



Product Specification

Model: FLC5330XSA-B

Jiangsu Fulian Communication Technology Co., Ltd.

Approval	Review	Draft	Version	Date
			V1.2	2025.03.07



I. Version Update Log

Date	Version	Updated content
2023-10-27	V1.0	Initial document
2024-06-19	V1.1	Finalize
2025-03-07	V1.2	Modified modulation rate



II. Product Overview

FLC5330XSA-B module adopts Chuangyao TR5330S chip, is highly integrated 2.4GHz WIFI and BLE,SLE Combo module, single antenna design, SDIO interface. This module integrates integrated IEEE 802.11b/g/n/ax baseband and RF circuits, including power amplifier PA, low noise amplifier LNA, RF balun, antenna switch and power management module; Supports 802.11n 20MHz/40MHz bandwidth and 802.11ax 20MHz bandwidth, providing a maximum 150Mbps physical layer rate and further coverage distance. FLC5330XSA-B adopts 12x12X1.9mm size, beautiful and traceable, optimized matching and RF performance, has the ultimate experience, and has a wide range of applications: consumer IP Camera, driving recorder, low-end smart TV, sweeping robot, drone and other iot intelligent terminal fields.

III. Key Features

- 2.4GHz band, support IEEE 802.11b/g/n/ax
- SDIO interface and UART interface
- Supports maximum speed up to 150Mbps@HT40 MCS7, 114.7Mbps@HE20 MCS9
- Built-in PA and LNA, integrated TX/RX Switch, Balun, etc
- Support STBC and LDPC
- Support Android and Linux operating systems
- Support SLE1.0
- Support SLE 1MHz/2MHz/4MHz, maximum air port rate 12Mbps
- Dimensions $(12\pm0.2) \times (12\pm0.2) \times (1.9\pm0.2)$ mm
- Stamp hole design, 44PIN



- Power supply voltage input range: 3V ~ 3.6V, typical value 3.3V
- Operating temperature -40~85°C
- Supports Wi-Fi, BLE, or SLE
- External crystal clock frequency 40MHz

IV. Detailed Parameters

Parameter name	Parameter description
Module model	FLC5330XSA-B
Module type	Wi-Fi 1T1R and BT BLE , SLE Module
Master chip	TR5330S
Standard	802.11b/g/n/ax, BLE 4.0/4.1/4.2/5.0/5.1/5.2, SLE1.0
speedometer	1, 2, 5.5, 6, 11, 12, 18, 22, 24, 30, 36, 48, 54, MCS0~MCS9
Modulation mode	DSSS/DBPSK/DQPSK/16-QAM/64-QAM/256QAM, GFSK, BPSK, QPSK, 8PSK
Physical frequency band	2.4~2.4835 GHz
Operating system support	Windows2000, XP, Vista, Win7, Linux, Mac, Android, Win CE
Security mechanism	Support WPA/WPA2/WPA3 personal、WPS2.0
Port	SDIO
Power supply mode	DC 3.3V (Minimum 3.0V to maximum 3.6V)
Operating temperature	-40~+85° C
Storage temperature	-20 ~ 125° C
Humidity class	5% ~ 90 %
Dimension	(12±0.2) x (12±0.2) x (1.9±0.2)mm



V. Hardware Block Diagram

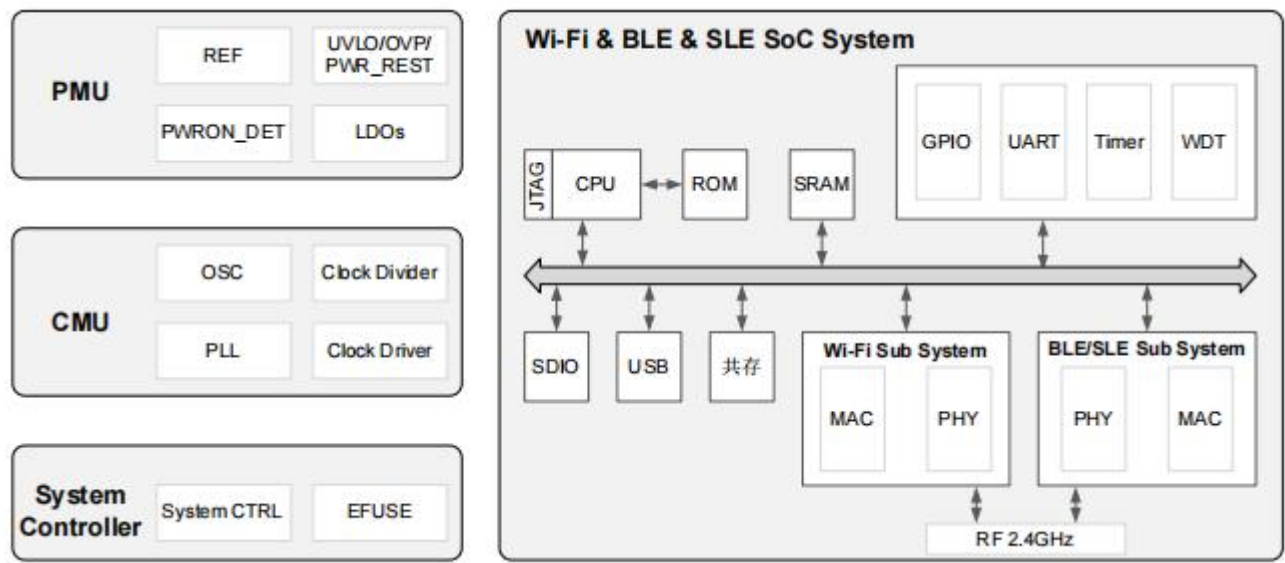


Figure 1. Hardware block diagram of FLC5330XSA-B

VI. Module Dimensions (Unit: mm)

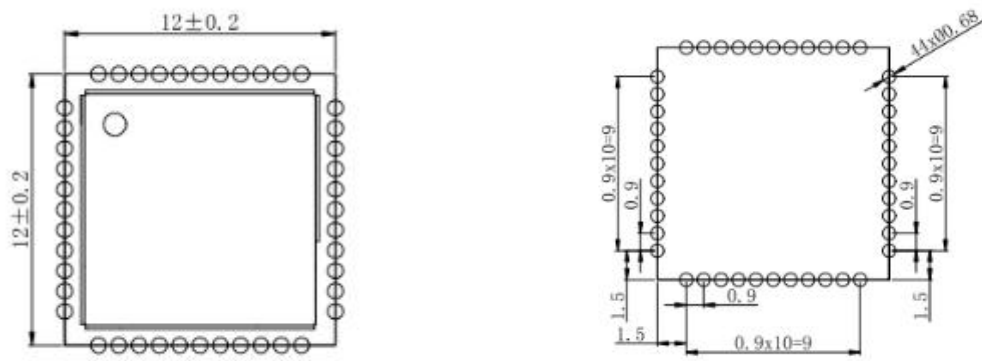


Figure 2. Dimensions of FLC5330XSA-B



VII. Module Pin Definitions

Table 1 Module pin comparison table

Pin No.	Pin Name	Description
1, 3, 20, 31, 33, 36, 41	GND	GND
2	WL_ANT	WL_ANT Connects to an antenna
4-8, 10, 11, 21, 23-30, 32, 34, 35, 37-40, 44	NC	NC
6	HOST_WAKE_WL/BLE	HOST wakes up WL/BLE
9	VBAT_IN	3.3V
12	PMU power-on Enables the pin	Follow the DVDDIO level 0: Power off. 1: Power on.
13	WL/BLE_WAKE_HOST	WL/BLE Wakes up the HOST
14	SD_D2	SDIO Data Line2
15	SD_D3	SDIO Data Line3
16	SD_CMD	SDIO Command Input
17	SD_CLK	SDIO Clock Input
18	SD_D0	SDIO Data Line0
19	SD_D1	SDIO Data Line1
22	VDDIO	1.8/3.3V, IO
42	UART_TXD	UART transmit data
43	UART_RXD	UART receive data

VIII. Radio frequency indicators:

1. Test indicators of BLE TX/RX

Sort	Index	Concrete item	Index value
TX	Output Power	Output Power (dBm)	8 ± 2
	CarrieFreq offset&drift (LE1M&LE2M)	Freq offset (kHz)	≤ 150
		Initial freq drift (kHz)	≤ 23
	Modulation	Δf_{1avg} (kHz)	$225 \leq x \leq 275$
	characteristic (LE1M)	Δf_{2avg} (kHz)	> 185



	Modulation characteristic (LE2M)	$\Delta f_{2avg}/\Delta f_{1avg}$	≥ 0.8
		Δf_{1avg} (kHz)	$450 \leq x \leq 550$
		Δf_{2avg} (kHz)	> 370
		$\Delta f_{2avg}/\Delta f_{1avg}$	≥ 0.8
	In-band Spurious Emission (LE1M)	$\pm 2M$ offset (dBm)	≤ -20
		$\geq 3MHz$ offset (dBm)	≤ -30
		$\leq -3MHz$ offset (dBm)	≤ -30
	In-band Spurious Emission (LE2M)	$\pm 4M$ offset (dBm)	≤ -20
		$\geq 6MHz$ offset (dBm)	≤ -30
		$\leq -6MHz$ offset (dBm)	≤ -30
RX	Sensitivity	LE1M (dBm)	≤ -70
		LE2M (dBm)	≤ -70

2. SLE TX/RX test indicators

Sort	Index	Concrete item	Index value
TX	Output Power	GFSK 1M/2M/4M (dBm)	8 ± 2
		QPSK (dBm)	14 ± 2
		8PSK (dBm)	14 ± 2
	CarrierFreq ffset&drift	Freq offset (kHz)	≤ 150
		Initial freq drift (kHz)	≤ 23



	Modulation characteristic (GFSK 4M)	Δf_{1avg} (kHz)	$900 \leq x \leq 1100$
		Δf_{2avg} (kHz)	> 740
		$\Delta f_{2avg} / \Delta f_{1avg}$	≥ 0.8
	TX EVM (QPSK)	RMS EVM	$\leq 13\%$
		99% EVM	$\leq 28\%$
		Peak EVM	$\leq 32\%$
	In-band Spurious Emission (GFSK 4M)	$\pm 7M$ offset (dBm)	≤ -20
		$\geq 10MHz$ offset (dBm)	≤ -30
		$\leq -10MHz$ offset (dBm)	≤ -30
	In-band Spurious Emission PSK 2M	$ \Delta f = 2MHz$	≤ -26
		$2.5MHz \leq \Delta f \leq 5.5MHz$	≤ -20
		$ \Delta f > 5.5MHz$	≤ -35
	In-band Spurious Emission PSK 4M	$ \Delta f = 4MHz$	≤ -26
		$3.5MHz \leq \Delta f \leq 7.5MHz$	≤ -20
		$ \Delta f > 7.5MHz$	≤ -35
RX	Sensitivity	SLE 4M GFSK (dBm)	-67
		SLE 2M QPSK (dBm)	-70
		SLE 4M QPSK (dBm)	-67

3. WiFi TX/RX test indicators

Agreement	Speed	Power (dBm)	EVM	Sensitivity
11b	1M	20.00	≤ -15	-98.00
	2M	20.00	≤ -15	-95.00
	5.5M	20.00	≤ -15	-92.00



	11M	20.00	≤ -15	-89.00
11g2g20	6Mbps	19.00	≤ -7	-94.00
	9Mbps	19.00	≤ -10	-92.00
	12Mbps	19.00	≤ -12	-91.00
	18Mbps	19.00	≤ -15	-89.00
	24Mbps	18.00	≤ -18	-86.00
	36Mbps	18.00	≤ -21	-62.00
	48Mbps	17.00	≤ -25	-78.00
	54Mbps	16.00	≤ -27	-76.00
11n2g20	MCS0	19.00	≤ -7	-94.00
	MCS1	19.00	≤ -12	-90.00
	MCS2	19.00	≤ -15	-88.00
	MCS3	19.00	≤ -18	-85.00
	MCS4	18.00	≤ -21	-81.00
	MCS5	17.00	≤ -24	-77.00
	MCS6	16.00	≤ -27	-75.00
	MCS7	15.00	≤ -29	-74.00
11n2g40	MCS0	19.00	≤ -7	-91.00
	MCS1	19.00	≤ -12	-87.00
	MCS2	19.00	≤ -15	-85.00
	MCS3	19.00	≤ -18	-82.00
	MCS4	18.00	≤ -21	-79.00
	MCS5	17.00	≤ -24	-75.00
	MCS6	16.00	≤ -27	-72.00
	MCS7	15.00	≤ -29	-71.00



11ax2g20	MCS0	19.00	≤ -7	-95.00
	MCS1	19.00	≤ -12	-91.00
	MCS2	19.00	≤ -15	-89.00
	MCS3	19.00	≤ -18	-86.00
	MCS4	18.00	≤ -21	-82.00
	MCS5	17.00	≤ -24	-78.00
	MCS6	16.00	≤ -27	-77.00
	MCS7	15.00	≤ -29	-75.00
	MCS8	14.00	≤ -32	-72.00
	MCS9	14.00	≤ -34	-69.00



IX. Primary and secondary reflow temperature

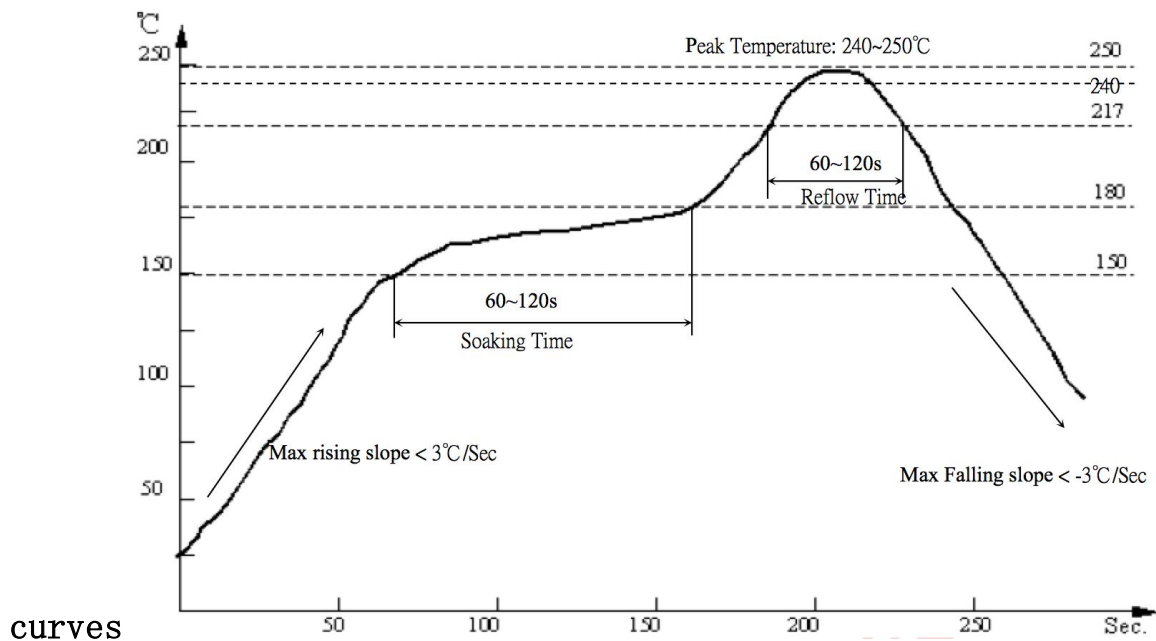


Figure 3.FLC5330XSA-B reflow temperature curve

X. Packing method

It is shipped by coil packaging, which is convenient for customers to SMT, built-in humidity card and desiccant, electrostatic bag vacuum, and carton packaging, and the coil and the outer box are pasted with factory notes and the inspection of the warehouse two-dimensional code, which is easy to track and cross goods.



Figure 4. Packaging of FLC5330XSA-B



Precautions

- The operators at all stations must wear electrostatic gloves during the whole process of production.
- During operation, ensure that the bottom surface of the module is protected from water or dirt;
- If the unpacking time exceeds 3 months, it is prohibited to use SMT process to weld this batch of modules, because PCB metal-sinking process, the pad oxidation is serious after 3 months, the SMT patch is very likely to lead to false welding, welding failure, and our company will not be responsible for all kinds of problems caused by this;
- Before installing the SMT, protect the module with electrostatic discharge (ESD);
- Please apply the SMT patch according to the reflow soldering curve, the peak temperature is 245°C, the reflow soldering temperature curve is shown in the figure;
- In order to ensure the qualified rate of reflow soldering, 10% of the first SMT products should be selected for visual inspection and AOI detection to ensure the reasonableness of furnace temperature control, device adsorption method and placement method; After mass production, it is recommended to extract 5-10 pieces per hour for visual inspection and AOI testing.



Storage conditions and ESD

	CAUTION This bag contains MOISTURE-SENSITIVE DEVICES	LEVEL 3 If Blank, see adjacent bar code label
1. Calculated shelf life in sealed bag: 12 months at $< 40^{\circ}\text{C}$ and $< 90\%$ relative humidity (RH) 2. Peak package body temperature: <u>260</u> $^{\circ}\text{C}$ If Blank, see adjacent bar code label 3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must a) Mounted within: <u>168</u> hrs. of factory conditions If Blank, see adjacent bar code label $\leq 30^{\circ}\text{C}/60\%\text{RH}$, OR b) Stored at $<10\%$ RH 4. Devices require bake, before mounting, if: a) Humidity Indicator Card is $> 10\%$ when read at $23 \pm 5^{\circ}\text{C}$ b) 3a or 3b not met. 5. If baking is required, devices may be baked for 48 hrs. at $125 \pm 5^{\circ}\text{C}$ Note: If device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure Bag Seal Date: _____ If Blank, see adjacent bar code label Note: Level and body temperature defined by IPC/JEDEC J-STD-020		



prevention

Figure 5. FLC5330XSA-B storage conditions and ESD prevention guide

Sales and technical support information

If you need to consult or purchase this product, please call Jiangsu Fu Unicom Communication Technology Co., LTD during office hours.

Office hours: Monday to Saturday, 8:00 am to 12:00 PM, 13:00 PM to 17:00 PM

Post Code: 212310

Contact number: 0511-80760088

Email: sales@fulian-link.com

Address: Fulianxun Industrial Park, Lanling Road, Economic and Technological Development Zone, Danyang City, Jiangsu Province



FCC Statement

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 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.

This modular has been tested and found to comply with part 15 requirements for Modular Approval.

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

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 C has been investigated. It is applicable to the modular transmitter

2.3 Specific Operational Use Conditions - Antenna Placement Within the Host Platform

The module is tested for standalone mobile RF exposure use condition.

- The antenna must be installed such that 20cm is maintained between the antenna and users,
- The transmitter module may not be co-located with any other transmitter or antenna.

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

2.4 Limited Module Procedures

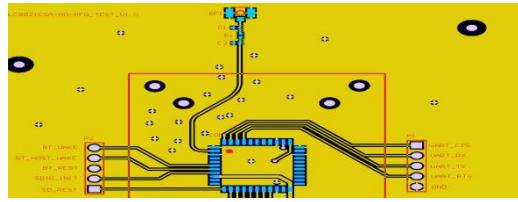
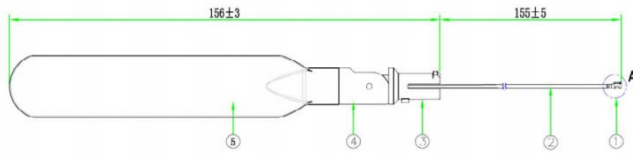
The transmitter does not have a shield.

2.5 Trace Antenna Designs

external antenna specification

Below is external antenna specification

You can see antenna size is 301(L)mm*16(W)mm*7.2(T)mm From below specification.



Note:PCB is RF-4 material, 0.6 m thick; four solder joints on PCB for OSP process or tinning.

The module needs to be attached to the PCB board and connected to the external antenna through the solder joint of the circuit on the PCB. A resistance of 0R is added between the module and the antenna at C6 to ensure that the impedance of the connection between the module and the antenna reaches 50R.The IPEX position on the PCB is where the external antenna is connected.

2.6 RF Exposure Considerations

This device 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.

2.7 Antenna Type and Gain

The following antennas have been certified for use with this module.

Only antennas of the same type with equal or lower gain may also be used with this module.

Other types of antennas and/or higher gain antennas may require the additional authorization for operation.

Antenna Specification list below:

Antenna Type	Antenna Model No.	Maximum Antenna Gain(dBi)	Frequency Range(MHz)
external antenna	FLC5330XSA-B	2.81	2400-2500

2.8 End Product Labelling Compliance Information

When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily removed. If not, a second label must be placed on the outside of the final device that contains the following text: "Contains FCC ID: **2AXS5-FLC5330XSA-B**". The FCC ID can be used only when all FCC compliance requirements are met.

2.9 Information on Test Modes and Additional Testing Requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) class II permissive change re-evaluation or new FCC authorization.

Host manufacturer installed this modular with single modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C, 15.209, 15.207 requirement, only if the test result comply with FCC part 15C, 15.209, 15.207 requirement, then the host can be sold legally.

2.10 Additional testing, Part 15 Subpart B Disclaimer

This transmitter modular us tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B rules requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rules requirements if applicable. As long as all conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this modular installed.



2.11 Manual Information to The End User

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 user's manual of the end product which integrates this module.

The host integrator must follow the integration instructions provided in this document and ensure that the composite system end product complies with the requirements by a technical assessment or evaluation to the rules and to KDB Publication 996369.

The host integrator installing this module into their product must ensure that the final composite product complies with the requirements by a technical assessment or evaluation to the rules, including the transmitter operation and should refer to guidance in KDB Publication 996369.

OEM/Host Manufacturer Responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and RF Exposure essential requirements of the FCC rules.

2.12 How to Make Changes - Important Note

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

This module is granted as a Limited Modular Approval because it has no shield. Each host specific integration will require a Class II Permissive Change filed by the grantee.

Please follow below Class II Permissive Change Test Plan for FCC evaluations:

- 1) Output power for Channel 19 of BLE 2M mode and channel 11 of IEEE 802.11ax_20 mode. (compliance with Part 15.247(b), and within the tune up tolerance of the module)
- 2) AC Conducted Emission for both BLE and WiFi link mode. (compliance with Part 15.207)
- 3) Radiated Emission for 30-1000 MHz, higher and lower band edge for both BLE 1M mode and IEEE 802.11 b mode (compliance with Part 15.205/209, FCC Part 15.247(d))
- 4) Host can not change the RF Exposure use conditions and must satisfying FCC multi-transmitter product guidelines.

Note: 1. These tests be based on ANSI C63.10 and FCC Part 15.247 as guidance.

2. For these tests, if test results are worst than original modular test results, all modes (GFSK-1M, GFSK-2M, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11ax-HE20) need to be checked to ensure continued compliance of Host Devices