

Structure : Silicon Monolithic Integrated Circuit  
 Product : Sound Processor for car audio  
 Type : **BD3488FS**  
 Package : SSOP-A32

●Feature

1. Reduce the external components by built-in equalizer filters.  
Possible to control Bass Treble Middle and LPF equalizer freely.
2. Possible to use this IC with favorite features (BBE, SRS etc) because external input/output pins are equipped.
3. It is equipped with 2 systems of output terminals of Subwoofer. Moreover, the stereo signal of the front and rear, too, can be output by the I<sup>2</sup>C BUS control.
4. Reduce the switching noise of Volume, Fader, Bass Middle Treble LPF gain and attenuation by using advanced switch circuit. (Possible to control all steps.)
5. It is possible for the bass, middle, treble to correspond to the simple loudness, too, with the gain adjustment quantity of ±20dB and 1 dB step gain adjustment.
6. Bi-CMOS process is suitable for the design
7. Built-in ground isolation amplifier inputs, ideal for external stereo input.
8. The package of this IC is SSOP-A32. The PCB layout can be easy and the area of PCB is reduced by putting sound input terminals together, and output terminals too.
9. It is possible to control by 3.3V / 5V for I<sup>2</sup>C BUS and 2 wire serial controller.
10. Built-in 7-band spectrum analyzer.

●Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Power supply Voltage	VCC	10.0	V
Input Voltage	VIN	VCC+0.3~GND-0.3	V
Power Dissipation	Pd	950 *1	mW
Storage Temperature	Tastg	-55~+150	°C

\*1 At Ta=25°C or higher, this value is decreased to 7.6mW/°C.

When Rohm standard board is mounted.

Rohm standard board:

size: 70×70×1.6 (mm<sup>3</sup>)

material: FR4 glass-epoxy substrate (copper foil area: not more than 3%).

●Operating Range

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	VCC	7.0	-	9.5	V
Temperature	Topr	-40	-	+85	°C

※ Design against radiation-proof isn't made.

Status of this document

The Japanese version of this document is the formal specification. A customer may use this translation only for a reference to help reading the formal version. If there are any differences in translation version of this document, formal version takes priority.

Application example

- ROHM cannot provide adequate confirmation of patents.
- The product described in this specification is designed to be used with ordinary electronic equipment or device (such as audio-visual equipment, office-automation equipment, communications devices, electrical appliances, and electronic toys.)  
Should you intend to use this product with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety device), please be sure to consult with our sales representative in advance.
- ROHM assumes no responsibility for use of any circuits described herein, conveys no license under any patent or other right, and makes no representations that the circuits are free from patent infringement.

●Function

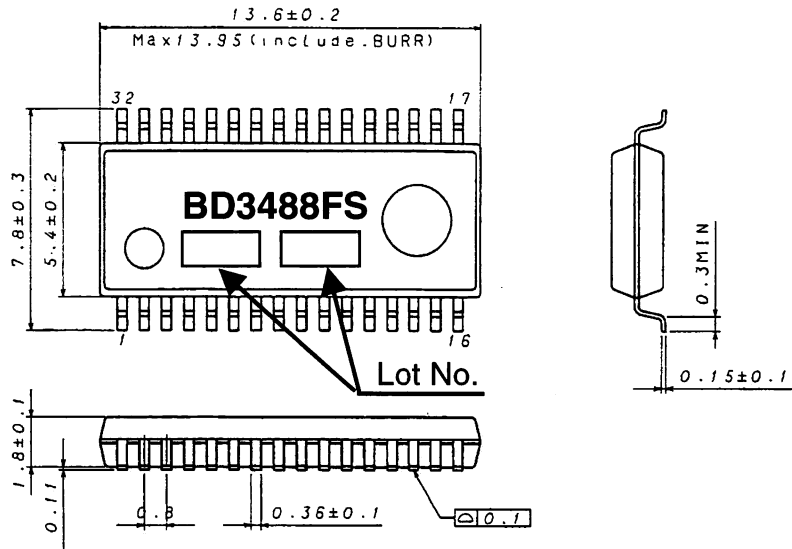
Function	Specifications
Input selector	Stereo 4 input Possible to select single/differential input at D input
Input gain	0~20dB (1dB step)
Mute	Possible to control by I <sup>2</sup> C BUS or external compulsory mute terminal, Possible to use advanced switch and select 4 switching time
Volume	+15dB~-79dB (1dB step), -∞dB Possible to use advanced switch and select 8 switching time
Bass	-20~+20dB (1dB step), Q= 0.5, 1, 1.5, 2, f <sub>0</sub> =60, 80, 100, 120 Possible to use advanced switch at changing gain
Middle	-20~+20dB (1dB step), Q= 0.75, 1, 1.25, 1.5, f <sub>0</sub> =500, 1k, 1.5k 2.5k Possible to use advanced switch at changing gain
Treble	-20~+20dB (1dB step), Q= 0.75, 1.25, f <sub>0</sub> =7.5k, 10k, 12.5k, 15k Possible to use advanced switch at changing gain
Fader	+15dB~-79dB (1dB step), -∞dB Possible to use advanced switch and select 8 switching time
LPF	f <sub>c</sub> =80/120/160Hz, LPF=off
Spectrum Analyzer	7-Band, 2-wired serial control, DC Output

●Electrical characteristics

Unless specified particularly, Ta=25°C, VCC=8.5V, f=1kHz, Vin=1Vrms, Rg=600Ω, RL=10kΩ, A input, Input gain 0dB, Mute off, Volume 0dB, Tone control 0dB, Fader 0dB

Item	Symbol	Limit			Unit	Condition
		Min.	Typ.	Max.		
Current upon no signal	I <sub>Q</sub>	—	37	50	mA	No signal
Voltage gain	G <sub>V</sub>	-1.5	0	1.5	dB	G <sub>V</sub> =20log(V <sub>OUT</sub> /V <sub>IN</sub> )
Channel balance	CB	-1.5	0	1.5	dB	CB=G <sub>V1</sub> -G <sub>V2</sub>
Total harmonic distortion	THD	—	0.005	0.05	%	V <sub>OUT</sub> =1Vrms BW=400-30kHz
Output noise voltage	V <sub>NO</sub>	—	9	25	μVrms	R <sub>g</sub> =0Ω BW=IHF-A
Residual output noise voltage	V <sub>NOR</sub>	—	2	10	μVrms	Fader=-∞dB R <sub>g</sub> =0Ω BW=IHF-A
Cross-talk between channels	CTC	—	-100	-90	dB	R <sub>g</sub> =0Ω CTC=20log(V <sub>OUT</sub> /V <sub>IN</sub> ) BW=IHF-A
Ripple rejection	RR	—	-70	-40	dB	R <sub>g</sub> =0Ω f=100Hz V <sub>RR</sub> =100mVrms RR=20log(V <sub>OUT</sub> /V <sub>CCIN</sub> )
Common mode rejection ratio	CMRR	50	65	—	dB	DP1 and DN input DP2 and DN input CMRR=20log(V <sub>IN</sub> /V <sub>OUT</sub> ) BW=IHF-A
Maximum input voltage	V <sub>IM</sub>	2.1	2.3	—	Vrms	V <sub>IM</sub> at THD+N(V <sub>OUT</sub> )=1% BW=400-30kHz
Maximum gain	G <sub>V MAX</sub>	+13	+15	+17	dB	Volume=+15dB V <sub>IN</sub> =100mVrms G <sub>V</sub> =20log(V <sub>OUT</sub> /V <sub>IN</sub> )
Maximum attenuation	G <sub>F MIN</sub>	—	-100	-90	dB	G <sub>f</sub> =20log(V <sub>OUT</sub> /V <sub>IN</sub> ) BW=IHF-A, Att=-∞dB
Maximum output voltage	V <sub>OM</sub>	2	2.2	—	Vrms	THD+N=1% BW=400-30kHz

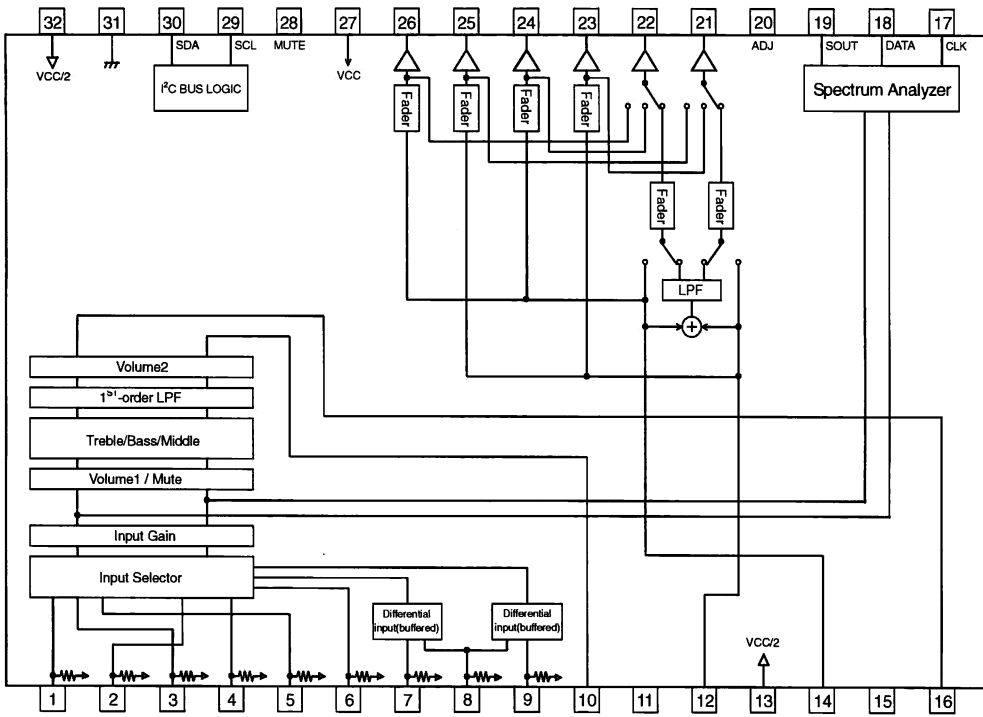
● Dimensional outline drawing



(UNIT : mm)

SSOP-A32

● Block diagram



● Terminal No. Terminal name

Terminal No.	Terminal name
1	A1
2	A2
3	B1
4	B2
5	C1
6	C2
7	DP1
8	DN
9	DP2
10	VOUT2
11	NC
12	FIN2
13	FBIAS
14	FIN1
15	NC
16	VOUT1
17	CLK
18	DATA
19	SOUT
20	ADJ
21	OUTS2
22	OUTS1
23	OUTR2
24	OUTR1
25	OUTF2
26	OUTF1
27	VCC
28	MUTE
29	SCL
30	SDA
31	GND
32	FIL

● Cautions on use

(1) 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.

(2) 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.

(3) Thermal design

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

(4) 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.

(5) Operation in strong magnetic fields

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

### Notes

- No technical content pages of this document may be reproduced in any form or transmitted by any means without prior permission of ROHM CO.,LTD.
- The contents described herein are subject to change without notice. The specifications for the product described in this document are for reference only. Upon actual use, therefore, please request that specifications to be separately delivered.
- Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.
- Any data, including, but not limited to application circuit diagrams information, described herein are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO.,LTD. disclaims any warranty that any use of such devices shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes no liability of whatsoever nature in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices, other than for buyer's right to use such devices itself, resell or otherwise dispose of the same, no express or implied right or license to practice or commercially exploit any intellectual property rights or other proprietary rights owned or controlled by
- ROHM CO., LTD. is granted to any such buyer.
- Products listed in this document are no antiradiation design.

The products listed in this document are 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).

Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

#### About Export Control Order in Japan

Products described herein are the objects of controlled goods in Annex 1 (Item 16) of Export Trade Control Order in Japan.

In case of export from Japan, please confirm if it applies to "objective" criteria or an "informed" (by MITI clause) on the basis of "catch all controls for Non-Proliferation of Weapons of Mass Destruction.

Thank you for your accessing to ROHM product informations.  
More detail product informations and catalogs are available,  
please contact your nearest sales office.

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
----------	-----------------------	------------------------