

Video signal switcher

BA7644AN

The BA7644AN is a four-channel analog multiplexer with mute, designed for use in video cassette recorders. It features a wide dynamic range, and wide operating frequency range, and is suitable for switching audio and video signals.

●Applications

VCR, TV and audio signal switching

●Features

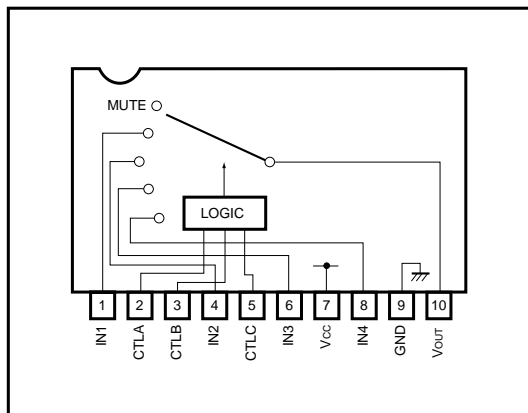
- 1) 4-input / 1-output switches.
- 2) Built-in mute.
- 3) Wide operating supply voltage range (4.5V to 13.0V).
- 4) Low power consumption (48mW Typ.).
- 5) Excellent frequency characteristics (10MHz, 0dB Typ.).
- 6) Wide dynamic range (3.5V_{P-P} Typ.).
- 7) High input impedance (20kΩ Typ.).
- 8) Low interchannel crosstalk (− 65dB Typ., f = 4.43MHz).

●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V _{CC}	13.5	V
Power dissipation	P _d	850*	mW
Operating temperature	T _{opr}	− 25 ~ + 75	°C
Storage temperature	T _{stg}	− 55 ~ + 125	°C

* Reduced by 8.5mW for each increase in Ta of 1°C over 25°C.

●Block diagram



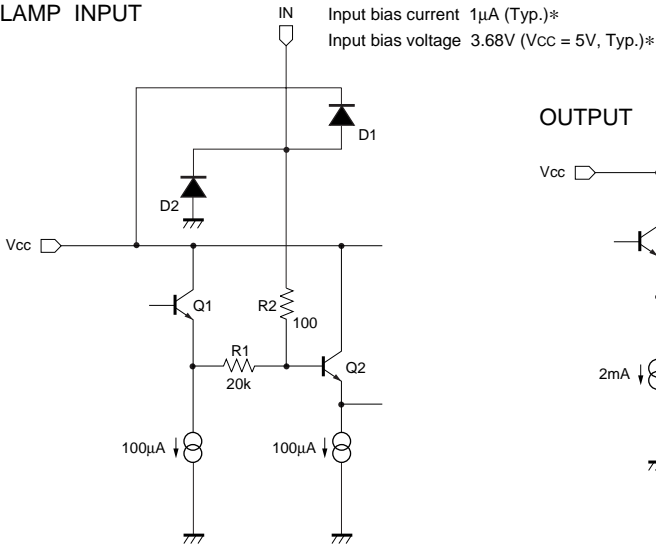
●Truth table

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

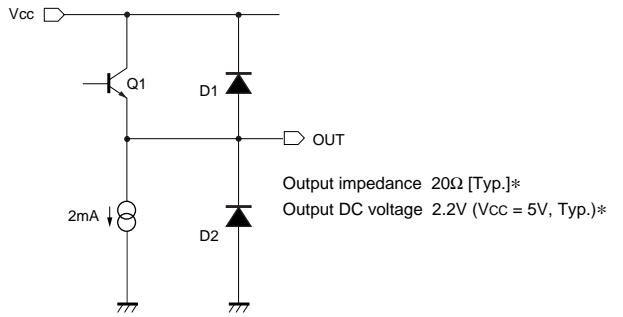
* Either "L (open)" or "H".

●Equivalent circuits

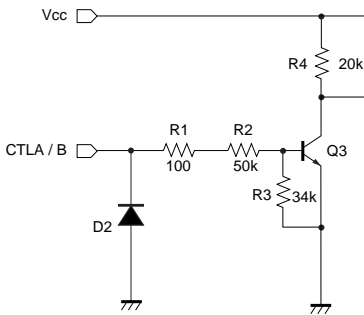
CLAMP INPUT



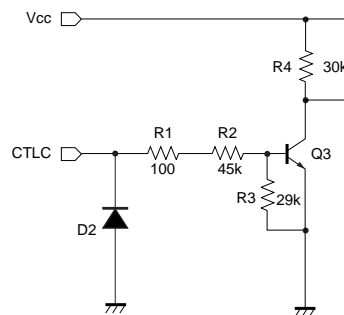
OUTPUT



CTLA / CTLB



CTLC



●Electrical characteristics (unless otherwise noted, Ta = 25°C and Vcc = 5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	
Operating voltage	V _{CC}	4.5	—	13.0	V	—	
Supply current	I _{CC}	—	9.5	14.5	mA	—	
Maximum output level	V _{om}	3.0	3.5	—	V _{P-P}	f = 1kHz, THD = 0.5%	
Voltage gain	G _V	-0.5	0	0.5	dB	f = 1MHz, V _{IN} = 1.0V _{P-P}	
Interchannel crosstalk	IN - IN	C _{Tin}	-	-65	-	dB	f = 4.43MHz, V _{IN} = 1.0V _{P-P}
	IN - MUTE	C _{TM}	-	-55	-	dB	f = 4.43MHz, V _{IN} = 1.0V _{P-P}
Frequency characteristic	C _f	-3.0	0	1.0	dB	f = 10MHz / 1MHz, V _{IN} = 1.0V _{P-P}	
Total-harmonic distortion	THD	-	0.007	-	%	f = 1kHz, V _{IN} = 1.0V _{P-P}	
Input impedance	Z _{IN}	14	20	26	kΩ	—	
CTL pin switching level A	V _{TH-A}	1.0	2.0	3.0	V	—	
CTL pin switching level B	V _{TH-B}	1.0	2.0	3.0	V	—	
CTL pin switching level C	V _{TH-C}	1.0	2.0	3.0	V	—	

○Not designed for radiation resistance.

●Measurement circuit

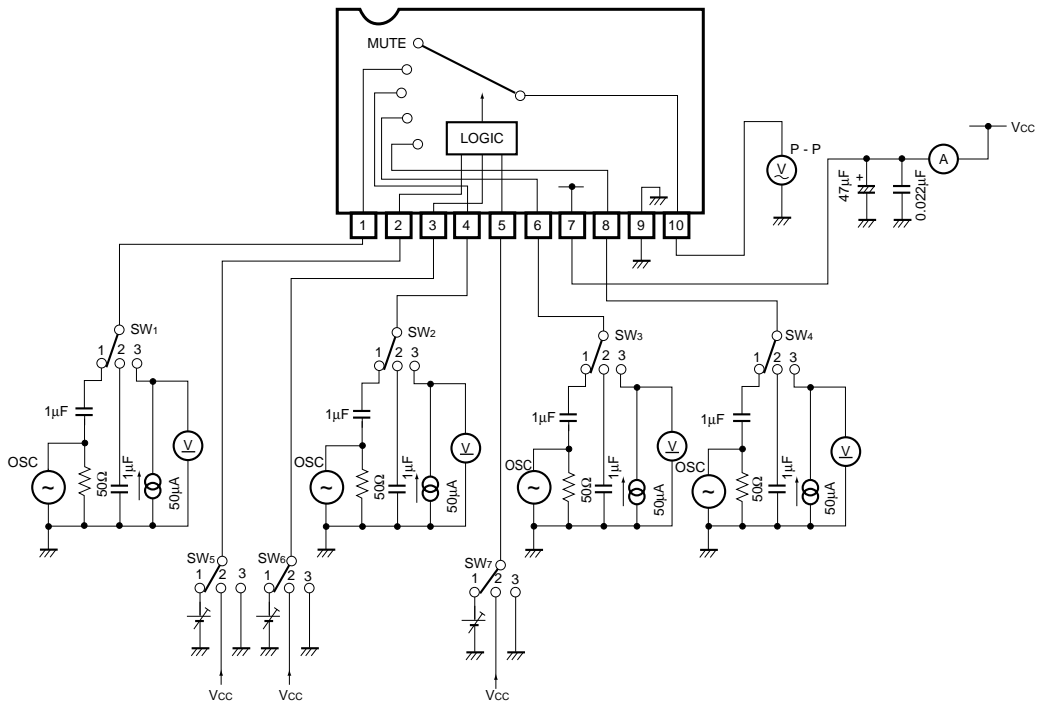


Fig. 1

● Measurement conditions

Parameter		Symbol	Switch settings							Measurement method
			SW ₁	SW ₂	SW ₃	SW ₄	SW ₅	SW ₆	SW ₇	
Current dissipation		I _{cc}	2	2	2	2	2	2	2	Ammeter
Maximum output level	IN 1	V _{om}	1	2	2	2	3	3	3	f = 1kHz, THD = 0.5% Note 1
	IN 2	V _{om}	2	1	2	2	3	2	3	
	IN 3	V _{om}	2	2	1	2	2	3	3	
	IN 4	V _{om}	2	2	2	1	2	2	3	
Voltage gain	IN1	G _V	1	2	2	2	3	3	3	f = 1MHz, V _{IN} = 1V _{P-P} Note 2
	IN2	G _V	2	1	2	2	3	2	3	
	IN3	G _V	2	2	1	2	2	3	3	
	IN4	G _V	2	2	2	1	2	2	3	
Interchannel crosstalk	IN1→IN2	C _T	1	2	2	2	3	2	3	f = 4.43MHz, V _{IN} = 1V _{P-P} Note 3
	IN1→IN3	C _T	1	2	2	2	2	3	3	
	IN1→IN4	C _T	1	2	2	2	2	2	3	
	IN1→MUTE	C _T	1	2	2	2	*	*	2	
	IN2→IN3	C _T	2	1	2	2	2	3	3	
	IN2→IN4	C _T	2	1	2	2	2	2	3	
	IN2→MUTE	C _T	2	1	2	2	*	*	2	
	IN3→IN4	C _T	2	2	1	2	2	2	3	
	IN3→MUTE	C _T	2	2	1	2	*	*	2	
IN4→MUTE	C _T	2	2	2	1	*	*	2		
Frequency characteristic	IN 1	G _f	1	2	2	2	3	3	3	f = 10MHz / f = 1MHz V _{IN} = 1V _{P-P} Note 4
	IN 2	G _f	2	1	2	2	3	2	3	
	IN 3	G _f	2	2	1	2	2	3	3	
	IN 4	G _f	2	2	2	1	2	2	3	
Total-harmonic distortion	IN 1	THD	1	2	2	2	3	3	3	f = 1kHz V _{IN} = 1V _{P-P} Note 5
	IN 2	THD	2	1	2	2	3	2	3	
	IN 3	THD	2	2	1	2	2	3	3	
	IN 4	THD	2	2	2	1	2	2	3	
Input impedance	IN 1	Z _{IN}	3	2	2	2	3	3	3	Note 6
	IN 2	Z _{IN}	2	3	2	2	3	2	3	
	IN 3	Z _{IN}	2	2	3	2	2	3	3	
	IN 4	Z _{IN}	2	2	2	3	2	2	3	
CTL pin switching level	CTL - A	V _{TH}	2	2	1	2	1	3	3	Note 7 Note 8
	CTL - B	V _{TH}	2	1	2	2	3	1	3	
	CTL - C	V _{TH}	1	2	2	2	3	3	1	

*: Anywhere is possible.

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 and measure the total-harmonic distortion of the output using a total-harmonic distortion meter.

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 × 10⁻⁶ [Ω].

Note 7: 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 V_{OUT} level drops below 20mV_{P-P}.

Note 8: Input a 1V_{P-P}, 1MHz sine wave. Increase the CTL pin voltage from 0V.

The CTL pin switching level (V_{TH}) is the CTL pin voltage at which the V_{OUT} level goes above 1.0V_{P-P}.

●Electrical characteristic curves

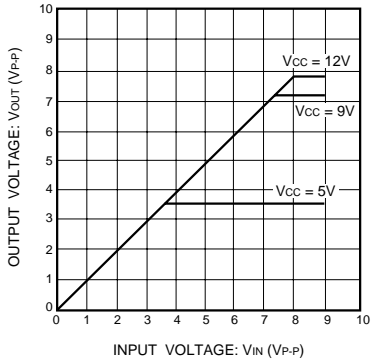


Fig. 2 VIN vs. VOUT (f = 1kHz)

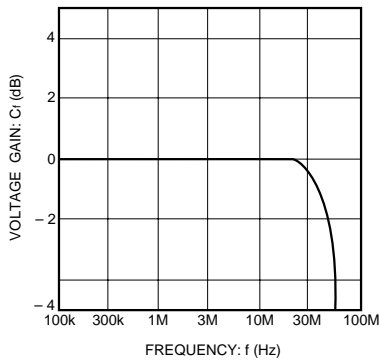


Fig. 3 Frequency characteristics

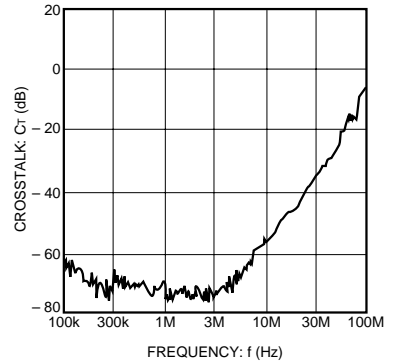


Fig. 4 Interchannel crosstalk

●External dimensions (Units: mm)

