

## Sound Processors for Home Theater Systems

# 6ch / 9ch Stereo Input Selectors


**BD3843FS, BD3841FS**

No.10081EAT07

**●Description**

BD3843FS is a function switch IC with two 6ch (9ch for BD3841FS) inputs. It can independently control outputs of 2 systems: 2ch REC output (3ch for BD3841FS) and 1ch line output. Therefore, it can be used for 2nd room entertainment and 2nd source recording. BD3843FS has excellent cross-talk characteristics between channels and selectors. Low distortion, and low noise are realized by a basic pattern layout.

**●Features**

- 1) 2 room entertainment / 2 source recording.
- 2) 6ch volume LSI BD3813KS/BD3815KS can be controlled simultaneously by the serial control bus.
- 3) 7ch volume LSI BD3816K1, BD3817KS with BD3843FS can be controlled simultaneously by the serial control bus.
- 4) 14ch input is available by combining 2chips (BD3843FS and BD3841FS).
- 5) Excellent cross-talk characteristics between channels by basic pattern layout.
- 6) Built-in buffer amplifier.
- 7) 2-line serial control bus (for both 3.3V and 5V).
- 8) Operated by single and dual power sources.

**●Applications**

AV receivers, home theater systems, mini-audio systems, and TVs.

**●Product lineup**

| Parameter      | BD3843FS | BD3841FS |
|----------------|----------|----------|
| Input selector | 6        | 9        |
| REC output     | 2        | 3        |
| Package        | SSOP-A24 | SSOP-A32 |

**●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~VEE-0.3                  | V        |
| Power Dissipation     | Pd     | 800 (BD3843FS)<br>950 (BD3841FS) | *2<br>mW |
| Operating temperature | Topr   | -20~+75                          | °C       |
| Storage temperature   | Tastg  | -55~+125                         | °C       |

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

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

\*2 Reduced by 8 mW/°C over 25°C (BD3843FS), when installed on the standard board (size: 70 x 70 x 1.6mm).  
Reduced by 7.7 mW/°C over 25°C (BD3841FS), when installed on the standard board (size: 70 x 70 x 1.6mm).

### ● Operating range

Must function normally at  $T_a = 25^\circ\text{C}$ ,

| Part No. | Parameter   | Symbol   | Ratings |      |      | Unit |
|----------|---|----------|---------|------|------|------|
|          |   |          | Min.    | Typ. | Max. |      |
| BD3843FS | Action power source voltage (both power sources)  | VCC      | 4       | 7    | 7.3  | V    |
|          |   | VEE      | -7.3    | -7   | -4   |      |
|          | Action power source voltage (single power source) | VCC- VEE | 8       | 14   | 14.6 |      |
| BD3841FS | Action power source voltage (both power sources)  | VCC      | 5       | 7    | 7.3  | V    |
|          |   | VEE      | -7.3    | -7   | -5   |      |
|          | Action power source voltage (single power source) | VCC- VEE | 10      | 14   | 14.6 |      |

### ● Electrical characteristics

$T_a=25^\circ\text{C}$ ,  $V_{CC}=7\text{V}$ ,  $V_{EE}=7\text{V}$ ,  $f=1\text{kHz}$ ,  $V_{in}=1\text{V}_{rms}$ ,  $R_L=10\text{k}\Omega$ ,  $R_g=600\Omega$ , unless otherwise noted.

|                                  | Parameter                             |      | Symbol | Limits |       |      | Unit                     | Conditions                               |
|----------------------------------|---------------------------------------|------|--------|--------|-------|------|--------------------------|--|
|                                  |                                       |      |        | Min.   | Typ.  | Max. |                          |  |
|                                  | Circuit current                       | VCC  | IQ     | —      | 3     | 10   | mA                       | No signal                                |
|                                  |                                       | VEE  |        | -10    | -3    | —    |                          |  |
| Output                           | Output voltage gain 1ch               |      | Gv1    | -2     | 0     | 2    | dB                       |  |
|                                  | Output voltage gain 2ch               |      | Gv2    | -2     | 0     | 2    | dB                       |  |
|                                  | Total harmonic distortion ratio 1ch   |      | THD1   | —      | 0.004 | 0.05 | %                        | BW=400~30kHz                             |
|                                  | Total harmonic distortion ratio 2ch   |      | THD2   | —      | 0.004 | 0.05 | %                        | BW=400~30kHz                             |
|                                  | Maximum output voltage 1ch            |      | Vomax1 | 3.4    | 4.2   | —    | Vrms                     | THD=1%                                   |
|                                  | Maximum output voltage 2ch            |      | Vomax2 | 3.4    | 4.2   | —    | Vrms                     | THD=1%                                   |
|                                  | Output noise voltage 1ch              |      | Vno1   | —      | 1     | 5    | $\mu\text{V}_{rms}$      | $R_g=0\Omega$ , BW=IHF-A                 |
|                                  | Output noise voltage 2ch              |      | Vno2   | —      | 1     | 5    | $\mu\text{V}_{rms}$      | $R_g=0\Omega$ , BW=IHF-A                 |
|                                  | Cross-talk between channels 1ch→2ch   |      | CTC12  | —      | -95   | -80  | dB                       | $R_g=0\Omega$ , BW=IHF-A                 |
|                                  | Cross-talk between channels 2ch→1ch   |      | CTC21  | —      | -95   | -80  | dB                       | $R_g=0\Omega$ , BW=IHF-A                 |
|                                  | Cross-talk between selectors 1ch      |      | CTS1   | —      | -95   | -80  | dB                       | $R_g=0\Omega$ , BW=IHF-A                 |
| Cross-talk between selectors 2ch |                                       | CTS2 | —      | -95    | -80   | dB   | $R_g=0\Omega$ , BW=IHF-A |  |
| REC output                       | R voltage gain 1ch                    |      | GVR1   | -2     | 0     | 2    | dB                       | $R_L=47\text{k}\Omega$ ,                 |
|                                  | R voltage gain 2ch                    |      | GVR2   | -2     | 0     | 2    | dB                       | $R_L=47\text{k}\Omega$ ,                 |
|                                  | R Total harmonic distortion ratio 1ch |      | THDR1  | —      | 0.01  | 0.09 | %                        | $R_L=47\text{k}\Omega$ ,<br>BW=400~30kHz |
|                                  | R Total harmonic distortion ratio 2ch |      | THDR2  | —      | 0.01  | 0.09 | %                        | $R_L=47\text{k}\Omega$ ,<br>BW=400~30kHz |
|                                  | R output noise voltage 1ch            |      | VnoR1  | —      | 1     | 5    | $\mu\text{V}_{rms}$      | $R_g=0\Omega$ , BW=IHF-A                 |
|                                  | R output noise voltage 2ch            |      | VnoR2  | —      | 1     | 5    | $\mu\text{V}_{rms}$      | $R_g=0\Omega$ , BW=IHF-A                 |
|                                  | R output impedance 1ch                |      | RoutR1 | —      | 50    | 100  | $\Omega$                 |  |
|                                  | R output impedance 2ch                |      | RoutR2 | —      | 50    | 100  | $\Omega$                 |  |

\* Note: This IC is not designed to be radiation-resistant.

●Timing chart

1. Signal timing standards

- Data is read at the rise of clock.
- Latch is read at the fall of clock.
- End latch signal at LOW.
- \* To avoid malfunctions, clock and data signals must terminate with the LOW state.

1byte=17bit

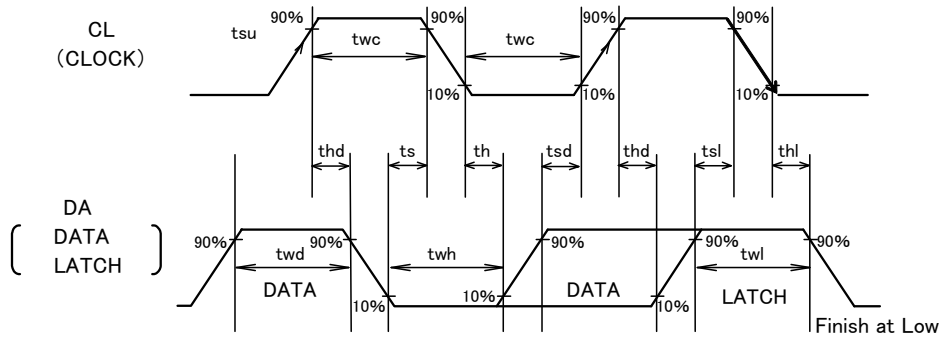


Fig.1

| Parameter                    | Symbol | Limit |      |      | 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 standards of control signal

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

3. Control data format list

(1) BD3843FS control data format

← Data input direction

|      |                  |     |     |     |                  |     |     |    |                       |                       |    |    |    |    |                |    |     |
|------|------------------|-----|-----|-----|------------------|-----|-----|----|-----------------------|-----------------------|----|----|----|----|----------------|----|-----|
|      | MSB              |     |     |     |                  |     |     |    |                       |                       |    |    |    |    |                |    | LSB |
|      | D16              | D15 | D14 | D13 | D12              | D11 | D10 | D9 | D8                    | D7                    | D6 | D5 | D4 | D3 | D2             | D1 | D0  |
| Data | INPUT FUNCTION 1 |     |     |     | INPUT FUNCTION 2 |     |     |    | RECA<br>0:OFF<br>1:ON | RECB<br>0:OFF<br>1:ON | *  | 0  | 0  | 0  | Select Address |    |     |

(2) BD3841FS control data format

← Data input direction

|      |                  |     |     |     |                  |     |     |    |                       |                       |                       |    |    |    |    |    |     |
|------|------------------|-----|-----|-----|------------------|-----|-----|----|-----------------------|-----------------------|-----------------------|----|----|----|----|----|-----|
|      | MSB              |     |     |     |                  |     |     |    |                       |                       |                       |    |    |    |    |    | LSB |
|      | D16              | D15 | D14 | D13 | D12              | D11 | D10 | D9 | D8                    | D7                    | D6                    | D5 | D4 | D3 | D2 | D1 | D0  |
| Data | INPUT FUNCTION 1 |     |     |     | INPUT FUNCTION 2 |     |     |    | RECA<br>0:OFF<br>1:ON | RECB<br>0:OFF<br>1:ON | RECC<br>0:OFF<br>1:ON | *  | *  | *  | 1  | 0  | 1   |

\*:Don't care.

(Ex.)

← Data input direction

|      |     |
|------|-----|
| MSB  | LSB |
| Data | L   |

"L" represents latch.

●Block diagram, application circuit

1)BD3843FS)  
(both power sources)

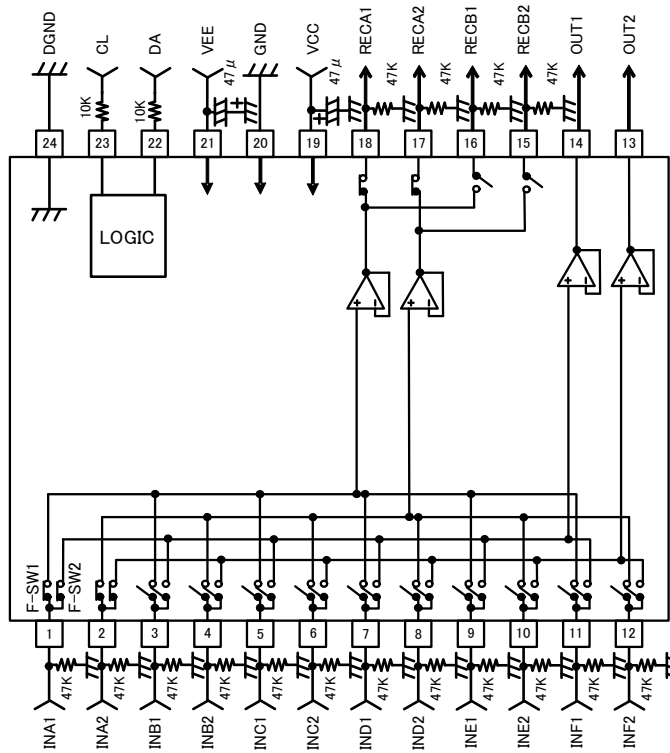


Fig.2

2)BD3841FS  
(both power sources)

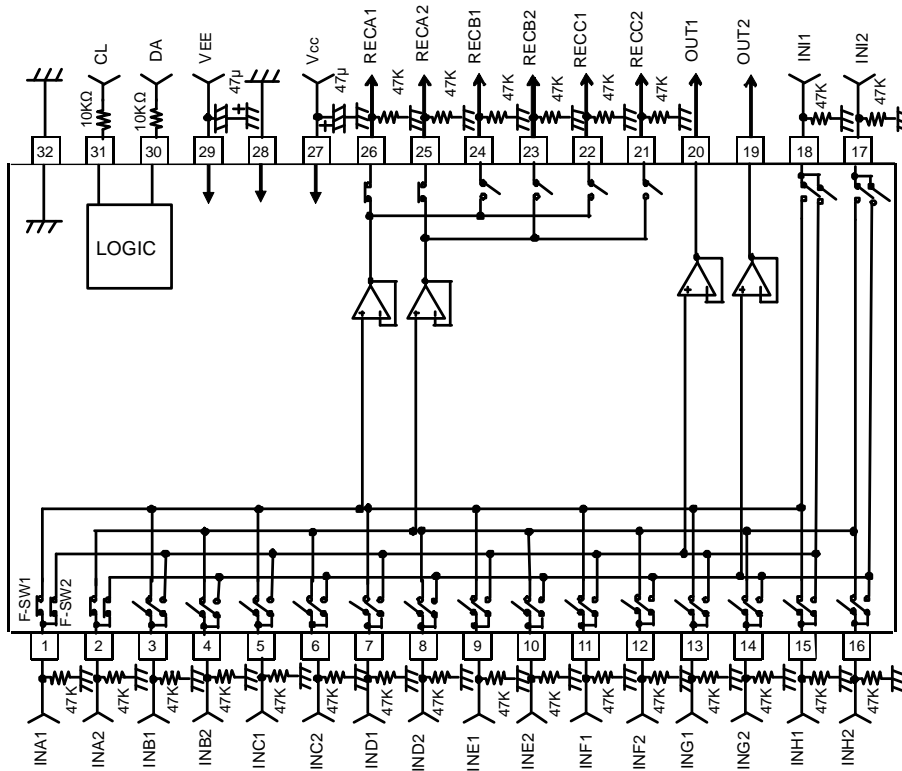


Fig.3

UNIT  
RESISTANCE : Ω  
CAPACITOR : F  
\* F-SW1 : INPUT FUNCTION1  
F-SW2 : INPUT FUNCTION2

3) BD3843FS  
(single power source)

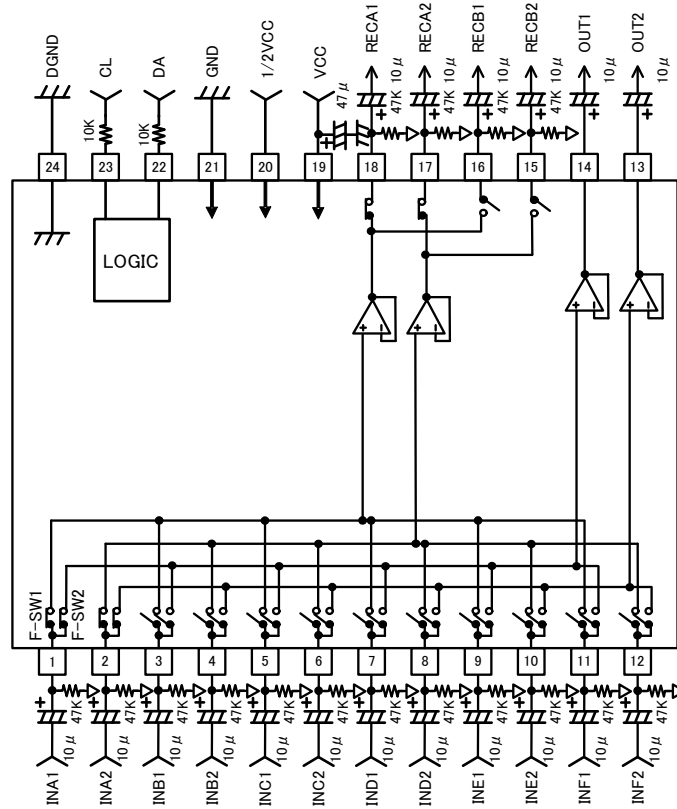


Fig.4

4) BD3841FS  
(single power source)

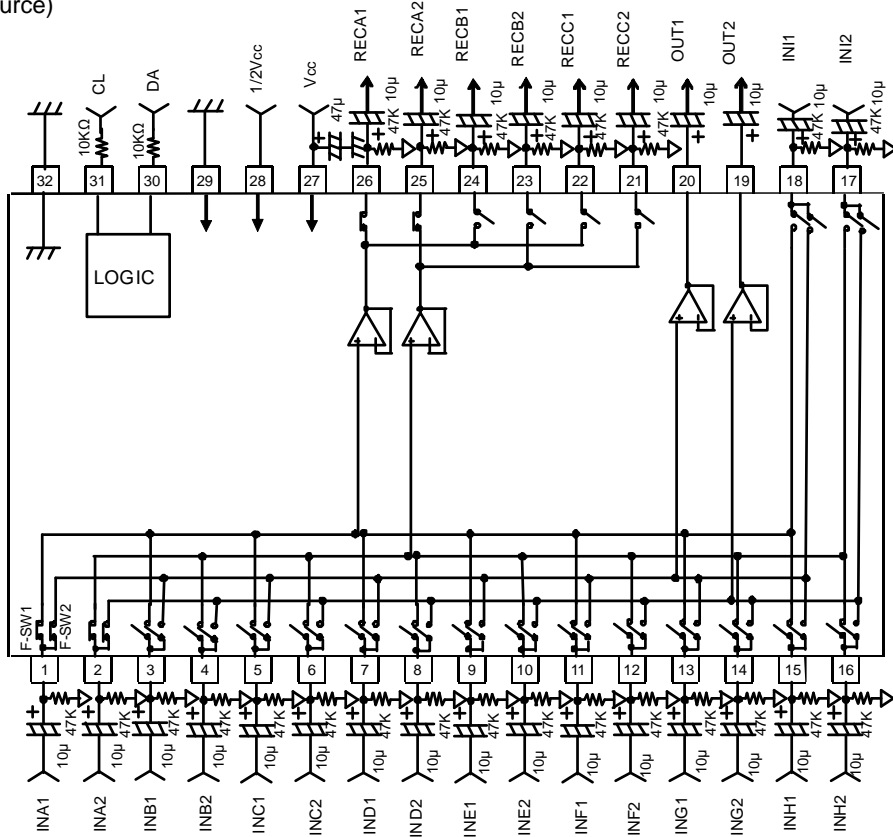


Fig.5

\* F-SW1 : INPUT FUNCTION1  
 F-SW2 : INPUT FUNCTION2

UNIT  
 RESISTANCE : Ω  
 CAPACITOR : F  
 RESISTANCE : Ω

● Reference data

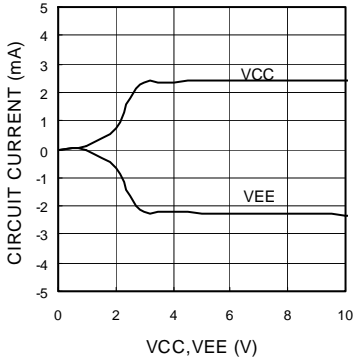


Fig.6 Circuit Current - Supply Voltage

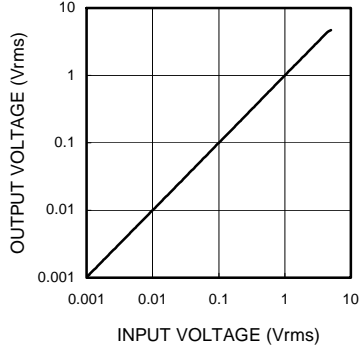


Fig.7 Output Voltage - Input Voltage

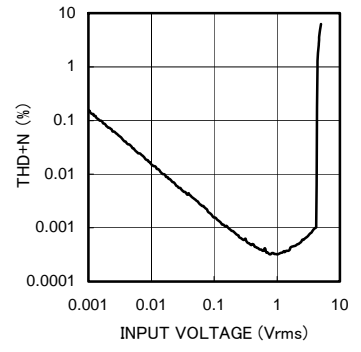


Fig.8 Total Harmonic Distortion - Input Voltage

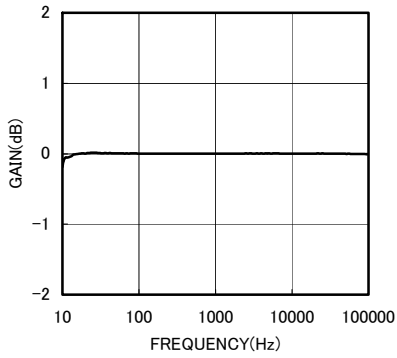


Fig.9 Voltage Gain - Frequency

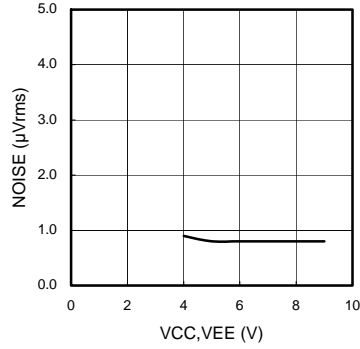


Fig.10 Output Noise Voltage - Supply Voltage

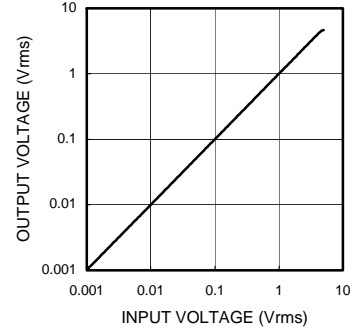


Fig.11 REC Output Voltage - Input Voltage

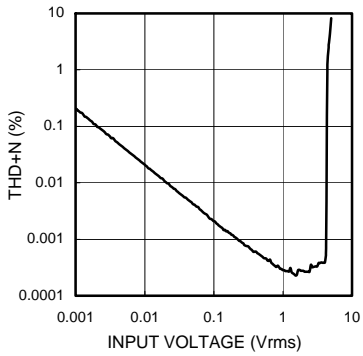


Fig.12 REC Total Harmonic Distortion - Input Voltage

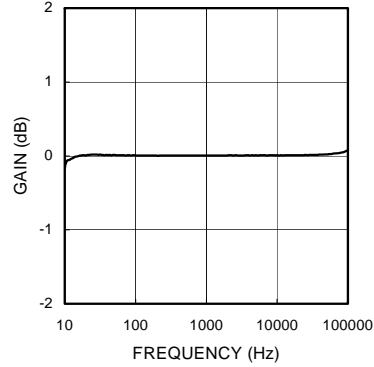


Fig.13 REC Voltage Gain - Frequency

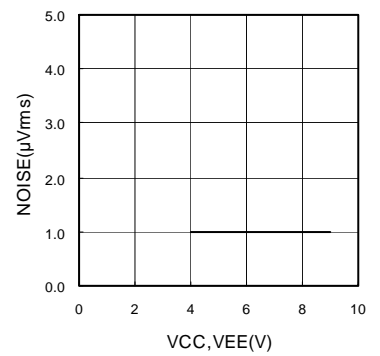


Fig.14 REC Output Noise - Supply Voltage

## ● Notes for use

1. Numbers and data in entries are representative design values and are not guaranteed values of the items.
2. Although ROHM is confident that the example application circuit reflects the best possible recommendations, be sure to verify circuit characteristics for your particular application. Modification of constants for other externally connected circuits may cause variations in both static and transient characteristics for external components as well as this Rohm IC. Allow for sufficient margins when determining circuit constants.
3. Absolute maximum ratings  
Use of the IC in excess of absolute maximum ratings, such as the applied voltage or operating temperature range ( $T_{opr}$ ), may result in IC damage. Assumptions should not be made regarding the state of the IC (short mode or open mode) when such damage is suffered. A physical safety measure, such as a fuse, should be implemented when using the IC at times where the absolute maximum ratings may be exceeded.
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 power dissipation ( $P_d$ ) in actual states of use.
6. Short circuit between terminals and erroneous mounting  
Pay attention to the assembly direction of the ICs. Wrong mounting direction or shorts between terminals, GND, or other components on the circuits, can damage the IC.
7. Operation in strong electromagnetic field  
Using the ICs in a strong electromagnetic field can cause operation malfunction.
8. Operating Voltage Range and Operating Temperature Range  
Circuit function actions are guaranteed within the action voltage range and the action temperature range. However, the specific values of the electrical characteristics are guaranteed under the specified conditions of the electrical characteristics. Therefore, carry out set considerations in sufficient consideration of IC characteristic fluctuations..
9. Power ON/OFF
  - (a) At power ON/OFF, a shock sound will be generated. Therefore, use MUTE on the set.
  - (b) When turning on power supplies, VEE and VCC should be powered on simultaneously, or VEE first followed by VCC. If the VCC side is started up first, an excessive current may flow from VCC to VEE.
10. Serial control  
For the CL and DA terminals, the patterned and other wirings should be routed as not to cause interference with the analog-signal-related lines.
11. Function switching  
For all functions, other than Master Volume, Treble, and Bass Gain Settings, use MUTE on the set.



● Ordering part number

|   |   |
|---|---|
| B | D |
|---|---|

Part No.

|   |   |   |   |
|---|---|---|---|
| 3 | 8 | 4 | 3 |
|---|---|---|---|

Part No.  
3843  
3841

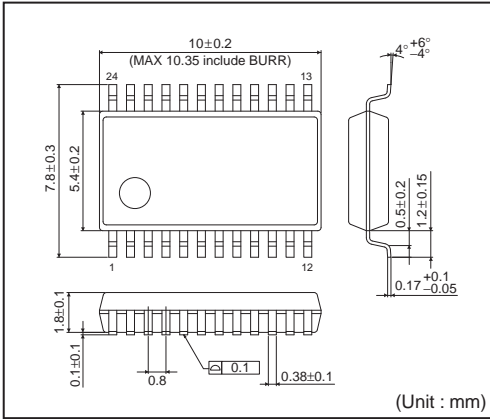
|   |   |
|---|---|
| F | S |
|---|---|

Package  
FS: SSOP-A24  
SSOP-A32

|   |   |
|---|---|
| E | 2 |
|---|---|

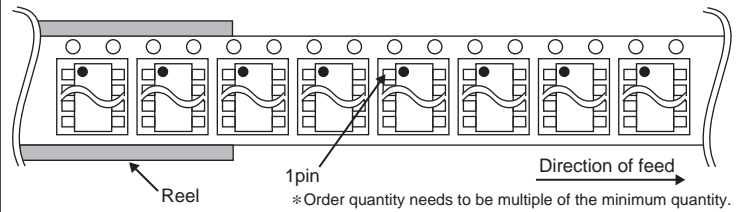
Packaging and forming specification  
None: Tray

SSOP-A24

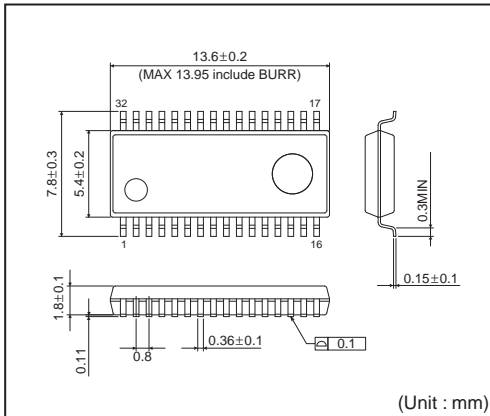


<Tape and Reel information>

|                   |   |
|-------------------|---|
| Tape              | Embossed carrier tape   |
| Quantity          | 2000pcs   |
| Direction of feed | E2<br>( 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 ) |

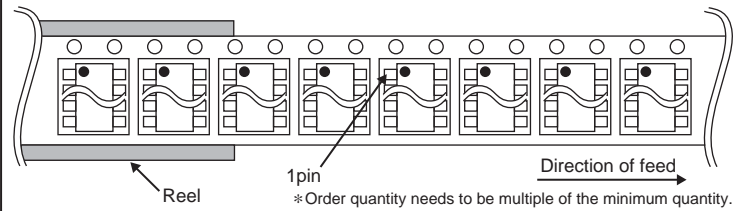


SSOP-A32



<Tape and Reel information>

|                   |   |
|-------------------|---|
| Tape              | Embossed carrier tape   |
| Quantity          | 2000pcs   |
| Direction of feed | E2<br>( 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 ) |



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| JAPAN     | USA       | EU         | CHINA     |
|-----------|-----------|------------|-----------|
| CLASS III | CLASS III | CLASS II b | CLASS III |
| CLASS IV  |           | CLASS III  |           |

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  - Installation of redundant circuits to reduce the impact of single or multiple circuit failure
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  - Use of our Products in any types of liquid, including water, oils, chemicals, and organic solvents
  - Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
  - Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, and NO<sub>2</sub>
  - Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
  - Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
  - Sealing or coating our Products with resin or other coating materials
  - Use of our Products without cleaning residue of flux (even if you use no-clean type fluxes, cleaning residue of flux is recommended); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
  - Use of the Products in places subject to dew condensation
- The Products are not subject to radiation-proof design.
- Please verify and confirm characteristics of the final or mounted products in using the Products.
- In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse. is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
- De-rate Power Dissipation (Pd) depending on Ambient temperature (Ta). When used in sealed area, confirm the actual ambient temperature.
- Confirm that operation temperature is within the specified range described in the product specification.
- ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

## Precaution for Mounting / Circuit board design

- When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.
- In principle, the reflow soldering method must be used; if flow soldering method is preferred, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

**Precautions Regarding Application Examples and External Circuits**

1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.
2. You agree that application notes, reference designs, and associated data and information contained in this document are presented only as guidance for Products use. Therefore, in case you use such information, you are solely responsible for it and you must exercise your own independent verification and judgment in the use of such information contained in this document. ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of such information.

**Precaution for Electrostatic**

This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control).

**Precaution for Storage / Transportation**

1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
  - [a] the Products are exposed to sea winds or corrosive gases, including Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, and NO<sub>2</sub>
  - [b] the temperature or humidity exceeds those recommended by ROHM
  - [c] the Products are exposed to direct sunshine or condensation
  - [d] the Products are exposed to high Electrostatic
2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.
3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

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