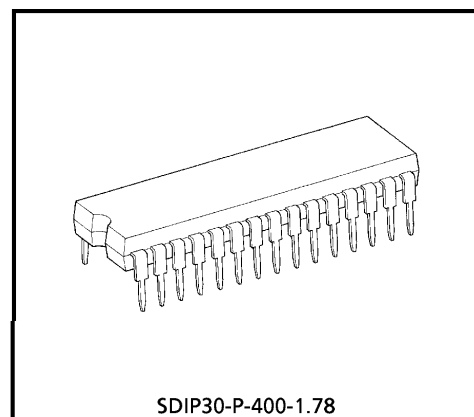


TA8751AN

AUTOMATIC KINE BIAS (AKB)

RGB INTERFACE

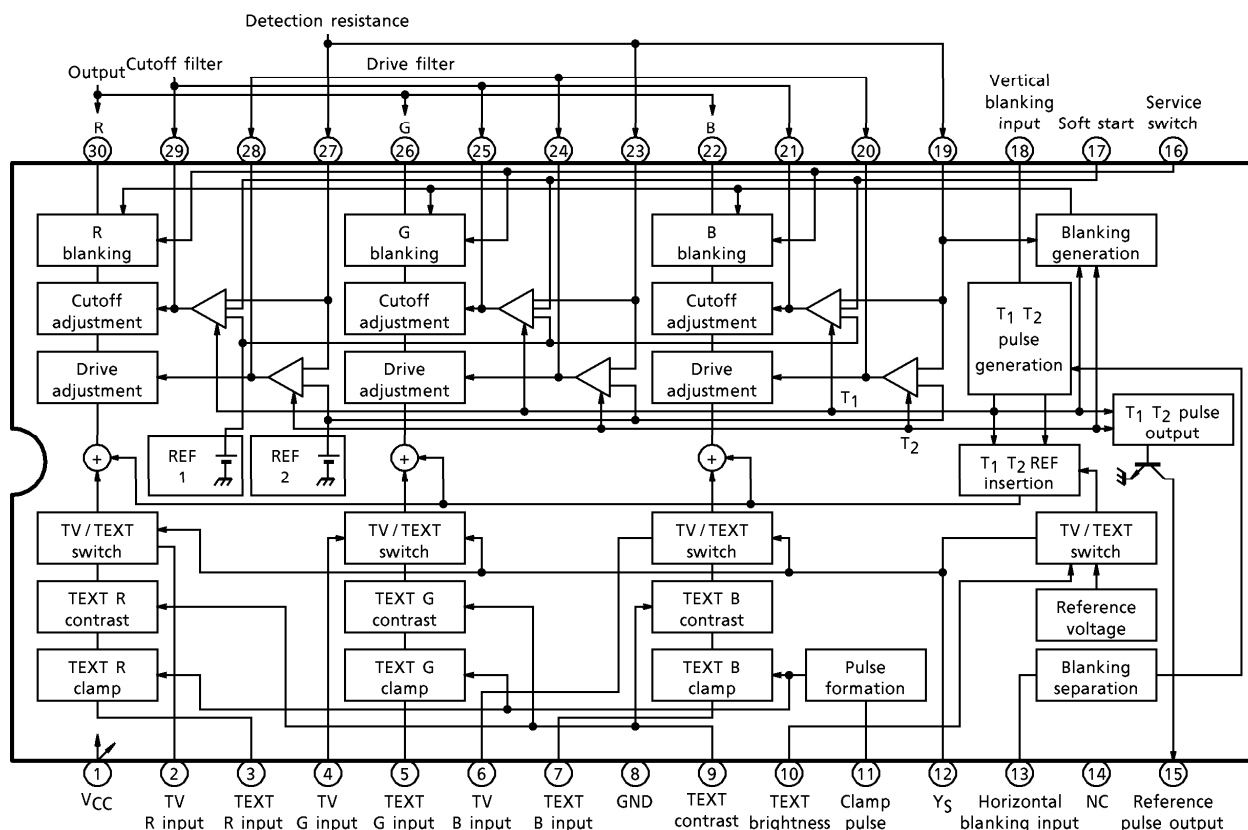
TA8751AN possesses functions that optimize the CRT drive conditions in televisions, and is an IC that automates the previously complex cutoff adjustment and drive adjustment non-adjustment. It has an RGB TEXT input pin, so TV signal and TEXT signal can be switched between rapidly. The TV's primary colors are DC coupled, so brightness control from previous stages can be utilized.



SDIP30-P-400-1.78

Weight : 1.99g (Typ.)

BLOCK DIAGRAM



961001EBA2

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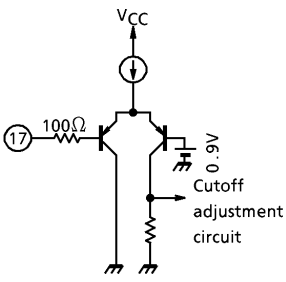
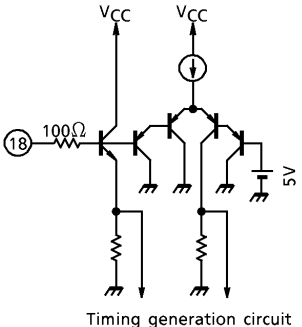
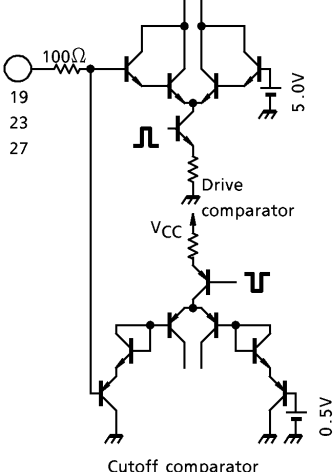
TERMINAL FUNCTION

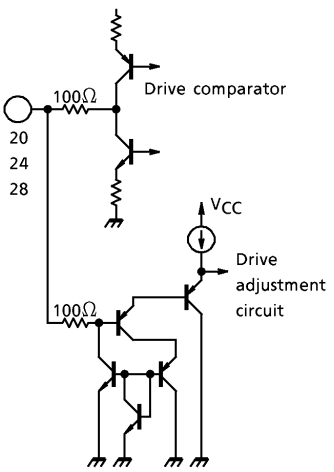
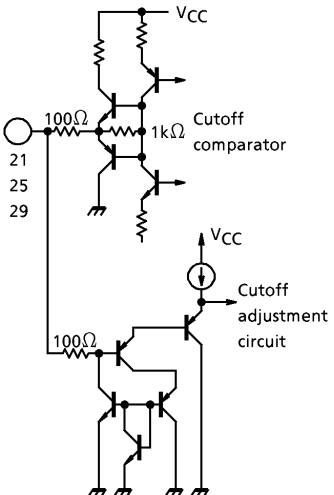
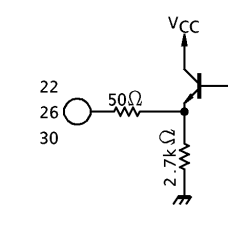
PIN No.	NAME	FUNCTION	INTERFACE
1	V _{CC}	V _{CC} = 12V (Standard) Please use voltage between 11 and 13V.	—
2 4 6	TV signal input R input G input B input	Input pin for TV primary color signals. Used with DC direct-coupling. Used with a standard black level of 3.0V (Standard).	
3 5 7	TEXT signal input R input G input B input	Input pin for TEXT primary color signals. Used with AC direct-coupling. The DC voltage for the clamp interval of the TEXT primary color signals and the DC voltage for the clamp interval of the TV primary color signals are joggled by an input clamp circuit inside the IC. After that the DC voltage determined by the TEXT brightness control from the internal matrix circuit is added.	
8	GND	—	—
9	TEXT contrast control	Pin that controls the amplitudes of the RGB signals input from pins 3, 5 and 7.	
10	TEXT brightness control	Pin that controls the DC voltage added to the RGB signals input from pins 3, 5 and 7.	

961001EBA2'

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- The information contained herein is subject to change without notice.

PIN No.	NAME	FUNCTION	INTERFACE
11	Clamp pulse input	Input pin for the clamp pulse that adjusts the black level of the TEXT signal and the black level of the TV signal. Detection level is 2V (Standard). Please ensure peak value is ($V_{CC} - 3V$) or less.	
12	Y_S input	Switches at high speed between TV signal (Pins 2, 4 and 6) and TEXT signal (Pins 3, 5 and 7). At high levels TEXT signal and at low levels TV signal can be selected.	
13	Horizontal blanking input	Input pin for horizontal blanking pulse. Horizontal blanking pulse and is used in the blanking of output signal and creation of reference pulse.	
14	N.C.	—	—
15	Reference pulse output	Output pin for reference pulse (T_1 , T_2). This is open collector output. Using the reference pulse output from this pin, please set the reference pulse interval output from the V/C/D IC in the previous stage so it is the black level.	
16	Service switch	Pin used to set the service mode. Service mode fixes RGB output at T_1 pulse level. Used for adjustment.	

PIN No.	NAME	FUNCTION	INTERFACE
17	Soft start	<p>When the power is off and the CRT is not warmed up, as a beam current does not flow to cutoff and drive detection interval, voltage is not obtainable from the sense pin. Accordingly, for operation so that current flows to the CRT for both cut adjustment and drive adjustment, the CRT starts from a white screen the instant it warms up.</p> <p>In order to prevent this, the soft start circuit returns the output DC voltage and operates so that if pin 17 exceeds a fixed value, cutoff adjustment is fixed on the black side. The set value is 0.9V.</p>	
18	Vertical blanking input	<p>Input pin for the vertical blanking pulse that determines the timing of the reference pulse for the cutoff adjustment and drive adjustment. The first 2H interval after the leading edge of the vertical blanking is the cutoff reference level, while the next 2H interval is the drive reference level. H timing is created by the horizontal blanking of pin 14.</p>	
19 23 27	B sense G sense R sense	<p>Detection pin for the CRT beam current. The current that flows to the CRT cathode as a result of the reference pulse inserted for cutoff adjustment and drive adjustment is converted to a voltage and detected by detection resistance. White balance can be changed by varying detection resistance. The internal comparator operates in tune with the timing of the reference pulse.</p>	

PIN No.	NAME	FUNCTION	INTERFACE
<p>20 24 28</p>	<p>B drive filter G drive filter R drive filter</p>	<p>The comparator output over the reference pulse interval is held for a 1V interval. RGB gain is controlled by this voltage, and operates so that the sense voltages of pins 19, 23 and 27 are 5V. Please use filter capacitance that has as little leak current as possible.</p>	
<p>21 25 29</p>	<p>B cutoff filter G cutoff filter R cutoff filter</p>	<p>The comparator output over the reference pulse interval is held for a 1V interval. The quantity of DC level shift for RGB is controlled by this voltage, and operates so that the sense voltages of pins 19, 23 and 27 are 0.5V. Please use a filter that has as little leak current as possible.</p>	
<p>22 26 30</p>	<p>B output G output R output</p>	<p>Primary color signal output pin. DC and gain determine the sense pin voltage of the cutoff detection interval is 0.5V and the sense pin voltage of the drive detection interval is 5V. These become approximately 1V during horizontal blanking and vertical blanking intervals.</p>	

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{CC}	15	V
Input Signal Voltage	e _{IN}	5	V
Primary Color Output Current	I _{OUT}	3.5	mA
TV/TEXT Switching Voltage	V ₁₂	-0.5~7.0	V
Blanking Pulse Input Voltage	V ₁₈	5~10	V
Adjustment Pin Voltage	V _{CONT}	0~V _{CC}	V
Dissipating Power	P _D (Note)	1.6	W
Operating Temperature	T _{opr}	-20~65	°C
Storage Temperature	T _{stg}	-55~150	°C

(Note) When used at temperatures of 25°C or above, please reduce the power by 12.8mW for each 1°C over 25°C.

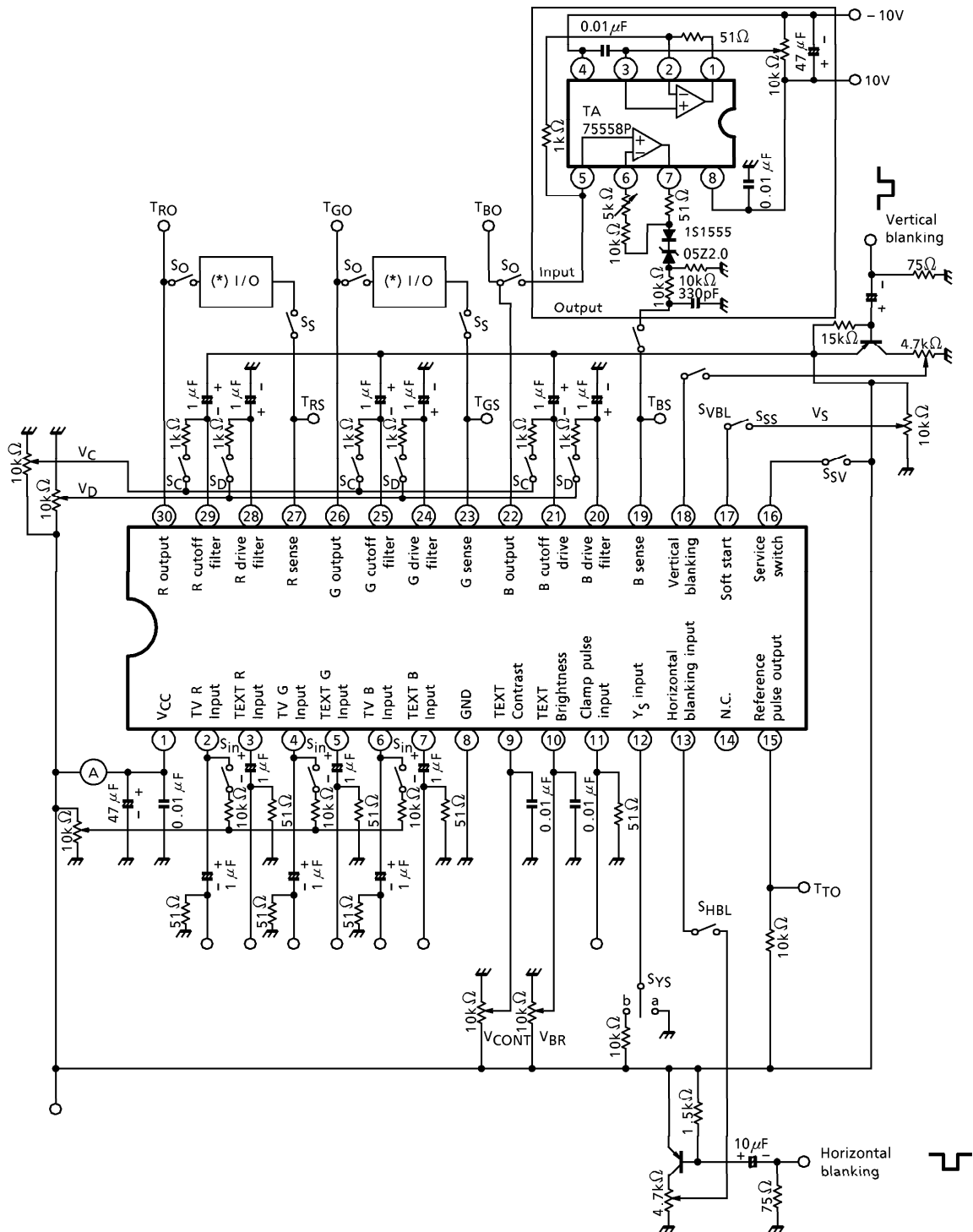
ELECTRICAL CHARACTERISTICS

AC CHARACTERISTICS (When not specified otherwise, V_{CC} = 12V, Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply Current	I _{CC}	—	V _{CC} = 12V	50	65	85	mA
TV Input Dynamic Range	V _{TV}	—	(Note 1)	5.0	7.0	—	V _{p-p}
Maximum Gain	G _m	—	(Note 2)	1.0	3.0	5.0	dB
Gain Variable Width	G _r	—	(Note 3)	10	12	13	dB
Cutoff Control Variable Range	ΔV _{CUT}	—	(Note 4)	1.5	2.0	—	V
Cutoff Control Control Sensitivity	β _C	—	(Note 5)	-0.4	-0.7	-1.0	
TV Frequency Characteristics	f _{TV}	—	(Note 6)	10	15	—	MHz
Crosstalk Between Channels	C _P TV	—	(Note 7)	—	-50	-40	dB
Horizontal Blanking Detection Level	V _{HBLK}	—	(Note 8)	1.5	1.7	1.9	V
Vertical Blanking Detection Level	V _{VBLK}	—	(Note 9)	4.0	5.0	6.0	V
Output Blanking Level	V _{OL}	—	(Note 10)	—	1.0	1.5	V
Black Detection Voltage	V _B	—	(Note 11)	0.4	0.55	0.7	V
White Detection Voltage	V _W			4.0	5.0	6.0	
Black Detection Level Temperature Drift	ΔV _B / ΔT	—	(Note 12)	—	0	±1	mV / °C
White Detection Level Temperature Drift	ΔV / ΔT			—	0	±2	
Difference in Black Detection Voltage Between Channels	ΔV _B	—	(Note 13)	—	0	±10	mV
Difference in White Detection Voltage Between Channels	ΔV _W			—	0	±100	
Output Voltage Vertical Interval Sag	V _{OS}	—	(Note 14)	—	0	±100	mV
Difference in Vertical Interval Sag between Channels	ΔV _{OS}			—	0	±50	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
T ₁ , T ₂ Pulse Output Voltage	V _{TO}	—	(Note 15)	—	0	0.3	V
Output Voltage when Service Switch is on	V _{SV}	—	(Note 16)	2.6	3.1	3.6	V
Soft Start Detection Voltage	V _{SS}	—	(Note 17)	0.8	0.9	1.0	V
TV→TEXT Crosstalk	C _{PTVTX}	—	(Note 18)	—	-50	-40	dB
Output DC Voltage	V _{OUT}	—	(Note 19)	2.5	3.0	3.5	V
Dependence of Black Detection Level on V _{CC}	V _{BVcc}	—	(Note 20)	—	0	10	mV
Dependence of White Detection Level on V _{CC}	V _{WVcc}			—	0	0.1	V
Vertical Blanking Delay Time	Δt _{V1}	—	(Note 21)	—	0	200	ns
	Δt _{V2}			—	0	200	
Horizontal Blanking Delay Time	Δt _{H1}	—	(Note 22)	—	0	200	ns
	Δt _{H2}			—	0	200	
TEXT Maximum Gain	G _{TXM}	—	(Note 23)	7.0	9.0	10.0	dB
TEXT Contrast Variable Width	G _{RTX}	—	(Note 24)	8.0	9.5	11.0	dB
TEXT Bright Voltage	V _{TXB}	—	(Note 25)	5.4	6.4	7.4	V
TEXT Contrast Voltage	V _{TXC}	—	(Note 26)	5.4	6.0	6.6	V
TEXT Frequency Characteristics	f _{TX}	—	(Note 27)	10	15	—	MHz
Gate Input Detection Level	V _{GT}	—	(Note 28)	1.1	1.4	1.7	V
TEXT Crosstalk Between Channels	C _{PTX}	—	(Note 29)	—	-50	-40	dB
TEXT→TV Crosstalk	C _{PTXTV}	—	(Note 30)	—	-50	-40	dB
TEXT Bright Variable Width	ΔV _{TXB}	—	(Note 31)	—	3.0	—	V
TEXT, TC Differential Voltage Change	ΔV _{def}	—	(Note 32)	-50	0	50	mV
TEXT RGB Relative Gain Differential	ΔG _V	—	(Note 33)	-1.0	0	1.0	dB
TV/TEXT Switching Level	V _{YS}	—	(Note 34)	0.4	0.7	1.0	V
TV→TEXT Switching Delay Time	t _{pTD}	—	(Note 35)	—	20	100	ns
TV→TEXT Switching Delay Time 3-Color Differential	Δt _{pTD}			—	0	±25	
TEXT→TV Switching Delay Time	t _{pDT}			—	20	100	
TEXT→TV Switching Delay Time 3-Color Differential	Δt _{pDT}			—	0	±25	

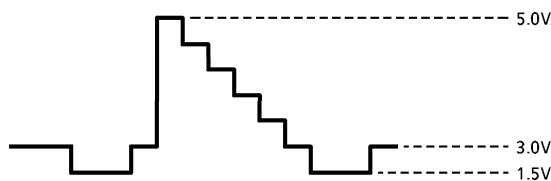
TEST CIRCUIT



CRT DRIVE DESIGN METHOD

1. Initialization

- (1) AKB (AUTOMATIC KINE BIAS) Circuits take the previously complex adjustment of CRT drive circuits and automates by absorbing the 3-color dispersion of the CRT. It is therefore necessary to design the CRT drive circuit in an AKB centered state to allow efficient absorption of the CRT's dispersion.
- (2) The primary color input on the TV side takes the form of DC coupling, so please set input levels so that the contrast control and brightness control in previous stages are under the following conditions in the center.



- (3) Cutoff control and drive control characteristics are shown in Fig.1 and Fig.2 respectively. Please forcibly center the AKB cutoff filter voltage and drive filter voltage using the external power supply. The I/O characteristics for TA8751AN when the various filter pins are centered (CUTOFF : 4.5V, DRIVE : 5.5V) are shown in Fig.3.
- (4) Please leave the AKB sense pins OPEN at this time.

2. Design of CRT drive circuit

- (1) The basic structure of the CRT drive circuit is shown in Fig.4.
- (2) Drive circuit gain : G is defined by the formula :

$$G = \frac{R_d}{(R_1 // R_2)} \dots\dots\dots \textcircled{1}$$

R₂ mainly determines gain, while R₁ mainly determines the operating voltage of the load side. Taking the signal amplitude required at the CRT cathode v_c (V_{p-p}), RGB output signal amplitude v_o is determined by initialization, so the gain necessary for the CRT drive circuit is determined by itself.

$$G = \frac{v_c}{v_o}$$

And so

$$\frac{v_c}{v_o} = \frac{R_d}{(R_1 // R_2)}$$

G is defined by the set.

- (3) Next the black level is set. Turn the AKB's service switch on. T_1 pulse level is output from the AKB. Taking that voltage as V_O and the cathode voltage set as V_d ,

$$V_d = +B - R_d \times \left(\frac{V_O - V_f}{R_1} + \frac{V_O - 2V_f - V_X}{R_2} \right) \dots\dots\dots ②$$

In order that the black level is not crushed by bright control, a value for V_O that satisfies the following equation should be chosen.

$$V_O > V_X + 2V_f$$

Note : When the service switch is on, please supply the cutoff filter with a center voltage from the external power supply.

- (4) The unknowns in equations (1) and (2) are R_d , R_1 and R_2 . When R_d is selected using frequency characteristics, R_1 and R_2 are determined by the above equations.

$$\begin{aligned} G = 24, V_O = 3.2V, V_X = 0.5V, V_d = 140V \\ \text{when } R_d = 15k\Omega, +B = 180V, V_f = 0.7V \\ R_1 = 2k\Omega \text{ and } R_2 = 910\Omega \end{aligned}$$

3. Setting sensing resistance

- (1) Sensing resistance R_S is set for the CRT drive circuit set in 2. Fig.5 shows CRT drive amplifier characteristics and CRT characteristics.
- (2) When there is a T_1 pulse in the AKB circuit, current I_{k1} that flows to the CRT results in feedback so that the voltage generated in R_S is 0.5V. Therefore,

$$R_S = \frac{0.5V}{I_{k1}} \dots\dots\dots ③$$

- (3) In the same way, when there is a T_2 pulse in the AKB circuit, current I_{k2} that flows to the CRT results in feedback so that the voltage generated in R_S is 0.5V, so

$$R_S = \frac{5.0V}{I_{k2}} \dots\dots\dots ④$$

I_{k1} and I_{k2} are determined when setting the CRT drive circuit in 2, so a value for R_S is selected that satisfies equations (3) and (4).

Note : Please make selection giving priority to equation (4).

4. Soft start circuit

- (1) When power is turned on with the CRT in a cooled state, current does not flow to the sensing resistance until the CRT warms up, so the AKB tries to start at DC level shift Max and the screen starts from the white side. The soft start circuit reduces this, and when the soft start pin has a T_1 pulse interval of 0.9V or more, works to control the DC level shift circuit to the Min side.

- (2) The T_1 pulse level V_{SS} at the RGB output pin that turns soft start on is

$$\begin{aligned} \frac{0.9V}{R_{SS}} &= \frac{V_{SS} - 2V_f - V_X}{R_2} + \frac{V_{CC} - V_f - V_X}{R_X} \\ \therefore V_{SS} &= \left(\frac{0.9V}{R_{SS}} - \frac{V_{CC} - V_f - V_X}{R_X} \right) R_2 + 2V_f + V_X \end{aligned}$$

Please set R_X and R_{SS} to satisfy the conditions above.

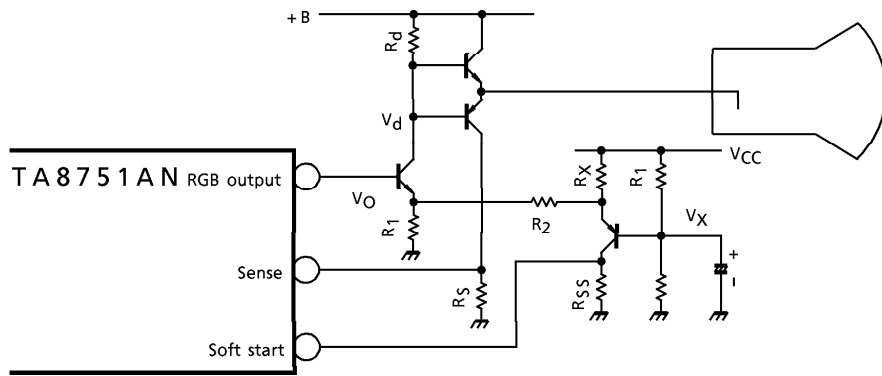


Fig.4 Basic structure of CRT drive circuit

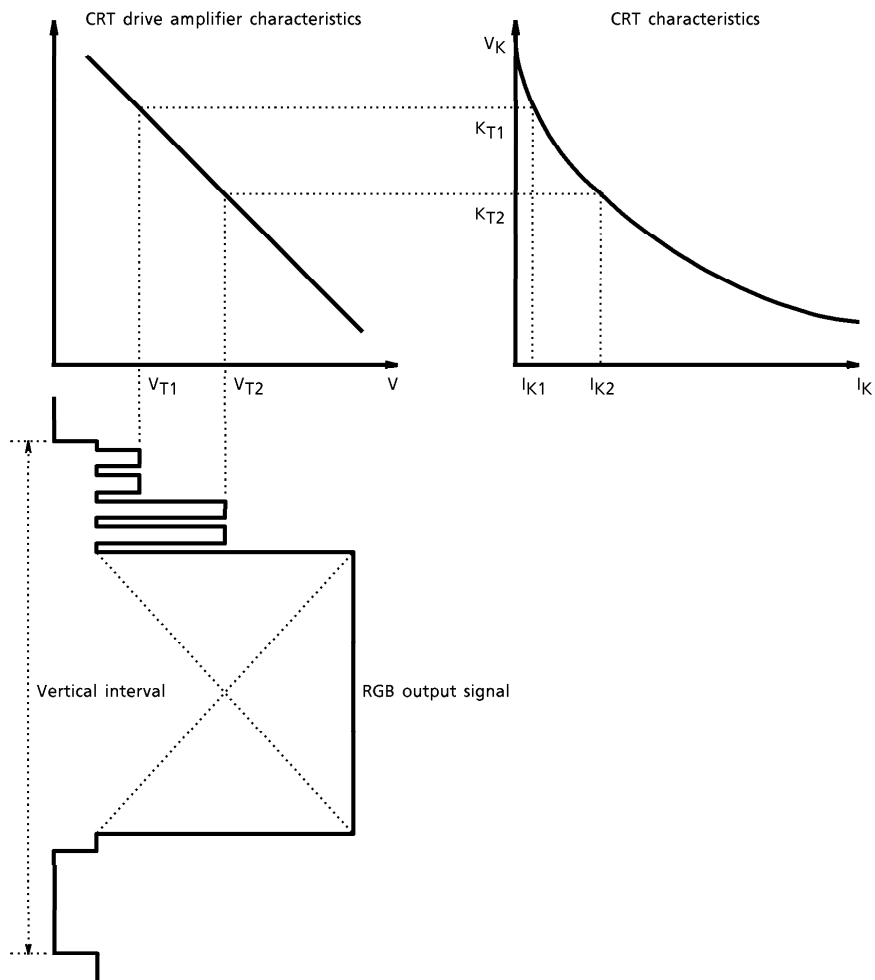
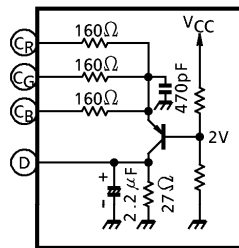
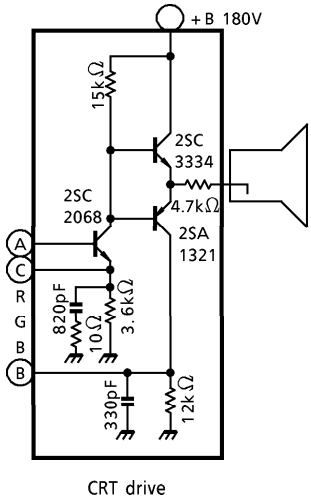
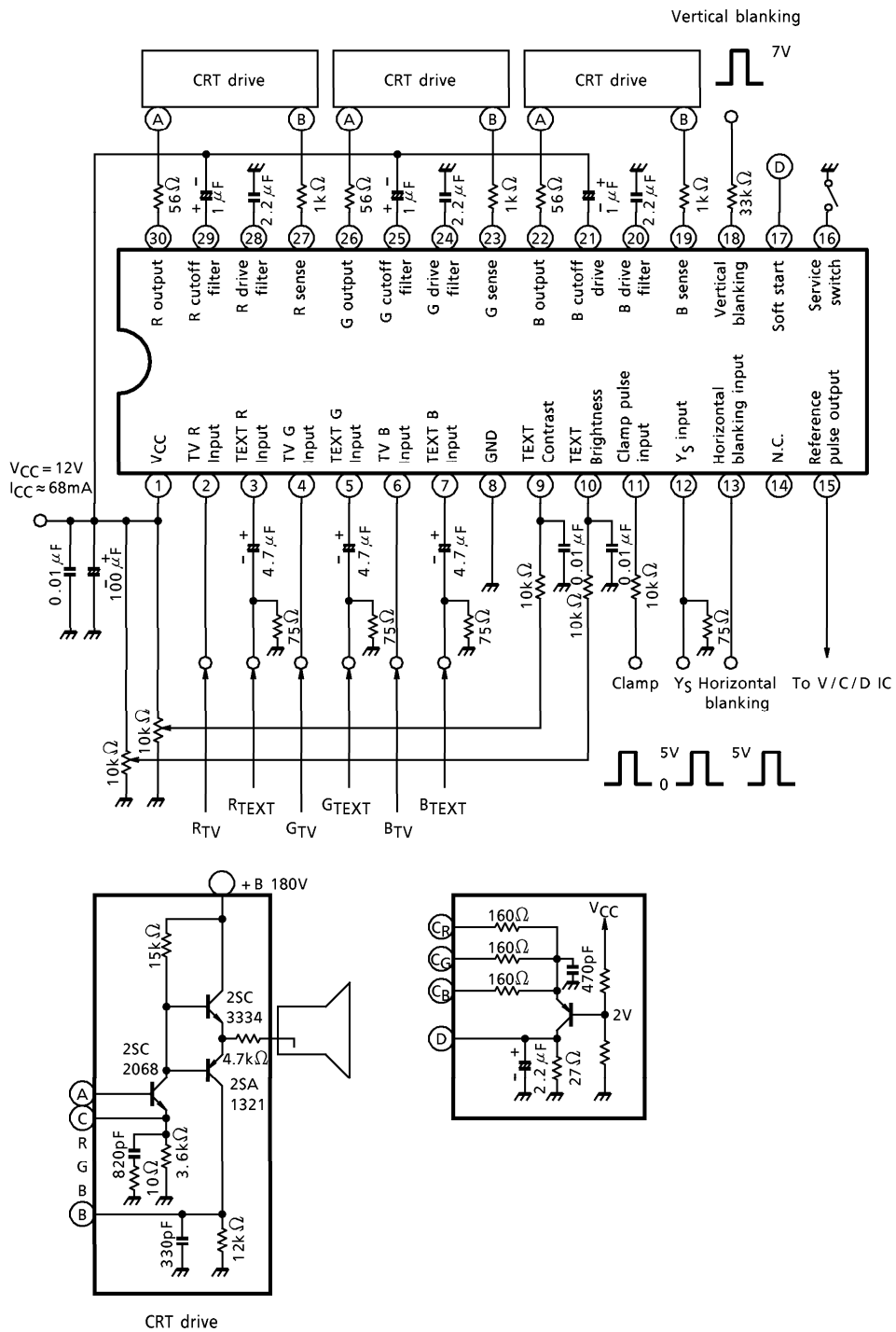


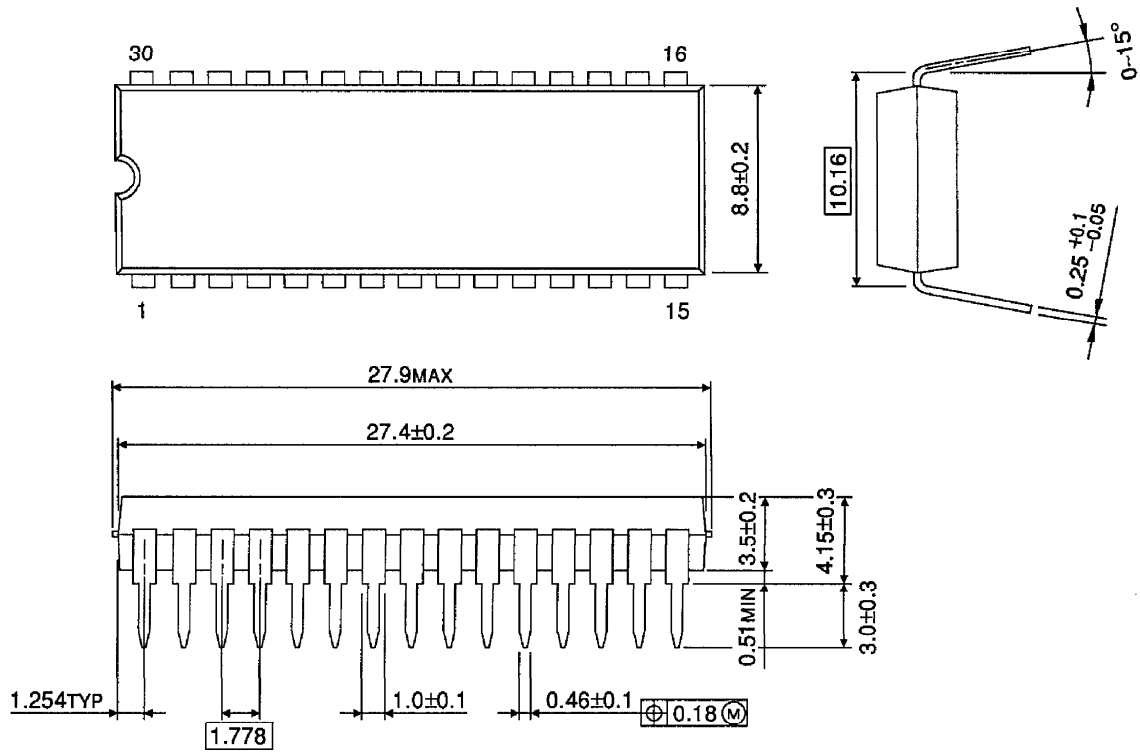
Fig.5 CRT drive amplifier characteristics and CRT characteristics

APPLICATION CIRCUIT



OUTLINE DRAWING
SDIP30-P-400-1.78

Unit : mm



Weight : 1.99g (Typ.)