M52339ASP

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION

The M52339ASP semiconductor integrated circuit has all necessary functions to process NTSC color TV signals. This single chip is able to handle video intermediate frequency, sound intermediate frequency, video signals, color signals, on-screen character indication signals, and deflection signals. A streamlined NTSC color TV set can be produced by combining this IC with a simple output stage including a tuner and transistor.

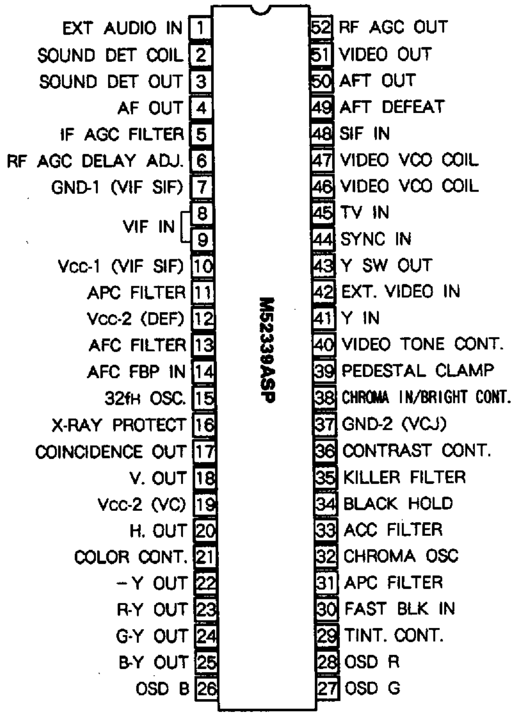
FEATURES

- This IC itself is relatively large, simplifying TV set construction, improving reliability, and saving energy.
- A completely synchronous detection circuit with a phase-locked loop is used as the video detector, ensuring excellent performance in differential gain control, differential phase control, beat frequency (920kHz) control, and cross-color prevention.
- A quadrature detection circuit is provided as the sound intermediate frequency modulation detector, reducing the number of externally connected circuits and improving linearity.
- Automatic fine-tuning (AFT) control has no coil.
- Able to perform "AFT defeat," video muting and sound muting.
- Horizontal oscillation is obtained by "counting down" horizontal frequency that is amplified 32 times by ceramic oscillator. No adjustment is necessary for horizontal free-run frequency.
- Vertical oscillation is obtained by counting down the horizontal frequency that is generated by "horizontal countdown." This frequency is amplified twice. No adjustment is necessary for vertical synchronous frequency.
- Double automatic frequency control is used in the horizontal output circuit, minimizing horizontal jitter in the weak electric field and image warping due to irregularity in brightness.

  Thanks to a synchronous detection circuit, signals can be used for detection in sound muting and automatic channel selection.
- Black exipansion circuit is built in.
- Y-delay line circuit is built in.
- On-screen character indication circuit is built in.

  Image quality, contrast, brightness, color saturation, tint and sound volume are controlled independently with DC voltage.

PIN CONFIGURATION (TOP VIEW)



Outline 52P4B

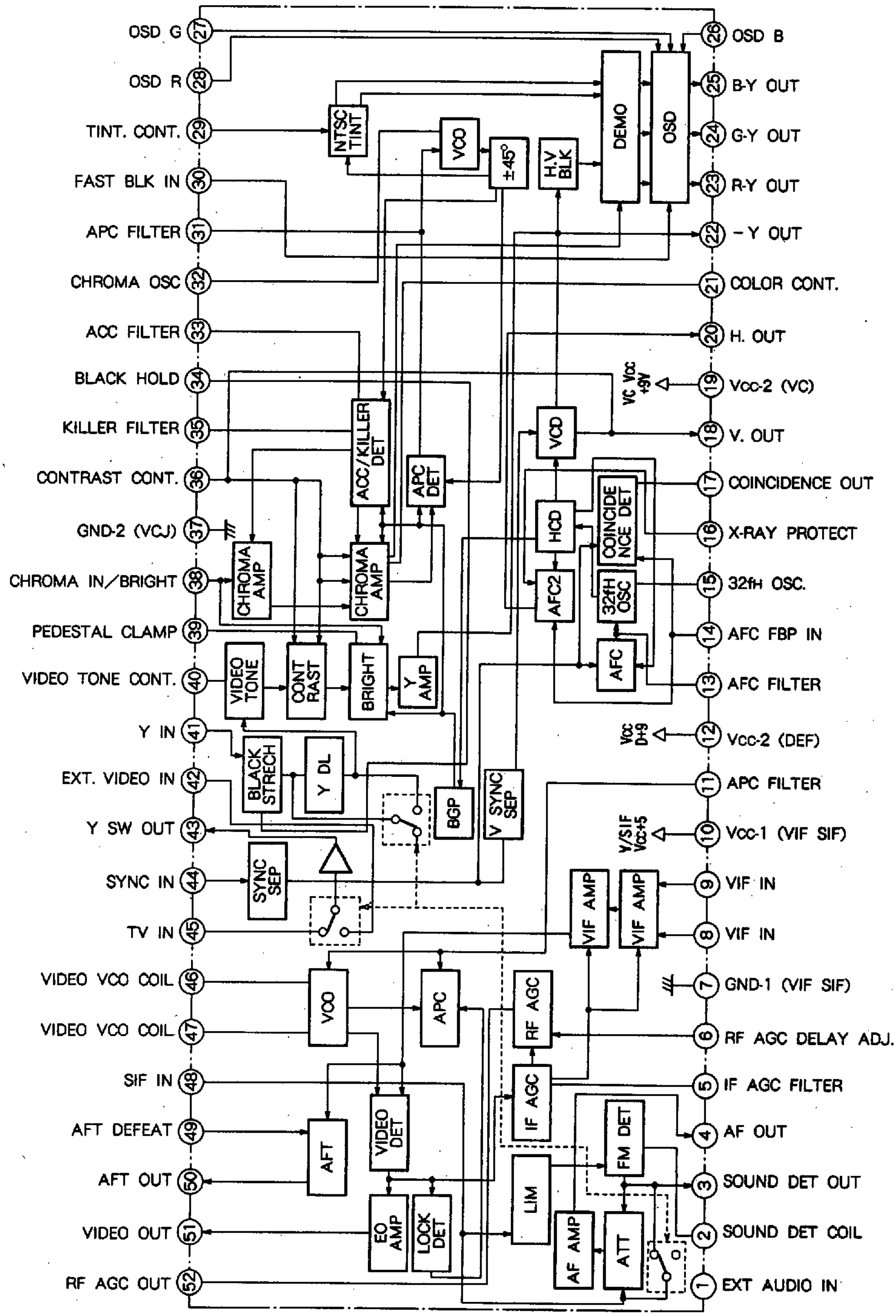
APPLICATION

NTSC system color TV sets

RECOMMENDED OPERATING CONDITION

Supply voltage range 5V, 9V
Rated supply voltage .... 4.5~5.5V, 8.5~9.5V
Maximum output current .... 3.0mA(pin⑱) 6.0mA(pin⑳)

BLOCK DIAGRAM



MITSUBISHI ELECTRIC

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ABSOLUTE MAXIMUM RATINGS

(Vss = 0V)

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	5.0~9.0	V
P_d	Power dissipation	1.35	W
T_{opr}	Operating temperature	−20~+65	℃
T_{stg}	Storage temperature	−40~+150	℃

ELECTRICAL CHARACTERISTICS (Ta = 25℃ unless otherwise noted)

Symbol	Parameter	Test point	Input	Test conditions*																						Limits			Unit
				2A	5	6	48	Vcc 10	Vcc 12	Vcc 19	S2	S2A	S5	S10	S10A	S12	S19	S48	S48A	S49	S51	S52	S16			Min.	Typ.	Max.	
Icc 10	Circuit current	A10	−	−	−	−	−	5.0V	9.0V	9.0V	−	−	−	−	ON	ON	ON	−	−	1	−	ON	−			29	38	47	mA
V_{51}	Video output DC voltage	51	−	−	−	−	−	5.0V	9.0V	−	ON	−	ON	ON	−	ON	−	−	−	2	−	ON	−			3.0	3.3	3.7	V
V_{O51}	Video detection output	51	A SG.1	−	−	−	−	5.0V	9.0V	−	ON	−	−	ON	−	ON	−	−	−	2	−	ON	−			1.2	1.4	1.6	V_{P-P}
V_{51L}	Sync signal peak voltage	51	A SG.2	−	−	−	−	5.0V	9.0V	−	ON	−	−	ON	−	ON	−	−	−	2	−	ON	−			1.5	1.75	1.95	V
Vin min	Input sensitivity	51A	A SG.3	−	−	−	−	5.0V	9.0V	−	ON	−	−	ON	−	ON	−	−	−	2	−	ON	−			−	48	55	dBμ
Vin max	Maximum allowable input	51A	A SG.4	−	−	−	−	5.0V	9.0V	−	ON	−	−	ON	−	ON	−	−	−	2	−	ON	−			101	107	−	dBμ
BW	Video frequency characteristic	51	A SG.10	−	−	−	−	5.0V	9.0V	−	ON	−	−	ON	−	ON	−	−	−	2	−	ON	−			5.0	6.5	−	MHz
IM	Intermodulation	51	A SG.11	−	Variable	−	−	5.0V	9.0V	−	ON	−	−	ON	−	ON	−	−	−	2	−	ON	−			30	35	−	dB
S/N	Video S/N	51A	A SG.2	−	−	−	−	5.0V	9.0V	−	ON	−	−	ON	−	ON	−	−	−	2	−	ON	−			50	55	−	dB
V_{50H}	AFT output maximum voltage	50	A SG.6	−	−	−	−	5.0V	9.0V	−	ON	−	−	ON	−	ON	−	−	−	1	−	ON	−			8.3	8.7	−	V
V_{50L}	AFT output minimum voltage	50	A SG.7	−	−	−	−	5.0V	9.0V	−	ON	−	−	ON	−	ON	−	−	−	1	−	ON	−			−	0.3	0.7	V
μAFT	AFT sensitivity	50	A SG.5	−	−	−	−	5.0V	9.0V	−	ON	−	−	ON	−	ON	−	−	−	1	−	ON	−			55	75	95	mV/kHz
V_{50D1}	AFT defeat voltage 1	50	−	−	−	−	−	5.0V	9.0V	−	ON	−	−	ON	−	ON	−	−	−	1	−	ON	−			4.25	4.4	4.55	V
V_{50D2}	AFT defeat voltage 2	50	A SG.14	−	−	−	−	5.0V	9.0V	−	ON	−	−	ON	−	ON	−	−	−	1	−	ON	−			4.25	4.4	4.55	V
V_{50D3}	AFT defeat voltage 3	50	A SG.1	−	−	−	−	5.0V	9.0V	−	ON	−	−	ON	−	ON	−	−	−	2	−	ON	−			4.25	4.4	4.55	V

* : "−" = OPEN

Symbol	Parameter	Test point	Input	Test conditions*																						Limits			Unit
				2A	5	6	48	Vcc 10	Vcc 12	Vcc 19	S2	S2A	S5	S5A	S10	S10A	S12	S19	S48	S48A	S49	S51	S52	S16		Min.	Typ.	Max.	
V_{50M}	AFT mute input level	A 50	A SG.1 variable	−	−	−	−	5.0V	9.0V	−	ON	−	−	−	ON	−	ON	ON	−	−	1	−	ON	−		45	50	55	dBμ
V_{52H}	RF AGC maximum voltage	52	A SG.2	−	−	2.0V	−	5.0V	9.0V	−	ON	−	−	−	ON	−	ON	ON	−	−	2	−	ON	−		7.8	8.8	−	V
V_{52L}	RF AGC minimum voltage	52	A SG.2	−	−	4.0V	−	5.0V	9.0V	−	ON	−	−	−	ON	−	ON	ON	−	−	2	−	ON	−		−	0.1	0.3	V

* : "−" = OPEN

ELECTRICAL CHARACTERISTICS (Ta = 25℃ unless otherwise noted) (Cont.)

Symbol	Parameter	Test point	Input	Test conditions*																						Limits			Unit
				2A	5	6	48	Vcc10	Vcc12	S2	S2A	S2B	S5	S5A	S10	S10A	S12	S48	S48A	S49	S51	S52	S16			Min.	Typ.	Max.	
V_3	AF direct output DC voltage	3	–	–	–	–	–	5.0V	9.0V	–	–	–	ON	–	ON	–	ON	ON	–	2	–	ON	–			3.3	3.8	4.3	V
V_{OAF}	AF direct output signal voltage	3	C SG.17	–	–	–	–	5.0V	9.0V	–	–	–	ON	–	ON	–	ON	ON	–	2	–	ON	–			250	295	340	mVrms
LIM	Limiting sensitivity	3	C SG.19	–	–	–	–	5.0V	9.0V	–	–	–	ON	–	ON	–	ON	ON	–	2	–	ON	–			–	49	55	dBμ
AMR	AMR	3	C SG.20	–	–	–	–	5.0V	9.0V	–	–	–	ON	–	ON	–	ON	ON	–	2	–	ON	–			44	55	–	dB
V_{O4}	AF driver output	4	C SG.17	–	–	–	–	5.0V	9.0V	–	–	–	ON	–	ON	–	ON	ON	–	2	–	ON	–			250	295	340	mVrms
V_{O4max}	AF driver maximum output	4	C SG.17	–	–	–	9.0V	5.0V	9.0V	–	–	–	ON	–	ON	–	ON	ON	–	2	–	ON	–			490	590	720	mVrms
ATT	Maximum attenuation	4	C SG.17	–	–	–	1.0V	5.0V	9.0V	–	–	–	ON	–	ON	–	ON	ON	–	2	–	ON	–			70	75	–	dB
G_{AF}	AF driver gain	4																					–			4.5	6.0	7.5	dB
S/N_{AF}	Sound S/N	4	C SG.21	–	–	–	9.0V	5.0V	9.0V	–	–	–	ON	–	ON	–	ON	ON	–	2	–	ON	–			60	66	–	dB
S_{TH}	Sound switching threshold voltage	4	C SG.17	1.1V	–	–	9.0V	5.0V	9.0V	ON	–	–	ON	–	ON	–	ON	ON	–	2	–	ON	–			–	0.4	1.0	mVrms
THD_{AF}	AF driver maximum output distortion rate	4	C SG.17	–	–	–	9.0V	5.0V	9.0V	–	–	–	ON	–	ON	–	ON	ON	–	2	–	ON	–			–	1.0	3.0	%
V_{48}	Pin㊽ voltage	48	–	–	–	–	M	5.0V	9.0V	–	–	–	ON	–	ON	–	ON	ON	–	2	–	ON	–			3.8	4.4	5.0	V
V_{OEXT}	Output signal voltage with input from outside	4	B SG.23	0V	–	–	9.0V	5.0V	9.0V	ON	–	–	ON	–	ON	–	ON	–	–	2	–	ON	–			580	710	830	mVrms
V_2	Pin② voltage	2	–	–	–	–	–	5.0V	9.0V	–	ON	–	ON	–	ON	–	ON	–	–	2	–	ON	–			2.2	2.5	2.9	V

* : "–" = OPEN

Symbol	Parameter	Test point	Input	Test conditions*																										Limits			Unit
				Vcc10	Vcc12	Vcc19	S5	S10	S12	S12A	S13	S14	S16	S19	S19A	S20	S22	S26	S27	S28	S31	S34	S35	S36	S39	S39A	S44	S44A	SD	Min.	Typ.	Max.	
Iss	Sync separation input sensitivity current	Iss 20	Iss variable	–	9.0V	–	ON	–	ON	–	–	–	ON	–	–	–	–	–	–	–	–	2	–	–	–	–	–	ON	1	0.05	0.1	0.2	mA
I_{CC12}	H. Vcc inflow current	A12	–	5.0V	9.0V	9.0V	ON	–	–	ON	ON	–	ON	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	1	16	21	26	mA
f_H	Horizontal free-run frequency	20	–	–	9.0V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	15.2	15.8	16.4	kHz
V_{12min}	Horizontal oscillation starting voltage	12 20	–	–	9.0V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	–	6.5	7.5	V
f_{PHL}	Horizontal pull-in range 1	E 20	D SG.B	–	9.0V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	−400	−450	–	Hz
f_{PHH}	Horizontal pull-in range 2	E 20	f variable	–	9.0V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	+400	+450	–	Hz
V_{20H}	Horizontal output maximum voltage	20	D SG.B	–	9.0V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	3.0	3.65	4.65	V_{O-P}
V_{20L}	Horizontal output minimum voltage	20	D SG.B	–	9.0V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	–	0	0.3	V_{O-P}
T_H	Horizontal output pulse width	20	D SG.B	–	9.0V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	21	24	29	μs
V_{RPO}	Overvoltage detection operating voltage	16 20	–	–	9.0V	–		–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	0.61	0.71	0.81	V

* : "–" = OPEN

ELECTRICAL CHARACTERISTICS (Ta = 25℃ unless otherwise noted) (Cont.)

Symbol	Parameter	Test point	Input	Test conditions*																										Limits			Unit
				Vcc 10	Vcc 12	Vcc 19	S 5	S 10	S 12	S 12A	S 13	S 14	S 16	S 19	S 19A	S 20	S 22	S 26	S 27	S 28	S 31	S 34	S 35	S 36	S 39	S 39A	S 44	S 44A	SD	Min.	Typ.	Max.	
f_{V60}	Vertical free-run frequency 60	18	D SG.B	–	9.0 V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	53.4	55	57.6	Hz
f_{PV60}	Vertical pull-in frequency 60	18	D SG. E f variable	–	9.0 V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	64.9	67.5	70	Hz
V_{18H}	Vertical output maximum voltage	18	D SG.A	–	9.0 V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	7.0	8.0	9.0	V_{O-P}
V_{18L}	Vertical output minimum voltage	18	D SG.A	–	9.0 V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	–	–	0.55	V_{O-P}
T_{V60}	Vertical output pulse width	18	D SG.A	–	9.0 V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	494	544	594	μs
V_{17H}	Coincidence output maximum voltage	17	D SG.B	–	9.0 V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	7.7	8.5	–	V
V_{17L}	Coincidence output minimum voltage	17	D SG. B f=17kHz	–	9.0 V	–	ON	–	ON	–	ON	ON	ON	–	–	ON	–	–	–	–	–	2	ON	–	–	–	ON	–	1	–	0.33	0.5	V

* : "–" = OPEN

Symbol	Parameter	Test point	Input	Test conditions*																										Limits			Unit
				Vcc 10	Vcc 12	Vcc 19	2 A	26	27	28	30	36	38	40	S 2	S 10	S 12	S 19	S 19A	S 20	S 22	S 26	S 27	S 28	S 34	S 35	S 36	S 39	S 39A	Min.	Typ.	Max.	
I_{CC19}	Circuit current	A19	–	5.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	–	–	–	ON	ON	–	ON	ON	ON	–	–	–	2	ON	–	–	–	48	58	68	mA
Ymax	Maximum output	22	F SG.F +6dB	5.0 V	9.0 V	9.0 V	–	–	–	–	–	9.0 V	–	9.0 V	–	ON	ON	ON	–	ON	–	–	–	–	2	–	–	–	–	5.4	6.4	–	V_{P-P}
GY	Reference gain	22	F SG.G	5.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	–	9.0 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	7.0	11.0	15.0	dB
GYmin	Contrast control characteristic 1	22	F SG.G	5.0 V	9.0 V	9.0 V	–	–	–	–	–	3.0 V	5.1 V	9.0 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	–	–	−35	dB
GYmax	Contrast control characteristic 2	22	F SG.G	5.0 V	9.0 V	9.0 V	–	–	–	–	–	9.0 V	5.1 V	9.0 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	2.5	6.0	8.5	dB
$V_{BRTnorm}$	Brightness control characteristic 1	22	D SG.A	5.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	5.0 V	9.0 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	3.3	3.6	3.9	V_{P-P}
V_{BRTL}	Brightness control characteristic 2	22	D SG.A	5.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	3.0 V	9.0 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	1.3	1.6	1.9	V_{O-P}
V_{BRTH}	Brightness control characteristic 3	22	D SG.A	5.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	7.0 V	9.0 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	5.3	5.6	5.9	V_{O-P}
G_{Tnorm}	Video tone control characteristic 1	22	F SG.J	5.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	–	4.5 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	−1.2	−0.5	1.0	dB
G_{Tmin}	Video tone control characteristic 2	22	F SG.J	5.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	–	0 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	−4.8	−8.3	−11.8	dB
G_{Tmax}	Video tone control characteristic 3	22	F SG.J	5.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	–	9.0 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	1.2	4.2	7.2	dB
$f_{B(Y)}$	Frequency characteristic	22	F SG.K	5.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	–	–	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	5.0	8.0	–	MHz
V_{40}	Pin㊵ voltage	40	–	5.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	–	M	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	4.05	4.3	4.55	V
V_{BLKV}	Vertical blanking	22	–	5.0 V	9.0 V	9.0 V	–	–	–	–	–	3.0 V	–	9.0 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	7.0	7.4	–	V_{O-P}
V_{BLKTV}	Vertical blanking pulse width	22	–	5.0 V	9.0 V	9.0 V	–	–	–	–	–	3.0 V	–	9.0 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	1.31	1.38	1.44	ms
H_{BLKH}	Horizontal blanking threshold voltage	22 25A	E SG.P 0.5V_{P-P}	5.0 V	9.0 V	9.0 V	–	–	–	–	–	3.0 V	–	9.0 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	ON	–	–	–	6.9	7.1	–	V_{O-P}
Y_{DL1}	Y delay 1	22 41	F SG.T	5.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	–	9.0 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	225	260	295	ns

* : "–" = OPEN

ELECTRICAL CHARACTERISTICS (Ta = 25℃ unless otherwise noted) (Cont.)

Symbol	Parameter	Test point	Input	Test conditions*																										Limits			Unit
				Vcc 10	Vcc 12	Vcc 19	2 A	26	27	28	30	36	38	40	S 2	S 10	S 12	S 19	S 19 A	S 20	S 22	S 26	S 27	S 28	S 34	S 35	S 36	S 39	S 39 A	Min.	Typ.	Max.	
Y_{DL2}	Y delay 2	22 41	F SG.T	5.0 V	9.0 V	9.0 V	4.0 V	–	–	–	–	5.1 V	–	9.0 V	–	ON	ON	ON	–	ON	ON	–	–	–	2	–	–	–	–	120	140	160	ns
BS	Black expansion threshold voltage 1	22	F SG.U variable	5.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	–	9.0 V	–	ON	ON	ON	–	ON	ON	–	–	–	1↓2	–	–	–	–	30	50	70	IRE
AV_{TH}	AV SW switching threshold voltage	43	H SG.G	5.0 V	9.0 V	9.0 V	2.1↓1.0 V	–	–	–	–	5.1 V	–	9.0 V	–	ON	ON	ON	–	–	–	–	–	–	2	–	–	–	–	1.0	1.5	2.1	V
AV_{TV}	AV SW TV output signal voltage	43	H SG.F –6dB	5.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	–	9.0 V	–	ON	ON	ON	–	–	–	–	–	–	2	–	–	–	–	0.85	1.0	1.15	V_{P-P}
AV_{EXT}	AV SW EXT output signal voltage	43	H SG.F –6dB	5.0 V	9.0 V	9.0 V	1.1 V	–	–	–	–	5.1 V	–	9.0 V	–	ON	ON	ON	–	–	–	–	–	–	2	–	–	–	–	0.85	1.0	1.15	V_{P-P}

∗ : "–" = OPEN

Symbol	Parameter	Test point	Input	Test conditions*																									Limits			Unit
				Vcc 10	Vcc 12	Vcc 19	21	26	27	28	29	30	36	38	40	S 10	S 12	S 19	S 22	S 26	S 27	S 28	S 31	S 34	S 35	S 36	S 39		Min.	Typ.	Max.	
Cmax	Chroma maximum output	25A	E SG.L 0dB	5.0 V	9.0 V	9.0 V	9.0 V	–	–	–	–	–	9.0 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	–	–		3.2	4.7	6.2	V_{P-P}
ACC – 1	ACC characteristic 1	25A	E SG.L –20dB	5.0 V	9.0 V	9.0 V	4.6 V	–	–	–	–	–	5.1 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	–	–		–5.0	–1.0	0	dB
ACC – 2	ACC characteristic 2	25A	E SG.L +6dB	5.0 V	9.0 V	9.0 V	4.6 V	–	–	–	–	–	5.1 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	–	–		–3.0	0	+3.0	dB
Vik	Killer operating level	G 25A	E SG.L variable	5.0 V	9.0 V	9.0 V	4.6 V	–	–	–	–	–	5.1 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	–	–		–4.8	–41	–35	dB
Vok	Remaining color after killer operation	25A	E SG.Q 0dB	5.0 V	9.0 V	9.0 V	4.6 V	–	–	–	–	–	9.0 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	–	–		–	15	35	mV_{P-P}
Cnorm	Chroma reference output	25A	E SG.L 0dB	5.0 V	9.0 V	9.0 V	4.6 V	–	–	–	–	–	5.1 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	–	–		1.0	1.45	1.85	V_{P-P}
Csmin	Color control characteristic 1	25A	E SG.L 0dB	5.0 V	9.0 V	9.0 V	0 V	–	–	–	–	–	5.1 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	–	–		–	–40	–30	dB
Csmax	Color control characteristic 2	25A	E SG.L 0dB	5.0 V	9.0 V	9.0 V	9.0 V	–	–	–	–	–	5.1 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	–	–		3.8	7.3	10.8	dB
Cumin	Color tracking characteristic 1	25A	E SG.L 0dB	5.0 V	9.0 V	9.0 V	4.6 V	–	–	–	–	–	3.0 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	–	–		–48	–38	–30	dB
Cumax	Color tracking characteristic 2	25A	E SG.L 0dB	5.0 V	9.0 V	9.0 V	4.6 V	–	–	–	–	–	9.0 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	–	–		1.7	5.2	8.7	dB
f_{PCL}	APC pull-in range 1	21 G	E SG.M 0dB	5.0 V	9.0 V	9.0 V	4.6 V	–	–	–	–	–	5.1 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	–	–		–0.3	–0.7	–	kHz
f_{PCH}	APC pull-in range 2	21 G	E SG.M 0dB	5.0 V	9.0 V	9.0 V	4.6 V	–	–	–	–	–	5.1 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	–	–		+0.3	+0.7	–	kHz
f_{PC}	Total APC pull-in range																												0.6	1.4	–	kHz
V23	Demodulation output DC voltage 1	23A	–	5.0 V	9.0 V	9.0 V	4.6 V	–	–	–	–	–	5.1 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	ON	–		5.0	5.4	5.8	V
V24	Demodulation output DC voltage 2	24A	–	5.0 V	9.0 V	9.0 V	4.6 V	–	–	–	–	–	5.1 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	ON	–		5.0	5.4	5.8	V
V25	Demodulation output DC voltage 3	25A	–	5.0 V	9.0 V	9.0 V	4.6 V	–	–	–	–	–	5.1 V	–	9.0 V	ON	ON	ON	ON	–	–	–	–	2	–	ON	–		5.0	5.4	5.8	V
V23-24	Demodulation output DC offset voltage 1		–																										–0.3	0	+0.3	V
V24-25	Demodulation output DC offset voltage 2		–																										–0.3	0	+0.3	V
V25-23	Demodulation output DC offset voltage 3		–																										–0.3	0	+0.3	V

∗ : "–" = OPEN

ELECTRICAL CHARACTERISTICS (Ta = 25℃ unless otherwise noted) (Cont.)

Symbol	Parameter	Test point	Input	Test conditions*																								Limits			Unit
				Vcc 10	Vcc 12	Vcc 19	21	26	27	28	29	30	36	38	40	S 10	S 12	S 19	S 22	S 26	S 27	S 28	S 31	S 34	S 35	S 36	S 39	Min.	Typ.	Max.	
CL_{B-Y}	Demodulation output carrier leak 1	25A	E SG.L 0dB	5.0V	9.0V	9.0V	4.6V	–	–	–	–	–	5.1V	–	9.0V	ON	ON	ON	ON	–	–	–	–	2	–	–	–	–	–	0.2	V_{P-P}
CL_{R-Y}	Demodulation output carrier leak 2	23A	E SG.L 0dB	5.0V	9.0V	9.0V	4.6V	–	–	–	–	–	5.1V	–	9.0V	ON	ON	ON	ON	–	–	–	–	2	–	–	–	–	–	0.2	V_{P-P}
CL_{G-Y}	Demodulation output carrier leak 3	24A	E SG.L 0dB	5.0V	9.0V	9.0V	4.6V	–	–	–	–	–	5.1V	–	9.0V	ON	ON	ON	ON	–	–	–	–	2	–	–	–	–	–	0.2	V_{P-P}
V_{21}	Pin ㉑ voltage	21	E SG.L 0dB	5.0V	9.0V	9.0V	M	–	–	–	–	–	5.1V	–	9.0V	ON	ON	ON	ON	–	–	–	–	2	–	–	–	4.2	4.6	5.0	V
SSY	Service switch operation 1	22	F SG.G	5.0V	9.0V	9.0V	4.6V	–	–	–	–	–	5.1V	–	9.0V	ON	ON	ON	ON	–	–	–	–	2	–	ON	–	–	10	90	mV_{P-P}
SSC	Service switch operation 2	34	E SG.L 0dB	5.0V	9.0V	9.0V	4.6V	–	–	–	–	–	5.1V	–	9.0V	ON	ON	ON	ON	–	–	–	–	2	–	ON	–	–	10	90	mV_{P-P}
SSV	Service switch operation 3	18	–	5.0V	9.0V	9.0V	4.6V	–	–	–	–	–	5.1V	–	9.0V	ON	ON	ON	ON	–	–	–	–	2	–	ON	–	–	8.1	9.0	V_{O-P}
$\frac{R-Y}{B-Y}$-N	NTSC demodulation ratio 1	23A 25A	E SG.L 0dB	5.0V	9.0V	9.0V	4.6V	–	–	–	2.0V	–	5.1V	–	9.0V	ON	ON	ON	ON	–	–	–	–	2	ON	–	–	0.83	0.9	0.97	–
$\frac{G-Y}{B-Y}$-N	NTSC demodulation ratio 2	24A 25A	E SG.L 0dB	5.0V	9.0V	9.0V	4.6V	–	–	–	2.0V	–	5.1V	–	9.0V	ON	ON	ON	ON	–	–	–	–	2	ON	–	–	0.24	0.3	0.35	–
∠R-Y-N	NTSC demodulation angle 1	23A 25A	E SG.S 0dB	5.0V	9.0V	9.0V	4.6V	–	–	–	2.0V	–	5.1V	–	9.0V	ON	ON	ON	ON	–	–	–	–	2	ON	–	–	–	104	–	deg
∠G-Y-N	NTSC demodulation angle 2	24A 25A	E SG.S 0dB	5.0V	9.0V	9.0V	4.6V	–	–	–	2.0V	–	5.1V	–	9.0V	ON	ON	ON	ON	–	–	–	–	2	ON	–	–	–	241	–	deg
Tmin	Tint control characteristic 1	23A 25A	E SG.M 0dB	5.0V	9.0V	9.0V	4.6V	–	–	–	0V	–	5.1V	–	9.0V	ON	ON	ON	ON	–	–	–	–	2	ON	–	–	+35	+45	+65	deg
Tmax	Tint control characteristic 2	23A 25A	E SG.M 0dB	5.0V	9.0V	9.0V	4.6V	–	–	–	9.0V	–	5.1V	–	9.0V	ON	ON	ON	ON	–	–	–	–	2	ON	–	–	−65	−45	−35	deg
OSR	On-screen threshold voltage 1	23A	–	5.0V	9.0V	9.0V	4.6V	–	–	–	–	3.0V	5.1V	–	9.0V	ON	ON	ON	ON	ON	ON	–	–	2	–	ON	–	7.0	7.5	–	V
OSG	On-screen threshold voltage 2	24A	–	5.0V	9.0V	9.0V	4.6V	–	–	–	–	3.0V	5.1V	–	9.0V	ON	ON	ON	ON	ON	ON	–	–	2	–	ON	–	7.0	7.5	–	V
OSB	On-screen threshold voltage 3	25A	–	5.0V	9.0V	9.0V	4.6V	–	–	–	–	3.0V	5.1V	–	9.0V	ON	ON	ON	ON	ON	ON	–	–	2	–	ON	–	7.0	7.5	–	V

* : "–" = OPEN

ELECTRICAL CHARACTERISTICS TEST METHOD

V_{51} Video output DC voltage
Measure pin(51) output voltage when there is no input.

V_{O51} Video detection output
1. Input SG. 1 (90dBμ).
2. Measure pin(51) output amplitude.

Vin min Input sensitivity
1. Diminish SG. 3 input gtadually, and read the input when the output amplitude is 3dB less than V_{O51} (measured value).

Vin max Maximum allowable input
1. Input SG. 4 (90dBμ).
2. Read the pin(51) output level (V_A).
3. Increase SG. 4 input gradually, and read the input when pin(51) output is 3dB less than V_A.

$$\text{Vin max} = 20 \log \frac{\text{Measured value}}{V_A} \text{ (dB)}$$

BW Video frequency characteristic
1. Input SG. 10, and adjust f_2 until pin(51) starts outputting 1MHz beat elements.
2. Raise the f_2 frequency, and read it when the f_2 frequency is 3dB less than the 1MHz elements.
BW = (Frequency smaller than 1MHz element by 3dB) − 58.75MHz (MHz)

IM Intermodulation
1. Input SG. 11, and apply voltage to pin⑤ so that the pin (51) output will become as shown in the diagram.
2. Calculate the difference in the pin(51) output level between at 920kHz and at 3.58MHz.

$$\text{IM} = 20 \log \frac{\text{920kHz element}}{\text{3.58MHz}} \text{ (dB)}$$

S/N Video S/N
1. Input SG. 2, and measure the pin(51) output signal root-mean-square value.
2. Reference S/N

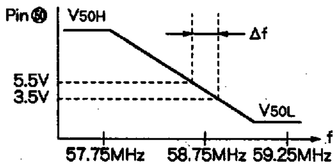
$$\text{S/N} = 20 \log \frac{V_{O51} \text{ measured value } (V_{P-P}) \times 10^3 \times 0.7}{\text{Measured value (mVrms)}} \text{ (dB)}$$

V_{50H} AFT output maximum voltage

V_{50L} AFT output minimum voltage

μAFT AFT sensitivity

V_{50H} and V_{50L} are as shown below. The μAFT calculation formula is also given below.



$$\text{Reference } \mu\text{AFT} = \frac{(5.5 - 3.5) \times 10^3 \text{mV}}{\Delta \text{ fkHz}} \text{ (mV/kHz)}$$

V_{50D1}, V_{50D2}, V_{50D3} AFT defeat voltage 1, 2, 3
Make sure that the pin(50) output is 4.4V under the following conditions : no signal, fo minus 2.5MHz, fo plus 1MHz, and defeat SW.

V_{50M} AFT mute input level
1. Input SG. 1 (80dBμ), and reduce the input gradually.
2. Read the input when the pin(50) voltage reaches the "center" (4.4V).

V_{52H} RF AGC maximum voltage
1. Input SG. 11, and apply 2.0V to pin⑥.
2. Measure pin(52) voltage.

V_{52L} RF AGC minimum voltage
1. Input SG. 10, and apply 4.0V to pin⑥.
2. Measure pin(52) voltage.

LIM Limiting sensitivity
Decrease SG. 19 input gradually, and read it at test point 3 when the 400Hz element is 3dB less than AF direct signal voltage V_{OAF} (parameter S2).

AMR
Measure the 400Hz element at test point 3. The reading is called Vam.
The reference AMR value can be calculated as follows :

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

ATT Maximum attenuation
1. Measure the 400Hz at pin④ output.
2. The reference ATT value can be calculated as follows :

$$\text{ATT} = 20 \log \frac{V_{O4max}}{\text{Measured value}} \text{ (dB)}$$

G_{AF} AF driver gain
Can be calculated as follows :

$$GAF = 20\ \log \frac{V_{O4}max}{V_{OAF}}\ (dB)$$

S/N_{AF} Sound S/N

1. Measure pin④ output noise in a frequency range between 20Hz and 100Hz.
2. Sound S/N can be calculatd as follows :

$$S/N_{AF} = 20\ \log \frac{V_{O4}max}{\text{Measured value}}\ (dB)$$

S_{TH} Sound switching threshold voltage
Input SG. 17, and measure pin④ output when AVSW is set to EXT (2A = 1.1V).

I_{SS} Sync separation input sensitivity current
Increase rated current supply Iss, and read the amperage when pin⑳ output horizontal frequency is "pulled in" from the free-run frequency.

$V_{12}min$ Horizontal oscillation starting voltage
Apply voltage of approximately 3V to pin⑫, and increase it gradually. Read the voltage when pin⑳ starts generating horizontal oscillation waveform. (Approx. 15kHz.)

f_{PHL} Horizontal pull-in range 1

f_{PHH} Horizontal pull-in range 2

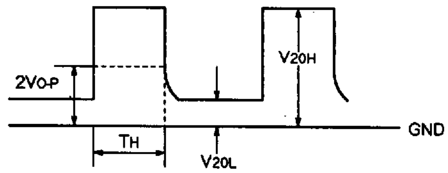
1. Reduce input signal SG. B frequency for input waveform and pin⑳ output waveform to become unsynchronous.
2. Increase input frequency, and measure it at the moment when input waveform and pin⑳ output waveform become synchronous. This lower pull-in frequency is called f_{PHL}.
3. Measure the upper pull-in frequency by the same procedure (f_{PHH}).
4. Calculate the difference between the measured values and reference value (15.734kHz).

V_{20H} Horizontal output maximum voltage

V_{20L} Horizontal output maximum voltage

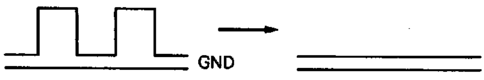
T_H Horizontal output pulse width

V_{20H}, V_{20L} and T_H are as indicated below :



Pin⑳ output waveform

T_{PRO} Overvoltage detection operating voltage
Increase voltage input to pin⑱ gradually. Read the voltage when the pin⑳ output waveform becomes as shown below :



"Open" voltage input to pin⑱, and check that the condition as shown above is maintained.

f_{PV60} Vertical pull-in range

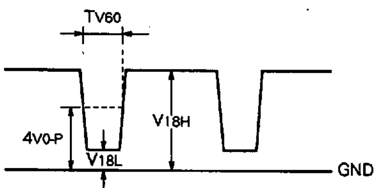
1. Raise input signal SG. E frequency for the input signal and pin⑱ output waveform to become unsynchronous.
2. Decrease the input frequency gradually, and read the frequency when input signal and pin⑱ output waveform become synchronous.

V_{18H} Vertical output maximum voltage

V_{18L} Vertical output minimum voltage

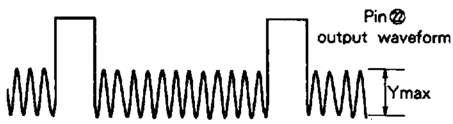
T_{V60} Vertical output pulse width

V_{18H}, V_{18L} and T_{V60} are as indicated below.



Pin⑱ output waveform

Ymax Maximum output
Input SG. F, and measure pin㉒ output amplitude.



GY Reference gain

1. Input SG. G, and measure pin㉒ output amplitude.
2. GY can be calculated as follows :

$$GY = 20\ \log \frac{\text{Measured value } (mV_{P-P})}{200mV_{P-P}}\ (dB)$$

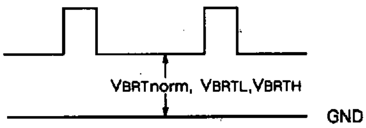
GYmin, GYmax Contrast control characteristics 1, 2

1. Input SG. G, and measure pin㉒ output amplitudes. The readings are called, respectively, V_A and V_B.
2. $$GYmin = 20 \log \frac{V_A(mV_{P-P})}{\text{Measured GY value } (mV_{P-P})} \text{ (dB)}$$

$$GYmax = 20 \log \frac{V_A(mV_{P-P})}{\text{Measured GY value } (mV_{P-P})} \text{ (dB)}$$

$V_{BRTnorm}$, V_{BRTL}, V_{BRTH} Brightness control characteristics

Input SG. A, and measure the difference as indicated below.



G_P Peaking gain

1. Input SG. H, and measure pin㉒ output voltage (V_A). Input SG. J, and measure pin㉒ output signal voltage (V_B).
2. Peaking gain can be calculated as follows :

$$G_P = 20 \log \frac{V_A(mV_{P-P})}{V_B(mV_{P-P})} \text{ (dB)}$$

G_{Tnorm}, G_{Tmin}, G_{Tmax} Video tone control characteristics 1, 2, 3

1. Measure pin㉒ output signal voltage when input to pin㊵ is 4.5V, 9.0V and 0V. The measurements are called, respectively, V_A, V_B and V_C.
2. $G_{Tmin} = 20 \log \frac{V_B}{V_A}$ (dB), $G_{Tmax} = 20 \log \frac{V_C}{V_A}$ (dB)

   G_{Tnorm}(dB) is expressed with the difference between the V_B measured value as in this test and another V_B value measured for calculation of G_P as described above (Y9).

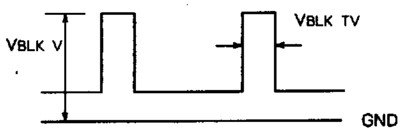
$f_B[Y]$ Frequency characteristic

Measure SG. K frequency at which pin㉒ output voltage is 3dB less than the V_A measured value for calculation of G_P as described above (Y9).

$V_{BLK V}$ Vertical blanking voltage

$V_{BLK TV}$ Vertical blanking width

1. $V_{BLK\ V}$ and $V_{BLK\ TV}$ are as shown below.

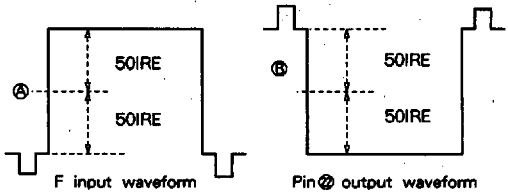


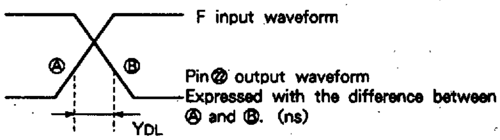
$V_{BLK H}$ Horizontal blanking threshold voltage

Increase voltage input to pin(22A) gradually, and read the pin ㉒ potential when pin(25A) comes to output no signal.

Y_{DL1}, Y_{DL2} Y delay 1, 2

Input SG. T to F. Measure pin㉒ output waveform delay with reference to input.





BS Black expansion threshold voltage

1. Set SG. U to 200kHz, V_1 to 0.35V, and V_2 to 0V. Input from "F." The difference between pedestal and white peak is 100IRE
2. Decrease V_2 gradually, starting from approximately 75IRE. Read the point at which black expansion becomes available.

AV_{TH} AWSW switching threshold voltage

1. Input SG. G to "H."
2. Apply 2.1V to pin(2A), and make sure that a waveform is being output from pin㊸.
3. Apply 1.0V to pin(2A), and make sure that no waveform is being output from pin㊸.

AV_{TV} AVSW TV output signal voltage

AV_{EXT} AVSW EXT output signal voltage

Input SG. W(−6dB) to "H" and "G," and measure pin㊸ output waveform amplitude when input to pin(2A) is set to OPEN and to GND.

ACC-1, ACC-2 ACC characteristics 1, 2

1. Measure pin(25A) output signal voltage when SG. L input is 0dB, −20dB and +6dB. The measurements are called, respectively, V_A, V_B and V_C.
2. ACC-1, ACC-2 can be calculated as follows :

$$ACC\text{-}1 = 20 \log \frac{V_B}{V_A} \text{ (dB)}$$

$$ACC\text{-}2 = 20 \log \frac{V_C}{V_A} \text{ (dB)}$$

Vik Killer operation input level

Decrease SG. L input level, and read the input when pin㉑ DC voltage reaches the LOW level.

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VOK Remaining color after killer operation
Input SG. Q, and measure pin (25A) output signal voltage.

Cnorm Chroma reference output
Input SG. L, and measure pin (25A) output signal voltage when input to pin ㊱ is 5.1V.

Csmin, Csmax Color control characteristics 1, 2

1. Read pin (25A) output signal voltage when input to pin ㉑ is 0V and 9.0V. The readings are called, respectively, V_A and V_B.

2. Csmin, Csmax is calculated as follows :

$$\text{Csmin} = 20 \log \frac{V_A}{\text{Measured Cnorm value}} \text{ (dB)}$$

$$\text{Csmax} = 20 \log \frac{V_B}{\text{Measured Cnorm value}} \text{ (dB)}$$

Csmin, Csmax Color tracking characteristics 1, 2

1. Measure pin ㉕ output signal voltage when input to pin ㊱ is 3.0V and 9.0V. The measurements are called, respectively, V_A and V_B.
2. Cumin, Cumax can be calculated as follows :

$$\text{Cumin} = 20 \log \frac{V_A}{\text{Measured Cnorm value}} \text{ (dB)}$$

$$\text{Cumax} = 20 \log \frac{V_B}{\text{Measured Cnorm value}} \text{ (dB)}$$

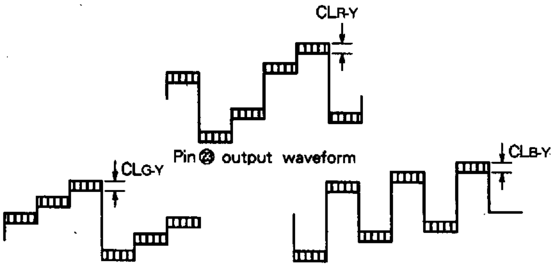
f_{PCL}, f_{PCH} APC pull-in range 1, 2

1. Input SG. M, and decrease burst frequency and chroma frequency (fsb = fsc) adequately until "pull-in" comes off.
2. Increase frequency gradually, and measure input frequency when "pull-in" comes on.
3. Measure the upper "pull-in" frequency by the same procedure.
4. The reference frequency is the difference from the standard value (3.579545MHz).

f_{PC} Total APC pull-in range
Calculated as follows : $f_{PC} = | f_{PCL} | + f_{PCH}$(kHz)

$CL_{B\text{-}Y}$, $CL_{R\text{-}Y}$, $CL_{G\text{-}Y}$ Demodulating output carrier leak 1, 2, 3

1. Input SG. L (0dB).
2. Apply 4.6V and 5.1V to pins ㉑ and ㊱, and measure pin ㉓, ㉔ and ㉕ output carrier leak.



SSY Service switch operation 1
Input SG. G to "F," and turn S36 on. Measure the amplitude during a pin ㉒ output signal scanning period.

SSC Service switch operation 2
Input SG. L to "E," and turn S36 on. Measure pin (25A) output signal amplitude.

SSV Service switch operation 3
Measure pin ⑱ output signal maximum value when S36 is on.

$\frac{R-Y}{B-Y}$ − N $\frac{G-Y}{B-Y}$ − N Demodulation ratio 1, 2

1. Input SG. L, and measure pin (23A), (24A) and (25A) output voltage.
2. The ratios can be calculated as follows, respectively :

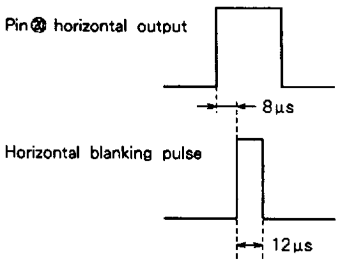
$$\left(\frac{R-Y}{B-Y} - N\right) = \frac{\text{Pin (23A) output signal voltage}}{\text{Pin (25A) output signal voltage}}$$

$$\left(\frac{G-Y}{B-Y} - N\right) = \frac{\text{Pin (24A) output signal voltage}}{\text{Pin (25A) output signal voltage}}$$

∠R-Y-N, ∠G-Y-N Demodulation angle 1, 2
Using the B-Y output pin (25A) phase as reference, measure phase difference between R-Y output pin (23A) and G-Y output (pin (24A)).

Continued

Note 1. Adjust the variable resistor of one-shot multivibrator so that horizontal blanking pulse timing and pulse width will be as shown below :

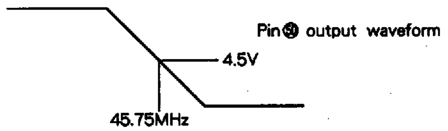


Determine 8μs with TTL IC M74LS221P pin ⑮ variable resistor. Also determine 12μs with pin ⑦ adjustable resistor.

Note 2. Coil adjustment

§ VCO coil

1. Set measuring conditions as previously described for V14.
2. Input continuous waves (Fo = 45.75MHz, Vi = 90dBμ) from input pin A, and set S49 to 1.
3. Adjust VCO coil so that AFT OUT (pin ㊿) DC will become a half of Vcc (4.5V).



§ SIF coil

Set measuring conditions as previously described for S5, and adjust SIF coil for output waveform to be maximum and for distortion to be minimum.

Note 3. Remarks for video-related item measurement

When measuring video-related items (Y1-Y23), be sure to satisfy the conditions listed below :

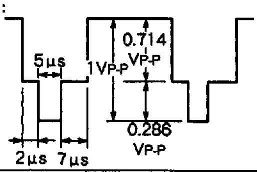
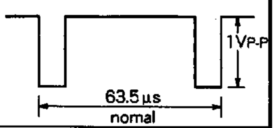
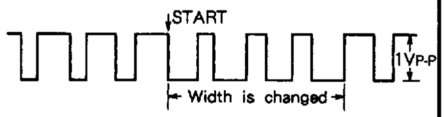
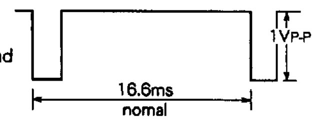
1. Set signal SG. A to "D."
2. Set switches S2B, S5, S10, S12, S13, S16, S20, S22 and S44 to ON.
3. Set other switches to OPEN unless otherwise noted.

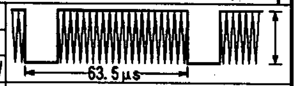
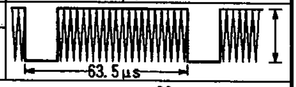
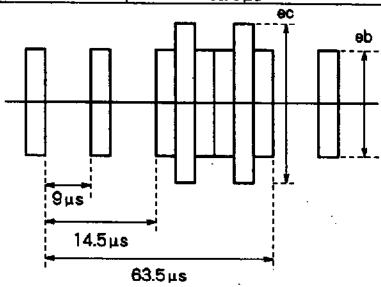
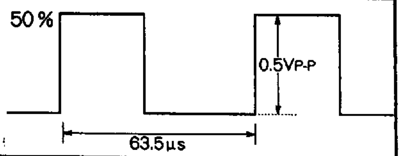
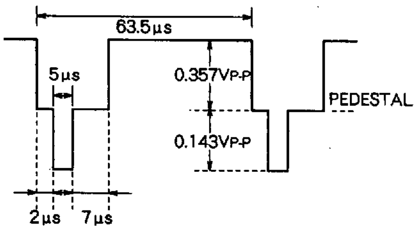
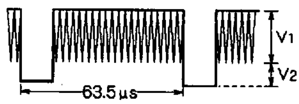
Note 4. Remarks for chroma-related item measurement

When measuring chroma-related items (C1-C32), be sure to satisfy the conditions listed below :

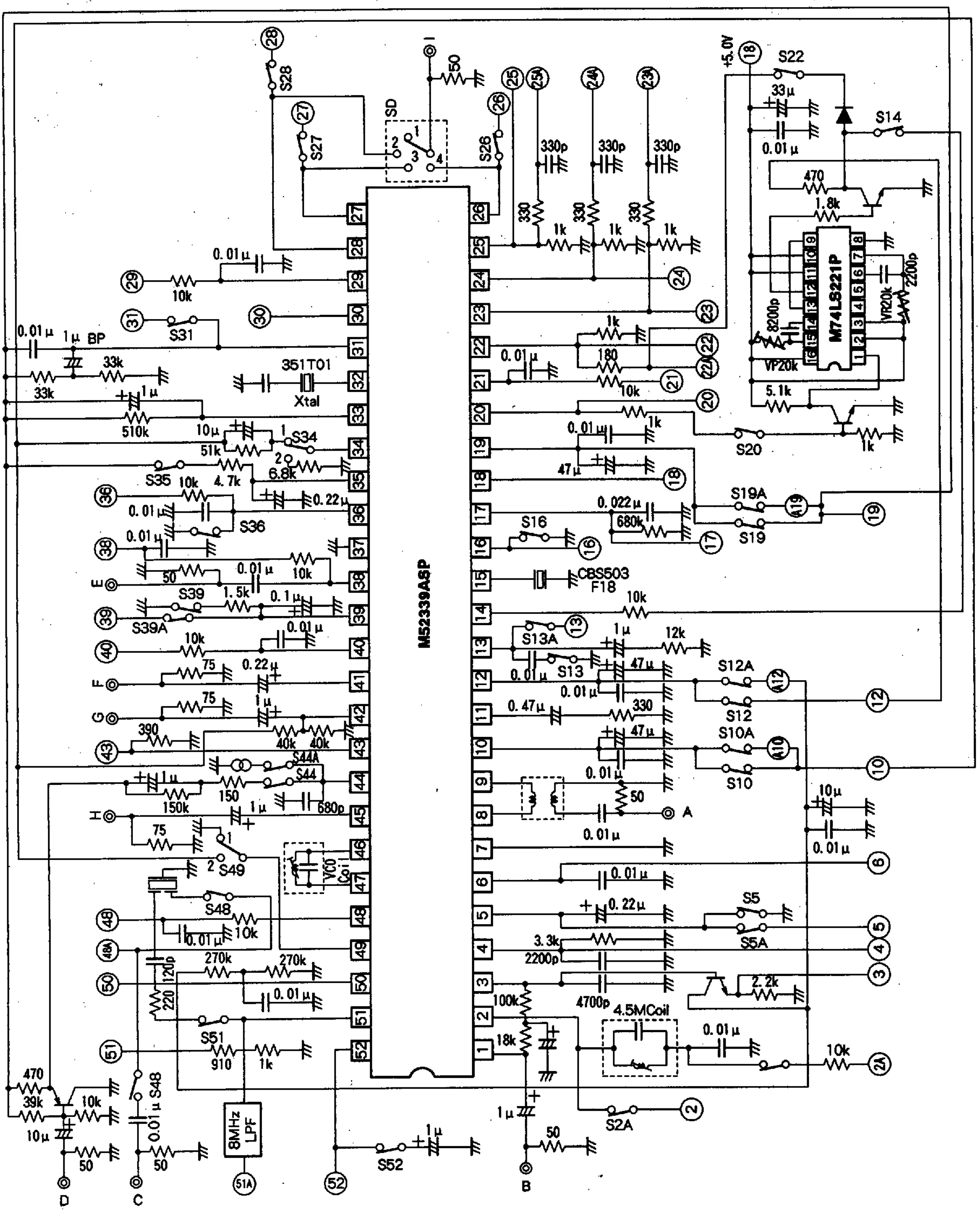
1. Set signal SG. A to input "D."
2. Set switches S2B, S5, S10, S12, S13, S14, S16, S20, S22 and S44 to ON. Set S34 to 2.
3. Set other switches to OPEN unless otherwise noted.

INPUT SIGNAL

SG. No.	Signal details (Terminal resistance : 50Ω)
SG. 1	fo = 45.75MHz, 90dBμ, fm = 20kHz, AM77.8%
SG. 2	fo = 45.75MHz, 80dBμ, CW
SG. 3	fo = 45.75MHz, CW, Level variable
SG. 4	fo = 45.75MHz, fm = 20kHz, AM16%, Level variable
SG. 5	fo = 45.75MHz, ±5MHz, 80dBμ, sweep signal
SG. 6	fo = 45.75MHz, 80dBμ, CW
SG. 7	fo = 46.2MHz, 80dBμ, CW
SG. 8	fo = 41.25MHz, 110dBμ, CW
SG. 9	fo = 41.25MHz, 70dBμ, CW
SG. 10	f1 = 45.75MHz, 90dBμ, CW f2 = 44 ± 5MHz, 70dBμ, CW } Mixed signal
SG. 11	f1 = 45.75MHz, 90dBμ, CW f2 = 42.17MHz, 80dBμ, CW } Mixed signal f3 = 41.25MHz, 80dBμ, CW
SG. 12	fo = 45.75MHz, 110dBμ, CW
SG. 13	fo = 45.75MHz, 60dBμ, CW
SG. 14	fo=45.75MHz, -2.5MHz, fo=45.75+1MHz, 80dBμ, CW
SG. 16	fo = 45.75MHz, 90dBμ, CW fo = 41.25MHz, 70dBμ, CW } Mixed signal
SG. 17	fo = 4.5MHz, 83dBμ, fm = 400Hz, FM ± 25kHz dev
SG. 19	fo=4.5MHz, 83dBμ, fm=400Hz, FM±25kHz Level variable
SG. 20	fo = 4.5MHz, 83dBμ, fm = 400Hz, AM30%
SG. 21	fo = 4.5MHz, 83dBμ, CW
SG. 23	fo = 400Hz, 1VP-P, CW
SG. 24	fo = 45.75MHz, 90dBμ, CW
SG. 25	fo = 45.75MHz, 84dBμ, CW
SG. 26	fo = 1kHz, 20mVP-P, CW
SG. 28	fo = 45.75MHz, 45dBμ, CW
SG. A	Sync separation input : NTSC standard video signal (APL100%) as shown in the illustration. Vertical input is interlaced at 60Hz. 
SG. B	Horizontal sync signal : Duty 92%. Input level and frequency is variable. 
SG. C	f = 2kHz, 100mVP-P, CW
SG. D	Varies SG. A vertical sync signal width. START position is the same. 
SG. E	Vertical sync signal : Duty 92%. Input level and frequency is variable. 

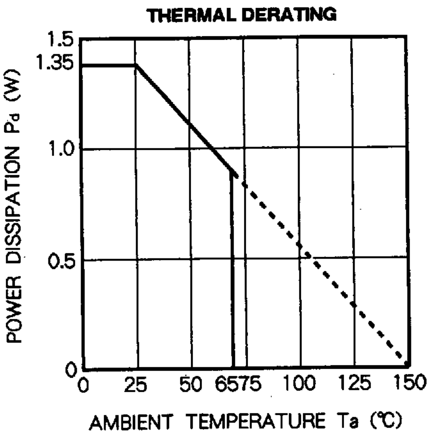
SG. No.	Signal details (Terminal resistance : 50Ω)
SG. F	f = 200kHz, 2VP-P, CW
SG. G	f=200kHz, 200mVP-P, CW
SG. H	f=200kHz, 50mVP-P, CW 
SG. J	f=3.58MHz, 200mVP-P, CW
SG. K	f=2MHz~10MHz, Variable 200mVP-P, CW 
SG. L	 fsB : Burst signal frequency fsc : Chroma signal frequency fsB = fsc = 3.579545MHz 0dB : eb = 100mVP-P ec = 200mVP-P
SG. M	Basically the same as SG. L NTSC simple macro signals, except that burst signals and macro signals are in phase, and that the frequency is adjustable.
SG. N	f = 3.57MHz, CW, Level variable
SG. Q	Basically the same as SG. L NTSC simple macro signals, except that burst signal "eb" is 0mVP-P and that macro signal amplitude "ec" is 200mVP-P.
SG. R	f = 4.58MHz, CW, 0.2VP-P
SG. P	f = 3.68MHz, CW, Level variable
SG. S	DUTY 50% 
SG. T	 NTSC video signal with variable automatic phase control. Vertical signals should be interlaced at 50Hz.
SG. U	f = 200kHz, CW V1, V2 variable 

TEST CIRCUIT

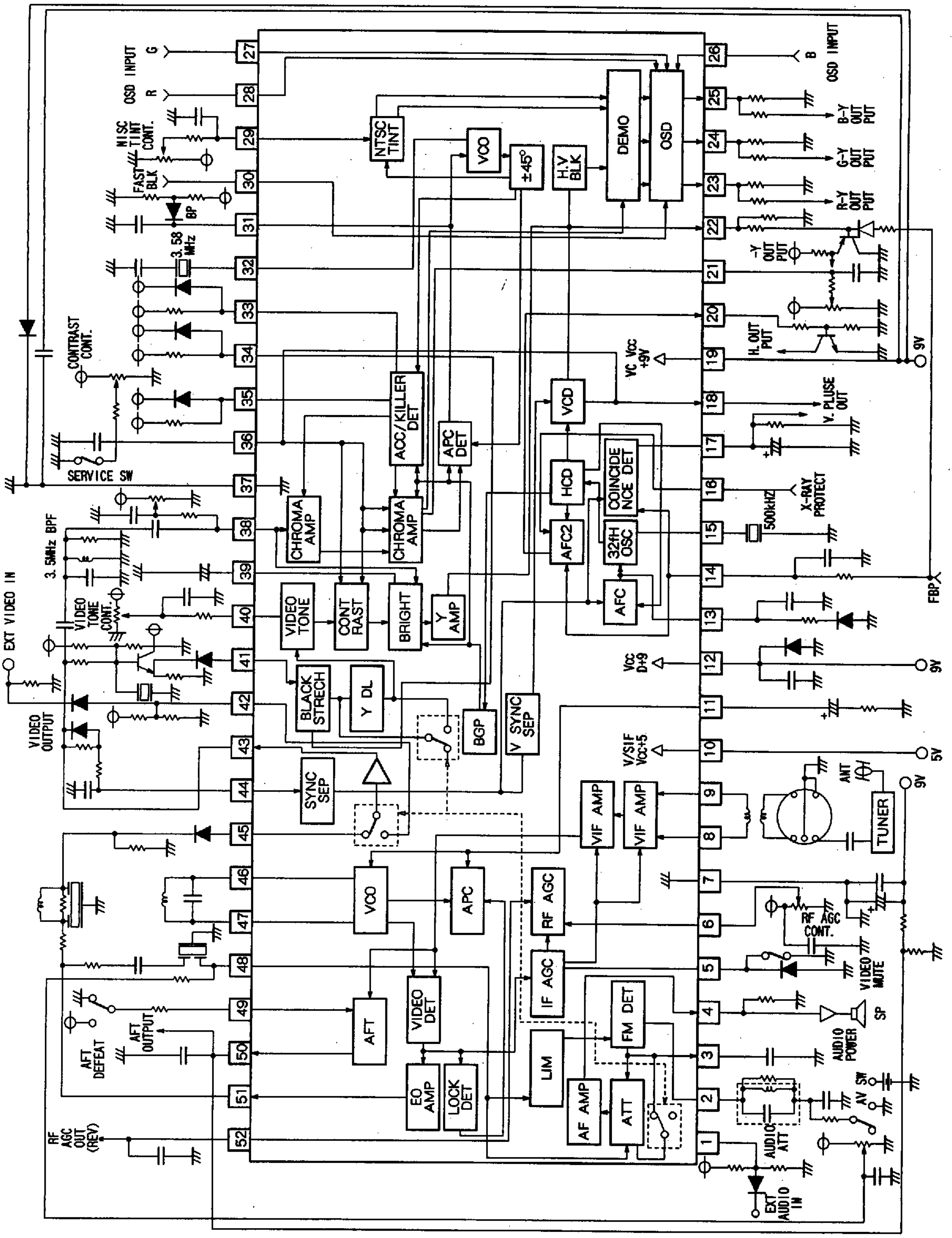


Units Resistance : Ω
Capacitance : F

TYPICAL CHARACTERISTICS



APPLICATION EXAMPLE



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