M52303ASP

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION

The M52303ASP is a single-chip semiconductor integrated circuit that processes color NTSC system television signals. It features a variety of signal processing functions including video IF, sound IF, picture, color, and deflection signal processing. It also combines tuner and simple transistor output level to facilitate practical PAL/NTSC system color television set design.

FEATURES

- With the exception of tuner and output level, all color television signal processing functions are built-in, enhancing practicality and reliability of the television set itself while contributing to lower power consumption.
- The intermediate frequency input pins consist of two pins for actuation input and feature high-stability toward oscillation.
- Horizontal oscillation can be counted down from 32 times the horizontal frequency using a ceramic oscillator, and requires no adjustment of free run frequency.
- Vertical oscillation can be counted down from 2 times the horizontal frequency produced by horizontal count-down and requires no vertical sync volume. Because count-down is used, the number of external components required for the vertical circuit is minimized.
- Enables use of AFT defeat, picture muting, and sound muting.
- Features direct current control for picture quality, contrast, luminance, color saturation, and volume.
- Equipped with built-in on-screen character display circuit.

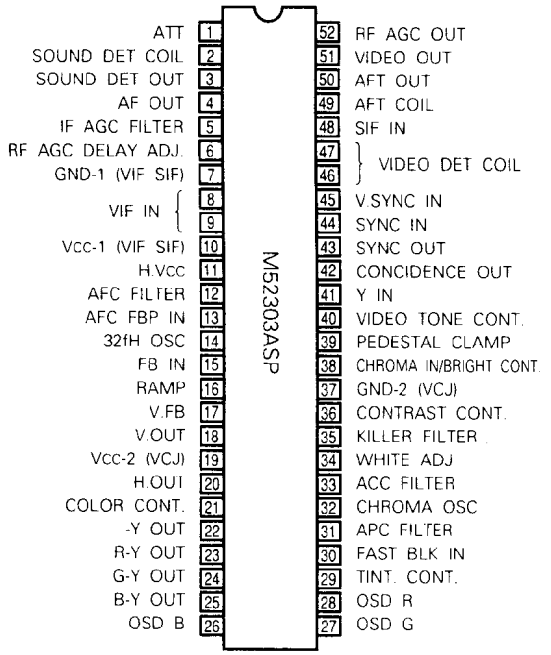
APPLICATION

NTSC CTV

RECOMMENDED OPERATING CONDITION

Supply voltage range ..... 8.5 ~ 9.5V (V10, V19)
Rated supply voltage 9.0V (V10, V19)
Current range ..... 15 ~ 22mA (I11)
Rated current 18mA (I11)

PIN CONFIGURATION (TOP VIEW)



Outline 52P4B

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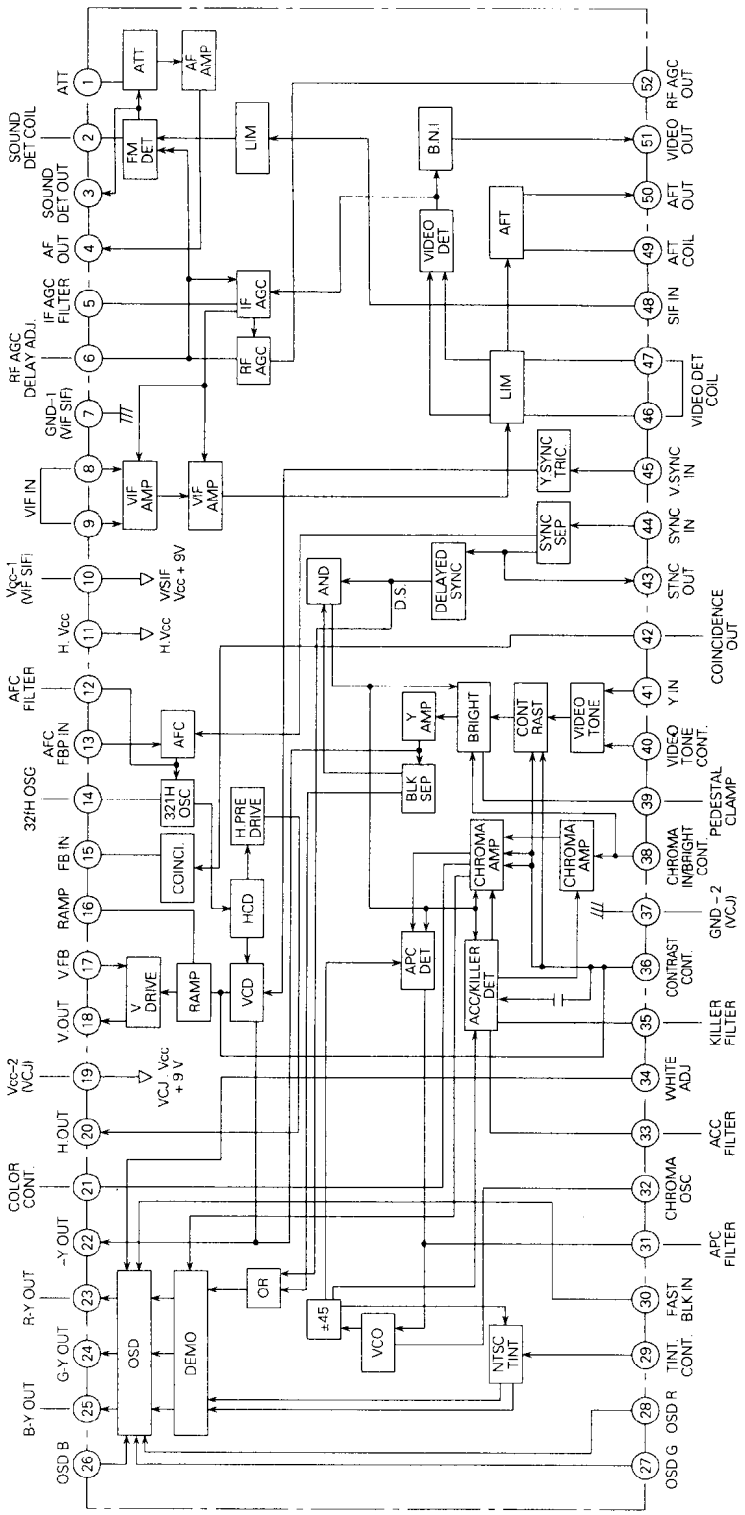
BLOCK DIAGRAM



MITSUBISHI ELECTRIC

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	10.8	V
P_d	Power dissipation	1.4	W
T_{opr}	Operating temperature	−20~65	°C
T_{stg}	Storage temperature	−40~125	°C

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

Symbol	Parameter	Test point	Input ( )	Test conditions ("–" in the table below denotes "OPEN".)																	Limits			Unit
				1	5	6	Vcc 10	S 2	S 5	S 6	S 6A	S 10	S 10A	S 47	S 48	S 48A	S 49	S 51	S 52	S 52A	Min.	Typ.	Max.	
I_{CC10}	Circuit current	A10	–	–	–	–	9.0 V	–	–	○	–	–	○	–	–	–	–	–	○	–	27	3G	50	mA
V51	Video output DC voltage	51	–	–	–	–	9.0 V	○	○	○	–	○	–	–	–	–	○	–	○	–	4.55	4.0	5.35	V
Vo51	Video output signal voltage	51	A SG.1	–	–	–	9.0 V	○	–	○	–	○	–	–	–	–	○	–	○	–	1.7	2.0	2.3	Vp-p
V51L	Sync. tip voltage	51	A SG.2	–	–	–	9.0 V	○	–	○	–	○	–	–	–	–	○	–	○	–	2.3	2.6	2.9	V
Vin min.	Input sensitivity	51A	A SG.3	–	–	–	9.0 V	○	–	○	–	○	–	–	–	–	○	–	○	–	37	45	51	dBμ
Vin max.	Maximum allowable input	51A	A SG.4	–	–	–	9.0 V	○	–	○	–	○	–	–	–	–	○	–	○	–	103	110	–	dBμ
V_{BTH}	Black spot noise inverter	51	A SG.2 SG.5	–	Variable	–	9.0 V	○	–	○	–	○	–	–	–	–	○	–	○	–	1.7	2.0	2.3	V
V_{BCL}																					3.3	3.8	4.3	
BW	Video frequency characteristics	51	A SG.8	–	Variable	–	9.0 V	○	–	○	–	○	–	–	–	–	○	–	○	–	5.6	8	–	MHz
IM	Intermodulation	51	A SG.9	–	–	–	9.0 V	○	–	○	–	○	–	–	–	–	○	–	○	–	32	45	–	dB
S/N	Video noise	51A	A SG.2	–	–	–	9.0 V	○	–	○	–	○	–	–	–	–	○	–	○	–	50	56	–	dB
V50	AFT output DC voltage	50	–	–	–	–	9.0 V	○	○	○	–	○	–	–	–	–	–	–	○	–	3.0	4.0	5.0	V
V50H	AFT output Maximum voltage	50	A SG.6	–	–	–	9.0 V	○	–	○	–	○	–	–	–	–	–	–	○	–	8.0	8.7	–	V
V50L	AFT output Minimum voltage	50	A SG.7	–	–	–	9.0 V	○	–	○	–	○	–	–	–	–	–	–	○	–	–	0.3	1.0	V
μAFT	AFT sensitivity	50	A SG.5	–	–	–	9.0 V	○	–	○	–	○	–	–	–	–	–	–	○	–	40	60	120	mV/kHz

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input ( )	Test conditions ("–" in the table below denotes "OPEN".)																Limits			Unit
				1	5	6	Vcc 10	S 2	S 5	S 6	S 6A	S 10	S 10A	S 47	S 48	S 48A	S 49	S 51	S 52	S 52A	Min.	Typ.	Max.	
V50D	AFT defeat voltage	50	A SG.5	–	–	–	9.0 V	O	–	O	–	O	–	–	–	–	–	–	O	–	4.35	4.5	4.65	V
V52H	RF AGC maximum voltage	52	A SG.11	–	–	2.5 V	9.0 V	O	–	–	–	O	–	–	–	–	O	–	O	–	7.0	8.0	–	V
V52L	RF AGC minimum voltage	52	A SG.10	–	–	2.5 V	9.0 V	O	–	–	–	O	–	–	–	–	O	–	O	–	–	0.01	0.3	V
V.S MUTE1	Video/sound mute starting voltage	5 6	–	9.0 V	M	Vari-able	9.0 V	–	–	–	–	O	–	–	–	O	O	–	O	–	–	0.7	1.2	V
V3	AF direct output DC voltage	3	–	–	–	–	9.0 V	–	O	O	–	O	–	–	–	O	O	–	O	–	3.4	3.9	4.5	V
V_{OAF}	AF direct output signal voltage	3	C SG.12	–	–	–	9.0 V	–	O	O	–	O	–	–	–	O	O	–	O	–	540	630	720	mVrms
LIM	Limiting sensitivity	3	C SG.14	–	–	–	9.0 V	–	O	O	–	O	–	–	–	O	O	–	O	–	–	42	50	dBμ
AMR	AMR	3	C SG.15	–	–	–	9.0 V	–	O	O	–	O	–	–	–	O	O	–	O	–	50	60	–	dB
V_{O4}	AF driver output	4	C SG.12	–	–	–	9.0 V	–	O	O	–	O	–	–	–	O	O	–	O	–	250	460	650	mVrms
$V_{O4\ max}$	AF driver maximum output	4	C SG.12	9.0 V	–	–	9.0 V	–	O	O	–	O	–	–	–	O	O	–	O	–	700	930	1200	mVrms
ATT	Maximum attenuation	4	C SG.12	1.0 V	–	–	9.0 V	–	O	O	–	O	–	–	–	O	O	–	O	–	70	80	–	dB
G_{AF}	AF driver gain																				2.1	4.3	5.2	dB
S/N_{AF}	Sound S/N	4	C SG.16	9.0 V	–	–	9.0 V	–	O	O	–	O	–	–	–	O	O	–	O	–	55	66	–	dB
S MUTE	Sound mute voltage	2	C SG.12	9.0 V	–	–	9.0 V	O	O	O	–	O	–	–	–	O	O	–	O	–	–	0.4	1.0	mVrms
V.S MUTE2	Sound output at video/sound mute	4	C SG.12	9.0 V	–	Vari-able	9.0 V	–	–	–	–	O	–	–	–	O	O	–	O	–	–	0.3	1.0	V
THD_{AF}	AF driver maximum output distortion	4	C SG.12	9.0 V	–	–	9.0 V	–	O	O	–	O	–	–	–	O	O	–	O	–	–	1	5	X
V_I	Terminal 1 voltage	1	–	M	–	–	9.0 V	–	O	O	–	O	–	–	–	O	O	–	O	–	4.8	5.3	5.8	V

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input ( )	Test conditions ("–" in the table below denotes "OPEN".)																		Limits			Unit
				11	11A	15	16A	17	19	S 11	S 11A	S 11B	S 12	S 12A	S 13	S 16	S 17	S 19	S 20	S 22	S 36	S 44	S 44A	Min.	Typ.	Max.	
I_{SS}	Sync. separation input sensitivity current	Iss 43	Iss Variable	–	–	–	–	–	9.0 V	–	–	–	–	–	–	–	–	○	–	–	–	○	0.05	0.1	0.2	mA
V_{43H}	Sync. separation output maximum voltage	43	D SG.17	–	–	–	–	–	9.0 V	–	–	–	–	–	–	–	–	○	–	–	○	–	8.0	8.9	–	Vo-p
V_{43L}	Sync. separation output minimum voltage	43	D SG.17	–	–	–	–	–	9.0 V	–	–	–	–	–	–	–	–	○	–	–	○	–	2.5	3.0	3.5	Vo-p
I_{CC11}	H. Vcc inflow current	A11	–	–	12 V	0 V	–	–	–	–	–	○	○	○	–	–	–	–	–	–	–	–	12.0	16.0	20.0	mA
f_H	Horizontal free-run frequency	20	–	–	12 V	0 V	–	–	–	○	–	–	○	○	–	–	–	–	–	–	–	–	15.20	15.625	15.95	kHz
$V_{11\ min}$	Horizontal oscillation starting voltage	11 20	–	Variable	–	0 V	–	–	–	○	–	–	○	○	–	–	–	–	–	–	–	–	–	4.5	5.4	V
f_{PHL}	Horizontal pull-in range	D 20	D SG.18 f variable	9.0 V	9.0 V	0 V	–	–	9.0 V	○	–	–	○	○	○	–	–	○	○	–	–	○	–	–500	–600	–	Hz
f_{PHH}																								+500	+600	–	
V_{20H}	Horizontal output maximum voltage	20	D SG.18	9.0 V	9.0 V	0 V	–	–	9.0 V	○	–	–	○	○	○	–	–	○	○	–	–	○	–	3.2	3.8	–	Vo-p
V_{20L}	Horizontal output minimum voltage	20	D SG.18	9.0 V	9.0 V	0 V	–	–	9.0 V	○	–	–	○	○	○	–	–	○	○	–	–	○	–	–	0	0.3	Vo-p
T_H	Horizontal output pulse width	20	D SG.18	9.0 V	9.0 V	0 V	–	–	9.0 V	○	–	–	○	○	○	–	–	○	○	–	–	○	–	22	24	26	µS
V_{20H} (6V)	Horizontal output maximum voltage at terminal 11 - 6 V	20	–	6.0 V	–	0 V	–	–	–	○	–	–	○	○	–	–	–	–	–	–	–	–	1.2	1.8	2.4	Vo-p
f_H (Vcc)	Free-run frequency increase/decrease supply voltage	20	–	–	9V 15V	0 V	–	–	–		○	–	○	○	–	–	–	–	–	–	–	–	15.20	15.625	15.95	kHz
V_{RPO}	Overvoltage detection operating voltage	15 20	–	9.0 V	–	Variable	–	–	–	○	–	–	○	○	–	–	–	–	–	–	–	–	0.63	0.73	0.83	V

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input ( )	Test conditions ("–" in the table below denotes "OPEN".)																						Limits			Unit
				11	11A	15	16A	17	19	36	S 11	S 11A	S 11B	S 12	S 12A	S 13	S 16	S 17	S 19	S 20	S 22	S 36	S 44	S 44A	Min.	Typ.	Max.	
V_{18H}	Vertical output maximum voltage	18	D SG.17	9.0 V	9.0 V	0 V	–	3.7 V	9.0 V	4.5 V	○	–	–	○	○	○	○	–	○	○	–	–	○	–	4.2	5	–	Vo-p
V_{18L}	Vertical output minimum voltage	18	D SG.17	9.0 V	9.0 V	0 V	–	3.7 V	9.0 V	4.5 V	○	–	–	○	○	○	○	–	○	○	–	–	○	–	–	0	0.3	Vo-p
G_{VV}	Vertical open loop gain	17 18	E SG.19	–	–	–	4.5 V Vari-able	3.7 V	9.0 V	–	–	–	–	–	–	–	–	○	○	–	–	○	–	–	16	22	28	dB
$V_{19\ min}$	Vertical oscillation starting voltage	16 19	–	9.0 V	9.0 V	0 V	0 V	–	Vari-able	4.5 V	○	–	–	○	○	○	–	–	○	○	–	–	○	–	–	5	6.5	V
V_{RAMP}	Ramp peak voltage	16	D SG.17	9.0 V	9.0 V	0 V	0 V	–	9.0 V	4.5 V	○	–	–	○	○	○	–	–	○	○	–	–	○	–	4.60	4.90	5.30	Vo-p
$\tilde{V}_{RAMP}$	Ramp amplitude	16	D SG.17	9.0 V	9.0 V	0 V	–	–	9.0 V	4.5 V	○	–	–	○	○	○	○	–	○	○	–	–	○	–	1.20	1.45	1.85	Vp-p
f_{V60}	Vertical free-run frequency 60	16	D SG.18	9.0 V	9.0 V	0 V	0 V	–	9.0 V	4.5 V	○	–	–	○	○	○	–	–	○	○	–	–	○	–	51.8	52.8	53.8	Hz
f_{PV60}	Vertical pull-in frequency 60	16	D SG.20 f vari-able	9.0 V	9.0 V	0 V	0 V	–	9.0 V	4.5 V	○	–	–	○	○	○	–	–	○	○	–	–	○	–	65.7	66.7	67.7	Hz
T_{V60}	Vertical output pulse width 60	16	D SG.17	9.0 V	9.0 V	0 V	0 V	–	9.0 V	4.5 V	○	–	–	○	○	○	–	–	○	○	–	–	○	–	494	544	594	µS
V_{42Hi}	Coincidence output maximum voltage	42	D SG.18	9.0 V	9.0 V	5 V	–	–	9.0 V	–	○	–	–	○	○	–	–	–	–	–	–	–	–	–	7.0	7.4	–	V
V_{42Lo}	Coincidence output minimum voltage	42	–	9.0 V	9.0 V	5 V	–	–	9.0 V	–	○	–	–	○	○	–	–	–	–	–	–	–	–	–	–	0	0.5	V

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input ( )	Test conditions ("–" in the table below denotes "OPEN".)																		Limits			Unit
				11A	16A	19	21	22A	29	36	38	39	40	42	S 19	S 19A	S 22	S 44	S 35	S 36	S 39	Min.	Typ.	Max.	
I_{CC19}	Circuit current	A19	–	–	–	9.0 V	–	–	–	4.5 V	–	2.7 V	–	–	–	○	–	–	○	–	–	36	46	56	mA
Y_{max}	Maximum output	22	F SG.21	–	–	9.0 V	–	–	–	9.0 V	–	Variable	–	–	○	–	–	–	–	–	–	5.0	6.2	–	Vp-p
G_Y	Standard gain	22	F SG.22	–	–	9.0 V	–	–	–	4.5 V	–	Variable	–	–	○	–	–	–	–	–	–	11	15	19	dB
$G_{Y\ min}$	Contrast control characteristics	22	F SG.22	–	–	9.0 V	–	–	–	2.5 V	–	Variable	–	–	○	–	–	–	–	–	–	–	–45	–30	dB
$G_{Y\ max}$										6.5 V												2	6	8.5	
$V_{BRT\ II\ norm}$	Brightness control characteristics II	22	D SG.18	12 V	–	9.0 V	–	–	–	4.5 V	.5 V	–	9.0 V	–	○	–	–	○	–	–	–	2.95	3.3	3.65	Vo-p
$V_{BRT\ II\ L}$											.4 V											2.05	2.4	2.75	
$V_{BRT\ II\ H}$											.4 V											3.75	4.1	4.45	
G_P	Peaking value	22	F SG.23 SG.24	–	–	9.0 V	–	–	–	4.5 V	–	Variable	–	–	○	–	–	–	–	–	–	7.5	11	14.5	dB
$G_{T\ norm}$	Video tone control characteristics	22	F SG.24	–	–	9.0 V	–	–	–	4.5 V	–	Variable	4.5 V	–	○	–	–	–	–	–	–	–1.3	–0.5	1.2	dB
$G_{T\ min}$													6.5 V									–21	–15	–11	
$G_{T\ max}$													2.5 V									3.0	6.0	10.0	
$f_{B\ Y}$	Frequency characteristics	22	F SG.25	–	–	9.0 V	–	–	–	4.5 V	–	Variable	–	–	○	–	–	–	–	–	–	7	8	–	MHz
DG_Y	Differential gain	22	F SG.22	–	–	9.0 V	–	–	–	4.5 V	–	Variable	–	–	○	–	–	–	–	–	–	–	1	6	X
V_{40}	Terminal 40 voltage	40	–	–	–	9.0 V	–	–	–	4.5 V	–	–	M	–	○	–	–	–	–	–	–	4.15	4.45	4.75	V
$V_{BLK\ Y}$	Vertical blanking voltage	22	–	12 V	–	9.0 V	–	–	–	2.5 V	–	Variable	–	–	○	–	–	–	–	–	–	7.3	7.7	–	Vo-p
$V_{BLK\ TV}$	Vertical blanking pulse width	22	–	12 V	–	9.0 V	–	–	–	2.5 V	–	Variable	–	–	○	–	–	–	–	–	–	1.31	1.38	1.44	mS
$V_{BLK\ H}$	Horizontal blanking threshold voltage	22 25A	H SG.28 0.5Vp-p	–	–	9.0 V	–	Variable	–	2.5 V	–	Variable	–	–	○	–	–	–	○	–	–	6.35	6.8	–	Vo-p
$Y_{DC\ REG}$	DC regeneration control characteristics	22	F SG.17	–	–	9.0 V	–	–	–	4.5 V	–	–	9.0 V	–	○	–	–	–	–	–	–	–1.2	–0.2	1.0	V

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input ( )	Test conditions ("–" in the table below denotes "OPEN".)																				Limits			Unit
				11A	16A	19	21	22A	29	36	38	39	40	S 19	S 19A	S 22	30	34	26	27	28	S 35	S 36	S 39	Min.	Typ.	Max.	
C_{max}	Demodulation output maximum amplitude	25A	G SG.26 0dB	12 V	–	9.0 V	6.5 V	–	–	6.5 V	–	–	9.0 V	○	–	○	–					–	–	–	3.6	5.5	–	Vp-p
ACC-I	ACC characteristics	25A	G SG.26 –20dB	12 V	–	9.0 V	–	–	–	4.5 V	–	–	9.0 V	○	–	○	–					–	–	–	–8	–3.8	0.5	dB
ACC-II			G SG.26 +6dB																					–3.0	0	3.0	
V_{ik}	Killer operation input level	G 21	G SG.26 Input vari-able	12 V	–	9.0 V	–	–	–	4.5 V	–	–	9.0 V	○	–	○	–					–	–	–	–59	–52	–46	dB
V_{ok}	Killer color residual	25A	G SG.29 0dB	12 V	–	9.0 V	–	–	–	9.0 V	–	–	9.0 V	○	–	○	–					–	–	–	–	15	35	mVp-p
C norm	Demodulation standard output	25A	G SG.26 0dB	12 V	–	9.0 V	–	–	–	4.5 V	–	–	9.0 V	○	–	○	–					–	–	–	1.0	1.7	2.4	Vp-p
$C_{u\ min}$	Color control characteristics I	25A	G SG.26 0dB	12 V	–	9.0 V	2.5 V	–	–	4.5 V	–	–	9.0 V	○	–	○	–					–	–	–	–62	–52	–46	dB
$C_{u\ max}$							6.5 V																	3.8	7.3	10.8	
$C_{s\ min}$	Color control characteristics II	25A	G SG.26 0dB	12 V	–	9.0 V	–	–	–	2.5 V	–	–	9.0 V	○	–	○	–					–	–	–	–48	–38	–30	dB
$C_{s\ max}$										6.5 V														1.7	5.2	8.7	
$f_{pc\ L}$	APC pull-in range	21 G	G SG.27 0dB	12 V	–	9.0 V	–	–	–	4.5 V	–	–	9.0 V	○	–	○	–					–	–	–	0.5	0.9	–	kHz
$f_{pc\ H}$																								0.5	0.9	–	
f_{pc}	Total APC range																							1.0	1.8	–	kHz
V_{23}	Demodulation output DC voltage	23A	–	12 V	–	9.0 V	–	–	–	4.5 V	–	–	9.0 V	○	–	○	–					–	○	–	4.6	5.0	5.4	V
V_{24}		24A																									
V_{25}		25A																									
V_{23-24}	Demodulation output DC offset voltage	–																						–0.3	0	0.3	V
V_{24-25}		–																									
V_{25-23}		–																									
CL_{B-Y}	Demodulation output carrier leak	25A	–	12 V	–	9.0 V	2.5 V	–	–	2.5 V	–	–	9.0 V	○	–	○		○	–	○	–	–	–	–	–	–	0.2	Vp-p
CL_{R-Y}		23A																									
CL_{G-Y}		24A																									

MITSUBISHI ELECTRIC

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input ( )	Test conditions ("–" in the table below denotes "OPEN".)																					Limits			Unit
				11A	16A	19	21	22A	29	36	38	39	40	S 19	S 19A	S 22	30	34	26	27	28	S 35	S 36	S 39	Min.	Typ.	Max.	
V_{21}	Terminal 21 voltage	21	G SG.26 0dB	12 V	–	9.0 V	M	–	–	4.5 V	–	–	9.0 V	○	–	○		○	–	○	–	–	–	–	4.2	4.6	5.0	V
V_{21k}		21	–																						–	0.1	0.35	
SS Y	Service switch operation	22	F SG.22	12 V	0 V	9.0 V	–	–	–	4.5 V	–	Vari-able	9.0 V	○	–	○									–	10	90	mVp-p
SS C		34	G SG.26 0dB																			–	○	–	–	10	90	mVp-p
SS V		16	–																						–	0	0.3	Vo-p
VMS	Video chroma mute switch operation	22	F SG.17	12 V	–	9.0 V	–	–	–	4.5 V	–	–	9.0 V	○	–	○						–	–	○	5.7	6.2	6.8	Vo-p
CMS R-Y		23A	G SG.26 0dB	12 V	–	9.0 V	–	–	–	4.5 V	–	–	9.0 V	○	–	○						–	–	○	–	10	90	mVp-p
CMS G-Y		24A																										
CMS B-Y		25A																										
$\frac{R-Y}{B-Y}$ -N	Demodulation ratio at NTSC action	23A 25A	G SG.31 0dB	12 V	–	9.0 V	–	–	2 V	4.5 V	–	–	–	○	–	○						○	–	–	0.6	0.9	1.2	–
$\frac{C-Y}{B-Y}$ -N		24A 25A																							0.1	0.3	0.5	
CR-Y-N	Demodulation angle at NTSC action	23A 25A	G SG.31 0dB	12 V	–	9.0 V	–	–	2 V	4.5 V	–	–	–	○		○						○	–	–	–	104	–	deg
CB-Y-N		24A 25A																							–	241	–	
T_{min}	NTSC TINT control characteristics	23A 25A	G SG.32 0dB	12 V	–	9.0 V	–	–	3.0 V 5.5 V	4.5 V	–	–	–	○	–	○			–	–	–	○	–	–	–	20	–	deg
T_{max}																									–	-80	–	
OS_R	On screen threshold voltage	23A	–	12 V	–	9.0 V	–	–	–	4.5 V	–	–	–	○	–	○	3.0 V	7.5 V			3.0 V	–	○	–	7.0	7.5	–	V
OS_G		24A																		3.0 V								
OS_B		25A																	3.0 V									

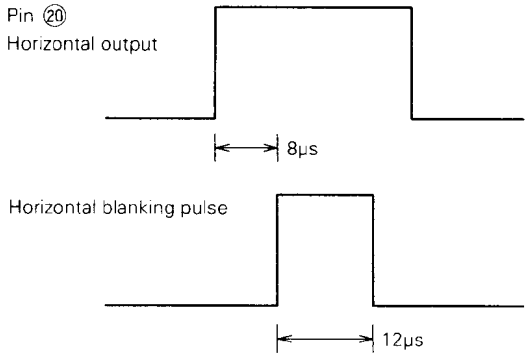
MITSUBISHI ELECTRIC

ELECTRICAL CHARACTERISTICS TEST METHOD

Note 1. Set SG to fo = 45.75MHz, 25m Vrms, CW. Adjust the voltage of pin ⑤ so that the voltage of pin ⑤1 is 1 (V) lower than in item "V51l." Set SG to fo = 45.75 MHz, 12.5m Vrms, CW. Test the voltage of pin ⑤1 and make it V51a.

$$LIN = \frac{V51l - V51a}{1(V)} \times 100(\%)$$

Note 2. Adjust the one-shot multivibrator's potentiometer so that the timing of the horizontal blanking pulse and pulse amplitude are as shown in the figure below.



Set to 8μs with the TTL IC M74LS221P's pin ⑮ potentiometer. Also set to 12μs with the pin ⑦ potentiometer.

Precautions When Testing Items Related to Chroma

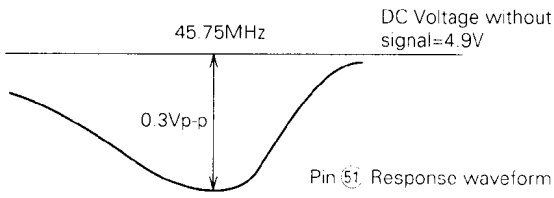
The conditions listed below are usually set when testing items related to chroma (Items C1 ~ C54).

1) Input signal SG.A into D input.
2) Turn switches S5, S11A, S12, S12A, S13, S20, and S44 on.

Coil and Potentiometer Adjustment

VIF/SIF Type Coil Adjustment

1. Set V_{BTH} test conditions described in item "V10."
2. Detune AFT coil.
3. Then adjust the applied voltage of pin ⑤ so that the tank response of pin ⑤1 is $0.3V_{P\text{-}P}$.
4. Adjust the DET coil so that the peak is 45.75 MHz.
   1) DC Voltage without Signal=4.9V
   2) Pin ⑤1 Response Waveform



5. Set μAFT test conditions of item "V22" and adjust the AFT coil so that the electric potential is 4.5V at 45.75 MHz as shown on the next page.

V8 Input Sensitivity "Vin min"

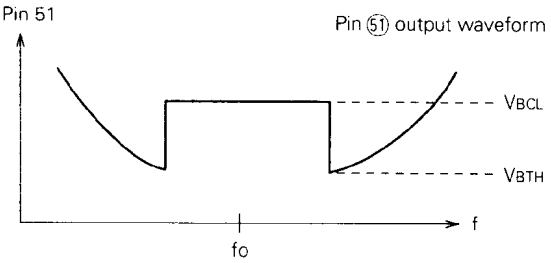
Expressed as input level 3 dB down from the test value of "video output signal voltage" as the level of SG.3 is decreased.

V9 Maximum Allowable Input "Vin max"

1. SG.4 is input as 90 dBμ.
2. Make V_A the output level of pin ⑤1 at this time.
3. Expressed as input level 3 dB down from output level of pin ⑤1 being V_A as the level of SG.4 is increased.

V10 Black Spot Noise Inverter "V_{BTH}, V_{BCL}"

1. Input SG.2 and adjust the applied voltage of pin 5 so that the voltage of pin ⑤1 is 2.5V.
2. Input SG.5 and test V_{BTH} and V_{BCL} as shown in the figure below.

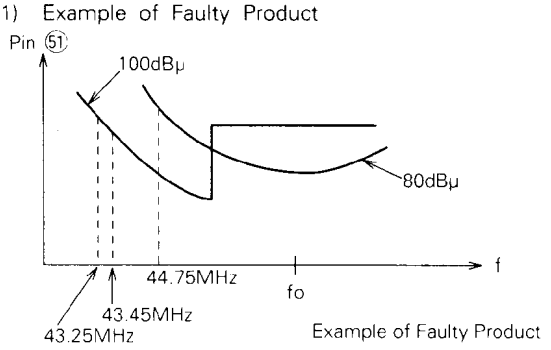


V11 Tank Response at Time of Large Input "TRA"

1. Input SG.2 and adjust the applied voltage of pin ⑤ so that the voltage of pin ⑤1 is 2.5V.
   (Apply the applied voltage of pin⑤when item V10 "Black Spot Inverter" was tested.)
2. Input SG.6, test the output voltage of pin ⑤1 and make it V_A.
3. Input SG.8, test the output voltage of pin ⑤1 and make it V_B.
4. Input SG.9, test the output voltage of pin ⑤1 and make it V_C.

Standard:The following is considered to be a faulty product. The tank response of a faulty product is given in the figure below.

1) Example of Faulty Product

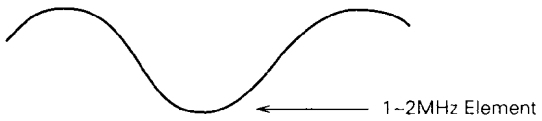


V12Tank Response "TR"

1. Input SG.2 and adjust the applied voltage of pin ⑤ so that the voltage of pin ㊶ is 2.5V.
   (Apply the applied voltage of pin⑤when item V10 "Black Spot Inverter" was tested.)
2. Input SG.6, test the output voltage of pin ㊶ and make it V_A.
   (Same V_A as tested in item V11 "Tank Response at Time of Large Input.")
3. Input SG.7, test the output voltage of pin ㊶ and make it V_B.
4. Standard value is expressed as TR = V_A - V_B.

V15Ringing "RG"

Test the p-p value via HPF of the 1~2MHz in the 16kHz low part of the pin ㊶ output signal as shown in the figure below.



V16Noise Canceller Level "V_{NC}"

Standard is expressed as V_{NC} = V_{51L} (sync signal tip voltage) – V_{BTH} (black spot noise inverter threshold voltage).

V17Sync Ratio "S/P"

1. Input SG1, test p-p value of the pin ㊶ output signal and make it V_A.
2. Input SG15, test p-p value of the pin ㊶ output signal and make it V_B.
3. Standard is expressed as $S/P = \frac{V_B}{V_A} \times 100$ [%]

V18Video Noise "S/N"

1. Input SG2 and test rms value of the ㊶ A output signal.
2. Standard is expressed as

$$S/N = 20 \log \frac{\text{V051 Test Value } (V_{p\text{-}p}) \times 10^3}{\text{Test Value (mVrms)}} \text{ [dB]}$$

S3 Limiting Sensitivity "LIM"

Decreasing the level of SG19, test the input level at test point 3 when the 400Hz element is 3 dB down from AF output "AF direct output signal voltage" V_{OAF}.

S4 AMR "AMR"

Test the 400Hz element at test point 3 and make it Vam. Standard is expressed as

$$AMR = 20 \log \frac{V_{OAF} \text{ (mVrms)}}{V_{am} \text{ (mVrms)}} \text{ [dB]}$$

S7 Maximum Attenuation "ATT"

1. Test 400Hz element at pin ④ output.
2. Standard Value $ATT = \frac{V_{04max}}{\text{Test Value}}$ [dB]

S8 AF Driver Gain "G_{AF}"

Expressed as $G_{AF} = 20 \log \frac{V_{04max}}{V_{OAF}}$ [dB]

S9 Sound S/N "S/N AF"

1. Test 20Hz~100kHz noise at pin ④ output.
2. Expressed as S/N AF = $20 \log \frac{V_{04max}}{\text{Test Value}}$ [dB]

S10AF Driver Pop Noise "N_{AFP}"

Test 20 times at 5ms amplitude.

DS1 Sync Separation Input Sensitivity Current "Iss"

The current value is expressed as the value of constant current source ISS where low electric potential (approx. 3V) can be obtained for pin ㊸ output as current of constant current source ISS is gradually increased.

DS2 Minimum Horizontal Sync Separation Input Voltage "H.SYNC min"

DS3 Minimum Vertical Sync Separation Input Voltage "V.SYNC min"

Expressed as input level where a high electrical potential can be obtained for pin ㊸ output as input level of SG.B or SG.E is gradually decreased. The reference level (0 dB) is 1Vp-p for both SG.B and SG.E.

DH3 Horizontal Oscillator Starting Voltage "V_{11} min"

Expressed as applied voltage of pin ⑪ where pin output waveform can be generated as the applied voltage of pin ⑪ is gradually increased from low voltage (approx. 3V).

DH4 Horizontal Pull-In Range "f_{PHL} f_{PHH}"

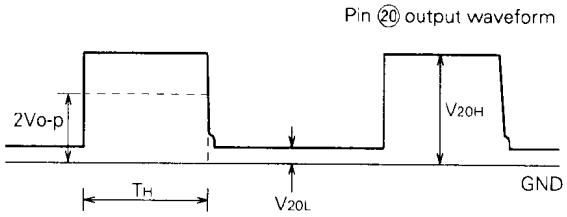
1. Decrease the frequency of input signal SG.B the proper amount and set while the input signal and output waveform of pin ⑳ are not in sync.
2. Next, gradually increase the input frequency and test the input signal frequency exactly when the input signal and output waveform of pin ⑳ become synchronized.
3. Perform in the same manner for pull-in range for upper side.
4. Expressed as difference from reference value of 15625 Hz.

DH5 Horizontal Output Maximum Voltage "V_{20H}"

DH6 Horizontal Output Minimum Voltage "V_{20L}"

DH7 Horizontal Output Pulse Amplitude "T_H"

V_{20H}, V_{20L}, and T_H are shown in the figure below.



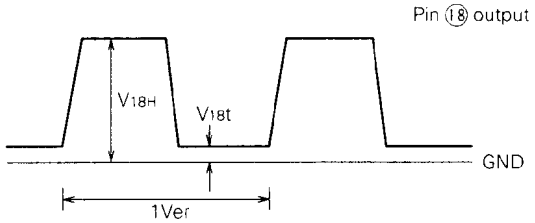
DH8 AFC Output Voltage "V_{AFC}"

Test p-p value of the pin ⑫ output waveform.

DV4 Vertical Output Maximum Voltage "V_{18H}"

DV5 Vertical Output Minimum Voltage "V_{18L}"

V_{18H} and V_{18L} are shown in the figure below.



DV6 Vertical Open Loop Gain "G_{VV}"

1. Input SG.C (2 kHz, 100m VP-P, CW) into pin ⑰ and test the output amplitude of pin ⑱.

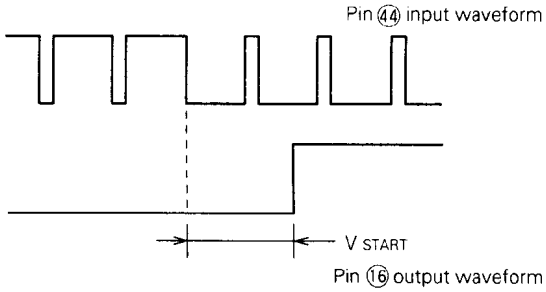
2. Standard Value = $20 \log \frac{\text{Pin 18 Output Amplitude}(mV_{p\text{-}p})}{100mV_{p\text{-}p}}$ [dB]

DV7 Vertical Oscillator Starting Voltage "V_{19min}"

Expressed as applied voltage of pin ⑲ where pin output waveform can be generated as the applied voltage of pin ⑲ is gradually increased from low voltage (approx. 3V).

DV8 Vertical Output Pulse Start Position "V_{START}"

"V_{START}" is shown in the figure below.



DV9 Minimum Vertical Sync Detection Amplitude "TV min"

Expressed as vertical sync signal amplitude of input signal where pin ⑯ output waveform can be generated as the vertical sync signal amplitude of SG.D is changed.

Y2 Maximum Output "Ymax"

Adjust applied voltage of pin ㊴ so that the DC potential of pin ㉒ is 4.5V.

Y3 Standard Gain "G_Y"

1. Adjust applied voltage of pin ㊴ so that the DC potential of pin ㉒ is 3.0V.
2. $G_Y = 20 \log \frac{\text{Test Value } mV_{p\text{-}p}}{200mVp\text{-}p}$ [dB]

Y4 Contrast Control Characteristics "GYmin GYmax"

1. Adjust applied voltage of pin ㊴ so that the DC potential of pin ㉒ is 3.0V.
   (Apply voltage of pin ㊴ described in item Y3.)
2. Change 36 applied voltage to 2.5V, 6.5V and make V_A and V_B the test values of pin ㉒ output signal.

3. $G_{Ymin} = 20 \log \frac{V_A\ (mV_{p\text{-}p})}{\text{GY Test Value}(mV_{p\text{-}p})}$ [dB]

$G_{Ymax} = 20 \log \frac{V_B\ (mV_{p\text{-}p})}{\text{GY Test Value}(mV_{p\text{-}p})}$ [dB]

Y7 Peaking Value "G_P"

1. Adjust applied voltage of pin ㊴ so that the DC potential of pin ㉒ is 3.0V.
   (Apply voltage of pin ㊴ described in item Y3.)
2. Make V_A the output signal voltage of pin ㉒ at time of SG.H input, and make V_B the output signal voltage of pin ㉒ at time of SG.J input.

3. $Gp = 20 \log \frac{V_B}{V_A}$ [dB]

Y8 Video Tone Control Characteristics "G_T norm, $G_{T\ min}$, $G_{T\ max}$)

1. Adjust applied voltage of pin ㊴ so that the DC potential of pin ㉒ is 3.0V.
   (Apply voltage of pin ㊴ described in item Y3.)
2. Change(40) applied voltage to 4.5V, 6.5V, 2.5V and make V_A, V_B, and V_C the output signal voltages of pin ㉒.
3. $G_{T\ min}=20 \log \frac{V_B}{V_A}$ [dB], $G_{T\ max}=20 \log \frac{V_C}{V_A}$ [dB],

   G_{Tnorm} (dB) is the amount of change with V_B when G_P was tested in item Y7.

Y9 Frequency Characteristics "$f_{B(Y)}$"

1. Adjust applied voltage of pin ㊴ so that the DC potential of pin ㉒ is 3.0V.
   (Apply voltage of pin ㊴ described in item Y3.)
2. Test the frequency of SG.K 3 dB down from the V_A value when G_P was tested in item Y3.

Y10 Differential Gain "DG_Y"

1. Adjust applied voltage of pin ㊴, change DC potential of pin ㉒ to 4.0V and 2.0V, and make V_A and V_B the output signal voltages of pin ㉒.

2. $DGY=\frac{[V_A-V_B]}{V_B} \times 100\%$

Y12 Vertical Blanking Voltage "$V_{BLK\ V}$"

Y15 DC Playback Ratio Adjustability Characteristic "VDC REG"

1. Make V_A the output pedestal electrical potential of pin ㉒ when S42 is off, and make V_B the output pedestal electrical potential of pin ㉒ when S42 is on.
   2.YDC REG=V_A–V_B[V]

Y14 Horizontal Blanking Threshold Voltage "$V_{BLK\ H}$"

1. In order to facilitate testing, apply 3.0V of applied voltage to pin ㊴ so that scanning period potential of pin ㉒ decreases.
2. Expressed as electric potential of pin ㉒ where no 25A output signal is obtained while gradually increasing the 22A applied voltage.

C2 Chroma Maximum Gain "G_C"

1. Set SG.L to –26dB (Burst:2.5m$V_{p\text{-}p}$, Chroma:5.0m$V_{p\text{-}p}$) and test the output signal voltage of pin ㉞.

2. $G_C=20 \log \frac{\text{Test Value (m}V_{p\text{-}p})}{5\text{m}V_{p\text{-}p}}$ [dB]

C3 ACC Characteristics "ACC-I, ACC-II"

1. Change the SG.L input level to 0, –20, +6dB and make pin 25A output signal voltages V_A, V_B, and V_C respectively.

2. ACC-I=$20 \log \frac{V_B}{V_A}$ [dB], ACC-II=$20 \log \frac{V_C}{V_A}$ [dB]

C4 Killer Operation Input Level "V_{ik}"

Expressed as the input level where direct current voltage of pin ㉑ becomes low when SG.L input level is decreased.

C5 Killer Color Residual "V_{ok}"

Input SG.Q and test output signal voltage of pin ㉕A.

C6 Chroma Normal Output "C_{norm}"

Input SG.L and test the output signal voltage of pin 25A when pin ㊱ applied voltage is 4.5V.

C7 Color Control Characteristics I "$C_{S\ min}$ $C_{S\ max}$"

1. Change applied voltage of pin ㉑ to 2.5V, 6.5V and make V_A and V_B the output signal voltages of pin 25A.

2. $C_{S\ min}=20 \log \frac{V_A}{C_{norm}\ \text{Test Value}}$ [dB],

   $C_{S\ max}=20 \log \frac{V_B}{C_{norm}\ \text{Test Value}}$ [dB]

C8 Color Control Characteristics II "$C_{U\ min}$, $C_{U\ max}$"

1. Change pin ㊱ applied voltage to 2.5V, 6.5V and make V_A and V_B the output signal voltages of pin ㉕A.

2. $C_{U\ min}=20 \log \frac{V_A}{C_{norm}\ \text{Test Value}}$ [dB],

   $C_{U\ max}=20 \log \frac{V_B}{C_{norm}\ \text{Test Value}}$ [dB]

C9 APC Pull-In Range "$f_{PC\ L}$, $f_{PC\ H}$"

1. Input SG.M, increase burst and chroma frequency (f_{SB} =f_{SC}) the proper amount and set so that the DC voltage of pin ㉑ is low.
2. Test the input frequency where the DC voltage of pin ㉑ changes from low to high (≈4.5) while gradually increasing the frequency.
3. Test upper side pull-in frequency in the same manner.
4. Standard value is expressed as difference from reference value 3.579545MHz.

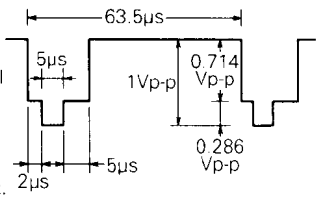
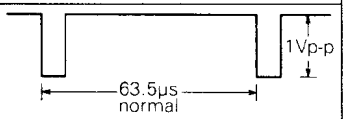
C10Total APC Range "f_{PC}"

$f_{PC}=|f_{PCL}|+f_{PCH}$ [kHz]

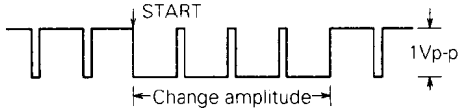
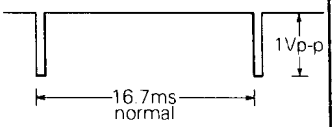
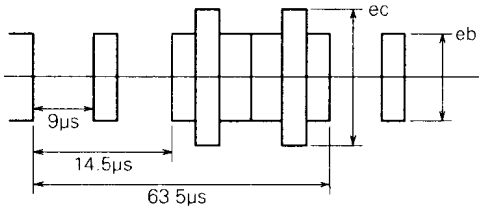
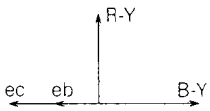
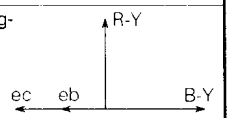
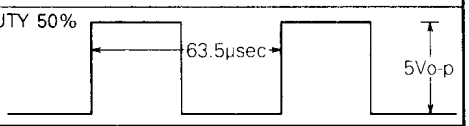
C23Chroma CW Phase Difference "ϕ_{CW}"

1. Carry out item 1 of item C22 "Phase Alteration by Color Control."
2. Apply input signal the contains 90° phase in relation to burst and make the deviation from reference phase the standard value of ϕ_{CW}.

INPUT SIGNAL

SG. No.	Signals (50Ω termination)
SG. 1	fo = 45.75MHz, 90dBμ, fm = 16kHz, AM77.8%
SG. 2	fo = 45.75MHz, 80dBμ, CW
SG. 3	fo = 45.75MHz, CW, Adjustable Level
SG. 4	fo = 45.75MHz, fm = 16kHz, AM16.0%, Adjustable Level
SG. 5	fo = 45.75MHz ± 5MHz, 80dBμ, Sweep signal
SG. 6	fo = 44.75MHz, 80dBμ, CW
SG. 7	fo = 46.75MHz, 80dBμ, CW
SG. 8	fo = 43.25MHz, 100dBμ, CW
SG. 9	fo = 43.45MHz, 100dBμ, CW
SG. 10	f1 = 45.75MHz, 90dBμ, CW f2 = 40 ± 5MHz, 70dBμ, CW } mixed signal
SG. 11	f1 = 45.75MHz, 90dBμ, CW f2 = 42.17MHz, 70dBμ, CW f3 = 41.25MHz, 70dBμ, CW } mixed signal
SG. 12	fo = 45.75MHz, 110dBμ, CW
SG. 13	fo = 45.75MHz, 60dBμ, CW
SG. 14	fo = 45.75MHz, 89dBμ
SG. 15	fo = 45.75MHz, 92dBμ, fm = 16kHz, AM16.0%
SG. 16	f1 = 45.75MHz, 90dBμ, CW f2 = 41.25MHz, 70dBμ, CW } mixed signal
SG. 17	fo = 4.5MHz, 90dBμ, fm = 400Hz, FM ± 25kHz dev.
SG. 18	fo = 45.75MHz, 90dBμ, 10-Stage Wave, 87.5% TV Modulation (fsc = 4.43MHz)
SG. 19	fo = 4.5MHz, fm = 400Hz, FM ± 25kHz dev. Adjustable Level
SG. 20	fo = 4.5MHz, 90dBμ, fm = 400Hz, AM30%
SG. 21	fo = 4.5MHz, 90dBμ, CW
SG. 22	f1 = 45.75MHz, 90dBμ, fm = 16kHz, AM77.8% f2 = 41.25MHz, 70dBμ, CW } mixed signal
SG. 23	f1 = 45.75MHz, 90dBμ, fm = 16kHz, AM77.8% f2 = 41.25MHz, 50dBμ, CW } mixed signal
SG. 24	fo = 45.75MHz, 90dBμ, CW
SG. 25	fo = 45.75MHz, 84dBμ, CW
SG. 26	fo = 400Hz, 20mVp-p, CW
SG. 27	fo = 40.75MHz 80dBμ, CW
SG. 28	fo = 40.75MHz 45dBμ, CW
SG. A	Make input for sync separation NTSC system APL 100% normal video signal shown in the figure on the right. Vertical must be interlaced at 50Hz. 
SG. B	Horizontal sync signal duty 92% input level and sync are adjustable. 
SG. C	f = 2kHz, 100mVp-p, CW

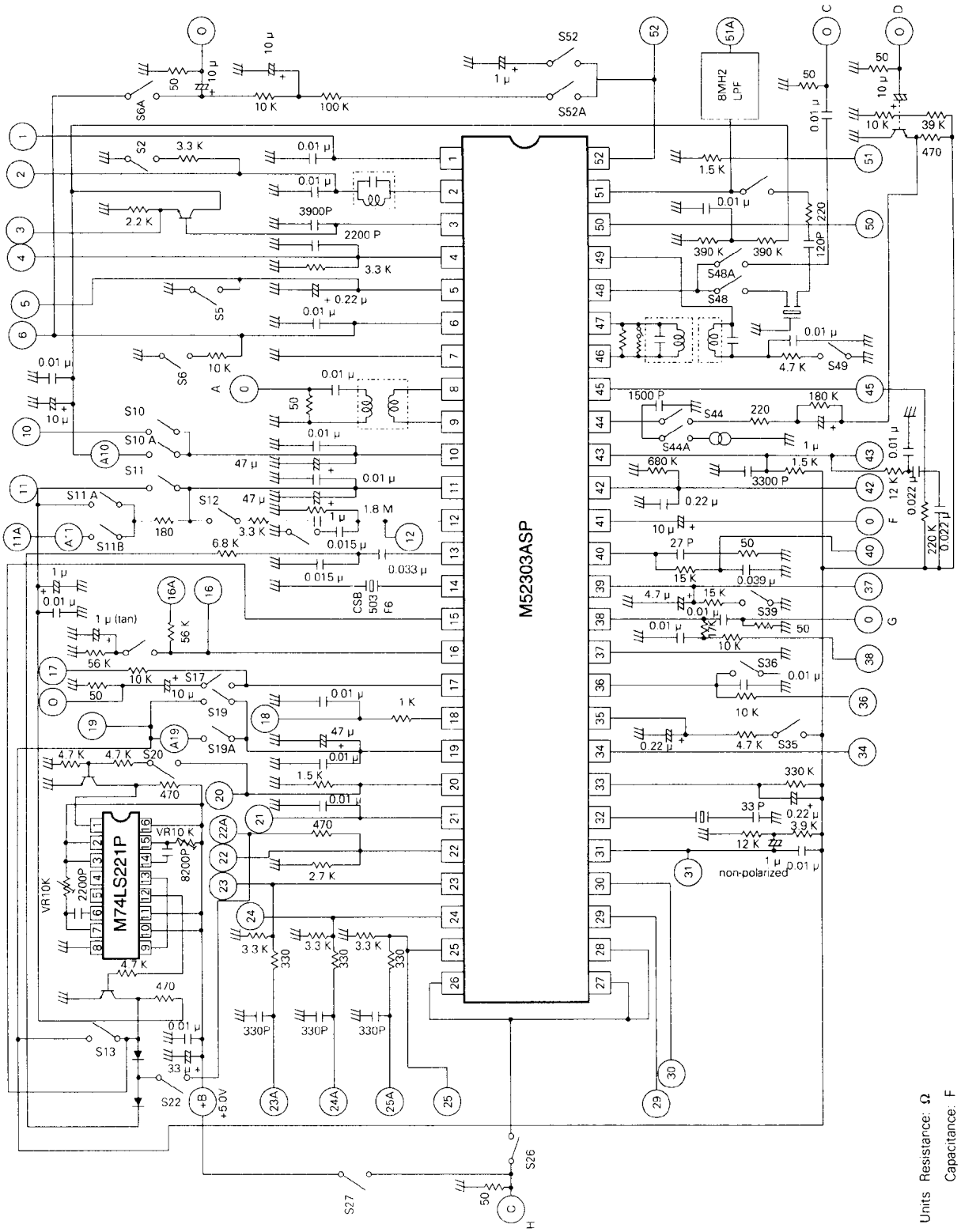
INPUT SIGNAL

SG. No.	Signals (50Ω termination)
SG. D	Change SGA vertical sync signal amplitude. Start position does not change. 
SG. E	Vertical Sync Signal Vertical sync signal duty 92% input level and sync are adjustable. 
SG. F	f = 200kHz, 2Vp-p, CW
SG. G	f = 200kHz, 200mVp-p, CW
SG. H	f = 200kHz, 100mVp-p, CW
SG. J	f = 3MHz, 100mVp-p, CW
SG. K	f = 3MHz~10MHz adjustable, 100mVp-p, CW
SG. L	NTSC Chroma Signal  fSB: Frequency of Burst Signal fSC: Frequency of Chroma Signal fSB = fSC = 3.579545MHz 0dB: eb = 50mVp-p ec = 100mVp-p
SG. M	With NTSC simple chroma signals for SG.L, the phase of burst and chroma signals should be the same and the frequency should be adjustable.
SG. P	f = 3.68MHz, CW, Adjustable Level
SG. Q	With NTSC simple chroma signals for SG.L, signal where: burst signal Ib = 0mVp-p, chroma signal amplitude Ic = 100mVp-p.
SG. R	f = 3~5MHz, CW, 0.3Vp-p
SG. S	With NTSC simple chroma signals for SG.L, fSB (Burst) = 3.579545MHz fSC (Chroma) = 3.68MHz Signal where phase correlation is such as shown in the figure below. 
SG. T	With NTSC simple chroma signals for SG.L, signal where phase correlation is such as shown in the figure on the right. 
SG. U	DUTY 50% 

M52303ASP

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

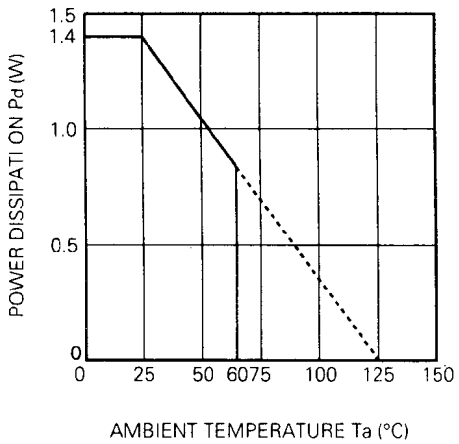
TEST CIRCUIT



MITSUBISHI ELECTRIC

TYPICAL CHARACTERISTICS

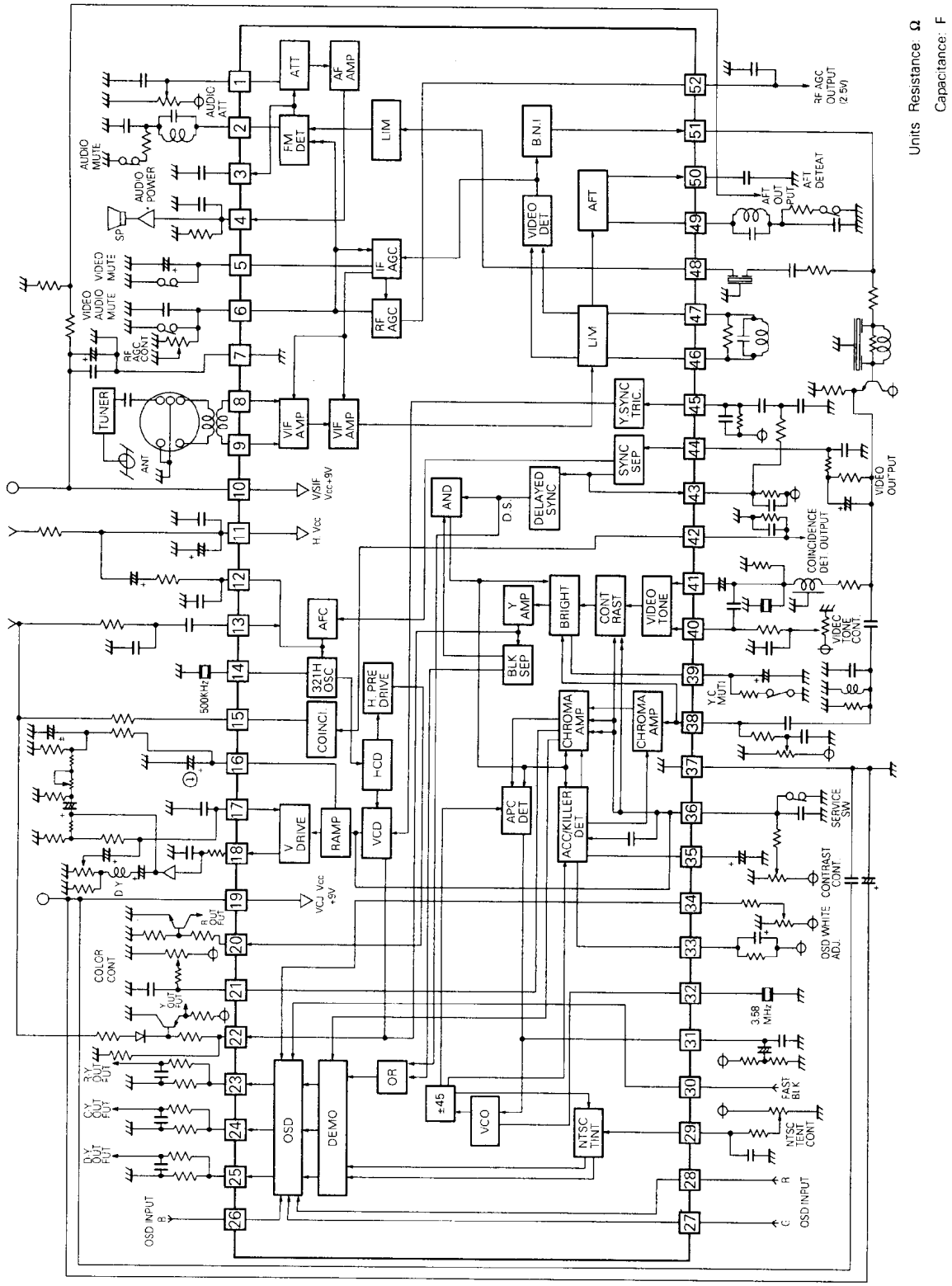
THERMAL DERATING (MAXIMUM RATING)



M52303ASP

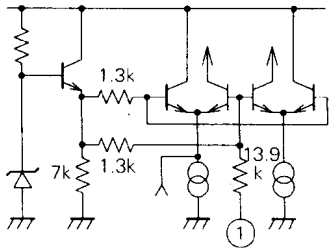
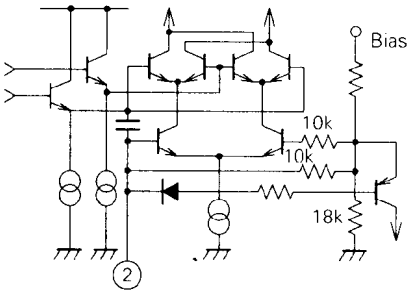
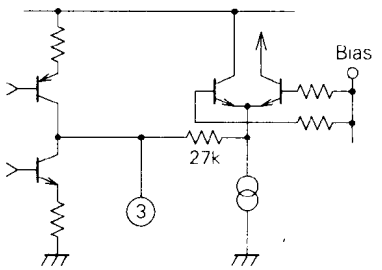
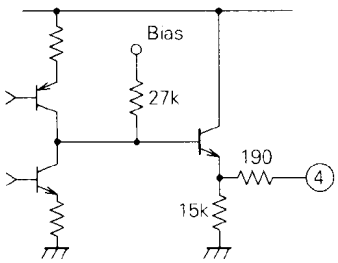
NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

APPLICATION EXAMPLE

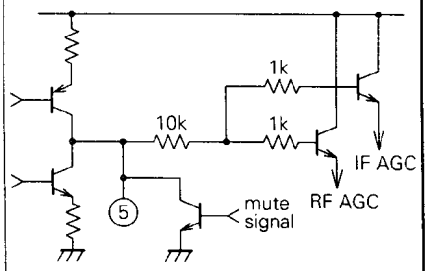
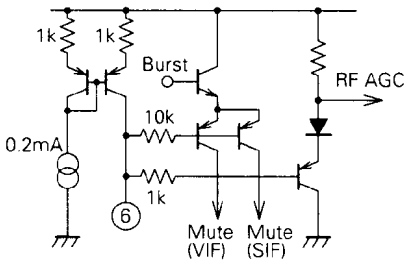
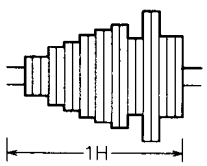
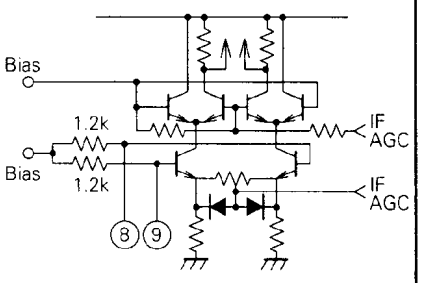


MITSUBISHI ELECTRIC

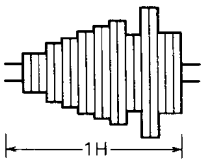
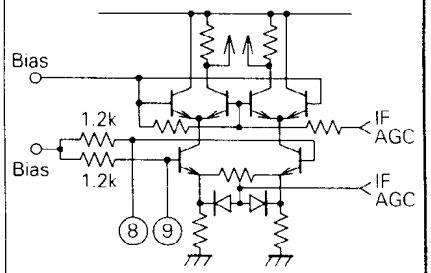
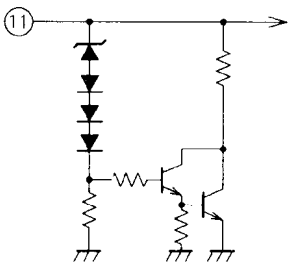
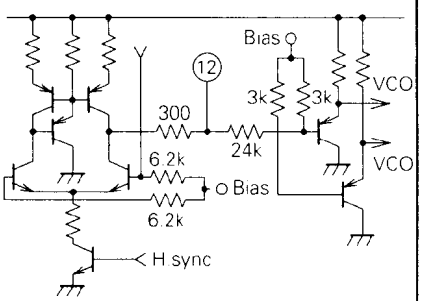
DESCRIPTION OF PIN

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
①	ATT	DC5.3	
②	SOUND DET COIL	DC 3.5 AC 250	
③	SOUND DET OUT	DC 4.6 AC 2100	
④	AF OUT	DC 3.9 AC 1600	

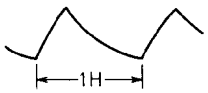
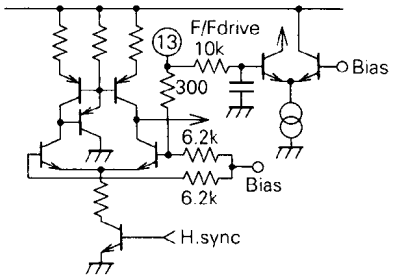
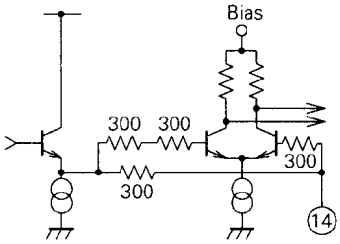
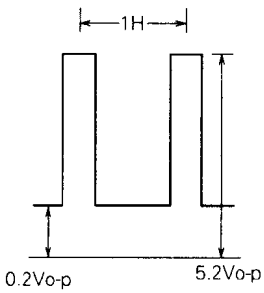
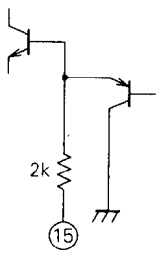
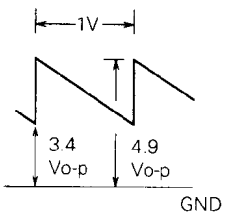
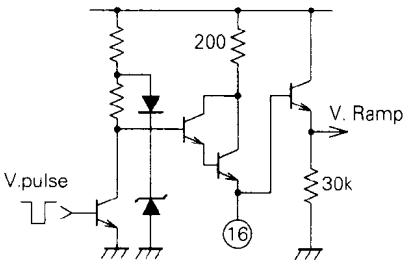
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
⑤	IF AGC FILTER	DC 4.1	
⑥	RF AGC DELAY ADJ.	DC 2.0	
⑦	GND – 1 (VIF SIF)		
⑧	VIF IN	DC 2.35 AC 89 	

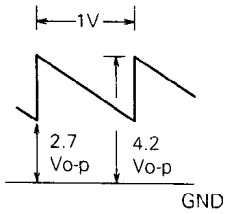
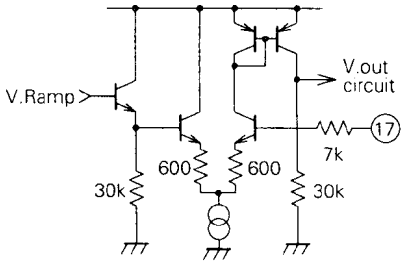
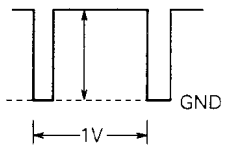
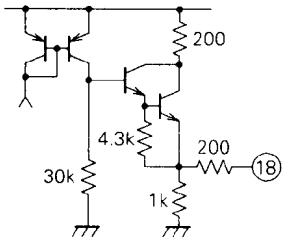
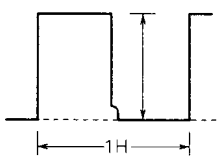
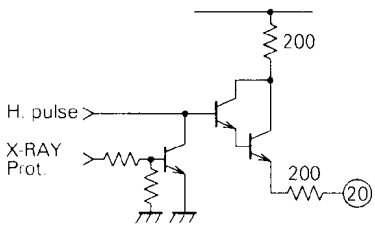
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
⑨	VIF IN	DC 2.35 AC 89 	
⑩	Vcc – 1 (VIF SIF)	Vcc 9.0	
⑪	H. Vcc	Vcc 9.0	
⑫	AFC FILTER	DC6.3	

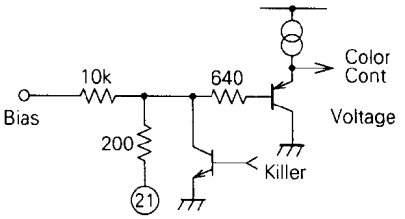
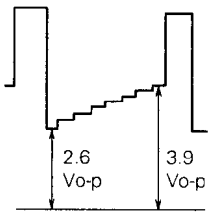
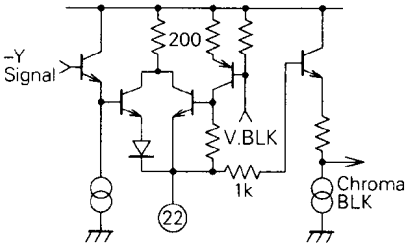
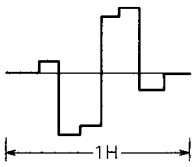
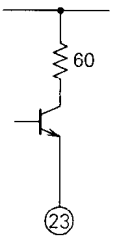
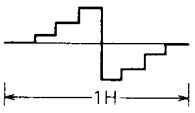
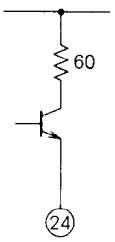
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
⑬	AFC FBP IN	DC 3.0 AC 1100 	
⑭	32th OSC	DC 3.7 AC 310 	
⑮	FBP IN		
⑯	RAMP	AC 1500 	

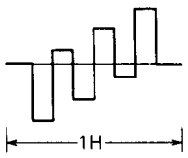
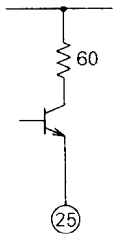
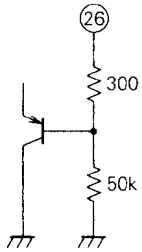
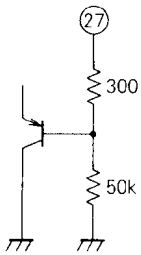
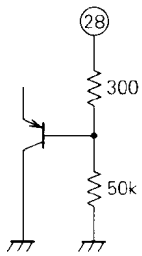
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
⑰	V. FB	AC 1500 	
⑱	V. OUT	AC 750Vo-p 	
⑲	Vcc – 2 (VCJ)	Vcc 9.0	
⑳	H. OUT	AC 3400mVo-p 	

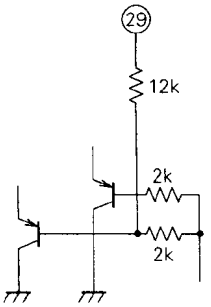
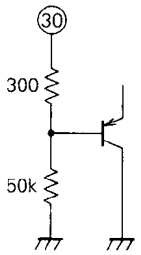
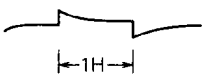
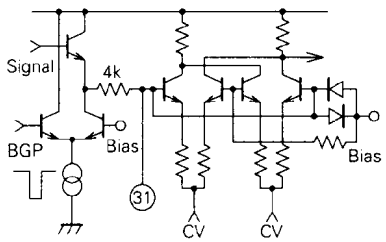
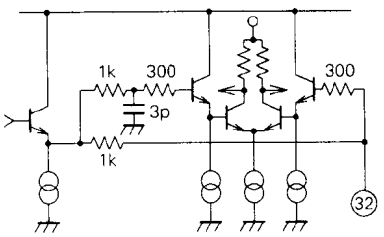
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
㉑	COLOR CONT.	DC 4.5	
㉒	– Y OUT		
㉓	R – Y OUT	DC 5.25 AC 1300 	
㉔	G – Y OUT	DC 5.25 AC 750 	

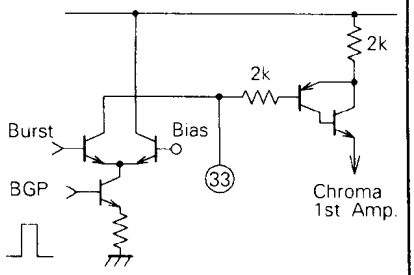
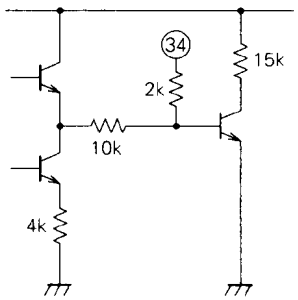
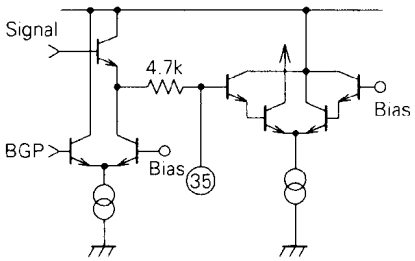
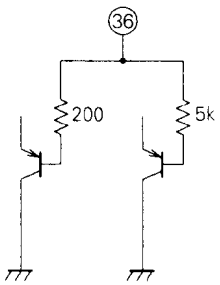
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
㉕	B - Y OUT	DC 5.25 AC 1600 	
㉖	OSD B		
㉗	OSD G		
㉘	OSD R		

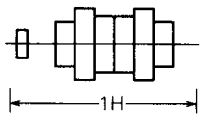
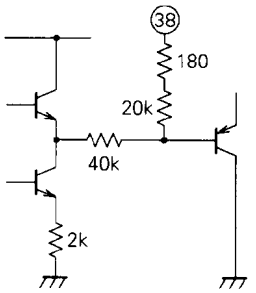
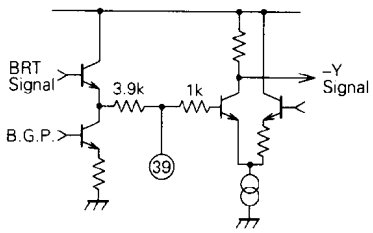
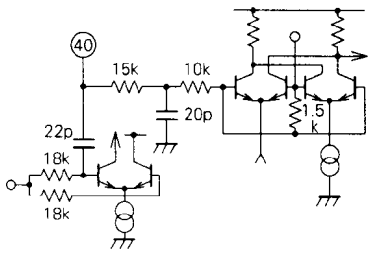
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
㉙	TINT. CONT.	DC 4.5V	
㉚	FAST BLK IN		
㉛	APC FILTER	DC 6.8 AC 60 	
㉜	CHROMA OSC		

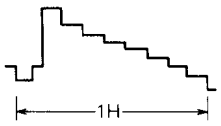
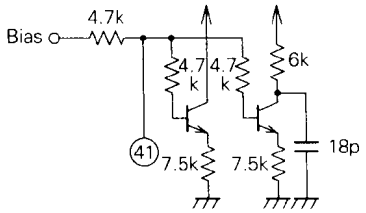
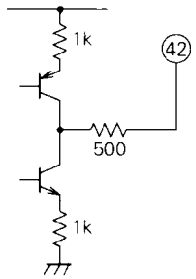
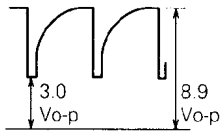
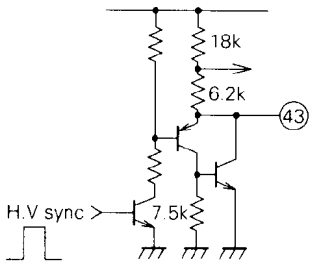
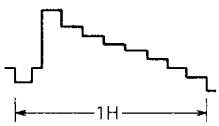
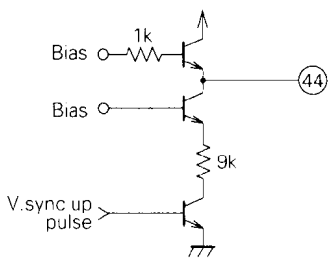
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
㉝	ACC FILTER	DC 8.0	
㉞	WHITE ADJ.	DC 8.0V	
㉟	KILLER FILTER	DC 6.9	
㊱	CONTRAST CONT.	DC 4.5V	

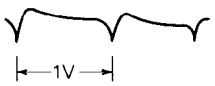
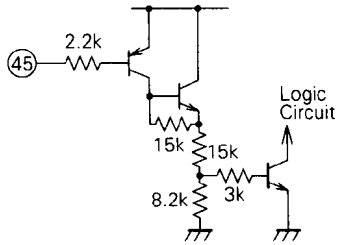
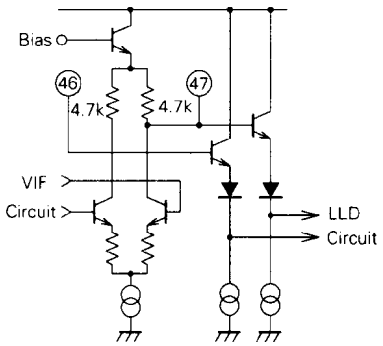
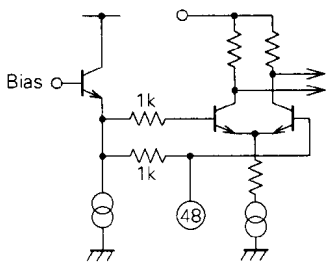
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
㊲	GND – 2 (VCJ)		
㊳	CHROMA IN/BRIGHT	DC 4.5V DC 4.5V AC Burst 50 AC Chroma 100 	
㊴	PEDESTAL CLAMP		
㊵	VIDEO TONE CONT.	DC 4.5	

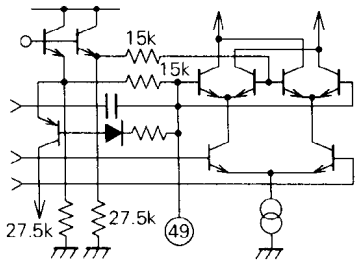
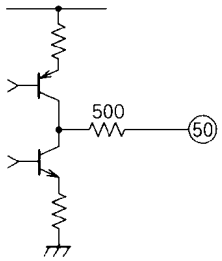
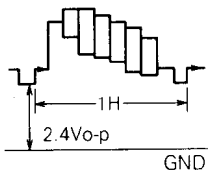
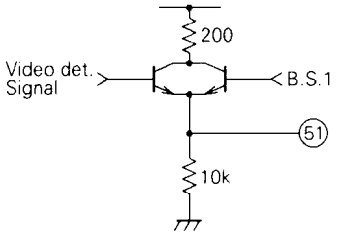
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
㊶	Y IN	DC 1.5 AC 500 	
㊷	COINCIDE – – NCE OUT		
㊸	SYNC OUT		
㊹	SYNC IN	DC 6.7 AC 700 	

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
㊺	V. SYNC IN	DC 9.0 AC 1600 	
㊻	VIDEO DET COIL	DC 4.8	
㊼	VIDEO DET COIL		
㊽	SIF IN	DC 2.7 AC 89 f_0 = 5.5MHz	

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins
㊾	AFT COIL	DC 5.3	
㊿	AFT OUT	DC 3.3	
(51)	VIDEO OUT	AC 2000 	
(52)	RF AGC OUT	DC 0