

STRUCTURE	Silicon Monolithic Integrated Circuit
PRODUCT NAME	Monaural Audio Interface LSI for Digital still camera
MODEL NAME	<b>BH6412KN</b>
FEATURES	<ul style="list-style-type: none"> <li>• Built-in circuit against line output noise</li> <li>• LPF with control variable cutoff and trap frequencies</li> </ul>

○ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Applied voltage	AVCC SPVCC	4.5	V
Power dissipation	Pd	580 *	mW
Operating Temperature Range	Topr	-20 to +70	°C
Storage Temperature Range	Tstg	-55 to +125	°C

\* Glass epoxy board with a dimension of 70mm \* 70mm \* 0.8mm.  
Over Ta=25°C, this value decreases at 5.8mW/°C.

○ Operating Range

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating supply voltage	AVCC SPVCC	2.7	3.0	3.6	V

\* Not designed against radiation

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.)

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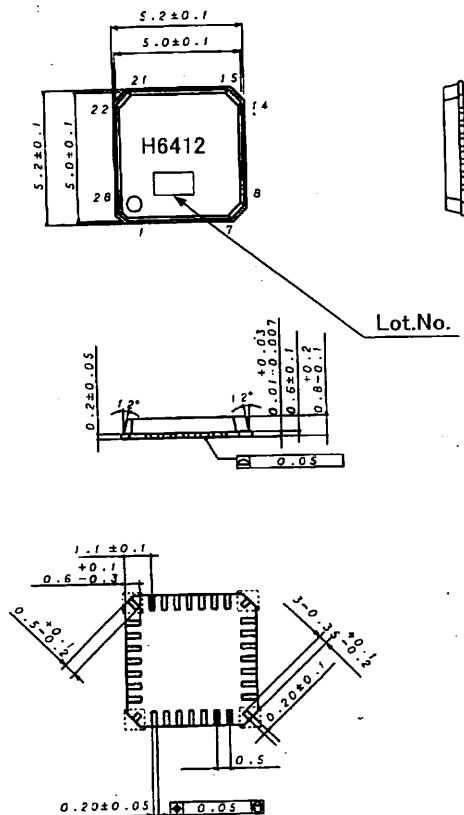
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## ○ Electrical Characteristics

(Ta=25°C, AVCC=3.0V, SPVCC=3.0V, unless otherwise noted.)

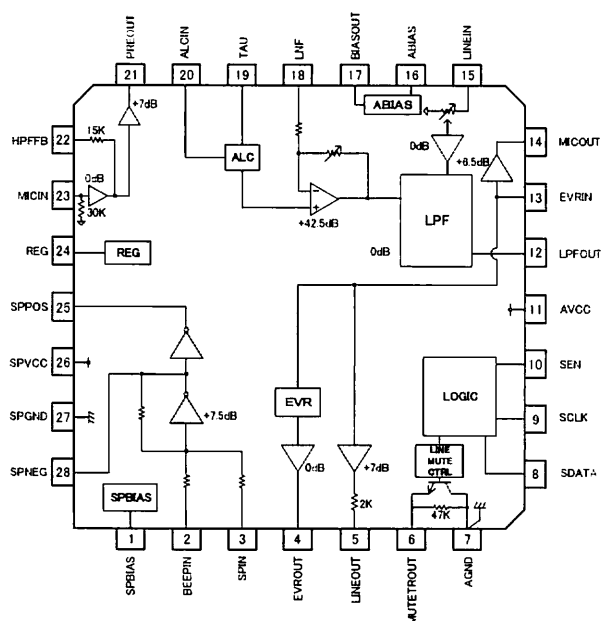
	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
■ Circuit current							
<<AVCC circuit current>>	Power down mode	ICCA	-	30	100	μA	No load, MUTE Tr:off
	MIC mode	ICCA	-	5.0	10	mA	No load, MUTE Tr:off
	LINE+EVR+SP mode	ICCA	-	4.8	9.6	mA	No load, MUTE Tr:off
	BIAS mode	ICCA	-	1.0	2.0	mA	No load, MUTE Tr:off
<<SPVCC circuit current>>	Power down mode	ICCSP	-	0	100	μA	No load
	LINE+EVR+SP mode	ICCSP	-	3.0	10	mA	No load
	BIAS mode	ICCSP	-	200	400	μA	No load
■ REG Vout:REG	REG output voltage	VOREG	2.1	2.3	2.5	V	No load
■ MICAMP Vin:MICIN,Vout:MICOUT	Voltage gain	GV	53	56	59	dB	Vin=-60dBV, f=1KHz, MICAMP gain: 42.5dB
	ALC output level	VOALC	2.1	2.3	2.5	Vpp	Vin=-40dBV, f=1KHz, MICAMP gain: 42.5dB
	Input conversion noise	VON	-	-110	-90	dBV	DIN-AUDIO
■ LPF Vin:LINEIN,Vout:LINEOUT	Voltage gain	GV	5.5	7.0	8.5	dB	Vin=-20dBV, f=1KHz, LINEIN: 0dB setting
	Frequency characteristic 1	ΔGV1	-3.0	-0.5	-	dB	Vin=-20dBV, f=3KHz/1KHz, LINEIN: 0dB
	Frequency characteristic 2	ΔGV2	-	-10	-6.0	dB	Vin=-20dBV, f=4KHz/1KHz, LINEIN: 0dB
	Frequency characteristic 3	ΔGV3	-	-50	-30	dB	Vin=-20dBV, f=8KHz/1KHz, LINEIN: 0dB
■ LINEAMP Vin:EVRIN,Vout:LINEOUT	Voltage gain	GV	6.2	7.7	9.2	dB	Vin=-20dBV, f=1KHz
	Maximum output level	VOM	2.2	2.5	-	Vpp	f=1KHz, THD=1%
■ EVR Vin:EVRIN,Vout:EVRROUT	Voltage gain	GV	-1.5	0	+1.5	dB	Vin=-20dBV, f=1KHz, EVR: 0dB setting
	Mute attenuation	MUTE	-	-70	-60	dB	Vin=-20dBV, f=1KHz, EVR: MUTE setting
■ SPAMP Vin:SPIN,Vout:SPNEG,SPPOS	Voltage gain	GV	11.5	13.5	15.5	dB	Vin=-14dBV,f=1KHz,BTL
	Maximum output power	VOM	200	250	-	mW	f=1KHz,BTL,THD=3%
■ LPF+EVR+SPAMP Vin:LINEIN,Vout:SPNEG,SPPOS	Voltage gain	GV	10.3	12.8	15.3	dB	Vin=-20dBV,f=1KHz,BTL, LINEIN: 0dB, EVR: 0dB setting

○ External Dimension Diagram - Marking Diagram



VQFN28 (Unit : mm)

- Block Diagram



○ Pin No. - Pin Name

No.	Name	No.	Name
1	SPBIAS	15	LINEIN
2	BEEPIN	16	ABIAS
3	SPIN	17	BIASOUT
4	EVROUT	18	LNFB
5	LINEOUT	19	TAU
6	MUTETROUT	20	ALCIN
7	AGND	21	PREOUT
8	SDATA	22	HPFFB
9	SCLK	23	MICIN
10	SEN	24	REG
11	AVCC	25	SPPOS
12	LPFOUT	26	SPVCC
13	EVRAIN	27	SPGND
14	MICOUT	28	SPNEG

## ○ Cautions On Use

## (1) 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.

## (2) 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.

## (3) Thermal design

Perform thermal design in which there are adequate margins by taking into account the allowable power dissipation in actual states of use.

## (4) 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.

## (5) Operation in strong magnetic fields

Adequately evaluate use in a strong magnetic field, since there is a possibility of malfunction.

## (6) Switching noise may occur in EVR gain setup.

Measures for noise, like next block AMP mute, must be done in case it becomes a problem in application.

## (7) Be careful pin no.12 (LPFOUT) doesn't have mute function.

(8) Each BIAS pin should connect capacity over 1.0  $\mu$ F.

(9) Connect the capacity of 4.7  $\mu$ F and below to the REG pin.

(10) CAPA between LNF pin and BIASOUT pin is should connect capacity over 2.2  $\mu$ F.

(11) Output pin should connect resistor over 47 K $\Omega$ .

## (12) The possibility of ALC incorrect action, set up PB mode before REC mode.

## (13) When serial command for mute reset is sent LINEOUT and MUTETR, the LINEOUT pin will be set to mute reset.

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