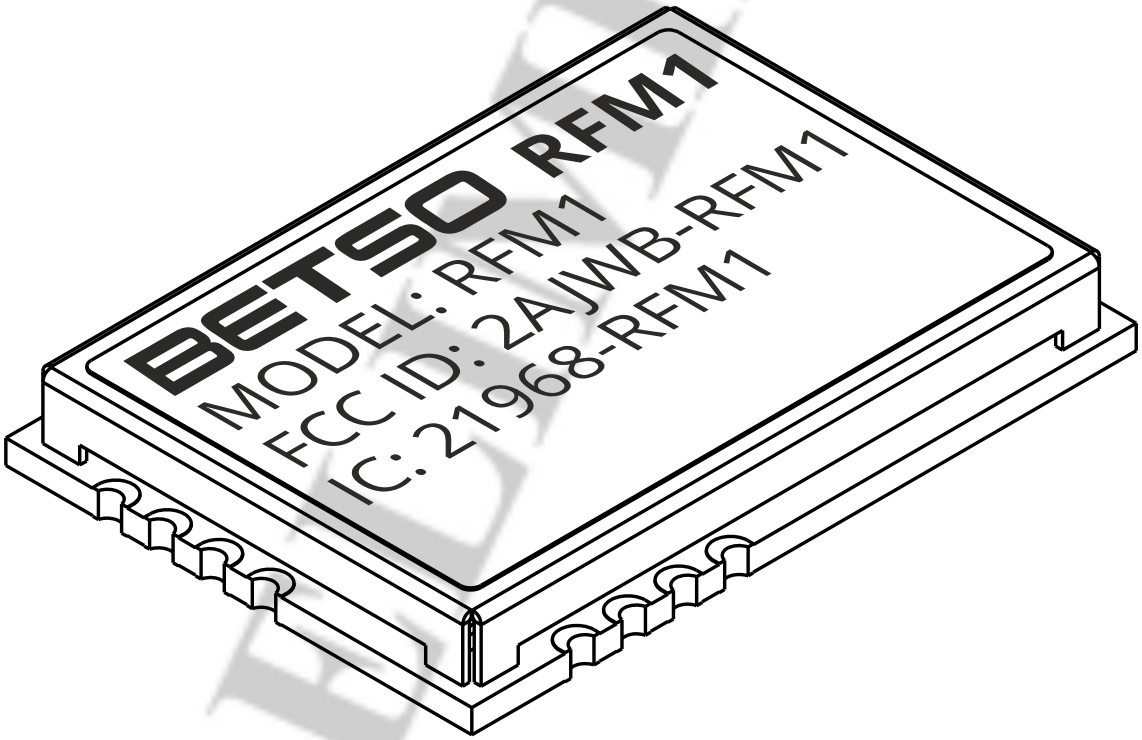
RFM1

RF Transceiver module



Contents

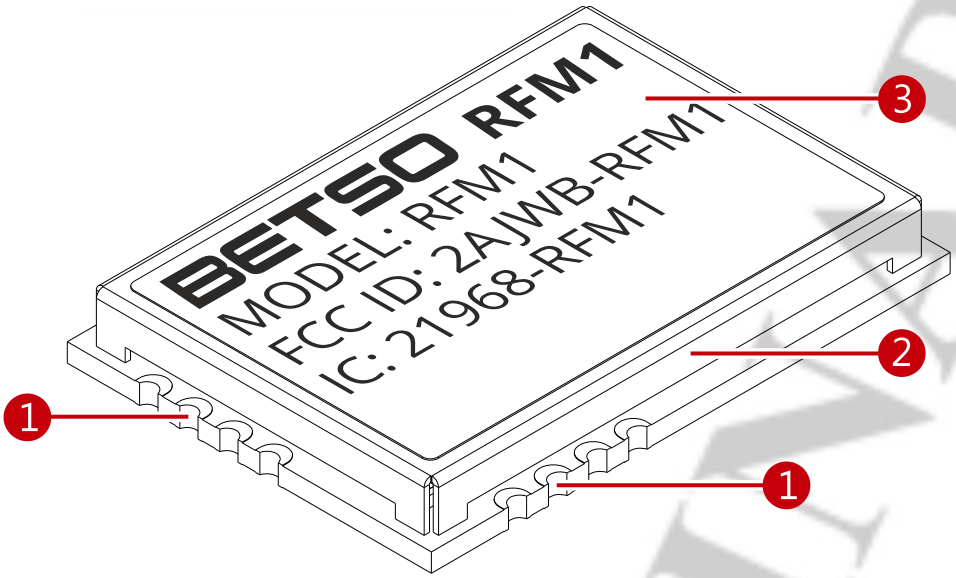
1. Product description

BETSO RFM1 is RF transceiver module with very long distance operational range with great immunity to RF noise or other systems interferences. It features very low power consumption and small physical dimensions.

2. Features

- Simple 'BetsoRFLink' Protocol Embedded
- Data speed 4800 kbps
- ISM Frequency Band (902-928MHz)
- Radio Compliance FCC/IC
- Frequency Hopping Spread Spectrum approach with 5 hopping tables “channels”
- Small 19.4 x 13.6 x 2.5mm surface mount device (SMD)
- Low power consumption (supply current only 18mA in TX, 10mA in RX)
- Internal power regulator
- Supply voltage range from +3.0V to +5.5V DC

3. Physical description



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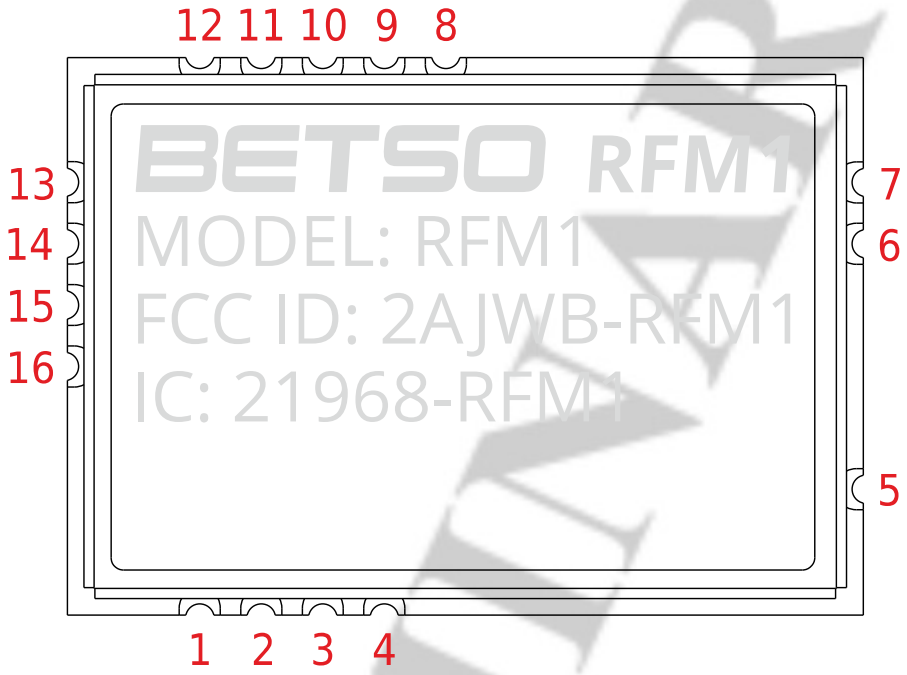

Pin	Pin name	I/O	Description
1	ENABLE	I	Enable input, if 1, RFM1 is enabled, if 0, RFM1 is disabled.
2	GND	GND	Power supply ground.
3	VCC	VCC	+3.0 to +5.5V DC Supply Voltage Input to Internal Regulator.
4	N/C		No Connect.
5	GND	GND	Power supply ground.
6	GND	GND	Power supply ground.
7	RF_OUT	I/O	Antenna output and input.
8	N/C		No Connect.
9	N/C		No Connect.
10	CTS	O	Clear to send, If RFM1 is ready to receive new command CTS = 1, otherwise CTS = 0.
11	RX_PKT	O	Received packet toggle. Toggles its state upon packet reception.
12	FH_RATE	O	Frequency hop toggle. Toggles its state upon frequency hop occurrence.
13	NSEL	I	Serial interface Select Input. 0–VDD V digital input. This

			pin provides the Select/Enable function for the 4-line serial data bus.
14	SCLK	I	Serial Clock Input. This pin provides the serial data clock function for the 4-line serial data bus. Data is clocked into the RFM1 on positive edge transitions.
15	MISO	O	Serial Data Output. 0–VDD V digital input. Provides a serial read back function of the internal control registers and received data packets.
16	MOSI	I	Serial Data Input. 0–VDD V digital input. This pin provides the serial data stream for the 4-line serial data bus.

5. Power supply

VCC of +3.0 to +5.5V DC Supply Voltage Input to Internal Regulator can be used.

The supply used to power the transceiver should be 'clean' and free from ripple and noise (<40mV p-p total). It is suggested that 100nF ceramic capacitors be used to decouple the supply close to the power pins of the transceiver.

6. 'BetsoRFLink' Protocol specification

Please refer to Functional Description of RFM1 Transceiver module for detailed protocol specification.

7. FCC regulatory information (USA) FCC 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.

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 receiving antenna.
- Increase the separation between the equipment and 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.

8. Industry Canada (IC) regulatory information

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

(1) This device may not cause interference; and

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. 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 necessary for successful communication.

This radio transmitter IC ID: 21968-RFM1 has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain 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.

Antenna	Manufacturer	Impedance [Ω]	Gain [dBi]
ANT-868-PW-LP	Linx Technologies	50	2.1dBi
ANT-868-CW-RH	Linx Technologies	50	-1.5dBi
ANT-916-CHP	Linx Technologies	50	0.5dBi

9. Avis de conformité à la réglementation d'Industrie Canada

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;

2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Conformément aux réglementations d'Industry Canada, les émetteurs radio de cet appareil ne peuvent fonctionner qu'à l'aide d'une antenne dont le type et le gain maximal (ou minimal) pour ces émetteurs - transmetteurs sont approuvés par Industry Canada. Pour réduire le risque d'interférence éventuelle pour les autres utilisateurs, le type et le gain de l'antenne doivent être choisis de manière à ce que la puissance isotrope rayonnée équivalente (p.i.r.e.) minimale nécessaire à une bonne communication soit

fournie.

Le présent émetteur radio IC ID: 21968-RFM1 a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Antenna	Fabricant	Impédance [Ω]	Gain [dBi]
ANT-868-PW-LP	Linx Technologies	50	2.1dBi
ANT-868-CW-RH	Linx Technologies	50	-1.5dBi
ANT-916-CHP	Linx Technologies	50	0.5dBi

10. OEM Responsibilities to comply with FCC and Industry Canada Regulations

The RFM1 Module (FCC ID: 2AJWB-RFM1, IC ID: 21968-RFM1) has been certified for integration into products only by OEM integrators under the following conditions:

1. The antenna(s) must be installed such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and all persons at all times.

2. The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter.

As long as the two conditions above are met, further transmitter testing will 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 cannot be met (for certain configurations or co-location with another transmitter), then the FCC and Industry Canada authorizations are no longer considered valid and the FCC ID and IC Certification Number cannot 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 and Industry Canada authorization.

11. End Product Labeling

The RFM1 Module (FCC ID: 2AJWB-RFM1, IC ID: 21968-RFM1) is labeled with its own FCC ID and IC Certification Number. If the FCC ID and IC Certification Number are 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 Transmitter Module FCC ID: 2AJWB-RFM1"

"Contains Transmitter Module IC: 21968-RFM1"

Or

"Contains FCC ID: 2AJWB-RFM1"

"Contains IC: 21968-RFM1"

The OEM of the host product may alternatively display the FCC ID information electronically, if the host in which the module is integrated has a display screen. The host manufacturer can electronically display the FCC ID information on the host by factory-encoding the FCC ID and IC ID of the module. Factory encoding must be secure and locked by the host manufacturer and not alterable by any third parties. The programmed information must display "Contains FCC ID: 2AJWB-RFM1" and "Contains IC: 21968-RFM1".

The OEM of the RFM1 Module (FCC ID: 2AJWB-RFM1, IC ID: 21968-RFM1) must only use the approved antenna(s) listed above, which have been certified with this module. 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.

The user manual for the end product must also include the following information in a prominent location:

"To comply with FCC and Industry Canada RF radiation exposure limits for general population, the antenna(s) used for this transmitter must be installed such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and all persons at all times and must not be co-located or operating in conjunction with any other antenna or transmitter."