

# Video signal switcher

## BA7603 / BA7603F

The BA7603 and BA7603F are switching ICs developed for use in VCRs. Each contains three two-channel analog multi-plexers. The switches have sync-tip clamped inputs and are ideal for switching video signals.

### ●Applications

Video cassette recorders and televisions

### ●Features

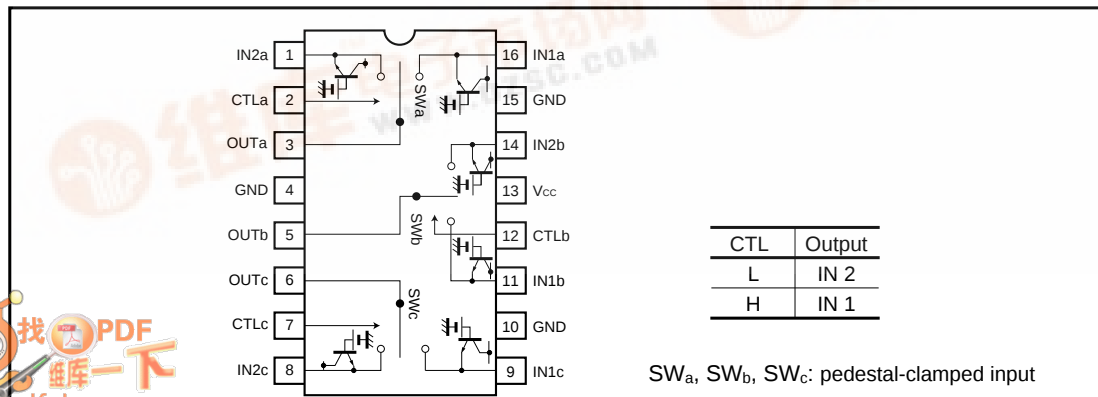
- 1) Three 2-input / 1-output switches.
- 2) Sync-tip clamped inputs.
- 3) 5V power supply.
- 4) Low power consumption (62.5mW Typ.).
- 5) Excellent frequency characteristics (10MHz, 0dB Typ.).
- 6) Wide dynamic range (2.9V<sub>P-P</sub> Typ.).
- 7) Fast switching speed (50ns Typ.).

### ●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> | - 40 ~ + 85  | °C   |
| Storage temperature   | T <sub>stg</sub> | - 55 ~ + 125 | °C   |

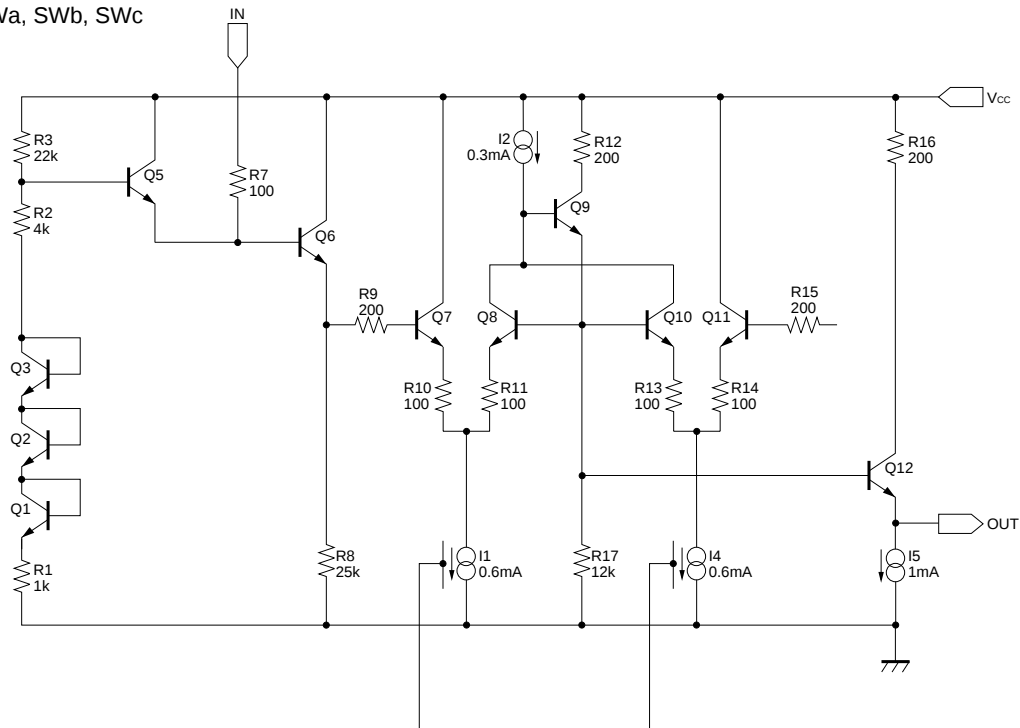
\* Reduced by 5.0mW for each increase in Ta of 1°C over 25°C.

### ●Block diagram

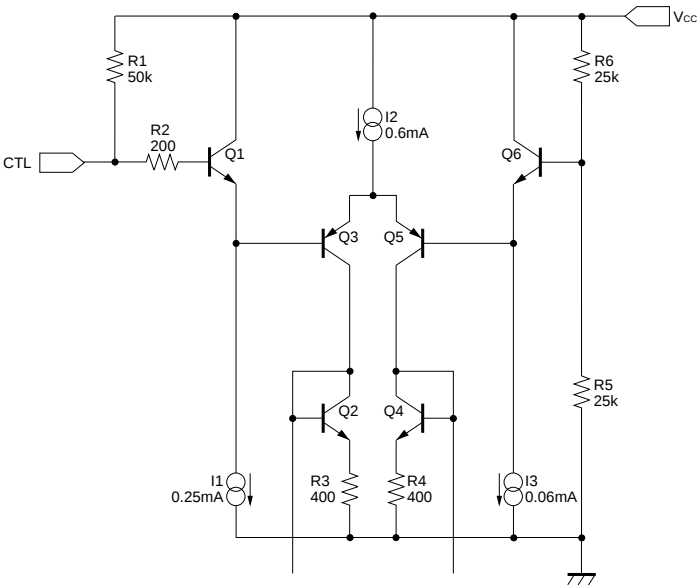


●Equivalent circuits

SWa, SWb, SWc



CTL



●Electrical characteristics (unless otherwise noted Ta = 25°C and V<sub>CC</sub> = 5V)

| Parameter                 | Symbol          | Min.  | Typ. | Max. | Unit             | Conditions                                       |
|---------------------------|-----------------|-------|------|------|------------------|--------------------------------------------------|
| Operating voltage         | V <sub>CC</sub> | 4.5   | 5.0  | 5.5  | V                | —                                                |
| Supply current            | I <sub>CC</sub> | —     | 13.0 | 20.0 | mA               | —                                                |
| Maximum output level      | V <sub>om</sub> | 2.7   | 2.9  | —    | V <sub>P-P</sub> | f = 1kHz, THD = 0.5%                             |
| Voltage gain              | G <sub>V</sub>  | − 0.5 | 0    | 0.5  | dB               | f = 1MHz, V <sub>IN</sub> = 1V <sub>P-P</sub>    |
| Interchannel crosstalk    | C <sub>T</sub>  | —     | − 65 | —    | dB               | f = 4.43MHz, V <sub>IN</sub> = 1V <sub>P-P</sub> |
| Frequency characteristics | G <sub>f</sub>  | − 3   | 0    | 1    | dB               | 10MHz / 1MHz, V = 1V <sub>P-P</sub>              |
| CTL pin switch level      | V <sub>TH</sub> | 2.0   | 2.5  | 3.0  | V                | —                                                |

\* Refer to the measurement circuit given in Fig. 1.

●Reference data

Pin DC voltages (reference values)

Units: Vdc

| Pin No. | DC voltage | Pin No. | DC voltage |
|---------|------------|---------|------------|
| 1       | 2.05       | 9       | 2.05       |
| 2       | 4.91       | 10      | 0          |
| 3       | 0.65       | 11      | 2.05       |
| 4       | 0          | 12      | 4.91       |
| 5       | 0.65       | 13      | 5.00       |
| 6       | 0.65       | 14      | 2.05       |
| 7       | 4.91       | 15      | 0          |
| 8       | 2.05       | 16      | 2.05       |

Electrical characteristics

| Parameter                    | Min. | Typ. | Max. | Unit |
|------------------------------|------|------|------|------|
| Sync tip clamp level         | 0.49 | 0.65 | 0.80 | Vdc  |
| Input impedance (with clamp) | —    | 1.7M | —    | Ω    |
| Output impedance             | —    | 30   | —    | Ω    |

The input coupling capacitor values should be 0.1μF to 1μF.

## ● Measurement circuit

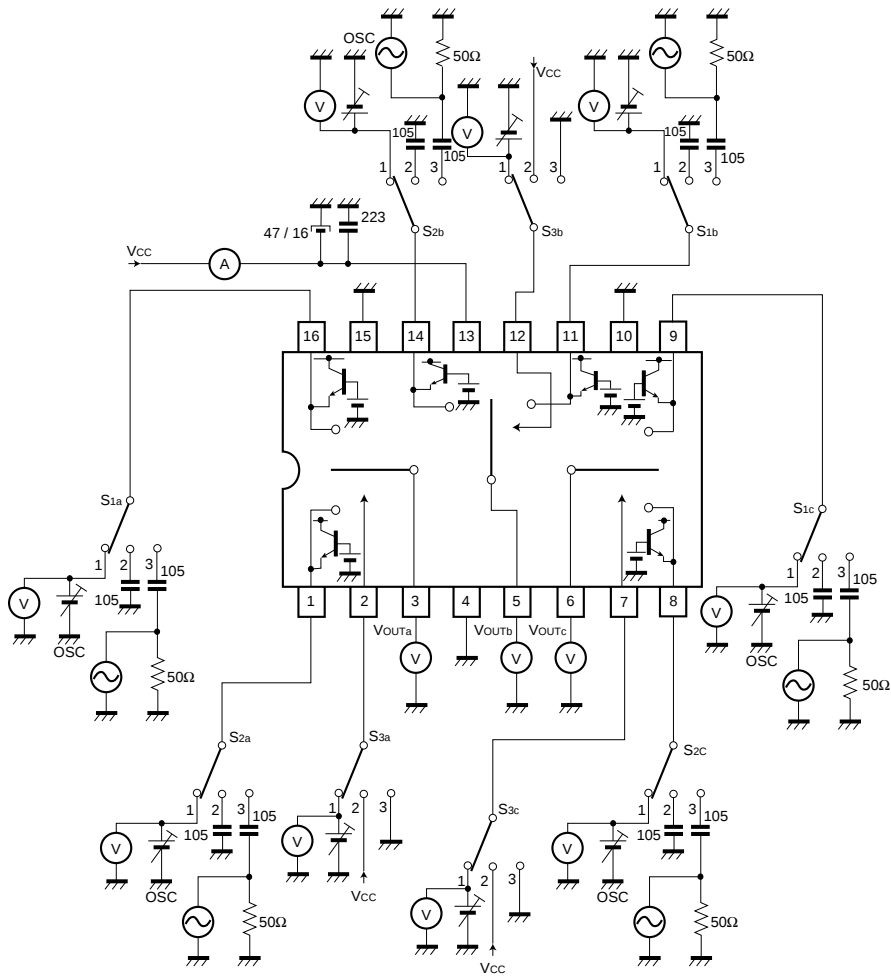


Fig.1

## ● Measurement conditions

| Parameter                |      | Symbol          | Switch settings |                 |                 |                 |                 |                 |                 |                 |                 | Measurement method                                       |
|--------------------------|------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------------------------------------------------|
|                          |      |                 | S <sub>1a</sub> | S <sub>2a</sub> | S <sub>3a</sub> | S <sub>1b</sub> | S <sub>2b</sub> | S <sub>3b</sub> | S <sub>1c</sub> | S <sub>2c</sub> | S <sub>3c</sub> |                                                          |
| Current dissipation      |      | 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,<br>THD = 0.5%<br>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 = 1kHz,<br>V = 1V <sub>P-P</sub><br>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               |                                                          |
| Inter-channel crosstalk  | IN1a | C <sub>T</sub>  | 2               | 3               | 2               | 2               | 2               | 2               | 2               | 2               | 2               | f = 4.43MHz,<br>V = 1V <sub>P-P</sub><br>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,<br>V = 1V <sub>P-P</sub><br>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               |                                                          |
| CTL pin switching level  | CTLa | V <sub>TH</sub> | 1               | 2               | 1               | 2               | 2               | 2               | 2               | 2               | 2               | Note 5                                                   |
|                          | CTLb | V <sub>TH</sub> | 2               | 2               | 2               | 1               | 2               | 1               | 2               | 2               | 2               |                                                          |
|                          | CTLc | V <sub>TH</sub> | 2               | 2               | 2               | 2               | 2               | 2               | 1               | 2               | 1               |                                                          |

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 V<sub>om</sub> (V<sub>P-P</sub>).

Note 2: Input a 1V<sub>P-P</sub>, 1MHz sine wave. The voltage gain is given by  $G_V = 20 \log (V_{OUT} / V_{IN})$ .

Note 3: Input a 1V<sub>P-P</sub>, 4.43MHz sine wave. The interchannel crosstalk is given by  $C_T = 20 \log (V_{OUT} / V_{IN})$ .

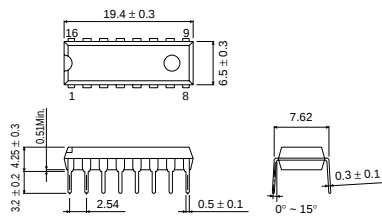
Note 4: Input 1V<sub>P-P</sub>, 1MHz and 10MHz sine waves. The frequency characteristic is given by  $G_f = 20 \log (V_{OUT} (f = 10\text{MHz}) / V_{OUT} (f = 1\text{MHz}))$ .

Note 5: Input a 1V<sub>P-P</sub>, 1MHz sine wave. Reduce the CTL pin voltage from V<sub>CC</sub>.

The CTL pin switching level (V<sub>TH</sub>) is the CTL pin voltage at which the V<sub>OUT</sub> level drops below 20mV<sub>P-P</sub>.

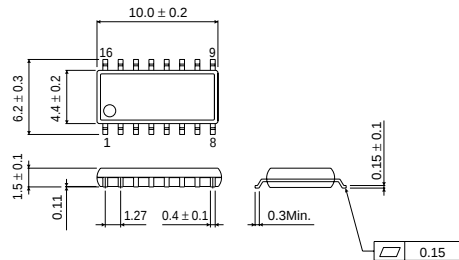
●External dimensions (Units: mm)

BA7603



DIP16

BA7603F



SOP16