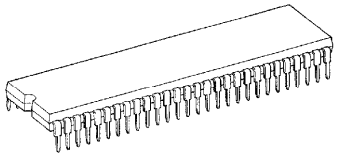
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8879N

1 CHIP NTSC COLOR TV

The TA8879N combines all the functions required for an NTSC color TV system in a 56-lead, dual-in-line shrink-type (1.78 mil) plastic package.
This device includes PIF / SIF circuits, video / chroma / deflection circuits, chroma band pass filters, red and green OSD interfaces, and 1ch Audio Video switches.



SDIP56-P-600-1.78

Weight : 5.55g (Typ.)

FEATURES

PIF Stage

- 3-stage variable-gain PIF amplification stage
- High-speed response AGC with dual time constants (peak AGC)
- Single end AFT output with defeat function
- RF delay AGC output (reverce AGC)
- Sync. negative detected video output polarity
- Internal black / white noise inverter
- Minimum externally mounted parts and adjusting spots

SIF Stage

- 3-stage limiter amplification stage
- Quadrature FM detector circuit with sound mute function
- 1ch external audio input
- High-performance electronic attenuater circuit
- Preamplifier circuit

Video Stage

- 2nd order-differential-type picture sharpness circuit (DC control)
- Contrast control with unicolor function
- Brightness control with pedestal clampling circuit (variable DC restoration ratio)
- External video input

Chroma Stage

- Internal 1/2 f_{SC} Trap
- Internal band pass filter
- ACC circuit
- Color control circuit
- Unicolor control circuit
- Color differential output
- Tint control circuit
- Adjustment-free APC Circuit

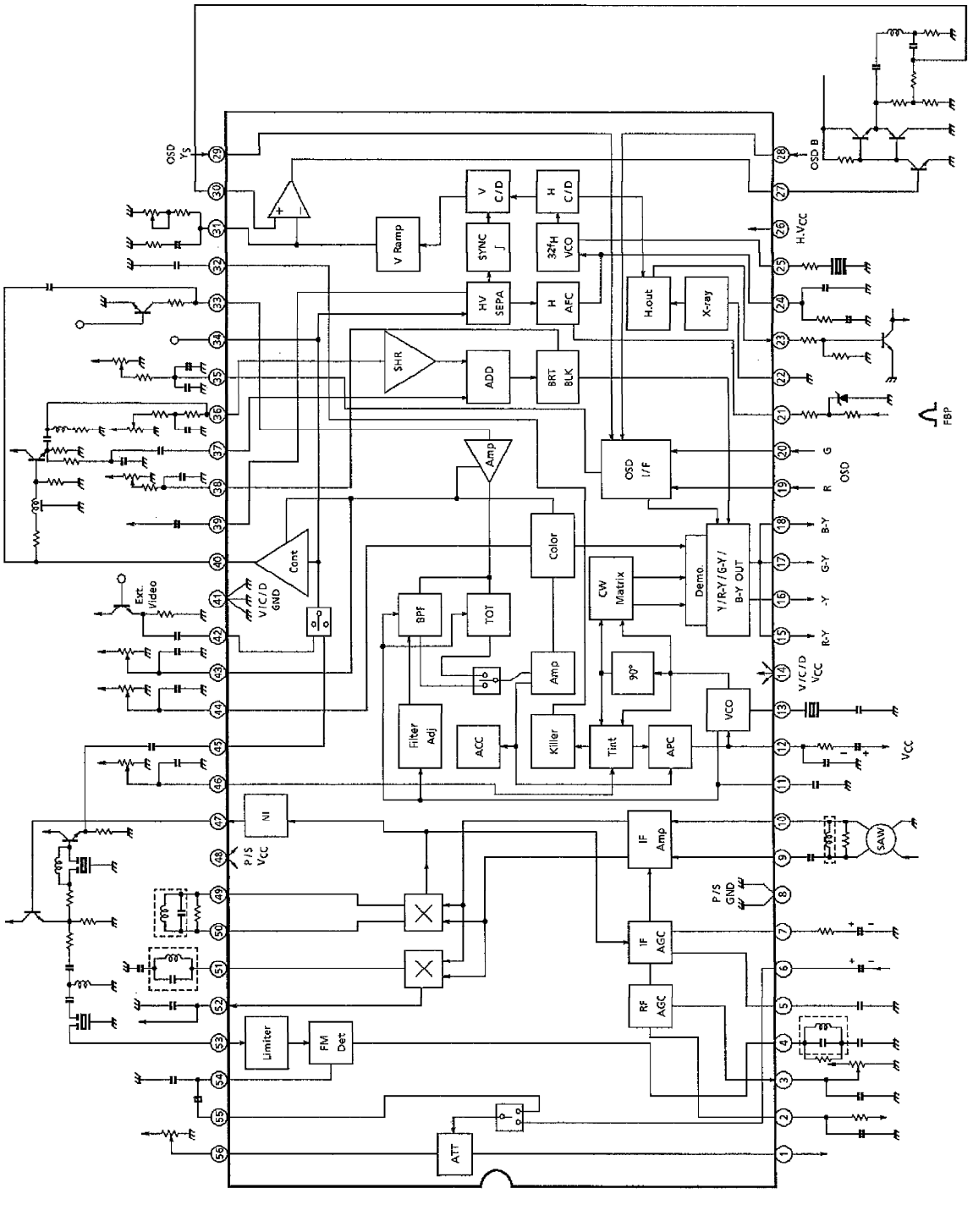
Defrection Stage

- High-performance sync separation circuit
- Adjustment free horizontal oscillation circuit
- Stable vertical synchronization
- Sawtooth-type AFC (internal sawtooth wave generator)
- Horizontal predrive output
- X-ray protection circuit
- Vertical NFB amplification circuit

OSD interface Stage

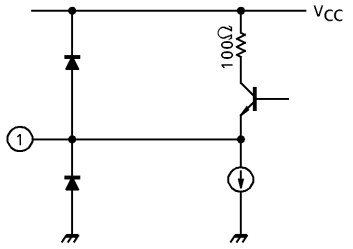
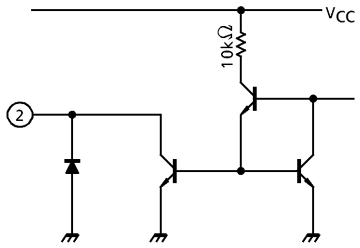
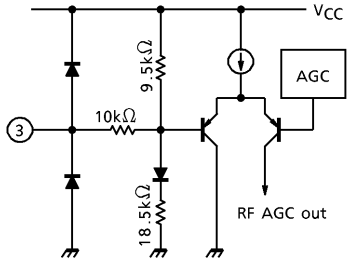
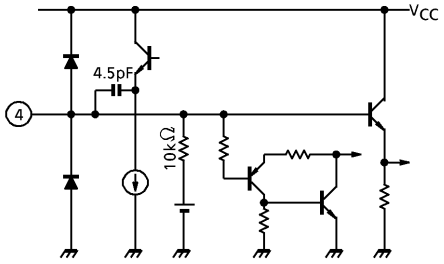
- Fast blanking SW

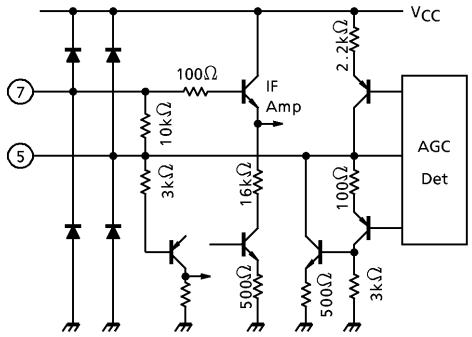
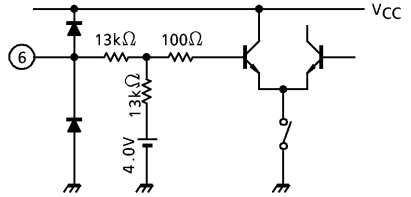
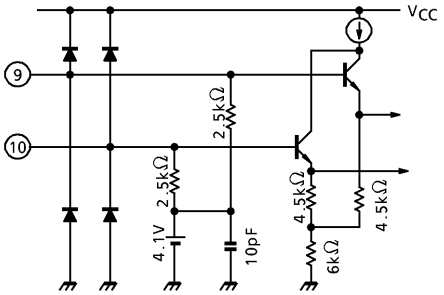
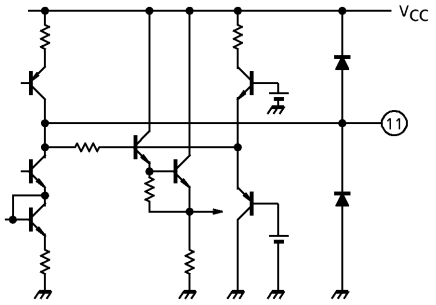
BLOCK DIAGRAM

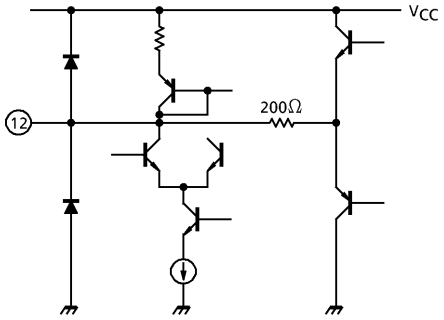
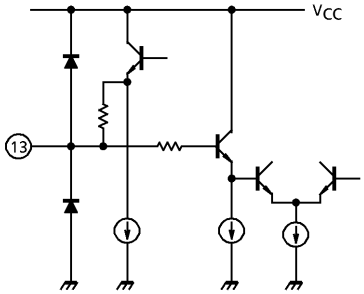
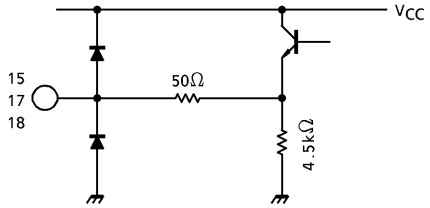
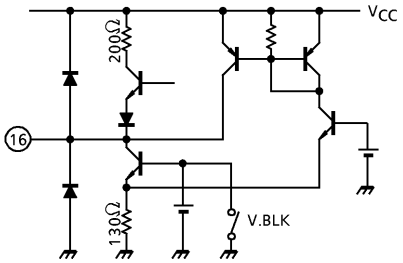


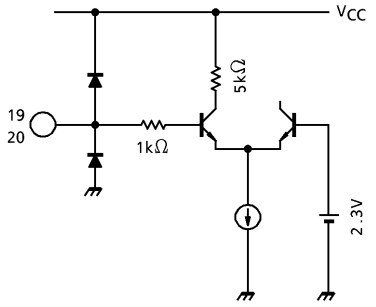
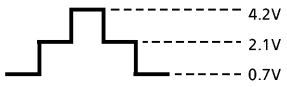
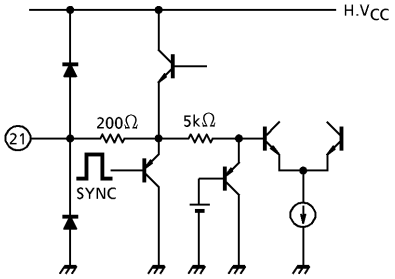
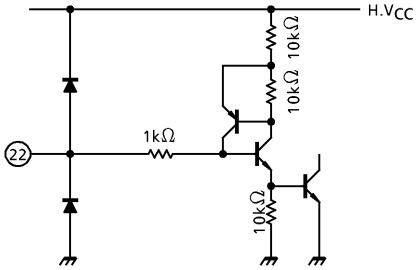
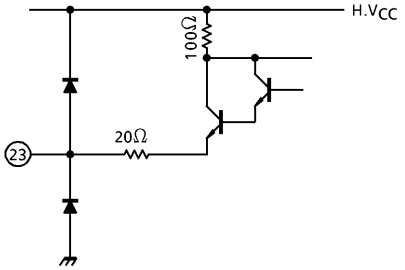
TA8879N – 3

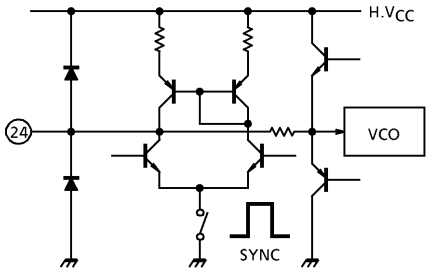
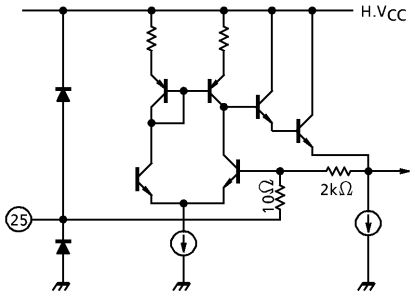
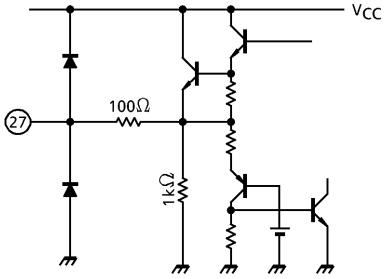
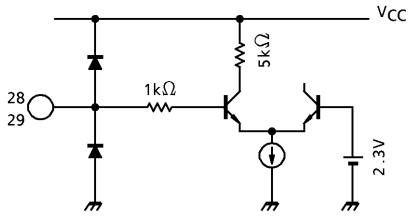
TERMINAL FUNCTION

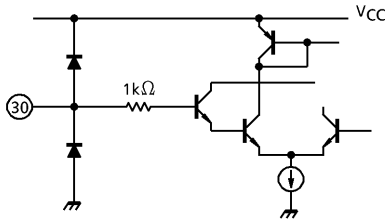
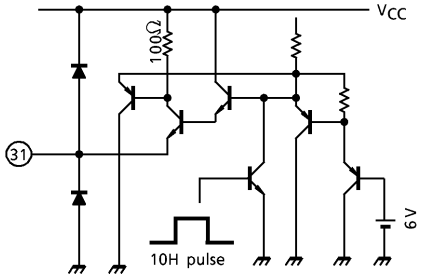
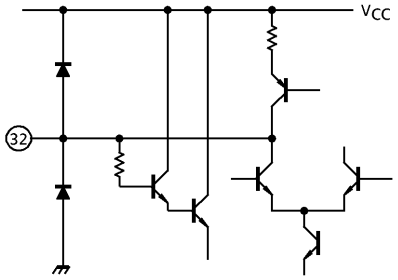
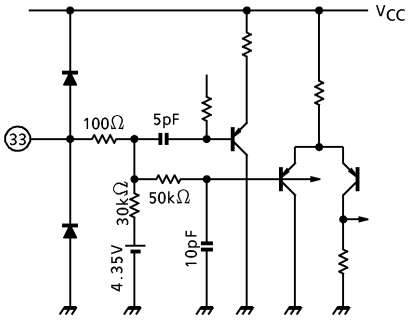
<table>
<tr><th>PIN No.</th><th>PIN NAME</th><th>FUNCTION</th><th>INTERFACE CIRCUIT</th></tr>
<tr><td>1</td><td>Audio Output</td><td>Emitter follower output for a volume controlled audio signal (TV / External) output stage
(Ref.)
<table>
<tr><th>MODE SELECT</th><th>MODE</th><th>INPUT</th><th>GAIN (ATT MAX)</th></tr>
<tr><td>Pin 33 open</td><td>TV</td><td>Pin 55</td><td>6dB</td></tr>
<tr><td>Pin 33 connected to GND through 47kΩ</td><td>EXT</td><td>Pin 6</td><td>0dB</td></tr>
</table></td><td> 
</td></tr>
<tr><td>2</td><td>RF AGC Output</td><td>An open collector output for RF AGC.
The gain is determined by an external load resistor.</td><td> 
</td></tr>
<tr><td>3</td><td>RF AGC Delay Adjust</td><td>The delay point of RF AGC is set by an applied external voltage.</td><td> 
</td></tr>
<tr><td>4</td><td>SIF Tank</td><td>A 4.5MHz tuned tank circuit is connected.
The detector muting function is on when this terminal is connected to GND.</td><td> 
</td></tr>
</table>

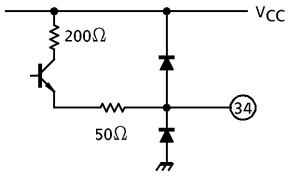
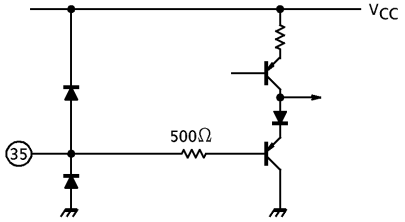
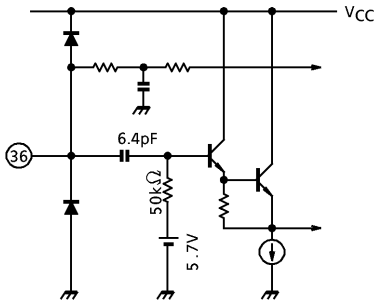
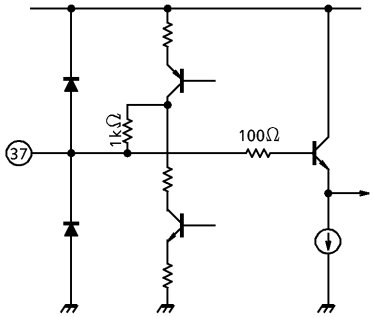
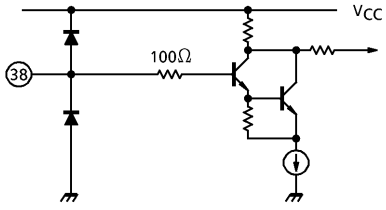
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
5 7	AGC Filter	Pin 5 and pin 7 are AGC time constant terminals A dual time constant system is adopted in order to achieve a high speed response.	
6	External Audio Input	External audio signal input terminal (Capacitor coupled input) (Ref.) External audio signal is selected when the terminal pin 33 is connected to GND through 47kΩ resistor.	
8	PIF / SIF GND	GND for PIF / SIF stage Decoupling capacitors should be connected between the terminal pin 48 and the terminal pin 8.	—
9 10	PIF Input	PIF signal input terminal Input impedance ; 2.5kΩ typ.	
11	Chroma filter and VCO Adjustment	The center frequency of the internal chroma filter and 3.58MHz VCO are adjusted simultaneously.	

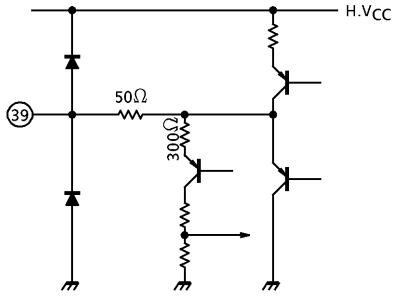
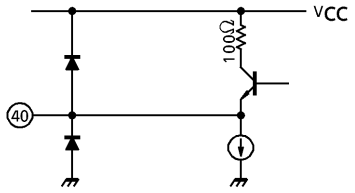
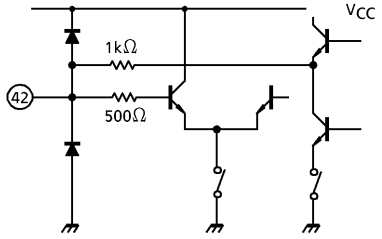
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
12	APC Filter	APC filter circuit is connected.	
13	3.58 X'tal	3.58MHz X'tal is connected.	
14	V / C / D V_{CC}	V_{CC} for video / chroma / deflection stage (V_{CC} = 9V typ., decoupling capacitors should be connected between the terminal pin 14 and pin 41)	—
15 17 18	R-Y Output G-Y Output B-Y Output	Color difference signal output terminal	
16	– Y Output	– Y signal output terminal Vertical blanking is generatecd internally, where as holizontal blanking should be added externally.	

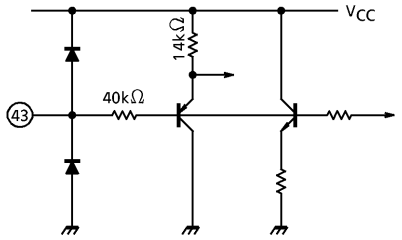
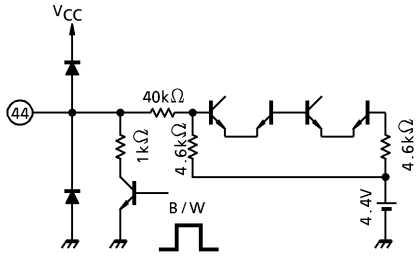
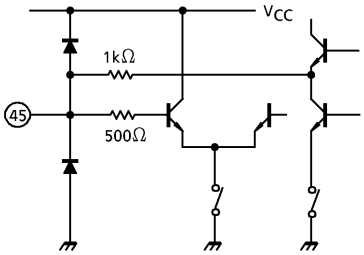
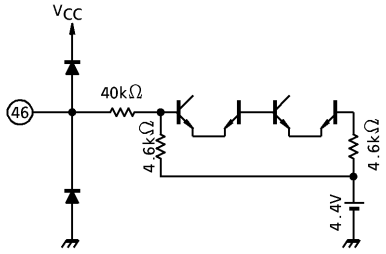
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
19 20	R OSD Input G OSD Input	OSD (On Screen Display) signal input terminal Threshold voltage : 2.3V (typ.) Max input level : 5.5V Min input level : −0.3V Max input Current in V_{CC} off : 7mA	
21	FBP Input	Input terminal for fly back pulse to horizontal AFC circuit (the integrator circuit for a sawtooth wave is provided internally.) Sync signal output terminal Pin 21 terminal voltage is clampled to 4.2V during sync pulse period. 	
22	X-ray Protector	The input terminal of the X-ray protector. Pin 23 horizontal drive terminal turns to "LOW" when the input voltage of this terminal exceeds the specified threshold voltage. (1.3V typ.)	
23	Horizontal Output	Horizontal drive output terminal (emitter follower) Amplitude : $5.0V_{p-p}$ (typ.) Duty : 43% (typ.)	

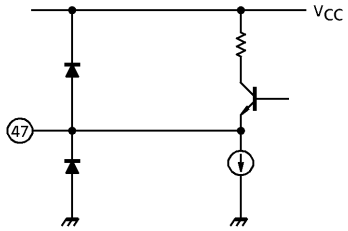
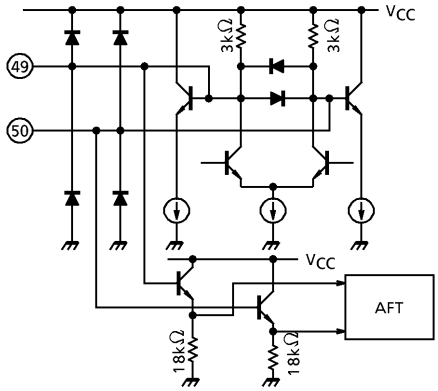
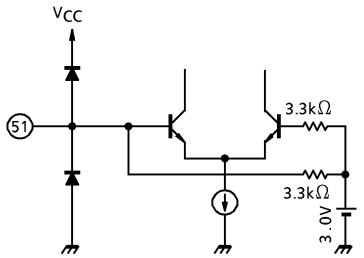
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
24	H.AFC	AFC filter is connected.	
25	$32f_H$ VCO	$32f_H$ oscillation circuit	
26	H.V_{CC}	V_{CC} for Horizontal Deflection H.V_{CC} = 9V typ. An external zener diode is required.	—
27	Vertical Output	Vertical output terminal (emitter follower) Test Mode The ramp wave at pin 31 is disappeared and the DC voltage of pin 31 becomes around 6V when 9V is applied to the terminal pin 27.	
28 29	B OSD Input Y_S Input	OSD (On Screen Display) signal input terminal Threshold voltage : 2.3V (typ.) Max input level : 5.5V Min input level : −0.3V Max input current in V_{CC} off : 7mA	

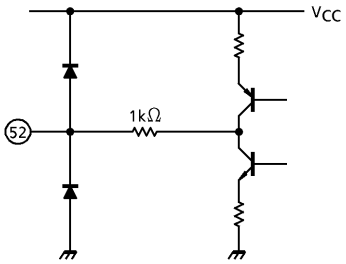
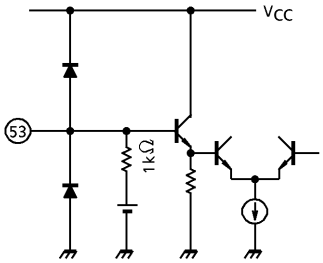
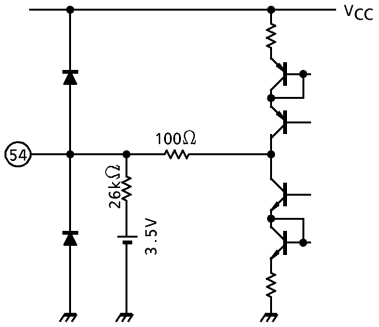
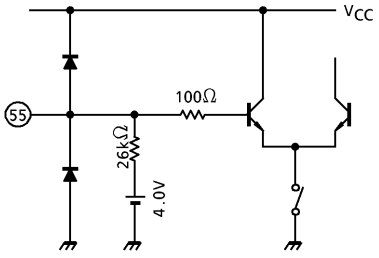
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
30	Vertical NFB	Input terminal for vertical NFB Amp. (AC, DC feedback)	
31	Vertical Ramp	The vertical ramp wave is generated at this terminal. During retrace period, external capacitor is charged by an internal current source, then, during trace period, an external capacitor is discharged by an external resistor. The vertical ramp voltage is subject to the horizontal V_{CC} (6V typ. when horizontal V_{CC} is 9V.)	
32	Killer Filter	Killer filter capacitor is connected.	
33	Chroma Input TV / EXT Switch S-VHS Switch	Chroma signal input terminal TV / External selection terminal Switching circuit for external Chroma signal input V33 [V] 3.25 TV MODE 2.15 EXT MODE S-VHS MODE S-VHS MODE : A compensation circuit for a unicolor control is disabled.	

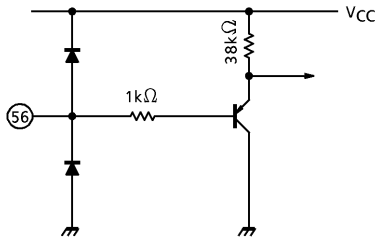
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
34	Video OUT (2)	Switching circuit for external chroma signal input Composite video signal with contrast amplitude is delivered from this terminal.	
35	OSD Bright	OSD signal brightness control terminal OSD brightness level is set by this terminal voltage.	
36	Picture Sharpness Control 2nd Order-differential Video Signal Input	2nd ordered-differential video signal input terminal Picture sharpness control terminal	
37	Video Input	Input terminal of delayed video signal	
38	Brightness Control	TV signal brightness control terminal DC restoration ratio is determined by the external resistors R_1 and R_2.	

<table>
<tr><th>PIN No.</th><th>PIN NAME</th><th>FUNCTION</th><th>INTERFACE CIRCUIT</th></tr>
<tr><td>39</td><td>Vertical Sepa. Filter</td><td>Vertical sync. separation filter is connected.</td><td> 
</td></tr>
<tr><td>40</td><td>Video Output (1)</td><td>Contrast controlled TV signal (from pin 45) and external video signal (from pin 42) are switched by terminal 33 voltage and delivered from this terminal.
<table>
<tr><th>MODE SELECT</th><th>MODE</th><th>INPUT</th><th>GAIN (CON-TRAST MAX)</th></tr>
<tr><td>Pin 33 open</td><td>TV</td><td>Pin 45</td><td>3.5dB</td></tr>
<tr><td>Pin 33 Connected to GND through 47kΩ</td><td>EXT</td><td>Pin 42</td><td>9.5dB</td></tr>
</table></td><td> 
</td></tr>
<tr><td>41</td><td>V / C / D GND</td><td>GND for Video / Chroma / Delection stage Decoupling capacitors should be connected between the terminal pin 14 and pin 41.</td><td>—</td></tr>
<tr><td>42</td><td>External Video Input</td><td>External video signal input terminal ($1V_{p-p}$ typ.)
(TV / External Selection : with pin 33 chroma signal input)</td><td> 
</td></tr>
</table>

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
43	Contrast Control	Uni-color control terminal (Gain control for video and color) Test Mode (1) Burst signal is appeared at the terminal pin 17 (G-Y output) when the terminal pin 43 voltage is set to 2.0V. Test Mode (2) Burst and chroma signal is appeared at the at the terminal pin 17 (G-Y output) when the terminal pin 43 voltage is set to 2.0V and pin 36 is set to 0.2V or connected GND thorough 3kΩ.	
44	Color Control	Color saturation control terminal This pin 44 is low at "killer" working.	
45	TV Input	TV video signal input terminal ($2V_{p-p}$ typ.) (TV / External Selection : with pin 33 chroma signal input)	
46	TINT Control	Hue control terminal Test Mode 3.58MHz X'tal drive wave form can be observed at the terminal pin 15, pin 17 and pin 18 when the terminal pin 46 voltage is set to lower than 1.3V.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
47	TV Video Output (VIF Output)	An output terminal for detected TV video signal. Video muting circuit operates when the terminal pin 5 is connected to GND.	
48	P / S V_{CC}	V_{CC} for PIF / SIF stage (V_{CC} = 9V typ.) Decoupling capacitors should be connected between the terminal pin 8 and pin 48.	—
49 50	PIF Tank	Terminals for a video DET tank circuit	
51	AFT Tank	A single ended tuned tank is connected. To defeat AFT, pin 45 is connected to GND through 10kΩ resistor.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
52	AFT Output	AFT output terminal AFT center voltage is determined by V_O, slope sensitivity is determined by $(R_1 + \frac{V_R}{2})$. 	
53	SIF Input	SIF signal input terminal	
54	De-Emphance	A SIF detection de-emphasis capacitor is connected. The output signal should be led to the terminal pin 55 through a coupling capacitor. In sound MPX Application, the signal from terminal pin 54 can be applied to the sound MPX decoder.	
55	Audio TV Input	TV audio signal input terminal (Audio signal from pin 54 is to be applied to pin 55 through a coupling capacitor.)	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
56	Audio Volume Control	Volume control terminal Controlled by 0 to 5V DC, suitable to μ-computer control interface. A linear taper potentiometer can be used. The attenuation range is 70dB.	

OSD LOGIC TABLE

MODE	INPUT				OUTPUT		
	Y_S (PIN 29)	R (PIN 19)	G (PIN 20)	B (PIN 28)	R-Y (PIN 15)	B-Y (PIN 17)	G-Y (PIN 18)
TV	L	L	L	L	TV	TV	TV
Black	H	L	L	L	L	L	L
Red	(*)	H	L	L	H	L	L
Blue	(*)	L	L	H	L	H	L
Green	(*)	L	H	L	L	L	H
Yellow	(*)	H	H	L	H	L	H
Magenta	(*)	H	L	H	H	H	L
Cyan	(*)	L	H	H	L	H	H
White	(*)	H	H	H	H	H	H

(*) : Don't CARE

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{CC}	13.0	V
Input Terminal Voltage	V_{in}	GND – 0.3V~V_{CC} + 0.3V	V
Input Signal Amplitude	e_{in}	4.0	V_{p-p}
Power Dissipation	P_D (Note)	1.92	W
Operating Temperature	T_{opr}	– 20~65	°C
Storage Temperature	T_{stg}	– 55~150	°C

(Note) When using the device at above Ta = 25°C, decrease the power dissipation by 15.3mW for each increase of 1°C.

RECOMMENDED POWER SUPPLY VOLTAGE

PIN No.	CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
14, 48	9V Power Supply Voltage	V_{CC}	8.5	9.0	9.5	V	—
26	9V Power Supply Voltage	H.V_{CC}					—

ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS (Unless otherwise specified, V_{CC} = 9V, H.V_{CC} = 9V, Ta = 25°C)

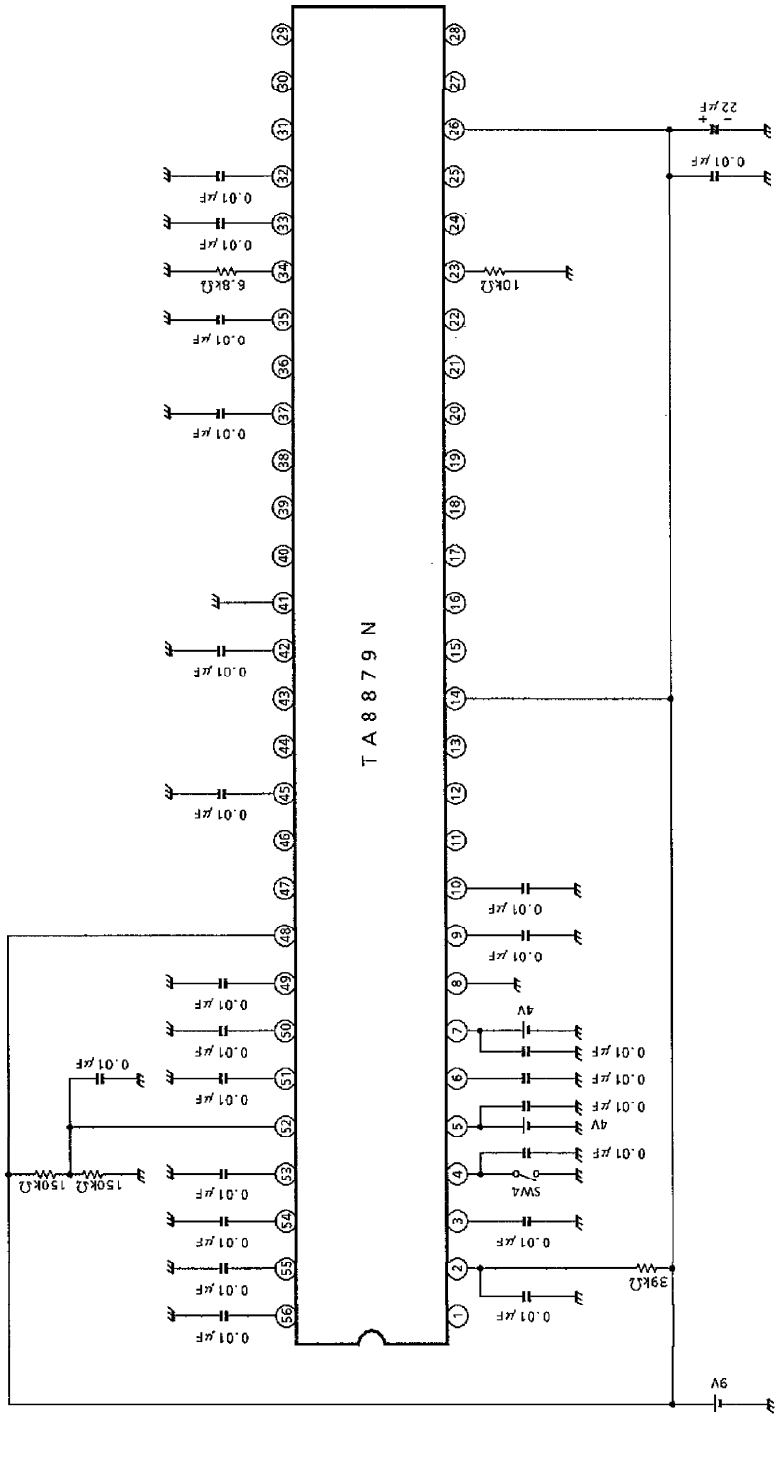
DC voltage characteristics

PIN No.	PIN NAME	SYM-BOL	MIN.	TYP.	MAX.	UNIT	NOTE
1	Audio Output	V1	4.0	4.7	5.2	V	SW4 : ON
2	RF AGC Output	V2	—	—	0.5		
3	RF AGC Delay	V3	5.8	6.2	6.7		
4	SIF Tank	V4	2.5	3.0	3.6		
5	1st AGC	V5	—	4	—		External Supply Voltage
6	External Audio Input	V6	3.3	4.0	5.1		
7	2nd AGC	V7	—	4	—		External Supply Voltage
8	PIF / SIF GND	V8	—	0	—		
9	PIF Input (1)	V9	3.5	3.9	4.5		
10	PIF Input (2)	V10	3.5	3.9	4.5		
11	f_c Adjustment	V11	3.5	4.5	5.5		
12	APC Filter	V12	5.9	6.4	6.9		
13	3.58 X'tal	V13	3.8	4.3	4.7		
14	V / C / D V_{CC}	V14	—	9.0	—		
15	R-Y output	V15	4.7	5.4	5.9		
16	– Y Output	V16	4.5	5.0	5.5		Bright Terminal 5.2V
17	G-Y Output	V17	4.7	5.4	5.9		
18	B-Y output	V18	4.7	5.4	5.9		
19	R OSD Input	V19	—	—	—		
20	G OSD Input	V20	—	—	—		
21	FBP Input	V21	0.5	0.9	1.2		
22	X-ray	V22	—	—	—		
23	Horizontal Output	V23	4.9	5.2	5.6		Ground via 10kΩ
24	Horizontal AFC	V24	6.7	7.2	7.8		
25	32f_H VCO	V25	4.80	5.2	5.75		
26	H.V_{CC}	V26	—	9.0	—		
27	Vertical Output	V27	2.9	3.5	4.1		
28	B OSD Input	V28	—	—	—		
29	Y_S OSD Input	V29	—	—	—		
30	Vertical NFB	V30	—	—	—		
31	Vertical Ramp	V31	5.9	6.1	6.3		
32	Killer Filter	V32	5.3	5.7	6.2		
33	Chroma Input	V33	3.8	4.35	4.8		
34	Video Out (2)	V34	1.7	2.0	2.3		Ground via 6.8kΩ
35	OSD Bright Control	V35	—	—	—		
36	Sharpness Control	V36	5.2	5.7	6.2		
37	Video IN	V37	4.6	5.1	5.6		Bright Terminal 5.2V

PIN No.	PIN NAME	SYM-BOL	MIN.	TYP.	MAX.	UNIT	NOTE
38	Brightness Control	V38	—	—	—	V	
39	Vertical Sync Sepa. Filter	V39	—	—	—		
40	Video OUT (1)	V40	1.6	2.4	3.2		
41	V/C/D GND	V41	—	0	—		
42	External Video Input	V42	2.0	2.5	3.0		External Input Mode
43	Contrast Control	V43	4.9	5.5	6.0		
44	Color Control	V44	3.9	4.4	4.8		
45	TV Input	V45	2.3	2.8	3.3		TV Mode
46	Tint Control	V46	3.9	4.4	4.8		
47	TV Detection Output	V47	4.2	4.6	4.9		
48	PIF/SIF V_{CC}	V48	—	9.0	—		
49	PIF Tank (1)	V49	6.2	6.8	7.1		
50	PIF Tank (2)	V50	6.2	6.8	7.1		
51	AFT Tank	V51	2.6	3.0	3.4		
52	AFT Output	V52	2.3	3.8	5.3		
53	SIF Input	V53	2.6	3.0	3.4		
54	De-emphasis	V54	2.7	3.5	4.2		SW4 : ON
55	Audio TV Input	V55	3.3	4.0	5.1		
56	Audio Control	V56	—	—	5		

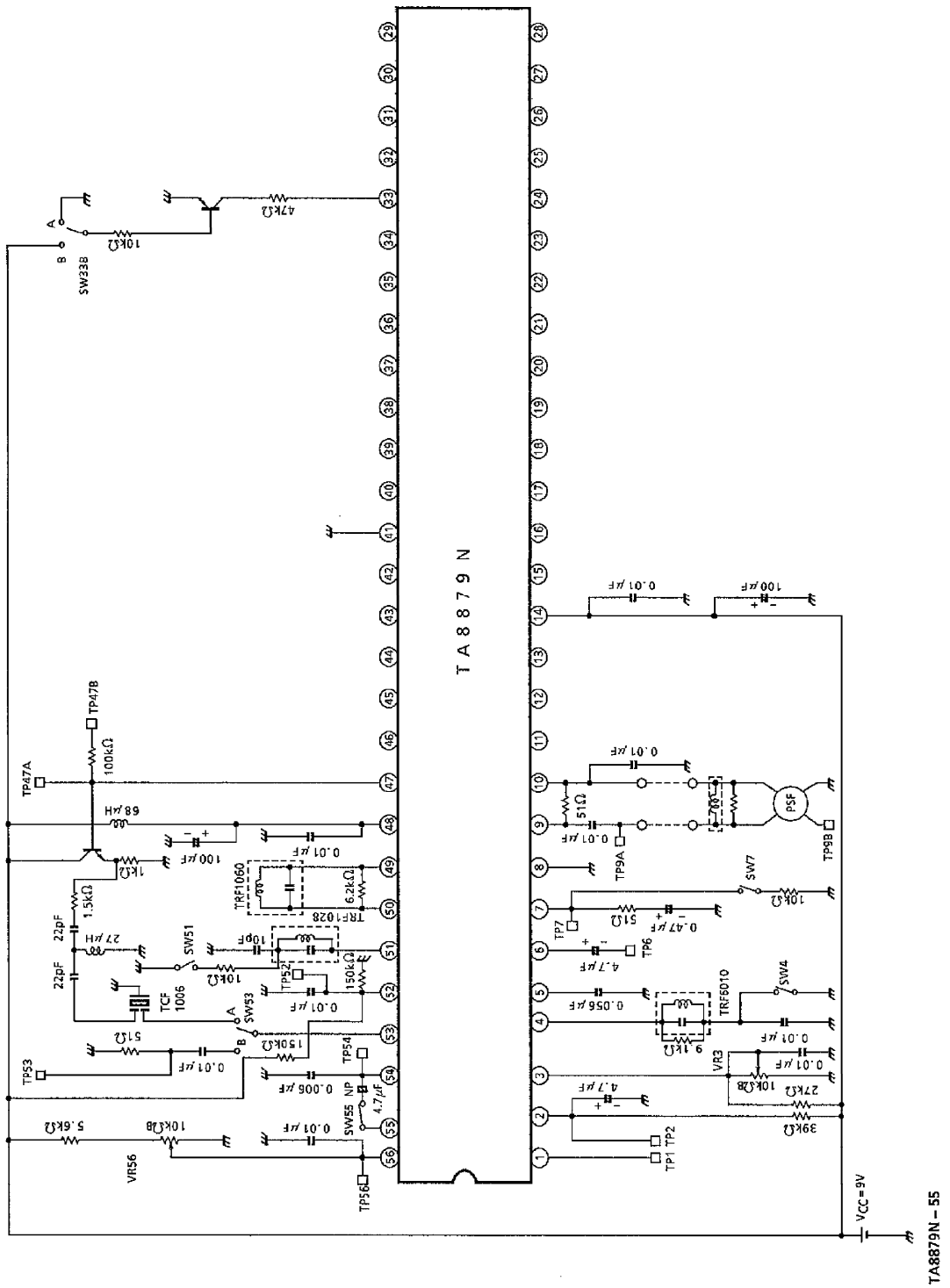
Power consumption, power dissipation

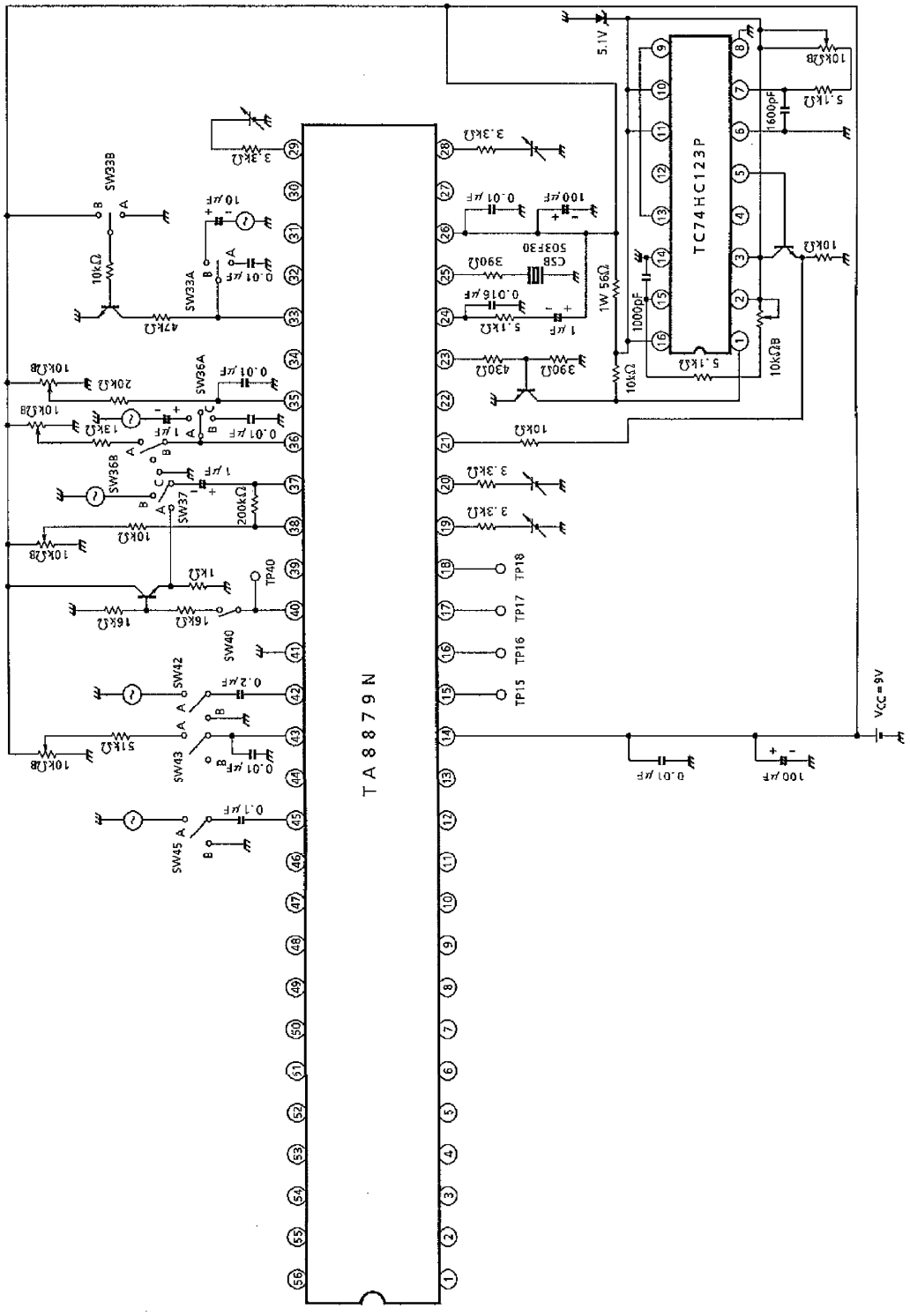
CHARACTERISTIC			SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Power Supply Current	PIF		I1	18	26	34	mA	"Video" includes OSD part.
	SIF		I2	7	11	15		
	Video		I3	15	22	29		
	Chroma		I4	14	22	29		
	Deflection	V_{CC}	I5	1	2	3		
		$H.V_{CC}$	I6	7	10	13		
Total Current		V_{CC}	I_{CC}	55	83	110	mA	
		$H.V_{CC}$	I_{CCH}	7	10	13		
Total Power Dissipation			P_D	558	837	1107	mW	



TEST CIRCUIT 1
DC characteristics

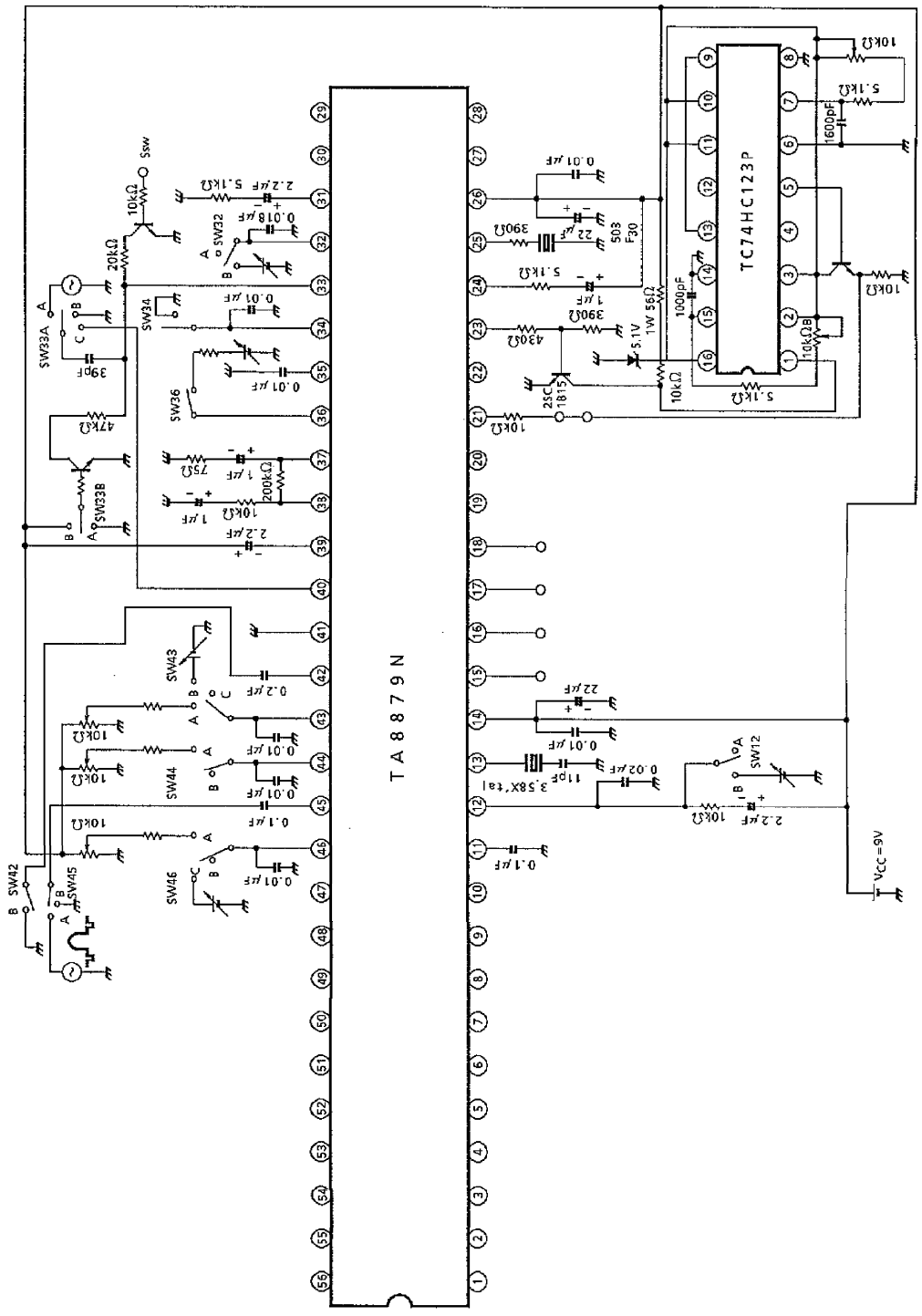
TA8879N – 54


TA8879N
SW33B
47kΩ
10kΩ
TP47B
100kΩ
TP47A
68μH
1kΩ
100pF
0.01μF
1.5kΩ
22pF
27μH
TRF1060
TRF1028
6.2kΩ
SW51
10pF
150kΩ
TP52
TCF
1006
SW53
51Ω
TP53
TP54
0.006μF
SW55 NP
4.7μF
5.6kΩ
VR56
TP56
0.1μF
100μF
51Ω
TP9A
TP9B
PSF
SW7
TP7
TP6
4.7μF
0.056μF
TRF6010
SW4
VR3
27kΩ
39kΩ
TP1 TP2
VCC=9V
TEST CIRCUIT 2
PIF, SIF stage
TA8879N-55



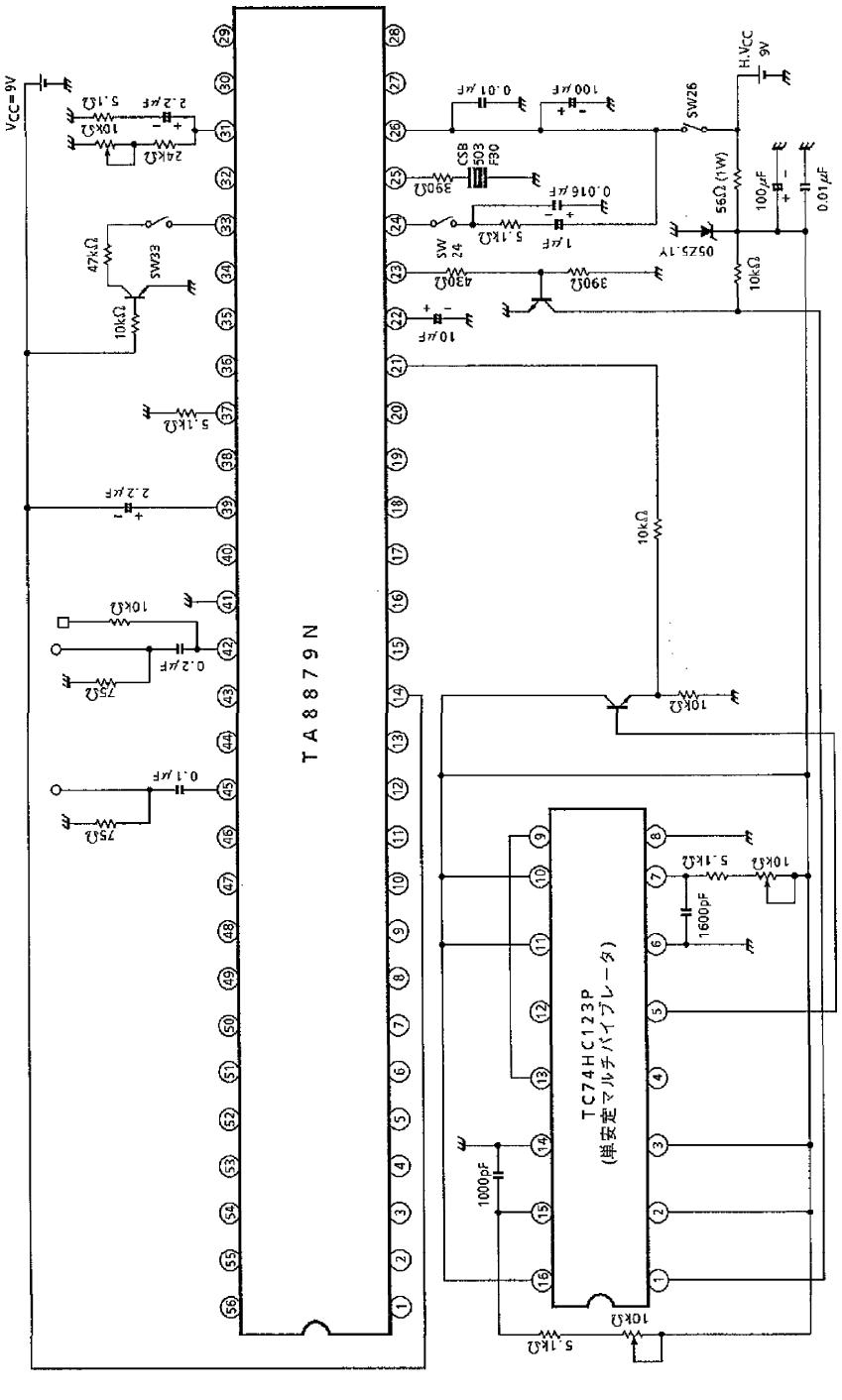
TEST CIRCUIT 3
Video, OSD interface stage

TA8879N – 56



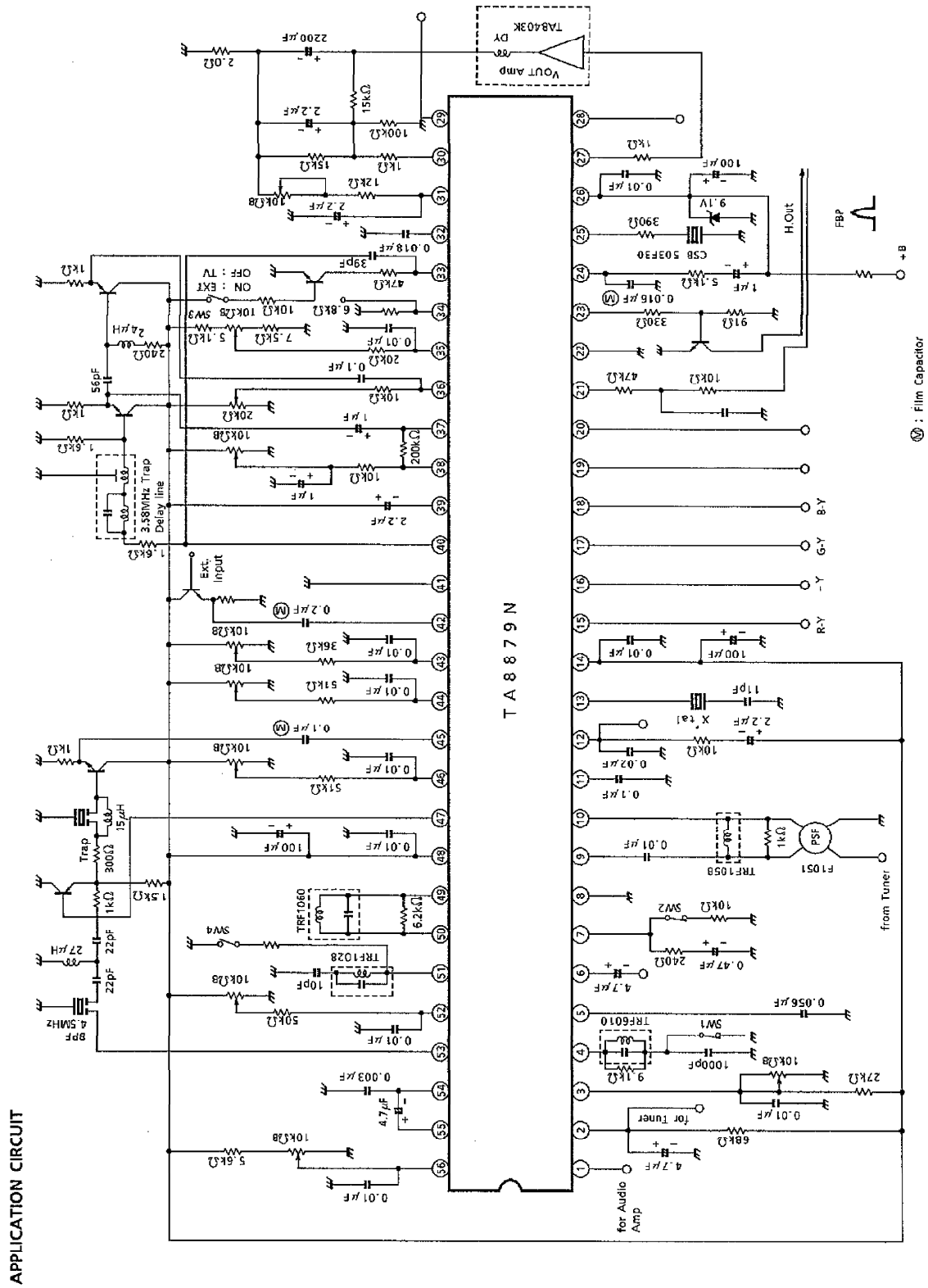
TEST CIRCUIT 4
Chroma stage

TA8879N – 57



TEST CIRCUIT
Defrection stage

TA8879N – 58

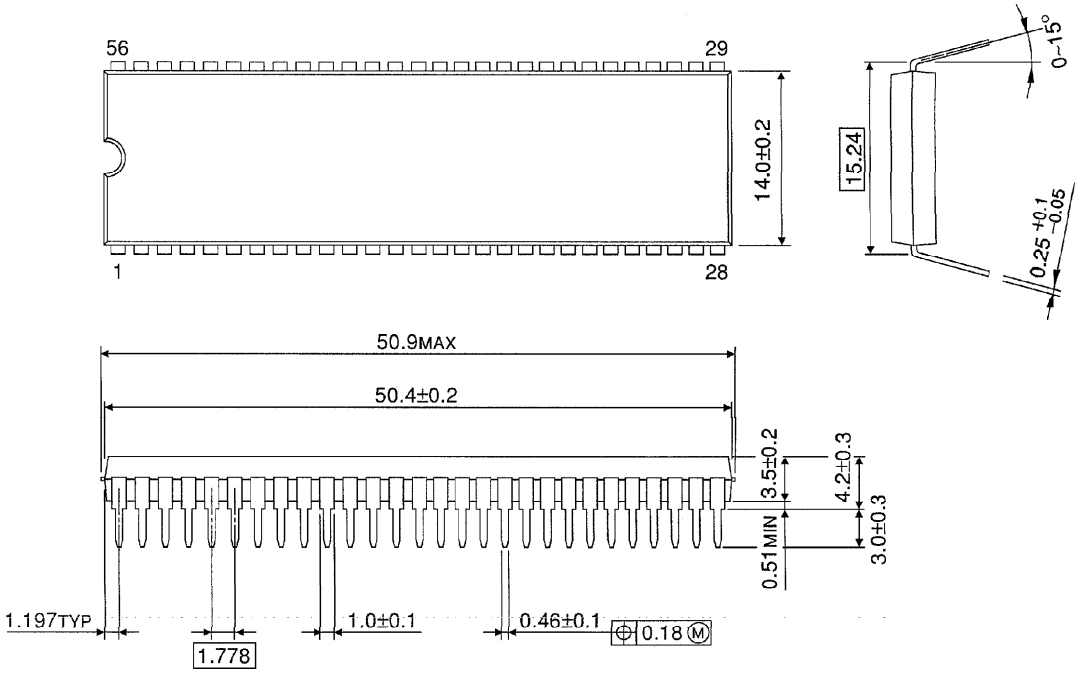


APPLICATION CIRCUIT

TA8879N – 59

OUTLINE DRAWING

SDIP56-P-600-1.78 Unit : mm



Weight : 5.55g (Typ.)