



*Full*

## **TEST REPORT**

**No. I18D00233-SRD07**

*For*

**Client : Shanghai Sunmi Technology Co.,Ltd.**

**Production : Wireless data POS System**

**Model Name : T5921**

**Brand Name : SUNMI**

**FCC ID: 2AH25T5921**

**Hardware Version: QP1665\_MB\_PCB\_V1**

**Software Version: zqp1665\_V002\_181121**

**Issued date: 2019-01-17**

## 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. KDB 789033 standard has not been approved by A2LA.
4. 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: 7-8F, G Area, No.668, Beijing East Road, Huangpu District, Shanghai, P. R. China

Tel: +86 21 63843300

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**Revision Version**

<b>Report Number</b>	<b>Revision</b>	<b>Date</b>	<b>Memo</b>
I18D00233-SRD07	00	2019-01-17	Initial creation of test report

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## 1. Test Laboratory

### 1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301
FCC registration No	958356

### 1.2. Testing Environment

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

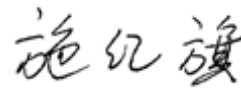
### 1.3. Project data

Project Leader:	Yu Anlu
Testing Start Date:	2018-12-13
Testing End Date:	2019-01-09

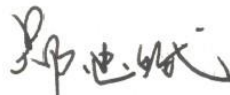
### 1.4. Signature



**Tang Tao**  
(Prepared this test report)



**Shi Hongqi**  
(Reviewed this test report)



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

## 2. Client Information

### 2.1. Applicant Information

Company Name	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
Telephone	18721763396
Postcode	200433

### 2.2. Manufacturer Information

Company Name	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
Telephone	18721763396
Postcode	200433

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

#### 3.1. About EUT

EUT Description	Wireless data POS System
Model name	T5921
FCC ID	2AH25T5921
WLAN Frequency Range(5G)	ISM Bands: 5150MHz-5250MHz
GSM Frequency Band	GSM850/GSM900/GSM1800/GSM1900
UMTS Frequency Band	Band I/II/IV/V
CDMA Frequency Band	BC0/BC1
LTE Frequency Band	Band 2/4/7/17/28
Additional Communication Function	BT/BLE/2.4G WLAN 802.11 b/g/n20/n40/5G WLAN 802.11 a/n20/n40
WLAN type of modulation	OFDM
Extreme Temperature	-10°C-+55°C
Nominal Voltage	7.6V
Extreme High Voltage	8.7V
Extreme Low Voltage	7V

Note: Photographs of EUT are shown in ANNEX A of this test report.

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

EUT ID*	Model Name	SN or IMEI	HW Version	SW Version	Date of receipt
N01	T5921	/	QP1665_MB _PCB_V1	zqp1665_V002_1 81121	2018-12-13
N07	T5921	/	QP1665_MB _PCB_V1	zqp1665_V002_1 81121	2018-12-13

\*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	SN
AE1	RF cable	---

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



## 4. Reference Documents

### 4.1. Reference Documents for testing

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

Reference	Title	Version
FCC Part15	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices	2018/10/ 1
ANSI 63.10	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2013
UNII: KDB 789033	Information Infrastructure (U-NII) Devices - Part 15, Subpart E	2017
KDB905462	COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION	2016

## 5. Summary of Test Results

A brief summary of the tests carried out is shown as following.

<b>SUMMARY OF MEASUREMENT RESULTS</b>	<b>Sub-clause of Part15E</b>	<b>Verdict</b>
Maximum Output Power	15.407	<b>P</b>
Power Spectral Density	15.407	<b>P</b>
Occupied 26dB Bandwidth	15.403	<b>P</b>
Band edge compliance	15.407	<b>P</b>
Transmitter spurious emissions radiated	15.407	<b>P</b>
Spurious emissions radiated < 30 MHz	15.407	<b>P</b>
Spurious emissions conducted < 30 MHz	15.407	<b>P</b>
Peak Excursion	15.407	<b>P</b>
Frequency Stability	15.407	<b>NA</b>
Transmit Power Control	15.407	<b>NA</b>

Note: Please refer to section 6 for detail; please refer to Annex A in this test report for the detailed test results.

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	3.8V
Humidity	Hnom	47%

### 5.1. Notes

All reported tests were carried out on a sample equipment to demonstrate limited compliance with section 3.

The test results of this test report relate exclusively to the item(s) tested as specified in section 5.

### 5.2. Statements

The T5921, supporting GSM/GPRS/EDGE/WCDMA/CDMA/LTE/BT/BLE/WLAN, manufactured by Shanghai Sunmi Technology Co.,Ltd., which is a new product for testing.

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

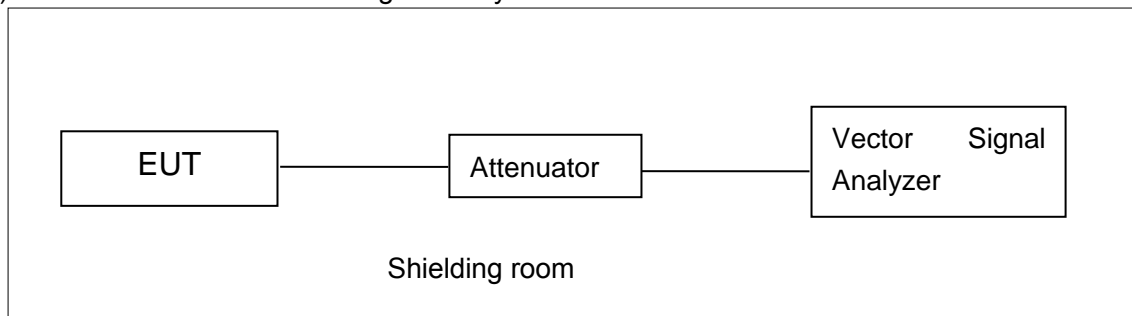
ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

## 6. Test result

### 6.1. Measurement Method

#### 6.1.1. Conducted Measurements

- 1). Connect the EUT to the test system correctly.
- 2). Set the EUT to the required work mode.
- 3). Set the EUT to the required channel.
- 4). Set the spectrum analyzer to start measurement.
- 5). Record the values. Vector Signal Analyzer

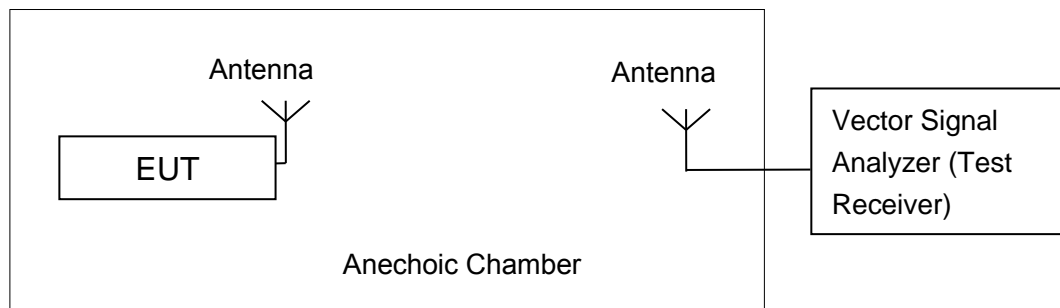


#### 6.1.2. Radiated Emission Measurements

In the case of radiated emission, the used settings are as follows,

Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;

Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 10Hz;



The measurement is made according to KDB 789033

The radiated emission test is performed in semi-anechoic chamber. The distance from the EUT to the reference point of measurement antenna is 3m. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept. During the test, the turntable is rotated 360° and the measurement antenna is moved from 1m to 4m to get the maximization result.

## 6.2. Maximum output Power

### Measurement Limit and Method:

Standard	Frequency (MHz)	Limit (dBm)
FCC CRF Part 15.407(a)	5150MHz~5250MHz	24dBm

Limit use the less value, and B is the 26dB bandwidth.

The measurement method SA-1 is made according to KDB 789033.

Set the spectrum analyzer in the following:

Detector: RMS.

RBW=1MHz.

VBW=3MHz.

Sweep time = AUTO.

Span:30MHz (for 20MHz); 50MHz (for 40MHz).

### Measurement Results:

#### 802.11a mode

##### U-NII-1

Mode	Data Rate(Mbps)	Teat Result(dBm)		
		5180MHz	5200MHz	5240MHz
802.11a	6	15.42	14.79	12.67

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

#### 802.11n-HT20 mode

##### U-NII-1

Mode	Data Rate(Index)	Teat Result(dBm)		
		5180MHz	5200MHz	5240MHz
802.11n(20MHz)	MCS0	13.8	13.08	10.98

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

#### 802.11n-HT40 mode

##### U-NII-1

Mode	Data Rate(Index)	Teat Result(dBm)		
		5190MHz	/	5230MHz
802.11n(40MHz)	MCS0	11.91	/	11.71

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

### 6.3. Peak Power Spectral Density (conducted)

#### Measurement Limit:

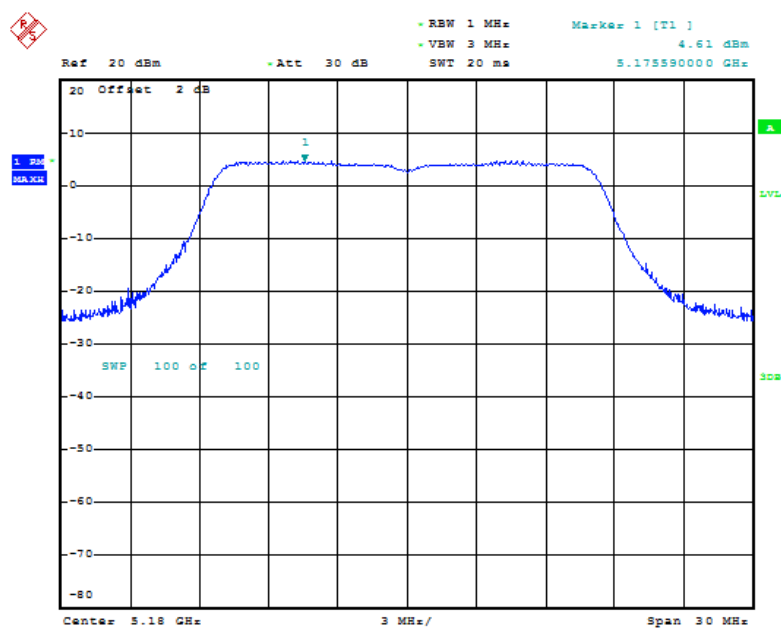
Standard	Frequency (MHz)	Limit (dBm/MHz)
FCC CRF Part 15.407(a)	5150MHz~5250MHz	11

The output power measurement method SA-1 is made according to KDB 789033

#### Measurement Results:

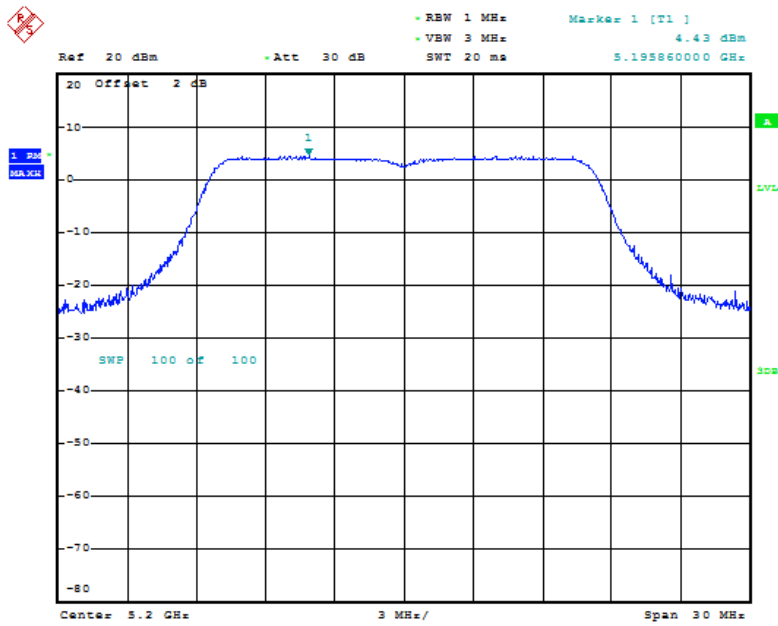
Mode	Channel	Power Spectral Density (dBm/MHz)		Conclusion
		Fig.	Value	
802.11a	5180 MHz	Fig.1	5.177	P
	5200 MHz	Fig.2	4.998	P
	5240 MHz	Fig.3	3.24	P
802.11n HT20	5180 MHz	Fig.4	3.316	P
	5200 MHz	Fig.5	3.005	P
	5240 MHz	Fig.6	1.189	P
802.11n HT40	5190 MHz	Fig.7	-1.161	P
	5230 MHz	Fig.8	-1.231	P

**Conclusion: PASS**



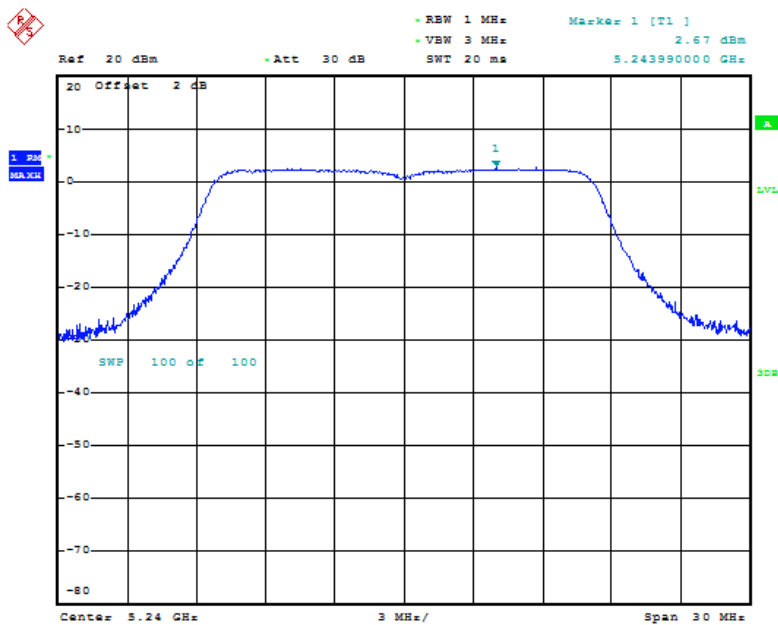
Date: 19.DEC.2018 08:24:53

**Fig. 1 Power Spectral Density (802.11a, 5180MHz)**



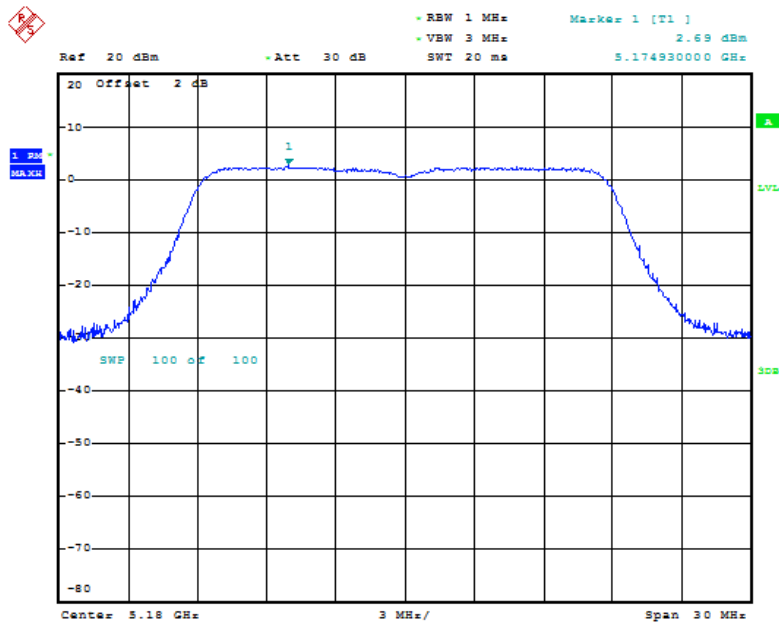
Date: 19.DEC.2018 08:26:23

**Fig. 2 Power Spectral Density (802.11a, 5200MHz)**



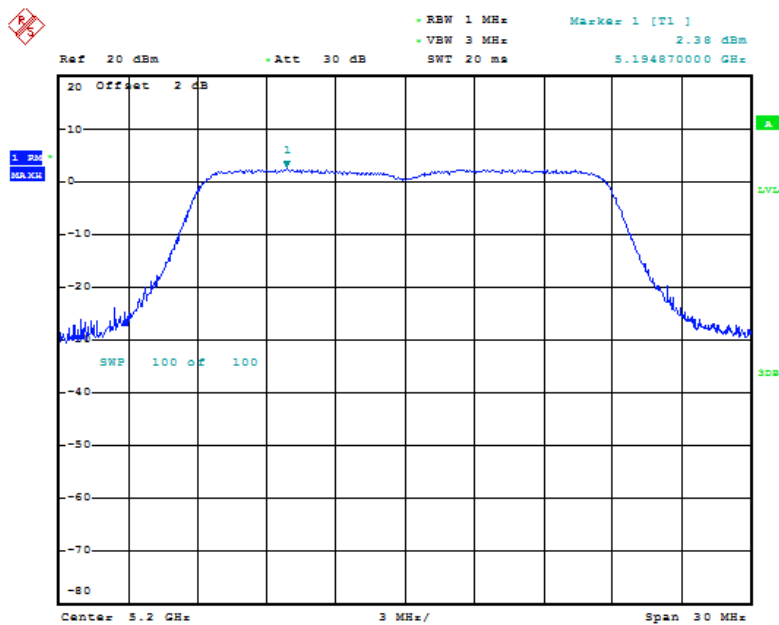
Date: 19.DEC.2018 08:27:38

**Fig. 3 Power Spectral Density (802.11a, 5240MHz)**



Date: 19.DEC.2018 08:32:59

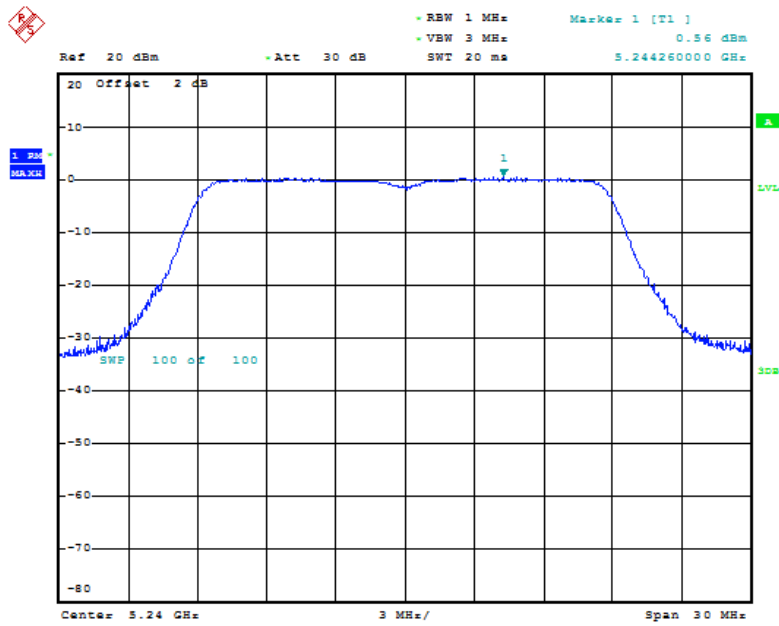
**Fig. 4 Power Spectral Density (802.11n-HT20, 5180MHz)**



Date: 19.DEC.2018 08:34:06

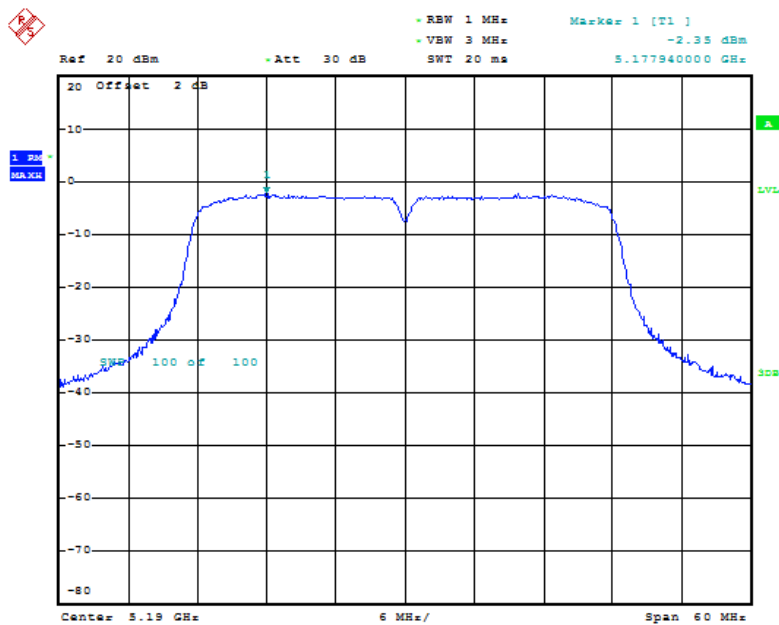
**Fig. 5 Power Spectral Density (802.11n-HT20, 5200MHz)**





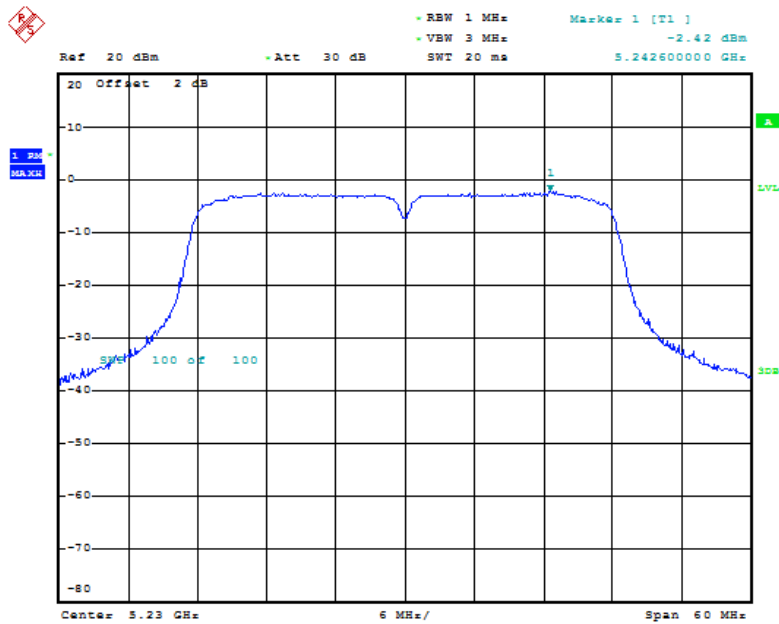
Date: 19.DEC.2018 08:38:22

**Fig. 6 Power Spectral Density (802.11n-HT20, 5240MHz)**



Date: 19.DEC.2018 08:39:58

**Fig. 7 Power Spectral Density (802.11n-HT40, 5190MHz)**



Date: 19.DEC.2018 08:40:55

**Fig. 8 Power Spectral Density (802.11n-HT40, 5230MHz)**

#### 6.4. Occupied 26dB Bandwidth(conducted)

##### Measurement Limit:

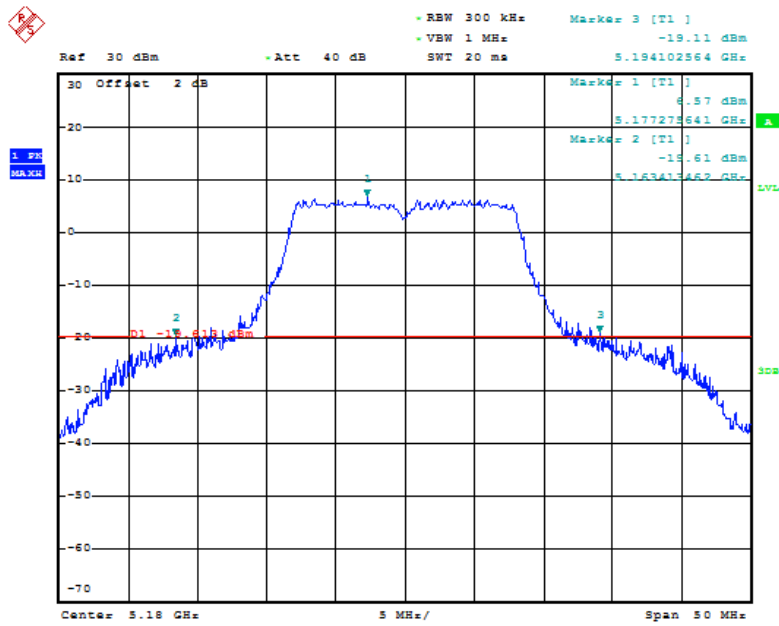
Standard	Limit (MHz)
FCC 47 CFR Part 15.403 (i)	/

The measurement is made according to KDB 789033

##### Measurement Result:

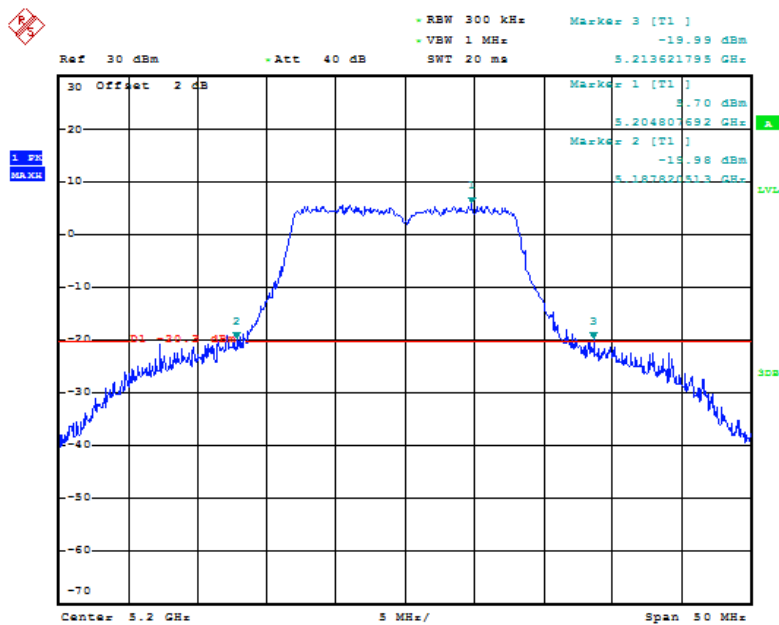
Mode	Channel	Occupied 26dB Bandwidth ( MHz)		conclusion
802.11a	5180 MHz	Fig.9	30.69	P
	5200 MHz	Fig.10	25.8	P
	5240 MHz	Fig.11	22.84	P
802.11n HT20	5180 MHz	Fig.12	23.32	P
	5200 MHz	Fig.13	23.24	P
	5240 MHz	Fig.14	23.08	P
802.11n HT40	5190 MHz	Fig.15	44.71	P
	5230 MHz	Fig.16	44.42	P

**Conclusion: PASS**
**Test graphs as below:**



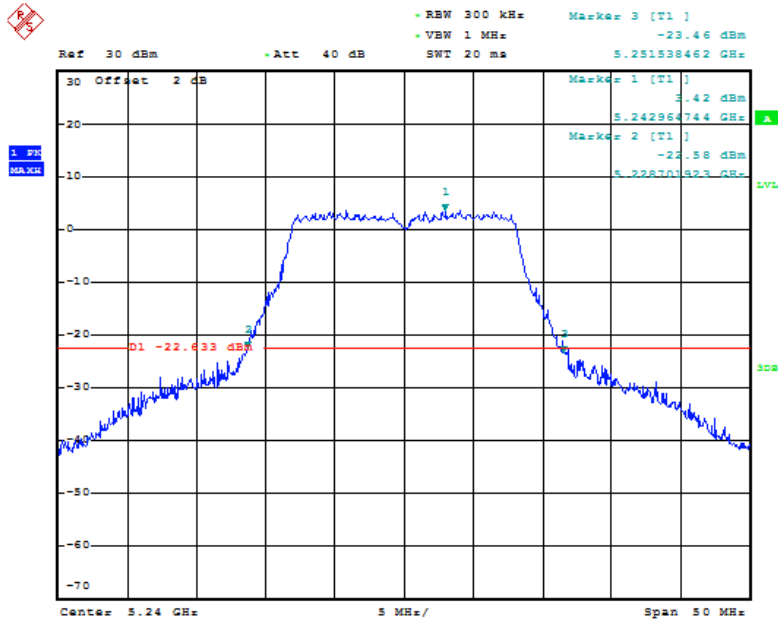
Date: 18.DEC.2018 14:28:47

**Fig. 9 Occupied 26dB Bandwidth (802.11a, 5180MHz)**



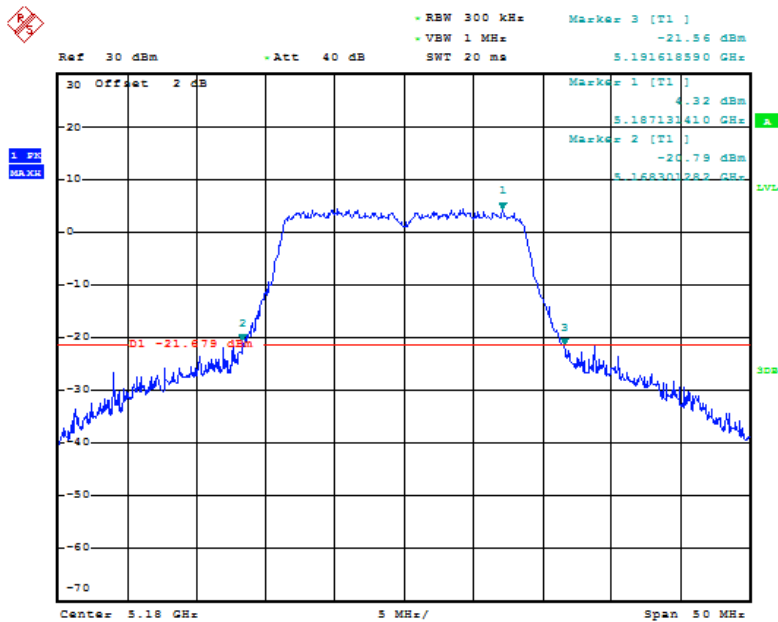
Date: 18.DEC.2018 14:29:31

**Fig. 10 Occupied 26dB Bandwidth (802.11a, 5200MHz)**



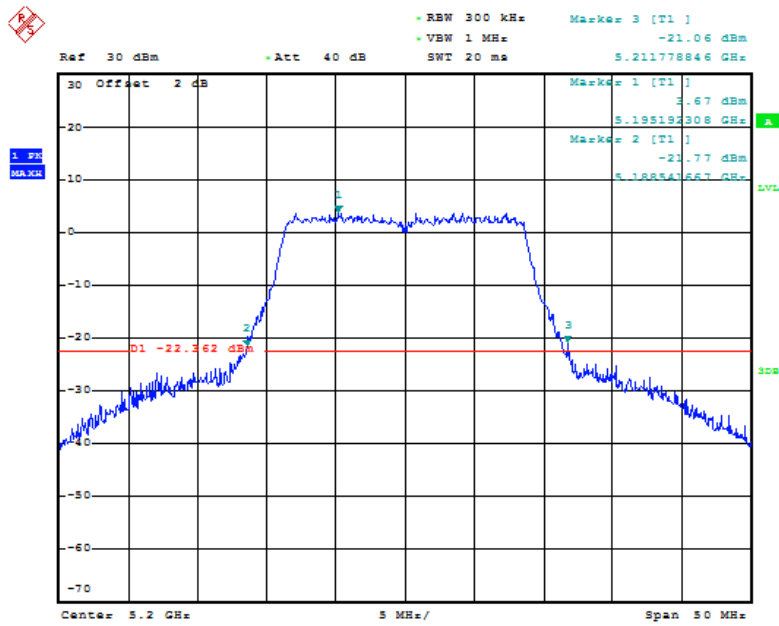
Date: 18.DEC.2018 14:30:12

**Fig. 11 Occupied 26dB Bandwidth (802.11a, 5240MHz)**



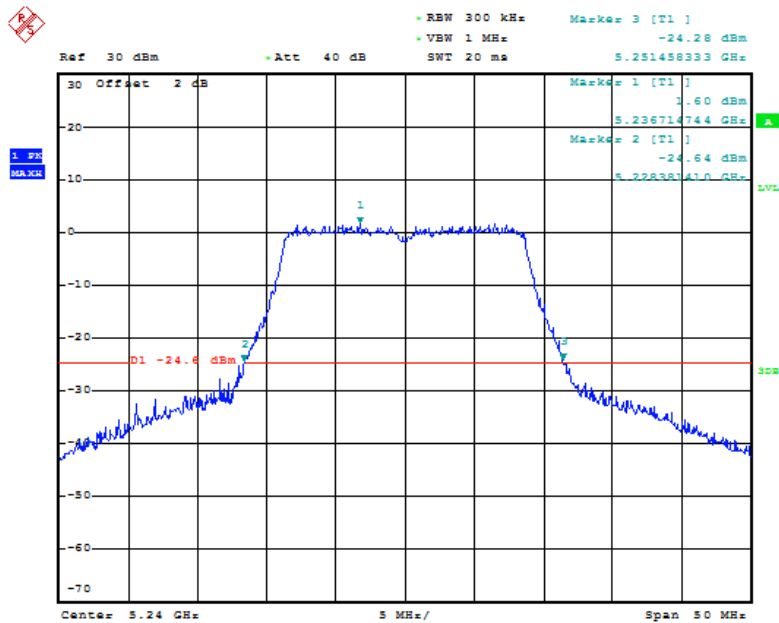
Date: 18.DEC.2018 14:31:31

**Fig. 12 Occupied 26dB Bandwidth (802.11n-HT20, 5180MHz)**



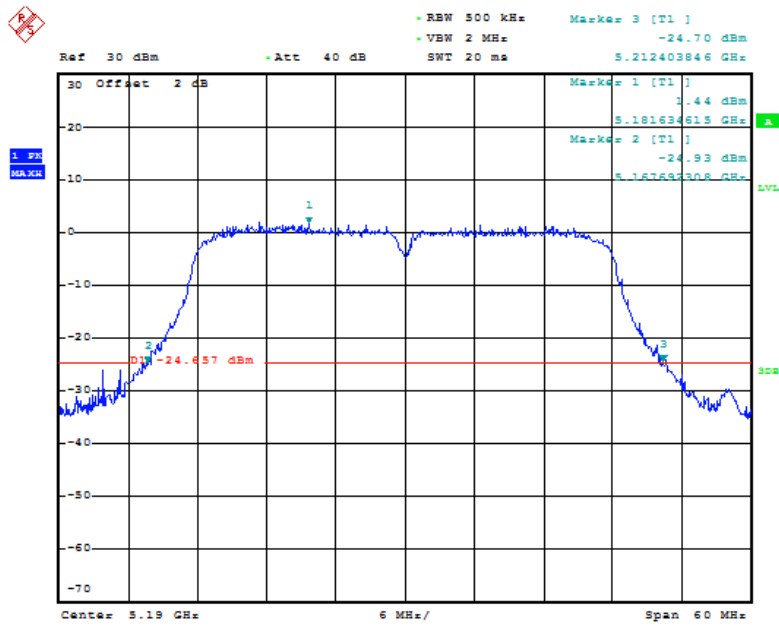
Date: 18.DEC.2018 14:32:24

**Fig. 13 Occupied 26dB Bandwidth (802.11n-HT20, 5200MHz)**



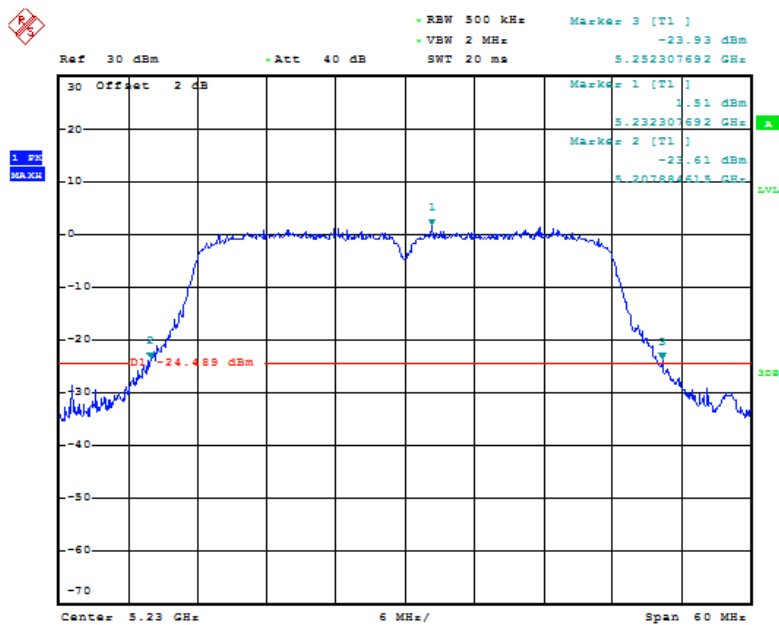
Date: 18.DEC.2018 14:33:10

**Fig. 14 Occupied 26dB Bandwidth (802.11n-HT20, 5240MHz)**



Date: 18.DEC.2018 14:35:01

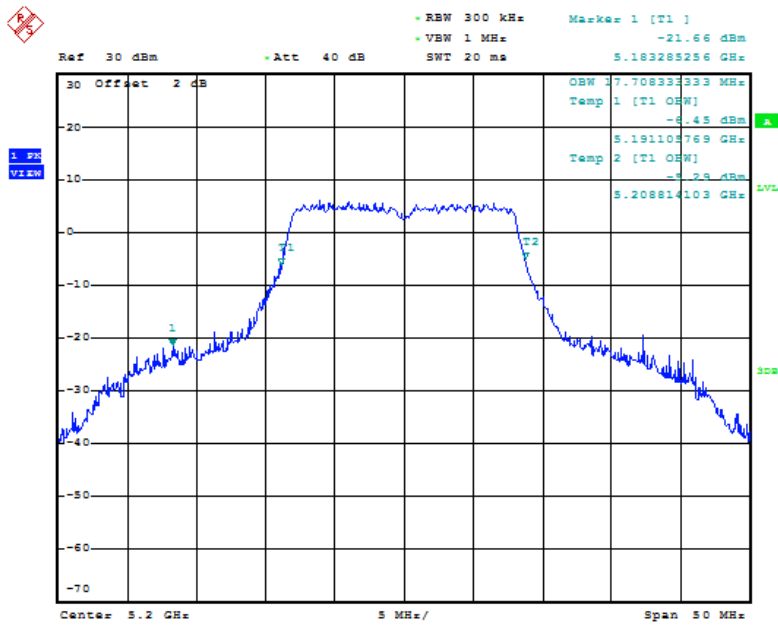
**Fig. 15 Occupied 26dB Bandwidth (802.11n-HT40, 5190MHz)**



Date: 18.DEC.2018 14:35:46

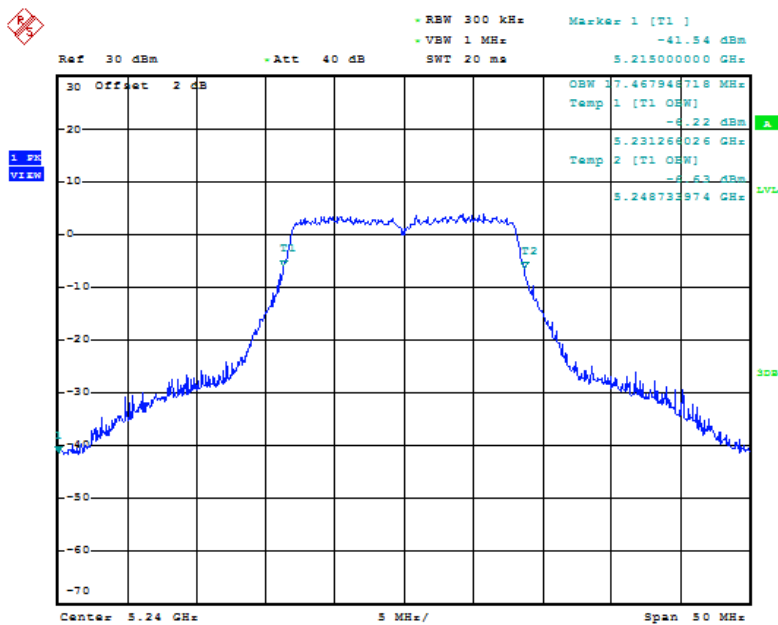
**Fig. 16 Occupied 26dB Bandwidth (802.11n-HT40, 5230MHz)**





Date: 18.DEC.2018 14:39:06

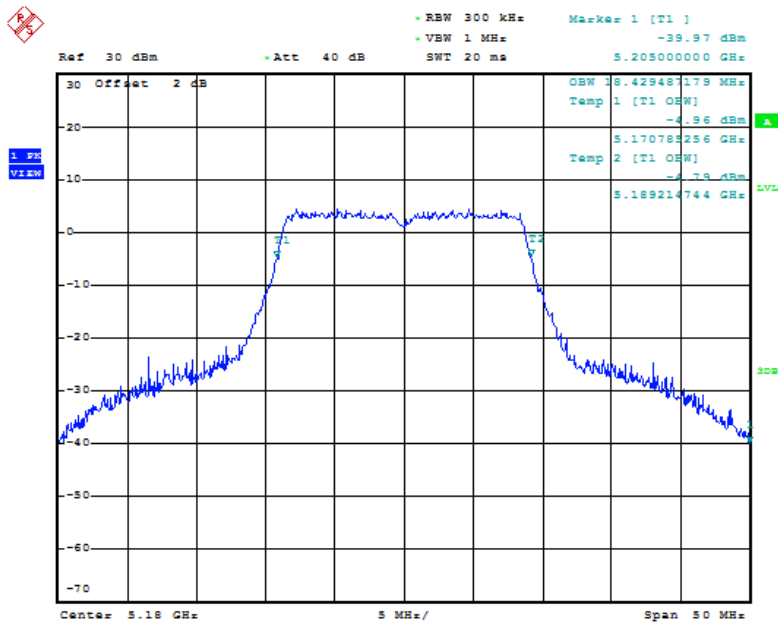
**Fig. 18 99% Occupied Bandwidth (802.11a, 5200MHz)**



Date: 18.DEC.2018 14:40:40

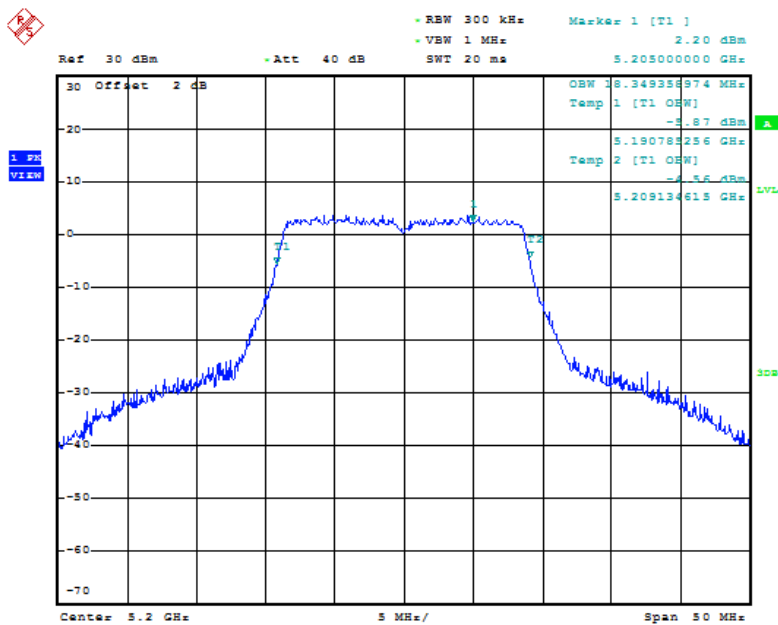
**Fig. 19 99% Occupied Bandwidth (802.11a, 5240MHz)**





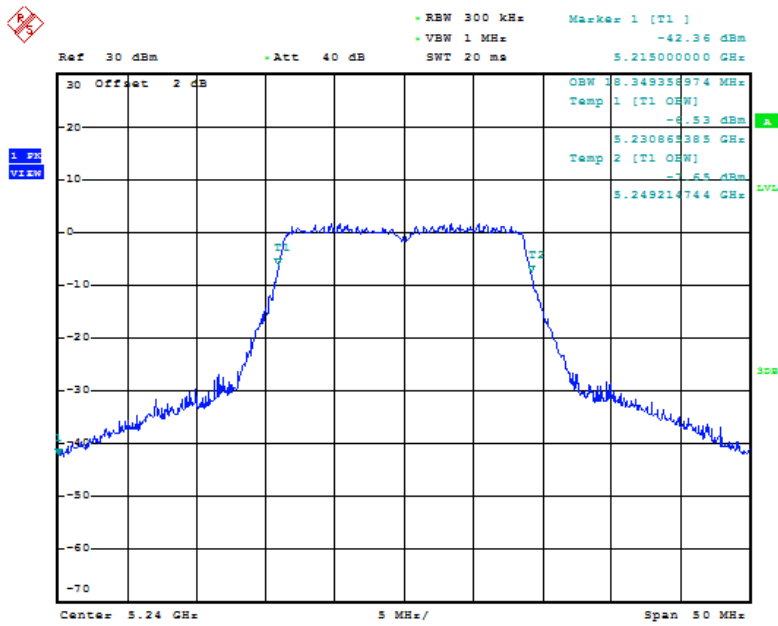
Date: 18.DEC.2018 14:41:52

**Fig. 20 99% Occupied Bandwidth (802.11n-HT20, 5180MHz)**



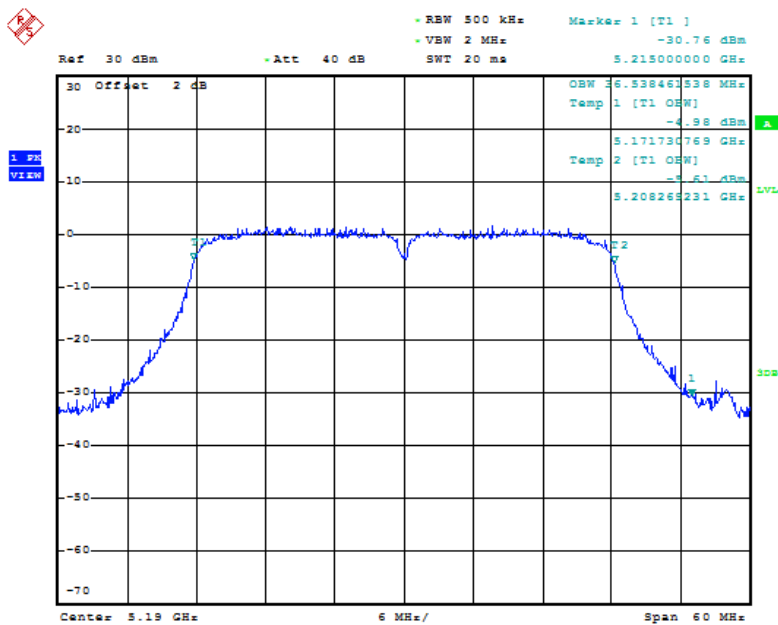
Date: 18.DEC.2018 14:45:16

**Fig. 21 99% Occupied Bandwidth (802.11n-HT20, 5200MHz)**



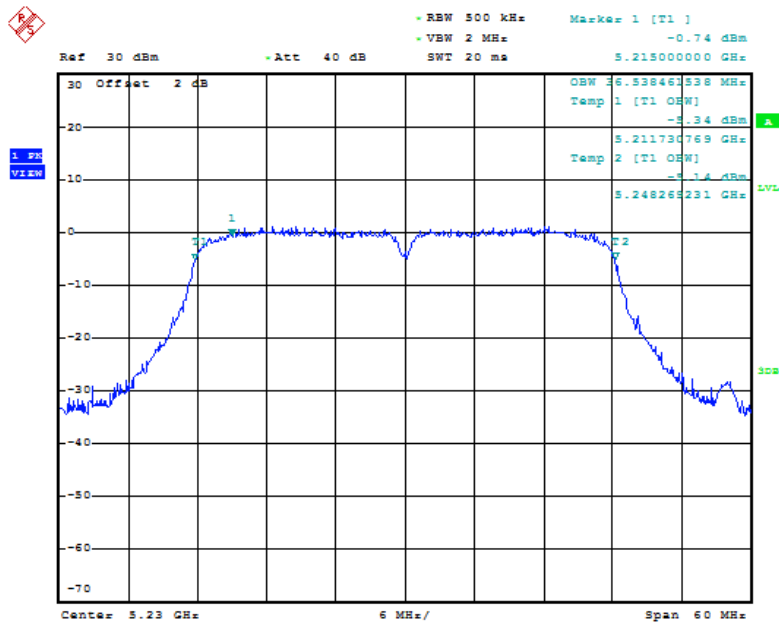
Date: 18.DEC.2018 14:46:24

**Fig. 22 99% Occupied Bandwidth (802.11n-HT20, 5240MHz)**



Date: 18.DEC.2018 14:48:46

**Fig. 23 99% Occupied Bandwidth (802.11n-HT40, 5190MHz)**



Date: 18.DEC.2018 14:51:12

**Fig. 24 99% Occupied Bandwidth (802.11n-HT40, 5230MHz)**

## 6.6. Band Edges Compliance

### 6.6.1 Band Edges - conducted

#### Measurement Limit:

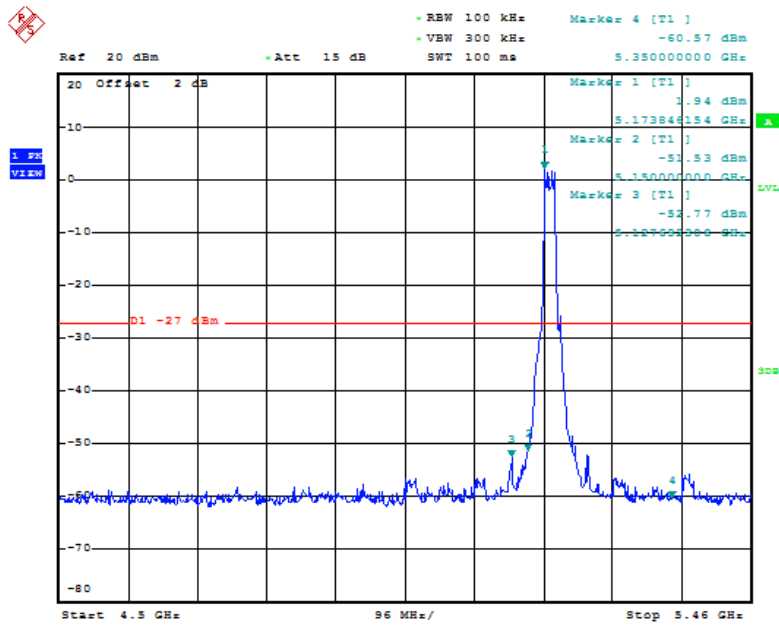
Standard	Limit (dBm/MHz)
FCC 47 CFR Part 15.407	< -27

The measurement is made according to KDB 789033

#### Measurement Result:

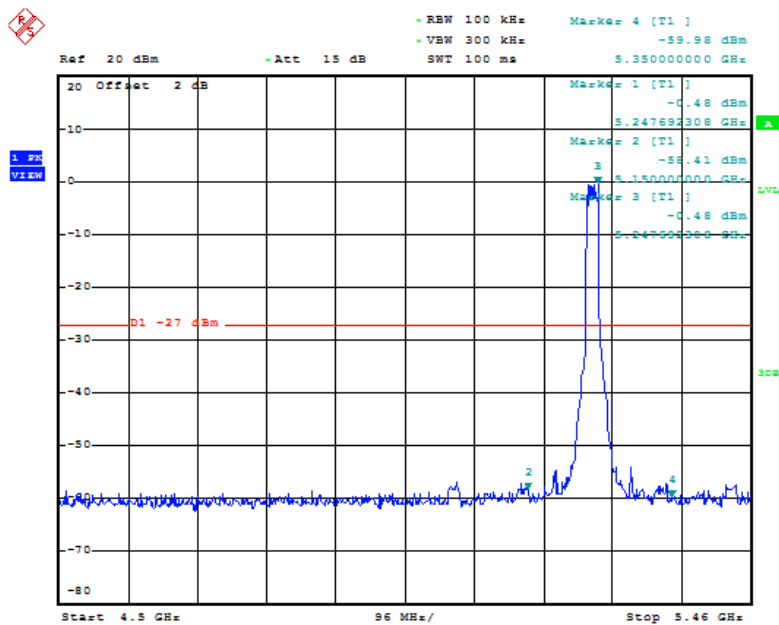
Mode	Channel	Test Results	Conclusion
802.11a	5180 MHz	Fig.25	P
	5240 MHz	Fig.26	P
802.11n HT20	5180 MHz	Fig.27	P
	5240 MHz	Fig.28	P
802.11n HT40	5190 MHz	Fig.29	P
	5230 MHz	Fig.30	P

**Conclusion: PASS**
**Test graphs as below:**



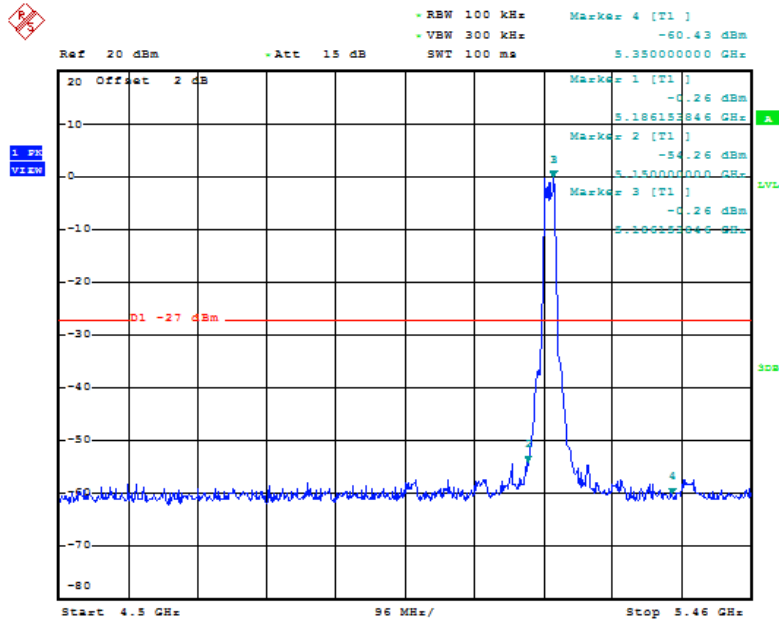
Date: 9.JAN.2019 09:26:52

**Fig. 25 Band Edges (802.11a, 5180MHz)**



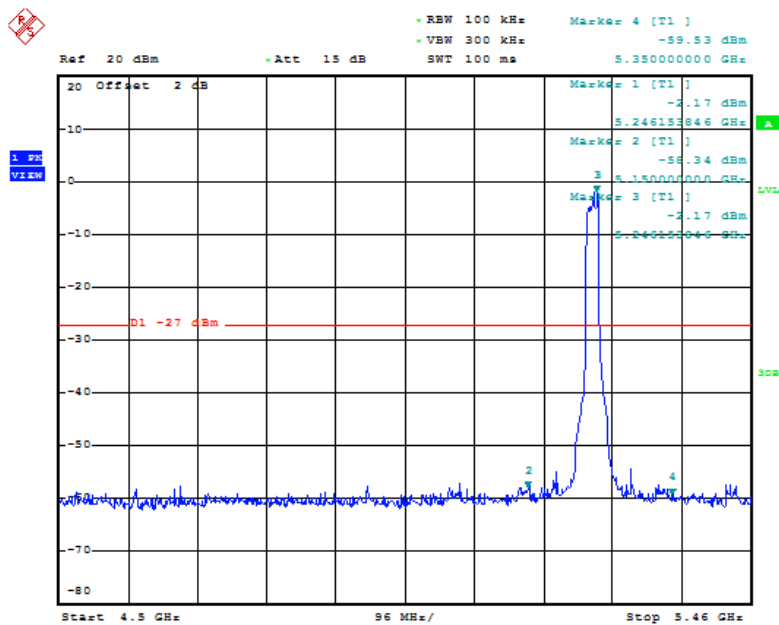
Date: 9.JAN.2019 09:31:51

**Fig. 26 Band Edges (802.11a, 5240MHz)**



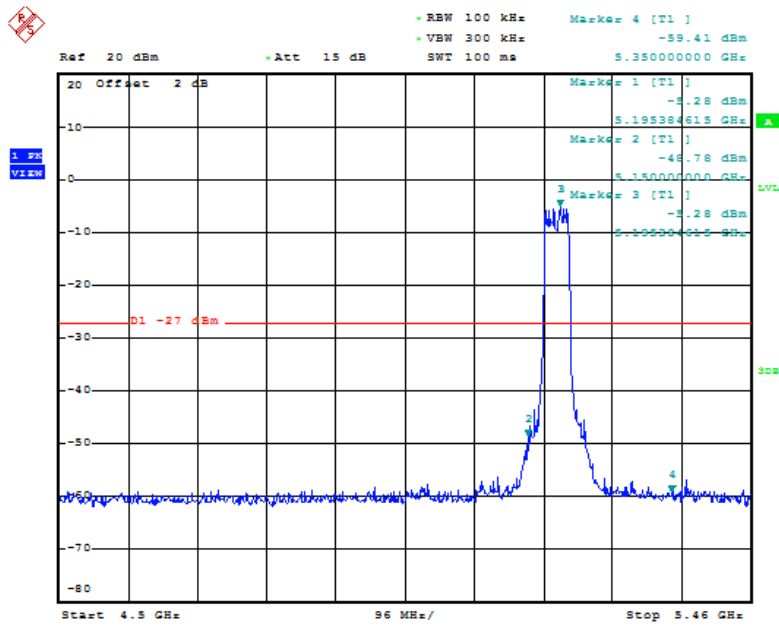
Date: 9.JAN.2019 09:35:28

**Fig. 27 Band Edges (802.11n-HT20, 5180MHz)**



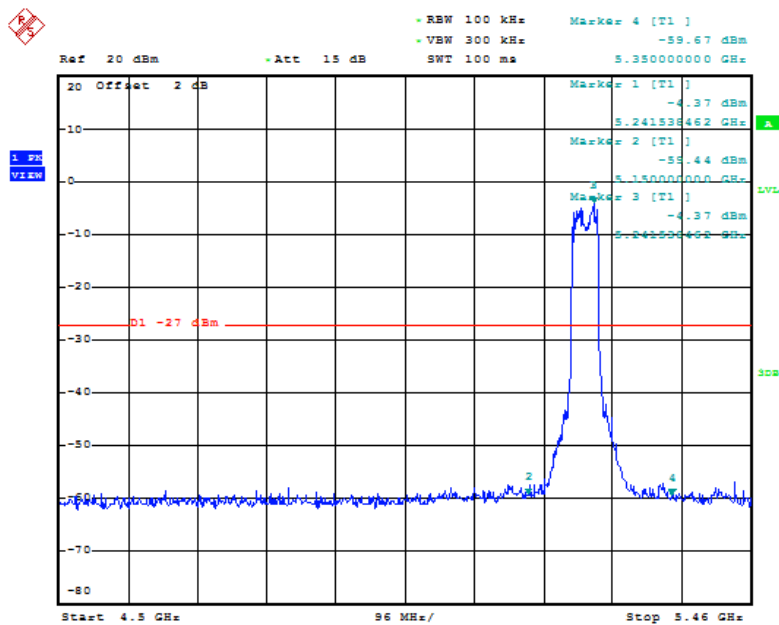
Date: 9.JAN.2019 09:41:20

**Fig. 28 Band Edges (802.11n-HT20, 5240MHz)**



Date: 9.JAN.2019 09:45:35

**Fig. 29 Band Edges (802.11n-HT40, 5190MHz)**



Date: 9.JAN.2019 09:48:07

**Fig. 30 Band Edges (802.11n-HT40, 5230MHz)**

### 6.6.2 Band Edges - Radiated

#### Measurement Limit:

Standard	Limit (dB $\mu$ V/m)	
FCC 47 CFR Part 15.209	Peak	74
	Average	54

The measurement is made according to KDB 789033.

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

#### Measurement Uncertainty:

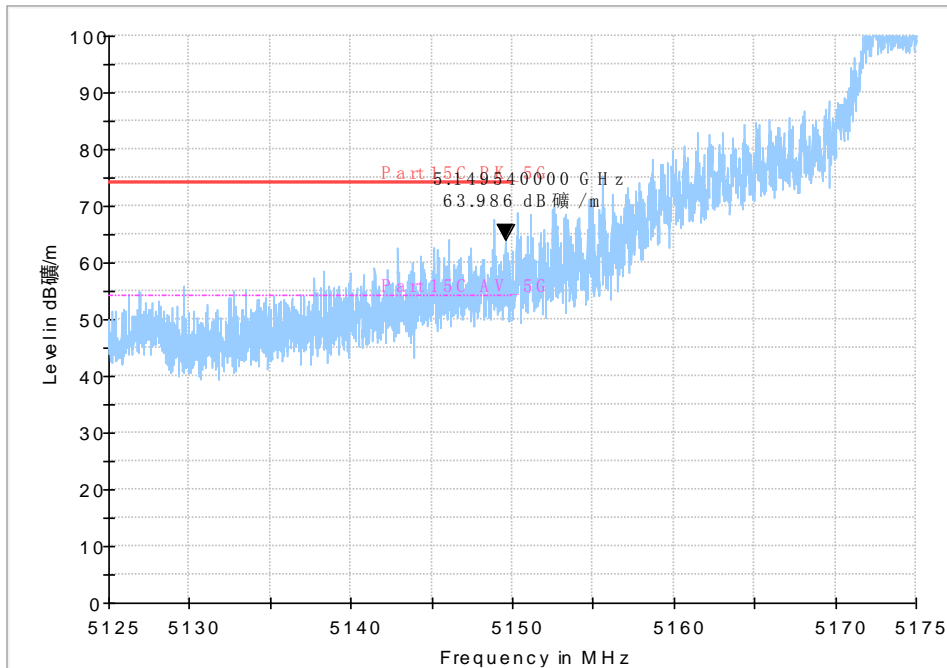
Measurement Uncertainty	0.75dB
-------------------------	--------

#### Measurement Result:

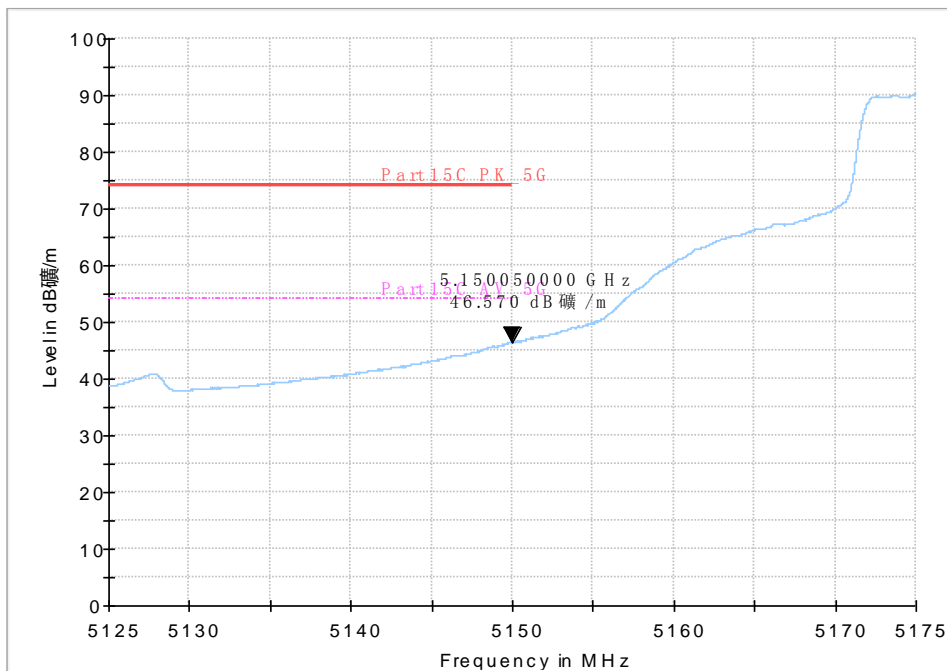
Mode	Channel	Test Results	Conclusion
802.11a	5180 MHz	Fig.31	P
	5240 MHz	Fig.32	P
802.11n HT20	5180 MHz	Fig.33	P
	5240 MHz	Fig.34	P
802.11n HT40	5190 MHz	Fig.35	P
	5230 MHz	Fig.36	P

**Conclusion: PASS**

**Test graphs as below:**



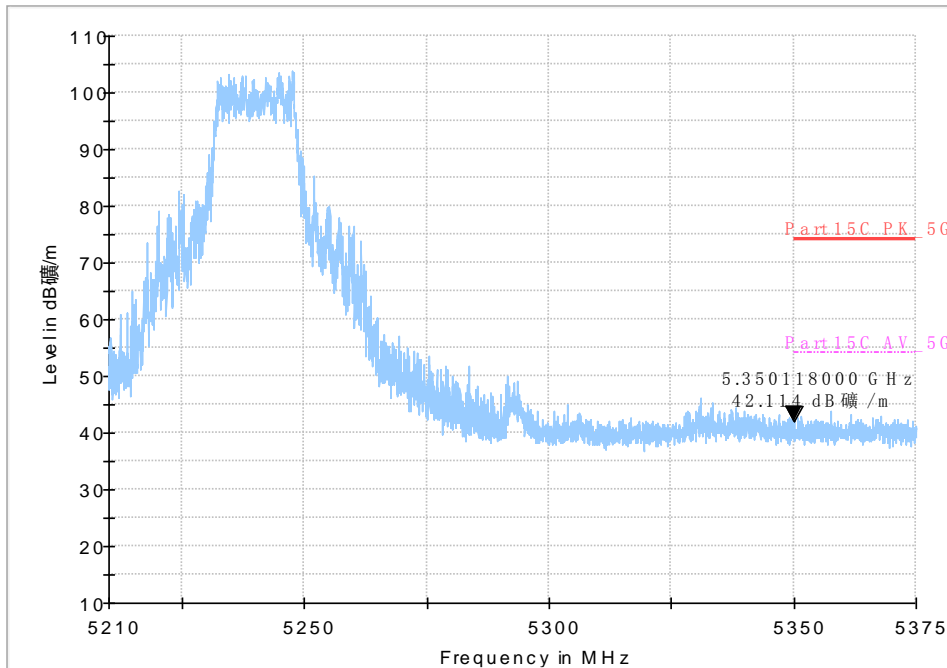
Peak



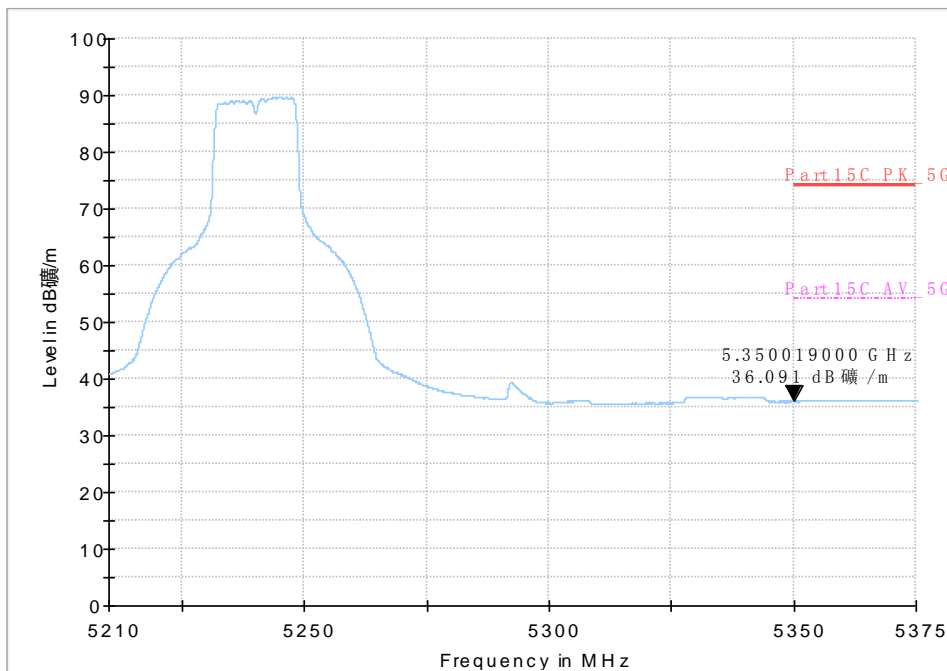
Average

**Fig. 31 Band Edges (802.11a, 5180MHz)**



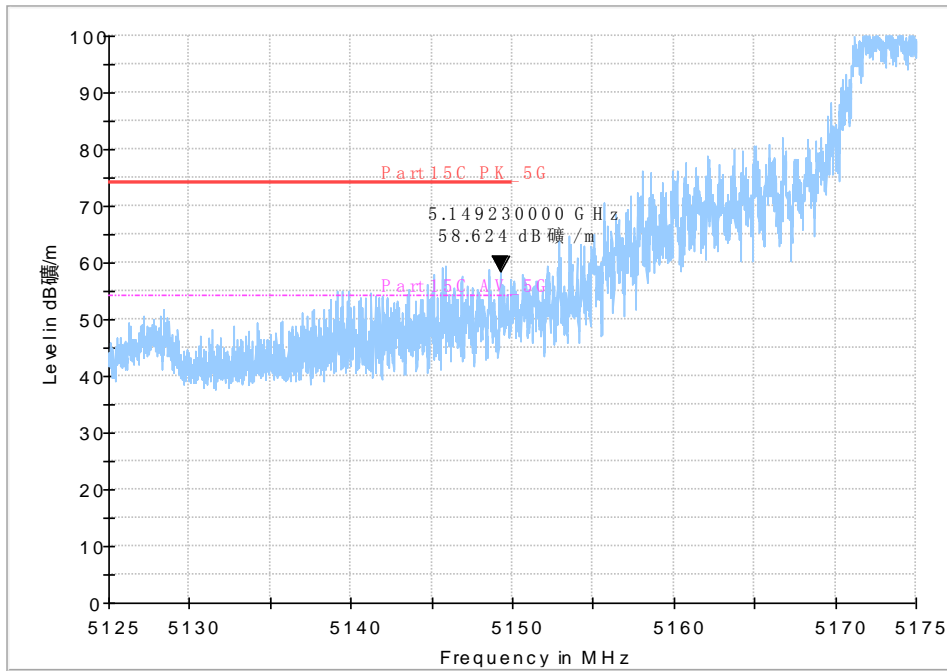


Peak

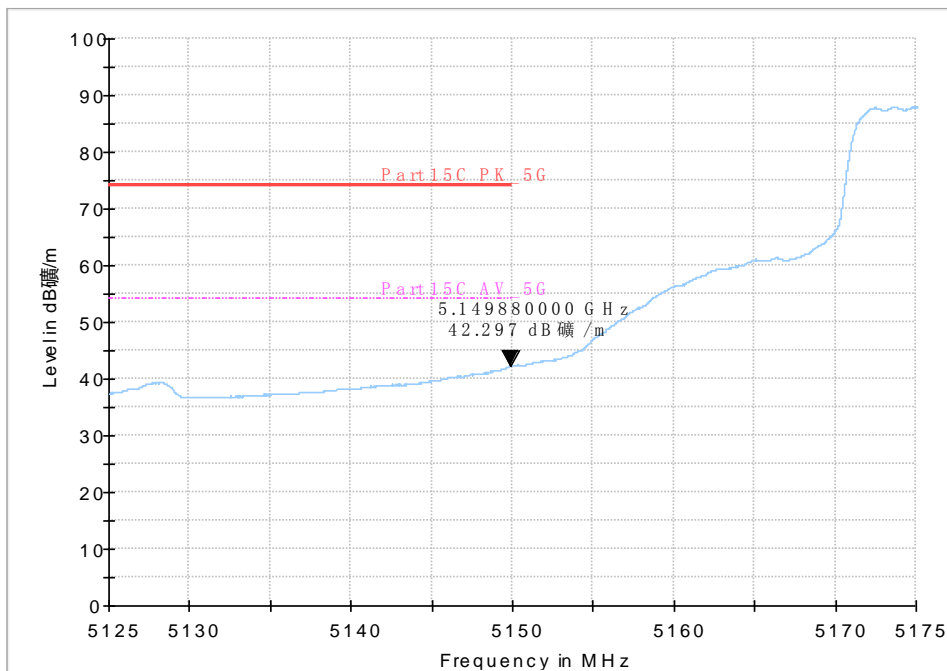


Average

**Fig. 32 Band Edges (802.11a, 5240MHz)**

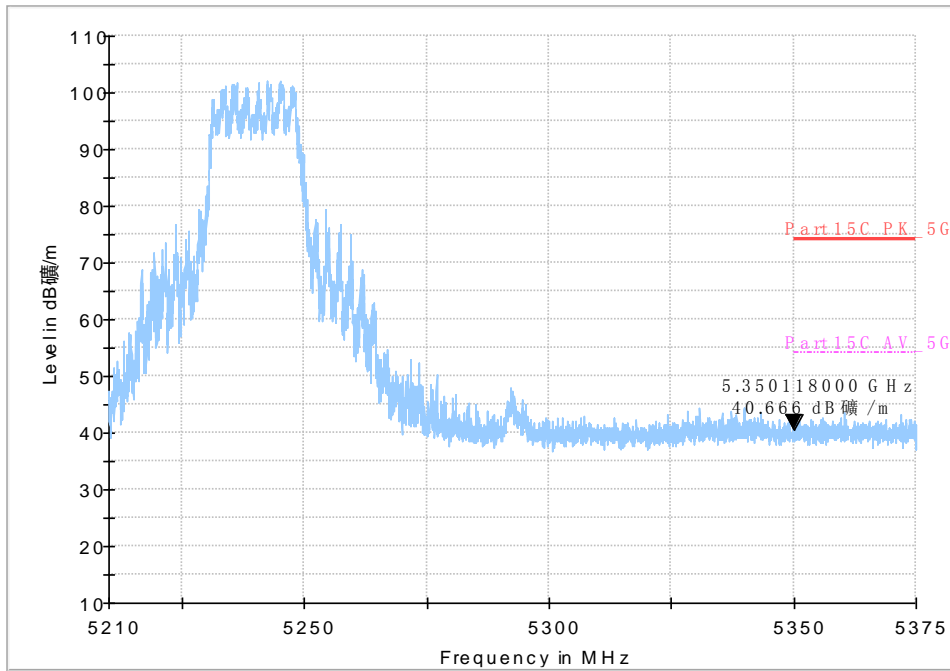


Peak

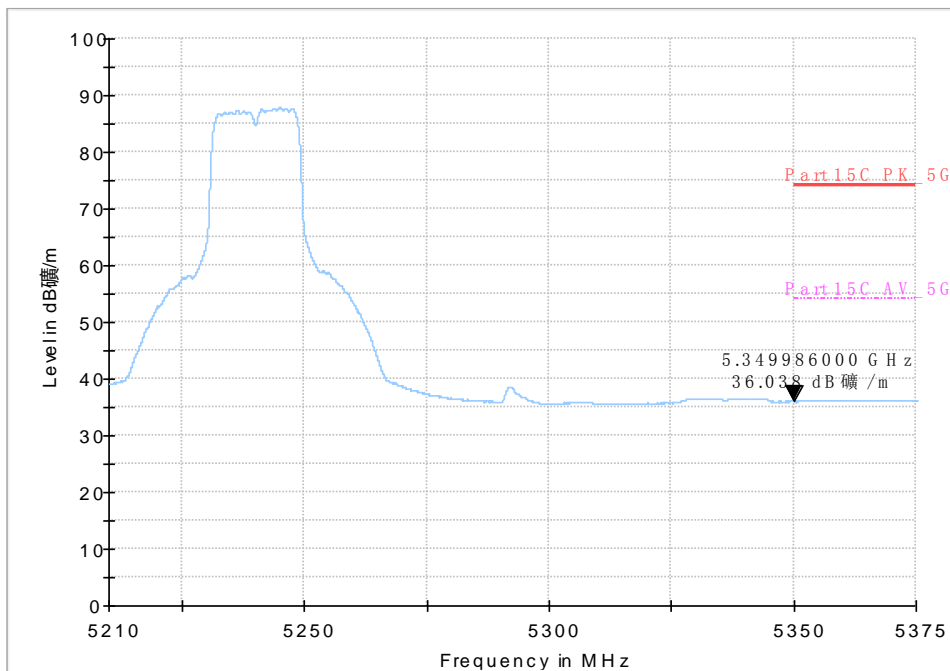


Average

**Fig. 33 Band Edges (802.11n-HT20, 5180MHz)**

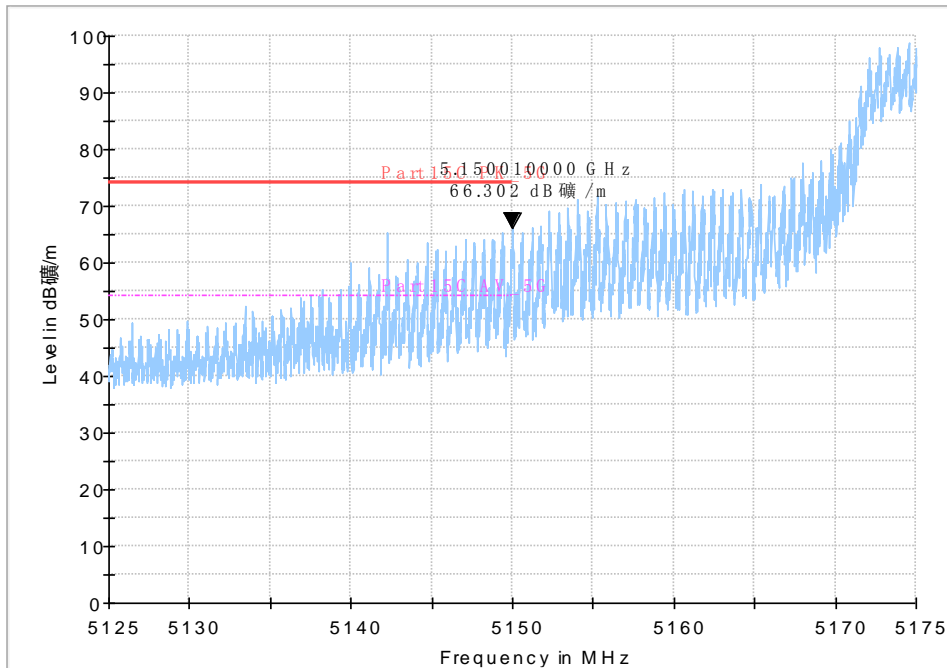


Peak

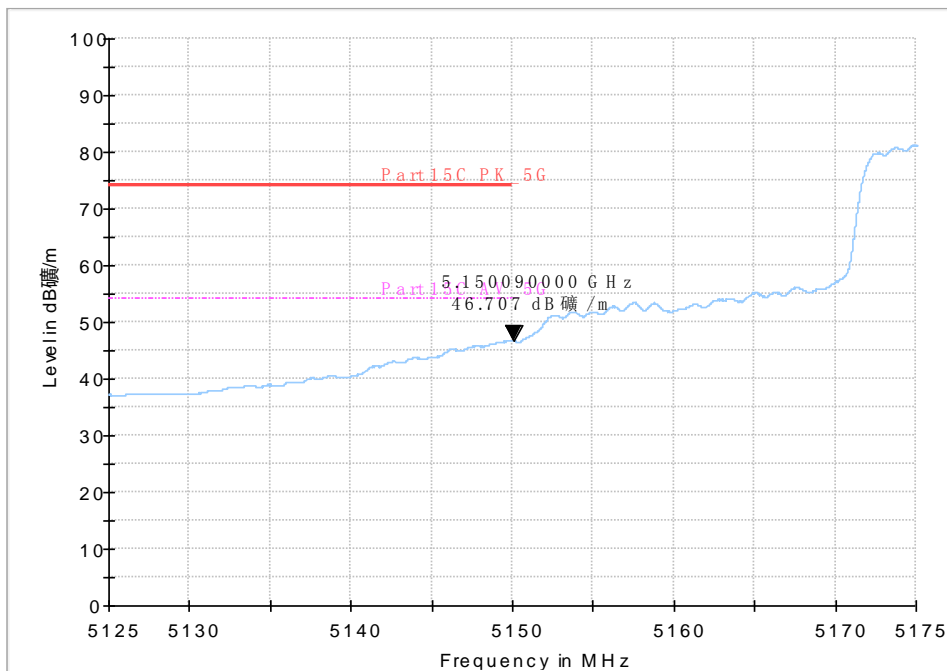


Average

**Fig. 34 Band Edges (802.11n-HT20, 5240MHz)**

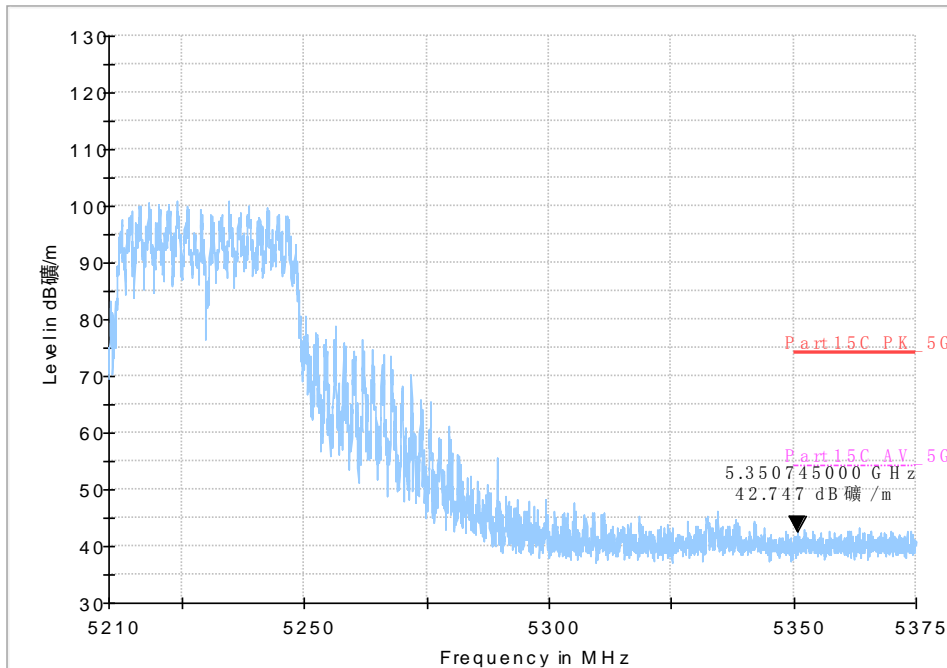


Peak

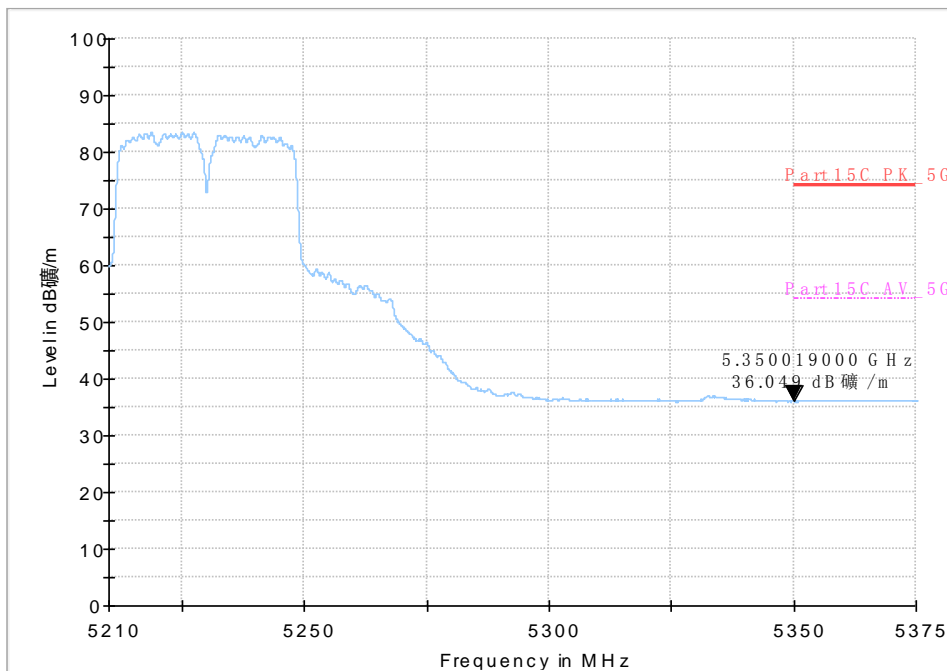


Average

**Fig. 35 Band Edges (802.11n-HT40, 5190MHz)**



Peak



Average

**Fig. 36 Band Edges (802.11n-HT40, 5230MHz)**

## 6.7. Transmitter Spurious Emission

### Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.407	-27 dBm/MHz

The measurement is made according to KDB 789033

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

The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.

During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

Set the spectrum analyzer in the following:

Below 1GHz(detector: Peak and Quasi-Peak)

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz(detector: Peak):

(a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=3MHz / Sweep= AUTO

### Limit in restricted band:

Frequency of emission (MHz)	Field strength(dB $\mu$ V/m)	Measurement distance(m)
0.009-0.490	129-94	3
0.490-1.705	74-63	3
1.705-30	70	3
30-88	40.0	3
88-216	43.5	3
216-960	46.0	3
Above 960	54.0	3

Note: for frequency range below 960MHz, the limit in 15.209 is defined in 10m test distance. The limit used above is calculated from 10m to 3m

Modulation type and data rate tested (Only worst case result is given below):

Mode	Data rate	Channel
802.11a	6Mbps	36(5180MHz)
802.11n-HT20	MCS0	36(5180MHz)

802.11n-HT40	MCS0	38(5190MHz)
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**Measurement Results:**
**802.11a mode**

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11a	36(5180MHz)	30 MHz ~ 1 GHz	Fig.37	P
		1 GHz ~ 8 GHz	Fig.38	P
		8 GHz ~ 18 GHz	Fig.39	P
		18 GHz ~ 26.5 GHz	Fig.40	P
		26.5 GHz ~ 40 GHz	Fig.41	P

**802.11n-HT20 mode**

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n-HT20	36(5180MHz)	30 MHz ~ 1 GHz	Fig.42	P
		1 GHz ~ 8 GHz	Fig.43	P
		8 GHz ~ 18 GHz	Fig.44	P
		18 GHz ~ 26.5 GHz	Fig.45	P
		26.5 GHz ~ 40 GHz	Fig.46	P

**802.11n-HT40 mode**

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n HT40	38(5190MHz)	30 MHz ~ 1 GHz	Fig.47	P
		1 GHz ~ 8 GHz	Fig.48	P
		8 GHz ~ 18 GHz	Fig.49	P
		18 GHz ~ 26.5 GHz	Fig.50	P
		26.5 GHz ~ 40 GHz	Fig.51	P

**Radiated Spurious Emission (9kHz-30MHz)**

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n HT40	134(5190MHz)	9kHz~30 MHz	Fig.52	P

**Conclusion: PASS**
**Note:**

A "reference path loss" is established and the  $A_{Rpl}$  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:

Result= $P_{Mea}+A_{Rpl}= P_{Mea}+Cable Loss+Antenna Factor$

**802.11a**

Channel 36 ( 30MHz ~1GHz )

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
34.0	16.26	-22	38.26	V
35.2	15.62	-21.9	37.52	V
36.4	16.85	-21.6	38.45	V
46.2	17.08	-20.1	37.18	V
260.4	18.85	-22.6	41.45	H
399.3	18	-19.1	37.1	H

Channel 36 ( 1GHz ~ 8GHz ) (Peak)

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
2996.0	61.09	-1.3	62.39	H
5368.8	51.77	4.1	47.67	H
5992.6	44.76	4.6	40.16	H
6383.4	46.41	5.6	40.81	H
6910.2	46.49	7	39.49	H
7752.4	47.53	8.4	39.13	H

Channel 36 ( 1GHz ~ 8GHz ) (Average)

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
2996.0	29.91	-1.3	31.21	H

Channel 36 ( 8GHz ~ 18GHz ) (Peak)

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
14635.4	53.98	19.6	34.38	H
15729.2	56.88	21.9	34.98	V
16104.8	56.41	22.5	33.91	H
16679.0	56.58	23.4	33.18	H
16983.0	56.61	23.7	32.91	H
17666.0	56.42	24.4	32.02	V



## Channel 36 ( 8GHz ~ 18GHz )(Average)

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
15729.2	43.36	21.9	21.46	V
16104.8	44.44	22.5	21.94	H
16679.0	43.81	23.4	20.41	H
16983.0	44.77	23.7	21.07	H
17666.0	44.56	24.4	20.16	V

## Channel 36 ( 18GHz ~ 26.5GHz )

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
18694.4	38.51	-5.6	44.11	V
19683.8	40.76	-5.1	45.86	H
20446.3	41.26	-4.4	45.66	V
21322.6	42.39	-3.6	45.99	V
22494.0	43.52	-3.1	46.62	H
23545.4	44.02	-2.8	46.82	H

## Channel 36 ( 26.5GHz ~ 40GHz )

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
30797.0	45.87	0.2	45.67	V
32801.8	44.09	0.7	43.39	H
34419.1	47.74	1.3	46.44	H
35848.8	46.19	0.9	45.29	V
36945.0	47.22	1.6	45.62	H
38385.4	47.39	2.3	45.09	V

**802.11n-HT20**

## Channel 36 ( 30MHz ~1GHz )

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
34.3	16.3	-22	38.3	V
35.3	16.04	-22	38.04	V

46.8	14.21	-20.1	34.31	V
55.3	12.63	-21.2	33.83	V
109.1	13.82	-23.8	37.62	V
173.2	13.37	-26.2	39.57	H

## Channel 36 ( 1GHz ~ 8GHz )

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
2993.6	46.29	-1.3	47.59	H
5373.4	47.76	4.1	43.66	V
5744.0	45.27	4.7	40.57	V
6438.6	47.27	5.8	41.47	V
6641.4	47.23	6.5	40.73	V
7692.6	46.58	8.1	38.48	V

## Channel 36 ( 8GHz ~ 18GHz ) (Peak)

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
16279.0	55.67	22.6	33.07	V
16715.4	55.9	23.6	32.3	H
16893.8	56.03	23.3	32.73	V
17247.8	56.6	24.2	32.4	V
17446.0	57.33	24.3	33.03	V
17706.4	56.73	24.3	32.43	H

## Channel 36 ( 8GHz ~ 18GHz )(Average)

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
16279.0	43.5	22.6	20.9	V
16715.4	44.12	23.6	20.52	H
16893.8	43.6	23.3	20.3	V
17247.8	44.26	24.2	20.06	V
17446.0	44.53	24.3	20.23	V

17706.4	44.22	24.3	19.92	H
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## Channel 36 ( 18GHz ~ 26.5GHz )

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
19253.8	39.67	-5.7	45.37	H
20088.4	41.06	-4.7	45.76	V
21497.8	43.19	-3.5	46.69	H
22284.8	44.52	-3.1	47.62	H
23541.2	45.24	-2.8	48.04	H
24845.9	45.2	-2.3	47.5	V

## Channel 36 ( 26.5GHz ~ 40GHz )

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
27817.6	44.47	-0.4	44.87	H
30829.4	45.67	0.3	45.37	H
32723.5	44.06	0.5	43.56	V
34126.2	47.5	1.6	45.9	H
35927.0	46.05	0.7	45.35	H
37414.8	46.32	0.9	45.42	V

**802.11n-HT40**

## Channel 38 ( 30MHz ~ 1GHz )

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
34.4	19.87	-22	41.87	V
36.5	16.35	-21.6	37.95	V
50.7	18.9	-20.2	39.1	V
72.0	18.95	-25.5	44.45	V
151.7	16.22	-27.9	44.12	H
398.6	21.26	-19.4	40.66	H

## Channel 38 (1GHz ~ 8GHz )

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
2997.4	42.35	-1.3	43.65	V
5902.4	45.63	4.6	41.03	H
6259.2	45.66	5.4	40.26	H
6637.4	47.14	6.5	40.64	H
7187.4	46.7	7.2	39.5	V
7824.4	48.1	8.5	39.6	H

## Channel 38 (8GHz ~ 18GHz )( Peak )

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
15763.8	56.14	22	34.14	H
16259.2	55.25	22.5	32.75	V
16688.2	56.27	23.5	32.77	V
16837.2	55.38	23.4	31.98	V
17140.2	56.12	24.1	32.02	H
17897.6	57.42	24.4	33.02	V

## Channel 38 (8GHz ~ 18GHz )( Average )

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
15763.8	43.21	22	21.21	H
16259.2	43.48	22.5	20.98	V
16688.2	43.93	23.5	20.43	V
16837.2	43.46	23.4	20.06	V
17140.2	44.36	24.1	20.26	H
17897.6	44.76	24.4	20.36	V

## Channel 38 (18GHz ~ 26.5GHz )

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
18632.4	40.15	-5.7	45.85	H
19495.2	40.24	-5.4	45.64	H

20450.6	41.03	-4.4	45.43	H
21218.1	43.2	-3.9	47.1	V
21828.4	43.35	-3.4	46.75	H
22905.4	44.36	-3	47.36	V

Channel 38 (26.5GHz ~ 40GHz)

Frequency (MHz)	Result (dB $\mu$ V/m)	ARpl (dB)	PMea (dB $\mu$ V/m)	Polarity
27175.0	44.32	-1	45.32	V
29956.0	43.15	-1.4	44.55	V
30828.1	45.99	0.3	45.69	H
32554.8	44.15	0.4	43.75	H
35829.8	47.26	1	46.26	V
37868.4	45.85	1.2	44.65	H

Test graphs as below:

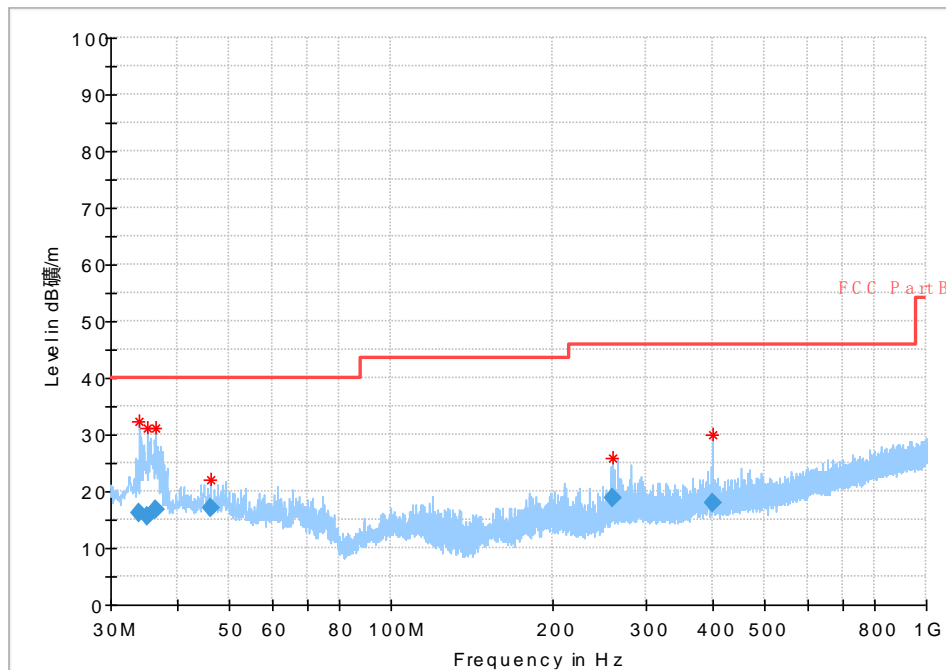
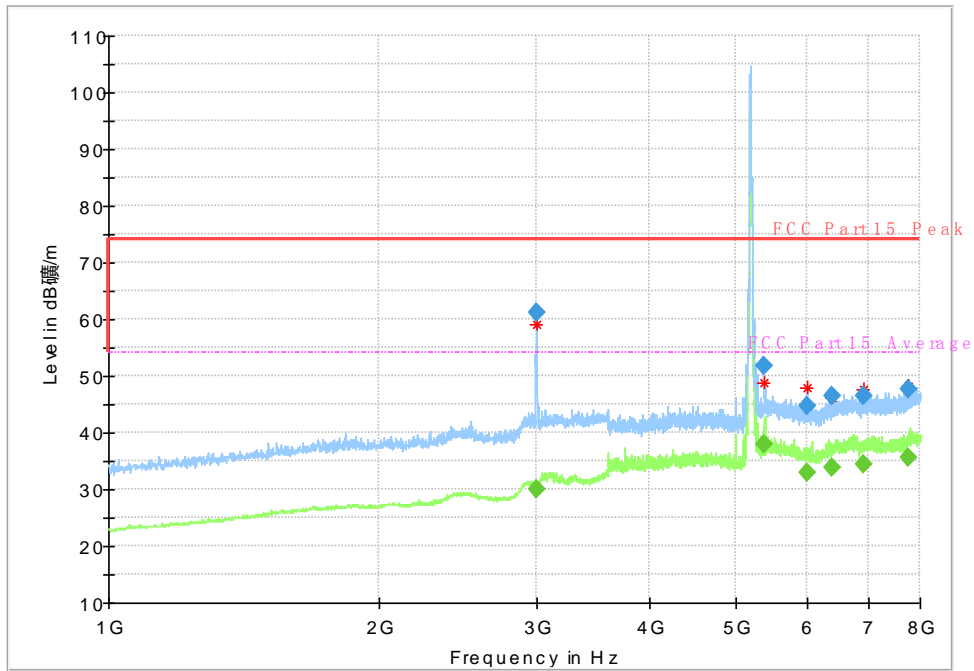
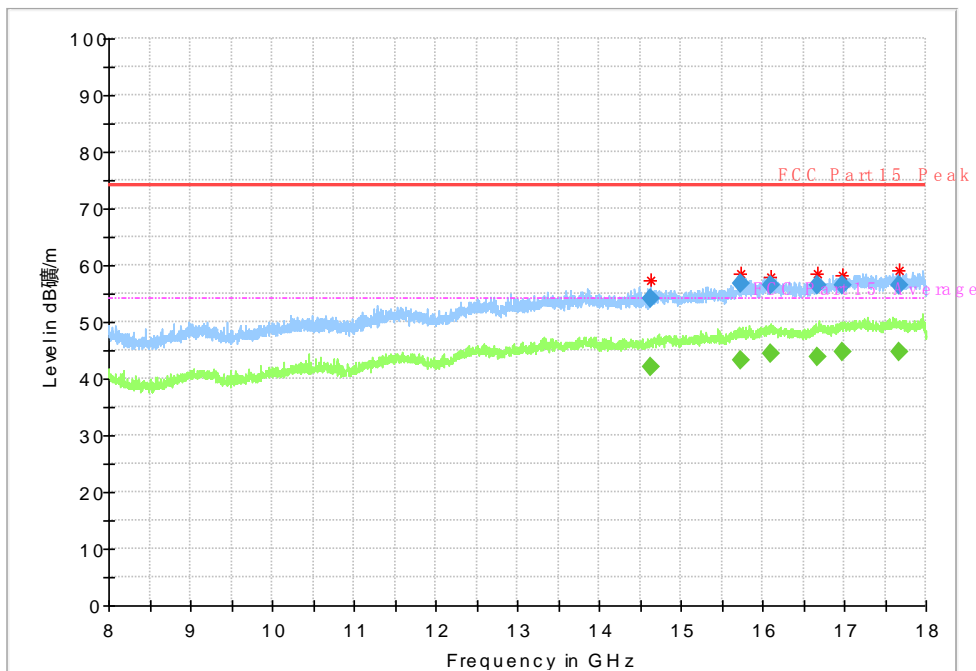


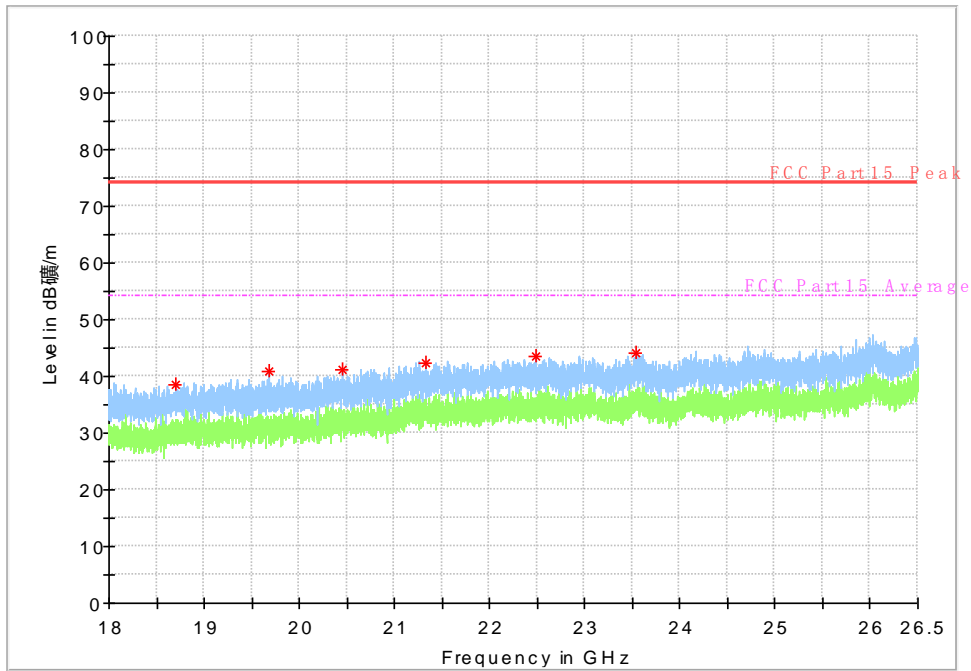
Fig. 37 Radiated Spurious Emission (802.11a, ch36, 30 MHz-1 GHz)



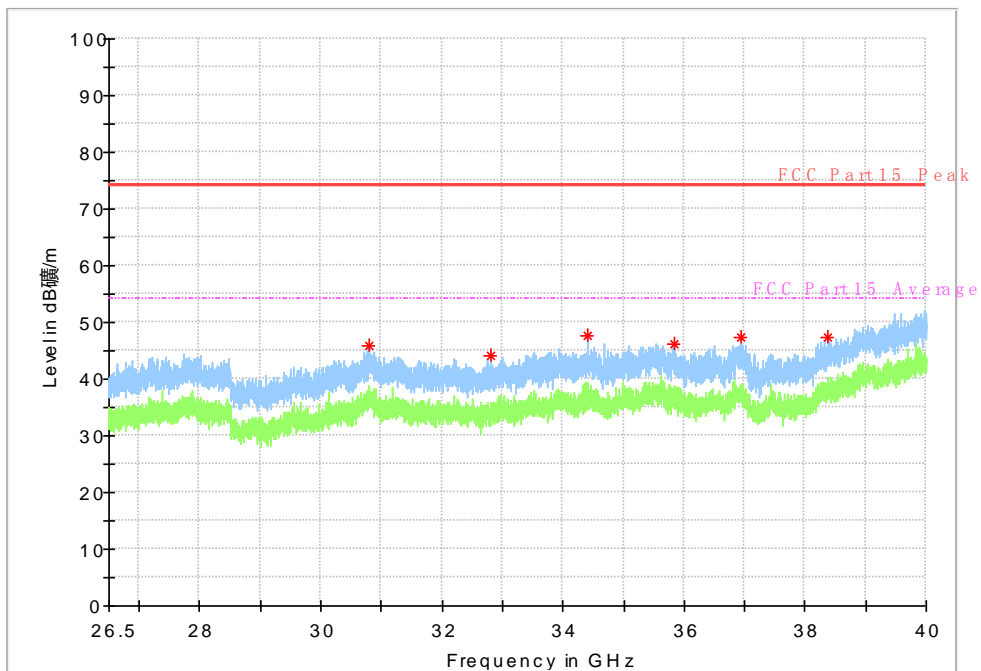
**Fig. 38 Radiated Spurious Emission (802.11a, ch36, 1 GHz-8 GHz)**



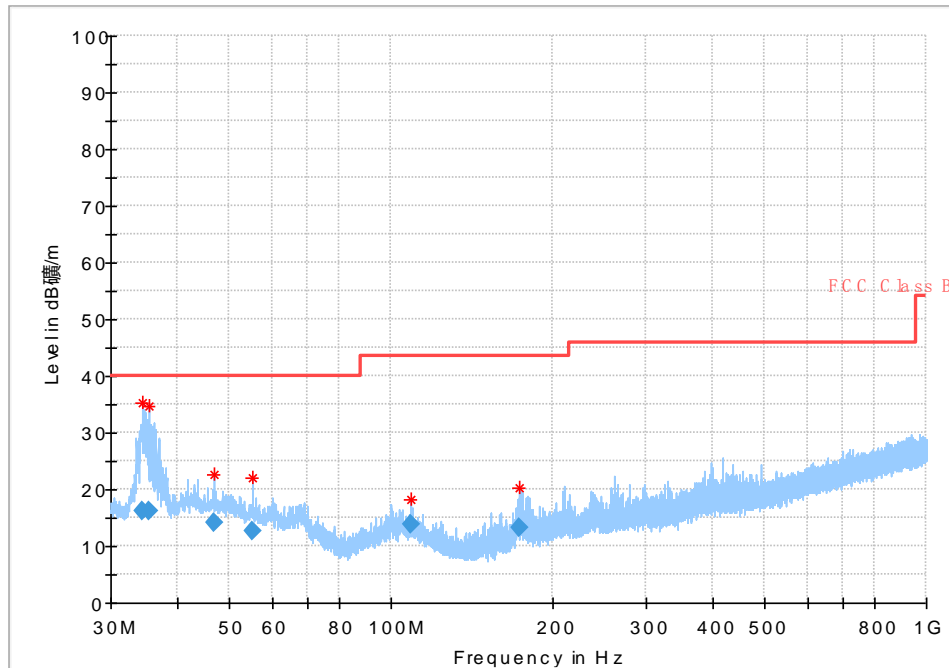
**Fig. 39 Radiated Spurious Emission (802.11a, ch36, 8 GHz-18 GHz)**



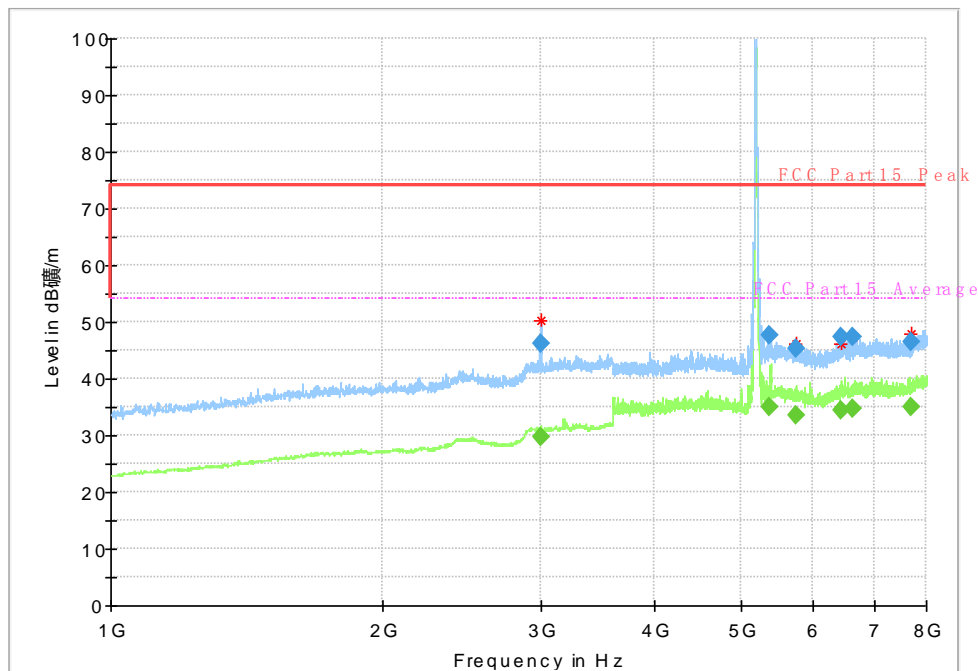
**Fig. 40 Radiated Spurious Emission (802.11a, ch36, 18 GHz-26.5 GHz)**



**Fig. 41 Radiated Spurious Emission (802.11a, ch36, 26.5 GHz-40 GHz)**

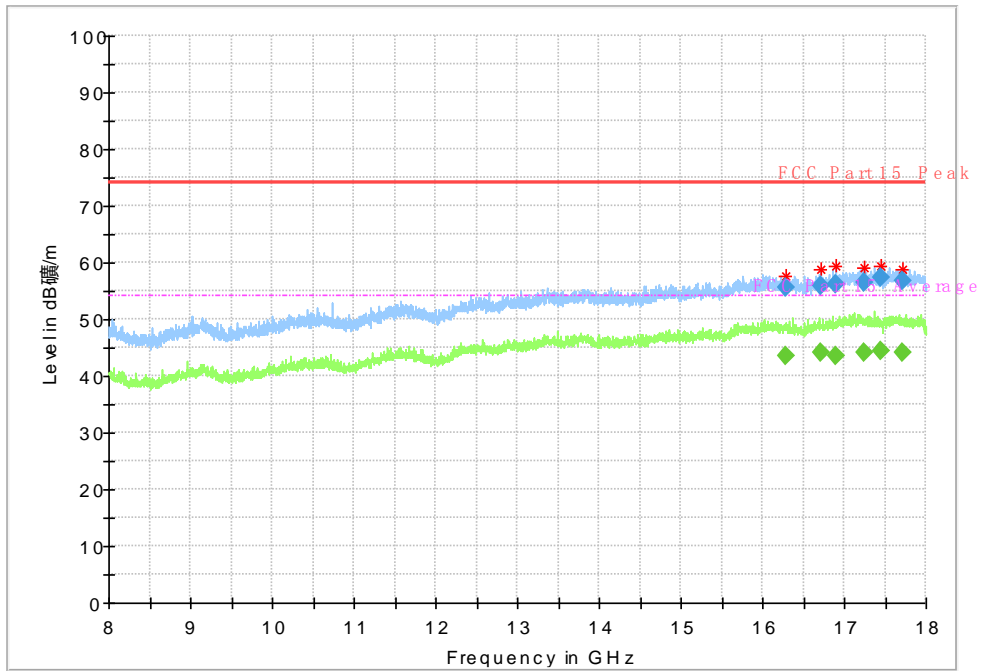


**Fig. 42 Radiated Spurious Emission (802.11n-HT20, ch36, 30 MHz-1 GHz)**

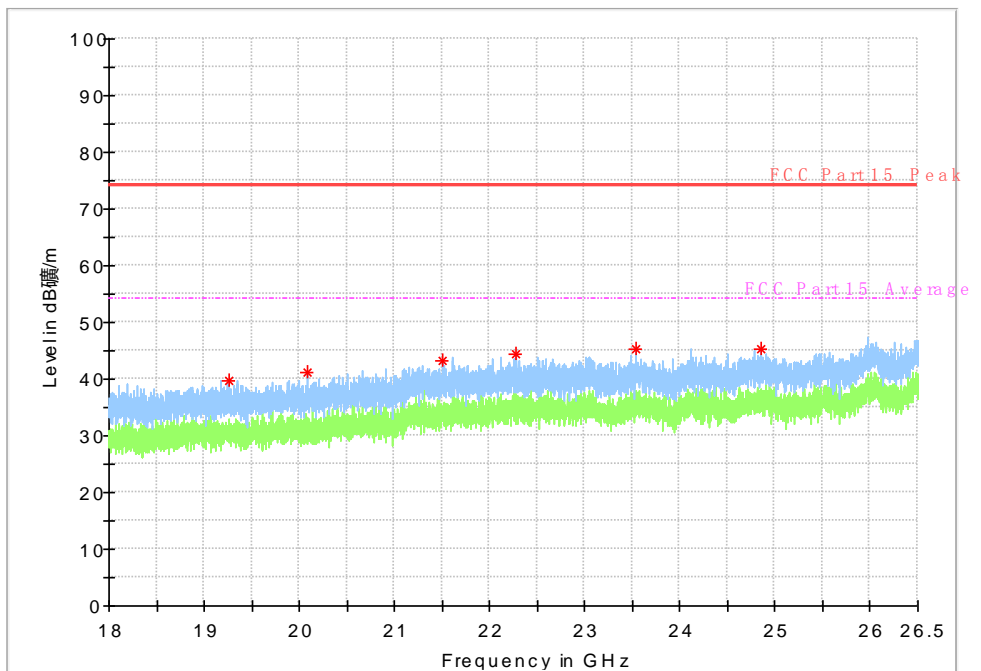


**Fig. 43 Radiated Spurious Emission (802.11n-HT20, ch36, 1 GHz-8 GHz)**

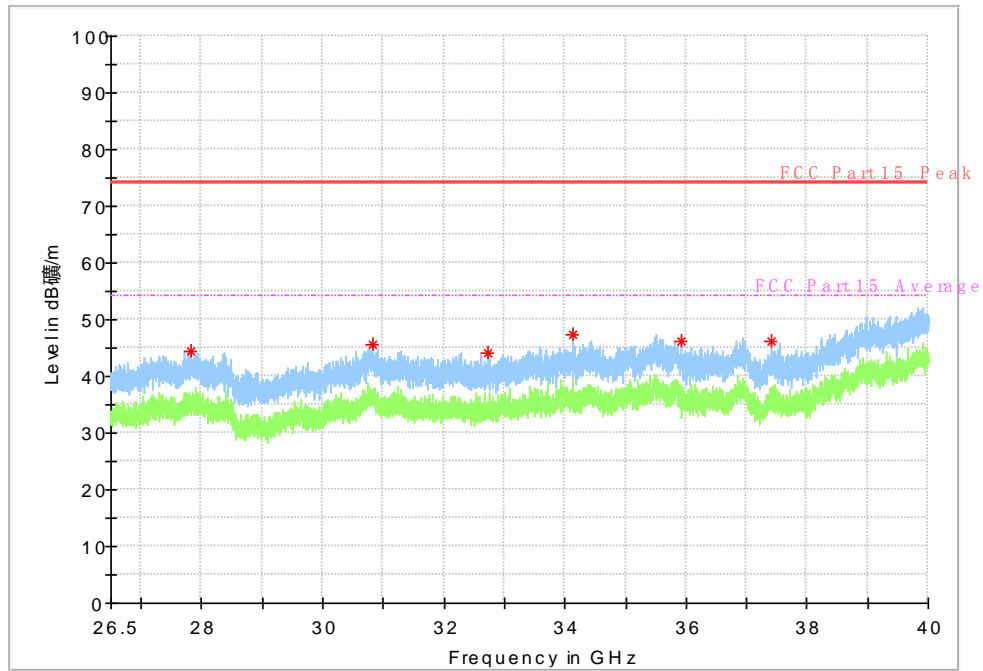




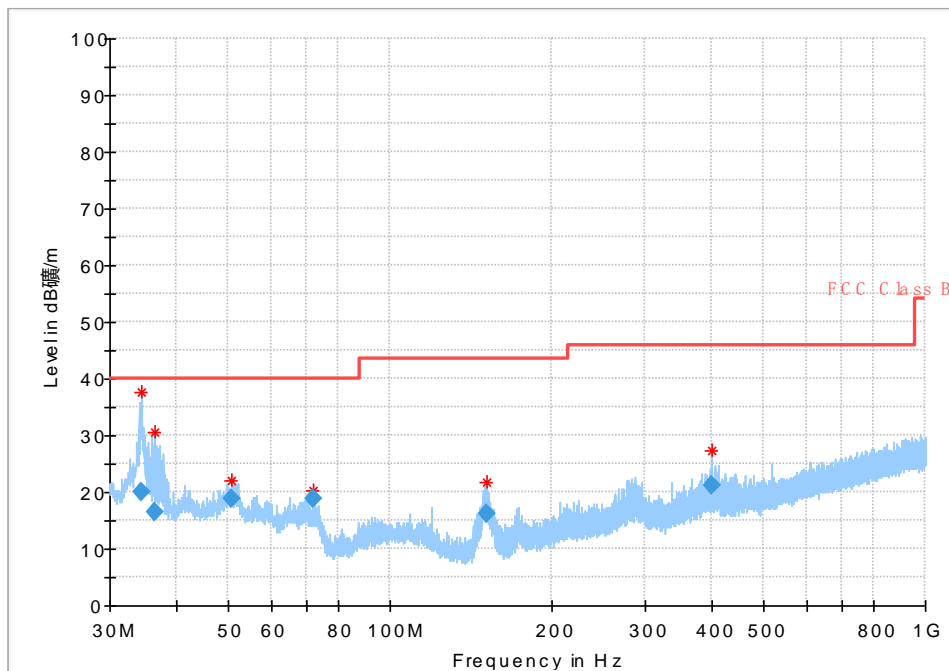
**Fig. 44 Radiated Spurious Emission (802.11n-HT20, ch36, 8 GHz-18 GHz)**



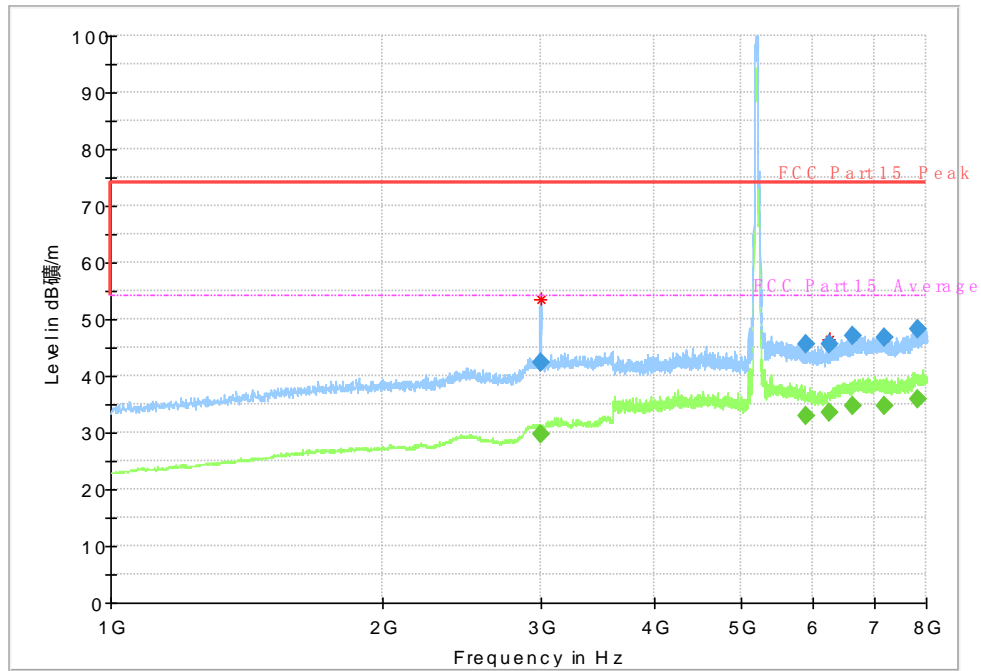
**Fig. 45 Radiated Spurious Emission (802.11n-HT20, ch36, 18 GHz-26.5 GHz)**



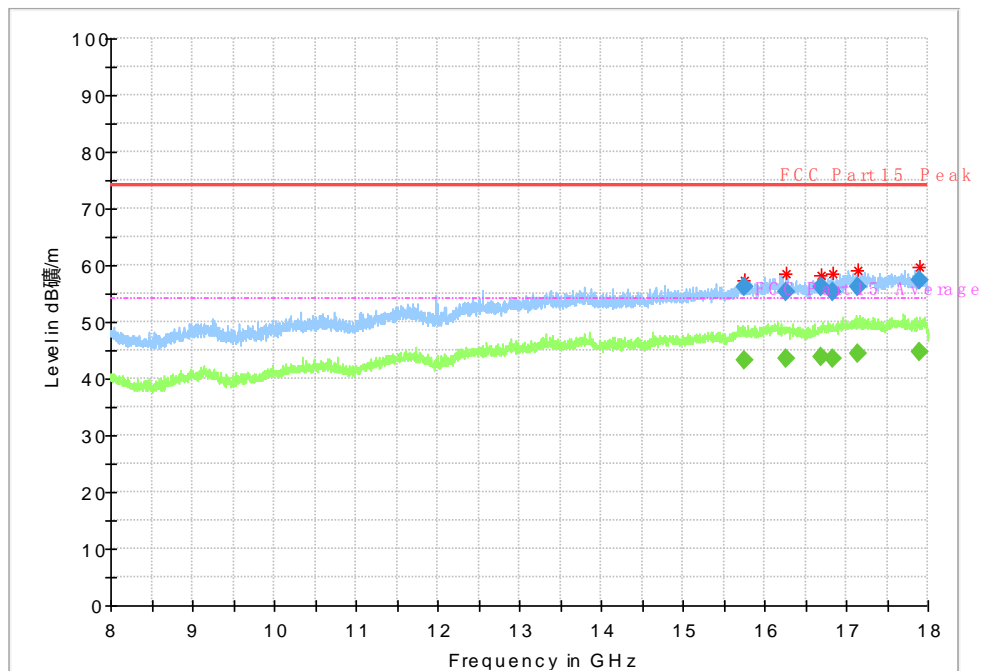
**Fig. 46 Radiated Spurious Emission (802.11n-HT20, ch36, 26.5 GHz-40 GHz)**



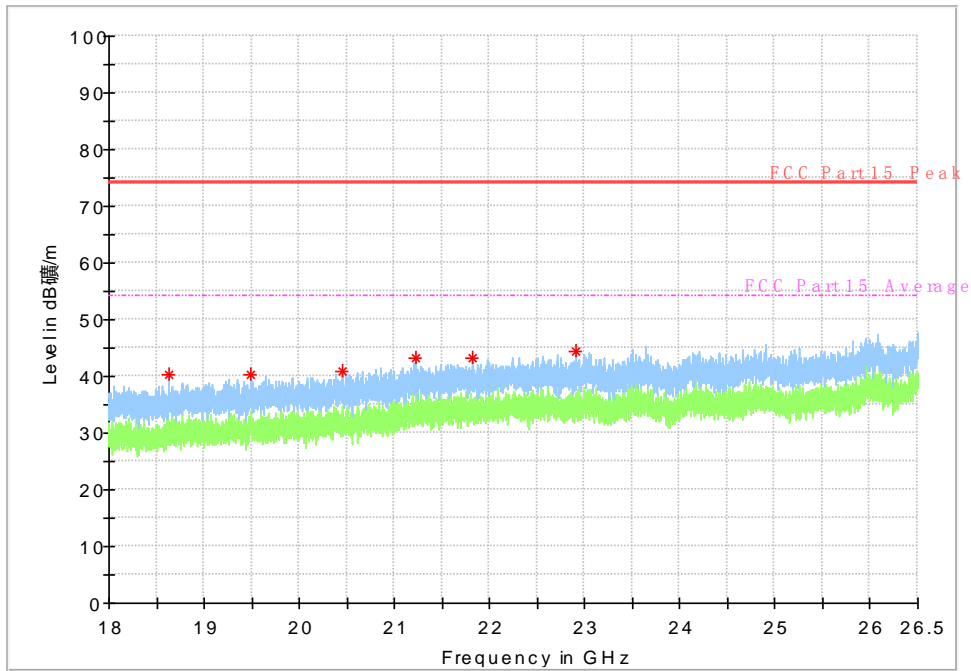
**Fig. 47 Radiated Spurious Emission (802.11n-HT40, ch38, 30 MHz-1 GHz)**



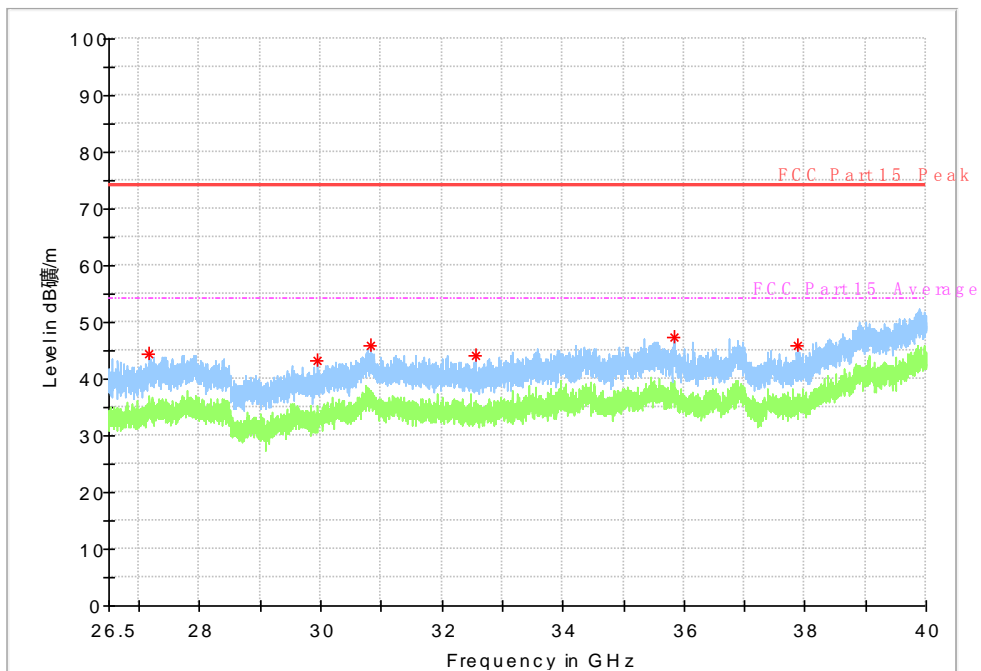
**Fig. 48 Radiated Spurious Emission (802.11n-HT40, ch38, 1 GHz-8 GHz)**



**Fig. 49 Radiated Spurious Emission (802.11n-HT40, ch38, 8 GHz-18 GHz)**



**Fig. 50 Radiated Spurious Emission (802.11n-HT40, ch38, 18 GHz-26.5 GHz)**



**Fig. 51 Radiated Spurious Emission (802.11n-HT40, ch38, 26.5 GHz-40 GHz)**

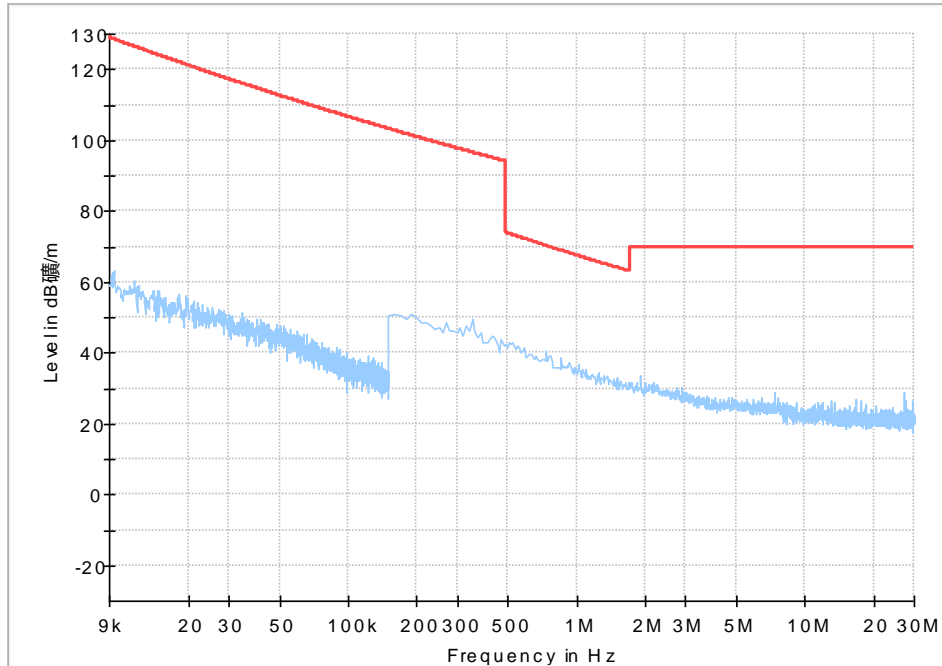


Fig. 52 Radiated Spurious Emission (9kHz-30MHz)

### 6.8. Conducted Emission (150kHz- 30MHz)

Test Condition:

Voltage (V)	Frequency (Hz)
110	60

Measurement Result and limit:

WLAN (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		11a mode	Idle	
0.15 to 0.5	66 to 56	Fig.53		P
0.5 to 5	56			
5 to 30	60			

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

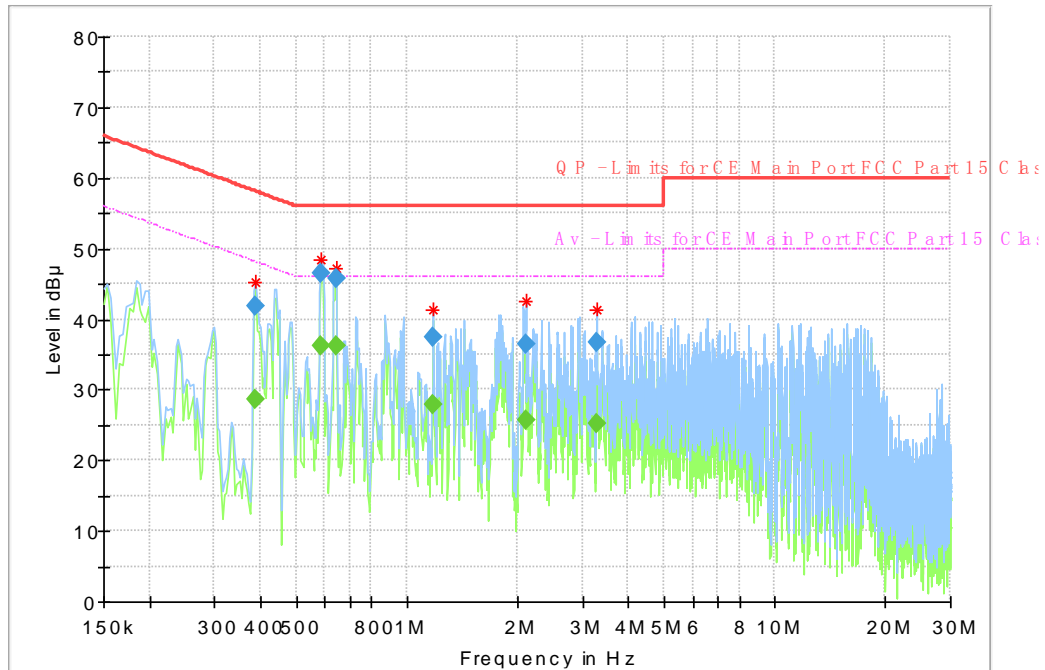
WLAN (Average Limit)

Frequency range (MHz)	Average Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		11a mode	Idle	
0.15 to 0.5	56 to 46	Fig.53		P
0.5 to 5	46			
5 to 30	50			

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

**Conclusion: PASS**

**Test graphs as below:**



**Fig. 53 Conducted Emission(802.11a, TX)**

Measurement Result:

Frequency (MHz)	Quasi Peak (dBµV)	Average (dBµV)	Limit (dBµV)	Marg in (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.388800	41.72	---	58.09	16.3	1000.0	9.000	N	ON	9.7
0.388800	---	28.57	48.09	19.5	1000.0	9.000	N	ON	9.7
0.586556	46.47	---	56.00	9.53	1000.0	9.000	L1	ON	9.7
0.586556	---	36.28	46.00	9.72	1000.0	9.000	L1	ON	9.7
0.642525	45.73	---	56.00	10.2	1000.0	9.000	L1	ON	9.7
0.642525	---	36.22	46.00	9.78	1000.0	9.000	L1	ON	9.7
1.179825	37.40	---	56.00	18.6	1000.0	9.000	L1	ON	9.7
1.179825	---	27.91	46.00	18.0	1000.0	9.000	L1	ON	9.7
2.105175	36.43	---	56.00	19.5	1000.0	9.000	L1	ON	9.7
2.105175	---	25.59	46.00	20.4	1000.0	9.000	L1	ON	9.7
3.284250	36.60	---	56.00	19.4	1000.0	9.000	L1	ON	9.7
3.284250	---	25.29	46.00	20.7	1000.0	9.000	L1	ON	9.7

## 6.9. Frequency Stability

Manufacturers ensured the EUT meet the requirement of frequency stability, such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

## 6.10. Power control

A Transmission Power Control mechanism is not required for systems with an e.i.r.p. of less than 27dBm (500 mW).

## 7. Test Equipment and Ancillaries Used For Tests

The test equipment and ancillaries used are as follows.

### Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Vector Signal Analyzer	FSQ40	200063	Rohde&Schwarz	2018-12-17	1 Year
2	DC Power Supply	ZUP60-14	LOC-220Z006	TDL-Lambda	2018-05-11	1 Year
3	Universal Radio Communication Tester	CMW50	104178	R&S	2018-05-11	1 Year

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Universal Radio Communication Tester	CMU200	123123	R&S	2018-05-11	1 Year
2	EMI Test Receiver	ESU40	100307	R&S	2018-05-11	1 Year
3	TRILOG Broadband Antenna	VULB9163	VULB9163-515	Schwarzbeck	2017-02-25	3 Year
4	Double-ridged Waveguide Antenna	ETS-3117	00135890	ETS	2017-01-11	3 Year
5	2-Line V-Network	ENV216	101380	R&S	2018-05-11	1 Year



6	Loop Antenna	AL-130R	121083	COM-POWER	2016-11-21	3 Year
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### Anechoic chamber

Fully anechoic chamber by Frankonia German.

## 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. =25 %, Max. = 75 %
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

## 9. Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in ECIT documents. The detailed measurement uncertainty to see the column, k=2

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%	$\pm 3.66\text{ dB}$

## ANNEX A. Detailed Test Results

### Annex A.1. Main Terms

Verdict	Verdict of each test cases.
Test cases	Test cases identification number and description in ETSI EN 300 328 test specification and ETSI specification.

### Annex A.2. Terms used in Condition column

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

### Annex A.3. Terms used in Verdict column

P	Pass, the EUT complies with the essential requirements in the standard.
NM	Not measure, the test was not measured by ECIT.
NA	Not applicable, the test was not applicable.
F	Fail, the EUT does not comply with the essential requirements in the standard.

### Annex A.4. Terms used in Note column

EUT ID	EUT ID (e.g N01, N02.....) is used to identify the EUT tested used for each test cases as specified in section 3 of this test report.
Lab Code	Lab code is used to identify the subcontracted lab if this test cases is performed in the subcontracted lab.

Subcontracted test lab code: N/A

**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 17025:2005 *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-IAF Communiqué dated 8 January 2009).



Presented this 15<sup>th</sup> day of March 2017.



President and CEO  
For the Accreditation Council  
Certificate Number 3682.01  
Valid to February 28, 2019

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

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