

# FCC Part 15 Subpart E §15.407

## Test Report

<b>Equipment Under Test</b>	<b>Car AVN</b>
<b>Model Name</b>	<b>DGU-8745-C300SA-1</b>
<b>Variant Model Name</b>	<b>DGU-8745-X150SA-1</b>
<b>FCC ID</b>	<b>2AE77DGU8745C300SA1</b>
<b>Applicant</b>	<b>DIGEN</b>
<b>Manufacturer</b>	<b>DIGEN</b>
<b>Date of Test(s)</b>	<b>2018. 11. 26 ~ 2019. 01. 10</b>
<b>Date of Issue</b>	<b>2019. 01. 31</b>

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

<b>Issue to</b>	<b>Issue by</b>
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## Revision history

Revision	Date of issue	Description	Revised by
--	Jan 28, 2019	Initial	-
1	Jan 31, 2019	DFS section remove	Suhyun seo

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## 1. Applicant Information

### 1.1. Details of applicant

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### 1.2. Manufacturer Information

Manufacturer : DIGEN  
Address : 89, Seongseo4chacheomdan-ro, Dalseo-gu, Daegu, 704-801, Korea

## 2. Laboratory Information

Company name : MOVON CORPORATION  
Test site number : FCC (KR0151)  
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Test site number : IC (6432B-3)  
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Address : 494, Geumeo-ro, Pogok-eup, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 170-30 Yongin IP 17030 Korea  
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### 3. Summary of test results

The EUT has been tested according to the following specifications:

Section in FCC part 15	Description	Result
§15.205(a) §15.209(a)	Transmitter radiated spurious emissions, Conducted spurious emission	C
§15.407(a)(1) §15.407(e)	Emission bandwidth & 99 % bandwidth	C
§15.407(a)(1)	Maximum conducted output power	C
§15.407(a)(1)	Maximum Power spectral density	C
§15.407(g)	Frequency stability	C
§15.207(a)	AC Conducted power line test	N/A
§15.203	Antenna requirement	C

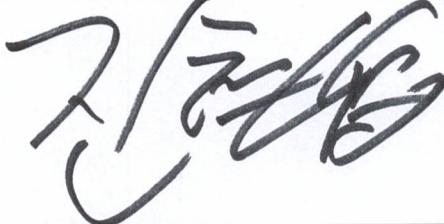
#### ※ Abbreviation

C Complied  
N/A Not applicable  
F Fail

#### The sample was tested according to the following specification:

FCC Parts 15.407; ANSI C63.10:2013  
FCC Public Notice KDB 789033 D02 v02r01

#### Approval Signatories

Test and Report Completed by :	Report Approval by :
	
Suhyun Seo Test Engineer MOVON CORPORATION	Issac Jin Technical Manager MOVON CORPORATION

#### 4. EUT Description

<b>Kind of product</b>	Car AVN
<b>Model Name</b>	DGU-8745-C300SA-1
<b>Variant Model Name</b>	DGU-8745-X150SA-1
<b>FCC ID</b>	2AE77DGU8745C300SA1
<b>IC Number</b>	-
<b>Power supply</b>	DC 13.5 V
<b>Frequency range</b>	UNII-1 5 180 MHz ~ 5 240 MHz (802.11a/n_HT20) 5 190 MHz ~ 5 230 MHz (802.11n_HT40) 5 210 MHz (802.11ac_VHT80) UNII-2A 5 260 MHz ~ 5 320 MHz (802.11a/n _HT20) 5 270 MHz ~ 5 310 MHz (802.11n _HT40) 5 290 MHz (802.11ac_VHT80) UNII-2C 5 500 MHz ~ 5 700 MHz (802.11a/n _HT20) 5 510 MHz ~ 5 670 MHz (802.11n _HT40) 5 530 MHz (802.11ac_VHT80) UNII-3 5 745 MHz ~ 5 805 MHz (802.11a/n _HT20) 5 755 MHz ~ 5 795 MHz (802.11n _HT40) 5 775 MHz (802.11ac_VHT80)
<b>Modulation technique</b>	OFDM
<b>Number of channels</b>	UNII-1 5 180 MHz ~ 5 240 MHz_4 ch (802.11a/n_HT20) 5 190 MHz ~ 5 230 MHz_2 ch (802.11n_HT40) 5 210 MHz_1 ch (802.11ac_VHT80) UNII-2A 5 260 MHz ~ 5 320 MHz_4 ch (802.11a/n _HT20) 5 270 MHz ~ 5 310 MHz_2 ch (802.11n _HT40) 5 290 MHz_1ch (802.11ac_VHT80) UNII-2C 5 500 MHz ~ 5 700 MHz_8 ch (802.11a/n _HT20) 5 510 MHz ~ 5 670 MHz_3 ch (802.11n _HT40) 5 530 MHz_1 ch (802.11ac_VHT80) UNII-3 5 745 MHz ~ 5 805 MHz_4 ch (802.11a/n _HT20) 5 755 MHz ~ 5 795 MHz_2 ch (802.11n _HT40) 5 775 MHz_1 ch (802.11ac_VHT80)
<b>Antenna gain</b>	0.00 dB i (Max.)
<b>Test Site Registration Number</b>	FCC (KR0151), IC (6432B-3), IC (21313-1)

#### 4.1. Table for Test Modes and Frequency

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

Mode	Data rate (Worst case)	Frequency (Freq. MHz)
<b>802.11a</b>	6 Mbps	<b>UNII-1</b> <b>Lowest</b> (5 180) / <b>Middle</b> (5 200) / <b>Highest</b> (5 240) <b>UNII-2A</b> <b>Lowest</b> (5 260) / <b>Middle</b> (5 280) / <b>Highest</b> (5 320) <b>UNII-2C</b> <b>Lowest</b> (5 500) / <b>Middle</b> (5 580) / <b>Highest</b> (5 700) <b>UNII-3</b> <b>Lowest</b> (5 745) / <b>Middle</b> (5 785) / <b>Highest</b> (5 805)
<b>802.11n_HT20</b>	MCS0	<b>UNII-1</b> <b>Lowest</b> (5 180) / <b>Middle</b> (5 200) / <b>Highest</b> (5 240) <b>UNII-2A</b> <b>Lowest</b> (5 260) / <b>Middle</b> (5 280) / <b>Highest</b> (5 320) <b>UNII-2C</b> <b>Lowest</b> (5 500) / <b>Middle</b> (5 580) / <b>Highest</b> (5 700) <b>UNII-3</b> <b>Lowest</b> (5 745) / <b>Middle</b> (5 785) / <b>Highest</b> (5 805)
<b>802.11n_HT40</b>	MCS0	<b>UNII-1</b> <b>Lowest</b> (5 190) / <b>Highest</b> (5 230) <b>UNII-2A</b> <b>Lowest</b> (5 270) / <b>Highest</b> (5 310) <b>UNII-2C</b> <b>Lowest</b> (5 510) / <b>Middle</b> (5 550) / <b>Highest</b> (5 670) <b>UNII-3</b> <b>Lowest</b> (5 755) / <b>Highest</b> (5 795)
<b>802.11ac_VHT80</b>	MCS0	<b>UNII-1</b> <b>Lowest</b> (5 210) <b>UNII-2A</b> <b>Lowest</b> (5 290) <b>UNII-2C</b> <b>Lowest</b> (5 530) <b>UNII-3</b> <b>Lowest</b> (5 775)

## 5. Measurement equipment

Equipment	Manufacturer	Model	Serial number	Calibration Interval	Calibration date	Calibration due.
Test Receiver	R&S	ESVS30	829673/015	1 year	2018-12-06	2019-12-06
Signal Generator	R&S	SMB100A	178128	1 year	2018-12-07	2019-12-07
Spectrum Analyzer	R&S	FSV-40	100832	1 year	2018-05-28	2019-05-28
Power Meter	Agilent	E4416A	GB41290645	1 year	2018-05-29	2019-05-29
Power Sensor	Agilent	9327A	US40441490	1 year	2018-05-29	2019-05-29
Horn Antenna	R&S	HF906	100236	2 year	2017-04-25	2019-04-25
Horn Antenna	AH Systems	SAS-572	269	2 year	2017-08-01	2020-08-01
Horn Antenna	AH Systems	SAS-573	164	2 year	2018-04-26	2020-04-26
Bi-Log Ant.	S/B	VULB 9161SE	4159	2 year	2018-06-11	2020-06-11
Loop Antenna	ETS LINDGREN	6502	00118166	2 year	2018-10-30	2020-10-30
Power Amplifier	TESTEK	TK-PA18H	170013-L	1 year	2018-05-28	2019-05-28
Power Amplifier	MITEQ	AFS43-01002600	2048519	1 year	2018-10-29	2019-10-29
Power Amplifier	MITEQ	AMF-6F-26004000-33-8P-HS	1511665	1 year	2018-12-10	2019-12-10
Power Amplifier	SONOMA INSTRUMENT	310N	185428	1 year	2018-12-07	2019-12-07
Step Attenuator	Agilent	8494B	US37181955	1 year	2018-05-31	2019-05-31
Step Attenuator	Agilent	8496B	US39212569	1 year	2018-05-29	2019-05-29
Controller	INNCO	CO2000	CO2000/064/6961003/L	N/A	N/A	N/A
Antenna Master	INNCO	MA4000	MA4000/038/6961003/L	N/A	N/A	N/A
Controller	INNCO	CO3000	CO3000/812/34240914/L	N/A	N/A	N/A
Antenna Master	INNCO	MA4640-XP-ET	None	N/A	N/A	N/A
Power Divider	HP	11636B	12481	1 year	2018-05-31	2019-05-31
Power Divider	HP	11636B	50387	1 year	2018-05-31	2019-05-31
RF Cable	SUHNER	SUCOFLEX100	84047746	N/A	N/A	N/A
RF Cable	SUHNER	SUCOFLEX102	801270/2	N/A	N/A	N/A
RF Cable	SUHNER	SUCOFLEX102	801270/2	N/A	N/A	N/A

**※ Remark**
**Support equipment**

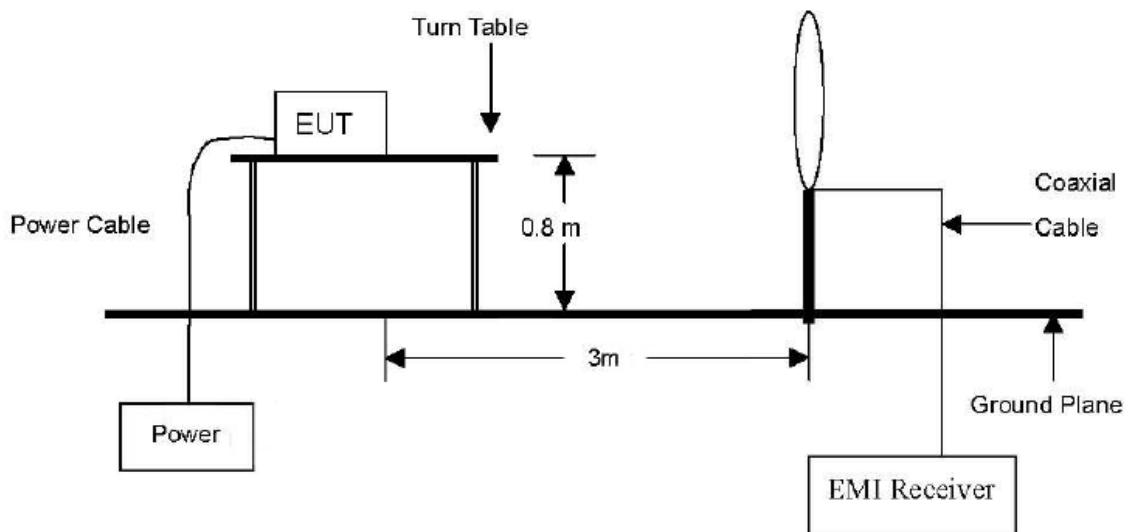
Description	Manufacturer	Model	Serial number
Access Point	NETGEAR	WAC720	-
Notebook computer	DELL	Latitude D510	-

## 6. Transmitter radiated spurious emissions and conducted spurious emissions

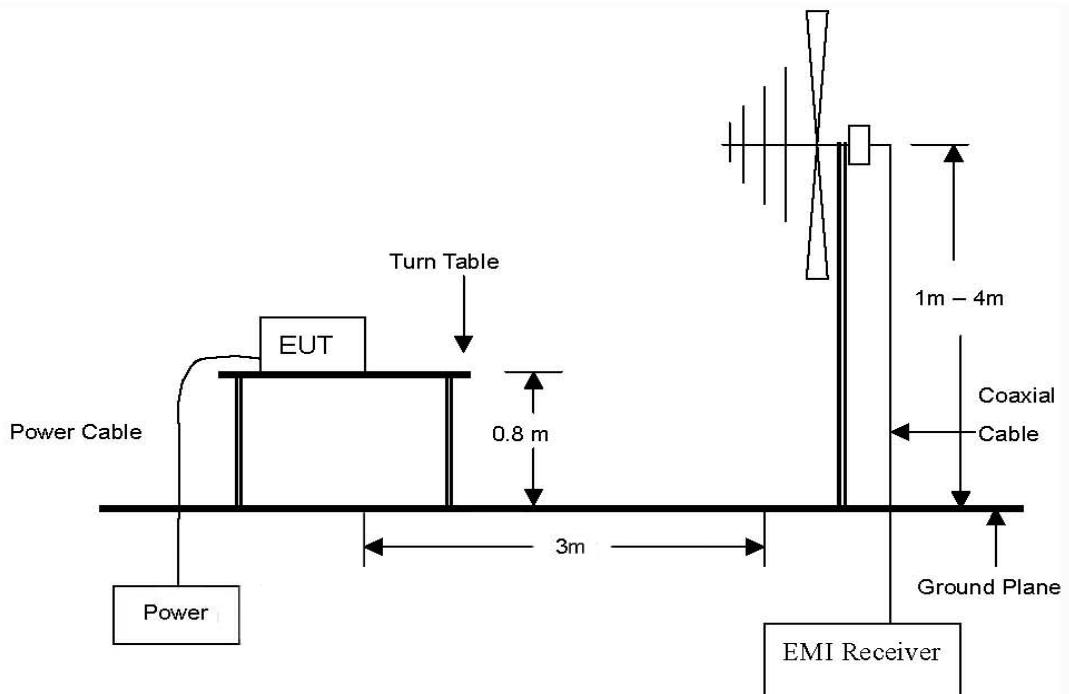
### 6.1. Test setup

#### 6.1.1. Transmitter radiated spurious emissions

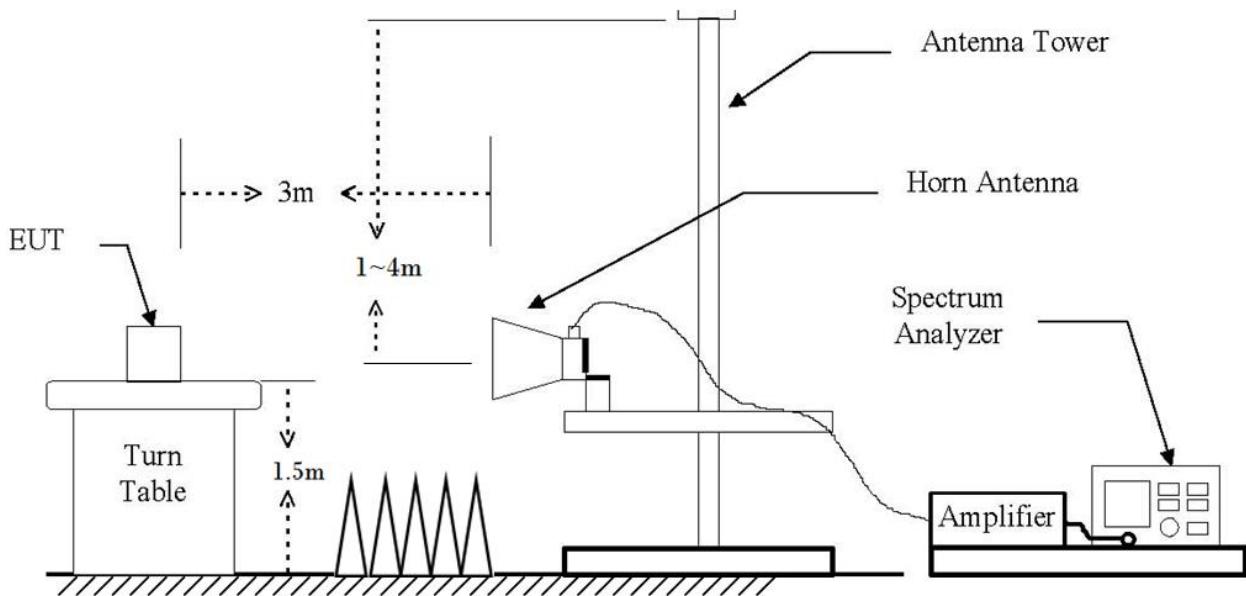
The diagram below shows the test setup that is utilized to make the measurements for emission from 9kHz to 30MHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 40 GHz emissions.



## 6.2. Limit

According to 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values :

Frequency (MHz)	Distance (Meters)	Radiated ( $\mu\text{V/m}$ )
0.009–0.490	300	2400/F(kHz)
0.490–1.705	30	24000/F(kHz)
1.705–30.0	30	30
30 - 88	3	100
88 – 216	3	150
216 – 960	3	200
Above 960	3	500

\*\*Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 ~ 72 MHz, 76 ~ 88 MHz, 174 ~ 216 MHz or 470 ~ 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

According to 15.407(b), (b) Undesirable emission limits: Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
  - (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
  - (ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.
- (5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
- (7) The provisions of §15.205 apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits

## 6.3. Test procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.10:2013  
In case of the air temperature of the test site is out of the range is 10 to 40°C before the testing  
proceeds the warm-up time of EUT maintain adequately

### 6.3.1. Test procedures for radiated spurious emissions

1. The EUT is placed on a turntable, which is 0.8 m (Below 1 GHz) / 1.5 m (Above 1 GHz) above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

#### ※Remark

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10 kHz for Peak detection (PK) at frequency below 30 MHz
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 GHz.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1 GHz.

## 6.4. Test results

### 6.4.1. Radiated spurious emissions (9 kHz to 30 MHz)

The frequency spectrum from 9 kHz to 30 MHz was investigated. Emission levels are not reported much lower than the limits by over 20 dB. All reading values are peak values.

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

**Test mode : 802.11a\_UNII2C\_5 500 MHz (Worst case)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.									

#### ※ Remark

1. Actual = Reading + Ant. factor - Amp + CL (Cable loss)

2. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

#### 6.4.2. Radiated spurious emissions (30 MHz to 1 000 MHz)

The frequency spectrum from 30 MHz to 1 000 MHz was investigated. Emission levels are not reported much lower than the limits by over 20 dB. All reading values are peak values.

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

**Test mode : 802.11a\_UNII2C\_5 500 MHz (Worst case)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
818.45	6.87	QP	H	21.89	7.15	-	35.90	46.02	10.12
Above 900 MHz Not detected									

**※Remark**

1. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
2. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

### 6.4.3. Radiated spurious emissions & Bandedge (Above 1 000 MHz)

The frequency spectrum above 1 000 MHz was investigated. Emission levels are not reported much lower than the limits by over 20 dB.

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

**Test mode : 802.11a (UNII-1)**

#### A. Lowest Ch. (5 180 MHz)

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*4976.30	43.76	Peak	V	32.86	35.47	-	41.15	74.00	32.85
*5149.68	55.54	Peak	H	32.86	35.47	-	52.93	74.00	21.07
Above 6 000 MHz Not detected									

#### B. Middle Ch. (5 200 MHz)

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.									

#### ※ Remark

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

6. \* is Restricted band.

**C. Highest Ch. (5 240 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5449.40	43.54	Peak	V	33.82	34.61	-	42.75	74.00	31.25
*5458.08	47.89	Peak	H	33.82	34.61	-	47.10	74.00	26.90
Above 6 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

6. \* is Restricted band.

**Test mode : 802.11a (UNII-2A)**
**A. Lowest Ch. (5 260 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*4843.18	44.21	Peak	V	32.86	35.47	-	41.60	74.00	32.40
*5147.76	46.17	Peak	H	32.86	35.47	-	43.56	74.00	30.44
Above 6 000 MHz Not detected									

**B. Middle Ch. (5 280 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.									

**C. Highest Ch. (5 320 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5398.85	43.74	Peak	V	33.82	34.61	-	42.95	74.00	31.05
*5350.93	52.55	Peak	H	33.82	34.61	-	51.76	74.00	22.24
Above 6 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

6. \* is Restricted band.

**Test mode : 802.11a (UNII-2C)**
**A. Lowest Ch. (5 500 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5427.31	43.55	Peak	V	33.82	34.61	-	42.76	74.00	31.24
*5456.98	47.42	Peak	H	33.82	34.61	-	46.63	74.00	27.37
Above 6 000 MHz Not detected									

**B. Middle Ch. (5 580 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.									

**C. Highest Ch. (5 700 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*7518.98	40.99	Peak	V	36.25	32.46	-	44.78	74.00	29.22
*7474.53	41.26	Peak	H	36.25	32.46	-	45.05	74.00	28.95
Above 8 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

6. \* is Restricted band.

**Test mode : 802.11a (UNII-3)**
**A. Lowest Ch. (5 745 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5428.19	43.47	Peak	V	33.82	34.61	-	42.68	74.00	31.32
*5364.89	45.04	Peak	H	33.82	34.61	-	44.25	74.00	29.75
Above 6 000 MHz Not detected									

**B. Middle Ch. (5 785 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.									

**C. Highest Ch. (5 805 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*7534.97	40.36	Peak	V	36.25	32.46	-	44.15	74.00	29.85
*7504.50	40.58	Peak	H	36.25	32.46	-	44.37	74.00	29.63
Above 8 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

6. \* is Restricted band.

**Test mode : 802.11n\_HT20 (UNII-1)**
**A. Lowest Ch. (5 180 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*4817.86	44.52	Peak	V	32.86	35.47	-	41.91	74.00	32.09
*5147.73	56.44	Peak	H	32.86	35.47	-	53.83	74.00	20.17
Above 6 000 MHz Not detected									

**B. Middle Ch. (5 200 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.									

**C. Highest Ch. (5 240 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5383.46	43.34	Peak	V	33.82	34.61	-	42.55	74.00	31.45
*5455.44	48.24	Peak	H	33.82	34.61	-	47.45	74.00	26.55
Above 6 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

6. \* is Restricted band.

**Test mode : 802.11n\_HT20 (UNII-2A)**
**A. Lowest Ch. (5 260 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5147.73	44.46	Peak	V	32.86	35.47	-	41.85	74.00	32.15
*5143.18	46.06	Peak	H	32.86	35.47	-	43.45	74.00	30.55
Above 6 000 MHz Not detected									

**B. Middle Ch. (5 280 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.									

**C. Highest Ch. (5 320 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5428.19	43.58	Peak	V	33.82	34.61	-	42.79	74.00	31.21
*5362.14	49.38	Peak	H	33.82	34.61	-	48.59	74.00	25.41
Above 6 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

6. \* is Restricted band.

**Test mode : 802.11n\_HT20 (UNII-2C)**
**A. Lowest Ch. (5 500 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5458.63	42.75	Peak	V	33.82	34.61	-	41.96	74.00	32.04
*5457.75	46.73	Peak	H	33.82	34.61	-	45.94	74.00	28.06
Above 6 000 MHz Not detected									

**B. Middle Ch. (5 580 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.									

**C. Highest Ch. (5 700 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*7570.93	41.26	Peak	V	36.25	32.46	-	45.05	74.00	28.95
*7550.95	40.66	Peak	H	36.25	32.46	-	44.45	74.00	29.55
Above 8 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

6. \* is Restricted band.

**Test mode : 802.11n\_HT20 (UNII-3)**
**A. Lowest Ch. (5 745 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5459.95	43.56	Peak	V	33.82	34.61	-	42.77	74.00	31.23
*5394.34	44.24	Peak	H	33.82	34.61	-	43.45	74.00	30.55
Above 6 000 MHz Not detected									

**B. Middle Ch. (5 785 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.									

**C. Highest Ch. (5 805 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*7465.03	40.83	Peak	V	36.25	32.46	-	44.62	74.00	29.38
*7562.94	40.84	Peak	H	36.25	32.46	-	44.63	74.00	29.37
Above 8 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

6. \* is Restricted band.

**Test mode : 802.11n\_HT40 (UNII-1)**
**A. Lowest Ch. (5 190 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*4822.40	44.20	Peak	V	32.86	35.47	-	41.59	74.00	32.41
*5149.03	65.73	Peak	H	32.86	35.47	-	63.12	74.00	10.88
*5149.03	50.32	Average	H	32.86	35.47	-	47.71	54.00	6.29
Above 6 000 MHz Not detected									

**B. Highest Ch. (5 230 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5458.96	44.12	Peak	V	33.82	34.61	-	43.33	74.00	30.67
*5397.09	46.16	Peak	H	33.82	34.61	-	45.37	74.00	28.63
Above 6 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.  
The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.
6. \* is Restricted band.
7. Average test method : KDB 789033 **Method VB** (Averaging using reduced video bandwidth)

**Test mode : 802.11n\_HT40 (UNII-2A)**
**A. Lowest Ch. (5 270 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5010.71	45.14	Peak	V	32.86	35.47	-	42.53	74.00	31.47
*5147.08	46.08	Peak	H	32.86	35.47	-	43.47	74.00	30.53
Above 6 000 MHz Not detected									

**B. Highest Ch. (5 310 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5438.64	41.90	Peak	V	33.82	34.61	-	41.11	74.00	32.89
*5350.05	60.85	Peak	H	33.82	34.61	-	60.06	74.00	13.94
*5350.05	44.19	Average	H	33.82	34.61	-	43.40	54.00	10.60
Above 6 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.  
The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.
6. \* is Restricted band.
7. Average test method : KDB 789033 **Method VB** (Averaging using reduced video bandwidth)

**Test mode : 802.11n\_HT40 (UNII-2C)**
**A. Lowest Ch. (5 510 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5410.71	45.01	Peak	V	33.82	34.61	-	44.22	74.00	29.78
*5459.84	48.95	Peak	H	33.82	34.61	-	48.16	74.00	25.84
Above 6 000 MHz Not detected									

**B. Middle Ch. (5 550 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
No other emissions were detected at a level greater than 20dB below limit.									

**C. Highest Ch. (5 670 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*7465.53	41.00	Peak	V	36.25	32.46	-	44.79	74.00	29.21
*7502.00	40.60	Peak	H	36.25	32.46	-	44.39	74.00	29.61
Above 8 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

6. \* is Restricted band.

**Test mode : 802.11n\_HT40 (UNII-3)**
**A. Lowest Ch. (5 755 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5427.31	43.61	Peak	V	33.82	34.61	-	42.82	74.00	31.18
*5400.60	42.82	Peak	H	33.82	34.61	-	42.03	74.00	31.97
Above 6 000 MHz Not detected									

**B. Highest Ch. (5 795 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*7538.46	40.88	Peak	V	36.25	32.46	-	44.67	74.00	29.33
*7371.13	40.67	Peak	H	36.25	32.46	-	44.46	74.00	29.54
Above 8 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.  
The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.
6. \* is Restricted band.

**Test mode : 802.11ac\_VHT80 (UNII-1)**
**A. Lowest Ch. (5 210 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*4999.68	44.67	Peak	V	32.86	35.47	-	42.06	74.00	31.94
*5143.83	67.12	Peak	H	32.86	35.47	-	64.51	74.00	9.49
*5143.83	49.07	Average	H	32.86	35.47	-	46.46	54.00	7.54
Above 6 000 MHz Not detected									

**Test mode : 802.11ac\_VHT80 (UNII-2A)**
**A. Lowest Ch. (5 290 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5441.81	43.38	Peak	V	33.82	34.61	-	42.59	74.00	31.41
*5353.02	56.34	Peak	H	33.82	34.61	-	55.55	74.00	18.45
*5353.02	41.40	Average	H	33.82	34.61		40.61	54.00	13.39
Above 6 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.  
The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.
6. \* is Restricted band.
7. Average test method : KDB 789033 **Method VB** (Averaging using reduced video bandwidth)

**Test mode : 802.11ac\_VHT80 (UNII-2C)**
**A. Lowest Ch. (5 530 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5378.41	42.73	Peak	V	33.82	34.61	-	41.94	74.00	32.06
*5453.24	48.57	Peak	H	33.82	34.61	-	47.78	74.00	26.22
Above 6 000 MHz Not detected									

**Test mode : 802.11ac\_VHT80 (UNII-3)**
**A. Lowest Ch. (5 775 MHz)**

Radiated emissions			Ant.	Correction factors			Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector Mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Duty factor (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*5449.95	44.43	Peak	V	33.82	34.61	-	43.64	74.00	30.36
*5355.88	43.84	Peak	H	33.82	34.61	-	43.05	74.00	30.95
Above 6 000 MHz Not detected									

**※Remark**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
2. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
3. Average measurement did not take place because the peak data did not exceed Average Limit.
4. Actual = Reading + Ant. factor - Amp + CL (Cable loss)
5. 15.31 Measurement standards.

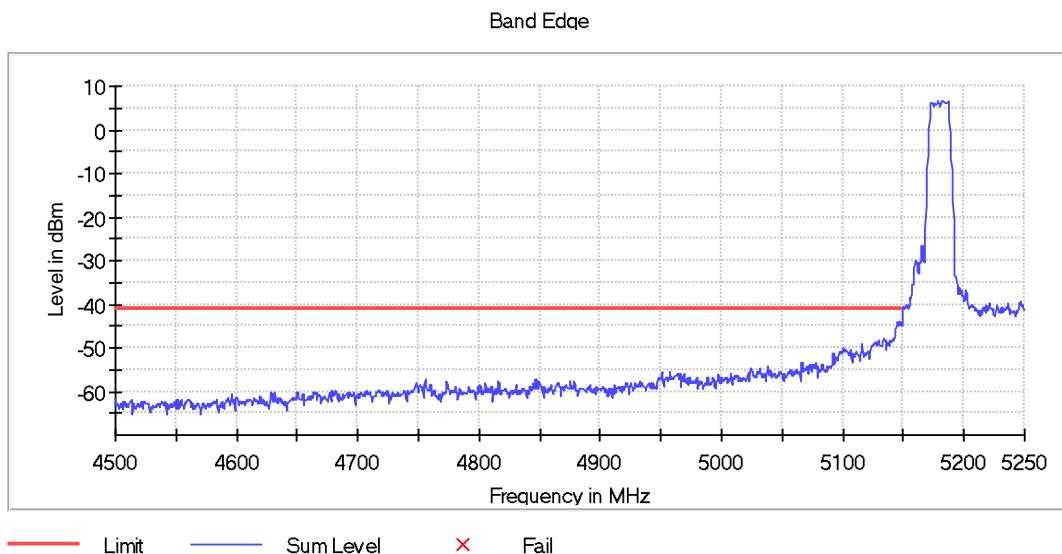
The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

6. \* is Restricted band.

#### 6.4.4. Test plot (Bandedge)

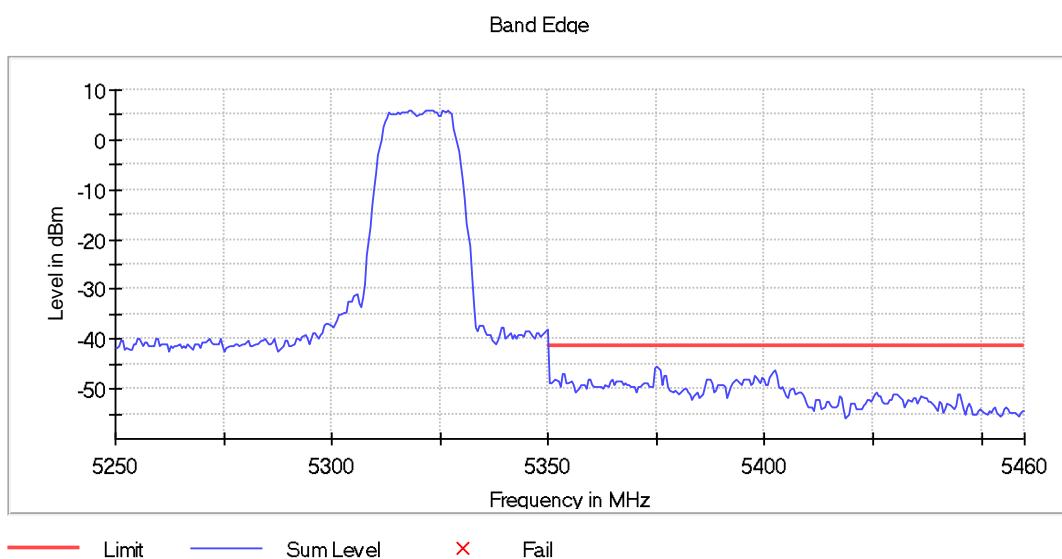
Test mode : 802.11a (UNII-1)

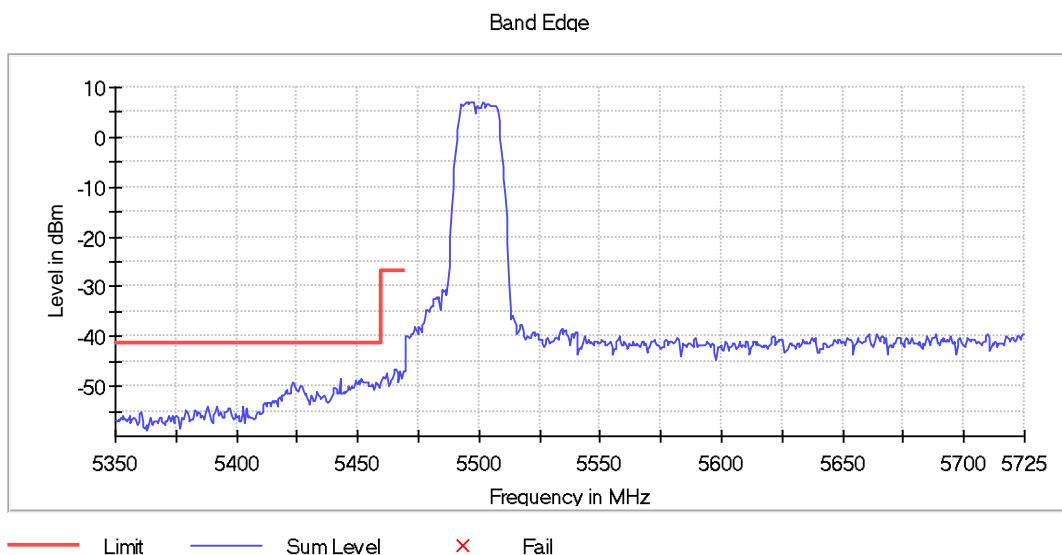
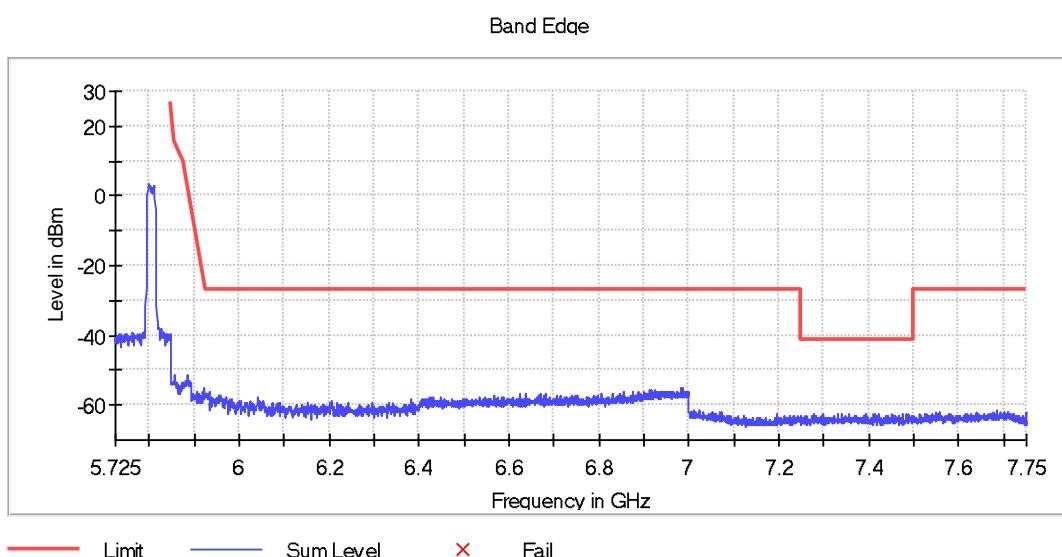
##### A. Lowest Ch. (5 180 MHz)

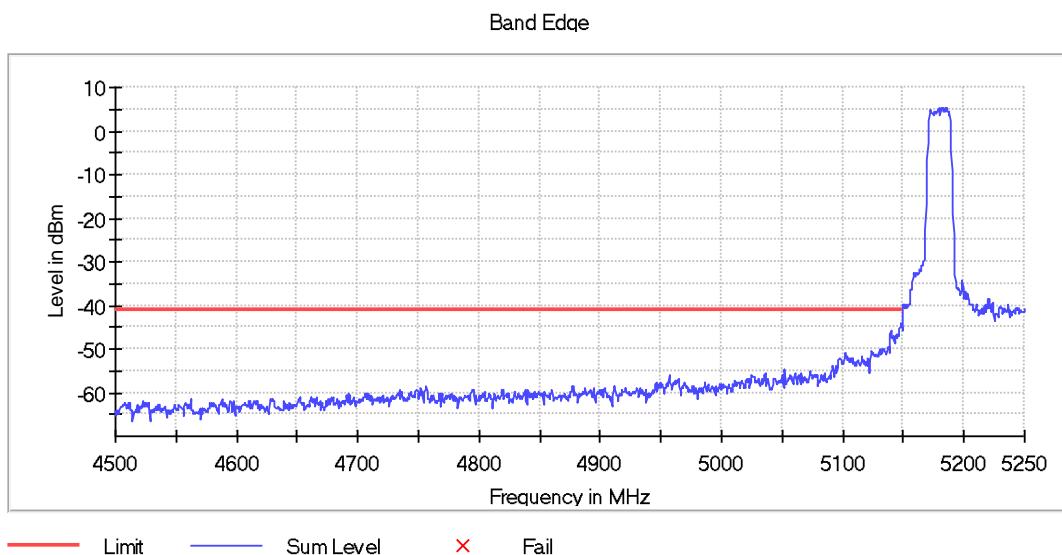
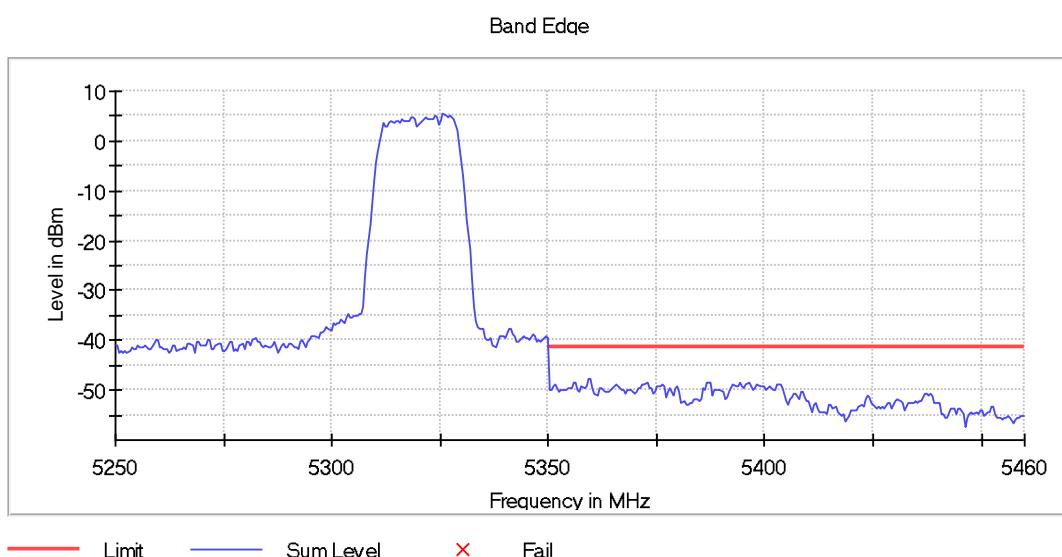


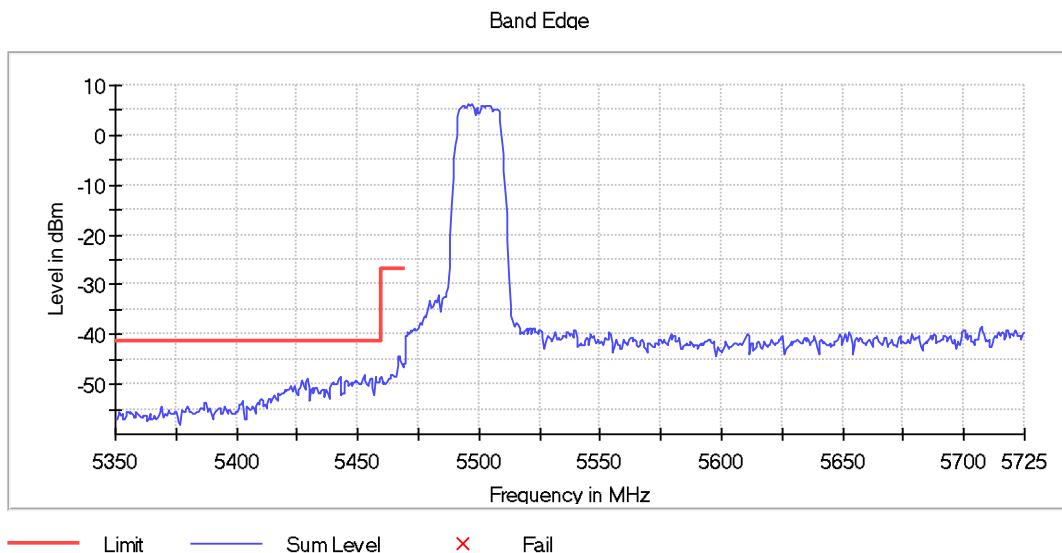
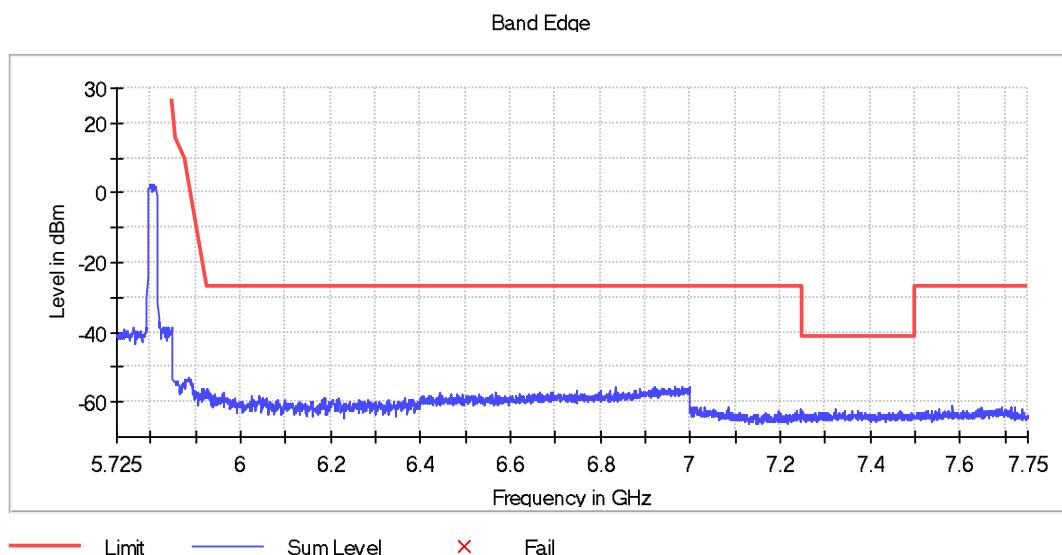
Test mode : 802.11a (UNII-2A)

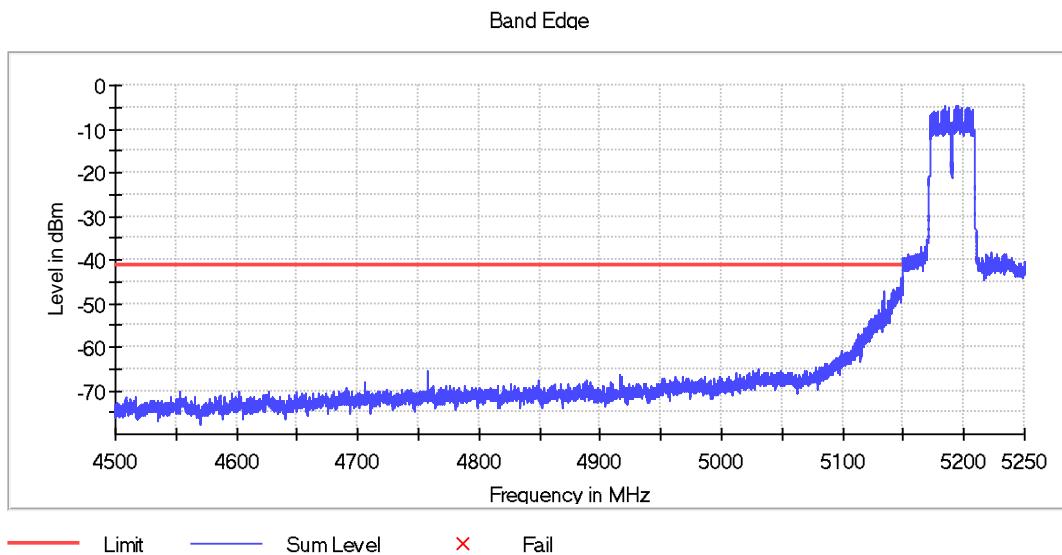
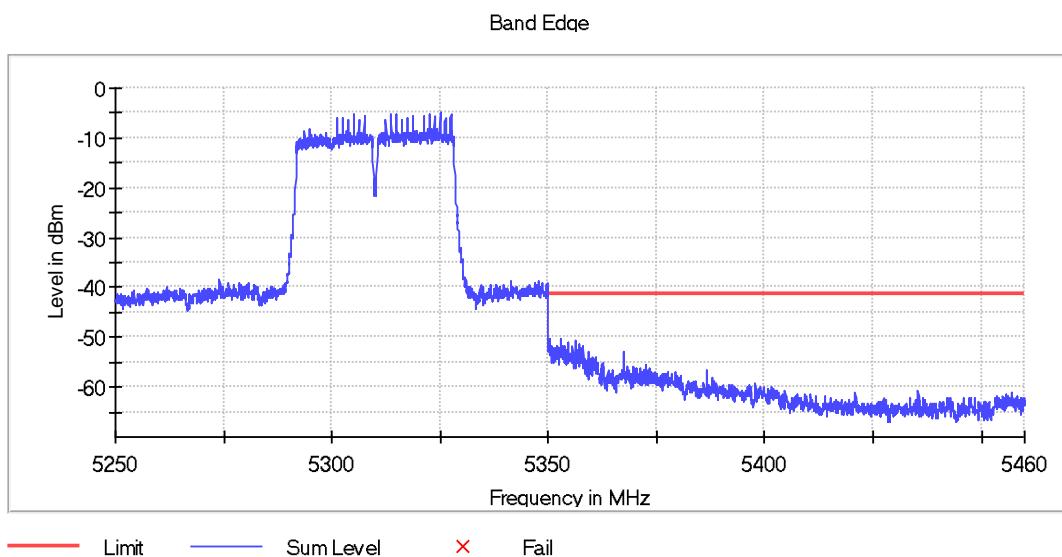
##### A. Highest Ch. (5 320 MHz)



**Test mode : 802.11a (UNII-2C)****A. Lowest Ch. (5 500 MHz)****Test mode : 802.11a (UNII-3)****A. Highest Ch. (5 805 MHz)**

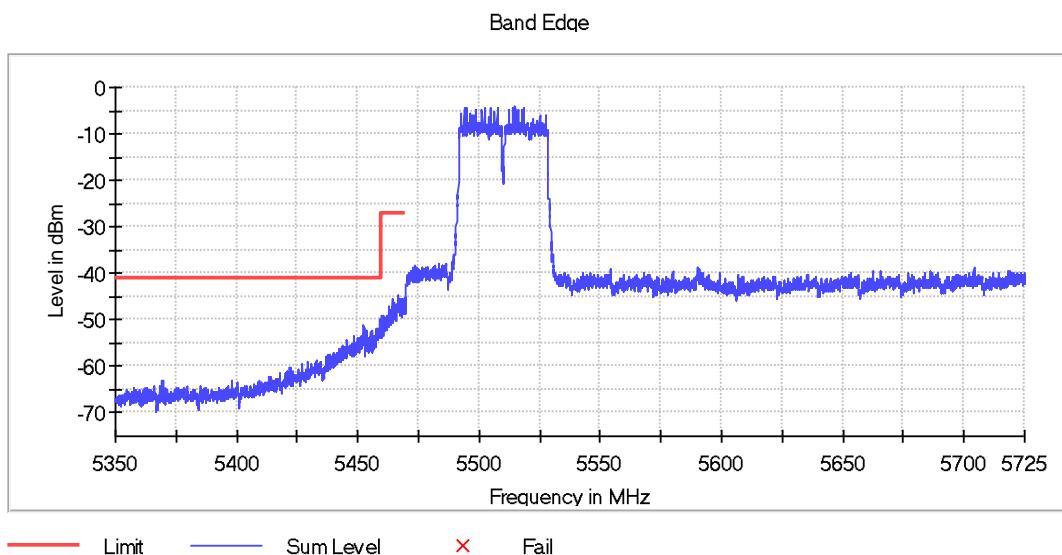
**Test mode : 802.11n\_HT20 (UNII-1)****A. Lowest Ch. (5 180 MHz)****Test mode : 802.11n\_HT20 (UNII-2A)****A. Highest Ch. (5 320 MHz)**

**Test mode : 802.11n\_HT20 (UNII-2C)****A. Lowest Ch. (5 500 MHz)****Test mode : 802.11n\_HT20 (UNII-3)****A. Highest Ch. (5 805 MHz)**

**Test mode : 802.11n\_HT40 (UNII-1)****A. Lowest Ch. (5 190 MHz)****Test mode : 802.11n\_HT40 (UNII-2A)****A. Highest Ch. (5 310 MHz)**

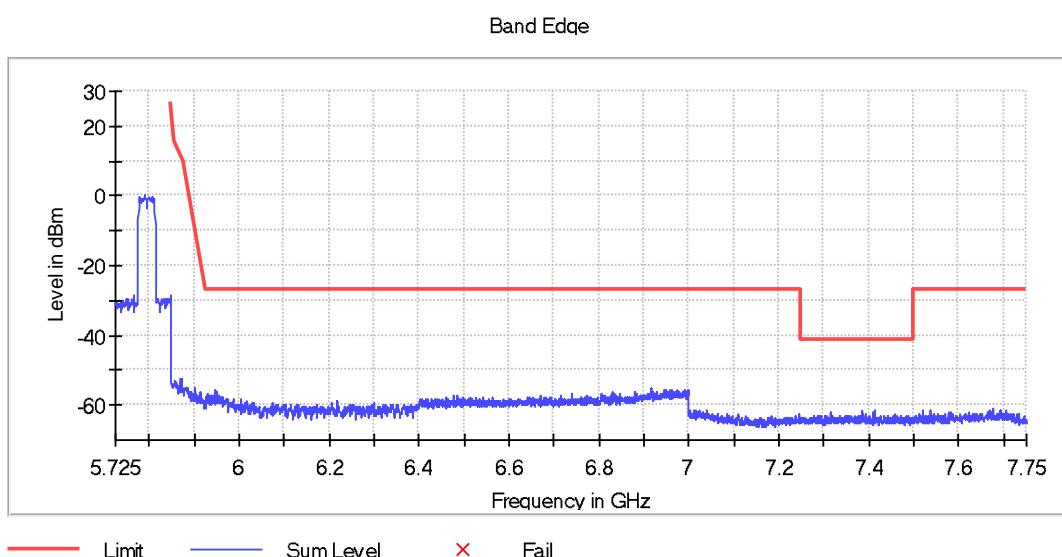
**Test mode : 802.11n\_HT40 (UNII-2C)**

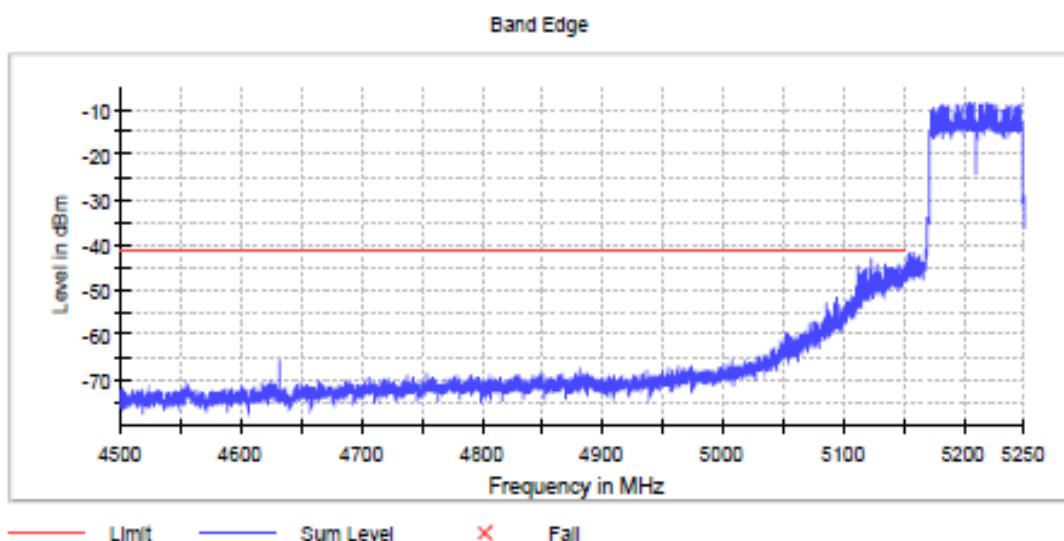
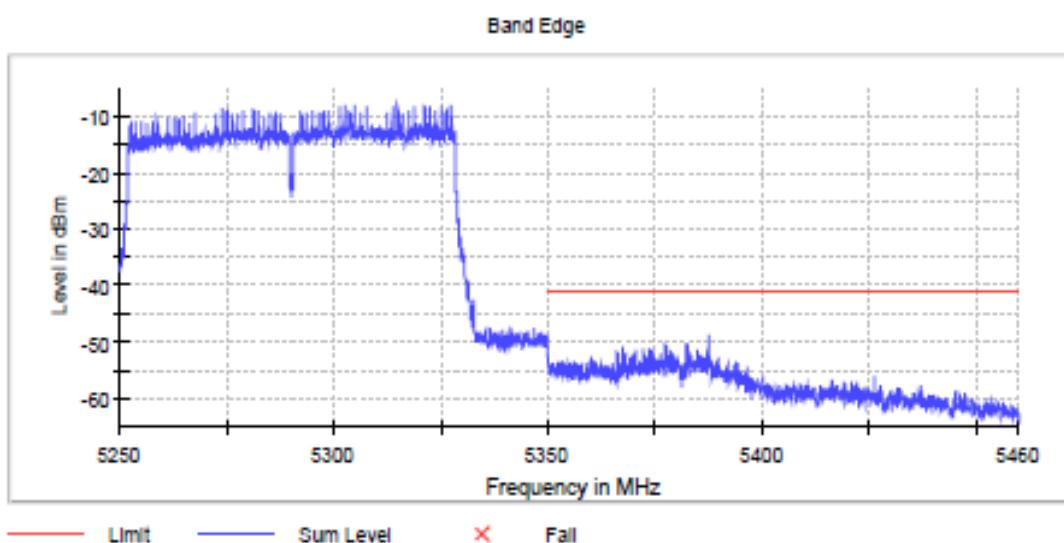
**A. Lowest Ch. (5 510 MHz)**

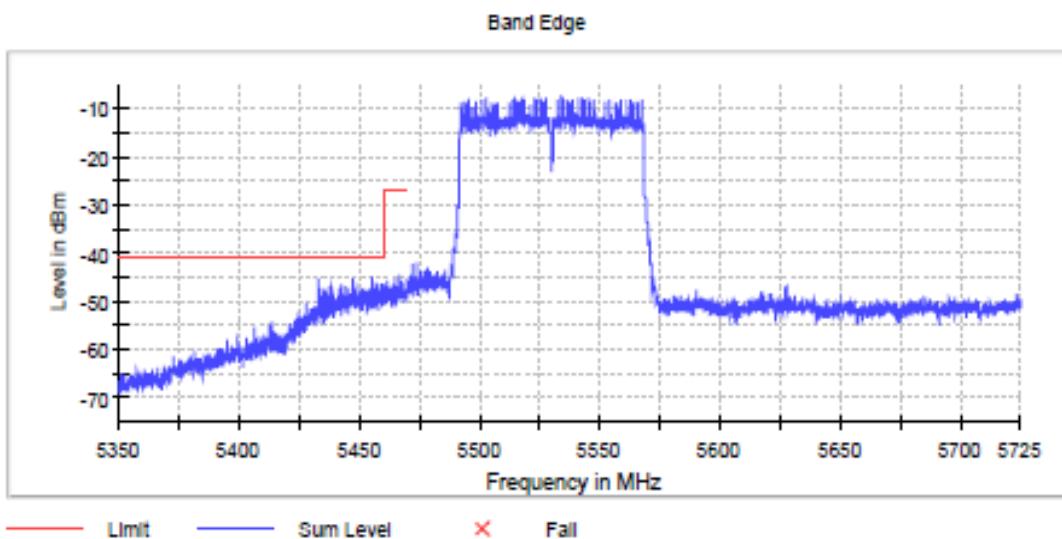
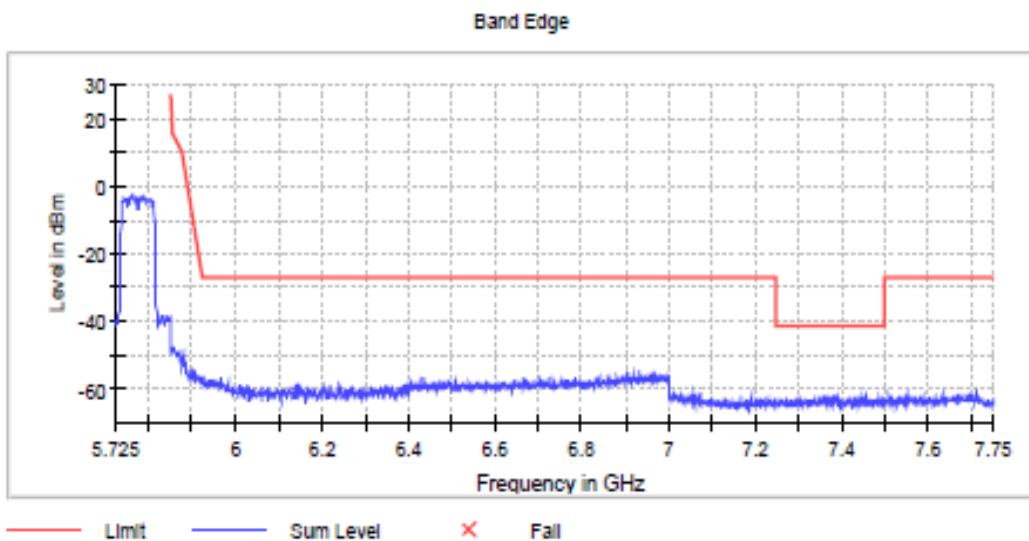


**Test mode : 802.11n\_HT40 (UNII-3)**

**A. Highest Ch. (5 795 MHz)**



**Test mode : 802.11ac\_VHT80 (UNII-1)****A. Lowest Ch. (5 210 MHz)****Test mode : 802.11ac\_VHT80 (UNII-2A)****A. Lowest Ch. (5 290 MHz)**

**Test mode : 802.11ac\_VHT80 (UNII-2C)****A. Lowest Ch. (5 530 MHz)****Test mode : 802.11ac\_VHT80 (UNII-3)****A. Lowest Ch. (5 775 MHz)**

## 7. Emission bandwidth & 99% bandwidth

### 7.1. Test setup



### 7.2. Limit

#### 7.2.1. Emission bandwidth for the Band 5.15-5.25 GHz, 5.25-5.35 GHz, 5.47-5.725 GHz

Not applicable

#### 7.2.2. Emission bandwidth for the Band 5.725-5.85 GHz

The minimum 6 dB emission bandwidth of at least 500 kHz

### 7.3. Test procedure (KDB 789033)

#### 7.3.1. Emission bandwidth for the Band 5.15-5.25 GHz, 5.25-5.35 GHz, 5.47-5.725 GHz

- a) Set RBW = approximately 1% of the emission bandwidth.
- b) Set the VBW > RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

#### 7.3.2. Emission bandwidth for the Band 5.725-5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for the band 5.725 - 5.85 GHz. The following procedure shall be used for measuring this bandwidth:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW)  $\geq 3 * \text{RBW}$ .
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) 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.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

## 7.4. Test results

### Test mode : 802.11a (UNII-1)

Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
5 180	21.80	17.00
5 200	21.80	17.00
5 240	21.80	17.00

### Test mode : 802.11a (UNII-2A)

Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
5 260	21.80	17.00
5 280	22.00	17.00
5 320	21.80	16.80

### Test mode : 802.11a (UNII-2C)

Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
5 500	21.80	17.00
5 580	21.80	16.80
5 700	21.80	17.00

### Test mode : 802.11a (UNII-3)

Frequency(MHz)	6 dB bandwidth(MHz)	99% bandwidth(MHz)
5 745	16.50	16.80
5 785	16.50	16.80
5 805	16.50	16.80

**Test mode : 802.11n\_HT20 (UNII-1)**

Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
5 180	22.00	18.20
5 200	21.80	18.00
5 240	22.00	17.80

**Test mode : 802.11n\_HT20 (UNII-2A)**

Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
5 260	22.20	18.20
5 280	22.20	18.00
5 320	22.20	18.00

**Test mode : 802.11n\_HT20 (UNII-2C)**

Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
5 500	22.20	17.80
5 580	21.80	17.80
5 700	22.00	17.80

**Test mode : 802.11n\_HT20 (UNII-3)**

Frequency(MHz)	6 dB bandwidth(MHz)	99% bandwidth(MHz)
5 745	17.80	18.00
5 785	17.80	18.00
5 805	17.80	18.00

**Test mode : 802.11n\_HT40 (UNII-1)**

Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
5 190	40.45	36.55
5 230	40.45	36.55

**Test mode : 802.11n\_HT40 (UNII-2A)**

Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
5 270	40.45	36.55
5 310	40.15	36.55

**Test mode : 802.11n\_HT40 (UNII-2C)**

Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
5 510	40.45	36.55
5 550	40.75	36.55
5 670	40.45	36.55

**Test mode : 802.11n\_HT40 (UNII-3)**

Frequency(MHz)	6 dB bandwidth(MHz)	99% bandwidth(MHz)
5 755	36.50	36.55
5 795	36.50	36.55

**Test mode : 802.11ac\_VHT80 (UNII-1)**

Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
5 210	84.00	76.00

**Test mode : 802.11ac\_VHT80 (UNII-2A)**

Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
5 290	84.00	76.00

**Test mode : 802.11ac\_VHT80 (UNII-2C)**

Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
5 530	84.00	76.50

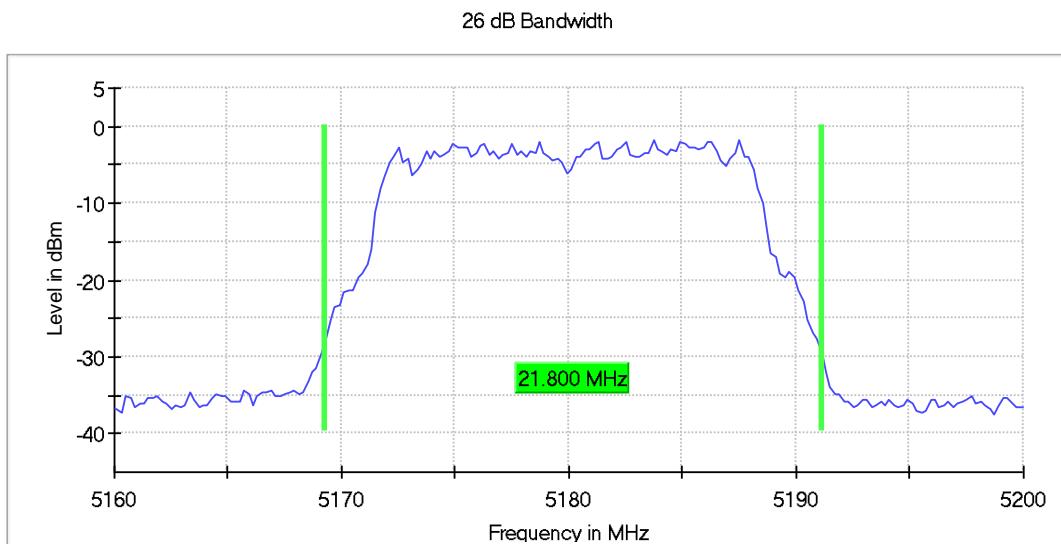
**Test mode : 802.11ac\_VHT80 (UNII-3)**

Frequency(MHz)	6 dB bandwidth(MHz)	99% bandwidth(MHz)
5 775	76.20	76.50

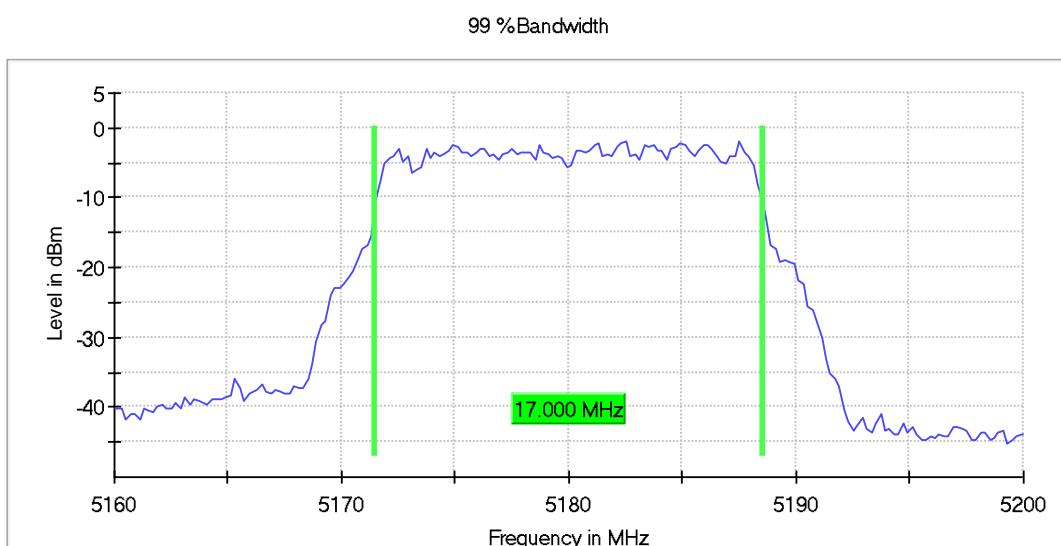
### 7.4.1 Test plot

Test mode : 802.11a (UNII-1)

#### A.1. Lowest Ch. (5 180 MHz)\_26 dB Bandwidth

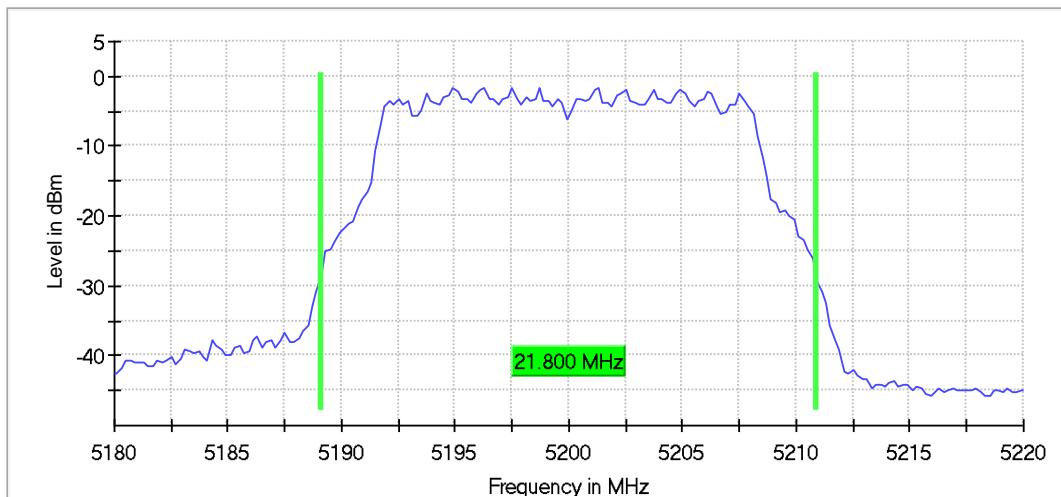


#### A.2. Lowest Ch. (5 180 MHz)\_99% Bandwidth

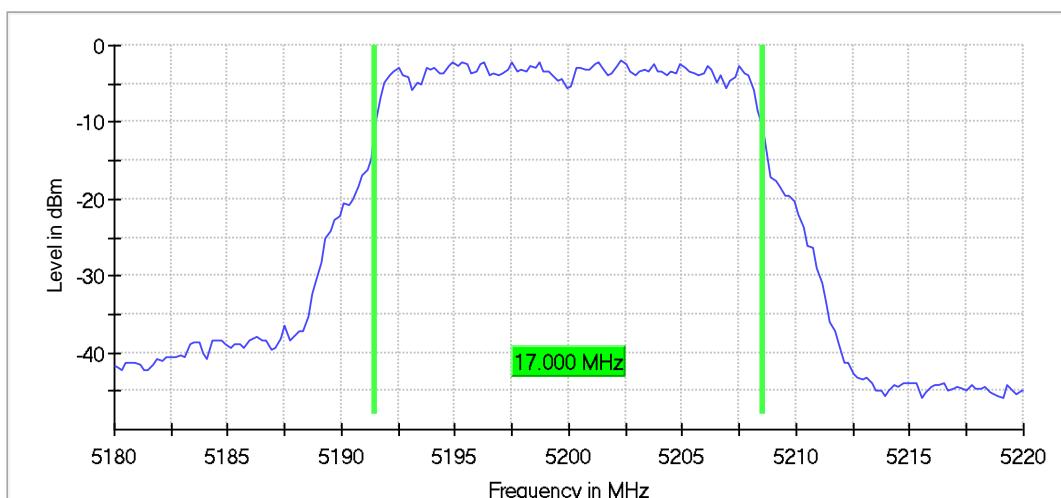


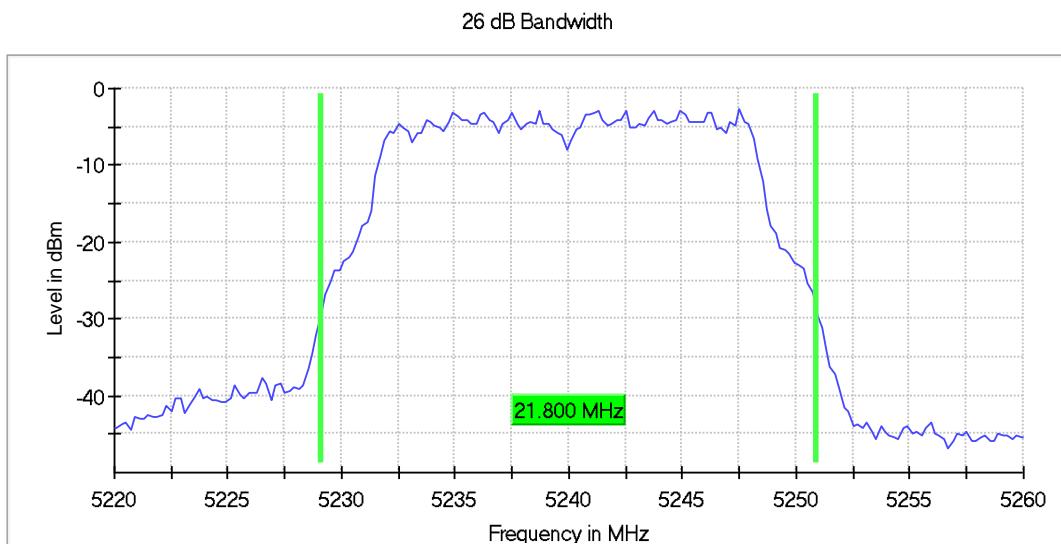
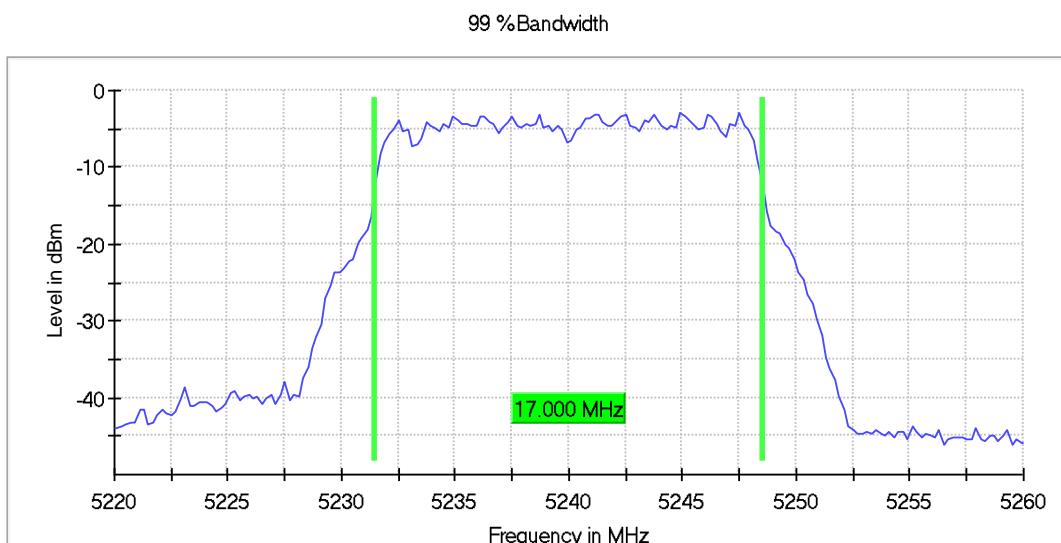
**B.1. Middle Ch. (5 200 MHz)\_26 dB Bandwidth**

26 dB Bandwidth

**B.2. Middle Ch. (5 200 MHz)\_99% Bandwidth**

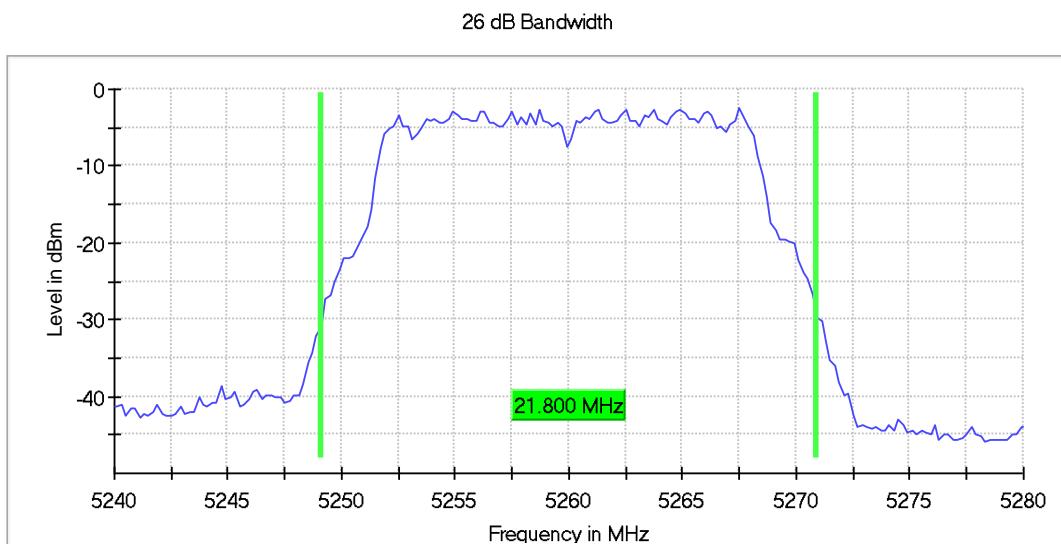
99 %Bandwidth



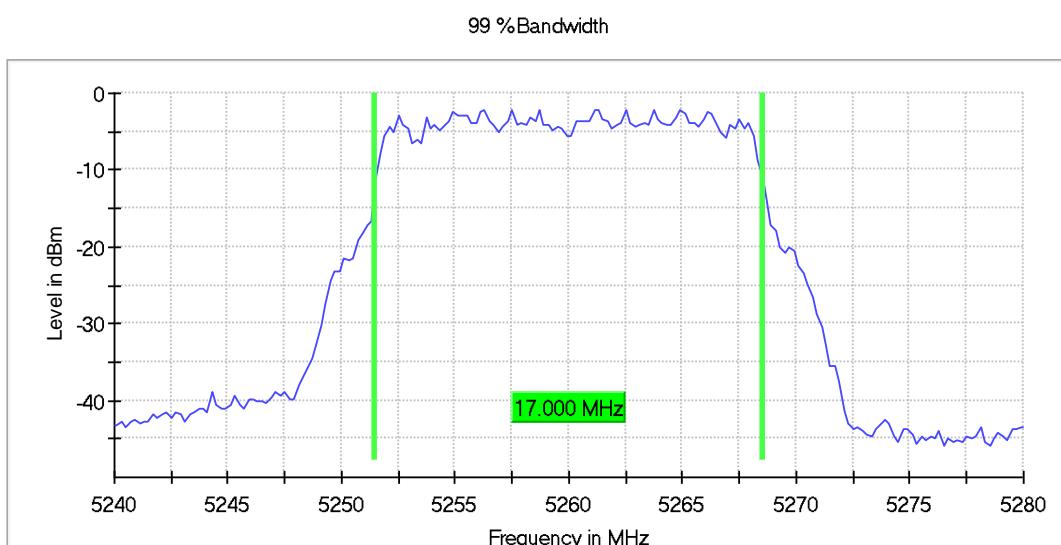
**C.1. Highest Ch. (5 240 MHz)\_26 dB Bandwidth****C.2. Highest Ch. (5 240 MHz)\_99% Bandwidth**

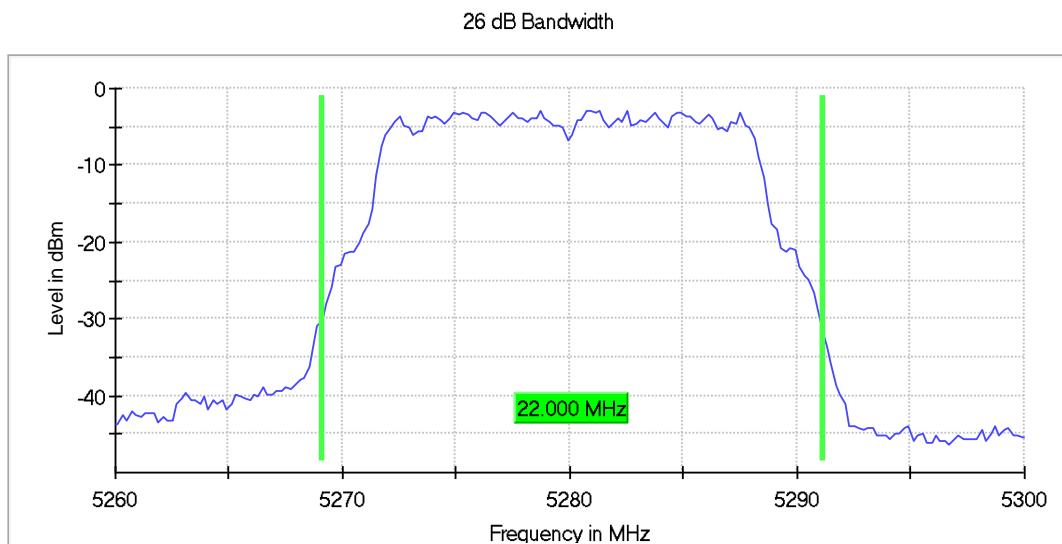
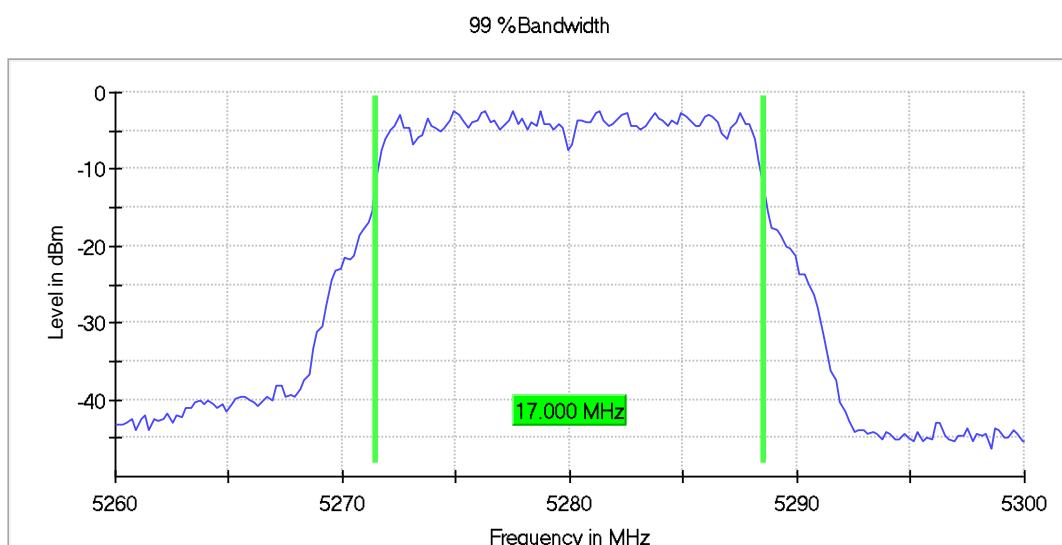
Test mode : 802.11a (UNII-2A)

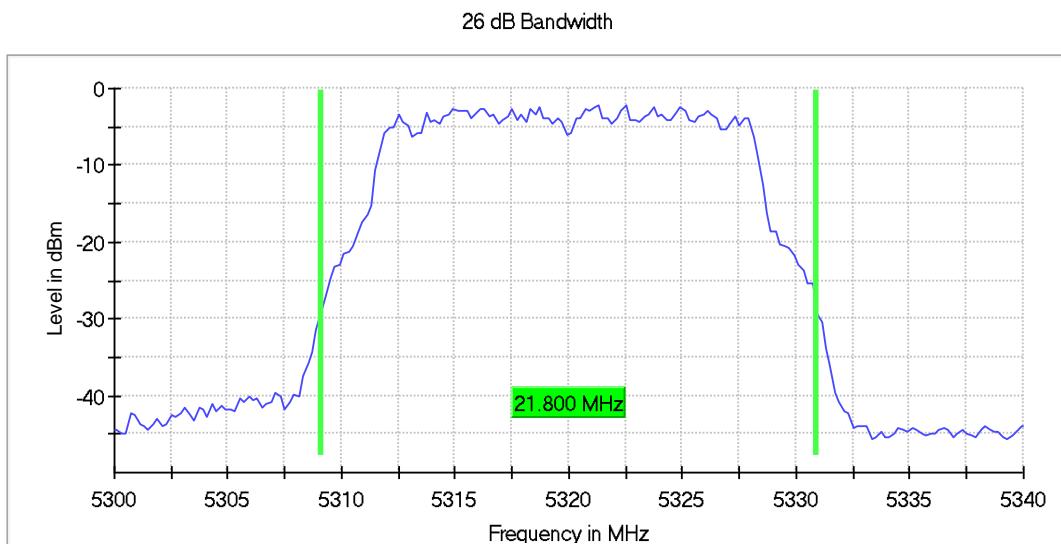
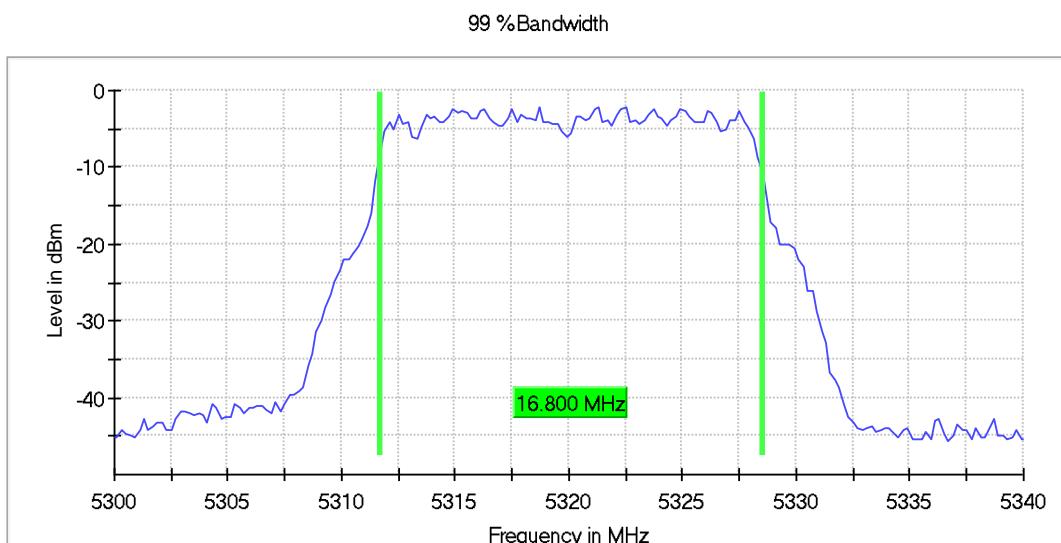
**A.1. Lowest Ch. (5 260 MHz)\_26 dB Bandwidth**



**A.2. Lowest Ch. (5 260 MHz)\_99% Bandwidth**

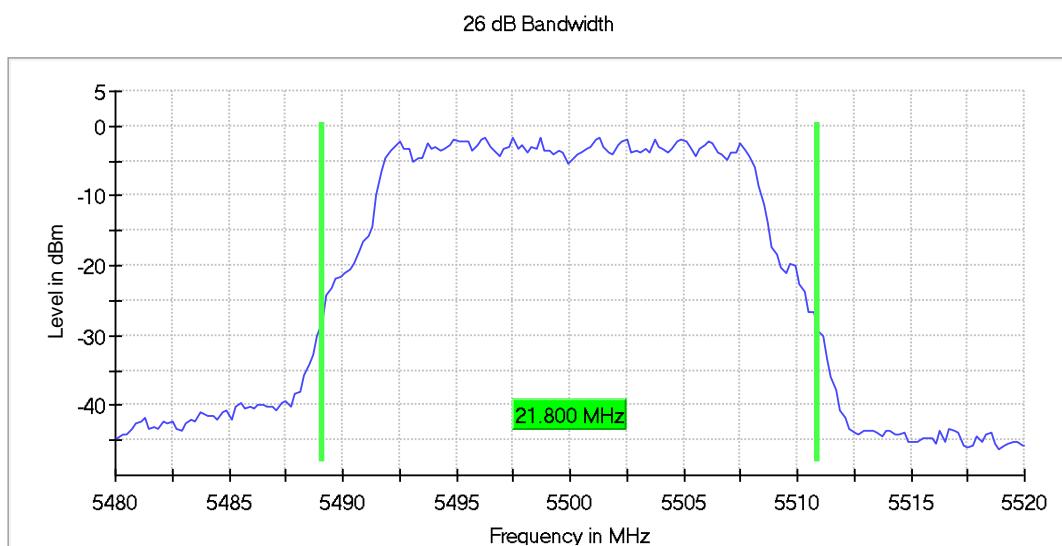


**B.1. Middle Ch. (5 280 MHz)\_26 dB Bandwidth****B.2. Middle Ch. (5 280 MHz)\_99% Bandwidth**

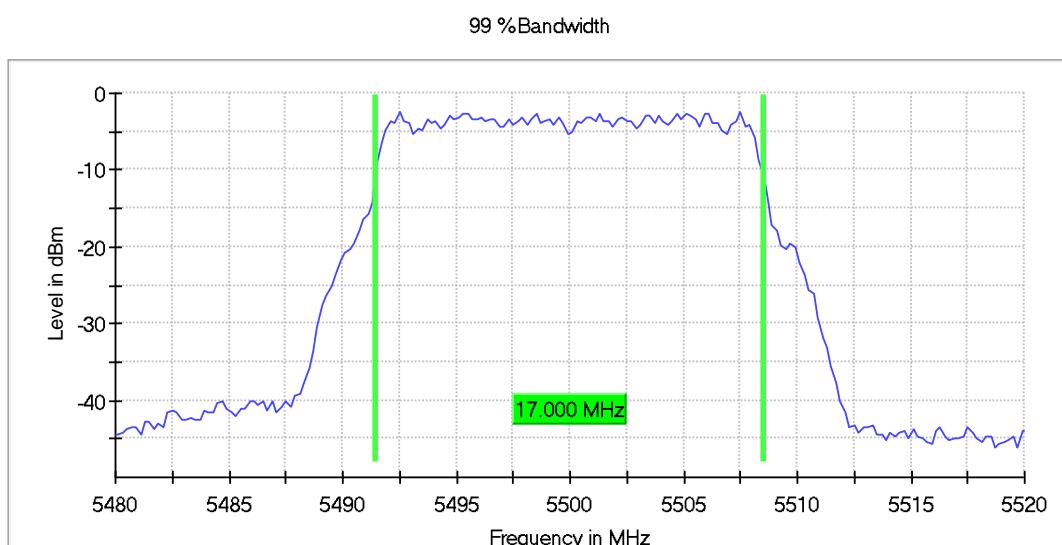
**C.1. Highest Ch. (5 320 MHz)\_26 dB Bandwidth****C.2. Highest Ch. (5 320 MHz)\_99% Bandwidth**

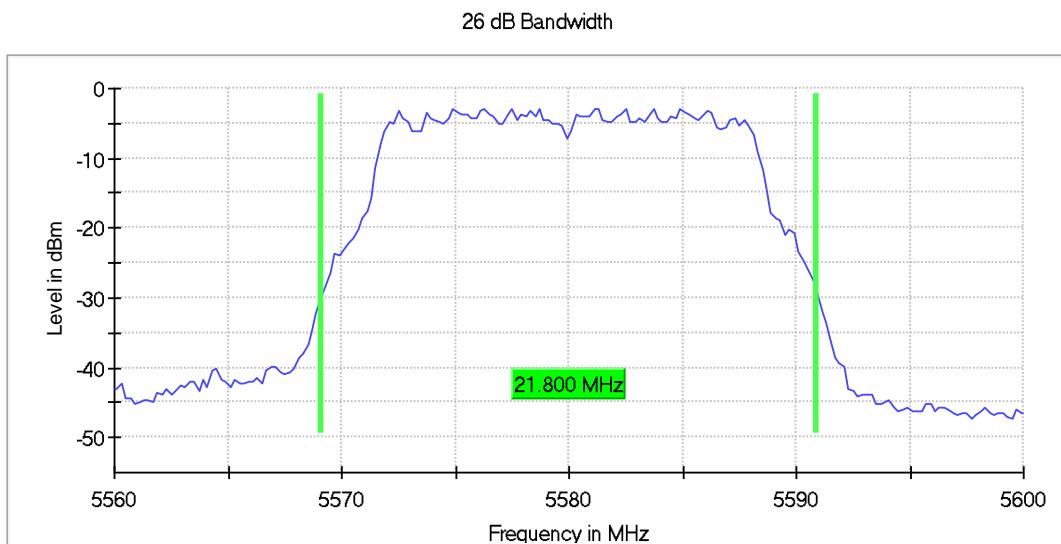
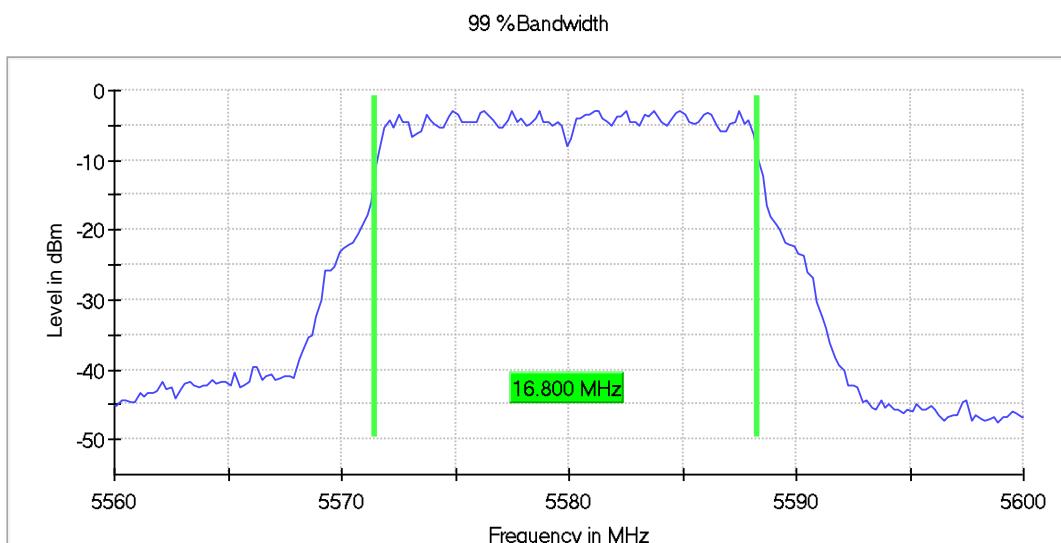
Test mode : 802.11a (UNII-2C)

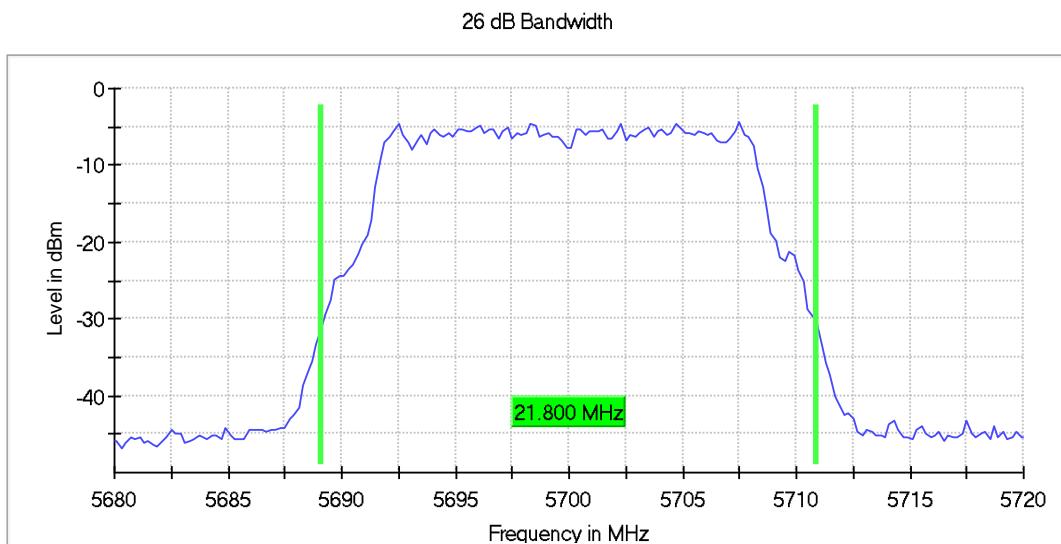
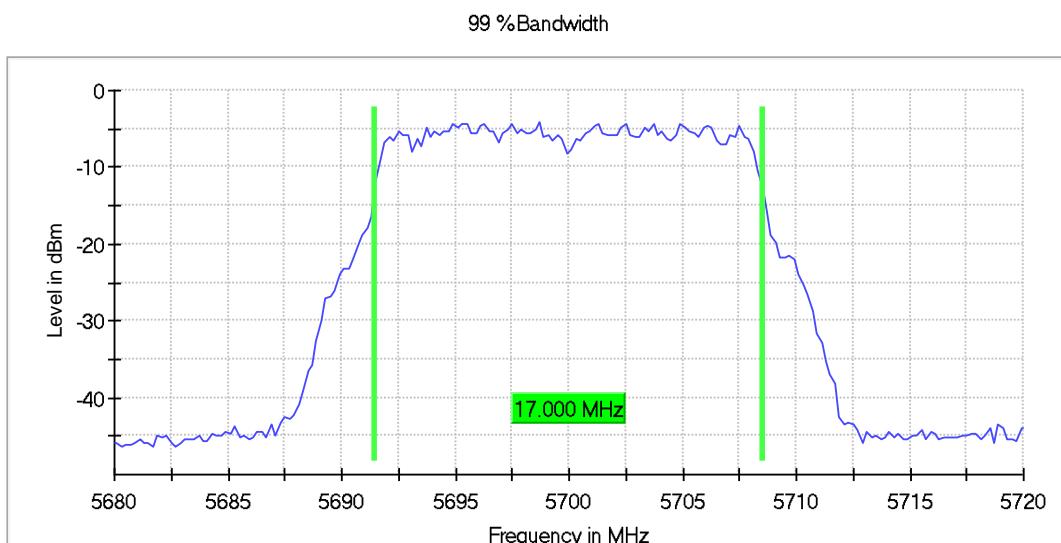
**A.1. Lowest Ch. (5 500 MHz)\_26 dB Bandwidth**



**A.2. Lowest Ch. (5 500 MHz)\_99% Bandwidth**

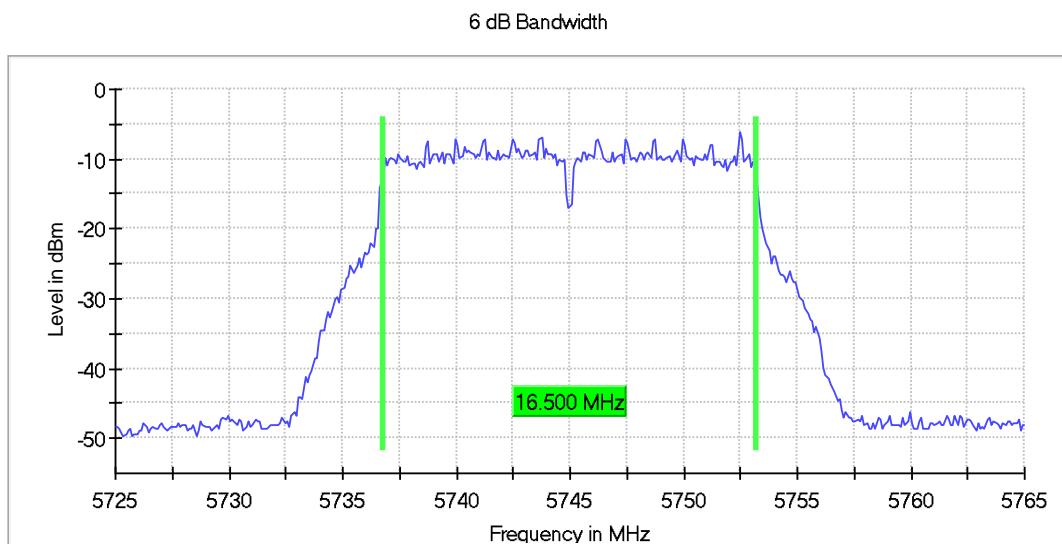


**B.1. Middle Ch. (5 580 MHz)\_26 dB Bandwidth****B.2. Middle Ch. (5 580 MHz)\_99% Bandwidth**

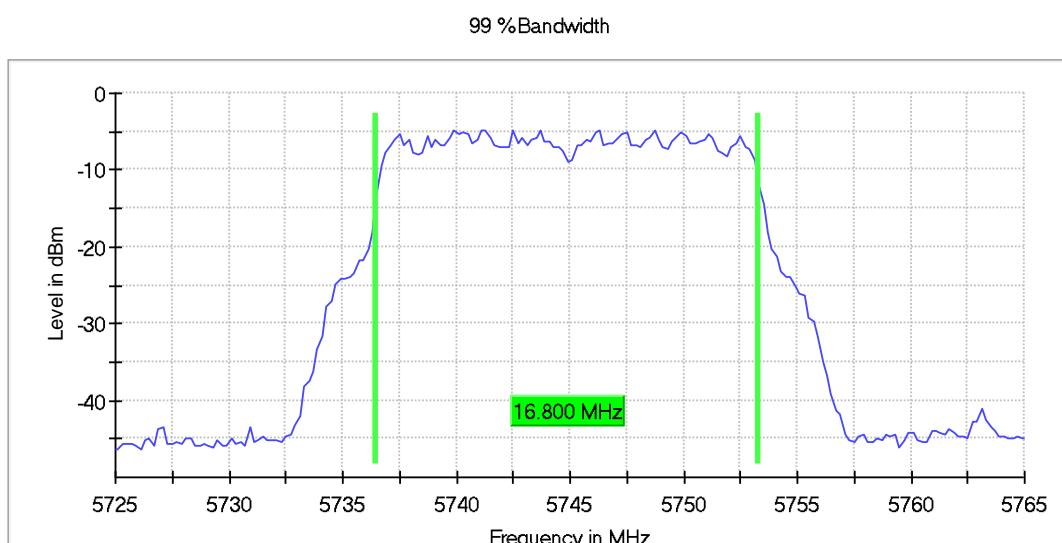
**C.1. Highest Ch. (5 700 MHz)\_26 dB Bandwidth****C.2. Highest Ch. (5 700 MHz)\_99% Bandwidth**

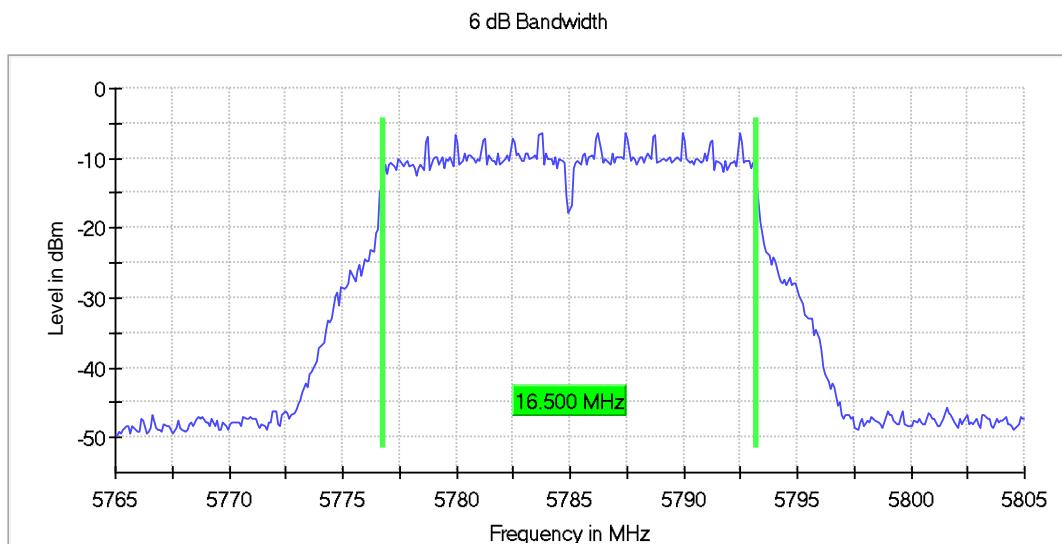
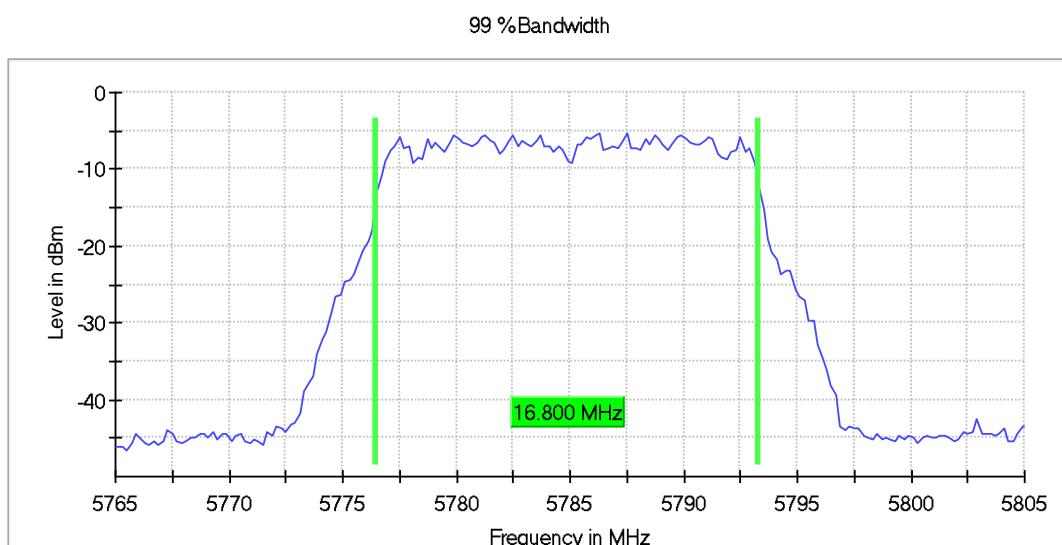
Test mode : 802.11a (UNII-3)

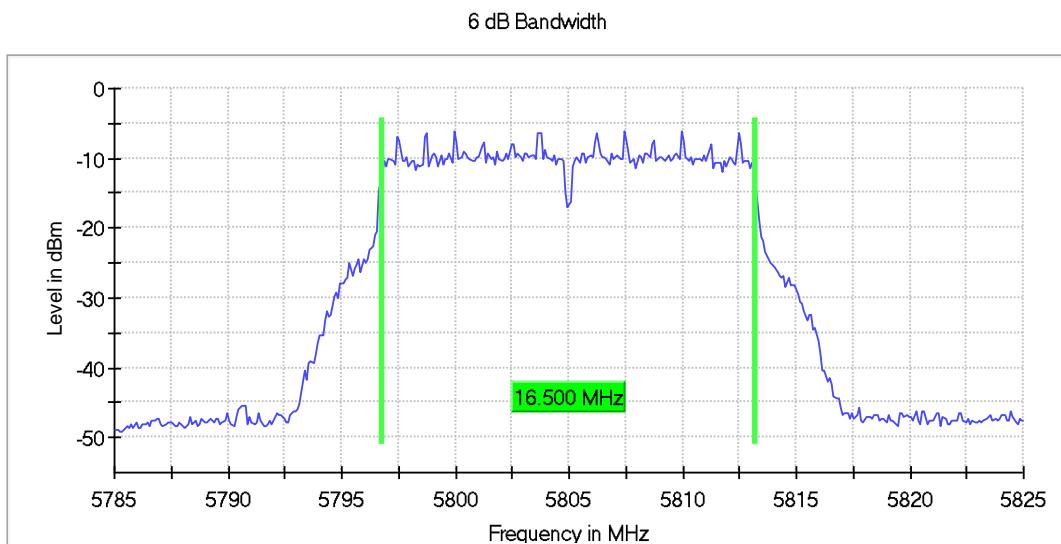
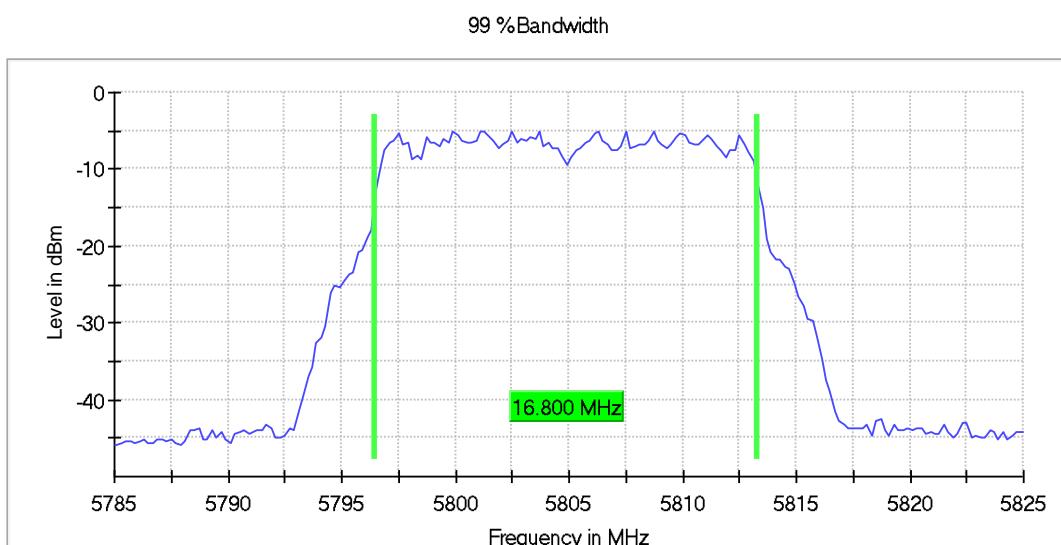
**A.1. Lowest Ch. (5 745 MHz)\_6 dB Bandwidth**



**A.2. Lowest Ch. (5 745 MHz)\_99% Bandwidth**

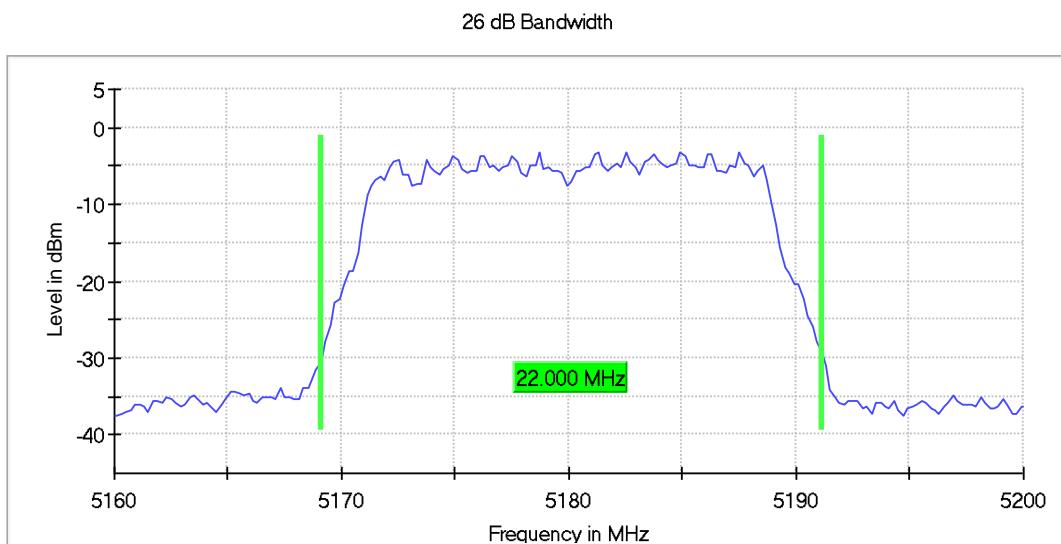


**B.1. Middle Ch. (5 785 MHz)\_6 dB Bandwidth****B.2. Middle Ch. (5 785 MHz)\_99% Bandwidth**

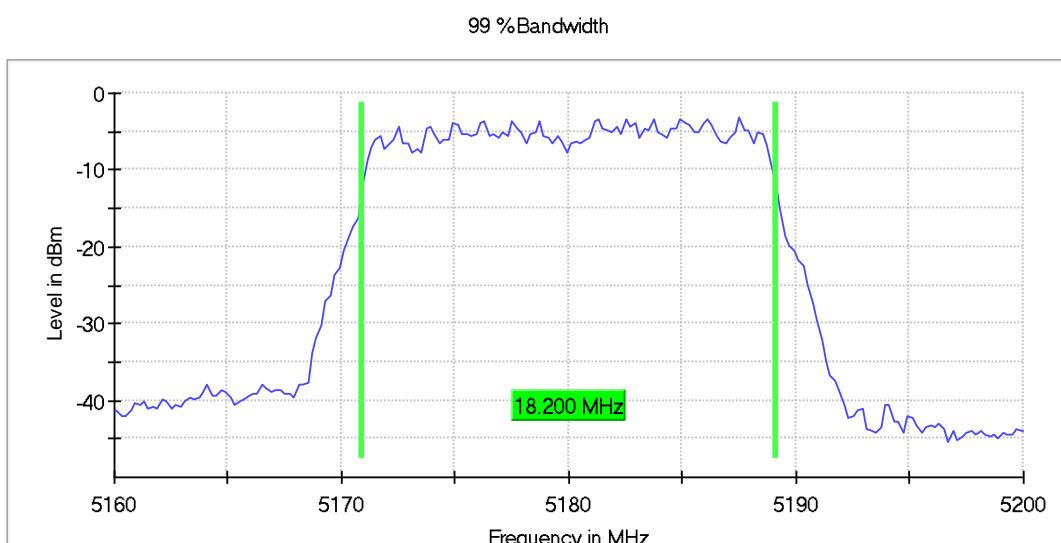
**C.1. Highest Ch. (5 805 MHz)\_6 dB Bandwidth****C.2. Highest Ch. (5 805 MHz)\_99% Bandwidth**

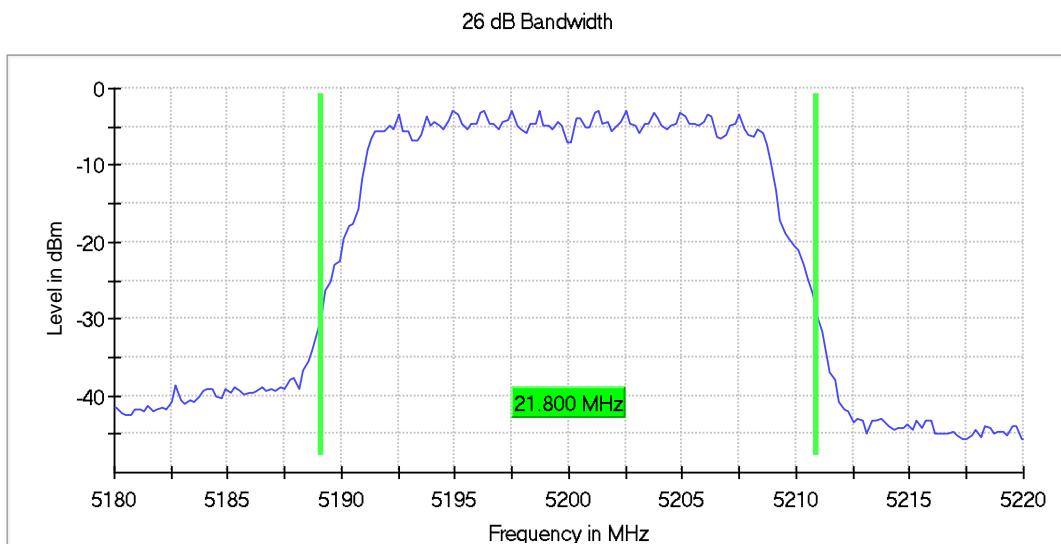
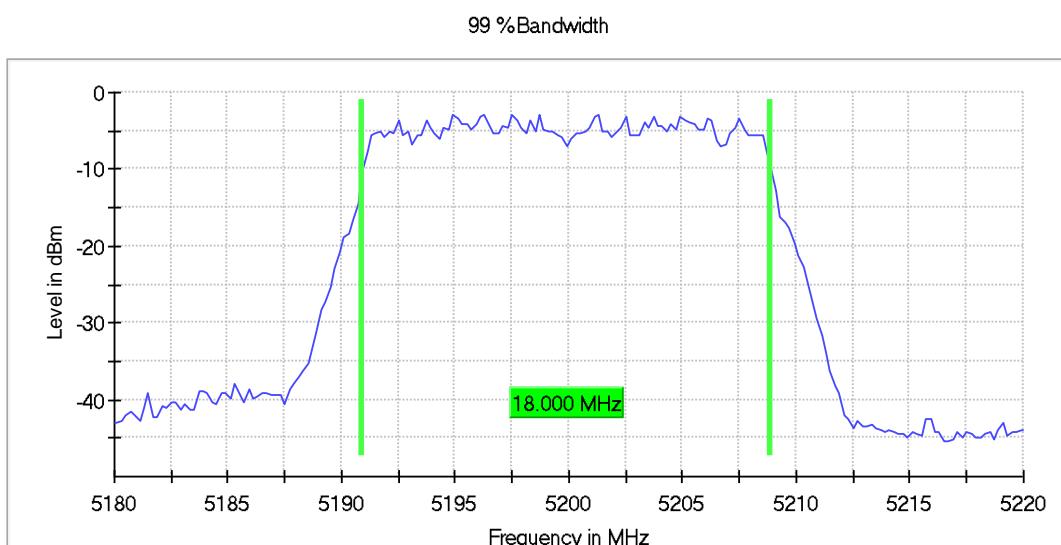
Test mode : 802.11n\_HT20 (UNII-1)

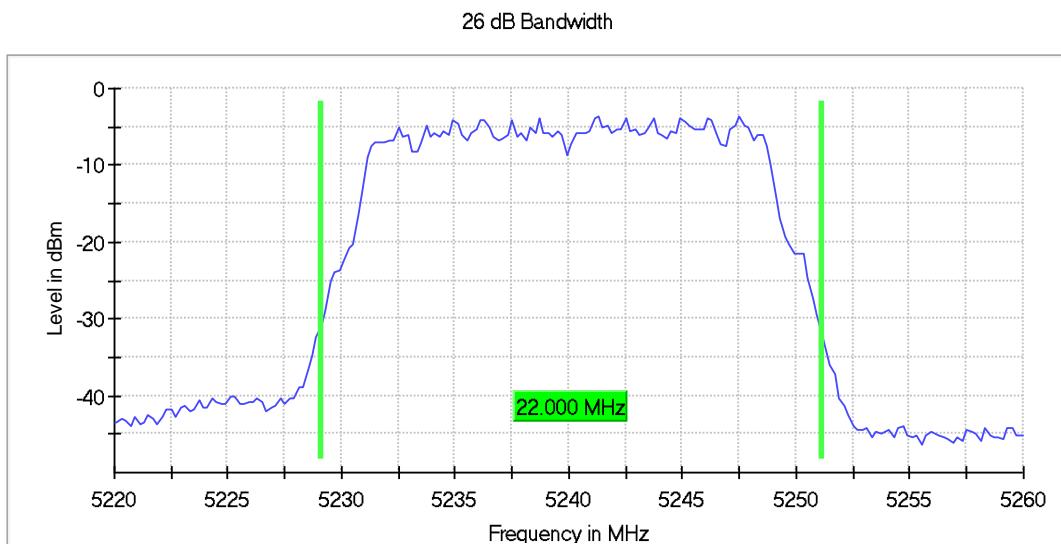
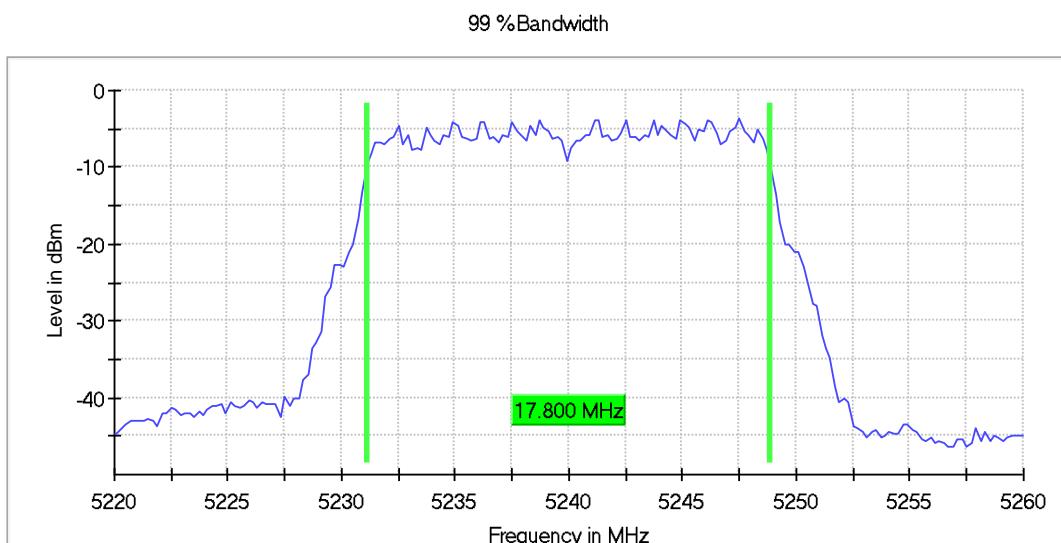
**A.1. Lowest Ch. (5 180 MHz)\_26 dB Bandwidth**



**A.2. Lowest Ch. (5 180 MHz)\_99% Bandwidth**

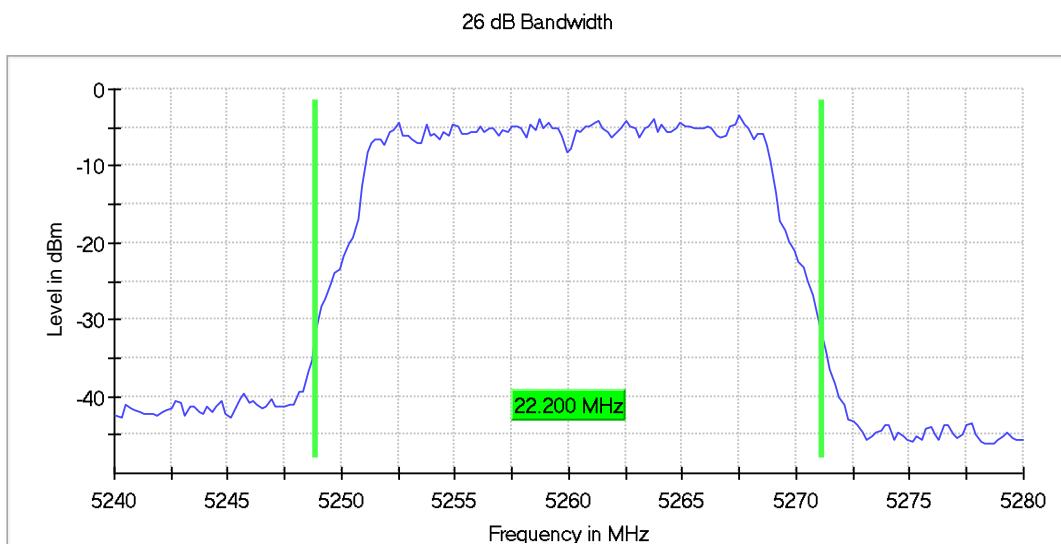


**B.1. Middle Ch. (5 200 MHz)\_26 dB Bandwidth****B.2. Middle Ch. (5 200 MHz)\_99% Bandwidth**

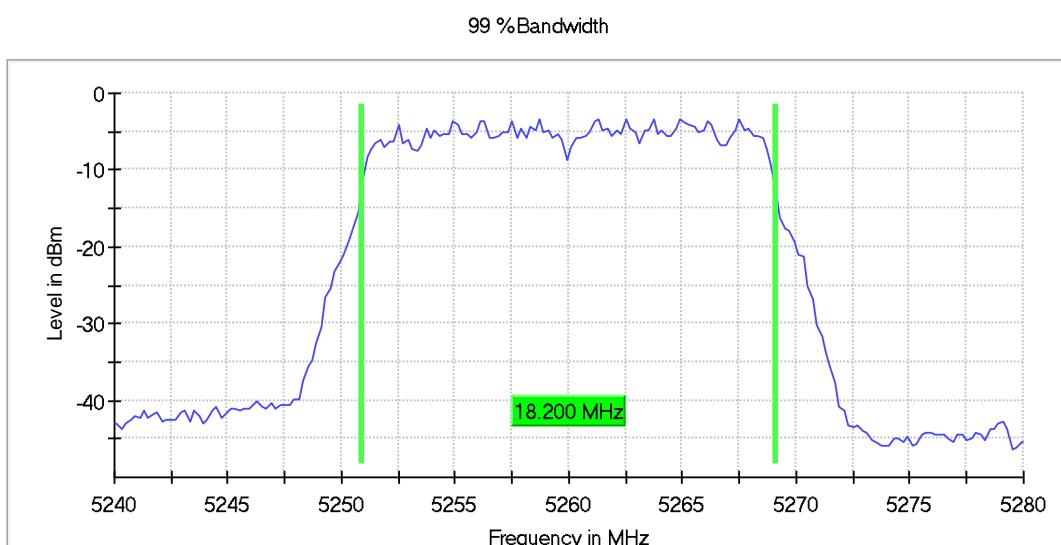
**C.1. Highest Ch. (5 240 MHz)\_26 dB Bandwidth****C.2. Highest Ch. (5 240 MHz)\_99% Bandwidth**

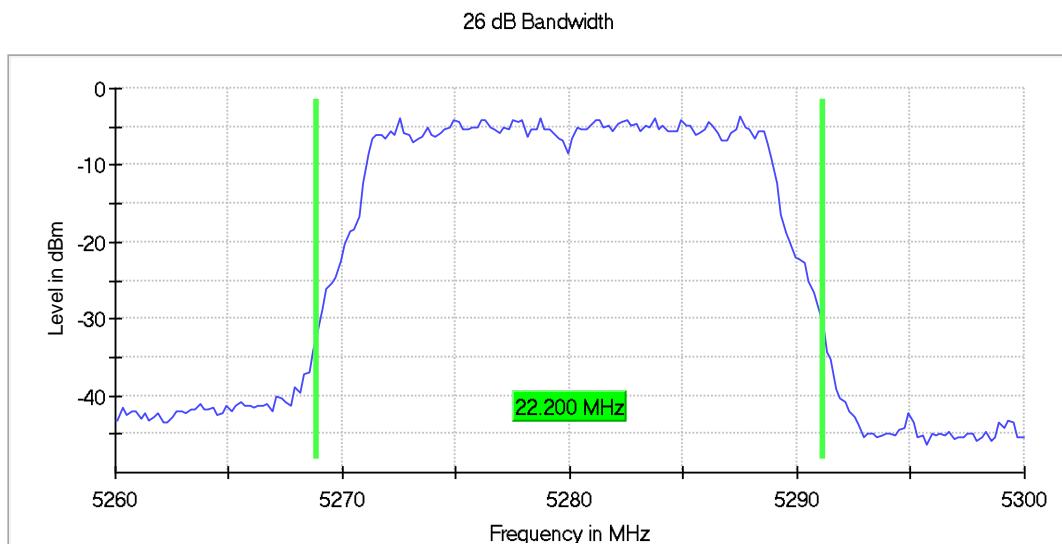
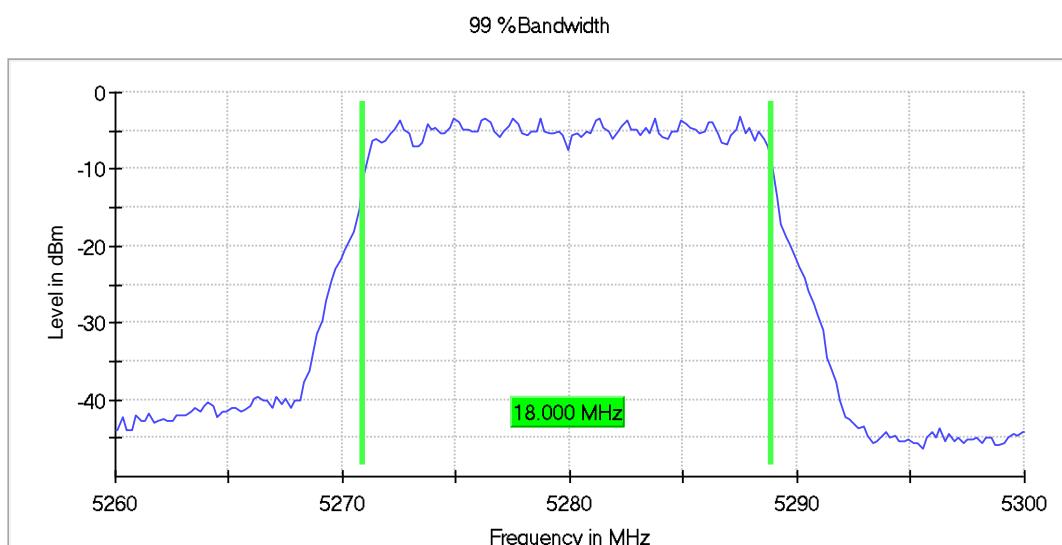
**Test mode : 802.11n\_HT20 (UNII-2A)**

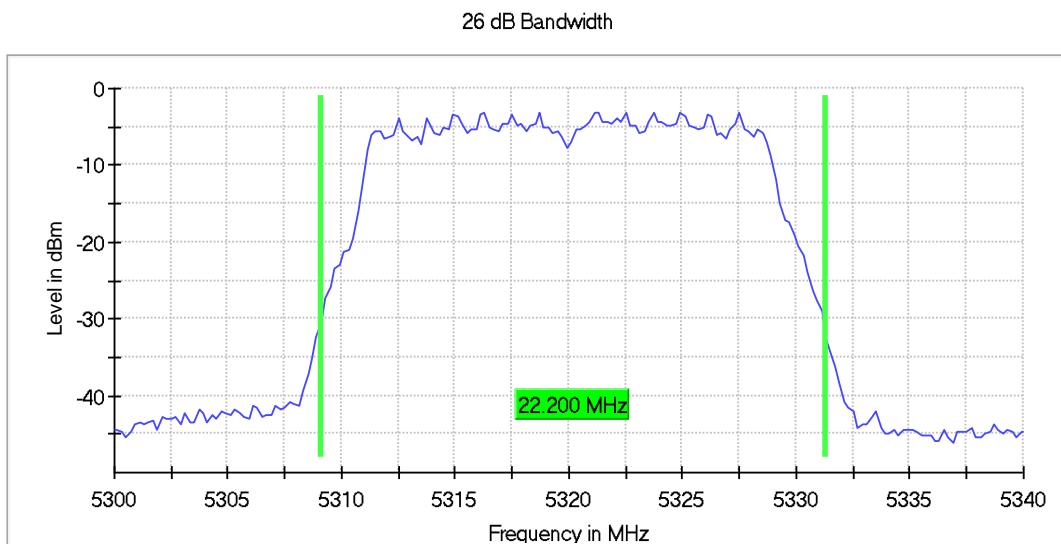
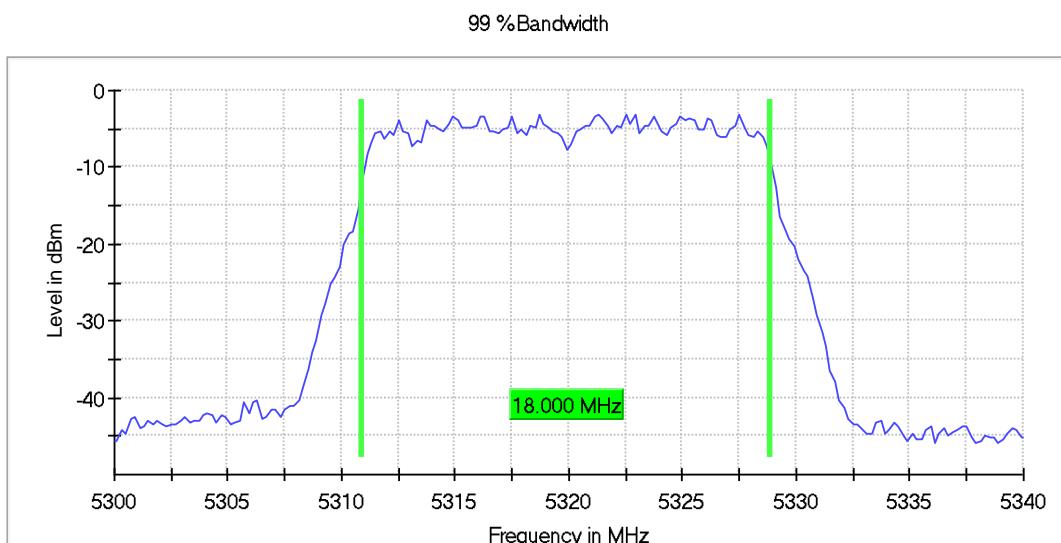
**A.1. Lowest Ch. (5 260 MHz)\_26 dB Bandwidth**



**A.2. Lowest Ch. (5 260 MHz)\_99% Bandwidth**

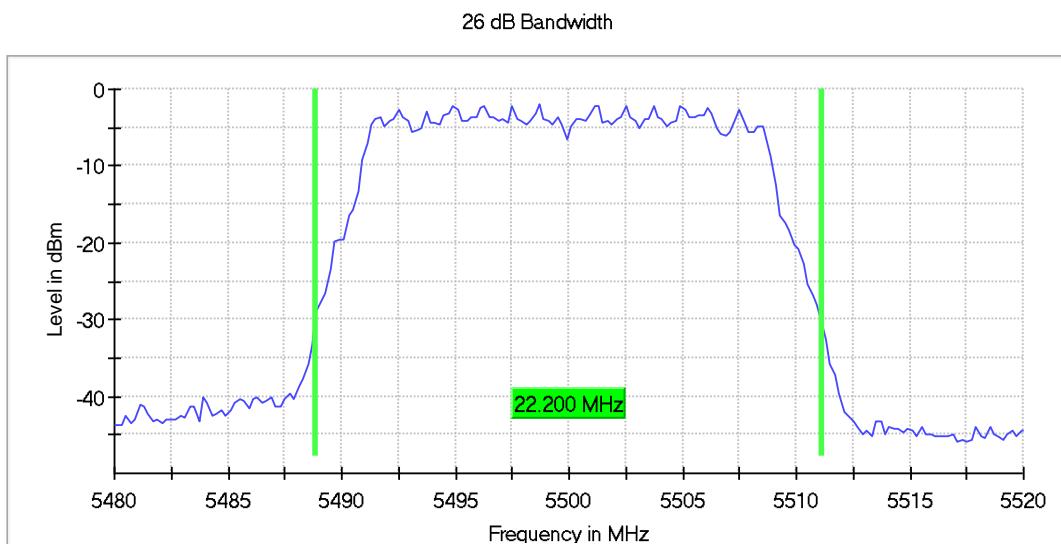


**B.1. Middle Ch. (5 280 MHz)\_26 dB Bandwidth****B.2. Middle Ch. (5 280 MHz)\_99% Bandwidth**

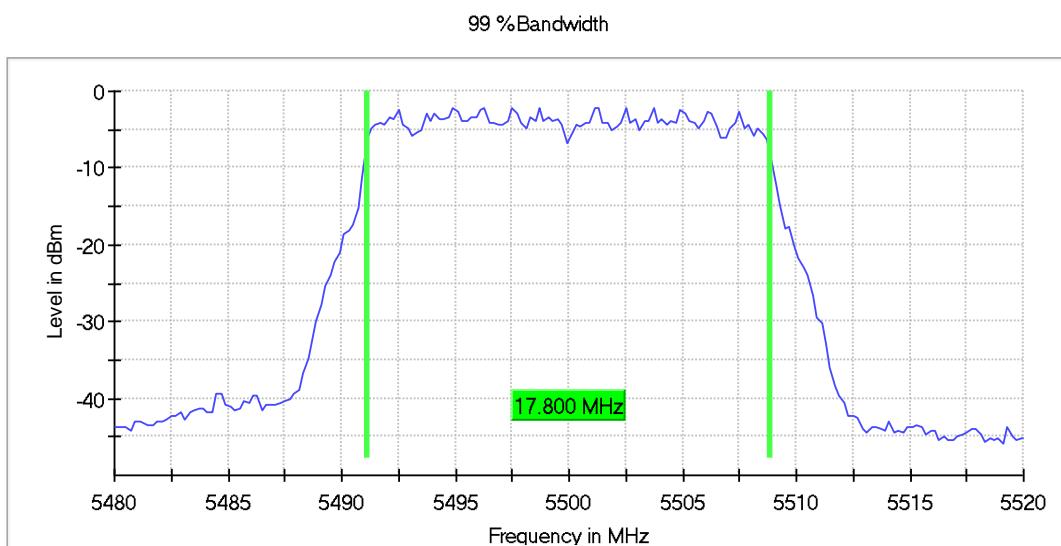
**C.1. Highest Ch. (5 320 MHz)\_26 dB Bandwidth****C.2. Highest Ch. (5 320 MHz)\_99% Bandwidth**

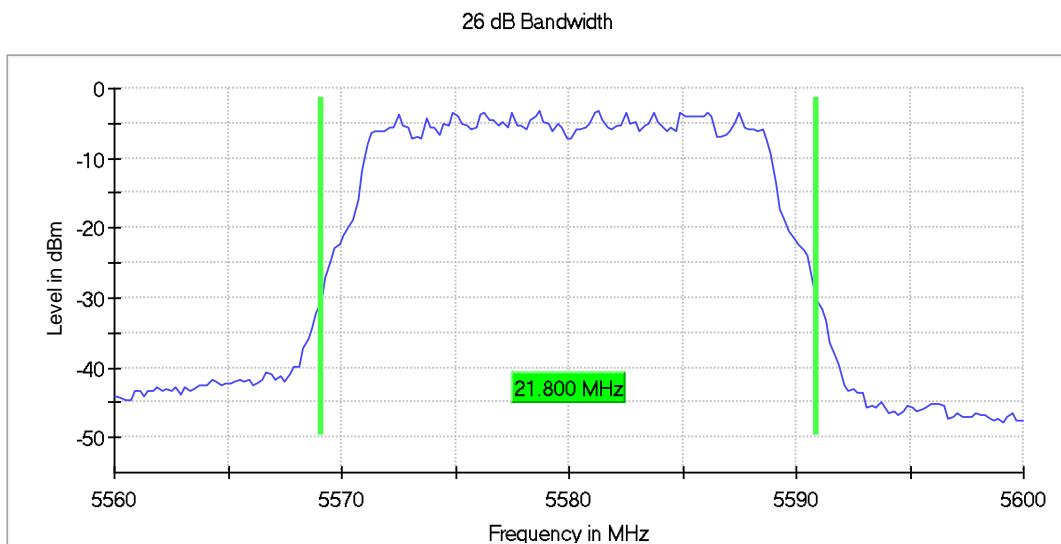
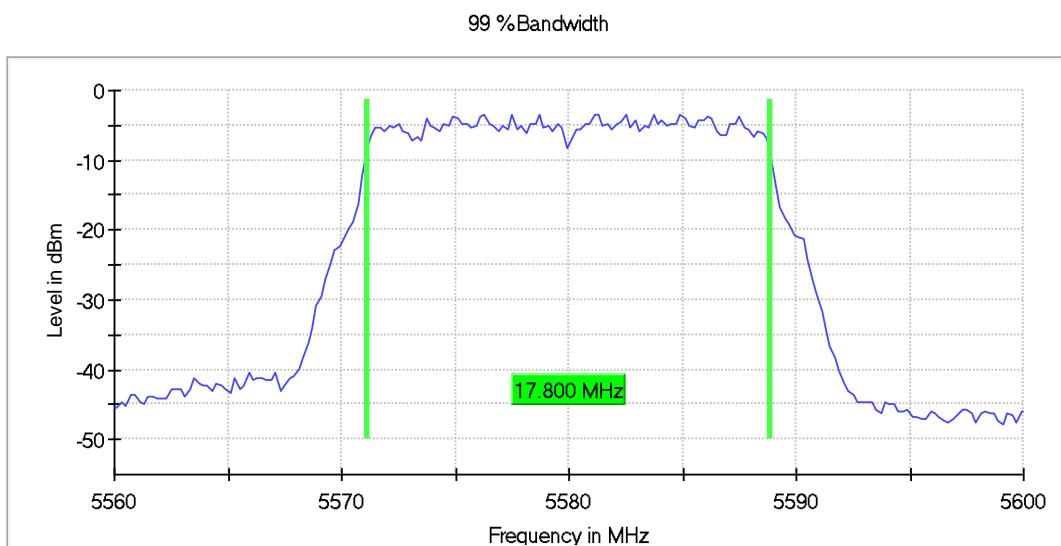
Test mode : 802.11n\_HT20 (UNII-2C)

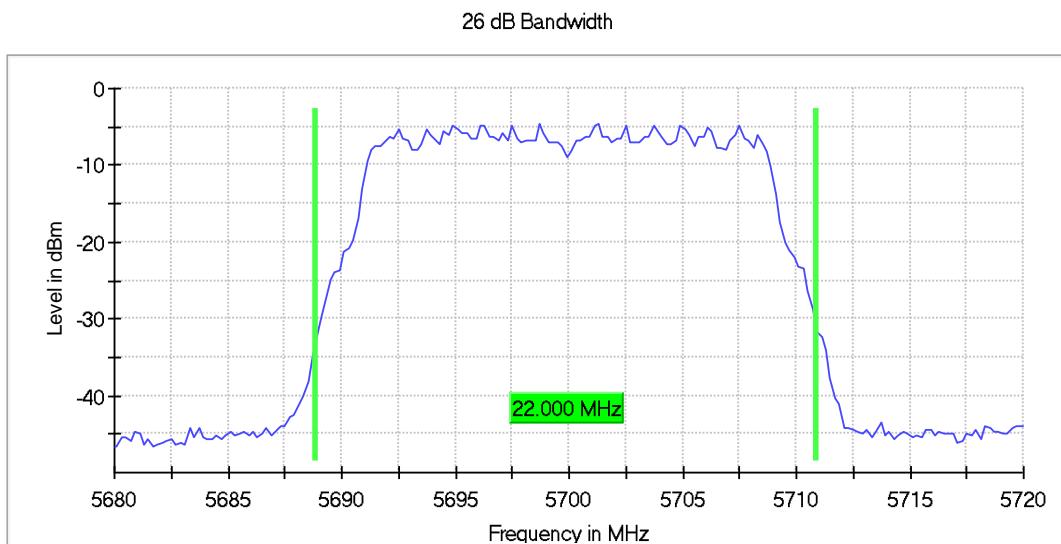
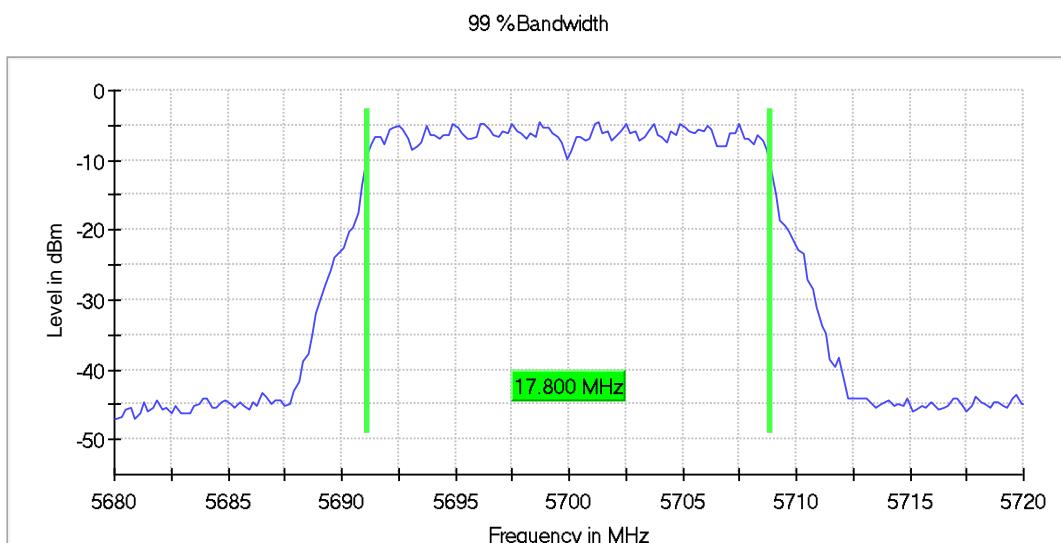
**A.1. Lowest Ch. (5 500 MHz)\_26 dB Bandwidth**



**A.2. Lowest Ch. (5 500 MHz)\_99% Bandwidth**

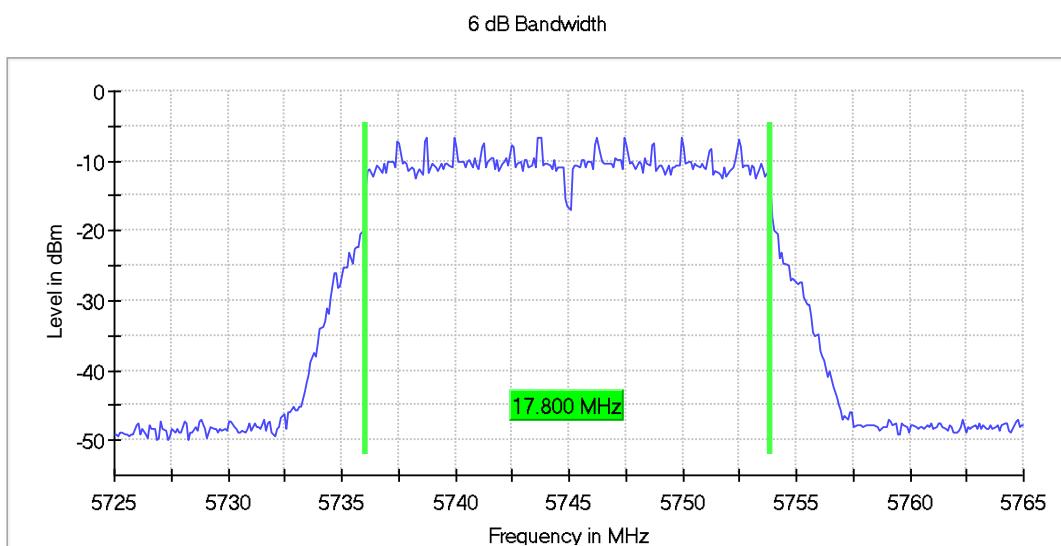


**B.1. Middle Ch. (5 580 MHz)\_26 dB Bandwidth****B.2. Middle Ch. (5 580 MHz)\_99% Bandwidth**

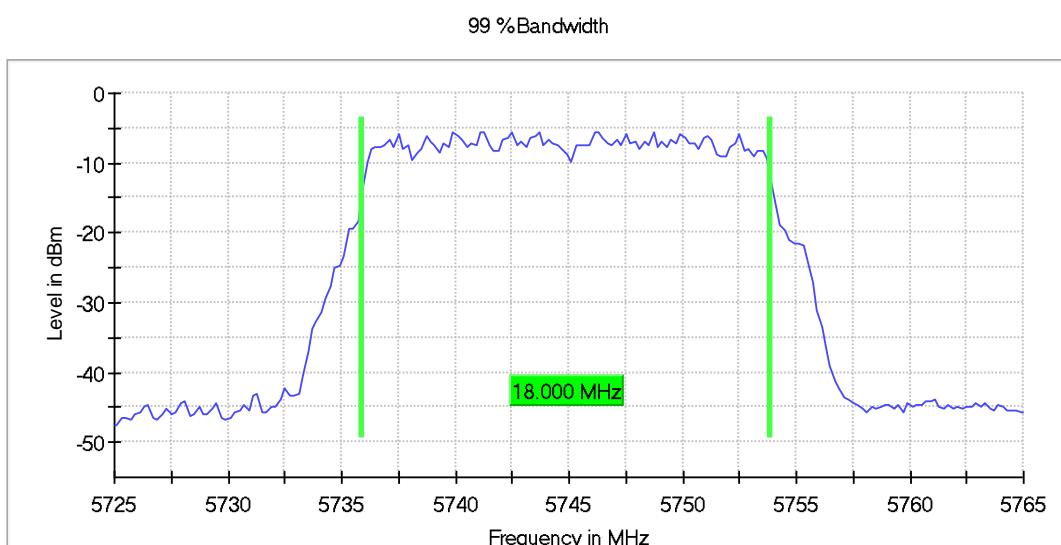
**C.1. Highest Ch. (5 700 MHz)\_26 dB Bandwidth****C.2. Highest Ch. (5 700 MHz)\_99% Bandwidth**

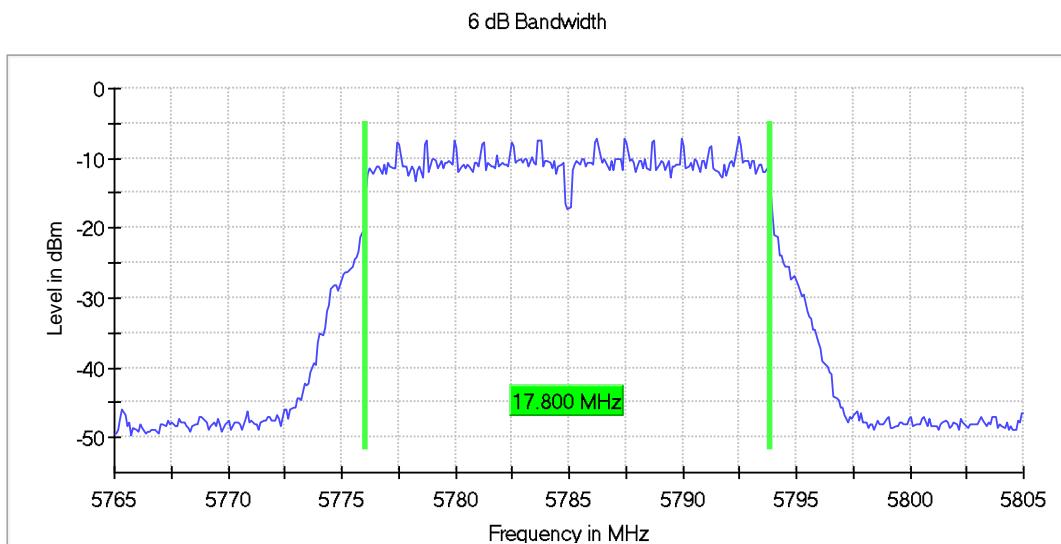
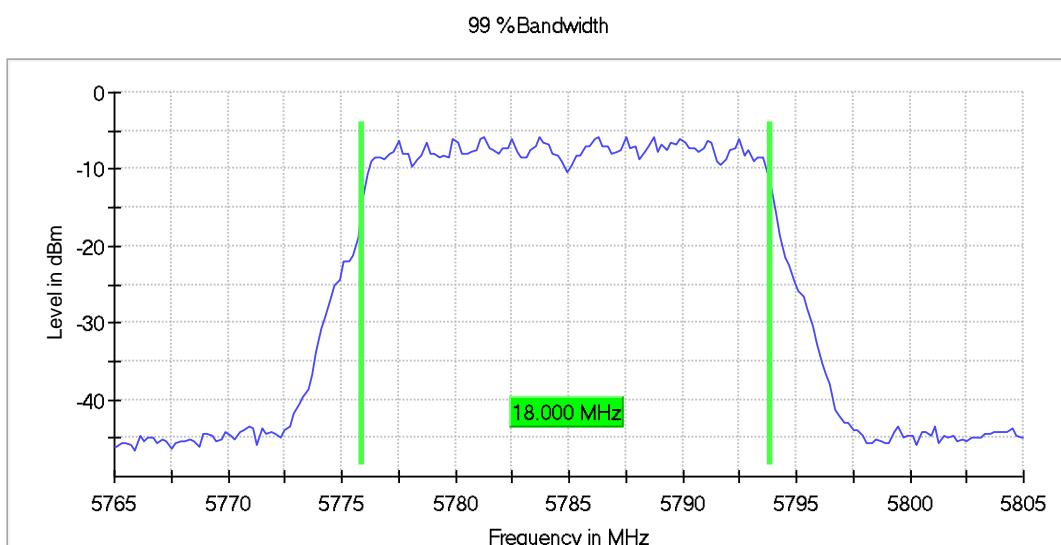
Test mode : 802.11n\_HT20 (UNII-3)

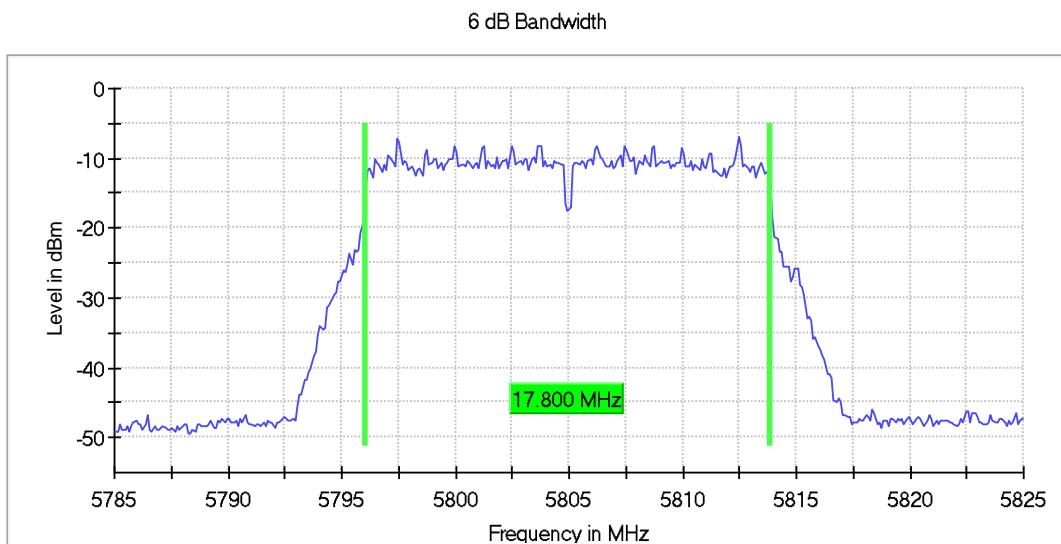
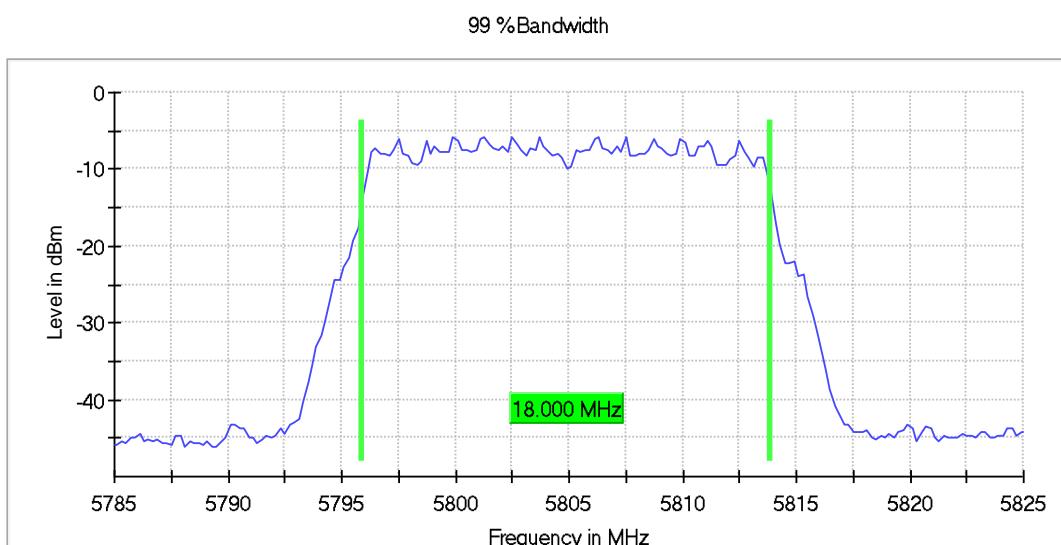
**A.1. Lowest Ch. (5 745 MHz)\_6 dB Bandwidth**



**A.2. Lowest Ch. (5 745 MHz)\_99% Bandwidth**

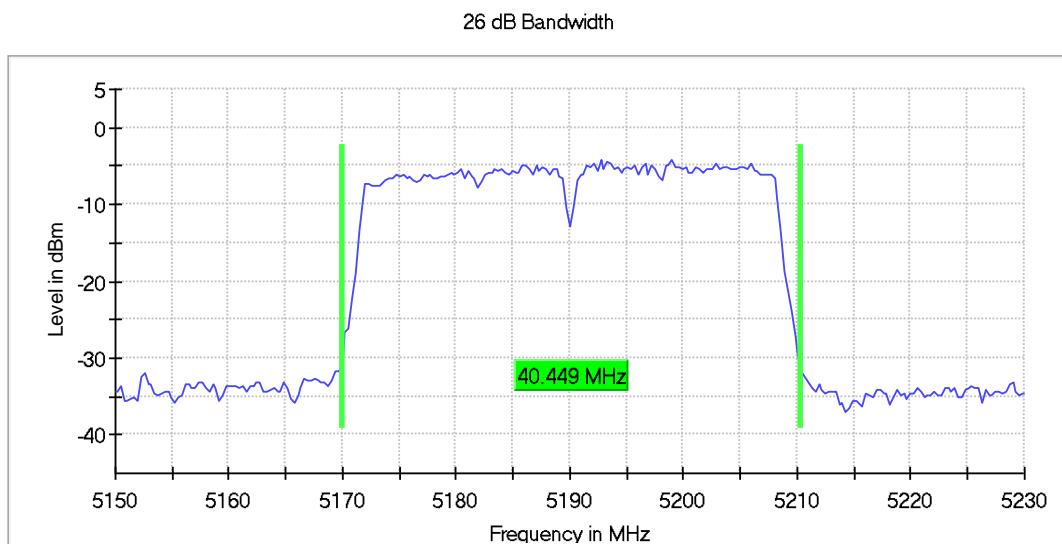


**B.1. Middle Ch. (5 785 MHz)\_6 dB Bandwidth****B.2. Middle Ch. (5 785 MHz)\_99% Bandwidth**

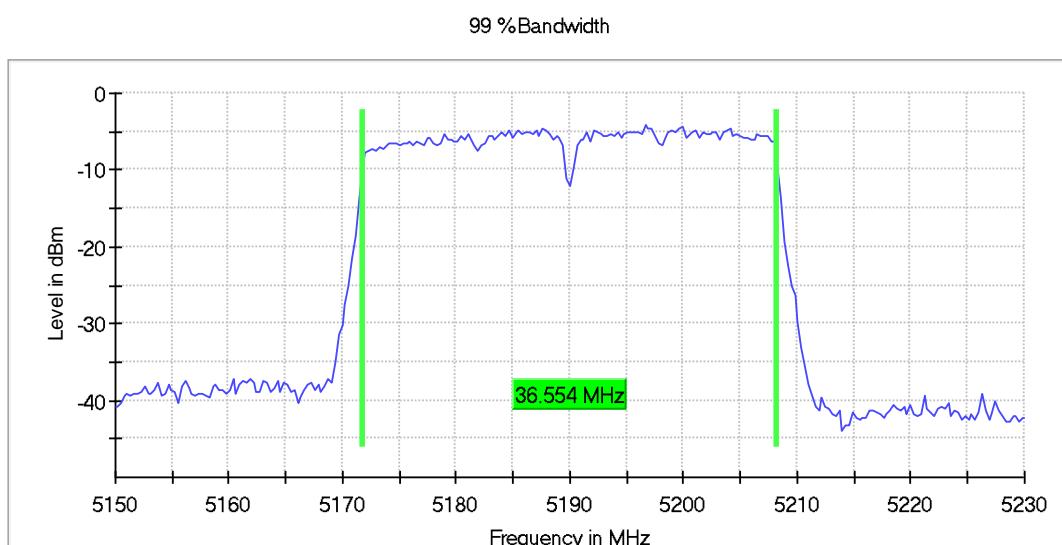
**C.1. Highest Ch. (5 805 MHz)\_6 dB Bandwidth****C.2. Highest Ch. (5 805 MHz)\_99% Bandwidth**

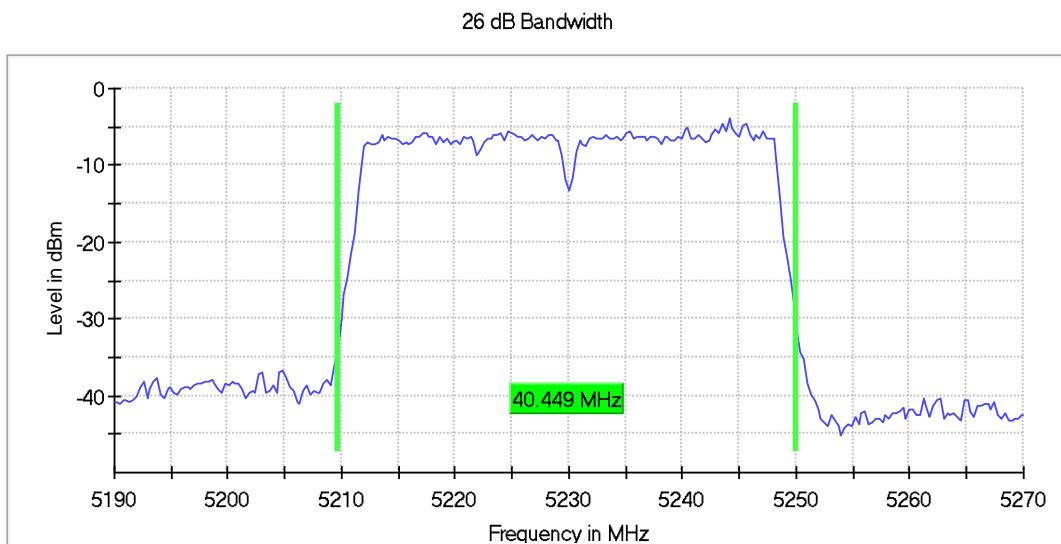
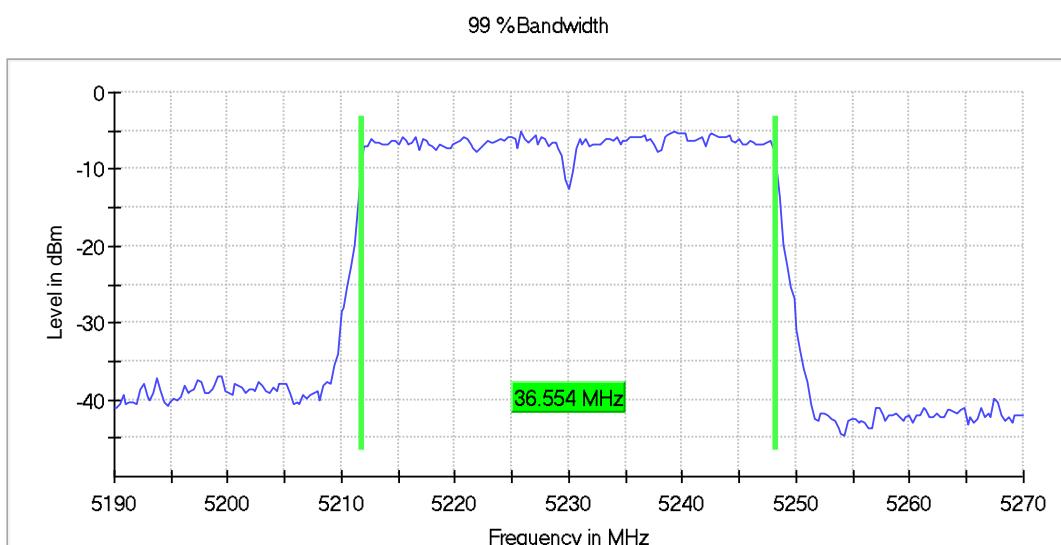
Test mode : 802.11n\_HT40 (UNII-1)

**A.1. Lowest Ch. (5 190 MHz)\_26 dB Bandwidth**



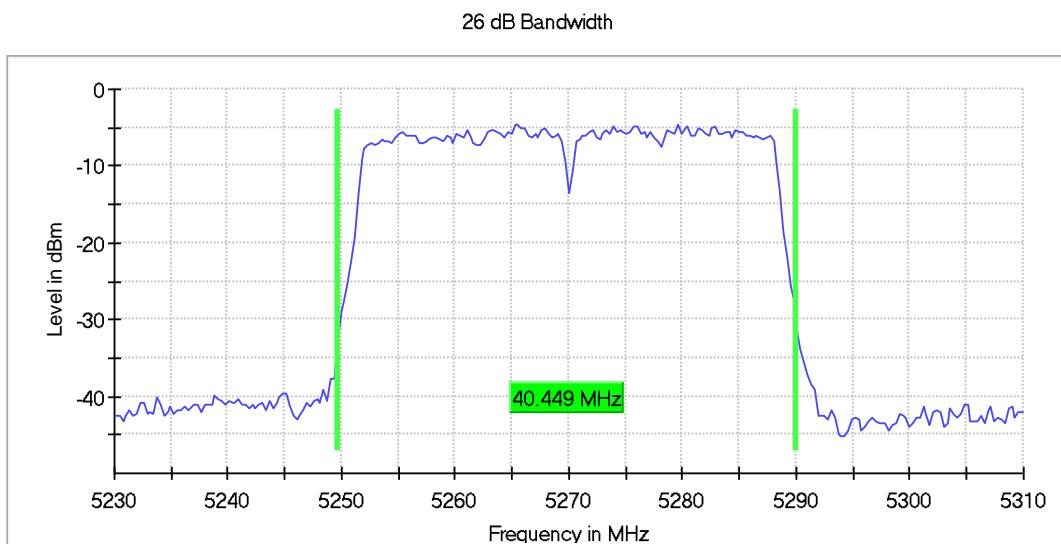
**A.2. Lowest Ch. (5 190 MHz)\_99% Bandwidth**



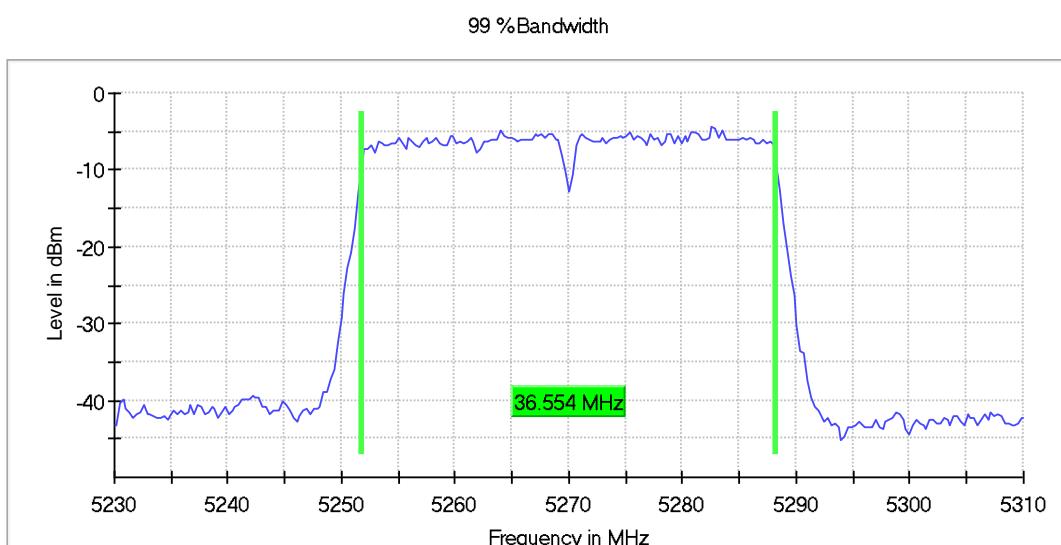
**B.1. Highest Ch. (5 230 MHz)\_26 dB Bandwidth****B.2. Highest Ch. (5 230 MHz)\_99% Bandwidth**

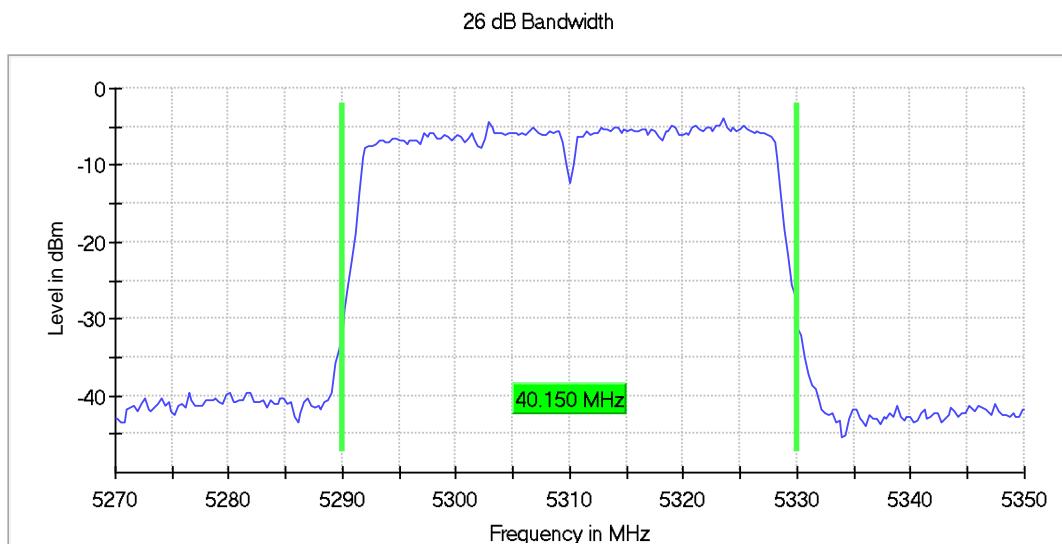
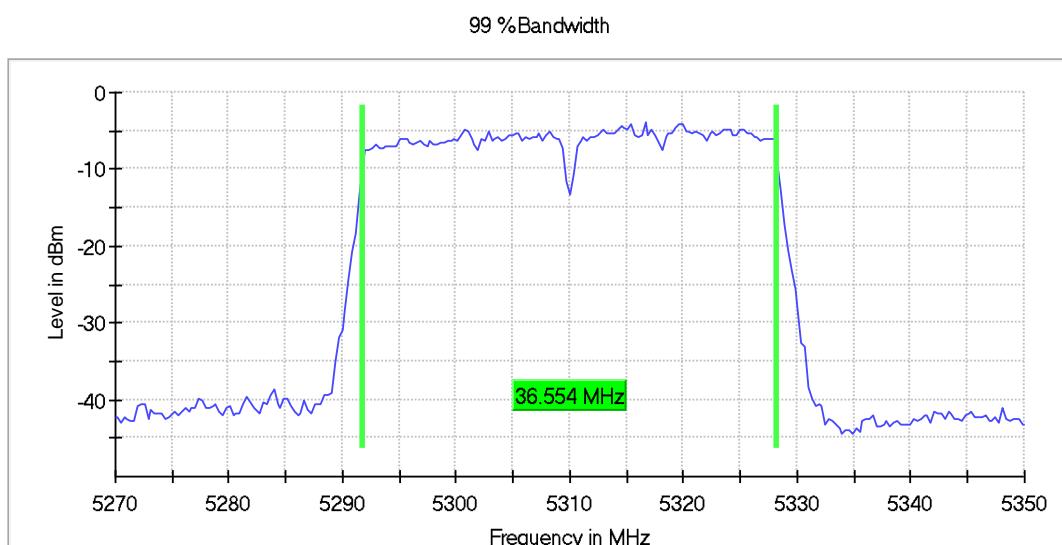
Test mode : 802.11n\_HT40 (UNII-2A)

**A.1. Lowest Ch. (5 270 MHz)\_26 dB Bandwidth**



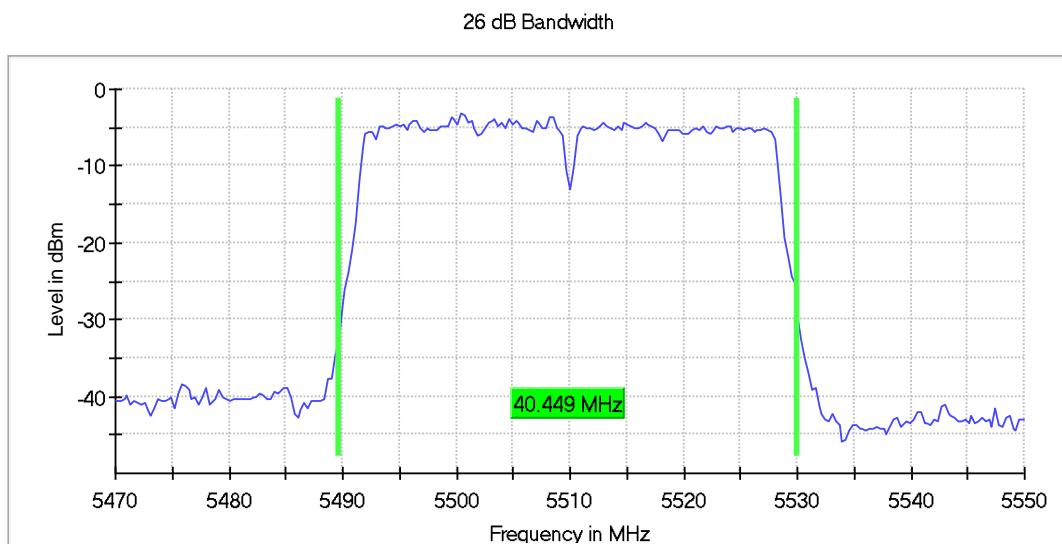
**A.2. Lowest Ch. (5 270 MHz)\_99% Bandwidth**



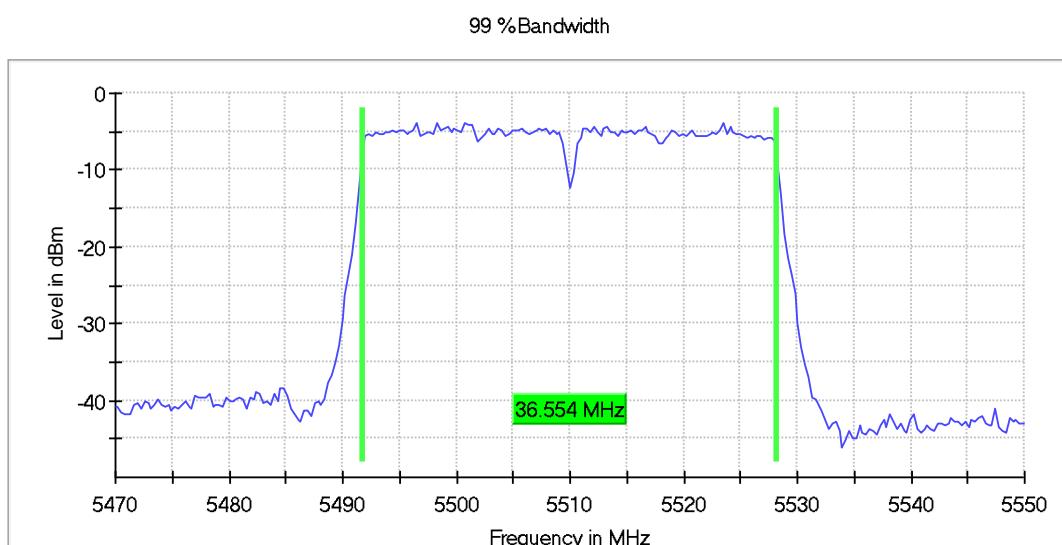
**B.1. Highest Ch. (5 310 MHz)\_26 dB Bandwidth****B.2. Highest Ch. (5 310 MHz)\_99% Bandwidth**

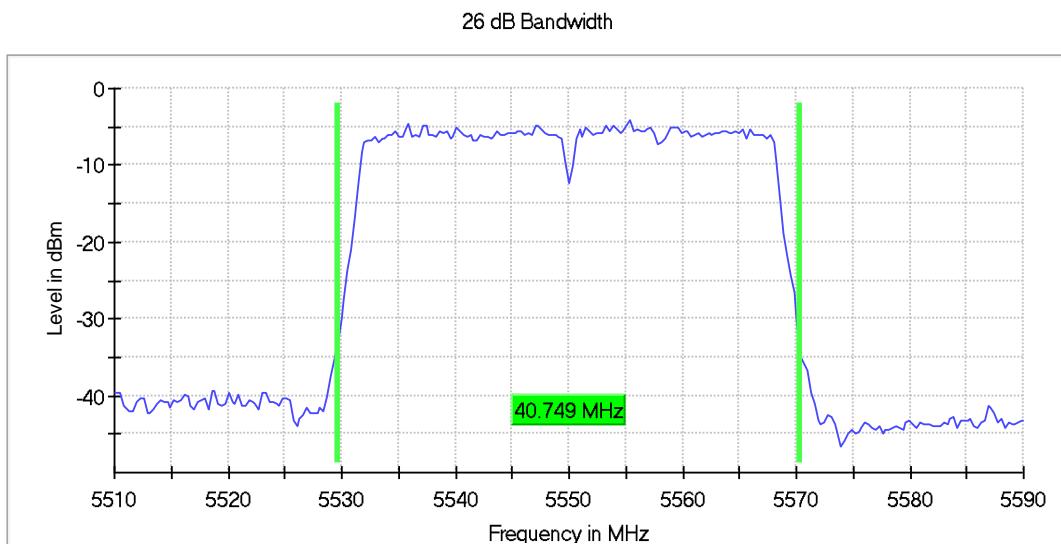
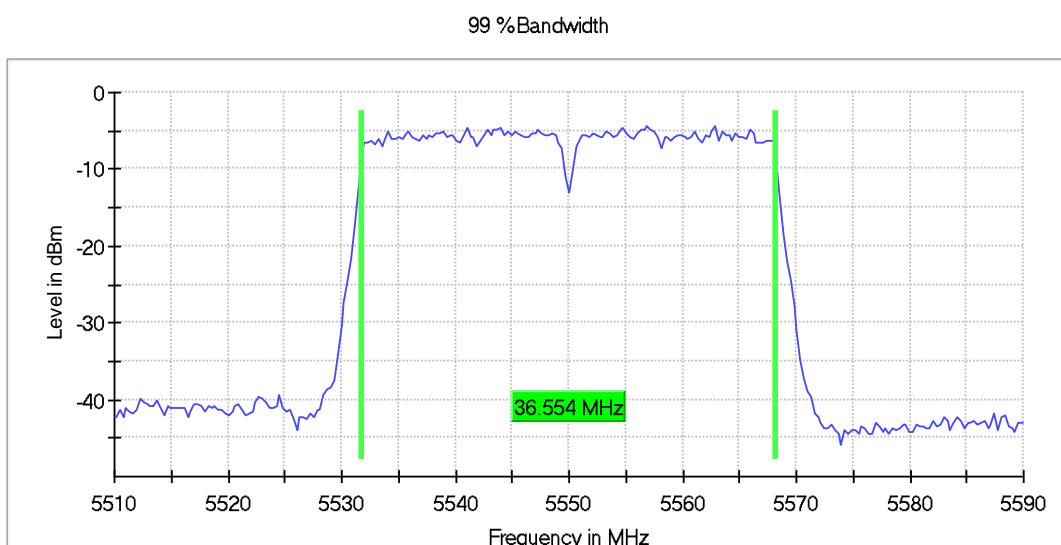
Test mode : 802.11n\_HT40 (UNII-2C)

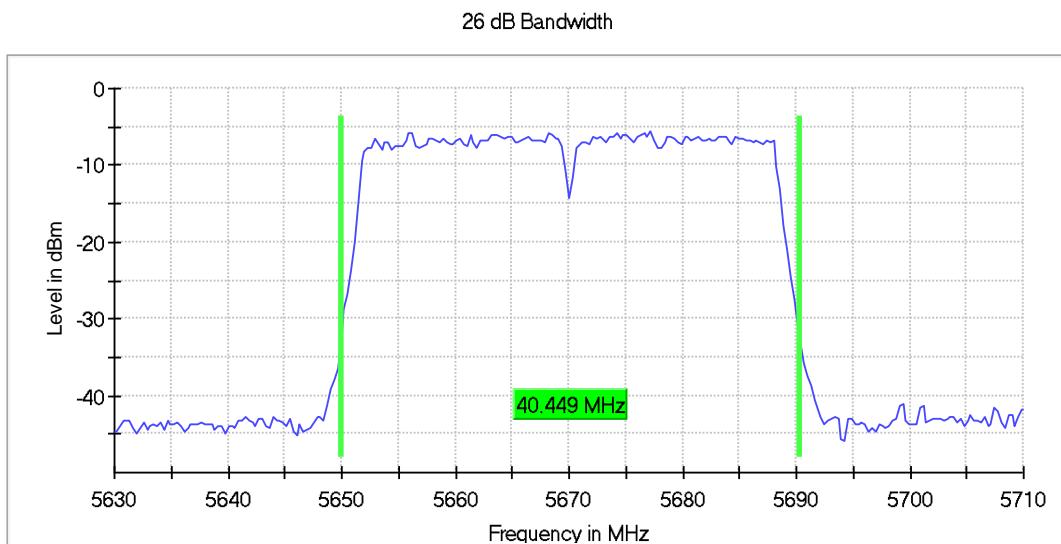
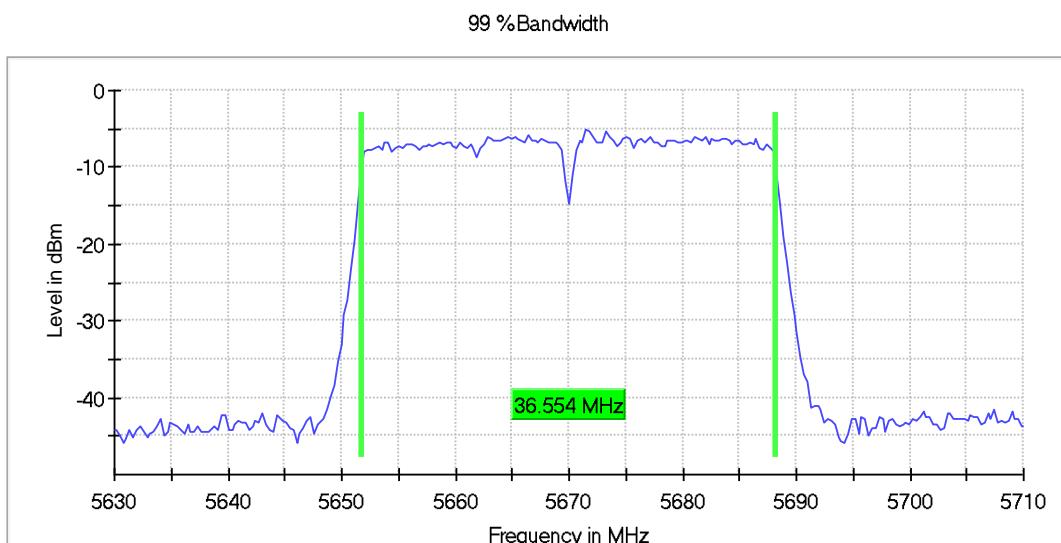
**A.1. Lowest Ch. (5 510 MHz)\_26 dB Bandwidth**



**A.2. Lowest Ch. (5 510 MHz)\_99% Bandwidth**

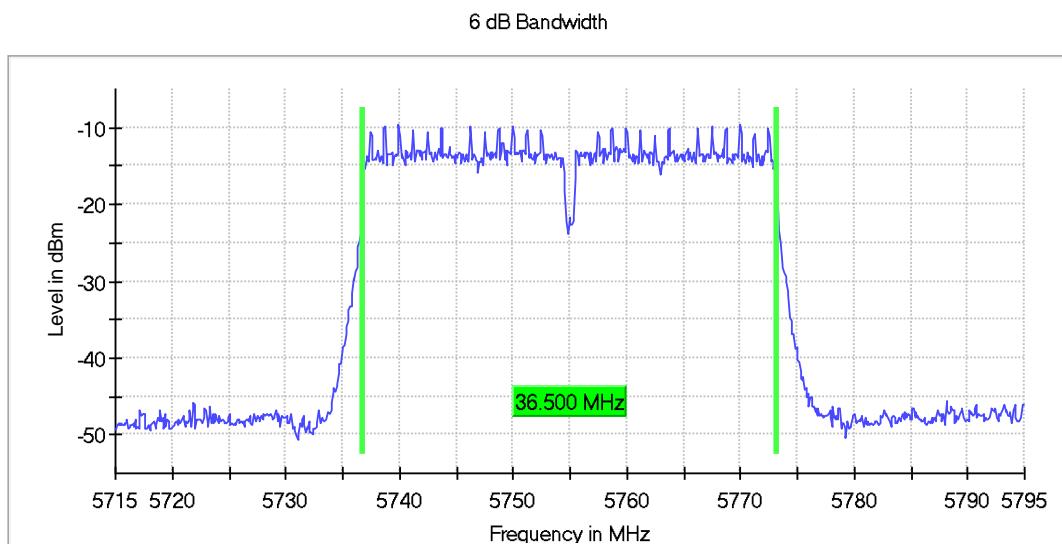


**B.1. Middle Ch. (5 550 MHz)\_26 dB Bandwidth****B.2. Middle Ch. (5 550 MHz)\_99% Bandwidth**

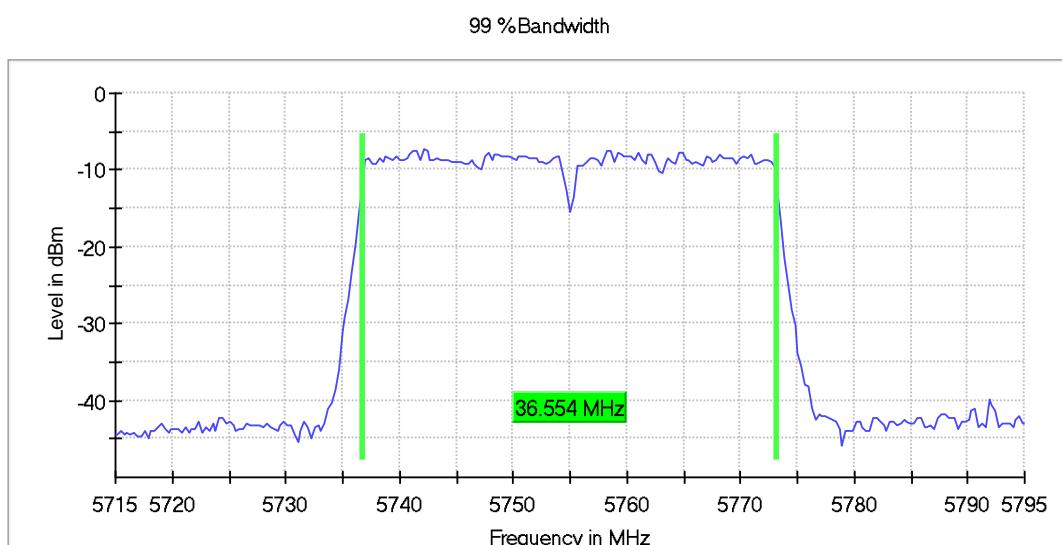
**C.1. Highest Ch. (5 670 MHz)\_26 dB Bandwidth****C.2. Highest Ch. (5 670 MHz)\_99% Bandwidth**

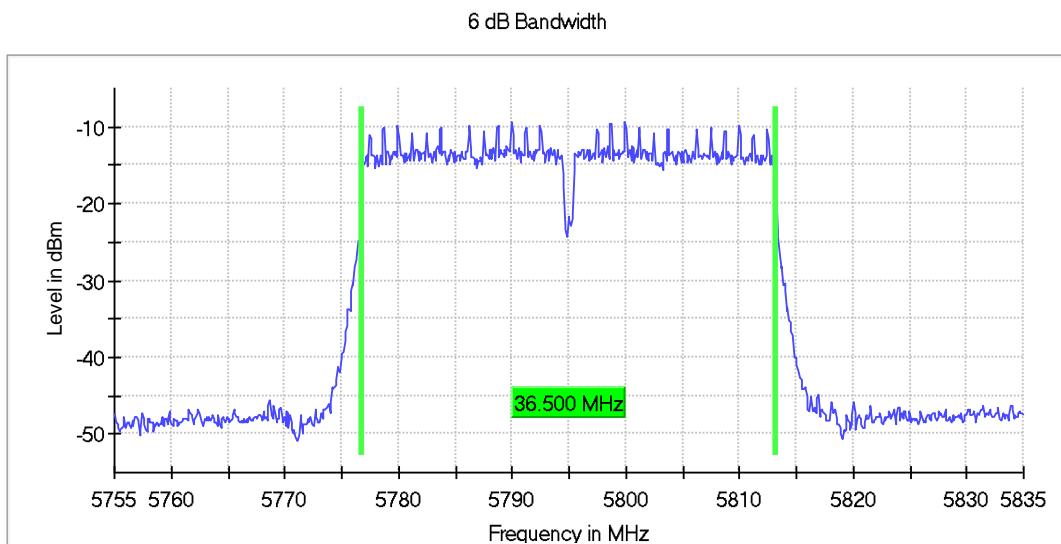
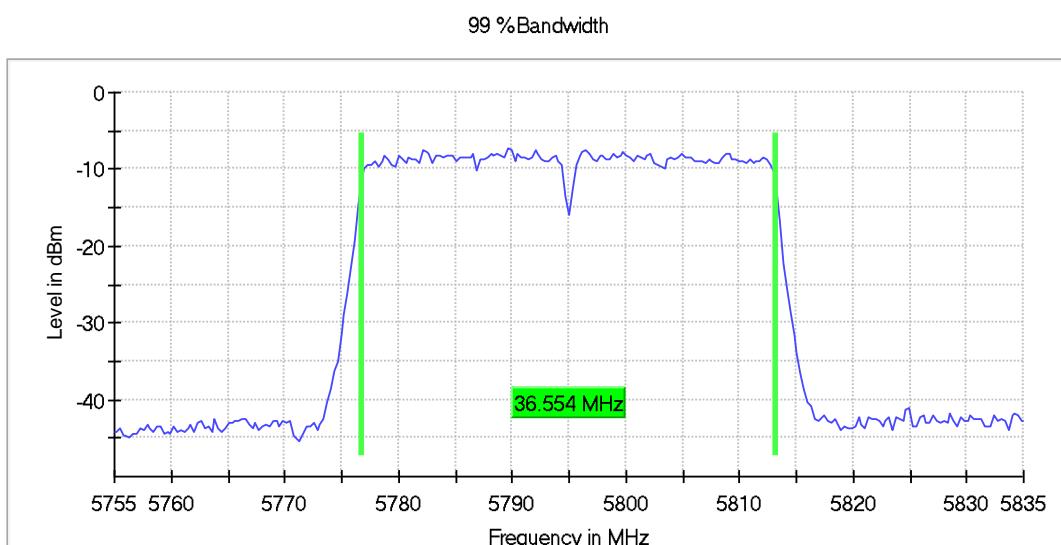
Test mode : 802.11n\_HT40 (UNII-3)

**A.1. Lowest Ch. (5 755 MHz)\_6 dB Bandwidth**



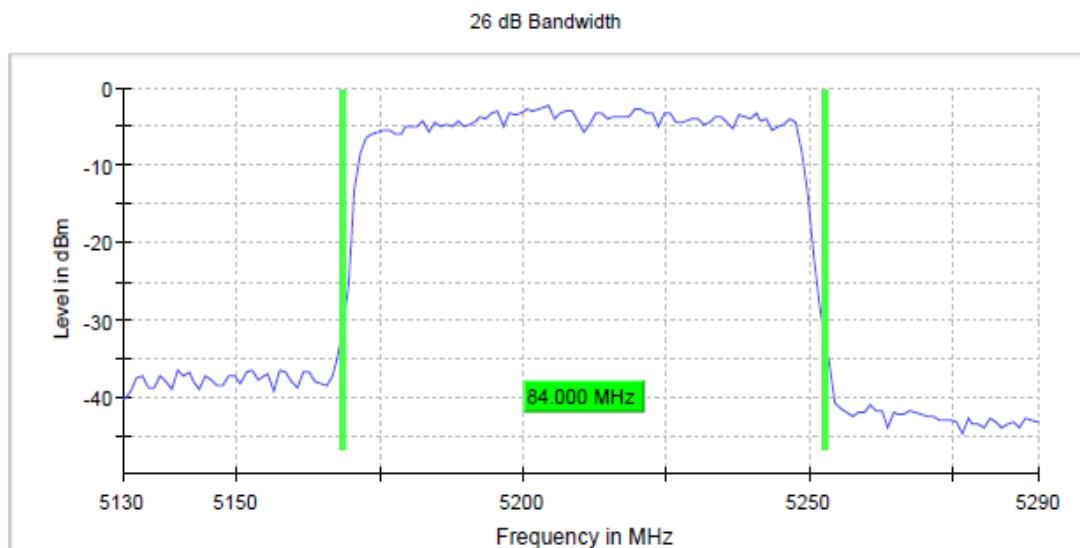
**A.2. Lowest Ch. (5 755 MHz)\_99% Bandwidth**



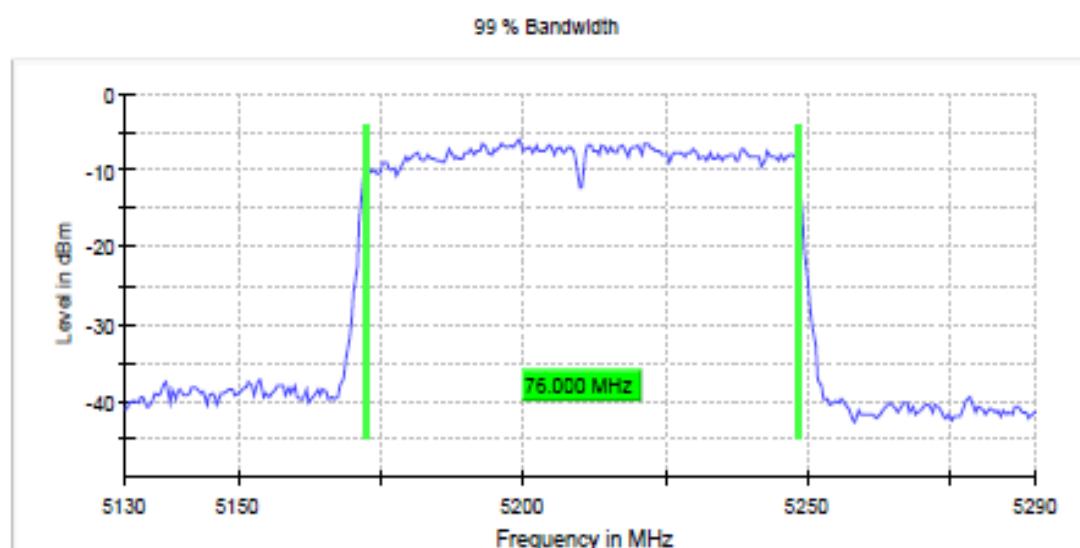
**B.1. Highest Ch. (5 795 MHz)\_6 dB Bandwidth****B.2. Highest Ch. (5 795 MHz)\_99% Bandwidth**

Test mode : 802.11ac\_VHT80 (UNII-1)

**A.1. Lowest Ch. (5 210 MHz)\_26 dB Bandwidth**

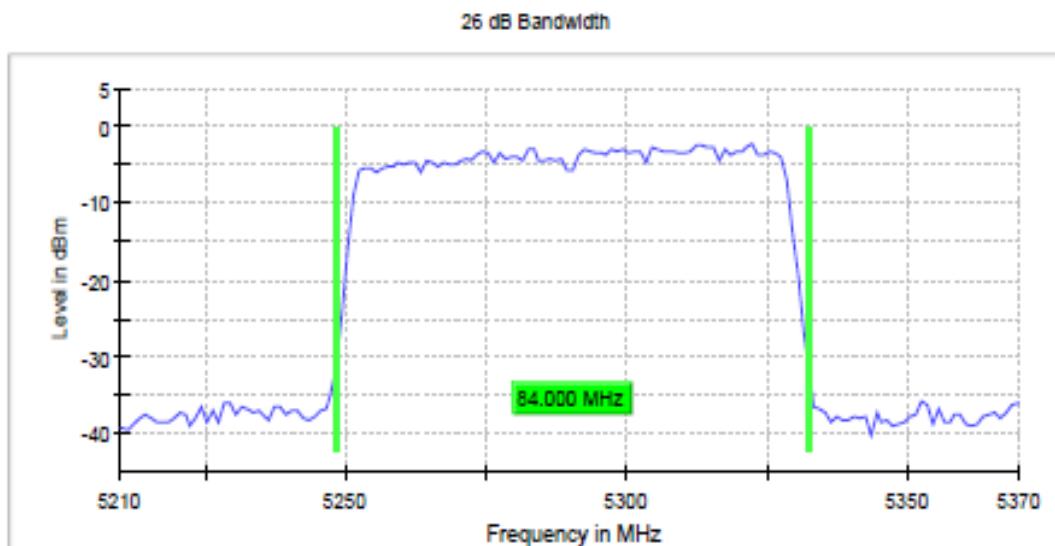


**A.2. Lowest Ch. (5 210 MHz)\_99% Bandwidth**

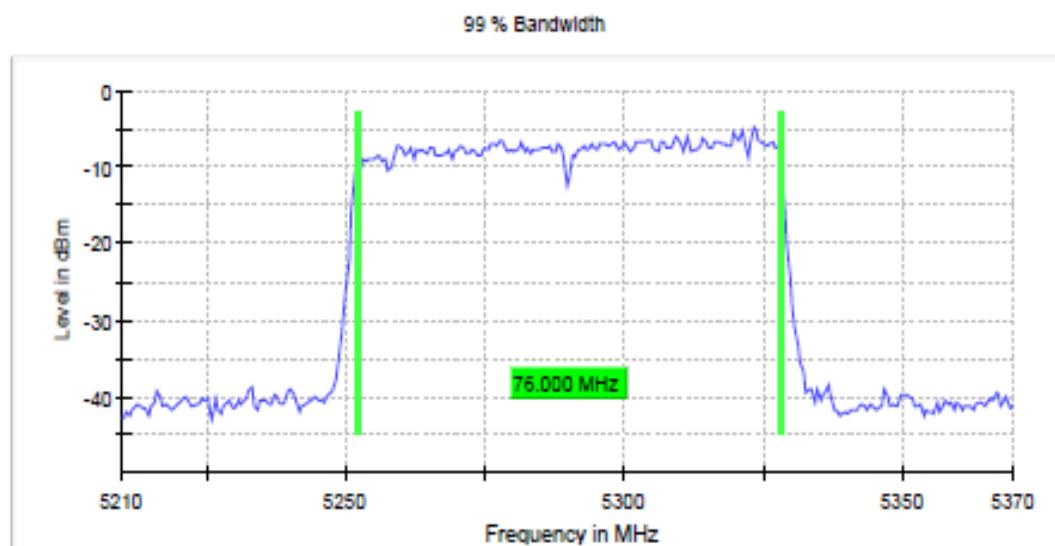


Test mode : 802.11ac\_VHT80 (UNII-2A)

**A.1. Lowest Ch. (5 290 MHz)\_26 dB Bandwidth**

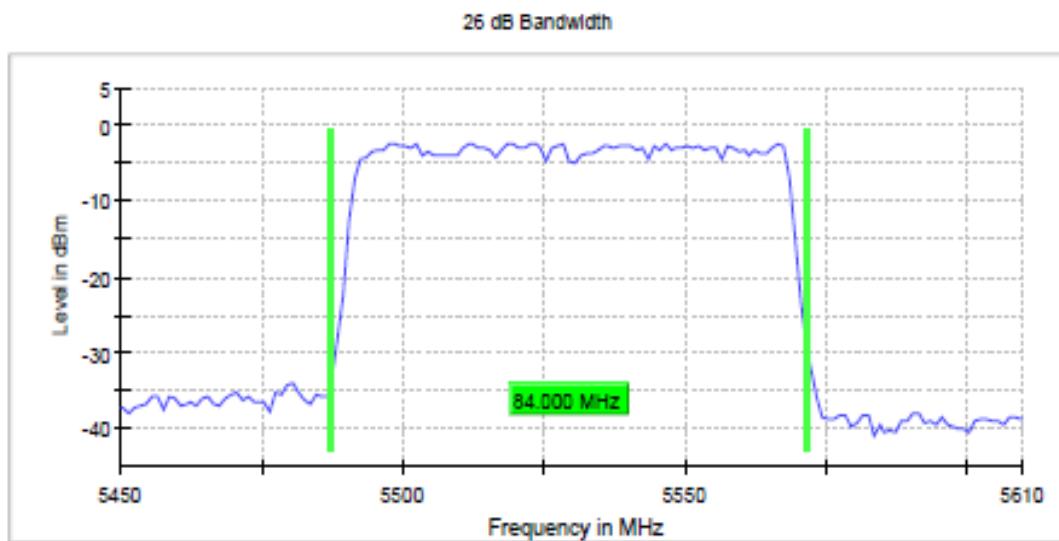


**A.2. Lowest Ch. (5 290 MHz)\_99% Bandwidth**

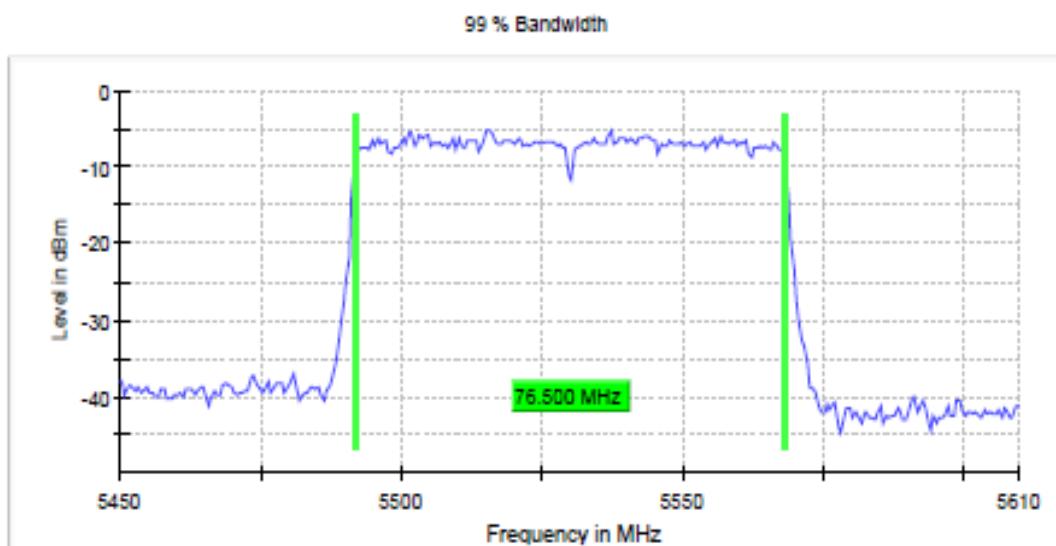


Test mode : 802.11ac\_VHT80 (UNII-2C)

**A.1. Lowest Ch. (5 530 MHz)\_26 dB Bandwidth**

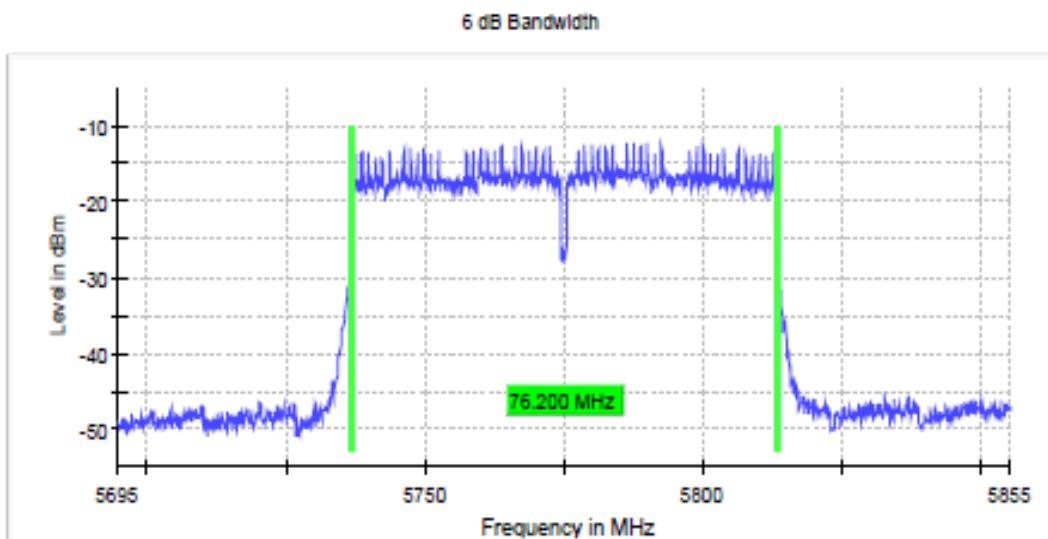


**A.2. Lowest Ch. (5 530 MHz)\_99% Bandwidth**

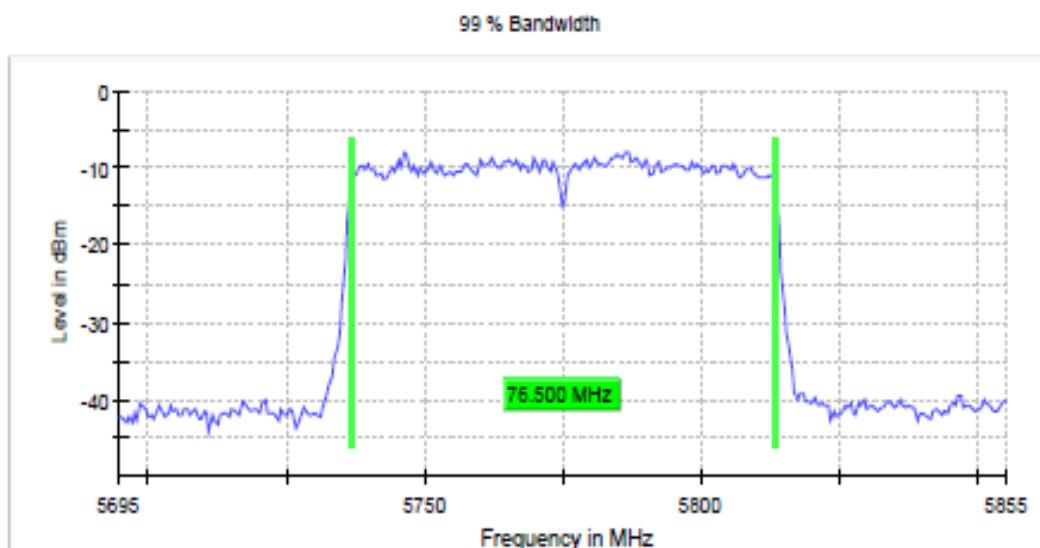


Test mode : 802.11ac\_VHT80 (UNII-3)

**A.1. Lowest Ch. (5775 MHz)\_6 dB Bandwidth**



**A.2. Lowest Ch. (5775 MHz)\_99% Bandwidth**



## 8. Maximum conducted output power

### 8.1. Test setup



### 8.2. Limit

Frequency Band	Limit
5150-5250MHz	Not exceed 250mW(24dBm)
5250-5350MHz	The lesser of 250mW(24dBm) or $11 + 10\log B$
5470-5725MHz	The lesser of 250mW(24dBm) or $11 + 10\log B$
5725-5850MHz	Not exceed 1W(30dBm)

\*Where B is the 26dB emission bandwidth in MHz

The maximum e.i.r.p. shall not exceed 200 mW or  $10 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

### 8.3. Test procedure (KDB 789033)

b) Method PM-G (Measurement using a gated RF average power meter):  
Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

#### 8.4. Test results

##### Test mode : 802.11a (UNII-1)

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 180	10.19	24
5 200	10.45	
5 240	9.62	

##### Test mode : 802.11a (UNII-2A)

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 260	10.29	24
5 280	9.83	
5 320	10.12	

##### Test mode : 802.11a (UNII-2C)

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 500	10.85	24
5 580	9.97	
5 700	8.56	

##### Test mode : 802.11a (UNII-3)

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 745	8.11	30
5 785	7.47	
5 805	7.67	

**Test mode : 802.11n\_HT20 (UNII-1)**

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 180	9.47	24
5 200	9.82	
5 240	8.93	

**Test mode : 802.11n\_HT20 (UNII-2A)**

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 260	9.55	24
5 280	9.49	
5 320	9.52	

**Test mode : 802.11n\_HT20 (UNII-2C)**

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 500	10.39	24
5 580	9.38	
5 700	8.26	

**Test mode : 802.11n\_HT20 (UNII-3)**

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 745	7.65	30
5 785	7.01	
5 805	6.91	

**Test mode : 802.11n\_HT40 (UNII-1)**

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 190	10.08	24
5 230	9.25	

**Test mode : 802.11n\_HT40 (UNII-2A)**

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 270	9.81	24
5 310	9.79	

**Test mode : 802.11n\_HT40 (UNII-2C)**

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 510	10.62	24
5 550	10.01	
5 670	8.96	

**Test mode : 802.11n\_HT40 (UNII-3)**

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 755	7.72	30
5 795	7.38	

**Test mode : 802.11ac\_VHT80 (UNII-1)**

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 210	9.02	24

**Test mode : 802.11ac\_VHT80 (UNII-2A)**

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 290	9.22	24

**Test mode : 802.11ac\_VHT80 (UNII-2C)**

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 530	9.90	24

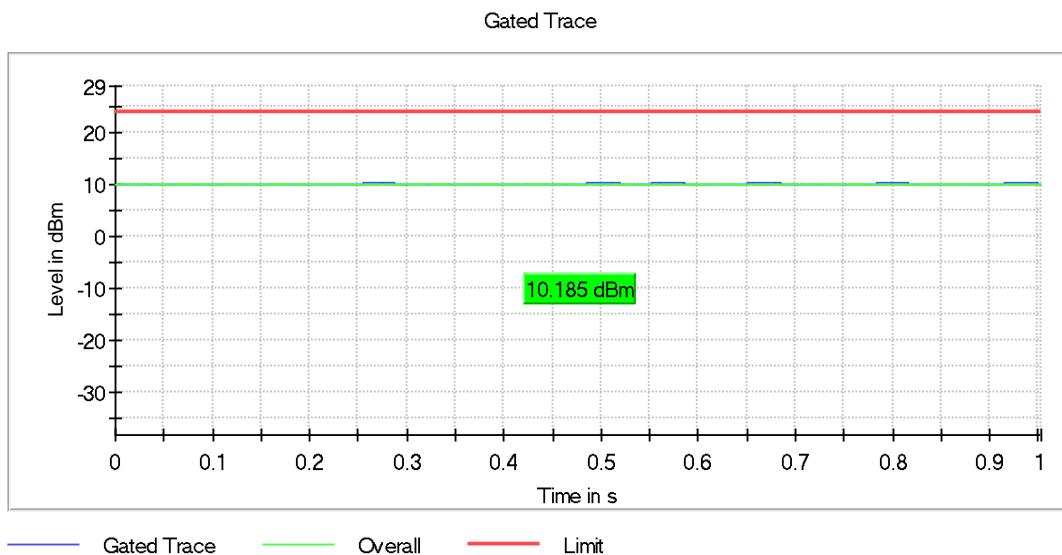
**Test mode : 802.11ac\_VHT80 (UNII-3)**

Frequency(MHz)	Conducted output power (dBm)	Limit (dBm)
5 775	7.20	30

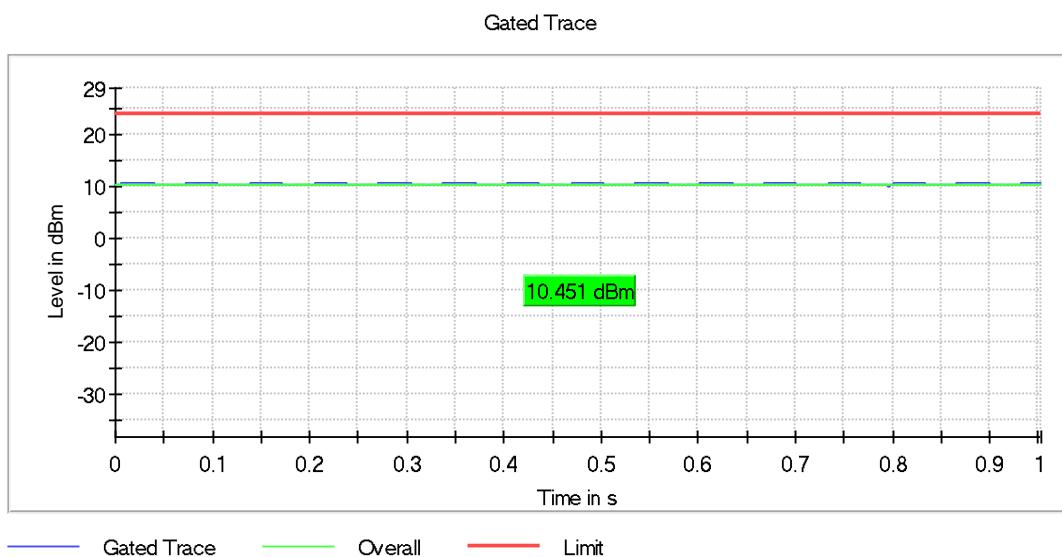
### 8.4.1 Test plot

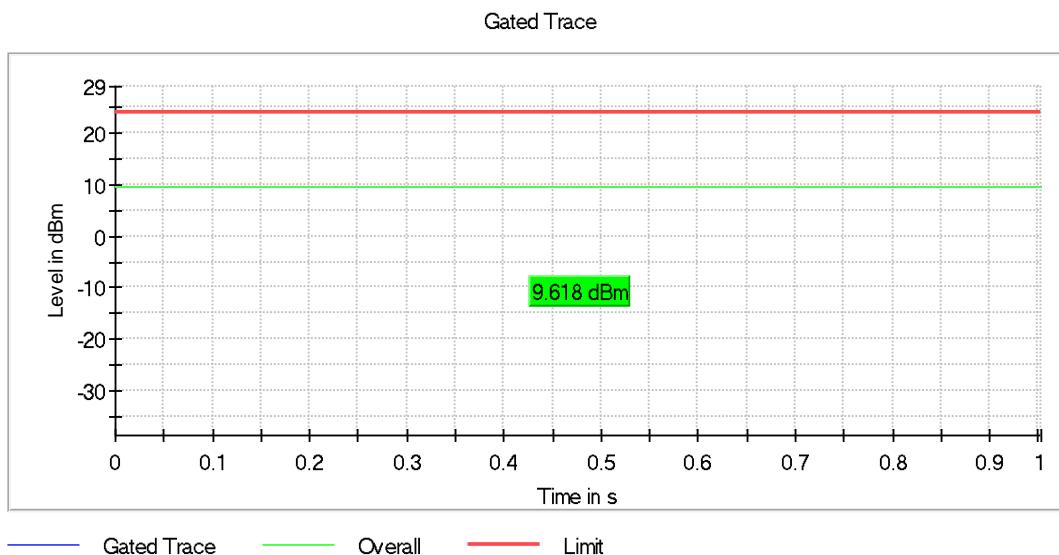
Test mode : 802.11a (UNII-1)

#### A. Lowest Ch. (5 180 MHz)



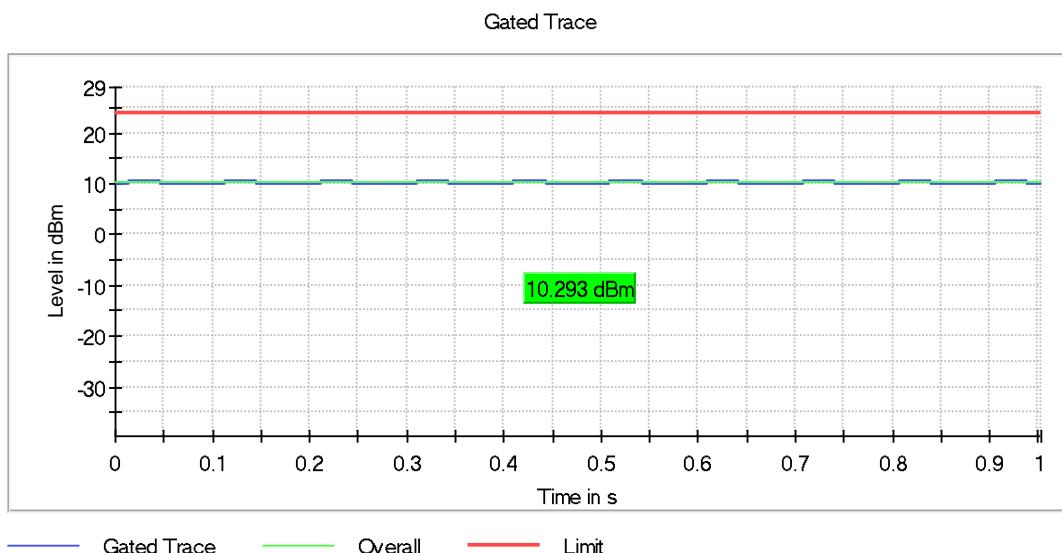
#### B. Middle Ch. (5 200 MHz)



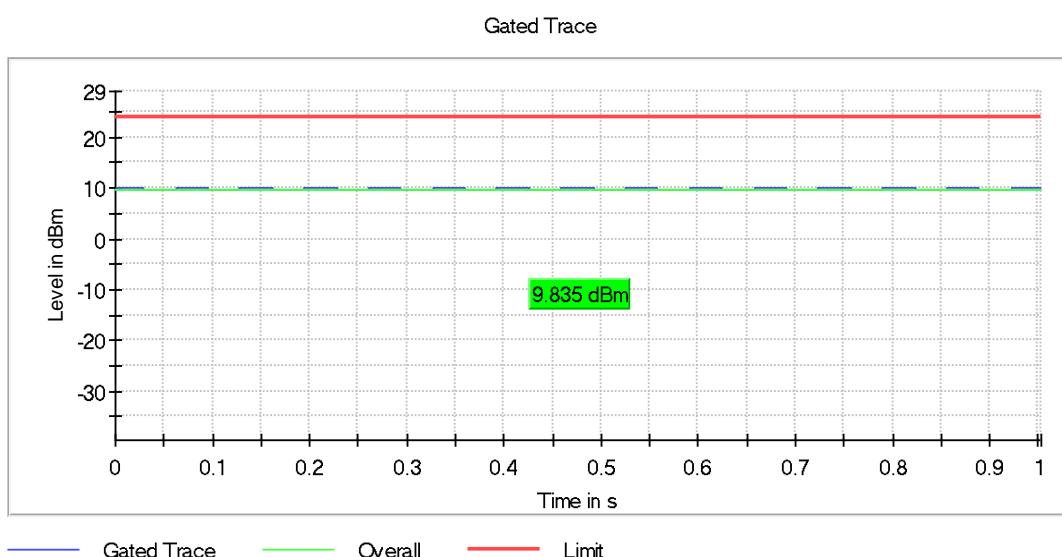
**C. Highest Ch. (5 240 MHz)**

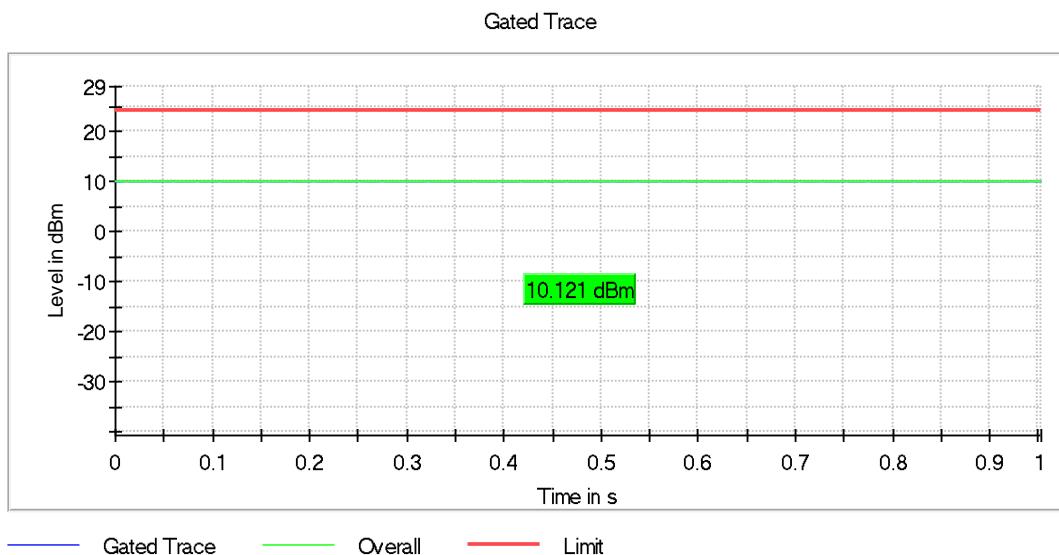
Test mode : 802.11a (UNII-2A)

**A. Lowest Ch. (5 260 MHz)**



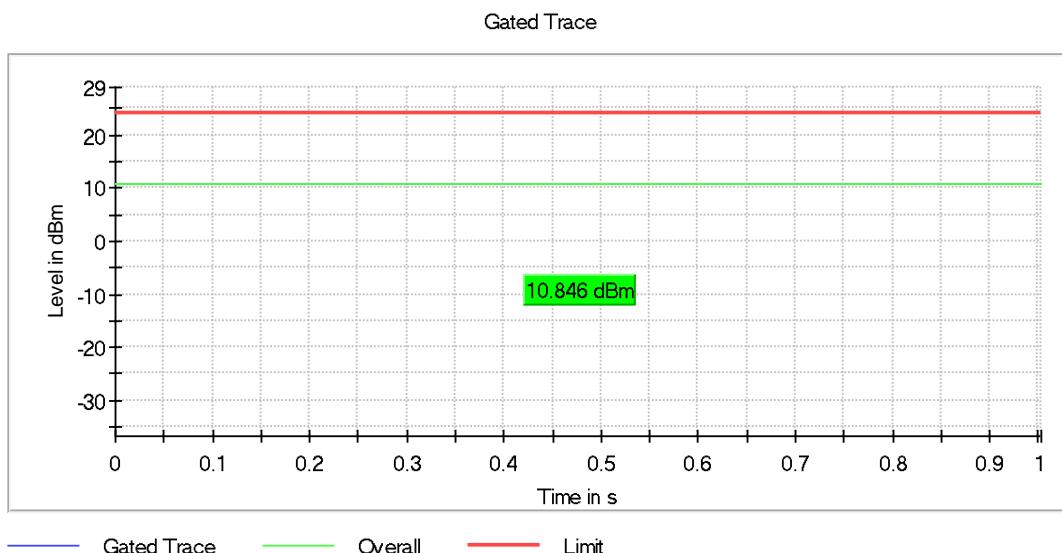
**B. Middle Ch. (5 280 MHz)**



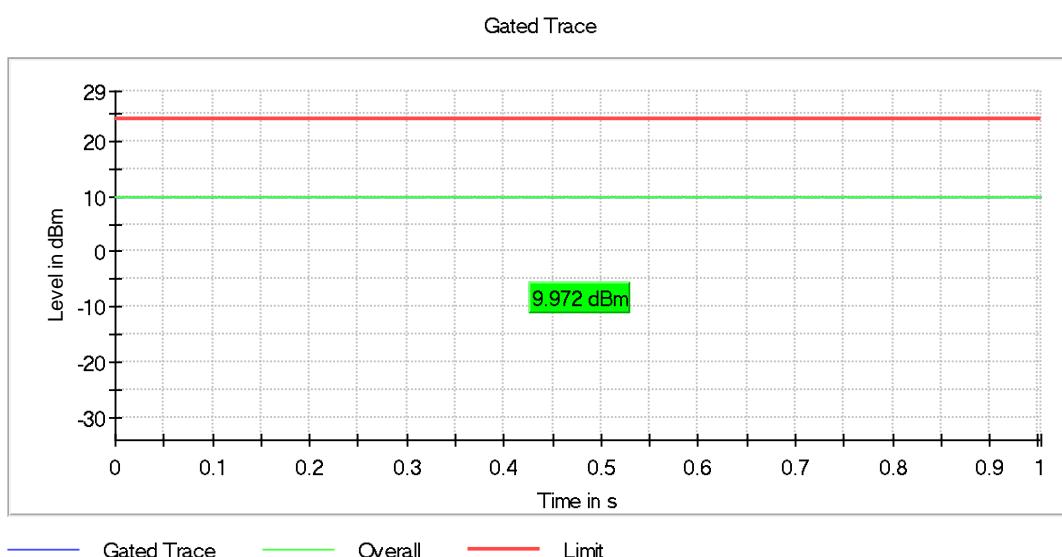
**C. Highest Ch. (5 320 MHz)**

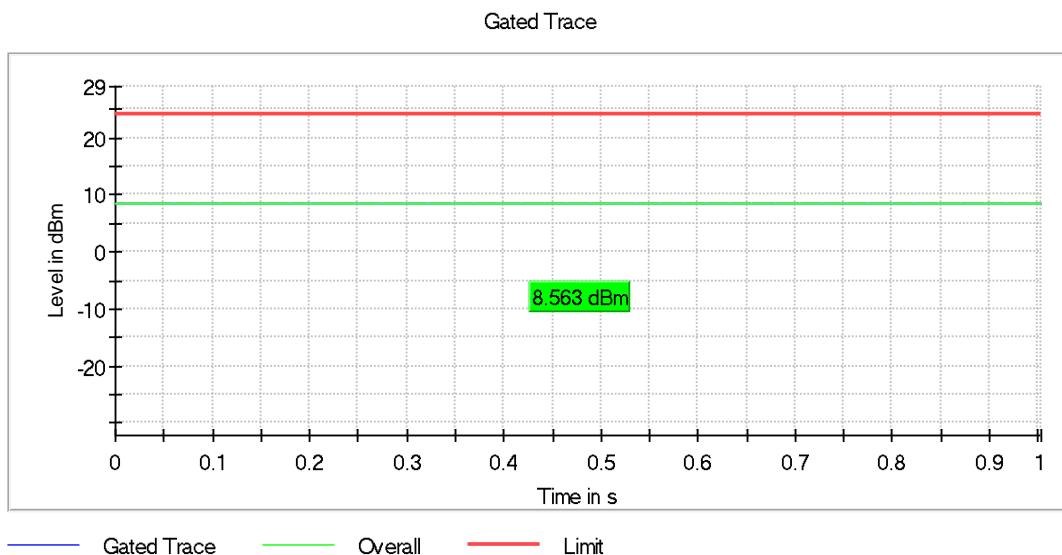
**Test mode : 802.11a (UNII-2C)**

**A. Lowest Ch. (5 500 MHz)**



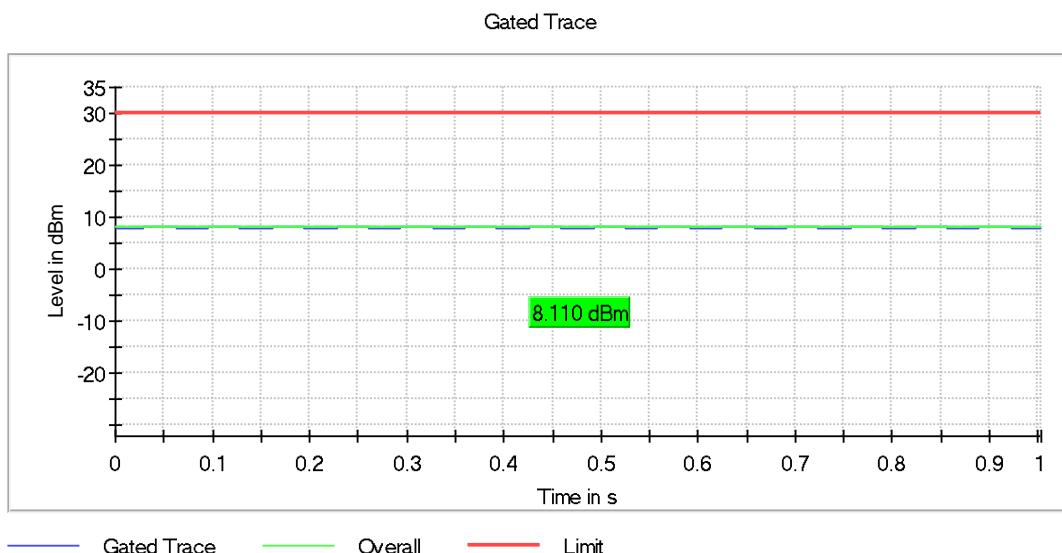
**B. Middle Ch. (5 580 MHz)**



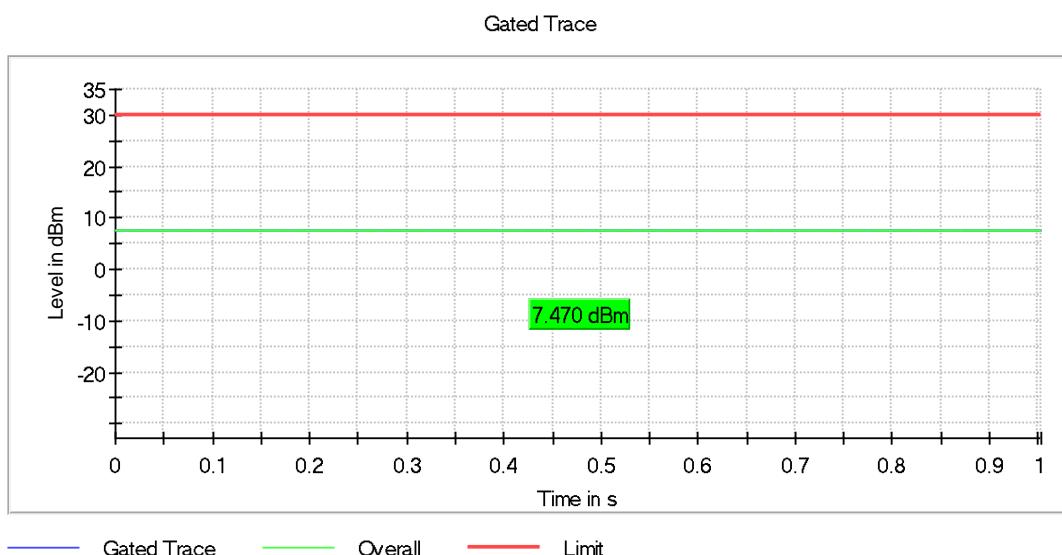
**C. Highest Ch. (5 700 MHz)**

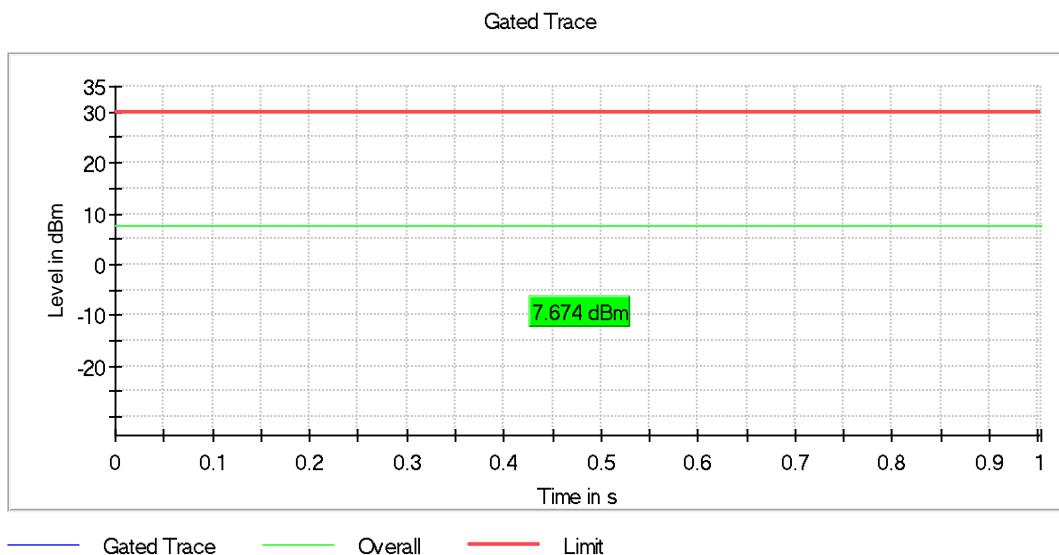
**Test mode : 802.11a (UNII-3)**

**A. Lowest Ch. (5 745 MHz)**



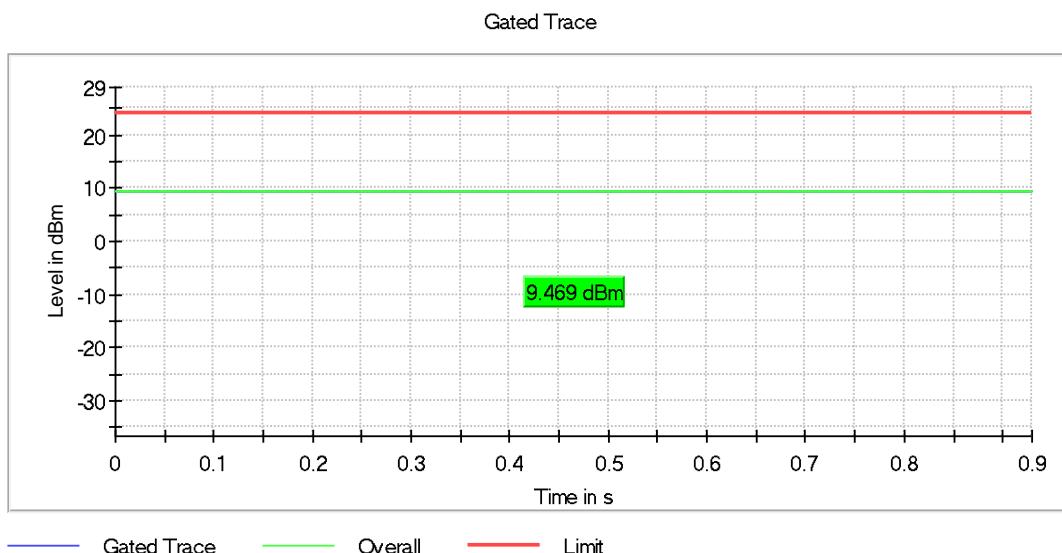
**B. Middle Ch. (5 785 MHz)**



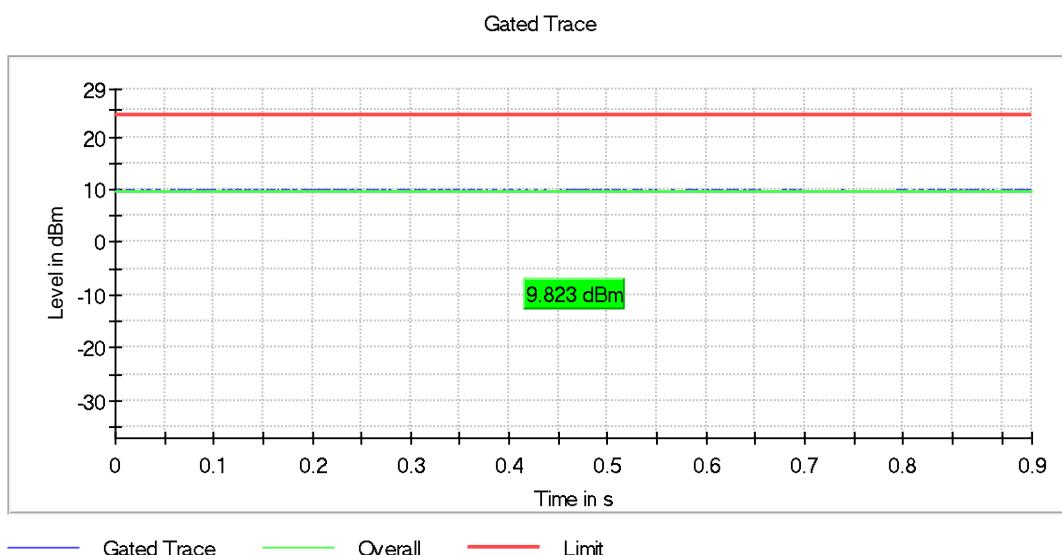
**C. Highest Ch. (5 805 MHz)**

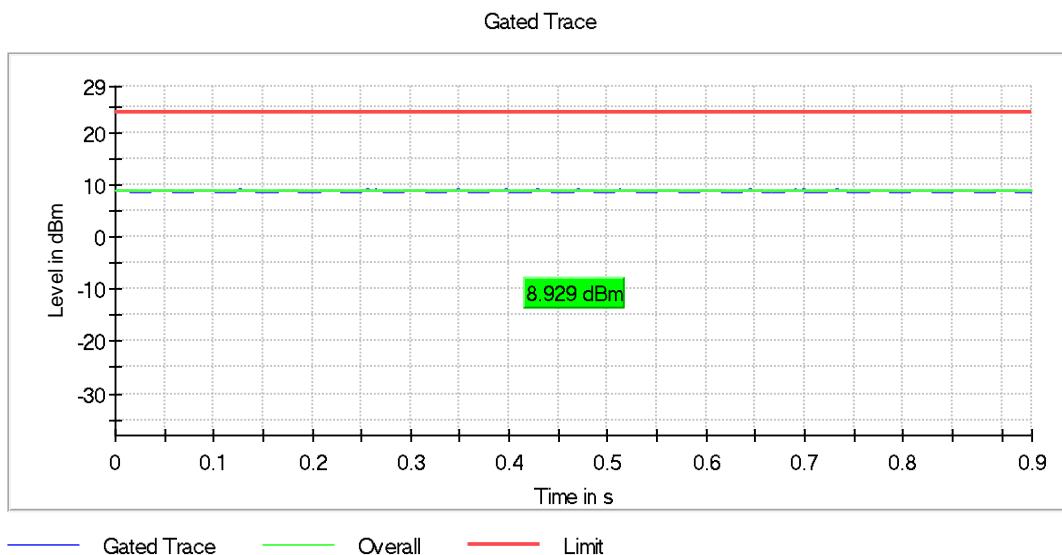
**Test mode : 802.11n\_HT20 (UNII-1)**

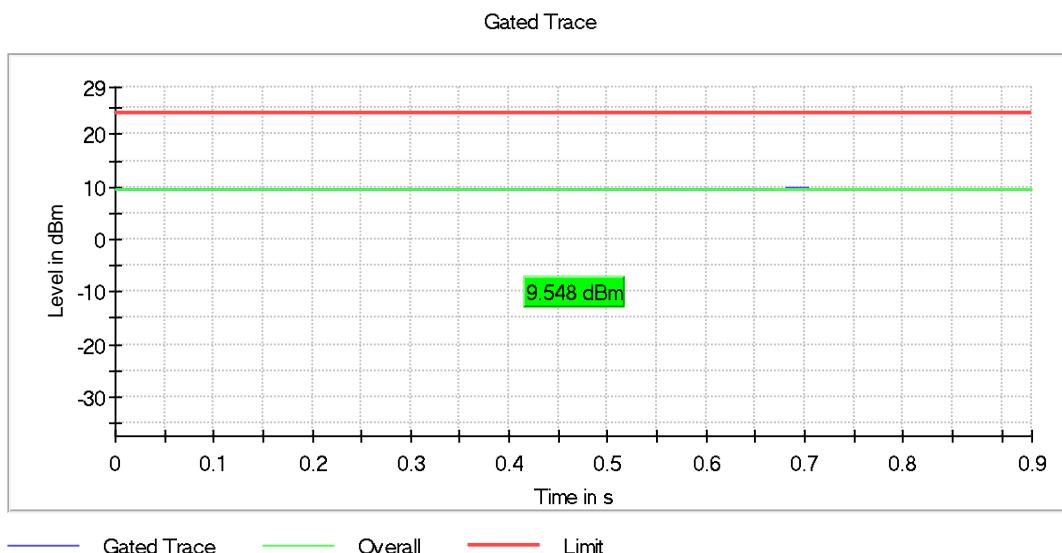
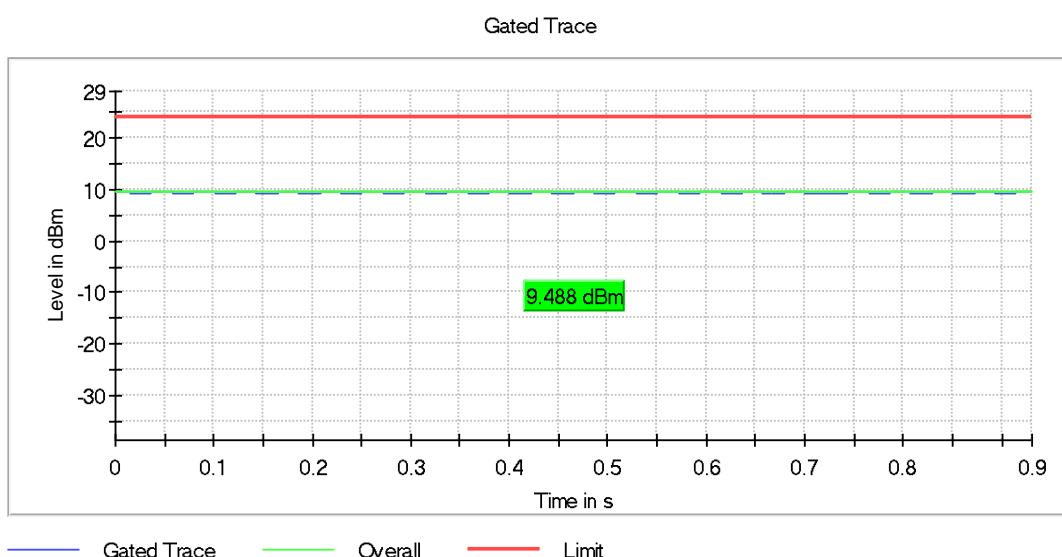
**A. Lowest Ch. (5 180 MHz)**

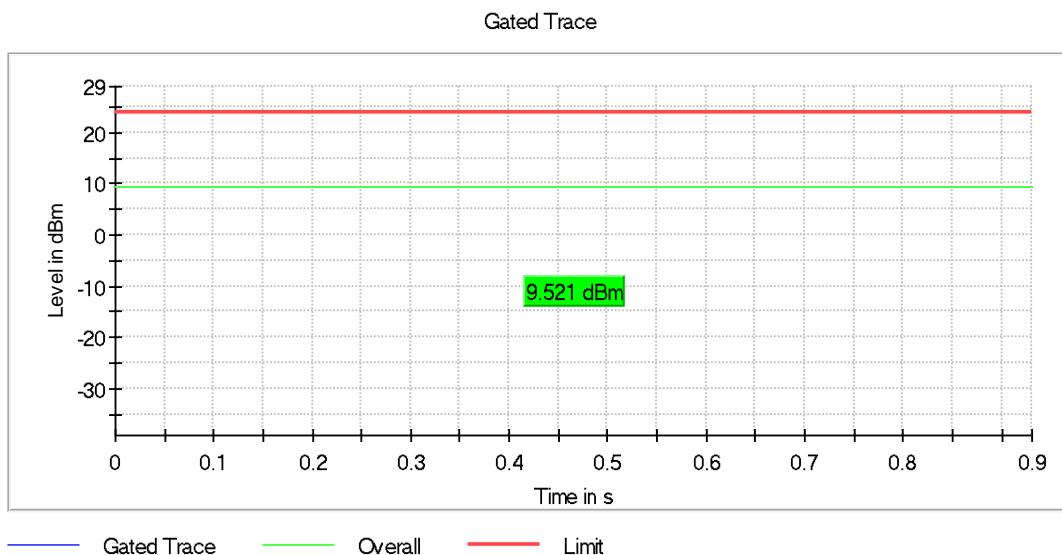


**B. Middle Ch. (5 200 MHz)**



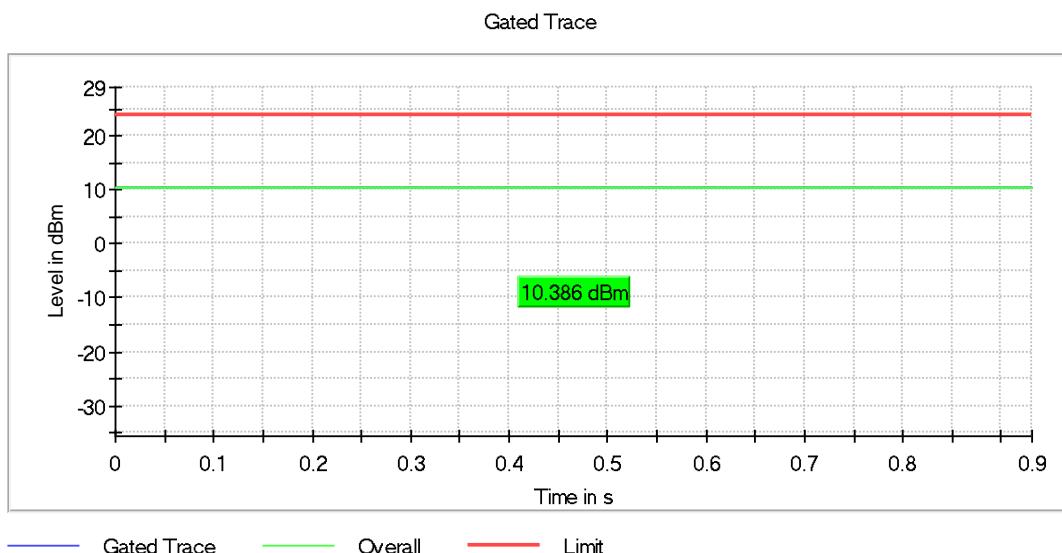
**C. Highest Ch. (5 240 MHz)**

**Test mode : 802.11n\_HT20 (UNII-2A)****A. Lowest Ch. (5 260 MHz)****B. Middle Ch. (5 280 MHz)**

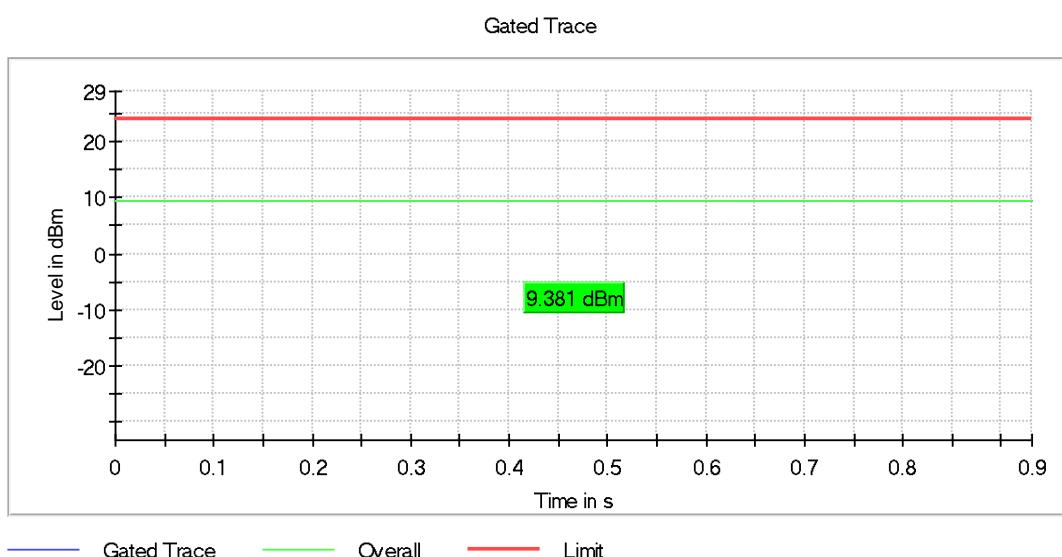
**C. Highest Ch. (5 320 MHz)**

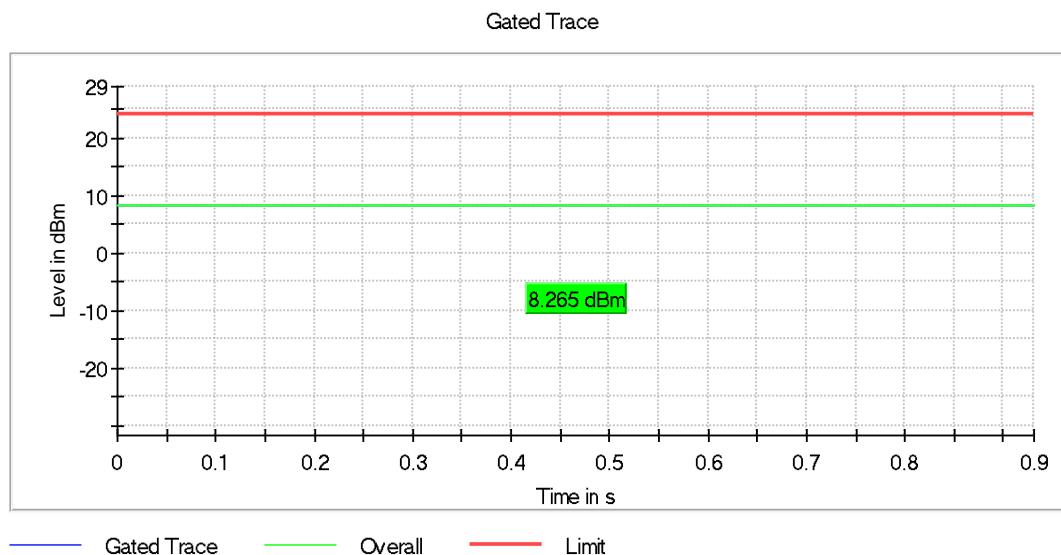
**Test mode : 802.11n\_HT20 (UNII-2C)**

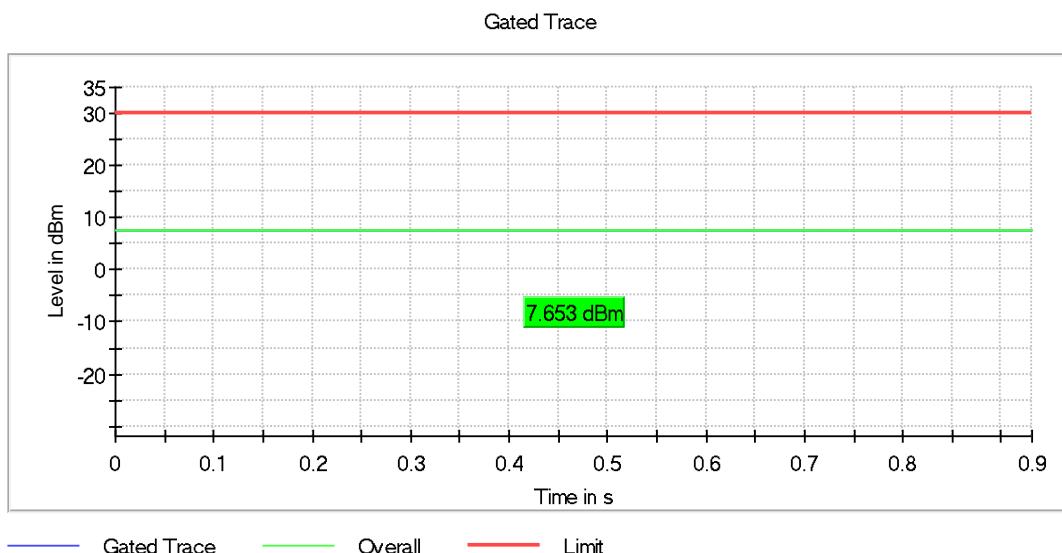
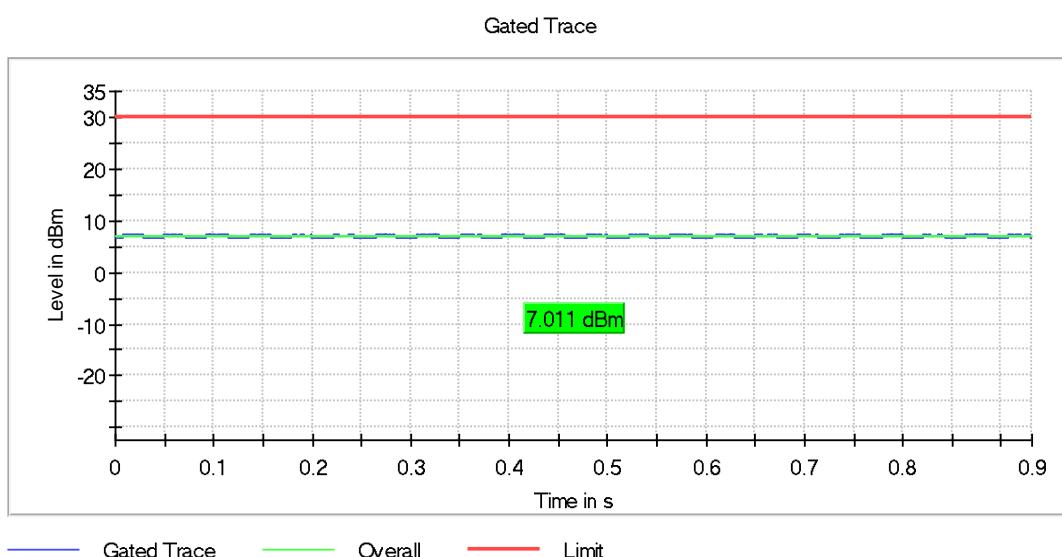
**A. Lowest Ch. (5 500 MHz)**

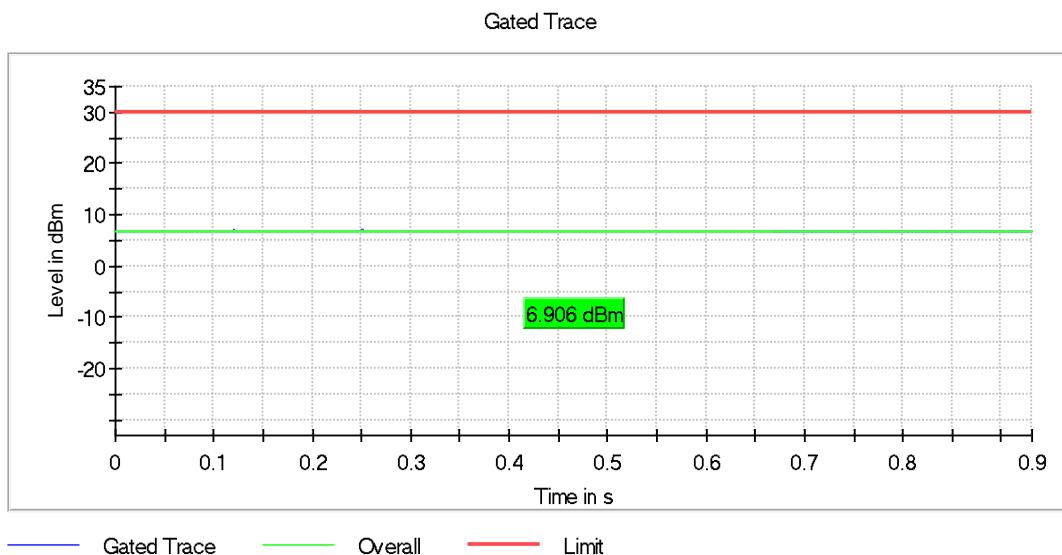


**B. Middle Ch. (5 580 MHz)**



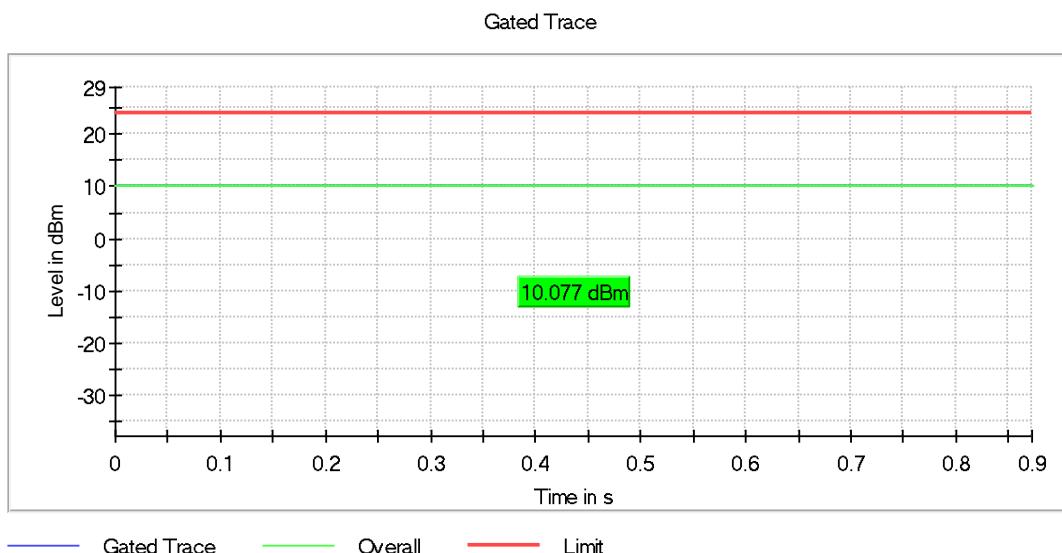
**C. Highest Ch. (5 700 MHz)**

**Test mode : 802.11n\_HT20 (UNII-3)****A. Lowest Ch. (5 745 MHz)****B. Middle Ch. (5 785 MHz)**

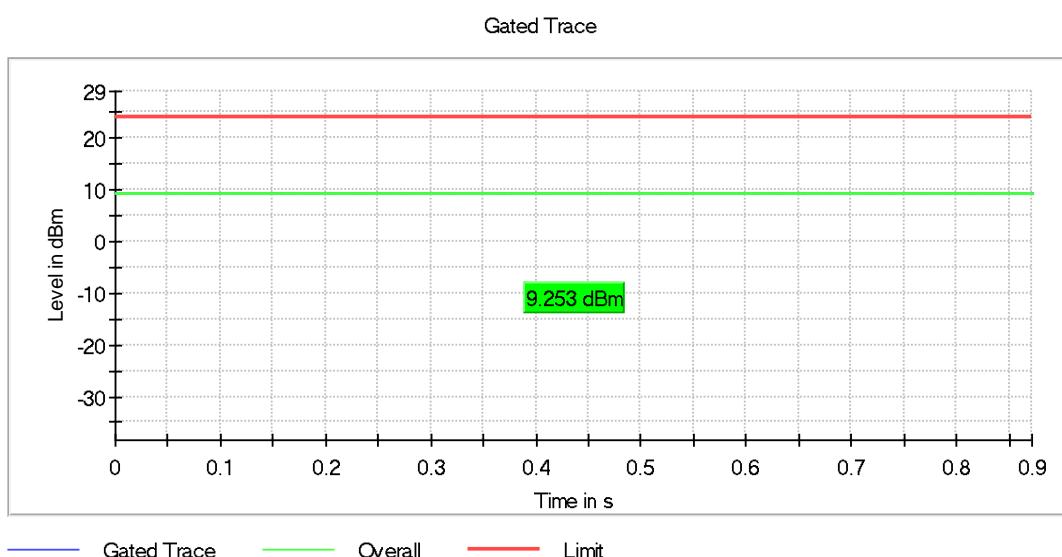
**C. Highest Ch. (5 805 MHz)**

**Test mode : 802.11n\_HT40 (UNII-1)**

**A. Lowest Ch. (5 190 MHz)**

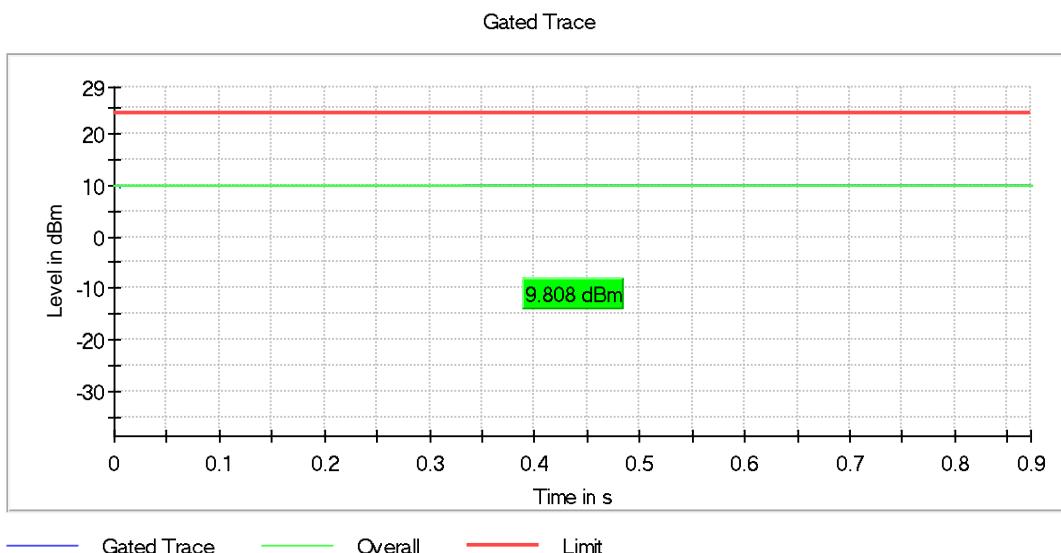


**B. Highest Ch. (5 230 MHz)**

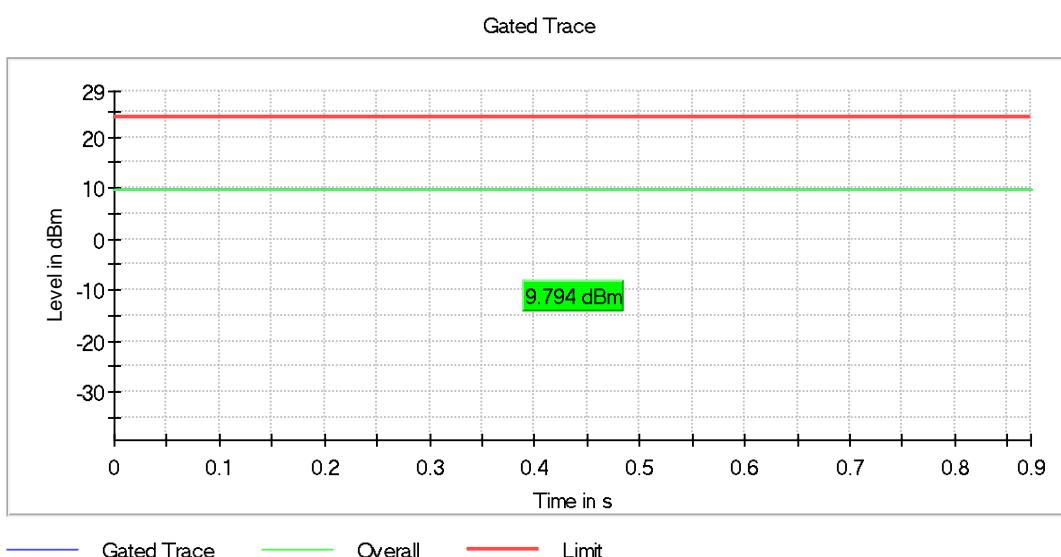


**Test mode : 802.11n\_HT40 (UNII-2A)**

**A. Lowest Ch. (5 270 MHz)**

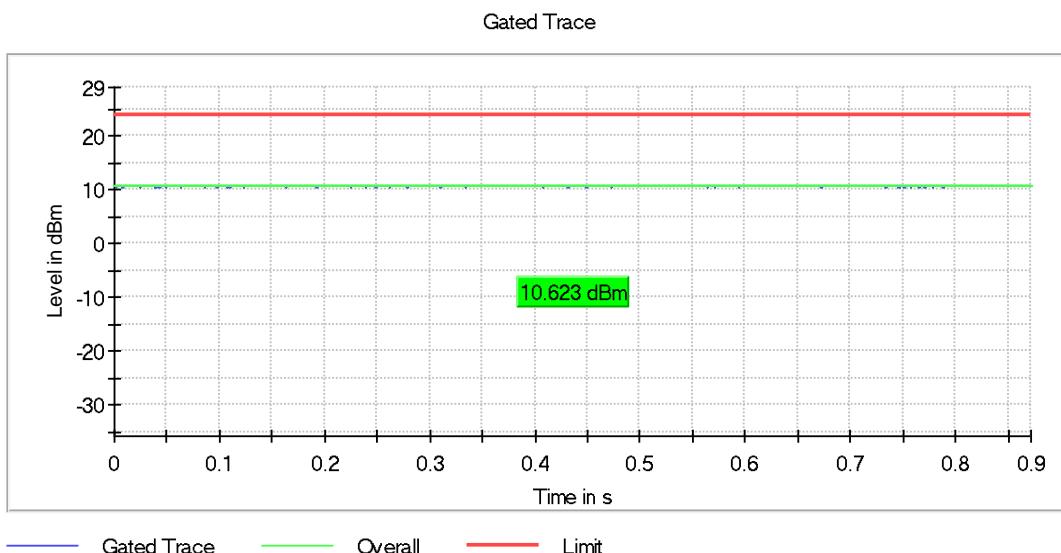


**B. Highest Ch. (5 310 MHz)**

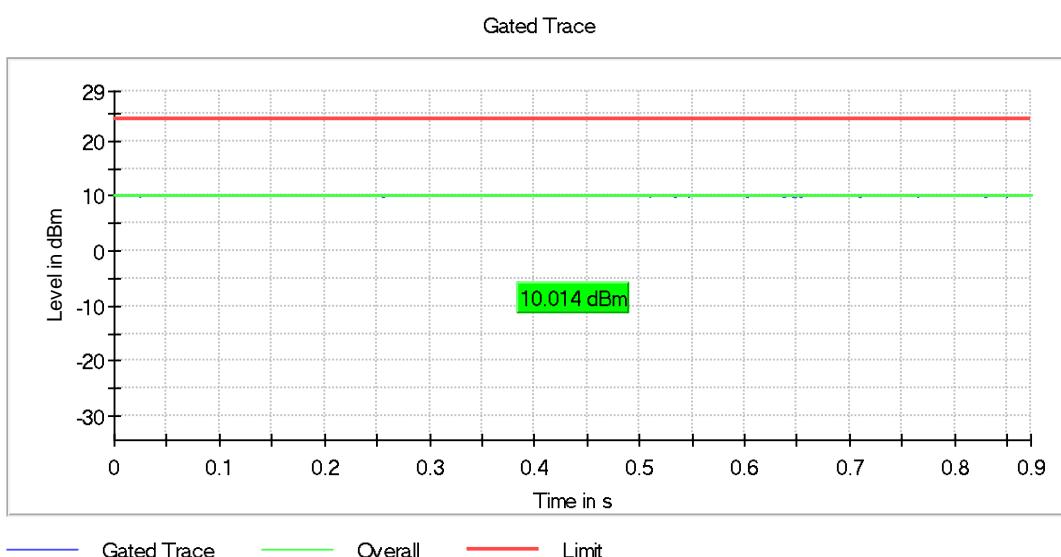


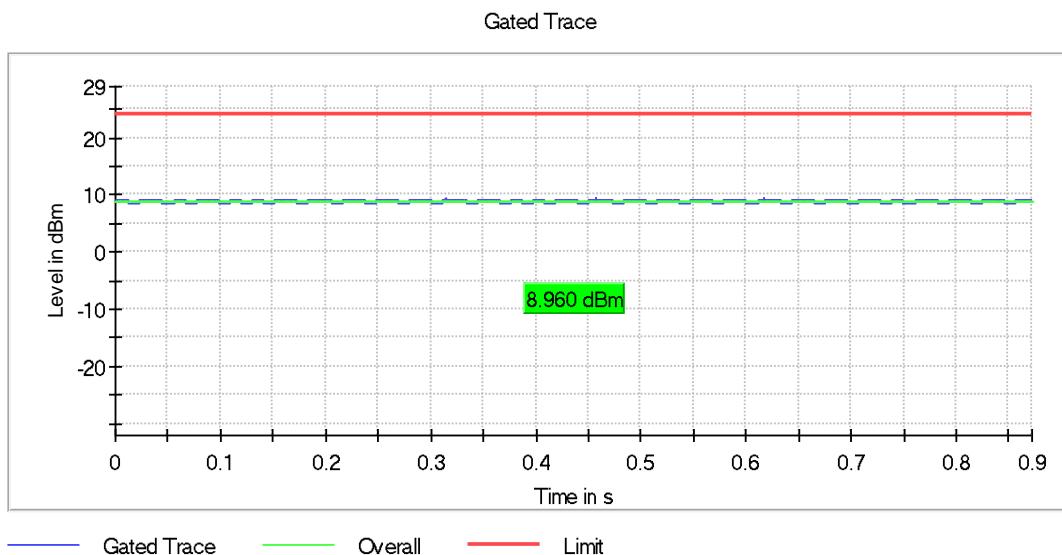
**Test mode : 802.11n\_HT40 (UNII-2C)**

**A. Lowest Ch. (5 510 MHz)**



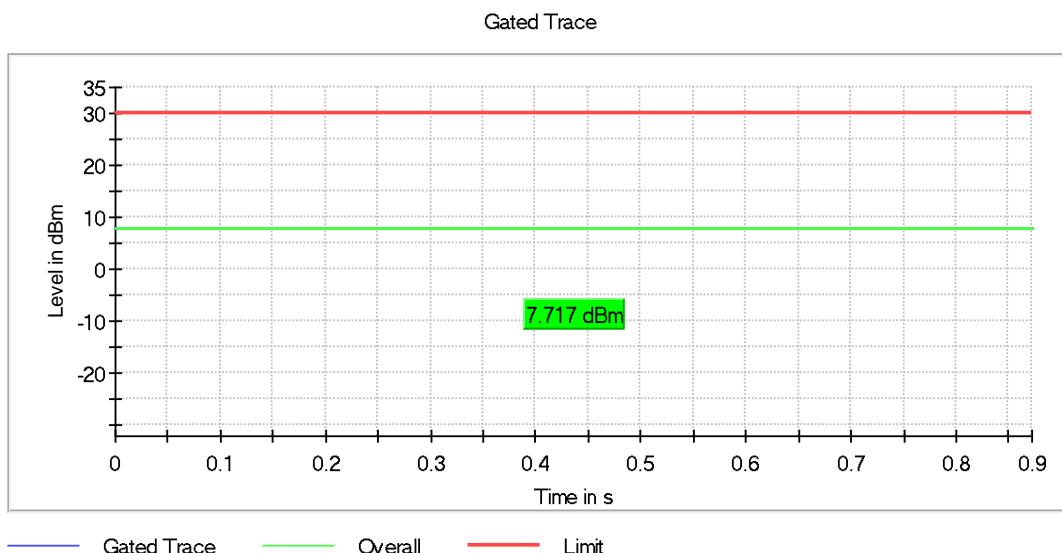
**B. Middle Ch. (5 550 MHz)**



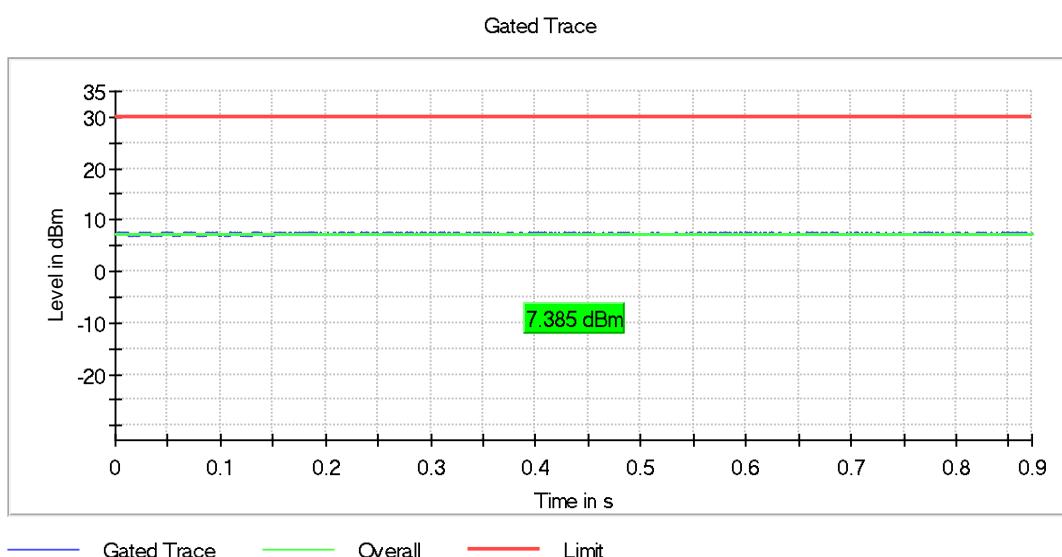
**C. Highest Ch. (5 670 MHz)**

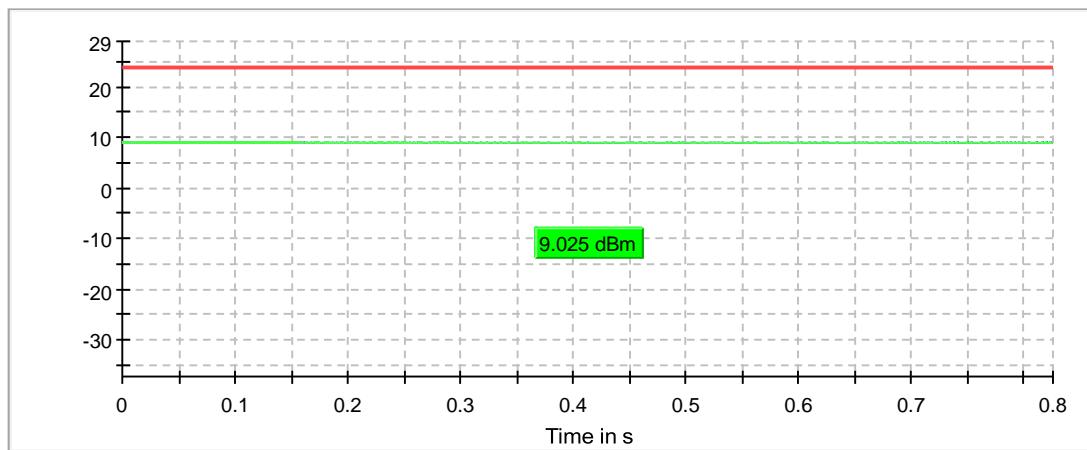
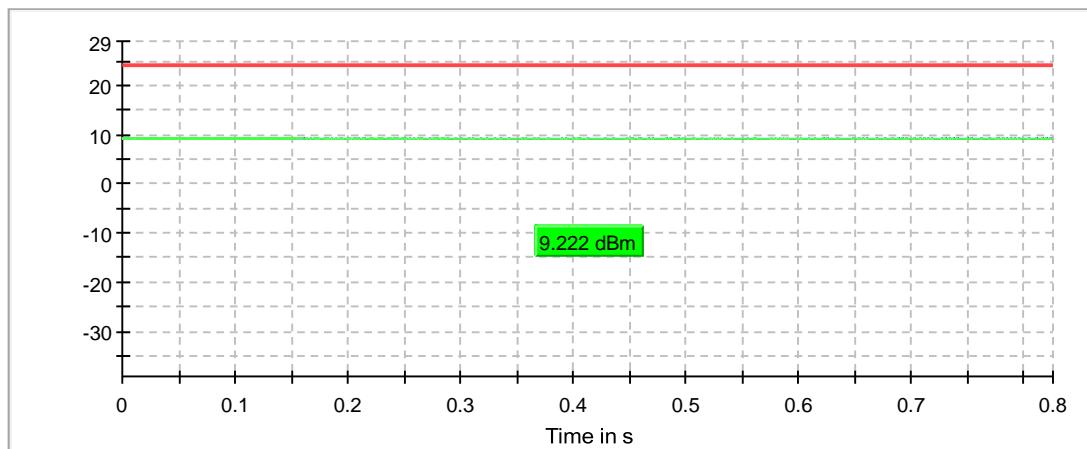
Test mode : 802.11n\_HT40 (UNII-3)

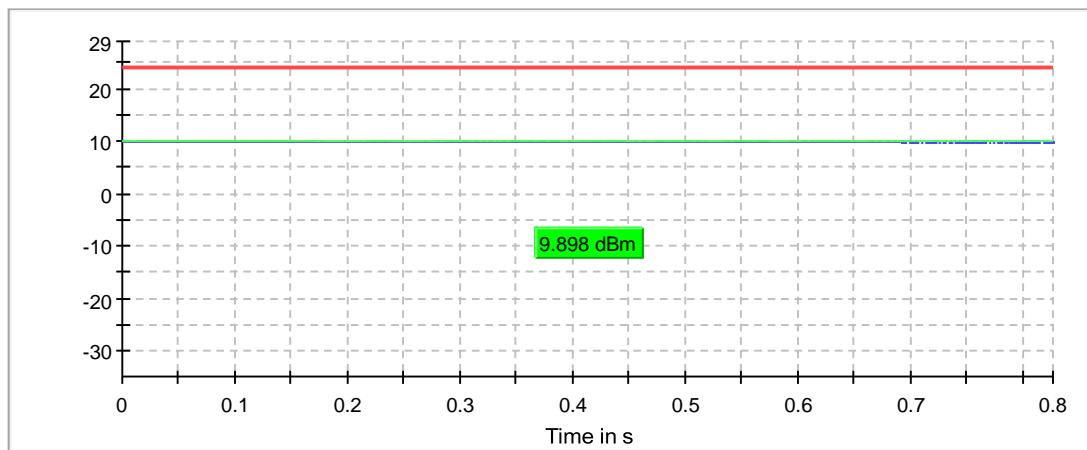
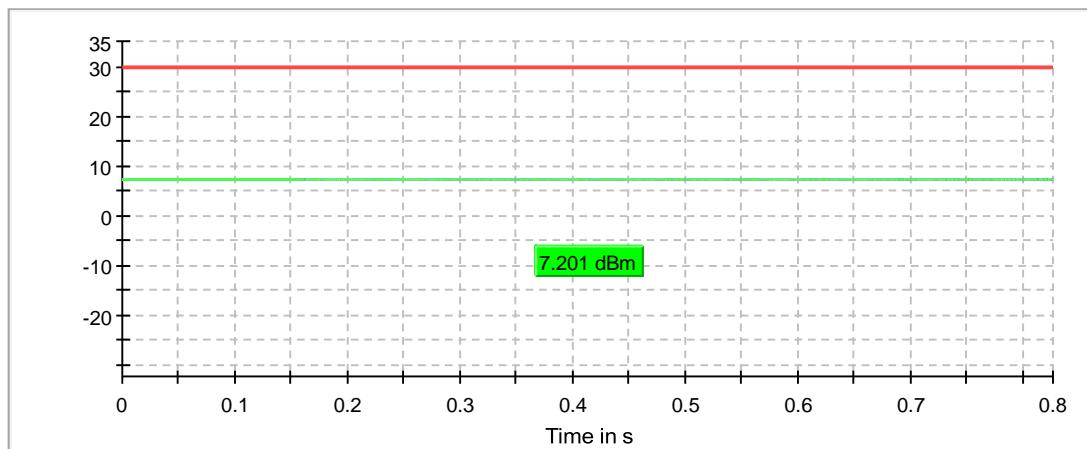
**A. Lowest Ch. (5 755 MHz)**



**B. Highest Ch. (5 795 MHz)**

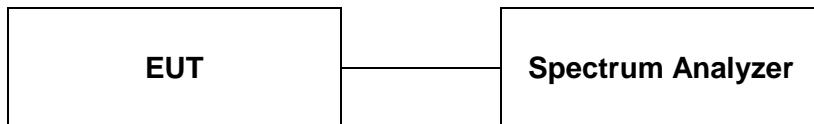


**Test mode : 802.11ac\_VHT80 (UNII-1)****A. Lowest Ch. (5 210 MHz)****Test mode : 802.11ac\_VHT80 (UNII-2A)****A. Lowest Ch. (5 290 MHz)**

**Test mode : 802.11ac\_VHT80 (UNII-2C)****A. Lowest Ch. (5 530 MHz)****Test mode : 802.11ac\_VHT80 (UNII-3)****A. Lowest Ch. (5 775 MHz)**

## 9. Maximum power spectral density

### 9.1. Test setup



### 9.2. Limit

Frequency Band	Limit
5150-5250MHz	The power spectral density less than 11dBm/1MHz
5250-5350MHz	The power spectral density less than 11dBm/1MHz
5470-5725MHz	The power spectral density less than 11dBm/1MHz
5725-5850MHz	The power spectral density less than 30dBm/500kHz

### 9.3. Test procedure

The rules requires “maximum power spectral density” measurements where the intent is to measure the maximum value of the time average of the power spectral density measured during a period of continuous transmission.

1. Create an average power spectrum for the EUT operating mode being tested by following the instructions in II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power....” (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
2. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
3. Make the following adjustments to the peak value of the spectrum, if applicable:
  - a) If Method SA-2 or SA-2 Alternative was used, add  $10 \log (1/x)$ , where  $x$  is the duty cycle, to the peak of the spectrum.
  - b) If Method SA-3 Alternative was used and the linear mode was used in II.E.2.g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
4. The result is the Maximum PSD over 1 MHz reference bandwidth.
5. For devices operating in the bands 5.15–5.25 GHz, 5.25–5.35 GHz, and 5.47–5.725 GHz, the preceding procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in Section 15.407(a)(5). For devices operating in the band 5.725–5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:
  - a) Set RBW  $\geq 1/T$ , where  $T$  is defined in II.B.1.a).
  - b) Set VBW  $\geq 3$  RBW.
  - c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add  $10 \log (500 \text{ kHz}/\text{RBW})$  to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
  - d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add  $10 \log (1\text{MHz}/\text{RBW})$  to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
  - e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) and II.F.5.d), since RBW=100 kHz is available on nearly all spectrum analyzers.

#### 9.4. Test results

**Test mode : 802.11a (UNII-1)**

Frequency(MHz)	Power spectral density(dBm/MHz)	Limit (dBm/MHz)
5 180	-2.98	11
5 200	-2.96	
5 240	-4.10	

**Test mode : 802.11a (UNII-2A)**

Frequency(MHz)	Power spectral density(dBm/MHz)	Limit (dBm/MHz)
5 260	-3.19	11
5 280	-3.68	
5 320	-3.44	

**Test mode : 802.11a (UNII-2C)**

Frequency(MHz)	Power spectral density(dBm/MHz)	Limit (dBm/MHz)
5 500	-2.93	11
5 580	-4.05	
5 700	-5.34	

**Test mode : 802.11a (UNII-3)**

Frequency(MHz)	Power spectral density(dBm/500 kHz)	Limit (dBm/500 kHz)
5 745	-8.99	30
5 785	-9.56	
5 805	-9.18	

**Test mode : 802.11n\_HT20 (UNII-1)**

Frequency(MHz)	Power spectral density(dBm/MHz)	Limit (dBm/MHz)
5 180	-4.81	11
5 200	-4.56	
5 240	-5.30	

**Test mode : 802.11n\_HT20 (UNII-2A)**

Frequency(MHz)	Power spectral density(dBm/MHz)	Limit (dBm/MHz)
5 260	-4.77	11
5 280	-4.64	
5 320	-4.64	

**Test mode : 802.11n\_HT20 (UNII-2C)**

Frequency(MHz)	Power spectral density(dBm/MHz)	Limit (dBm/MHz)
5 500	-3.70	11
5 580	-4.97	
5 700	-6.20	

**Test mode : 802.11n\_HT20 (UNII-3)**

Frequency(MHz)	Power spectral density(dBm/500 kHz)	Limit (dBm/500 kHz)
5 745	-10.05	30
5 785	-10.32	
5 805	-10.22	

**Test mode : 802.11n\_HT40 (UNII-1)**

Frequency(MHz)	Power spectral density(dBm/MHz)	Limit (dBm/MHz)
5 190	-6.82	11
5 230	-7.74	

**Test mode : 802.11n\_HT40 (UNII-2A)**

Frequency(MHz)	Power spectral density(dBm/MHz)	Limit (dBm/MHz)
5 270	-7.33	11
5 310	-7.06	

**Test mode : 802.11n\_HT40 (UNII-2C)**

Frequency(MHz)	Power spectral density(dBm/MHz)	Limit (dBm/MHz)
5 510	-6.39	11
5 550	-7.04	
5 670	-7.88	

**Test mode : 802.11n\_HT40 (UNII-3)**

Frequency(MHz)	Power spectral density(dBm/500 kHz)	Limit (dBm/500 kHz)
5 755	-12.97	30
5 795	-12.92	

**Test mode : 802.11ac\_VHT80 (UNII-1)**

Frequency(MHz)	Power spectral density(dBm/MHz)	Limit (dBm/MHz)
5 210	-10.81	11

**Test mode : 802.11ac\_VHT80 (UNII-2A)**

Frequency(MHz)	Power spectral density(dBm/MHz)	Limit (dBm/MHz)
5 290	-10.58	11

**Test mode : 802.11ac\_VHT80 (UNII-2C)**

Frequency(MHz)	Power spectral density(dBm/MHz)	Limit (dBm/MHz)
5 530	-10.20	11

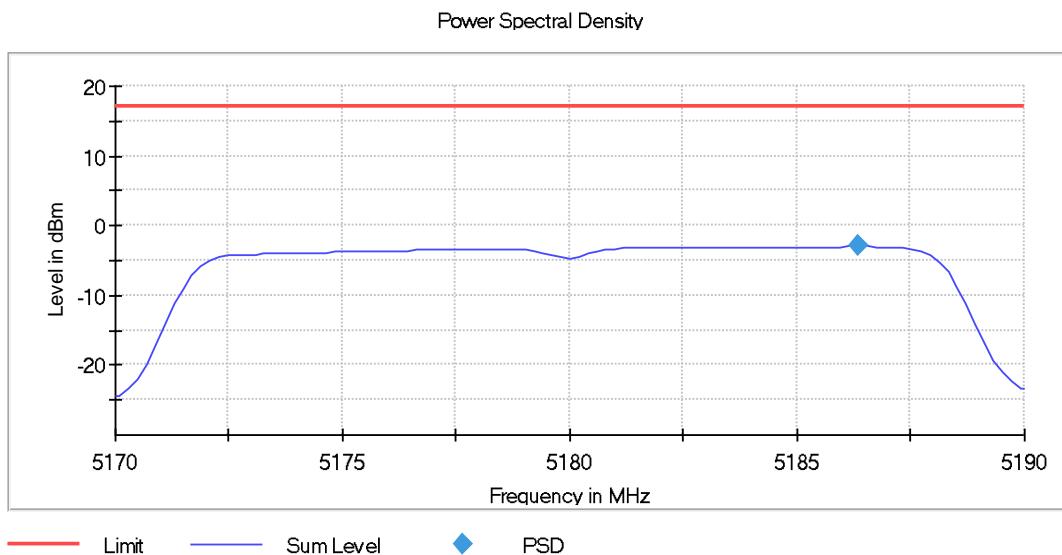
**Test mode : 802.11ac\_VHT80 (UNII-3)**

Frequency(MHz)	Power spectral density(dBm/500 kHz)	Limit (dBm/500 kHz)
5 775	-15.99	30

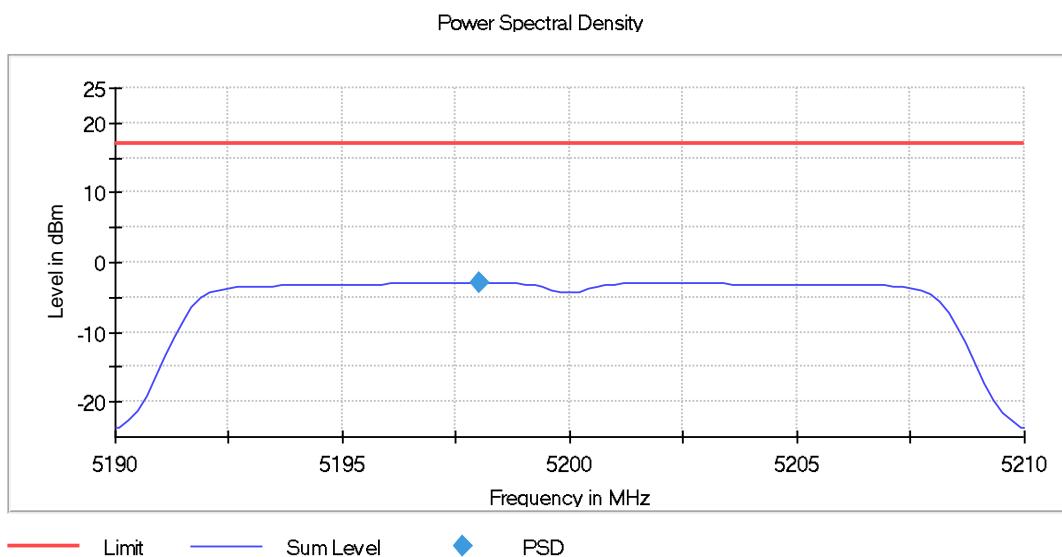
### 8.4.1 Test plot

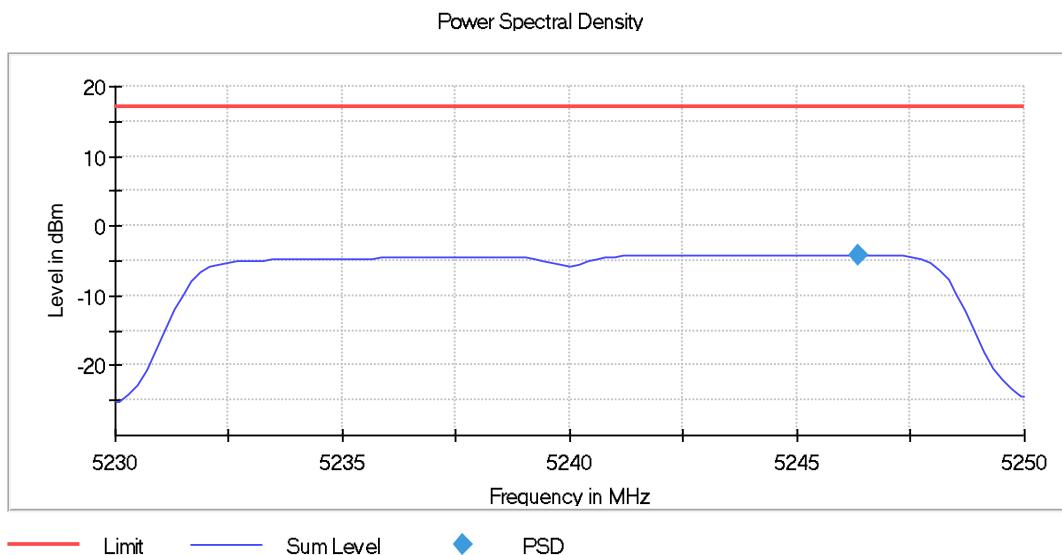
Test mode : 802.11a (UNII-1)

#### A. Lowest Ch. (5 180 MHz)



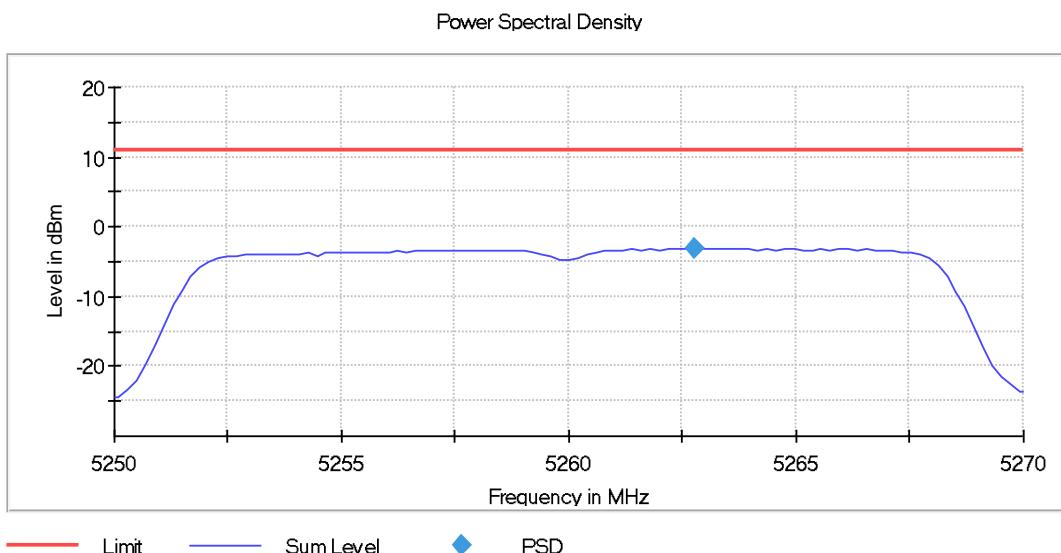
#### B. Middle Ch. (5 200 MHz)



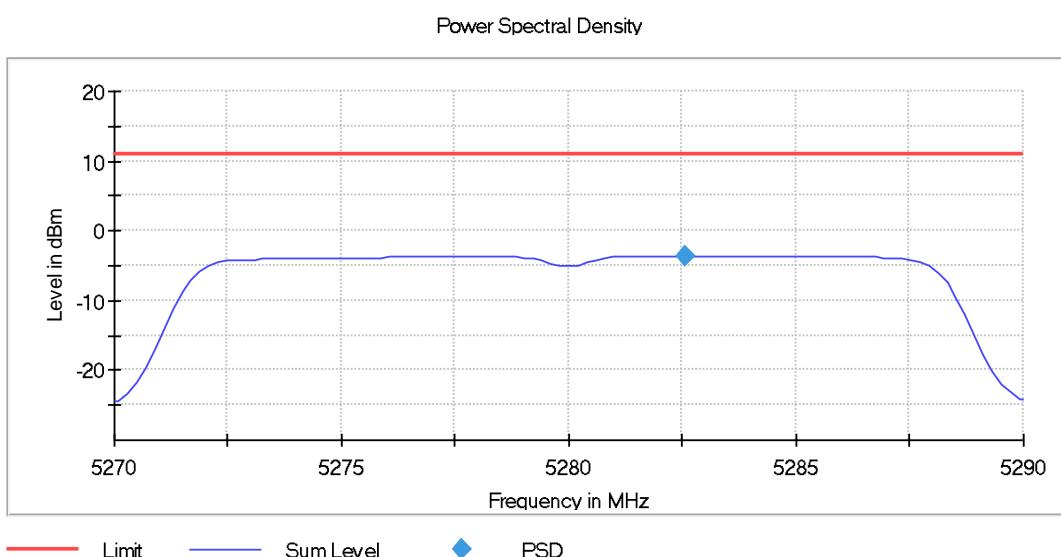
**C. Highest Ch. (5 240 MHz)**

**Test mode : 802.11a (UNII-2A)**

**A. Lowest Ch. (5 260 MHz)**



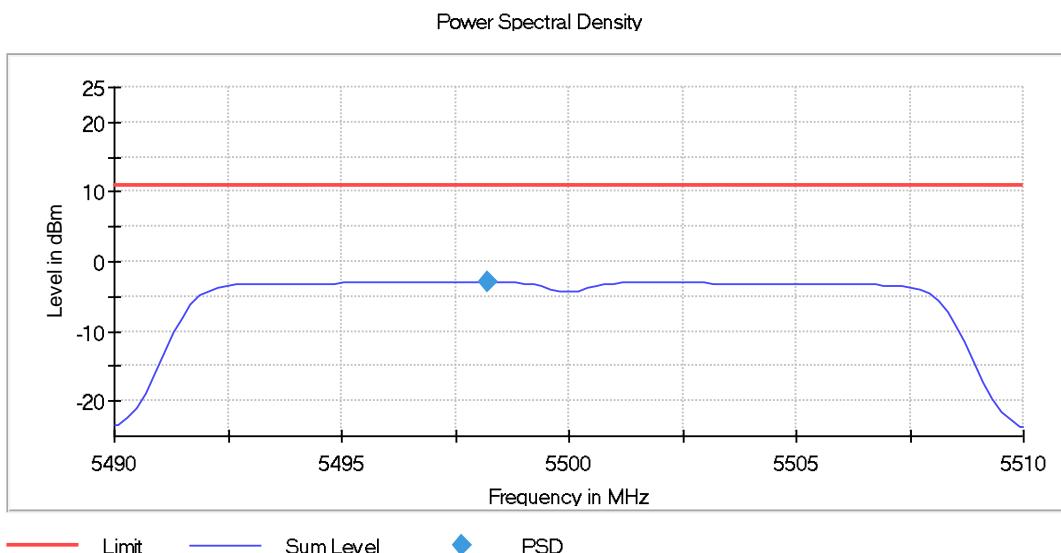
**B. Middle Ch. (5 280 MHz)**



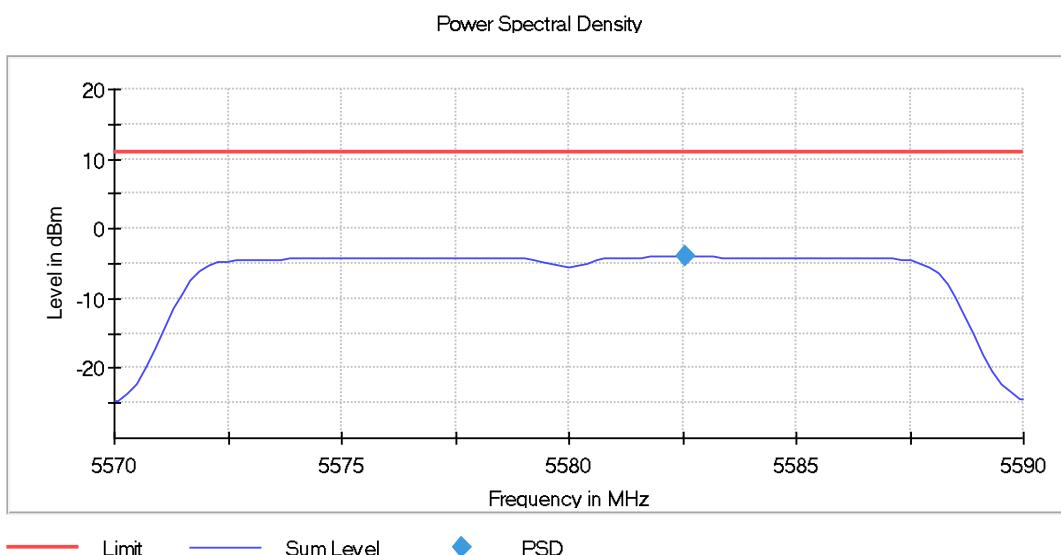
**C. Highest Ch. (5 320 MHz)**

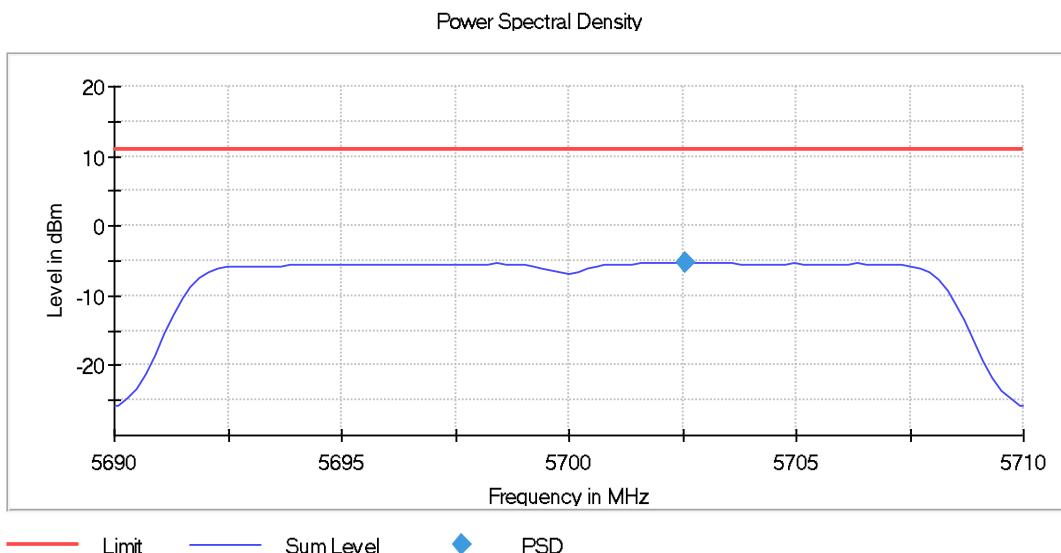
**Test mode : 802.11a (UNII-2C)**

**A. Lowest Ch. (5 500 MHz)**



**B. Middle Ch. (5 580 MHz)**



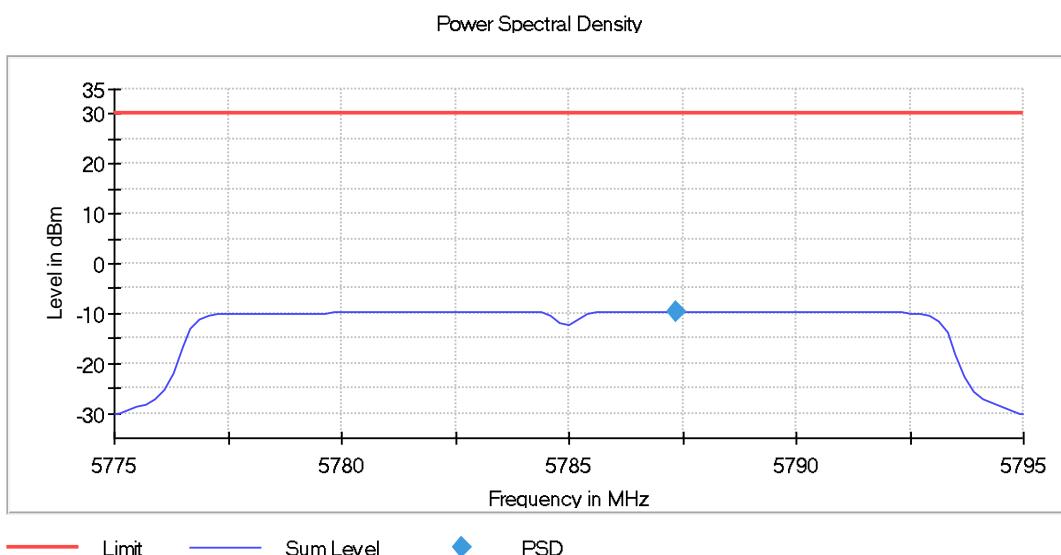
**C. Highest Ch. (5 700 MHz)**

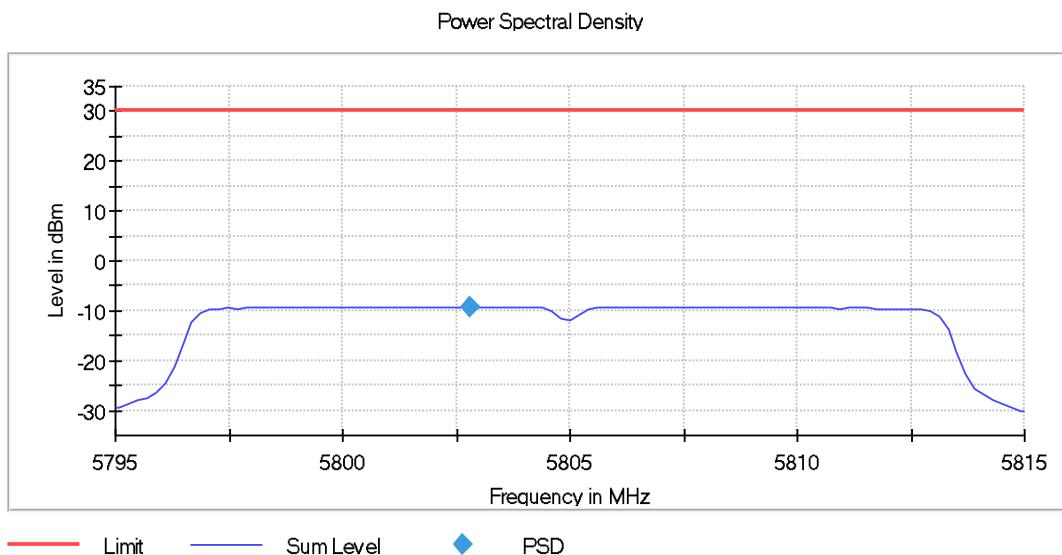
**Test mode : 802.11a (UNII-3)**

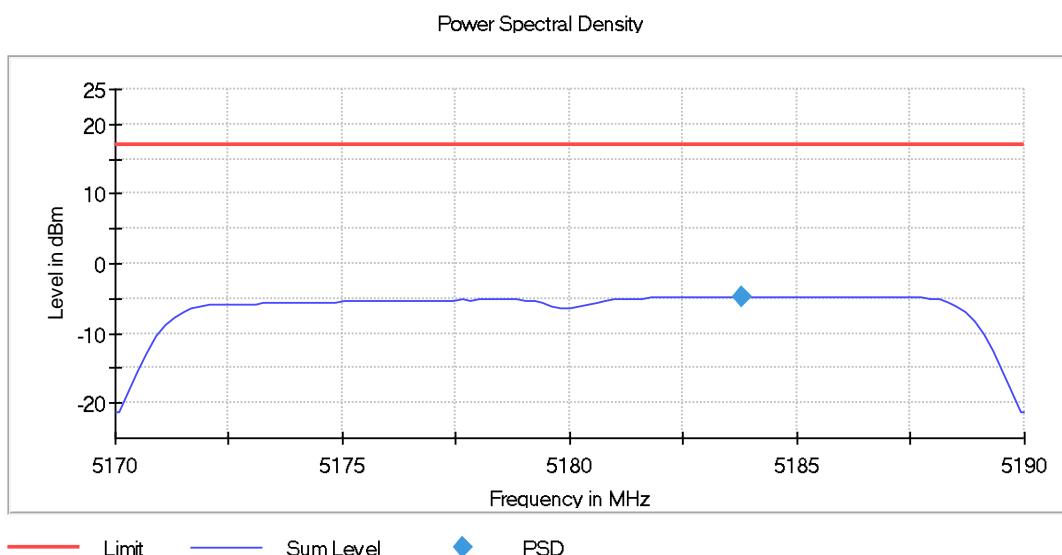
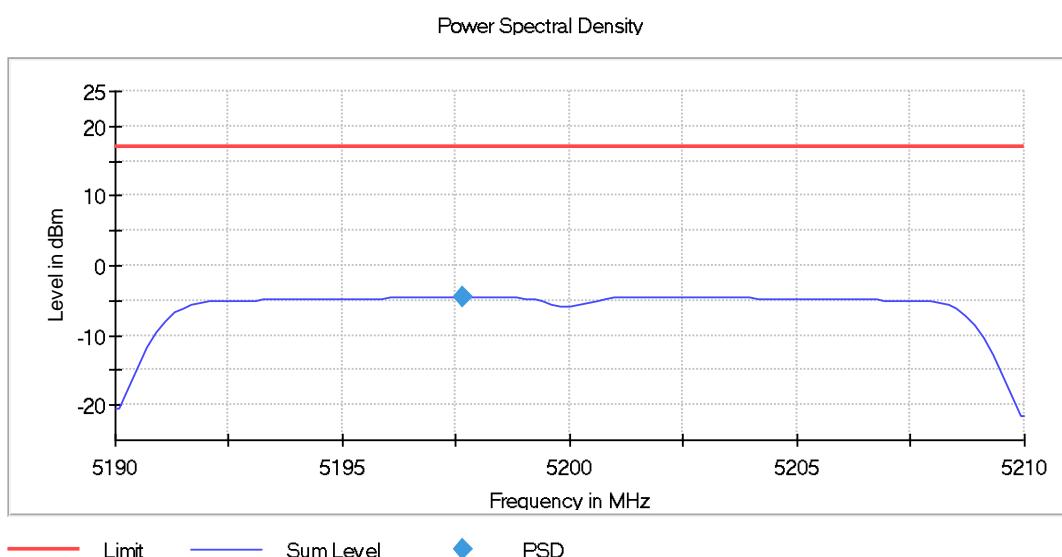
**A. Lowest Ch. (5 745 MHz)**

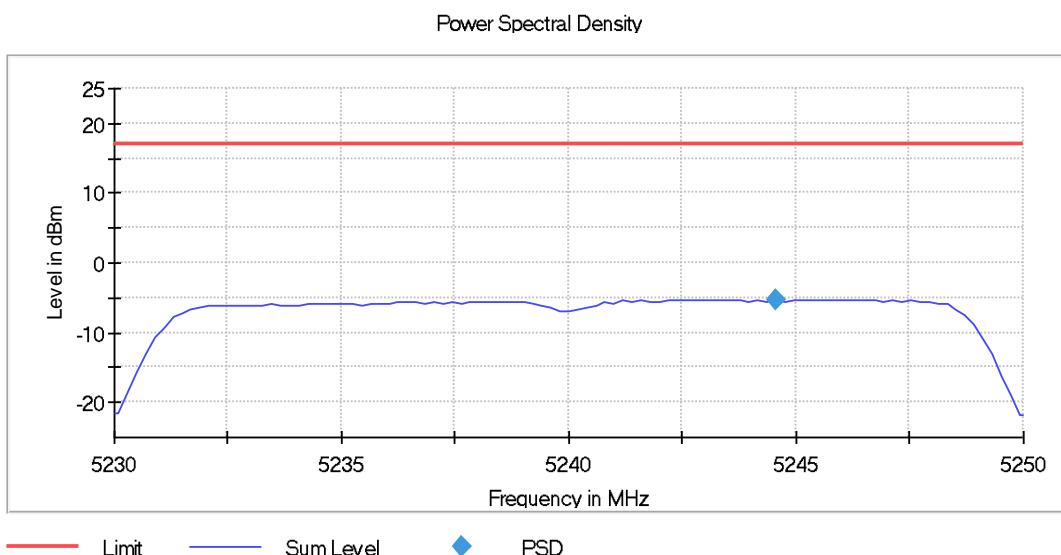


**B. Middle Ch. (5 785 MHz)**



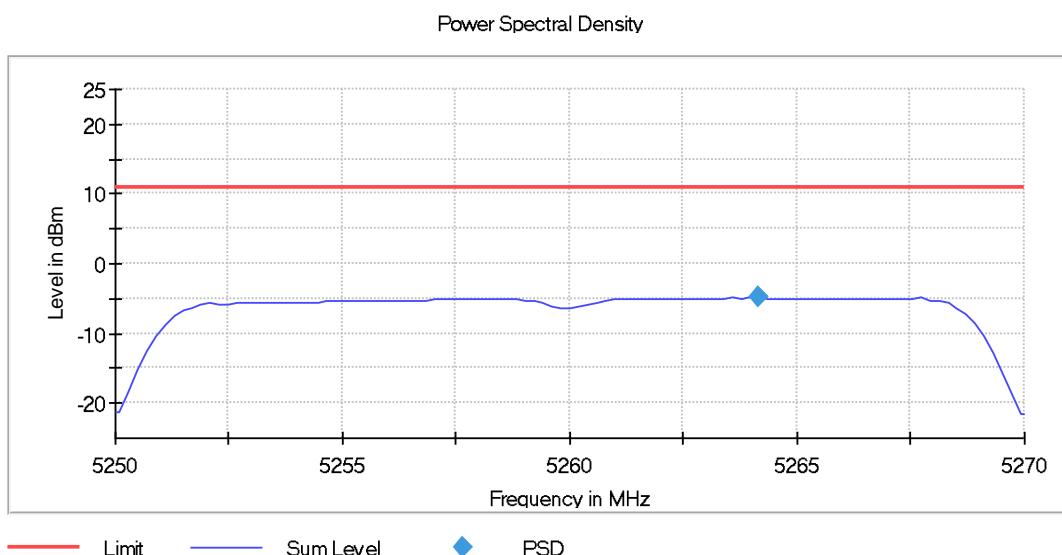
**C. Highest Ch. (5 805 MHz)**

**Test mode : 802.11n\_HT20 (UNII-1)****A. Lowest Ch. (5 180 MHz)****B. Middle Ch. (5 200 MHz)**

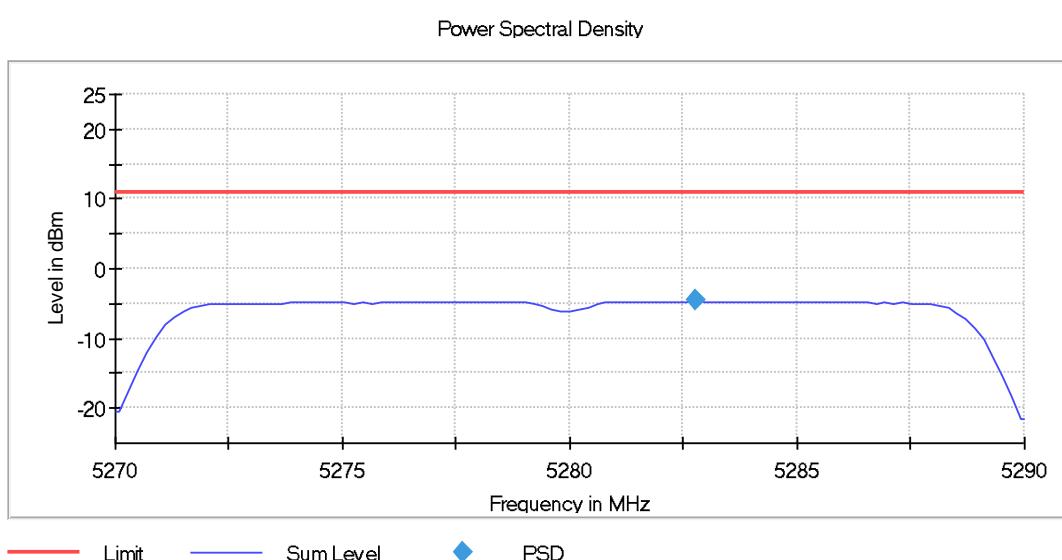
**C. Highest Ch. (5 240 MHz)**

**Test mode : 802.11n\_HT20 (UNII-2A)**

**A. Lowest Ch. (5 260 MHz)**



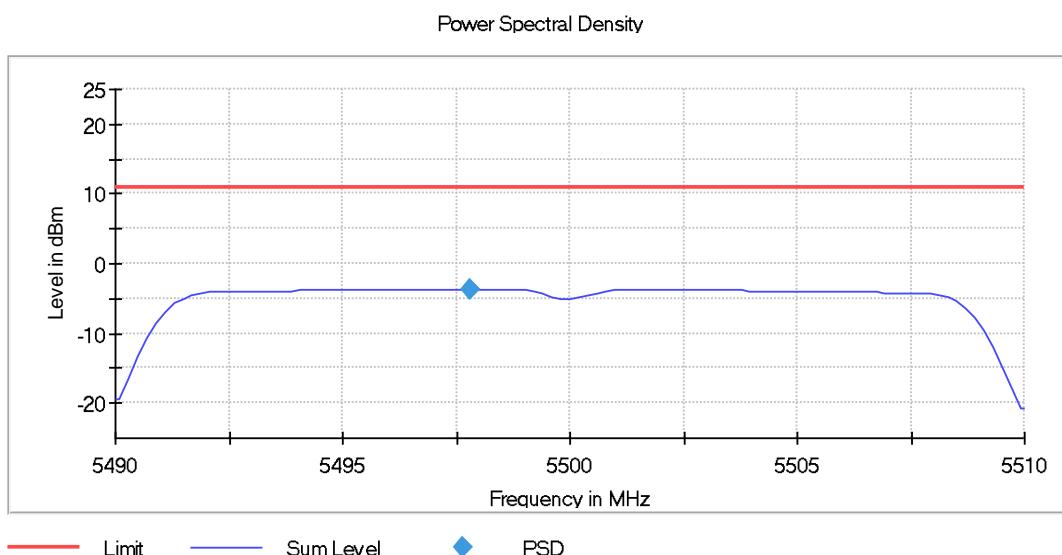
**B. Middle Ch. (5 280 MHz)**



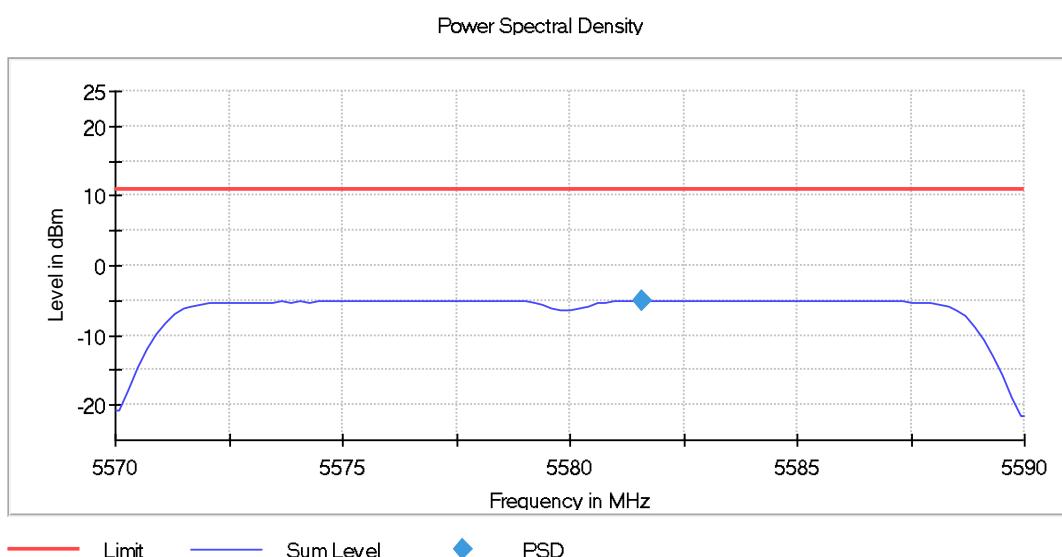
**C. Highest Ch. (5 320 MHz)**

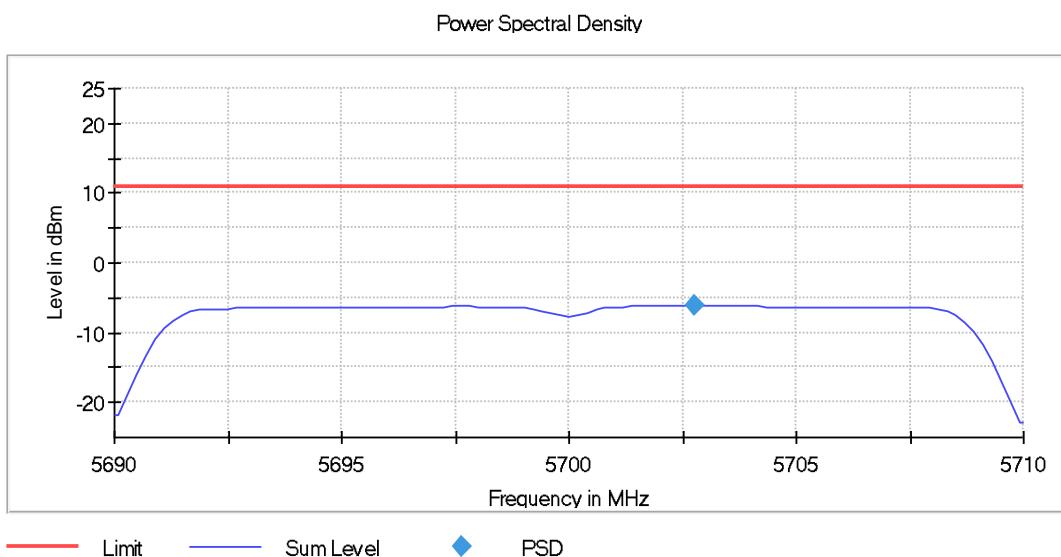
Test mode : 802.11n\_HT20 (UNII-2C)

**A. Lowest Ch. (5 500 MHz)**



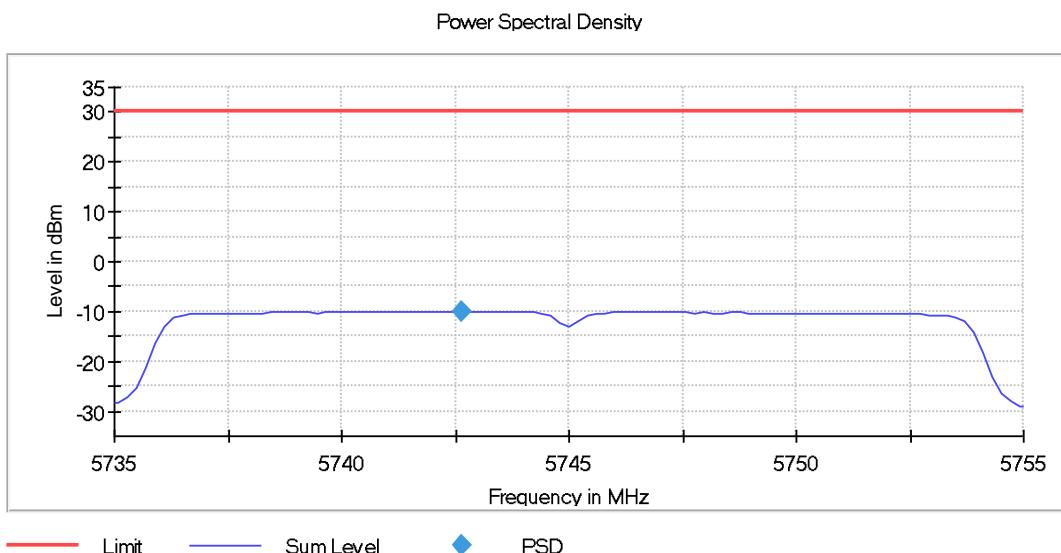
**B. Middle Ch. (5 580 MHz)**



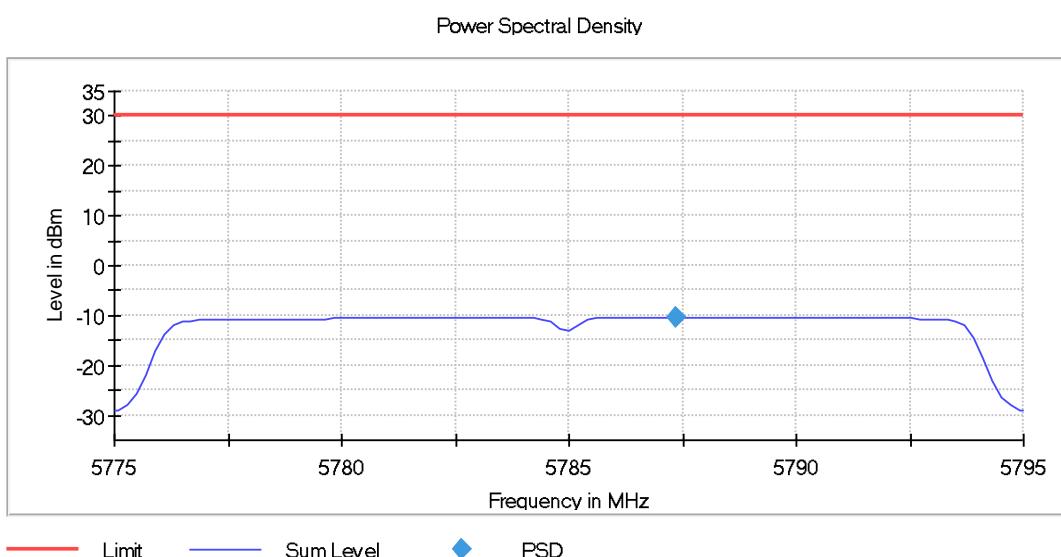
**C. Highest Ch. (5 700 MHz)**

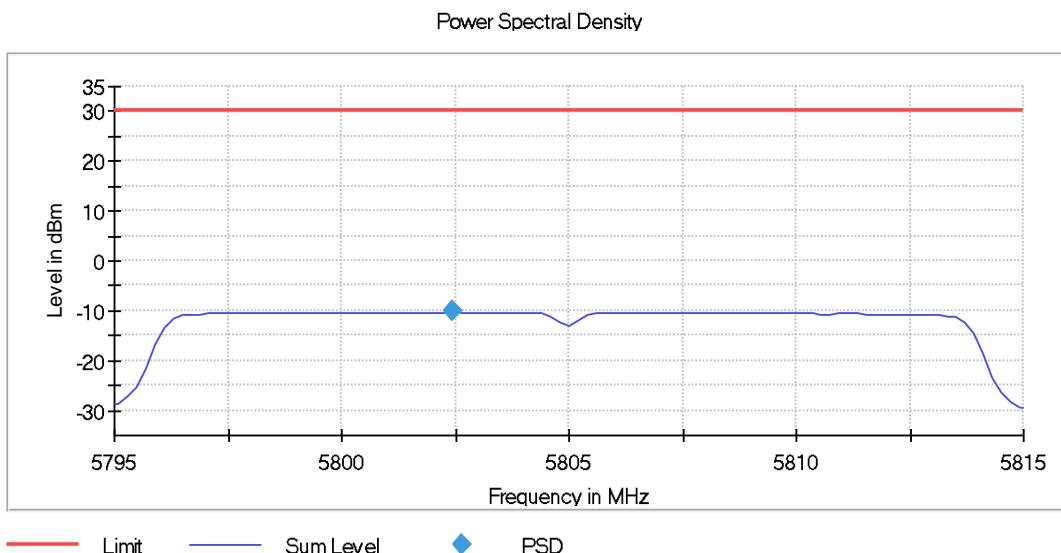
**Test mode : 802.11n\_HT20 (UNII-3)**

**A. Lowest Ch. (5 745 MHz)**



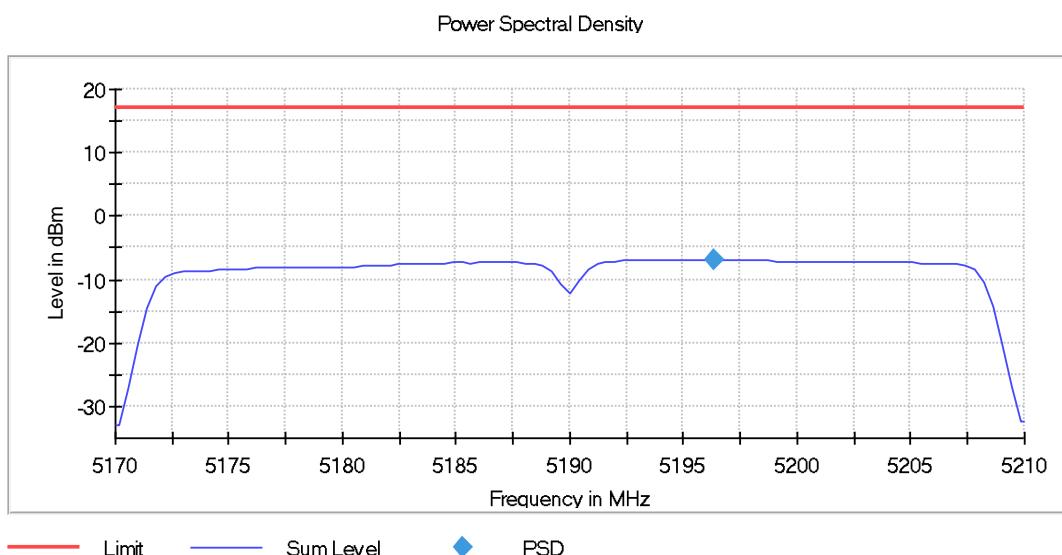
**B. Middle Ch. (5 785 MHz)**



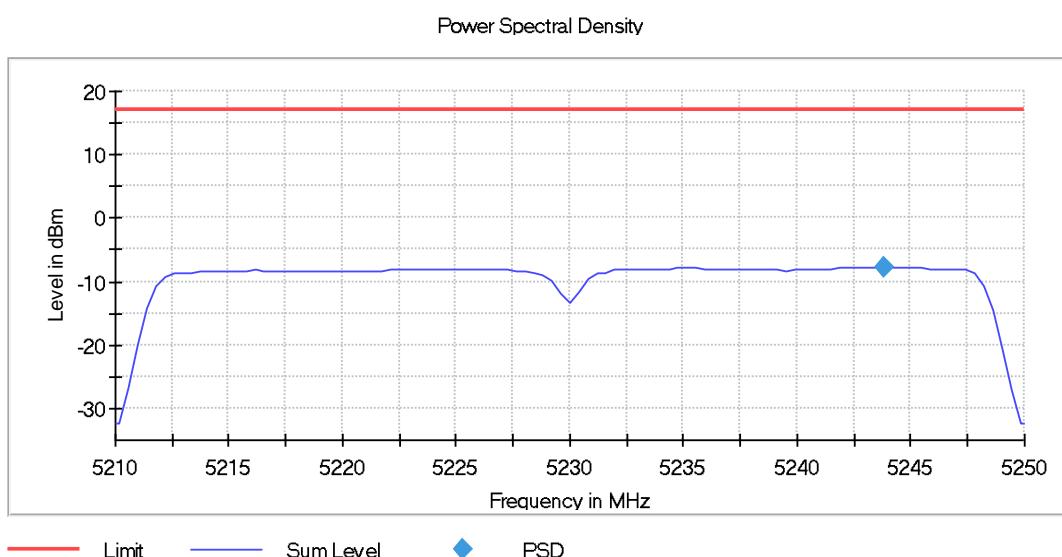
**C. Highest Ch. (5 805 MHz)**

**Test mode : 802.11n\_HT40 (UNII-1)**

**A. Lowest Ch. (5 190 MHz)**

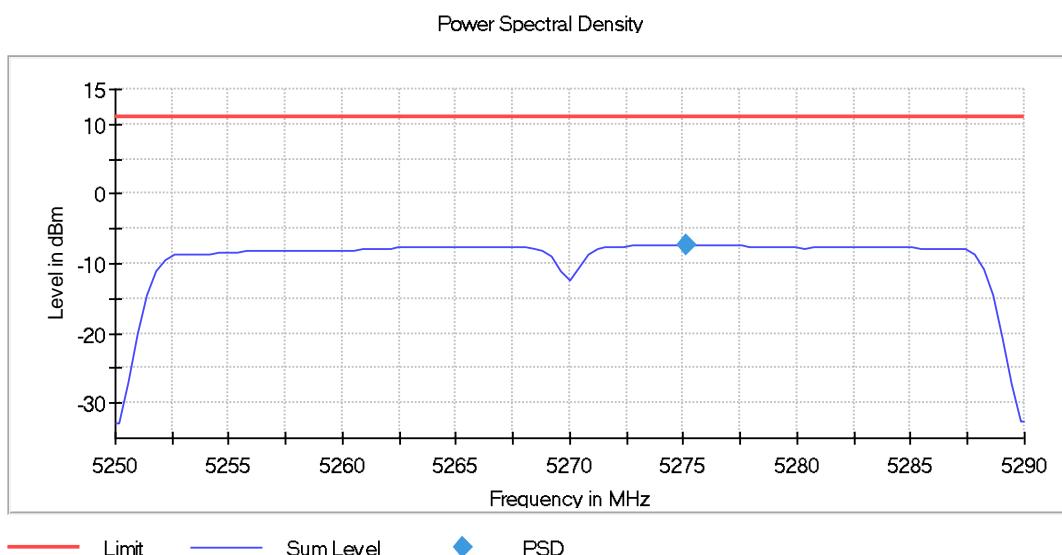


**B. Highest Ch. (5 230 MHz)**

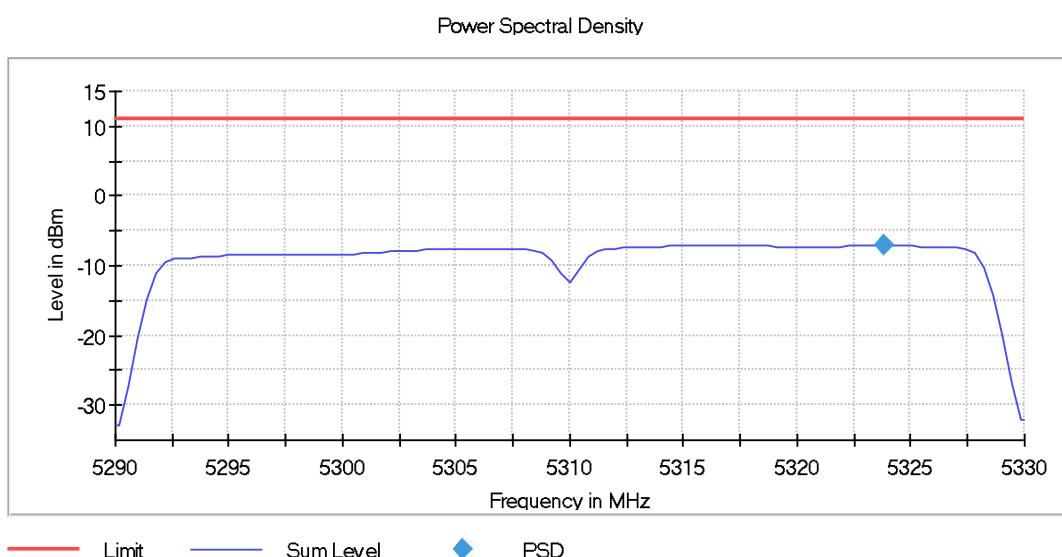


**Test mode : 802.11n\_HT40 (UNII-2A)**

**A. Lowest Ch. (5 270 MHz)**

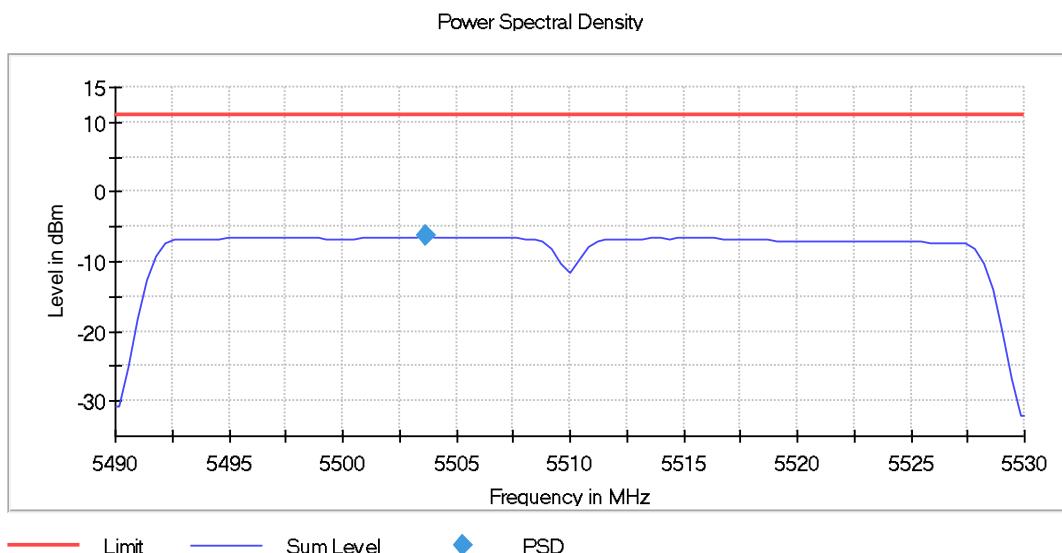


**B. Highest Ch. (5 310 MHz)**

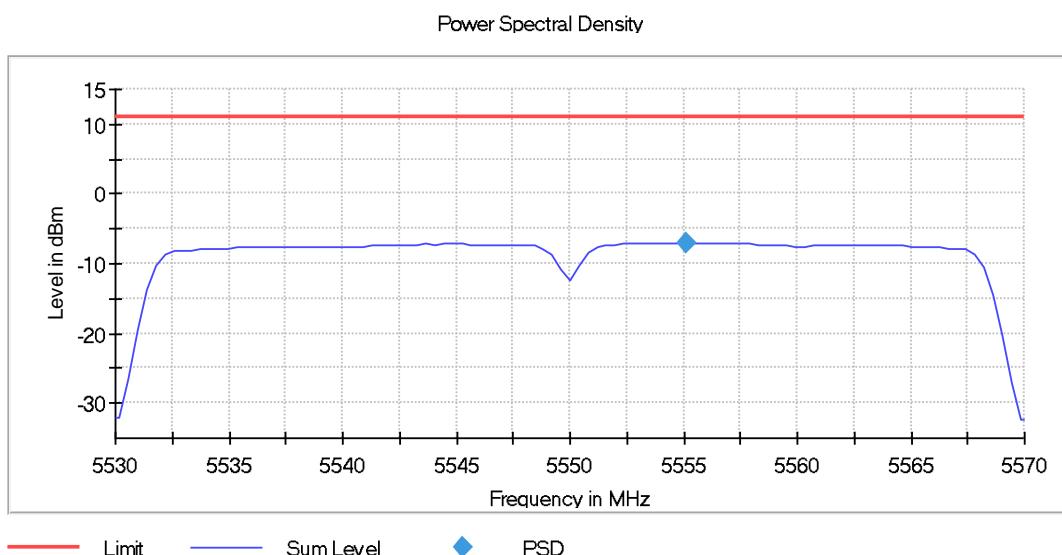


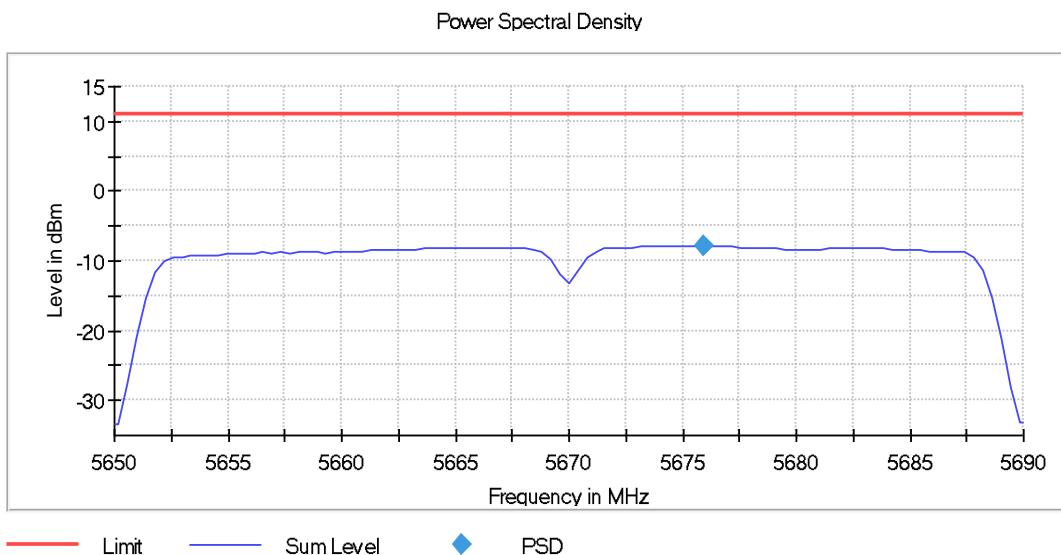
**Test mode : 802.11n\_HT40 (UNII-2C)**

**A. Lowest Ch. (5 510 MHz)**



**B. Middle Ch. (5 550 MHz)**



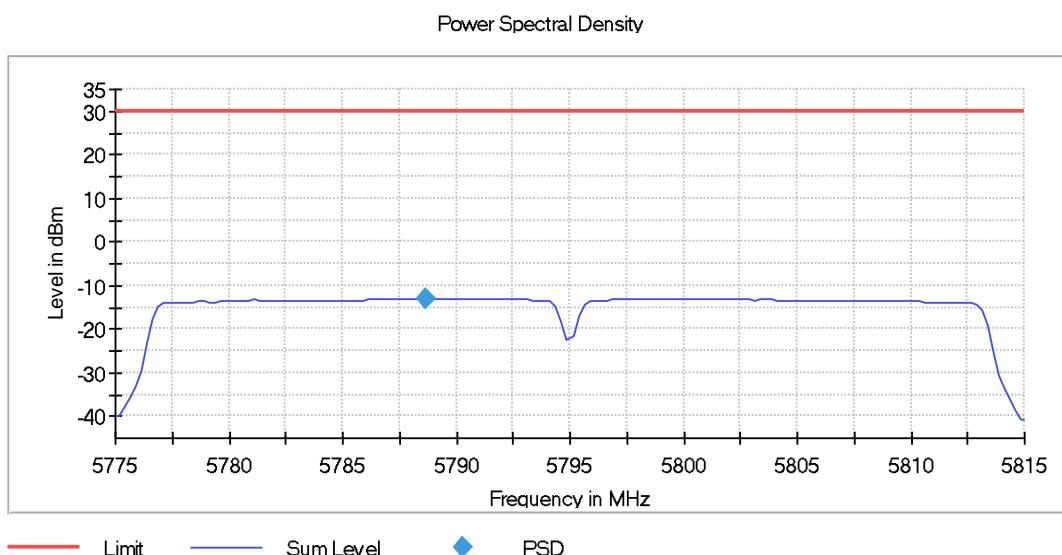
**C. Highest Ch. (5 670 MHz)**

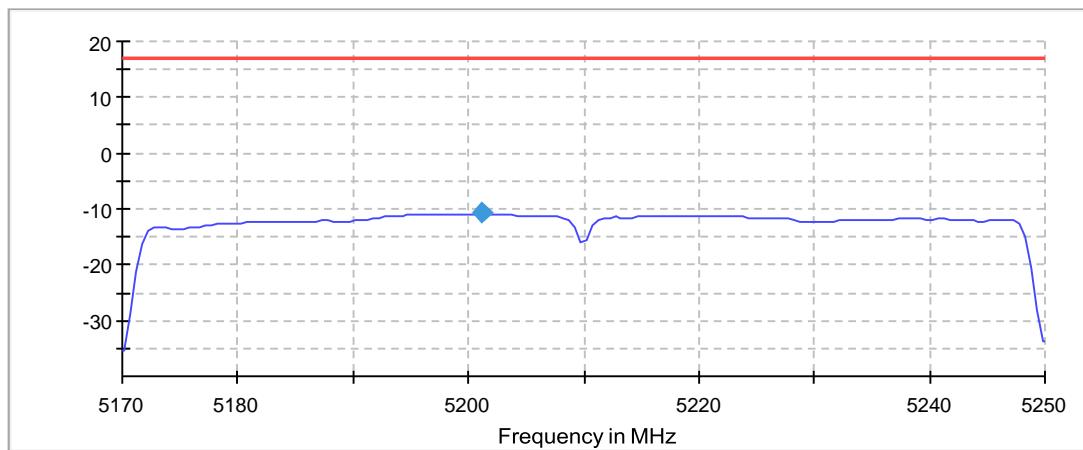
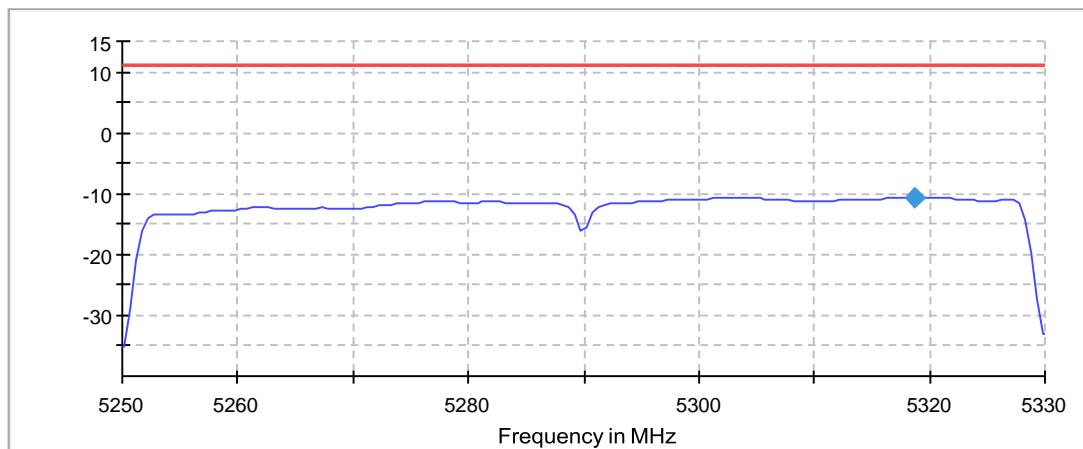
**Test mode : 802.11n\_HT40 (UNII-3)**

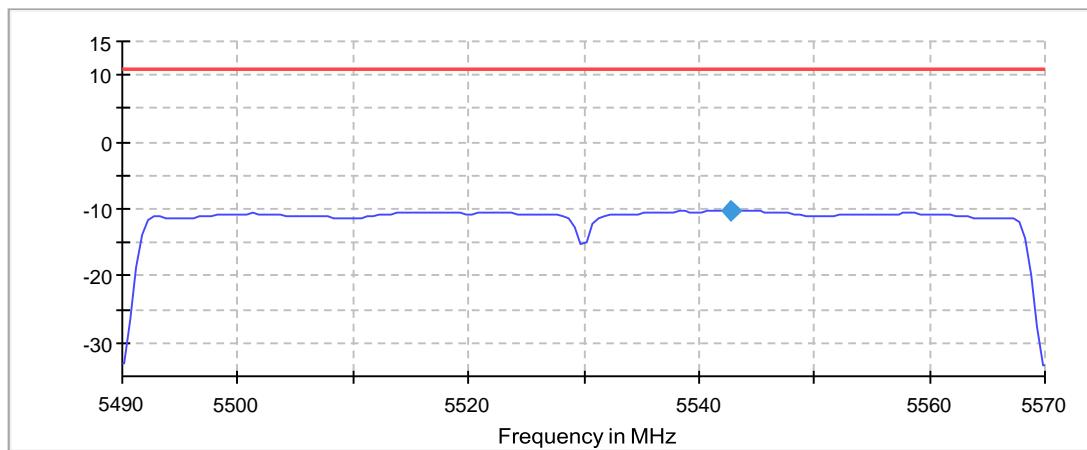
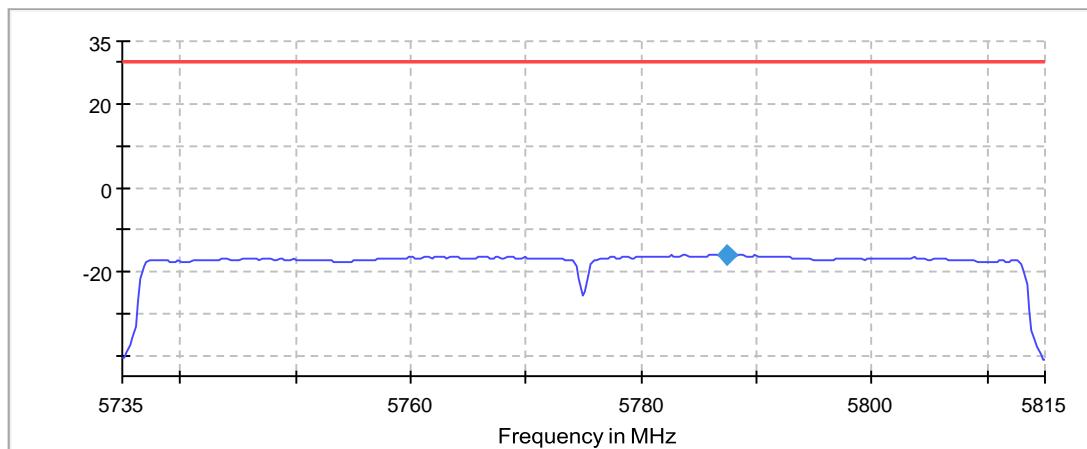
**A. Lowest Ch. (5 755 MHz)**



**B. Highest Ch. (5 795 MHz)**

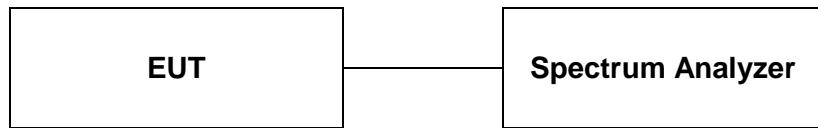


**Test mode : 802.11ac\_VHT80 (UNII-1)****A. Lowest Ch. (5 210 MHz)****Test mode : 802.11ac\_VHT80 (UNII-2A)****A. Lowest Ch. (5 290 MHz)**

**Test mode : 802.11ac\_VHT80 (UNII-2C)****A. Lowest Ch. (5 530 MHz)****Test mode : 802.11ac\_VHT80 (UNII-3)****A. Lowest Ch. (5 775 MHz)**

## 10. Frequency stability

### 10.1. Test setup



### 10.2. Limit

Not applicable

### 10.3. Test procedure

- a. The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage.
- b. Turn the EUT on and couple its output to a spectrum analyzer.
- c. Turn the EUT off and set the chamber to the highest temperature specified.
- d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize.
- e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes.  
The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

#### 10.4. Test results

**Test mode : UNII-1 (5 180 MHz)**

<b>Voltage(%)</b>	<b>Power(V)</b>	<b>Temp(°C)</b>	<b>Frequency(Hz)</b>	<b>Deviation(ppm)</b>
100	13.5	-20	37 526	7.24
		-10	24 998	4.83
		0	6 529	1.26
		10	6 999	1.35
		20	25 997	5.02
		30	27 997	5.40
		40	29 997	5.79
		50	30 997	5.98
		23	28 997	5.60
		23	29 997	5.79
85	11.48	23	29 997	5.79
115	15.53	23	29 997	5.79

**Test mode : UNII-2A (5 260 MHz)**

<b>Voltage(%)</b>	<b>Power(V)</b>	<b>Temp(°C)</b>	<b>Frequency(Hz)</b>	<b>Deviation(ppm)</b>
100	13.5	-20	35 996	6.84
		-10	26 527	5.04
		0	7 529	1.43
		10	8 999	1.71
		20	25 997	4.94
		30	30 997	5.89
		40	31 997	6.08
		50	33 996	6.46
		23	29 997	5.70
		23	31 997	6.08
85	11.48	23	31 997	6.08
115	15.53	23	30 997	5.89

**Test mode : UNII-2C (5 500 MHz)**

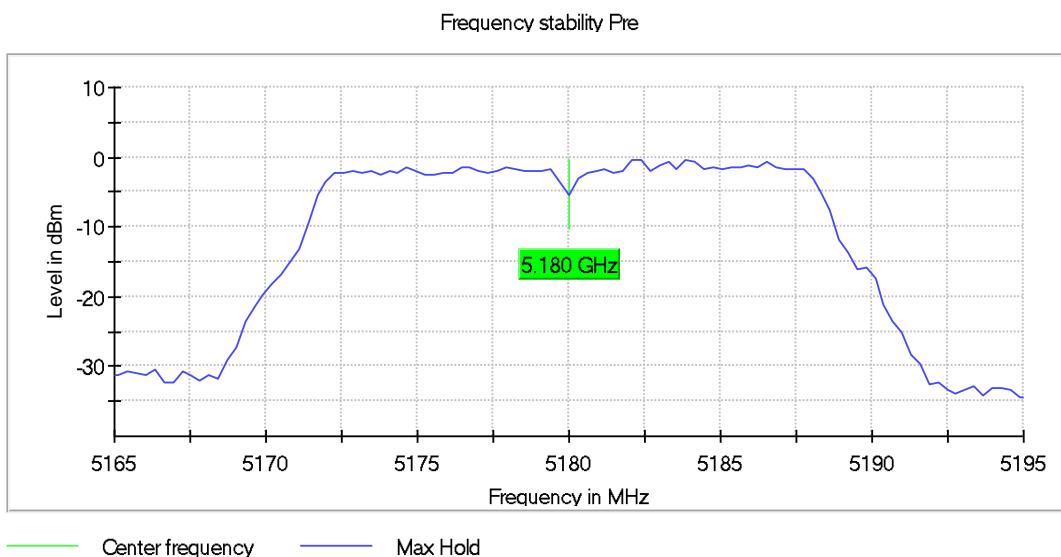
<b>Voltage(%)</b>	<b>Power(V)</b>	<b>Temp(°C)</b>	<b>Frequency(Hz)</b>	<b>Deviation(ppm)</b>
100	13.5	-20	36 997	6.73
		-10	25 997	4.73
		0	7 000	1.27
		10	8 999	1.64
		20	26 997	4.91
		30	33 996	6.18
		40	33 996	6.18
		50	35 996	6.54
		23	33 996	6.18
		23	34 526	6.28
85	11.48	23	33 526	6.10
115	15.53	23	33 526	6.10

**Test mode : UNII-3 (5 745 MHz)**

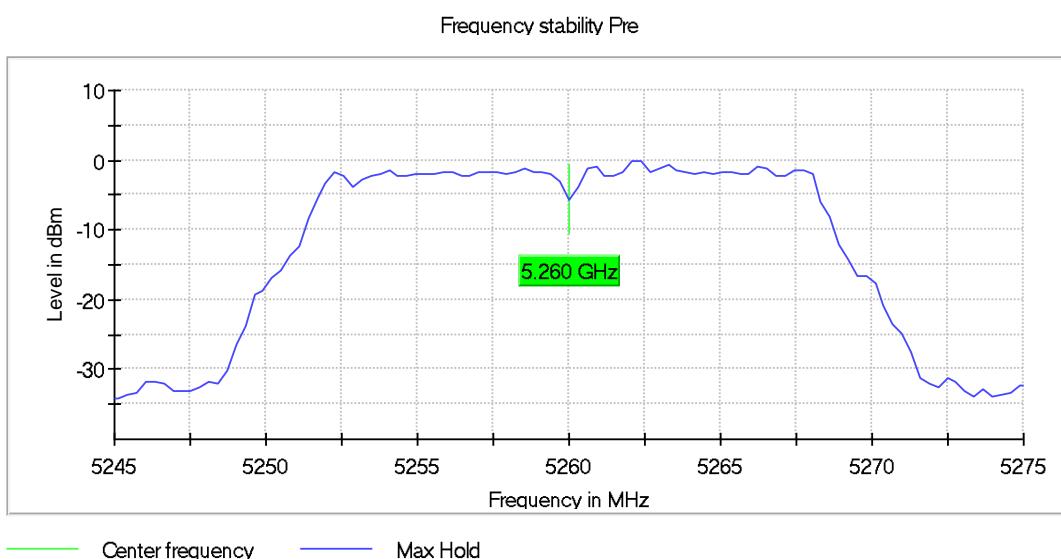
<b>Voltage(%)</b>	<b>Power(V)</b>	<b>Temp(°C)</b>	<b>Frequency(Hz)</b>	<b>Deviation(ppm)</b>
100	13.5	-20	38 996	6.79
		-10	30 526	5.31
		0	9 000	1.57
		10	5 999	1.04
		20	27 997	4.87
		30	33 996	5.92
		40	35 996	6.27
		50	37 996	6.61
		23	34 996	6.09
		23	35 996	6.27
85	11.48	23	35 996	6.27
115	15.53	23	35 996	6.27

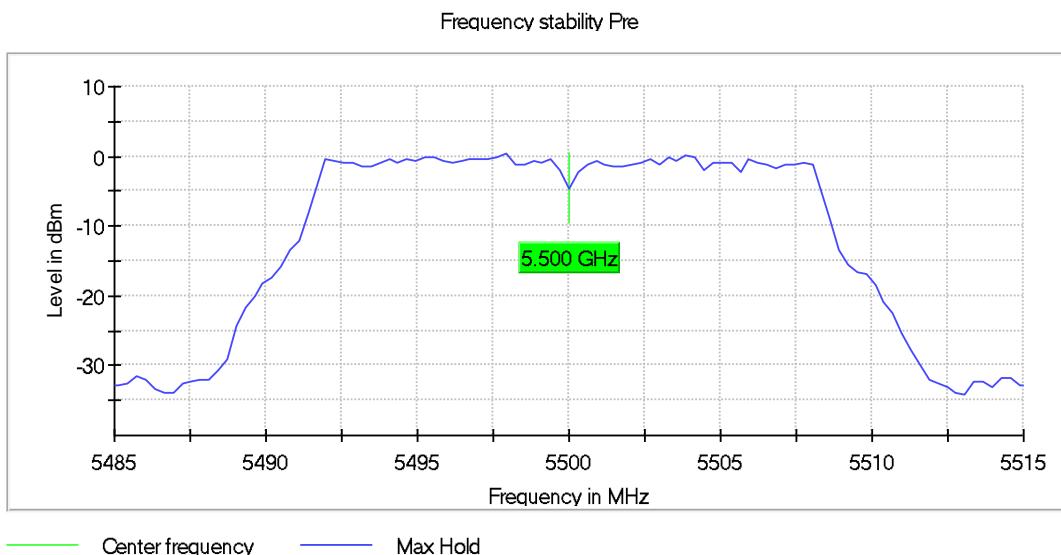
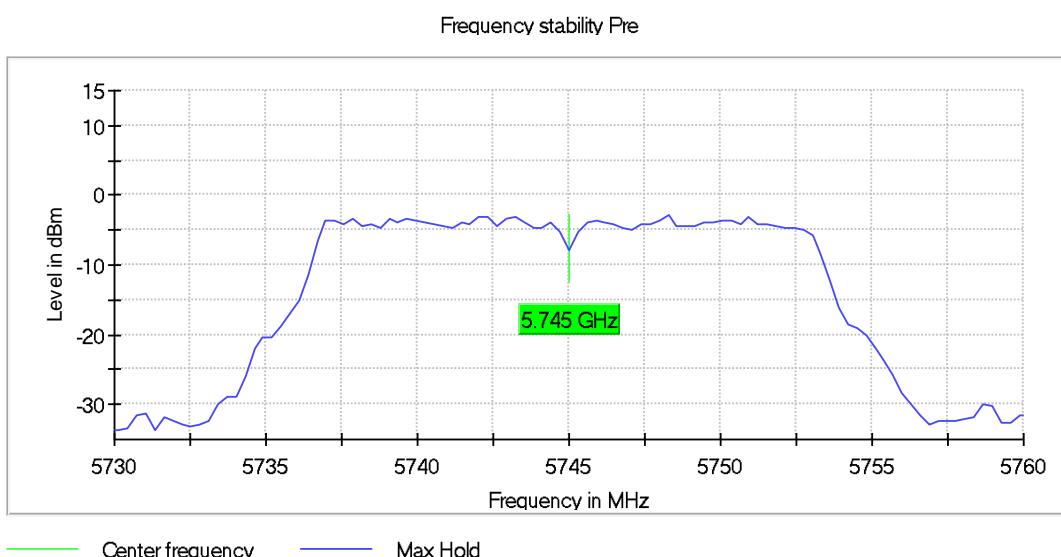
#### 10.4.1 Test plot

**Test mode : UNII-1\_Normal Vol. Normal Temp. (5 180 MHz)**



**Test mode : UNII-2A\_Normal Vol. Normal Temp. (5 260 MHz)**



**Test mode : UNII-2C\_Normal Vol. Normal Temp. (5 500 MHz)****Test mode : UNII-3\_Normal Vol. Normal Temp. (5 745 MHz)**

## 11. Antenna requirement

### 11.1. Standard applicable

According to §15.203, Antenna requirement.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

### 11.2. Antenna connected construction

Antenna used in this product is PCB antenna,  
Antenna gain is 0.00 dBi.