

TOSHIBA Bi-CMOS INTEGRATED CIRCUIT SILICON MONOLITHIC

T B 1 2 2 6 D N G

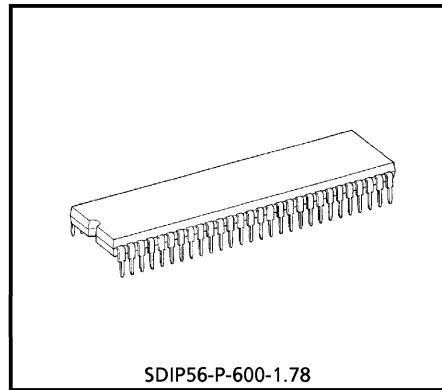
VIDEO, CHROMA AND SYNCHRONIZING SIGNALS PROCESSING IC FOR PAL / NTSC / SECAM SYSTEM COLOR TV

TB1226DNG that is a signal processing IC for the PAL/NTSC/SECAM color TV system integrates video, chroma and synchronizing signal processing circuits together in a 56-pin shrink DIP plastic package.

TB1226DNG incorporates a high performance picture quality compensation circuit in the video section, an automatic PAL/NTSC/SECAM discrimination circuit in the chroma section, and an automatic 50/60Hz discrimination circuit in the synchronizing section. Besides a crystal oscillator that internally generates 4.43MHz, 3.58MHz and M/N-PAL clock signals for color demodulation, there is a horizontal PLL circuit built in the IC.

The PAL/SECAM demodulation circuit which is an adjustment-free circuit incorporates a 1H DL circuit inside for operating the base band signal processing system.

Also, TB1226DNG makes it possible to set or control various functions through the built-in I²C bus line.



SDIP56-P-600-1.78

Weight : 5.55g (Typ.)

FEATURES

Video section

- Built-in trap filter
- Black expansion circuit
- Variable DC regeneration rate
- Y delay line
- Sharpness control by aperture control
- γ correction

Chroma section

- Built-in 1H Delay circuit
- PAL/SECAM base band demodulation system
- One crystal color demodulation circuit (4.43MHz, 3.58MHz, M/N-PAL)
- Automatic system discrimination, system forced mode
- 1H delay line also serves as comb filter in NTSC demodulation
- Built-in band-pass filter, SECAM bell filter
- Color limiter circuit

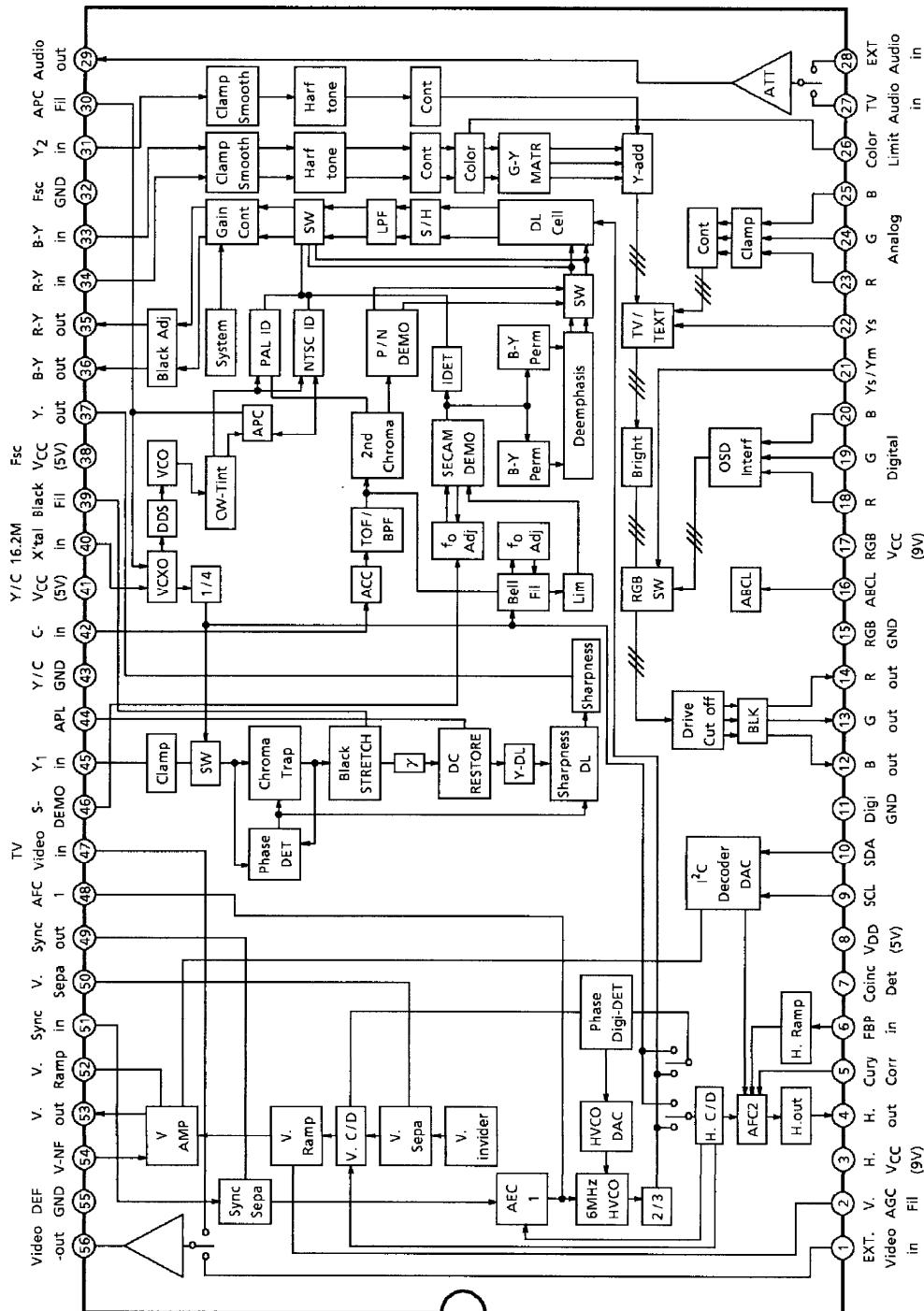
Synchronizing deflecting section

- Built-in horizontal VCO resonator
- Adjustment-free horizontal / vertical oscillation by count-down circuit
- Double AFC circuit
- Vertical frequency automatic discrimination circuit
- Horizontal / vertical holding adjustment
- Vertical ramp output
- Vertical amplitude adjustment
- Vertical linearity / S-shaped curve adjustment

Text section

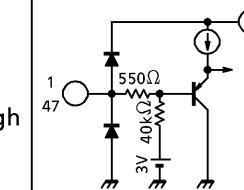
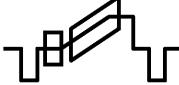
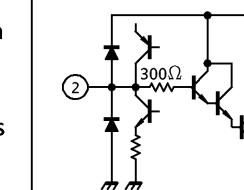
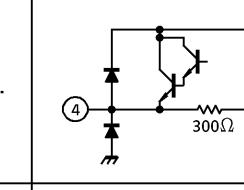
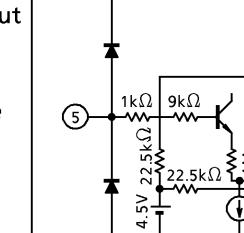
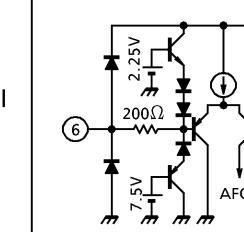
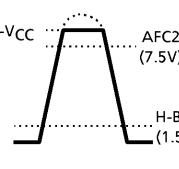
- Linear RGB input
- OSD RGB input
- Cut/off-drive adjustment
- RGB primary signal output

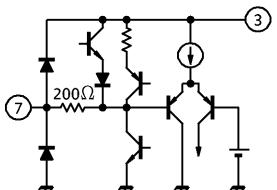
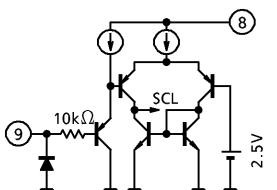
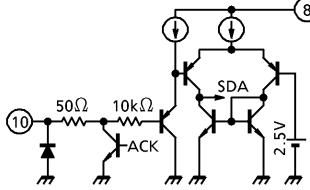
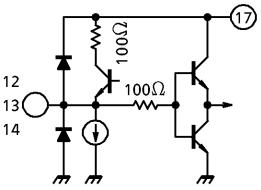
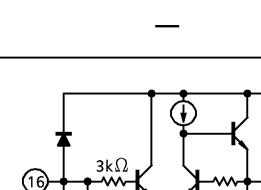
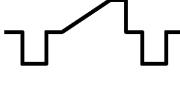
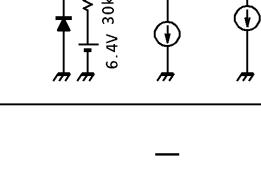
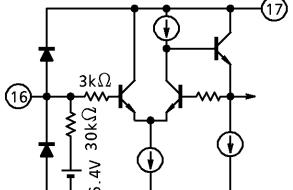
BLOCK DIAGRAM



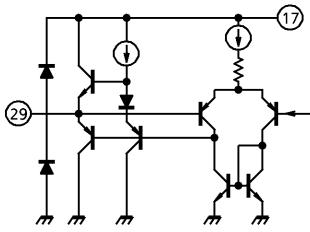
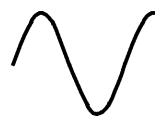
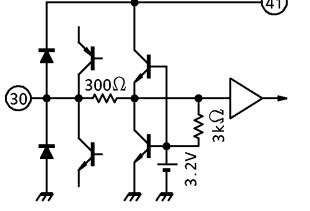
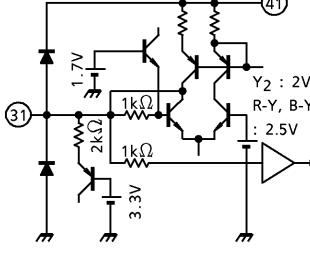
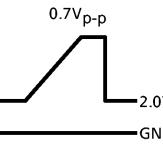
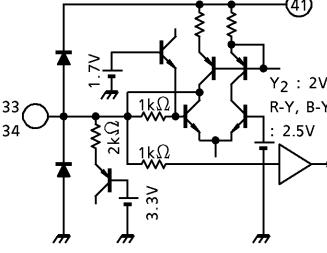
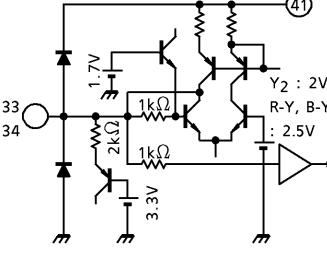
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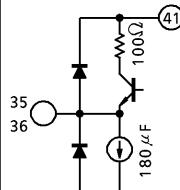
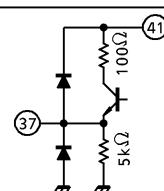
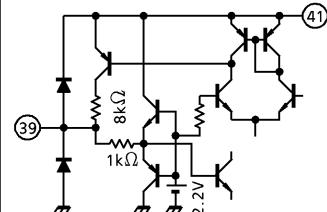
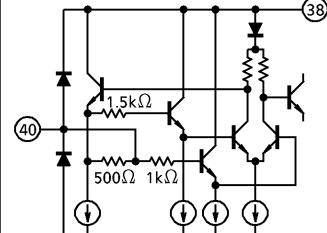
TERMINAL FUNCTIONS

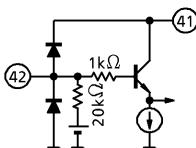
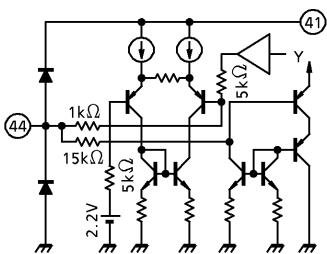
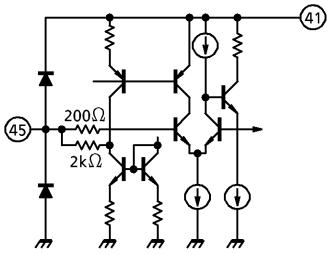
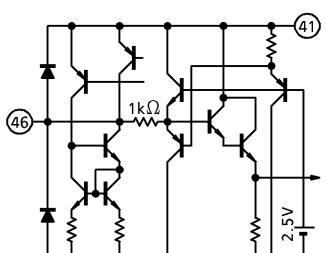
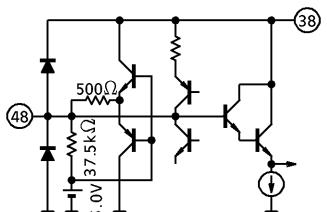
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT / OUTPUT SIGNAL
1	External Video Input	For inputting external / TV composite video signal. Input negative 1V _{p-p} synchronizing signal through a coupling capacitor to these pins.		Negative 1V _{p-p} sync 
2	V-AGC	Controls pin 52 to maintain a uniform V-ramp output. Connect a current smoothing capacitor to this pin.		—
3	H-V _{CC} (9V)	V _{CC} for the DEF block (deflecting system). Connect 9V (Typ.) to this pin.	—	—
4	Horizontal Output	Horizontal output terminal.		5.0V 0.2V 
5	Picture Distortion Correction	Corrects picture distortion in high voltage variation. Input AC component of high voltage variation. For inactivating the picture distortion correction function, connect 0.01μF capacitor between this pin and GND.		4.5V at Open
6	FBP Input	FBP input for generating horizontal AFC2 detection pulse and horizontal blanking pulse. The threshold of horizontal AFC2 detection is set H.V _{CC} - 2V _f ($V_f \approx 0.75V$). Confirming the power supply voltage, determine the high level of FBP.		H-V _{CC} AFC2 (7.5V) H-BLK (1.5V) 

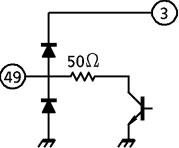
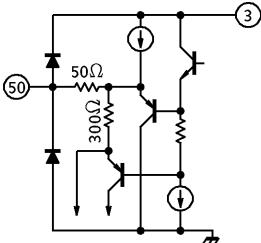
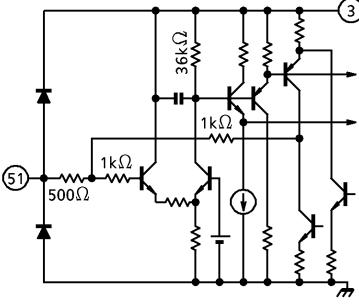
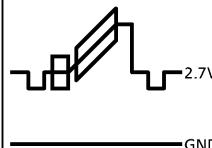
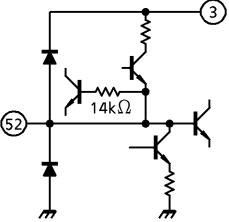
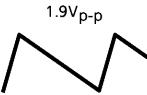
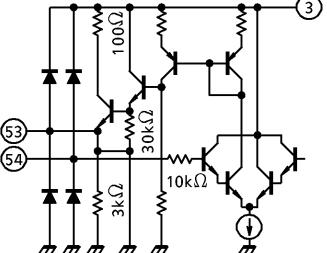
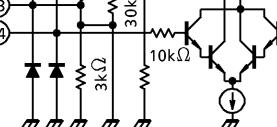
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT/OUTPUT SIGNAL
7	Coincident Det.	To connect filter for detecting presence of H. synchronizing signal or V. synchronizing signal.		—
8	VDD (5V)	VDD terminal of the LOGIC block. Connect 5V (Typ.) to this pin.	—	—
9	SCL	SCL terminal of I ² C bus.		—
10	SDA	SDA terminal of I ² C bus.		—
11	Digital GND	Grounding terminal of LOGIC block.	—	—
12	B Output			
13	G Output	R, G, B output terminals.		
14	R Output			
15	TEXT GND	Grounding terminal of TEXT block.	—	—
16	ABCL	External unicolor brightness control terminal. Sensitivity and start point of ABL can be set through the bus.		6.4V at Open
17	RGB-V _{CC} (9V)	V _{CC} terminal of TEXT block. Connect 9V (Typ.) to this pin.	—	—

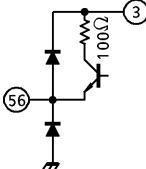
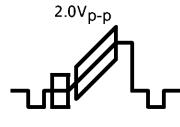
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT/OUTPUT SIGNAL
18	Digital R Input	Input terminals of digital R, G, B signals. Input DC directly to these pins.		OSD — 2.0V TEXT — 1.0V — GND
19	Digital G Input			
20	Digital B Input	OSD or TEXT signal can be input to these pins.		
21	Digital YS / YM	Selector switch of halftone / internal RGB signal / digital RGB (pins 18, 19, 20).		OSD — 2.0V TEXT — 1.0V H.T. — 0.5V TV — GND
22	Analog YS	Selector switch of internal RGB signal or analog RGB (pins 23, 24, 25).		Analog RGB — 0.5V TV — GND
23	Analog R Input	Analog R, G, B input terminals. Input signal through the clamping capacitor.		100IRE = 0.5Vp-p 4.6V — GND
24	Analog G Input			
25	Analog B Input	Standard input level : 0.5V _{p-p} (100 IRE).		
26	Color Limiter	To connect filter for detecting color limit.		—
27	TV Audio Input			
28	External Audio Input	Input terminals for monaural audio signal.		DC 2.9V AC Max. 6.0V _{p-p}
29				

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT/OUTPUT SIGNAL
29	Audio Output	Output terminal of audio signal that passes attenuator.		
30	APC Filter	To connect APC filter for chroma demodulation.		—
31	Y ₂ Input	Input terminal of processed Y signal. Input Y signal through clamping capacitor. Standard input level : 0.7V _{p-p}		
32	Fsc GND	Grounding terminal of VCXO block. Insert a decoupling capacitor between this pin and pin 38 (Fsc VDD) at the shortest distance from both.	—	—
33	B-Y Input	Input terminal of B-Y or R-Y signal. Input signal through a clamping capacitor.		DC 2.5V
34	R-Y Input			AC B-Y : 650mV _{p-p} R-Y : 510mV _{p-p} (with input of PAL-75% color bar signal)

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT/OUTPUT SIGNAL
35	R-Y Output	Output terminal of demodulated R-Y or B-Y signal. There is an LPF for removing carrier built in this pin.		DC 1.9V AC B-Y : 650mVp-p R-Y : 510mVp-p (with input of PAL-75% color bar signal)
36	B-Y Output			
37	Y Output	Output terminal of processed Y signal. Standard output level : 0.7Vp-p		0.7Vp-p 2.3V GND
38	Fsc VDD	VDD terminal of VCXO block. Insert a decoupling capacitor between this pin and pin 32 (Fsc GND) at the shortest distance from both. If decoupling capacitor is inserted at a distance from the pins, it may cause spurious deterioration.	—	—
39	Black Stretch	To connect filter for controlling black expansion gain of the black expansion circuit. Black expansion gain is determined by voltage of this pin.		—
40	16.2MHz X'tal	To connect 16.2MHz crystal clock for generating sub-carrier. Lowest resonance frequency (f_0) of the crystal oscillation can be varied by changing DC capacity. Adjust f_0 of the oscillation frequency with the board pattern.		—

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT/OUTPUT SIGNAL
41	Y/C V _{CC} (5V)	V _{CC} terminal of Y/C signal processing block.	—	—
42	Chroma Input	Chroma signal input terminal. Input negative 1.0V _{p-p} sync composite video signal to this pin through a coupling capacitor.		DC 2.4V AC : 300mV _{p-p} burst
43	Y/C GND	Grounding terminal of Y/C signal processing block.	—	—
44	APL	To connect filter for DC regeneration compensation. Y signal after black expansion can be monitored by opening this pin.		—
45	Y ₁ Input	Input terminal of Y signal. Input negative 1.0V _{p-p} sync composite video signal to this pin through a clamping capacitor.		1.0V _{p-p} 2.2V GND
46	S-Demo-Adj.	To connect f ₀ adjustment filter for SECAM demodulation.		DC 3.2V
48	AFC1 Filter	To connect filter for horizontal AFC1 detection. Horizontal frequency is determined by voltage of this pin.		—

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT/OUTPUT SIGNAL
49	Sync Output	Output terminal of synchronizing signal separated by sync separator circuit. Connect a pull-up resistor to this pin because it is an open-collector output type.		
50	V-Sepa.	To connect filter for vertical synchronizing separation.		—
51	Sync Input	Input terminal of synchronizing separator circuit. Input signal through a clamping capacitor to this pin. Negative 1.0V _{p-p} sync.		
52	V-Ramp	To connect filter for generating V-ramp waveform.		
53	Vertical Output	Output terminal of vertical ramp signal.		
54	V-NF	Input terminal of vertical NF signal.		

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT/OUTPUT SIGNAL
55	DEF GND	Grounding terminal of DEF (deflection) block.	—	—
56	Video Output	Output terminal of external /TV video input selected by bus. Output level is 2.0V _{p-p} (Typ.). Connect a drive resistor to this pin because it is an open-emitter output type. The minimum drive resistance is 1.2kΩ.		

BUS CONTROL MAP
WRITE DATA
Slave address : 88H

BLOCK	SUB ADDR	MSB 7	6	5	4	3	2	1	LSB 0	PRESET
	00									1 0 0 0 0 0 0 0 0
	01									1 0 0 0 0 0 0 0 0
	02									1 0 0 0 0 0 0 0 0
VIDEO / TEXT	03	AV SW								0 1 0 0 0 0 0 0 0
	04	P / N KIL	ND SW							0 0 1 0 0 0 0 0 0
	05	DTrp-SW	R-Mon	B-Mon						1 0 0 1 0 0 0 0 0
A ATT	06	A MUTE								1 0 0 0 0 0 0 0 0
	07	Y γ	WPL SW	0	BLUE BACK MODE					1 0 0 0 0 0 0 0 0
VIDEO / TEXT	08									0 0 0 0 0 0 0 0 0
	09									0 1 0 0 0 0 0 0 0
DEF	0A									1 0 0 0 0 0 0 0 0
	0B									1 0 0 0 0 0 0 0 0
	0C									0 0 0 0 0 0 0 0 0
	0D									0 0 0 0 0 0 0 0 0
TEXT (P / N)	0E	B. S. OFF	C-TRAP	OFST SW	C-TOF	P / N GP	CLL SW	WBK SW	WMUT SW	0 0 0 0 0 0 0 0 0
	0F	S-INHBT	358 Trap	F-B / W	X'tal MODE					0 0 0 0 0 0 0 0 0
SYSTEM	10									0 0 0 0 0 0 0 0 0
	11	R-Y BLACK OFFSET				B-Y BLACK OFFSET				0 0 0 0 0 0 0 0 0
P/N	12	CLL LEVEL		PN CD ATT		TOF Q		TOF FO		0 0 0 0 0 0 0 0 0
Vi/C	13	V-MODE	*	*	*	C-TRAP Q		C-TRAP FO		1 0 1 0 0 0 0 0 0
	14	BLACK STRETCH POINT				DC TRAN RATE		APA-CON FO / SW		1 0 1 0 0 0 0 0 0
VIDEO (DEF)	15	ABL POINT				ABL GAIN		HALF TONE SW		0 0 0 0 0 0 0 0 0
	16	H BLK PHASE		V FREQ		V OUT PHASE				0 0 0 0 0 0 0 0 0
GEOME TRY	17			V-AMPLITUDE				*	1 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0
	18	*	*	*	*	*	*		COINCIDENT DET	1 0 0 0 0 0 0 0 0
	19			V S-CORRECTION					DRG SW	1 0 0 0 0 0 0 0 0
	1A			V LINEARITY		V-CD MD	DRV CNT	VAGC SP		0 0 0 0 0 0 0 0 1
	1B	MUTE MODE				WIDE V-BLK START PHASE				0 1 1 1 1 1 1 1 1
	1C	BLK SW				WIDE V-BLK STOP PHASE				0 0 0 0 0 0 0 0 0
DEF-V	1D	NOISE DET LEVEL				WIDE P-MUTE START PHASE				1 0 1 1 1 1 1 1 1
	1E	N COMB				WIDE P-MUTE STOP PHASE				0 0 0 0 0 0 0 0 0
SECAM	1F	S-field	SCD ATT	DEMP FO	S GP	V-ID SW	S KIL	BELL FO		0 0 0 0 0 0 0 0 1

(Note) * : Data is ignored.

READ-IN DATA

Slave address : 89H

		MSB 7	6	5	4	3	2	1	LSB 0
	00	PORES	COLOR SYSTEM		X'tal		V-FREQ	V-STD	N-DET
	01	LOCK	RGBOUT	Y ₁ -IN	UV-IN	Y ₂ -IN	H	V	V-GUARD

BUS CONTROL FUNCTION

WRITE FUNCTION

ITEM	DESCRIPTION	NUMBER OF BITS	VARIABLE RANGE	PRESET VALUE
UNI-COLOR	—	8bit	–18dB~0dB	80h MAX – 5.0dB
BRIGHT	—	8bit	–1V~1V	80h 0V
COLOR	—	8bit	~0dB	80h – 6dB
AV SW	Ext Audio and Video SW	1bit	INT / EXT	00h INT
TINT	—	7bit	–45°~45°	40h 0°
P/N KIL	P/N KILLER sensitivity control	1bit	Normal / Low	00h NORMAL
SHARPNESS	—	6bit	–6dB~12dB	20h +3dB
DTrp-SW	SECAM double trap ON/OFF	1bit	ON / OFF	01h OFF
R-Mon	TEXT-11 dB pre-amplification UV output	1bit	Normal / Monitor	00h Normal
B-Mon	(Pin 35 : Bo, Pin 36 : Ro)	1bit	Normal / Monitor	00h Normal
Y SUB CONTRAST	—	5bit	–3dB~+3dB	10h 0dB
RGB-CONTRAST	EXT RGB UNI-COLOR control	8bit	–18dB~0dB	80h MAX – 5.0dB
A MUTE	Audio Mute ON/OFF SW	1bit	OFF / ON	01h ON
Audio-ATT Gain	Audio ATT GAIN	7bit	–85dB~1dB	00h –85dB
Yγ	γ ON/OFF	1bit	OFF / 95 IRE	00h OFF
WPL SW	White peak limit level	1bit	130 IRE / OFF	00h 130 IRE
BLUE BACK MODE	Luminance selector switch	2bit	IRE ; OFF, 40, 50, 50	00h OFF
Y-DL SW	Y-DL TIME (28, 33, 38, 43, 48)	3bit	280~480ns after Y IN	04h 480ns
G DRIVE GAIN	—	8bit	–5dB~3dB	80h 0dB
B DRIVE GAIN	—	8bit	–5dB~3dB	80h 0dB
HORIZONTAL POSITION	Horizontal position adjustment	5bit	–3μs~+3μs	10h 0μs

ITEM	DESCRIPTION	NUMBER OF BITS	VARIABLE RANGE	PRESET VALUE
AFC MODE	AFC1 detection sensitivity selector	2bit	dB ; AUTO, 0, -10, -10	00h AUTO
H-CK SW	HOUT generation clock selector	1bit	384fh-VCO, FSC-VCXO	01h FSC-VCXO
R CUT OFF	—	8bit	-0.5~0.5V	00h -0.5V
G CUT OFF	—	8bit	-0.5~0.5V	00h -0.5V
B CUT OFF	—	8bit	-0.5~0.5V	00h -0.5V
B. S. OFF	Black expansion ON/OFF	1bit	ON/OFF	00h ON
C-TRAP	Chroma Trap ON/OFF SW	1bit	ON/OFF	00h ON
FST SW	Black offset SECAM discrimination interlocking switch	1bit	SECAM only / All systems	00h S only
C-TOF	P/N TOF ON/OFF SW	1bit	ON/OFF	00h ON
P/N GP	PAL GATE position	1bit	Standard / 0.5μs delay	00h Standard
CL-L SW	COLOR LIMIT ON/OFF	1bit	ON/OFF	00h ON
WBLK SW	WIDE V-BLK ON/OFF	1bit	OFF/ON	00h OFF
WMUT SW	WIDE Picture-MUTE ON/OFF	1bit	OFF/ON	00h OFF
S-INHBT	To detect or not to detect SECAM	1bit	Yes / No	00h Yes
3.58 Trap	C Trap-f ₀ , force 3.58MHz switch	1bit	AUTO / Forced 3.58MHz	00h AUTO
F-B/W	Force B/W switch	1bit	AUTO / Forced B/W	00h AUTO
X'tal MODE	APC oscillation frequency selector switch	3bit	000 ; European system AUTO, 001 ; 3N 010 ; 4P, 011 ; 4P (N inhibited) 100 ; S.American system AUTO, 101 ; 3N, 110 ; MP, 111 ; NP	00h European system AUTO
COLOR SYSTEM	Chroma system selection	2bit	AUTO, PAL, NTSC, SECAM	00h AUTO
R-Y BLACK OFFSET	R-Y color difference output black offset adjustment	4bit	-24~21mV STEP 3mV	08h 0mV
B-Y BLACK OFFSET	B-Y color difference output black offset adjustment	4bit	-24~21mV STEP 3mV	08h 0mV
CLL LEVEL	Color limit level adjustment	2bit	91, 100, 108, 116%	02h 108%

(Note) 3N ; 3.58-NTSC, 4P ; 4.43-PAL, MP ; M-PAL, NP ; N-PAL
 European system AUTO ; 4.43-PAL, 4.43-NTSC, 3.58-NTSC, SECAM
 S. American system AUTO ; 3.58-NTSC, M-PAL, N-PAL

ITEM	DESCRIPTION	NUMBER OF BITS	VARIABLE RANGE	PRESET VALUE
PN CD ATT	P / N color difference amplitude adjustment	2bit	+ 1~ - 2dB STEP 1dB	01h 0dB
TOF Q	TOF Q adjustment	2bit	1.0, 1.5, 2.0, 2.5	02h 2.0
TOF F ₀	TOF f ₀ adjustment	2bit	kHz ; 0, 500, 600, 700	02h 600kHz
C-TRAP Q	Chroma trap Q control	2bit	1.0, 1.5, 2.0, 2.5	02h 2.0
C-TRAP F ₀	Chroma trap f ₀ control	2bit	kHz ; - 100, - 50, 0, + 50	02h 0kHz
BLACK STRETCH POI	Black expansion start point setting	3bit	28~70% IRE × 0.4	05h 56% IRE
DC TRAN RATE	Direct transmission compensation degree selection	3bit	100~130% APL	00h 100%
APA-CON PEAK F ₀	Sharpness peak frequency selection	2bit	kHz ; 2.5, 3.1, 4.2, OFF	02h 4.2kHz
ABL POINT	ABL detection voltage	3bit	ABL point ; 6.5V~5.9V	00h 6.5V
ABL GAIN	ABL sensitivity	3bit	Brightness ; 0~-2V	00h 0V
HALF TONE SW	Halftone gain selection	2bit	- 3dB, - 6dB, OFF, OFF	00h - 3dB
H BLK PHASE	Horizontal blanking end position	3bit	0~3.5μs step 0.5μs	00h 0μs
V FREQ	Vertical frequency	2bit	AUTO, 60Hz, Forced 312.5H, Forced 262.5H	00h AUTO
V OUT PHASE	Vertical position adjustment	3bit	0~7H STEP 1H	00h 0H
V-AMPLITUDE	Vertical amplitude selection	7bit	- 50~50%	40h 0%
COINCIDENT MODE	Discriminator output signal selection	2bit	00 ; DSYNC 01 ; DSYNC × AFC 10 ; Field counting 11 ; VP is present.	02h Field counting
V S-CORRECTION	Vertical S-curve correction	7bit	Reverse S-curve, S-curve	40h —
V-MODE	Force Sync Mode selection	1bit	TELETEXT / Normal	01h Normal
DRG SW	Drive reference axis selection	1bit	R / G	00h R
V LINEARITY	Vertical linearity correction	5bit	(one side)	00h —
ND SW	NOISE DET SW	1bit	Normal, Low	00h Normal
V-CD MD	Vertical count-down mode selection	1bit	AUTO / Force synchronization	00h AUTO
DRV CNT	All drive gains forced centering switch	1bit	OFF / Force centering	00h OFF
VAGC SP	Vertical ramp time constant selection	1bit	Normal / High speed	01h High speed

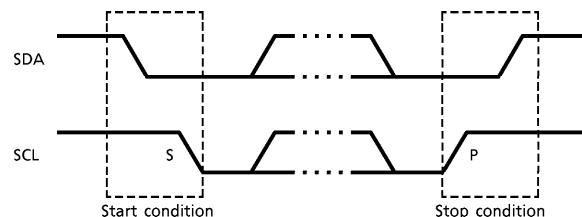
ITEM	DESCRIPTION	NUMBER OF BITS	VARIABLE RANGE	PRESET VALUE
MUTE MODE	OFF, RGB mute, Y mute, transverse	2bit	OFF, RGB, Y, Transverse	01h RGB
WIDE V-BLK START PH	Vertical pre-position selection	6bit	-64~-1H STEP 1H	3Fh -1H
BLK SW	Blanking ON/OFF	1bit	ON/OFF	00h ON
WIDE V-BLK STOP PH	Vertical post-position selection	7bit	0~128H STEP 1H	00h 0H
NOISE DET LEVEL	Noise detection level selection	2bit	ND SW Normal : 0.15, 0.125, 0.1, 0.075 Low : 0.5, 0.475 0.45, 0.425	02h 0.1
WIDE P-MUTE START PH	Video mute pre-position selection	6bit	-64~-1H STEP 1H	3Fh -1H
N COMB	1H addition selection	1bit	OFF / ADD	00h OFF
WIDE P-MUTE STOP PH	Video mute post-position selection	7bit	0~128H STEP 1H	00h 0H
S-field	SECAM color and Q selection in weak electric field	1bit	Weak electric field control ON/OFF	00h ON
SCD ATT	SECAM color difference amplitude adjustment	1bit	0 / -1dB	00h 0dB
DEMO F ₀	SECAM deemphasis time constant selection	1bit	85kHz / 100kHz	00h 85kHz
S GP	SECAM gate position selection	1bit	Standard / 0.5μs delay	00h Standard
V-ID SW	SECAM V-ID ON/OFF switch	1bit	OFF / ON	00h OFF
S KIL	SECAM KILLER sensitivity selection	1bit	NORMAL / LOW	00h NORMAL
BELL F ₀	Bell f ₀ adjustment	2bit	-46~92kHz STEP 46kHz	01h 0kHz

READ-IN FUNCTION

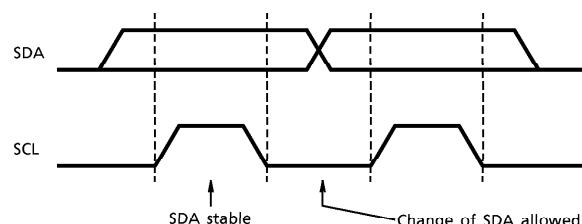
ITEM	DESCRIPTION	NUMBER OF BITS
PONRES	0 : POR cancel, 1 : POR ON	1bit
COLOR SYSTEM	00 : B / W, 01 : PAL 10 : NTSC, 11 : SECAM	2bit
X'tal	00 : 4.433619MHz 01 : 3.579545MHz 10 : 3.575611MHz (M-PAL) 11 : 3.582056MHz (N-PAL)	2bit
V-FREQ	0 : 50Hz, 1 : 60Hz	1bit
V-STD	0 : NON-STD, 1 : STD	1bit
N-DET	0 : Low, 1 : High	1bit
LOCK	0 : UN-LOCK, 1 : LOCK	1bit
RGBOUT, Y ₁ -IN UV-IN, Y ₂ -IN, H, V	Self-diagnosis 0 : NG, 1 : OK	1bit each
V-GUARD	Detection of breaking neck 0 : Abnormal, 1 : Normal	1bit

DATA TRANSFER FORMAT VIA I²C BUS

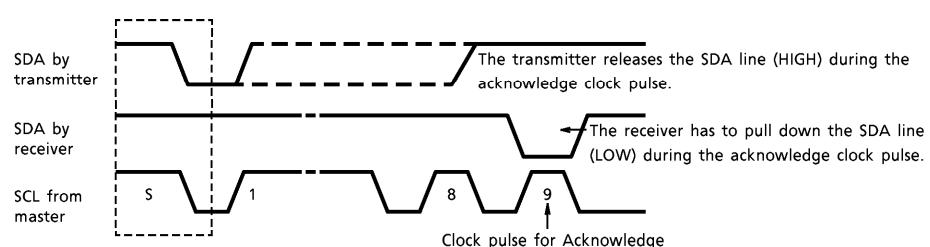
Start and stop condition



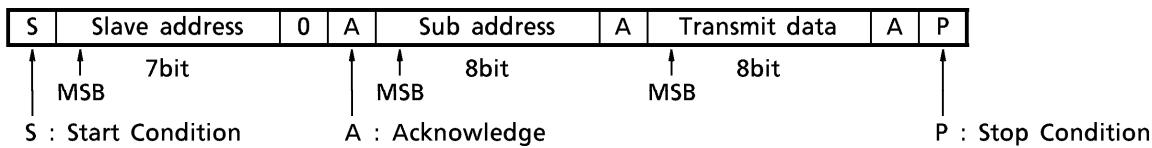
Bit transfer



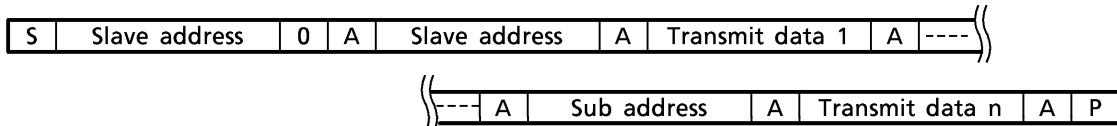
Acknowledge



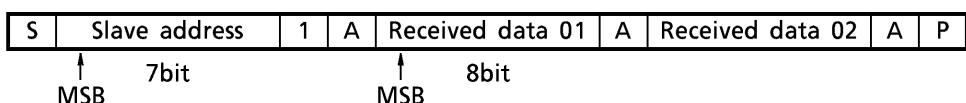
Data transmit format 1



Data transmit format 2



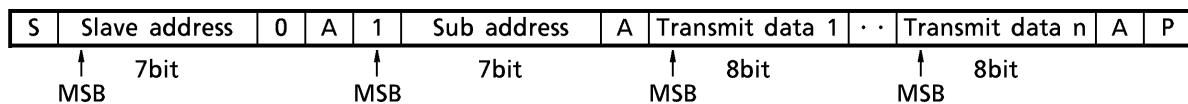
Data receive format



At the moment of the first acknowledge, the master transmitter becomes a master receiver and the slave receiver becomes a slave transmitter. This acknowledge is still generated by the slave.

The STOP condition is generated by the master.

Optional data transmit format : Automatic increment mode



In this transmission method, data is set on automatically incremented sub-address from the specified sub-address.

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 (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CCMAX}	12	V
Permissible Loss	P _{DMAX}	2190 (Note)	mW
Power Consumption Declining Degree	1 / Q _{ja}	17.52	mW / °C
Input Terminal Voltage	V _{in}	GND – 0.3~V _{CC} + 0.3	V
Input Signal Voltage	e _{in}	7	V _{p-p}
Operating Temperature	T _{opr}	- 20~65	°C
Conserving Temperature	T _{stg}	- 55~150	°C

(Note) In the condition that IC is actually mounted. See the diagram below.

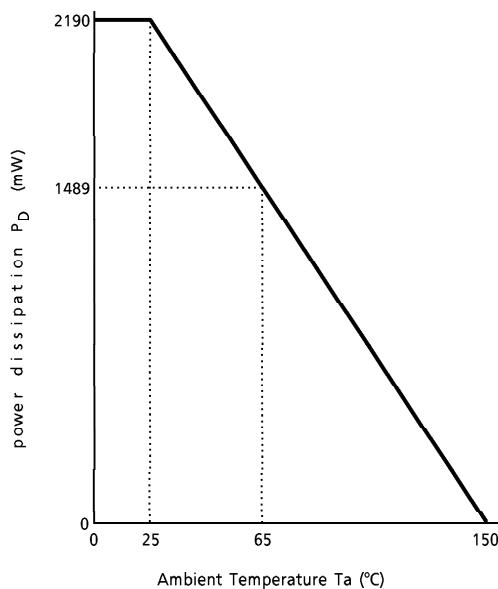


Fig. Power consumption declining curve relative to temperature change

RECOMMENDED OPERATING CONDITION

CHARACTERISTIC	DESCRIPTION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	Pin 3, pin 17	8.50	9.0	9.25	V
	Pin 8, pin 38, pin 41	4.75	5.0	5.25	
TV, External Input Level	Pin 1, pin 47	0.9	1.0	1.1	V_{p-p}
Video Input Level		0.9	1.0	1.1	
Chroma Input Level	100% white, negative sync	0.9	1.0	1.1	
Sync Input Level		0.9	1.0	2.2	
FBP Width	—	11	12	13	μs
Incoming FBP Current (Note)	—	—	—	1.5	mA
H. Output Current	—	—	1.0	2.0	
RGB Output Current	—	—	1.0	2.0	
Analog RGB Input Level	—	—	0.7	0.8	V
OSD RGB Input Level	In TEXT input	0.7	1.0	1.3	
	In OSD input	—	4.2	5.0	
Incoming Current to Pin 49	Sync-out	—	0.5	1.0	mA

(Note) The threshold of horizontal AFC2 detection is set $H.V_{CC} - 2V_f$ ($V_f \approx 0.75V$). Confirming the power supply voltage, determine the high level of FBP.

ELECTRICAL CHARACTERISTIC

(Unless otherwise specified, H, RGB $V_{CC} = 0V$, V_{DD} , F_{sc} V_{DD} ,
 Y/C $V_{CC} = 5V$, $T_a = 25 \pm 3^\circ C$)

CURRENT CONSUMPTION

PIN No.	CHARACTERISTIC	SYMBOL	TEST CIRCUIT	MIN.	TYP.	MAX.	UNIT
3	H. V_{CC} (9V)	I_{CC1}	—	14.0	20.0	25.7	mA
8	V_{DD} (5V)	I_{CC2}	—	5.8	12.0	18.2	
17	RGB V_{CC} (9V)	I_{CC3}	—	24.5	36.0	48.2	
38	F_{sc} V_{CC} (5V)	I_{CC4}	—	3.8	6.5	9.2	
41	Y/C V_{CC} (9V)	I_{CC5}	—	57.8	94.0	130.2	

TERMINAL VOLTAGE

PIN No.	PIN NAME	SYMBOL	TEST CIRCUIT	MIN.	TYP.	MAX.	UNIT
1	Ext. Video Input	V ₁	—	2.5	3.0	3.5	V
16	ABCL	V ₁₆	—	5.9	6.4	6.9	V
18	OSD R Input	V ₁₈	—	—	0	0.3	V
19	OSD G Input	V ₁₉	—	—	0	0.3	V
20	OSD B Input	V ₂₀	—	—	0	0.3	V
21	Digital Ys	V ₂₁	—	—	0	0.3	V
22	Analog Ys	V ₂₂	—	—	0	0.3	V
23	Analog R Input	V ₂₃	—	3.3	5.0	6.7	V
24	Analog G Input	V ₂₄	—	3.3	5.0	6.7	V
25	Analog B Input	V ₂₅	—	3.3	5.0	6.7	V
27	TV Audio Input	V ₂₇	—	2.4	3.0	3.5	V
28	Ext. Audio Input	V ₂₈	—	2.4	3.0	3.5	V
29	Audio Output	V ₂₉	—	4.1	4.5	5.0	V
31	Y ₂ Input	V ₃₁	—	1.5	2.0	2.5	V
33	B-Y Input	V ₃₃	—	2.0	2.5	3.0	V
34	R-Y Input	V ₃₄	—	2.0	2.5	3.0	V
35	R-Y Output	V ₃₅	—	1.25	1.80	2.40	V
36	B-Y Output	V ₃₆	—	1.25	1.80	2.40	V
37	Y ₁ Output	V ₃₇	—	1.56	2.18	2.80	V
40	16.2MHz X'tal Oscillation	V ₄₀	—	3.4	3.9	4.4	V
42	Chroma Input	V ₄₂	—	1.9	2.4	2.9	V
47	TV Video Input	V ₄₇	—	2.6	3.1	3.6	V
50	V-Sepa.	V ₅₀	—	3.1	4.8	6.5	V
56	Video Output	V ₅₆	—	2.6	3.1	3.6	V

AC CHARACTERISTIC

Video switch section ((Note) T = TV mode, E = Ext. mode)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT		
Min. Linear Video Input	TVdi1	—	(Note) V ₁	V	1.5	2.0			
	EVdi1	—							
Max. Linear Video Input	TVdi2	—	(Note) V ₂		5.0	—			
	EVdi2	—							
Video Input Dynamic Range	TVdiA	—	(Note) V ₃		3.5	—			
	EVdiA	—							
Min. Output	TVdo1	—	(Note) V ₄		0.1	0.5			
	EVdo1	—							
Max. Output	TVdo2	—	(Note) V ₅		7.3	—			
	EVdo2	—							
AC Gain	TGv1	—	(Note) V ₆	times	2.0	2.1			
	EGv1	—							
Frequency Characteristic	TGf1	—	(Note) V ₇		0	1.0			
	EGf1	—							
Crosstalk between TV and EXT	TVcr	—	(Note) V ₈		-70	-60			
	EVcr	—							

Video section

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Y Input Pedestal Clamping Voltage	VYclp	—	(Note) Y ₁	2.0	2.2	2.4	V
Chroma Trap Frequency	ftr3	—	(Note) Y ₂	3.429	3.58	3.679	MHz
	ftr4	—					
Chroma Trap Attenuation (3.58MHz) (4.43MHz) (SECAM)	Gtr3a	—	(Note) Y ₃	20	26	52	dB
	Gtr3f	—					
	Gtr4	—					
	Gtrs	—					
Y _γ Correction Point	γp	—	(Note) Y ₆	90	95	99	—
Y _γ Correction Curve	γc	—	(Note) Y ₇	-2.6	-2.0	-1.3	dB
APL Terminal Output Impedance	Zo44	—	(Note) Y ₈	15	20	25	kΩ
DC Transmission Compensation Amplifier Gain	Adrmax	—	(Note) Y ₉	0.11	0.13	0.15	times
	Adrcnt	—					
Maximum Gain of Black Expansion Amplifier	Ake	—	(Note) Y ₁₀	1.20	1.5	1.65	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Black Expansion Start Point	VBS9MX	—	(Note) Y11	65	77.5	80	IRE
	VBS9CT	—		55	62.5	70	
	VBS9MN	—		48	55.5	63	
	VBS2MX	—		35	42.5	50	
	VBS2CT	—		25	31.5	38	
	VBS2MN	—		19	25.5	32	
Black Peak Detection Period (Horizontal)	TbpH	—	(Note) Y12	15	16	17	μs
	TbpV	—		33	34	35	H
Picture Quality Control Peaking Frequency	fp25	—	(Note) Y13	1.5	2.5	3.4	MHz
	fp31	—		1.9	3.1	4.3	
	fp42	—		3.0	4.2	5.4	
Picture Quality Control Maximum Characteristic	GS25MX	—	(Note) Y14	12.0	14.5	17.0	dB
	GS31MX	—		12.0	14.5	17.0	
	GS42MX	—		10.6	13.5	16.4	
Picture Quality Control Minimum Characteristic	GS25MN	—	(Note) Y15	-22.0	-19.5	-17.0	
	GS31MN	—		-22.0	-19.5	-17.0	
	GS42MN	—		-19.5	-16.5	-13.5	
Picture Quality Control Center Characteristic	GS25CT	—	(Note) Y16	6.0	8.5	11.0	
	GS31CT	—		6.0	8.5	11.0	
	GS42CT	—		4.6	7.5	10.4	
Y Signal Gain	Gy	—	(Note) Y17	-1.0	0	1.6	
Y Signal Frequency Characteristic	Gfy	—	(Note) Y18	-6.5	0	1.0	
Y Signal Maximum Input Range	Vyd	—	(Note) Y19	0.9	1.2	1.5	V

Chroma section

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MIN.	UNIT
ACC Characteristic $f_o = 3.58$	3NeAT	—	(Note) C ₁	30	35	90	mV _{p-p}
	3NF1T	—		68	85	105	
	3NAT	—		0.9	1.0	1.1	
	3NeAE	—		18	35	—	
	3NF1E	—		71	85	102	
	3NAE	—		0.9	1.0	1.1	times
	4NeAT	—		18	35	—	
	4NF1T	—		71	85	102	
	4NAT	—		0.9	1.0	1.1	
	4NeAE	—		18	35	—	
$f_o = 4.43$	4NF1E	—	(Note) C ₁	71	85	102	mV _{p-p}
	4NAE	—		0.9	1.0	1.1	
	3Nfo ₀	—		3.43	3.579	3.73	MHz
	3Nfo ₅₀₀	—		3.93	4.079	4.23	
	3Nfo ₆₀₀	—		4.03	4.179	4.33	
	3Nfo ₇₀₀	—		4.13	4.279	4.43	
	4Nfo ₀	—		4.28	4.433	4.58	
	4Nfo ₅₀₀	—		4.78	4.933	4.58	
	4Nfo ₆₀₀	—		4.88	5.033	5.18	
	4Nfo ₇₀₀	—		4.98	5.133	5.28	
Band Pass Filter Characteristic $f_o = 3.58$	f _{o0}	—	(Note) C ₂	1.64	1.79	1.94	MHz
	f _{o500}	—		2.07	2.22	2.37	
	f _{o600}	—					
	f _{o700}	—					
	f _{o0}	—					
	f _{o500}	—					
	f _{o600}	—					
	f _{o700}	—					
	Q ₁	—	(Note) C ₄	—	3.58	—	
	Q _{1.5}	—		—	2.39	—	
Band Pass Filter, Q Characteristic Check $f_o = 3.58$	Q _{2.0}	—		1.64	1.79	1.94	
	Q _{2.5}	—		—	1.43	—	
	Q ₁	—		—	4.43	—	
	Q _{1.5}	—		—	2.95	—	
	Q _{2.0}	—		2.07	2.22	2.37	
	Q _{2.5}	—		—	1.77	—	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
1 / 2 f_c Trap Characteristic $f_o = 3.58$	f_{o0}	—	(Note) C ₅	1.45	1.60	1.75	MHz
	f_{o500}	—		1.70	1.85	2.00	
	f_{o600}	—		1.75	1.90	2.06	
	f_{o700}	—		1.80	1.95	2.10	
	f_{o0}	—		1.85	2.00	2.15	
	f_{o500}	—		2.00	2.15	2.30	
	f_{o600}	—		2.05	2.20	2.35	
	f_{o700}	—		2.10	2.25	2.40	
Tint Control Range ($f_o = 600\text{kHz}$)	$3N\Delta\theta 1$	—	(Note) C ₆	35.0	45.0	55.0	°
	$3N\Delta\theta 2$	—		- 55.0	- 45.0	- 35.0	
	$4N\Delta\theta 1$	—		35.0	45.0	55.0	
	$4N\Delta\theta 2$	—					
Tint Control Variable Range ($f_o = 600\text{kHz}$)	$3N\Delta\theta T$	—	(Note) C ₇	70.0	90.0	110.0	
	$4N\Delta\theta T$	—					
Tint Control Characteristic	$3T\theta \text{Tin}$	—	(Note) C ₈	39	40	47	bit
	$3E\theta \text{Tin}$	—		73	80	87	Step
	$3N\Delta\text{Tin}$	—		39	40	47	bit
	$4T\theta \text{Tin}$	—		73	80	87	Step
	$4E\theta \text{Tin}$	—					
	$4N\Delta\text{Tin}$	—					
APC Lead-In Range (Lead-In Range)	4.433PH	—	(Note) C ₉	350	500	1500	Hz
	4.433PL	—		- 350	- 500	- 1500	
	3.579PH	—		350	500	1700	
	3.579PL	—		- 350	- 500	- 1700	
	4.433HH	—		400	500	1100	
	4.433HL	—		- 400	- 500	- 1100	
	3.579HH	—		400	500	1100	
	3.579HL	—		- 400	- 500	- 1100	
APC Control Sensitivity	$3.58\beta 3$	—	(Note) C ₁₀	1.50	2.2	2.90	—
	$4.43\beta 3$	—		1.70	2.4	3.10	
	M-PAL βM	—					
	N-PAL βN	—		1.50	2.2	2.90	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Killer Operation Input Level	3N-VTK1	—	(Note) C11	1.8	2.5	3.2	mV _{p-p}
	3N-VTC1	—		2.2	3.2	4.0	
	3N-VTK2	—		2.5	3.6	4.5	
	3N-VTC2	—		3.2	4.5	5.6	
	4N-VTK1	—		1.8	2.5	3.2	
	4N-VTC1	—		2.2	3.2	4.0	
	4N-VTK2	—		2.5	3.6	4.5	
	4N-VTC2	—		3.2	4.5	5.6	
	4P-VTK1	—		1.8	2.5	3.2	
	4P-VTC1	—		2.2	3.2	4.0	
	4P-VTK2	—		2.5	3.6	4.5	
	4P-VTC2	—		3.2	4.5	5.6	
	MP-VTK1	—		1.8	2.5	3.2	
	MP-VTC1	—		2.2	3.2	4.0	
	MP-VTK2	—		2.5	3.6	4.5	
	MP-VTC2	—		3.2	4.5	5.6	
	NP-VTK1	—		1.8	2.5	3.2	
	NP-VTC1	—		2.2	3.2	4.0	
	NP-VTK2	—		2.5	3.6	4.5	
	NP-VTC2	—		3.2	4.5	5.6	
Color Difference Output (Rainbow Color Bar)	3NeB-Y	—	(Note) C12	320	380	460	
	3NeR-Y	—		240	290	350	
	4NeB-Y	—		320	380	460	
	4NeR-Y	—		240	290	350	
	4PeB-Y	—		360	430	520	
	4PeR-Y	—		200	240	290	
	4Peb-y	—		540	650	780	
	4Per-y	—		430	510	610	
Demodulation Relative Amplitude	3NGR / B	—	(Note) C13	0.69	0.77	0.86	times
	4NGR / B	—		0.70	0.77	0.85	
	4PGR / B	—		0.49	0.56	0.64	
Demodulation Relative Phase	3NθR-B	—	(Note) C14	85	93	100	°
	4NθR-B	—		87	93	99	
	4PθR-B	—		85	90	95	
Demodulation Output Residual Carrier	3N-SCB	—	(Note) C15	0	5	15	mV _{p-p}
	3N-SCR	—					
	4N-SCB	—					
	4N-SCR	—					

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Demodulation Output Residual Higher Harmonic	3N-HCB	—	(Note) C16	0	10	30	mV _{p-p}
	3N-HCR	—					
	4N-HCB	—					
	4N-HCR	—					
Color Difference Output ATT Check	B-Y - 1dB	—	(Note) C17	-1.20	-0.9	-0.60	dB
	B-Y - 2dB	—		-2.30	-1.7	-1.55	
	B-Y + 1dB	—		0.60	0.8	1.20	
16.2MHz Oscillation Frequency	ΔfoF	—	(Note) C18	-2.0	0	2.0	kHz
16.2MHz Oscillation Start Voltage	Vfon1	—	(Note) C19	3.0	3.2	3.4	V
f _{sc} Free-Run Frequency (3.58M)	3fr	—	(Note) C20	-100	50	200	Hz
	(4.43M)	—		-125	25	175	
	(M-PAL)	Mfr		-140	10	160	
	(N-PAL)	Nfr					

DEF section

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
H. Reference Frequency	FHVCO	—	(Note) DH1	5.95	6.0	6.10	MHz
H. Reference Oscillation Start Voltage	VSHVCO	—	(Note) DH2	2.3	2.6	2.9	V
H. Output Frequency 1	fH1	—	(Note) DH3	15.5	15.625	15.72	kHz
H. Output Frequency 2	fH2	—	(Note) DH4	15.62	15.734	15.84	
H. Output Duty 1	H ϕ 1	—	(Note) DH5	39	41	43	%
H. Output Duty 2	H ϕ 2	—	(Note) DH6	35	37	39	
H. Output Duty Switching Voltage 1	V5-1	—	(Note) DH7	1.2	1.5	1.8	V
H. Output Voltage	VHH	—	(Note) DH8	4.5	5.0	5.5	
	VHL	—		—	—	0.5	
H. Output Oscillation Start Voltage	VHS	—	(Note) DH9	—	5.0	—	
H. FBP Phase	φFBP	—	(Note) DH10	6.2	6.9	7.6	μs
H. Picture Position, Maximum	HSFTmax	—	(Note) DH11	17.7	18.4	19.1	
H. Picture Position, Minimum	HSFTmin	—	(Note) DH12	12.4	13.1	13.8	
H. Picture Position Control Range	ΔHSFT	—	(Note) DH13	4.5	5.3	6.1	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
H. Distortion Correction Control Range	ΔHCC	—	(Note) DH14	0.5	1.0	1.5	$\mu s/V$
H. BLK Phase	ϕBLK	—	(Note) DH15	6.2	6.9	7.6	
H. BLK Width, Minimum	BLKmin	—	(Note) DH16	9.8	10.5	11.3	
H. BLK Width, Maximum	BLKmax	—	(Note) DH17	13.2	14.0	14.7	
P/N-GP Start Phase 1	SPGP1	—	(Note) DH18	3.45	3.68	3.90	
P/N-GP Start Phase 2	SPGP2	—	(Note) DH19	3.95	4.18	4.40	
P/N-GP Gate Width 1	PGPW1	—	(Note) DH20	1.65	1.75	1.85	
P/N-GP Gate Width 2	PGPW2	—	(Note) DH21	1.70	1.75	1.85	
SECAM-GP Start Phase 1	SSGP1	—	(Note) DH22	5.2	5.4	5.6	
SECAM-GP Start Phase 2	SSGP2	—	(Note) DH23	5.7	6.0	6.2	
SECAM-GP Gate Width 1	SGPW1	—	(Note) DH24	1.9	2.0	2.1	
SECAM-GP Gate Width 2	SGPW2	—	(Note) DH25	1.9	2.0	2.1	
Noise Detection Level 1	NL1	—	(Note) DH26	0.15	0.2	0.25	
Noise Detection Level 2	NL2	—	(Note) DH27	0.1	0.18	0.26	
Noise Detection Level 3	NL3	—	(Note) DH28	0.1	0.15	0.2	
Noise Detection Level 4	NL4	—	(Note) DH29	0.08	0.13	0.2	
V. Ramp Amplitude	Vramp	—	(Note) DV1	1.62	2.0	2.08	
V. NF Maximum Amplitude	VNFmax	—	(Note) DV2	3.2	3.5	3.8	
V. NF Minimum Amplitude	VNFmin	—	(Note) DV3	0.8	1.0	1.2	
V. Amplification Degree	GVA	—	(Note) DV4	20	26	32	dB
V. Amplifier Max. Output	Vvmax	—	(Note) DV5	5.0	—	—	
V. Amplifier Min. Output	Vvmin	—	(Note) DV6	0	—	1.5	V
V. S-Curve Correction, Max. Correction Quantity	VS	—	(Note) DV7				
V. Reverse S-Curve Correction, Max. Correction Quantity	VSR	—	(Note) DV8	9	11	13	%
V. Linearity Max. Correction Quantity	VL	—	(Note) DV9	9	20	31	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
AFC-MASK Start Phase	ϕ AFCf	—	(Note) DV10	2.6	3.2	3.8	H
AFC-MASK Stop Phase	ϕ AFCe	—	(Note) DV11	4.4	5.0	5.6	
VNFB phase	ϕ VNFB	—	(Note) DV12	0.45	0.75	1.05	
V. Output Maximum Phase	$V\phi_{max}$	—	(Note) DV13	7.3	8.0	8.7	
V. Output Minimum Phase	$V\phi_{min}$	—	(Note) DV14	0.5	1.0	1.5	
V. Output Phase Variable Range	$\Delta V\phi$	—	(Note) DV15	6.3	7.0	7.7	
50 System VBLK Start Phase	V50BLKf	—	(Note) DV16	0.4	0.55	0.7	
50 System VBLK Stop Phase	V50BLKe	—	(Note) DV17	20	23	26	
60 System VBLK Start Phase	V60BLKf	—	(Note) DV18	0.4	0.55	0.7	
60 System VBLK Stop Phase	V60BLKe	—	(Note) DV19	15	18	21	
V. Lead-In Range 1	VAcaL	—	(Note) DV20	—	232.5	—	Hz
	VAcaH	—		—	344.5	—	
V. Lead-In Range 2	V60caL	—	(Note) DV21	—	232.5	—	
	V60caH	—		—	294.5	—	
W-VBLK Start Phase	SWVB	—	(Note) DV22	9	—	88	H
W-PMUTE Start Phase	SWP	—	(Note) DV23		—	—	
W-VBLK Stop Phase	STWVB	—	(Note) DV24	10	—	120	
W-PMUTE Stop Phase	STWP	—	(Note) DV25		—	—	

1H DL section

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
1HDL Dynamic Range, Direct	VNBD	—	(Note) H1	0.8	1.2	—	V
	VNRD	—					
1HDL Dynamic Range, Delay	VPBD	—	(Note) H2	0.8	1.2	—	V
	VPRD	—					
1HDL Dynamic Range, Direct + Delay	VSBD	—	(Note) H3	0.9	1.2	—	V
	VSRD	—					
Frequency Characteristic, Direct	GHB1	—	(Note) H4	-3.0	-2.0	0.5	dB
	GHR1	—					
Frequency Characteristic, Delay	GHB2	—	(Note) H5	-8.2	-6.5	-4.3	dB
	GHR2	—					
AC Gain, Direct	GBY1	—	(Note) H6	-2.0	-0.5	2.0	dB
	GRY1	—					
AC Gain, Delay	GBY2	—	(Note) H7	-2.4	-0.5	1.1	dB
	GRY2	—					
Direct-Delay AC Gain Difference	GBYD	—	(Note) H8	-1.0	0.0	1.0	dB
	GRYD	—					
Color Difference Output DC Stepping	VBD	—	(Note) H9	-5	0.0	5	mV
	VRD	—					
1H Delay Quantity	BDt	—	(Note) H10	63.7	64.0	64.4	μ s
	RDt	—					
Color Difference Output DC-Offset Control	Bomin	—	(Note) H11	22	36	55	mV
	Bomax	—		-55	-36	-22	
	Romin	—		22	36	55	
	Romax	—		-55	-36	-22	
Color Difference Output DC-Offset Control / Min. Control Quantity	Bo1	—	(Note) H12	1	4	8	mV
	Ro1	—					
NTSC Mode Gain / NTSC-COM Gain	GNB	—	(Note) H13	-0.90	0	1.20	dB
	GNR	—					

Text section

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Y Color Difference Clamping Voltage	Vcp31	—	(Note) T1	1.7	2.0	2.3	V
	Vcp33	—		2.2	2.5	2.8	
	Vcp34	—					
Contrast Control Characteristic	Vc12mx	—	(Note) T2	2.50	3.00	3.50	
	Vc12mn	—		0.21	0.31	0.47	
	D12c80	—		0.83	1.24	1.86	
	Vc13mx	—		2.50	3.00	3.50	
	Vc13mn	—		0.21	0.31	0.47	
	D13c80	—		0.83	1.24	1.86	
	Vc14mx	—		2.50	3.00	3.50	
	Vc14mn	—		0.21	0.31	0.47	
	D14c80	—		0.83	1.24	1.86	
AC Gain	Gr	—	(Note) T3	2.8	4.0	5.2	times
	Gg	—					
	Gb	—					
Frequency Characteristic	Gf	—	(Note) T4	—	-1.0	-3.0	dB
Y Sub-Contrast Control Characteristic	ΔVscnt	—	(Note) T5	3.0	6.0	9.0	V
Y ₂ Input Range	Vy2d	—	(Note) T6	0.7	—	—	
Unicolor Control Characteristic	Vn12mx	—	(Note) T7	1.6	2.3	4.3	
	Vn12mn	—		0.17	0.35	0.42	
	D12n80	—		0.67	1.16	1.68	
	Vn13mx	—		1.6	2.3	4.3	
	Vn13mn	—		0.17	0.35	0.42	
	D13n80	—		0.67	1.16	1.68	
	Vn14mx	—		1.6	2.3	4.3	
	Vn14mn	—		0.17	0.26	0.42	
	D14n80	—		0.67	1.16	1.68	
	ΔV13un	—		16	20	24	dB
Relative Amplitude (NTSC)	Mnr-b	—	(Note) T8	0.70	0.77	0.85	times
	Mng-b	—		0.30	0.34	0.38	
Relative Phase (NTSC)	θnr-b	—	(Note) T9	87	93	99	°
	θng-b	—		235	241.5	248	
Relative Amplitude (PAL)	Mpr-b	—	(Note) T10	0.50	0.56	0.63	times
	Mpg-b	—		0.30	0.34	0.38	
Relative Phase (PAL)	θpr-b	—	(Note) T11	86	90	94	°
	θpg-b	—		232	237	242	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Color Control Characteristic	Vcmx	—	(Note) T12	1.50	1.80	2.10	V _{p-p}
	e _{col}	—		80	128	160	step
	Δ _{col}	—		142	192	242	
Color Control Characteristic, Residual Color	e _{cr}	—	(Note) T13	0	12.5	25	mV _{p-p}
	e _{cg}	—					
	e _{cb}	—					
Chroma Input Range	V _{cr}	—	(Note) T14	700	—	—	mV
Brightness Control Characteristic	V _{brmx}	—	(Note) T15	3.05	3.45	3.85	V
	V _{brmn}	—		1.05	1.35	1.65	
Brightness Center Voltage	V _{bcnt}	—	(Note) T16	2.05	2.30	2.55	mV
Brightness Data Sensitivity	ΔV _{brt}	—	(Note) T17	6.3	7.8	9.4	
RGB Output Voltage Axes Difference	ΔV _{bct}	—	(Note) T18	−150	0	150	
White Peak Limit Level	V _{wpl}	—	(Note) T19	2.63	3.25	3.75	V
Cutoff Control Characteristic	V _{comx}	—	(Note) T20	2.55	2.75	2.95	V
	V _{comm}	—		1.55	1.75	1.95	
Cutoff Center Level	V _{coc}	—	(Note) T21	2.05	2.3	2.55	mV
Cutoff Variable Range	Δ _{dcut}	—	(Note) T22	2.3	3.9	5.5	
Drive Variable Range	DR +	—	(Note) T23	2.7	3.85	5.0	dB
	DR −	—		−6.5	−5.6	−4.7	
DC Regeneration	T _{DC}	—	(Note) T24	0	50	100	mV
RGB Output S/N Ratio	S _{No}	—	(Note) T25	—	−50	−45	dB
Blanking Pulse Output Level	V _v	—	(Note) T26	0.7	1.0	1.3	V
	V _h	—		—	—	—	
Blanking Pulse Delay Time	t _{don}	—	(Note) T27	0.05	0.25	0.45	μs
	t _{doff}	—		0.05	0.35	0.85	
RGB Min. Output Level	V _{mn}	—	(Note) T28	0.8	1.0	1.2	V
RGB Max. Output Level	V _{mx}	—	(Note) T29	6.85	7.15	7.45	
Halftone ON Ys Level	V _{thtl}	—	(Note) T30	0.3	0.5	0.7	
Halftone Gain 1	G _{3htl3}	—	(Note) T31	−4.5	−3.0	−1.5	dB
Halftone Gain 2	G _{6htl3}	—	(Note) T32	−7.5	−6.0	−4.5	
Text ON Ys Level	V _{ttxl}	—	(Note) T33	0.8	1.0	1.2	
Text / OSD Output, Low Level	V _{txl13}	—	(Note) T34	−0.45	−0.25	−0.05	V
Text RGB Output, High Level	V _{mvt13}	—	(Note) T35	1.15	1.4	1.85	
OSD Ys ON Level	V _{tosl}	—	(Note) T36	1.8	2.0	2.2	
OSD RGB Output, High Level	V _{mos13}	—	(Note) T37	1.75	2.15	2.55	V
Text Input Threshold Level	V _{txtg}	—	(Note) T38	0.7	1.0	1.3	
OSD Input Threshold Level	V _{osdg}	—	(Note) T39	1.7	2.0	2.3	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
OSD Mode Switching Rise-Up Time	τ_{Rosr}	—	(Note) T40	—	40	100	ns
	τ_{Rosg}	—					
	τ_{Rosb}	—					
OSD Mode Switching Rise-Up Transfer Time	t_{PRosr}	—	(Note) T41	—	40	100	ns
	t_{PRosg}	—					
	t_{PRosb}	—					
OSD Mode Switching Rise-Up Transfer Time, 3 Axes Difference	Δt_{PRos}	—	(Note) T42	—	15	40	ns
OSD Mode Switching Breaking Time	τ_{Fosr}	—	(Note) T43	—	30	100	ns
	τ_{Fosg}	—					
	τ_{Fosb}	—					
OSD Mode Switching Breaking Transfer Time	t_{PFosr}	—	(Note) T44	—	30	100	ns
	t_{PFosg}	—					
	t_{PFosb}	—					
OSD Mode Switching Breaking Transfer Time, 3 Axes Difference	Δt_{Fros}	—	(Note) T45	—	20	40	ns
OSD Hi DC Switching Rise-Up Time	τ_{Roshr}	—	(Note) T46	—	20	100	ns
	τ_{Roshg}	—					
	τ_{Roshb}	—					
OSD Hi DC Switching Rise-Up Transfer Time	t_{PRohr}	—	(Note) T47	—	20	100	ns
	t_{PRohg}	—					
	t_{PRohb}	—					
OSD Hi DC Switching Rise-Up Transfer Time, 3 Axes Difference	Δt_{PRoh}	—	(Note) T48	—	0	40	ns
OSD Hi DC Switching Breaking Time	τ_{Foshr}	—	(Note) T49	—	20	100	ns
	τ_{Foshg}	—					
	τ_{Foshb}	—					
OSD Hi DC Switching Breaking Transfer Time	t_{PFohr}	—	(Note) T50	—	20	100	ns
	t_{PFohg}	—					
	t_{PFohb}	—					
OSD Hi DC Switching Breaking Transfer Time, 3 Axes Difference	Δt_{PFoh}	—	(Note) T51	—	0	40	ns

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
RGB Contrast Control Characteristic	Vc12mx	—	(Note) T ₅₂	2.10	2.5	2.97	V
	Vc12mn	—		0.21	0.31	0.47	
	D12c80	—		0.84	1.25	1.87	
	Vc13mx	—		2.10	2.5	2.97	
	Vc13mn	—		0.21	0.31	0.47	
	D13c80	—		0.84	1.25	1.87	
	Vc14mx	—		2.10	2.5	2.97	
	Vc14mn	—		0.21	0.31	0.47	
	D14c80	—		0.84	1.25	1.87	
Analog RGB AC Gain	Gag	—	(Note) T ₅₃	4.0	5.1	6.3	times
Analog RGB Frequency Characteristic	Gfg	—	(Note) T ₅₄	-0.5	-1.75	-3.0	dB
Analog RGB Dynamic Range	Dr24	—	(Note) T ₅₅	0.5	—	—	
RGB Brightness Control Characteristic	Vbrmxg	—	(Note) T ₅₆	3.05	3.25	3.45	V
	Vbrmng	—		1.05	1.25	1.45	
RGB Brightness Center Voltage	Vbcntg	—	(Note) T ₅₇	2.05	2.25	2.45	
RGB Brightness Data Sensitivity	ΔVbrtg	—	(Note) T ₅₈	6.3	7.8	9.4	mV
Analog RGB Mode ON Voltage	Vanath	—	(Note) T ₅₉	0.8	1.0	1.2	V
Analog RGB Switching Rise-Up Time	τRanr	—	(Note) T ₆₀	—	50	100	ns
	τRang	—		—	20	100	
	τRanb	—		—	0	40	
Analog RGB Switching Rise-Up Transfer Time	t _P Ranr	—	(Note) T ₆₁	—	50	100	
	t _P Rang	—		—	30	100	
	t _P Ranb	—		—	0	40	
Analog RGB Switching Rise-Up Transfer Time, 3 Axes Difference	Δt _P Ras	—	(Note) T ₆₂	—	50	100	
Analog RGB Switching Breaking Time	τFanr	—	(Note) T ₆₃	—	30	100	
	τFang	—		—	0	40	
	τFanb	—		—	50	100	
Analog RGB Switching Breaking Transfer Time	t _P Fanr	—	(Note) T ₆₄	—	30	100	
	t _P Fang	—		—	0	40	
	t _P Fanb	—		—	50	100	
Analog RGB Switching Breaking Transfer Time, 3 Axes Difference	Δt _P Fas	—	(Note) T ₆₅	—	30	100	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Analog RGB Hi Switching Rise-Up Time	τ_{Ranhr}	—	(Note) T ₆₆	—	50	100	ns
	τ_{Ranhg}	—					
	τ_{Ranhb}	—					
Analog RGB Hi Switching Rise-Up Transfer Time	t_{PRahr}	—	(Note) T ₆₇	—	20	100	ns
	t_{PRahg}	—					
	t_{PRahb}	—					
Analog RGB Hi Switching Rise-Up Transfer Time, 3 Axes Difference	Δt_{PRah}	—	(Note) T ₆₈	—	0	40	
Analog RGB Hi Switching Breaking Time	t_{Fanhr}	—	(Note) T ₆₉	—	50	100	ns
	t_{Fanhg}	—					
	t_{Fanhb}	—					
Analog RGB Hi Switching Breaking Transfer Time	t_{PFahr}	—	(Note) T ₇₀	—	20	100	ns
	$t_{P Fahg}$	—					
	$t_{P Fahb}$	—					
Analog RGB Hi Switching Breaking Transfer Time, 3 Axes Difference	Δt_{PFah}	—	(Note) T ₇₁	—	0	40	
TV-Analog RGB Crosstalk	Crvag	—	(Note) T ₇₂	-80	-50	-40	dB
Analog RGB-TV Crosstalk	Crantg	—	(Note) T ₇₃				
ABL Point Characteristic	Vablpl	—	(Note) T ₇₄	5.5	5.6	5.7	V
	Vablpc	—		5.7	5.8	5.9	
	Vablph	—		5.9	6.0	6.1	
ACL Characteristic	Vcal	—	(Note) T ₇₅	-19	-16	-13	dB
ABL Gain Characteristic	Vabll	—	(Note) T ₇₆	-0.3	0	0.3	V
	Vablc	—		-1.3	-1.0	-0.7	
	Vablh	—		-2.3	-2.0	-1.7	

Audio section

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Attenuator Max. Gain	Gmxt	—	(Note) A1	0	1	2	dB
	Gmxе	—					
Attenuator Center Gain	Gcntt	—	(Note) A2	-20	-17	-14	
	Gcnтe	—					
Attenuator Residual Sound	Vmnt	—	(Note) A3	—	—	70	μ V
	Vmne	—					
Audio Mute Residual Sound	Vmutt	—	(Note) A4	—	—	70	
	Vmute	—					
Attenuator Gain Switching Offset	ATToft	—	(Note) A5	-100	0	100	mV
	ATTofe	—					
Audio Mute Offset	AMToft	—	(Note) A6	-30	0	30	
	AMTofe	—					
Audio Crosstalk	CRtv	—	(Note) A7	—	-75	-70	dB
	CRExt	—					
Attenuator Max. Input Voltage	Dltv	—	(Note) A8	6.0	—	—	V_{p-p}
	Dlext	—					
A-SW Switching Offset	VSWof	—	(Note) A9	-30	0	30	mV
Attenuator Breaking Frequency	fctv	—	(Note) A10	500	—	—	kHz
	fcext	—					
Audio S/N Ratio	SNtv	—	(Note) A11	60	—	—	dB
	SNext	—					
Attenuator Max. Output Voltage	DOtv	—	(Note) A12	5.5	—	—	V_{p-p}
	DOext	—					

SECAM section

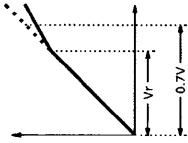
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MIN.	UNIT				
Bell Monitor Output Amplitude	embo	—	(Note) S ₁	200	300	400	mV _{p-p}				
Bell Filter f ₀	foB-C	—	(Note) S ₂	-23	0	23					
Bell Filter f ₀ Variable Range	foB-L	—		-69	-46	-23	kHz				
	foB-H	—	(Note) S ₃	69	92	115					
Bell Filter Q	QBEL	—	(Note) S ₄	14	16	18	—				
Color Difference Output Amplitude	VBS	—	(Note) S ₅	0.50	—	0.91	V _{p-p}				
	VRS	—		0.39	—	0.73					
Color Difference Relative Amplitude	R / B-S	—	(Note) S ₆	0.70	—	0.90	—				
Color Difference Attenuation Quantity	SATTB	—	(Note) S ₇	-1.50	—	-0.50	dB				
Color Difference S/N Ratio	SATTR	—			—	—					
	SNB-S	—	(Note) S ₈	-85	—	-25	%				
	SBR-S	—			—	—					
Linearity	LinB	—	(Note) S ₉	75	—	117	%				
	LinR	—		85	—	120					
Rising-Fall Time (Standard De-Emphasis)	trfB	—	(Note) S ₁₀	—	1.3	1.5	μs				
	trfR	—			—	—					
Rising-Fall Time (Wide-Band De-Emphasis)	trfBw	—	(Note) S ₁₁	—	1.1	1.3					
	trfRw	—			—	—					
Killer Operation Input Level (Standard Setting)	eSK	—	(Note) S ₁₂	0.5	1	2	mV _{p-p}				
	eSC	—									
Killer Operation Input Level (VID ON)	eSFK	—	(Note) S ₁₃								
	eSFC	—									
Killer Operation Input Level (Low Sensitivity, VID OFF)	eSWK	—	(Note) S ₁₄	0.7	1.5	3					
	eSWC	—									

**TEST CONDITION
VIDEO SWITCH SECTION**

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB $V_{CC} = 9V$; V_{DD} , F_{sc} , V_{DD} , Y/C $V_{CC} = 5V$; $T_a = 25 \pm 3^\circ C$)				MEASURING METHOD	
		SW MODE	S ₁	S ₄₇	S ₅₁	SUB-ADDRESS & BUS DATA	
V ₁	Min. Linear Video Input					03H	(1) While supplying DC voltage to pin 47 (TVin), measure voltage change at pin 56 (Video Out) to find values of V _{d1} and V _{d2} . (2) Find dynamic range from V _{d1} and V _{d2} . $V_{d1A} = V_{d1} - V_{d2}$ (3) Perform the same measurement in the EXT. mode as well as the TV mode. (EXT. IN : pin 1). (Note) T = TV mode, E = EXT. mode
V ₂	Max. Linear Video Input	B	B	A		40H ↓ B0H	(1) In the same measurement as the preceding item V ₁ , find minimum output voltage (V _{d01}) and maximum output voltage (V _{d02}) at pin 56 (Video OUT). (2) Perform the same measurement in the EXT. mode as well as the TV mode. (EXT. IN : pin 1). (1) Input 10kHz, 0.5V _{p-p} TG7 sine wave signal to pin 47 (TV IN).
V ₃	Video Input Dynamic Range		↑	↑	↑		(2) Measure amplitude of video output at pin 56. (3) Calculate gain of the input and output (output / input). Calculation result shall be expressed as Gv1. $Gv1 = v_{56} / v_{47}$
V ₄	Min. Output					40H ↓ B0H	(4) Perform the same measurement and calculation in the EXT. mode as well as the TV mode. (EXT. IN : pin 1) (1) Input 100kHz, 0.5V _{p-p} and 6MHz, 0.5V _{p-p} TG7 sine wave signals to pin 47 (TV IN). (2) Measure amplitude of the respective video output at pin 56. Measurement results shall be expressed as V _{100k} and V _{6M} respectively, and difference in the frequency characteristic between those outputs shall be expressed as Gf1. $Gf1 = 20\log (V_{6M} / V_{100k})$
V ₅	Max. Output					40H ↓ B0H	(3) Perform the same measurement in the EXT. mode as the TV mode. (EXT. IN : pin 1) (1) Input 3MHz, 0.7V (video portion) TG7 sine wave signal to pin 47 (TV IN).
V ₆	AC Gain	A	A	↑			(2) Short circuit pin 1 (EXT. IN) in AC coupling. (3) Measure amplitude of the video output at pin 56 in both the TV mode and EXT. mode, and express the measurement results as V _{TV} and V _{EXT} respectively. (4) $V_{cr} = 20\log (V_{EXT} / V_{TV})$
V ₇	Frequency Characteristic		↑	↑	↑		(5) Perform the same measurement in the EXT. mode as well as the TV mode. (EXT. IN : pin 1)
V ₈	Crosstalk between TV and EXT	B ↓ A	B ↓ A	A ↓ A		40H ↓ B0H	

VIDEO SECTION		TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , Fsc V _{DD} , Y/C V _{CC} = 5V ; T _a = 25 ± 3°C)										
NOTE	ITEM	SW MODE					SUB-ADDRESS & BUS DATA					MEASURING METHOD
		S39	S42	S44	S45	S51	04H	08H	0FH	10H	13H	
Y ₁	Y Input Pedestal Clamping Voltage	A	C	B	A	A	20H	04H	80H	00H	BAH 03H	(1) Short circuit pin 45 (Y ₁ IN) in AC coupling. (2) Input synchronizing signal to pin 51 (SYNC IN). (3) Measure DC voltage at pin 45, and express the measurement result as V _{YClp} .
Y ₂	Chroma Trap Frequency	↑	↑	A	B	↑	↑	↑	↑	↑	↑	(1) Set the 358 TRAP mode to AUTO by setting the bus data. (2) Set the bus data so that chroma trap is ON and f ₀ is 0. (3) Input TG7 sine wave signal whose frequency is 3.58MHz (NTSC) and video amplitude is 0.5V to pin 45 (Y ₁ IN). (4) While observing waveform at pin 37 (Y _{1out}), find a frequency with minimum amplitude of the waveform. The obtained frequency shall be expressed as f _{1f3} . (5) Change the frequency of the signal 1 to 4.43MHz (PAL) and perform the same measurement as the preceding step 4. The obtained frequency shall be expressed as f _{1f4} .
Y ₃	Chroma Trap Attenuation (3.58MHz)	↑	↑	↑	↑	↑	↑	↑	↑	Vari-Vari-able Vari-Vari-able Vari-Vari-able ↑	(1) Set the 358 TRAP mode to AUTO by setting bus data. (2) Set the bus data so that Q of chroma trap is 1.5. (3) Set the bus data so that f ₀ of chroma trap is 0. (4) Input TG7 sine wave signal whose frequency is 3.58MHz (NTSC) and video amplitude is 0.5V to pin 45 (Y ₁ IN). (5) While turning on and off the chroma trap by controlling the bus, measure chroma amplitude (V _{Ton}) at pin 37 (Y _{1out}) with the chroma trap being turned on and measure chroma amplitude (V _{Toff}) at pin 37 (Y _{1out}) with the chroma trap being turned off. G _{tr} = 20log (V _{Toff} /V _{Ton}) (6) Change f ₀ of the chroma trap to -100kHz, -50kHz, 0 and +50kHz, and perform the same measurement as the preceding steps 4 and 5 with the respective f ₀ settings. (7) Change Q of the chroma trap to 1, 1.5, 2 and 2.5, and perform the same measurement as the preceding steps 4 through 6. The maximum G _{tr} shall be expressed as G _{tr3a} . (8) Set the 358 TRAP mode to the forces 358 mode by setting bus data, and perform the same measurement as the preceding steps 2 through 7 (G _{tr3f}).	

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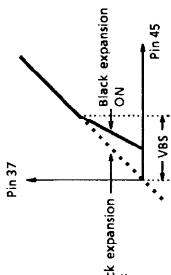
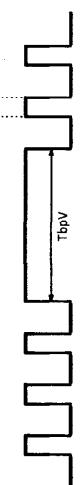
TB1226DN^G - 39

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , Fsc V _{DD} , Y/C V _{CC} = 5V ; T _a = 25 ± 3°C)								MEASURING METHOD			
		S ₃₉	S ₄₂	S ₄₄	S ₄₅	S ₅₁	04H	08H	0FH	10H	13H	14H	
Y ₈	APL Terminal Output Impedance	A	C	B	A	A	20H	04H	80H	00H	BAH	03H	(1) Short circuit pin 45 (Y ₁ IN) in AC coupling. (2) Input synchronizing signal to pin 51. (3) Connect power supply and an ammeter to the APL of pin 44 as shown in the figure, and adjust the power supply so that the ammeter reads 0 (zero). (4) Raise the voltage at pin 44 by 0.1V, and measure the current (Iin) at that time. $Z_{O44} (\Omega) = 0.1V / I_{in} (A)$
Y ₉	DC Transmission Compensation Amplifier Gain	↑	↑	↑	↑	↑	↑	↑	↑	↑	Vari- able	(1) Set the bus data so that DC transmission factor correction gain is maximum. (2) In the condition of the Note Y ₈ , observe Y _{1out} waveform at pin 37 and measure voltage change in the video period. (3) Set the bus data so that DC transmission factor correction gain is centered, and measure voltage in the same manner as the above step 2.  $Adr = (\Delta V_2 - \Delta V_1) / 0.1V + Y_1$ gain	
Y ₁₀	Maximum Gain of Black Expansion Amplifier	↑	↑	A	B	↑	↑	↑	↑	00H	↑	↑ E3H	

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , Fsc V _{DD} , Y/C V _{CC} = 5V ; Ta = 25 ± 3°C)								MEASURING METHOD	
		S39	S42	S44	S45	S51	04H	08H	0FH	10H	
Y11	Black Expansion Start Point	A	C	A	A	A	20H	04H	00H	00H	Variabile
Y12	Black Peak Detection Period (Horizontal)	B	↑	↑	↑	↑	↑	↑	↑	↑	E3H
	Black Peak Detection Period (Vertical)										T _{bph}
											T _{bpv}

(1) Set the bus data so that black expansion is on and black expansion point is maximum.
(2) Supply 1.0V to pin 39 (Black Peak Hold).
(3) Supply 2.9V to the APL of pin 44.
(4) Connect the power supply to pin 45 (Y₁ IN). While raising the supply voltage from the level measured in the preceding item Y₁, measure voltage change at pin 37 (Y_{out}).
(5) Set the bus data to center the black expansion point, and perform the same measurement as the above steps 2 through 4.
(6) Set the black expansion point to the minimum by setting the bus data, and perform the same measurement as the above steps 2 through 4.
(7) While supplying 2.2V to the APL of pin 44, perform the same measurement as the above step 4 with the black expansion point set to maximum, center and minimum.

In the condition of the Note Y₁, measure waveform at pin 39 (Black Peak Hold).

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , Fsc V _{DD} , Y/C V _{CC} = 5V ; Ta = 25 ± 3°C)								MEASURING METHOD			
		S39	S42	S44	S45	S51	04H	08H	0FH	10H	13H	14H	
Y13	Picture Quality Control Peaking Frequency	A	C	A	B	A	3FH	04H	80H	00H	BAH	Variabile	(1) Set the bus data so that picture quality control frequency is 2.5MHz. (2) Input TG7 sine wave (sweeper) signal whose video level is 0.1V to pin 45 (Y ₁ IN) and pin 51 (Sync. IN). (3) Maximize the picture quality control data. (4) While observing Y ₁ out of pin 37, find an SG frequency as the waveform amplitude is maximum (fp25). (5) Set the bus data so that picture quality control frequency is 3.1MHz and 4.2MHz, and perform the same measurement as the above steps 2 through 4 at the respective frequencies (fp31, fp42). (1) Input TG7 sine wave (sweeper) signal whose video level is 0.1V to pin 45 (Y ₁ IN) and pin 51 (Sync. IN). (2) Set the picture quality control data to maximum. (3) Set the picture quality control frequency is 2.5MHz by setting the bus data. (4) Measure amplitude (V100k) of the output of pin 37 (Y ₁ OUT) as the SG frequency is 100kHz, and the amplitude (Vp25) of the same as the SG frequency is 2.5MHz. GS25MX = 20f6g (Vp25 / V100k) (5) Set the picture quality control frequency data to 3.1MHz by setting the bus data. (6) Measure amplitude (V100k) of the output of pin 37 (Y ₁ OUT) as the SG frequency is 100kHz, and the amplitude (Vp31) of the same as the SG frequency is 3.1MHz. GS31MX = 20f6g (Vp31 / V100k) (7) Set the picture quality control frequency to 4.2MHz by setting the bus data. (8) Measure amplitude (V100k) of the output of pin 37 (Y ₁ OUT) as the SG frequency is 100kHz, and the amplitude (Vp42) of the same as the SG frequency is 4.2MHz. GS42MX = 20f6g (Vp42 / V100k)
Y14	Picture Quality Control Maximum Characteristic	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	

TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , F _{SC} V _{DD} , Y/C V _{CC} = 5V ; Ta = 25 ± 3°C)													
NOTE	ITEM	SW ADDRESS & BUS DATA										MEASURING METHOD	
		S39	S42	S44	S45	S51	04H	08H	0FH	10H	13H	14H	
Y15	Picture Quality Control Minimum Characteristic	A	C	A	B	A	00H	04H	80H	00H	BAH	Vari-able	(1) In the condition of the Note Y14, set the picture quality control bus data to minimum. (2) Perform the same measurement as the steps 3 through 8 of the Note Y14 to find respective gains as the picture quality control frequency is set to 2.5MHz, 3.1MHz and 4.2MHz. GS25MN = 20log (Vp25 / V100k) GS31MN = 20log (Vp31 / V100k) GS42MN = 20log (Vp42 / V100k)
Y16	Picture Quality Control Center Characteristic	↑	↑	↑	↑	↑	↑	20H	↑	↑	↑	↑	(1) In the condition of the Note Y14, set the picture quality control bus data to center. (2) Perform the same measurement as the steps 3 through 8 of the Note Y14 to find respective gains as the picture quality control frequency is set to 2.5MHz, 3.1MHz and 4.2MHz. GS25CT = 20log (Vp25 / V100k) GS31CT = 20log (Vp31 / V100k) GS42CT = 20log (Vp42 / V100k)
Y17	Y Signal Gain	↑	↑	↑	↑	↑	↑	↑	↑	↑	03H		(1) Set the bus data so that black expansion is off, picture quality control is off and DC transmission compensation is minimum. (2) Input TG7 sine wave signal whose frequency is 100kHz and video level is 0.5V to pin 45 (Y ₁ IN) and pin 51 (Sync. IN). (Vyi100) (3) Measure amplitude of Y ₁ output at pin 37 (Vyout). Gy = 20log (Vyout / Vyi100)
Y18	Y Signal Frequency Characteristic	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	(1) Set the bus data so that black expansion is off, picture quality control is off and DC transmission compensation is minimum. (2) Input TG7 sine wave signal whose frequency is 6MHz and video level is 0.5V to pin 45 (Y ₁ IN) and pin 51 (Sync. IN). (Vyi6M) (3) Measure amplitude of Y ₁ output at pin 37 (Vyout). Gy6M = 20log (Vyout6M / Vyi6M) (4) Find Gfy from the result of the Note Y17. Gfy = Gy6M - Gy

		TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , F _{SC} , V _{DD} , Y/C V _{CC} =5V ; T _a =25±3°C)										
NOTE	ITEM	SW MODE				SUB ADDRESS & BUS DATA				MEASURING METHOD		
		S39	S42	S44	S45	S51	04H	08H	0FH	10H	13H	14H
Y19	Y Signal Maximum Input Range	A	C	A	B	A	20H	04H	80H	00H	BAH	03H

(1) Set the bus data so that black expansion is off, picture quality control is off and DC transmission compensation is minimum.
(2) Input TG7 sine wave signal whose frequency is 100kHz to pin 45 (Y₁ IN) and pin 51 (Sync. IN).
(3) While increasing the amplitude V_{yd} of the signal in the video period, measure V_{yd} just before the waveform of Y₁ output (pin 37) is distorted.

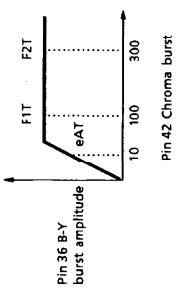
CHROMA SECTION		TEST CONDITION (Unless otherwise specified : H _i , RGB V _{CC} = 9V ; V _{DD} , Fsc V _{DD} , Y/C V _{CC} = 5V ; Ta = 25 ± 3°C)									
NOTE	ITEM	SW MODE					MEASURING METHOD				
		S ₂₆	S ₁	S ₃₁	S ₃₃	S ₂₄	S ₃₉	S ₄₂	S ₄₄	S ₄₅	S ₅₁
C ₁	ACC Characteristic	ON	A	B	B	A	A	A	A	A	B

(1) Activate the test mode (S26-ON, Sub Add 02 ; 01h).
(2) Set as follows : band pass filter Q = 2, f₀ = 600kHz, crystal clock = conforming to European, Asian system.
(3) Set the gate to the normal status.
(4) Input 3N rainbow color bar signal to pin 42 (Chroma IN).
(5) When input signal to pin 42 is the same in the burst and chroma levels (10mVp-p), burst amplitude of B-Y output signal from pin 36 is expressed as eAT. When the level of input signal to pin 42 is 100mVp-p or 300mVp-p, burst amplitude of the B-Y output signal is expressed as F1T or F2T. The ratio between F1T and F2T is expressed as AT.

F2T / F1T = AT

(6) Perform the same measurement in the EXT. mode (f₀ = 0).
(eAE, F1E, A_E)

(7) Input 4N rainbow color bar signal to pin 42 (Chroma IN), and perform the same measurement as the above-mentioned steps with 3N rainbow color bar signal input.

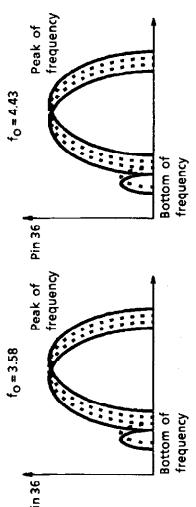


NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , Fsc V _{DD} , Y/C V _{CC} = 5V ; Ta = 25 ± 3°C)								
		S26	S1	S31	S33	S34	S39	S42	S44	S45
C2	Band Pass Filter Characteristic	ON	A	B	B	A	B	A	A	B

MEASURING METHOD

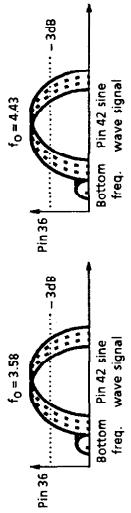
(1) Activate the test mode (S26-ON, Sub Add 02 ; 01h).
(2) Set as follows : band pass filter Q = 2, crystal clock = conforming to 3.579 / 4.43MHz, gate = normal status.
(3) Input 3N composite sine wave signal (1Vp-p) to pin 42 (Chroma IN).
(4) Measure frequency characteristic of B-Y output of pin 36 and measure the peak frequency, too.
(5) Changing f₀ to 0, 500, 600 and 700 by the bus control and measure peak frequencies respectively with different f₀.
(6) For measuring frequency characteristic as f₀ is 4.43, use 4.43MHz crystal clock.

Measure the following items in the same manner.



NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , Fsc V _{DD} , Y/C V _{CC} =5V ; Ta = 25 ± 3°C)									MEASURING METHOD
		S26	S1	S31	S33	S34	S39	S42	S44	S45	
C ₃	Band Pass Filter, -3dB Characteristic	ON	A	B	B	A	B	A	A	B	(1) Activate the test mode (S26.ON, Sub Add 02 ; 01h). (2) Set as follows : band pass filter Q = 2, crystal clock = conforming to 3.579 / 4.43MHz. (3) Set the gate to the normal status. (4) Input 3N composite sine wave signal (1Vp-p) to pin 42 (Chroma IN). (5) Measure frequency characteristic of B-Y output of pin 36, and measure peak frequency in the -3dB band. (6) Changing f _o to 0, 500, 600 and 700 by the bus control and measure peak frequencies in the -3dB band respectively with different f _o .
C ₄	Band Pass Filter, Q Characteristic Check										(1) Activate the test mode (S26.ON, Sub Add 02 ; 01h). (2) Set as follows : TV mode (f _o = 600), Crystal mode = conforming to 3.579 / 4.43MHz, gate = normal status. (3) Input 3N composite sine wave signal (1Vp-p) to pin 42 (Chroma IN). (4) Measure frequency characteristic of B-Y output of pin 36, and measure peak frequency in the -3dB band. (5) Changing f _o of the band pass filter to 0, 500, 600 and 700 by the bus control and measure peak frequencies in the -3dB band respectively with different f _o . f _o = 3.58 Pin 36 -3dB Pin 42 sine wave signal f _o = 4.43 Pin 36 -3dB Pin 42 sine wave signal

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB $V_{CC} = 9V$; $V_{DD_Fsc} V_{DD/Y/C} V_{CC} = 5V$; $T_a = 25 \pm 3^\circ C$)										MEASURING METHOD
		SW MODE										
		S26	S1	S31	S33	S34	S39	S42	S44	S45	S51	
C5	1/2 f_0 Trap Characteristic	ON	A	B	B	B	A	B	A	A	B	(1) Activate the test mode (S26-ON, Sub Add 02 ; 01h). (2) Set as follows : band pass filter Q = 2, crystal clock = conforming to 3.579 / 4.43MHz, gate = normal status. (3) Input 3N composite sine wave signal (1Vp-p) to pin 42 (Chroma IN). (4) Measure frequency characteristic of B-Y output of pin 36, and measure bottom frequency. (5) Changing f_0 to 0, 500, 600 and 700 by the bus control and measure bottom frequencies respectively with different f_0 .



NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , F _C V _{DD} , Y/C V _{CC} =5V ; Ta = 25 ± 3°C)										MEASURING METHOD
		SW MODE					S26 S1 S31 S33 S34 S39 S42 S44 S45 S51					
C ₆	Tint Control Sharing Range (f _o = 600kHz)	ON	A	B	B	A	A	A	A	B		(1) Activate the test mode (S26-ON, Sub Add 02 : 08h). (2) Connect band pass filter (Q = 2), set crystal mode to conform to European, Asian system and set the gate to normal status. (3) Input 3N rainbow color bar signal (100mVp-p) to pin 42 (Chroma IN). (4) Measure phase shift of B-Y color difference output of pin 36. (5) While shifting color phase (tint) from minimum to maximum by the bus control, measure phase change of B-Y color difference output of pin 36. On the condition that 6 bars in the center have the peak level (regarded as center of color phase), the side of 5 bars is regarded as positive direction while the side of 7 bars is regarded as negative direction when the 5 bars or the 7 bars are in the peak level. Based on this assumption, open angle toward the positive direction is expressed as $\Delta\theta_1$ and that toward the negative direction is expressed as $\Delta\theta_2$ as viewed from the phase center. $\Delta\theta_1$ and $\Delta\theta_2$ show the tint control sharing range. (6) Variable range is expressed by sum of $\Delta\theta_1$ sharing range and $\Delta\theta_2$ sharing range. $\Delta\theta_{Tin} = \Delta\theta_1 + \Delta\theta_2$ (7) While shifting color phase from minimum to maximum with the bus control, measure phase shift of B-Y color difference output of pin 36. When center 6 bars have peak level, value of color phase bus step is expressed as θ_{Tin} . (8) While shifting color phase from minimum to maximum with the bus control, measure values of color phase bus step corresponding to 10% and 90% of absolutely variable phase shift of B-Y color difference output of pin 36. The range of color phase shifted by the bus control is expressed as While shifting color phase from minimum to maximum with the bus control, measure phase shift of B-Y color difference output of pin 36. When center 6 bars have peak level, value of color phase bus step is expressed as $\Delta\theta_{Tin}$ (conforming to TV mode, f _o = 600kHz). (9) Input 4N rainbow color bar signal to pin 42 (Chroma IN), and perform the same measurement as the 3N signal.
C ₇	Tint Control Variable Range (f _o = 600kHz)	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
C ₈	Tint Control Characteristic	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , Fsc V _{DD} , Y/C V _{CC} =5V ; Ta = 25±3°C)										MEASURING METHOD
		S26	S1	S31	S33	S34	S39	S42	S44	S45	S51	
C11	Killer Operation Input Level	OFF	A	B	B	A	A	A	A	A	B	(1) Connect band pass filter (Q = 2) and set to TV mode ($f_o = 600\text{kHz}$). (2) Set the crystal mode to conform to European, Asian system and set the gate to normal status. (3) Input 3N color signal having 200mV _{p-p} burst to pin 42 (Chroma IN). (4) While attenuating chroma input signal, measure input burst amplitudes of the signal when B-Y color difference output of pin 36 is discolored and when the same signal is colored. Measured input burst amplitudes shall be expressed as 3N-VTK1 and 3N-VTC1 respectively (killer operation input level). (5) Killer operation input level in the condition that P/N killer sensitivity is set to LOW with the bus control is expressed as 3N-VTK2 or 3N-VTC2. (6) Perform the same measurement as the above step 4, with different inputs of 4N, 4P, MP, NP color signals having 200mV _{p-p} burst to pin 42 (Chroma IN). (When measuring with MP / NP color signal, set the crystal system to conform to South American system.) (7) Killer operation input level at that time is expressed as follows. Normal killer operation input level in the 4N system is expressed as 4N-VTK1, 4N-VTC1. Normal killer operation input level in the 4P system is expressed as 4P-VTK1, 4P-VTC1. Killer operation input level with low killer sensitivity is expressed as 4P-VTK2, 4P-VTC2. Normal killer operation input level in the MP system is expressed as MP-VTK2, MP-VTC2. Normal killer operation input level in the NP system is expressed as NP-VTK1, NP-VTC1. Killer operation input level with low killer sensitivity is expressed as NP-VTK2, NP-VTC2. [Reference] 3N system : 3.579545MHz NTSC 4N system : 4.433619MHz False NTSC 4P system : 4.433619MHz PAL MP system : 3.575611MHz M-PAL NP system : 3.582056MHz N-PAL

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _D , Fsc V _{DD} , Y/C V _{CC} = 5V ; Ta = 25 ± 3°C)									
		SW MODE					MEASURING METHOD				
		S ₂₆	S ₁	S ₃₁	S ₃₃	S ₃₄	S ₃₉	S ₄₂	S ₄₄	S ₄₅	S ₅₁
C12	Color Difference Output	ON	A	B	B	A	A	A	A	B	
C13	Demodulation Relative Amplitude	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑

(1) Activate the test mode (\$26-ON, Sub Add 02 ; 08h).
(2) Connect band pass filter (Q = 2), set to TV mode ($f_0 = 600\text{kHz}$) with 0dB attenuation.
(3) Set the crystal mode to conform to European, Asian system and set the gate to normal status.
(4) Input 3N, 4N and 4P rainbow color bar signals having 100mV_{p-p} burst to pin 42 of the chroma input terminal one after another.
(5) Measure amplitudes of color difference signals of pin 36 (B-Y) and pin 35 (R-Y) respectively, and express them as 3NeB-Y/R-Y, 4NeB-Y/R-Y and 4PeB-Y/R-Y respectively.
(6) While inputting 4P 75% color bar signal (100mV_{p-p} burst) to pin 42 of the chroma input terminal, measure amplitudes of color difference signals of pin 36 (B-Y OUT) and pin 35 (R-Y OUT) respectively. (Ratio of those amplitudes is expressed as 4Pb-Y/r-y for checking color level of SECAM system.)

(1) Activate the test mode (\$26-ON, Sub Add 02 ; 08h).
(2) Connect band pass filter (Q = 2), set to TV mode ($f_0 = 600\text{kHz}$) with 0dB attenuation.
(3) Set the crystal mode to conform to European, Asian system and set the gate to normal status.
(4) Input 3N, 4N and 4P rainbow color bar signals having 100mV_{p-p} burst to pin 42 of the chroma input terminal one after another.
(5) Measure amplitudes of color difference signals of pin 36 (B-Y) and pin 35 (R-Y) respectively, and express ratio between the two amplitudes as 3NG R/B, 4NG R/B and 4PG R/B respectively.
(Note) Relative amplitude of G-Y color difference signal shall be checked later in the Text section.

TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , F _C V _{CC} =5V ; T _A =25±3°C)												
NOTE	ITEM	SW MODE						MEASURING METHOD				
		S26	S1	S31	S33	S34	S39	S42	S44	S45	S51	
C14	Demodulation Relative Phase	ON	A	B	B	A	A	A	B			
C15	Demodulation Output Residual Carrier											

(1) Activate the test mode (S26-ON, Sub Add 02 ; 08h).
(2) Connect band pass filter ($f_o = 600\text{kHz}$) with 0dB attenuation.
(3) Set the crystal mode to conform to European, Asian system and set the gate to normal status.
(4) Input 3N, 4N and 4P rainbow color bar signals having 100mV_{p-p} burst to pin 42 of the chroma input terminal one after another.
(5) Measure phases of color difference signals of pin 36 (B-Y) and pin 35 (R-Y) respectively, and express them as 3N@R-B, 4N@R-B and 4P@R-B respectively.
(6) For measuring with 3N and 4N color bar signals in NTSC system, set six bars of the B-Y color difference waveform to the peak level with the Tint control and measure its phase difference from phase of R-Y color difference signal of pin 35 (R-Y OUT).
(Note) Relative phase of G-Y color difference signal shall be checked later in the Test section.

(1) Activate the test mode (S26-ON, Sub Add 02 ; 08h).
(2) Connect band pass filter ($f_o = 600\text{kHz}$) with 0dB attenuation.
(3) Set the crystal mode to conform to European, Asian system.
(4) Set the gate to normal status.
(5) Input 3N and 4N rainbow color bar signals having 100mV_{p-p} burst to pin 42 of the chroma input terminal one after another.
(6) Measure subcarrier leak of 3N and 4N color bar signals appearing in color difference signals of pin 36 (B-Y OUT) and pin 35 (R-Y OUT) respectively, and express those leaks as 3N-SCB / R and 4N-SCB / R.

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , Fsc V _{DD} , Y/C V _{CC} = 5V ; T _a = 25 ± 3°C)									MEASURING METHOD
		S26	S1	S31	S33	S34	S39	S42	S44	S45	
C16	Demodulation Output Residual Higher Harmonic	ON	A	B	B	A	A	A	A	B	(1) Activate the test mode (S26-ON, Sub Add 02 ; 08h). (2) Connect band pass filter (Q = 2), set to TV mode ($f_0 = 600\text{kHz}$) with 0dB attenuation. (3) Set the crystal mode to conform to European, Asian system and set the gate to normal status. (4) Input 3N and 4N rainbow color bar signals having 100mV _{p-p} burst to pin 42 of the chroma input terminal one after another. (5) Measure higher harmonic ($2f_c = 7.15\text{MHz}$ or 8.87MHz) of 3N and 4N color bar signals appearing in color difference signals of pin 36 (B-Y OUT) and pin 35 (R-Y OUT) respectively, and express them as 3N-HCB / R and 4N-HCB / R.
C17	Color Difference Output ATT Check	↑	↑	↑	↑	↑	↑	↑	↑	↑	(1) Activate the test mode (S26-ON, Sub Add 02 ; 08h). (2) Connect band pass filter (Q = 2) and set bus data for the TV mode ($f_0 = 600\text{kHz}$). (3) Set the X'tal clock mode to conform to European, Asian system and set the gate to normal status. (4) Input 3N rainbow color bar signal whose burst is 100mV _{p-p} to pin 42 of the chroma input terminal. (5) Measure amplitude of color difference output signal of pin 36 (B-Y OUT) with 0dB attenuation set by the bus control. Set the amplitude of the color difference output of pin 36 (B-Y OUT) to 0dB, and measure amplitude of the same signal with different attenuation of -2dB, -1dB and +1dB set by the bus control.

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , Fsc V _{DD} , Y/C V _{CC} = 5V ; Ta = 25 ± 3°C)											
		BUS : TEST MODE				BUS : NORMAL CONTROL MODE				MEASURING METHOD			
		26	D ₅	D ₂	D ₁	D ₀	D ₇	D ₄	D ₃	D ₅	D ₄	D ₃	D ₂
C18	16.2MHz Oscillation Frequency	ON	0	0	1	0	0	0	0	0	0	0	0
C19	16.2MHz Oscillation Start Voltage	ON	0	0	0	1	0	0	0	0	0	0	0
C20	f _{sc} Free-Run Frequency	ON	0	0	0	1	0	0	0	Variable	0	0	—

(1) Input nothing to pin 42.
(2) Measure frequency of CW signal of pin 35 as f_r, and find oscillation frequency by the following equation.
Δf_{OF} = (f_r - 0.05MHz) × 4

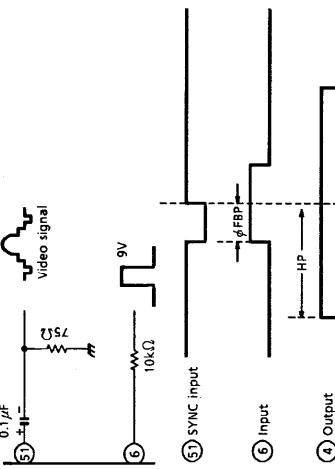
Impress pin 38 individually with separate power supply.
While raising voltage of pin 38, measure voltage when oscillation waveform appears at pin 40.

(1) Input nothing to pin 42.
(2) Change setting of SUB (10H) D₄, D₃ and D₂ according to respective frequency modes, and measure frequency of CW signal of pin 35.
Detail of D₄, D₃ and D₂
3.58M = 1 : (001), 4.43M = 2 : (010)
M-PAL = 6 : (110), N-PAL = 7 : (111)

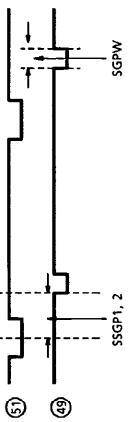
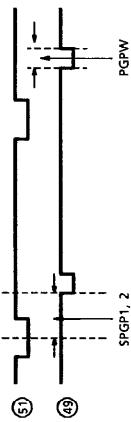
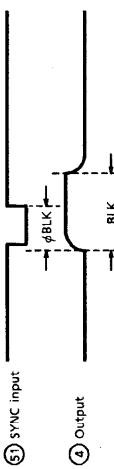
DEF SECTION		TEST CONDITION									
NOTE	ITEM	(Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , F _C V _{DD} , Y/C V _{CC} =5V ; Ta = 25 ± 3°C ; BUS = preset value ;) (Note) "x" in the data column represents preset value at power ON.									
		SUB-ADDRESS & BUS DATA					MEASURING METHOD				
DH1	H. Reference Frequency	Sub 02H	0	0	0	0	0	0	1	(1) Supply 5V to pin 26. (2) Set bus data as indicated on the left. (3) Measure the frequency of sync. output of pin 49.	
DH2	H. Reference Oscillation Start Voltage	Sub 02H	0	0	0	0	0	0	1	In the test condition of the Note DH1, turning down the voltage supplied to pin 26 from 5V, measure the voltage when oscillation of pin 49 stops.	
DH3	H. Output Frequency 1	Sub 10H	x	x	x	x	x	0	1	(1) Set bus data as indicated on the left. (2) In the condition of the above step 1, measure frequency (TH1) at pin 4.	
DH4	H. Output Frequency 2	Sub 10H	x	x	x	x	x	1	0	(1) Set bus data as indicated on the left. (2) Set bus data as indicated on the left. (3) In the above-mentioned condition, measure frequency (TH2) at pin 4.	
DH5	H. Output Duty 1	—	—	—	—	—	—	—	—	(1) Supply 4.5V DC to pin 5 (or, make pin 5 open-circuited). (2) Measure duty of pin 4 output.	
DH6	H. Output Duty 2	—	—	—	—	—	—	—	—	(1) Make a short circuit between pin 5 and ground. (2) Measure duty of pin 4 output.	
DH7	H. Output Duty Switching Voltage	—	—	—	—	—	—	—	—	Supply 2V DC to pin 5. While turning down the voltage from 2V, measure voltage when the output duty ratio becomes 41 to 37%.	
DH8	H. Output Voltage	—	—	—	—	—	—	—	—	Measure the low voltage and high voltage of pin 4 output whose waveform is shown below.	
DH9	H. Output Oscillation Start Voltage	—	—	—	—	—	—	—	—	While raising H. V _{CC} (pin 3) from 0V, measure voltage when pin 4 starts oscillation.	



NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB VCC = 9V ; VDD, Y/C VCC = 5V ; Ta = 25±3°C ; BUS = preset value ;) (Note) "x" in the data column represents preset value at power ON.										
		SUB-ADDRESS & BUS DATA										
MEASURING METHOD												
		(1) Supply 4.5V DC to pin 5. (2) Input video signal to pin 51. (3) Set the width of pin 6 input pulse to 8μs. (4) Measure φFBP shown in the figure below (φFBP). (5) Adjust the phase of pin 6 input pulse so that the center of pin 4's output pulse corresponds to the trailing edge of input sync. signal. (6) Set bus data as indicated on the left and measure the horizontal picture position with respective bus data settings (HSFTmax, HSFTmin). (7) Find HP difference between the conditions mentioned in the above step 6 (ΔHSFT). (8) Reset bus data to the preset value. (9) While impressing 5V DC to pin 5, measure HP. (10) While impressing 4V DC to pin 5, measure HP. (11) Find difference between the two measurement results obtained in the preceding steps 9 and 10 (ΔHCC).										
DH10	H. FBP Phase											
DH11	H. Picture Position, Maximum											
DH12	H. Picture Position, Minimum											
DH13	H. Picture position Control Range	Sub 0BH	1	1	1	1	x	x	x	x	x	x
DH14	H. Distortion Correction Control Range											

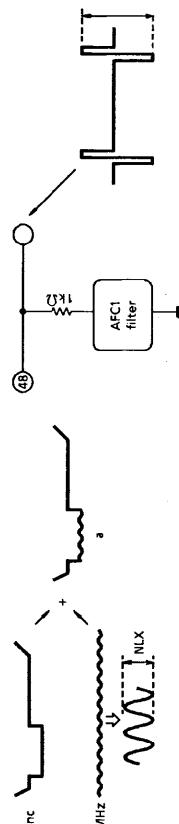


NOTE	ITEM	SUB-ADDRESS & BUS DATA								TEST CONDITION (Note) "x" in the data column represents preset value at power ON.	MEASURING METHOD
		Sub 02H	0	0	0	0	1	0	0		
DH15	H. BLK Phase	Sub 02H	0	0	0	0	0	1	0	(1) In the condition of the steps 1 through 4 of the Note DH10, perform the following measurement. (2) Supply 5V DC to pin 26. (3) Set bus data as indicated on the left. (4) Measure phase difference between pin 51 and pin 49 as shown below. (5) Change the bus data as shown on the left and measure BLK width.	
DH16	H. BLK Width, Minimum	Sub 16H	0	0	0	x	x	x	x		
DH17	H. BLK Width, Maximum	Sub 16H	1	1	1	x	x	x	x		
DH18	P / N-GP Start Phase 1									(1) Supply 5V to pin 26. (2) Set bus data as indicated on the left. (3) With the respective bus data settings mentioned above, measure the phase and gate width as shown in the figure below.	
DH19	P / N-GP Start Phase 2	Sub 0FH	x	x	0	x	x	x	x		
DH20	P / N-GP Gate Width 1	Sub 0FH	x	x	x	1	x	x	x		
DH21	P / N-GP Gate Width 2									(1) Supply 5V to pin 26. (2) Set bus data as indicated on the left. (3) With the respective bus data settings mentioned above, measure the phase and gate width as shown in the figure below.	
DH22	SECAM-GP Start Phase 1										
DH23	SECAM-GP Start Phase 2	Sub 1FH	x	x	0	x	x	x	x		
DH24	SECAM-GP Gate Width 1	Sub 1FH	x	x	1	x	x	x	x		
DH25	SECAM-GP Gate Width 2										

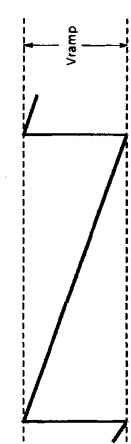


NOTE	ITEM	TEST CONDITION																				
		(Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , F _C V _{DD} , Y / C V _{CC} =5V ; T _A = 25 ± 3°C ; BUS = preset value ;) (Note) "x" in the data column represents preset value at power ON.																				
SUB-ADDRESS & BUS DATA																						
MEASURING METHOD																						
DH26	Noise Detection Level 1	0	0	x	x	x	x	x	x	x	x											
DH27	Noise Detection Level 2	0	1	x	x	x	x	x	x	x	x											
DH28	Noise Detection Level 3	Sub 1DH	1	0	x	x	x	x	x	x	x											
DH29	Noise Detection Level 4		1	1	x	x	x	x	x	x	x											
DV1	V. Ramp Amplitude																					
DV2	V. NF Maximum Amplitude	Sub 17H	1	1	1	1	1	1	1	x												
DV3	V. NF Minimum Amplitude	Sub 17H	0	0	0	0	0	0	0	x												

(1) input such a signal as shown by "a" of the following figure to pin 51.
(2) Set bus data as indicated in the first line of the left table.
(3) Measure NLX when amplitude of pin 41 changes. → NL1
(4) Set bus data as indicated in the second line of the left table.
(5) Measure NLX when amplitude of pin 41 changes. → NL2
(6) Set bus data as indicated in the third line of the left table.
(7) Measure NLX when amplitude of pin 41 changes. → NL3
(8) Set bus data as indicated in the fourth line of the left table.
(9) Measure NLX when amplitude of pin 41 changes. → NL4



(1) Measure amplitude of V. ramp waveform of pin 52.



(1) Set data bus as indicated on the left.
(2) Measure amplitude of pin 54's signal.

(1) Set data bus as indicated on the left.
(2) Measure amplitude of pin 54's signal.

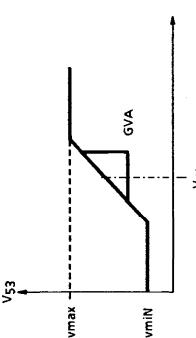
NOTE	ITEM	(Unless otherwise specified : H, RGB VCC = 9V ; VDD, Fsc VDD, Y/C VCC = 5V ; Ta = 25 ± 3°C ; BUS = preset value ;) (Note) "x" in the data column represents preset value at power ON.										MEASURING METHOD
		SUB-ADDRESS & BUS DATA										
DV4	V. Amplification Degree											
DV5	V. Amplifier Max. Output	Sub 1BH	1	x	x	x	x	x	x	x	x	
DV6	V. Amplifier Min. Output											
DV7	V. S-Curve Correction, Max. Correction Quantity	Sub 19H	1	1	1	1	1	1	1	x		

TEST CONDITION
Pin 51 input video signal = 50 system

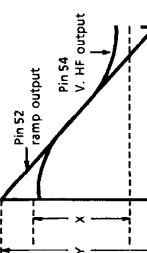
(Note) "x" in the data column represents preset value at power ON.

MEASURING METHOD

(1) Set bus data as indicated on the left.
 (2) Change 5.0V of pin 54 voltage by +0.1V and -0.1V, and measure V₅₃ output voltage in both the conditions.
 (3) Find GVA shown in the figure below.
 (4) Measure V_mmax and V_mmin shown in the figure below.



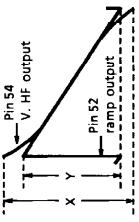
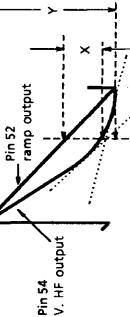
(1) Adjust the oscilloscope's amplitude with the UNCAL so that pin 52 and pin 54 waveforms overlap each other as the bus data is set to the preset value.
 (2) Change the bus data as indicated on the left, and measure values of X and Y shown in the figure below.
 (3) Find V_S according to the equation that $V_S = (X / Y) \times 100\%$.



NOTE	ITEM	(Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , Fsc V _{DD} , V _C V _{CC} =5V ; Ta = 25±3°C ; BUS = preset value ;) (Note) "x" in the data column represents preset value at power ON.							
		SUB-ADDRESS & BUS DATA				MEASURING METHOD			
DV8	V. Reverse S-Curve Correction, Max. Correction Quantity	Sub 19H	0	0	0	0	0	x	
DV9	V. Linearity Max. Correction Quantity	Sub 1AH	1	1	1	1	x	x	

TEST CONDITION
V_{CC}=9V ; V_{DD}, Fsc V_{DD}, V_C V_{CC}=5V ; Ta = 25±3°C ; BUS = preset value ;
pin 51 input video signal=50 system
Note) "x" in the data column represents preset value at power ON.

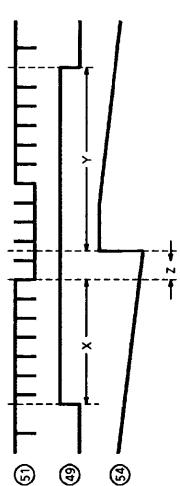
(1) Adjust the oscilloscope's amplitude with the UNCAL so that pin 52 and pin 54 waveforms overlap each other as the bus data is set to the preset value.
(2) Change the bus data as indicated on the left, and measure values of X and Y shown in the figure below.
(3) Find V_S according to the equation that $V_S = (X/Y) \times 100\%$.

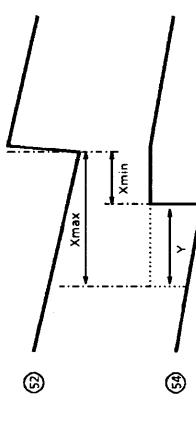
NOTE	ITEM	(Unless otherwise specified : H, RGB VCC=9V ; VDD, Fc VDD, Y, C VCC=5V ; Ta = 25±3°C , BUS = preset value ;) (Note) "x" in the data column represents preset value at power ON.									
		SUB-ADDRESS & BUS DATA									
DV10	AFC-MASK Start Phase	Sub 02H	0	0	0	0	0	0	1		
DV11	AFC-MASK Stop Phase	Sub 16H	x	x	x	x	x	x			
DV12	VNFB Phase										
DV13	V. Output Maximum Phase										
DV14	V. Output Minimum Phase	Sub 16H	x	x	x	x	x	x			
DV15	V. Output Phase Variable Range										

MEASURING METHOD

(1) Supply 5V DC to pin 26.
(2) Set bus data as indicated on the left and activate the test mode.
(3) Measure the AFC-MASK start phase (X) and AFC-MASK stop phase (Y) of pin 49.
(4) Set the Sub 16H as indicated on the left.
(5) Measure the VNFB start phase (Z) of pin 54.



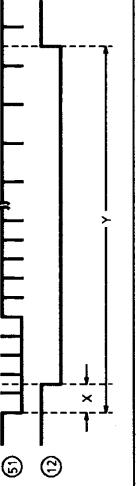
(1) Input video signal to pin 51.
(2) Measure both phases (Xmax, Xmin) of pin 52 and pin 54 with the respective bus data settings shown on the left.
(3) Find difference between the two phases measured in the above step 2.
 $Y = X_{\max} - X_{\min}$



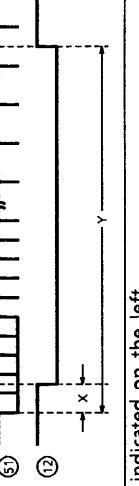
NOTE	ITEM	TEST CONDITION Unless otherwise specified : H, RGB $V_{CC}=9V$; $V_{DD}, V_{FC}, V_{CC}=5V$; $T_a=25 \pm 3^\circ C$; BUS=preset value ; (Note) "x" in the data column represents preset value at power ON.									
		SUB-ADDRESS & BUS DATA									
DV16	50 System VBLK Start Phase	Sub 1BH	0	x	x	x	x	x	x	x	x
DV17	50 System VBLK Stop Phase	Sub 1CH	0	x	x	x	x	x	x	x	x
DV18	60 System VBLK Start Phase	Sub 1BH	0	x	x	x	x	x	x	x	x
DV19	60 System VBLK Stop Phase	Sub 1CH	0	x	x	x	x	x	x	x	x
DV20	V. Lead-In Range 1	Sub 16H	x	x	x	0	0	0	0	0	0

MEASURING METHOD

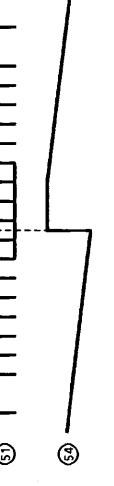
(1) Input such a video signal of the 50 system as shown in the figure to pin 51.
(2) Set bus data as indicated on the left.
(3) Measure the VBLK start phase (X) and VBLK stop phase (Y) of pin 12.



(1) Input such a video signal of the 60 system as shown in the figure to pin 51.
(2) Set bus data as indicated on the left.
(3) Measure the VBLK start phase (X) and VBLK stop phase (Y) of pin 12.



(1) Set bus data as indicated on the left.
(2) Input 262.5 H video signal to pin 51.
(3) Set a certain number of field lines in which signals of pin 51 and pin 54 completely synchronize with each other as shown in the figure below.
(4) Decrease the field lines in number and measure number of lines in which pin 51 and pin 54 signals do not synchronize with each other.
(5) Again set a certain number of field lines in which pin 51 and pin 52 signals synchronize with each other.
(6) Increase the field lines in number and measure number of lines in which pin 51 and pin 52 signals do not synchronize with each other.



NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB VCC = 9V ; VDD, Fsc VDD, Y/C VCC = 5V ; Ta = 25 ± 3°C ; BUS = preset value ;) (Note) "x" in the data column represents preset value at power ON.										MEASURING METHOD
		SUB-ADDRESS & BUS DATA										
DV21	V. Lead-in Range 2	x	x	x	0	1	0	0	0	0	0	(1) Set bus data as indicated on the left. (2) Input 262.5 H video signal to pin 51. (3) Set a certain number of field lines in which signals of pin 51 and pin 54 completely synchronize with each other as shown in the figure below. (4) Decrease the field lines in number and measure number of lines in which pin 51 and pin 54 signals do not synchronize with each other. (5) Again set a certain number of field lines in which pin 51 and pin 52 signals synchronize with each other. (6) Increase the field lines in number and measure number of lines in which pin 51 and pin 52 signals do not synchronize with each other.
DV22	W-VBLK Start Phase	x	x	0	0	0	0	0	0	0	0	(1) Set bus data as specified for the Sub 1BH in the left columns, and measure the value of X shown in the figure below. W-VBLK start phase : MAX, MIN
DV23	W-PMUTE Start Phase	x	x	1	1	1	1	1	1	1	1	(2) Set bus data as specified for the Sub 1DH in the left columns, and measure the value of X shown in the figure below. W-PMUTE start phase : MAX, MIN
	(Note) Only the 60 system is subject to evaluation.	x	x	0	0	0	0	0	0	0	0	

NOTE	ITEM	TEST CONDITION									
		<p>(Unless otherwise specified : H, RGB VCC = 9V ; VDD, Fc VDD, Y / C VCC = 5V ; Ta = 25 ± 3°C ; BUS = preset value ;)</p> <p>(Note) "x" in the data column represents preset value at power ON.</p>									
SUB:ADDRESS & BUS DATA											
DV24	W-VBLK Stop Phase	Sub 1CH	x	0	0	0	0	0	0	0	0
DV25	W-PMUTE Stop Phase	Sub 1EH	x	1	1	1	1	1	1	1	1
<p>(Note) Only the 60 system is subject to evaluation.</p> <p>MEASURING METHOD</p> <p>(1) Set bus data as specified for the Sub 1CH in the left columns, and measure the value of Y shown in the figure below.</p> <p>W-VBLK stop phase : MAX, MIN</p> <p>(2) Set bus data as specified for the Sub 1EH in the left columns, and measure the value of Y shown in the figure below.</p> <p>W-PMUTE stop phase : MAX, MIN</p>											

1H DL SECTION

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , Fc V _{DD} , Y/C V _{CC} = 5V ; Ta = 25 ± 3°C ; BUS = preset value ; pin 3 = 9V ; pin 8 - 38 - 41 = 5V)			SUB ADDRESS & DATA	MEASURING METHOD
		SW MODE	07H	0FH	11H	
H1	1HDL Dynamic Range Direct	ON	94H	—	—	(1) Input waveform 1 to pin 33 (B-Yin), and measure VNBD, that pin 36 (B-Yout) is saturated input level. (2) Measure VNRD of R-Y input in the same way as VNBD.
H2	1HDL Dynamic Range Delay	↑	8CH	—	—	(1) Input waveform 1 to pin 33 (B-Yin), and measure VPBD, that pin 36 (B-Yout) is saturated input level. (2) Measure VRD of R-Y input in the same way as VPBD.
H3	1HDL Dynamic Range, Direct + Delay	↑	A4H	—	—	(1) Input waveform 1 to pin 33 (B-Yin), and measure VSBD, that pin 36 (B-Yout) is saturated input level. (2) Measure VNRD of R-Y input in the same way as VSBD.
H4	Frequency Characteristic, Direct	↑	94H	—	—	(1) In the same measuring as H1, set waveform 1 to 0.3V _{p-p} and f = 100kHz. Measure VB100, that is pin 36 (B-Yout) level. And set waveform 1 to f = 700kHz. Measure VB700, that is pin 36 (B-Yout) level. GHB1 = 20log (VB700 / VB100) (2) Measure GHR1 of R-Y out in the same way as GHB1.
H5	Frequency Characteristic, Delay	↑	8CH	—	—	(1) In the same measuring as H1, set waveform 1 to 0.3V _{p-p} and f = 100kHz. Measure VB100, that is pin 36 (B-Yout) level. And set waveform 1 to f = 700kHz. Measure VB700, that is pin 36 (B-Yout) level. GHB2 = 20log (VB700 / VB100) (2) Measure GHR2 of R-Y out in the same way as GHB2.
H6	AC Gain Direct	↑	94H	—	—	(1) In the same measuring as H1, set waveform 1 to 0.7V _{p-p} . Measure VByt1, that is pin 36 (B-Yout) level. GBY1 = 20log (VByt1 / 0.7) (2) Measure GRY1 of R-Y out in the same way as GBY1.
H7	AC Gain Delay	↑	8CH	—	—	(1) In the same measuring as H1, set waveform 1 to 0.7V _{p-p} . Measure VByt2, that is pin 36 (B-Yout) level. GBY2 = 20log (VByt2 / 0.7) (2) Measure GRY2 of R-Y out in the same way as GBY2.

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , Fc V _{DD} , Y/C V _{CC} = 5V ; Ta = 25 ± 3°C ; BUS = preset value ; pin 3 = 9V ; pin 8-38-41 = 5V)				MEASURING METHOD
		SW MODE		SUB ADDRESS & DATA		
		S26	07H	0FH	11H	
H8	Direct-Delay AC Gain Difference	↑	94H 8CH	—	—	(1) GBYD = GBY1 - GBY2 (2) GRYD = GRY1 - GRY2
H9	Color Difference Output DC Stepping	↑	8CH	—	—	(1) Measure pin 36 (B-YouT) DC stepping of the picture period. (2) Measure pin 35 (R-YouT) DC stepping of the picture period.
H10	1H Delay Quantity	ON	8CH	—	—	(1) Input waveform 2 to pin 33 (B-Yin). And measure the time deference RDt of pin 36 (B-YouT). (2) Input waveform 2 to pin 34 (R-Yin). And measure the time deference RDt of pin 36 (B-YouT).
H11	Color Difference Output DC-Offset Control	↑	8CH	20H	00H 88H FFF	(1) Set Sub-Address 11h ; data 88h. Measure the pin 36 DC voltage, that is BDC1. (2) Set Sub-Address 11h ; data 88h. Measure the pin 35 DC voltage, that is RDC1. (3) Set Sub-Address 11h ; data 00h. Measure the pin 36 DC voltage, that is BDC2. (4) Set Sub-Address 11h ; data 00h. Measure the pin 35 DC voltage, that is RDC2. (5) Set Sub-Address 11h ; data FFh. Measure the pin 36 DC voltage, that is BDC3. (6) Set Sub-Address 11h ; data FFh. Measure the pin 35 DC voltage, that is RDC3. (7) Bomin = BDC2 - BDC1, Biomax = BDC3 - BDC1, Romin = RDC2 - RDC1, Romax = RDC3 - RDC1
H12	Color Difference Output DC-Offset Control / Min. Control Quantity	↑	A4H	00H	89H	(1) Measure the pin 36 DC voltage, that is BDC4. (2) Measure the pin 35 DC voltage, that is RDC4. (3) Bo1 = BDC4 - BDC1, Ro1 = RDC4 - RDC1
H13	NTSC Mode Gain / NTSC-COM Gain	↑	94H	80H	—	(1) Input waveform 1, that is set 0.3Vp-p and f = 100kHz, to pin 33. Measure pin 36 output level, that is VBNc. (2) GNB = 20log (VBNc/VB100) (3) In the same way as (1) and (2), measure the pin 36 output level, that is VRNC. GNR = 20log (VRNC/VR100)

TEXT SECTION

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB $V_{CC} = 9V$; $V_{DD_FSC} = 5V$; $V_{DD_Y/C} = 5V$; $T_a = 25 \pm 3^\circ C$; BUS = preset value)										MEASURING METHOD	
		SW MODE					SUB-ADDRESS & BUS DATA						
		\$21	\$22	\$31	\$33	\$34	\$51	—	—	00H 02H	—	—	—
T ₁	Y Color Difference Clamping Voltage	B	B	B	B	A	—	—	FFH	00H	—	—	—
T ₂	Contrast Control Characteristic	↑	↑	↑	↑	↑	↑	—	—	80H 00H	—	—	—
T ₃	AC Gain	↑	↑	↑	↑	↑	↑	↑	↑	—	—	—	—

(1) Short circuit pin 31 (Y IN), pin 34 (R-Y IN) and pin 33 (B-Y IN) in AC coupling.

(2) Input 0.3V Synchronizing signal to pin 51 (Sync IN).

(3) Measure voltage at pin 31, pin 34 and pin 33 (V_{cp31}, V_{cp34}, V_{cp33}).

(1) Input TG7 sine wave signal whose frequency is 100kHz and video amplitude is 0.7V to pin 31 (Y IN).

(2) Input 0.3V Synchronizing Signal to pin 51 (Sync IN).

(3) Connect both pin 21 (Digital Y_S) and pin 22 (Analog Y_S) to ground.

(4) Set bus data so that Y sub contrast and drive are set at each center value and color is minimum.

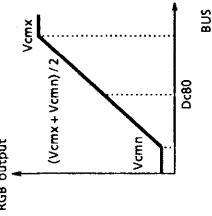
(5) Varying data on contrast from maximum (FF) to minimum (00), measure maximum and minimum amplitudes of respective outputs of pin 14 (R OUT), pin 13 (G OUT) and pin 12 (B OUT) in video period, and read values of bus data at the same time.

Also, measure the respective amplitudes with the bus data set to the center value (80).

(V_{c12mx}, V_{c12mn}, D12c80)
(V_{c13mx}, V_{c13mn}, D13c80)
(V_{c14mx}, V_{c14mn}, D14c80)

(6) Find ratio between amplitude with maximum unicolor and that with minimum unicolor in conversion into decibel ($\Delta V/3ct$).

In the test condition of Note T₂, find output/input gain (double) with maximum contrast.
 $G = V_{c13mx} / 0.7V$

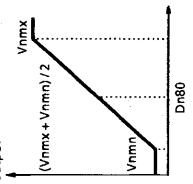


NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB $V_{CC} = 9V$; $V_{DD}, F_{SC}, V_{DD}, Y/C, V_{CC} = 5V$; $T_a = 25 \pm 3^\circ C$; BUS = preset value)										MEASURING METHOD	
		\$21	\$22	\$31	\$33	\$34	\$51	—	—	00H	02H	—	
T ₄	Frequency Characteristic	B	B	B	B	A	—	—	FFH	00H	—	—	(1) Input TG7 sine wave signal whose frequency is 6MHz and video amplitude is 0.7V to pin 31 (Y IN). (2) Input 0.3V synchronizing signal to pin 51 (Sync IN). (3) Connect both pin 21 (Digital Y _S) and pin 22 (Analog Y _S) to ground. (4) Set bus data so that contrast is maximum, Y sub contrast and drive are set at each center value and color is minimum. (5) Measure amplitude of pin 13 signal (G OUT) and find the output/input gain (double) (G6M). (6) From the results of the above step 5 and the Note T ₃ , find the frequency characteristic. $G_f = 20\log(G6M/G)$

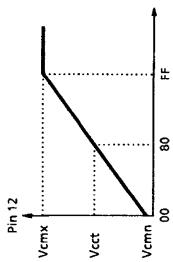
		TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , F _{SC} V _{DD} , Y/C V _{CC} =5V ; Ta = 25±3°C ; BUS = preset value)										
NOTE	ITEM	SW MODE					SUB-ADDRESS & BUS DATA					MEASURING METHOD
		S21	S22	S31	S32	S33	S34	S41	S42	—	00H 02H 05H 1BH 08H	—
T5	Y Sub-Contrast Characteristic	B	B	B	B	A	—	—	FFH	00H	1FH	—
T6	Y ₂ Input Level	↑	↑	↑	↑	↑	—	—	↑	—	BFH 44H	—

(1) Connect both pin 21 (Digital Ys) and pin 22 (Analog Ys) to ground.
(2) Input TG7 sine wave signal whose frequency is 100kHz and video amplitude is 0.7V to pin 31 (Y IN).
(3) Input 0.3V synchronizing signal to pin 51 (Sync IN).
(4) Set bus data so that contrast is maximum, drive is set at center value and color is minimum.
(5) Set bus data on Y sub contrast at maximum (FF) and measure amplitude (Vscrem) of pin 14 output (R OUT). Then, set data on Y sub contrast at minimum (00), measure the same (Vscrem).
(6) From the results of the above step 5, find ratio between Vscrem and Vscrem in conversion into decibel (ΔVscrem).
(1) Set bus data so that contrast is maximum, Y sub contrast and drive are at each center value.
(2) Input 0.3V synchronizing signal to pin 51 while inputting TG7 sine wave signal whose frequency is 100kHz to pin 31 (Y IN).
(3) While increasing the amplitude of the sine wave signal, measure video amplitude of signal 1 just before R output of pin 14 is distorted. (Vy2d)

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , F _{SC} V _{DD} , Y / C V _{CC} =5V ; Ta = 25±3°C ; BUS = preset value)										MEASURING METHOD				
		S21	S22	S31	S33	S34	S51	S42	—	00H	02H	05H	1BH	08H	—	
T7	Unicolor Control Characteristic	B	B	B	B	B	A	—	—	FFH	—	BFH	—	—		(1) Input 0.3V synchronizing signal to pin 51 (Sync IN). (2) Input 100kHz, 0.3Vp-p sine wave signal to both pin 33 (B-Y IN) and pin 34 (R-Y IN). (3) Connect pin 21 (Digital Ys) and pin 22 (Analog Ys) to ground. (4) Set bus data so that drive is at center value and Y mute is on. (5) While changing bus data on unicolor from maximum (FF) to minimum (00), measure maximum and minimum amplitudes of pin 13 (G OUT) and pin 12 (B OUT) in video period respectively, and read the bus data together with., Also, measure respective amplitudes as unicolor data is set at center value (80). (Vn12mx, Vn12mn, D12n80) (Vn13mx, Vn13mn, D13n80) (Vn14mx, Vn14mn, D14n80)
T8	Relative Amplitude (NTSC)	↑	↑	A	A	A	↑	A	—	FFH	—	—	↑	—	(6) Find ratio between amplitude with maximum unicolor data and that with minimum unicolor data in conversion into decibel ($\Delta V/13un$). While inputting rainbow color bar signal (3.58MHz for NTSC) to pin 42 and 0.3V synchronizing signal to pin 51 so that video amplitude of pin 33 is 0.38Vp-p, find the relative amplitude. ($Mnr-b = V_{u14mx}/V_{u12mx}$, $Mng-b = V_{u13mx}/V_{u12mx}$)	
T9	Relative Phase (NTSC)	↑	↑	↑	↑	↑	↑	↑	—	—	—	—	↑	—	(1) In the test condition of the Note T8, adjust bus data on tint so that output of pin 12 (B OUT) has the peak level in the 8th bar. (2) Regarding the phase of pin 12 (B OUT) as a reference phase, find comparative phase differences of pin 14 (R OUT) and pin 13 (G OUT) from the reference phase respectively (θ_{nr-b} , θ_{ng-b}).	



NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , F _{SC} V _{DD} , Y/C V _{CC} =5V ; Ta = 25±3°C ; BUS = preset value)										MEASURING METHOD				
		S21	S22	S31	S33	S34	S51	S42	—	—	00H	02H	1BH	—	—	—
T ₁₀	Relative Amplitude (PAL)	B	B	A	A	A	A	—	—	FFH	—	BFH	—	—	—	While inputting rainbow color bar signal (4.43MHz for PAL) to pin 42 and 0.3V synchronizing signal to pin 51 so that video amplitude of pin 33 is 0.38V _{p-p} , find the relative amplitude. (Mpr-b = Vu14mx/Vu12mx, Mpg-b = Vu13mx/Vu12mx)
T ₁₁	Relative Phase (PAL)	↑	↑	↑	↑	↑	—	—	↑	—	—	—	—	—	(1) In the test condition of the Note T10, adjust bus data on tint so that output of pin 12 (B OUT) has the peak level in the 6th bar. (2) Regarding the phase of pin 12 (B OUT) as a reference phase, find comparative phase differences of pin 14 (R OUT) and pin 13 (G OUT) from the reference phase respectively (θ_{pr-b} , θ_{pg-b}). (1) Input 0.3V synchronizing signal to pin 51 (Sync IN). (2) Input 100kHz, 0.1V _{p-p} sine wave signal to both pin 33 (B-Y IN) and pin 34 (R-Y IN). (3) Connect pin 21 (Digital Ys) and pin 22 (Analog Ys) to ground. (4) Set bus data so that unicolor is maximum, drive is at center value and Y mute is on. (5) Measure amplitude of pin 12 (B OUT) as bus data on color is set maximum (FF). (V _{cmax}) (6) Read bus data when output level of pin 12 is 10%, 50% and 90% of V _{cmax} respectively (Dc10, Dc50, Dc90). (7) From results of the above step 6, calculate number of steps from Dc10 to Dc90 (Δ_{col}) and that from 00 to Dc50 (ecol).	
T ₁₂	Color Control Characteristic	↑	↑	B	B	B	↑	—	—	↑	FFH	↑	—	—	—	(8) Measure respective amplitudes of pin 12 (B OUT), pin 13 (G OUT) and pin 14 (R OUT) with color data set at minimum, and regard the results as color residuals (ecb, ecb, etc).
T ₁₃	Color Control Characteristic, Residual Color	↑	↑	↑	↑	↑	—	—	—	↑	00H	↑	—	—	—	—



NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V : V _{DD} , Fc V _{DD} , Y/C V _{CC} =5V : Ta = 25±3°C ; BUS = preset value)										MEASURING METHOD	
		S21	S22	S31	S33	S41	S42	—	00H	02H	18H	—	
SUB-ADDRESS & BUS DATA												—	—
T14	Chroma Input Range	B	B	A	A	A	A	—	FFH	88H	BFH	—	—

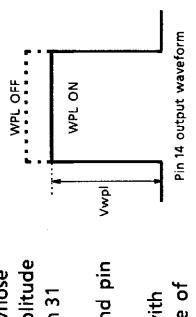
(1) Input rainbow color bar signal (3.58MHz for NTSC or 4.43MHz for PAL) to pin 42 (C IN) and 0.3V synchronizing signal to pin 51 (Sync IN).
(2) Connect pin 36 (B-Y OUT) and pin 33 (B-Y IN), pin 35 (R-Y OUT) and pin 34 (R-Y IN) in AC coupling respectively.
(3) Connect pin 21 (Digital Ys) and pin 22 (Analog Ys) to ground.
(4) Set bus data so that unicolor is maximum, drive and color are set at each center value (80) and mute is on.
(5) While increasing amplitude of chroma signal input to pin 42, measure amplitude just before any of pin 12 (B OUT), pin 13 (G OUT) and pin 14 (R OUT) output signals is distorted (Vcr).

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , F _{SC} V _{DD} , Y/C V _{CC} =5V ; T _a =25±3°C ; BUS=preset value)										MEASURING METHOD
		S21	S22	S31	S32	S33	S34	S51	S52	SW MODE	SUB-ADDRESS & BUS DATA	
T15	Brightness Control Characteristic	B	B	B	B	A	—	—	—	FFH	10H	—
T16	Brightness Center Voltage	↑	↑	↑	↑	↑	—	—	—	00H	—	—
T17	Brightness Data Sensitivity	↑	↑	↑	↑	↑	—	—	—	—	—	—
T18	RGB Output Voltage Axes Difference	↑	↑	↑	↑	↑	—	—	—	—	—	—
T19	White Peak Limit Level	↑	↑	↑	↑	↑	—	—	—	—	—	—

(1) Short circuit pin 31 (Y IN), pin 33 (B-Y IN) and pin 34 (R-Y IN) in AC coupling.
(2) Input 0.3V synchronizing signal to pin 51 (Sync IN).
(3) Set bus data so that R, G, B cut off data are set at center value.
(4) Connect pin 21 (Digital Y's) and pin 22 (Analog Y's) to ground.
(5) While changing bus data on brightness from maximum to minimum, measure video voltage of pin 13 (G OUT) to find maximum and minimum voltages (max : V_{brmx}, min : V_{brmn}).
(6) With bus data on brightness set at center value, measure video voltage of pin 13 (G OUT) (V_{brcnt}).
(7) On the condition that bus data with which V_{brmx} is obtained in measurement of the above step 5 is D_{brmx} and bus data with which V_{brmn} is obtained in measurement of the above step 5 is D_{brmn}, calculate sensitivity of brightness data (ΔV_{brcnt}).

$$\Delta V_{brcnt} = (V_{brmxg} - V_{brmg}) / (D_{brmxg} - D_{brmg})$$

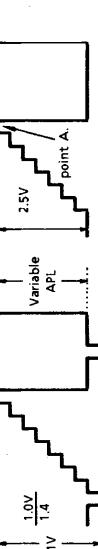
(1) In the same manner as the Note T16, measure video voltage of pin 12 (B OUT) with bus data on brightness set at center value.
(2) Find maximum axes difference in the brightness center voltage.

(1) Set bus data so that contrast and Y sub contrast are maximum and brightness is minimum.
(2) Input TG7 sine wave signal whose frequency is 100kHz and amplitude in video period is 0.9V to pin 31 (Y IN).
(3) Connect pin 21 (Digital Y's) and pin 22 (Analog Y's) to ground.
(4) While turning on/off WPL with bus, measure video amplitude of pin 14 (R OUT) with WPL being activated (V_{wpl}).


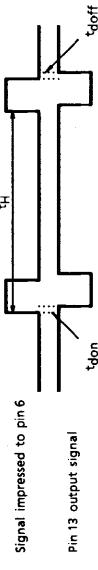
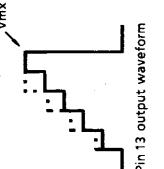
NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , E _{SC} V _{DD} , Y / C V _{CC} =5V ; Ta = 25 ± 3°C ; BUS = preset value)										MEASURING METHOD				
		S21	S22	S31	S33	S34	S51	—	—	09H	0AH	0CH	0DH	0EH	—	
T20	Cutoff Control Characteristic	B	B	B	B	B	A	—	—	FFH	FFH	FFH	FFH	FFH	—	(1) Short circuit pin 31 (Y IN), pin 33 (B-Y IN) and pin 34 (R-Y IN) in AC coupling. (2) Input 0.3V synchronizing signal to pin 51 (Sync IN). (3) Connect pin 21 (Digital Ys) and pin 22 (Analog Ys) to ground. (4) Set bus data on brightness at center value. (5) While changing data on cutoff from maximum to minimum, measure video voltage of pin 13 (G OUT) to find maximum and minimum values (max : Vcomx, min : Vcomm). (6) Set cutoff data at center value and measure video voltage of pin 13 (G OUT) (Vcuct). (7) On the condition that bus data with which Vcomx is obtained in measurement of the above step 5 is Dcomx and bus data with which Vcomm is obtained in the same is Dcomm, calculate number of steps (Δ Dcut). Δ Dcut = Dcomx - Dcomm
T21	Cutoff Center Level	↑	↑	↑	↑	↑	—	—	↑	80H	80H	80H	80H	—	—	—
T22	Cutoff Variable Range	↑	↑	↑	↑	↑	—	—	—	—	—	—	—	—	—	—
T23	Drive Variable Range	↑	↑	↑	↑	↑	↑	—	—	FFH	FFH	FFH	FFH	FFH	—	(1) Short circuit pin 33 (B-Y IN) and pin 34 (R-Y IN) in AC coupling. (2) Input a stepping signal whose amplitude in video period is 0.3V to pin 31 (Y IN). (3) Input 0.3V synchronizing signal to pin 51 (Sync IN). (4) Connect pin 21 (Digital Ys) and pin 22 (Analog Ys) to ground. (5) Set bus data so that contrast is maximum and Y sub contrast is minimum. (6) While changing drive data from minimum to maximum, measure video amplitude of pin 13 (G OUT) to find maximum and minimum values (max : Vdrmx, min : Vdrm). (7) Set drive data at center value and measure video amplitude of pin 13 (G OUT) (Vdrct). Calculate amplitude ratio of the measured value to the maximum and minimum amplitudes measured in the above step 6 respectively (DR+, DR-).

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , Fsc V _{DD} , Y / C V _{CC} = 5V ; Ta = 25 ± 3°C ; BUS = preset value)										MEASURING METHOD
		S ₂₁	S ₂₂	S ₃₁	S ₃₂	S ₃₃	S ₃₄	S ₄₅	S ₃₉	S ₄₄	SUB-ADDRESS & BUS DATA	
T24	DC Regeneration	B	B	A	B	B	A	B	A	A	—	—
T25	RGB Output S/N Ratio	↑	↑	B	↑	↑	↑	—	—	—	—	—

(1) Short circuit pin 33 (B-Y IN) and pin 34 (R-Y IN) in AC coupling.
(2) Input such the step-up signal as shown below to pin 45 (Y IN) and pin 51 (Sync IN).
(3) Connect pin 21 (Digital Ys) and pin 22 (Analog Ys) to ground.
(4) Set bus data so that contrast is maximum and DC transmission correction factor is minimum.
(5) Adjust data on Y sub contrast so that video amplitude of pin 13 (G OUT) is 2.5V.
(6) While varying APL of the step-up signal from 10% to 90%, measure change in voltage at the point A.



(1) Short circuit pin 31 (Y IN), pin 33 (B-Y IN) and pin 34 (R-Y IN) in AC coupling.
(2) Input synchronizing signal of 0.3V in amplitude to pin 51 (Sync IN).
(3) Connect pin 21 (Digital Ys) and pin 22 (Analog Ys) to ground.
(4) Set bus data on contrast at maximum.
(5) Set bus data on Y sub contrast at center value.
(6) Measure video noise level of pin 13 (G OUT) with oscilloscope (no).
SNo = -20log (2.5/(1/5) × no)

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB VCC = 9V ; VDD, Fsc VDD, Y/C VCC = 5V ; Ta = 25 ± 3°C ; BUS = preset value)										MEASURING METHOD
		S21	S22	S31	S33	S34	S51	—	—	—	—	
T26	Blanking Pulse Output Level	B	B	B	B	B	A	—	—	—	—	(1) Input synchronizing signal of 0.3V in amplitude to pin 51 (Sync IN). (2) Connect pin 21 (Digital Ys) and pin 22 (Analog Ys) to ground. (3) Set bus data so that blanking is on. (4) Measure voltage of pin 13 (G OUT) in V. blanking period (Vy). (5) Measure voltage of pin 13 (G OUT) in H. blanking period (Vh). In the setting condition of the Note T26, find "t _{don} " and "t _{doff} " (see figure below) between the signal impressed to pin 6 (BPP IN) and output signal of pin 13 (G OUT).
T27	Blanking Pulse Delay Time	↑	↑	↑	↑	↑	—	—	—	↑	↑	
T28	RGB Min. Output Level	↑	↑	↑	↑	↑	—	—	—	00H	↑	↑ 00H 00H 00H (1) Short circuit pin 31 (Y IN), pin 33 (B-Y IN) and pin 34 (R-Y IN) in AC coupling. (2) Input synchronizing signal of 0.3V in amplitude to pin 51 (Sync IN). (3) Connect pin 21 (Digital Ys) and pin 22 (Analog Ys) to ground. (4) Set bus data so that brightness and RGB cutoff are minimum. (5) Measure video voltage of pin 13 (G OUT) (Vm _m). (1) Short circuit pin 33 (B-Y IN) and pin 34 (R-Y IN) in AC coupling. (2) Input stepping signal to pin 31 (Y IN) and synchronizing signal of 0.3V in amplitude to pin 51 (Sync IN). (3) Connect pin 21 (Digital Ys) and pin 22 (Analog Ys) to ground. (4) Set bus data so that contrast and Y sub contrast are maximum. (5) While increasing amplitude of the stepping signal, measure maximum output level just before video signal of pin 13 (G OUT) is distorted (Vm _n).
T29	RGB Max. Output Level	↑	↑	↑	↑	↑	↑	—	—	—	80H 1fH 4fH 80H 80H 80H 80H Pin 13 output waveform	

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , Fsc V _{DD} , Y/C V _{CC} =5V ; Ta = 25 ± 3°C ; BUS = preset value)										MEASURING METHOD	
		S18	S19	S20	S21	S22	S31	S33	S34	S51	15H	1CH	
T30	Halftone Ys Level	B	B	A	B	B	B	B	A	00H	80H	—	—
T31	Halftone Gain 1	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	—	—
T32	Halftone Gain 2	↑	↑	↑	↑	↑	↑	↑	↑	01H	↑	—	—
T33	Text ON Ys, Low Level	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	—	—
T34	Text / OSD Output, Low Level	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	—	—

(1) Input stepping signal whose amplitude is 0.3V in video period to pin 31 (Y IN) and pin 51 (Sync IN)
(2) Set bus data so that blanking is off and halftone is -3dB in on status.
(3) Connect power supply to pin 21 (Digital Ys). While impressing 0V to it, measure amplitude and pedestal level of pin 13 (G OUT) in video period (Vm13, Vp13).
(4) Raising supply voltage to pin 21 gradually from 0V, measure level (V_{tht1}) of pin 21 when amplitude of pin 13 output signal changes. At the same time, measure amplitude and pedestal level of pin 13 in video period after the pin 13 output signal changed in amplitude. (Vm13b, Vp13b)
(5) According to results of the above steps 3 and 4, calculate gain of -3dB halftone and variation of pedestal level.
G_{3ht13} = 20log (Vm13b / Vm13)
(6) set bus data so that halftone is -6dB in on status, and perform the same measurement as the above steps 3 and 5 to find gain of -6dB halftone and variation of pedestal level (G_{6ht13}).
(7) Raising supply voltage to pin 21 further from V_{tht1}, measure level (V_{tx13}) of pin 21 when output signal of pin 13 (G OUT) changes in amplitude and DC level of pin 13 after the change of its output (V_{tx13}).
(8) From results of the above steps 3 and 7, calculate low level of the output in the text mode.
V_{tx13} = V_{tx13} - V_{p13}
(9) Raising supply voltage to pin 21 by 3V from that in the above step 7, confirm that there is no change in output level of pin 13.

TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , F _C V _{DD} , Y / C V _{CC} = 5V ; T _a = 25 ± 3°C ; BUS = preset value)												
NOTE	ITEM	SUB-ADDRESS & BUS DATA										MEASURING METHOD
		SW MODE		S ₁₈ S ₁₉ S ₂₀ S ₂₁ S ₂₂ S ₃₁ S ₃₃ S ₅₁			— 15H 1CH — — — —					
T35	Text RGB Output, High Level	A	A	A	B	B	A	— 02H 80H — — — —	(1) Input stepping signal whose amplitude is 0.3V in video period to pin 31 (Y IN) and pin 51 (Sync IN). (2) Set bus data so that blanking and halftone are off. (3) Connect power supply to pin 21 (Digital Ys). While impressing 0V to it, measure pedestal level of pin 13 output signal (G OUT) (V _{p13}). (4) Connect power supply to pin 19 (Digital G IN) and impress it with 2V. (5) Raising supply voltage to pin 21 gradually from 0V, measure video level of pin 21 after output signal of pin 13 changed (V _{i13}). (6) From measurement results of the above steps 3 and 5, calculate high level in the test mode. $V_{mt13} = V_{tx13} - V_{pt13}$	(7) Raising supply voltage to pin 21 further from that in the step 5, measure level (V_{tost}) of pin 21 when the level of pin 13 output signal changes from that in the step 5 to -6dB as halftone data is set to ON (the 6th step of Notes T30 to T34). (8) In the condition of the above step 7, raise voltage impressed to pin 19 to 3V and measure output voltage of pin 13 (V _{os13}). (9) From results of the above steps 3 and 7, calculate high level of the output in the OSD mode. $V_{mos13} = V_{os13} - V_{pt13}$		
T36	OSD Ys ON, Low Level	↑	↑	↑	↑	↑	—	↑	—	—	—	
T37	OSD RGB Output, High Level	↑	↑	↑	↑	↑	↑	—	↑	—	—	

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB $V_{CC} = 9V$; $V_{DD}, V_{SC} = 5V$; $T_a = 25 \pm 3^\circ C$; BUS = Dreset value)										MEASURING METHOD
		SUB-ADDRESS & BUS DATA										
		S_{18}	S_{19}	S_{20}	S_{21}	S_{22}	S_{31}	S_{33}	S_{34}	S_{51}		
T40	OSD Mode Switching Rise-Up Time	A	A	A	B	B	B	A	B	A	—	—
T41	OSD Mode Switching Rise-Up Transfer Time	↑	↑	↑	↑	↑	↑	↑	↑	—	—	—
T42	OSD Mode Switching Rise-Up Transfer Time, 3 Axes Difference	↑	↑	↑	↑	↑	↑	↑	↑	—	—	—
T43	OSD Mode Switching Breaking Time	↑	↑	↑	↑	↑	↑	↑	↑	—	—	—
T44	OSD Mode Switching Breaking Transfer Time	↑	↑	↑	↑	↑	↑	↑	↑	—	—	—
T45	OSD Mode Switching Breaking Transfer Time, 3 Axes Difference	↑	↑	↑	↑	↑	↑	↑	↑	—	—	—

(1) Input a Signal Shown by (a) in the following figure to pin 21 (Digital Ys).

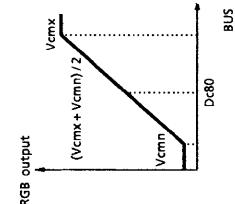
(2) According to (b) in the figure, measure t_{P2d1} , t_{P2d2} , t_{P2f1} and t_{P2f2} for output signals of pin 14 (R OUT), pin 13 (G OUT) and pin 12 (B OUT) respectively.

(3) Find maximum values of t_{P2d1} and t_{P2f2} respectively (Δt_{P2d1} , Δt_{P2f2}).

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , Fsc V _{DD} , Y/C V _{CC} = 5V ; Ta = 25 ± 3°C ; BUS = preset value)										MEASURING METHOD
		S18	S19	S20	S21	S22	S31	S33	S34	S51	SUB-ADDRESS & BUS DATA	
T46	OSD Hi DC Switching Rise-Up Time	A	A	A	B	B	B	A	—	—	—	—
T47	OSD Hi DC Switching Rise-Up Transfer Time	↑	↑	↑	↑	↑	↑	↑	—	—	—	—
T48	OSD Hi DC Switching Rise-Up Transfer Time, 3 Axes Difference	↑	↑	↑	↑	↑	↑	↑	—	—	—	—
T49	OSD Hi DC Switching Breaking Time	↑	↑	↑	↑	↑	↑	↑	—	—	—	—
T50	OSD Hi DC Switching Breaking Transfer Time	↑	↑	↑	↑	↑	↑	↑	—	—	—	—
T51	OSD Hi DC Switching Breaking Transfer Time, 3 Axes Difference	↑	↑	↑	↑	↑	↑	↑	↑	—	—	—

(1) Supply pin 21 (Digital Ys) with 2.5V.
(2) Input 5V_{p-p} signal shown by (a) in the figure to pin 18 (Digital R IN).
(3) Referring to (b) of the following figure, measure τ_{Roh} , t_{pRoh} , τ_{Foh} and t_{pFoh} for output signal of pin 14 (R OUT).
(4) Input 5V_{p-p} signal shown by (a) in the figure to pin 19 (Digital G IN).
(5) Perform the same measurement as the above step 3 for pin 13 output (G OUT) referring to (b) of the following figure.
(6) Input 5V_{p-p} signal shown by (a) in the figure to pin 20 (Digital B IN).
(7) Perform the same measurement as the above step 3 for pin 12 output (B OUT) referring to (b) of the following figure.
(8) Find maximum axes differences in t_{pRoh} and t_{pFoh} among the three outputs (Δt_{pRoh} , Δt_{pFoh}).

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =5V ; V _{DD} , F _{SC} V _{DD} , Y / C V _{CC} =5V ; Ta = 25 ± 3°C ; BUS=preset value)								MEASURING METHOD		
		S21	S22	S31	S33	S34	S51	—	—	06H	—	—
SUB-ADDRESS & BUS DATA												
T52	RGB Control Characteristic	B	A	B	B	A	—	—	FFH	—	—	—
									80H	—	—	—
									00H	—	—	—



		TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD} , V _{SC} V _{DD} , Y/C V _{CC} =5V ; Ta = 25±3°C ; BUS = preset value)										
NOTE	ITEM	SW MODE					SUB-ADDRESS & BUS DATA					MEASURING METHOD
		S21	S22	S31	S32	S33	S34	S51	—	—	06H	
T53	Analog RGB AC Gain	B	A	B	B	A	—	—	—	—	—	In the setting condition of the Note T52, calculate output/input gain (double) with contrast data being set maximum. $G = V_{C13} \text{mV} / 0.5V$
T54	Analog RGB Frequency Characteristic	↑	↑	↑	↑	↑	↑	—	—	FFH	—	(1) Input 0.3V synchronizing signal to pin 51 (Sync IN). (2) Supply 5V of external supply voltage to pin 22 (Analog Ys). (3) Input TG7 sine wave signal ($f = 100\text{kHz}$, video amplitude = 0.5V) to pin 24 (Analog G IN). (4) Set bus data so that contrast is maximum and drive is set at center value. (5) Measure video amplitude of pin 13 (G OUT) and calculate output/input gain (double) (G6M). (6) From measurement results of the above step 5 and the preceding Note 53, find frequency characteristic. $G_f = 20\log (G6M/G)$

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , F _{SC} V _{DD} , Y / C V _{CC} = 5V ; Ta = 25 ± 3°C ; BUS = preset value)										MEASURING METHOD	
		SW MODE					SUB-ADDRESS & BUS DATA						
		S21	S22	S31	S33	S34	S51	—	—	01H	06H	—	—
T55	Analog RGB Dynamic Range	B	A	B	B	A	—	—	—	00H	—	—	—
T56	RGB Brightness Control Characteristic	↑	↑	↑	↑	↑	↑	—	—	FFH	—	—	—
T57	RGB Brightness Center Voltage	↑	↑	↑	↑	↑	↑	—	—	00H	—	—	—
T58	RGB Brightness Data Sensitivity	↑	↑	↑	↑	↑	↑	—	—	80H	—	—	—
T59	Analog RGB Mode ON Voltage	↑	↑	↑	↑	↑	↑	—	—	—	—	—	—

(1) Input 0.3V synchronizing signal to pin 51 (Sync IN).
(2) Supply 5V of external supply voltage to pin 22 (Analog Ys).
(3) Set bus data so that contrast is minimum and drive is set at center value.
(4) While inputting stepping signal to pin 24 (Analog G IN), increase video amplitude gradually from 0.
(5) Measure video amplitude of pin 24 when video voltage of pin 13 (G OUT) does not change.

(1) Short circuit pin 31 (Y IN), pin 33 (B-Y IN) and pin 34 (R-Y IN) in AC coupling.
(2) Input 0.3V synchronizing signal to pin 51 (Sync IN).
(3) Set bus data on RGB cutoff at center value.
(4) Supply 5V of external supply voltage to pin 22 (Analog Ys).
(5) While changing data brightness from maximum to minimum, measure maximum and minimum voltages of pin 13 (G OUT) in video period. (max : V_{brrmx}, min : V_{brrmn})
(6) Set bus data on brightness at center value and measure video voltage of pin 13 (G OUT) (V_{bent}).
(7) On the condition that bus data with which V_{brrmx} is obtained in measurement of the above step 5 is D_{brrmx} and bus data with which V_{brrmn} is obtained in measurement of the above step 5 is D_{brrmn}, calculate sensitivity of brightness data (ΔV_{brrt}).

$$\Delta V_{brrt} = (V_{brrmx} - V_{brrmn}) / (D_{brrmx} - D_{brrmn})$$

(1) Input TG7 sine wave signal (f = 100kHz, video amplitude = 0.3V) to pin 23 (Analog R IN).
(2) Supply 5V of external supply voltage to pin 22 (Analog Ys) and raise the voltage gradually from 0V.
(3) Measure voltage at pin 22 when signal 1 is output from pin 14 (R OUT) (Vanath).

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB $V_{CC} = 9V$; $V_{DD}, V_{fsc}, V_{DD}, Y/C, V_{CC} = 5V$; $T_a = 25 \pm 3^\circ C$; BUS = preset value)										MEASURING METHOD	
		SW MODE					SUB-ADDRESS & BUS DATA						
		S_{21}	S_{22}	S_{31}	S_{33}	S_{34}	S_{51}	$-$	$-$	$-$	$-$	$-$	
T60	Analog RGB Switching Rise-Up Time	B	A	B	B	A	-	-	-	-	-	-	(1) Supply signal ($2V_{pp}$) shown by (a) in the following figure to Pin 22 (Analog Ys).
T61	Analog RGB Switching Rise-Up Transfer Time	\uparrow	\uparrow	\uparrow	\uparrow	\uparrow	-	-	-	-	-	-	(2) Referring to (b) of the following figure, measure τ_{Rana} , t_{PRan} , τ_{Fana} and t_{PFan} for outputs of pin 14 (R OUT), pin 13 (G OUT) and pin 12 (B OUT).
T62	Analog RGB Switching Rise-Up Transfer Time, 3 Axes Difference	\uparrow	\uparrow	\uparrow	\uparrow	\uparrow	-	-	-	-	-	-	(3) Find maximum values of t_{PRan} and t_{PFan} respectively (Δt_{PRan} , Δt_{PFan}).
T63	Analog RGB Switching Breaking Time	\uparrow	\uparrow	\uparrow	\uparrow	\uparrow	-	-	-	-	-	-	(a)
T64	Analog RGB Switching Breaking Transfer Time	\uparrow	\uparrow	\uparrow	\uparrow	\uparrow	-	-	-	-	-	-	(b)
T65	Analog RGB Switching Breaking Transfer Time, 3 Axes Difference	\uparrow	\uparrow	\uparrow	\uparrow	\uparrow	-	-	-	-	-	-	(c)

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} =9V ; V _{DD_FSC} V _{DD_Y/C} V _{CC} =5V ; Ta = 25 ± 3°C ; BUS=preset value)										MEASURING METHOD	
		SW MODE		SUB-ADDRESS & BUS DATA									
S21	S22	S31	S33	S34	S51	—	—	—	—	—	—	—	—
T66	Analog RGB Hi Switching Rise-Up Time	B	A	B	B	A	—	—	—	—	—	—	—
T67	Analog RGB Hi Switching Rise-Up Transfer Time	↑	↑	↑	↑	↑	—	—	—	—	—	—	—
T68	Analog RGB Hi Switching Rise-Up Transfer Time, 3 Axes Difference	↑	↑	↑	↑	↑	—	—	—	—	—	—	—
T69	Analog RGB Hi Switching Breaking Time	↑	↑	↑	↑	↑	—	—	—	—	—	—	—
T70	Analog RGB Hi Switching Breaking Transfer Time	↑	↑	↑	↑	↑	—	—	—	—	—	—	—
T71	Analog RGB Hi Switching Breaking Transfer Time, 3 Axes Difference	↑	↑	↑	↑	↑	—	—	—	—	—	—	—

(1) Supply 2V to pin 22 (Analog Ys).
(2) Input 0.5V p-p signal shown by (a) in the following figure to pin 23 (Analog R IN).
(3) Referring to (b) of the following figure, measure t_{PRah} , t_{PFah} and t_{PRf} for output of pin 14 (R OUT).
(4) Input 0.5V p-p signal shown by (a) in the following figure to pin 24 (Analog G IN).
(5) Referring to (b) of the following figure, perform the same measurement as the above step 3 for output of pin 13 (G OUT).
(6) Input 0.5V p-p signal shown by (a) in the following figure to pin 25 (Analog B IN).
(7) Referring to (b) of the following figure, perform the same measurement as the above step 3 for output of pin 12 (B OUT).
(8) Find maximum axes difference in t_{PRoh} and t_{PFoh} among the three outputs (Δt_{PRah} , Δt_{PFah}).

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB $V_{CC} = 9V$; $V_{DD}, V_{SC} V_{DD}, Y/C V_{CC} = 5V$; $T_a = 25 \pm 3^\circ C$; BUS = preset value)										MEASURING METHOD
		S ₂₁	S ₂₂	S ₃₁	S ₃₃	S ₃₄	S ₅₁	—	—	—	—	
T72	TV-Analog RGB Crosstalk	B	A	B	B	A	—	—	—	—	—	(1) Input TG7 sine wave signal ($f = 4MHz$, video amplitude = 0.5V) to pin 31 (Y_2 IN). (2) Short circuit pin 25 (Analog G IN) in AC coupling. (3) Input 0.3V synchronizing signal to pin 51 (Sync IN). (4) Set bus data so that contrast is maximum, Y sub contrast and drive are set at center value. (5) Supply pin 22 (Analog Y_S) with 0V of external power supply. (6) Measure video voltage of output signal of pin 13 (G OUT) (V_{tg}). (7) Supply pin 22 (Analog Y_S) with 2V of external power supply. (8) Measure video voltage of output signal of pin 13 (G OUT) (V_{tan}). (9) From measurement results of the above steps 5 and 7, calculate crosstalk from TV to analog RGB. $C_{rtv} = 20 \log \left(\frac{V_{tan}}{V_{tg}} \right)$
T73	Analog RGB-TV Crosstalk	↑	↑	↑	↑	↑	↑	—	—	—	—	(1) Short circuit pin 31 (Y_2 IN), pin 34 (R-Y IN) and pin 33 (B-Y IN) in AC coupling. (2) Input 0.3V synchronizing signal to pin 51 (Sync IN). (3) Set bus data so that contrast is maximum and drive is set at center value. (4) Input TG7 sine wave signal ($f = 4MHz$, video amplitude = 0.5V) to pin 24 (Analog G IN). (5) Supply pin 22 (Analog Y_S) with 0V of external power supply. (6) Measure video voltage of output signal of pin 13 (G OUT) (V_{tan}). (7) Supply pin 22 (Analog Y_S) with 2V of external power supply. (8) Measure video voltage of output signal of pin 13 (G OUT) (V_{tan}). (9) From measurement results of the above steps 6 and 8, calculate crosstalk from analog RGB to TV. $C_{rant} = 20 \log \left(\frac{V_{tan}}{V_{tg}} \right)$

		TEST CONDITION (Unless otherwise specified : H, RGB VCC=9V ; VDD, Fsc VDD, Y/C VCC = 5V ; TA = 25 ± 3°C ; BUS = preset value)												
NOTE	ITEM	SUB-ADDRESS & BUS DATA												MEASURING METHOD
		SW MODE			S21 S22 S31 S33 S34 S51			— — 01H 15H — — —						
T74	ABL Point Characteristic	B B B B A — —						10H	— —					(1) Input TG7 sine wave signal (f = 4MHz, video amplitude = 0.5V) to pin 31 (Y2 IN). (2) Short circuit pin 23 (Analog R IN), pin 25 (Analog G IN) and pin 26 (Analog B IN) in AC coupling. (3) Set bus data so that brightness is maximum and ABL gain is at center value, and supply pin 16 with external supply voltage. While turning down voltage supplied to pin 16 gradually from 7V, measure voltage at pin 16 when the voltage supplied to pin 12 decreases by 0.3V in three conditions that data on ABL point is set at minimum, center and maximum values respectively. (Vab1l, Vab1pc, Vab1ph)
T75	ACL Characteristic	↑ ↑ ↑ ↑ ↑ — —						FFH	90H	— —				(1) Input TG7 sine wave signal (f = 4MHz, video amplitude = 0.5V) to pin 31 (Y2 IN). (2) Input 0.3V synchronizing signal to pin 51 (Sync IN). (3) Measure video amplitude at pin 12. (Vacl1) (4) Measure DC voltage at pin 16 (ABCL). (5) Supply pin 16 with a voltage that the voltage measured in the above step 4 minus 2V. (6) Measure video amplitude at pin 12 (Vacl2) and its ratio to the amplitude measured in the above step 3. $Vacl = 20 \log (Vacl2 / Vacl1)$
T76	ABL Gain Characteristic	↑ ↑ ↑ ↑ ↑ — —						00H	— —					(1) Short circuit pin 31 (Y2 IN), pin 34 (R-Y IN) and pin 33 (B-Y IN) in AC coupling. (2) Input 0.3V synchronizing signal to pin 51 (Sync IN). (3) Set bus data on brightness at maximum and measure video DC voltage at pin 12 (Vmax). (4) Measure voltage at pin 16 which is being supplied with the voltage measured in the step 5 of the preceding Note 75. (5) Changing setting of bus data on ABL gain at minimum, center and maximum values one after another, measure video DC voltage at pin 12. (Vab1l, Vab12, Vab13) (6) Find respective differences of Vab1l, Vab12 and Vab13 from the voltage measured in the above step 3. $Vab1l = Vmax - Vab1l$ $Vab12 = Vmax - Vab12$ $Vab13 = Vmax - Vab13$

AUDIO SECTION		TEST CONDITION (Unless otherwise specified : H _i , RGB V _{CC} = 9V ; V _{DD} , F _{SC} V _{DD} , Y/C V _{CC} = 5V ; Ta = 25 ± 3°C)					
NOTE	ITEM	SW MODE			SUB-ADDRESS & BUS DATA		MEASURING METHOD
		S27	S28	S29	03H	07H	
A1	Attenuator Max. Gain	A ↓ B	B ↓ A	B ↑ A	40H ↓ 0CH	7FH	(1) Input 1kHz, 500mVrms signal to pin 27 (TV Audio IN). (2) Set bus data so that the audio switch is set at TV mode and ATT gain is maximum (7F). (3) Measure audio output level at pin 29 and find the gain (Gmxt). (4) Set bus data on the audio switch to EXT mode. While inputting 1kHz, 500mVrms signal to pin 28 (Ext. Audio IN), perform the same measurement as the above step 3. (Gmxext)
A2	Attenuator Center Gain	↑	↑	↑	↑	40H	(1) Input 1kHz, 500mVrms signal to pin 27 (TV Audio IN). (2) Set bus data so that the audio switch is set at TV mode and ATT gain is center value (40). (3) Measure audio output level at pin 29 and find the gain (Gcntt). (4) Set bus data on the audio switch to EXT mode. While inputting 1kHz, 500mVrms signal to pin 28 (Ext. Audio IN), perform the same measurement as the above step 3. (Gcntext)
A3	Attenuator Residual Sound	↑	↑	↑	↑	00H	(1) Input 1kHz, 500mVrms signal to pin 27 (TV Audio IN). (2) Set bus data so that the audio switch is set at TV mode and ATT gain is minimum (00). (3) Measure audio output level at pin 29 and find the audio output level (Vmntt). (4) Set bus data on the audio switch to EXT mode. While inputting 1kHz, 500mVrms signal to pin 28 (Ext. Audio IN), perform the same measurement as the above step 3. (Vmnetext) (Note) For measuring signal level, use 1kHz band pass filter.
A4	Audio Mute Residual Sound	↑	↑	↑	↑	FFH	(1) Input 1kHz, 500mVrms signal to pin 27 (TV Audio IN). (2) Set bus data so that the audio switch is set at TV mode and ATT gain is maximum (7F). (3) Set bus data on audio mute to ON. (4) Measure audio output level at pin 29 (Vmuntt). (5) Set bus data on the audio switch to EXT mode. While inputting 1kHz, 500mVrms signal to pin 28 (Ext. Audio IN), perform the same measurement as the above step 4. (Vmnetext) (Note) For measuring signal level, use 1kHz band pass filter.
A5	Attenuator Gain Switching Offset	A ↓ B	B ↓ A	B ↑ A	40H ↓ 0CH	7FH ↓ 00H	(1) Short circuit pin 27 (TV Audio IN) in AC coupling. (2) Set bus data on the audio switch to TV mode. (3) Changing bus data on ATT gain from maximum (00), measure change in DC level of audio output of pin 29 (Audio OUT) at that time (ATT0ft). (4) Short circuit pin 28 (Ext. Audio IN) in AC coupling and set bus data on the audio switch to EXT mode. In this condition perform the same measurement as the above step 3 (ATT0fext).
A6	Audio Mute Offset	B	B	↑	40H ↓ C0H	7FH ↓ FFH	(1) Short circuit pin 27 (TV Audio IN) in AC coupling. (2) Set bus data on the audio switch to TV mode. (3) Changing bus data on audio mute from OFF to ON, measure change in DC level of audio output of pin 29 (Audio OUT) at that time (AMT0ft). (4) Short circuit pin 28 (Ext. Audio IN) in AC coupling and set bus data on the audio switch to EXT mode. In this condition perform the same measurement as the above step 3 (AMT0fext).

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , F _{SC} V _{DD} , Y / C V _{CC} = 5V ; T _a = 25 ± 3°C)				MEASURING METHOD
		S27	S28	S29	SUB-ADDRESS & BUS DATA	
		03H	07H			
A7	Audio Crosstalk	B ↓ A	A ↓ B	↑ ↑	↑ 7FH	(1) Input 1kHz, 500mVrms signal to pin 28 (Ext. Audio IN). (2) Changing bus data on the audio switch from EXT. mode to TV mode, measure output level of pin 29 (Audio OUT) to find ratio between two outputs in the EXT mode and TV mode (CRv). (3) Change bus data on the audio switch from TV to EXT. mode and input 1kHz, 500mVrms signal to pin 27 (TV Audio IN). In this condition measure output level of pin 29 (Audio OUT) to find ratio of this output to the output level measured in the above step 2. (Cext) (Note) For measuring signal level, use 1kHz band pass filter.
A8	Attenuator Max. Input Voltage	A ↓ B	B ↓ A	↑ ↑	↑ 40H	(1) Input 1kHz signal to pin 27 (TV Audio IN). (2) Set bus data so that the audio switch is set at TV mode and ATT gain is set at center value (40). (3) While increasing amplitude of the signal, measure input amplitude just before output waveform of pin 29 (Audio OUT) is distorted (Dlrv). (4) Set bus data on the audio switch to EXT mode. While inputting 1kHz signal to pin 28 (Ext. Audio IN), perform the same measurement as the above step 3. (Dext).
A9	A-SW Switching Offset	B	B	B ↓ COH	40H 7FH	(1) Short circuit pin 27 (TV Audio IN) and pin 28 (Ext. Audio IN) in AC coupling. (2) Changing bus data on the audio switch from TV mode to EXT. mode, measure change in DC level of output signal of pin 29 (Audio OUT) at that time (VSWoF).
A10	Attenuator Breaking Frequency	A ↓ B	B ↓ A	↑ ↑	↑ 1	(1) Input 500mVrms signal to pin 27 (TV Audio IN). (2) Set bus data on the audio switch to TV mode. (3) While increasing the signal frequency from 1kHz, measure frequency when amplitude of pin 29 output (Audio OUT) is -3dB as low as the amplitude at 1kHz frequency (fcv). (4) Set bus data on the audio switch to EXT mode. While inputting 500mVrms signal to pin 28 (Ext. Audio IN), perform the same measurement as the above step 3. (fext)
A11	Audio S/N Ratio	↑	↑	↑ ↓ 0CH	40H ↑	(1) Input 500mVrms signal to pin 27 (TV Audio IN). (2) Set bus data on the audio switch to TV mode and measure output level of pin 29 (Audio OUT) (Vs). (3) Short circuit pin 27 in AC coupling and measure noise level at pin 29 (Vn). (SNtv = 20log (Vs / Vn)) (4) Change the setting of bus data on the audio switch to EXT. mode and change the 500mVrms input from pin 27 to pin 28. Perform the same measurement as the above step 3. (SNext) (Note) For measuring output level, use 15kHz low pass filter.

TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , F _{SC} V _{DD} , Y / C V _{CC} = 5V ; T _a = 25 ± 3°C)								
NOTE	ITEM	SW MODE			SUB-ADDRESS & BUS DATA		MEASURING METHOD	
		SW27	SW28	SW29	03H	07H		
A12	Attenuator Max. Output Voltage	↑	↑	↑	↑	↑	(1) Input 1kHz signal to pin 27 (TV Audio IN). (2) Set bus data so that the audio switch is set to TV mode and ATT gain is maximum (7F). (3) While increasing the signal amplitude, measure output signal of pin 29 (Audio OUT) is distorted. (DO1v) (4) Set bus data so that the audio switch is set to EXT. mode and ATT gain is maximum (7F). While inputting 1kHz signal to pin 28 (Ext. Audio IN), perform the same measurement as the above step 3. (DOext) (Note) Output must be loaded with 5kΩ or more resistance.	

SECAM SECTION		TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _{DD} , F _{SC} V _{DD} , Y/C V _{CC} = 5V ; T _a = 25 ± 3°C)																		
NOTE	ITEM	BUS : TEST MODE				BUS : NORMAL CONTROL MODE				MEASURING METHOD										
		S 02H	07H	0FH	10H	1FH	D ₄	D ₃	D ₂	D ₅	D ₄	D ₃	D ₂	D ₅	D ₄	D ₃	D ₂	D ₁	D ₀	
S ₁	Bell Monitor Output Amplitude	ON	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	
S ₂	Bell Filter f ₀	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
S ₃	Bell Filter f ₀ Variable Range	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	Vari-Vari-able able			
S ₄	Bell Filter Q	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
S ₅	Color Difference Output Amplitude	OFF	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
S ₆	Color Difference Relative Amplitude	↑	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

(1) Input 200mV_{p-p} (R-Y ID), 75% chroma color bar signal (SECAM system) to pin 42.
(2) Measure amplitude of R-Y ID output of pin 36 as abmo.

(1) While supplying 20mV_{p-p} CW sweep signal from network analyzer to pin 42 and monitoring output signal of pin 36 with the network analyzer, measure frequency having maximum Gain as foBEL of the bell frequency characteristic.
(2) Find difference between foBEL and 4.286MHz as foB-C.

(1) The same procedure as the steps 1 and 2 of the Note S₂.
(2) Measure foBEL in different condition that SUB (IF) D₁D₀ = (00) or (11), and find difference of each measurement result from 4.286MHz as foB-L or foB-H.

(1) The same procedure as the step 1 of the Note S₂.
(2) While monitoring output signal of pin 36 with network analyzer, measure Q of bell frequency characteristic as QBEL.
QBEL = (QMAX - 3dB band width) / FoBEL

(1) Input 200mV_{p-p} (R-Y ID), 75% chroma color bar signal (SECAM system) to pin 42.
(2) Measure color difference levels VRS and VBS with signals of pin 35 and pin 36.
(3) Calculate relative amplitude from VRS / VBS.

NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _D DD, F _C V _D DD, Y/C V _{CC} = 5V ; T _A = 25 ± 3°C)												MEASURING METHOD							
		BUS : TEST MODE						BUS : NORMAL CONTROL MODE													
		S	02H	07H	0FH	10H	1FH	D ₄	D ₃	D ₂	D ₁	D ₀	D ₇	D ₆	D ₅	D ₄	D ₃	D ₂	D ₁	D ₀	
S ₇	Color Difference Attenuation Quantity	OFF	--	--	--	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	
S ₈	Color Difference S/N Ratio	↑	--	--	--	↑	↑	↑	↑	↑	↑	↑	0	↑	↑	↑	↑	↑	↑	↑	
S ₉	Linearity	↑	--	--	--	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	

Note S₅.

(1) The same procedure as the steps 1 and 2 of the Note S₅.

(2) In the condition that SUB (IF) D₆ = 1, measure amplitudes of color difference signals of pin 35 and pin 36 as VRSA and VBSA respectively, and find SATTR and SATTB from measurement results.

SATTR = 20log (VRSA / VRS),
SATTB = 20log (VBSA / VBS)

(1) The same procedure as the steps 1 and 2 of the Note S₅.

(2) input non-modulated 200V_{p-p} (R-Y) chroma signal to pin 42.

(3) Measure noise amplitude nR and nB (mV_{p-p}) appearing in color difference signals of pin 35 and pin 36 respectively.

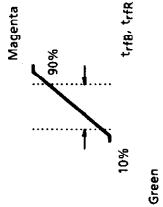
(4) Find S / N ratio by the following equation.
SNB-S = 20log (2 $\sqrt{2}$ × VBS / nB × 10⁻³)
SNR-S = 20log (2 $\sqrt{2}$ × VRS / nR × 10⁻³)

(1) The same procedure as the step 1 of the Note S₅.

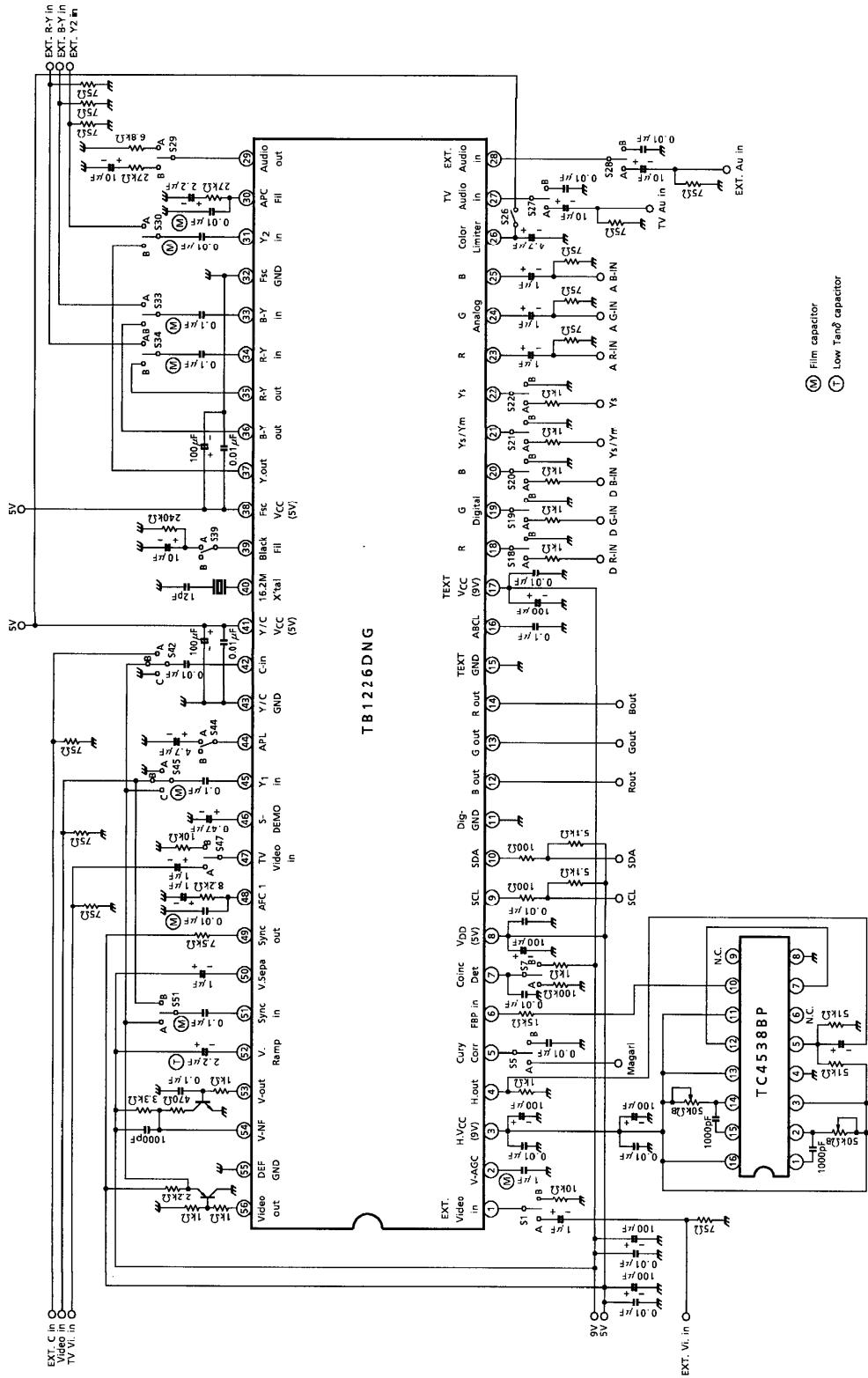
(2) Measure and calculate amplitude of black bar levels in output waveforms of pin 35 and pin 36 as shown below.

LinB = V [cyan] / V [red] $\left(\begin{array}{l} \text{Maximum positive /} \\ \text{negative amplitudes in} \end{array} \right)$
LinR = V [yellow] / V [blue] $\left(\begin{array}{l} \text{respective axes} \end{array} \right)$

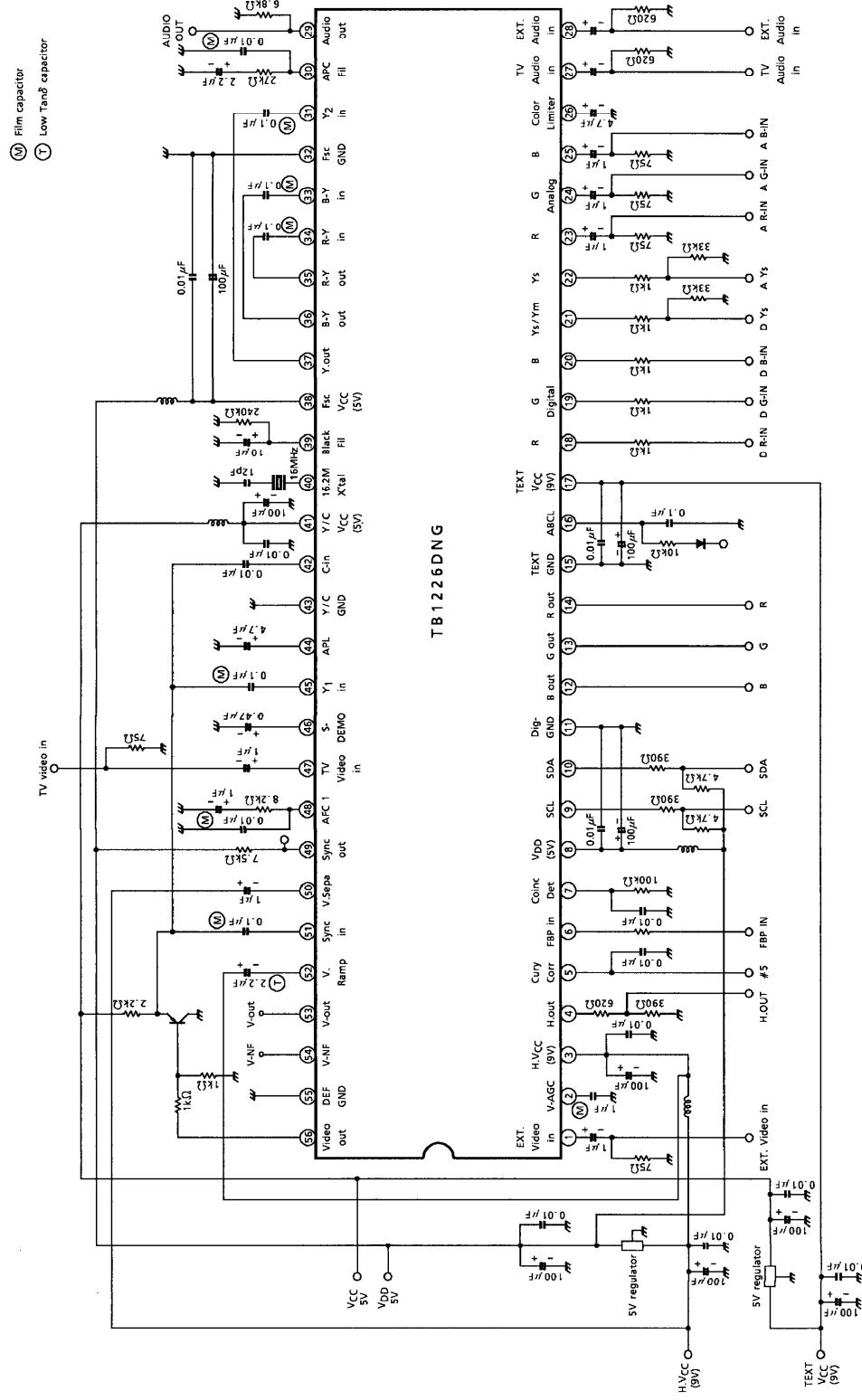
NOTE	ITEM	TEST CONDITION (Unless otherwise specified : H, RGB V _{CC} = 9V ; V _D DD, F _{SC} V _{DD} , Y/C V _{CC} = 5V ; T _a = 25 ± 3°C)														
		BUS : TEST MODE							BUS : NORMAL CONTROL MODE							
		02H	07H	0FH	10H	1FH	MEASURING METHOD									
26	D ₄	D ₃	D ₂	D ₇	D ₅	D ₄	D ₇	D ₅	D ₄	D ₃	D ₂	D ₁	D ₀			
S10	Rising-Fall Time (Standard De- Emphasis)	OFF	--	--	0	0	0	0	0	0	0	0	0	0	(1) The same procedure as the step 1 of the Note S5. (2) Measure output waveforms of pin 35 and pin 36 to find the period between the two points shown in the figure in time.	
S11	Rising-Fall Time (Wide-Band De- Emphasis)	↑	--	--	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	(3) In the condition that SUB (IF) D ₅ = 1, perform the same measurement as the above step 2. Measurement results are expressed as t _r fBW and t _r fFW.	
S12	Killer Operation Input Level (Standard Setting)	↑	--	--	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	(1) Input 200mV _{p-p} (R-Y ID) standard 75% color bar signal (SECAM system) to pin 42. (2) Attenuate the input signal to pin 42. Measure R-Y ID signal level at pin 42 that turns on / off the killer as eSK and eSC.	
S13	Killer Operation Input Level (VID ON)	↑	--	--	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	(3) In the condition that SUB (IF) D ₃ = 1, perform the same measurement as the above step 2 and express the measurement results as eSK and eSF.	
S14	Killer Operation Input Level (Low Sensitivity, VID OFF)	↑	--	--	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	(4) In the condition that SUB (IF) D ₃ = 0, D ₂ = 1, perform the same measurement as the above step 2 and express the measurement results as eSWK and eSWC.	



TEST CIRCUIT



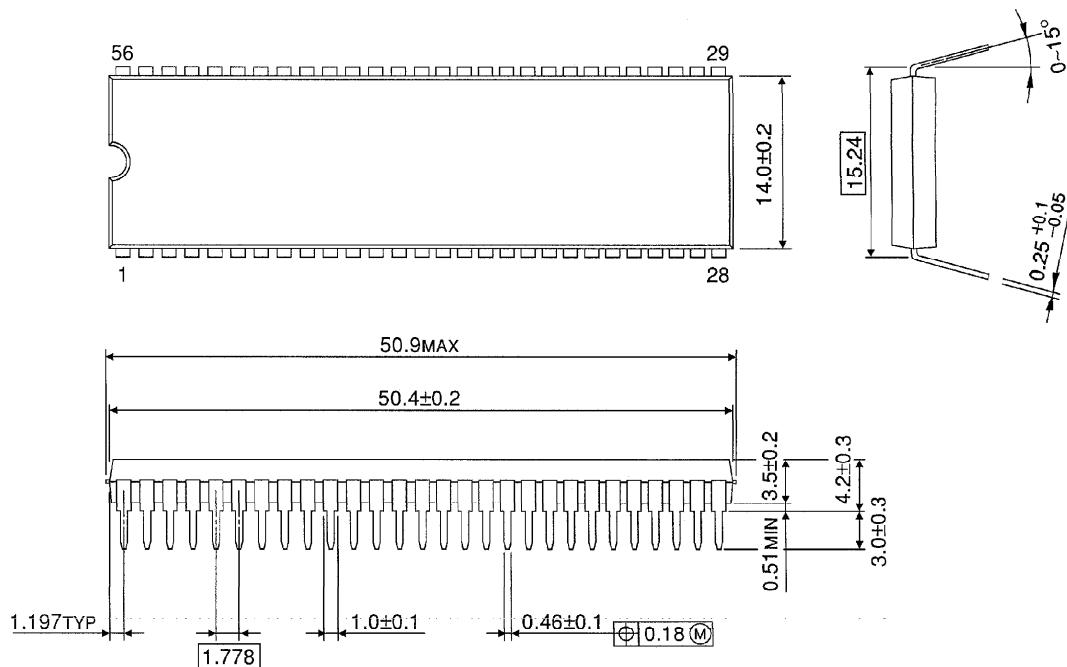
APPLICATION CIRCUIT



PACKAGE DIMENSIONS

SDIP56-P-600-1.78

Unit : mm



Weight : 5.55 (Typ.)

About solderability, following conditions were confirmed

- Solderability
 - (1) Use of Sn-63Pb solder Bath
 - solder bath temperature = 230°C
 - dipping time = 5 seconds
 - the number of times = once
 - use of R-type flux
 - (2) Use of Sn-3.0Ag-0.5Cu solder Bath
 - solder bath temperature = 245°C
 - dipping time = 5 seconds
 - the number of times = once
 - use of R-type flux

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030619EBA

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