◇Structure Silicon monolithic integrated circuit
◇Classification Monaural audio interface with CODEC
◇Product BU7812KN
◇Features ・Monaural microphone amplifier with stereo ALC functions + 16-bit Δ Σ CODEC + Line amplifier + BTL speaker amplifier
・PLL built-in (Reference clock: 12MHz/24MHz/16fs)

◇Absolute maximum ratings (Ta=25℃)

Parameter	Symbol	Limits	Unit	Remarks
Power Supply voltage	VDD	−0.3～4.5	V	AVDD、SPVDD、DVDD
Terminal voltage	VIN	−0.3～VDD+0.3	V	
Storage temperature range	TSTG	−50～125	℃	
Operating temperature range	TOPE	−10～70	℃	
Permissible dissipation ＊1	PD	580	mW	

＊1 : For installed glass epoxy board (copper plate:35 μm in thickness, 70x70 mm, t=0.8 mm)
over Ta=25℃,loss decreases at a rate of 5.8mW each time the temperature rises 1℃.

◇Operating conditions

Parameter	Symbol	Limits			Unit	Condition
		MIN.	TYP.	MAX.		
Operating supply voltage range	VDD	2.7	3.3	3.6	V	AVDD、SPVDD、DVDD

＊This product is no antiradiation design.

◇Electrical Characteristics (Ta=25℃,AVDD=DVDD=SPVDD=3.3V, unless otherwise stated)

Parameter	Symbol	Limits			Unit	Condition
		MIN.	TYP.	MAX.		
Current consumption	IDDPD	−	0.2	0.6	mA	at power down mode
	IDDREC	−	9.1	18.4	mA	at recording mode＋PLL ON
	IDDPB	−	8.0	16.0	mA	at playback mode＋PLL ON
Input level at recording	VIN	−41.0	−39.0	−37.0	dBV	ADOUT,DOUT=0dBFS
Distortion at recording	THD+N	55	70	−	dB	ADOUT,DOUT=−6dBFS@1kHz
SNR at recording	SNR	72	79	−	dB	ADOUT,B.W.=JIS-A
ALC output level at recording	DOALC	−	−6.3	−	dBFS	ADOUT,ALC1=ON
Output voltage for microphone	VOREG	2.1	2.3	2.5	V	Load resistance : 2.2kΩ
Output level at playback	VO	−5.5	−4.0	−2.5	dBV	LINEOUT,DIN=−6dBFS
		1.0	3.0	5.0	dBV	SPOUT,DIN=0dBFS
Distortion at playback	THD+N	59	79	−	dB	LINEOUT,DIN=−6dBFS@1kHz
		47	62	−	dB	SPOUT,DIN=0dBFS@1kHz
SNR at playback	SNR	85	92	−	dB	LINEOUT,B.W.=JIS-A
		76	83	−	dB	SPOUT,B.W.=JIS-A
ALC output level at playback	VOALC	1.0	3.0	5.0	dBV	SPOUT,ALC2=ON, EVR=8dB
BEEP gain	GV	11.5	13.5	15.5	dB	BEEPIN→SPOUT
Input impedance	ZIN	25	42	60	kΩ	BEEPIN
L input voltage	VIL	DVSS	—	0.3DVDD	V	
H input voltage	VIH	0.7DVDD	—	DVDD	V	

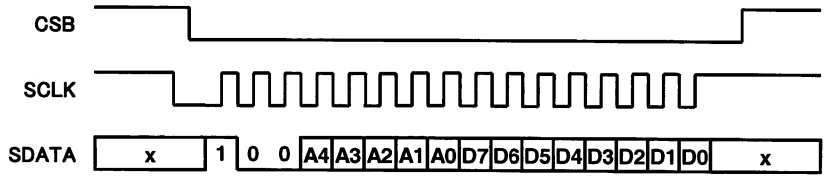
Status of this document
The Japanese version of this document is the formal specification.
A customer may use this translation version only for a reference to help reading the formal version.
If there are any differences in translation version of this document, formal version takes priority.

Application example
The application circuit is recommended for use. Make sure to confirm the adequacy of the characteristics.
When using the circuit with changes to the external circuit constants, make sure to leave an adequate margin for external components including static
and transitional characteristics as well as dispersion of the IC.
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.

ROHM assumes to responsibility for use of any circuits described herein, conveys no license under any patent or other right, and makes no representations that the circuits are free from patent infringement.

◇Serial interface/Register map



addr	register	D7	D6	D5	D4	D3	D2	D1	D0
00H	Power control	HDMD	0	PWAP	PWMRG	MDSP	MDPB	MDREC	MDPLL
01H	Level mute control	ALC1	ALC2	ADA	MGAIN	MUBSP	MUSP	MULO	MUDA
02H	CODEC control	0	0	0	0	0	DIF2	DIF1	DIF0
03H	Clock control	0	PLX5B	FRCLK1	FMCLK	SFS1	SFS0	DIV1	DIV0
04H	BEEP volume control	0	0	0	0	0	BVOL2	BVOL1	BVOL0
05H	EVR volume control	0	0	EVR5	EVR4	EVR3	EVR2	EVR1	EVR0
06H	ALC control	RCMC1	RCMC0	ATMC1	ATMC0	RCSP1	RCSP0	ATSP1	ATSP0
0AH	DAC volume control	0	0	0	0	DVOL3	DVOL2	DVOL1	DVOL0
0BH	REC pre-charge control	RINI1	RINI0	0	0	0	0	0	0

◇Audio interface

<Digital audio format>

- Master or Slave
- MSB justified DSP 1-4 or (ADC MSB justified + DAC LSB justified) or IIS

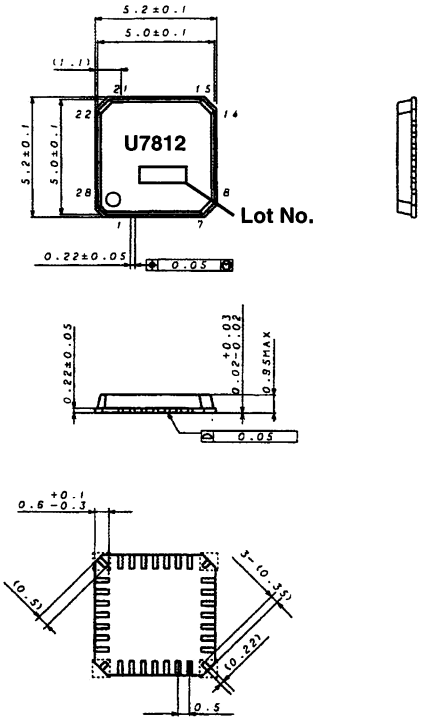
<Sampling frequency>

- 8KHz、12KHz、16KHz、24KHz、32KHz、48KHz
- 11.025KHz、22.05KHz、44.1KHz

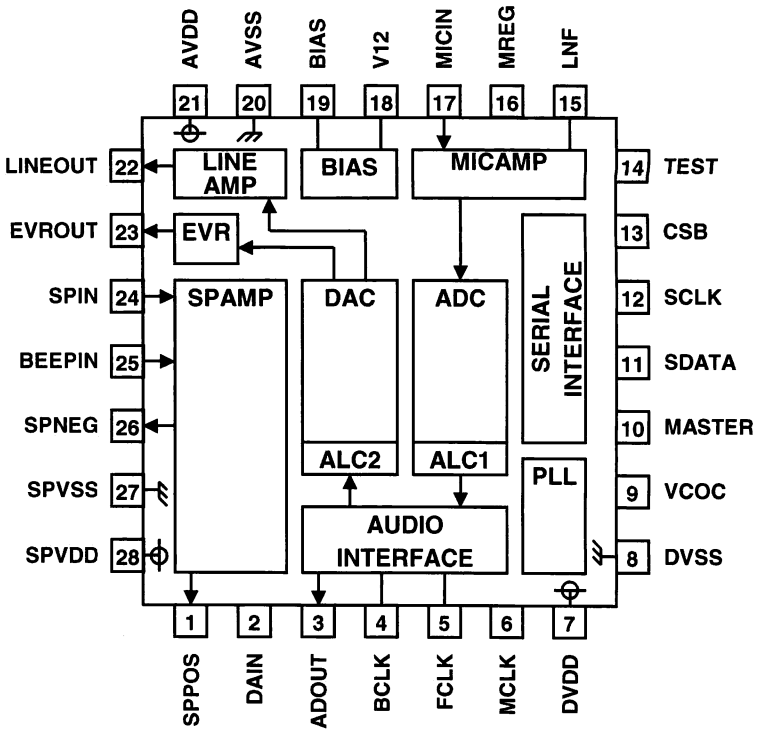
(Ta=25℃、DVDD= 3.3V , unless otherwise stated)

Parameter	Symbol	Limits			Unit	Condition
		MIN.	TYP.	MAX.		
MCLK frequency at PLL mode	fMCLK1	—	12	—	MHz	12MHz mode
		—	24	—	MHz	24MHz mode
		—	16fs	—	KHz	16fs mode
MCLK frequency at non PLL mode	fMCLK2	—	256fs	—	Hz	fs=30kHz～48kHz
		—	512fs	—	Hz	fs=15kHz～30kHz
		—	1024fs	—	Hz	fs=8kHz～15kHz
Sampling frequency	fs	8	—	48	KHz	Non PLL mode
FCLK frequency	fFCLK	—	fs	—	Hz	
BCLK output frequency	foutBCLK	—	32fs	—	Hz	Master
BCLK input frequency	finBCLK	16fs	—	64fs	Hz	Slave+at DSP mode
		32fs	—	64fs	Hz	Slave+at Non DSP mode

◇External dimensions/Marking figure(VQFN28)



◇Pin Number/Pin name/Block diagram



Note) Mounting on the portions indicated by dotted lines is not recommended.

Drawing no: EX344-5001-4

◇Cautions on 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 charcteristics.

(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) GND potential
Make the GND 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 GND 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.

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As of 18th. April 2005