



## TEST REPORT

No. I20D00101-SRD23

*For*

**Client: NetEase Youdao Information Technology  
(Beijing) Co., Ltd.**

**Production: Youdao Dictionary Pen 2**

**Model Name: YDP021**

**Brand Name: youdao**

**FCC ID : 2AV6G-YDP021**

**Hardware Version: WM86-V4**

**Software Version: V1.3.6AD**

**Issued date: 2020-09-15**

## NOTE

1. The test results in this test report relate only to the devices specified in this report.
2. This report shall not be reproduced except in full without the written approval of East China Institute of Telecommunications.
3. For the test results, the uncertainty of measurement is not taken into account when judging the compliance with specification, and the results of measurement or the average value of measurement results are taken as the criterion of the compliance with specification directly.

**Test Laboratory:**

East China Institute of Telecommunications

Add: Block No.4, No.766, Jingang Road, Pudong District, Shanghai, P. R. China

Tel: +86 21 63843300

E-Mail: [welcome@ecit.org.cn](mailto:welcome@ecit.org.cn)

**Revision Version**

<b>Report Number</b>	<b>Revision</b>	<b>Date</b>	<b>Memo</b>
I20D00101-SRD23	00	2020-09-02	Initial creation of test report
I20D00101-SRD23	01	2020-09-15	First modification of test report

## CONTENTS

1. TEST LABORATORY.....	6
1.1. TESTING LOCATION .....	6
1.2. TESTING ENVIRONMENT.....	6
1.3. PROJECT DATA.....	6
1.4. SIGNATURE .....	6
2. CLIENT INFORMATION.....	7
2.1. APPLICANT INFORMATION .....	7
2.2. MANUFACTURER INFORMATION .....	7
3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE).....	8
3.1. ABOUT EUT .....	8
3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST.....	8
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST .....	8
4. REFERENCE DOCUMENTS .....	9
4.1. DOCUMENTS SUPPLIED BY APPLICANT .....	9
4.2. REFERENCE DOCUMENTS FOR TESTING .....	9
5. TEST RESULTS .....	10
5.1. SUMMARY OF TEST RESULTS.....	10
5.2. STATEMENTS .....	11
6. TEST EQUIPMENTS UTILIZED .....	12
6.1. CONDUCTED TEST SYSTEM.....	12
6.2. RADIATED EMISSION TEST SYSTEM.....	12
6.3. SOFTWARE.....	12
7. MEASUREMENT UNCERTAINTY.....	13
8. TEST ENVIRONMENT .....	14
ANNEX A. DETAILED TEST RESULTS.....	15

<b>ANNEX A.1.</b>	<b>OUTPUT POWER-CONDUCTED .....</b>	<b>15</b>
<b>ANNEX A.2.</b>	<b>PEAK POWER SPECTRAL DENSITY .....</b>	<b>16</b>
<b>ANNEX A.3.</b>	<b>OCCUPIED 6DB BANDWIDTH .....</b>	<b>20</b>
<b>ANNEX A.4.</b>	<b>BAND EDGES COMPLIANCE .....</b>	<b>24</b>
<b>ANNEX A.5.</b>	<b>TRANSMITTER SPURIOUS EMISSION-CONDUCTED.....</b>	<b>27</b>
<b>ANNEX A.6.</b>	<b>TRANSMITTER SPURIOUS EMISSION-RADIATED .....</b>	<b>34</b>
<b>ANNEX A.7.</b>	<b>AC POWERLINE CONDUCTED EMISSION.....</b>	<b>48</b>
<b>ANNEX B.</b>	<b>ACCREDITATION CERTIFICATE .....</b>	<b>50</b>

## 1. Test Laboratory

### 1.1. Testing Location

Company Name	East China Institute of Telecommunications
Address	Block No.4, No.766, Jingang Road, Pudong District, Shanghai, P. R. China
Postal Code	201206
Telephone	+86 21 63843300
FCC registration No	CN1177

### 1.2. Testing Environment

Normal Temperature	15°C-35°C
Relative Humidity	20%-75%

### 1.3. Project Data

Project Leader	Xu Yuting
Testing Start Date	2020-07-20
Testing End Date	2020-07-27

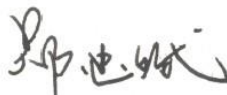
### 1.4. Signature



\_\_\_\_\_  
**Liu Yan**  
(Prepared this test report)



\_\_\_\_\_  
**Fan Songyan**  
(Reviewed this test report)



\_\_\_\_\_  
**Zheng Zhongbin**  
(Approved this test report)

## 2. Client Information

### 2.1. Applicant Information

Company Name	NetEase Youdao Information Technology (Beijing) Co., Ltd.
Address	No.7 Building,Zhongguancun Software Park West No.10 Xibeiwang East RD,Haidian
Telephone	+86 13810968741
Postcode	100193

### 2.2. Manufacturer Information

Company Name	Mobiwire Mobiles(NingBo) Co.,LTD
Address	Building A,No.999 Dacheng East Road,Fenghua District,Ningbo City,Zhejiang Province,PRC
Telephone	13586835362
Postcode	/

### 3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

#### 3.1. About EUT

Production	Youdao Dictionary Pen 2
Model name	YDP021
WLAN Frequency	2412MHz-2462MHz
WLAN Channel	Ch1-11
WLAN type of modulation	802.11b:DSSS 802.11g/n: OFDM
Extreme Temperature	-10/+50°C
Nominal Voltage	3.85V
Extreme High Voltage	4.40 V
Extreme Low Voltage	3.50V
Maximum of Antenna Gain	2.4GHz: -0.37dBi

Note:

- a. Photographs of EUT are shown in ANNEX A of this test report.
- b. The value of the antenna gain is provided by the customer. For specific antenna information, please check the antenna specifications of the customer.

#### 3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
N01	/	WM86-V4	V1.3.6AD	2020-07-14
N02	/	WM86-V4	V1.3.6AD	2020-07-14

\*EUT ID: is used to identify the test sample in the lab internally.

#### 3.3. Internal Identification of AE used during the test

AE ID*	Description	Type	Manufacturer
AE1	RF cable	/	AE1

\*AE ID: is used to identify the test sample in the lab internally.



## 4. Reference Documents

### 4.1. Documents supplied by applicant

All technical documents are supplied by the client or manufacturer, which is the basis of testing.

### 4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.	2018-10-01
ANSI 63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013
KDB 558074	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247	v05r02

## 5. Test Results

### 5.1. Summary of Test Results

Measurement Items	Sub-clause of Part15C	Verdict
Maximum Peak Output Power	15.247(a)	P
Peak Power Spectral Density	15.247(e)	P
Occupied 6dB Bandwidth	15.247(d)	P
Band Edges Compliance	15.247(b)	P
Transmitter Spurious Emission-Conducted	15.247	P
Transmitter Spurious Emission-Radiated	15.209,15.247	P
AC Powerline Conducted Emission	15.107,15.207	P

Note: please refer to Annex A in this test report for the detailed test results.

Please refer to part 5 for detail.

The measurements are according to Public notice KDB558074 and ANSI C63.10.

Terms used in Verdict column

The following terms are used in the above table.

P	Pass, the EUT complies with the essential requirements in the standard.
NP	Not Perform, the test was not performed by ECIT.
NA	Not Applicable, the test was not applicable.
F	Fail, the EUT does not comply with the essential requirements in the standard.

#### Test Conditions

Tnom	Normal Temperature
Tmin	Low Temperature
Tmax	High Temperature
Vnom	Normal Voltage
Vmin	Low Voltage
Vmax	High Voltage
Hnom	Norm Humidity
Anom	Norm Air Pressure

For this report, all the test case listed above are tested under Normal Temperature and Normal Voltage, and also under norm humidity, the specific conditions as following:

Temperature	Tnom	25°C
-------------	------	------

Voltage	Vnom	3.85V
Humidity	Hnom	48%
Air Pressure	Anom	1010hPa

## 5.2. Statements

The Youdao Dictionary Pen 2 is a parent model for testing.

ECIT only performed test cases which identified with P/NP/NA/F results in Annex A.

ECIT has verified that the compliance of the tested device specified in section 3 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 4 of this test report.

## 6. Test Equipments Utilized

### 6.1. Conducted Test System

Item	Instrument Name	Type	SN	Manufacturer	Cal. Date	Cal. interval
1	Vector Signal Analyzer	FSQ26	101091	R&S	2020-05-10	1 year
2	DC Power Supply	ZUP60-14	LOC-220Z0 06-0007	TDL-Lambda	2020-05-10	1 year

### 6.2. Radiated Emission Test System

Item	Instrument Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Universal Radio Communication Tester	CMU200	123123	R&S	2020-05-10	1 year
2	EMI Test Receiver	ESU40	100307	R&S	2020-05-10	1 year
3	TRILOG Broadband Antenna	VULB9163	VULB9163- 515	Schwarzbeck	2020-02-28	2 years
4	Double- ridged Waveguide Antenna	ETS-3117	00135890	ETS	2020-02-28	2 years
5	2-Line V-Network	ENV216	101380	R&S	2020-05-10	1 year

#### Climate chamber

No.	Equipment	Model	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Climate chamber	UT333 BT	C191995461	UNI-T	2020-05-10	1 years

### 6.3. Software

Name	Version
Eagle CE WLAN auto test system	V3.0
EMC32	V9.15

#### Anechoic chamber

Fully anechoic chamber by ETS

## 7. Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in ECIT documents . The detailed measurement uncertainty is defined in ECIT documents.

Measurement Items	Range	Confidence Level	Calculated Uncertainty
Peak Output Power-Conducted	2412MHz-2462MHz	95%	$\pm 0.544\text{dB}$
Peak Power Spectral Density	2412MHz-2462MHz	95%	$\pm 0.544\text{dB}$
Occupied 6dB Bandwidth	2412MHz-2462MHz	95%	$\pm 62.04\text{Hz}$
Frequency Band Edges-Conducted	2412MHz-2462MHz	95%	$\pm 0.544\text{dB}$
Conducted Emission	30MHz-2GHz	95%	$\pm 0.90\text{dB}$
Conducted Emission	2GHz-3.6GHz	95%	$\pm 0.88\text{dB}$
Conducted Emission	3.6GHz-8GHz	95%	$\pm 0.96\text{dB}$
Conducted Emission	8GHz-20GHz	95%	$\pm 0.94\text{dB}$
Conducted Emission	20GHz-22GHz	95%	$\pm 0.88\text{dB}$
Conducted Emission	22GHz-26GHz	95%	$\pm 0.86\text{dB}$
Transmitter Spurious Emission-Radiated	9KHz-30MHz	95%	$\pm 5.66\text{dB}$
Transmitter Spurious Emission-Radiated	30MHz-1000MHz	95%	$\pm 4.98\text{dB}$
Transmitter Spurious Emission-Radiated	1000MHz -18000MHz	95%	$\pm 5.06\text{dB}$
Transmitter Spurious Emission-Radiated	18000MHz -40000MHz	95%	$\pm 5.20\text{dB}$
AC Power line Conducted Emission	0.15MHz-30MHz	95%	$\pm 3.66\text{ dB}$

## 8. Test Environment

**Shielding Room1** (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Ground system resistance	< 0.5 Ω

**Control room** did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =30 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

**Fully-anechoic chamber1** (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB,30MHz to 1GHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

## ANNEX A. Detailed Test Results

### ANNEX A.1. Output Power-Conducted

#### A.1.1 Measurement Limit and method:

Standard	Limit(dBm)
FCC 47 Part 15.247(b)	<30

#### A.1.2 Test procedure

The measurement is according to ANSI C63.10 clause 11.2

1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Set  $RBW \geq OBW(1MHz)$ ,  $VBW \geq 3RBW(3MHz)$ .
4. Span : 80MHz
5. Detector: Peak/RMS.
6. Trace mode: Max Hold
7. Spectrum Analyzer setting : Meas—channel PWR ACP—CP/ACP Config—channel bandwidth—20/40MHz

#### A.1.4 Maximum Average Output Power-conducted

##### Measurement Results:

Mode	Test Result(dBm)		
	2412MHz (Ch1)	2437MHz (Ch6)	2462MHz (Ch11)
802.11b	16.46	16.40	16.29
802.11g	16.00	16.04	15.90
802.11n(20MHz)	15.16	15.13	15.05
Mode	2422MHz (Ch3)	2437MHz (Ch6)	2452MHz (Ch9)
802.11n(40MHz)	13.51	13.49	13.36

## ANNEX A.2. Peak Power Spectral Density

### A.2.1 Measurement Limit:

Standard	Limit
FCC 47 Part 15.247(e)	< 8dBm/3 KHz

### A.2.2 Test procedures

The measurement is according to ANSI C63.10 clause 11.10.

1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Set analyzer center frequency to DTS channel center frequency.
4. Set the span to 1.5 times the DTS bandwidth.
5. Set the RBW to  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
6. Set the VBW  $\geq [3 \times \text{RBW}]$ .
7. Detector = peak.
8. Sweep time = auto couple.
9. Trace mode = max hold.
10. Allow trace to fully stabilize.
11. Use the peak marker function to determine the maximum amplitude level within the RBW.
12. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.



**Measurement Results:**

Power Spectral Density(dBm/3kHz) (802.11b,Ch1)	-4.869	Power Spectral Density(dBm/3kHz) (802.11b,Ch6)	-6.203
Power Spectral Density (dBm/3kHz) (802.11b,Ch11)	-5.338	Power Spectral Density (dBm/3kHz) (802.11g,Ch1)	-13.343

Power Spectral Density (dBm/3kHz) (802.11g,Ch6)	-13.762	Power Spectral Density (dBm/3kHz) (802.11g,Ch11)	-13.480
<p>Ref 20 dBm Offset 1.7 dB Att 30 dB RBW 10 kHz VBW 30 kHz SWT 300 ms Marker 1 [T1] -13.76 dBm 2.440509615 GHz</p> <p>Center 2.437 GHz 3 MHz/ Span 30 MHz</p> <p>Date: 18.JUL.2020 15:15:11</p>	<p>Ref 20 dBm Offset 1.7 dB Att 30 dB RBW 10 kHz VBW 30 kHz SWT 300 ms Marker 1 [T1] -13.48 dBm 2.465909625 GHz</p> <p>Center 2.462 GHz 3 MHz/ Span 30 MHz</p> <p>Date: 18.JUL.2020 15:15:57</p>		
Power Spectral Density (dBm/3kHz) (802.11n-20MHz,Ch1)	-14.541	Power Spectral Density (dBm/3kHz) (802.11n-20MHz,Ch6)	-14.929
<p>Ref 20 dBm Offset 1.7 dB Att 30 dB RBW 10 kHz VBW 30 kHz SWT 300 ms Marker 1 [T1] -14.54 dBm 2.419500000 GHz</p> <p>Center 2.412 GHz 3 MHz/ Span 30 MHz</p> <p>Date: 18.JUL.2020 15:18:44</p>	<p>Ref 20 dBm Offset 1.7 dB Att 30 dB RBW 10 kHz VBW 30 kHz SWT 300 ms Marker 1 [T1] -14.93 dBm 2.444500000 GHz</p> <p>Center 2.437 GHz 3 MHz/ Span 30 MHz</p> <p>Date: 18.JUL.2020 15:19:35</p>		

Power Spectral Density (dBm/3kHz) (802.11n-20MHz,Ch11)	-15.237	Power Spectral Density (dBm/3kHz) (802.11n-40MHz,Ch3)	-20.091
<p>Date: 18.JUL.2020 15:20:33</p>	<p>Date: 18.JUL.2020 15:22:19</p>	<p>Date: 18.JUL.2020 15:23:56</p>	<p>Date: 18.JUL.2020 15:25:18</p>

## ANNEX A.3. Occupied 6dB Bandwidth

### A.3.1 Measurement Limit:

Standard	Limit(KHz)
FCC 47 Part 15.247(a)	≥500

### A.3.2 Test procedure

The measurement is according to ANSI C63.10 clause 11.8.

1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Set RBW = 100 kHz.
4. Set the VBW  $\geq [3 \times \text{RBW}]$ .
5. Detector = peak.
6. Trace mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize.
9. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

**Measurement Results:**

Occupied 6dB Bandwidth(MHz) (802.11b,Ch1)	10.06	Occupied 6dB Bandwidth(MHz) (802.11b,Ch6)	9.55
<p>                     Ref: 20 dBm, Offset: 1.7 dB, Att: 30 dB, RBW: 100 kHz, VSW: 300 kHz, SWT: 15 ms.                 </p> <p>                     Date: 17.JUL.2020 14:51:08                 </p>		<p>                     Ref: 20 dBm, Offset: 1.7 dB, Att: 30 dB, RBW: 100 kHz, VSW: 300 kHz, SWT: 15 ms.                 </p> <p>                     Date: 17.JUL.2020 14:52:42                 </p>	
Occupied 6dB Bandwidth(MHz) (802.11b,Ch11)	9.55	Occupied 6dB Bandwidth(MHz) (802.11g,Ch1)	17.69
<p>                     Ref: 20 dBm, Offset: 1.7 dB, Att: 30 dB, RBW: 100 kHz, VSW: 300 kHz, SWT: 15 ms.                 </p> <p>                     Date: 17.JUL.2020 14:53:27                 </p>		<p>                     Ref: 20 dBm, Offset: 1.7 dB, Att: 30 dB, RBW: 100 kHz, VSW: 300 kHz, SWT: 15 ms.                 </p> <p>                     Date: 17.JUL.2020 15:21:46                 </p>	

Occupied 6dB Bandwidth(MHz) (802.11g,Ch6)	17.63	Occupied 6dB Bandwidth(MHz) (802.11g,Ch11)	17.69
<p>Date: 17.JUL.2020 15:22:38</p>		<p>Date: 17.JUL.2020 15:23:27</p>	
Occupied 6dB Bandwidth(MHz) (802.11n-20MHz,Ch1)	17.69	Occupied 6dB Bandwidth(MHz) (802.11n-20MHz,Ch6)	17.69
<p>Date: 17.JUL.2020 15:16:54</p>		<p>Date: 17.JUL.2020 15:17:42</p>	

Occupied 6dB Bandwidth(MHz) (802.11n-20MHz,Ch11)	17.69	Occupied 6dB Bandwidth(MHz) (802.11n-40MHz,Ch3)	35.51
<p>                     Ref 20 dBm *Att 30 dB RBW 100 kHz Marker 3 [T1] -10.83 dBm                      VBW 300 kHz SWT 15 ms 2.470846134 GHz                      Marker 1 [T1] -5.03 dBm 2.46071249 GHz                      Marker 2 [T1] -10.18 dBm 2.46218356 GHz                      Center 2.462 GHz 4 MHz/ Span 40 MHz                      Date: 17.JUL.2020 15:18:32                 </p>		<p>                     Ref 20 dBm *Att 30 dB RBW 100 kHz Marker 3 [T1] -11.32 dBm                      VBW 300 kHz SWT 10 ms 2.439820513 GHz                      Marker 1 [T1] -5.66 dBm 2.42271249 GHz                      Marker 2 [T1] -11.82 dBm 2.434303593 GHz                      Center 2.422 GHz 8 MHz/ Span 80 MHz                      Date: 17.JUL.2020 15:13:26                 </p>	
Occupied 6dB Bandwidth(MHz) (802.11n-40MHz,Ch6)	35.51	Occupied 6dB Bandwidth(MHz) (802.11n-40MHz,Ch9)	35.51
<p>                     Ref 20 dBm *Att 30 dB RBW 100 kHz Marker 3 [T1] -11.95 dBm                      VBW 300 kHz SWT 10 ms 2.454820513 GHz                      Marker 1 [T1] -4.41 dBm 2.432003000 GHz                      Marker 2 [T1] -11.29 dBm 2.438793570 GHz                      Center 2.437 GHz 8 MHz/ Span 80 MHz                      Date: 17.JUL.2020 15:14:31                 </p>		<p>                     Ref 20 dBm *Att 30 dB RBW 100 kHz Marker 3 [T1] -13.33 dBm                      VBW 300 kHz SWT 10 ms 2.470205128 GHz                      Marker 1 [T1] -1.30 dBm 2.447003000 GHz                      Marker 2 [T1] -12.69 dBm 2.453333570 GHz                      Center 2.452 GHz 8 MHz/ Span 80 MHz                      Date: 17.JUL.2020 15:15:36                 </p>	

## ANNEX A.4. Band Edges Compliance

### A.4.1 Measurement Limit:

Standard	Limited(dBc)
FCC 47 Part 15.247(d)	>20

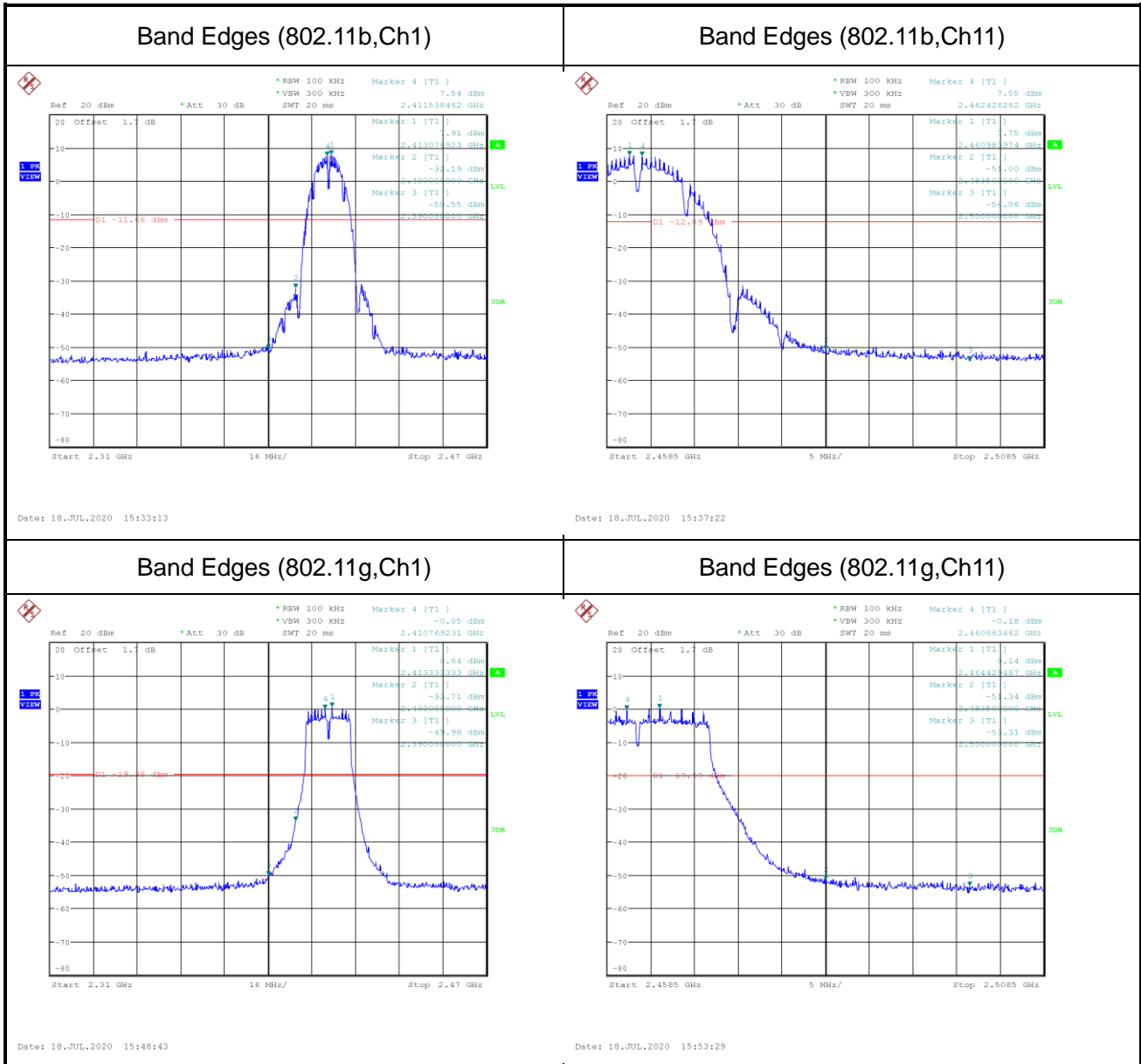
### A.4.2 Test procedures

The measurement is according to ANSI C63.10 clause 11.13.

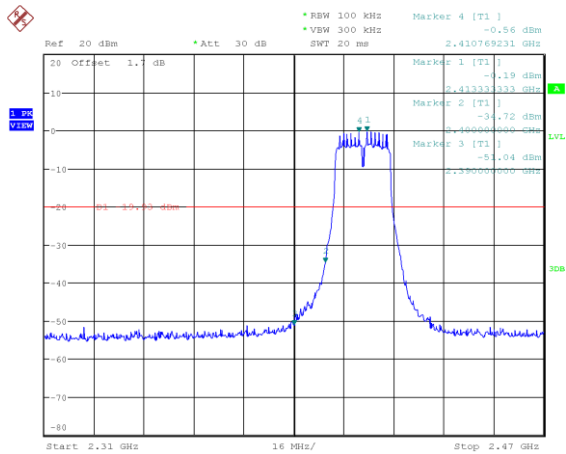
1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Set instrument center frequency to the frequency of the emission to be measured (must be within 2MHz of the authorized band edge).
4. Set span to 2 MHz.
5. RBW = 100 kHz.
6. VBW  $\geq$  [3  $\times$  RBW].
7. Detector = peak.
8. Sweep time = auto.
9. Trace mode = max hold.
10. Allow sweep to continue until the trace stabilizes



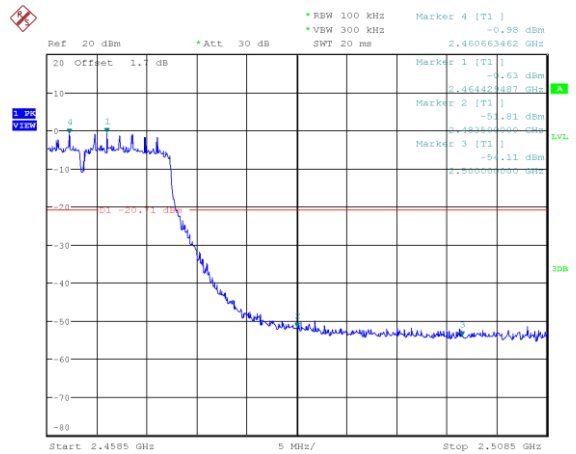
Measurement results:



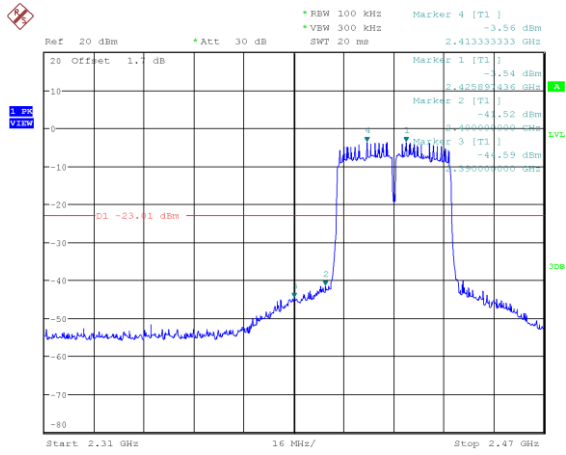
Band Edges (802.11n-20MHz,Ch1)



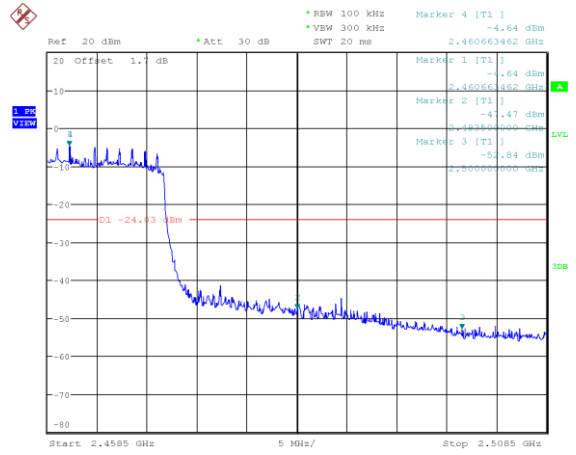
Band Edges (802.11n-20MHz,Ch11)



Band Edges (802.11n-40MHz,Ch3)



Band Edges (802.11n-40MHz,Ch9)



## ANNEX A.5. Transmitter Spurious Emission-conducted

### A.5.1 Measurement Limit:

Standard	Limit
FCC 47 Part 15.247(d)	20dB below peak output power in 100KHz bandwidth

### A.5.2 Test procedures

This measurement is according to ANSI C63.10 clause 11.11.

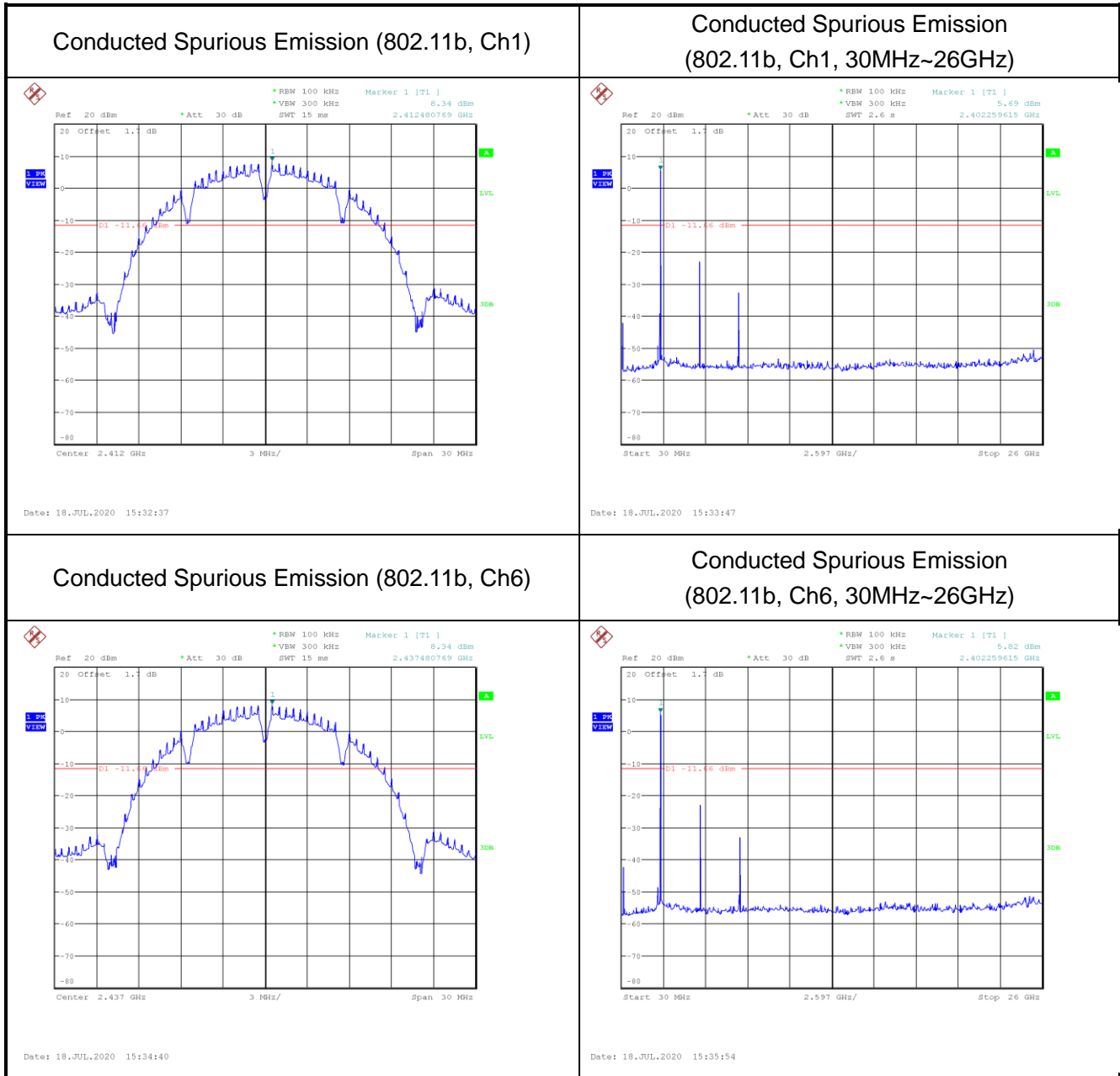
1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.

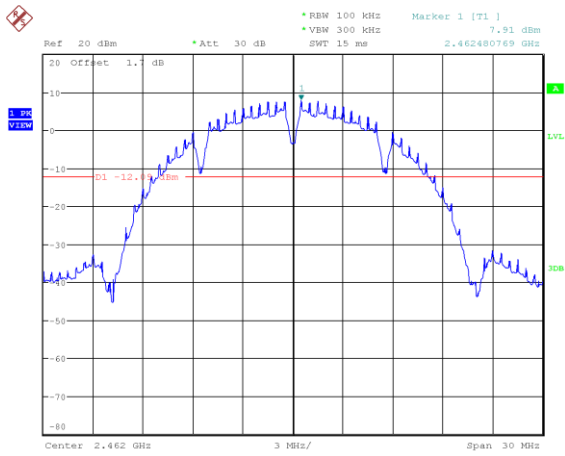
Reference level measurement

3. Set instrument center frequency to DTS channel center frequency.
4. Set the span to  $\geq 1.5$  times the DTS bandwidth.
5. Set the RBW = 100 kHz.
6. Set the VBW  $\geq [3 \times \text{RBW}]$ .
7. Detector = peak.
8. Sweep time = auto couple.
9. Trace mode = max hold.
10. Allow trace to fully stabilize.
11. Use the peak marker function to determine the maximum PSD level.

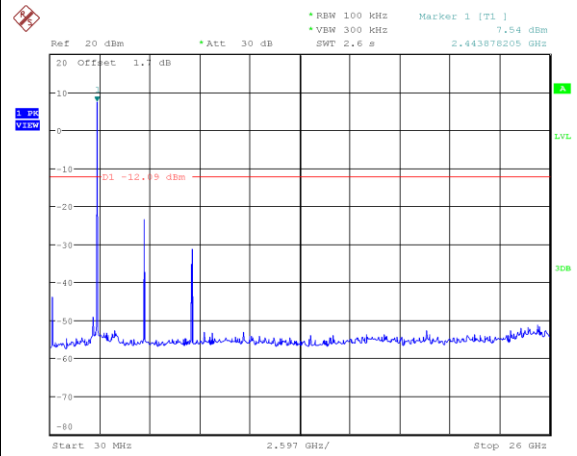
Emission level measurement

12. Set the center frequency and span to encompass frequency range to be measured.
13. Set the RBW = 100 kHz.
14. Set the VBW  $\geq [3 \times \text{RBW}]$ .
15. Detector = peak.
16. Sweep time = auto couple.
17. Trace mode = max hold.
18. Allow trace to fully stabilize.
19. Use the peak marker function to determine the maximum amplitude level.

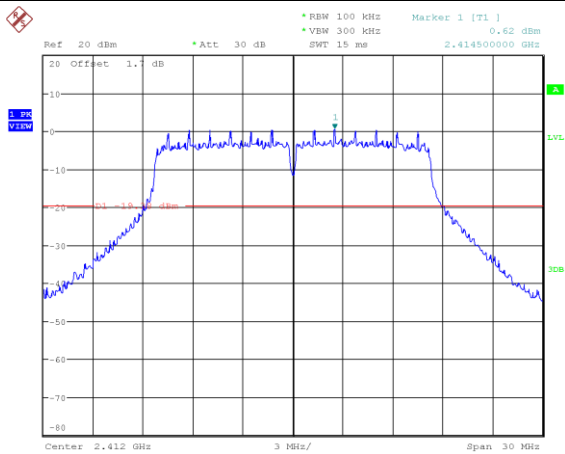
**Measurement Results:**


**Conducted Spurious Emission (802.11b, Ch11)**


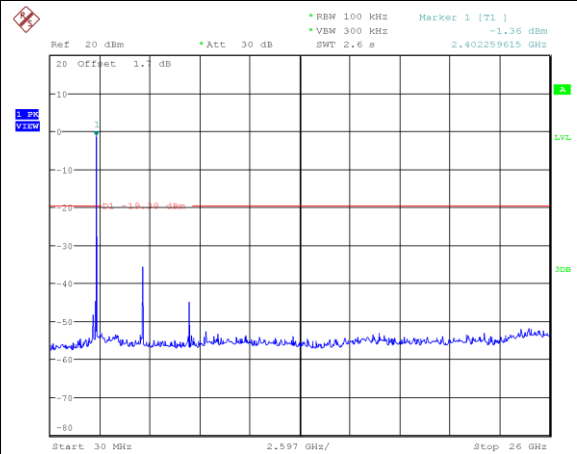
Date: 18.JUL.2020 15:36:47

**Conducted Spurious Emission (802.11b, Ch11, 30MHz~26GHz)**


Date: 18.JUL.2020 15:37:56

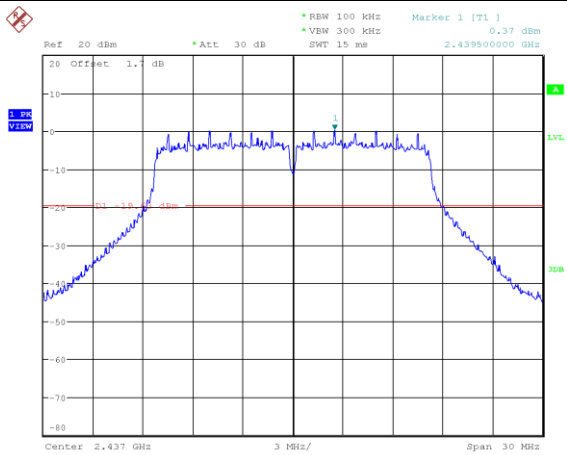
**Conducted Spurious Emission (802.11g, Ch1)**


Date: 18.JUL.2020 15:48:07

**Conducted Spurious Emission (802.11g, Ch1, 30MHz~26GHz)**


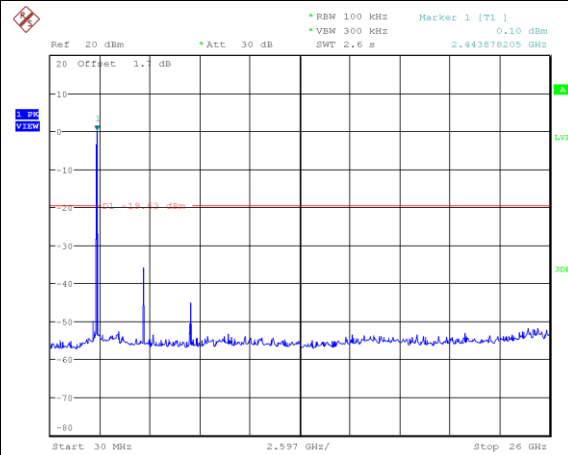
Date: 18.JUL.2020 15:49:17

### Conducted Spurious Emission (802.11g, Ch6)



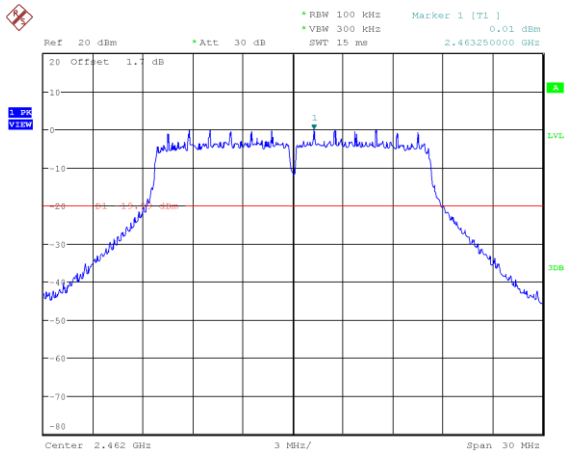
Date: 18.JUL.2020 15:50:32

### Conducted Spurious Emission (802.11g, Ch6, 30MHz~26GHz)



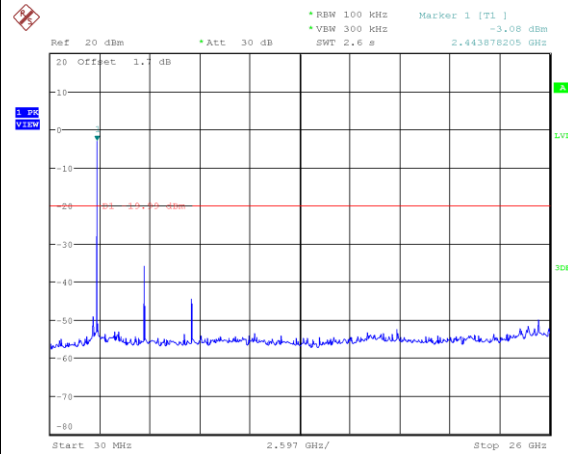
Date: 18.JUL.2020 15:51:47

### Conducted Spurious Emission (802.11g, Ch11)



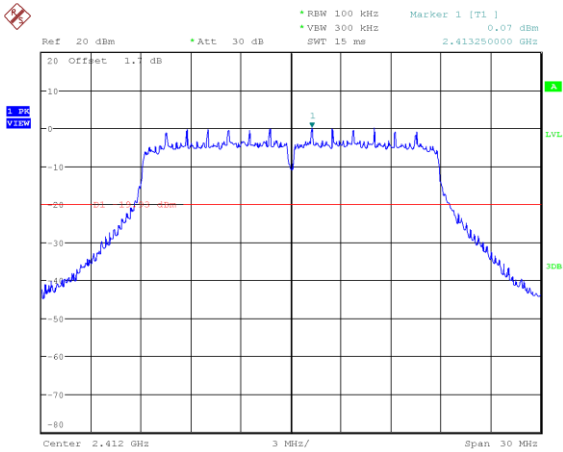
Date: 18.JUL.2020 15:52:53

### Conducted Spurious Emission (802.11g, Ch11, 30MHz~26GHz)



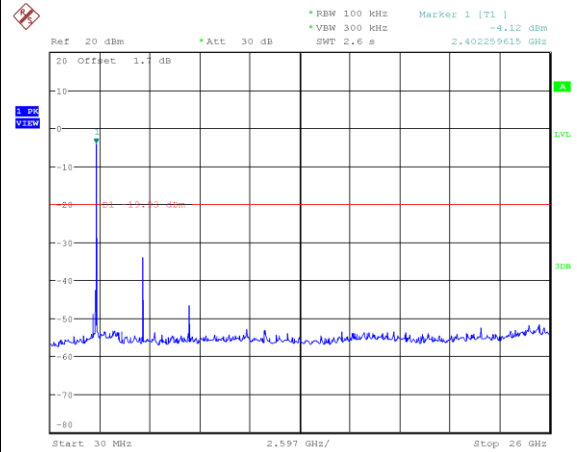
Date: 18.JUL.2020 15:54:03

Conducted Spurious Emission  
(802.11n-20MHz, Ch1)



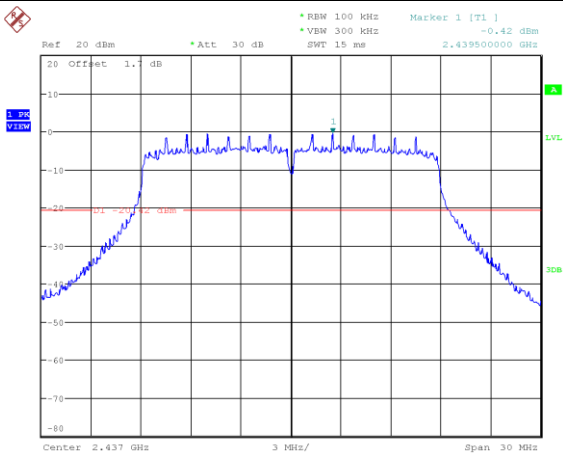
Date: 18.JUL.2020 16:03:42

Conducted Spurious Emission  
(802.11n-20MHz, Ch1, 30MHz~26GHz)



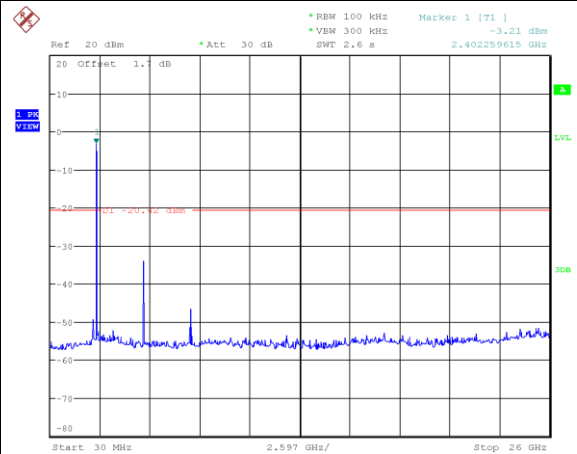
Date: 18.JUL.2020 16:04:52

Conducted Spurious Emission  
(802.11n-20MHz, Ch6)



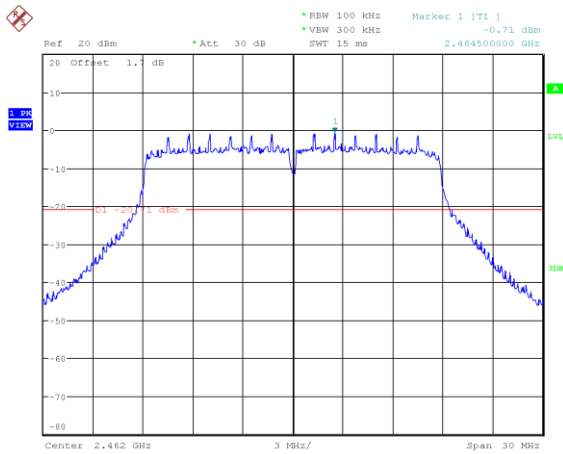
Date: 18.JUL.2020 16:06:21

Conducted Spurious Emission  
(802.11n-20MHz, Ch6, 30MHz~26GHz)



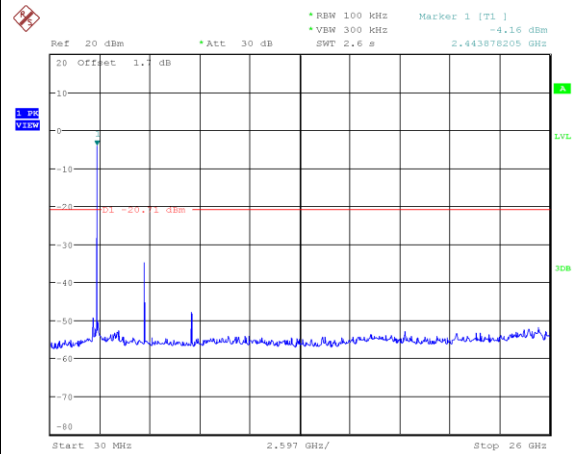
Date: 18.JUL.2020 16:07:36

### Conducted Spurious Emission (802.11n-20MHz, Ch11)



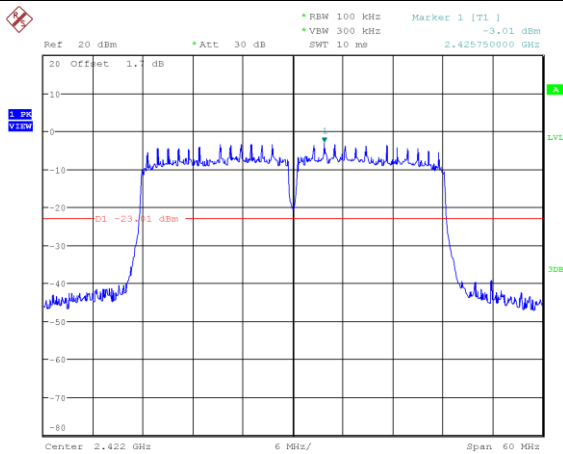
Date: 18.JUL.2020 16:09:11

### Conducted Spurious Emission (802.11n-20MHz, Ch11, 30MHz~26GHz)



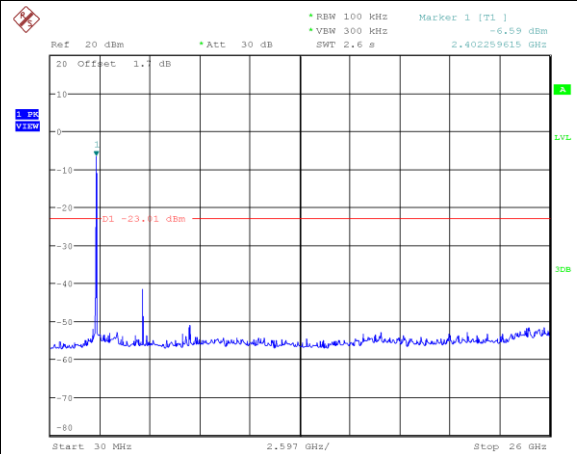
Date: 18.JUL.2020 16:10:21

### Conducted Spurious Emission (802.11n-40MHz, Ch3)



Date: 18.JUL.2020 16:16:10

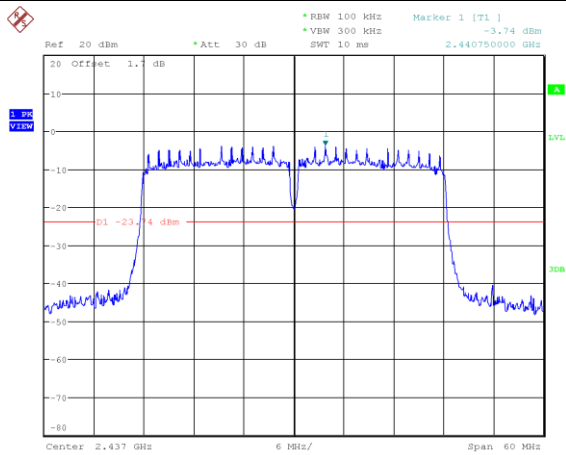
### Conducted Spurious Emission (802.11n-40MHz, Ch3, 30MHz~26GHz)



Date: 18.JUL.2020 16:17:20

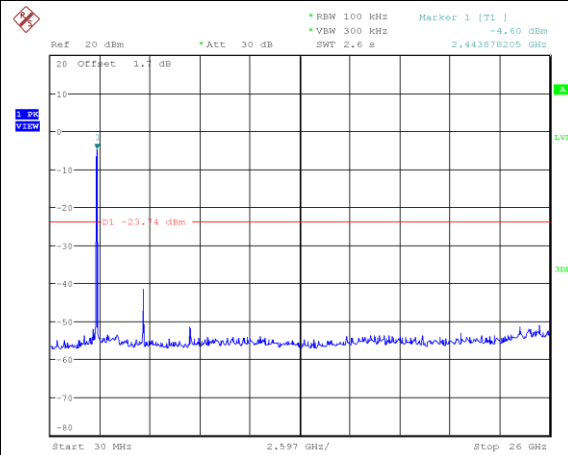


### Conducted Spurious Emission (802.11n-40MHz, Ch6)



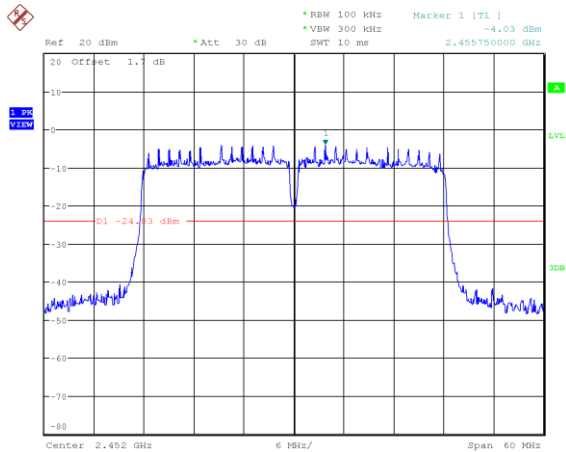
Date: 18.JUL.2020 16:19:10

### Conducted Spurious Emission (802.11n-40MHz, Ch6, 30MHz~26GHz)



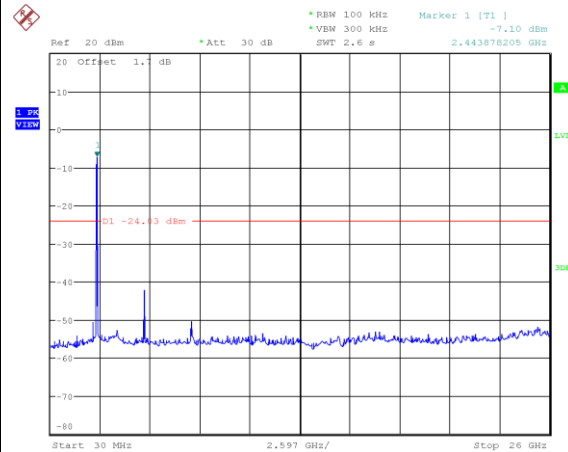
Date: 18.JUL.2020 16:20:24

### Conducted Spurious Emission (802.11n-40MHz, Ch9)



Date: 18.JUL.2020 16:21:20

### Conducted Spurious Emission (802.11n-40MHz, Ch9, 30MHz~26GHz)



Date: 18.JUL.2020 16:22:31

## ANNEX A.6. Transmitter Spurious Emission-Radiated

### A.6.1 Measurement Limit:

Standard	Limit
FCC 47 Part 15.247,15.205,15.209	20dB below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in 25.205(a), must also comply with the radiated emission limits specified in 15.209(a)(see 15.205(c)).

The measurement is according to ANSI C63.10 clause 11.11 and 11.12.

### A.6.2 Limit in restricted band:

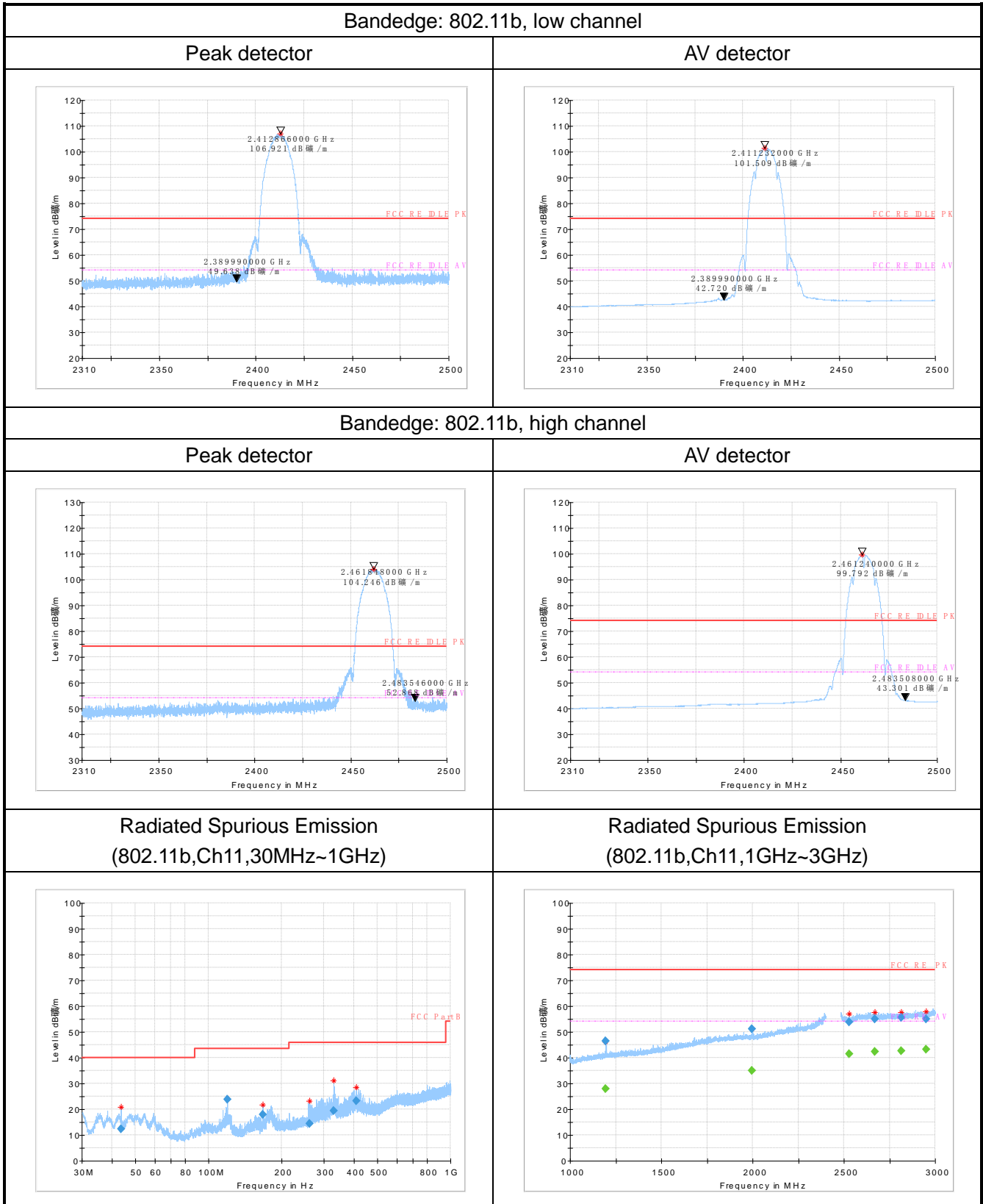
Frequency of emission(MHz)	Field strength(uV/m)	Field strength(dBuV/m)
30~88	100	40
88~216	150	43.5
216~960	200	46
Above 960	500	54

### A.6.3 Test procedures

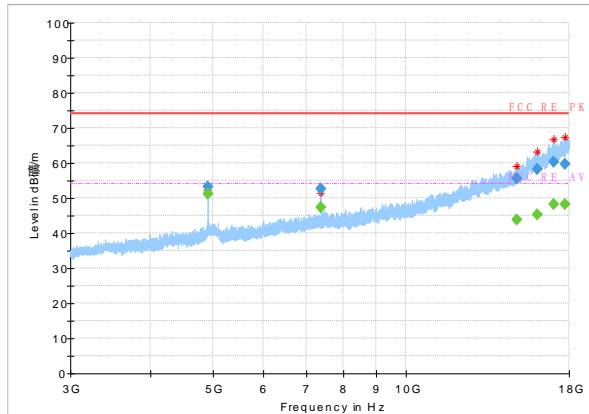
Portable, small, lightweight, or modular devices that may be handheld, worn on the body, or placed on a table during operation shall be positioned on a nonconducting platform, the top of which is 80 cm above the reference ground plane. The preferred area occupied by the EUT arrangement is 1 m by 1.5 m, but it may be larger or smaller to accommodate various sized EUTs. For testing purposes, ceiling- and wall-mounted devices also shall be positioned on a tabletop (see also ANSI C63.4-2013 section 6.3.4 and 6.3.5). In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During testing, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emission from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Times (s)
30~1000	100KHz/300KHz	5
1000~4000	1MHz/3MHz	15
4000~18000	1MHz/3MHz	40
18000~26500	1MHz/3MHz	20

**Measurement Results:**


Radiated Spurious Emission  
(802.11b, Ch11, 3GHz~18GHz)

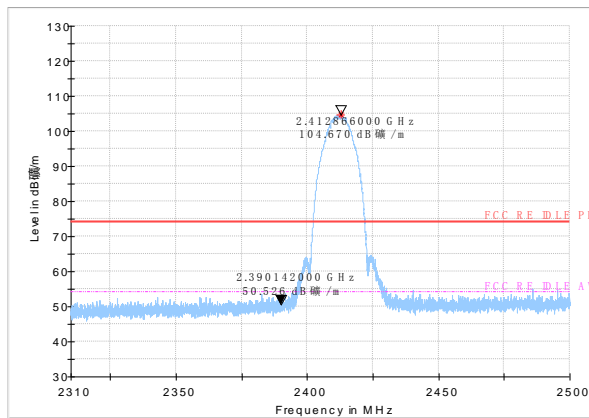


/

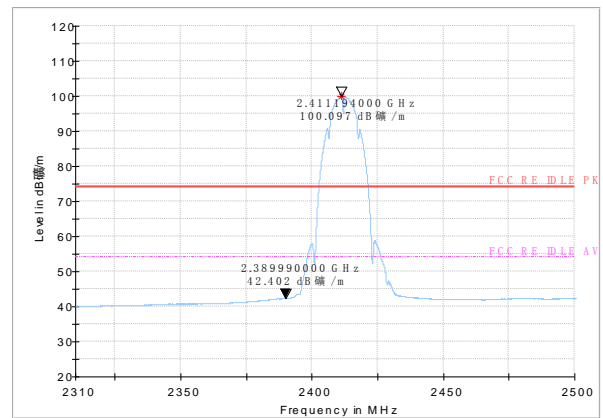
/

Bandedge: 802.11g, low channel

Peak detector

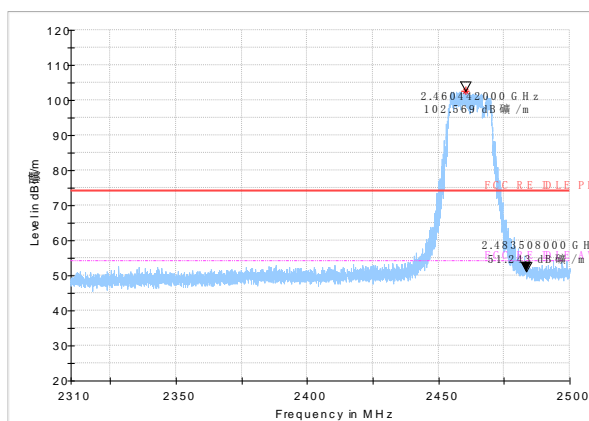


AV detector

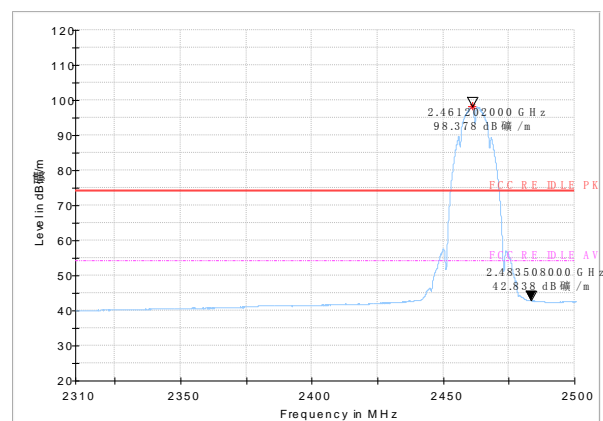


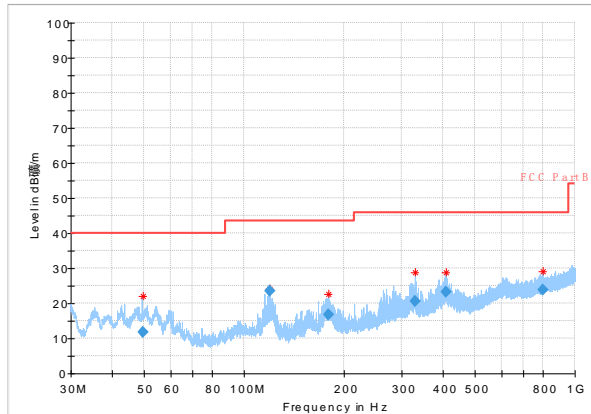
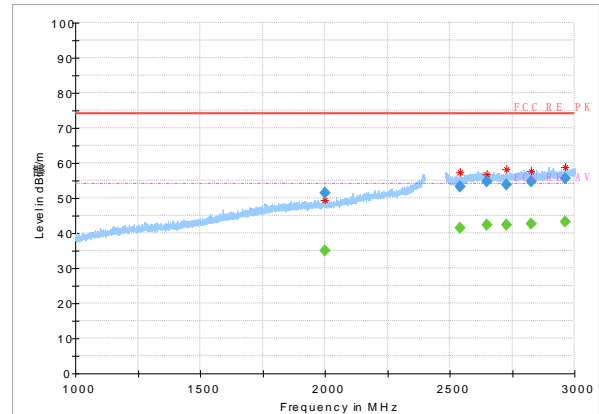
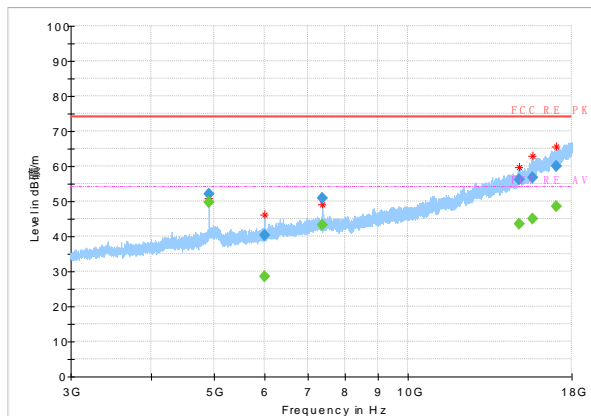
Bandedge: 802.11g, high channel

Peak detector



AV detector



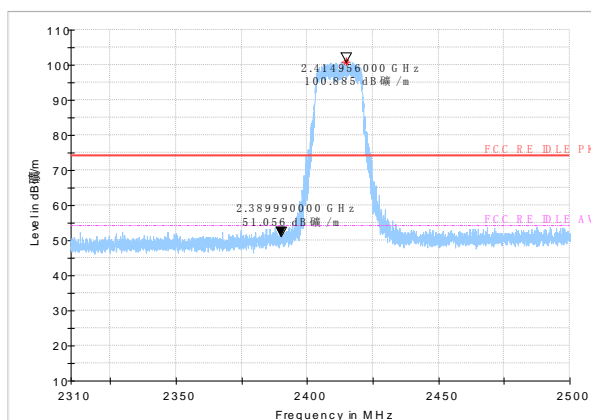
Radiated Spurious Emission  
 (802.11g, Ch11, 30MHz~1GHz)

 Radiated Spurious Emission  
 (802.11g, Ch11, 1GHz~3GHz)

 Radiated Spurious Emission  
 (802.11g, Ch11, 3GHz~18GHz)


/

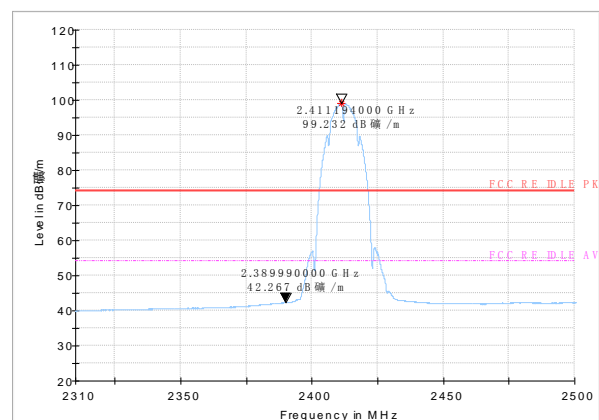
/

Bandedge: 802.11n-20MHz, low channel

Peak detector

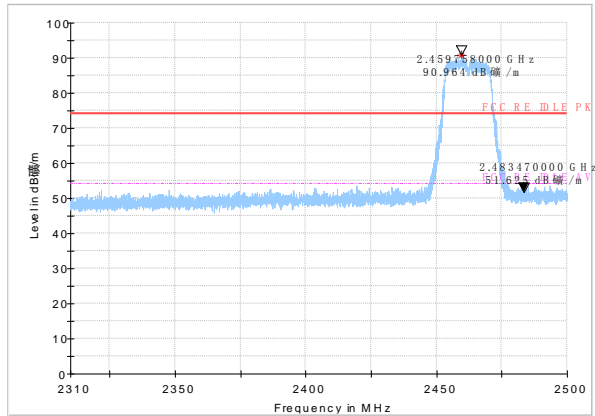


AV detector

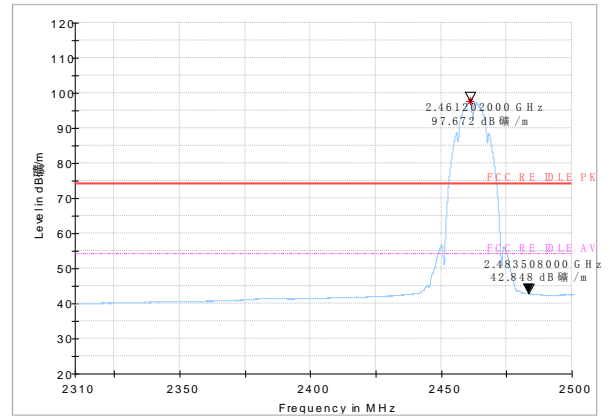
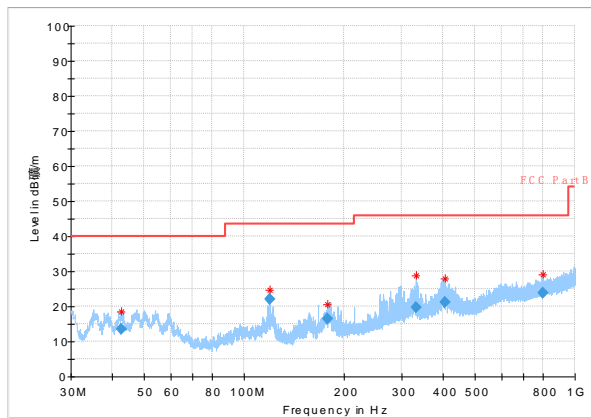
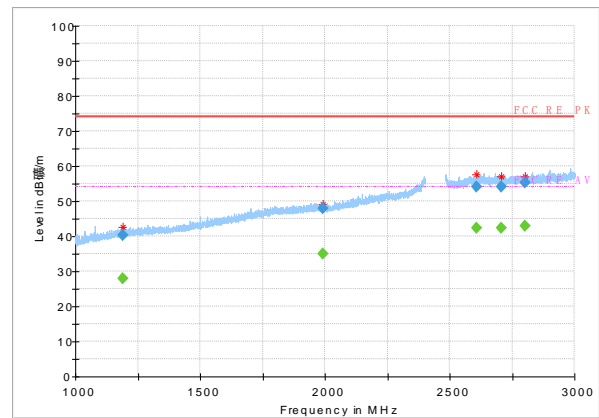
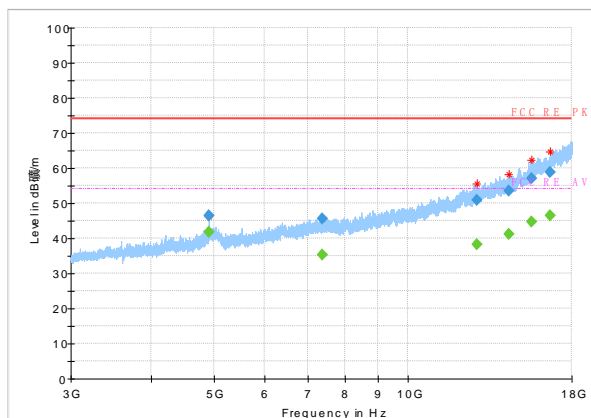


## Bandedge: 802.11n-20MHz, high channel

Peak detector

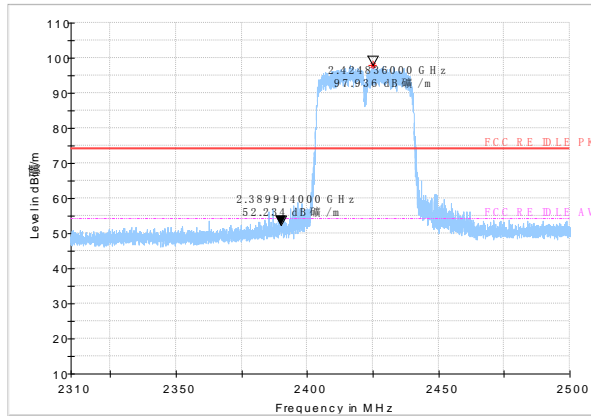
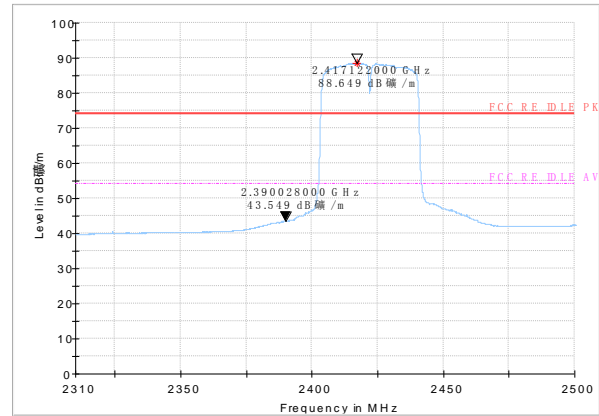
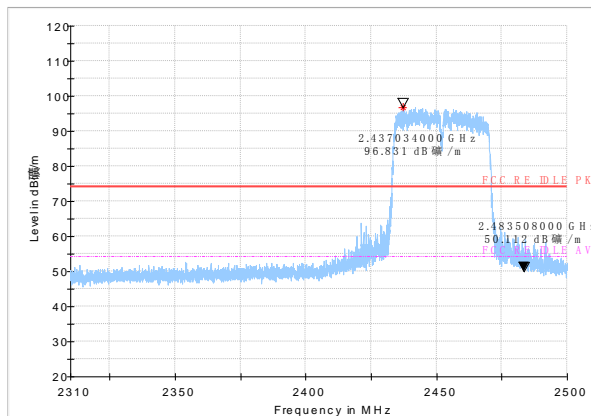
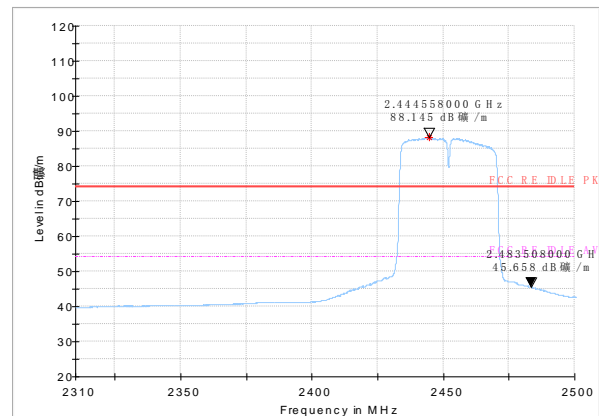
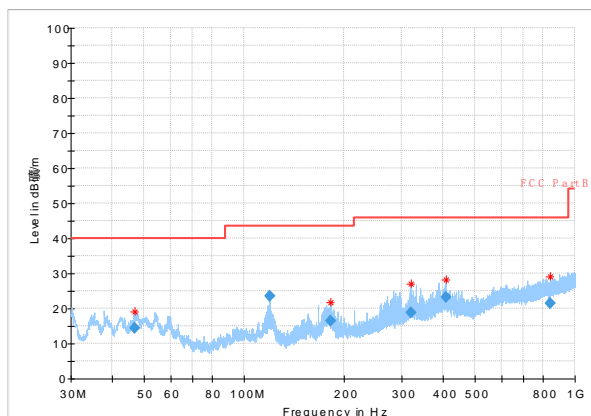
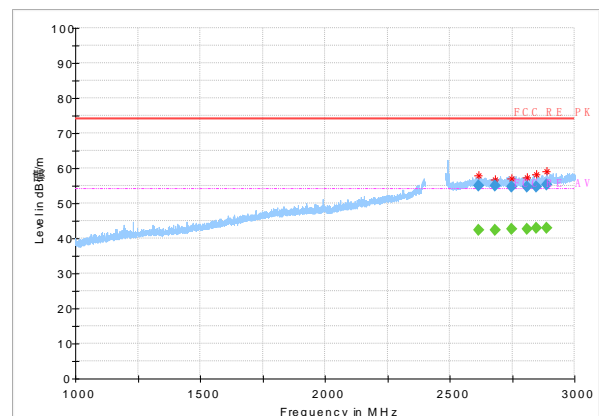


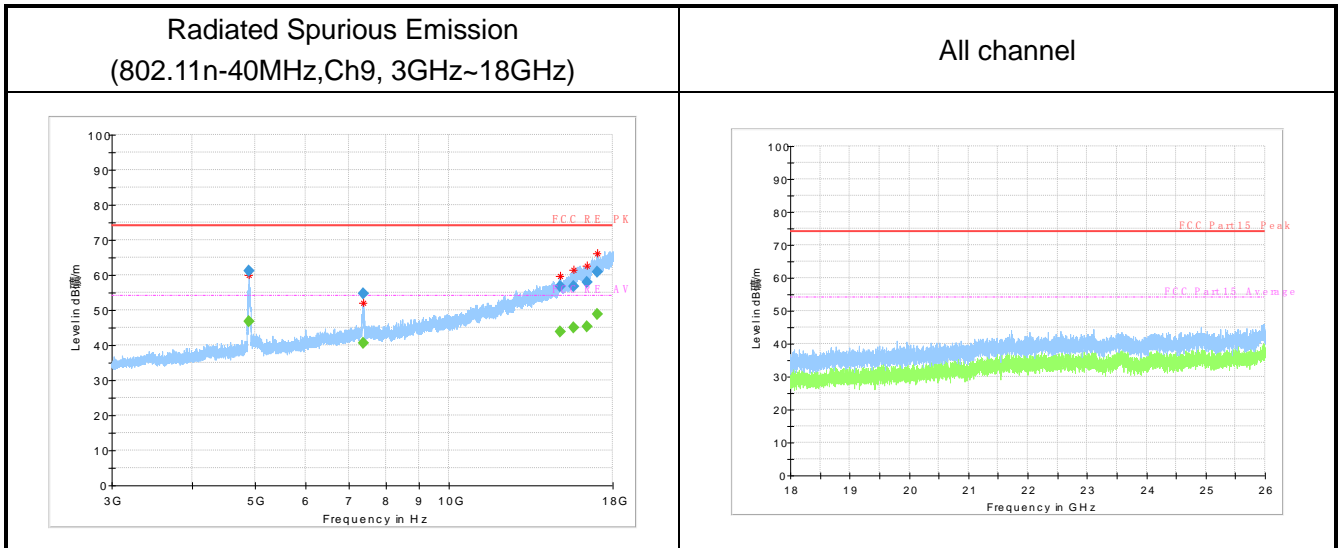
AV detector


 Radiated Spurious Emission  
(802.11n-20MHz, Ch11, 30MHz~1GHz)

 Radiated Spurious Emission  
(802.11n-20MHz, Ch11, 1GHz~3GHz)

 Radiated Spurious Emission  
(802.11n-20MHz, Ch11, 3GHz~18GHz)


/

/

**Bandedge: 802.11n-40MHz, low channel**
**Peak detector**

**AV detector**

**Bandedge: 802.11n-40MHz, high channel**
**Peak detector**

**AV detector**

**Radiated Spurious Emission  
(802.11n-40MHz, Ch9, 30MHz~1GHz)**

**Radiated Spurious Emission  
(802.11n-40MHz, Ch9, 1GHz~3GHz)**




**Note:**

A "reference path loss" is established and  $A_{Rpi}$  is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

$P_{Mea}$  is the field strength recorded from the instrument.

The measurement results are obtained as described below:

$$AR_{pi} = \text{Cable loss} + \text{Antenna Gain} - \text{Preamplifier gain}$$

$$\text{Result} = P_{Mea} + \text{Cable loss} + \text{Antenna Gain} - \text{Preamplifier gain} = P_{Mea} + AR_{pi}$$



**802.11b mode**
**Ch11 30MHz~1GHz**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
43.5	12.31	-15.9	28.21	V
120.0	23.78	-16.6	40.38	H
168.0	18.05	-16.2	34.25	H
262.3	14.44	-12.5	26.94	H
328.9	19.31	-10.2	29.51	H
408.4	23.21	-8.4	31.61	H

**Ch11 1GHz~3GHz (Peak)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1195.7	46.35	2.9	43.45	V
1994.5	51.3	10.1	41.2	V
2529.2	53.74	16.5	37.24	V
2670.8	54.99	17.8	37.19	V
2813.7	55.55	18.2	37.35	V
2948.7	55.08	18.8	36.28	V

**Ch11 1GHz~3GHz (Average)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2670.8	42.4	17.8	24.6	V
2813.7	42.67	18.2	24.47	V
2948.7	43.33	18.8	24.53	V

**Ch11 3GHz~18GHz (Peak)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
4923.9	53.28	3	50.28	H
7387.0	52.61	6.2	46.41	H
14899.4	55.62	22.4	33.22	V
16070.1	58.13	24.7	33.43	H
17025.7	60.15	28	32.15	V
17728.5	59.77	28.4	31.37	H

**Ch11 3GHz~18GHz (Average)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14899.4	43.7	22.4	21.3	V
16070.1	45.36	24.7	20.66	H
17025.7	48.25	28	20.25	V
17728.5	48.12	28.4	19.72	H

**802.11g mode**
**Ch11 30MHz~1GHz**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
49.4	11.71	-15.5	27.21	V
120.0	23.48	-16.6	40.08	H
180.5	16.81	-15.8	32.61	H
328.9	20.53	-10.2	30.73	H
407.4	23.13	-8.4	31.53	H
799.0	23.75	-1.8	25.55	H

**Ch11 1GHz~3GHz (Peak)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1998.5	51.56	10.2	41.36	V
2542.3	53.27	16.8	36.47	V
2647.0	54.72	17.8	36.92	V
2728.6	53.9	17.9	36	V
2825.6	54.76	18.3	36.46	V
2962.8	55.46	19	36.46	V

**Ch11 1GHz~3GHz (Average)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2647.0	42.29	17.8	24.49	V
2825.6	42.64	18.3	24.34	V
2962.8	43.1	19	24.1	V

**Ch11 3GHz~18GHz (Peak)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
4924.0	51.93	3	48.93	H
5998.5	40.31	3.1	37.21	H
7386.4	50.86	6.2	44.66	H
14911.9	56.31	22.2	34.11	V
15626.3	56.7	24.3	32.4	H
17015.9	60.09	28.1	31.99	V

**Ch11 3GHz~18GHz (Average)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14911.9	43.45	22.2	21.25	V
15626.3	44.99	24.3	20.69	H
17015.9	48.44	28.1	20.34	V

**802.11n-20MHz**
**Ch11 30MHz~1GHz**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
42.6	13.62	-15.9	29.52	V
120.0	22.14	-16.6	38.74	H
178.3	16.4	-15.8	32.2	H
332.2	19.75	-10.2	29.95	H
404.7	21.05	-8.4	29.45	H
799.2	23.8	-1.8	25.6	V

**Ch11 1GHz~3GHz (Peak)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1188.2	40.19	2.8	37.39	H
1992.0	47.96	10	37.96	V
2605.9	54.01	17.8	36.21	H
2704.8	54.13	17.8	36.33	V
2800.2	55.18	18.2	36.98	V
1188.2	40.19	2.8	37.39	H

**Ch11 1GHz~3GHz (Average)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2605.9	42.23	17.8	24.43	H
2704.8	42.22	17.8	24.42	V
2800.2	42.85	18.2	24.65	V

**Ch11 3GHz~18GHz (Peak)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
4924.1	46.5	3	43.5	V
7389.1	45.65	6.2	39.45	V
12805.1	50.93	16.3	34.63	H
14381.5	53.6	19.4	34.2	V
15565.0	57.12	24.3	32.82	V
16673.6	58.69	26.5	32.19	H

**Ch11 3GHz~18GHz (Average)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
15565.0	44.59	24.3	20.29	V
16673.6	46.4	26.5	19.9	H

**802.11n-40MHz**
**Ch9 30MHz~1GHz**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
46.7	14.32	-15.7	30.02	V
120.0	23.58	-16.6	40.18	H
182.6	16.36	-15.8	32.16	H
320.0	18.97	-10.5	29.47	H
407.1	23.09	-8.4	31.49	H
839.1	21.34	-1.6	22.94	H

**Ch9 1GHz~3GHz (Peak)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2617.6	55.05	17.8	37.25	V
2681.0	54.93	17.8	37.13	H
2747.7	54.63	18	36.63	H
2808.7	54.77	18.2	36.57	V
2847.6	54.61	18.4	36.21	V
2889.8	55.17	18.6	36.57	V

**Ch9 1GHz~3GHz (Average)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2617.6	42.29	17.8	24.49	V
2681.0	42.39	17.8	24.59	H
2747.7	42.64	18	24.64	H
2808.7	42.68	18.2	24.48	V
2847.6	42.81	18.4	24.41	V
2889.8	42.81	18.6	24.21	V

**Ch9 3GHz~18GHz (Peak)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
4903.1	61.24	2.7	58.54	H
7364.6	54.82	6	48.82	V
14897.8	56.83	22.3	34.53	H
15619.0	56.81	24.4	32.41	H
16399.7	57.9	25.5	32.4	V
17004.7	60.94	28.3	32.64	H

**Ch9 3GHz~18GHz (Average)**

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
4903.1	46.9	2.7	44.2	H
7364.6	40.68	6	34.68	V
14897.8	43.78	22.3	21.48	H
15619.0	44.98	24.4	20.58	H
16399.7	45.28	25.5	19.78	V
17004.7	48.78	28.3	20.48	H

**Note: Only the worst case is written in the report.**

## ANNEX A.7. AC Powerline Conducted Emission

### Method of Measurement: ANSI C63.10 clause 6.2

- 1 The one EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit is selected for the final measurement, while applying the appropriate modulating signal to the EUT.
- 2 If the EUT is relocated from an exploratory test site to a final test site, the highest emissions shall be remaximized at the final test location before final ac power-line conducted emission measurements are performed.
- 3 The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment in the system) is then performed for the full frequency range for which the EUT is being tested for compliance without further variation of the EUT arrangement, cable positions, or EUT mode of operation.
- 4 If the EUT is comprised of equipment units that have their own separate ac power connections, e.g., floor-standing equipment with independent power cords for each shelf that are able to connect directly to the ac power network, each current-carrying conductor of one unit is measured while the other units are connected to a second (or more) LISN(s). All units shall be separately measured. If a power strip is provided by the manufacturer, to supply all of the units making up the EUT, only the conductors in the power cord of the power strip shall be measured.

If the EUT uses a detachable antenna, these measurements shall be made with a suitable dummy load connected to the antenna output terminals; otherwise, the tests shall be made with the antenna connected and, if adjustable, fully extended. When measuring the ac conducted emissions from a device that operates between 150 kHz and 30 MHz a non-detachable antenna may be replaced with a dummy load for the measurements within the fundamental emission band of the transmitter, but only for those measurements.<sup>36</sup> Record the six highest EUT emissions relative to the limit of each of the current-carrying conductors of the power cords of the equipment that comprises the EUT over the frequency range specified by the procuring or regulatory agency. Diagram or photograph the test setup that was used. See Clause 8 for full reporting requirements.

#### Test Condition:

Voltage (V)	Frequency (Hz)
120	60

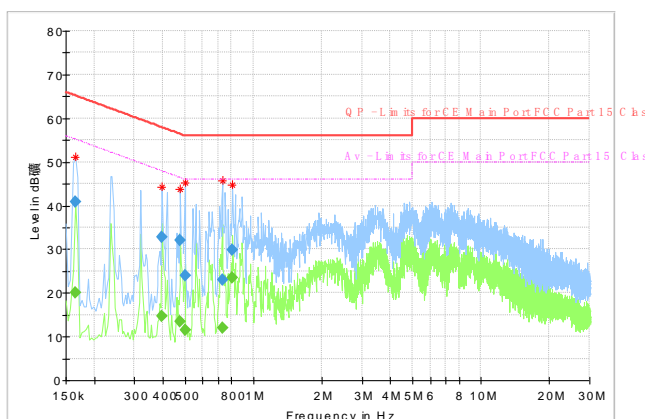


**Measurement Result and limit:**

(Quasi-peak-average Limit)

Frequency range (MHz)	Quasi-peak Limit (dB $\mu$ V)	Average Limit (dB $\mu$ V)	Conclusion
0.15 to 0.5	66 to 56	56 to 46	P
0.5 to 5	56	46	
5 to 30	60	50	

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



Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Average (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.164925	---	20.01	55.21	35.21	15000.0	9.000	N	ON	9.7
0.164925	40.76	---	65.21	24.45	15000.0	9.000	N	ON	9.7
0.396263	---	14.63	47.93	33.30	15000.0	9.000	N	ON	9.7
0.396263	32.84	---	57.93	25.09	15000.0	9.000	N	ON	9.7
0.478350	---	13.42	46.37	32.95	15000.0	9.000	N	ON	9.8
0.478350	31.97	---	56.37	24.40	15000.0	9.000	N	ON	9.8
0.500738	---	11.47	46.00	34.53	15000.0	9.000	N	ON	9.8
0.500738	24.04	---	56.00	31.96	15000.0	9.000	N	ON	9.8
0.732075	---	12.01	46.00	33.99	15000.0	9.000	N	ON	9.8
0.732075	23.11	---	56.00	32.89	15000.0	9.000	N	ON	9.8
0.810431	---	23.38	46.00	22.62	15000.0	9.000	N	ON	9.8
0.810431	29.94	---	56.00	26.06	15000.0	9.000	N	ON	9.8

## ANNEX B. Accreditation Certificate



**Accredited Laboratory**

A2LA has accredited

**EAST CHINA INSTITUTE OF TELECOMMUNICATIONS**  
Shanghai, People's Republic of China

for technical competence in the field of  
**Electrical Testing**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-JAF Communiqué dated April 2017).



Presented this 6<sup>th</sup> day of May 2019.



Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 3682.01  
Valid to February 28, 2021

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

\*\*\*\*\*END OF REPORT\*\*\*\*\*