QOGRISYS

SHENZHEN OFEIXIN TECHNOLOGY LIMITED

O9101SA

Wi-Fi Dual-band 1x1

802.11ax + Bluetooth5.4

Module Datasheet

Cover of Approval Sheet

PRODUCT NAME	Part No.	Description
O9101SA	FWAAO9101SA10	WQ9101S SDIO 3.3V 1T1R 12*12*1.9mm 80MHz 11ax WIFI6+BT5.4 External 1Antenna

Customer: _____

Customer P/N: _____

Signature: _____

Date: _____

Maker Information:

SHENZHEN OFEIXIN TECHNOLOGY LIMITED

902, Building 4, Guangming Fenghuang Plaza, Dongkeng Community,

Fenghuang Street, Guangming District, Shenzhen, China

Revision History

Version	Date	Description	Draft	Approved
V1.0	2025-09-16	Preliminary Project version	EZX	Ben·Chen
V2.0	2025-11-11	Revise Company Logo and Address Revised Operating Temperature Specifications	EZX	Ben·Chen
V2.1	2025-12-15	Adjust layout dimensions	EZX	Ben·Chen
V2.2	2026-01-29	Correct the pin description error	EZX	Ben·Chen

CONTENTS

1.Overview

1.1 Introduction

The O9101SA is a dual-mode module, support 1x1 2.4G + 5G dual-frequency Wi-Fi function and Bluetooth function. Wi-Fi Da We supports Wi-Fi protocol IEEE 802.11ax and backward compatibility protocol 802.11a/b/g/n/ac. The Bluetooth subsystem supports the Bluetooth system Protocol 5.4 with low-power audio.

The O9101SA module integrates five high-performance RISC-VCPUs, high-speed interfaces (SDIO3.0).The module supports a good radio frequency with very low power consumption And baseband performance.

1.2 Features

- Supported for the IEEE 802.11 a / b / g / n / ac / ax protocol.
- Dual-band 2.4 GHz/5 GHz support.
- 20MHz/40MHz channel bandwidth for 2.4 GHz and 20MHz/40MHz/80MHz channel bandwidth for 5 GHz.
- Support WFA、WPA/WPA2/WPA3、WEP、WAPI.
- Supports IEEE 802.11k /v/r protocol.
- Support Soft AP/STA/P2P mode.
- Fully compatible with Bluetooth 5.4 protocol.
- Support for BT / BLE dual-mode.

1.3 General Specification

Model Name	O9101SA
Product Description	Support WiFi6+BT5.4
Dimension	L x W x H: 12 x 12 x 1.9 (typical) mm
Wi-Fi Interface	SDIO3.0
BT Interface	UART/PCM
Operting temperature	-10 to 70℃
Storage temperature	-40℃ to 120℃

Note: This module operates normally within a temperature range of -10℃ to 70℃; continuous operation at extreme temperature points over extended periods is not recommended.

1.4 Recommended Operating Rating

Feature		Minimum	Type	Maximum	Units
Operating Temperature		-10	25	70	℃
VCC		3.15	3.3	3.45	V
Power Consumption (Type VCC)	TX (2.4G HE40)	298 mA			
	RX (2.4G HE40)	179 mA			
	TX (5G HE80)	317 mA			
	RX (5G HE80)	208 mA			
	BT TX(3DH5)	171 mA			
	BT RX(3DH5)	98 mA			

2. RF Specification

2.1 Wi-Fi RF Specification

2.4GHz RF Specification	
Feature	Description
Operating Frequency	US: 2412~2462MHz EU: 2412-2472MHz
Standards	Wi-Fi: IEEE 802.11b/g/n/ax & Wi-Fi compliant
Operating Channel	US: 11; EU: 13
Modulation	DSSS, OFDM, OFDMA
PHY Data rates	Wi-Fi:802.11b:11,5.5,2,1Mbps 802.11g:54,48,36,24,18,12,9,6Mbps 802.11n: up to 150Mbps (2.4G HT40) 802.11ax: up to 286Mbps data rate (2.4G HE40)
RF Output Power: 14.0dBm(Only for CE)	
5GHz RF Specification	
Feature	Description
Operating Frequency	5150-5250MHz; 5725-5850MHz
Standards	Wi-Fi: IEEE 802.11 a/n/ac/ax Wi-Fi compliant

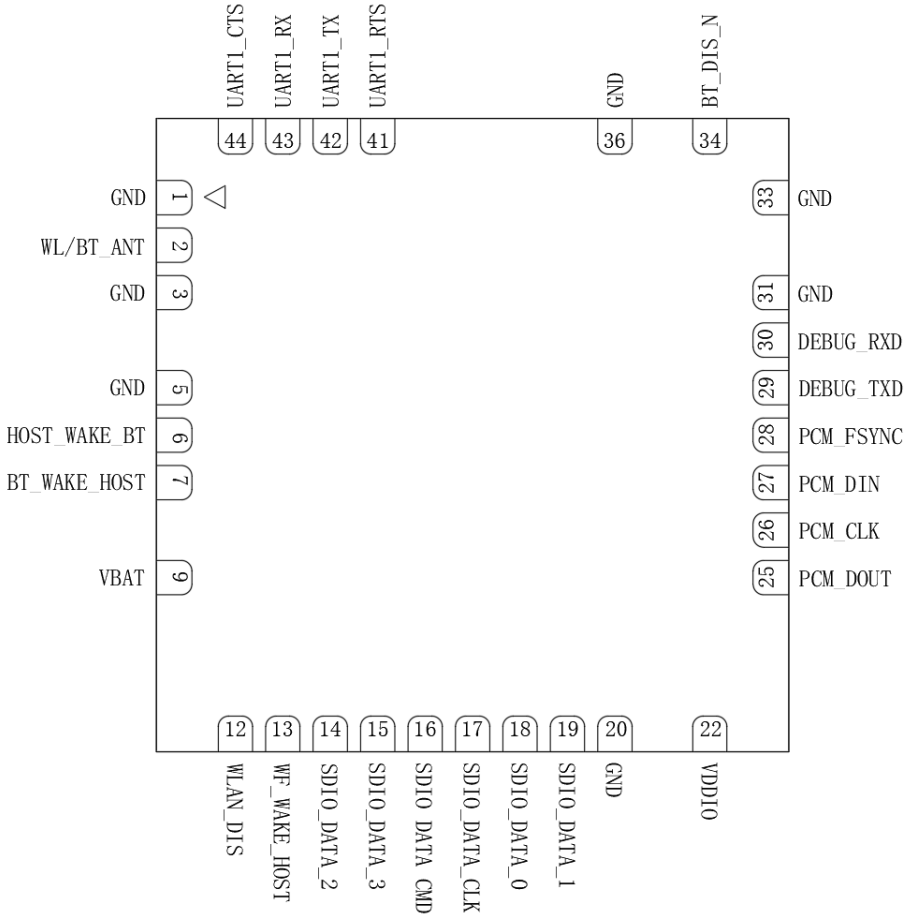
Modulation	OFDM, OFDMA
PHY Data rates	Wi-Fi: 802.11a:54,48,36,24,18,12,9,6Mbps 802.11n: up to 150Mbps(5G HT40) 802.11ac: up to 433Mbps (5G VHT80) 802.11ax: up to 600Mbps data rate (5G HE80)
RF Output Power: Band 1: 15.0 dBm, Band 4: 13.98 dBm(Only for CE)	

2.2 BT RF Specification

Feature	Description
Operating Frequency	2.402～2.480GHz
Number of Channels	BDR/EDR: 79 channels BLE: 40 channels
Standards	Bluetooth V5.4
Modulation	8DPSK, π/4 DQPSK, GFSK
PHY Data rates	Supports 2Mbps Bluetooth Low Energy(BLE),BLELong Range
Output Power	2.0 dBm(Only for CE)

3.Pin Assignments

3.1 Pin Outline



3.2 Pin Definition

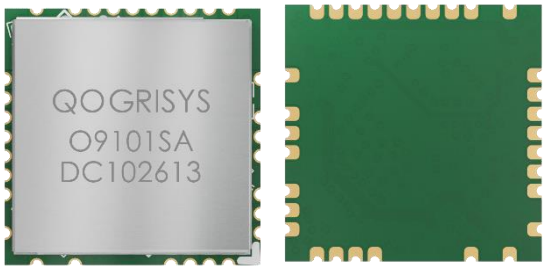
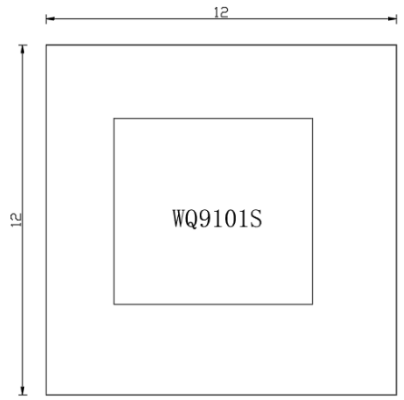
PIN	Name	Type	Description	Voltage
1	GND	-	Ground connections	
2	WL/BT_ANT	I/O	WLAN and BT RF I/O port	
3	GND	-	Ground connections	
5	GND	-	Ground connections	
6	HOST_WAKE_BT	I	GPIOB3/HOST_WAKE_BT	
7	BT_WAKE_HOST	O	GPIOB3/HOST_WAKE_BT	
9	VBAT	I/PU	Main power voltage source input	3.3V

12	WLAN_DIS	P	Enable pin for WLAN Radio ON: pull high; OFF: pull low External pull low to disable WLAN Radio	VDDIO
13	WF Wake Up Host		WF Wake Up Host	VDDIO
14	SD_D2		SDIO data line 2	VDDIO
15	SD_D3		SDIO data line 3	VDDIO
16	SD_CMD		SDIO command line	VDDIO
17	SD_CLK		SDIO clock line	VDDIO
18	SD_D0		SDIO data line 0	VDDIO
19	SD_D1		SDIO data line 1	VDDIO
20	GND	-	Ground connections	
22	VDDIO		I/O Voltage	1.8 or 3.3V
25	PCM_DOUT		PCM Data output	VDDIO
26	PCM_CLK		PCM clock	VDDIO
27	PCM_DIN		PCM data input	VDDIO
28	PCM_SYNC		PCM sync signal	VDDIO
29	DEBUG_TXD		Debug UART TXD don't connect to ground	VDDIO
30	DEBUG_RXD		Debug UART RXD don't connect to ground	VDDIO
31	GND	-	Ground connections	
33	GND	-	Ground connections	
34	BT_DIS_N	I/PU	Enable pin for Bluetooth device ON: pull high; OFF: pull low External pull low to shut down BT,recommended 10K pull high.	VDDIO
36	GND	-	Ground connections	
41	UART1_RTS		BT_UART1_RTS	VDDIO
42	UART1_TX		BT_UART1_TX	VDDIO
43	UART1_RX		BT_UART1_RX	VDDIO
44	UART1_CTS		BT_UART1_CTS	VDDIO

4.Dimensions

4.1 Physical Dimensions and Module Photo

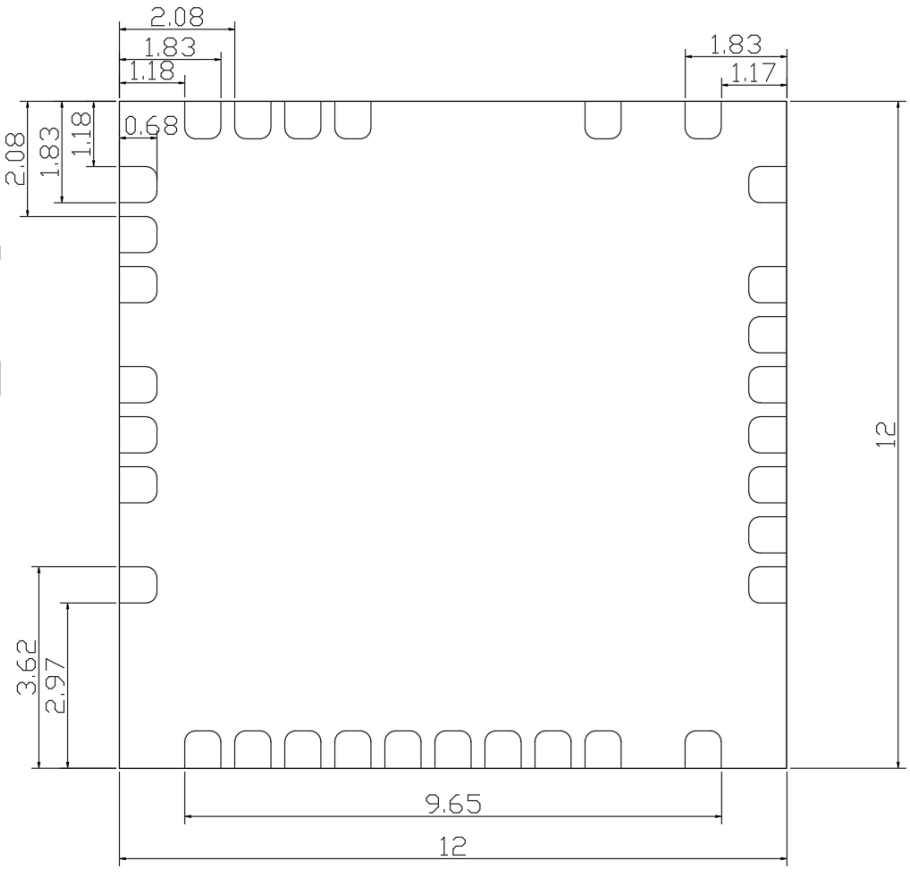
(Unit: mm)

<table>
<tr><td>L x W : 12 x 12 (+0.3/-0.1) mm
 
</td><td> 
</td></tr>
<tr><td>H: 1.9(±0.2)mm</td><td>  </td></tr>
</table>

4.2 Module Physical Dimensions

(Unit: mm)

< TOP VIEW >



5 Reference Design

5.1 External Antenna

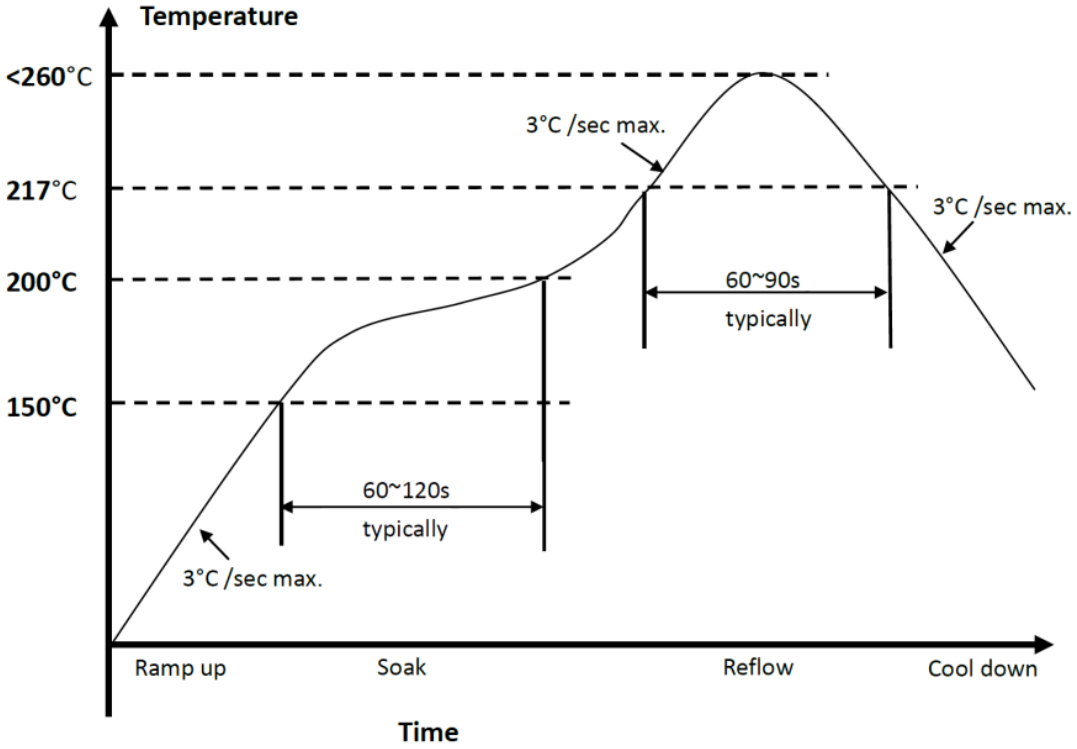
When the customer selects an external antenna, the external antenna selected must meet the parameter requirements specified ,Impedance 50Ω

6 Recommended Reflow Profile

Referred to IPC/JEDEC standard.

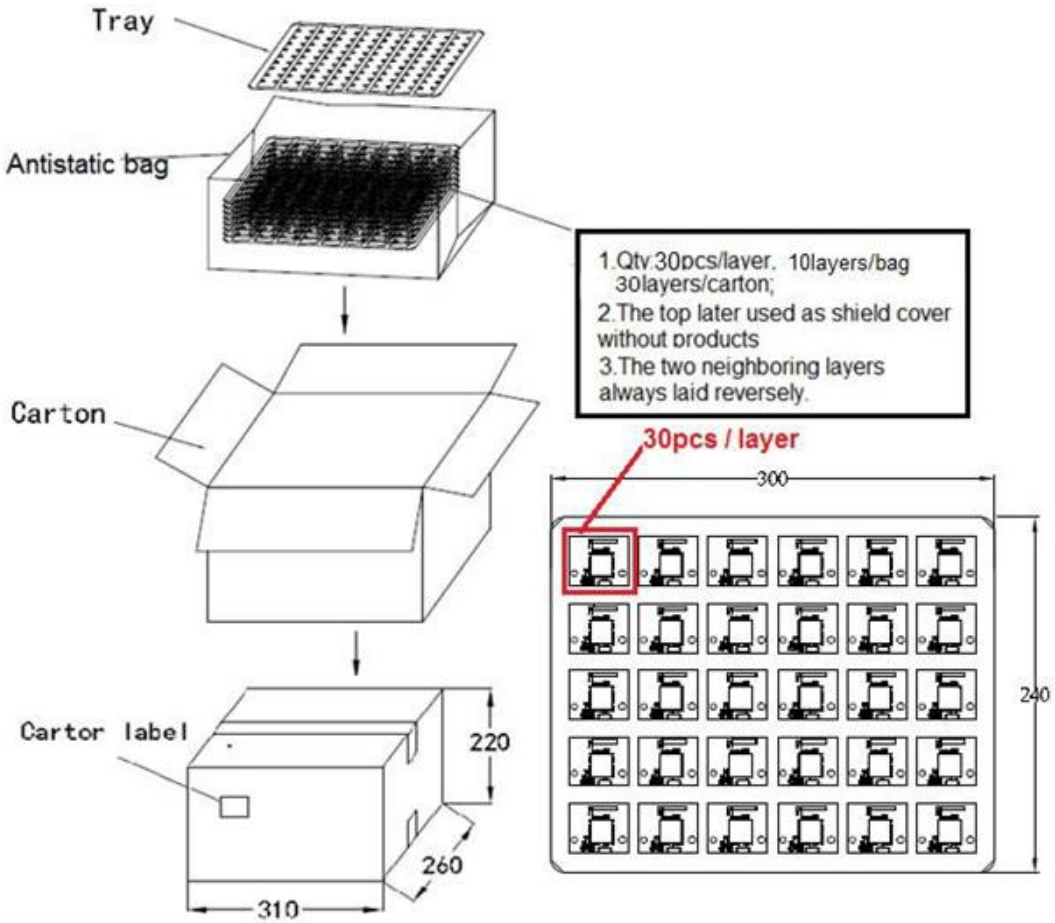
Peak Temperature : <260°C

Number of Times : 2 times max



7 Package

7.1 Reel



7.2 Storage Temperature And Humidity

The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDEC J-STD-020, tak e care all the relatives requirements for using this kind of components.

Moreover, the customer has to take care of the following conditions:

a） Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH).

b） Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5.

c）The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition.

d） “IPC/JEDEC J-STD-033A paragraph 5.2” is respected.

e） Baking is required if conditions b) or c) are not respected.

f）Baking is required if the humidity indicator inside the bag indicates 10% RH or more.

FCC Caution:

Any 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 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.

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

IMPORTANT NOTE:

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.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment .This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01r01

2.2 List of applicable FCC rules

CFR 47 FCC PART 15 SUBPART A&C&E has been investigated. It is applicable to the modular.

2.3 Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-

alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

2.4 Limited module procedures

Not applicable

2.5 Trace antenna designs

Not applicable

2.6 RF exposure considerations

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance of 20cm from your body.

2.7 Antennas

This radio transmitter FCC ID: **2AT5W-O9101SA** has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Antenna Description	Antenna Type	Frequency Range (MHz)	Impedance (Ω)	Maximum antenna gain(dBi)
Bluetooth/Wi-Fi Antenna	FPC	2400-2500MHz 5150-5850MHz	50	BT&2.4G Wi-Fi: 1.76dBi 5G Wi-Fi: 1.47dBi(B1); 1.64dBi(B4)

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following" Contains FCC ID: **2AT5W-O9101SA**"

2.9 Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B

Conformity Assessment of the Radio Module to the RED

This radio module is for professional installation only. When installing this radio module permanently into a host product to a create new radio equipment device; the manufacturer responsible for placing the final radio product on the market in the EU must assess if the combination of this radio module and the host product complies with the essential requirements of the RE Directive 2014/53/EU.

Firmware version: 2.2.3.80

Test Antenna: FPC antenna and maximum gain 2.4G: 1.76dBi, 5G: 1.64dBi

The final radio product will need to be fully assessed to Article 3.1a of the RED, for product safety With regard to RF exposure for Article 3.1a of the RED, the manufacturer of the final radio product will need to assess if the compliance assessment of the original radio equipment/module remains relevant to the final radio product, or if further action is necessary. This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.

If the final radio equipment is used at the same distance from a person or domesticated animal as the radio module was assessed, (for example: >20cm), then the final radio product assessment could conclude that the final radio product is compliant with the RF exposure requirements without additional actions.

If the final radio equipment is used at a closer distance from a person or domesticated animal than the radio module was assessed, then the final radio product assessment could not automatically conclude that the final radio product is compliant with the RF exposure requirements without additional actions; and further assessment is necessary.

The final radio product will need to be fully assessed to Article 3.1b of the RED, for EMC. EMC testing of the radio module will have been performed on some sort of temporary host or test jig; but now the module is in a new host product and the EMC performance of the final radio product must be assessed. Most likely the host product will have its own EMC assessment for other functions, which should be performed with the radio module installed; and inclusion of the radio module into the host product will also require an assessment, such as to the relevant applicable part of EN 301 489, on the final radio product.

In theory, radio transmitter or receiver measurements made as conducted measurements at a radio module antenna port may be considered applicable to the radio performance of the final radio product. However, in this example, the radio module does not have an antenna port. The radio module has a pin which leads through a PCB trace to an antenna on the host product. If the manufacturer of the final radio product wishes to use conducted power, conducted emissions or receiver performance measurements from the radio module to show compliance of the final radio product, then they will need to exactly follow the detailed instructions from the radio module manufacturer; including input voltage, driver software, environmental conditions, antenna trace layout design construction and material, circuit board layout design construction and material, nearby circuitry, etc. In reality, it is expected that manufacturers of final radio products will need to test the output power, conducted spurious emissions and receiver performance requirements on the final radio product; and not take the results of those test cases from the radio module test reports. Radiated test cases will also need to be performed on the final radio product.

BE	BG	CZ	DK	DE	EE	IE	EL
ES	FR	HR	IT	CY	LV	LT	LU
HU	MT	NL	AT	PL	PT	RO	SI
SK	FI	SE	NO	IS	LI	CH	TR

In all EU member states, operation of 5150-5250 MHz is restricted to indoor use only.

THE END