Structure : Silicon Monolithic Integrated Circuit

Product : 3 Dual operational amplifier with switch for car audio systems

Type : **BA3131FS**

Function :
1. High gain and low distortion. (Gv = 110dB, THD = 0.0015% typ.)
2. Low noise. (Vn = 2μVrms typ.)
3. Switching circuit can be directly coupled to microcomputer port.
4. Small switching noise.
5. Equipped with 1/2 Vcc output circuit for single power supply.

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Power supply voltage	Vcc	18.0	V
Power dissipation	Pd	750*	mW
Operating temperature	Topr	−40～+85	°C
Storage temperature	Tastg	−55～+125	°C
Common-mode input voltage	Vi	3～Vcc	V
Differential input voltage	Vid	Vcc	V
Load current	IoMax.	±50.0	mA

※This value decreases 7.5 mW/°C for Ta=25°C or more.
(When mounted on a glass epoxy board (90mm × 50mm × 1.6t))

Operating Voltage Range (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Power supply voltage	Vcc	6.0	8.0	16.0	V	Single power source

Application example

Note that ROHM cannot provide adequate confirmation of patents.

The product described in this specification is designed to be used with ordinary electronic equipment or devices (such as audio-visual equipment, office-automation equipment, communications devices, electrical appliances, and electronic toys).

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Electrical characteristics

(unless otherwise noted, Ta=25°C, Vcc=8V)

Parameter	Symbol	Limit			Unit	Conditions
		Min.	Typ.	Max.		
Quiescent current	Iq	2.0	4.9	7.8	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=±1.5V
Common-mode input voltage	Vicm	3	6	—	V	
In-phase signal rejection ratio	CMRR	60	72	—	dB	RS≦10kΩ
Power supply voltage rejection ratio	PSRR	76	90	—	dB	RS≦10kΩ
Maximum output voltage	V_{OH}/V_{OL}	3	6	—	V	RL≧10kΩ
		3	6	—	V	RL≧2kΩ
Input conversion noise voltage	Vn	—	2.0	4.0	μVrms	*2
Reference voltage change	ΔV_{REF}	—	—	±10	mV	Ioref=±1mA

0. 1 Because the first stage is configured with PNP transistors, input bias current is from the IC.

0. 2 Tested under the following conditions: Gv = 40dB, RS = 2kΩ, Matsushita Tsuko VP-9690A (using DIN audio filter)

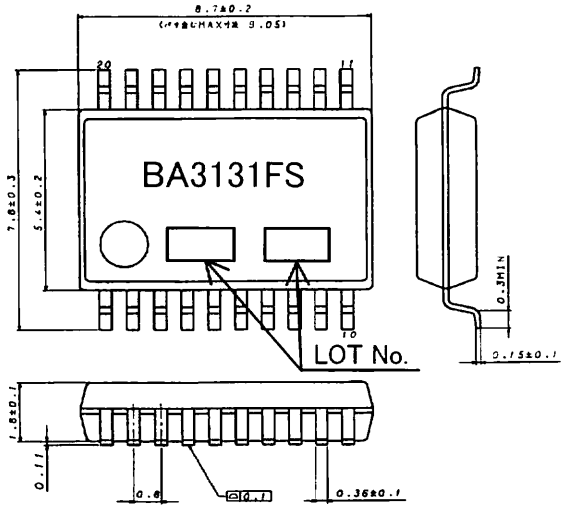
Design guaranteed values

(unless otherwise noted, Ta=25°C, Vcc=8V)

Parameter	Symbol	Limit			Unit	Conditions
		Min.	Typ.	Max.		
Slew rate	SR	0.5	1.2	—	V/μS	Gv=0dB,RL=2kΩ
Gainbandwidth product	GBW	1.5	2.6	—	MHz	f=10kHz
Crosstalk between A, B and C	CT_{ABC}	60	73	—	dB	f=1kHz
Total harmonic distortion	THD	—	0.0025	0.01	%	Gv=0dB, f=1kHz, Vo=1Vrms
Channel separation	CS	90	115	—	dB	f=1kHz,input conversion

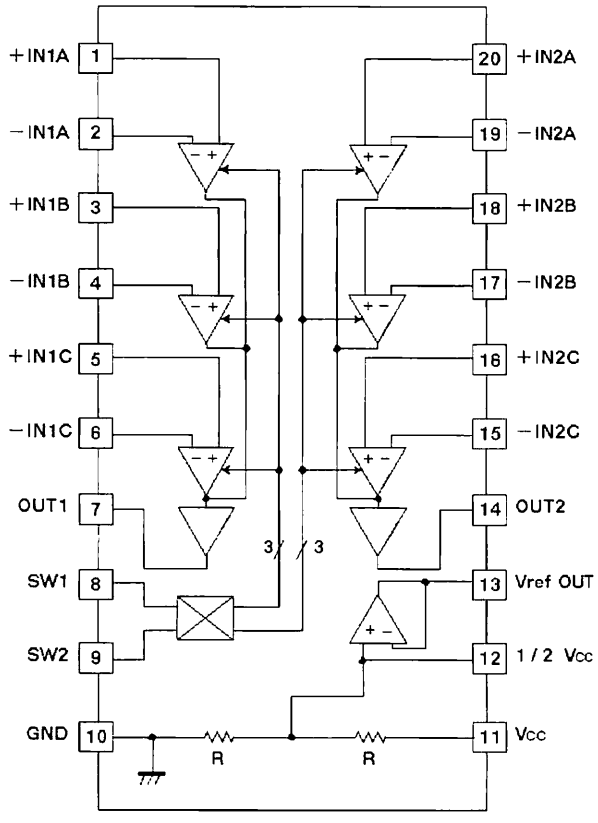
※This item is not guaranteed during processes.

Outline Dimension



SSOP-A20 (Unit:mm)

Block Diagram



Terminal Number/ Terminal Name

Terminal Number	Terminal Name
1	+IN1A
2	-IN1A
3	+IN1B
4	-IN1B
5	+IN1C
6	-IN1C
7	OUT1
8	SW1
9	SW2
10	GND
11	Vcc
12	1/2 Vcc
13	Vref OUT
14	OUT2
15	-IN2C
16	+IN2C
17	-IN2B
18	+IN2B
19	-IN2A
20	+IN2A

Application example

(1) Numbers and data in entries are representative design values and are not guaranteed values of the items.

(2)Although we are confident in recommending the sample application circuits, carefully check their characteristics further when using them. When modifying externally attached component constants before use, determine them so that they have sufficient margins by taking into account variations in externally attached components and the Rohm LSI, not only for static characteristics but also including transient characteristics.

(3) Absolute maximum ratings

If applied voltage, operating temperature range, or other absolute maximum ratings are exceeded, the LSI may be damaged. Do not apply voltages or temperatures that exceed the absolute maximum ratings. If you think of a case in which absolute maximum ratings are exceeded, enforce fuses or other physical safety measures and investigate how not to apply the conditions under which absolute maximum ratings are exceeded to the LSI.

(4) GND potential

Make the GND pin voltage such that it is the lowest voltage even when operating below it. Actually confirm that the voltage of each pin does not become a lower voltage than the GND pin, including transient phenomena.

(5) Thermal design

Perform thermal design in which there are adequate margins by taking into account the allowable power dissipation in actual states of use.

(6) Shorts between pins and misinstallation

When mounting the LSI on a board, pay adequate attention to orientation and placement discrepancies of the LSI. If it is misinstalled and the power is turned on, the LSI may be damaged. It also may be damaged if it is shorted by a foreign substance coming between pins of the LSI or between a pin and a power supply or a pin and a GND.

(7) Operation in strong magnetic fields

Adequately evaluate use in a strong magnetic field, since there is a possibility of malfunction.

(8) The 13 Pin is the reference output terminal, which outputs 1/2 Vcc. Determine the bypass condenser value in accordance with the desired characteristics. In addition, as the value may oscillate within the 500pF– 1μF, make sure to set the bypass condenser value of more than 10μF for alternate grounding. Further, as 12 pin is located in the reference circuit, make sure to use bypass condenser for ac grounding for reference output. (Recommended value22μF)

●Reference data (these values are intended only as a reference, and performance is not guaranteed)

12 pin bypass capacitor(μF)	Ripple Rejection (fin=100Hz) (dB)	Output Startup Time
10	−35	150
22	−42	300
47	−48	550

* Measuring condition: With Power Voltage ON (Vcc=8V), Vcc path control, 13 pin path control100μF, the time which is 90% of equilibrium output voltage

(9) This IC can be stably used in the low grain range (0–2dB). It may oscillate at the capacity load of more than 200pF. [the phase margin 10° Typ.(Ta=85°C, 0dB point)for capacity 200pF] Therefore, caution is required for using capacity load.

In addition, for using 0db buffer, inserting bias resister of kΩ to minus input will enable stable use against the capacity load.

(10) Truth value table

	ch1	ch2	ch3	OFF	Conditions
SW1 (8pin)	H	H	L	L	Correspons to μCOM output
SW2 (9pin)	H	L	H	L	

※"H" when the applied at pins8 and 9 is 2.0V or more, and "L" when it is 1.0V or less.

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Please contact our sales offices for details ;

U.S.A / San Diego	TEL : +1(858)625-3630	FAX : +1(858)625-3670
Atlanta	TEL : +1(770)754-5972	FAX : +1(770)754-0691
Dallas	TEL : +1(972)312-8818	FAX : +1(972)312-0330
Germany / Dusseldorf	TEL : +49(2154)9210	FAX : +49(2154)921400
United Kingdom / London	TEL : +44(1)908-282-666	FAX : +44(1)908-282-528
France / Paris	TEL : +33(0)1 56 97 30 60	FAX : +33(0) 1 56 97 30 80
China / Hong Kong	TEL : +852(2)740-6262	FAX : +852(2)375-8971
Shanghai	TEL : +86(21)6279-2727	FAX : +86(21)6247-2066
Dilian	TEL : +86(411)8230-8549	FAX : +86(411)8230-8537
Beijing	TEL : +86(10)8525-2483	FAX : +86(10)8525-2489
Taiwan / Taipei	TEL : +866(2)2500-6956	FAX : +866(2)2503-2869
Korea / Seoul	TEL : +82(2)8182-700	FAX : +82(2)8182-715
Singapore	TEL : +65-6332-2322	FAX : +65-6332-5662
Malaysia / Kuala Lumpur	TEL : +60(3)7958-8355	FAX : +60(3)7958-8377
Philippines / Manila	TEL : +63(2)807-6872	FAX : +63(2)809-1422
Thailand / Bangkok	TEL : +66(2)254-4890	FAX : +66(2)256-6334

Japan /
(Internal Sales)

Tokyo 2-1-1, Yaesu, Chuo-ku, Tokyo 104-0082
TEL : +81(3)5203-0321 FAX : +81(3)5203-0300

Yokohama 2-4-8, Shin Yokohama, Kohoku-ku, Yokohama, Kanagawa 222-8575
TEL : +81(45)476-2131 FAX : +81(45)476-2128

Nagoya Dainagayo Building 9F 3-28-12, Meieki, Nakamura-ku, Nagoya,Aichi 450-0002
TEL : +81(52)581-8521 FAX : +81(52)561-2173

Kyoto 579-32 Higashi Shiokouji-cho, Karasuma Nishi-iru, Shiokoujidori, Shimogyo-ku, Kyoto 600-8216
TEL : +81(75)311-2121 FAX : +81(75)314-6559

(Contact address for overseas customers in Japan)

Yokohama TEL : +81(45)476-9270 FAX : +81(045)476-9271

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