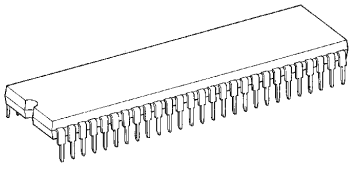
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8884AN

RGB PROCESSOR IC

The TA8884AN is an RGB processor IC for digital-analog system color TV. TA8884AN organizes digital-analog TV system by combined with TC90A02F or TC90A06F (Digital VCD IC : TOSHIBA Product). Input signals are Luminance signal and color difference signals which have been demodulated by digital IC. And RGB primary color signals are outputted.

TA8884AN contains I^2C bus, so various control and setting of various function can be digital-controled through the bus line.



SDIP54-P-600-1.78

Weight : 5.44g (Typ.)

FEATURES

Video stage

- Super real transient
- Black expansion
- Luminance γ correction
- High-bright color
- DC restoration

Chroma stage

- Output of primary color signals
- Cut-off, drive adjustment
- Color detail emphasis
- Changing of relative phase and relative amplitude
- Color γ correction
- Automatic correction of flesh tone
- ACC circuit

RGB stage

- On screen display interface
- Analog RGB interface
- Fast blanking

961001EBA2

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- The products described in this document are subject to foreign exchange and foreign trade control laws.
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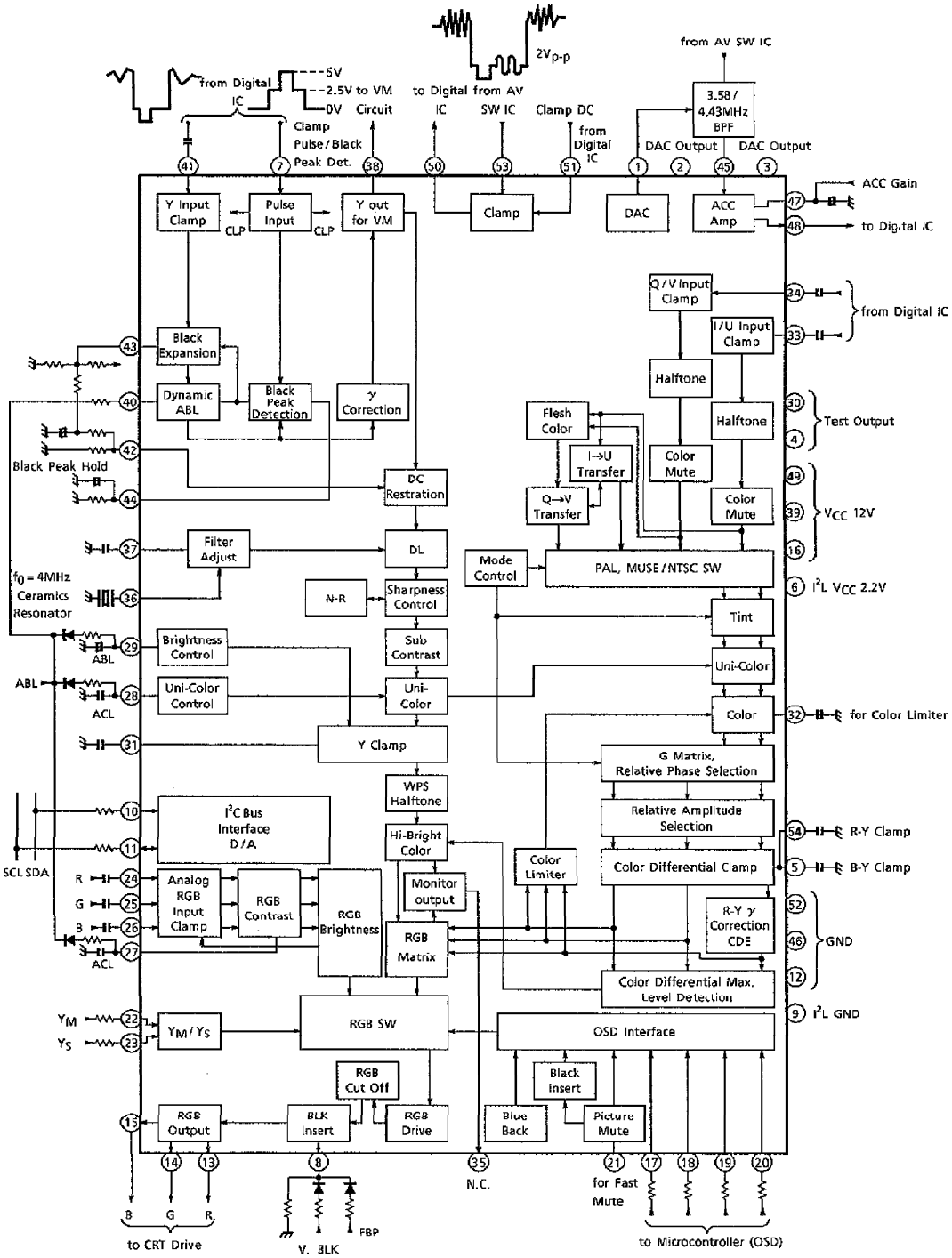
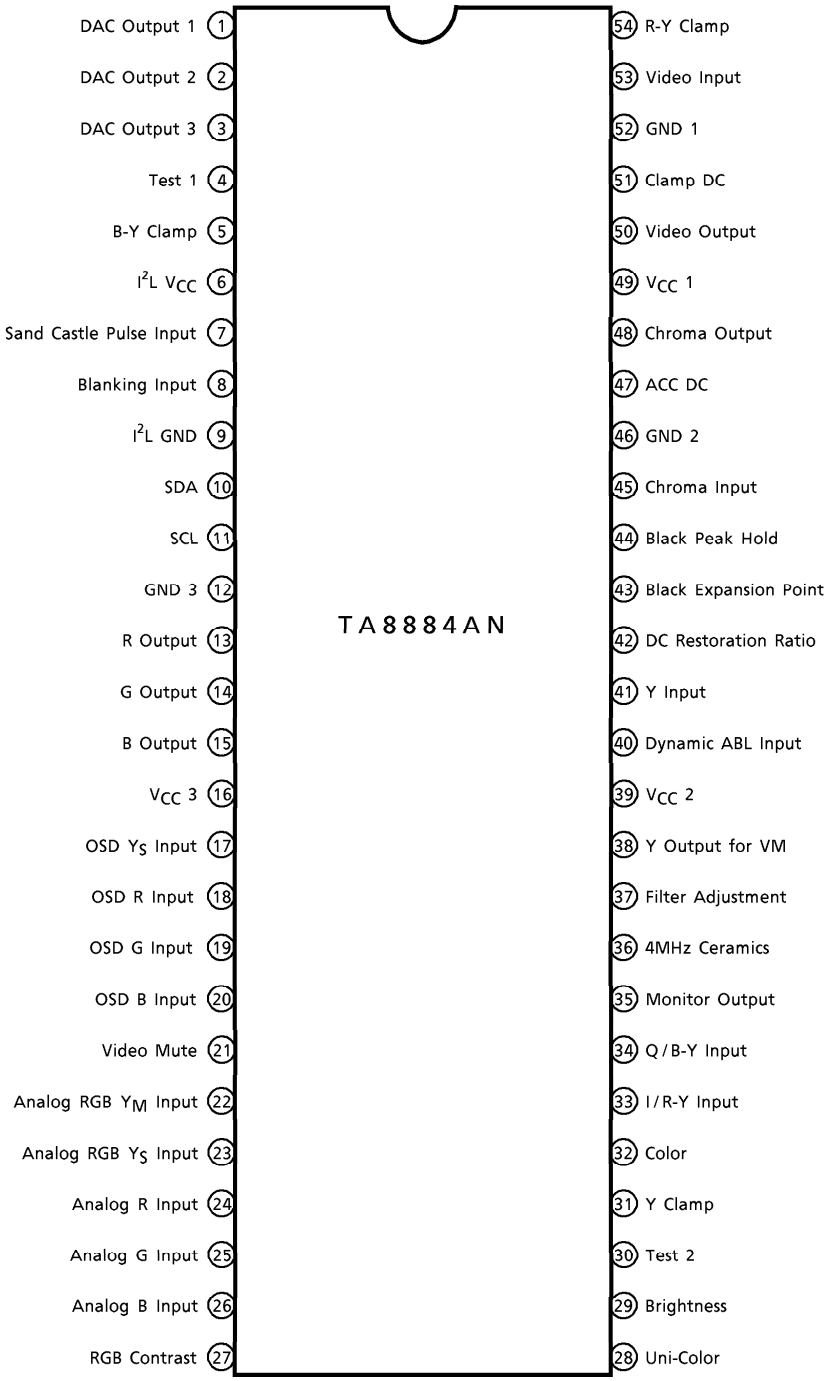
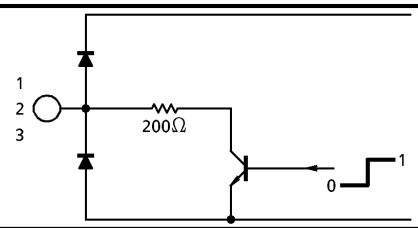
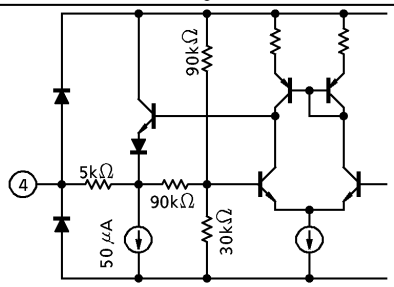
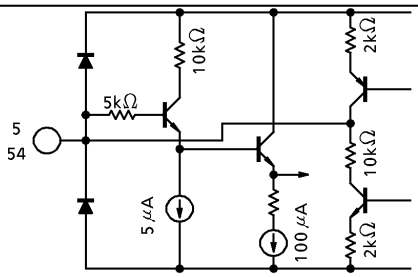
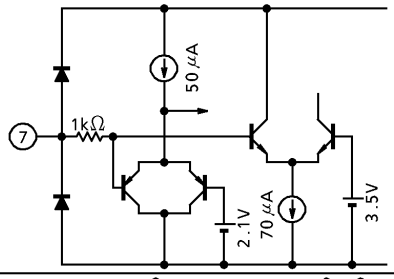
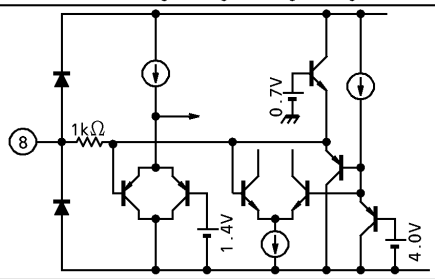
BLOCK DIAGRAM

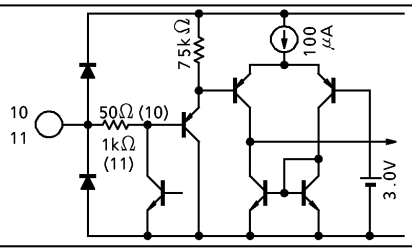
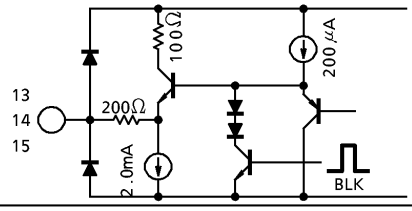
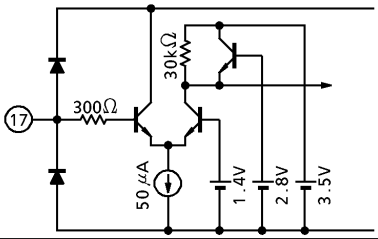
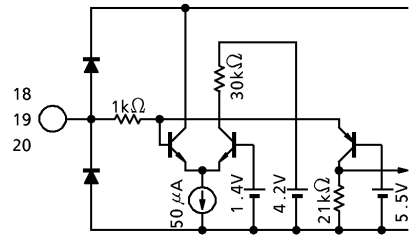
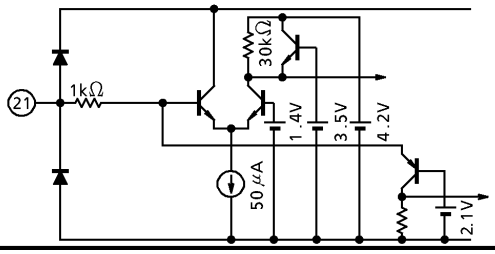


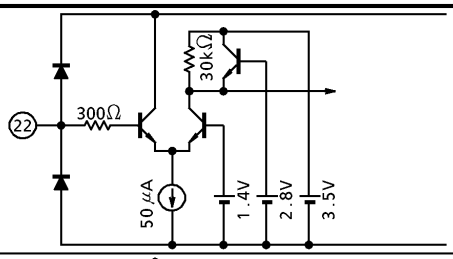
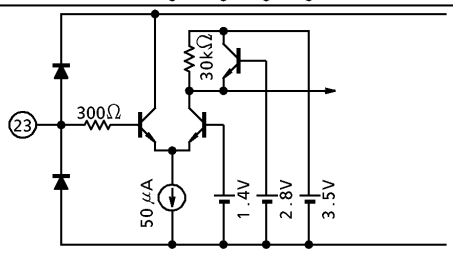
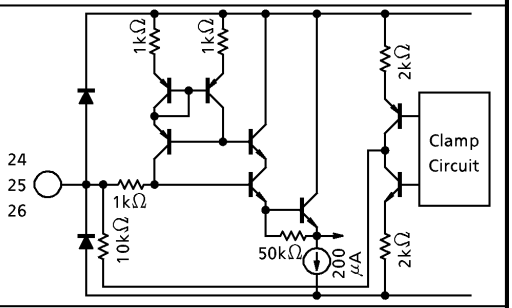
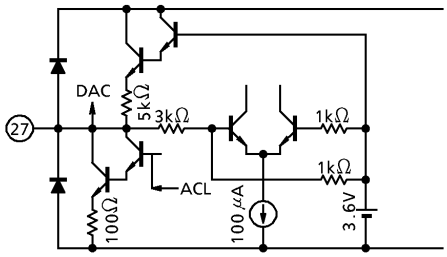
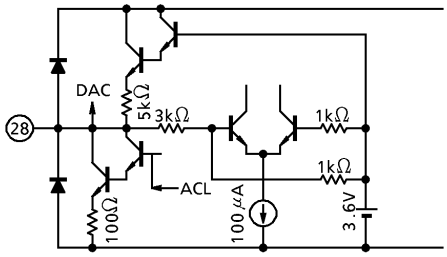
TERMINAL CONNECTION DIAGRAM

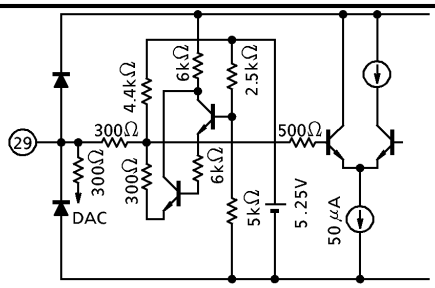
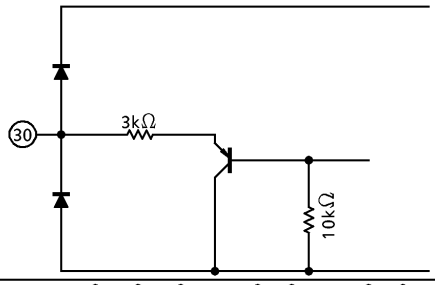
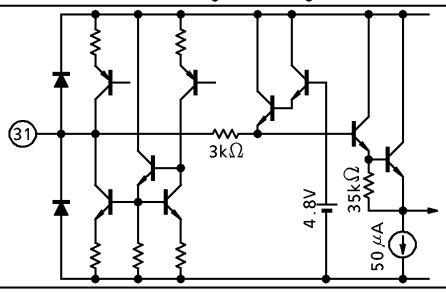
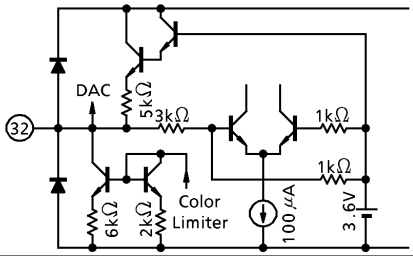
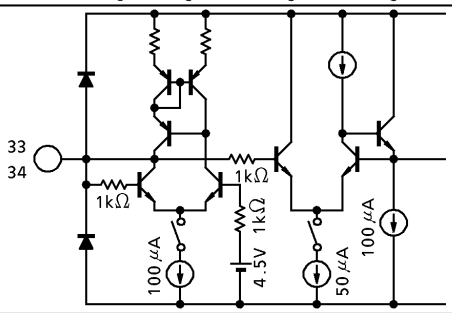


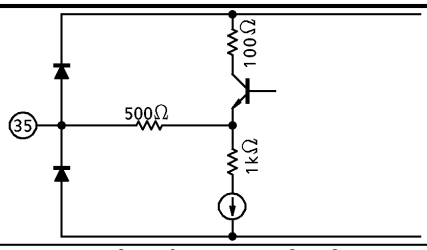
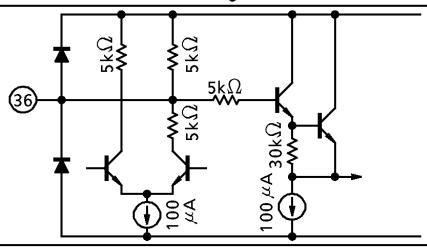
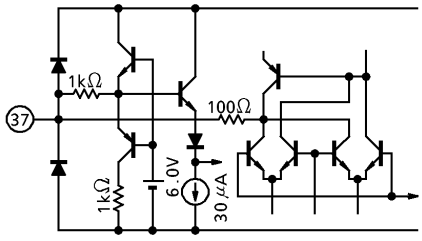
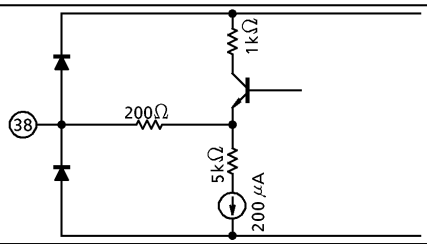
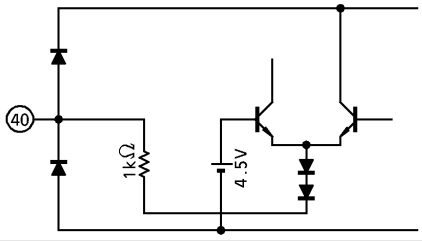
TERMINAL FUNCTION

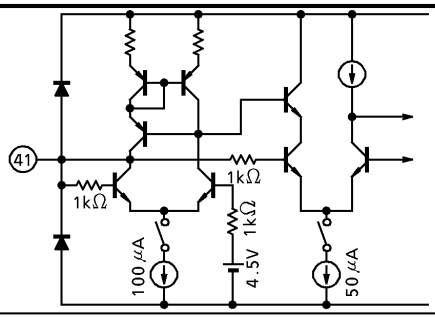
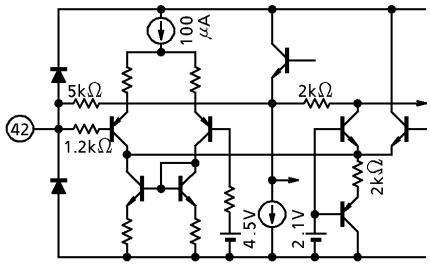
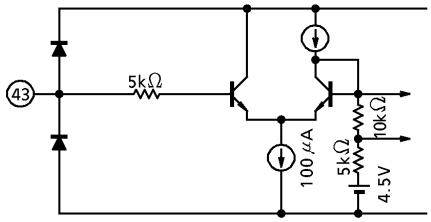
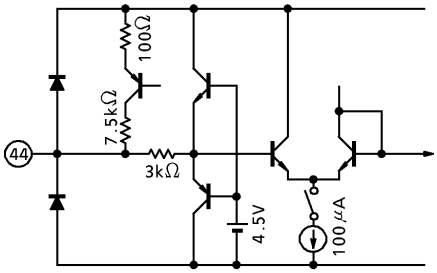
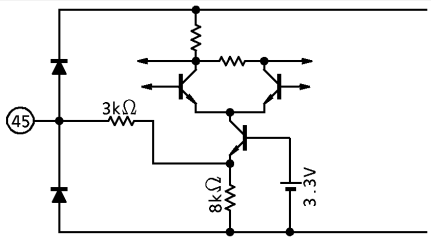
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
1 2 3	DAC Output 1 DAC Output 2 DAC Output 3	The terminals for 1 bit DAC output. Controlled by I^2C bus. When the data is "1", this terminal's voltage is 0V.	
4	Test 1	The terminal for test of this IC. Please use this IC with this terminal open.	
5 54	B-Y Clamp R-Y Clamp	The terminals for a filter to clamp R-Y and B-Y signals. Pedestal levels of R-Y, B-Y and G-Y signal are made equal by the internal clamping circuit.	
6	I^2L V_{CC}	V_{CC} of I^2L circuit. Please supply 2.2V to this terminal.	—
7	Sand Castle Pulse Input	The terminal for input of sand castle pulse (Black peak detection pulse + clamp pulse). Threshold levels of B.P.D pulse and C. pulse are 2.1V and 3.5V.	
8	Blanking Pulse Input	The terminal for input of horizontal and vertical blanking pulse. Threshold levels of H.B. pulse and V.B. pulse are 4.0V and 1.4V.	

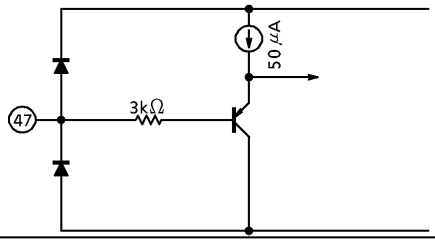
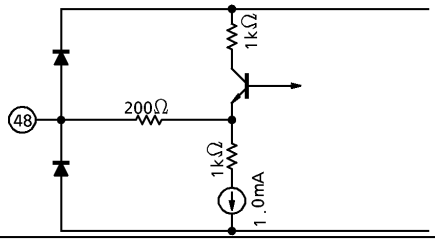
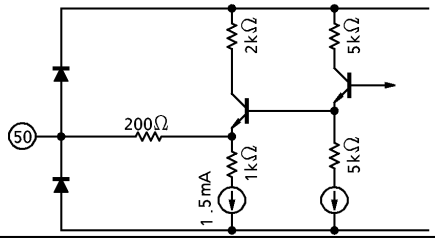
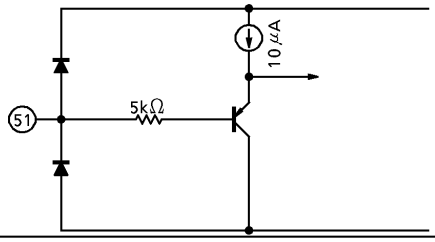
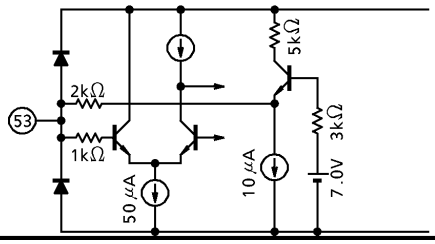
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
9	I^2L GND	Ground of I^2L circuit.	—
10 11	SDA SCL	The terminals for I^2C bus input and output. Input threshold level is 2.3V.	
12	GND 3	Ground of RGB interface part, color-defference demodulation circuit and Digital / Analog Convertor.	—
13 14 15	R Output G Output B Output	The terminals for output of RGB primary color signals. Horizontal and vertical blanking signals are mixed with RGB signals.	
16	V_{CC} 3	V_{CC} of RGB interface part, color-defference demodulation circuit and Digital / Analog Convertor. Please supply 12V to this terminal.	—
17	OSD Y_S Input	The terminals for input of fast blanking signal for On Screen Display. Threshold level is 1.4V.	
18 19 20	OSD R Input OSD G Input OSD B Input	The terminals for input of RGB signals for OSD. Threshold levels are 1.4V. If Terminal 20 is connected with V_{CC}, it is test mode for this IC. Threshold level of test mode is V_{CC} – 0.7V.	
21	Video Mute	The terminal for input a signal to mute the video signal when combining this IC with AKB IC. Threshold levels of video mute (muting TV and Picture In Picture) and TV mute (muting only TV) are 2.8V and 1.4V.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
22	Analog RGB Y_M Input	The terminal for input a signal to reduce the contrast of TV signal when Analog RGB signals superimpose upon TV signal. Threshold level is 1.4V.	
23	Analog RGB Y_S Input	The terminal for input of fast blanking signal for Analog RGB. Threshold level is 1.4V.	
24 25 26	Analog R Input Analog G Input Analog B Input	The terminals for input of Analog RGB signals. These are clamped by internal clamping circuit. Recommendable input levels are $1.0V_{p\text{-}p}$.	
27	RGB Contrast	The terminal to control the contrast of Analog RGB signals.	
28	Uni-Color	The terminal for output of DAC to adjust Uni-Color and also for input of Automatic Contrast Limiter.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
29	Brightness	The terminal for output of DAC to adjust Brightness and also for input of Automatic Brightness Limiter.	
30	Test 2	The terminal for test of this IC. If this terminal is connected with V_{CC}, it is the test mode for this IC. Please use this IC with this terminal connected to GND.	
31	Y Clamp	The terminal for a filter to clamp Y signal. It is impossible to change DC restoration ratio by brightness control circuit because it is compensated by pin 42. It is fixed to 100%.	
32	Color	The terminal to fix time constant of Color Limiter. Please connect capacitor to this terminal.	
33 34	I / R-Y Input Q / B-Y Input	The terminals for input of I / R-Y and Q / B-Y signals from digital IC. Please input the signals through capacitors because the signals are clamped to standard voltage at the inside of this IC.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
35	Monitor Output	The terminal to observe Y, R-Y, B-Y and G-Y signals. The signals are selected by I^2C bus.	
36	4MHz Ceramics	The terminal for 4MHz Ceramics resonator to adjust internal Delay Line.	
37	Filter Adjustment	The terminal for a filter to adjust delay time of internal Delay Line. The peak frequency of DL aperture correction is 4.0MHz when only capacitor is connected. To insert resistance between this terminal and GND makes peak frequency lower, between this and V_{CC} makes it higher.	
38	Y Output for Velocity Modulation	The terminal for output of Y signal to velocity modulation circuit. This Y signal is output after passing black expansion and γ correction circuit.	
39	V_{CC} 2	V_{CC} of video part and sharpness part. Please give 12V to this terminal.	—
40	Dynamic ABL Input	The terminal to supply control current for Dynamic ABL and Black Peak Level Correction. D. ABL and B.P.L.C. are the functions to shift the level of Y signal toward black side when the most black level is still whitish after black expansion.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
41	Y Input	The terminal for input of Y signal. Recommendable input level is $1.0V_{p-p}$ (negative Sync). Because the pedestal level of Y signal is clamped at this terminal, please reduce the impedance of signal source.	
42	DC Restoration Ratio	The terminal to correct DC restoration ratio. DC restoration ratio is fixed by following expression. $T_{DC} = \frac{5k\Omega}{5k\Omega + R\Omega} \times 30 + 100\ [\%]$ The smaller the external resistance R is, the larger the amount of correction is. With this terminal open, you can monitor the Y signal from which has been removed Sync signal and which has been done black expansion.	
43	Black Expansion Point	The terminal to fix black expansion start point. The higher voltage is supplied, the higher the start point is.	
44	Black Peak Hold	The terminal to control the gain of black expansion and of black level shift for Dynamic ABL. Resistance connected between this terminal and GND makes black expansion change. The smaller the resistance is, the larger the black area is.	
45	Chroma Input	The terminal for input of Chroma signal. Recommendable input level is $50mV_{p-p}$.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
46	GND 2	GND of video part and sharpness part.	—
47	ACC DC	The terminal to fix the gain of ACC Amp. The higher voltage is supplied (0~5V), the larger the gain is.	
48	Chroma Output	The terminal for output of Chroma signal which has been input to pin 45 and has passed ACC Amp.	
49	V_{CC} 1	V_{CC} of ACC part. Please supply 12V to this terminal.	—
50	Video Output	The terminal for output of Composite Video signal which has been input to pin 53. This signal is output after clamped to the level which is fixed by pin 52's voltage	
51	Clamp DC	The terminal to fix clamping level for Composite Video signal which has been input to pin 53. Please supply 0~5V to this terminal.	
52	GND 1	GND of ACC part.	—
53	Video Input	The terminal for input of Composite Video signal. Recommendable input level is $2V_{p-p}$.	

I²C BUS MAP (Slave Address : 88H)

FUNCTION	SUB ADD.	DATA							
		D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
Uni-color (TV)	00	Video Mute (0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Brightness (TV)	01	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Color (TV)	02	Color Mute (0)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Tint (TV)	03	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Sharpness (TV)	04	Color Temperature Mode (1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
RGB Brightness	05	Brightness Link (0)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
RGB Contrast	06	OSD Contrast (1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Sub-Contrast	07	Y Gain for VM (1)	(1)	Color Limiter Level (1)	(1)	(1)	(0)	(0)	(0)
R Cut off	08	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
G Cut off	09	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
B Cut off	0A	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
G Drive	0B	Color Temperature (0)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
B Drive	0C	Blue Back (0)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Color-Difference Control	0D	γ Color Correction (1)	R-Y Phase (0)	P / N Change (0)	Flesh Tone ON / OFF (0)	Flesh Tone Pull-in Range (1)	Color Detail Emphasis (0)	(0)	DAC1 (0)
Video Control 1	0E	Service (0)	High-Bright Color (0)	(0)	Sharpness Tracking (1)	(0)	DAC2 (0)	WPS (0)	Peak ACL ON / OFF (0)
Video Control 2	0F	DAC3 (0)	Black Expansion (0)	Y-NR Level (1)	(1)	γ Correction Point (1)	(1)	Monitor Output (0)	(0)

(0), (1) : Preset

CONTENTS OF BUS CONTROL

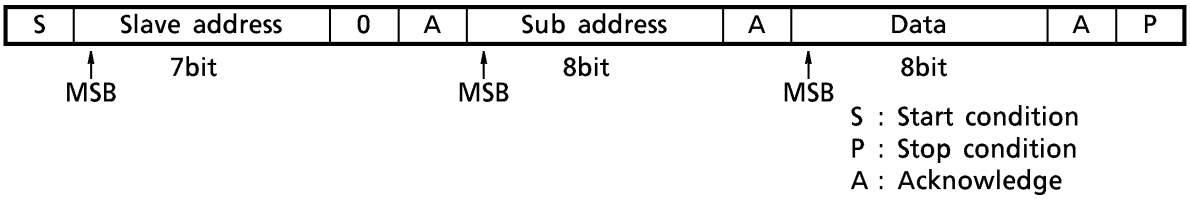
ITEM	SUBSTANCE (MIN.~MAX.)	DE-FAULT
Uni-color (TV)	– 18dB~0dB (7bit)	0dB
Brightness (Including Sub)	– 1.3V~ + 1.3V 10mV / STEP (8bit)	0V
Tint (Including Sub)	– 51.2°~ + 50.8° 0.4° / STEP (8bit)	0°
Color	– 14dB~ + 4dB (7bit)	0dB
Brightness Link	0 : OFF (Brightness of RGB is fixed by data of RGB Brightness.) 1 : ON (Brightness of RGB is linked with Brightness of TV.)	OFF
RGB Contrast	– 18dB~0dB (Same characteristic as Uni-Color) (7bit)	– 5dB
Sub Contrast (TV)	– 2dB~ + 2dB 0.25dB / STEP (4bit)	0dB
Sharpness Tracking	Correction level of S.R.T when Sharpness is center 00 : – ∞ / 01 : – 3dB / 10 : 0dB / 11 : + 3dB	0dB
Sharpness	– 6dB~ + 12dB (at 2.4MHz) (7bit)	+ 6dB
RGB Brightness (Including Sub)	– 0.9V~ + 0.9V (7bit)	0V
Primary Color Output Cut Off	– 0.3V~ + 0.7V (Compared with 3V) 4mV / STEP (8bit)	+ 0.2V
Primary Color Output Drive	The standard is R. – 3dB~ + 3dB (7bit)	center
OSD Contrast	0 : $2.0V_{p-p}$ / 1 : $2.5V_{p-p}$	$2.5V_{p-p}$
Blue Back ON / OFF	0 : OFF / 1 : $1.2V_{p-p}$	OFF
High-Bright Color	00 : OFF / 01 : 0.04 / 10 : 0.08 / 11 : 0.12 times	OFF
Flesh Tone ON / OFF	0 : OFF / 1 : ON Drawing to I axis (123°)	OFF
Flesh Tone Pull-in Range	0 : ± 34° / 1 : ± 18° (Compared with I axis)	± 18°
Color Limiter Level	00 : + 1dB / 01 : 0dB / 10 : – 1dB / 11 : OFF	OFF
Color Temperature Mode Change	0 : ON At all modes, color temperature mode change is on. 1 : OFF At normal TV mode, color temperature mode change is on.	OFF
Y Output Gain For Velocity Modulation	00 : – ∞ / 01 : – 6dB / 10 : – 3dB / 11 : 0dB	0dB
Service	0 : OFF Normal mode 1 : ON RGB output voltage becomes to cut off voltage	OFF
Y-NR Level	00 : 75 IRE (Y-NR Level is 0.) / 01 : 50 IRE / 10 : 25 IRE / 11 : OFF	OFF
γ Correction Start Point	00 : 70 IRE / 01 : 80 IRE / 10 : 90 IRE / 11 : OFF	OFF
Peak ACL ON / OFF	0 : OFF / 1 : ON	OFF
White Peak Slice Level	0 : 95 IRE / 1 : 105 IRE (The standard is cut off voltage)	95 IRE
DAC Output 1	0 : OPEN / 1 : ON	OPEN
Color Detail Emphasis	00 : OFF / 01 : + 3dB / 10 : + 6dB / 11 : + 9dB (max gain) at R-Y	OFF
R-Y Phase	0 : 95° / 1 : 90°	95°
Black Expansion Max. Gain	0 : + 3dB / 1 : OFF	+ 3dB
PAL / NTSC Change	0 : NTSC / 1 : PAL	NTSC
DAC Output 2	0 : OPEN / 1 : ON	OPEN
DAC Output 3	0 : OPEN / 1 : ON	OPEN
Color γ Correction	Positive side of R-Y is corrected. 0 : ON / 1 : OFF	OFF
Video Mute	0 : OFF / 1 : ON	OFF

ITEM	SUBSTANCE (MIN.~MAX.)	DE-FAULT
Color Mute	0 : OFF / 1 : ON	OFF
Color Temperature	0 : OFF / 1 : ON (G : – 1dB, B : – 2dB)	OFF
Monitor Output	Selection among 00 : G-Y / 01 : R-Y / 10 : B-Y / 11 : Y	G-Y

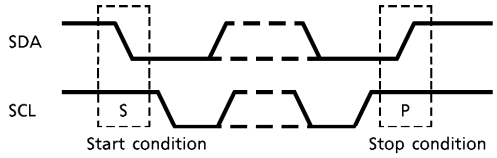
I²C BUS CONTROLLED FORMAT SUMMARY

Bus controlled format of TA8884AN is based on I²C Bus control format of Philips.

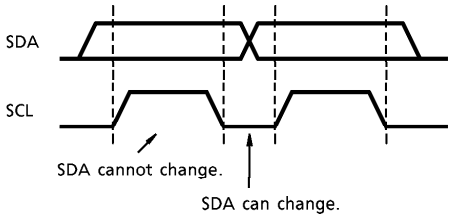
Data transfer format



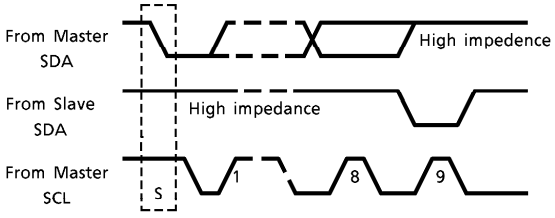
(1) Start and stop condition



(2) Bit transfer



(3) Acknowledge



(4) Slave address

A6	A5	A4	A3	A2	A1	A0	R / $\overline{W}$
1	0	0	0	1	0	0	0

Purchase of TOSHIBA I²C components conveys a license under the Philips I²C Patent Rights to use these components in an I²C system, provided that the system conforms to the I²C Standard Specification as defined by Philips.

MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{CC}	14.5	V
Input Signal Voltage	e_{in}	5.0	V_{p-p}
Power Dissipation	P_D (Note)	1920	mW
Operating Temperature	T_{opr}	−20~65	°C
Storage Temperature	T_{stg}	−55~150	°C

(Note) When using the device at above Ta = 25°C, decrease the power dissipation by 15.4mW for each increase of 1°C.

RECOMMENDABLE POWER SUPPLY VOLTAGE

PIN No.	PIN NAME	MIN.	TYP.	MAX.	UNIT
16, 39, 49	12V V_{CC}	11.0	12.0	13.0	V
6	2.2V V_{CC}	2.0	2.2	2.4	V

ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS (Unless otherwise specified, V_{CC} = 12V, I^2L V_{CC} = 2.2V, Ta = 25°C)

DC voltage characteristics

PIN No.	PIN NAME	SYMBOL	MIN.	TYP.	MAX.	UNIT
1	DAC Output 1	V_1	11.5	11.9	12.0	V
2	DAC Output 2	V_2	11.5	11.9	12.0	V
3	DAC Output 3	V_3	11.5	11.9	12.0	V
4	Test 1	V_4	6.15	6.65	7.15	V
5	B-Y Clamp	V_5	6	7	8	V
6	I^2L V_{CC}	V_6	—	2.2	—	V
7	SCP Input	V_7	4.3	4.6	4.9	V
8	BLK Input	V_8	—	0	—	V
9	I^2L GND	V_9	—	0	—	V
10	SDA	V_{10}	—	0	—	V
11	SCL	V_{11}	—	0	—	V
12	GND 3	V_{12}	—	0	—	V
13	R Output	V_{13}	3.1	3.3	3.5	V
14	G Output	V_{14}	3.1	3.3	3.5	V
15	B Output	V_{15}	3.1	3.3	3.5	V
16	V_{CC} 3	V_{16}	—	12	—	V
17	OSD Y_S Input	V_{17}	—	0	—	V
18	OSD R Input	V_{18}	—	0	—	V
19	OSD G Input	V_{19}	—	0	—	V
20	OSD B Input	V_{20}	—	0	—	V
21	Video Mute	V_{21}	—	0	—	V
22	Analog RGB Y_M Input	V_{22}	—	0	—	V
23	Analog RGB Y_S Input	V_{23}	—	0	—	V
24	Analog RGB R Input	V_{24}	3.7	4.0	4.3	V
25	Analog RGB G Input	V_{25}	3.7	4.0	4.3	V
26	Analog RGB B Input	V_{26}	3.7	4.0	4.3	V
27	RGB Contrast	V_{27}	3.45	3.65	3.85	V
28	Uni-Color	V_{28}	3.45	3.65	3.85	V
29	Brightness	V_{29}	4.3	4.5	4.7	V
30	Test 2	V_{30}	0.0	0.8	1.5	V
31	Y Clamp	V_{31}	6.5	7.5	8.5	V
32	Color	V_{32}	3.45	3.65	3.85	V
33	I/R-Y Input	V_{33}	5.9	6.1	6.3	V
34	Q/B-Y Input	V_{34}	5.9	6.1	6.3	V
35	Monitor Output	V_{35}	4.5	4.7	4.9	V
36	4MHz Ceramics	V_{36}	11.5	11.8	12.0	V
37	Filter Adjustment	V_{37}	5.2	6.0	6.8	V

PIN No.	PIN NAME	SYMBOL	MIN.	TYP.	MAX.	UNIT
38	Y Output For VM	V_{38}	3.0	3.5	4.0	V
39	V_{CC} 2	V_{39}	—	12	—	V
40	Dynamic ABL Input	V_{40}	2.1	2.6	3.1	V
41	Y Input	V_{41}	4.3	4.5	4.7	V
42	DC Restoration	V_{42}	4.1	4.3	4.5	V
43	Black Expansion Point	V_{43}	4.1	4.3	4.5	V
44	Black Peak Hold	V_{44}	3.7	4.5	5.3	V
45	Chroma Input	V_{45}	2.3	2.6	2.9	V
46	GND 2	V_{46}	—	0	—	V
47	ACC DC	V_{47}	—	0	—	V
48	Chroma Output	V_{48}	4.05	4.20	4.35	V
49	V_{CC} 1	V_{49}	—	12	—	V
50	Video Output	V_{50}	2.1	2.3	2.5	V
51	Clamp DC	V_{51}	—	0	—	V
52	GND 1	V_{52}	—	0	—	V
53	Video Input	V_{53}	6.15	6.35	6.55	V
54	R-Y Clamp	V_{54}	6	7	8	V

DC current characteristics

PIN No.	PIN NAME	SYMBOL	MIN.	TYP.	MAX.	UNIT
49	V_{CC} 1	I_{CC} 1	4.02	4.82	6.03	mA
39	V_{CC} 2	I_{CC} 2	24.40	29.28	36.60	mA
16	V_{CC} 3	I_{CC} 3	40.03	48.03	60.04	mA
6	I^2L V_{CC}	I^2L I_{CC}	7.19	8.63	10.78	mA

AC CHARACTERISTICS (Unless otherwise specified, V_{CC} = 12V, I^2L V_{CC} = 2.2V, Ta = 25°C)
Video stage

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Video Gain	G_{V50}	—	(Note 1)	0.95	1.00	1.05	—
Video Frequency Characteristics	G_{f50}	—	(Note 2)	—	− 1	− 3	dB
Dynamic Range Of Video Input And Output	DR_{53}	—	(Note 3)	5.6	6.2	—	V_{p-p}
	V_{50}^{MAX}			7.0	7.4	—	V
	V_{50}^{MIN}			—	0.1	0.5	
Video Clamp Characteristics	DR_{51}	—	(Note 4)	3.8	4.0	4.2	V_{p-p}
	V_{51}^{CNT}			2.35	2.40	2.55	V
	V_{CL}^{MAX}			4.4	4.6	4.8	
	V_{CL}^{MIN}			2.1	2.3	2.5	
Drive Current Of Video Output	I_{50}	—	(Note 5)	1.2	1.5	1.8	mA
Drive Current Of Chroma Output	I_{48}	—	(Note 6)	0.7	1.0	1.3	mA
ACC Characteristics	G_{V48}^{MAX}	—	(Note 7)	24	27	30	—
	G_{V48}^{CNT}			10.5	12.5	15.0	
	G_{V48}^{MIN}			0.5	0.6	0.7	
Dynamic Range Of Chroma Input And Output	DR_{45}	—	(Note 8)	1.7	1.9	2.1	V_{p-p}
	V_{48}^{MAX}			5.4	5.6	5.8	V
	V_{48}^{MIN}			2.6	2.8	3.0	
Pedestal Clamp Voltage For Y Input	V_{41}	—	(Note 9)	4.3	4.5	4.7	V
Phase Of Pedestal Clamp Pulse For Y Input	T_{CL1}	—	(Note 10)	—	0.0	1.0	μs
	T_{CL2}			2.0	2.2	2.4	
Gain Of DC Restoration Ratio Amplifier	A_{V42}	—	(Note 11)	0.28	0.34	0.40	—
Max. Sensitivity Of Dynamic ABL	G_{V40}	—	(Note 12)	3.5	5.0	6.5	mV / μA
Max. Gain Of Black Expansion Amplifier	G_{VBE}	—	(Note 13)	1.3	1.4	1.5	—
Dynamic Range Of Y Input	DR_{41}	—	(Note 14)	0.9	1.0	1.2	V_{p-p}
Peak Frequency Of Sharpness Control	F_P	—	(Note 15)	3.7	4.0	4.3	MHz
Variable Range Of Peak Frequency	F_P^{MAX}	—	(Note 16)	4.3	5.9	7.8	MHz
	F_P^{MIN}			1.8	2.7	3.6	
Sharpness Control Range	G_S^{MAX}	—	(Note 17)	10	12	14	dB
	G_S^{MIN}			− 13	− 11	− 9	
Sharpness Control Characteristics At Center	G_{SCT}	—	(Note 18)	4.0	5.5	7.0	dB

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
2T Pulse Response For Super Real Transient	POS_{00}	—	(Note 19)	160	170	180	ns
	POS_{01}			140	150	160	
	POS_{10}			110	120	130	
	POS_{11}			90	100	110	
Noise Reduction	G_{NR00}	—	(Note 20)	−13.0	−11.0	−8.5	dB
	G_{NR01}			−6	−4	−2	
	G_{NR10}			5	7	9	
Black Expansion Point	V_{ST1}	—	(Note 21)	250	310	370	mV_{p-p}
	V_{ST2}			340	430	520	
Voltage For Black Peak Detection ON	V_{BPON}	—	(Note 22)	1.2	1.5	1.8	V
Black Peak Detection Level	V_{BP}	—	(Note 23)	−15	±0	15	mV
Gain Of Y Output For Velocity Modulation	G_{VM00}	—	(Note 24)	—	−40	−20	dB
	G_{VM01}			−7	−6	−5	
	G_{VM10}			−4	−3	−2	
	G_{VM11}			−1	0	1	
γ Correction Point	$V_{\gamma 00}$	—	(Note 25)	530	575	620	mV
	$V_{\gamma 01}$			600	645	690	
	$V_{\gamma 10}$			620	665	710	
γ Correction Gain	G_{γ}	—	(Note 26)	−2.7	−2.0	−1.3	dB
Limiting Range Of Delay Line Aparature Correction	V_{AL}	—	(Note 27)	20	45	70	mV_{p-p}
Color Detail Emphasis	G_{CD00}	—	(Note 28)	−1.0	+1.0	+3.0	dB
	G_{CD01}			9	11	13	
	G_{CD10}			16	18	20	
	G_{CD11}			18	20	22	
Voltage For HP Pulse ON	V_{HPON}	—	(Note 29)	4.4	4.7	5.0	V
Voltage For Clamp Voltage ON	V_{CLON}	—	(Note 30)	3.2	3.5	3.8	V
FSC Oscillating Frequency	f_{FSC}	—	(Note 31)	3.85	4.00	4.15	MHz

Chroma stage

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Clamp Voltage For Color Difference Input	V_{33}	—	(Note 32)	5.9	6.1	6.3	V
	V_{34}			5.9	6.1	6.3	
Control Characteristics Of Color Difference Contrast	Vu_{RY}^{MAX}	—	(Note 33)	1.16	1.38	1.64	V_{p-p}
	Vu_{RY}^{CNT}			0.67	0.80	0.95	
	Vu_{RY}^{MIN}			0.17	0.20	0.24	
	Vu_{RY}			16.5	17.5	18.5	dB
	Vu_{BY}^{MAX}			1.45	1.72	2.04	V_{p-p}
	Vu_{BY}^{CNT}			0.84	1.00	1.19	
	Vu_{BY}^{MIN}			0.21	0.25	0.30	
	ΔVu_{BY}			16.5	17.5	18.5	dB
Difference Of Color Difference Characteristics Among Axes	ΔVu_{CY}^{MAX}	—	(Note 34)	1.0	2.0	3.0	dB
	ΔVu_{CY}^{CNT}			1.0	2.0	3.0	
	ΔVu_{CY}^{MIN}			1.0	2.0	3.0	
Color Control Characteristics	VC_{RY}^{MAX}	—	(Note 35)	1.83	2.18	2.56	V_{p-p}
	VC_{RY}^{CNT}			1.16	1.38	1.64	
	VC_{RY}^{MIN}			0.23	0.27	0.32	
	$\Delta VC_{RY}+$			3	4	5	dB
	$\Delta VC_{RY}-$			− 15	− 14	− 13	
	VC_{BY}^{MAX}			2.29	2.72	3.23	V_{p-p}
	VC_{BY}^{CNT}			1.45	1.72	2.04	
	VC_{BY}^{MIN}			0.29	0.34	0.40	
	$\Delta VC_{BY}+$			3	4	5	dB
	$\Delta VC_{BY}-$			− 15	− 14	− 13	
Difference Of Color Characteristics Among Axes	ΔVC_{CY}^{MAX}	—	(Note 36)	1.0	2.0	3.0	dB
	ΔVC_{CY}^{CNT}			1.0	2.0	3.0	
	ΔVC_{CY}^{MIN}			1.0	2.0	3.0	
Variable Range Of Color Terminal's Voltage	V_{32} (+)	—	(Note 37)	0.57	0.63	0.69	V
	V_{32} (−)			0.57	0.63	0.69	
R-Y Relative Phase And Amplitude (NTSC)	θR_{95}	—	(Note 38)	90	95	100	°
	θR_{90}			85	90	95	
	VR_{NTSC} / VB			0.72	0.80	0.88	—
R-Y Relative Phase And Amplitude (PAL)	θR_{PAL}	—	(Note 39)	85	90	95	°
	VR_{PAL} / VB			0.50	0.56	0.62	—
G-Y Relative Phase And Amplitude (NTSC)	θG_{NTSC}	—	(Note 40)	235	240	245	°
	VG_{NTSC} / VB			0.29	0.32	0.35	—
G-Y Relative Phase And Amplitude (PAL)	θG_{PAL}	—	(Note 41)	231	236	241	°
	VG_{PAL} / VB			0.32	0.36	0.40	—

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Half Tone Characteristics Of Color Difference	G_{HTRY}	—	(Note 42)	0.47	0.50	0.53	—
	G_{HTBY}			0.47	0.50	0.53	
DC Voltage Of Color Difference Output	V_{RY}	—	(Note 43)	4.5	4.7	4.9	V
	V_{GY}			4.5	4.7	4.9	
	V_{BY}			4.5	4.7	4.9	
Color γ Characteristics	V_{γ}	—	(Note 44)	0.0	0.2	0.5	$V_{0\text{-}p}$
	Δ_{γ}			0.51	0.64	0.77	—
Color Limiter Characteristics	CLT_{00}	—	(Note 45)	1.1	1.4	1.7	$V_{p\text{-}p}$
	CLT_{01}			1.5	1.8	2.1	
	CLT_{10}			1.8	2.1	2.4	
	CLT_{11}			3.8	4.0	4.2	
Gain Of High-Bright Color	HBC_{00}	—	(Note 46)	—	0.00	0.02	—
	HBC_{01}			0.01	0.02	0.04	
	HBC_{10}			0.07	0.09	0.11	
	HBC_{11}			0.10	0.12	0.14	
Tint Control Characteristics Of Color Difference	θTR^{MAX}	—	(Note 47)	34	40	46	°
	θTB^{MAX}			34	40	46	
	θTR^{MIN}			−46	−40	−34	
	θTB^{MIN}			−46	−40	−34	
Flesh Color Characteristics	$F\alpha_{18}$	—	(Note 48)	0.46	0.58	0.70	—
	$F\alpha_{33}$			0.38	0.48	0.58	
Color Mute	C_{MUTE}	—	(Note 49)	—	—	—	—
DAC1 Characteristics	$V1_0$	—	(Note 50)	11.5	12.0	—	V
	$V1_1$			—	0.2	0.5	
DAC2 Characteristics	$V2_0$	—	(Note 51)	11.5	12.0	—	V
	$V2_1$	—		—	0.2	0.5	
DAC3 Characteristics	$V3_0$	—	(Note 52)	11.5	12.0	—	V
	$V3_1$	—		—	0.2	0.5	
Dynamic Range Of Color Difference Input	$DR_{R\text{-}Y}$	—	(Note 53)	1.0	1.2	—	$V_{p\text{-}p}$
	$DR_{B\text{-}Y}$	—		1.0	1.2	—	

Text stage

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
AC Characteristics	G_R	—	(Note 54)	3.7	4.2	4.8	—
	G_G			3.7	4.2	4.8	
	G_B			3.7	4.2	4.8	
Frequency Characteristics	Gf_R	—	(Note 55)	−5.0	−2.5	0	dB
	Gf_G			−5.0	−2.5	0	
	Gf_B			−5.0	−2.5	0	
Control Characteristics Of Uni-Color	Vu^{MAX}	—	(Note 56)	1.11	1.26	1.41	V_{p-p}
	Vu^{CNT}			0.64	0.73	0.82	
	Vu^{MIN}			0.16	0.18	0.20	
	ΔVu			16.5	17.5	18.5	dB
Variable Range Of Uni-Color Terminal's Voltage	$V_{28}(+)$	—	(Note 57)	0.59	0.65	0.71	V
	$V_{28}(-)$			0.59	0.65	0.71	
Control Characteristics Of Brightness	$V_{br}{}^{MAX}$	—	(Note 58)	5.8	6.0	6.2	V
	$V_{br}{}^{CNT}$			4.5	4.7	4.9	
	$V_{br}{}^{MIN}$			3.2	3.4	3.6	
Brightness Data Sensitivity	G_{br}	—	(Note 59)	9.2	10.2	11.2	mV
Variable Range Of Brightness Terminal's Voltage	$V_{29}(+)$	—	(Note 60)	1.30	1.45	1.60	V
	$V_{29}(-)$			1.30	1.45	1.60	
White Peak Slice Level	$V_{WPS1\ R}$	—	(Note 61)	5.9	6.1	6.3	V
	$V_{WPS1\ G}$			5.9	6.1	6.3	
	$V_{WPS1\ B}$			5.9	6.1	6.3	
	$V_{WPS2\ R}$			6.2	6.4	6.6	
	$V_{WPS2\ G}$			6.2	6.4	6.6	
	$V_{WPS2\ B}$			6.2	6.4	6.6	
Black Peak Slice Level	$V_{BPS\ R}$	—	(Note 62)	2.6	2.8	3.0	V
	$V_{BPS\ G}$			2.6	2.8	3.0	
	$V_{BPS\ B}$			2.6	2.8	3.0	
DC Restoration	$T_{DC\ R}$	—	(Note 63)	—	0	50	mV
	$T_{DC\ G}$			—	0	50	
	$T_{DC\ B}$			—	0	50	
Emitter Follower Drive Current Of RGB Output	I_R	—	(Note 64)	1.5	2.0	2.5	mA
	I_G			1.5	2.0	2.5	
	I_B			1.5	2.0	2.5	
Half Tone Characteristics	G_{HT}	—	(Note 65)	0.47	0.50	0.53	—
Voltage For Half Tone ON	V_{HT}	—	(Note 66)	1.2	1.5	1.8	V
Output Level Of Vertical Blanking Pulse	V_{VR}	—	(Note 67)	0.3	0.8	1.3	V
	V_{VG}			0.3	0.8	1.3	
	V_{VB}			0.3	0.8	1.3	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Level Of Horizontal Blanking Pulse	V_{HR}	—	(Note 68)	0.3	0.8	1.3	V
	V_{HG}			0.3	0.8	1.3	
	V_{HB}			0.3	0.8	1.3	
Delay Time Of Blanking Pulse	td_{ON}	—	(Note 69)	—	0.10	0.30	μs
	td_{OFF}			—	0.25	0.45	
Variable Range Of Sub-Contrast	ΔV_{SU} (+)	—	(Note 70)	1.8	2.0	2.2	dB
	ΔV_{SU} (−)			−2.4	−2.2	−2.0	
RGB Output Voltage	V_R	—	(Note 71)	3.1	3.3	3.5	V
	V_G			3.1	3.3	3.5	
	V_B			3.1	3.3	3.5	
Variable Range Of Cut Off Voltage	CUT_R (+)	—	(Note 72)	0.49	0.54	0.59	V
	CUT_G (+)			0.49	0.54	0.59	
	CUT_B (+)			0.49	0.54	0.59	
	CUT_R (−)			−0.59	−0.54	−0.49	
	CUT_G (−)			−0.59	−0.54	−0.49	
	CUT_B (−)			−0.59	−0.54	−0.49	
Variable Range Of Drive Control	DR_G (+)	—	(Note 73)	2.7	3.2	3.7	dB
	DR_G (−)			−4.0	−3.5	−3.0	
	DR_B (+)			2.7	3.2	3.7	
	DR_B (−)			−4.0	−3.5	−3.0	
Output Voltage At Mute Mode	MU_{RD}	—	(Note 74)	2.5	2.7	2.9	V
	MU_{GD}			2.5	2.7	2.9	
	MU_{BD}			2.5	2.7	2.9	
	MU_{RA}			2.5	2.7	2.9	
	MU_{GA}			2.5	2.7	2.9	
	MU_{BA}			2.5	2.7	2.9	
Voltage For Mute ON (1)	V_{MU1R}	—	(Note 75)	2.4	2.7	3.0	V
	V_{MU1G}			2.4	2.7	3.0	
	V_{MU1B}			2.4	2.7	3.0	
Voltage For Mute ON (2)	V_{MU2R}	—	(Note 76)	1.2	1.5	1.8	V
	V_{MU2G}			1.2	1.5	1.8	
	V_{MU2B}			1.2	1.5	1.8	
Output Voltage At Blue Back Mode	BB_R	—	(Note 77)	2.5	2.7	2.9	V
	BB_G			2.5	2.7	2.9	
	BB_B			4.2	4.4	4.6	
Output Voltage At Service Mode	$V_{R\ SER}$	—	(Note 78)	3.1	3.3	3.5	V
	$V_{G\ SER}$			3.1	3.3	3.5	
	$V_{B\ SER}$			3.1	3.3	3.5	
Peak ACL Level	V_{ACL}	—	(Note 79)	2.8	3.0	3.2	V

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Color Temperature Change	$V_{CT1\ G}$	—	(Note 80)	−1.5	−1.0	−0.5	dB
	$V_{CT1\ B}$			−2.5	−2.0	−1.5	
	$V_{CT2\ G}$			−1.5	−1.0	−0.5	
	$V_{CT2\ B}$			−2.5	−2.0	−1.5	
	$V_{CT3\ G}$			−0.1	0.0	0.1	
	$V_{CT3\ B}$			−0.1	0.0	0.1	
	$V_{CT4\ G}$			−1.5	−1.0	−0.5	
	$V_{CT4\ B}$			−2.5	−2.0	−1.5	
Gain Of Analog RGB	$G_{TX\ R}$	—	(Note 81)	4.5	5.1	5.7	—
	$G_{TX\ G}$			4.5	5.1	5.7	
	$G_{TX\ B}$			4.5	5.1	5.7	
Frequency Characteristics Of Analog RGB	$Gf_{TX\ R}$	—	(Note 82)	−4	−2	0	dB
	$Gf_{TX\ G}$			−4	−2	0	
	$Gf_{TX\ B}$			−4	−2	0	
Dynamic Range Of Analog RGB Input	DR_R	—	(Note 83)	1.0	1.5	—	V_{p-p}
	DR_G			1.0	1.5	—	
	DR_B			1.0	1.5	—	
White Peak Slice Level Of Analog RGB	$V_{WPS\ R}^{TX}$	—	(Note 84)	6.8	7.0	7.2	V
	$V_{WPS\ G}^{TX}$			6.8	7.0	7.2	
	$V_{WPS\ B}^{TX}$			6.8	7.0	7.2	
Black Peak Slice Level Of Analog RGB	$V_{BPS\ R}$	—	(Note 85)	2.2	2.4	2.6	V
	$V_{BPS\ G}$			2.2	2.4	2.6	
	$V_{BPS\ B}$			2.2	2.4	2.6	
Variable Range Of RGB Contrast Terminal's Voltage	$V_{27}(+)$	—	(Note 86)	0.59	0.65	0.71	V
	$V_{27}(-)$			0.59	0.65	0.71	
Control Characteristics Of Analog RGB Brightness	V_{brTX1}^{MAX}	—	(Note 87)	4.4	4.6	4.8	V
	V_{brTX1}^{CNT}			3.5	3.7	3.9	
	V_{brTX1}^{MIN}			2.6	2.8	3.0	
	V_{brTX2}^{MAX}			5.8	6.0	6.2	
	V_{brTX2}^{CNT}			4.5	4.7	4.9	
	V_{brTX2}^{MIN}			3.2	3.4	3.6	
Data Sensitivity Of Analog RGB Brightness	G_{brTX1}	—	(Note 88)	12.7	14.1	15.5	mV
	G_{brTX2}			9.2	10.2	11.2	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Control Characteristics Of RGB Contrast	$Vu_{TX\ R}^{MAX}$	—	(Note 89)	1.36	1.53	1.72	V_{p-p}
	$Vu_{TX\ G}^{MAX}$			1.36	1.53	1.72	
	$Vu_{TX\ B}^{MAX}$			1.36	1.53	1.72	
	$Vu_{TX\ R}^{CNT}$			0.76	0.85	0.95	
	$Vu_{TX\ G}^{CNT}$			0.76	0.85	0.95	
	$Vu_{TX\ B}^{CNT}$			0.76	0.85	0.95	
	$Vu_{TX\ R}^{MIN}$			0.20	0.22	0.25	
	$Vu_{TX\ G}^{MIN}$			0.20	0.22	0.25	
	$Vu_{TX\ B}^{MIN}$			0.20	0.22	0.25	
	$\Delta Vu_{TX\ R}$			15.8	16.8	17.8	dB
	$\Delta Vu_{TX\ G}$			15.8	16.8	17.8	
	$\Delta Vu_{TX\ B}$			15.8	16.8	17.8	
Voltage For Analog RGB Mode ON	$V_{TX\ R}^{ON}$	—	(Note 90)	1.2	1.5	1.8	V
	$V_{TX\ G}^{ON}$			1.2	1.5	1.8	
	$V_{TX\ B}^{ON}$			1.2	1.5	1.8	
Transmission Characteristics Of Analog RGB Mode	$\tau R_{YS\ R}$	—	(Note 91)	—	20	100	ns
	$\tau R_{YS\ G}$			—	20	100	
	$\tau R_{YS\ B}$			—	20	100	
	$tPR_{YS\ R}$			—	20	100	
	$tPR_{YS\ G}$			—	20	100	
	$tPR_{YS\ B}$			—	20	100	
	ΔtPR_{YS}			—	0	20	
	$\tau F_{YS\ R}$			—	10	100	
	$\tau F_{YS\ G}$			—	10	100	
	$\tau F_{YS\ B}$			—	10	100	
	$tPF_{YS\ R}$			—	45	100	
	$tPF_{YS\ G}$			—	45	100	
	$tPF_{YS\ B}$			—	45	100	
	ΔtPF_{YS}			—	0	20	

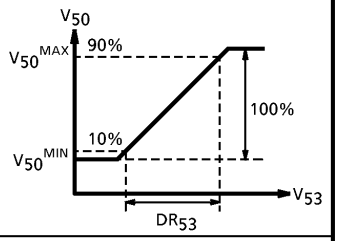
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transmission Characteristics Of Analog RGB	$\tau R_{TX\ R}$	—	(Note 92)	—	30	100	ns
	$\tau R_{TX\ G}$			—	30	100	
	$\tau R_{TX\ B}$			—	30	100	
	$tPR_{TX\ R}$			—	15	100	
	$tPR_{TX\ G}$			—	15	100	
	$tPR_{TX\ B}$			—	15	100	
	ΔtPR_{TX}			—	0	20	
	$\tau F_{TX\ R}$			—	40	100	
	$\tau F_{TX\ G}$			—	40	100	
	$\tau F_{TX\ B}$			—	40	100	
	$tPF_{TX\ R}$			—	20	100	
	$tPF_{TX\ G}$			—	20	100	
	$tPF_{TX\ B}$			—	20	100	
	ΔtPF_{TX}			—	0	20	
Crosstalk From Video To Analog RGB	$V_{V\rightarrow AR}$	—	(Note 93)	—	− 55	− 50	dB
	$V_{V\rightarrow AG}$			—	− 55	− 50	
	$V_{V\rightarrow AB}$			—	− 55	− 50	
Crosstalk From Analog RGB To Video	$V_{A\rightarrow VR}$	—	(Note 94)	—	− 55	− 50	dB
	$V_{A\rightarrow VG}$			—	− 55	− 50	
	$V_{A\rightarrow VB}$			—	− 55	− 50	
Crosstalk Among 3 Axes Of Analog RGB	$V_{R\text{-}G}$	—	(Note 95)	—	− 55	− 40	dB
	$V_{R\text{-}B}$			—	− 55	− 40	
	$V_{G\text{-}R}$			—	− 55	− 40	
	$V_{G\text{-}B}$			—	− 55	− 40	
	$V_{B\text{-}R}$			—	− 55	− 40	
	$V_{B\text{-}G}$			—	− 55	− 40	
Output Voltage Of OSD Mode	$V_{OSD\ R}^{DC}$	—	(Note 96)	2.5	2.7	2.9	V
	$V_{OSD\ G}^{DC}$			2.5	2.7	2.9	
	$V_{OSD\ B}^{DC}$			2.5	2.7	2.9	
Voltage For OSD Mode ON	$V_{OSD\ R}^{ON}$	—	(Note 97)	1.2	1.5	1.8	V
	$V_{OSD\ G}^{ON}$			1.2	1.5	1.8	
	$V_{OSD\ B}^{ON}$			1.2	1.5	1.8	
Output Voltage Of OSD High Mode	$V_{OSD1\ R}^{HI}$	—	(Note 98)	5.5	5.7	5.9	V
	$V_{OSD1\ G}^{HI}$			5.5	5.7	5.9	
	$V_{OSD1\ B}^{HI}$			5.5	5.7	5.9	
	$V_{OSD2\ R}^{HI}$			5.0	5.2	5.4	
	$V_{OSD2\ G}^{HI}$			5.0	5.2	5.4	
	$V_{OSD2\ B}^{HI}$			5.0	5.2	5.4	

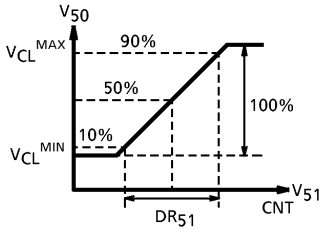
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Voltage For OSD High Mode ON	$V_{OSD\ R}^{HION}$	—	(Note 99)	1.2	1.5	1.8	V
	$V_{OSD\ G}^{HION}$			1.2	1.5	1.8	
	$V_{OSD\ B}^{HION}$			1.2	1.5	1.8	
Propagation Characteristics Of OSD Mode	$\tau R_{OSD\ R}$	—	(Note 100)	—	15	100	ns
	$\tau R_{OSD\ G}$			—	15	100	
	$\tau R_{OSD\ B}$			—	15	100	
	$tPR_{OSD\ R}$			—	20	100	
	$tPR_{OSD\ G}$			—	20	100	
	$tPR_{OSD\ B}$			—	20	100	
	ΔtPR_{OSD}			—	0	20	
	$\tau F_{OSD\ R}$			—	35	100	
	$\tau F_{OSD\ G}$			—	35	100	
	$\tau F_{OSD\ B}$			—	35	100	
	$tPF_{OSD\ R}$			—	25	100	
	$tPF_{OSD\ G}$			—	25	100	
	$tPF_{OSD\ B}$			—	25	100	
	ΔtPF_{OSD}^{HI}			—	0	20	
Propagation Characteristics Of OSD High Mode	$\tau R_{OSD\ R}^{HI}$	—	(Note 101)	—	25	100	ns
	$\tau R_{OSD\ G}^{HI}$			—	25	100	
	$\tau R_{OSD\ B}^{HI}$			—	25	100	
	$tPR_{OSD\ R}^{HI}$			—	15	100	
	$tPR_{OSD\ G}^{HI}$			—	15	100	
	$tPR_{OSD\ B}^{HI}$			—	15	100	
	ΔtPR_{OSD}^{HI}			—	0	20	
	$\tau F_{OSD\ R}^{HI}$			—	35	100	
	$\tau F_{OSD\ G}^{HI}$			—	35	100	
	$\tau F_{OSD\ B}^{HI}$			—	35	100	
	$tPF_{OSD\ R}^{HI}$			—	25	100	
	$tPF_{OSD\ G}^{HI}$			—	25	100	
	$tPF_{OSD\ B}^{HI}$			—	25	100	
	ΔtPF_{OSD}^{HI}			—	0	20	

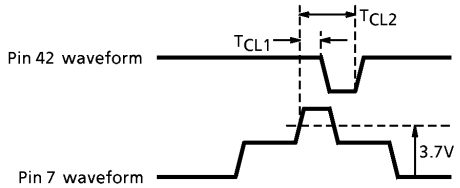
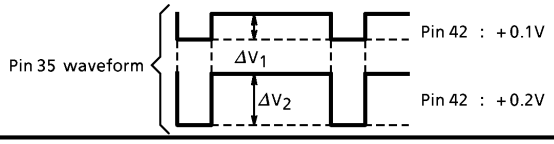
MEASUREMENT CONDITION

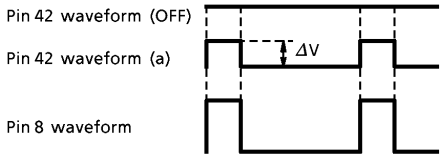
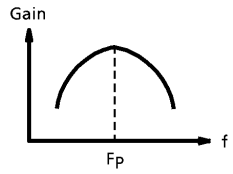
Video stage

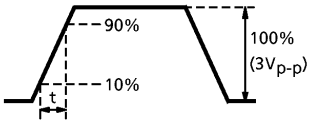
NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
1	Video Gain	SW_{45}	a	(1) Input sine wave of f = 100kHz, 0.5V_{p-p} to pin 53. (2) Measure output amplitude of pin 50 and calculate AC gain from pin 53 to pin 50. [G_{V50}]
		SW_{47}	a	
		SW_{51}	a	
		SW_{53}	b	
2	Video Frequency Characteristic	Same as above		(1) Input sine wave of f = 8MHz, 0.5V_{p-p} to pin 53. (2) Measure output amplitude of pin 50 and calculate AC gain from pin 53 to pin 50. [$G_{V50\ (8MHz)}$] (3) Calculate frequency characteristic from G_{V50} and $G_{V50\ (8MHz)}$. $Gf_{50} = 20\ell og\ (G_{V50\ (8MHz)} / G_{V50})$
3	Video In / Output Dynamic Range	SW_{45}	a	(1) Connect external supply to pin 53. (2) Measure pin 50 voltage variation when varying external supply. (3) Calculate DR_{53}, V_{50}^{MAX} and V_{50}^{MIN}.
		SW_{47}	a	
		SW_{51}	a	
		SW_{53}	a	
		—	—	
4	Video Clamp Characteristic	SW_{45}	a	(1) Connect external supply to pin 51. (2) Measure pin 50 voltage variation when varying external voltage from 0 to 5V. (3) Calculate DR_{51}, V_{51}^{CNT}, V_{CL}^{MAX} and V_{CL}^{MIN}.
		SW_{47}	a	
		SW_{51}	b	
		SW_{53}	a	
		—	—	
5	Video Output Drive Current	SW_{45}	a	Measure inflow current to pin 50 when connecting external voltage of 6V to pin 50 via 200Ω resistance. [I_{50}]
		SW_{47}	a	
		SW_{51}	a	
		SW_{53}	a	
6	Chroma Output Drive Current	Same as above		Measure inflow current to pin 48 when connecting external voltage of 6V to pin 48 via 200Ω resistance. [I_{48}]
7	ACC Characteristics	SW_{45}	b	(1) Connect external supply to pin 47. (2) Input sine wave of f = 3.58MHz, 50mV_{p-p} to pin 45. (3) Set pin 47 voltage to 0V. (4) Calculate output amplitude of pin 48. (5) Calculate AC gain from pin 45 to pin 48. [G_{V48}^{MIN}] (6) Repeat (4) and (5) when setting pin 47 voltage to 2.5V. [G_{V48}^{CNT}] (7) Repeat (4) and (5) when setting pin 47 voltage to 5V. [G_{V48}^{MAX}]
		SW_{47}	b	
		SW_{51}	a	
		SW_{53}	a	
		—	—	

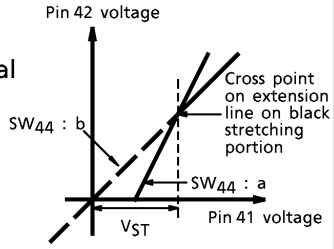




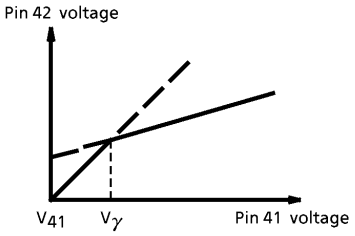
NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
8	Chroma In / Output Dynamic Range	SW_{45}	b	(1) Repeat (1)~(3) of Note 7. (2) Measure input amplitude when pin 48 output waveform starts to distort while raising input amplitude. [DR_{45}] (3) Set pin 47 to 5V. (4) Measure max. and min. voltage whose outputs are clipped while raising input voltage. [V_{48}^{MAX}, V_{48}^{MIN}]
		SW_{47}	b	
		SW_{51}	a	
		SW_{53}	a	
		—	—	
9	Y Input Pedestal Clamp Voltage	SW_7	b	Measure pin 41 DC voltage. [V_{41}]
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	a	
		SW_{43}	OFF	
		SW_{44}	b	
		SW_{30}	OFF	
10	Y Input Pedestal Clamp Pulse Phase	SW_7	b	(1) Connect 200kΩ resistance between pin 41 and V_{CC}. (2) Observe waveforms of pin 7 and pin 42 using oscilloscope. Measure TCL1 and TCL2. 
		SW_8	b	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	OFF	
		SW_{43}	OFF	
		SW_{44}	b	
		SW_{30}	OFF	
11	DC Transmission Rate Correction Amplifier Gain	SW_7	b	(1) Set the data of sub-address (0F) to (3F). (2) Connect pin 42-current meter (μA meter)-external supply-GND in serial. Adjust external supply so that value of current meter can be 0. (3) Observe pin 35 waveform when raising pin 42 voltage to the above (2) value +0.1V and +0.2V. [ΔV_1, ΔV_2] (4) $A_{V42} = (\Delta V_2 - \Delta V_1) / 0.1$ <V> / Y gain (G : Note 54) 
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	a	
		SW_{43}	OFF	
		SW_{44}	b	
		SW_{30}	OFF	

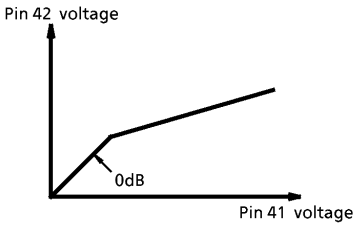
NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
12	Dynamic ABL Max. Sensitivity	SW_7	b	(1) Set the data of sub-address (0F) to (7C). (2) Observe pin 42 waveform when SW_{40} is OFF. (3) Observe pin 42 waveform when SW_{40} is a. (4) $G_{V40} = \Delta V$ <mV> / 10 <μA> 
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF / a	
		SW_{41}	a	
		SW_{43}	OFF	
		SW_{44}	a	
		SW_{30}	OFF	
13	Black Stretching Amplifier Max. Gain	SW_7	b	(1) Set the data of sub-address (0F) to (7C) and black stretching to OFF. (2) Input sine wave of f = 500kHz, $0.1V_{p-p}$ to pin 41. (3) Supply 4.5V to pin 43. (4) Measure pin 42 waveform amplitude. [V_A] (5) Set the data of sub-address (0F) to (3C) and black stretching to ON. (6) Measure pin 42 waveform amplitude. [V_B] (7) $G_{VBE} = V_B / V_A$
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	b	
		SW_{43}	OFF	
		SW_{44}	a	
		SW_{30}	OFF	
14	Y Input Dynamic Range	SW_7	b	(1) Connect external supply to pin 41. (2) Set the data of sub-address (00) to (40). (3) Set the data of sub-address (0F) to (3F). (4) Measure voltage V_{41}' when no voltage variation of pin 35 monitor output (Y output) while raising external supply voltage from V_{41} (Note 9). (5) $DR_{41} = V_{41}' - V_{41}$
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	a	
		SW_{43}	OFF	
		SW_{44}	b	
		SW_{30}	OFF	
15	Picture Quality Control Peaking Frequency	SW_7	b	(1) Connect SG to pin 41. (2) Input sine wave of $20mV_{p-p}$ to pin 41. (3) Set the data of sub-address (04) to (FF). (4) Observe pin 20 waveform. (5) Measure SG frequency when pin 20 waveform amplitude becomes maximum. [F_P] 
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	b	
		SW_{41}	b	
		SW_{43}	ON	
		SW_{44}	b	
		SW_{30}	ON	

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
16	Peaking Frequency Variation Range	SW_7	b	(1) Connect SG to pin 41. (2) Input sine wave of 20mV_{p-p} to pin 41. (3) Set the data of sub-address (04) to (FF). (4) Measure SG frequency when pin 13 waveform amplitude becomes maximum (with SW_{37} a). [F^{MAX}] (5) Repeat (4) with SW_{37} b. [F^{MIN}]
		SW_8	a	
		SW_{20}	b	
		SW_{37}	a / b	
		SW_{40}	b	
		SW_{41}	b	
		SW_{43}	ON	
		SW_{44}	b	
		SW_{30}	ON	
17	Picture Quality Control Range	SW_7	b	(1) Connect SG to pin 41. (2) Input sine wave of 20mV_{p-p} to pin 41. (3) Set the data of sub-address (04) to (FF). (4) Measure pin 35 monitor output (Y output) amplitude when input signal frequencies are 10kHz [V_{10K}] and 2.4MHz [V_{PK}]. (5) $G^{MAX} = 20\ell og\ (V_{PK} / V_{10K})$ (6) Set the data of sub-address (04) to (80). (7) Measure monitor output (Y output) amplitude when input signal frequencies are 10kHz [V_{10K}] and 2.4MHz [V_{TP}]. (8) $G_S^{MIN} = 20\ell og\ (V_{TP} / V_{10K})$
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	b	
		SW_{43}	ON	
		SW_{44}	b	
		SW_{30}	ON	
18	Picture Quality Control Center Characteristic	Same as above		(1) Connect SG to pin 41. (2) Input sine wave of 20mV_{p-p} to pin 41. (3) Set the data of sub-address (04) to (C0). (4) Measure pin 35 monitor output (Y output) amplitude when input signal frequencies are 10kHz [V_{10K}] and 2.4MHz [V_{PK}]. (5) $G_{SCT} = 20\ell og\ (V_{PK} / V_{10K})$
19	Super Real Transient 2T Pulse Response	SW_7	b	(1) Apply 2T pulse to pin 41 (0.7V_{p-p} = 100IRE) (2) Set the data of sub-address (0E) to (12). (3) Adjust sub-contrast so that pin 35 waveform (Y output) can be as shown in the right diagram (100% = 3V_{p-p}).  (4) Calculate t from pin 35 waveform. [POS_{10}] (5) Repeat (3) and (4) when setting the data of sub-address (0E) to (02), (0A) and (1A). [POS_{00}], [POS_{01}], [POS_{11}]
		SW_8	a	
		SW_{20}	a	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	b	
		SW_{43}	ON	
		SW_{44}	b	
		SW_{30}	ON	

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
20	Noise Reduction	SW_7	b	(1) Connect SG to pin 41. (2) Input sine wave of 20mV_{p-p}. (3) Set the data of sub-address (04) to (FF). (4) Set the data of sub-address (0F) to (0F). (5) Measure pin 35 monitor output (Y output) amplitude when input signal frequencies are 10kHz [V_{10K}] and 2.4MHz [V_{PK}]. (6) $G_{NR00} = 20\ell og\ (V_{PK} / V_{10K})$ (7) Repeat (5) and (6) when setting the data of sub-address (0F) to (1F), and (2F). [G_{NR01}], [G_{NR10}]
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	b	
		SW_{43}	ON	
		SW_{44}	b	
		SW_{30}	ON	
21	Black Stretching Point	SW_7	b	(1) Connect external supply to pin 41. (2) Apply V_{41} (Note 9) to pin 43. (3) Measure pin 42 voltage variation while raising external supply voltage from V_{41}. (4) Calculate V_{ST} from the result of (3). [V_{ST1}] (5) Repeat (3) and (4) when setting pin 43 voltage to V_{41} + 0.5V. [V_{ST2}] 
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	a	
		SW_{43}	OFF	
		SW_{44}	a / b	
		SW_{30}	OFF	
22	Black Peak Detection ON Voltage	SW_7	a	(1) Connect external supply to pin 41 and apply 5.0V. (2) Connect external supply to pin 7 and raise voltage from 0V slowly. (3) Measure pin 7 applied voltage when pin 44 voltage varies. [V_{BPON}]
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	a	
		SW_{41}	a	
		SW_{43}	OFF	
		SW_{44}	c	
		SW_{30}	OFF	
23	Black Peak Detection Level	SW_7	b	(1) Connect external supply to pin 41. (2) Observe pin 44. (3) Measure pin 41 voltage when pin 44 goes from high level to low level (picture period). [V_{BP}]
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	a	
		SW_{43}	OFF	
		SW_{44}	c	
		SW_{30}	OFF	

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
24	Velocity Modulation Output Y Gain	SW_7	b	(1) Input sine wave of $0.1V_{p-p}$, 500kHz to pin 41. (2) Set the data of sub-address (07) to (38). (3) Measure pin 38 amplitude. [V_A] (4) $G_{VM00} = 20\ell og\ (V_A / 0.1 < V_{p-p} >)$ (5) Repeat (3) and (4) when setting the data of sub-address (07) to (78), (B8) and (F8). [G_{VM01}], [G_{VM10}], [G_{VM11}]
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	b	
		SW_{43}	ON	
		SW_{44}	b	
		SW_{30}	OFF	
25	γ Correction Point	SW_7	b	(1) Connect external supply to pin 41. (2) Set the data of sub-address (0F) to (30). (3) Measure V_γ from pin 42 voltage variation characteristic when raising supply voltage from V_{41}. [$V_\gamma 00$] (4) Repeat (3) when setting the data of sub-address (0F) to (34) and (38). [$V_\gamma 01$], [$V_\gamma 10$]
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	a	
		SW_{43}	OFF	
		SW_{44}	b	
		SW_{30}	OFF	
26	γ Correction Curve	Same as above		Considering the part in which γ correction is not executed as 0dB in Note 25, calculate the gain of part in which γ correction is executed. [G_γ]
27	DL Aperture Condenser Limiting Range	SW_7	b	(1) Connect SG to pin 41. (2)Adjust SG frequency to F_P (Note 15). (3) Set the data of sub-address (04) to (FF). (4) Observe pin 35 monitor output (Y output). (5) Measure input amplitude when pin 35 waveform starts to distort while raising input amplitude slowly. [V_{AL}]
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	b	
		SW_{41}	b	
		SW_{43}	ON	
		SW_{44}	b	
		SW_{30}	ON	



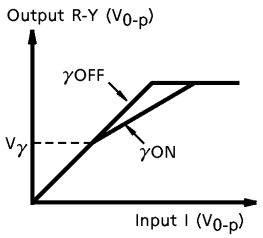


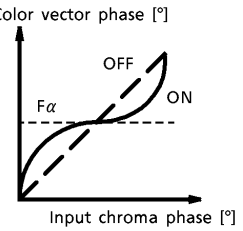
NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
28	Color Detail Emphasis	SW_7	b	(1) Connect SG to pin 41. (2) Input white signal to TP33A, and set SW_{33} to b. Adjust input amplitude so that pin 35 monitor output amplitude can be $3V_{p-p}$. (3) Input sine wave of frequency : F_P, $20mV_{p-p}$ to pin 41. (4) Measure sine wave amplitude of frequency F_P outputted from pin 35 when setting the data of sub-address (0D) to (88), (8A) and (8E). [V_{CD} <mV>] (5) $G_{CD} = 20\ell og\ (V_{CD} / 20$ <mV>) (6) When the data of sub-address (0D) are (88), (8A), (8C) and (8E), each is defined as G_{CD00}, G_{CD01}, G_{CD10} and G_{CD11}, respectively.
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	b	
		SW_{41}	b	
		SW_{43}	ON	
		SW_{44}	b	
		SW_{30}	ON	
29	HP Pulse ON Voltage	SW_7	b	(1) Connect external supply to pin 41 and apply 4.0V. (2) Connect external supply to pin 8 and raise voltage from 0V slowly. (3) Measure pin 8 voltage when pin 42 voltage varies. [$V_{HP\ ON}$]
		SW_8	b	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	a	
		SW_{43}	OFF	
		SW_{44}	b	
		SW_{30}	OFF	
30	Clamp Voltage ON Voltage	SW_7	a	(1) Connect external supply to pin 7 and raise voltage from 0V slowly. (2) Calculate pin 7 voltage when pin 41 voltage becomes V_{41}. [$V_{CL\ ON}$]
		SW_8	b	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	a	
		SW_{43}	OFF	
		SW_{44}	b	
		SW_{30}	OFF	
31	FSC Oscillation Frequency	SW_7	b	Calculate pin 36 oscillation frequency (4MHz ceramic). [f_{FSC}]
		SW_8	a	
		SW_{20}	b	
		SW_{37}	OFF	
		SW_{40}	OFF	
		SW_{41}	a	
		SW_{43}	OFF	
		SW_{44}	b	
		SW_{30}	OFF	

Chroma stage

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
32	Color Difference Input Clamp Voltage	SW_7	b	(1) Measure pin 33 voltage. [V_{33}] (2) Measure pin 34 voltage. [V_{34}]
		SW_8	a	
		SW_{33}	a	
		SW_{34}	a	
33	Color Difference Contrast Adjustment Characteristic	SW_7	b	(1) Input signal 3 of diagram 1 (f_0 = 100kHz, picture period amplitude : 0.2V_{p-p}) to pin 34. (2) Input signal whose phase is advanced by 90° against signal 3 to pin 33. (3) Set the data of sub-address (0F) to (3D). (4) Measure pin 35 picture period voltage when changing Uni-Color data (7F) : max., (40) : center and (00) : min. [Vu_{RY}^{MAX}, Vu_{RY}^{CNT}, Vu_{RY}^{MIN}] (5) $\Delta Vu_{RY} = 20\ell og\ (Vu_{RY}^{MAX} / Vu_{RY}^{MIN})$ (6) Repeat (1)~(5) when setting the data of sub-address (0F) to (3E). [Vu_{BY}^{MAX}, Vu_{BY}^{CNT}, Vu_{BY}^{MIN}, ΔVu_{BY}]
		SW_8	a	
		SW_{33}	b	
		SW_{34}	b	
		—	—	
34	Difference Between Axes Of Color Difference Contrast Characteristic	Same as above		(1) $\Delta Vu_{CY}^{MAX} = 20\ell og\ (Vu_{BY}^{MAX} / Vu_{RY}^{MAX})$ (2) $\Delta Vu_{CY}^{CNT} = 20\ell og\ (Vu_{BY}^{CNT} / Vu_{RY}^{CNT})$ (3) $\Delta Vu_{CY}^{MIN} = 20\ell og\ (Vu_{BY}^{MIN} / Vu_{RY}^{MIN})$
35	Color Adjustment Characteristic	Same as above		(1) Input signal 3 of diagram 1 (f_0 = 100kHz, picture period amplitude : 0.2V_{p-p}) to pin 34. (2) Input signal whose phase is advanced by 90° against signal 3 to pin 33. (3) Set the data of sub-address (0F) to (3D). (4) Measure pin 35 picture period voltage when changing Uni-Color data (7F) : max., (40) : center and (00) : min. [VC_{RY}^{MAX}, VC_{RY}^{CNT}, VC_{RY}^{MIN}] (5) $\Delta VC_{RY}(+) = 20\ell og\ (VC_{RY}^{MAX} / VC_{RY}^{CNT})$ $\Delta VC_{RY}(-) = 20\ell og\ (VC_{RY}^{MIN} / VC_{RY}^{CNT})$ (6) Repeat (1)~(5) when changing the data of sub-address (0F) to (3E). [VC_{BY}^{MAX}, VC_{BY}^{CNT}, VC_{BY}^{MIN}, $\Delta VC_{BY}(+)$, $\Delta VC_{BY}(-)$]
36	Color Characteristic Between Axes	Same as above		(1) $\Delta VC_{CY}^{MAX} = 20\ell og\ (VC_{BY}^{MAX} / VC_{RY}^{MAX})$ (2) $\Delta VC_{CY}^{CNT} = 20\ell og\ (VC_{BY}^{CNT} / VC_{RY}^{CNT})$ (3) $\Delta VC_{CY}^{MIN} = 20\ell og\ (VC_{BY}^{MIN} / VC_{RY}^{MIN})$
37	Color Pin Variation Range	SW_7	b	(1) Measure pin 32 voltage when changing color data (7F) : max., (40) : center and (00) : min. [V_{32}^{MAX}, V_{32}^{CNT}, V_{32}^{MIN}] (2) $V_{32}(+) = V_{32}^{MAX} - V_{32}^{CNT}$ $V_{32}(-) = V_{32}^{CNT} - V_{32}^{MIN}$
		SW_8	a	
		SW_{33}	a	
		SW_{34}	a	
		—	—	

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
38	R-Y Relative Phase And Amplitude (NTSC)	SW_7	b	(1) Input signal 3 of diagram 1 (f_0 = 100kHz, picture period amplitude : 0.2V_{p-p}) to pin 34. (2) Input signal whose phase is advanced by 90° against signal 3 to pin 33. (3) Measure phase difference of R-Y against B-Y when selecting the data of sub-address (0F) to R-Y (3D) and B-Y (3E). (4) Calculate (3) when setting the data of sub-address (0D) to (88) and (C8). [θR_{95}, θR_{90}] (5) Measure picture period amplitude of signal outputted from pin 35 when selecting the data of sub-address (0F) to R-Y (3D) and B-Y (3E). Calculate the amplitude ratio of R-Y against B-Y. [VR_{NTSC} / VB]
		SW_8	a	
		SW_{33}	b	
		SW_{34}	b	
		—	—	
39	R-Y Relative Phase And Amplitude (PAL)	Same as above		(1) Input signal 3 of diagram 1 (f_0 = 100kHz, picture period amplitude : 0.2V_{p-p}) to pin 34. (2) Input signal whose phase is advanced by 90° against signal 3 to pin 33. (3) Set the data of sub-address (0D) to (A8). (4) Measure pin 35 waveform when setting the data of sub-address (0F) to R-Y (3D) and B-Y (3E). Calculate the amplitude ratio of R-Y against B-Y. [θR_{PAL}] (5) Measure picture period amplitude of signal outputted from pin 35 when setting the data of sub-address (0F) to R-Y (3D) and B-Y (3E). Calculate the amplitude ratio of R-Y against B-Y. [VR_{PAL} / VB]
40	G-Y Relative Phase And Amplitude (NTSC)	Same as above		(1) Input signal 3 of diagram 1 (f_0 = 100kHz, picture period amplitude : 0.2V_{p-p}) to pin 34. (2) Input signal whose phase is advanced by 90° against signal 3 to pin 33. (3) Observe pin 35 waveform when selecting the data of sub-address (0F) to (3C) G-Y and (3E) B-Y. Measure the phase difference of G-Y against B-Y. [θG_{NTSC}] (4) Calculate picture period amplitude of signal outputted from pin 35 when the data of sub-address (0F) is (3C) G-Y and (3E) B-Y. Calculate the amplitude ratio of G-Y against B-Y. [VG_{NTSC} / VB]

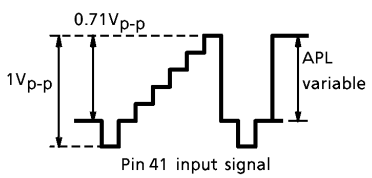
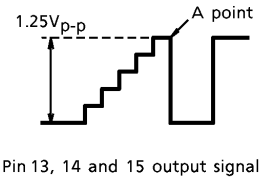
NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
41	G-Y Relative Phase And Amplitude (PAL)	SW_7	b	(1) Input signal 3 of diagram 1 (f_0 = 100kHz, picture period amplitude : 0.2V_{p-p}) to pin 33. (2) Input signal whose phase is advanced by 90° against signal 3 to pin 33. (3) Set the data of sub-address (0D) to (A8). (4) Observe pin 35 waveform by selecting the data of sub-address (0F) to (3C) : G-Y and (3E) : B-Y. (5) Calculate phase difference of G-Y against B-Y. [θG_{PAL}] (6) Measure picture period amplitude of signal outputted from pin 35 when setting the data of sub-address (0F) to (3C) : G-Y and (3E) : B-Y. Calculate the amplitude ratio of G-Y against B-Y. [VG_{PAL} / VB]
		SW_8	a	
		SW_{33}	b	
		SW_{34}	b	
		—	—	
42	Color Difference Half Tone Characteristic	Same as above		(1) Input signal 3 (f_0 = 100kHz, picture period amplitude : 0.2V_{p-p}) to pin 33. (2) Set the data of sub-address (0F) to (0D). (3) Measure picture period amplitude of pin 35 output. [V_{35ARY}] (4) Add external supply of 5V to pin 22. (5) Measure picture period amplitude of pin 35 output. [V_{35BRY}] (6) $G_{HTRY} = V_{35BRY} / V_{35ARY}$ (7) Input signal to pin 34, and repeat (1)~(5) when setting the data of sub-address (0F) to (0E). (8) $G_{HTBY} = V_{35BBY} / V_{35ABY}$
43	Color Difference Output DC Voltage	Same as above		(1) Set the data of sub-address (02) to (C0). (2) Measure each pin 35 DC voltage when setting the data of sub-address (0F) to (0D), (0C) and (0E). [V_{RY}, V_{GY}, V_{BY}]
44	Color γ Characteristic	SW_7	b	(1) Input signal 3 (f_0 = 100kHz, picture period amplitude : 0.2V_{p-p}) to pin 33. (2) Set the data of sub-address (0F) to (0D). (3) Change picture period amplitude of signal 3. Measure each pin 35 output signal amplitude variation when setting the data of sub-address (0D) to (88) : γ OFF and (08) : γ ON. Then, describe the characteristic.  (4) Calculate the point at which γ starts working (Vγ). Considering the inclination of straight line when γOFF as 1, calculate the inclination of $\Delta\gamma$ when γON.
		SW_8	a	
		SW_{33}	b	
		SW_{34}	a	
		—	—	

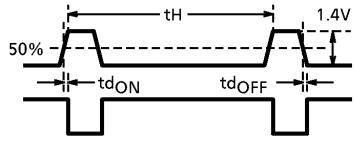
NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
45	Color Limiter Characteristic	SW_7	b	(1) Input signal 2 (picture period voltage : 0.3V_{p-p}) of diagram 1 to pin 34. (2) Set the data of sub-address (0D) to (A8). (3) Set the data of sub-address (0F) to (0E). (4) Measure each pin 35 output picture period amplitude when setting the data of sub-address (07) to (C8), (D8), (E8), and (F8). [CLT_{00}, CLT_{01}, CLT_{10}, CLT_{11}]
		SW_8	a	
		SW_{33}	a	
		SW_{34}	b	
		—	—	
46	High Bright Color Gain	Same as above		(1) Input signal 2 (picture period voltage : 0.2V_{p-p}) of diagram 1 to pin 34. (2) Set the data of sub-address (0D) to (A8). (3) Set the data of sub-address (0F) to (0E). (4) Adjust color control so that pin 35 output picture period amplitude can be 2V_{p-p}. (5) Set the data of sub-address (0F) to (0F). (6) Measure each pin 35 output picture period amplitude when setting the data of sub-address (0E) to (10), (30), (50) and (70). [V_{3500}, V_{3501}, V_{3510}, V_{3511}] (7) $HBC_{00} = V_{3500} / 2$, $HBC_{01} = V_{3501} / 2$ $HBC_{10} = V_{3510} / 2$, $HBC_{11} = V_{3511} / 2$
47	RGB Color Difference Tint Control Characteristic	SW_7	b	(1) Input signal 3 (f_0 = 100kHz, picture period amplitude : 0.2V_{p-p}) to pin 34. (2) Input signal whose phase is advanced by 90° against signal 3 to pin 33. (3) Set the data of sub-address (0F) to (0D). (4) Observe pin 35 output waveform. (5) Calculate phase variation of pin 35 output waveform when setting the data of tint control (sub-address 03) to (FF) : max. and (00) : min. [θTR^{MAX}, θTR^{MIN}] (6) Repeat (4) and (5) when setting the data of sub-address (0F) to (0E). [θTB^{MAX}, θTB^{MIN}]
		SW_8	a	
		SW_{33}	b	
		SW_{34}	b	
		—	—	
48	Flesh Color Characteristic	Same as above		(1) Input signal IQ demodulated flesh bar (rainbow signal at spaces of 15° in the range of −30°~+240°) to pin 34 (Q signal) and pin 33 (I signal) by 0.2V_{p-p} amplitude. (2) Set the data of sub-address (0D) to (D8). (3) Observe pin 35 output signal when selecting the data of sub-address (0F) to (3D) : R-Y and (3E) : B-Y. Graph the characteristic of color vector phase variation.  (4) Calculate the inclination at I axis in the graph [±18°]. (5) Repeat (3) and (4) when setting the data of sub-address (0D) to (D0) [±33°]. Chroma input phase [°].

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
49	Color Mute	SW_7	b	(1) Input signal 3 (f_0 = 100kHz, picture period amplitude : 0.2V_{p-p}) to pin 33 and 34. (2) Select the data of sub-address (0F) to (3D) and (3E), and confirm that signal is outputted from pin 35. (3) Select the data of sub-address (02) to (C0). (4) Select the data of sub-address (0F) to (3D) and (3E), and confirm that signal is not outputted from pin 35.
		SW_8	a	
		SW_{33}	b	
		SW_{34}	b	
		—	—	
50	DAC1 Characteristic	SW_7	b	(1) Set the data of sub-address (0D) to (88). (2) Measure pin 1 voltage. [$V1_0$] (3) Set the data of sub-address (0D) to (89). (4) Measure pin 1 voltage. [$V1_1$]
		SW_8	a	
		SW_{33}	a	
		SW_{34}	a	
51	DAC2 Characteristic	Same as above		(1) Set the data of sub-address (0E) to (10). (2) Measure pin 2 voltage. [$V2_0$] (3) Set the data of sub-address (0E) to (14). (4) Measure pin 2 voltage. [$V2_1$]
52	DAC3 Characteristic	Same as above		(1) Set the data of sub-address (0F) to (3C). (2) Measure pin 3 voltage. [$V3_0$] (3) Set the data of sub-address (0F) to (BC). (4) Measure pin 3 voltage. [$V3_1$]
53	Color Difference Input Dynamic Range	SW_7	b	(1) Input signal 3 (f_0 = 100kHz, picture period amplitude : 0.2V_{p-p}) to pin 34. (2) Input signal whose phase is advanced by 90° against signal 3 to pin 3. (3) Minimize color and Uni-Color. (4) Set the data of sub-address (0F) to (0D). (5) Measure input signal amplitude when output waveform starts to distort while raising input signal amplitude of pin 33 and pin 34. [DR_{R-Y}] (6) Repeat (5) when setting the data of sub-address (0F) to (0E). [DR_{B-Y}]
		SW_8	a	
		SW_{33}	b	
		SW_{34}	b	
		—	—	

Text stage

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
54	AC Gain	SW_7	b	(1) Input signal 1 (f_0 = 10kHz, picture period amplitude : 0.3V_{p-p}) to pin 41. (2) Measure picture period amplitude of pin 13, 14 and 15. [V_{13}, V_{14}, V_{15}] (3) $G_R = V_{13} / 0.3 <V_{p-p}>$ $G_G = V_{14} / 0.3 <V_{p-p}>$ $G_B = V_{15} / 0.3 <V_{p-p}>$
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	b	
55	Frequency Characteristic	Same as above		(1) Input signal 1 (f_0 = 8MHz, picture period amplitude : 0.3V_{p-p}) to pin 41. (2) Measure picture period amplitude of pin 13, 14 and 15. [$V_{13\ 8MHz}$, $V_{14\ 8MHz}$, $V_{15\ 8MHz}$] (3) $Gf_R = 20\ell og\ (V_{13\ 8MHz} / V_{13})$ $Gf_G = 20\ell og\ (V_{14\ 8MHz} / V_{14})$ $Gf_B = 20\ell og\ (V_{15\ 8MHz} / V_{15})$
56	Uni-Color Adjustment Characteristic	Same as above		(1) Input signal 1 (f_0 = 10kHz, picture period amplitude : 0.3V_{p-p}) to pin 41. (2) Set the data of sub-address (0F) to (3F). (3) Measure each pin 35 picture period amplitude when changing the data of Uni-Color to (7F) : max., (40) : center and (00) : min. [Vu^{MAX}, Vu^{CNT}, Vu^{MIN}] (4) $\Delta Vu = 20\ell og\ (Vu^{MAX} / Vu^{MIN})$
57	Uni-Color Pin Variation Range	SW_7	b	(1) Measure each pin 28 voltage when changing the data of Uni-Color to (7F) : max., (40) : center and (00) : min. [V_{28}^{MAX}, V_{28}^{CNT}, V_{28}^{MIN}] (2) $V_{28}(+) = V_{28}^{MAX} - V_{28}^{CNT}$ $V_{28}(-) = V_{28}^{CNT} - V_{28}^{MIN}$
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	a	
58	Brightness Adjustment Characteristic	Same as above		(1) Set the data of sub-address (0F) to (3F). (2) Measure each pin 35 picture period voltage when changing the data of brightness to (FF) : max., (80) : center and (00) : min. [V_{br}^{MAX}, V_{br}^{CNT}, V_{br}^{MIN}]
59	Brightness Sensitivity	Same as above		Calculate brightness data sensitivity from the value calculated in Note 58. $G_{br} = (V_{br}^{MAX} - V_{br}^{MIN}) / 256$
60	Bright Pin Variation Range	Same as above		(1) Measure each pin 29 voltage when changing the data of brightness to (FF) : max., (80) : center and (00) : min. [V_{29}^{MAX}, V_{29}^{CNT}, V_{29}^{MIN}] (2) $V_{29}(+) = V_{29}^{MAX} - V_{29}^{CNT}$ $V_{29}(-) = V_{29}^{CNT} - V_{29}^{MIN}$

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
61	White Peak Slice Level	SW_7	b	(1) Maximize sub-contrast data. (2) Connect external supply to pin 41, and raise voltage from DC 4.5V slowly. Calculate voltage when each picture period of pin 13, pin 14 and pin 15 is clipped. [$V_{WPS1\ R}$ $V_{WPS1\ G}$, $V_{WPS1\ B}$] (3) Repeat (2) when setting the data of sub-address (0E) to (12). [$V_{WPS2\ R}$, $V_{WPS2\ G}$, $V_{WPS2\ B}$]
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	a	
62	Black Peak Slice Level	Same as above		(1) Maximize sub-contrast data. (2) Connect external supply to pin 41, and lower voltage from DC 4.5V slowly. Calculate voltage when each picture period of pin 13, 14 and pin 15 is clipped. [$V_{BPS\ R}$, $V_{BPS\ G}$, $V_{BPS\ B}$]
63	DC Regeneration	SW_7	b	(1) Add stairstep signal to pin 41 from SG. (2) Adjust the data of Uni-Color so that pin 13 stairstep output signal can be $1.25V_{p-p}$. (3) Measure voltage variation of A point when changing average luminance level (APL) of stairstep signal from 10% up to 90%. [$T_{DC\ R}$] (4) Repeat (2) and (3) for pin 14 and 15. [$T_{DC\ G}$, $T_{DC\ B}$]  Pin 41 input signal  Pin 13, 14 and 15 output signal
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	b	
		—	—	
64	RGB Output Emitter Follower Drive Current	SW_7	b	(1) Adjust the data of brightness so that pin 13 picture period voltage can be 3.2V. (2) Measure inflow current to pin 13 when connecting external supply 4.2V to pin 13 via 100Ω resistance. [I_R] (3) Repeat (1) and (2) for pin 14 and 15. [I_G, I_B]
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	a	
65	Half-tone Characteristic	SW_7	b	(1) Input signal 1 (f_0 = 100kHz, picture period amplitude : $0.3V_{p-p}$) to pin 41. (2) Measure pin 13 picture period amplitude. [V_{13A}] (3) Apply external supply of 5V to pin 22. (4) Measure pin 13 picture period amplitude. [V_{13B}] (5) $G_{HT} = V_{13B} / V_{13A}$
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	b	

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
66	Half-Tone ON Voltage	SW_7	b	(1) Input signal 1 (f_0 = 100kHz, picture period amplitude : 0.3V_{p-p}) to pin 41. (2) Connect external supply to pin 22 and raise voltage from 0V slowly. (3) Measure pin 22 voltage when pin 13 picture period amplitude varies. [V_{HT}]
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	b	
67	Vertical Blanking Pulse Output Level	SW_7	b	Calculate each voltage of pin 13, 14 and 15 while vertical blanking. [V_{VR}, V_{VG}, V_{VB}]
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	a	
68	Horizontal Blanking Pulse Output Level	Same as above		Calculate each voltage of pin 13, 14 and 15 while horizontal blanking. [V_{HR}, V_{HG}, V_{HB}]
69	Blanking Pulse Delay Time	Same as above		Calculate td_{ON} and td_{OFF} from applied signal (A) to pin 8 (horizontal blanking input) and output signal (B) of pin 13, pin 14 and pin 15. (A) Input signal of pin 8. (1.4V_{p-p}) (B) Output signal of pin 13, 14 and 15 
70	Sub-Contrast Variable Range	Same as above		(1) Input signal 1 (f_0 = 10kHz, picture period amplitude : 0.3V_{p-p}) to pin 41. (2) Measure pin 13 picture period amplitude when changing the data of sub-address (07) and sub contrast to max. (7F), center (40) and min. (00). [V_{SU}^{MAX}, V_{SU}^{CNT}, V_{SU}^{MIN}] (3) $\Delta V_{SU}(+) = 20\ell og\ (V_{SU}^{MAX} / V_{SU}^{CNT})$ $\Delta V_{SU}(-) = 20\ell og\ (V_{SU}^{MIN} / V_{SU}^{CNT})$
71	RGB Output Voltage	Same as above		Calculate each picture period amplitude of pin 13, 14 and 15. [V_R, V_G, V_B]
72	Cut Off Voltage Variable Range	Same as above		(1) Set the data of sub-address (0E) to (90). (2) Measure pin 13 picture period amplitude when changing the data of cut-off (sub-address 08) to (FF) : max., (80) : center and (00) : min. Calculate the difference between max. and min. amplitudes. [$CUT_R(+)$, $CUT_R(-)$] (3) Repeat (2) for pin 14 when changing the data of sub-address (09) and for pin 15 when sub-address (0A). [$CUT_G(+)$, $CUT_G(-)$, $CUT_B(+)$, $CUT_B(-)$]

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
73	Drive Adjustment Variable Range	SW_7	b	(1) Input signal 1 (f_0 = 100kHz, picture period amplitude : 0.3V_{p-p}) to pin 41. (2) Measure pin 14 picture period amplitude when changing the data of drive (sub-address 0B) to (7F) : max., (40) : center and (00) : min. [V_{DRG}^{MAX}, V_{DRG}^{CNT}, V_{DRG}^{MIN}] (3) DR_G (+) = 20ℓog (V_{DRG}^{MAX} / V_{DRG}^{CNT}) DR_G (−) = 20ℓog (V_{DRG}^{MIN} / V_{DRG}^{CNT}) (4) Repeat (2) and (3) for pin 15 when changing the data of sub-address (0C). [DR_B (+), DR_B (−)]
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	b	
		—	—	
74	Output Voltage When Mute	SW_7	b	(Bus mode) (1) Set the data of sub-address (00) to (FF). (2) Measure picture period voltage of pin 13, 14 and 15. [MU_{RD}, MU_{GD}, MU_{BD}] (Pin mode) (3) Apply external voltage of 5V to pin 21. (4) Measure picture period voltage of pin 13, 14 and 15. [MU_{RA}, MU_{GA}, MU_{BA}]
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	a	
75	Mute ON Voltage (1)	Same as above		(1) Set the data of sub-address (05) to (7F). (2) Apply 5V to pin 23. (3) Connect external voltage to pin 21, and raise voltage from 0V slowly. (4) Measure each pin 21 voltage when changing picture period voltage of pin 13, 14 and 15. [V_{MU1R}, V_{MU1G}, V_{MU1B}]
76	Mute ON Voltage (2)	Same as above		(1) Connect external voltage to pin 21, and raise voltage from 0V slowly. (2) Measure each pin 21 voltage when changing picture period voltage of pin 13, 14 and 15. [V_{MU2R}, V_{MU2G}, V_{MU2B}]
77	Output Voltage When Blue Back	Same as above		(1) Set the data of sub-address (0C) to (C0). (2) Calculate each picture period voltage of pin 13, 14 and 15. [BB_R, BB_G, BB_B]
78	Output Voltage When Service	Same as above		(1) Apply 5V to pin 21. (2) Set the data of sub-address (0E) to (90). (3) Calculate each picture period voltage of pin 13, 14 and 15. [$V_{R\ SER}$, $V_{G\ SER}$, $V_{B\ SER}$]

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
79	Peak ACL Level	SW_7	b	(1) Set the data of sub-address (0E) to (11). (2) Set the data of sub-address (02) to (7F), and set color to maximum. (3) Input signal 2 to test pin 34A (TP34A), and set SW_{34} to B. (4) Raise amplitude A of signal 2 slowly. (5) Measure pin 15 picture period amplitude when pin 28 DC voltage. (Uni-Color) changes.
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	a	
80	Color Temperature Selection	SW_7	b	(1) Input signal 1 (f_0 = 100kHz, picture period amplitude : 0.3V_{p-p}) to pin 41. (2) Measure picture period amplitude of pin 14 and 15. [V_{14a}, V_{15a}] (3) Measure picture period amplitude of pin 14 and 15 when setting the data of sub-address (0B) to (C0). [V_{14aCT1}, V_{15aCT1}] (4) $V_{CT1G} = 20\ell og\ (V_{14aCT1} / V_{14a})$ $V_{CT1B} = 20\ell og\ (V_{15aCT1} / V_{15a})$ (5) Set the data of sub-address (04) to (40) while leaving the data of sub-address (0B) to (C0). (6) Measure picture period amplitude of pin 14 and 15. [V_{14aCT2}, V_{15aCT2}] (7) $V_{CT2G} = 20\ell og\ (V_{14aCT2} / V_{14a})$ $V_{CT2B} = 20\ell og\ (V_{15aCT2} / V_{15a})$ (8) Repeat (2)~(7) when changing pin 41 (input) to both pin 25 and pin 26 (measure), likewise. As a result of (4) : V_{CT3G}, V_{CT3B}° As a result of (7) : V_{CT4G}, V_{CT4B}°
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a / b	
		SW_{26}	a / b	
		SW_{41}	a / b	
		—	—	
81	Analog RGB Gain	SW_7	b	(1) Input signal 1 (f_0 = 10kHz, picture period amplitude : 0.3V_{p-p}) to pin 41. Adjust drive adjustment data so that picture period amplitude of pin 14 and 15 can be equal to that of pin 13. (2) Apply external supply 5V to pin 23. (3) Input signal 1 (f_0 = 10kHz, picture period amplitude : 0.3V_{p-p}) to pin 24. (4) Measure pin 13 picture period amplitude. [V_{13R}] (5) Repeat (3) and (4) when pin 25 (input) pin 14 (measure) [V_{14G}] and pin 26 pin 15 [V_{15B}], likewise. (6) $G_{TX\ R} = V_{13R} / 0.3 <V_{p-p}>$ $G_{TX\ G} = V_{14G} / 0.3 <V_{p-p}>$ $G_{TX\ B} = V_{15B} / 0.3 <V_{p-p}>$
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a / c	
		SW_{25}	a / c	
		SW_{26}	a / c	
		SW_{41}	b	
		—	—	

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
82	Analog RGB Frequency Characteristic	SW_7	b	(1) Input signal 1 (f_0 = 10kHz, picture period amplitude : 0.3V_{p-p}) to pin 41. Adjust drive adjustment data so that picture period amplitude of pin 14 and 15 can be equal to that of pin 13. (2) Apply external supply of 5V to pin 23. (3) Input signal 1 (f_0 = 8MHz, picture period amplitude : 0.3V_{p-p}) to pin 24. (4) Measure pin 13 picture amplitude. [$V_{13R8MHz}$] (5) Repeat (3) and (4) when pin 25 (input) pin 14 (measure) [$V_{14G8MHz}$] and pin 26 pin 15 [$V_{15G8MHz}$], likewise. (6) $Gf_{TX\ R} = 20\ell og\ (V_{13R8MHz} / V_{13R})$ $Gf_{TX\ G} = 20\ell og\ (V_{14G8MHz} / V_{14G})$ $Gf_{TX\ B} = 20\ell og\ (V_{15B8MHz} / V_{15B})$
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a / c	
		SW_{25}	a / c	
		SW_{26}	a / c	
		SW_{41}	b	
		—	—	
83	Analog RGB Input Dynamic Range	SW_7	b	(1) Apply external voltage of 5V to pin 23. (2) Set the data of RGB contrast to (00) : min. (3) Input signal 2 of diagram 1 to pin 24 and raise picture period amplitude A from 0V slowly. (4) Measure picture period amplitude A when no variation of pin 13 picture period voltage. [DR_R] (5) Repeat (3) & (4) when pin 25 (input) pin 14 (measure) [DR_G] and pin 26 pin 15 [DR_B], likewise.
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	a	
84	Analog RGB White Peak Slice Level	Same as above		(1) Input signal 1 (f_0 = 10kHz, picture period amplitude : 0.3V_{p-p}) to pin 41. Adjust drive adjustment data so that picture period amplitude of pin 14 and 15 can be equal to that of pin 13. (2) Apply external supply of 5V to pin 23. (3) Set the data of RGB contrast to (7F) : max. (4) Apply external voltage to pin 24 and raise voltage from DC 4.5V slowly. Calculate voltage at which pin 13 is clipped. [$V_{WPS\ R}{}^{TX}$] (5) Repeat (3) and (4) when pin 25 (input) pin 14 (measure) [DRG] and pin 26 pin 15 [DRG], likewise.
85	Analog RGB Black Peak Slice Level	Same as above		(1) Input signal 1 (f_0 = 10kHz, picture period amplitude : 0.3V_{p-p}) to pin 41. Adjust drive adjustment data so that picture period amplitude of pin 14 and 15 can be equal to that of pin 13. (2) Apply external supply 5V from pin 23. (3) Set the data of RGB contrast to (7F) : max. (4) Apply external voltage to pin 24 and raise voltage from DC 4.5V slowly. Calculate voltage at which pin 13 is clipped. [$V_{BPS\ R}$] (5) Repeat (3) and (4) when pin 25 input pin 14 (measure) [$V_{BPS\ G}$] and pin 26 pin 15 [$V_{BPS\ B}$], likewise.

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
86	RGB Contrast Pin Variation Range	SW_7	b	(1) Apply external supply of 5V to pin 23. (2) Calculate each pin 27 voltage when changing the data of RGB contrast to (7F) : max., (40) : center and (00) : min. [V_{27}^{MAX}, V_{27}^{CNT}, V_{27}^{MIN}] (3) Calculate the difference of RGB contrast pin voltage. $V_{27}(+) = V_{27}^{MAX} - V_{27}^{CNT}$ $V_{27}(-) = V_{27}^{CNT} - V_{27}^{MIN}$
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	a	
87	Analog RGB Brightness Adjustment Characteristic	Same as above		(1) Input signal 1 (f_0 = 10kHz, picture period amplitude : $0.3V_{p-p}$) to pin 41. Adjust drive adjustment data so that picture period amplitude of pin 14 and 15 can be equal to that of pin 13. (2) Input signal 2 to pin 24, pin 25 and 26. (3) Apply external supply 5V to pin 23. (4) Adjust amplitude A of signal 2 so that picture period amplitude of pin 13 can be $0.5V_{p-p}$. (5) Calculate picture period voltage of pin 13, 14 and 15 when changing the data of RGB contrast to (7F) : max., (40) : center and (00) : min. [V_{brTX1}^{MAX}, V_{brTX1}^{CNT}, V_{brTX1}^{MIN}] (6) Set the data of sub-address (05) to (C0). (7) Adjust amplitude A of signal 2 so that pin 13 picture period amplitude can be $1.5V_{p-p}$. (8) Calculate each picture period voltage of pin 13, 14 and 15 when changing the data of brightness to (FF) : max., (80) : center and (00) : min. [V_{brTX2}^{MAX}, V_{brTX2}^{CNT}, V_{brTX2}^{MIN}]
88	Analog RGB Brightness Sensitivity	Same as above		(1) $G_{brTX1} = (V_{brTX1}^{MAX} - V_{brTX1}^{MIN}) / 128$ (2) $G_{brTX2} = (V_{brTX2}^{MAX} - V_{brTX2}^{MIN}) / 256$
89	RGB Contrast Adjustment Characteristic	SW_7	b	(1) Input signal 1 (f_0 = 10kHz, picture period amplitude : $0.3V_{p-p}$) to pin 41. Adjust the data of drive adjustment so that picture period amplitude of pin 14 and 15 can be equal to that of pin 13. (2) Apply external supply 5V to pin 23. (3) Input signal 1 (f_0 = 100kHz, picture period amplitude : $0.3V_{p-p}$) to pin 41. (4) Calculate pin 13 picture period voltage when changing the data of RGB contrast to (FF) : max., (40) : center and (00) : min. [$Vu_{TX\ R}^{MAX}$, $Vu_{TX\ R}^{CNT}$, $Vu_{TX\ R}^{MIN}$] (5) $\Delta Vu_{TX\ R} = 20\ell og\ (Vu_{TX\ R}^{MAX} / Vu_{TX\ R}^{MIN})$ (6) Repeat (3) to (5) when pin 25 (input) pin 14 (measure), [$Vu_{TX\ G}^{MAX}$, $Vu_{TX\ G}^{CNT}$, $Vu_{TX\ G}^{MIN}$, $\Delta Vu_{TX\ G}$] and pin 26 (input) pin 15 (measure). likewise. [$Vu_{TX\ B}^{MAX}$, $Vu_{TX\ B}^{CNT}$, $Vu_{TX\ B}^{MIN}$, $\Delta Vu_{TX\ B}$]
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a / c	
		SW_{25}	a / c	
		SW_{26}	a / c	
		SW_{41}	b	
		—	—	

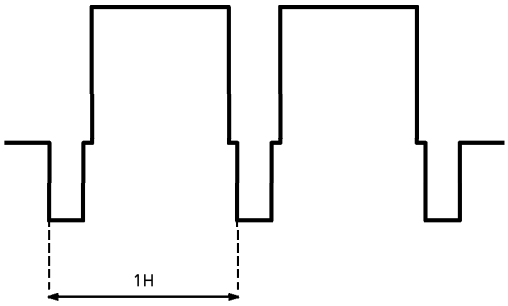
NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
90	Analog RGB Mode ON Voltage	SW_7	b	(1) Input signal 1 (f_0 = 10kHz, picture period amplitude : 0.3V_{p-p}) to pin 41. (2) Connect external supply to pin 23 and raise voltage from 0V slowly. (3) Measure pin 23 voltage when signal 1 is outputted to pin 13. [$V_{TX\ R}^{ON}$] (4) Repeat (1) to (3) when pin 25 (input) pin 14 (measure) [$V_{TX\ G}^{ON}$] and pin 26 pin 15 [$V_{TX\ B}^{ON}$], likewise.
		SW_8	a	
		SW_{20}	b	
		SW_{24}	c	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	a	
91	Analog RGB Mode Change Characteristic	SW_7	b	(1) Set the data of RGB brightness to (7F) : max. (2) Input signal 4 (signal amplitude : 3V_{p-p}) of diagram 2 to pin 23. (3) Measure change characteristic of pin 13 in accordance with the diagram 2. [$\tau R_{YS\ R}$, $tPR_{YS\ R}$, $\tau F_{YS\ R}$, $tPF_{YS\ R}$] (4) Repeat (3) for pin 14 and 15, likewise. [$\tau R_{YS\ G}$, $tPR_{YS\ G}$, $\tau F_{YS\ G}$, $tPF_{YS\ G}$, $\tau R_{YS\ B}$, $tPR_{YS\ B}$, $\tau F_{YS\ B}$, $tPF_{YS\ B}$] (5) From the above measurement data, calculate max. difference between axes of transmission delay time at rise and fall time.[ΔtPR_{YS}, ΔtPF_{YS}]
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	a	
92	Analog RGB Change Characteristic	SW_7	b	(1) Apply external supply 5V to pin 23. (2) Input signal 4 (signal amplitude : 0.5V_{p-p}) to pin 23. (3) Measure change characteristic of pin 13 in accordance with the diagram 2. [$\tau R_{TX\ R}$, $tPR_{TX\ R}$, $\tau F_{TX\ R}$, $tPF_{TX\ R}$] (4) Repeat (3) for pin 14 and 15. [$\tau R_{TX\ G}$, $tPR_{TX\ G}$, $\tau F_{TX\ G}$, $tPF_{TX\ G}$, $\tau R_{TX\ B}$, $tPR_{TX\ B}$, $\tau F_{TX\ B}$, $tPF_{TX\ B}$] (5) From the above measurement data, calculate max. difference between axes of transmission delay time at rise and fall time. [ΔtPR_{TX}, ΔtPF_{TX}]
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a / c	
		SW_{25}	a / c	
		SW_{26}	a / c	
		SW_{41}	a	
93	Crosstalk To Video→Analog RGB	SW_7	b	(1) Input signal 1 (f_0 = 4MHz, picture period amplitude : 0.7V_{p-p}) to pin 41. (2) Adjust the data of sub-contrast so that picture period amplitude of pin 13 can be 3V_{p-p}. (3) Apply external supply 5V to pin 23. (4) Measure pin 13 picture period output amplitude. [V_{13A}] (5) Calculate crosstalk amount from video to analog RGB. $V_{V\rightarrow AR} = -20\ell og\ (V_{13A} / 3)$ (6) Repeat (2)~(5) for pin 14 and 15. [$V_{V\rightarrow AG}$, $V_{V\rightarrow AB}$]
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	b	
		—	—	

NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
94	Crosstalk To Analog RGB→Video	SW_7	b	(1) Apply external supply 5V to pin 23. (2) Input signal 1 (f_0 = 4MHz, picture period amplitude : 0.7V_{p-p}) to pin 41. (3) Adjust the data of RGB contrast so that picture period amplitude of pin 13 can be 3V_{p-p}. (4) Set the data of sub-address (04) to (C0) : max. (5) Measure pin 13 picture period output amplitude. [V_{13B}] (6) Calculate crosstalk amount from analog RGB to video. $V_{A\rightarrow VR} = -20\ell og\ (V_{13B}/3)$ (7) Repeat (2) to (6) when pin 25 (input)→pin 14 (measure) [$V_{A\rightarrow VG}$] and pin 26→pin 15 [$V_{A\rightarrow VB}$] likewise.
		SW_8	a	
		SW_{20}	b	
		SW_{24}	a / b	
		SW_{25}	a / b	
		SW_{26}	a / b	
		SW_{41}	a	
		—	—	
95	Analog RGB Crosstalk Between 3 Axes	Same as above		(1) Apply external supply 5V to pin 23. (2) Input signal 1 (f_0 = 1MHz, picture period amplitude : 0.5V_{p-p}) to pin 41. (3) Measure picture period output amplitude of pin 13, 14 and 15. [V_{13}, V_{14}, V_{15}] (4) Measure crosstalk between 3 axes. $V_{R\rightarrow G} = -20\ell og\ (V_{14}/V_{13})$ $V_{R\rightarrow B} = -20\ell og\ (V_{15}/V_{13})$ (5) Input to pin 25 and 26, and calculate $V_{G\rightarrow R}$, $V_{G\rightarrow B}$, $V_{B\rightarrow R}$, $V_{B\rightarrow G}$.
96	OSD Output DC Current Voltage	SW_7	b	(1) Apply external supply 5V to pin 17. (2) Measure each picture period voltage of pin 13, 14 and 15. [$V_{OSD\ R}^{DC}$, $V_{OSD\ G}^{DC}$, $V_{OSD\ B}^{DC}$]
		SW_8	a	
		SW_{20}	a	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	a	
97	OSD Mode ON Voltage	Same as above		(1) Connect external supply to pin 17 and raise voltage from 0V slowly. (2) Measure picture period output amplitude of pin 13, 14 and 15. [$V_{OSD\ R}^{ON}$, $V_{OSD\ G}^{ON}$, $V_{OSD\ B}^{ON}$]
98	OSD Output High Level Voltage	Same as above		(1) Apply external supply 5V to pin 17. (2) Apply external supply 5V to pin 18. (3) Measure pin 13 picture period voltage. [$V_{OSD1\ R}^{HI}$] (4) Set the data of sub-address (06) to (40). (5) Measure pin 13 picture period voltage. [$V_{OSD2\ R}^{HI}$] (6) Repeat (2)~(5) when pin 19 (input) pin 14 (measure) [$V_{OSD1\ G}^{HI}$, $V_{OSD2\ G}^{HI}$] and pin 20 pin 15 [$V_{OSD1\ B}^{HI}$, $V_{OSD2\ B}^{HI}$] likewise.

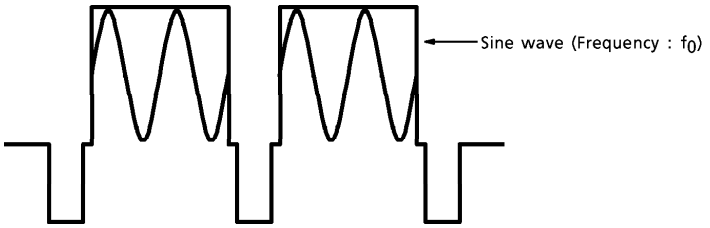
NOTE No.	ITEM	SW MODE		MEASUREMENT METHOD (TEST CONDITION : V_{CC} = 12V, Ta = 25°C)
99	OSD High Level Mode ON Voltage	SW_7	b	(1) Apply external supply 5V to pin 17. (2) Connect external supply to pin 23 and raise voltage from 0V slowly. (3) Measure pin 18 voltage when pin 13 picture period voltage changes. [$V_{OSD\ R}^{HI\ ON}$] (4) Repeat (2) and (3) when applying voltage to pin 19 to measure pin 14 [$V_{OSD\ G}^{HI\ ON}$] and pin 20 to pin 15 [$V_{OSD\ B}^{HI\ ON}$], likewise.
		SW_8	a	
		SW_{20}	a	
		SW_{24}	a	
		SW_{25}	a	
		SW_{26}	a	
		SW_{41}	a	
100	OSD Mode Change Characteristic	Same as above		(1) Input signal 4 (signal amplitude : $3V_{p-p}$) to pin 17. (2) Measure change characteristic for pin 13, 14 and 15, in accordance with the diagram 2. [$\tau R_{OSD\ R}$, $tPR_{OSD\ R}$, $\tau F_{OSD\ R}$, $tPF_{OSD\ R}$, $\tau R_{OSD\ G}$, $tPR_{OSD\ G}$, $\tau F_{OSD\ G}$, $tPF_{OSD\ G}$, $\tau R_{OSD\ B}$, $tPR_{OSD\ B}$, $\tau F_{OSD\ B}$, $tPF_{OSD\ B}$] (3) From the above measurement data, calculate max. difference between axes of transmission delay time at rise and fall time. [ΔtPR_{OSD}, ΔtPF_{OSD}]
101	OSD High Mode Change Characteristic	Same as above		(1) Apply external supply 5V to pin 17. (2) Input signal 4 (signal amplitude : $3V_{p-p}$) to pin 18. (3) Measure change characteristic for pin 13, 14 and 15, in accordance with the diagram 2. [$\tau R_{OSD\ R}^{HI}$, $tPR_{OSD\ R}^{HI}$, $\tau F_{OSD\ R}^{HI}$, $tPF_{OSD\ R}^{HI}$] (4) Repeat (2) and (3) when pin 19 (input) pin 14 (measure), [$\tau R_{OSD\ G}^{HI}$, $tPR_{OSD\ G}^{HI}$, $\tau F_{OSD\ G}^{HI}$, $tPF_{OSD\ G}^{HI}$], and pin 20 pin 14, likewise. [$\tau R_{OSD\ B}^{HI}$, $tPR_{OSD\ B}^{HI}$, $\tau F_{OSD\ B}^{HI}$, $tPF_{OSD\ B}^{HI}$] (5) From the above measurement data, calculate max. difference between axes of transmission delay time at rise and fall time. [ΔtPR_{OSD}^{HI}, ΔtPF_{OSD}^{HI}]

THE SIGNALS FOR TEXT AND CHROMA STAGE MEASUREMENT

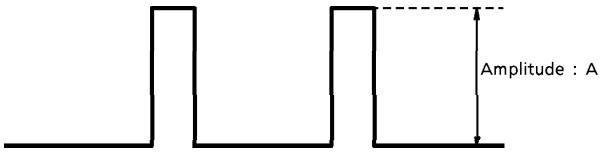
① Video signal



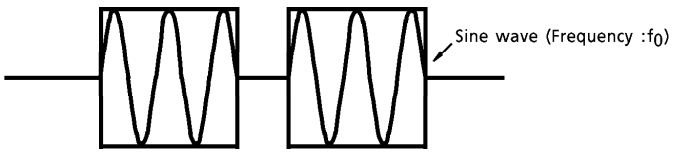
② Input signal 1



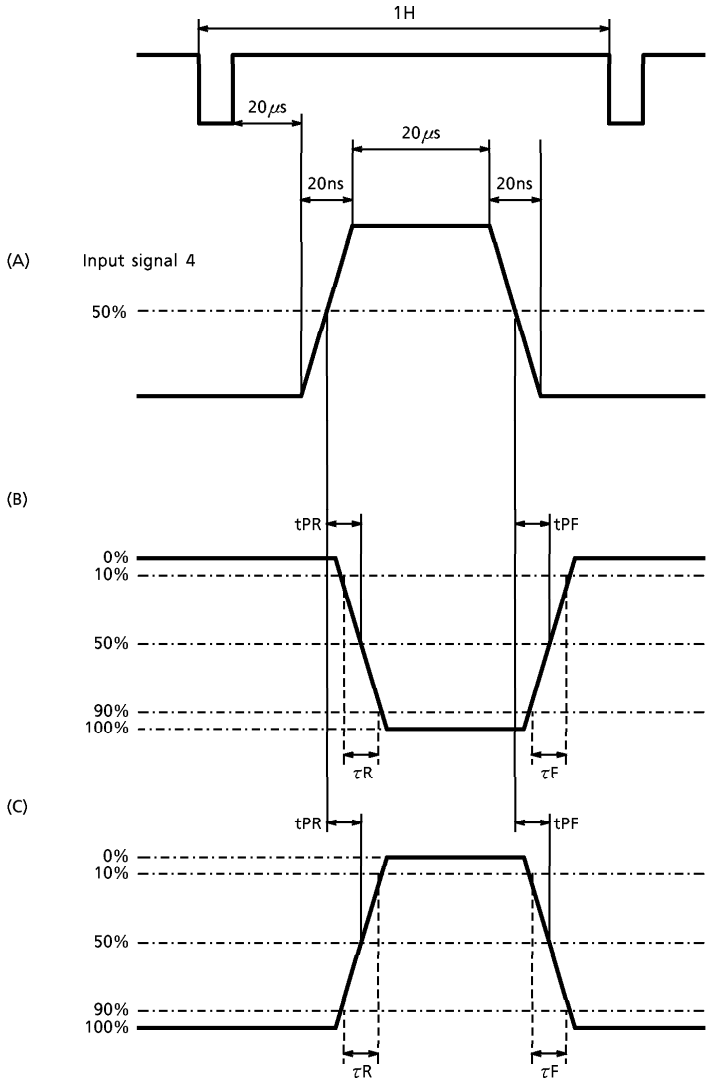
③ Input signal 2



④ Input signal 3

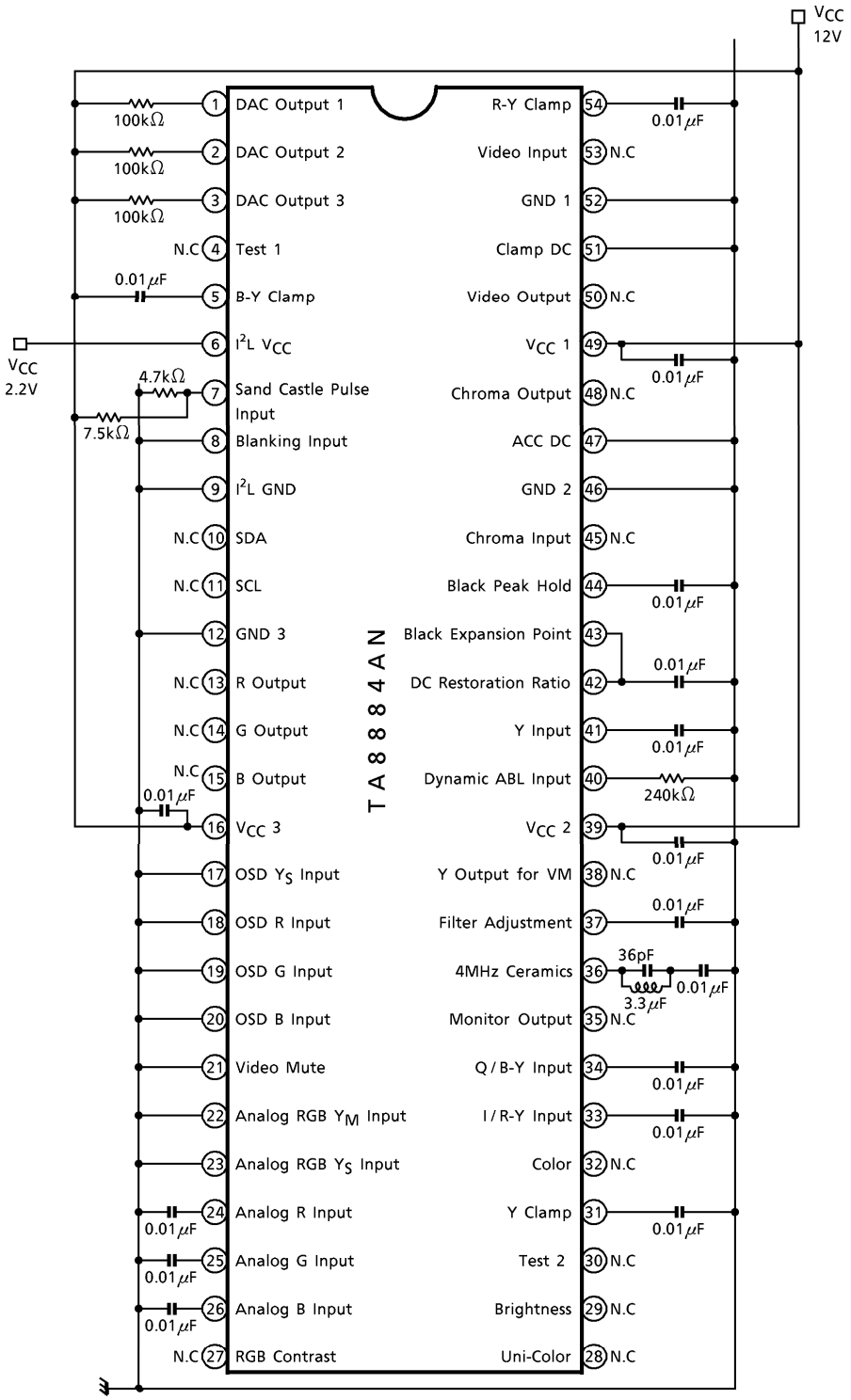


THE PULSES FOR TEXT AND CHROMA STAGE MEASUREMENT



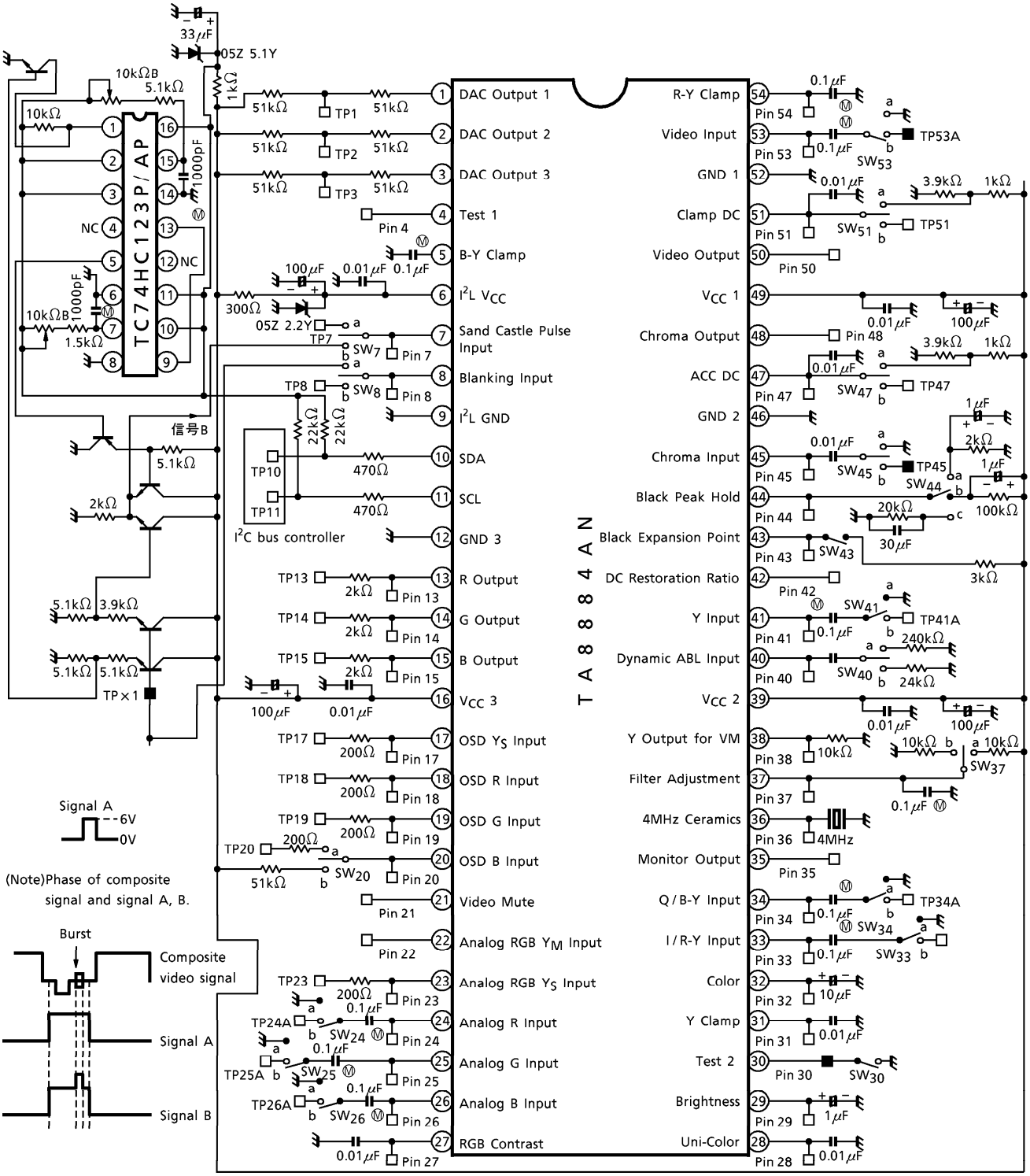
TEST CIRCUIT 1

DC characteristics

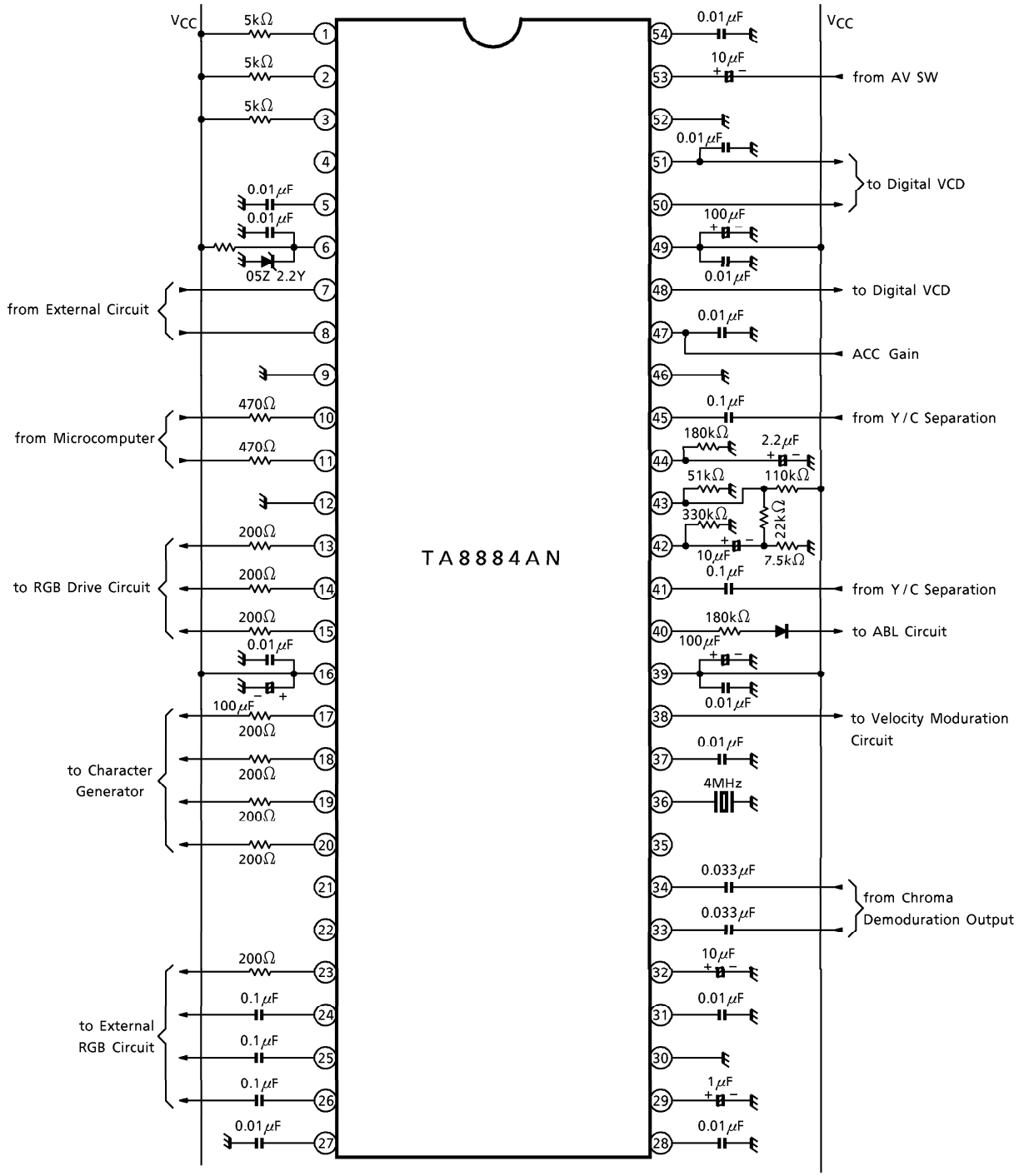


TEST CIRCUIT 2

AC characteristics

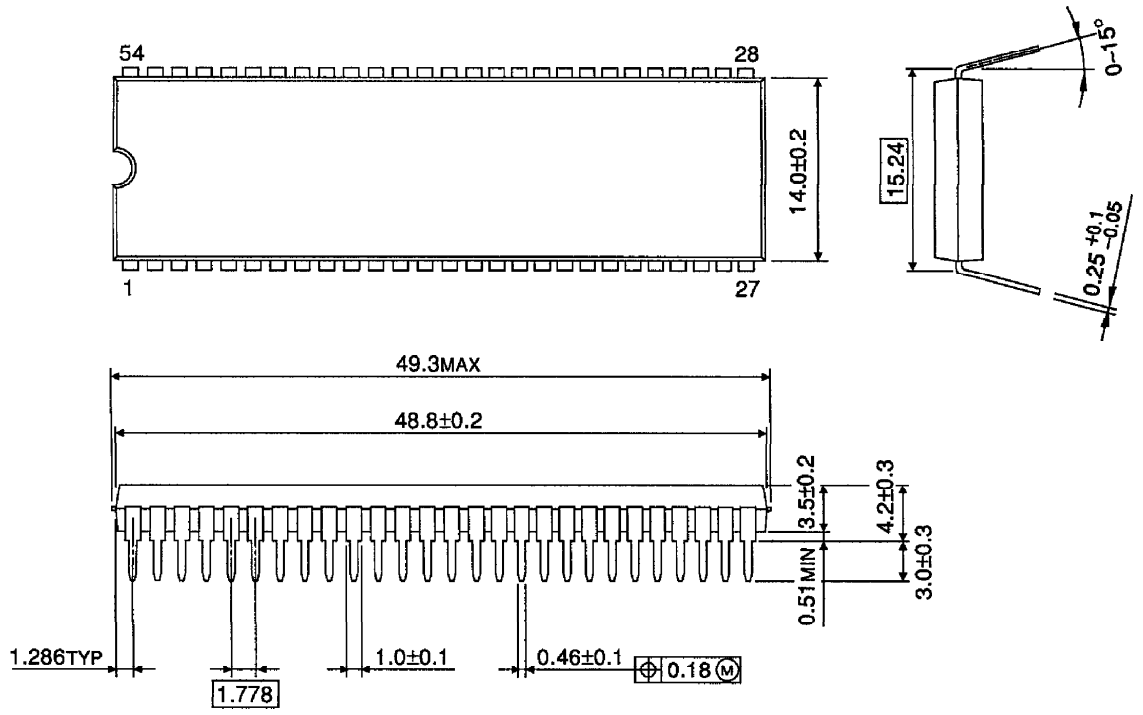


APPLICATION CIRCUIT



OUTLINE DRAWING

SDIP54-P-600-1.78 Unit : mm



Weight : 5.44g (Typ.)