

FCC Part 15 Subpart E §15.407

Test Report

Equipment Under Test	OTT+IPTV
Model Name	SC7210
FCC ID	WQT-SC7210
Applicant	Kaonmedia Co.,Ltd.
Manufacturer	Kaonmedia Co.,Ltd.
Date of Test(s)	2018. 01. 29 ~ 2018. 03. 12
Date of Issue	2018. 03. 12

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

Issue to	Issue by
Kaonmedia Co.,Ltd. KAONMEDIA Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea Tel.: +82-31-724-8728 Fax: +82-31-724-8999	MOVON CORPORATION 498-2, Geumeo-ro, Pogok-eup, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 449-812 Tel.: +82-31-338-8837 Fax: +82-31-338-8847

Revision history

Revision	Date of issue	Description	Revised by
--	Feb 14, 2018	Initial	--
01	Mar 06, 2018	Add to Radiated test plots	Kin Son
02	Mar 12, 2018	Add Test Ac Power Line Test	Kin Son

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1. Attestation of test result

1.1. Details of applicant and manufacturer

Applicant : Kaonmedia Co.,Ltd.
Address : KAONMEDIA Building, 884-3, Seongnam-daero, Bundang-gu,
Seongnam-si, Gyeonggi-do, Korea
Contact Person : Kim intae
Telephone : +82-31-724-8728
Fax : +82-31-724-8999

1.2. 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	C
§15.407(a)(1)	26 dB and 99% Occupied Bandwidth	C
§15.407(a)(1)	Maximum conducted Output power	C
§15.407(a)(1)	Power spectral density	C
§15.407(g)	frequency stability	C
§15.407(e)	6 dB bandwidth	C
1.1307(b)(1)	RF exposure evaluation	C
§15.203	Antenna Requirement	C
§15.207(a)	AC Conducted power line test	C

The sample was tested according to the following specification:

ANSI C63.10:2013, FCC Public Notice KDB789033 D02 v02r01

TEST SITE REGISTRATION NUMBER: **FCC(KR0151)**

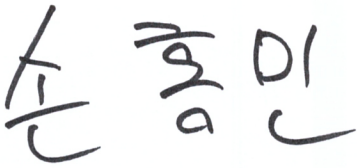
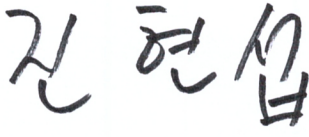
※ Abbreviation

C Complied

N/A Not applicable

F Fail

Approval Signatories

Test and Report Completed by :	Report Approval by :
	
Kin Son Test Engineer MOVON CORPORATION	Issac Jin Technical Manager MOVON CORPORATION

2. EUT Description

Kind of product	OTT+IPTV
Model Name	SC7210
FCC ID	WQT-SC7210
Serial Number	N/A
Power supply	DC 12V
Frequency range	UNII-1 5 180 MHz ~ 5 240 MHz (802.11a/n_HT20) 5 190 MHz ~ 5 230 MHz (802.11an_HT40) UNII-2A 5 260 MHz ~ 5 320 MHz (802.11a/n_HT20) 5 270 MHz ~ 5 310 MHz (802.11an_HT40) UNII-2C 5 500 MHz ~ 5 620 MHz (802.11a/n_HT20) 5 510 MHz ~ 5 590 MHz (802.11an_HT40) UNII-3 5 745 MHz ~ 5 805 MHz (802.11a/n_HT20) 5 755 MHz ~ 5 795 MHz (802.11an_HT40)
Modulation technique	OFDM
Number of channels	UNII-1 5 180 MHz ~ 5 240 MHz (4ch) 5 190 MHz ~ 5 230 MHz (2ch) UNII-2A 5 260 MHz ~ 5 320 MHz (4ch) 5 270 MHz ~ 5 310 MHz (2ch) UNII-2C 5 500 MHz ~ 5 620 MHz (7ch) 5 510 MHz ~ 5 590 MHz (3ch) UNII-3 5 745 MHz ~ 5 805 MHz (4ch) 5 755 MHz ~ 5 795 MHz (2ch)
Antenna gain	ANT1 : 2.00 dB i (Max.)
	ANT2 : 2.00 dB i (Max.)
Test Site Registration Number	FCC(KR0151)

2.1. Declarations by the manufacturer

None

2.2. Details of modification

None

2.3 Test Mode

UNII-1		UNII-2A		UNII-2C		UNII-3	
CH.	Frequency(MHz)	CH.	Frequency(MHz)	CH.	Frequency(MHz)	CH.	Frequency(MHz)
36	5 180	52	5 260	100	5 500	149	5 745
44	5 220	60	5 300	112	5 560	157	5 785
48	5 240	64	5 320	124	5 620	161	5 805

(802.11a/n_HT20)

UNII-1		UNII-2A		UNII-2C		UNII-3	
CH.	Frequency(MHz)	CH.	Frequency(MHz)	CH.	Frequency(MHz)	CH.	Frequency(MHz)
38	5 190	54	5 270	102	5 510	151	5 755
46	5 230	62	5 310	110	5 550	159	5 795
				118	5 590		

(802.11an_HT40)

2.4. Table for Test Modes

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

Test Mode	Data rate (Worst case)
802.11a	6 Mbps
802.11an_HT20 802.11an_HT40	MCS0

2.5. Duty Cycle Factor

Mode	Duty Cycle (%)	Duty Cycle Factor (dB)
802.11a	-	-
802.11an(HT20)	-	-
802.11an(HT40)	-	-

3. Measurement Equipment

Equipment	Manufacturer	Model	Serial number	Calibration Interval	Calibration due.
Test Receiver	R&S	ESVS30	829673/015	1 year	2018-12-07
Signal Generator	R&S	SMA100A	102188	1 year	2018-05-30
Spectrum Analyzer	R&S	FSV-40	100832	1 year	2018-05-30
Power Meter	Agilent	E4416A	GB41290645	1 year	2018-05-30
Power Sensor	Agilent	9327A	US40441490	1 year	2018-05-30
Power Module	R&S	OSP120	100905	1 year	2018-12-08
Horn Antenna	R&S	HF906	100236	2 year	2019-04-25
Horn Antenna	AH Systems	SAS-572	269	2 year	2019-08-01
Horn Antenna	AH Systems	SAS-573	164	2 year	2018-05-30
TRILOG Supper Broadband test Antenna	SCHWARZBECK	SAS-521-7	9161-4159	2 year	2018-06-14
Power Amplifier	MITEQ	AM-1431	1497315	1 year	2018-05-30
Power Amplifier	MITEQ	AFS43-01002600	1374382	1 year	2018-11-03
Band Rejection Filter	Micro-Tonics	BRM50702	064	1 year	2018-05-30
Controller	INNCO	CO2000	co200/064/6961003/L	N/A	N/A
Antenna Master	INNCO	MA4000	MA4000/038/6961003/L	N/A	N/A
Loop Antenna	ETS LINDGREN	6502	00118166	2 year	2018-02-23
TWO LINE-V-NETWORK	R&S	ESH3-Z5	100296	1 year	2018-12-07
Low Noise Amplifier	TESTEK	TK-PA18H	170013-L	1 year	2018-06-02
High Pass Filter	Wainwright	WHKX7.0/18G-8SS	25	1 year	2018-05-30

※Remark;
Support equipment

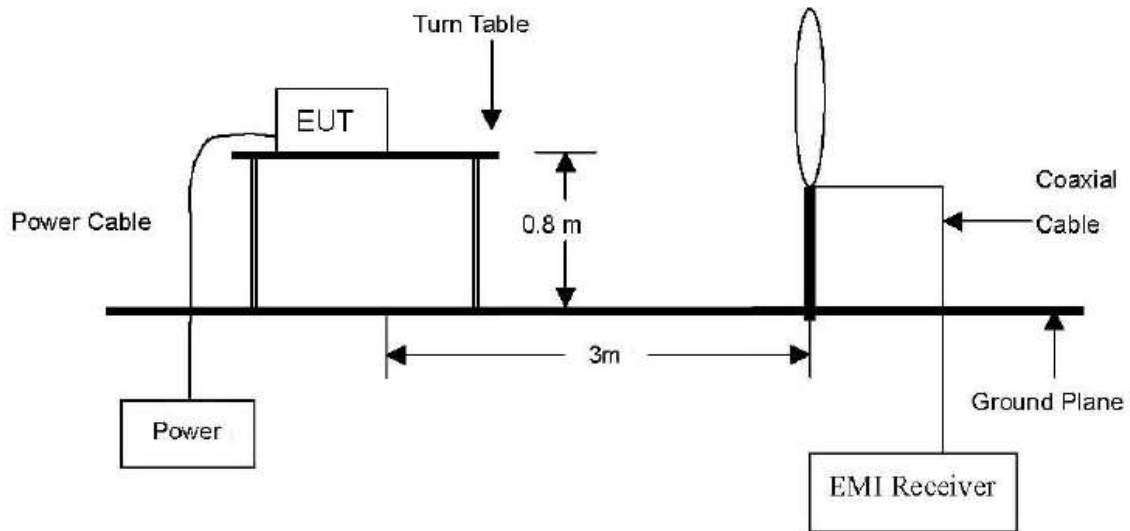
Description	Manufacturer	Model	Serial number
Notebook computer	DELL	Lattitude D510	-

4. Transmitter radiated spurious emissions and conducted spurious emissions

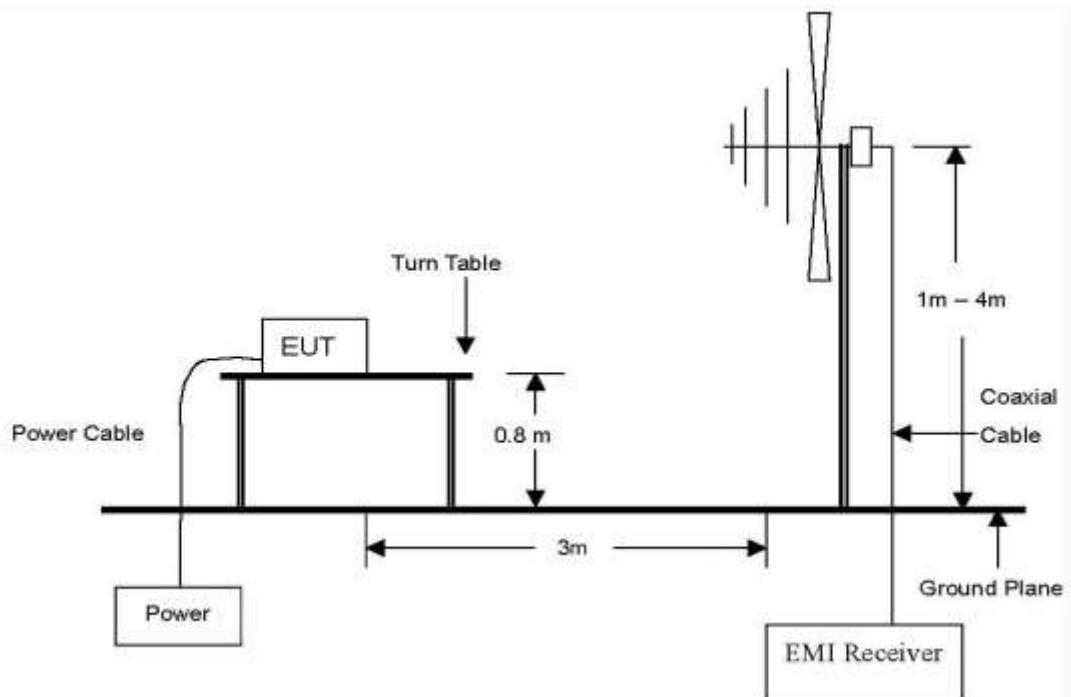
4.1. Test setup

4.1.1. Transmitter radiated spurious emissions

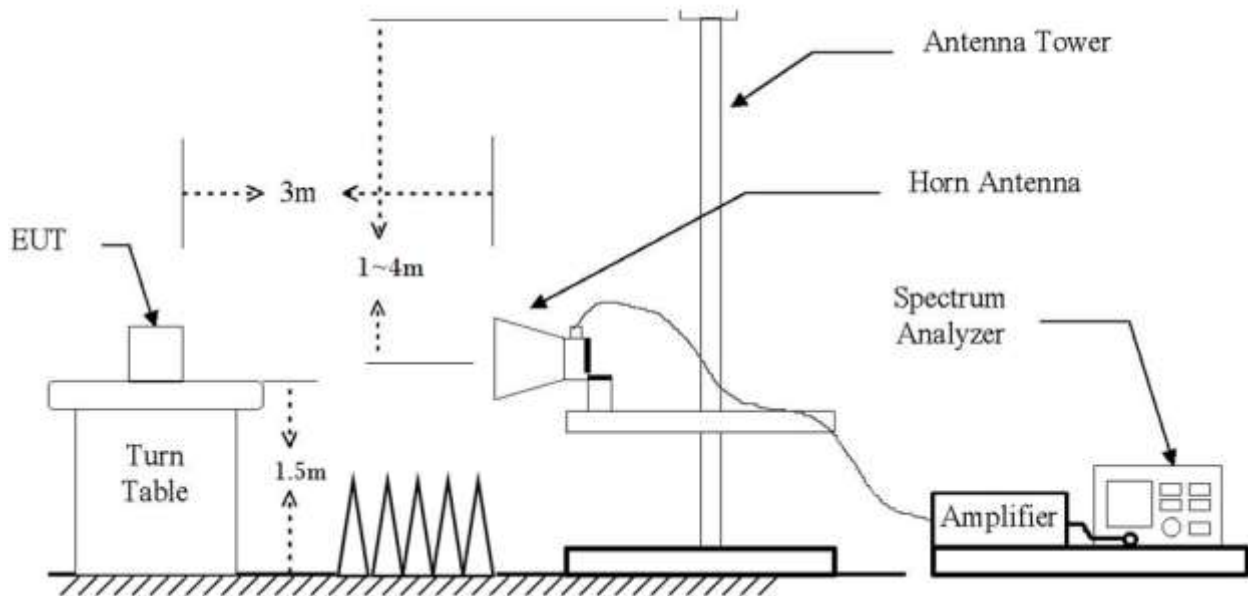
The diagram below shows the test setup that is utilized to make the measurements for emission from 9kHz to 30MHz Emissions.



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.



4.2. 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 ($\mu V/m$)
0.009 ~ 0.490	300	$2\,400 / F(\text{kHz})$
0.490 ~ 1.705	30	$24\,000 / F(\text{kHz})$
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 dB m/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 –27dBm/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 –27dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHzband:
 - 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 bandedge.
 - 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 thissection.
- (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 equipmentpermits.

4.3. 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.

4.3.1. 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.

4.4. Test result

Ambient temperature: 20°C

Relative humidity: 45% R.H.

4.4.1. Spurious radiated emission

The frequency spectrum from 9kHz to 30MHz 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.

Operation mode: UNII-1(802.11a) worst case

A. Low channel (5 180 MHz)

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

B. Middle channel (5 220 MHz)

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

C. High channel (5 240 MHz)

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

Operation mode: UNII-1(n_HT20) worst case
A. Low channel (5 180 MHz)

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

B. Middle channel (5 220 MHz)

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

C. High channel (5 240 MHz)

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

Operation mode: UNII-1(n_HT40) worst case
A. Low channel (5 190 MHz)

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

B. High channel (5 230 MHz)

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

Operation mode: UNII-2A(802.11a) worst case
A. Low channel (5 260 MHz)

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

B. Middle channel (5 300 MHz)

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

C. High channel (5 320 MHz)

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

Operation mode: UNII-2A(n_HT20) worst case
A. Low channel (5 260 MHz)

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

B. Middle channel (5 300 MHz)

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

C. High channel (5 320 MHz)

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

Operation mode: UNII-2A(n_HT40) worst case
A. Low channel (5 270 MHz)

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

B. High channel (5 310 MHz)

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

Operation mode: UNII-2C(802.11a) worst case
A. Low channel (5 500 MHz)

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

B. Middle channel (5 560 MHz)

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

C. High channel (5 620 MHz)

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

Operation mode: UNII-2C(n_HT20) worst case
A. Low channel (5 500 MHz)

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

B. Middle channel (5 560 MHz)

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

C. High channel (5 620 MHz)

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

Operation mode: UNII-2C(n_HT40) worst case
A. Low channel (5 510 MHz)

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

B. Middle channel (5 550 MHz)

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

C. High channel (5 590 MHz)

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

Operation mode: UNII-3(802.11a) worst case

A. Low channel (5 745 MHz)

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

B. Middle channel (5 785 MHz)

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

C. High channel (5 805 MHz)

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

Operation mode: UNII-3(n_HT20) worst case
A. Low channel (5 745 MHz)

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

B. Middle channel (5 785 MHz)

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

C. High channel (5 805 MHz)

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

Operation mode: UNII-3(n_HT40) worst case
A. Low channel (5 745 MHz)

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

B. High channel (5 795 MHz)

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

※ Remark

1. Actual = Reading + Ant. factor + CL (Cable loss)+Amp factor
2. Limit line = specific Limits (dBuV) + Distance extrapolation factor
3. 15.31 Measurement standards.

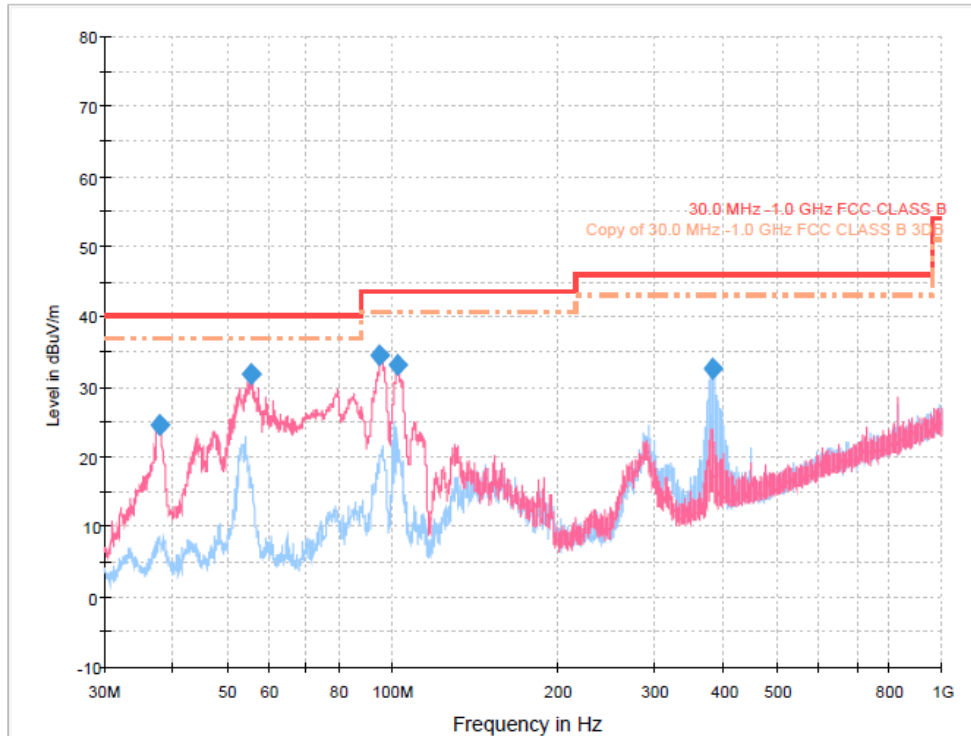
The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

4.4.2. Spurious radiated emission

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.

**Operation mode: Transmitting mode
worst case data**



Frequency (MHz)	MaxPeak-MaxHold (dBuV/m)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
37.892273	24.6	V	96.0	-19.7	15.4	40.0
55.616818	31.9	V	87.0	-19.6	8.1	40.0
95.166364	34.5	V	7.0	-21.3	9.0	43.5
102.132727	33.2	V	7.0	-20.8	10.3	43.5
384.005909	32.6	H	129.0	-13.5	13.4	46.0

※ Remark

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.

4.4.3. Spurious radiated emission

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.

Operation mode: UNII-1(802.11a)

A. Low channel (5 180 MHz)

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

B. Middle channel (5 220 MHz)

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

C. High channel (5 240 MHz)

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

Operation mode: UNII-1_(n_HT20)

A. Low channel (5 180 MHz)

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

B. Middle channel (5 220 MHz)

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

C. High channel (5 240 MHz)

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

Operation mode: UNII-1_(n_HT40)
A. Low channel (5 190 MHz)

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

B. High channel (5 230 MHz)

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

Operation mode: UNII-2A(802.11a)
A. Low channel (5 260 MHz)

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

B. Middle channel (5 300 MHz)

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

C. High channel (5 320 MHz)

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

Operation mode: UNII-2A_(n_HT20)
A. Low channel (5 260 MHz)

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

B. Middle channel (5 300 MHz)

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

C. High channel (5 320 MHz)

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

Operation mode: UNII-2A_(n_HT40)
A. Low channel (5 270 MHz)

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

B. High channel (5 310 MHz)

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

Operation mode: UNII-2C(802.11a)
A. Low channel (5 500 MHz)

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

B. Middle channel (5 560 MHz)

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

C. High channel (5 620 MHz)

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

Operation mode: UNII-2C_(n_HT20)
A. Low channel (5 500 MHz)

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

B. Middle channel (5 560 MHz)

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

C. High channel (5 620 MHz)

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

Operation mode: UNII-2C_(n_HT40)
A. Low channel (5 510 MHz)

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

B. Middle channel (5 550 MHz)

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

C. High channel (5 590 MHz)

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

Operation mode: UNII-3(802.11a)
A. Low channel (5 745 MHz)

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

B. Middle channel (5 785 MHz)

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

C. High channel (5 805 MHz)

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

Operation mode: UNII-3(n_HT20)
A. Low channel (5 745 MHz)

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

B. Middle channel (5 785 MHz)

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

C. High channel (5 805 MHz)

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

Operation mode: UNII-3_(n_HT40)

A. Low channel (5 755 MHz)

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

B. High channel (5 795 MHz)

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

※ **Remark**

1. Actual = Reading + Ant. factor + CL (Cable loss)
2. Limit line = specific Limits (dB μ V) + Distance extrapolation factor
3. 15.31 Measurement standards.

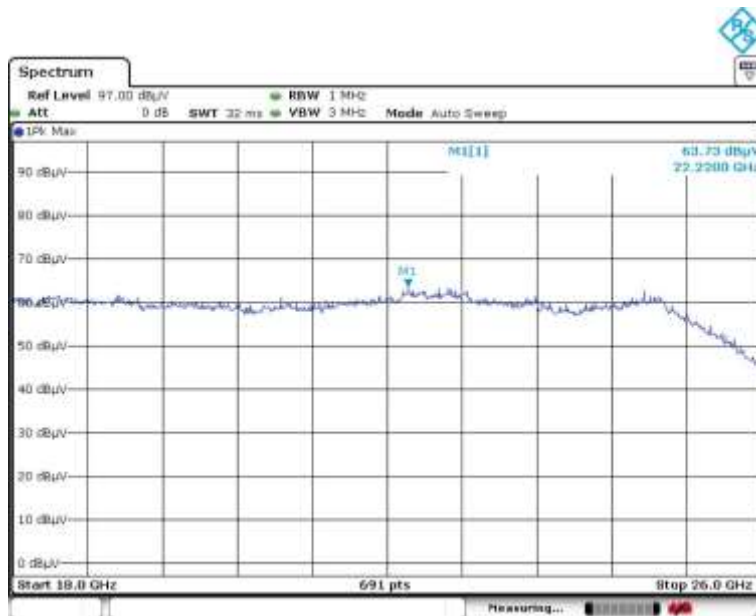
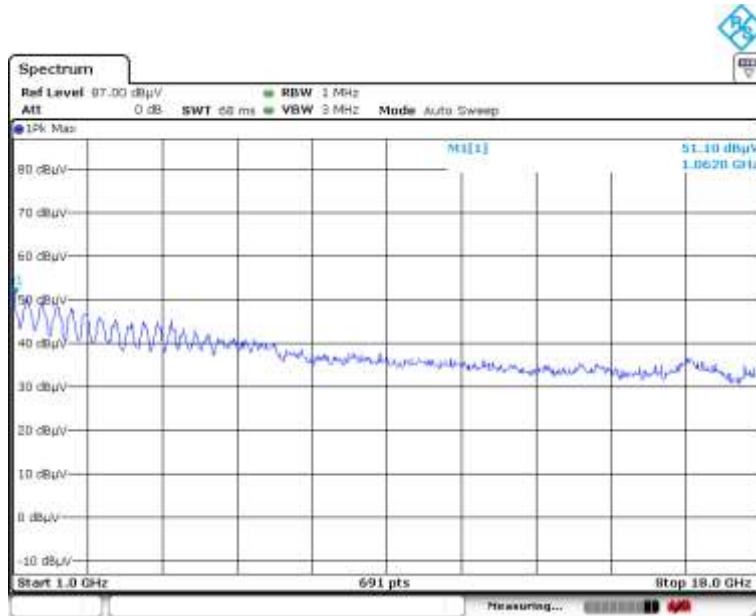
The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

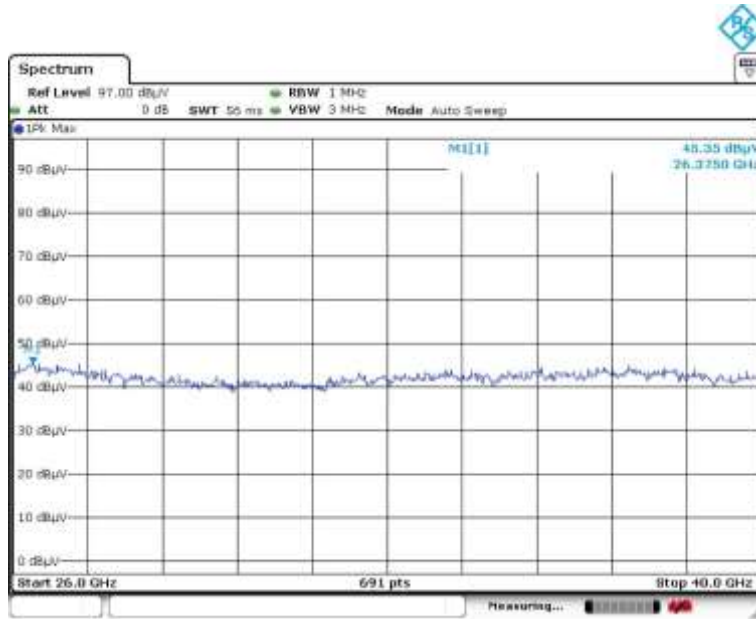
4.4.4 Spurious radiated emission.

Test plots

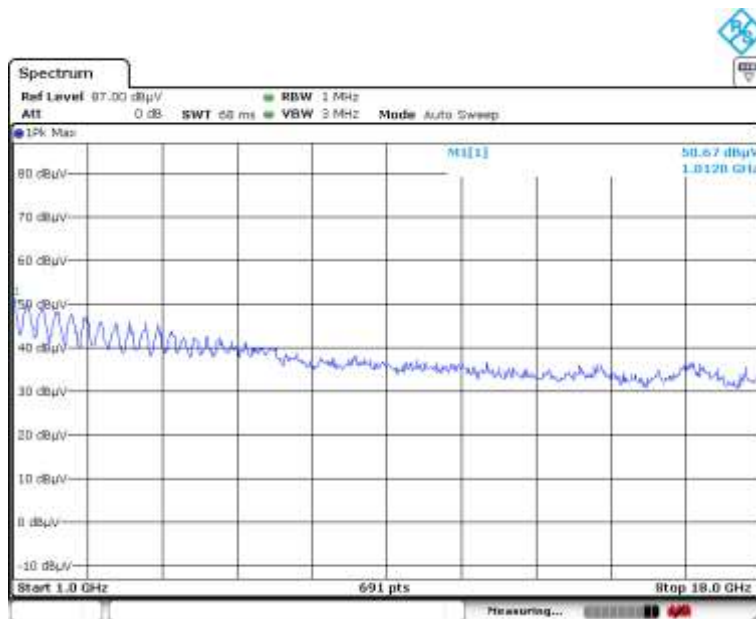
Operation mode: UNII-1(802.11a) 1TX worst case

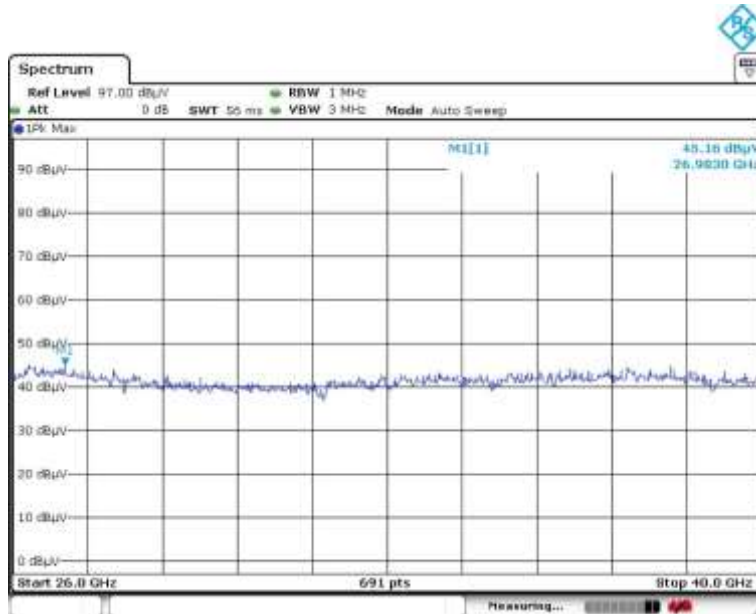
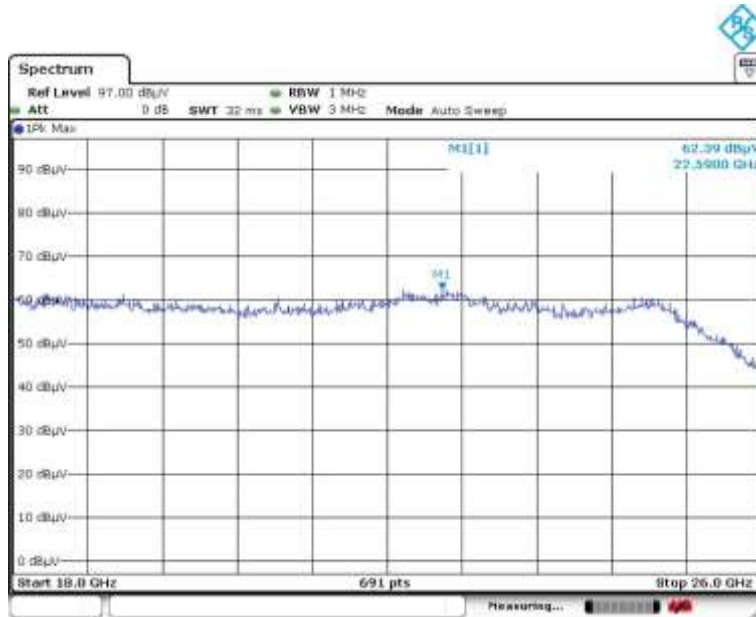
* channel(5 180 MHz)



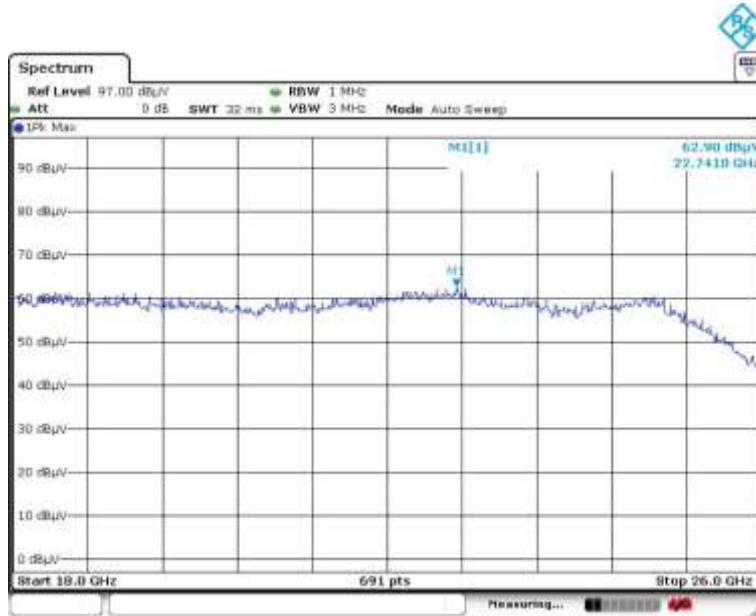
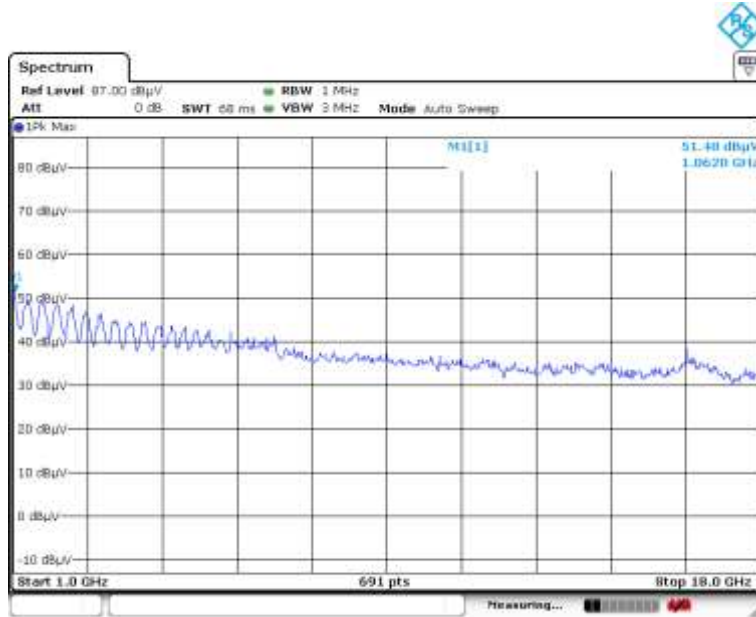


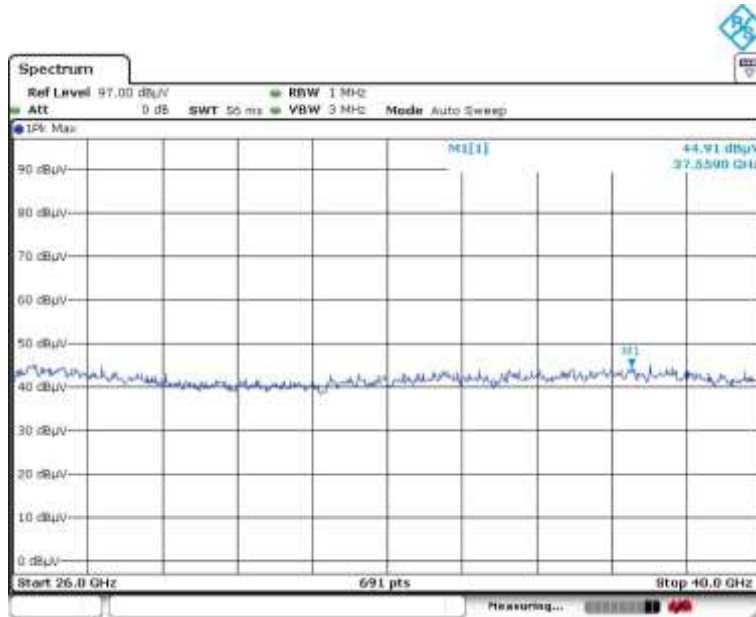
Operation mode: UNII-1(n_HT20) 2TX worst case
* channel(5 180 MHz)



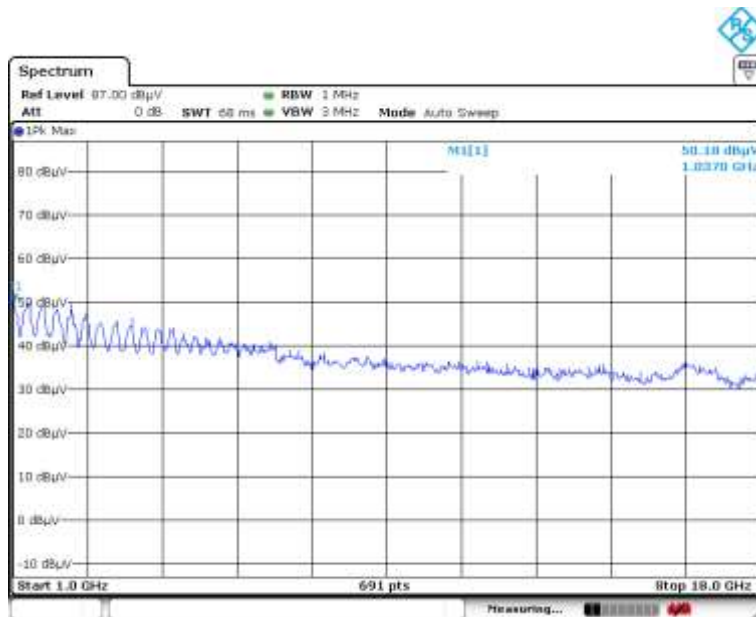


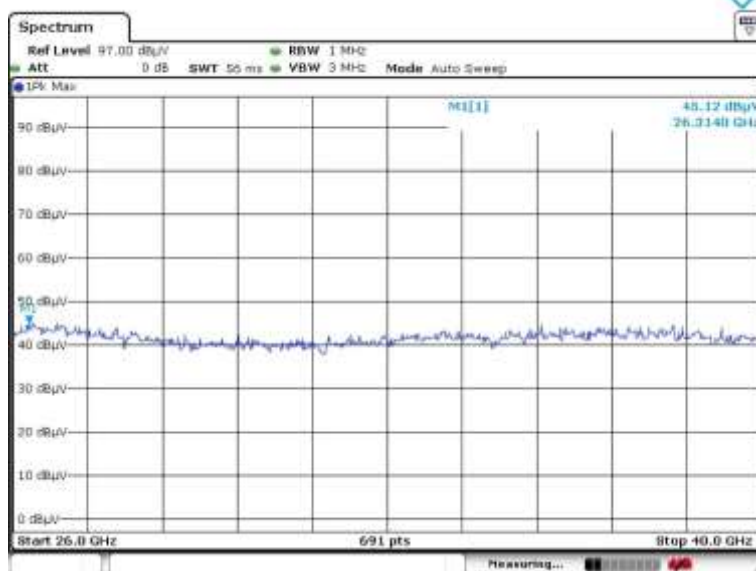
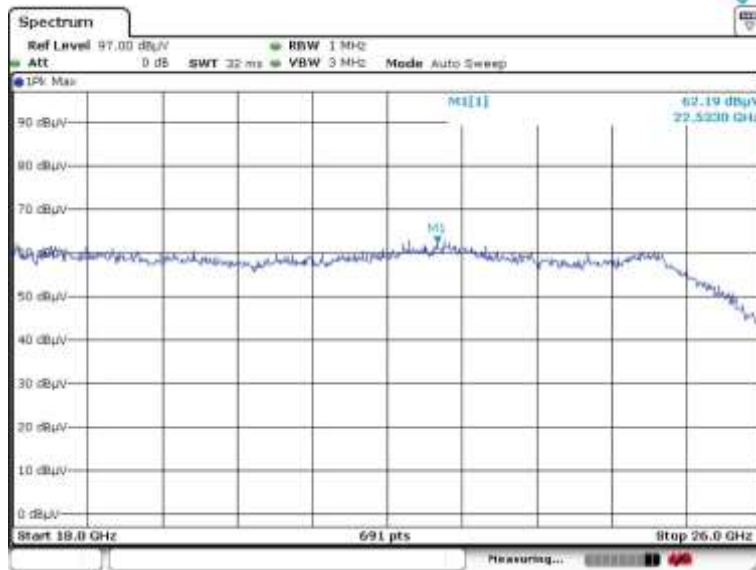
Operation mode: UNII-1(n_HT40) 2TX worst case
* channel(5 190 MHz)



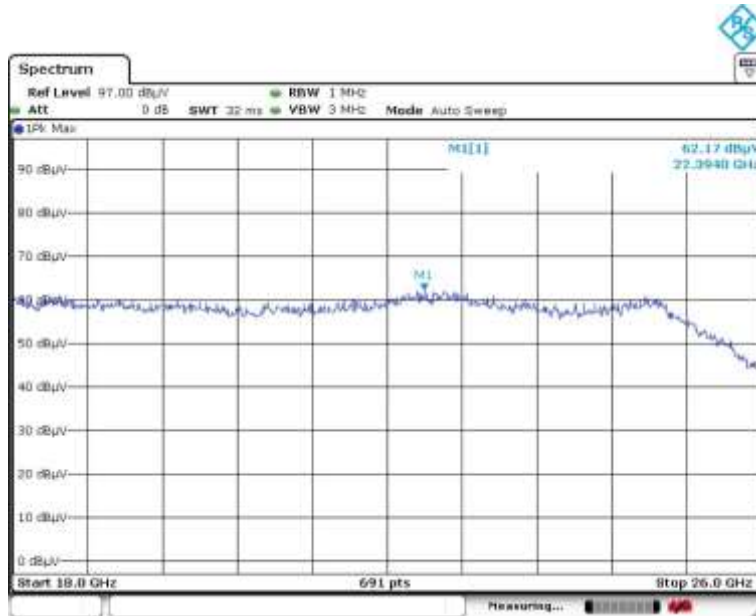
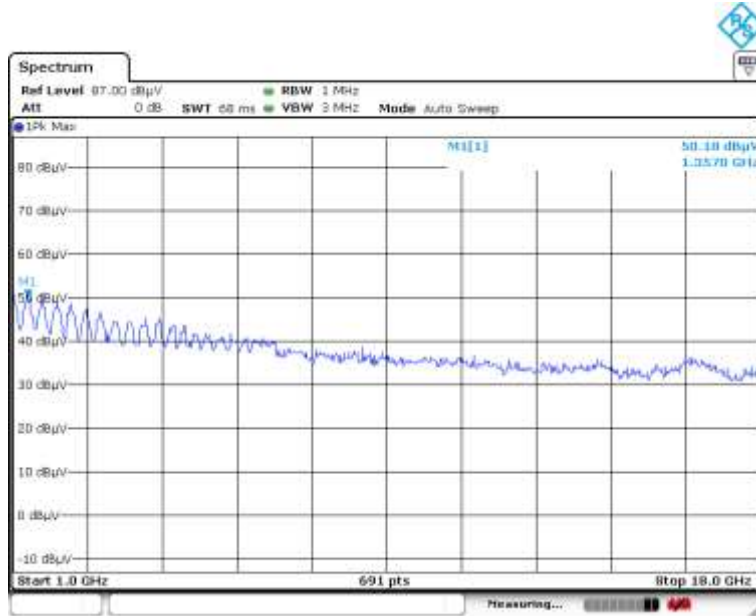


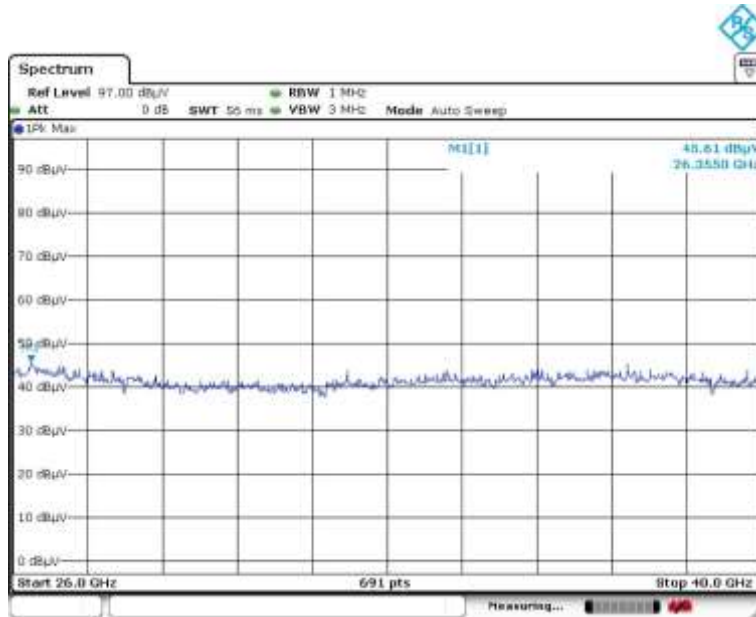
Operation mode: UNII-2A(802.11a) 1TX worst case
 * channel(5 320 MHz)



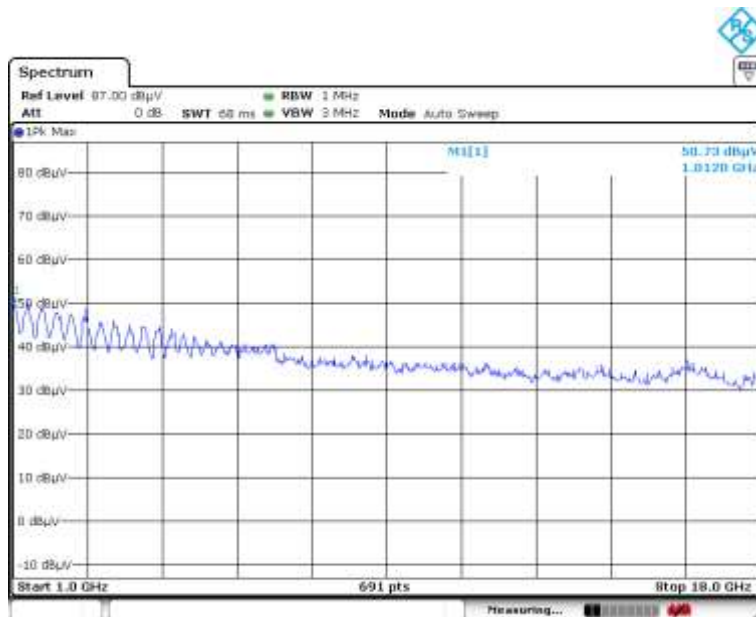


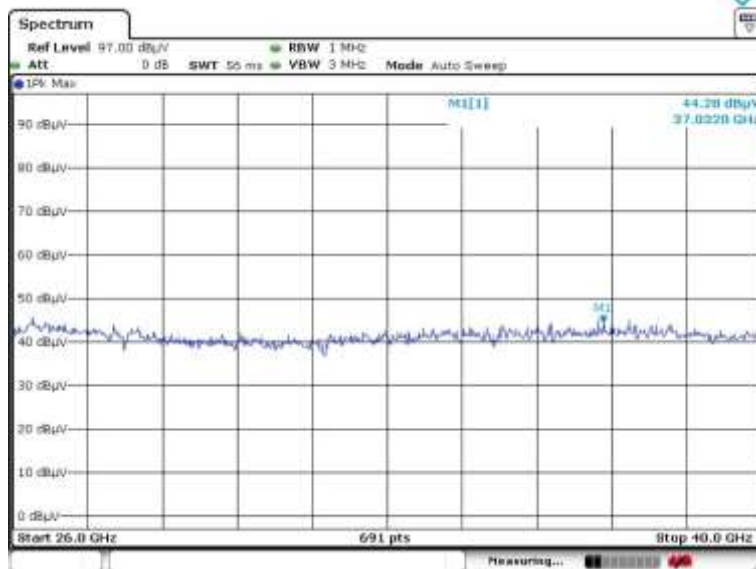
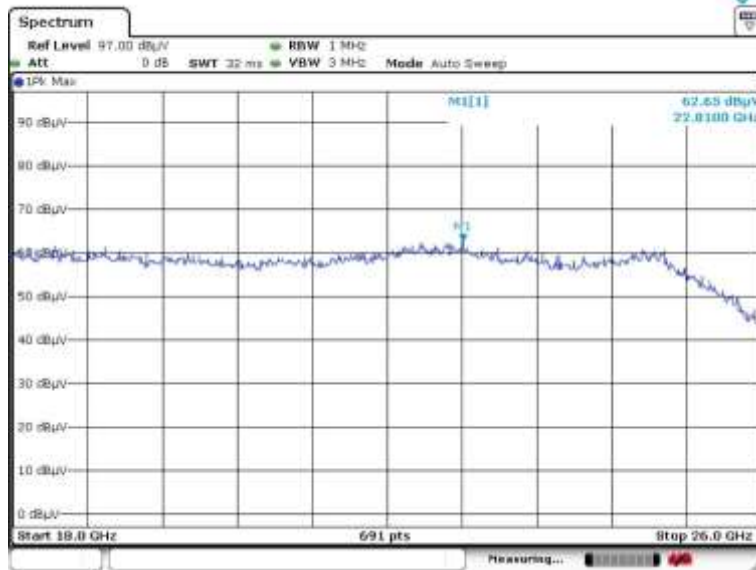
Operation mode: UNII-2A(n_HT20) 2TX worst case
* channel(5 320 MHz)



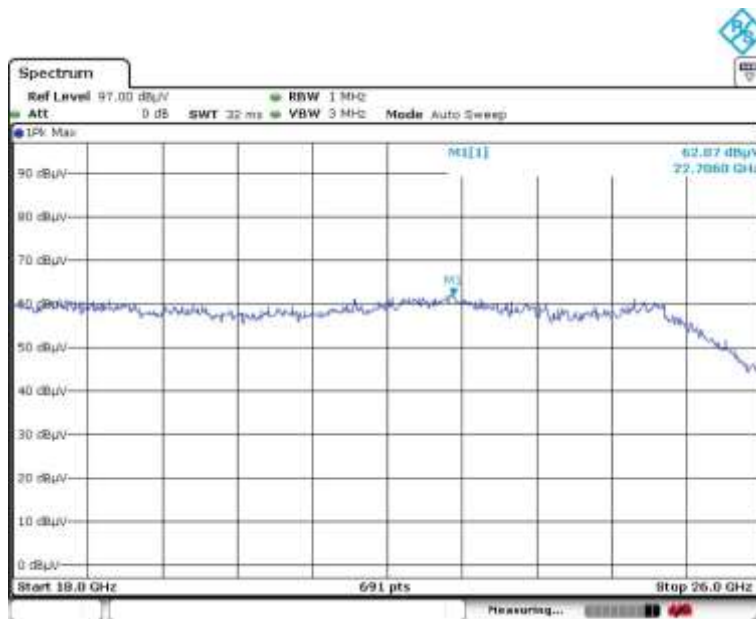
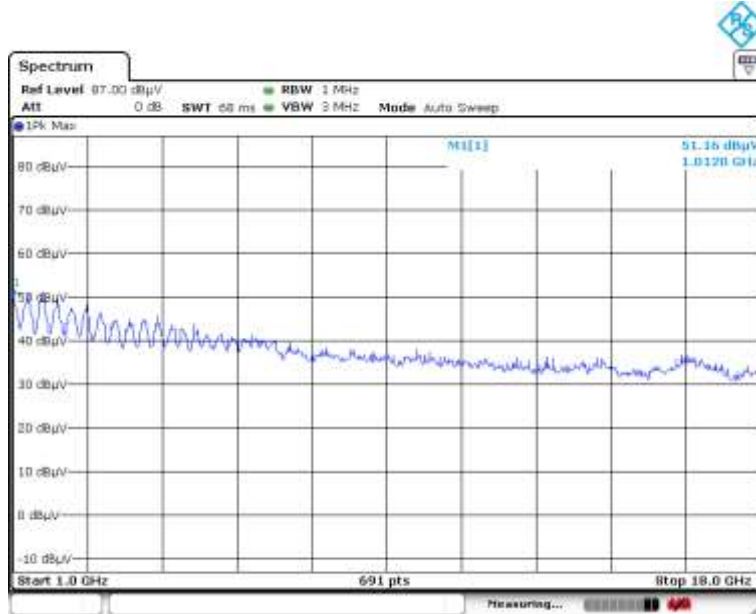


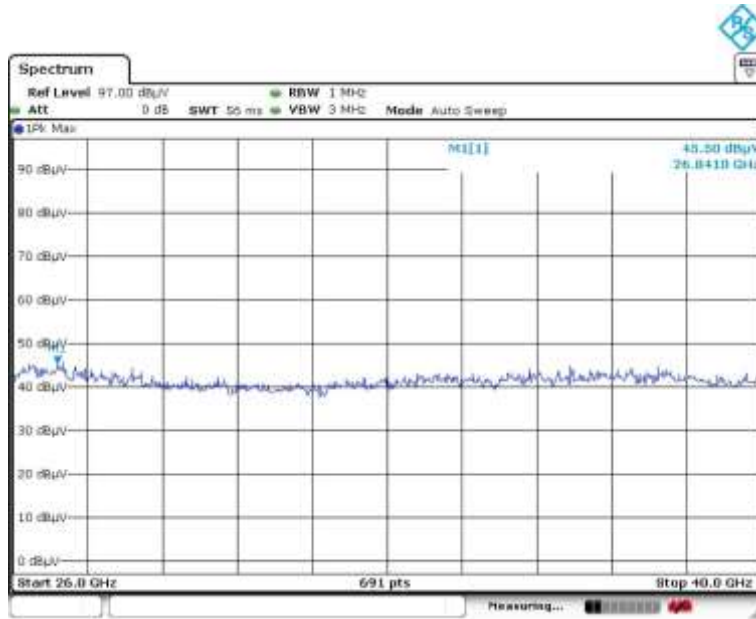
Operation mode: UNII-2A(n_HT40) 2TX worst case
* channel(5 310 MHz)





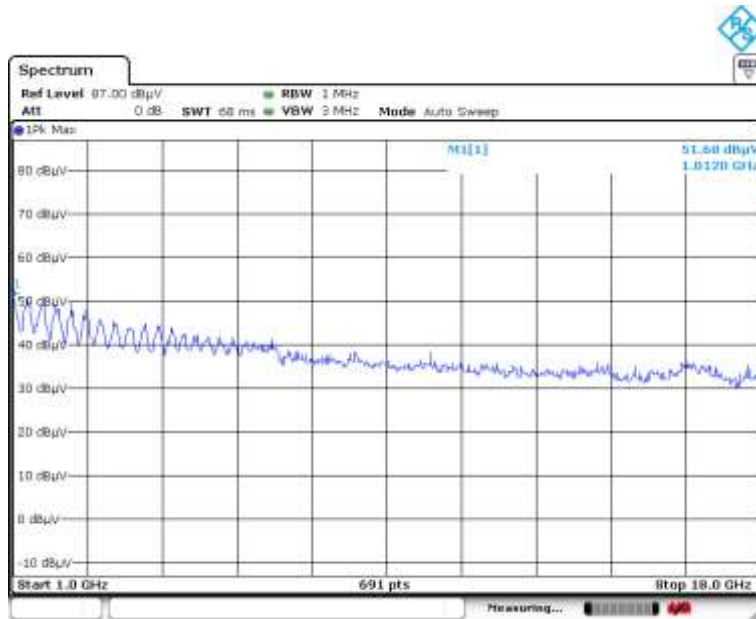
Operation mode: UNII-2C(802.11a) 1TX worst case
* channel(5 500 MHz)

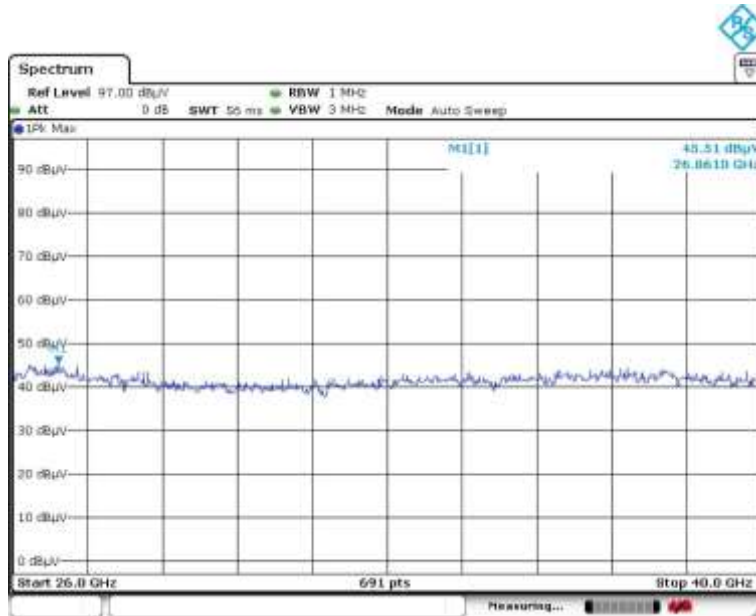
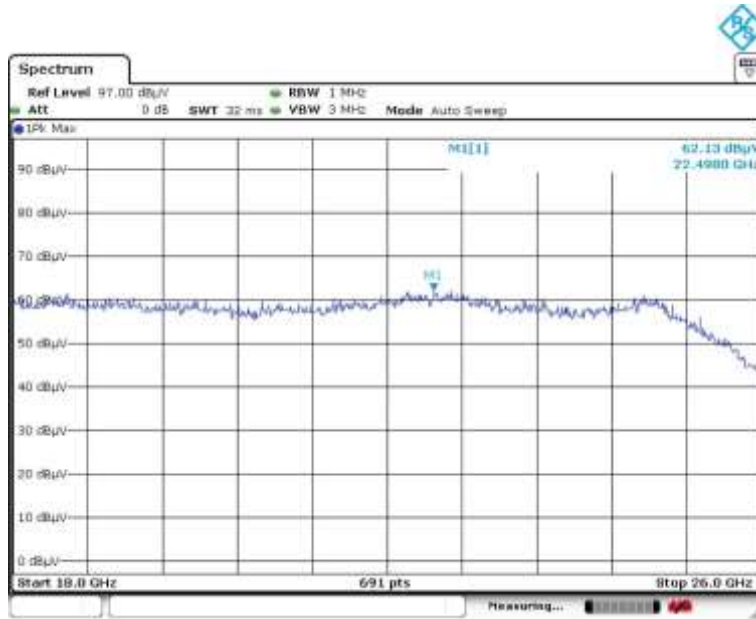




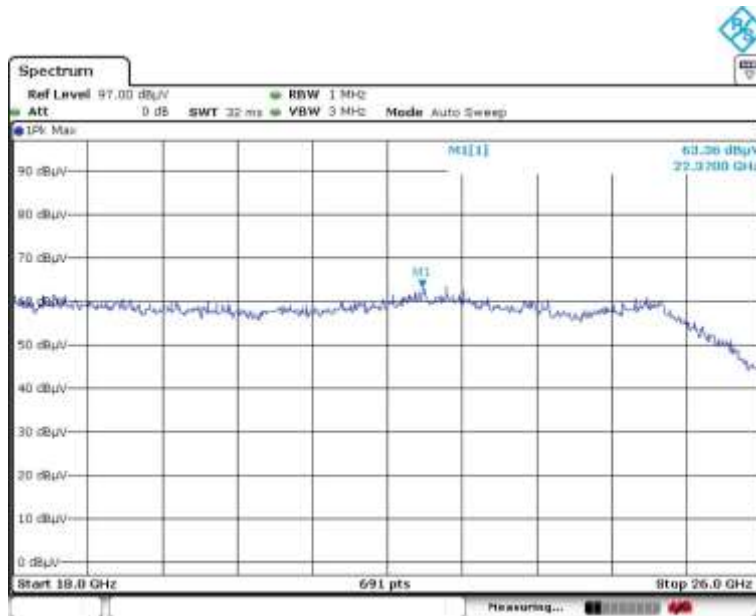
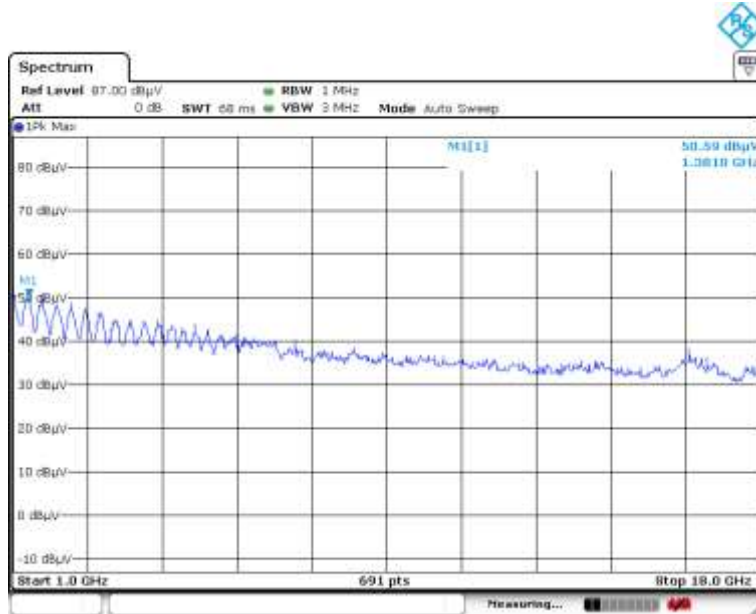
Operation mode: UNII-2C(n_HT20) 2TX worst case

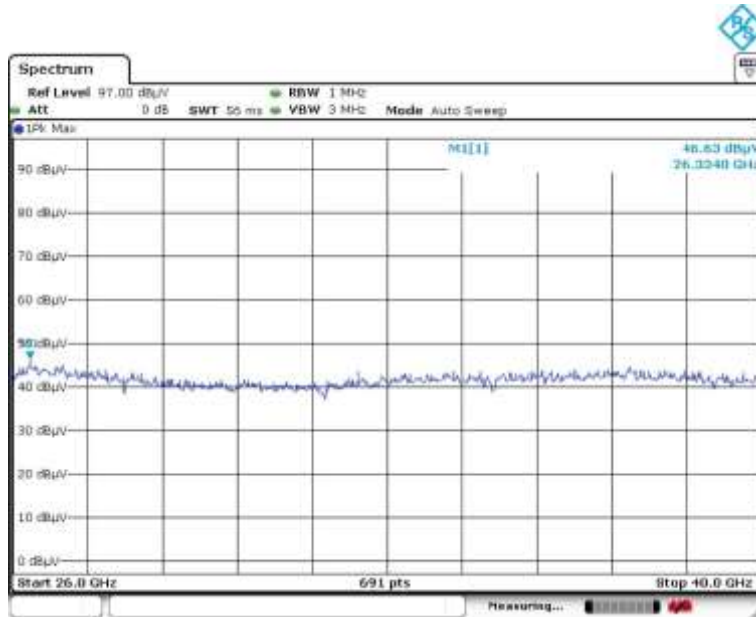
* channel(5 500 MHz)



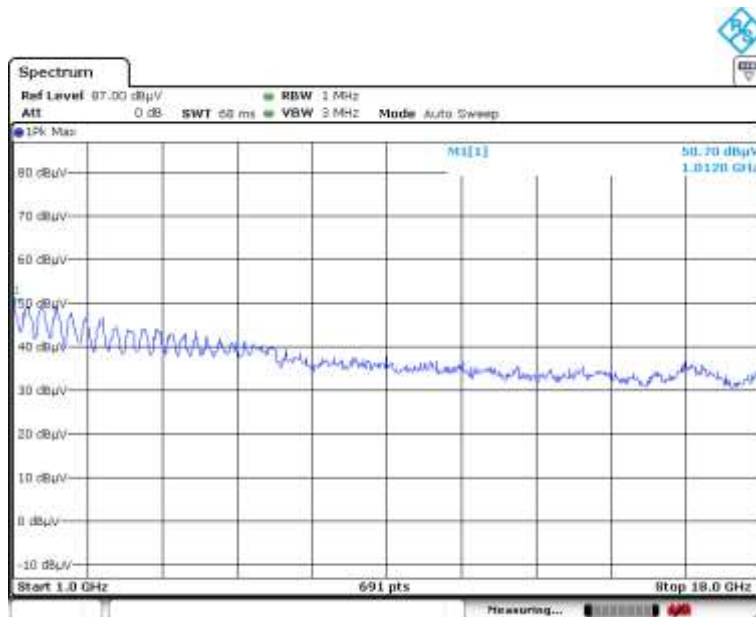


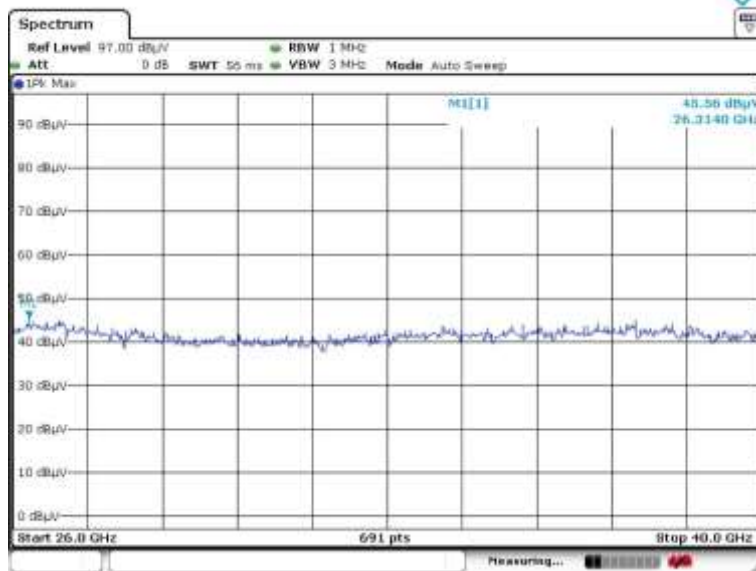
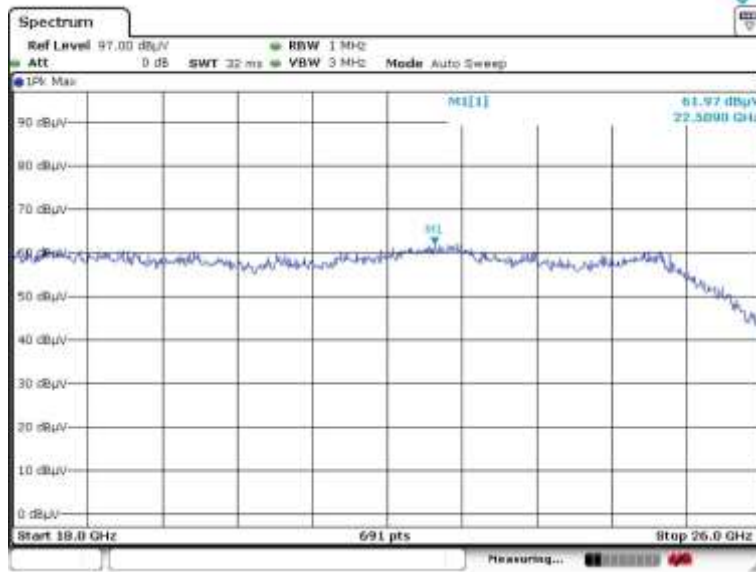
Operation mode: UNII-2C(n_HT40) 2TX worst case
* channel(5 510 MHz)



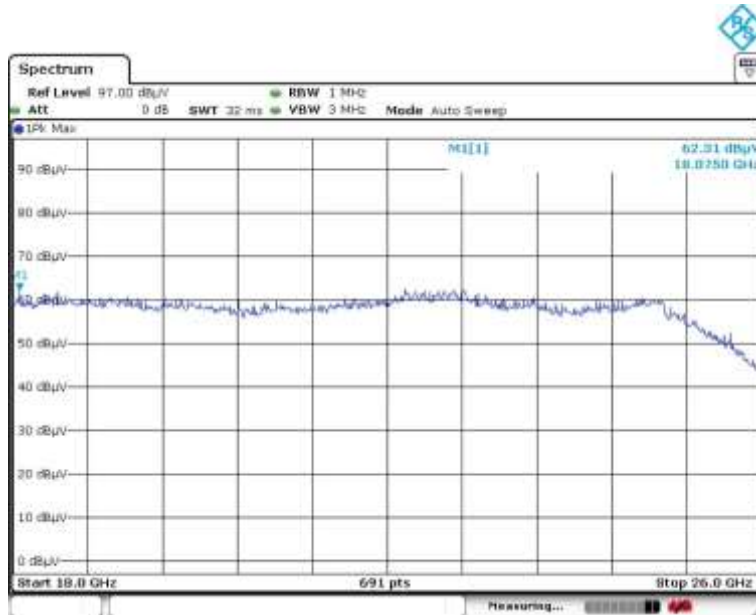
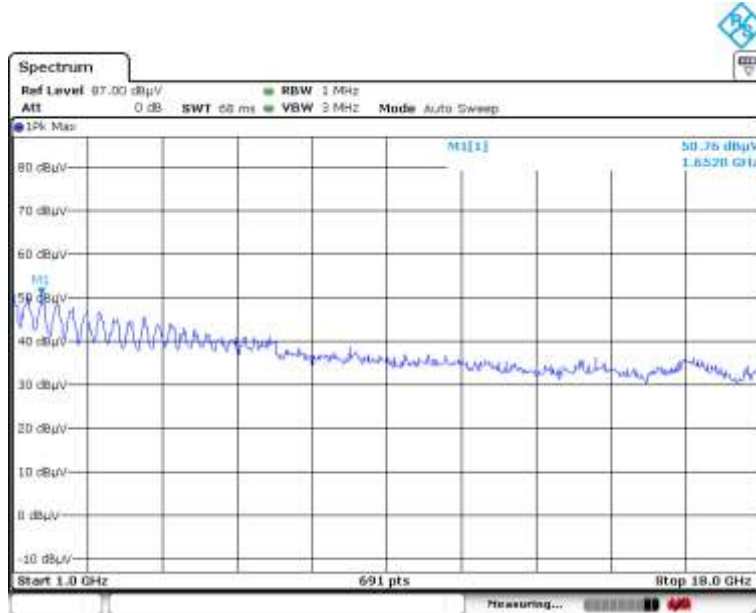


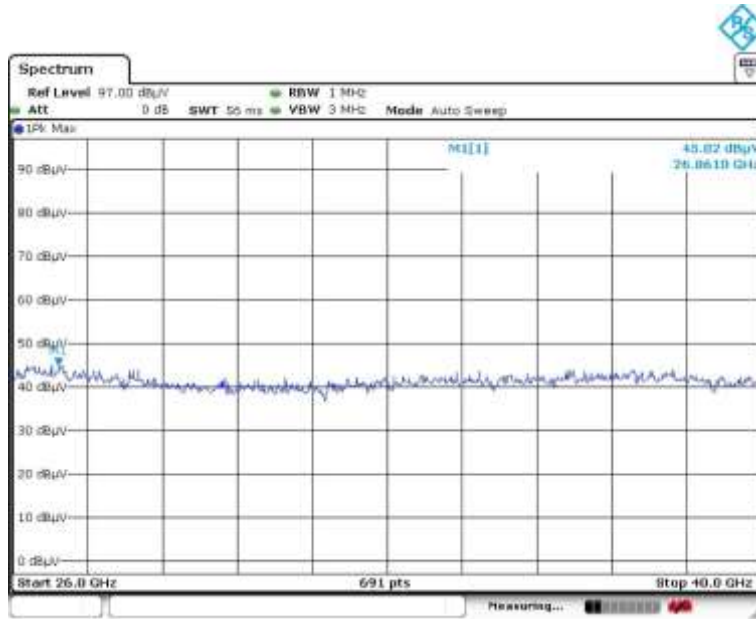
Operation mode: UNII-3(802.11a) 1TX worst case
* channel(5 745 MHz)



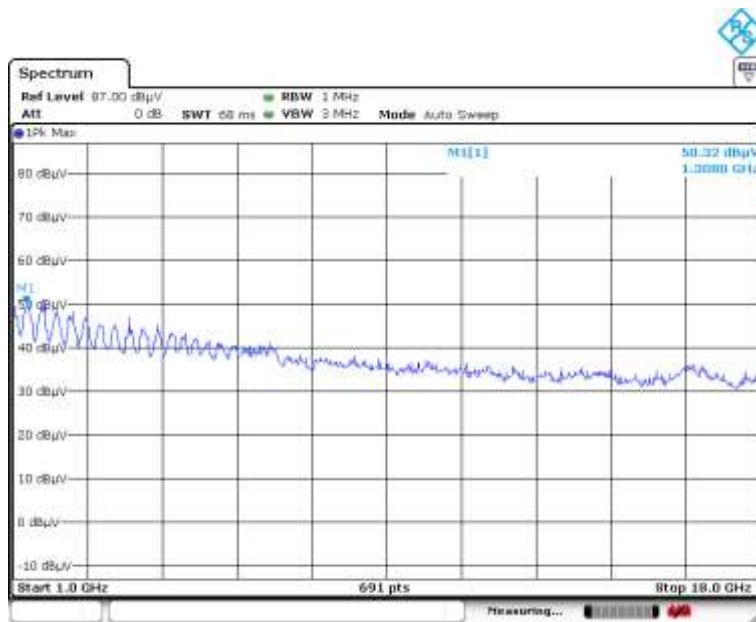


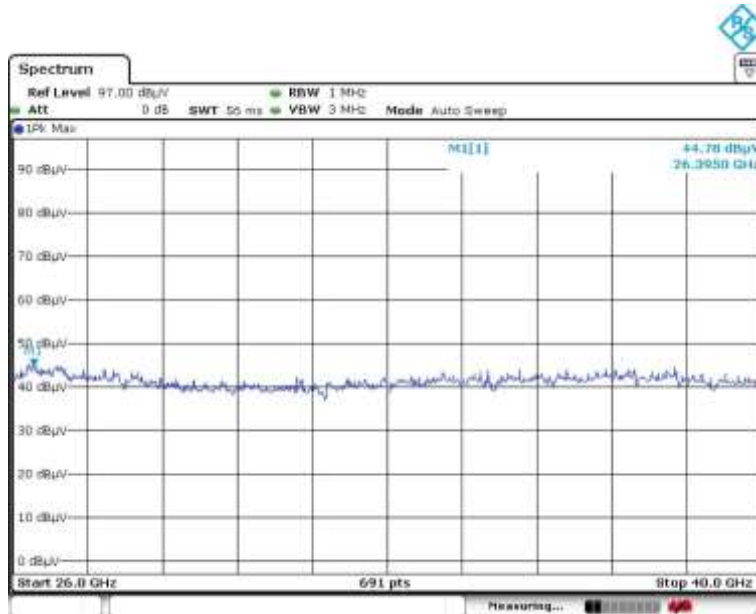
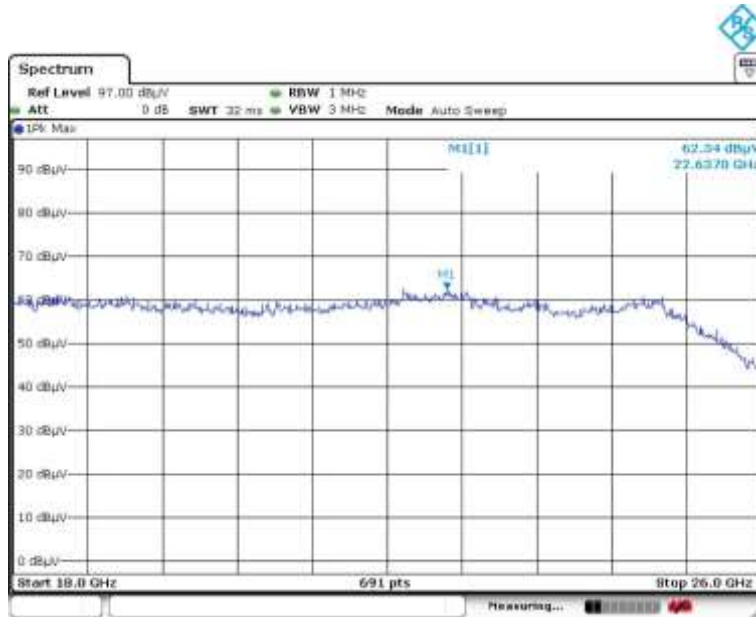
Operation mode: UNII-3(n_HT20) 2TX worst case
* channel(5 745 MHz)





Operation mode: UNII-3(n_HT40) 2TX worst case
*channel(5 755 MHz)





4.4.5. Restricted Band

Operation mode: UNII-1(802.11a) worst case

* channel(5 180 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5146.60	78.40	Peak	H	32.89	45.06	66.23	74.00	7.77
5129.60	61.49	Peak	V	32.89	45.06	49.32	74.00	24.68

Operation mode: UNII-1(n_HT20) worst case

* channel(5 180 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5143.60	63.35	Peak	H	32.89	45.06	51.18	74.00	22.82
5086.60	61.58	Peak	V	32.89	45.06	49.41	74.00	24.59

Operation mode: UNII-1(n_HT40) worst case

* channel(5 190 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5146.60	76.88	Peak	H	32.89	45.06	64.71	74.00	9.29
5051.70	60.70	Peak	V	32.89	45.06	48.53	74.00	25.47

Operation mode: UNII-2A(802.11a) worst case

* channel(5 320 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5350.00	79.84	Peak	H	33.86	45.06	68.64	74.00	5.36
5365.68	59.54	Peak	V	33.86	45.06	48.34	74.00	25.66

Operation mode: UNII-2A(n_HT20) worst case
*** channel(5 320 MHz)**

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5352.22	76.51	Peak	H	33.86	45.06	65.31	74.00	8.69
5368.07	61.43	Peak	V	33.86	45.06	50.23	74.00	23.77

Operation mode: UNII-2A(n_HT40) worst case
*** channel(5 310 MHz)**

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5350.00	63.17	Peak	H	33.86	45.06	51.97	74.00	22.03
5363.24	62.38	Peak	V	33.86	45.06	51.18	74.00	22.82

Operation mode: UNII-2C(802.11a) worst case
*** channel(5 500 MHz)**

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5456.45	62.18	Peak	H	33.86	45.06	50.98	74.00	23.02
5457.84	59.81	Peak	V	33.86	45.06	48.61	74.00	25.39

Operation mode: UNII-2C(n_HT20) worst case
*** channel(5 500 MHz)**

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5452.51	61.68	Peak	H	33.86	45.06	50.48	74.00	23.52
5458.76	59.35	Peak	V	33.86	45.06	48.15	74.00	25.85

Operation mode: UNII-2C(n_HT40) worst case
*** channel(5 510 MHz)**

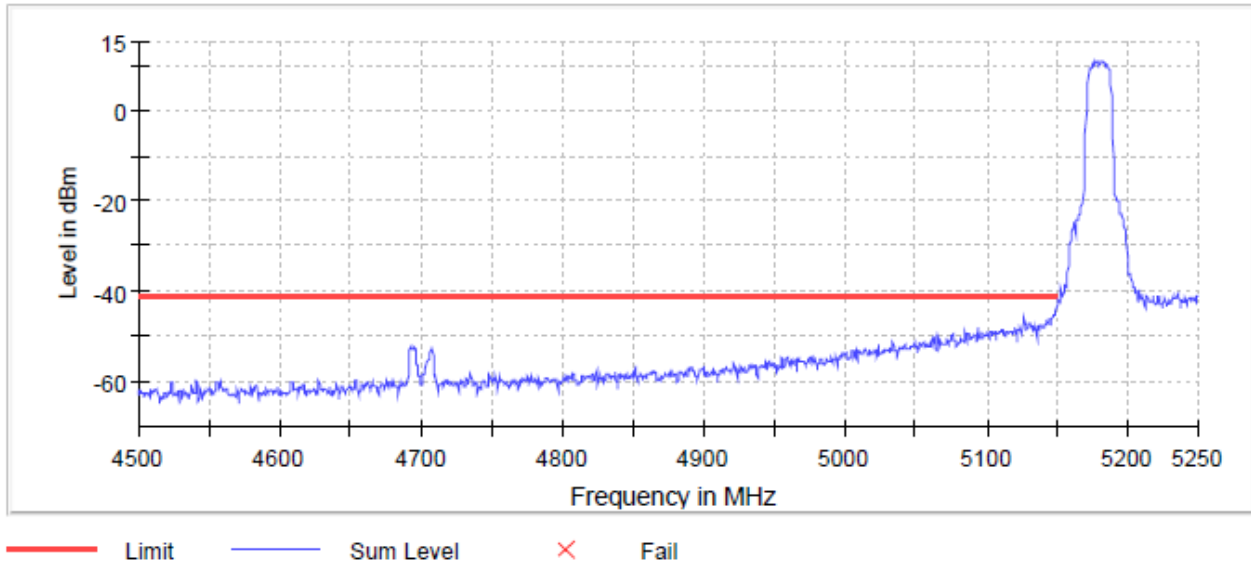
Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detector mode	Pol.	Ant. factor (dB/m)	Amp+CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5456.22	62.31	Peak	H	33.86	45.06	51.11	74.00	22.89
5452.28	59.15	Peak	V	33.86	45.06	47.95	74.00	26.05

4.4.6. Out of Band-edge Measurement.

Test plots

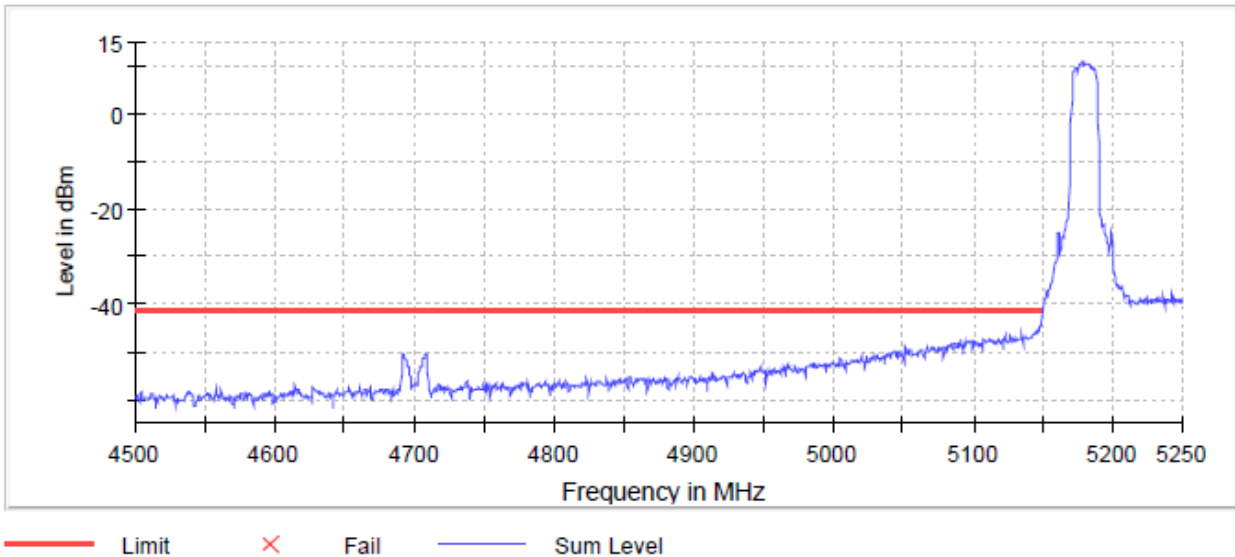
Operation mode: UNII-1(802.11a) 1TX worst case

* channel(5 180 MHz)



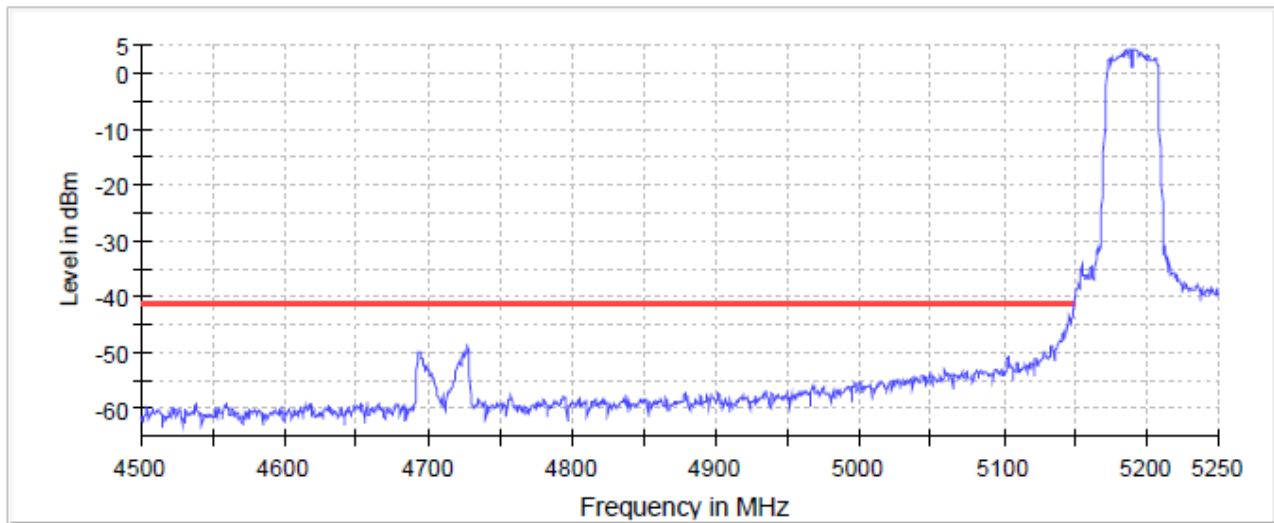
Operation mode: UNII-1(n_HT20) 2TX worst case

* channel(5 180 MHz)



Operation mode: UNII-1(n_HT40) 2TX worst case

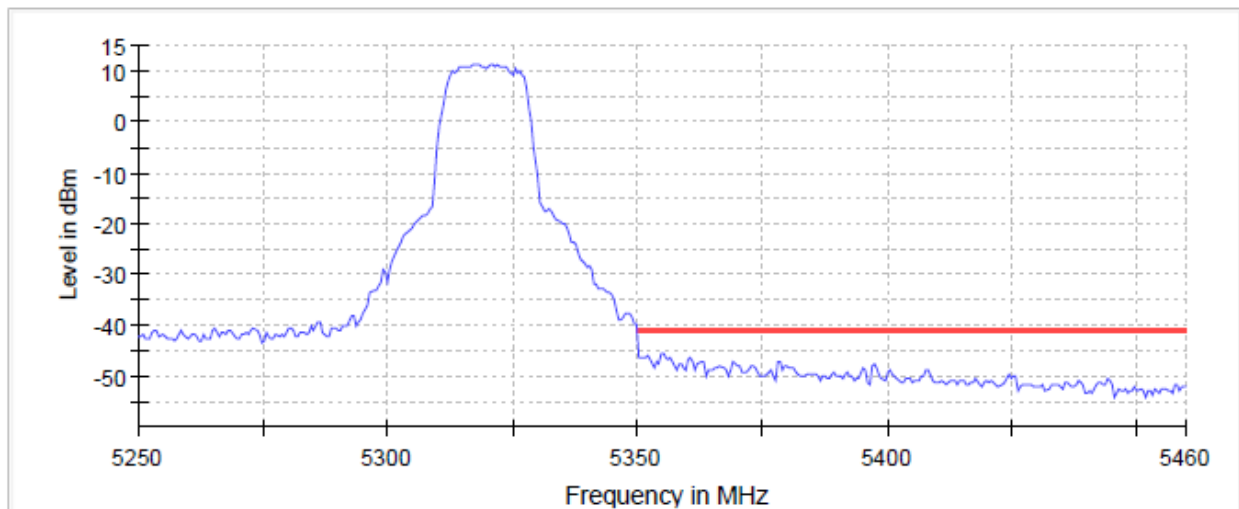
* channel(5 190 MHz)



— Limit × Fail — Sum Level

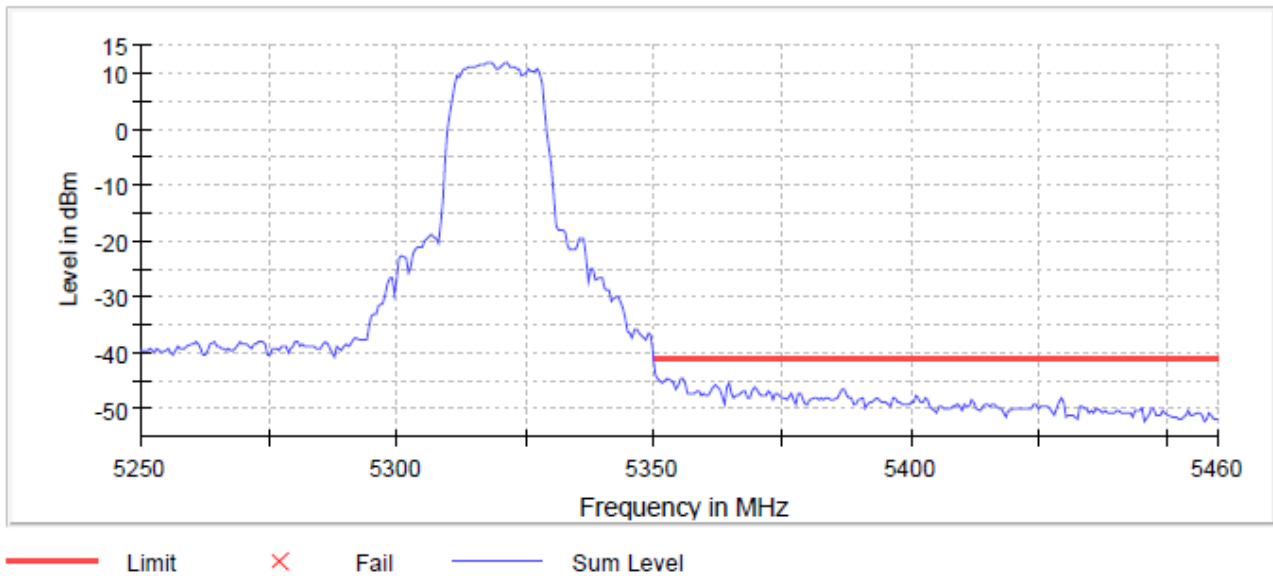
Operation mode: UNII-2A(802.11a) 1TX worst case

* channel(5 320 MHz)

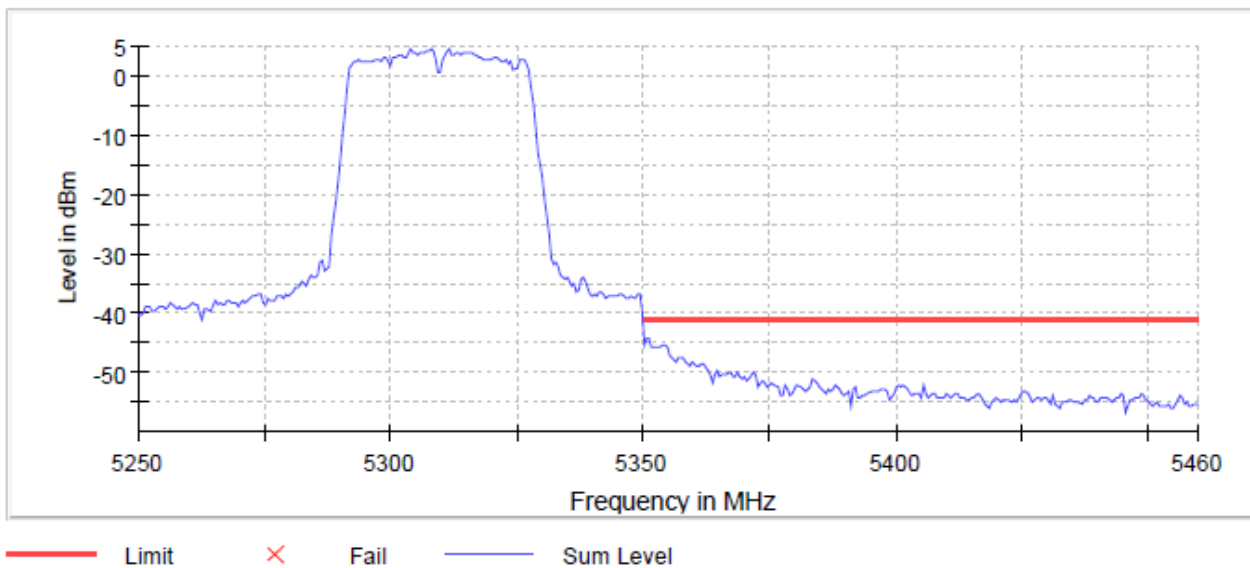


— Limit — Sum Level × Fail

Operation mode: UNII-2A(n_HT20) 2TX worst case
* channel(5 320 MHz)

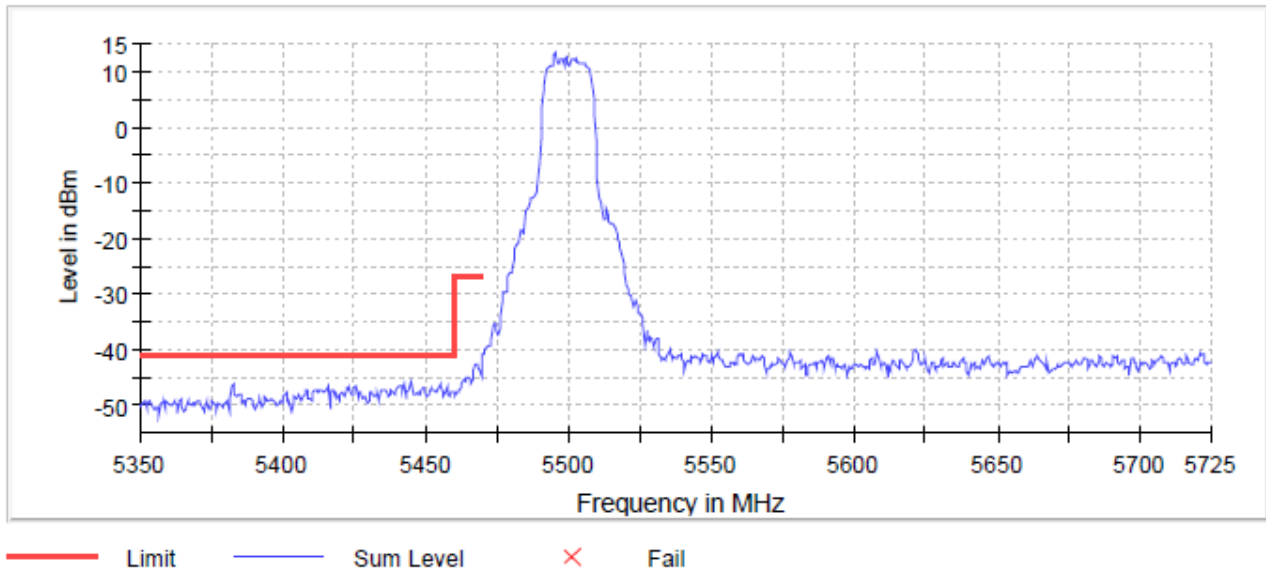


Operation mode: UNII-2A(n_HT40) 2TX worst case
* channel(5 310 MHz)



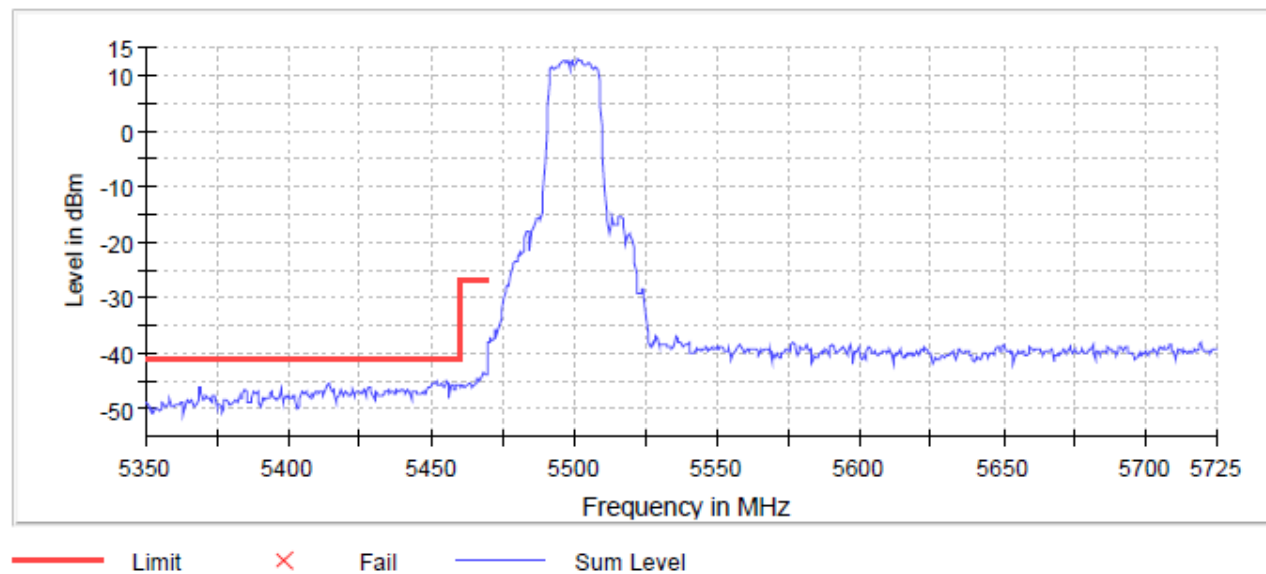
Operation mode: UNII-2C(802.11a) 1TX worst case

* channel(5 500 MHz)



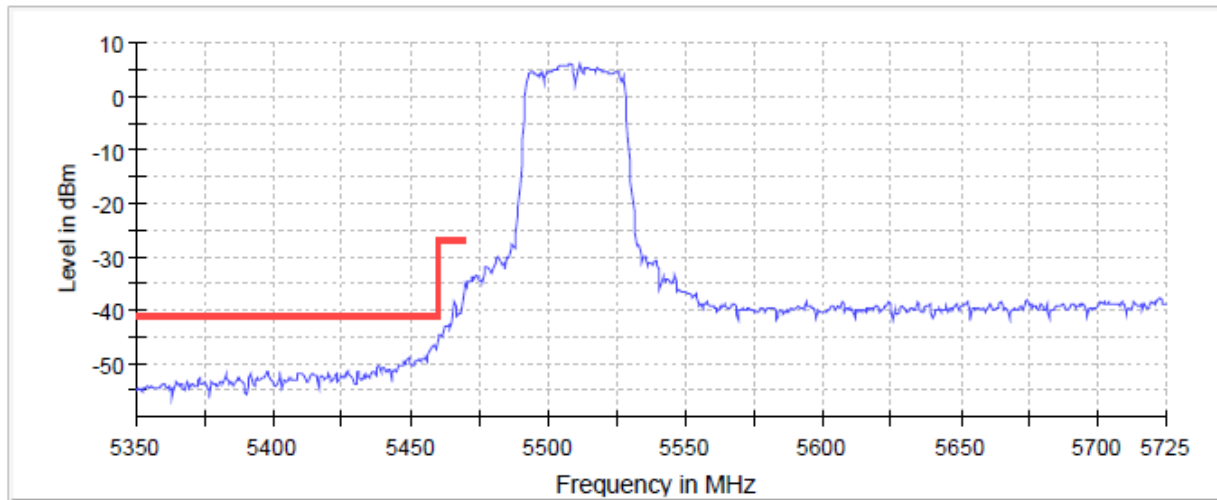
Operation mode: UNII-2C(n_HT20) 2TX worst case

* channel(5 500 MHz)



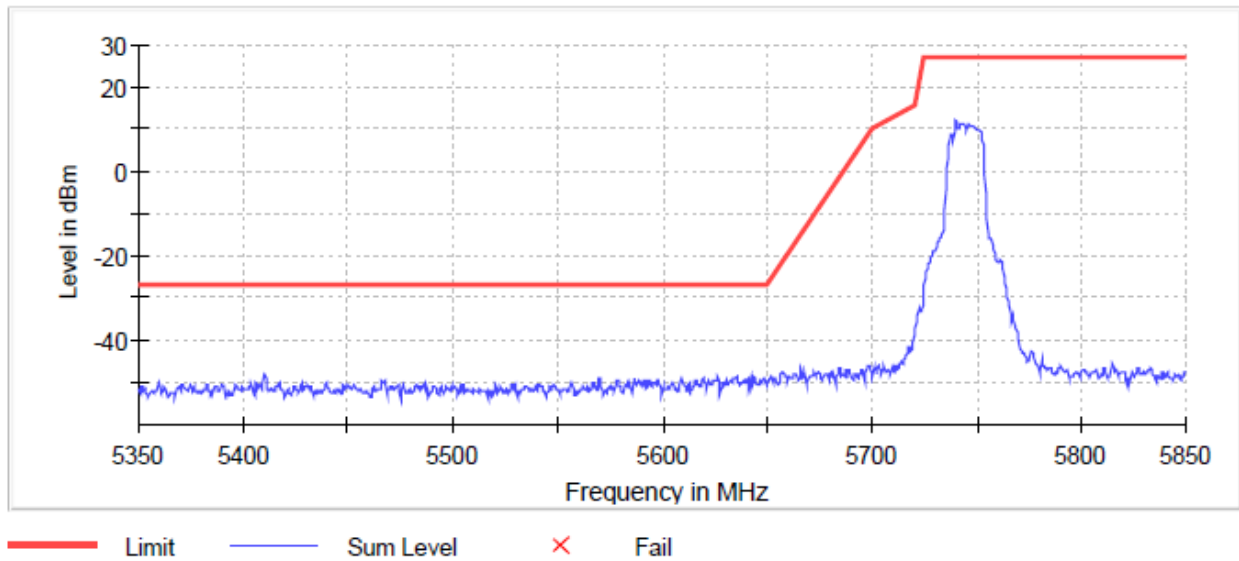
Operation mode: UNII-2C(n_HT40) 2TX worst case

* channel(5 510 MHz)

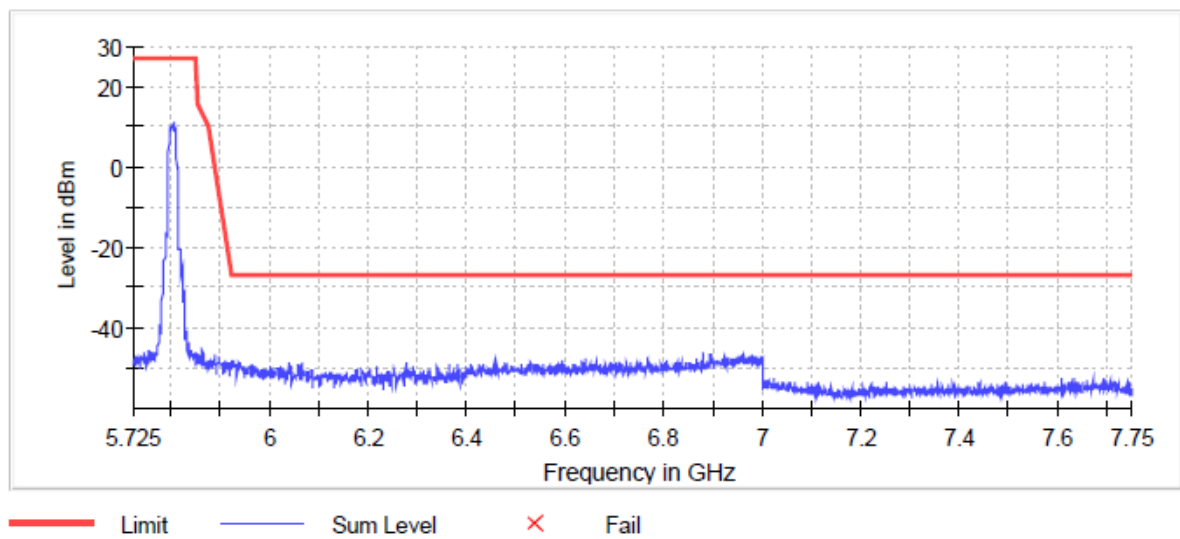


Operation mode: UNII-3(802.11a) 1TX worst case

* Low channel(5 745 MHz)

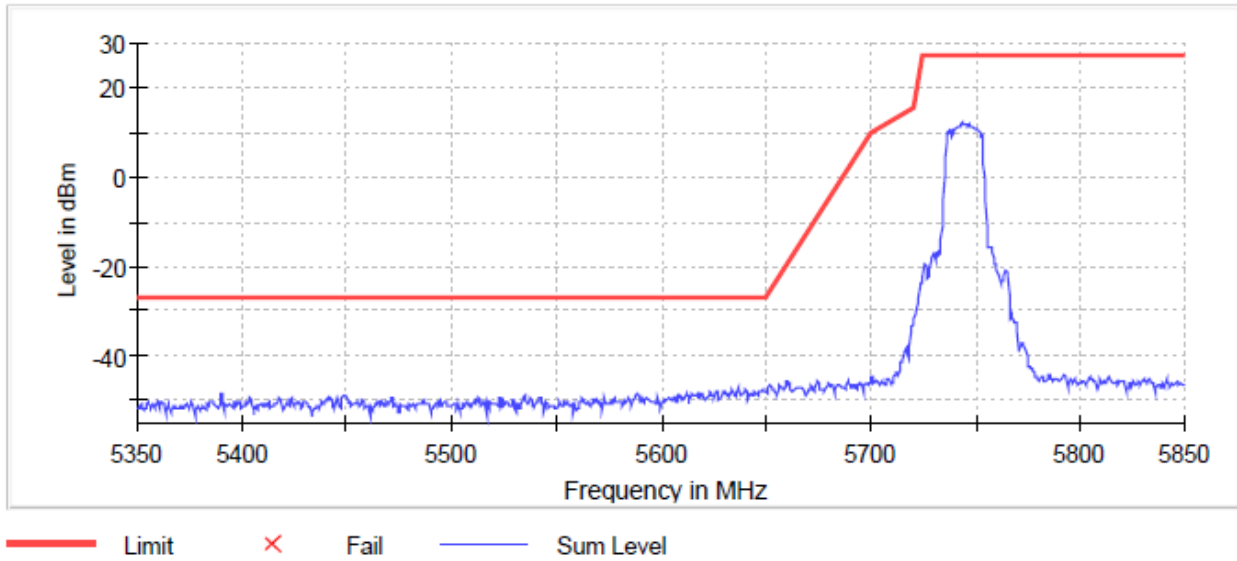


* High channel(5 805 MHz)

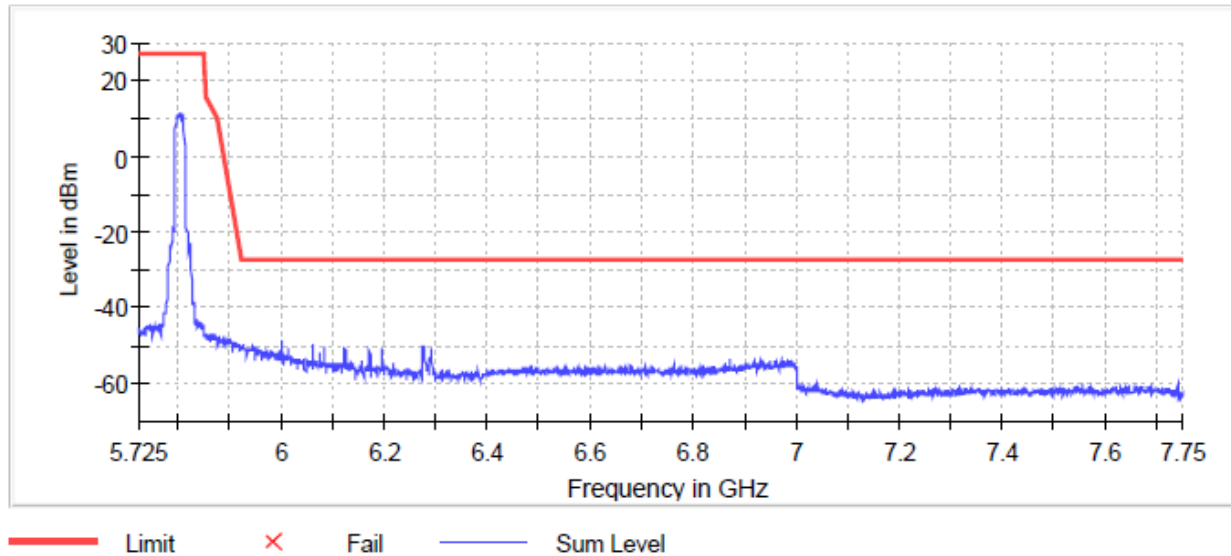


Operation mode: UNII-3(n_HT20) 2TX worst case

* Low channel(5 745 MHz)

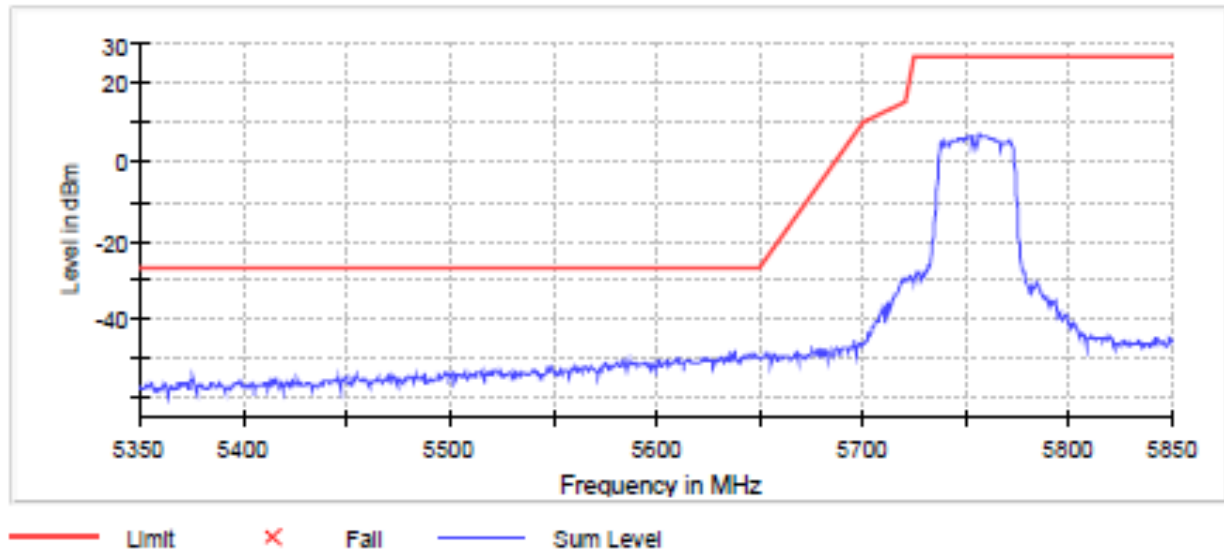


* High channel(5 805 MHz)

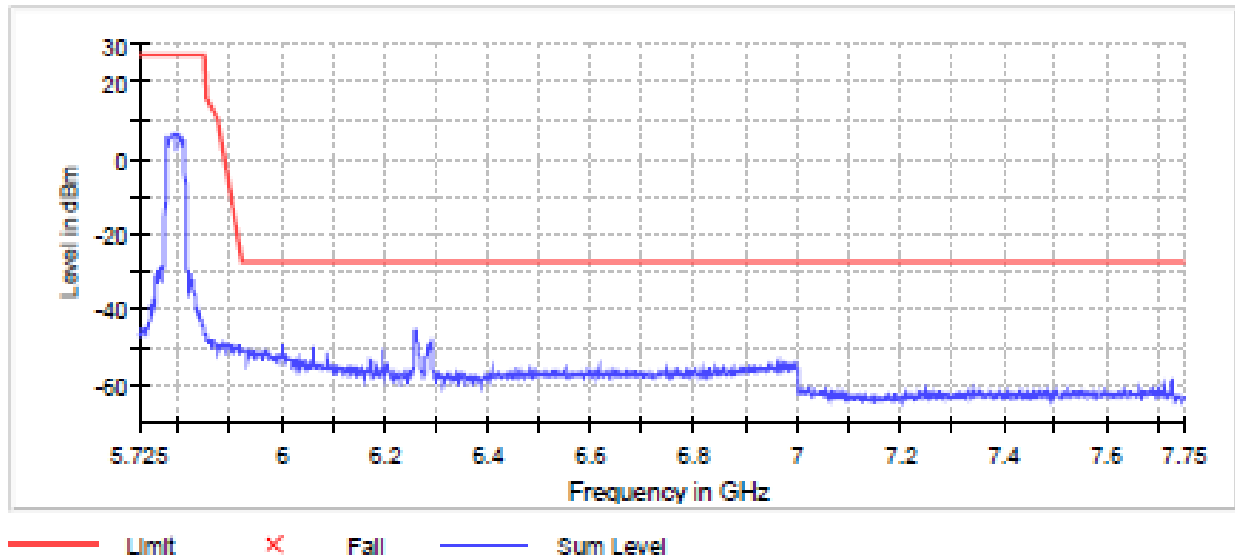


Operation mode: UNII-3(n_HT40) 2TX worst case

* Low channel(5 755 MHz)

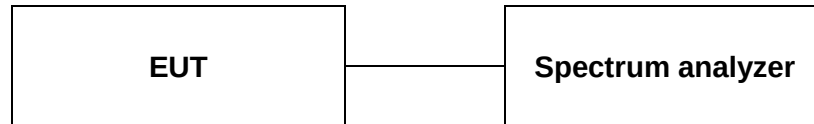


* High channel(5 795 MHz)



5. 26 dB and 99% bandwidth

5.1. Test setup



5.2. Limit

Not applicable

5.3. Test procedure (KDB 789033)

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to $X = 26$. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.

2. Set the spectrum analyzer as,

- 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%.

3. Repeat until all the rest channels are investigated.

5.4. Test results

Ambient temperature: 21°C

Relative humidity: 45% R.H.

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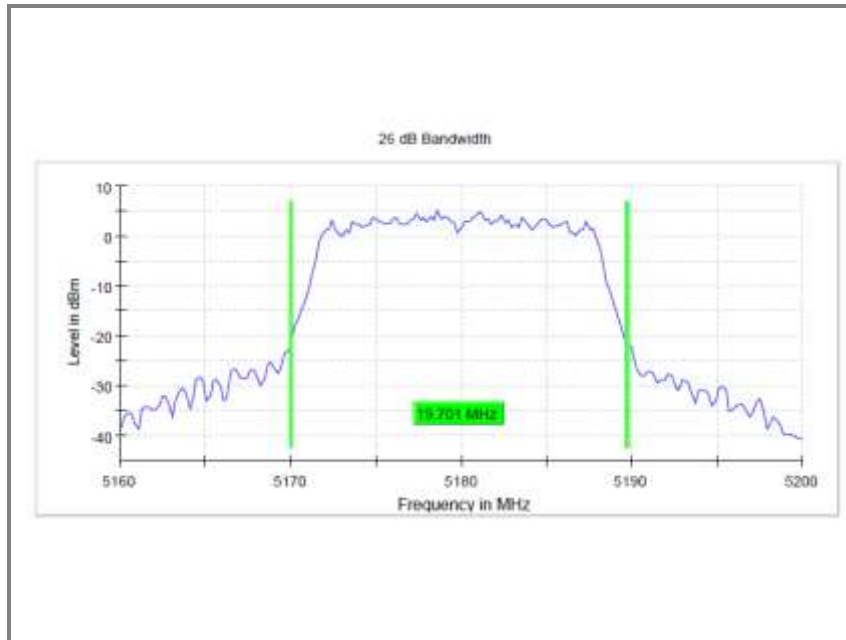
The worst case test data

Mode	Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
U-NII-1(802.11a)	5 180	19.70	16.72
	5 220	19.70	16.72
	5 240	19.70	16.72
U-NII-1(n_HT20)	5 180	20.30	17.71
	5 220	20.10	17.71
	5 240	20.30	17.71
U-NII-1(n_HT40)	5 190	40.30	35.82
	5 230	40.00	85.82
U-NII-2A(802.11a)	5 260	19.70	16.72
	5 300	19.70	16.72
	5 320	19.70	16.72
U-NII-2A(n_HT20)	5 260	20.10	17.71
	5 300	20.10	17.71
	5 320	20.30	17.71
U-NII-2A(n_HT40)	5 270	40.30	35.82
	5 310	40.00	35.82
U-NII-2C(802.11a)	5 500	20.70	16.72
	5 560	20.70	16.72
	5 620	20.70	16.72
U-NII-2C(n_HT20)	5 500	21.29	17.71
	5 560	20.30	17.71
	5 620	20.50	17.71
U-NII-2C(n_HT40)	5 510	40.30	35.82
	5 550	40.30	35.82
	5 590	40.00	35.82

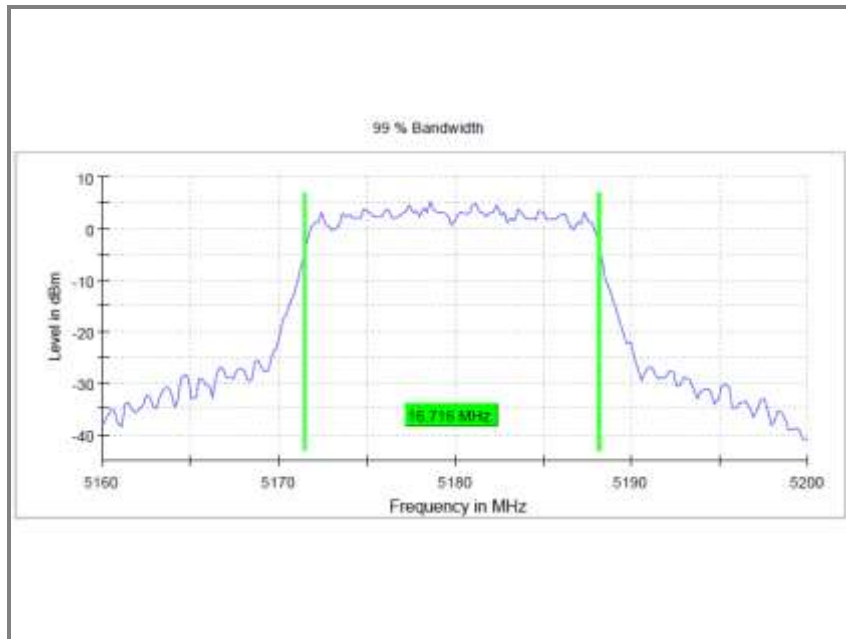
Mode	Frequency(MHz)	26 dB bandwidth(MHz)	99% bandwidth(MHz)
U-NII-3(802.11a)	5 745	20.70	16.72
	5 785	20.70	16.72
	5 805	20.30	16.72
U-NII-3(n_HT20)	5 745	20.30	17.71
	5 785	20.10	17.71
	5 805	20.30	17.71
U-NII-3(n_HT40)	5 755	40.00	35.82
	5 795	40.00	35.82

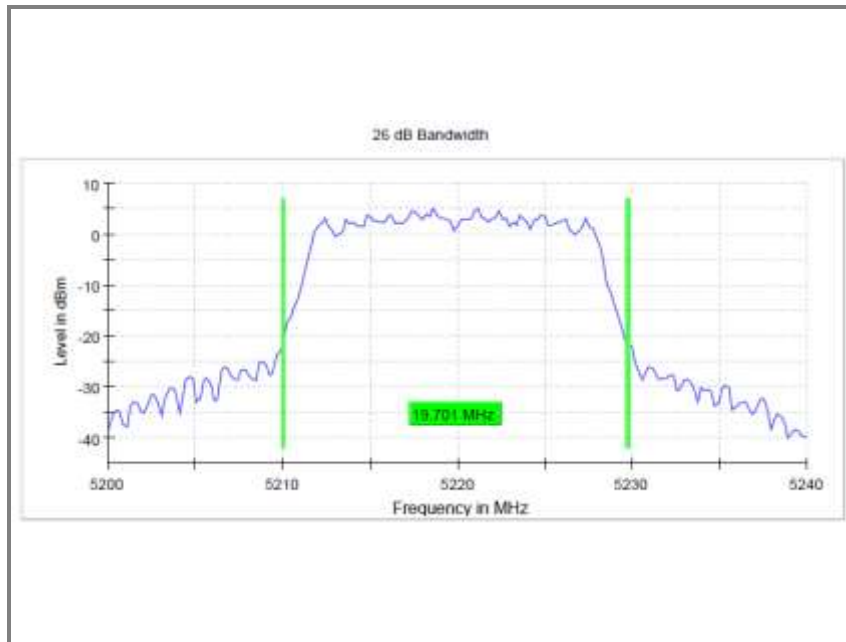
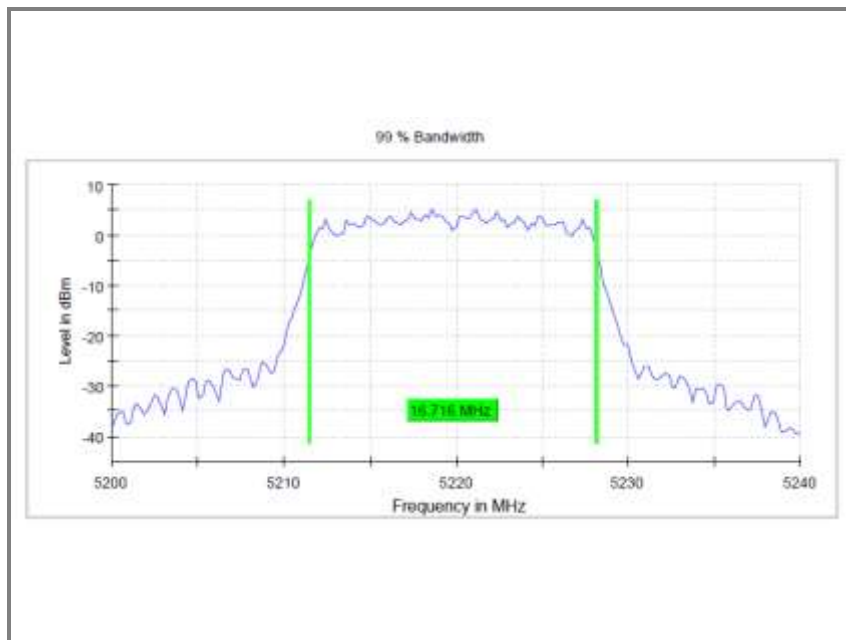
Operation mode: U-NII-1(802.11a)

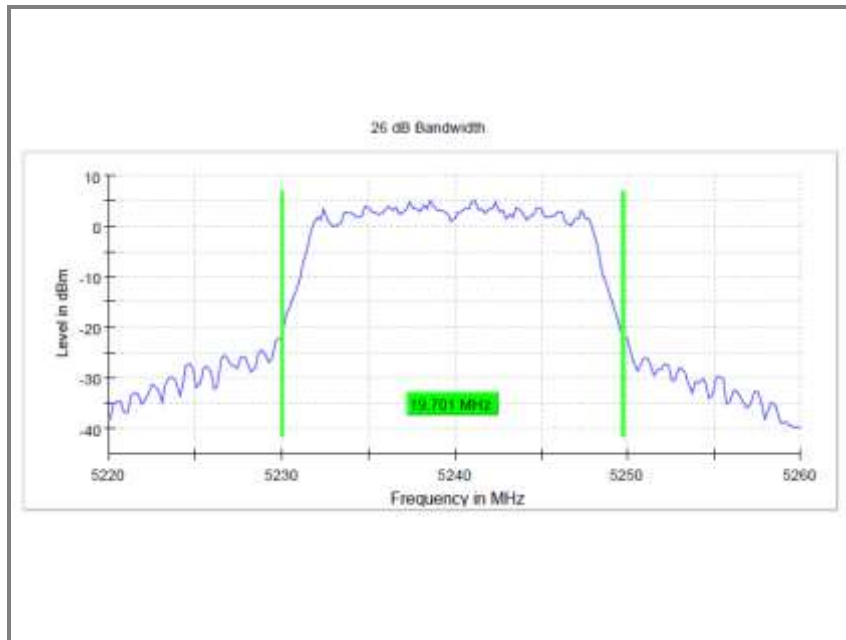
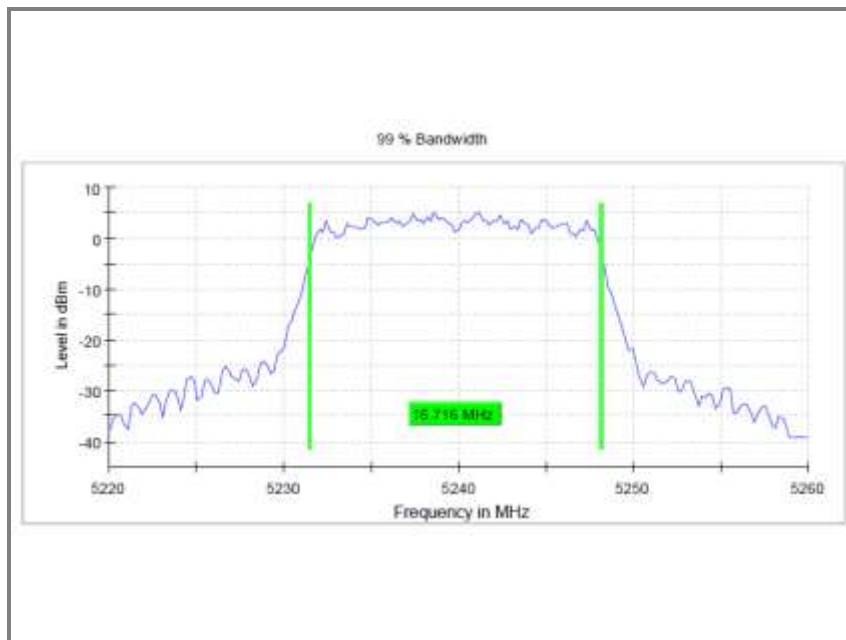
A. Low channel(5180 MHz)- 26 dB bandwidth



A. Low channel(5180 MHz)– 99% bandwidth

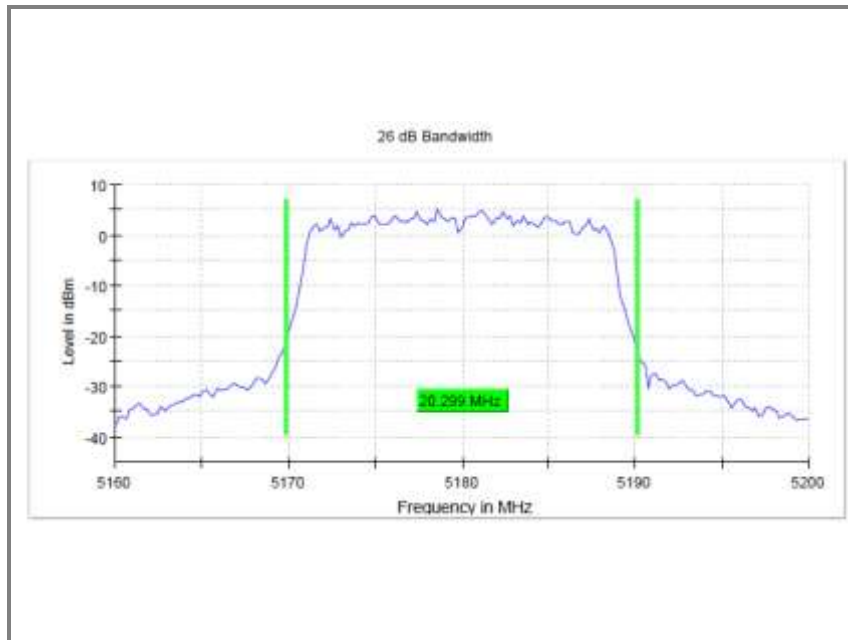


B. Middle channel(5220 MHz)- 26 dB bandwidth**B. Middle channel(5220 MHz)- 99% bandwidth**

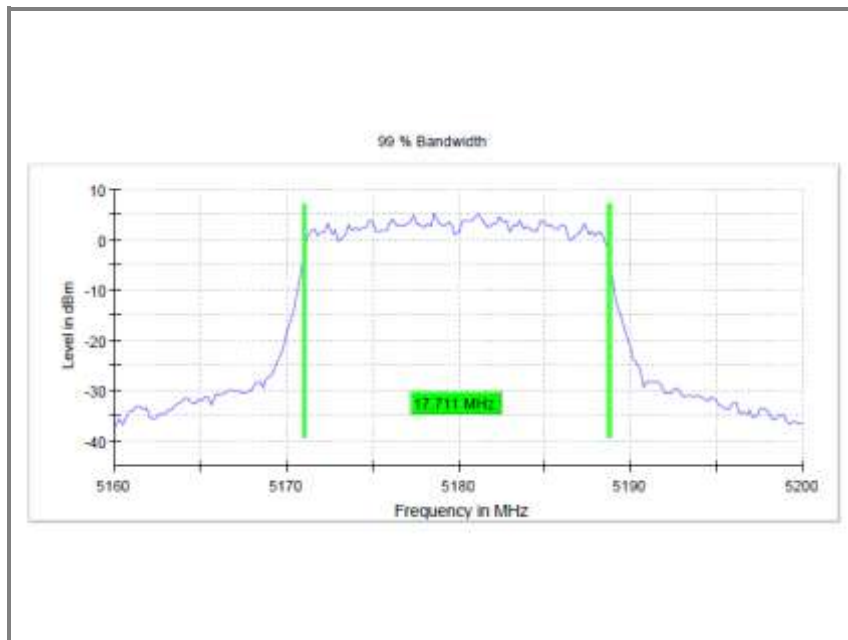
C. High channel(5240 MHz)- 26 dB bandwidth**C. High channel(5240 MHz)- 99% bandwidth**

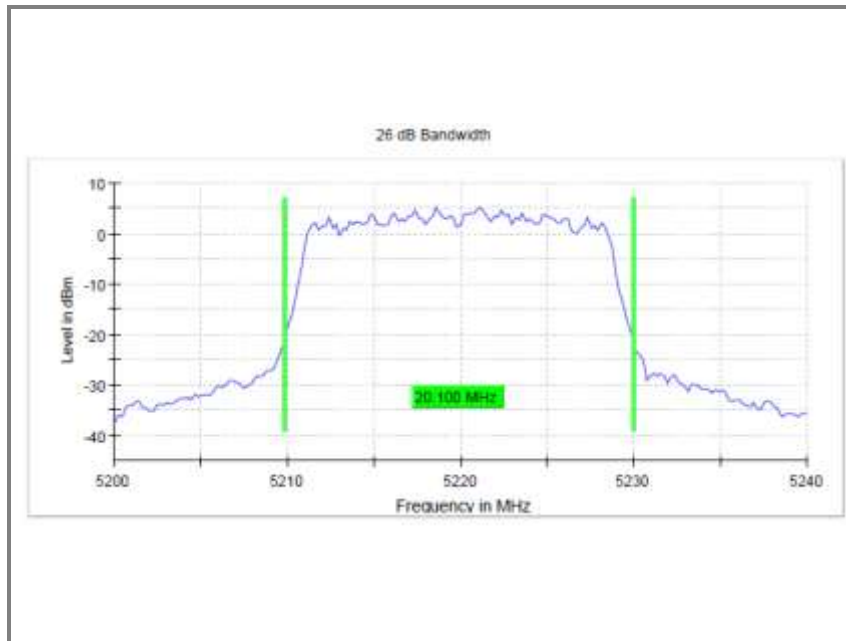
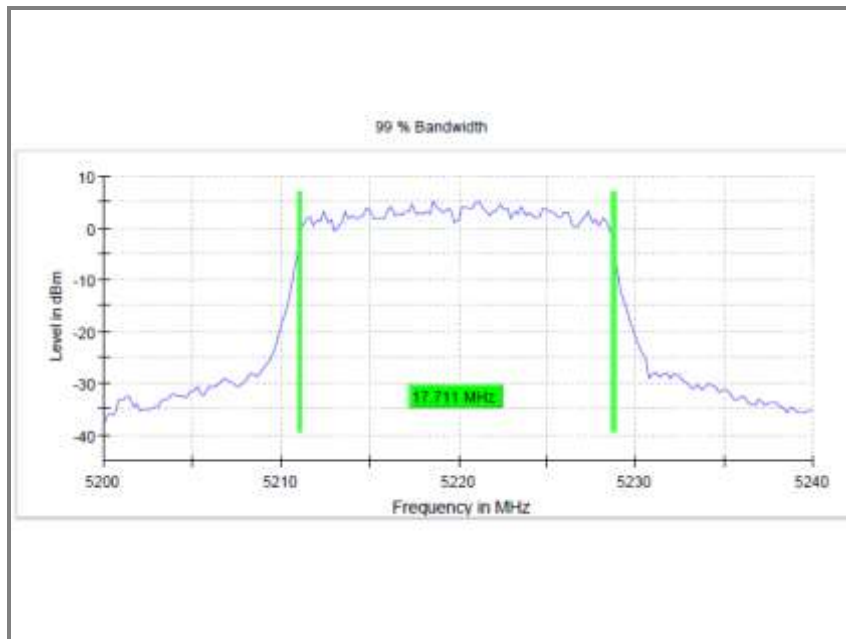
Operation mode: U-NII-1(n_HT20)

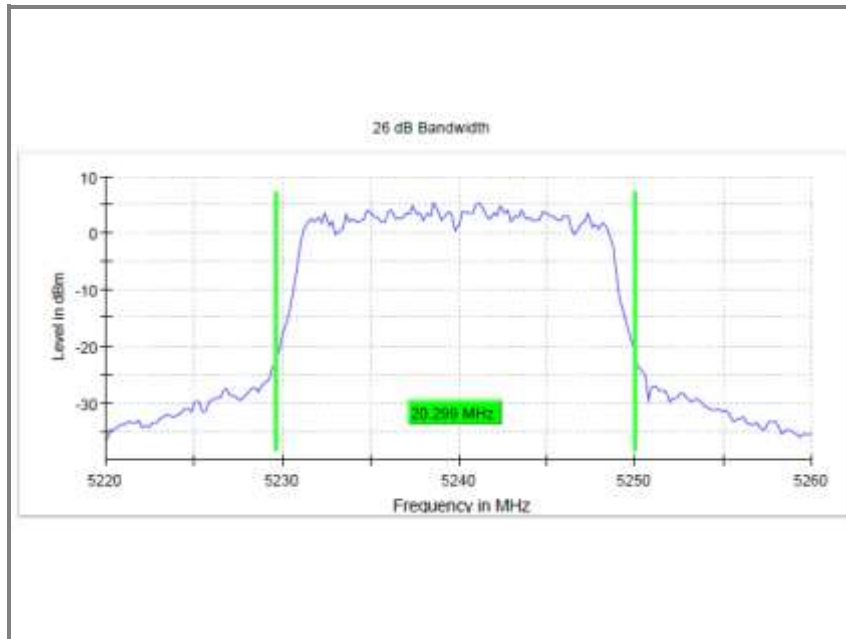
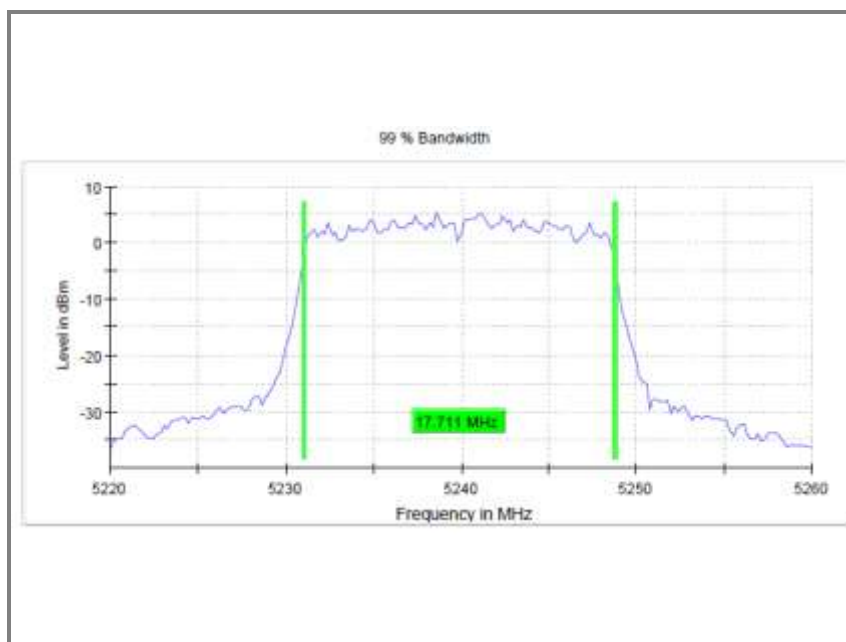
A. Low channel(5180 MHz)- 26 dB bandwidth



A. Low channel(5180 MHz)- 99% bandwidth

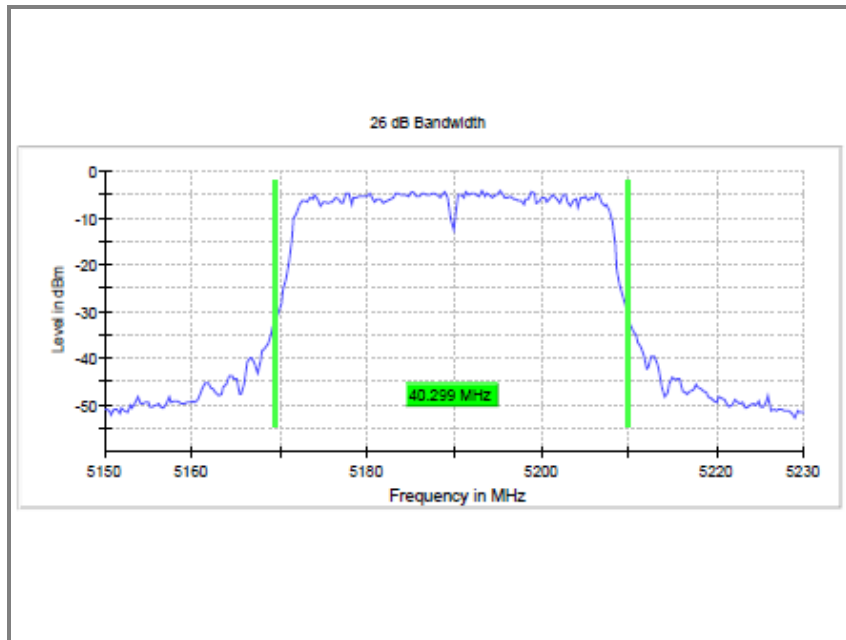


B. Middle channel(5220 MHz)- 26 dB bandwidth**B. Middle channel(5220 MHz)- 99% bandwidth**

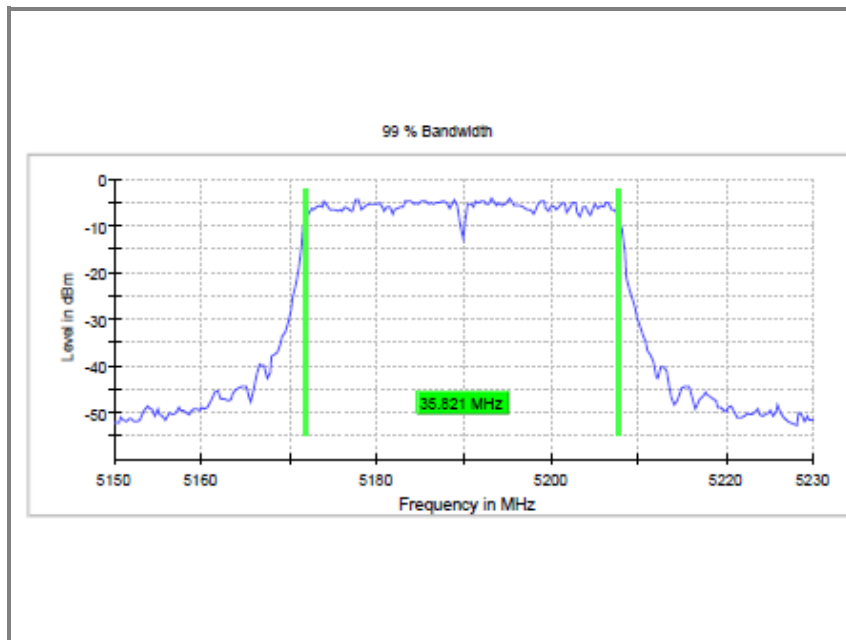
C. High channel(5240 MHz)- 26 dB bandwidth**C. High channel(5240 MHz)- 99% bandwidth**

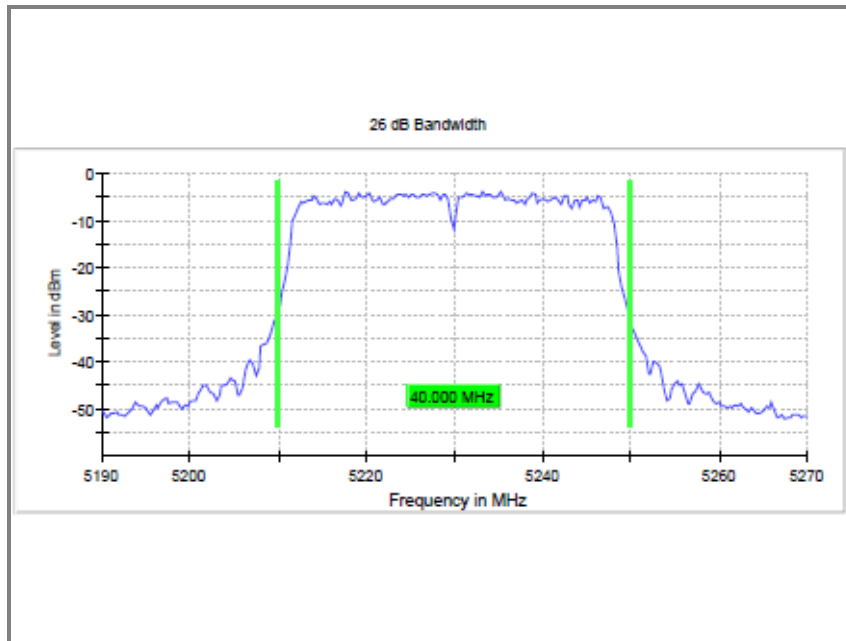
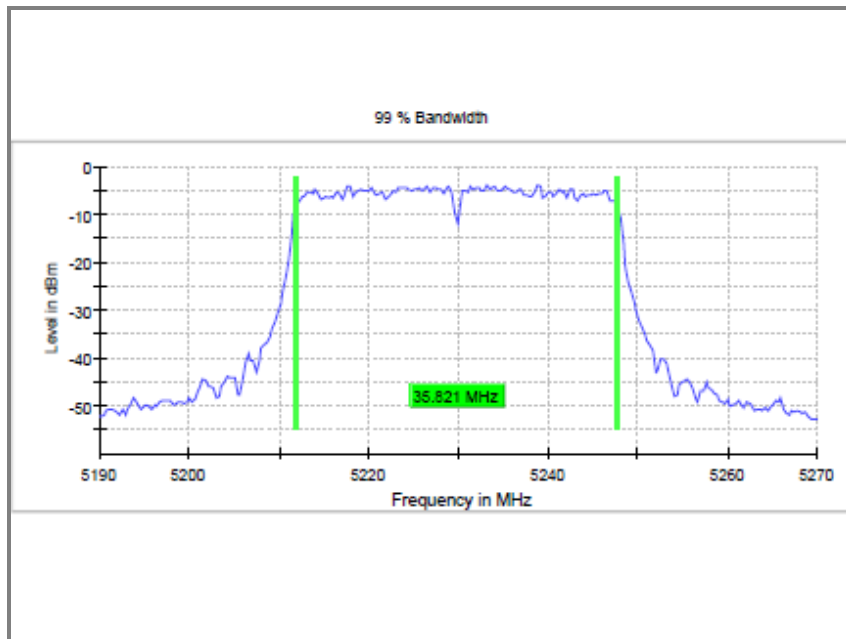
Operation mode: U-NII-1(n_HT40)

A. Low channel(5190 MHz)- 26 dB bandwidth



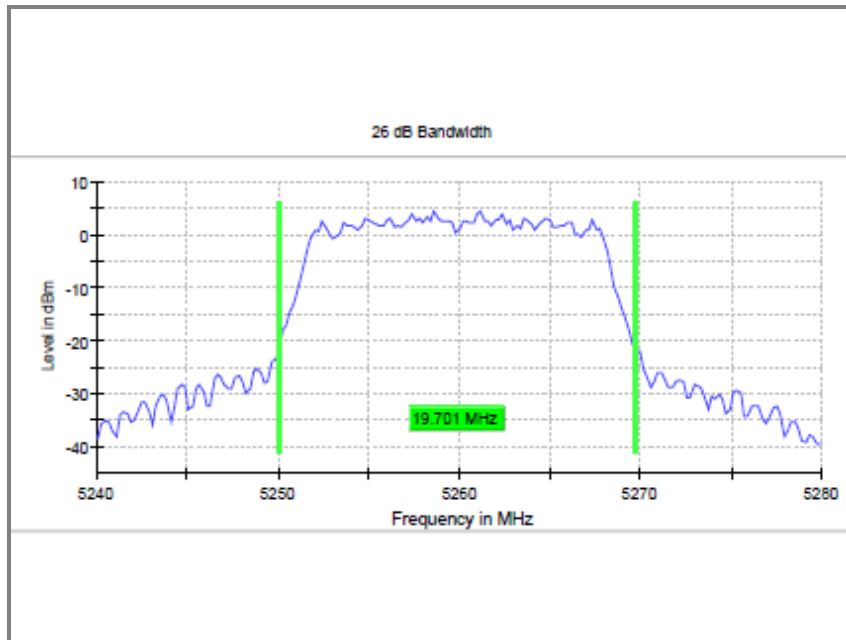
A. Low channel(5190 MHz)- 99% bandwidth



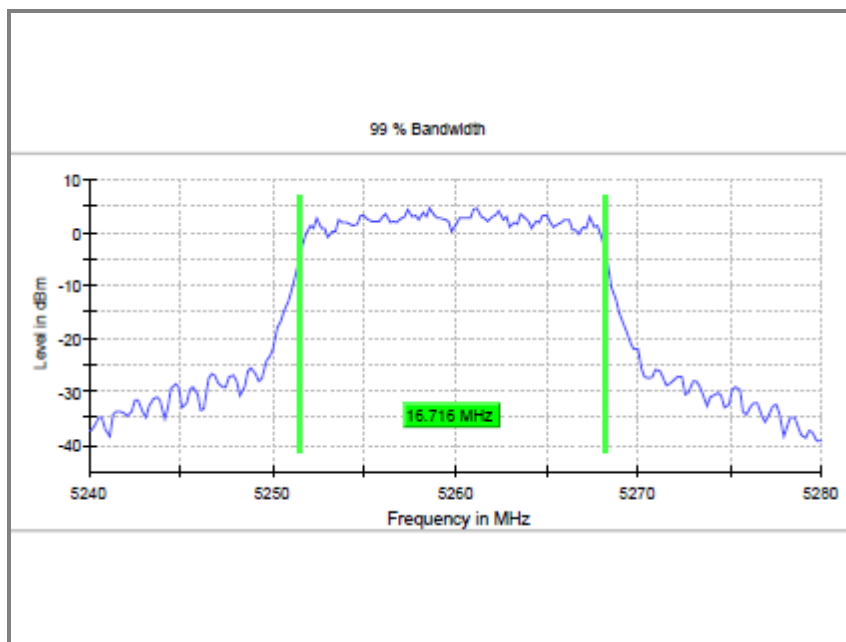
B. High channel(5230 MHz)- 26 dB bandwidth**B. High channel(5230 MHz)- 99% bandwidth**

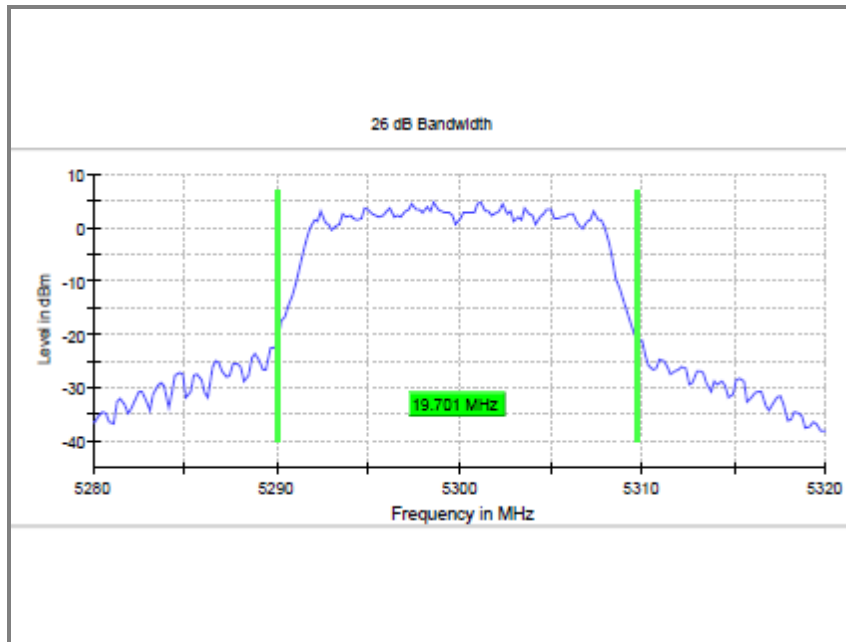
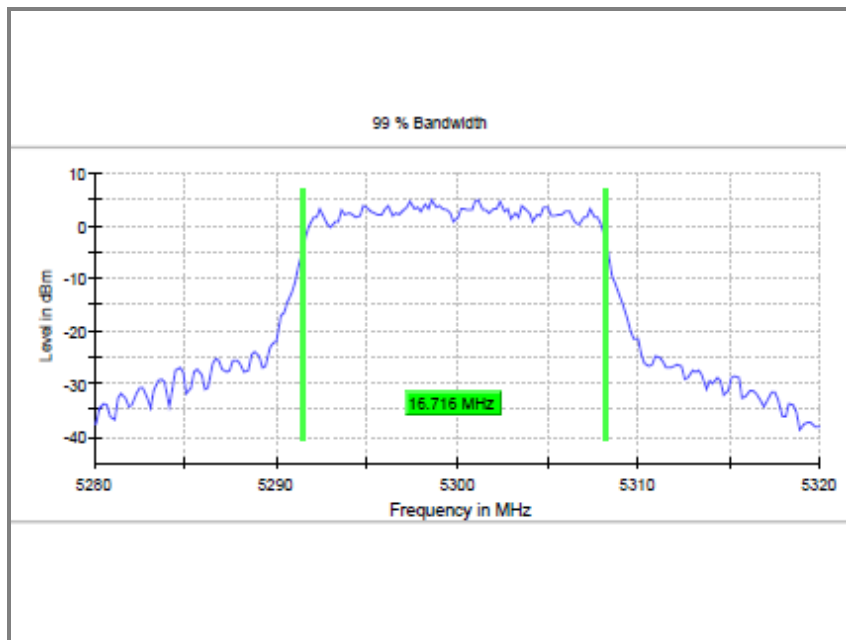
Operation mode: U-NII-2A(802.11a)

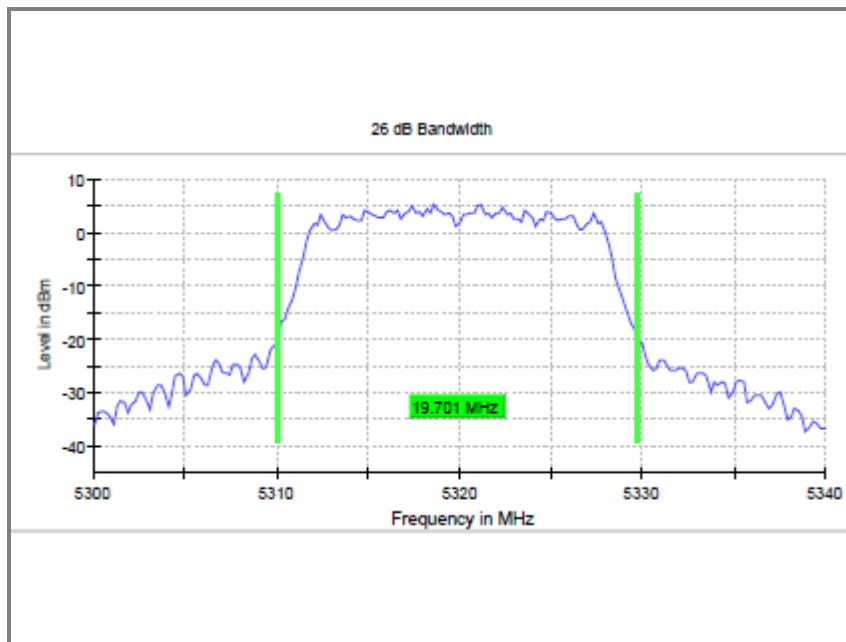
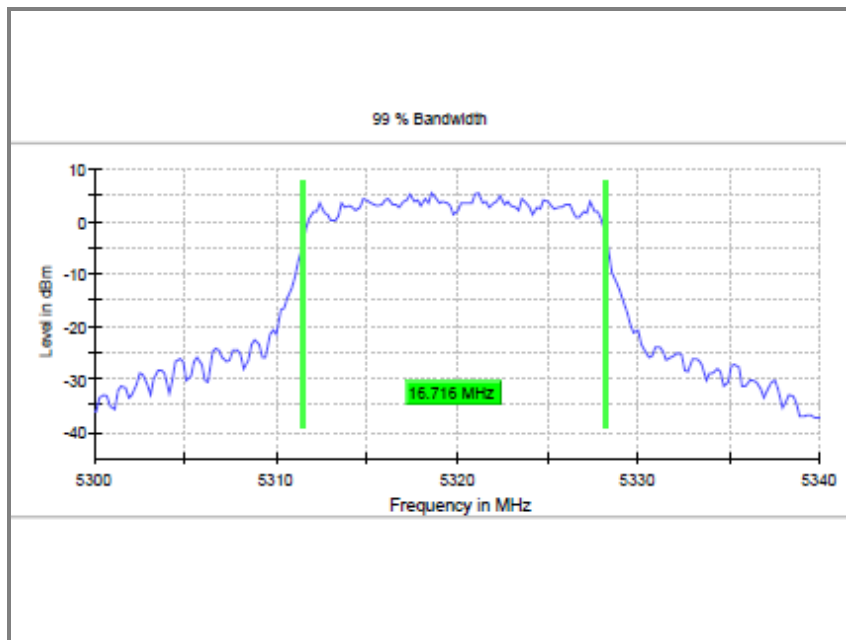
A. Low channel(5260 MHz)- 26 dB bandwidth



A. Low channel(5260 MHz)– 99% bandwidth

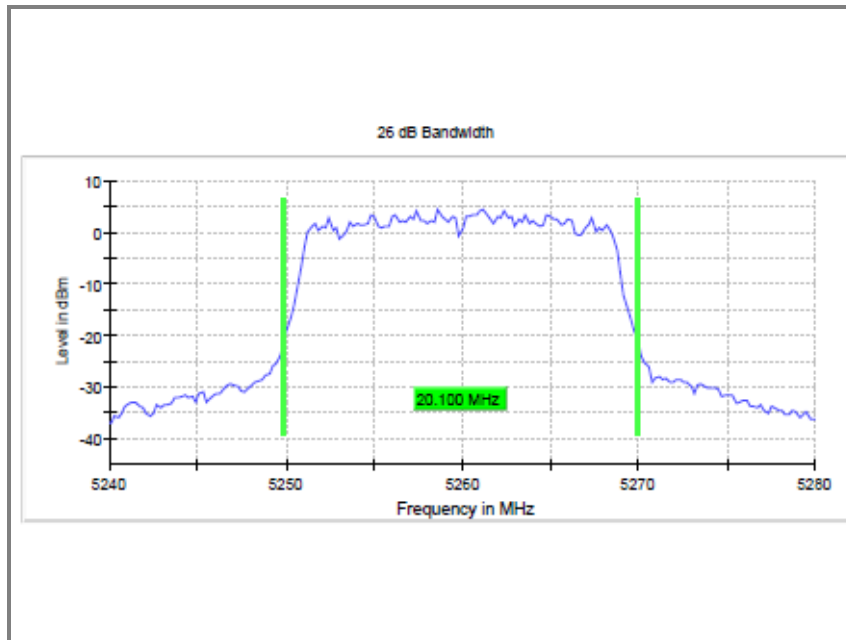


B. Middle channel(5300 MHz)- 26 dB bandwidth**B. Middle channel(5300 MHz)- 99% bandwidth**

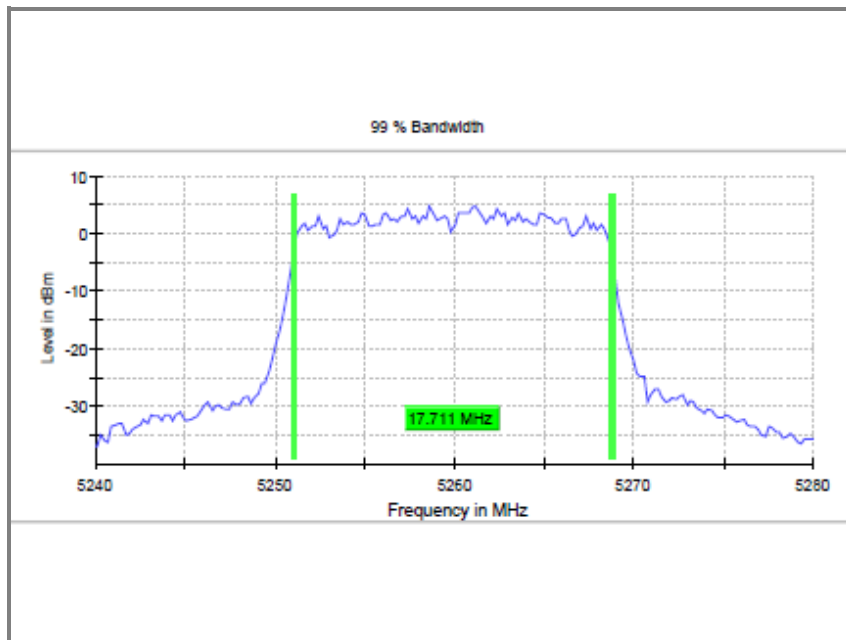
C. High channel(5320 MHz)- 26 dB bandwidth**C. High channel(5320 MHz)- 99% bandwidth**

Operation mode: U-NII-2A(n_HT20)

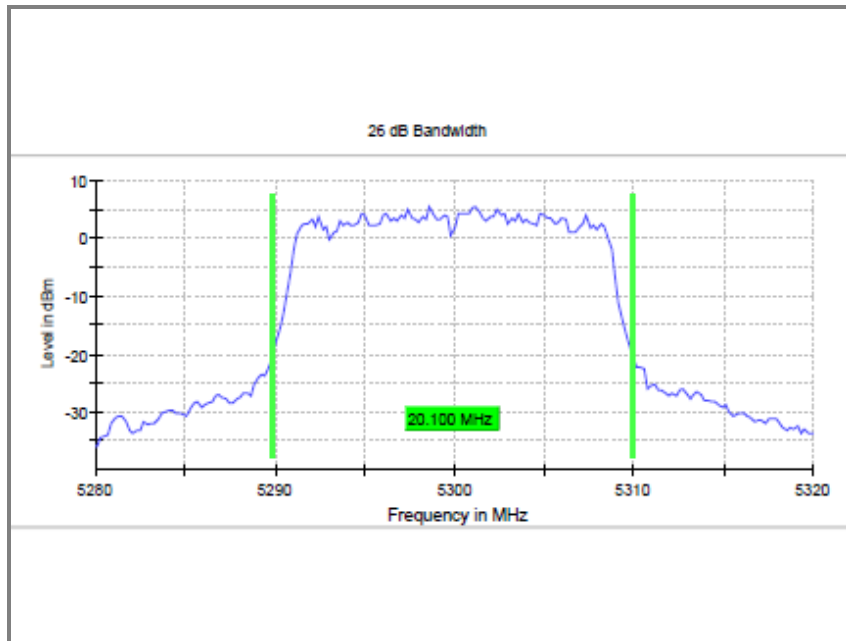
A. Low channel(5260 MHz)- 26 dB bandwidth



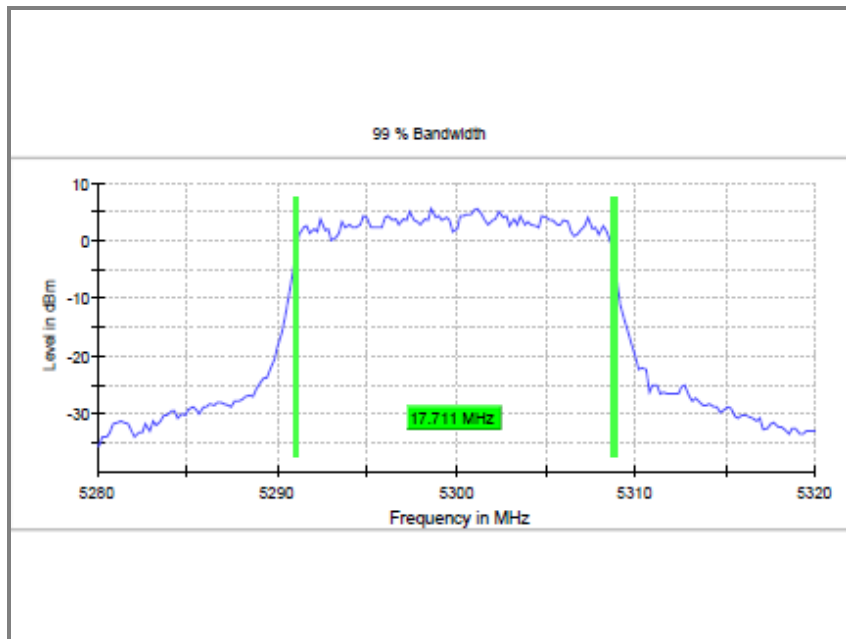
A. Low channel(5260 MHz)- 99% bandwidth

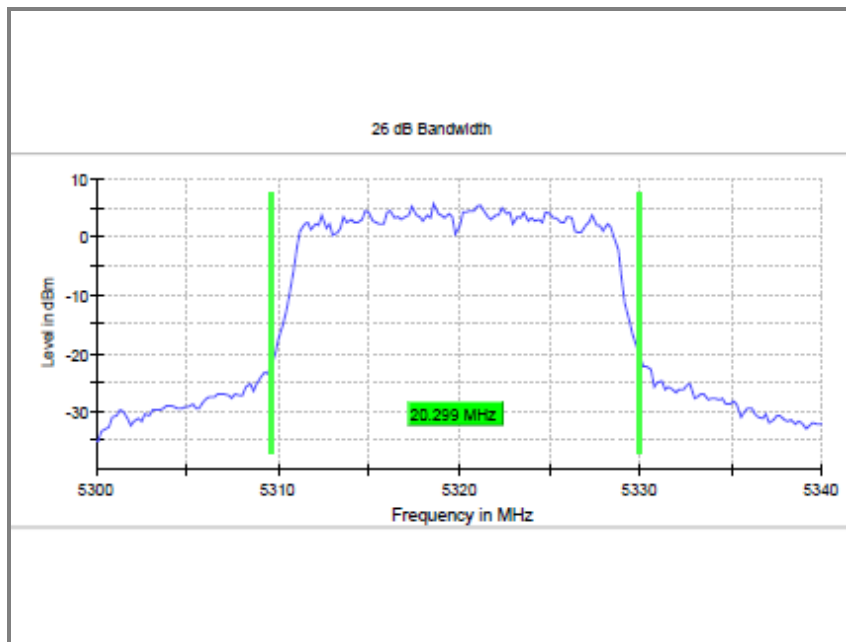
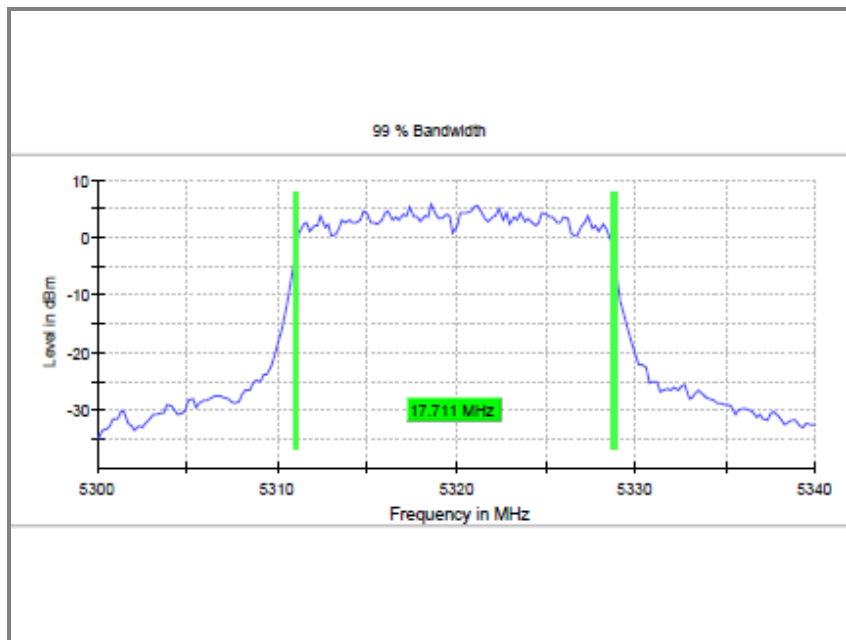


B. Middle channel(5300 MHz)- 26 dB bandwidth



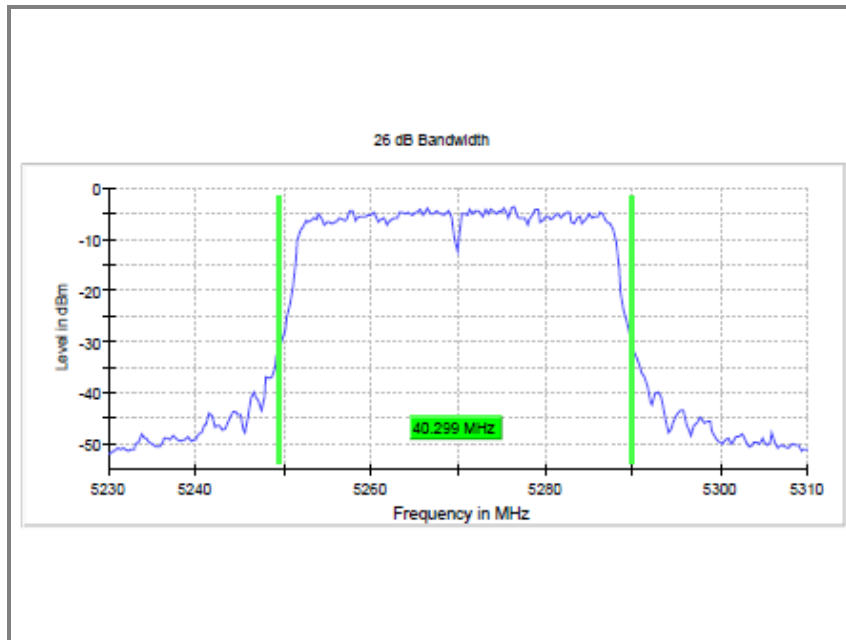
B. Middle channel(5300 MHz)- 99% bandwidth



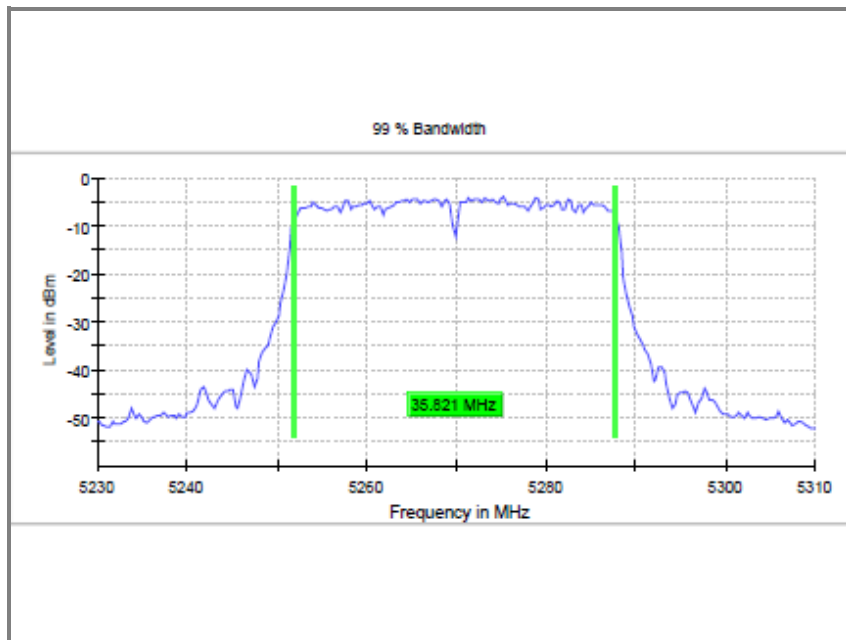
C. High channel(5320 MHz)- 26 dB bandwidth**C. High channel(5320 MHz)- 99% bandwidth**

Operation mode: U-NII-2A(n_HT40)

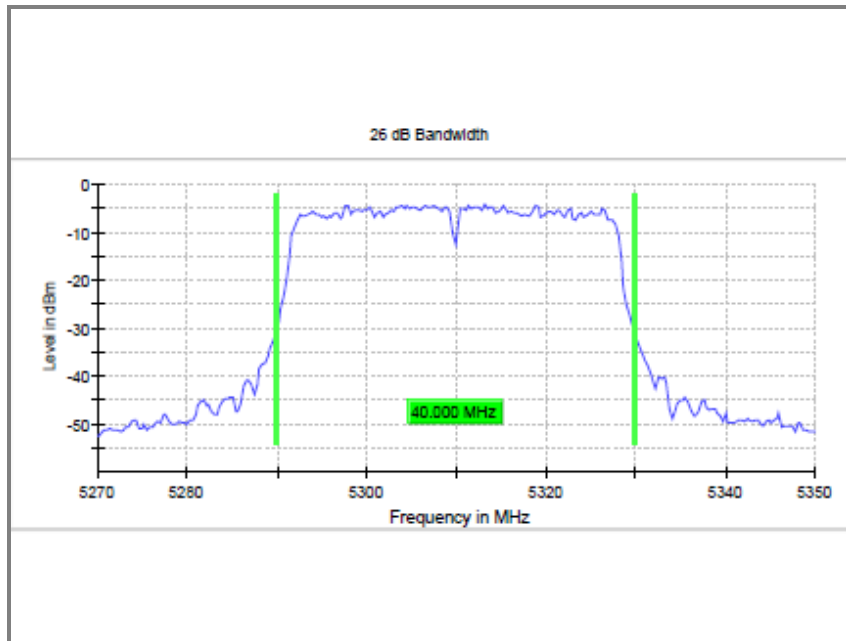
A. Low channel(5270 MHz)- 26 dB bandwidth



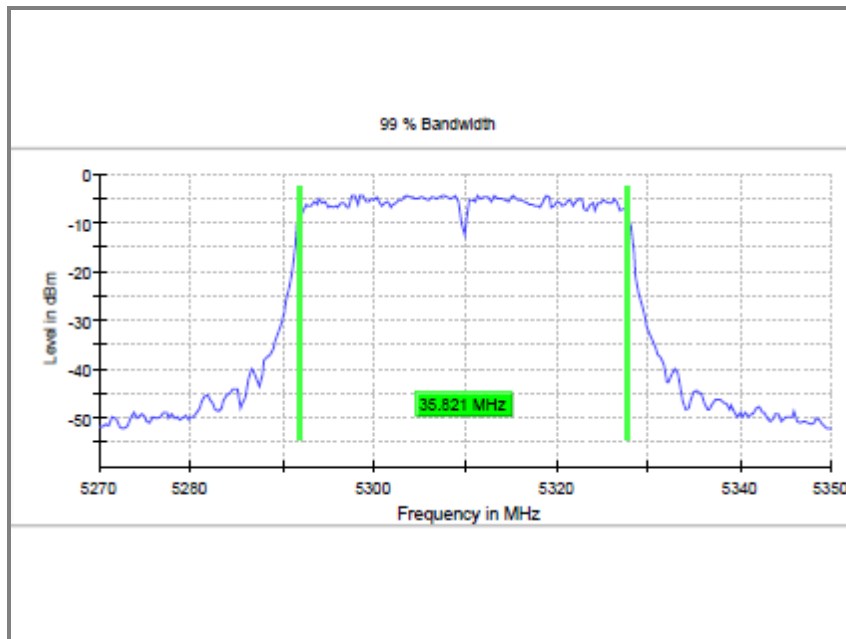
A. Low channel(5270 MHz)- 99% bandwidth



B. High channel(5310 MHz)- 26 dB bandwidth

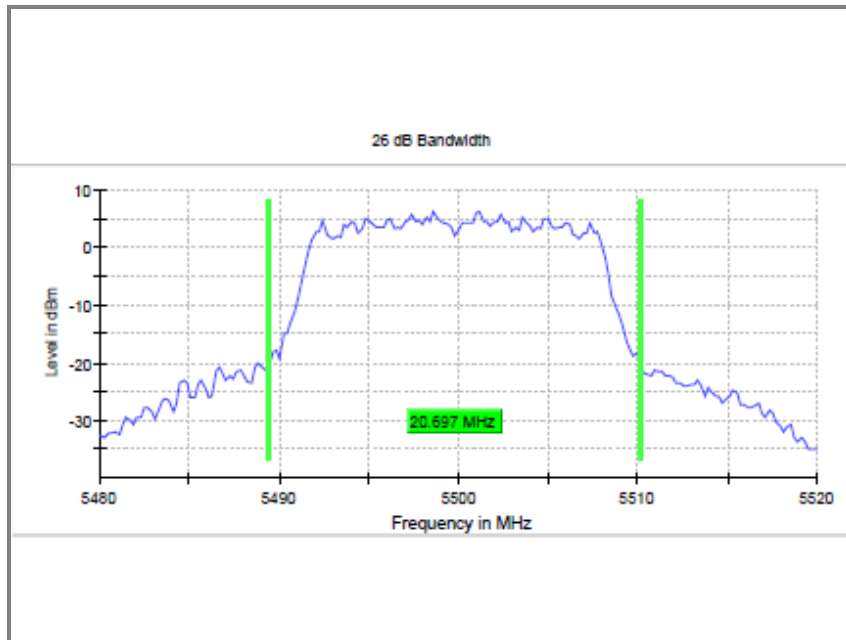


B. High channel(5310 MHz)- 99% bandwidth

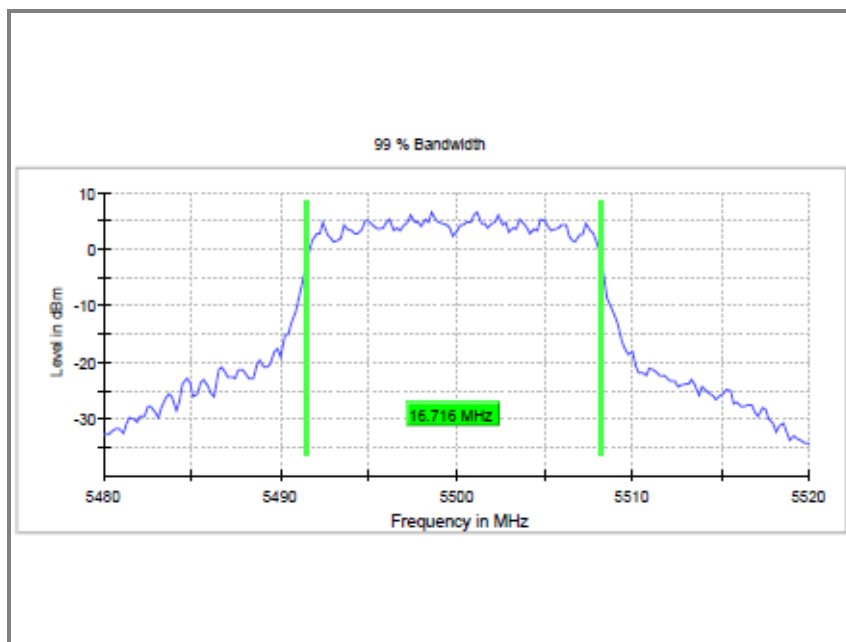


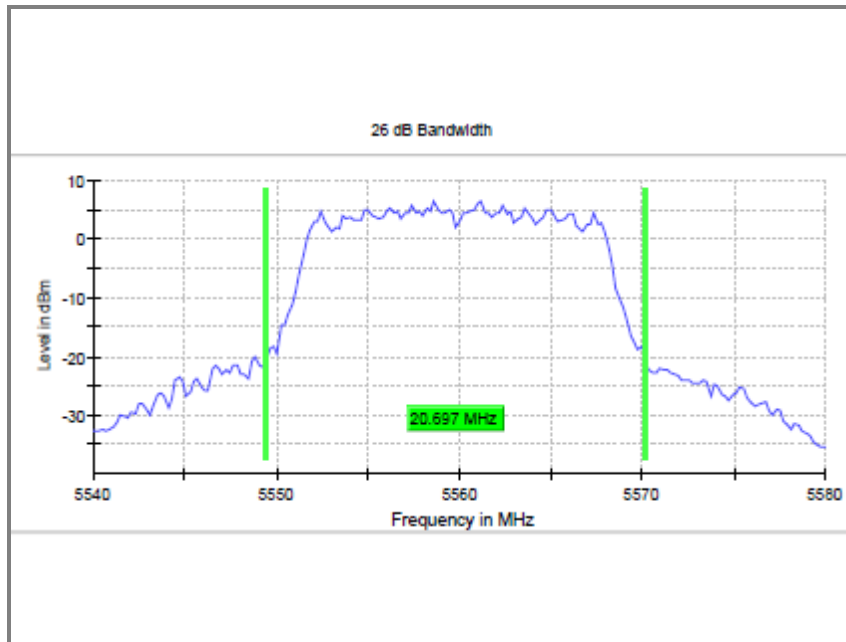
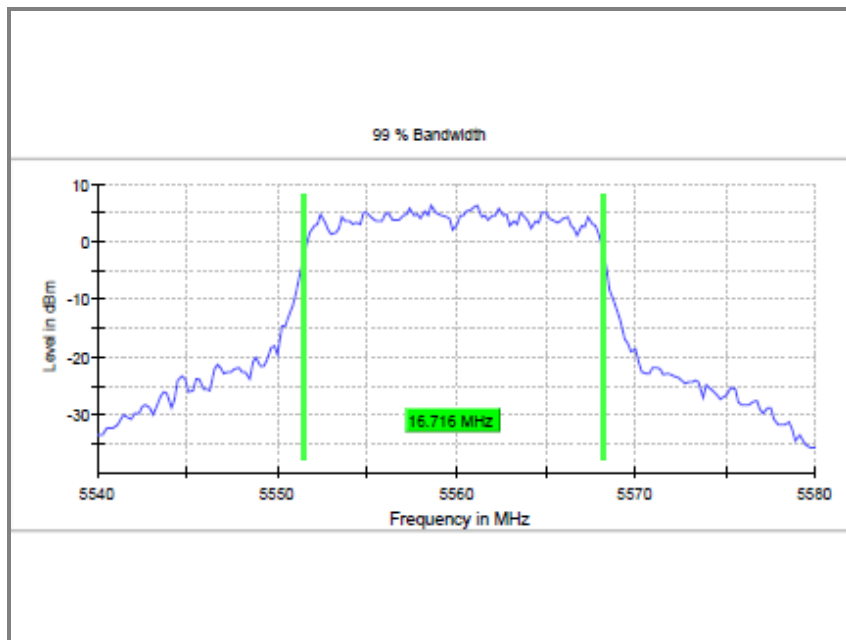
Operation mode: U-NII-2C(802.11a)

A. Low channel(5500 MHz)- 26 dB bandwidth

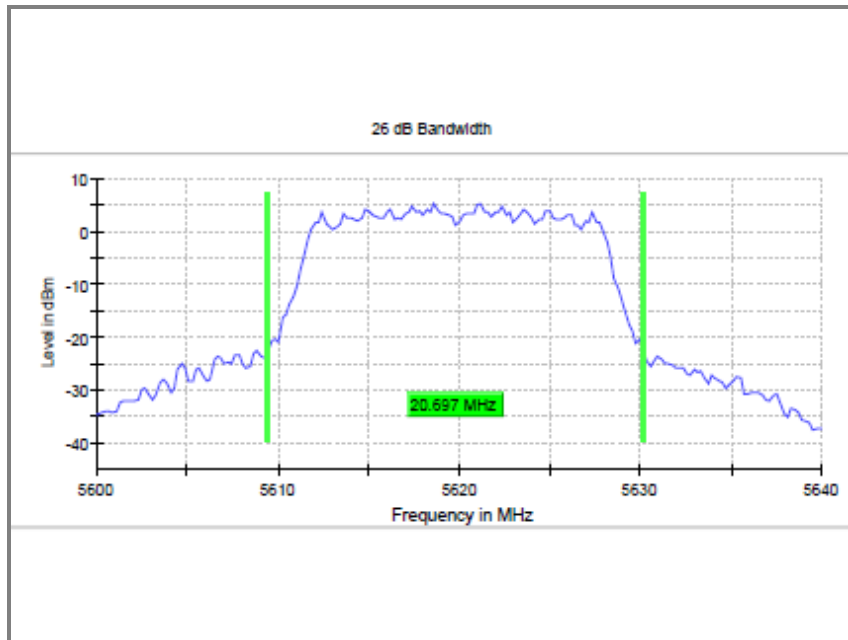


A. Low channel(5500 MHz)– 99% bandwidth

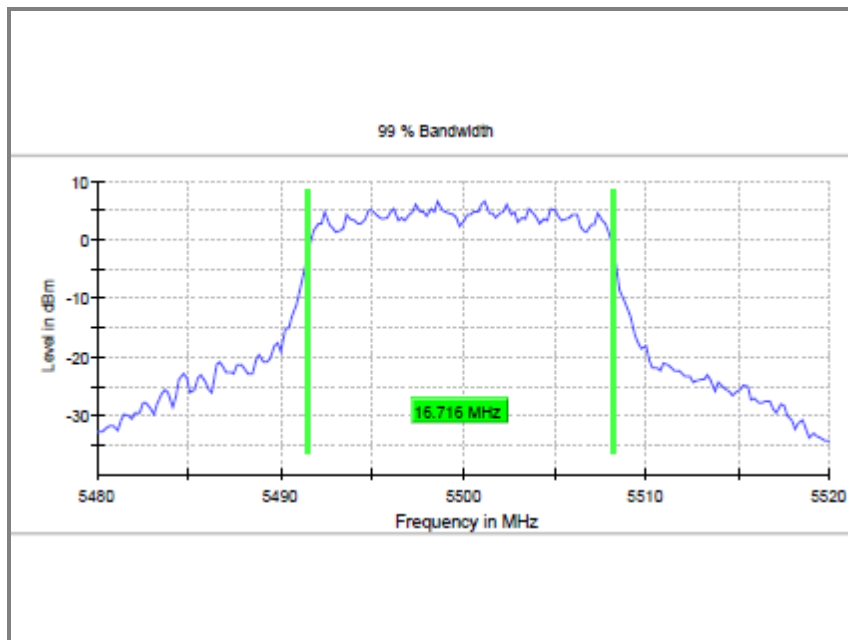


B. Middle channel(5560 MHz)- 26 dB bandwidth**B. Middle channel(5560 MHz)- 99% bandwidth**

C. High channel(5620 MHz)- 26 dB bandwidth

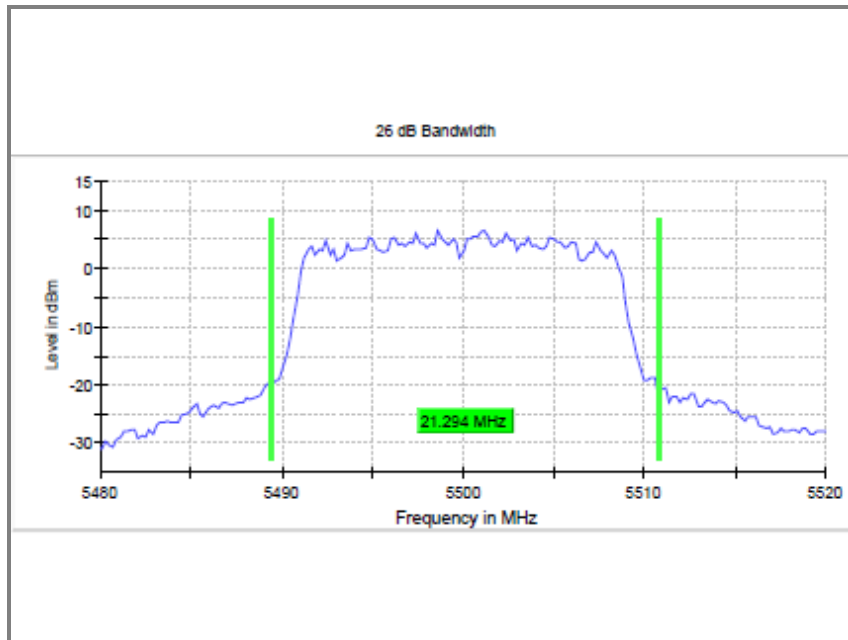


C. High channel(5620 MHz)- 99% bandwidth

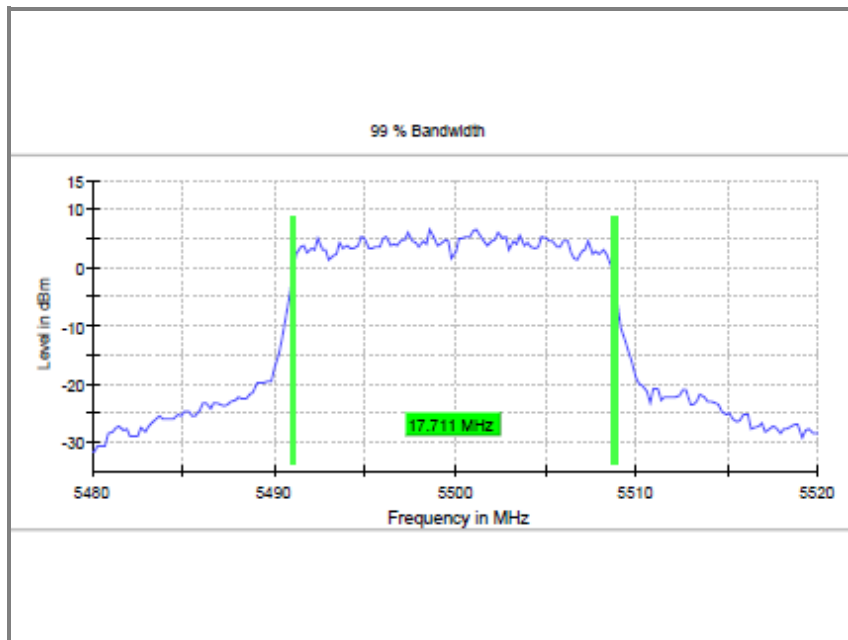


Operation mode: U-NII-2C(n_HT20)

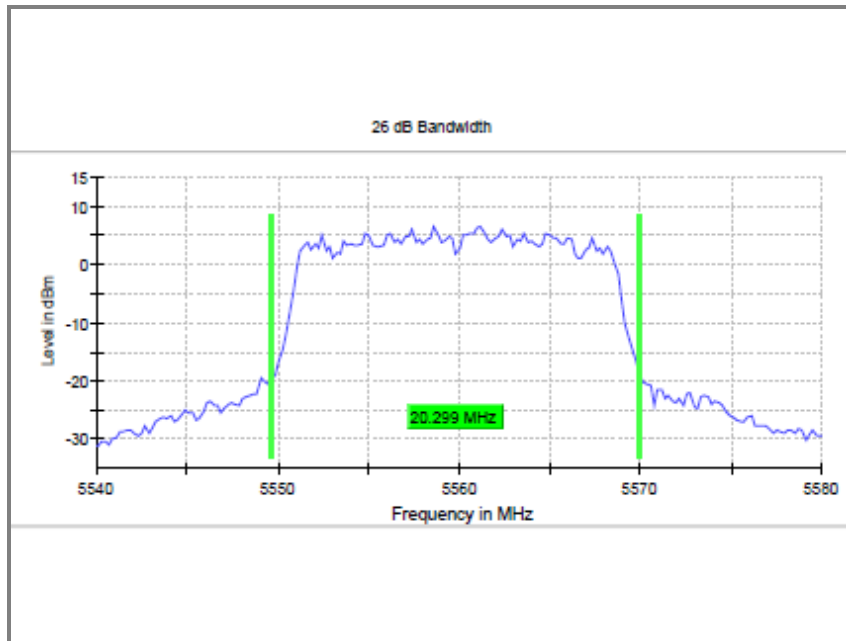
A. Low channel(5500 MHz)- 26 dB bandwidth



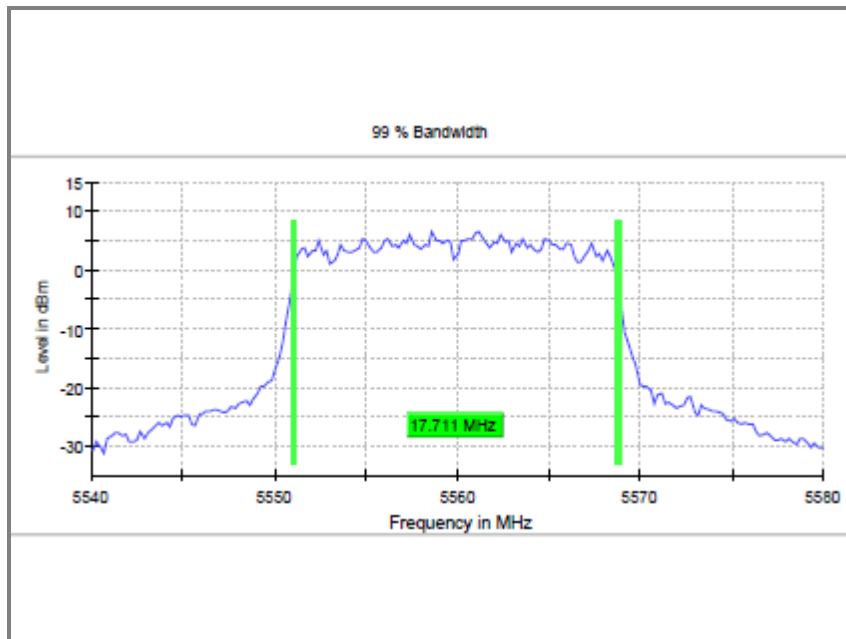
A. Low channel(5500 MHz)- 99% bandwidth



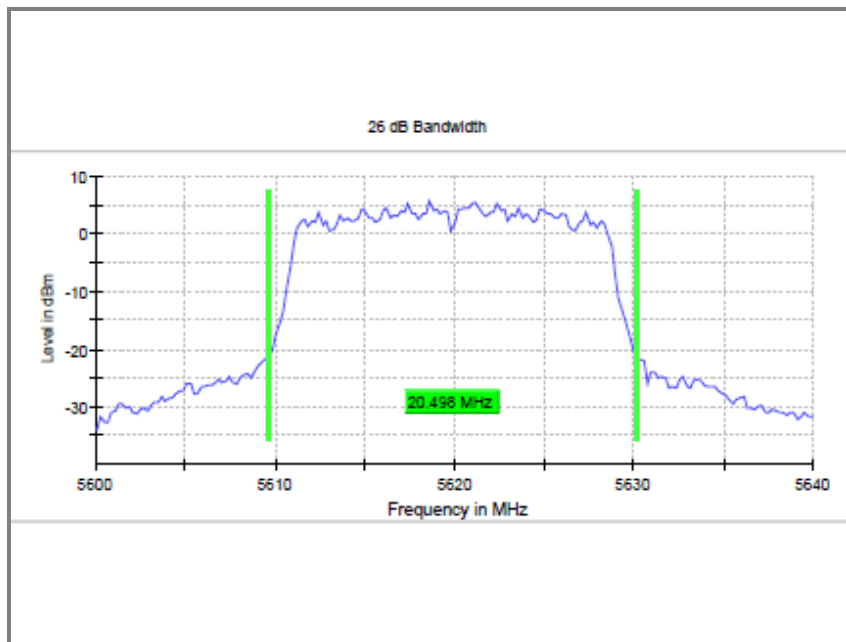
B. Middle channel(5560 MHz)- 26 dB bandwidth



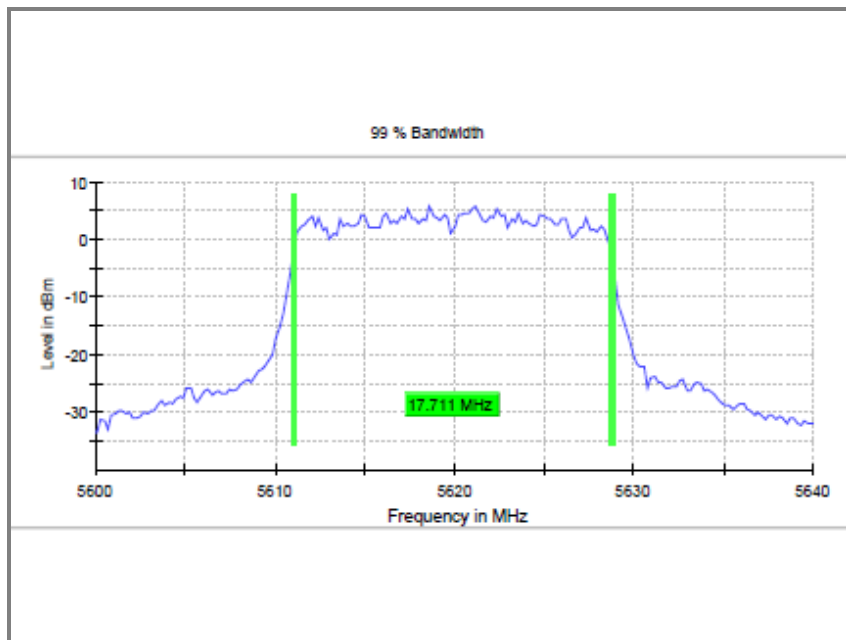
B. Middle channel(5560 MHz)- 99% bandwidth



C. High channel(5620 MHz)- 26 dB bandwidth

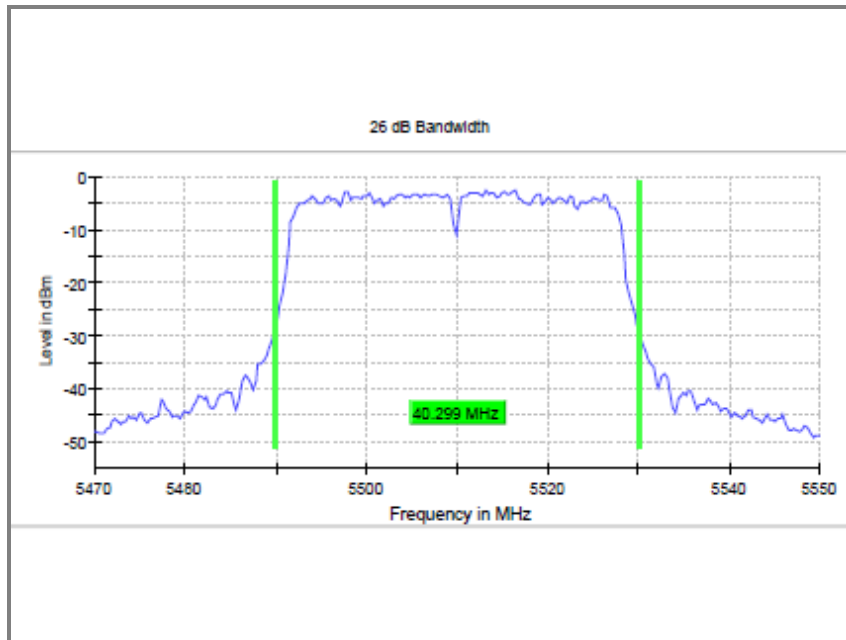


C. High channel(5620 MHz)- 99% bandwidth

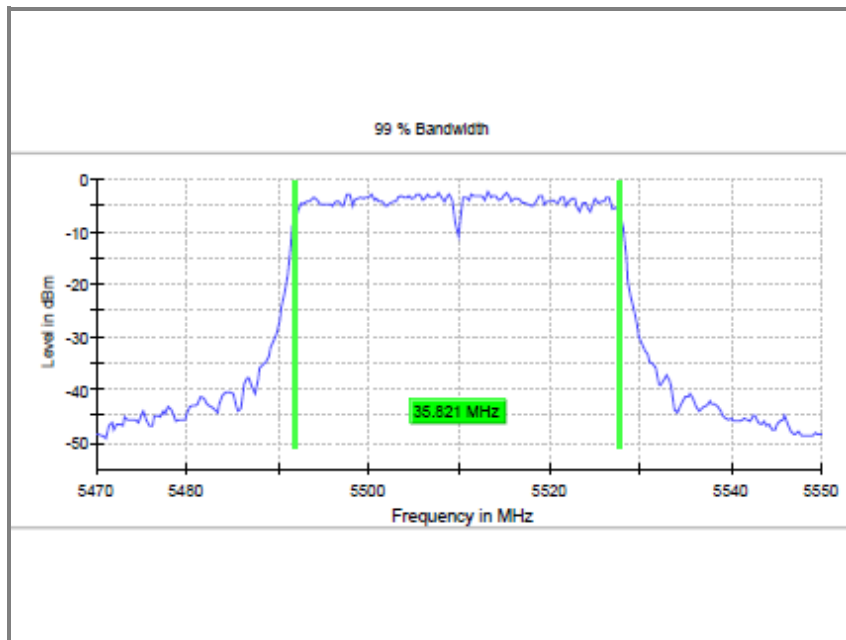


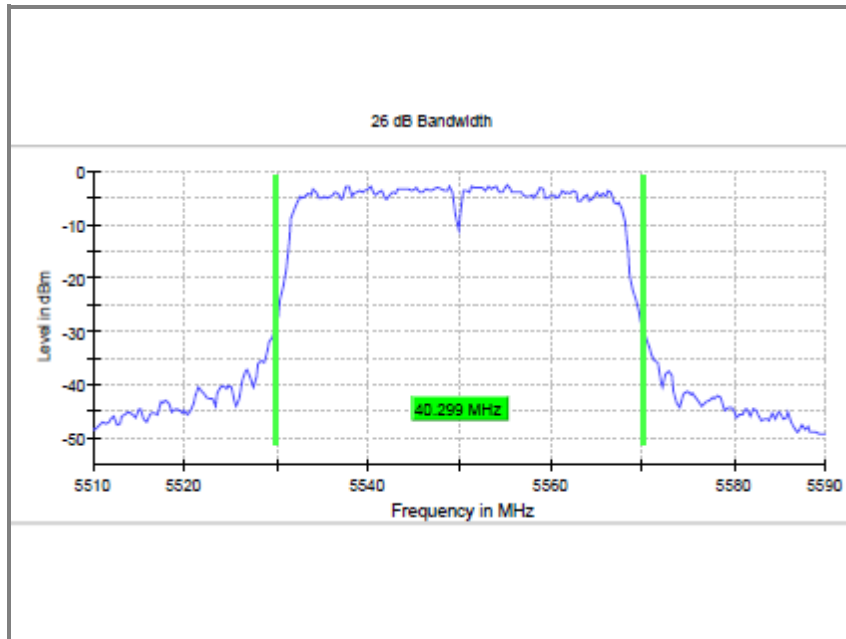
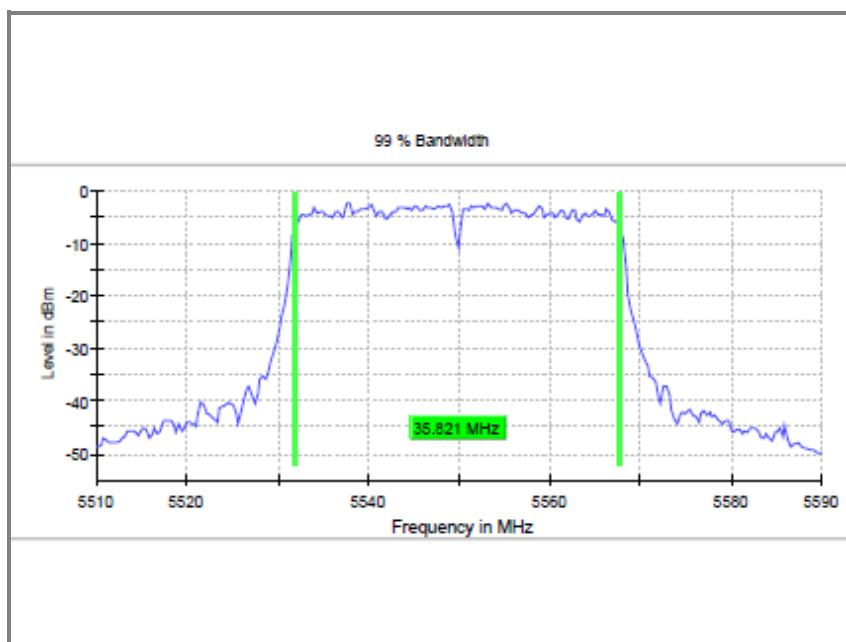
Operation mode: U-NII-2C(n_HT40)

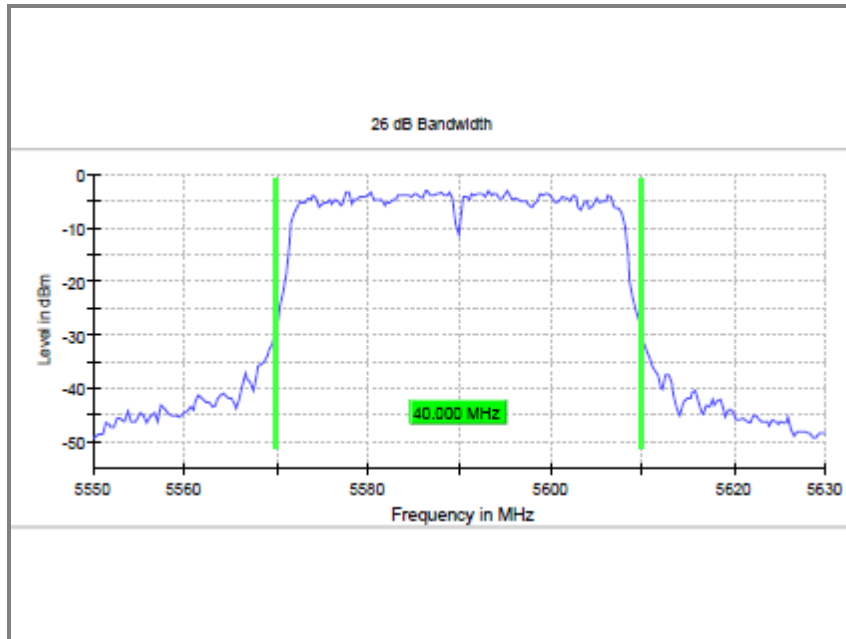
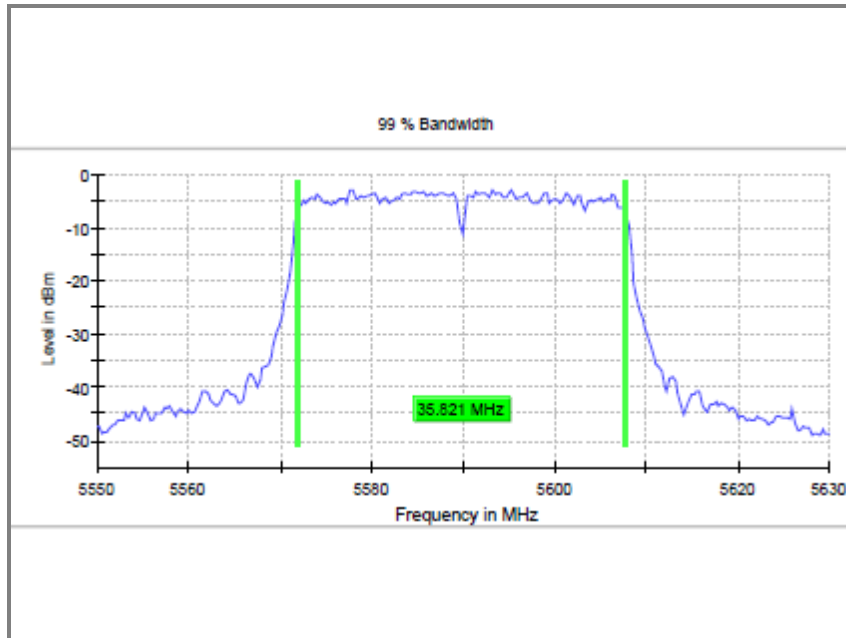
A. Low channel(5510 MHz)- 26 dB bandwidth



A. Low channel(5510 MHz)- 99% bandwidth

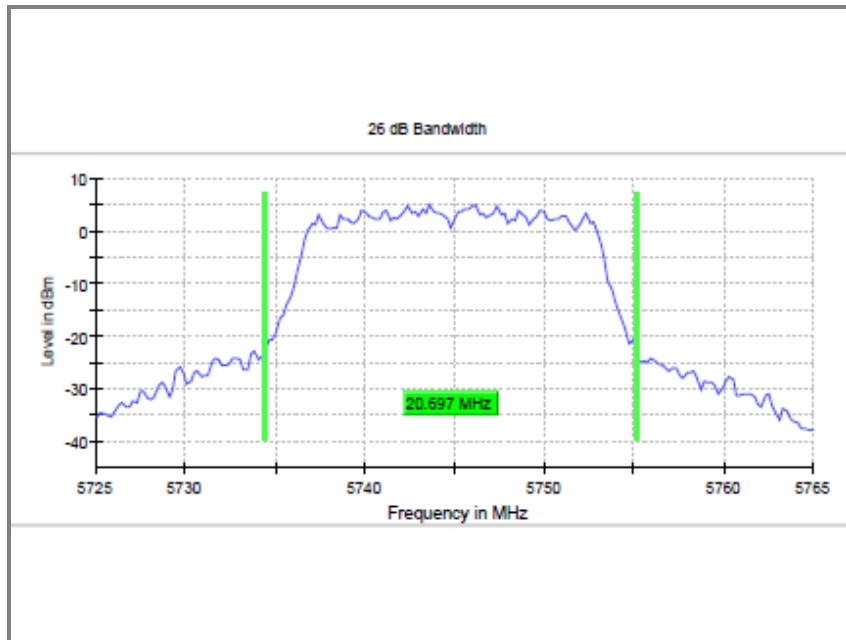


B. Middle channel(5550 MHz)- 26 dB bandwidth**B. Middle channel(5550 MHz)- 99% bandwidth**

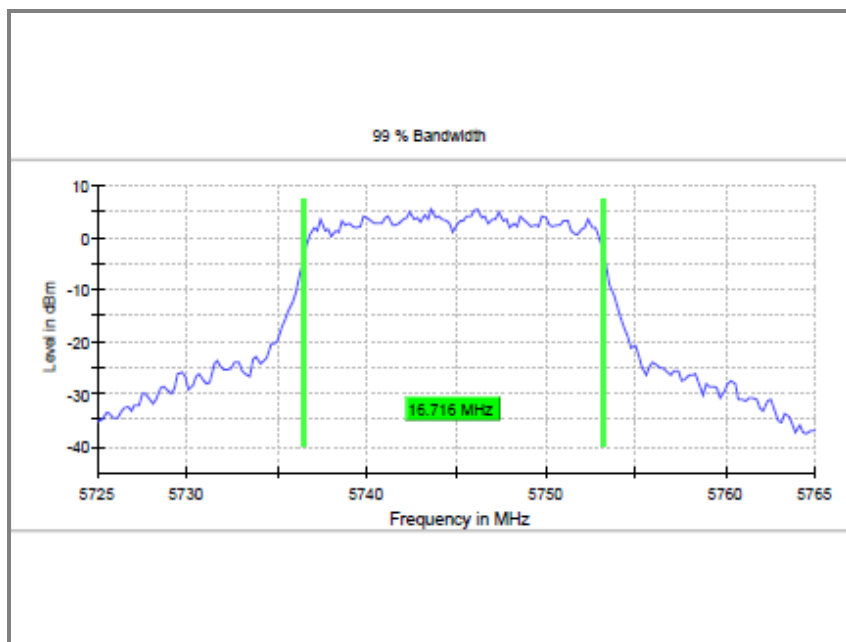
C. High channel(5590 MHz)- 26 dB bandwidth**C. High channel(5590 MHz)- 99% bandwidth**

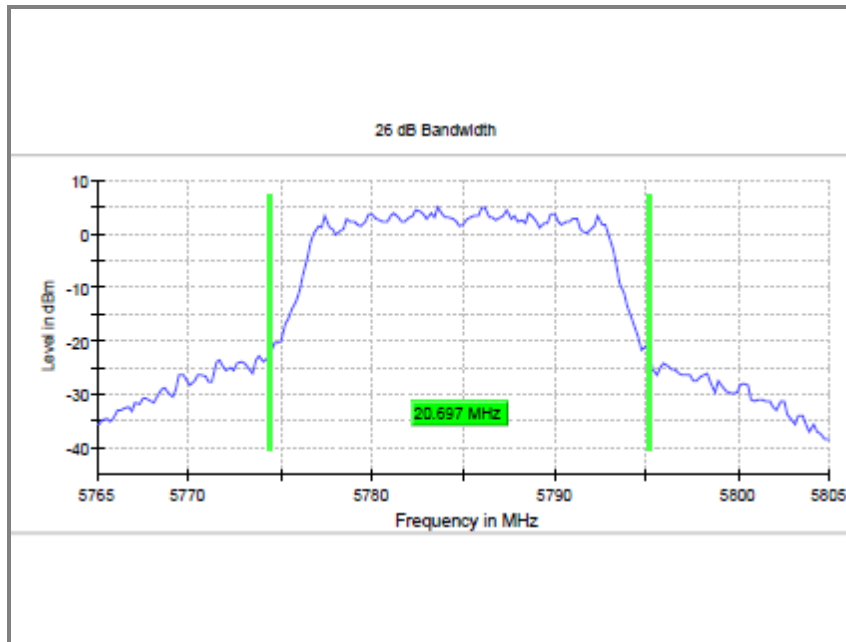
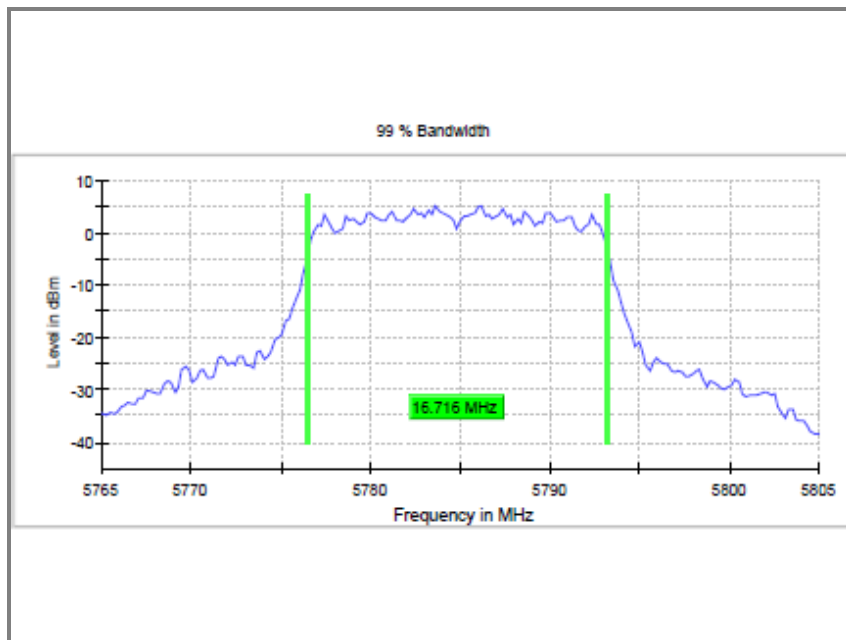
Operation mode: U-NII-3(802.11a)

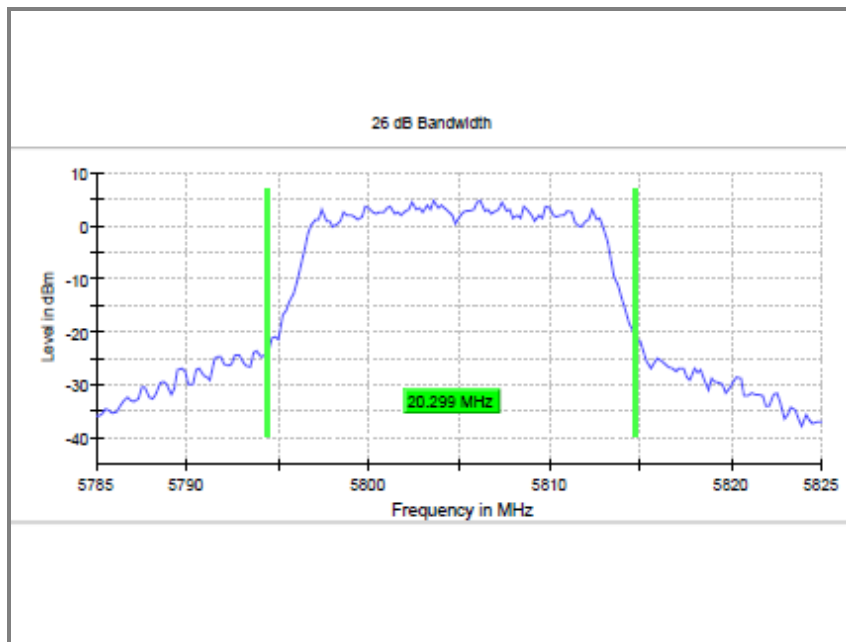
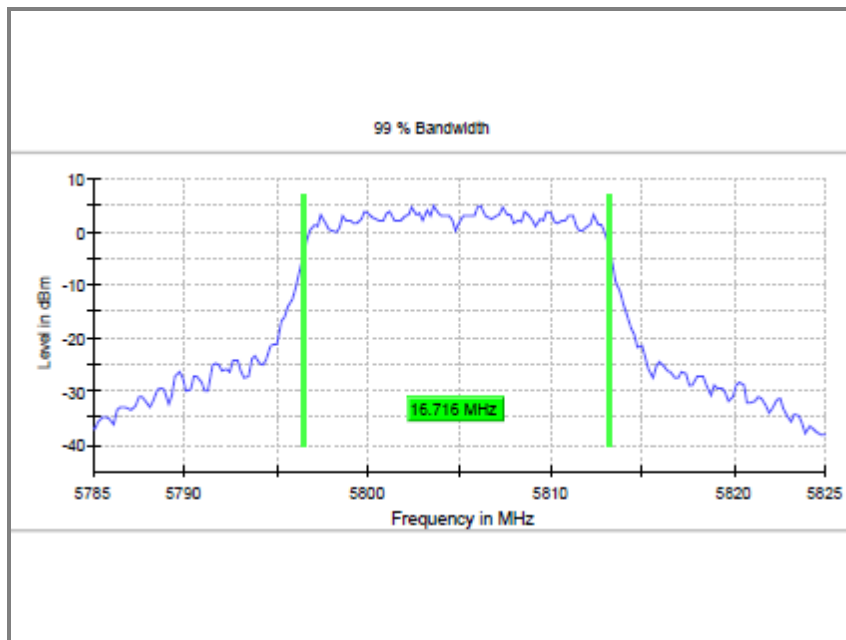
A. Low channel(5745 MHz)- 26 dB bandwidth



A. Low channel(5745 MHz)- 99% bandwidth

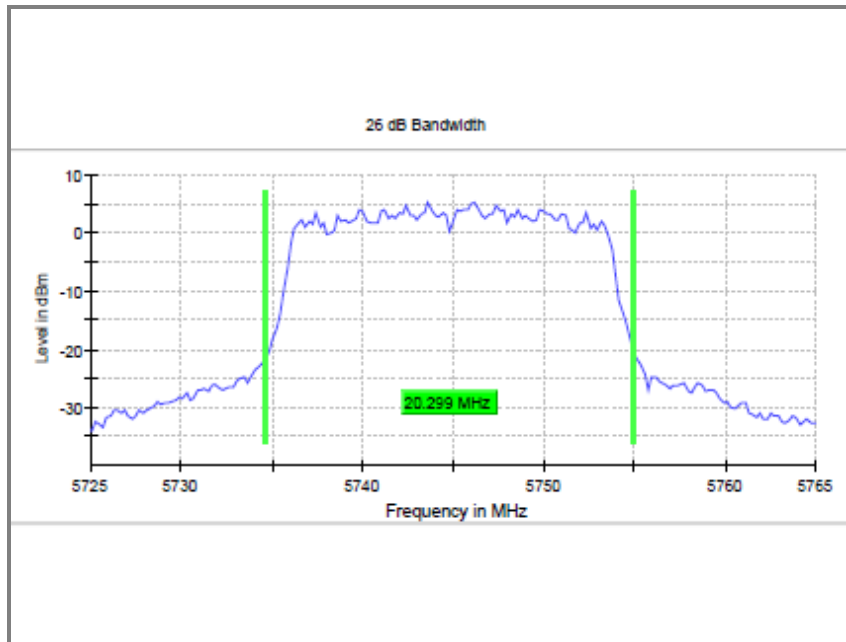


B. Middle channel(5785 MHz)- 26 dB bandwidth**B. Middle channel(5785 MHz)- 99% bandwidth**

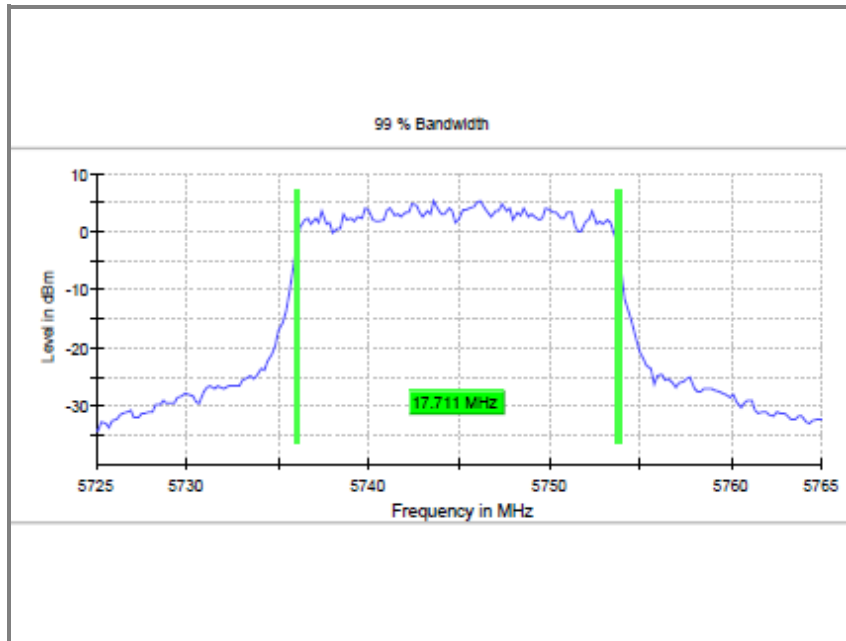
C. High channel(5805 MHz)- 26 dB bandwidth**C. High channel(5805 MHz)- 99% bandwidth**

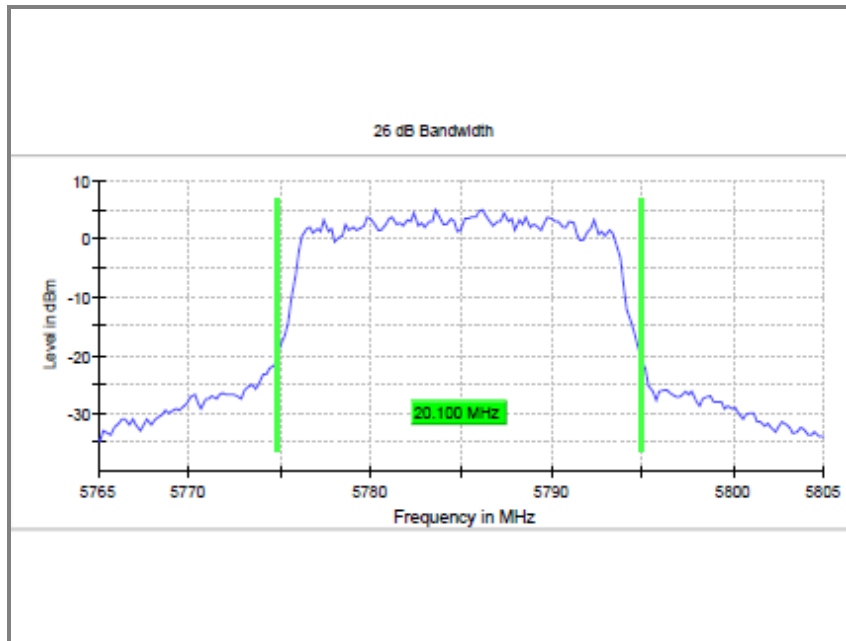
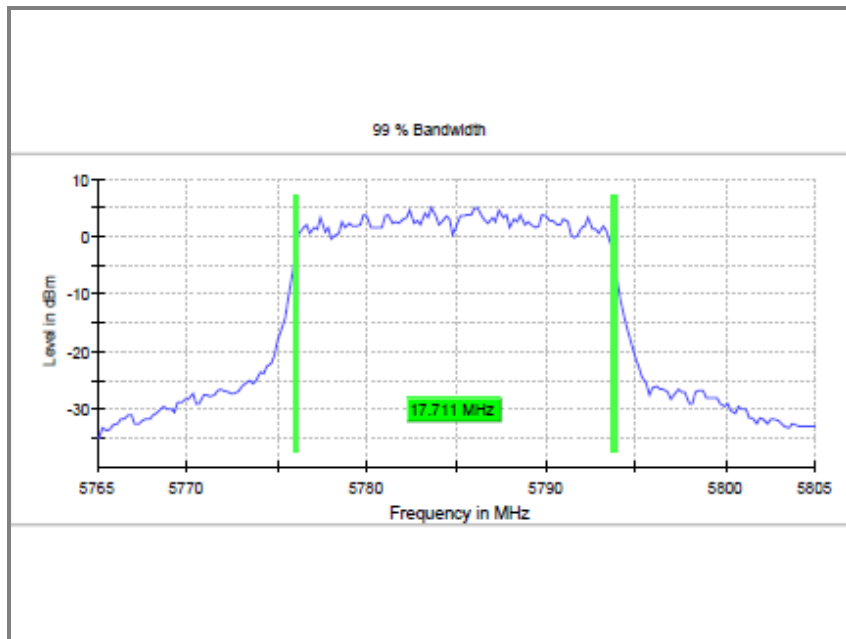
Operation mode: U-NII-3(n_HT20)

A. Low channel(5745 MHz)- 26 dB bandwidth

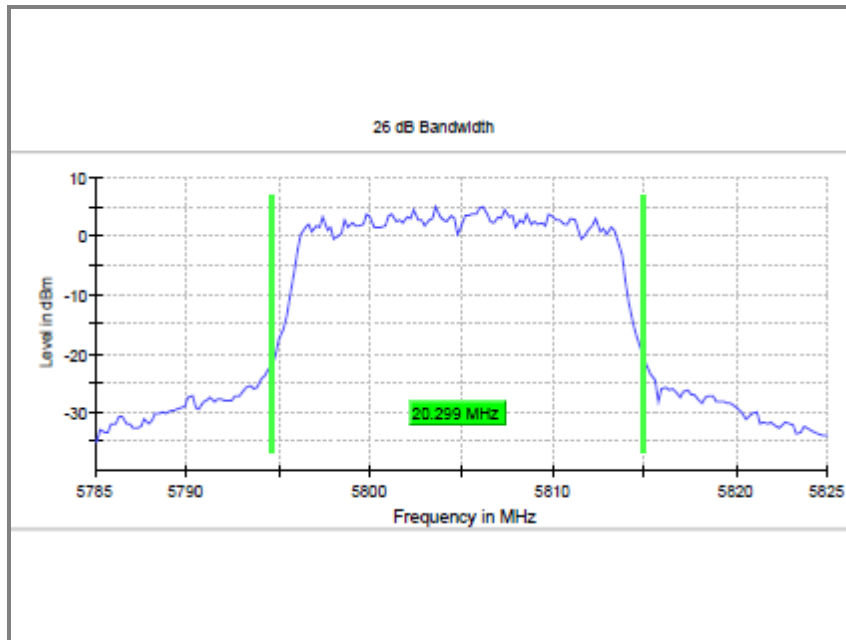


A. Low channel(5745 MHz)- 99% bandwidth

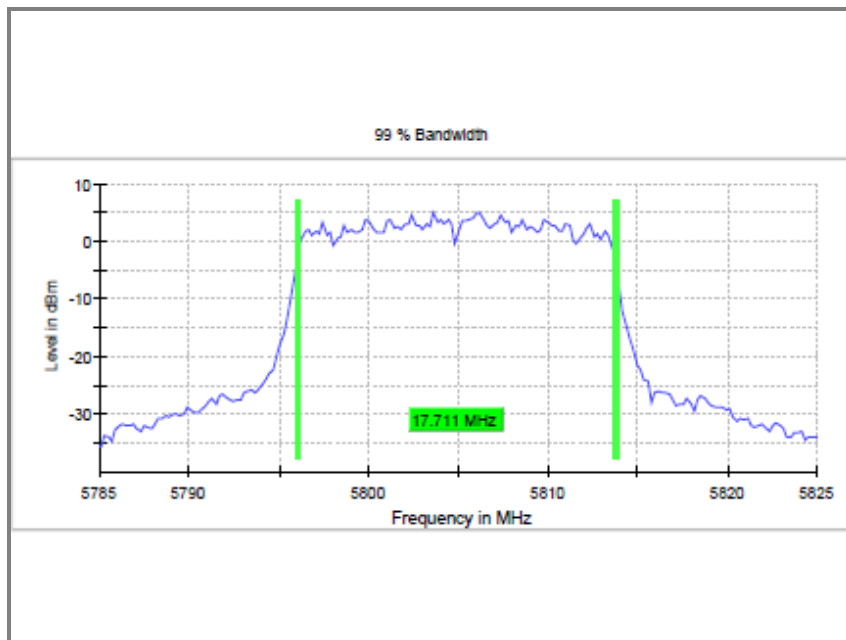


B. Middle channel(5785 MHz)- 26 dB bandwidth**B. Middle channel(5785 MHz)- 99% bandwidth**

C. High channel(5805 MHz)- 26 dB bandwidth

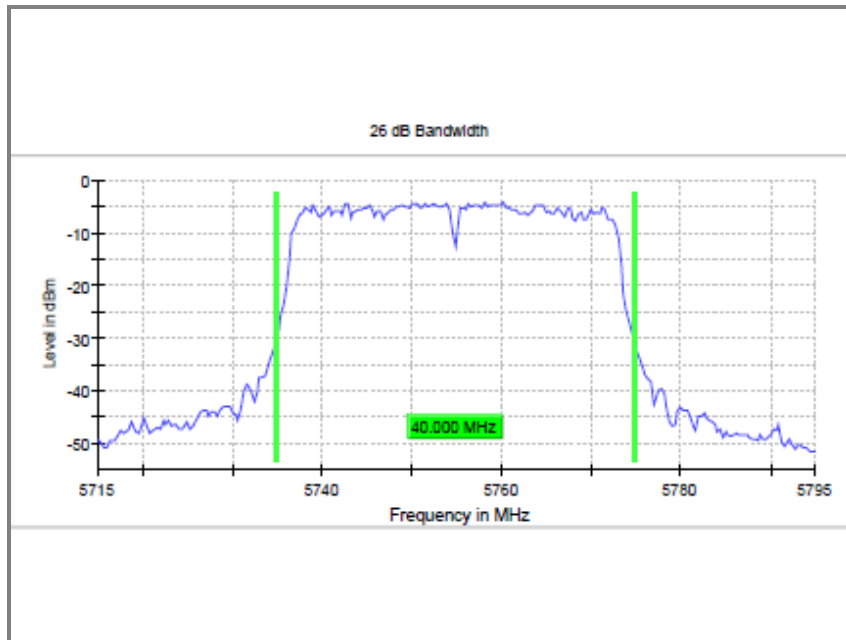


C. High channel(5805 MHz)- 99% bandwidth

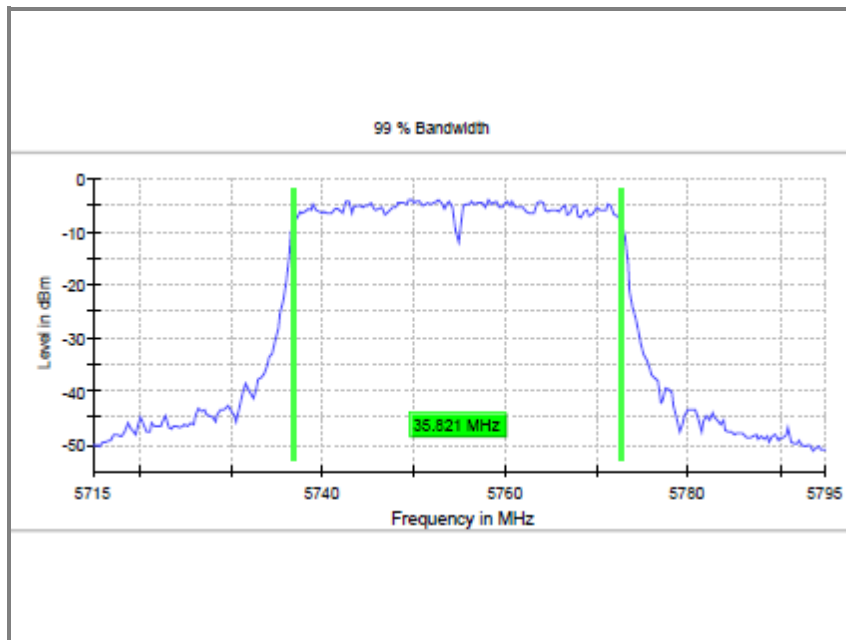


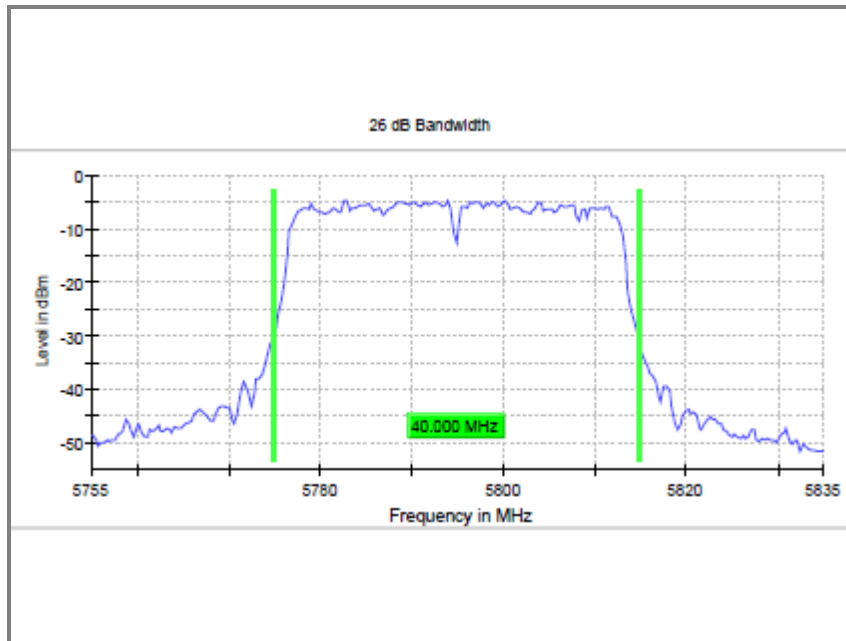
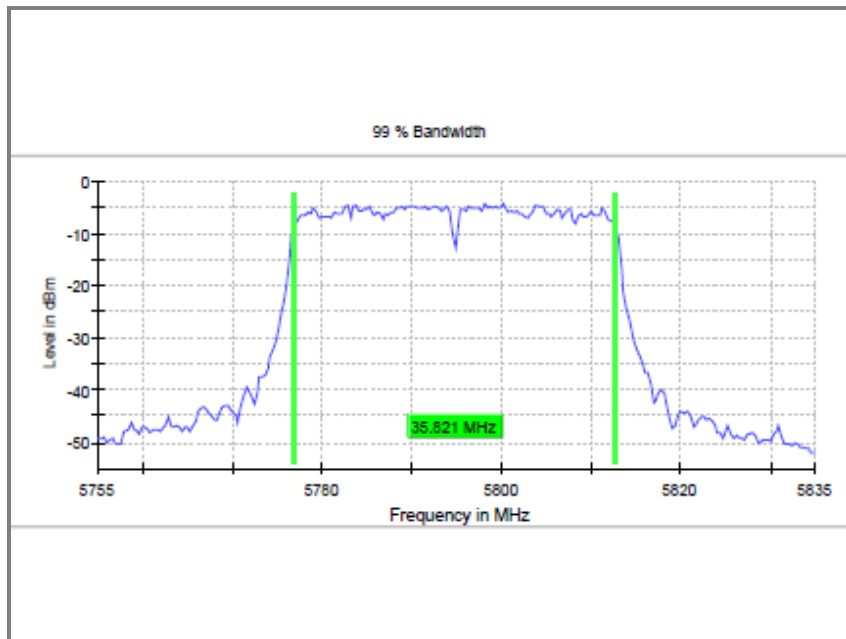
Operation mode: U-NII-3(n_HT40)

A. Low channel(5755 MHz)- 26 dB bandwidth



A. Low channel(5755 MHz)- 99% bandwidth



B. High channel(5795 MHz)- 26 dB bandwidth**B. High channel(5795 MHz)- 99% bandwidth**

6. Maximum Conducted Output power

6.1. 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.

6.2. 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.

6.4. Test results

Ambient temperature: 21°C

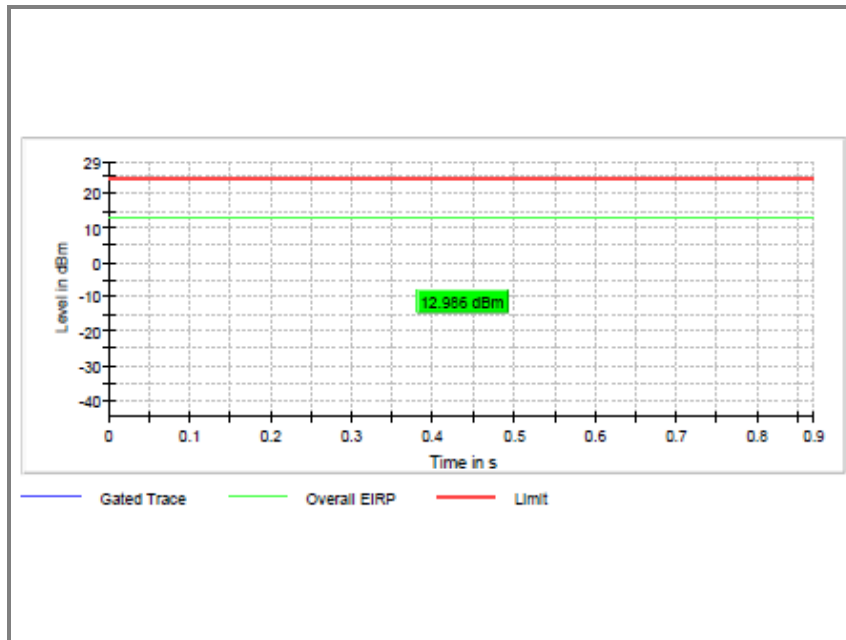
Relative humidity: 45% R.H.

Mode	Frequency(MHz)	Output Power(dB m)		
		ANT1	ANT2	2X2 Mimo
U-NII-1(802.11a)	5 180	12.99	6.23	
	5 220	13.02	6.18	
	5 240	13.28	6.01	
U-NII-1(n_HT20)	5 180	12.92	8.24	13.23
	5 220	13.02	8.04	13.62
	5 240	13.28	8.01	13.92
U-NII-1(n_HT40)	5 190	6.14	4.36	9.09
	5 230	6.48	4.00	9.21
U-NII-2A(802.11a)	5 260	12.81	8.73	
	5 300	13.00	8.05	
	5 320	13.61	8.69	
U-NII-2A(n_HT20)	5 260	12.83	8.33	13.52
	5 300	13.54	8.33	14.09
	5 320	13.62	8.38	14.22
U-NII-2A(n_HT40)	5 270	6.45	3.58	9.51
	5 310	6.20	3.21	9.34
U-NII-2C(802.11a)	5 500	14.53	10.35	
	5 560	14.60	10.62	
	5 620	13.68	10.05	
U-NII-2C(n_HT20)	5 500	14.57	10.01	15.25
	5 560	14.62	10.37	14.84
	5 620	13.73	9.78	14.49
U-NII-2C(n_HT40)	5 510	7.86	6.24	10.96
	5 550	7.99	6.67	10.98
	5 590	7.76	6.91	10.92

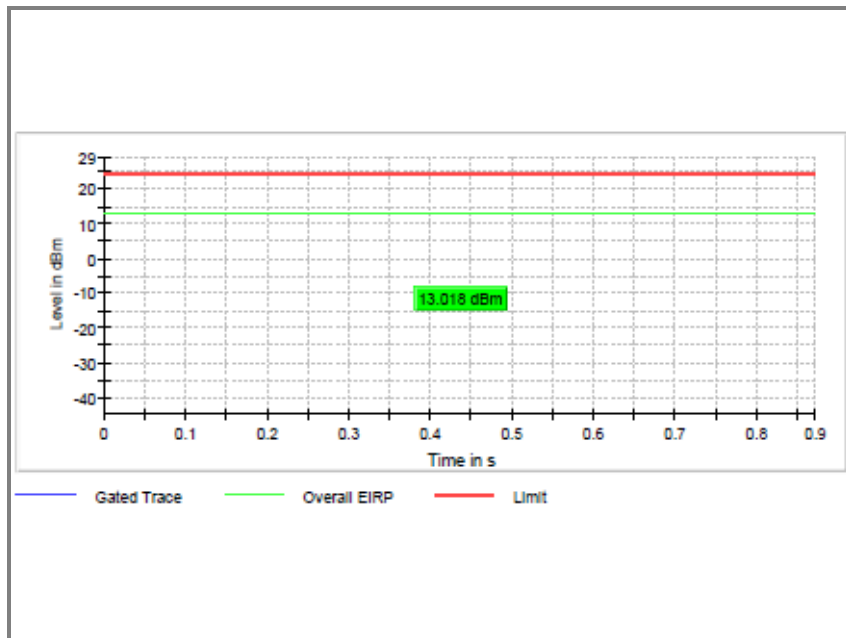
Mode	Frequency(MHz)	Output Power(dB m)		
		ANT1	ANT2	2X2 MIMO
U-NII-3(802.11a)	5 745	13.37	9.01	
	5 785	13.36	9.01	
	5 805	13.14	9.27	
U-NII-3(n_HT20)	5 745	13.36	8.96	12.80
	5 785	13.20	9.14	12.62
	5 805	13.11	8.93	12.58
U-NII-3(n_HT40)	5 755	6.55	5.54	7.28
	5 795	6.32	6.25	7.24

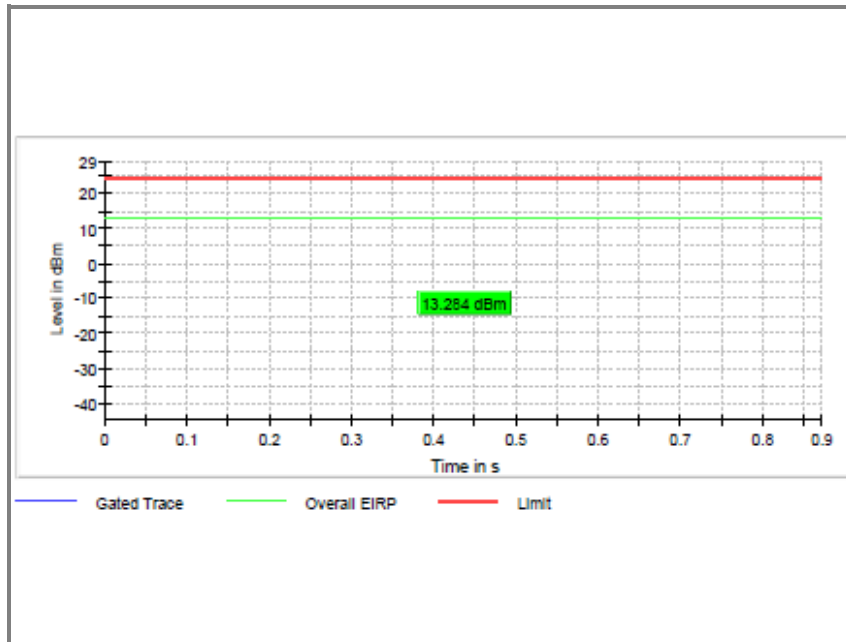
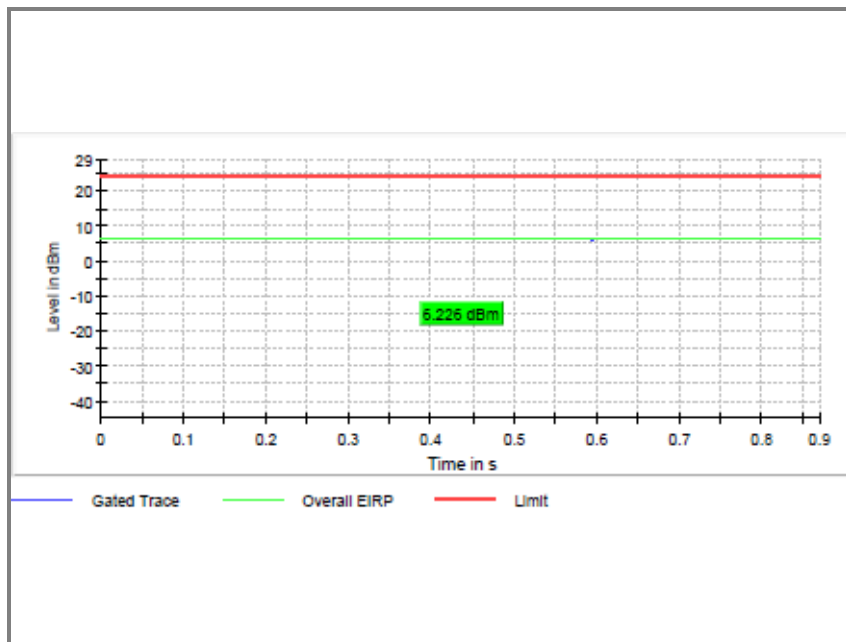
Operation mode: U-NII-1(802.11a) ANT1

A. Low channel(5180 MHz)

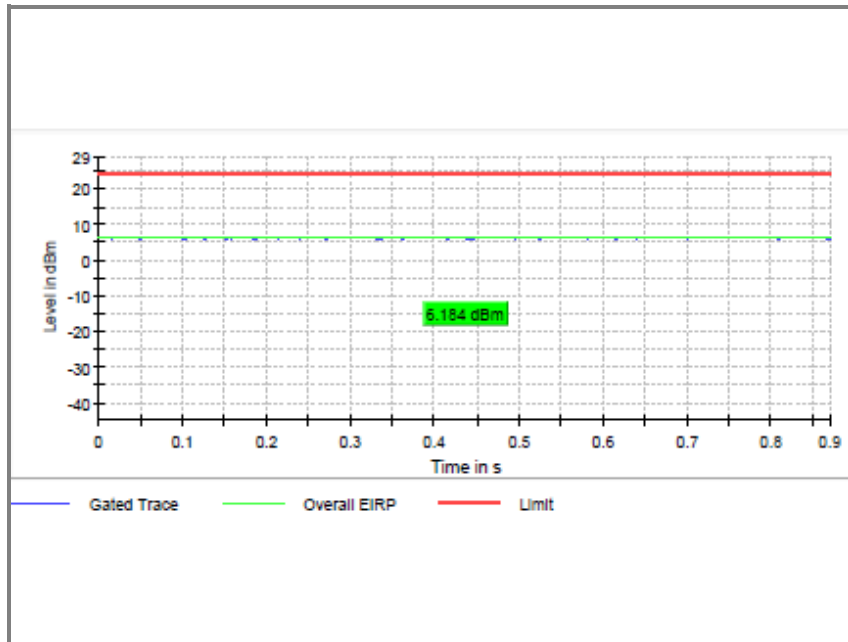


B. Middle channel(5220 MHz)

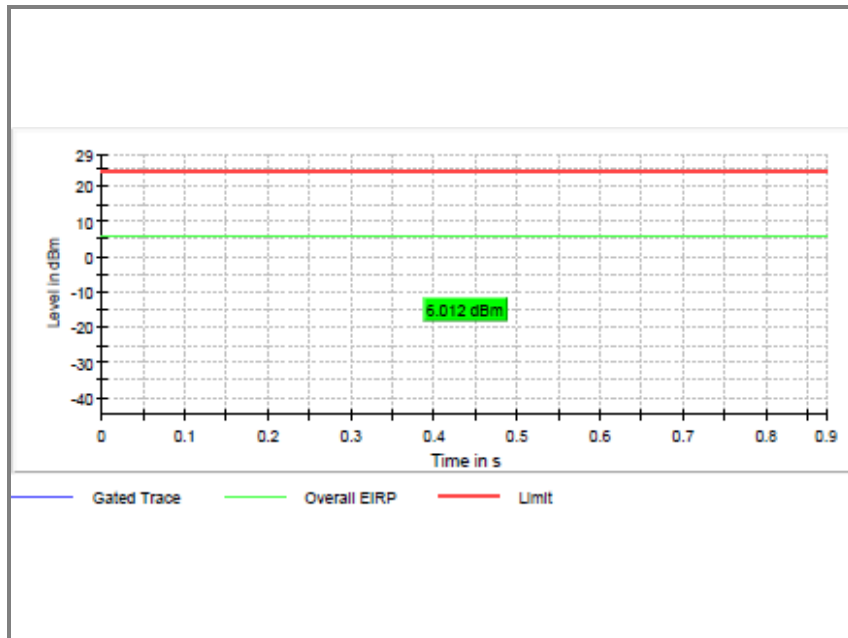


C. High channel(5240 MHz)**Operation mode: U-NII-1(802.11a) ANT2****A. Low channel(5180 MHz)**

B. Middle channel(5220 MHz)

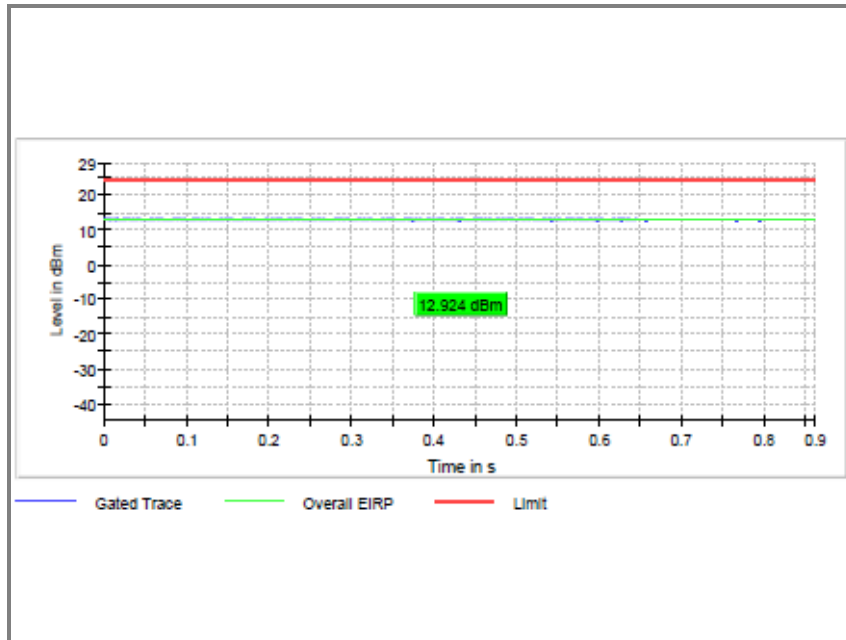


C. High channel(5240 MHz)

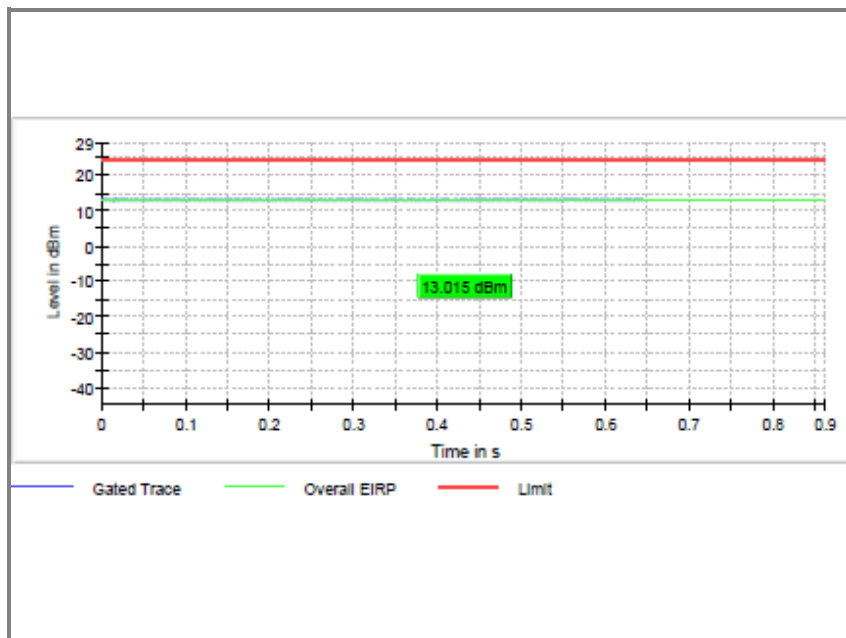


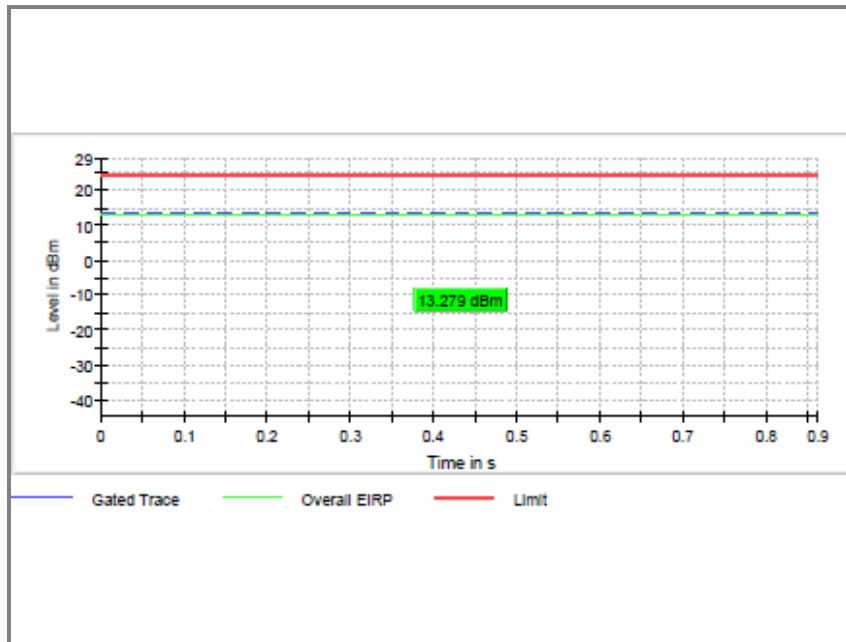
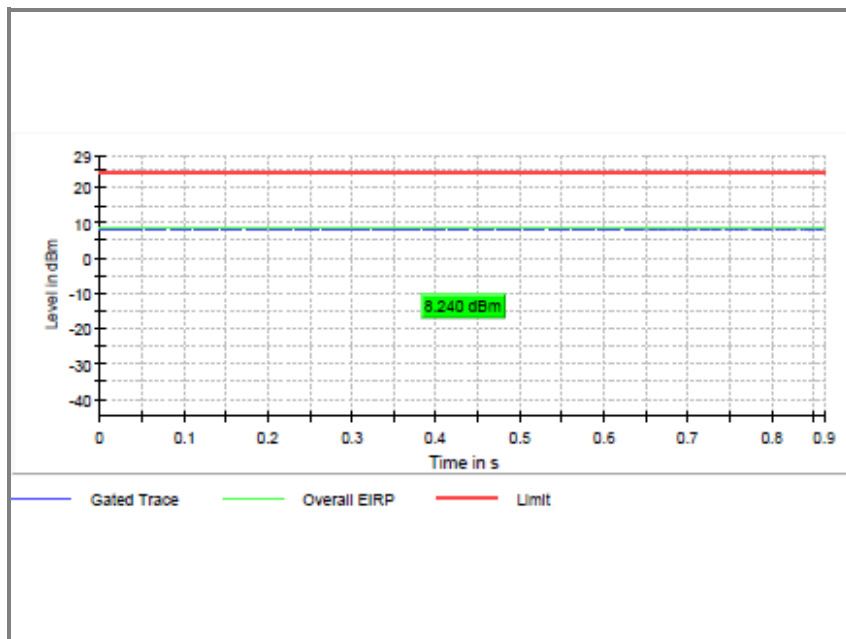
Operation mode: U-NII-1(n_HT20)ANT1

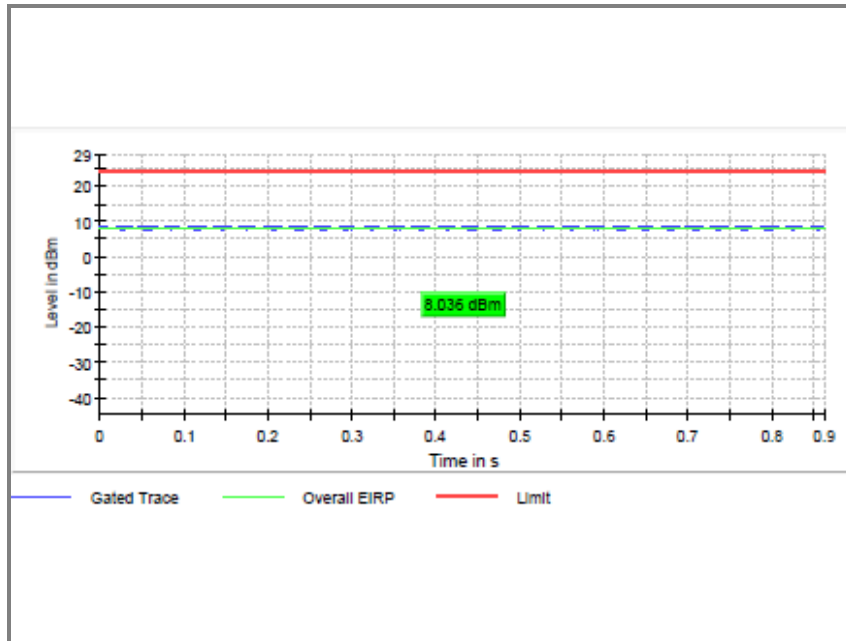
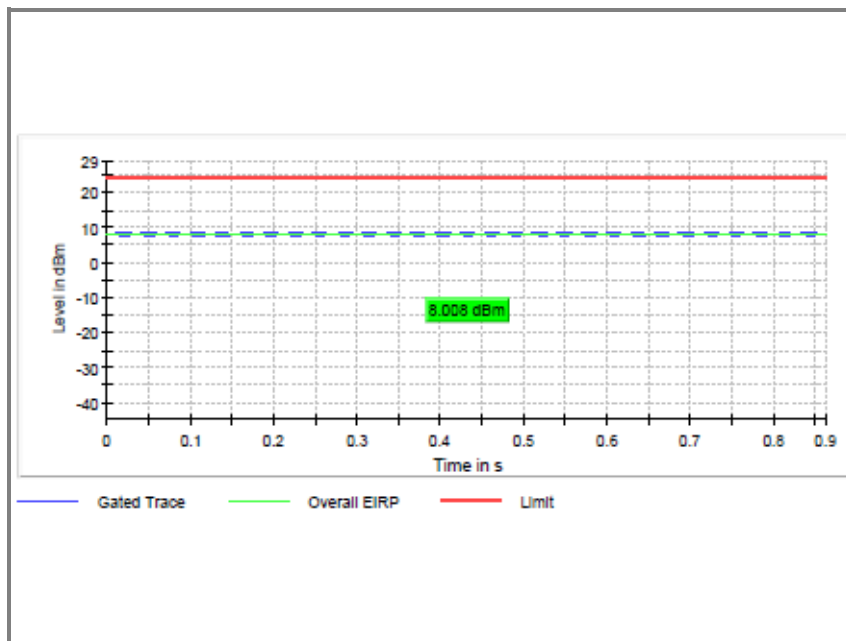
A. Low channel(5180 MHz)



B. Middle channel(5220 MHz)

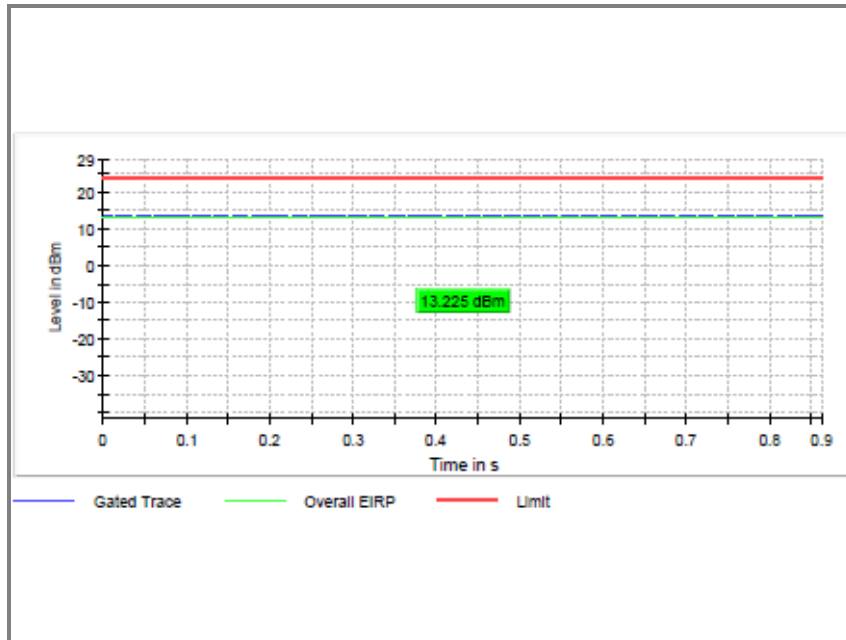


C. High channel(5240 MHz)**Operation mode: U-NII-1(n_HT20)ANT2****A. Low channel(5180 MHz)**

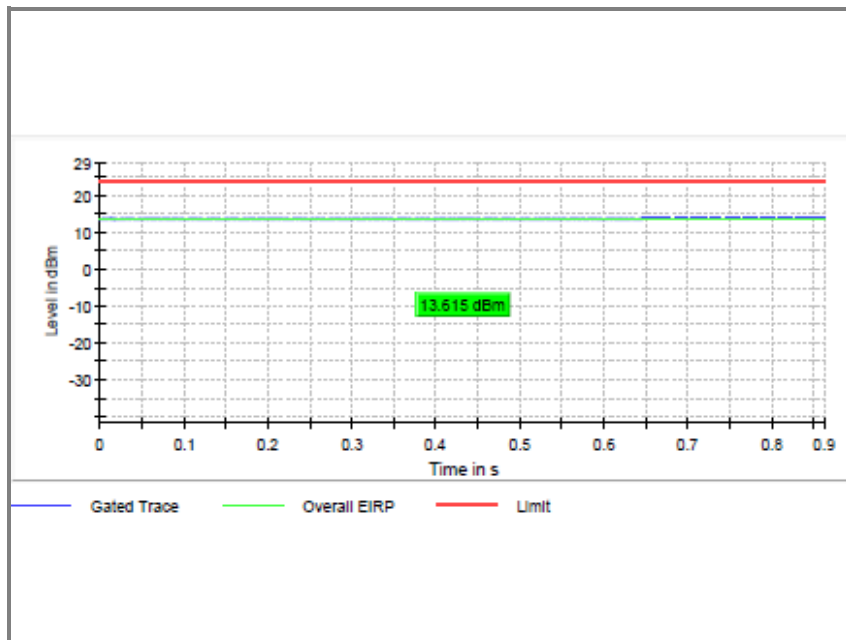
B. Middle channel(5220 MHz)**C. High channel(5240 MHz)**

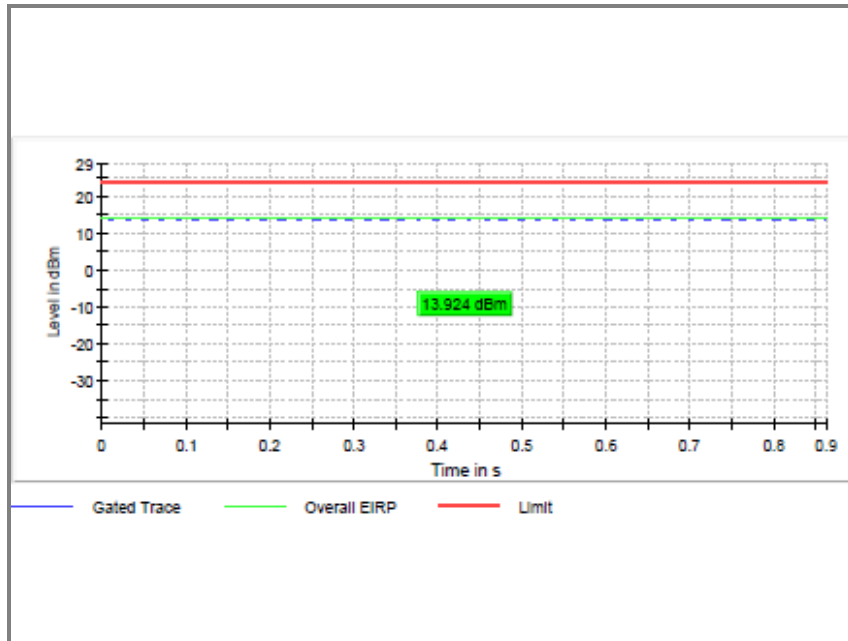
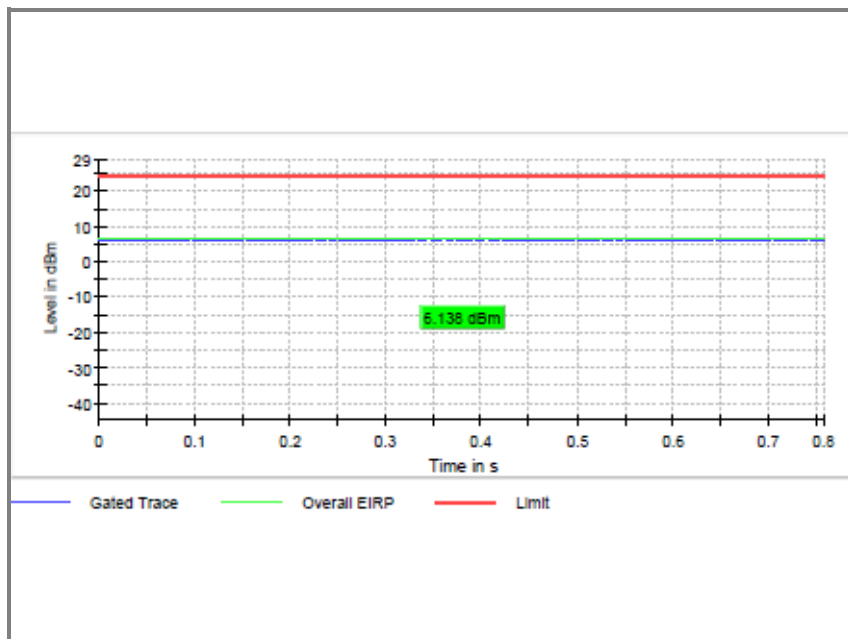
Operation mode: U-NII-1(n_HT20) Mimo2X2

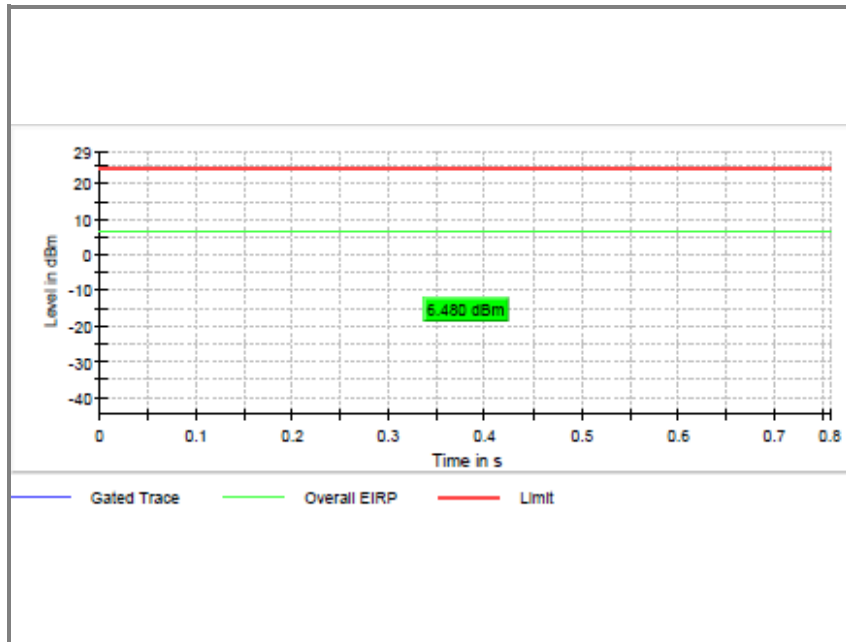
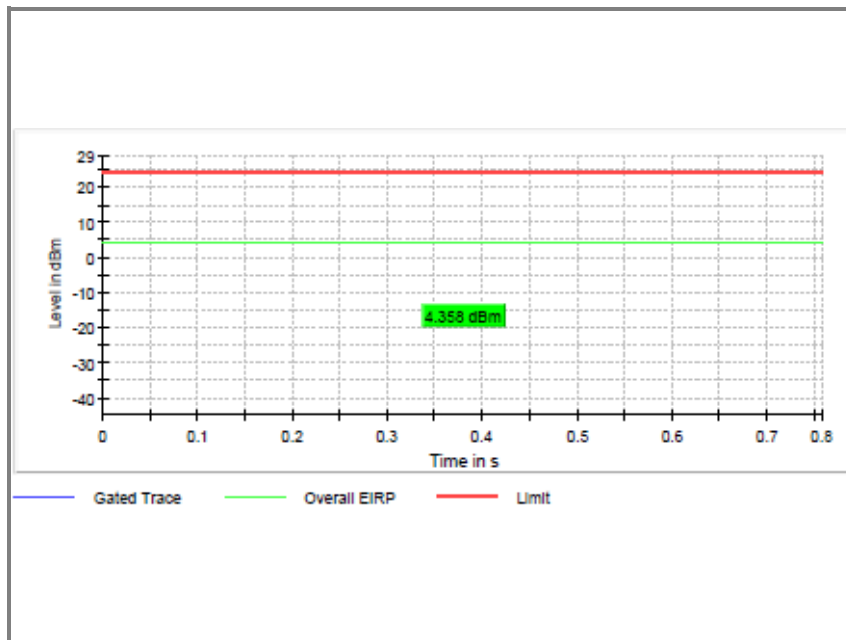
A. Low channel(5180 MHz)

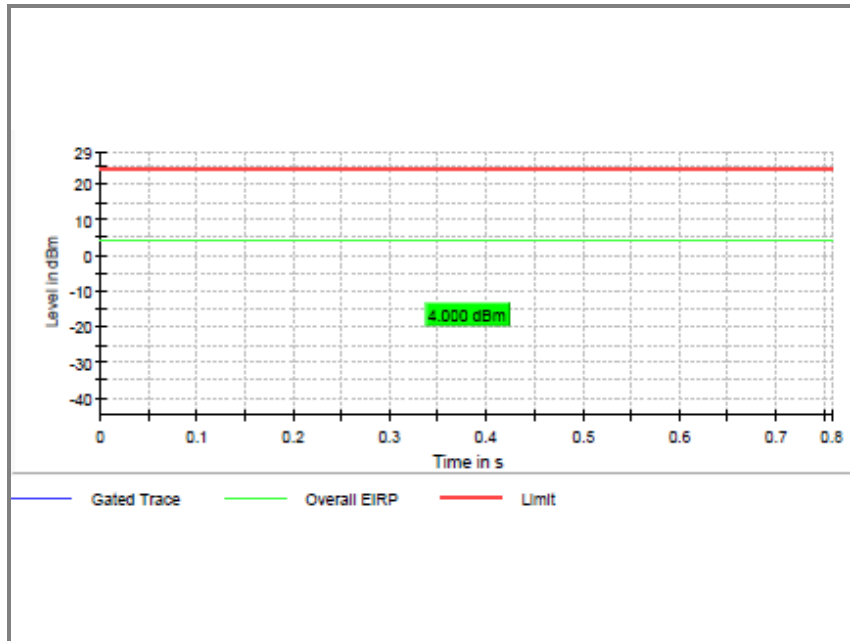


B. Middle channel(5220 MHz)

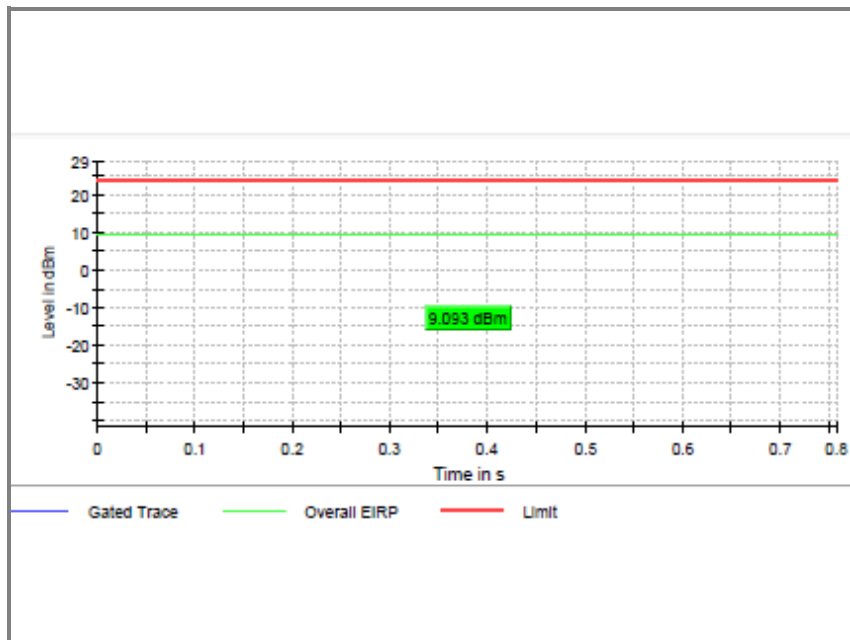


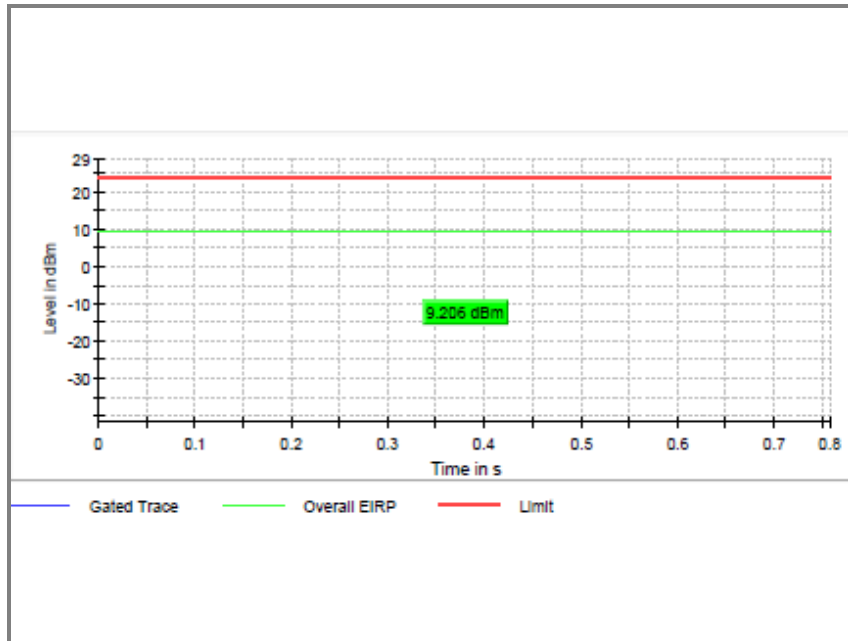
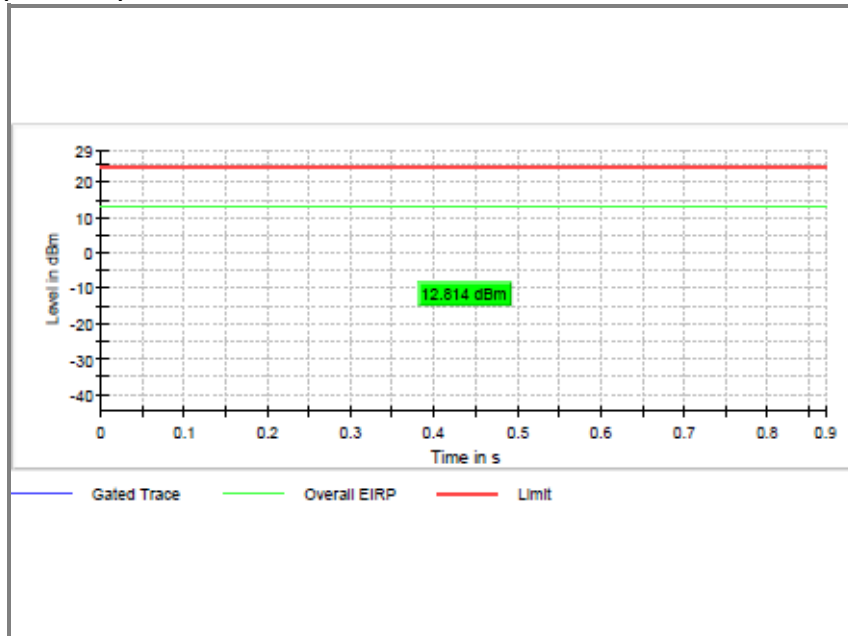
C. High channel(5240 MHz)**Operation mode: U-NII-1(n_HT40) ANT1****A. Low channel(5190 MHz)**

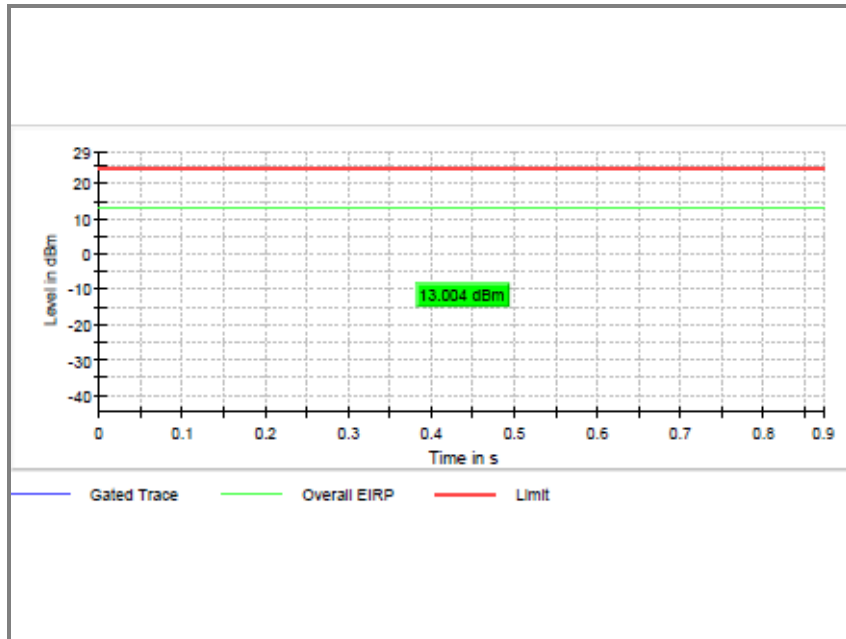
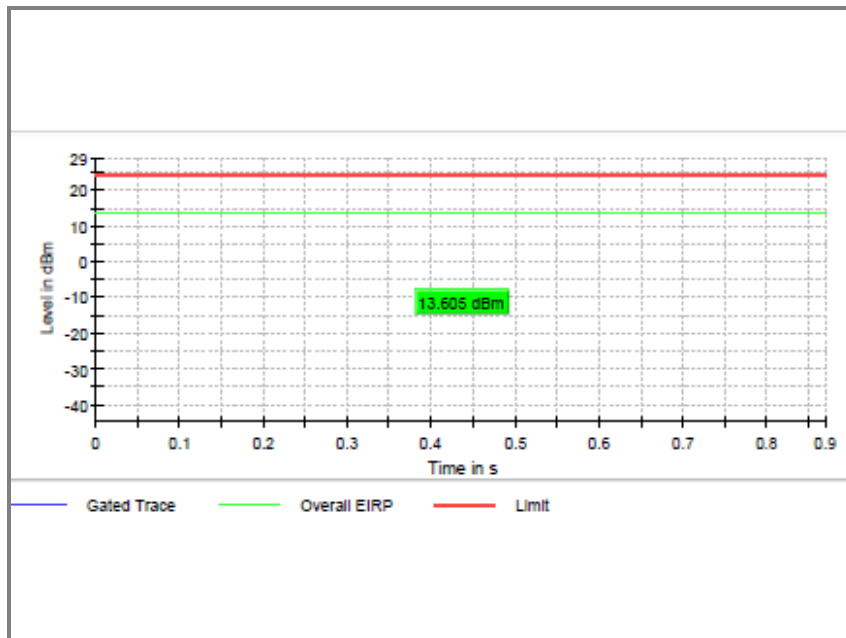
B. High channel(5230 MHz)**Operation mode: U-NII-1(n_HT40)ANT2****A. Low channel(5190 MHz)**

B. High channel(5230 MHz)

Operation mode: U-NII-1(n_HT40) Mimo2X2

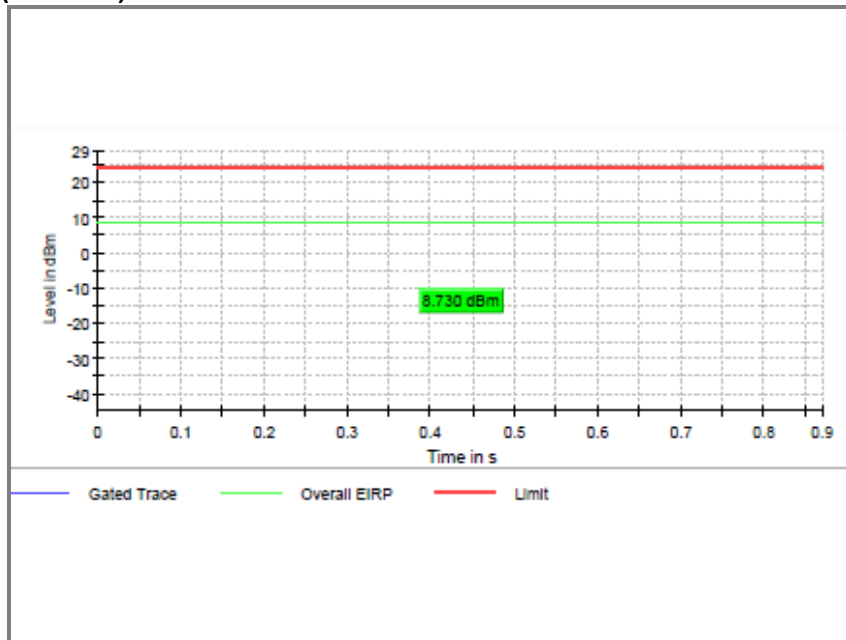
A. Low channel(5190 MHz)

B. High channel(5230 MHz)**Operation mode: U-NII-2A(802.11a) ANT1****A. Low channel(5260 MHz)**

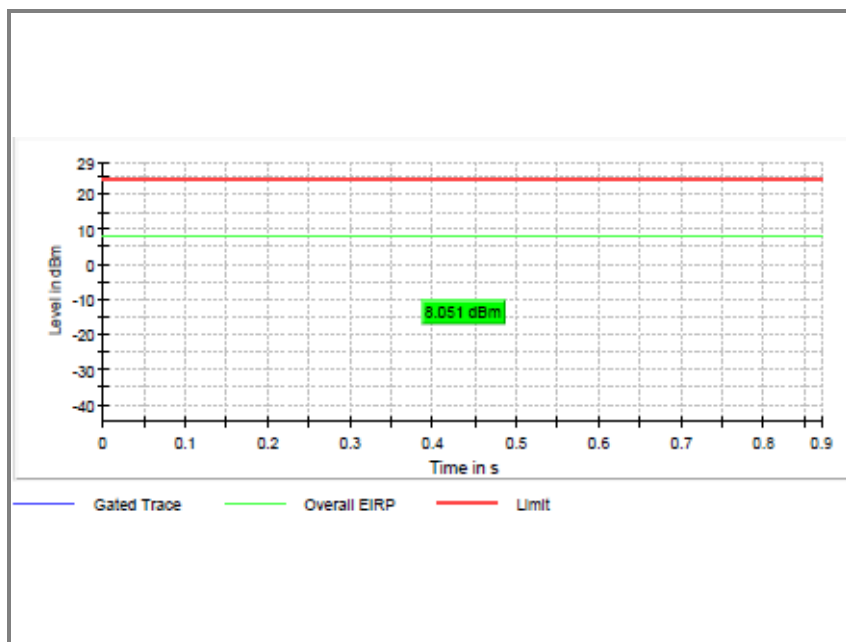
B. Middle channel(5300 MHz)**C. High channel(5320 MHz)**

Operation mode: U-NII-2A(802.11a)ANT2

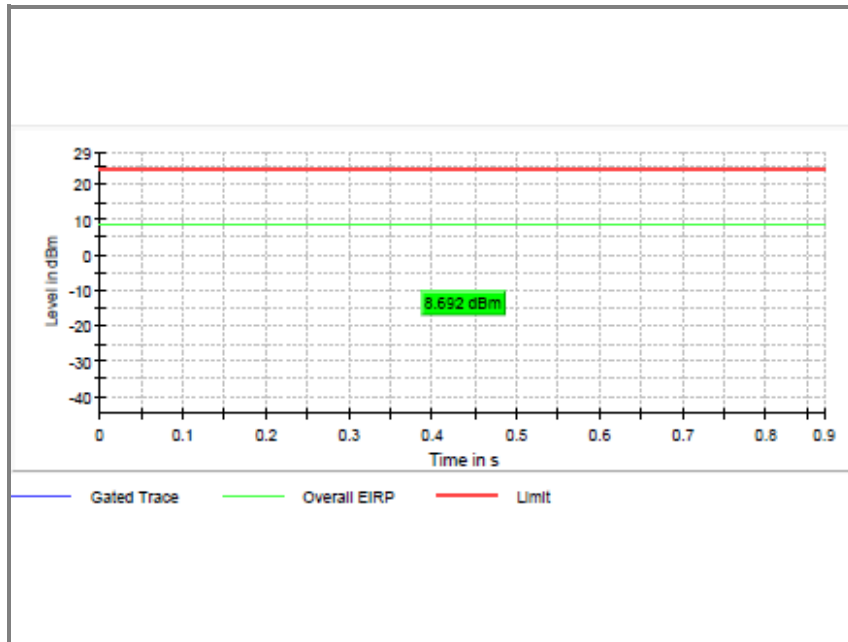
A. Low channel(5260 MHz)



B. Middle channel(5300 MHz)

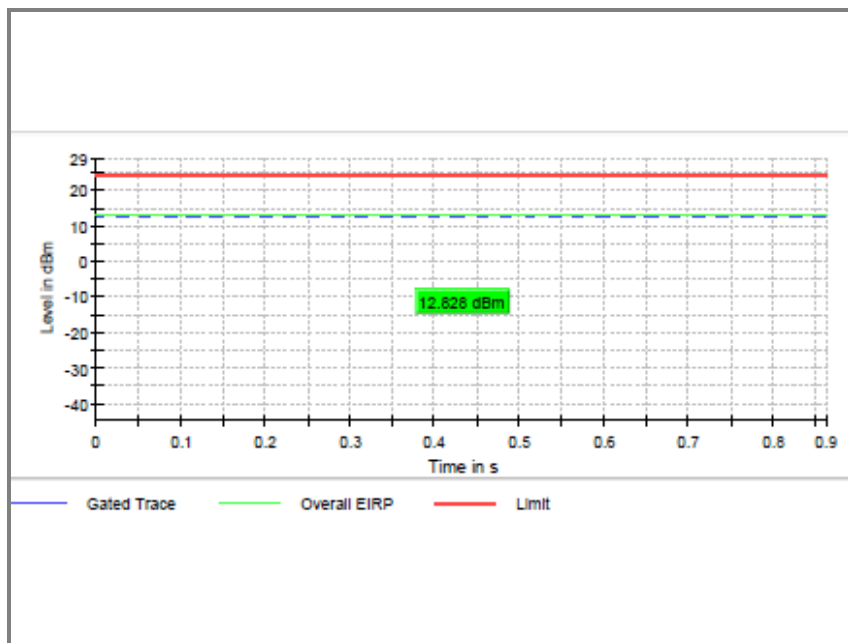


C. High channel(5320 MHz)

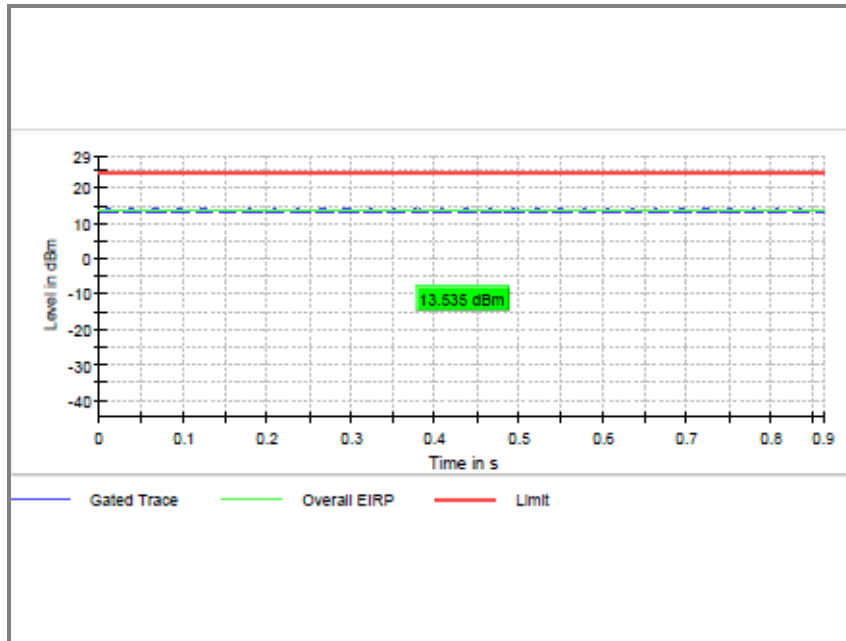


Operation mode: U-NII-2A(n_HT20) ANT1

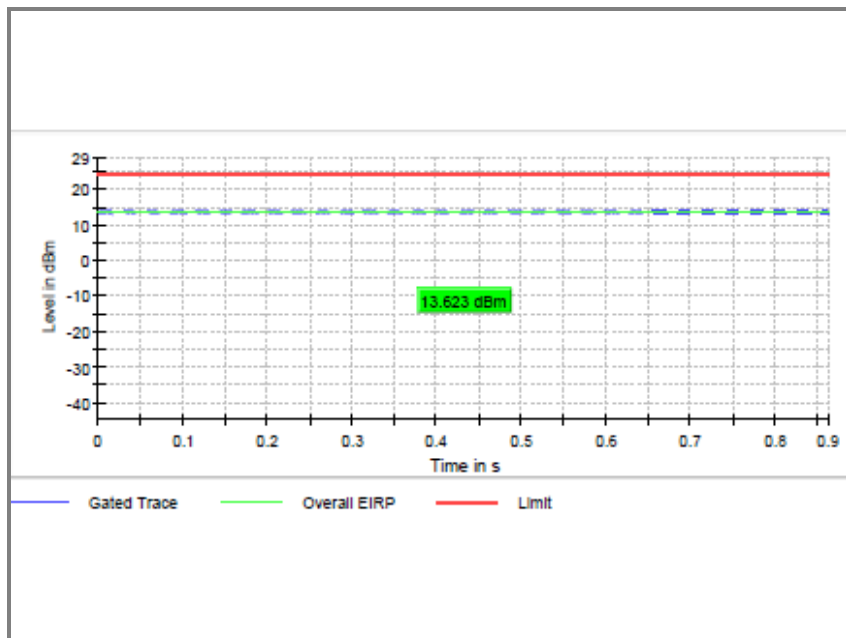
A. Low channel(5260 MHz)



B. Middle channel(5300 MHz)

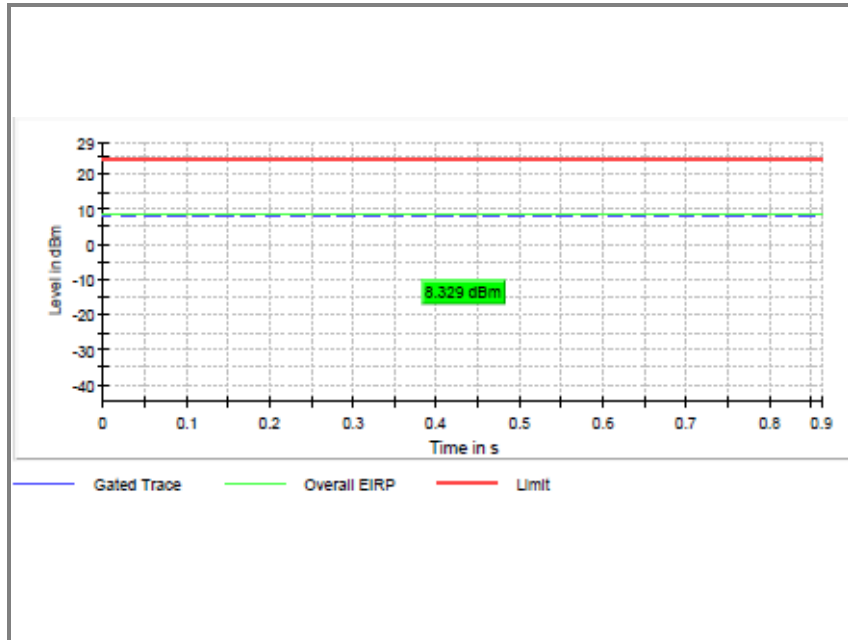


C. High channel(5320 MHz)

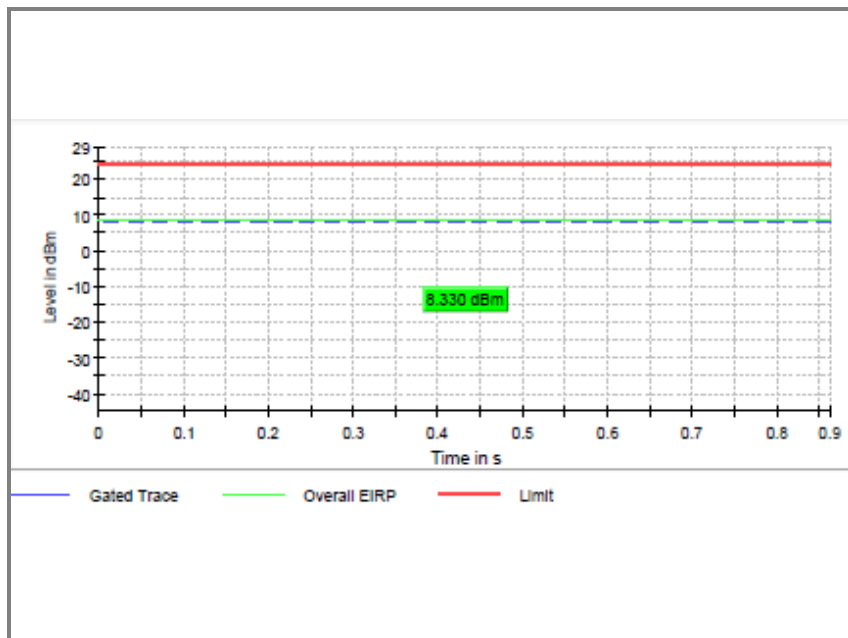


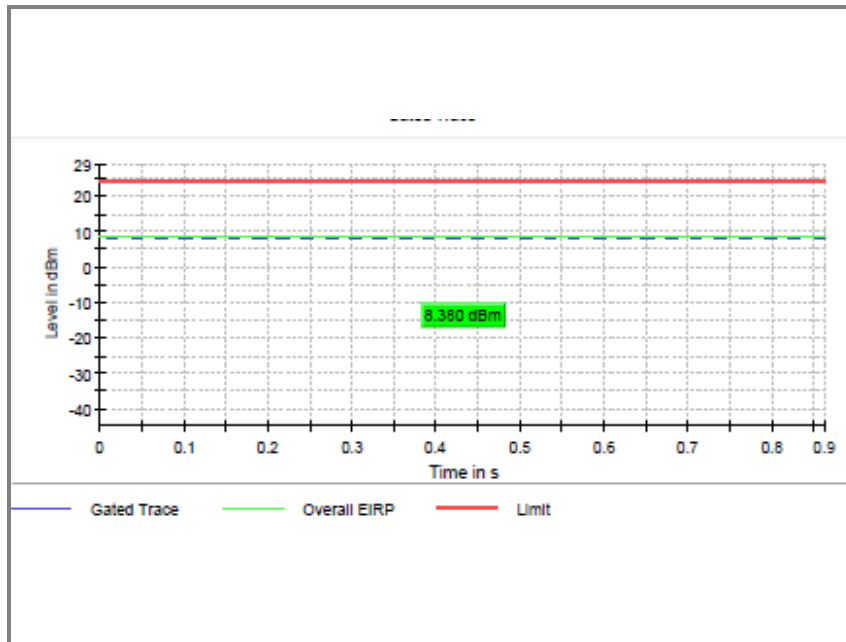
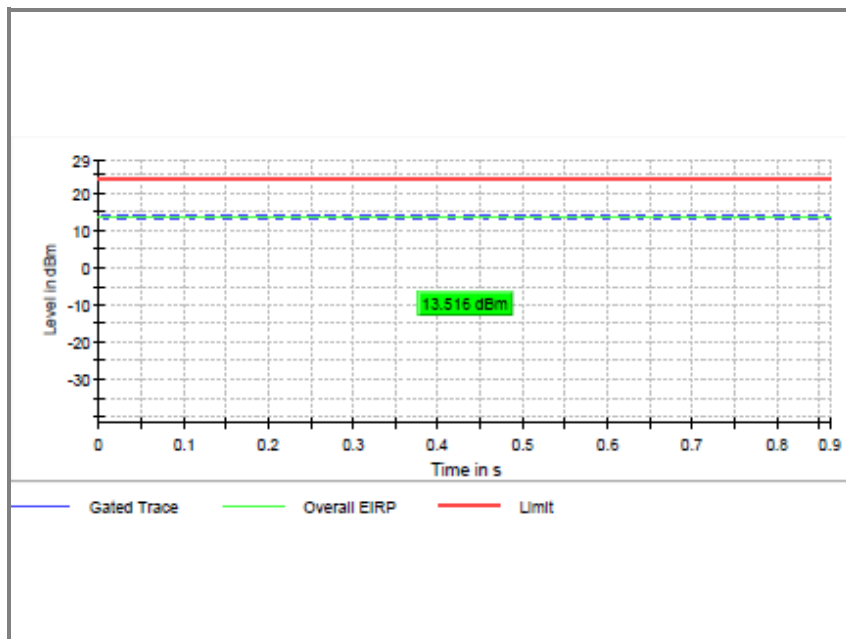
Operation mode: U-NII-2A(n_HT20) ANT2

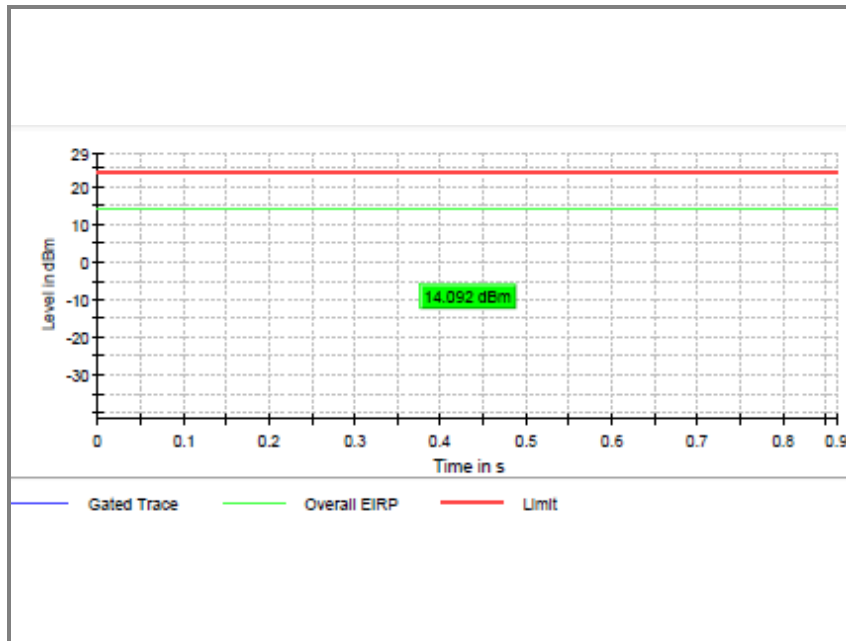
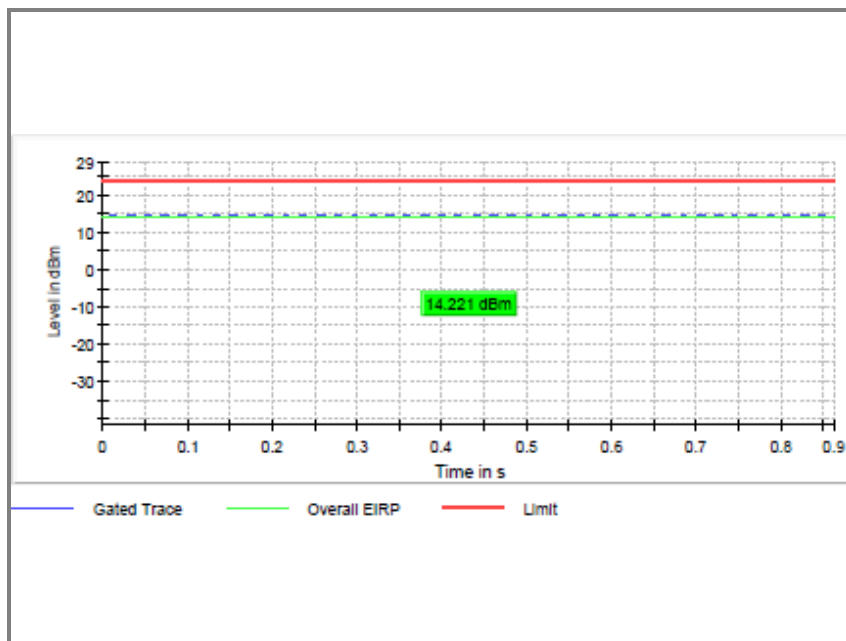
A. Low channel(5260 MHz)



B. Middle channel(5300 MHz)

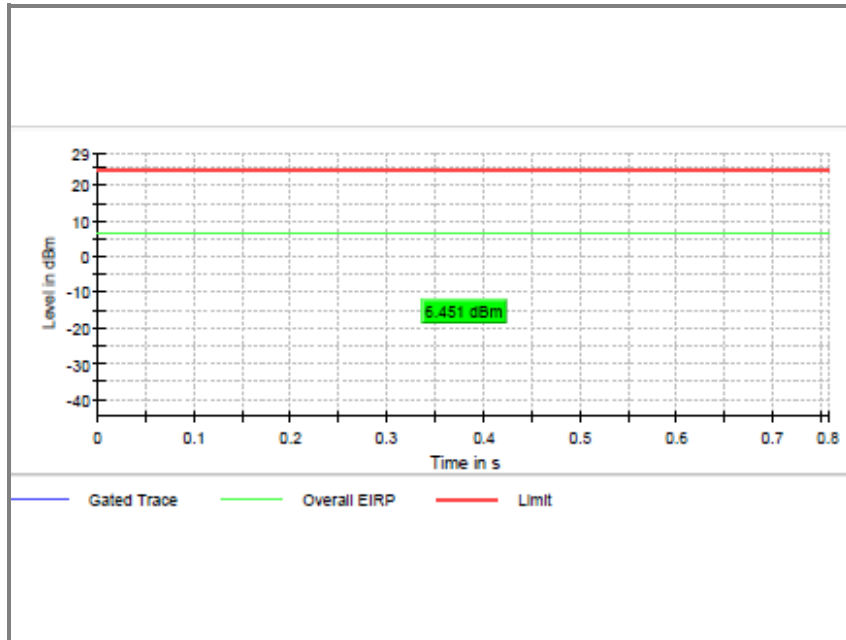


C. High channel(5320 MHz)**Operation mode: U-NII-2A(n_HT20) Mimo2X2****A. Low channel(5260 MHz)**

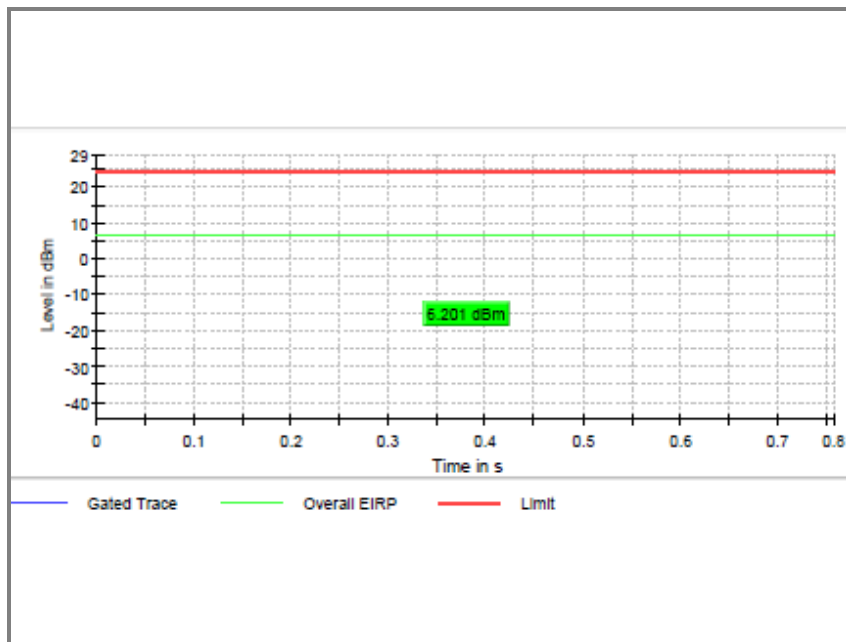
B. Middle channel(5300 MHz)**C. High channel(5320 MHz)**

Operation mode: U-NII-2A(n_HT40) ANT1

A. Low channel(5270 MHz)

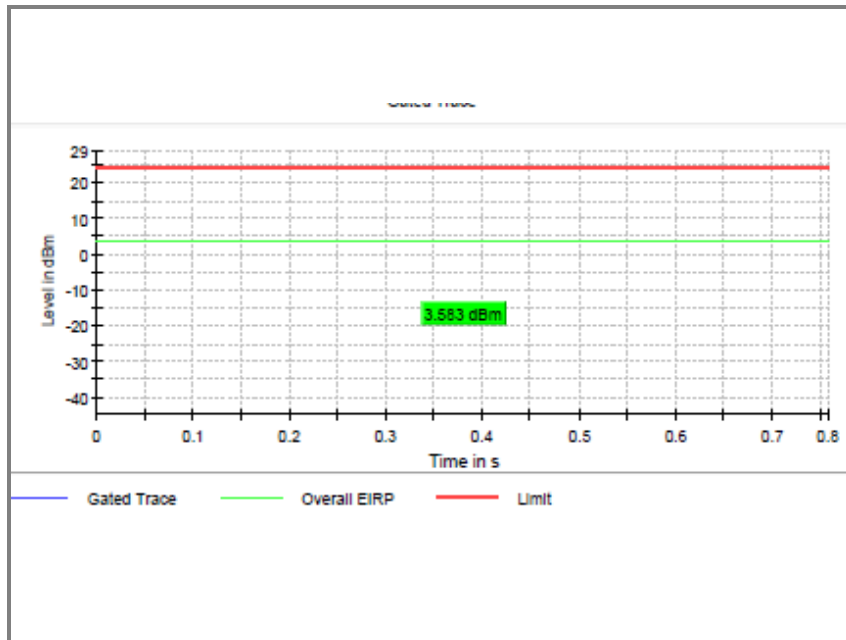


B. High channel(5310 MHz)

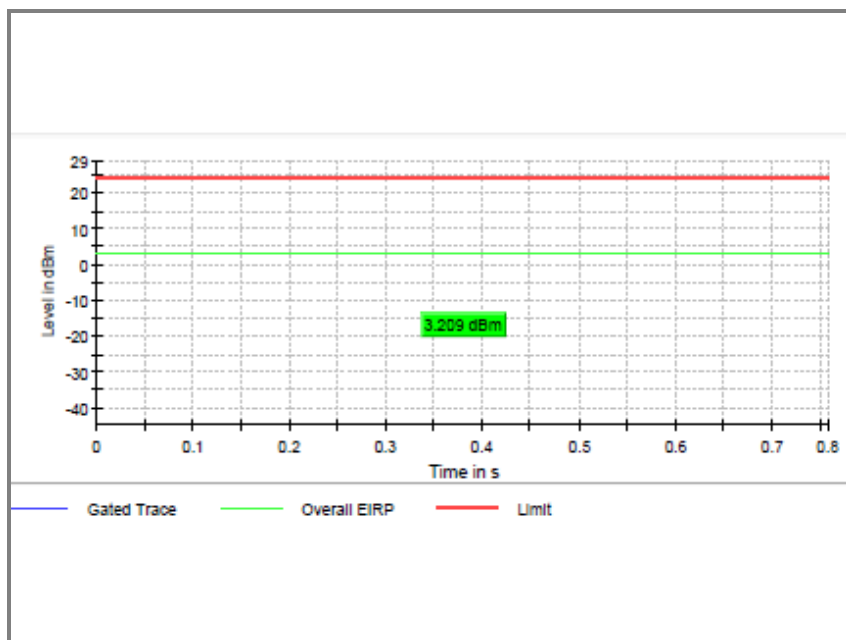


Operation mode: U-NII-2A(n_HT40) ANT2

A. Low channel(5270 MHz)

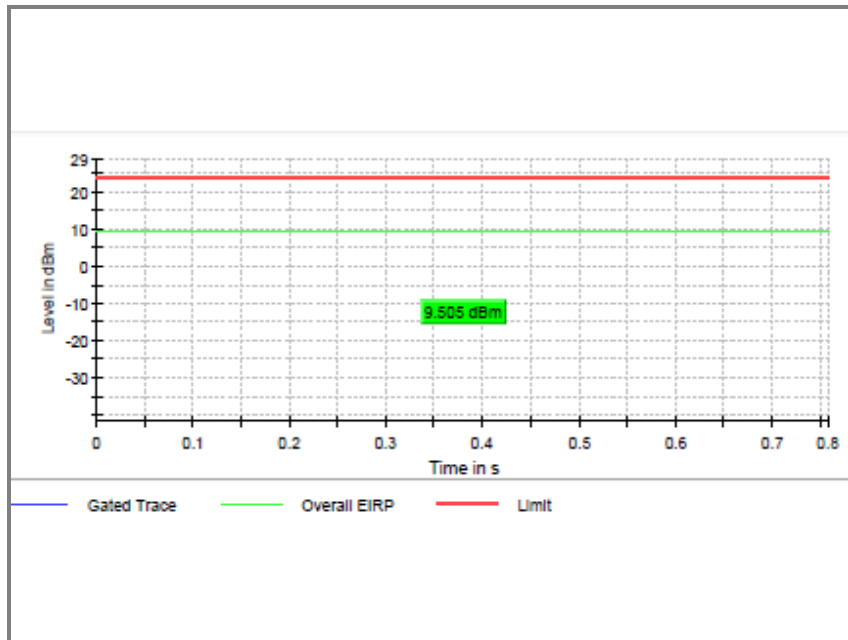


B. High channel(5310 MHz)

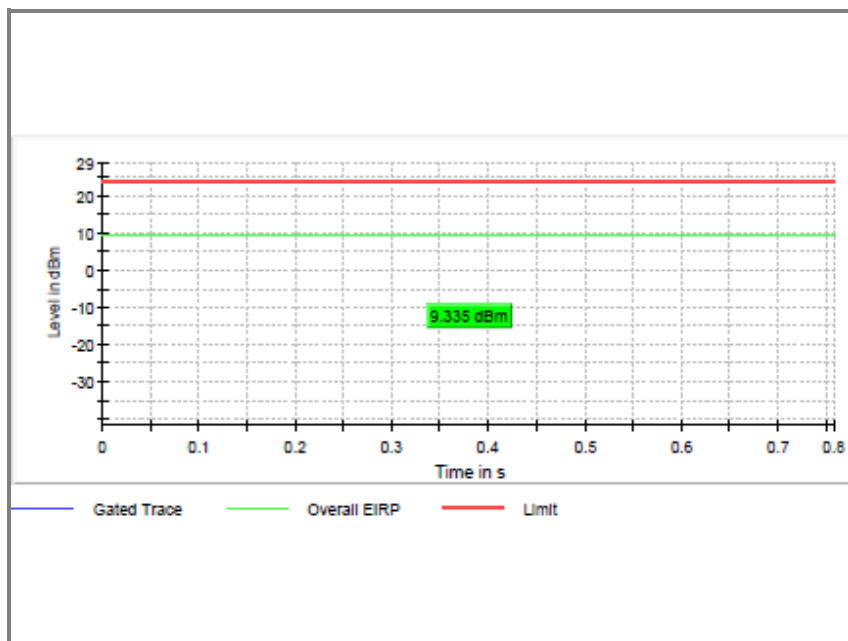


Operation mode: U-NII-2A(n_HT40) Mimo2X2

A. Low channel(5270 MHz)

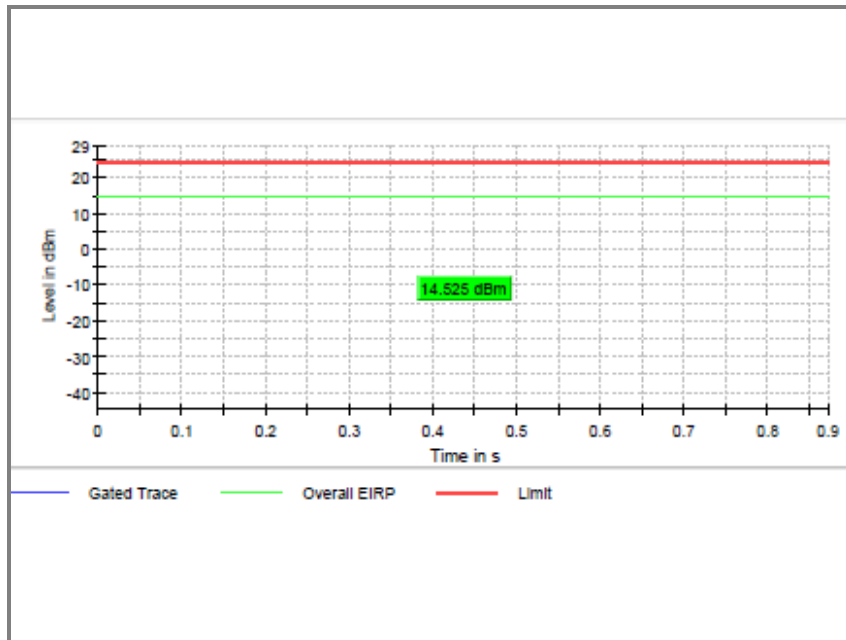


B. High channel(5310 MHz)

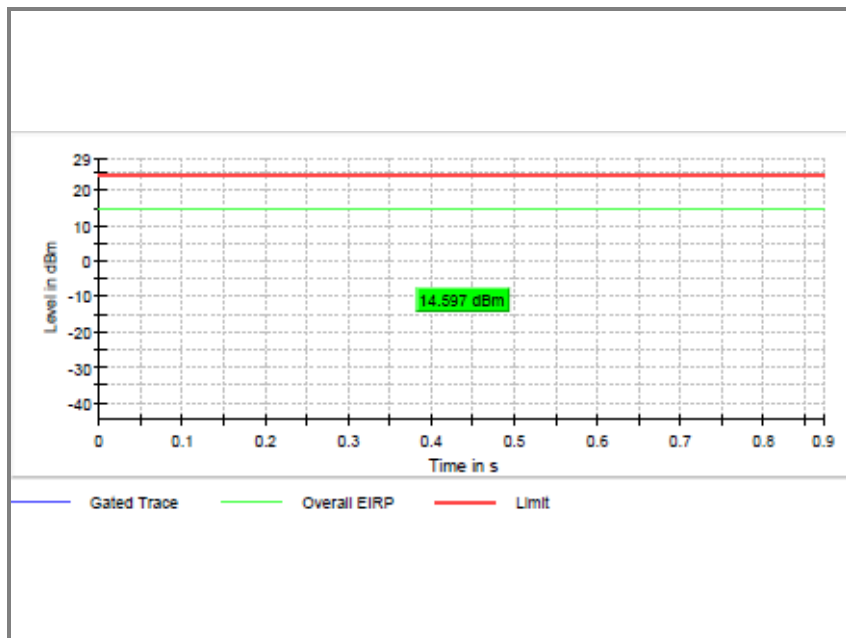


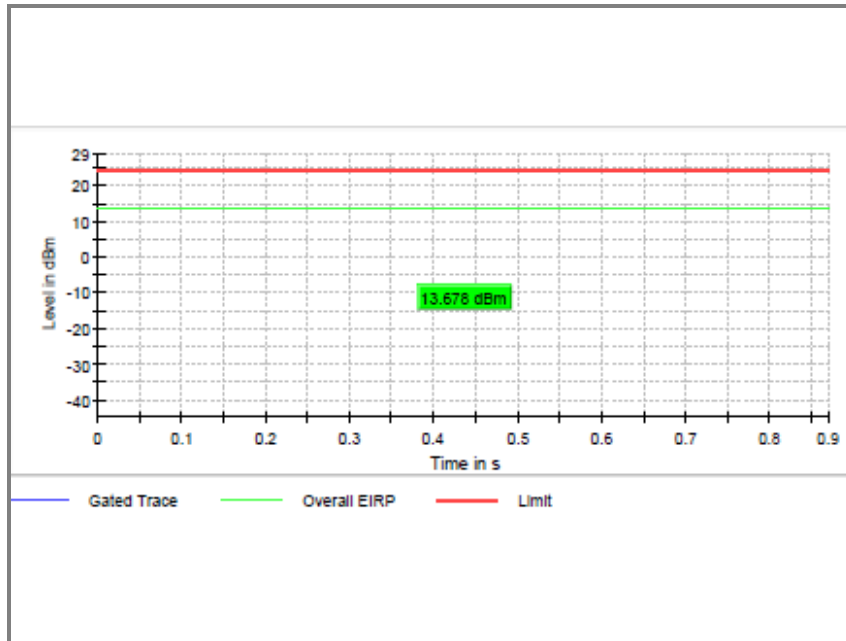
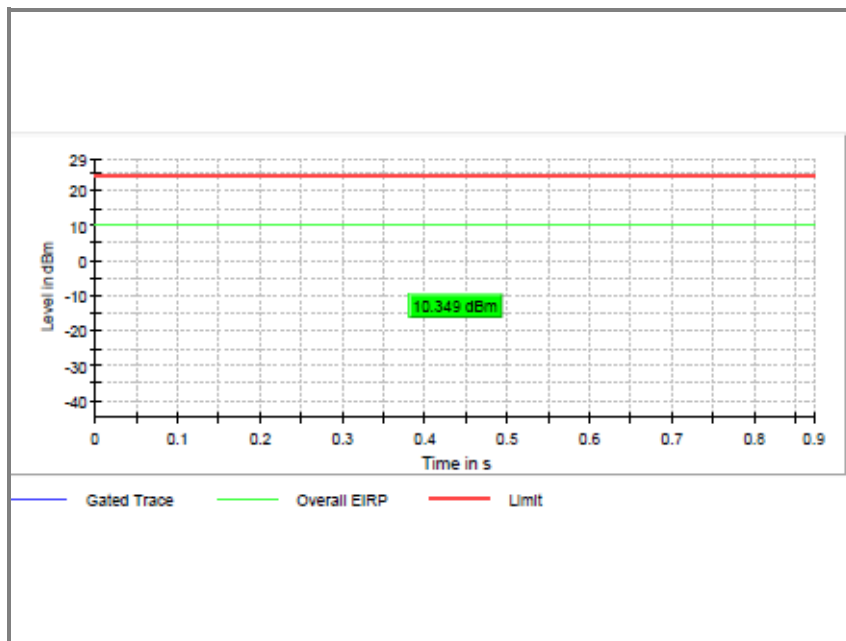
Operation mode: U-NII-2C(802.11a) ANT1

A. Low channel(5500 MHz)

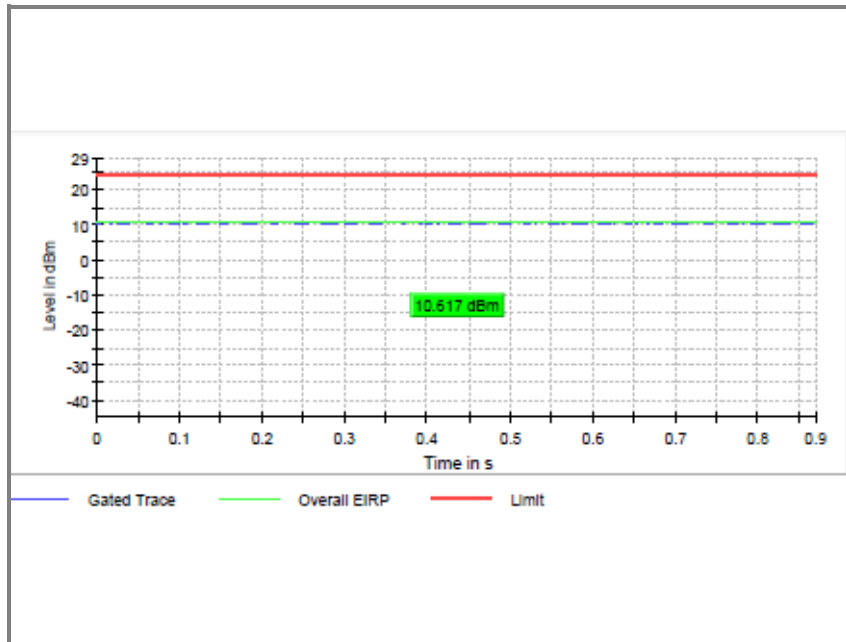


B. Middle channel(5560 MHz)

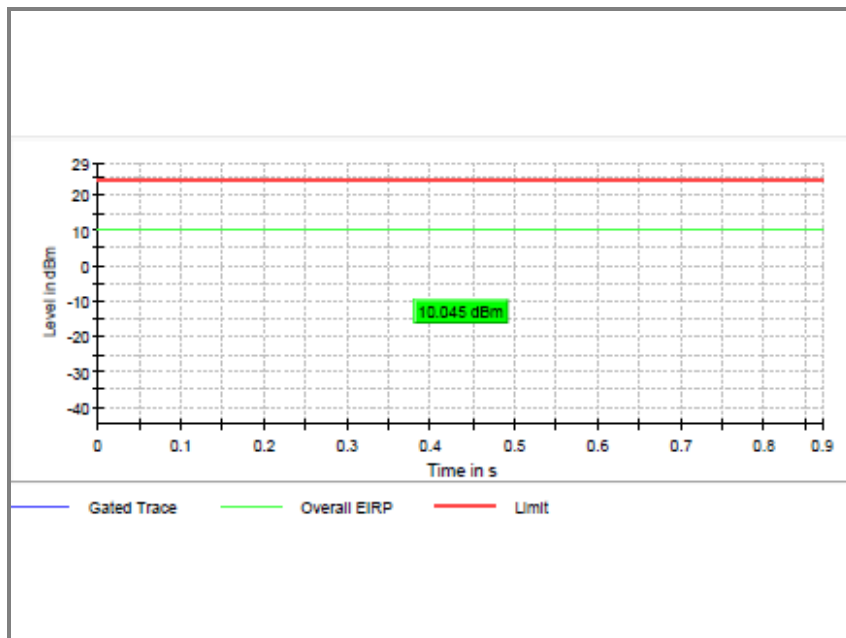


C. High channel(5620 MHz)**Operation mode: U-NII-2C(802.11a) ANT2****A. Low channel(5500 MHz)**

B. Middle channel(5560 MHz)

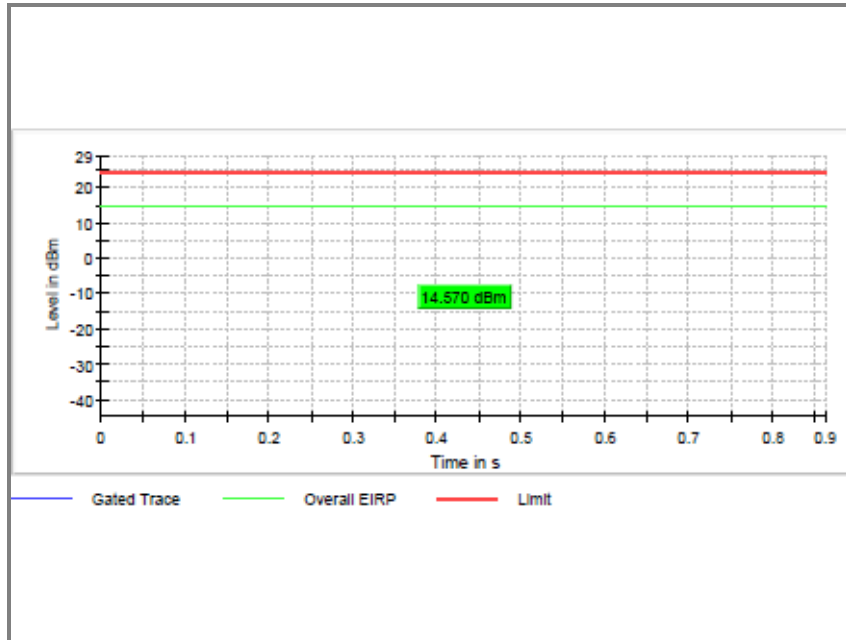


C. High channel(5620 MHz)

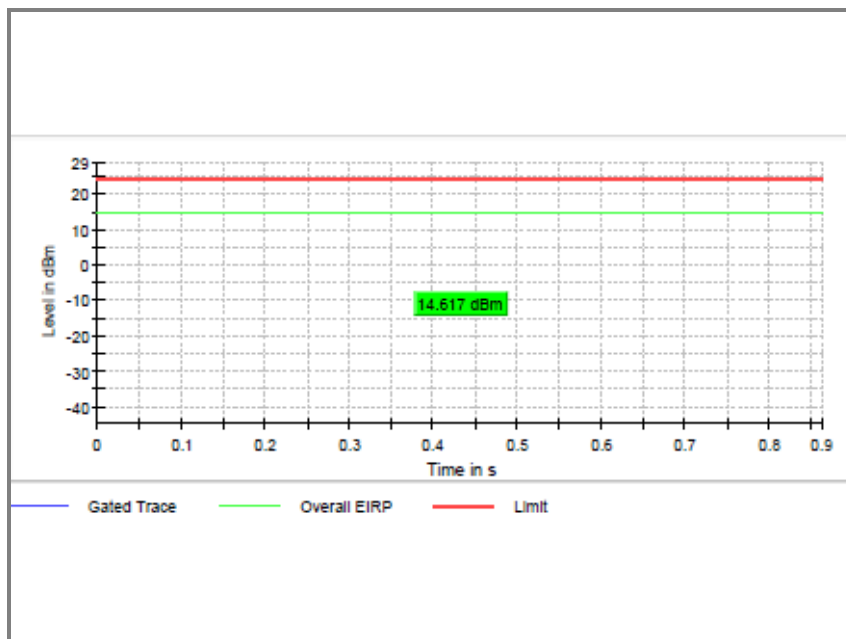


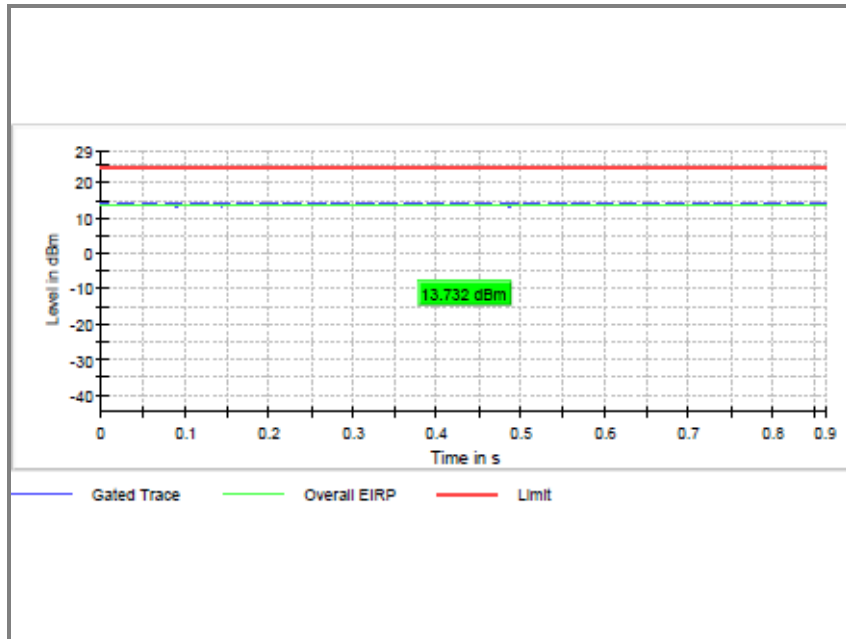
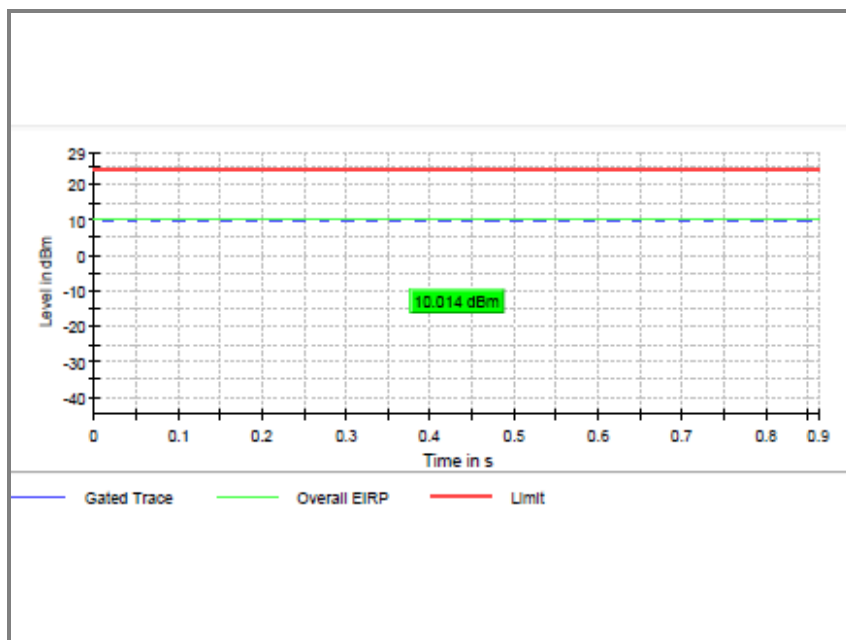
Operation mode: U-NII-2C(n_HT20) ANT1

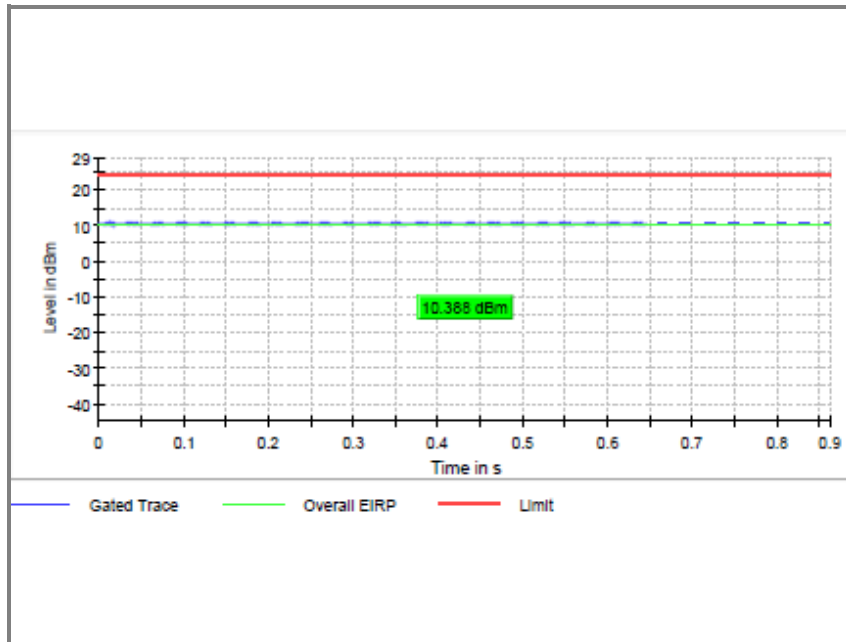
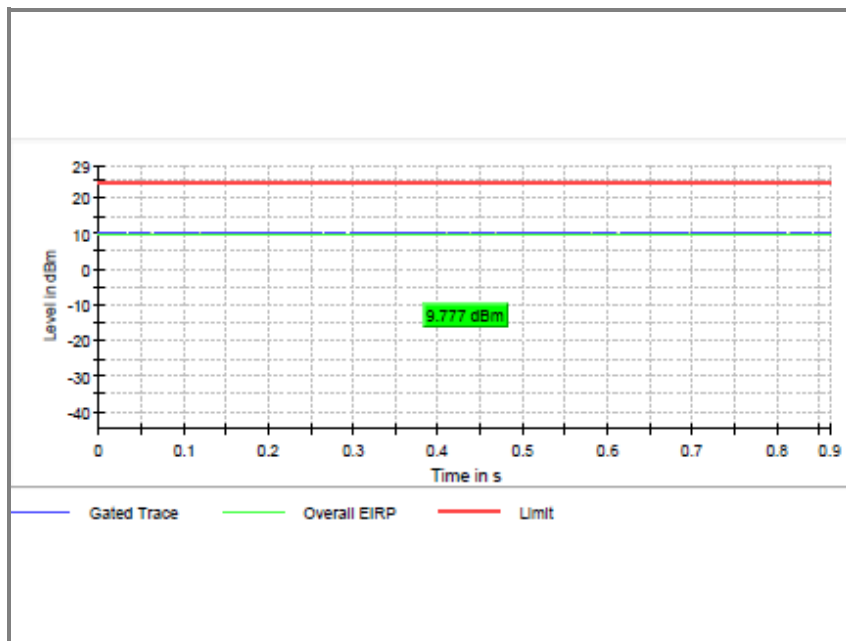
A. Low channel(5500 MHz)



B. Middle channel(5560 MHz)

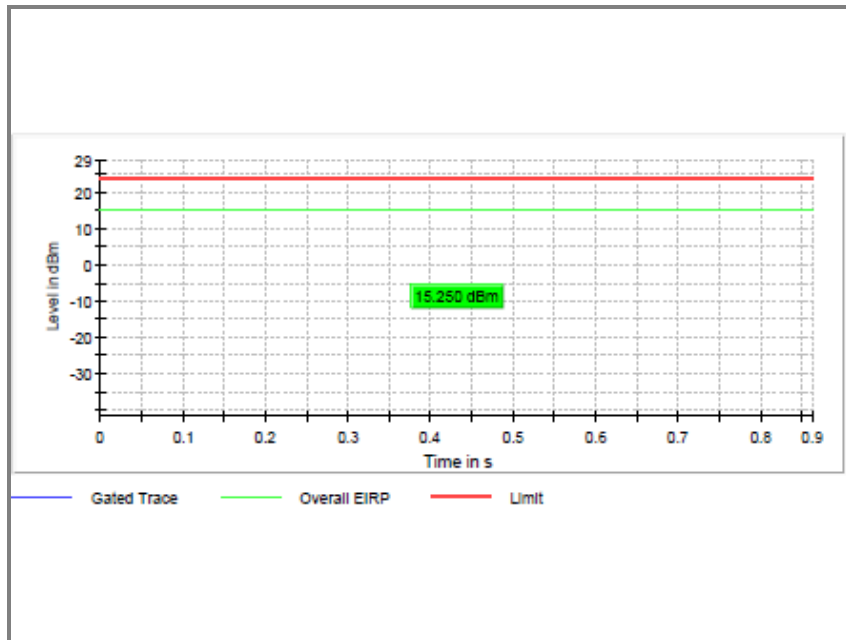


C. High channel(5620 MHz)**Operation mode: U-NII-2C(n_HT20) ANT2****A. Low channel(5500 MHz)**

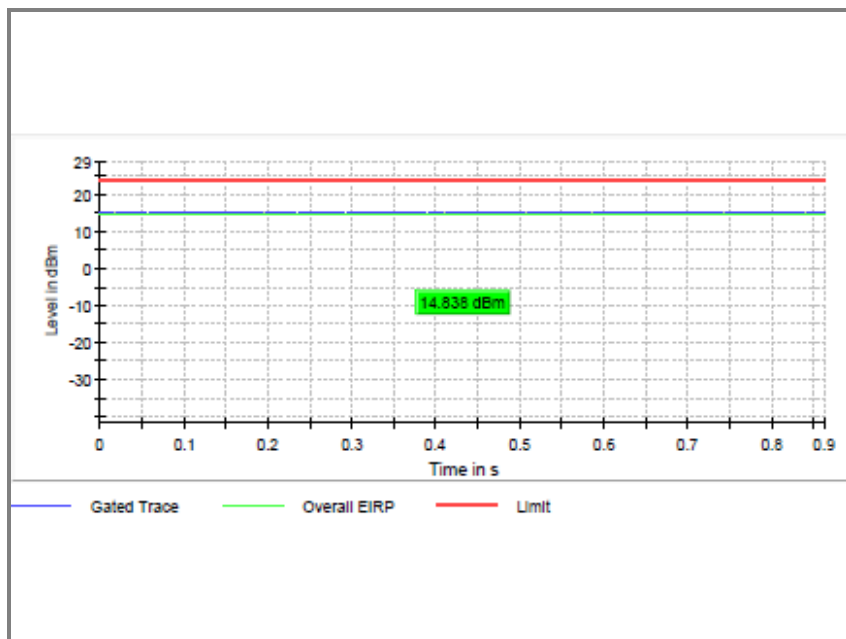
B. Middle channel(5560 MHz)**C. High channel(5620 MHz)**

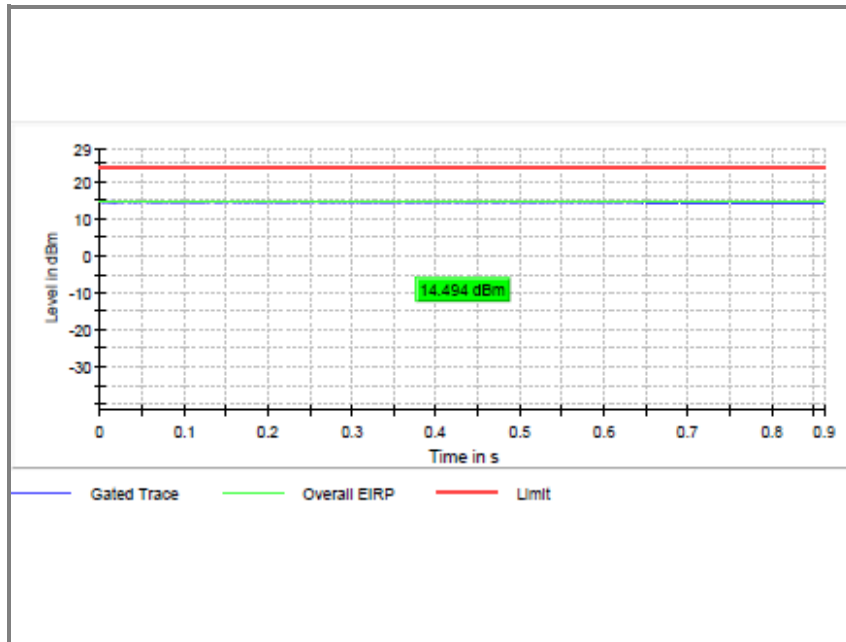
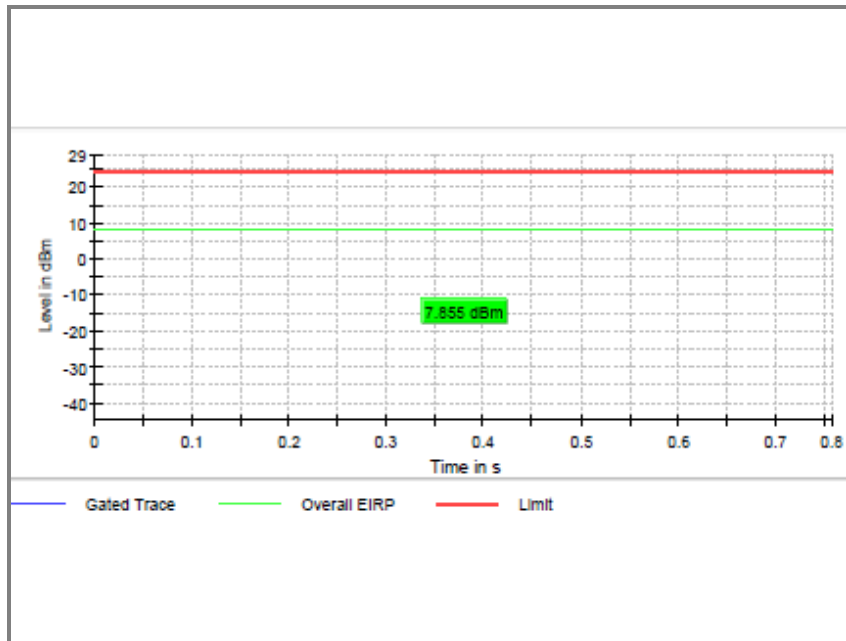
Operation mode: U-NII-2C(n_HT20) Mimo2X2

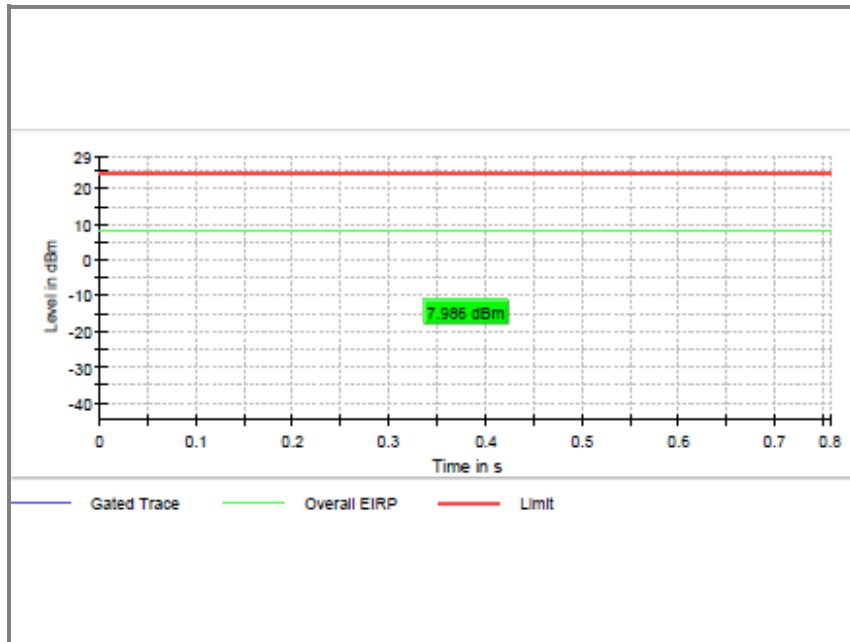
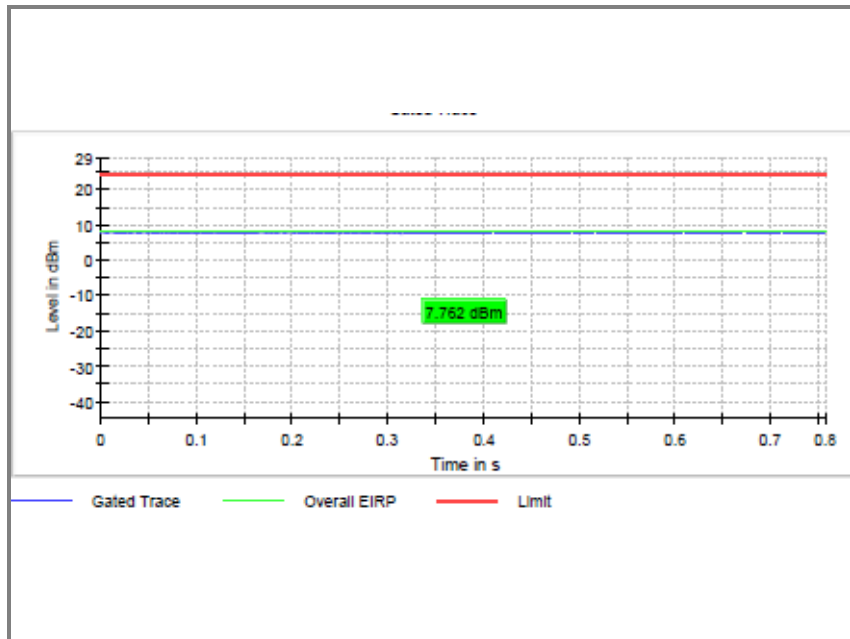
A. Low channel(5500 MHz)



B. Middle channel(5560 MHz)

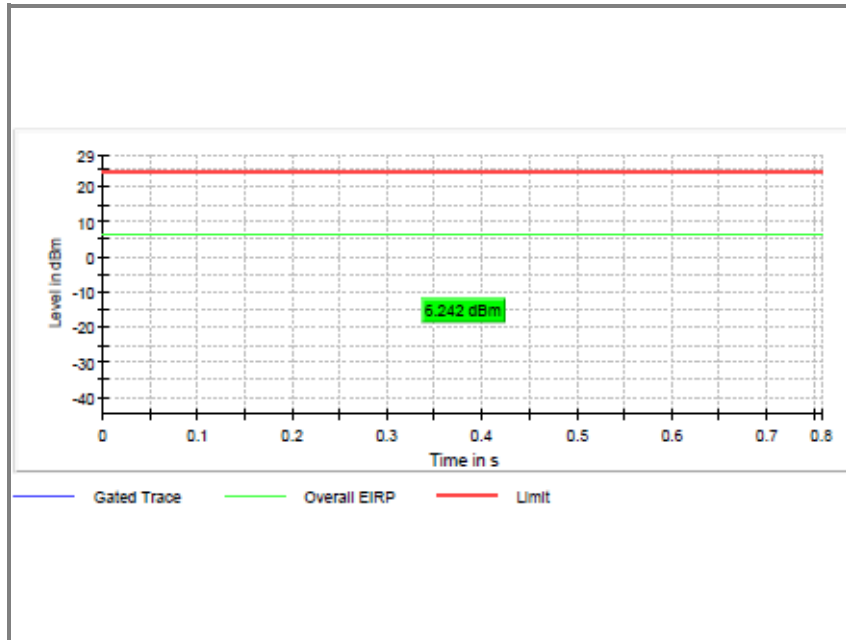


C. High channel(5620 MHz)**Operation mode: U-NII-2C(n_HT40)ANT1****A. Low channel(5510 MHz)**

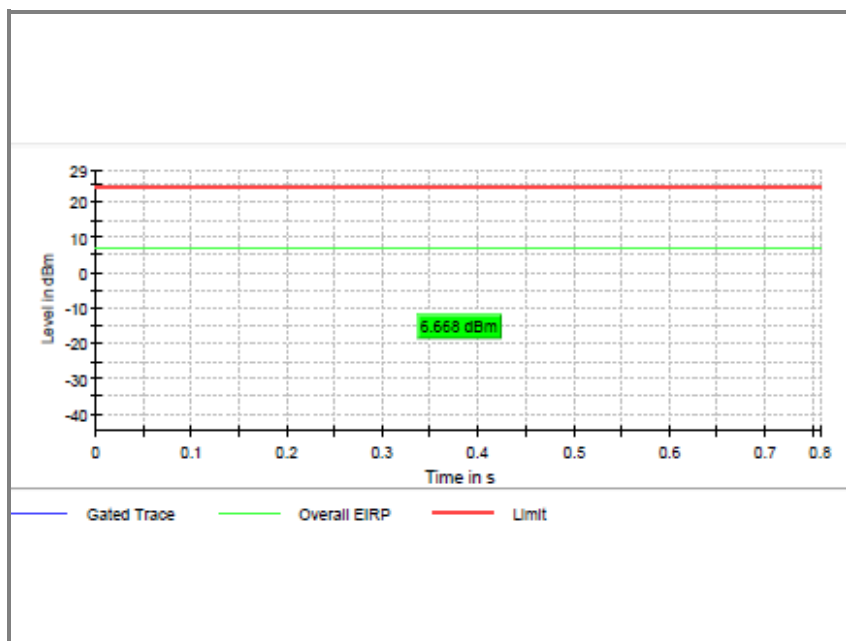
B. Middle channel(5550 MHz)**C. High channel(5590 MHz)**

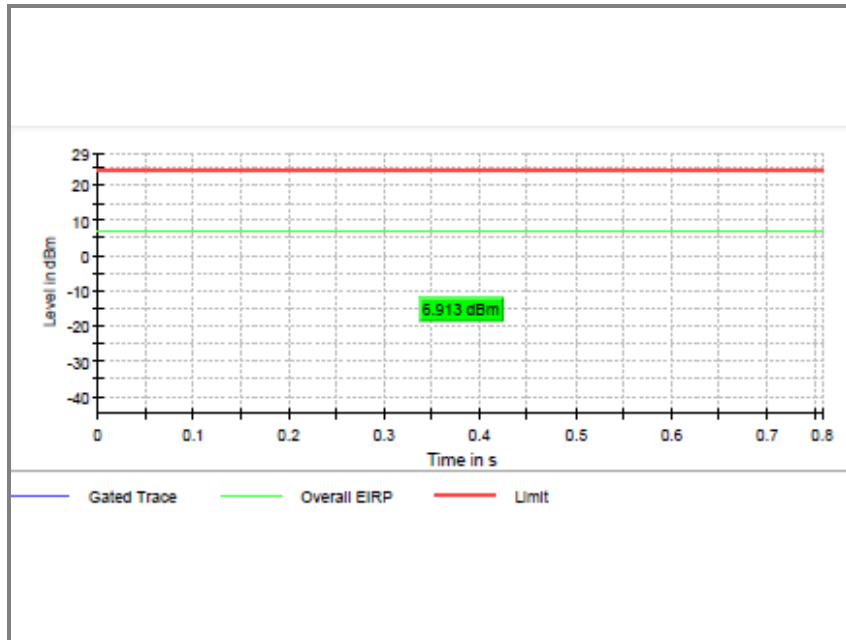
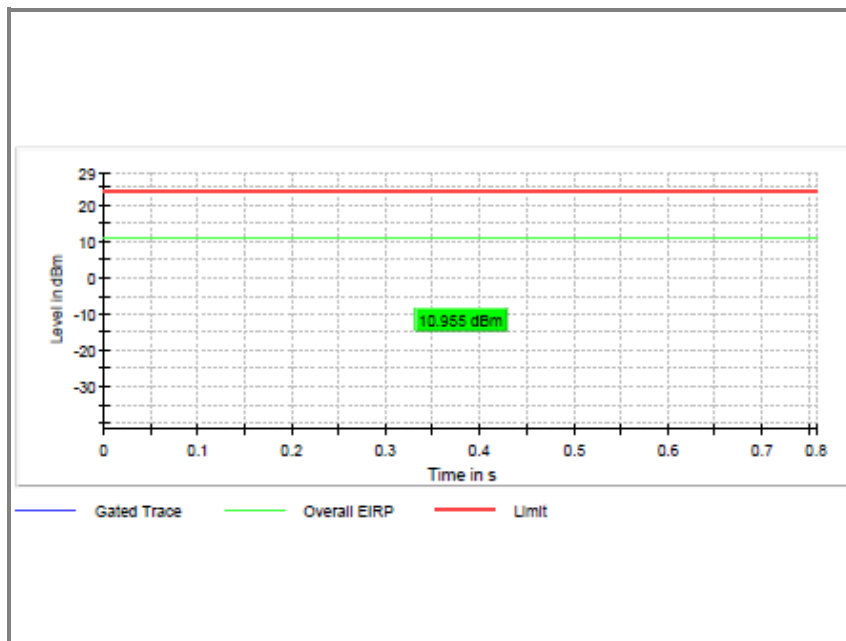
Operation mode: U-NII-2C(n_HT40)ANT2

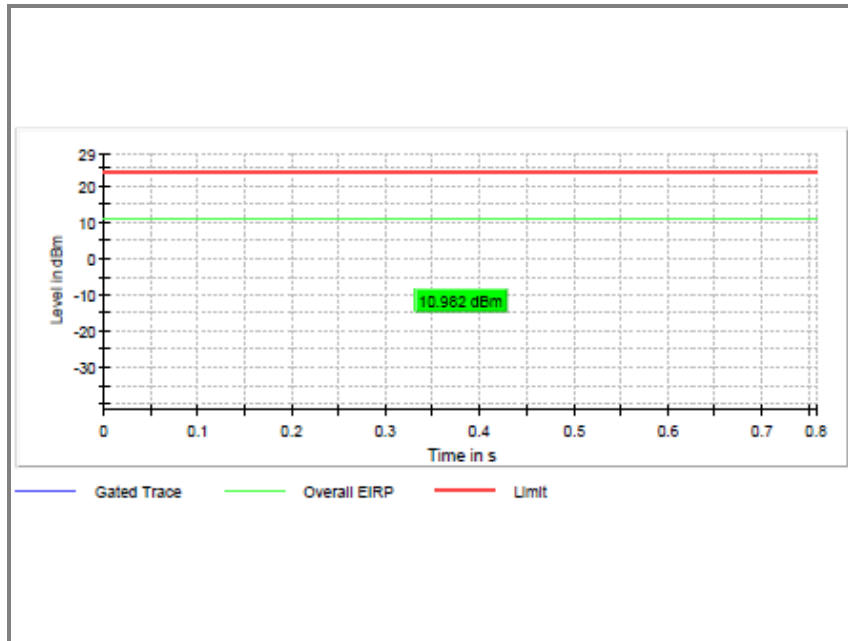
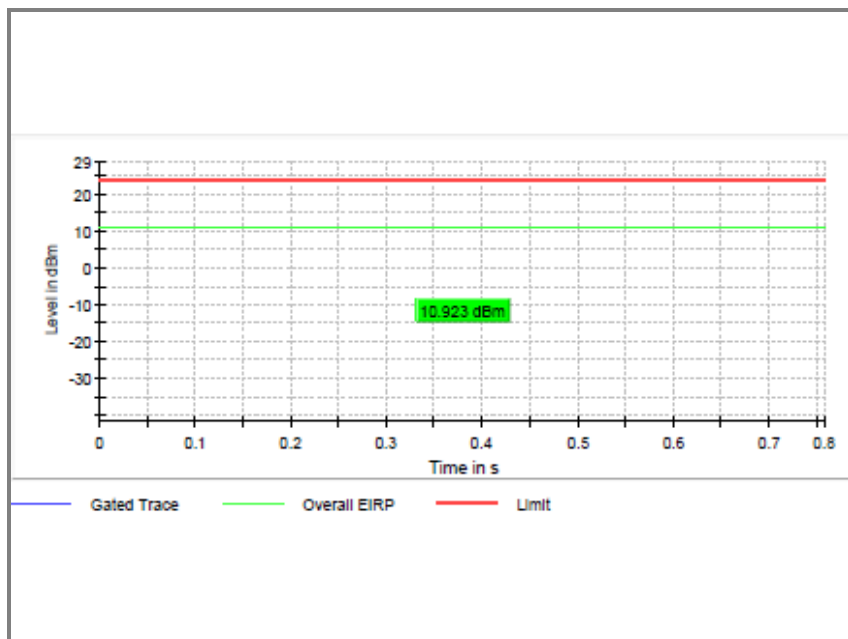
A. Low channel(5510 MHz)



B. Middle channel(5550 MHz)

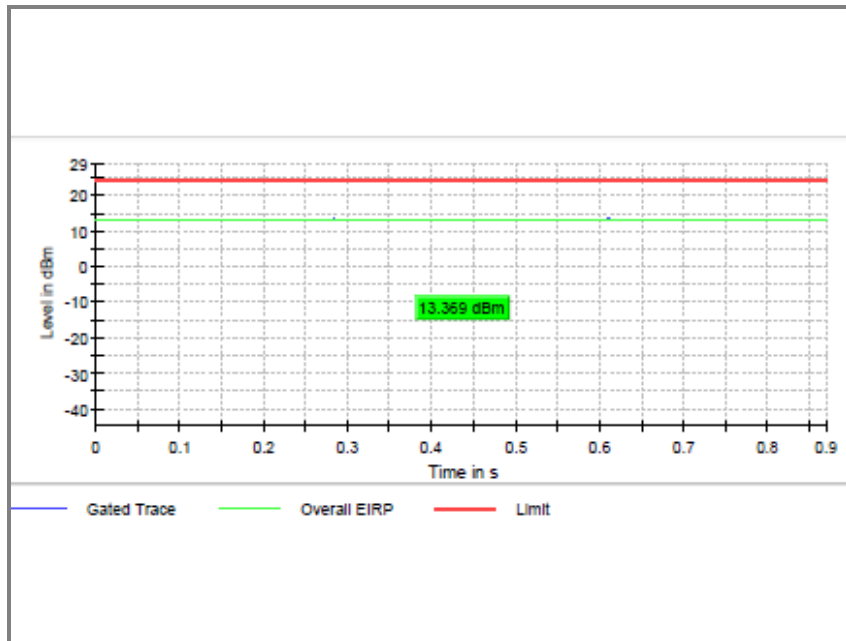


C. High channel(5590 MHz)**Operation mode: U-NII-2C(n_HT40) Mimo 2X2****A. Low channel(5510 MHz)**

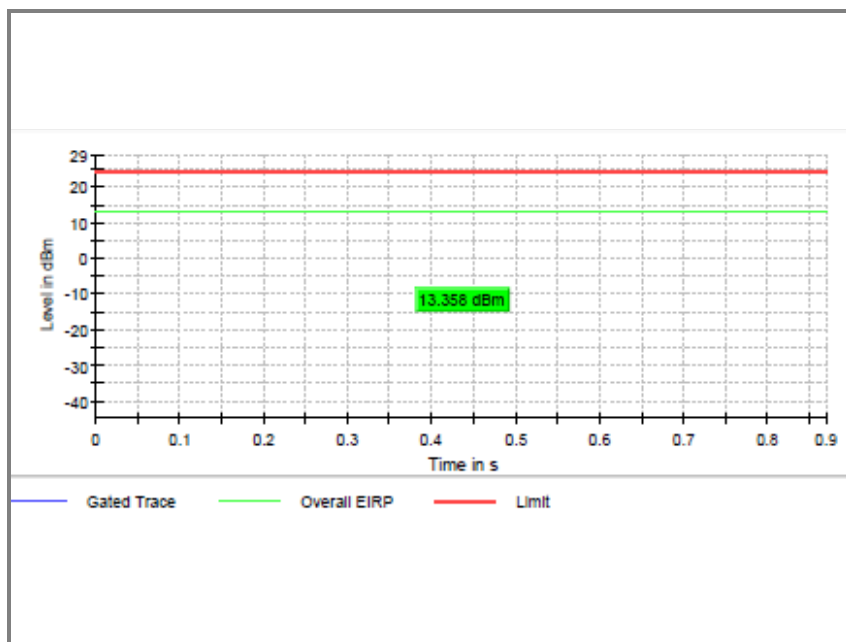
B. Middle channel(5550 MHz)**C. High channel(5590 MHz)**

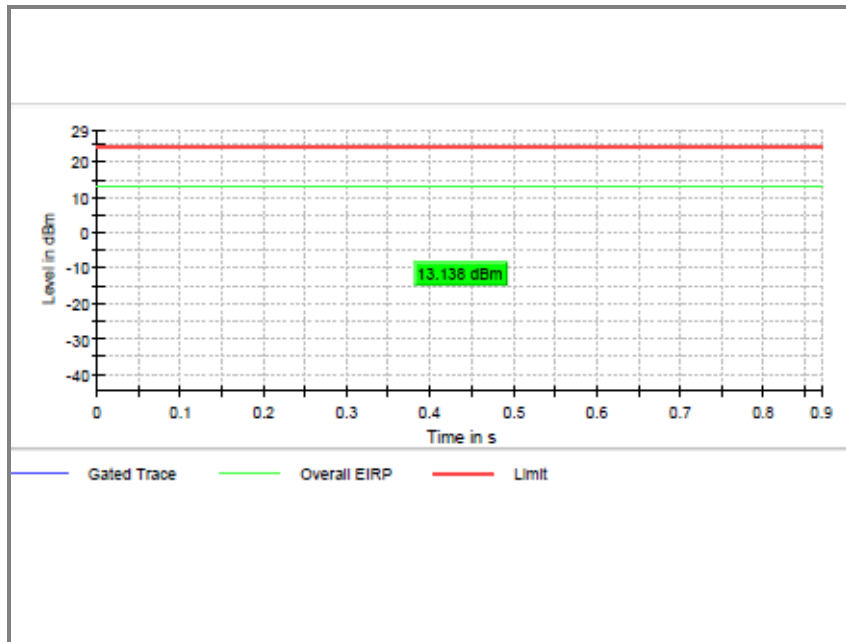
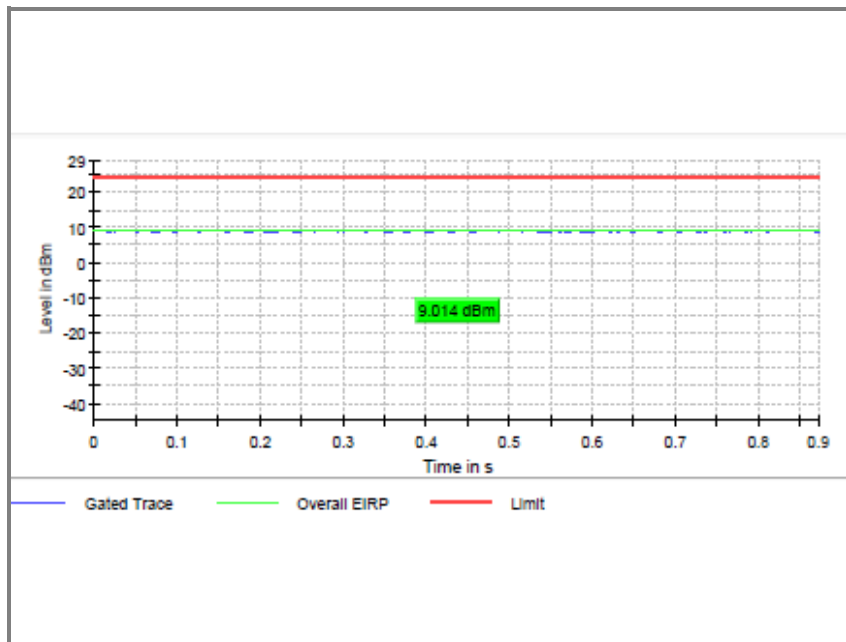
Operation mode: U-NII-3(802.11a) ANT1

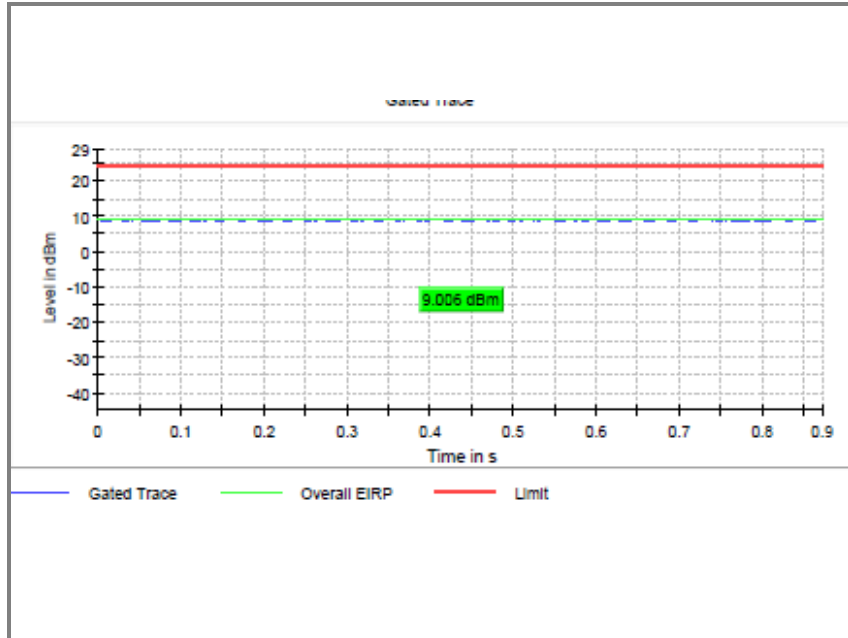
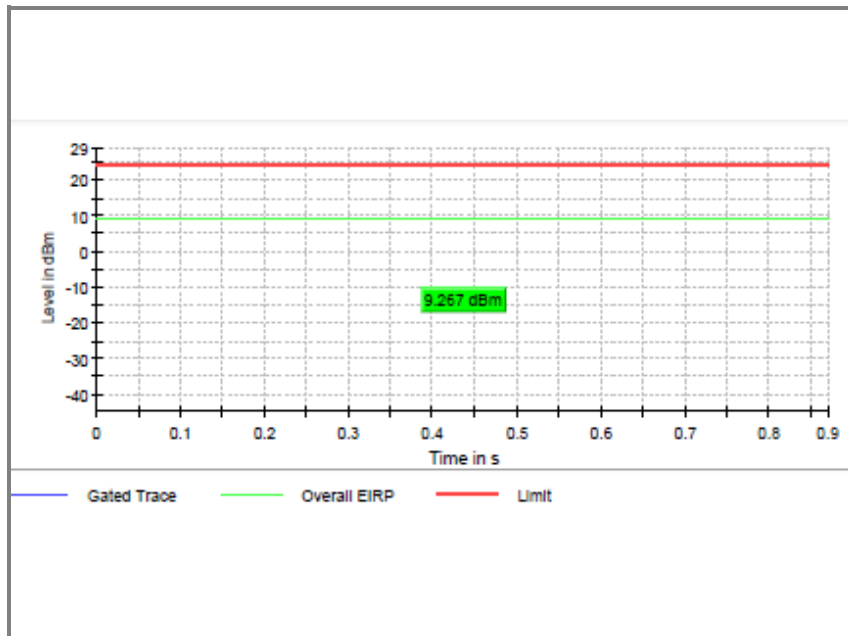
A. Low channel(5745 MHz)



B. Middle channel(5785 MHz)

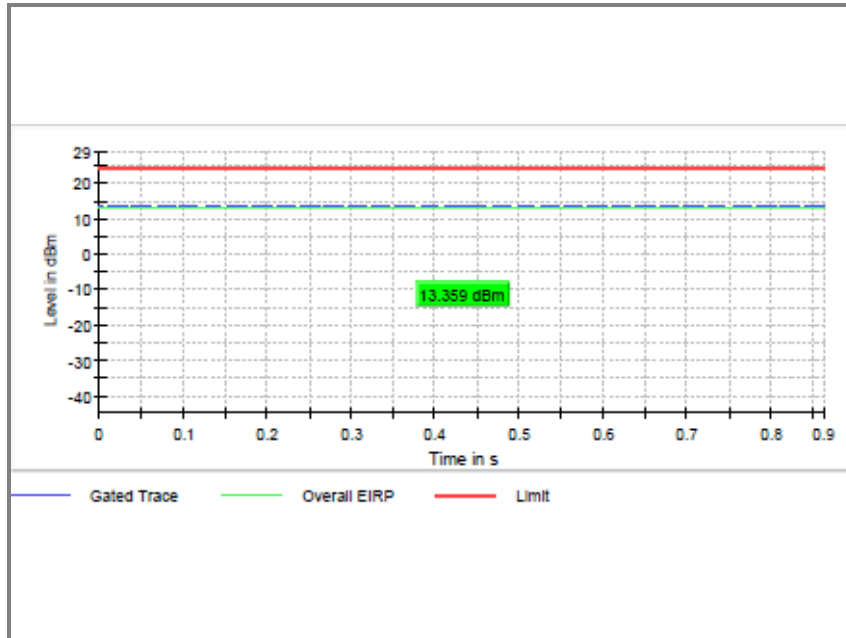


C. High channel(5805 MHz)**Operation mode: U-NII-3(802.11a) ANT2****A. Low channel(5745 MHz)**

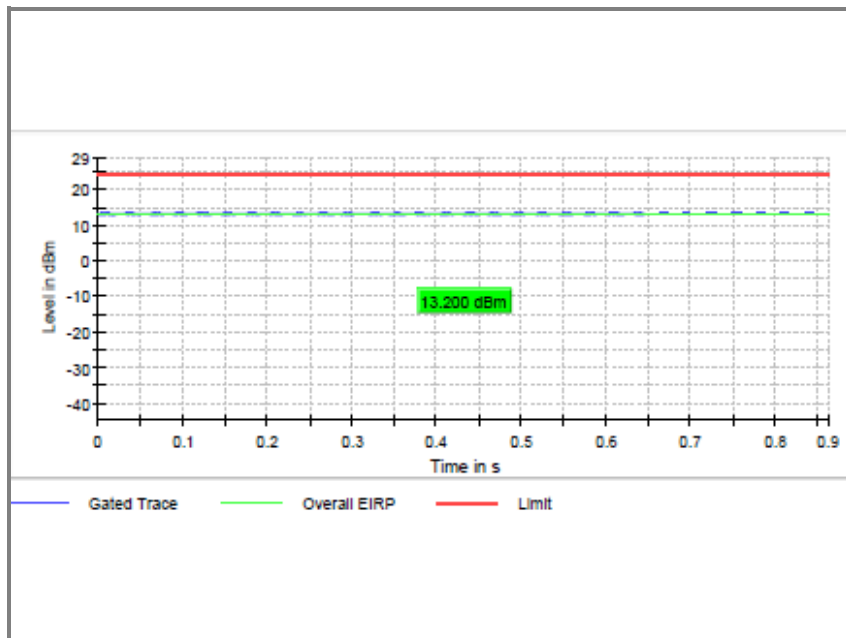
B. Middle channel(5785 MHz)**C. High channel(5805 MHz)**

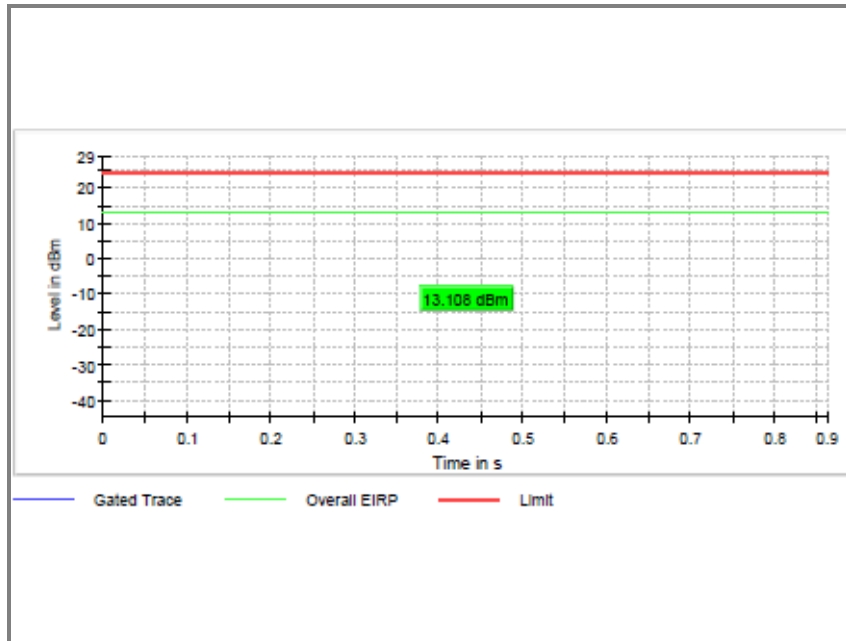
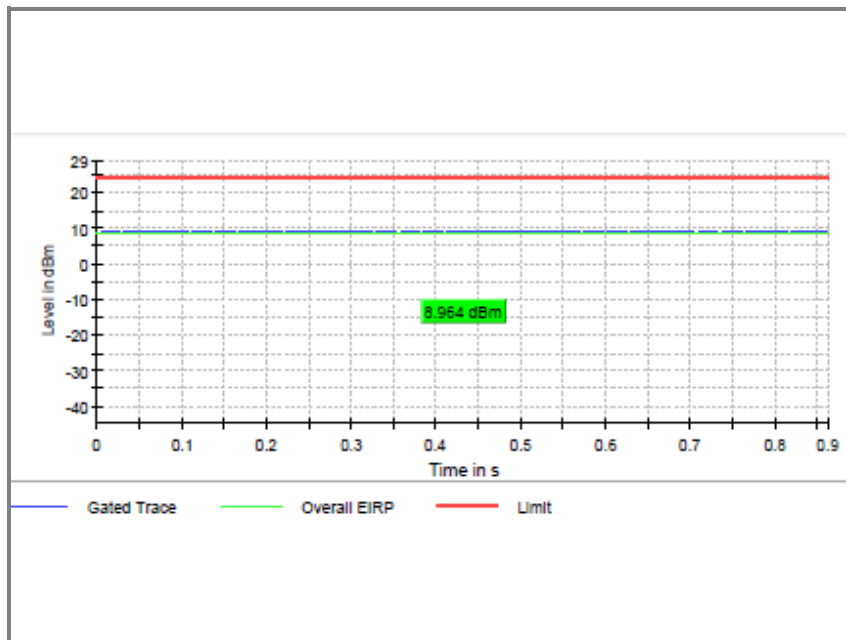
Operation mode: U-NII-3(n_HT20) ANT1

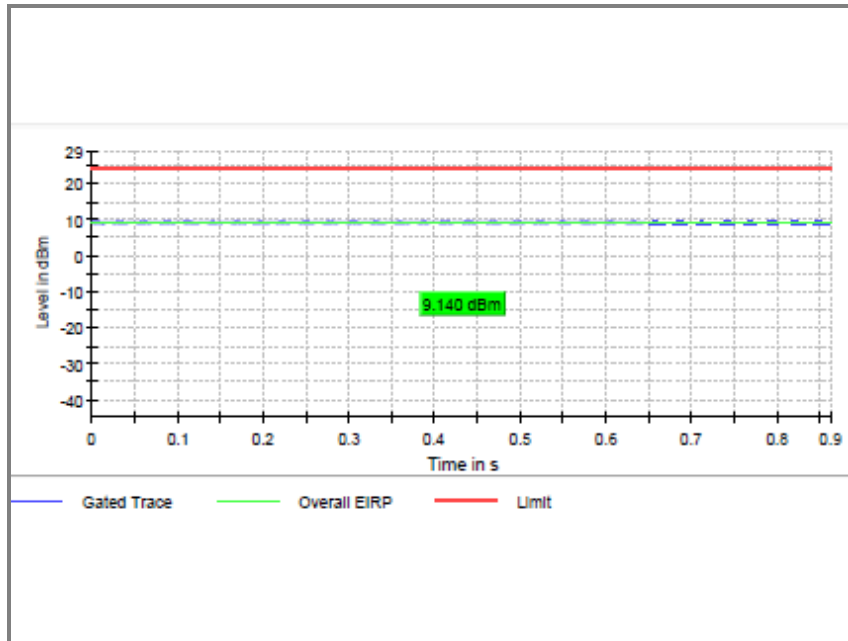
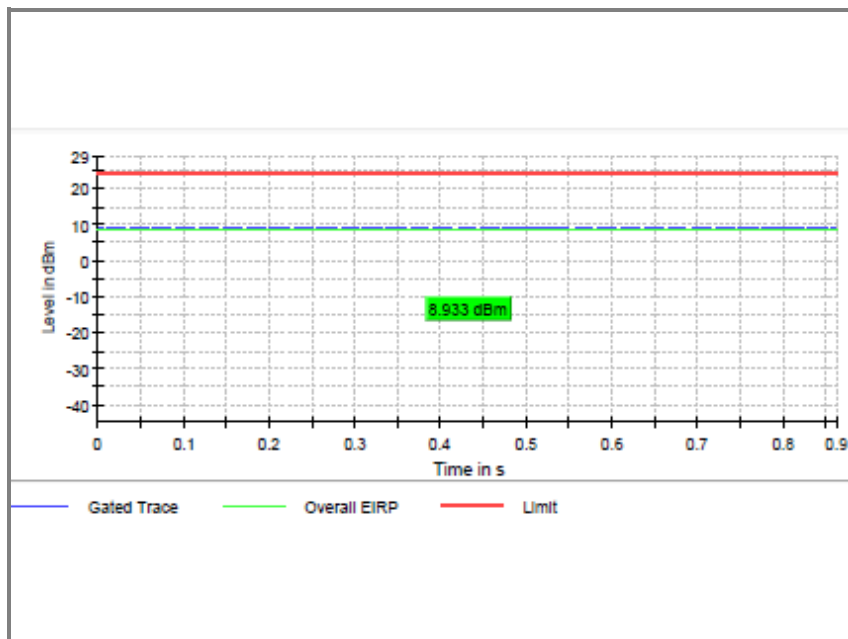
A. Low channel(5745 MHz)



B. Middle channel(5785 MHz)

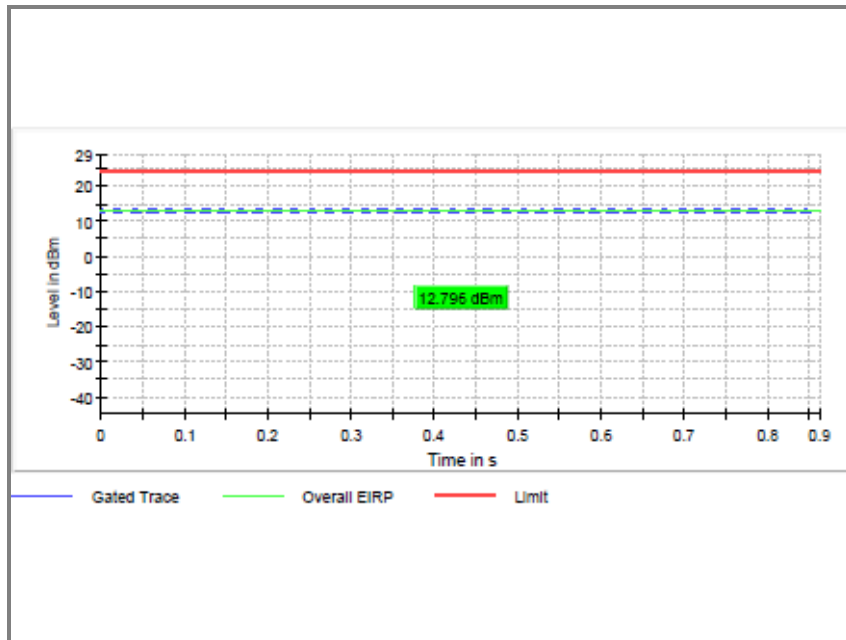


C. High channel(5805 MHz)**Operation mode: U-NII-3(n_HT20) ANT2****A. Low channel(5745 MHz)**

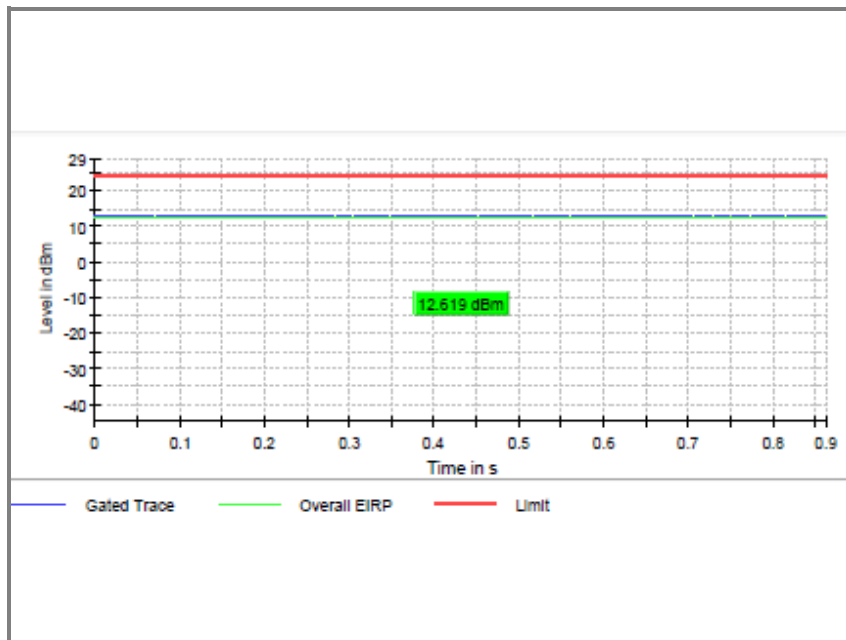
B. Middle channel(5785 MHz)**C. High channel(5805 MHz)**

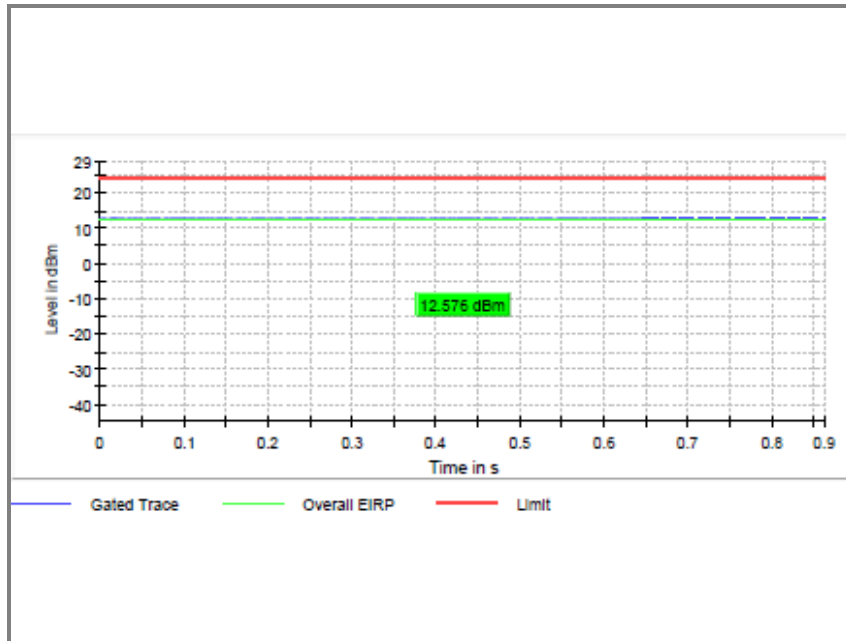
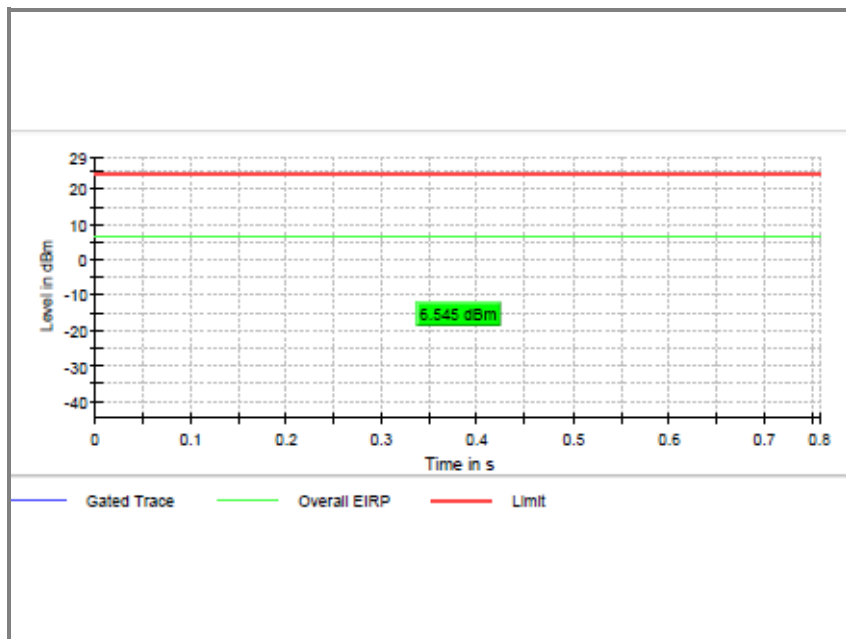
Operation mode: U-NII-3(n_HT20) Mimo 2X2

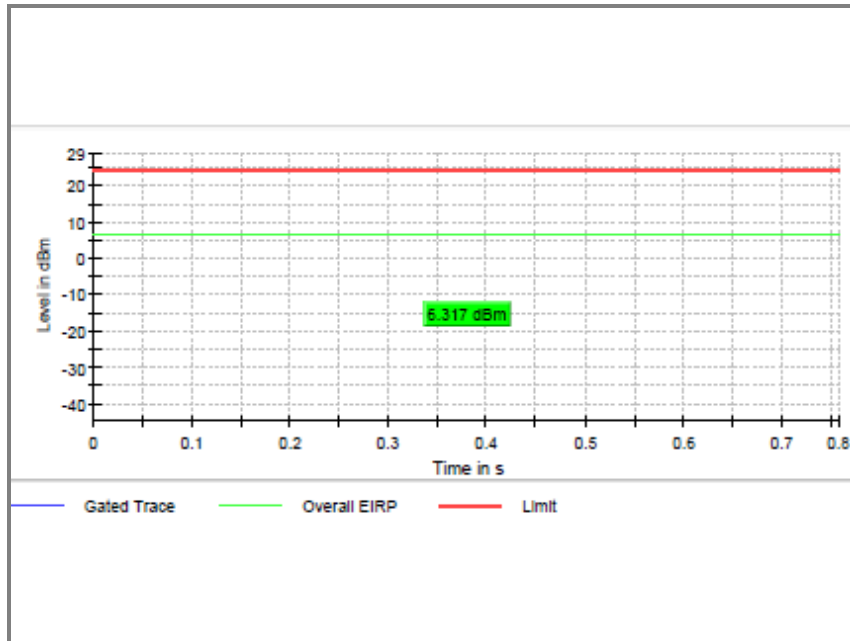
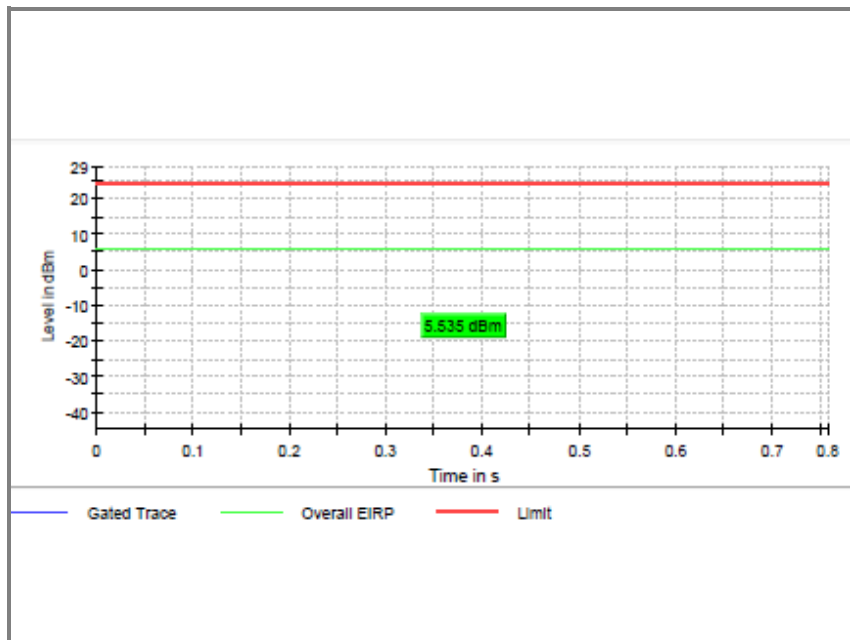
A. Low channel(5745 MHz)

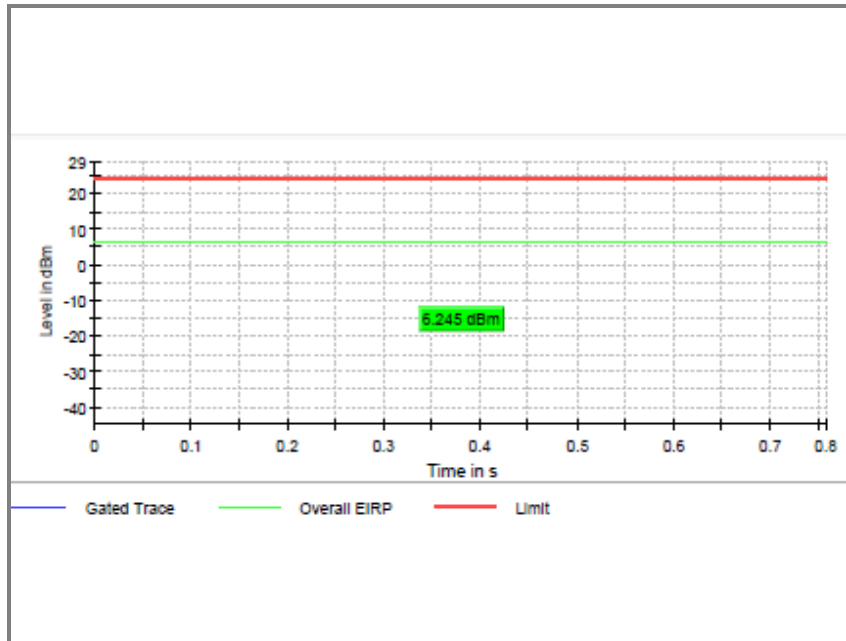
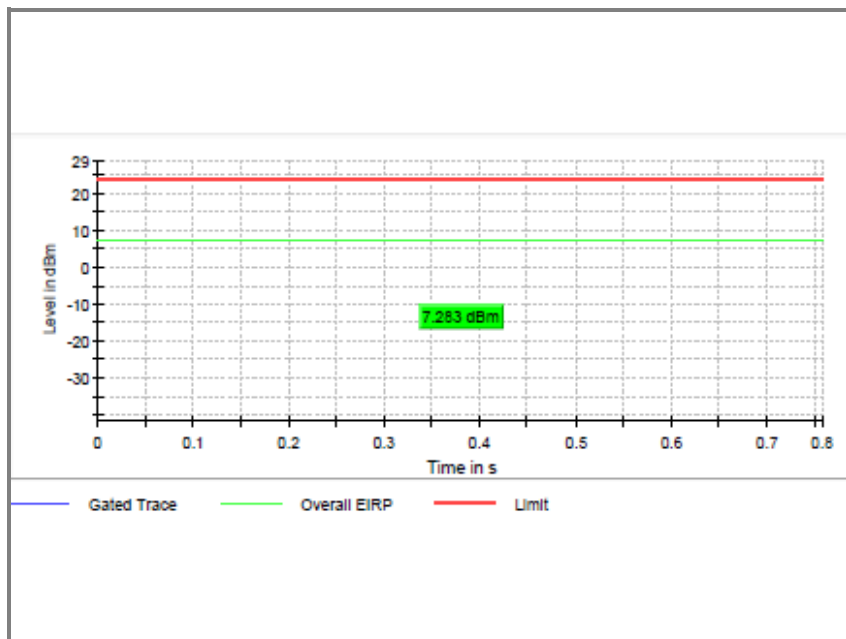


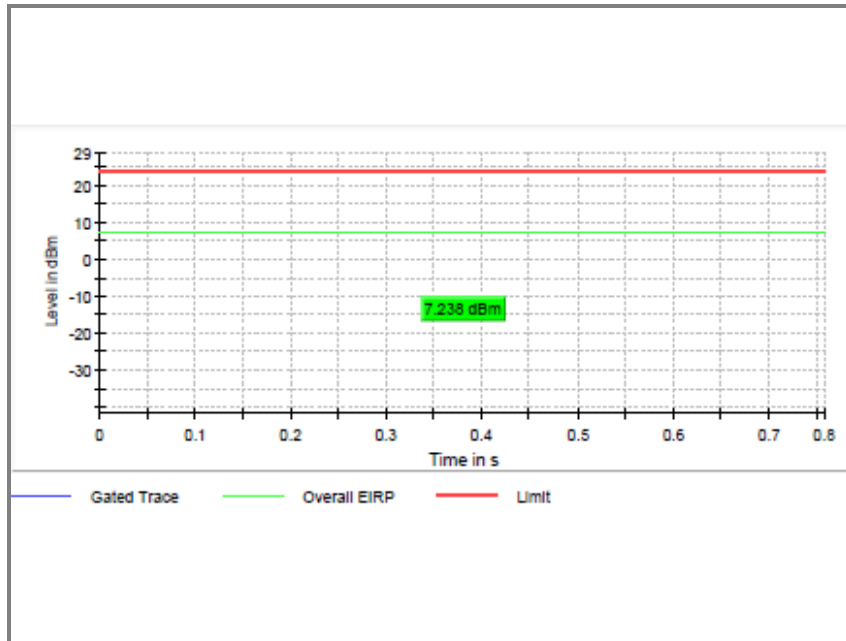
B. Middle channel(5785 MHz)



C. High channel(5805 MHz)**Operation mode: U-NII-3(n_HT40) ANT1****A. Low channel(5755 MHz)**

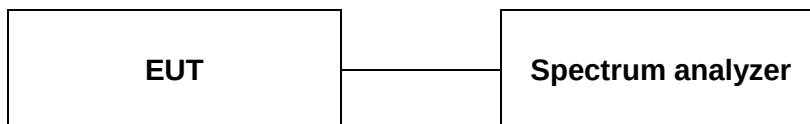
B. High channel(5795 MHz)**Operation mode: U-NII-3(n_HT40) ANT2****A. Low channel(5755 MHz)**

B. High channel(5795 MHz)**Operation mode: U-NII-3(n_HT40) Mimo 2X2****A. Low channel(5755 MHz)**

B. High channel(5795 MHz)

7. power spectral density

7.1. Test setup



7.2. Test Overview and 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

7.3. Test procedure (KDB 789033)

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 $10 \log (500 \text{ kHz}/RBW)$ to the measured result, whereas $RBW (< 500 \text{ kHz})$ 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 $10 \log (1\text{MHz}/RBW)$ to the measured result, whereas $RBW (< 1 \text{ MHz})$ 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 $RBW=100 \text{ kHz}$ is available on nearly all spectrum analyzers.

7.4. Test results

Ambient temperature: 21°C

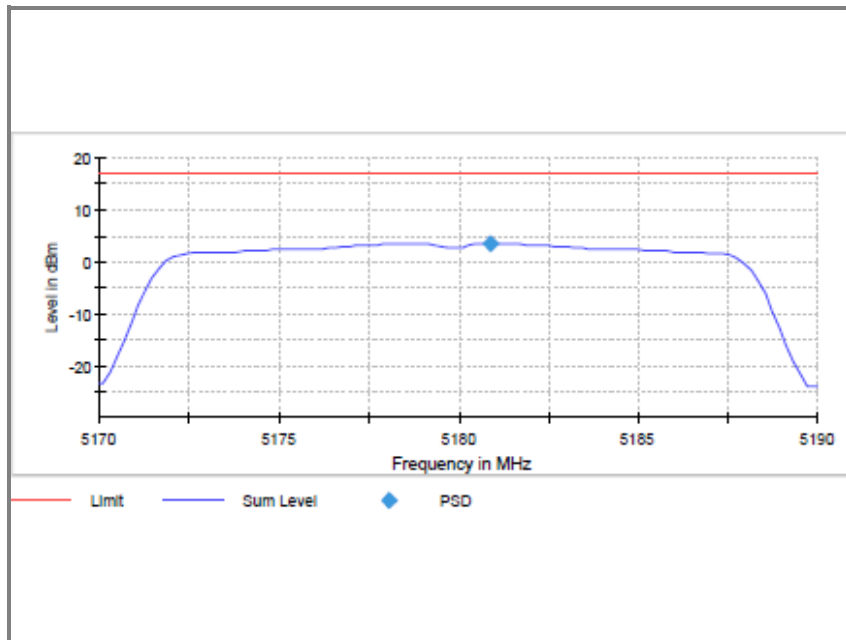
Relative humidity: 45% R.H.

Mode	Frequency (MHz)	Power Spectral Density (dB m /1 MHz)			Limit (dB m /1 MHz)
		ANT1	ANT2	Mimo 2X2	
U-NII-1(802.11a)	5 180	3.64	-3.06		11dBm
	5 220	3.73	-3.07		
	5 240	3.93	-3.27		
U-NII-1(n_HT20)	5 180	3.39	-1.28	3.62	
	5 220	3.56	-1.43	4.05	
	5 240	3.73	-1.53	4.30	
U-NII-1(n_HT40)	5 190	-6.47	-8.03	-3.42	11dBm
	5 230	-6.10	-8.44	-3.29	
U-NII-2A(802.11a)	5 260	3.41	-0.44		
	5 300	3.68	-1.08		
	5 320	4.19	-0.56		
U-NII-2A(n_HT20)	5 260	3.27	-1.24	3.91	
	5 300	4.07	-1.13	4.56	
	5 320	4.06	-1.18	4.58	
U-NII-2A(n_HT40)	5 270	-6.27	-9.02	-3.02	11dBm
	5 310	-6.47	-9.34	-3.19	
U-NII-2C(802.11a)	5 500	5.13	1.05		
	5 560	5.09	1.18		
	5 620	4.12	0.60		
U-NII-2C(n_HT20)	5 500	5.02	0.43	5.64	
	5 560	4.92	0.62	5.07	
	5 620	4.06	0.02	4.68	
U-NII-2C(n_HT40)	5 510	-4.97	-6.42	-1.62	11dBm
	5 550	-4.74	-5.95	-1.52	
	5 590	-5.33	-5.95	-1.88	

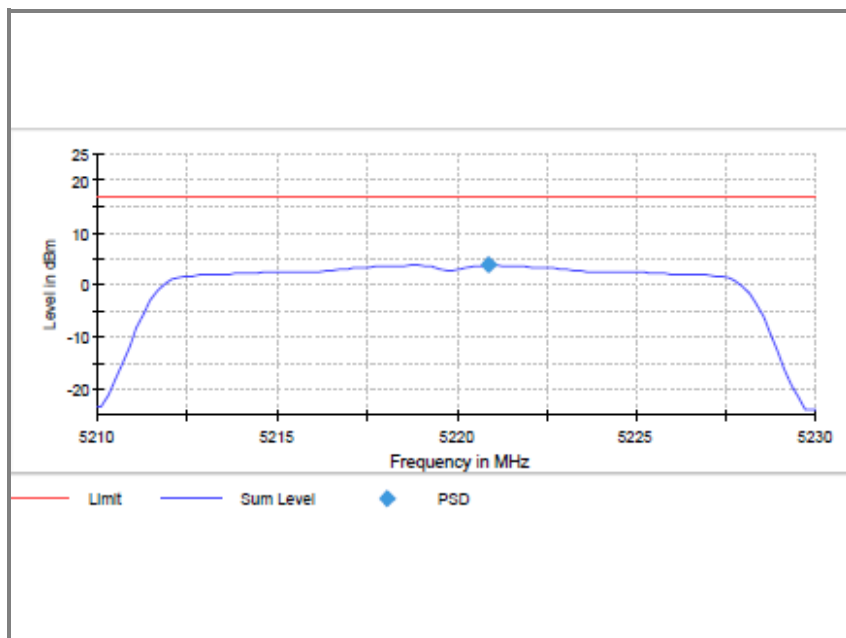
Mode	Frequency (MHz)	Power Spectral Density (dB m /500kHz)			Limit (dB m /500kHz)
		ANT1	ANT2	Mimo 2X2	
U-NII-3(802.11a)	5 745	1.14	-3.42		30
	5 785	1.03	-3.51		
	5 805	0.85	-3.18		
U-NII-3(n_HT20)	5 745	0.95	-3.67	0.34	
	5 785	0.63	-3.59	0.03	
	5 805	0.57	-3.75	-0.05	
U-NII-3(n_HT40)	5 755	-9.25	-10.18	-8.38	30
	5 795	-9.66	-9.60	-8.53	

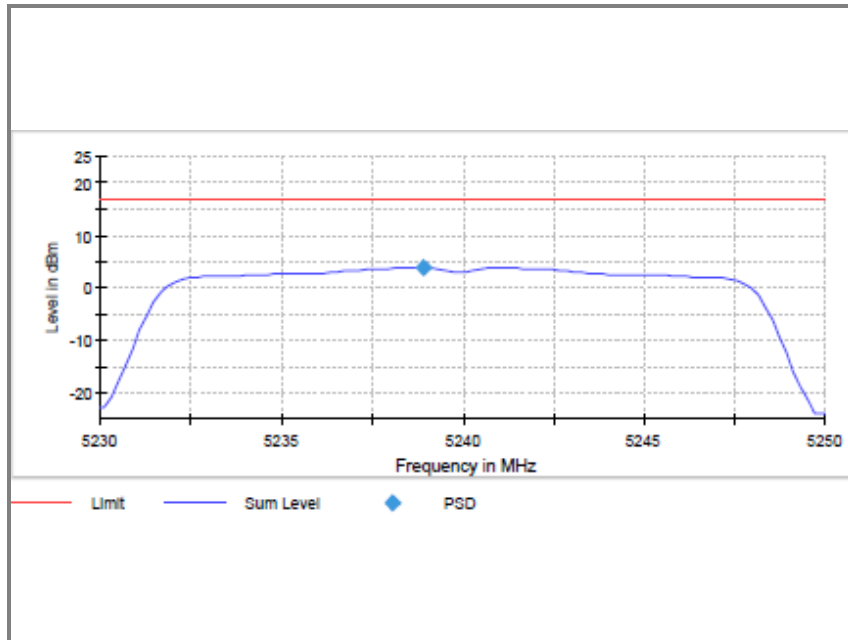
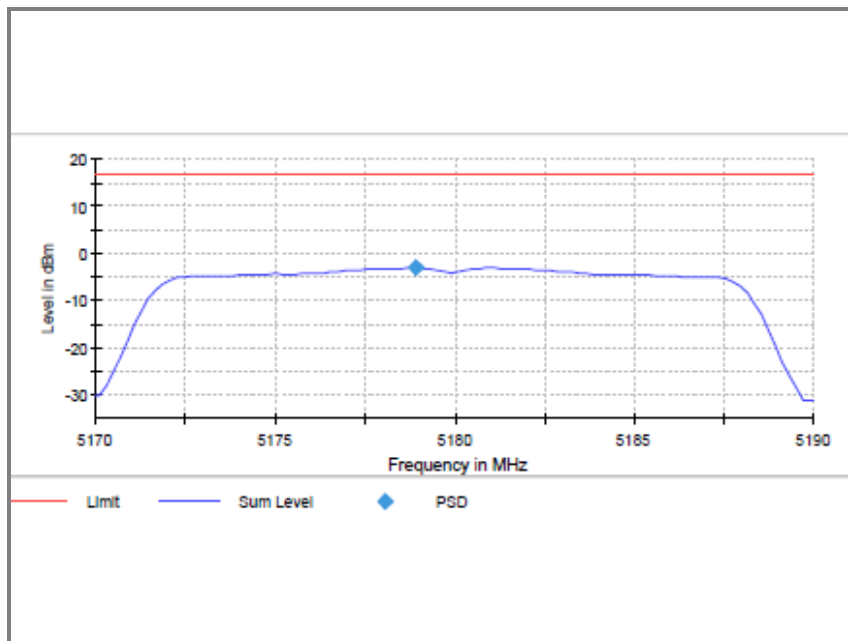
Operation mode: U-NII-1(802.11a)ANT1

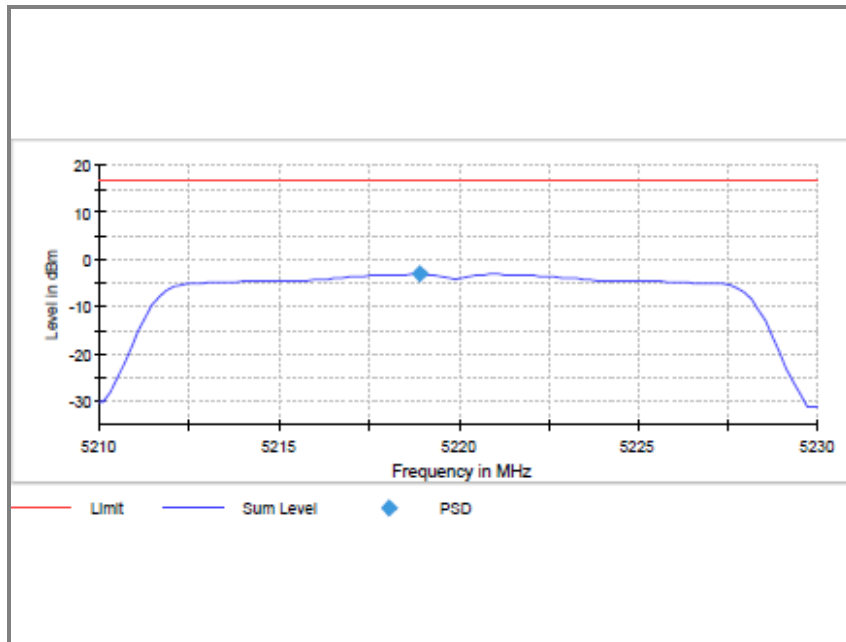
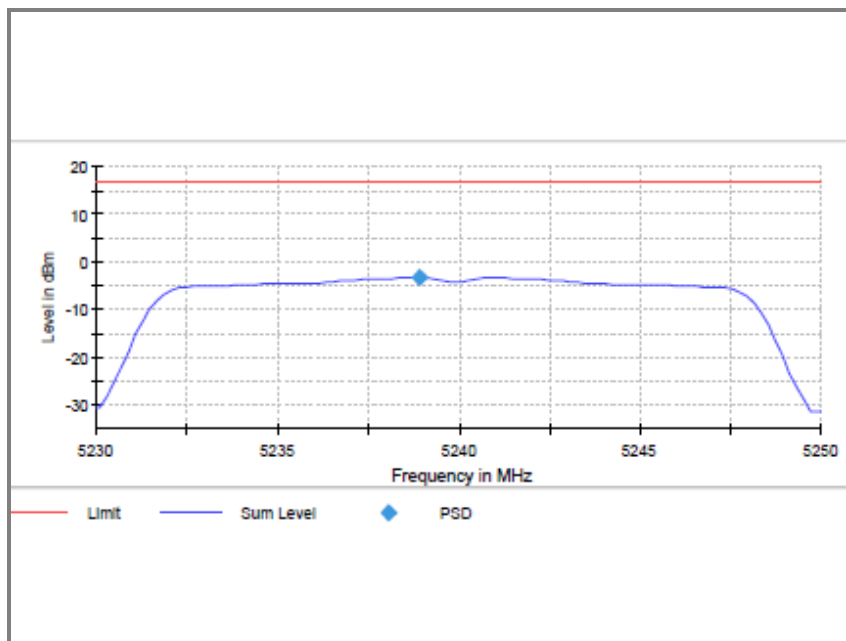
A. Low channel(5180 MHz)



B. Middle channel(5220 MHz)

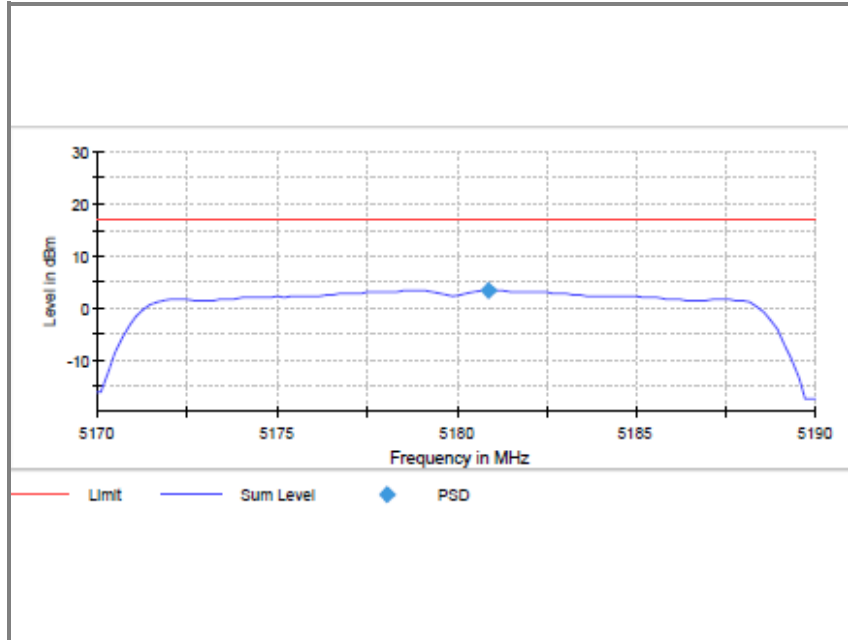


C. High channel(5240 MHz)**Operation mode: U-NII-1(802.11a)ANT2****A. Low channel(5180 MHz)**

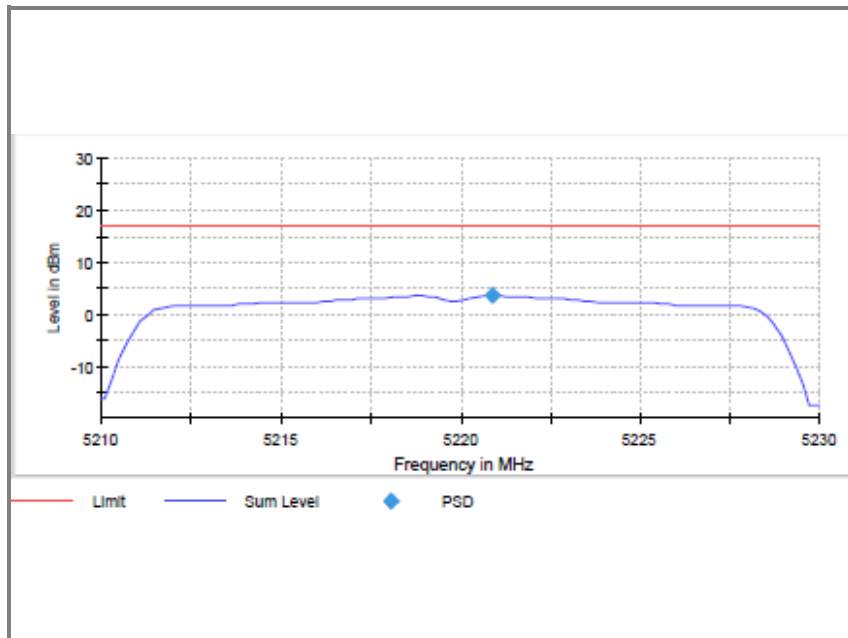
B. Middle channel(5220 MHz)**C. High channel(5240 MHz)**

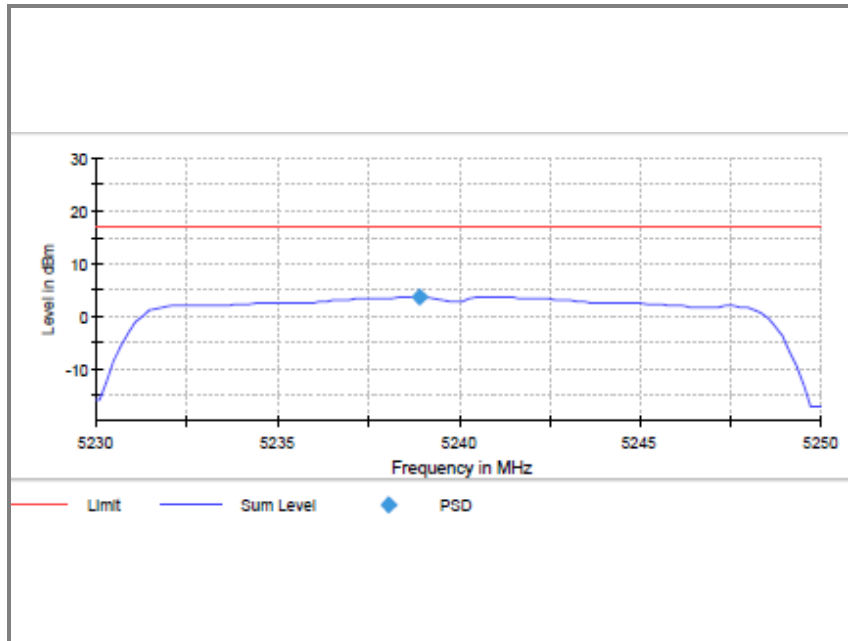
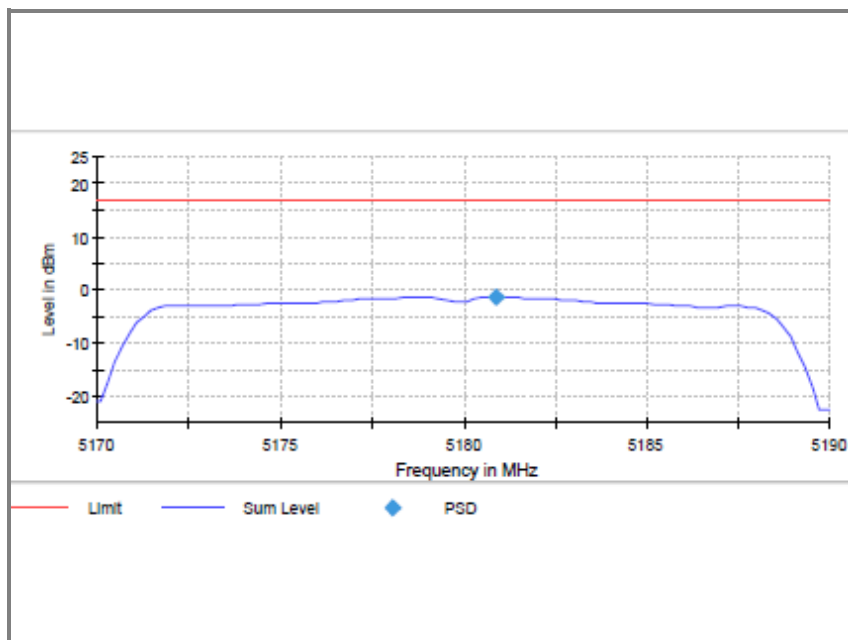
Operation mode: U-NII-1(n_HT20)ANT1

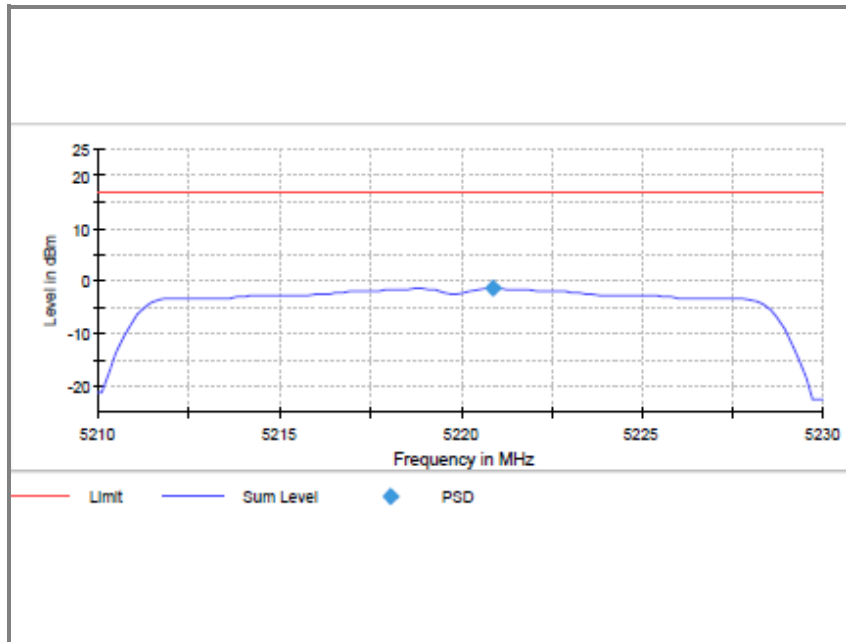
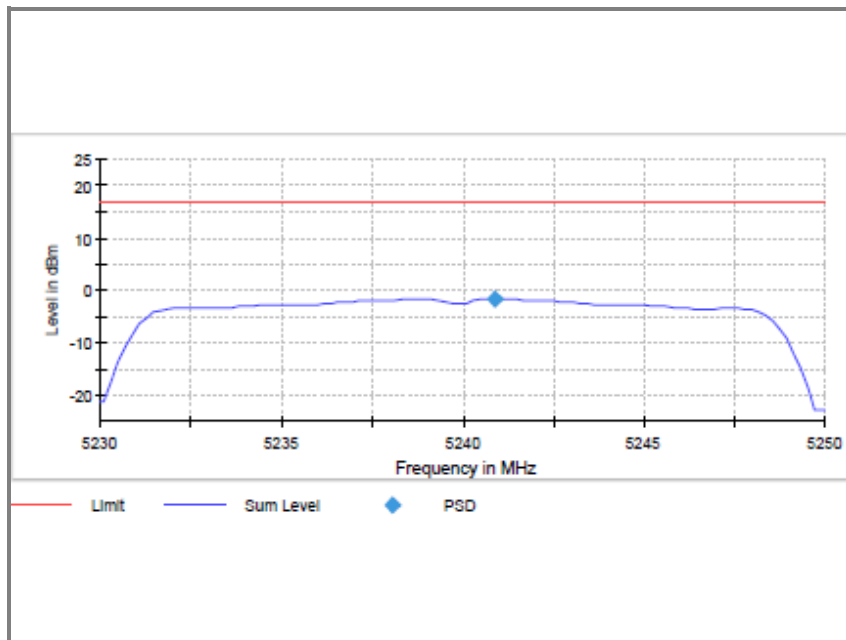
A. Low channel(5180 MHz)



B. Middle channel(5220 MHz)

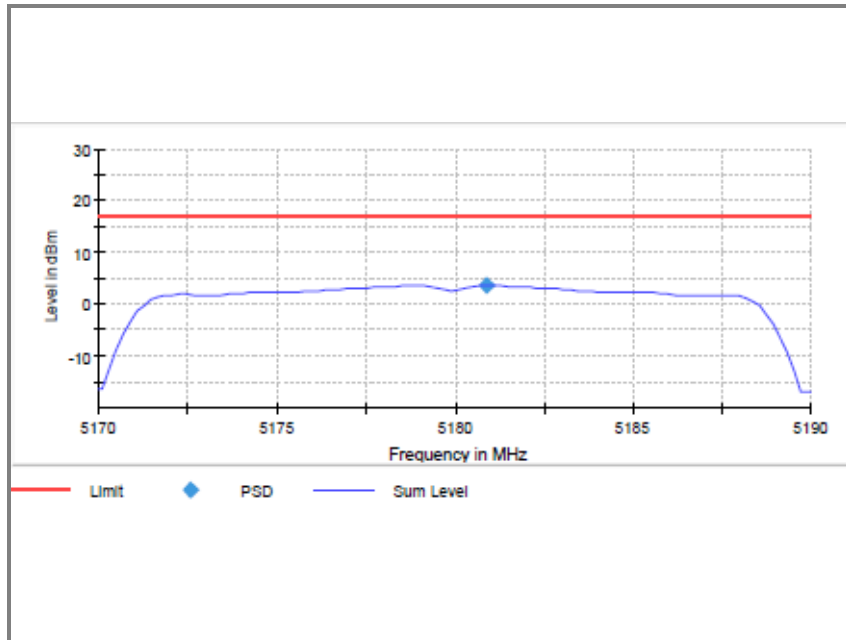


C. High channel(5240 MHz)**Operation mode: U-NII-1(n_HT20)ANT2****A. Low channel(5180 MHz)**

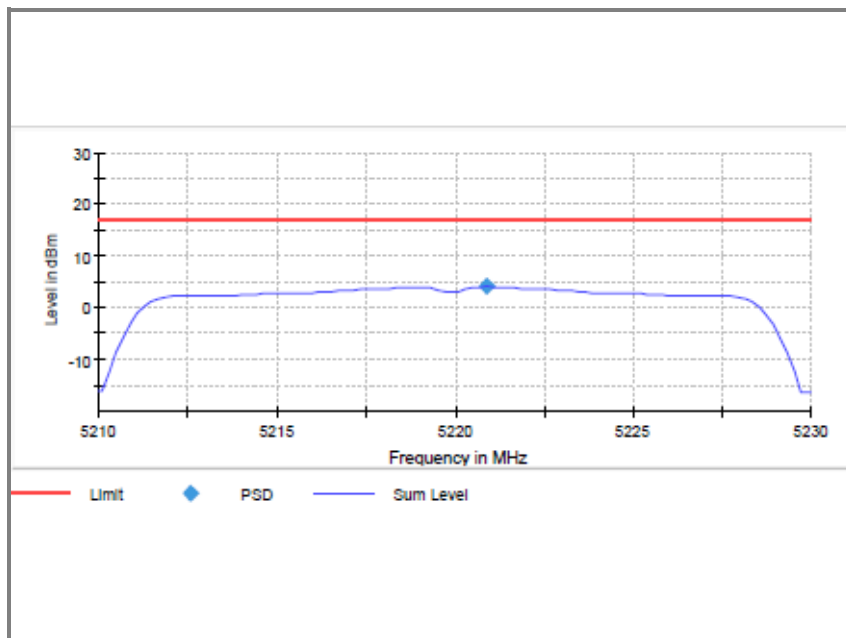
B. Middle channel(5220 MHz)**C. High channel(5240 MHz)**

Operation mode: U-NII-1(n_HT20)Mimo2X2

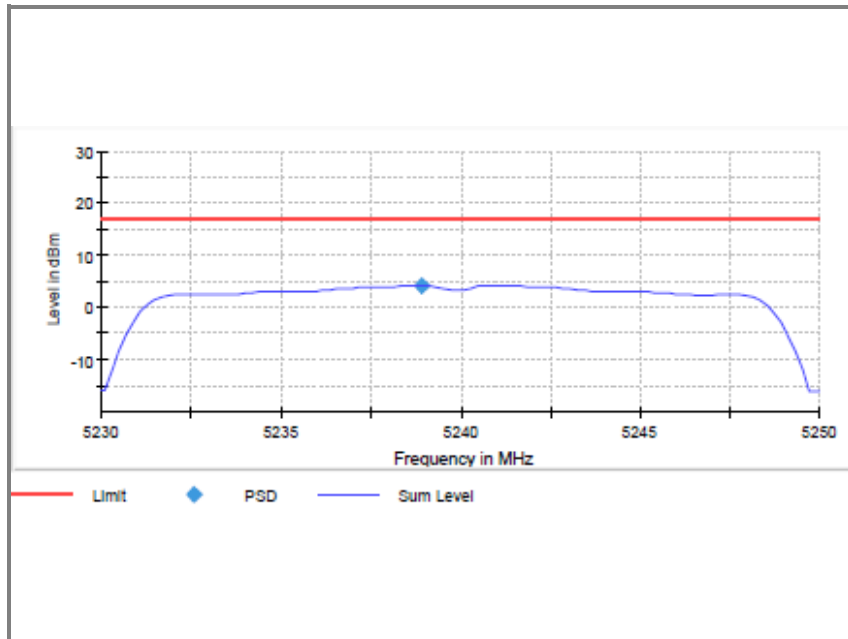
A. Low channel(5180 MHz)



B. Middle channel(5220 MHz)

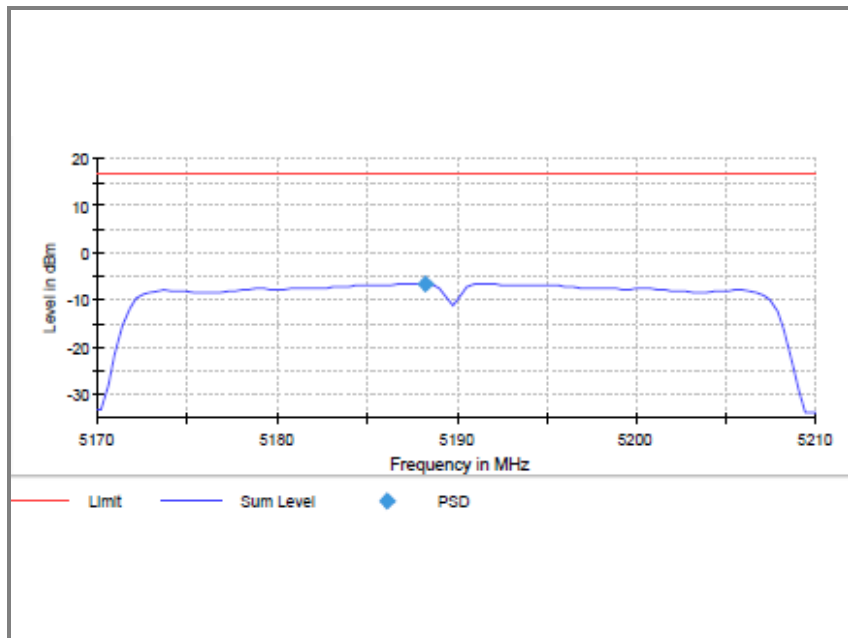


C. High channel(5240 MHz)

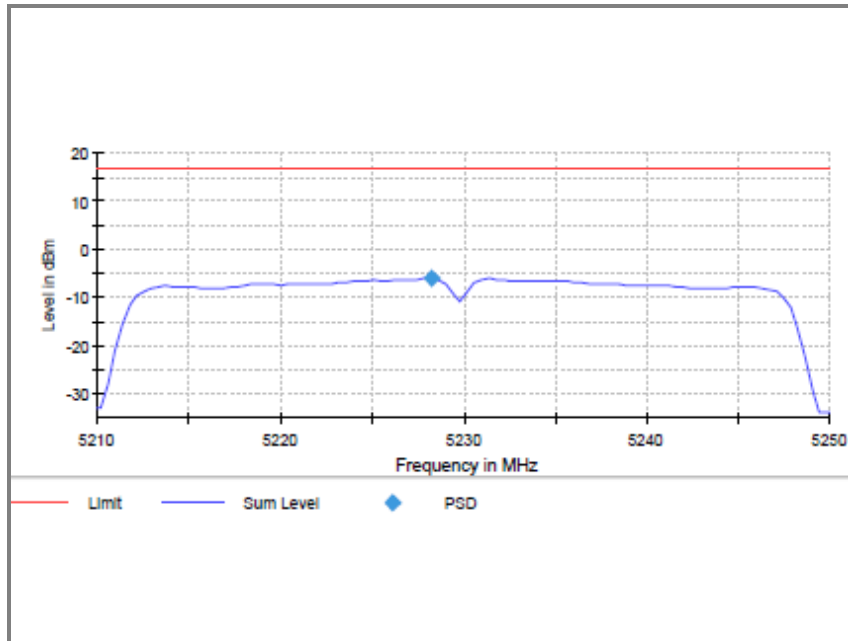


Operation mode: U-NII-1(n_HT40)ANT1

A. Low channel(5190 MHz)

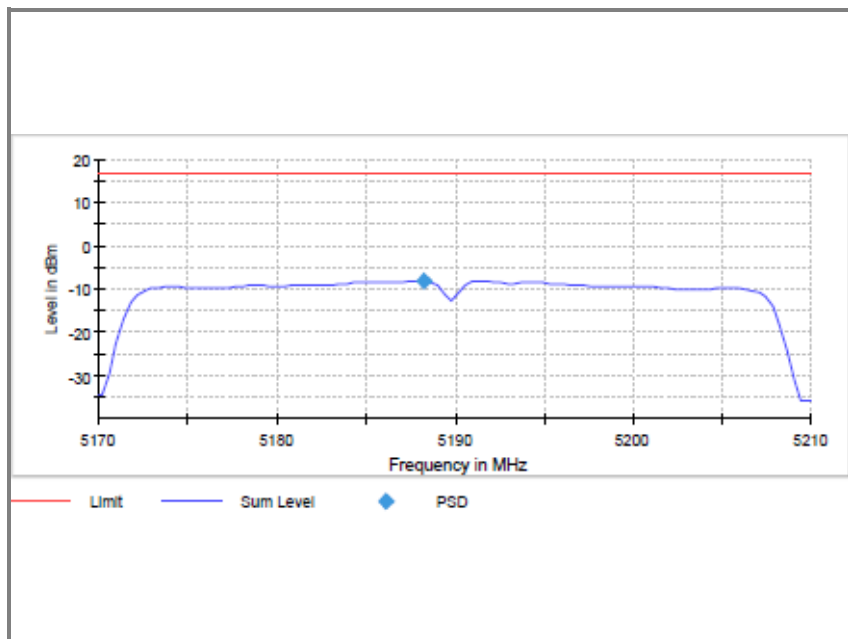


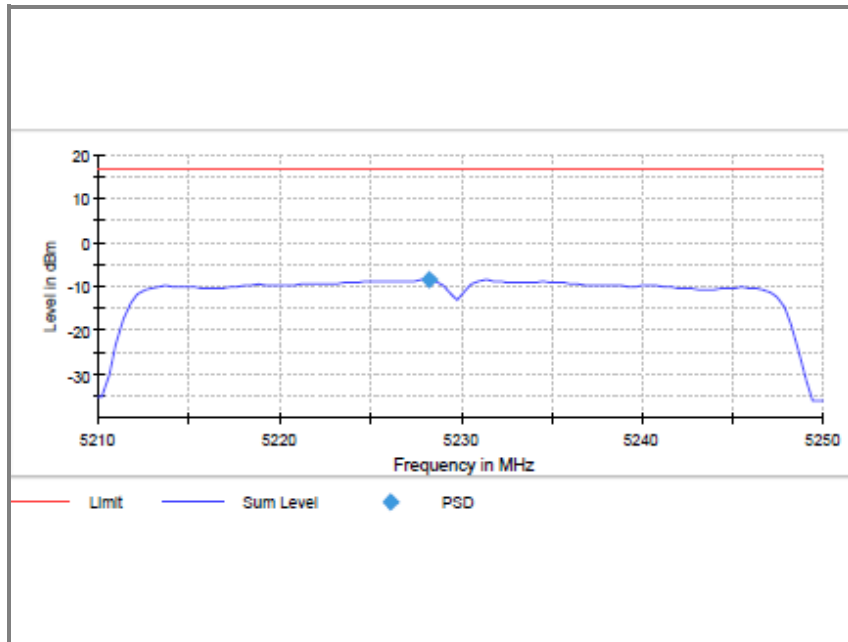
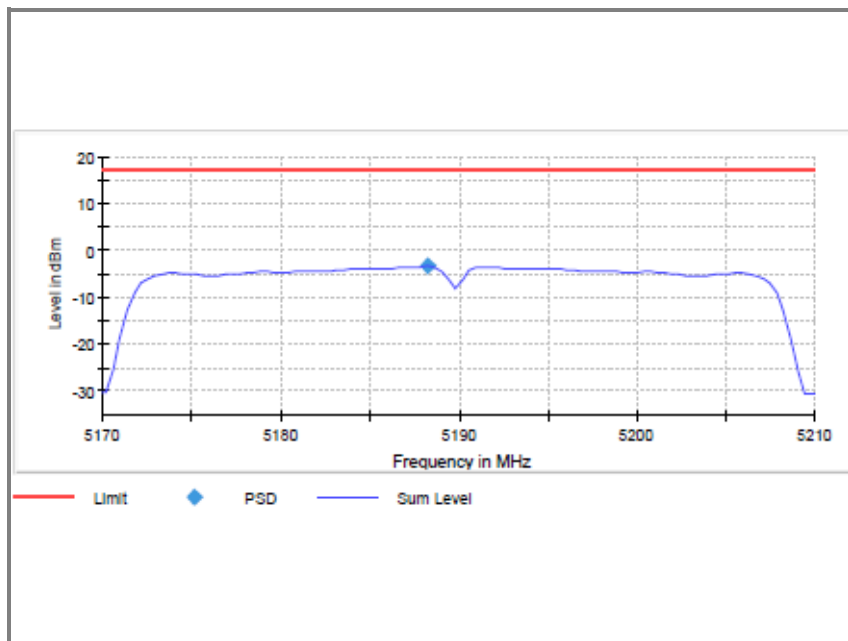
B. High channel(5230 MHz)



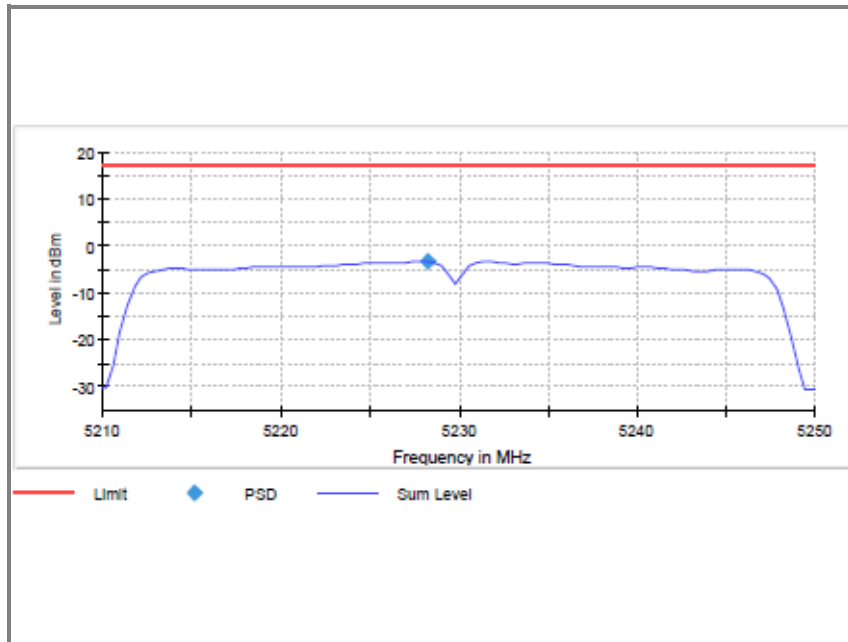
Operation mode: U-NII-1(n_HT40)ANT2

A. Low channel(5190 MHz)



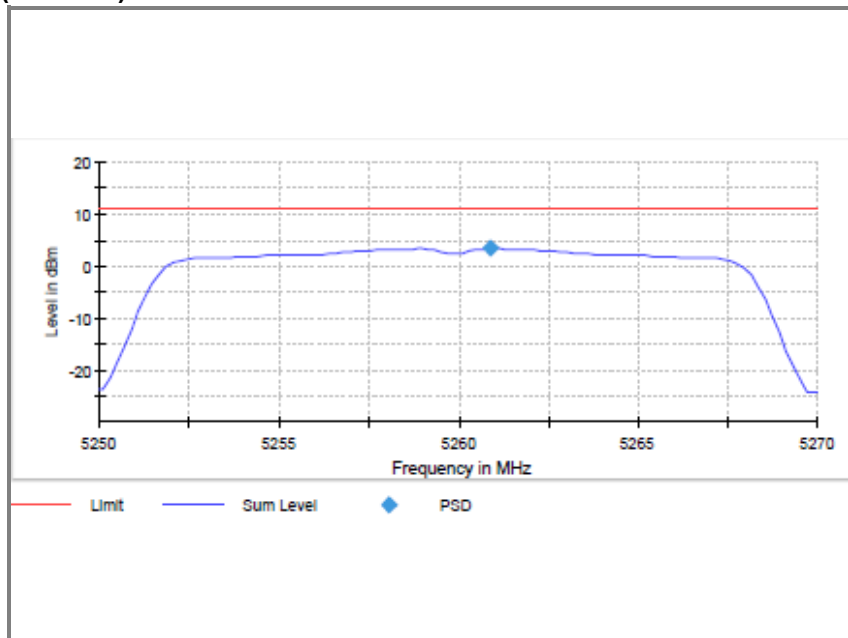
B. High channel(5230 MHz)**Operation mode: U-NII-1(n_HT40)Mimo2X2****A. Low channel(5190 MHz)**

B. High channel(5230 MHz)

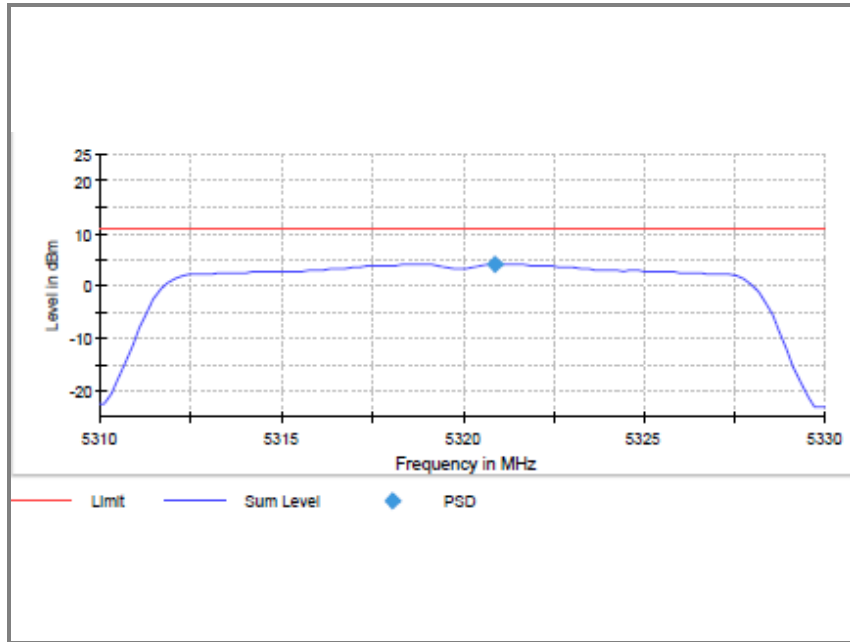


Operation mode: U-NII-2A(802.11a)ANT1

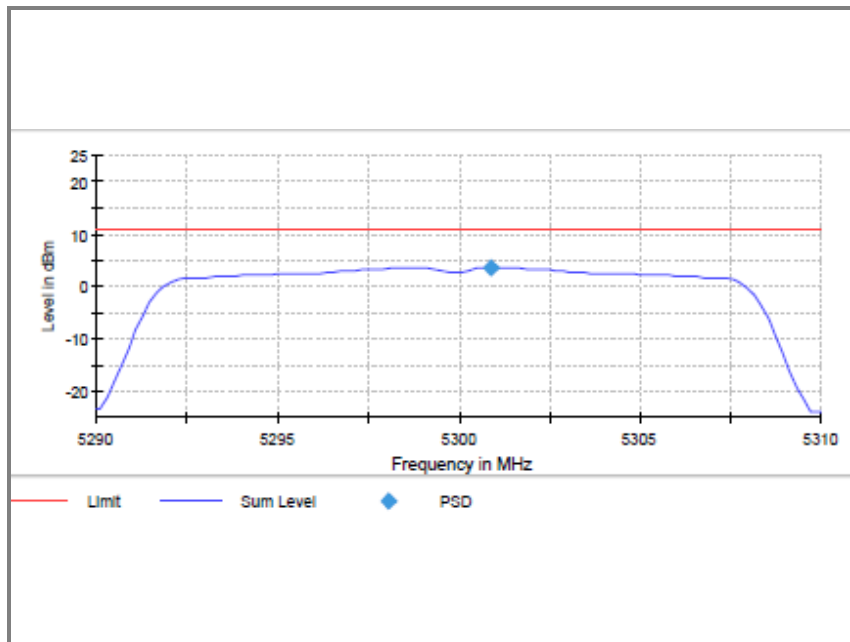
A. Low channel(5260 MHz)



B. Middle channel(5300 MHz)

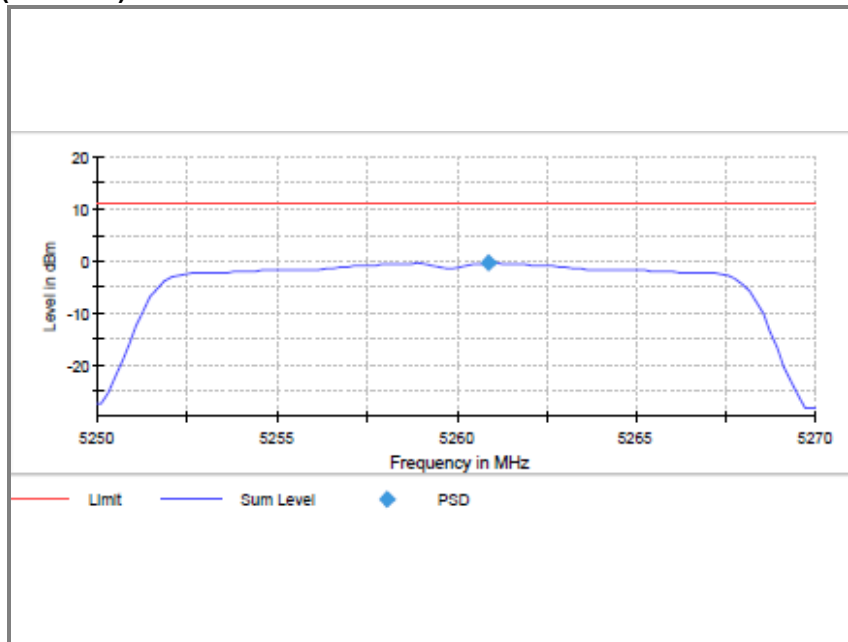


C. High channel(5320 MHz)

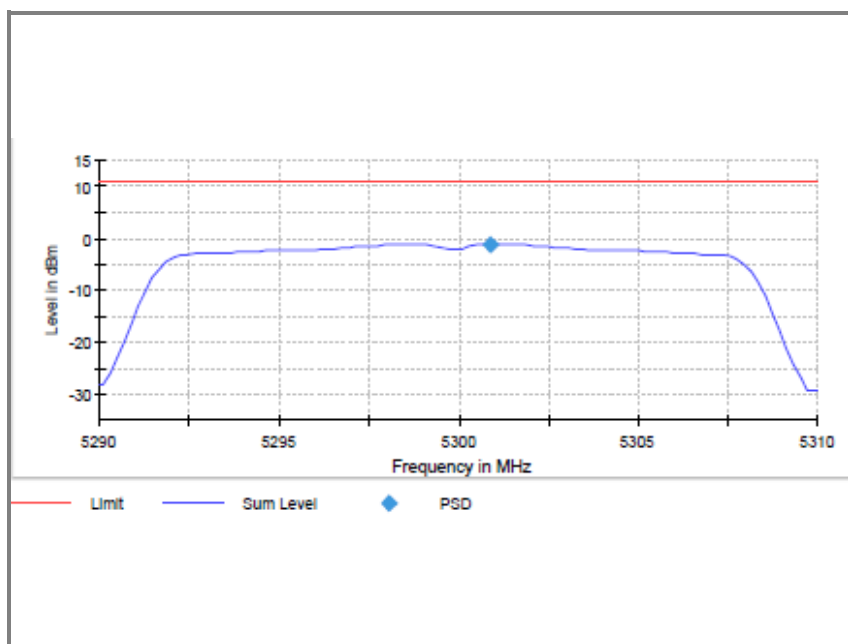


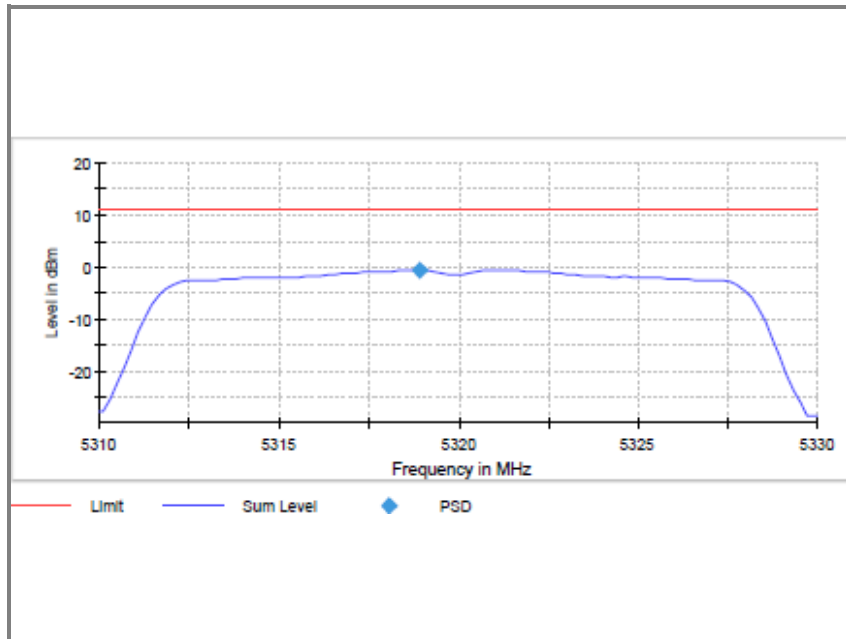
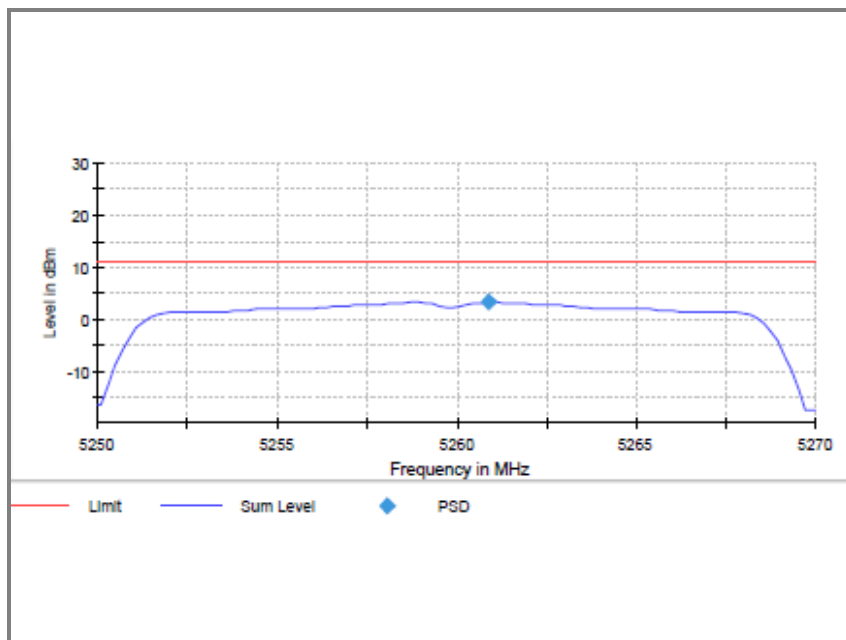
Operation mode: U-NII-2A(802.11a)ANT2

A. Low channel(5260 MHz)

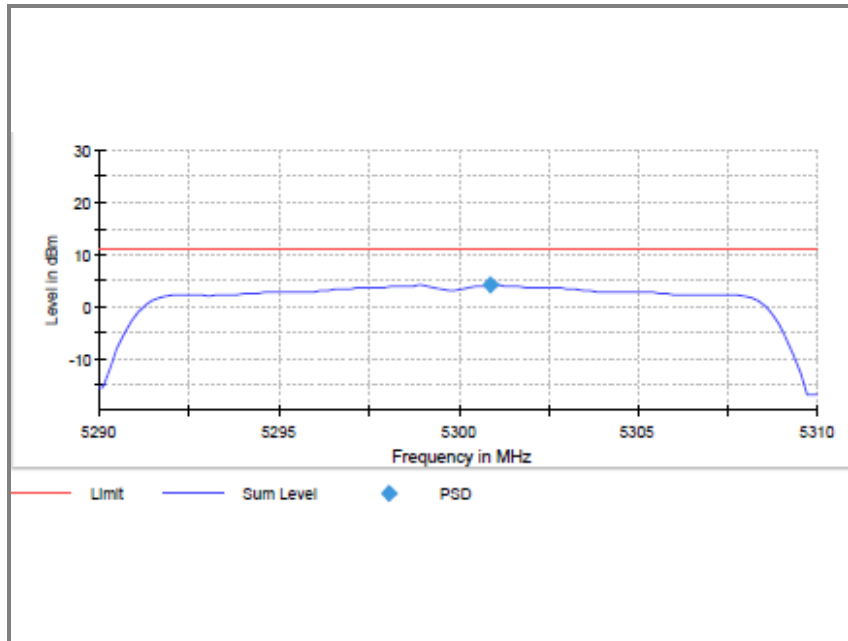


B. Middle channel(5300 MHz)

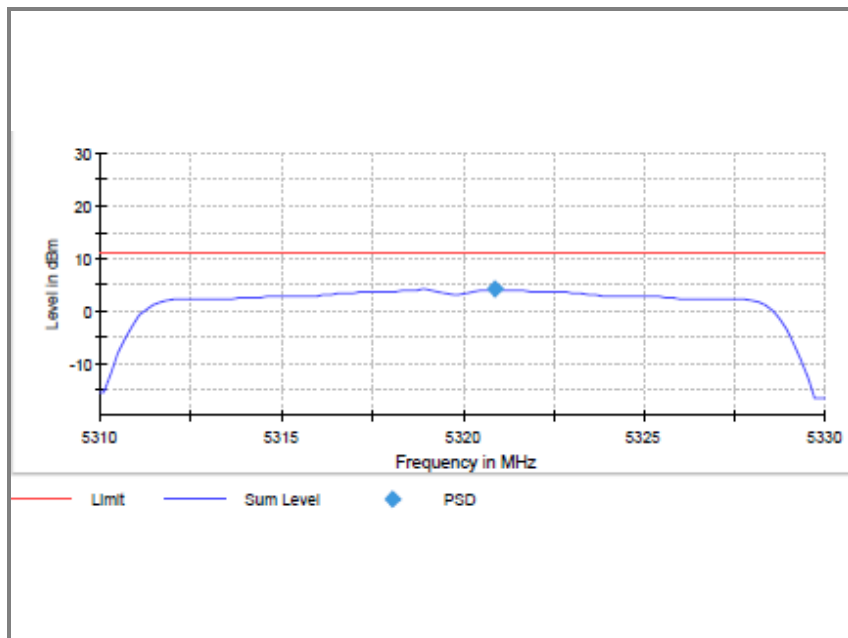


C. High channel(5320 MHz)**Operation mode: U-NII-2A(n_HT20)ANT1****A. Low channel(5260 MHz)**

B. Middle channel(5300 MHz)

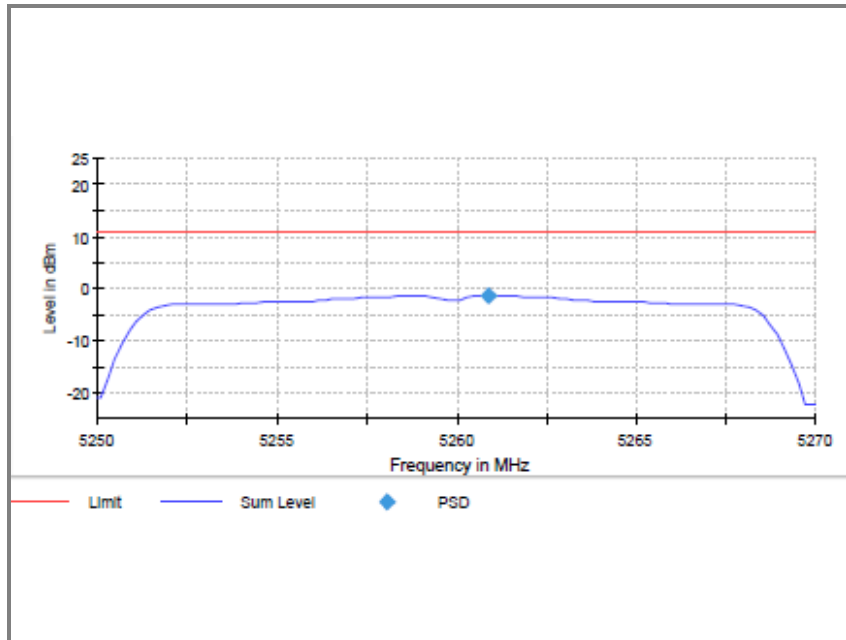


C. High channel(5320 MHz)

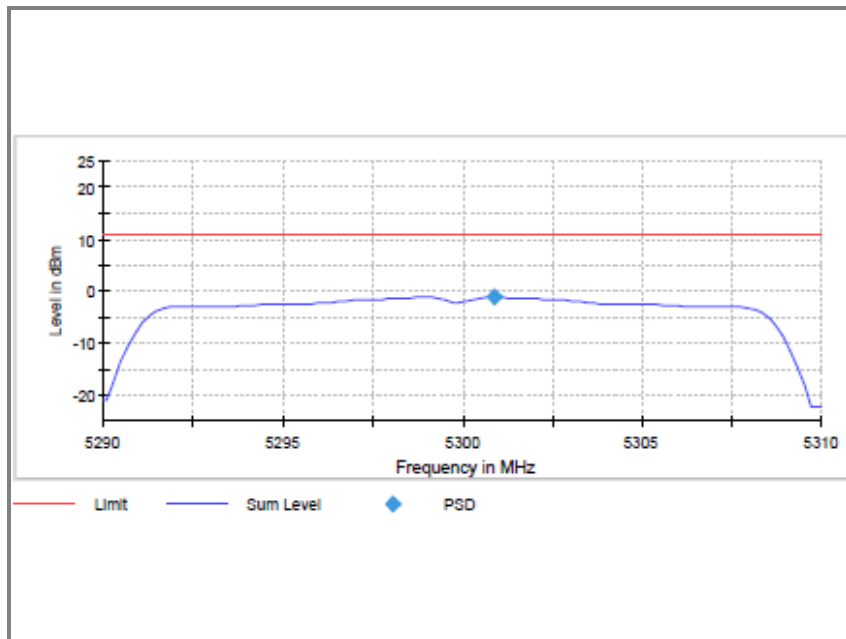


Operation mode: U-NII-2A(n_HT20)ANT2

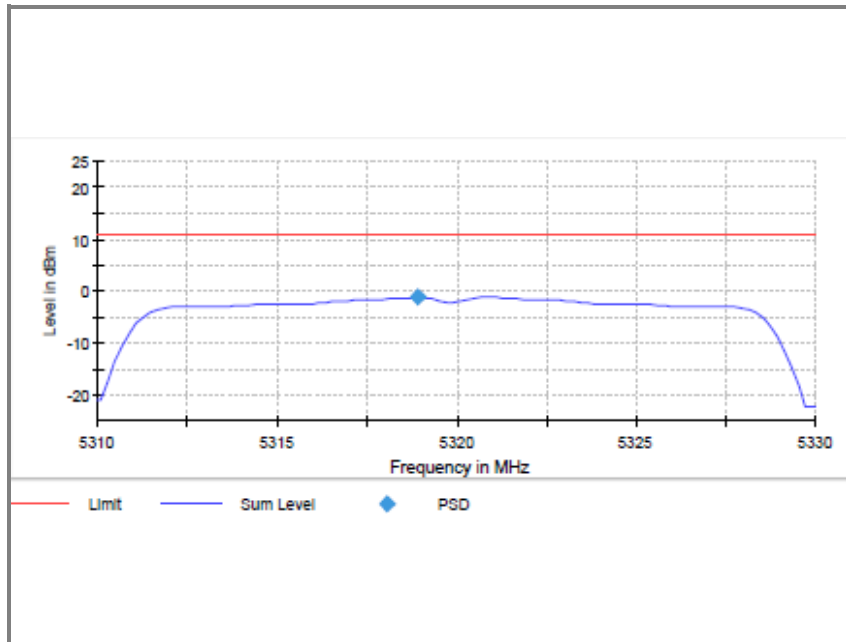
A. Low channel(5260 MHz)



B. Middle channel(5300 MHz)

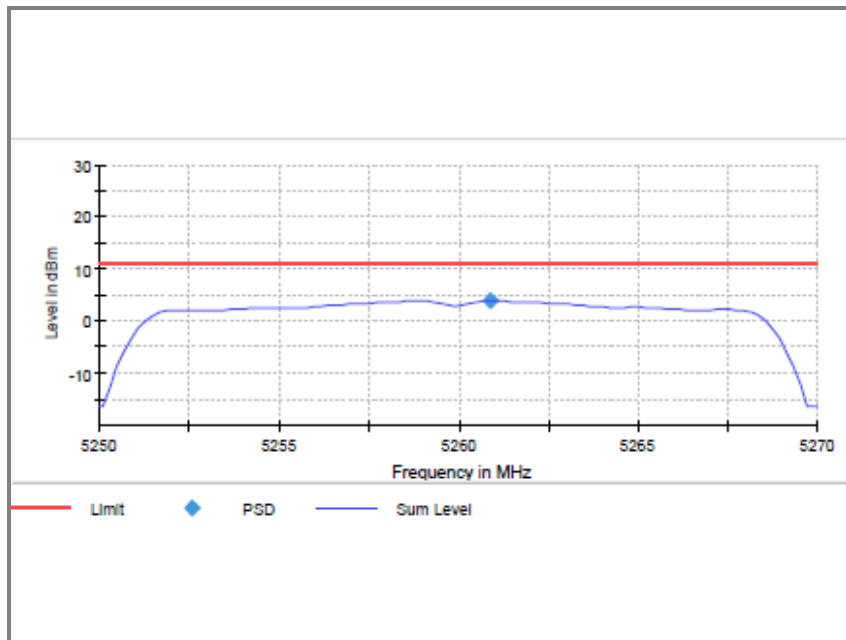


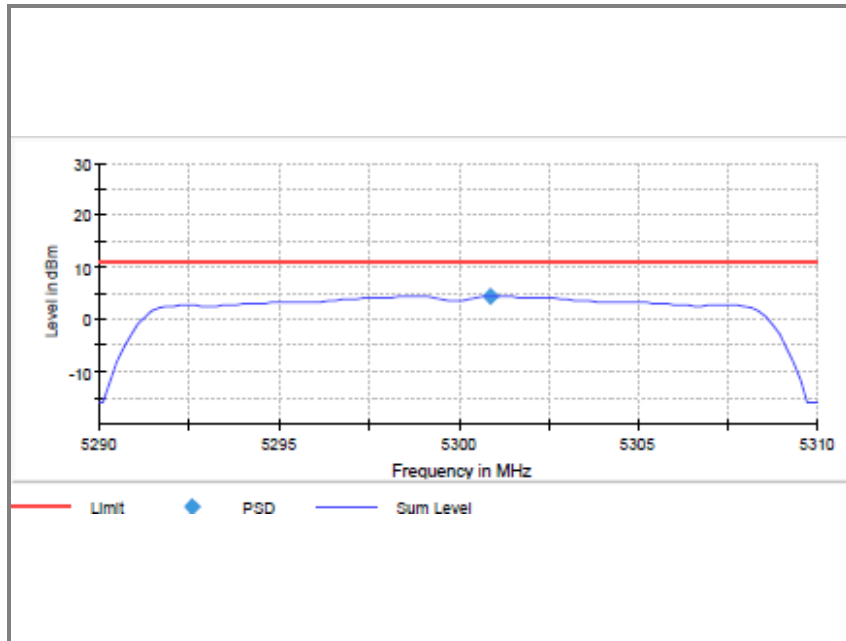
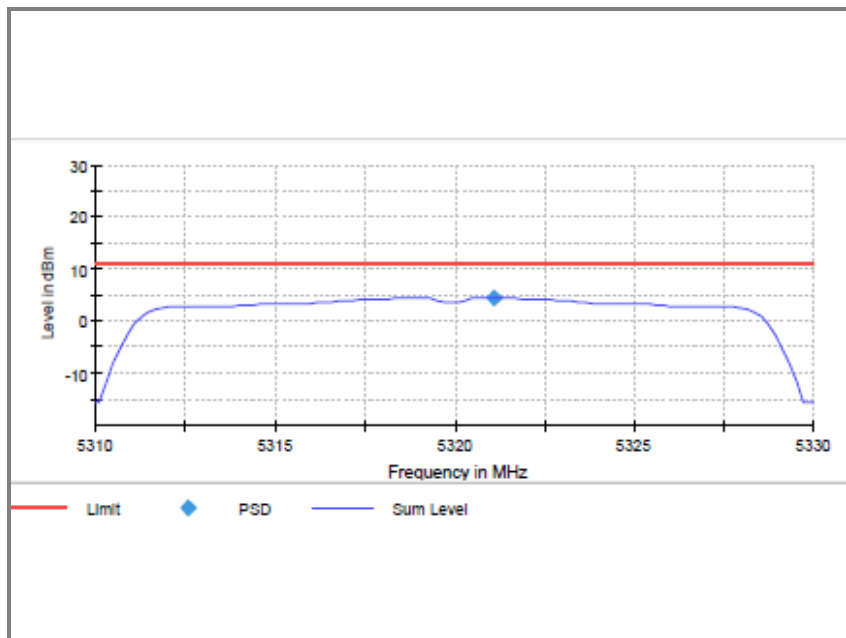
C. High channel(5320 MHz)



Operation mode: U-NII-2A(n_HT20)Mimo2X2

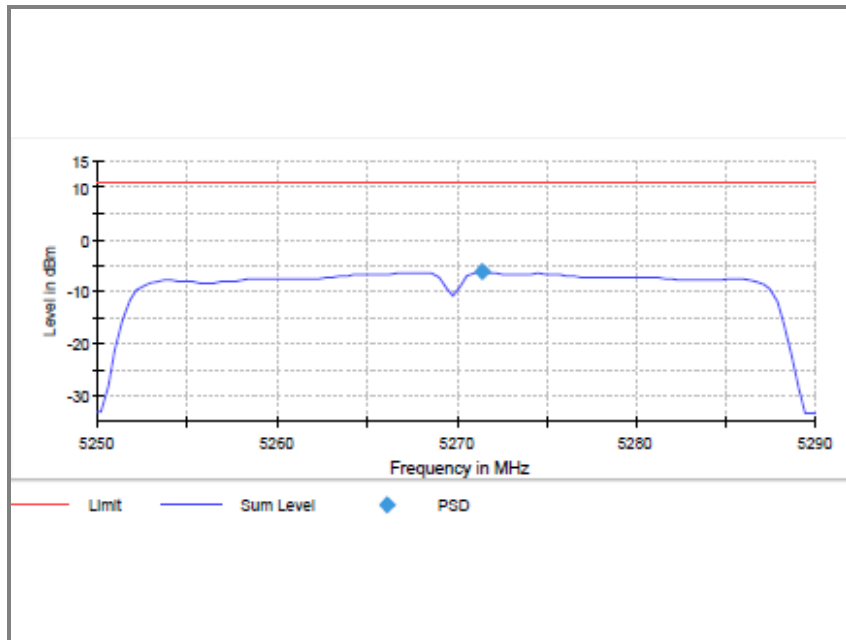
A. Low channel(5260 MHz)



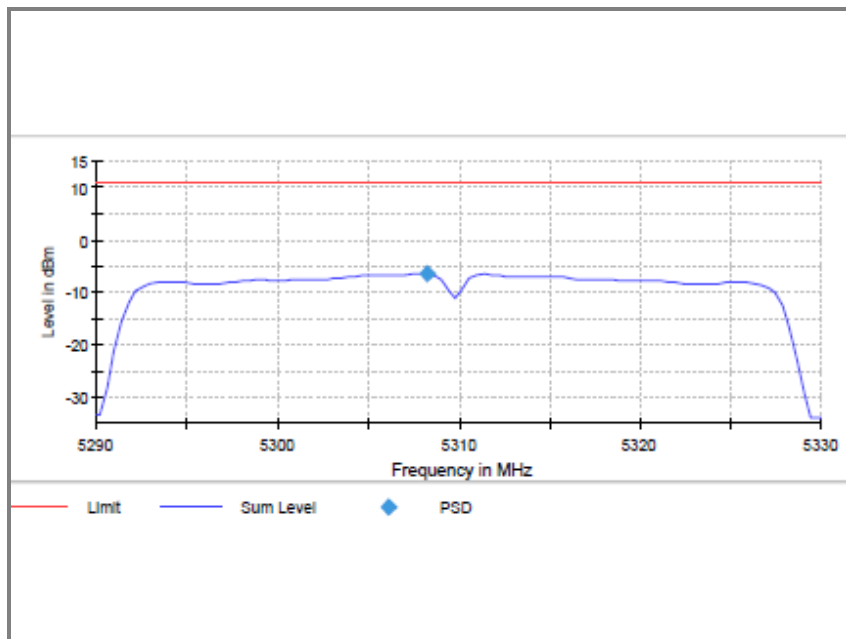
B. Middle channel(5300 MHz)**C. High channel(5320 MHz)**

Operation mode: U-NII-2A(n_HT40)ANT1

A. Low channel(5270 MHz)

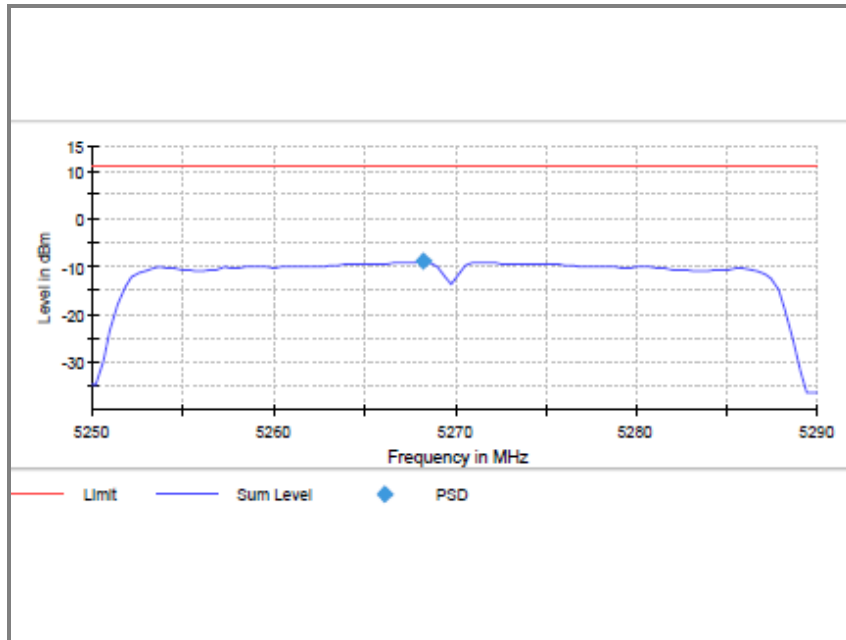


B. High channel(5310 MHz)

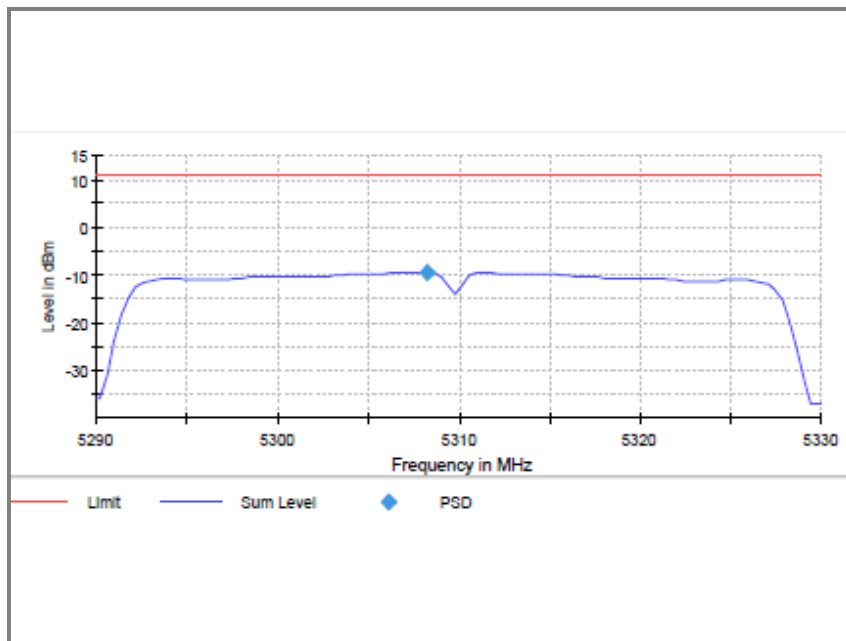


Operation mode: U-NII-2A(n_HT40)ANT2

A. Low channel(5270 MHz)

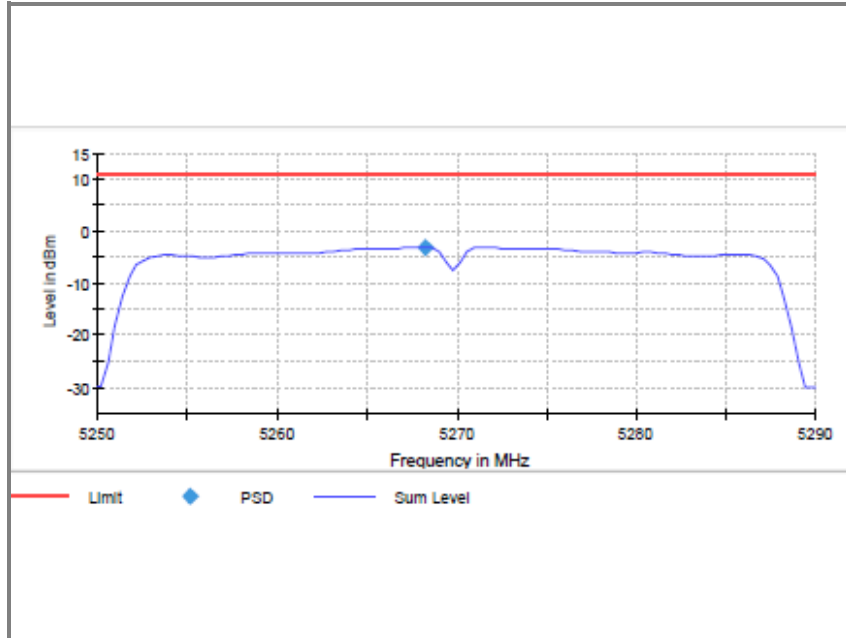


B. High channel(5310 MHz)

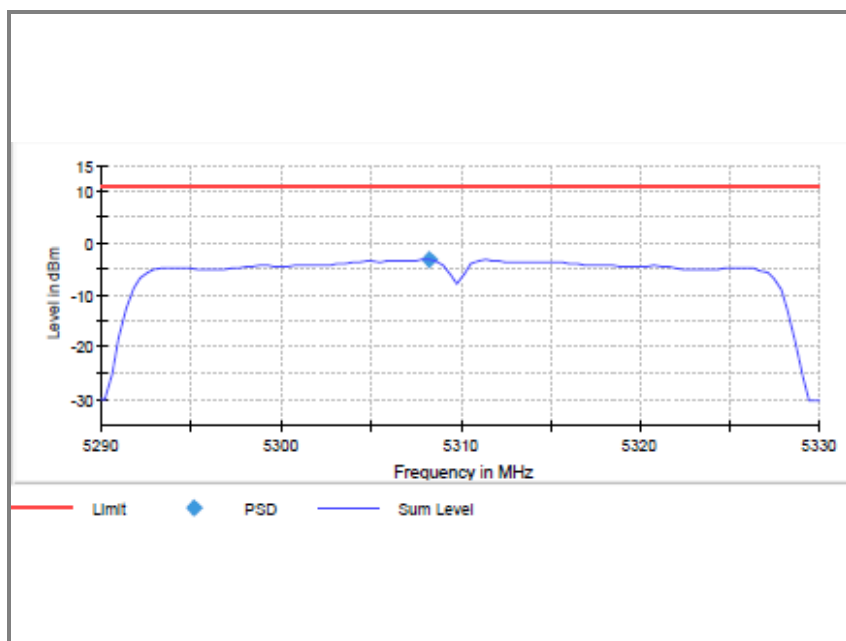


Operation mode: U-NII-2A(n_HT40)Mimo2X2

A. Low channel(5270 MHz)

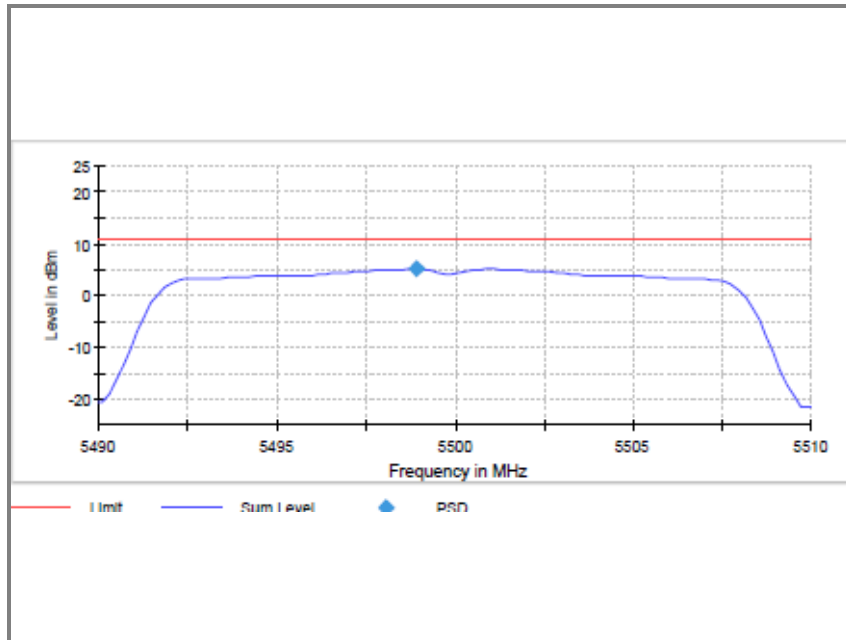


B. High channel(5310 MHz)

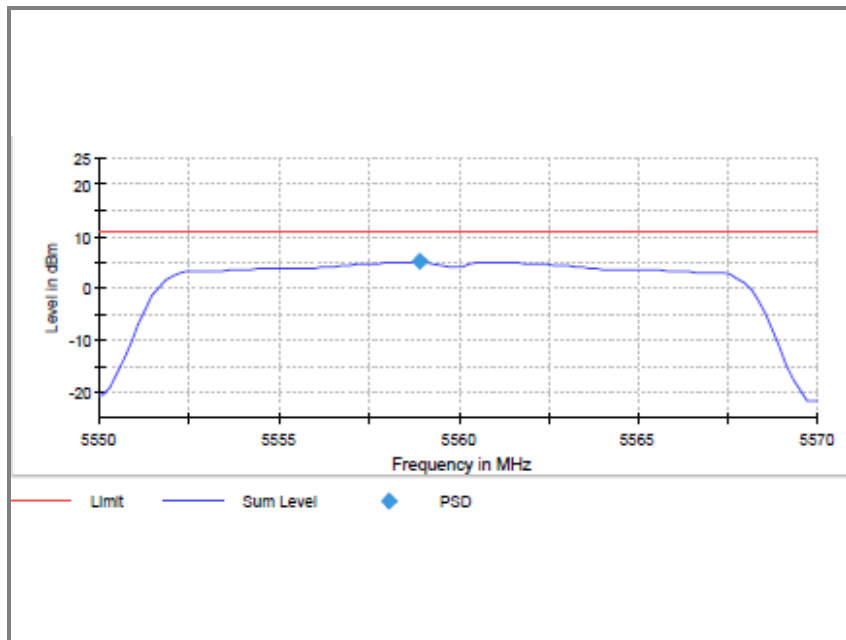


Operation mode: U-NII-2C(802.11a)ANT1

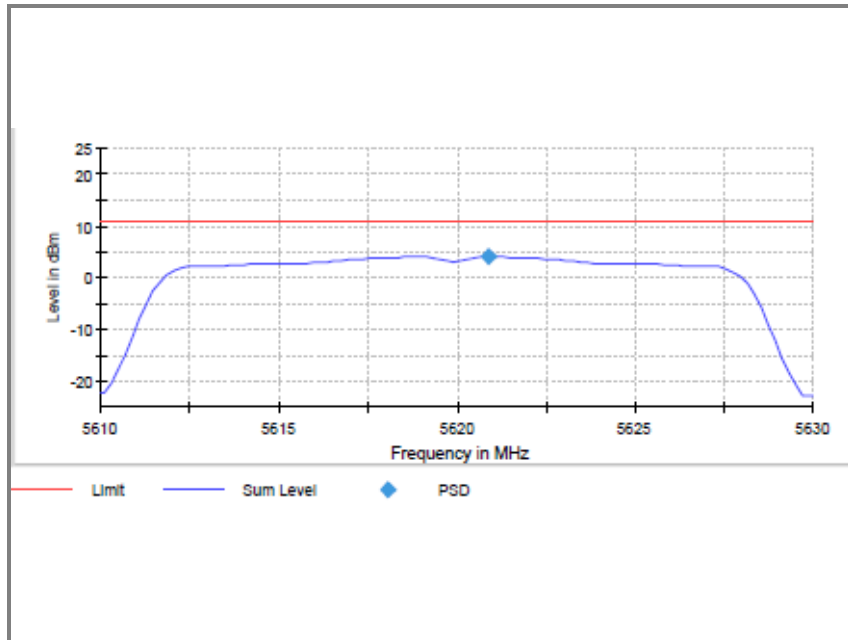
A. Low channel(5500 MHz)



B. Middle channel(5560 MHz)

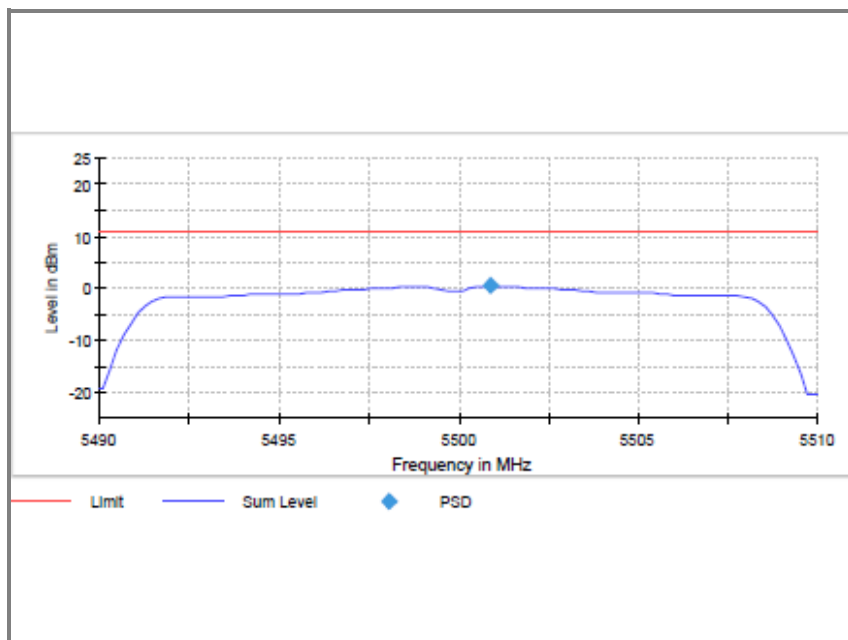


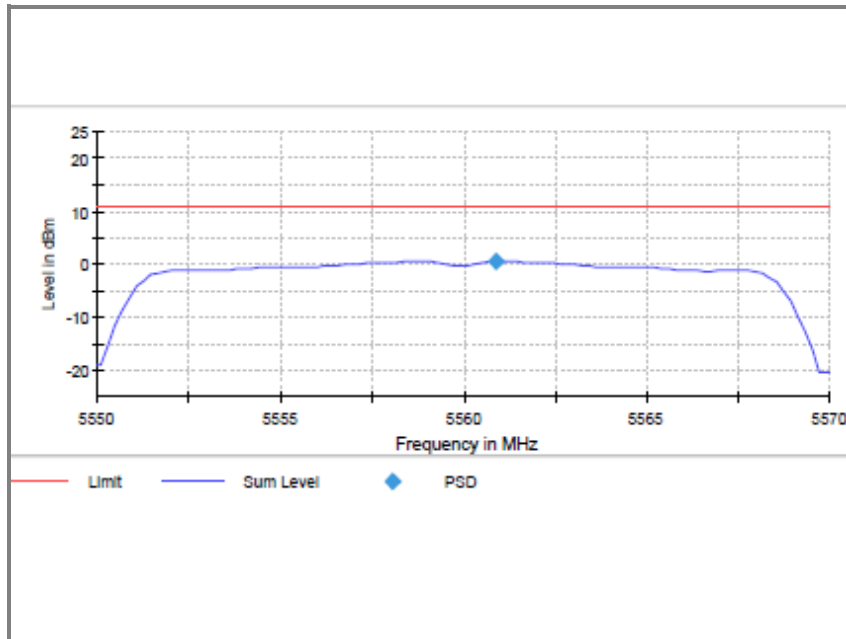
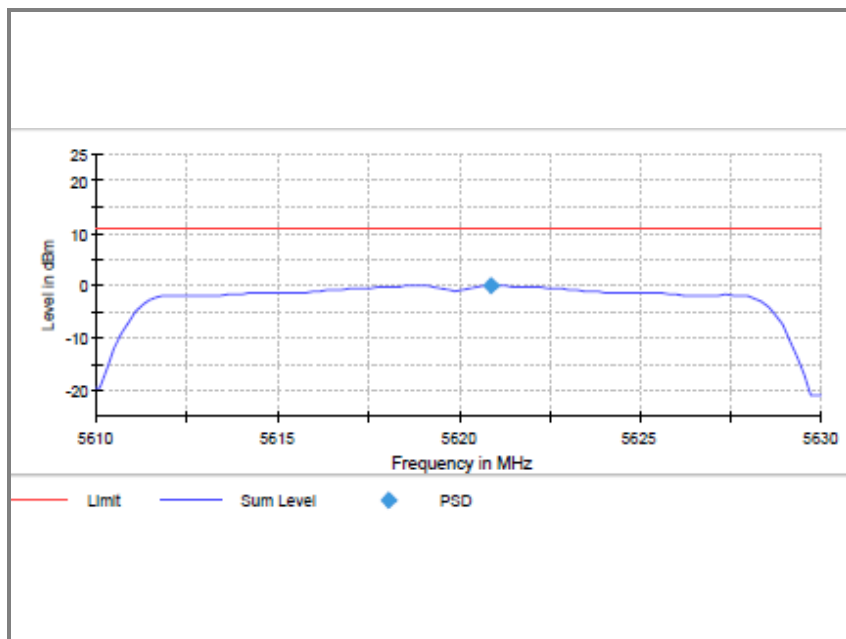
C. High channel(5620 MHz)



Operation mode: U-NII-2C(802.11a)ANT2

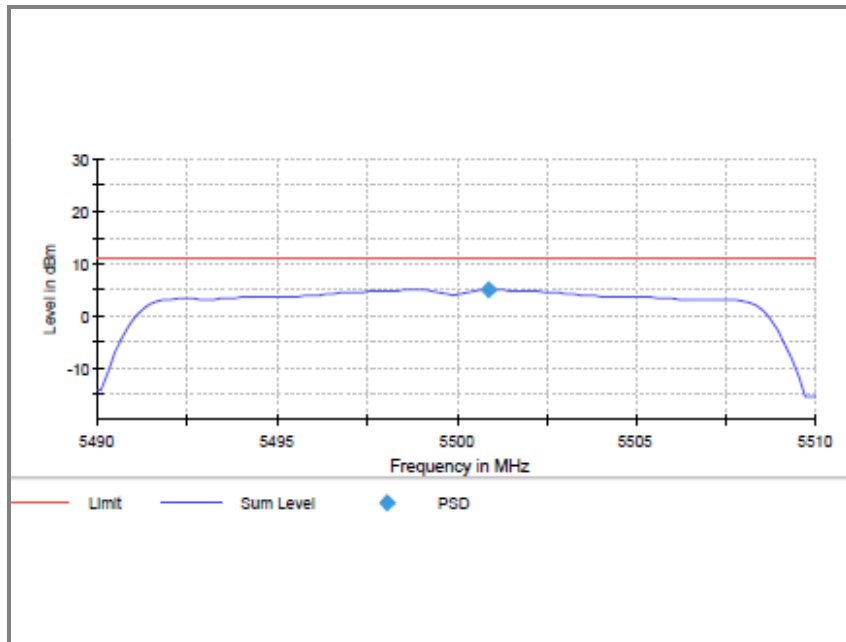
A. Low channel(5500 MHz)



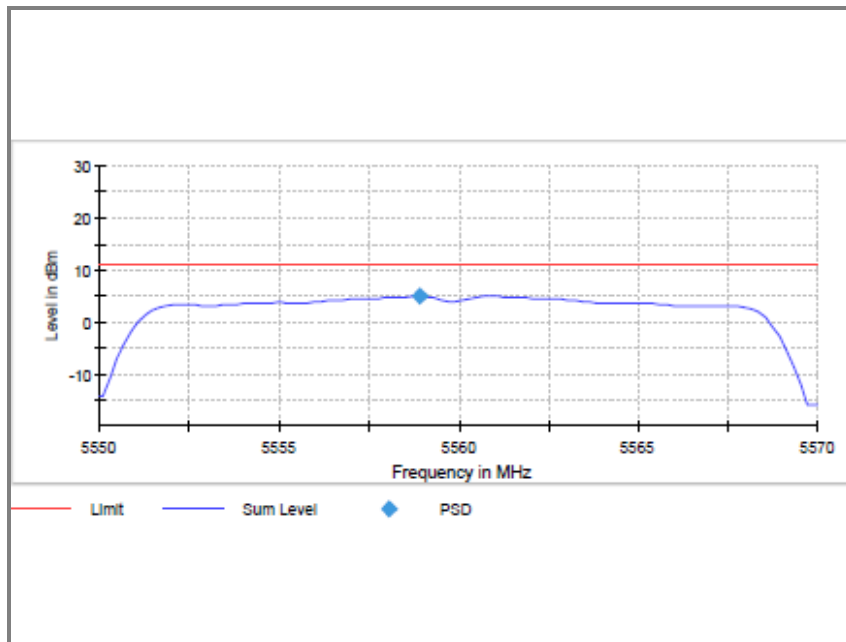
B. Middle channel(5560 MHz)**C. High channel(5620 MHz)**

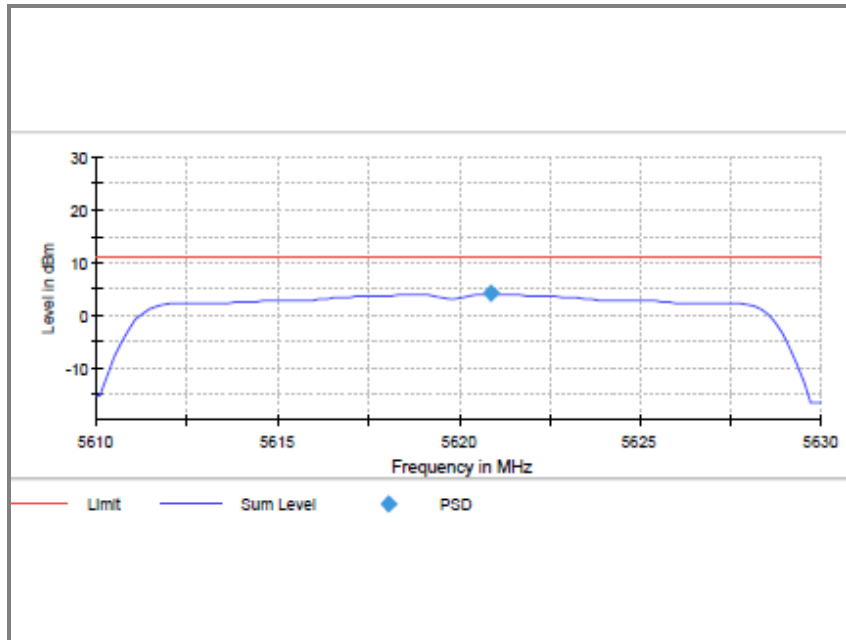
Operation mode: U-NII-2C(n_HT20) ANT1

A. Low channel(5500 MHz)

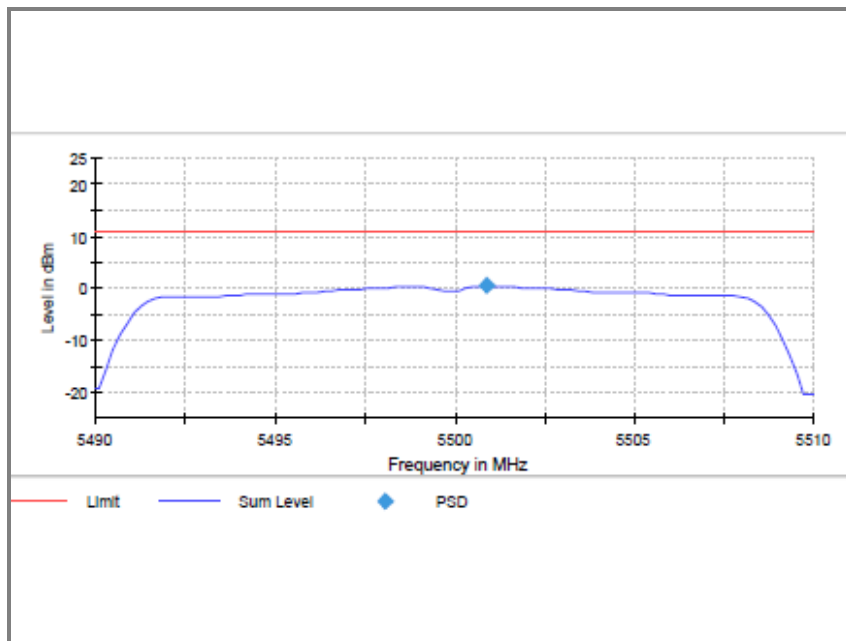


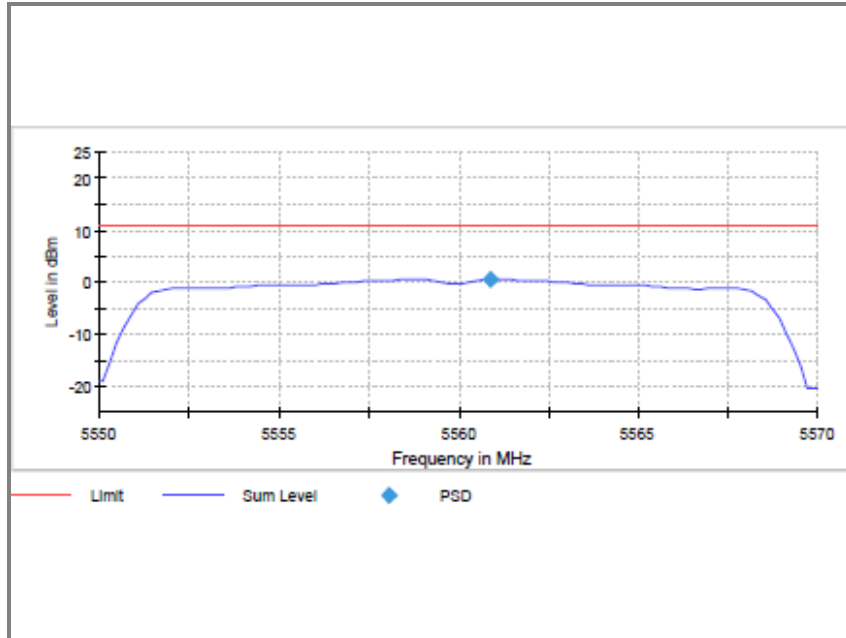
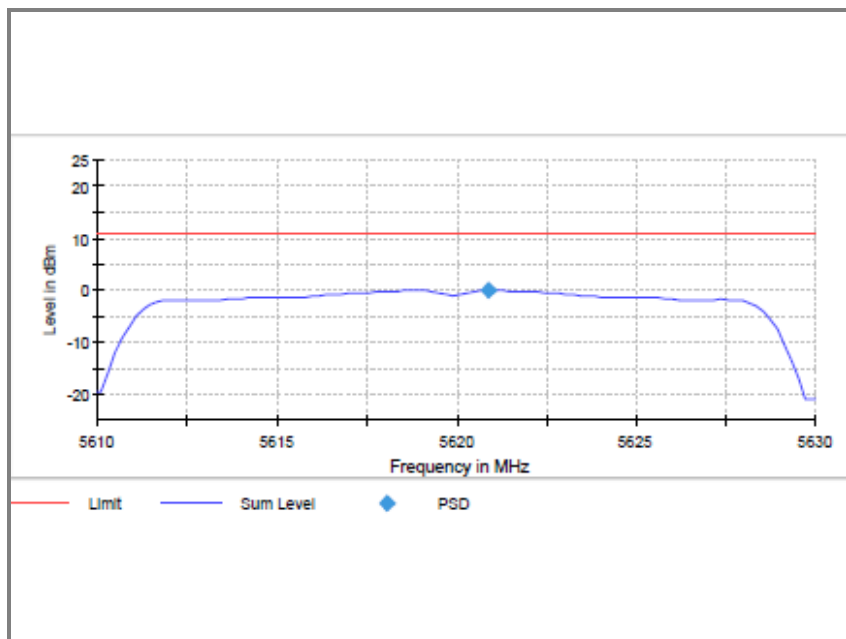
B. Middle channel(5560 MHz)



C. High channel(5620 MHz)

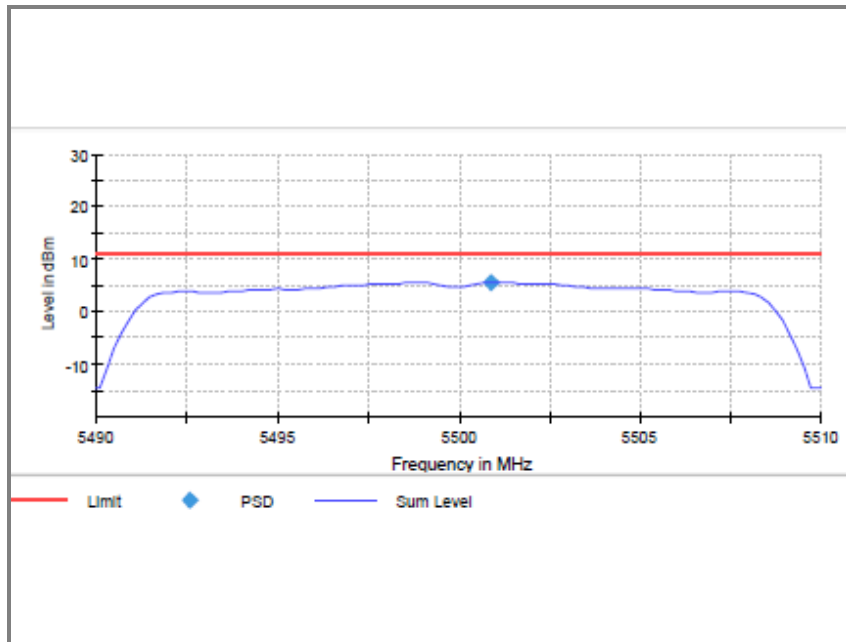
Operation mode: U-NII-2C(n_HT20) ANT2

A. Low channel(5500 MHz)

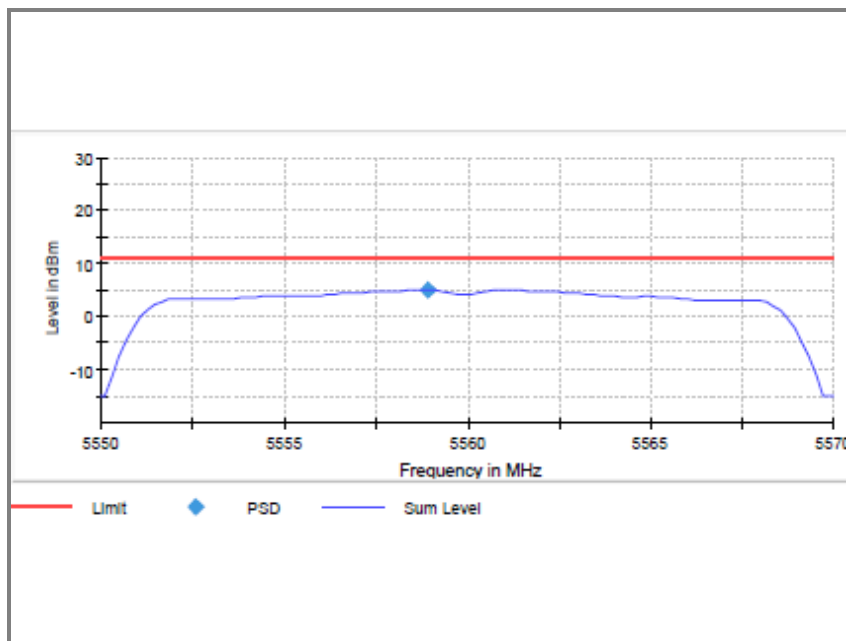
B. Middle channel(5560 MHz)**C. High channel(5620 MHz)**

Operation mode: U-NII-2C(n_HT20) Mimo2X2

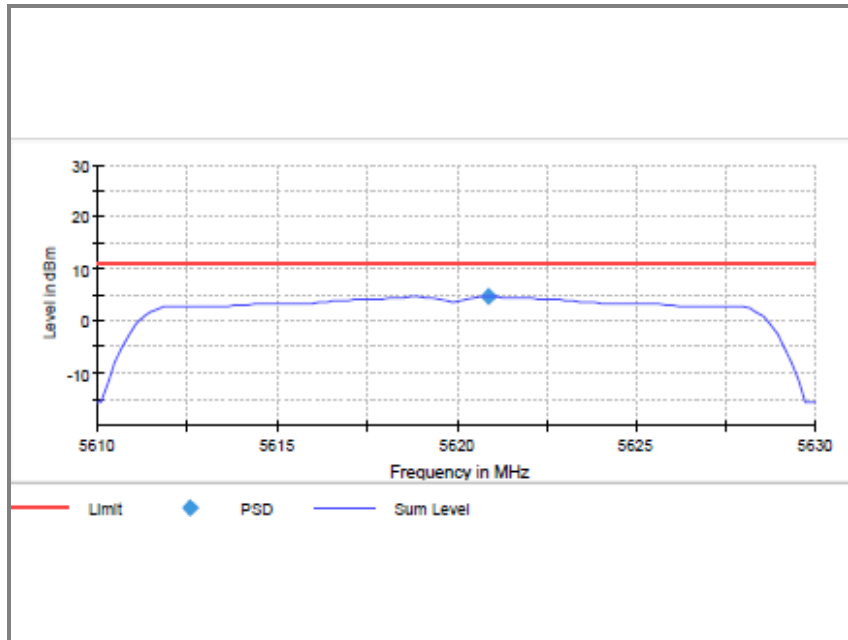
A. Low channel(5500 MHz)



B. Middle channel(5560 MHz)

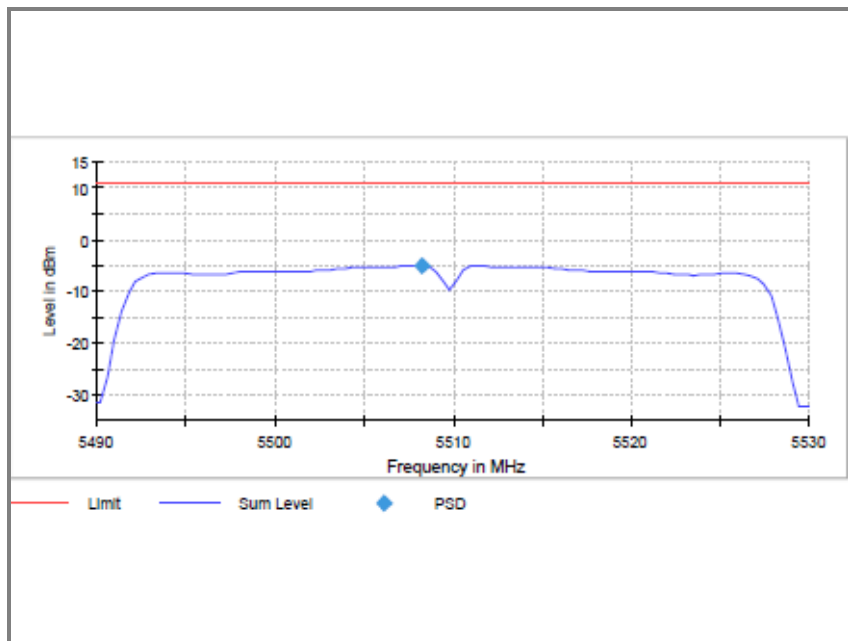


C. High channel(5620 MHz)

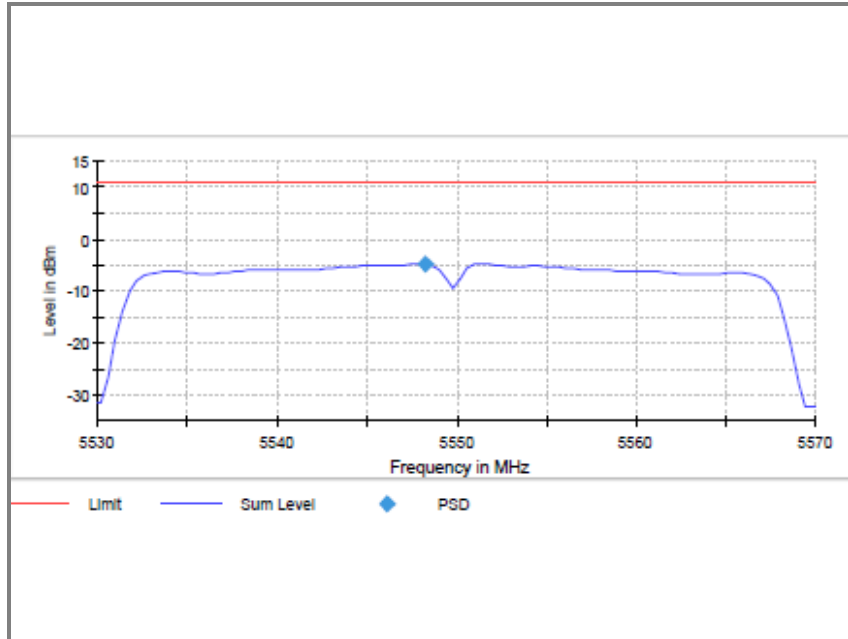


Operation mode: U-NII-2C(n_HT40) ANT1

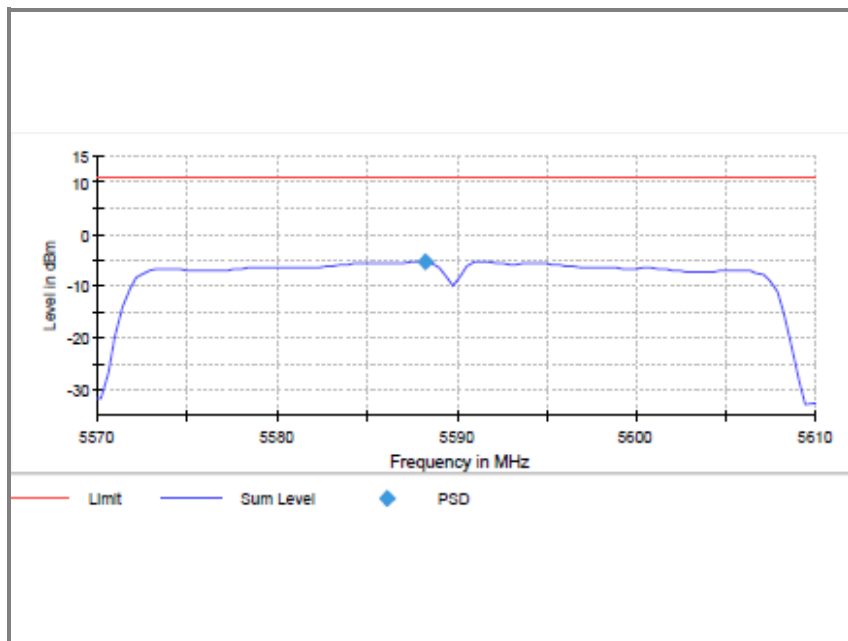
A. Low channel(5510 MHz)



B. Middle channel(5550 MHz)

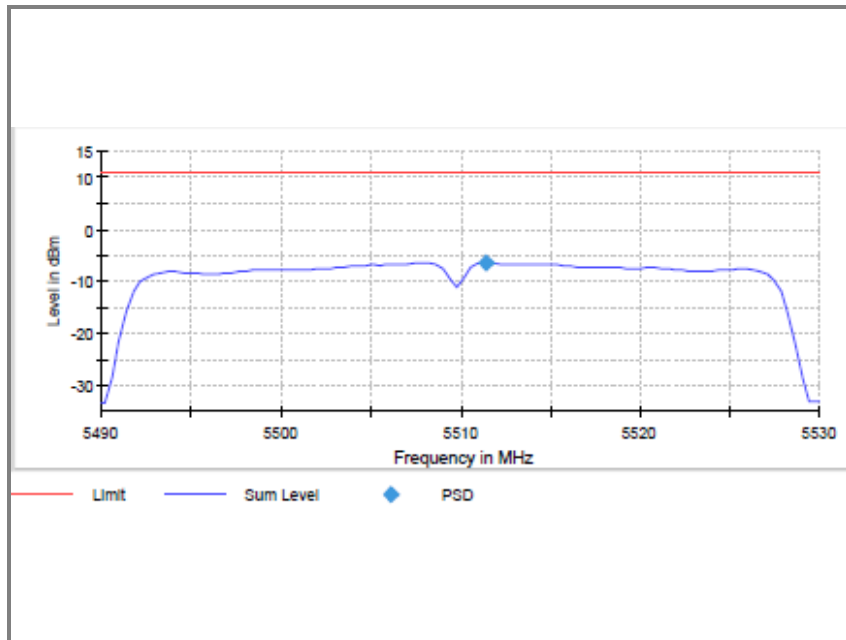


C. High channel(5590 MHz)

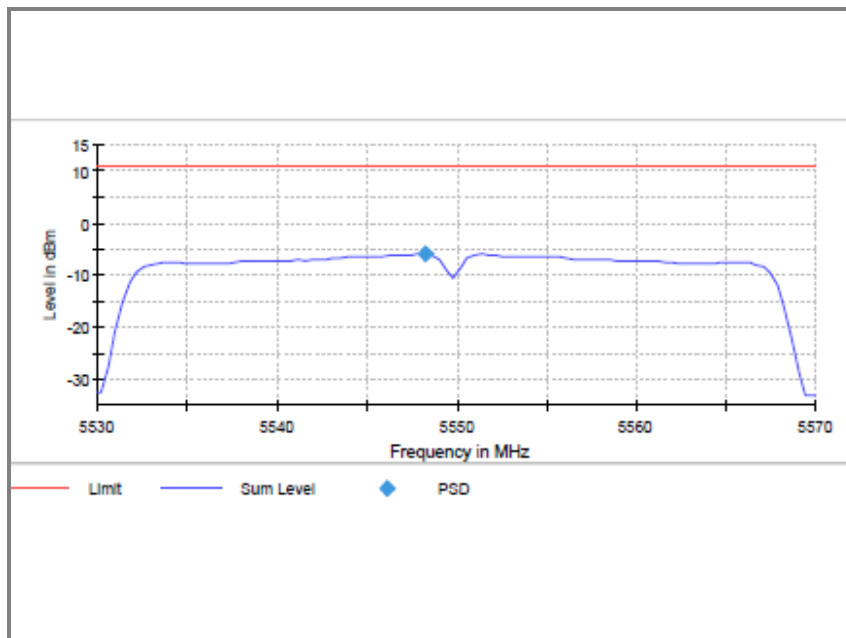


Operation mode: U-NII-2C(n_HT40) ANT2

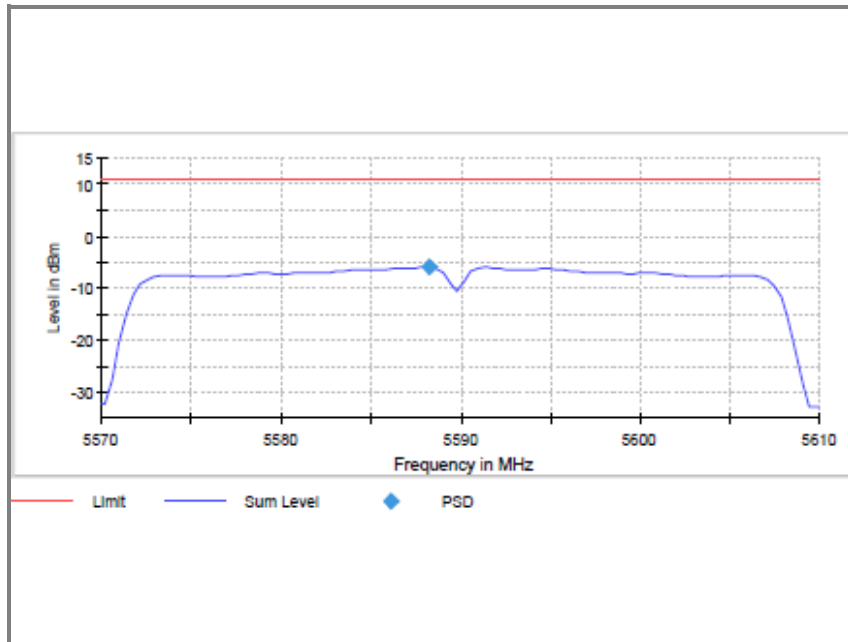
A. Low channel(5510 MHz)



B. Middle channel(5550 MHz)

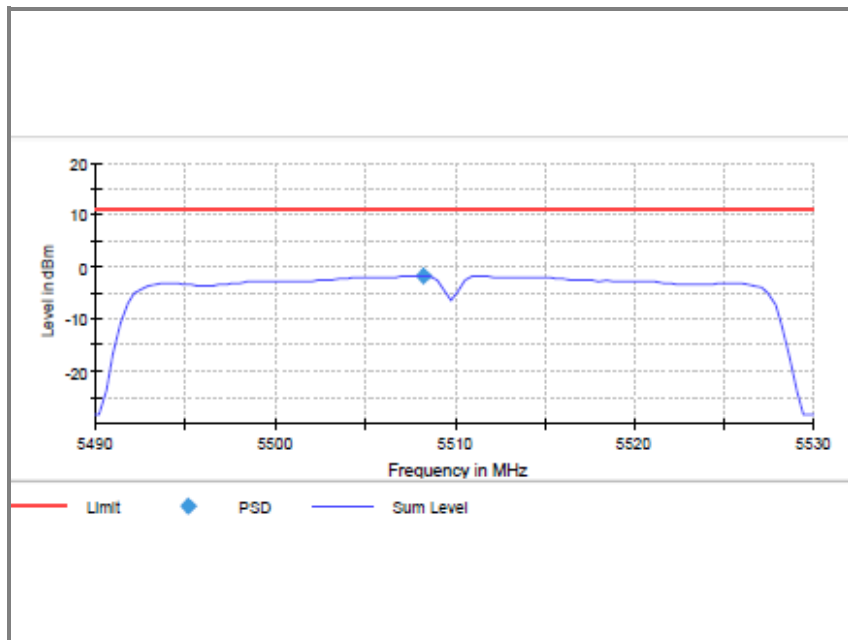


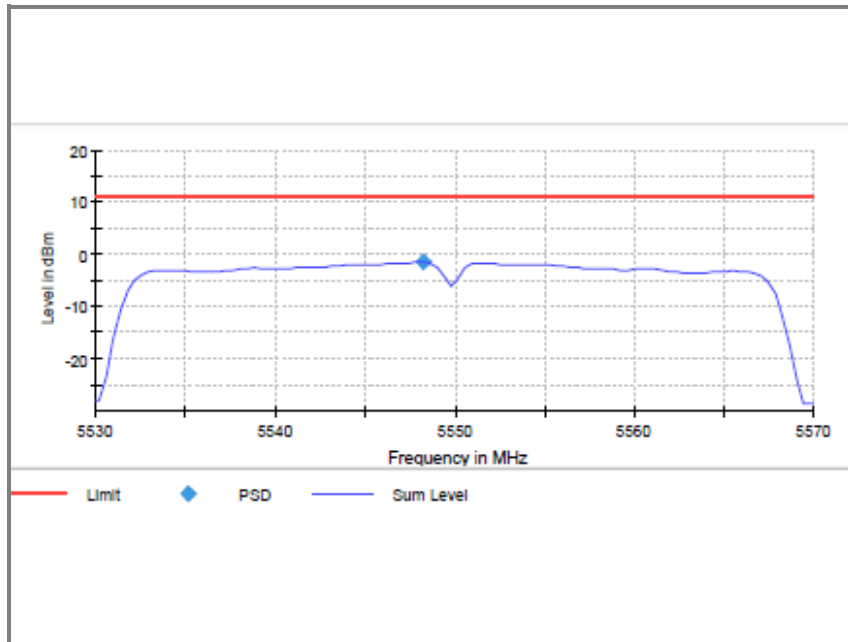
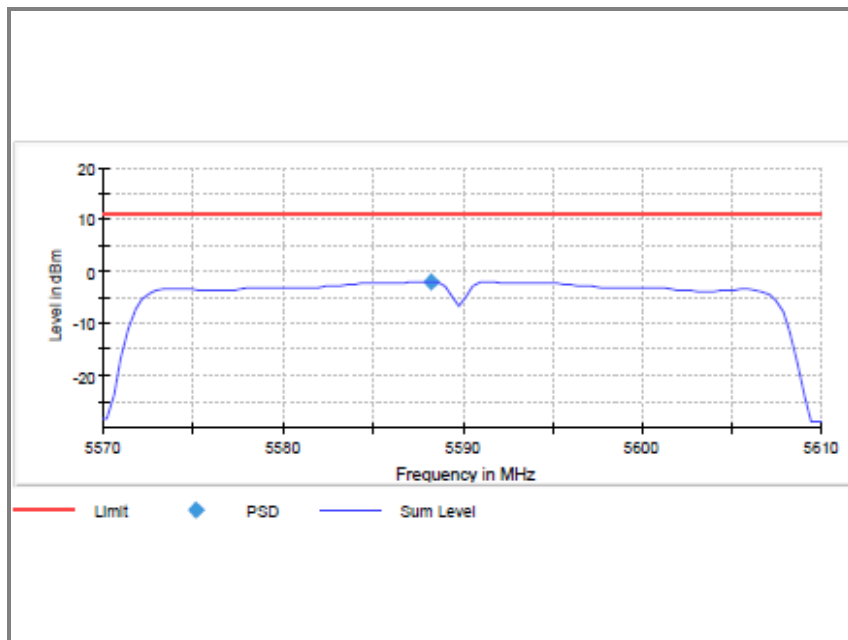
C. High channel(5590 MHz)



Operation mode: U-NII-2C(n_HT40) Mimo2X2

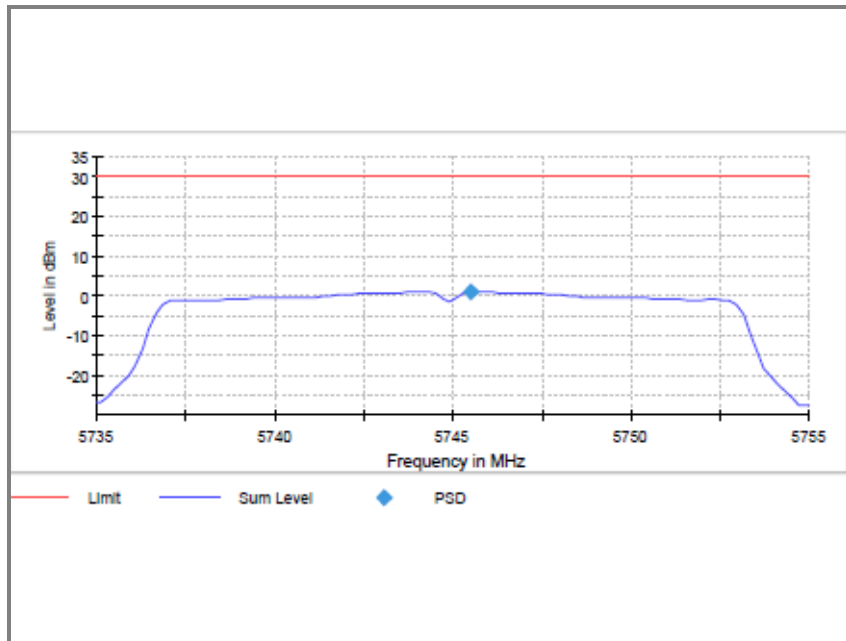
A. Low channel(5510 MHz)



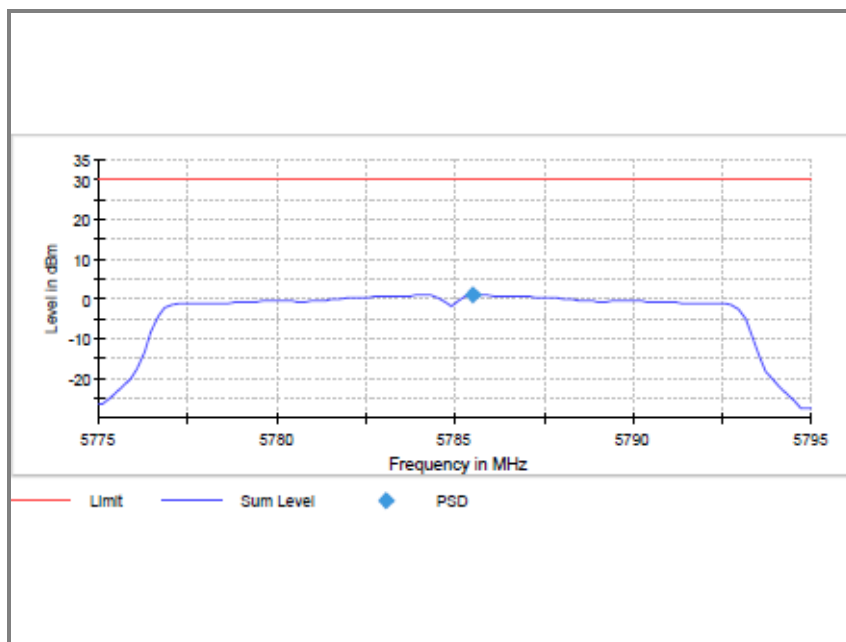
B. Middle channel(5550 MHz)**C. High channel(5590 MHz)**

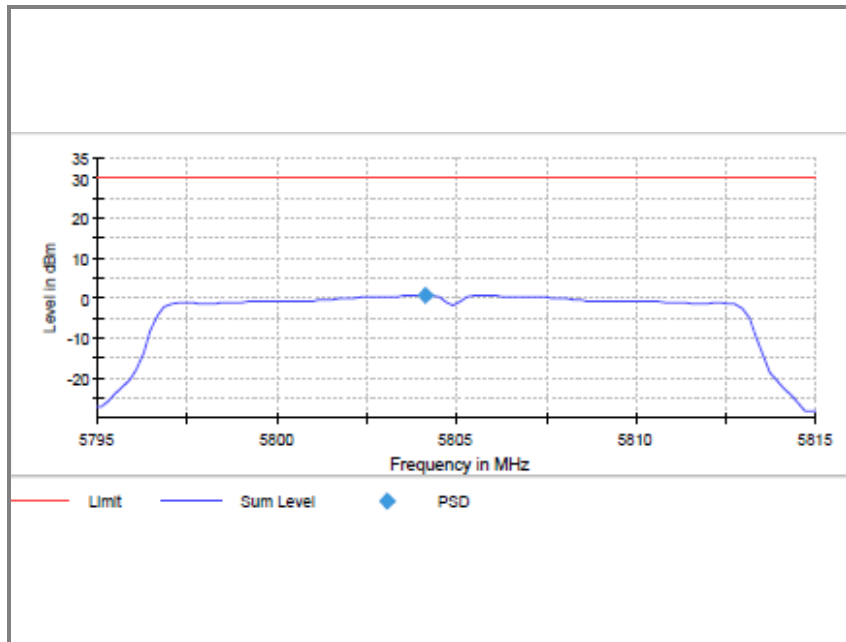
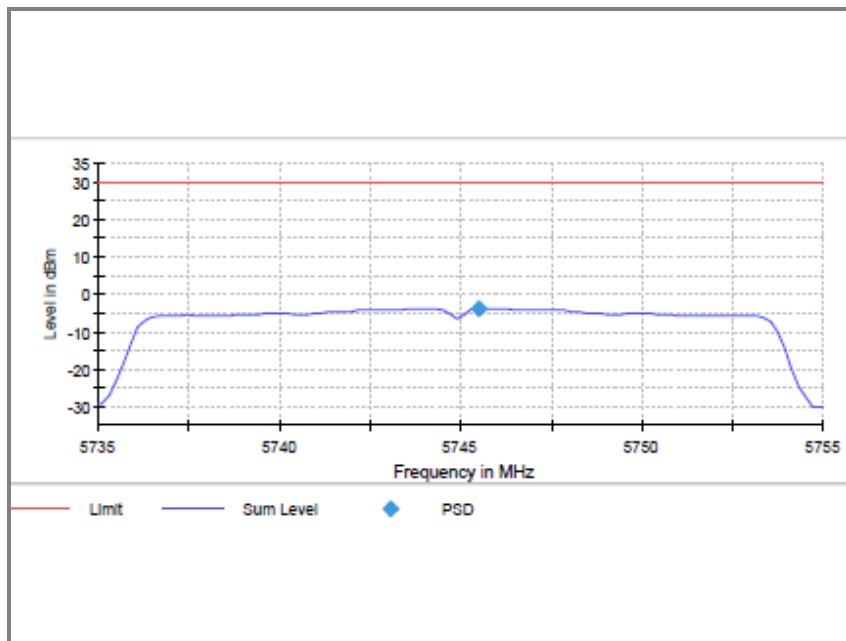
Operation mode: U-NII-3(802.11a) ANT1

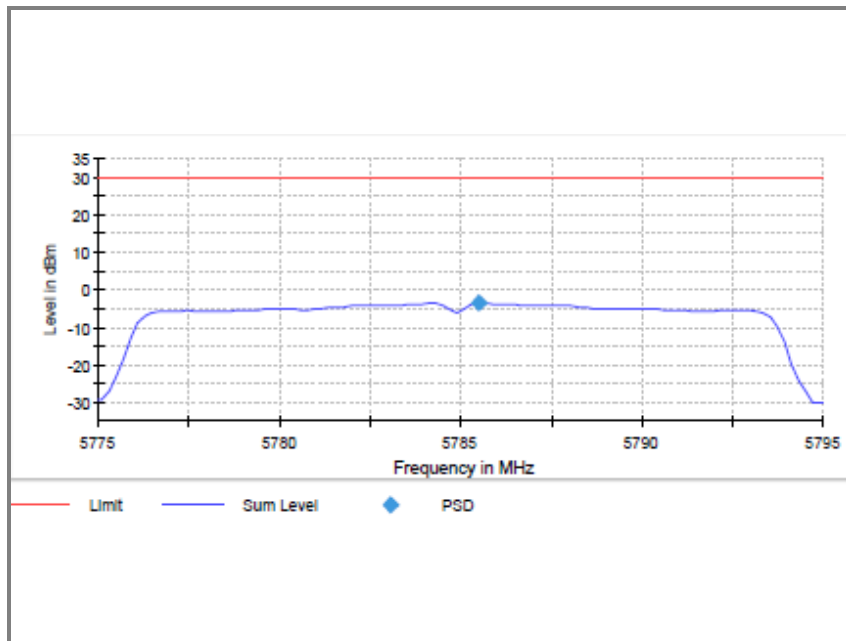
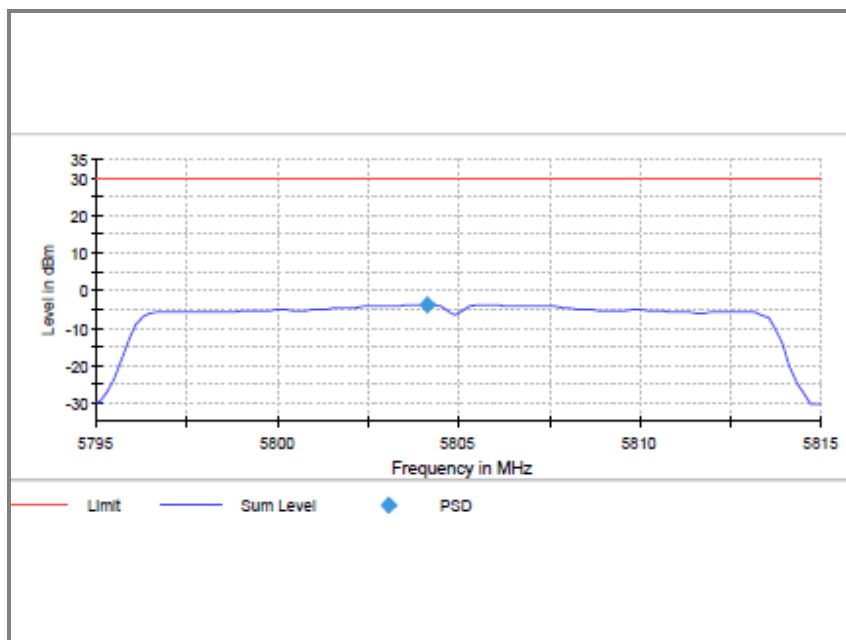
A. Low channel(5745 MHz)



B. Middle channel(5785 MHz)

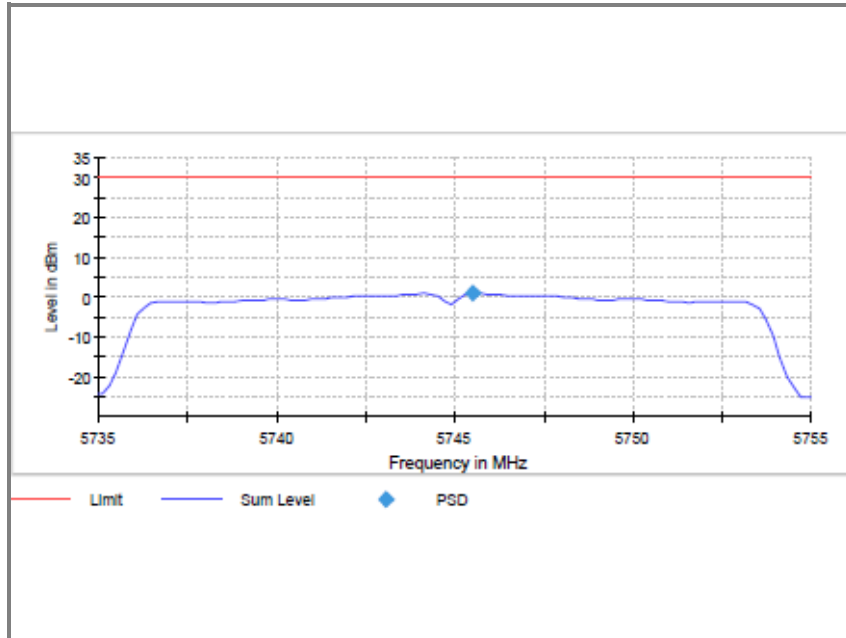


C. High channel(5805 MHz)**Operation mode: U-NII-3(802.11a) ANT2****A. Low channel(5745 MHz)**

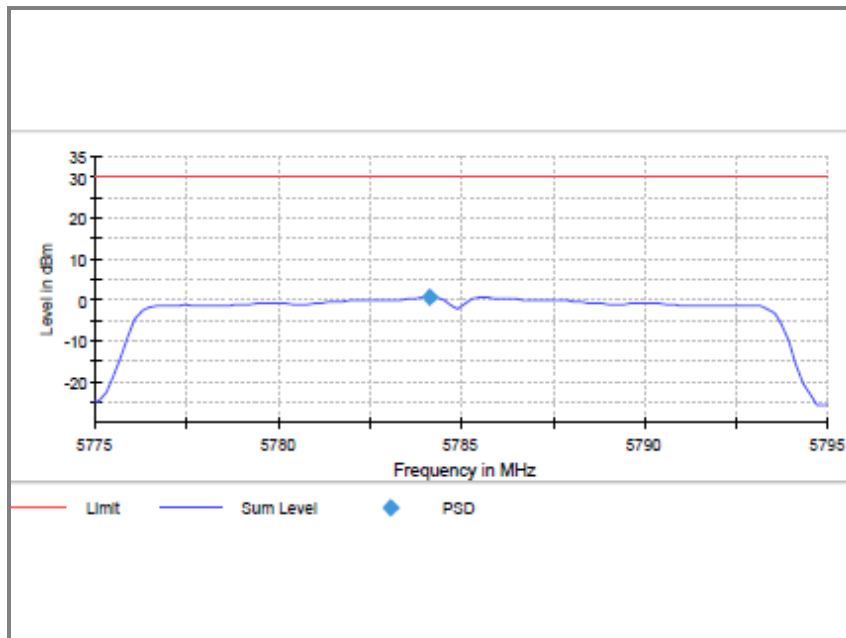
B. Middle channel(5785 MHz)**C. High channel(5805 MHz)**

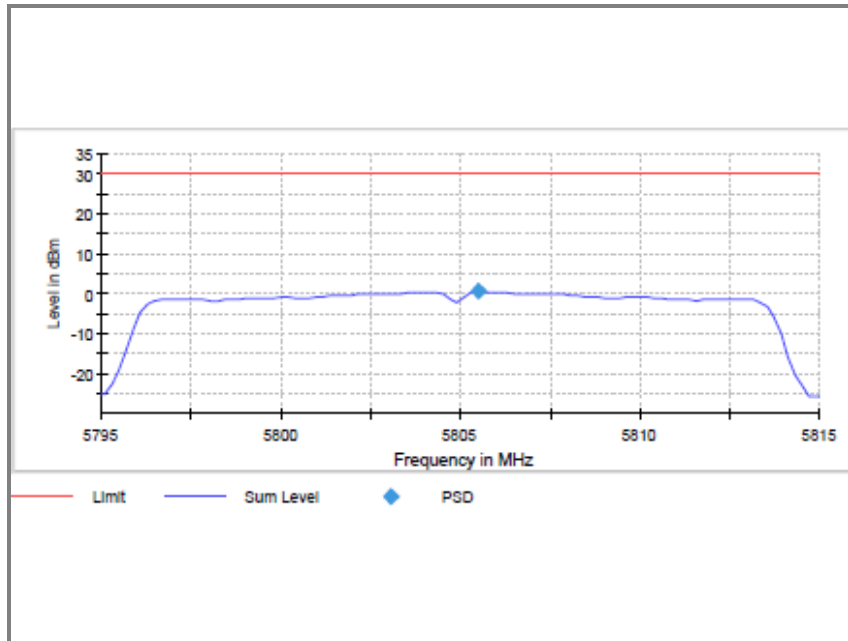
Operation mode: U-NII-3(n_HT20) ANT1

A. Low channel(5745 MHz)

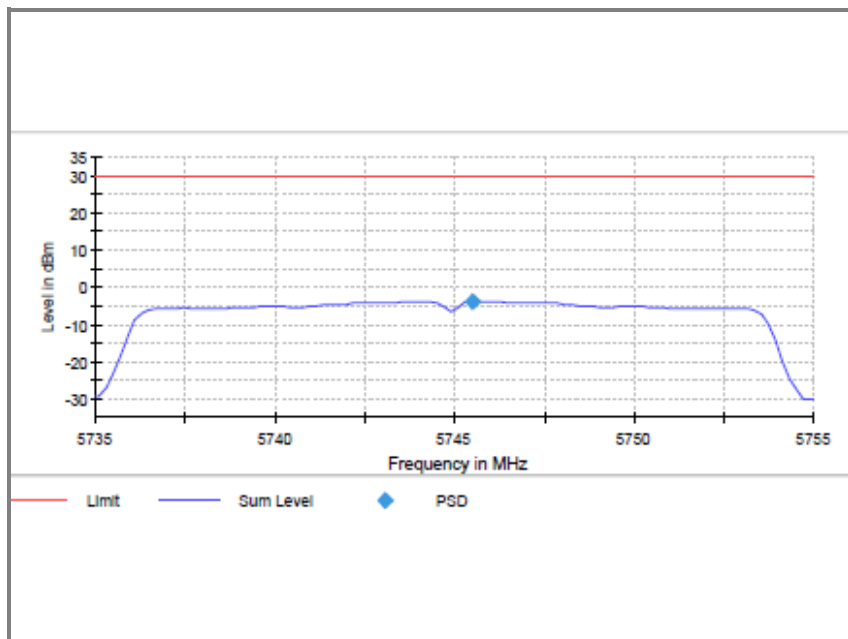


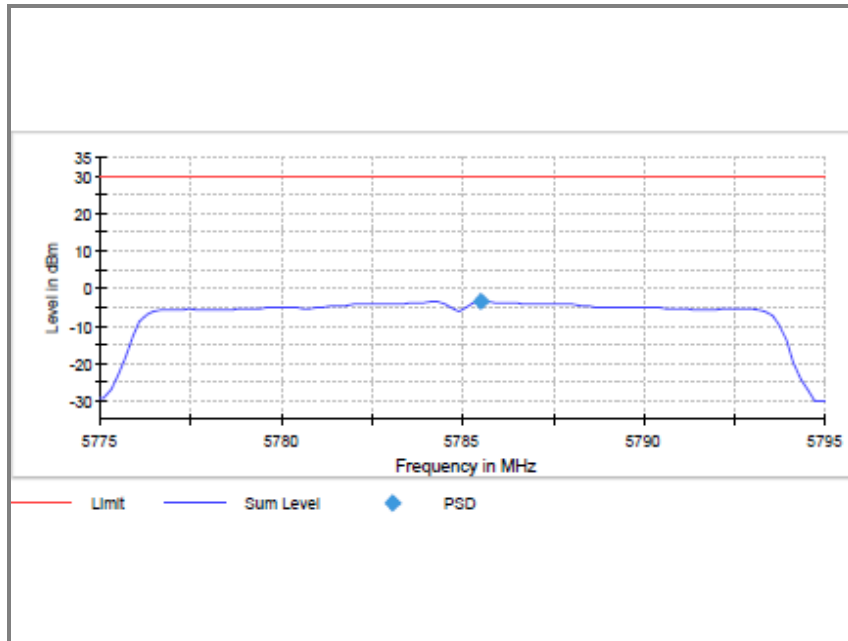
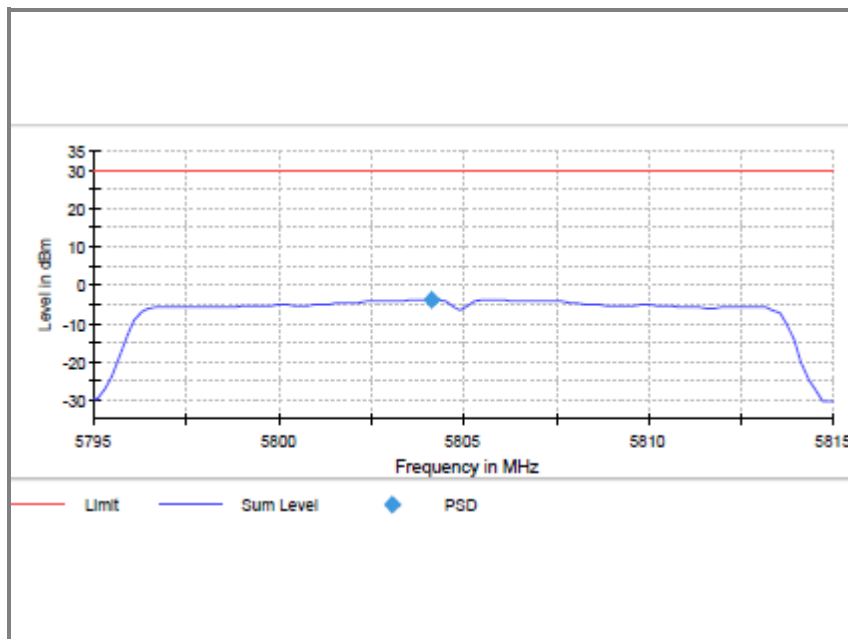
B. Middle channel(5785 MHz)



C. High channel(5805 MHz)

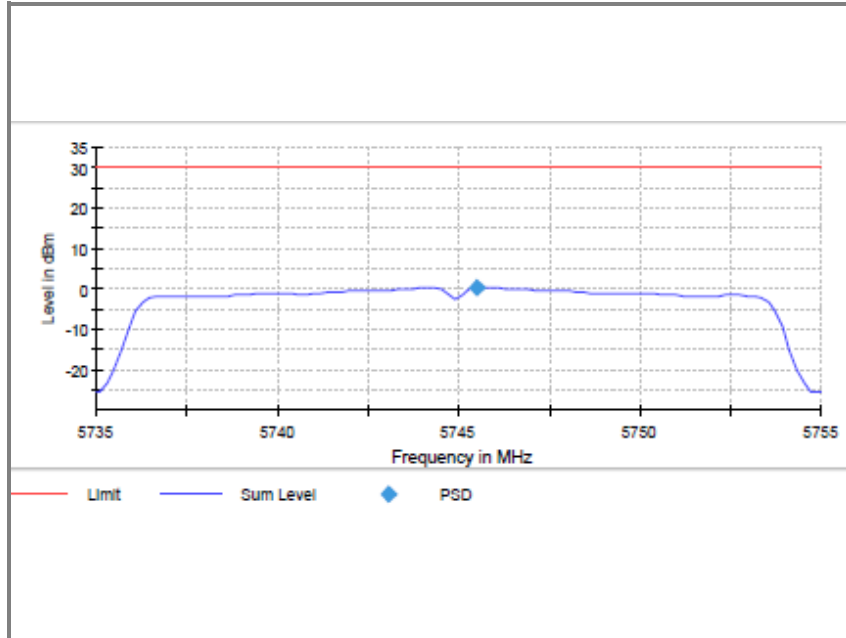
Operation mode: U-NII-3(n_HT20) ANT2

A. Low channel(5745 MHz)

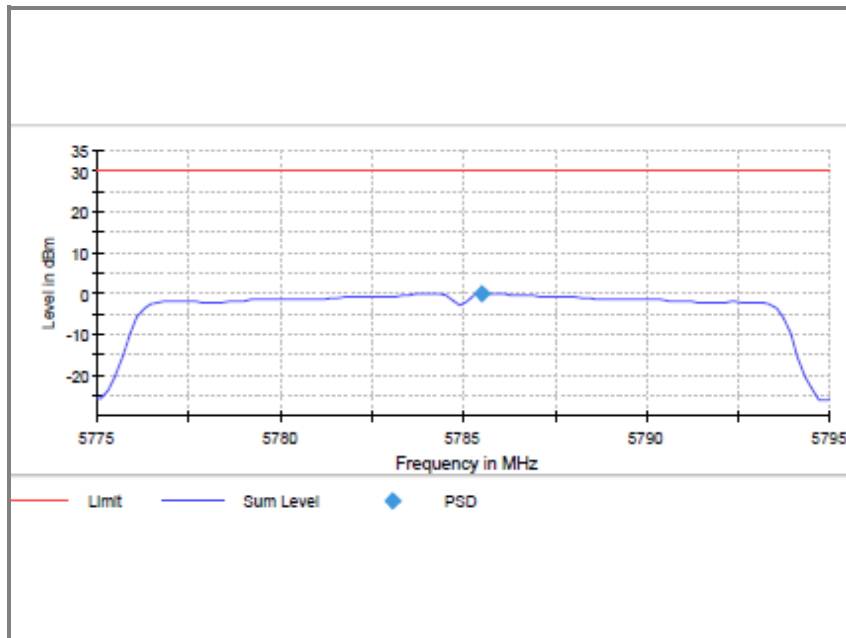
B. Middle channel(5785 MHz)**C. High channel(5805 MHz)**

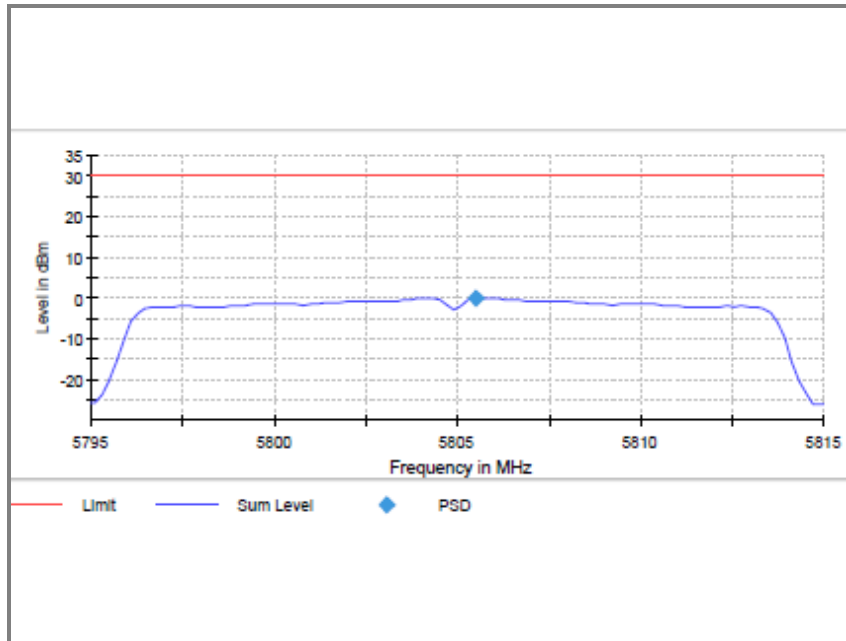
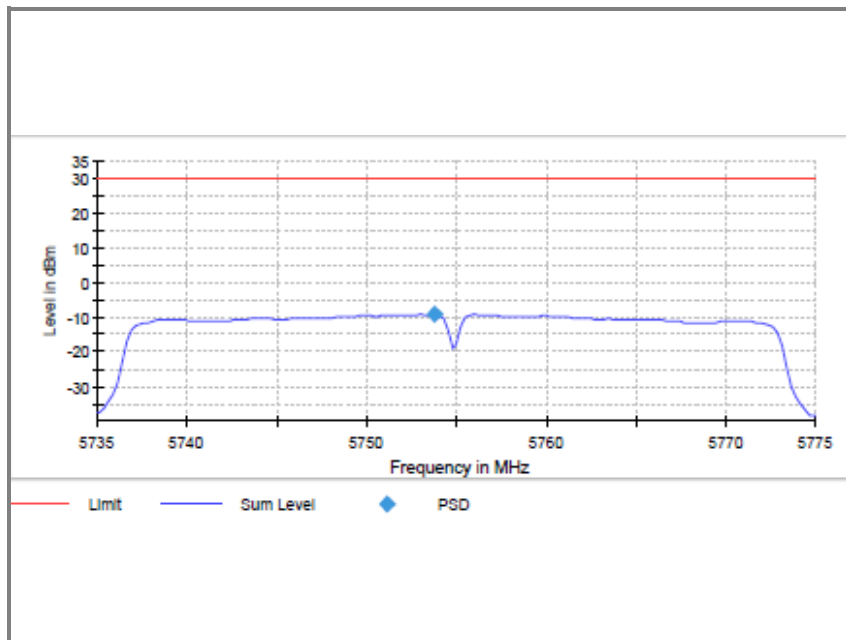
Operation mode: U-NII-3(n_HT20) Mimo2X2

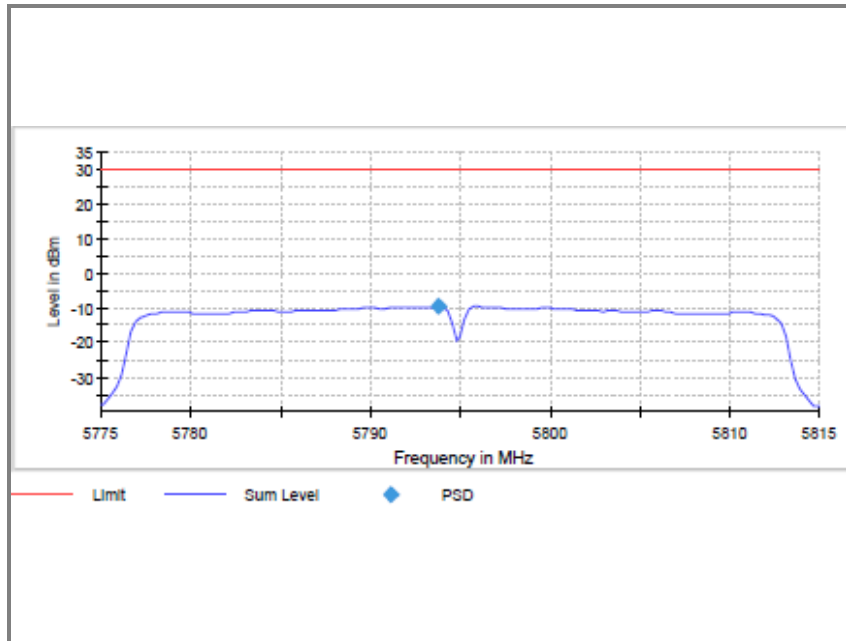
A. Low channel(5745 MHz)



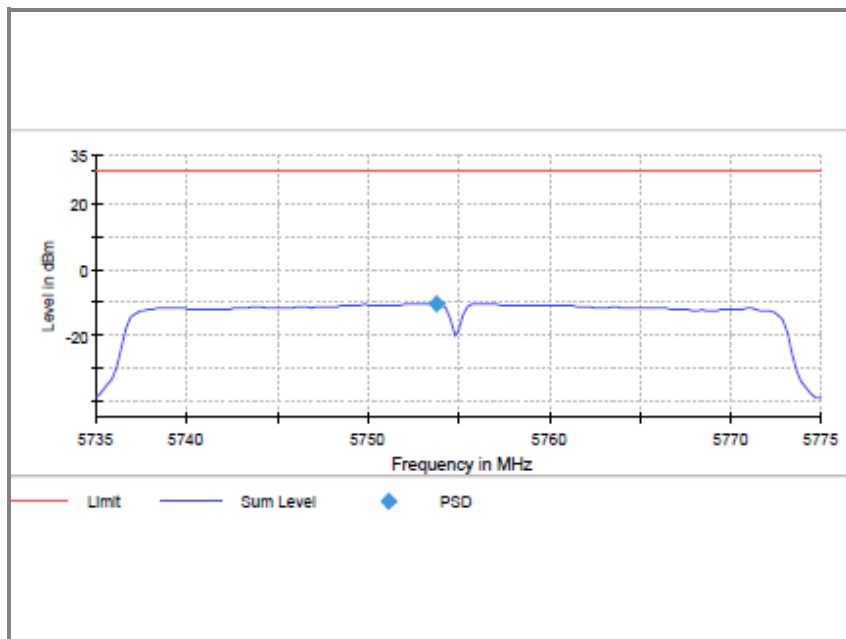
B. Middle channel(5785 MHz)

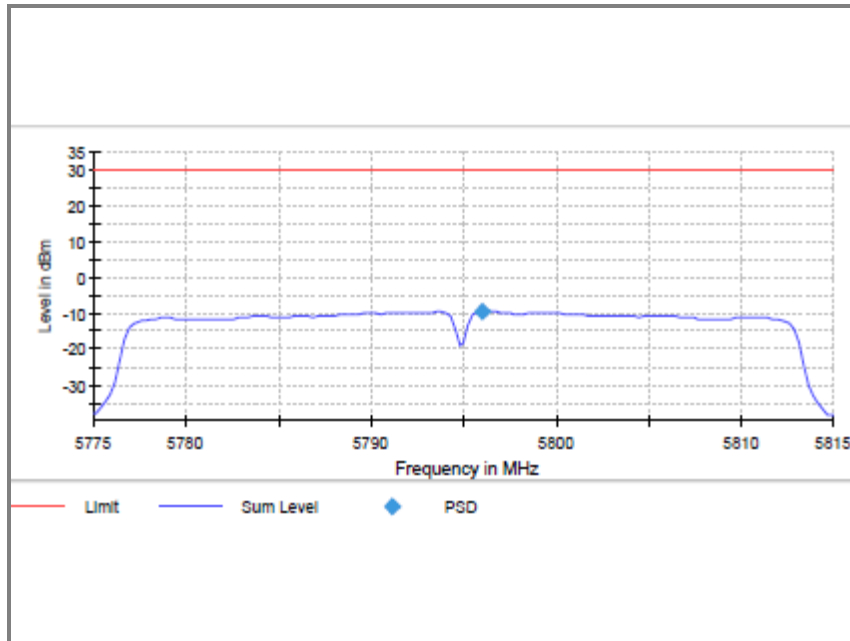


C. High channel(5805 MHz)**Operation mode: U-NII-3(n_HT40) ANT1****A. Low channel(5755 MHz)**

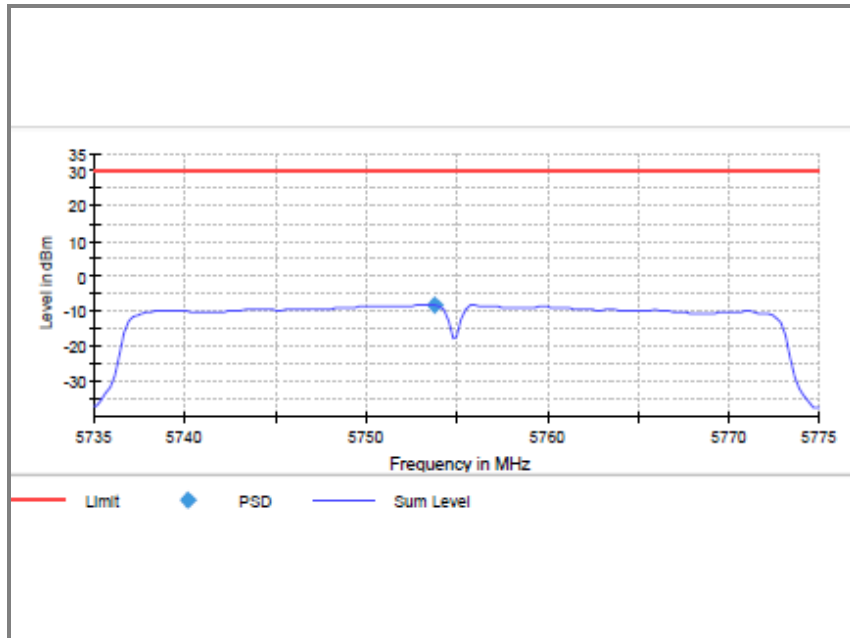
B. High channel(5795 MHz)

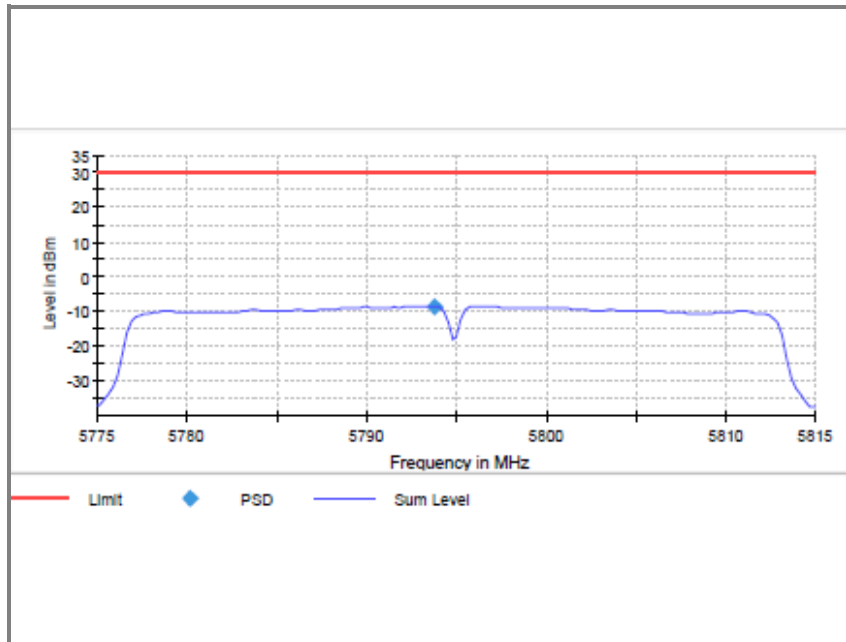
Operation mode: U-NII-3(n_HT40) ANT2

A. Low channel(5755 MHz)

B. High channel(5795 MHz)

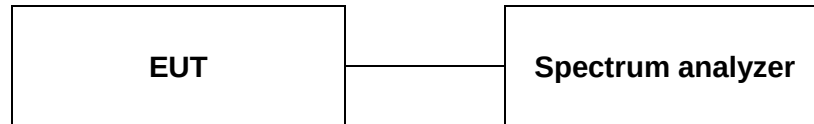
Operation mode: U-NII-3(n_HT40) Mimo2X2

A. Low channel(5755 MHz)

B. High channel(5795 MHz)

8. 6 dB Bandwidth

8.1. Test setup



8.2. Limit

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

8.3. Test procedure

Test procedure(KDB 789033)

- Set RBW = 100 kHz.
- Set the video bandwidth (VBW) ≥ 3 RBW.
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- 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.

8.4. Test results

Ambient temperature: 21°C

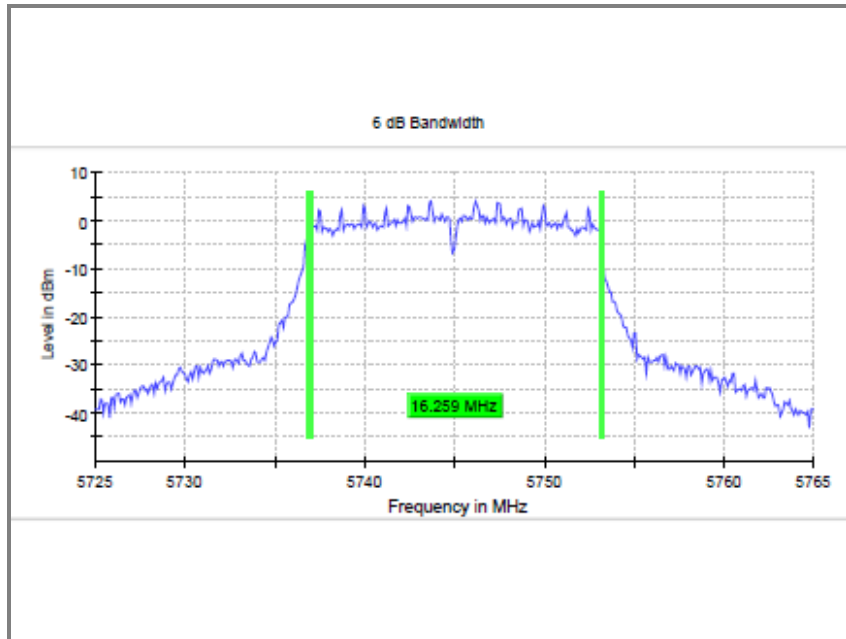
Relative humidity: 45 % R.H.

The worst case test data

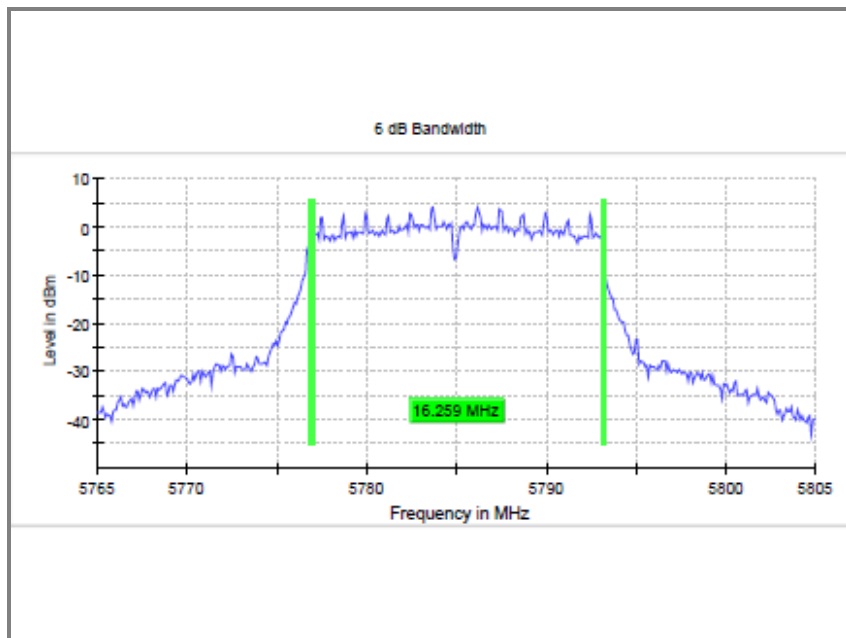
Mode	Frequency (MHz)	6 dB bandwidth (MHz)
U-NII-3(802.11a)	5 745	16.26
	5 785	16.26
	5 805	16.46
U-NII-3(n_HT20)	5 745	16.76
	5 785	16.76
	5 805	17.06
U-NII-3(n_HT40)	5 755	35.26
	5 795	35.26

Operation mode: U-NII-3(802.11a)

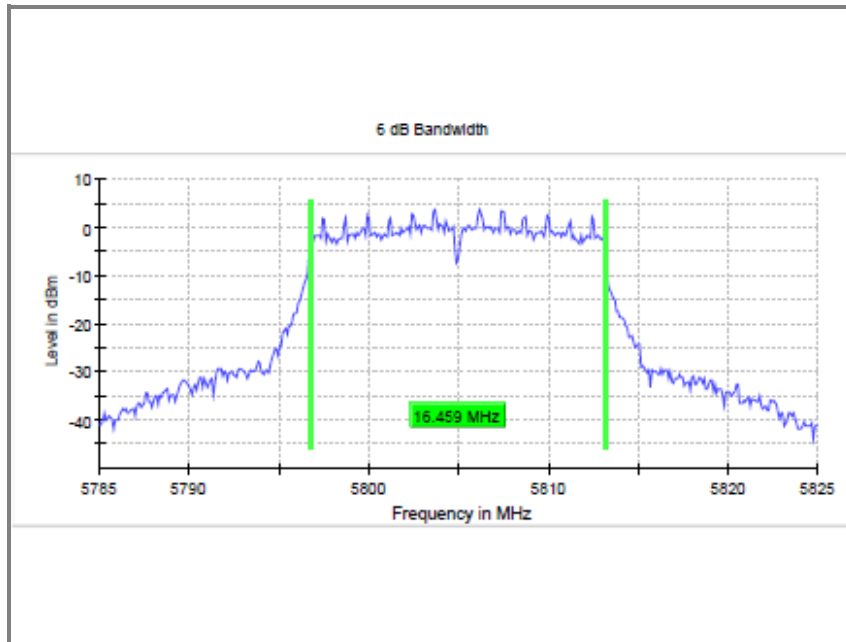
A. Low channel(5745 MHz)



B. Middle channel(5785 MHz)

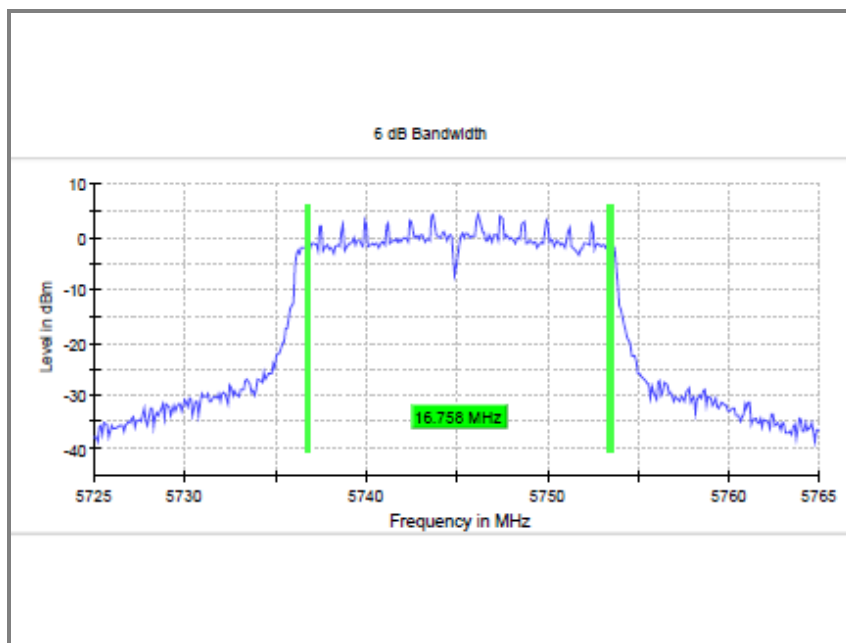


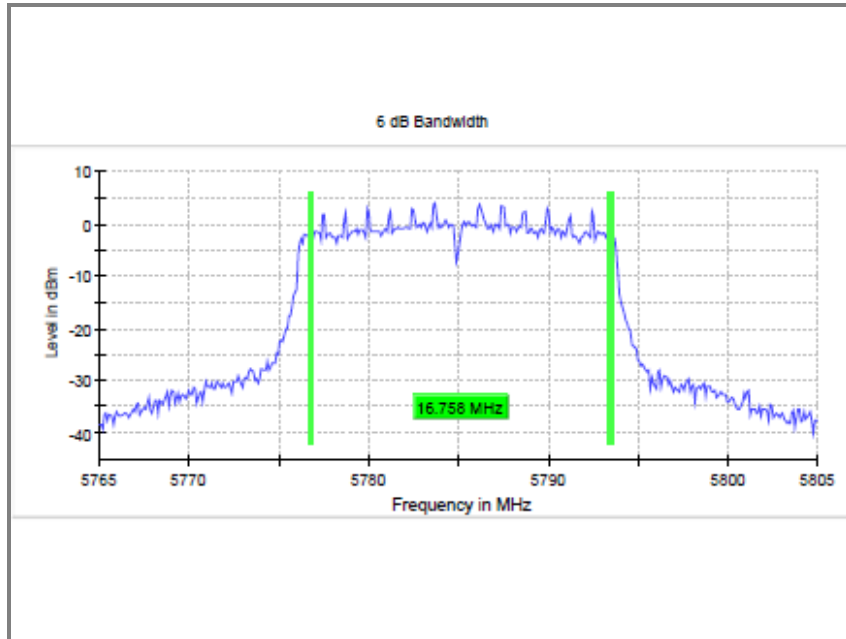
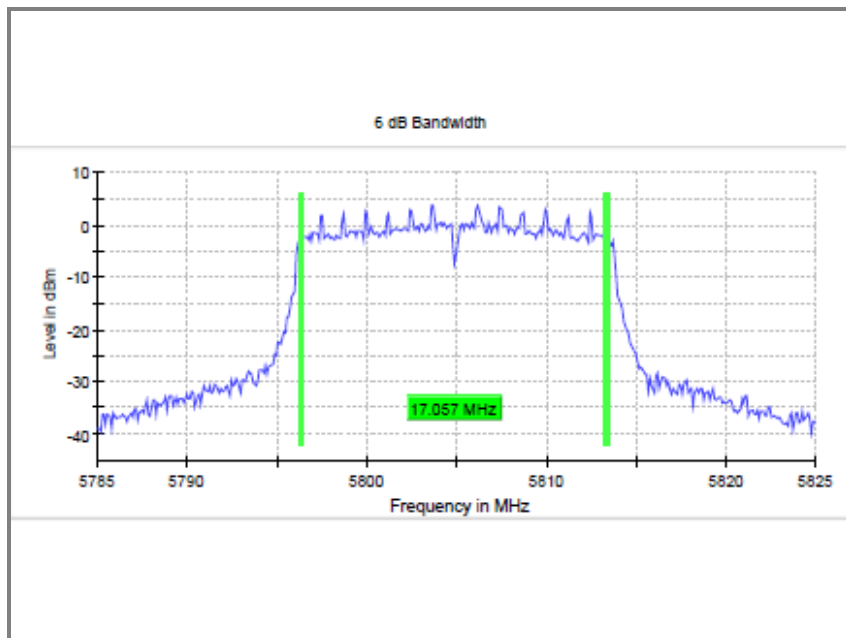
C. High channel(5805 MHz)



Operation mode: U-NII-3(n_HT20)

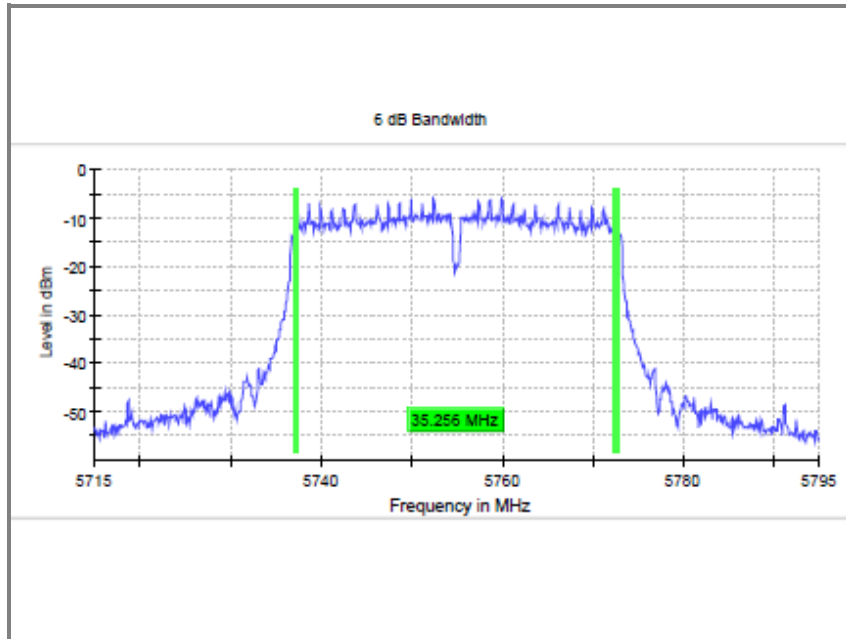
A. Low channel(5745 MHz)



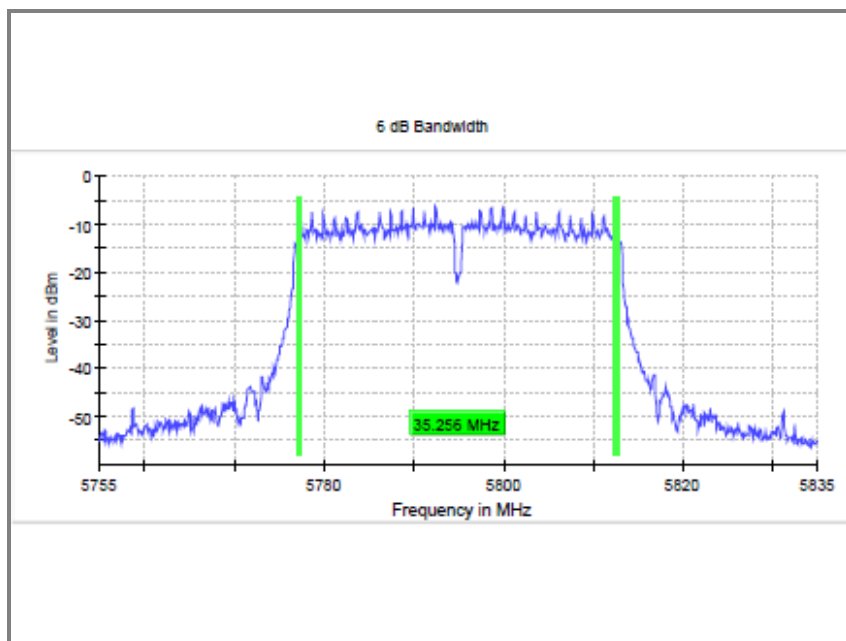
B. Middle channel(5785 MHz)**C. High channel(5805 MHz)**

Operation mode: U-NII-3(n_HT40)

A. Low channel(5755 MHz)

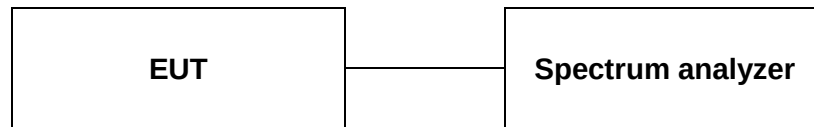


B. High channel(5795 MHz)



9. Frequency stability

9.1. Test setup



9.2. Limit

Not applicable

9.3. Test procedure

- The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- 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.

9.4. Test results

Operation mode: Normal mode

The worst case test data

Operation Frequency :5 180 MHz (Worst case)

VOLTAGE (%)	POWER (VDC)	TEMP (dB)	FREQ (Hz)	Deviation (%)
100%	13.5	+20(Ref)	5 179.998 5	-0.000029
100%		-20	5 179.996 1	-0.000075
100%		-10	5 179.991 7	-0.000160
100%		0	5 179.998 6	-0.000027
100%		+10	5 179.997 7	-0.000044
100%		+20	5 179.989 6	-0.000201
100%		+25	5 179.998 3	-0.000033
100%		+30	5 179.998 1	-0.000037
100%		+40	5 179.998 3	-0.000033
100%		+50	5 179.996 8	-0.000062
100%		+60	5 179.995 1	-0.000095
85%	11.48	+20	5 179.991 8	-0.000158
115%	15.53	+20	5 179.998 9	-0.000021

10. RF exposure evaluation

10.1 Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

According to §15.247(e)(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines. According to KDB 447498 (2)(a)(i)

Limits for maximum permissible exposure (MPE)

Frequency range (MHz)	Electric field strength(V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Average time
(A) Limits for Occupational / Control exposures				
300 – 1 500	--	--	F/300	6
1 500 – 100 000	--	--	5	6
(B) Limits for General Population / Uncontrol Exposures				
300 – 1 500	--	--	F/1 500	6
<u>1 500 – 100 000</u>	--	--	<u>1</u>	<u>30</u>

10.2. Friis transmission formula : $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = Power density in mW/cm²

P_{out} = output power to antenna in mW

G = Numeric gain of the antenna relative to isotropic antenna

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

10.3. Test result of RF exposure evaluation

Test Item : RF Exposure evaluation data

Test Mode : Normal operation

10.4. Output power into antenna & RF exposure evaluation distance

ANT1

Mode	Frequency (MHz)	Output Peak power to antenna (dBm)	Antenna gain(dBi)	Antenna Gain (dBi) Numeric	Powerdensity at 20 cm (mW/cm ²)	Power density Limits (mW/cm ²)
U-NII-1(802.11a)	5 180	12.99	2.00	1.58	0.006 280	1
	5 220	13.02			0.006 323	
	5 240	13.28			0.006 714	
U-NII-1(n_HT20)	5 180	12.92			0.006 179	
	5 220	13.02			0.006 323	
	5 240	13.28			0.006 714	
U-NII-1(n_HT40)	5 190	6.14			0.001 297	
	5 230	6.48			0.001 403	
U-NII-2A(802.11a)	5 260	12.81			0.006 025	
	5 300	13.00			0.006 294	
	5 320	13.61			0.007 244	
U-NII-2A(n_HT20)	5 260	12.83			0.006 053	
	5 300	13.54			0.007 128	
	5 320	13.62			0.007 260	
U-NII-2A(n_HT40)	5 270	6.45			0.001 393	
	5 310	6.20			0.001 315	
U-NII-2C(802.11a)	5 500	14.53			0.008 953	
	5 560	14.60			0.009 098	
	5 620	13.68			0.007 361	
U-NII-2C(n_HT20)	5 500	14.57			0.009 035	
	5 560	14.62			0.009 140	
	5 620	13.73			0.007 446	
U-NII-2C(n_HT40)	5 510	7.86			0.001 927	
	5 550	7.99			0.001 986	
	5 590	7.76			0.001 883	
U-NII-3(802.11a)	5 745	13.37			0.006 854	
	5 785	13.36			0.006 838	
	5 805	13.14			0.006 501	
U-NII-3(n_HT20)	5 745	13.36			0.006 838	
	5 785	13.20			0.006 591	
	5 805	13.11			0.006 456	
U-NII-3(n_HT40)	5 755	6.55			0.001 425	
	5 795	6.32			0.001 352	

ANT2

Mode	Frequency (MHz)	Output Peak power to antenna (dBm)	Antenna gain(dBi)	Antenna Gain (dBi) Numeric	Powerdensity at 20 cm (mW/cm ²)	Power density Limits (mW/cm ²)
U-NII-1(802.11a)	5 180	6.23	2.00	1.58	0.001 324	1
	5 220	6.18			0.001 309	
	5 240	6.01			0.001 259	
U-NII-1(n_HT20)	5 180	8.24			0.002 104	
	5 220	8.04			0.002 009	
	5 240	8.01			0.001 995	
U-NII-1(n_HT40)	5 190	4.36			0.000 861	
	5 230	4.00			0.000 792	
U-NII-2A(802.11a)	5 260	8.73			0.002 355	
	5 300	8.05			0.002 013	
	5 320	8.69			0.002 333	
U-NII-2A(n_HT20)	5 260	8.33			0.002 148	
	5 300	8.33			0.002 148	
	5 320	8.38			0.002 172	
U-NII-2A(n_HT40)	5 270	3.58			0.000 719	
	5 310	3.21			0.000 661	
U-NII-2C(802.11a)	5 500	10.35			0.003 419	
	5 560	10.62			0.003 639	
	5 620	10.05			0.003 191	
U-NII-2C(n_HT20)	5 500	10.01			0.003 162	
	5 560	10.37			0.003 435	
	5 620	9.78			0.002 999	
U-NII-2C(n_HT40)	5 510	6.24			0.001 327	
	5 550	6.67			0.001 465	
	5 590	6.91			0.001 549	
U-NII-3(802.11a)	5 745	9.01			0.002 512	
	5 785	9.01			0.002 512	
	5 805	9.27			0.002 667	
U-NII-3(n_HT20)	5 745	8.96			0.002 483	
	5 785	9.14			0.002 588	
	5 805	8.93			0.002 466	
U-NII-3(n_HT40)	5 755	5.54			0.001 130	
	5 795	6.25			0.001 330	

2X2 Mimo

Mode	Frequency (MHz)	Output Peak power to antenna (dBm)	Antenna gain(dBi)	Antenna Gain (dBi) Numeric	Powerdensity at 20 cm (mW/cm ²)	Power density Limits (mW/cm ²)
U-NII-1(n_HT20)	5 180	13.23	2.00	1.58	0.006 637	1
	5 220	13.62			0.007 260	
	5 240	13.92			0.007 779	
U-NII-1(n_HT40)	5 190	9.09			0.002 558	
	5 230	9.21			0.002 630	
U-NII-2A(n_HT20)	5 260	13.52			0.007 095	
	5 300	14.09			0.008 090	
	5 320	14.22			0.008 336	
U-NII-2A(n_HT40)	5 270	9.51			0.002 818	
	5 310	9.34			0.002 710	
U-NII-2C(n_HT20)	5 500	15.25			0.010 567	
	5 560	14.84			0.009 615	
	5 620	14.49			0.008 871	
U-NII-2C(n_HT40)	5 510	10.96			0.003 935	
	5 550	10.98			0.003 953	
	5 590	10.92			0.003 899	
U-NII-3(n_HT20)	5 745	12.80			0.006 011	
	5 785	12.62			0.005 767	
	5 805	12.58			0.005 714	
U-NII-3(n_HT40)	5 755	7.28			0.001 686	
	5 795	7.24			0.001 671	

※ Remark

The power density P_d (5th column) at a distance of 20 cm calculated from the friis transmission formula is far below the limit of 1 mW/cm² .

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:

The directional gains of antenna used for transmitting is below table, and the antenna connector is designed with fixed type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.

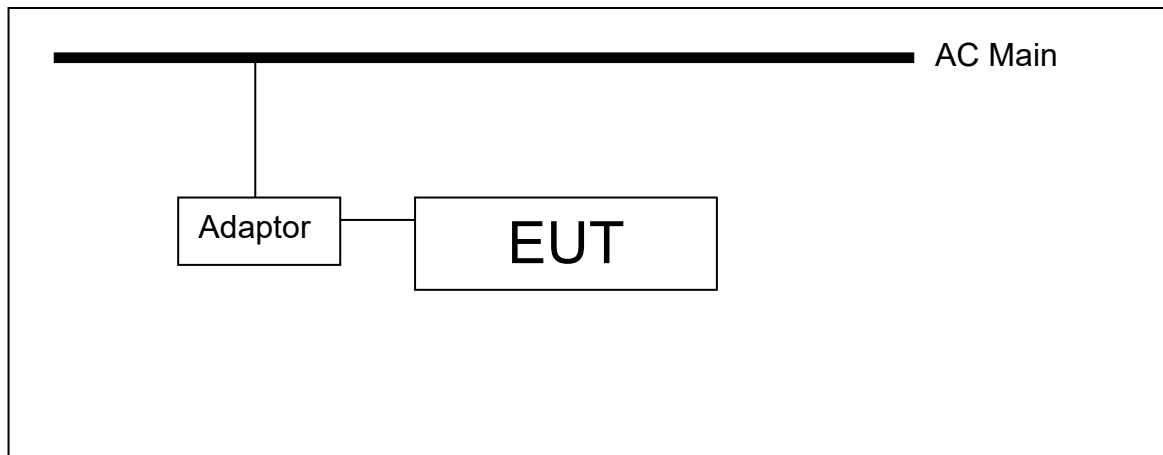
	P/N	Gain
Ant1	EPWD1-B150UT	2.00 dBi
Ant2		2.00 dBi
Directional gain (Mimo)		5.01 dBi

※ Remark

Directional gain = Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi

12. AC Conducted power line test

12.1 Test setup



12.2 Limit

According to §15.107(a) for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 uH/50ohm line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall be on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted limit (dBμV/m)	
	Quasi-peak	Average
0.15 – 0.50	66-56*	56-46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

※ Remark

Decreases with the logarithm of the frequency.

12.3 Test procedures

The test procedure is performed in a 6.5 m × 3.6 m × 3.6 m (L×W×H) shielded room. The EUT along with its peripherals were placed on a 1.0m(W)× 1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.

The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

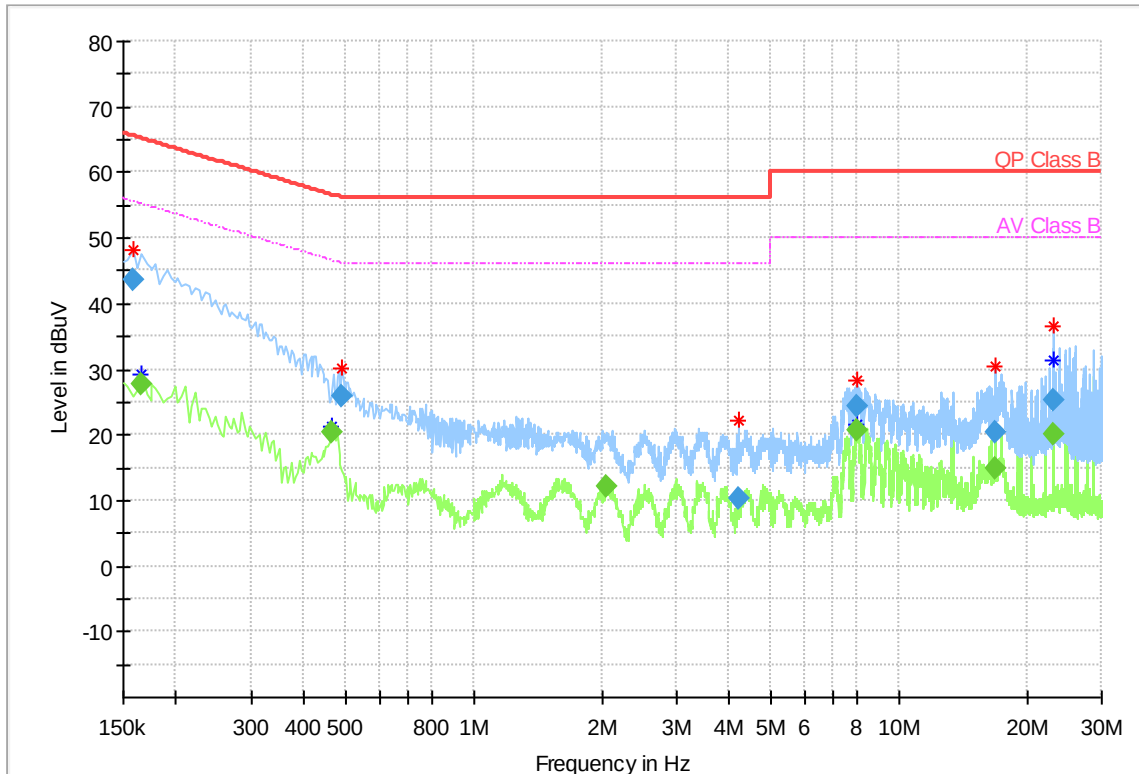
12.4 Test results

Ambient temperature: 22°C

Relative humidity: 45% R.H.

Frequency range: 0.15 MHz ~ 30 MHz

Measured bandwidth: 9 kHz



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.16	43.70	---	65.57	21.87	7000.0	9.00	N	GND	9.99
0.17	---	27.62	55.16	27.54	7000.0	9.00	L1	GND	10.00
0.47	---	20.47	46.59	26.12	7000.0	9.00	L1	GND	10.02
0.49	25.77	---	56.17	30.40	7000.0	9.00	N	GND	10.01
2.06	---	12.01	46.00	33.99	7000.0	9.00	L1	GND	10.14
4.21	10.23	---	56.00	45.77	7000.0	9.00	N	GND	10.27
7.95	24.35	---	60.00	35.65	7000.0	9.00	L1	GND	10.66
7.96	---	20.77	50.00	29.23	7000.0	9.00	L1	GND	10.66
16.89	---	14.78	50.00	35.22	7000.0	9.00	N	GND	11.03
16.89	20.24	---	60.00	39.76	7000.0	9.00	N	GND	11.03
23.12	25.21	---	60.00	34.79	7000.0	9.00	L1	GND	11.41
23.12	---	20.14	50.00	29.86	7000.0	9.00	L1	GND	11.41