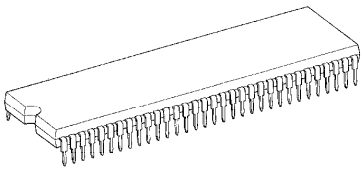
TENTATIVE TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8880CN

VIDEO, CHROMA, AND SYNC. SIGNAL PROCESSING IC FOR PAL / NTSC / SECAM-SYSTEM COLOR TELEVISIONS

The TA8880CN is a signal processing IC for a PAL / NTSC / SECAM-system color television involving video, chroma, and sync. signal processing circuits in a 64-pin shrink DIP plastic package.
The video section contains a high-performance picture quality emphasis circuit, the chroma section contains a PAL / NTSC / SECAM-system automatic identification circuit, and the sync. section contains a 50 / 60Hz automatic identification circuit. The PAL / SECAM demodulating circuit uses a baseband signal processing system, providing an adjustment-free demodulating circuit. User control functions, system switching, etc. are controlled via the I^2C bus.



SDIP64-P-750-1.78

Weight : 8.85g (Typ.)

FEATURES

Video section

- Sharpness control with internal delay lines
- Black stretching circuit
- YNR
- Variable DC restoration ratio
- Gamma (γ) contrast correction

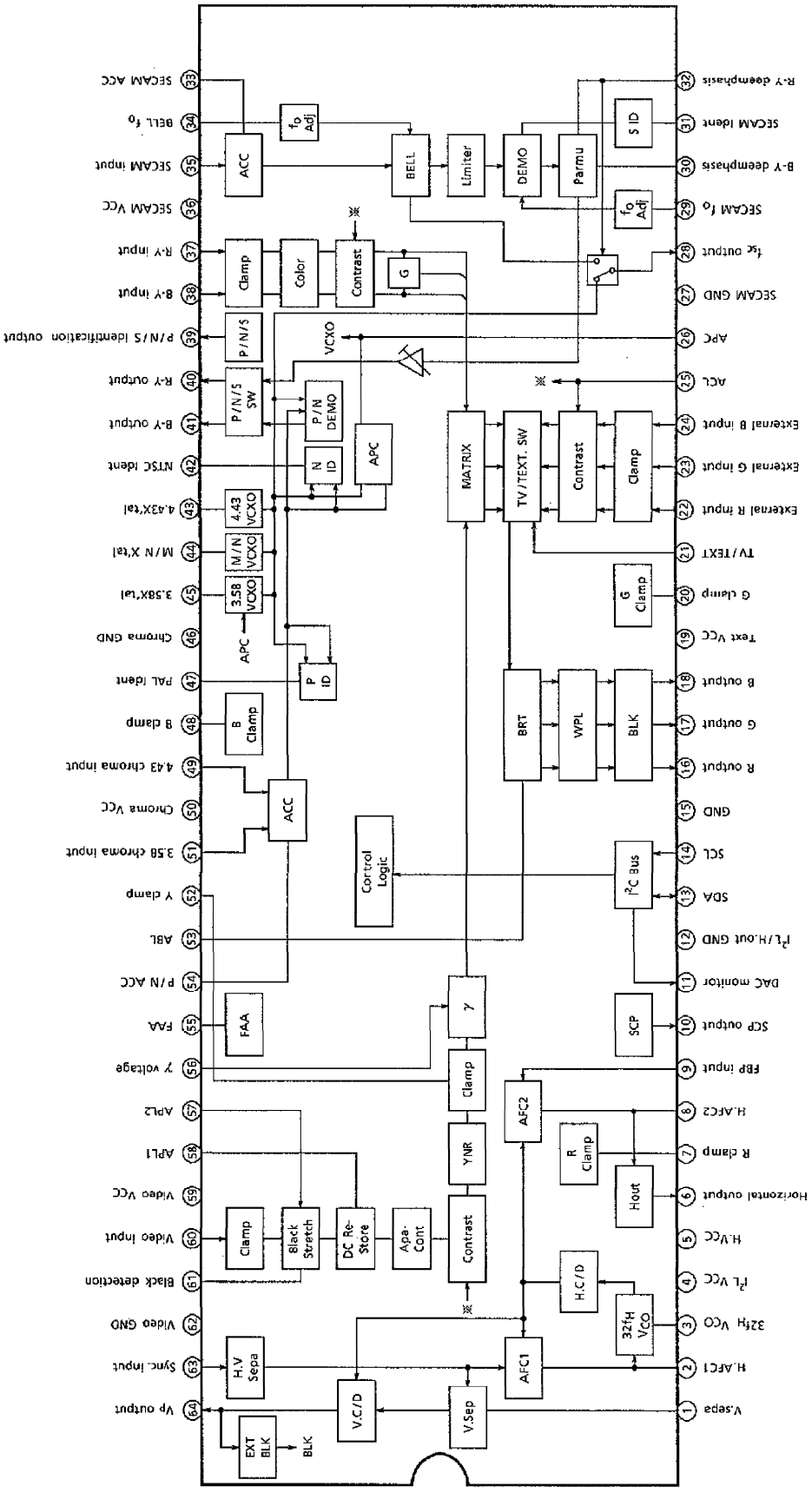
Chroma section

- PAL / SECAM baseband demodulation system
- Automatic crystal frequency identification (4.43MHz / 3.58MHz / M, N-PAL)
- Automatic chroma system identification (PAL / NTSC / SECAM)
- PLL SECAM adjustment-free demodulating circuit without any tank coils
- Built-in SECAM BELL filter

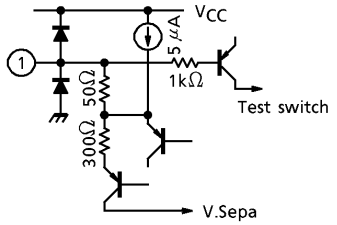
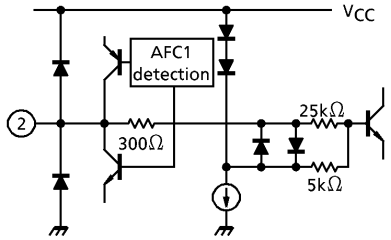
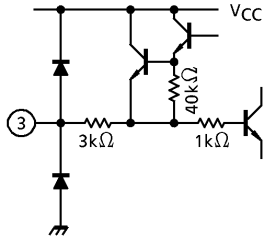
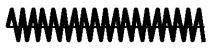
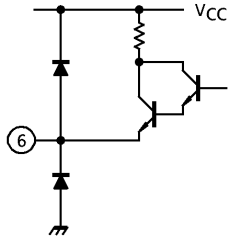
Sync. section

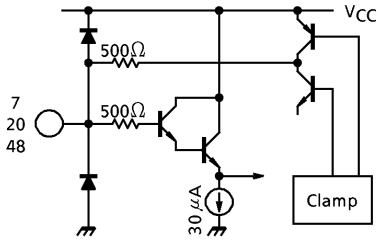
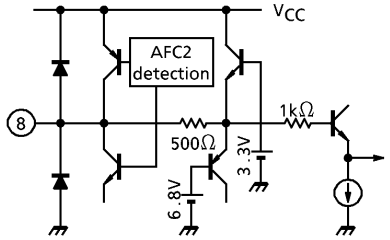
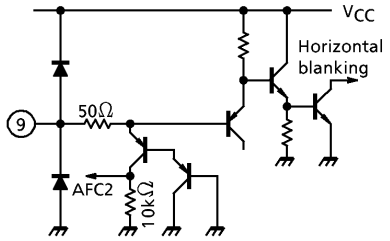
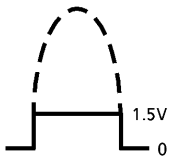
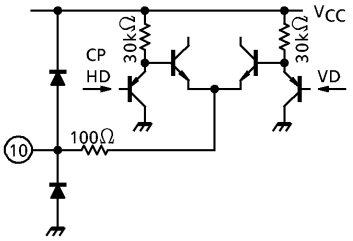
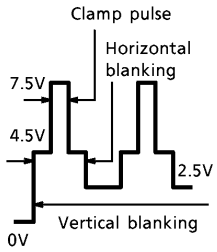
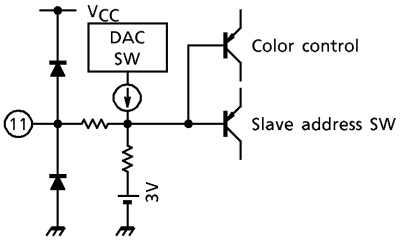
- Adjustment-free horizontal and vertical oscillation circuits based on countdown system
- Automatic vertical frequency identification (50 / 60Hz)3

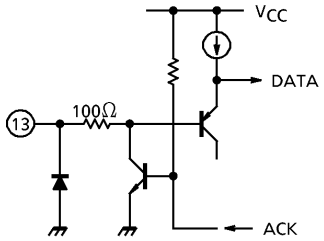
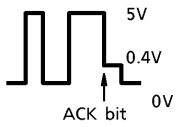
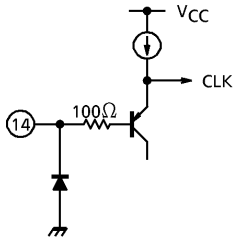
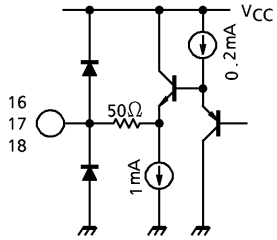
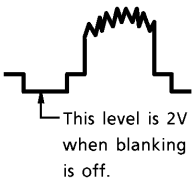
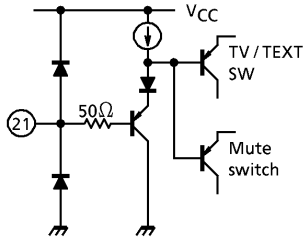
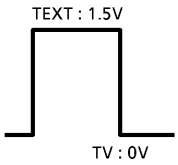
BLOCK DIAGRAM

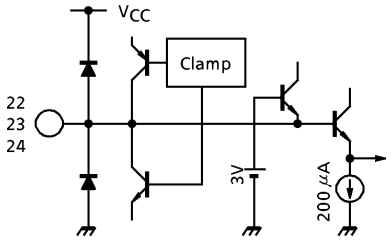
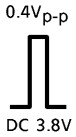
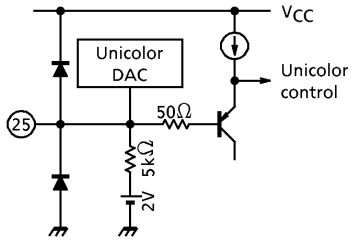
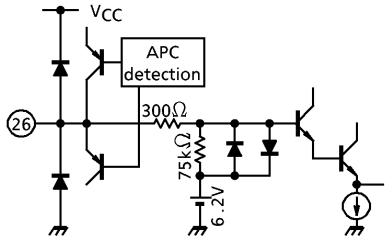
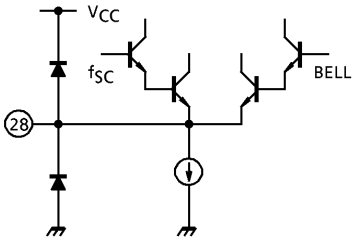
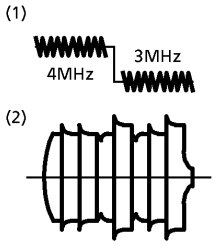
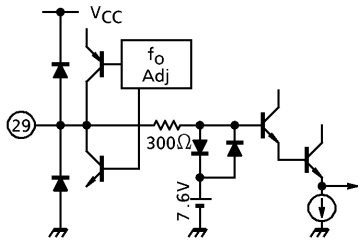


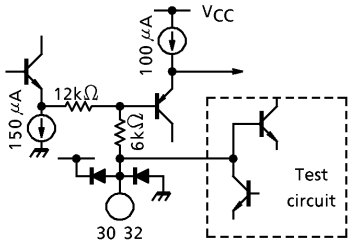
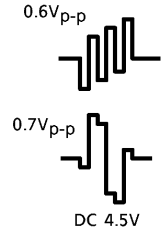
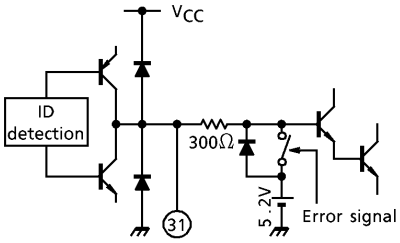
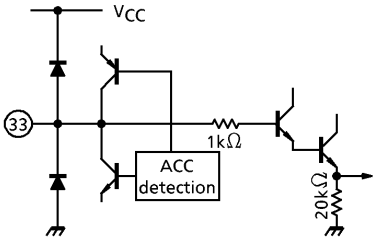
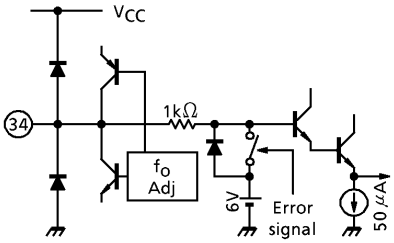
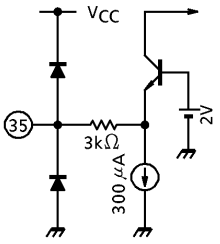
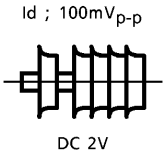
TERMINAL FUNCTION

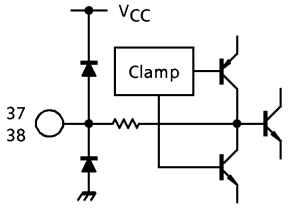
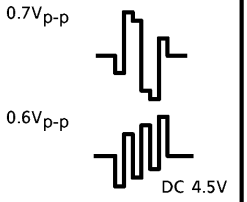
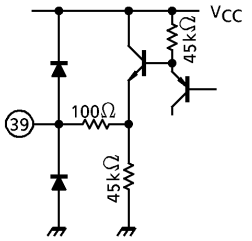
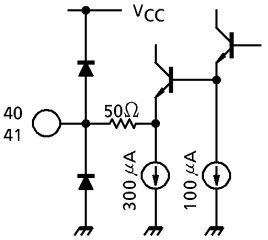
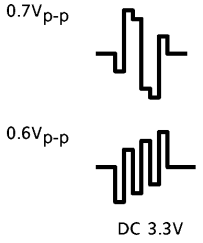
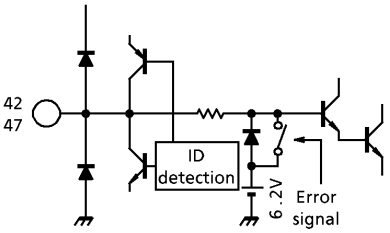
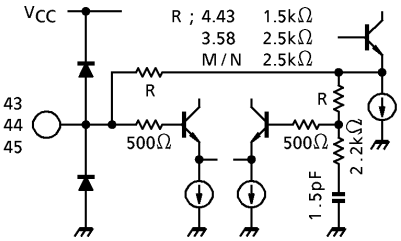
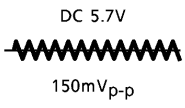
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	TERMINAL SIGNAL
1	V.Sepa	This pin is for a vertical sync. signal separation filter.		DC 6V  100mVp-p
2	H.AFC1	This pin is for a horizontal AFC filter. The voltage at this pin determines the frequency of horizontal output.		DC 7.6V
3	$32f_H$ V_{CO}	This pin is for a ceramic resonator for horizontal oscillation. For this resonator, we recommend the CSB503F30 made by MURATA ELECTRONICS Co.		DC 6V  100mVp-p
4	I^2L V_{CC}	This is the power supply for the logic processing circuit. Apply 3.3V (typ.) to this pin.	—	—
5	H.V_{CC}	This is the power supply for the horizontal sync. circuit. Apply 9V (typ.) to this pin.	—	—
6	Horizontal output	This is a horizontal output terminal.		High : 5V Low : 0V  Duty cycle : 41%

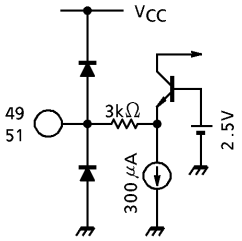
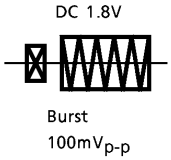
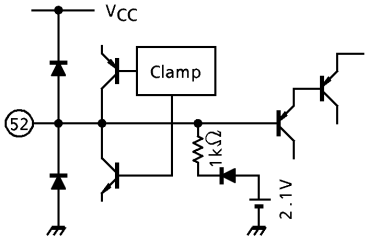
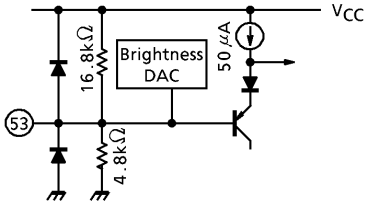
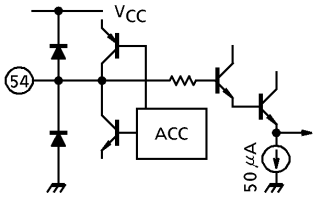
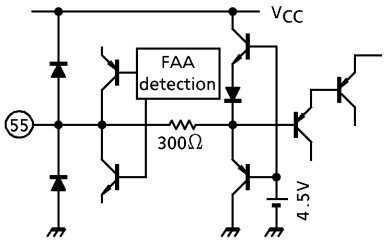
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	TERMINAL SIGNAL
7 20 48	R clamp G clamp B clamp	These pins are for the R, G, and B output clamping filters.		DC 3.5V~4.5V
8	H.AFC2	This pin is for a H.AFC2 filter. The voltage at this pin determines the phase of the horizontal output.		DC 7V
9	FBP input	This pin is input terminal for FBP to generate pulses for H.AFC2 and horizontal blanking circuits.		
10	SCP output	This pin outputs a Sand Castle Pulse (SCP). The output signal consists of a clamp pulse, horizontal blanking, and vertical blanking. Use 10kΩ for load resistance.		
11	DAC monitor	(1) Selects a slave address. High : 8AH Low : 88H (2) Can monitor the output voltage of each control DAC. (3) Color control terminal.		DC 3V
12	I^2L / H.out GND	This is the ground for the logic and horizontal output circuits.	—	—

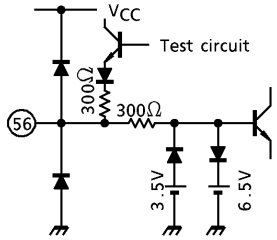
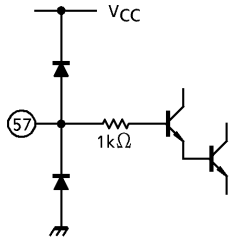
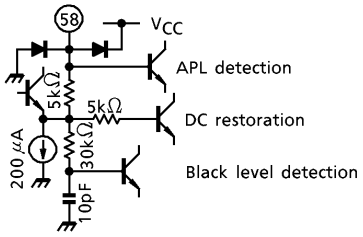
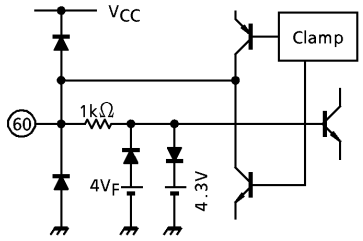
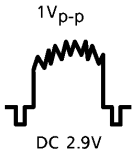
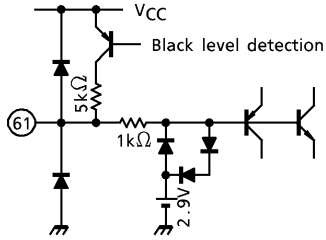
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	TERMINAL SIGNAL
13	SDA	This is a SDA terminal for the I^2C bus. Because its is week for surge inpulse, connect external devices for protection against surge if necessary.		
14	SCL	This is a SCL terminal for the I^2C bus. Because its is week for surge inpulse, connect external devices for protection against surge if necessary.		
15	GND	This is the ground for the sync. and TEXT circuits.	—	—
16 17 18	R output G output B output	These pins are R, G, and B outputs. When using this device in combination with the TA8889P or TA8889AP, turn its blanking mode off.		
19	TEXT V_{CC}	This is the power supply for the TEXT circuit. Apply 9V (typ.) to this pin.	—	—
21	TV / TEXT	This pin is a switch selecting the R / G / B output signal between TV signal and external TEXT signal. This pin also is a R / G / B mute switch. Vth : 5V Mute, 1V TEXT, 0V TV		

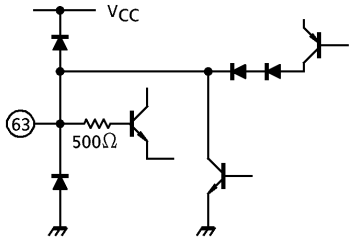
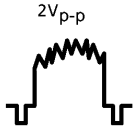
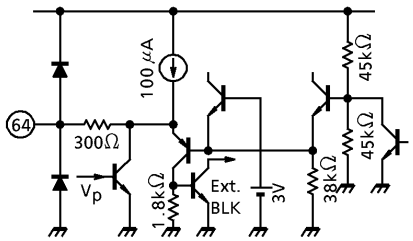
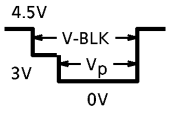
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	TERMINAL SIGNAL
22 23 24	External R input External G input External B input	These are external TEXT input pins. Input R / G / B signal through a clamping capacitor.		
25	ACL	This is an external unicolor control terminal. Use this pin when applying ACL.		DC 2V
26	APC	This pin is for an APC filter for PAL / NTSC demodulation. The voltage at this pin determines the oscillation frequency of VCXO.		DC 6.2V
27	SECAM GND	This is the ground for the SECAM demodulator circuit.	—	—
28	f_{SC} output	(1) Outputs the oscillation waveform of VCXO. (2) Outputs the signal through the BELL filter if applying 1V to pin 32.		
29	SECAM f_O	Connect automatic f_O adjusting filter for SECAM PLL demodulation VCO.		DC 7.6V

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	TERMINAL SIGNAL
30 32	B-Y deemphasis R-Y deemphasis	This pin is for a SECAM deemphasis capacitor. The output of the BELL filter can be monitored at pin 28 by applying 1V to pin 32.		
31	SECAM Ident	This pin is for a SECAM Ident filter. Connect a proper value resistance in parallel to prevent mis-identification of color system.		DC 5.2V
33	SECAM ACC	This pin is for a SECAM ACC filter.		DC 4V
34	BELL f_O	This pin is for an automatic f_O adjusting filter for the BELL filter.		DC 6V
35	SECAM input	This pin is for the SECAM chroma signal input. Input the chroma signal through a broadband 4.3MHz BPF to improve the color signal edge shape on the condition of small signal input.		
36	SECAM V_{CC}	This is the power supply for the SECAM demodulator circuit.	—	—

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	TERMINAL SIGNAL
37 38	R-Y input B-Y input	These are input terminals for R-Y and B-Y signals. Input R-Y and B-Y signals through a clamping capacitor.		
39	P / N / S identification output	This pin shows the system identification, PAL, SECAM or NTSC. For the black and white identification, this pin keeps the immediate voltage. The voltage at this pin immediately after power -on is indeterminate.		DC PAL 8.3V SECAM 4.6V NTSC 0V
40 41	R-Y output B-Y output	These pins output the R-Y and B-Y signals.		
42 47	NTSC Ident PAL Ident	This pin is for a PAL / NTSC Ident filter. The color killer sensitivity can be set by connecting resistance in parallel to prevent mis-identification.		DC 6.2V
43 44 45	4.43X'tal M / N X'tal 3.58X'tal	These pins are for crystal resonators. Use the series capacitance to vary the free running frequency, f_o, and the parallel capacitance to vary the frequency control range.		
46	Chroma GND	This is the ground for the PAL / NTSC demodulator circuit.	—	—

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	TERMINAL SIGNAL
49 51	4.43 chroma input 3.58 chroma input	These pins are the 4.43 / 3.58MHz chroma signal inputs. Input the chroma signal through a BPF.		
50	Chroma V_{CC}	This is the power supply for the PAL / NTSC demodulator circuit. Apply 9V (typ.) to this pin.	—	—
52	Y clamp	This pin is for a clamp filter for the video signal circuit.		DC 2V
53	ABL	This is an external brightness control terminal. Use this pin when applying ABL.		DC 2V
54	ACC	This pin is for a PAL / NTSC ACC filter.		DC 5.8V
55	FAA	This pin is for a filter of automatic f_O adjustment circuit for the built-in filters. The voltage at this filter determines the sharpness peak frequency, BELL center frequency and SECAM demodulation center frequency.		DC 4.5V

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	TERMINAL SIGNAL
56	Gamma (γ) voltage	The voltage at this pin determines the starting point of γ conpensation for the video signal. This is also a test pin.		DC 5V
57	APL2	The voltage at this pin determines the starting point of black stretching.		DC 3.2V
58	APL1	This pin is for a filter to determine the DC restoration ratio. The black-stretched video signal is appeared at this pin.		
59	Video V_{CC}	This is the power supply for the video circuit. Apply 9V (typ.) to this pin.	—	—
60	Video input	This pin is the video signal input. Input the video signal through a clamping capacitor.		
61	Black detection	This pin is for a filter to detect the black level of video signal. The voltage at this pin determines the black stretching gain.		DC 2.9V

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	TERMINAL SIGNAL
62	Video GND	This is the ground for the video circuit.	—	—
63	Sync. input	This pin is input for the sync. separation circuit. Input the sync. signal through a clamping capacitor.		
64	V_p output	This is a vertical pulse output terminal. This pin is also an external vertical blanking input. Blanking is applied after being OR'ed with the internal blanking.		

TERMINAL SIGNAL : Standard input / output signals under normal operation.

BUS CONTROL MAP

Write data (Standard slave address 88H)

SUB ADDRESS	MSB 7	6	5	4	3	2	1	LSB 0	INITIAL VALUE AT POWER-ON MSB	LSB
00	WPL	Color							0100	0000
01	Sharp-ness SW	TINT (for NTSC only)							0100	0000
02		Brightness							0100	0000
03	P / N GP	Unicolor							0100	0000
04	Vertical mode		Sharpness						0010	0000
05	Vertical phase adjustment			Horizontal phase adjustment					0001	0000
06	Mute mode		BLK	B / W	X'tal mode		Color system		0100	0000
07	P / N amplitu-de	SECAM amplitude		BELL filter f_o adjustment			S GP	S ID	0001	0000
08	SECAM black level adjustment R-Y				SECAM black level adjustment B-Y				1000	1000
09	Search	Blue back		YNR	AFC	Test mode selection			0000	0000

Read data (Standard slave address 89H)

	PONRES	Color system	X'tal mode	Vertical F	Reserved	

BUS CONTROL FUNCTIONS

- Write function (★ : Initial value at power-on)

Color, TINT, brightness, unicolor, sharpness

User control.

For color, TINT, and unicolor, It is recommended to use 100LSB in 128LSB for user control and 28LSB for subcontrol.

Vertical phase adjustment

Fine adjust the screen position in the vertical direction. (The variable range is approximately 1.3% of the screen size.)

Horizontal phase adjustment

Fine adjust the screen position in the horizontal direction. (The variable range is approximately 7.8% of the screen size.)

P / N amplitude, SECAM amplitude

Adjust these amplitudes if there is any difference in color-difference signal amplitude between PAL / NTSC and SECAM.

BELL filter f_O

Fine adjust the internal BELL filter's f_O. Q is fixed.

SECAM black level adjustment

Adjust the black level (blanking level) of the SECAM color-difference signal.

WPL	★ 0	: WPL (White Peak Limiter) on
	1	: WPL off
Sharpness	★ 0	: Sharpness function on
SW	1	: Sharpness function off
P / N GP	★ 0	: PAL / NTSC gate pulse position, initial value
	1	: 0.5μs delay
Vertical mode	★ 00	: Vertical frequency automatically identification (312.5H / 262.5H)
	01	: Reserved (operates in the same way as for 00 ; V separation level is not sensitive.)
	10	: Fixed to 312.5H (without vertical sync pull-in function)
	11	: Fixed to 262.5H (without vertical sync pull-in function)
Mute mode	00	: Mute off
	★ 01	: RGB muted, RGB output voltage 2V (trace period)
	10	: Y signal muted (used for adjusting NTSC TINT center)
	11	: Y / C muted, V_p output stop, brightness control possible
BLK	★ 0	: Blanking on
	1	: Blanking off
B / W	★ 0	: Color killer is available
	1	: Forced monochrome mode
X'tal mode	★ 00	: Crystal resonator frequency automatic identification mode
	01	: 4.43MHz fixed mode
	10	: 3.58MHz fixed mode
	11	: M / N crystal fixed mode

Color system	★	00 : Color system automatic identification mode
		01 : Color killer operating with PAL ident only
		10 : Color killer operating with NTSC ident only
		11 : Color killer operating with SECAM ident only
S GP	★	0 : SECAM gate pulse position, initial value
		1 : $-0.5\mu s$
S ID	★	0 : SECAM identification depends on only H ident signal
		1 : SECAM identification depends on only H and V ident signal
Search	★	0 : X'tal identification period is 4 vertical period
		1 : X'tal identification period is 8 vertical period
Blue back	★	00 : Blue back off
		01 : All white
		10 : All red
		11 : Blue back on
YNR	★	0 : YNR off
		1 : YNR on
AFC	★	0 : AFC detection current $350\mu A$
		1 : AFC detection current $700\mu A$

- Read function

PONRES	0 : Read data at the second and following read timing after power-on
	1 : Read data at the first read timing after power-on
Color system	00 : Monochrome
	01 : PAL
	10 : NTSC
	11 : SECAM
X'tal mode	01 : 4.43MHz X'tal
	10 : 3.58MHz X'tal
	11 : M / N X'tal
Vertical F	0 : Vertical 50Hz
	1 : Vertical 60Hz

COLOR SYSTEM AUTOMATIC IDENTIFICATION MODE SWITCH

Color system automatic identification mode, 4PAL / 4NTSC / 3NTSC / MN-PAL or 4PAL / 4NTSC / 3NTSC / SECAM, can be selected. Connecting pin 44 to GND with 2.4kΩ selects the automatic identification mode for 4PAL / 4NTSC / 3NTSC / SECAM.

4PAL : 4.43MHz PAL
4NTSC : 4.43MHz NTSC
3NTSC : 3.58MHz NTSC

DATA TRANSFER FORMAT VIA I²C BUS

Slave address : Voltage at pin 11 determines the slave address.

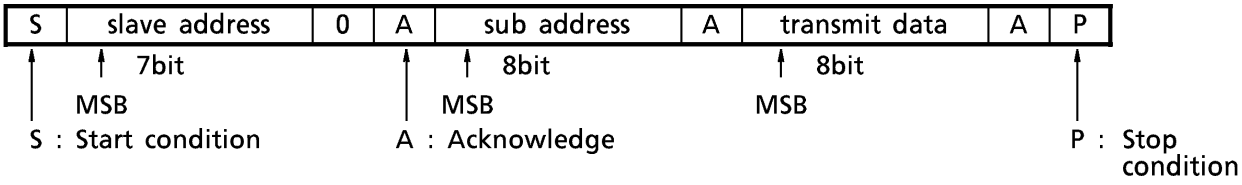
If the voltage is less than 5V

A6	A5	A4	A3	A2	A1	A0	W / R
1	0	0	0	1	0	0	0 / 1

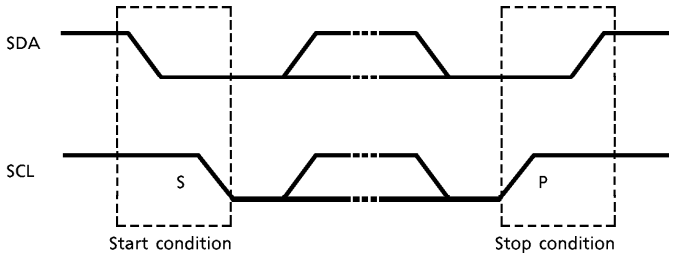
If the voltage is more than 5V

A6	A5	A4	A3	A2	A1	A0	W / R
1	0	0	0	1	0	1	0 / 1

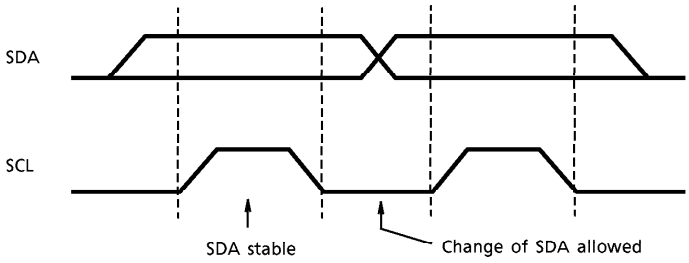
Data transmit format



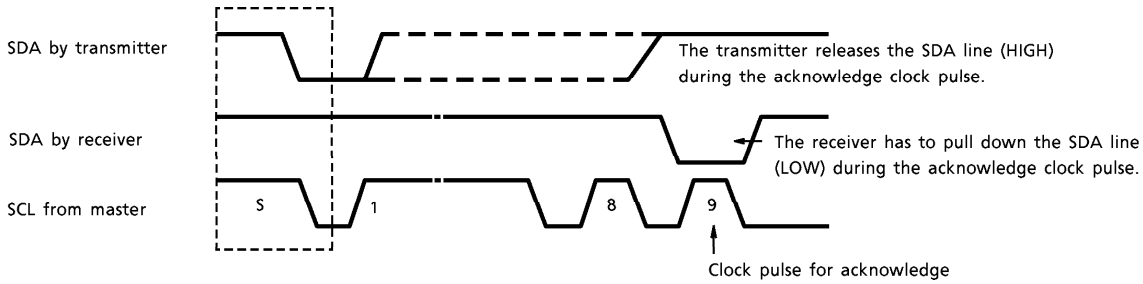
Start and stop conditions



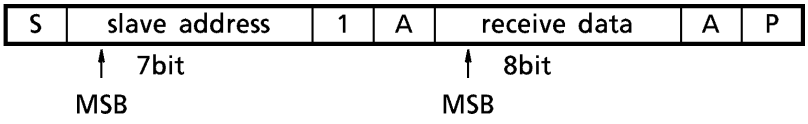
Bit transfer



Acknowledge



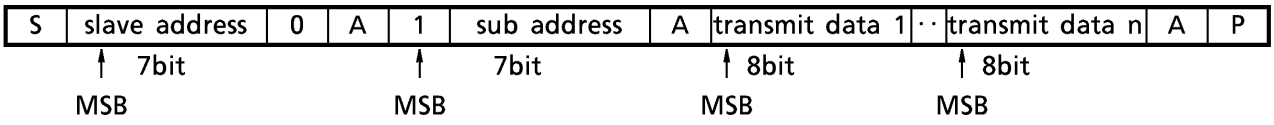
Data receive format



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 I^2C components conveys a license under the Philips I^2C Patent Rights to use these components in an I^2C system, provided that the system conforms to the I^2C Standard Specification as defined by Philips.

SPECIAL FUNCTION SWITCH (used to test the device before shipping)

DAC monitor

The voltages of the internal DACs can be monitored at pin 11.

Test mode selection

★ 000 : On the condition that voltage at pin 11 is lower than 5V, the slave address is 88H and external color control is available.
On the condition that voltage at pin 11 is higher than 5V, the slave address is 8AH.

001 : Color DAC

010 : TINT DAC

011 : Sharpness DAC

100 : Horizontal phase adjustment DAC

101 : BELL filter f_O adjustment DAC

The voltages of the SECAM adjustment DACs can be monitored on pin 30 and pin 32.

Test mode selection

110 : SECAM amplitude adjustment DAC

111 : SECAM black level adjustment DAC

Internal pulses monitor of sync.

Some internal pulses in the sync. section can be monitored by applying the designated voltage to pin 1 as shown below.

PULSE NAME	APPLIED VOLTAGE (V)			MONITOR PIN
	0~1.5	1.5~3	3~V_{CC}	
PN GP	OFF	ON	OFF	64
Video GP	ON	OFF	OFF	

RGB blanking stops in this test mode.

AFC1 mask stop mode

The AFC1 masking operation can be disabled by connecting pin 1 to GND.

Internal signal monitor in SECAM demodulating section

Internal signals in the SECAM demodulating section can be monitored as shown below.

CONDITION / NAME OF INTERNAL SIGNAL	VOLTAGES APPLIED TO PIN30				OUTPUT PIN
	0~2	5.6~6.5	6.5~V_{CC}	OPEN	
f_O adj. pulse	ON	OFF	OFF	OFF	32
ACC key pulse	OFF	ON	OFF	OFF	
ID key pulse	OFF	OFF	ON	OFF	

CONDITION / NAME OF INTERNAL SIGNAL	VOLTAGES APPLIED TO PIN32				OUTPUT PIN
	0~2	7~8	8~V_{CC}	OPEN	
Permu. stop	OFF	ON	OFF	OFF	30
All time f_O adj.	OFF	OFF	ON	OFF	
Bell monitor	ON	OFF	OFF	OFF	28

Video section delay line monitor

The characteristics of the internal delay line that is used for sharpness in the video section can be monitored. The characteristics of the internal delay line can be monitored at pin 56 as a trap frequency response.

CONDITION / INTERNAL SIGNAL	VOLTAGE APPLIED TO PIN53	OUTPUT PIN
DL Trap	higher than 5.5 V	56

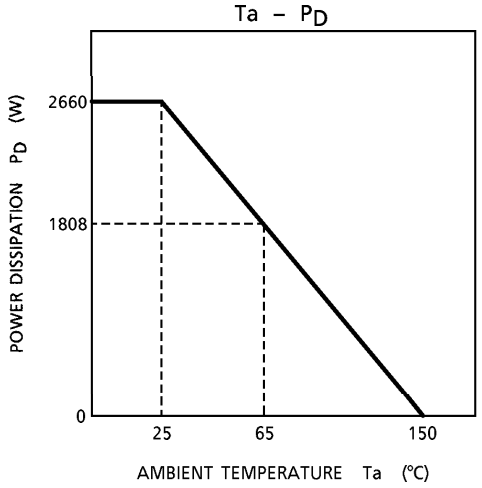
When monitoring, connect pin 56 to GND with 5.1kΩ.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	15	V
Power Dissipation	$P_D$max.	2660 (Note 1)	mW
Input Signal Amplitude	e_{in}	5	V_{p-p}
Applied Voltage	E_{in}	GND – 0.3~V_{CC} + 0.3	V
Operating Temperature	T_{opr}	– 20~65	°C
Storage Temperature	T_{stg}	– 55~150	°C

(Note 1) When using the device at above Ta = 25°C, decrease the power dissipation by 21.2mW for each increase of 1°C.

(Note 2) Pin 13 and pin 14 are weak against static electricity and surge impulse. If necessary, please take counter measure to meet.



RECOMMENDED OPERATING CONDITION

CHARACTERISTIC	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	At pin 19, pin 36, pin 50 and pin 59	8.1	9.0	9.5	V
	At pin 5	8.1	9.0	10.0	
	At pin 4	3.0	3.3	3.6	
Video Input Signal Level	Composite video signal amplitude	0.7	1.0	1.2	V_{p-p}
Chroma Input Signal Level	PAL / NTSC chroma input	100	200	300	mV_{p-p}
	SECAM chroma input	50	100	150	
Sync Input Signal Level	Composite video signal amplitude	1.0	2.0	2.5	V_{p-p}
Text Input Signal Level	—	0.5	0.7	1.0	V_{p-p}
FBP Width	—	11	12	13	μs
FBP Input Current	—	0.3	1.0	1.3	mA
RGB Output Current	—	—	1.0	2.0	mA
H.out Output Current	—	—	3.0	5.0	mA
V_p Output Current	—	—	1.0	2.0	mA

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, V_{CC} = 9V, logic V_{CC} = 3.3V, and Ta = 25°C, the data of each sub-address is the device's switch-on default values except the following : Sub-address 06H : data 00H)

DC CHARACTERISTICS

CHARACTERISTIC	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current	1	Logic V_{CC} (pin 4) 3.3V	10	20	28	mA
	1	Video / chroma V_{CC} turned off	15	30	40	
	1	H.V_{CC} (pin 5) 9V	10	20	28	
	1	Video / chroma V_{CC} turned off	15	30	40	
	1	TEXT section V_{CC} (pin 19) 9V	15	31	44	
	1	SECAM section V_{CC} (pin 36) 9V	10	18	25	
	1	Chroma section V_{CC} (pin 50) 9V	12	27	38	
	1	Video section V_{CC} (pin 59) 9V	17	37	52	
Terminal Voltage	1	Pin 2	7.2	7.4	7.8	V
	1	Pin 16, pin 17 and pin 18 (In mute mode)	1.7	2.0	2.3	
	1	Pin 22, pin 23 and pin 24 (Unicolor dac center)	3.3	3.8	4.2	
	1	Pin 63 (Apply 5V with 5.1kΩ resister, measure DC output voltage at trace period.)	3.1	3.5	3.9	

AC CHARACTERISTICS

Video section

CHARACTERISTIC		TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Y Input Dynamic Range	Upper	1	Measure dynamic range above the pedestal level	0.7	1.0	1.3	V_{p-p}
	Lower		Measure dynamic range below the pedestal level	0	0.3	0.5	
Y Input Impedance		1	Measure input impedance of pin 60	100	130	—	kΩ
Y Input Clamp Voltage		1	Measure DC voltage at pin 60 when Y input connected to AC GND	2.5	2.8	3.1	V
Maximum Y Gain		1	Note 1	15	17.5	23	dB
Y Frequency Bandwidth		1	Note 2	8	10	15	MHz
Black Stretching Amp Maximum Gain		1	Note 3	1.3	1.4	1.5	—
Black Stretching Start Point		1	Note 4	40	50	65	IRE
DC Restoration Ratio		1	Note 5	97	100	103	%
Black Stretching Start Voltage		1	Note 6	3.2	3.3	3.6	V
Delay Time Of Sharpness Circuit		1	Measure difference in Y output signal delay time between sharpness SW turned on and off	115	125	135	ns

CHARACTERISTIC			TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Sharpness Control	Maximum Gain		1	(1) Input 2T pulse VBS to TP60 and TP63. (2) Measure 2T pulse output gain of data = 3FH, 20H, and 00H. 0dB is equal to the output gain of sharpness SW off.	3.5	5.5	7.5	dB
	Center Gain				0.5	1.5	3.5	
	Minimum Gain				− 3	− 1	1	
YNR Gain			1	Note 7	− 20	− 13	− 8	dB
Contrast Control	Center Gain		1	Measure Y output gain of data = 40H and 00H. Maximum Y gain is 0dB.	− 4	− 5.5	− 7	dB
	Minimum Gain				− 17	− 19	− 21	
γ Point		Va	1	Note 8	40	50	60	IRE
		Vb			80	90	100	
γ Gain		Ga	1		− 1	− 3	− 5	dB
		Gb			− 4	− 6	− 8	
Y S/N Ratio			1	Note 9	50	55	60	dB

Chroma section 1 (PAL / NTSC)

CHARACTERISTIC			TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
ACC Output Characteristic		e300	1	Input rainbow signal whose burst and chroma signal level is 300mV_{p-p} and 100mV_{p-p}. Measure signal amplitude at pin 41.	260	370	520	mV_{p-p}
		e100			260	370	520	
ACC Flatness			1	e300 / e100	0.9	1.0	1.1	—
Killer-on Level		PAL	1	Input color bar signal. Measure burst amplitude at which color begins to disappear when burst is gradually reduced.	0.2	0.5	1.0	mV_{p-p}
		NTSC			0.2	0.5	1.0	
Killer-off Level		PAL	1	Input color bar signal. Measure burst amplitude at which color begins to be tinted when burst is gradually increased from 0.	1.0	2.5	4.0	mV_{p-p}
		NTSC			1.0	2.5	4.0	
APC Pull-in Range	3.58MHz	High	1	f_O = 3.579545MHz	300	500	1000	Hz
		Low			− 300	− 500	− 1000	
	4.43MHz	High	1	f_O = 4.433619MHz	300	500	1000	Hz
		Low			− 300	− 500	− 1000	
	M PAL	High	1	f_O = 3.575611MHz	300	500	1000	Hz
		Low			− 300	− 500	− 1000	
VCXO Frequency Control Sensitivity	4.43MHz		1	(1) Fix X'tal mode with bus. (2) Measure frequency changes at TP28 when varying TP26 voltage from 6.2V to 6.3V.	1.7	2.4	3.2	Hz / mV
	3.58MHz				1.5	2.2	3.0	
	M PAL				1.8	2.5	3.3	

CHARACTERISTIC		TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
f_{SC} Output Amplitude	4.43MHz	1	(1) Fix X'tal mode with bus. (2) Measure signal amplitude at TP28.	130	150	170	mV_{p-p}
	3.58MHz			120	140	160	
f_{SC} Output Voltage	4.43MHz	1	(1) Fix X'tal mode with bus. (2) Measure DC voltage at TP28.	3.6	3.9	4.2	V
	3.58MHz			2.8	3.1	3.4	
B-Y Output Amplitude	4PAL	1	Input rainbow signal. Measure signal amplitude at pin 41.	260	370	520	mV_{p-p}
	3NTSC			260	370	520	
R-Y Output Amplitude	4PAL	1	Input rainbow signal. Measure signal amplitude at pin 40.	220	315	440	mV_{p-p}
	3NTSC			220	315	440	
Relative Amplitude	4PAL	1	Input rainbow signal. Measure (R-Y) / (B-Y)	0.73	0.8	0.90	—
	3NTSC			0.73	0.8	0.90	
Relative Phase	4PAL / 4NTSC	1	Input rainbow signal. Measure θ (R-Y) – θ (B-Y)	85	90	95	°
	3NTSC			85	90	95	
Chroma Demodulation Bandwidth		1	Note 10	0.5	0.8	1.5	MHz
Residual Carrier Level	B-Y	1	Measure residual carrier waves (f_{SC} frequencies) on pin 40 and pin 41.	0	3	5	mV_{p-p}
	R-Y			0	3	5	
Residual Harmonics Level	B-Y	1	Measure residual higher harmonics (double the f_{SC} frequency) on pin 40 and pin 41.	0	20	30	mV_{p-p}
	R-Y			0	20	30	
TINT Control	TINT Maximum	1	(1) Input NTSC rainbow signal. (2) Measure TINT of data = 00H, 40H, and 7FH. (3) TINT 0° is when the 6th bar of B-Y is maximum.	27	32	39	°
	TINT Center			– 12	– 4	8	
	TINT Minimum			– 39	– 44	– 49	
PAL / NTSC Color Difference Amplitude Adjustment Gain		1	Note 11	– 2	– 1	– 0.5	dB
PAL / NTSC / SECAM Identification Output	PAL	1	Measure output voltage from pin 39.	8.0	8.3	8.6	V
	SECAM			4.3	4.6	4.9	
	NTSC			0.0	0.1	0.4	

Chroma section 2 (SECAM)

CHARACTERISTIC	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Color System Identification Mode Switch Threshold Voltage	1	Measure voltage at pin 44 at which SECAM signal becomes unable to be demodulated when the DC voltage applied to TP44 is varied from 6V to 0V.	4.7	5.0	5.3	V

CHARACTERISTIC		TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
ACC Characteris-tic	Input Id 150mV$_{p-p}$	1	(1) V_{32} = 1V (2) Measure ident amplitude at pin 28.	220	280	340	mV$_{p-p}$
	Input Id 50mV$_{p-p}$			220	280	340	
Killer-on Level	Ident Data = 0	1	Input color bar signal. Measure burst amplitude at which color begins to disappear when burst is gradually reduced.	0.1	1	3	mV$_{p-p}$
	Ident Data = 1			0.1	1	3	
B-Y Output Amplitude		1	Input color bar signal. Measure output amplitude at pin 41.	400	580	750	mV$_{p-p}$
R-Y Output Amplitude		1	Input color bar signal. Measure output amplitude at pin 40.	450	680	950	mV$_{p-p}$
BELL Monitor Switch Threshold Voltage		1	Note 12	1.5	1.8	2.1	V
BELL Filter Characteristic	Ident Ratio	1	Note 13	0.9	1.0	1.1	—
	Cyan Bar			1.00	1.15	1.30	
	Yellow Bar			1.10	1.25	1.40	
BELL Filter f_O Control Range		1	Data = 07	70	105	140	kHz
			Data = 00	− 175	− 140	− 105	
PLL Pull-in Range		1	High	4.75	5	5.5	MHz
			Low	3	3.7	3.9	
Black Level Offset Voltage		1	Note 14	− 15	0	15	mV
Black Level Offset Adjustment	Maximum			19	24	29	
	Minimum			− 31	− 28	− 25	
SECAM Color Difference Amplitude Adjustment Gain		1	Note 15	− 1.0	− 1.8	− 2.5	dB
				− 2	− 1	− 0.5	
				− 0.5	0	0.5	
				0.5	1	1.5	

TEXT / Matrix section

CHARACTERISTIC	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
RGB Maximum Output	1	Measure maximum output voltage from pin 16 when WPL is off.	7.3	7.7	8.8	V
Color Difference Input Dynamic Range	1	Measure input dynamic range at pin 37 and pin 38.	1.6	2.0	2.3	V$_{p-p}$
Relative Amplitude	1	Input PAL rainbow signal. Measure G / B in the color difference output mode selected by bus on RGB output pins.	0.31	0.37	0.42	—
Relative Phase	1	Input PAL rainbow signal. Measure θ (G) − θ (B) in the color difference output mode selected by bus on RGB output pins.	230	237	245	°

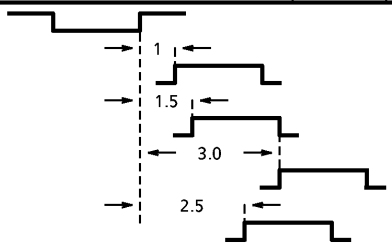
CHARACTERISTIC		TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Color Control Characteristic	Maximum Gain	1	Note 16	18	19.5	21	dB
	Center Gain			– 9	– 7	– 5	
	Minimum Gain			– 80	– 50	– 40	
	Maximum Gain Voltage			3.2	3.5	3.8	V
	Minimum Gain Voltage			2.2	2.5	2.8	
Contrast Control Characteristic	Maximum Gain	1	Note 17	3.5	5	6.5	dB
	Minimum Gain			– 16	– 14	– 12	
	Maximum Gain Voltage			2.2	2.5	2.8	V
	Minimum Gain Voltage			1.2	1.5	1.8	
Brightness Control Characteristic	Maximum Voltage	1	(1) No Y input. (AC GND) (2) Data = FFH. Measure DC voltage at pin 18 during trace period. (3) Data = 80H. Measure DC voltage at pin 18 during trace period. (4) Data = 00H. Measur DC voltage at pin 18 during trace period.	3.2	3.5	3.8	V
	Center Voltage			1.8	2.0	2.2	
	Minimum Voltage			0.2	0.5	0.8	
	Control Voltage (1)	1	Measure DC voltage at pin 18 during trace period when V_{53} = 1V.	0.7	1.0	1.3	V
	Control Voltage (2)		Measure DC voltage at pin 18 during trace period when V_{53} = 3V.	2.7	3.0	3.3	
Brightness Tracking		1	Measure DC voltage difference between R, G and B outputs of brightness data = 40H.	– 0.2	0	0.2	V
WPL Voltage		1	Measure maximum output voltage from pin 18 when WPL is on.	5.7	6.0	6.3	V
Blanking Output Voltage		1	Measure output voltage from pin 18 during blanking period.	0.3	0.5	0.8	V
Vertical Blanking Period	50Hz	1	Measure vertical blanking period width.	—	23	—	H
	60Hz			—	18	—	
Horizontal Blanking Threshold Voltage		1	Measure lowest voltage at pin 9 which causes horizontal blanking.	0.5	0.7	1.0	V
Horizontal Blanking Delay Time		1	Measure blanking-on delay time.	0.0	0.1	0.3	μs
			Measure blanking-off delay time.	0.1	0.3	0.5	
External Blanking Threshold Current		1	Measure minimum input current to pin 64 which causes blanking.	300	330	400	μA
Mute Output Voltage		1	Note 18	1.7	2.0	2.3	V
Mute Switch Threshold Voltage				4.7	5.0	5.3	

CHARACTERISTIC		TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
External TEXT Input Dynamic Range		1	Measure input dynamic range on pin 22, pin 23 and pin 24.	1.0	1.5	—	V_{p-p}
External TEXT Contrast Control	Maximum Gain	1	(1) Input signal 3 (V_{im} = 0.1V_{p-p}) to TP24. (2) Measure output amplitude at pin 18 when data = 7FH, 40H, and 00H as V_{18}. (3) Gain = 20ℓog (V_{18} / 0.1)	15	16	18	dB
	Center Gain			12	13.5	15	
	Minimum Gain			− 7	− 4	− 2	
External TEXT Rising Time		1	(1) Load capacitance is 10pF. (2) Adjust contrast data so that RGB output amplitude is 1V_{p-p}.	10	25	50	ns
External TEXT Falling Time				10	25	50	
External TEXT Output Delay Time				10	25	50	
External TEXT Switching Delay Time				10	25	50	
TV / TEXT Switching Voltage		1	Note 19	0.7	1.0	1.3	V
Crosstalk	TV→TEXT	1	Note 20	− 45	− 55	—	dB
	TEXT→TV		Note 21	− 45	− 55	—	
External TEXT Bandwidth		1	Note 22	12	15	20	MHz
All White Mode Output Voltage	R Output	1	(1) Select all-white mode by bus. (2) Measure R, G, and B amplitudes during trace period.	3.6	3.8	4.0	V_{p-p}
	G Output			3.5	3.7	3.9	
	B Output			3.6	3.8	4.0	

Sync. section

CHARACTERISTIC		TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Horizontal Sync. Separation Level		1	Note 23	30	35	40	%
Sync. Separation Input Sensitivity		1	Note 24	10	18	25	μA
Horizontal Free Running Frequency		1	Measure H.out frequency when no sync. input and no FBP input.	15.50	15.62	15.75	kHz
AFC1 Pull-in Range	High	1	Center frequency is f_H = 15.625Hz	500	750	1000	Hz
	Low			− 500	− 750	− 1000	
Horizontal Oscillation Frequency Control Range		1	Note 25	14.70	15.62	16.90	Hz
Horizontal Oscillation Frequency Control Sensitivity		1	Note 26	2.0	2.3	2.6	kHz / V
AFC1 Detection Current		1	Note 27	250	350	450	μA

CHARACTERISTIC		TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
AFC1 Stop Period	50Hz	1	Observe pin 2 to measure the period while AFC1 does not operate.	—	308~6	—	H
	60Hz			—	258~6	—	
Horizontal Oscillation Starting Voltage		1	Note 28	3.5	4.0	4.5	V
Horizontal Output Starting Voltage				4.0	4.5	5.0	
Horizontal Output Duty Cycle		1	Measure duty cycle = (High period) / (1H period) at pin 6.	38	41	44	%
Horizontal Output Voltage	High	1	Measure high voltage at pin 6.	4.7	5.0	5.3	V
	Low		Measure low voltage at pin 6.	—	0	0.3	
AFC2 Control Range		1	Note 29	14	15	16	μs
Horizontal Phase Adjustment Range		1	Note 30	±2.0	±2.5	±3.0	μs
Vertical Free Running Frequency		1	Measure output frequency at pin 64 when no sync. signal input.	—	50 / 60	—	Hz
Vertical Pull-in Range		1	Note 31	240.5	—	352	H
Vertical 60Hz Identification Range				240.5	—	288	
Vertical Pulse Output Voltage	High	1	Measure high voltage at pin 64	4.2	4.5	4.8	V
	Low		Measure low voltage at pin 64	—	0	0.3	
Vertical Blanking Pulse Output Voltage		1	Measure middle voltage at pin 64	2.7	3.0	3.3	V
Vertical Output Delay Time	50Hz	1	Note 32	4.25	4.75	5.25	H
	60Hz			0.25	0.75	1.25	
Vertical Output Phase Variable Range		1	Sync. input 60Hz, data = 000, 111	0	—	7	H
SCP Output Voltage	Clamp Gate Pulse Period	1	Note 33	7.3	7.5	7.8	V
	Horizontal Blanking Period			4.2	4.5	4.8	
	Vertical Blanking Period			2.2	2.5	2.8	
FBP Input Terminal Voltage	High	1	(1) Sink current into pin 9 is kept at 0.1mA when measured. (2) Measure high and low voltages at pin 9.	1.1	1.5	1.8	V
	Low			—	0	0.3	
Gate Pulse Width		1	Note 33	1.8	2.0	2.2	μs

CHARACTERISTIC		TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Pulse Phase	Sync. Signal Input	1					μs
	PAL Gate 0						
	PAL Gate 1						
	SECAM Gate 0						
	SECAM Gate 1						

TEST CONDITION

Note 1. Maximum Y gain

(1) Input signal 1 (f_o = 100kHz, V_{im} = 0.3V_{p-p}) to TP60 and TP63.

(2) Contrast data = 7FH. V_{56} = 5V.

(3) Measure picture signal amplitude at pin 18.→V_{18}.

(4) Maximum Y gain = 20ℓog (V_{18} / 0.3).

Note 2. Y frequency band width

(1) Input signal 1 (V_{im} = 0.3V_{p-p}) to TP60 and TP63.

(2) Measure picture signal amplitude at pin 18 when f_o = 100kHz.→V_{18}.

(3) Find the value of f_o at which the picture amplitude at pin 18 becomes −3dB of V_{18} when f_o is varied from 100kHz to 15MHz.

Note 3. Black stretching amplifier maximum gain

(1) Input signal 1 (f_o = 500kHz, V_{im} = 0.1V_{p-p}) to TP60 and TP63.

(2) V_{57} = 3.2V, V_{61} = 2V.

(3) Measure picture signal amplitude at pin 58→V_{58}.

(4) Black stretching amplifier maximum gain = V_{58} / 0.1.

Note 4. Black stretching start point

(1) Input signal 2 to TP60 and TP63.

(2) V_{57} = 3.15V.

(3) Measure picture signal amplitude at pin 58 while varying V_{im} from 0IRE to 100IRE.→V_{58}.

(4) Obtain V_{st} as the figure1.

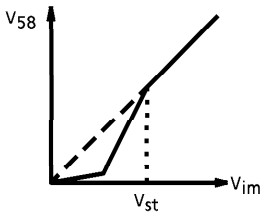


Figure 1

Note 5. DC restoration ratio

(1) Keep pin 58 open.

(2) Input APL = 10%, 90% ramp waveforms to TP60 and TP63.

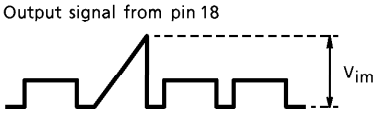


Figure 2

(3) V_{57} = 2.1V.

(4) Measure pedestal level DC voltage at pin 18 difference between APL = 10% and 90%. →ΔV.

(5) Measure output signal picture amplitude on pin 18.→V_{im}.

(6) DC restoration ratio = (V_{im} − ΔV × 1.25) / V_{im}

Note 6. Black stretching start voltage

(1) Input signal 1 (f_o = 100kHz, V_{im} = 0.3V_{p-p}) to TP60 and TP63.

(2) Measure the voltage at pin 61 which causes the output signal amplitude at pin 18 to be bigger than output signal when V_{61} = 4V, while varying the voltage at pin 61 from 4V to 2.5V.

Note 7. YNR gain

(1) Input signal 1 (f_o = 2.5MHz, V_{im} = 50mV_{p-p}) to TP60 and TP63.

(2) Measure output amplitude ratio at pin 18 when turning YNR on and off.

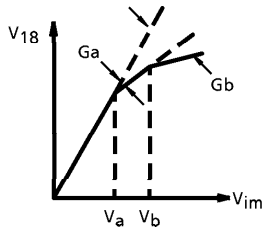
Note 8. γ point / γ gain

(1) Input signal 2 to TP60 and TP63.

(2) V_{56} = 3.5V, V_{57} = 2.1V.

(3) Measure picture signal amplitude at pin 18 while varying V_{im} from 0IRE to 100IRE.→V_{18}.

(4) Find and calculate V_a, V_b, Ga and Gb.



Note 9. Y S / N ratio

(1) Input signal 2 to TP60 and TP63.

(2) V_{56} = 3.5V, V_{57} = 2.1V, V_{61} = 3.5V.

(3) Measure picture signal amplitude at pin 18 when V_{im} = 0 and 100IRE.→V_0, V_{100}.

(4) S / N ratio = 20ℓog (V_{100} / V_0).

Note 10. Chroma demodulation bandwidth

(1) Input signal 2 to TP63.

(2) Input CW signal with frequency f_o to TP51.

(3) V_{42} = 6.8V, V_{26} = 6.2V ; set X'tal mode to 3.58MHz and set color mode to NTSC by bus.

(4) Measure output amplitude at pin 41 when f_o is 3.579545MHz + 1kHz. →V_{41}.

(5) Find the value of f_o at which the picture amplitude at pin 41 becomes − 3dB of V_{41} when f_o is varied from 3.579545MHz + 100kHz to + 2MHz.

Note 11. PAL / NTSC color difference amplitude adjustment gain

(1) Input rainbow signal to TP63, TP51, and TP49.

(2) Measure output amplitude at pin 41 when data = 0.→V_0.

(3) Measure output amplitude at pin 41 when data = 1.→V_1.

(4) Adjustment gain = 20ℓog (V_1 / V_0).

Note 12. BELL monitor switch threshold voltage

(1) Input SECAM color bar signal to TP63, TP60 and TP49.

(2) Apply DC voltage to pin 32.→V_{32}.

(3) Measure the voltage at which output from pin 28 changes into BELL filter output while V_{32} is varied from 3V to 1V.

Note 13. BELL filter characteristic

(1) Input SECAM color bar signal to TP63, TP60 and TP49.

(2) V_{32} = 1V

(3) Measure the following amplitude ratios at pin 28 :

- (R-Y line Ident) / (B-Y line Ident) amplitude ratio
- (Cyan bar of R-Y) / Ident amplitude ratio
- (Yellow bar of B-Y) / Ident amplitude ratio

Note 14. Black level offset voltage, black level offset adjustment

(1) Input SECAM black signal (with Ident and chroma signal) to TP63, TP60 and TP49.

(2) Black level adjustment data = 88H.

(3) Measure voltage difference between blanking and trace period at pin 40 and pin 41. →Black level offset voltage.

(4) Measure voltage changes during trace period when black level adjustment data is varied from 88H to 00H and FFH→Black level offset adjustment.

Note 15. SECAM color difference amplitude adjustment gain

(1) Input rainbow signal to TP63, TP60 and TP49.

(2) Measure output amplitude at pin 41 when data = 10.→0dB.

(3) Measure output amplitude at pin 41 when data = 00, 01 and 11. Compare with the measurement when data = 00.

Note 16. Color control characteristic

(1) Input signal 3 (f_o = 100kHz, $V_{im} = 0.1V_{p\text{-}p}$) to TP38 and signal 2 ($V_{im}$ = 100IRE) to TP63.

(2) Contrast data = 40H.

(3) Color data = 7FH.

(4) Measure output amplitude at pin 18→V_{18}.

(5) Maximum gain = 20ℓog (V_{18} / 0.1) .

(6) Measure output amplitude at pin 18 when color data = 40H and 00H. Compare with the maximum gain (= 0dB).

(7) Apply DC voltage to TP11.→V_{11}.

(8) Measure the minimum voltage of V_{11} at which the output amplitude of pin 18 becomes maximum while V_{11} is varied from 3V to 5V.

(9) Measure the maximum voltage of V_{11} at which the output amplitude of pin 18 becomes minimum while V_{11} is varied from 3V to 0V.

Note 17. Contrast control characteristic

(1) Input Signal 3 (f_o = 100kHz, $V_c = 0.1V_{p-p}$) to TP38 and signal 2 (V_{im} = 100IRE) to TP63.

(2) Color data = 40H.

(3) Contrast data = 40H. Measure output amplitude at pin 18.→V_{18}.

(4) Contrast data = 7FH. Measure output amplitude at pin 18.→V_{18}'.

(5) Maximum gain = $20\ell og\ (V_{18}' / V_{18})$.

(6) Contrast data = 00H. Measure output amplitude at pin 18.→V_{18}''.

(7) Minimum gain = $20\ell og\ (V_{18}'' / V_{18})$.

(8) Apply DC voltage to TP25.→V_{25}.

(9) Measure the minimum voltage of V_{25} at which the output amplitude on pin 18 becomes maximum while V_{25} is varied from 2V to 4V.

(10) Measure the maximum voltage of V_{25} at which the output amplitude on pin 18 becomes minimum while V_{25} is varied from 2V to 0V.

Note 18. Mute output voltage, mute switch threshold voltage

(1) Input signal 2 (V_{im} = 100IRE) to TP63.

(2) Apply DC voltage to TP21.→V_{21}.

(3) V_{21} = 5.5V

(4) Measure DC output voltage at pin 18 during trace period → Mute Output Voltage .

(5) Measure the voltage of V_{21} at which the trace period at pin 18 is muted while V_{21} is varied from 4V to 6V.

Note 19. TV / TEXT switching voltage

(1) Input signal 2 (V_{im} = 100IRE) to TP63.

(2) Apply DC voltage to TP21.→V_{21}.

(3) Measure the voltage of V_{21} at which output from pin 18 is changed from TEXT input to TV input while V_{21} is varied from 2V to 0V.

Note 20. Crosstalk (TV→TEXT)

(1) Input signal 1 (V_{im} = 0.3V_{p-p}) to TP60 and TP63. Connect TP22, TP23 and TP24 to AC GND.
(2) Contrast data = 7FH, Brightness data = 80H, Sharpness SW-Off.
(3) Connect TP21 to GND.
Measure picture amplitude during trace period at TP18 when f_o = 1MHz→V_{18}.
(4) Apply TP21 to 1.5V. Measure picture amplitude at TP18→$V_{18'}$.
(5) Crosstalk [dB] = 20ℓog (V_{18} / $V_{18'}$).

Note 21. Crosstalk (TEXT→TV)

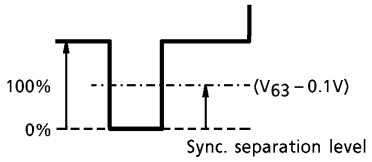
(1) Input signal 1 (V_{im} = 0.3V_{p-p}) to TP63, TP22, TP23 and TP24. Connect TP60 to AC GND.
(2) Contrast data = 7FH, Brightness data = 80H.
(3) Connect TP21 to 1.5V.
Measure picture amplitude during trace period at TP18 when f_o = 1MHz→V_{18}.
(4) Connect TP21 to GND. Measure picture amplitude at TP18→$V_{18'}$.
(5) Crosstalk [dB] = 20ℓog (V_{18} / $V_{18'}$).

Note 22. External TEXT bandwidth

(1) Input signal 2 (V_{im} = 100IRE) to TP63 and signal 3 (V_{im} = 0.3V_{p-p}) to TP24.
(2) Measure picture signal amplitude at pin 18 when f_o = 100kHz.→V_{18}.
(3) Find the value of f_o at which the picture signal amplitude at pin 18 becomes −3dB of V_{18} while f_o is varied from 100kHz to 15MHz.

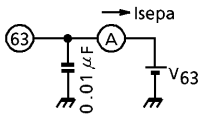
Note 23. Horizontal Sync. separation level

(1) Connect TP63 to AC GND.
(2) Measure DC voltage at pin 63.→V_{63}.
(3) Input signal 2 (V = 2V_{p-p}) to TP63.
(4) Measure the level at which the DC voltage (V_{63} − 0.1V) crosses the waveform of pin 63 relative to sync. tip (= 0%).



Note 24. Sync. separation input sensitivity

Measure the value of Isepa when the output frequency of pin 64 changes, while V_{63} is varied from 4V to 1V.



Note 25. Horizontal oscillation frequency control range

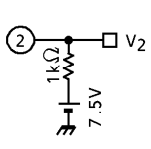
(1) Apply DC voltage to TP2.→V_2.
(2) Measure the output frequencies at pin 6, when V_2 is 8.5V, 7.5V and 6.5V.

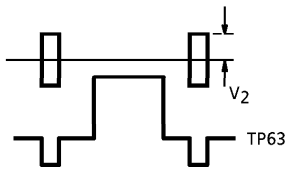
Note 26. Horizontal oscillation frequency control sensitivity

(1) Apply DC voltage to TP2.→V_2.
(2) Measure changes in output frequency at pin 6 when varying V_2 from 7.6V to 7.7V.

Note 27. AFC1 detection current

(1) Input signal 2 (V = 2V_{p-p}) to TP63.
(2) Observe waveform at pin 2 and measure V_2.
(3) Detection current = V_2 / 1kΩ.





Note 28. Horizontal oscillation starting voltage, horizontal output starting voltage

(1) Measure the value of $H.V_{CC}$ at which oscillation waveform can be observed at TP3 when varying $H.V_{CC}$ from 0V to 9V. →Horizontal Oscillation Starting Voltage.

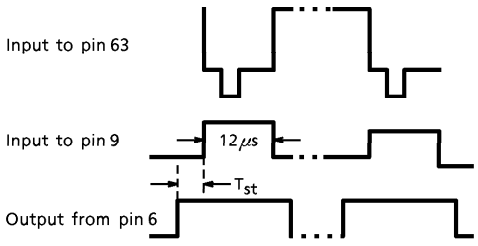
(2) Measure the value of $H.V_{CC}$ at which horizontal output can be observed at pin 6 when increasing $H.V_{CC}$ higher.→Horizontal Output Starting Voltage.

Note 29. AFC2 control range

(1) Input signal 2 (V_{im} = 100IRE) to TP63.

(2) Adjust the width of FBP from the FBP generator (Unit2) to be 12μs.

(3) Measure the value of T_{st} at which the phase relationship begins to be not sycronous while varying T_{st} from 10μs to 17μs from the FBP generator.



Note 30. Horizontal phase adjustment

(1) Input signal 2 (V_{im} = 100IRE) to TP63.

(2) Adjust the FBP width to be 12μs from the FBP generator.

(3) Adjust the T_{st} to be 8μs from the FBP generator.

(4) Measure phase changes of data = 1FH and 00H relative to the phase relationship of data = 10H.

Note 31. Vertical pull-in range, vertical 60Hz identification range

(1) Input signal 2 ($V = 2V_{p-p}$) to TP63.

(2) Measure the range of vertical frequencies where synchronization between the input signal and the TP64 output can be achieved while varying the vertical frequency from 40Hz to 70Hz.

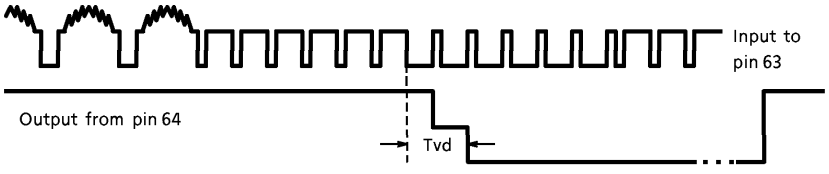
(3) Measure the vertical frequency range where 60Hz is identified against other frequencies by reading the bus during measurement in (2) above.

Note 32. Vertical output delay time

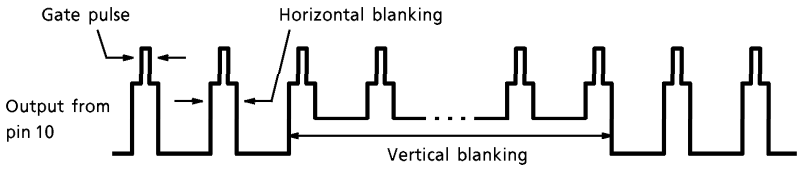
(1) Input Signal 2 ($V = 2V_{p-p}$) to TP63.

(2) Vertical phase data = 000.

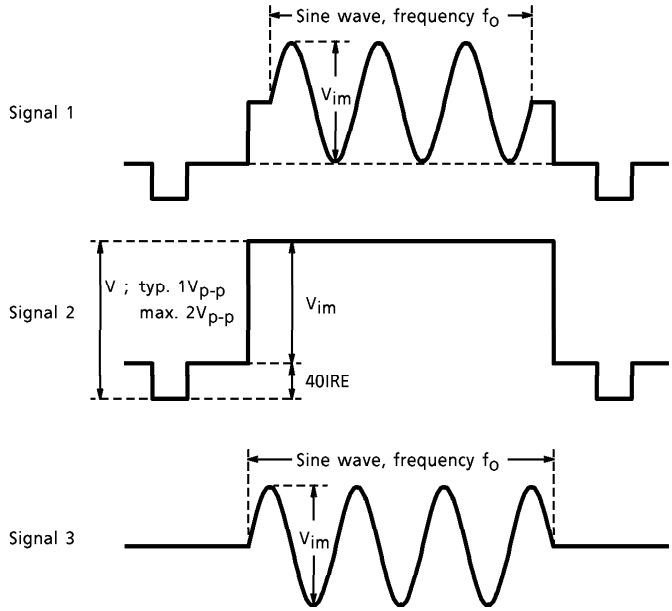
(3) Measure the Tvd.

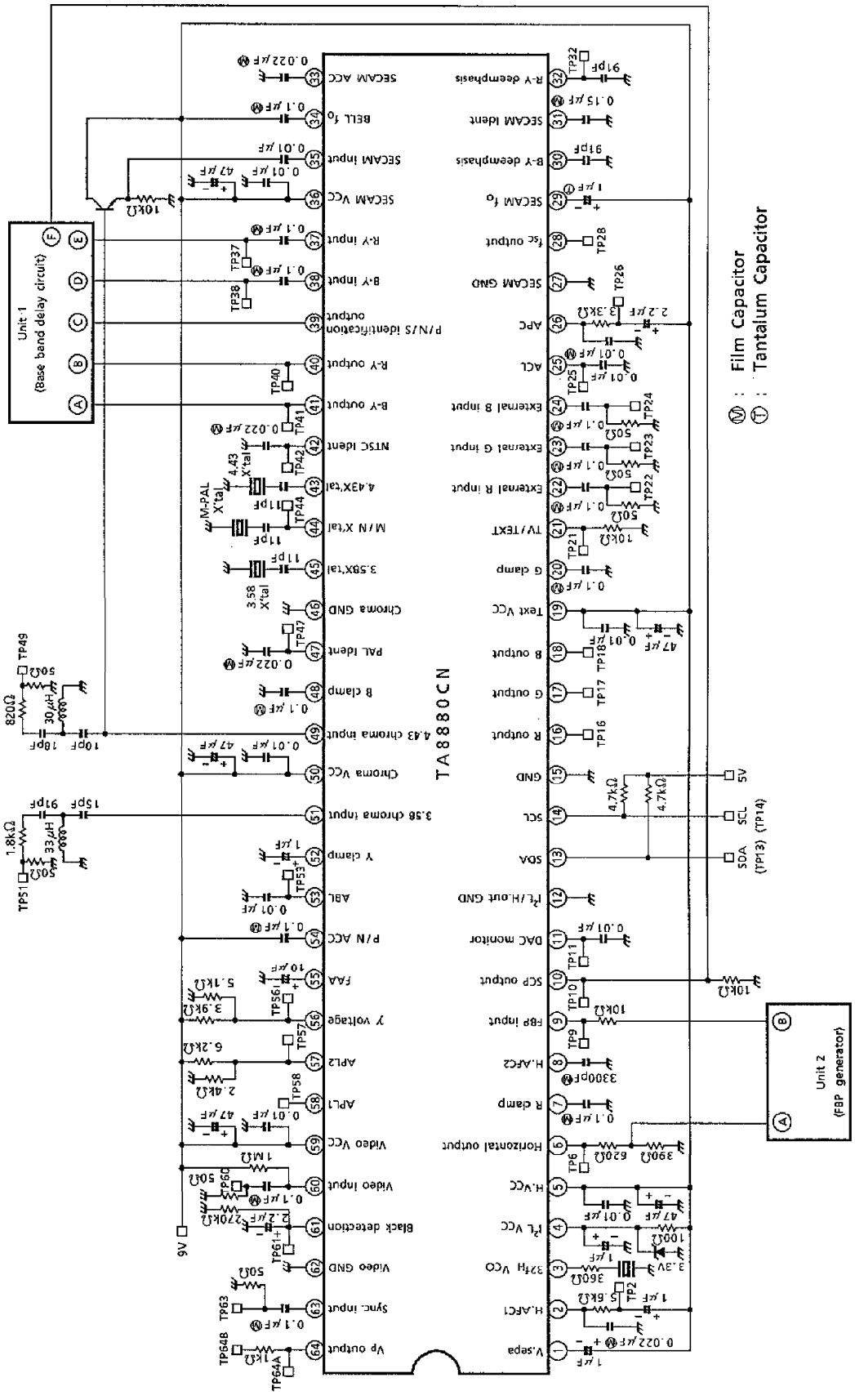


Note 33. SCP output voltage, gate pulse width



TEST SIGNALS





TEST CIRCUIT 1

Main unit

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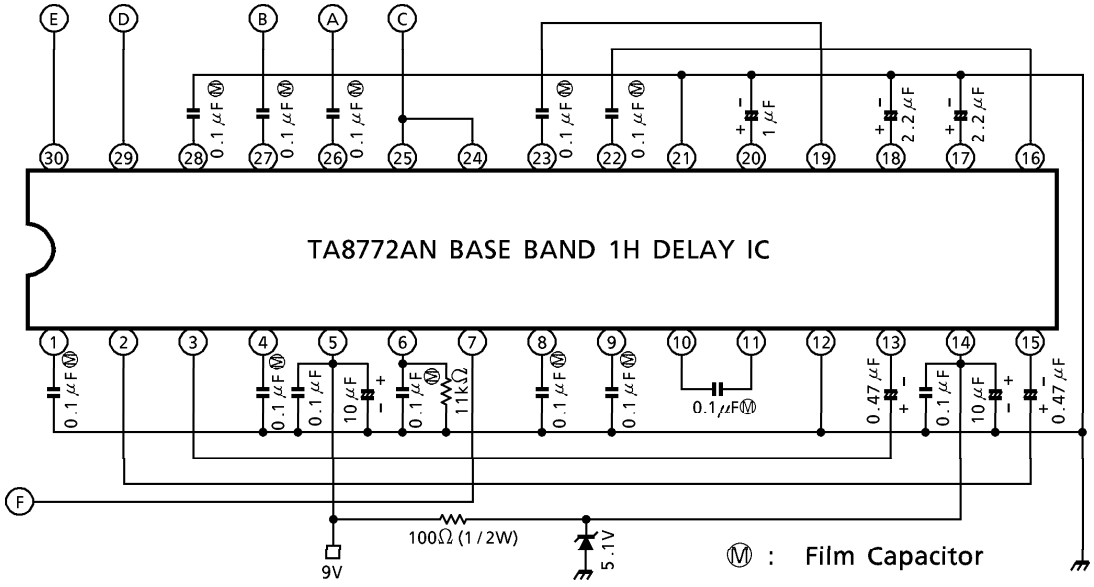
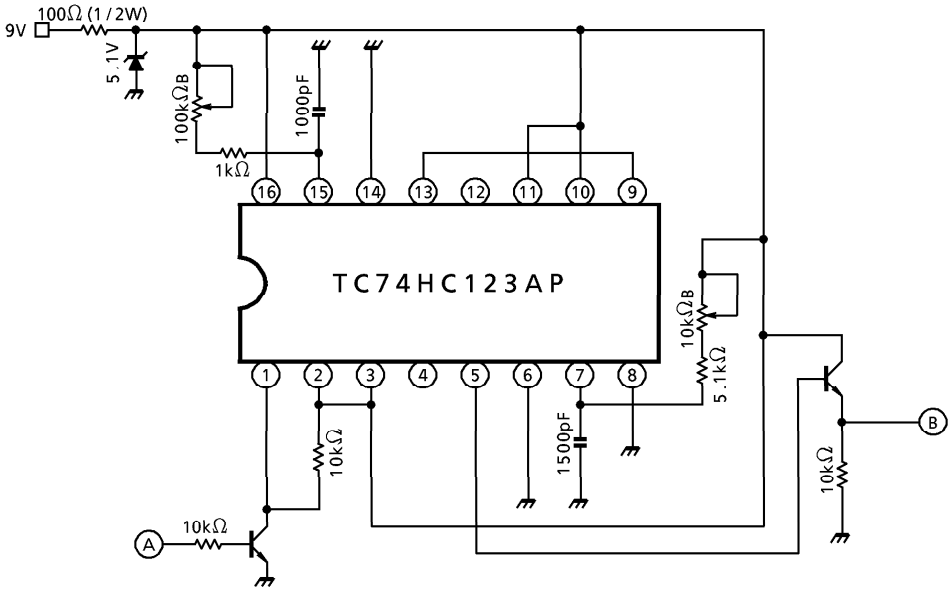
TEST CIRCUIT 2

Unit 1
(Base band delay circuit)

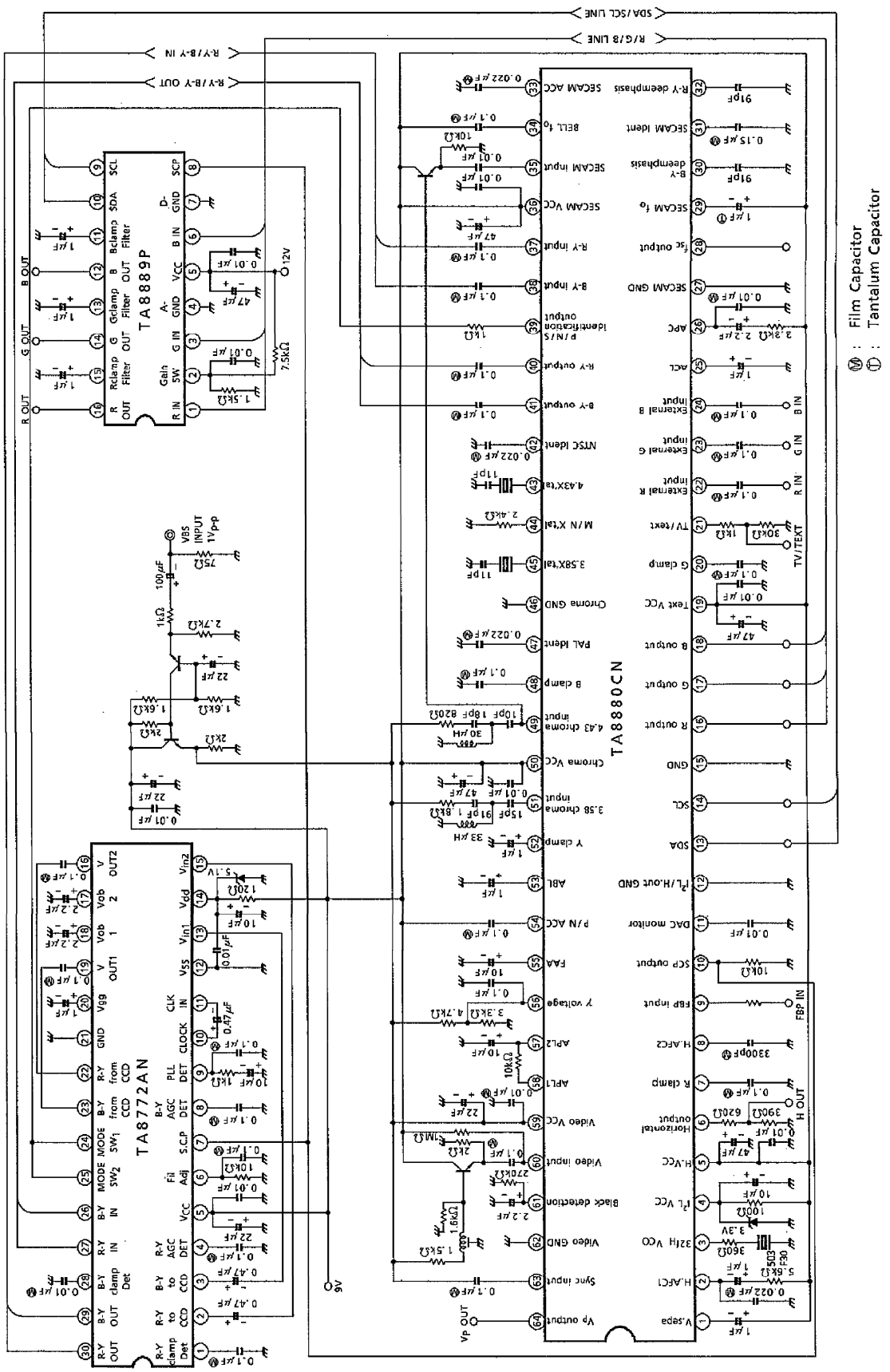


TEST CIRCUIT 3

Unit 2
(FBP generator)



APPLICATION EXAMPLE CIRCUIT 1 (FOR PAL/NTSC/SECAM)



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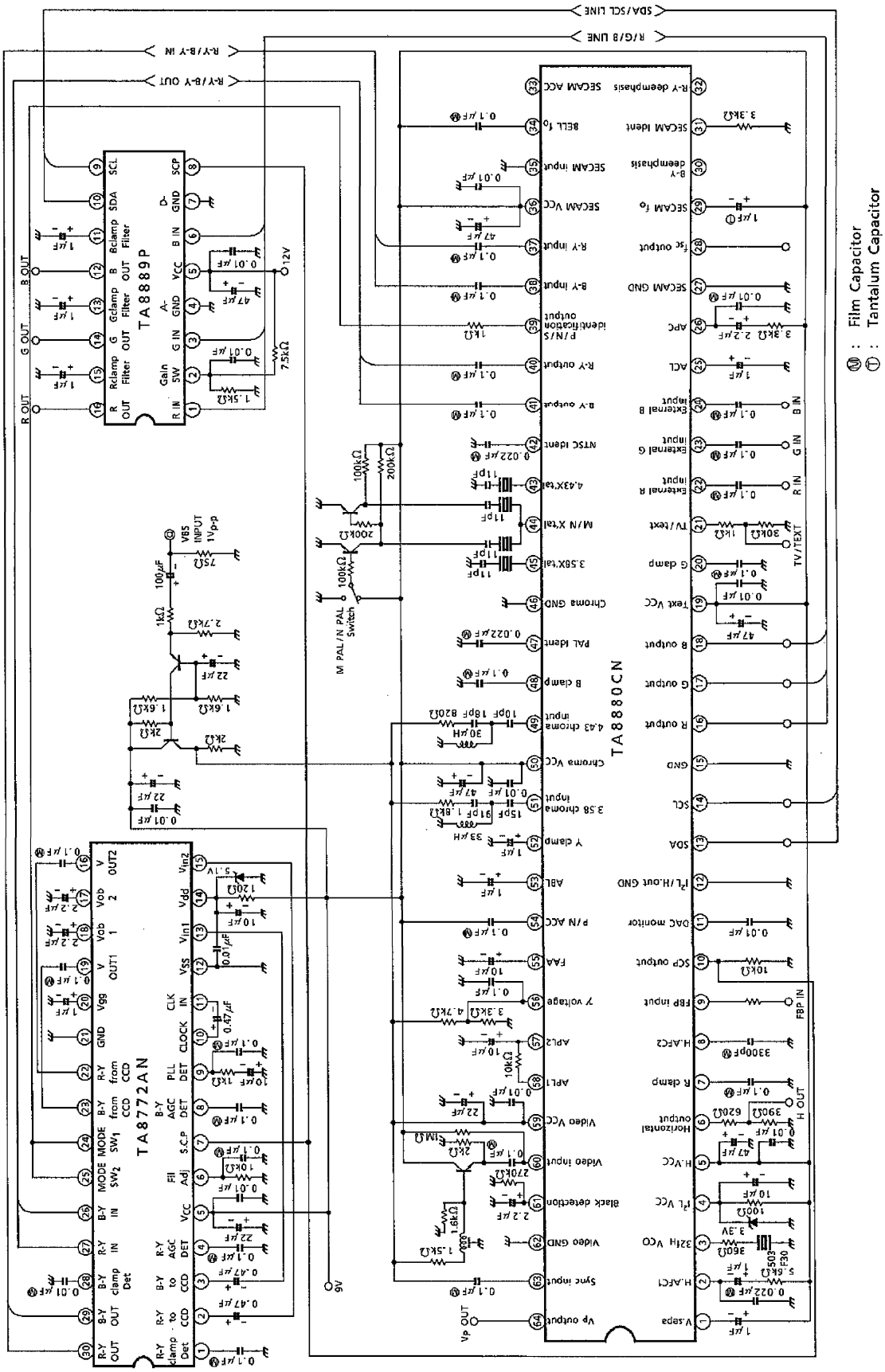

APPLICATION EXAMPLE CIRCUIT 2 (FOR NTSC/M PAL/N PAL)

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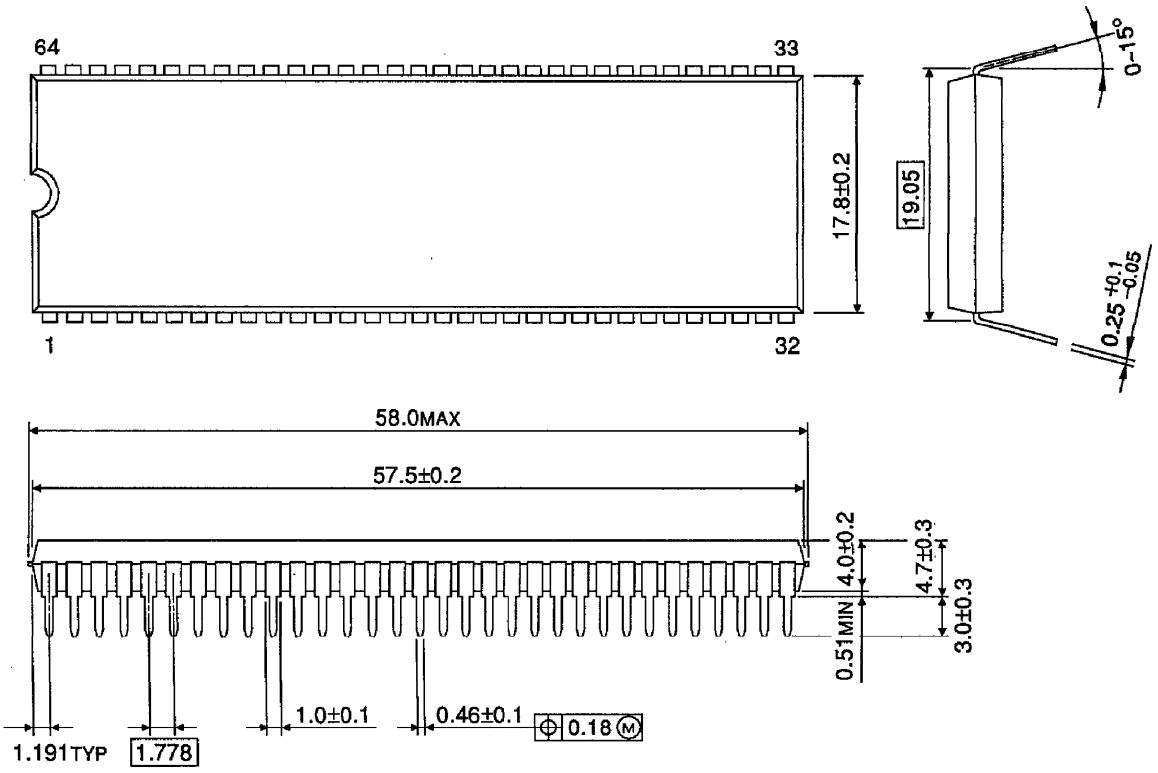
PACKAGE DIMENSIONS

SDIP64-P-750-1.78 Unit : mm



Weight : 8.85g (Typ.)

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000707EBA

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