



Module user manual

Bluetooth Low Energy Module

Model: MS50SFB

The MS50SFB is a compact and small size Bluetooth 5.0 module with ultra-low power consumption and optional antenna types; The module has the large number of GPIOs and excellent RF performance. Therefore, it can apply to a wide range of Bluetooth connected products. With an ARM Cortex™ M4(F) MCU, up to 512KB flash, 64KB RAM, embedded 2.4GHz, MS50SFB can save the R&D and time cost.

The module is highly integrated that contains all the necessary components from radio to a different antenna and a completely implemented Bluetooth protocol stack and programming UART communication protocol.

Features

1. Frequency: 2400 to 2483 MHz
2. Max. Output power: 0 dBm
3. Single power supply: 1.7 – 3.6V
4. Range: up to 60 meters in open space
5. Chip: nRF52832 (Nordic)
6. GPIO Quantity: 30
7. 512KB Flash and 64KB RAM (nRF52832)
8. Module size: 20.0 x 12.0 x 2.0 mm
9. ARM Cortex-M4 processor
10. Metal shielding with marking
11. UART communication protocol (Slave optional)
12. Antenna: PCB, chip antenna, u.FL/IPEX connector
13. Operating Temperature range: -40 to 85 degree Celsius

Application

1. Medical devices
2. Heart rate monitor
3. Blood pressure monitor
4. Blood glucose meter
5. Thermometer
6. Sport facilities
7. Weighing machine
8. Sports and fitness sensors
9. Accessories
10. 3D glasses and gaming controller
11. Mobile accessories
12. Remote controllers / Toys
13. Electronic devices
14. Cycle computer



Applicable Transmitter Rules:

USA: FCC 15.247

MS50SFB module is being tested and is expected to be compliant against the Federal Communications Commission standards.

As for the OEM integration:

For OEM integration, this device may only be used by OEM integrators, subject to the following conditions:

Any other transmitter or antenna must not be co-located with the antenna and transmitter. The module shall be only used with the integral antenna(s) that has been originally tested and certified with this module.

The OEM integrator shall test their end-product for any additional compliance requirements with this module installed (for example, digital device emission, PC peripheral requirements, etc.).

If the installation requirements conditions herein cannot be met (for example certain laptop configuration or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the final product shall not use the FCC ID of the module. In these circumstances, the OEM integrator shall be re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

The OEM shall be verifying end product compliance with FCC Part 15, sub-part B limits for unintentional radiators.

Conditions of integration:

This radio frequency module has been certified for integration into host products under the modular approval procedures of the Federal Communications Commission (FCC).

The module is limited to installation in OEM integrator products only. The module must not be sold or operated as a standalone device.

The OEM integrator is responsible for ensuring that the end product into which the module is installed complies with all applicable regulatory requirements.

The module shall be installed in accordance with the instructions provided in this integration manual.



The module is approved for integration in devices where separation from persons is >20cm and is additionally approved for <20cm separation under the following conditions:

Portable Device

This module has been evaluated and approved for use as a portable device (≤ 20 cm separation distance) in a stand-alone configuration only, where this module is the only radio frequency (RF) transmitter installed in the host device.

Any party integrating this module into a host device must comply with the following requirements:

- This approval is limited to host devices containing only this singular module as the sole RF transmitter. Hosts incorporating additional radios or RF transmitters are outside the scope of this filing and require separate FCC authorization.
- The host device manufacturer is responsible for ensuring that the final integrated product complies with all applicable FCC regulations, including but not limited to Part 15 requirements.
- The host device manual must include appropriate instructions and warnings regarding the use of this module, in accordance with FCC requirements for modular transmitters.
- Configurations involving implantable medical devices, multi-radio environments, or any other use case not explicitly covered by this documentation are not authorized under this filing.

This module has not been approved for use in any configuration other than those described above. Any deviation from these conditions may require additional FCC authorization. Unauthorized modifications void and invalidate the equipment authorization and the authority to operate the equipment.



Approved Antenna Information

The module incorporates a permanently attached, integral antenna. The antenna is integral and only this antenna is authorized under the existing equipment certifications. Any modification to the antenna is not permitted.

Any antenna modifications or the addition of a new external antenna is subject to a separate equipment authorization and certification filing with the FCC.

The integrator shall not:

- Modify the antenna structure or matching network
- Add an RF connector
- Re-route the RF path
- Change the antenna enclosure environment in a manner that alters RF characteristics
- Non-compliance with these requirements voids the module certification.

Testing requirements

The radio module has been evaluated and certified as a transmitter module under the applicable FCC rules. The module certification covers only the intentional radiator portion of the device. The OEM integrator is responsible for ensuring that the final host product complies with all additional applicable regulatory requirements.

The module certification does not cover unintentional radiator requirements.

The final host product must be evaluated for:

United States: FCC Part 15, Subpart B (Class B or Class A, as applicable)

Testing must be performed with the module installed and operational in a representative configuration.

This Bluetooth module includes a test mode that is intended for regulatory compliance testing only. The test mode is not available to end users and cannot be activated during normal operation. It can only be enabled by the manufacturer using proprietary commands through a wired interface (such as USB or UART).

No user-accessible test software is provided with this device. All necessary tools, commands, and instructions required to place the device into test mode are controlled by the manufacturer and are made available only to authorized test laboratories upon request.

During compliance testing, the device is configured to operate under specific conditions, including continuous transmission, maximum output power, and operation across all supported Bluetooth channels and modes.

Because this device is intended for internal company use only, access to test mode and RF configuration settings is strictly restricted. End users cannot enable test mode or modify any RF parameters.



The Bluetooth module has been evaluated with appropriate electromagnetic interference (EMI) considerations to ensure accurate compliance measurements. Testing was performed using representative configurations, including typical power supply arrangements, data interfaces, and peripheral connections, to reflect normal Bluetooth operation. Care was taken to minimize the impact of unintended emissions from support equipment and the surrounding environment. Standard EMC practices, including proper grounding, cable placement, and system configuration, were applied to ensure that measured emissions are attributable to the device under test. Additional guidance provided in KDB 996369 D04 has been considered where applicable.

How to authorize changes to this module

Authorization of additional antennas, RF exposure use cases or other modifications will require the requesting party to file for their own certification numbers (US FCC 2.933 change in ID). Requests for letters can be obtained by contacting us.

Use e-mail: service.tools@inficon.com

Host labelling requirements

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating “Contains FCC ID” with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The host system using this module, should have label in a visible area indicated the following texts: "Contains FCC ID: 2BFIX-MS50SFB."



Host Product's User Manual Requirements

The host product's user's manual shall include the following required legal statements:

FCC Required Statements:

When to include:	Statement to include:
Always	<i>Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.</i>
Always	<i>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.</i>
15.109 Class B hosts only.	<i>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.</i>
15.109 Class A hosts only	<i>Note: 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 instruction manual, 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.</i>



Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors, are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, *i.e.*, shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge, at the time of purchase. For additional information on host requirements see 47 CFR 15.27

Legal

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following 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.

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.