

# LBEE5ZZ1XL User Manual for FCC

Model Name: **LBEE5ZZ1XL**

FCC ID: **VPYLBEE5ZZ1XL**

Since this module is not sold to general end users directly, there is no user manual of module.

For the details about this module, please refer to the specification sheet of module.

This module should be installed in the host device according to the interface specification (installation procedure)

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the end user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as shown in User manual.

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

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

This device complies with below part 15 of the FCC Rules.

Part 15 Subpart C

Part 15 Subpart E

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The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.

The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

This module designed for mounting inside of the end product by us professionally.  
Therefore, it complies with the antenna and transmission system requirements of §15.203.

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This manual is based on KDB 996369, which is designed to ensure that module manufacturer correctly communication the necessary information to host manufacturers that incorporate their modules.

## **INTEGRATION INSTRUCTIONS**

### 1. General: Applicable

Sections 2 through 10 describe the items that must be provided in the integration instructions for host product manufacturers (e.g., OEM instruction manual) to use when integrating a module in a host product. This Modular transmitter applicant(muRata) should include information in their instructions for all these items indicating clearly when they are not applicable.

### 2. List of applicable FCC rules: Applicable

This device complies with below part 15 of FCC Rules.  
Part 15.247  
Part 15.407

## 3. Summarize the specific operational use conditions : Applicable

This module designed for mounting inside of the end product by us professionally.  
Therefore, it complies with the antenna and transmission system requirements of §15.203.

## 4. Limited module procedures : Applicable

This module does not supply a regulated voltage, it can only be used in a host that supplies regulated voltage. See page 12  
About Power Supply(limited condition).

## 6. RF exposure considerations : Applicable

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

It is necessary to take a SAR test with your set mounting this module (except to use only Bluetooth).  
Class II permissive change application is necessary using the SAR report. Please contact Murata.  
And an application for a Class II permissive change from a Mobile equipment to a Portable equipment is also required.

Note)

Portable equipment : Equipment for which the spaces between human body and antenna are used within 20cm.

Mobile equipment : Equipment used at position in which the spaces between human body and antenna exceeded 20cm.

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## 7. Antennas : Applicable

Part number	Vendor	Peak Gain(dBi)		Type	Connector
		2.4GHz	5GHz		
146153	Molex	3.2	4.25	Dipole	U.FL

## 8. Label and compliance information : Applicable

The following statements must be described on the user manual of the host device of this module;

Contains Transmitter Module FCC ID: VPYLBEE5ZZ1XL

or

Contains FCC ID: VPYLBEE5ZZ1XL

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.

\*If it is difficult to describe this statement on the host device due to the size, please describe in the user's manual and also either describe on the device packaging or on a removable label attached to the device.

### FCC CAUTION

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

### Compliance with FCC requirement 15.407(c)

Data transmission is always initiated by software, which is then passed down through the MAC, through the digital and analog baseband, and finally to the RF chip. Several special packets are initiated by the MAC. These are the only ways the digital baseband portion will turn on the RF transmitter, which it then turns off at the end of the packet. Therefore, the transmitter will be on only while one of the aforementioned packets is being transmitted. In other words, this device automatically discontinues transmission in case of either absence of information to transmit or operational failure.

Frequency Tolerance:  $\pm 20$  ppm

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

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When installing it in a mobile equipment. Please describe the following warning to the manual.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

This module is only approval as a mobile equipment.

Therefore, do not install it on portable equipment.

If you wish to use it as a portable equipment, please contact Murata in advance as Class II application accompanied by SAR testing using the final product are required.

Note)

Portable equipment : Equipment for which the spaces between human body and antenna are used within 20cm.

Mobile equipment : Equipment used at position in which the spaces between human body and antenna exceeded 20cm.





## 9. Information on test modes and additional testing requirements: Applicable

Please check the installation manual first.

Please contact Murata if you have any questions when conducting the RF certification test on the host.

We (Murata) are ready to present the control manual and others for the RF certification test.

## 10. Additional testing, Part 15 Subpart B disclaimer : Applicable

The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.

The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

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If the final product with this module is FCC Class A digital device, include the following in the manual of the final product:

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.

If the final product with this module is FCC Class B digital device, include the following in the manual of the final product:

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.

## 11. Note EMI Considerations : Applicable

Note that a host manufacture is recommended to use KDB 996369 D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

For standalone mode, reference the guidance in D04 Module Integration Guide and for simultaneous mode<sup>7</sup>; see D02 Module Q&A Question 12, which permits the host manufacturer to confirm compliance.

## 12. How to make changes: Applicable

When changing from the conditions of approval, please present technical documentation that it is equivalent to a Class I change. For example, when adding or changing an antenna, the following technical documents are required.

- 1) The document indicating the same type as the original antenna
- 2) Technical document showing that the gain is the same or lower than the gain at the time of the original approval
- 3) Technical document showing that the spurious is no more than 3 dB worse than when it was originally certified

## About Power supply(Limited condition)

This Module(LBEE5ZZ1XL and LBEE5ZZ2XS) have been approved as Limited Modular Approval. These modules do not have a voltage stabilizing circuit in the power path to the internal RF circuitry. Therefore, the Limited Condition must provide a stable power supply for the supply voltage to the module.

Please supply a stable power supply so that the voltage shown in the table below is applied.

Parameter		Min.	Typ.	Max.	unit
Supply Voltage	VDD33	3.14	3.3	3.46	V
	VDD18	1.71	1.8	1.89	V
	VIO	1.71 3.14	1.8 3.3	1.89 3.46	V
	VIO_SD	1.71 3.14	1.8 3.3	1.89 3.46	V

## Microstrip trace line on the host PCB to the antenna connectors

### ■ About the signal line between an antenna and a module

It is a 50-ohm line design.

Fine tuning of return loss etc. can be performed using a matching network.

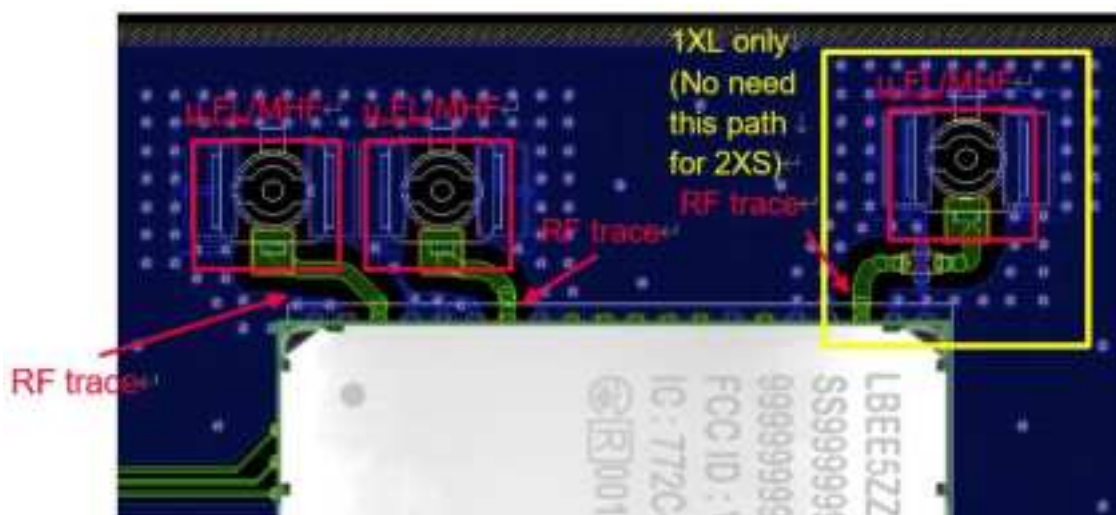
However, it is required to check "Class1 change" and "Class2 change" which the authorities define then.

The concrete contents of a check as follows.

- 1) Different length and shapes affect radiated emissions, must confirm the same specification is used as the following page 14 and 15.
- 2) The emission level is not getting worse.

The following is the design of the EVB used for the test.

Certification tests are conducted in the following patterns.



The 50ohm microstrip line needs to be copied when module is installed in the End product.

Murata provides set makers with Gerber data or something similar.

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About the Trace antenna and feed line of the jig where the certification test was conducted

Substrate type name of certification test jig: P2ML9917

feed line width : 0.4mm

Substrate thin :  $0.8 \pm 0.1$  mm

Substrate material: FR -4

Substrate thickness between GND layer and surface layer: 0.408mm

