Testing
NVLAP LAB CODE 600222-0

MEASUREMENT REPORT

FCC CFR Title 47 Part 15 Subpart B

Report No.: S20240620077202E04
Issue Date: 08-21-2024

Applicant:	Shanghai MXCHIP Information Technology Co., Ltd
Address:	Floor 9, Building B, Lane 2145,JinshaJiang Road, Putuo District, Shanghai Jiangsu,China
FCC ID:	P53-EMC3183
Product:	2.4GHz Wi-Fi/BLE Module
Model No.:	EMC3183-E
Trade Mark:	MXCHIP
FCC Rule Part(s):	CFR Title 47 Part 15 Subpart B
Test Procedure(s):	ANSI C63.4: 2014
Result:	Pass
Item Receipt Date:	Jun. 26 2024
Test Date:	Jul. 22, 2024

Compiled By: Qianlan Sang
(Qianlan Sang)
Senior Test Engineer

Approved By: Line Chen
(Line Chen)
Engineer Manager

The test results relate only to the samples test.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2014. Test results reported herein relate only to the item(s) tested.
The test report shall not be reproduced except in full without the written approval of Fangguang Inspection & Testing Co., Ltd. Wuxi Branch
The test report must not be used by the client to claim product certifications, approval, or endorsement by NVLAP, NIST or any agency of U.S. Government.

Revision History

Report No.	Version	Description	Issue Date
S20240620077202E04	Rev. 01	/	08-21-2024

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Description Page

1. General Information

Applicant:	Shanghai MXCHIP Information Technology Co., Ltd
Applicant Address:	Floor 9, Building B, Lane 2145,JinshaJiang Road, Putuo District, Shanghai Jiangsu,China
Manufacturer:	Shanghai MXCHIP Information Technology Co., Ltd
Manufacturer Address:	Floor 9, Building B, Lane 2145,JinshaJiang Road, Putuo District, Shanghai Jiangsu,China
Factory:	Chengdu Xuguang Technology Co., Ltd
Factory Address:	No. 86, Section 2, Gongyuan Road, Longquanyi, Chengdu, Sichuan
Test Site:	Fangguang Inspection & Testing Co., Ltd. Wuxi Branch
Lab ID:	CN5037
Test Site Address:	G9 Building, China Sensor Network International Innovation Park No.200, Linghu AvenueWuxi, Jiangsu 214000 China
Test Device Serial No.:	N/A ☐ Production ☒Pre-Production ☐ Engineering

2. INTRODUCTION

2.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

2.2. Fangguang Test Location

These measurement tests were performed at the Fangguang Inspection and testing Co.,Ltd. Wuxi Branch located at 200 Linghu Avenue, Xinwu District, Wuxi City. The detailed description of the measurement facility was found to be in compliance with the requirements of ANSI C63.4-2014.

3. PRODUCT INFORMATION

3.1. Equipment Description

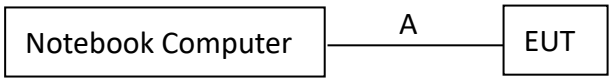
Product Name:	2.4GHz Wi-Fi/BLE Module
Model Name:	EMC3183-E
Trade Mark:	MXCHIP
Input Voltage Range:	DC 3.3V
Wi-Fi Specification:	802.11b/g/n20
Bluetooth Version:	5.3
Software Version:	A258
Hardware Version:	1.0
Note:	/

3.2. Configuration of Tested System

The **2.4GHz Wi-Fi/BLE Module** was tested per the guidance FCC CFR Title 47 Part 15 Subpart B and ANSI C63.4: 2014 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

3.3. Test Mode

Test Mode	
EMI Mode	Mode 1: operation in BLE/WiFi mode, power supply by DC 3.3V

Connection Diagram (Mode 1)	
	
Signal Cable Type	
A	Serial port board(3.3V to EUT)

3.4. Description of Auxiliary Equipment

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook Computer	Dell	/	/	/
2	Serial port board	/	/	/	/

3.5. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

3.6. Calculation with all conversion and correction factors used

For AC Line Conducted Emissions Test:

Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

For Radiated Emissions Below 1GHz Test:

Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

For Radiated Emissions Above 1GHz Test:

Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

4. DESCRIPTION OF TEST

4.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical Equipment in the Range of 9kHz to 18GHz (ANSI C63.4-2014) was used in the measurement of the **2.4GHz Wi-Fi/BLE Module.**

Deviation from measurement procedure…….....None

4.2. AC Line Conducted Emissions

The line-conducted facility is located inside an shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150 kHz to 30 MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site.

4.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30 MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30 MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB beam-width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

5. LIST OF USED TEST EQUIPMENT

Conducted Emissions

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	FWXGJC-2016-181	1 year	2025/03/07
Two-Line V-Network	R&S	ENV 216	FWXGJC-2016-182	1 year	2025/04/28
Thermohygrometer	Yuhuaze	HTC-1	FWXDA-2016-385	1 year	2025/02/25

Radiated Emission

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Bi-Log Antenna	R&S	HL562E	FWXGJC-2016-267-06	1 year	2025/03/02
Broadband Horn Antenna	R&S	HF907	FWXGJC-2016-267-07	1 year	2025/03/01
EMI Receiver	R&S	ESR26	FWXGJC-2016-267-01	1 year	2024/11/05
Pre-Amplifier	R&S	SCU-18D	FWXGJC-2016-267-05	1 year	2024/11/05
Hygrothermograph	Mittel	HTC-1	FWXDA-2016-386	1 year	2024/11/03
Anechoic Chamber	Aimuke	EMCCT-3	FWXGJC-2016-270	3 year	2025/06/07

Test Software	Manufacturer	Version	Asset No.	Function
EMI Test Software	tonscend	V2.5.2.4	FWXWA-2018-004	RE
EMC32	R&S	9.26.00	/	CE

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 2.05dB
Radiated Emission Measurement(Below 1GHz)
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 3.06dB
Radiated Emission Measurement(Above 1GHz)
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 4.13dB

7. TEST RESULT

7.1. Summary

FCC Part Section(s)	Test Description	Test Result
FCC CFR Title 47 Part 15 Subpart B 15.107, ANSI C63.4: 2014	Conducted Emissions	NA
FCC CFR Title 47 Part 15 Subpart B 15.109, ANSI C63.4: 2014	Radiated Emissions	Pass

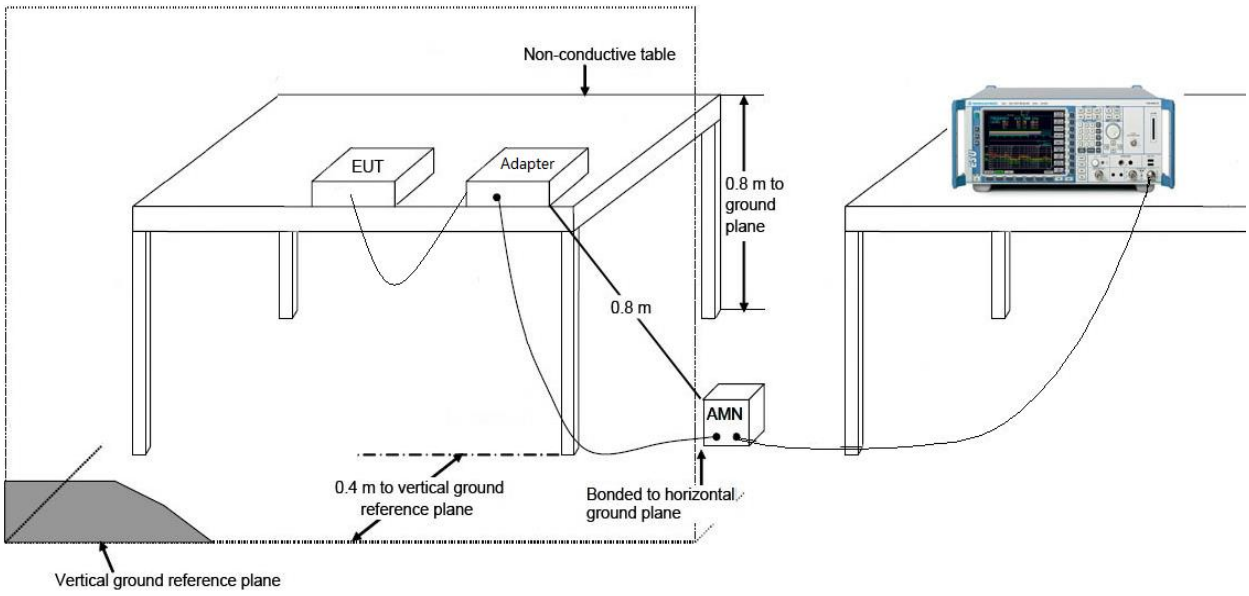
7.2. Conducted Emission Measurement

7.2.1.Test Limit

FCC Part 15.107 Class A Limits		
Frequency (MHz)	QP (dBμV)	AV (dBμV)
0.15 - 0.50	79	66
0.50 - 30	73	60

Note 1: The lower limit shall apply at the transition frequencies.

7.2.2.Test Setup



7.2.3.Test Result of Conducted Emissions

Not Applicable . The device is only powered by DC 3.3V.

7.3. Radiated Emission Measurement

7.3.1.Test Limit

FCC Part 15.109 Class A Limits		
Frequency (MHz)	Distance (m)	Level (dBμV/m)
30 - 88	3	49.5
88 - 216	3	54
216 - 960	3	56.9
Above 960	3	60

Note 1: The lower limit shall apply at the transition frequency.

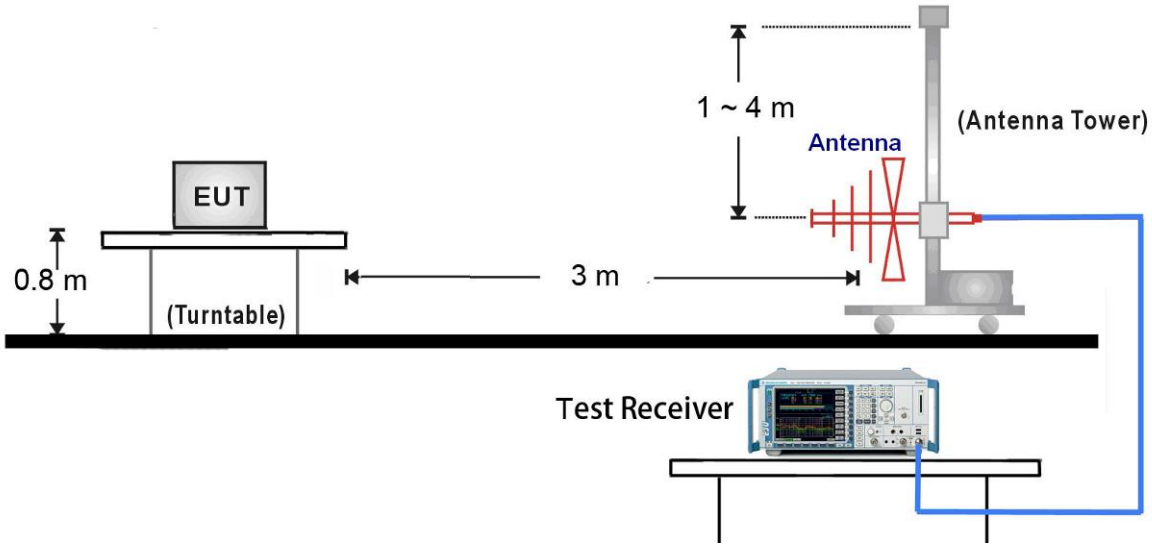
Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBμV/m) = 20 log E field strength (uV/m)

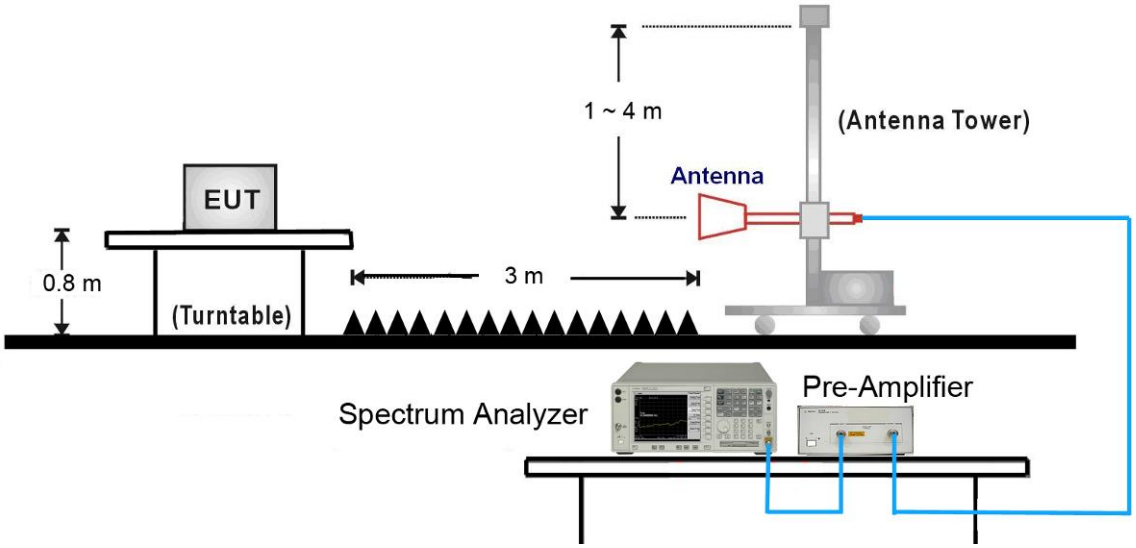
Note 4:On any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

7.3.2.Test Setup

30MHz ~ 1GHz Test Setup:



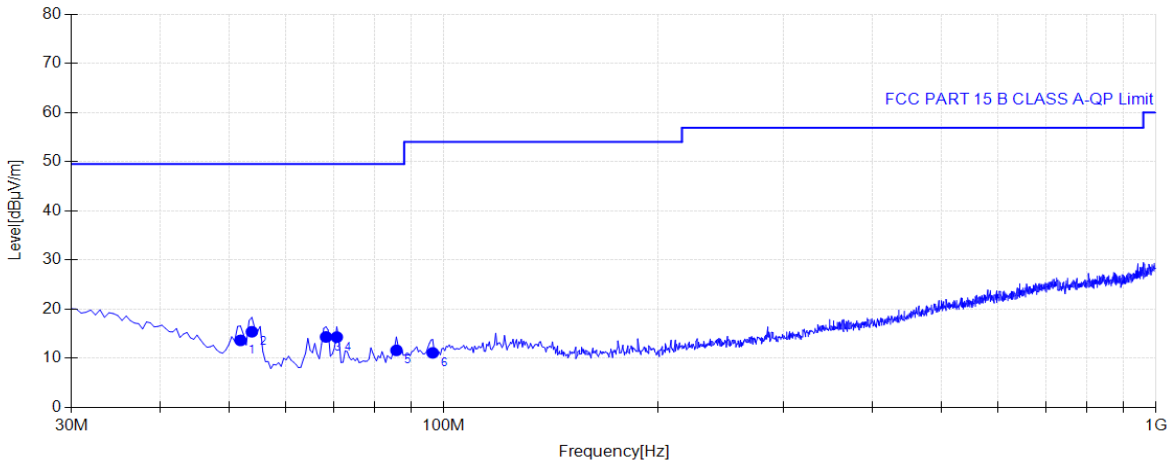
1GHz ~18GHz Test Setup:



7.3.3.Test Result of Radiated Emissions

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Horizontal
Model:	EMC3183-E	Power Supply:	DC 3.3V
Environment:	Temp: 23℃; Humi:51%	Engineer:	Hongyuan Wang
Remark	Operation Mode: Mode 1		

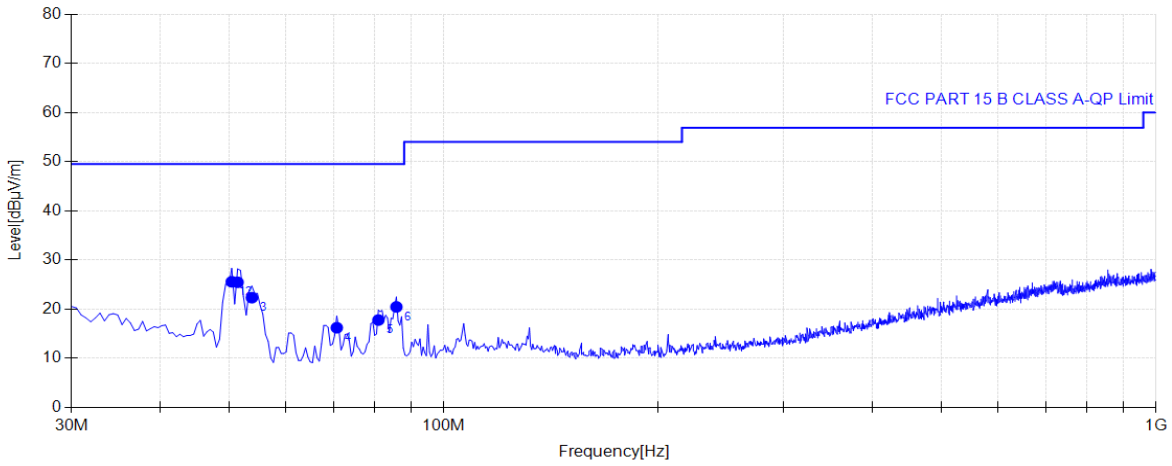
Test Graph



Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	51.8359	9.56	13.64	49.50	35.86	200	116	Horizonta
2	53.7769	9.07	15.40	49.50	34.10	200	356	Horizonta
3	68.3342	8.05	14.35	49.50	35.15	200	126	Horizonta
4	70.7604	8.22	14.31	49.50	35.19	200	107	Horizonta
5	85.8029	9.82	11.61	49.50	37.89	200	277	Horizonta
6	96.4782	10.81	11.11	54.00	42.89	200	2	Horizonta

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Vertical
Model:	EMC3183-E	Power Supply:	DC 3.3V
Environment:	Temp: 23℃; Humi:51%	Engineer:	Hongyuan Wang
Remark	Operation Mode: Mode 1		

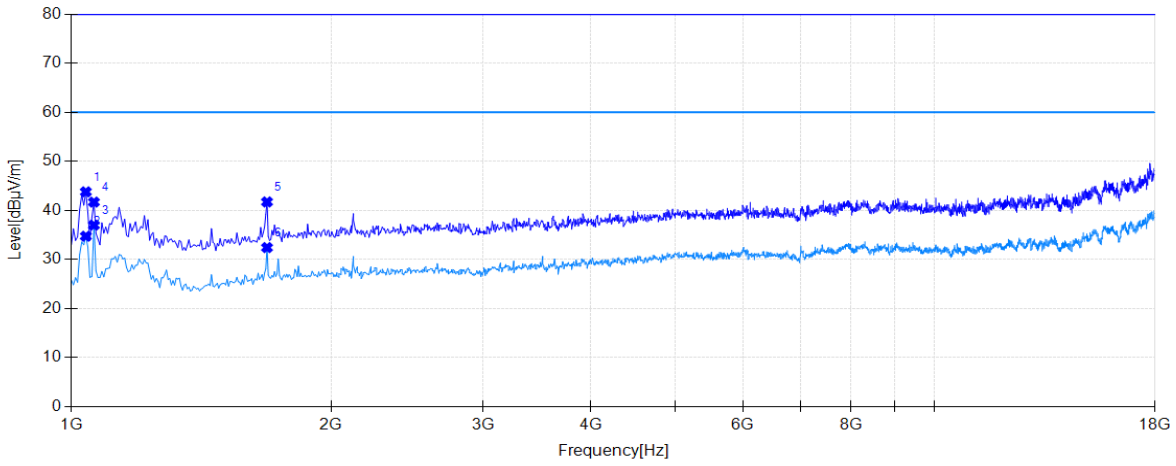
Test Graph



Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	50.3802	9.34	25.58	49.50	23.92	100	36	Vertical
2	51.3507	9.13	25.46	49.50	24.04	100	357	Vertical
3	53.7769	8.62	22.33	49.50	27.17	100	59	Vertical
4	70.7604	7.84	16.22	49.50	33.28	100	123	Vertical
5	80.9505	8.94	17.79	49.50	31.71	100	10	Vertical
6	85.8029	9.56	20.46	49.50	29.04	100	216	Vertical

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Horizontal
Model:	EMC3183-E	Power Supply:	DC 3.3V
Environment:	Temp: 23℃; Humi:51%	Engineer:	Hongyuan Wang
Remark	Operation Mode: Mode 1		

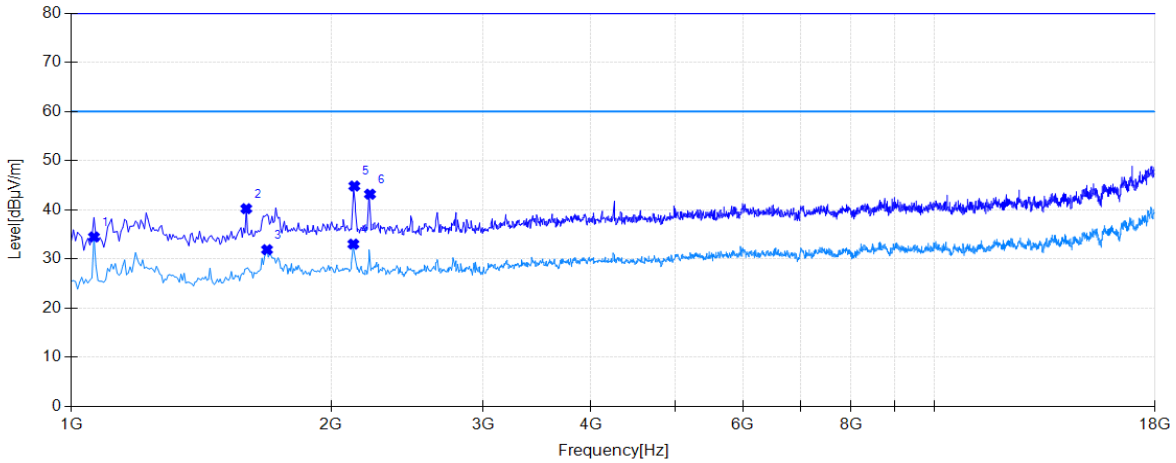
Test Graph



Suspected Data List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1039.66	43.77	-20.52	80.00	36.23	100	120	Horizontal
2	1039.66	34.73	-20.52	60.00	25.27	100	120	Horizontal
3	1062.33	36.99	-20.42	60.00	23.01	200	91	Horizontal
4	1062.33	41.68	-20.42	80.00	38.32	100	135	Horizontal
5	1685.66	41.72	-17.54	80.00	38.28	100	242	Horizontal
6	1685.66	32.41	-17.54	60.00	27.59	100	242	Horizontal

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Vertical
Model:	EMC3183-E	Power Supply:	DC 3.3V
Environment:	Temp: 23℃; Humi:51%	Engineer:	Hongyuan Wang
Remark	Operation Mode: Mode 1		

Test Graph



Suspected Data List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1062.33	34.48	-19.27	60.00	25.52	200	294	Vertical
2	1595.00	40.22	-17.30	80.00	39.78	200	274	Vertical
3	1685.66	31.88	-16.82	60.00	28.12	100	43	Vertical
4	2122.00	33.02	-14.91	60.00	26.98	100	74	Vertical
5	2127.66	44.83	-14.90	80.00	35.17	100	200	Vertical
6	2218.33	43.17	-14.73	80.00	36.83	100	150	Vertical

8. CONCLUSION

The data collected relate only the item(s) tested and show that the **2.4GHz Wi-Fi/BLE Module (Model: EMC3183-E)** has been tested to comply with the requirements specified in §15.107 / §15.109 of the FCC CFR Title 47 Part 15 Subpart B.

9. APPENDIX A. PHOTOGRAPHS OF EUT

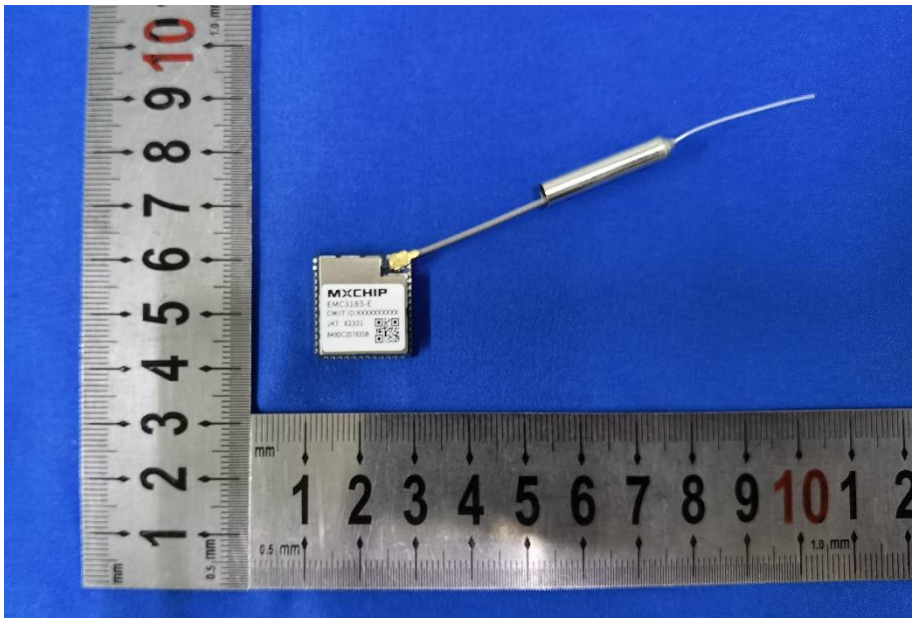


Photo 1: General view

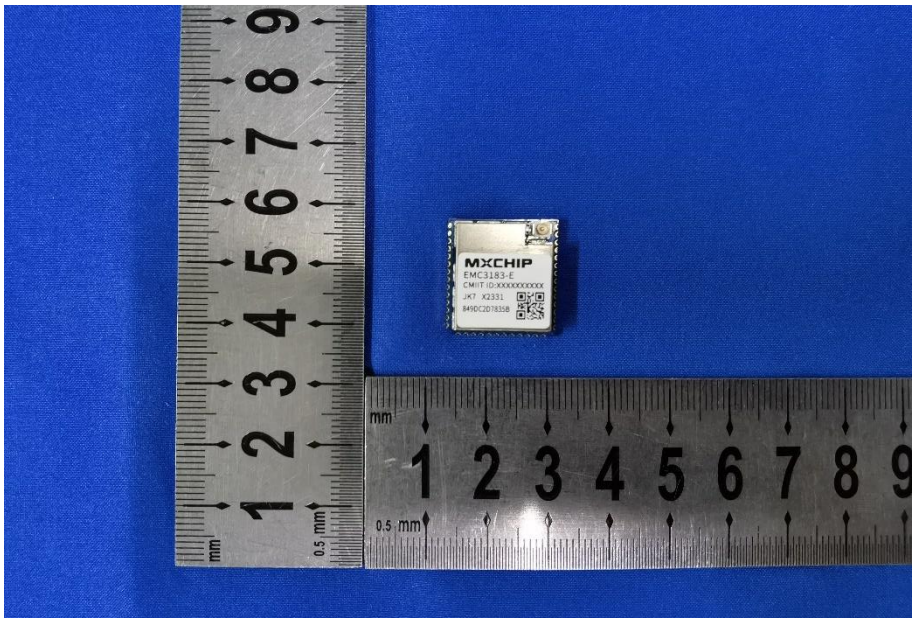


Photo 2: PCB view

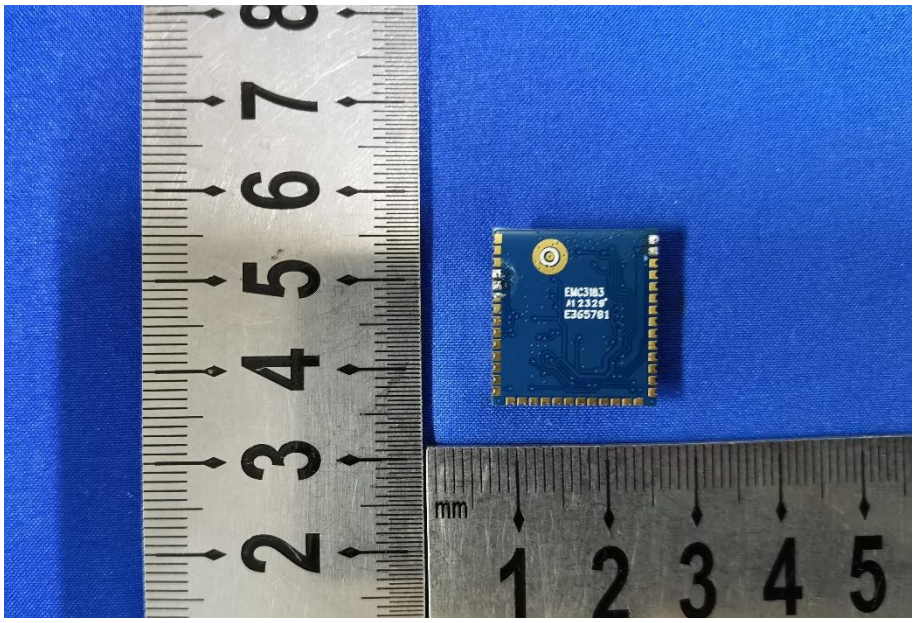
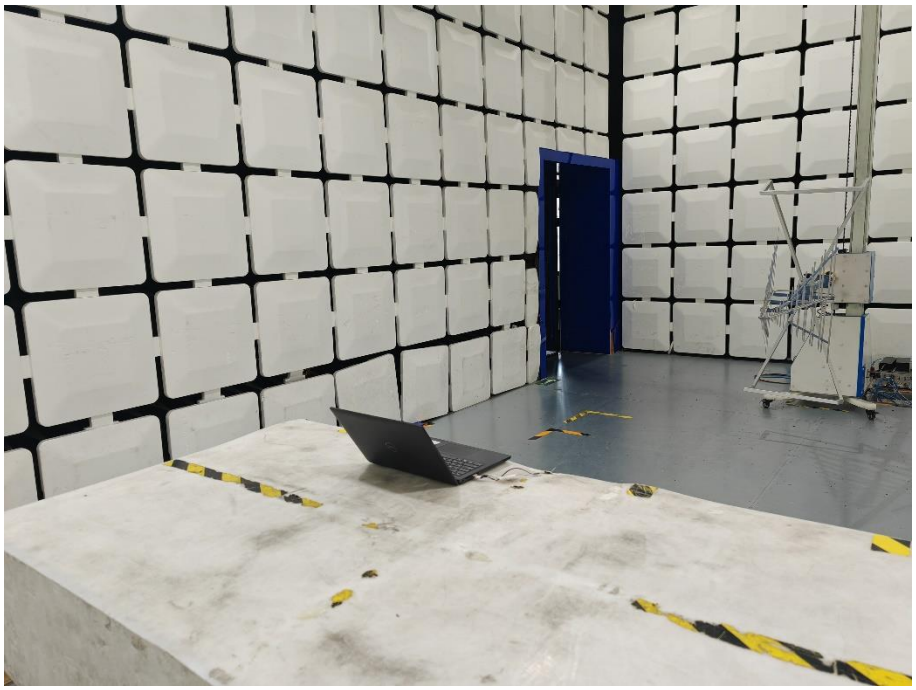
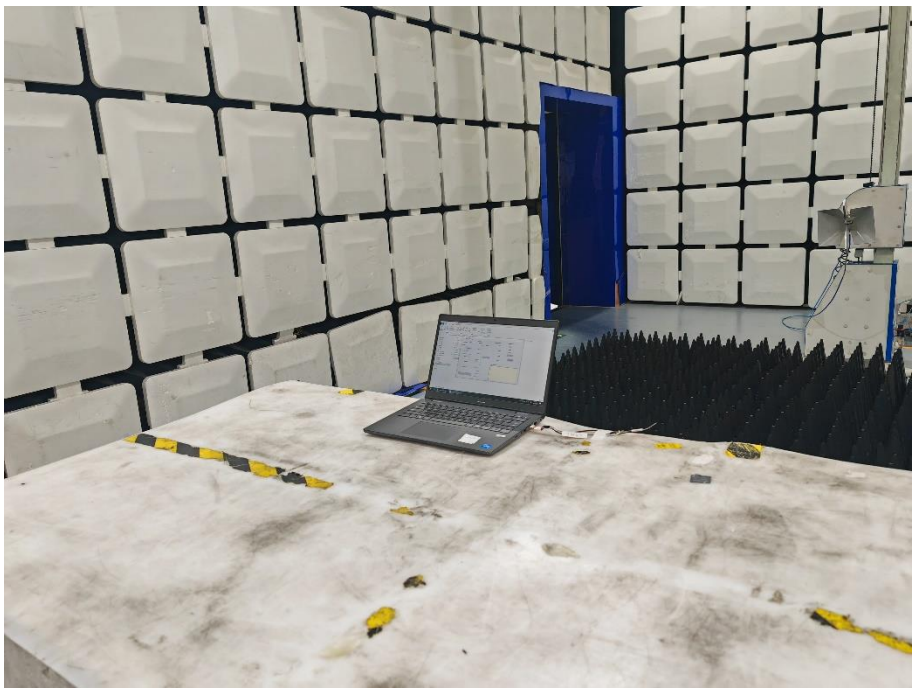


Photo 3: PCB view

10. APPENDIX B: PHOTOGRAPH OF THE TEST ARRANGEMENT



RE (30M~1GHz)



RE (1G~18GHz)

The End