Shenzhen CTL Testing Technology Co., Ltd.
Tel: +86-755-89486194 E-mail: ctl@ctl-lab.com

TEST REPORT

FCC PART 15.247

Report Reference No. ..... : **CTL2104143031-WF**

Compiled by: (position+printed name+signature)	Happy Guo (File administrators)	Happy Guo
Tested by: (position+printed name+signature)	Gary Gao (Test Engineer)	Gary Gao
Approved by: (position+printed name+signature)	Ivan Xie (Manager)	Ivan Xie

Product Name ..... : WiFi module

Model/Type reference ..... : LF-WM03

List Model(s)..... : N/A

Trade Mark..... : LeapFive

FCC ID..... : 2AZXW- LF-WM03

Applicant's name ..... : **Guangdong Yuefang Technology Co. Ltd**

Address of applicant ..... : 13/F,#9-B1, Shenzhen Bay Eco-Technology Park, Nanshan Disc, Shenzhen, Guangdong Province, China

Test Firm..... : **Shenzhen CTL Testing Technology Co., Ltd.**

Address of Test Firm ..... : Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

Test specification..... :

Standard ..... : **47 CFR FCC Part 15 Subpart C 15.247**

TRF Originator ..... : Shenzhen CTL Testing Technology Co., Ltd.

Master TRF..... : Dated 2011-01

Date of receipt of test item ..... : Apr. 28, 2021

Date of sampling..... : Apr. 28, 2021

Date of Test Date..... : Apr. 28, 2021 – May. 10, 2021

Date of Issue ..... : May. 11, 2021

Result..... : **Pass**

Shenzhen CTL Testing Technology Co., Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen CTL Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen CTL Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

TEST REPORT

Test Report No. : CTL2104143031-WF	May. 11, 2021 Date of issue

Equipment under Test	:	WiFi module
Sample No.		CTL210414303-1-S001
Model /Type	:	LF-WM03
Listed Models	:	N/A
Applicant	:	**Guangdong Yuefang Technology Co. Ltd**
Address	:	13/F,#9-B1, Shenzhen Bay Eco-Technology Park, Nanshan Disc, Shenzhen, Guangdong Province, China
Manufacturer	:	**Huizhou GaoshengdaTechnology Co. Ltd**
Address	:	No.2, Jin-da Road, Huinan High-tech Industrial Park, Hui-ao Avenue, Huizhou City, Guangdong Province, China

Test result	**Pass ***

* In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

** Modified History **

Revisions	Description	Issued Data	Report No.	Remark
Version 1.0	Initial Test Report Release	2021-05-11	CTL2104143031-WF	Tracy Qi

Table of Contents Page

1. SUMMARY 5

1.1. TEST STANDARDS 5
1.2. TEST DESCRIPTION 5
1.3. TEST FACILITY 6
1.4. STATEMENT OF THE MEASUREMENT UNCERTAINTY 6

2. GENERAL INFORMATION 8

2.1. ENVIRONMENTAL CONDITIONS 8
2.2. GENERAL DESCRIPTION OF EUT 8
2.3. DESCRIPTION OF TEST MODES AND TEST FREQUENCY 9
2.4. EQUIPMENTS USED DURING THE TEST 11
2.5. RELATED SUBMITTAL(S) / GRANT (S) 11
2.6. MODIFICATIONS 11

3. TEST CONDITIONS AND RESULTS 12

3.1. CONDUCTED EMISSIONS TEST 12
3.2. RADIATED EMISSIONS AND BAND EDGE 15
3.3. MAXIMUM CONDUCTED OUTPUT POWER 23
3.4. POWER SPECTRAL DENSITY 24
3.5. 6DB BANDWIDTH 25
3.6. OCCUPIED BANDWIDTH 26
3.7. OUT-OF-BAND EMISSIONS 27
3.8. ANTENNA REQUIREMENT 28

4. TEST SETUP PHOTOS OF THE EUT 29

5. PHOTOS OF THE EUT 30

1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ANSI C63.10: 2013: American National Standard for Testing Unlicensed Wireless Devices

KDB558074 D01 15.247 Meas Guidance v05r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

1.2. Test Description

FCC PART 15.247		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2)	6dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Conducted Output Power	PASS
FCC Part 15.247(e)	Power Spectral Density	PASS
FCC Part 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9618B

CAB identifier: CN0041

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9618B on Jan. 22, 2019.

FCC-Registration No.: 399832

Designation No.: CN1216

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 399832, December 08, 2017.

1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2. GENERAL INFORMATION

2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2. General Description of EUT

Product Name:	WiFi module
Model/Type reference:	LF-WM03
Power supply:	DC 3.3V
Hardware Version:	V1.0
Software Version:	V1.0
Test Method:	Conducted, Radiated
2.4G WIFI :	
Supported type:	802.11b/802.11g/802.11n(H20)
Modulation:	802.11b: DSSS 802.11g/802.11n(H20): OFDM
Operation frequency:	802.11b/802.11g/802.11n(H20): 2412MHz~2462MHz
Channel number:	802.11b/802.11g/802.11n(H20): 11
Channel separation:	5MHz
Antenna type:	PCB Antenna
Antenna gain:	1.5dBi

Note: For more details, please refer to the user’s manual of the EUT.

2.3. Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing.

There are 11 channels provided to the EUT and Channel 01/06/11 were selected for WIFI test.

Operation Frequency WIFI：

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	**2412**	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	**11**	**2462**
5	2432		
6	**2437**		
7	2442		

Note: The line display in grey were the channel selected for testing

Power Setting of Test Software:

Software Name	SecureCRT		
Frequency(MHz)	**2412**	**2437**	**2462**
IEEE 802.11b Setting	**13**	**13**	**13**
IEEE 802.11g Setting	**13**	**13**	**13**
IEEE 802.11n HT20 Setting	**13**	**13**	**13**

BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED：

For AC Conducted Emission Mode

For Radiated Test Cases

For Conducted Test Cases

Data Rate Used:

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
Maximum Conducted Output Power Power Spectral Density 6dB Bandwidth Spurious RF conducted emission Radiated Emission 9kHz~1GHz& Radiated Emission 1GHz~10th Harmonic	11b/DSSS	1 Mbps	1/6/11
	11g/OFDM	6 Mbps	1/6/11
	11n(20MHz)/OFDM	6.5Mbps	1/6/11
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	6.5Mbps	1/11

2.4. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ESH2-Z5	860014/010	2020/06/21	2021/06/21
Double cone logarithmic antenna	Schwarzbeck	VULB 9168	824	2020/06/24	2021/06/23
Horn Antenna	Ocean Microwave	OBH100400	26999002	2020/11/29	2021/11/28
EMI Test Receiver	R&S	ESCI	1166.5950.03	2020/06/22	2021/06/21
Spectrum Analyzer	Agilent	E4407B	MY41440676	2020/06/21	2021/06/20
Spectrum Analyzer	Agilent	N9020A	US46220290	2020/06/21	2021/06/20
Spectrum Analyzer	Keysight	N9020A	MY53420874	2020/06/21	2021/06/20
Controller	EM Electronics	EM 1000	060859	2020/06/22	2021/06/21
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2020/06/24	2021/06/23
Active Loop Antenna	Da Ze	ZN30900A	/	2020/06/24	2021/06/23
Amplifier	Agilent	8449B	3008A02306	2020/06/22	2021/06/21
Amplifier	Agilent	8447D	2944A10176	2020/06/22	2021/06/21
Amplifier	Brief&Smart	LNA-4018	2104197	2020/06/21	2021/06/20
Temperature/Humidity Meter	Gangxing	CTH-608	02	2020/06/23	2021/06/22
Power Sensor	Agilent	U2021XA	MY55130004	2020/06/21	2021/06/20
Power Sensor	Agilent	U2021XA	MY55130006	2020/06/21	2021/06/20
Power Sensor	Agilent	U2021XA	MY54510008	2020/06/21	2021/06/20
Power Sensor	Agilent	U2021XA	MY55060003	2020/06/21	2021/06/20
Spectrum Analyzer	RS	FSP	1164.4391.38	2020/06/21	2021/06/20

Test Software	
Name of Software	Version
TST-PASS:	1.0.2
ES-K1(Below 1GHz):	V1.71
e3(Above 1GHz):	6.111221a

The calibration interval was one year

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

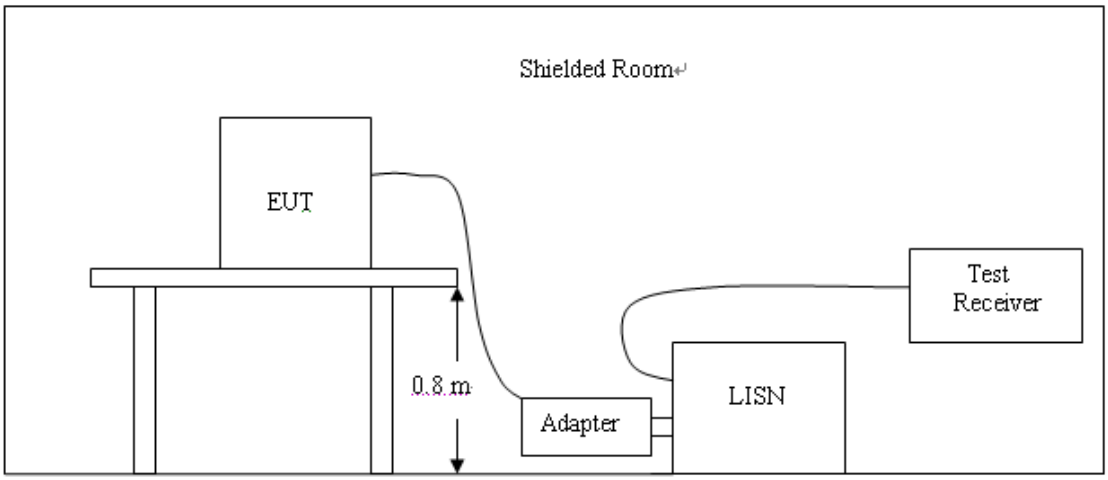
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

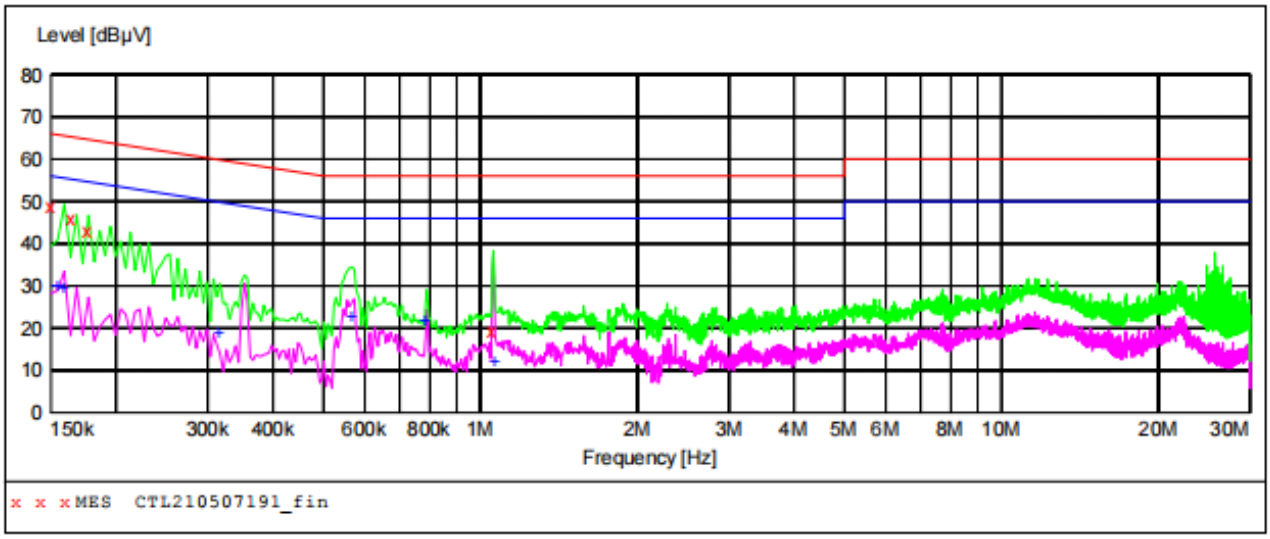
1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

Remark:802.11b/802.11g/802.11n(H20) mode all have been tested, only worse case of 802.11b High Channel was reported.

Test Mode	WIFI	Line:	L

SCAN TABLE: "Voltage (9K-30M)FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL210507191_fin"

5/7/2021 6:25PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	49.10	10.0	66	16.9	QP	L1	GND
0.163500	46.10	10.0	65	19.2	QP	L1	GND
0.177000	43.20	10.0	65	21.4	QP	L1	GND
1.054500	19.20	10.2	56	36.8	QP	L1	GND

MEASUREMENT RESULT: "CTL210507191_fin2"

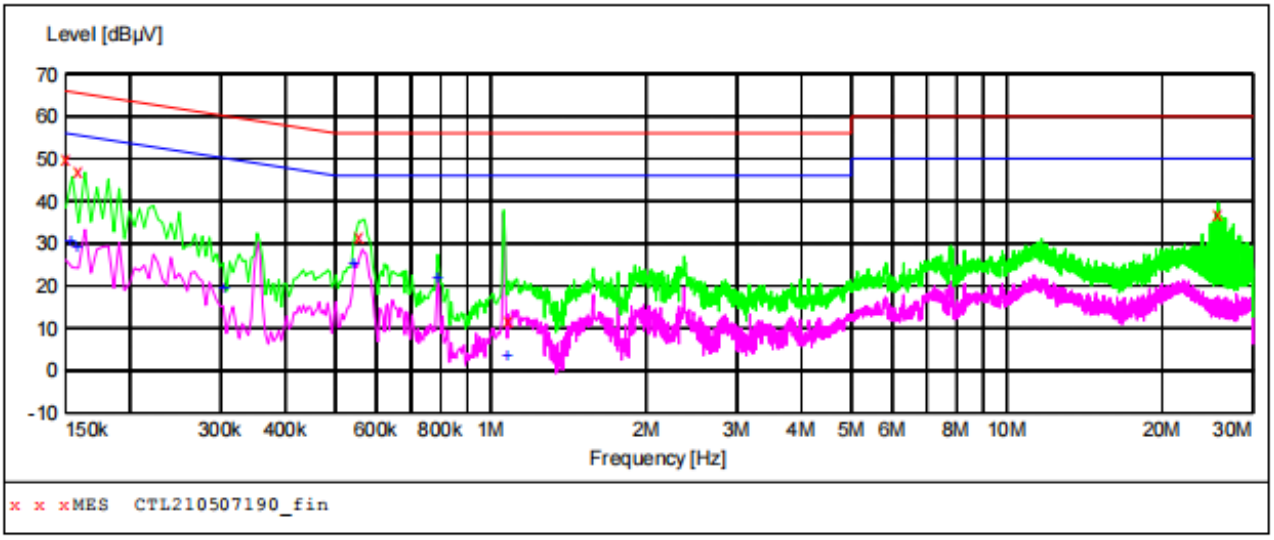
5/7/2021 6:25PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.154500	30.10	10.0	56	25.7	AV	L1	GND
0.159000	29.50	10.0	56	26.0	AV	L1	GND
0.316500	19.00	10.0	50	30.8	AV	L1	GND
0.568500	23.00	10.1	46	23.0	AV	L1	GND
0.789000	22.00	10.1	46	24.0	AV	L1	GND
1.068000	12.10	10.2	46	33.9	AV	L1	GND

Test Mode	WIFI	Line:	N

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL210507190_fin"

5/7/2021 6:22PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	50.20	10.0	66	15.8	QP	N	GND
0.159000	47.30	10.0	66	18.2	QP	N	GND
0.555000	31.60	10.1	56	24.4	QP	N	GND
1.086000	11.90	10.2	56	44.1	QP	N	GND
25.692000	36.80	11.5	60	23.2	QP	N	GND

MEASUREMENT RESULT: "CTL210507190_fin2"

5/7/2021 6:22PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.154500	30.90	10.0	56	24.9	AV	N	GND
0.159000	29.10	10.0	56	26.4	AV	N	GND
0.307500	19.40	10.0	50	30.6	AV	N	GND
0.546000	25.20	10.1	46	20.8	AV	N	GND
0.789000	21.80	10.1	46	24.2	AV	N	GND
1.077000	3.60	10.2	46	42.4	AV	N	GND

3.2. Radiated Emissions and Band Edge

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

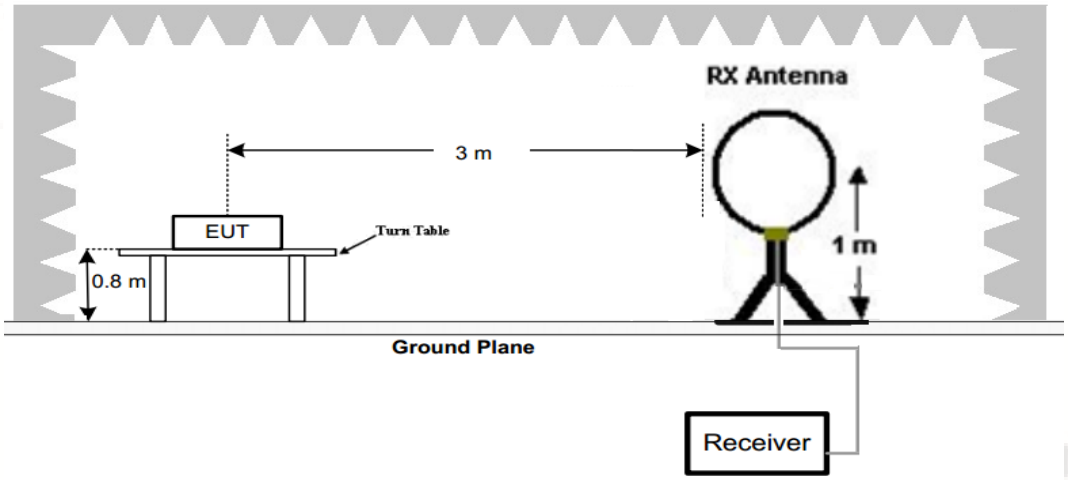
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

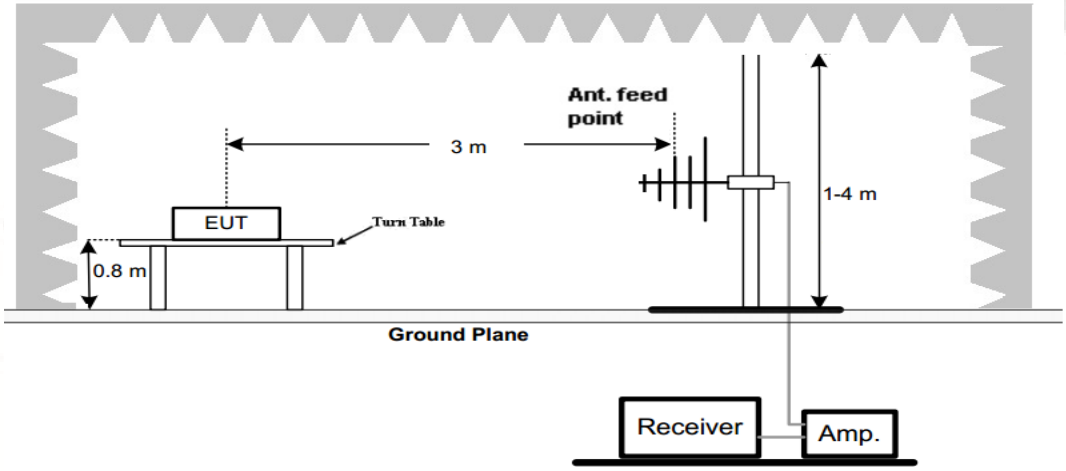
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

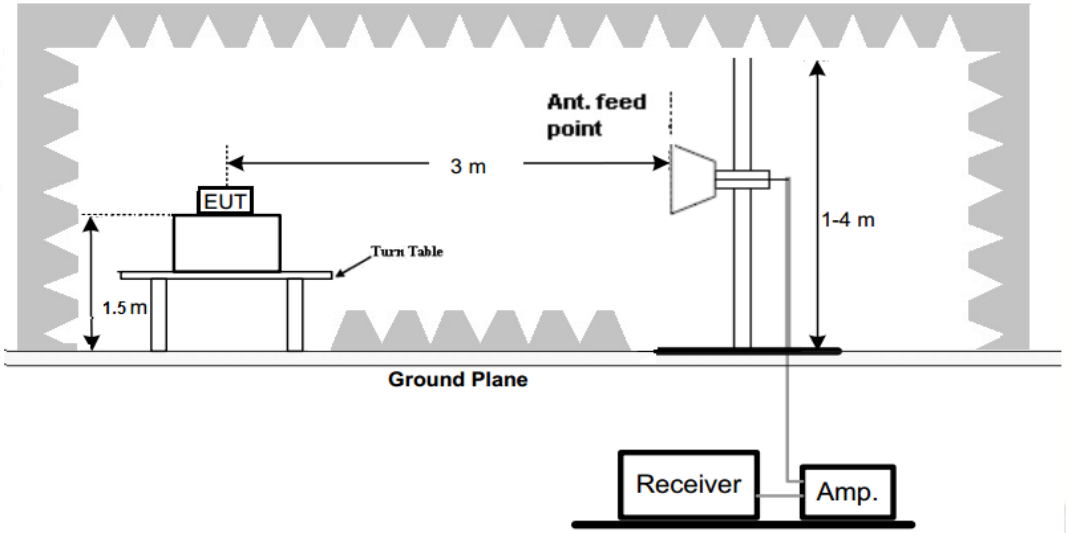
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

TEST RESULTS

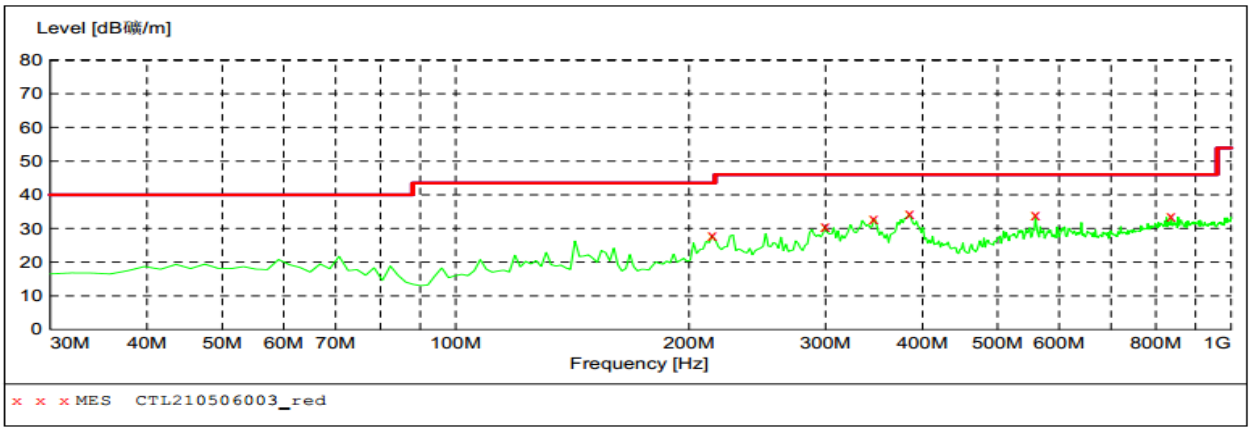
Remark:
1. All three channels (lowest/middle/highest) of each mode were measured below 1GHz and recorded worst case at 802.11b low channel.
2. All three channels (lowest/middle/highest) of each mode were measured above1GHz and recorded worst case at 802.11b mode.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

For 30MHz-1GHz

Test mode:	WIFI	Polarization:	Horizontal

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	VULB9168 20200407



MEASUREMENT RESULT: "CTL210506003_red"

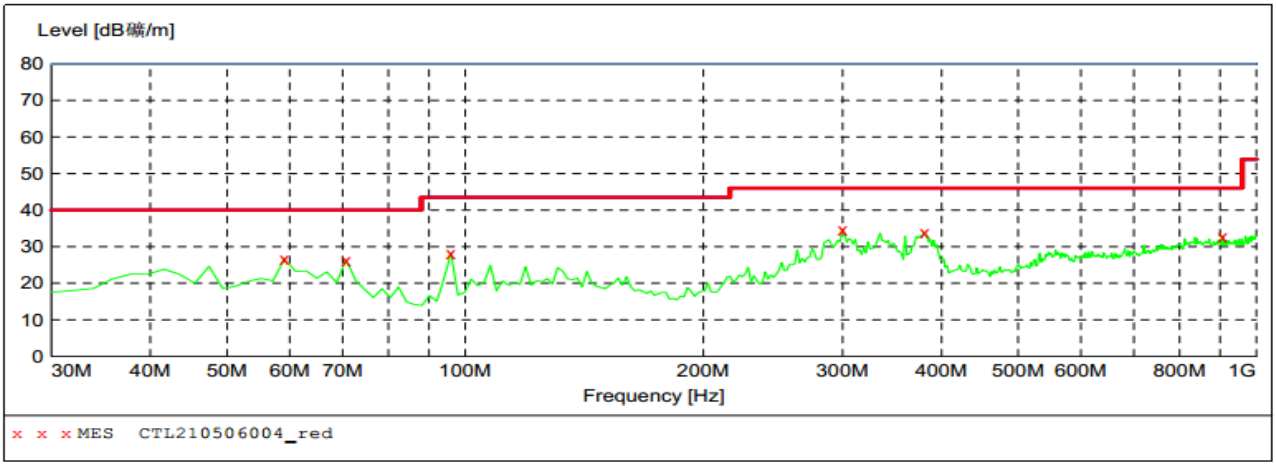
2021-5-6 18:49

Frequency MHz	Level dB磺/m	Transd dB	Limit dB磺/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
214.300000	27.90	12.7	43.5	15.6	---	70.0	35.45	HORIZONTAL
299.660000	30.60	14.9	46.0	15.4	---	90.2	45.42	HORIZONTAL
346.220000	32.80	16.0	46.0	13.2	---	125.4	125.00	HORIZONTAL
385.020000	34.20	17.3	46.0	11.8	---	142.8	156.00	HORIZONTAL
559.620000	33.90	20.6	46.0	12.1	---	245.1	245.05	HORIZONTAL
837.040000	33.60	26.2	46.0	12.4	---	311.4	14.10	HORIZONTAL

Test mode:	WIFI	Polarization:	Vertical

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	VULB9168 20200407



MEASUREMENT RESULT: "CTL210506004_red"

2021-5-6 18:51

Frequency MHz	Level dB磺/m	Transd dB	Limit dB磺/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
59.100000	26.70	14.6	40.0	13.3	---	55.0	55.45	VERTICAL
70.740000	26.40	12.0	40.0	13.6	---	45.2	75.42	VERTICAL
95.960000	28.30	11.6	43.5	15.2	---	126.4	186.00	VERTICAL
299.660000	34.60	14.9	46.0	11.4	---	175.8	256.00	VERTICAL
381.140000	33.70	17.1	46.0	12.3	---	227.1	295.05	VERTICAL
906.880000	32.80	26.5	46.0	13.2	---	341.4	14.50	VERTICAL

For 1GHz to 25GHz

802.11b Mode (above 1GHz)

Note: 802.11b/802.11g/802.11n (H20) all have been tested, only worse case 802.11b is reported

Frequency(MHz):			2412		Polarity:			HORIZONTAL			
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)	Height (cm)	Azimuth (deg)
4824.00	57.16	PK	74	16.84	52.61	33.52	6.92	35.89	4.55	186	33
4824.00	50.44	AV	54	3.56	45.89	33.52	6.92	35.89	4.55	111	195
5170.50	48.70	PK	74	25.3	41.5	34.38	7.10	34.28	7.20	254	110
5170.50	--	AV	54	--	--	--	--	--	--	--	--
7236.00	48.95	PK	74	25.05	37.68	37.1	9.19	35.02	11.27	356	163
7236.00	--	AV	54	--	--	--	--	--	--		--

Frequency(MHz):			2412		Polarity:			VERTICAL			
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)	Height (cm)	Azimuth (deg)
4824.00	58.19	PK	74	15.81	53.64	33.52	6.92	35.89	4.55	178	66
4824.00	51.25	AV	54	2.75	46.7	33.52	6.92	35.89	4.55	321	50
5170.50	47.62	PK	74	26.38	40.42	34.38	7.10	34.28	7.20	117	32
5170.50	--	AV	54	--	--	--	--	--	--	--	--
7236.00	57.74	PK	74	16.26	46.47	37.1	9.19	35.02	11.27	309	219
7236.00	--	AV	54	--	--	--	--	--	--		--

Frequency(MHz):			2437		Polarity:			HORIZONTAL			
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)	Height (cm)	Azimuth (deg)
4874.00	59.74	PK	74	14.26	53.5	33.59	6.95	34.3	6.24	239	201
4874.00	52.92	AV	54	1.08	46.68	33.59	6.95	34.3	6.24	302	55
5210.50	48.18	PK	74	25.82	40.58	34.56	7.15	34.11	7.60	207	130
5210.50	--	AV	54	--	--	--	--	--	--	--	--
7311.00	47.26	PK	74	26.74	35.60	37.44	9.22	35	11.66	162	27
7311.00	--	AV	54	--	--	--	--	--	--		--

Frequency(MHz):			2437		Polarity:			VERTICAL			
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)	Height (cm)	Azimuth (deg)
4874.00	58.36	PK	74	15.64	52.02	33.59	6.95	34.2	6.34	190	237
4874.00	51.71	AV	54	2.29	45.37	33.59	6.95	34.2	6.34	195	175
5210.50	46.12	PK	74	27.88	39.22	34.07	7.05	34.22	6.90	131	200
5210.50	--	AV	54	--	--	--	--	--	--	--	--
7311.00	48.40	PK	74	25.6	36.74	37.44	9.22	35	11.66	300	18
7311.00	--	AV	54	--	--	--	--	--	--		--

Frequency(MHz):			2462		Polarity:			HORIZONTAL			
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)	Height (cm)	Azimuth (deg)
4924.00	58.53	PK	74	15.47	53.55	33.71	6.98	35.91	4.78	131	277
4924.00	50.36	AV	54	3.64	43.73	33.71	6.98	35.91	4.78	212	190
5160.50	49.68	PK	74	24.32	41.24	34.34	7.09	34.27	7.17	347	304
5160.50	--	AV	54	--	--	--	--	--	--	--	--
7386.00	48.15	PK	74	25.85	37.4	37.61	9.25	34.98	11.88	267	244
7386.00	--	AV	54	--	--	--	--	--	--		--

Frequency(MHz):			2462		Polarity:			VERTICAL			
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)	Height (cm)	Azimuth (deg)
4924.00	59.51	PK	74	14.49	53.17	33.71	6.98	34.2	6.34	35.91	4.78
4924.00	51.77	AV	54	2.23	45.43	33.71	6.98	34.2	6.34	35.91	4.78
5160.50	47.82	PK	74	26.18	40.92	34.34	7.09	34.22	6.90	34.27	7.17
5160.50	--	AV	54	--	--	--	--	--	--	--	--
7386.00	48.75	PK	74	25.25	37.09	37.61	9.25	35	11.66	34.98	11.88
7386.00	--	AV	54	--	--	--	--	--	--	--	--

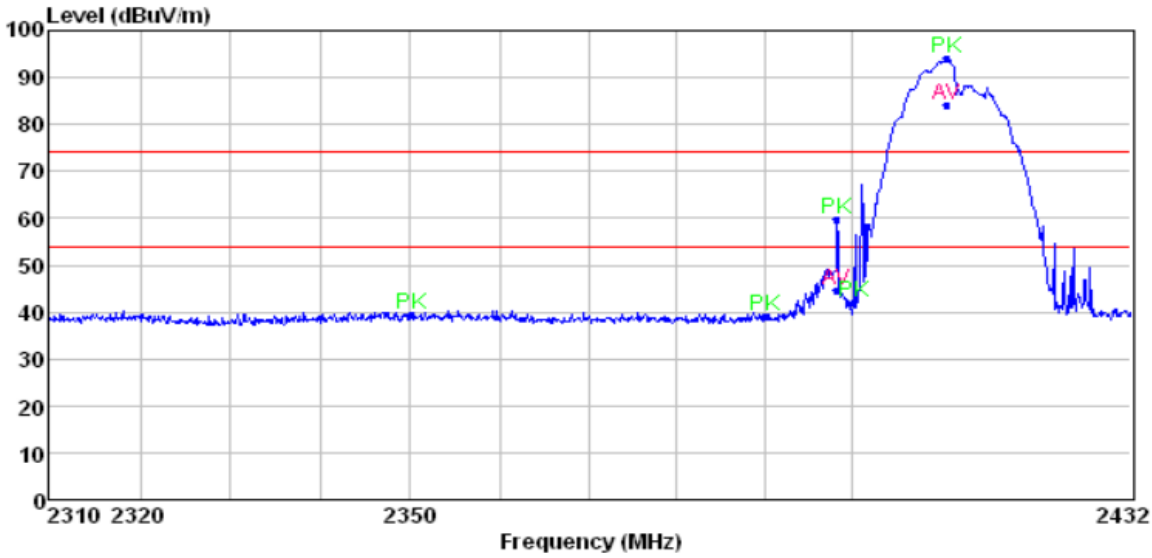
REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.
6. Other emissions are attenuated 20dB below the limits from 9 kHz to 30MHz, so it does not recorded in report.

Results of Band Edges Test (Radiated)

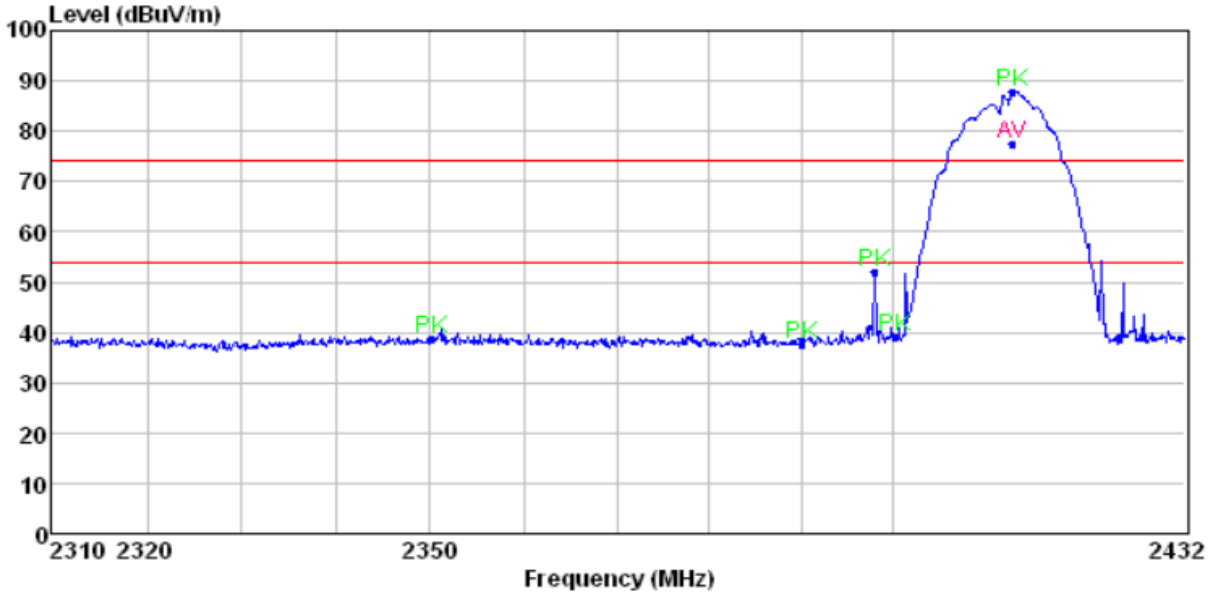
Note: *802.11b/802.11g/802.11n (H20)* all have been tested, only worse case 802.11b is reported

Test mode:	WIFI	2412MHz	Polarization:	Horizontal



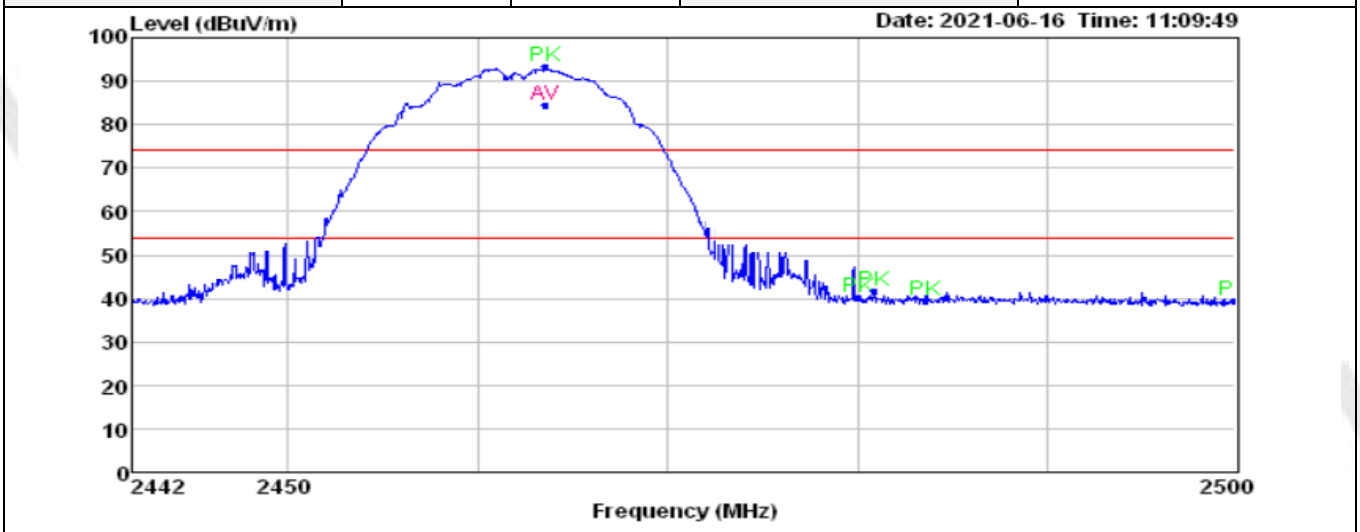
Mark	Freq MHz	RD dBuv	C.F dB	Result dBuv	Limit dBuv	Margin dB	Det.	Polarity
1	2350.05	41.05	-1.39	39.66	74.00	34.34	Peak	HORIZONTAL
2	2390.06	40.35	-1.26	39.09	74.00	34.91	Peak	HORIZONTAL
3	2398.19	45.73	-1.22	44.51	54.00	9.49	Average	HORIZONTAL
4	2398.19	61.10	-1.22	59.88	74.00	14.12	Peak	HORIZONTAL
5	2400.04	43.32	-1.21	42.11	74.00	31.89	Peak	HORIZONTAL
6	2410.69	95.21	-1.16	94.05	74.00	-20.05	Peak	HORIZONTAL
7	2410.69	85.11	-1.16	83.95	54.00	-29.95	Average	HORIZONTAL

Test mode:	WIFI	2412MHz	Polarization:	Vertical



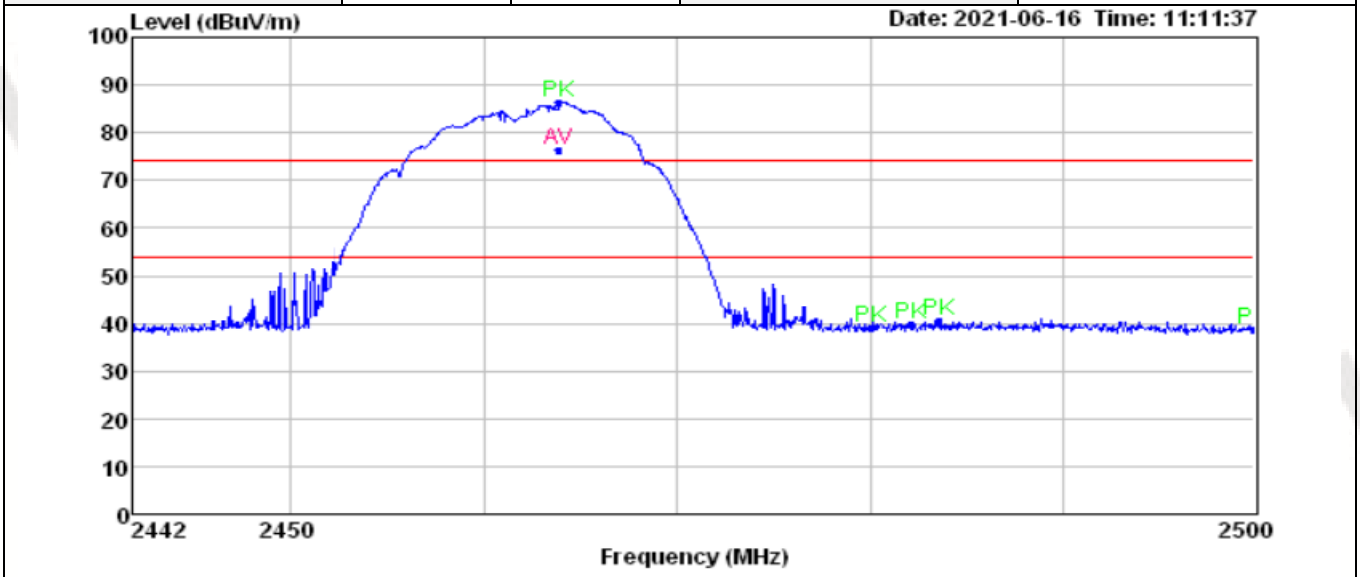
Mark	Freq MHz	RD dBuv	C.F dB	Result dBuv	Limit dBuv	Margin dB	Det.	Polarity
1	2350.05	40.66	-2.01	38.65	74.00	35.35	Peak	VERTICAL
2	2390.06	39.65	-1.85	37.80	74.00	36.20	Peak	VERTICAL
3	2397.95	53.67	-1.80	51.87	74.00	22.13	Peak	VERTICAL
4	2400.04	41.09	-1.79	39.30	74.00	34.70	Peak	VERTICAL
5	2413.05	79.34	-1.72	77.62	54.00	-23.62	Average	VERTICAL
6	2413.05	89.67	-1.72	87.95	74.00	-13.95	Peak	VERTICAL

Test mode:	WIFI	2462MHz	Polarization:	Horizontal



Mark	Freq MHz	RD dBuv	C.F dB	Result dBuv	Limit dBuv	Margin dB	Det.	Polarity
1	2463.53	94.25	-0.98	93.27	74.00	-19.27	Peak	HORIZONTAL
2	2463.53	85.35	-0.98	84.37	54.00	-30.37	Average	HORIZONTAL
3	2480.01	41.28	-0.92	40.36	74.00	33.64	Peak	HORIZONTAL
4	2480.88	42.71	-0.92	41.79	74.00	32.21	Peak	HORIZONTAL
5	2483.51	40.23	-0.92	39.31	74.00	34.69	Peak	HORIZONTAL
6	2500.00	40.36	-0.86	39.50	74.00	34.50	Peak	HORIZONTAL

Test mode:	WIFI	2462MHz	Polarization:	Vertical



Mark	Freq MHz	RD dBuv	C.F dB	Result dBuv	Limit dBuv	Margin dB	Det.	Polarity
1	2463.88	87.95	-1.51	86.44	74.00	-12.44	Peak	VERTICAL
2	2463.88	77.85	-1.51	76.34	54.00	-22.34	Average	VERTICAL
3	2480.01	40.71	-1.43	39.28	74.00	34.72	Peak	VERTICAL
4	2482.05	41.37	-1.43	39.94	74.00	34.06	Peak	VERTICAL
5	2483.51	41.88	-1.43	40.45	74.00	33.55	Peak	VERTICAL
6	2500.00	39.93	-1.36	38.57	74.00	35.43	Peak	VERTICAL

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.
6. Other emissions are attenuated 20dB below the limits from 9kHz to 30MHz, so it does not recorded in report.

3.3. Maximum Conducted Output Power

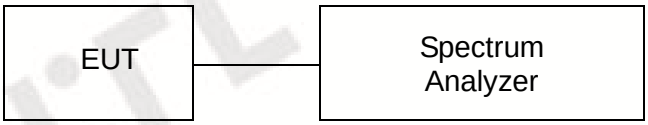
Limit

The Maximum Peak Output Power Measurement is 30dBm.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration



Test Results

See Appendix 2.

3.4. Power Spectral Density

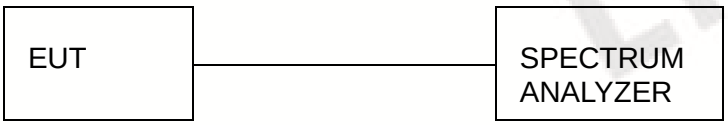
Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW ≥ 3 kHz.
3. Set the VBW ≥ 3× RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

Test Configuration



Test Results

See Appendix 3.

3.5. 6dB Bandwidth

Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

Test Configuration

Test Results

See Appendix 1.

3.6. Occupied Bandwidth

Limit

N/A

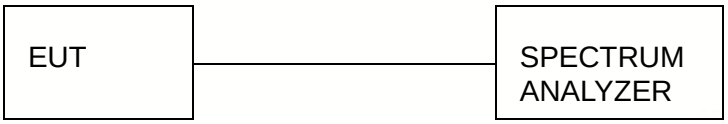
Test Procedure

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

RBW=1% to 5% of the OBW
VBW=approximately 3 X RBW
Detector=Peak
Trace Mode: Max Hold

Use the 99% power bandwidth function of the instrument to measure the Occupied Bandwidth and recoded.

Test Configuration



Test Results

See Appendix 1.

3.7. Out-of-band Emissions

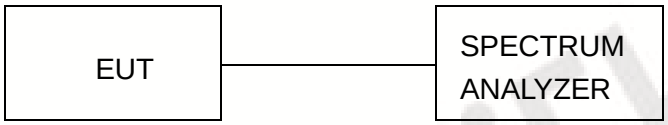
Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF con-ducted or a radiated measurement, pro-vided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter com-plies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

Test Configuration



Test Results

See Appendix 4.

3.8. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

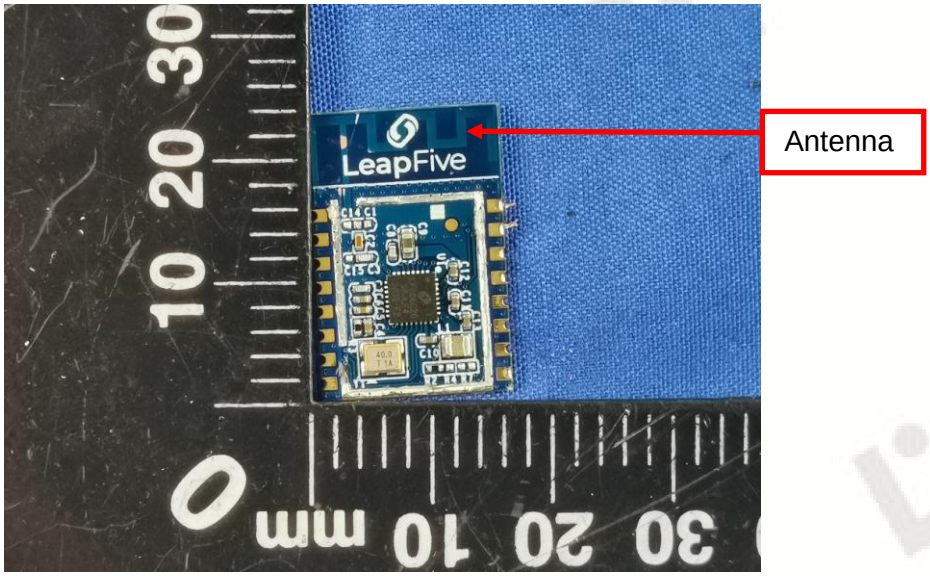
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Test Result:

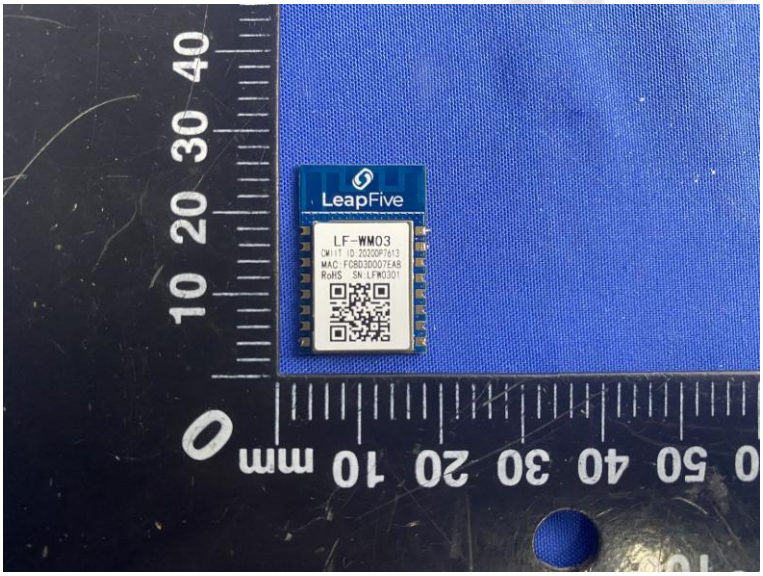
The maximum gain of antenna was 1.5dBi.

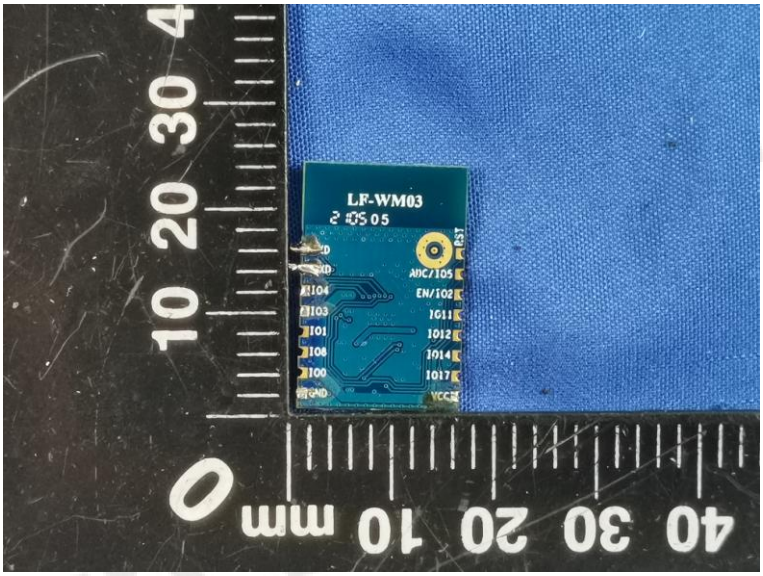


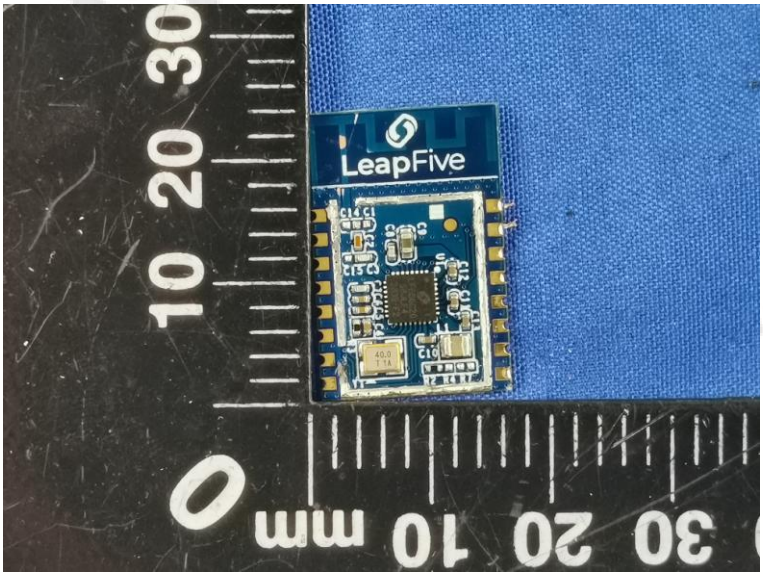
4. Test Setup Photos of the EUT

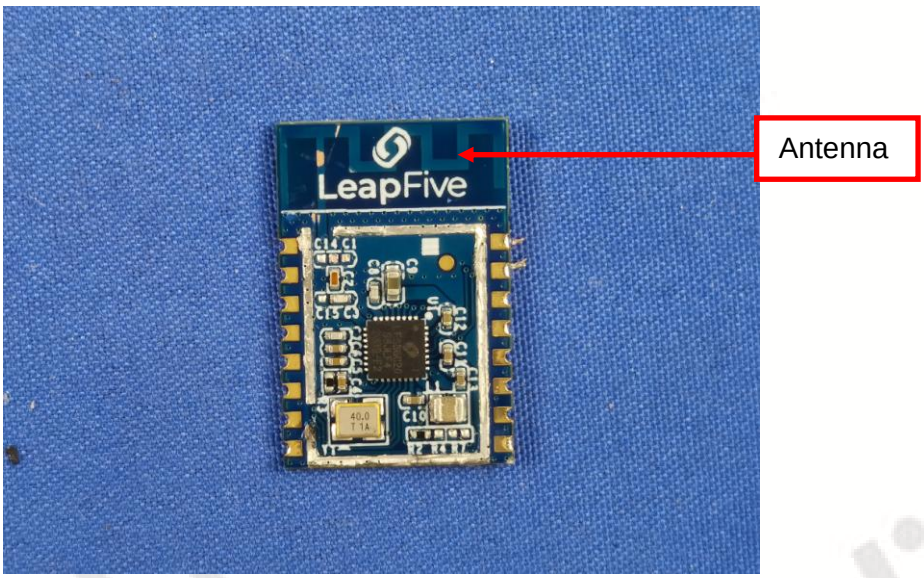
5. Photos of the EUT

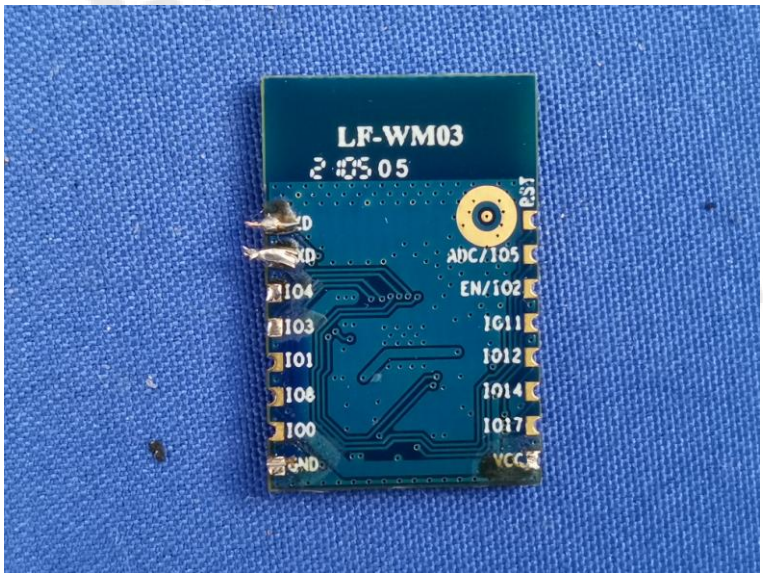
Photos of EUT











********** End of Report **********