

Structure Silicon Monolithic Integrated Circuit  
 Product name FM stereo radio receiver IC for mobile phone  
 Type **BH1406KV**

Features

- Built-in front end, IF amplifier, FM detector, FM stereo demodulator, and PLL frequency synthesizer
- No need for external IF filter and external phase shifter for FM detector
- Built-in 32.768kHz crystal oscillator for system clock
- Mono / stereo blend function, according to change in field strength
- Adjustment free stereo demodulator
- For 3-wire serial and I<sup>2</sup>C BUS I/F
- Output of 5-bit digital field strength information via BUS
- Stand-by mode
- Switch between soft mute and mono / stereo blend functions via BUS
- Power down of stereo demodulation block by software operation
- Selection of upper / lower injection of local oscillation via BUS
- Two software programmable ports (open drain)
- Received Frequency 76~108MHz ( 0.05MHz step)

○Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit	Conditions
Supply voltage	V <sub>CC</sub>	+5.0	V	Pin 3, 4, 5, 6, 8, 16, 17, 38, 43, 47
Data input voltage	V <sub>IN-D</sub>	-0.3~V <sub>CCIF</sub> +0.3	V	Pin 9, 10, 11, 12, 14, 15
Power dissipation	P <sub>d</sub>	400	mW	(*1)
Storage temperature range	T <sub>stg</sub>	-55 ~ +125	°C	

(\*1) In the case of use at Ta= 25°C or more, 4mW to be reduced per 1°C.

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.


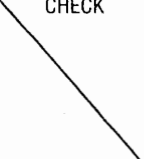

When using the circuit with changes to the external circuit constants, make sure to leave an adequate margin for external components including static and transitional characteristics as well as dispersion of the IC.

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 no 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.

DESIGN 	CHECK 	APPROVAL 	DATE : 16/Nov/2005	SPECIFICATION No. : TSZ02201-BH1406KV-1-2
			REV. A	<b>ROHM CO., LTD.</b>

### Operating Range

Parameter	Symbol	Limits			Unit	Conditions
		Min.	Typ.	Max.		
Analog supply voltage	Vcca	2.4	2.7	4.0	V	(*2) (*3)
Digital supply voltage	Vccd	2.4	2.7	4.0	V	(*2) (*3)
I/F supply voltage	Vccif	1.7	1.8	4.0	V	(*2)
Operating temperature	Ta	-20	---	+85	°C	
Frequency band width	fBAND	76	---	108	MHz	Step 0.05MHz
BUS input High level	VBIH	0.7 × Vccif	---	Vccif+0.3V	V	Pin 9, 10, 11, 12, 14, 15
BUS input Low level	VBIL	GND-0.3V	---	0.3 × Vccif	V	Pin 9, 10, 11, 12, 14, 15

(\*2) Standard operation to be made at Ta= 25°C.

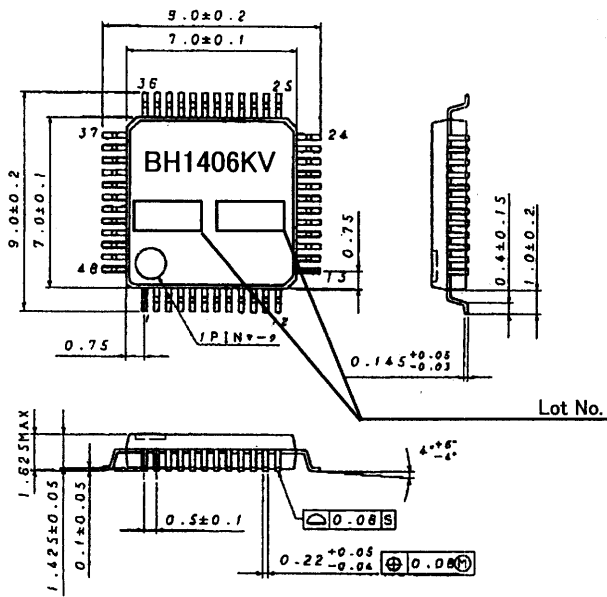
(\*3) Keep the potential difference among power sources 0.3V or below.

### Electric Characteristics (Unless otherwise specified, Ta= 25°C, Vcc=2.7V, fin=98MHz, fmod=1kHz, Δf=±75kHz Measuring Filter=200Hz~15kHz)

Parameter	Symbol	Limits			Unit	Conditions
		Min.	Typ.	Max.		
Supply current	Icc	---	15.0	18.9	mA	At no input
Power down mode current	IPD	---	0	1	μA	Reference clock (32.768kHz sleep) Busenable="L"
Sleep mode current	ISL	---	---	50	μA	Reference clock (32.768kHz sleep) Busenable="H"
Sensitivity	S	---	9	14	dBμVemf	(S+N)/N=30dB, MONO
Image rejection ratio	IRR	24	---	---	dB	
Signal to noise ratio 1	SNR1	55	60	---	dB	Vin=65dBμVemf, MONO
Signal to noise ratio 2	SNR2	50	55	---	dB	Vin=65dBμVemf, L=R
Total harmonic distortion	THD	---	0.5	1.5	%	Vin=65dBμVemf, L=R
Stereo channel separation	SEP	22	30	---	dB	Vin=65dBμVemf
Audio output level	VOA	155	220	310	mVrms	Vin=65dBμVemf, MONO, RL=100kΩ
Soft mute attenuation amount	ATT	16	26	36	dB	Vin=0dBμVemf
AM suppression ratio	AMR	---	59	---	dB	AM: fmod=400Hz, MOD=30% Vin=65dBμVemf

◆ This product is not designed for protection against radioactive rays.

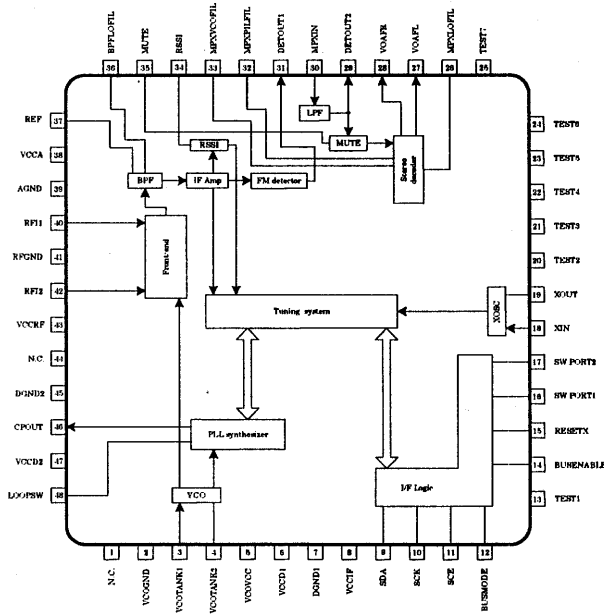
External dimension diagram • Marking diagram



VQFP48 (Unit:mm)

Block diagram

Pin No. • Pin name



端子番号	端子名	端子番号	端子名
1	N.C.	25	TEST7
2	VCOGND	26	MPXLOFIL
3	VCOTANK1	27	VOAFL
4	VCOTANK2	28	VOAFR
5	VGOVCC	29	DETOUT2
6	VCCD1	30	MPXIN
7	DGND1	31	DETOUT1
8	VCCIF	32	MPXPILFIL
9	SDA	33	MPXVCOFIL
10	SCK	34	RSSI
11	SCE	35	MUTE
12	BUSMODE	36	BPFLOFIL
13	TEST1	37	REF
14	BUSENABLE	38	VCCA
15	RESETX	39	AGND
16	SW PORT1	40	RFI1
17	SW PORT2	41	RFGND
18	XIN	42	RFI2
19	XOUT	43	VCCRF
20	TEST2	44	N.C.
21	TEST3	45	DGND2
22	TEST4	46	CPOUT
23	TEST5	47	VCCD2
24	TEST6	48	LOOPSW

## ○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.