# Video signal switcher
## BA7649A/BA7649AF

The BA7649A and BA7649AF are five-channel analog multiplexers (the IN5 pin can be used a mute input) designed for use in video cassette recorders. They feature large dynamic range, and a wide operating frequency range, and have sync-tip inputs which are ideal for switching video signals.

●Applications

Video cassette recorders and televisions

●Features

1) 5-input / 1-output switches.
2) Built-in mute (the IN5 pin can be used a mute input).
3) Sync-tip clamp inputs.
4) Wide operating supply voltage range (4.5V to 13.0V).
5) Low power consumption (48mW Typ.).
6) Excellent frequency characteristics (10MHz, 0dB Typ.).
7) Wide dynamic range (3.5Vp-p Typ.).
8) Low interchannel crosstalk (-65dB Typ., f=4.43MHz).
9) DIP/SOP 14 pin package.

●Block diagram
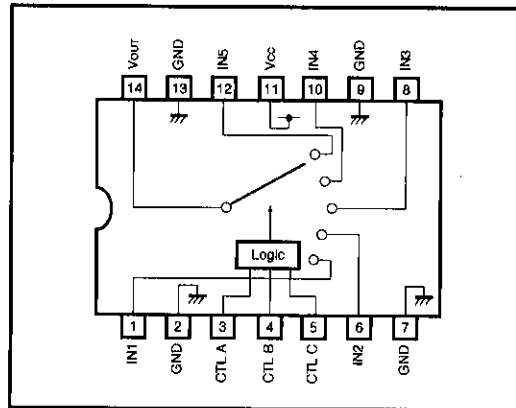


●Truth table

| CTL - A | CTL - B | CTL - C | OUT |
|---------|---------|---------|-----|
| L (OPEN) | L (OPEN) | L (OPEN) | IN1 |
| L (OPEN) | H | L (OPEN) | IN2 |
| H | L (OPEN) | L (OPEN) | IN3 |
| H | H | L (OPEN) | IN4 |
| * | * | H | MUTE (IN5) |

* Either "L" (open) of "H".

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●Absolute maximum ratings (Ta=25℃)

BA7649A

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Power supply voltage | Vcc | 13.5 | V |
| Allowable current | Pd | 1100 * | mW |
| Operating temperature | Topr | −25~75 | ℃ |
| Storage temperature | Tstg | −55~125 | ℃ |

* Reduced by 11.0mW for each increase in Ta of 1°C over 25°C.

BA7649AF

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Power supply voltage | Vcc | 13.5 | V |
| Allowable current | Pd | 450 * | mW |
| Operating temperature | Topr | −25~75 | ℃ |
| Storage temperature | Tstg | −55~125 | ℃ |

* Reduced by 4.5mW for each increase in Ta of 1°C over 25°C when installed on a 50mm x 50mm PCB.

●Equivalent circuits



CLUMP INPUT

IN   Input clamp voltage   2.1V (Vcc=5V, Typ.)
     Input bias current   1 μA [Typ.]
     Input impedance   over 1MΩ

OUTPUT

Output impedance   20Ω [Typ.]
Output DC voltage   0.55V(Vcc=5V, Typ.)

CTLa / CTLb

CTLc
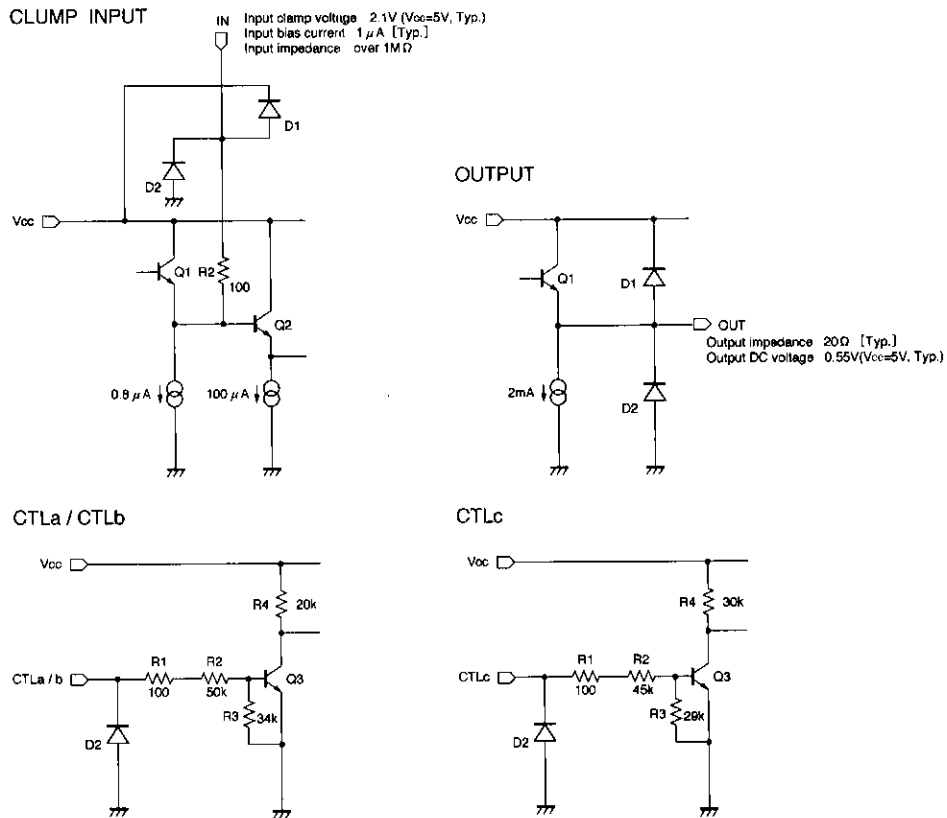
●Electrical characteristics (Unless otherwise specified Ta=25℃ and Vcc=5V)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions | Measurement Circuit |
|---|---|---|---|---|---|---|---|
| Operating voltage | Vcc | 4.5 | — | 13.0 | V | | Fig.1 |
| Circuit current | Icc | — | 9.5 | 14.5 | mA | | Fig.1 |
| Maximum output level | Vom | 3.0 | 3.5 | — | Vp-p | f=1kHz, THD=0.5% | Fig.1 |
| Voltage gain | Gv | −0.5 | 0 | 0.5 | dB | f=1MHz, Vin=1.0Vp-p | Fig.1 |
| Interchannel crosstalk | CT | — | −65 | — | dB | f=4.43MHz, Vin=1.0Vp-p | Fig.1 |
| Frequency characteristic | Gf | −3.0 | 0 | 1.0 | dB | f=10MHz / 1MHz, Vin=1.0Vp-p | Fig.1 |
| CTL pin switching level A | VTH-A | 1.0 | 2.0 | 3.0 | V | | Fig.1 |
| CTL pin switching level B | VTH-B | 1.0 | 2.0 | 3.0 | V | | Fig.1 |
| CTL pin switching level C | VTH-C | 1.0 | 2.0 | 3.0 | V | | Fig.1 |

○Not designed for radiation resistant.
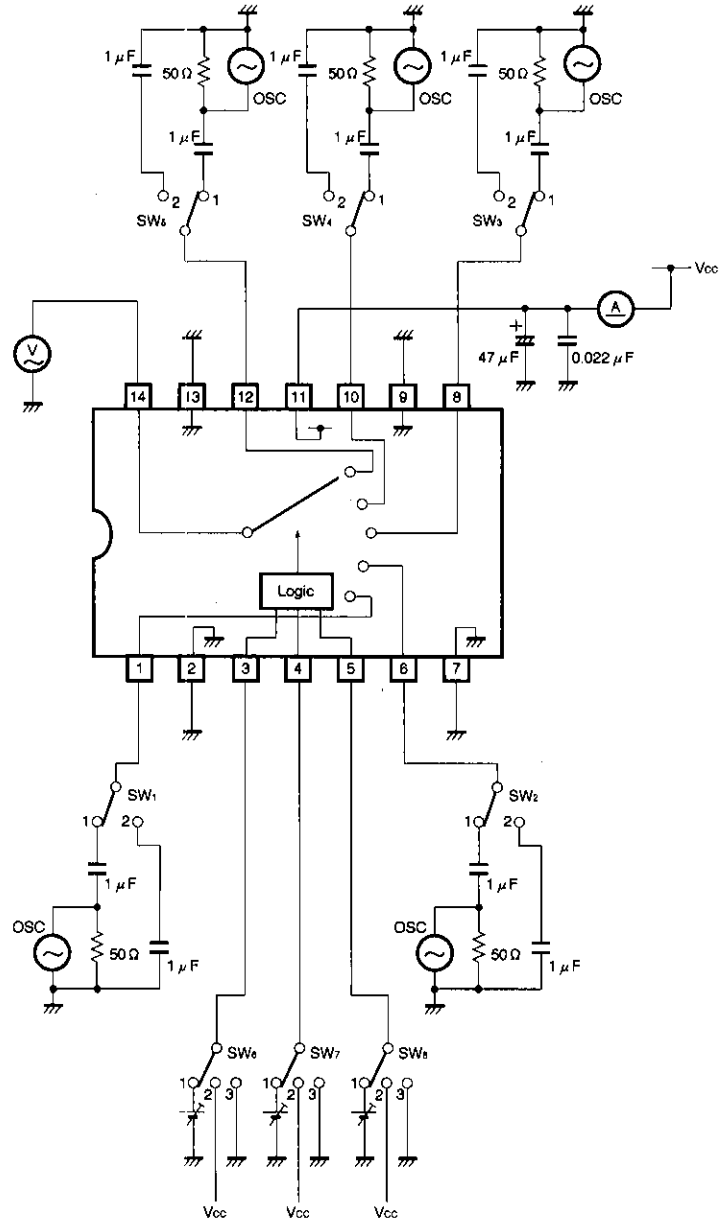
Video signal selection switches

AV switches

●Measurement circuit



Fig.1

●Measurement conditions

| Parameter | | Symbol | Switch settings | | | | | | | | Measurement method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SW₁ | SW₂ | SW₃ | SW₄ | SW₅ | SW₆ | SW₇ | SW₈ | |
| Current consumption | | Icc | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | Ammeter |
| Maximum output level | IN 1 | Vom | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | f=1kHz, THD=0.5% Note 1 |
| | IN 2 | Vom | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | |
| | IN 3 | Vom | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | |
| | IN 4 | Vom | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | |
| | IN 5 | Vom | 2 | 2 | 2 | 2 | 1 | * | * | 2 | |
| Voltage gain | IN 1 | Gv | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | f=1MHz, Vin=1Vp-p Note 2 |
| | IN 2 | Gv | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | |
| | IN 3 | Gv | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | |
| | IN 4 | Gv | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | |
| | IN 5 | Gv | 2 | 2 | 2 | 2 | 1 | * | * | 2 | |
| Interchannel crosstalk | IN1→1N2 | CT | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | f=4.43MHz, Vin=1Vp-p Note 3 |
| | IN1→1N3 | CT | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | |
| | IN1→1N4 | CT | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | |
| | IN1→1N5 | CT | 1 | 2 | 2 | 2 | 2 | * | * | 2 | |
| | IN2→1N3 | CT | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | |
| | IN2→1N4 | CT | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | |
| | IN2→1N5 | CT | 2 | 1 | 2 | 2 | 2 | * | * | 2 | |
| | IN3→1N4 | CT | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | |
| | IN3→1N5 | CT | 2 | 2 | 1 | 2 | 2 | * | * | 2 | |
| | IN4→1N5 | CT | 2 | 2 | 2 | 1 | 2 | * | * | 2 | |
| Frequency characteristic | IN 1 | GI | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | f=10MHz, f=1MHz, Vin=1Vp-p Note 4 |
| | IN 2 | GI | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | |
| | IN 3 | GI | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | |
| | IN 4 | GI | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | |
| | IN 5 | GI | 2 | 2 | 2 | 2 | 1 | * | * | 2 | |
| CTL pin switching level | CTL - A | VTH | 2 | 2 | 1 | 2 | 2 | 1 | 3 | 3 | Note 5 |
| | CTL - B | VTH | 2 | 1 | 2 | 2 | 2 | 3 | 1 | 3 | |
| | CTL - C | VTH | 2 | 2 | 2 | 2 | 1 | * | * | 1 | |

* Anywhere possible.
Note 1: Connect a distortion meter to the output, and input a f = 1kHz sine wave. Adjust the output level until the output distortion is 0.5%. This output voltage at this time is the maximum output level Vom (VP-P).
Note 2: Input a 1VP-P, 1MHz sine wave. The voltage gain is given by Gv = 20 log (VOUT/VIN).
Note 3: Input a 1VP-P, 4.43MHz sine wave. The interchannel crosstalk is given by CT = 20 log (VOUT/VIN).
Note 4: Input 1VP-P, 1MHz and 10MHz sine waves. The frequency characteristic is given by GI = 20 log (VOUT (f = 10MHz)/VIN (f = 1MHz)).
Note 5: Input a 1VP-P, 1MHz sine wave. Reduce the CTL pin voltage from Vcc. The CTL pin switching level (VTH) is the CTL pin voltage at which the VOUT level drops below 20mVP-P.
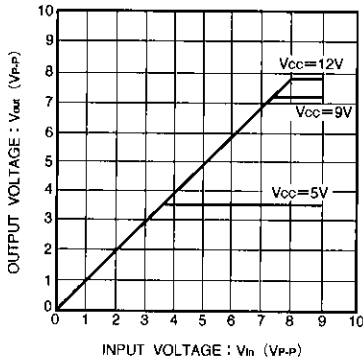
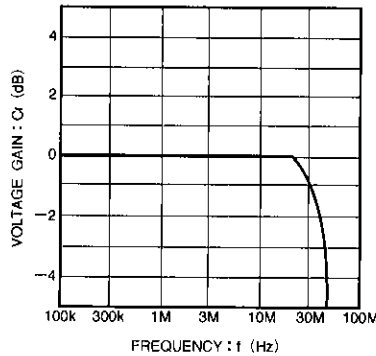●Electrical characteristic curves



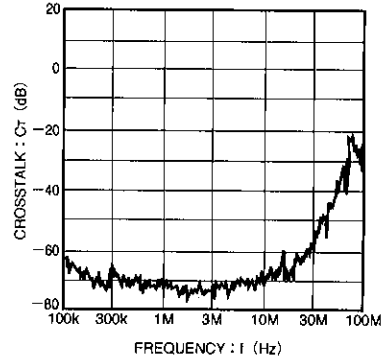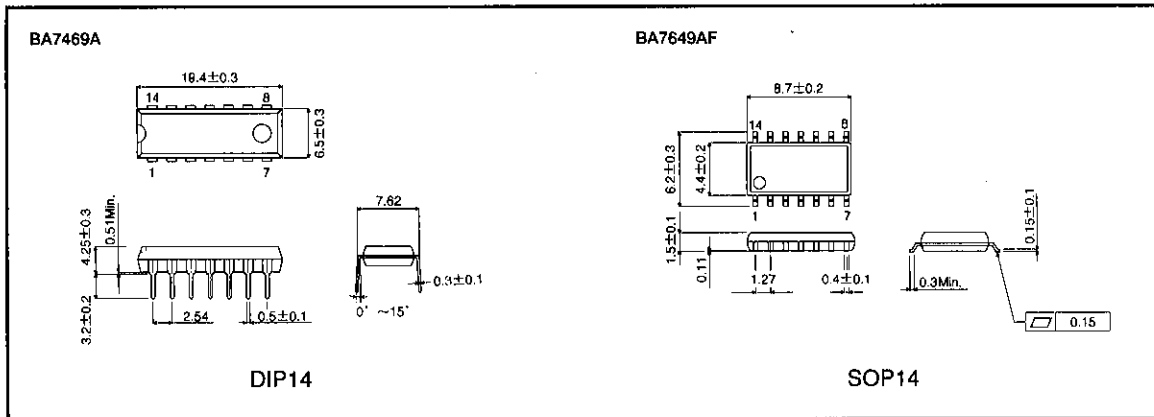Fig. 2  Vin vs. Vout (f = 1kHz)



Fig. 3  Frequency characteristic



Fig. 4  Interchannel crosstalk

*(right margin, vertical text)* Video signal selection switches

*(right margin, vertical text)* AV switches

●External dimensions (Units: mm)



BA7469A

16.4±0.3

14          8

6.5±0.3

1          7

4.25±0.3
0.51Min.

3.2±0.2

2.54     0.5±0.1

7.62

0.3±0.1

0°  ~15°

**DIP14**

BA7649AF

8.7±0.2

14

6.2±0.3

4.4±0.2

1          7

1.5±0.1

0.11

1.27     0.4±0.1

0.3Min.

0.15±0.1

0.15

**SOP14**

**ROHM**

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