Dual operational amplifier with switch, for audio use (2 inputs / 1 output × 2)

BA3129 / BA3129F

The BA3129 and BA3129F contain two circuits with operational amplifiers configured of two differential input circuits, an output circuit, and a switch circuit. The two differential input circuits are separate, enabling independent settings to be entered for the amplifier gain and frequency characteristic.

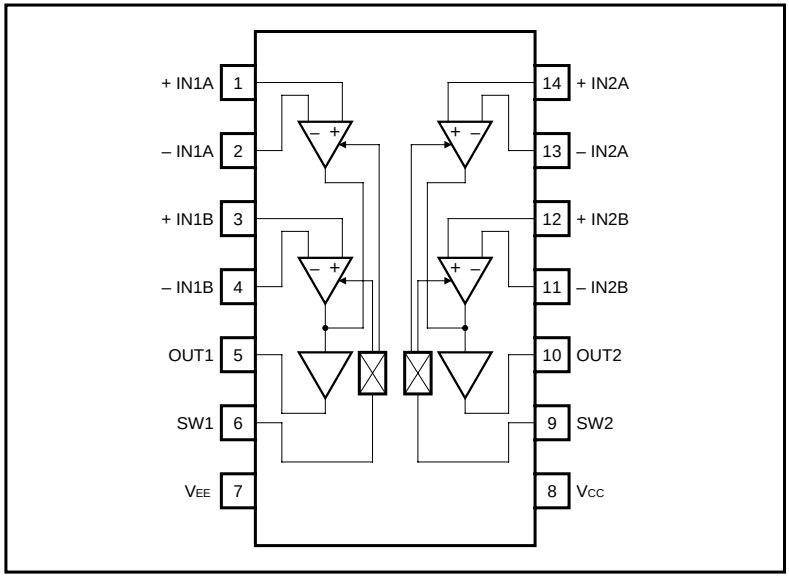
●Applications

Audio amplifiers and other electronic circuits

●Features

1) Can drive both dual or single power supplies.
2) High gain and low distortion.
   (Gv = 110dB, THD = 0.0015%)
3) Low noise. (Vn = 2μV_{rms} typ.: FLAT)
4) Little switching noise.
5) Internal phase compensation.

●Block diagram



●Absolute maximum ratings (Ta = 25°C)

Parameter		Symbol	Limits	Unit
Applied voltage		V_{CC}	± 18	V
Power dissipation	BA3129	Pd	1100*1	mW
	BA3129F		450*2	
Operating temperature		Topr	– 20 ~ + 75	°C
Storage temperature		Tstg	– 55 ~ + 125	°C
Differential input voltage		Vid	± V_{CC}	V
Common-mode input voltage		Vi	– V_{CC} ~ V_{CC}	V
Load current		$I_{OMax.}$	± 50	mA

*1 Reduced by 11mW for each increase in Ta of 1°C over 25°C.

*2 Reduced by 4.5mW for each increase in Ta of 1°C over 25°C.

●Recommended operating conditions (Ta = 25°C)

Parameter		Symbol	Limits	Unit
Operating power supply voltage	Single power supply	V_{CC}	5 ~ 32	V
	Dual power supplies	V_{CC}, V_{EE}	± 2.5 ~ ± 16	V
Load conditions		R_L	2 k Min.	Ω

●Electrical characteristics (unless otherwise noted, Ta = 25°C, V_{CC} = 15V, V_{EE} = – 15V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent circuit current	I_Q	—	4.6	8.0	mA	V_{IN} = 0, RL = ∞ SW pin open
Input offset voltage	Vio	—	0.5	5.0	mV	RS ≦ 10kΩ
Input offset current	Iio	—	5	200	nA	—
Input bias current	Ib	—	50	500	nA	*1
High-amplitude voltage gain	Avol	86	110	—	dB	RL ≦ 2kΩ, Vo = ± 10V
Common-mode input voltage	Vicm	± 12	± 14	—	V	—
Common-mode rejection ratio	CMRR	70	90	—	dB	RS ≦ 10kΩ
Power supply voltage rejection ratio	PSRR	76	90	—	dB	RS ≦ 10kΩ
Maximum output voltage	V_{OH} / V_{OL}	± 12	± 14	—	V	RL ≧ 10kΩ
		± 10	± 13	—	V	RL ≧ 2kΩ
Slew rate	SR	—	2.4	—	V / µs	GV = 0dB, RL ≦ 2kΩ
Gain band width product	GBW	—	6.5	—	MHz	f = 10kHz
Input conversion noise voltage	Vn	—	2.0	—	µVrms	RL = 2kΩ. B. P. F = 20 ~ 30kHz
Crosstalk between A-B	CT_{A-B}	—	85	—	dB	f = 1kHz
Total harmonic distortion	THD	—	0.0015	—	%	f = 1kHz, Vo = 5Vrms
Channel separation	CS	—	120	—	dB	f = 1kHz, input conversion

*1 Because the first stage is configured with a PNP transistor, input bias current is from the IC.

○ Not designed for radiation resistance.

●Operation notes

(1) Using SW pins

The Pin 6 and Pin 9 SW pins control switching of the dual-system differential input amplifier. When the current flowing from the SW pins is detected, the differential input amplifier is switched. If no current is flowing from the SW pins, the A amplifier is activated, and if current of 20μA or higher is flowing, the B amplifier is activated.

The pin voltage is $V = V_{CC} - (5 \times 10^3 + 10 \times 10^3)\, I - 0.7$. Thus, R1 and R2 are set so that when the switch is off, the switching current is 1μA or lower, and when the switch is on, the switching current is 20μA or higher.

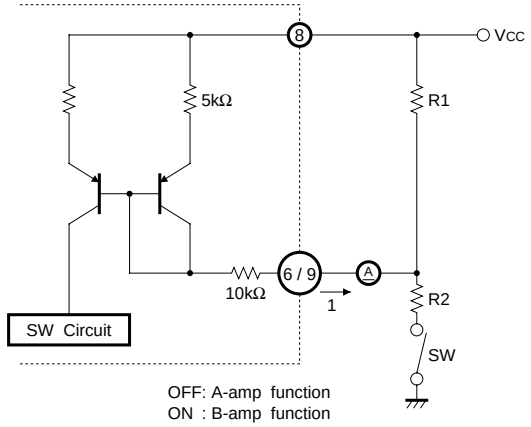


Fig.1

●Application example

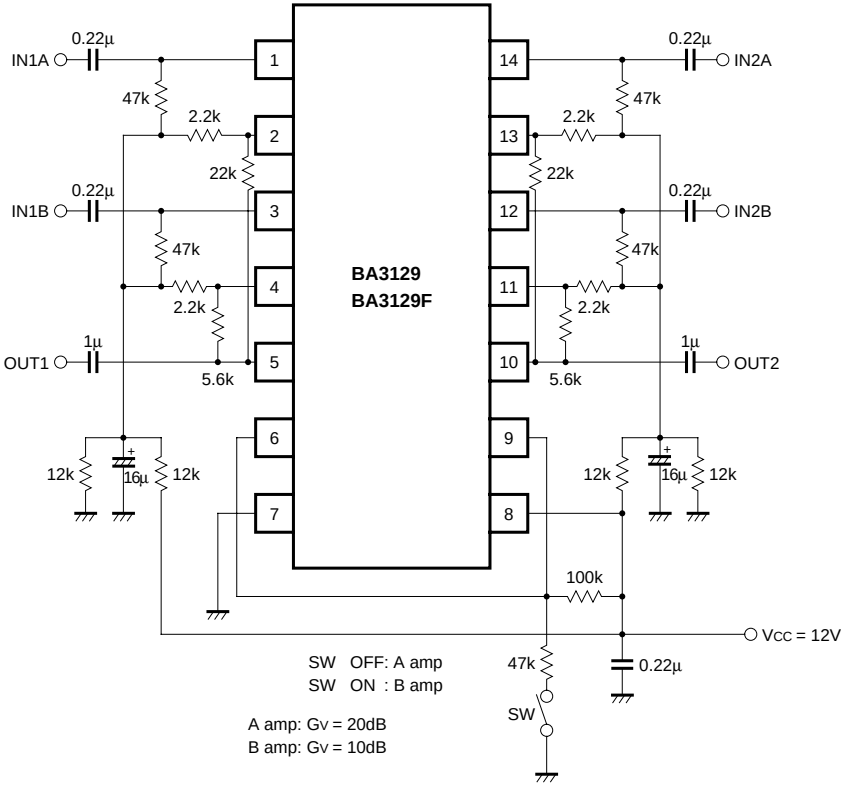
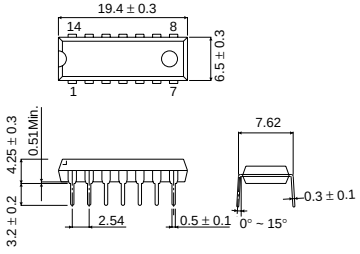


Fig.2

When the switch is off, Pins 6 and 9 are open, resulting in high impedance. To guard against induction noise and other adverse effects, we recommend using a pull-up resistance.

●External dimensions (Units: mm)

BA3129



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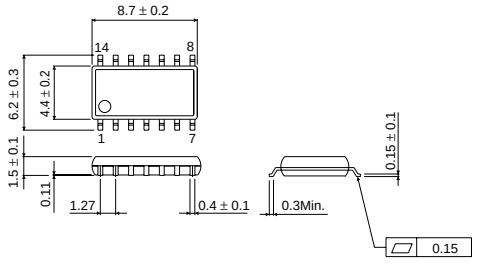

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