

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION

The M52335SP is a semiconductor integrated circuit that integrates NTSC system color TV signal processing functions into a single chip. It contains video IF, sound IF, picture, color, on-screen character display and deflection signal processing functions. Combining the IC with a simple output stage using a tuner and transistors provides rational NTSC system color TV set design.

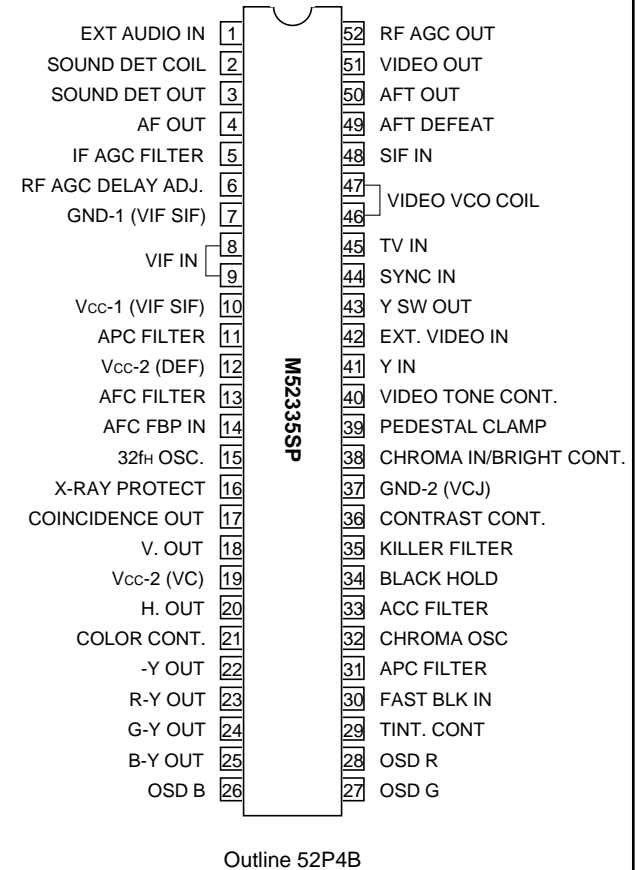
FEATURES

- Large-scale single-chip integration provides set rationalization, high reliability and less power dissipation.
- PLL-employed full sync detector circuit is used as a video detector circuit to improve characteristics such as DG, DP, 920kHz beat and cross color.
- A quadrature detector circuit is used as a sound IF FM detector to simplify external circuits and improve linearity.
- Coilless AFT.
- Horizontal oscillator is obtained by counting down from x32 horizontal frequency oscillator using a ceramic oscillator, requiring no adjustment of horizontal free run frequency.
- Vertical oscillator is obtained by counting down double horizontal frequency oscillator generated by horizontal count-down, requiring no vertical sync adjustment. Using a 2-wind system provides high noise resistance capability.
- Double AFC is used as a horizontal circuit to reduce horizontal jitter in a weak electric field and screen distortion caused by luminance change.
Also, the sync detector circuit allows use as a detector signal as for sound muting or automatic tuning.
- Built-in black expansion circuit
- Built-in Y-delay line circuit.
- Built-in on-screen character display circuit.
DC voltage control is applied to picture quality, contrast, luminance, color saturation, tint and sound volume.

APPLICATION

NTSC system color TV set

PIN CONFIGURATION (TOP VIEW)



RECOMMENDED OPERATING CONDITION

Supply voltage.....5V, 9V
 Operating supply voltage.....4.5 to 5.5V, 8.5 to 9.5V

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

ABSOLUTE MAXIMUM RATINGS

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 to 65°C	°C
T _{stg}	Storage temperature	-40 to 150	°C

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

Symbol	Parameter	Test point	Input signal	Test conditions											Limits			Unit
				5	V _{cc} 10	V _{cc} 12	S 2	S 5	S 10	S 10A	S 12	S 49	S 52	Min.	Typ.	Max.		
I _{cc10}	Circuit current	A10			5.0 V	9.0 V					ON	ON	1	ON	24	33	42	mA
V ₅₁	Video output DC voltage	51			5.0 V	9.0 V	ON	ON	ON		ON	2	ON	3.0	3.3	3.7	V	
V _{o51}	Video detector output signal voltage	51	A SG. 1		5.0 V	9.0 V	ON		ON		ON	2	ON	1.2	1.4	1.6	V _{P-P}	
V _{51L}	Sync signal tip voltage	51	A SG. 2		5.0 V	9.0 V	ON		ON		ON	2	ON	1.5	1.75	1.95	V	
V _{in min.}	Input sensitivity	51A	A SG. 3		5.0 V	9.0 V	ON		ON		ON	2	ON		48	55	dB _μ	
V _{in max}	Maximum allowable input	51A	A SG. 4		5.0 V	9.0 V	ON		ON		ON	2	ON	101	107		dB _μ	
BW	Video frequency characteristics	51	A SG. 10		5.0 V	9.0 V	ON		ON		ON	2	ON	5.0	6.5		MHz	
IM	Inter-modulation	51	A SG. 11	Variable	5.0 V	9.0 V	ON		ON		ON	2	ON	30	35		dB	
S/N	Video S/N	51A	A SG. 2		5.0 V	9.0 V	ON		ON		ON	2	ON	49	55		dB	
V _{50H}	AFT output maximum voltage	50	A SG. 6		5.0 V	9.0 V	ON		ON		ON	1	ON	8.3	8.7		V	
V _{50L}	AFT output minimum voltage	50	A SG. 7		5.0 V	9.0 V	ON		ON		ON	1	ON		0.3	0.7	V	
μAFT	AFT sensitivity	50	A SG. 5		5.0 V	9.0 V	ON		ON		ON	1	ON	55	75	95	mV/kHz	
V _{50D1}	AFT defeat voltage1	50			5.0 V	9.0 V	ON		ON		ON	1	ON	4.25	4.4	4.55	V	
V _{50D2}	AFT defeat voltage2	50	A SG. 14		5.0 V	9.0 V	ON		ON		ON	1	ON	4.25	4.4	4.55	V	

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input signal	Test conditions																Limits			Unit	
				2 A	6	48	V _{CC} 10	V _{CC} 12	S 2	S 2A	S 5	S 5A	S 10	S ₁₀ A	S 12	S 48	S ₄₈ A	S 49	S 51	S 52	Min.	Typ.		Max.
V50D3	AFT defeat voltage ³	50	A SG. 1				5.0 V	9.0 V	ON				ON		ON			2		ON	4.25	4.4	4.55	V
V50M	AFT mute input level	A 50	A SG. 1 variable				5.0 V	9.0 V	ON				ON		ON			1		ON	45	50	55	dB μ
V52H	RF AGC maximum voltage	52	A SG. 2	2.0 V			5.0 V	9.0 V	ON				ON		ON			2		ON	7.8	8.8		V
V52L	RF AGC minimum voltage	52	A SG. 2	4.0 V			5.0 V	9.0 V	ON				ON		ON			2		ON		0.1	0.3	V
V3	AF direct output DC voltage	3					5.0 V	9.0 V				ON		ON		ON	ON	2		ON	2.65	3.15	3.65	V
V0AF	AF direct output signal voltage	3	C SG. 17				5.0 V	9.0 V				ON		ON		ON	ON	2		ON	250	295	340	mV _{rms}
LIM	Limiting sensitivity	3	C SG. 19				5.0 V	9.0 V				ON		ON		ON	ON	2		ON		49	55	dB μ
AMR	AMR	3	C SG. 20				5.0 V	9.0 V				ON		ON		ON	ON	2		ON	44	55		dB
V04	AF driver output	4	C SG. 17				5.0 V	9.0 V				ON		ON		ON	ON	2		ON	250	295	340	mV _{rms}
V40 _{max}	AF driver maximum output	4	C SG. 17			9.0 V	5.0 V	9.0 V				ON		ON		ON	ON	2		ON	490	590	720	mV _{rms}
ATT	Maximum attenuation	4	C SG. 17			1.0 V	5.0 V	9.0 V				ON		ON		ON	ON	2		ON	70	75		dB
GAF	AF driver gain	4																			4.5	6.0	7.5	dB
S/N AF	Sound S/N	4	C SG. 21			9.0 V	5.0 V	9.0 V				ON		ON		ON	ON	2		ON	60	66		dB
S TH	Sound switching threshold voltage	4	C SG. 17	1.1 V			9.0 V	5.0 V	9.0 V	ON			ON		ON		ON	2		ON		0.4	1.0	mV _{rms}
THD AF	AF driver maximum output distortion	4	A SC. 17				9.0 V	5.0 V	9.0 V				ON		ON		ON	2		ON		1.0	5.0	%
V48	Pin $\text{\textcircled{48}}$ voltage	48				M	5.0 V	9.0 V				ON		ON		ON	ON	2		ON	3.8	4.4	5.0	V
V0EXT	Output signal voltage at external input	4	B SG. 23	0 V	4.5 V		5.0 V	9.0 V	ON			ON		ON		ON		2		ON	580	710	830	mV _{rms}

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input signal	Test conditions																Limits			Unit					
				36	V _{CC} 10	V _{CC} 12	V _{CC} 19	S ₂ A	S ₅	S ₁₀	S ₁₂	S ₁₂ A	S ₁₃	S ₁₄	S ₁₆	S ₁₉ A	S ₂₀	S ₂₂	S ₃₄	S ₃₅	S ₄₄ A	S ₄₉		S ₅₂	S _D	Min.	Typ.	Max.
V ₂	Pin ② voltage	2	I _{SS} f variable	5.0 V	9.0 V		ON	ON	ON	ON											2	ON			2.2	2.5	2.9	V
I _{SS}	Sync separation input sensitivity current	I _{SS} 20			9.0 V			ON	ON				ON				2			ON			1	0.05	0.1	0.2	mA	
I _{CC12}	H. VCC inflow Current	A12			9.0 V	9.0 V		ON			ON	ON	ON				2						1	29	34	39	mA	
f _H	Horizontal free run frequency	20			9.0 V			ON	ON		ON	ON	ON				ON	2	ON	ON			1	15.4	15.800	16.2	kHz	
V _{12 min.}	Horizontal oscillator starting voltage	12 20			9.0 V			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		9.0 V			ON	ON		ON	ON	ON				ON	2	ON	ON			1	-500	-600		Hz	
f _{PHH}	Horizontal pull-in range 2	E 20	f variable		9.0 V			ON	ON		ON	ON	ON				ON	2	ON	ON			1	+500	+600		Hz	
V _{20H}	Horizontal output maximum voltage	20	D SG. B		9.0 V			ON	ON		ON	ON	ON				ON	2	ON	ON			1	3.0	3.65	4.65	V _{0-P}	
V _{20L}	Horizontal output minimum voltage	20	D SG. B		9.0 V			ON	ON		ON	ON	ON				ON	2	ON	ON			1		0	0.3	V _{0-P}	
T _H	Horizontal output pulse width	20	D SG. B		9.0 V			ON	ON		ON	ON	ON				ON	2	ON	ON			1	21	24	29	μsec	
V _{RPO}	Overvoltage detector operating voltage	16 20			9.0 V				ON		ON	ON	ON				ON	2	ON	ON			1	0.61	0.71	0.81	V	
f _{V60}	Vertical free run frequency 60	18	D SG. E		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. B 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 _{0-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 _{0-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	μsec	
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	
I _{CC19}	Circuit current	A19		5.1 V	9.0 V	9.0 V			ON	ON							ON	ON	ON	2	ON				38	48	58	mA

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ELECTRICAL CHARACTERISTIC (cont.)

Symbol	Parameter	Test point	Input signal	Test conditions													Limits			Unit
				36	38	40	V _{CC} 10	V _{CC} 12	V _{CC} 19	S 10	S 12	S 19	S 20	S 22	S 34	S 35	Min.	Typ.	Max.	
Ymax.	Maximum output	22	F SG. F	9.0 V		9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		5.4	6.4		V _{P-P}
GY	Standard gain	22	F SG. G	5.1 V		9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		7.0	11.0	15.0	dB
GYmix.	Contrast control characteristic 1	22	F SG. G	2.5 V		9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2				-35	dB
GYmax.	Contrast control characteristic 2	22	F SG. G	9.0 V		9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		2.5	6.0	8.5	dB
VBRT norm	Brightness control characteristic 1	22	D SG. A	5.1 V	4.5 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		3.05	3.45	3.8	V _{P-P}
VBRT L	Brightness control characteristic 2	22	D SG. A	5.1 V	2.5 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		2.0	2.4	2.7	V _{P-P}
VBRT H	Brightness control characteristic 3	22	D SG. A	5.1 V	6.5 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		4.25	4.7	5.15	V _{P-P}
GP	Peaking value	22	F SG. G SG. J	5.1 V			5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		7.5	11.0	14.5	dB
GT norm	Video tone control characteristic 1	22	F SG. J	5.1 V		4.5 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		-1.2	-0.5	1.0	dB
GT min.	Video tone control characteristic 2	22	F SG. J	5.1 V		0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		-4.8	-8.3	-11.8	dB
GT max.	Video tone control characteristic 3	22	F SG. J	5.1 V		9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		1.2	4.2	7.2	dB
fbY	Frequency characteristic	22	F SG. K	5.1 V			5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		5.0	8.0		MHz
V40	Pin ④ voltage	40		5.1 V		M	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		4.05	4.3	4.55	V
V _{BLK V}	Vertical blanking voltage	22		2.5 V		9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		6.9	7.1		V _{0-P}
V _{BLK TV}	Vertical blanking pulse width	22		2.5 V		9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		1.31	1.38	1.44	msec
H _{BLK H}	Horizontal blanking threshold voltage	22 25A	E SG. P 0.2V _{P-P}	2.5 V		9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2 ON		6.9	7.1		V _{0-P}
YDL 1	Y delay value 1	22 41	F SG. T	5.1 V	2A -		5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		225	260	295	nsec
YDL 2	Y delay valye 2	22 41	F SG. T	5.1 V	0 V		5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	2		120	140	160	nsec

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input signal	Test conditions												Limits			Unit	
				2 A	21	36	40	V _{CC} 10	V _{CC} 12	V _{CC} 19	S 10	S 12	S 19	S 20	S 22	S 34	Min.	Typ.		Max.
BS1	Black stretch threshold 1	22	F SG. U variable			5.1 V		5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	1 ↓ 2	37	50	63	IRE
AV _{TH}	AV SW switching threshold voltage	43 2A	H SG. G	2.1 ↓ 1.0 V		5.1 V		5.0 V	9.0 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	-		5.1 V		5.0 V	9.0 V	9.0 V	ON	ON	ON			2	1.4	1.5	1.6	VP-P
AV _{EXT}	AV SW EXT output signal voltage	43	G SG. F -6dB	1.1 V		5.1 V		5.0 V	9.0 V	9.0 V	ON	ON	ON			2	1.4	1.5	1.6	VP-P
C _{max.}	Chroma maximum output	25A	E SG. L 0dB		6.5 V	9.0 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON		ON	2	3.2	4.7	6.2	VP-P
ACC-1	ACC characteristic 1	25A	E SG. L -20dB			5.1 V	9.0 V	5.0 V	9.0 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			5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON		ON	2	-3.0	0	+3.0	dB
V _{ik}	Killer operation level	G 25A	E SG. L variable			5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON		ON	2	-48	-41	-35	dB
V _{ok}	Killer color residual	25A	E SG. Q 0dB			9.0 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON		ON	2	-	15	35	mVP-P
C _{norm.}	Chroma standard output	25A	E SG. L 0dB			5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON		ON	2	1.0	1.45	1.85	VP-P
C _{smin.}	Color control characteristic 1	25A	E SG. L 0dB		0 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON		ON	2		-40	-30	dB
C _{smax.}	Color control characteristic 2	25A	E SG. L 0dB		9.0 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON		ON	2	3.8	7.3	10.8	dB
C _{umin.}	Color tracking characteristic 1	25A	E SG. L 0dB			2.5 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON		ON	2	-48	-38	-30	dB
C _{umax.}	Color tracking characteristic 2	25A	E SG. L 0dB			9.0 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON		ON	2	1.7	5.2	8.7	dB

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input signal	Test conditions													Limits			Unit
				21	36	40	V _{CC} 10	V _{CC} 12	V _{CC} 19	S 10	S 12	S 19	S 22	S 34	S 36	S 39	Min.	Typ.	Max.	
fpcL	APC pull-in range 1	25A G	F SG. M 0dB		5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	2			-0.3	-0.7		kHz
fpcH	APC pull-in range 2	25A G	E SG. M 0dB		5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	2			+0.3	+0.7		kHz
fpc	Total APC pull-in range																0.6	1.4		kHz
V23	Modulated output DC voltage 1	23A			5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	2	ON		5.0	5.4	5.8	V
V24	Modulated output DC voltage 2	24A			5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	2	ON		5.0	5.4	5.8	V
V25	Modulated output DC voltage 3	25A			5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	2	ON		5.0	5.4	5.8	V
V23-24	Modulated output DC offset voltage 1																-0.3	0	+0.3	V
V24-25	Modulated output DC offset voltage 2																-0.3	0	+0.3	V
V25-23	Modulated output DC offset voltage 3																-0.3	0	+0.3	V
CL B-Y	Modulated output carrier leak 1	25	E SG. L 0dB	4.5 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	2					0.2	V _{P-P}
CL R-Y	Modulated output carrier leak 2	23	E SG. L 0dB	4.5 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	2					0.2	V _{P-P}
CL G-Y	Modulated output carrier leak 3	24	E SG. L 0dB	4.5 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	2					0.2	V _{P-P}
V21	Pin ⑳ voltage 1	21	E SG. L 0dB	M	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	2			4.2	4.6	5.0	V
SS Y	Servise switch operation 1	22	F SG. G		5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	2				10	90	mV _{P-P}
SS C	Servise switch operation 2	25A	E SG. L 0dB		5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	2				10	90	mV _{P-P}

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ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Input signal	Test signal														Limits			Unit	
				29	30	36	40	V _{CC} 10	V _{CC} 12	V _{CC} 19	S 10	S 12	S 19	S 22	S 26	S 27	S 34	S 35	S 36	Min.		Typ.
SS V	Service switch operation 3	18				5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON			2	ON		8.1	9.0	V _{0-P}
$\frac{R-Y}{B-Y}$ -N	NTSC demodulated ratio 1	23A 25A	E SG. L 0dB	2.0 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON			2	ON		0.83	0.9	0.97	
$\frac{G-Y}{B-Y}$ -N	NTSC demodulated ratio 2	24A 25A	E SG. L 0dB	2.0 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON			2	ON		0.24	0.3	0.35	
$\angle R-Y-N$	NTSC demodulated phase angle 1	23A 25A	E SG. S 0dB	2.0 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON			2	ON		104			deg
$\angle G-Y-N$	NTSC demodulated phase angle 2	24A 25A	E SG. S 0dB	2.0 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON			2	ON		241			deg
T min.	TINT control characteristics 1	23A 25A	E SG. M 0dB	2.5 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON			2	ON		+25	+45	+65	deg
T max.	TINT control characteristics 2	23A 25A	E SG. M 0dB	6.5 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON			2	ON		-65	-45	-25	deg
OSR	On-screen threshold voltage 1	23A			3.0 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	ON	2	ON		7.0	7.5	V
OSG	On-screen threshold voltage 2	24A			3.0 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	ON	2	ON		7.0	7.5	V
OSB	On-screen threshold voltage 3	25A			3.0 V	5.1 V	9.0 V	5.0 V	9.0 V	9.0 V	ON	ON	ON	ON	ON	ON	2	ON		7.0	7.5	V

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

ELECTRICAL CHARACTERISTICS TEST METHODS

V51

Measure the voltage at output (51) in the no input state.

VO51

1. Enter SG 1 at 90dB μ .
2. Measure the amplitude at output (51) .

Vin min.

1. Lower the SG 3 level. Represent Vin as an input level at which it is 3dB lower than the VO51 measured value.

Vin max.

1. Enter SG 4 at 90dB μ .
2. Define the output level (51A) as VA.
3. Raise the SG 4 level. Represent Vin as an input level at which the output level (51A) is 3dB lower than VA.

$$V_{in \max.} = 20 \log \frac{\text{measured value}}{V_A} \text{ (dB)}$$

BW

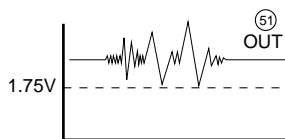
1. Enter SG 10. Adjust f2 so that a 1MHz beat component can appear at output (51).
2. Raise the f2 frequency. Measure a frequency which is -3dB lower than the 1MHz component.

$$BW = (\text{frequency of -3dB}) - 58.75\text{MHz (MHz)}$$

IM

1. Enter SG 11. Apply voltage (5) so that output (51) is as shown in the figure.
2. Calculate level difference between 920kHz and 3.58MHz at output (51) .

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

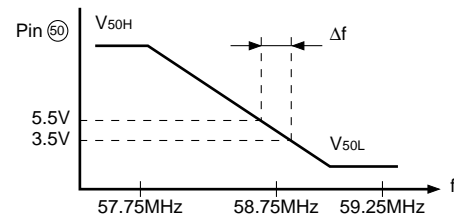
**S/N**

1. Enter SG 2. Measure a rms value of output (51) signal.
2. Standard

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

V50H, V50L, μ AFT

V50H, V50L and μ AFT are shown below.



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

V50D1, V50D2, V50D3

Use no signal, fo-2.5MHz, fo+1MHz and defeat SW to confirm that output (50) goes to 4.4V.

V50M

1. Enter SG 1. Lower the input level from 80dB μ .
2. Represent V50M as an input level at which voltage of output (50) is center (4.4V).

V52H

1. Enter SG 11. Apply 2.0V to (6) .
2. Measure voltage (52) .

V52L

1. Enter SG 10. Apply 4.0V to (6) .
2. Measure voltage (52) .

LIM

Decrease the SG 19 level. At test point 3, measure an input level when a 400Hz component goes down 3dB lower than parameter S2. AF direct signal voltage VOAF.

AMR

At test point 3, measure a 400Hz component and define it as Vam.

Standard value

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

ATT

1. Measure a 400Hz component at output (4) .
2. Standard value

$$ATT = 20 \log \frac{V_{O4 \max.}}{\text{measured value}} \text{ (dB)}$$

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

GAF

$$ATT = 20 \log \frac{Vo4 \text{ max.}}{\text{measured value}} \text{ (dB)}$$

S/N AF

1. Measure noise within the range of 20Hz to 100kHz at output ④.
2. $S/N \text{ AF} = 20 \log \frac{Vo4 \text{ max.}}{\text{measured value}} \text{ (dB)}$

STH

Enter SG 17. Measure output ④ when AV SW is set to EXT (2A=1.1V).

I_{ss}

Increase the current of constant current source I_{ss}. Measure a current value of I_{ss} when the horizontal frequency at output ⑳ is pulled in from free run.

V₁₂ min.

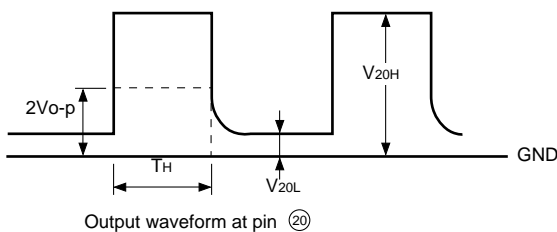
Increase voltage ⑫ from about 3V. Measure voltage ⑫ applied when horizontal oscillator waveforms begin to appear at ⑳ (about 15kHz).

f_{PHL}, f_{PHH}

1. Lower the frequency of input signal SG B to make the input waveform asynchronous to output waveform at pin ⑳.
2. Raise the input frequency. Measure the frequency at the moment when the input waveform begin to synchronize with output waveform ⑳. Define the frequency as lower pull-in frequency f_{PHL}.
3. Measure upper pull-in frequency f_{PHH} in the same manner.
4. Represent the difference from reference value of 15.734kHz.

V_{20H}, V_{20L}, T_H

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



T_{PRO}

Raise the voltage applied to ⑩ gradually. Represent T_{PRO} as the voltage at which output waveform at pin ⑳ is as shown below.



Make sure that the voltage applied to ⑩ is opened and retained.

Y max.

Enter SG F. Measure the amplitude of output ⑳.

GY

1. Enter SG G. Measure the amplitude of output ⑳.

$$2. GY = 20 \log \frac{\text{measured value mVP-P}}{200\text{mVP-P}} \text{ (dB)}$$

GY min., GY max.

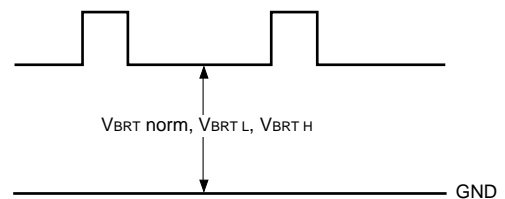
1. Enter SG G. Measure the amplitude of output ⑳. Define the amplitude as V_A or V_B.

$$2. GY \text{ min.} = 20 \log \frac{V_A \text{ (mVP-P)}}{GY \text{ measured value (mVP-P)}} \text{ (dB)}$$

$$GY \text{ max.} = 20 \log \frac{V_B \text{ (mVP-P)}}{GY \text{ measured value (mVP-P)}} \text{ (dB)}$$

VBRT norm, VBRT L, VBRT H

Enter SG A. Measure the level given below.



G_p

1. Define as V_A the output signal voltage ⑳ at the entry of SG G, as V_B the voltage at the entry of SG J.

$$2. G_P = 20 \log \frac{V_A}{V_B} \text{ (dB)}$$

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

GT norm., GT min., GT max.

1. Change the applied voltage (40) to 4.5V, 6.5V and 2.5V. Define output signal (22) measured values as VA, VB and VC, respectively.

2. $GT \text{ min.} = 20 \log \frac{V_B}{V_A} \text{ (dB)}$, $GT \text{ max.} = 20 \log \frac{V_C}{V_A} \text{ (dB)}$

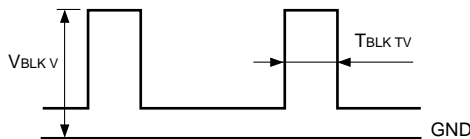
GT norm. (dB) is represented by a change of VB (dB) at parameter Y9 GP measurement.

fB [Y]

Measure the SG K frequency which is 3dB lower than the VA value at parameter Y9 GP measurement.

VBLK v, VBLK TV

VBLK V and VBLK TV are shown below.

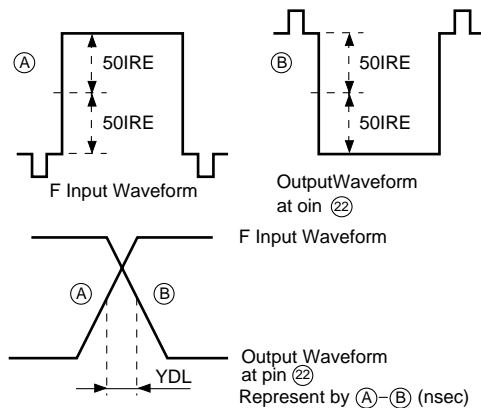


VBLK H

Raise the applied voltage 22A gradually. Represent VBLK H as a voltage level (22) at which output signal 25A disappears.

YDL 1, YDL 2

Enter SG T into (F). Measure the delay time of output waveform at pin (22) to the entry.



Black stretch threshold

1. Set SG U at 200kHz, V1=0.35V and V2=0.1V. Enter them from F. Define the range from the pedestal to the white peak as 100 IRE.
2. Lower V2 from about 75 IRE gradually. Measure an operating point which causes black expansion.

AVTH

1. Enter SG G into H input.
2. Apply voltage of 2.0V to 2A. Measure the amplitude of output waveform at pin (43).
3. Apply voltage of 1.1V to 2A. If the output at pin (43) becomes DC, everything will be O.K.

AVTV, AVEXT

Enter SG F (-6dB) into inputs H and G. Measure the amplitudes of output waveform at pin (43) when the voltage applied to (2A) becomes OPEN and goes to 1.1V.

ACC-1, ACC-2

1. Define output signal voltages (25A) as VA, VB and VC, respectively, when changing the SG L input level to 0, -20 and +6dB.

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

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

Vik

Lower the SG L input level. Represent Vik as an input level when output signal (25A) disappears.

Vok

Enter SG Q. Measure output signal voltage (25A).

C norm.

Enter SG L. Measure output signal voltage (25A) when the voltage applied to (36) is 5.1V.

CS min., CS max.

1. Change the voltage applied to (21) to 0V and 9.0V. Define output signal voltages (25A) as VA and VB, respectively.

2. $CS \text{ min.} = 20 \log \frac{V_A}{C \text{ norm. measured value}} \text{ (dB)}$

$CS \text{ max.} = 20 \log \frac{V_B}{C \text{ norm. measured value}} \text{ (dB)}$

Cu min., Cu max.

1. Change the voltage applied to (36) to 2.5V and 9.0V. Define output signal voltages (25A) as VA and VB, respectively.

2. $Cu \text{ min.} = 20 \log \frac{V_A}{C \text{ norm. measured value}} \text{ (dB)}$

$Cu \text{ max.} = 20 \log \frac{V_B}{C \text{ norm. measured value}} \text{ (dB)}$

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

fPCL, fPCH

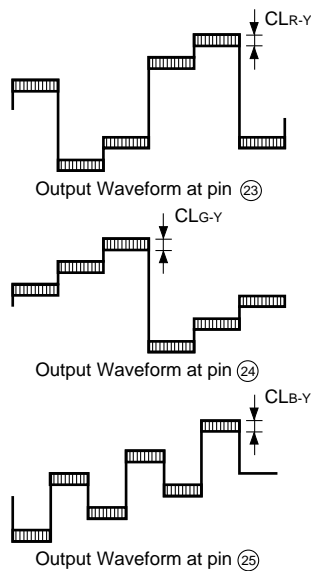
1. Enter SG M. Lower burst and chroma frequencies (fsb=fsc) properly to set them free from pull-in.
2. Raise the frequencies gradually. Measure the input pull-in frequency.
3. Measure the upper pull-in frequency in the same manner.
4. Represent a standard value by a difference from reference value of 3.579545MHz.

fPC

$$fPC = |fPCL| + fPCH \text{ (kHz)}$$

CLB-Y, CLR-Y, CLG-Y

1. Enter SG L of 0dB.
2. Measure a carrier leak at output pins (23), (24) and (25) when applying voltages of 4.5V and 5.1V to (21) and (36).



SSY

Enter SG G into input F. Turn on S36. Measure the amplitude of output signal (22) at scanning period.

SSC

Enter SG G into input E. Turn on S36. Measure the amplitude of output signal 25A.

SSV

Measure the maximum value of output signal (18) when turning on S36.

$$\frac{R-Y}{B-Y} - N, \quad \frac{G-Y}{B-Y} - N$$

1. Enter SG L. Measure output signal voltages 23A, 24A and 25A.

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

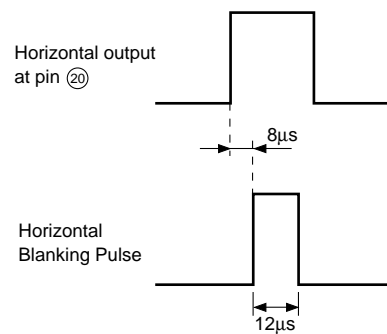
$$\left(\frac{G-Y}{B-Y} - N \right) = \frac{\text{Output signal voltage 24A}}{\text{Output signal voltage 25A}}$$

∠R-Y-N, ∠G-Y-N

Define the output phase of B-Y output (25A) as a reference. Measure the phase differences of R-Y output (23A) and G-Y output (24A).

Measurement notes

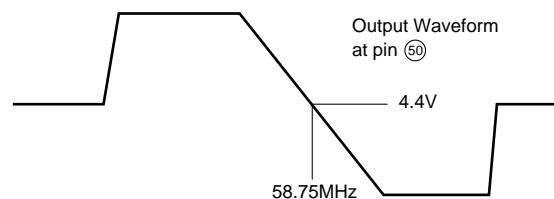
Note 1: For horizontal blanking pulse timing and width, adjust the variable resistor of a one-shot multi-vibrator as shown below.



Decide 8µs using the pin (15) variable resistor of TTL IC M74LS221P. Also, decide 12µs using the pin 7 variable resistor.

Note 2: Coil adjustment
VCO coil

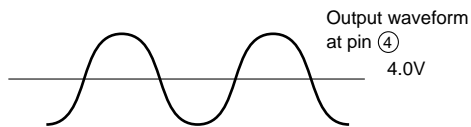
1. Set conditions of measurement to measurement parameter "V50D2".
2. Enter CW with Fo=58.75MHz and Vi=90dBµ from input pin A. Set S49 to 1.
3. Adjust the VCO coil so that the DC of AFT OUT (pin 50) becomes 1/2Vcc (4.4V).



NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

SIF coil

Set conditions of measurement to measurement parameter "V₀₄". Adjust the SIF coil so that the output waveform is maximized and the distortion is minimized.

**Note 3: Video measurement note**

At video measurement, always set the conditions given below.

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

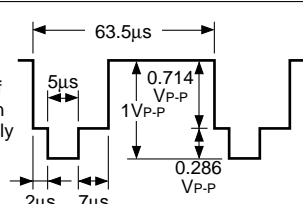
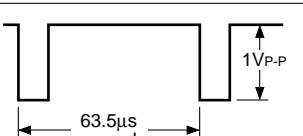
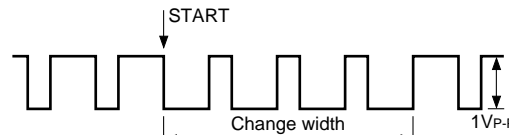
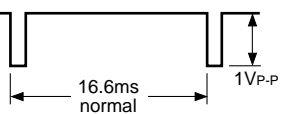
Note 4: Chroma measurement note

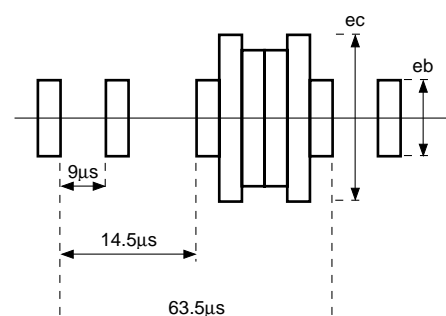
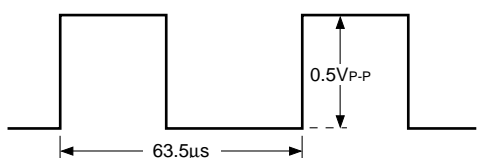
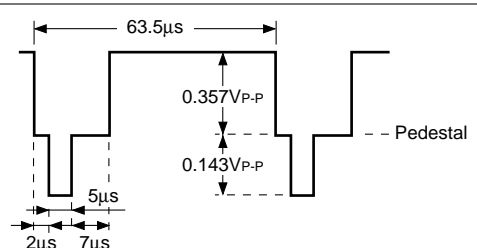
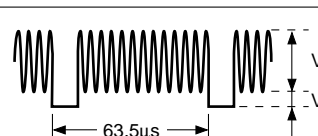
At chroma measurement, always set the conditions given below.

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

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

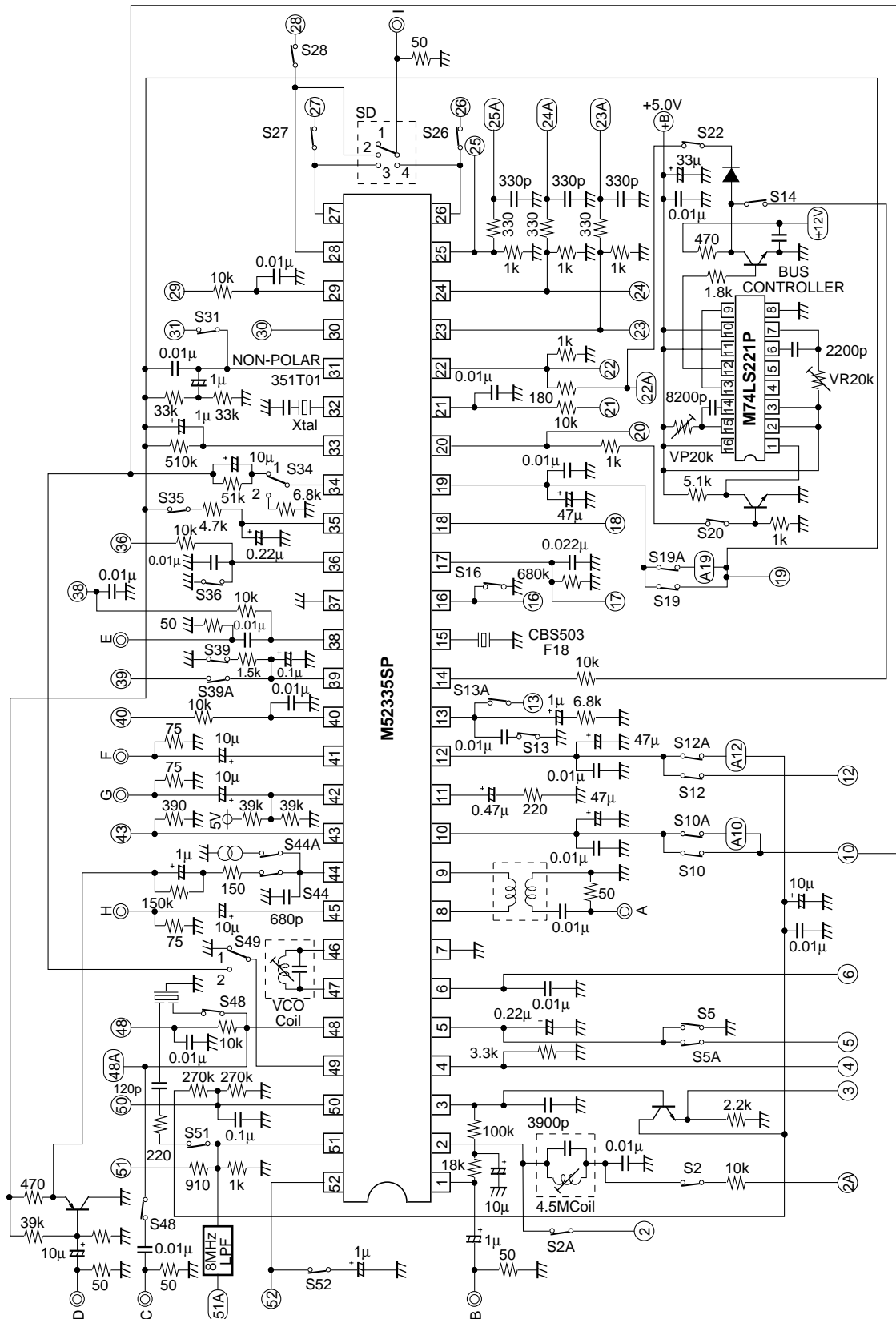
INPUT SIGNAL

SG No.	Signals (50Ω termination)
SG 1	f ₀ =58.75MHz, 90dBμ, fm=20kHz, AM77.8%
SG 2	f ₀ =58.75MHz, 80dBμ, CW
SG 3	f ₀ =58.75MHz, CW, Level variable
SG 4	f ₀ =58.75MHz, fm=20kHz, AM16%, Level variable
SG 5	f ₀ =58.75MHz ±5MHz, 80dBμ, Sweep signal
SG 6	f ₀ =57.75MHz, 80dBμ, CW
SG 7	f ₀ =59.2MHz, 80dBμ, CW
SG 8	f ₀ =54.25MHz, 110dBμ, CW
SG 9	f ₀ =54.25MHz, 70dBμ, CW
SG 10	f ₁ =58.75MHz, 90dBμ, CW f ₂ =53 ±5MHz, 70dBμ, CW } Mixed signal
SG 11	f ₁ =58.75MHz, 90dBμ, CW f ₂ =55.17MHz, 80dBμ, CW f ₃ =54.25MHz, 80dBμ, CW } Mixed signal
SG 12	f ₀ =58.75MHz, 110dBμ, CW
SG 13	f ₀ =58.75MHz, 60dBμ, CW
SG 14	f ₀ =58.75MHz-2.5MHz, f ₀ =58.75MHz+1MHz, 80Bμ, CW
SG 16	f ₀ =58.75MHz, 90dBμ, CW f ₀ =54.25MHz, 70dBμ, CW } Mixed signal
SG 17	f ₀ =4.5MHz, 83dBμ, fm=400Hz, FM±25kHz dev.
SG 19	f ₀ =4.5MHz, 83dBμ, fm=400Hz, FM±25kHz Level variable
SG 20	f ₀ =4.5MHz, 83dBμ, fm=400Hz, AM30%
SG 21	f ₀ =4.5MHz, 83dBμ, CW
SG 23	f ₀ =400Hz, 1VP-P, CW
SG 24	f ₀ =58.75MHz, 90dBμ, CW
SG 25	f ₀ =58.75MHz, 84dBμ, CW
SG 26	f ₀ =1kHz, 20mVP-P, CW
SG 27	f ₀ =58.75MHz, 80dBμ, CW
SG 28	f ₀ =58.75MHz, 45dBμ, CW
SG A	Sync separation input should be an APL 100% standard video signal of NTSC system as shown right. Should be vertically interlaced at 60Hz. 
SG B	Horizontal sync signal.duty 92% Input level and sync should be variable. 
SG C	f=2kHz, 100mVP-P, CW
SG D	SG A vertical sync signal width should be variable. START position is the same. 
SG E	Vertical sync signal.duty 92% Input level and sync should be variable. 

SG No.	Signals (50Ω termination)
SG F	f=200kHz, 2VP-P, CW
SG G	f=200kHz, 200mVP-P, CW
SG H	f=200kHz, 50mVP-P, CW
SG J	f=3.58kHz, 200mVP-P, CW
SG K	f=2MHz to 10MHz Variable, 200mVP-P, CW
SG L	 fSB: Frequency of burst signal fSC: Frequency of chroma signal fSB=fSC=3.579545MHZ 0dB:eb=100mVP-P ec=200mVP-P
SG M	For SGL NTSC simple chroma signals, burst signal and chroma signal should be in the same phase and their frequencies should be variable.
SG N	f=3.5MHz, CW Level variable
SG Q	For SG L NTSC simple chroma signals, burst signal eb should be 0mVP-P and chroma signal amplitude ec should be 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	 Should be APL variable video signals of NTSC system. Should be vertically interlaced at 60Hz.
SG U	f=200kHz, CW V ₁ ,V ₂ variable 

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

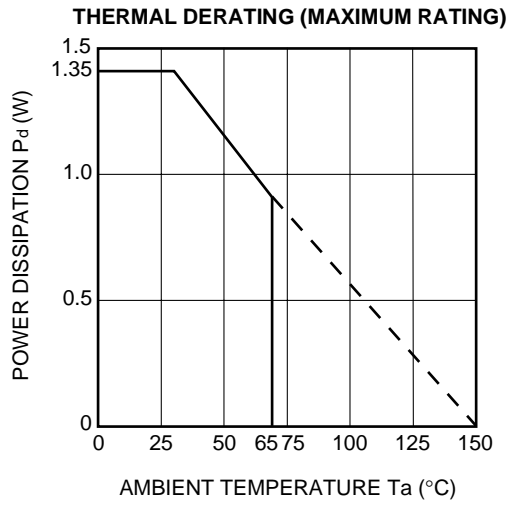
TEST CIRCUIT



Units Resistance : Ω
Capacitance :F

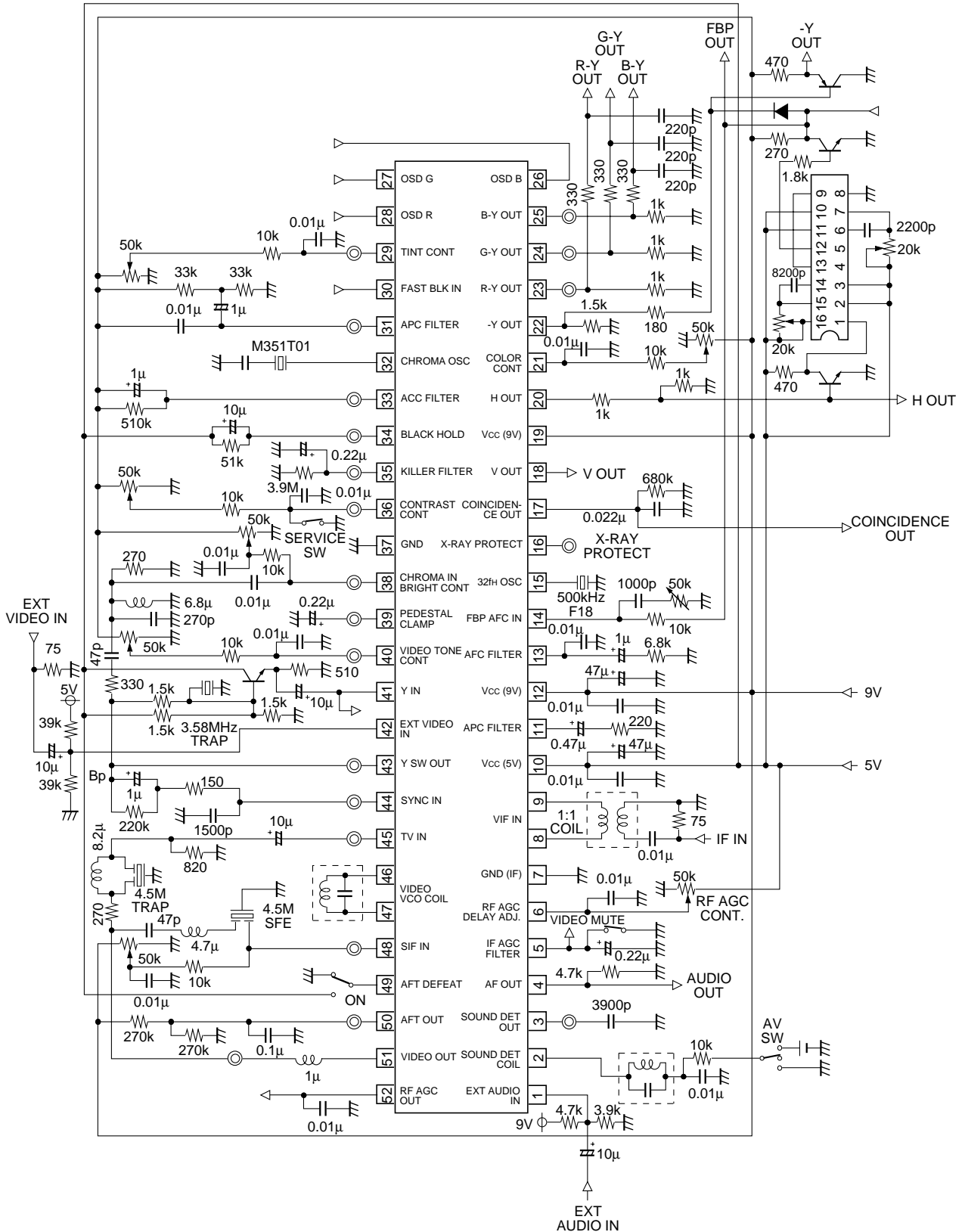
NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

TYPICAL CHARACTERISTICS



NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

APPLICATION EXAMPLE



Units Resistance :Ω
Capacitance :F

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION OF PIN

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Description of function
①	EXT AUDIO IN	3.25V		The input impedance is 18kΩ. Add a bias to outside as shown right for use.
②	SOUND DET COIL	2.5V		<p>The FM detector is a quadrature detector and externally connects a tank coil or discriminator. This is also used as an AV switching pin to apply voltage through a 10kΩ.</p> <p>GND to EXT (Y-DL) OPEN to TV (Y-DL) Vcc (5V) to TV (S input)</p>
③	SOUND DET OUT	3.75V (Varying with coil position)		Sound direct output pin. For de-emphasis, connect a capacitor between this pin and GND.
④	AF OUT	4.2V		Sound output pin through ATT.

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Description of function
⑤	IF AGC FILTER	4.4 to 1.5V		<p>Dynamic AGC circuit is used to improve AGC response characteristics. Set a filter constant to avoid a sag around 70dBμ.</p> <p>IF AGC Voltage</p>
⑥	RF AGC DELAY ADJ.	_____		RFAGC delay point is set by the voltage applied to this pin.
⑦	GND-1 (VIF SIF)	_____	_____	_____
⑧ ⑨	VIF IN	1.5V		Input resistance is 1kΩ. Input capacitance is 7pF.
⑩	Vcc-1 (VIF SIF)	5V	_____	_____
⑪	APC FILTER	3V		<p>⑪ Pin Output</p> <p>The f characteristic of a loop in the locked state can be set by R. Normally, set fc in the range of 100 to 150kHz.</p>

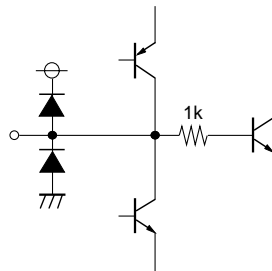
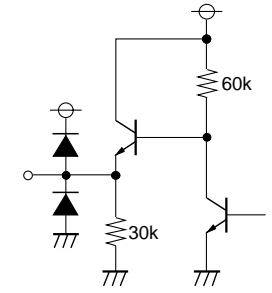
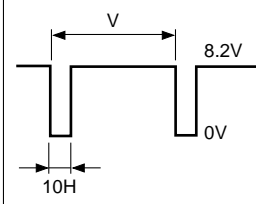
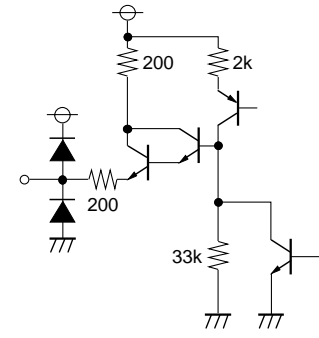
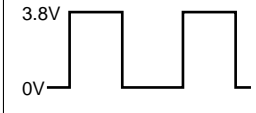
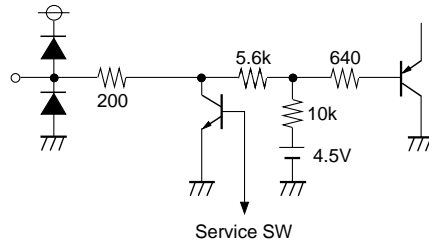
NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Description of function
⑫	H. Vcc	—————	—————	Power supply pin for horizontal and vertical systems. Its current is about 34mA.
⑬	AFC FILTER	6.25V		Horizontal AFC filter pin. Action against VCR skews can be taken by increasing an external resistor R to provide a faster response speed. However, horizontal jitters in a weak electric field will increase.
⑭	AFC FBP IN	—————		Flyback pulse is sliced on 4V to generate an AFC2 detector pulse. Remember that any peak around 4V may cause jitters. The screen moves rightward by integrating and entering the flyback pulse.
⑮	32fh OSC	3.8V		CSB500F18 is used.
⑯	X-RAY PROTECT	—————		Applying voltage of 0.7V or more operates the X-ray protector. Connect to GND if not using the pin.


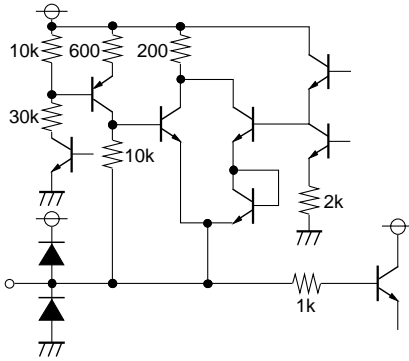
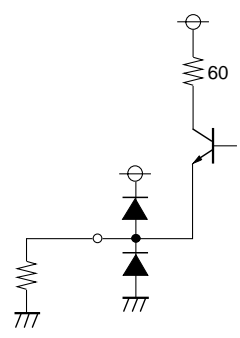

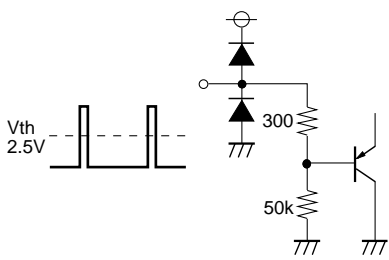
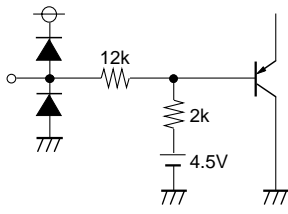
NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Description of function
⑰	COINCIDENCE OUT	8V (Synchronous) to 0V (Asynchronous)		Voltage goes up if a sync signal is entered and horizontal AFC is locked; otherwise, the voltage goes down. Therefore, the pin can be also used as a MUTE detector. At that time, pay attention to high impedance.
⑱	V.OUT	_____		Pulse as shown below is output. 
⑲	Vcc-2 (VCJ)	9V	_____	Power supply for VC, AFT, RF AGC and SIF DET.
⑳	H. OUT	_____		Horizontal pulse of 24μs wide is output. It is open emitter output. 
㉑	COLOR CONT.	4.5V		Color control pin. Its voltage goes to 0V when service SW is ON.


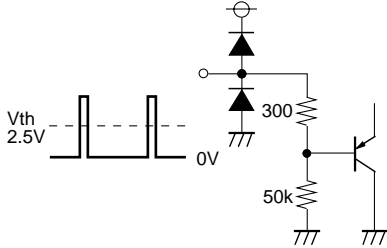
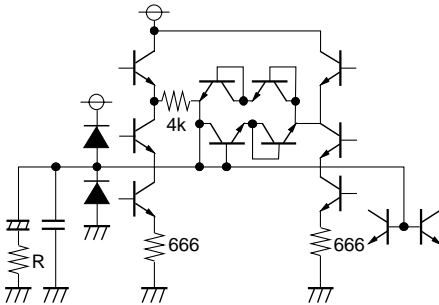
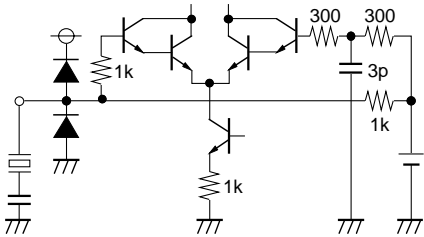

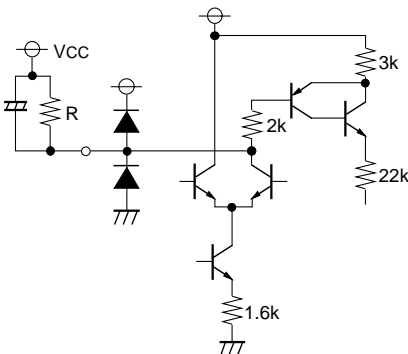
NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Description of function
②②	-Y OUT			Video output pin. When a flyback pulse is entered from outside, a blanking pulse is entered internally and a chroma symbol is also blanked. The blanking threshold voltage is 7.1V.
②③ ②④ ②⑤	R-Y OUT G-Y OUT B-Y OUT	5.4V		Open emitter output with maximum current of about 5mA.
②⑥ ②⑦ ②⑧	OSD B OSD G OSD R			Input impedance is 50kΩ. Apply voltage of 2.5V or more when inserting a character signal.
②⑨	TINT CONT.	4.5V		Tint control pin.

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Description of function
③⑩	FAST BLK IN			Applying voltage of 2.5V or more causes blanking.
③①	APC FILTER	6.5V		Cap challenge is changed by R. As R is decreased, the cap challenge becomes narrower but phase jitters are reduced.
③②	CHROMA OSC	6.8V	 <p>Such as M351T01</p>	Use XTAL of series capacitance type.
③③	ACC FILTER			As R is decreased, chroma output increases but ACC is not activated smoothly.

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Description of function
③④	BLACK HOLD	About 3.2V		Pin holding the most dark part of a video signal. As R is increased, the black peak is held; contrarily, the peak gets closer to an average.
③⑤	KILLER FILTER	7.6V at signal input		To decrease killer sensitivity, connect a several M of resistor between the pin and GND.
③⑥	CONTRAST CONT.	Normally 4.8V Applied from outside		Can be controlled by 5.1V center.
③⑦	GND-2 (VCD)	_____	_____	_____
③⑧	CHROMA IN/ BRIGHTNESS	4.5V		Chroma signal standard. Make an entry at 200mV _{P-P} . This pin is also used as a brightness control pin. DC reproduction ratio is 100%.

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Description of function
③⑨	PEDESTAL CLAMP	About 2.2V		Used to connect a hold capacitor.
④⑩	VIDEO TONE CONT.	4.5V		Sharpness control pin. By increasing voltage, the pin is set to soft side.
④①	Y IN	3.3V		Make an entry at low input impedance to avoid pedestal clamp. Standard coupling capacitor is 0.1μF. Make an entry at 0.5V _{P-P} .
④②	EXT VIDEO IN	—————		Make an entry at 1V _{P-P} .

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Description of function
④③	Y SW OUT	2.5V		Output at 1.5VP-P.
④④	SYNC IN	6.6V		Sync separation of emitter input type. Vertical sync separation is done inside the IC.
④⑤	TV IN	2.5V		Make an entry at 1VP-P.
④⑥ ④⑦	VCO COIL	4V		Reference tuning capacitance is 27pF. As the capacitance is decrease, the variable range becomes wider but stability becomes worse.

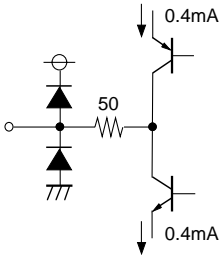
NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Description of function
④⑧	SIF IN/ATT	4.5V		Volume control pin.
④⑨	AFT DEFEAT	—		Applying voltage of 2.5V or more defeats AFT.
⑤⑩	AFT OUT	8.2 to 0.5V		Current output type. As load resistor R is increased, detector sensitivity becomes higher but offlot becomes larger.
⑤①	VIDEO OUT	—		Output at 1.4V _{P-P} . 1.75V is applied to sink tip.

NTSC SYSTEM SINGLE-CHIP COLOR TV SIGNAL PROCESSOR

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Description of function
<p>⑤②</p>	<p>RF AGC OUT</p>	<p>—————</p>		<p>Current output type. Max. 0.4mA.</p>