

Structure : Silicon Monolithic Integrated Circuit

Product : Audio Sound Processor for home audio

Type : **BD3870FS**

- Features :
- 1) Using external components, center frequencies and Q factors of the bass characteristics can be arbitrarily designed.
  - 2) Providing a mute switch onto one of the input pins allows cross-talk suppression.

**Absolute Maximum Ratings(Ta=25°C)**

Parameter	Symbol	Limits	Unit
Power Supply Voltage	Vcc	10	V
Power Dissipation	Pd	800*	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 8.0mW/°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). 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 devices), please be sure to consult with our sales representative in advance.

Electrical characteristics

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

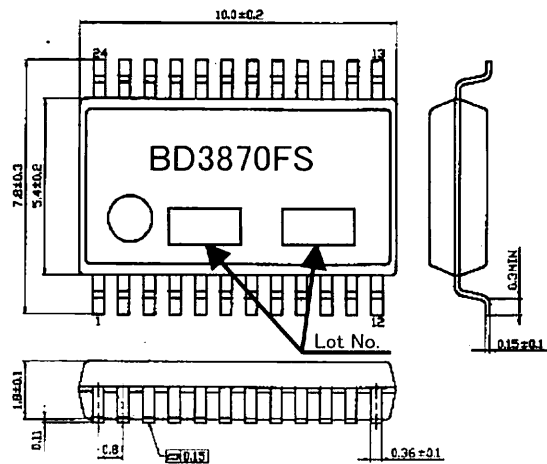
Parameter	Symbol	Limits			Unit	Condition
		Min.	Typ.	Max.		
Circuit Current	IQ	—	8	21	mA	At no signal
Total Output Voltage Gain	Gv	-2	0	2	dB	$G_v=20\log(V_{OUT}/V_{IN})$
Total Harmonic Distortion ratio	THD	—	0.01	0.1	%	Bw=400 to 30kHz
Maximum Output Voltage	Vomax	1.6	2.1	—	Vrms	THD=1%, Bw=400 to 30kHz
Total Output Noise Voltage*	Vno	—	4.5	15	$\mu\text{V}_{\text{rms}}$	$R_g=0\Omega$ , Bw=IHF-A,
Total Residual Noise Voltage*	Vmno	—	4.5	15	$\mu\text{V}_{\text{rms}}$	$R_g=0\Omega$ , $V_{ol}=-\infty\text{dB}$ , Bw=IHF-A,
Cross-talk between Channels*	CTC	—	-80	-70	dB	$R_g=0\Omega$ , Bw=IHF-A, $V_{OUT}=1\text{V}_{\text{rms}}$
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	10	12	14	dB	$GT=20\log(V_{OUT}/V_{IN})$
Treble Cut Gain (Max)	GTC	-14	-12	-10	dB	$GT=20\log(V_{OUT}/V_{IN})$
Surround Opposite-phase Gain	Vsur	8	10	12	dB	2ch opposite-phase inputs

\*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 Equiphas.

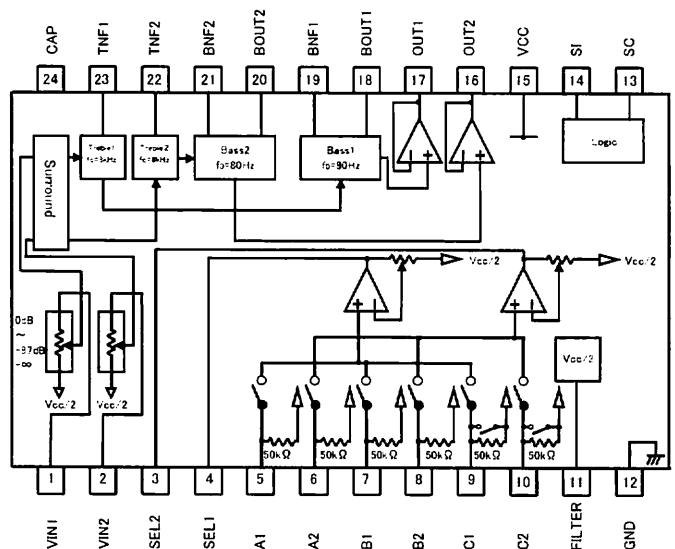
\*Not designed for radiation resistance.

Outline dimensions and Marking diagram



SSOP-A24 (Unit: mm)

Block diagram



Terminal number・Terminal name

Terminal number	Terminal name	Terminal description	Terminal number	Terminal name	Terminal description
1	VIN1	1ch volume input terminal	13	SC	Serial clock input terminal
2	VIN2	2ch volume input terminal	14	SI	Serial data input terminal
3	SEL2	2ch input selector output terminal	15	VCC	Power supply terminal
4	SEL1	1ch input selector output terminal	16	OUT2	2ch output terminal
5	A1	1ch input terminal A	17	OUT1	1ch output terminal
6	A2	2ch input terminal A	18	BOUT1	1ch bass filter setting terminal
7	B1	1ch input terminal B	19	BNF1	1ch bass filter setting terminal
8	B2	2ch input terminal B	20	BOUT2	2ch bass filter setting terminal
9	C1	1ch input terminal C	21	BNF2	2ch bass filter setting terminal
10	C2	2ch input terminal C	22	TNF2	2ch treble filter setting terminal
11	FILTER	1/2 VCC terminal	23	TNF1	1ch treble filter setting terminal
12	GND	Grounding terminal	24	CAP	A pin for ON/OFF switching time constant of surround to soften switching noise

**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 corralled 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**

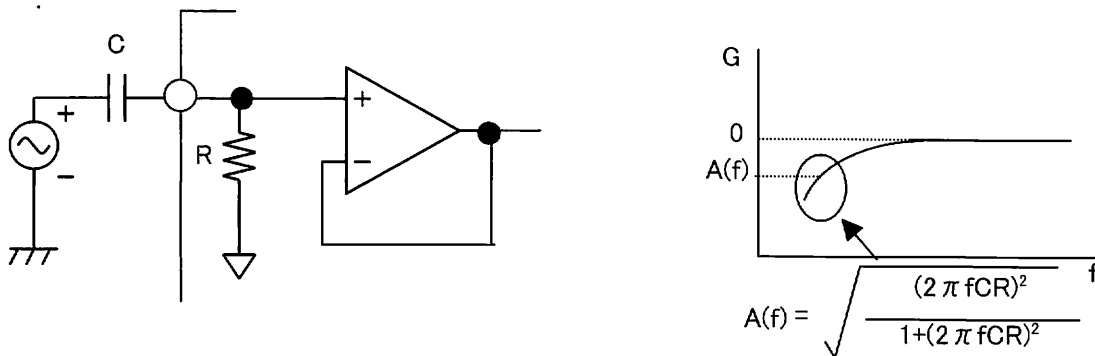
As the terminals of SI and SC are designed for inputting high-frequency digital signals, the wiring and layoutpatterns should be routed not to cause interference with the analog-signal-related lines.

**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 input coupling capacitor

As described in the figure below, low frequency characteristics are determined depending on the external capacitor value for input coupling and the input impedance value inside the IC.



7) About step switching noise

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

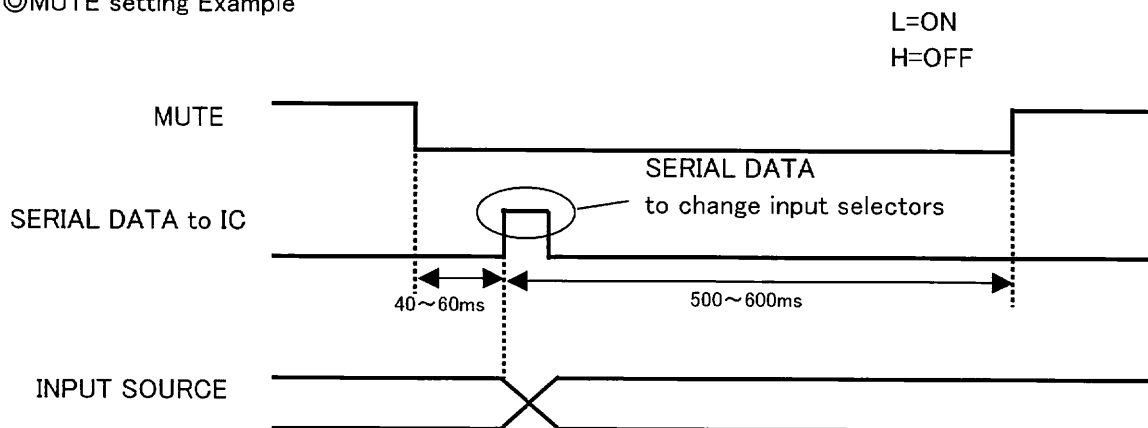
The time constant, which is used to charge/discharge the external capacitor C (varying between  $V_{be}$  to  $5V_{be}$  (2.65V)) on the CAP pin, controls the soft switching operation. The switching time constant T is stated as  $T=2.55 \times 10^5 \times C$ .

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

8) 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.

©MUTE setting Example



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