	5V	0V			5.5 V				5.5 V					O	O			1			O				1	22	25	28	µs
VHMIN	Horizontal output voltage	6	SGa		11V	11V	5V	0V			5.5 V				5.5 V					×	O			1			O				1	3.1	3.9	4.8	V
VHMAX																																–	0.04	0.16	
TGP	Burst gate pulse position	14	SGa		11V	11V	5V	0V			5.5 V				5.5 V					O	O			1			O				1	4.1	5.0	5.9	µs
FV50	Vertical freerun frequency (50)	15	–		11V	11V	5V	0V			5.5 V				5.5 V					O	O			3		O	O				1	45.6	47	48.6	Hz
FV60	Vertical freerun frequency (60)	15	–		11V	11V	5V	0V			5.5 V				5.5 V					O	O			3		O	O				1	52.7	55	57.2	Hz
FPV50	Vertical pull-in range (50)	15	SGc		11V	11V	5V	0V			5.5 V				5.5 V					O	O			1			O				1	54	55.7	58	Hz
FPV60	Vertical pull-in range (60)	15	SGc		11V	11V	5V	0V			5.5 V				5.5 V					O	O			1		O	O				1	65	66.3	69	Hz
TV50	Vertical output pulse amplitude (50)	15	–		11V	11V	5V	0V			5.5 V				5.5 V					O	O			3			O				1	474	544	614	µs
TV60	Vertical output pulse amplitude (60)	15	–		11V	11V	5V	0V			5.5 V				5.5 V					O	O			3		O	O				1	474	544	614	µs
VVMAX	Vertical output maximum voltage	15	SGa		11V	11V	5V	0V			5.5 V				5.5 V					O	O			1			O				1	3.2	4.2	–	V
VVMIN	Vertical output minimum voltage	15	SGa		11V	11V	5V	0V			5.5 V				5.5 V					O	O			1			O				1	–	–	0.3	V
PR	Ramp peak voltage	17	SGa		11V	11V	5V				5.5 V				5.5 V					O	O		O	1			O				1	5.6	6.05	6.5	V
VR	Ramp amplitude	17	A SGa		11V	11V	5V				5.5 V				5.5 V					O	O		O	1			O				1	1.5	1.8	2.1	V_{PP}
GVV	Vertical open loop gain	15	B SGd –30dB		11V	11V	5V	0V			5.5 V				5.5 V					O	O	O		3			O	O			1	16	20	24	dB
ISS	Sync separation input sensitivity current	14	–		11V	11V	5V	0V			5.5 V				5.5 V					O	O			2			O				1	0.07	0.1	0.15	mA

ELECTRICAL CHARACTERISTICS (Cont.)

Symbol	Parameter	Test point	Input	Test conditions ("O" in the table below denotes switched "ON".)																															Limits			Unit
				V 7	Vcc 9A	V 14A	V 16A	V 17A	V 19A	V 21	V 22A	Vcc 24	V 25A	V 26A	V 28A	V 34A	V 35	V 36	S 3	S 6	S 8	S 16	S 17	S 18	S 23	S 25	S 29A	S 29B	S 31	S 34	S 35	Min.	Typ.	Max.	
TGP1	Burst gate pulse timimg-1	14	A SGa		11V	11V	5V	0V			5.5 V				5.5 V					O	O			1			O				1	0.35	0.5	0.7	µs
TGP2	Burst gate pulse timimg-2	14	A SGa		11V	11V	5V	0V			5.5 V				5.5 V					O	O			1			O				1	3.2	3.6	4.1	µs
VFBP	Flyback pulse clamp voltage	14	A SGa		11V	11V	5V	0V			5.5 V				5.5 V					O	O			1			O				1	4.3	4.8	5.3	V
VBGP	Burst gate pulse voltage	14	A SGa		11V	11V	5V	0V			5.5 V				5.5 V					O	O			1			O				1	9.5	10.0	10.5	V
50/60 SW	50/60 Threshold	15	–		11V	11V	5V	0V			5.5 V			Variable	5.5 V					O	O			3			O				1	4.5	5.0	5.6	V
XR	X-ray protector	6	–	Variable	11V	11V	5V	0V			5.5 V				5.5 V					O	O			1			O				1	–	0.75	1.0	V
2FH	Vertical reset timing switch threshold	35	–		11V	11V	5V	0V			5.5 V				5.5 V		Variable			O	O			1			O				1	–	–	4	V

ELECTRICAL CHARACTERISTICS TEST METHOD

GY Video amplifier gain

1. Test-Y output amplitude and make V_{CO} the testing value.
2. $GY = 20 \times \log \frac{V_{CO}(mV_{P\text{-}P})}{200(mV_{P\text{-}P})}$ (dB)

GY_{MID} 1 GY_{MAX} Contrast control characteristics-1

1. $GY_{MID}\ 1 = V_{CO}(V_{P\text{-}P})$
2. Test-Y output amplitude and make V_{C1} the testing value.
3. $GYMAX = 20 \times \log \frac{V_{C1}(mV_{P\text{-}P})}{V_{CO}(mV_{P\text{-}P})}$ (dB)

GYMIN Contrast control characteristics-2

1. Test-Y output amplitude and make V_{C2} the testing value.
2. $GYMIN = 20 \times \log \frac{V_{C2}(mV_{P\text{-}P})}{V_{CO}(mV_{P\text{-}P})}$ (dB)

GYMID 2 Contrast control characteristics-3

1. Test-Y output amplitude and make V_{C3} the testing value.
2. $GYMID = 20 \times \log \frac{V_{C3}(mV_{P\text{-}P})}{V_{CO}(mV_{P\text{-}P})}$ (dB)

YTMID Video tone control characteristics-1

1. Test-Y output amplitude and make V_{TO} the testing value.
2. $YTMID = V_{TO}(V_{P\text{-}P})$

YTMIN Video tone control characteristics-2

1. Test-Y output amplitude and make V_{T1} the testing value.
2. $YTMIN = 20 \times \log \frac{V_{T1}(mV_{P\text{-}P})}{V_{TO}(mV_{P\text{-}P})}$ (dB)

YTMAX Video tone control characteristics-3

1. Test-Y output amplitude and make V_{T2} the testing value.
2. $YTMAX = 20 \times \log \frac{V_{T2}(mV_{P\text{-}P})}{V_{TO}(mV_{P\text{-}P})}$ (dB)

Y_{BRTMID} Luminance control characteristics-1

1. Test-Y output DC voltage.

Y_{BRTMIN} Luminance control characteristics-2

1. Same as Y9

Y_{BRTMAX} Luminance control characteristics-3

1. Same as Y9

Y_f Frequency characteristics

1. Test-Y output amplitude.
2. Make V_{f1} the amplitude when SG2 is input.
3. Make V_{f2} the amplitude when SG4 is input.
4. $Y_f = 20 \times \log \frac{V_{f2}}{V_{f1}}$ (dB)

DG Differential gain

1. Test-Y output DC voltage.
2. Make V_{G1} the amplitude when pin㉑ is set 2.4V.
3. Make V_{G1} the amplitude when pin㉑ is set 1.8V.
4. $DG = \frac{|V_{G1}-V_{G2}|}{V_{G2}} \times 100$ (%)

H.BLK TH Horizontal blanking threshold voltage

1. Apply voltage to pin④ and increase from 8V.
2. Test the voltage of pin④ when signal ceases to be output by ⑭.

GC Chroma maximum gain

1. Test output amplitude (P-P) and make V_{GC} the testing value.
2. Input amplitude.

$$GC = 20 \times \log \frac{V_{GC}\ (mV_{P\text{-}P})}{\text{Input amplitude } (= 7.94mV_{P\text{-}P})}\ (dB)$$

ACC 1 ACC characterics-1

1. Test output amplitude (P-P).
2. Make V_{A0} the testing value when SG5 0dB is input.
3. Make V_{A1} the testing value when SG5 -20dB is input.
4. $ACC\ 1 = 20 \times \log \frac{V_{A1}}{V_{A0}}$ (dB)

ACC 2 ACC characterics-2

1. In the same manner as in C3, make V_{A2} the testing value when SG5 +6dB is input.
2. $ACC\ 2 = 20 \times \log \frac{V_{A2}}{V_{A0}}$ (dB)

KIL Killer operation input

1. Gradually attenuate the level of SG5.
2. While monitoring DC voltage of pin⑱, input level of SG5 when voltage becomes less than 1V.

D KIL Killer color residual

1. Test output amplitude within 1H interval.

CCMID 1 CCMAX color control characteristics-1

1. Test output amplitude (P-P) and make V_{C10} the testing value.
2. $CCMID\ 1 = V_{C10}\ (V_{P\text{-}P})$
3. Test output amplitude (P-P) and make V_{C11} the testing value.
4. $CCMAX = 20 \times \log \frac{V_{C11}}{V_{C10}}$ (dB)

CCMIN Color control characteristics-2

1. Test output amplitude (P-P) and make V_{C12} the testing value.
2. $CCMIN = 20 \times \log \frac{V_{C12}}{V_{C10}}$ (dB)

CCMID 2 Color control characteristics-3

1. Test output amplitude (P-P) and make V_{C13} the testing value.

2. CCMID 2 = $20 \times \log \frac{V_{C13}}{V_{C10}}$ (dB)

UCMID 1 UCMAX color tracking characteristics-1

1. Test output amplitude (P-P) and make V_{U0} the testing value.
2. UCMID 1 = V_{U0} ($V_{P\text{-}P}$)
3. Test output amplitude (P-P) and make V_{U1} the testing value.

4. UCMAX = $20 \times \log \frac{V_{U1}}{V_{U0}}$ (dB)

UCMIN Color tracking characteristics-2

1. Test output amplitude (P-P) and make V_{U2} the testing value.

2. UCMIN = $20 \times \log \frac{V_{U2}}{V_{U0}}$ (dB)

UCMID 2 Color tracking characteristics-3

1. Test output amplitude (P-P) and make V_{U3} the testing value.

2. UCMID = $20 \times \log \frac{V_{U3}}{V_{U0}}$ (dB)

APC 1 APC pull-in range-1

1. Set so that the frequency of SG6 is less than 4.433MHz and pin ⑱ is Lo.
2. Gradually increase the frequency of SG6.
3. Test the frequency when the voltage of pin ⑱ changes from Lo to Hi and make $F_{A\mu}$ the testing value.
4. APC 1 = 4433619(Hz) − $F_{A\mu}$(Hz)

APC 2 APC pull-in range-2

1. Set so that the frequency of SG6 is more than 4.434MHz and pin ⑱ is Lo.
2. Gradually decrease the frequency of SG6.
3. Test the frequency when the voltage of pin ⑱ changes from Lo to Hi and make F_{AD} the testing value.
4. APC 2 = F_{AD}(Hz) − 4433619(Hz)

DDC Demodulated output DC voltage

1. Test DC voltage at ①A, ②A, and ③A.

D OFF Demodulated output DC offset

1. Calculate each voltage difference of ①A②A, ②A③A, ③A①A from the testing value of C15.

RB Demodulation ratio-1

1. Test output amplitude and make DR-Y testing value.

2. RB = $\frac{D_{R\text{-}Y}}{D_{B\text{-}Y}\text{(Testing value at C18)}}$ (dB)

DB Demodulation ratio-2

1. Test output amplitude and make $D_{G\text{-}Y}$ the testing value.

2. GB = $\frac{D_{G\text{-}Y}}{D_{B\text{-}Y}\text{(Testing value at C18)}}$ (dB)

DDH Demodulated output 1H level difference

1. Test both AC, DC for each 1H level difference.

CL Demodulated output carrier leak

1. Test output carrier element for ①A, ②A, and ③A.

VN NTSC operation control voltage

1. Gradually decrease voltage of ⑭A from the area of 8V.
2. Test the ⑭A voltage when signal ceases to be output by ①A.

NTSC R/B Demodulation ratio (NTSC)-1

1. Test output amplitude and make $NTSC_R$ the testing value.

2. NTSC R/B = $\frac{NTSC_R}{NTSC_B\text{(Testing value at C25)}}$

NTSC G/B Demodulation ratio (NTSC)-2

1. Test output amplitude and make $NTSC_R$ the testing value.

2. NTSC R/B = $\frac{NTSC_R}{NTSC_B\text{(Testing value at C25)}}$

V P/N PAL/NTSC demodulated output DC voltage difference

1. Test the difference in DC voltage when (S34) is on and when it is OFF.

SS Service switch operation

1. No output signal from ④.
2. No vertical sync pulse from ⑮.
3. Voltage of ⑱ drops below 1V.
4. Check 1, 2, and 3.

DBW Demodulated output bandwidth

1. Set frequency of SG8 to 4.5MHz, and test output amplitude of ①, ② and ③.
2. Gradually increase the frequency of SG8.
3. Test output frequency of ①, ②, and ③ when output amplitude is 3dB less than when 4.5MHz is input.

CD Chroma input dynamic range

1. Increase the level of SG5 and test the input amplitude when output become distorted.

RYP, GYP Pal demodulated phase angle

1. Make R-Y-P the phase difference of ①A, ②A.
2. Make G-Y-P the phase difference of ①A, ③A.

RYN, GYN NTSC Demodulated phase angle

1. Make R-Y-N the phase difference of ①A, ②A.
2. Make G-Y-N the phase difference of ①A, ③A.

TMIN, TMAX NTSC Tint

1. Set oscilloscope to X-Y. Connect ⑭ to X and ㉔ to Y.
2. Open ㉞ and set SG6 frequency to 4.433619MHz.
3. At this time the oscilloscope waveform is shown as 180°.
4. Make T_{MIN} the remainder of subtracting 180° from the angle when ㉞ was set to 4V.
5. Make T_{MAX} the remainder of subtracting 180° from the angle when ㉞ was set to 1V.

V9MIN Horizontal oscillator starting voltage

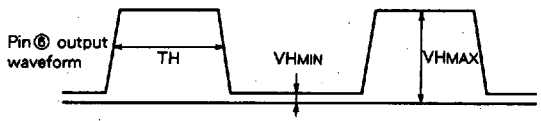
1. Increase V_{CC} from 0V.
2. Test V_{CC} voltage where the output waveform cycle of pin ⑥ is approx 64μs.

F PHL, F PHH Horizontal pull-in range-1

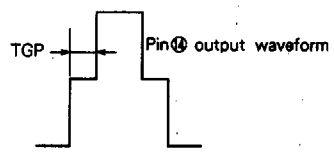
1. Decrease the frequency of input signal so that the SGb input signal and pin ⑥ output waveform are not synchronized.
2. Increase the frequency of SGb.
3. Test the SGb frequency when SGb and pin ⑥ output waveforme become synchronized and make F_{L1} the testing value.
4. (Testing value at J3)
5. Test the upper side pull-in the same manner and make F_{H1} the SGb frequency when the two become synchronized.
6. (Testing value at J3)

TH Horizontal output pulse amplitude

VH MIN, VH MIN Horizontal output voltage



TPG Burst gate pulse position



FPV50 Vertical pull-in range 50(Hz)

1. Increase the frequency of input signal so that the SGc input signal and pin ⑮ output waveform are not synchronized.
2. Decrease the frequency of SGc and test the SGc frequency when SGc and the output waveform of pin ⑮ become synchronized.

FPV60 Vertical pull-in range 60(Hz)

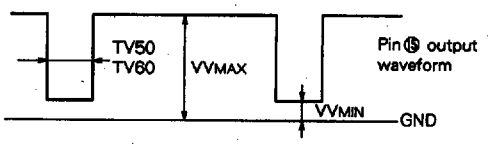
1. Same as J12.

TV50 Vertical output pulse amplitude 50(Hz)

TV60 Vertical output pulse amplitude 60(Hz)

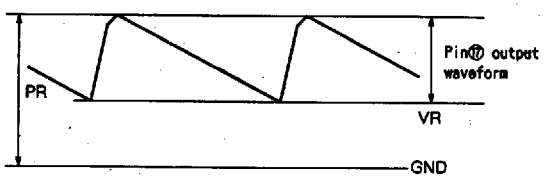
VVMAX Vertical output maximum voltage

VVMIN Vertical output mainimum voltage



PR Ramp peak voltage

VR Ramp amplitude



Gvv Vertical open loop gain

1. Test the output amplitude of pin ⑮ and make Vvo the testing value.
2. $Gvv = 20 \times \log \frac{Vvo(mV_{P\text{-}P})}{\text{Input amplitude}(= 50mV_{P\text{-}P})}$ (dB)

Iss Sync separation input sensitivity current

1. Increase is from 0mA.
2. Test is when burst gate pulse ceases to be output by ⑭.

T_{BGP} 1 Burst gate pulse timing-1

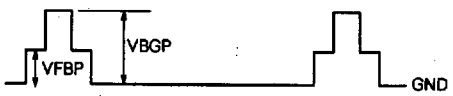
1. Test the time from SGa rise to burst gate pulse rise.

T_{BGP} 2 Burst gate pulse timing-2

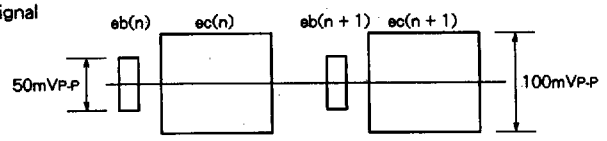
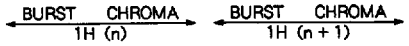
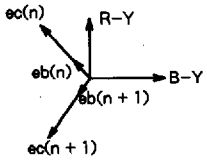
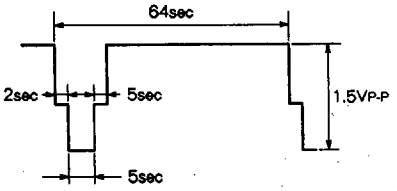
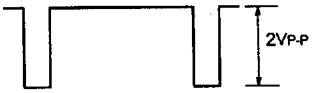
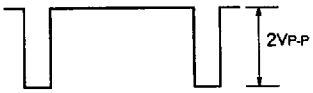
1. Test burst gate pulse amplitude.

V_{FBR} Flyback pulse clamp voltage

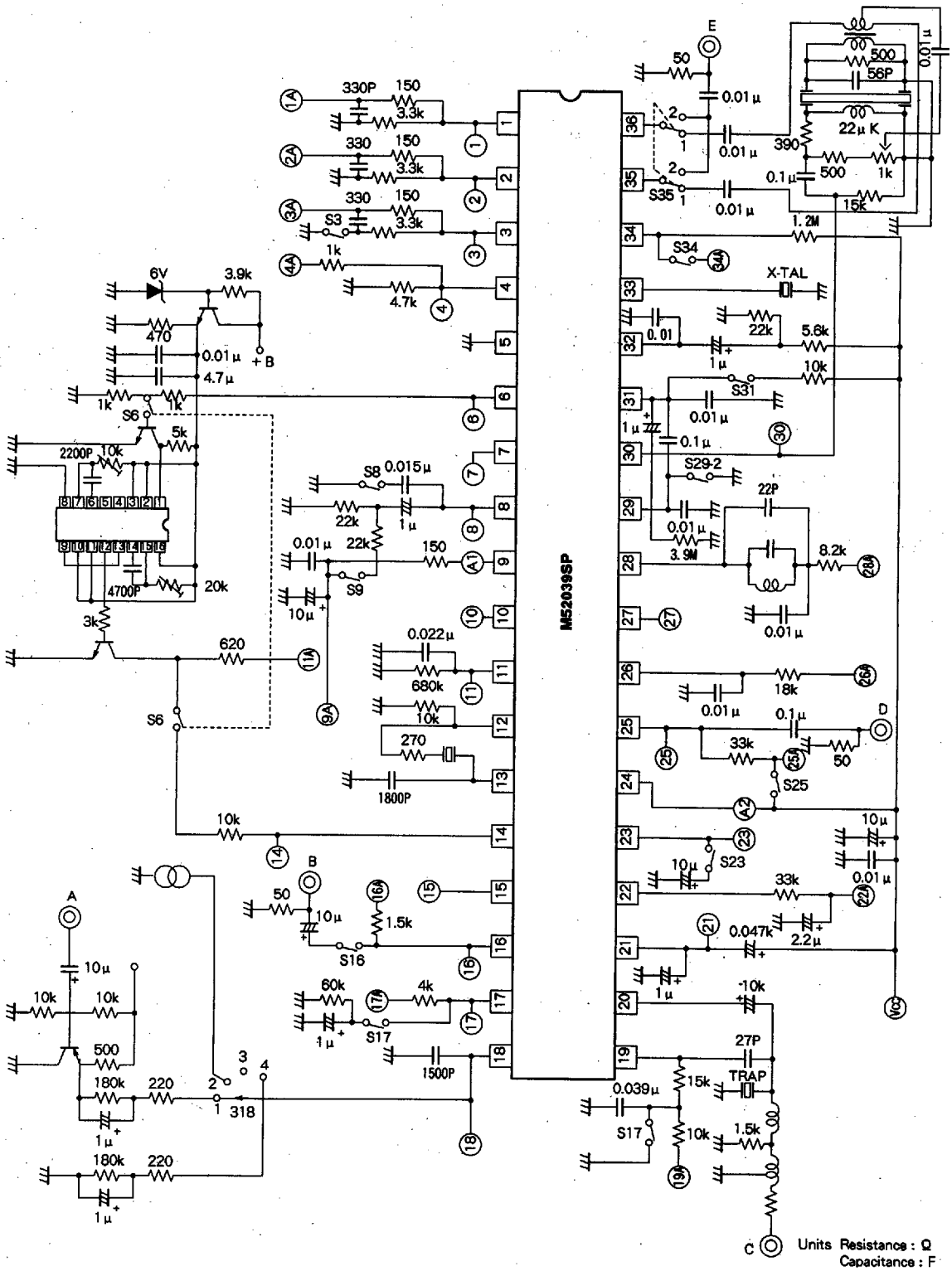
V_{BGP} Burst gate pulse voltage



INPUT SIGNAL

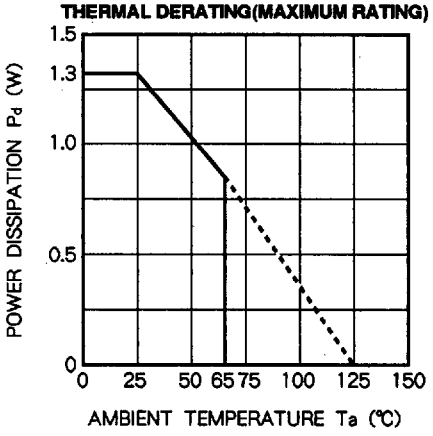
SG. No.	Signal		
SG 1	100kHz	CW	3VP-P
SG 2	100kHz	CW	200mVP-P
SG 3	2MHz	CW	200mVP-P
SG 4	5MHz	CW	200mVP-P
SG 5	PAL simple chroma signal   fsb(m) = fsc(m) = 4.433619MHz (SAME PHASE) The phase correlation between the about signal is outlined in the figure on the right. The phase correlation with burst of ec (n) and ec (n + 1) does not always have to be as shown in the figure on the right, and in particular must be adjustable according to conditions when testing phase correlation. 		
SG 6	With PAL simple chroma signals for SG5, the phase of burst and chroma signals should be the same and the frequency should be ajustable.		
SG 7	4.42MHz	CW	0.2~0.5VP-P
SG 8	4~6MHz	CW	
SG 9	fsb (Burst) = 4.433619MHz, fsc (Chroma) = 4.53MHz at SG5.		
SG a	Input for sync separation should be APL 100% standard combined image signal 1.5VP-P for PAL system such as illustrated by the figure on the right. 		
SG b	 Duty 90%		
SG c	 Duty 95%		
SG d	2kHZ, CW ; 500mVPP = 0dB		

TEST CIRCUIT

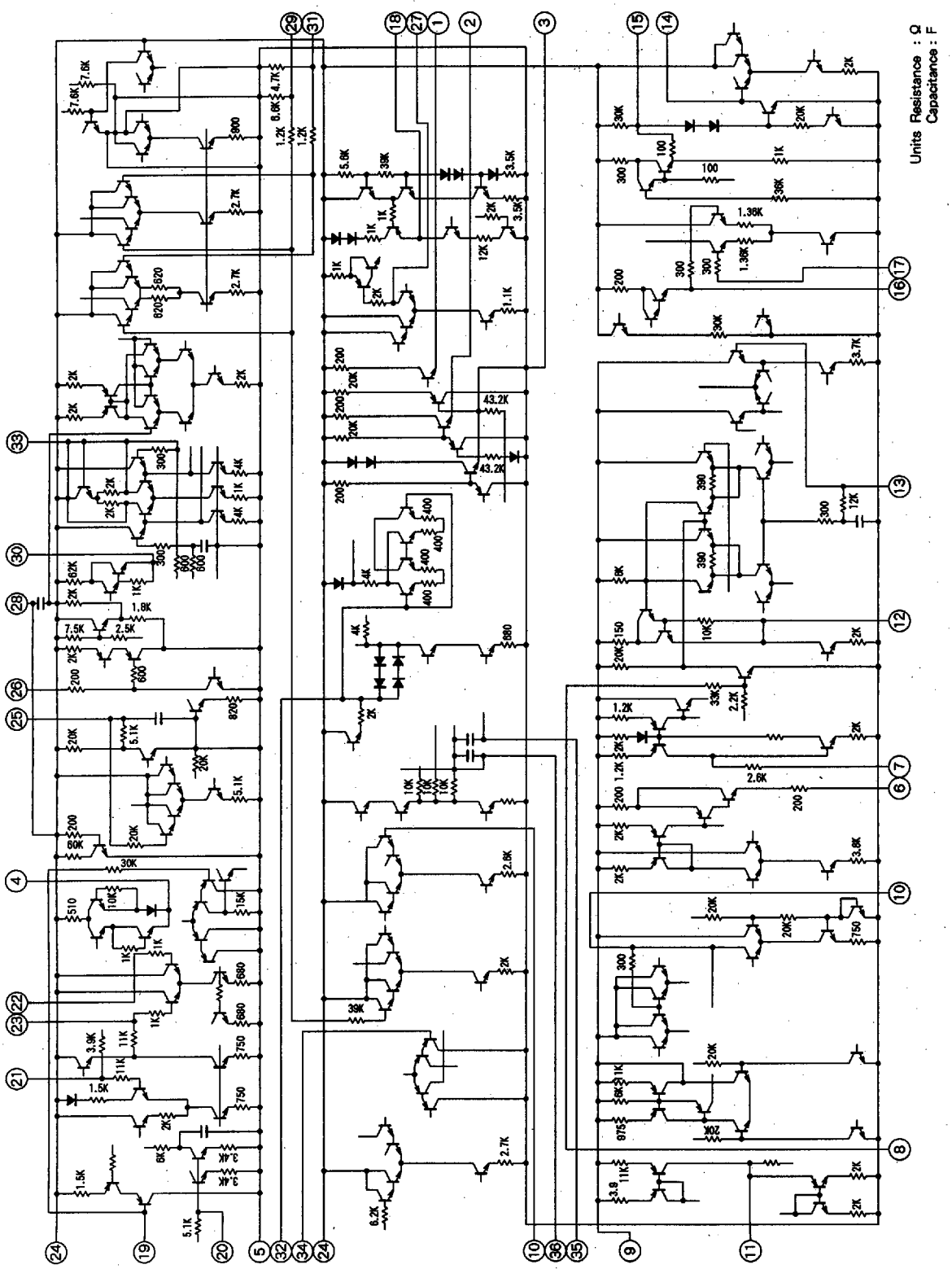


TYPICAL CHARACTERISTICS

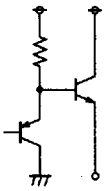
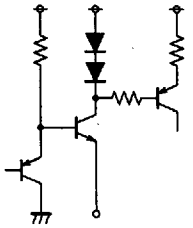
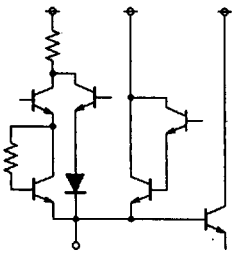
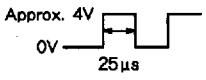
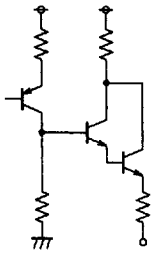
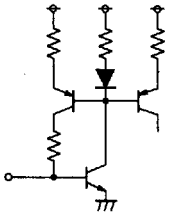
THERMAL DERATING(MAXIMUM RATING)



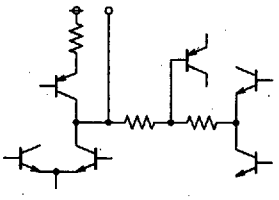
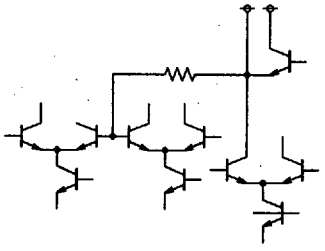
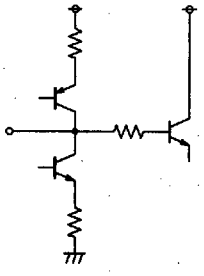
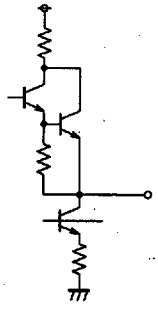
PERIPHERAL CIRCUIT OF PIN



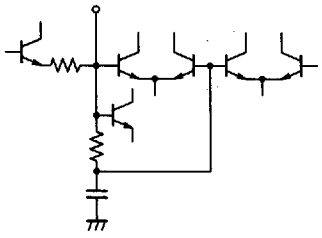
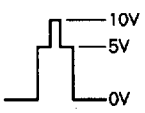
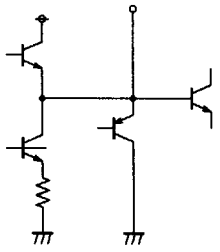
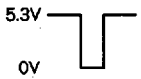
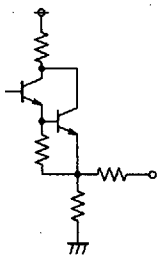
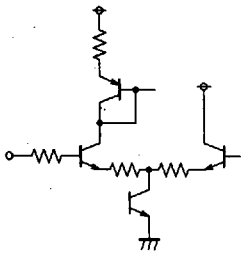
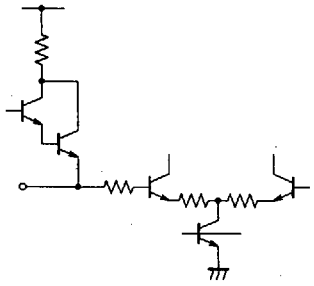
DESCRIPTION OF PIN

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
① ②	B – Y OUTPUT R – Y OUTPUT	• Chroma output B – Y R – Y		6.4
③	G – Y OUTPUT	• Chroma output G – Y • If color tracking switch external resistor (emitter resistor) is removed, color tracking is ineffectual.		6.4
④	–Y OUTPUT	• – Y output • Horizontal blanking input		–
⑤	GND	–	–	0
⑥	HORIZONTAL OUTPUT	 Horizontal pre-driver output		–
⑦	X – RAY PROTECTOR	X – RAY protector is actuated when pin voltage exceeds approx. 0.75V.		–

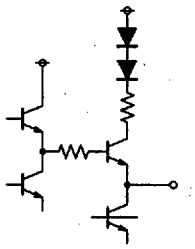
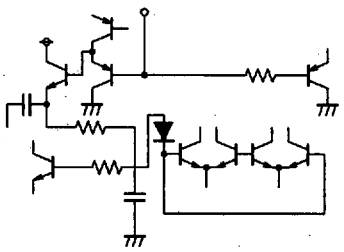
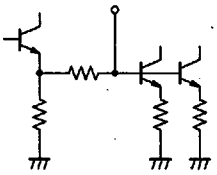
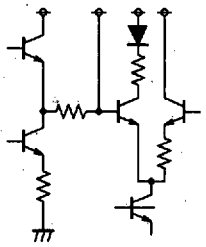
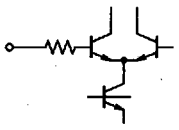
DESCRIPTION OF PIN (Cont.)

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
⑧	AFC1 FILTER	 When VCO frequency becomes high  Filter voltage decreases causing VCO frequency to drop. Operates oppositely when frequency become high.		6.6
⑨	Vcc H	Built-in regulator	–	10
⑩	HORIZONTAL RAMP	 Generates horizontal ramp. Horizontal output pulse is created according to this ramp.		–
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	 f = approx. 500kHz Output to external phase shifter.		9.5

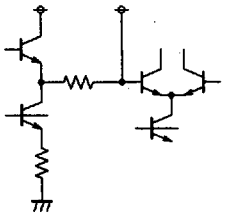
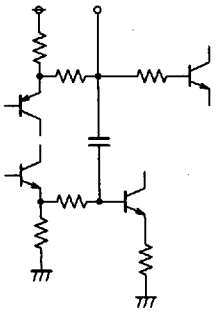
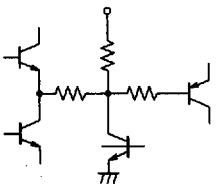
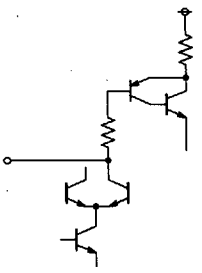
DESCRIPTION OF PIN (Cont.)

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
⑬	HORIZONTAL OSCILLATOR INPUT	 f = approx. 500kHz Output to external phase shifter.		5.2
⑭	F.B.P. INPUT/ B.G.P. OUTPUT	 B.G.P. and f.b.p. output as sandcastle.		–
⑮	VERTICAL OUTPUT			–
⑯	VERTICAL RETURN	AC/DC return input pin		–
⑰	VERTICAL RAMP	 Vertical ramp generation		–

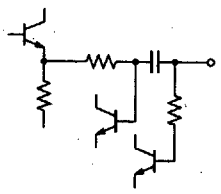
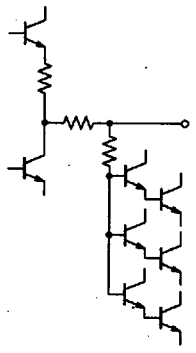
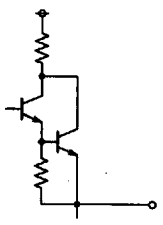
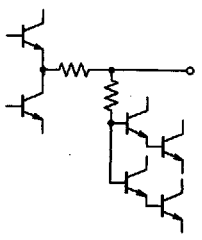
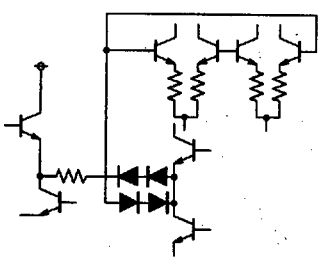
DESCRIPTION OF PIN (Cont.)

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	• Picture quality control High-pass increases as pin voltage is decreased. • Picture muting If voltage is less than 2V, picture muting is actuated and −Y output become BLK level. • Built-in buffer		−
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 Become brighter as voltage is increased.		−

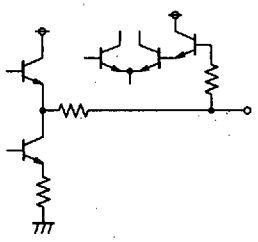
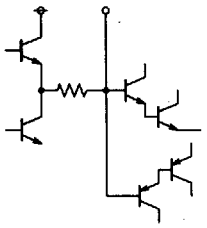
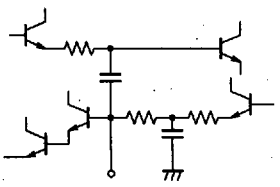
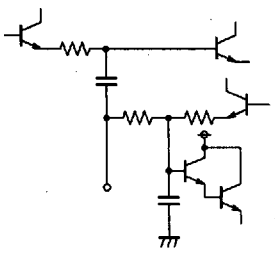
DESCRIPTION OF PIN (Cont.)

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
㉓	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 output.		–
㉗	PEAK ACC FILTER	Gain of chroma amp is controlled by this filter in order to maintain a constant chroma amplitude.		–

DESCRIPTION OF PIN (Cont.)

Pin No.	Name	Description	Peripheral circuit of pins	DC voltage(V)
㉘	CONTRAST CONTROL/ BURST CHEANING	Burst cleaning Coil connection contrast control Changes amplitude of − Y output. Amplitude increases as voltage is increased.		−
㉙	ACC/KILLER (1) / SERVICE SWITCH	Sync acc/killer filter ACC and killer are operated according to voltage differential between this pin and pin㉛. When this pin is connected to GND, the service switch is ON. (Vertical stop and cotrast MIN, killer ON.)		7.3
㉚	CHROM OUTPUT	PAL system ACC chroma signals are output. NTSC system Low DC chroma signals are output.		7.1 4.2
㉛	ACC/KILLER FILTER (2)	Sync acc/killer filter ACC and killer are operated according to voltage differential between this pin and pin㉙.		7.3
㉜	APC FILTER	Chroma VCO phase is controlled by this voltage in order to check burst.		9.1

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