Video signal switcher
BA7613N / BA7613F

The BA7613N and BA7613F are three-channel analog multiplexers with built-in mute, 6dB amplifier and 75Ω driver. The ICs designed for use in video cassette recorders, and feature a large dynamic range and wide operating frequency range. Sync-tip clamp inputs make this an ideal switch for video signals.

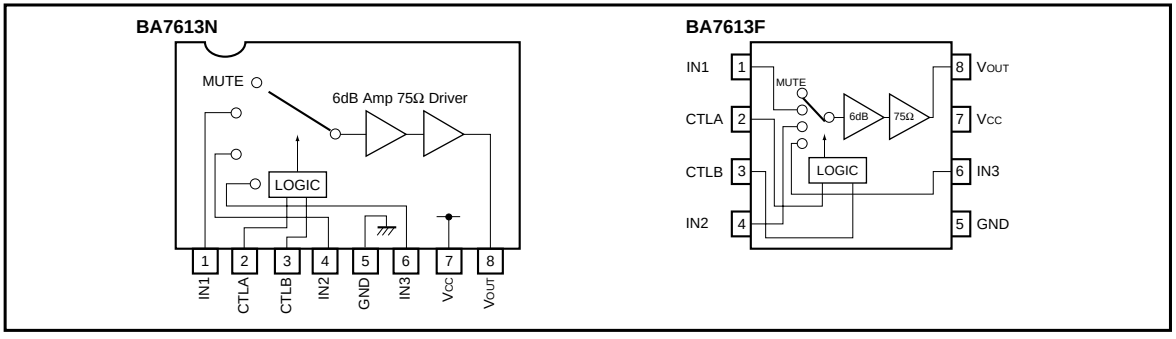
●Applications

Video cassette recorders and televisions

●Features

1) 3-input / 1-output switches.
2) Built-in 6dB amplifier and 75Ω driver.
3) Built-in mute.
4) Sync-tip clamp inputs.
5) Wide operating supply voltage range
   (4.5V ~ 13.0V, BA7613N)
   (4.5V ~ 9.5V, BA7613F).
6) Low power consumption (100mW Typ.).
7) Excellent frequency characteristics
   (10MHz, 0dB Typ.).
8) Wide dynamic range (3.5V_{P-P} Typ.).
9) Low interchannel crosstalk
   (– 65dB Typ., f = 4.43MHz).

●Block diagram



●Truth table

CTL A	CTL B	OUT
L (OPEN)	L (OPEN)	IN 1
L (OPEN)	H	IN 2
H	L (OPEN)	IN 3
H	H	MUTE

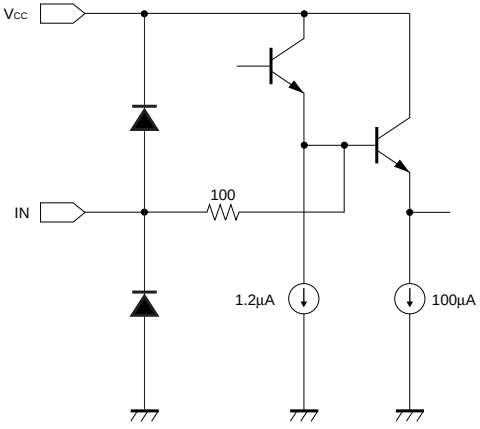
●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	*1 13.5 / *2 10.0	V
Power dissipation	Pd	*1 900*3 / *2 550*4	mW
Operating temperature	Topr	– 25 ~ + 75	°C
Storage temperature	Tstg	– 55 ~ + 125	°C

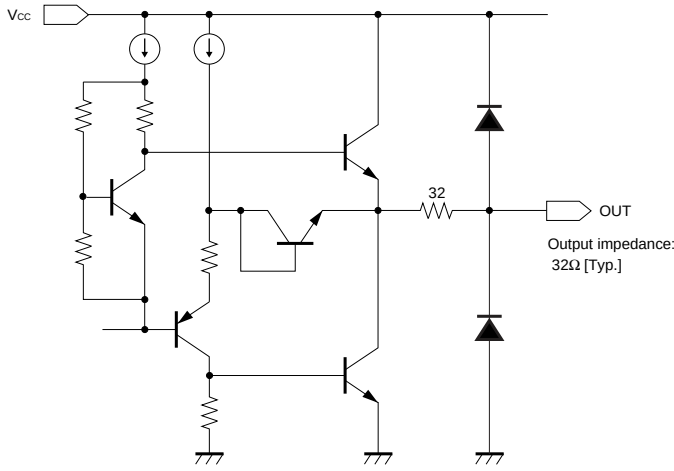
*1 BA7613N.
*2 BA7613F.
*3 Reduced by 9.0mW for each increase in Ta of 1°C over 25°C.
*4 Reduced by 5.5mW for each increase in Ta of 1°C over 25°C.

●Equivalent circuits

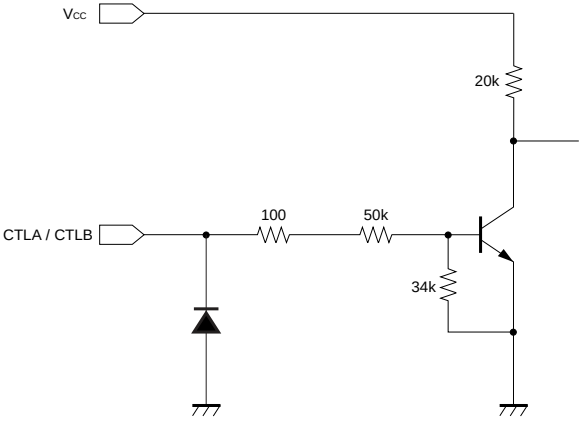
CLAMP INPUT



OUTPUT



CTLA / CTLB



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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Operating voltage	V_{CC}	4.5	—	13.0	V	BA7613F is Max.9.5V
Supply current	I_{CC}	—	20.0	28.5	mA	—
Maximum output level	V_{om}	3.0	3.5	—	V_{P-P}	f = 1kHz, THD = 0.5%
Voltage gain	G_V	5.5	6.0	6.5	dB	f = 1MHz, V_{IN} = 1.0V_{P-P}
Interchannel crosstalk	C_T	—	– 65	—	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}
CTL pin switch level A	V_{TH-A}	1.0	2.0	3.0	V	—
CTL pin switch level B	V_{TH-B}	1.0	2.0	3.0	V	—

○Not designed for radiation resistance.

●Measurement circuit

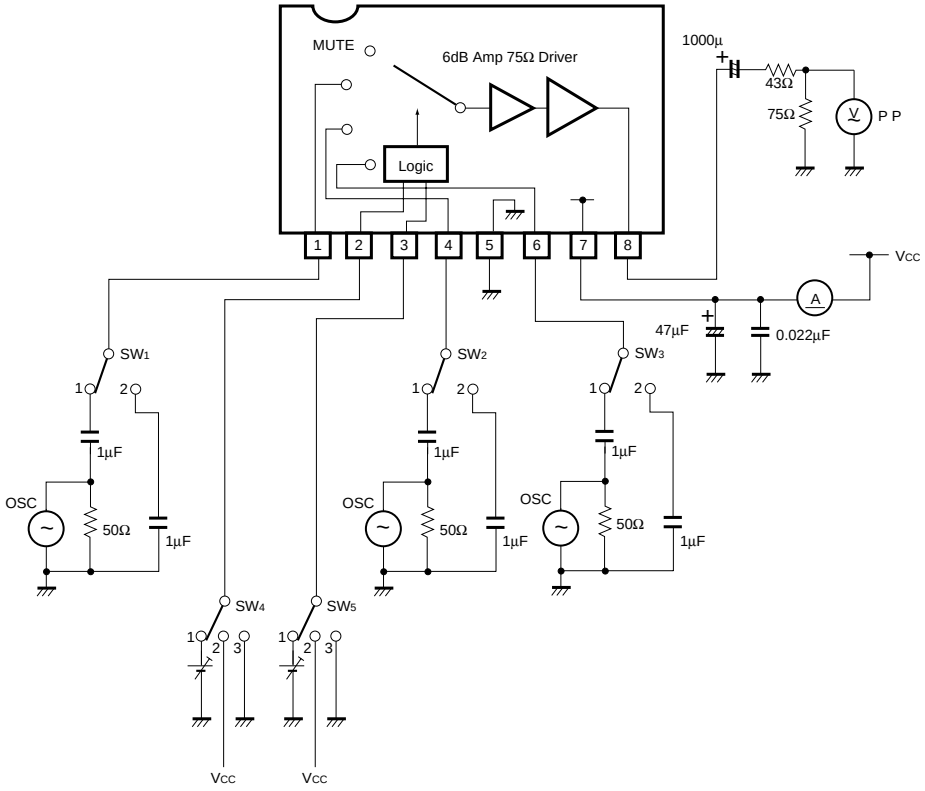


Fig. 1

●Measurement conditions

Parameter		Symbol	Switch settings					Measurement method
			SW_1	SW_2	SW_3	SW_4	SW_5	
Current dissipation		I_{CC}	2	2	2	2	2	Ammeter
Maximum output level	I_{N1}	V_{om}	1	2	2	3	3	f = 1kHz THD = 0.5% ∗1
	I_{N2}	V_{om}	2	1	2	3	2	
	I_{N3}	V_{om}	2	2	1	2	3	
Voltage gain	I_{N1}	G_V	1	2	2	3	3	f = 1MHz, V = $1V_{P-P}$ ∗2
	I_{N2}	G_V	2	1	2	3	2	
	I_{N3}	G_V	2	2	1	2	3	
Interchannel crosstalk	I_{N1}→I_{N2}	C_T	1	2	2	3	2	f = 4.43MHz, V = $1V_{P-P}$ ∗3
	I_{N1}→I_{N3}	C_T	1	2	2	2	3	
	I_{N1}→MUTE	C_T	1	2	2	2	2	
	I_{N2}→I_{N3}	C_T	2	1	2	2	3	
	I_{N2}→MUTE	C_T	2	1	2	2	2	
	I_{N3}→MUTE	C_T	2	2	1	2	2	
Frequency characteristic	I_{N1}	G_f	1	2	2	3	3	f = 10MHz / f = 1MHz, V = $1V_{P-P}$ ∗4
	I_{N2}	G_f	2	1	2	3	2	
	I_{N3}	G_f	2	2	1	2	3	
CTL pin switching level	CTLA	V_{TH}	2	2	1	1	3	∗5
	CTLB	V_{TH}	2	1	2	3	1	

∗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 multiplied by 2 is the maximum output level V_{om} (V_{P-P}).

∗2: Input a $1V_{P-P}$, 1MHz sine wave. The voltage gain is given by $G_V = 20 \log (V_{OUT} / V_{IN}) + 6$.

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

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

∗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 V_{OUT} level drops below $20mV_{P-P}$.

●Electrical characteristic curves

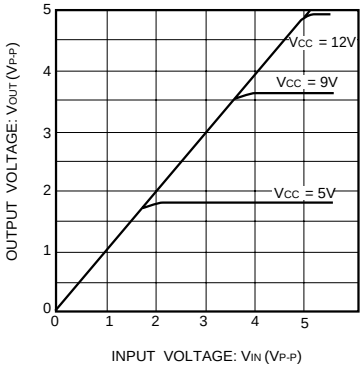


Fig. 2 V_{IN} vs. V_{OUT} (f = 1kHz)

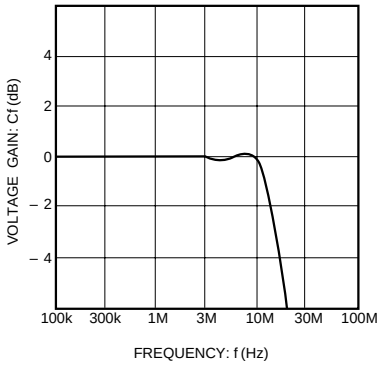


Fig. 3 Frequency characteristics

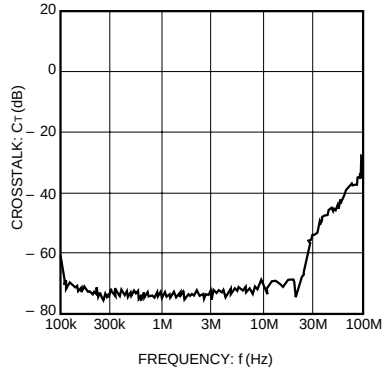


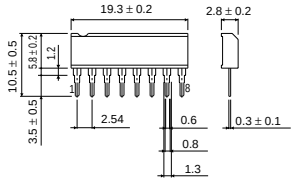
Fig. 4 Interchannel crosstalk

●Operation notes

The output impedance is approximately 32Ω. Therefore,
to ensure output matching, connect an external resistor of 43Ω.

●External dimensions (Units: mm)

BA7613N



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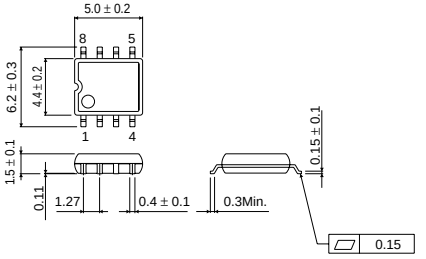
BA7613F



SOP8

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