

2BQZ3-ML1 User Manual

1. Introduction

The 2BQZ3-ML1 is a LoRa wireless communication module certified under FCC rules with Single Modular Approval (SMA). This module is intended for OEM integration only and is not to be installed or operated by end users.

2. FCC Compliance Statements

FCC Part 15 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 harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

FCC RF Exposure Statement (Portable, SAR-Exempt)

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This transmitter is exempt from routine RF exposure evaluation under portable use conditions and may be operated in close proximity to the user's body without restriction.

Modification Warning

Changes or modifications not expressly approved by Firefly Technology Inc. could void the user's authority to operate the equipment.

3. OEM Integrator Instructions

The module is limited to OEM installation only. The OEM integrator is responsible for ensuring:

- End users cannot remove or install the module.
- The host product complies with all applicable FCC regulations.
- Final host devices must include the regulatory statements in their end-user documentation.

If an antenna other than those listed in this manual is used, a Class II Permissive Change filing is required with the FCC.

4. Integration Instructions

(per KDB 996369 D03 Sections 2.2–2.12)

2.2 List of Applicable FCC Rules

- 47 CFR Part 15.247 (902–928 MHz ISM band spread spectrum / digitally modulated devices)
- 47 CFR Part 15.209 (general emission limits)

Note: Part 15 Subpart B unintentional radiator rules apply at the host level.

2.3 Specific Operational Use Conditions

- Certified for FHSS operation in the 902–928 MHz ISM band under FCC Part 15.247.
- Approved for portable use and is SAR-exempt provided operation remains within the certified antenna, power, and duty-cycle conditions.
- To maintain SAR exemption, transmissions must not exceed an average of 37.5 seconds total airtime in any 30-minute period ($\approx 0.21\%$ duty cycle at maximum power).
- Host manufacturers are responsible for ensuring these conditions are not exceeded. Use of different antennas, higher output power, or higher duty cycles requires a new SAR evaluation.
- Other modulation modes supported by the underlying silicon are disabled in firmware and not accessible in this certified module configuration

2.4 Limited Module Procedures

Not applicable. This is a **Single Modular Approval** device.

2.5 Trace Antenna Designs

This module does not support trace antenna integration.

For trace design to the approved antenna, please refer to the following recommended trace dimensions:

Length: 19.13mm

Width: 0.50mm

2.6 RF Exposure Considerations

- Module is **SAR-exempt** under FCC rules for portable use (<20 cm).
- Compliance valid only when operated with approved antenna and duty cycle.
- Host manufacturer must evaluate SAR if using different antennas, higher output power, or higher transmit duty cycle.

End-user manual text required:

"This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter is exempt from routine RF exposure evaluation under portable use conditions and may be operated in close proximity to the user's body without restriction."

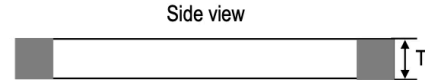
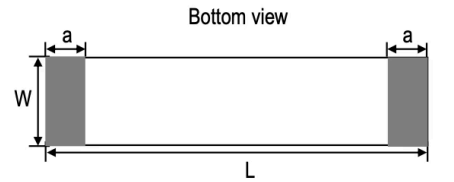
2.7 Antennas

The following antenna has been approved for use with this module:

- **Type:** Chip antenna (Johanson Technology P/N 0915AT43A0026001E)
- **Frequency Band:** 902–928 MHz
- **Peak Gain:** –1.0 dBi

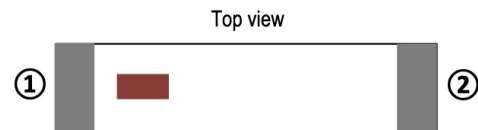
Mechanical Dimensions

	Inches			Millimeters		
L	0.276	±	0.008	7.00	±	0.20
W	0.079	±	0.008	2.00	±	0.20
T	0.031	+0.004/-0.008		0.80	+0.10/-0.20	
a	0.020	±	0.012	0.50	±	0.30



Terminal Configuration⁴

Pin Number	Function
1	Feed
2	NC*



No other antenna types or higher gains are authorized for use with this module. Use of non-approved antennas requires a Class II Permissive Change.

2.8 Label and Compliance Information

- When the FCC ID is not visible on the installed module, the host product must display a label referring to the enclosed module:

"Contains FCC ID: 2BQZ3-ML1"

- The label shall comply with **KDB 784748** guidance on placement, visibility, and permanence.

- Electronic labeling (e-label) is permitted if consistent with FCC guidance.



2.9 Test Modes and Additional Testing Requirements

The module supports test modes for evaluation:

- Continuous transmit mode at maximum output power.
- Continuous receive mode.
- Channel selection across the certified frequency band.

Host manufacturers must configure the module in continuous transmission mode for radiated spurious emissions testing and EMC compliance evaluation per **KDB 996369 D04 Module Integration Guide**.

2.10 Additional Testing – Part 15 Subpart B Disclaimer

- Module authorization covers only transmitter rules listed in Section 2.2.
- Host manufacturer is responsible for ensuring Part 15 Subpart B compliance (unintentional radiator) for the final product with the module installed.

2.11 EMI Considerations

- Host manufacturers are recommended to follow **KDB 996369 D04** best practices to avoid EMI issues caused by module placement, PCB layout, or interaction with other transmitters.

2.12 How to Make Changes

- Only the grantee (Firefly Technology Inc.) may file Class II Permissive Changes.
- Host manufacturers must contact Firefly for approval of modifications.

Contact:

Firefly Technology Inc.
19 W 24th St FL 6
New York, NY 10010
(408)673-7366
regulatory@firefly.co

5. End-User Manual Requirements for Hosts

The host manufacturer must include the following statements in their end-user manuals:

1. FCC Part 15 compliance statement (see Section 2).
2. RF exposure compliance statement (portable, SAR-exempt).
3. Modification warning: "Changes or modifications not expressly approved by Firefly Technology Inc. could void the user's authority to operate the equipment."