Structure : Silicon Monolithic Integrated Circuit

Product : Sound Processor for Car Audio

Type : **BD3489FS**

Package : SSOP-A32

●Feature

1. Highly reduced switching noise of Volume, Fader, Bass, Middle, Treble gain and attenuation by using advanced switch circuit（Possible to control all steps）.
2. Reduce the external components by built-in equalizer filters.
   Possible to control Bass Treble Middle equalizer freely.
3. Possible to use Fader volume as independent 6ch volume because 6ch input/output pins are equipped.
4. It is equipped with output terminals of Subwoofer. Moreover, the stereo signal of the front and rear, too, can be output by the I^2C BUS control.
5. It is possible for the Bass, Middle, Treble to control the gain adjustment quantity of ±20dB and 1dB step gain adjustment.
6. Bi-CMOS process is suitable for the design of low current and low energy. And it provides more quality for small Scale regulator and heat in a set.
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.

●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 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.)
  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.
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●Function

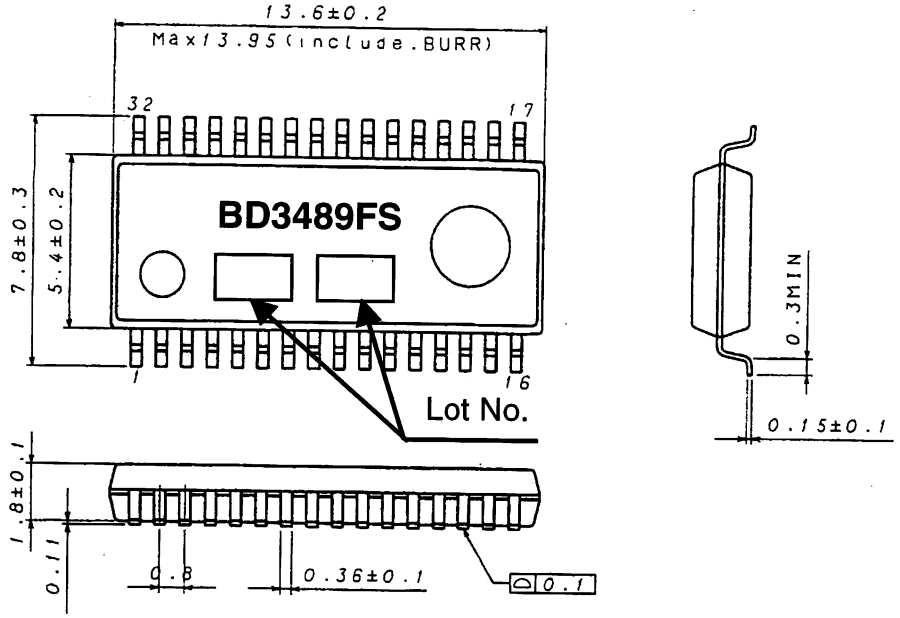
Function	Specifications
Input selector	Stereo 4 input, Possible to select single/differential input at D input
Input gain	0～20dB、1dB step
Mute	Possible to control by I²C BUS or external compulsory mute terminal Possible to use advanced switch and select 4 advanced switch time
Volume	+15dB～-79dB (1dB step) , -∞, Volume1:+15dB～-24dB, Volume2:0dB～-55dB, -∞ Possible to use advanced switch and select 8 advanced switch time
Bass	-20～+20dB (1dB step) , Q=0.5, 1, 1.5, 2, fo=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 fo=500, 1k, 1.5k 2.5k Possible to use advanced switch at changing gain
Treble	-20～+20dB (1dB step) , Q=0.75, 1.25 fo=7.5k, 10k, 12.5k, 15k Possible to use advanced switch at changing gain
Fader	+23dB～-79dB(1dB step), -∞dB, Possible to use advanced switch and select 8 advanced switch time

●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

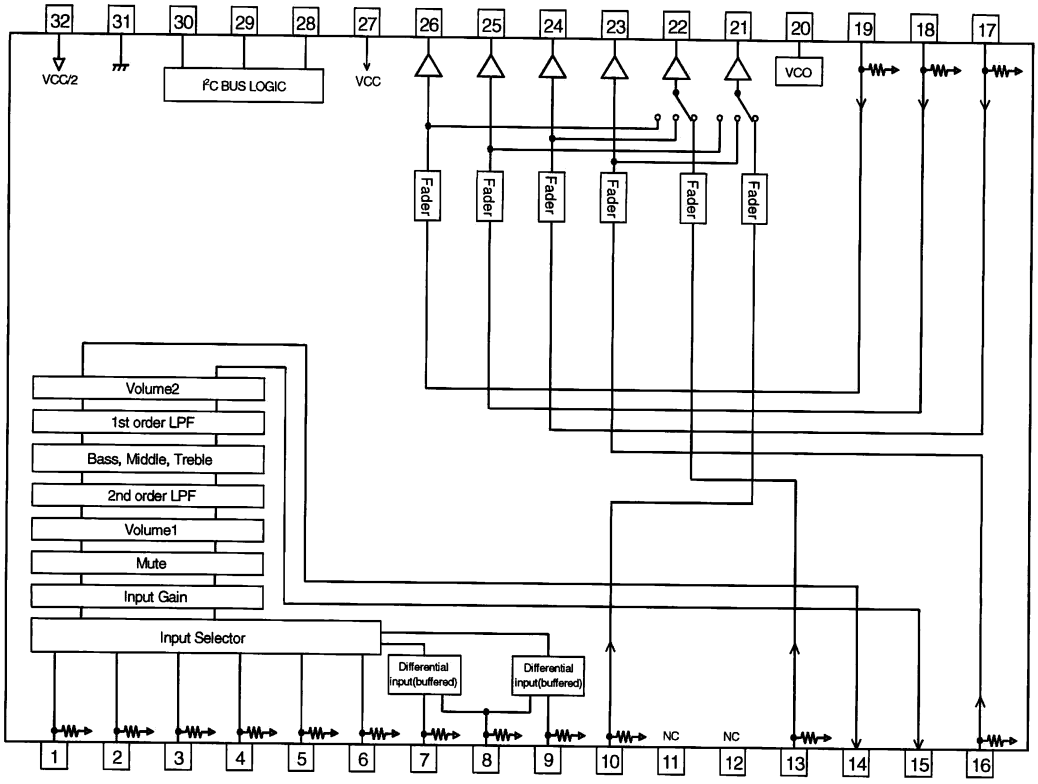
Item	Symbol	Limit			Unit	Condition
		Min.	Typ.	Max.		
Current upon no signal	I_Q	–	36	50	mA	No Signal
Voltage gain	G_V	-1.5	0	1.5	dB	G_V=20log(VOUT/VIN)
Channel balance	CB	-1.5	0	1.5	dB	CB=G_{V1}-G_{V2}
Total harmonic distortion	THD	–	0.007	0.05	%	VOUT=1Vrms BW=400-30kHz
Output noise voltage	V_{NO}	–	10.5	25	μVrms	Rg=0Ω BW=IHF-A
Residual output noise voltage	V_{NOR}	–	2.5	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	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	$G_{F\ BST}$	21	23	25	dB	Gain=23dB VIN=100mVrms G_F=20log (VOUT/VIN)
Maximum attenuation	$G_{F\ MIN}$	–	-100	-90	dB	Volume=-∞dB Gf=20log(VOUT/VIN) BW=IHF-A
Maximum output voltage	V_{OM}	2.0	2.2	–	Vrms	THD+N=1% BW=400-30kHz

●Dimensional outline drawing



SSOP-A32 (Unit : mm)

●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	INS2
11	NC
12	NC
13	INS1
14	VOUT1
15	VOUT2
16	INR2
17	INR1
18	INF2
19	INF1
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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