MEASUREMENT REPORT

FCC PART 15.247 WLAN 802.11b/g/n

Report No.: S20241028562501

Issue Date: 12-13-2024

Applicant:	Shanghai MXCHIP Information Technology Co., Ltd
Address:	9th Floor, No.5, Lane2145 JinshaJiang Road, Putuo District, Shang Hai, China (200333)
FCC ID:	P53-EMC3183
Product:	2.4GHz Wi-Fi/BLE Module
Model No.:	EMC3183-E
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Part 15 Subpart C (15.247)
Test Procedure(s):	ANSI C63.10-2013, KDB 558074 D01v05r02
Result:	Pass
Receipt date:	Oct. 31, 2024
Test Date:	Nov. 10, 2024

Compiled By: Chuang Li
(Chuang Li)
Senior Test Engineer

Approved By: Line Chen
(Line Chen)
Engineer Manager

FANGGUANG INSPECTION & TESTING CO.,LTD. APPROVED(02)

The test results relate only to the samples tested.

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 KDB 558074 D01. 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
S20241028562501	Rev. 01	/	12-13-2024
Note: The module adds a PCB antenna (SUN-wifi stick V1.0, 2400 ~ 2500MHz, Max Gain: 2dBi) this time. After evaluation, only radiation items need to be retested.The test results of other conducted items please refer to the FCC test report (Report NO. S20240620077202E01) which was issued by Fangguang Inspection & Testing Co., Ltd. on 2024.08.23.			

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Description Page

§2.1033 General Information

Applicant:	Shanghai MXCHIP Information Technology Co., Ltd
Applicant Address:	9th Floor, No.5, Lane2145 JinshaJiang Road, Putuo District, Shang Hai, China (200333)
Manufacturer:	Shanghai MXCHIP Information Technology Co., Ltd
Manufacturer Address:	9th Floor, No.5, Lane2145 JinshaJiang Road, Putuo District, Shang Hai, China (200333)
Factory:	Chengdu Xuguang Technology Co., Ltd
Factory Address:	No. 86, Section 2, Gongyuan Road, Longquanyi, Chengdu, Sichuan
Test Site:	Fangguang Inspection & Testing Co., Ltd.
LAB ID:	CN5037
Test Site Address:	G9 Building, China Sensor Network International Innovation Park No.200, Linghu Avenue Wuxi, Jiangsu 214000 China
FCC Rule Part(s):	Part 15 Subpart C (15.247)
FCC ID:	P53-EMC3183
Test Device Serial No.:	S/N:/ ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	Digital Transmission System (DTS)

1. INTRODUCTION

1.1. 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 Innovation, Science and Economic Development Canada.

1.2. Fangguang Test Location

These measurement tests were performed at the Fangguang Inspection and testing Co.,LTD 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.

2. PRODUCT INFORMATION

2.1. 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
Software Version:	A258
Hardware Version:	1.0
Note:	This information is provided by the Customer and its authenticty is the responsibility of the Customer.

2.2. Product Specification Subjective to this Report

Frequency Range:	802.11b/g/n20: 2412 ~ 2462MHz
Channel Number:	802.11b/g/n20: 11
Type of Modulation:	802.11b: DSSS 802.11g/n: OFDM
Data Rate:	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: MCS0~MCS7
Antenna Type:	PCB antenna
Antenna Gain:	2dBi

2.3. Operation Frequency / Channel List

802.11b/g/n20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	--	--

2.4. Description of Available Antennas

Antenna	Frequency Band (MHz)	Product Number	Tx Paths	Antenna
PCB antenna	2400 ~ 2500	/	1	Ant 1

Antenna	Frequency Band (MHz)	Tx Paths	Per Chain Max Antenna Gain (dBi)	Beam Forming Directional Gain (dBi)	CDD Directional Gain (dBi)
			Ant 1		
PCB antenna	2400 ~ 2500	1	2	NA	NA

Note：

Unequal Antenna gains, with equal transmit powers. For Antenna gains given by G_1, G_2, …, G_N dBi transmit signals are correlated, then

Directional gain = $10*\log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2/N_{ANT}]$ dBi [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

2.5. Device Capabilities

This device contains the following capabilities:

2.4GHz WLAN (DTS)

Note: 2.4GHz WLAN (DTS) operation is possible in 20MHz channel bandwidths. The maximum achievable duty cycle was determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles:

Test Mode	Antenna	Frequency[MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
11B	Ant1	2412	12.42	12.56	98.89
		2437	12.41	12.54	98.96
		2462	7.00	7.00	100.00
11G	Ant1	2412	2.06	2.19	94.06
		2437	2.07	2.20	94.09
		2462	2.06	2.19	94.06
11N20SISO	Ant1	2412	1.93	2.06	93.69
		2437	1.92	2.05	93.66
		2462	1.92	2.05	93.66

Refer to the Report S20240620077202E01.

2.6. Description of Test Software

The test utility software used during testing was “UI_mptool.exe”, Power Parameter Value:

Test Mode	Channel	ANT1
B	2412	84
	2437	83
	2462	83
G	2412	95
	2437	95
	2462	95
N20	2412	87
	2437	93
	2462	91

2.7. Test Mode

Test Mode	Mode 1: Transmit by 802.11b
	Mode 2: Transmit by 802.11g
	Mode 3: Transmit by 802.11n20

2.8. Test Configuration

The EUT was tested per the guidance of KDB 558074 D01 v05r02. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.9. EMI Suppression Device(s)/Modifications

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

2.10. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 558074 D01 v05r02 were used in the measurement of the EUT.

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

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' 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. 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 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. 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 data exchange speed, 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. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

3.3. 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. The 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 30MHz 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 30MHz, 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 for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-25GHz was placed on top of the 1.5 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, clock speed, mode of operation or video resolution, 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.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- Use a unique coupling to the intentional radiator.

5. TEST EQUIPMENT CALIBRATION DATE

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
Loop Antenna	Schwarzbeck	FMZB 1519B	FWXGJC-2018-015	3 year	2025/07/23
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	2025/07/26
Broadband Horn Antenna	Schwarzbeck	BBHA9170	FWXGJC-2018-016	3 year	2025/07/26
EMI Receiver	R&S	ESR26	FWXGJC-2016-267-01	1 year	2025/07/26
Pre-Amplifier	R&S	SCU-18D	FWXGJC-2016-267-05	1 year	2025/07/23
Pre-Amplifier	R&S	EMC184055 SE	FWXGJC-2018-018	3 year	2025/07/23
Hygrothermograph	Mittel	HTC-1	FWXDA-2016-386	1 year	2025/02/25
Anechoic Chamber	Aimuke	EMCCT-3	FWXGJC-2016-270	3 year	2026/04/05

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Keysight	N9010B	FWXGJC-2018-010	1 year	2025/03/02
RF Control Unit	Toncend	JS0806-2	FWXGJC-2018-013	1 year	2025/05/19
Thermohygrometer	Yuhuaze	HTC-1	FWXDA-2016-385	1 year	2025/02/25

Auxiliary Equipment

Instrument	Manufacturer	Type No.	Asset No.	Function
Filter	Toncend	ZBSF6	07247867	/
Filter	Toncend	ZHPF6	07233297	/
Attenuator	Toncend	10dB	/	/
RF Cable	Toncend	T-1	/	/

Test Software

Test Software	Manufacturer	Version	Asset No.	Function
EMI Test Software	Tonscend	V2.5.2.4	FWXWA-2018-004	Emission Test
RF Test Software	Tonscend	3.3.10	/	/

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
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 30MHz-1GHz: 1.00 dB 1GHz-12.75GHz: 1.30 dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.60dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.80dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.20MHz
Frequency Stability
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.1×10^{-6}

7. TEST RESULT

7.1. Summary

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.203	Antenna Requirement	/	/	Pass	Section 4
15.247(a)(2)	6dB Bandwidth	≥ 500kHz	Conducted	Pass	Section 7.2
15.247(b)(3)	Output Power	≤ 30dBm		Pass	Section 7.3
15.247(e)	Power Spectral Density	≤ 8dBm/3kHz		Pass	Section 7.4
15.247(d)	Band Edge	≥ 20dBc		Pass	Section 7.5
15.247(d)	Out-of-Band Emissions	≥ 20dBc		Pass	Section 7.5
15.205	Restricted Bands	Emissions in restricted bands must meet the radiated limits detailed in 15.205	Radiated	Pass	Section 7.7
15.209	General Field Strength Limits (Radiated Emission Limits)	Radiated Emission must meet the radiated limits detailed in 15.209 (RSS GEN [8.9])		Pass	Section 7.6
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	AC Line Conducted	N/A	Section 7.8

Notes:

1) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

7.2. 6dB Bandwidth Measurement

7.2.1. Test Limit

The minimum permissible 6dB bandwidth is 500 kHz.

7.2.2. Test Procedure used

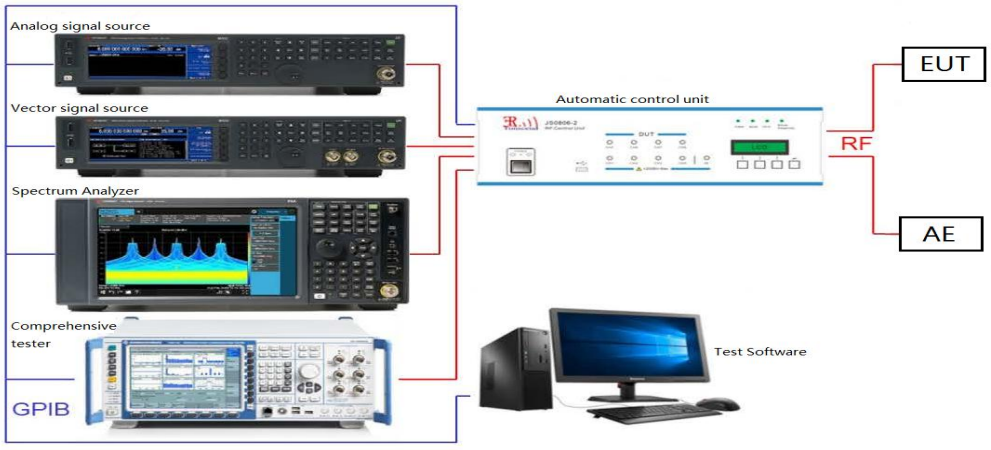
ANSI C63.10-2013 Section 11.8.2 Option 1

KDB 558074 D01 v05r02 – Section 8.2

7.2.3. Test Setting

1. Set RBW = 100 kHz
2. VBW ≥ 3 × RBW
3. Detector = peak
4. Trace mode = max hold
5. Sweep = auto couple
6. Allow the trace was allowed to stabilize
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.2.4. Test Setup



7.2.5. Test Result

Refer to the Report S20240620077202E01.

7.3. Output Power Measurement

7.3.1. Test Limit

The maximum conducted output power is 1 Watt. And for antenna gain greater than 6dBi the limit shall reduce by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.3.2. Test Procedure Used

ANSI C63.10-2013 – Section 11.9.2.2.4

KDB 558074 D01 v05r02 – Section 8.3.2.2

7.3.3. Test Setting

1. Set span to at least 1.5 times the OBW..

2. Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.

3. Set VBW ≥ [3 × RBW].

4. Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing RBW / 2, so that narrowband signals are not lost between frequency bins.)

5.Sweep time = auto.

6. Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

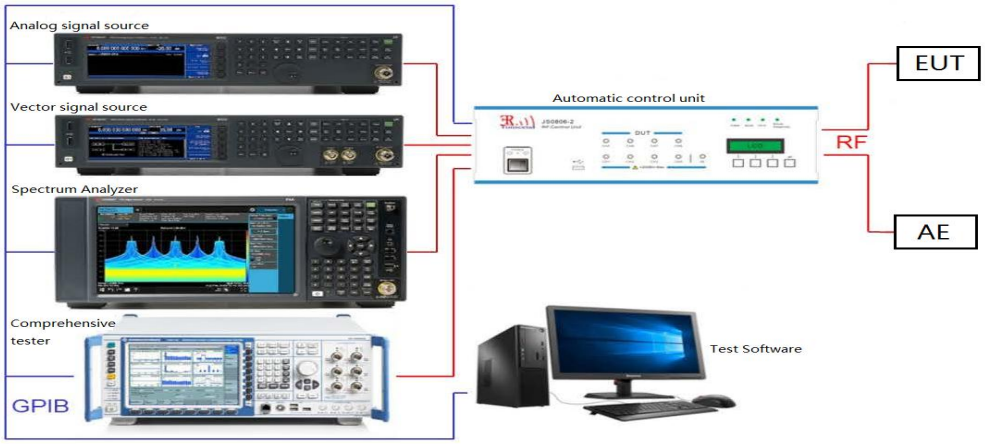
7. Do not use sweep triggering. Allow the sweep to “free run.”

8. Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the ON and OFF periods of the transmitter.

9. Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum. 10Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both

the ON and OFF times of the transmission). For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is 25%.

7.3.4. Test Setup



7.3.5. Test Result

Refer to the Report S20240620077202E01.

7.4. Power Spectral Density Measurement

7.4.1. Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band. And for antenna gain greater than 6dBi the limit shall reduce by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.4.2. Test Procedure Used

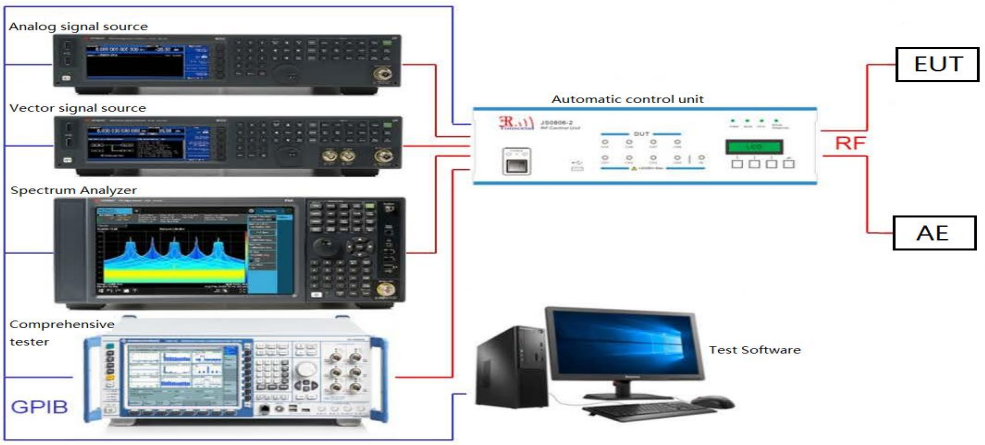
KDB 558074 D01 v05r02 - Section 8.4

ANSI C63.10 – Section 11.10.5

7.4.3. Test Setting

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the OBW.
3. Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ [3 × RBW].
5. Detector = power averaging (rms) or sample detector (when rms not available).
6. Ensure that the number of measurement points in the sweep ≥ [2 × span / RBW].
7. Sweep time = auto couple.
8. Do not use sweep triggering; allow sweep to “free run.”
9. Employ trace averaging (rms) mode over a minimum of 100 traces.
10. Use the peak marker function to determine the maximum amplitude level.
11. Add [10 log (1 / D)], where D is the duty cycle measured in step a), to the measured PSD to
12. If measured value exceeds requirement specified by regulatory agency, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced)..

7.4.4. Test Setup



7.4.5. Test Result

Refer to the Report S20240620077202E01.

7.5. Conducted Band Edge and Out-of-Band Emissions

7.5.1. Test Limit

The limit for out-of-band spurious emissions at the band edge is 30dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth per the PSD procedure.

7.5.2. Test Procedure Used

KDB 558074 D01 v05r02 - Section 8.5 & Section 8.6

ANSI C63.10 – Section 11.11&11.12

7.5.3. Test Settitng

(a) Set the center frequency and span to encompass frequency range to be measured

(b) RBW = 100kHz

(c) VBW = 300kHz

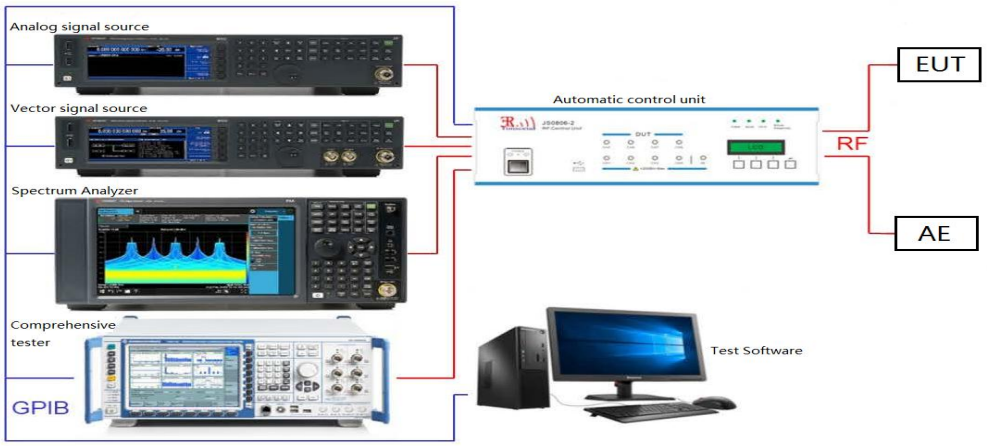
(d) Detector = RMS

(e) Trace mode = max hold

(f) Sweep time = auto couple

(g) The trace was allowed to stabilize

7.5.4. Test Setup



7.5.5. Test Result

Refer to the Report S20240620077202E01.

7.6. Radiated Spurious Emission Measurement

7.6.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 – 0.490	2400/F (kHz)	300
0.490 – 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.6.2. Test Procedure Used

ANSI C63.10-2013 – Section 6.6.4.3

7.6.3. Test Setting

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold

7. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

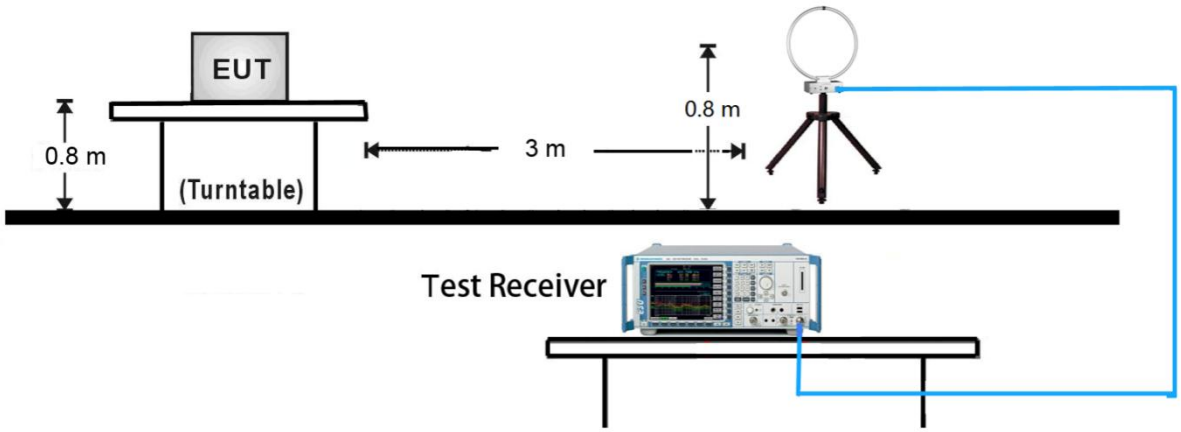
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

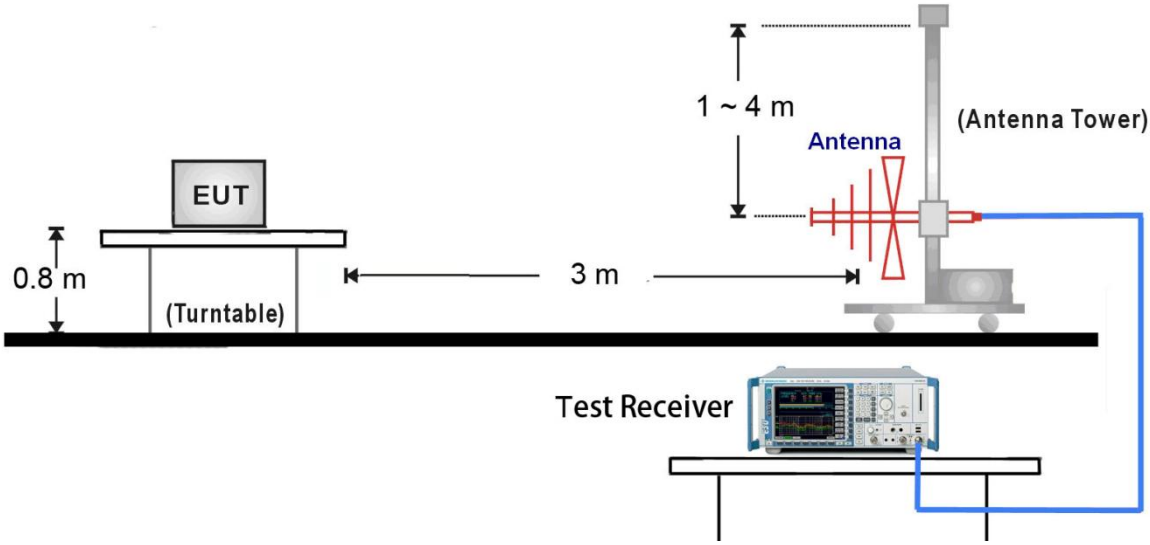
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = Power Average (RMS)
5. Number of sweep point = 2001 (Number of sweep points must be ≥ 2 x span / RBW)
6. Sweep time = auto
7. Trace (RMS) averaging was performed over at least 100 traces.

7.6.4. Test Setup

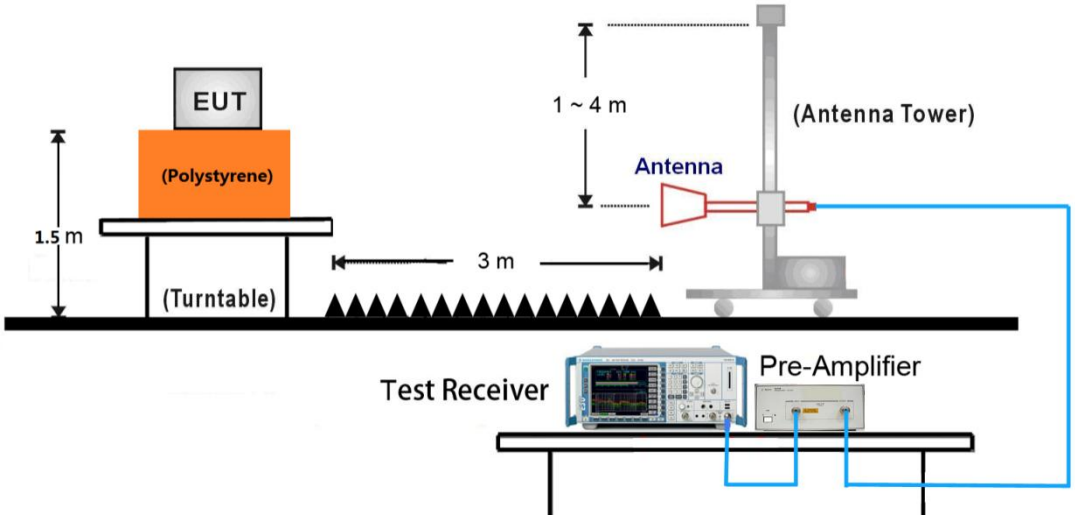
9kHz ~ 30MHz Test Setup:



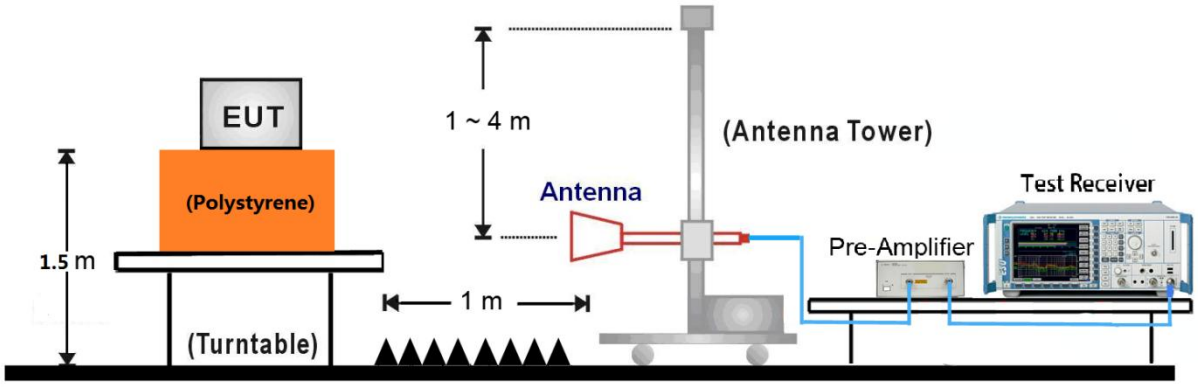
30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:



18GHz ~25GHz Test Setup:



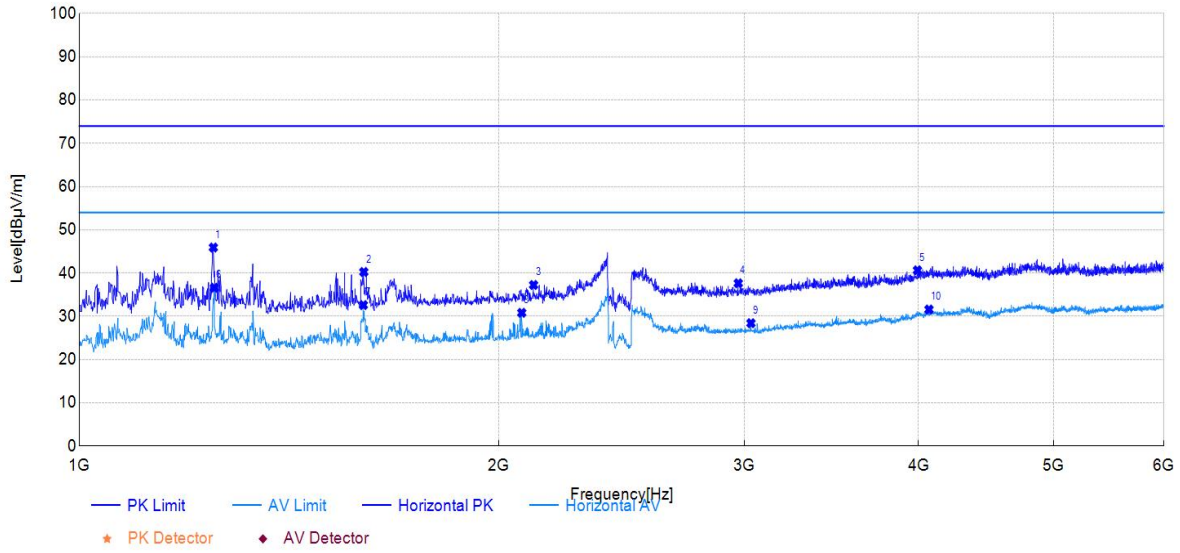
7.6.1. Test Result

The worst case of Radiated Emission above 1GHz:

1GHz – 6GHz Test Data

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Horizontal
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2412MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph

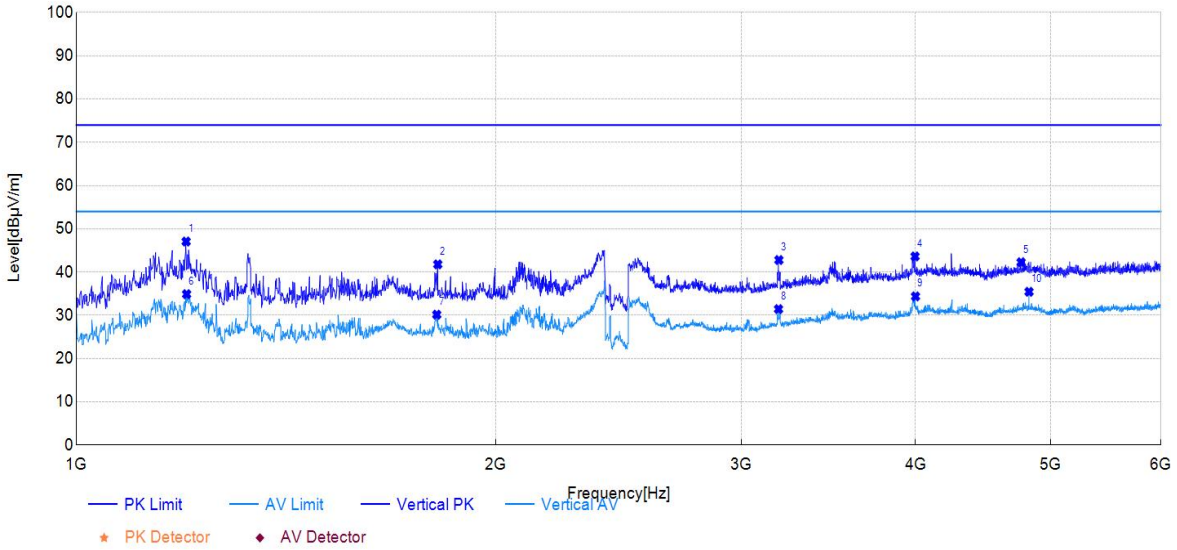


Frequency (MHz)	Level (dBµV/m)	Factor (dB)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
1248.00	45.91	-23.18	74.00	28.09	PK	Horizontal
1600.00	40.25	-21.09	74.00	33.75	PK	Horizontal
2118.00	37.25	-17.57	74.00	36.75	PK	Horizontal
2970.00	37.64	-14.61	74.00	36.36	PK	Horizontal
3993.00	40.64	-8.63	74.00	33.36	PK	Horizontal
1250.00	36.60	-23.17	54.00	17.40	AV	Horizontal
1599.00	32.60	-21.10	54.00	21.40	AV	Horizontal
2077.00	30.81	-17.77	54.00	23.19	AV	Horizontal
3033.00	28.41	-14.40	54.00	25.59	AV	Horizontal
4070.00	31.57	-8.24	54.00	22.43	AV	Horizontal

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 26.5GHz), therefore no data appear in the report.

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Vertical
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2412MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph



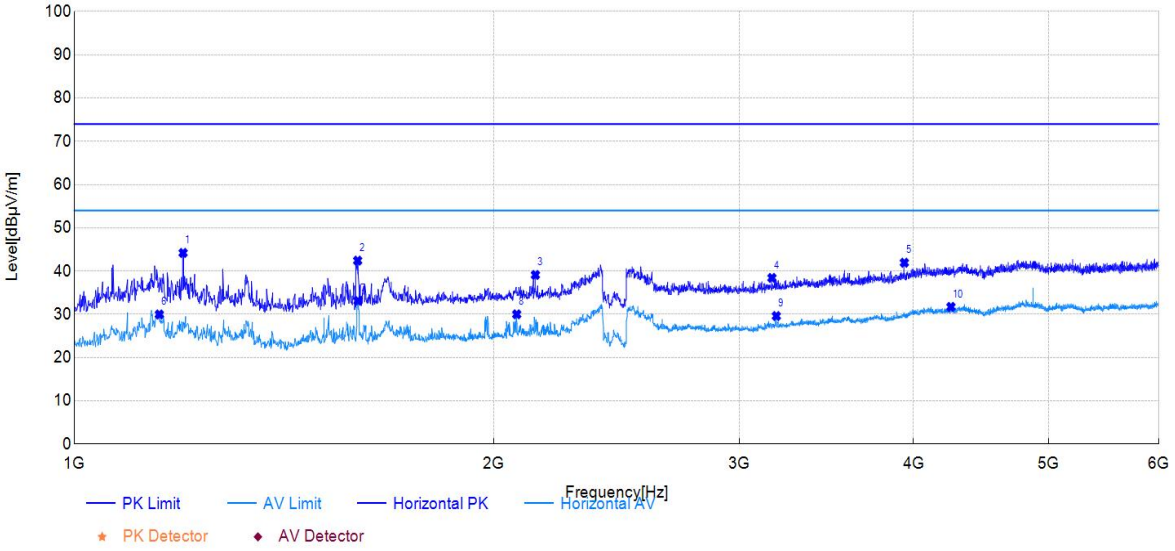
Frequency (MHz)	Level (dBµV/m)	Factor (dB)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
1199.00	47.06	-22.47	74.00	26.94	PK	Vertical
1817.00	41.78	-18.86	74.00	32.22	PK	Vertical
3192.00	42.79	-13.21	74.00	31.21	PK	Vertical
3997.00	43.62	-8.30	74.00	30.38	PK	Vertical
4762.00	42.27	-7.39	74.00	31.73	PK	Vertical
1200.00	34.89	-22.47	54.00	19.11	AV	Vertical
1814.00	30.15	-18.87	54.00	23.85	AV	Vertical
3190.00	31.43	-13.23	54.00	22.57	AV	Vertical
4000.00	34.37	-8.28	54.00	19.63	AV	Vertical
4825.00	35.44	-7.27	54.00	18.56	AV	Vertical

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 26.5GHz), therefore no data appear in the report.

1GHz – 6GHz Test Data

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Horizontal
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2437MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph

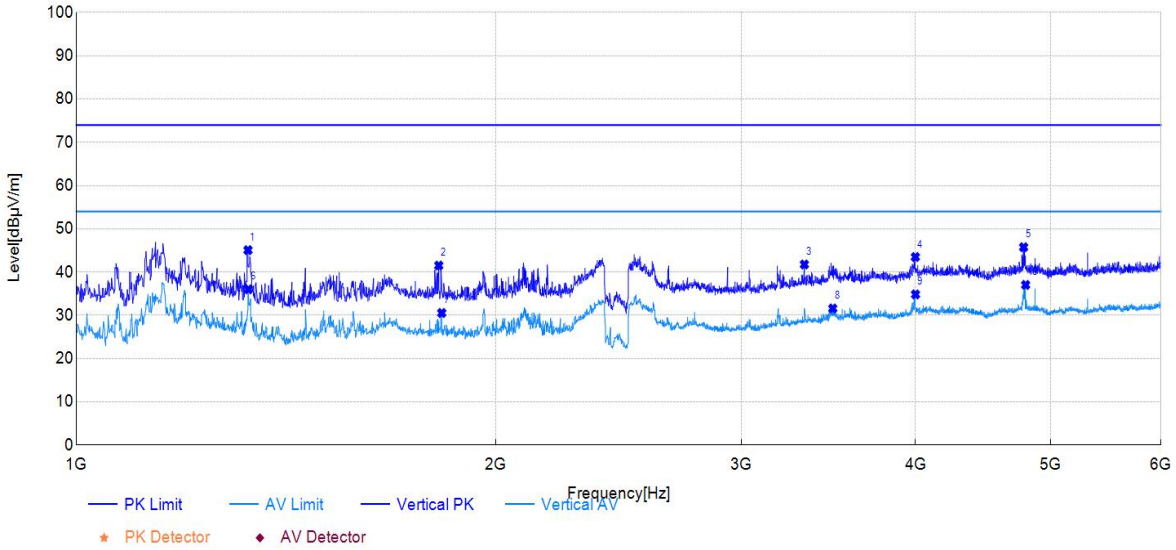


Frequency (MHz)	Level (dBµV/m)	Factor (dB)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
1197.00	44.20	-23.46	74.00	29.80	PK	Horizontal
1597.00	42.42	-21.11	74.00	31.58	PK	Horizontal
2142.00	39.10	-17.47	74.00	34.90	PK	Horizontal
3166.00	38.42	-13.77	74.00	35.58	PK	Horizontal
3940.00	41.93	-8.99	74.00	32.07	PK	Horizontal
1151.00	29.97	-23.65	54.00	24.03	AV	Horizontal
1598.00	33.12	-21.10	54.00	20.88	AV	Horizontal
2077.00	30.00	-17.77	54.00	24.00	AV	Horizontal
3189.00	29.60	-13.66	54.00	24.40	AV	Horizontal
4255.00	31.72	-7.78	54.00	22.28	AV	Horizontal

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 26.5GHz), therefore no data appear in the report.

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Vertical
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2437MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph



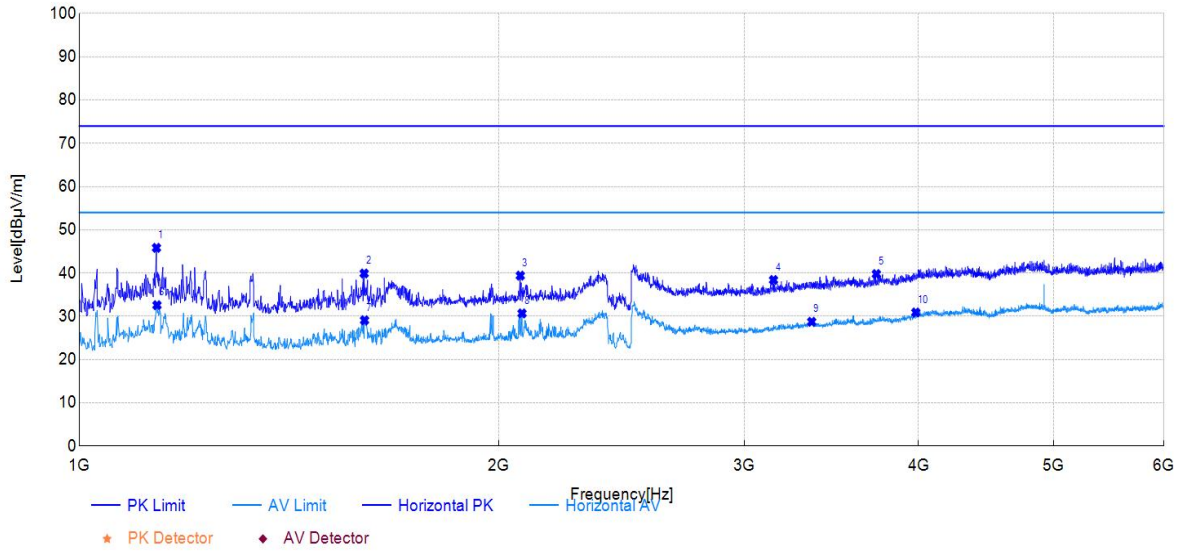
Frequency (MHz)	Level (dBµV/m)	Factor (dB)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
1328.00	45.07	-21.79	74.00	28.93	PK	Vertical
1820.00	41.51	-18.85	74.00	32.49	PK	Vertical
3329.00	41.76	-12.43	74.00	32.24	PK	Vertical
3999.00	43.48	-8.28	74.00	30.52	PK	Vertical
4782.00	45.75	-7.35	74.00	28.25	PK	Vertical
1329.00	36.01	-21.78	54.00	17.99	AV	Vertical
1829.00	30.54	-18.82	54.00	23.46	AV	Vertical
3489.00	31.59	-11.63	54.00	22.41	AV	Vertical
4000.00	34.83	-8.28	54.00	19.17	AV	Vertical
4798.00	37.02	-7.33	54.00	16.98	AV	Vertical

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 26.5GHz), therefore no data appear in the report.

1GHz – 6GHz Test Data

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Horizontal
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2462MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph

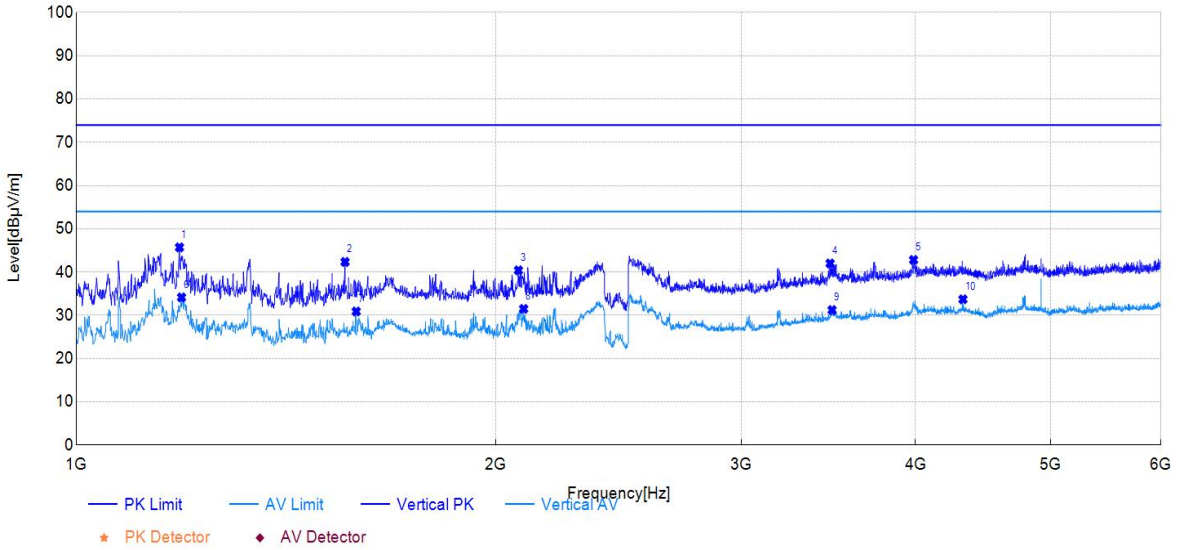


Frequency (MHz)	Level (dBµV/m)	Factor (dB)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
1136.00	45.83	-23.70	74.00	28.17	PK	Horizontal
1601.00	39.91	-21.08	74.00	34.09	PK	Horizontal
2072.00	39.41	-17.80	74.00	34.59	PK	Horizontal
3148.00	38.40	-13.85	74.00	35.60	PK	Horizontal
3731.00	39.77	-10.78	74.00	34.23	PK	Horizontal
1137.00	32.57	-23.70	54.00	21.43	AV	Horizontal
1602.00	29.08	-21.08	54.00	24.92	AV	Horizontal
2078.00	30.67	-17.76	54.00	23.33	AV	Horizontal
3353.00	28.73	-12.94	54.00	25.27	AV	Horizontal
3982.00	30.88	-8.70	54.00	23.12	AV	Horizontal

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 26.5GHz), therefore no data appear in the report.

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Vertical
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2462MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph



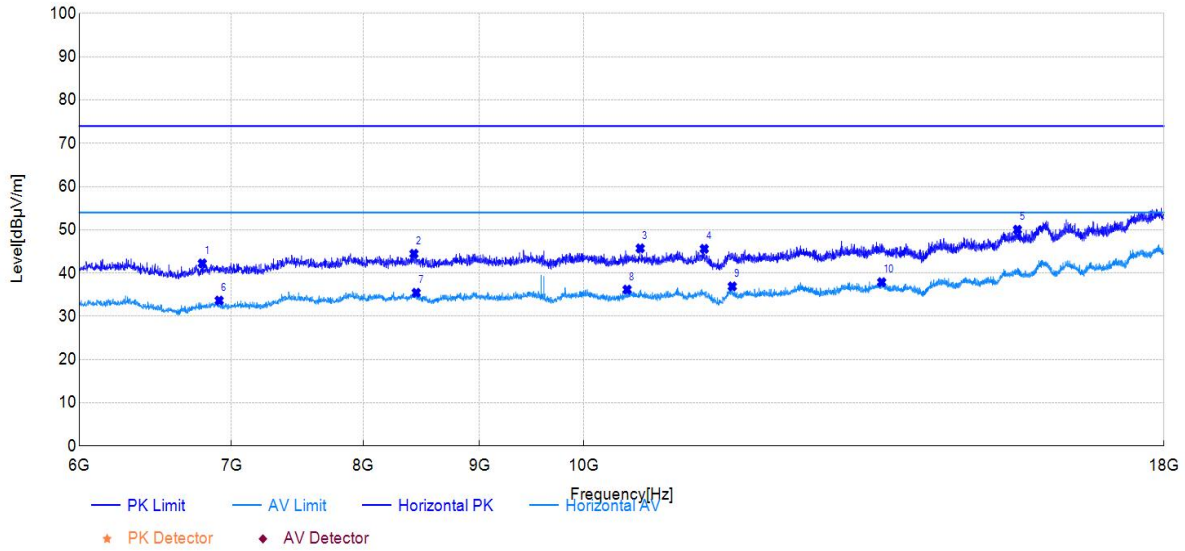
Frequency (MHz)	Level (dBµV/m)	Factor (dB)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
1186.00	45.71	-22.52	74.00	28.29	PK	Vertical
1559.00	42.35	-20.60	74.00	31.65	PK	Vertical
2076.00	40.40	-17.47	74.00	33.60	PK	Vertical
3474.00	42.00	-11.70	74.00	32.00	PK	Vertical
3987.00	42.80	-8.35	74.00	31.20	PK	Vertical
1190.00	34.15	-22.50	54.00	19.85	AV	Vertical
1588.00	30.88	-20.44	54.00	23.12	AV	Vertical
2094.00	31.48	-17.42	54.00	22.52	AV	Vertical
3485.00	31.22	-11.65	54.00	22.78	AV	Vertical
4326.00	33.70	-7.68	54.00	20.30	AV	Vertical

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 26.5GHz), therefore no data appear in the report.

6GHz – 18GHz Test Data

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Horizontal
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2412MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph

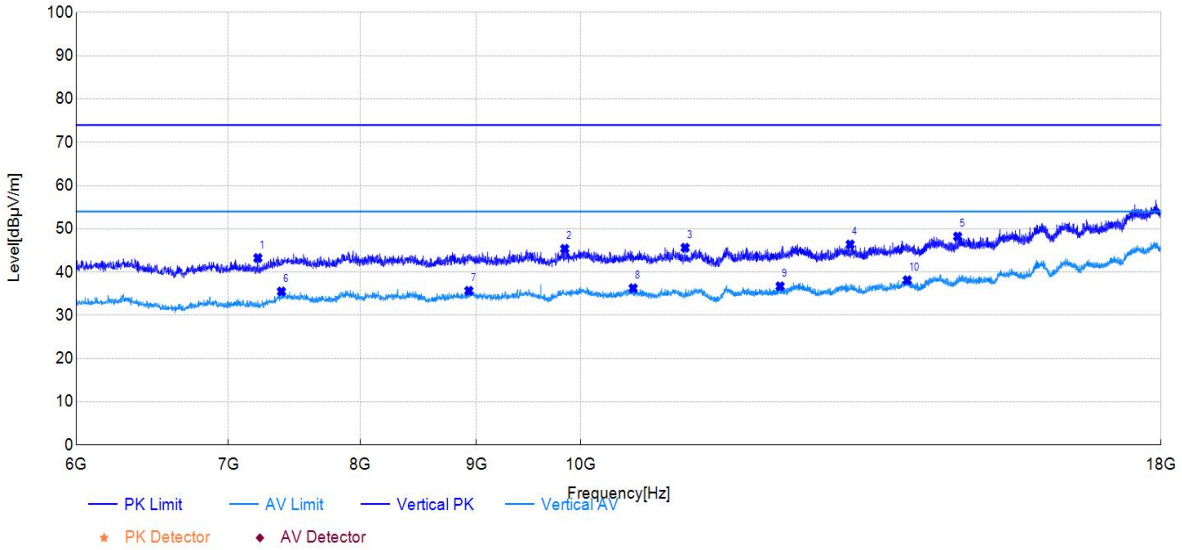


Frequency (MHz)	Level (dBµV/m)	Factor (dB)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
6796.50	42.23	-4.94	74.00	31.77	PK	Horizontal
8421.00	44.45	-1.12	74.00	29.55	PK	Horizontal
10590.00	45.71	0.76	74.00	28.29	PK	Horizontal
11299.50	45.60	0.87	74.00	28.40	PK	Horizontal
15517.50	50.02	7.49	74.00	23.98	PK	Horizontal
6913.50	33.65	-4.45	54.00	20.35	AV	Horizontal
8440.50	35.44	-1.24	54.00	18.56	AV	Horizontal
10450.50	36.17	0.53	54.00	17.83	AV	Horizontal
11625.00	36.91	1.26	54.00	17.09	AV	Horizontal
13524.00	37.88	3.28	54.00	16.12	AV	Horizontal

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 26.5GHz), therefore no data appear in the report.

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Vertical
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2412MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph



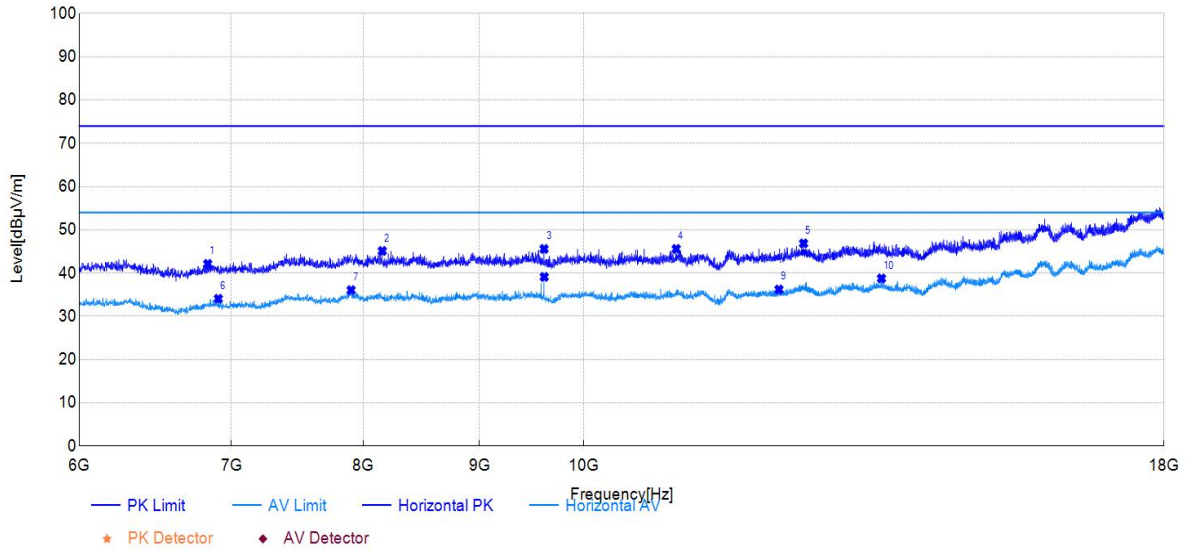
Frequency (MHz)	Level (dBµV/m)	Factor (dB)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
7212.00	43.24	-4.09	74.00	30.76	PK	Vertical
9840.00	45.38	0.02	74.00	28.62	PK	Vertical
11116.50	45.63	0.85	74.00	28.37	PK	Vertical
13138.50	46.38	2.65	74.00	27.62	PK	Vertical
14650.50	48.21	5.09	74.00	25.79	PK	Vertical
7386.00	35.50	-2.83	54.00	18.50	AV	Vertical
8929.50	35.65	-1.07	54.00	18.35	AV	Vertical
10546.50	36.25	1.09	54.00	17.75	AV	Vertical
12238.50	36.71	1.74	54.00	17.29	AV	Vertical
13921.50	38.10	4.03	54.00	15.90	AV	Vertical

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 26.5GHz), therefore no data appear in the report.

6GHz – 18GHz Test Data

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Horizontal
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2437MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph

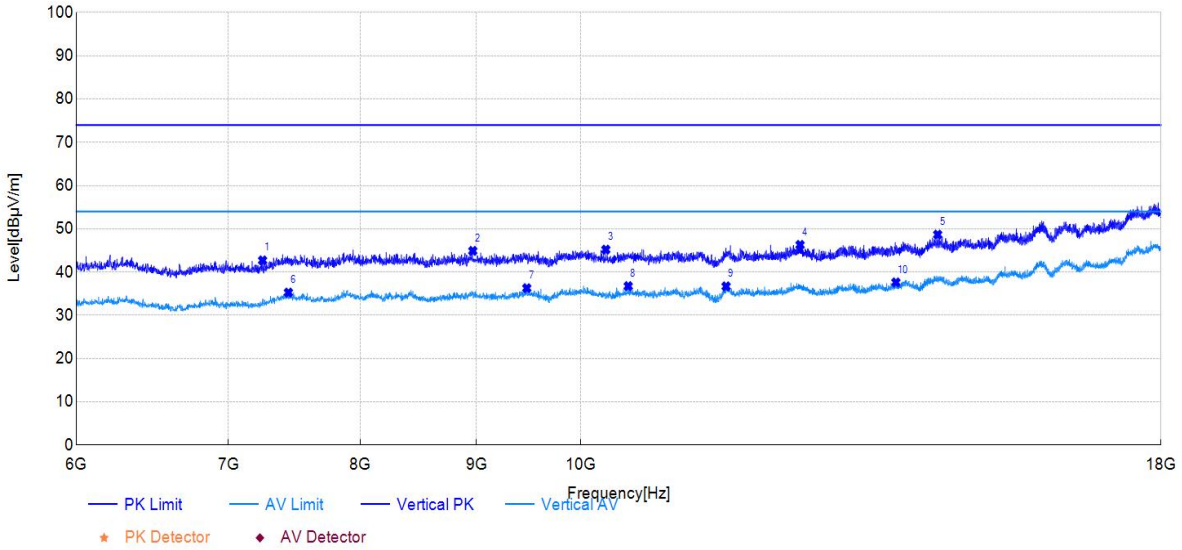


Frequency (MHz)	Level (dBµV/m)	Factor (dB)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
6834.00	42.12	-4.73	74.00	31.88	PK	Horizontal
8155.50	45.11	-1.26	74.00	28.89	PK	Horizontal
9607.50	45.58	-0.28	74.00	28.42	PK	Horizontal
10983.00	45.58	1.25	74.00	28.42	PK	Horizontal
12495.00	46.85	2.44	74.00	27.15	PK	Horizontal
6907.50	34.05	-4.43	54.00	19.95	AV	Horizontal
7902.00	36.05	-0.97	54.00	17.95	AV	Horizontal
9609.00	39.11	-0.30	54.00	14.89	AV	Horizontal
12187.50	36.20	1.73	54.00	17.80	AV	Horizontal
13521.00	38.75	3.29	54.00	15.25	AV	Horizontal

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 26.5GHz), therefore no data appear in the report.

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Vertical
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2437MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph



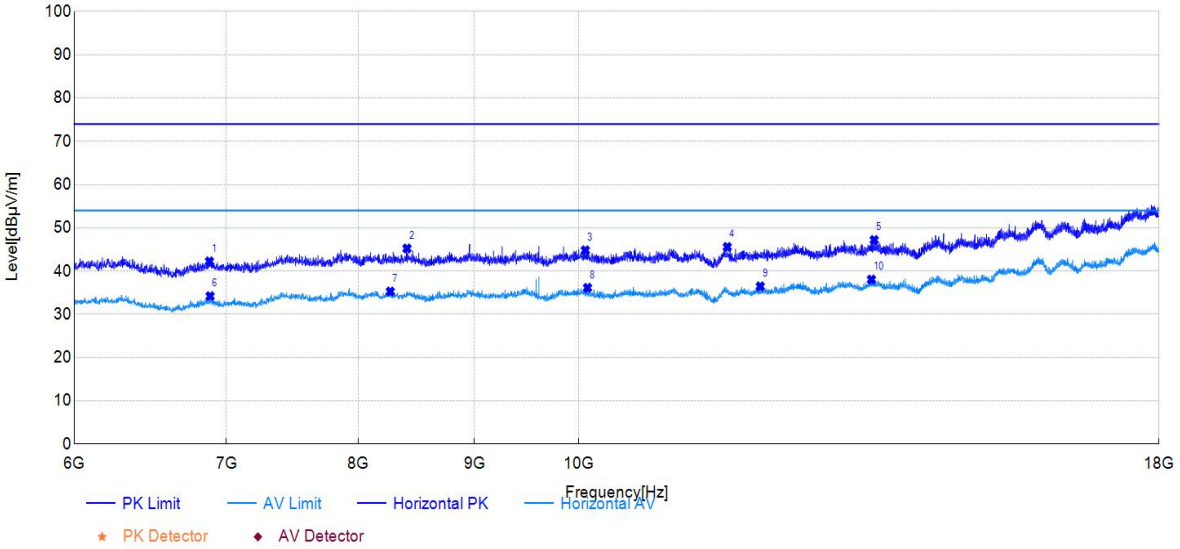
Frequency (MHz)	Level (dBµV/m)	Factor (dB)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
7246.50	42.69	-3.84	74.00	31.31	PK	Vertical
8965.50	44.90	-0.92	74.00	29.10	PK	Vertical
10258.50	45.18	0.41	74.00	28.82	PK	Vertical
12489.00	46.28	2.53	74.00	27.72	PK	Vertical
14356.50	48.66	5.49	74.00	25.34	PK	Vertical
7438.50	35.26	-2.84	54.00	18.74	AV	Vertical
9469.50	36.27	-0.19	54.00	17.73	AV	Vertical
10494.00	36.74	1.14	54.00	17.26	AV	Vertical
11587.50	36.69	1.57	54.00	17.31	AV	Vertical
13762.50	37.61	3.41	54.00	16.39	AV	Vertical

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 26.5GHz), therefore no data appear in the report.

6GHz – 18GHz Test Data

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Horizontal
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2462MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph

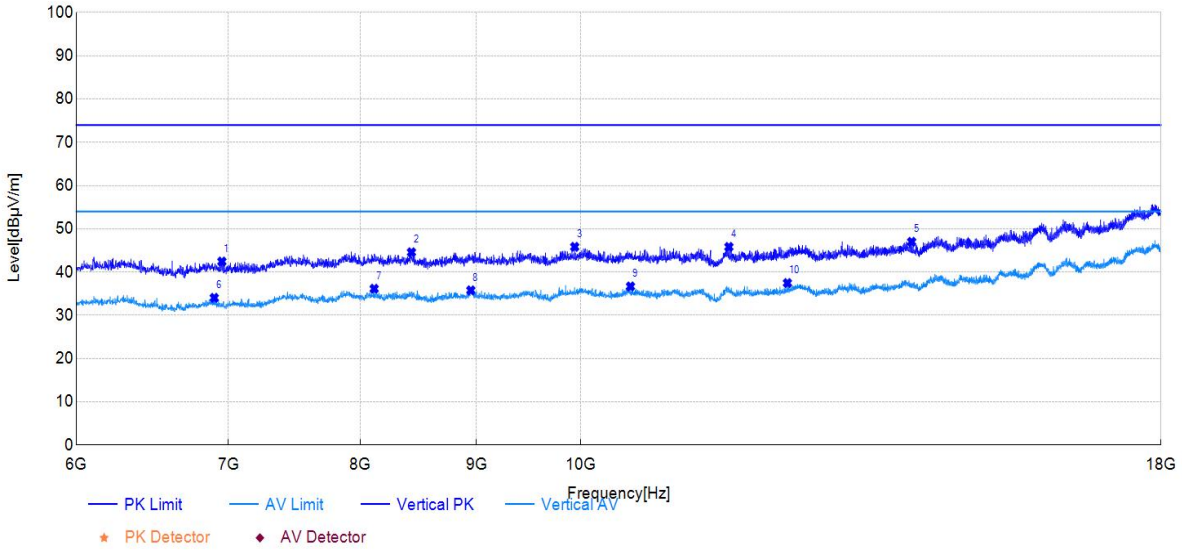


Frequency (MHz)	Level (dBµV/m)	Factor (dB)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
6880.50	42.24	-4.49	74.00	31.76	PK	Horizontal
8404.50	45.22	-1.02	74.00	28.78	PK	Horizontal
10068.00	44.80	-0.04	74.00	29.20	PK	Horizontal
11625.00	45.58	1.26	74.00	28.42	PK	Horizontal
13489.50	47.19	3.29	74.00	26.81	PK	Horizontal
6885.00	34.20	-4.47	54.00	19.80	AV	Horizontal
8263.50	35.28	-1.28	54.00	18.72	AV	Horizontal
10090.50	36.13	-0.05	54.00	17.87	AV	Horizontal
12019.50	36.47	1.52	54.00	17.53	AV	Horizontal
13452.00	38.04	3.12	54.00	15.96	AV	Horizontal

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 26.5GHz), therefore no data appear in the report.

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Vertical
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2462MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph



Frequency (MHz)	Level (dBµV/m)	Factor (dB)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
6954.00	42.43	-4.62	74.00	31.57	PK	Vertical
8425.50	44.57	-1.14	74.00	29.43	PK	Vertical
9940.50	45.83	0.17	74.00	28.17	PK	Vertical
11620.50	45.81	1.61	74.00	28.19	PK	Vertical
13983.00	46.99	3.84	74.00	27.01	PK	Vertical
6900.00	34.04	-4.33	54.00	19.96	AV	Vertical
8113.50	36.14	-1.08	54.00	17.86	AV	Vertical
8947.50	35.77	-0.99	54.00	18.23	AV	Vertical
10518.00	36.68	1.14	54.00	17.32	AV	Vertical
12330.00	37.46	1.86	54.00	16.54	AV	Vertical

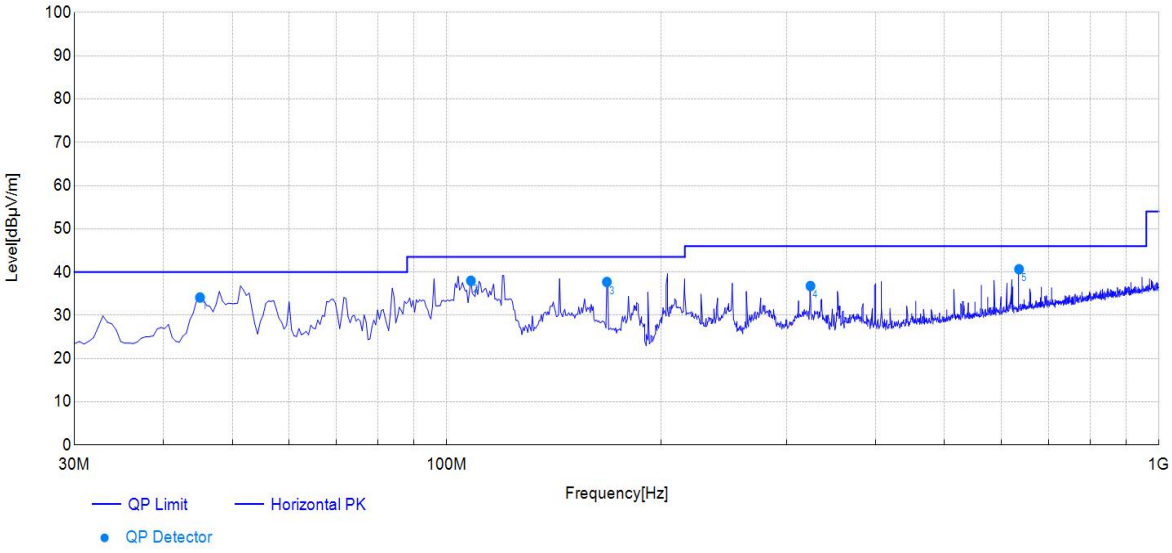
Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 26.5GHz), therefore no data appear in the report.

The worst case of Radiated Emission below 1GHz:

30MHz – 1GHz Test Data

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Horizontal
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2412MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph

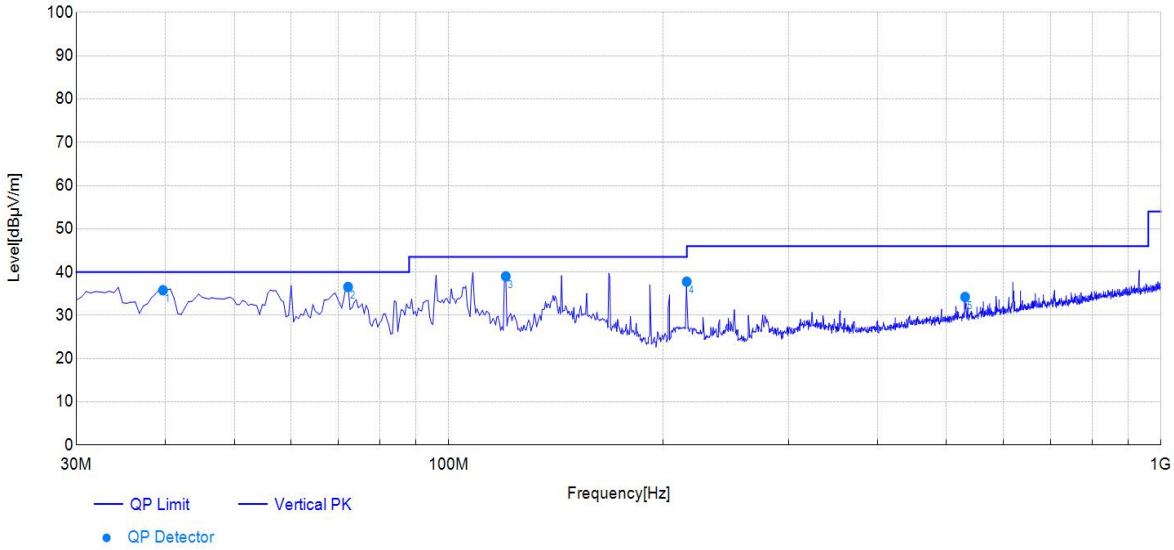


Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	45.04	14.58	34.12	40.00	5.88	150	49	Horizontal
2	108.12	12.45	37.99	43.50	5.51	100	75	Horizontal
3	167.81	14.93	37.71	43.50	5.79	150	217	Horizontal
4	324.06	15.81	36.77	46.00	9.23	100	35	Horizontal
5	636.07	22.22	40.66	46.00	5.34	100	138	Horizontal

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Vertical
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2412MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph

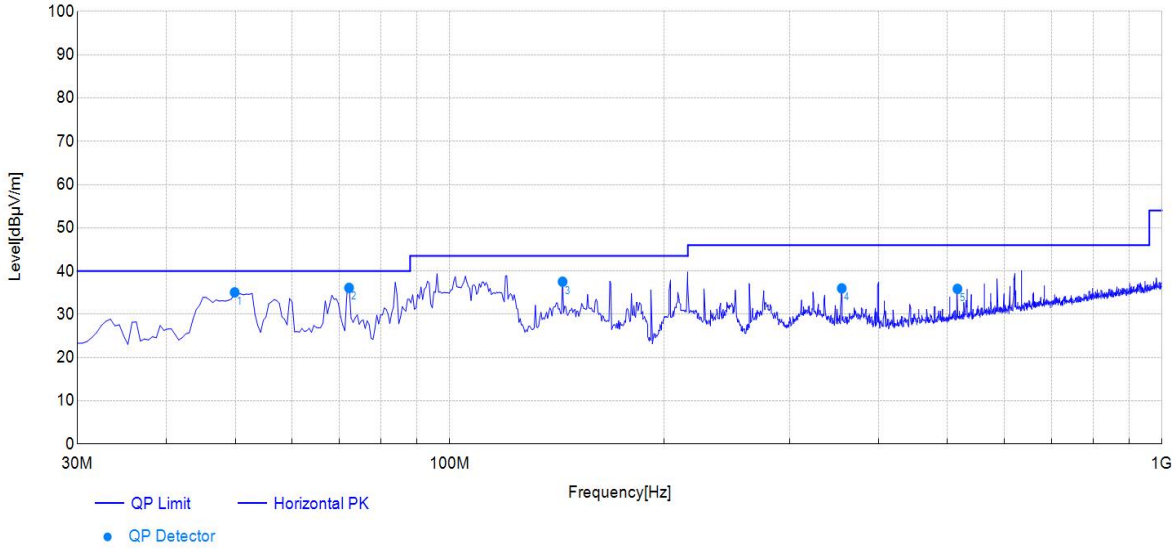


Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	39.70	14.88	35.80	40.00	4.20	100	292	Vertical
2	72.22	11.73	36.56	40.00	3.44	100	0	Vertical
3	120.26	13.77	39.02	43.50	4.48	150	78	Vertical
4	215.85	12.40	37.77	43.50	5.73	150	57	Vertical
5	530.77	20.21	34.24	46.00	11.76	150	251	Vertical

30MHz – 1GHz Test Data

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Horizontal
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2437MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

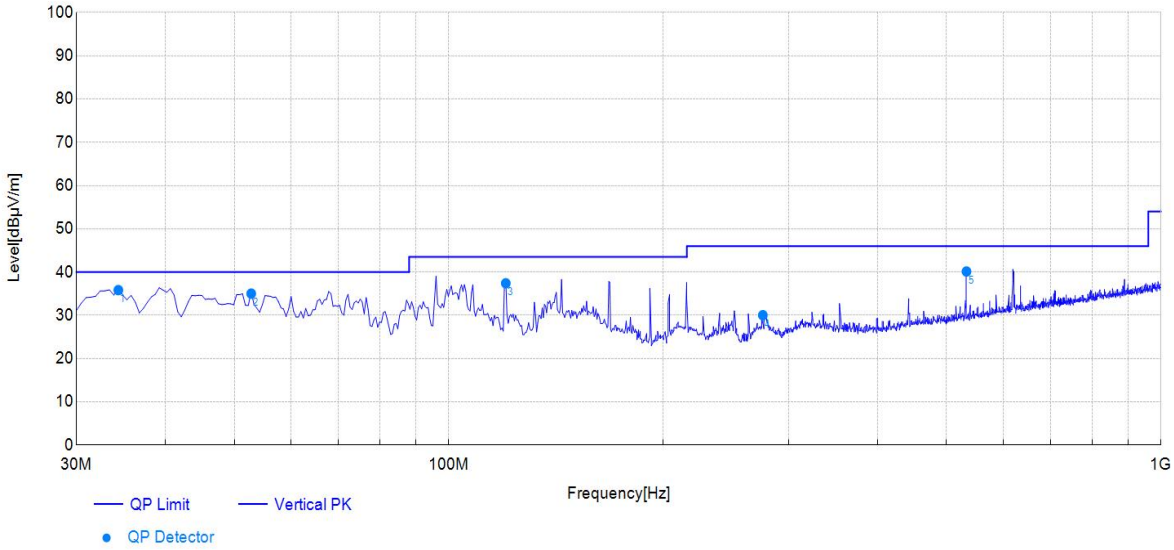
Test Graph



Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	49.89	14.53	35.08	40.00	4.92	150	23	Horizontal
2	72.22	11.73	36.12	40.00	3.88	150	197	Horizontal
3	144.03	15.30	37.53	43.50	5.97	150	193	Horizontal
4	355.11	16.45	36.00	46.00	10.00	100	87	Horizontal
5	516.21	19.92	35.89	46.00	10.11	100	115	Horizontal

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Vertical
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2437MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

Test Graph



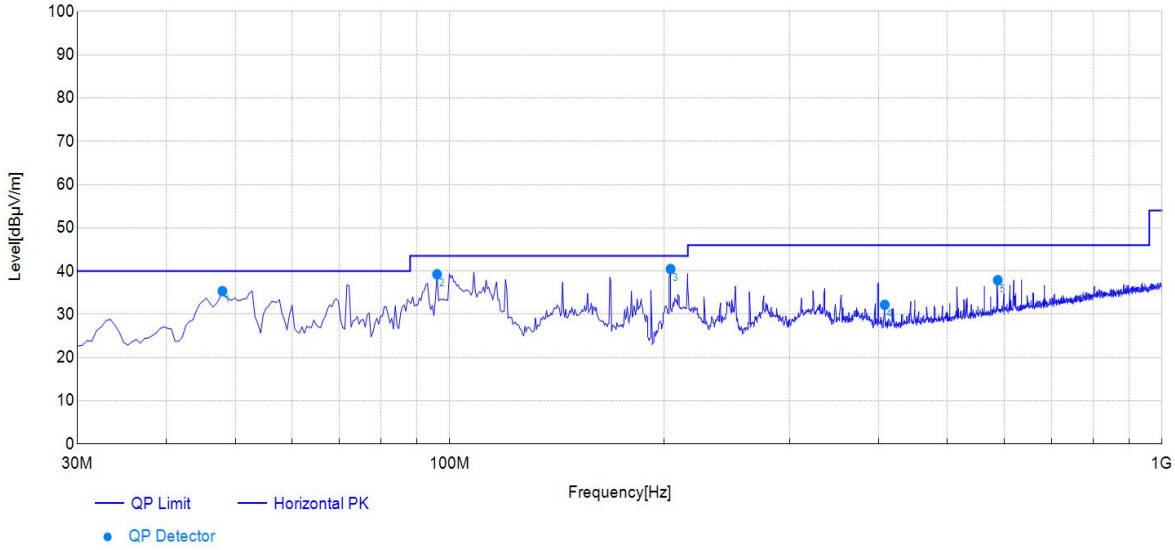
Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	34.37	14.12	35.84	40.00	4.16	100	68	Vertical
2	52.81	14.34	35.02	40.00	4.98	100	0	Vertical
3	120.26	13.77	37.41	43.50	6.09	150	84	Vertical
4	276.02	14.44	30.02	46.00	15.98	100	345	Vertical
5	533.20	20.25	40.14	46.00	5.86	100	86	Vertical

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

30MHz – 1GHz Test Data

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Horizontal
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2462MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

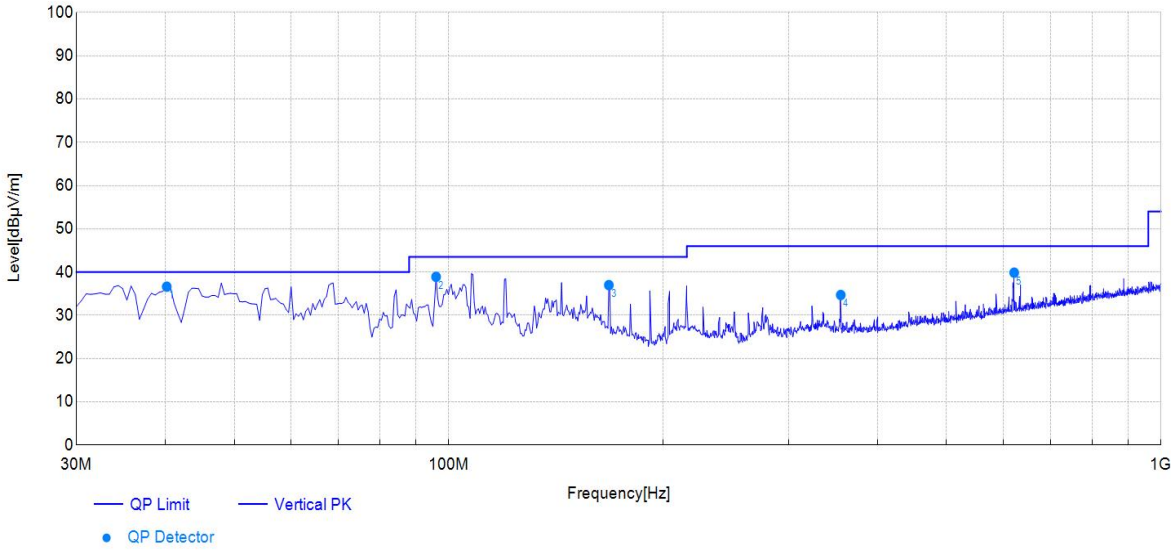
Test Graph



Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	47.95	14.55	35.35	40.00	4.65	150	191	Horizontal
2	95.99	11.20	39.26	43.50	4.24	100	90	Horizontal
3	204.20	11.94	40.47	43.50	3.03	100	100	Horizontal
4	408.00	17.65	32.21	46.00	13.79	100	185	Horizontal
5	588.03	21.44	37.90	46.00	8.10	150	169	Horizontal

EUT:	2.4GHz Wi-Fi/BLE Module	Polarity:	Vertical
Model:	EMC3183-E	S/N:	/
Mode:	Transmit by 802.11b at Channel 2462MHz	Voltage:	DC3.3V
Environment:	Temp: 19℃; Humi:48%	Engineer:	Chuang Li

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	40.19	14.91	36.63	40.00	3.37	100	314	Vertical
2	95.99	11.20	38.91	43.50	4.59	100	200	Vertical
3	167.81	14.93	36.99	43.50	6.51	150	114	Vertical
4	355.11	16.45	34.70	46.00	11.30	100	79	Vertical
5	622.00	21.98	39.87	46.00	6.13	100	86	Vertical

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

7.7. Restricted Band Edge Measurement

7.7.1. Test Limit

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1] 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.25 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.7.2. Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

7.7.3. Test Setting

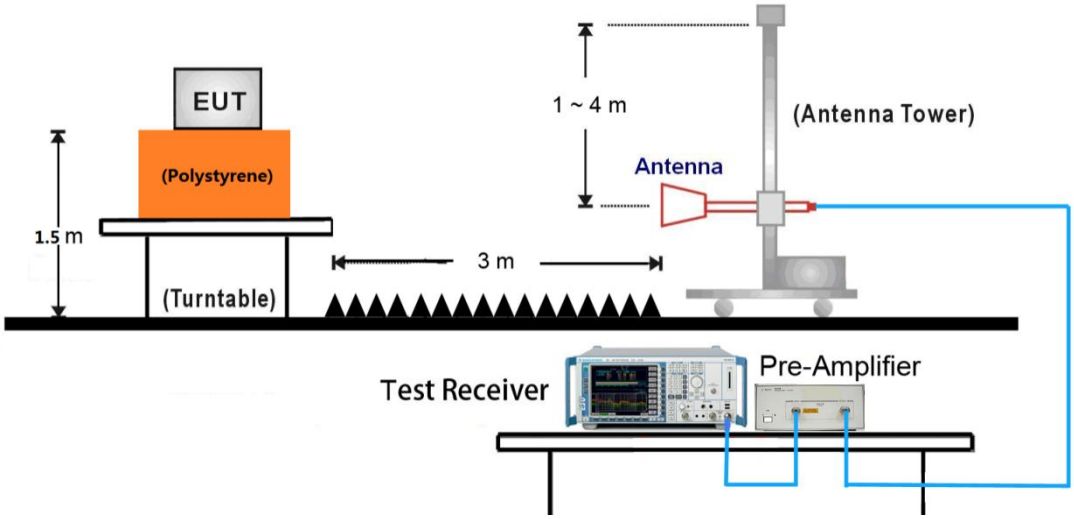
Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = Power Average (RMS)
5. Number of sweep point = 2001 (Number of sweep points must be ≥ 2 x span / RBW)
6. Sweep time = auto
7. Trace (RMS) averaging was performed over at least 100 traces.

7.7.4. Test Setup

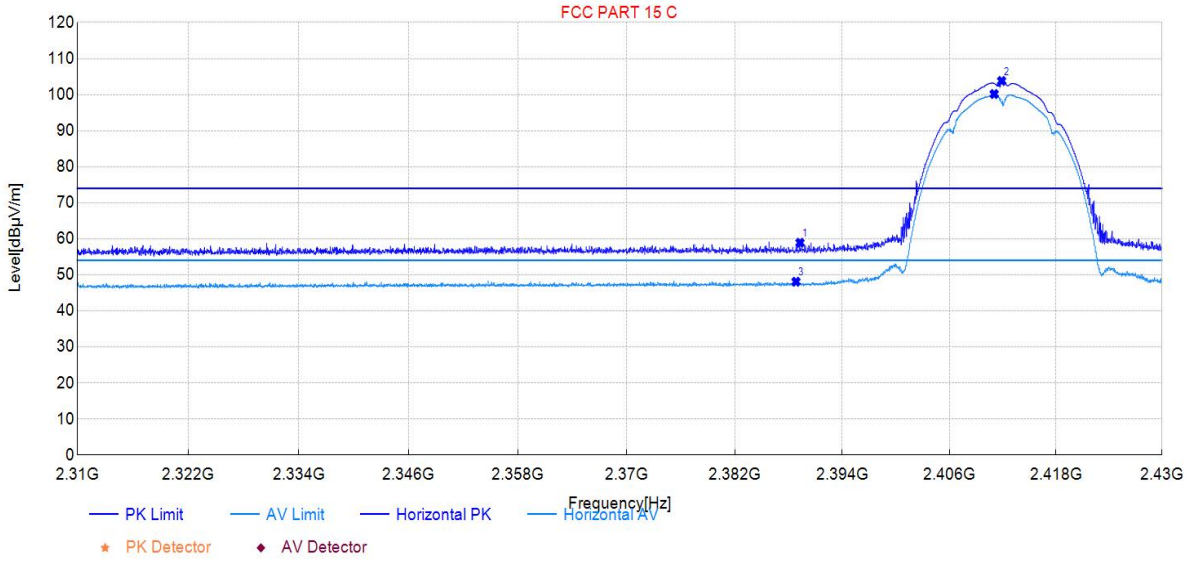


7.7.5. Test Result

802.11b

Test Mode:	802.11b	Test Date:	2024-11-10
Test Channel:	2412	Test Engineer:	Chuang Li
Remark:	The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.		

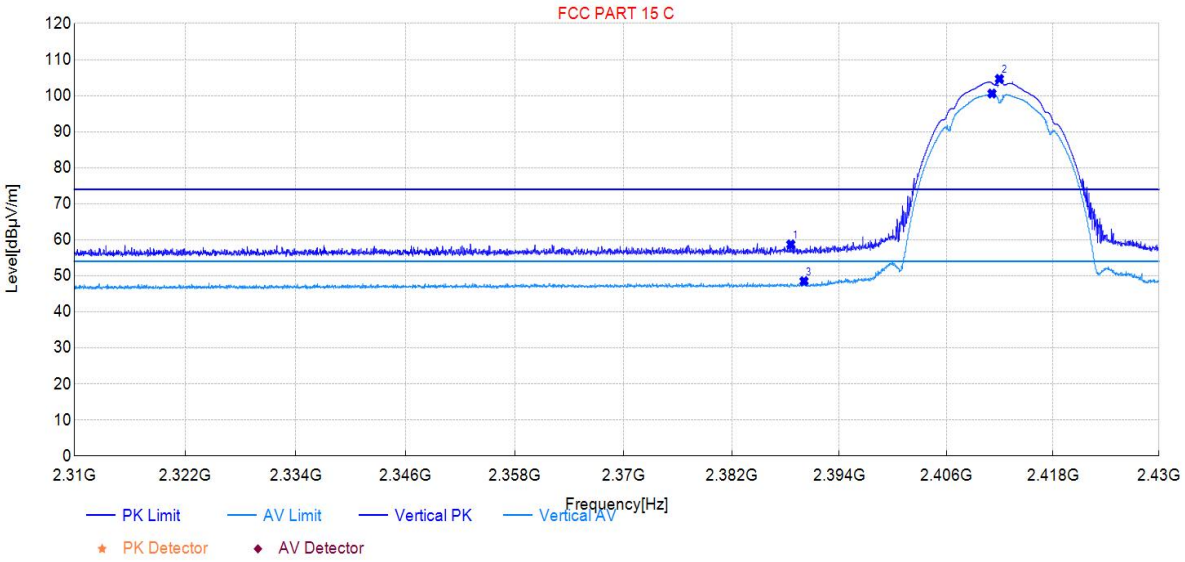
Test Graph



Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
2389.28	58.90	36.09	74.00	15.10	150	150	Peak	Horizontal
2411.88	103.81	36.18	74.00	-29.81	150	128	Peak	Horizontal
2388.83	48.10	36.09	54.00	5.90	150	302	Average	Horizontal
2411.04	100.18	36.18	54.00	-46.18	150	128	Average	Horizontal

Test Mode:	802.11b	Test Date:	2024-11-10
Test Channel:	2412	Test Engineer:	Chuang Li
Remark:	The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.		

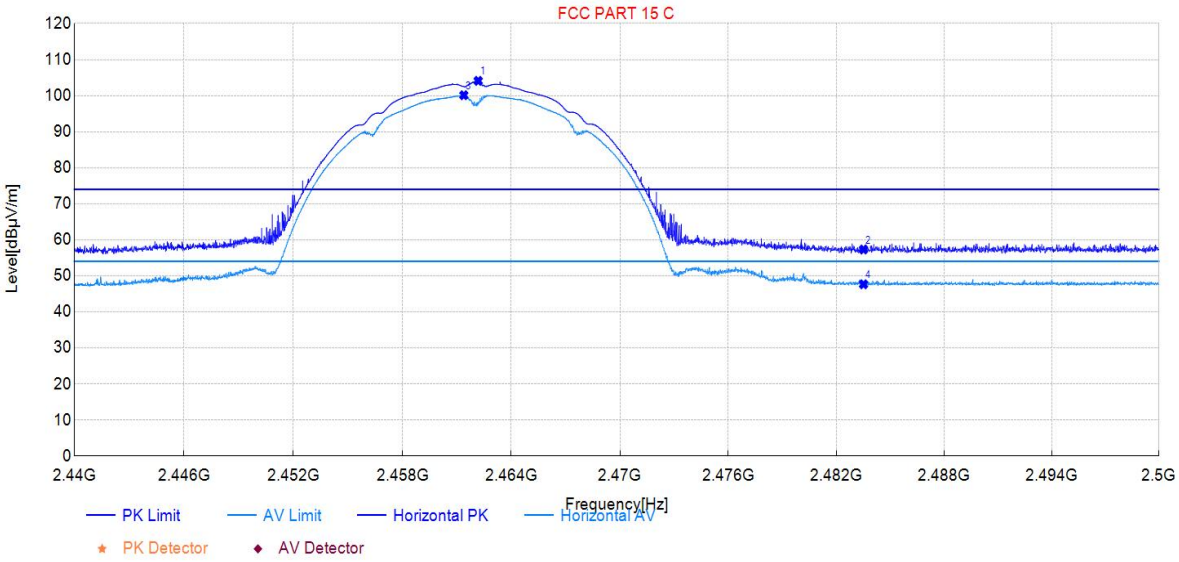
Test Graph



Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
2388.59	58.72	35.95	74.00	15.28	150	122	Peak	Vertical
2411.97	104.66	36.00	74.00	-30.66	150	16	Peak	Vertical
2390.06	48.53	35.95	54.00	5.47	150	105	Average	Vertical
2411.13	100.59	36.00	54.00	-46.59	150	16	Average	Vertical

Test Mode:	802.11b	Test Date:	2024-11-10
Test Channel:	2462	Test Engineer:	Chuang Li
Remark:	The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.		

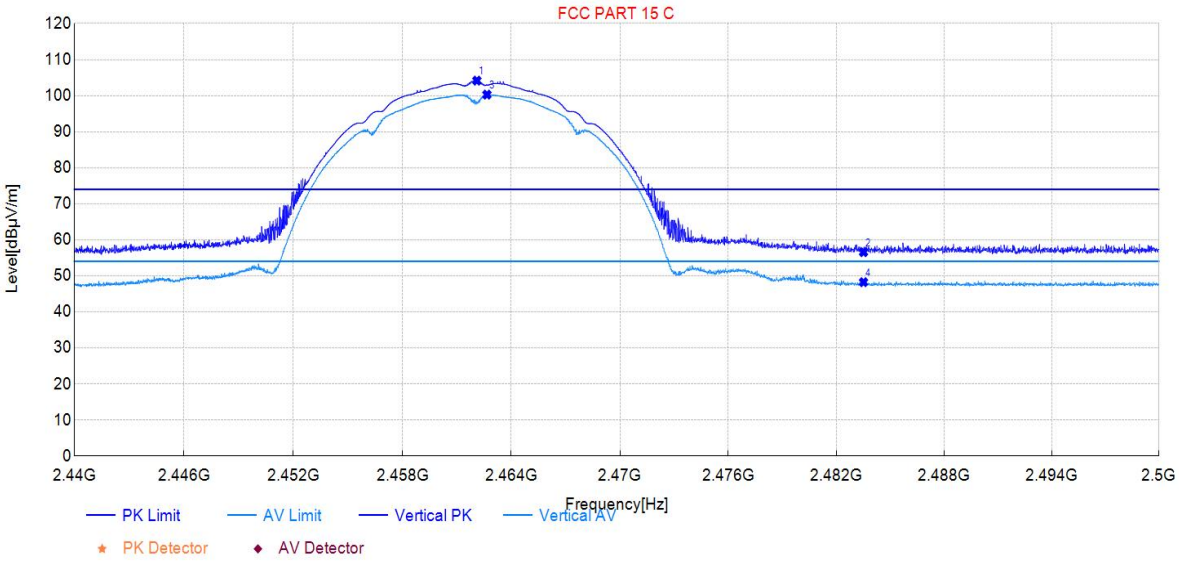
Test Graph



Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
2462.18	104.11	36.31	74.00	-30.11	150	336	Peak	Horizontal
2483.51	57.32	36.36	74.00	16.68	150	192	Peak	Horizontal
2461.38	100.13	36.31	54.00	-46.13	150	336	Average	Horizontal
2483.51	47.66	36.36	54.00	6.34	150	247	Average	Horizontal

Test Mode:	802.11b	Test Date:	2024-11-10
Test Channel:	2462	Test Engineer:	Chuang Li
Remark:	The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.		

Test Graph

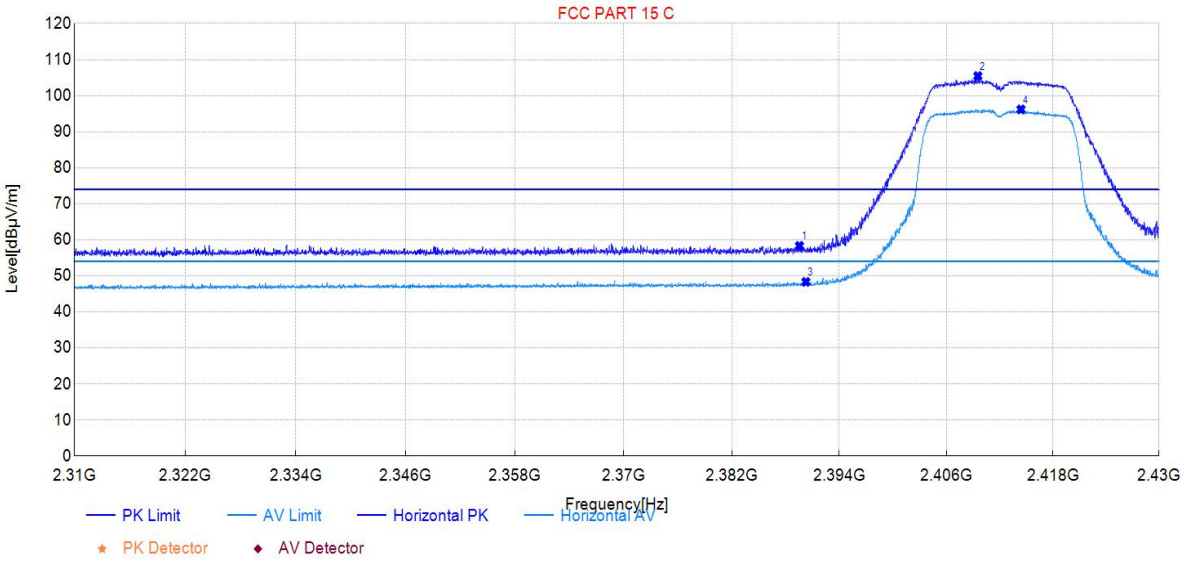


Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
2462.10	104.17	36.06	74.00	-30.17	150	54	Peak	Vertical
2483.51	56.58	36.08	74.00	17.42	150	187	Peak	Vertical
2462.66	100.29	36.06	54.00	-46.29	150	49	Average	Vertical
2483.51	48.24	36.08	54.00	5.76	150	137	Average	Vertical

802.11g

Test Mode:	802.11g	Test Date:	2024-11-10
Test Channel:	2412	Test Engineer:	Chuang Li
Remark:	The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.		

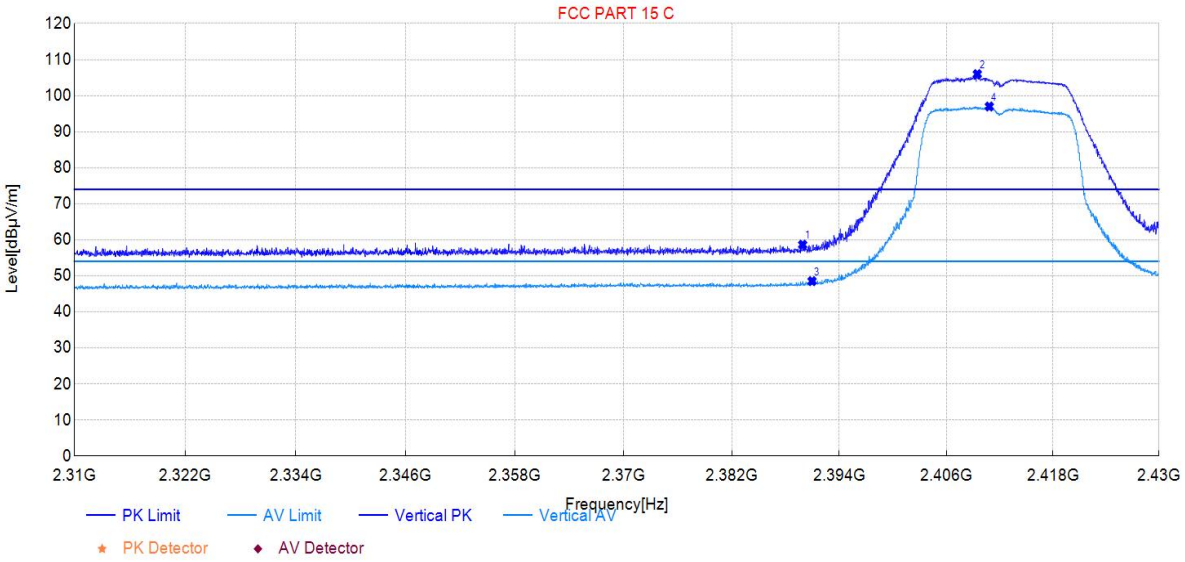
Test Graph



Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
2389.55	58.32	36.09	74.00	15.68	150	151	Peak	Horizontal
2409.53	105.45	36.17	74.00	-31.45	150	129	Peak	Horizontal
2390.27	48.33	36.10	54.00	5.67	150	318	Average	Horizontal
2414.40	96.19	36.18	54.00	-42.19	150	133	Average	Horizontal

Test Mode:	802.11g	Test Date:	2024-11-10
Test Channel:	2412	Test Engineer:	Chuang Li
Remark:	The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.		

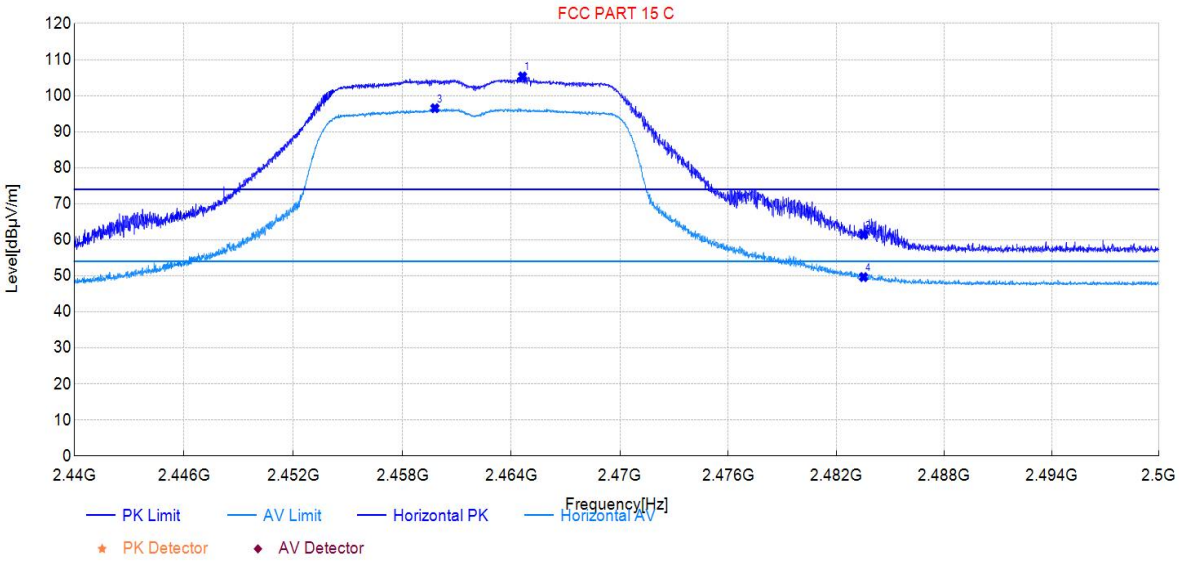
Test Graph



Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
2389.91	58.64	35.95	74.00	15.36	150	91	Peak	Vertical
2409.47	105.99	36.00	74.00	-31.99	150	29	Peak	Vertical
2390.96	48.54	35.96	54.00	5.46	150	25	Average	Vertical
2410.83	96.99	36.00	54.00	-42.99	150	16	Average	Vertical

Test Mode:	802.11g	Test Date:	2024-11-10
Test Channel:	2462	Test Engineer:	Chuang Li
Remark:	The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.		

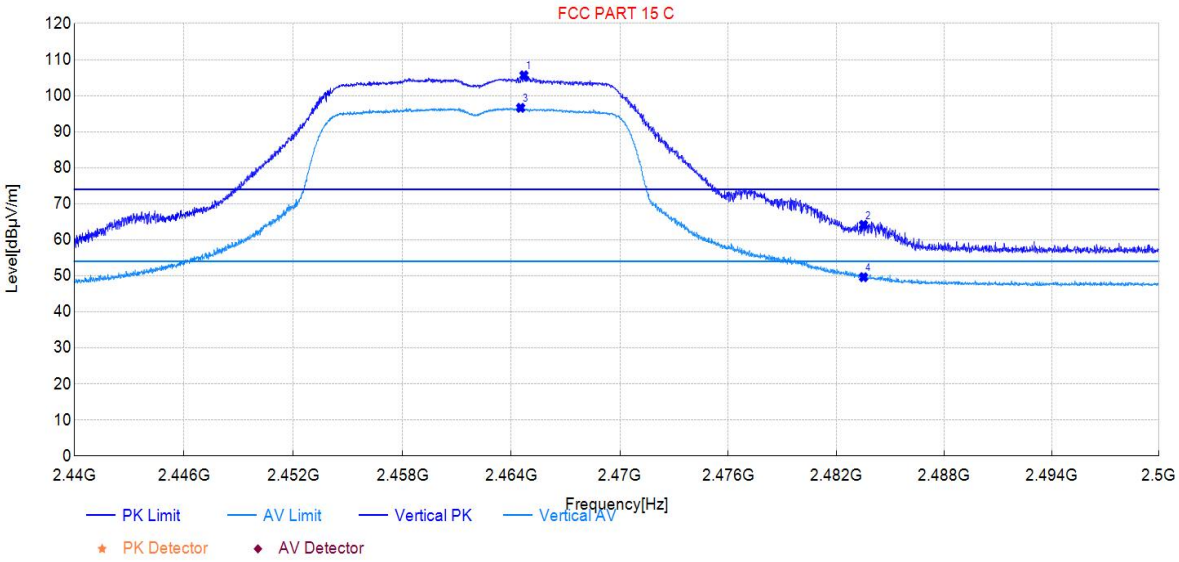
Test Graph



Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
2464.62	105.35	36.32	74.00	-31.35	150	331	Peak	Horizontal
2483.51	61.42	36.36	74.00	12.58	150	133	Peak	Horizontal
2459.79	96.52	36.30	54.00	-42.52	150	334	Average	Horizontal
2483.51	49.66	36.36	54.00	4.34	150	334	Average	Horizontal

Test Mode:	802.11g	Test Date:	2024-11-10
Test Channel:	2462	Test Engineer:	Chuang Li
Remark:	The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.		

Test Graph

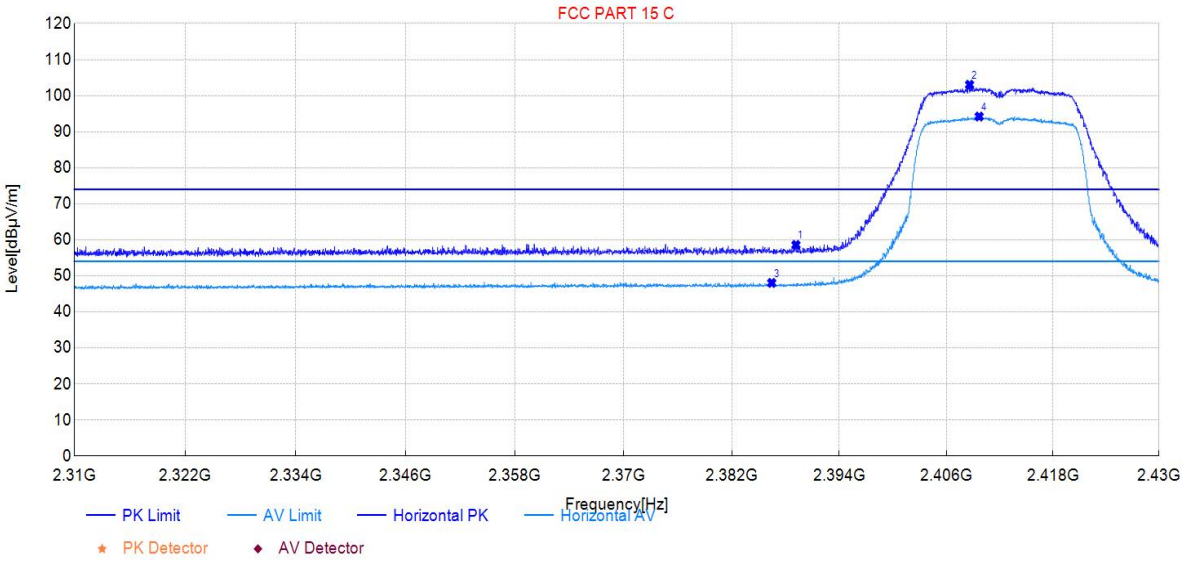


Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
2464.70	105.65	36.06	74.00	-31.65	150	54	Peak	Vertical
2483.51	64.15	36.08	74.00	9.85	150	54	Peak	Vertical
2464.52	96.63	36.06	54.00	-42.63	150	54	Average	Vertical
2483.51	49.63	36.08	54.00	4.37	150	360	Average	Vertical

802.11n20SISO

Test Mode:	802.11n20SISO	Test Date:	2024-11-10
Test Channel:	2412	Test Engineer:	Chuang Li
Remark:	The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.		

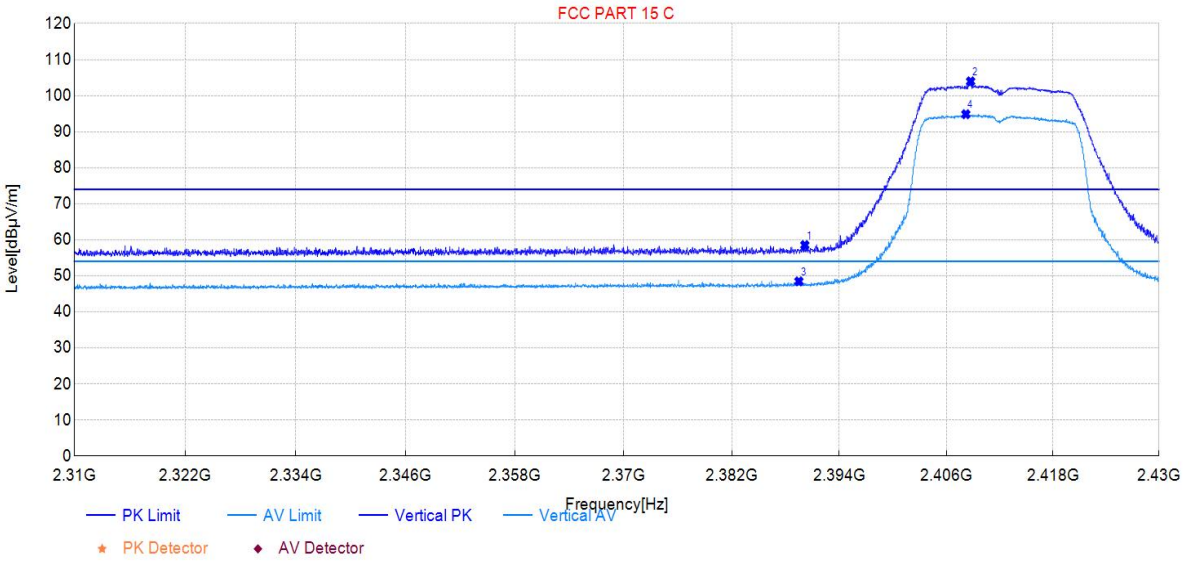
Test Graph



Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
2389.16	58.58	36.09	74.00	15.42	150	281	Peak	Horizontal
2408.60	103.04	36.17	74.00	-29.04	150	125	Peak	Horizontal
2386.46	48.05	36.08	54.00	5.95	150	315	Average	Horizontal
2409.68	94.21	36.17	54.00	-40.21	150	129	Average	Horizontal

Test Mode:	802.11n20SISO	Test Date:	2024-11-10
Test Channel:	2412	Test Engineer:	Chuang Li
Remark:	The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.		

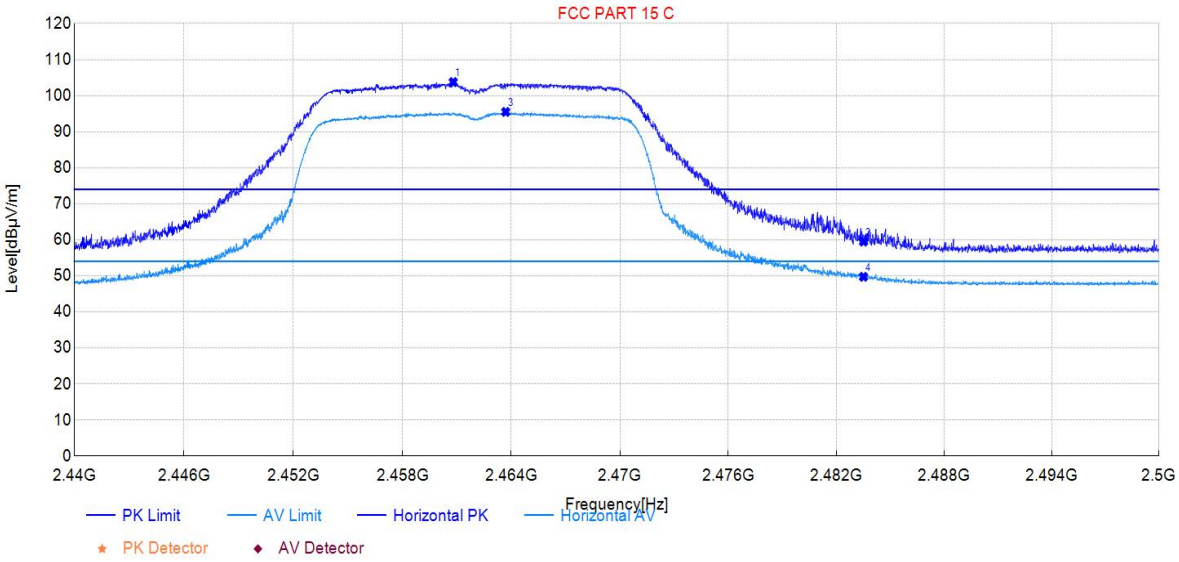
Test Graph



Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
2390.15	58.54	35.95	74.00	15.46	150	353	Peak	Vertical
2408.72	103.97	36.00	74.00	-29.97	150	15	Peak	Vertical
2389.49	48.47	35.95	54.00	5.53	150	50	Average	Vertical
2408.18	94.85	36.00	54.00	-40.85	150	15	Average	Vertical

Test Mode:	802.11n20SISO	Test Date:	2024-11-10
Test Channel:	2462	Test Engineer:	Chuang Li
Remark:	The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.		

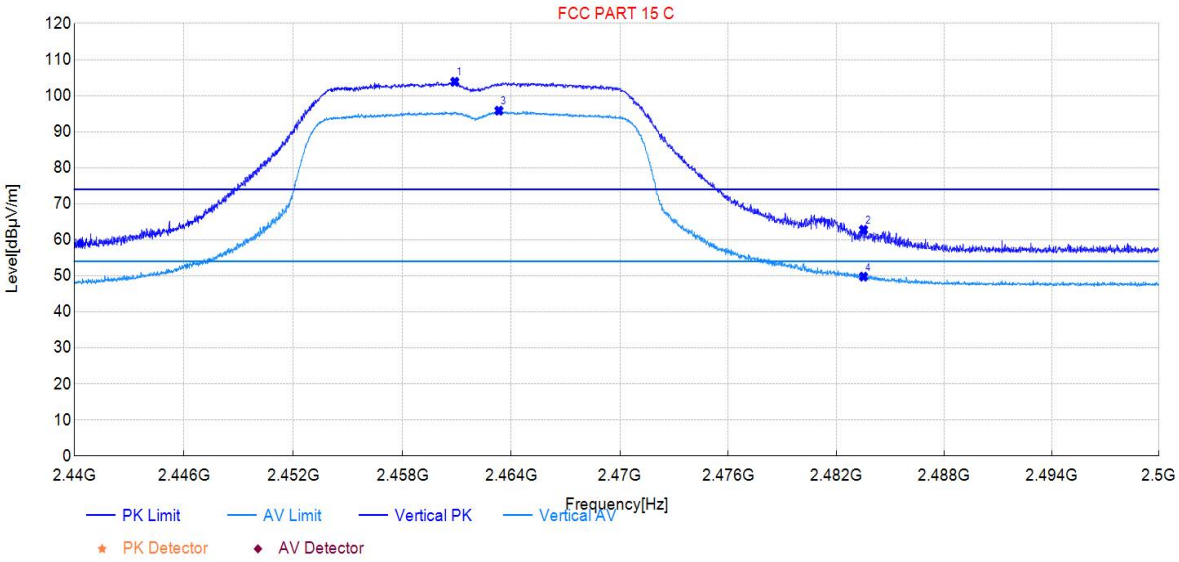
Test Graph



Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
2460.80	103.78	36.31	74.00	-29.78	150	334	Peak	Horizontal
2483.51	59.50	36.36	74.00	14.50	150	323	Peak	Horizontal
2463.69	95.49	36.31	54.00	-41.49	150	334	Average	Horizontal
2483.51	49.74	36.36	54.00	4.26	150	334	Average	Horizontal

Test Mode:	802.11n20SISO	Test Date:	2024-11-10
Test Channel:	2462	Test Engineer:	Chuang Li
Remark:	The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.		

Test Graph



Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
2460.89	103.86	36.06	74.00	-29.86	150	54	Peak	Vertical
2483.51	62.78	36.08	74.00	11.22	150	131	Peak	Vertical
2463.32	95.84	36.06	54.00	-41.84	150	50	Average	Vertical
2483.51	49.78	36.08	54.00	4.22	150	360	Average	Vertical

7.8. AC Conducted Emissions Measurement

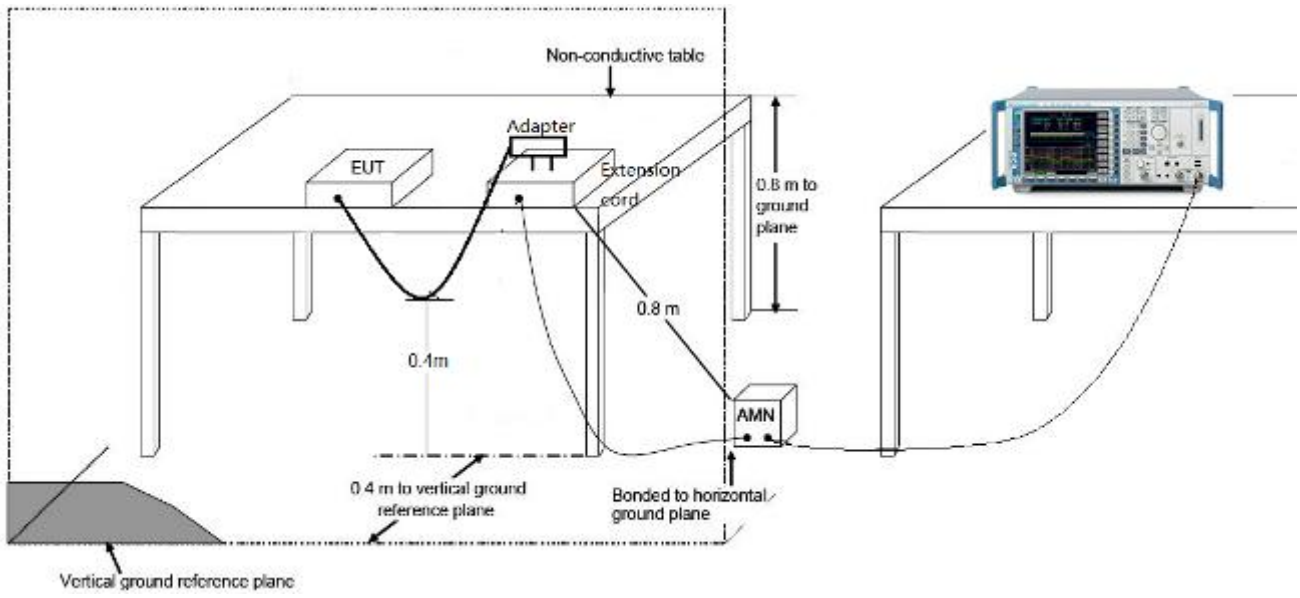
7.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 – 46
0.50 - 5.0	56	46
5.0 - 30	60	50

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

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

7.8.2. Test Setup



7.8.3. Test Result

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

8. CONCLUSION

The data collected relate only the item(s) tested and show that the **2.4GHz Wi-Fi/BLE Module (Model: EMC3183-E)** is in compliance with Part 15C of the FCC Rules.

The End