

TOSHIBA

TA1276AN

TENTATIVE TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

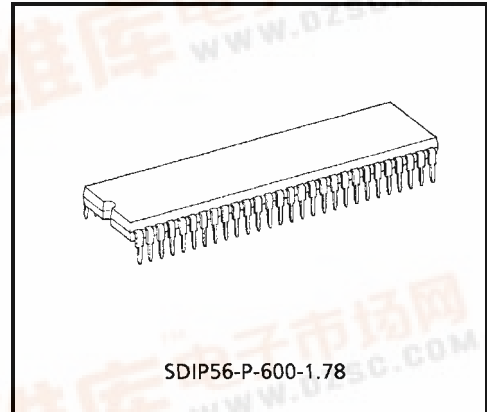
TA1276AN

PAL / NTSC VIDEO CHROMA AND DEFLECTION IC FOR CTV
(NORMAL SCAN / DOUBLE SCAN MODE)

TA1276AN provides Video, Chroma and Deflection (Sync, when double scan mode) circuit for a PAL / NTSC Color TV, and suitable for a high picture quality, large screen size, wide and / or double scanning TV. These functions are integrated in a 56pin dual-in-line shrink-type plastic package.

TA1276AN provides a high-performance video processor in which a YUV double scanning signal can be applied in Video, PAL / NTSC auto-detection circuit in Chroma and 50 / 60Hz auto-detection circuit in Sync. PAL demodulation circuit includes Baseband signal processing system. And this demodulation circuit does not required any adjustment.

TA1276AN includes I²C bus interface, so you can adjust various functions and controls via the bus.

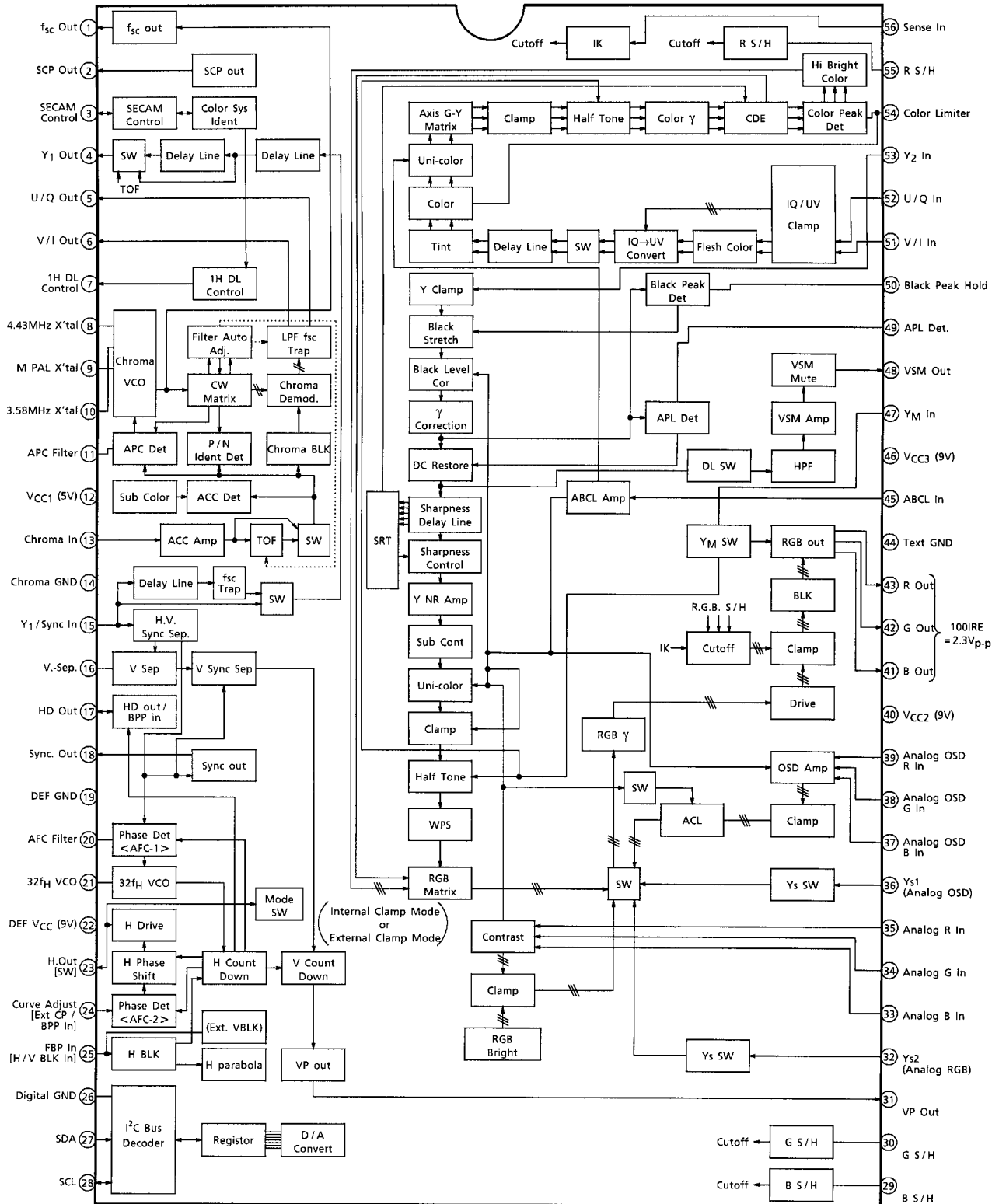


Weight: 5.55g (Typ.)

FEATURES

- Video / Chroma section
 - Y delay line
 - Chroma trap
 - IQ demodulation for NTSC, UV demodulation for PAL
- BEP (Back End Processor) section
 - Enable to process a YUV signal independently
 - Double scanning signal processing capability
- (Y processing section)
 - Black Stretcher (Controlled by I²C bus)
 - DC Restoration Circuit (Controlled by I²C bus)
 - Highbright-color Circuit
 - D.L. Aperture Sharpness Circuit+Super Real Transcend Circuit (LTI)
 - γ Correction (Enable to control Binary line, Gain / Start point)
 - Y noise reduction circuit
 - Velocity Scan Modulation output (The first order differential output and phase / amplitude adjustment)
- (Color difference section)
 - Color Detail Enhancer
 - Selectable relative phase and amplitude
 - Flesh-color restoration
 - Color γ circuit
 - Baseband tint color
- (Text section)
 - RGB primary color output
 - On Screen Display interface
 - Linear RGB interface
 - Fast Blanking
 - Drive control
 - AKB (only black level) or Cut-off Bus control
- Deflection section
 - High Performance Sync. Separation Circuit
 - Adjustment free H and V oscillation circuit by Countdown system
 - Horizontal and Vertical position adjustment
 - Sync separation, HD output
 - Horizontal and Vertical pulse output in normal mode.

BLOCK DIAGRAM



- Pin 23 connect to V_{CC} : Double Scan mode
- (Note) [] : for Double Scan mode only (External clamping pulse input mode)

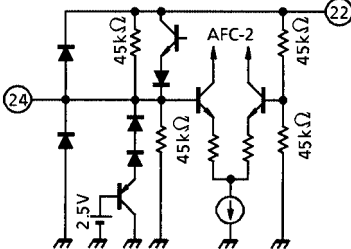
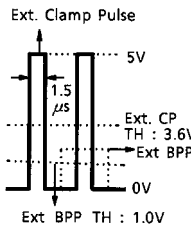
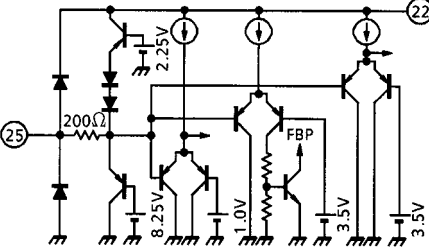
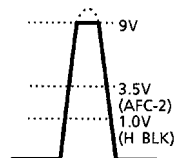
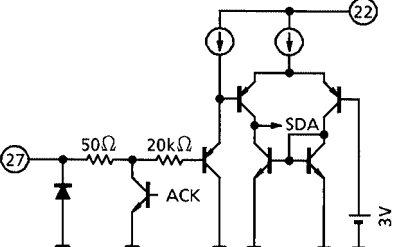
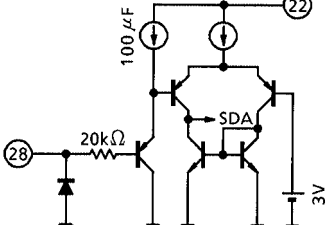
TERMINAL FUNCTIONS

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT / OUTPUT SIGNAL
1	f _{sc} output	Outputs oscillation waveform of VCXO. When 3.58NTSC killer-off this pin voltage sets 3.2V. When B / W or other systems killer-off, this pin voltage sets 1.4V.		DC 3.58NTSC :3.2V B / W or Others system :1.4V AC 0.6V _{p-p}
2	SCP output	Outputs SCP (Sand Castle Pulse). The output signal consists of clamp pulse, horizontal blanking pulse, and vertical blanking. The minimum load resistance is 3kΩ.		
3	SECAM control	The input / output pin that is used to control the SECAM demodulation IC. When current stronger than 250μA flows from this pin, that is recognized as SECAM.		When PAL / NTSC 4.0V When SECAM 0.75V
4	Y1 output	Outputs the Y signal that routed the f _{sc} TRAP (TRAP can be turned on or off with Bus.) and the Y delay line circuit.		
5	U / Q output	Outputs B-Y (U) or I signal. It includes LPF that can remove carrier.		DC 2.5V Rainbow color bar : 360mV _{p-p}

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT / OUTPUT SIGNAL
6	V / I output	Outputs R-Y (V) or Q signal. It includes LPF that can remove carrier. The chroma signal that routed ACC and TOF circuits (before demo input) can be monitored by pulling up this pin at 10k Ω .		DC 2.5V Rainbow color bar : 360mV _{p-p}
7	1H DL control	Outputs the result of whether the signal is PAL, SECAM or NTSC. Connect the output to the 1H DL IC. In the case of discrimination between white or black, the voltage just before that is retained. The voltage immediately after turning-on is not fixed.		8.4V: PAL 4.3V: SECAM 0V: NTSC
8 9 10	4.43MHz X'tal M PAL X'tal 3.58MHz X'tal	Connect X'tal. In the case of series capacity, the oscillation frequency (f_0) can be changed. In the case of parallel capacity, the changeable range of frequency can be changed.		DC 4.0V 90mV _{p-p}
11	APC filter	Connect APC filter demodulating the chroma. The oscillation frequency of VCXO varies depending on the voltage at this pin.		DC
12	V _{CC1} (5V)	The V _{CC} of the chroma and I ² C Bus blocks. Connect 5V (Typ.)	—	—

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT / OUTPUT SIGNAL
13	Chroma input	The pin through which the chroma is input. Input the chroma signal that was subjected to Y / C separation.		
14	Chroma GND	The GND pin of the chroma processing block.	—	—
15	Y1 / SYNC input	The pin through which the composite video signal or Y signal is input. Input via clamp capacitor.		
16	V-Sep.	Connect the filter separating the vertical synchronization.		DC6.4V
17	HD output	<p>(1) When BUS HD-OUT = 0 Output the HD pulse (pulse duration : 1μs) together with AFC. This pin also serves as the external input pin that accepts BPP (black peak detection stopping pulse) signal.</p> <p>(2) When BUS HD-OUT = 1 When AKB mode is ON, the pulse which covers AKB reference period is output.</p>		<p>(1) </p> <p>(2) </p>

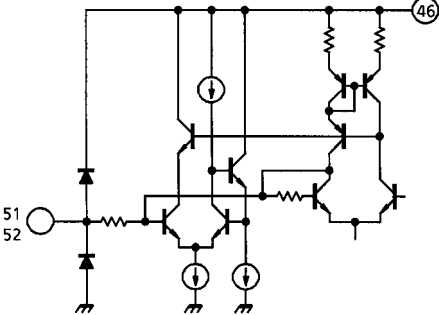
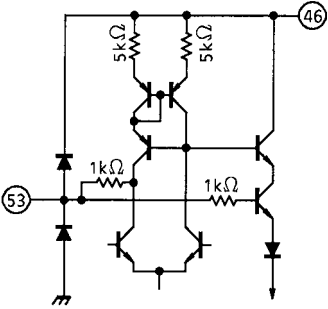
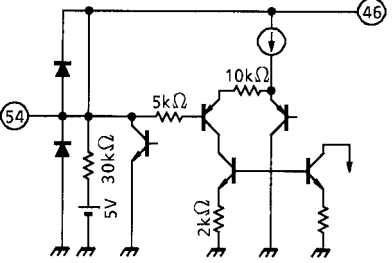
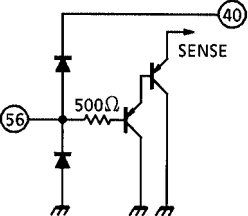
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT / OUTPUT SIGNAL
18	SYNC. output	Output the synchronizing signal that was separated in the synchronous separation circuit. This pin is of the open collector system. Connect the pull-up resistor.		
19	DEF GND	The GND pin of DEF block.	—	—
20	AFC filter	Connect the filter for horizontal AFC. The frequency of the horizontal output varies depending on the voltage at this pin.		DC
21	32fH VCO	Connect the ceramic oscillator for horizontal oscillation. The oscillator to be used is CSBLA503KECZF30, made by Murata electronics.		
22	DEF V _{CC} (9V)	The V _{CC} of DEF block. Connect 9V (Typ.) to this pin.	—	—
23	Horizontal output (Mode SW)	Produces the horizontal output. Connecting the DEF V _{CC} to this pin can switch Double Scan mode. In this case, the horizontal output is not produced.		HIGH: 3.2V LOW: 0.2V

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT / OUTPUT SIGNAL
24	Curve correction (Ext. CP / BPP input)	<p>(1) Used to correct distortion of picture in the case of high-tension fluctuation. Input the AC component of high-tension fluctuation. To deactivate the distortion correction feature, connect a capacitor of 0.01μF between this pin and GND.</p> <p>(2) Double scan mode This pin is to input external CP (Clamping Pulse) and BPP (Black Peak detection stopping Pulse).</p>		<p>(1) DC 4.5V</p> <p>(2)</p> 
25	FBP input	The pin through which FBP is input to generate pulses for horizontal AFC2, Y smoothing, and horizontal blanking. When double SCAM mode, input H blanking pulse (5V or over).		
26	Digital GND	The GND pin of I ² L block.	—	—
27	SDA	The SDA pin of I ² C bus.		—
28	SCL	The SCL pin of I ² C bus.		—

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT / OUTPUT SIGNAL
29 30	B S / H G S / H	These pins are to be connected with a capacitor for sampling and holding a bias voltage in the AKB operation, or for clamping to set DC voltage of RGB outputs in the no-AKB mode.		DC
31	VP output	Outputs the vertical pulse. This pin also serves as the external blanking input. When current stronger than 350 μA flows, blanking takes place due to the internal blanking and OR logic circuit.		
32	YS2	Switches between the internal RGB signal and analog RGB (pin 33, 34, 35) signal. When this switch is on, the VSM output is muted.		
33 34 35	Analog B input Analog G input Analog R input	The pin through which the analog RGB is input. Input the RGB signal via clamp capacitor.		
36	YS1	Switches between the internal RGB signal and OSD / analog RGB (pin 37, 38, 39). When this switch is on, the VSM output is muted.		

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT / OUTPUT SIGNAL
37 38 39	Analog OSD B input Analog OSD G input Analog OSD R input	The pin through which the OSD signal or analog RGB is input. (1) When inputting an OSD signal, input the ODS signal with a voltage of 0~5V (4.1V or more). (2) When inputting an analog RGB, input the RGB signal via clamp capacitor. ACL works on this input signal only when the entire screen is YS1-HI (the entire screen : OSD).		(1) (2)
40	V _{CC2} (9V)	The V _{CC} pin of the text block. Connect 9V (Typ.).	—	—
41 42 43	B output G output R output	Outputs RGB.		 At Cont Max. BRT Cent.
44	TEXT GND	The GND pin of TEXT block.	—	—
45	ABCL input	Used to control the external uni-color, brightness, and dynamic ABL. Use this pin when using ABL or ACL. The sensitivity and starting point of the ABL and dynamic ABL can be set by using bus.		ABCL OFF : 6V or more

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT / OUTPUT SIGNAL
46	V _{CC3} (9V)	The V _{CC} pin of picture quality and color difference blocks. Connect 9V (Typ.).	—	—
47	YM input	The half-tone switch for internal RGB signal. When the voltage at this pin is set to 7.0V or more, the RGB output voltage.		<p>Soft AKB — 7.0V</p> <p>Half Tone — 0.75V</p> <p>TV — GND</p>
48	VSM output	Outputs the Y-signal that routed HPF after it had been subjected to DC restoration. The output is muted with the switches of pins 32 and 36.		DC 3.5V
49	APL detection	Connect the filter correcting DC restoration ratio. Opening this pin can monitor the Y-signal that was subjected to black stretching.		DC
50	Black peak hold	Connect the filter controlling the black stretching gain of the black stretching circuit. The black stretching gain varies depending on the voltage at this pin.		DC

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT / OUTPUT SIGNAL
51 52	V / I input U / Q input	The pin through which R-Y (V) / I and B-Y (U) / Q signals are input. Input via clamp capacitor.		When Burst : Chroma = 1 : 1 360mV _{p-p} DC : 5.0V
53	Y2 input	The pin through which B-Y (V) / I and R-Y (U) / Q signals are input. Input via clamp capacitor.		1V _{p-p} (同期合) 6.3V GND
54	Color limiter	Color the filter detecting the color limit.		DC
55	R S / H	The same as pin 29 and 30.	The same as pin 29 and 30.	DC
56	SENSE input	This pin is to sense IK voltage feed-back from a CRT Drive circuit.		R G B -1.5V

BUS CONTROL MAP

WRITE MODE

SLAVE ADDRESS : 88H (10001000)

SUB ADDRESS	D7 MSB	D6	D5	D4	D3	D2	D1	D0 LSB	PRESET	
									MSB	LSB
00	P-MUTE	UNI-COLOR							1000	0000
01	BRIGHTNESS								1000	0000
02	COLOR							Y-MUTE	1000	0000
03	TINT							YM-SW	1000	0000
04	SHARPNESS							YNR	1000	0000
05	RGB BRIGHTNESS							WPS L	1000	0000
06	HI BRT	RGB CONTRAST							1000	0000
07	SUB COLOR				COLOR γ		CLT	1000	0000	
08	SUB CONTRAST				Y- γ CURVE		FLESH	1000	0000	
09	G (R) DRIVE							DR-SW	1000	0000
0A	B DRIVE							CDE	1000	0000
0B	HORIZONTAL POSITION				HV-SepL	V-OFF	H-BLK	1000	0000	
0C	R CUT OFF								1000	0000
0D	G CUT OFF								1000	0000
0E	B CUT OFF								1000	0000
0F	R-Y PHASE	R / B GAIN		G / B GAIN		G-Y PHASE		0000	0000	
10	COLOR SYSTEM		P / N-ID	BB SW	OSD-SL	OS-ACL	TX-ACL	0000	0000	
11	VSM PHASE	VSM GAIN		APACON PEAK f_0			VSM-PB	0000	0000	
12	DC RESTORATION POINT		DC RESTORATION RATE			DC REST. LIMIT		0000	0000	
13	BLACK STRETCH POINT		APL VS BSP		Y- γ PNT	VSM-H.PB FREQ		0000	0000	
14	SHR-TRACKING	TEST	RGB- γ	B.L.C.	B.S.G.	B.D.L.	BS-ARE	0000	0000	
15	DYNAMIC ABL POINT		DYNAMIC ABL GAIN			AKB MODE		0000	0000	
16	ABL POINT		ABL GAIN			RGB OUT MODE		0000	0000	
17	HD-OUT	V-BLK	VERTICAL FREQUENCY			VERTICAL POSITION		0000	0000	
18	Y-DL	C-TRAP	TOF f_0			TOF-Q		0000	0000	

READ MODE

SLAVE ADDRESS : 89H (10001001)

	D7	D6	D5	D4	D3	D2	D1	D0
0	PORSET	COLOR SYSTEM		X'tal		V-FREQ	V-STD	H-LOCK
1	N-DET	RGBOUT	Y ₁ -IN	IQ-IN	Y ₂ -IN	H-OUT	VP-OUT	IK-IN

BUS CONTROL FEATURE WRITE MODE

ITEM	EXPLAIN	PRESET
P-MUTE	Picture mute SW ; (0) : OFF, (1) : ON	ON
UNI-COLOR	Uni-color adjustment ; -18dB~0dB	Center
BRIGHTNESS	Brightness adjustment (including sub adjustment) ; -40IRE~+40IRE	Center
COLOR	Color adjustment ; -20dB (Color mute)~+4dB	0dB
Y-MUTE	Y mute SW ; (0) : ON, (1) : OFF	ON
TINT	Hue adjustment ; -32°~+32°	0°
TM-SW	Half-tone SW (YUV input) ; (0) : OFF, (1) : ON	OFF
SHARPNESS	Sharpness adjustment ; -20dB~+14dB	+8dB
YNR	Y Noise Reduction SW ; (0) : OFF, (1) : ON	OFF
RGB BRIGHTNESS	RGB Brightness Adjustment ; -20IRE~+20IRE	0IRE
WPS L	White Peak Suppression Level ; (0) : 130IRE, (1) : 110IRE	130IRE
HI BRT	High-bright color ; (0) : OFF, (1) : ON	OFF
RGB CONTRAST	RGB Contrast ; -18dB~0dB	-18dB
SUB COLOR	Sub-color ; -4dB~0dB~+3dB	0dB
COLOR γ	Color γ correction point ; (00) : OFF, (01) : 0.2V _{p-p} , (10) : 0.4V _{p-p} , (11) : 0.6V _{p-p}	OFF
CLT	Color Limiter Level ; (0) : 1.8V _{p-p} , (11) : 2.2V _{p-p}	1.8V _{p-p}
SUB CONTRAST	Sub-contrast adjustment ; -3dB~+3dB	0dB
Y- γ CURVE	Y- γ curve switching ; (00) : OFF, (01) : -2.5dB, (10) : -5.6dB, (11) : -7dB	OFF
FLESH	Flesh color ; (0) : OFF, (1) : ON	OFF
G (R) / B DRIVE	R (G) / B drive gain adjustment ; -5dB~0dB~+3dB	0dB (40h)
DG-SW	Drive gain base axis switching ; (0) : G, (1) : R	G
CDE	Color Detail Enhancer ; (0) : ON (Foced OFF when sharpness go through), (1) : OFF	ON
HORIZONTAL POSITION	Horizontal position adjustment ; -3 μ s~+3 μ s	0 μ s
HV-SepL	Sync separation level ; (from SYNC TIP) (0) : 35%, (1) : 40%	35%
V-OFF	Vertical output SW ; (0) : ON, (1) : OFF	ON
H-BLK	Horizontal blanking SW ; (0) : ON, (1) : OFF	ON
R / G / B CUTOFF	R / G / B cut-off adjustment ; • When AKB-OFF : RGB output 2V~2.5V~3V • When AKB-ON : SENS input 1V _{p-p} ~1.5V _{p-p} ~2V _{p-p} (\pm 5IRE)	Center (80h)
R-Y PHASE	R-Y relative phase switching ; (00) : 90°, (01) : 92°, (10) : 94°, (11) : 112°	90°
R / B GAIN	R / B relative amplitude switching ; (00) : 0.56, (01) : 0.68, (10) : 0.79, (11) : 0.86	0.56
G / B GAIN	G / B relative amplitude switching ; (00) : 0.3, (01) : 0.34, (10) : 0.4, (11) : 0.45	0.3
G-Y PHASE	G-Y relative phase switching ; (00) : 236°, (01) : 240°, (10) : 244°, (11) : 253°	236°

ITEM	EXPLAIN	PRESET																																													
COLOR SYSTEM	Color system ; <table border="1"> <thead> <tr> <th>System</th> <th>X'tal</th> <th>Color difference mute</th> <th>Color difference input</th> <th>TINI control</th> </tr> </thead> <tbody> <tr> <td>(000) : NTSC</td> <td>3.58</td> <td>Forced OFF</td> <td>I / Q</td> <td>Enable</td> </tr> <tr> <td>(001) : NTSC</td> <td>3.58</td> <td>Forced OFF</td> <td>U / V</td> <td>Enable</td> </tr> <tr> <td>(010) : NTSC</td> <td>4.43</td> <td>Forced OFF</td> <td>U / V</td> <td>Enable</td> </tr> <tr> <td>(011) : PAL</td> <td>4.43 (N)</td> <td>Forced OFF</td> <td>U / V</td> <td>Enable</td> </tr> <tr> <td>(100) : PAL</td> <td>M</td> <td>Forced OFF</td> <td>U / V</td> <td>Enable</td> </tr> <tr> <td>(101) : SECAM</td> <td>4.43</td> <td>Forced OFF</td> <td>U / V</td> <td>Enable</td> </tr> <tr> <td>(110) : MULTI</td> <td>3.58 / 4.43</td> <td>Forced OFF</td> <td>U / V</td> <td>Enable</td> </tr> <tr> <td>(111) : Trinorma</td> <td>3.58 / M / N</td> <td>Forced OFF</td> <td>U / V</td> <td>Enable</td> </tr> </tbody> </table>	System	X'tal	Color difference mute	Color difference input	TINI control	(000) : NTSC	3.58	Forced OFF	I / Q	Enable	(001) : NTSC	3.58	Forced OFF	U / V	Enable	(010) : NTSC	4.43	Forced OFF	U / V	Enable	(011) : PAL	4.43 (N)	Forced OFF	U / V	Enable	(100) : PAL	M	Forced OFF	U / V	Enable	(101) : SECAM	4.43	Forced OFF	U / V	Enable	(110) : MULTI	3.58 / 4.43	Forced OFF	U / V	Enable	(111) : Trinorma	3.58 / M / N	Forced OFF	U / V	Enable	NTSC (000)
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(101) : SECAM	4.43	Forced OFF	U / V	Enable																																											
(110) : MULTI	3.58 / 4.43	Forced OFF	U / V	Enable																																											
(111) : Trinorma	3.58 / M / N	Forced OFF	U / V	Enable																																											
P / N ID	PAL / NTSC ident sensitivity switching ; (0) : LOW (When digital comb filter used), (1) : Normal	LOW																																													
BB SW	Blue Back SW ; (0) : OFF, (1) : ON	OFF																																													
OSD-SL	OSD peak suppressing level switching ;(0) : 96IRE, (1) : 76IRE	96IRE																																													
OS-ACL	OSD ACL SW ; (0) : ON, (1) : OFF	ON																																													
TX-ACL	RGB ACL SW ; (0) : Gain 1 / 2, (1) : Normal	Gain1 / 2																																													
VSM PHASE	VSM output phase switching ; (00) : -40ns, (01) : -20ns, (10) : 0ns, (11) +20ns	-40ns																																													
VSM GAIN	VSM output gain switching ; (00) : 0dB, (01) : -6dB, (10) : -9dB, (11) : OFF	0dB																																													
APACON PEAK f ₀	Apacon peak frequency switching ; (000) : Through (Apacon off), (001) : 4.0MHz, (010) : 3.3MHz, (011) : 2.5MHz, (100) : Through (Apacon off), (101) : 13MHz, (110) : 10MHz, (111) : 8MHz	(000) Through																																													
VSM PB	VSM output horizontal parabolic modulation SW ; (0) : Parabolic modulation OFF, (1) : ON (Nearby sharpness -3dB)	Parabolic modulation OFF																																													
DC RESTORATION POINT	DC restoration start point ; (000) : 0% ~ (111) : 42%	0%																																													
DC RESTORATION RATE	DC restoration rate ; (000) : 100%~(111) : 130%	100%																																													
DC REST. LIMIT	DC restoration limit point ; (APL) (00) : 100%, (01) : 87%, (10) : 73%, (11) : 60%	100%																																													
BLACK STRETCH POINT (BSP)	Black stretcher start point ; When APL 0% (000) : 22IRE~(111) : 56IRE	22IRE																																													
APL VS BSP (AVS)	APL level vs. black stretcher start point ; (00) : 0dB~(11) : 1.5dB, BSP+APL×BSP×AVS	0dB																																													
Y-γ PNT	Y-γ point switching ; (0) : 100IRE, (1) : 95IRE	100IRE																																													
VSM-H. PB FREQ	VSM output horizontal parabolic frequency ; (00) : 15.7kHz, (01) : 24.8kHz, (10) : 31.5kHz, (11) : 33.75kHz	—																																													
SHR-TRACKING	Sharpness tracking ; (00) : HIGH, (11) : LOW	HIGH																																													

ITEM	EXPLAIN	PRESET
TEST	Test mode ; (0) : NORMAL (1) : Test mode (For factory test) Switched by sub-address 17H <during gate-pulse> D ₂ (0) : during V-BLK, (1) : NORMAL Y / RGB smoothing OFF, Monitor of DAC at HD output	NORMAL
RGB-γ	RGB-γ SW ; (0) : OFF, (1) : ON	OFF
B.L.C.	Block level automatic correction (Priority over black stretcher) ; MAX 7.5IRE (0) : OFF, (1) : ON	OFF
B.S.G.	Black stretcher gain SW ; (0) ON, (1) : OFF	ON
B.D.L.	Black detection SW ; (0) : 3IRE, (1) : 0IRE	3IRE
BS-ARE	Black area reinforcement SW ; For wide TV (When using time axis compression IC) (0) : ON, (1) : OFF	ON
DYNAMIC ABL POINT	Dynamic ABL detection voltage ; (000) : MIN~(111) : MAX	MIN
DYNAMIC ABL GAIN	Dynamic ABL sensitivity ; (000) : MIN~(111) : MAX	MIN
AKB MODE	AKB MODE ; Only black level (00) : AKB OFF+S / H LOW, (01) : AKB OFF+Cutoff BUS (10) : AKB ON+I-DET NORMAL, (11) : AKB ON+I-DET×3	(00) AKB OFF+S / H LOW
ABL POINT	ABL detect voltage ; (000) : MIN~(111) : MAX	MIN
ABL GAIN	ABL GAIN ; (000) : MIN~(111) : MAX	MIN
RGB OUT MODE	RGB output mode SW ; (00) : NORMAL, (01) : Only R, (10) : Only G, (11) : Only B	NORMAL
HD-OUT	HD output SW ; (0) : HD output, (1) : AKB period pulse	HD output
V-BLK	Vertical Blanking SW ; (0) : ON, (1) : OFF	ON
VERTICAL FREQUENCY	Vertical Frequency ; (000) : AUTO (50, 60Hz), (001) : AUTO (50, 60Hz / V MASK OFF), (010) : 60Hz, (011) : 60Hz (V MASK OFF), (100) : Forced 262.5H, (101) : Forced 263H, (110) : Forced 312.5H, (111) : Forced 313H, When (100), (101), (110), (111) : AFC Free-run	(000) AUTO
VERTICAL POSITION	Vertical position ; (000) : 0H~(111) : 7H (1H STEP)	0H
Y-DL	Y-DL SW ; (0) OFF, (1) : ON (+80ns)	OFF
C-TRAP	Chroma Trap SW ; (0) : OFF, (1) : ON	OFF
TOF-f ₀	Selectable TOF Peak Frequency ; (000) : 0.8f _{sc} +TOF OFF~(111) : 1.5f _{sc}	TOF OFF
TOF-Q	Selectable TOF Q ; (000) : 0.6~(111) : 1.2	0.6

DELAY TIME FROM Y₁ INPUT (PIN 15) TO Y₁ OUTPUT (PIN 4)

COLOR	TRAP	Y-DL	DELAY TIME
B / W	—	OFF ON	295ns 375ns
PAL / NTSC	OFF	OFF	295ns (4.43)
		OFF	295ns (3.58 / M / N)
		ON	375ns (4.43)
		ON	375ns (3.58 / M / N)
SECAM	—	OFF	495ns
		OFF	310ns (3.58 / M / N)
		ON	375ns (4.43)
		ON	390ns (3.58 / M / N)

READ MODE

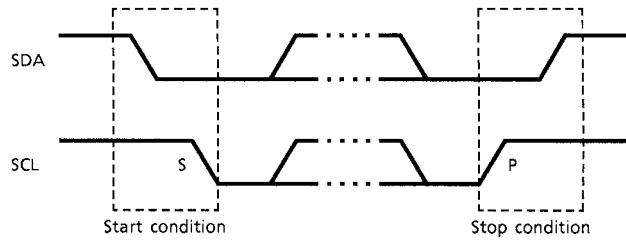
CHARACTERISTIC	EXPLAIN
PORSET	Power On Reset ; (0) : RESISTER PRESET, (1) : NORMAL
COLOR SYSTEM	Color system ; Receiving system (Judgement of ID ON / OFF) (00) : B / W, (01) : SECAM, (10) : PAL, (11) : NTSC
X'tal	X'tal Mode ; (00) : —, (01) : 4.43 (N), (10) : M, (11) : 3.58
V-FREQ	Vertical frequency ; (0) : 50Hz, (1) : 60Hz
V-STD	Vertical Standard ident ; (0) NON-STANDARD, (1) : STANDARD
H-LOCK	Horizontal Lock ident ; (0) : LOCK, (1) : UN-LOCK
N-DET	Noise ident result ; (0) : FEW, (1) : MANY
RGBOUT, Y ₁ -IN, IQ-IN, Y ₂ -IN, H-OUT, VP-OUT	Self-ident result ; (0) : NG, (1) : OK
IK IN	IK input ident result ; (0) : NG, (1) : OK

I²C BUS TRANSMISSION / RECEIVING

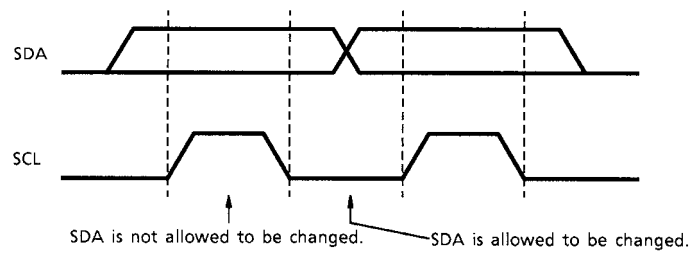
SLAVE ADDRESS : 88H

A ₆	A ₅	A ₄	A ₃	A ₂	A ₁	A ₀	W / R
1	0	0	0	1	0	0	0 / 1

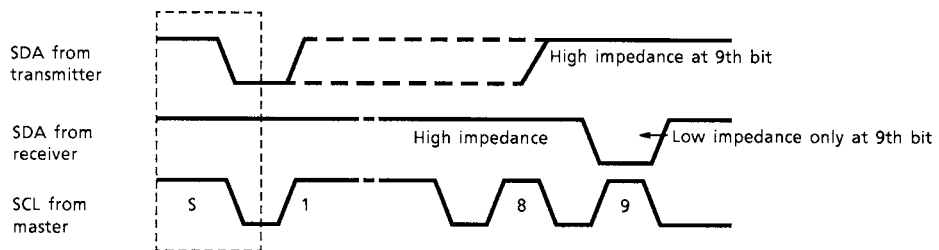
Start / stop condition



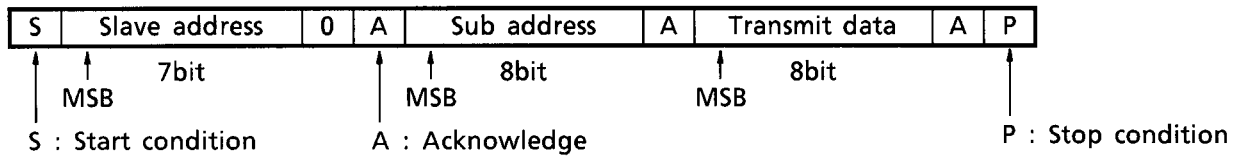
Bit transmission



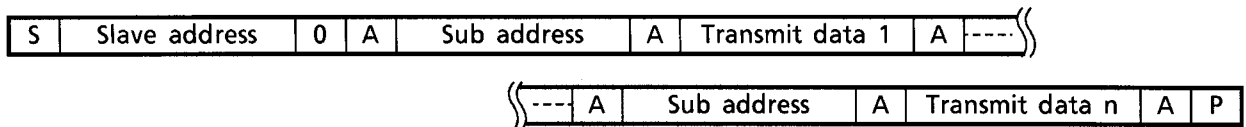
Confirmation response



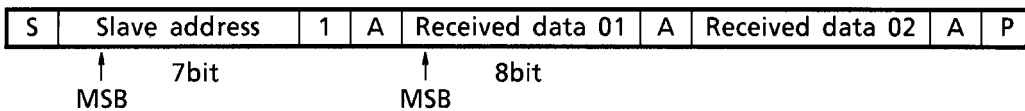
DATA TRANSMIT FORMAT 1



DATA TRANSMIT FORMAT 2

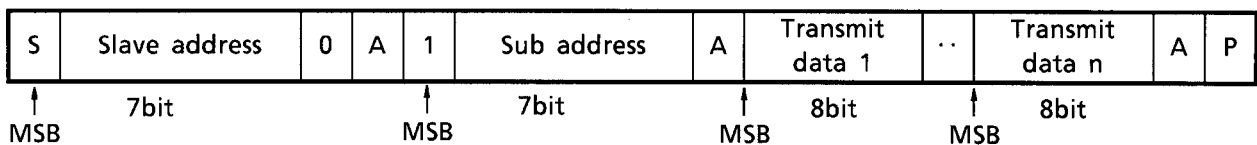


DATA RECEIVE FORMAT



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 Phillips I²C Patent Rights to use these components in an I²C system, provided that the system conforms to the I²C standard Specification as defined by Phillips.

- Pin 23 H-out (Mode SW)
 You can select the Double Scan Mode (External CP (Clamping Pulse) input Mode), by connecting Pin 23 to DEF VCC. (The threshold of Pin 23 : $8.7V = DEF V_{CC} - 0.3V$)
 When Double Scan Mode, function of Pin 24 and 25 are changed.
- Normal Scan (Internal CP) Mode : Pin 23 — H-out
 The function of Pin 24 is curve correction input, that of Pin 25 is FBP (Flay Back Pulse) input.
 The input signals of Y2, U / I and V / I inputs (Pin 53, 52 and 51), Analog OSD inputs (Pin 39, 38 and 37), Analog RGB inputs (Pin 35, 34 and 33) are clamped of the internal CP based on the Y1 / Sync input (Pin 15).
- Double Scan (External CP input) Mode : Pin 23 — H-out
 The function of Pin 24 is EXT / BPP (Note) input, that of Pin 25 is H / V BLK (blanking) input.
 The input signals of Y2, U / I and V / I inputs (Pin 53, 52 and 51), Analog OSD inputs (Pin 39, 38 and 37), Analog RGB inputs (Pin 35, 34 and 33) are clamped of the external CP based on Pin 24.
 In case of Double Scan Mode, bus “V-BLK” should be set (1) ; OFF.

TERMINAL FUNCTIONS

MODE PIN No.	NORMAL SCAN MODE (INTERNAL CP)	DOUBLE SCAN MODE (EXTERNAL CP INPUT)
Pin 23	H-out	DEF V _{CC} (9V)
Pin 24	Curve correction signal input	EXT CP / BPP input
Pin 25	FBP input (for AFC-2 detection, H BKL)	H / V BLK input (for RGB H / V BLK, AKB)
Pin 53, 52, 51	Clamping by internal CP (based on Pin 15)	Clamping by external CP (based on Pin 24)
Pin 39, 38, 37		
Pin 35, 34, 33		
Pin 15	Normal scan ; Y / Sync signal input	
Pin 17	Normal scan ; HD pulse output (based on Pin 15)	
Pin 31	Normal scan ; VP output (based on Pin 15)	

Note: BPP : Black Peak detection stopping Pulse

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CCmax}	12	V
Input Terminal Voltage	e _{inmax}	9	V _{p-p}
Power Dissipation	P _D (Note 1)	1920	mW
Power Dissipation Reduction Rate	1 / θ _{ja}	15.4	mW / °C
Operating Temperature	T _{opr}	-20~65	°C
Storage Temperature	T _{stg}	-55~150	°C

Note 1: Refer to the figure below.

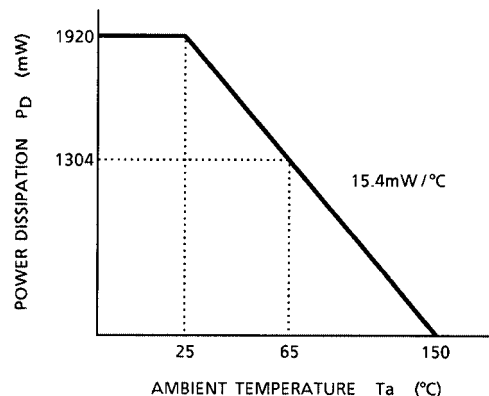


Fig. Power dissipation reduction against higher temperature

RECOMMENDED CONDITION IN USE

CHARACTERISTIC	DESCRIPTION	MIN	TYP.	MAX	UNIT
Supply Voltage	Pin 5	4.3	5.0	5.3	V
	Pin 22, Pin 40, Pin 46	8.7	9.0	9.3	
Y ₁ / Sync, Y ₂ Input Signal Level	White : 100%, including, synchronization (Synchronization : minus)	0.9	1.0	1.1	V _{p-p}
Chroma Input Signal Level	When TOF OFF (Burst level)	200	300	400	mV _{p-p}
	When TOF ON (Burst level)	100	200	300	
I / Q, U / V Input Level	B : C = 1 : 1	—	300	—	mV _{p-p}
OSD / Analog RGB Input Level	When OSD input (DC coupling)	4.2	—	5.0	V
	When analog RGB input (AC coupling)	0.4	0.5	0.6	
Analog RGB Input Level	—	0.4	0.5	0.6	V _{p-p}
FBP Width	—	11	12	13	μs
FBP Input Current	—	—	—	1.5	mA
RGB Output Current	—	—	1.0	2.0	
H. Output Current	—	—	3.0	10.0	
Pin 18 Input Current	—	—	0.5	1.0	

ELECTRICAL CHARACTERISTICS

(V_{CC1} = 5V, V_{CC2} / V_{CC3} / DEF V_{CC} = 9V, Ta = 25°C, unless otherwise specified)

SUPPLY CURRENT

PIN NAME	SYMBOL	TEST CIR-CUIT	MIN	TYP.	MAX	UNIT
V _{CC1}	I _{CC1}	—	34.0	40.5	50.0	mA
V _{CC2}	I _{CC2}	—	33.0	40.0	49.0	
V _{CC3}	I _{CC3}	—	32.0	39.5	48.0	
DEF V _{CC}	I _{CC4}	—	9.5	12.8	18.0	

TERMINAL VOLTAGE

PIN No.	PIN NAME	SYMBOL	TEST CIR-CUIT	MIN	TYP.	MAX	UNIT
3	SECAM CONT.	V ₃	—	3.7	4.0	4.3	V
4	Y ₁ OUTPUT	V ₄	—	1.7	2.0	2.3	
5	U / Q OUTPUT	V ₅	—	2.2	2.5	2.8	
6	V / I OUTPUT	V ₆	—	2.2	2.5	2.8	
8	4.43MHz X'tal	V ₈	—	3.7	4.0	4.3	
9	M PAL X'tal	V ₉	—	3.7	4.0	4.3	
10	3.58MHz X'tal	V ₁₀	—	3.7	4.0	4.3	
13	CHROMA INPUT	V ₁₃	—	2.2	2.5	2.8	
15	Y ₁ INPUT	V ₁₅	—	2.7	3.0	3.3	
16	V SEP.	V ₁₆	—	5.7	6.1	6.5	
17	SYNC. IN	V ₁₇	—	2.60	2.85	3.10	
21	32f _H VCO	V ₂₁	—	5.4	5.7	6.0	
24	CURVE CORRECTION	V ₂₄	—	4.3	4.5	4.7	
32	Ys2	V ₃₂	—	0	0.1	0.3	
33	ANALOG B INPUT	V ₃₃	—	3.5	3.8	4.1	
34	ANALOG G INPUT	V ₃₄	—	3.5	3.8	4.1	
35	ANALOG R INPUT	V ₃₅	—	3.5	3.8	4.1	
36	Ys1	V ₃₆	—	0	0.1	0.3	
37	OSD / ANALOG B INPUT	V ₃₇	—	3.3	3.6	3.9	
38	OSD / ANALOG G INPUT	V ₃₈	—	3.3	3.6	3.9	
39	OSD / ANALOG R INPUT	V ₃₉	—	3.3	3.6	3.9	
45	ABCL INPUT	V ₄₅	—	5.85	6.10	6.35	
48	VM OUTPUT	V ₄₈	—	3.2	3.5	3.8	
49	APL DET	V ₄₉	—	4.8	5.0	5.2	
50	BLACK PEAK HOLD	V ₅₀	—	4.2	4.4	4.6	
51	V / I INPUT	V ₅₁	—	4.8	5.0	5.2	
52	U / Q INPUT	V ₅₂	—	4.8	5.0	5.2	
53	Y ₂ INPUT	V ₅₃	—	6.1	6.3	6.5	
54	COLOR LIMITER	V ₅₄	—	6.6	6.9	7.2	

AC CHARACTERISTIC VIDEO SECTION

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Y ₂ Input Dynamic Range	DR ₅₃	—	—	0.7	1.0	1.5	V _{p-p}
Black Level Shift	V _B	—	(Note V ₁)	-5	0	5	mV
	V _{B3}	—		35	42	49	
Black Stretching Amplifier Maximum Gain	GBS	—	(Note V ₂)	1.30	1.40	1.50	times
Black Stretching Start Point (1)	P _{BST1}	—	(Note V ₃)	17	22	27	IRE
	P _{BST2}	—		51	56	61	
Black Stretching Start Point (2)	P _{BS1}	—	(Note V ₄)	—	0	4	
	P _{BS2}	—		14	20	26	
D.ABL Detection Voltage	ΔV ₀₀₁	—	(Note V ₅)	30	50	70	mV
	ΔV ₀₁₀	—		90	110	130	
	ΔV ₁₀₀	—		220	240	260	
D.ABL Sensitivity	S _{DAMIN}	—	(Note V ₆)	—	0	0.04	V / V
	S _{DAMAX}	—		0.280	0.295	0.310	
Black Level Correction	B _{LC}	—	(Note V ₇)	6.5	7.0	7.5	IRE
Y γ Correction Point	P _{Y0}	—	—	95	100	105	
	P _{Y100}	—		2	5	8	
Y γ Correction Gain	G _{Y01}	—	—	-3.5	-2.5	-1.5	dB
	G _{Y10}	—		-5.8	-4.8	-3.8	
	G _{Y11}	—		-7.5	-6.5	-5.5	
Black Peak Detection Level	ΔV _{BP}	—	(Note V ₈)	-15	0	15	mV
DC Restoration Gain	ADT100	—	(Note V ₉)	0.9	1.0	1.1	times
	ADT130	—		1.25	1.35	1.45	
DC Restoration Start Point	V _{DT0}	—	(Note V ₁₀)	-3	0	3	%
	V _{DT48}	—		42	47	51	
DC Restoration Limit Point	P _{DTL60}	—	(Note V ₁₁)	59	63	67	
	P _{DTL73}	—		71	75	79	
	P _{DTL87}	—		83	87	91	
	P _{DTL100}	—		95	99	103	
Sharpness Peak Frequency	F _{APL01}	—	—	3.3	4.2	5.1	MHz
	F _{APL10}	—		2.6	3.3	4.0	
	F _{APL11}	—		2.0	2.5	3.0	
	F _{APH01}	—		11.2	14.5	17.4	
	F _{APH10}	—		9.5	11.9	14.3	
	F _{APH11}	—		6.5	8.1	9.7	

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Sharpness Control Range	G _{MAXL}	—	(Note V ₁₂)	11	14	17	dB
	G _{MINL}	—		-11	-8	-5	
	G _{MAXH}	—		11	14	17	
	G _{MINH}	—		-9	-6	-3	
Sharpness Control Center Gain	G _{CENL}	—	—	7	10	13	
	G _{CENH}	—		7	10	13	
YNR Characteristic	G _{YL}	—	(Note V ₁₃)	-11	-8	-5	
	G _{YH}	—		-9	-6	-4	
SRT Response to 2T Pulse Input	T _{SL1}	—	(Note V ₁₄)	100	120	140	ns
	T _{SRTL}	—		40	60	80	
	T _{SH1}	—		160	180	200	
	T _{SRTH}	—		20	30	45	
VSM Peak Frequency	F _{VL}	—	When normal mode	7	9	11	MHz
	F _{VH}	—	When double scan mode	12.5	16	19.5	
VSM Gain	G _{VL00}	—	(Note V ₁₅)	11	13	15	dB
	G _{VL01}	—		-7.5	-6	-4.5	
	G _{VL10}	—		-11	-9	-8	
	G _{VL11}	—		-∞	-35	-29	
	G _{VH00}	—		11	13	15	
	G _{VH01}	—		-7.5	-6	-5	
	G _{VH10}	—		-11	-9	-7	
	G _{VH11}	—		-∞	-32	-26	
VSM Parabolic Modulating Gain	G _{VRL}	—	(Note V ₁₆)	-4	-3	-2	
	G _{VLL}	—		-4	-3	-2	
	G _{VRH}	—		-4	-3	-2	
	G _{VLH}	—		-4	-3	-2	
Threshold Voltage of VSM Muting	V _{SR36}	—	Pin 32, Pin 36	0.65	0.75	0.85	V
Response Time for VSM High Speed Muting	T _{VML1}	—	(Note V ₁₇)	0	50	100	ns
	T _{VML2}	—		0	50	100	
	T _{VML3}	—		0	50	100	
	T _{VML4}	—		0	50	100	
	T _{VMH1}	—		0	50	100	
	T _{VMH2}	—		0	50	100	
	T _{VMH3}	—		0	50	100	
	T _{VMH4}	—		0	50	100	
Between Y2 Input and R Output Delay Time	T _{Y2RD}	—	When through	26	36	46	
	T _{Y2RL}	—	When normal mode	200	220	240	
	T _{Y2RH}	—	When double scan mode	85	100	115	

CHROMA SECTION

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
ACC Characteristic	F ₆₀₀	—	(Note C ₁)	0.300	0.355	0.410	V _{p-p}
	F ₃₀₀	—		0.300	0.355	0.410	
	F ₃₀	—		0.290	0.343	0.400	
	F ₁₀	—		0.090	0.113	0.135	
	A	—		0.90	0.97	1.05	times
Sub Color Control Characteristic	es+	—	—	2.0	3.0	4.0	dB
	es-	—		-6.0	-4.3	-2.0	
APC Frequency Control Sensitivity	β ₃	—	(Note C ₂)	0.70	1.20	1.70	Hz / mV
	β ₄	—		0.70	1.20	1.70	
	β _M	—		0.70	1.20	1.70	
APC Pull-In / Hold Range	f _{3PH}	—	(Note C ₃)	250	500	2000	Hz
	f _{3HH}	—		250	500	2000	
	f _{3PL}	—		-2000	-500	-250	
	f _{3HL}	—		-2000	-500	-250	
	f _{4PH}	—		250	500	2000	
	f _{4HH}	—		250	500	2000	
	f _{4PL}	—		-2000	-500	-250	
	f _{4HL}	—		-2000	-500	-250	
	f _{M_{PH}}	—		250	500	2000	
	f _{M_{HH}}	—		250	500	2000	
	f _{M_{PL}}	—		-2000	-500	-250	
f _{M_{HL}}	—	-2000	-500	-250			
3.58MHz / 4.43MHz Free Run Frequency	f ₀₃	—	f ₀ = 3.579545MHz	-200	0	200	Hz
	f ₀₄	—	f ₀ = 4.433619MHz	-200	0	200	
	f _{0M}	—	f ₀ = 3.575611MHz	-200	0	200	
f _{sc} Output Amplitude	f _{3c}	—	When 3.58NTSC	0.54	0.78	0.96	V _{p-p}
	f _{4c}	—	When 4.43PAL	0.52	0.72	0.90	
	f _{Mc}	—	When M-PAL	0.54	0.78	0.96	
f _{sc} output DC Level	V _{1a}	—	When 3.58NTSC	2.80	3.20	3.50	V
	V _{1b}	—	Except for 3.58NTSC	1.15	1.55	1.75	
IQ Color Difference Signal Output Level	Q Axis	V _{BN}	When B : C = 1 : 1 signal	290	355	415	mV _{p-p}
	I Axis	V _{RN}		290	355	415	
IQ Signal Demodulation Ratio		V _{RN} / V _{BN}	R-Y / B-Y	0.94	1.00	1.15	—
IQ Demodulation Angle	Q Axis	θ _{BN}	—	29.0	33.0	37.0	°
	I Axis	θ _{RN}		118.0	123.0	126.0	
IQ Demodulation Angle	Relative	θ _{BRN}	I-Q	87.0	90.0	93.0	
UV Color Difference Signal Output Level	B-Y	V _{BP}	When B : C = 1 : 1 signal	290	355	415	mV _{p-p}
	R-Y	V _{RP}		290	355	415	
UV Signal Demodulation Ratio		V _{RP} / V _{BP}	R-Y / B-Y	0.94	1.00	1.10	—
UV Demodulation Angle	B-Y	θ _{BP}	—	-5.0	0.0	3.0	°
	R-Y	θ _{RP}		85.0	90.0	93.0	
UV Demodulation Angle	Relative	θ _{BRP}	—	87.0	90.0	93.0	

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Residual Carrier Level		V _{BNe}	—	f _{sc} level	—	1.90	4.00	mV _{p-p}
		V _{RNe}	—		—	1.90	4.00	
		V _{BPe}	—		—	1.90	4.00	
		V _{RPe}	—		—	1.90	4.00	
Residual Higher Harmonics Level		V _{BHNe}	—	f _{sc} ×2 level	—	1.90	4.00	
		V _{RHNe}	—		—	1.90	4.00	
		V _{BHPe}	—		—	1.90	4.00	
		V _{RHPe}	—		—	1.90	4.00	
Color Difference Output DC Voltage	3.58NTSC	V _{BN}	—	B-Y output	1.80	2.15	2.50	V
		V _{RN}	—	R-Y output	1.90	2.24	2.60	
	4.43NTSC	V _{BP}	—	B-Y output	1.80	2.15	2.50	
		V _{RP}	—	R-Y output	1.90	2.25	2.60	
1HDL Output DC Level	PAL	V _{DLP}	—	Output from pin	8.00	8.30	8.60	
	NTSC	V _{DLS}	—		4.00	4.30	4.60	
	SECAM	V _{DLN}	—		0.01	0.50	0.20	
Sand Castle Pulse Height	CP	SCH	—	—	7.50	7.80	8.10	
	HD	SCM	—		3.95	4.20	4.45	
	VD	SCL	—		2.25	2.50	2.75	
SECAM Output DC Level		SEN	—	(Note C ₄)	3.70	4.00	4.30	mV _{p-p}
		SEP	—		3.70	4.00	4.30	
		SES	—		0.40	0.70	1.00	
NTSC Ident Sensitivity		v _{NCL}	—	(Note C ₅)	3.80	5.83	7.87	
		v _{NCH}	—		2.52	3.88	5.24	
		v _{NBL}	—		3.73	5.74	7.75	
		v _{NBH}	—		2.44	3.75	5.06	
PAL Ident Sensitivity		v _{PCL}	—	(Note C ₆)	4.80	6.83	8.87	
		v _{PCH}	—		3.52	4.88	6.24	
		v _{PBL}	—		4.73	6.74	8.75	
		v _{PBH}	—		3.44	4.75	6.06	
TOF Characteristic		GF _{H3}	—	(Note C ₇)	20.7	22.7	24.7	dB
		GF _{C3}	—		20.2	22.2	24.2	
		GF _{L3}	—		18.2	20.2	22.2	
		GF _{H4}	—		19.1	21.1	23.1	
		GF _{C4}	—		19.4	21.4	23.4	
		GF _{L4}	—		18.8	20.8	22.8	
Y ₁ In~Y ₁ Out AC Gain	Through	GY _s	—	20 log (output level / input level)	-1.21	0.00	1.06	
	Normal	GY _d	—		-1.21	0.00	1.06	
	Double	GY _t	—		-1.21	0.00	1.06	
Y ₁ In~Y ₁ Out Frequency Bandwidth		Gf _{Y1}	—	—	-4.0	-1.0	0.0	
Trap Filter Gain	3.58	GT _{C3}	—	—	—	-25	-20	
	4.43	GT _{C4}	—	—	—	-25	-20	
Y ₁ Input Dynamic Range	3.58NTSC	VD3	—	—	1.30	1.60	—	V _{p-p}
	4.43PAL	VD4	—		1.30	1.60	—	

TEXT SECTION

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
AC Gain		G _R	—	(Note T ₁)	2.95	3.30	3.70	times
		G _G	—		2.95	3.30	3.70	
		G _B	—		2.95	3.30	3.70	
AC Gain Axial Difference		G _G /R	—	—	0.94	1.00	1.06	—
		G _B /R	—		0.94	1.00	1.06	
Output Bandwidth	R	G _{fR}	—	at -3dB point	25	30	—	MHz
	G	G _{fG}	—		25	30	—	
	B	G _{fB}	—		25	30	—	
Uni-Color Control Characteristic		v _u MAX	—	(Note T ₂)	0.59	0.66	0.74	V _{p-p}
		v _u CNT	—		0.34	0.39	0.44	
		v _u MIN	—		0.09	0.11	0.13	
		Δv _u	—		14	15	16	dB
Brightness Control Characteristic		VbrMAX	—	(Note T ₃)	4.1	4.4	4.7	V
		VbrCNT	—		3.25	3.55	3.85	
		VbrMIN	—		2.4	2.7	3.0	
Brightness Control Sensitivity		Gbr	—	(Note T ₄)	5.7	6.6	7.5	mV
White Peak Slice Level		Vwps1	—	(Note T ₅)	2.75	2.95	3.15	V _{p-p}
		Vwps2	—		2.30	2.50	2.70	
Black Peak Slice Level		V _{BPS}	—	(Note T ₆)	2.10	2.26	2.42	V
Signal-to -Noise Ratio of RGB Output	R	N ₄₁	—	—	—	-58	-49	dB
	G	N ₄₂	—		—	-58	-49	
	B	N ₄₃	—		—	-58	-49	
Half-Tone Gain		G _{HT1}	—	(Note T ₇)	0.45	0.50	0.55	times
		G _{HT2}	—		0.45	0.50	0.55	
Half-Tone ON Voltage		V _{HT}	—	Pin 47	0.65	0.85	1.05	V
V-BLK Pulse Output Level	R	VVR	—	—	0.3	0.8	1.3	
	G	VVG	—		0.3	0.8	1.3	
	B	VVB	—		0.3	0.8	1.3	
H-BLK Pulse Output Level	R	VHR	—	—	0.3	0.8	1.3	
	G	VHG	—		0.3	0.8	1.3	
	B	VHB	—		0.3	0.8	1.3	
Blanking Pulse Delay Time		t _{dON}	—	(Note T ₈)	—	0.1	0.3	μs
		t _{dOFF}	—		—	0.15	0.3	
Sub-Contrast Control Range		ΔV _{SU+}	—	—	2.0	2.5	3.0	dB
		ΔV _{SU-}	—		-3.8	-3.3	-2.8	
RGB Output Voltage		V _{#41}	—	(Note T ₉)	2.25	2.50	2.75	V
		V _{#42}	—		2.25	2.50	2.75	
		V _{#43}	—		2.25	2.50	2.75	
RGB Output Voltage Triaxial Difference		ΔV _{out}	—	—	—	0	150	mV
Cut-Off Voltage Control Range		CUT+	—	(Note T ₁₀)	0.45	0.50	0.55	V
		CUT-	—		0.45	0.50	0.55	

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Drive Adjustment Control Range	DRG+	—	(Note T ₁₁)	2.35	2.85	3.35	dB
	DRG-	—		-5.75	-5.00	-4.25	
	DRB+	—		2.35	2.85	3.35	
	DRB-	—		-5.75	-5.00	-4.25	
	DRR+	—		2.35	2.85	3.35	
	DRR-	—		-5.75	-5.00	-4.25	
Output Voltage of Muting	MURD	—	(Note T ₁₂)	2.1	2.26	2.42	V
	MUGD	—		2.1	2.26	2.42	
Output Voltage of Blue Back	BB _R	—	(Note T ₁₃)	2.1	2.26	2.42	V
	BB _G	—		2.1	2.26	2.42	
	BB _B	—		1.15	1.30	1.45	V _{p-p}
ACL Characteristic	ACL1	—	(Note T ₁₄)	-5	-3	-1	dB
	ACL2	—		-14.5	-13	-11.5	
ABL Point	ABL _{P1}	—	(Note T ₁₅)	0.12	0.17	0.22	V
	ABL _{P2}	—		0.04	0.09	0.14	
	ABL _{P3}	—		-0.05	0.00	0.05	
	ABL _{P4}	—		-0.15	-0.10	-0.05	
	ABL _{P5}	—		-0.24	-0.19	-0.14	
	ABL _{P6}	—		-0.34	-0.29	-0.24	
	ABL _{P7}	—		-0.43	-0.38	-0.33	
	ABL _{P8}	—		-0.50	-0.45	-0.40	
ABL Gain	ABL _{G1}	—	(Note T ₁₆)	-0.04	0.00	0.00	V
	ABL _{G2}	—		-0.09	-0.04	0.00	
	ABL _{G3}	—		-0.24	-0.19	-0.14	
	ABL _{G4}	—		-0.40	-0.35	-0.30	
	ABL _{G5}	—		-0.56	-0.51	-0.46	
	ABL _{G6}	—		-0.73	-0.68	-0.63	
	ABL _{G7}	—		-0.90	-0.85	-0.80	
	ABL _{G8}	—		-0.10	-0.92	-0.87	
RGB Output Mode	V43 _R	—	(Note T ₁₇)	2.25	2.5	2.75	V
	V42 _R	—		0.3	0.8	1.3	
	V41 _R	—		0.3	0.8	1.3	
	V43 _G	—		0.3	0.8	1.3	
	V42 _G	—		2.25	2.5	2.75	
	V41 _G	—		0.3	0.8	1.3	
	V43 _B	—		0.3	0.8	1.3	
	V42 _B	—		0.3	0.8	1.3	
	V41 _B	—		2.25	2.5	2.75	
ACB Pulse Phase / Amplitude	θ _{ACBR}	—	(Note T ₁₈)	—	1	—	H
	θ _{ACBG}	—		—	2	—	
	θ _{ACBB}	—		—	3	—	
	V _{ACBR}	—		0.1	0.125	0.15	V _{p-p}
	V _{ACBG}	—		0.1	0.125	0.15	
	V _{ACBB}	—		0.1	0.125	0.15	

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
IK Input Level	IKR	—	Pin 56 input level	1.45	1.65	1.85	V
	IKG	—		1.45	1.65	1.85	
	IKB	—		1.45	1.65	1.85	
RGB γ Correction Characteristic	Y1R	—	(Note T ₁₉)	40	50	60	IRE
	Y2R	—		60	70	80	
	Δ _{1R}	—		0.75	1.50	2.25	
	Δ _{2R}	—		-0.75	0.00	0.75	
	Δ _{3R}	—		-4.05	-3.30	-2.55	
	Y1G	—		40	50	60	IRE
	Y2G	—		60	70	80	
	Δ _{1G}	—		0.75	1.50	2.25	
	Δ _{2G}	—		-0.75	0.00	0.75	
	Δ _{3G}	—		-4.05	-3.30	-2.55	
	Y1B	—		40	50	60	IRE
	Y2B	—		60	70	80	
	Δ _{1B}	—		0.75	1.50	2.25	
	Δ _{2B}	—		-0.75	0.00	0.75	
	Δ _{3B}	—		-4.05	-3.30	-2.55	
Analog RGB Gain	G _{TXR}	—	(Note T ₂₀)	4.0	4.5	5.0	times
	G _{TXG}	—		4.0	4.5	5.0	
	G _{TXB}	—		4.0	4.5	5.0	
Analog RGB Gain Triaxial Difference	G _{TXG} / R	—	—	0.94	1.00	1.06	—
	G _{TXB} / R	—		0.94	1.00	1.06	
Analog RGB Bandwidth	R	G _{fTXR}	at -3dB point	25	30	—	dB
	G	G _{fTXG}		25	30	—	
	B	G _{fTXB}		25	30	—	
Analog RGB Input Dynamic Range	R	DR35	—	0.6	1.0	1.5	V _{p-p}
	G	DR34		0.6	1.0	1.5	
	B	DR33		0.6	1.0	1.5	
Analog RGB White Peak Slice Level	V _{TXWPSR}	—	(Note T ₂₁)	2.30	2.55	2.80	V _{p-p}
	V _{TXWPSG}	—		2.30	2.55	2.80	
	V _{TXWPSB}	—		2.30	2.55	2.80	
Analog RGB Black Peak Limiter Level	V _{BPSR}	—	(Note T ₂₂)	2.10	2.26	2.42	V
	V _{BPSG}	—		2.10	2.26	2.42	
	V _{BPSB}	—		2.10	2.26	2.42	

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
RGB Contrast Control Characteristic	$v_{uTXR_{MAX}}$	—	(Note T ₂₃)	0.8	0.9	1.0	V_{p-p}
	$v_{uTXG_{MAX}}$	—		0.8	0.9	1.0	
	$v_{uTXB_{MAX}}$	—		0.8	0.9	1.0	
	$v_{uTXR_{CNT}}$	—		0.45	0.52	0.59	
	$v_{uTXG_{CNT}}$	—		0.45	0.52	0.59	
	$v_{uTXB_{CNT}}$	—		0.45	0.52	0.59	
	$v_{uTXR_{MIN}}$	—		0.10	0.12	0.14	
	$v_{uTXG_{MIN}}$	—		0.10	0.12	0.14	
	$v_{uTXB_{MIN}}$	—		0.10	0.12	0.14	
	Δv_{uTXR}	—		15.5	17.0	18.5	dB
	Δv_{uTXG}	—		15.5	17.0	18.5	
	Δv_{uTXB}	—		15.5	17.0	18.5	
Analog RGB Brightness Control Characteristic	$V_{brTX_{MAX}}$	—	(Note T ₂₄)	3.3	3.5	3.7	V
	$V_{brTX_{CNT}}$	—		2.85	3.05	3.25	
	$V_{brTX_{MIN}}$	—		2.45	2.65	2.85	
Analog RGB Brightness Control Sensitivity	G_{brTX}	—	(Note T ₂₅)	6.0	6.8	7.6	mV
Analog RGB Mode ON Voltage	V_{TXON}	—	Pin 32	0.65	0.85	1.05	V
Text ACL Characteristic	TX_{ACL1}	—	(Note T ₂₆)	-2	-1	-0.05	dB
	TX_{ACL2}	—		-6.5	-4.5	-2.5	
	TX_{ACL3}	—		-6.5	-4.5	-2.5	
	TX_{ACL4}	—		-16.5	-15.0	-13.5	
Analog OSD Gain	G_{OSD_R}	—	(Note T ₂₇)	4.1	4.8	5.4	times
	G_{OSD_G}	—		4.1	4.8	5.4	
	G_{OSD_B}	—		4.1	4.8	5.4	
Analog OSD Gain Triaxial Difference	$G_{OSD_G/R}$	—	G / R	0.94	1.00	1.06	—
	$G_{OSD_B/R}$	—	B / R	0.94	1.00	1.06	
Analog OSD Band Width	G_{fOSD_R}	—	at -3dB point	25	30	—	dB
	G_{fOSD_G}	—		25	30	—	
	G_{fOSD_B}	—		25	30	—	
Analog OSD White Peak Slice Level	V_{OSD1R}	—	(Note T ₂₈)	1.80	2.00	2.20	V_{p-p}
	V_{OSD1G}	—		1.80	2.00	2.20	
	V_{OSD1B}	—		1.80	2.00	2.20	
	V_{OSD2R}	—		1.45	1.65	1.85	
	V_{OSD2G}	—		1.45	1.65	1.85	
	V_{OSD2B}	—		1.45	1.65	1.85	

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Analog OSD Black Peak Limiter Level	V _{OSD3R}	—	(Note T ₂₉)	2.10	2.26	2.42	V
	V _{OSD3G}	—		2.10	2.26	2.42	
	V _{OSD3B}	—		2.10	2.26	2.42	
Analog OSD Output DC Voltage	V _{OSDDCR}	—	(Note T ₃₀)	2.3	2.5	2.7	
	V _{OSDDCG}	—		2.3	2.5	2.7	
	V _{OSDDCB}	—		2.3	2.5	2.7	
Analog OSD Mode ON Voltage	V _{OSDON}	—	Pin 36	2.05	2.30	2.55	
OSD ACL Characteristic	OSDA _{CL1}	—	(Note T ₃₁)	—	0	—	dB
	OSDA _{CL2}	—		—	0	—	
	OSDA _{CL3}	—		-6.5	-4.5	-2.5	
	OSDA _{CL4}	—		-16.5	-15	-13.5	
Crosstalk of RGB Inputs	GCT	—	—	—	-50	-45	

COLOR DIFFERENCE SECTION

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Color Difference Signal Contrast Control Characteristic	v _{uCY} _{MAX}	—	(Note A ₁)	1.5	1.8	2.13	V _{p-p}
	v _{uCY} _{CNT}	—		0.85	1.0	1.2	
	v _{uCY} _{MIN}	—		0.24	0.29	0.355	
	Δv _{uCY}	—		14.0	15.5	17.0	dB
Color Control Characteristic	v _{uCY} _{MAX}	—	(Note A ₂)	1.18	1.4	1.68	V _{p-p}
	v _{uCY} _{CNT}	—		0.73	0.86	1.04	
	v _{uCY} _{MIN}	—		0.076	0.090	0.108	
	Δv _{uCY} ₊	—		3	4	5	dB
	Δv _{uCY} ₋	—		-20	-18	-16	
R - Y Relative Phase	00	θ _{R90}	—	88	90	92	°
	01	θ _{R93}		90	92	94	
	10	θ _{R96}		92	94	96	
	11	θ ₁₁₂		109	111	113	
R - Y Relative Amplitude	00	v _{R56} / v _B	—	0.55	0.58	0.61	times
	01	v _{R68} / v _B		0.67	0.7	0.73	
	10	v _{R76} / v _B		0.78	0.81	0.84	
	11	v _{R84} / v _B		0.85	0.88	0.91	
G - Y Relative Phase	00	θ _{G236}	—	234	237	240	°
	01	θ _{G240}		238	241	244	
	10	θ _{G244}		242	245	248	
	11	θ _{G253}		251	254	257	
G - Y Relative Amplitude	00	v _{G30} / v _B	—	0.275	0.300	0.325	times
	01	v _{G325} / v _B		0.300	0.325	0.350	
	10	v _{G35} / v _B		0.325	0.350	0.375	
	11	Gv ₃₇₅ / v _B		0.350	0.375	0.400	
Color Difference Half-Tone Gain	R	GHT _{RY}	(Note A ₃)	0.47	0.50	0.53	
	G	GHT _{GY}		0.47	0.50	0.53	
	B	GHT _{BY}		0.47	0.50	0.53	

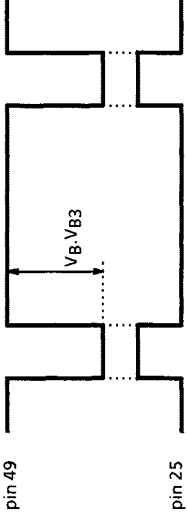
CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT	
Color γ Characteristic	$V_{\gamma 1}$	—	(Note A ₄)	0.09	0.23	0.37	V_{p-p}	
	$V_{\gamma 2}$	—		0.23	0.37	0.51		
	$V_{\gamma 3}$	—		0.38	0.52	0.66		
	$\Delta\gamma$	—		0.65	0.75	0.85	—	
Color Limiter Characteristic	CLT0	—	(Note A ₅)	1.45	1.65	1.85	V_{p-p}	
	CLT1	—		1.8	2.0	2.2		
High Bright Color Gain	HBC1	—	(Note A ₆)	0.02	0.04	0.06	times	
Base Band Tint Control Characteristic	Max	θ_{TRMAX}	—	R	29	33	37	°
		θ_{TBMAX}	—	B	29	33	37	
	Min	θ_{TRMIN}	—	R	-37	-33	-29	
		θ_{TBMIN}	—	B	-37	-33	-29	
Flesh Color Characteristic	Fa33	—	(Note A ₇)	0.38	0.48	0.58	—	
Color Difference Signal Input Dynamic Range	DR_{R-Y}	—	—	0.9	1.2	1.5	V_{p-p}	
	DR_{B-Y}	—	—	0.9	1.2	1.5		
Color Detail Emphasis Characteristic	GCD0	—	(Note A ₈)	15.0	18.0	21.0	V_{p-p}	
	GCD1	—		—	-15.0	0.0		
Phase Shift at IQ→UV Conversion	$\theta_{I \rightarrow U}$	—	—	31	33	35	°	
	$\theta_{Q \rightarrow V}$	—		31	33	35		

DEF SECTION

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
32f _H VCO Oscillation Start Voltage		V _{VCO}	—	DEF V _{CC} Voltage	3.1	3.4	3.7	V
Horizontal Output Start Voltage		V _{HON23}	—		4.7	5.0	5.3	
Horizontal Output Duty Cycle		T ₂₃	—	Pin 23	38.5	40.5	42.5	%
Horizontal Output Free-Run Frequency		f _{H050}	—	Vertical freq. ; Auto	15475	15625	15775	Hz
		f _{H060}	—	Vertical freq. ; 60Hz	15585	15734	15885	
Variable Range of Horizontal Output Frequency		f _{HMIN}	—	Variable pin 20 voltage	14700	15000	15300	
		f _{HMAX}	—		16500	16700	16900	
Horizontal Output Frequency Control Sensitivity		β _H	—	(Note D ₁)	180	230	280	Hz / 0.1V
Horizontal Output Voltage	High Level	V _{H23}	—	Pin 23	2.7	3.0	3.3	V
	Low Level	V _{L23}	—		—	0.15	0.30	
Horizontal Output Phase		SPH1	—	(Note D ₂)	11.1	11.3	11.5	V
		SPH2	—		0.35	0.45	0.55	
		SPH3	—		0.11	0.21	0.31	
Curve Correction Characteristic		ΔH ₂₄	—	(Note D ₃)	2.3	2.5	2.7	V
Variable Range of Horizontal Picture Position		ΔH _{SFT}	—	(Note D ₄)	5.7	6.2	6.7	
Clamp Pulse Start Phase		CP _S	—	(Note D ₅)	2.8	2.9	3.1	V
Clamp Pulse Width		CP _W	—		1.0	1.2	1.4	
Threshold of External Clamp Pulse Input		CP _{V30}	—	Pin 24	3.3	3.6	3.9	V
Threshold of External Clamp Mode Switching		CPM _{V23}	—	Pin 23	8.5	8.7	8.9	
Threshold of External Black Peak Hold Stopping Pulse		BP _{V17}	—	Pin 17, at normal scan	0.9	1.1	1.3	—
		BP _{V24}	—	Pin 24, at doble scan	0.9	1.1	1.3	
SPC Gate Pulse Start Phase		GP _S	—	(Note D ₆)	1.9	2.1	2.3	μs
SPC Gate Pulse Width		GP _W	—		1.9	2.1	2.3	
SPC Horizontal Blanking Pulse Start Phase		HP _S	—	(Note D ₇)	4.6	4.8	5.0	μs
SPC Horizontal Blanking Pulse Pulse Width		HP _{W50}	—		9.9	10.4	10.9	
		HP _{W60}	—		10.5	11.0	11.5	

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT		
HD Output Start Phase	HD _S	—	(Note D ₈)	0.7	0.9	1.1	μs		
HD Output Pulse Width	HD _W	—		0.7	0.9	1.1			
HD Output Voltage	V _{HD}	—		4.5	4.8	5.1			
Threshold of AFC-2 Detection	V _{HBLK1}	—	Pin 25, at normal scan	3.2	3.5	3.8	V		
Threshold of Horizontal Timing	V _{HBLK2}	—	Pin 25, at double scan	3.2	3.5	3.8			
Threshold of Blanking Pulse	V _{HBLK3}	—	Pin 25, H / V blanking	0.8	1.1	1.4			
Vertical Blanking Pulse Start Phase	VP _{50S1}	—	(Note D ₉)	46	48	50	μs		
Vertical Blanking Pulse Stop Phase	VP _{50S2}	—		—	23	—	H		
Vertical Blanking Pulse Start Phase	VP _{60S1}	—	(Note D ₁₀)	46	48	50	μs		
Vertical Blanking Pulse Stop Phase	VP _{60S2}	—		—	21	—	H		
External Blanking Threshold Current	ABLK	—	Pin 31 input current	150	300	400	μA		
Vertical Output Start Voltage	V _{ON}	—	DEF V _{CC} voltage	4.7	5.0	5.3	V		
Vertical Output	f _{V050}	—	Vertical freq. ; Auto	40	45	50	Hz		
Free-Run Frequency	f _{V060}	—	Vertical freq. ; 60Hz	48	53	58			
Vertical Output Voltage	V _{VH}	—	Pin 31	4.7	5.0	5.3	V		
	V _{VL}	—		—	0.0	0.3			
Vertical Pull-In Range (1)	f _{PL1}	—	(Note D ₁₁)	—	224.5	—	H		
	f _{PH1}	—		—	353	—			
Vertical Pull-In Range (2)	f _{PL2}	—		—	224.5	—			
	f _{PH2}	—		—	297	—			
Vertical Pull-In Range (3)	f _{50P}	—		—	288.5	—			
Vertical Pull-In Range (4)	f _{60P}	—		—	288	—			
RGB Vertical Blanking Pulse Start Phase (1)	VR _{50S1}	—		(Note D ₁₂)	44	46		48	μs
	VG _{50S1}	—			44	46		48	
	VB _{50S1}	—	44		46	48			
RGB Vertical Blanking Pulse Stop Phase (1)	VR _{50S2}	—	—		19	—	H		
	VG _{50S2}	—	—		19	—			
	VB _{50S2}	—	—		19	—			
RGB Vertical Blanking Pulse Start Phase (2)	VR _{60S1}	—	(Note D ₁₃)	44	46	48	μs		
	VG _{60S1}	—		44	46	48			
	VB _{60S1}	—		44	46	48			
RGB Vertical Blanking Pulse Stop Phase (2)	VR _{60S2}	—		—	17	—	H		
	VG _{60S2}	—		—	17	—			
	VB _{60S2}	—		—	17	—			

TEST CONDITIONS

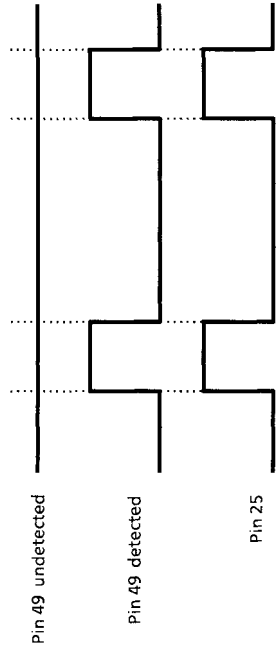
NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / DEF V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)		
		SW ₁₅	SW ₄₉ / SW ₅₀	SW ₅₃
	Video Block			
				<p>Video block common test conditions</p> <ol style="list-style-type: none"> 1) SW₁₃ : A, SW₁₈ : ON, SW₂₀ : ON, SW₂₃ : ON, SW₃₃ : A, SW₃₄ : A, SW₃₅ : A, SW₃₇ : A, SW₃₈ : A, SW₃₉ : A, SW₄₆ : ON, SW₅₁ : B, SW₅₂ : B 2) For testing, see the picture sharpness AC characteristics testing circuit diagram. After using the preset values to transmit the BUS control data, set ACB operation switching to ACB off (01). 3) Ensure the composite signal is always input to pin 15 (Y₁ / sync input).
V ₁	Black Detect Level Shift	C	OFF C C	<ol style="list-style-type: none"> 1) Set the BUS control data to the preset value. 2) Connect pin 53 to an external power supply (PS) and observe pin 50. 3) Turn the Y mute off (1), turn the black stretch gain off (1), and set the black detect level to 0IRE (1). 4) Increase the PS voltage from 5V and measure the DC differential VB of pin 49 where the picture period (high period) of pin 50 goes low. 5) Set the black detect level to 3IRE (0). 6) As in 4), measure the DC differential VB3 of pin 49. 
V ₂	Black Stretch Amp Maximum Gain	↑	↑ A A	<ol style="list-style-type: none"> 1) Set the BUS control data to the preset value. 2) Set SW₅₀ to A (maximum gain) and input a 500kHz sine wave to TP53. 3) Use pin 53 to adjust the signal amplitude to 0.1Vp-p. 4) Turn the Y mute off (1), turn the black stretch gain off (1), and measure the amplitude VA of pin 49. 5) Turn the black stretch gain on (0) and measure the amplitude VB of pin 49. 6) Calculate the G_{BS} using the following formula. G_{BS} = VB÷VA

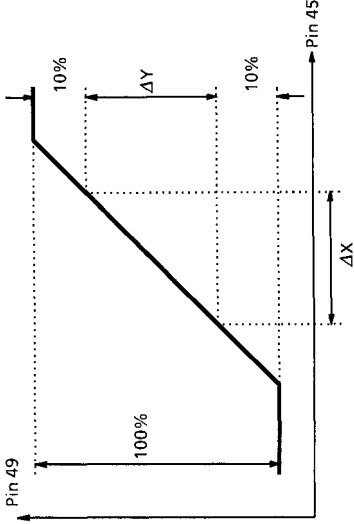
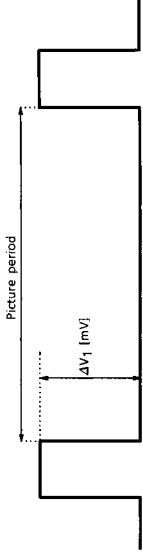
NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / DEF V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)				
		SW ₁₅	SW ₄₉	SW ₅₃		
				TEST CONDITIONS		
				<ol style="list-style-type: none"> 1) Set the BUS control data to the preset value. 2) Set SW₅₀ to A (maximum gain), turn the Y mute off (1), and turn the black stretch gain off. 3) Connect pin 53 to an external power supply (PS), increase the voltage from V₅₃, and plot the resulting change in voltage S₁ of pin 49. 4) Next, turn the black stretch gain on (0), set the black stretch point 1 to the minimum (000), increase the PS voltage from V₅₃ as in 3), and plot the resulting change in voltage S₂ of pin 49. 5) Set the black stretch point 1 to the maximum (111), increase the PS voltage from V₅₃ as in 3), and plot the change in voltage S₃ of pin 49. 6) Use the diagram below to calculate the intersections V_{BST1} and V_{BST2} of S₁, S₂, and S₃. Use the following formulas to calculate P_{BST1} and P_{BST2}. $P_{BST1} [(IRE)] = (V_{BST1} [V] - V_{49} [V]) \times 100 [(IRE)]$ $P_{BST2} [(IRE)] = (V_{BST2} [V] - V_{49} [V]) \times 100 [(IRE)]$ 		
V ₃	Black Stretch Start Point (1)	C	OFF	A	C	

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)		
		SW ₁₅	SW ₄₉	SW ₅₀ SW ₅₃
				TEST CONDITIONS
V ₄	Black Stretch Start Point (2)	C	ON	A

- 1) Set the BUS control data to the preset value.
- 2) Turn the black stretch gain off (1), turn the Y mute off (1), and turn the video mute off (0). Input the TG7 linearity to TP53, use pin 53 to adjust the amplitude as in the diagram, set unicolor to the center (1000000), and measure the resulting amplitude (V₄₃) of pin 43 (R OUT).
- 3) Turn the black stretch gain on (0), connect pin 49 to an external power supply (PS), and measure pin 43 (R OUT).
- 4) When the black stretch start point 2 data are at the minimum (000), calculate as in the diagram the black stretch start point differential ΔV_{000} for when P is V₄₉ (APL 0%) and for when P is V₄₉+1.0 [V] (APL 100%).
- 5) Next, when the black stretch start point 2 data are maximum (111), calculate differential ΔV_{111} in the same way.
- 6) Calculate the following formulas.
 $PBS1 = (\Delta V_{000} / V_{43}) \times 100$
 $PBS2 = (\Delta V_{111} / V_{43}) \times 100$

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)		
		SW ₁₅	SW ₄₉	SW ₅₀ SW ₅₃
				TEST CONDITIONS
				<ol style="list-style-type: none"> 1) Set the BUS control data to the preset value. 2) Turn the Y mute off (1), set the ABL sensitivity to the minimum (000), set the D.ABL sensitivity to the maximum (111), and turn the black stretch gain off (1). 3) Connect pin 45 to an external power supply (PS) and decrease the voltage from 6.5V. 4) Repeat 3) when the D.ABL detect voltage bus data are 000, 001, 010, and 100 respectively. Measure PS voltages V_{000}, V_{001}, V_{010}, and V_{100} when the picture period of pin 49 changes to low. (Enlarge the range before measuring.) 5) Next, calculate the ΔV_{001}, ΔV_{010}, and ΔV_{100} voltage differentials from V_{000} and V_{001}, V_{010}, and V_{100}. $\Delta V_{***} = V_{000} - V_{001}$ (V_{010}, V_{100})
V ₅	D.ABL Detect Voltage	C	OFF	A C



NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V, V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V, T_a = 25 \pm 3^\circ\text{C}$)			TEST CONDITIONS	
		SW ₁₅	SW ₄₉	SW ₅₀		SW ₅₃
V ₆	D.ABL Sensitivity	C	ON	A	C	<p>1) Set the BUS control data to the preset value.</p> <p>2) Turn the Y mute off (1), turn the black stretch gain off (1), and connect pin 45 to an external power supply.</p> <p>3) With the D.ABL detect voltage at the minimum (000), plot the voltage characteristics of pin 49 in relation to the voltage of pin 45 when D.ABL sensitivity is at the minimum (000) and the maximum (111).</p> <p>4) From the diagram, calculate the SDAMIN and SPAMAX gradients. $SDAMIN, SDAMAX = \Delta Y / \Delta X$</p> 
V ₇	Black Level Compensation	↑	OFF	↑	↑	<p>1) Set the BUS control data to the preset value.</p> <p>2) Turn the Y mute off (1), turn the black stretch gain off (1), and observe pin 49.</p> <p>3) Turn the black level compensation on (1), measure ΔV_1 [mV], and calculate the following formula. $BLC = (\Delta V_1 / 1.4 \times 10^{-3}) \times 100$ (IRE)</p> 

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)		
		SWITCHING MODE		
		SW ₁₅	SW ₄₉	SW ₅₃
V ₈	Black Peak Detect Level	C	ON	C
				<p>TEST CONDITIONS</p> <ol style="list-style-type: none"> 1) Set the BUS control data to the preset value. 2) Measure the DC voltage V₄₉ of pin 49. 3) Connect pin 53 to an external power supply (PS). 4) Turn the Y mute off (1), the black stretch gain off (1), and set the black detect level shift to 0IRE (1). 5) Increase the PS from 0V and measure the voltage V_{BP} of pin 49 where the DC level of the picture period of pin 50 shifts from high to low. 6) Calculate ΔV_{BP} from the following formula. $\Delta V_{BP} = V_{BP} - V_{49}$

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)		
		SW ₁₅	SW ₄₉	SW ₅₃
				TEST CONDITIONS
V ₉	DC Transmission Rate Compensation Gain	C	ON	<p>1) Set the BUS control data to the preset value.</p> <p>2) Turn the Y mute off (1), turn the video mute off (0), and connect pin 53 to an external power supply (PS).</p> <p>3) Measure the amplitude V₄₃ of pin 43, set the PS to V₅₃+0.7V, and adjust V₄₃ to 0.7V_{p-p} using unicolor.</p> <p>4) With the DC transmission rate compensation gain at the minimum (000), measure ΔV_1 and ΔV_2 as in the diagram below.</p> <p>5) Next, with the DC transmission rate compensation gain at the maximum (111), measure ΔV_3 and ΔV_4.</p> <p>6) Calculate ADT100 and ADT130 from the following formula. $ADT100 = (\Delta V_2 [V] - \Delta V_1 [V]) \div 0.1 [V]$ $ADT130 = (\Delta V_4 [V] - \Delta V_3 [V]) \div 0.1 [V]$</p>

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)		
		SW ₁₅	SW ₄₉	SW ₅₃
V ₁₀	DC Transmission Compensation Start Point	C	ON	B
		C	ON	C

TEST CONDITIONS	
1)	Repeat steps 1) and 2) of V ₂₁ .
2)	Measure the amplitude V ₄₃ of pin 43, set the PS to V ₅₃ +0.7V, and adjust V ₄₃ to around 1.0V _{p-p} using unicolor.
3)	With the DC transmission compensation rate at the minimum (000), increase PS from V ₅₃ and plot the relationship between the voltages of pins 49 and 43.
4)	Next, with the DC transmission compensation rate at the maximum (111), increase PS from V ₅₃ and plot the relationship between the voltages of pins 49 and 43.
5)	With the DC transmission compensation rate at the maximum (111), increase the PS from V ₅₃ when the DC transmission compensation start point reaches the maximum (111) and plot the relationship between the voltages of pins 49 and 43.
6)	Calculate V _{DT0} and V _{DT42} from the following formula. $V_{DT0} = ((V_{SP0} - V_{49}) / 1 [V]) \times 100 [\%]$ $V_{DT42} = ((V_{SP42} - V_{49}) / 1 [V]) \times 100 [\%]$

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)		
		SW ₁₅	SW ₄₉	SW ₅₀ SW ₅₃
V ₁₁	DC Transmission Compensation Limit Point	C	ON	B C

TEST CONDITIONS

- 1) Set the BUS control data to the preset value.
- 2) Turn the Y mute off (1), turn the video mute off (0), and with the unicolor set at maximum (111111), connect pin 49 to an external power supply (PS).
- 3) Set the DC transmission compensation rate to the maximum (111).
- 4) Increase the PS from 5V, observe pin 43, and plot the DC transmission compensation rate.
- 5) Repeat 4) above but change the DC transmission compensation limit point data. Calculate P_{DTL60}, P_{DTL73}, P_{DTL87}, and P_{DTL100} from the measured data and the following formulas.

$$P_{DTL60} = ((V_{L60} - V_{49}) / 1.0) \times 100 [\%]$$

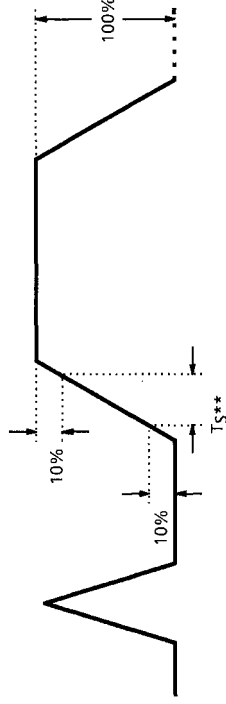
$$P_{DTL73} = ((V_{L73} - V_{49}) / 1.0) \times 100 [\%]$$

$$P_{DTL87} = ((V_{L87} - V_{49}) / 1.0) \times 100 [\%]$$

$$P_{DTL100} = ((V_{L100} - V_{49}) / 1.0) \times 100 [\%]$$

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)		
		SW ₁₅	SW ₄₉ / SW ₅₀	SW ₅₃
				TEST CONDITIONS
V ₁₂	Picture Sharpness Control Range	C	B OFF	A
				<ol style="list-style-type: none"> 1) Set the BUS control data to the preset value. 2) Input a sine wave to TP53. 3) Set the amplitude of pin 53 to 20mV_{p-p}. 4) Set the unicolor to the maximum (1111111), set SHR tracking to SRT-gain low (11), and set the aperture compensator peak frequency to 4.2M (001). 5) Turn the Y mute off (1), the video mute off (0), connect TP43 and TP41b, and observe TP41e. 6) Set the picture sharpness to the maximum (1111111). When the frequencies are 100kHz and F_{APL01}, measure the V₁₀₀ and V_L amplitudes respectively and calculate G_{MAXL} by the formula shown below. 7) Next, set the picture sharpness to the minimum (0000000). As in 6), when the frequencies are 100kHz and 2.4MHz, measure the V₁₀₀ and V_L amplitudes respectively and calculate G_{MINL} by the formula shown below. 8) Set the aperture compensator peak frequency to 7.7M (111) and the picture sharpness to the maximum (1111111). When the frequencies are 100kHz and F_{APH11}, measure the V₁₀₀ and V_H amplitudes respectively and calculate G_{MAXH} by the formula shown below. 9) Next, set the picture sharpness to the minimum (0000000). When the frequencies are 100kHz and 4MHz, measure the V₁₀₀ and V_H amplitudes respectively and calculate G_{MINH} by the following formula. G**** [dB] = 20×Log (V_L (H)²/V₁₀₀)
V ₁₃	YNR Characteristics	↑	↑	↑
				<ol style="list-style-type: none"> 1) Repeat steps 1) to 5) of V₁₂. 2) With YNR on (1) and the picture sharpness at minimum (0000000), measure the TP41e amplitudes V₁₀₀ and V_L when the input signal frequencies are 100kHz and 2.4MHz respectively. 3) Next, set the aperture compensator peak frequency to 7.7M (111). When the input signal frequencies are 100kHz and 4MHz, measure the V₁₀₀ and V_H amplitudes respectively and calculate G_{YL} and G_{YH} by the following formula. G_{YL} (H) [dB] = 20×Log (V_L (H)²/V₁₀₀)

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)		
		SW ₁₅	SW ₄₉	SW ₅₃
				TEST CONDITIONS
				<ol style="list-style-type: none"> 1) Set the BUS control data to the preset value. 2) Input a 2T pulse (STD) signal to TP53, turn the Y mute off (1), turn the video mute off (0), set unicolor to maximum (1111111), and set SHR tracking to SRT-gain low (11). 3) Set the sharpness control to the center (1000000), set the aperture compensator peak frequency to 4.2M (001), connect TP43 and TP41b, and observe TP41e. 4) Measure T_{SL1} as in the diagram below. 5) Set SHR tracking to SRT-gain high (00) and measure T_{SL2}. 6) Next, set the aperture compensator peak frequency to 7.7M (111) and measure T_{SH1} and T_{SH2} as above. 7) Calculate the following formula. $T_{SRTL} = T_{SL1} - T_{SL2}$ $T_{SRTH} = T_{SH1} - T_{SH2}$
V ₁₄	2T Pulse Response SRT Control	C	ON	A



NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)		
		SW ₁₅	SW ₄₉	SW ₅₃
				TEST CONDITIONS
V ₁₅	VSM Gain	C	ON	A
				B

1)	Set the BUS control data to the preset value.
2)	Input the frequency F_{VL} sine wave to TP53.
3)	Turn the Y mute off (1), turn the video mute off (0), set the aperture compensator peak frequency to 4.2M (001), and set the amplitude of pin 53 to $0.1V_{p-p}$.
4)	Measure the TP48 amplitudes V_{L00} , V_{L01} , V_{L10} , and V_{L11} in the following cases. VSM gain 0dB (00) → $V_L(H)00$ -6dB (01) → $V_L(H)01$ -9dB (10) → $V_L(H)10$ OFF (11) → $V_L(H)11$
5)	Input the sine wave of frequency F_{VH} to TP53, set the aperture compensator peak frequency to 7.7M (111), and measure the TP48 amplitudes V_{H00} , V_{H01} , V_{H10} , and V_{H11} as above.
6)	Calculate the following formulas. $G_{VL(H)00} = 20 \times \text{Log} (V_L(H)00 / 0.1)$ [dB] $G_{VL(H)01} = 20 \times \text{Log} (V_L(H)01 / 0.1)$ [dB] - $20 \times \text{Log} (V_L(H)00 / 0.1)$ [dB] $G_{VL(H)10} = 20 \times \text{Log} (V_L(H)10 / 0.1)$ [dB] - $20 \times \text{Log} (V_L(H)00 / 0.1)$ [dB] $G_{VL(H)11} = 20 \times \text{Log} (V_L(H)11 / 0.1)$ [dB]

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)		
		SW ₁₅	SW ₄₉	SW ₅₃
				TEST CONDITIONS
				<ol style="list-style-type: none"> Repeat steps 1) to 3) of V₁₅. Turn on the VSM output horizontal parabola modulation (1) and set the VSM gain to 0dB (00). As in the diagram, measure the picture period amplitudes VCL, VRL, and VLL of TP48. Next, input the sine wave of frequency F_{VH} to TP53, set the aperture compensator peak frequency to 7.7M (111), set the VSM horizontal parabola frequency to 31.5k (10), and measure the picture period amplitudes VCH, VRH, and VLH of TP48 as above. Calculate GVRL, GVLL, GVRH, and GVLH from the following formulas. $GVRL (H) = 20 \times \text{Log} (VRL (H) / VCL (H))$ $GVLL (H) = 20 \times \text{Log} (VLL (H) / VCL (H))$
V ₁₆	VSM Horizontal Parabola Modulation Gain	C	ON	A
				<ol style="list-style-type: none"> In 3) and 4) above, turn the VSM output horizontal parabola modulation off (0) and check that no parabola modulation is generated on the picture period signal. (VPOFL, VPOFH)

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)		
		SW ₁₅	SW ₄₉	SW ₅₃
V ₁₇	VSM High-Speed Mute Response Time	C	ON	A

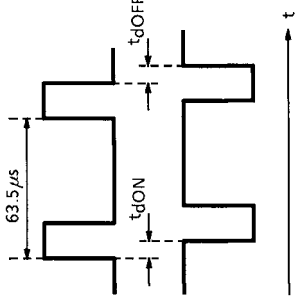
TEST CONDITIONS	
1)	Repeat steps 1) to 3) of V ₁₅ , then observe pin 48.
2)	Input a pulse like that shown below to pin 32 and measure the response time T _{VML1} (2) at that input.
3)	Similarly, input the pulse to pin 36 and measure the response time T _{VML3} (4) at that input.
4)	Input the sine wave of frequency F _{VH} to TP53, set the aperture compensator peak frequency to 7.7M (111), and measure the response time T _{VMH1} (2) as in 2) above.
5)	Similarly, input the pulse to pin 36 and measure the response time T _{VMH3} (4) at the input.

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / DEF V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)											
		SUBADDRESS			SWITCHING MODE			TEST CONDITIONS					
		07	10	17	18	SW5	SW6	SW13	SW15				
	Chroma Block												Chroma block common test conditions SW ₁₃ : B, SW ₁₅ : C, SW ₁₈ : ON, SW ₂₀ : ON, SW ₂₃ : ON, SW ₂₄ : ON, SW ₂₅ : ON, SW ₃₃ : A, SW ₃₄ : A, SW ₃₅ : A, SW ₃₇ : A, SW ₃₈ : A, SW ₃₉ : A, SW ₄₆ : ON
C1	ACC Characteristics	80	00	00	00	OPEN	OPEN	B	A				1) Input 3.58-NTSC rainbow signal (C-4 signal) burst / chroma signals with the same burst / chroma amplitude to the chroma input pin (TP13). 2) Measure the output amplitudes F ₁₀ , F ₃₀ , F ₃₀₀ , and F ₆₀₀ of the UQ output pin 5 when the chroma input amplitude levels are set to 10, 30, 300, and 600mV _{p-p} . 3) Calculate A = F ₃₀ / F ₃₀₀ .
C2	APC Frequency Control Sensitivity	↑	↑	↑	↑	↑	A						1) Connect SW ₁₃ to A. 2) Switch the color system mode (10) to 3.58 NTSC (00), 4.43 PAL (60), and M-PAL (80) and measure the following for each of those cases. 3) Connect external voltage source (V ₁₁) to APC filter pin 11. 4) Vary the voltage of the external voltage source (V ₁₁) and observe the fsc output pin 1 using a frequency counter. 5) Measure the free-run sensitivity β for the V ₁₁ +ΔV ₁₁ (100mV) near the f _c . (3.5 NTSC = β ₃ , 4.3 ; PAL = β ₄ ; M-PAL = β _M)
C3	APC Pull-in and Hold Range	↑	↑	↑	↑	↑	↑						1) Input 3.579545MHz, 4.433619MHz, and 3.575611MHz continuous waves (200mV _{p-p} to the chroma input pin (TP13)). 2) Switch the color system mode (10) to 3.58 NTSC (00), 4.43 PAL (60), and M-PAL (80), and measure the following for each of those cases. 3) Vary the input signal frequency in 10Hz-steps within a range of ±3kHz. 4) Clamp B / W → color mode (P*P*). While holding color → B / W mode (P*H*), measure the ± deviations from the frequency at each continuous wave input.

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)										
		SUBADDRESS			SWITCHING MODE					TEST CONDITIONS		
		07	10	17	18	SW ₅	SW ₆	SW ₁₃	SW ₁₅			
C4	SECAM Output DC Level Change	80	C ₀	00 or 30 or 60	00	OPEN	OPEN	A	A	1) Connect SW ₁₃ to A. 2) Measure the output DC level of the SECAM control pin 3 when the color system mode (10) is switched to 3.58 NTSC (00), 4.43 PAL (30), and SECAM (60). (3.58 NTSC mode: SEN) (4.43 PAL mode: SEF) (SECAM mode: SES)		
C5	NTSC Ident Sensitivity	↑	C ₀ or D ₀	00	↑	↑	↑	B	↑	1) Input a 3.58-NTSC rainbow (C-4 signal) burst / chroma signal with the same burst / chroma amplitudes to the chroma input pin (TP13). 2) Observe the BUS READ mode (5th and 6th bits of the 1st byte). 3) Switch the indent sensitivity (set the subaddress (10) data low (C ₀) and high (D ₀)) and perform the following measurements. 4) Increase the input signal amplitude from 0 and measure the input signal amplitude at the switch to 3.58 NTSC mode. (LOW (C ₀) : vN _{CL} , High (D ₀) : vN _{CH}) 5) Lower the input signal amplitude from 100mV _{p-p} and measure the input signal amplitude at the deviation from 3.58 NTSC mode. (LOW (C ₀) : vN _{BL} , High (D ₀) : vN _{BH})		

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)									
		SUBADDRESS					SWITCHING MODE				
		07	10	17	18	SW5	SW6	SW13	SW15	TEST CONDITIONS	
C6	PAL Ident Sensitivity	80	C0 or D0	00	00	OPEN	OPEN	B	A	1) Input a 4.43-PAL rainbow (C-4 signal) burst / chroma signal with the same burst / chroma amplitude to the chroma input pin (TP13). 2) Observe the BUS READ mode (5th and 6th bits of the 1st byte). 3) Switch the indent sensitivity (set the subaddress (10) data low (C0) and high (D0)) and perform the following measurements. 4) Increase the input signal amplitude from 0 and measure the input signal amplitude at the switch to 4.43 PAL mode. (LOW (C0) : vPCL, High (D0) : vPCH) 5) Lower the input signal amplitude from 100mVp-p and measure the input signal amplitude at the deviation from 4.43 PAL mode. (LOW (C0) : vPBL, High (D0) : vPBH)	
C7	TOF Characteristics	↑	00 or 60	↑	38	↑	↑	↑	↑	1) Input the signal C-1 to the chroma input pin. (Signal amplitude = 50mVp-p). 2) When the subaddress (10) data are $f_0 = 3.58\text{MHz}$ (00) and $f_0 = 4.43\text{MHz}$ (60), and subaddress (18) data are (38), connect 1.5kΩ between the V _I output pin 6 and the 5V-V _{CC} and observe the V _I output pin 6. 3) Measure the output amplitude when $f_0 = 3.58\text{MHz}$ and calculate the gain in decibels from the input (GFC3). 4) Measure the output amplitude when $f_0 = 3.58\text{MHz} \pm 500\text{kHz}$ and calculate the gain in decibels from the input (+500kHz : GF _{H3} , -500kHz : GF _{L3}). 5) Measure the output amplitude when $f_0 = 4.43\text{MHz}$ and calculate the gain in decibels from the input (GFC4). 6) Measure the output amplitude when $f_0 = 4.43\text{MHz} \pm 500\text{kHz}$ and calculate the gain in decibels from the input (+500kHz : GF _{H4} , -500kHz : GF _{L4}).	

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / DEF V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)										
		TEST CONDITIONS										
		SWITCHING MODE										
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃		
	Text Block											Text block common test conditions SW ₁₃ : A, SW ₁₅ : C, SW ₁₈ : ON, SW ₂₀ : ON, SW ₂₃ : ON, SW ₂₄ : ON, SW ₂₅ : ON
T ₁	AC Gain	A	A	A	A	A	A	B	B	A		1) Input signal 1 ($f_0 = 100kHz$, picture period amplitude = $0.2V_{p-p}$) to pin 53. 2) Measure the picture period amplitude of pins 41, 42, 43 (V ₄₁ , V ₄₂ , and V ₄₃). 3) $G_R = V_{43} / 0.2$ $G_G = V_{42} / 0.2$ $G_B = V_{41} / 0.2$
T ₂	Unicolor Adjustment Characteristics	↑	↑	↑	↑	↑	↑	↑	↑	↑		1) Input signal 1 ($f_0 = 100kHz$, picture period amplitude = $0.2V_{p-p}$) to pin 53. 2) Set the unicolor data to maximum (7F), center (40), and minimum (00) and measure the pin 43 picture period amplitudes for each case. (V _u MAX, v _u CNT, v _u MIN) 3) Calculate the unicolor maximum and minimum amplitude ratios using digital conversion. (ΔV_u)
T ₃	Brightness Adjustment Characteristics	↑	↑	↑	↑	↑	↑	↑	↑	↑		1) Input signal 2 to pin 53 and adjust the picture period amplitude output of pin 43 to $1V_{p-p}$. 2) Measure the voltage of pin 43 when the brightness is changed to maximum (FF), center (80), and minimum (00). (V _{br} MAX, V _{br} CNT, V _{br} MIN)
T ₄	Brightness Sensitivity	↑	↑	↑	↑	↑	↑	↑	↑	↑		1) Using the results obtained from T ₃ , calculate the brightness sensitivity from the following formula. 2) $G_{br} = (V_{br}MAX - V_{br}MIN) / 256$
T ₅	White Peak Slice Level	↑	↑	↑	↑	↑	↑	↑	↑	↑		1) Change the bus data and set the sub-contrast to maximum. 2) Connect an external power supply to pin 53 and increase the voltage gradually from 5.8V. 3) Measure the picture period amplitude voltage of pin 43 when pin 43's picture period is clipped (V _{wps1}). 4) Change the subaddress (05) data to (81) and repeat steps 1) to 3) above. (V _{wps2})

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)										
		SWITCHING MODE										
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃	TEST CONDITIONS	
T ₆	Black Peak Slice Level	A	A	A	A	A	A	B	B	C	<ol style="list-style-type: none"> Repeat step 1) of T₅. Connect an external power supply to pin 53 and decrease the voltage gradually from 5.8V. Measure the voltages of pins 41, 42, and 43 when their picture periods are clipped. 	
T ₇	Half Tone Characteristics	↑	↑	↑	↑	↑	↑	↑	↑	A	<ol style="list-style-type: none"> Input signal 1 ($f_0 = 100\text{kHz}$, picture period amplitude = $0.2V_{p-p}$) to pin 53. Measure the picture period amplitude of pin 41 (V41A). Apply 1.5V from an external power supply to pin 47. Measure the picture period amplitude of pin 41 (V41B). GHT1 = V41B / V41A Halt the voltage applied to pin 47, set the subaddress (03) data to (81), and measure the picture period amplitude of pin 41 (V41C). GHT2 = V41C / V41A 	
T ₈	BLK Pulse Delay Time	↑	↑	↑	↑	↑	↑	↑	↑	C	<ol style="list-style-type: none"> Calculate t_{ON}, t_{OFF} from the signal applied to pin 25 (H.BLK input) (A below) and the output signals from pins 41, 42, and 43 (B below). (A) Signal applied to pin 25  (B) Output signals from pins 41, 42, 43 	
T ₉	RGB Output Voltage	↑	↑	↑	↑	↑	↑	↑	↑	↑	<ol style="list-style-type: none"> Measure the picture period voltages for pins 41, 42, and 43. 	

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)										
		SWITCHING MODE										
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃	TEST CONDITIONS	
T ₁₀	Cutoff Voltage Variable Range	A	A	A	A	A	A	B	B	C	<ol style="list-style-type: none"> 1) Set the subaddress (17) data to (07). 2) Measure the picture period voltage of pin 43 when the cutoff (subaddress 0C) data are changed to maximum (FF), center (80), and minimum (00), and calculate the amount of change of maximum and minimum from the center. (CUT+, CUT-). 3) In steps 1) and 2) above, make the following changes and remeasure : Change the subaddress (0D) data and measure pin 42, Change the subaddress (0E) data and measure pin 41. 	
T ₁₁	Drive Adjustment Variable Range	↑	↑	↑	↑	↑	↑	↑	↑	A	<ol style="list-style-type: none"> 1) Input signal 1 ($f_0 = 100\text{kHz}$, picture period amplitude = $0.2V_{p-p}$) to pin 53. 2) Measure the picture period amplitude of pin 42 when the drive (subaddress-09) data are changed to maximum (FE), center (80), and minimum (00). 3) Calculate the maximum and minimum amplitude ratios for the drive center using decibel conversion. (DRG+, DRG-) 4) In steps 1) to 3) above, change the subaddress (0A) data, measure pin 41, and repeat the calculations. (DRB+, DRB-) 5) In steps 1) to 3) above, set data of the LSB of subaddress (09) to 1, measure pin 43, and repeat the calculations. (DRR+, DRR-) 	
T ₁₂	Output Voltage During Muting	↑	↑	↑	↑	↑	↑	↑	↑	C	<ol style="list-style-type: none"> 1) Set the subaddress (00) data to (FF). 2) Measure the picture period voltages of pins 43, 42, and 41. (MURD, MUGD, MUBD) 	
T ₁₃	Output Voltage at Blue Back	↑	↑	↑	↑	↑	↑	↑	↑	↑	<ol style="list-style-type: none"> 1) Set the subaddress (10) data to (08). 2) Measure the picture period voltages of pins 43 and 42 and the picture period amplitude of pin 41. (BBR, BBG, BBB) 	

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, V _{CC1} = 5V, V _{CC2} / V _{CC3} / DEF V _{CC} = 9V, Ta = 25±3°C)										
		SWITCHING MODE									TEST CONDITIONS	
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃		
T ₁₄	ACL Characteristics	A	A	A	A	A	A	A	B	B	A	<ol style="list-style-type: none"> 1) Input signal 1 (f₀ = 100kHz, picture period amplitude = 0.2V_{p-p}) to pin 53. 2) Measure the picture period amplitude of pin 43 (V_{ACL1}). 3) Measure the picture period amplitude of pin 43 when -0.5V DC is applied to pin 45 from an external power supply. (V_{ACL2}) 4) Measure the picture period amplitude of pin 43 when -1V DC is applied to pin 45 from an external power supply. (V_{ACL3}) 5) ACL1 = -20×f_{0g} (V_{ACL2} / V_{ACL1}) ACL2 = -20×f_{0g} (V_{ACL3} / V_{ACL1})
T ₁₅	ABL Point	↑	↑	↑	↑	↑	↑	↑	↑	↑	<ol style="list-style-type: none"> 1) Measure the DC voltage of pin 45. (V_{ABL1}) 2) Set the subaddress (16) data to (1C). 3) Applying external voltage to pin 45, lower the pin voltage from 6.5V. Measure the voltage of pin 45 when the voltage of pin 43 starts to change. (V_{ABL2}) 4) Change the data of subaddress (16) to (3C), (5C), (7C), (9C), (BC), (DC), and (FC), and repeat step 3) for each of these data. (V_{ABL3}, V_{ABL4}, V_{ABL5}, V_{ABL6}, V_{ABL7}, V_{ABL8}, V_{ABL9}) 5) ABL_{P1} = V_{ABL2}-V_{ABL1}, ABL_{P5} = V_{ABL6}-V_{ABL1} ABL_{P2} = V_{ABL3}-V_{ABL1}, ABL_{P6} = V_{ABL7}-V_{ABL1} ABL_{P3} = V_{ABL4}-V_{ABL1}, ABL_{P7} = V_{ABL8}-V_{ABL1} ABL_{P4} = V_{ABL5}-V_{ABL1}, ABL_{P8} = V_{ABL9}-V_{ABL1} 	

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)										TEST CONDITIONS
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃		
T ₁₆	ABL Gain	A	A	A	A	A	A	A	B	B	C	<ol style="list-style-type: none"> Apply 6.5V from an external power supply to pin 45. Set the subaddress (16) data to (00). Set the brightness to the maximum. Measure the voltage of pin 43. (VABL10) Apply 4.5V from an external power supply to pin 45. Change the data of subaddress (16) to (00), (04), (08), (0C), (10), (14), (18), and (1C), and repeat step 3) for each of these data (VABL11, VABL12, VABL13, VABL14, VABL15, VABL16, VABL17, VABL18) ABL_{G1} = VABL11-VABL10, ABL_{G5} = VABL15-VABL10 ABL_{G2} = VABL12-VABL10, ABL_{G6} = VABL16-VABL10 ABL_{G3} = VABL13-VABL10, ABL_{G7} = VABL17-VABL10 ABL_{G4} = VABL14-VABL10, ABL_{G8} = VABL18-VABL10
T ₁₇	RGB Output Mode	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	<ol style="list-style-type: none"> Adjust the brightness so that the picture period voltage of pin 43 is set to 2.5V. Set the subaddress (16) data to (01). Measure the picture period voltages of pins 43, 42, and 41. (V43R, V42R, V41R) Change the subaddress (16) data to (02) and repeat step 3). (V43G, V42G, V41G) Change the subaddress (16) data to (03) and repeat step 3). (V43B, V42B, V41B)

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)										
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃	TEST CONDITIONS	
T ₁₈	ACB Insertion Pulse Phase and Amplitude	A	A	A	A	A	A	A	B	B	A or C	<p>1) Input signal 1 ($f_0 = 100\text{kHz}$, picture period amplitude = $0.2V_{p-p}$) to pin 53 and adjust the drive adjustment data so that the picture period amplitudes of pins 41 and 42 are equal to that of pin 43.</p> <p>2) Set SW₅₃ to C.</p> <p>3) Measure the voltages of pins 29, 30, and 55. From an external power supply, apply the measured voltages to these pins.</p> <p>4) Set subaddress (15) data to (D₂).</p> <p>5) From pins 43, 42, and 41, calculate the phase of the ACB insertion pulse in accordance with Fig.1 below.</p> <p>(Note) After the completion of V.BLK, the video period following the falling edge of the FBP input is regarded as 1H and the periods at each completion of H.BLK are counted as 2H, 3H, 4H...</p> <p>6) Measure the ACB insertion pulse amplitude (the level from the picture period amplitude at no input) of pins 43, 42, and 41.</p>

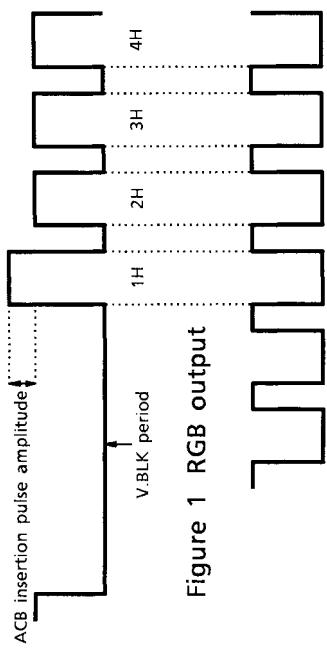
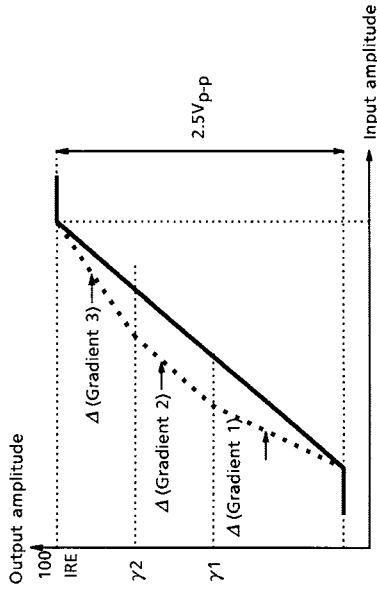


Figure 1 RGB output

Figure 2 FBP input (No.25)

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V, V_{CC2} / V_{CC3} / DEF V_{CC} = 9V, T_a = 25 \pm 3^\circ C$)									
		SWITCHING MODE					TEST CONDITIONS				
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃	
T ₁₉	RGB Y Characteristics	A	A	A	A	A	A	B	B	A	<p>1) Input a ramp waveform to pin 53 and adjust the input amplitude so that the picture period amplitude of pin 43 is $2.3V_{p-p}$.</p> <p>2) Adjust the drive adjustment data so that the picture period amplitudes of pins 41 and 42 are equal to that of pin 43.</p> <p>3) Set the subaddress (14) data to (10).</p> <p>4) From pins 43, 42, and 41, calculate the RGB y start point and its gradient (decibel conversion) in relation to the off point in accordance with Fig.1.</p>



NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / DEF V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)										TEST CONDITIONS
		SWITCHING MODE										
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃		
T ₂₀	Analog RGB Gain	A or B	A or B	A or B	A	A	A	B	B	A		<ol style="list-style-type: none"> 1) Input signal 1 ($f_0 = 100kHz$, picture period amplitude = $0.2V_{p-p}$) to pin 53 and adjust the drive adjustment data so that the picture period amplitudes of pins 41 and 42 are equal to that of pin 43. 2) Apply 5V from an external power supply to pin 32. 3) Input signal 1 ($f_0 = 100kHz$, picture period amplitude = $0.2V_{p-p}$) to pin 35. 4) Measure the picture period amplitude of pin 43. (V43R) 5) As in steps 2) and 3) above, input to pin 34 and measure pin 42, then input to pin 33 and measure pin 41. (V42G, V41B) 6) $GTXR = V43R / 0.2$ $GTXG = V42G / 0.2$ $GTXB = V41B / 0.2$
T ₂₁	Analog RGB White Peak Slice Level	A	A	A	↑	↑	↑	↑	↑	↑		<ol style="list-style-type: none"> 1) Repeat step 1) of T₂₀. 2) Apply 5V from an external power supply to pin 32. 3) Set the RGB contrast data to the maximum (7F). 4) Connect an external power supply to pin 35, increase the voltage gradually from 3.0V, and measure the picture period amplitude voltage when pin 43 is clipped. 5) As in steps 3) and 4) above, input to pin 34 and measure pin 42, then input to pin 33 and measure pin 41.
T ₂₂	Analog RGB Black Peak Limiter Level	↑	↑	↑	↑	↑	↑	↑	↑	↑		<ol style="list-style-type: none"> 1) Repeat step 1) of T₂₀. 2) Apply 5V from an external power supply to pin 32. 3) Set the RGB contrast data to the maximum (7F). 4) Connect an external power supply to pin 35, decrease the voltage gradually from 4.5V, and measure the voltage when pin 43 is clipped. 5) As in steps 3) and 4) above, input to pin 34 and measure pin 42, then input to pin 33 and measure pin 41.

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, V _{CC1} = 5V, V _{CC2} / V _{CC3} / DEF V _{CC} = 9V, T _a = 25±3°C)									
		SWITCHING MODE									
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃	TEST CONDITIONS
T ₂₃	RGB Contrast Adjustment Characteristics	A or B	A or B	A or B	A	A	A	B	B	A	<ol style="list-style-type: none"> Repeat step 1) of T₂₀. Apply 5V from an external power supply to pin 32. Input signal 1 (f₀ = 100kHz, picture period amplitude = 0.2V_{p-p}) to pin 35. Measure the picture period amplitude of pin 43 when the RGB contrast data change to the maximum (7F), the center (40), and the minimum (00). (V_{brTXMAX}, V_{brTXCNT}, V_{brTXMIN}) Calculate the maximum and minimum amplitude ratios using decibel conversion. (DRG+, DRG-) As in steps 3), 4) and 5) above, input to pin 34 and measure pin 42, then input to pin 33 and measure pin 41.
T ₂₄	Analog RGB Brightness Adjustment Characteristics	A or B	A or B	A or B	↑	↑	↑	↑	↑	↑	<ol style="list-style-type: none"> Repeat step 1) of T₂₀. Input signal 2 to pins 33, 34, and 35. Apply 5V from an external power supply to pin 32. Adjust the signal 2 amplitude A so that the picture period amplitude of pin 43 is 0.5V_{p-p}. Measure the picture period voltage of pins 43, 42, and 41 when the RGB brightness change to the maximum (7F), the center (40), and the minimum (00). (V_{brTXMAX}, V_{brTXCNT}, V_{brTXMIN})
T ₂₅	Analog RGB Brightness Sensitivity	↑	↑	↑	↑	↑	↑	↑	↑	↑	<ol style="list-style-type: none"> Using the results obtained from T₂₄, calculate the RGB brightness sensitivity for pins 43, 42, and 41. GbrTX = (V_{brTXMAX} - V_{brTXMIN}) / 128

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)										TEST CONDITIONS
		SWITCHING MODE										
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃		
T ₂₆	Text ACL Characteristics	A	A	B	A	A	A	B	B	A		<ol style="list-style-type: none"> 1) Repeat step 1) of T₂₀. 2) Apply 5V from an external power supply to pin 32. 3) Input signal 1 ($f_0 = 100\text{kHz}$, picture period amplitude = $0.2V_{p-p}$) to pin 35. 4) Measure the picture period amplitude of pin 43. (VTXACL1) 5) Measure the picture period amplitude of pin 43 when $-0.5V$ DC is applied to pin 45 from an external source. (VTXACL2) 6) Measure the picture period amplitude of pin 43 when $-1V$ DC is applied to pin 45 from an external source. (VTXACL3) 7) T_{TXACL1} = $-20 \times \log(V_{TXACL2} / V_{TXACL1})$ T_{TXACL2} = $-20 \times \log(V_{TXACL3} / V_{TXACL1})$ 8) Set the subaddress (10) data to (01) and repeat the calculations in steps 5) and 6). (TXACL3, TXACL4)
T ₂₇	Analog OSD Gain	↑	↑	A	A or B	A or B	A or B	↑	↑	↑		<ol style="list-style-type: none"> 1) Input signal 1 ($f_0 = 100\text{kHz}$, picture period amplitude = $0.2V_{p-p}$) to pin 53 and adjust the drive adjustment data so that the picture period amplitudes of pins 41 and 42 are equal to that of pin 43. 2) Apply 5V from an external power supply to pin 36. 3) Input signal 1 ($f_0 = 100\text{kHz}$, picture period amplitude = $0.2V_{p-p}$) to pin 39. 4) Measure the picture period amplitude of pin 43. (V43R) 5) As in steps 3) and 4) above, input to pin 38 and measure pin 42, then input to pin 37 and measure pin 41. (V42G, V41B) 6) GOSDR = $V43R / 0.2$ GOSDG = $V42G / 0.2$ GOSDB = $V41B / 0.2$

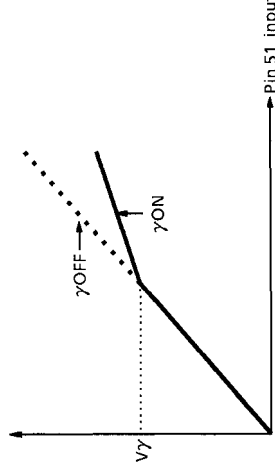
NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)										TEST CONDITIONS
		SWITCHING MODE										
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃		
T ₂₈	Analog OSD White Peak Slice Level	A	A	A	A	A	A	B	B	A		<ol style="list-style-type: none"> 1) Repeat step 1) of T₂₇. 2) Apply 5V from an external power supply to pin 36. 3) Apply external voltage to pin 39, increase the voltage gradually from 0.0V, and measure the picture period amplitude voltage when pin 43 is clipped. (V_{OSD1R}) 4) As in step 3) above, input to pin 38 and measure pin 42. Input to pin 37 and measure pin 41. 5) Set the subaddress (10) data to (04) and repeat the measurements in steps 3) and 4). (V_{OSD2R}, V_{OSD2G}, V_{OSD2B})
T ₂₉	Analog OSD Black Peak Limiter Level	↑	↑	↑	↑	↑	↑	↑	↑	↑		<ol style="list-style-type: none"> 1) Repeat step 1) of T₂₇. 2) Apply 5V from an external power supply to pin 36. 3) Apply external voltage to pin 39, decrease the voltage gradually from 4.5V, and measure the voltage when pin 43 is clipped. 4) As in step 3) above, input to pin 38 and measure pin 42. Input to pin 37 and measure pin 41.
T ₃₀	Analog OSD Output DC Voltage	↑	↑	↑	↑	↑	↑	↑	↑	↑		<ol style="list-style-type: none"> 1) Repeat step 1) of T₂₇. 2) Apply 5V from an external power supply to pin 36. 3) Measure the picture period voltages of pins 43, 42, and 41. (V_{OSDDCR}, V_{OSDDCG}, V_{OSDDCB})

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)										
		SWITCHING MODE										TEST CONDITIONS
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃		
T ₃₁	OSD ACL Characteristics	A	A	A	A	A	B	B	B	A		<ol style="list-style-type: none"> 1) Repeat step 1) of T₂₇. Set the subaddress (10) data to (02). 2) Apply 5V from an external power supply to pin 36. 3) Input signal 1 ($f_0 = 100\text{kHz}$, picture period amplitude = $0.2V_{p-p}$) to pin 39. 4) Measure the picture period amplitude of pin 43. (V_{OSDACL1}) 5) Measure the picture period amplitude of pin 43 when $-0.5V$ DC is applied to pin 45 from an external source. (V_{OSDACL2}) 6) Measure the picture period amplitude of pin 43 when $-1V$ DC is applied to pin 45 from an external source. (V_{OSDACL3}) 7) OSDACL1 = $-20 \times \log(V_{OSDACL2} / V_{OSDACL1})$ OSDACL2 = $-20 \times \log(V_{OSDACL3} / V_{OSDACL1})$ 8) Change the subaddress (10) data to (00) and repeat the measurements in steps 1) to 7). (OSDACL3; OSDACL4)

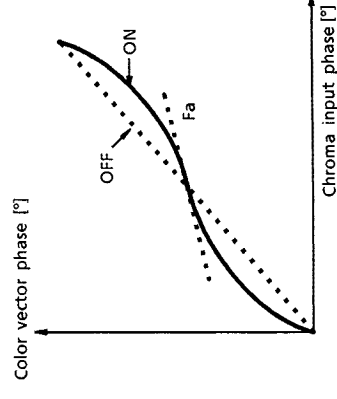
NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)									
		TEST CONDITIONS									
		SWITCHING MODE									
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃	
	Color Difference Block										Color difference block common test conditions SW ₁₃ : A, SW ₁₅ : C, SW ₁₈ : ON, SW ₂₀ : ON, SW ₂₃ : ON, SW ₂₄ : ON, SW ₂₅ : ON
A ₁	Color Difference Contrast Adjustment Characteristics	A	A	A	A	A	A	A or B	A or B	C	<ol style="list-style-type: none"> 1) Change the G and B drive data to the value resulting from the adjustment in step 1) of T₂₀. 2) Set the brightness to maximum, set the subaddress (0F) data to (30), and set the subaddress (10) data to (20). 3) Input signal 3 ($f_0 = 100\text{kHz}$, picture period amplitude = $0.23V_{p-p}$) to pin 51. 4) Measure the picture period amplitude of pin 43 when the unicolor data change to the maximum (7F), the center (40), and the minimum (00). ($v_{cY_{MAX}}$, $v_{cY_{CNT}}$, $v_{cY_{MIN}}$) 5) Calculate the unicolor maximum and minimum amplitude ratios using decibel conversion. (Δv_{uCY}) 6) Repeat steps 3), 4), and 5) above, inputting the picture period amplitude $0.2V_{p-p}$ to pin 52 and measuring pin 41.
A ₂	Color Adjustment Characteristics	↑	↑	↑	↑	↑	↑	↑	↑	↑	<ol style="list-style-type: none"> 1) Measure the voltage of pin 51. Set the brightness to maximum, set the subaddress (0F) data to (30), and set the subaddress (10) data to (20). 2) Input signal 3 ($f_0 = 100\text{kHz}$, picture period amplitude = $0.115V_{p-p}$) to pin 51. 3) Measure the picture period amplitude of pin 43 when the color data are changed to the maximum (7F), the center (40), and the minimum (01). ($v_{cY_{MAX}}$, $v_{cY_{CNT}}$, $v_{cY_{MIN}}$) 4) Calculate the color maximum and minimum amplitude ratios for the center using decibel conversion. (Δv_{cY+}, Δv_{cY-}) 5) Repeat steps 2) to 4) above, inputting the picture period amplitude $0.1V_{p-p}$ to pin 52 and measuring pin 41.

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)										
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃	TEST CONDITIONS	
A ₃	Color Difference Half Tone Characteristics	A	A	A	A	A	A	A or B	A or B	C		<ol style="list-style-type: none"> 1) Set the subaddress (10) data to (20). 2) Input signal 3 ($f_0 = 100\text{kHz}$, picture period amplitude = $0.2V_{p-p}$) to pin 51. 3) Measure the picture period amplitude of the waveform output from pin 43. (VHTA_{RY}) 4) Apply 1.5V from an external power supply to pin 47. 5) Measure the picture period amplitude of the waveform output from pin 43. (VHTB_{RY}) 6) GHTRY = vHTB_{RY} / vHTA_{RY} 7) Repeat steps 1) to 5) above with pin 42. GHTGY = vHTB_{GY} / vHTAGY 8) Repeat steps 1) to 5) above, inputting signal to pin 52 and measuring pin 41. GHTBY = vHTB_{BY} / vHTA_{BY}

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V, V_{CC2} / V_{CC3} / DEF V_{CC} = 9V, T_a = 25 \pm 3^\circ C$)									
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃	TEST CONDITIONS
A ₄	Color Y Characteristics	A	A	A	A	A	A	B	B	C	<p>1) Set the subaddress (10) data to (20).</p> <p>2) Input signal 2 to pin 51.</p> <p>3) When the subaddress (07) data are: (80)–YOFF (82)–Y1ON (84)–Y2ON (86)–Y3ON measure the changes in the amplitude level of the pin 43 output signal at an increase the amplitude A of signal 2 and plot the characteristics.</p> <p>4) Calculate the γ_{ON} gradient Δ, using V_Y, which represents the point at which the γ characteristics become effective, and the gradient of the linear section with γ_{OFF} as (1).</p>
A ₅	Color Limiter Characteristics	↑	↑	↑	↑	↑	↑	↑	A	↑	<p>1) Measure the voltage of pin 51.</p> <p>2) Set the subaddress (10) data to (20).</p> <p>3) Input signal 2 (picture period amplitude = $0.4V_{p-p}$) to pin 52.</p> <p>4) Measure the picture period amplitude of the pin 43 output signal when the subaddress (07) data are (80) and (81). (CLT0, CLT1)</p>



NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V$, $T_a = 25 \pm 3^\circ\text{C}$)										
		SWITCHING MODE										
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃	TEST CONDITIONS	
A ₆	High-Brightness Color Gain	A	A	A	A	A	A	A	B	A	C	<ol style="list-style-type: none"> 1) Set subaddress (10) data to (20). 2) Input signal 2 (picture period amplitude = $0.2V_{p-p}$) to pin 52. 3) Adjust the color control so that the picture period amplitude output from pin 41 is $1.2V_{p-p}$. 4) Measure the picture period amplitude of the pin 41 output signal when the subaddress (06) data are (FF). (V_{41}) 5) $HBC1 = (1.2 - V_{41}) / 1.2$
A ₇	Flesh Color Characteristics	↑	↑	↑	↑	↑	↑	↑	A	↑	↑	<ol style="list-style-type: none"> 1) Input IQ demodulated flesh-bar signals (15°-step rainbow signals in the range -30° to $+240^\circ$) to pin 52 (Q signal) and pin 51 (I signal) as $0.2V_{p-p}$. Set the brightness to maximum. 2) Set subaddress (10) data to (00). 3) Measure the signals output from pins 41 and 43 and switch to subaddress (10) data to (06). Measure the output signals and calculate the variation characteristics of the color vector phase. 4) Draw the vector variation characteristics curve showing the on state from the off state and calculate the gradient in the vicinity of the I axis as Fa33. Subaddress (08) Data (80) off Data (81) on



NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / DEF V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)										
		SW ₃₃	SW ₃₄	SW ₃₅	SW ₃₇	SW ₃₈	SW ₃₉	SW ₅₁	SW ₅₂	SW ₅₃	TEST CONDITIONS	
A8	Color Detail Emphasis	A	A	A	A	A	A	A	A	B	A	<ol style="list-style-type: none"> 1) Connect SG to Y-IN and input a 4MHz frequency sine wave at 20mV_{p-p}. 2) Set the subaddress (02) data to (01). 3) Set the subaddress (10) data to (20). 4) Set the subaddress (11) data to (02). 5) Read the 4MHz amplitude output to pin 43. (V_{CDE0}) 6) Input signal 2 (picture period amplitude = 0.3V_{p-p}) to pin 51. 7) Set the subaddress (02) data to (81). 8) Read the 4MHz amplitude output to pin 43. (V_{CDE1}) (mV_{p-p}) 9) Set the subaddress (0A) data to (81) and read the amplitude of frequency Fp output to pin 43. (V_{CDE2}) (mV_{p-p}) 10) $GCD0 = 20 \times \log(V_{CDE1} - V_{CDE0} / 20)$ $GCD1 = 20 \times \log(V_{CDE2} - V_{CDE0} / 20)$

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / DEF V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)					
		SWITCHING MODE					
		SW16	SW17	SW18	SW20	SW23	SW25
	DEF Block						
D1	Horizontal Oscillation Control Sensitivity	D	B	ON	OFF	A	ON
D2	Horizontal Sync Phase	↑	C	↑	ON	↑	↑

DEF Block common test conditions
 SW13 : A, SW33 : A, SW34 : A, SW35 : A, SW37 : A, SW38 : A,
 SW39 : A, SW48 : ON, SW49 : ON, SW51 : B, SW52 : B,
 SW56 : ON, BUS Data = power on reset

Calculate the pin 23 (H.out) frequency variation rate when the voltage on pin 20 is varied by $\pm 0.05V$ with a horizontal oscillation frequency of 15.734kHz.

Measure the phase difference SPH_1 of the pin 23 (H.out) waveform in relation to the pin 17 (HD.out) waveform when a 50Hz composite video signal is applied to TP15. Measure the phase difference SPH_2 of the pin 20 waveform in relation to the center of the input signal's horizontal sync signal. Also, apply a 60Hz composite video signal to pin 15 and measure SPH_3 .

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V, V_{CC2} / V_{CC3} / DEF V_{CC} = 9V, T_a = 25 \pm 3^\circ C$)					
		SW ₁₆	SW ₁₇	SW ₁₈	SW ₂₀	SW ₂₃	SW ₂₅
D ₃	Range of Curve Correction	D	C	ON	ON	A	ON
D ₄	Horizontal Screen Phase Adjustment Range	↑	↑	↑	↑	↑	↑

TP15
(Sync input)
TG7

Pin 15

Pin 24
(Curve correction pin)

Pin 23
(H.O.U.T)

TEST CONDITIONS

Vary the voltage by 1.5V to 3.5V, apply a 50Hz composite video signal to pin TP15, and measure the phase variation of the pin 23 (H.out) waveform.

Pin 17 waveform

Pin 23 Input signal

Pin 24 = 3.5V

Pin 24 = 1.5V

ΔH_{24}

Under the same conditions as those for D₃, measure phase variation of the pin 23 (H.out) waveform when subaddress (0B) data D₇ to D₃ are varied by (00000) to (11111).

Pin 17 waveform

Pin 23 Input signal

When (00000)

When (11111)

ΔH_{5FT}

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V, V_{CC2} / V_{CC3} / \text{DEF } V_{CC} = 9V, T_a = 25 \pm 3^\circ C$)							
		SW ₁₆	SW ₁₇	SW ₁₈	SW ₂₀	SW ₂₃	SW ₂₅	SW ₃₅	
D ₅	Clamp Pulse Start Phase Pulse Width of Clamp Pulse	D	C	ON	ON	A	ON	OPEN	<p>TEST CONDITIONS</p> <p>Apply a 50Hz composite video signal to TP15, then measure the phase difference CP_S and the pulse width CP_W of the pin 35 (Rin) waveform in relation to the pin 17 (HD.out) waveform.</p>
D ₆	Gate Pulse Start Phase Pulse Width of Gate Pulse	↑	↑	↑	↑	↑	↑	—	<p>Apply a 50Hz composite video signal to TP15, then measure the phase difference CP_S and the pulse width CP_W of the pin 2 (SCP) waveform in relation to the pin 17 (HD.out) waveform.</p>

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / DEF V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)					
		SW ₁₆	SW ₁₇	SW ₁₈	SW ₂₀	SW ₂₃	SW ₂₅
D7	Horizontal Blanking Pulse Start Phase Pulse Width of Horizontal Blanking Pulse	D	C	ON	ON	A	ON
D8	HD Output Start Phase HD Output Pulse Width HD Output Amplitude	↑	↑	↑	↑	↑	↑

Pin 17 Waveform

Pin 2 Output waveform

HPW

Under the same conditions as those for D6, measure the phase difference HP_S and HP_{W60} of the horizontal blanking pulse.
Also measure HP_{W60} at 60Hz.

TP15 (illegible input)

Pin 15

Pin 20 (AFC1 filter)

Pin 17 (HD output)

Apply a 50Hz composite video signal to TP15, then measure the phase difference HP_S and the pulse width HP_W / V_{HD} of the pin 17 (HD out) waveform in relation to the pin 20 (AFC1 filter) waveform.

Pin 15 Input waveform

Pin 20 Waveform

HPW

HP_S

Pin 17 Output waveform

V_{HD}

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / DEF V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)					TEST CONDITIONS
		SWITCHING MODE					
		SW ₁₆	SW ₁₇	SW ₁₈	SW ₂₀	SW ₂₃	SW ₂₅
D ₉	Vertical Blanking Pulse Start Phase (1)						
	Vertical Blanking Pulse End Phase (1)	D	C	ON	ON	A	ON
D ₁₀	Vertical Blanking Pulse Start Phase (2)						
	Vertical Blanking Pulse End Phase (2)	↑	↑	↑	↑	↑	↑
D ₁₁	Vertical Pull-In Range (1)						
	Vertical Pull-In Range (2)						
	Vertical pull-in range (3)	↑	↑	↑	↑	↑	↑
	Vertical pull-in range (4)						

Apply a 50Hz composite video signal to TP15, then measure the phase difference VP_{50S1} and the pulse width VP_{50S2} of the pin 2 (SCP) waveform in relation to the pin 17 (sync input) waveform.

Apply the same conditions as those for D₉ except change the input signal to a 60Hz composite video signal and measure the phase difference VP_{60S} and pulse width VP_{60W}.

Input a 60Hz composite video signal to pin TP15, vary the vertical frequency of this signal in 0.5H-steps, and measure the vertical pull-in range.

Set D₅ to D₃ of subaddress (17) to (001), vary the vertical frequency of a 60Hz composite video signal input to pin TP15 in 0.5H-steps, and measure the vertical pull-in range.

Input a 60Hz composite video signal to pin TP15, vary the vertical frequency of this signal in 0.5H-steps, and measure the number of Hs when D₂ of the 1st byte changes from 0 to 1 in bus read mode. Also check that D₁ of the 1st byte is 0 when 1V = 312.5H, when D₁ is 1 in bus read mode, and 1V < 311.5 or 1V > 313.5H.

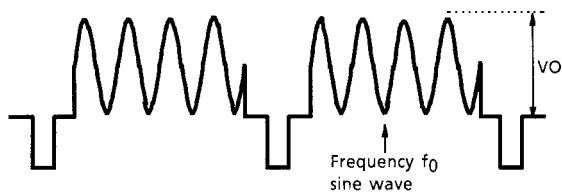
Input a 60Hz composite video signal to pin TP15, vary the vertical frequency of this signal in 0.5H-steps, and measure the number of Hs when D₂ of the 1st byte changes from 1 to 0 in bus read mode when. Also check that D₁ of the 1st byte is 0 when 1V = 262.5H, D₁ is 1 in bus read mode, and 1V < 261.5 or 1V > 263.5H.

NOTE	PARAMETER	TEST CONDITIONS (UNLESS OTHERWISE STATED, $V_{CC1} = 5V$, $V_{CC2} / V_{CC3} / DEF V_{CC} = 9V$, $T_a = 25 \pm 3^\circ C$)							TEST CONDITIONS	
		SW ₁₆	SW ₁₇	SW ₁₈	SW ₂₀	SW ₂₃	SW ₂₅	SW ₃₃ SW ₃₄ SW ₃₅ SW ₃₇ SW ₃₈ SW ₃₉		#32 #36 #47
D ₁₂	RGB Output Vertical Blanking Pulse Start Phase (1) RGB Output Vertical Blanking Pulse End Phase (1)	D	C	ON	ON	A	ON	A	Ground	<p>Apply a 50Hz composite video signal to TP15, then measure the phase difference VR_{50S1} and the pulse width VR_{50S2} of the pin 43 (R.out) waveform in relation to the pin 15 (sync input) waveform. Similarly, measure pins 42 and 41.</p>
D ₁₃	RGB Output Vertical Blanking Pulse Start Phase (2) RGB Output Vertical Blanking Pulse End Phase (2)	↑	↑	↑	↑	↑	↑	↑	↑	<p>Apply the same conditions as those for D₁₂ except change the input signal to a 60Hz composite video signal and measure the phase difference VP_{60S1} and pulse width VP_{60S2}.</p>

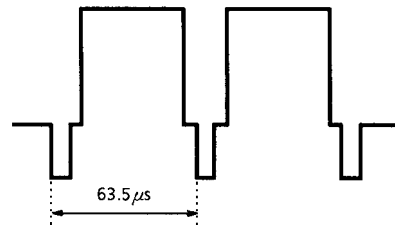
CHROMA TEST SIGNALS

TEXT / COLOR DIFFERENCE TEST SIGNALS

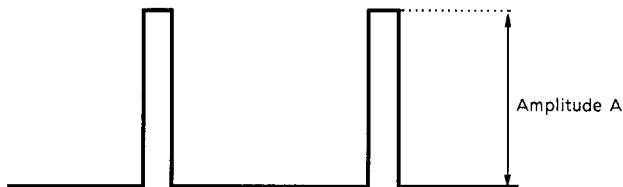
1) Input signal C-1



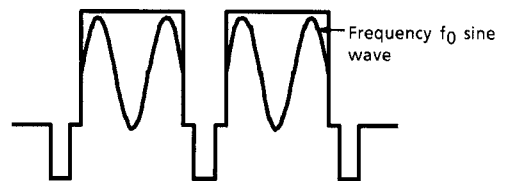
1) Video signal



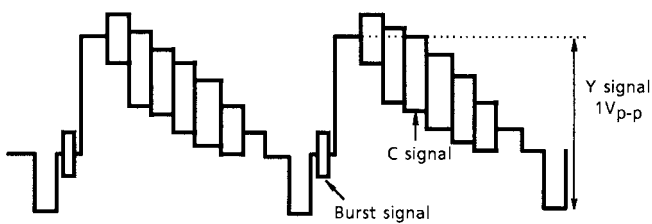
2) Input signal C-2



2) Input signal 1



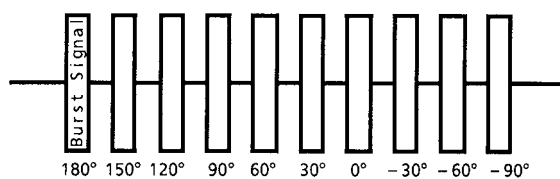
3) Input signal C-3



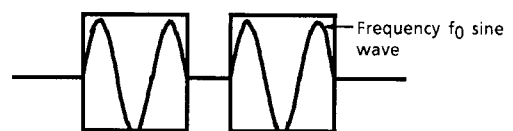
3) Input signal 2



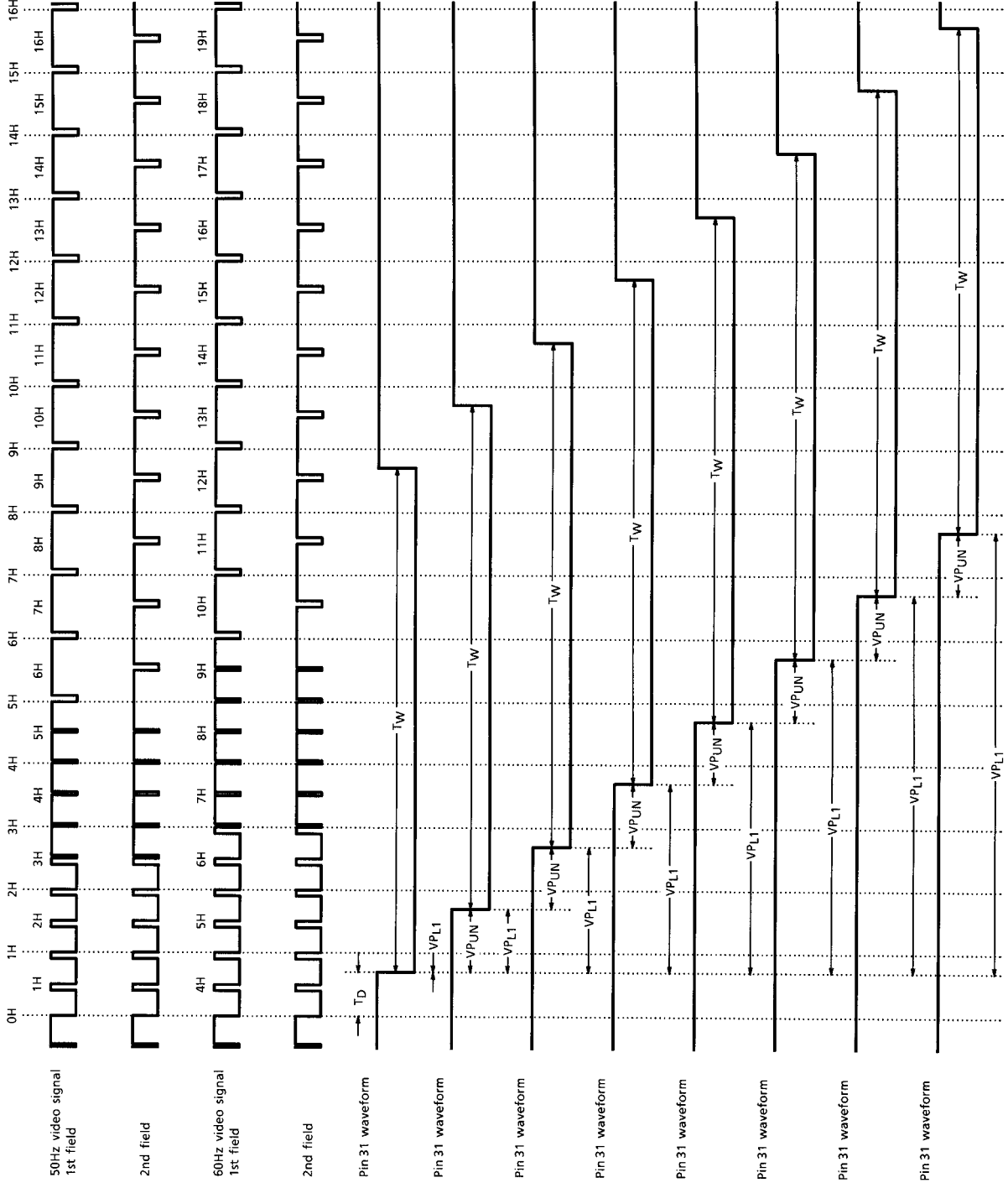
4) Input signal C-4



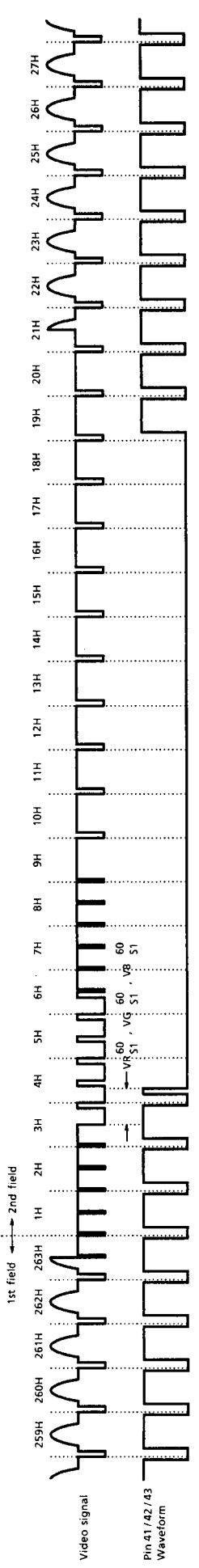
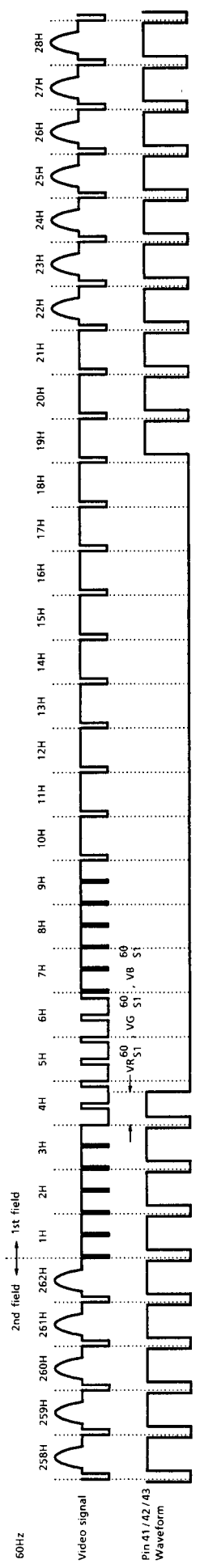
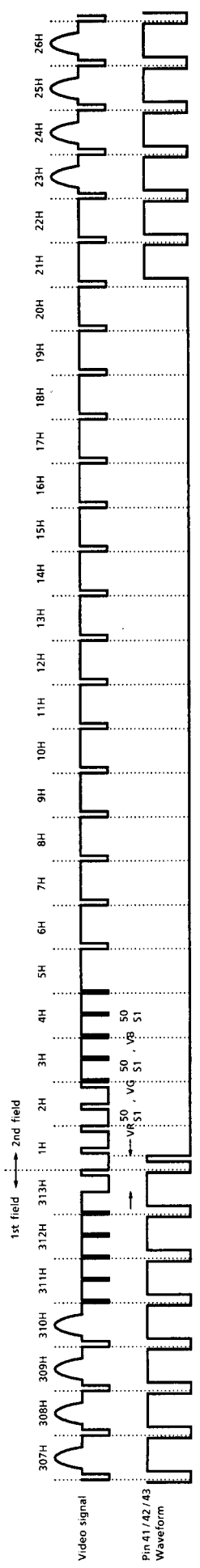
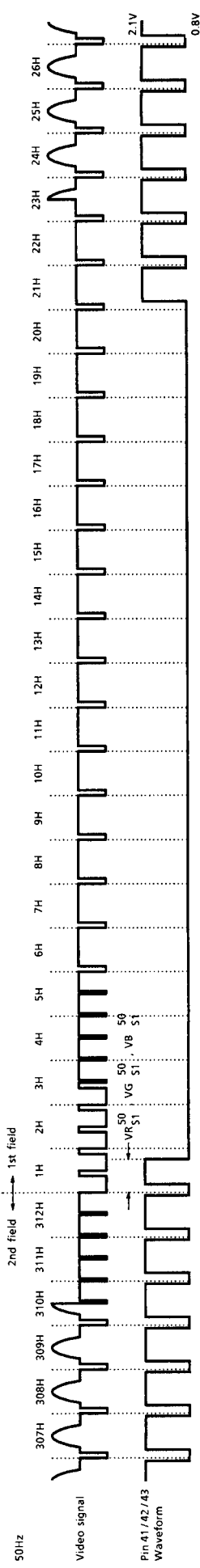
4) Input signal 3



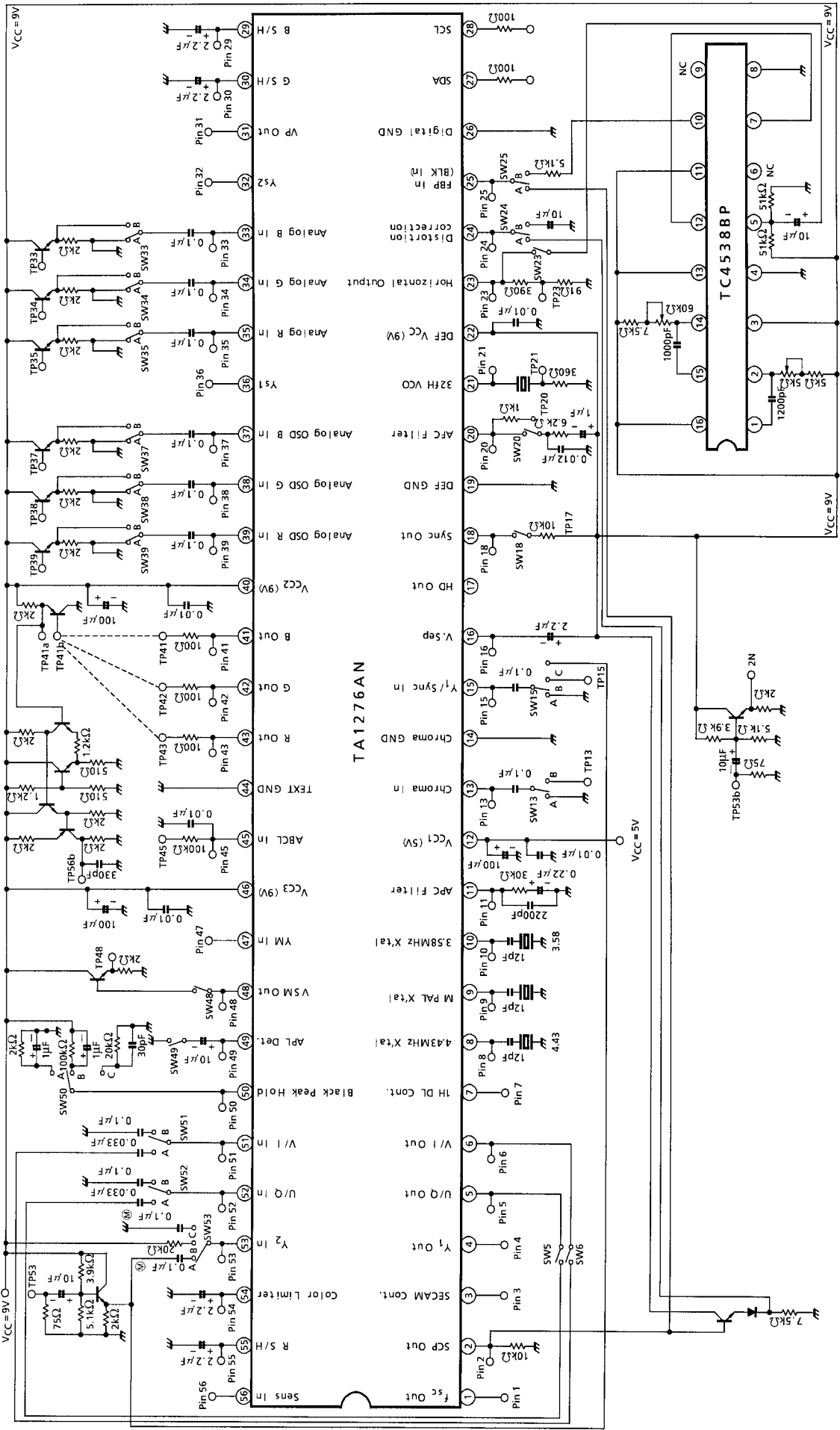
VERTICAL OUTPUT PULSE WIDTH / VERTICAL OUTPUT PULSE PHASE VARIATION / VERTICAL OUTPUT PULSE PHASE RANGE



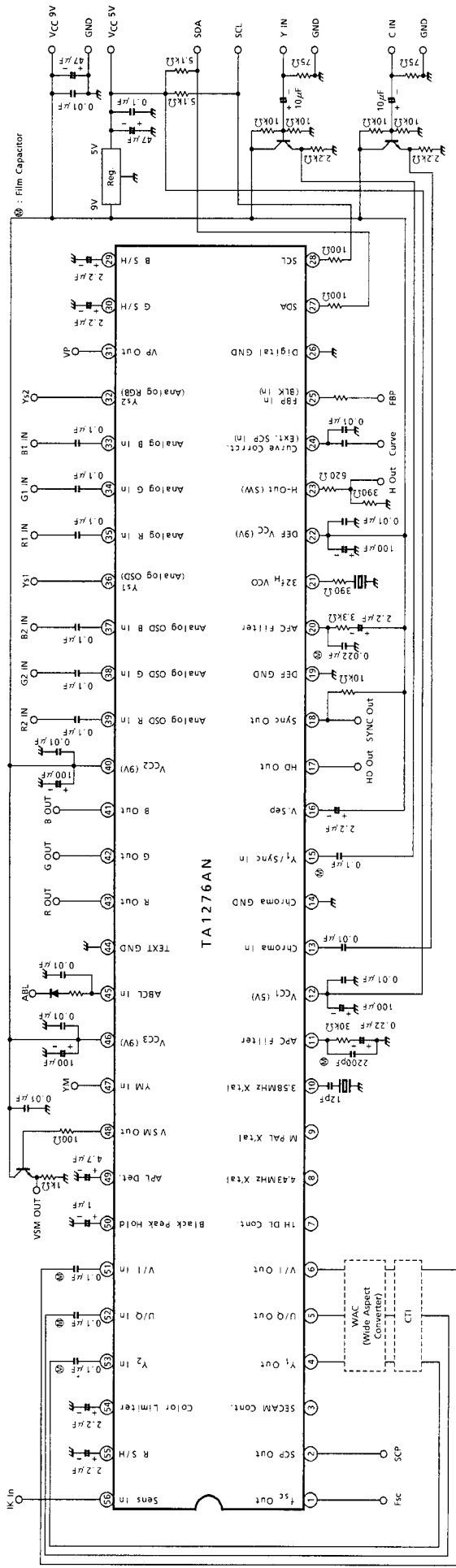
RGB VERTICAL BLANKING PULSE START PHASE / END PHASE



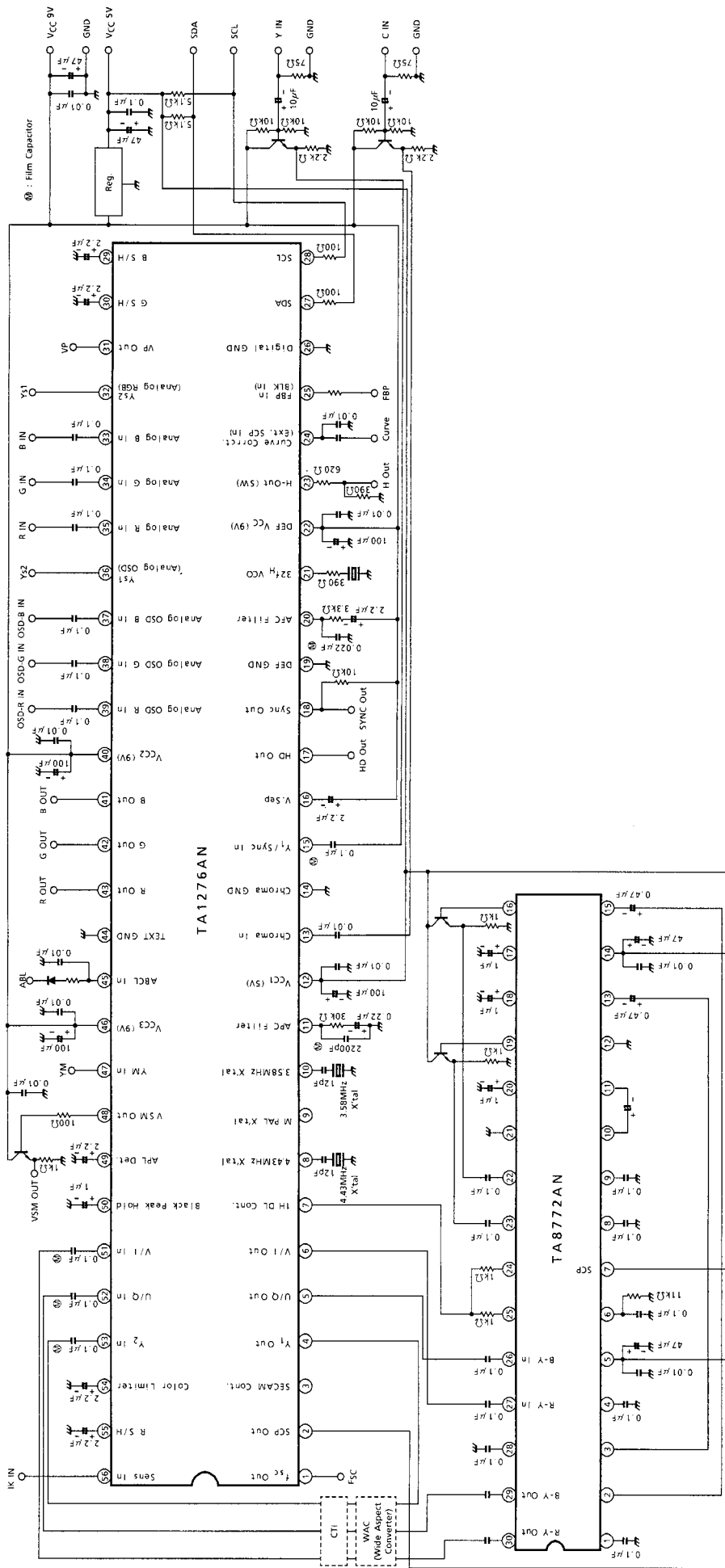
TEST CIRCUIT



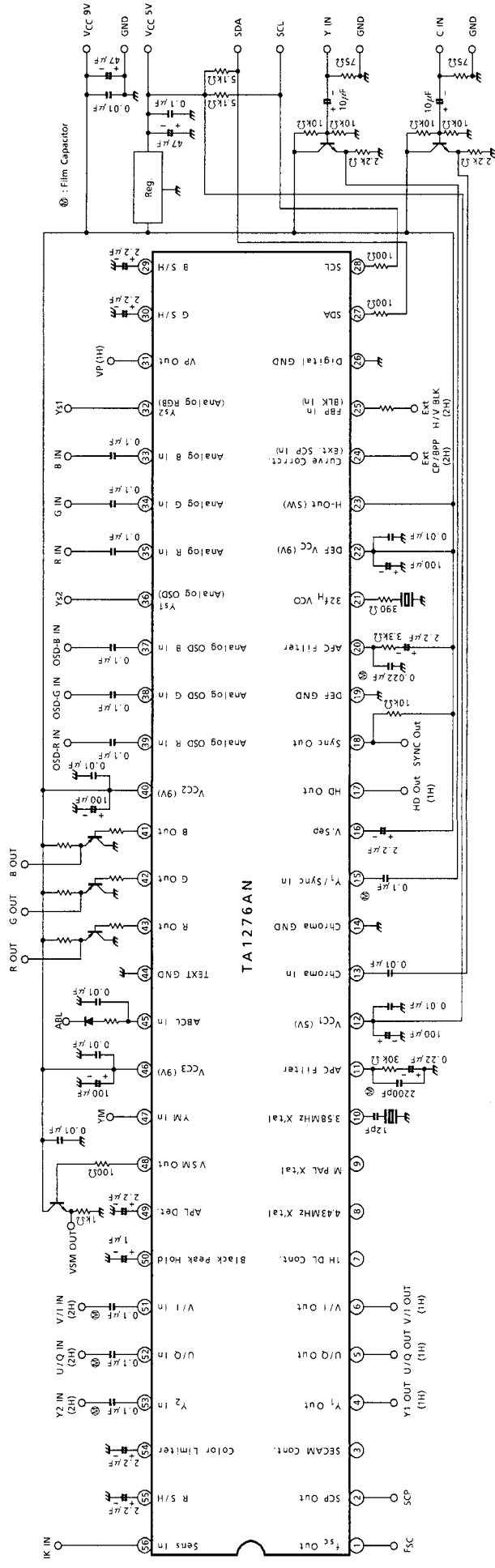
APPLICATION CIRCUIT 1-NORMAL SCAN (3.58NTSC)



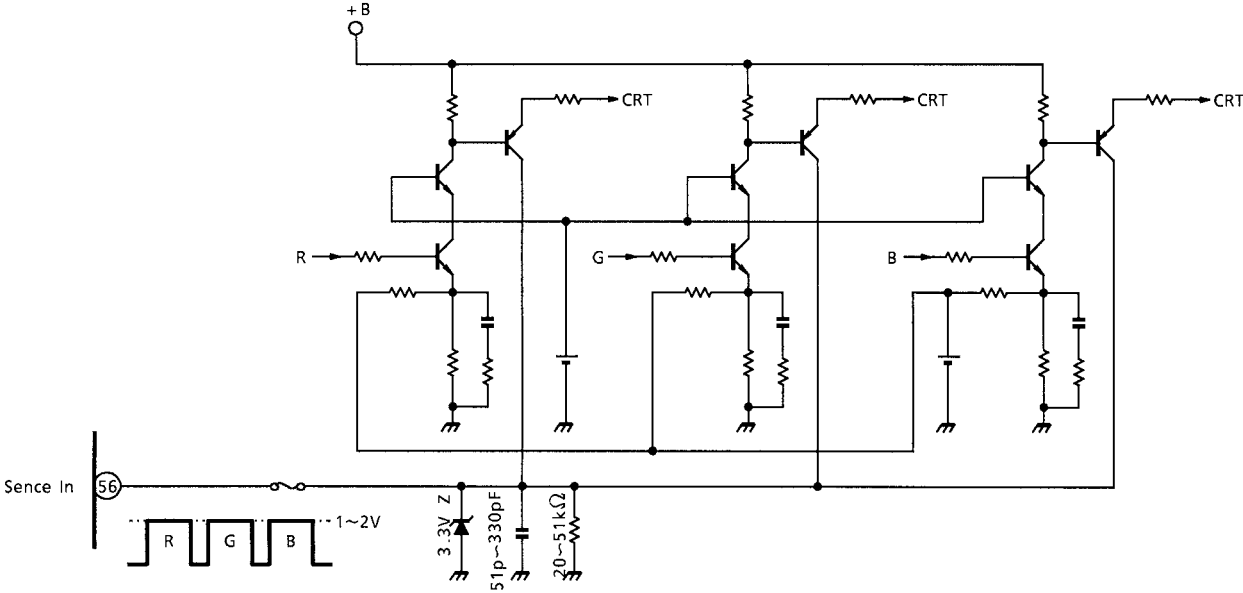
APPLICATION CIRCUIT 2-NORMAL SCAN (4.43PAL / 4.43NTSC / 3.58NTSC)



APPLICATION CIRCUIT 5-DOUBLE SCAN (3.58NTSC)



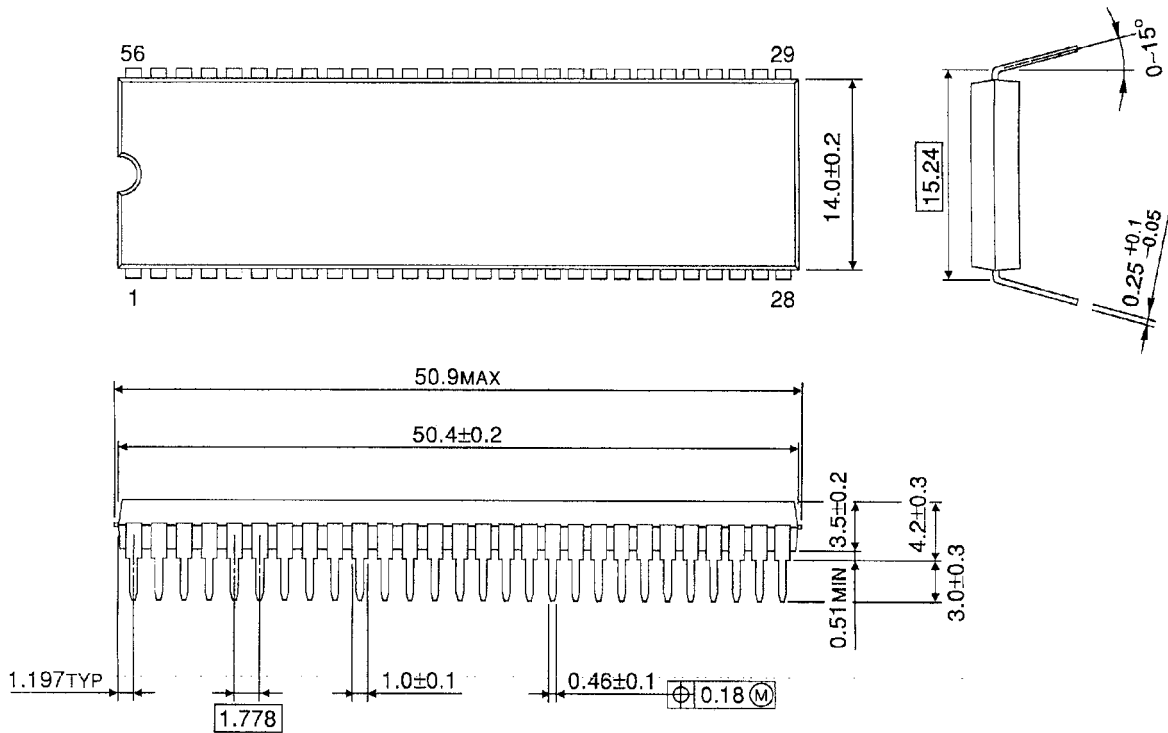
AKB APPLICATION CIRCUIT



PACKAGE DIMENSIONS

SDIP56-P-600-1.78

Unit : mm



Weight: 5.55g (Typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

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