

OxTech Multi-Connectivity Module



Summary Datasheet

Document Status: Preliminary – Gen 2

Revision History

Date	Version	Description
09/25/2023	0.9	Initial Release
02/19/2025	1.0	Public Release
04/10/2025	1.1	Updated for website Release

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1. Introduction

The OxTech Multi-Connectivity Module (MCM) is outlined in this document. This covers its RF interfaces, hardware interfaces, serial commands, and provisioning details. It provides a convenient way to comprehend the module's interface specifications, electrical and mechanical aspects, and related information, facilitating the design and setup of applications using the module.

Target applications include:

- Smart Home – Gateways and hubs, sensors, switches, door locks, smart plugs.
 - Lighting – LED bulbs, luminaries
 - Building Automations - Gateways, sensors, switches, location services
 - AI/ML – Predictive maintenance, glass break detection, wake-word detection.
 - Remote Controls
 - Passive Entry Passive Start (PEPS)
 - Tire Pressure Monitoring System (TPMS)
 - Tire Monitoring Sensor (TMS)
-

Table 1 describes the documentation conventions.

Table 1: Document Conventions

Conventions	Description
	Info Note Intended for information purposes. Users should review
Console input/output or code snippet	Console I/O or Code Snippet This text Style denotes console input/output or a code snippet

2. Product Overview

The Oxtech Multi-Connectivity Module is presented in **Figure 1**.

Figure 1: Multi-Connectivity Module



2.1 General Description

The MCM is a highly efficient, low-power connectivity module designed for IoT applications requiring reliable wireless connectivity and cloud integration. Supporting multiple protocols (Amazon Sidewalk, LoRaWAN, Bluetooth, Zigbee, Thread, Matter, Wi-SUN, and other proprietary standards), the module integrates:

- Secure Vault (Secure Debug, and Secure Boot, Anti-Tamper).
- AI/ML accelerator.
- Semtech SX126x sub-GHz transceiver (LoRa/FSK).
- Silicon Lab's EFR32MG24 microcontroller
- Integrated Bluetooth antenna (BLE).
- Shared SPI eFlash for FUOTA and data storage.
- FUOTA over LoRaWAN and Sidewalk

2.2 Key Features

Table 2: Key Features

Features	Description	Details
Power Supply	Supply Voltage	2.8 – 3.6 V

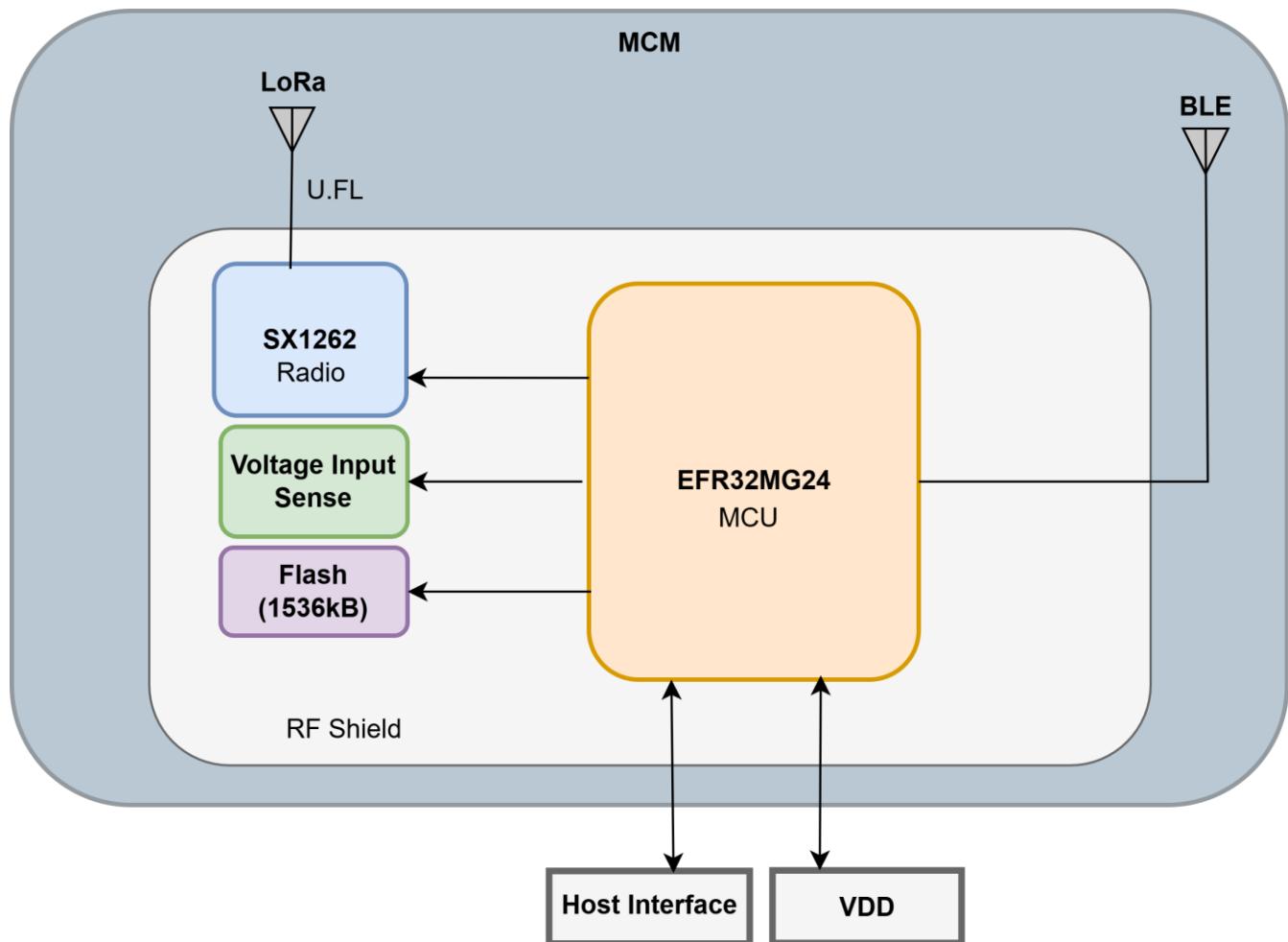
	Typical Supply	2.1 V
Operating Frequency	LoRa/FSK	863 – 928 MHz
	BLE	2.402 – 2.480 GHz
LoRa/FSK Features	High Efficiency PA	+22dBm or +15dBm
	Integrated DC-DC Converter and LDO	N/A
	High Sensitivity	Down to -148dBm*
	Built-in bit synchronizer	clock recovery
	FSK, GFSK, MSK, LoRa and Long Range FHSS modulations	N/A
Bluetooth Protocol	BLE 5.3	N/A
Bluetooth Operational Mode	BLE	N/A
Bluetooth Modulation	GFSK	N/A
Antenna Interfaces	U.FL Antenna Port	LoRa/FSK
	Trace Antenna	BLE
	Antenna Interface (Pin 3)	LoRa/FSK
	Impedance	50 Ω
Physical Characteristics	Dimensions	25.40 mm × 22.86 mm × 3.94 mm
	SMD Module	29 Pins
	Operating Temperature	-30 °C to +85 °C
Temperature Range	Storage Temperature	-40 °C to +95 °C
Integrated SPI Flash	Size	1 MB

*These values are subject to change based on further testing

2.3 Block Diagram

The multi-connectivity block diagram is presented in **Figure 1**.

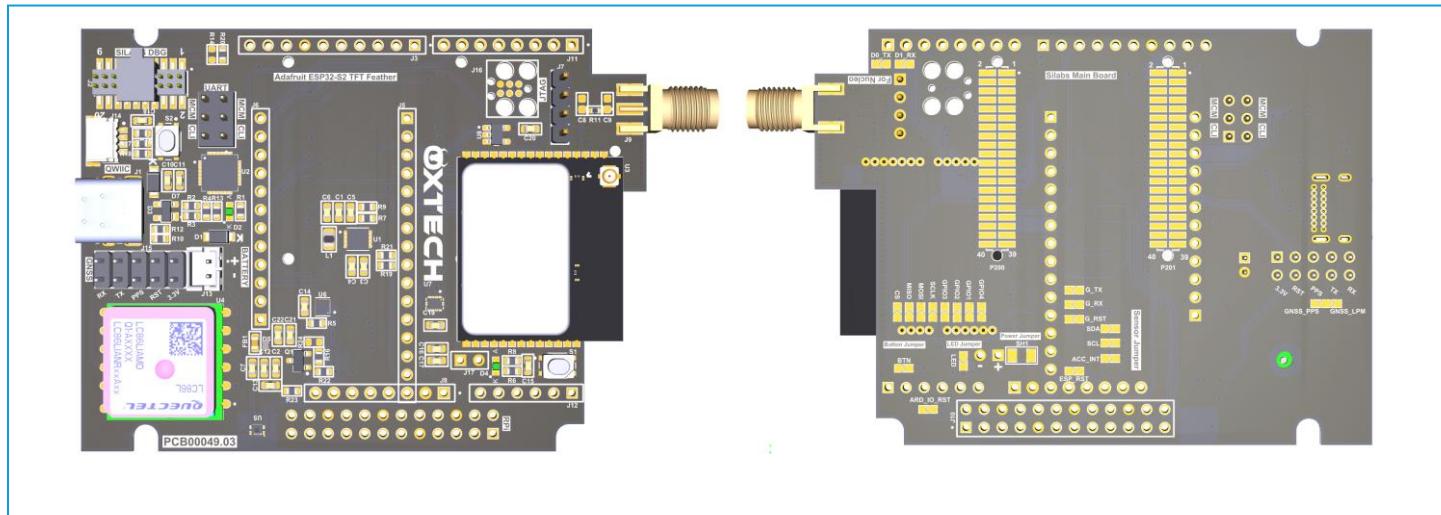
Figure 2: Block Diagram



2.4 EVB Kit

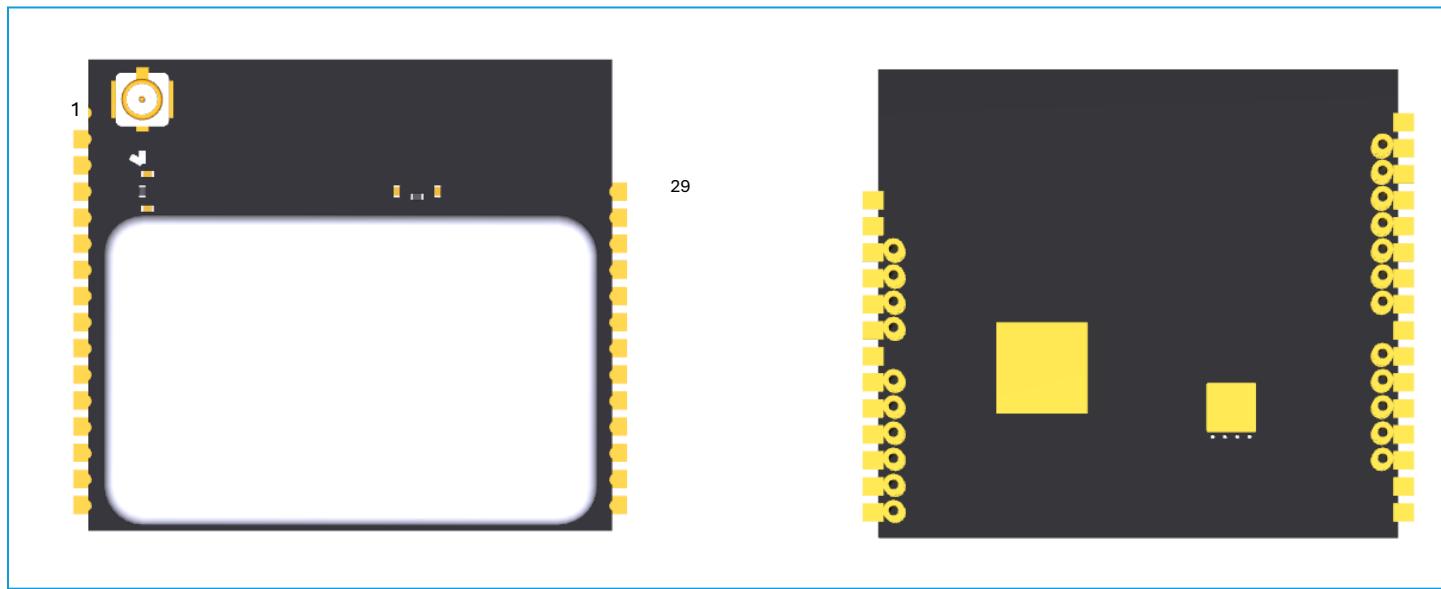
To help develop applications with the module, Oxit also provides an evaluation board (MCM-S0-N1-X1L1-KIT) with accessories to explore the module's capabilities. This document focuses on the OxTech Multi-Connectivity Module (MCM), for more information about the EVB Kit please visit Oxit.com.

Figure 3: MCM Evaluation Board



3. MCM Pinout Interfaces

Figure 4: MCM Top and Bottom View



i *Schematics are subject to change, 29 Pins (from top left to top right in top view).

3.1 Modem Pins

Table 3: Modem Pins

Pin No.	Terminal Name	Type	Description
1	GND	Power	Ground
2	GND	Power	Ground

3	ANT	RF	LoRa RF path for application board antenna.
4	GND	Power	Ground
5	JTAG-SWO	O	Debug Serial Wire Output
6	JTAG-SWIO	I/O	Debug Serial Wire I/O
7	JTAG-SWCLK	CLK	Debug Serial Wire Clock
8	RESET	I	Sidewalk Application MCU Reset
9	GND	Power	Ground
10	UART TX	O	UART TX, Module to Hose
11	UART RX	I	UART RX, Host to Module
12	COMMAND	I	Module Command Input
13	EVENT	O	Module Event Out
14	BUSY	O	Module Busy Out
15	GND	Power	Ground
16	GND	Power	Ground
17	VDD	POWER	Module VDD Supply
18	GND	Power	Ground
19	EXT_GPIO4	I/O	General Purpose Input/Output
20	EXT_GPIO1	I/O	General Purpose Input/Output
21	EXT_GPIO2	I/O	General Purpose Input/Output
22	EXT_GPIO3	I/O	General Purpose Input/Output
23	GND	Power	Ground
24	FLASH_SCLK	CLK	Module/eFlash SPI Clock
25	FLASH_MOSI	I	Module/eFlash SPI Master Out Slave In
26	FLASH_MISO	O	Module/eFlash SPI Master In Slave Out
27	FLASH_CS	I	Module/eFlash SPI Chip Select
28	GND	Power	Ground
29	GND	Power	Ground

3.2 Modem Interface

Table 4: Modem Interface

Parameter	Value
Baud Rate	9600 bps
Data Bits	8
Stop Bits	1
Parity	None

3.3 Modem Operating Voltage

Table 5: Operating Voltages

Symbol	Description	Min.	Typ.	Max	Unit
VDD	Supply Voltage, Applied to VDD and GND	2.8	3.3	3.6	V

3.4 GPIO Signaling Lines – Network Co-Processor (NCP) Mode

3.4.1 COMMAND Line

Active-low, GPIO input line

This line is used to send a signal to the MCM that the Application MCU is about to transmit a command. After driving the line low, the host must wait until the BUSY line goes low before sending the first character. This allows the module to wake up and start reception. After the command is sent, the line must be driven high, the Modem will then process the command. If a valid command was received, the Modem will transmit its response.

3.4.2 BUSY Line

Active-high, GPIO output line

This line signals whether the module is busy or ready to receive commands. It is high while the Modem is busy and will go low as soon as the module is ready to receive a command. The BUSY line will go high again after the command has been received and the COMMAND line has been released.

3.4.3 EVENT Line

Active-high, GPIO output line

This line signals to the Application MCU that the module has event data pending. The Application MCU can use the `GetEvent` command to retrieve such data.

3.4.4 RESET Line

Active-low, RESET Line

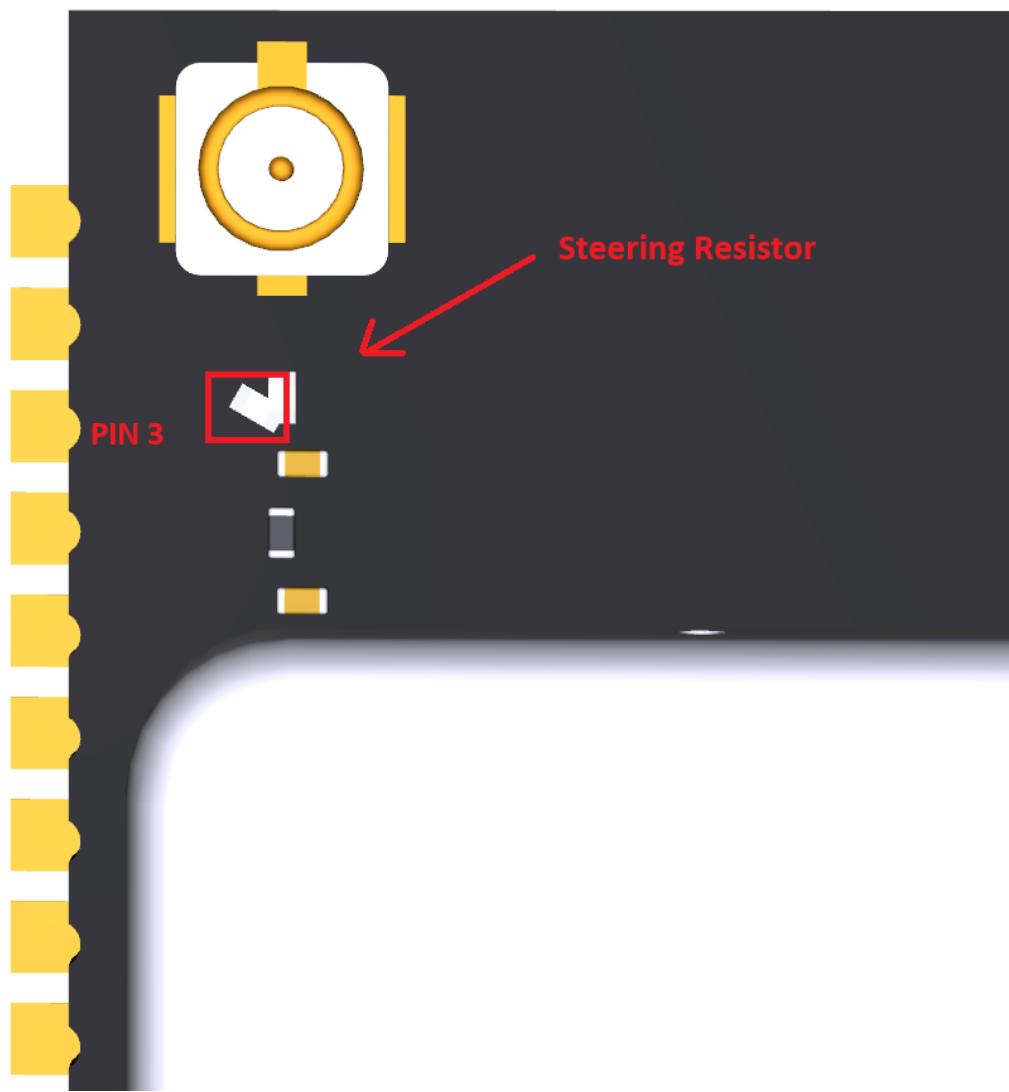
The Application MCU uses this line to perform a hardware reset on the MCM.

4. RF Antenna Interfaces

4.1 RF Antenna Pin Description

The MCM has a U.FL connector for LoRa/FSK and a PCB antenna for BLE operation. However, the LoRa/FSK signal can be routed to either the U.FL connector or to Pin 3 of the module via the steering resistor shown in **Figure 5**.

Figure 5: RF Steering Resistor



4.2 Operating Frequency

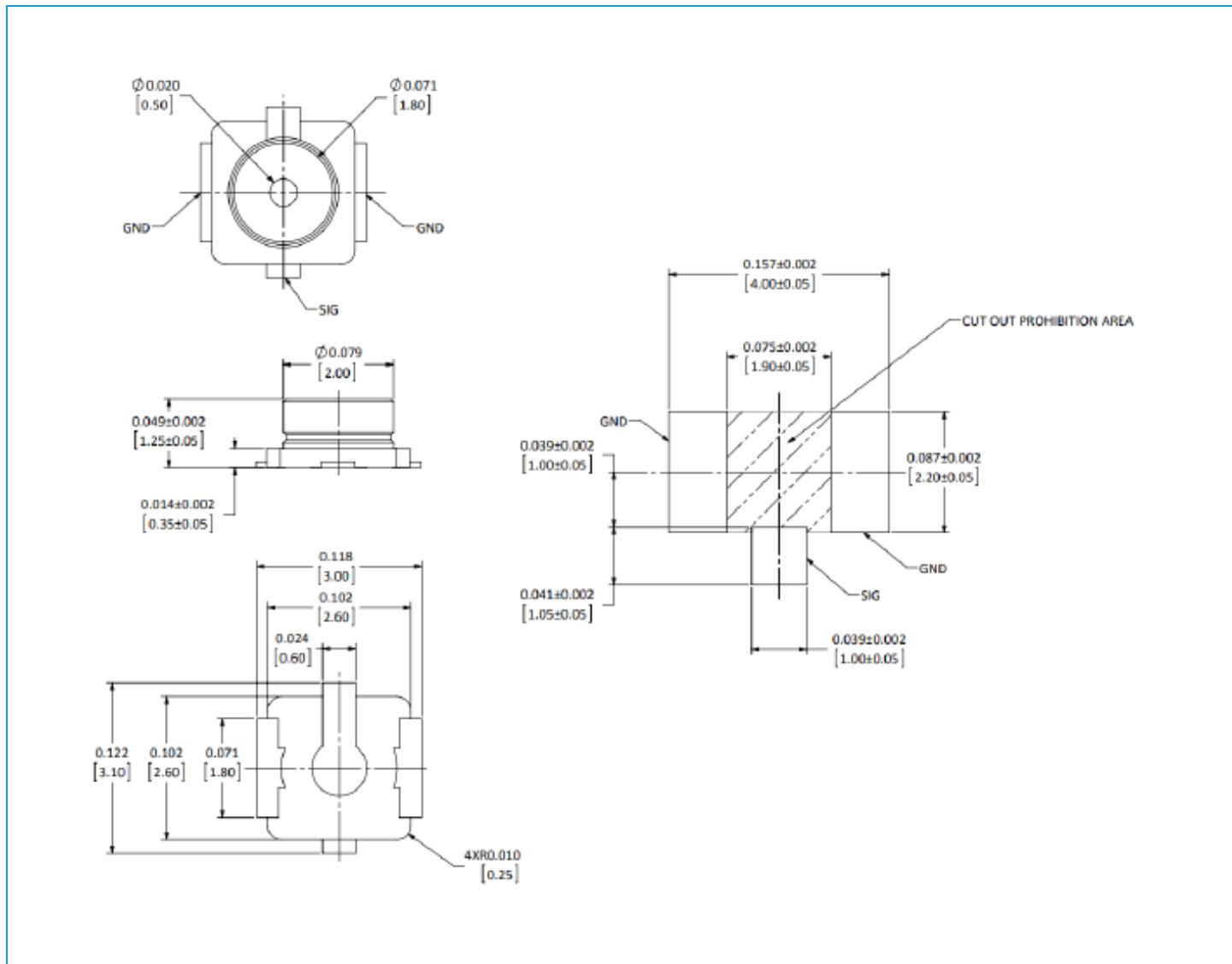
Table 6: Operating Frequency

Mode	Frequency	Unit
LoRa/FSK	868 – 928	MHz
BLE	2.402 – 2.480	GHz

4.3 RF Connector

The module has a U.FL connector for antenna connection as shown in **Figure 6**.

Figure 6: Dimensions of the Receptacle



5. Electrical Characteristics & Reliability

5.1 Absolute Maximum Ratings

Absolute maximum ratings and recommended operating conditions for power supply and voltage on digital and analog pins of the module are listed in **Table 6**.

Table 7: Absolute Maximum Ratings

Symbol	Min.	Typ.	Max	Unit
VDD	2.8	3.3	3.6	V
Voltage at Digital Pins	VDD - 0.3	-	VDD + 0.3	V

5.2 Power Consumption

Table 7: Power Consumption in Different Scenarios

Operating Mode	Operating State	Current Draw*	Unit
LoRa	Idle Mode	4 – 6	mA
	Sleep	15 – 40	uA
	Tx @ 22 dBm	130 – 150	mA
	Rx	6 – 12	mA
FSK	Idle Mode	4 – 6	mA
	Sleep	15 – 40	uA
	Tx @ 22 dBm	130 – 150	mA
	Rx	6 – 12	mA
BLE	Idle Mode	4 – 6	mA
	Sleep Mode	4 – 6	mA
	Tx @ 10 dBm	19.5	mA
	Rx	10.66	mA

*These values are subject to change based on further testing.

5.3 RF Performance

The following table summarizes the transmitting and receiving performance of the module.

Table 8: RF Performance

Operating Mode	Output Power (Typ.)*	Scenario*	Receive Sensitivity (dBm)*
LoRa (863 – 928 MHz)	22	BW = 125 kHz, SF = 7	-124
		BW = 125 kHz, SF = 12	-137
		BW = 500 kHz, SF = 7	-117
		BW = 500 kHz, SF = 12	-129
FSK (863 – 928 MHz)	22	4.8 kbps	-118
		38.4 kbps	-109
		250 kbps	-104

*These values are subject to change based on further testing.

BLE	10	1 Mbps	-96
		2 Mbps	-93.3

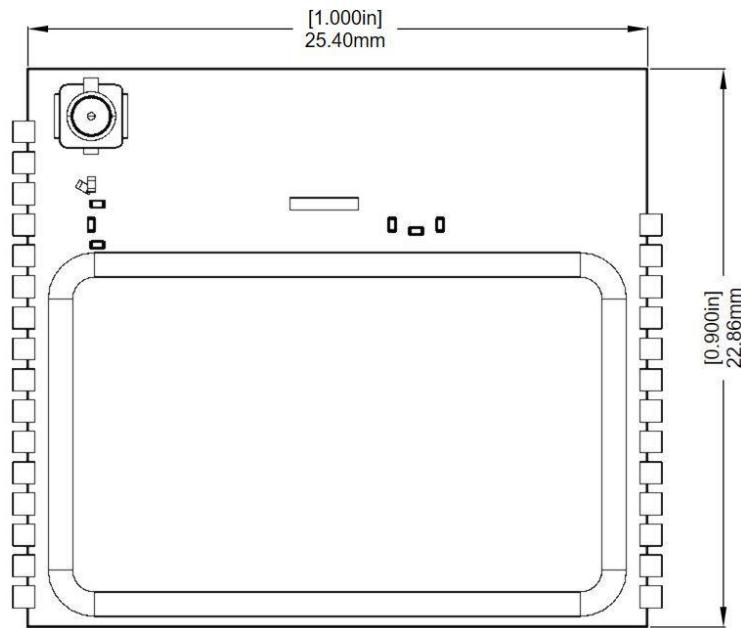
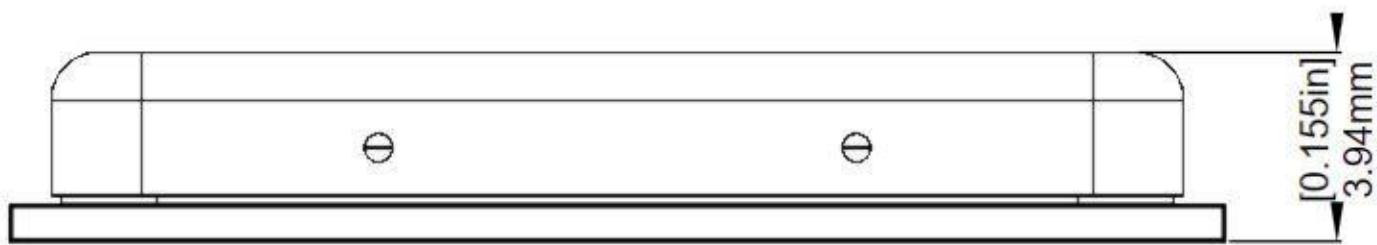
5.4 Operating and Storage Temperatures

Table 9: Temperature Ratings

Parameter	Min.	Max	Unit
Operating Temperature Range	-30	+85	C
Storage Temperature Range	-40	+95	C

6. Mechanical Information

This section describes the mechanical dimensions of the module. All dimensions are measured in millimeters (mm), and the dimensional tolerances are ± 0.2 mm, unless otherwise specified.

Figure 7: Top Dimensions**Figure 8: Side Dimensions**

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