



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



Sound Processors for Home Theater Systems

2ch Electronic Volume


BD3812F

No.10081EAT03

●Description

BD3812F is an electronic volume having volume, gain amplifier functions necessary for applications in AV receivers, home theatre systems, min-component systems and so forth. Having a chip select terminal, it can be controlled until 4 chips with common bus line.

●Features

- 1) Residual noise : 1.2 μ Vrms {dynamic range : 131dB (IHF-A)}
- 2) 2ch independent volume (0 to -103dB, MUTE 1dB/step)
- 3) 8ch at maximum available in combination of any of BD3811K1, BD3813KS, BD3814FV, BD3815KS (6ch volume) in common bus line
- 4) It can be controlled until 4 chips with common bus line at the same time
- 5) Maximum output voltage : 4.2Vrms (Vcc=7, VEE=-7V, RL=10k Ω)
- 6) 2-line serial control (for both 3.3V and 5V)
- 7) Built-in Output gain amplifier for adjustment of output signal voltage (0, 6 to 18dB, 2dB/step)
- 8) Output mute controllable by serial data and external control terminal

●Applications

AV receivers, home theater systems, mini-component systems, etc.

●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Ratings	Unit
Power supply voltage	VCC	7.5 ^{*1}	V
	VEE	-7.5	
Input signal voltage	VIN	VCC+0.3 to VEE-0.3	V
Power dissipation	Pd	450 ^{*2}	mW
Operating temperature range	Topr	-20 to +75	°C
Storage temperature range	Tastg	-55 to +125	°C

*1 Even in the specified range of Power Supply Voltage, applying voltage only to the VCC side may cause an excessive current to give a permanent damage to the IC.

When starting up power supplies, VEE and VCC should be powered on simultaneously or VEE first; then followed by VCC.

*2 Over Ta=25°C, reduce at the rate of 4.5mW/°C. When installed on the standard board (size: 70x70x1.6mm).

●Operating conditions

It must function normally at Ta=25°C.

Parameter	Symbol	Ratings			Unit
		Min.	Typ.	Max.	
Operating source voltage	VCC	5	7	7.3	V
	VEE	-7.3	-7	-5	

●Electrical characteristics

Ta=25°C, VCC=7V, VEE=-7V, f=1kHz, Vin=1Vrms, RL=10kΩ, Rg=600Ω, Master volume=0dB, Output gain=0dB, unless otherwise specified.

Parameter	Symbol	Limits			Unit	Conditions
		Min.	Typ.	Max.		
Circuit current	VCC	—	2	6	mA	No signal
	VEE	-6	-2	—		
Output voltage gain	Gv	-2	0	2	dB	Measure : Pin14, 13
Total harmonic distortion ratio	THD	—	0.005	0.09	%	Measure : Pin14, 13 BW=400~30kHz
Maximum output voltage	Vomax	3.4	4.2	—	Vrms	Measure : Pin14, 13 THD=1%
Output noise voltage	Vno	—	1.2	5	μVrms	Measure : Pin 14, 13 Rg=0Ω, BW=IHF-A
Input impedance	Rin	20	30	40	kΩ	Measure : Pin1, 3
Cross talk between channels 1ch→2ch	CTC12	—	-100	-70	dB	Measure : Pin13(OUT2) Rg=0Ω, BW=IHF-A Reference : Pin14(OUT1)=1Vrms
Cross talk between channels 2ch→1ch	CTC21	—	-100	-70	dB	Measure : Pin14(OUT1) Rg=0Ω, BW=IHF-A Reference : Pin13(OUT2)=1Vrms
Volume control range	GVR	-106	-103	-100	dB	Measure : Pin 14, 13 Vin=3Vrms
Volume set error 1	VE1	-2	0	2	dB	Measure : Pin 14, 13 0 to -53dB, Vin=3Vrms
Volume set error 2	VE2	-3	0	3	dB	Measure : Pin 14, 13 -54 to -103dB, Vin=3Vrms
Maximum attenuation	Vmin	—	-118	-105	dB	Measure : Pin 14, 13 BW=IHF-A, Vin=3Vrms
Output gain control range	GOG	16	18	20	dB	Measure : Pin 14, 13 Vin=0.4Vrms
Output gain set error	GOE	-2	0	-2	dB	Measure : Pin 14, 13 Vin=0.4Vrms

* This product is not of "anti radiation design".

●Timing chart

1) Signal timing conditions

- Data is read on the rising edge of the clock.
 - Latch is read on the falling edge of the clock.
 - Latch signal must terminate with the LOW state.
- * To avoid malfunctions, clock and data signals must terminate with the LOW state.

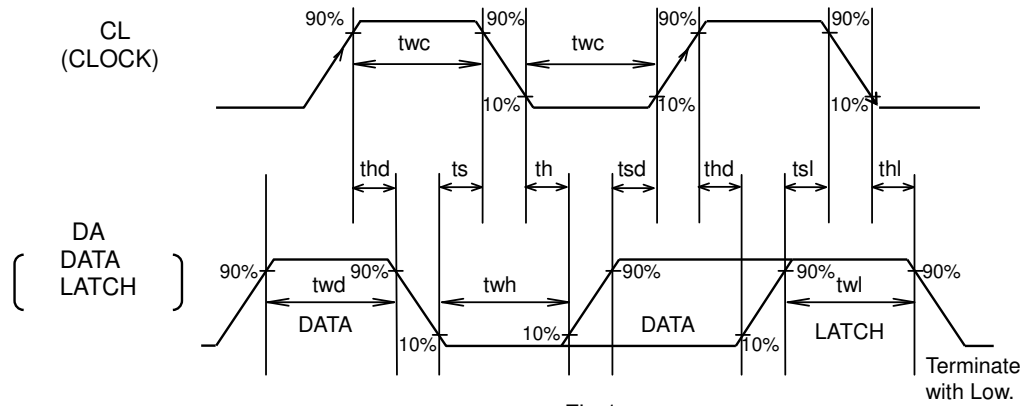


Fig.1

Parameter	Symbol	Limits			Unit
		Min.	Typ.	Max.	
Minimum clock width	twc	2.0	—	—	μs
Minimum data width	twd	2.0	—	—	μs
Minimum latch width	twl	2.0	—	—	μs
LOW hold width	twh	2.0	—	—	μs
Data setup time (DATA→CLK)	tsd	1.0	—	—	μs
Data hold time (CLK→DATA)	thd	1.0	—	—	μs
Latch setup time (CLK→LATCH)	tsl	1.0	—	—	μs
Latch hold time (DATA→LATCH)	thl	1.0	—	—	μs
Latch low setup time	ts	1.0	—	—	μs
Latch low hold time	th	1.0	—	—	μs

2) Voltage conditions for control signal

Parameter	Condition	Limits			Unit
		Min.	Typ.	Max.(≤Vcc)	
“H”input voltage	Vcc=5~7.3V	2.2	—	5.5	V
“L” input voltage	VEE=-5~-7.3V	0	—	1.0	V

3) Basic configuration of control data format

← Input direction

	MSB															LSB	
Data	D16	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
	Data														Select Address		

• Control data format

← Input direction

															Select Address		
Data ①	D16	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
	Master Volume 2ch							Master Volume 1ch							1	1	0
Data ②	D16	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
	*	*	*	*	*	*	*	*	*	*	*	Output gain amp			1	1	1

* is 0 or 1.

By changing the setting of select address, 4 control data formats can be selected.
Do not set the select address data to other than specified above.

At power on, initialize all the data.

← Input direction

MSB	LSB	MSB	LSB
Data①	L	Data②	L

"L" shows latch.

After power on, in the second time or after, only data you want to change can be set.

(Example) When to change bus

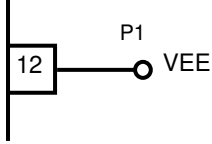
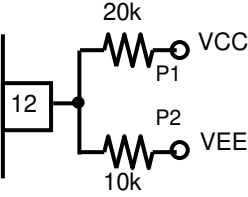
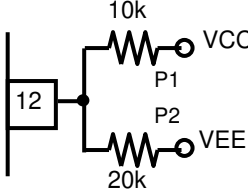
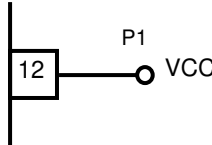
← Input direction

MSB	LSB
Data①	L

"L" shows latch.

4) SEL terminal setting

By determining the SEL terminal voltage, select address can be fixed.
An example of the SEL terminal voltage setting method is shown below.

Setting	P1 Condition	P2 Condition	Setting of SEL(12pin) Terminal	SEL(12pin) Terminal Voltage(V)	Select Address	
					D2	D1
Setting 1	VEE	—		VEE	0	0
Setting 2	VCC	VEE		$VCC/3+2 \times VEE/3$	0	1
Setting 3	VCC	VEE		$VCC/3$	1	0
Setting 4	VCC	—		VCC	1	1

SEL terminal voltage is DGND standard.

When to use several chips of BD3812F

Select address can be changed by setting SEL terminal (12pin), therefore, up to 4 chips can be used on a same bus line. When to use one chip or two chips of this IC, use the setting 1 and the setting 4. In this case, the terminal voltage of 12pin may be VCC or VEE, therefore external resistor of 12pin is unnecessary.

When to use BD3812F and BD3811K1 at the same time

By using BD3812F and BD3811K1 at the same time, independent control of 8ch volume can be made. And control is available on a same bus line. In this case, be sure to set the SEL terminal setting to “setting 4”.

●Application circuit

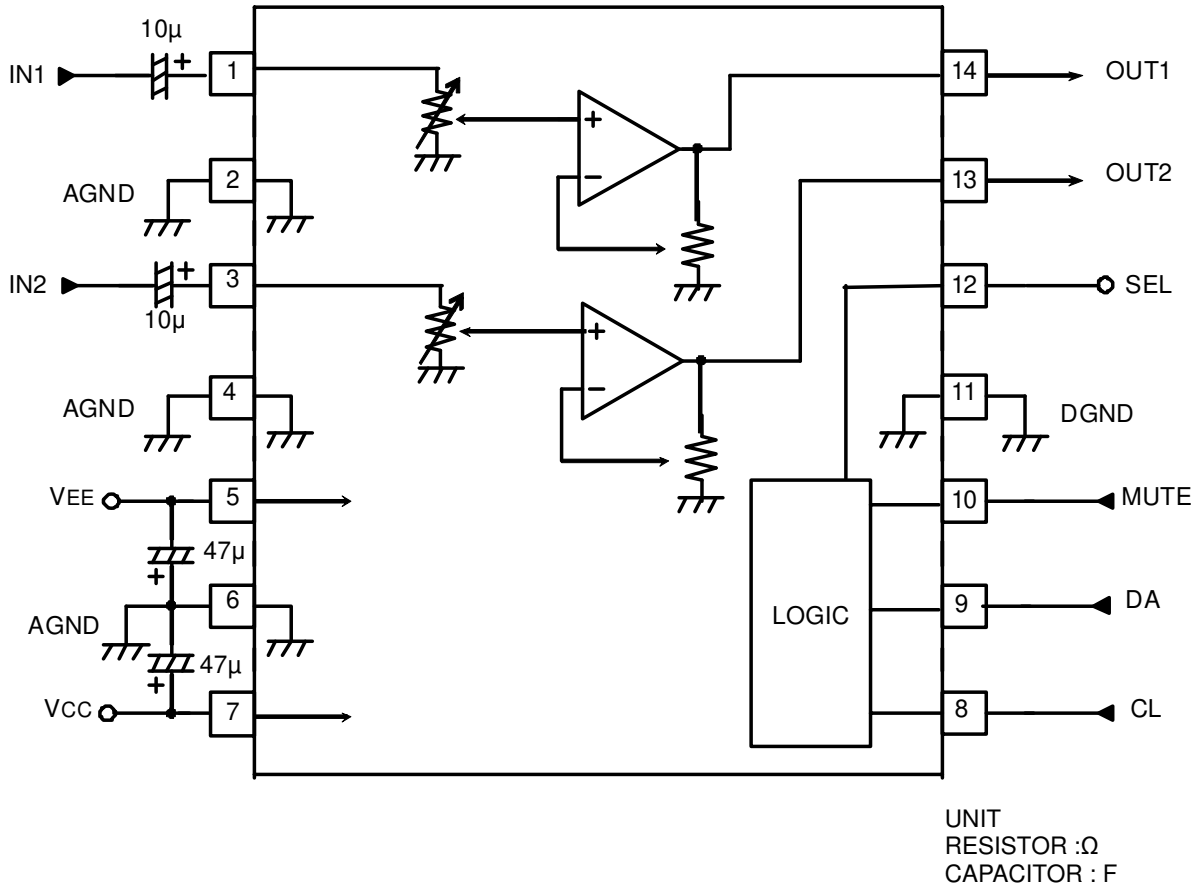


Fig.2

●Reference data

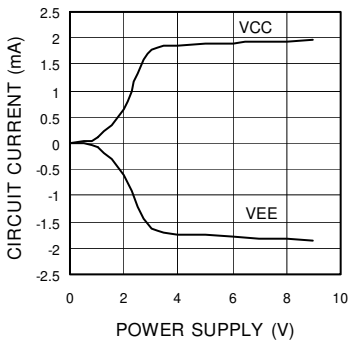


Fig.3 Circuit current - Power supply

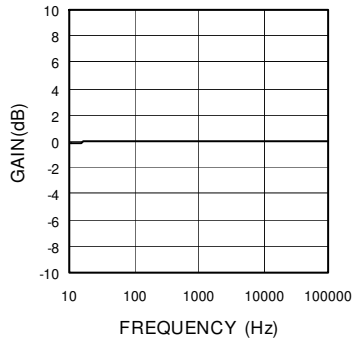


Fig.4 Voltage gain - Frequency

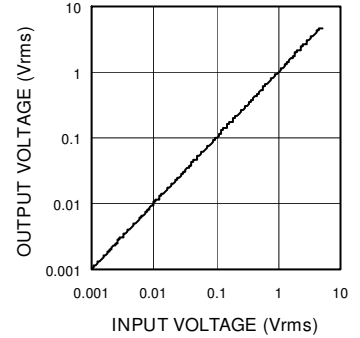


Fig.5 Output voltage - Input voltage

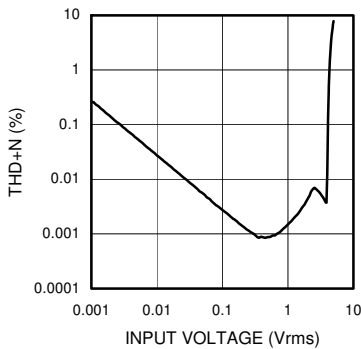


Fig.6 THD+N - Input voltage

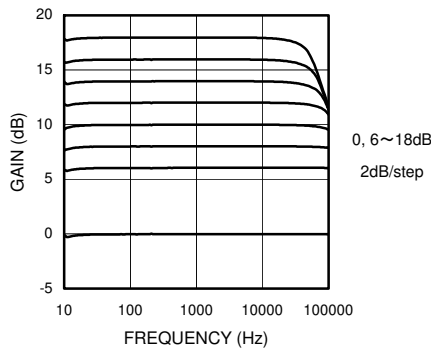


Fig.7 Output gain - Frequency

●Notes for use

- (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) VEE potential
Make the VEE 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 VEE 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) Serial control
For the CL and DA terminals, the patterned and other wirings should be routed not to cause interference with the analog-signal-related lines.
- (9) About power ON/OFF
 - (a) At power ON/OFF, a shock sound will be generated and, therefore, use MUTE on the set.
 - (b) When turning on power supplies, VEE and VCC should be powered on simultaneously or VEE first; then followed by VCC. If the VCC side is started up first, an excessive current may pass VCC through VEE.
- (10) Function switching
For the functions except master volume, use MUTE on the set.
- (11) Reduction of switching noise when changing volume from -3dB to -4dB
In order to reduce switching noise when changing volume from -3dB to -4dB, after switching the switch of -4dB step, change the switch of -1dB step by -1dB.

●Thermal derating characteristic

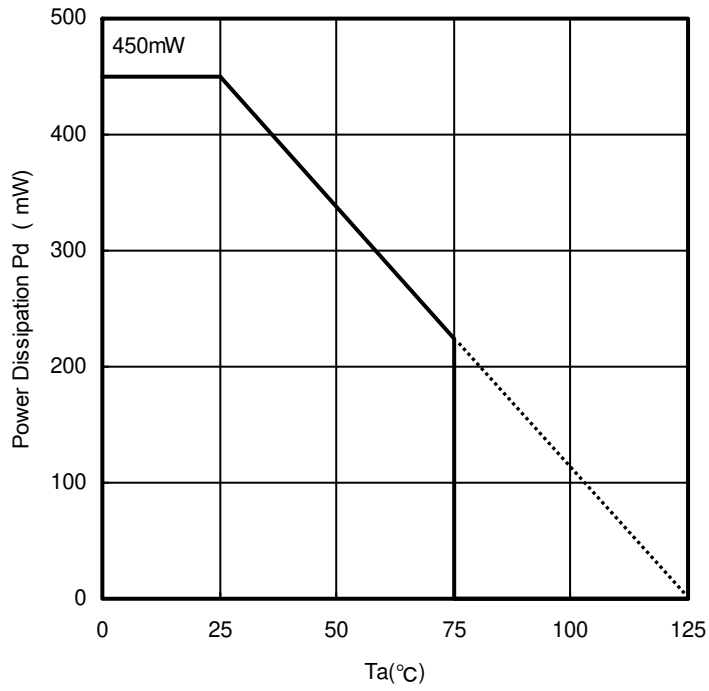


Fig.8

BD3812

ROHM standard board packaging time value

Board size : 70 x 70 x 1.6mm Raw material : FR4 glass epoxy board (copper area 3% or below)

●Ordering part number

B	D
---	---

Part No.

3	8	1	2
---	---	---	---

Part No.

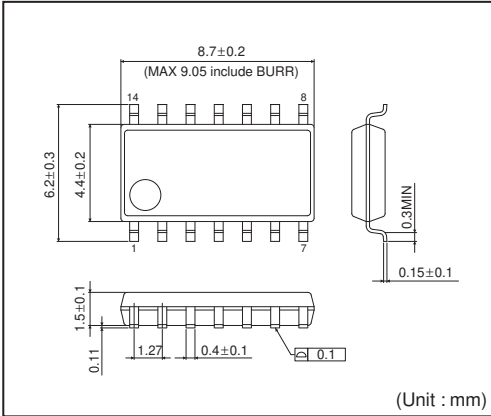
F

Package
F:SOP14

E	2
---	---

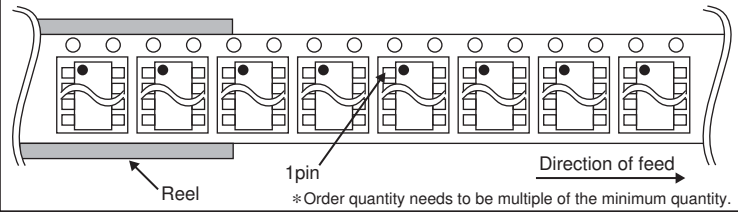
Packaging and forming specification
E2: Embossed tape and reel

SOP14



<Tape and Reel information>

Tape	Embossed carrier tape
Quantity	2500pcs
Direction of feed	E2 (The direction is the 1pin of product is at the upper left when you hold reel on the left hand and you pull out the tape on the right hand)



Notes

No copying or reproduction of this document, in part or in whole, is permitted without the consent of ROHM Co.,Ltd.

The content specified herein is subject to change for improvement without notice.

The content specified herein is for the purpose of introducing ROHM's products (hereinafter "Products"). If you wish to use any such Product, please be sure to refer to the specifications, which can be obtained from ROHM upon request.

Examples of application circuits, circuit constants and any other information contained herein illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

Great care was taken in ensuring the accuracy of the information specified in this document. However, should you incur any damage arising from any inaccuracy or misprint of such information, ROHM shall bear no responsibility for such damage.

The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM and other parties. ROHM shall bear no responsibility whatsoever for any dispute arising from the use of such technical information.

The Products specified in this document are intended to be used with general-use electronic equipment or devices (such as audio visual equipment, office-automation equipment, communication devices, electronic appliances and amusement devices).

The Products specified in this document are not designed to be radiation tolerant.

While ROHM always makes efforts to enhance the quality and reliability of its Products, a Product may fail or malfunction for a variety of reasons.

Please be sure to implement in your equipment using the Products safety measures to guard against the possibility of physical injury, fire or any other damage caused in the event of the failure of any Product, such as derating, redundancy, fire control and fail-safe designs. ROHM shall bear no responsibility whatsoever for your use of any Product outside of the prescribed scope or not in accordance with the instruction manual.

The Products are not designed or manufactured to be used with any equipment, device or system which requires an extremely high level of reliability the failure or malfunction of which may result in a direct threat to human life or create a risk of human injury (such as a medical instrument, transportation equipment, aerospace machinery, nuclear-reactor controller, fuel-controller or other safety device). ROHM shall bear no responsibility in any way for use of any of the Products for the above special purposes. If a Product is intended to be used for any such special purpose, please contact a ROHM sales representative before purchasing.

If you intend to export or ship overseas any Product or technology specified herein that may be controlled under the Foreign Exchange and the Foreign Trade Law, you will be required to obtain a license or permit under the Law.



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

ROHM Customer Support System

<http://www.rohm.com/contact/>