

User manual of SFM11R2D

1. Introduction

The module is a SIGFOX only module able to transmit and receive messages using the SIGFOX network. The Sigfox chipset is from ON semiconductor, part number AX-SFUS-1-01.

2. Hardware Architecture:

2.1 Main Chipset Information

Item	Vendor	Part Number
Sigfox	ON semiconductor	AX-SFUS-1-01

2.2 Circuit Block Diagram

The major internal and external block diagram of Module is illustrated in Figure 1-1.

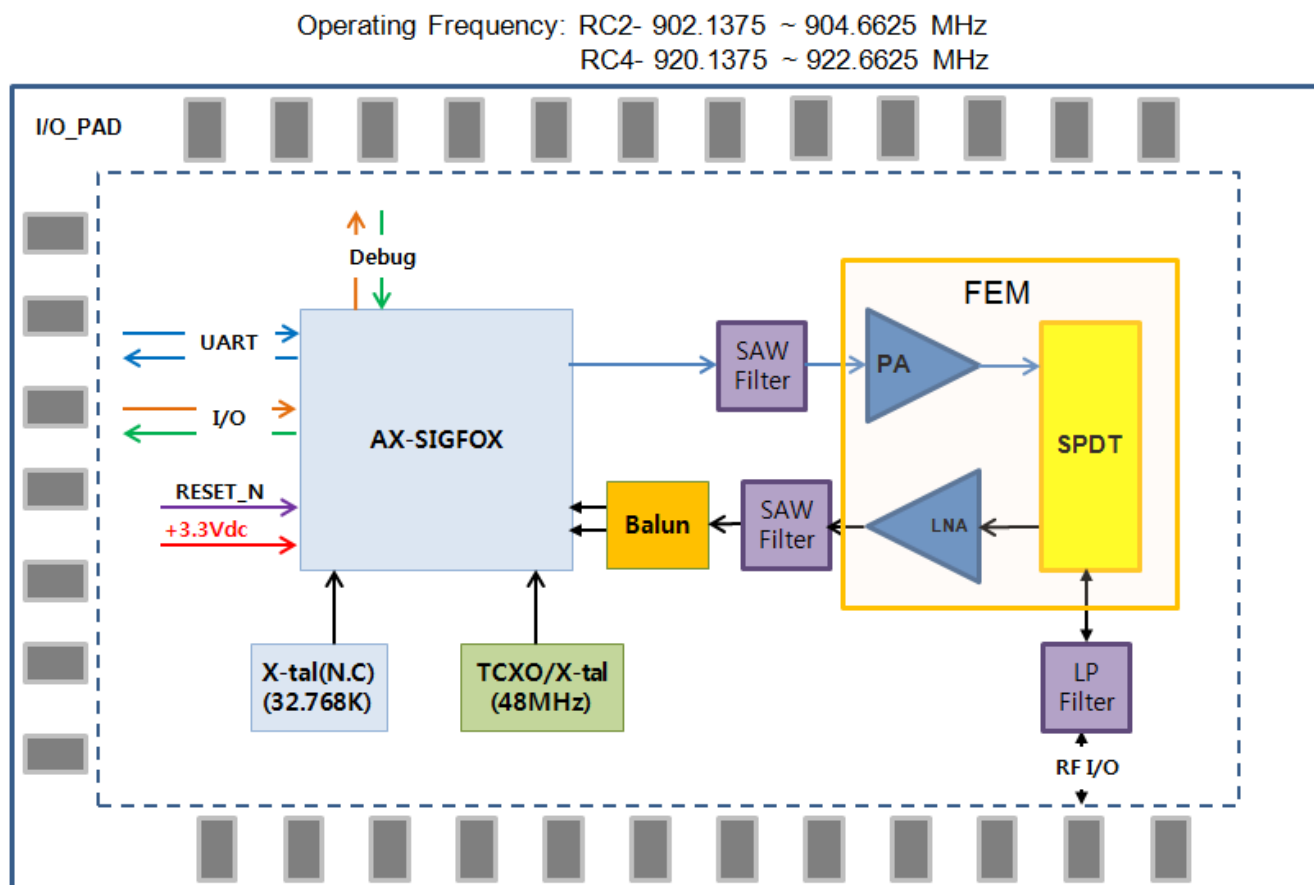


Figure 1-1 Module block diagram and Interface

3. Operational Description

This Module able to transmit and receive messages using the SIGFOX network.

This module addresses the RC2 and RC4 zone (North America and Australia).

- Features

- > Sigfox up-link and down-link functionality controlled by AT commands
- > Temperature sensor
- > Ultra-low power consumption
- > High performance narrow-band Sigfox

- Time base of the RF frequency

For Sigfox RF frequency, a TCXO(48MHz) is a clock reference.

- Transmission

The Tx path produces a DBPSK-modulated signal. modulate RF signal generated by the synthesizer. The modulated RF signal is fed to the integrated RX/TX switch and antenna interface and then out of the AX-SFEU-1-01.

- Receiver

The Rx path is able to receive 905.2MHz, 922.3MHz signal and the noise amplifier is built in the inside of the chip, it amplifies the received signal by the low noise amplifier according to the receiving intensity, and the amplified signal is converted into the digital signal through the ADC, Packets will be interpreted.

- Product Details

> Data Modulation

Sigfox : TX- DBPSK
RX- 2GFSK

> Frequency :

Sigfox zone	Uplink(TX)	Downlink(RX)
RC2(North America)	902.1375 ~ 904.6625 MHz	905.2MHz
RC4(Australia)	920.1375 ~ 922.6625 MHz	922.3MHz

- Product Spec.

Parameter		Min	Typ.	Max	Unit
RF Frequency	RC2	Tx	902.2		MHz
		Rx	905.2		MHz
	RC4	Tx	920.8		MHz
		Rx	922.3		MHz
Tx output power(at "24" setting)		-	+22.5	+24	dBm
Frequency Error Tolerance(+25°C)		-2.5	-	+2.5	ppm
2 nd Harmonics(conducted)		-	-44	-	dBm
3 rd Harmonics(conducted)		-	-44	-	dBm
Rx Sensitivity(@600bps, GFSK)		-	-129	-	dBm
Rx Spurious Emission(30MHz~12.75GHz)				-54	dBm

- Product pwr Spec.

Symbol	Parameter	Min	Typ.	Max	Unit
VDD	Power supply	2.7	3.3	3.6	V
Idd	current	-	170	-	mA

- Product Temp. Spec.

Symbol	Parameter	Rating	Unit
Temp	Operating	-30 to +85	°C
TSTG	Storage Temperature	-40 to +125	°C

4. Installation Guide

- Contents

- Installation Figure

5. Notice

<Warning Statements>

FCC Part 15.19 / RSS-GEN Sec.8.4 Statements:

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, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

FCC Part 15.21 statement

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

RF Exposure Statement

The antenna(s) must be installed such that a minimum separation distance of at least 20 cm is maintained between the radiator (antenna) and all persons at all times. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

l'exposition aux RF L'antenne (ou les antennes) doit être installée de façon à maintenir à tout instant une distance minimum de au moins 20 cm entre la source de radiation (l'antenne) et toute personne physique.

End Product Labeling

The module is labeled with its own FCC ID. If the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

"Contains FCC ID: 2ABA2SFM11R2D

" Contains IC: 11534A-SFM11R2D

Étiquetage du produit final Le module BT111 est étiqueté avec sa propre identification FCC et son propre numéro de certification IC. Si l'identification FCC et le numéro de certification IC ne sont pas visibles lorsque le module est installé à l'intérieur d'un autre dispositif, la partie externe du dispositif dans lequel le module est installé devra également présenter une étiquette faisant référence au module inclus. Dans ce cas, le produit final devra être étiqueté sur une zone visible avec les informations suivantes :

« Contient module émetteur identification FCC ID : 2ABA2SFM11R2D

« Contient module émetteur IC : 11534A-SFM11R2D

OEM Responsibilities to comply with FCC Regulations

The module has been certified for integration into products only by OEM integrators under the following condition:

- The antenna(s) must be installed such that a minimum separation distance of at least 20 cm is maintained between the radiator (antenna) and all persons at all times.
- The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

As long as the two condition above is met, further transmitter testing may not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions can't be met (for certain configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can't be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module or change RF related parameters in the user manual of the end product.

RSS-GEN, Sec. 8.3

This radio transmitter (IC: 11534A-SFM11R2D, Model: SFM11R2D has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

- List of approved antennas

- 1) For Sigfox antenna, INNO-EL9SWS-149 or similar part manufactured by Inno-Link. Co., Ltd. (Highest permitted antenna gain: 2.01 dBi)

Le présent émetteur radio (IC: 11534A-SFM20R4, Model: SFM20R4) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

- Liste des antennes approuvées

- 1) Pour l'antenne Sigfox, INNO-EL9SWS-149 ou une pièce similaire fabriquée par Inno-Link. Co., Ltd. (Plus haut gain d'antenne autorisé: 2,01 dBi)

Antenna Installation Requirement

The host manufacturer must meet the antenna requirements stated in operational description and must not give to access to antenna connector to user when you install this module into devices to be compliance with FCC section 15.203.