

Structure : Silicon Monolithic Integrated Circuit

Product : Audio Sound Processor for home audio

Type : **BD3872FS**

- Features :
- 1) This IC includes various functions : Loud speaker equalizer, 5-input selector, input gain amplifier, Electronic volume control, surround and tone control (2band)
  - 2) BiCMOS 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.
  - 3) Q factor, the center frequency  $f_0$  and gain G of bass characteristic can be controlled by external parts.
  - 4) The mute switch at an input terminal allows the low cross-talk. It applies to AUX.
  - 5) 2-wire serial control by 3.3V or 5V.
  6. 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 (the total are 10) together, output terminals (the total are 2) too.

**Absolute Maximum Ratings (Ta=25°C)**

Parameter	Symbol	Limits	Unit
Power Supply Voltage	Vcc	10	V
Power Dissipation	Pd	950*	mW
Operating Temperature Range	Topr	-25 to +75	°C
Storage Temperature Range	Tstg	-55 to +125	°C

\*Over Ta=25°C, derating at the rate of 9.5mW/°C. When installed on the standard board (size: 70 × 70 × 1.6mm).

**Operating Voltage Range**

Symbol	Limits	Unit
Vcc	4.5 to 9.5	V

\*It must function normally at Ta=25°C.

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

( $T_a=25^{\circ}\text{C}$ ,  $V_{CC}=8\text{V}$ ,  $f=1\text{kHz}$ ,  $V_i=200\text{mVrms}$ ,  $R_L=10\text{k}\Omega$ ,  $R_g=600\Omega$ , Input Gain=0dB, Volume=0dB, Bass=0dB, Treble=0dB, Surround=OFF, Loud Speaker Equalizer=OFF, unless otherwise noted.)

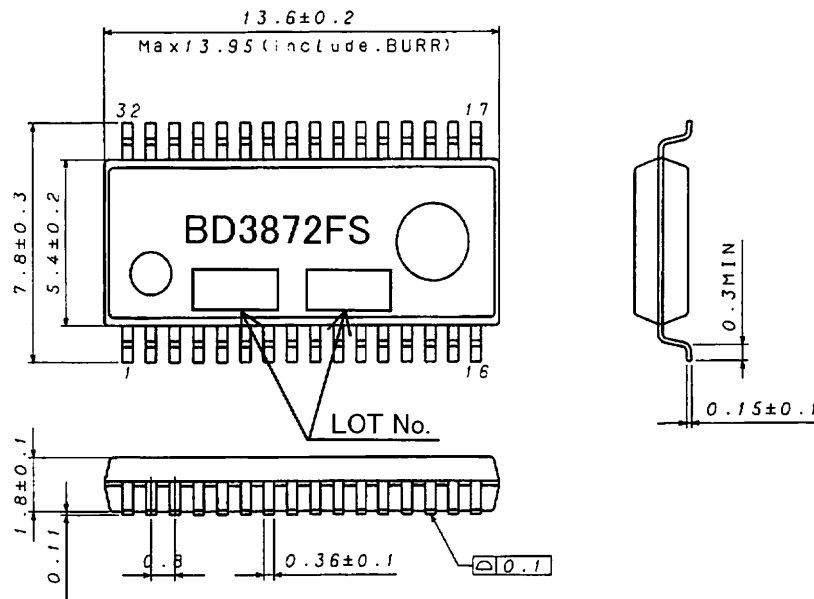
Parameter	Symbol	Limits			Unit	Condition
		Min.	Typ.	Max.		
Circuit Current	IQ	-	8	21	mA	At no signal
Total Output Voltage Gain	Gv	-2	0	2	dB	
Total Harmonic Distortion ratio	THD	-	0.01	0.1	%	Bw=400 to 30kHz
Maximum Output Voltage	Vom	1.6	2.1	-	Vrms	THD=1%, Bw=400 to 30kHz
Total Output Noise Voltage*	Vno	-	4.5	15	$\mu\text{Vrms}$	$R_g=0\Omega$ , Bw=IHF-A,
Total Residual Noise Voltage*	Vmno	-	4.5	15	$\mu\text{Vrms}$	$R_g=0\Omega$ , Vol=- $\infty$ dB, Bw=IHF-A
Cross-talk between Channels*	CTC	-	-80	-70	dB	$R_g=0\Omega$ , Bw=IHF-A OUT=1Vrms
Cross-talk between Selectors*	CTS	-	-80	-70	dB	$R_g=0\Omega$ , Bw=IHF-A
Maximum Volume Attenuation	Vmin	-	-	-90	dB	Bw=IHF-A
Bass Boost Gain (Max)	GBB	12	14	16	dB	$GB=20\log(V_{OUT}/V_{IN})$
Bass Cut Gain (Max)	GBC	-16	-14	-12	dB	$GB=20\log(V_{OUT}/V_{IN})$
Treble Boost Gain (Max)	GTB	12	14	16	dB	$GT=20\log(V_{OUT}/V_{IN})$
Treble Cut Gain (Max)	GTC	-16	-14	-12	dB	$GT=20\log(V_{OUT}/V_{IN})$
Surround Opposite-phase Gain	Vsur	8	10	12	dB	2ch opposite-phase inputs
Loud Speaker Equalizer Gain	Seq	3	5	7	dB	$f=10\text{kHz}$

\*For measurements, VP-9690A (Average value wave detection, Effective value display) IHF-A filter by Matsushita Communication Industrial is used.

\*Phase relation between Input/Output signal terminals is Equiphase.

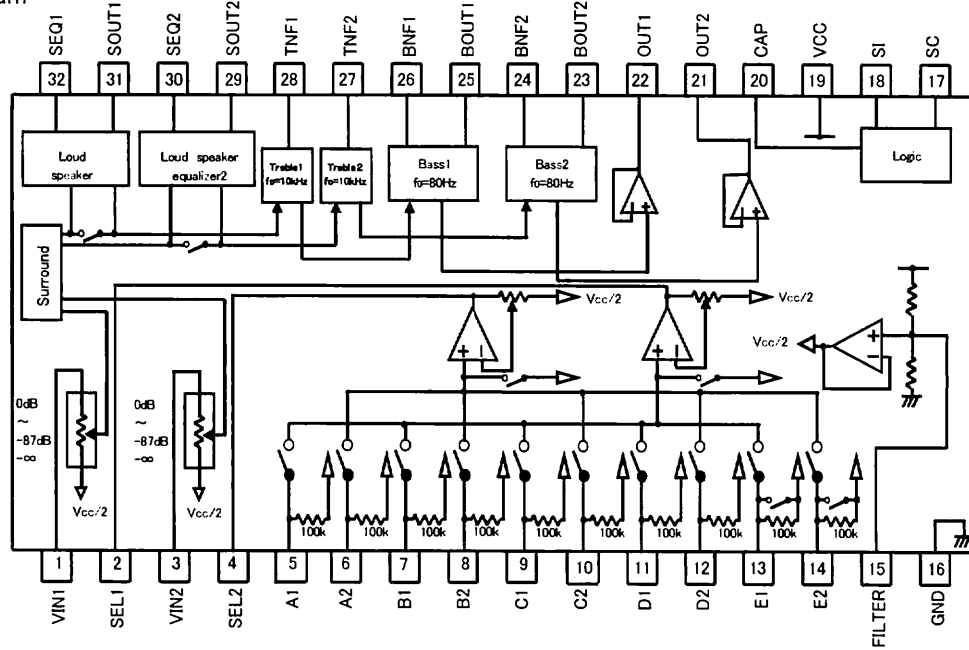
\*Not designed for radiation resistance.

Outline dimensions and Marking diagram



SSOP-A32(Unit:mm)

Block diagram



Terminal description

Terminal number	Terminal name	Terminal description	Terminal number	Terminal name	Terminal description
1	VIN1	1ch volume input terminal	17	SC	Serial clock input terminal
2	SEL1	1ch input selector output terminal	18	SI	Serial data input terminal
3	VIN2	2ch volume input terminal	19	VCC	Power supply terminal
4	SEL2	2ch input selector output terminal	20	CAP	A pin for ON/OFF switching time constant of surround to soften switching noise
5	A1	1ch input terminal A	21	OUT2	2ch output terminal
6	A2	2ch input terminal A	22	OUT1	1ch output terminal
7	B1	1ch input terminal B	23	BOUT2	2ch bass filter setting terminal
8	B2	2ch input terminal B	24	BNF2	2ch bass filter setting terminal
9	C1	1ch input terminal C	25	BOUT1	1ch bass filter setting terminal
10	C2	2ch input terminal C	26	BNF1	1ch bass filter setting terminal
11	D1	1ch input terminal D	27	TNF2	2ch treble filter setting terminal
12	D2	2ch input terminal D	28	TNF1	1ch treble filter setting terminal
13	E1	1ch input terminal E	29	SOUT2	2ch CINEMA SURROUND or loud speaker equalizer setting terminal
14	E2	2ch input terminal E	30	SQI2	2ch CINEMA SURROUND or loud speaker equalizer setting terminal
15	FILTER	1/2 VCC terminal	31	SOUT1	1ch CINEMA SURROUND or loud speaker equalizer setting terminal
16	GND	Grounding terminal	32	SQI1	1ch CINEMA SURROUND or loud speaker equalizer setting terminal

## Caution on use

## 1) About operation voltage supply range

Within operation voltage supply range, basic circuit function Operation is guaranteed within operation ambient temp. But please confirm set up of constant and element, voltage set up and temp set up on use.

## 2) About operation temp range

If it within operation voltage range, circuit function operation is guaranteed within operation temp. it corrallated to conditions of power dissipation to temp.

Please watch out except condition stipulated by electrical characteristics within the range, It cannot guarantee standard value of electrical characteristics. But it retains original function.

## 3) About Power-ON RESET

A built-in circuit for performing initialization inside the IC at Power-ON is provided. In the case of the set design, however, in case of an emergency, it is recommended that data shall be sent to all the addresses as initial data at power-ON and, until this sending operation is completed, the mute shall be applied.

## 4) About 2-wire serial control

As the terminals of SI and SC are designed for inputting high-frequency digital signals, the wiring and layout patterns should be routed not to cause interference with the analog-signal-related lines.

## 5) About function switching

When switching between the volume, bass, and treble functions, the action to absorb such switching shock sound is taken.

## 6) About step switching noise

For Surround and Loud Speaker Equalizer external capacitor C is attached to the CAP pin as the switching step noise control measures.

The time constant, which is used to charge/discharge the external capacitor C (varying between  $V_{be}$  to  $5V_{be}$  (2.65V)) on the CAP pin, controls the soft switching operation.. The switching time constant T is stated as  $T=2.55 \times 10^5 \times C$ .

$V_{be}$  has a temperature characteristic and may affect the time constant T.

## 7) About Input Selector and Input Gain

When setting/changing Input Selector or Input Gain, the soft switching operation is not applied as the noise control measures. Accordingly, it is recommended to provide a mute circuit constructed of the external components for the set design.

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