

# Video signal switcher for AV amplifiers

## BA7625

The BA7625 is a video signal switch that contains two five-channel analog multiplexers and wide-band 6dB amplifiers. It designed for use in video cassette recorders. By simply adding transistor buffers to the outputs, it is possible to construct a record/playback switch for two record/playback VCRs, and three video playback machines (eg. laser disk players). Input switching and VCR record switching can be done independently. The BA7625 has sync-tip clamp inputs which are ideal for switching video signals.

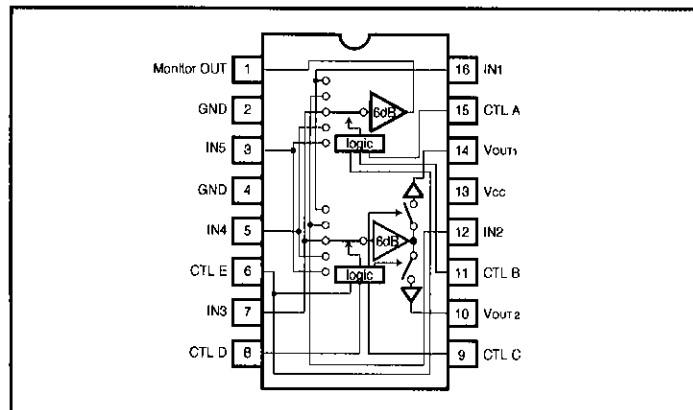
● Applications

AV amplifiers and video selectors

● Features

- 1) 5-input / 3-output switches.
- 2) Sync-tip clamp inputs.
- 3) Built-in 6dB amplifiers.
- 4) 5V supply voltage.

● Block diagram



Video signal selection switches

AV switches

● Truth table

A	B	E	Monitor OUT
L	L	*	IN1
H	L	*	IN2
L	H	*	IN3
H	H	L	IN4
H	H	H	IN5

C	D	E	VOUT1
L	L	*	—
H	L	*	IN2
L	H	*	IN3
H	H	L	IN4
H	H	H	IN5

C	D	E	VOUT2
L	L	*	IN1
H	L	*	—
L	H	*	IN3
H	H	L	IN4
H	H	H	IN5

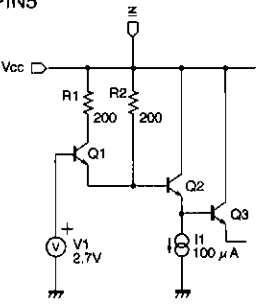
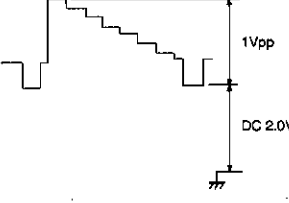
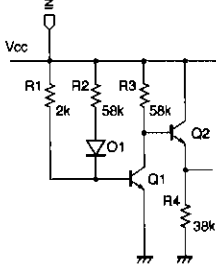
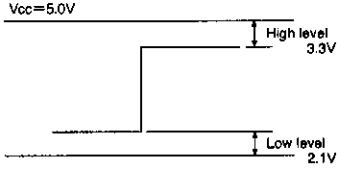
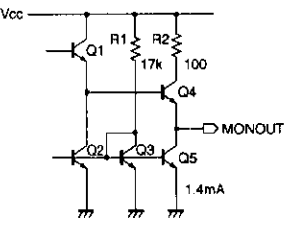
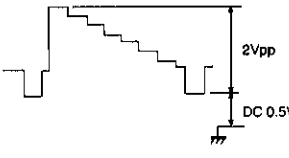
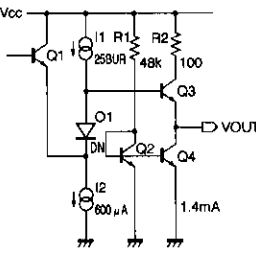
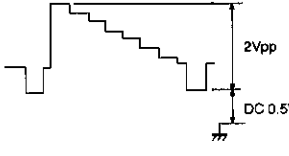
Note 1: \* indicates "don't care" (H or L).

## ● Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V <sub>CC</sub>	9	V
Power dissipation	P <sub>d</sub>	500 *	mW
Operating temperature	T <sub>opr</sub>	-25~70	°C
Storage temperature	T <sub>stg</sub>	-55~125	°C

\* Reduced by 5mW for each increase in Ta of 1°C over 25°C.

●Equivalent input / output circuits

Input circuit	Waveform
<p>IN1~IN5</p> 	
<p>CTLA~CTLE</p> 	
<p>Monitor OUT</p> 	
<p>VOUT1, VOUT2</p> 	

Video signal selection switches

AV switches

●Electrical characteristics (Unless otherwise specified Ta=25°C and Vcc=5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Operating voltage	V <sub>CC</sub>	4.5	5.0	5.5	V	—
Circuit current	I <sub>CC</sub>	—	15.0	20.0	mA	—
Maximum output level	V <sub>om</sub>	2.6	2.9	—	V <sub>P-P</sub>	f=1kHz, THD=0.5%
Voltage gain	G <sub>v</sub>	5.7	6.2	6.7	dB	f=MHz, V <sub>IN</sub> =1V <sub>P-P</sub>
Interchannel crosstalk	CT	—	-65	-45	dB	f=4.43MHz, V <sub>IN</sub> =1V <sub>P-P</sub>
Mute level	CTM	—	-35	-25	dB	f=4.43MHz, V <sub>IN</sub> =1V <sub>P-P</sub>
Frequency characteristic	G <sub>f</sub>	-3	0	3	dB	10MHz / 1MHz, V <sub>IN</sub> =1V <sub>P-P</sub>
CTL pin switch level	V <sub>TH</sub>	2.2	—	3.3	V	—

©Not designed for radiation resistant.

●Measurement circuit

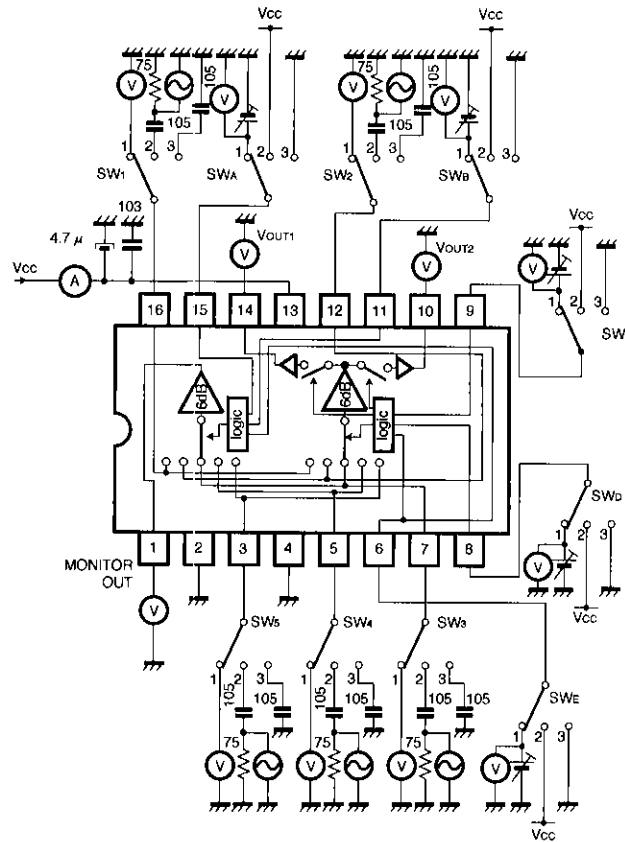


Fig.1

## ●Measurement conditions

Parameter	Symbol	Switch settings										Measurement method
		SW <sub>1</sub>	SW <sub>2</sub>	SW <sub>3</sub>	SW <sub>4</sub>	SW <sub>5</sub>	SW <sub>A</sub>	SW <sub>B</sub>	SW <sub>C</sub>	SW <sub>D</sub>	SW <sub>E</sub>	
Current consumption	I <sub>CC</sub>	3	3	3	3	3	2	2	2	2	2	
Monitor OUT maximum output level	V <sub>om</sub> 1MON	2	3	3	3	3	3	3	*	*	*	Note 1
	V <sub>om</sub> 2MON	3	2	↓	↓	↓	2	3	↓	↓	↓	
	V <sub>om</sub> 3MON	↓	3	2	↓	↓	3	2	↓	↓	↓	
	V <sub>om</sub> 4MON	↓	↓	3	2	2	2	2	↓	↓	3	
	V <sub>om</sub> 5MON	↓	↓	↓	3	2	2	2	↓	↓	2	
Monitor OUT voltage gain	G <sub>v</sub> 1MON	2	3	3	3	3	3	3	*	*	*	Note 2
	G <sub>v</sub> 2MON	3	2	↓	↓	↓	2	3	↓	↓	↓	
	G <sub>v</sub> 3MON	↓	3	2	↓	↓	3	2	↓	↓	↓	
	G <sub>v</sub> 4MON	↓	↓	3	2	2	2	2	↓	↓	3	
	G <sub>v</sub> 5MON	↓	↓	↓	3	2	2	2	↓	↓	2	
Monitor OUT interchannel crosstalk	CT1-2MON	2	3	3	3	3	2	3	*	*	*	Note 3
	CT1-3MON	↓	↓	↓	↓	↓	3	2	↓	↓	↓	
	CT1-4MON	↓	↓	↓	↓	↓	2	2	↓	↓	3	
	CT1-5MON	↓	↓	↓	↓	↓	2	2	↓	↓	2	
	CT2-1MON	3	2	3	3	3	3	3	*	*	*	
	CT2-3MON	↓	↓	↓	↓	↓	3	2	↓	↓	↓	
	CT2-4MON	↓	↓	↓	↓	↓	2	2	↓	↓	3	
	CT2-5MON	↓	↓	↓	↓	↓	2	2	↓	↓	2	
	CT3-1MON	3	3	2	3	3	3	3	*	*	*	
	CT3-2MON	↓	↓	↓	↓	↓	2	3	↓	↓	↓	
	CT3-4MON	↓	↓	↓	↓	↓	2	2	↓	↓	3	
	CT3-5MON	↓	↓	↓	↓	↓	2	2	↓	↓	2	
	CT4-1MON	3	3	3	2	3	3	3	*	*	*	
	CT4-2MON	↓	↓	↓	↓	↓	2	3	↓	↓	↓	
	CT4-3MON	↓	↓	↓	↓	↓	2	2	↓	↓	↓	
	CT4-5MON	↓	↓	↓	↓	↓	2	2	↓	↓	3	
	CT5-1MON	3	3	3	3	2	3	3	*	*	*	
	CT5-2MON	↓	↓	↓	↓	↓	2	3	↓	↓	↓	
	CT5-3MON	↓	↓	↓	↓	↓	2	2	↓	↓	↓	
	CT5-4MON	↓	↓	↓	↓	↓	2	2	↓	↓	2	
Monitor OUT frequency characteristic	G <sub>f</sub> 1MON	2	3	3	3	3	3	3	*	*	*	Note 4
	G <sub>f</sub> 2MON	3	2	↓	↓	↓	2	3	↓	↓	↓	
	G <sub>f</sub> 3MON	↓	3	2	↓	↓	3	2	↓	↓	↓	
	G <sub>f</sub> 4MON	↓	↓	3	2	↓	2	2	↓	↓	3	
	G <sub>f</sub> 5MON	↓	↓	↓	3	2	2	2	↓	↓	2	
V <sub>OUT1</sub> maximum output level	V <sub>om</sub> 2OUT1	3	2	3	3	3	*	*	2	3	*	Note 1
	V <sub>om</sub> 3OUT1	↓	3	2	↓	↓	↓	↓	3	2	↓	
	V <sub>om</sub> 4OUT1	↓	↓	3	2	3	↓	↓	2	2	3	
	V <sub>om</sub> 5OUT1	↓	↓	↓	3	2	↓	↓	2	2	2	

Video signal selection switches

AV switches

## ● Measurement conditions

Parameter	Symbol	Switch settings										Measurement method
		SW <sub>1</sub>	SW <sub>2</sub>	SW <sub>3</sub>	SW <sub>4</sub>	SW <sub>5</sub>	SW <sub>A</sub>	SW <sub>B</sub>	SW <sub>C</sub>	SW <sub>D</sub>	SW <sub>E</sub>	
V <sub>OUT1</sub> voltage gain	Gv 2OUT1	3	2	3	3	3	*	*	2	3	*	Note 2
	Gv 3OUT1	↓	3	2	↓	↓	↓	↓	3	2	↓	
	Gv 4OUT1	↓	↓	3	2	3	↓	↓	2	2	3	
	Gv 5OUT1	↓	↓	↓	3	2	↓	↓	2	2	2	
V <sub>OUT1</sub> interchannel crosstalk	CT1-2OUT1	2	3	3	3	3	*	*	3	3	*	Note 3
	CT1-3OUT1	↓	↓	↓	↓	↓	↓	↓	3	2	↓	
	CT1-4OUT1	↓	↓	↓	↓	↓	↓	↓	2	2	3	
	CT1-5OUT1	↓	↓	↓	↓	↓	↓	↓	2	2	2	
	CT2-1OUT1	3	2	3	3	3	*	*	3	3	*	
	CT2-3OUT1	↓	↓	↓	↓	↓	↓	↓	3	2	↓	
	CT2-4OUT1	↓	↓	↓	↓	↓	↓	↓	2	2	3	
	CT2-5OUT1	↓	↓	↓	↓	↓	↓	↓	2	2	2	
	CT3-1OUT1	3	3	2	3	3	*	*	3	3	*	
	CT3-2OUT1	↓	↓	↓	↓	↓	↓	↓	2	3	↓	
	CT3-4OUT1	↓	↓	↓	↓	↓	↓	↓	2	2	3	
	CT3-5OUT1	↓	↓	↓	↓	↓	↓	↓	2	2	2	
	CT4-1OUT1	3	3	3	2	3	*	*	3	3	*	
	CT4-2OUT1	↓	↓	↓	↓	↓	↓	↓	2	3	↓	
	CT4-3OUT1	↓	↓	↓	↓	↓	↓	↓	3	2	↓	
	CT4-5OUT1	↓	↓	↓	↓	↓	↓	↓	2	2	2	
CT5-1OUT1	3	3	3	3	2	*	*	3	3	*		
CT5-2OUT1	↓	↓	↓	↓	↓	↓	↓	2	3	↓		
CT5-3OUT1	↓	↓	↓	↓	↓	↓	↓	3	2	↓		
CT5-4OUT1	↓	↓	↓	↓	↓	↓	↓	2	2	3		
V <sub>OUT1</sub> frequency characteristic	Gr 2OUT1	3	2	3	3	3	*	*	2	3	*	Note 4
	Gr 3OUT1	↓	3	2	↓	↓	↓	↓	3	2	↓	
	Gr 4OUT1	↓	↓	3	2	3	↓	↓	2	2	3	
	Gr 5OUT1	↓	↓	↓	3	2	↓	↓	2	2	2	
V <sub>OUT2</sub> maximum output level	V <sub>om</sub> 1OUT2	2	3	3	3	3	*	*	3	3	*	Note 1
	V <sub>om</sub> 3OUT2	3	2	↓	↓	↓	↓	↓	3	2	↓	
	V <sub>om</sub> 4OUT2	↓	3	↓	2	↓	↓	↓	2	2	3	
	V <sub>om</sub> 5OUT2	↓	↓	↓	3	2	↓	↓	2	2	2	
V <sub>OUT2</sub> voltage gain	Gv 1OUT2	2	3	3	3	3	*	*	3	3	*	Note 2
	Gv 3OUT2	3	2	↓	↓	↓	↓	↓	3	2	↓	
	Gv 4OUT2	↓	3	↓	2	↓	↓	↓	2	2	3	
	Gv 5OUT2	↓	↓	↓	3	2	↓	↓	2	2	2	

# Video signal switcher

## BA7627FV

The BA7627FV is a switching IC developed for use in video equipment. It contains three two-channel analog multiplexers; two two with sync-tip clamp inputs and one with a DC-biased input, and is ideal for switching audio, video, brightness and chroma signals.

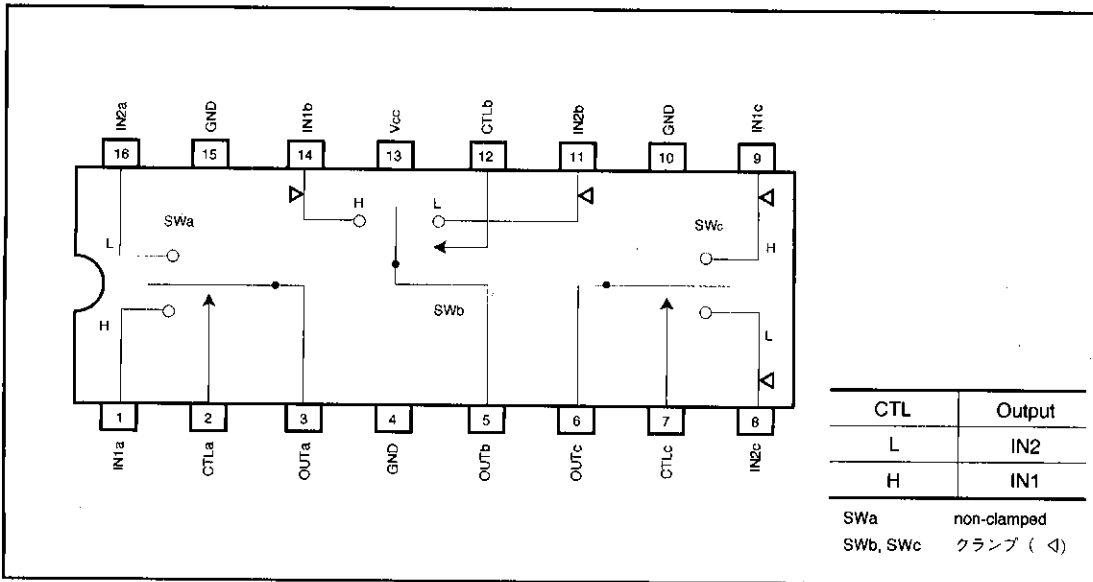
●Applications

Video cassette recorders and camcorders

●Features

- 1) Three 2-input / 1-output switches (two with sync-tip clamped inputs, the other one non-clamped).
- 2) 5V power supply.
- 3) Low power consumption (62.5mW Typ.).
- 4) Excellent frequency characteristics (10MHz, 0dB Typ.).
- 5) Wide dynamic range
- 6) Fast switching speed (50ns Typ.).
- 7) Small package (SSOP 16pin).

●Block diagram



●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	Vcc	9	V
Power dissipation	Pd	450*	mW
Operating temperature	Topr	-40~85	°C
Storage temperature	Tstg	-55~125	°C

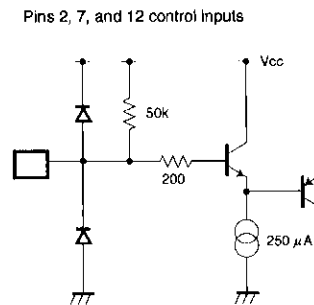
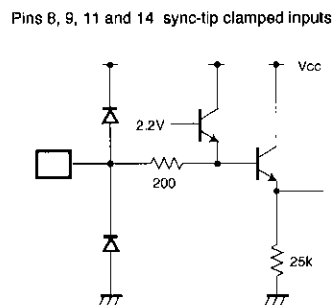
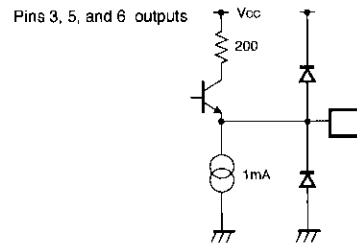
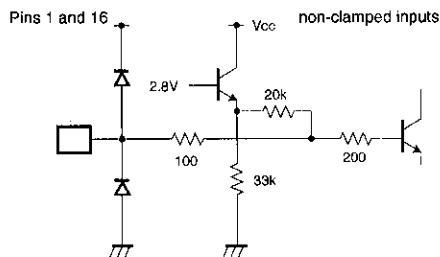
\* Reduced by 4.5mW for each increase in Ta of 1°C over 25°C

## ● Pin descriptions

Pin No.	Pin Name	Function
1	IN1a	Non-clamped SWa input pin 1 (bias input)
2	CTLa	SWa control pin. "L" selects IN2a, "H" selects IN1a
3	OUTa	SWa output pin
4	GND	Earth connection*
5	OUTb	SWb output pin
6	OUTc	SWc output pin
7	CTLc	SWc control pin. "L" selects IN2c, "H" selects IN1c
8	IN2c	SWc input pin 2 (sync-tip clamp input)
9	IN1c	SWc input pin 1 (sync-tip clamp input)
10	GND	Earth connection*
11	IN2b	SWb input pin 2 (sync-tip clamp input)
12	CTLb	SWb control pin. "L" selects IN2b, "H" selects IN1b
13	Vcc	Power supply
14	IN1b	SWb input pin 1 (sync-tip clamp input)
15	GND	Earth connection*
16	IN2a	Non-clamped SWa input pin 2 (bias input)

\* GND pins 4, 10 and 15 are common connections.

## ● Input/output circuits





●Electrical characteristics (Unless otherwise specified Ta=25°C and Vcc=5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Test Circuit
Operating voltage	V <sub>CC</sub>	4.5	5.0	5.5	V		Fig.1
Circuit current	I <sub>CC</sub>	—	12.5	17.0	mA		Fig.1
Maximum output level 1	V <sub>OM</sub>	2.6	2.9	—	V <sub>P-P</sub>	f=1kHz THD=0.5% clamped input	Fig.1
Maximum output level 2	V <sub>OM</sub>	2.7	3.0	—	V <sub>P-P</sub>	f=1kHz THD=0.5% non-clamped input	Fig.1
Voltage gain	G <sub>V</sub>	-0.5	0	0.5	dB	f=1MHz V <sub>in</sub> =1V <sub>P-P</sub>	Fig.1
Interchannel crosstalk	CT	—	-65	—	dB	f=4.43MHz V <sub>in</sub> =1V <sub>P-P</sub>	Fig.1
Frequency characteristic	G <sub>f</sub>	-1	0	1	dB	10MHz / 1MHz V <sub>in</sub> =1V <sub>P-P</sub>	Fig.1
Input impedance	Z <sub>in</sub>	14	20	26	kΩ	1,16pin	Fig.1
Total-harmonic distortion	THD	—	0.007	—	%	f=1kHz 1V <sub>P-P</sub> non-clamped input	Fig.1
CTL pin switch level	V <sub>TH</sub>	2.0	2.5	3.0	V		Fig.1
Differential gain	DG	—	0.5	1.0	%	V <sub>in</sub> =1V <sub>P-P</sub> Standard staircase signal	Fig.1
Differential phase	DP	—	0.3	1.0	deg	V <sub>in</sub> =1V <sub>P-P</sub> Standard staircase signal	Fig.1

●Measurement circuit

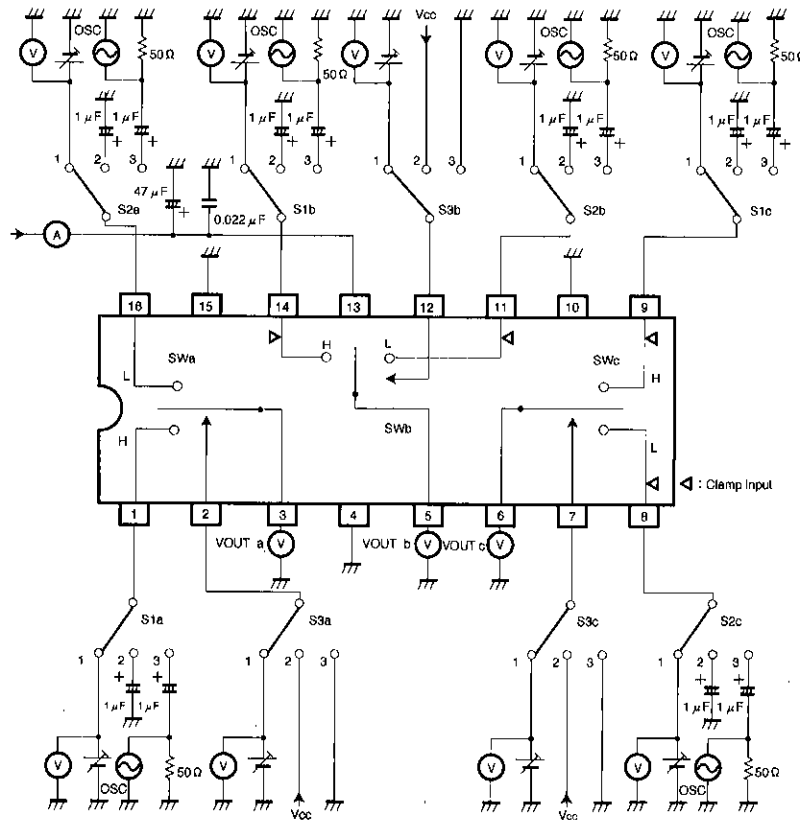


Fig.1

Audio/video signal selection switches

AV switches

## ● Measurement conditions

Parameter		Symbol	Switch settings									Measurement method
			S1a	S2a	S3a	S1b	S2b	S3b	S1c	S2c	S3c	
Current consumption		I <sub>cc</sub>	2	2	2	2	2	2	2	2	2	
Maximum output level	In1a	V <sub>om</sub>	3	2	2	2	2	2	2	2	2	f=1kHz THD=0.5% Note 1
	In2a	V <sub>om</sub>	2	3	3	2	2	2	2	2	2	
	In1b	V <sub>om</sub>	2	2	2	3	2	2	2	2	2	
	In2b	V <sub>om</sub>	2	2	2	2	3	3	2	2	2	
	In1c	V <sub>om</sub>	2	2	2	2	2	2	3	2	2	
	In2c	V <sub>om</sub>	2	2	2	2	2	2	2	3	3	
Voltage gain	In1a	G <sub>v</sub>	3	2	2	2	2	2	2	2	2	f=1MHz V=1V <sub>P-P</sub> Note 2
	In2a	G <sub>v</sub>	2	3	3	2	2	2	2	2	2	
	In1b	G <sub>v</sub>	2	2	2	3	2	2	2	2	2	
	In2b	G <sub>v</sub>	2	2	2	2	3	3	2	2	2	
	In1c	G <sub>v</sub>	2	2	2	2	2	2	3	2	2	
	In2c	G <sub>v</sub>	2	2	2	2	2	2	2	3	3	
Interchannel crosstalk	In1a	C <sub>t</sub>	2	3	2	2	2	2	2	2	2	f=4.43MHz V=1V <sub>P-P</sub> Note 3
	In2a	C <sub>t</sub>	3	2	3	2	2	2	2	2	2	
	In1b	C <sub>t</sub>	2	2	2	2	3	2	2	2	2	
	In2b	C <sub>t</sub>	2	2	2	3	2	3	2	2	2	
	In1c	C <sub>t</sub>	2	2	2	2	2	2	2	3	2	
	In2c	C <sub>t</sub>	2	2	2	2	2	2	3	2	3	
Frequency characteristic	In1a	G <sub>f</sub>	3	2	2	2	2	2	2	2	2	f=10MHz / f=1MHz V=1V <sub>P-P</sub> Note 4
	In2a	G <sub>f</sub>	2	3	3	2	2	2	2	2	2	
	In1b	G <sub>f</sub>	2	2	2	3	2	2	2	2	2	
	In2b	G <sub>f</sub>	2	2	2	2	3	3	2	2	2	
	In1c	G <sub>f</sub>	2	2	2	2	2	2	3	2	2	
	In2c	G <sub>f</sub>	2	2	2	2	2	2	2	3	3	
Input impedance	In1a	Z <sub>in</sub>	1	2	2	2	2	2	2	2	2	Note 5
	In2a	Z <sub>in</sub>	2	1	3	2	2	2	2	2	2	
Total-harmonic distortion	In1a	THD	3	2	2	2	2	2	2	2	2	Note 6
	In2a	THD	2	3	3	2	2	2	2	2	2	
CTL pin switching level	CTLa	V <sub>TH</sub>	3	2	1	2	2	2	2	2	2	Note 7
	CTLb	V <sub>TH</sub>	2	2	2	3	2	1	2	2	2	
	CTLc	V <sub>TH</sub>	2	2	2	2	2	2	3	2	1	
Differential gain	In1a	DG	3	2	2	2	2	2	2	2	2	Standard staircase signal V=1V <sub>P-P</sub> Note 8
	In2a	DG	2	3	3	2	2	2	2	2	2	
	In1b	DG	2	2	2	3	2	2	2	2	2	
	In2b	DG	2	2	2	2	3	3	2	2	2	
	In1c	DG	2	2	2	2	2	2	3	2	2	
	In2c	DG	2	2	2	2	2	2	2	3	3	
Differential phase	In1a	DP	3	2	2	2	2	2	2	2	2	Standard staircase signal V=1V <sub>P-P</sub> Note 8
	In2a	DP	2	3	3	2	2	2	2	2	2	
	In1b	DP	2	2	2	3	2	2	2	2	2	
	In2b	DP	2	2	2	2	3	3	2	2	2	
	In1c	DP	2	2	2	2	2	2	3	2	2	
	In2c	DP	2	2	2	2	2	2	2	3	3	

Note 1: Connect a distortion meter to the output, and input a f = 1kHz sine wave. Adjust the input level until the output distortion is 0.5%. This output voltage at this time is the maximum output level V<sub>om</sub> (V<sub>P-P</sub>).

Note 2: Input a 1V<sub>P-P</sub>, 1MHz sine wave. The voltage gain (in dB) is given by G<sub>v</sub> = 20 log (V<sub>OUT</sub>/V<sub>IN</sub>).

Note 3: Input a 1V<sub>P-P</sub>, 4.43MHz sine wave. The interchannel crosstalk (in dB) is given by C<sub>t</sub> = 20 log (V<sub>OUT</sub>/V<sub>IN</sub>).

Note 4: Input 1V<sub>P-P</sub>, 1MHz and 10MHz sine waves. The frequency characteristic (in dB) is given by G<sub>f</sub> = 20 log (V<sub>OUT</sub> (f = 10MHz)/V<sub>IN</sub> (f = 1MHz)).

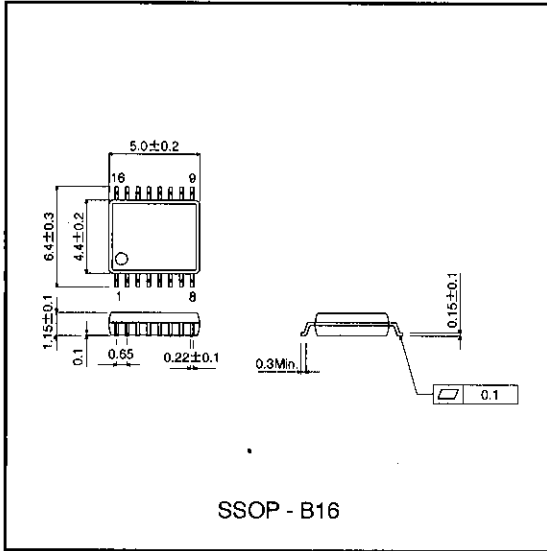
Note 5: Measure the input pin voltage V<sub>IN50</sub> when a current of DC50 μA is flowing the input pin. Measure the input pin open-circuit voltage. The input impedance given by Z = (V<sub>IN50</sub> - V<sub>IN0</sub>)/50 × 10<sup>-6</sup> Ω.

Note 6: Input a 1V<sub>P-P</sub>, 1kHz sine wave and measure the total-harmonic distortion the output using a total-harmonic distortion meter.

Note 7: Input a 1V<sub>P-P</sub>, 1MHz sine wave. Reduce the CTL pin voltage from V<sub>CC</sub>. The pin switching level (V<sub>TH</sub>) is the CTL pin voltage at which the V<sub>OUT</sub> level drops 20mV<sub>P-P</sub>.

Note 8: Input a 1V<sub>P-P</sub> staircase signal. Measure the phase differential on a vectorscope.

●External dimensions (Units: mm)



Audio/video signal selection switches

AV switches

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