Structure Silicon Monolithic Integrated Circuit

Product name FM stereo radio receiver IC for mobile phone

Type **BH1403AGU**

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^2C BUS I/F
- Output of 5-bit digital field strength information via BUS
- Auto search tuning function by program control (up / down)
- Built-in reception frequency channel decoder
- 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)

○Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit	Conditions
Supply voltage	Vcc	+5.0	V	Pin 3, 4, 5, 6, 8, 16, 17, 38, 43, 47
Data input voltage	V_{IN-D}	−0.3～Vccif +0.3	V	Pin 9, 10, 11, 12, 14, 15
Power dissipation	Pd	490	mW	(*1)
Storage temperature range	Tstg	−55 ～ +125	°C	

(*1) 114.3mm × 76.2mm × 1.6mm (Glass epoxy board packaged). In the case of use at Ta= 25°C or more, 4.9mW 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.)
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○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	℃	
Frequency band width1	f_{BAND1}	76	--	90	MHz	Step 0.1MHz
Frequency band width2	f_{BAND2}	87.5	--	108	MHz	Step 0.1MHz
BUS input High level	V_{BIH}	0.7×Vccif	--	Vccif+0.3V	V	Pin 9, 10, 11, 12, 14, 15
BUS input Low level	V_{BIL}	GND-0.3V	--	0.3×Vccif	V	Pin 9, 10, 11, 12, 14, 15

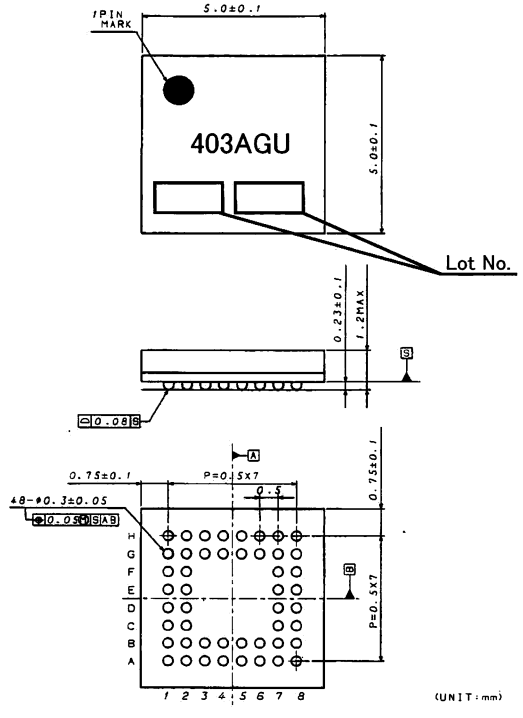
(*2) Standard operation to be made at Ta= 25℃.
(*3) Keep the potential difference among power sources 0.3V or below.

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

Parameter	Symbol	Limits			Unit	Conditions
		Min.	Typ.	Max.		
Supply current	I_{CC}	--	15.0	18.9	mA	At no input
Power down mode current	I_{PD}	--	0	1	μA	Reference clock (32.768kHz sleep) Busenable="L"
Sleep mode current	I_{SL}	--	--	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	24	30	--	dB	Vin=65dBμVemf
Audio output level	V_{OA}	155	220	310	mVrms	Vin=65dBμVemf, MONO, R_L=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

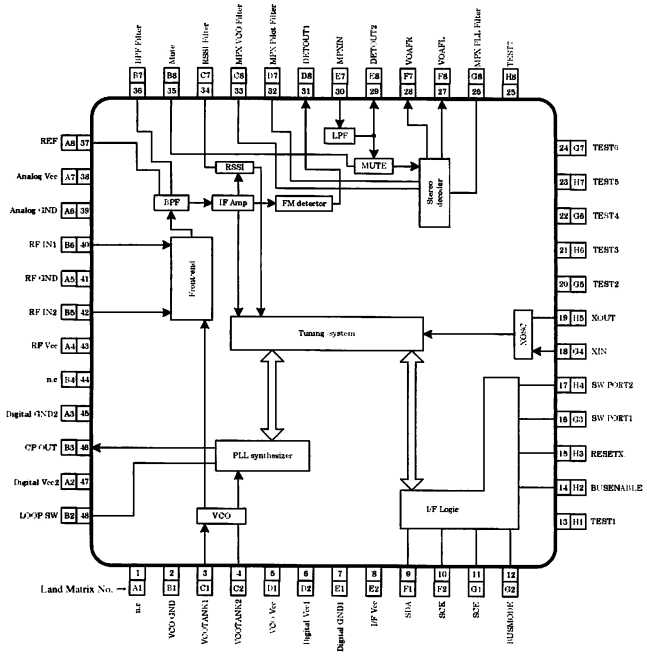
♦ This product is not designed for protection against radioactive rays.

OExternal dimension diagram • Marking diagram



VBGA048T050 (Unit: mm)

OBlock diagram



OPin No. • Pin name

Pin No.	Land Matrix	Pin name	Pin No.	Land Matrix	Pin name
1	A1	N.C.	25	H8	TEST7
2	B1	VCOGND	26	G8	MPXLOFIL
3	C1	VCOTANK1	27	F8	VOAFL
4	C2	VCOTANK2	28	F7	VOAFR
5	D1	VCOVCC	29	E8	DETOUT2
6	D2	VCCD1	30	E7	MPXIN
7	E1	DGND1	31	D8	DETOUT1
8	E2	VCCIF	32	D7	MPXPILFIL
9	F1	SDA	33	C8	MPXVCOFIL
10	F2	SCK	34	C7	RSSI
11	G1	SCE	35	B8	MUTE
12	G2	BUSMODE	36	B7	BPFLOFIL
13	H1	TEST1	37	A8	REF
14	H2	BUSENABLE	38	A7	VCCA
15	H3	RESETX	39	A6	AGND
16	G3	SW PORT1	40	B6	RFI1
17	H4	SW PORT2	41	A5	RFGND
18	G4	XIN	42	B5	RFI2
19	H5	XOUT	43	A4	VCCRF
20	G5	TEST2	44	B4	N.C.
21	H6	TEST3	45	A3	DGND2
22	G6	TEST4	46	B3	CPOUT
23	H7	TEST5	47	A2	VCCD2
24	G7	TEST6	48	B2	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.

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