



WillowBee

WB-L-U-2 and WB-L-W-2

Operational Description

FCC ID: **2BCAS-BIPOM-WBL**

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Device Overview

This device is a low-power, long-range wireless module designed for integration into IoT endpoints operating in the unlicensed 902–928 MHz ISM band, compliant with LoRaWAN protocols. The module is built around the **STM32WL5MOCH6TR** system-on-chip from STMicroelectronics, which integrates both an STM32 microcontroller and a LoRa-compatible radio transceiver.

Radio Technology

- **Modulation:** LoRa™ (Chirp Spread Spectrum)
- **Transmitter Output Power:** Programmable, up to **+22 dBm**
- **Frequency Range:** 902.3 MHz to 914.9 MHz (uplink), 923.3 MHz to 927.5 MHz (downlink)
- **Bandwidths Supported:** LoRa: 125 kHz (standard), 500 kHz (for higher data rates)
- **Spreading Factors:** All spreading factors supported by LoRaWAN
- **Channel Plan:** Complies with LoRaWAN US902–928 MHz regional parameters
- **Hopping:** Frequency hopping enabled for compliance with FCC Part 15.247

Transmit Behavior

- Transmission is event-driven under LoRaWAN Class A operation.
- A typical uplink lasts **< 1 second**, followed by receive windows per LoRaWAN spec.
- **Duty cycle and dwell time** are controlled by the LoRaWAN MAC and remain within FCC limits.
- Frequency hopping is implemented as per LoRaWAN regional parameters for US.

Power & Host Interface

- **Operating Voltage:** 2.8 V to 3.6 V DC
- **TX Current (22 dBm):** ~135 mA
- **RX Current:** ~10 mA
- **Sleep Current:** < 2 μ A
- **Interfaces:** UART/SPI from host MCU, with software control of radio settings

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Antenna Information

The module supports **external antennas**, with verified operation and FCC testing conducted using the following 3 antenna types:

| Model | Manufacturer | Type | Frequency MHz | Ground Plane | Peak Gain (dbi) |
|-------------------|--------------|-------------|------------------|--------------|------------------------------|
| 2JW1115-C952B | 2J | Dipole | 863-870, 902-928 | Not needed | 2.3 @868 MHz 3.3 @915 MHz |
| 2JF0415P-010MC137 | 2J | Flex PCB | 863-870, 902-928 | Not needed | 2.7 @868 MHz 3.6 @915 MHz |
| SI328100009 | 2J | Coil (wire) | 863-870, 902-928 | Needed | -0.3 |

All three antennas are **50-ohm** nominal impedance. Only antennas of **equal or lesser gain** will be marketed with the module.

Intended Applications

This module is designed to be embedded in a wide range of IoT devices, including:

- Smart meters
- Wireless sensors
- Industrial monitoring equipment
- Asset tracking solutions

RF Exposure Statement

The module is intended for use in devices that maintain a **minimum separation distance of 20 cm** from the human body. Final host devices will include proper labeling and user instructions to ensure compliance with FCC RF exposure guidelines.

Compliance Statement

The module will be labeled with a valid FCC ID (2BCAS-BIPOM-WBL) and ISED ID (33805-BIPOMWBL), and all integration and end-user documentation will include the required statements in accordance with 47 CFR §§ 15.19, 15.21, and 15.105.

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