AN3366SB

Record/Playback Amplifier for 2 Audio and 4 Video Head with Auto Tracking VCR

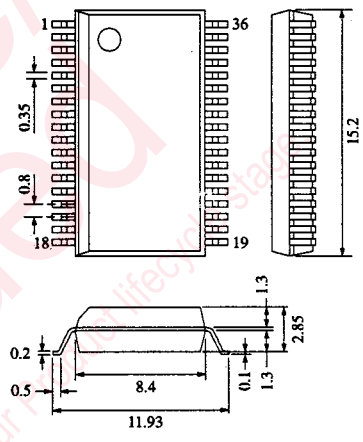
■ Description

The AN3366SB is a monolithic bipolar integrated circuit designed for 6 head audio / video record playback amplifier.

■ Features

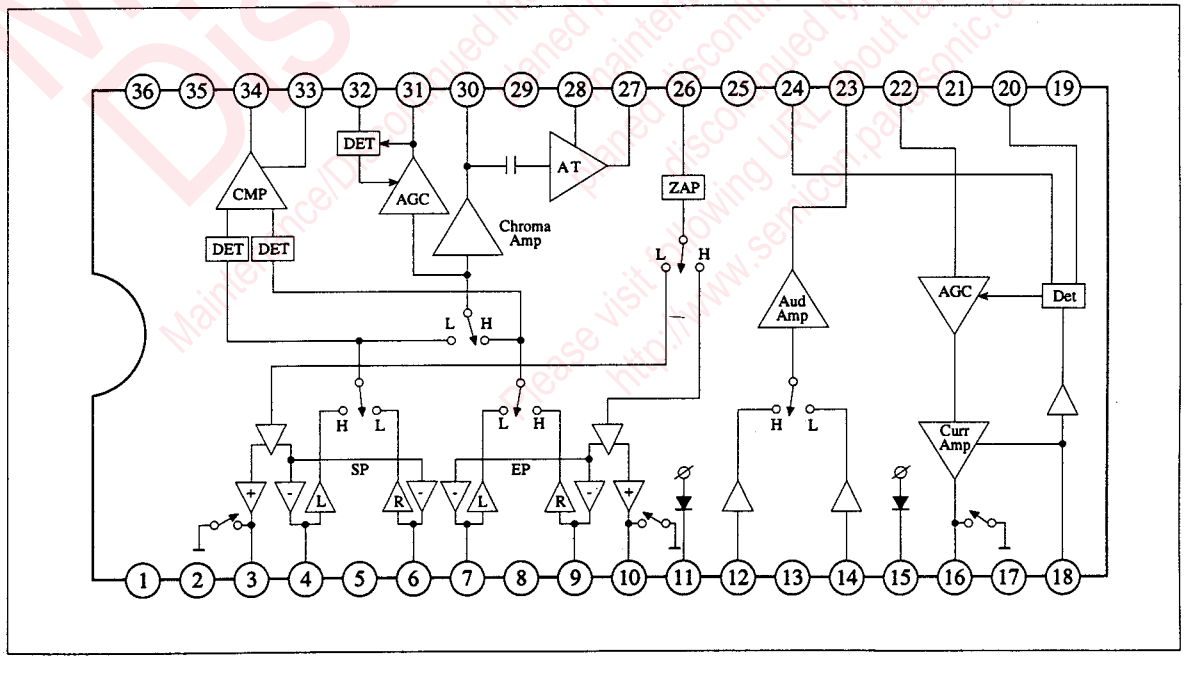
- Single supply operation : Vcc = 5V (typ.)
- Built-in AGC circuit
- Built-in head auto selection function when special playback
- Built-in auto tracking interface function

Unit : mm



36-Lead PANAFLAT Plastic Package (USONF-36D)

■ Block Diagram



■ Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Rating	Unit
Supply Voltage (1)	Video V_{CC}	6	V
Supply Voltage (2)	Audio V_{CC}		
Power Dissipation (Ta=70°C, in free air)	P_D	645	mW
Operating Ambient Temperature	Topr	-20 ~ +70	°C
Storage Temperature	Tstg	-55 ~ +150	°C

■ Recommended Operating Range (Ta=25°C)

Item	Symbol	Range
Operating Supply Voltage Range (1)	Video V_{CC}	4.5V ~ 5.5V
Operating Supply Voltage Range (2)	Audio V_{CC}	

■ Electrical Characteristics (Ta=25°C)

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Video Vcc I total (PB)	$I_{36(PB)}$	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (L)	21	(32)	45	mA
Video HSW Threshold Voltage	V_{TH1}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (L)	1.5	(2.5)	3.5	V
Video HASW (PB) Threshold Voltage	$V_{TH2(PB)}$	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (L)	1.5	(2.5)	3.5	V
Video HASW (Rec) Threshold Voltage	$V_{TH2(Rec)}$	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (H)	1.5	(2.5)	3.5	V
Rec/PB SW Threshold Voltage	V_{TH35}	2	Video Vcc=5.0V Audio Vcc=5.0V	1.5	(2.5)	3.5	V
Audio Rec/Mute Threshold Voltage	V_{TH25}	2	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (H)	1.5	(2.5)	3.5	V
Audio Current Emphasis Threshold Voltage	V_{TH23}	2	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (H)	1.5	(2.5)	3.5	V
Audio HSW Threshold Voltage	V_{TH17}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (L)	1.5	(2.5)	3.5	V
Video CH1 Gain	G_{4-30}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (L)	56	(60)	64	dB
Video CH2 Gain	G_{6-30}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (L)	56	(60)	64	dB
Video CH3 Gain	G_{7-30}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (L)	56	(60)	64	dB
Video CH4 Gain	G_{9-30}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (L)	56	(60)	64	dB
Audio CH1 Gain	G_{12-23}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (L)	66	(70)	74	dB
Audio CH2 Gain	G_{14-23}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (L)	66	(70)	74	dB
Video CH1 Input Conversion Noise	N_{4-30}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (L)			1.0	μVrms
Video CH2 Input Conversion Noise	N_{6-30}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (L)			1.0	μVrms
Video CH3 Input Conversion Noise	N_{7-30}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : (L)			1.0	μVrms

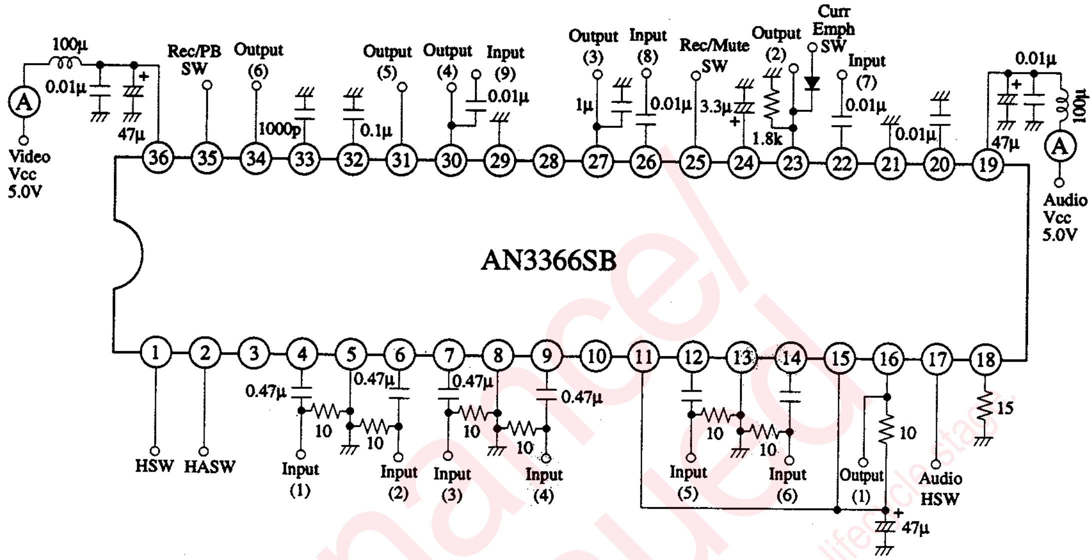
Note) The values in the brackets ( ) are typical values and are not guaranteed.

■ Electrical Characteristics (Ta=25°C) (Continue)

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Video CH4 Input Conversion Noise	$N_{9\text{-}30}$	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ			1.0	μVrms
Audio CH1 Input Conversion Noise	$N_{12\text{-}23}$	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ		(0.7)	1.0	μVrms
Audio CH2 Input Conversion Noise	$N_{14\text{-}23}$	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ		(0.7)	1.0	μVrms
Video HSW DC Unbalanced (1)	ΔV_{HSW1}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ, HASW : Ⓛ			100	mVp-p
Video HSW DC Unbalanced (2)	ΔV_{HSW2}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ, HASW : Ⓗ			100	mVp-p
Video HASW DC Unbalanced (1)	ΔV_{HASW1}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ, HSW : Ⓛ			100	mVp-p
Video HASW DC Unbalanced (2)	ΔV_{HASW2}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ, HSW : Ⓗ			100	mVp-p
Audio HSW DC Unbalanced	ΔV_{AHSW}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ			20	mVp-p
Video RF AGC Output Amplitude	V_{13}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ	130	(200)	270	mVp-p
Video RF AGC Control Sensitivity	ΔV_{31}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ			3.0	dB
Video Env Output Amplitude	V_{34}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ	4.0			Vp-p
Auto Tracking Output when No Input	V_{27min}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ	0	(0.5)	1.0	V
Auto Tracking Maximum Output	V_{27max}	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ	4.0	(4.5)		V
Video CH2/CH1 Gain Ratio	$G_{6\text{-}30} / G_{4\text{-}30}$	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ	-2	(0)	2	dB
Video CH3/CH1 Gain Ratio	$G_{7\text{-}30} / G_{4\text{-}30}$	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ	-2	(0)	2	dB
Video CH4/CH1 Gain Ratio	$G_{9\text{-}30} / G_{4\text{-}30}$	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ	-2	(0)	2	dB
Audio CH2/CH1 Gain Ratio	$G_{14\text{-}23} / G_{12\text{-}23}$	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ	-2	(0)	2	dB
Audio Vcc I total (PB)	$I_{19(PB)}$	1	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓛ	9	(15)	22	mA
Video Vcc I total (Rec)	$I_{36(Rec)}$	2	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓗ	42	(50)	58	mA
Video SP Output Rec Current	i_3	2	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓗ	27.9	30	32.1	mAp-p
Video EP Output Rec Current Ratio	i_{10} / i_3	2	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓗ	-1.6	(-8.0)	0	dB
Audio Output Rec Current	i_{16}	2	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓗ	39	(43)	47	mAp-p
Audio Rec AGC Control Characteristics	Δi_{16}	2	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓗ		(0.2)	1.0	dB
Audio Rec Current Emphasis Ratio	i_{CE} / i_{16}	2	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓗ	1.2	(1.7)	2.2	dB
Audio Vcc I total (Rec)	$I_{19(Rec)}$	2	Video Vcc=5.0V Audio Vcc=5.0V Rec/PB SW : Ⓗ	41	(49)	65	mA

Note) The values in the brackets ( ) are typical values and are not guaranteed.

Test Circuit 1



Test Method

1 Playback Mode Video Vcc=5.0V, Audio Vcc=5.0V
Rec/PB SW (Pin 35) : (L)

No.1. Video Vcc I total (PB) : Circuit current flow into Video Vcc (Pin 36).

No.35. Audio Vcc I total (PB) : Circuit current flow into Audio Vcc (Pin 19).

No.2/3/8. Threshold Voltage : Voltage level change the internal switch at playback mode.

No.9~No.14. Gain : The table below shows the SW setting of the voltage gain.

$$\text{Gain } G=20\log\left(\frac{\text{Output voltage amplitude (mVp-p)}}{\text{Input Voltage amplitude (mVp-p)}}\right)$$

No.	Item	Pin 1 (HSW)	Pin 2 (HASW)	Pin 17 (Audio HSW)	Input	Input Level	Output
9	Video CH1 Gain	H	L	-	(1)	fin=3.58MHz, Vin=0.3mVp-p	(4)
10	Video CH2 Gain	L	L	-	(2)	fin=3.58MHz, Vin=0.3mVp-p	(4)
11	Video CH3 Gain	L	H	-	(3)	fin=3.58MHz, Vin=0.3mVp-p	(4)
12	Video CH4 Gain	H	H	-	(4)	fin=3.58MHz, Vin=0.3mVp-p	(4)
13	Audio CH1 Gain	-	-	H	(5)	fin=2MHz, Vin=0.1mVp-p	(2)
14	Audio CH2 Gain	-	-	L	(6)	fin=2MHz, Vin=0.1mVp-p	(2)

No.15~No.20. Input Conversion Noise : Each output pass through the 1MHz BPF, the input noise is obtained by taking the output noise divide by the gain.

Test Method (Continue)

No.21/22. Video HSW DC Unbalance :

Apply a rectangular wave of 5kHz (L:0V, H:5.0V) to pin 1. Measure the signal level difference at pin 30 (output (4)).

No.23/24. Video HASW DC Unbalance :

Apply a rectangular wave of 5kHz (L:0V, H:5.0V) to pin 2. Measure the signal level difference at pin 30 (output (4)).

No.25. Audio HSW DC Unbalance :

Apply a rectangular wave of 5kHz (L:0V, H:5.0V) to pin 17. Measure the signal level difference at pin 23 (output (2)).

No.26. Video RF AGC Output Amplitude :

Apply a sine wave (Vin=0.3mVp-p, fin=3.58MHz) at input (4) during the SW setting at No.9. Measure the output voltage amplitude at pin 31 (output (5)).

No.27. Video RF AGC Control Sensitivity :

When SW setting at No.9, apply a sine wave (Vin=0.6mVp-p, fin=3.58MHz) at input (4). Measure the output voltage amplitude V_{31H}(mVp-p) at pin 31 (output (5)). Next apply a sine wave (Vin=0.15mVp-p, fin=3.58MHz) at input (4) and measure the output voltage amplitude V_{31L}(mVp-p) at pin 31 (output (5)). The ratio is calculated by V_{31H} divide by V_{31L} (V_{31H}/V_{31L}).

No.28. Video Env Output Amplitude :

Apply a sine wave (Vin=0.3mVp-p, fin=3.58MHz) at input (2), (4). Apply a rectangular wave of 5kHz (L=0V, H=5.0V) to pin 1. Measure the signal level difference at pin 34 (output (6)).

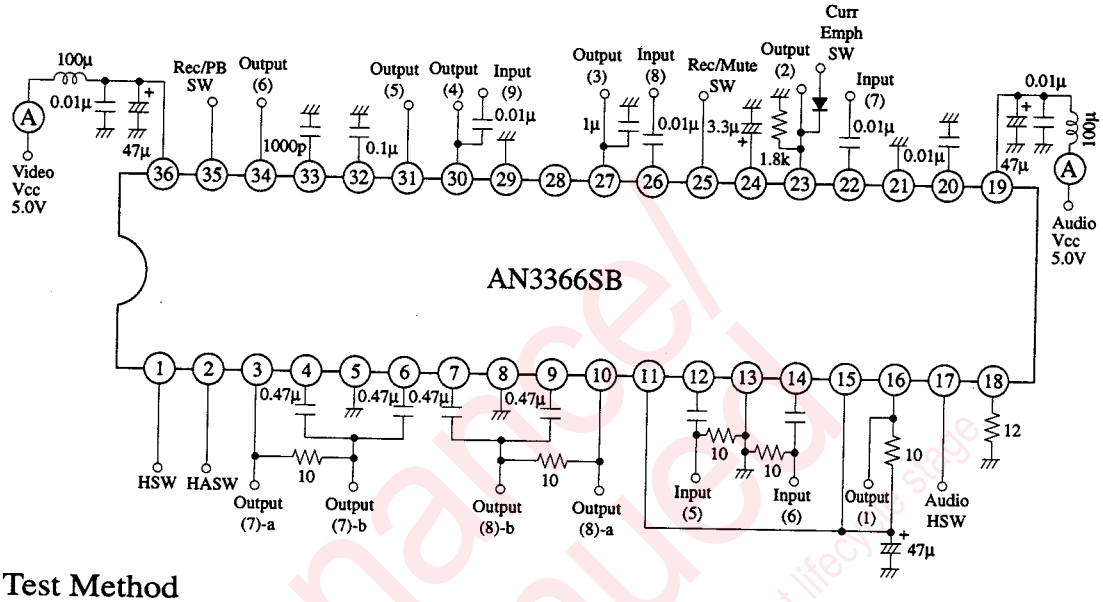
No.29. Auto Tracking Output when no Input (HASW : Ⓛ) :

Measure the DC voltage of pin 27 (output (3)) when no input is applied at input (9).

No.30. Auto Tracking Maximum Output (HASW : Ⓛ) :

Apply a sine wave (Vin=0.1Vp-p, fin=3.58MHz) at input (9). Measure the DC voltage of pin 27 (output (3)).

Test Circuit 2



Test Method

2 Record Mode Video Vcc=5.0V, Audio Vcc=5.0V
Rec/PB SW (Pin 35) : (H)

No.6/7. Threshold Voltage : Voltage level change the internal switch at Rec mode.

No.36. Video Vcc I total (Rec) : Circiut current flow at Video Vcc (pin 36).

No.42. Audio Vcc I total (Rec) : Circuit current flow at Audio Vcc (pin 19).

No.37. Video SP Rec Current Output (HASW : (L)) :

Apply a sine wave (Vin=290mVp-p, fin=3.58MHz) at input (8) (Pin 26). Measure the AC current amplitude (i_3) that flow between output (7)-a and output (7)-b.

No.38. Video EP Output Rec Current Ratio (HASW : (H)) :

Apply a sine wave (Vin=290mVp-p, fin=3.58MHz) at input (8) (Pin 26). Measure the AC current amplitude (i_{10}) that flow between output (8)-a and output (8)-b. The ratio is calculated by i_{10} divide by i_3 (i_{10}/i_3).

No.39. Audio Rec Current Output (Curr Emph SW : (L)) :

Apply a sine wave (Vin=130mVp-p, fin=2MHz) at input (7) (Pin 22). The current value (i_{16}) is converted from the voltage amplitude measured at output (1) (Pin 16).

Test Method (Continue)

No.40. Audio Rec AGC Control Characteristics (Curr Emph SW : Ⓛ) :

Apply a sine wave (Vin=370mVp-p, fin=2MHz) at input (7) (Pin 22). Measure the output current amplitude (i_{16H}) of output (1) (Pin 16). Next reduced the input sine wave to (Vin=180mVp-p, fin=2MHz). Measure the output current amplitude (i_{16L}) of output (1) (Pin 16). The ratio is calculated by i_{16H} divide by i_{16L} (i_{16H}/i_{16L}).

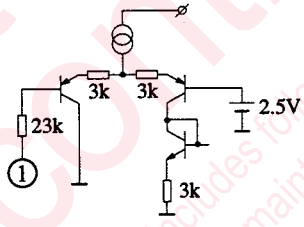
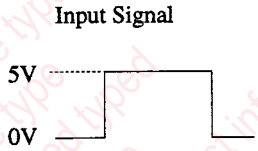
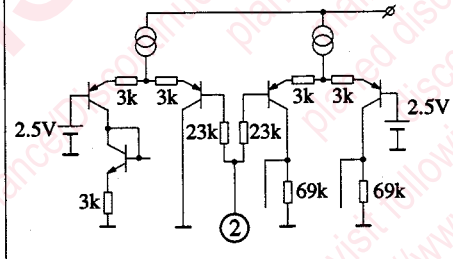
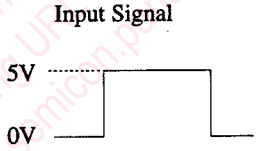
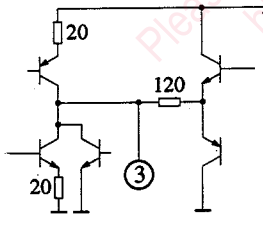
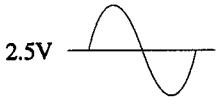
No.41. Audio Rec Current Emphasis Ratio (Curr Emph SW : Ⓗ) :

Apply a sine wave (Vin=130mVp-p, fin=2MHz) at input (7) (Pin 22). Measure the output current amplitude (i_{16CE}) of output (1) (Pin 16). The ratio is calculated by i_{16CE} divide by i_{16} (i_{16CE}/i_{16}).

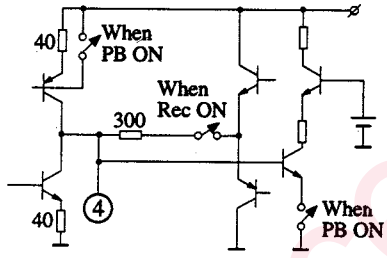
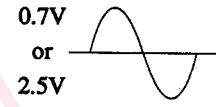
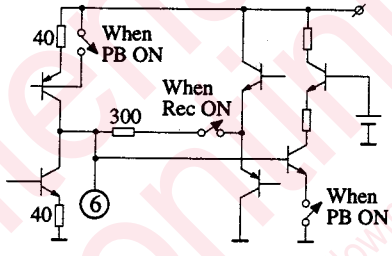
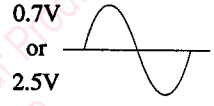
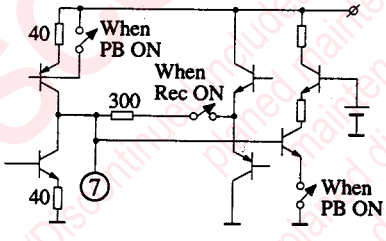
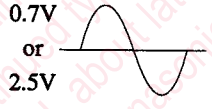
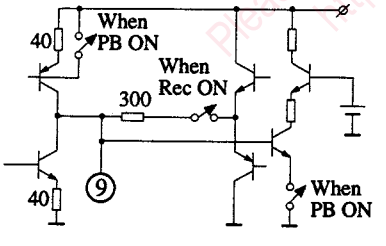
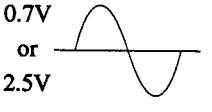
No.5. Rec/PB SW Threshold Voltage :

Decrease the voltage at the Rec/PB SW (Pin 35) at 5V gradually. Measure the DC voltage at pin 35 when the mode change from Rec mode to PB mode.

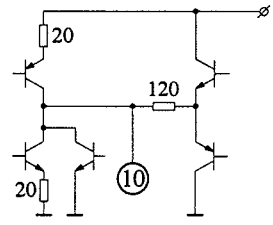
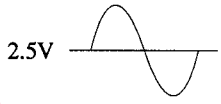
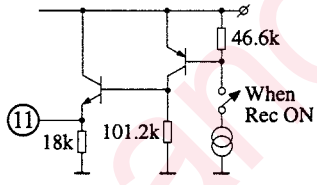
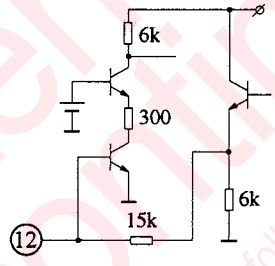
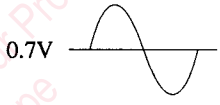
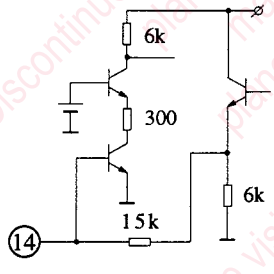
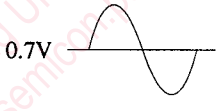
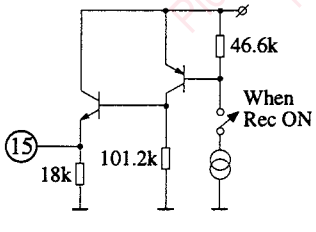
■ Pin Descriptions

Pin No.	Pin Name	Equivalent Circuit	Waveform	Remarks
1	Head SW			Video Vcc
2	Head Amp SW			Video Vcc
3	Video Rec SP Out			Video Vcc

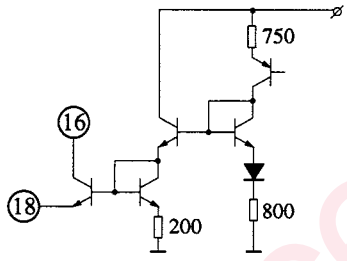
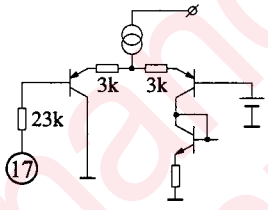
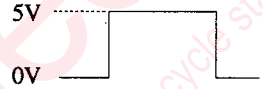
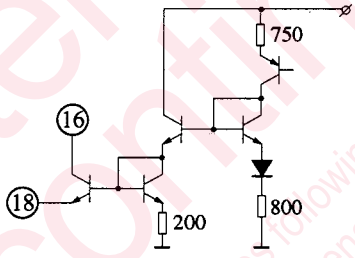
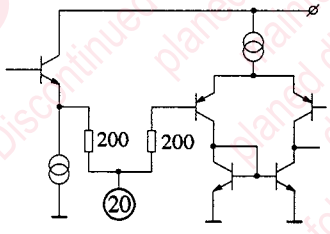
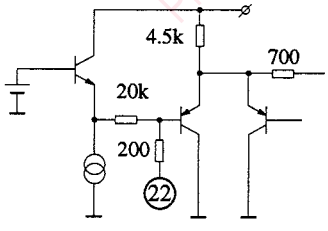
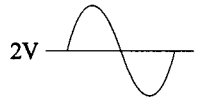
■ Pin Descriptions (Continue)

Pin No.	Pin Name	Equivalent Circuit	Waveform	Remarks
4	Video Head Amp CH1 Input			Video Vcc
5	GND (Video Small Signal)			
6	Video Head Amp CH2 Input			Video Vcc
7	Video Head Amp CH3 Input			Video Vcc
8	GND (Video Small Signal)			
9	Video Head Amp CH4 Input			Video Vcc

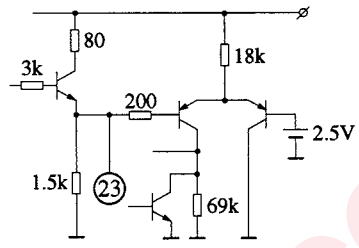
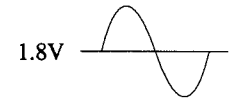
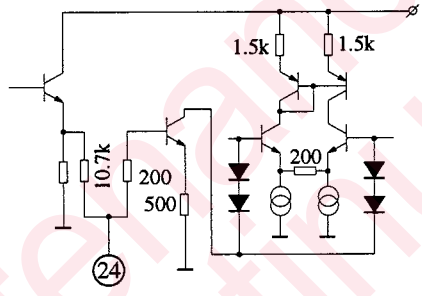
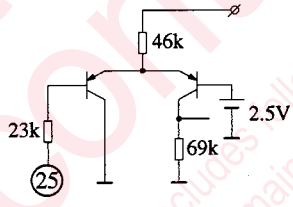
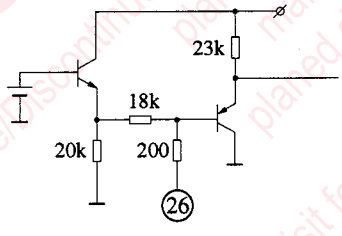
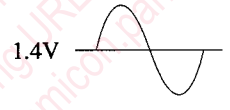
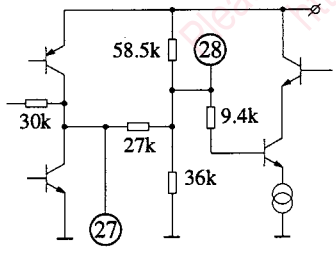
■ Pin Descriptions (Continue)

Pin No.	Pin Name	Equivalent Circuit	Waveform	Remarks
10	Video Rec EP Out			Video Vcc
11	Audio Rec Regulator 1		DC	Audio Vcc
12	Audio Head Amp CH1 Input			Audio Vcc
13	GND (Audio Small Signal)			
14	Audio Head Amp CH2 Input			Audio Vcc
15	Audio Rec Regulator 2		DC	Audio Vcc

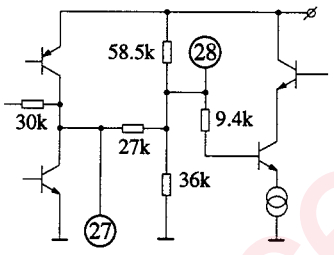
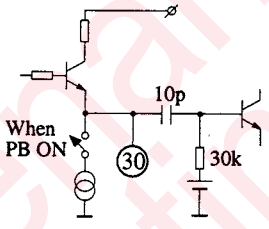
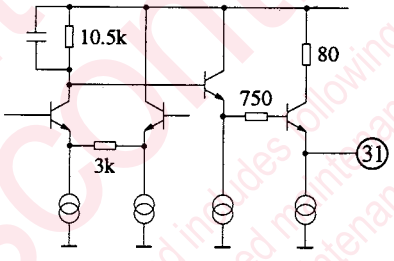
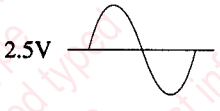
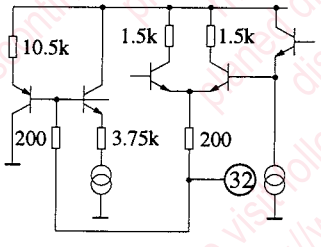
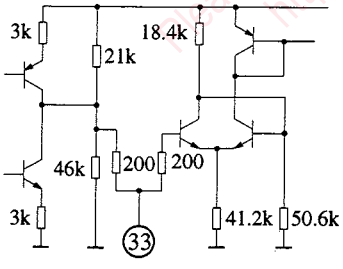
■ Pin Descriptions (Continue)

Pin No.	Pin Name	Equivalent Circuit	Waveform	Remarks
16	Audio Rec Out		AC	Audio Vcc
17	Audio Head SW		Input Signal 	Audio Vcc
18	Audio Rec Curr Monitor (Control)		AC	Audio Vcc
19	Audio Vcc 5V			
20	Audio Rec AGC Det		DC	Audio Vcc
21	GND (Audio)			
22	Audio Rec Input			Audio Vcc

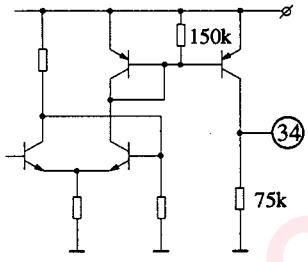
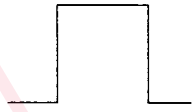
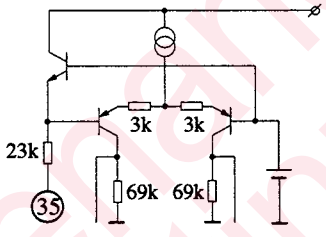
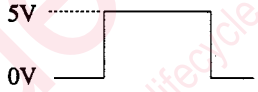
■ Pin Descriptions (Continue)

Pin No.	Pin Name	Equivalent Circuit	Waveform	Remarks
23	Audio PB Out			Audio Vcc
	Curr Emph			
24	Audio Rec C		DC	Audio Vcc
25	Audio Rec / Mute SW			Audio Vcc
26	Video Rec Input			Video Vcc
27	Auto Tracking Out		DC	Video Vcc

■ Pin Descriptions (Continue)

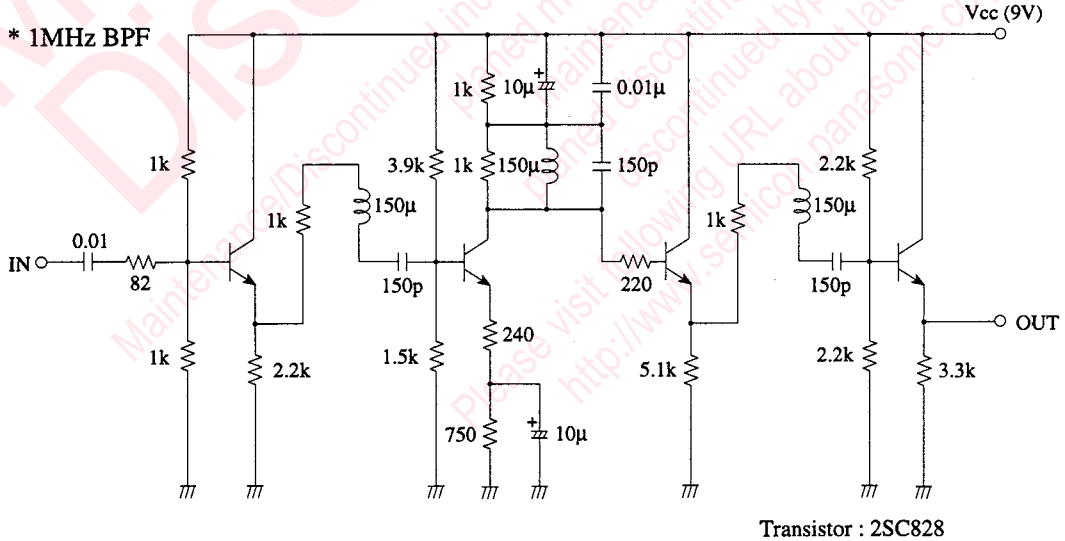
Pin No.	Pin Name	Equivalent Circuit	Waveform	Remarks
28	Auto Tracking GCA Control		DC	Video Vcc
29	GND (Video)			
30	Video Chroma Out			Video Vcc
31	Video RF AGC Out			Video Vcc
32	Video RF AGC Det		DC	Video Vcc
33	Video Env Comparator C		DC = 2.2V	Video Vcc

■ Pin Descriptions (Continue)

Pin No.	Pin Name	Equivalent Circuit	Waveform	Remarks
34	Video Env Comparator (Select) Out			Video Vcc
35	Rec/PB Select SW			Video Vcc
36	Video Vcc			

■ Supplementary Explanation

● Circuit Diagram



Transistor : 2SC828

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