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Video/Audio Interfaces for TV and DVD Recorders

NTSC-PAL Audio I/O Interface for Recording/Playing

BD3822FS, BD3824FS

●Description

BD3822FS and BD3824FS are the audio selectors with internal input selector, gain amp, ALC and power save ON/OFF functions. BD3822FS contains the 1/2 power compression amp for level meter and 2ch volume. BD3824FS contains the line amp. BD3822FS and BD3824FS unify the board pattern by pin compatible, and can be used individually as a high-end and low-end model.

●Features

1) Low distortion (0.0015%) and low noise (3.2μVrms) by using a resistance ladder type circuit for volume. Shock sound in switching is also reduced (BD3822FS)
2) Low distortion (0.0015%) and low noises (2.3μVrms)(BD3824FS)
3) Contains an ALC circuit, and can also be used as an RF output
4) Best suited to energy-saving design by low current consumption by using the Bi-CMOS process; compact regulator in the set, being advantageous to heating in terms of quality
5) SSOP-A32 is used for package. The PCB layout can be easy and the area of PCB is reduced by putting sound input terminals together, and output terminals, too.
6) BD3822FS and BD3824FS can be used with the same PCB board.
7) I^2C BUS data format of BD3822FS is upward compatible with BD3824FS, and can be used without changing the software.
8) A system is employed, in which the waveform connected to the input (tuner, Front, Ext) is not distorted even in standby mode.

●Applications

DVD recorder

●Product lineup

Function	BD3822FS	BD3824FS
Volume function	Available	-
1/2 power compression amp	Available	-
Line amp	-	Available
Circuit current (mA)	7	6.4
Output noise (μVrms)	3.2	2.3

BD3822FS is an upstream compatible IC with BD3824FS.

●**Absolute maximum ratings** (Ta=25°C)

Parameter	Symbol	Limits	Unit
Applied voltage	V_{CC}	10.0	V
Input voltage	V_{IN}	V_{CC}+0.3～GND-0.3	V
Power Dissipation	Pd	950 *1	mW
Operating temperature	Topr	-40～+85 *2	°C
Storage temperature	Tastg	-55～+150	°C

*1 Reduced by 7.6 mW/°C at 25°C or higher.
Thermal resistance θja = 131.6 (°C/W), 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%).

*2 As long as voltage stays within operating voltage range, certain circuit operation is guaranteed in the operating temperature range.
Allowable power loss conditions are related to temperature, to which care must be taken.
In addition though the standard value of its electrical characteristics cannot be guaranteed under the conditions other than those specified, basic functions are maintained.

●**Operating range** (Basic operation at Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply voltage *3	VCC	7.0	-	9.5	V

*3 As long as temperature and operating voltage meet specifications
In addition, though the standard value of its electrical characteristics cannot be guaranteed under the conditions other than those specified, basic functions are maintained.

● **Electric characteristics** BD3822FS

(Unless specified: Ta=25℃, VCC=9V, f=1kHz, V_{IN}=1Vrms, Rg=600Ω, RL=10kΩ,Gain Amp=0dB,Volume=0dB, Input terminal=Front1,Output Terminal=OUT1)

	Parameter	Symbol	Limits			Unit	Conditions
			Min.	Typ.	Max.		
GENERAL	Circuit current upon no signal	I_Q	-	7	30	mA	V_{IN}=0Vrms
	Standby current	I_{OFF}	-	540	1000	μA	「Power OFF」 MODE
	Voltage gain	G_V	-1.5	0	1.5	dB	GV=20log(VOUT/VIN)
	Maximum output voltage	V_{OM}	2.0	2.5	-	Vrms	V_{OM} at THD(VOUT)=1% BW=400-30KHz
	Channel balance	CB	-1.5	0	1.5	dB	CB = GV1-GV2 G_{V1}:ch1Gain G_{V2}:ch2 Gain
	Total harmonic distortion	THD	-	0.0015	0.05	%	V_{IN}=2Vrms,Volume=-12dB Gain Amp=5.6dB,BW=400-30KHz
	Output noise voltage *	V_{NO}	-	3.2	16	μVrms	Volume=-12dB,Gain Amp=5.6dB Rg = 0Ω, BW=IHF-A
	Residual noise voltage *	V_{NOR}	-	2	10	μVrms	Volume = -∞dB,Rg = 0Ω, BW=IHF-A
	Cross-talk between channels *	CTC	-	-110	-80	dB	Rg = 0Ω、BW = IHF-A
INPUT	Input impedance	R_{IN}	77	110	143	kΩ	*1)
	Maximum input voltage	V_{IM}	2.1	2.5	-	Vrms	V_{IM} at THD(VOUT)=1% BW=400-30KHz *1)
	Cross-talk between selector	CTS	-	-110	-80	dB	Rg = 0Ω、BW = IHF-A CTS=20log(VOUT/VIN)
	Tuner gain	G_{TU}	10	12	14	dB	Tuner gain=12dB, V_{IN}=0.25Vrms G=20log(VOUT/VIN)
	Output offset voltage	V_{DC}	-20	0	20	mV	Tuner SAP⇔Front1
VOLUME	Volume control range	V_{V1}	-81	-78	-75	dB	G_V=20log(VOUT/VIN),BW = IHF-A
	Maximum attenuation	$G_{V\ MIN1}$	-	-106	-85	dB	Volume = -∞dB, BW = IHF-A G_V=20log(VOUT/VIN)
	Step resolution 1	$G_{V\ STEP1}$	-	1	-	dB	Volume=0～-46dB
	Step resolution 2	$G_{V\ STEP2}$	-	2	-	dB	Volume=-46～-78dB
	Attenuation set error 1	$G_{V\ ERR1}$	-2	0	2	dB	Volume=0～-58dB
	Attenuation set error 2	$G_{V\ ERR2}$	-3	0	3	dB	Volume=-60～-78dB
GAIN AMP	Minimum gain	G_{MIN}	-1.5	0	1.5	dB	Gain Amp=0dB,G=20log(VOUT/VIN)
	Maximum gain	G_{MAX}	4.5	6	7.5	dB	Gain Amp=6dB,VIN=500mVrms G=20log(VOUT/VIN)
	Step resolution	G_{STEP}	-	0.2	-	dB	4.6dB to 5.6dB
	Gain set error	G_{ERR}	-1.5	0	1.5	dB	
MUTE	Mute attenuation	G_{MUTE}	-	-110	-85	dB	Mute ON GMUTE=20log(VOUT/VIN) BW = IHF-A Volume=-∞dB, or -78dB
ALC	ALC I/O level 1	ALC1	-	-3	0	dBV	Suppression level is set to -3dBV.
	ALC I/O level 2	ALC2	-	-5	-2	dBV	Suppression level is set to -5dBV.
	ALC I/O level 3	ALC3	-	-7	-4	dBV	Suppression level is set to -7dBV.
Square-Law Compression Amp	Output offset voltage	$V_{DC\ OFF}$	-	30	100	mV	V_{IN} =0dBV
	DC maximum output voltage	$V_{DC\ MAX}$	2.9	3.7	-	V	V_{IN} =+6dBV
	DC standard output voltage	$V_{DC\ ST}$	1.1	1.5	1.9	V	V_{IN} =-10dBV
	DC voltage difference between channels	$\triangle V_{DC}$	-250	0	250	mV	V_{IN} =-10dBV
	DC output voltage linearity	$\triangle V_{DC}/\triangle V_{IN}$	0.9	1.4	1.9	V	V_{IN} =-30～-6dBV

*1: 1) Refers to 1,2,3,9,10,11,12,13,14,25,26,31,32 pin terminals.

● **Electric characteristics** BD3824FS

(Unless specified: Ta=25℃, VCC=9V, f=1kHz, V_{IN}=1Vrms, Rg=600Ω, RL=10kΩ,Gain Amp=0dB,Volume=0dB, Input terminal=Front1,Output Terminal=OUT1)

	Parameter	Symbol	Limits			Unit	Conditions
			Min.	Typ.	Max.		
GENERAL	Circuit current upon no signal	I_Q	-	6.4	19.2	mA	V_{IN}=0Vrms
	Standby current	I_{OFF}	-	940	1760	μA	「Power OFF」 MODE
	Voltage gain	G_V	-7.6	-6.1	-4.6	dB	G_V=20log(VOUT/VIN), RL2=10kΩ
	Maximum output voltage 1	V_{OM1}	1.68	2.1	-	Vrms	Output terminal = OUT1/OUT2, RL2=10kΩ V_{OM} at THD(VOUT)=1% Gain Amp=5dB, BW=400-30kHz
	Maximum output voltage 2	V_{OM2}	2.0	2.5	-	Vrms	Output terminal=RF OUT V_{OM} at THD(VOUT)=1% ALC=OFF, RL2=10kΩ BW=400-30kHz
	Maximum output voltage 3	V_{OM3}	2.2	2.5	-	Vrms	Output terminal= LINE OUT1/LINE OUT2 V_{OM} at THD(VOUT)=1% RL1=4.7kΩ External LPF Gvc=6dB BW=400-30kHz
	Channel balance	CB	-1.5	0	1.5	dB	CB = G_{V1}-G_{V2} G_{V1}:ch1Gain G_{V2}:ch2 Gain
	Total harmonic distortion	THD	-	0.0015	0.05	%	V_{IN}=2Vrms,BW=400-30KHz
	Output noise voltage *	V_{NO}	-	2.3	11.5	μVrms	Rg = 0Ω, BW=IHF-A
	Cross-talk between channels *	CTC	-	-100	-80	dB	Rg = 0Ω,BW = IHF-A
INPUT	Input impedance	R_{IN}	77	110	143	kΩ	*2)
	Maximum input voltage	V_{IM}	2.1	2.5	-	Vrms	V_{IM} at THD(VOUT)=1% BW=400-30KHz*2)
	Cross-talk between selector *	CTS	-	-105	-80	dB	Rg = 0Ω,BW = IHF-A CTS=20log(VOUT/VIN)
	Tuner gain	G_{TU}	10	12	14	dB	Tuner gain=12dB V_{IN}=0.25Vrms, G=20log(VOUT/VIN)
	Output offset voltage	V_{DC}	-20	0	20	mV	Tuner1⇔Front1, Tuner Gain = 8dB
GAINAMP	Minimum gain	G_{MIN}	-1.5	0	1.5	dB	Gain Amp=0dB G=20log(VOUT/VIN)
	Maximum gain	G_{MAX}	3.5	5	6.5	dB	Gain Amp=5dB,VIN=500mVrms G=20log(VOUT/VIN)
RF MUTE	Mute attenuation	G_{MUTE}	-	-110	-85	dB	Mute ON, BW = IHF-A GMUTE=20log(VOUT/VIN)
ALC	ALC I/O level 1	ALC1	-	-3	0	dBV	Suppression level is set to -3dBV.
	ALC I/O level 2	ALC2	-	-5	-2	dBV	Suppression level is set to -5dBV.
	ALC I/O level 3	ALC3	-	-7	-4	dBV	Suppression level is set to -7dBV.

1. *2) Refers to 2,3,9,10,11,12,13,14,31,32pin terminals.
2. VP-9690A (Average value detection, effective value display) IHF-A filter by Matsushita Communication is used fo measurement.
3. Phase between input/output is the same.
4. This IC is not designed to be radiation-resistant.

●**Example of application circuit**

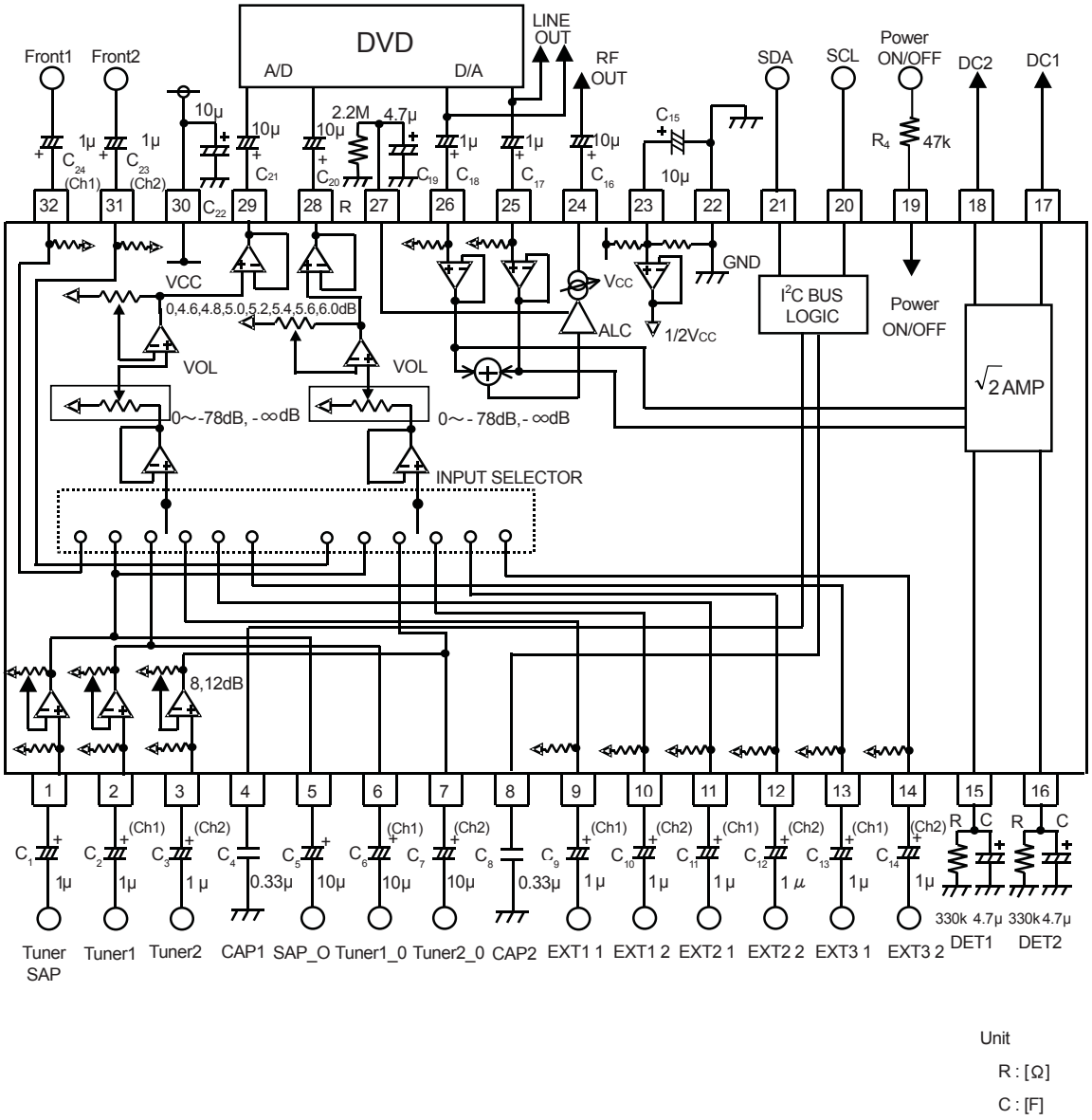
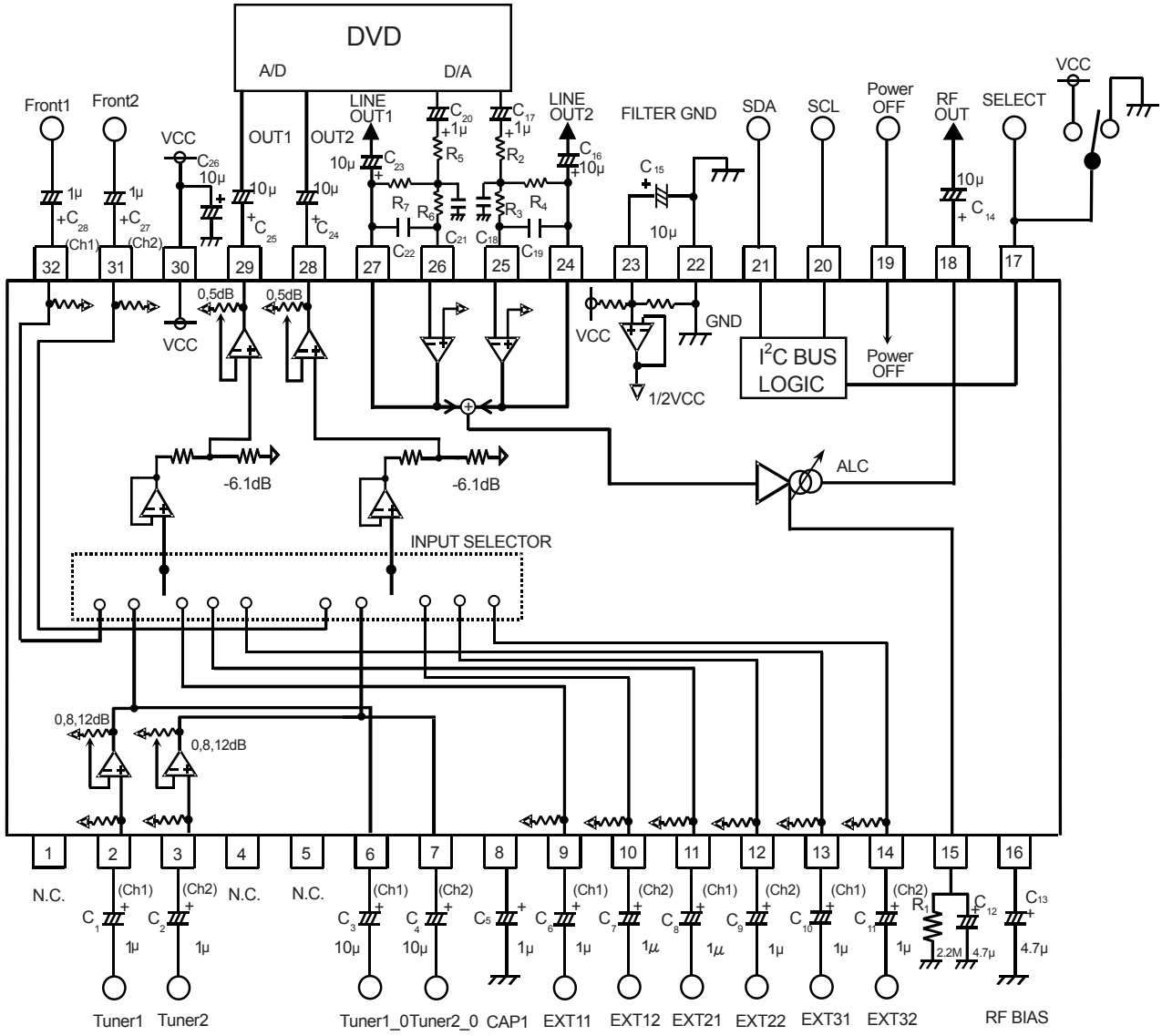


Fig.1 Example of application circuit (BD3822FS)

●**Example of application circuit**



Unit
R : [Ω]
C : [F]

Fig.2 Example of application circuit (BD3824FS)

●**Reference data**

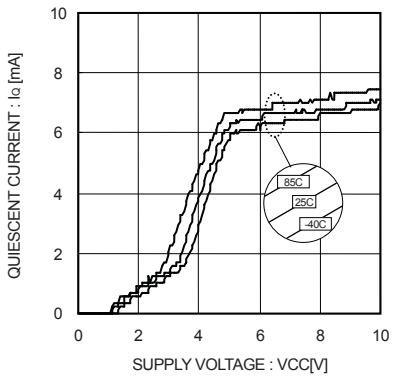


Fig.3 Quiescent current vs Supply voltage (BD3822FS)

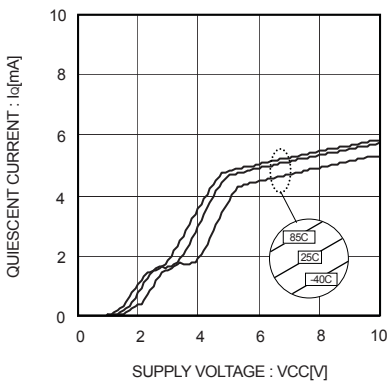


Fig.4 Quiescent current vs Supply voltage (BD3824FS)

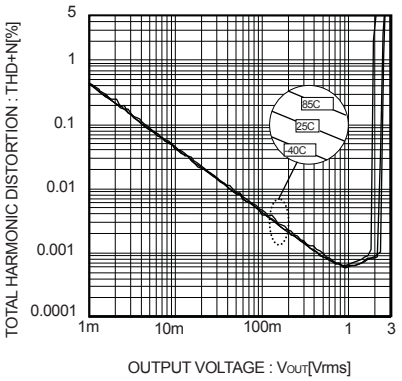


Fig.5 Total harmonic distortion vs Output voltage (BD3822FS)

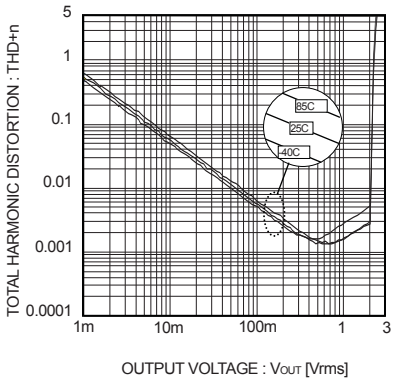


Fig.6 Total harmonic distortion vs Output voltage (BD3824FS)

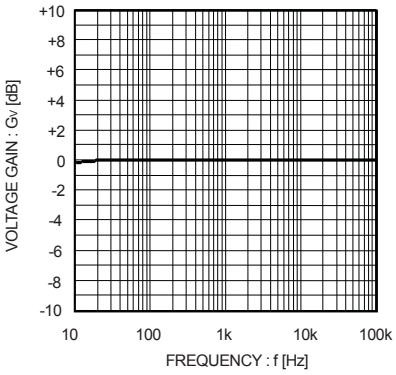


Fig.7 Voltage gain vs Frequency (BD3822FS)

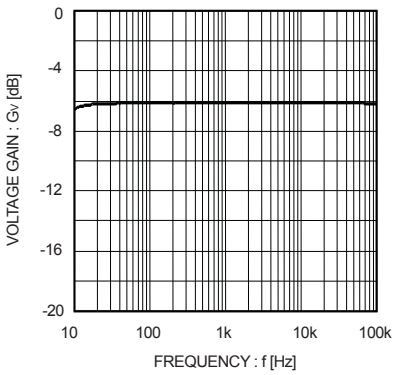


Fig.8 Voltage gain vs Frequency (BD3824FS)

-

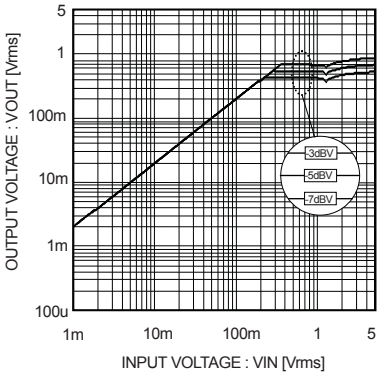


Fig.9 ALC I/O characteristic (BD3822FS)

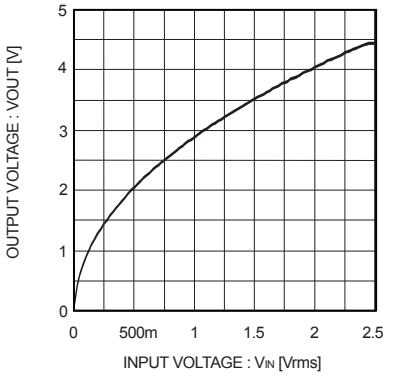


Fig.10 Square-Low Compression amp I/O characteristic (BD3824FS)

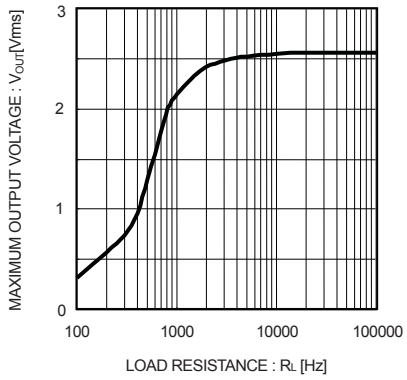


Fig.11 Output load characteristic (BD3822FS, BD3824FS)

●Operation Notes

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 (Topr), 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. GND potential
   Ensure a minimum GND pin potential in all operating conditions. Make sure that no pins are at a voltage below the GND at any time, regardless of whether it is a transient signal or not.
5. Thermal design
   Perform thermal design, in which there are adequate margins, by taking into account the permissible dissipation (Pd) 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.

●**Selection of order type**

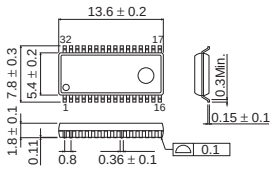
B	D	3	8	2	2	F	S	—	E	2

Part No.
BD3822FS
BD3824FS

Tape and Reel information

SSOP-A32

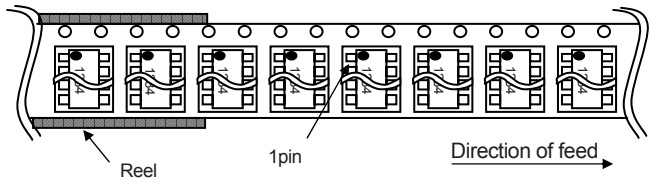
<Dimension>



(Unit:mm)

<Tape and Reel information>

Tape	Embossed carrier tape
Quantity	2000pcs
Direction of feed	E2 (Correct direction: 1pin of product should be 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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