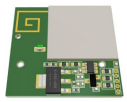
senTec Elektronik 868MHz IX Module



senTec Elektronik 868MHz IX Module User Manual

Contents

senTec Elektronik 868MHz IX Module

Dear customer,
We are delighted that you have decided on a module from the product range of senTec Elektronik GmbH. The

sense Elektronik GmbH offers you the highest quality and the latest technology. In order to be able to take full advantage of the performance of your module and to enjoy your device for many years, please read these operating instructions carefully before connecting commissioning and operating the module according to the instructions. The operational safety and function of the module can only be guaranteed if both the general safety and accident prevention regulations of the legislator and the safety instructions in the operating instructions are observed. We assume no liability for damage caused by improper use or incorrect operation.

-  Please ensure that everyone who operate the module has read and understood the operating instructions.
-  Keep the operating instructions in a safe place so that you can refer to them at any time if necessary.

For your Safety

Observe the Operating Instructions

Any commissioning and handling of the module requires precise knowledge and observance of these operating instructions. The module is only intended for the use described. In these operating instructions, especially important comments are highlighted as follows:

Warning

-  This is a warning that indicates risk situations and dangers. Failure to observe this warning may result in life-threatening situations. These warnings must be observed!

Information

-  This is information that indicates certain features that must be observed.

Safety Instructions

 The module is designed for a DC voltage of 5V to 20V. Make sure that your device is always operated with the correct DC voltage.

1.3 Liability for Function and Damage

The liability for the function of the module is in any case transferred to the owner or operator, if the module is improperly maintained, repaired or changed by persons who do not belong to an authorized specialist company or if it is handled that does not correspond to its intended use. The senses Elektronik GmbH is not liable for damage caused by failure to observe the above information. The warranty and liability conditions of the sales and delivery conditions of senTec Elektronik GmbH are not extended by the above information.

General

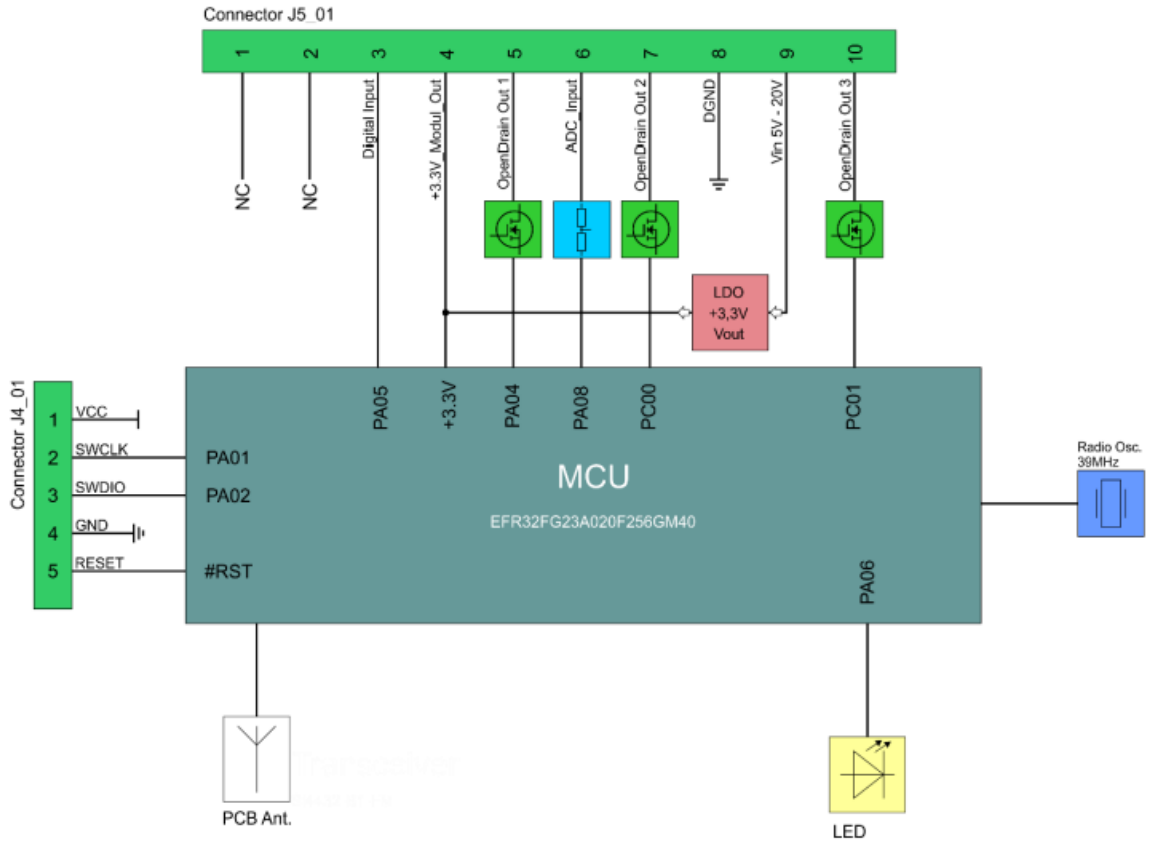
Description

The 868MHz IX module is a radio module with an integrated EFR32FG23 from Silicon Labs. The module has 256kB flash memory, 32kB RAM and can be used as a plug-in module via the 10-pin header with a pitch of 2.54 mm. Up to three OpenDrain outputs, one digital input and one ADC input (0-20VDC) can be used. The voltage supply of the module is 5VDC to 20VDC. The module is certified according to the Radio Equipment Directive 2014/53/EU.

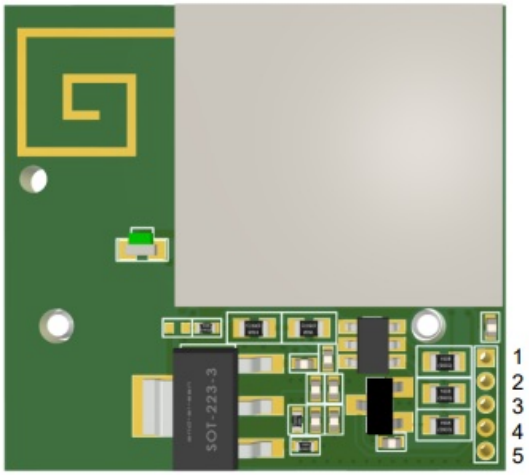
Application
The main applications for the module are:

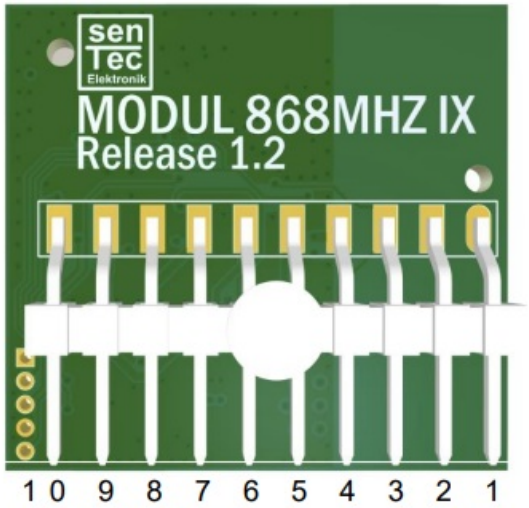
- Home and Building Automation
- Water, Gas, and Energy Meter Measurements
- Wireless Sensor Networks
- Lighting Control
- Health and Fitness Applications

Block Diagram



Pinout





Pin Header 5Pin 1.27 mm J4_01	Function	PIN EFR32FG23A020F256GM40
1	Internal 3.3VDC	VDD
2	SWCLK	PA01
3	SWDIO	PA02
4	Ground DGND	DGND
5	#RESET Module	#RESET

Pin Header 10Pin 2.54 mm J5_01	Function	PIN EFR32BG22C112F352GM32
1	NC	
2	NC	
3	Digital Input	PA05
4	Internal 3.3VDC	VDD
5	OpenDrain Output 1	Over MOSFET at PA04
6	ADC Input 0VDC-20VDC	PA08
7	OpenDrain Output 2	Over MOSFET at PC00
8	Ground DGND	DGND (EP,11,27)
9	VIN 5VDC – 20VDC	LDO
10	OpenDrain Output 3	Over MOSFET at PC01

Electrical Specification

Maximum Operating Conditions

Parameter	Symbol	Min	Type	Max	Unit
Temperature Range Storage	TSTG	-40	–	85	°C
Maximum Soldering Temperature	TS	–	–	260	°C
External Voltage Supply	VDDMAX	5	–	20	V
Voltage OpenDrain Output	VDS	–	–	30 / 50[1]	V
Power OpenDrain Output	IDS			1.5 / 0.51[1]	A
Voltage ADC Input	VADC	0	–	20	V

More detailed information on each OpenDrain outputs can be found in section 3.2

 The module is designed for a DC voltage of 5V to 20V. Make sure that your device is always operated with the correct DC voltage.

Technical Data

Parameter	Symbol	Min	Type	Max	Unit
Temperature Range Operation	TSTG	-20	–	70	°C
Voltage Supply Operation	VDD	5.0	–	20.0	V
Voltage Digital Input	VIOPIN	-0.3	–	VDD + 0.3	V
Voltage OpenDrain 1 Output	VDS1	–	–	50	V
Power OpenDrain 1 Output	IDS1Continuos	–	–	0.51	A
	IDS1Pulse	–	–	1.5	A
Voltage OpenDrain 2 Output	VDS2	–	–	50	V
Power OpenDrain 2 Output	IDS2Continuos	–	–	0.51	A
	IDS2Pulse	–	–	1.5	A
Voltage OpenDrain 3 Output	VDS3	–	–	30	V
Power OpenDrain 3 Output	IDS3Continuos	–	–	1.4	A
	IDS3Pulse	–	–	10	A
Voltage ADC Input	VADC	0	–	20	V
Power Consumption TX (14dBm)	ITX10	–	50	–	mA
Power Consumption RX	IRX	–	29	–	mA
Reception Sensitivity	PLNA	–	-110	–	dBm
Receiver Category EN 300 220-1 V3.1.1	–	–	1.5	–	–
Internal Clock Frequency	fint	–	–	78	MHz
Memory Size RAM	–	–	32	–	kB
Memory Size Flash	–	–	256	–	kB

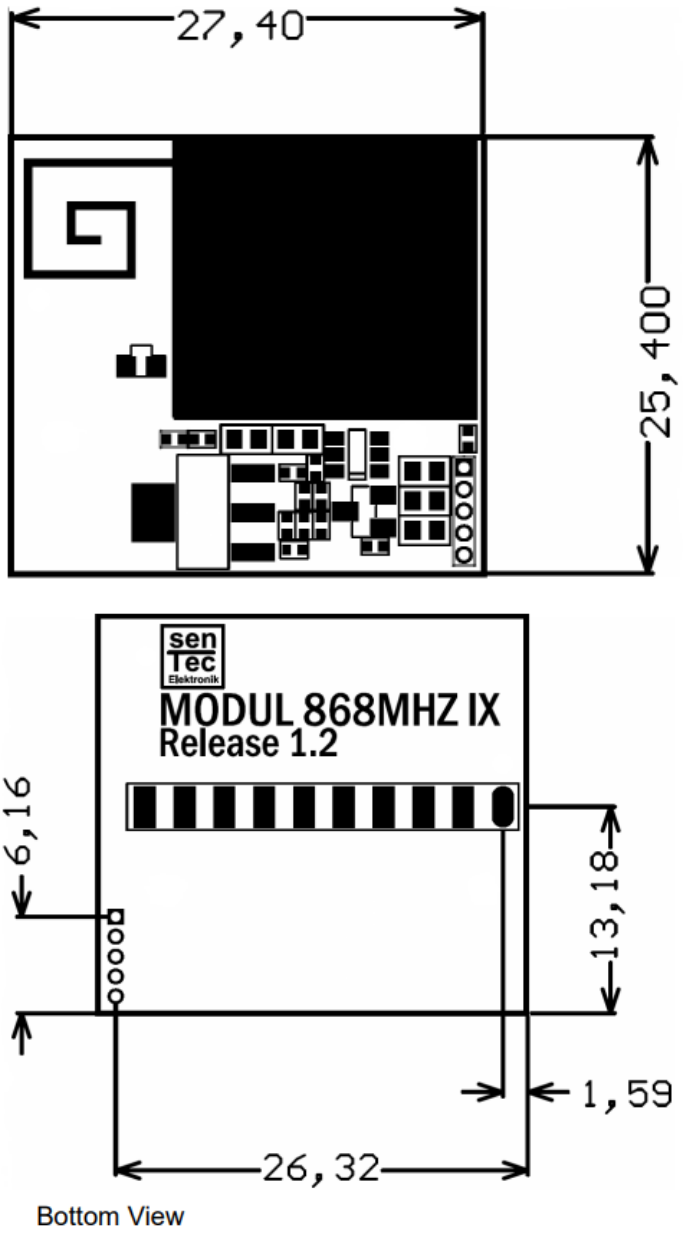
HF Characteristics senTec Radio Protocol RED					
Parameter	Symbol	Min	Type	Max	Unit
Modulation			2GFSK		
Frequency Deviation	fDev	±40	±50	±60	kHz
Frequency Bandwidth	fOCW	150	200	350	kHz
Data Rate			100		kbps
Transmission Power Power Amplifier	PPA		14		dBm
Reception Sensitivity	PLNA		-110		dBm
Duty Cycle	DC	1%			
Basic Frequency (Band L&M)	fBas	867,500	868,000	869,850	MHz
Frequency CH1 (Band L)	fCH1	865,450	865,500	865,550	MHz
Frequency CH2 (Band L)	fCH2	866,120	866,125	866,130	MHz
Frequency CH3 (Band L)	fCH3	866,700	866,750	866,800	MHz
Frequency CH4 (Band L)	fCH4	867,370	867,375	867,380	MHz
Frequency CH5 (Band R)	fCH5	869,800	869,850	869,900	MHz

HF Characteristics senTec Radio Protocol FCC					
Parameter	Symbol	Min	Type	Max	Unit
Modulation			2GFSK		
Frequency Deviation	fDev	±190	±200	±210	kHz
Frequency Bandwidth 6dB	fOCW	500	600	700	kHz
Data Rate			100		kbps
Transmission Power Power Amplifier	PPA		17		dBm
Reception Sensitivity	PLNA		-110		dBm
Duty Cycle	DC	1%			
Basic Frequency	fBas	915,150	915,500	915,85	MHz
Frequency CH1	fCH1	903,150	903,500	903,85	MHz
Frequency CH2	fCH2	904,350	904,700	905,05	MHz
Frequency CH3	fCH3	905,550	905,900	906,25	MHz
Frequency CH4	fCH4	906,750	907,100	907,45	MHz
Frequency CH5	fCH5	907,950	908,300	908,65	MHz
Frequency CH6	fCH6	909,150	909,500	909,85	MHz
Frequency CH7	fCH7	910,350	910,700	911,05	MHz
Frequency CH8	fCH8	911,550	911,900	912,25	MHz
Frequency CH9	fCH9	912,750	913,100	913,45	MHz
Frequency CH10	fCH10	913,950	914,300	914,65	MHz
Frequency CH11	fCH11	916,350	916,700	917,05	MHz
Frequency CH12	fCH12	917,550	917,900	918,25	MHz
Frequency CH13	fCH13	918,750	919,100	919,45	MHz
Frequency CH14	fCH14	919,950	920,300	920,65	MHz
Frequency CH15	fCH15	921,150	921,500	921,85	MHz
Frequency CH16	fCH16	922,350	922,700	923,05	MHz
Frequency CH17	fCH17	923,550	923,900	924,25	MHz
Frequency CH18	fCH18	924,750	925,100	925,45	MHz
Frequency CH19	fCH19	925,950	926,300	926,65	MHz
Frequency CH20	fCH20	927,150	927,500	927,85	MHz

Mechanical Specification

Dimensions

Top View



Bottom View

Recommended Connector

The following connectors are recommended for using the module:

Manufacturer	Manufacturer Designation	Manufacturer-Nr
MPE-Garry GmbH	Socket Strip 8,50 height, 2,54 mm	094-1-010-0-NFX-YS0
SAMTEC	Tiger Buy™ Socket Strip 2,54 mm	SSW-110-01-G-S

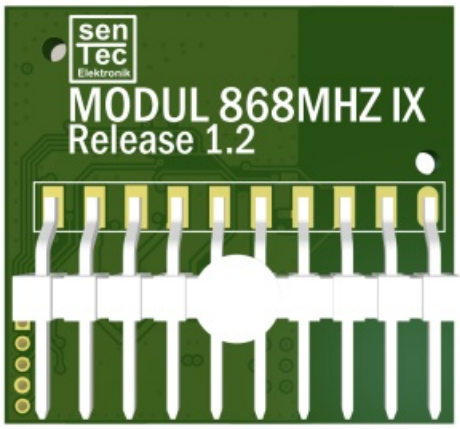
When using other connectors, ensure the exact fit and pin assignment!

Labelling Modul 868MHz IX

.The label is located on the top of the shielding from the Modul_868MHz_IX. The Label size is 16,2mm x 15,0mm. Information

1. Software version
2. Module address
3. FCC mark
4. CE mark
5. FCC ID
6. ISED ID
7. Production information as QR-Code
8. Production information as plan text

The manufacturer, product name, and hardware release are printed on the backside of the module.



Picture Modul 868MHz IX topside

EU Declaration of Conformity

- supplier´s name senTec Elektronik GmbH
- address Robert-Bosch-Ring 2 98693 Ilmenau

We declare in our sole responsibility that the product(s)

- Modul 868MHz IX
- Hardware Release 1.x
- Firmware Release 9.x

complies with the requirements of the following European directive(s):

Radio Equipment Directive 2014/53/EU
RoHS- directive 2011/65/EU

the following standards are used:

Safety (Art. 3.1a 2014/53/EU)	**EMC** (Art. 3.1b 2014/53/EU)	**Spectrum** (Art. 3.2 2014/53/EU)
EN 62368-1:2014/ AC:2015/A11:2017/AC2017	EN 301 489-1 V2.2.3:2019-11 EN 301 489-3 V2.3.1:2022-11	EN 300 220-1 V3.1.1 EN 300 220-2 V3.1.1
Health (Art. 3.1a 2014/53/EU) EN 62479:2010		

FCC

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01
List of applicable FCC / ISED rules

FCC:	ISED:
47CFR Part 15 Subpart C §15.247	RSS-247

Specific operational use conditions

- The module has a 10-pin header with a pitch of 2.54 mm to connect it to the host.
- The voltage supply of the module is 5VDC to 20VDC. For details refer to the operating instruction chapter 3 Electrical Specification.
- The module has a fixed integrated PCB antenna. The operation frequency is 903.5Mhz to 927.5MHz. The modulation type is 2GFSK.

Limited module procedures

- Installations Notes:
- The module power supply range is 5VDC to 20VDC.
- When connecting the module to the host device, the host device must power off.
- Make sure the module pins are correctly installed

Trace antenna designs

- Not applicable. The module does have a fixed PCB antenna.

RF exposure considerations

- This equipment complies with FCC’s RF radiation exposure limits set forth for an
- uncontrolled environment.

Antennas

- PCB-antenna is permanently attached, and can’t be replaced. The PCB-antenna design corresponds to the Silicon Labs reference design WES0118-01-APL915S-01.
- 2.8 Label and compliance information
- Each module has its own label with the FCC identification number. It is placed at the shielding of the module. The host device shall be labeled to identify the modules within the host device, which means that the host device shall be
- labeled to display the FCC ID of the module preceded by words “Contains transmitter module” or “Contains”, E.g.
- Contains FCC ID: 2BB4J-WM09A

Information on test modes and additional testing requirements

- Contact sense Elektronik GmbH for information on how to configure test modes for the module.

Additional testing, Part 15 Subpart B disclaimer

- The modular transmitter is only FCC-authorized for the specific rule parts listed on the grant. The host product manufacturer, is responsible for compliance to any other FCC rules that apply to the host not covered by the modular
- transmitter grant of certification.

FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the module
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body

Technical Support

If you have any technical questions, please contact us at the following e-mail address:

Info@senTec-Elektronik.de

CONTACT

- senTec Elektronik GmbH Robert-Bosch-Ring 2 D-98693 Ilmenau
- **Tel.**: +49 (0)3677 / 689 37 – 0
- **Fax**: +49 (0)3677 / 689 37 29
- Info@senTec-Elektronik.de

Documents / Resources

	senTec Elektronik 868MHz IX Module [pdf] User Manual WM09A, 2BB4J-WM09A, 2BB4JWM09A, 868MHz IX Module, 868MHz IX, Module

References

- Elektronik - Elektroniknet
- senTec Elektronik GmbH
- User Manual