

# FCC REPORT

## (WIFI)

**Applicant:** PAX Technology Limited  
**Address of Applicant:** Room 2416, 24/F., Sun Hung Kai Centre, 30 Harbour Road, Wanchai, Hong Kong

### Equipment Under Test (EUT)

**Product Name:** CM20 Communication Module  
**Model No.:** CM20  
**Trade mark:** PAX

**FCC ID:** V5PCM20W

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.247

**Date of sample receipt:** 23 Aug., 2019

**Date of Test:** 24 Aug., to 24 Sep., 2019

**Date of report issued:** 21 Oct., 2019

**Test Result:** PASS\*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Bruce Zhang  
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

## 2 Version

Version No.	Date	Description
00	25 Sep., 2019	Original
01	18 Oct., 2019	Update page 10, 11, 48 , 49
02	21 Oct., 2019	Update page 20

Tested by:

*Mike.ou*

Date:

21 Oct., 2019

**Test Engineer**

Reviewed by:

*Winner Zhang*

Date:

21 Oct., 2019

**Project Engineer**

## 3 Contents

	Page
<b>1 COVER PAGE.....</b>	<b>1</b>
<b>2 VERSION .....</b>	<b>2</b>
<b>3 CONTENTS .....</b>	<b>3</b>
<b>4 TEST SUMMARY.....</b>	<b>4</b>
<b>5 GENERAL INFORMATION.....</b>	<b>5</b>
5.1 CLIENT INFORMATION.....	5
5.2 GENERAL DESCRIPTION OF E.U.T.....	5
5.3 TEST ENVIRONMENT AND TEST MODE .....	6
5.4 DESCRIPTION OF SUPPORT UNITS.....	6
5.5 MEASUREMENT UNCERTAINTY.....	6
5.6 LABORATORY FACILITY.....	6
5.7 LABORATORY LOCATION .....	7
5.8 TEST INSTRUMENTS LIST.....	7
<b>6 TEST RESULTS AND MEASUREMENT DATA .....</b>	<b>8</b>
6.1 ANTENNA REQUIREMENT .....	8
6.2 CONDUCTED EMISSION .....	9
6.3 CONDUCTED OUTPUT POWER .....	12
6.4 OCCUPY BANDWIDTH .....	15
6.5 POWER SPECTRAL DENSITY .....	20
6.6 BAND EDGE .....	23
6.6.1 Conducted Emission Method.....	23
6.6.2 Radiated Emission Method.....	26
6.7 SPURIOUS EMISSION.....	43
6.7.1 Conducted Emission Method.....	43
6.7.2 Radiated Emission Method.....	46
<b>7 TEST SETUP PHOTO .....</b>	<b>54</b>
<b>8 EUT CONSTRUCTIONAL DETAILS .....</b>	<b>56</b>

## 4 Test Summary

Test Items	Section in CFR 47	Result
Antenna requirement	15.203 & 15.247 (b)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(3)	Pass
6dB Emission Bandwidth 99% Occupied Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247 (d)	Pass
Spurious Emission	15.205 & 15.209	Pass
All measurement data were performed in accordance with ANSI C63.10: 2013 and KDB 558074 D01 15.247 Meas Guidance v05r02 of test method.		
<i>Remark:</i> 1. <i>Pass: The EUT complies with the essential requirements in the standard.</i> 2. <i>N/A: Not Applicable.</i>		

## 5 General Information

### 5.1 Client Information

Applicant:	PAX Technology Limited
Address:	Room 2416, 24/F., Sun Hung Kai Centre, 30 Harbour Road, Wanchai, Hong Kong
Manufacturer:	PAX Computer Technology (Shenzhen) Co., Ltd.
Address:	4/F, No.3 Building, Software Park, Second Central Science-Tech Road, High-Tech industrial Park, Shenzhen, Guangdong, P.R.C.

### 5.2 General Description of E.U.T.

Product Name:	CM20 Communication Module
Model No.:	CM20
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(HT20)) 2422MHz~2452MHz (802.11n(HT40))
Channel numbers:	11 for 802.11b/802.11g/802.11(HT20) 7 for 802.11n(HT40)
Channel separation:	5MHz
Modulation technology: (IEEE 802.11b)	Direct Sequence Spread Spectrum (DSSS)
Modulation technology: (IEEE 802.11g/802.11n)	Orthogonal Frequency Division Multiplexing(OFDM)
Data speed (IEEE 802.11b):	1Mbps, 2Mbps, 5.5Mbps, 11Mbps
Data speed (IEEE 802.11g):	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps
Data speed (IEEE 802.11n):	Up to 150Mbps
Antenna Type:	External Antenna
Antenna gain:	1.0dBi
AC adapter:	Model No: GLH0901000 Input: AC100-240V, 50/60Hz, 0.5A Output: DC 9.0V, 1.0A
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

Operation Frequency each of channel for 802.11b/g/n(HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Note:

- For 802.11n-HT40 mode, the channel number is from 3 to 9;
- Channel 1, 6 & 11 selected for 802.11b/g/n-HT20 as Lowest, Middle and Highest channel. Channel 3, 6 & 9 selected for 802.11n-HT40 as Lowest, Middle and Highest Channel.

## 5.3 Test environment and test mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
Transmitting mode	Keep the EUT in continuous transmitting with modulation
<p>The sample was placed 0.8m (below 1GHz)/1.5m (above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y &amp; Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.</p> <p>We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:</p>	
Per-scan all kind of data rate, the follow list were the worst case.	
Mode	Data rate
802.11b	1Mbps
802.11g	6Mbps
802.11n(HT20)	6.5Mbps
802.11n(HT40)	13.5Mbps

## 5.4 Description of Support Units

The EUT has been tested as an independent unit.

## 5.5 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±1.60 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±3.12 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.32 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.38 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±3.36 dB (k=2)

## 5.6 Laboratory Facility

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

- **FCC - Designation No.: CN1211**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

- **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

## 5.7 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.  
 Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,  
 Bao'an District, Shenzhen, Guangdong, China  
 Tel: +86-755-23118282, Fax: +86-755-23116366  
 Email: info@ccis-cb.com, Website: http://www.ccis-cb.com


## 5.8 Test Instruments list

Radiated Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
Loop Antenna	SCHWARZBECK	FMZB1519B	00044	03-18-2019	03-17-2020
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-18-2019	03-17-2020
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-18-2019	03-17-2020
Horn Antenna	SCHWARZBECK	BBHA9120D	1805	06-22-2017	06-21-2020
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170582	11-21-2018	11-20-2019
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-18-2019	03-17-2020
Pre-amplifier	CD	PAP-1G18	11804	03-18-2019	03-17-2020
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-18-2019	03-17-2020
Spectrum analyzer	Rohde & Schwarz	FSP40	100363	11-21-2018	11-20-2019
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-18-2019	03-17-2020
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-18-2019	03-17-2020
Cable	MICRO-COAX	MFR64639	K10742-5	03-18-2019	03-17-2020
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-18-2019	03-17-2020
RF Switch Unit	MWRFTST	MW200	N/A	N/A	N/A
Test Software	MWRFTST	MTS8200	Version: 2.0.0.0		

Conducted Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
EMI Test Receiver	Rohde & Schwarz	ESCI	101189	03-18-2019	03-17-2020
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	03-18-2019	03-17-2020
LISN	CHASE	MN2050D	1447	03-18-2019	03-17-2020
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2018	07-20-2021
Cable	HP	10503A	N/A	03-18-2019	03-17-2020
EMI Test Software	AUDIX	E3	Version: 6.110919b		

## 6 Test results and Measurement Data

### 6.1 Antenna requirement

<b>Standard requirement:</b>	FCC Part 15 C Section 15.203 /247(b)
<p>15.203 requirement: 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.</p> <p>15.247(b) (4) requirement: (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p>	
<b>E.U.T Antenna:</b>	
<p>The Wi-Fi antenna is an External antenna which cannot replace by end-user, the best case gain of the antenna is 1.0 dBi.</p>	
 <p>The photograph shows a black PAX Wi-Fi antenna system. On the left is a separate antenna with a coiled spring base and a black cable ending in a gold SMA connector. A red label 'Wi-Fi ANT' with an arrow points to this antenna. In the center is a black power adapter with a two-prong AC plug and a USB-C cable. On the right is the main black rectangular device with the 'PAX' logo. A red label 'Wi-Fi ANT Port' with an arrow points to a gold SMA connector on the right side of the device. Two stainless steel rulers are placed horizontally and vertically for scale, showing measurements in centimeters and inches.</p>	

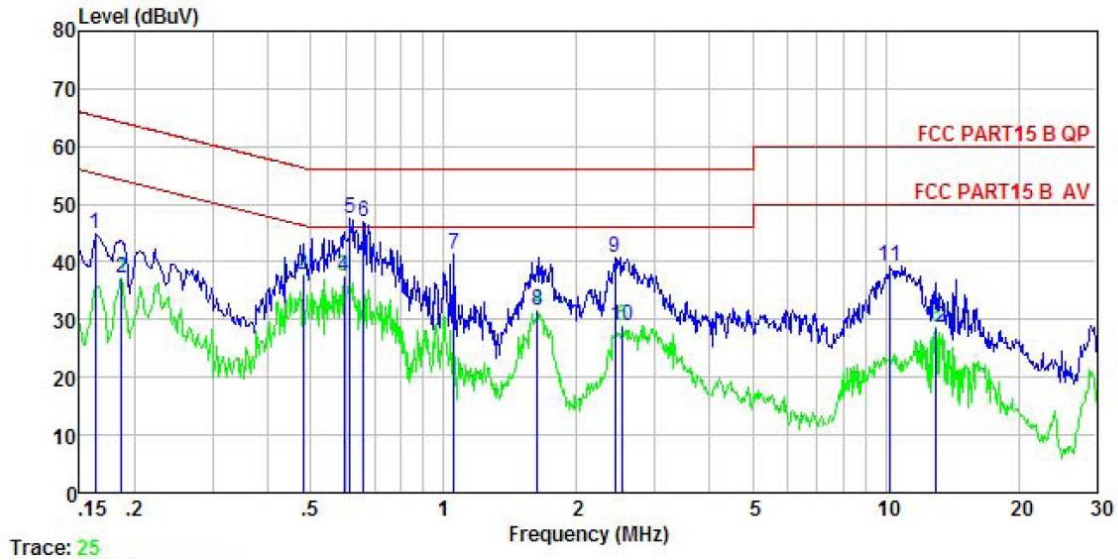


## 6.2 Conducted Emission

Test Requirement:	FCC Part 15 C Section 15.207														
Test Frequency Range:	150 kHz to 30 MHz														
Class / Severity:	Class B														
Receiver setup:	RBW=9 kHz, VBW=30 kHz														
Limit:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>	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
	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 procedure	<ol style="list-style-type: none"> <li>The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.), which provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li> </ol>														
Test setup:	<p><i>Remark</i>  <i>E.U.T: Equipment Under Test</i>  <i>LISN: Line Impedance Stabilization Network</i>  <i>Test table height=0.8m</i></p>														
Test Instruments:	Refer to section 5.8 for details														
Test mode:	Refer to section 5.3 for details														
Test results:	Passed														

**Measurement Data:**

<b>Product name:</b>	CM20 Communication Module	<b>Product model:</b>	CM20
<b>Test by:</b>	Mike	<b>Test mode:</b>	802.11b- Highest channel mode
<b>Test frequency:</b>	150 kHz ~ 30 MHz	<b>Phase:</b>	Line
<b>Test voltage:</b>	AC 120 V/60 Hz	<b>Environment:</b>	Temp: 22.5°C      Humi: 55%



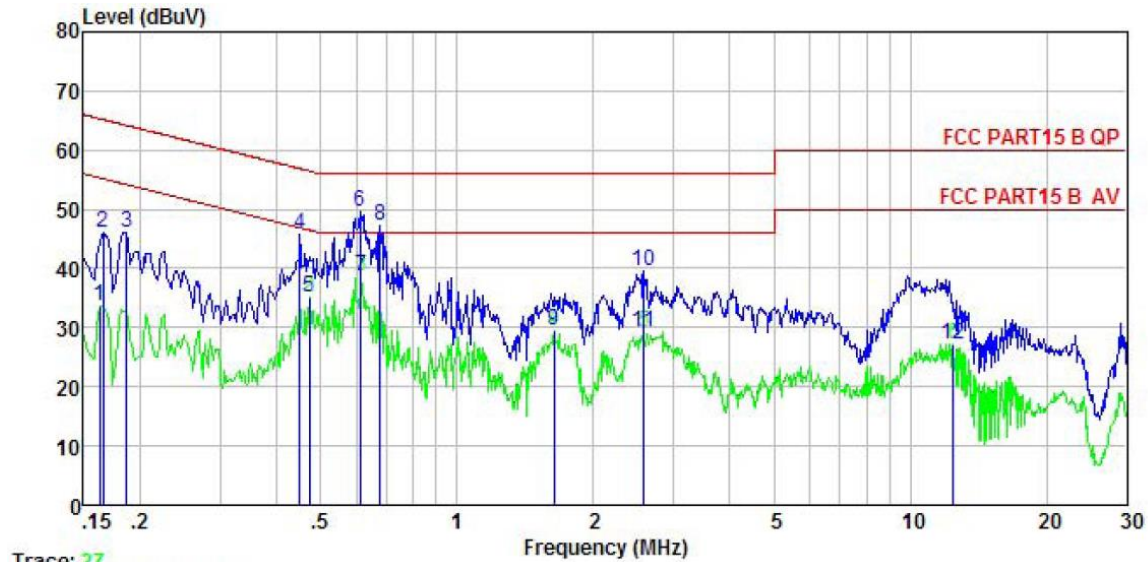
Trace: 25

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.162	34.47	-0.44	10.77	44.80	65.34	-20.54	QP
2	0.186	26.75	-0.42	10.76	37.09	54.20	-17.11	Average
3	0.481	27.47	-0.39	10.75	37.83	46.32	-8.49	Average
4	0.595	26.97	-0.38	10.77	37.36	46.00	-8.64	Average
5	0.614	37.12	-0.38	10.77	47.51	56.00	-8.49	QP
6	0.658	36.63	-0.38	10.77	47.02	56.00	-8.98	QP
7	1.054	30.77	-0.38	10.88	41.27	56.00	-14.73	QP
8	1.628	21.16	-0.40	10.93	31.69	46.00	-14.31	Average
9	2.435	30.36	-0.42	10.94	40.88	56.00	-15.12	QP
10	2.540	18.38	-0.43	10.94	28.89	46.00	-17.11	Average
11	10.233	29.01	-0.61	10.94	39.34	60.00	-20.66	QP
12	12.988	18.27	-0.66	10.91	28.52	50.00	-21.48	Average

**Notes:**

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.

<b>Product name:</b>	CM20 Communication Module	<b>Product model:</b>	CM20
<b>Test by:</b>	Mike	<b>Test mode:</b>	802.11b- Highest channel mode
<b>Test frequency:</b>	150 kHz ~ 30 MHz	<b>Phase:</b>	Neutral
<b>Test voltage:</b>	AC 120 V/60 Hz	<b>Environment:</b>	Temp: 22.5°C      Humi: 55%



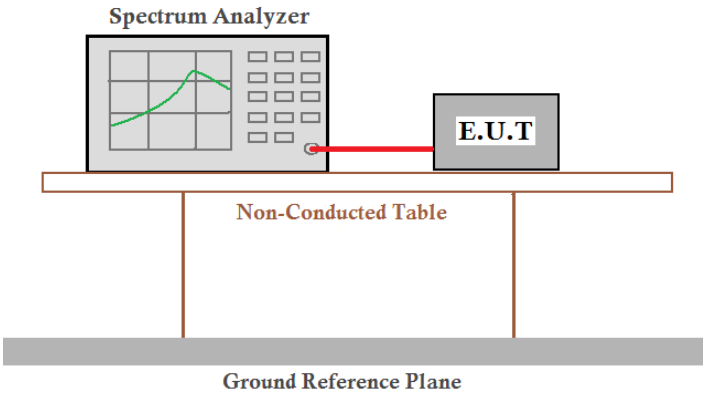
Trace: 27

	Read Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.162	23.56	-0.68	10.77	33.65	55.34	-21.69	Average
2	0.166	36.05	-0.68	10.77	46.14	65.16	-19.02	QP
3	0.186	36.03	-0.69	10.76	46.10	64.20	-18.10	QP
4	0.449	35.65	-0.65	10.74	45.74	56.89	-11.15	QP
5	0.471	24.98	-0.65	10.75	35.08	46.49	-11.41	Average
6	0.611	39.59	-0.64	10.77	49.72	56.00	-6.28	QP
7	0.614	28.63	-0.64	10.77	38.76	46.00	-7.24	Average
8	0.675	37.22	-0.64	10.77	47.35	56.00	-8.65	QP
9	1.636	19.28	-0.66	10.93	29.55	46.00	-16.45	Average
10	2.581	29.25	-0.67	10.93	39.51	56.00	-16.49	QP
11	2.581	19.07	-0.67	10.93	29.33	46.00	-16.67	Average
12	12.449	17.05	-0.80	10.92	27.17	50.00	-22.83	Average

**Notes:**

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.

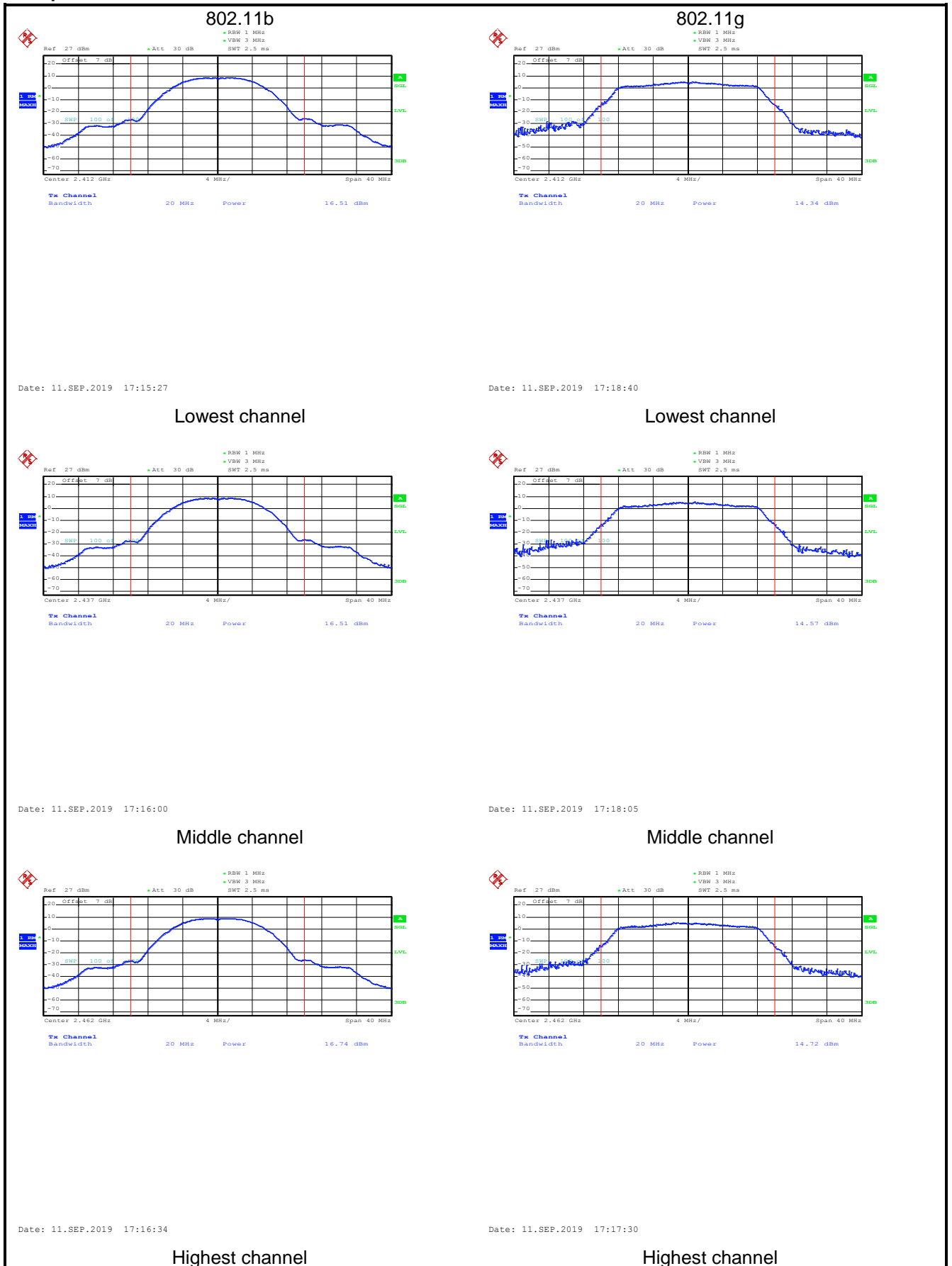
## 6.3 Conducted Output Power

Test Requirement:	FCC Part 15 C Section 15.247 (b)(3)
Limit:	30dBm
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

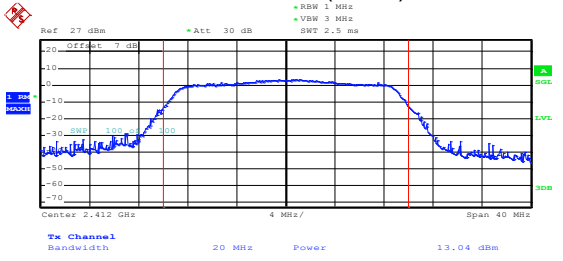
### Measurement Data:

Test CH	Maximum Conducted Output Power (dBm)				Limit(dBm)	Result
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)		
Lowest	16.51	14.34	13.04	13.30	30.00	Pass
Middle	16.51	14.57	13.23	13.48		
Highest	16.74	14.72	13.45	13.60		

Test plot as follows:

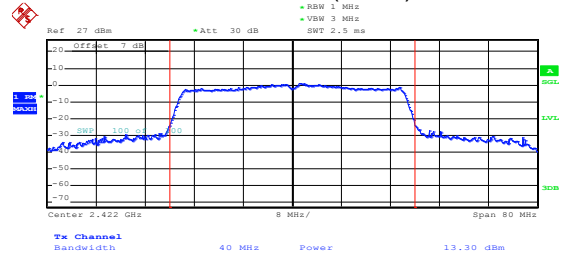


802.11n(HT20)



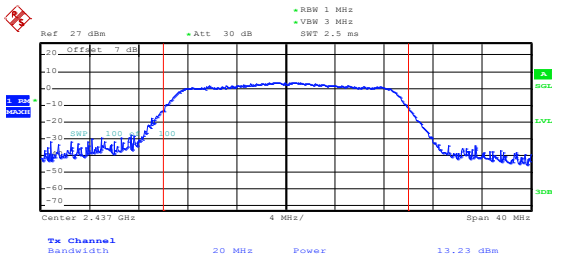
Date: 11.SEP.2019 17:19:32

802.11n(HT40)



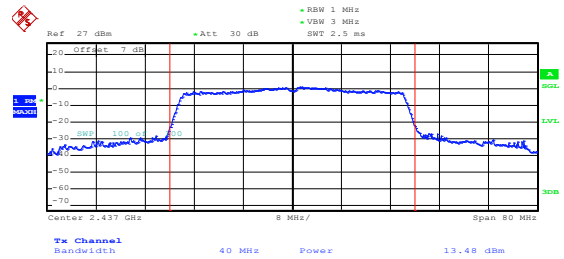
Date: 11.SEP.2019 17:32:00

Lowest channel



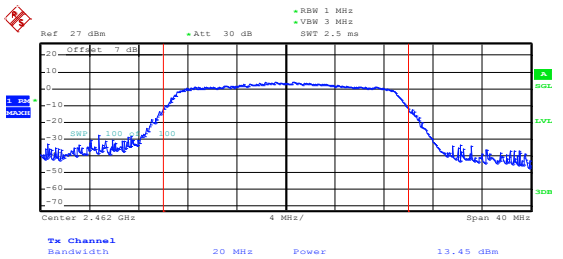
Date: 11.SEP.2019 17:20:00

Lowest channel



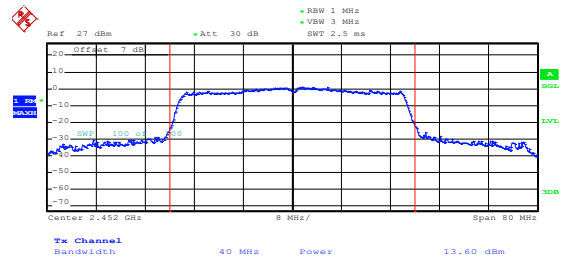
Date: 11.SEP.2019 17:46:58

Middle channel



Date: 11.SEP.2019 17:20:28

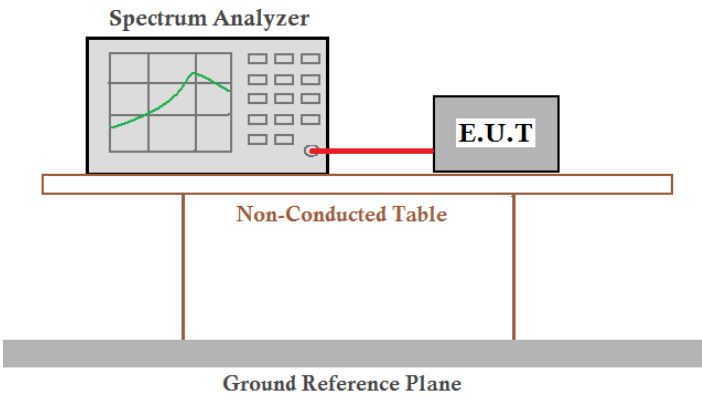
Middle channel



Date: 11.SEP.2019 17:47:36

Highest channel

## 6.4 Occupy Bandwidth

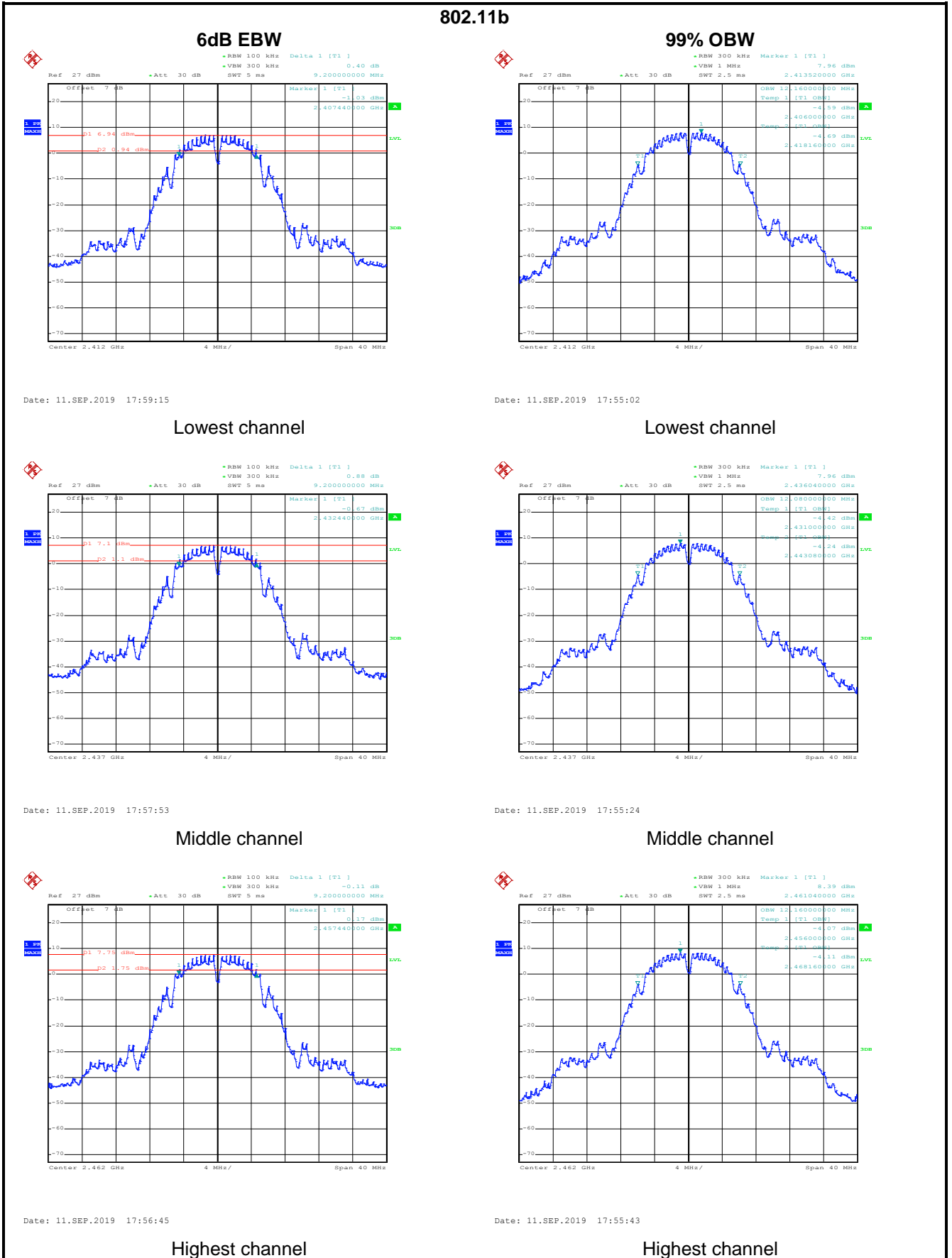
Test Requirement:	FCC Part 15 C Section 15.247 (a)(2)
Limit:	>500kHz
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

### Measurement Data:

Test CH	6dB Emission Bandwidth (MHz)				Limit(kHz)	Result
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)		
Lowest	9.20	16.48	17.44	36.00	>500	Pass
Middle	9.20	16.56	17.52	36.16		
Highest	9.20	16.56	17.52	36.00		
Test CH	99% Occupy Bandwidth (MHz)				Limit(kHz)	Result
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)		
Lowest	12.16	16.96	18.08	36.80	N/A	N/A
Middle	12.08	17.04	18.08	36.80		
Highest	12.16	17.04	18.00	36.80		



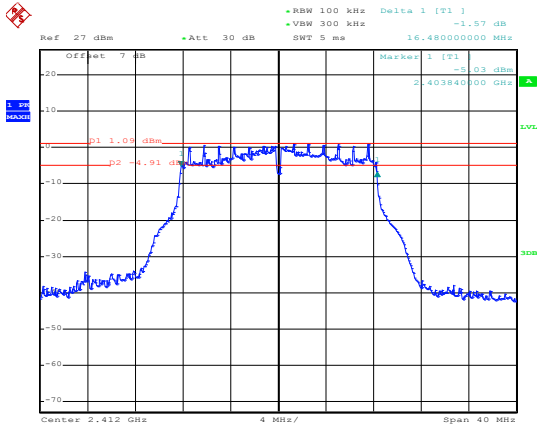
Test plot as follows:





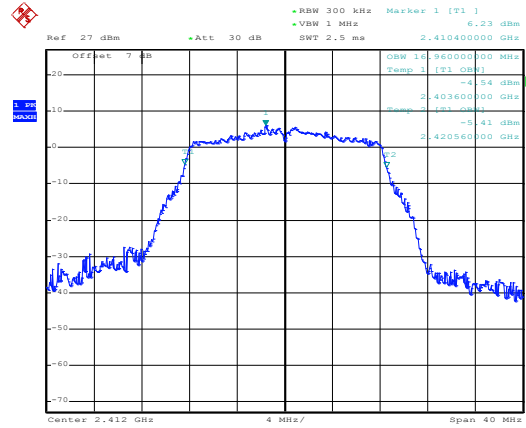
## 802.11g

### 6dB EBW



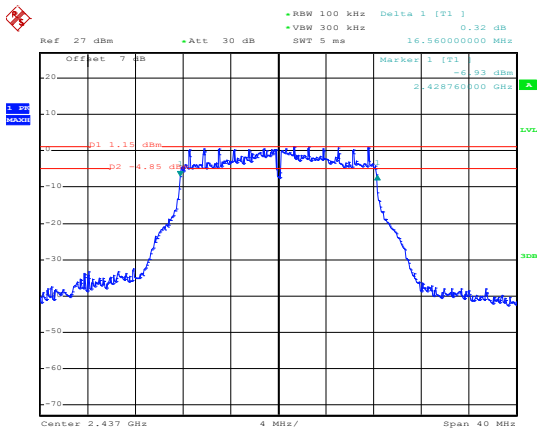
Date: 11.SEP.2019 18:01:43

### 99% OBW



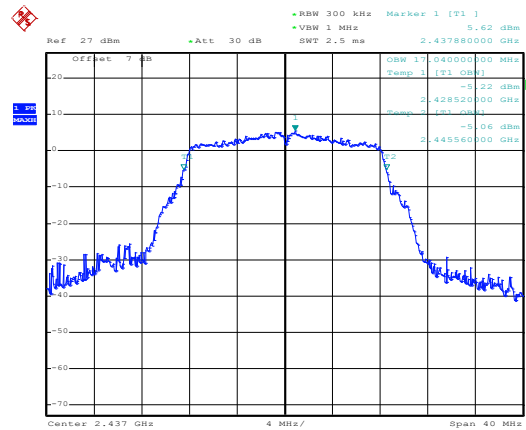
Date: 11.SEP.2019 17:54:38

### Lowest channel



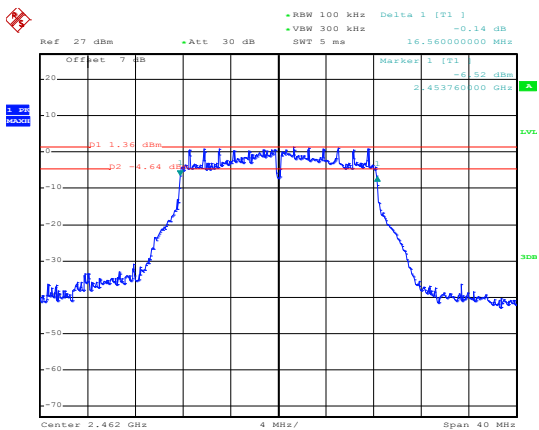
Date: 11.SEP.2019 18:03:12

### Lowest channel



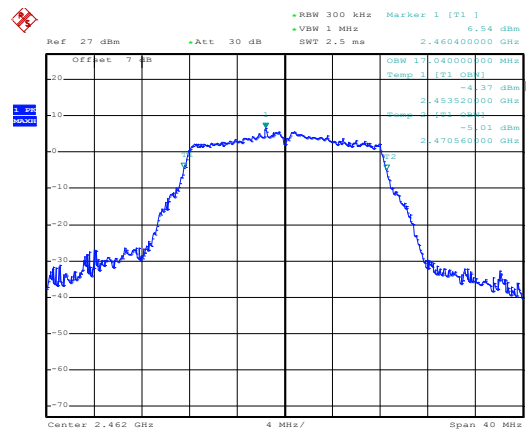
Date: 11.SEP.2019 17:54:21

### Middle channel



Date: 11.SEP.2019 18:04:40

### Middle channel



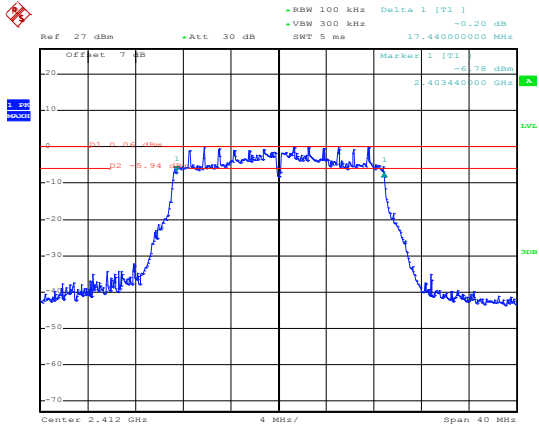
Date: 11.SEP.2019 17:54:04

### Highest channel

### Highest channel

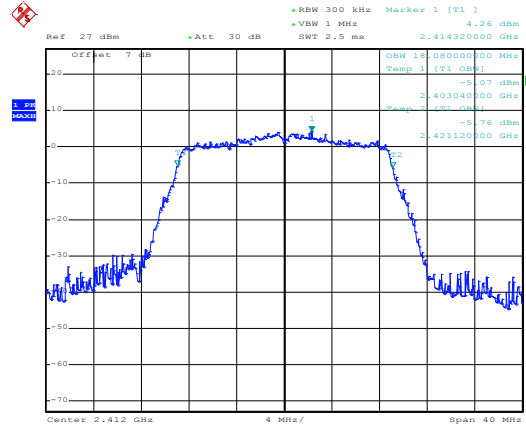
## 802.11n(HT20)

### 6dB EBW



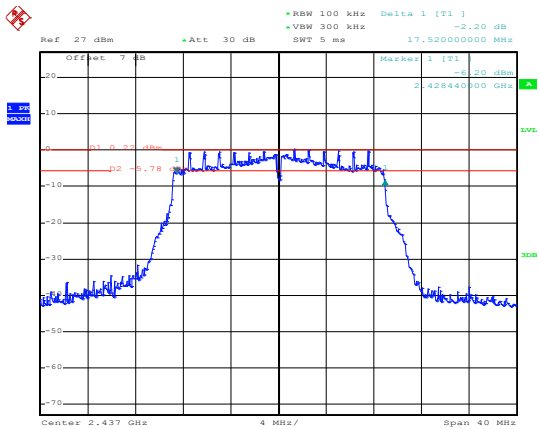
Date: 11.SEP.2019 18:09:48

### 99% OBW



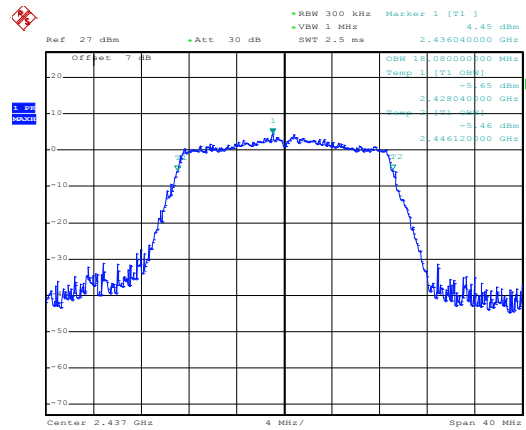
Date: 11.SEP.2019 17:53:01

### Lowest channel



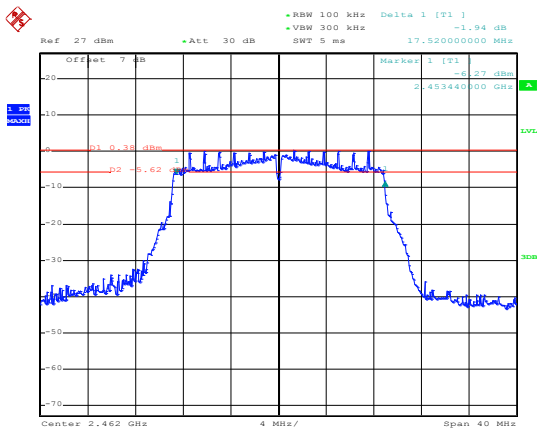
Date: 11.SEP.2019 18:08:16

### Lowest channel



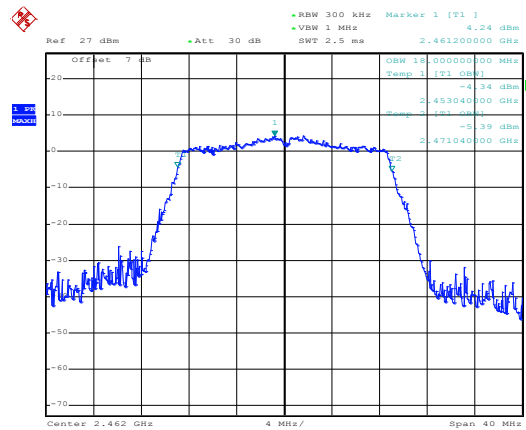
Date: 11.SEP.2019 17:53:21

### Middle channel



Date: 11.SEP.2019 18:06:27

### Middle channel



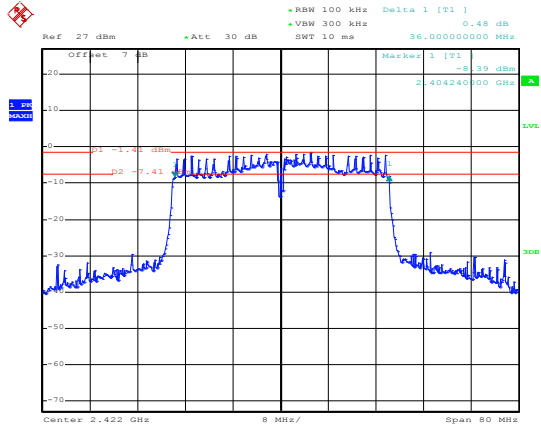
Date: 11.SEP.2019 17:53:38

### Highest channel

### Highest channel

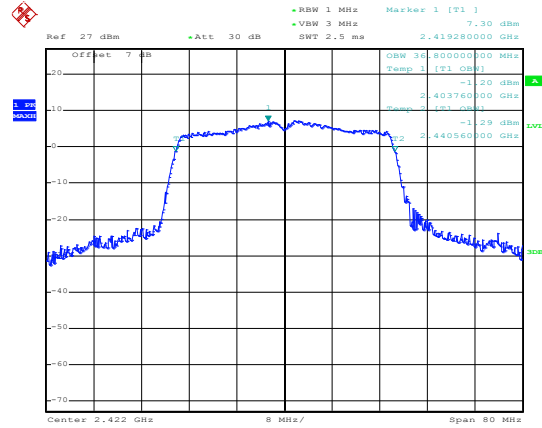
## 802.11n(HT40)

### 6dB EBW



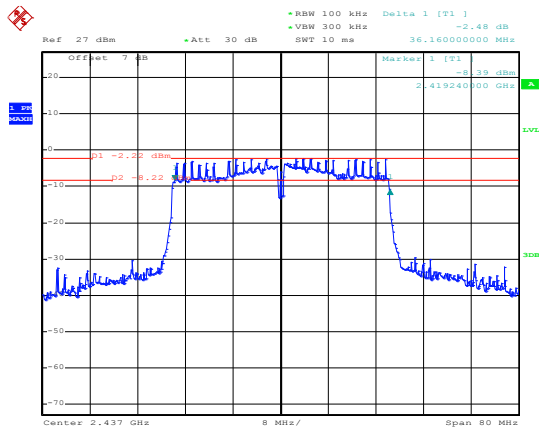
Date: 11.SEP.2019 18:11:31

### 99% OBW



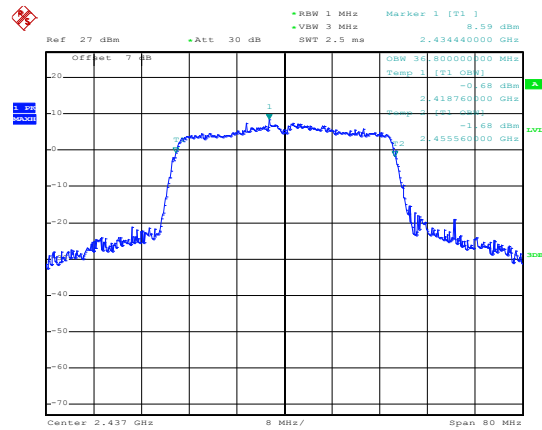
Date: 11.SEP.2019 17:51:45

### Lowest channel



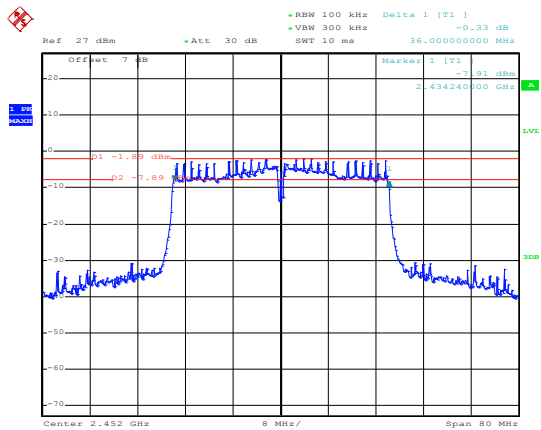
Date: 11.SEP.2019 18:13:09

### Lowest channel



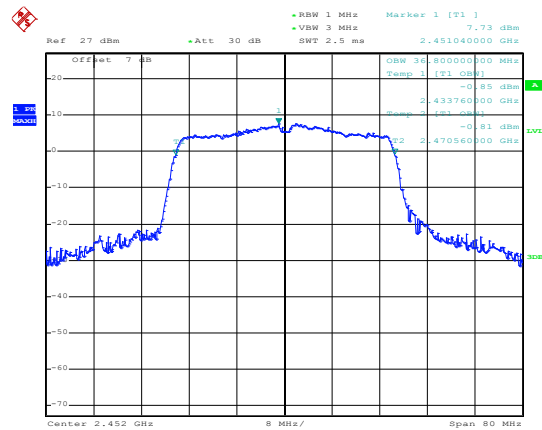
Date: 11.SEP.2019 17:51:06

### Middle channel



Date: 11.SEP.2019 18:14:46

### Middle channel

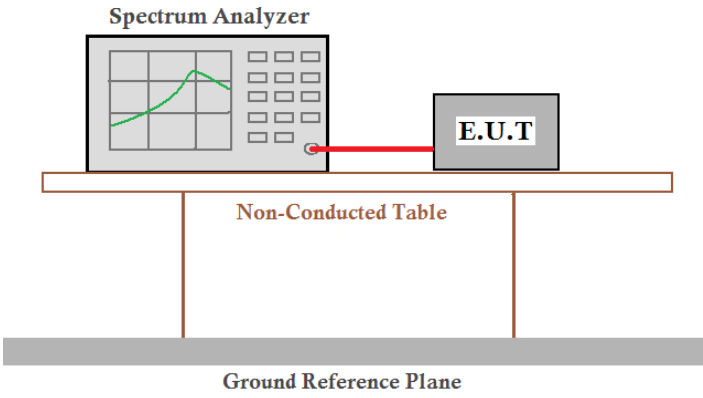


Date: 11.SEP.2019 17:50:24

### Highest channel

### Highest channel

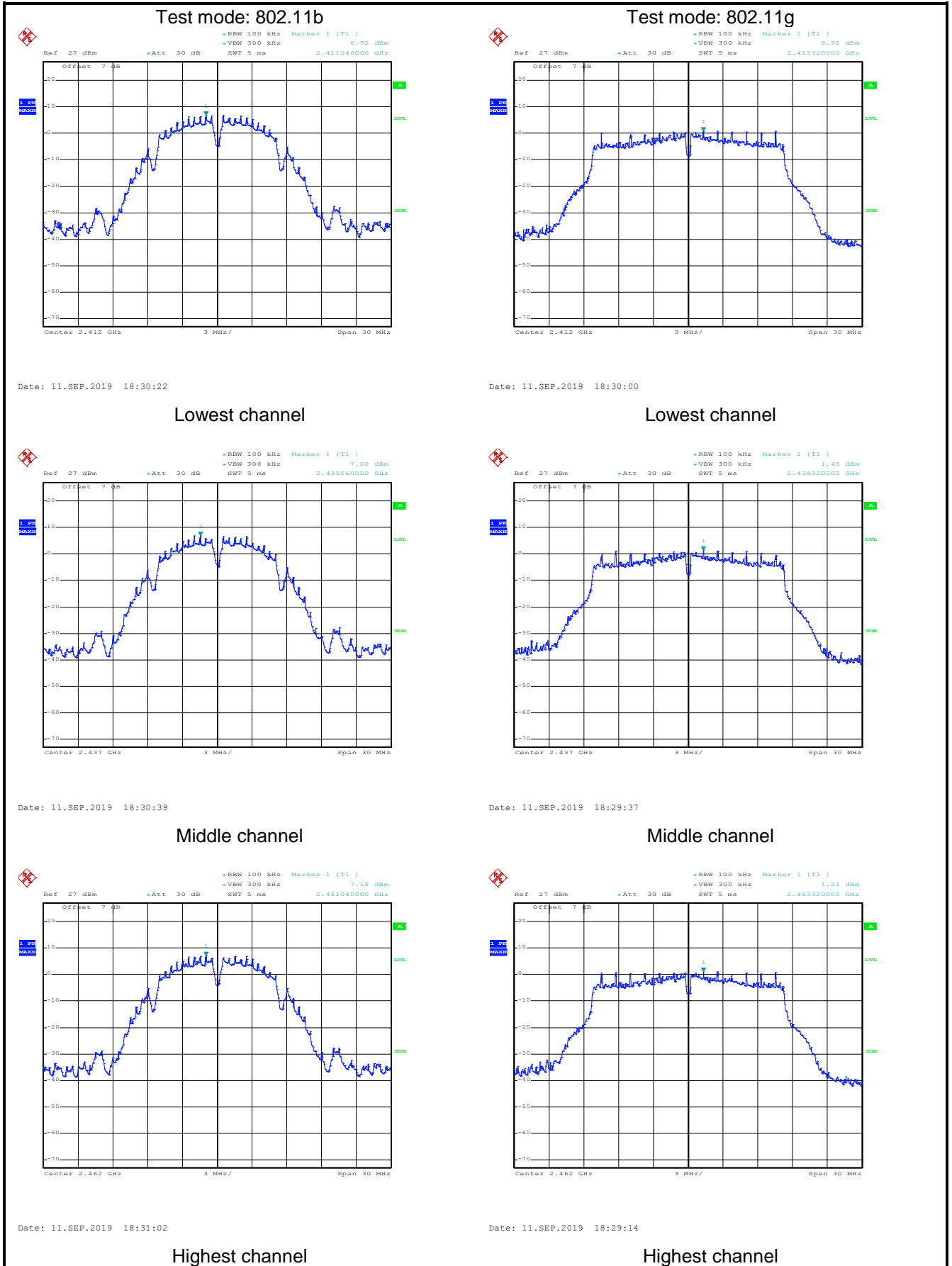
## 6.5 Power Spectral Density

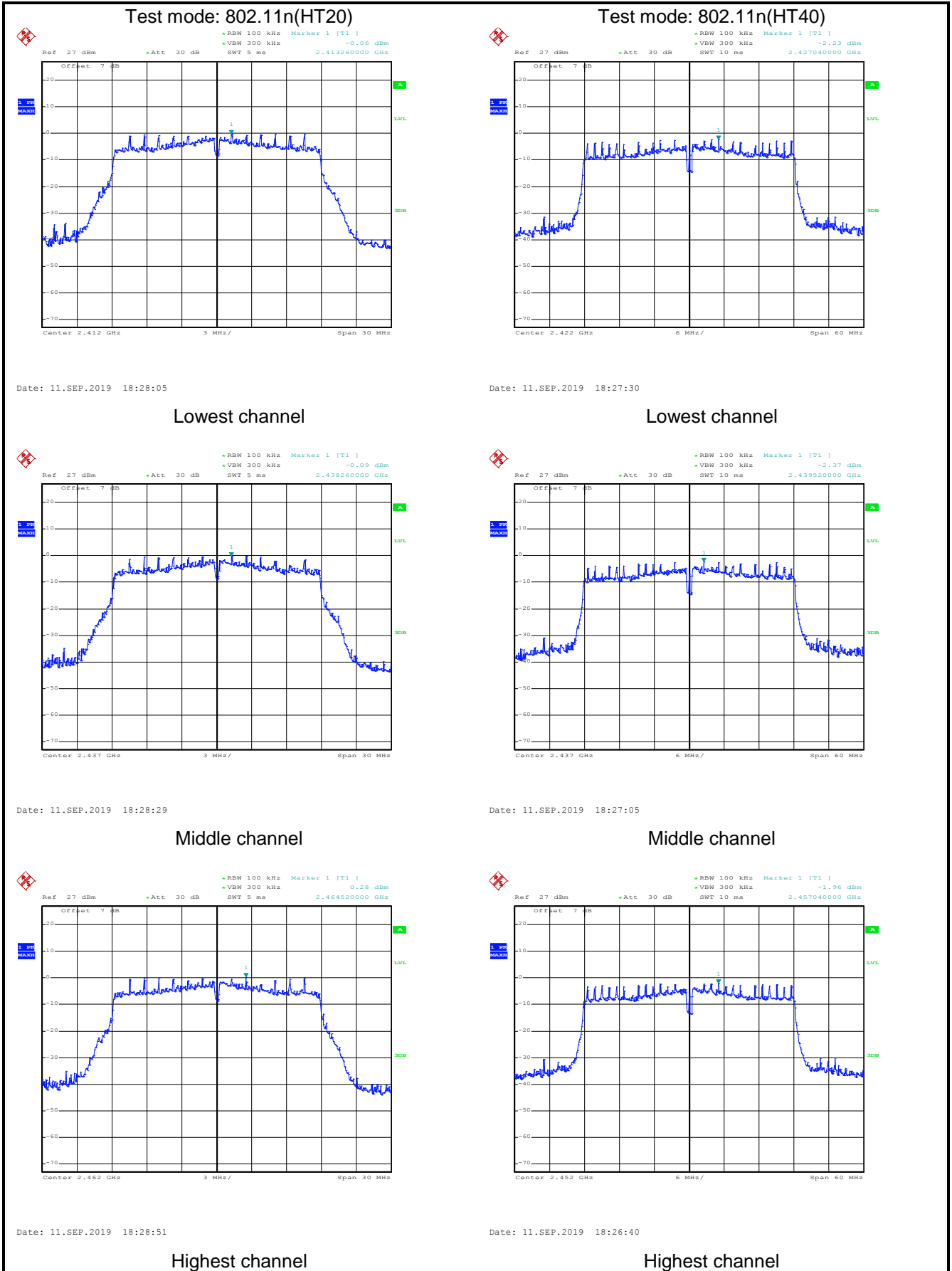
Test Requirement:	FCC Part 15 C Section 15.247 (e)
Limit:	8dBm/3KHz
Test setup:	 <p>The diagram shows a Spectrum Analyzer and an E.U.T. (Equipment Under Test) connected by a red cable. They are positioned on a table labeled 'Non-Conducted Table'. Below the table is a 'Ground Reference Plane'.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

### Measurement Data:

Test CH	Power Spectral Density (dBm)				Limit (dBm/100KHz)	Result
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)		
Lowest	6.92	0.92	-0.06	-2.23	23.22	Pass
Middle	7.00	1.45	-0.09	-2.37		
Highest	7.18	1.21	0.28	-1.96		
NOT: Limit(dBm/100KHz)= Limit (dBm/3KHz)+10lg (BW <sub>Measured</sub> /BW <sub>Reference</sub> )=8+15.22=23.22(dBm/100KHz)						

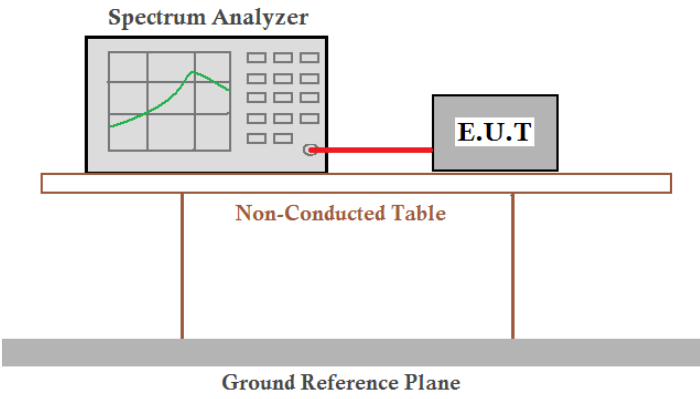
Test plot as follows:



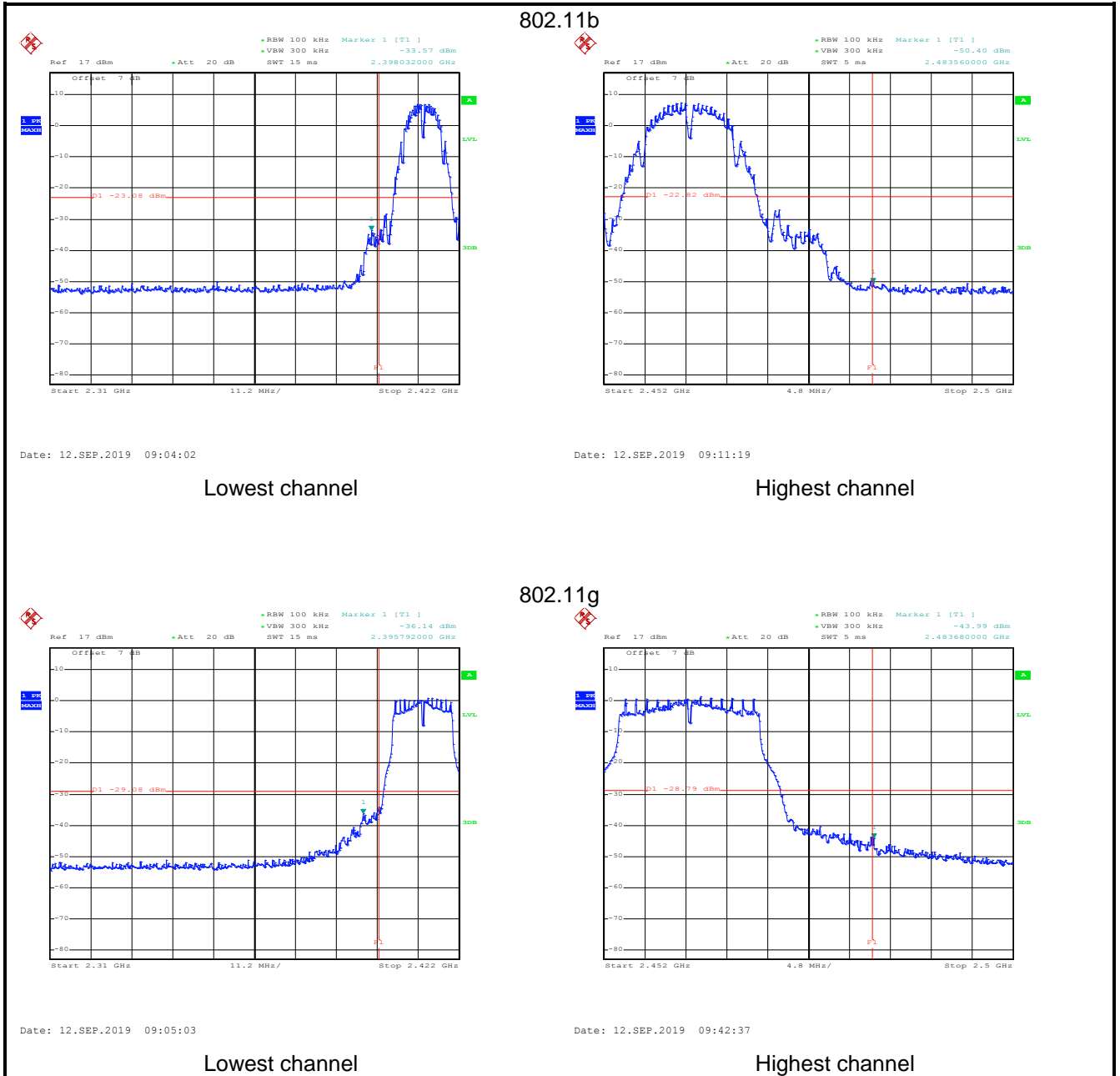


## 6.6 Band Edge

### 6.6.1 Conducted Emission Method

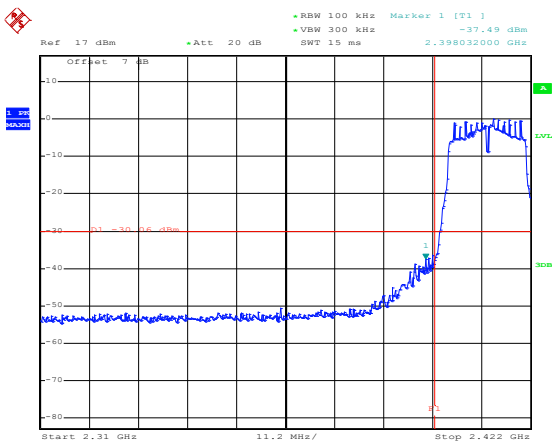
Test Requirement:	FCC Part 15 C Section 15.247 (d)
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which sits on a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plot as follows:



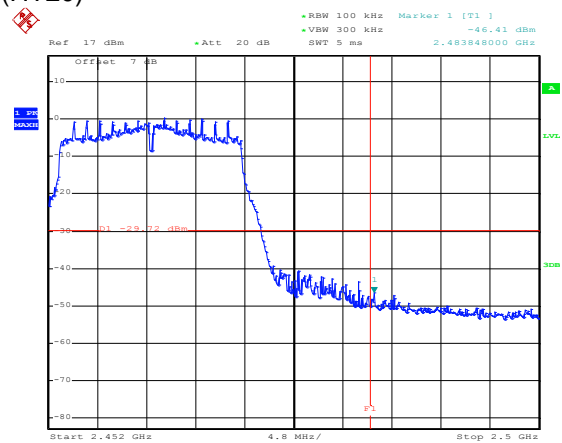


## 802.11n(HT20)



Date: 12.SEP.2019 09:05:51

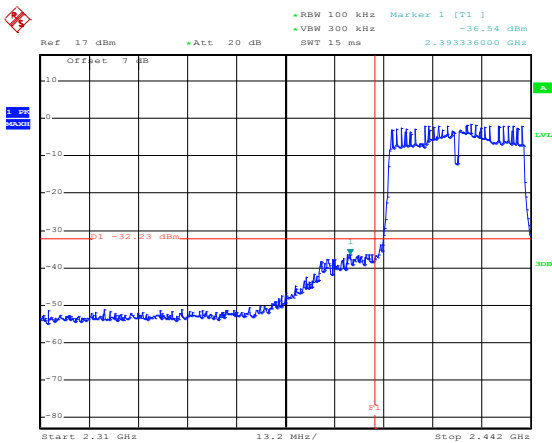
Lowest channel



Date: 12.SEP.2019 09:09:49

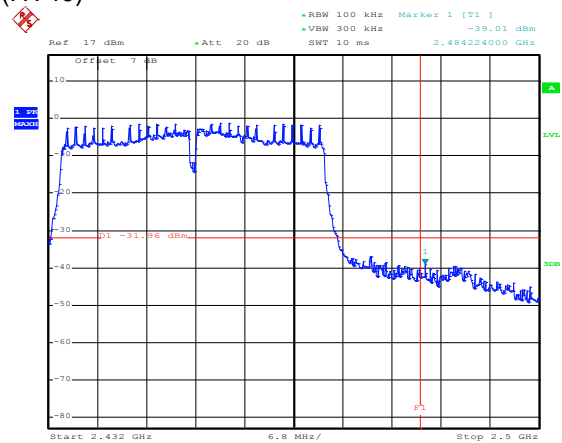
Highest channel

## 802.11n(HT40)



Date: 12.SEP.2019 09:07:57

Lowest channel



Date: 12.SEP.2019 09:08:53

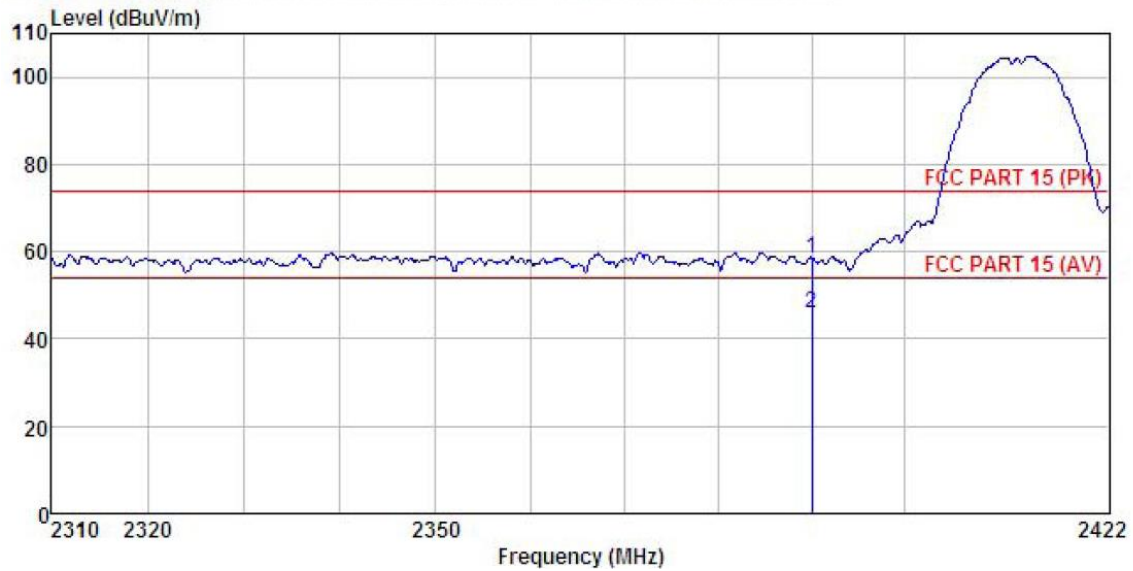
Highest channel

## 6.6.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C Section 15.209 and 15.205				
Test Frequency Range:	2.3GHz to 2.5GHz				
Test Distance:	3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
RMS		1MHz	3MHz	Average Value	
Limit:	Frequency	Limit (dBuV/m @3m)		Remark	
	Above 1GHz	54.00		Average Value	
74.00		Peak Value			
Test Procedure:	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol>				
Test setup:					
Test Instruments:	Refer to section 5.8 for details				
Test mode:	Refer to section 5.3 for details				
Test results:	Passed				

802.11b mode:

Product Name:	CM20 Communication Module	Product Model:	CM20
Test By:	Mike	Test mode:	802.11b Tx mode
Test Channel:	Lowest channel	Polarization:	Vertical
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24°C Humi: 57%

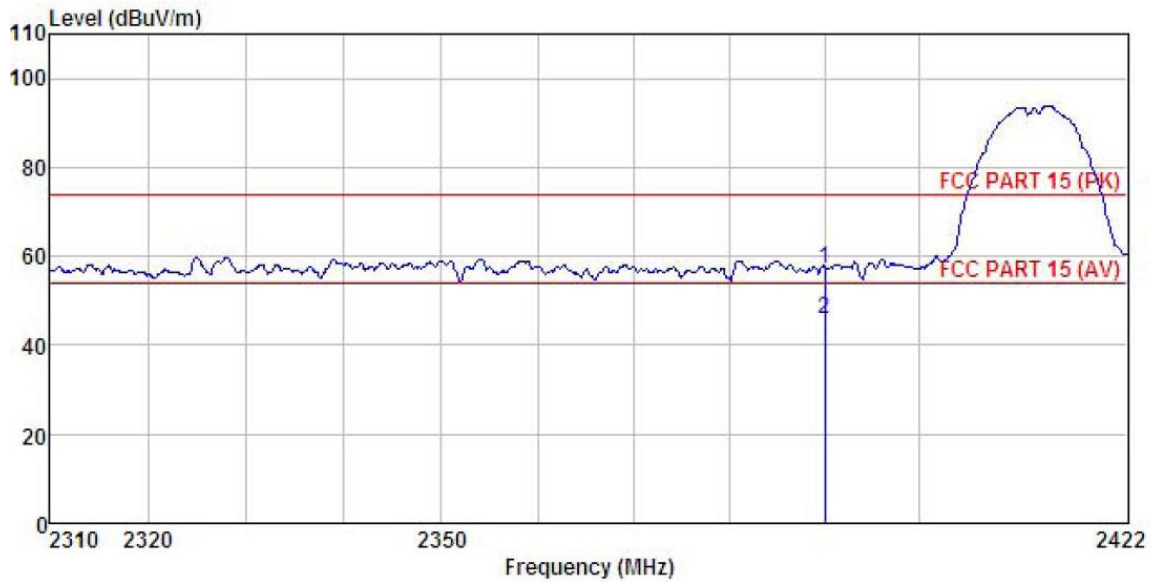


	Read Freq	Antenna Level	Antenna Factor	Cable Loss	Preamplifier Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	25.03	27.07	4.69	0.00	58.47	74.00	-15.53	Peak
2	2390.000	12.32	27.07	4.69	0.00	45.76	54.00	-8.24	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11b Tx mode
<b>Test Channel:</b>	Lowest channel	<b>Polarization:</b>	Horizontal
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%

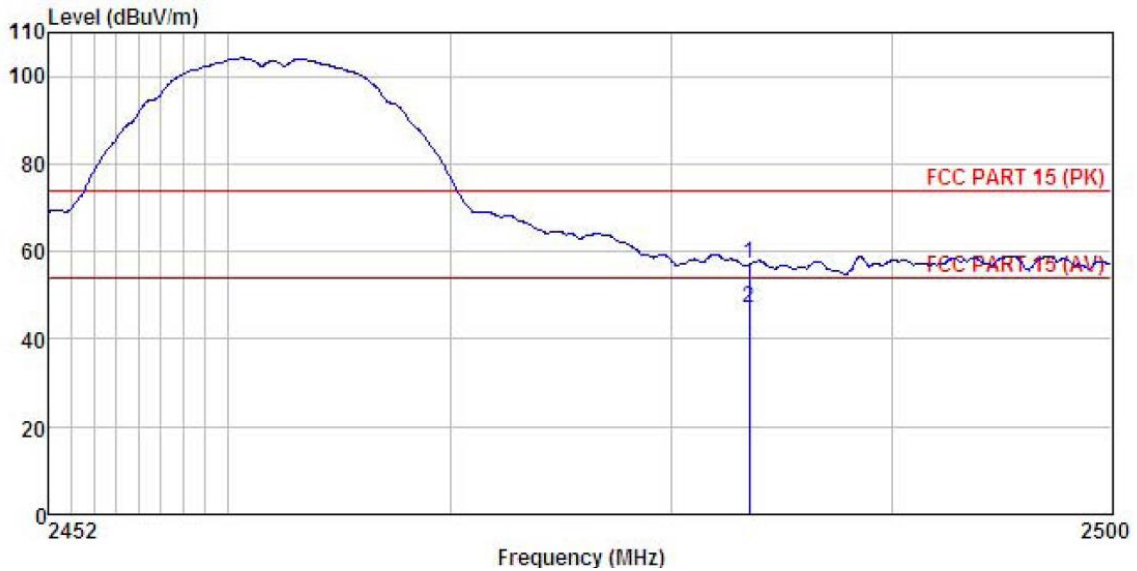


	Read	Antenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	23.91	27.08	4.69	0.00	57.36	74.00	-16.64 Peak
2	2390.000	12.57	27.08	4.69	0.00	46.02	54.00	-7.98 Average

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11b Tx mode
<b>Test Channel:</b>	Highest channel	<b>Polarization:</b>	Vertical
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%

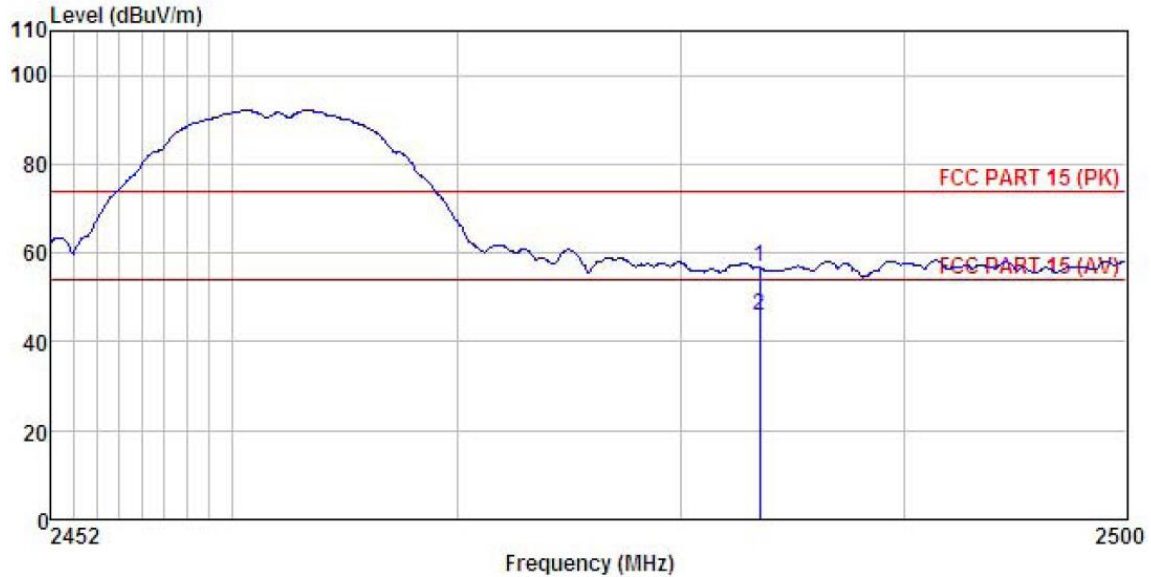


	Read	Antenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	23.22	27.36	4.81	0.00	57.09	74.00	-16.91 Peak
2	2483.500	13.29	27.36	4.81	0.00	47.16	54.00	-6.84 Average

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11b Tx mode
<b>Test Channel:</b>	Highest channel	<b>Polarization:</b>	Horizontal
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%



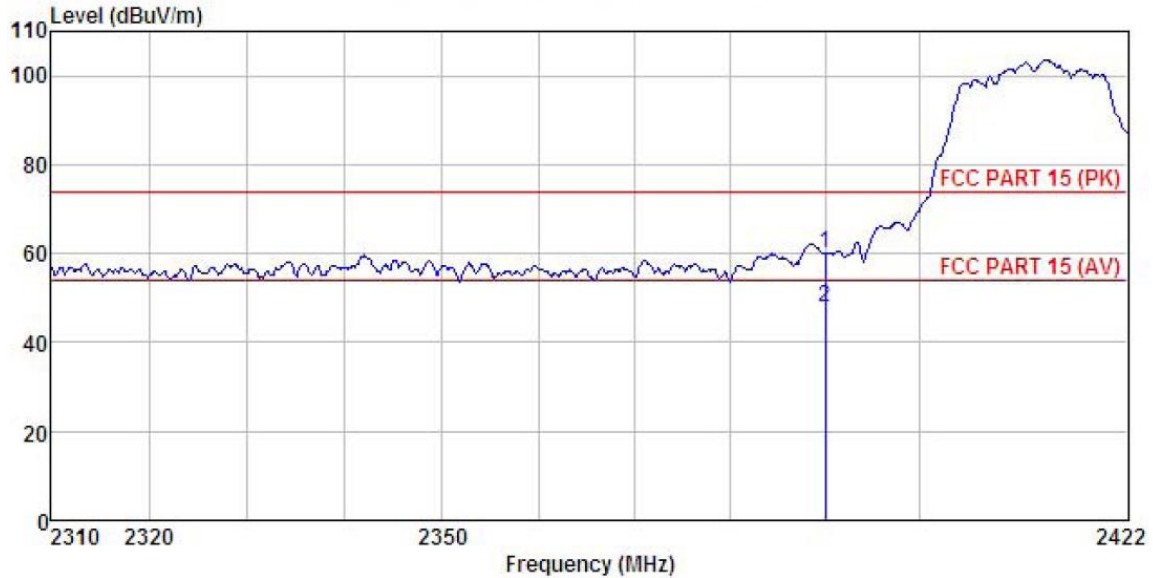
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	22.89	27.35	4.81	0.00	56.75	74.00	-17.25	Peak
2	2483.500	11.96	27.35	4.81	0.00	45.82	54.00	-8.18	Average

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

802.11g mode:

Product Name:	CM20 Communication Module	Product Model:	CM20
Test By:	Mike	Test mode:	802.11g Tx mode
Test Channel:	Lowest channel	Polarization:	Vertical
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24°C Humi: 57%



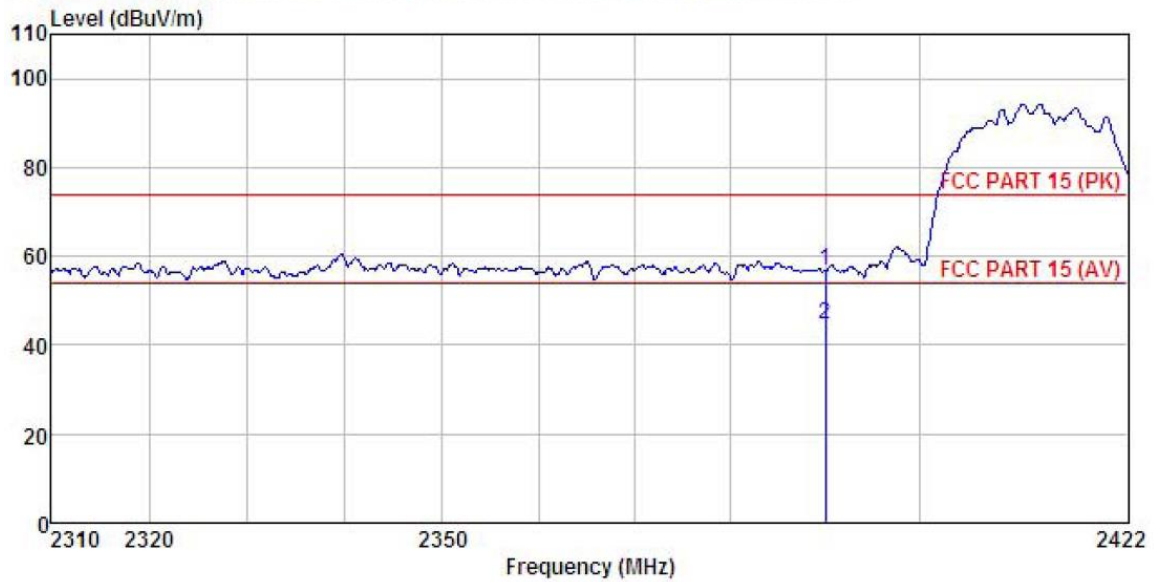
	ReadAntenna	Cable	Preamp	Limit	Over				
Freq	Level	Loss	Factor	Line	Limit	Remark			
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m			
1	2390.000	26.78	27.07	4.69	0.00	60.22	74.00	-13.78	Peak
2	2390.000	14.40	27.07	4.69	0.00	47.84	54.00	-6.16	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.



<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11g Tx mode
<b>Test Channel:</b>	Lowest channel	<b>Polarization:</b>	Horizontal
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%



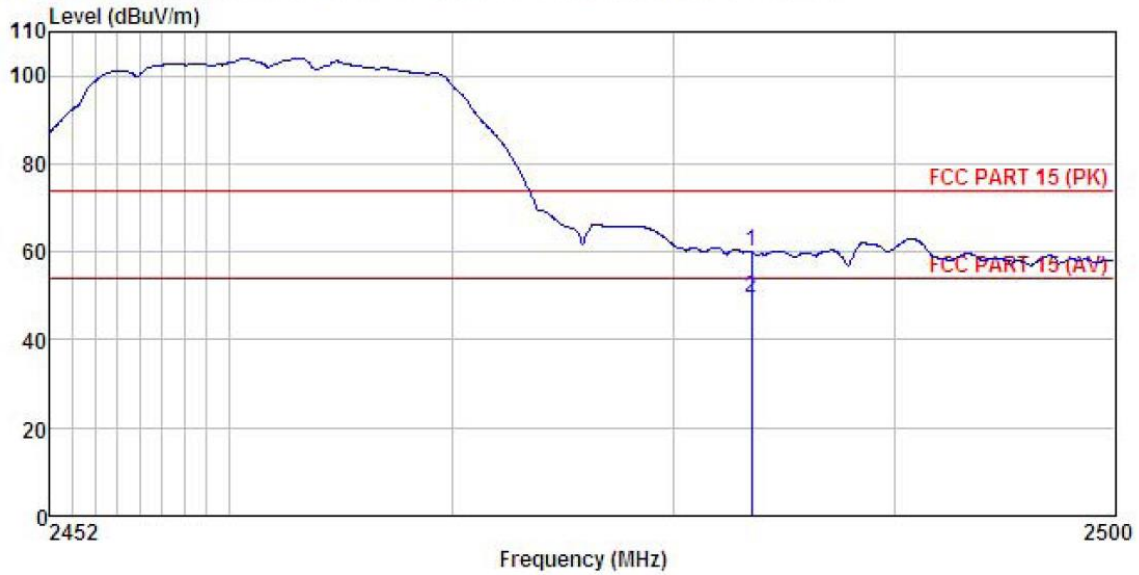
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	23.21	27.08	4.69	0.00	56.66	74.00	-17.34	Peak
2	2390.000	11.16	27.08	4.69	0.00	44.61	54.00	-9.39	Average

**Remark:**

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
- The emission levels of other frequencies are very lower than the limit and not show in test report.



<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11g Tx mode
<b>Test Channel:</b>	Highest channel	<b>Polarization:</b>	Vertical
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%

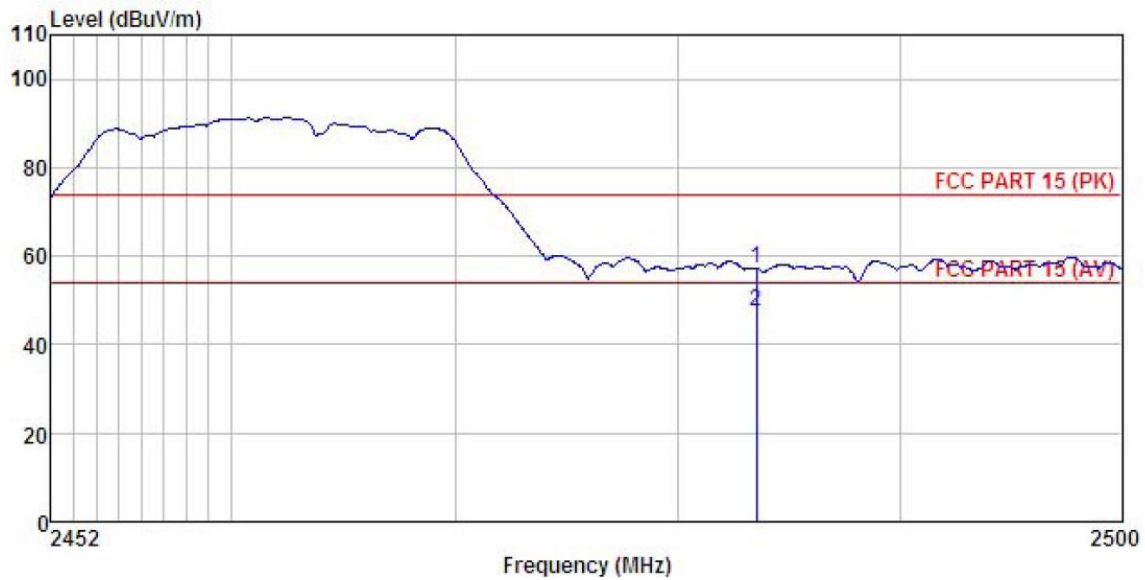


	ReadAntenna	Cable Preamp	Limit	Over					
Freq	Level	Loss	Line	Limit	Remark				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2483.500	26.03	27.36	4.81	0.00	59.90	74.00	-14.10	Peak
2	2483.500	15.77	27.36	4.81	0.00	49.64	54.00	-4.36	Average

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11g Tx mode
<b>Test Channel:</b>	Highest channel	<b>Polarization:</b>	Horizontal
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%



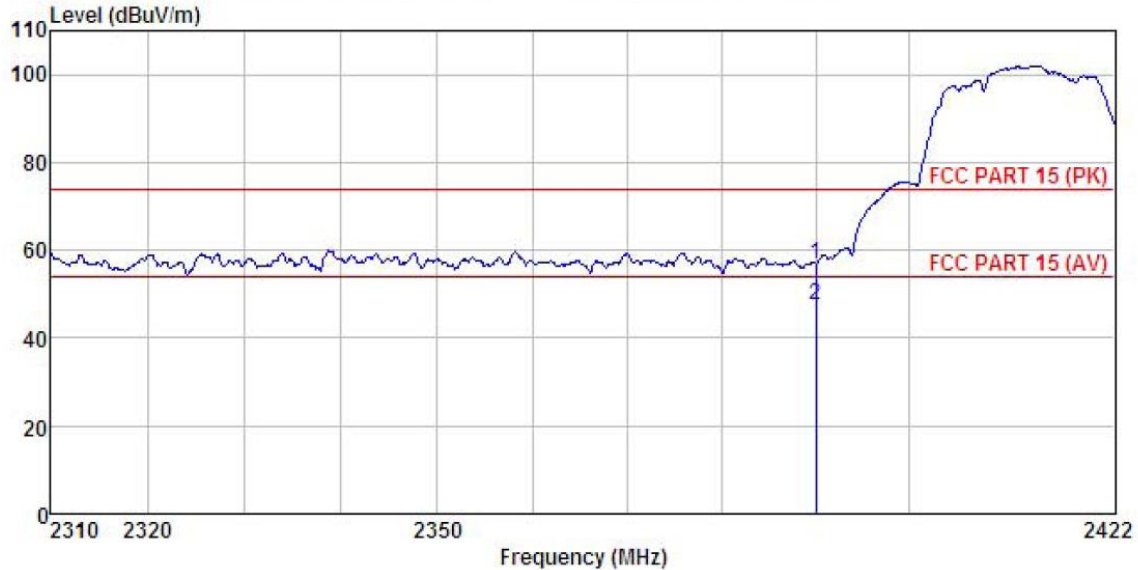
	ReadAntenna	Cable Preamp	Limit	Over					
Freq	Level Factor	Loss Factor	Line	Limit	Remark				
MHz	dBuV	dB/m	dB	dB	dBuV/m				
1	2483.500	23.41	27.35	4.81	0.00	57.27	74.00	-16.73	Peak
2	2483.500	13.76	27.35	4.81	0.00	47.62	54.00	-6.38	Average

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

802.11n(HT20):

<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11n(HT20) Tx mode
<b>Test Channel:</b>	Lowest channel	<b>Polarization:</b>	Vertical
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%

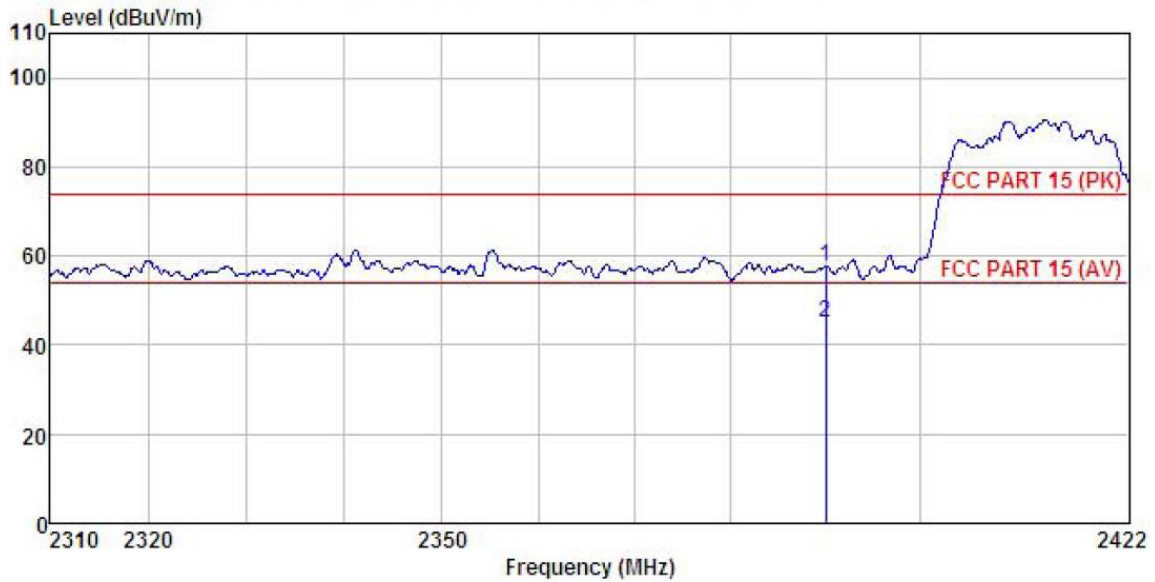


	Read	Antenna	Cable	Preamp	Level	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	23.48	27.07	4.69	0.00	56.92	74.00	-17.08 Peak
2	2390.000	13.91	27.07	4.69	0.00	47.35	54.00	-6.65 Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11n(HT20) Tx mode
<b>Test Channel:</b>	Lowest channel	<b>Polarization:</b>	Horizontal
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%

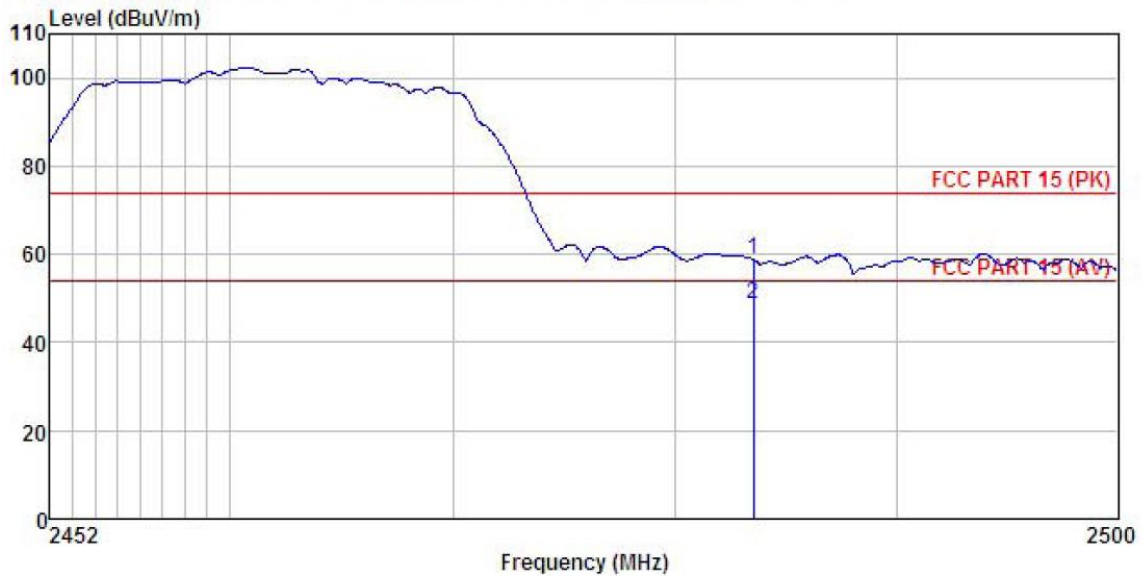


	ReadAntenna	Cable	Preamp	Limit	Over				
Freq	Level	Loss	Factor	Line	Limit	Remark			
MHz	dBuV	dB/m	dB	dB	dBuV/m	dB			
1	2390.000	24.35	27.08	4.69	0.00	57.80	74.00	-16.20	Peak
2	2390.000	11.71	27.08	4.69	0.00	45.16	54.00	-8.84	Average

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11n(HT20) Tx mode
<b>Test Channel:</b>	Highest channel	<b>Polarization:</b>	Vertical
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%

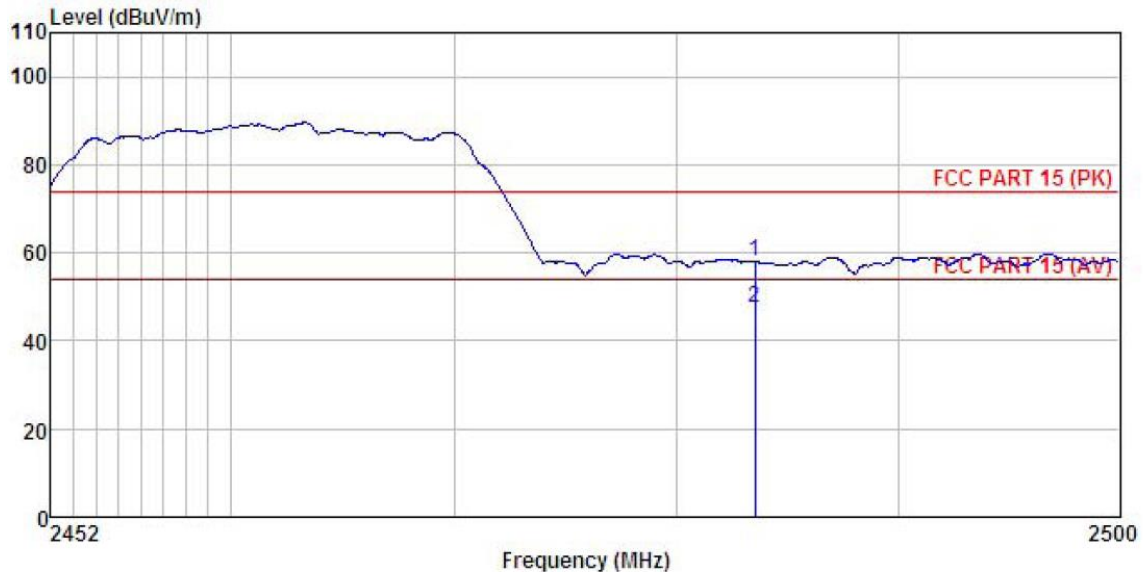


	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	24.89	27.36	4.81	0.00	58.76	74.00	-15.24	Peak
2	2483.500	14.96	27.36	4.81	0.00	48.83	54.00	-5.17	Average

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11n(HT20) Tx mode
<b>Test Channel:</b>	Highest channel	<b>Polarization:</b>	Horizontal
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%



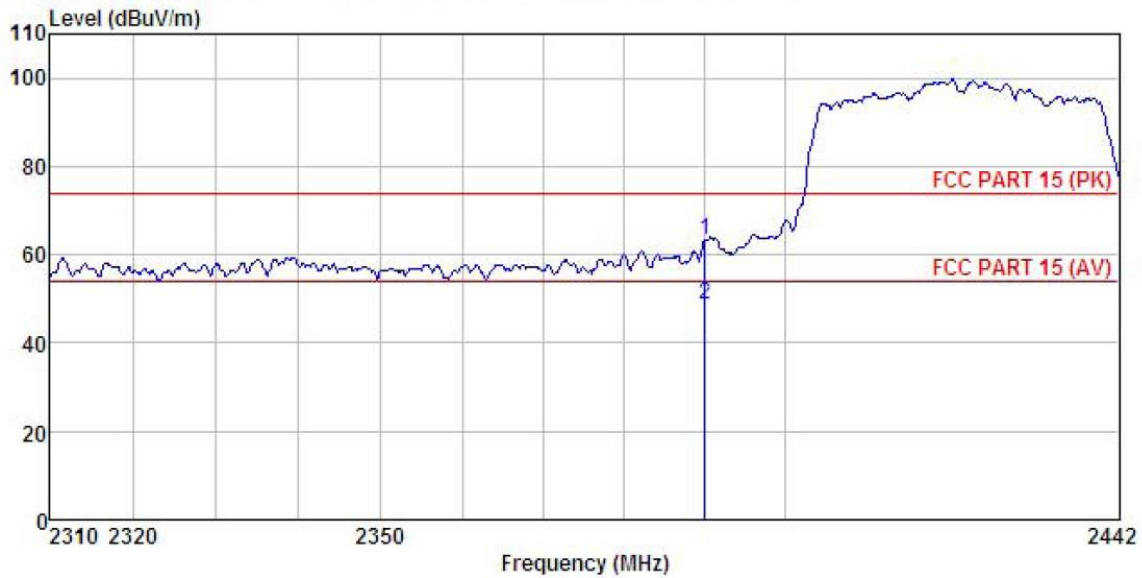
	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	24.34	27.35	4.81	0.00	58.20	74.00	-15.80	Peak
2	2483.500	13.45	27.35	4.81	0.00	47.31	54.00	-6.69	Average

**Remark:**

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
- The emission levels of other frequencies are very lower than the limit and not show in test report.

802.11n(HT40):

<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11n(HT40) Tx mode
<b>Test Channel:</b>	Lowest channel	<b>Polarization:</b>	Vertical
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%



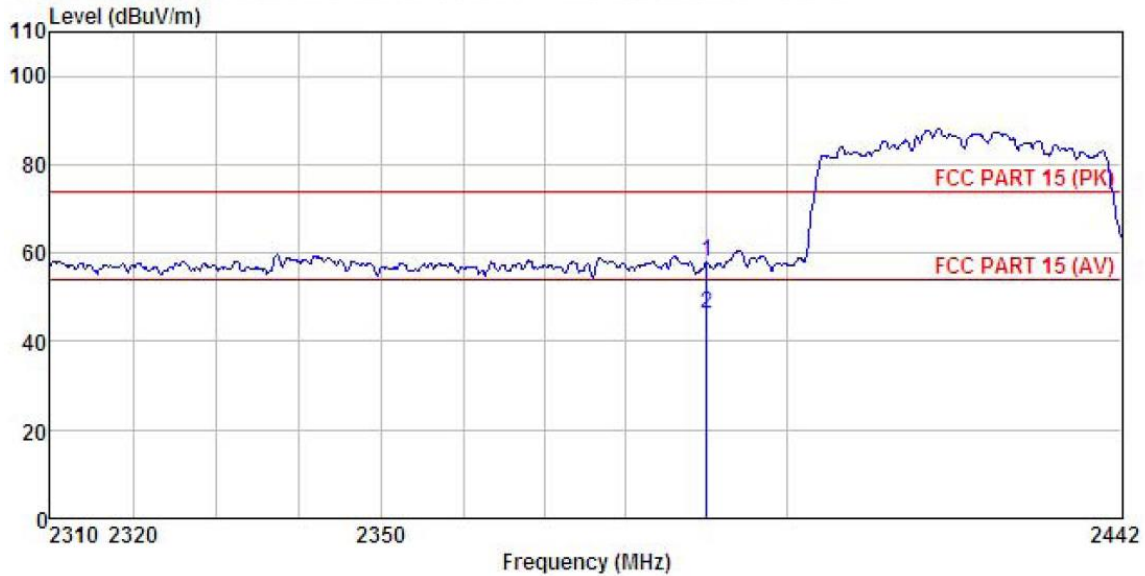
	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over	Remark
	MHz	Level	Loss	Factor	Level	Line	Limit	
		dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2390.000	29.86	27.07	4.69	0.00	63.30	74.00	-10.70 Peak
2	2390.000	15.39	27.07	4.69	0.00	48.83	54.00	-5.17 Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.



<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11n(HT40) Tx mode
<b>Test Channel:</b>	Lowest channel	<b>Polarization:</b>	Horizontal
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%



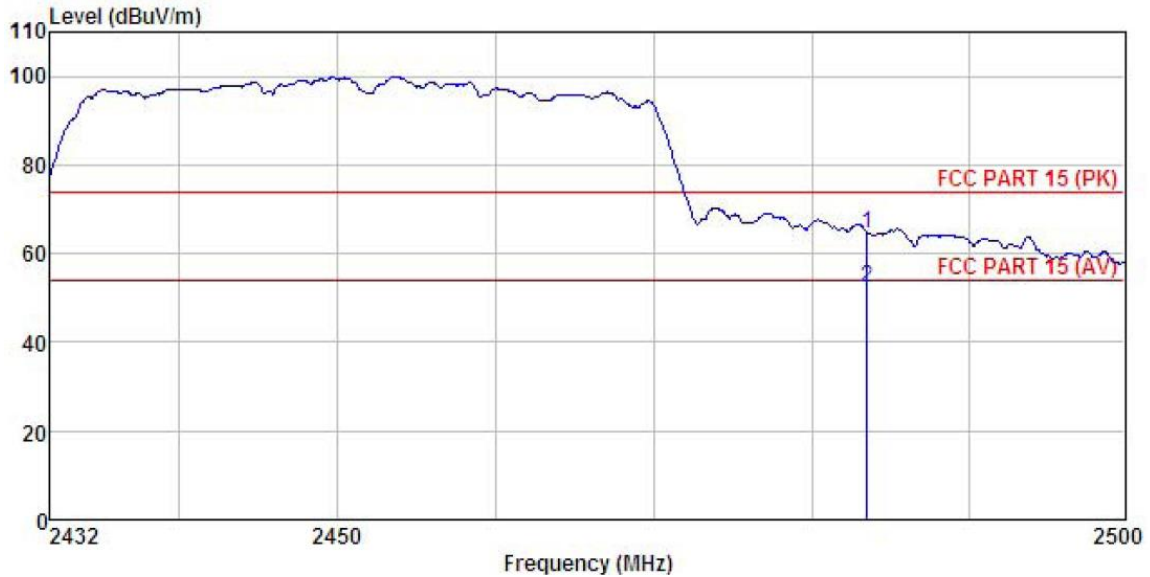
	ReadAntenna	Cable Preamp	Limit	Over					
Freq	Level Factor	Loss Factor	Level	Line	Limit Remark				
MHz	dBuV	dB/m	dB	dB	dBuV/m				
1	2390.000	24.53	27.08	4.69	0.00	57.98	74.00	-16.02	Peak
2	2390.000	12.82	27.08	4.69	0.00	46.27	54.00	-7.73	Average

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.



<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11n(HT40) Tx mode
<b>Test Channel:</b>	Highest channel	<b>Polarization:</b>	Vertical
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%

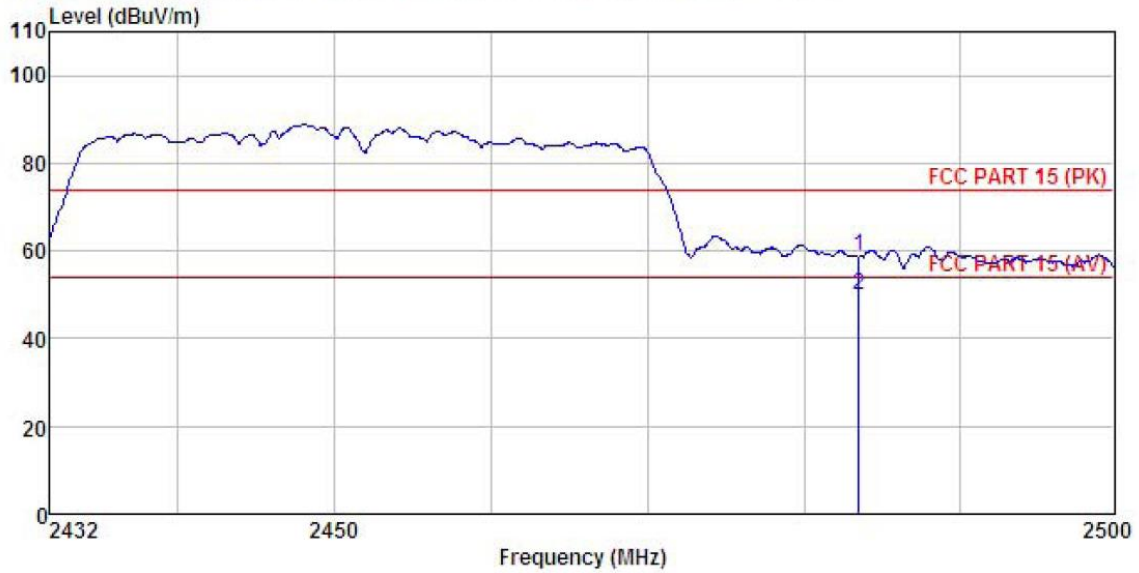


	Read	Antenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	30.83	27.36	4.81	0.00	64.70	74.00	-9.30 Peak
2	2483.500	18.46	27.36	4.81	0.00	52.33	54.00	-1.67 Average

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11n(HT40) Tx mode
<b>Test Channel:</b>	Highest channel	<b>Polarization:</b>	Horizontal
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%



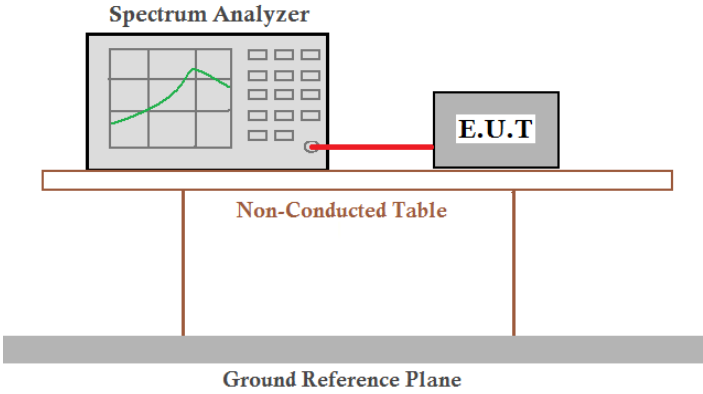
	ReadAntenna	Cable	Preamp	Limit	Over				
Freq	Level	Loss	Factor	Line	Limit	Remark			
MHz	dBuV	dB/m	dB	dB	dBuV/m	dB			
1	2483.500	24.82	27.35	4.81	0.00	58.68	74.00	-15.32	Peak
2	2483.500	16.22	27.35	4.81	0.00	50.08	54.00	-3.92	Average

**Remark:**

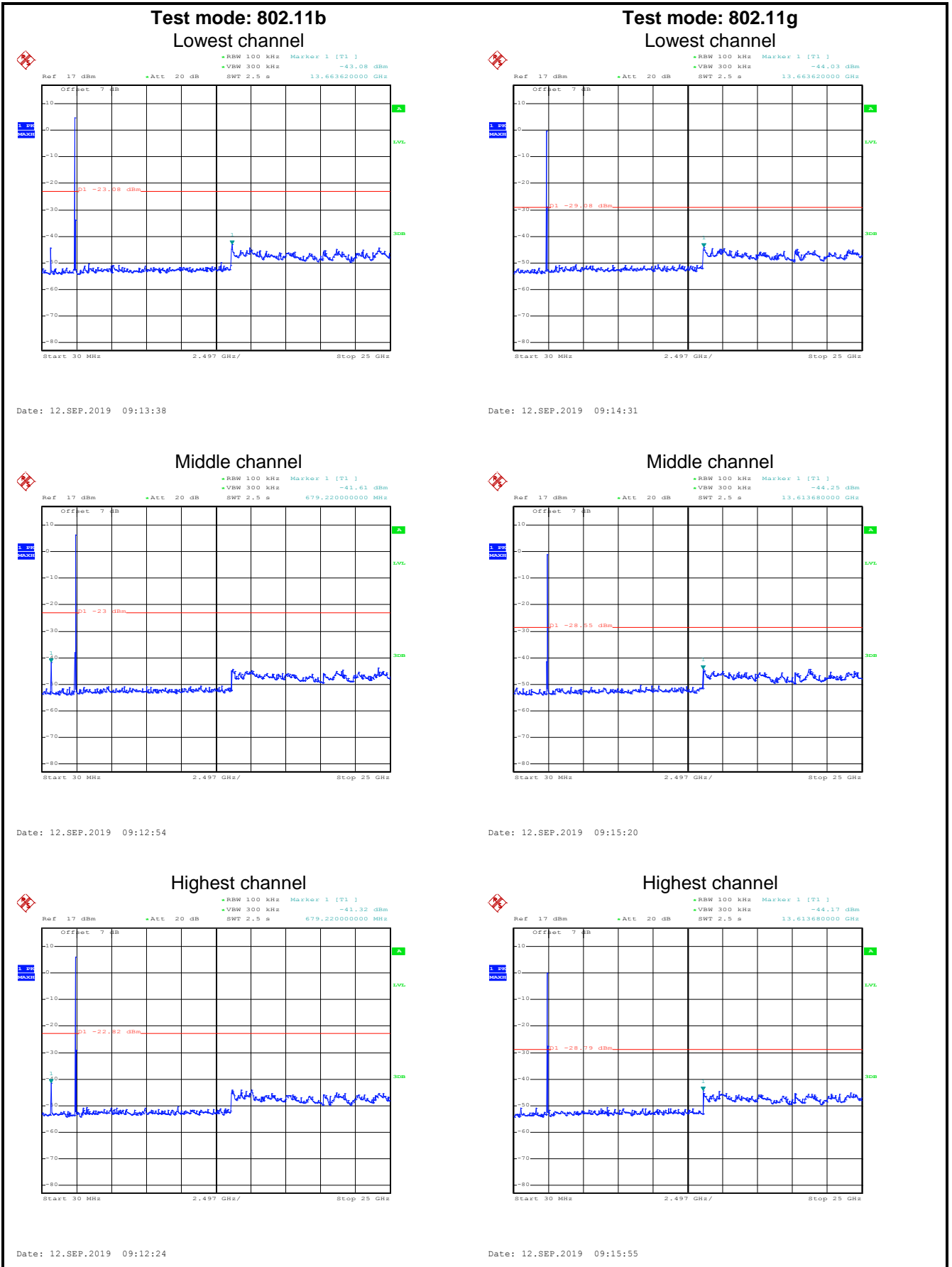
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

## 6.7 Spurious Emission

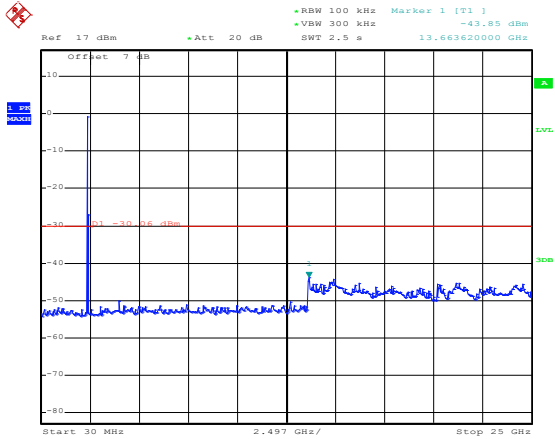
### 6.7.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d)
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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 conducted or a radiated measurement. If the transmitter complies 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.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plot as follows:

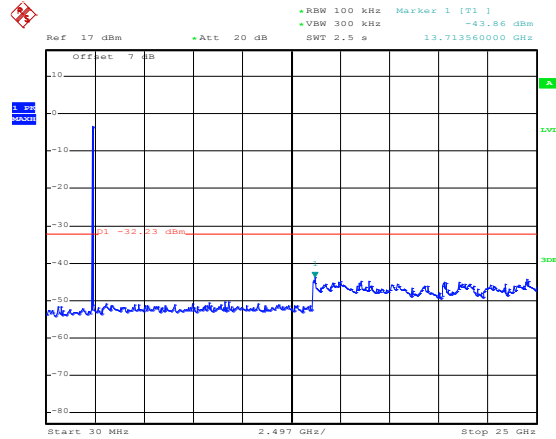


### Test mode: 802.11n(HT20) Lowest channel



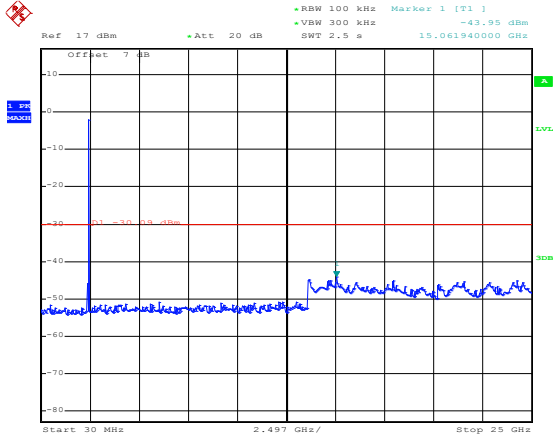
Date: 12.SEP.2019 09:17:50

### Test mode: 802.11n(HT40) Lowest channel



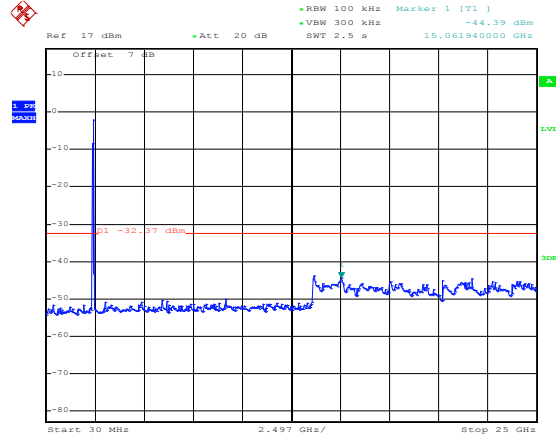
Date: 12.SEP.2019 09:18:38

### Middle channel



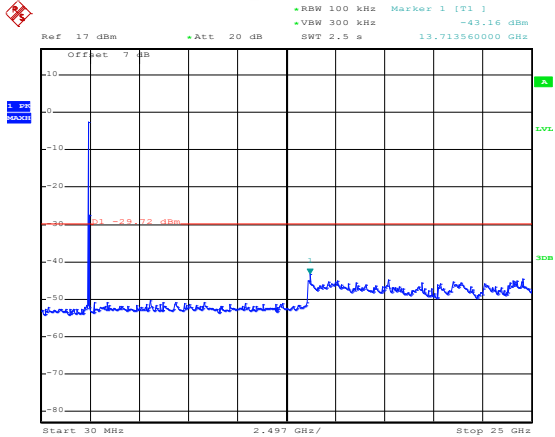
Date: 12.SEP.2019 09:17:09

### Middle channel



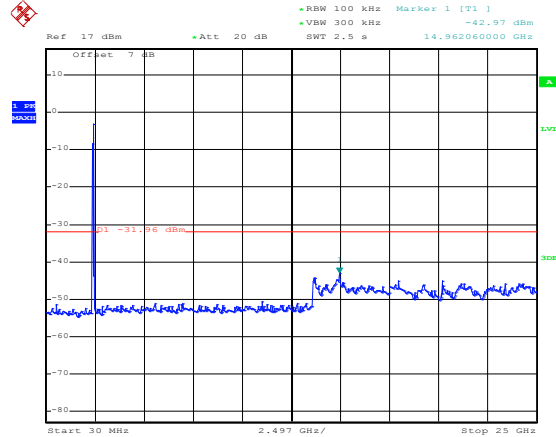
Date: 12.SEP.2019 09:19:23

### Highest channel



Date: 12.SEP.2019 09:16:36

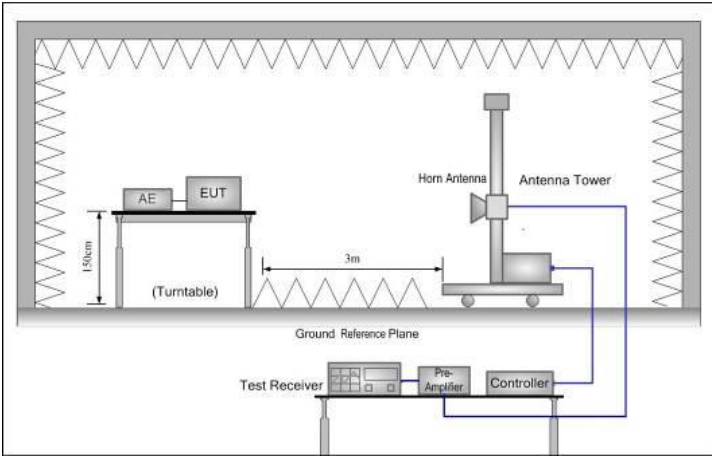
### Highest channel



Date: 12.SEP.2019 09:19:49

## 6.7.2 Radiated Emission Method

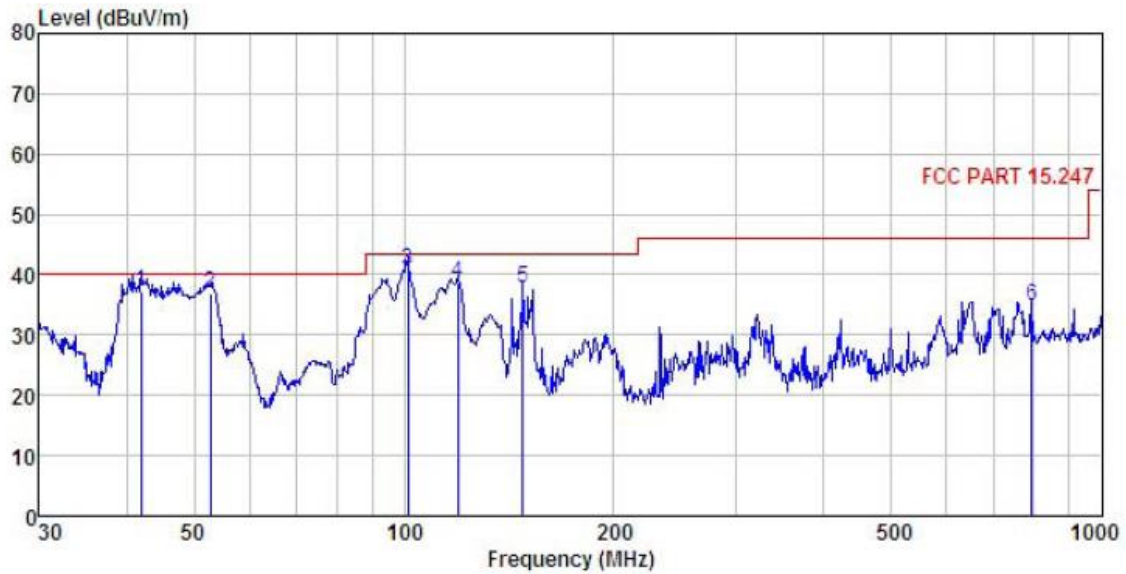
Test Requirement:	FCC Part 15 C Section 15.209 and 15.205				
Test Frequency Range:	9kHz to 25GHz				
Test Distance:	3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
RMS		1MHz	3MHz	Average Value	
Limit:	Frequency	Limit (dBuV/m @3m)		Remark	
	30MHz-88MHz	40.0		Quasi-peak Value	
	88MHz-216MHz	43.5		Quasi-peak Value	
	216MHz-960MHz	46.0		Quasi-peak Value	
	Above 1GHz	54.0		Average Value	
74.0		Peak Value			
Test Procedure:	<ol style="list-style-type: none"> <li>The EUT was placed on the top of a rotating table 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol>				
Test setup:	<p>Below 1GHz</p> <p>Above 1GHz</p>				

	
<p>Test Instruments:</p>	<p>Refer to section 5.8 for details</p>
<p>Test mode:</p>	<p>Refer to section 5.3 for details</p>
<p>Test results:</p>	<p>Passed</p>
<p>Remark:</p>	<ol style="list-style-type: none"> <li>1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case.</li> <li>2. 9 kHz to 30MHz is too low, so only shows the data of above 30MHz in this report.</li> </ol>

**Measurement Data (worst case):**

**Below 1GHz:**

<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11b- Highest channel mode
<b>Test Frequency:</b>	30 MHz ~ 1 GHz	<b>Polarization:</b>	Vertical
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C      Humi: 57%



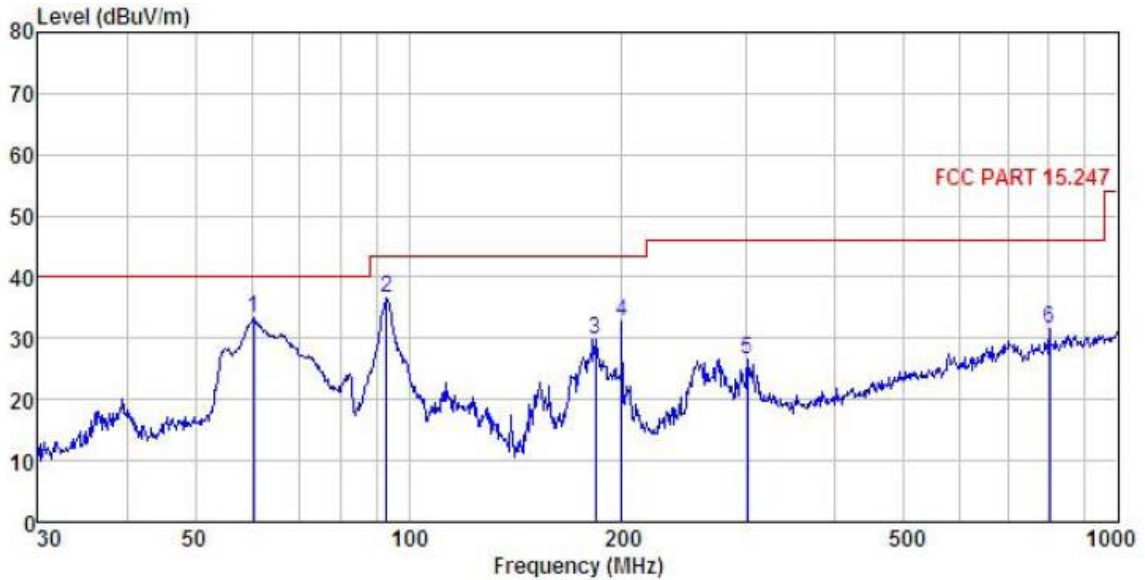
	ReadAntenna	Cable Preamp	Limit	Over					
Freq	Level	Factor	Loss	Factor	Level				
MHz	dBuV	dB/m	dB	dB	dBuV/m				
1	42.007	53.44	12.36	1.24	29.88	37.16	40.00	-2.84	QP
2	52.760	53.47	11.83	1.29	29.81	36.78	40.00	-3.22	QP
3	101.289	55.90	12.39	1.95	29.52	40.72	43.50	-2.78	QP
4	119.436	55.08	10.93	2.16	29.39	38.78	43.50	-4.72	QP
5	147.921	55.37	9.01	2.50	29.23	37.65	43.50	-5.85	QP
6	793.396	37.47	21.39	4.35	28.23	34.98	46.00	-11.02	QP

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.



<b>Product Name:</b>	CM20 Communication Module	<b>Product Model:</b>	CM20
<b>Test By:</b>	Mike	<b>Test mode:</b>	802.11b- Highest channel mode
<b>Test Frequency:</b>	30 MHz ~ 1 GHz	<b>Polarization:</b>	Horizontal
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C      Humi: 57%



	ReadAntenna	Cable Preamp	Limit	Over					
Freq	Level	Factor	Loss	Factor	Level				
MHz	dBuV	dB/m	dB	dB	dBuV/m				
1	60.492	50.45	11.21	1.38	29.77	33.27	40.00	-6.73	QP
2	93.113	53.32	10.87	2.02	29.56	36.65	43.50	-6.85	QP
3	183.201	45.96	10.08	2.75	28.95	29.84	43.50	-13.66	QP
4	199.986	48.11	10.60	2.87	28.83	32.75	43.50	-10.75	QP
5	300.367	38.44	13.63	2.94	28.45	26.56	46.00	-19.44	QP
6	801.786	33.79	21.50	4.34	28.19	31.44	46.00	-14.56	QP

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

**Above 1GHz**

802.11b								
Test channel: Lowest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4824.00	48.96	30.94	6.81	41.82	44.89	74.00	-29.11	Vertical
4824.00	49.07	30.94	6.81	41.82	45.00	74.00	-29.00	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4824.00	38.94	30.94	6.81	41.82	34.87	54.00	-19.13	Vertical
4824.00	39.12	30.94	6.81	41.82	35.05	54.00	-18.95	Horizontal
Test channel: Middle channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4874.00	49.14	31.20	6.85	41.84	45.35	74.00	-28.65	Vertical
4874.00	49.38	31.20	6.85	41.84	45.59	74.00	-28.41	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4874.00	39.10	31.20	6.85	41.84	35.31	54.00	-18.69	Vertical
4874.00	39.24	31.20	6.85	41.84	35.45	54.00	-18.55	Horizontal
Test channel: Highest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4924.00	49.42	31.46	6.89	41.86	45.91	74.00	-28.09	Vertical
4924.00	48.86	31.46	6.89	41.86	45.35	74.00	-28.65	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4924.00	39.21	31.46	6.89	41.86	35.70	54.00	-18.30	Vertical
4924.00	38.96	31.46	6.89	41.86	35.45	54.00	-18.55	Horizontal
Remark:								
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.								
2. The emission levels of other frequencies are very lower than the limit and not show in test report.								

802.11g								
Test channel: Lowest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4824.00	49.16	30.94	6.81	41.82	45.09	74.00	-28.91	Vertical
4824.00	48.97	30.94	6.81	41.82	44.90	74.00	-29.10	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4824.00	39.06	30.94	6.81	41.82	34.99	54.00	-19.01	Vertical
4824.00	38.87	30.94	6.81	41.82	34.80	54.00	-19.20	Horizontal
Test channel: Middle channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4874.00	49.32	31.20	6.85	41.84	45.53	74.00	-28.47	Vertical
4874.00	48.75	31.20	6.85	41.84	44.96	74.00	-29.04	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4874.00	39.14	31.20	6.85	41.84	35.35	54.00	-18.65	Vertical
4874.00	38.26	31.20	6.85	41.84	34.47	54.00	-19.53	Horizontal
Test channel: Highest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4924.00	48.96	31.46	6.89	41.86	45.45	74.00	-28.55	Vertical
4924.00	49.57	31.46	6.89	41.86	46.06	74.00	-27.94	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4924.00	38.67	31.46	6.89	41.86	35.16	54.00	-18.84	Vertical
4924.00	39.43	31.46	6.89	41.86	35.92	54.00	-18.08	Horizontal
Remark:								
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.								
2. The emission levels of other frequencies are very lower than the limit and not show in test report.								

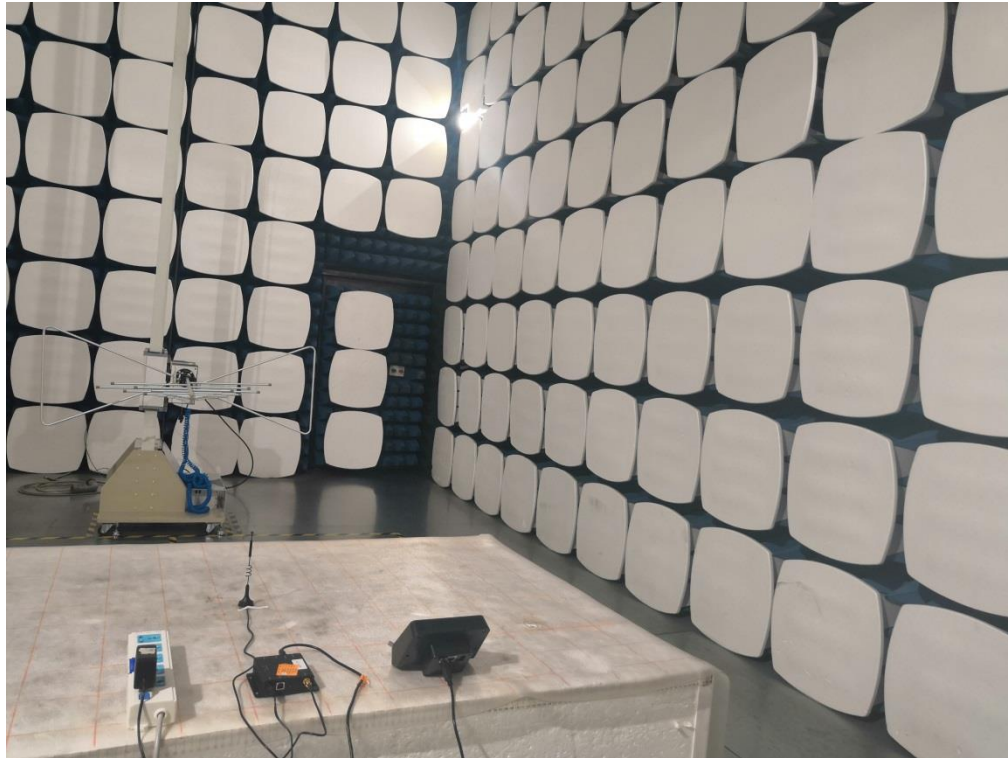
802.11(HT20)								
Test channel: Lowest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4824.00	49.23	36.06	6.81	41.82	50.28	74.00	-23.72	Vertical
4824.00	49.06	36.06	6.81	41.82	50.11	74.00	-23.89	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4824.00	39.14	36.06	6.81	41.82	40.19	54.00	-13.81	Vertical
4824.00	38.98	36.06	6.81	41.82	40.03	54.00	-13.97	Horizontal
Test channel: Middle channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4874.00	49.73	36.32	6.85	41.84	51.06	74.00	-22.94	Vertical
4874.00	48.95	36.32	6.85	41.84	50.28	74.00	-23.72	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4874.00	39.12	36.32	6.85	41.84	40.45	54.00	-13.55	Vertical
4874.00	38.79	36.32	6.85	41.84	40.12	54.00	-13.88	Horizontal
Test channel: Highest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4924.00	48.97	36.58	6.89	41.86	50.58	74.00	-23.42	Vertical
4924.00	49.21	36.58	6.89	41.86	50.82	74.00	-23.18	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4924.00	39.08	36.58	6.89	41.86	40.69	54.00	-13.31	Vertical
4924.00	39.34	36.58	6.89	41.86	40.95	54.00	-13.05	Horizontal
Remark:								
3. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.								
4. The emission levels of other frequencies are very lower than the limit and not show in test report.								

802.11n(HT40)								
Test channel: Lowest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4844.00	49.17	36.06	6.81	41.82	50.22	74.00	-23.78	Vertical
4844.00	49.08	36.06	6.81	41.82	50.13	74.00	-23.87	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4844.00	39.26	36.06	6.81	41.82	40.31	54.00	-13.69	Vertical
4844.00	38.97	36.06	6.81	41.82	40.02	54.00	-13.98	Horizontal
Test channel: Middle channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4874.00	49.52	36.32	6.85	41.84	50.85	74.00	-23.15	Vertical
4874.00	48.98	36.32	6.85	41.84	50.31	74.00	-23.69	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4874.00	39.07	36.32	6.85	41.84	40.40	54.00	-13.60	Vertical
4874.00	38.89	36.32	6.85	41.84	40.22	54.00	-13.78	Horizontal
Test channel: Highest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4904.00	48.98	36.45	6.87	41.85	50.45	74.00	-23.55	Vertical
4904.00	49.35	36.45	6.87	41.85	50.82	74.00	-23.18	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4904.00	38.73	36.45	6.87	41.85	40.20	54.00	-13.80	Vertical
4904.00	39.06	36.45	6.87	41.85	40.53	54.00	-13.47	Horizontal
<b>Remark:</b> 1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor. 2. The emission levels of other frequencies are very lower than the limit and not show in test report.								

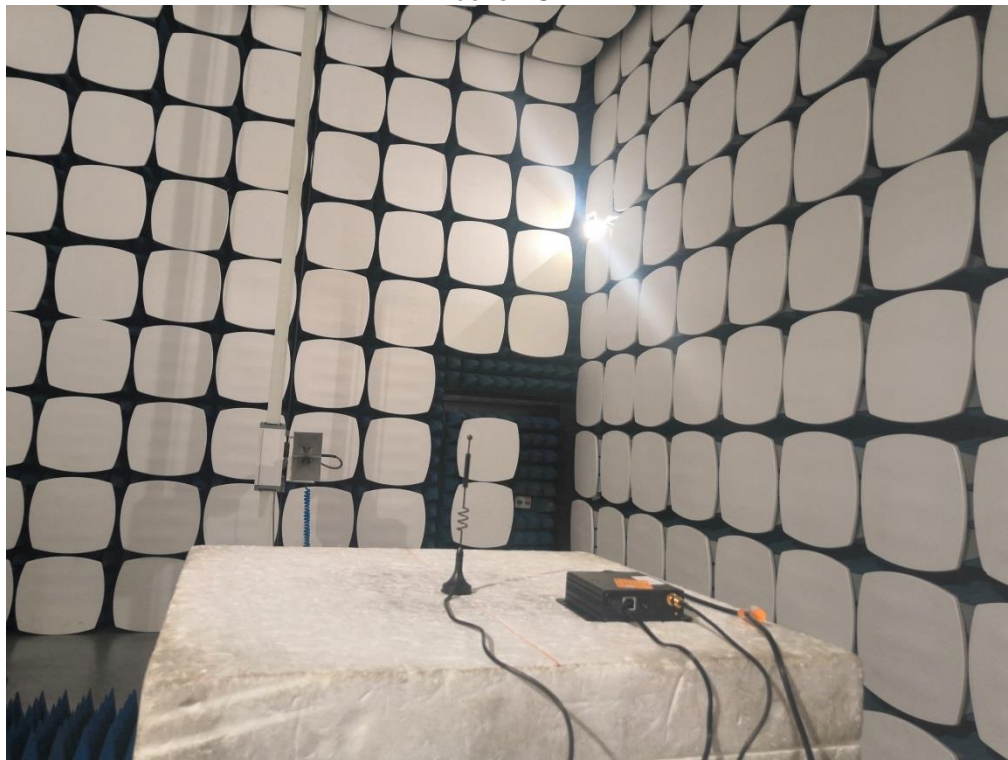


## 7 Test Setup Photo

Radiated Spurious Emission  
Below 1GHz



Above 1GHz



### Conducted Emission



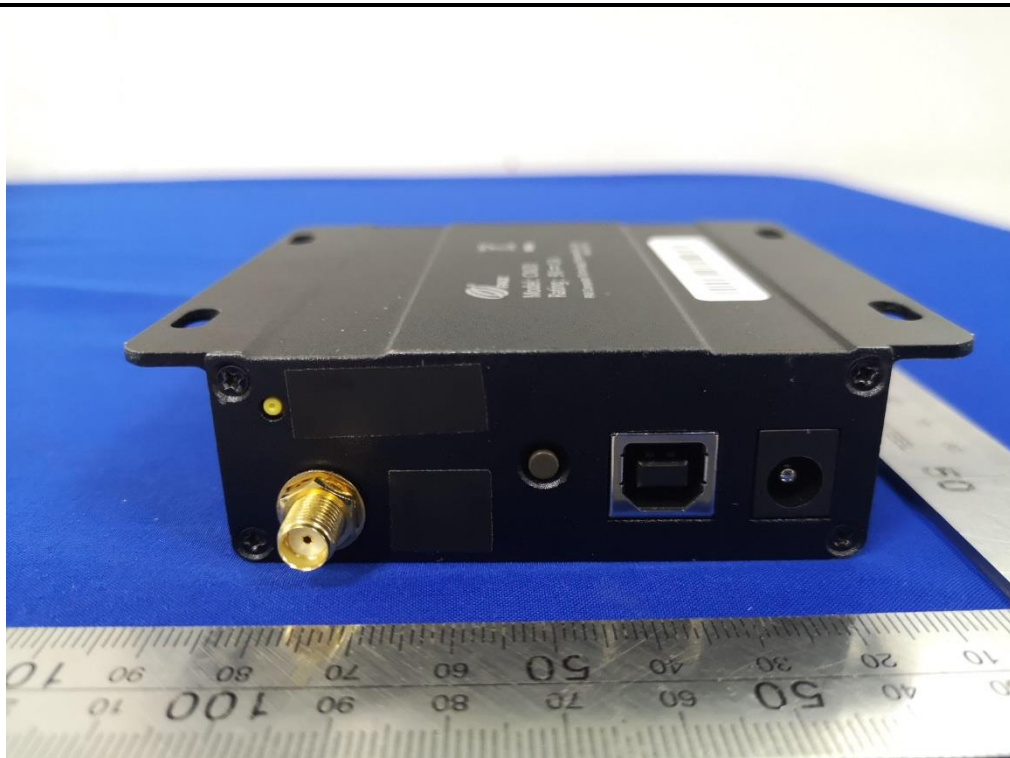
## 8 EUT Constructional Details





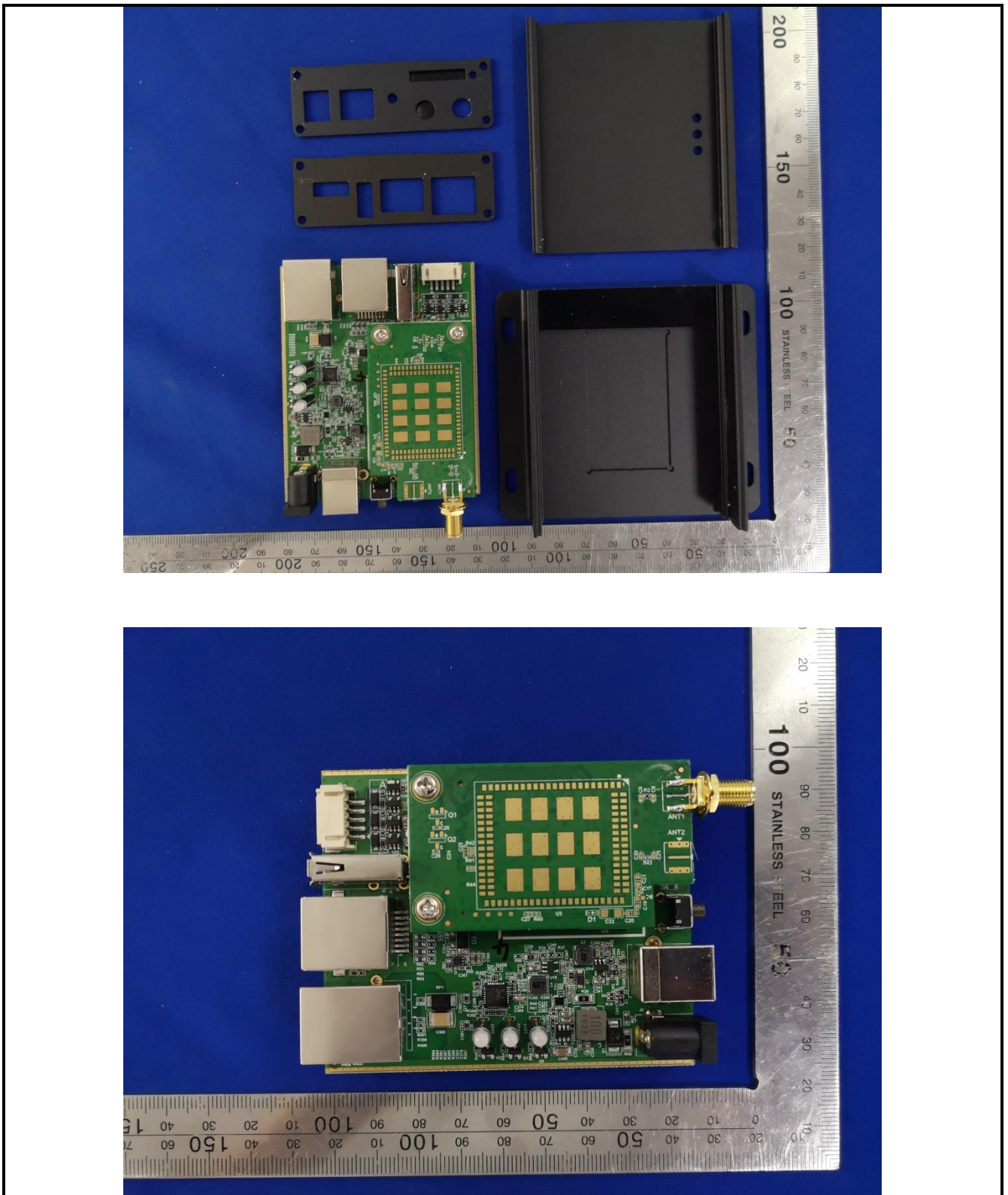




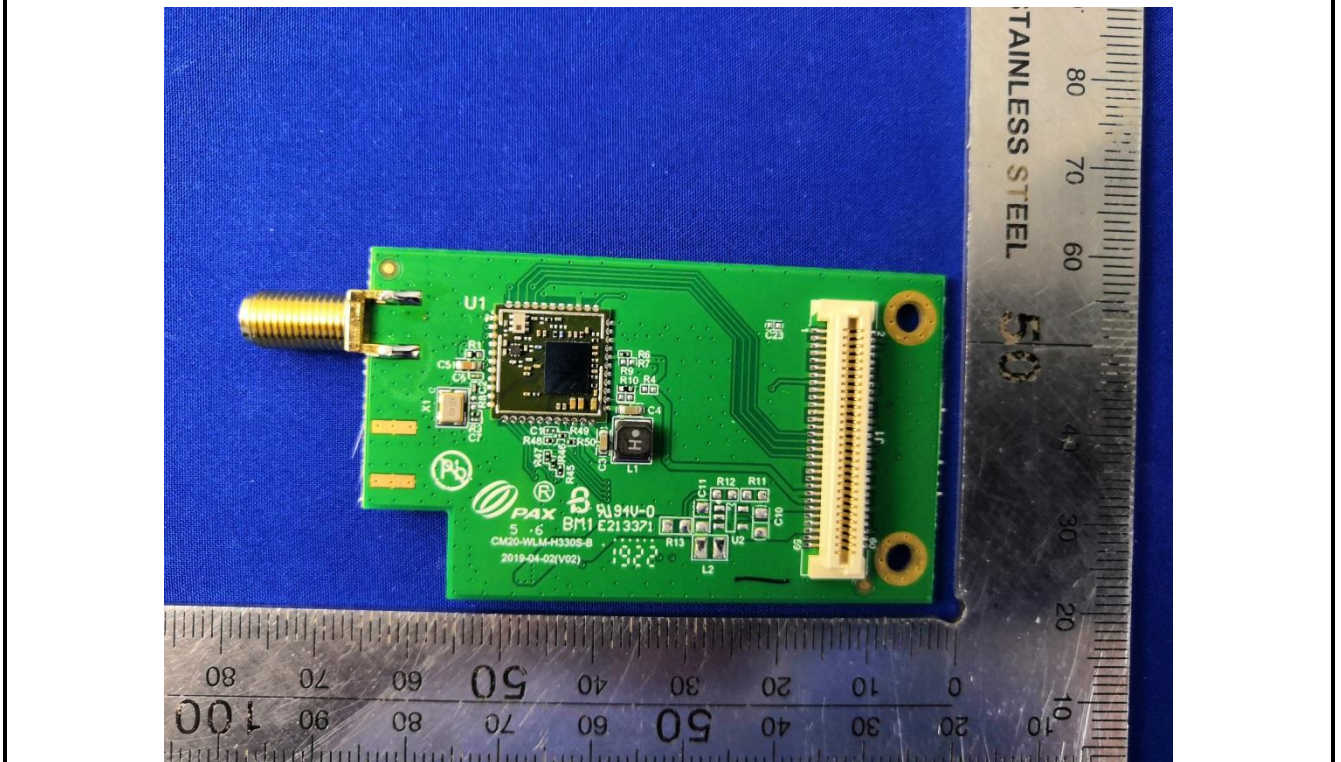
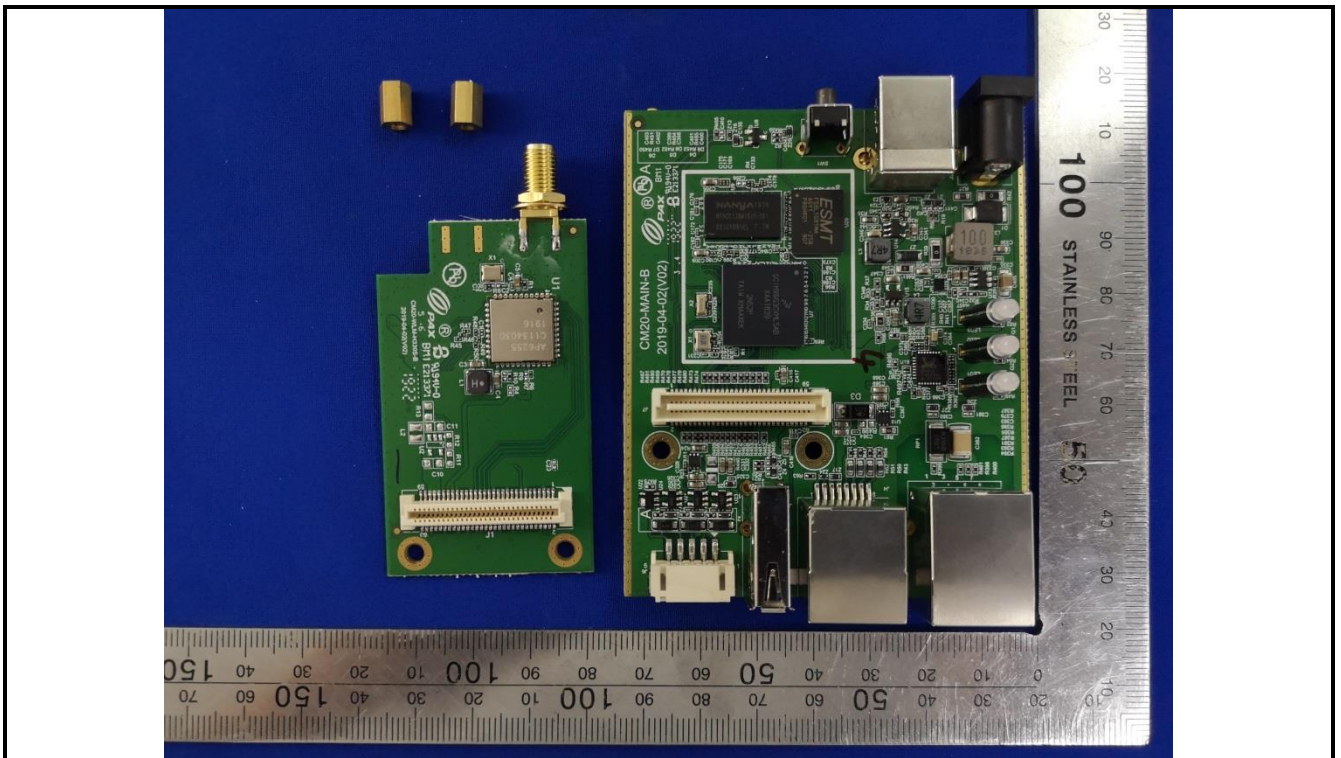


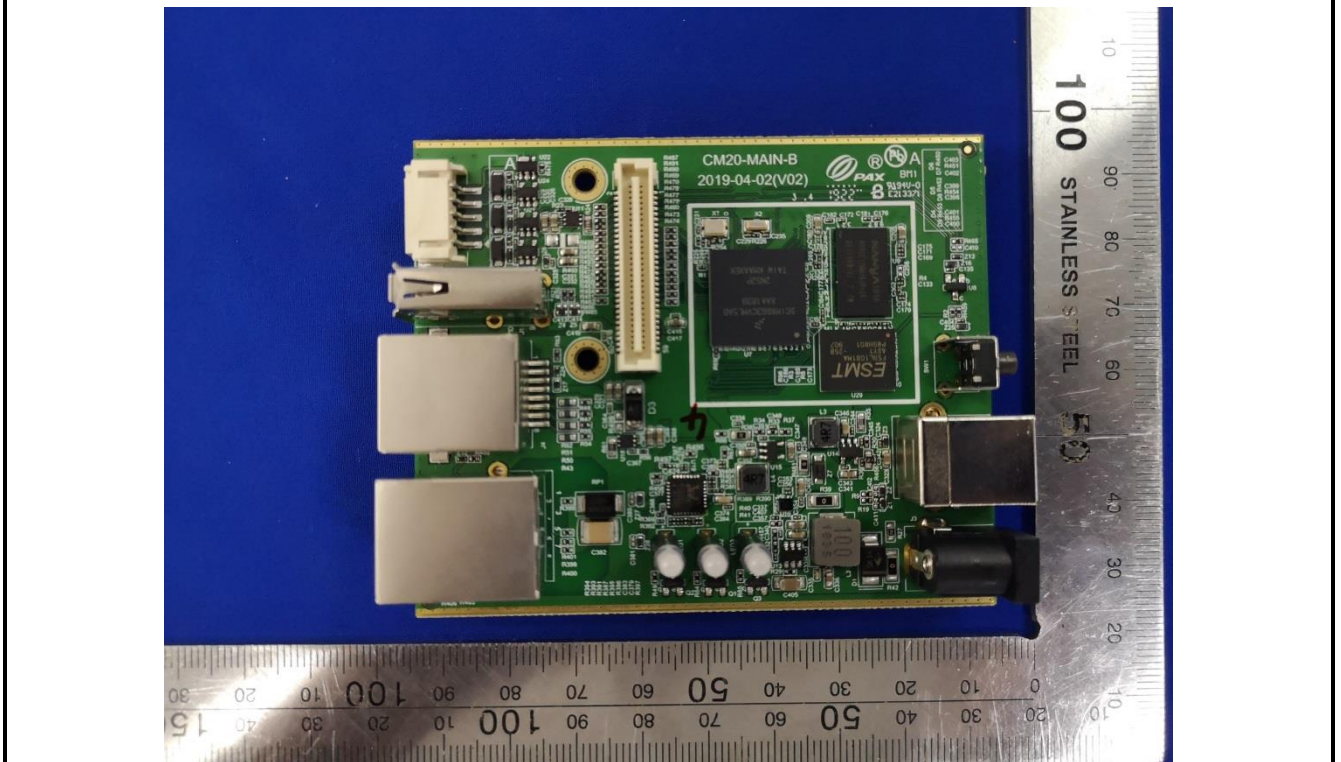
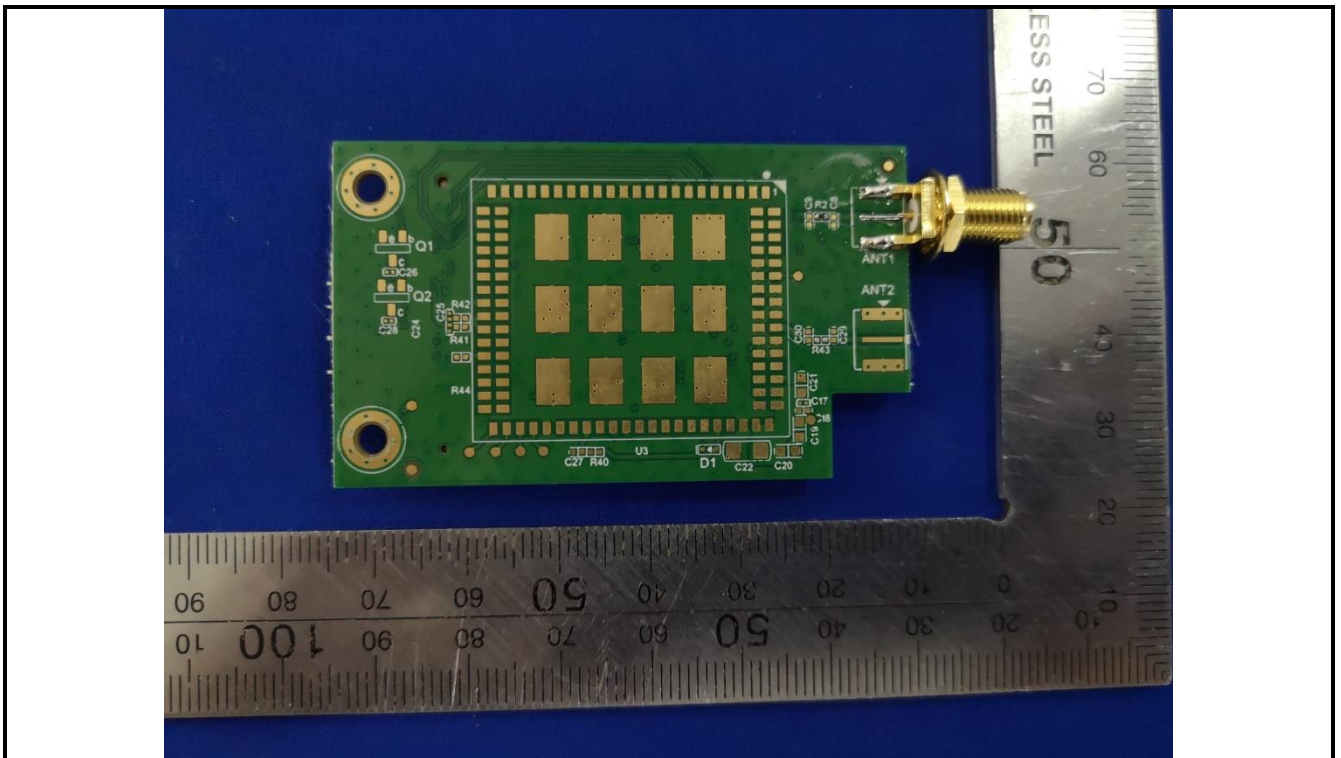




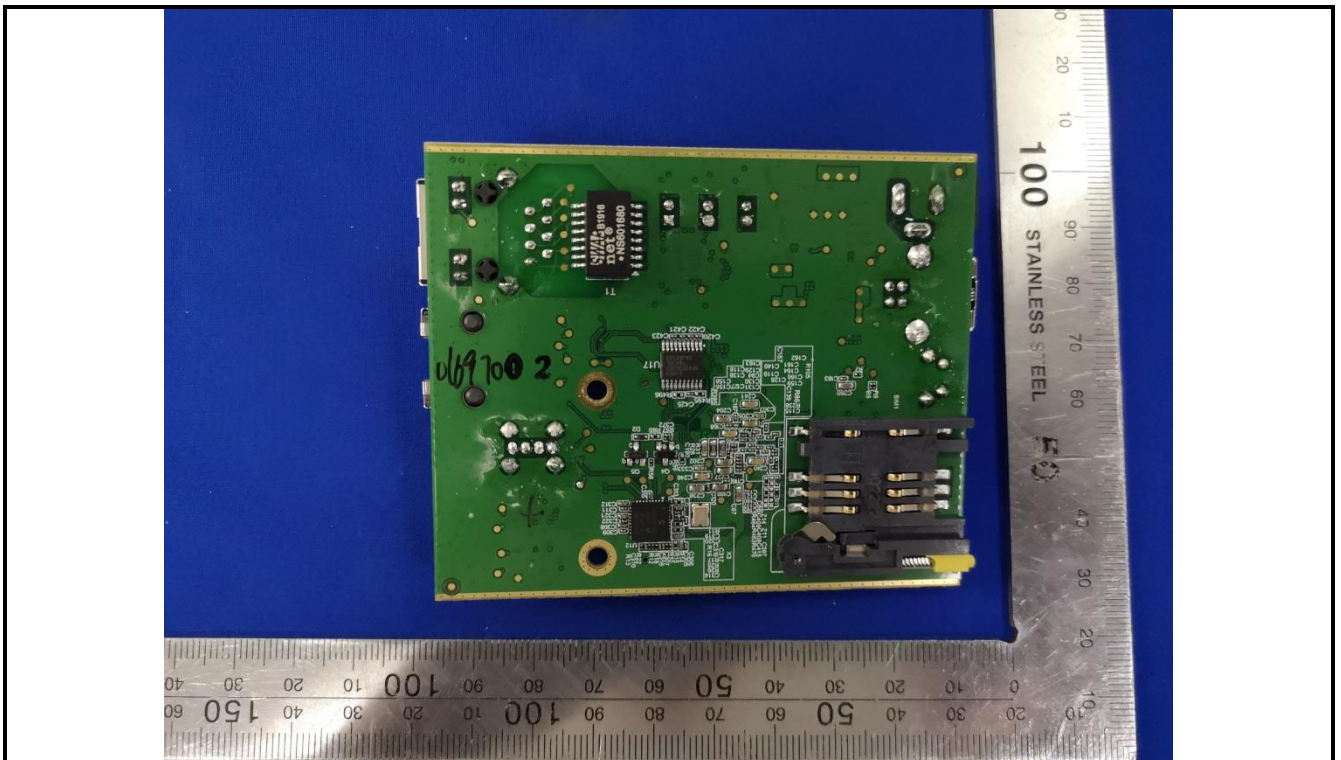












-----End of report-----