



TigoRFcore User Guide

Revision 0.1

Sep. 19, 19

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Approval Table

Role	Name	Version	Date
Written By	Yaniv Yardeni	0.1	09/09/19
Reviewed By			
Approved By			

Table 1: Approval Table

Revision Control

Author Name	Description	Revision	Date
Yaniv Yardeni	Creation	0.1	09/09/19

Table 2: Revision Control

1 Overview

TigoRFcore Module is a complete physical layer solution for IO-Link Wireless. The module enables a compact, robust and efficient solution for Industry 4.0 applications such as IO-Link Wireless.



Figure 1: TigoRFcore

2 Specification

Radio:

- Output power: 10dBm
- Frequency band: 2.4-2.48GHz
- Channel BW: 1MHz
- Modulation: GFSK

Electrical:

- Input power: 3.3V D, 1.8V DC

Physical:

- Footprint: 33 Terminals, 0.8mm Pitch, $7 \times 7 \times 1.4$ [mm]
- Weight: 0.2g
- Operating temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$

Physical interfaces:

- UART, GPIO

Clock:

- Internal XO 38.4MHz
- External slow clock 32.768kHz

3 Application and Implementation

3.1 Power source

DC power of 3.3V and 1.8V should be supplied to the power input ports:

Supply 1.8V DC to Pin number 18 – VDD_IO

Supply 3.3V DC to Pin number 12 – VBAT

3.2 External clock

Slow clock of 32.768kHz should be provided for module startup.

Supply slow clock to pin number 8 - SLOW_CLK_IN

3.3 Reset

For resetting the module apply GND to pin number 16 – nSHUTD, for releasing reset apply 1.8V DC

3.4 GPIO

This GPIO is used for general purpose, may be used for debugging HW/SW issues for development.

Pin 23 – IO1

3.5 UART

External patches can be downloaded from the host to the module through the UART interface. UART interface support adjustable baud rates between 9600bps to 4Mbps

UART configuration:

Pin 1 - UART_CTS

Pin 2 - UART_TX

Pin 3 - UART_RX

Pin 4 - UART_RTS

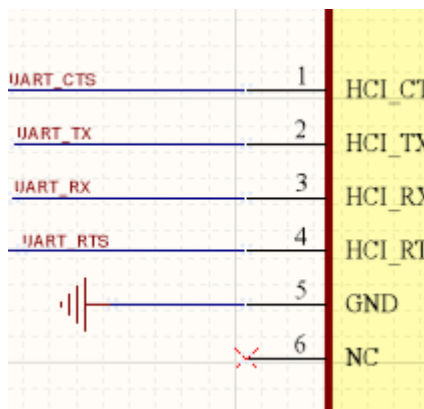


Figure 2: UART Interface

3.7 RF port

RF port is used to connect the module to the antenna. This port should be matched to 50ohm for best RF performance

RF port – pin 14

4 Certification and Regulation

FCC ID: 2ATSM-TGRFCM1

4.1 RF Exposure Warnings

RF Exposure Warnings

This device is only authorized for use in a mobile application. At least 20 cm of separation distance between the TigoRFcore module and the user's body must always be maintained .

4.2 Class A Warnings

The FCC Wants You to Know

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

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.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

4.3 Modification Statements

FCC Warning (Modification statement)

CoreTigo LTD has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the equipment.

4.4 FCC Regulatory Notices

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

Wireless notice

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guideline. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

4.5 Limited Modular Approval

The requirement for KDB 996369 D03:

List of applicable FCC rules

FCC CFR Title 47 Part 15 Subpart C Section 15.247

Summarize the specific operational use conditions

This module has been granted **Limited Modular Approval** for mobile applications. OEM integrators for host products may use the module in their final products without additional FCC certifications if they meet the following conditions. Otherwise, additional FCC approvals must be obtained.

- The host product with the module installed must be evaluated for simultaneous transmission requirements.
- The user's manual for the host product must clearly indicate the operating requirements and conditions that must be observed to ensure compliance with current FCC RF exposure guidelines.
- To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed: <https://www.inventeksys.com/2-4ghz-antenna-sma/>
- A label must be affixed to the outside of the host product with the following statement:

This device contains FCC ID: **2ATSM-TGRFCM1**

The final host / module combinations may also need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.

Information on test modes and additional testing requirements

Date transfer module demo board can control the EUT work in RF test mode at specified test channel.

Additional testing, Part 15 Subpart B disclaimer

The module without unintentional-radiator digital circuit, so the module does not required an evaluation by FCC Part 15 Subpart B. The host should be evaluated by the FCC Subpart B.

Limited module procedures

The module has not its own antenna, the host meets the necessary requirements to satisfy the module limiting conditions.

Trace antenna designs

Not applicable.

RF exposure considerations

The host device manufacturer should confirm that a separation distance of 20 cm or more should be maintained between the antenna of this host device and persons during the host device operation.

Antennas

The device itself has no antenna, customer can use the PCB antenna, Ceramic antenna or FPC antenna with antenna gain isn't greater than 2.15dBi.

Label and compliance information

If this certified module is installed inside the host device, then the outside of the host must be labeled with "Contains FCC ID: 2ATSM-TGRFCM1".