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^2C 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^2C 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	V_{IN}	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 decreaced to 7.6mW/°C.
When Rohm standard board is mounted.
Rohm standard board: size: 70×70×1.6 (mm^3)
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	℃

※ 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.)
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●Function

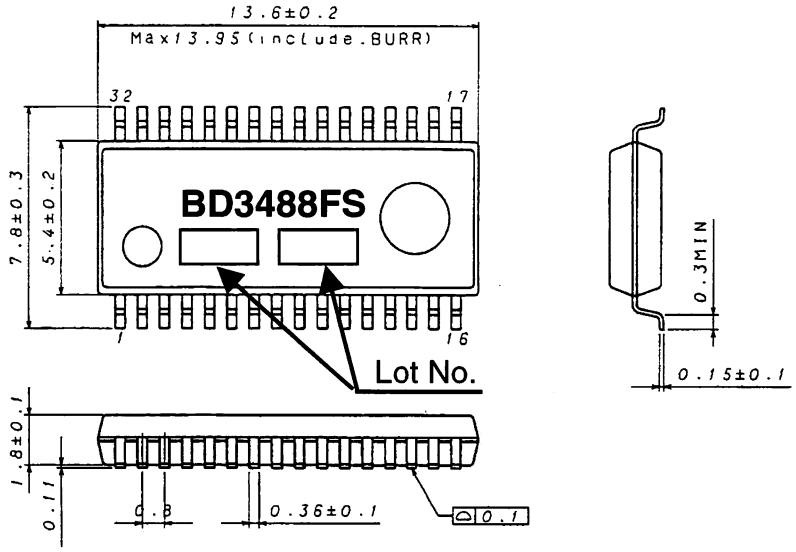
Function	Specifications
Input selector	Stereo 4 input Possible to select single/differential input at D input
Input gain	0～20dB (1dB step)
Mute	Possible to control by I^2C BUS or external compulsory mute terminal, Possible to use advanced switch and select 4 switching time
Volume	+15dB～-79dB (1dB step), -∞dB Possible to use advanced switch and select 8 switching time
Bass	-20～+20dB (1dB step), Q= 0.5, 1, 1.5, 2、 f0=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、 f0=500, 1k, 1.5k 2.5k Possible to use advanced switch at changing gain
Treble	-20～+20dB (1dB step), Q= 0.75, 1.25、 f0=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	fc=80/120/160Hz、 LPF=off
Spectrum Analyzer	7-Band, 2-wired serial control, DC Output

●Electrical characteristics

Unless specified particularly, Ta=25℃, 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_Q	–	37	50	mA	No signal
Voltage gain	G_V	-1.5	0	1.5	dB	Gv=20log(VOUT/VIN)
Channel balance	CB	-1.5	0	1.5	dB	$CB=G_{V1}-G_{V2}$
Total harmonic distortion	THD	–	0.005	0.05	%	VOUT=1Vrms BW=400-30kHz
Output noise voltage	V_{NO}	–	9	25	μVrms	Rg=0Ω BW=IHF-A
Residual output noise voltage	V_{NOR}	–	2	10	μVrms	Fader=-∞dB Rg=0Ω BW=IHF-A
Cross-talk between channels	CTC	–	-100	-90	dB	Rg=0Ω CTC=20log(VOUT/VIN) BW=IHF-A
Ripple rejection	RR	–	-70	-40	dB	Rg=0Ω f=100Hz VRR=100mVrms RR=20log(VOUT/VCCIN)
Common mode rejection ratio	CMRR	50	65	–	dB	DP1 and DN input DP2 and DN input CMRR=20log(VIN/VOUT) BW=IHF-A
Maximum input voltage	V_{IM}	2.1	2.3	–	Vrms	VIM at THD+N(VOUT)=1% BW=400-30kHz
Maximum gain	$G_{V\,MAX}$	+13	+15	+17	dB	Volume=+15dB VIN=100mVrms Gv=20log(VOUT/VIN)
Maximum attenuation	$G_{F\,MIN}$	–	-100	-90	dB	Gf=20log(VOUT/VIN) BW=IHF-A, Att=-∞dB
Maximum output voltage	V_{OM}	2	2.2	–	Vrms	THD+N=1% BW=400-30kHz

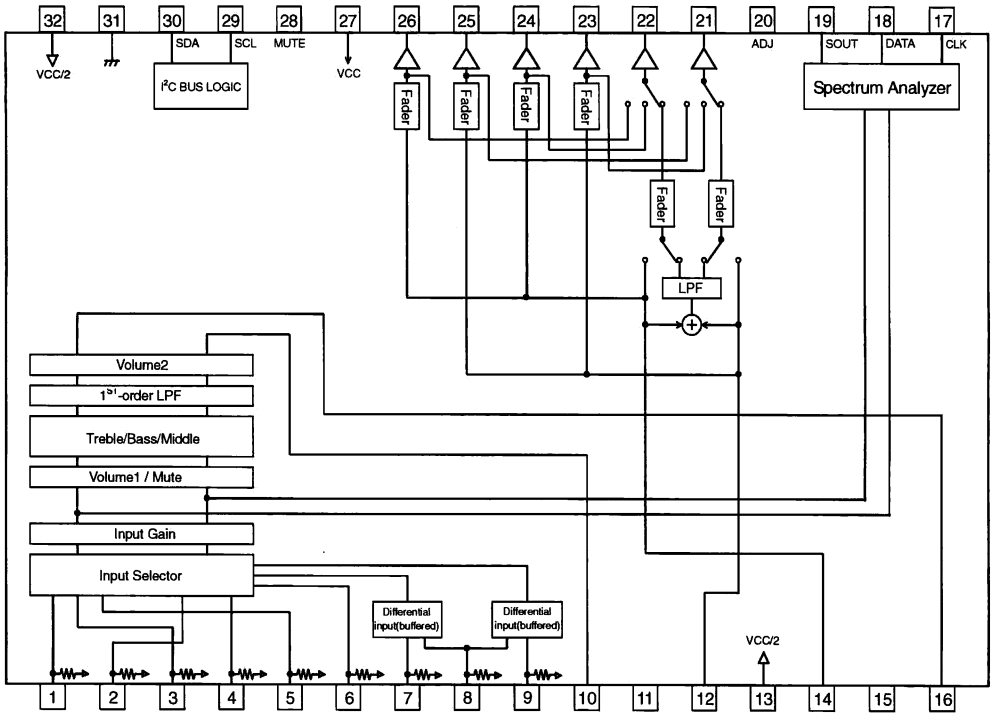
●Dimensional outline drawing



(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.

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