Video signal switcher
BA7609 / BA7609F

The BA7609 and BA7609F are switching ICs developed for use in VCRs. Each contains three two-channel analog multiplexers. As one of the switches has sync-tip clamp inputs and the other two have non-clamped inputs these ICs are ideal for switching audio, video and chroma signals.

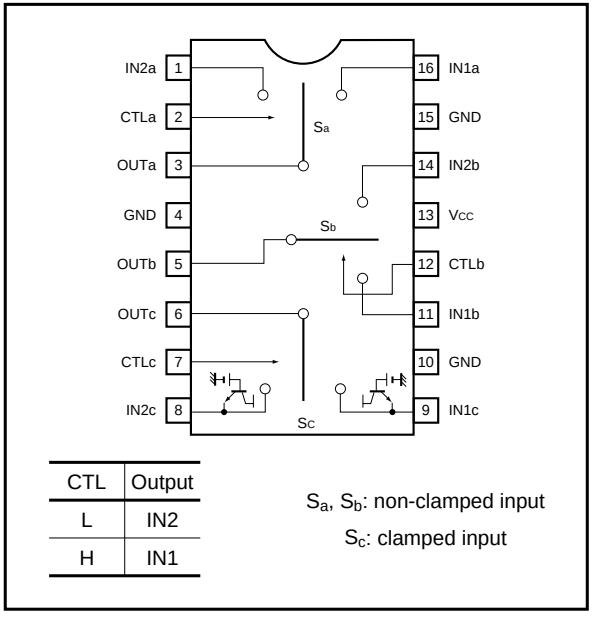
●Applications

Video cassette recorders and televisions

●Features

1) Three 2-input / 1-output switches (one with sync-clamped inputs, the other two non-clamped).
2) 5V power supply.
3) Low power consumption (62.5mW Typ.).
4) Excellent frequency characteristics (10MHz, 0dB Typ.).
5) Wide dynamic range (clamped input: 2.9V_{P-P} Typ., non-clamped input: 3.0V_{P-P}, Typ.).
6) Fast switching speed (50ns Typ.).

●Block diagram



CTL	Output
L	IN2
H	IN1

S_a, S_b: non-clamped input

S_c: clamped input

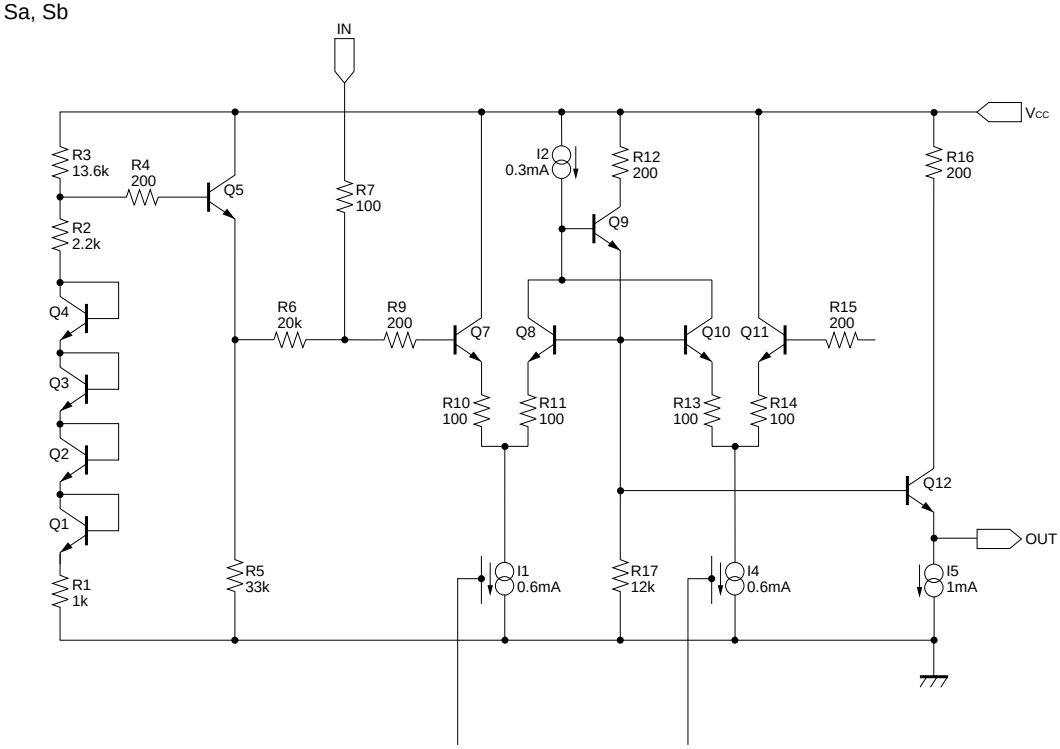
●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	9	V
Power dissipation	Pd	500*	mW
Operating temperature	Topr	– 40 ~ + 85	°C
Storage temperature	Tstg	– 55 ~ + 125	°C

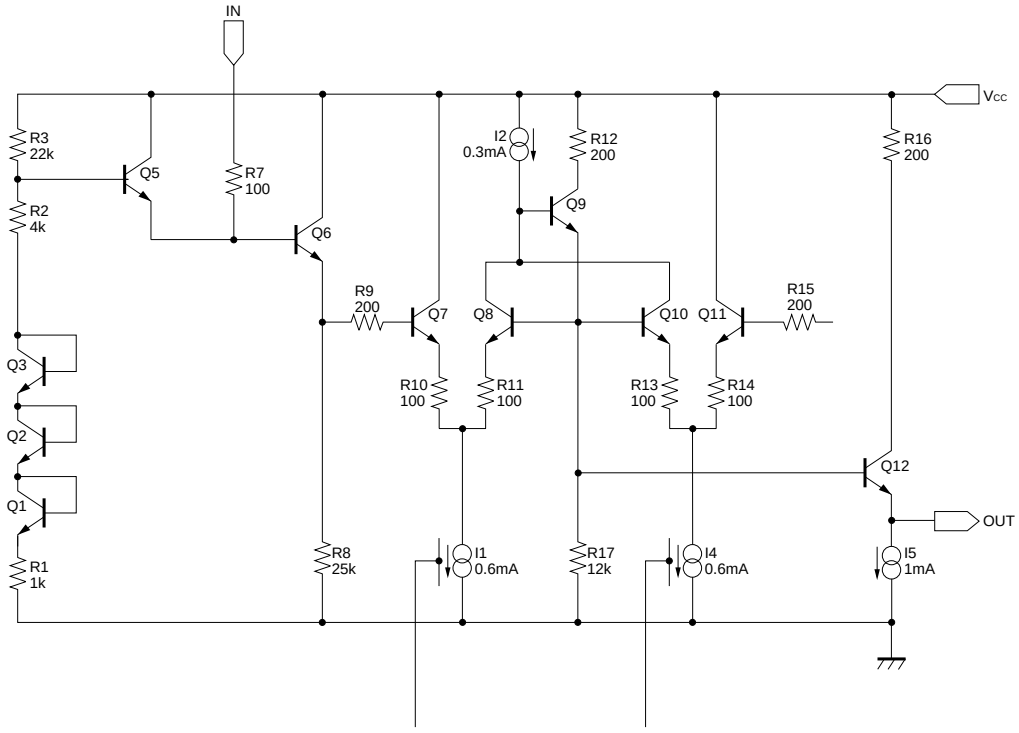
* Reduced by 5.0mW for each increase in Ta of 1°C over 25°C.

●Equivalent circuits

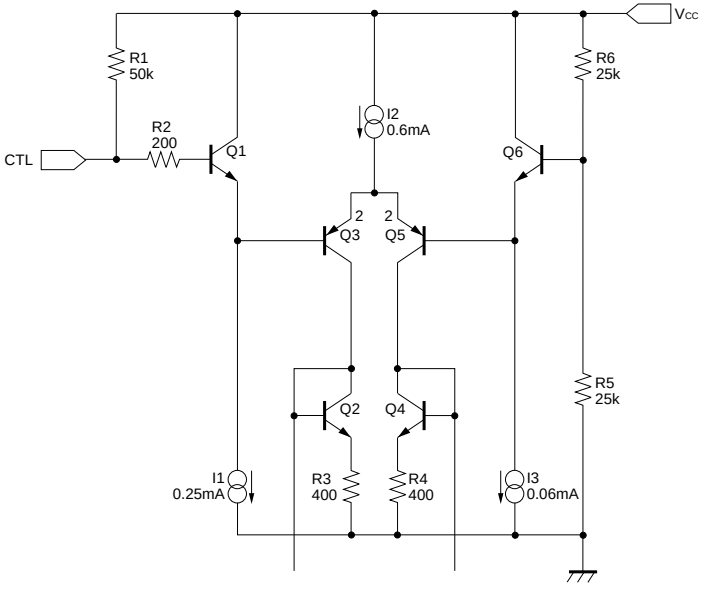
Sa, Sb



Sc



CTL



Units
: R = Ω

●Electrical characteristics (unless otherwise noted, Ta = 25°C and V_{CC} = 5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Operating voltage	V_{CC}	4.5	5.0	5.5	V	—
Supply current	I_{CC}	—	12.5	20.0	mA	—
Maximum output level 1	V_{om}	2.6	2.9	—	V_{P-P}	f = 1kHz, THD = 0.5% clamped input
Maximum output level 2	V_{om}	2.7	3.0	—	V_{P-P}	f = 1kHz, THD = 0.5% non-clamped input
Voltage gain	G_V	– 0.5	0	0.5	dB	f = 1MHz, V_{IN} = $1V_{P-P}$
Interchannel crosstalk	C_T	—	– 65	—	dB	f = 4.43MHz, V_{IN} = $1V_{P-P}$
Frequency characteristic	G_f	– 3	0	1	dB	10MHz / 1MHz, V_{IN} = $1V_{P-P}$
Input impedance	Z_{IN}	14	20	26	kΩ	non-clamped input
Total-harmonic distortion	THD	—	0.007	—	%	f = 1kHz, $1V_{P-P}$ non-clamped input
CTL pin switch level	V_{TH}	2.0	2.5	3.0	V	—

Note: 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	2.48	9	2.05
2	4.91	10	0
3	1.76	11	2.48
4	0	12	4.91
5	1.76	13	5.00
6	0.65	14	2.48
7	4.91	15	0
8	2.05	16	2.48

Electrical characteristics

Parameter	Min.	Typ.	Max.	Unit
Sync tip clamp level	0.49	0.65	0.80	Vdc
Input impedance (no clamp)	—	20k	—	Ω
Input impedance (with clamp)	—	1.7M	—	Ω
Output impedance	—	30	—	Ω

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

●Measurement circuit

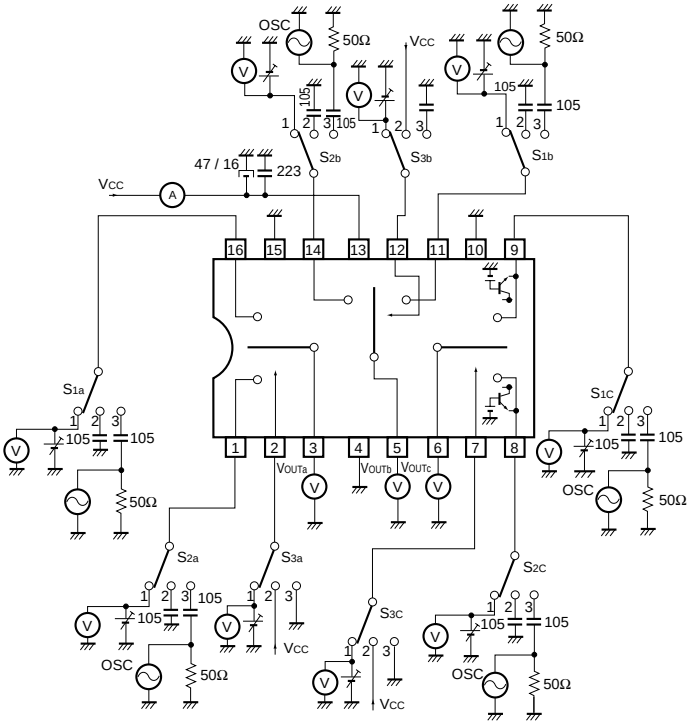


Fig.1

●Measurement conditions

Parameter		Symbol	Switch settings									Measurement method
			S_{1a}	S_{2a}	S_{3a}	S_{1b}	S_{2b}	S_{3b}	S_{1c}	S_{2c}	S_{3c}	
Current dissipation		I_{CC}	2	2	2	2	2	2	2	2	2	Ammeter
Maximum output level	I_{N1a}	V_{om}	3	2	2	2	2	2	2	2	2	f = 1kHz THD = 0.5% Note 1
	I_{N2a}	V_{om}	2	3	3	2	2	2	2	2	2	
	I_{N1b}	V_{om}	2	2	2	3	2	2	2	2	2	
	I_{N2b}	V_{om}	2	2	2	2	3	3	2	2	2	
	I_{N1c}	V_{om}	2	2	2	2	2	2	3	2	2	
	I_{N2c}	V_{om}	2	2	2	2	2	2	2	3	3	
Voltage gain	I_{N1a}	G_V	3	2	2	2	2	2	2	2	2	f = 1MHz V = $1V_{P-P}$ Note 2
	I_{N2a}	G_V	2	3	3	2	2	2	2	2	2	
	I_{N1b}	G_V	2	2	2	3	2	2	2	2	2	
	I_{N2b}	G_V	2	2	2	2	3	3	2	2	2	
	I_{N1c}	G_V	2	2	2	2	2	2	3	2	2	
	I_{N2c}	G_V	2	2	2	2	2	2	2	3	3	
Interchannel crosstalk	I_{N1a}	C_T	2	3	2	2	2	2	2	2	2	f = 4.43MHz V = $1V_{P-P}$ Note 3
	I_{N2a}	C_T	3	2	3	2	2	2	2	2	2	
	I_{N1b}	C_T	2	2	2	2	3	2	2	2	2	
	I_{N2b}	C_T	2	2	2	3	2	3	2	2	2	
	I_{N1c}	C_T	2	2	2	2	2	2	2	3	2	
	I_{N2c}	C_T	2	2	2	2	2	2	3	2	3	
Frequency characteristic	I_{N1a}	G_f	3	2	2	2	2	2	2	2	2	f = 10MHz f = 1MHz V = $1V_{P-P}$ Note 4
	I_{N2a}	G_f	2	3	3	2	2	2	2	2	2	
	I_{N1b}	G_f	2	2	2	3	2	2	2	2	2	
	I_{N2b}	G_f	2	2	2	2	3	3	2	2	2	
	I_{N1c}	G_f	2	2	2	2	2	2	3	2	2	
	I_{N2c}	G_f	2	2	2	2	2	2	2	3	3	
CTL pin switching level	CTLa	V_{TH}	3	2	1	2	2	2	2	2	2	Note 5
	CTLb	V_{TH}	2	2	2	3	2	1	2	2	2	
	CTLc	V_{TH}	2	2	2	2	2	2	3	2	1	
Input impedance	I_{N1a}	Z_{IN}	1	2	2	2	2	2	2	2	2	Note 6
	I_{N2a}	Z_{IN}	2	1	3	2	2	2	2	2	2	
	I_{N1b}	Z_{IN}	2	2	2	1	2	2	2	2	2	
	I_{N2b}	Z_{IN}	2	2	2	2	1	3	2	2	2	
Total-harmonic distortion	I_{N1a}	THD	3	2	2	2	2	2	2	2	2	Note 7
	I_{N2a}	THD	2	3	3	2	2	2	2	2	2	
	I_{N1b}	THD	2	2	2	3	2	2	2	2	2	
	I_{N2b}	THD	2	2	2	2	3	3	2	2	2	

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_{om} (V_{P-P}).

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

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

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

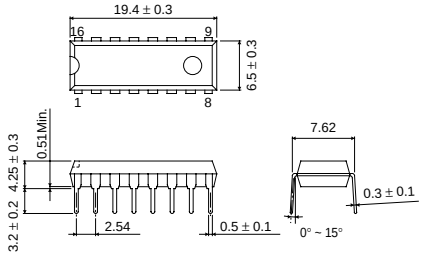
Note 5: Input a $1V_{P-P}$, 1MHz sine wave. Reduce the CTL pin voltage from V_{CC}.
The CTL pin switching level (V_{TH}) is the CTL pin voltage at which the Vout level drops below $20mV_{P-P}$.

Note 6: Measure the input pin voltage V_{IN50} when a current of DC50μA is flowing into the input pin. Measure the input pin open-circuit voltage.
The input impedance is given by $Z = (V_{IN50} - V_{IN0}) / 50 \times 10^{-6}[\Omega]$.

Note 7: Input a $1V_{P-P}$, 1kHz sine wave and measure the total-harmonic distortion of the output using a total-harmonic distortion meter.

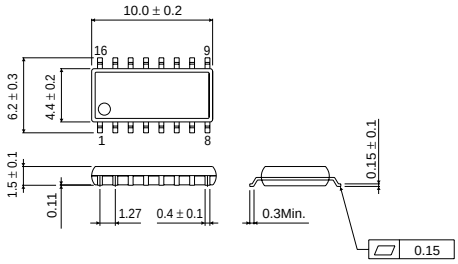
●External dimensions (Units: mm)

BA7609



DIP16

BA7609F



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