

## User's manual

The module is only approved for use by the grantee in its own products and not intended for sale to third parties. The user manual for integration instructions are internal confidential manufacturing documents. For the details about this module, please refer to the specification sheet of the module.

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

### **Identifier marking for 2.4GHz band RF SiP MR-2400MB modules**

The module is a Surface Mount Device SiP (System in Package) soldered onto the end product and is not accessible to the end-user. It is not possible for the end-user to replace or remove the module.

The outline size is 6.5 x 6.5 mm. The identification marking is made by sticker (see Figure-1):

- Readable module name
- Company Logo

The size of the marking area is only 4.0 x 6.0 mm, thus the size of the module/label makes it impossible to print the FCC and IC IDs on the identifier label in a print size of 4 points or larger. Instead the FCC, CE-Red, MIC and NCC IDs are printed on the cardboard box as well as the modules user manual of the end devices.



**Figure-1 MR-2400MB with identifier marking.**

This device complies with radio regulations of below countries and region.

1) Regulatory information for Japan Radio Law

The MR-2400MB module comply with the Japanese Technical Regulation Conformity Certification of Specified Radio Equipment (ordinance of MPT No. 37, 1981), Article 2, Paragraph 1: Item 19 "2.4 GHz band wide band low power data communication system". End products based on MR-2400MB module and targeted for distribution in Japan must be affixed with a label with the "Giteki" marking or certification number. The marking or certification number must be visible for inspection.

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

本製品は、電波法に基づく小電力データ通信システムの無線局の無線設備（技術基準適合認定：証明規則第2条第1項第19号）として、認証を受けています。

従って、本製品を使用するときに無線局の免許は必要ありません。

ただし、以下の事項を行うと法律で罰せられることがあります。

- ・本製品を分解／改造すること
- ・本製品に貼ってある証明ラベルをはがすこと

機器名称：MR-2400MB 工事設計認証番号：007-AM0009

Statement translation:

The product has been certified as a low-power data communications system in the 2.4 GHz band (Technical Regulations Conformity Certification System: Ordinance of MPT No. 37, 1981, Article 2, paragraph 1, item (19)) according to the Radio Law of Japan.

Accordingly, no radio equipment license is required to use this product.

However, the following actions may be punishable under law:

- ・ Disassembling or modifying the product.
- ・ Removing the certification label on the product.

Name of radio equipment: MR-2400MB Number of type certification: 007-AM0009

\* If it is difficult to describe this statement on the host product due to the size, please describe it in the User's manual.

The auxiliary label will have at least the information shown in the figure below:

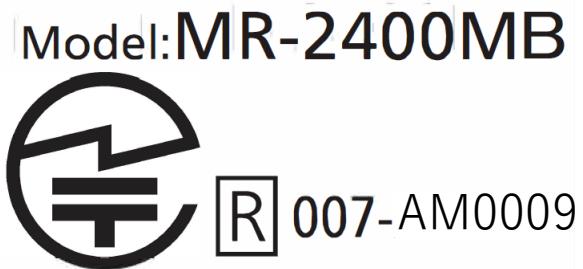


Figure-2 MR-2400MB auxiliary label for Japan Radio Low

2) Regulatory information for FCC(U.S.A.)

The MR-2400MB module is 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 C compliance testing with the modular transmitter installed.

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 following information must be indicated on the host device of this module;

**Contains Transmitter Module FCC ID: 2AJE9MR-2400MB**

or

**Contains FCC ID: 2AJE9MR-2400MB**

**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 product due to the size, please describe in the User's manual.

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

**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 equipment complies with FCC radiation exposure limits set forth for an**

uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment is not certified as type of the portable device with FCC Rules. Then, please use within specification of this product and have a separation distance of minimum 20 mm between the user and/or bystander and the antenna and /or radiating element.

**Digital devices used EXCLUSIVELY as industrial, commercial or medical test equipment.** "Test equipment" includes devices used for maintenance, research, evaluation, simulation and other analytical or scientific applications in areas such as industrial plants, public utilities, hospitals, universities, laboratories, automotive service centers and electronic repair shops.

**If the final host is installed at the areas that are not subject to 15.103(c) exempted devices from Part 15 subpart B, it requires Part 15 Subpart B compliance testing.**

FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

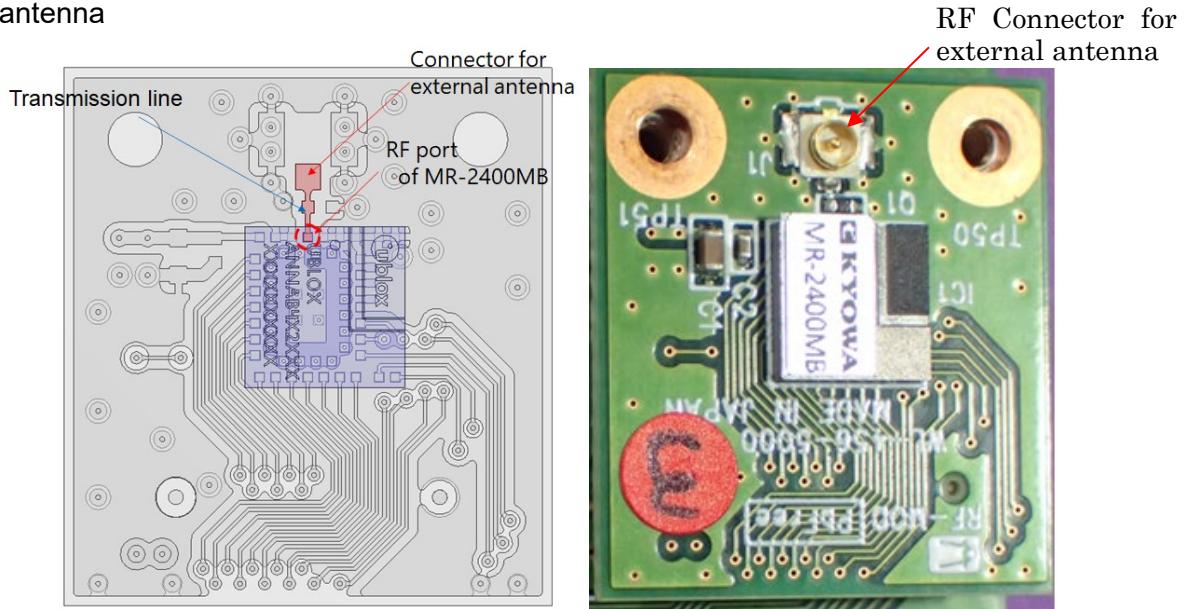
The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product."

Antenna list:

No	Antennas				Cable		Total gain[dBi]
	Brand name	Model name	Antenna type	Antenna gain[dBi]	Combination	Total loss[dB]	
A	HWaYaoTek	DA-2450-03RP-SMA-04	Dipole antenna	4.3	1+2	1.01	3.29
B	FUTABA	EXT-ANT2	Patch antenna	1.95	1+2	1.01	0.94

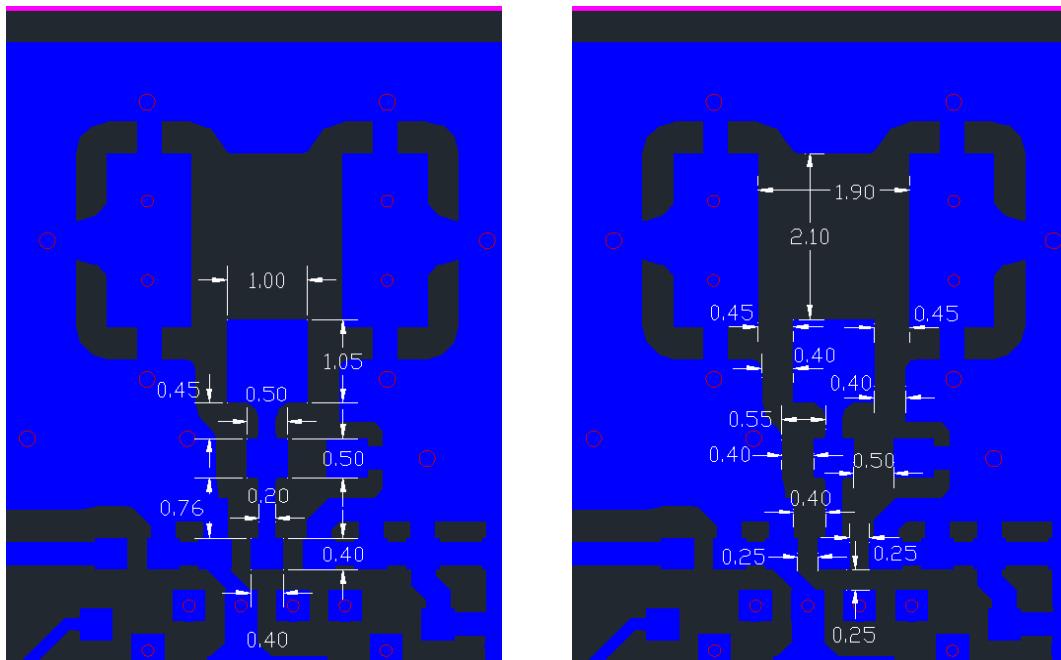
Cable			
	Product number	Length	Insertion loss
1	WL-456-5000	Refer to as below	0.38dB
2	AA-562-2020	150mm	0.63dB

WL-456-5000: RF port of MR-2400MB, transmission line and RF connector for external antenna

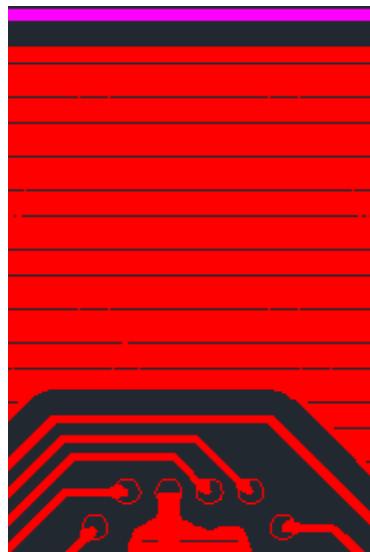


Layout of Trace design:

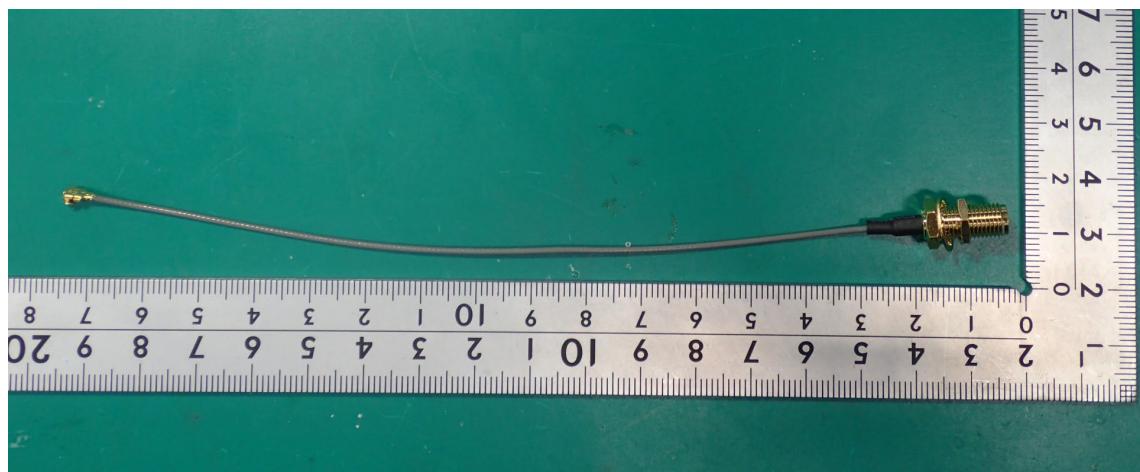
The figure below shows the Top layer layout of the reference host board focused on RF port of MR-2400MB and RF connector for external antenna. The snapshot also indicates the critical dimensions that are required to be replicated in the design to maintain compliance.



Below board shows the bottom layer layout of the reference board directly beneath the RF traces.



Antenna (DA-2450-03RP-SMA-04 and EXT-ANT2) which are connected to the RF Connector for external antenna (UFL connector) connected to MR-2400MB via 150mm RF cable (AA-562-2020). Photo shown below.



This module is approved as a stand-alone module. This module is mounted for only telemetry systems to measure strain, temperature, etc. at an industrial plant that is subject to 15.103(c) exempted devices from Part 15 subpart B.

If the final host is installed at the areas that are not subject to 15.103(c) exempted devices from Part 15 subpart B, it requires Part 15 Subpart B compliance testing with the modular transmitter installed.

3) Regulatory information of RED(CE)

For information about the regulatory compliance of MR-2400MB module against requirements and provisions in the European Union.

The MR-2400MB module comply with the essential requirements and other relevant provisions of Radio Equipment Directive (RED) 2014/53/EU.

The MR-2400MB module comply with the Directive 2011/65/EU (EU RoHS 2) and its amendment Directive (EU) 2015/863 (EU RoHS 3).

#### 4) Regulatory information of Taiwan NCC

取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前述合法通信，指依電信管理法規定作業之無線電通信。

低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

系統廠商應於平台上標示「本產品內含射頻模組： XXXyyyLPDzzzzx」字樣

#### Statement translation:

Without permission granted by the NCC, any company, enterprise, or user is not allowed to change frequency, enhance transmitting power, or alter original characteristic as well as performance to an approved low power radio-frequency device.

The low power radio-frequency devices shall not influence aircraft security and interfere legal communications; If any interference is found or suspected, the user shall immediately cease operating the equipment until the interference has been prevented. The said legal communications means radio communications is operated in compliance with the Telecommunications Act. The low power radio-frequency devices must accept interference from legal communications or ISM radio wave radiated devices.

End products based on MR-2400MB module and targeted for distribution in Taiwan must carry labels with the textual and graphical elements shown below.

Contains Transmitter Module 內含發射器模組： xxxxxxxxxyyyyyy