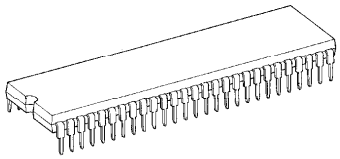
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8690AN

PAL / NTSC DUAL MODE COLOR TV SINGLE CHIP SIGNAL PROCESSING IC

The TA8690AN is provided with the circuit of PIF, SIF, video, chroma, deflection. And the package the small DIP (shrink DIP with 54pins). With this item, the PAL / NTSC Dual Mode Color TV is to be composed of fewer components, and with small area.



SDIP54-P-600-1.78

Weight : 5.44g (Typ.)

FEATURES

PIF stage

- 3 Stage Variable Gain IF AMP
- High Speed response AGC (peak AGC) with dual time constants
- Single end AFT output with defeat function
- RF delay AGC output (Reverse AGC)
- internal black / white noise inverter

SIF stage

- Quadrature FM Detection Circuit
- Adjustment free Detection Circuit with ceramic discriminater
- High performance electronic attenuater circuit
- NF Preamplifier Circuit

Video stage

- Secondary Differential Picture Sharpness Circuit
- Contrast Control with Uni-color function
- Brightness Control with Pedestal Clamp Circuit
- Internal Blanking Circuit

000707EBA2

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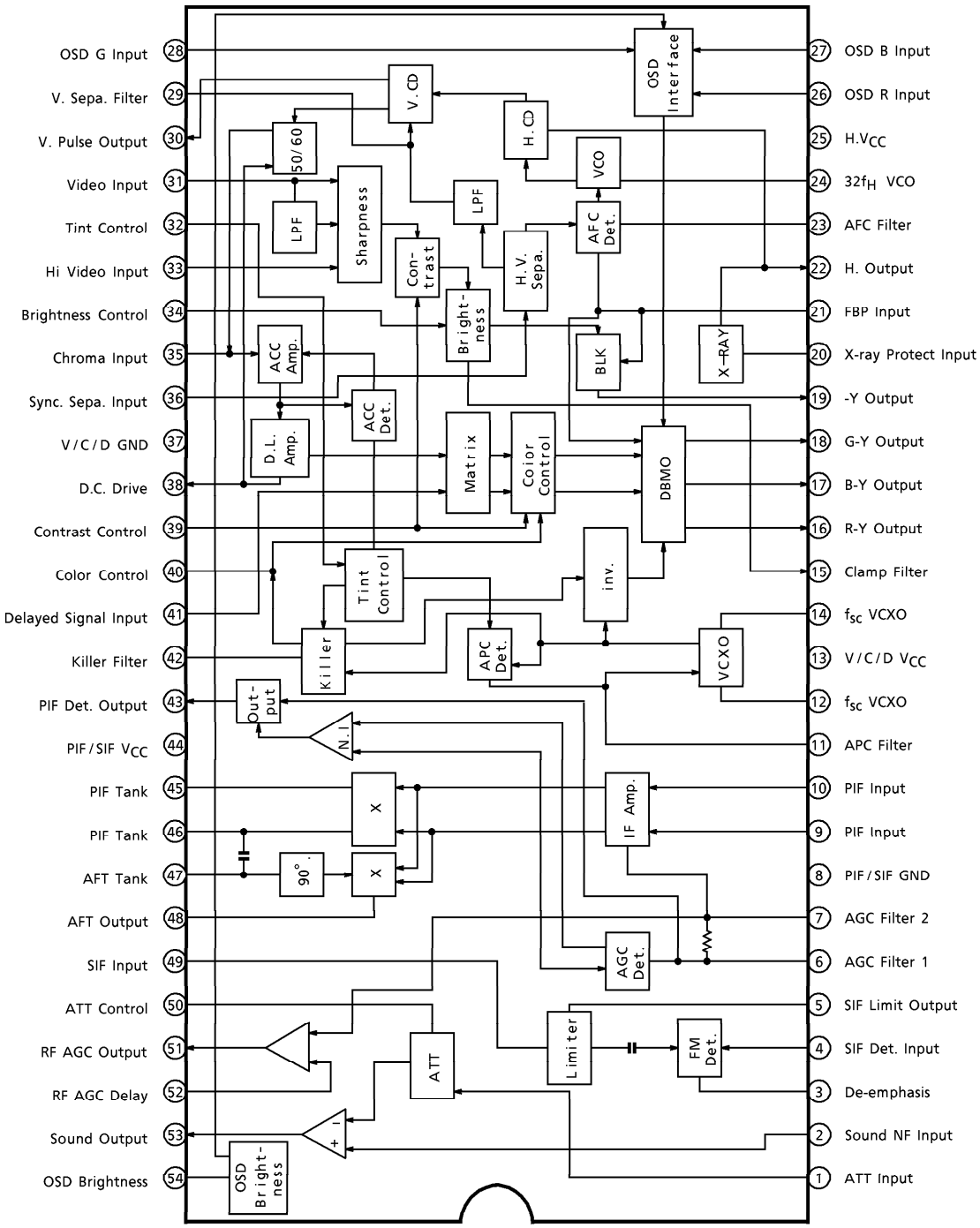
Chroma stage

- ACC Circuit
- Color Control Circuit
- Uni-Color Control Circuit
- Color Differtencial output
- Adjustment free APC Circuit
- Killer Circuit
- OSD interface with Brightness control
- PAL / NTSC system SW
- TINT Control Circuit at NTSC Mode

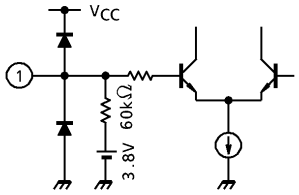
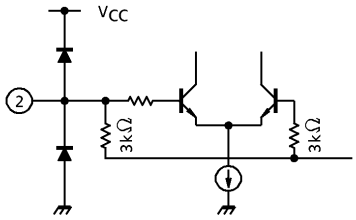
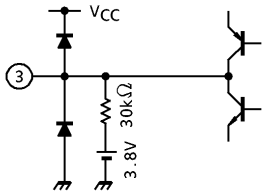
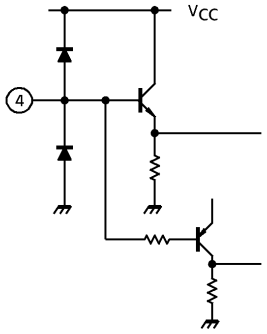
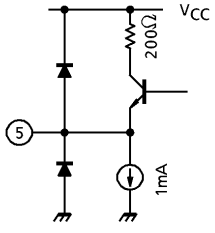
Deflection stage

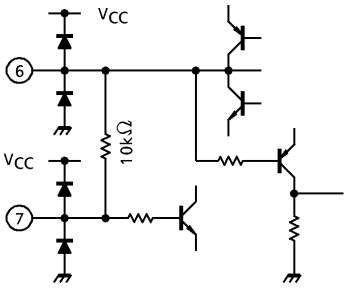
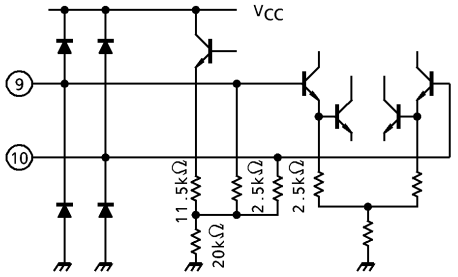
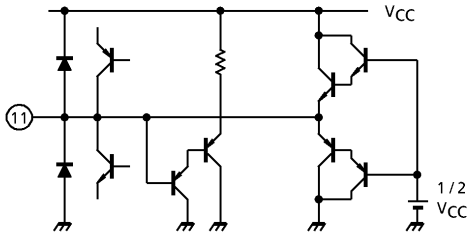
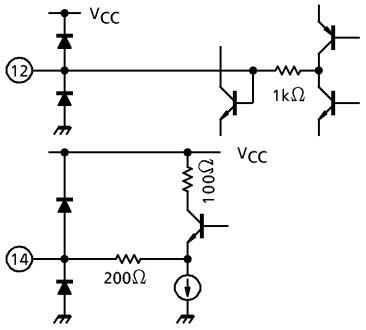
- High performance sync. separation circuit
- Adjustment free Countdown system
- AFC Circuit
- Flyback pulse input with sync. output
- Horizontal Pre-Drive Output
- X-ray Protection Circuit
- Vertical Pulse Output
- 50Hz / 60Hz auto detector
- 50Hz / 60Hz manual SW

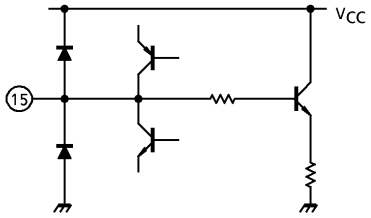
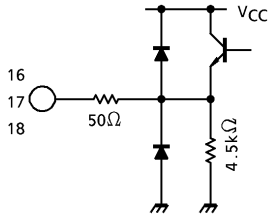
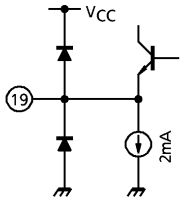
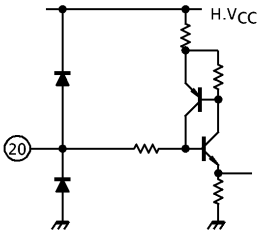
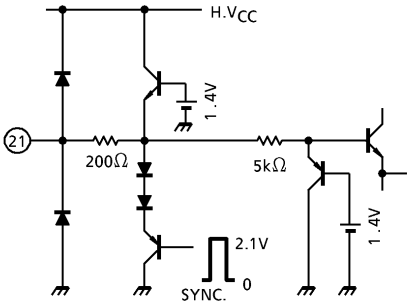
BLOCK DIAGRAM

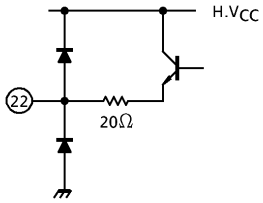
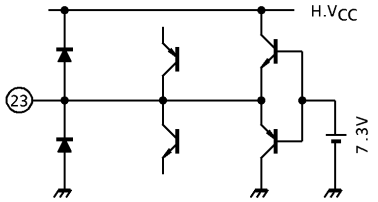
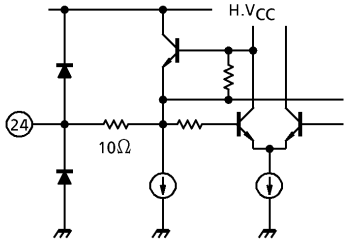
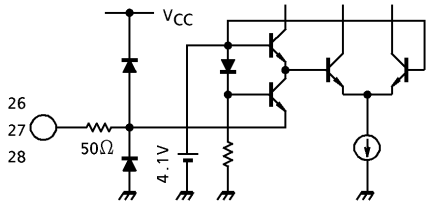
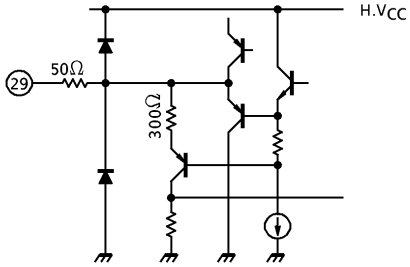


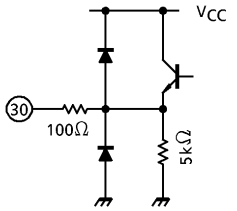
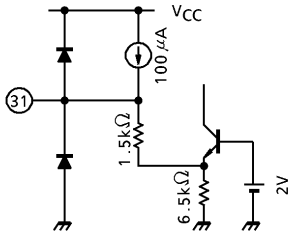
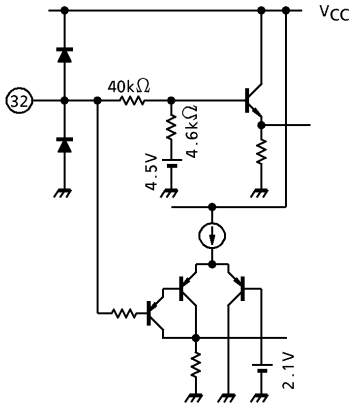
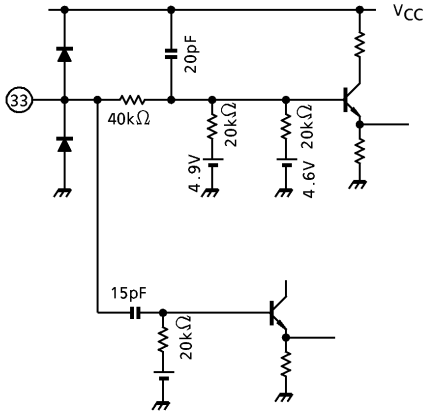
TERMINAL FUNCTION

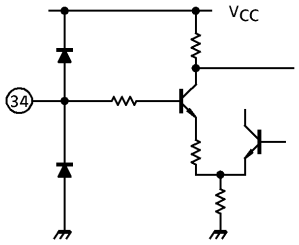
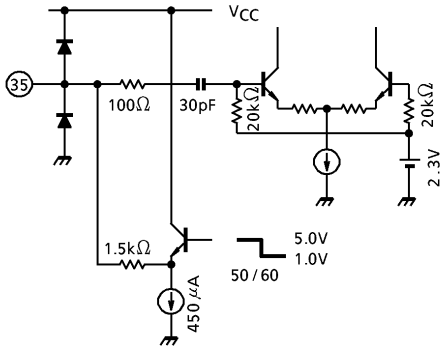
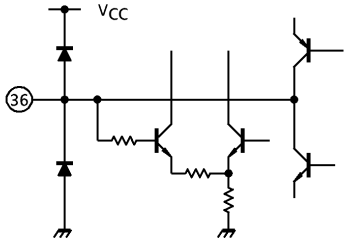
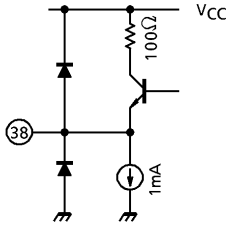
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
1	ATT Input	Input terminal for audio amplifier.	
2	Sound NF Input	NFB terminal for audio amplifier.	
3	De-emphasis	A SIF detection de-emphasis capacitor is connected.	
4	SIF Det. Input	A 4.5MHz tuned tank circuit is connected. The detector muting function is on when this terminal is connected to GND.	
5	SIF Limit Output	A sound carrier output to drive SIF tuned tank coil circuit.	

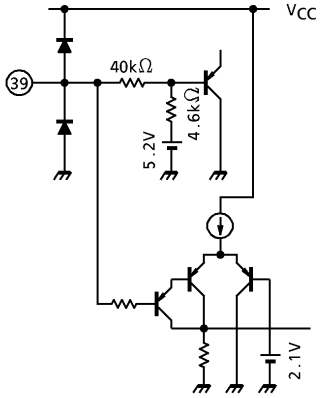
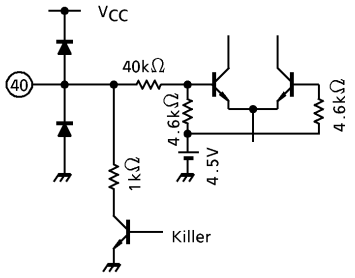
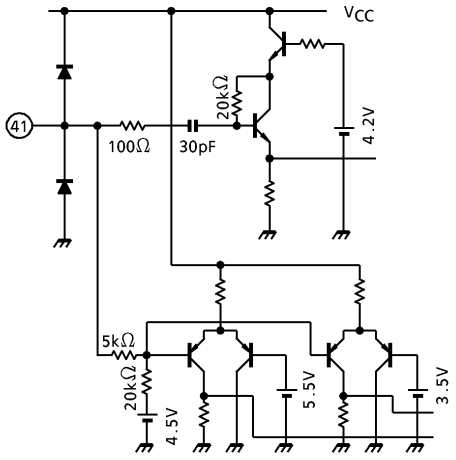
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
6 7	AGC Filter 1 AGC Filter 2	Pins 6 and 7 are AGC time constant terminals. A dual time constant system is adopted in order to achieve a high speed response.	
8	PIF / SIF GND	GND terminal for pin 39 V_{CC}.	—
9 10	PIF Input	PIF signal input terminal. Input impedance : 2.5kΩ Typ.	
11	APC Filter	APC filter time constant is connected. When killer works, automatic search circuit operates in order to widen the pull-in range. The search speed is also determined by the external filter time constant.	
12 14	f_{SC} VCXO	A f_{SC} X'tal is connected between pins 11 and 13. Pin is a drive output and pin is an input.	

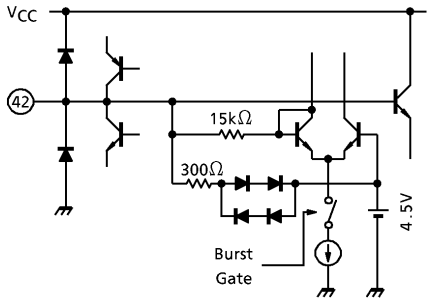
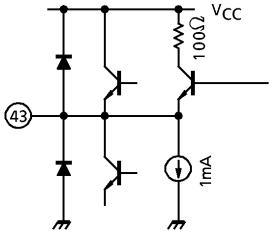
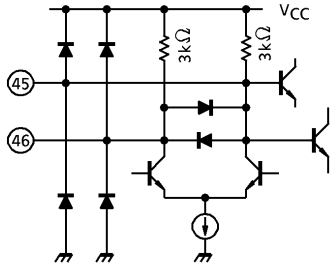
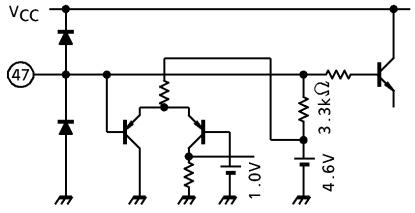
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
13	V/C/D V_{CC}	V_{CC} terminal for Video, Chroma, Deflection.	—
15	Clamp Filter	A terminal for a pedestal clamp capacitor.	
16 17 18	R-Y Output B-Y Output G-Y Output	Color differential signal outputs.	
19	-Y Output	The output terminal of video signal which is processed by vertical blanking and horizontal blanking.	
20	X-ray Protect Input	The input terminal of the X-ray protector. Pin 21 horizontal drive terminal turns to low when the input voltage of this terminal exceeds the specified threshold voltage, 1.3V Typ.	
21	FBP Input	Input terminal for fly back pulse to horizontal AFC circuit (the integrator circuit for a sawtooth wave is provided internally). Pin 21 terminal voltage is clamped to 4.2V during Sync. pulse period.	

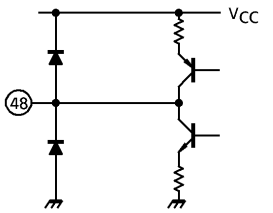
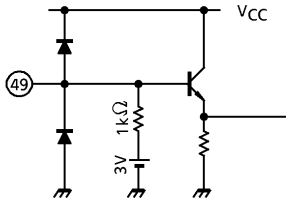
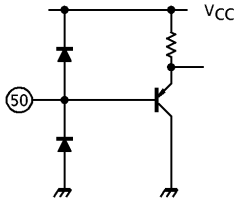
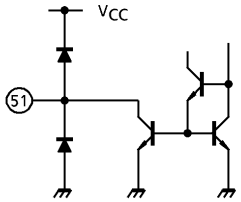
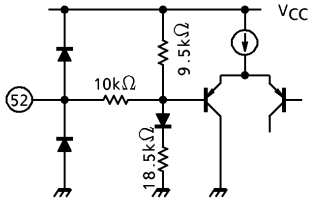
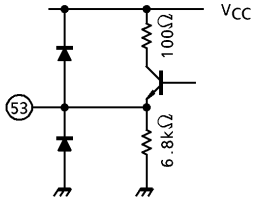
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
22	H. Output	Horizontal output terminal (emitter follower). Amplitude : $5.0V_{p-p}$ (Typ.) Duty : 43% (Typ.)	
23	AFC Filter	AFC filter is connected.	
24	$32f_H$ VCO	Adjustment free $32f_H$ oscillator. A ceramic resonater is connected.	
25	$H.V_{CC}$	V_{CC} for Horizontal Deflection. $H.V_{CC}$ = 9V (Typ.) made by external parts.	—
26 27 28	OSD R Input OSD B Input OSD G Input	OSD (On Screen Display) signal input terminal. OSD switch circuit is enabled by sink current at the input terminal (0.3mA Typ.)	
29	V. Sepa. Filter	Vertical sync. separation filter is connected.	

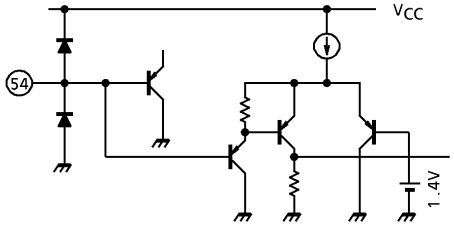
<table>
<tr><th>PIN No.</th><th>PIN NAME</th><th>FUNCTION</th><th>INTERFACE CIRCUIT</th></tr>
<tr><td>30</td><td>V. Pulse Output</td><td>Vertical pulse output terminal. (10H width positive pulse)</td><td> 
</td></tr>
<tr><td>31</td><td>Video Input</td><td>Input terminal of delayed video signal, 1V_{p-p} (Typ.).</td><td> 
</td></tr>
<tr><td>32</td><td>Tint Control</td><td>The terminal for tint control. And also PAL / NTSC SW.
<table><tr><th>PIN VOLTAGE</th><th>MODE</th></tr><tr><td>0.7V +</td><td>NTSC</td></tr><tr><td>0.7V –</td><td>PAL</td></tr></table></td><td> 
</td></tr>
<tr><td>33</td><td>Hi Video Input</td><td>The second order differential video signal input terminal and the picture sharpness control terminal.</td><td> 
</td></tr>
</table>

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
34	Brightness Control	Brightness control terminal.	
35	Chroma Input	Chroma signal input terminal. Recommendable input burst signal level is 100mV$_{p-p}$. 50Hz / 60Hz Detect out 60Hz : 1.2V 50Hz : 5.0V	
36	Sync. Sepa. Input	Video signal input for H / V sync. separator. Automatic slicer (slice level is approximately 50% of sync. signal) is adopted.	
37	V / C / D GND	GND for Video / Chroma / Deflection.	—
38	D.C. Drive	The chroma signal output for a 1H delay line driving.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
39	Contrast Control	Video gain and color gain are controlled by this terminal simultaneously. When the terminal pin 39 Voltage is set to 1.4V~GND, V-out is stop and Contrast Control is min.	
40	Color Control	Color saturation control terminal. When the color killer circuit operates, this terminal voltage turns low.	
41	Delayed Signal Input	1H delayed chroma signal input. The signal phase shift between pins 38 and 41 should be less than 5 deg. The signal loss of the 1H delay line should be 16dB. 50Hz Mode : 3.0V 60Hz Mode : 6.0V	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
42	Killer Filter	A capacitor for an ident filter is connected. For B / W signal, the terminal voltage of pin 42 is around 8V. When color signal is applied, an ident is correct the terminal voltage goes high whereas it goes low during incorrect ident. Pin Voltage 5.9V Killer Off / 3.1V Killer On / Killer Off — PAL Mode Pin Voltage 5.9V Killer Off / 3.1V Killer On / Killer Off — NTSC Mode	
43	PIF Det. Output	An output terminal for detected video signal.	
44	IF V_{CC}	V_{CC} for PIF / SIF.	—
45 46	PIF Tank	Terminals for a video Det. tank circuit.	
47	AFT Tank	A single ended turned tank is connected. To defeat AFT, this terminal is GNDed by a 10kohm resister.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
48	AFT Output	AFT output terminal. AFT center voltage is determined by V_O.	
49	SIF Input	SIF signal input terminal.	
50	ATT Control	Volume control terminal. Controlled by 0 to 5V DC, suitable for μ-computer control interface. A linear taper potentiometer can be used. The Typ. attenuation range is 80dB.	
51	RF AGC Output	An open collector output for RF AGC. The gain is determined by an external load resister.	
52	RF AGC Delay	The delay point of RF AGC is set by an applied external voltage.	
53	Sound Output	Emitter follower output for an audio output stage.	

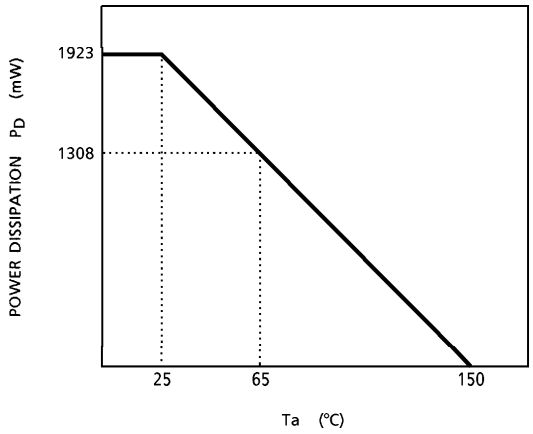
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
54	OSD Brightness	OSD signal brightness control terminal.	

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{CC}	15	V
Power Dissipation	$P_D$max	1923 (Note)	mW
Input Signal Voltage	e_{in}	5	V_{p-p}
Operating Temperature	T_{opr}	− 20~65	°C
Storage Temperature	T_{stg}	− 55~150	°C

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

P_D vs Ta CURVE



RECOMMENDED OPERATING CONDITION

PIN No.	PIN NAME	SYMBOL	MIN.	TYP.	MAX.	UNIT
13	V/C/D V_{CC}	V_{13}	8.5	9.0	9.5	V
25	H.V_{CC}	V_{25}	8.5	9.0	9.5	V
44	PIF/SIF V_{CC}	V_{44}	8.5	9.0	9.5	V

ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS

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

PIN No.	PIN NAME	SYMBOL	TEST CIRCUIT	MIN.	TYP.	MAX.	UNIT
1	ATT Input	V_1	—	3.3	3.8	4.5	V
2	Sound NF Input	V_2	—	3.2	3.9	4.5	V
3	De-emphasis	V_3	—	3.3	3.8	4.5	V
4	SIF Det. Input	V_4	—	2.4	2.8	3.3	V
5	SIF Limit Output	V_5	—	3.0	3.6	4.2	V
6	AGC Filter 1	V_6	—	7.8	8.5	9.0	V
7	AGC Filter 2	V_7	—	7.9	8.5	8.9	V
9	PIF Input	V_9	—	3.3	3.9	4.3	V
10	PIF Input	V_{10}	—	3.3	3.9	4.3	V
11	APC Filter	V_{11}	—	2.8	4.5	4.9	V
12	f_{sc} VCXO	V_{12}	—	4.3	5.2	6.1	V
14	f_{sc} VCXO	V_{14}	—	5.3	6.4	7.2	V
15	Clamp Filter	V_{15}	V_{34} = 4.5V	2.4	3.2	4.1	V
16	R-Y Output	V_{16}	—	4.8	5.5	6.0	V
17	B-Y Output	V_{17}	—	4.8	5.5	6.0	V
18	G-Y Output	V_{18}	—	4.8	5.5	6.0	V
19	-Y Output	V_{19}	—	—	—	—	V
20	X-ray Protect Input	V_{20}	—	—	—	—	V
21	FBP Input	V_{21}	—	—	—	—	V
22	H. Output	V_{22}	—	—	—	—	V
23	AFC Filter	V_{23}	—	6.7	7.3	8.7	V
24	$32f_H$ VCO	V_{24}	—	3.1	5.2	6.3	V
26	OSD R Input	V_{26}	—	1.3	1.9	2.3	V
27	OSD B Input	V_{27}	—	1.3	1.9	2.3	V
28	OSD G Input	V_{28}	—	1.3	1.9	2.3	V
29	V. Sepa. Filter	V_{29}	H.V_{CC} : Open	3.8	4.5	5.9	V
30	V. Pulse Output	V_{30}	—	4.5	5.0	5.5	V
31	Video Input	V_{31}	—	1.8	2.8	4.0	V
32	Tint Control	V_{32}	—	4.0	4.5	4.9	V
33	Hi Video Input	V_{33}	—	4.3	5.5	7.5	V
34	Brightness Control	V_{34}	I_{in} = 20μA	2.6	3.8	5.1	V
35	Chroma Input	V_{35}	—	4.1	5.0	5.7	V
36	Sync. Sepa. Input	V_{36}	—	1.8	2.1	3.7	V
38	D.C. Drive	V_{38}	—	6.5	7.2	8.2	V
39	Contrast Control	V_{39}	—	4.3	5.2	5.6	V
40	Color Control	V_{40}	—	3.9	4.5	4.9	V
41	Delayed Signal Input	V_{41}	—	3.5	4.5	4.9	V
42	Killer Filter	V_{42}	—	3.3	3.8	4.1	V
43	PIF Det. Output	V_{43}	—	4.0	4.5	5.0	V

PIN No.	PIN NAME	SYMBOL	TEST CIRCUIT	MIN.	TYP.	MAX.	UNIT
45	PIF Tank	V_{45}	—	6.0	6.6	7.2	V
46	PIF Tank	V_{46}	—	6.0	6.6	7.2	V
47	AFT Tank	V_{47}	—	2.4	3.0	3.6	V
48	AFT Output	V_{48}	—	2.0	4.5	6.0	V
49	SIF Input	V_{49}	—	2.4	3.0	3.7	V
50	ATT Control	V_{50}	—	—	—	—	V
51	RF AGC Output	V_{51}	—	—	—	—	V
52	RF AGC Delay	V_{52}	—	5.6	6.2	6.6	V
53	Sound Output	V_{53}	—	3.2	4.1	4.6	V
54	OSD Brightness	V_{54}	—	—	—	—	V

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

PIN No.	PIN NAME	SYMBOL	TEST CIRCUIT	MIN.	TYP.	MAX.	UNIT
13	V / C / D V_{CC}	I_{13}	—	25	50	75	mA
25	H.V_{CC}	I_{25}	—	7	13.5	21	mA
44	PIF / SIF V_{CC}	I_{44}	—	25	43.5	60	mA

X'tal

For PAL	4.433619MHz	
Frequency deflection	±25ppm	
Temperature characteristics	±30ppm (−10~75°C)	
Load capacitance	16pF	
Recommended	Nihon Denpa Industries	NR-18

1H delay line

Nominal frequency	4.433619MHz (f_O)	
Insertion loss	10±3dB (at f_O), delay time 63, 945μs	
3dB band	f_O ± 1.0MHz or more	
Unwanted reflection	32dB or more (f_O ± 1MHz)	
Recommended	Matsushita Denshi	EFD-ED 645A41T

$32f_H$ ceramic oscillator

Recommended	Murata Manufacturing Co., Ltd.	CSB503F30

Delay line

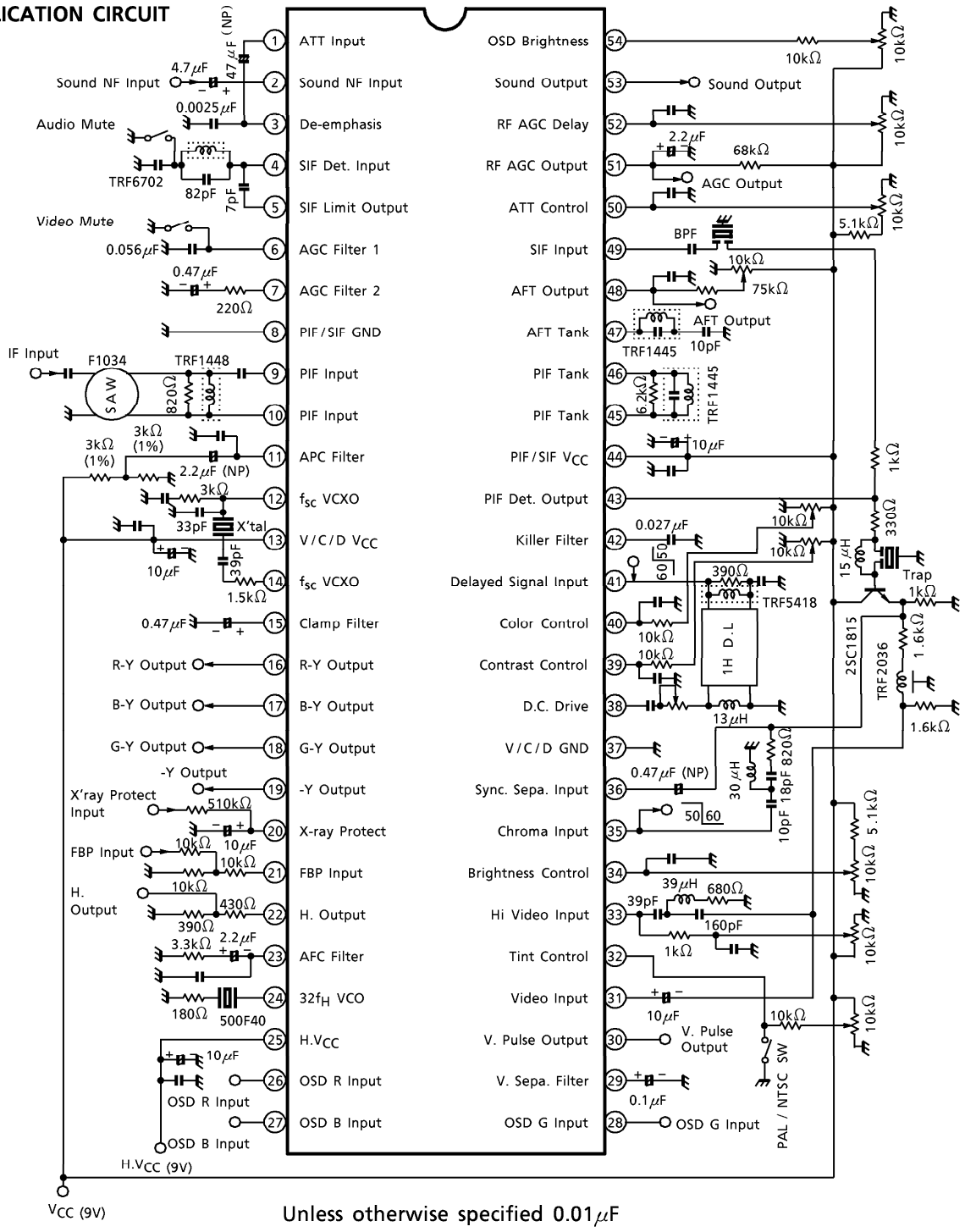
TRF2036

Delay time	600ns±7%
Characteristic impedance	1.6kΩ±10%

Frequency characteristics

Frequency (MHz)	3.0	4.0	4.43
Attenuation (dB)	2±1.5	6±2	25 or higher

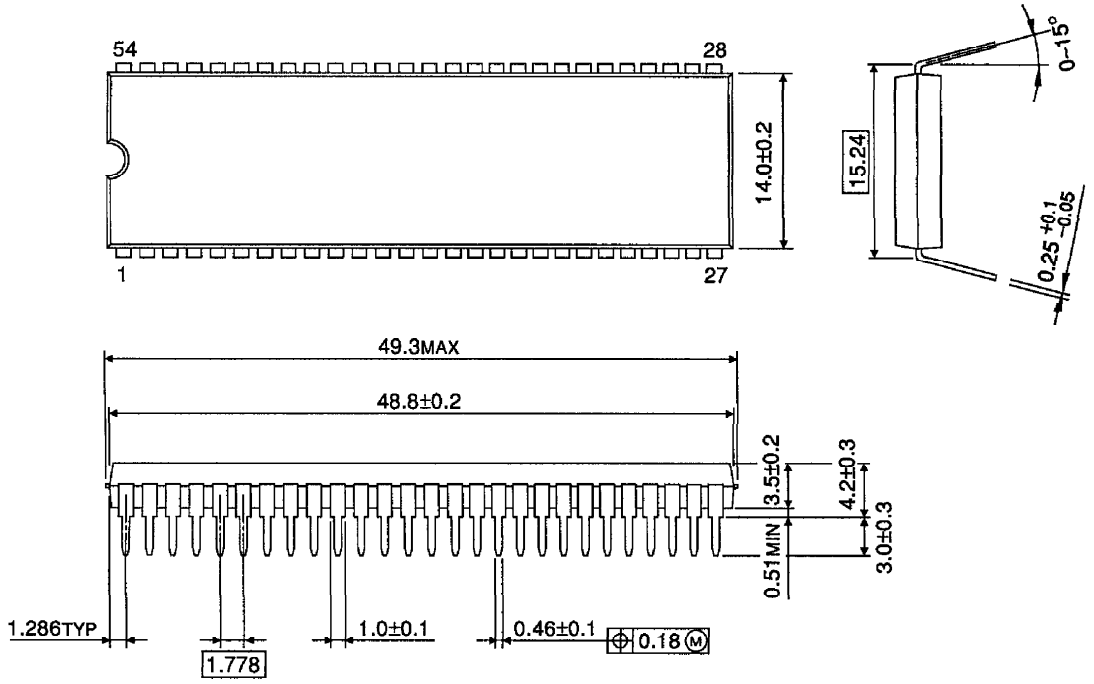
APPLICATION CIRCUIT



Unless otherwise specified 0.01μF

PACKAGE DIMENSIONS

SDIP54-P-600-1.78 Unit : mm



Weight : 5.44g (Typ.)