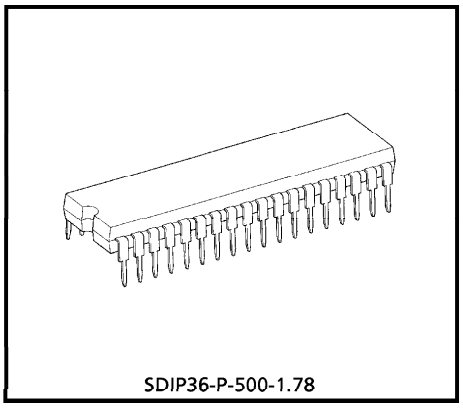
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8801AN

VIDEO / CHROMA / DEFLECTION PROCESSOR IC FOR NTSC COLOR TV

TA8801AN is an integrated circuit for NTSC color TV, which has a function of Video / Chroma / Deflection Processor inside a 36-pin shrink DIP plastic package. This is most suitable for high-definition, large-screen televisions.



SDIP36-P-500-1.78

Weight : 2.98g (Typ.)

FEATURES

Video section

- Black stretch circuit
- Contour improvement by built-in delay lines
- High-brightness color
- DC restoration

On-screen-display section

- OSD by digital R / G / B inputs
- Picture mute
- Contrast controllable

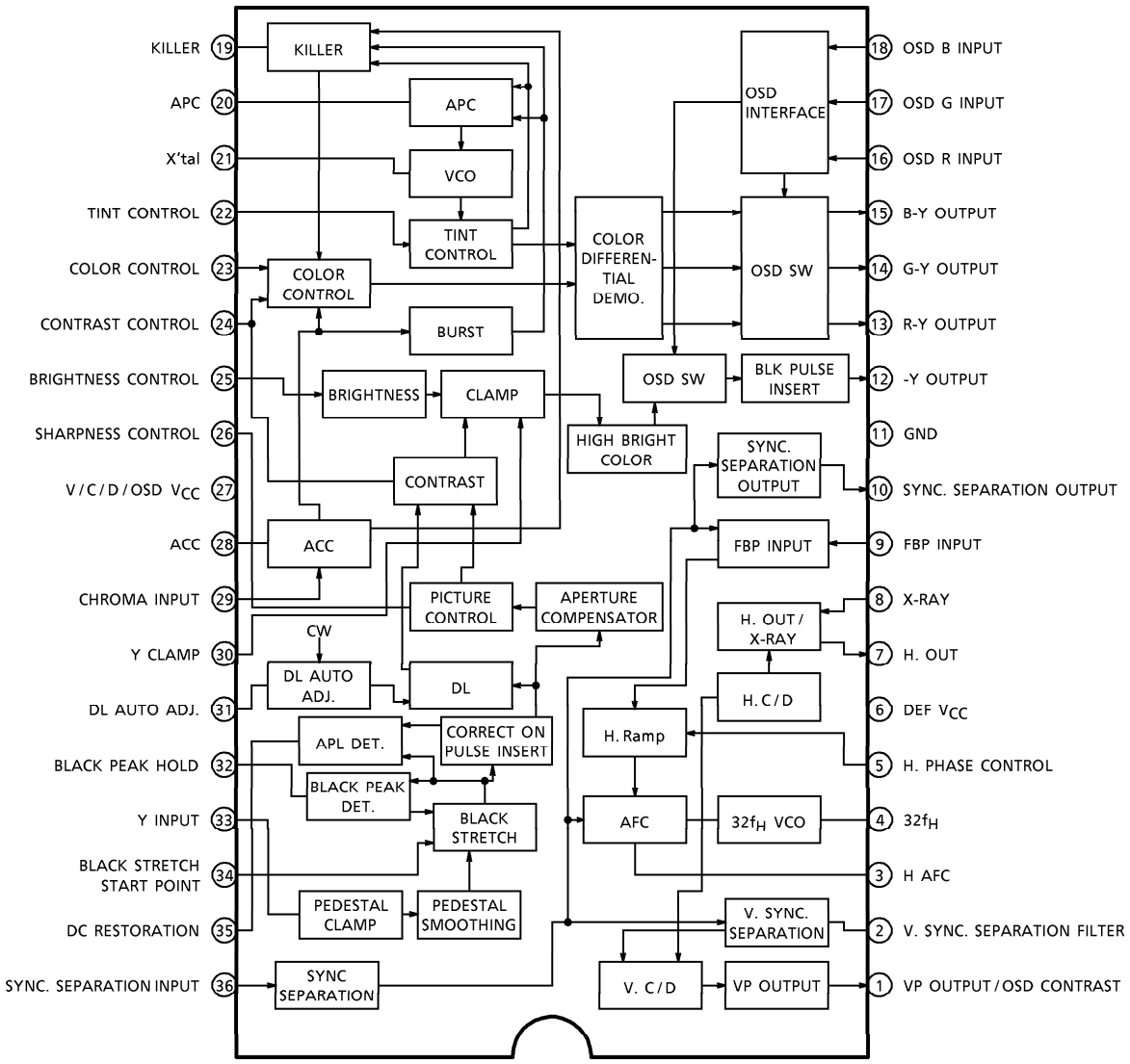
Deflection section

- High-performance sync. separator circuit
- Adjustment-free oscillator circuit based on count-down system
- Horizontal phase adjustable
- X-ray protection circuit

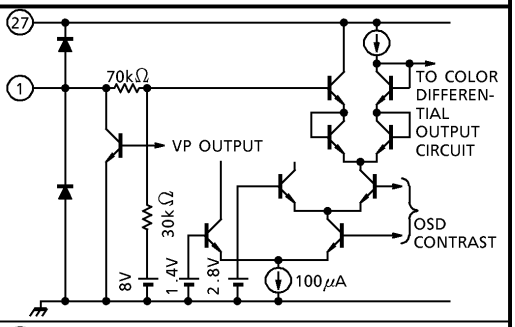
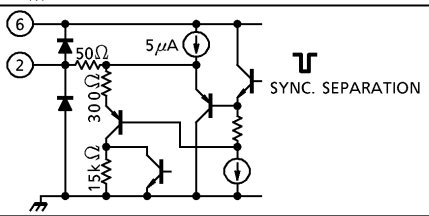
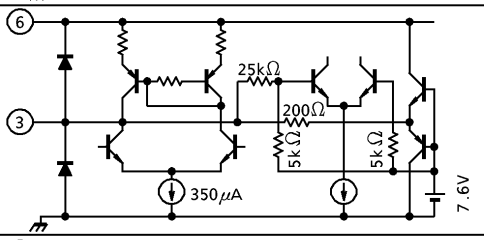
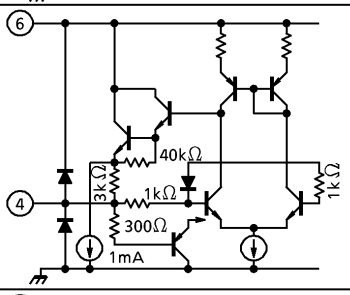
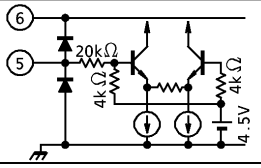
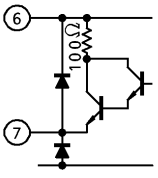
Chroma section

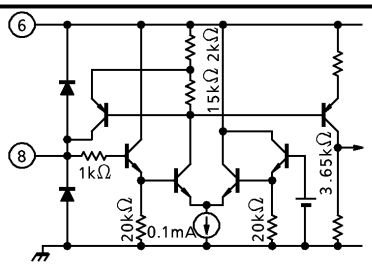
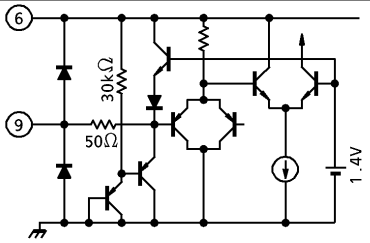
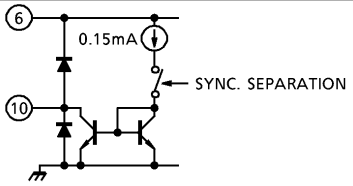
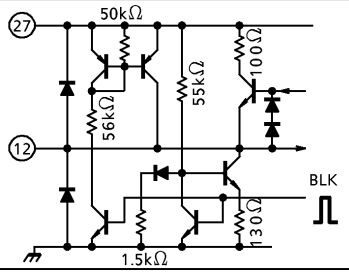
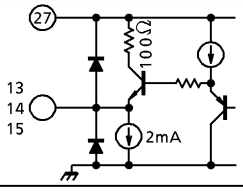
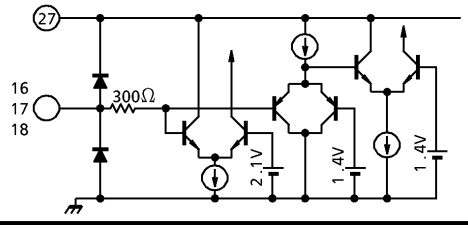
- R-Y, B-Y axes demodulation
- Automatic phase control (Adjustment-free)

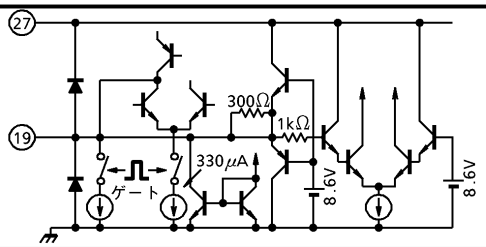
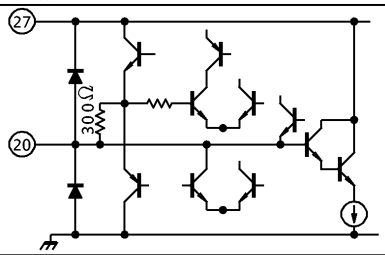
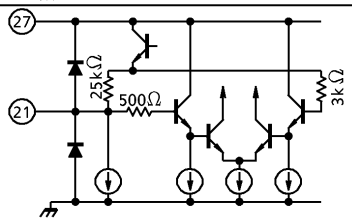
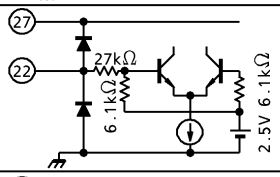
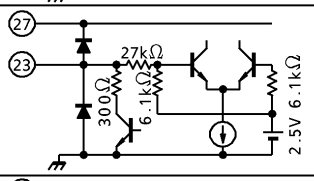
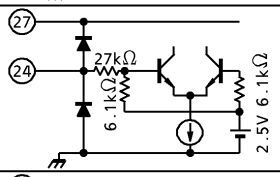
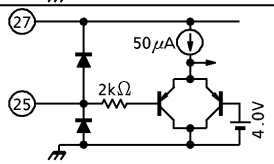
BLOCK DIAGRAM

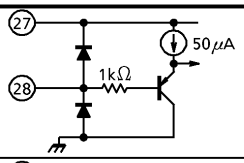
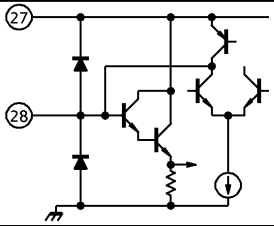
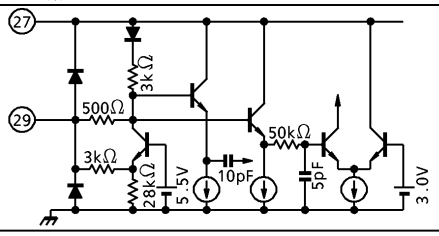
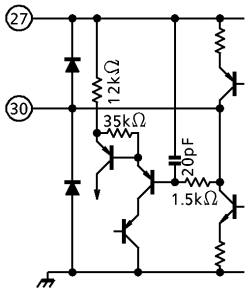
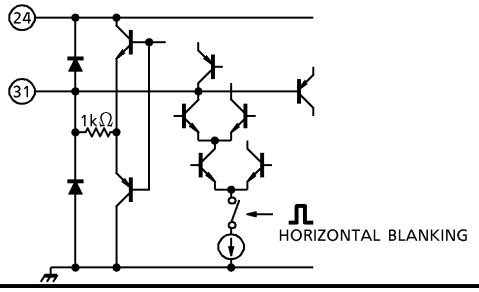


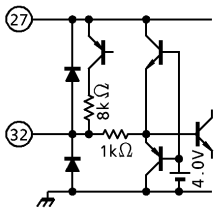
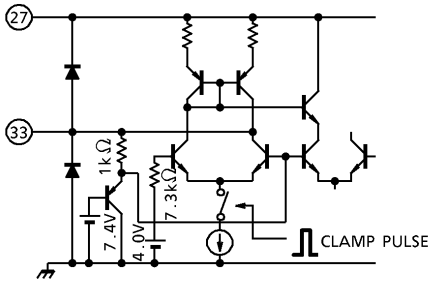
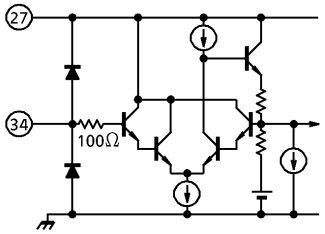
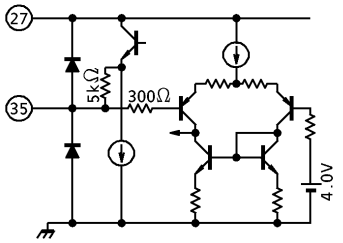
TERMINAL FUNCTION

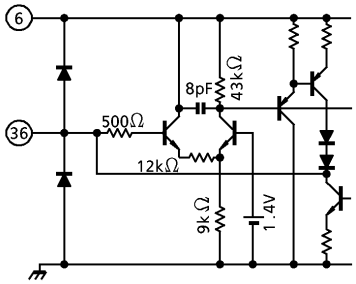
PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
1	Vertical Pulse Output / OSD Contrast	The terminal for vertical pulse output. And OSD contrast is adjusted by the DC voltage supplied this terminal.	
2	Vertical Sync. Separation Filter	The terminal for vertical sync. separation filter.	
3	H. AFC Filter	The terminal for horizontal AFC filter.	
4	32 f_H VCO	The terminal for 32f_H (503kHz) ceramic resonator. CSB503F30 (Murata Manufacturing Co. product) is recommended.	
5	Horizontal Phase Control	Horizontal phase is adjusted by DC voltage supplied this terminal. The variable range is 2.4μs (Typ.).	
7	Horizontal Pulse Output	Horizontal pulse is outputted from this terminal. Its amplitude is 5.0V_{p-p} (typ.) and duty is 43% (typ). Output form is emitter follower. And keep the output current less than 12mA.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
8	X-ray Protection	The terminal for an overvoltage protection circuit. The threshold level is 3.65V (typ.). The horizontal output terminal (pin 9) is pulled Low when a voltage applied to this pin is greater than the threshold level.	
9	FBP Input	The terminal for flyback pulse input.	
10	Sync. Separation Output	The terminal for a sync. signal output. Output form is an open-collector. And the current flowing into is 0.15mA (typ.).	
12	-Y Output	The terminal for -Y output. Blanking can be disabled by connecting a resistor between this pin and GND and flowing a current more than 0.2mA. And keep the output current less than 2.5mA.	
13 14 15	R-Y Output G-Y Output B-Y Output	The terminals for color-difference signals output. Keep the output current less than 4.8mA.	
16 17 18	R Input G Input B Input	The terminals for OSD signals input. The threshold voltage is 0.75V (typ.).	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
19	Killer Filter	The terminal to be connected a killer filter.	
20	APC Filter	The terminal to be connected an APC filter.	
21	X'tal	The terminal to be connected a 3.58MHz crystal resonator for the VCXO.	
22	Tint Control	The terminal for tint control. Control voltage is 0V to 5V.	
23	Color Control	The terminal for color control. Control voltage is 0V to 5V. The voltage of this terminal turns to low level while the color killer is on.	
24	Contrast Control	The terminal for contrast control. Control voltage is 0V to 5V.	
25	Brightness Control	The terminal for brightness control. Control voltage is 0V to 5V.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
26	Sharpness Control	The terminal for sharpness control. Control voltage is 0V to 5V.	
28	ACC	The terminal to be connected the ACC filter.	
29	Chroma Input	The terminal for chroma input. The standard input level is 286mV$_{p-p}$ in burst amplitude.	
30	Y Clamp	The terminal to be connected a Y clamp filter. Use a low leak capacitor for this filter.	
31	Delay Time Automatic Adjustment	The terminal to be connected a filter for a delay time automatic adjustment circuit for the internal delay line. Use a low leak capacitor for this filter.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
32	Black Peak Hold	The terminal for a filter to hold black peak. The voltage of this terminal can control the gain of black stretch amplifier. When the voltage is higher than pedestal level, the gain goes up and when the voltage is lower, the gain goes down. Black stretch is turned off by supplying 5V or more to this terminal.	
33	Y Input	The terminal for input of luminance signal (negative sync., 1.0V_{p-p}). -Y output turns out 4.0V_{p-p} with contrast max. Because the pedestal level is clamped at the input pin, the signal source's impedance must be sufficiently low. The pedestal voltage is clamped to 4.0V (typ.).	
34	Black Stretch Start Point	The terminal for setting the start point of black stretch. The higher the voltage of this terminal is. The higher the start point is.	
35	DC Restoration	The terminal to adjust DC restoration ratio. The DC restoration ratio (T_{DC}) is determined by the equation below. $T_{DC} = \frac{5k\Omega}{5k\Omega + R\Omega} \times 30 + 100\ [\%]$ The smaller the value of external resistance R, the greater the amount of correction. You can monitor a black-stretched Y signal with the sync. signal eliminated by leaving this terminal open.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
36	Sync Separation Input	The terminal for input of the sync. separation circuit. Input a $2V_{p-p}$ video signal with negative sync. Because the coupling capacitor also functions as a sync separation filter, make sure the signal source's impedance is sufficiently low. Use a low leak capacitor for coupling.	

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	15	V
Power Dissipation	P_{Dmax}	1.8 (Note)	W
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 this device at a temperature higher than 25°C, deduct 14.4mW from the above rated value for each increment of 1°C.

ELECTRICAL CHARACTERISTICS

DC VOLTAGE CHARACTERISTICS (Unless otherwise specified V_{CC} = 12V, H.V_{CC} = 9V, Ta = 25°C)

PIN No.	PIN NAME	SYMBOL	PIN VOLTAGE (V)			MEASURING CONDITION
			MIN.	TYP.	MAX.	
1	VP output / OSD contrast	V_1	7.40	7.70	8.00	—
3	H AFC	V_3	7.00	7.50	8.00	—
4	$32f_H$	V_4	5.70	6.00	6.30	—
5	Horizontal position adjustment	V_5	4.25	4.50	4.75	—
7	Horizontal output	V_7	2.30	2.50	2.70	—
9	Flyback pulse input	V_9	0.48	0.53	0.58	—
10	Sync separation output	V_{10}	—	9.00	—	R_L = 10kΩ (to V_{CC})
12	-Y output	V_{12}	6.90	7.20	7.50	—
13	R-Y output	V_{13}	7.00	7.50	8.00	—
14	G-Y output	V_{14}	7.00	7.50	8.00	—
15	B-Y output	V_{15}	7.00	7.50	8.00	—
19	Killer filter	V_{19}	7.70	7.90	8.10	With no input
20	APC filter	V_{20}	8.60	8.90	9.20	—
21	3.58MHz X'tal	V_{21}	5.75	5.95	6.15	With this terminal open
22	Tint control	V_{22}	2.30	2.50	2.70	—

PIN No.	PIN NAME	SYMBOL	PIN VOLTAGE (V)			MEASURING CONDITION
			MIN.	TYP.	MAX.	
23	Color control	V_{23}	2.30	2.50	2.70	Killer turned off
24	Contrast control	V_{24}	2.30	2.50	2.70	—
25	Bright control	V_{25}	—	2.50	—	—
26	Picture quality adjustment	V_{26}	—	2.50	—	—
28	ACC filter	V_{28}	10.60	11.30	12.00	With no input
29	Chroma input	V_{29}	4.50	4.70	4.90	—
30	Y clamp	V_{30}	5.40	6.40	7.40	Bright 2.5V / FBP inputted
31	Delay time automatic adjustment	V_{31}	6.60	7.40	8.20	—
32	Black peak hold	V_{32}	4.20	4.50	4.80	—
33	Bright input	V_{33}	3.80	4.00	4.20	—
34	Black stretch	V_{34}	3.80	4.00	4.20	—
35	DC restoration	V_{35}	3.80	4.00	4.20	—
36	Sync separation input	V_{36}	2.00	2.25	2.50	AC GND / FBP inputted

Current consumption
(Unless otherwise specified, V_{CC} = 12V, H.V_{CC} = 9V at Ta = 25°C)

PIN No.	PIN NAME	SYMBOL	CURRENT CONSUMPTION (mA)		
			MIN.	TYP.	MAX.
6	DEF V_{CC}	I_{CC} 6pin	8.5	20.0	33.0
27	V / C / OSD V_{CC}	I_{CC} 27pin	43.5	56.5	93.0

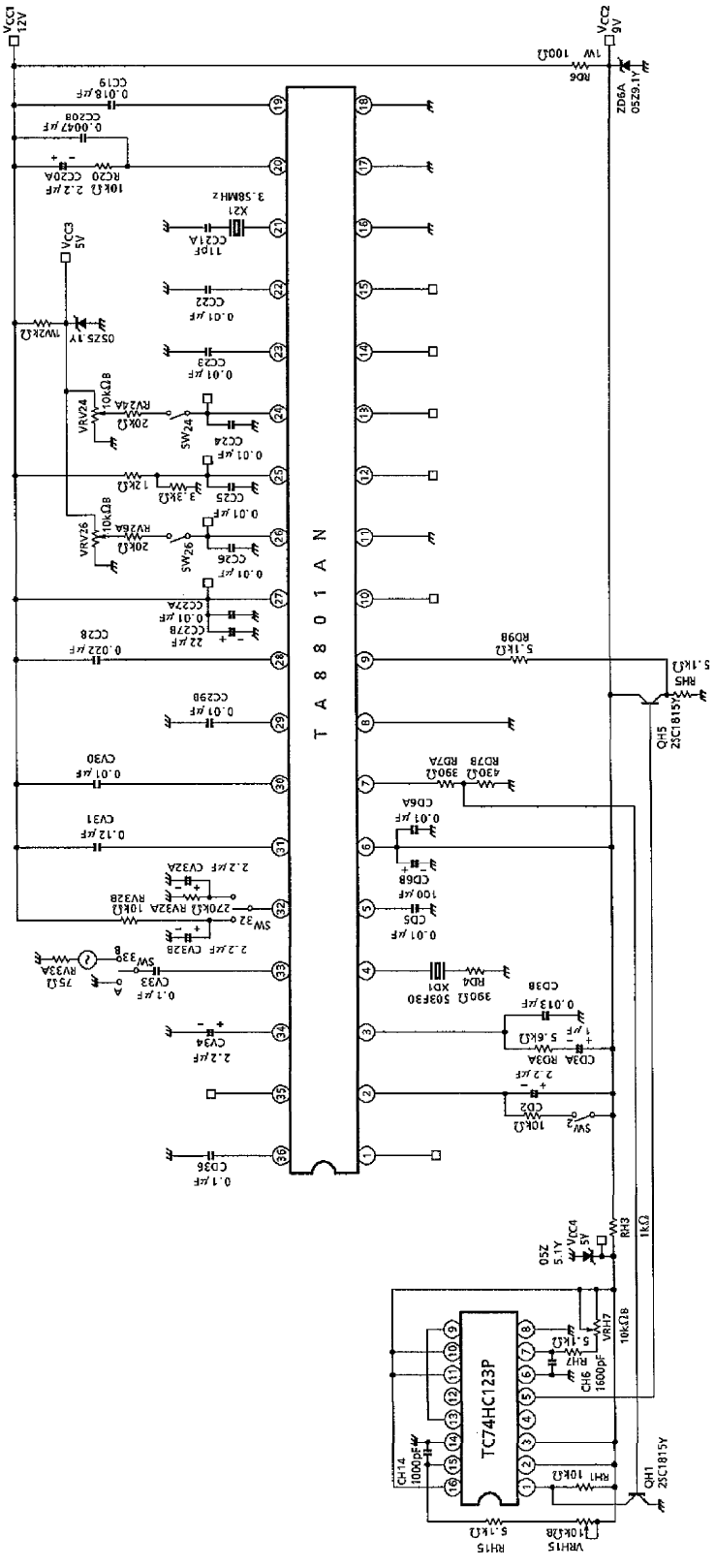
AC CHARACTERISTICS (Unless otherwise specified, V_{CC} = 12V, H.V_{CC} = 9V, Ta = 25°C)
Video and OSD section

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Y Input Pedestal Clamp Voltage	V_{33}	1	(Note 1)	3.8	4.0	4.2	V
Input Pedestal Clamp Pulse Phase	T_{CL1}	1	(Note 2)	7.20	7.65	8.10	μs
	T_{CL2}			8.35	8.80	9.25	
DC Restoration Amp Gain	A_{V35}	1	(Note 3)	0.28	0.34	0.40	
Black Stretch Amp Maximum Gain	G_{VBE}	1	(Note 4)	1.35	1.45	1.55	
Y Input / Output Delay Time	T_Y	1	(Note 5)	110	120	130	ns
Y Input Dynamic Range	D_{R33}	1	(Note 6)	0.9	1.1	1.3	V_{p-p}
Sharpness Control Range	G_{SMAX}	1	(Note 7)	+ 6.5	+ 8.5	+ 10.5	dB
	G_{SMIN}			− 2.5	− 4.5	− 6.5	
Sharpness Control Center Characteristic	G_{SCT}	1	(Note 8)	+ 2.0	+ 3.5	+ 5.0	dB
Black Stretch Start Point	V_{ST1}	1	(Note 9)	225	260	295	mV_{p-p}
	V_{ST2}			385	420	455	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Black Peak Detection Period (Other Than Horizontal Blanking Interval)	T_{BPH}	1	(Note 10)	20	22	24	H
AC Gain	G_V	1	(Note 11)	4.6	5.2	5.8	
Frequency Characteristics	G_f	1	(Note 12)	− 3	0	+ 3	dB
Contrast Adjustment Voltage Range	ΔV_{ct}	1	(Note 13)	0.29	0.44	0.66	V
Contrast Adjustment Center Voltage	V_{cto}	1	(Note 14)	2.30	2.50	2.72	V
Brightness Adjustment Voltage	V_{br}	1	(Note 15)	2.2	2.5	2.8	V
Brightness Adjustment Sensitivity	Gbr	1	(Note 16)	− 1.5	− 1.7	− 1.9	
DC Restoration	TDC	1	(Note 17)	—	0	50	mV
Minimum Output	V_{do1}	1	(Note 18)	—	0.6	0.9	V
Maximum Output	V_{do2}	1	(Note 19)	8.3	8.7	—	V
Vertical Blanking Output Level	V_V	1	(Note 20)	11.0	11.8	12.0	V
Sink Current During Vertical Blanking	I_V	1	(Note 21)	0.4	0.6	0.85	mA
High Bright Color Gain	G_{HBC}	1	(Note 22)	0.08	0.10	0.12	
OSD Output DC Voltage	V_{DCY}	2	(Note 23)	4.3	4.6	4.9	V
	V_{DCC}			4.7	5.0	5.3	V
OSD Output Maximum Voltage	V_{OSDMAX}	2	(Note 24)	8.2	8.4	8.6	V
OSD Mode Switching Threshold Voltage	V_{OSDSW}	2	(Note 25)	0.65	0.75	0.85	V
OSD High Voltage Switching Threshold Voltage	$V_{OSDHISW}$	2	(Note 26)	1.9	2.1	2.3	V
OSD Mode Switching Rise Time	τR_{OSDY}	2	(Note 27)	—	35	100	ns
	τR_{OSDC}			—	45	100	
OSD Mode Switching Rise Transfer Time	tR_{OSDY}	2	(Note 28)	—	30	100	ns
	tR_{OSDC}			—	40	100	
OSD Mode Switching Fall Time	τF_{OSDY}	2	(Note 29)	—	20	100	ns
	τF_{OSDC}			—	45	100	
OSD Mode Switching Fall Transfer Time	tF_{OSDY}	2	(Note 30)	—	25	100	ns
	tF_{OSDC}			—	45	100	
OSD High Voltage Switching Rise Time	τR_{OSDHI}	2	(Note 31)	—	40	100	ns
OSD High Voltage Switching Rise Transfer Time	tR_{OSDHI}	2	(Note 32)	—	50	100	ns
OSD High Voltage Switching Fall Time	τF_{OSDHI}	2	(Note 33)	—	45	100	ns
OSD High Voltage Switching Fall Transfer Time	tF_{OSDHI}	2	(Note 34)	—	50	100	ns

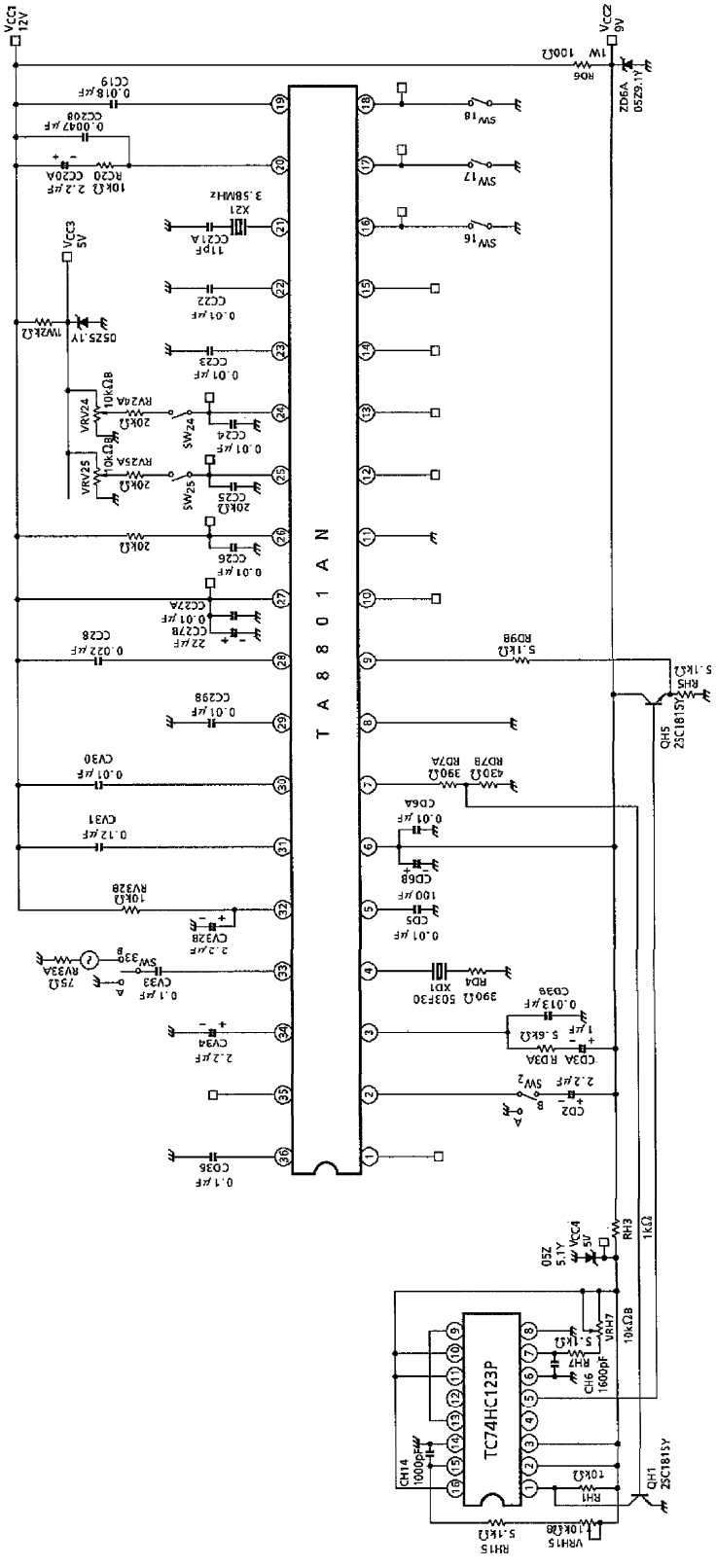
Chroma section

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
ACC Characteristic	F_1	3	(Note 35)	2.04	2.65	3.44	V_{p-p}
	e_a			0.34	0.67	1.00	
	A			0.90	1.00	1.30	
Color Control Characteristic	V_{23}	3	(Note 36)	2.30	2.50	2.72	V
	ΔV_{23}			0.29	0.44	0.66	
Contrast Control Characteristic	V_{24}	3	(Note 37)	2.30	2.50	2.72	V
	ΔV_{24}			0.29	0.44	0.66	
	e_u			15.9	18.0	20.1	dB
Maximum Input Level	E_{MAX}	3	(Note 38)	0.88	1.10	2.00	V_{p-p}
Killer On Input Level	e_{BK}	3	(Note 39)	1.12	2.24	5.62	mV_{p-p}
APC Frequency Control Sensitivity	β	3	(Note 40)	1.0	1.7	2.9	Hz / mV
APC Pull-In / Hold Range	f_{PH}	3	(Note 41)	250	500	1000	Hz
	f_{PL}						
	f_{HH}						
	f_{HL}						
Color-Difference Output Level	e_R	3	(Note 42)	1.72	2.23	2.90	V_{p-p}
	e_G			0.63	0.82	1.06	
	e_B			2.04	2.65	3.44	
Color-Difference Output Relative Amplitude	e_R / e_B	3	(Note 43)	0.73	0.84	0.97	
	e_G / e_B			0.26	0.31	0.36	
Color-Difference Output Relative Phase	θ_{R-B}	3	(Note 44)	88	95	102	°
	θ_{G-B}			230	240	250	
Tint Control Characteristic	θ_1	3	(Note 45)	35	45	55	°
	θ_2			35	45	55	
	θ			80	90	100	
	V_{37}			2.30	2.50	2.72	V
	ΔV_{37}			0.29	0.44	0.66	
Color-Difference Maximum Output Level	E_R	3	(Note 46)	3.65	4.45	5.56	V_{p-p}
	E_G			1.35	1.65	2.06	
	E_B			4.35	5.30	6.62	
Residual Carrier Level	v_{13e}	3	(Note 47)	—	—	15	mV_{p-p}
	v_{14e}						
	v_{15e}						
Residual Harmonic Level	v_{13eH}	3	(Note 48)	—	—	75	mV_{p-p}
	v_{14eH}						
	v_{15eH}						



TEST CIRCUIT1.

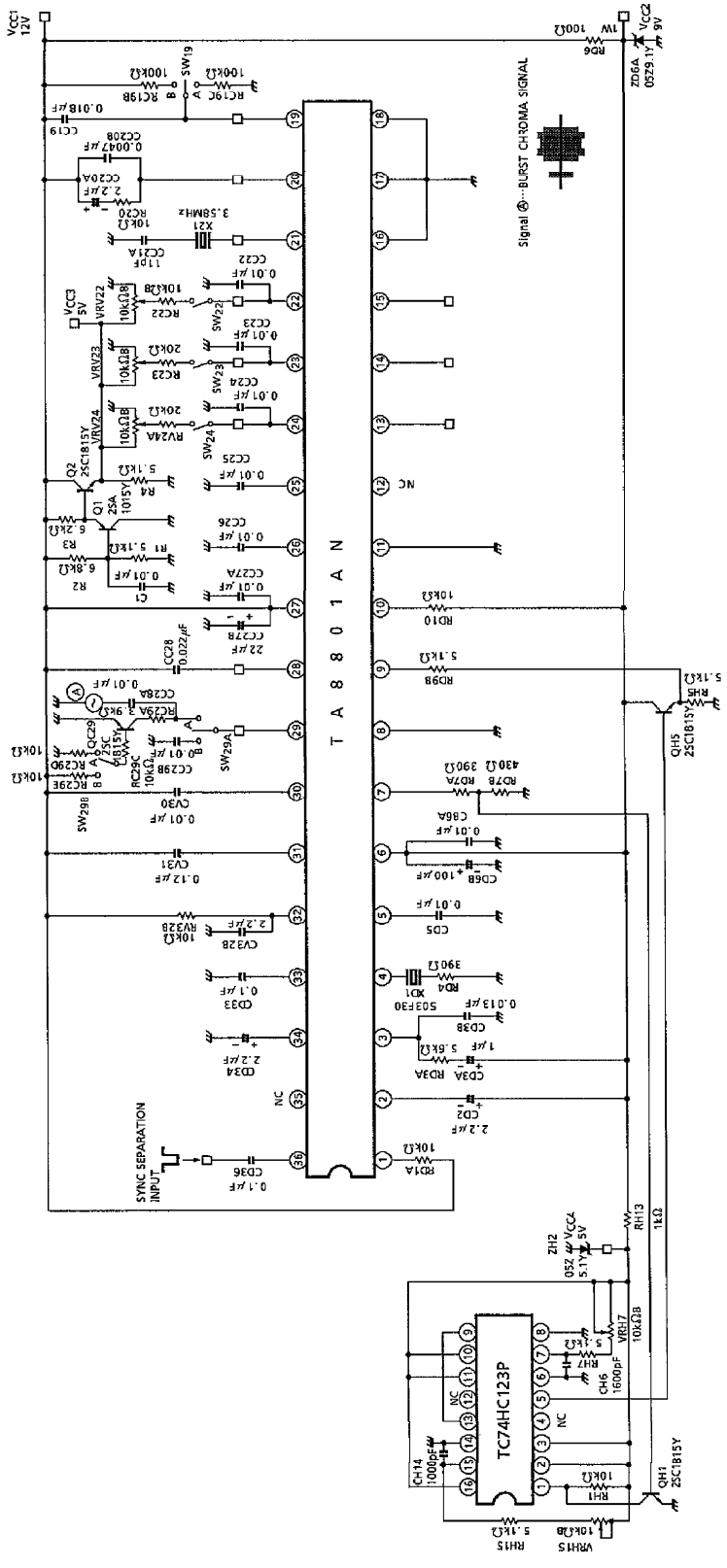
Video section



TEST CIRCUIT2.

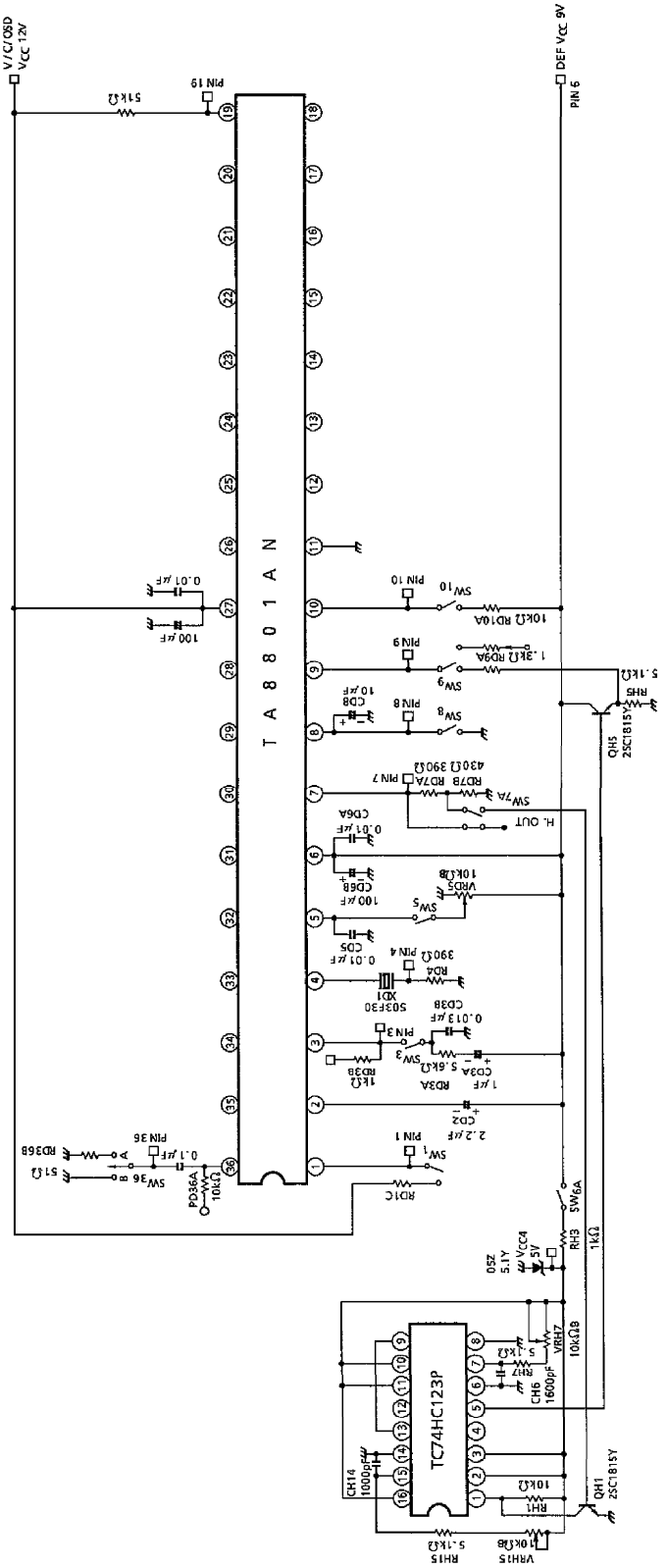
OSD section

TA8801AN – 30



TEST CIRCUIT3.

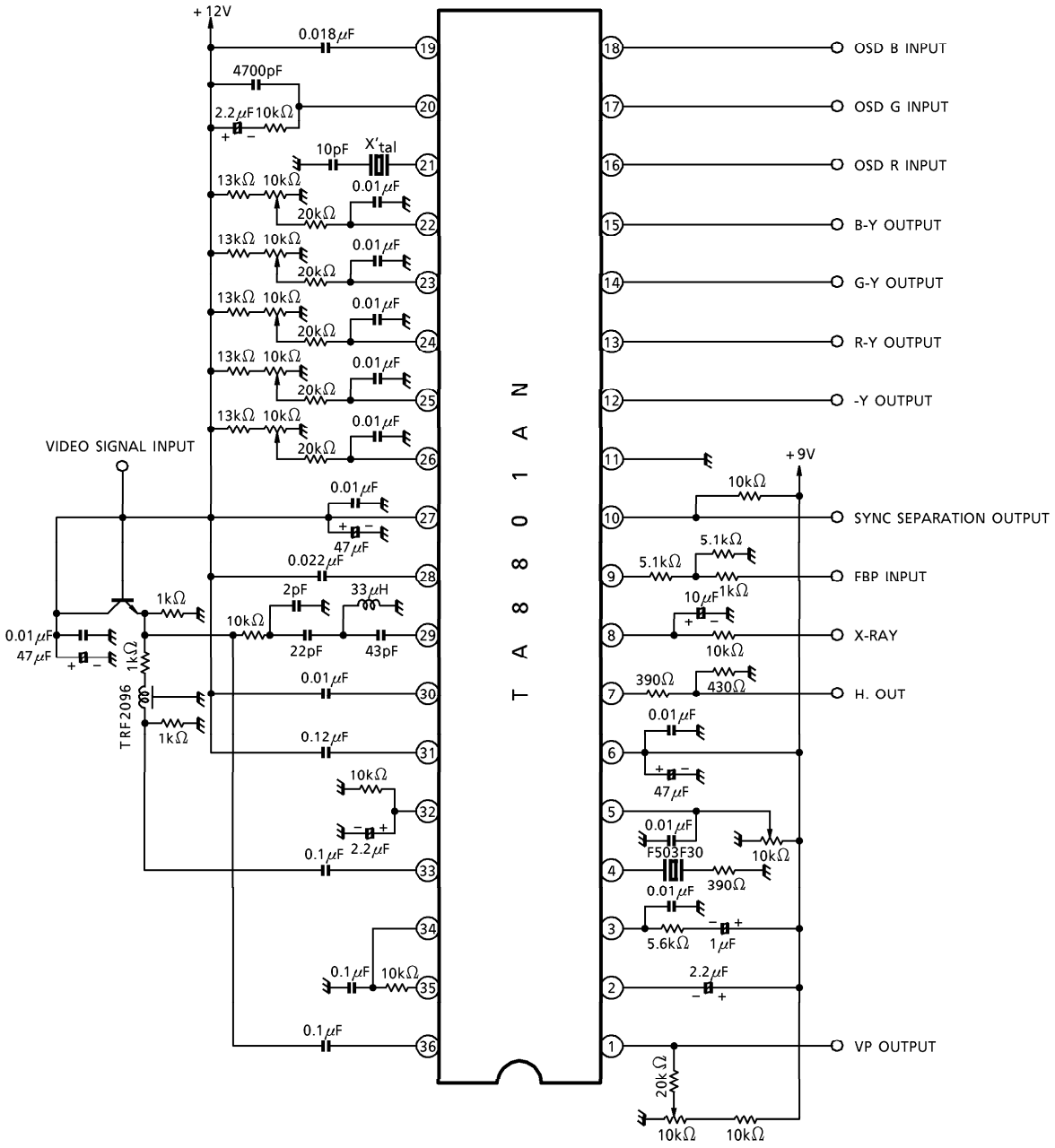
Chroma section



TEST CIRCUIT4.

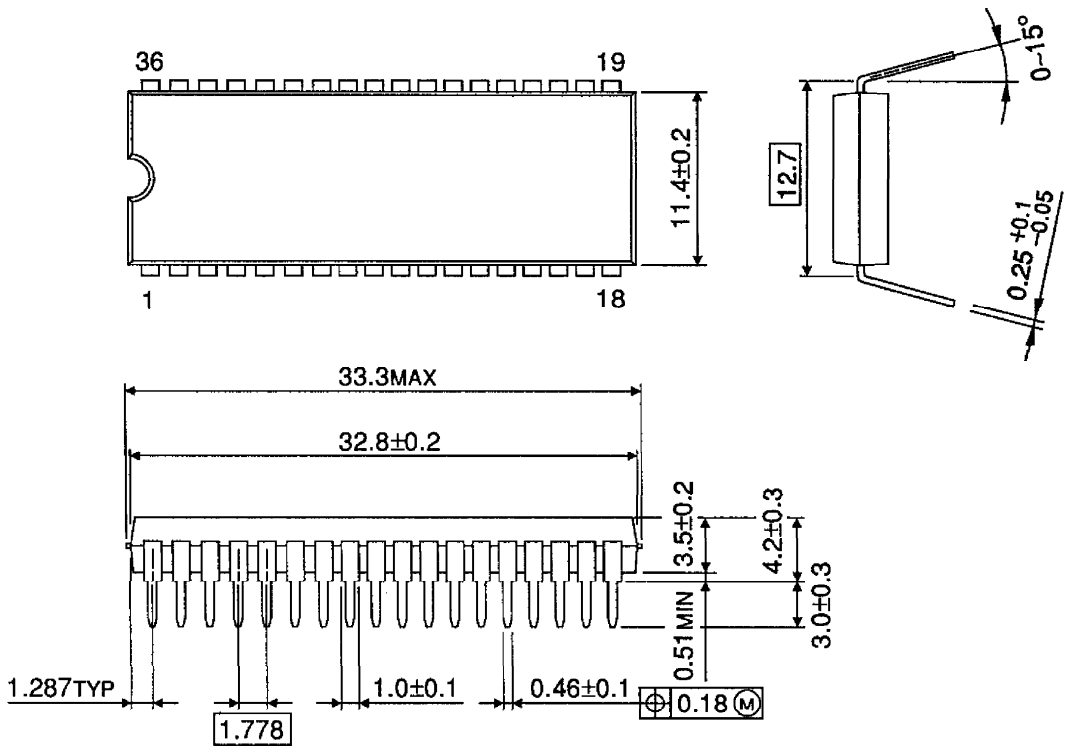
Deflection section

APPLICATION CIRCUIT



PACKAGE DIMENSIONS

SDIP36-P-500-1.78 Unit : mm



Weight : 2.98g (Typ.)