

User Manual – RF Module MB001-A

Note: this manual describes the limitations of the RF Module MB001-A.

Product capabilities

The MB001-A is an RF module communicating over the ISM band, capable of doing fixed frequency mesh network (not frequency hopping). It can be used in both “master” and “slave” configuration. The master is responsible for synchronizing all the slaves in a given mesh network. Once synchronized, all slaves will transmit sensor data towards the master at periodic interval. The master can then be used to send all sensor data to a cloud based application, so that users can access data history.

Circuit Description

The circuit of the MB001-A consists of an MCU with an integrated RF transceiver, along with some peripherals:

1. Analog inputs
2. Digital inputs/outputs
3. 1 uart (used in master communication with cellular modem)
4. Onboard analog temperature sensor

The MB001-A can operate in the range 1.0VDC to 5VDC.

Configurations

The MB001-A RF Module is intended to operate in one of the following configurations:

Master mode:

Config-1: Cellular Gateway (Master mode)

Slave mode:

Config-2: Device with configurable IOs

The MB001-A can be configured using the programming port J7, via a PC terminal using the following settings:

Baud rate:	115200
Data:	8 bit
Parity:	none
Stop:	1 bit
Flow control:	none

RF Specifications

Frequency range: 902-928 MHz

Frequency (min): 903 MHz

Frequency (max): 927 MHz

Module bitrate: 4800 bit/s

Modulation: FSK

Measure BW, 99% OBW: 385 kHz

Maximum RF Power (Conducted): 15mW (11.9dBm)

Emission classification: F1D

Below is a table of all the ports available:

Port	Name	Function
J1-1	V+	Analog Supply
J1-2	ANG IN	Analog input-1
J1-3	V-	Analog Ground
J2-1	DGT IN	Digital input-1
J2-2	GND	Digital Ground
J3-1	RELAY 2	Digital output-2 / Analog input-3
J3-2	RELAY 1	Digital output-1 / Analog input-2
J3-3	GND	Digital Ground
J9-1	VSW	User controlled Supply
J9-2	VBATT	Battery Supply
J9-3	MCU.RX	Cellular UART port receive
J9-4	MCU.TX	Cellular UART port transmit
J9-5	EN	Cellular Enable / Digital output-3
J9-6	RST_CELL	Cellular Reset / Digital input-2
J9-7	GND	Cellular Ground
J7	-	Programming port
J6	-	Watchdog enable (option)
J4	-	(Reserved)
P1	GND	Power Supply Negative
P2	VBAT	Power Supply Positive (1-5 VDC)
J10	-	I2C port
J8	-	RF port

FCC and ISSED Regulations

The MB001-A RF Module is licensed under the following numbers and rules:

FCC ID: 2ANOUTL

IC: 23199-TL

FCC 47 CFR Part 15 Subpart C, §15.247

Operation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz

RSS-247, Issue 2, Feb 2017, Section 5

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

Standard specifications for frequency hopping systems and digital transmission systems operating in the bands 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz

Note: host product manufacturers using this product are responsible for compliance to any other FCC/ISSED rules that apply to the host not covered by the above rules.

RF Exposure Considerations

This product complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment. To comply with RF exposure requirements, the unit must be installed and operated with 20 cm (8 in.) or more between the product and your body. This product may not be collocated or operated in conjunction with any other antenna or transmitter. This device has been designed to operate with the antennas listed below, and having a maximum gain of 2.0 dB. Antennas not included in this list or having a gain greater than 4.5 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

The MB001-A is intended to be used without RF gain limitations but with one of the following antennas:

1/4 wave monopole antenna (4.5dBi)	MFG: Trilogik	PN: TLA001
1/4 wave monopole antenna (2.5dBi)	MFG: Abracon	PN: APAMS-131
1/2 wave dipole antenna (2.0dBi)	MFG: Pulse Larsen	PN: W1063

End Product Labelling Requirements

Any host product using MB001-A must have a label stating:

Contains FCC ID: 2ANOUTL, IC: 23199-TL

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