DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29507456

ISED CABid: ES1909

Test Report No:
NIE: 67442RRF.008

Test Report
USA FCC Part 15.407, 15.209
CANADA RSS-247, RSS-Gen

(*) Identification of item tested	Communications device
(*) Trademark	Ring LLC
(*) Model and /or type reference	5AT3T3
Other identification of the product	FCC ID: 2AEUPBHAXN001 IC: 20271-BHAXN001
(*) Features	--
Applicant	Ring LLC 1523 26th Street, Santa Monica, 90404, California, United States
Test method requested, standard	USA FCC Part 15.407 (10-1-20) Edition: Unlicensed National Information Infrastructure (U-NII) Devices. General technical requirements. USA FCC Part 15.209 (10-1-20) Edition: Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 Amendment 1 (March 2019). Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General U-NII Test Procedures New Rules v02r01 dated Dec 14, 2017. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López Martín EMC Consumer & RF Lab. Manager 2021.10.27 11:01:23 +02'00'
Date of issue	2021-10-27
Report template No	FDT08_23 (*) "Data provided by the client"

Index

Competences and guarantees 3
General Conditions 3
Uncertainty 3
Data provided by the client 3
Usage of samples 4
Test sample description 5
Identification of the client 6
Testing period and place 6
Document history 6
Environmental conditions 6
Remarks and comments 7
Testing verdicts 8
Summary 8
Appendix A: Tests results for the U-NII-2A: 5.25 GHz – 5.35 GHz Band 9

Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification S.A.U. is an FCC-recognized accredited testing laboratory with the appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification S.A.U. is an ISED-recognized accredited testing laboratory, CABid: ES1909, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA Testing and Certification S.A.U.

General Conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").

2. The sample of the model number 5AT3T3 is a communications device.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of result.

Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Reception
67442/077	Communications Device	5AT3T3	GCB1ES011307006K	2021/09/07

Auxiliary elements used with the Sample S/01:

Control Nº	Description	Model	Serial Nº	Reception
67442/079	AC/DC Adapter	DSA-36PDB FUS	GB51PR0110770RW0	2021/09/07

Sample S/01 has undergone the test(s): All Conducted tests indicated in the Appendix A.

- Sample S/03 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Reception
67442/076	Communications Device	5AT3T3	GCB1ES0113070060	2021/09/07

Auxiliary elements used with the Sample S/03:

Control Nº	Description	Model	Serial Nº	Reception
67442/078	AC/DC Adapter	DSA-36PDB FUS	GB51PR0110770RU3	2021/09/07

Sample S/02 has undergone the test(s): All Radiated tests indicated in the Appendix A.

Test sample description

Ports…… :	Port name and description	Cable			
		Specified max length [m]	Attached during test	Shielded	Coupled to patient
	AC power port	>3m	Yes	No	
	USB power port	<3m	Yes	Yes	
	Ethernet ports	>3m	Yes	No	
	-				
	-				
	-				

Supplementary information to the ports…… :	-						
Rated power supply .....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	X	AC: 110V (60Hz).	X			X	
	X	DC: 12V, 3A					
Rated Power .....:	Not provided.						
Clock frequencies.....:	Not provided.						
Other parameters .....:	Not provided.						
Software version .....:	Not provided.						
Hardware version .....:	Not provided.						
Dimensions in cm (W x H x D) ....:	Not provided.						
Mounting position .....:	X	Table top equipment					
		Wall/Ceiling mounted equipment					
		Floor standing equipment					
		Hand-held equipment					
		Other:					

Modules/parts.....:	Module/parts of test item	Type	Manufacturer
	-		
Accessories (not part of the test item) .....:	Description	Type	Manufacturer
	-		
Documents as provided by the applicant.....:	Description	File name	Issue date
	-		

Identification of the client

Ring LLC

1523 26th Street, Santa Monica, 90404, California, United States

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-09-07
Date (finish)	2021-10-01

Document history

Report number	Date	Description
67442RRF.008	2021-10-27	First release.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Victoria Olmedo, Daniel Mejías, Jaime Barranquero, Antonio Manuel Sánchez, Juan Manuel Pino.

Used instrumentation:

Radiated Measurements:

		Last Calibration	Due Calibration
1.	Semianechoic Absorber Lined Chamber ALBATROSS PROJECTS GMBH P29419	2020/01	2023/01
2.	Shielded Room ALBATROSS PROJECTS GMBH P29419	N/A	N/A
3.	EMI Test Receiver 2 Hz - 44 GHz ROHDE AND SCHWARZ ESW44	2020/02	2022/02
4.	Hybrid Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E	2019/02	2022/02
5.	EMI Test Receiver 2Hz-44GHz, ROHDE AND SCHWARZ ESW44	2019/10	2021/10
6.	Preamplifier 30 dB 500MHz-18GHz, SCHWARZBECK BBV 9718 C	2021/02	2022/02
7.	Horn Antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D	2019/11	2022/11
8.	Preamplifier G>30 dB 18-40GHz BONN ELEKTRONIK BLMA 1840-3G	2019/11	2021/11
9.	Horn Antenna 18 - 40 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9170	2021/03	2024/03

Conducted Measurements

		Last Calibration	Due Calibration
1.	Shielded Room ETS LINDGREN S101	N/A	N/A
2.	Signal and Spectrum Analyzer 2Hz-50GHz ROHDE AND SCHWARZ FSW50	2021/07	2023/07
3.	Vector Signal Generator 100 KHz-6GHz ROHDE AND SCHWARZ SMU200A	2021/04	2023/04
4.	Signal Generator 9 KHz-6 GHz, ROHDE AND SCHWARZ SMB100A	2019/10	2021/10
5.	Open Switch and Control Platform ROHDE & SCHWARZ OSP-B157W8	2021/03	2023/03
6.	Spectrum Analyzer 9kHz-6GHz ROHDE AND SCHWARZ FSL6	2021/04	2023/04

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured:	N/M

Summary

A. U-NII-2A: 5.25 GHz – 5.35 GHz Band:

FCC PART 15 PARAGRAPH / RSS-247			
Requirement – Test case		Verdict	Remark
FCC 15.407 (a)(2) / RSS-247 6.2.2.1	Transmitter Maximum Conducted Output Power Transmitter Maximum Equivalent Isotropically Radiated Power	P	
FCC 15.407 (a)(2) / RSS-247 6.2.2.1	Transmitter Maximum Power Spectral Density Transmitter EIRP Spectral Density	P	
FCC 15.407 (b)(2) / RSS-247 6.2.2.2	Transmitter Out of Band Radiated Emissions	P	
FCC 15.407 (b)(2) / RSS-247 6.2.2.2	Transmitter Band Edge Radiated Emissions	P	
FCC 15.407 (h)(1) / RSS-247 6.2.2.1	Transmitter Power Control	P	
Supplementary information and remarks: None.			

Appendix A: Tests results for the U-NII-2A: 5.25 GHz – 5.35 GHz Band

INDEX

TEST CONDITIONS 11

FCC 15.407 (a)(2) Transmitter Maximum Conducted Output Power / RSS-247 6.2.2.1 Transmitter Maximum Equivalent Isotropically Radiated Power 17

FCC 15.407 (a)(2) Transmitter Maximum Power Spectral Density / RSS-247 6.2.2.1. Transmitter EIRP Spectral Density 48

FCC 15.407 (b)(1) / RSS-247 6.2.1.2. Out of Band Radiated Emissions 79

FCC 15.407 (b)(1) / RSS-247 6.2.1.2. Band Edge Radiated Emissions 97

FCC Section 15.407(h)(1) / RSS-247 6.2.2.1 Transmitter Power Control 122

TEST CONDITIONS

(*) Declared by the Client.

POWER SUPPLY (*):

Vnominal:	110 Vac
Type of Power Supply:	AC/DC Adapter.

ANTENNA (*):

Type of Antennas:	Integral (stamped metal).
Maximum Declared Antenna Gain WLAN1 U-NII-2A:	+3.5 dBi
Maximum Declared Antenna Gain WLAN2 U-NII-2A:	+2.8 dBi

<u>Directional Antenna Gain Calculations for CDD MIMO:</u>

U-NII-2A:

- For 2Tx CDD MIMO modes, in accordance with KDB 662911 D01 v02r01 Section F)2)f)(ii), directional gain was calculated as (worst case):

$N_{ss} = 1$, $N_{ANT} = 2$, $G_{WLAN1} = +3.5$ dBi, $G_{WLAN2} = +2.8$ dBi

$$DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$$

Directional Gain = +6.17 dBi

Maximum Declared Antenna Gain MIMO U-NII-2A: +6.17 dBi

TEST FREQUENCIES (*):

Technology Tested:	WLAN (IEEE 802.11 a20 / n2040 / ac204080 / ax204080 2x2) / U-NII-2A	
Modes:	802.11a: 6, 9, 12, 18, 24, 36, 48 & 54 Mbps (SISO, MIMO with CDD)	
	802.11n HT20: MCS0 to MCS23 (1 or 2 spatial stream with either SISO or 2 chain MIMO CDD)	
	802.11n HT40: MCS0 to MCS23 (1 or 2 spatial stream with either SISO or 2 chain MIMO CDD)	
	802.11ac VHT20: MCS0 to MCS9 (1 or 2 spatial stream) (SISO, or MIMO with CDD without TxBF)	
	802.11ac VHT40: MCS0 to MCS9 (1 or 2 spatial stream) (SISO, or MIMO with CDD without TxBF)	
	802.11ac VHT80: MCS0 to MCS9 (1 or 2 spatial stream) (SISO, or MIMO with CDD without TxBF)	
	802.11ax HE20: MCS0 to MCS9 (1 or 2 spatial stream) (SISO, or MIMO with CDD without TxBF)	
	802.11ax HE40: MCS0 to MCS9 (1 or 2 spatial stream) (SISO, or MIMO with CDD without TxBF)	
	802.11ax HE80: MCS0 to MCS9 (1 or 2 spatial stream) (SISO, or MIMO with CDD without TxBF)	
Setting of cores / ports:	WLAN1, WLAN2, WLAN12	
Beamforming:	No.	
Frequency Range:	5250 - 5350 MHz	
Operating Channel Bandwidth:	20 MHz	
Transmission Channels:	Channels	Channel Frequency (MHz)
	Low: 52	5260
	Middle: 56	5280
	High-1: 60	5300
	High: 64	5320
Operating Channel Bandwidth:	40 MHz	
Transmission Channels:	Channels	Channel Frequency (MHz)
	Low: 54	5270
	High: 62	5310
Operating Channel Bandwidth:	80 MHz	
Transmission Channels:	Channels	Channel Frequency (MHz)
	Single: 58	5290

POWER SETTINGS (*):

U-NII-2A. FCC and IC:

WLAN1

Channel	Frequency	11a	11n	11ac	11ax
52	5260 MHz	22.5	24	23	23.5
56	5280 MHz	22.5	24	23	23.5
60	5300 MHz	22	24	23	23.5
64	5320 MHz	22.5	24	23.5	24
54	5270 MHz		22.5	22.5	23
62	5310 MHz		21.5	21.5	21.5
58	5290 MHz			21.5	21.5

WLAN2

Channel	Frequency	11a	11n	11ac	11ax
52	5260 MHz	23	23.5	23.5	23.5
56	5280 MHz	23	23.5	23	23.5
60	5300 MHz	23	23.5	23.5	23.5
64	5320 MHz	23	23.5	23	23.5
54	5270 MHz		22.5	22	18.5
62	5310 MHz		18.5	18.5	18.5
58	5290 MHz			19	19

WLAN12

Channel	Frequency	11a	11n	11ac	11ax
52	5260 MHz	19.5	20	20	20.5
56	5280 MHz	19.5	20	20	20
60	5300 MHz	19	20	20	20.5
64	5320 MHz	19	19.5	20	20.5
54	5270 MHz		19	19	19.5
62	5310 MHz		19	19	19.5
58	5290 MHz			19	19

The test set-up was made in accordance to the general provisions of FCC Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General U-NII Test Procedures New Rules v02r01 dated Dec 14, 2017.

The EUT was tested in the following operating mode:

- Continuously transmitting with a modulated carrier at maximum power in all required channels using the supported data rates/modulations types.

The field strength at the band edges was evaluated for each mode on the lowest and highest channels at the rated power for the channel under test.

For all modes, the EUT was configured in test mode using a software application. The application was used to enable a continuous transmission and to select the test channels as required. The client supplied instructions to configure the EUT. The customer supplied a document containing the setup instructions.

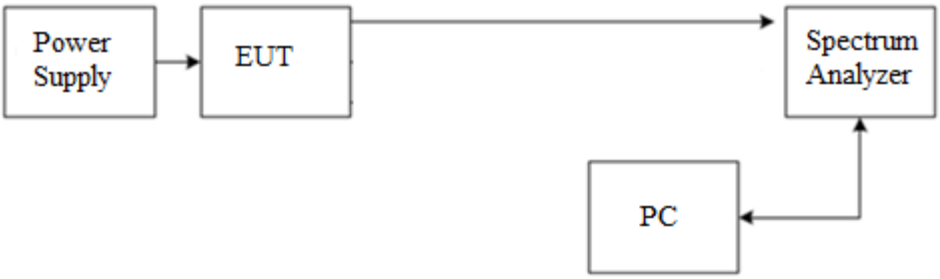
The worst-cases for testing were identified for output power and spurious levels at the band edges which were selected based on preliminary testing that correspond to next data rates:

- 802.11a:	6 Mbps SISO 1Tx on WLAN1 / MIMO 2Tx on WLAN12.
- 802.11n HT20:	MCS0 SISO 1Tx on WLAN1 / MIMO 2Tx on WLAN12.
- 802.11n HT40:	MCS0 SISO 1Tx on WLAN1 / MIMO 2Tx on WLAN12.
- 802.11ac VHT20:	MCS0 SISO 1Tx on WLAN1 / MIMO 2Tx on WLAN12.
- 802.11ac VHT40:	MCS0 SISO 1Tx on WLAN1 / MIMO 2Tx on WLAN12.
- 802.11ac VHT80:	MCS0 SISO 1Tx on WLAN1 / MIMO 2Tx on WLAN12.
- 802.11ax HE20:	MCS0 SISO 1Tx on WLAN1 / MIMO 2Tx on WLAN12.
- 802.11ax HE40:	MCS0 SISO 1Tx on WLAN1 / MIMO 2Tx on WLAN12.
- 802.11ax HE80:	MCS0 SISO 1Tx on WLAN1 / MIMO 2Tx on WLAN12.

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and connected to the spectrum analyzer using a low loss RF cable. The reading in the spectrum analyzer is corrected taking into account the internal and external RF cable loss.

For all modes:



RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz) and 1 GHz-18 GHz Double ridge horn antenna is situated at a distance of 3 m and a distance of 1 m for the frequency range 17 GHz-40 GHz (18 GHz-40 GHz horn antenna).

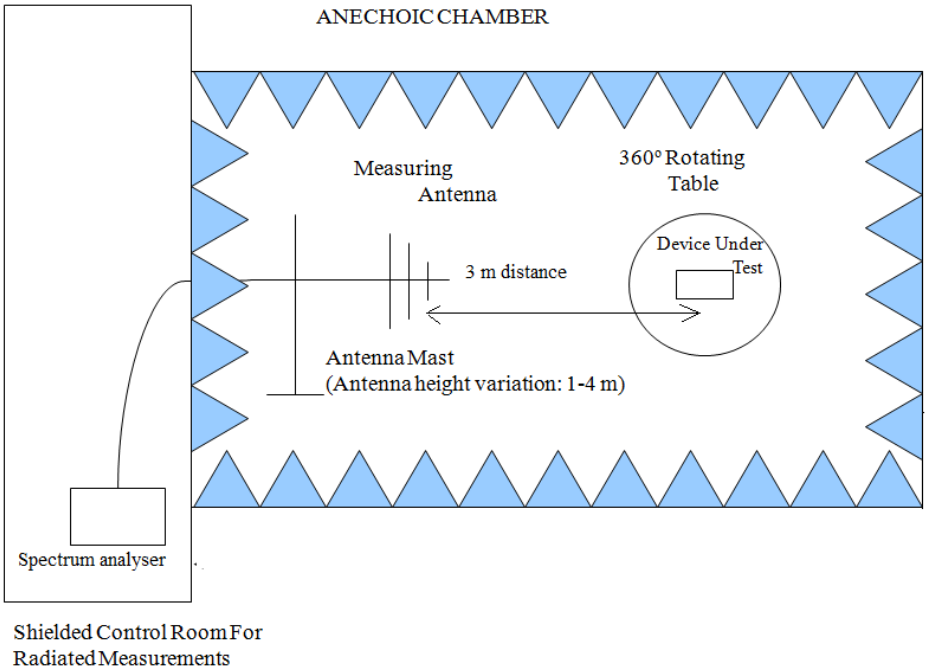
For radiated emissions in the range 17 GHz-40 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

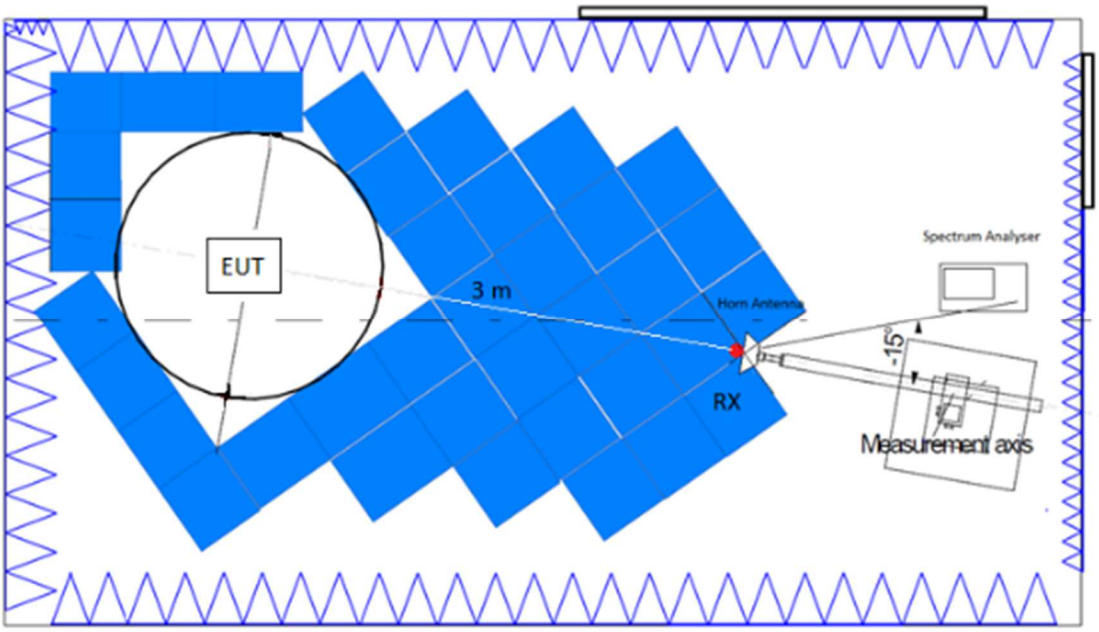
Measurements were made in both horizontal and vertical planes of polarization.

The final measured value, for the given emission, in the tables below incorporates the calibrated antenna factor and cable loss.

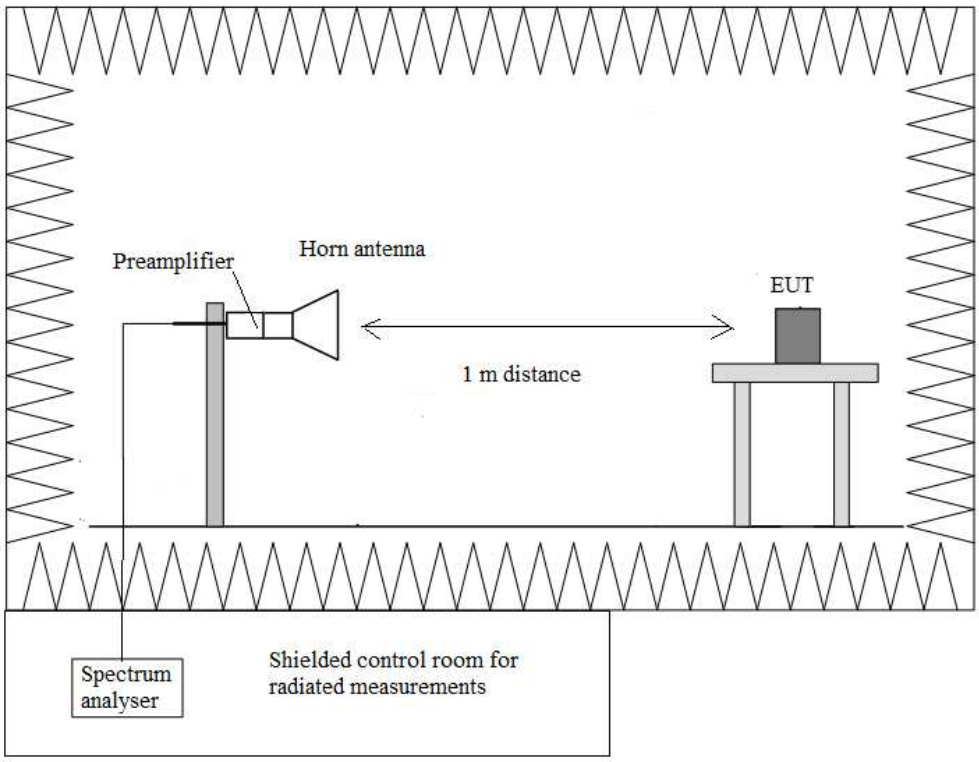
Radiated measurements setup f < 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup f > 17 GHz:



FCC 15.407 (a)(2) Transmitter Maximum Conducted Output Power / RSS-247 6.2.2.1 Transmitter Maximum Equivalent Isotropically Radiated Power

SPECIFICATION:

FCC 15.407 (a)(2): For the 5.25-5.35 GHz band, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RSS-247 6.2.2.1: Devices, other than devices installed in vehicles, shall comply with the following:

a. The maximum conducted output power shall not exceed 250 mW or 11 + 10 $\log_{10}$ B, dBm, whichever is less;
b. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 $\log_{10}$ B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

RESULTS:

The maximum conducted output power was measured using the channel power integration method according to point E.2.b) (Method SA-1) of 789033 D02 General UNII Test Procedures New Rules v02r01. When the duty cycle is >98% and the channel power integration method according to point E.2.d) (Method SA-2) of 789033 D02 General UNII Test Procedures New Rules v02r01 when the duty cycle is <98%.

For data rates where the EUT was transmitting at <98% duty cycle, the duty cycle was added to the measured power in order to calculate the total average power during the actual transmission time.

The e.i.r.p. levels are calculated by adding the declared maximum antenna gain (dBi).

- Preliminary tests determined the SISO worst-case: WLAN1.
- Preliminary tests determined the MIMO worst-case: WLAN12.

Maximum Declared Antenna Gain:

- SISO Antenna – WLAN1: +3.5 dBi
- MIMO Antennas – WLAN12:
  - WLAN1: +3.5 dBi
  - WLAN2: +2.8 dBi
  - WLAN12: +6.17 dBi

For the SISO technique, the antenna gain is less than 6 dBi.
For the MIMO technique, the antenna gain is higher than 6 dBi.

FCC and IC power setting:

SISO worst-case:

- Preliminary tests determined the SISO worst-case: WLAN1.

SISO 802.11 a20:

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted Power (dBm)	23.2	23.1	22.8	22.9
Maximum EIRP Corrected Conducted Power (dBm)	26.7	26.6	26.3	26.4
Measurement uncertainty (kHz)	<±36.95			

SISO 802.11 n20 (HT20):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted Power (dBm)	23.4	23.3	23.1	22.9
Maximum EIRP Corrected Conducted Power (dBm)	26.9	26.8	26.6	26.4
Measurement uncertainty (kHz)	<±36.95			

SISO 802.11 ac20 (VHT20):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted Power (dBm)	23.3	23.2	23.1	23.4
Maximum EIRP Corrected Conducted Power (dBm)	26.8	26.7	26.6	26.9
Measurement uncertainty (kHz)	<±36.95			

SISO 802.11 ax20 (HE20):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted Power (dBm)	23.6	23.7	23.5	23.8
Maximum EIRP Corrected Conducted Power (dBm)	27.1	27.2	27	27.3
Measurement uncertainty (kHz)	<±36.95			

SISO 802.11 n40 (HT40):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 54 (5270 MHz)	High Channel 62 (5310 MHz)
Maximum Corrected Conducted Power (dBm)	23.6	22.7
Maximum EIRP Corrected Conducted Power (dBm)	27.1	26.2
Measurement uncertainty (kHz)	<±36.95	

SISO 802.11 ac40 (VHT40):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 54 (5270 MHz)	High Channel 62 (5310 MHz)
Maximum Corrected Conducted Power (dBm)	23.6	22.6
Maximum EIRP Corrected Conducted Power (dBm)	27.1	26.1
Measurement uncertainty (kHz)	<±36.95	

SISO 802.11 ax40 (HE40):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 54 (5270 MHz)	High Channel 62 (5310 MHz)
Maximum Corrected Conducted Power (dBm)	23.7	22.2
Maximum EIRP Corrected Conducted Power (dBm)	27.2	25.7
Measurement uncertainty (kHz)	<±36.95	

SISO 802.11 ac80 (VHT80):

U-NII-2A (5250-5350 MHz):

Channel	Single Channel 58 (5290 MHz)
Maximum Corrected Conducted Power (dBm)	22.1
Maximum EIRP Corrected Conducted Power (dBm)	25.6
Measurement uncertainty (kHz)	<±36.95

SISO 802.11 ax80 (HE80):

U-NII-2A (5250-5350 MHz):

Channel	Single Channel 58 (5290 MHz)
Maximum Corrected Conducted Power (dBm)	21.9
Maximum EIRP Corrected Conducted Power (dBm)	25.4
Measurement uncertainty (kHz)	<±36.95

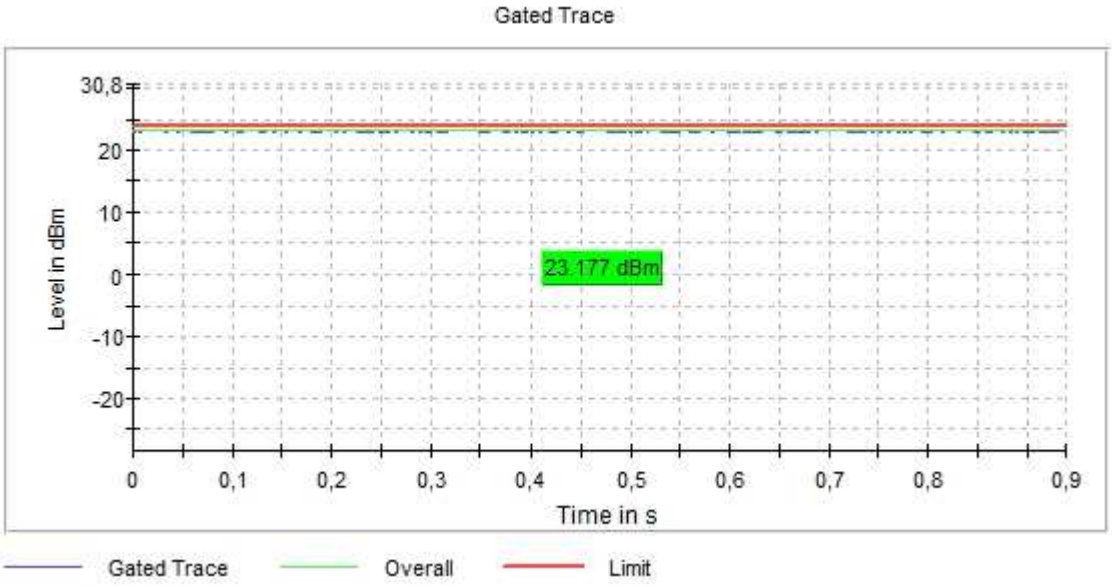
Verdict: PASS

SISO worst-case:

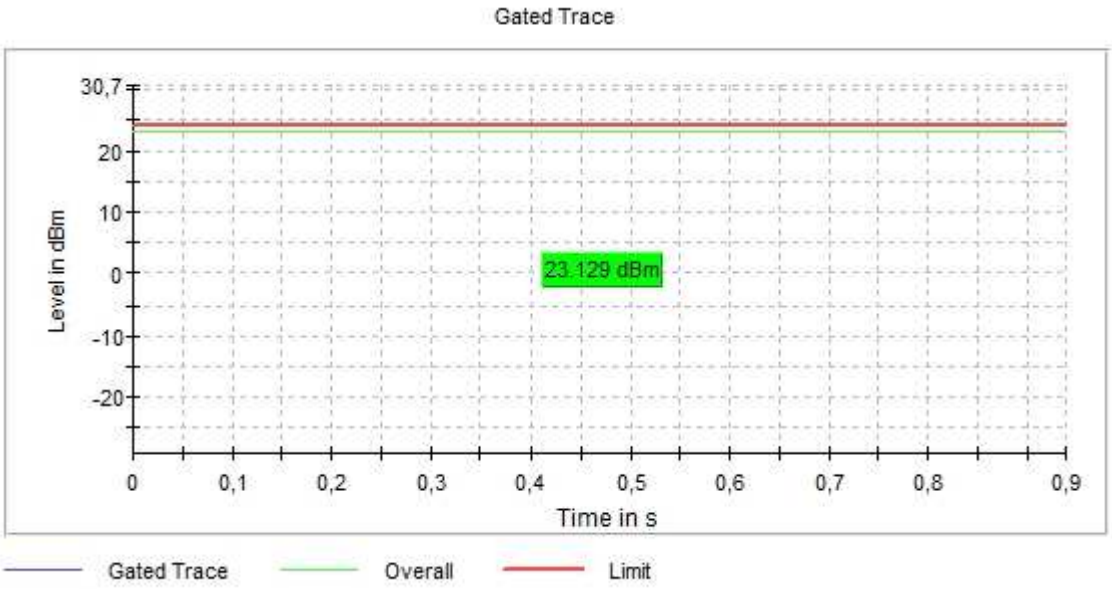
SISO 802.11 a20:

U-NII-2A (5250-5350 MHz)

- Low Channel 52 (5260 MHz):

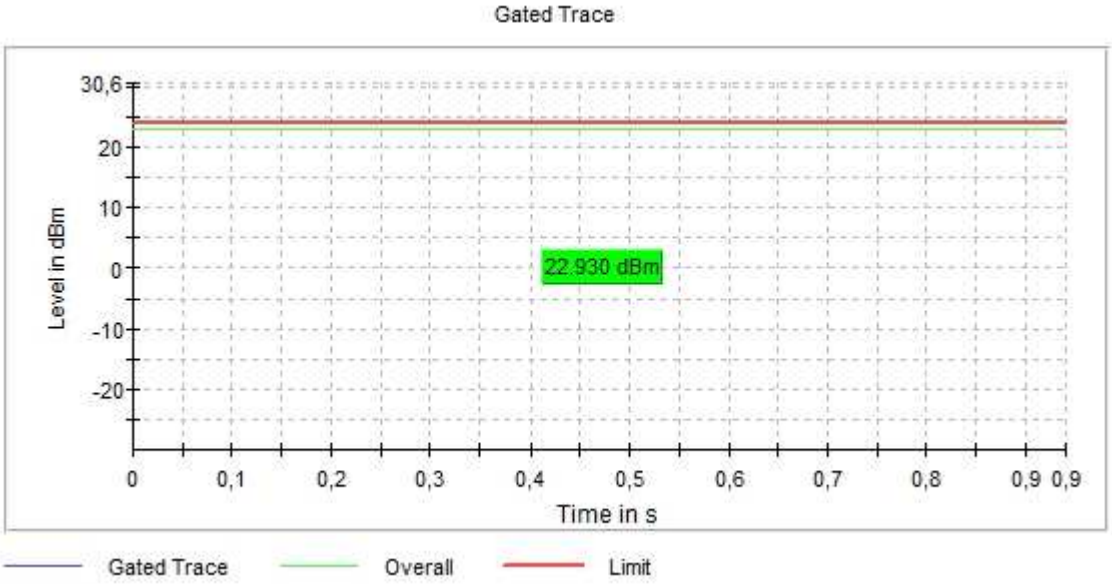


- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):

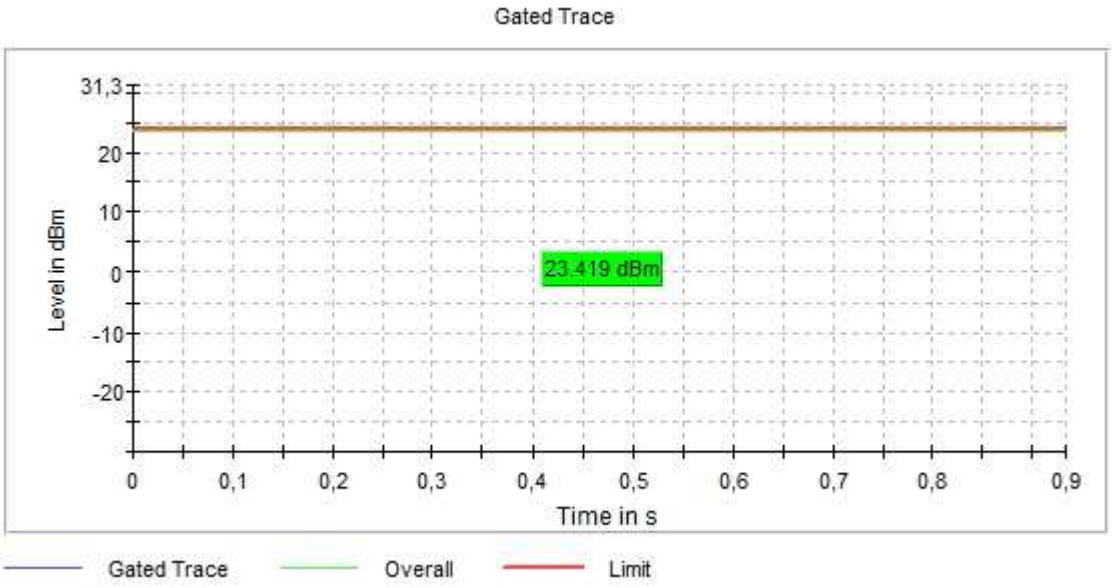
- High Channel 64 (5320 MHz):



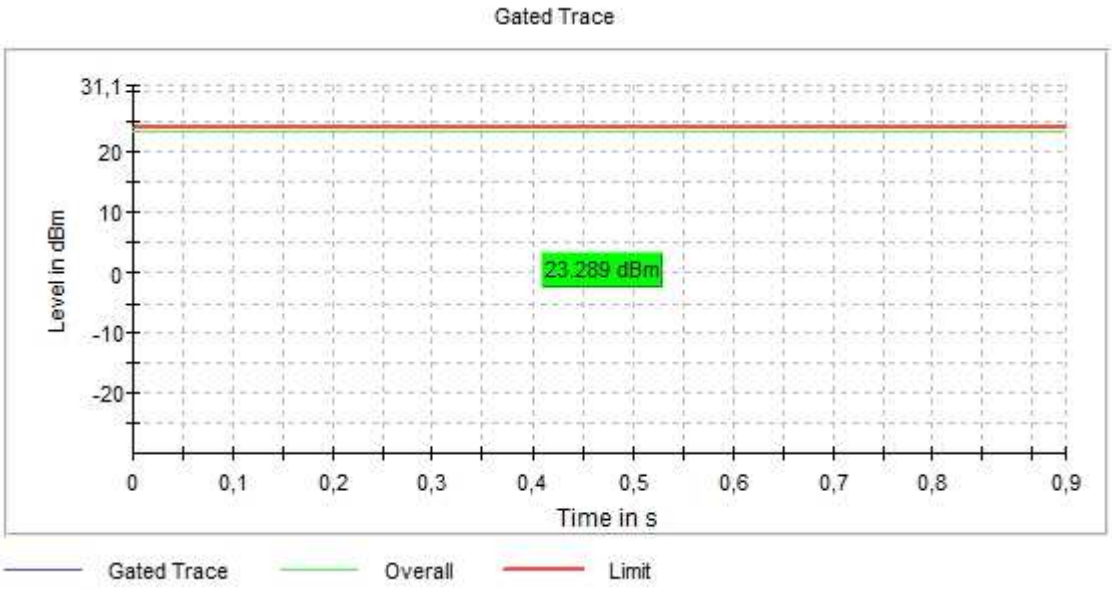
SISO 802.11 n20 (HT20):

U-NII-2A (5250-5350 MHz)

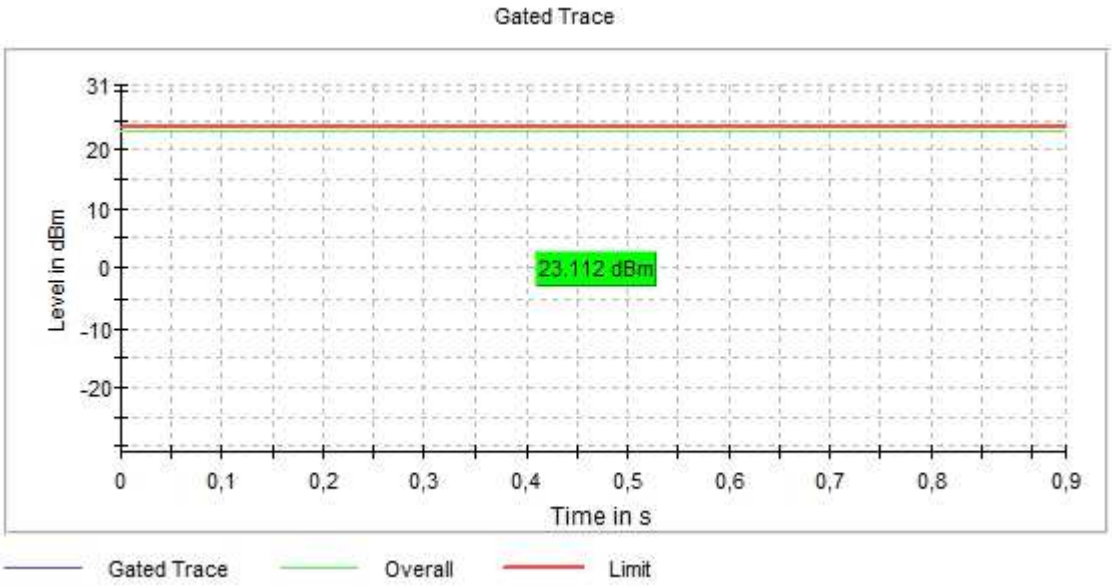
- Low Channel 52 (5260 MHz):



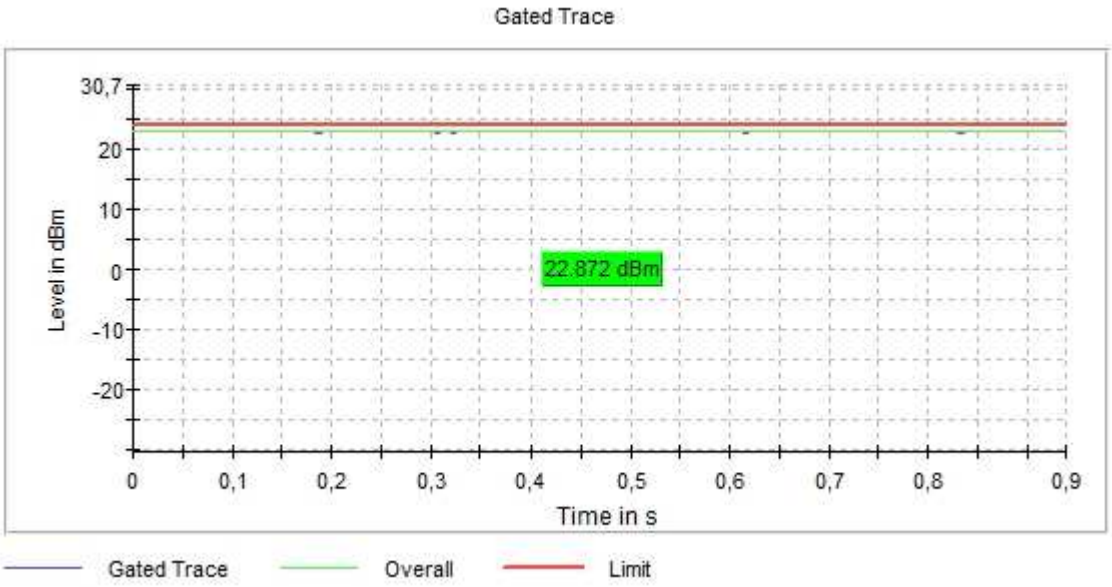
- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):



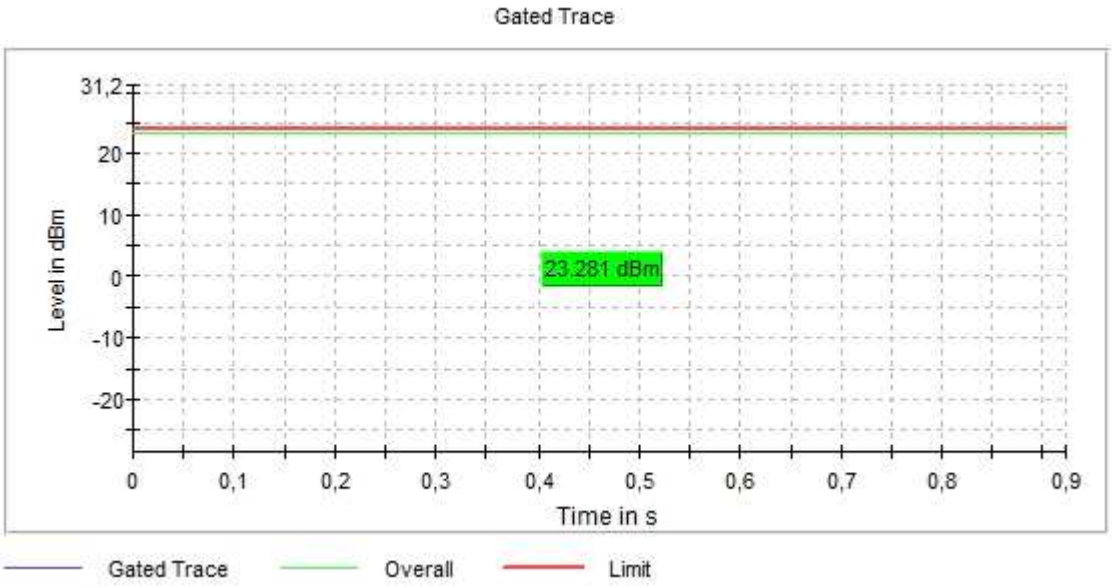
- High Channel 64 (5320 MHz):



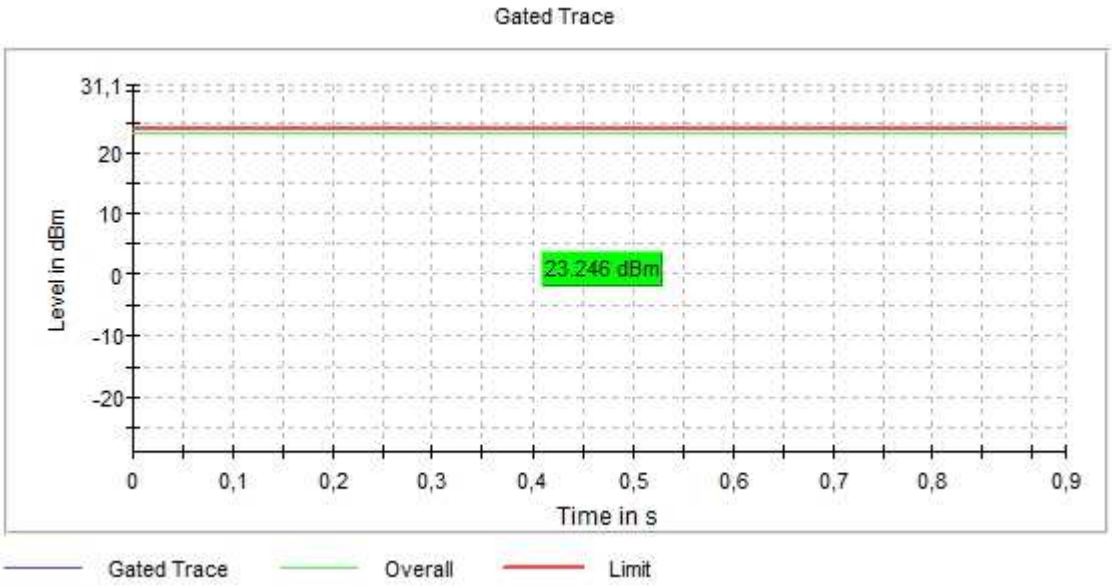
SISO 802.11 ac20 (VHT20):

U-NII-2A (5250-5350 MHz)

- Low Channel 52 (5260 MHz):

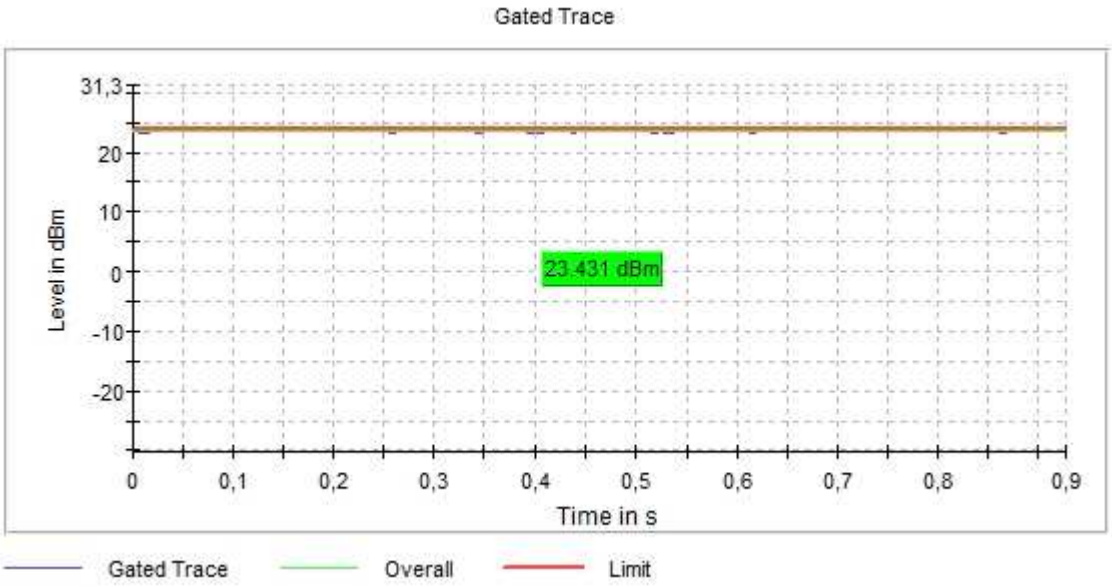


- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):

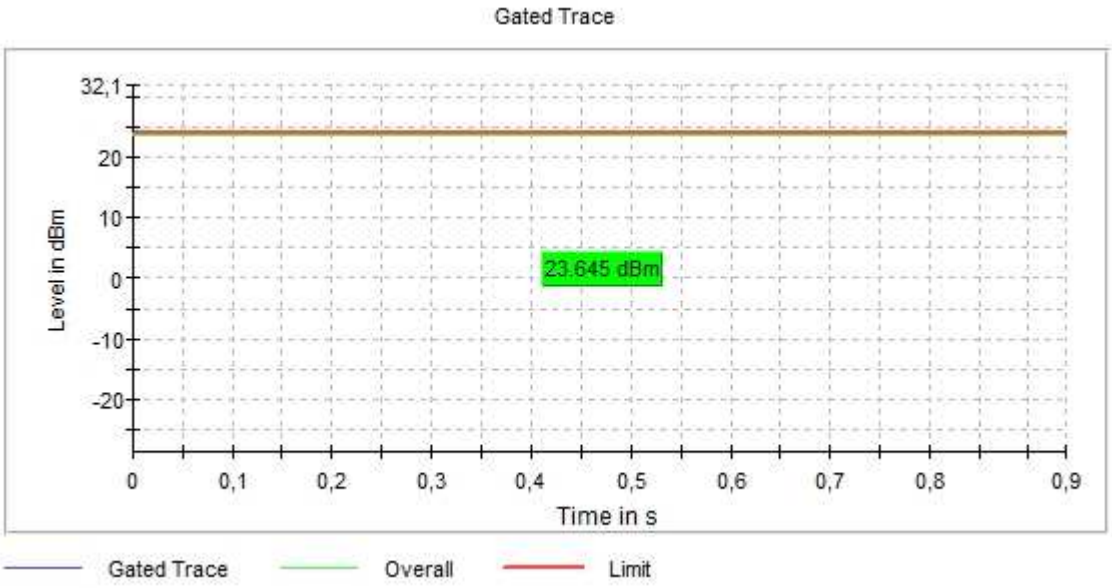
- High Channel 64 (5320 MHz):



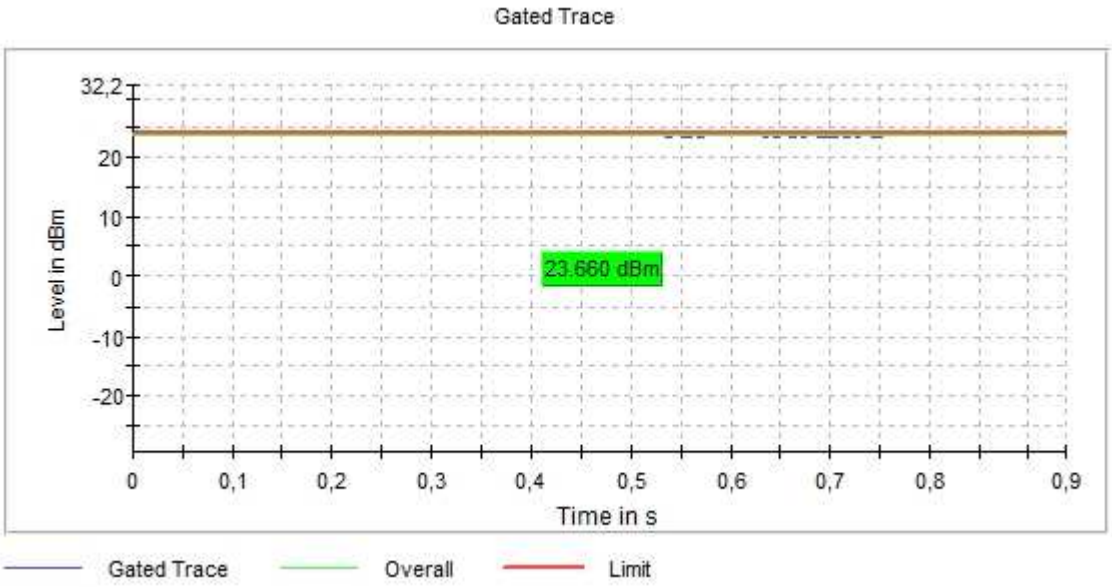
SISO 802.11 ax20 (HE20):

U-NII-2A (5250-5350 MHz)

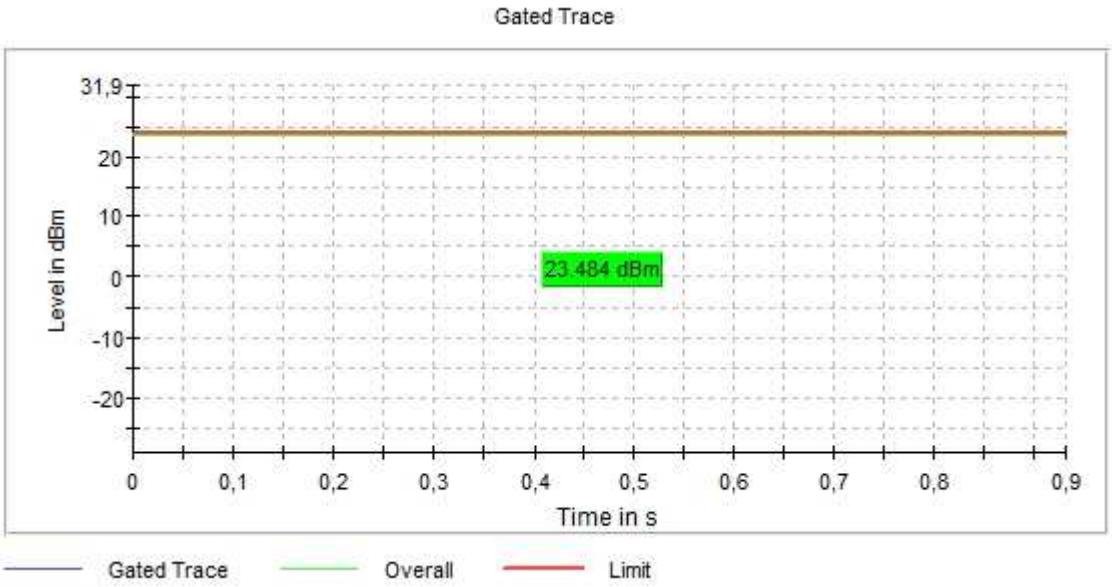
- Low Channel 52 (5260 MHz):



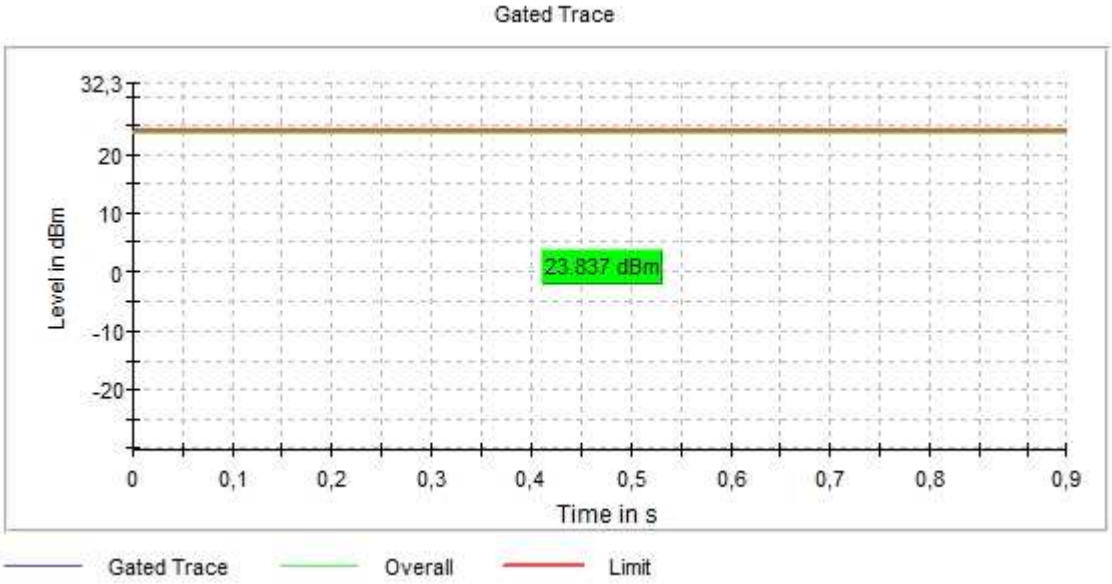
- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):



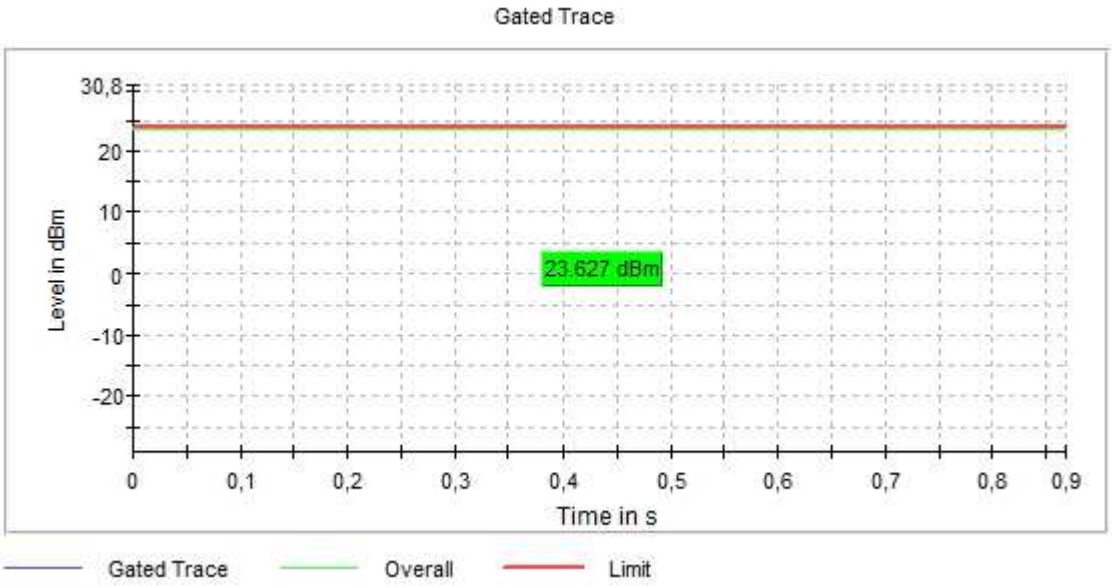
- High Channel 64 (5320 MHz):



SISO 802.11 n40 (VHT40):

U-NII-2A (5250-5350 MHz)

- Low Channel 54 (5270 MHz):

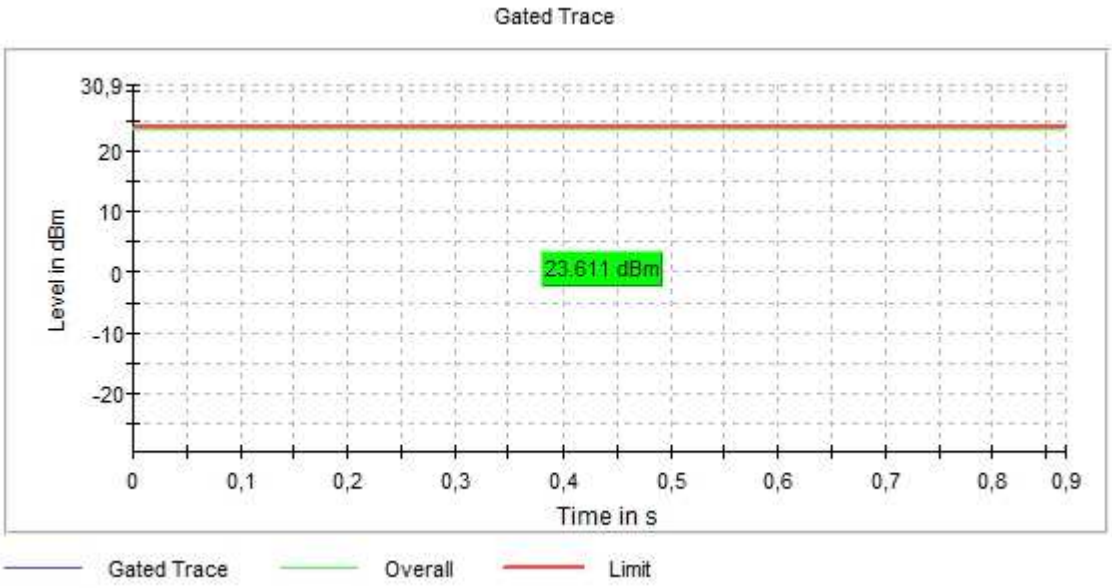


- High Channel 62 (5310 MHz):

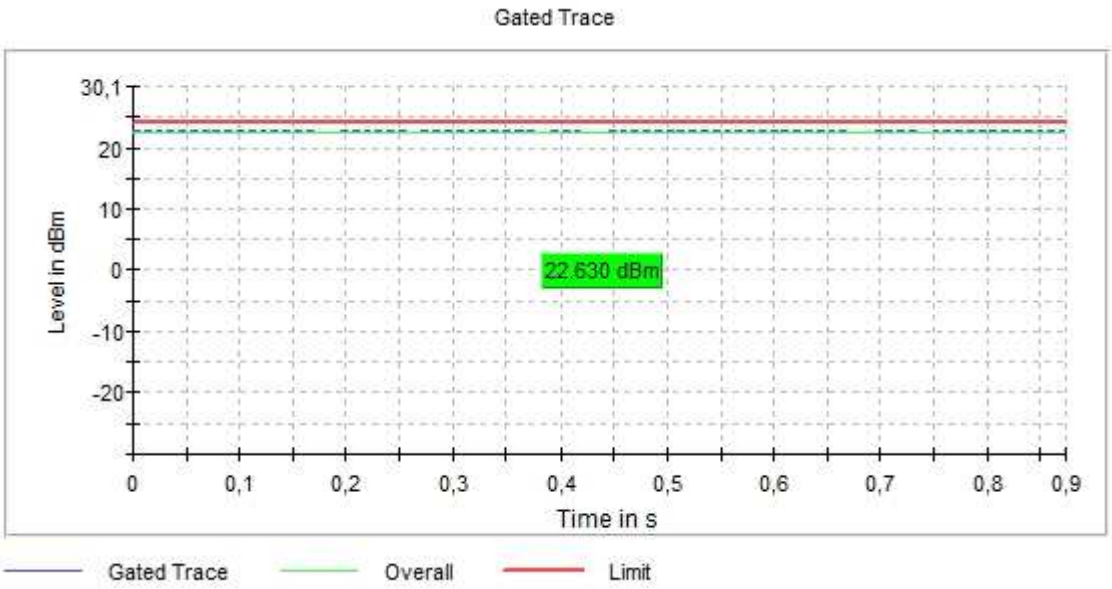
SISO 802.11 ac40 (VHT40):

U-NII-2A (5250-5350 MHz)

- Low Channel 54 (5270 MHz):



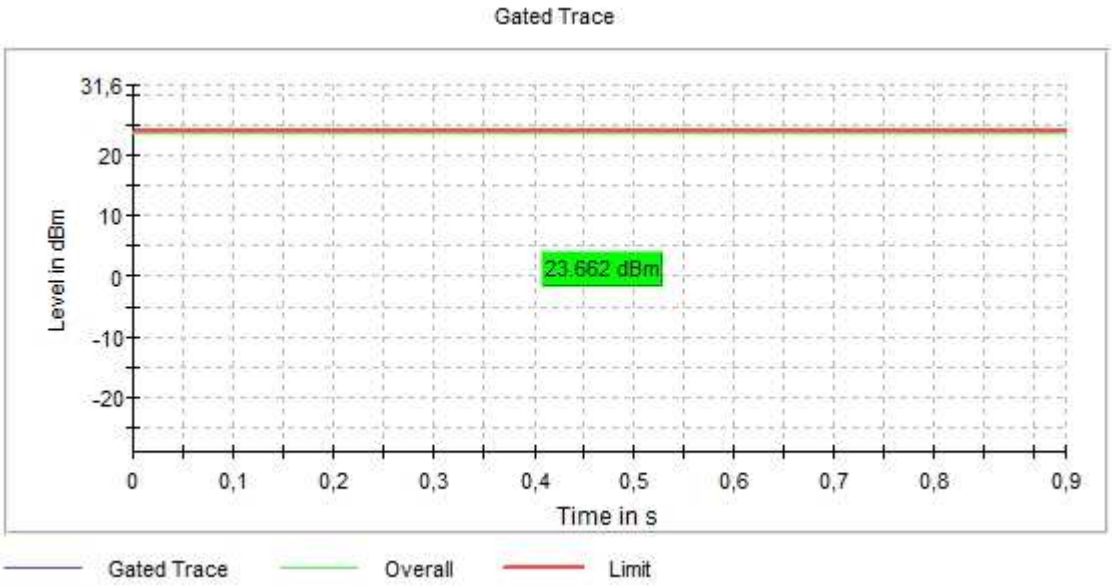
- High Channel 62 (5310 MHz):



SISO 802.11 ax40 (HE40):

U-NII-2A (5250-5350 MHz)

- Low Channel 54 (5270 MHz):

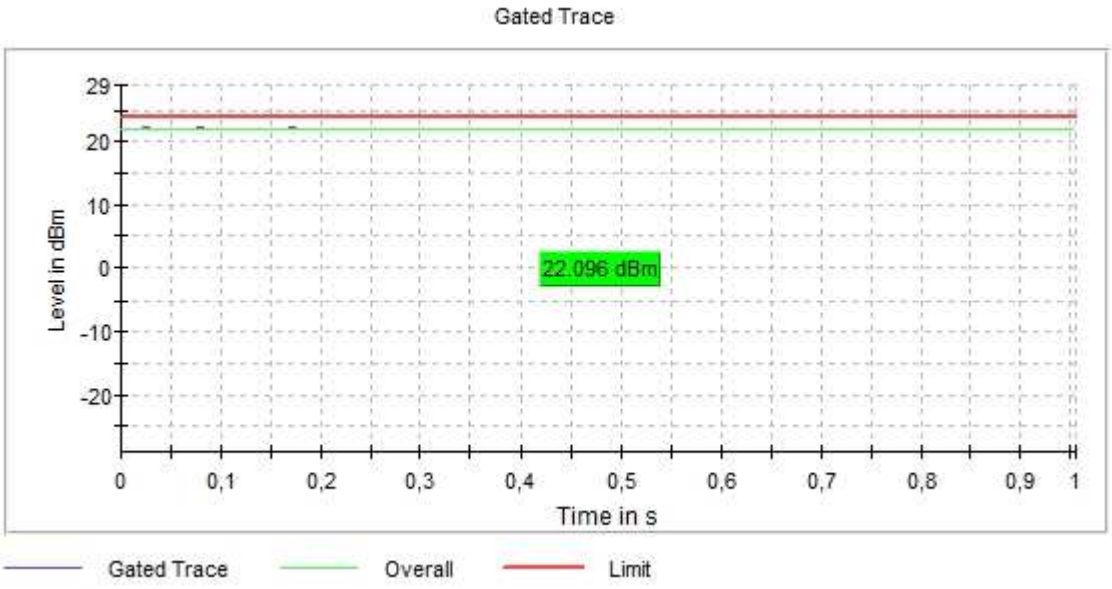


- High Channel 62 (5310 MHz):

SISO 802.11 ac80 (VHT80):

U-NII-2A (5250-5350 MHz)

- Single Channel 58 (5290 MHz):



SISO 802.11 ax80 (HE80):

U-NII-2A (5250-5350 MHz)

- Single Channel 58 (5290 MHz):

FCC and IC power setting:

MIMO worst-case:

- Preliminary tests determined the MIMO worst-case: WLAN12.

MIMO 802.11 a20:

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted Power (dBm)	23.3	23.4	22.8	22.9
Maximum EIRP Corrected Conducted Power (dBm)	29.47	29.57	28.97	29.07
Measurement uncertainty (kHz)	<±36.95			

MIMO 802.11 n20 (HT20):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted Power (dBm)	23.6	23.6	23.5	23.1
Maximum EIRP Corrected Conducted Power (dBm)	29.77	29.77	29.67	29.27
Measurement uncertainty (kHz)	<±36.95			

MIMO 802.11 ac20 (VHT20):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted Power (dBm)	23.3	23.4	23.3	23.5
Maximum EIRP Corrected Conducted Power (dBm)	29.47	29.57	29.47	29.67
Measurement uncertainty (kHz)	<±36.95			

MIMO 802.11 ax20 (HE20):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted Power (dBm)	23.7	23.4	23.8	23.8
Maximum EIRP Corrected Conducted Power (dBm)	29.87	29.57	29.97	29.97
Measurement uncertainty (kHz)	<±36.95			

MIMO 802.11 n40 (HT40):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 54 (5270 MHz)	High Channel 62 (5310 MHz)
Maximum Corrected Conducted Power (dBm)	23.8	23.5
Maximum EIRP Corrected Conducted Power (dBm)	29.97	29.67
Measurement uncertainty (kHz)	<±36.95	

MIMO 802.11 ac40 (VHT40):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 54 (5270 MHz)	High Channel 62 (5310 MHz)
Maximum Corrected Conducted Power (dBm)	23.7	23.4
Maximum EIRP Corrected Conducted Power (dBm)	29.87	29.57
Measurement uncertainty (kHz)	<±36.95	

MIMO 802.11 ax40 (HE40):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 54 (5270 MHz)	High Channel 62 (5310 MHz)
Maximum Corrected Conducted Power (dBm)	23.7	23.4
Maximum EIRP Corrected Conducted Power (dBm)	29.87	29.57
Measurement uncertainty (kHz)	<±36.95	

MIMO 802.11 ac80 (VHT80):

U-NII-2A (5250-5350 MHz):

Channel	Single Channel 58 (5290 MHz)
Maximum Corrected Conducted Power (dBm)	23.0
Maximum EIRP Corrected Conducted Power (dBm)	29.17
Measurement uncertainty (kHz)	<±36.95

MIMO 802.11 ax80 (HE80):

U-NII-2A (5250-5350 MHz):

Channel	Single Channel 58 (5290 MHz)
Maximum Corrected Conducted Power (dBm)	22.7
Maximum EIRP Corrected Conducted Power (dBm)	28.87
Measurement uncertainty (kHz)	<±36.95

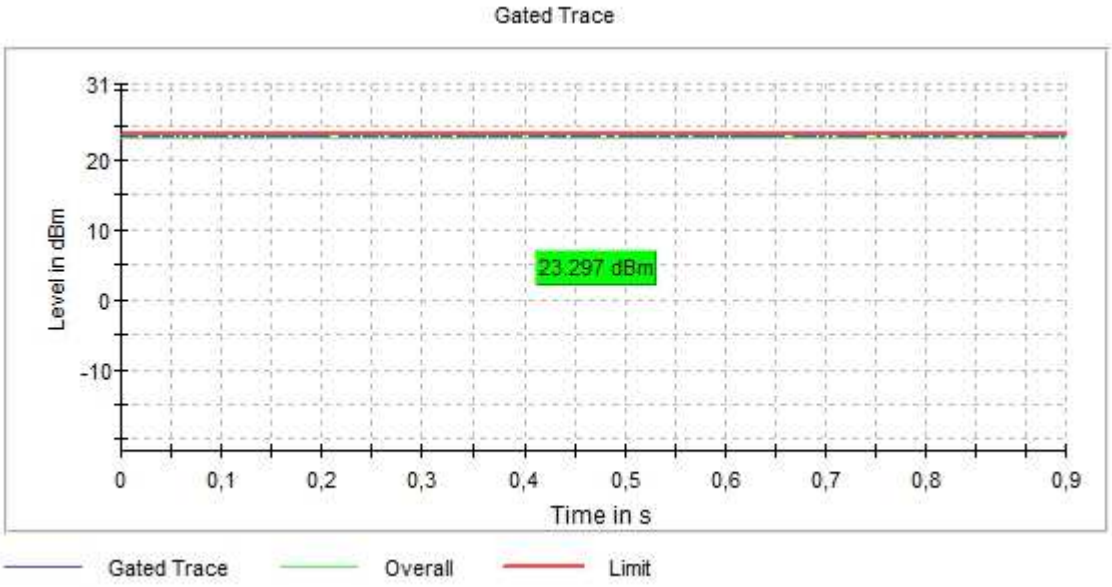
Verdict: PASS

MIMO worst-case:

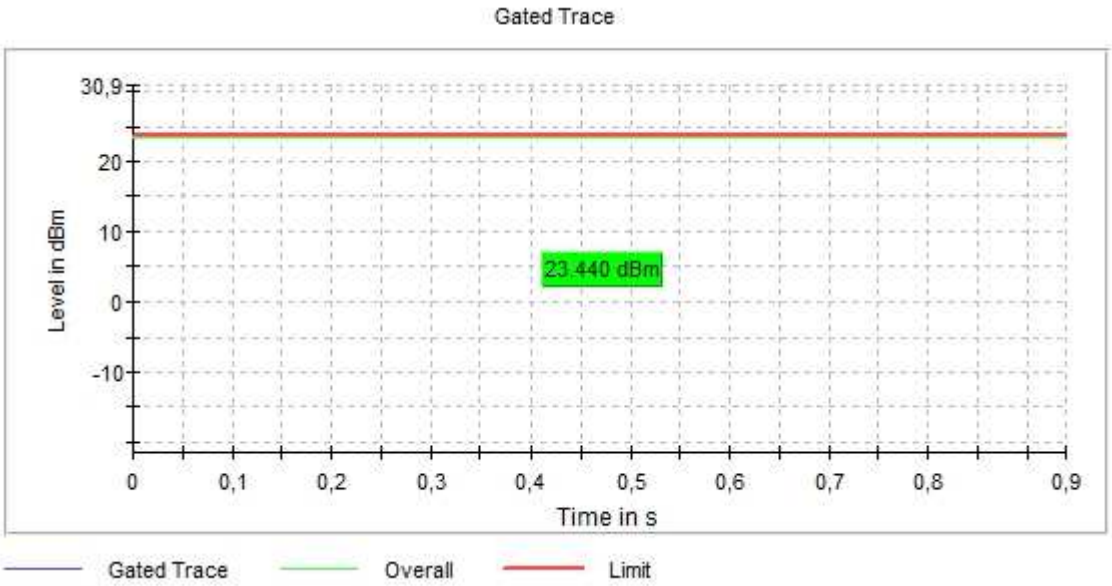
MIMO 802.11 a20:

U-NII-2A (5250-5350 MHz)

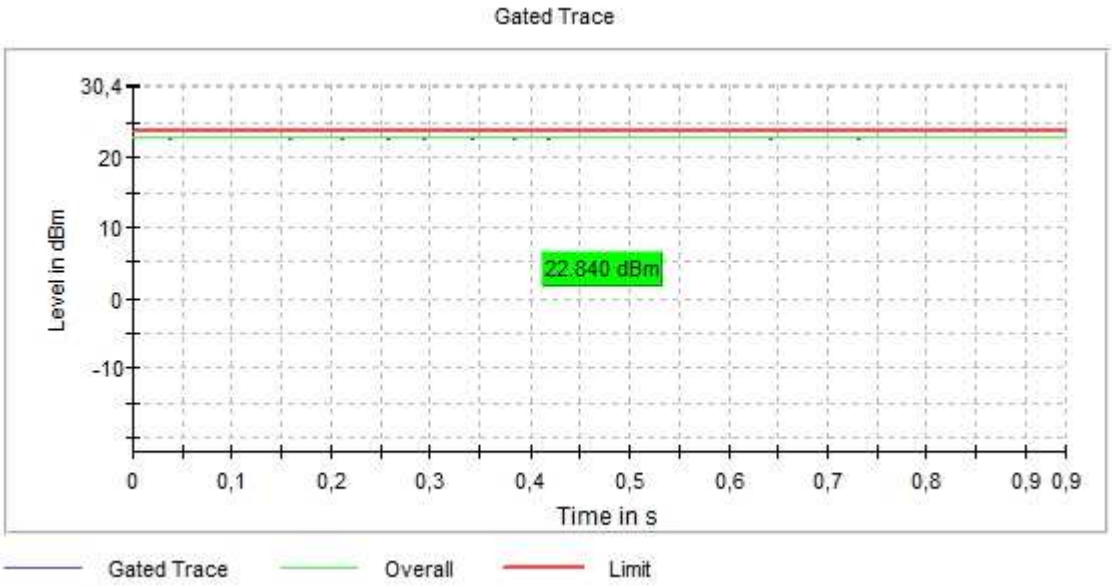
- Low Channel 52 (5260 MHz):



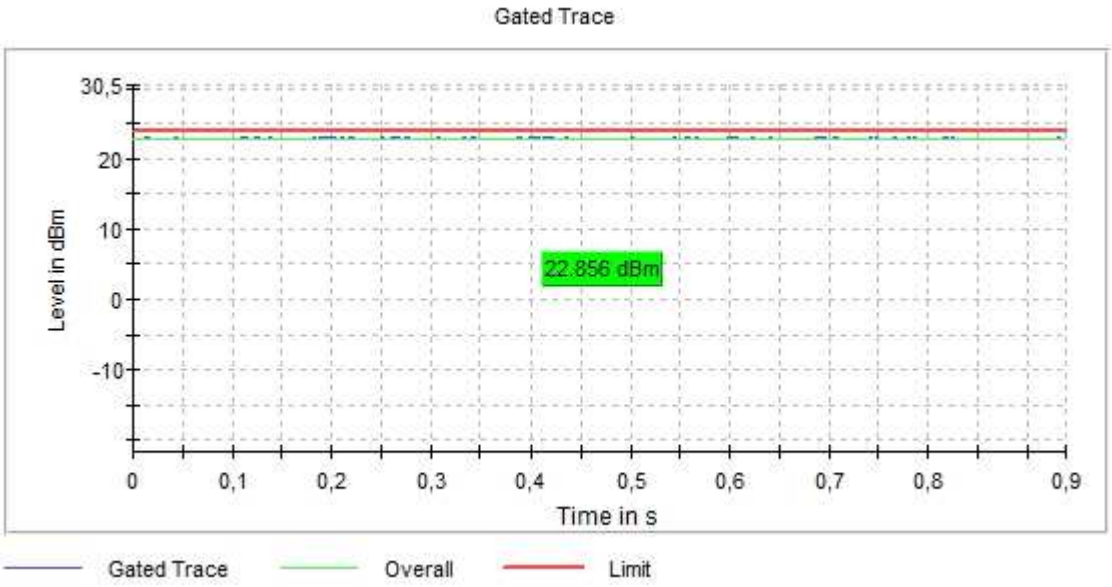
- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):



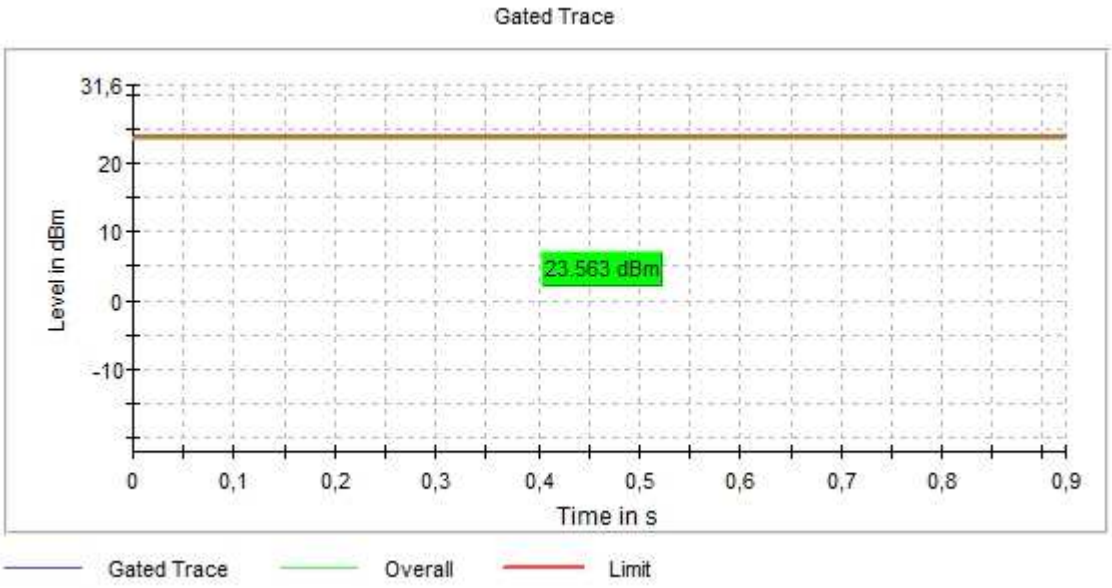
- High Channel 64 (5320 MHz):



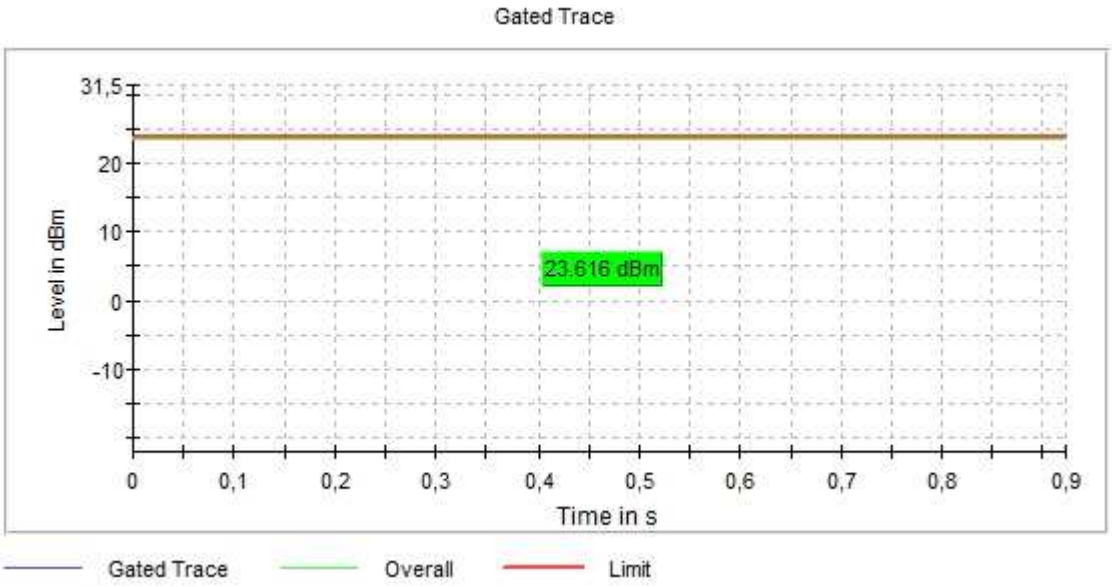
MIMO 802.11 n20 (HT20):

U-NII-2A (5250-5350 MHz)

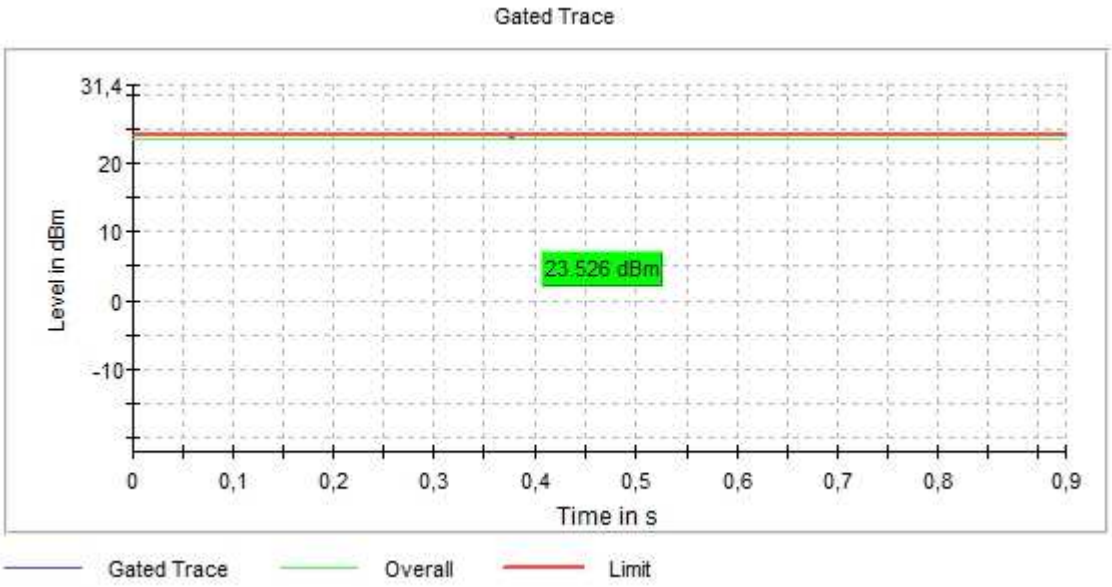
- Low Channel 52 (5260 MHz):



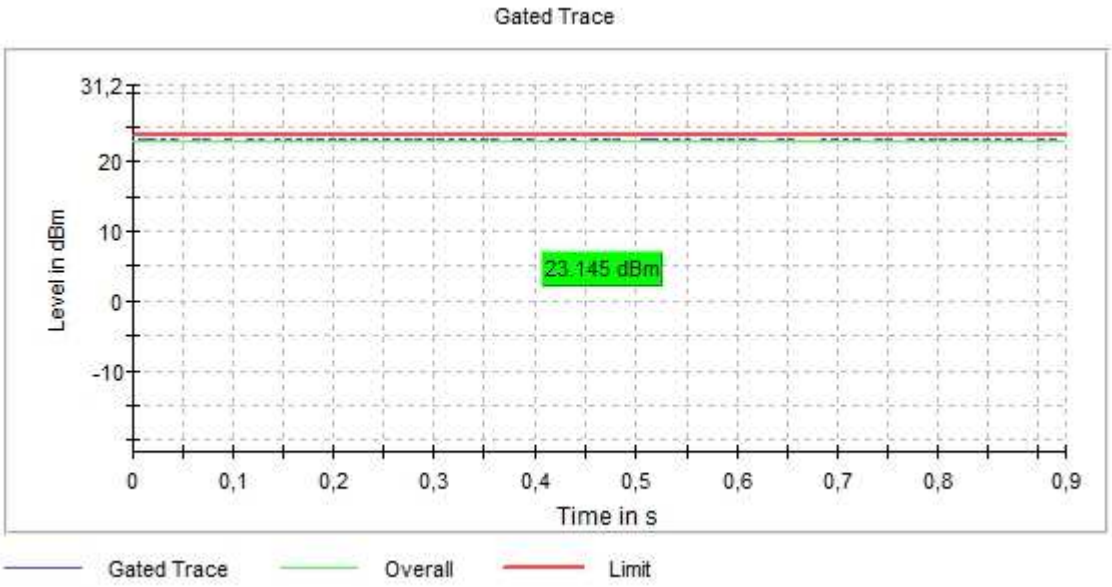
- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):



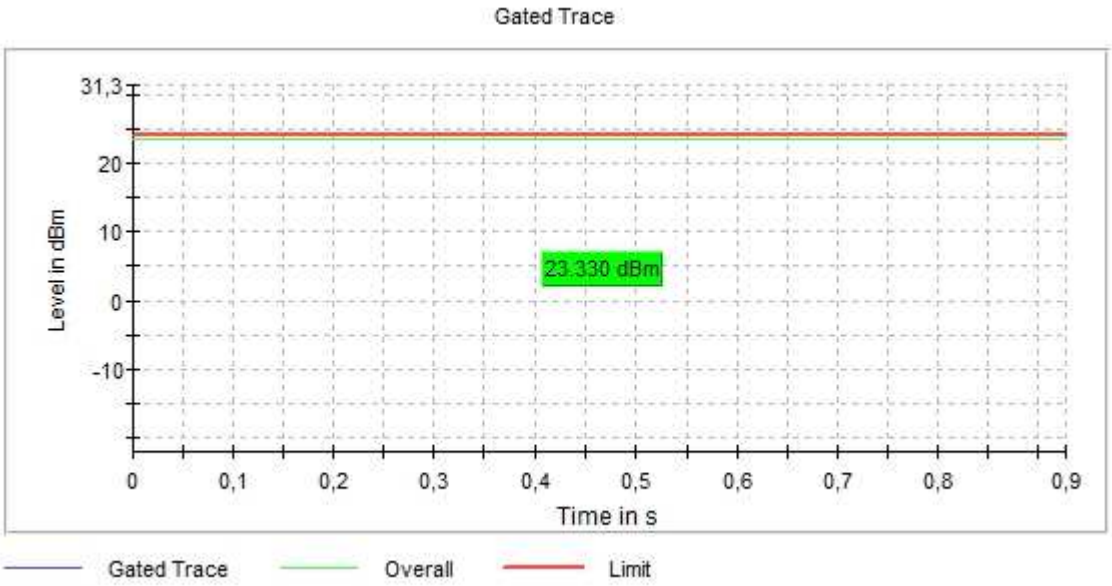
- High Channel 64 (5320 MHz):



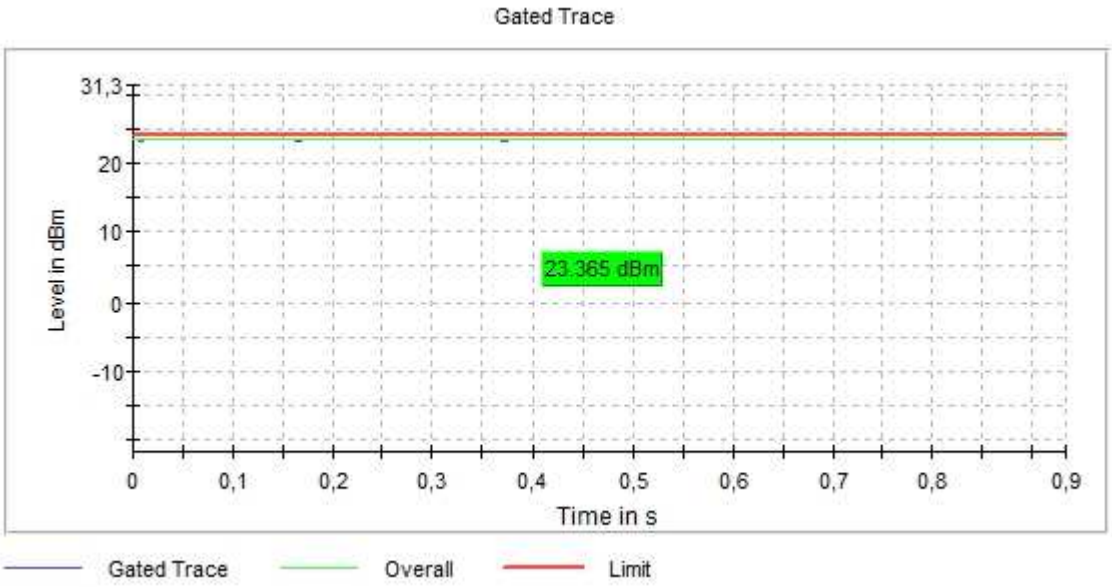
MIMO 802.11 ac20 (VHT20):

U-NII-2A (5250-5350 MHz)

- Low Channel 52 (5260 MHz):

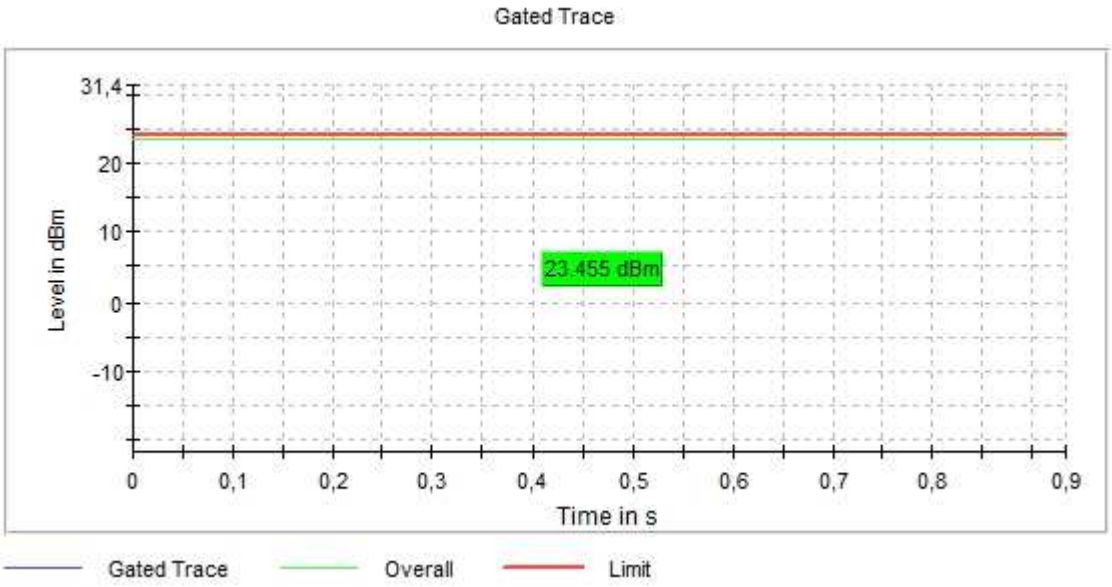


- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):

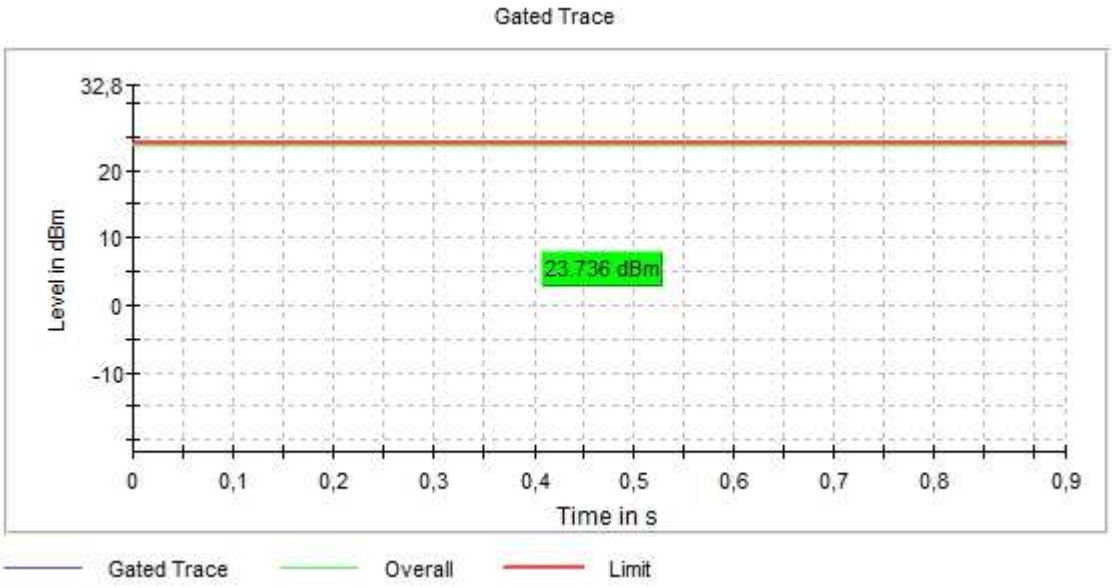
- High Channel 64 (5320 MHz):



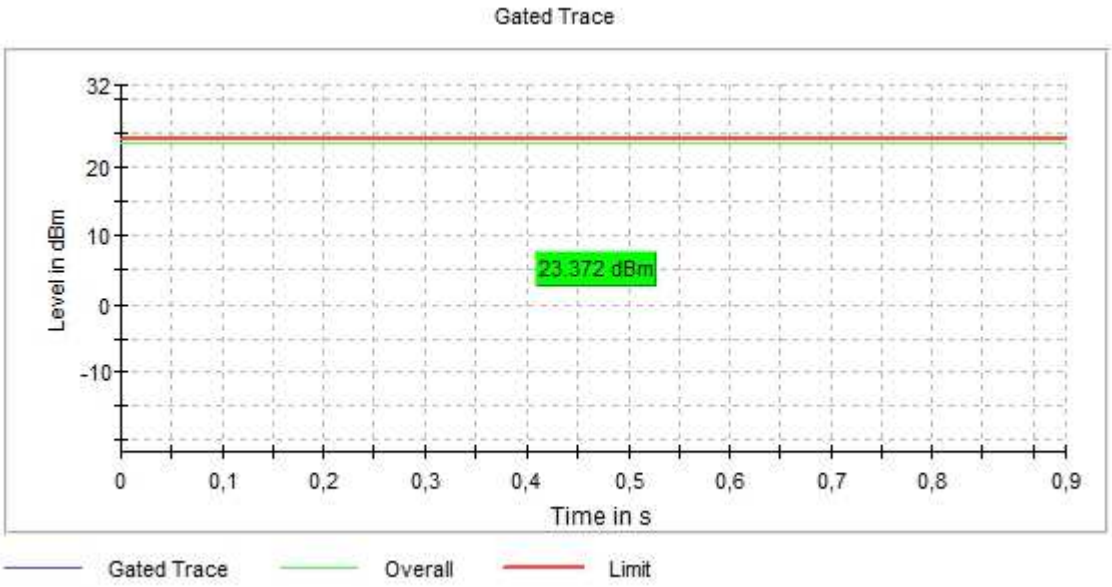
MIMO 802.11 ax20 (HE20):

U-NII-2A (5250-5350 MHz)

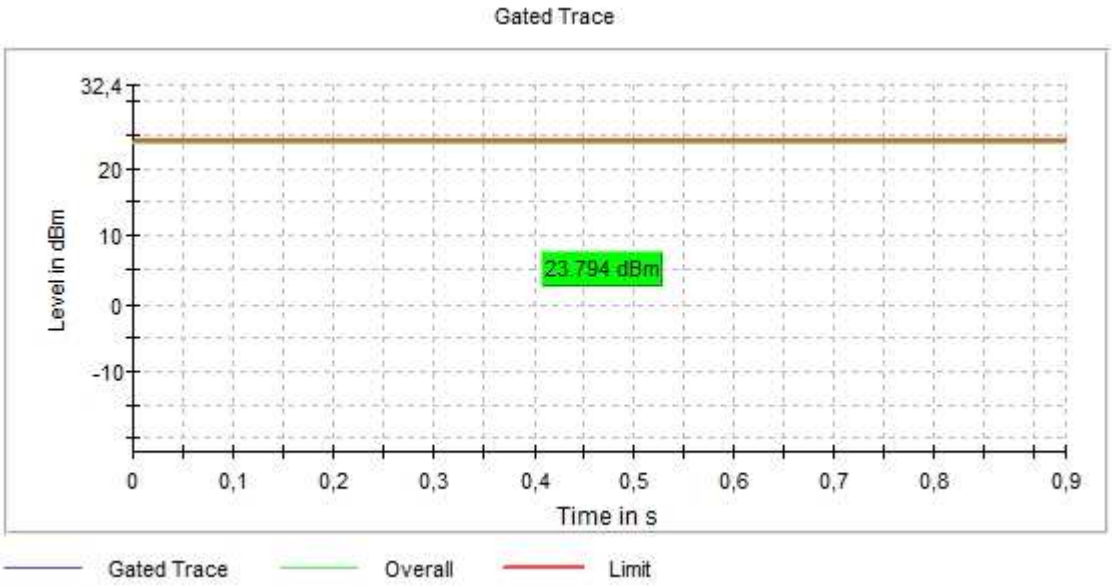
- Low Channel 52 (5260 MHz):



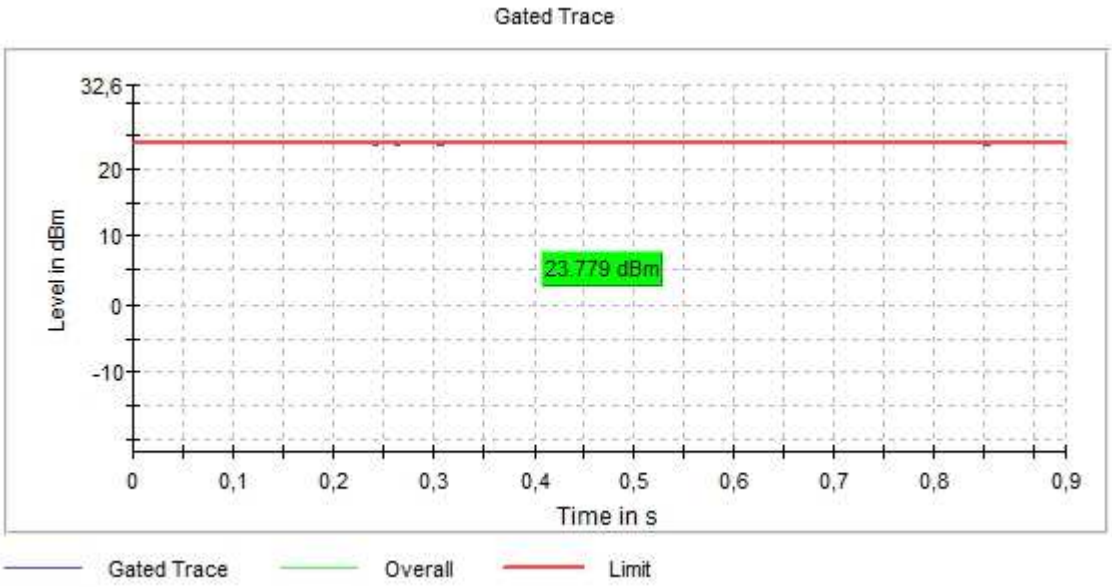
- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):



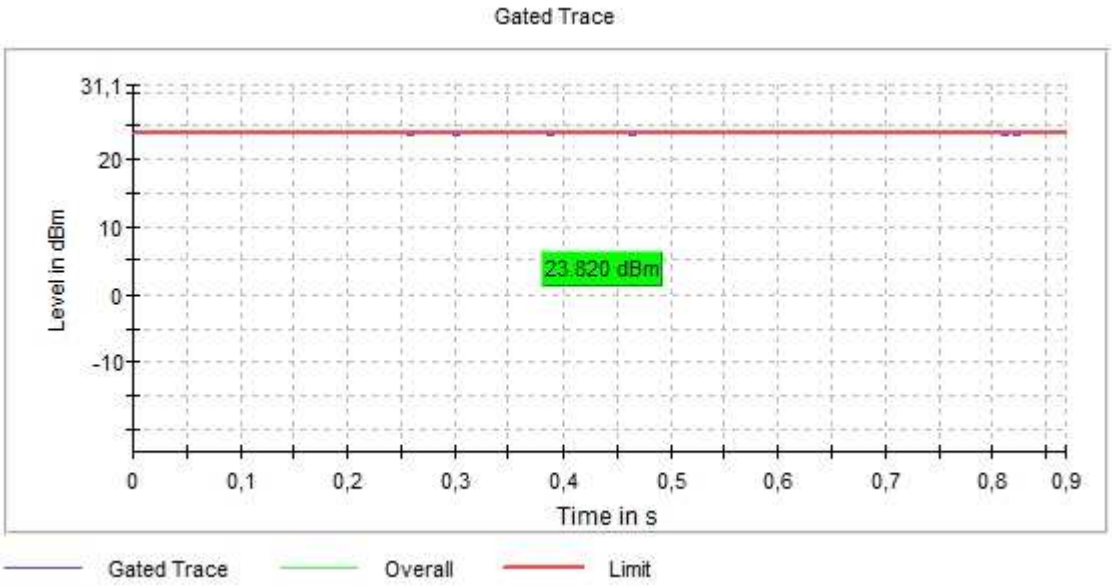
- High Channel 64 (5320 MHz):



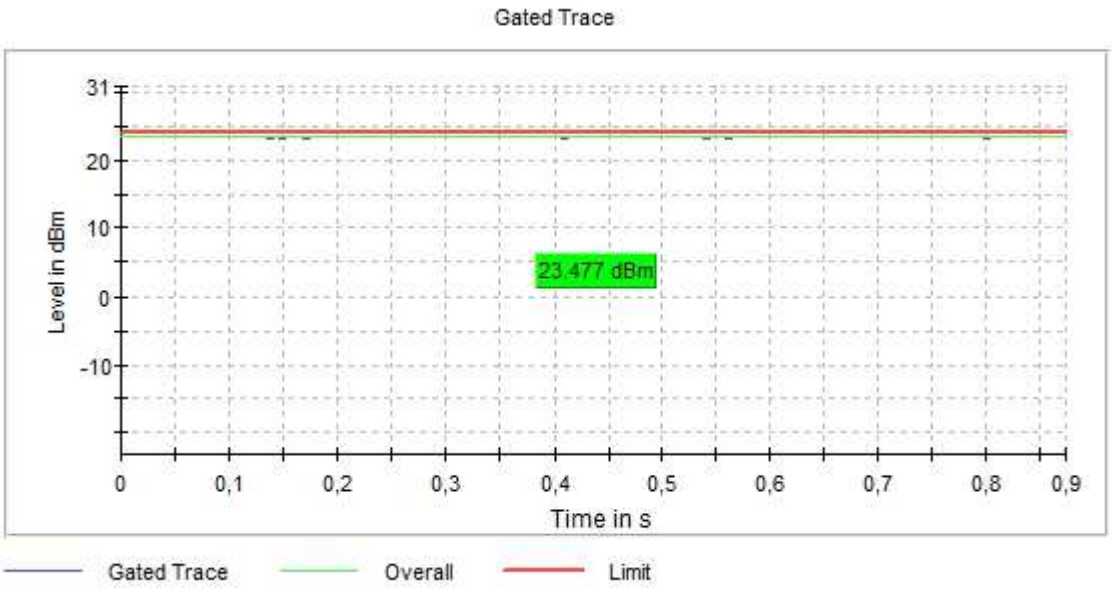
MIMO 802.11 n40 (VHT40):

U-NII-2A (5250-5350 MHz)

- Low Channel 54 (5270 MHz):



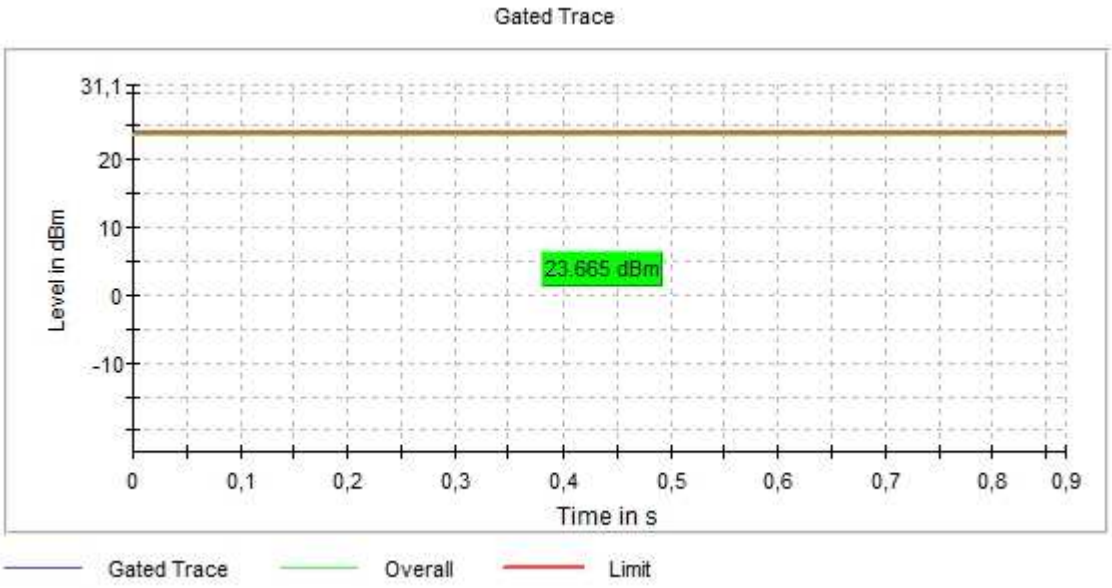
- High Channel 62 (5310 MHz):



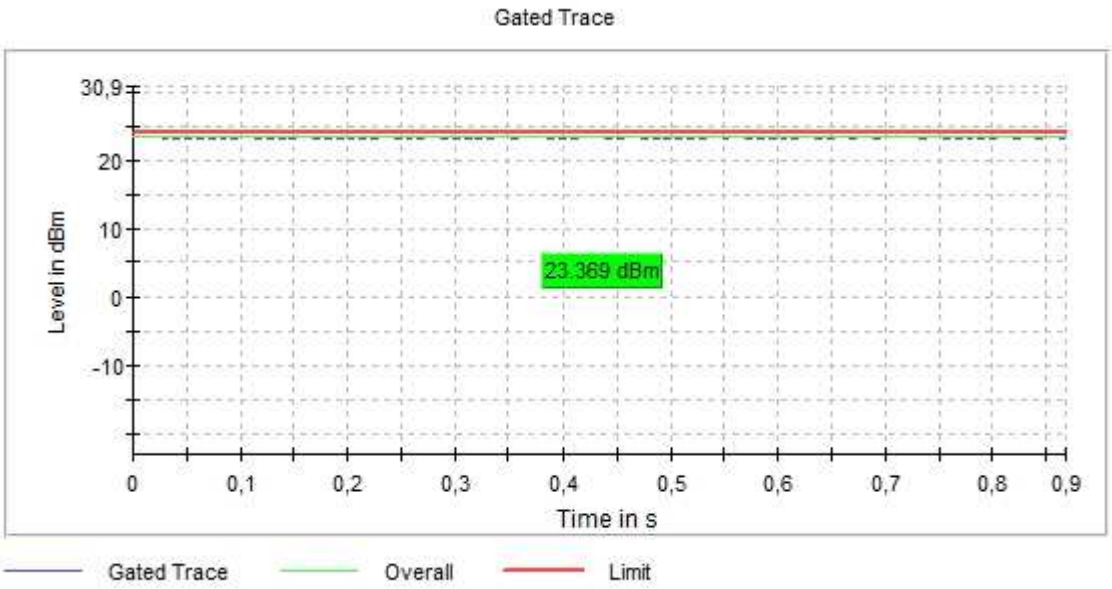
MIMO 802.11 ac40 (VHT40):

U-NII-2A (5250-5350 MHz)

- Low Channel 54 (5270 MHz):



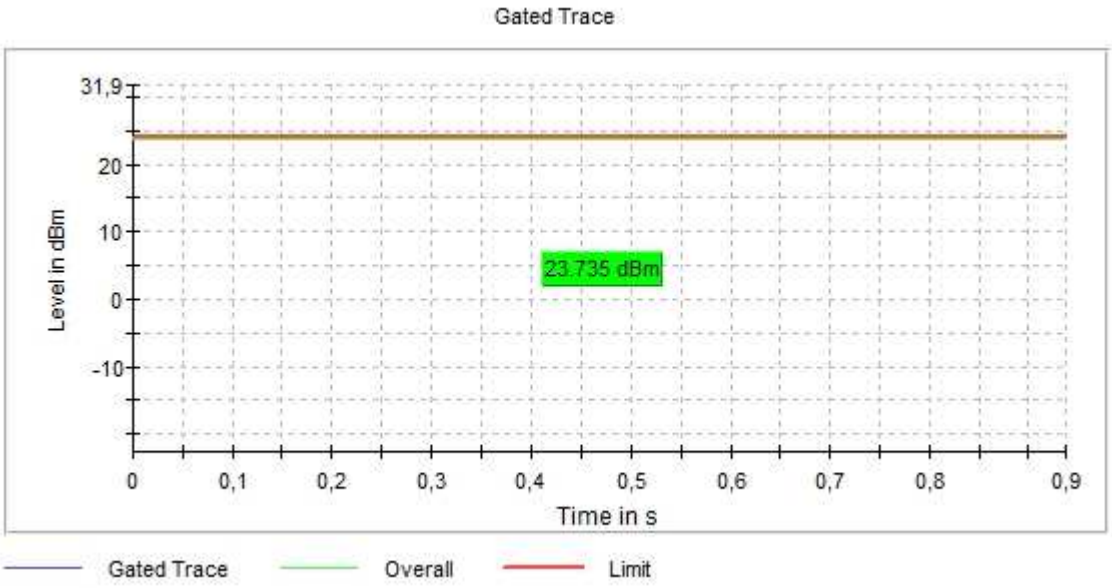
- High Channel 62 (5310 MHz):



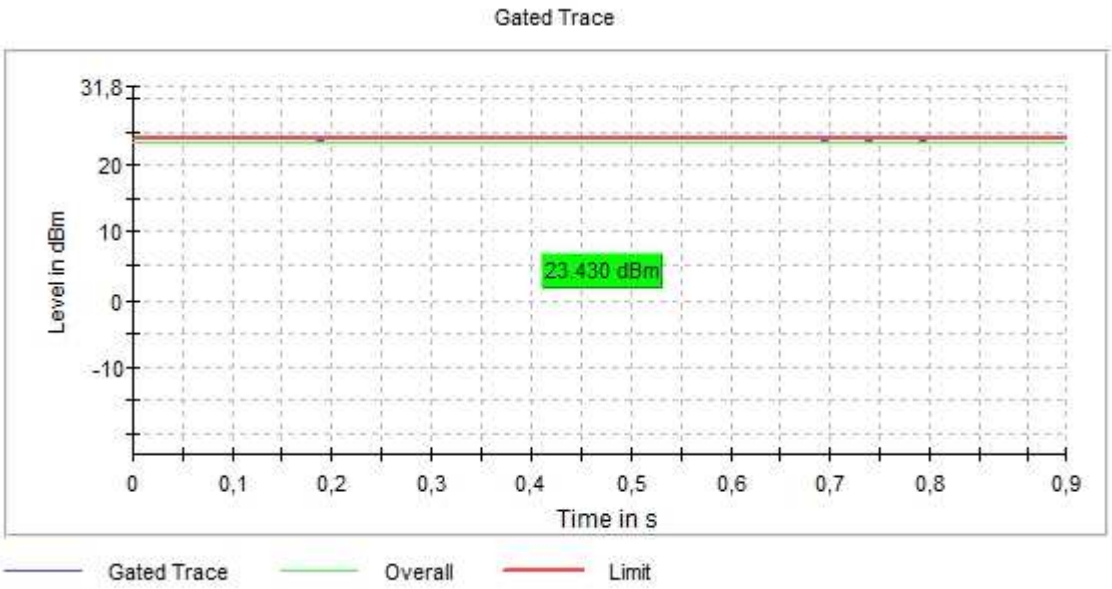
MIMO 802.11 ax40 (HE40):

U-NII-2A (5250-5350 MHz)

- Low Channel 54 (5270 MHz):



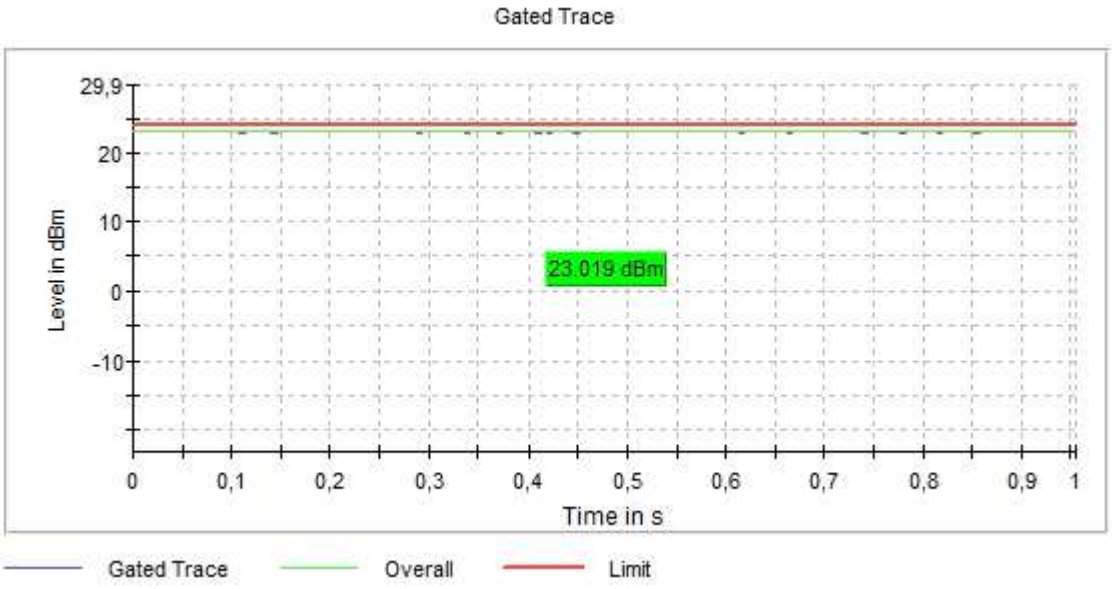
- High Channel 62 (5310 MHz):



MIMO 802.11 ac80 (VHT80):

U-NII-2A (5250-5350 MHz)

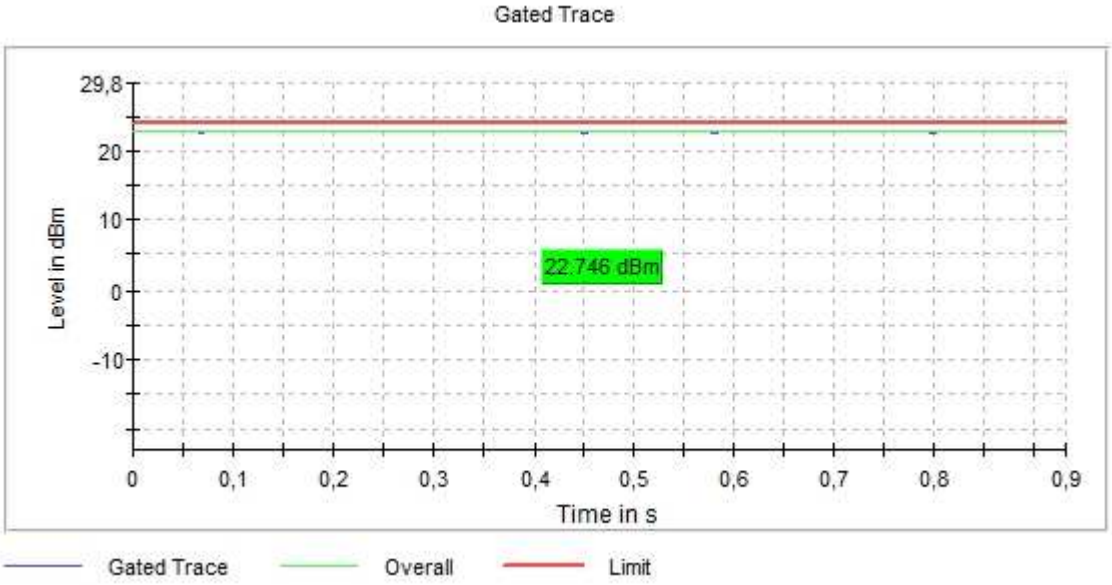
- Single Channel 58 (5290 MHz):



MIMO 802.11 ax80 (HE80):

U-NII-2A (5250-5350 MHz)

- Single Channel 58 (5290 MHz):



FCC 15.407 (a)(2) Transmitter Maximum Power Spectral Density / RSS-247 6.2.2.1. Transmitter EIRP Spectral Density

SPECIFICATION:

FCC 15.407 (a)(2): For the 5.25-5.35 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RSS-247 6.2.2.1: Devices, other than devices installed in vehicles, shall comply with the following:

a. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band;
b. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

RESULTS:

The maximum Power Spectral Density (PSD) was measured using the method according to point F) referencing E.2.b) (Method SA-1) and E.2.b) (Method SA-2) of Guidance 789 033 D02 General UNII Test Procedures New Rules v02r01. When the duty cycle is >98% and the channel power integration method according to point E.2.d) (Method SA-2) of 789033 D02 General UNII Test Procedures New Rules v02r01 when the duty cycle is <98%.

For data rates where the EUT was transmitting at <98% duty cycle, the duty cycle was added to the measured power spectral density in order to calculate the total average power spectral density during the actual transmission time.

The PSD test uses the same setup as the transmitter maximum conducted output power test.

The result of the Peak PSD was measured by colocating a marker on the peak of the signal and the results are in the tables below.

The e.i.r.p. levels are calculated by adding the declared maximum antenna gain (dBi).

- Preliminary tests determined the SISO worst-case: WLAN1.
- Preliminary tests determined the MIMO worst-case: WLAN12.

Maximum Declared Antenna Gain:

- SISO Antenna – WLAN1: +3.5 dBi
- MIMO Antennas – WLAN12:
  - WLAN1: +3.5 dBi
  - WLAN2: +2.8 dBi
  - WLAN12: +6.17 dBi

For the SISO technique, the antenna gain is less than 6 dBi.
For the MIMO technique, the antenna gain is higher than 6 dBi.

FCC and IC power setting:

SISO worst-case:

- Preliminary tests determined the SISO worst-case: WLAN1.

SISO 802.11 a20:

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted PSD (dBm)	10.690	10.853	10.405	10.365
Measurement uncertainty (kHz)	<±36.95			

SISO 802.11 n20 (HT20):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted PSD (dBm)	10.630	10.680	10.325	9.975
Measurement uncertainty (kHz)	<±36.95			

SISO 802.11 ac20 (VHT20):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted PSD (dBm)	10.683	10.609	10.451	10.710
Measurement uncertainty (kHz)	<±36.95			

SISO 802.11 ax20 (HE20):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted PSD (dBm)	10.755	10.787	10.519	10.887
Measurement uncertainty (kHz)	<±36.95			

SISO 802.11 n40 (HT40):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 54 (5270 MHz)	High Channel 62 (5310 MHz)
Maximum Corrected Conducted PSD (dBm)	7.687	6.550
Measurement uncertainty (kHz)	<±36.95	

SISO 802.11 ac40 (VHT40):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 54 (5270 MHz)	High Channel 62 (5310 MHz)
Maximum Corrected Conducted PSD (dBm)	7.736	7.264
Measurement uncertainty (kHz)	<±36.95	

SISO 802.11 ax40 (HE40):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 54 (5270 MHz)	High Channel 62 (5310 MHz)
Maximum Corrected Conducted PSD (dBm)	8.142	6.541
Measurement uncertainty (kHz)	<±36.95	

SISO 802.11 ac80 (VHT80):

U-NII-2A (5250-5350 MHz):

Channel	Single Channel 58 (5290 MHz)
Maximum Corrected Conducted PSD (dBm)	3.805
Measurement uncertainty (kHz)	<±36.95

SISO 802.11 ax80 (HE80):

U-NII-2A (5250-5350 MHz):

Channel	Single Channel 58 (5290 MHz)
Maximum Corrected Conducted PSD (dBm)	3.638
Measurement uncertainty (kHz)	<±36.95

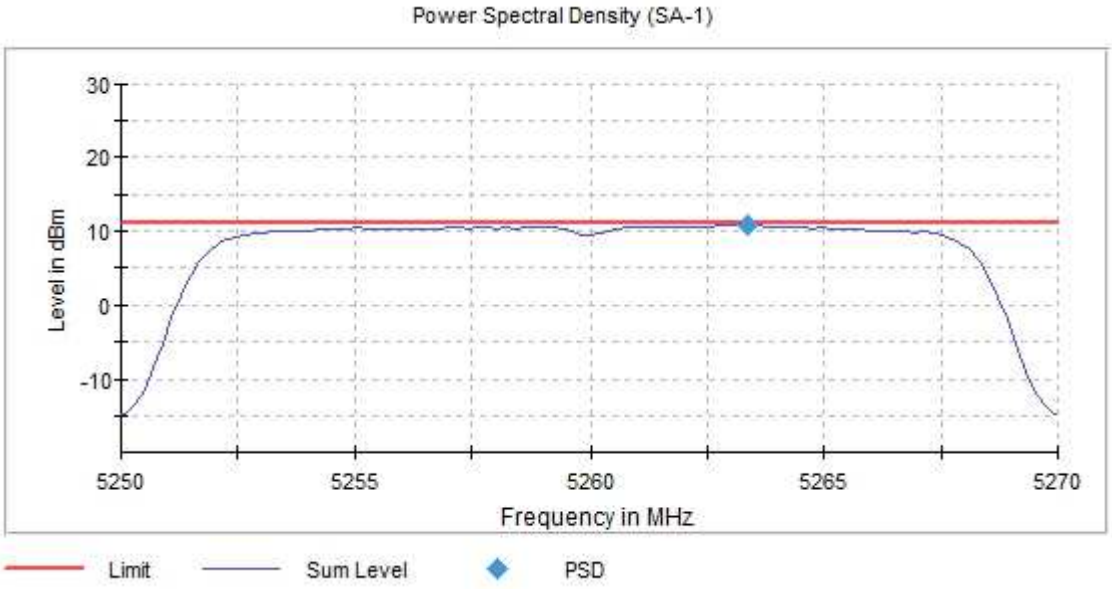
Verdict: PASS

SISO worst-case:

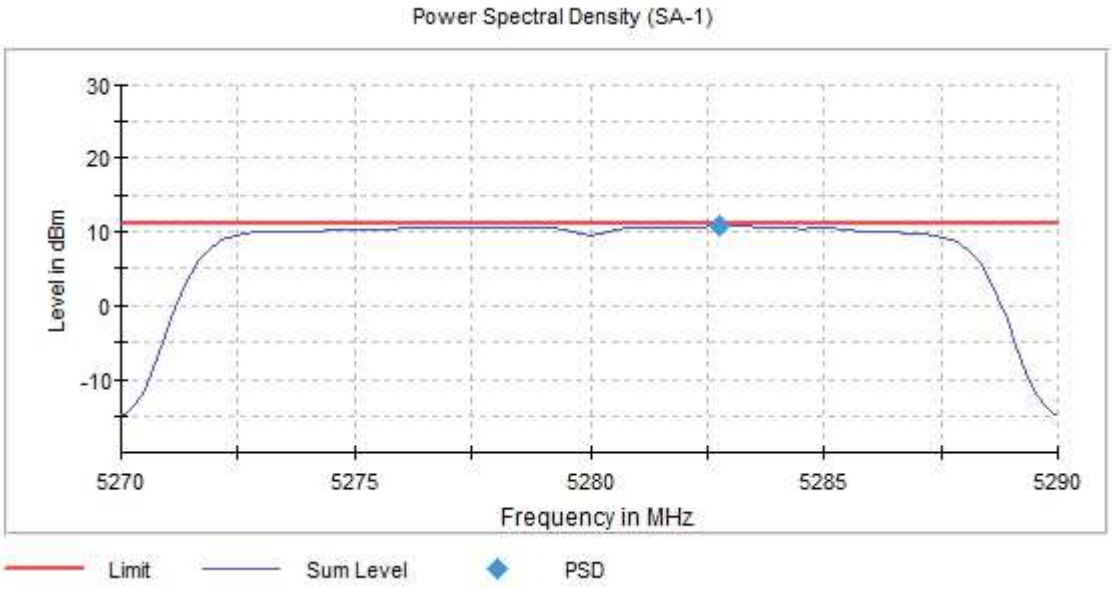
SISO 802.11 a20:

U-NII-2A (5250-5350 MHz)

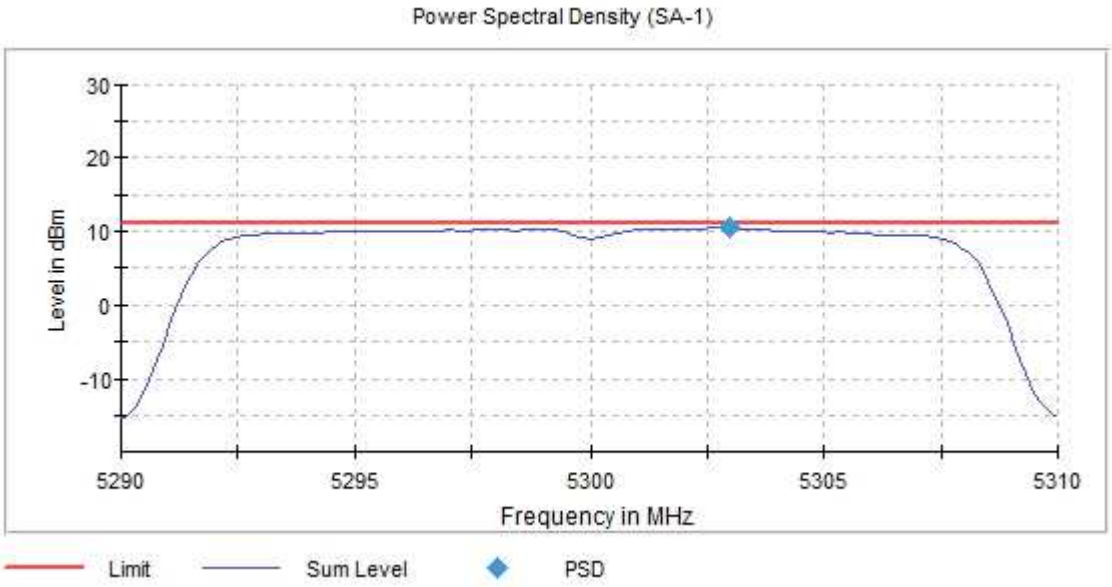
- Low Channel 52 (5260 MHz):



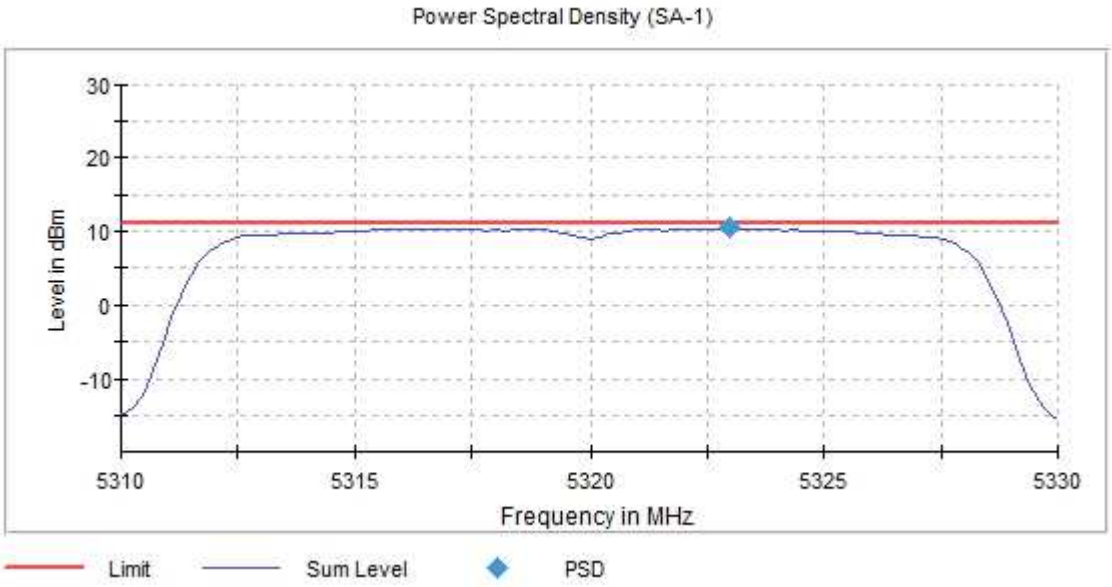
- Low+1 Channel 56 (5280 MHz):



- Channel 60 (5300 MHz):



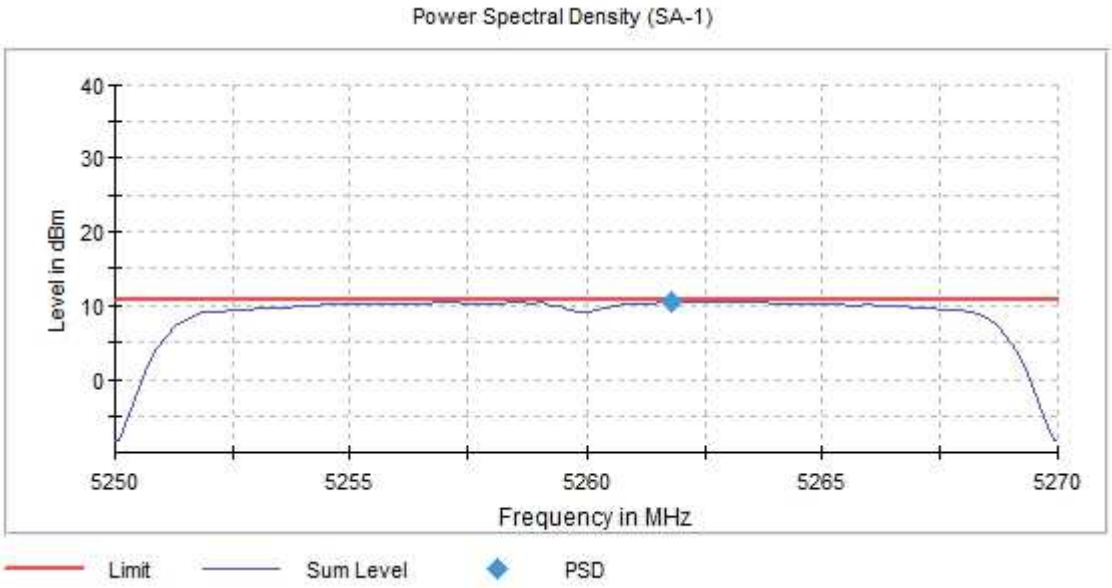
- High Channel 64 (5320 MHz):



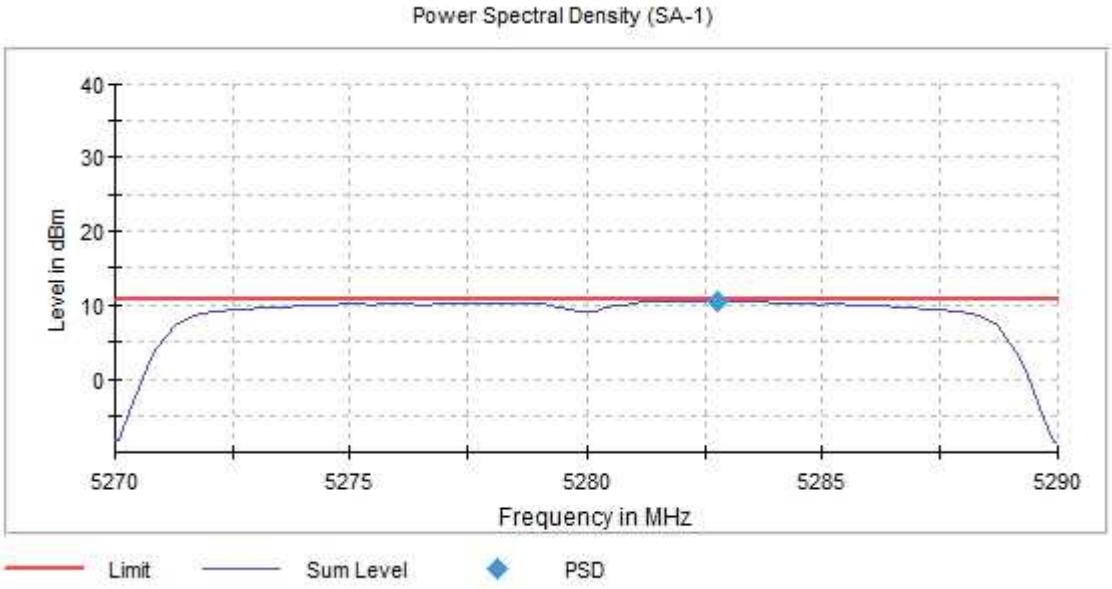
SISO 802.11 n20 (HT20):

U-NII-2A (5250-5350 MHz)

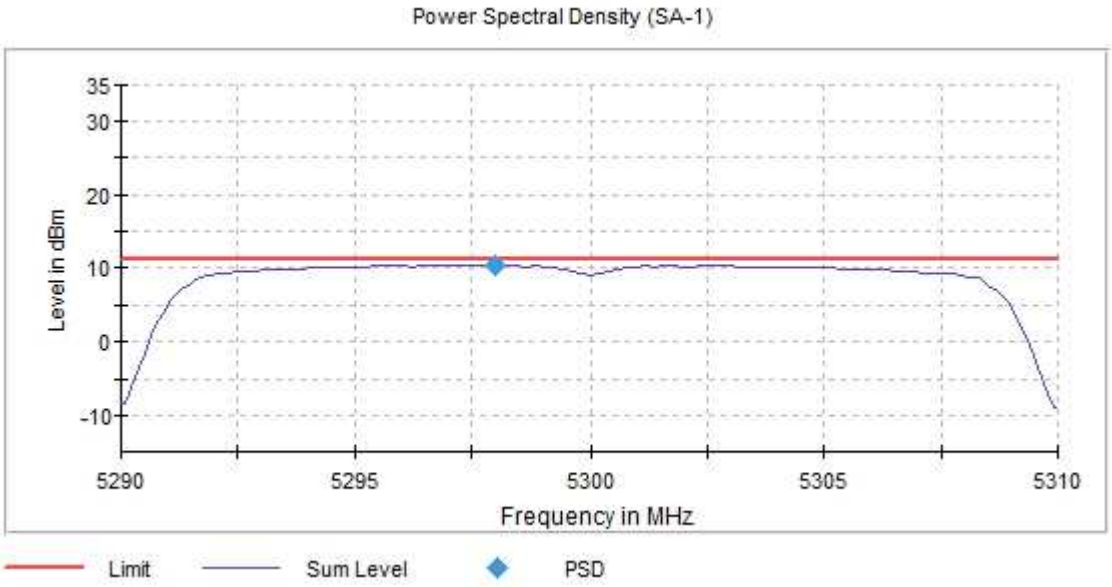
- Low Channel 52 (5260 MHz):



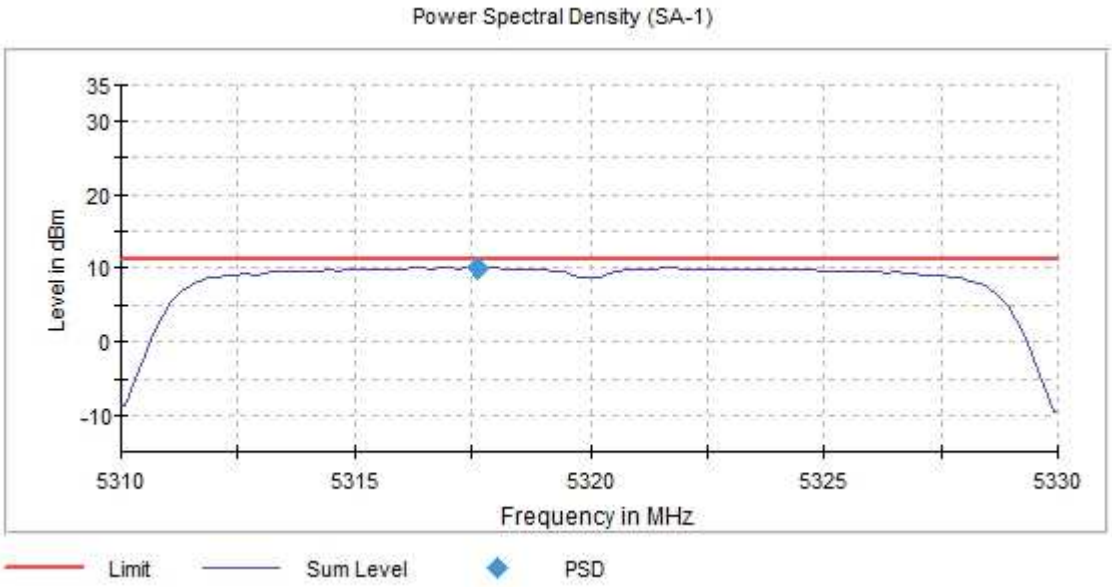
- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):



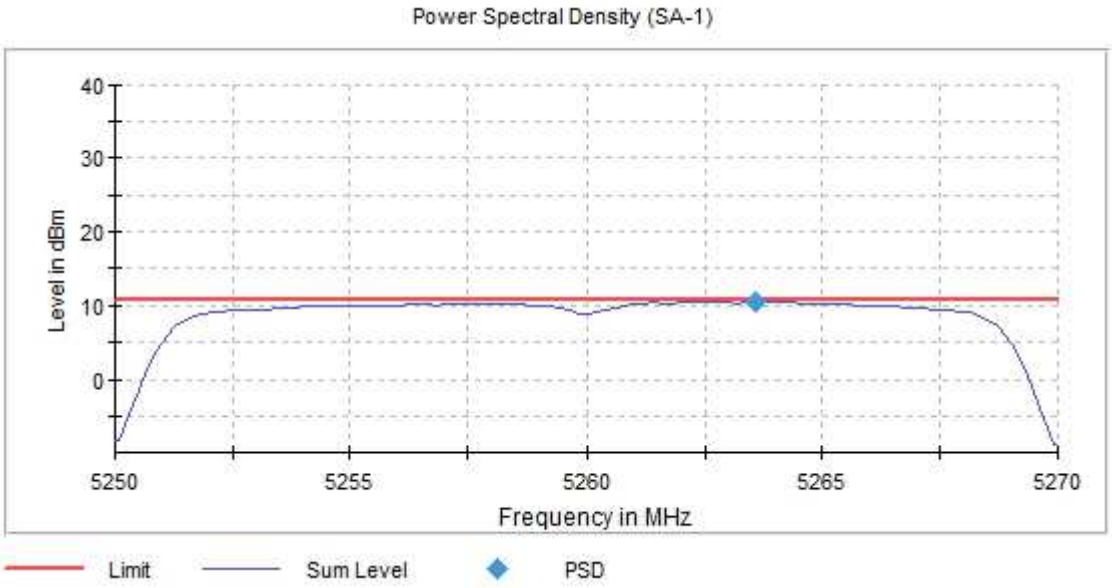
- High Channel 64 (5320 MHz):



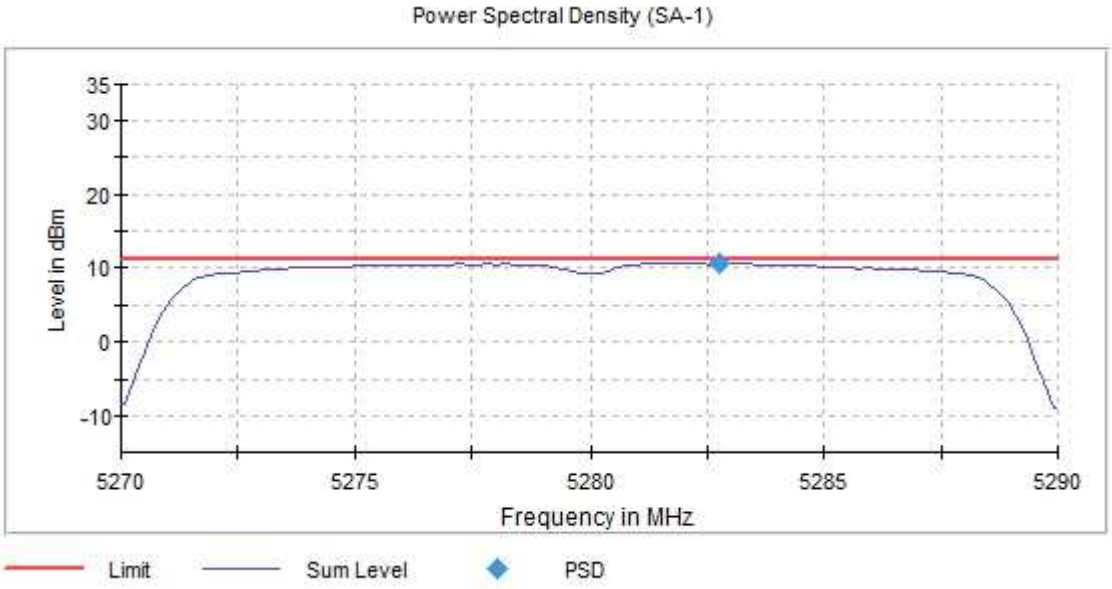
SISO 802.11 ac20 (VHT20):

U-NII-2A (5250-5350 MHz)

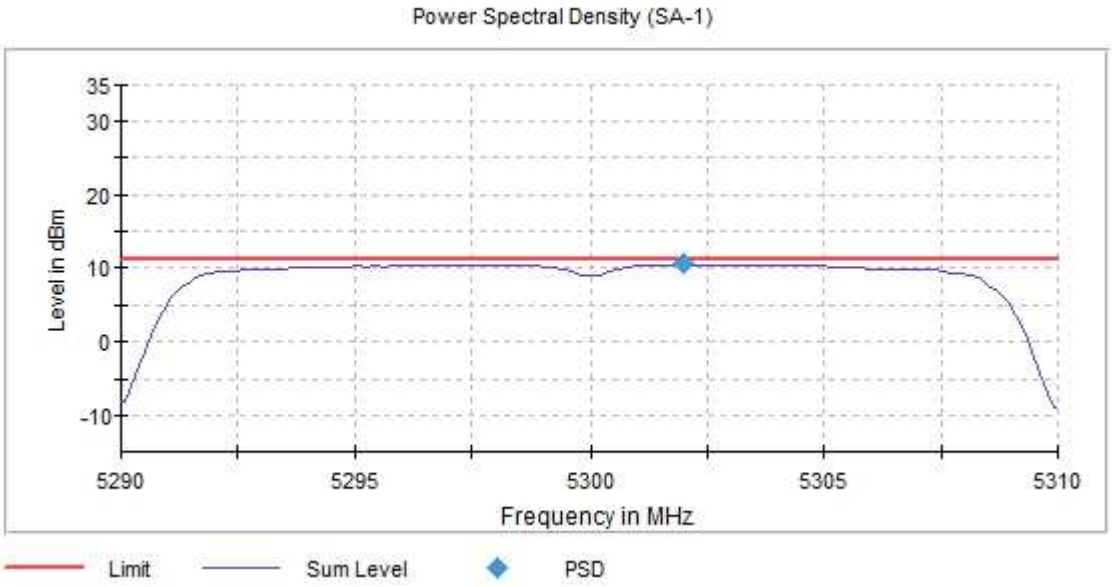
- Low Channel 52 (5260 MHz):



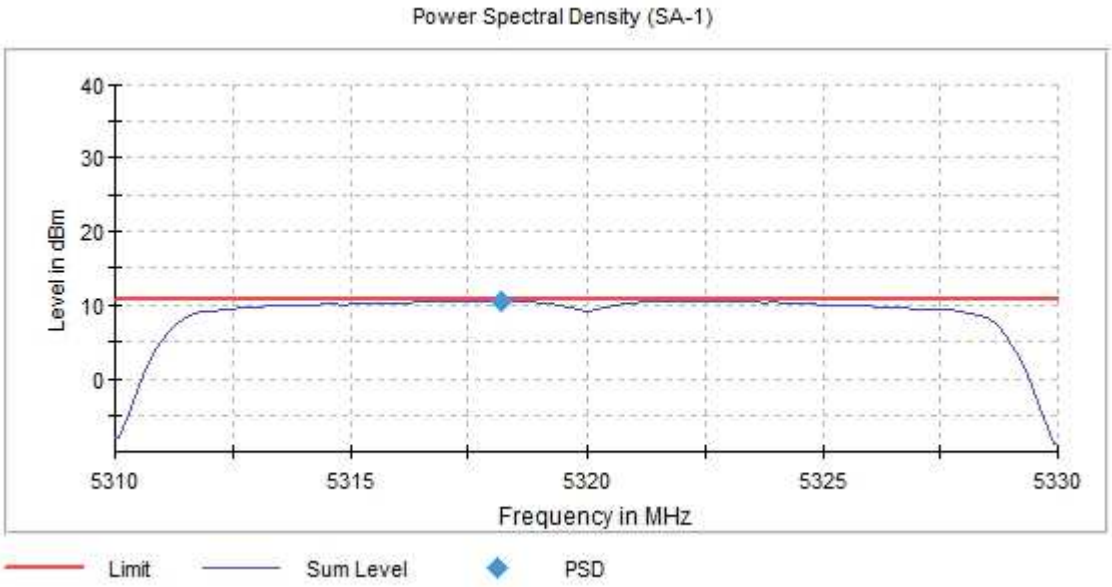
- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):



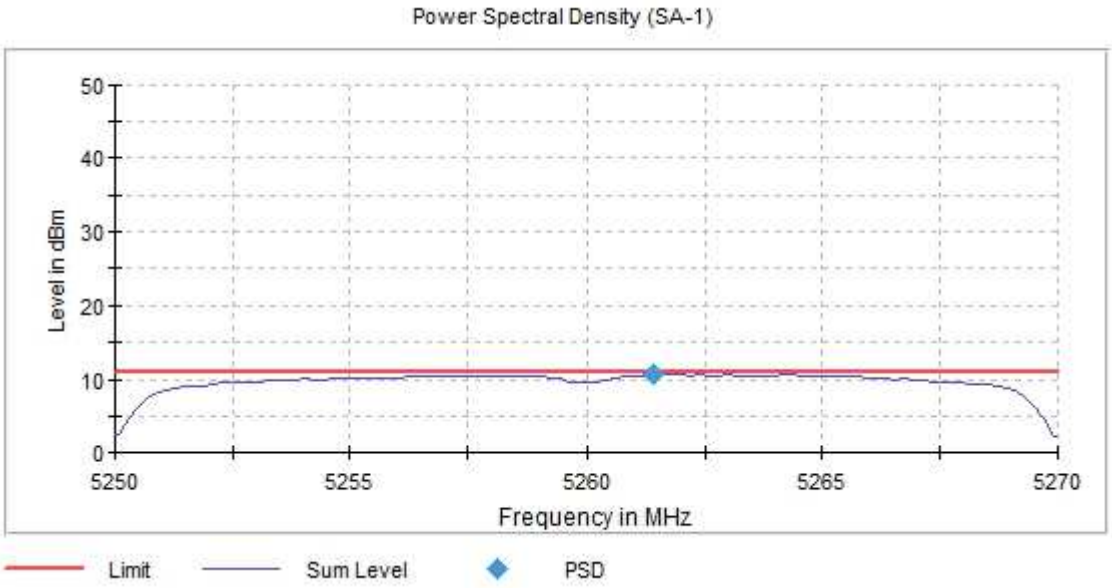
- High Channel 64 (5320 MHz):



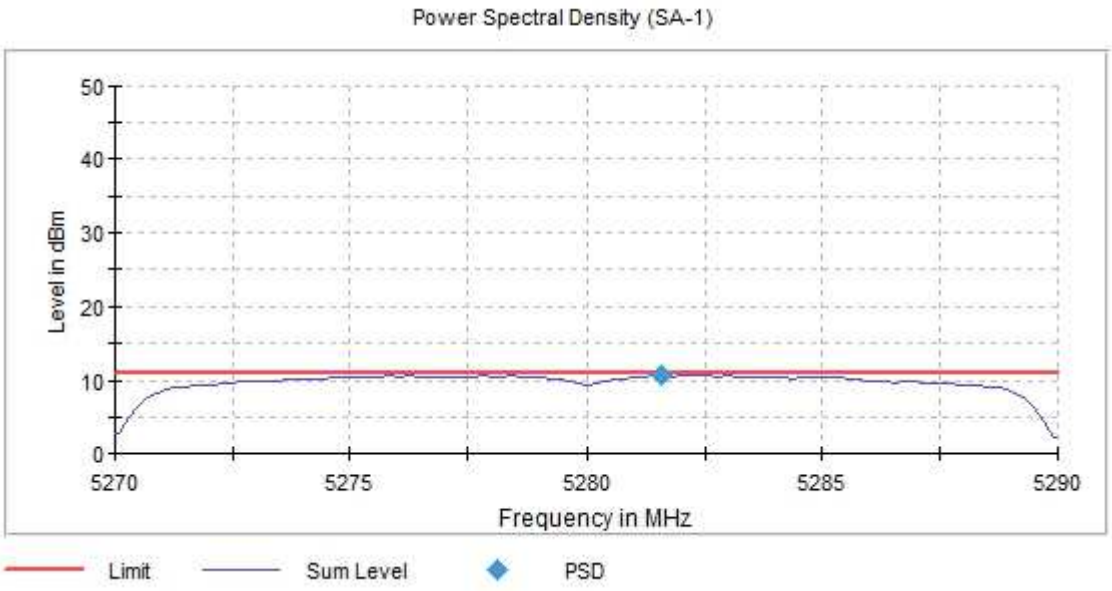
SISO 802.11 ax20 (HE20):

U-NII-2A (5250-5350 MHz)

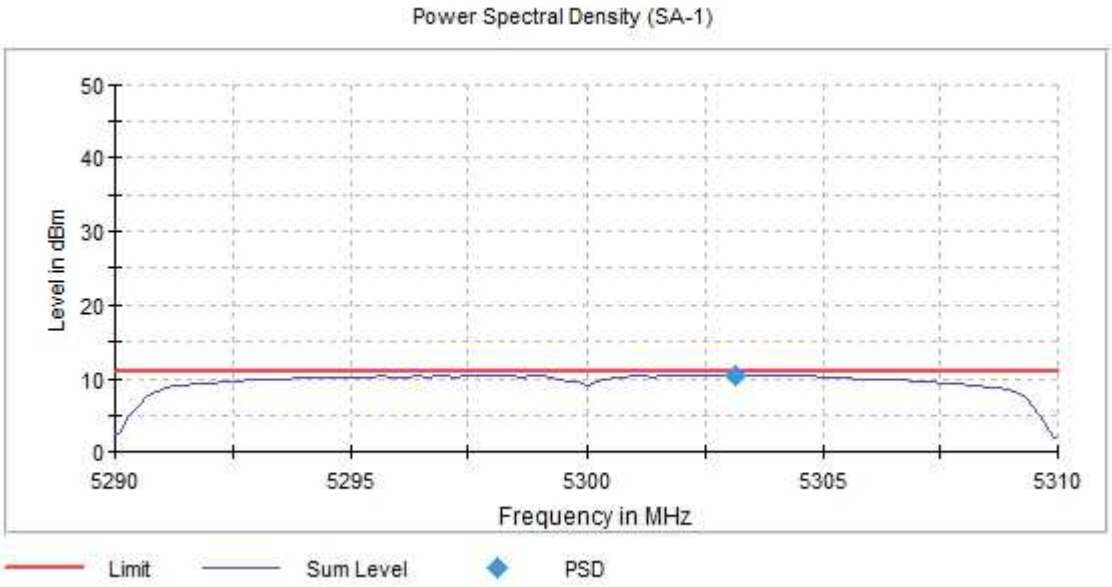
- Low Channel 52 (5260 MHz):



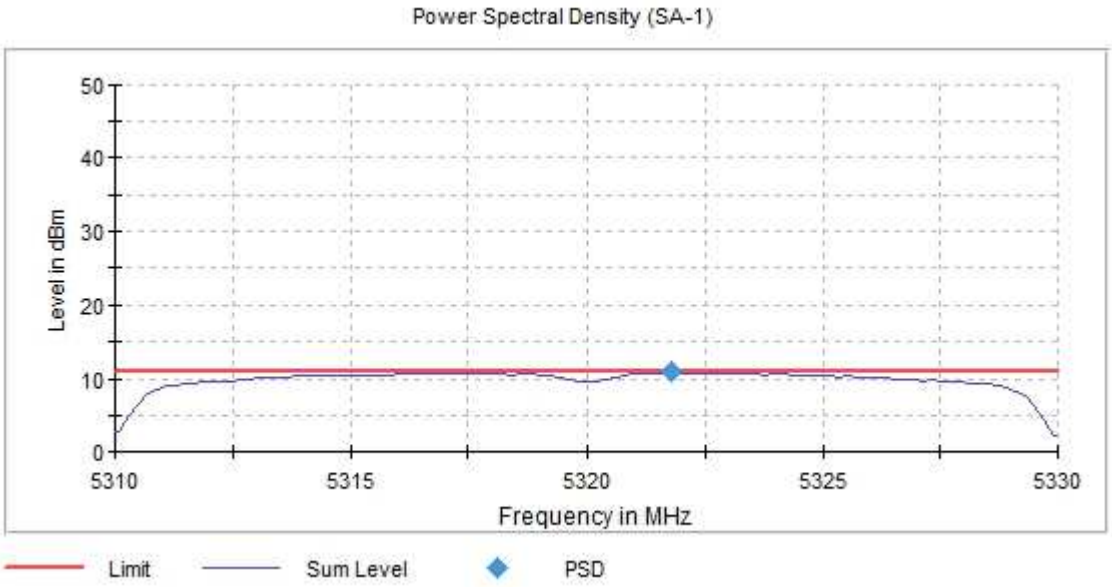
- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):



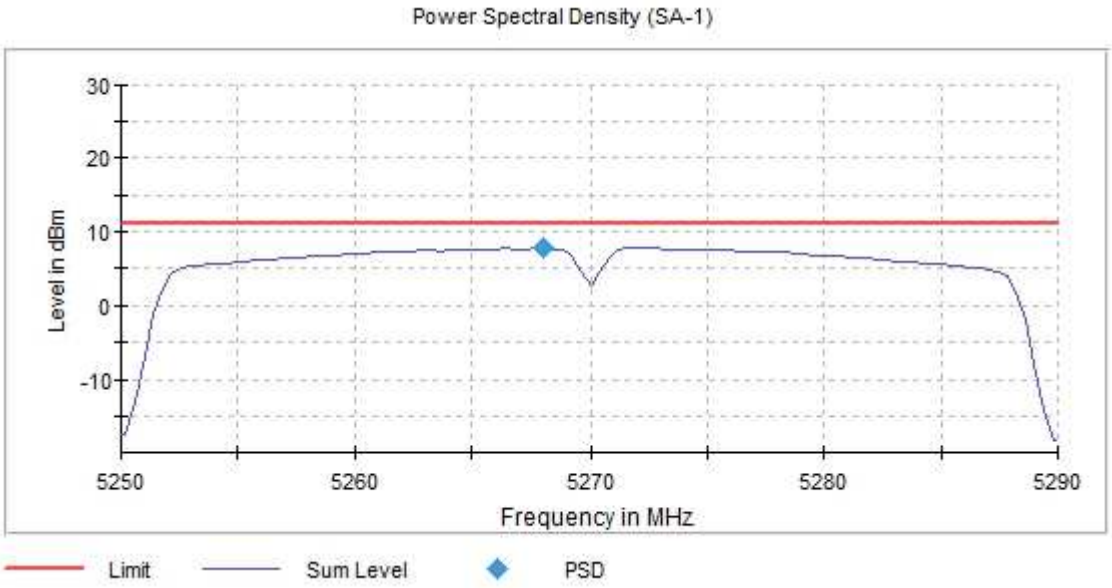
- High Channel 64 (5320 MHz):



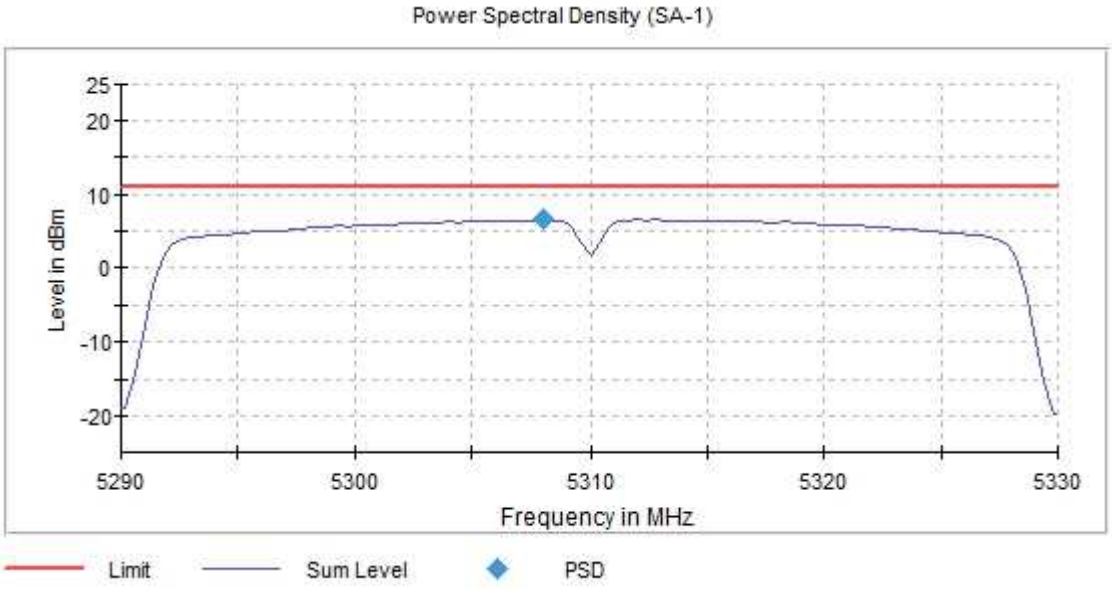
SISO 802.11 n40 (HT40):

U-NII-2A (5250-5350 MHz)

- Low Channel 54 (5270 MHz):



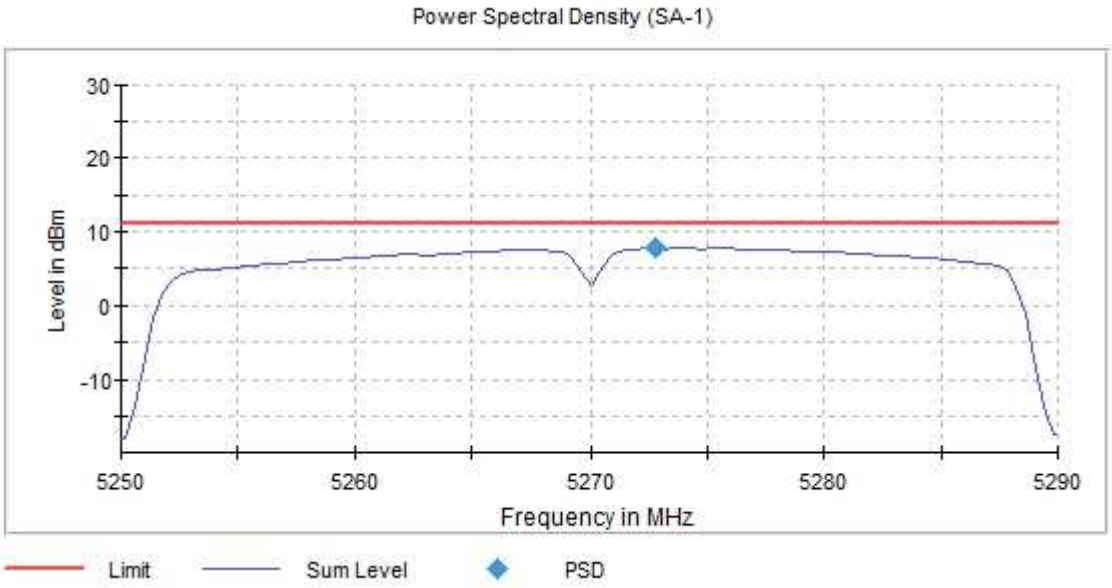
- High Channel 62 (5310 MHz):



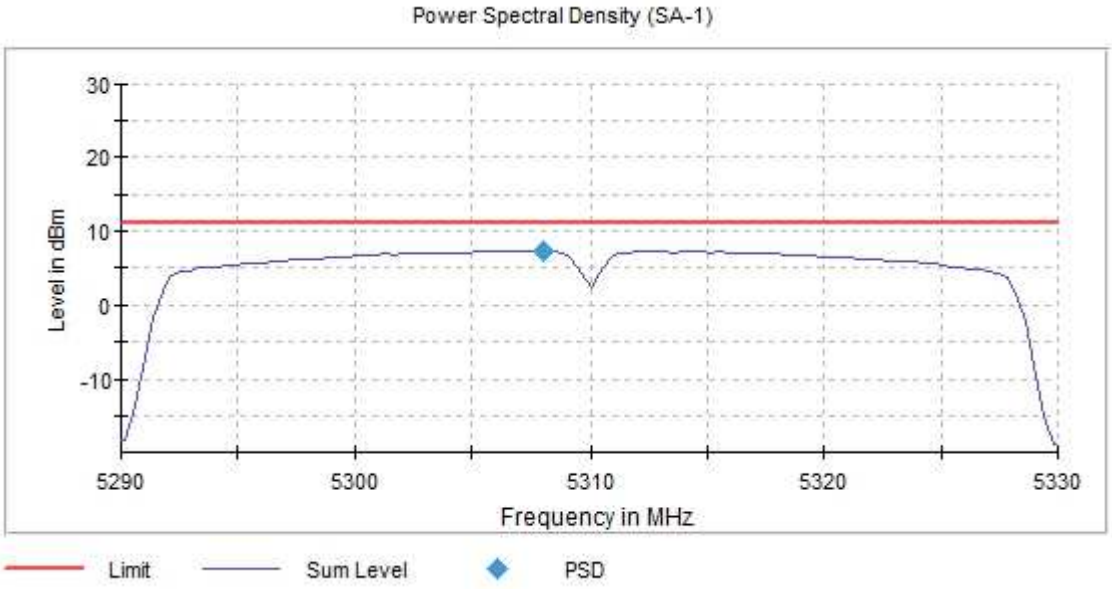
SISO 802.11 ac40 (VHT40):

U-NII-2A (5250-5350 MHz)

- Low Channel 54 (5270 MHz):



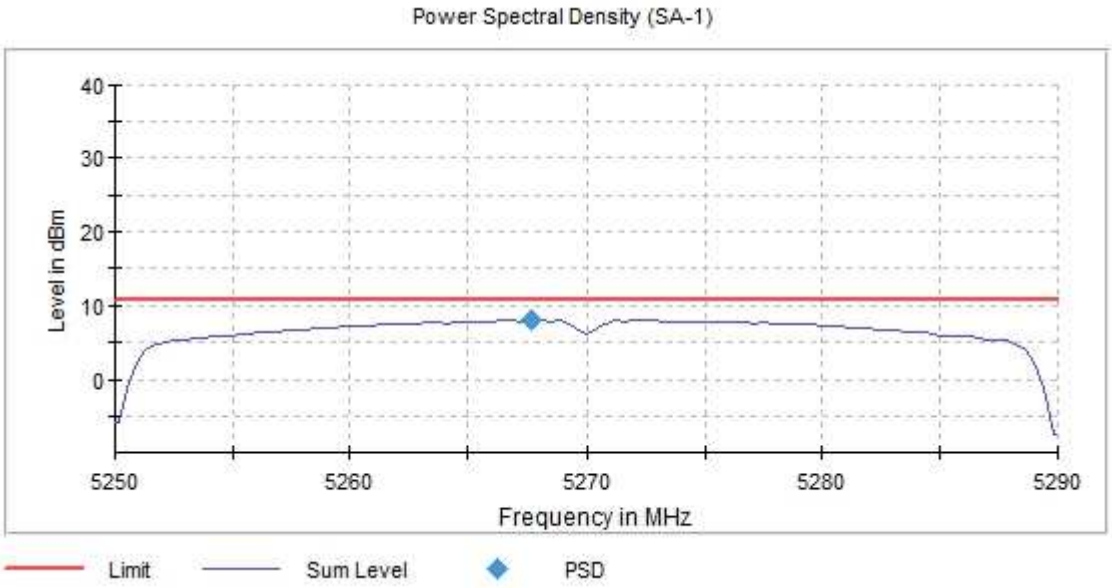
- High Channel 62 (5310 MHz):



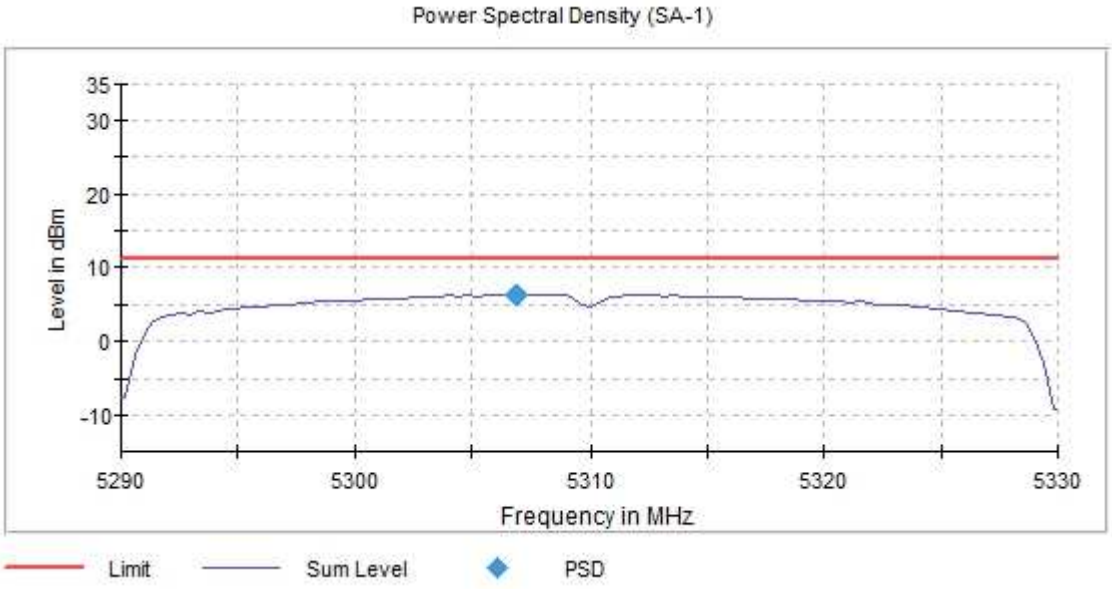
SISO 802.11 ax40 (HE40):

U-NII-2A (5250-5350 MHz)

- Low Channel 54 (5270 MHz):



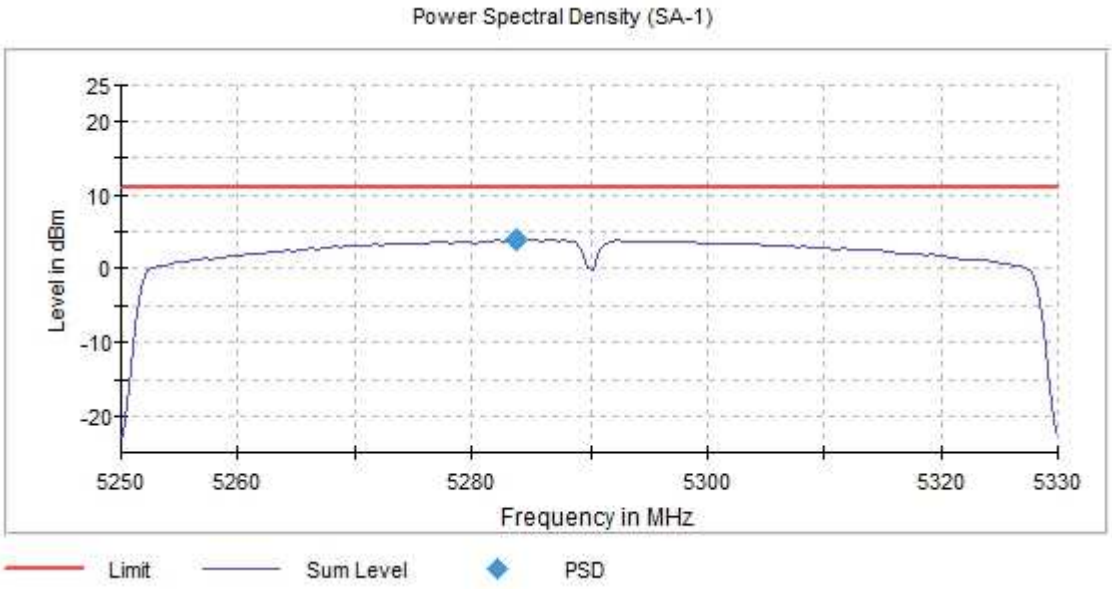
- High Channel 62 (5310 MHz):



SISO 802.11 ac80 (VHT80):

U-NII-2A (5250-5350 MHz)

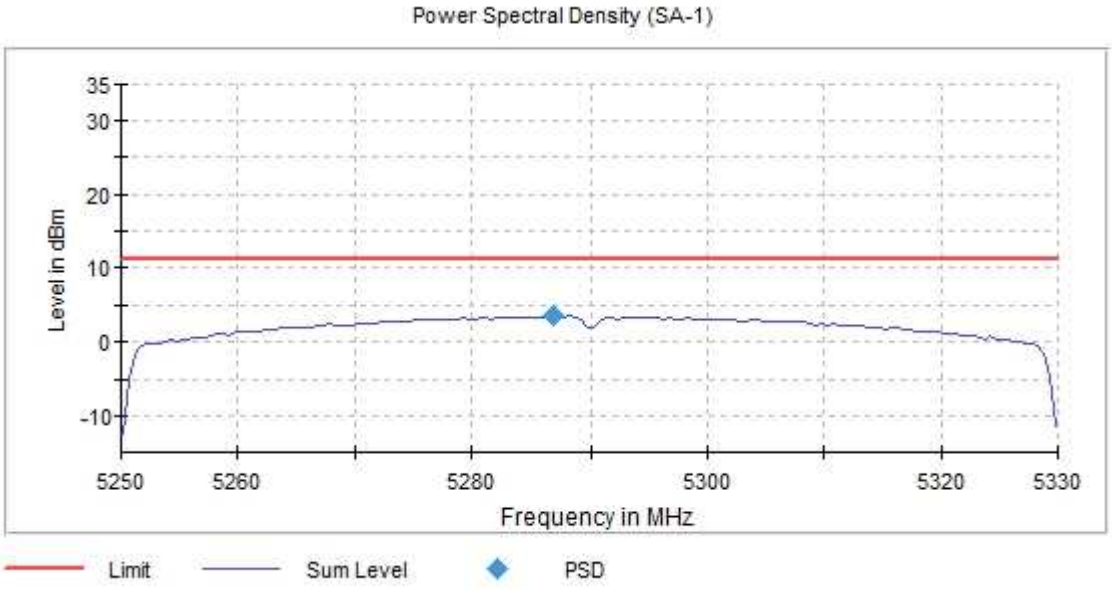
- Single Channel 58 (5290 MHz):



SISO 802.11 ax80 (HE80):

U-NII-2A (5250-5350 MHz)

- Single Channel 58 (5290 MHz):



FCC and IC power setting:

MIMO worst-case:

- Preliminary tests determined the MIMO worst-case: WLAN12.

MIMO 802.11 a20:

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted PSD (dBm)	9.939	9.827	9.458	9.108
Measurement uncertainty (kHz)	<±36.95			

MIMO 802.11 n20 (HT20):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted PSD (dBm)	9.924	9.816	9.697	8.899
Measurement uncertainty (kHz)	<±36.95			

MIMO 802.11 ac20 (VHT20):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted PSD (dBm)	9.915	9.657	9.703	9.561
Measurement uncertainty (kHz)	<±36.95			

MIMO 802.11 ax20 (HE20):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 52 (5260 MHz)	Low+1 Channel 56 (5280 MHz)	High-1 Channel 60 (5300 MHz)	High Channel 64 (5320 MHz)
Maximum Corrected Conducted PSD (dBm)	9.909	9.234	9.903	9.414
Measurement uncertainty (kHz)	<±36.95			

MIMO 802.11 n40 (HT40):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 54 (5270 MHz)	High Channel 62 (5310 MHz)
Maximum Corrected Conducted PSD (dBm)	8.487	7.770
Measurement uncertainty (kHz)	<±36.95	

MIMO 802.11 ac40 (VHT40):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 54 (5270 MHz)	High Channel 62 (5310 MHz)
Maximum Corrected Conducted PSD (dBm)	8.135	7.889
Measurement uncertainty (kHz)	<±36.95	

MIMO 802.11 ax40 (HE40):

U-NII-2A (5250-5350 MHz):

Channels	Low Channel 54 (5270 MHz)	High Channel 62 (5310 MHz)
Maximum Corrected Conducted PSD (dBm)	8.297	7.911
Measurement uncertainty (kHz)	<±36.95	

MIMO 802.11 ac80 (VHT80):

U-NII-2A (5250-5350 MHz):

Channel	Single Channel 58 (5290 MHz)
Maximum Corrected Conducted PSD (dBm)	4.814
Measurement uncertainty (kHz)	<±36.95

MIMO 802.11 ax80 (HE80):

U-NII-2A (5250-5350 MHz):

Channel	Single Channel 58 (5290 MHz)
Maximum Corrected Conducted PSD (dBm)	4.496
Measurement uncertainty (kHz)	<±36.95

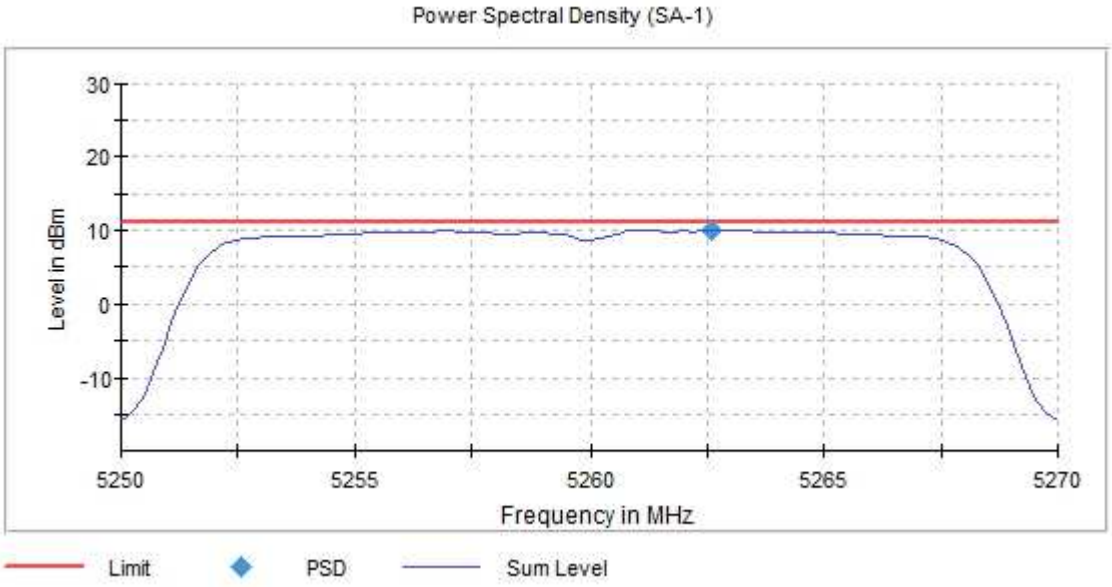
Verdict: PASS

MIMO worst-case:

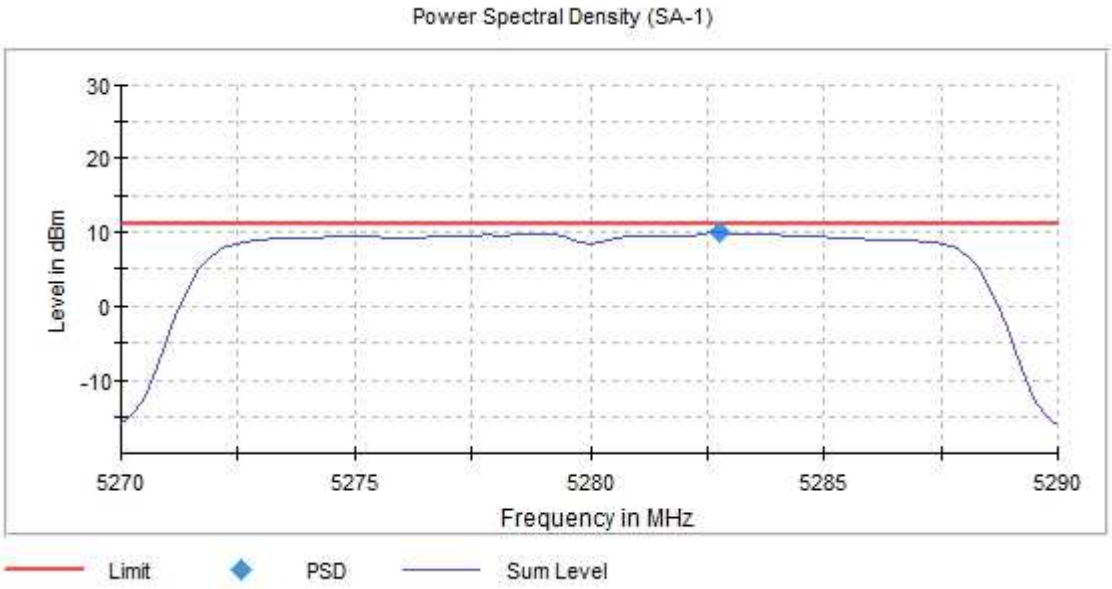
MIMO 802.11 a20:

U-NII-2A (5250-5350 MHz)

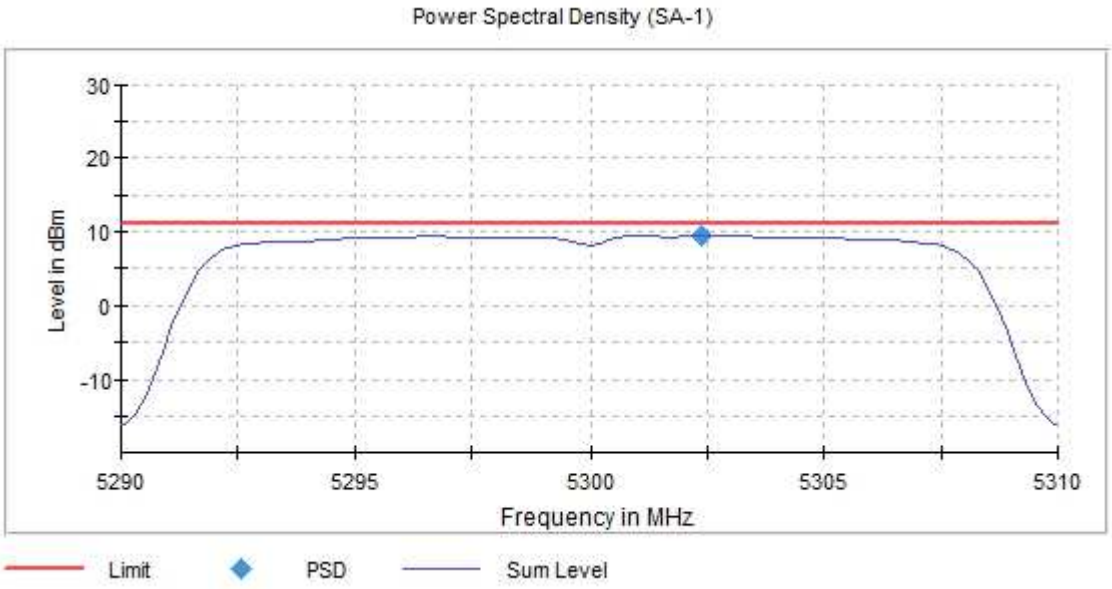
- Low Channel 52 (5260 MHz):



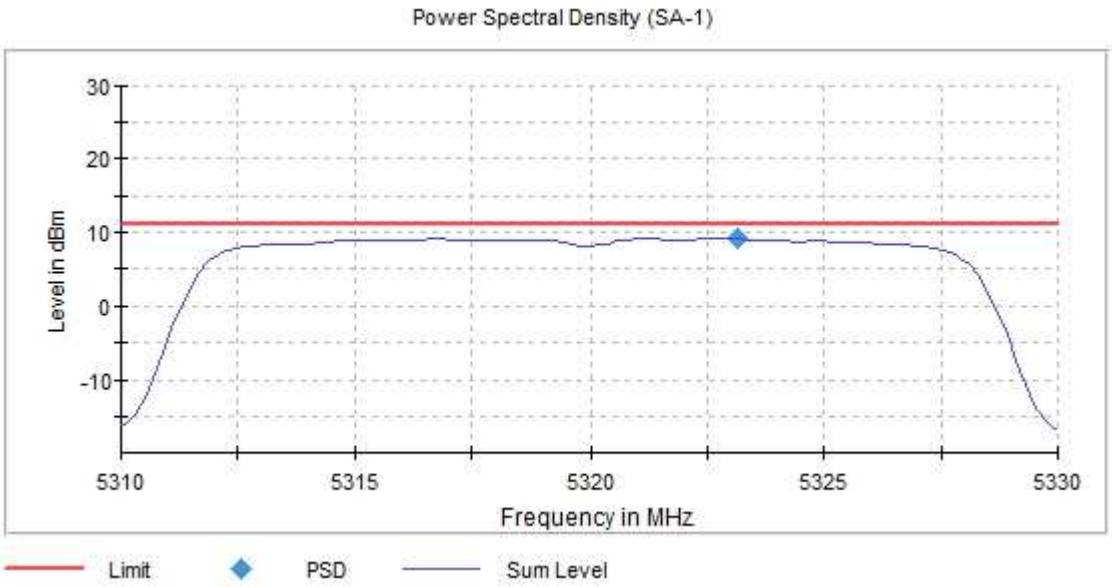
- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):



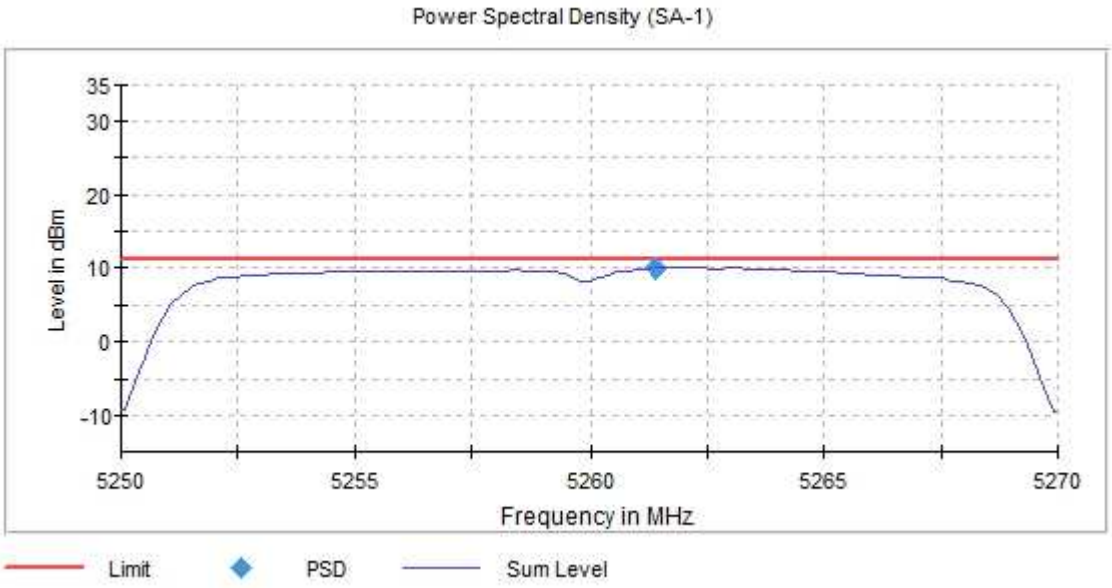
- High Channel 64 (5320 MHz):



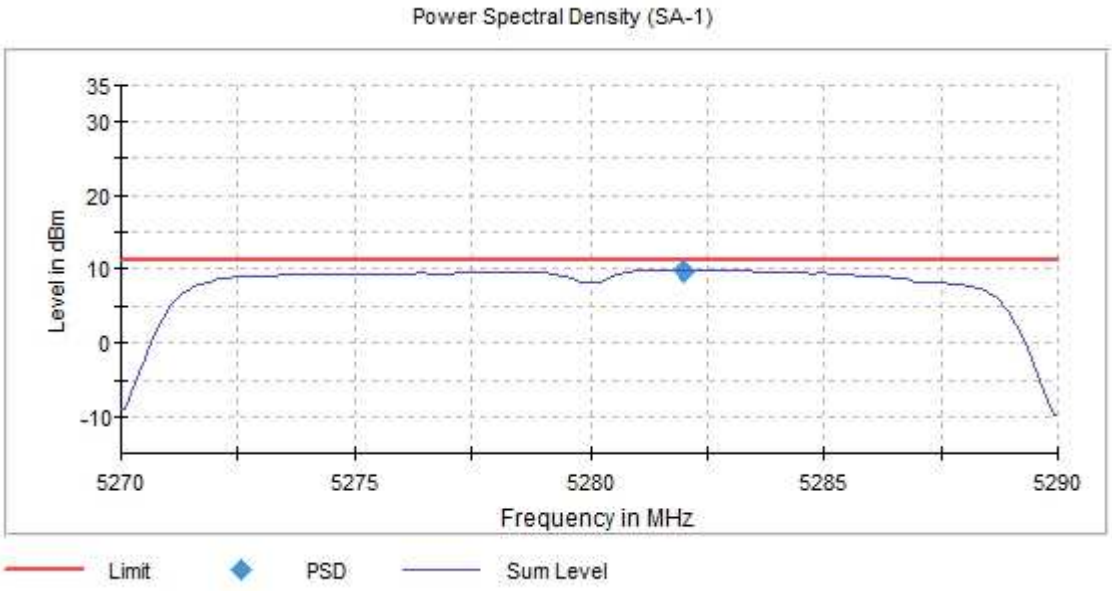
MIMO 802.11 n20 (HT20):

U-NII-2A (5250-5350 MHz)

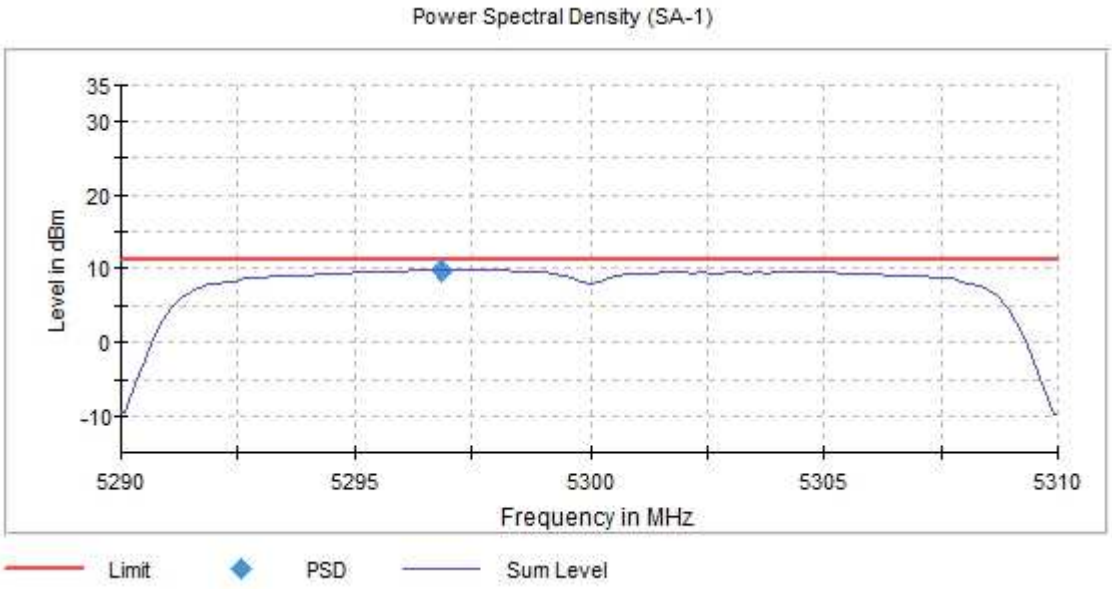
- Low Channel 52 (5260 MHz):



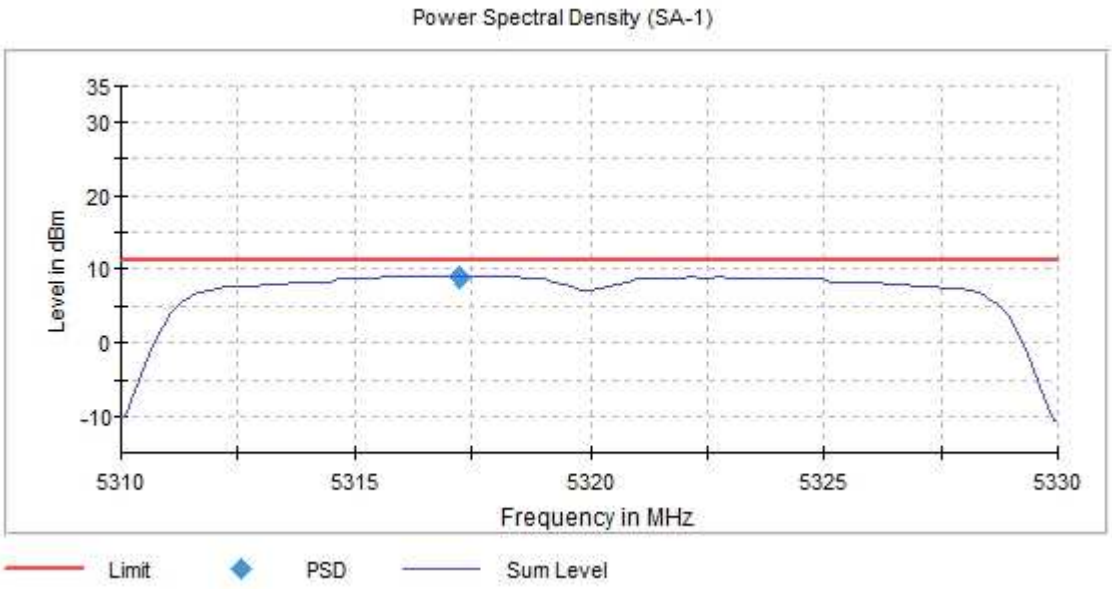
- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):



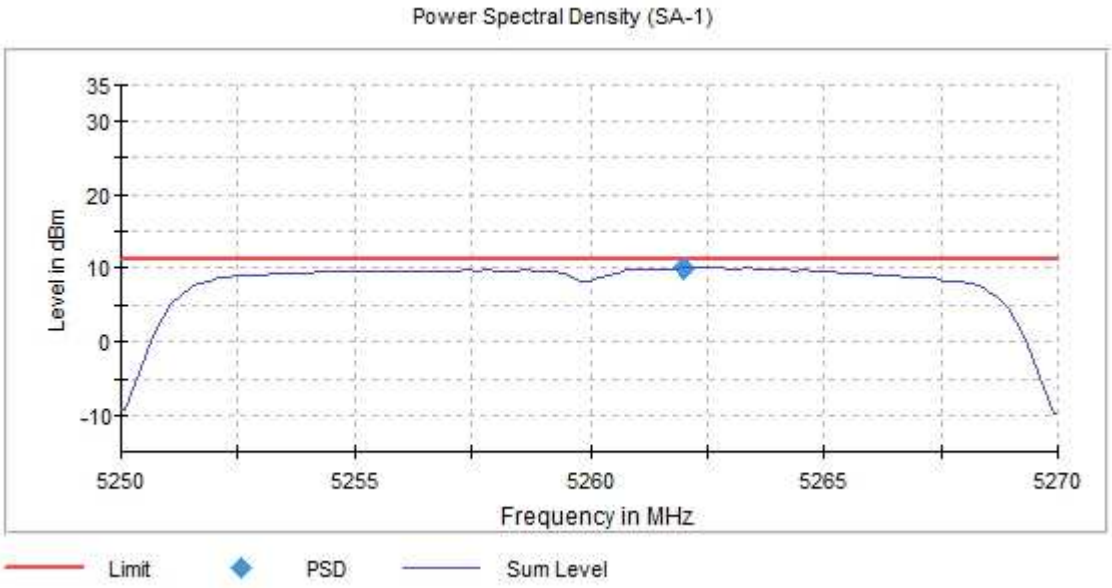
- High Channel 64 (5320 MHz):



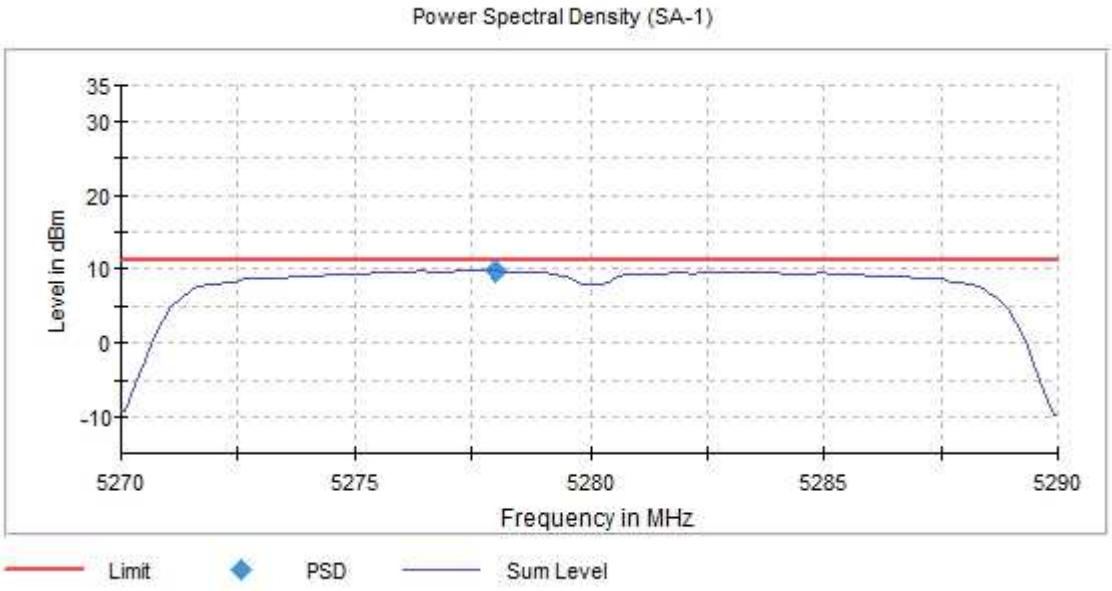
MIMO 802.11 ac20 (VHT20):

U-NII-2A (5250-5350 MHz)

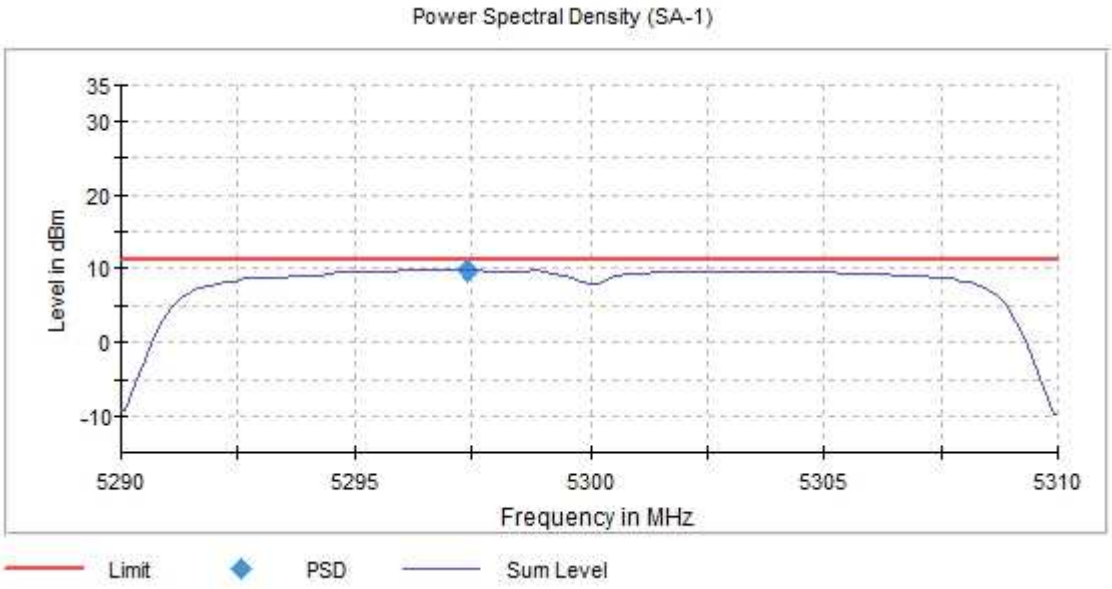
- Low Channel 52 (5260 MHz):



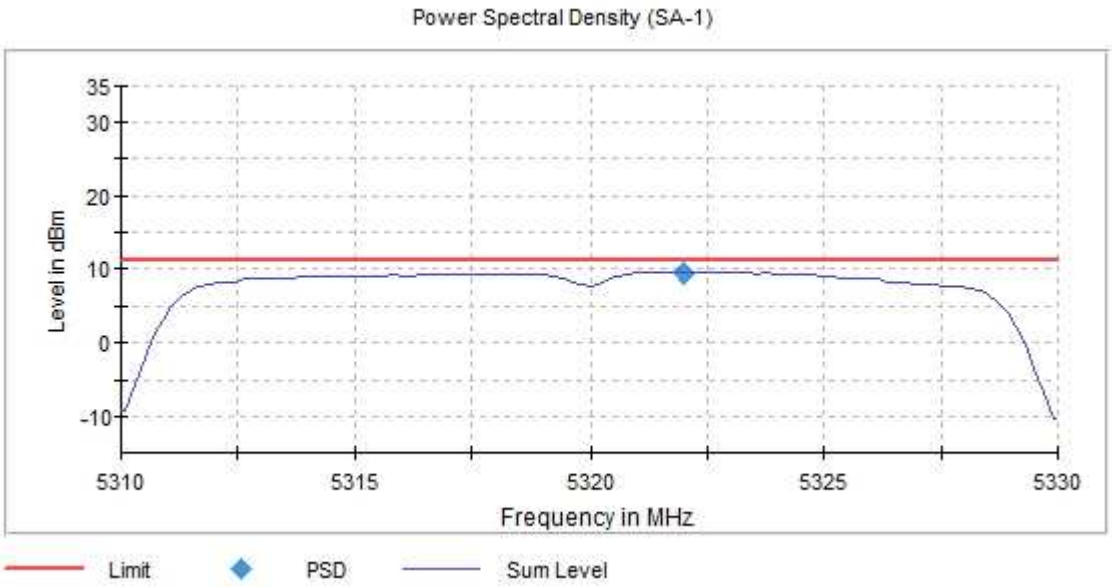
- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):



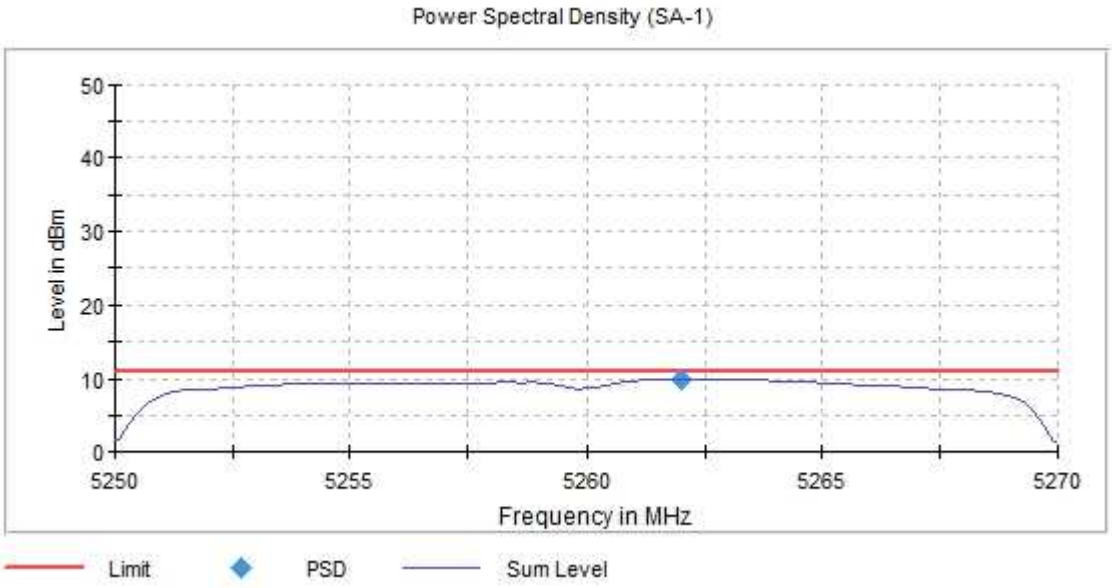
- High Channel 64 (5320 MHz):



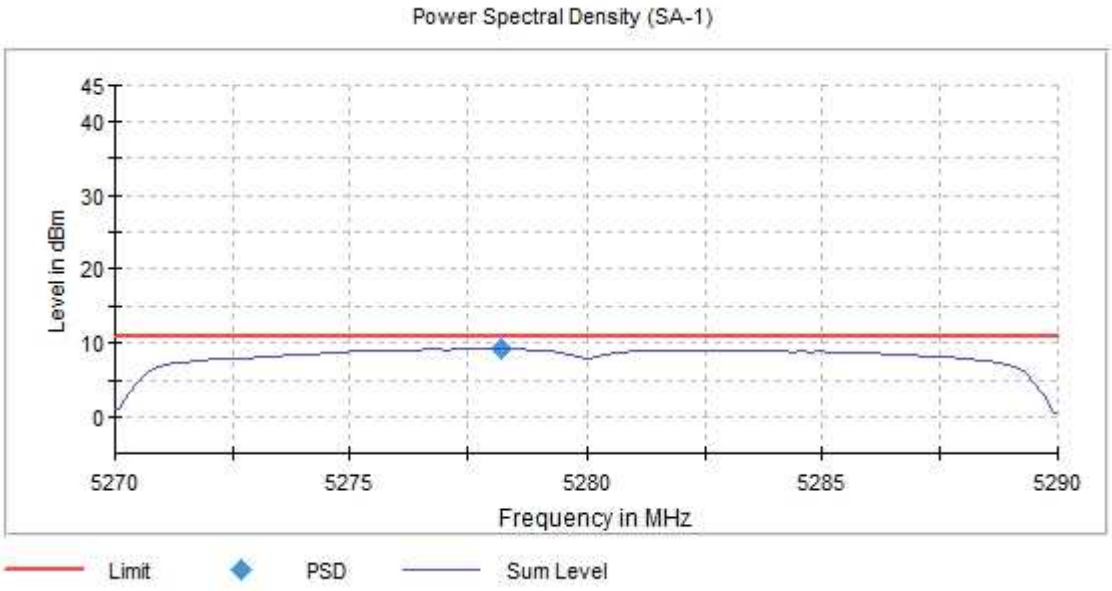
MIMO 802.11 ax20 (HE20):

U-NII-2A (5250-5350 MHz)

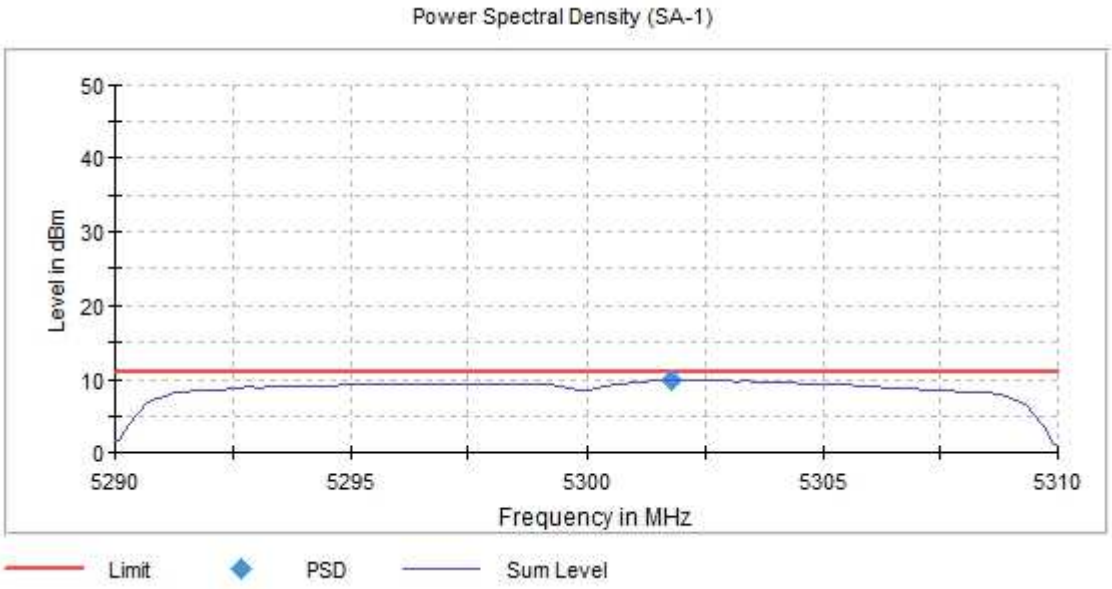
- Low Channel 52 (5260 MHz):



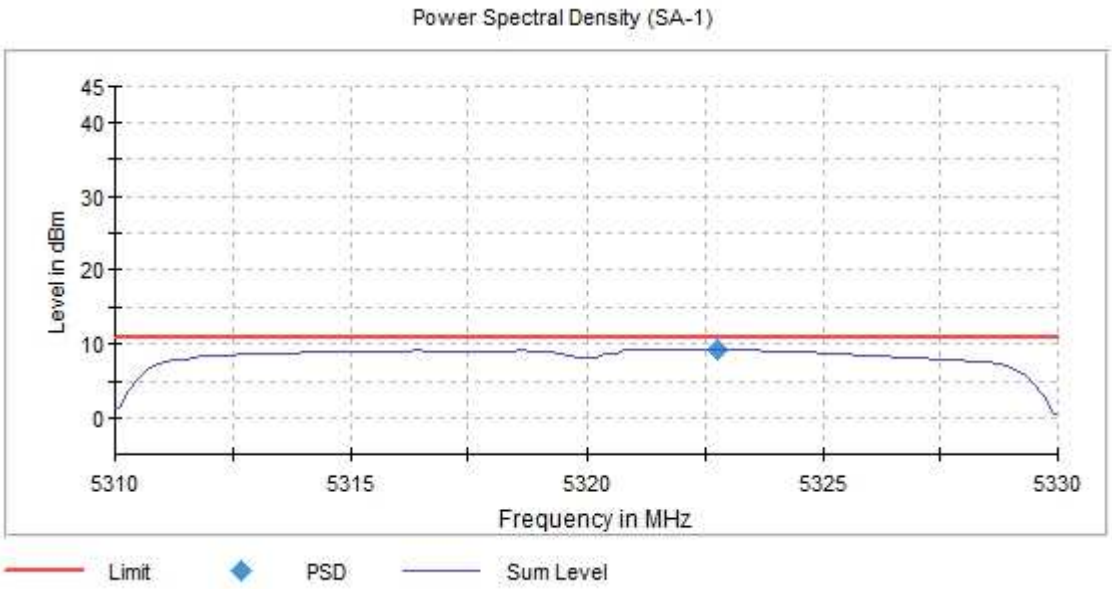
- Low+1 Channel 56 (5280 MHz):



- High-1 Channel 60 (5300 MHz):



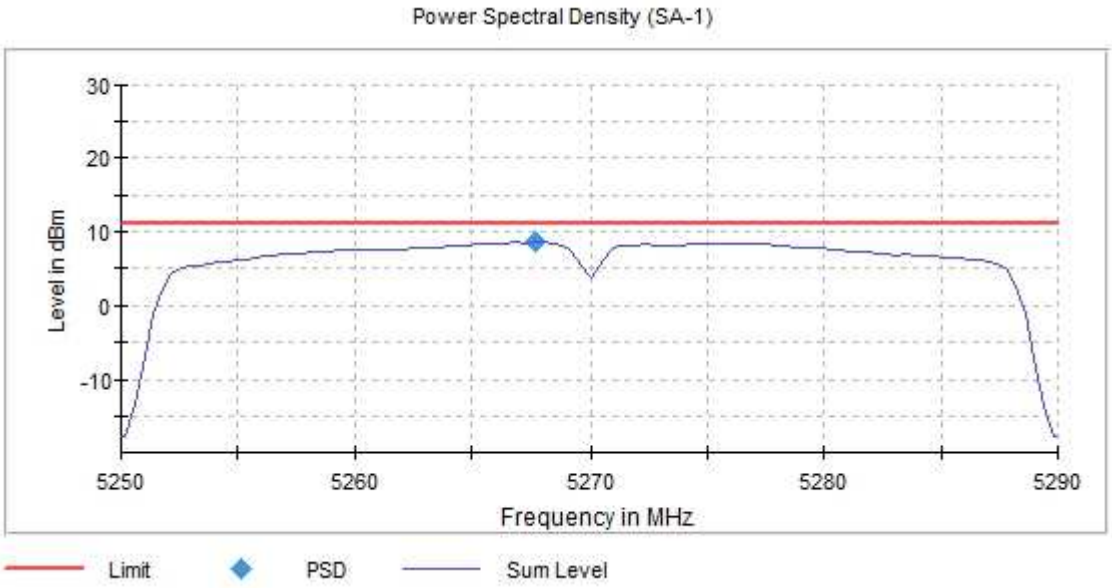
- High Channel 64 (5320 MHz):



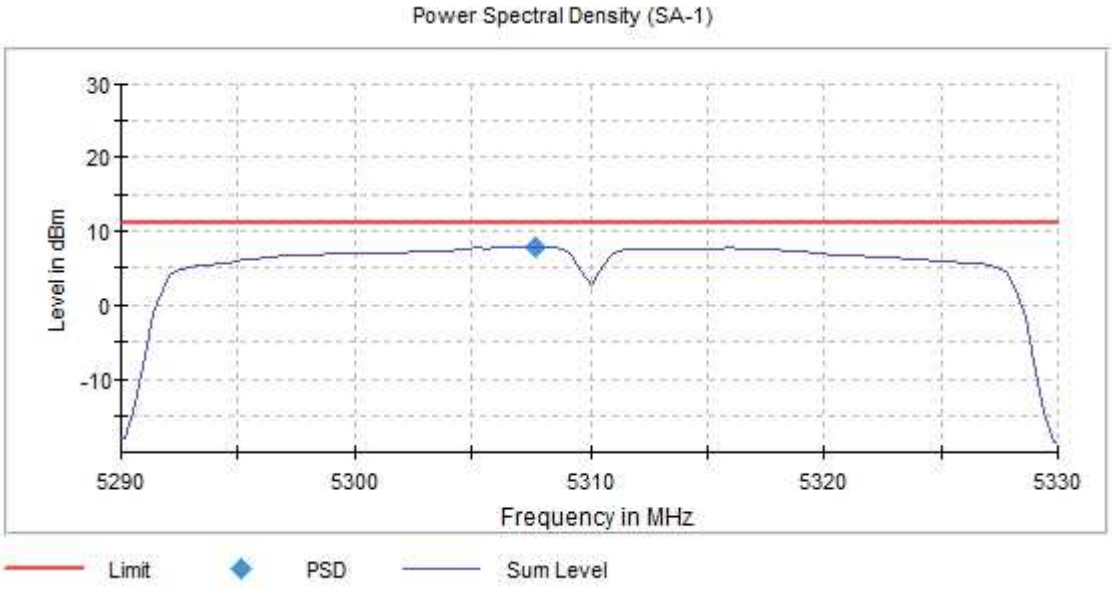
MIMO 802.11 n40 (HT40):

U-NII-2A (5250-5350 MHz)

- Low Channel 54 (5270 MHz):



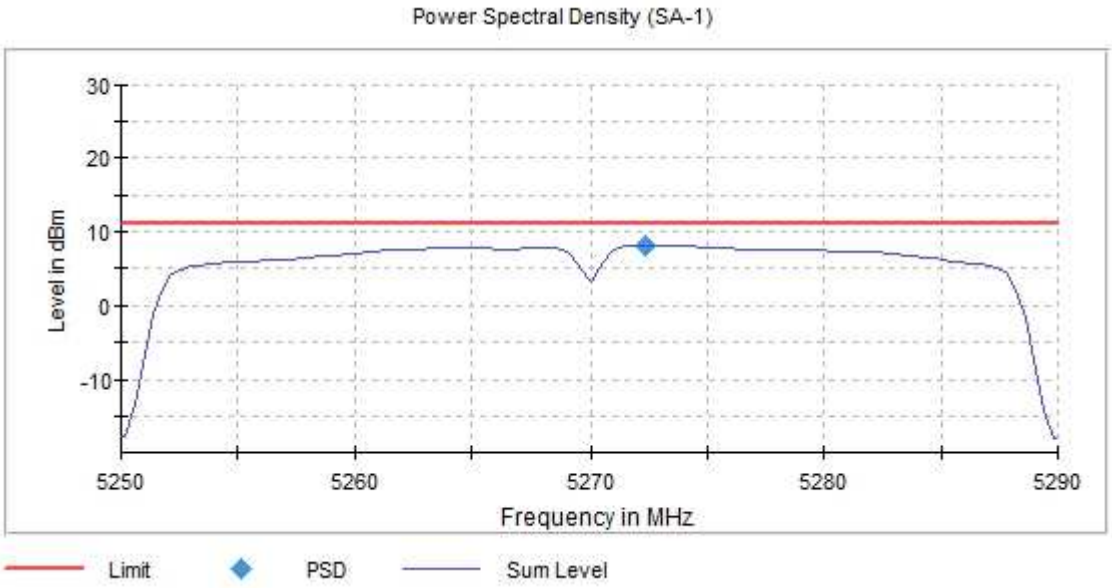
- High Channel 62 (5310 MHz):



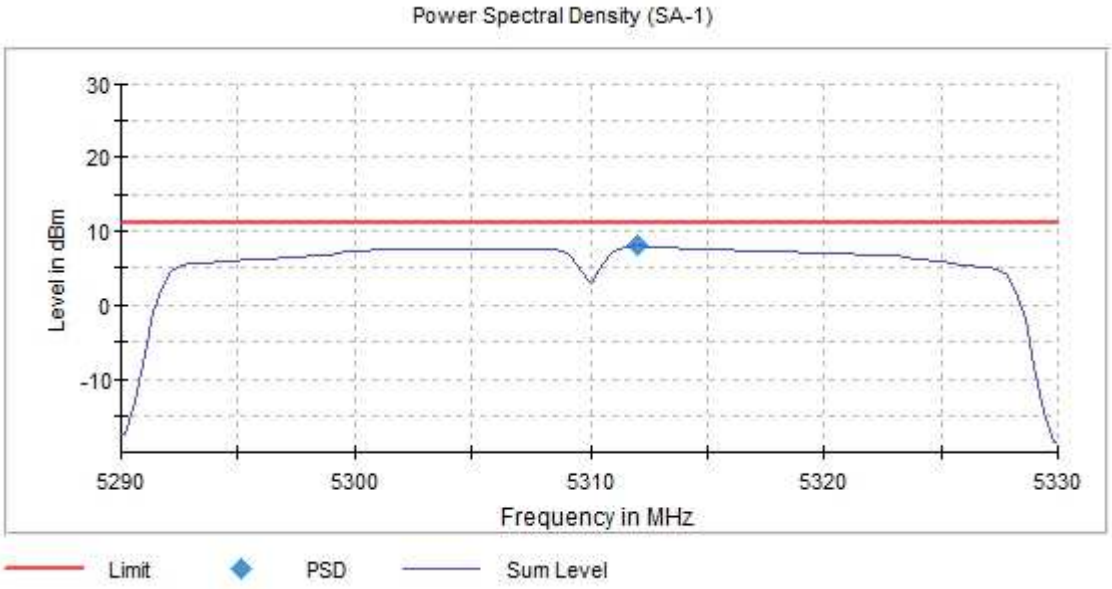
MIMO 802.11 ac40 (VHT40):

U-NII-2A (5250-5350 MHz)

- Low Channel 54 (5270 MHz):



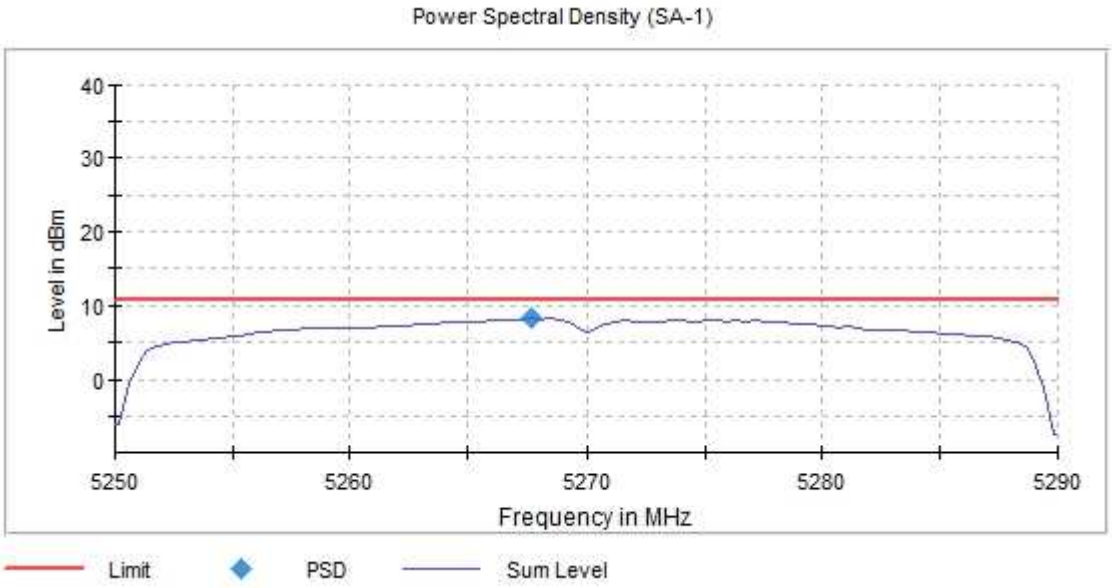
- High Channel 62 (5310 MHz):



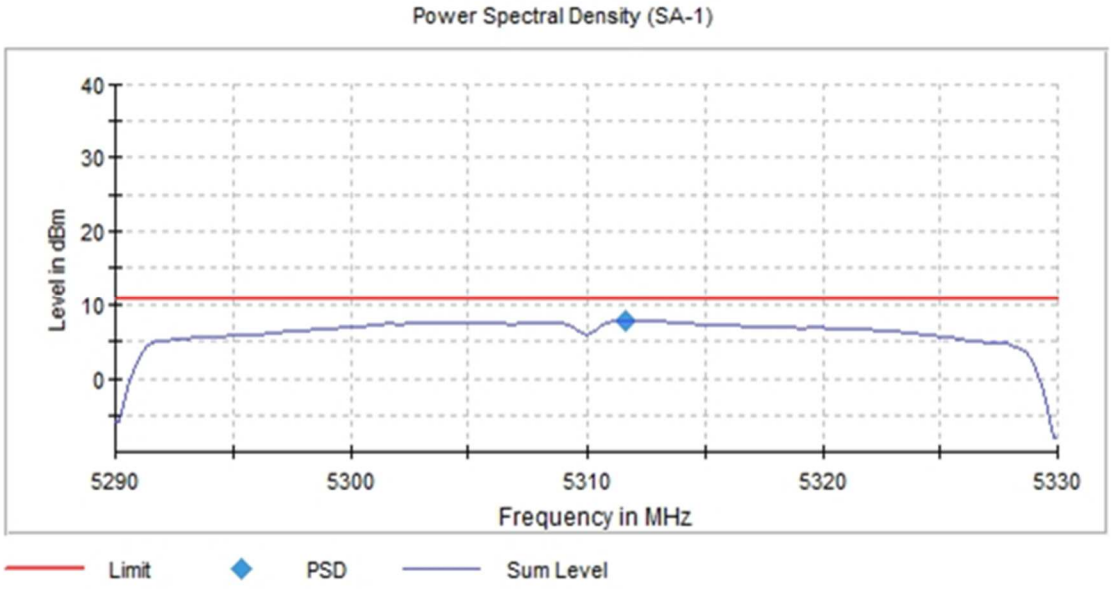
MIMO 802.11 ax40 (HE40):

U-NII-2A (5250-5350 MHz)

- Low Channel 54 (5270 MHz):



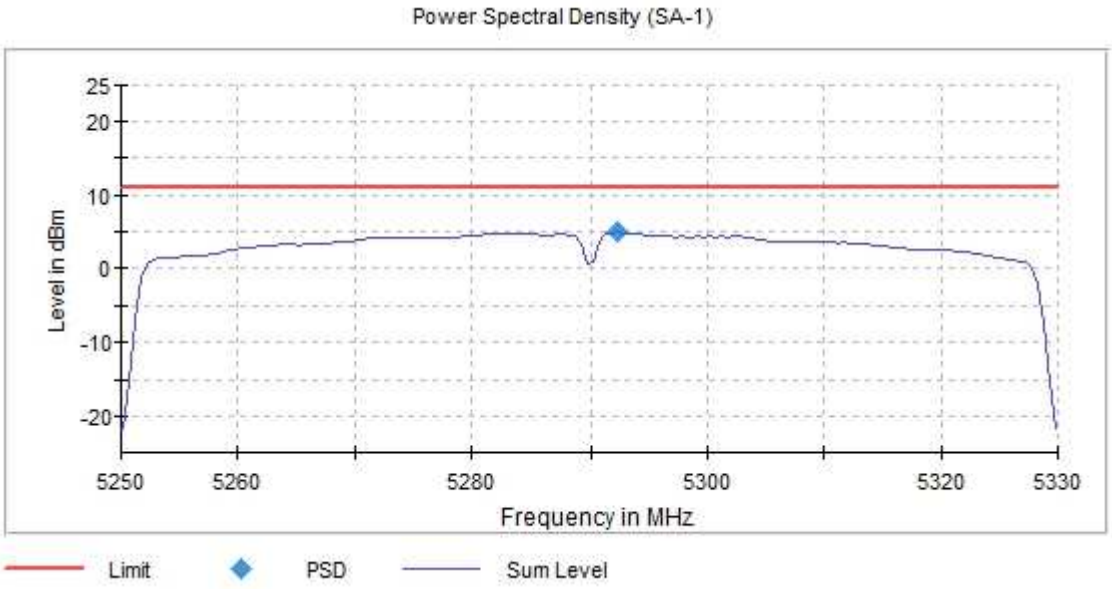
- High Channel 62 (5310 MHz):



MIMO 802.11 ac80 (VHT80):

U-NII-2A (5250-5350 MHz)

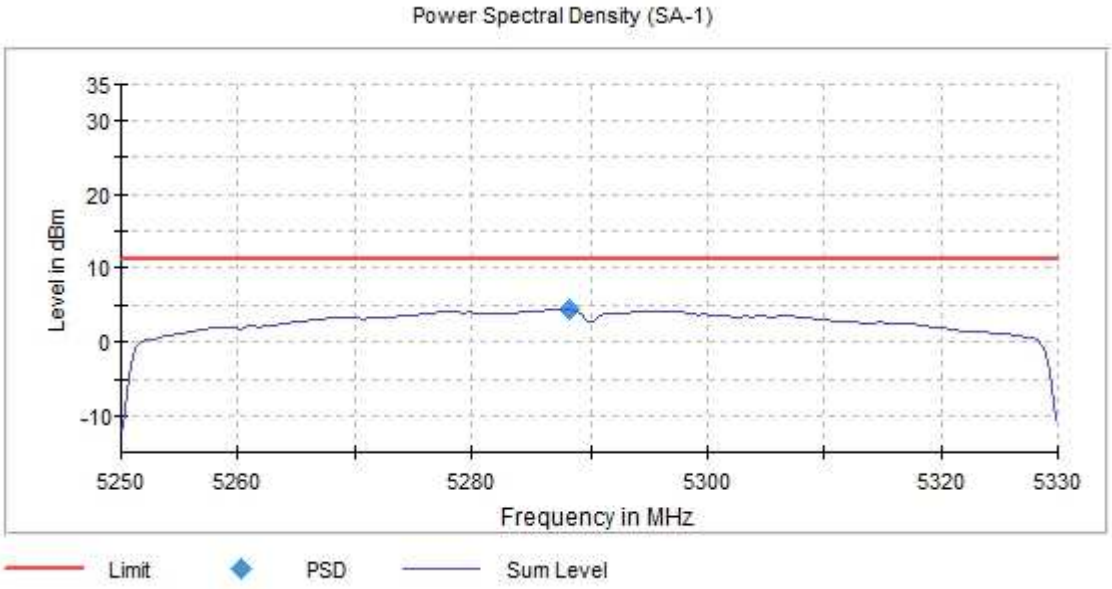
- Single Channel 58 (5290 MHz):



MIMO 802.11 ax80 (HE80):

U-NII-2A (5250-5350 MHz)

- Single Channel 58 (5290 MHz):



FCC 15.407 (b)(1) / RSS-247 6.2.1.2. Out of Band Radiated Emissions

SPECIFICATION:

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 EIRP of -27 dBm/MHz (68.20 dBµV/m at 3 m distance).

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

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 40000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 1m for the frequency range 1 GHz-40 GHz and a distance of 3m for frequency range 30MHz-1GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

The worst-case was determined by measuring the eirp density (radiated). Test performed on the worst-case:

SISO worst-case:

- Preliminary tests determined the SISO worst-case: WLAN1.

  Worst-case: 802.11 ax20 (HE20) (index MCS0).

Frequency range 30 MHz - 1 GHz (SISO worst-case):

The spurious emissions below 1 GHz do not depend on either the operating channel or the modulation mode selected in the EUT.

Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Polarization	Detector
125.884500	27.56	V	Quasi Peak
151.250000	27.10	V	Quasi Peak

Measurement Uncertainty (dB) <± 5.1

Frequency range 1 - 40 GHz (SISO worst-case):

The results in the next tables show the maximum measured levels in the 1-40 GHz frequency range.

The Low, Middle and High Channels were measured for out-of-band emissions for the worst mode.

Spurious frequencies with peak levels above the average limit (54 dBµV/m at 3 m) are measured with an average detector for checking compliance with the average limit.

- **SISO 802.11 ax20 (HE20) (SISO worst-case):**

** Duty Cycle: 0.31 dB*

- LOW CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Corrected Emission Level (dBµV/m)	Polarization	Detector
3750.000000	51.17	51.17	H	Peak
	41.83	42.14		Average
4992.000000	57.43	57.43	H	Peak
	46.53	46.84		Average
5088.000000	57.58	57.58	H	Peak
	47.33	47.64		Average
5376.000000	56.20	56.20	H	Peak
	44.26	44.57		Average
21119.760000	42.89	42.89	V	Peak
39791.620000	52.55	52.55	H	Peak
	39.63	39.94		Average

- LOW+1 CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Corrected Emission Level (dBµV/m)	Polarization	Detector
3750.000000	52.20	52.20	H	Peak
	43.27	43.58		Average
4896.000000	54.69	54.69	H	Peak
	42.23	42.54		Average
4992.000000	56.52	56.52	H	Peak
	45.88	46.19		Average
5376.000000	53.61	53.61	H	Peak
	41.35	41.66		Average

- HIGH-1 CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Corrected Emission Level (dBµV/m)	Polarization	Detector
3750.000000	51.73	51.73	H	Peak
	43.21	43.52		Average
4992.000000	57.36	57.36	H	Peak
	46.36	46.67		Average
5088.000000	57.12	57.12	H	Peak
	46.63	46.94		Average
5376.000000	55.80	55.80	H	Peak
	44.15	44.46		Average
8750.000000	50.42	50.42	V	Peak
	37.56	37.87		Average
8954.500000	49.39	49.39	V	Peak
	36.09	36.4		Average
10600.000000	54.63	54.63	V	Peak
	43.09	43.4		Average
14472.000000	53.73	53.73	V	Peak
	42.85	43.16		Average

- HIGH CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Corrected Emission Level (dBµV/m)	Polarization	Detector
3750.000000	51.90	51.90	H	Peak
	42.49	42.8		Average
3812.500000	50.59	50.59	H	Peak
	39.80	40.11		Average
4992.000000	56.62	56.62	H	Peak
	45.91	46.22		Average
5088.000000	57.35	57.35	H	Peak
	46.25	46.56		Average
5376.000000	54.89	54.89	H	Peak
	42.53	42.84		Average

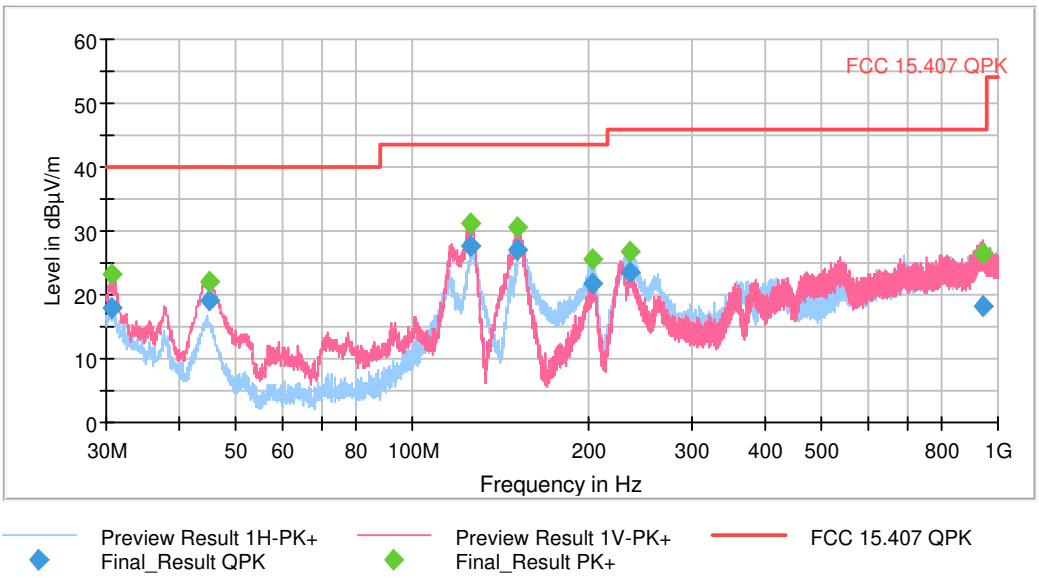
Measurement Uncertainty (dB): 1 GHz <± f < 17 GHz: <± 4.6
17 GHz <± f <± 26.5 GHz: <± 4.89
26.5 GHz <± f <± 40 GHz: <± 5.14

Verdict: PASS

SISO worst-case:

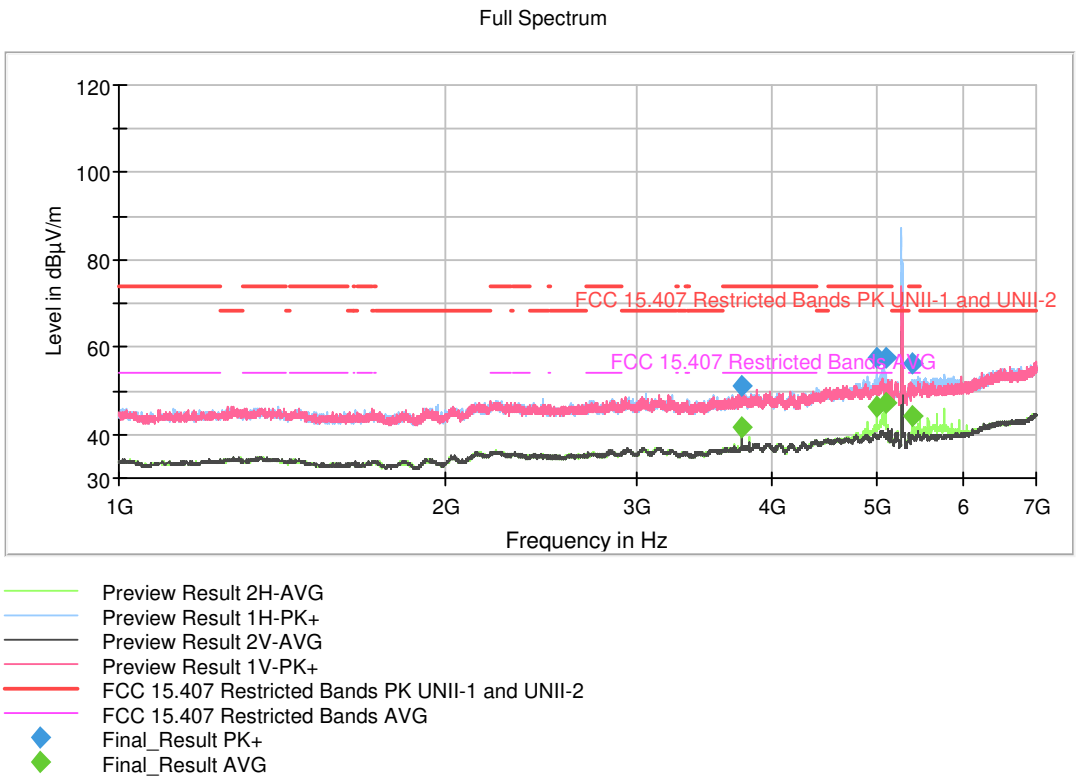
FREQUENCY RANGE 30 MHz - 1 GHz (SISO worst-case):

This plot is valid for the Low, Middle and High Channels and all the modulation modes.



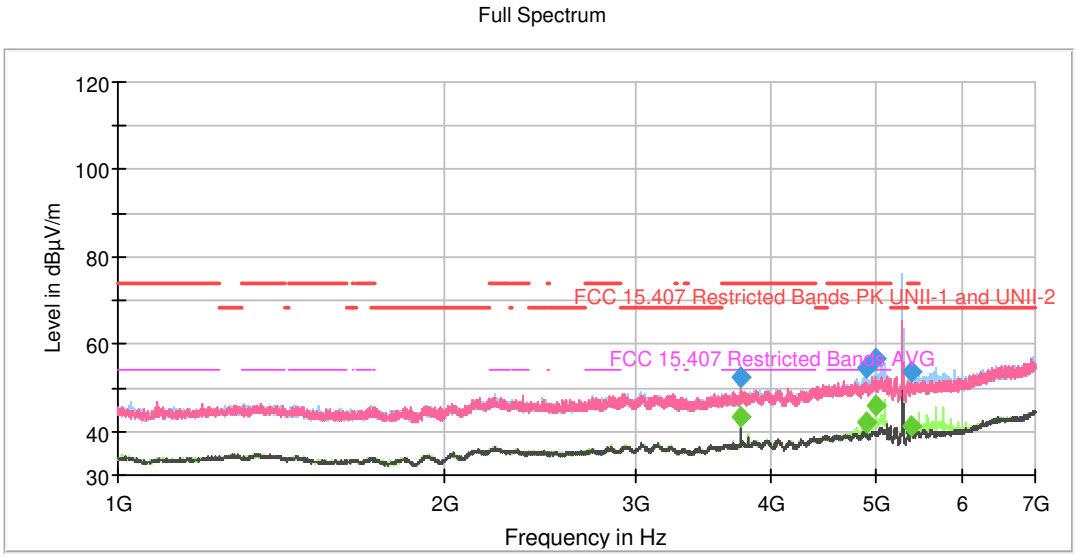
FREQUENCY RANGE 1 - 7 GHz (SISO worst-case):

- Low Channel:



Note: The peak shown in the plot above the limit is the carrier frequency.

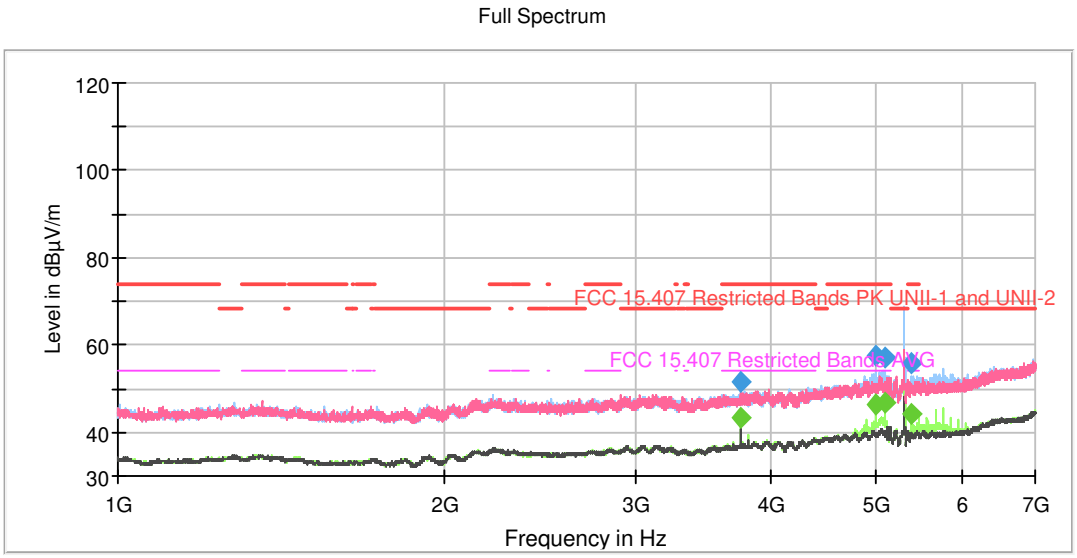
- Low+1 Channel:



Preview Result 2H-AVG
Preview Result 1H-PK+
Preview Result 2V-AVG
Preview Result 1V-PK+
FCC 15.407 Restricted Bands PK UNII-1 and UNII-2
FCC 15.407 Restricted Bands AVG
Final_Result PK+
Final_Result AVG

Note: The peak shown in the plot above the limit is the carrier frequency.

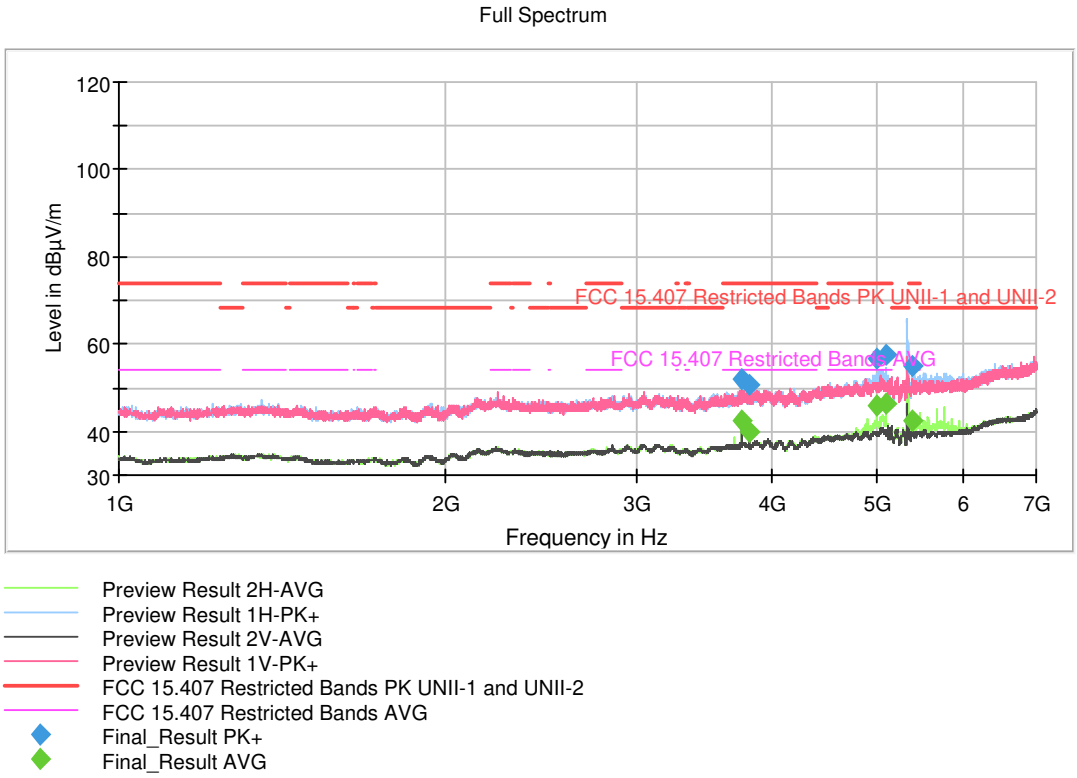
- High-1 Channel:



Preview Result 2H-AVG
Preview Result 1H-PK+
Preview Result 2V-AVG
Preview Result 1V-PK+
FCC 15.407 Restricted Bands PK UNII-1 and UNII-2
FCC 15.407 Restricted Bands AVG
Final_Result PK+
Final_Result AVG

Note: The peak shown in the plot above the limit is the carrier frequency.

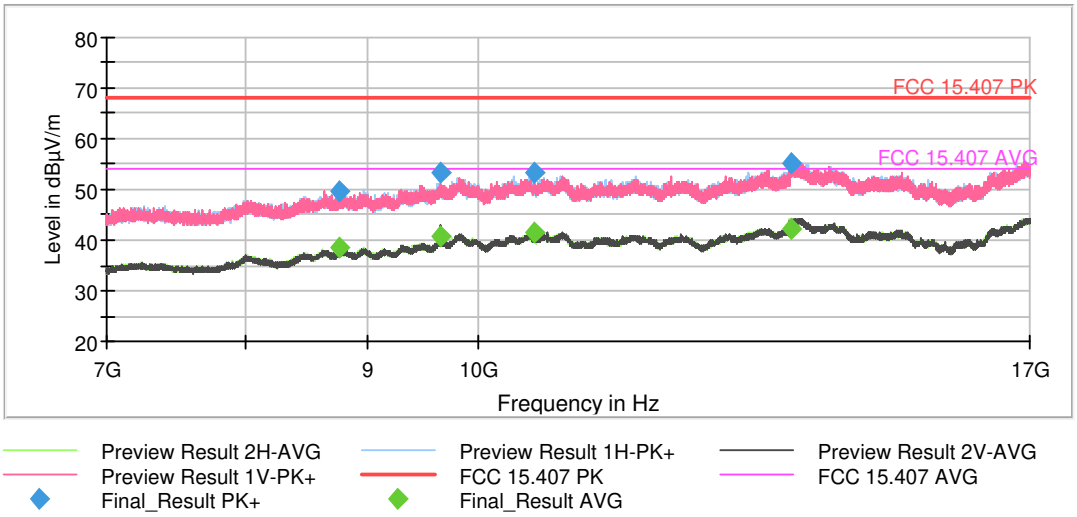
- High Channel:



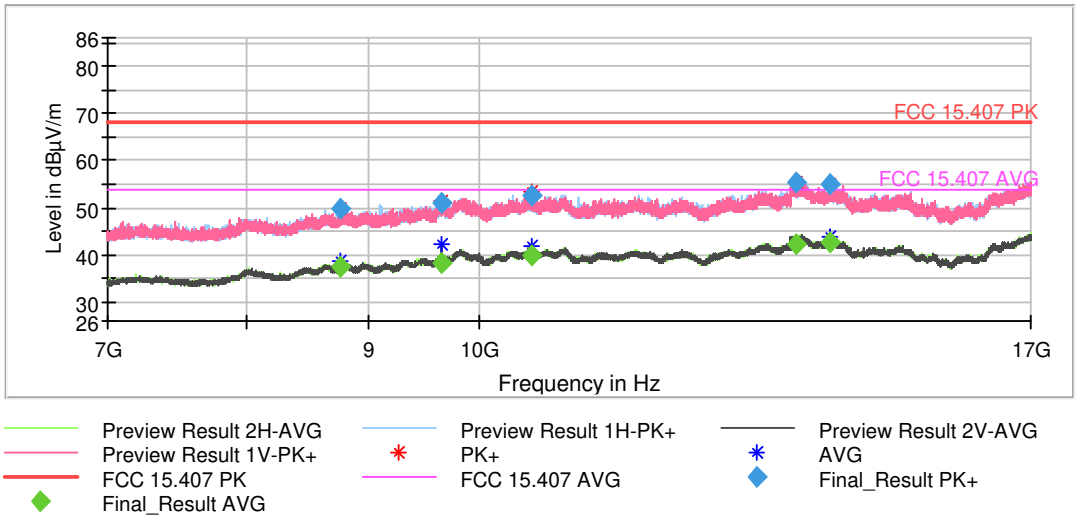
Note: The peak shown in the plot above the limit is the carrier frequency.

FREQUENCY RANGE 7 - 17 GHz (SISO worst-case):

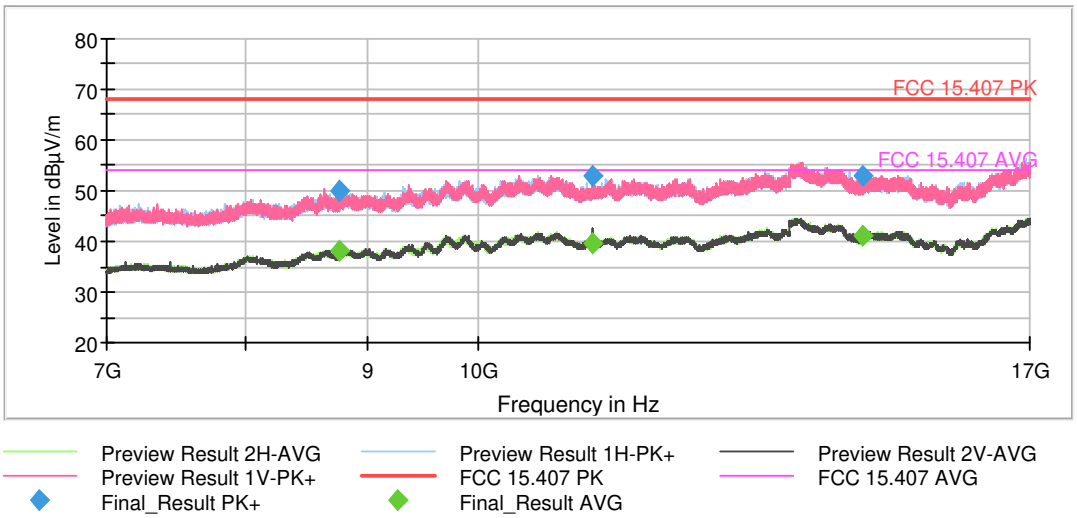
- Low Channel:



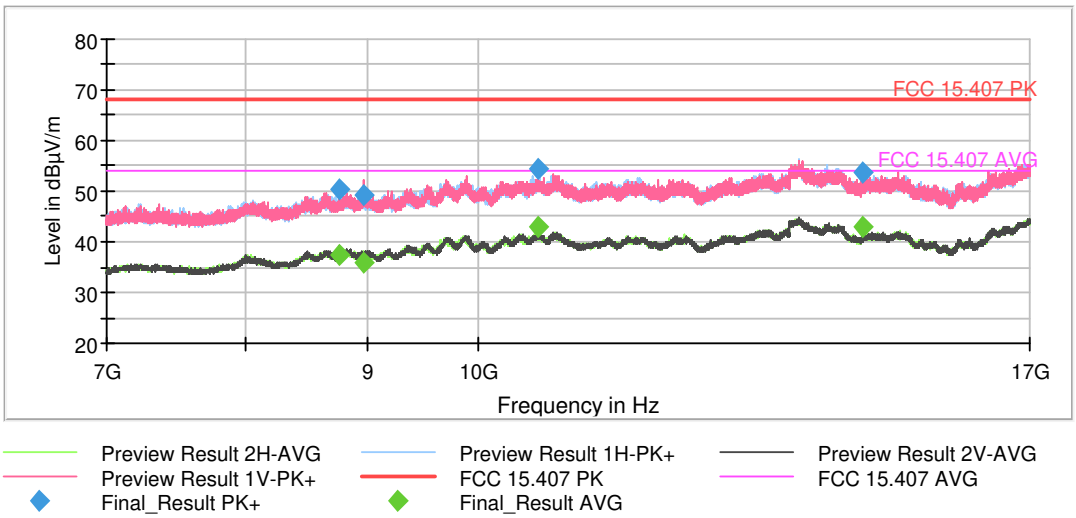
- Low+1 Channel:



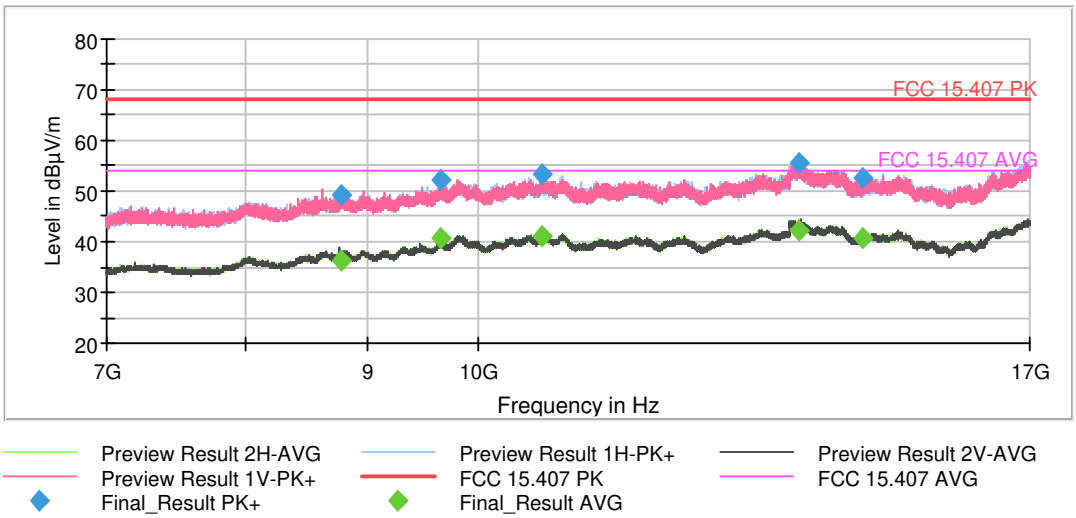
- Mid Channel:



High-1 Channel:

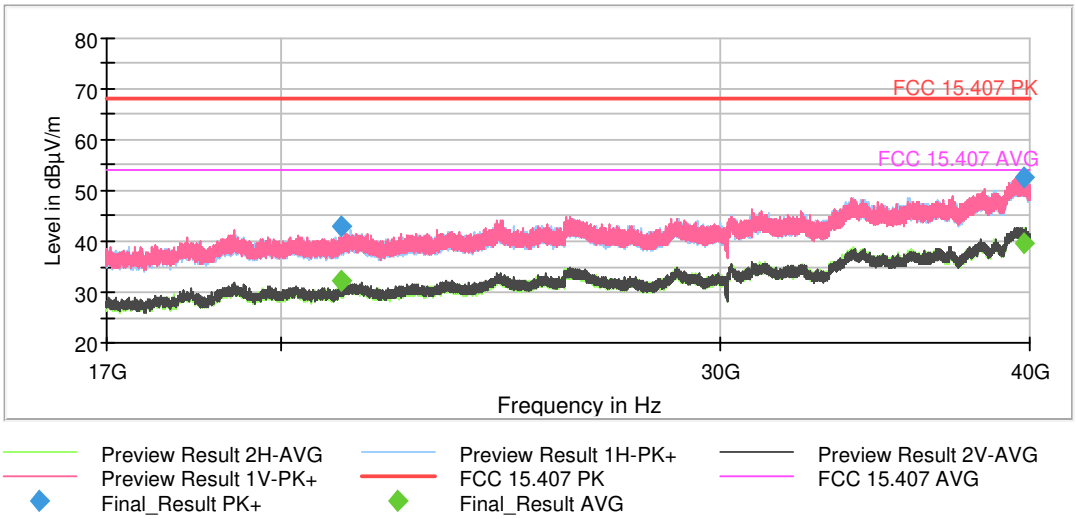


- High Channel:



FREQUENCY RANGE 17 - 40 GHz (SISO worst-case):

This plot is valid for all the Channels and all the modulation modes and bandwidths.



MIMO worst-case:

- Preliminary tests determined the MIMO worst-case: WLAN12.

Worst-case: 802.11 a20 (bit rate of 6 Mbps).

Frequency range 30 MHz - 1 GHz (MIMO worst-case):

The spurious emissions below 1 GHz do not depend on either the operating channel or the modulation mode selected in the EUT.

Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Polarization	Detector
125.981500	26.28	V	Quasi Peak
151.056000	25.25	V	Quasi Peak

Measurement Uncertainty (dB) <± 5.1

Frequency range 1 - 40 GHz (MIMO worst-case):

The results in the next tables show the maximum measured levels in the 1-40 GHz frequency range.

The Low, Middle and High Channels were measured for out-of-band emissions for the worst mode.

Spurious frequencies with peak levels above the average limit (54 dBµV/m at 3 m) are measured with an average detector for checking compliance with the average limit.

- **MIMO 802.11 a20 (MIMO worst-case):**

** Duty Cycle: 0.27 dB*

- LOW CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Corrected Emission Level (dBµV/m)	Polarization	Detector
3750.000000	50.75	50.75	V	Peak
	39.29	39.56		Average
5067.000000	61.74	61.74	H	Peak
	49.08	49.35		Average
5380.500000	70.59	70.59	H	Peak
	43.76	44.03		Average
5573.500000	52.65	52.65	V	Peak
	39.54	39.81		Average
8750.000000	50.23	50.23	V	Peak
	39.83	40.1		Average
9648.000000	53.13	53.13	V	Peak
	41.21	41.48		Average
10520.000000	53.09	53.09	V	Peak
	40.85	41.12		Average
14472.000000	52.94	52.94	V	Peak
	40.08	40.35		Average

- LOW+1 CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Corrected Emission Level (dBµV/m)	Polarization	Detector
3750.000000	51.46	51.46	H	Peak
	41.96	42.23		Average
5081.000000	59.95	59.95	H	Peak
	47.76	48.03		Average
5401.000000	62.11	62.11	H	Peak
	43.04	43.31		Average
5952.500000	54.99	54.99	H	Peak
	44.04	44.31		Average
9647.500000	51.91	51.91	V	Peak
	39.65	39.92		Average
10560.000000	51.31	51.31	V	Peak
	38.27	38.54		Average
14472.000000	52.82	52.82	V	Peak
	39.29	39.56		Average
28828.440000	44.18	44.18	V	Peak
39623.720000	51.95	51.95	V	Peak
	39.01	39.28		Average

- HIGH-1 CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Corrected Emission Level (dBµV/m)	Polarization	Detector
3750.000000	51.86	51.86	H	Peak
	41.17	41.44		Average
5101.500000	57.64	57.64	H	Peak
	45.01	45.28		Average
5420.000000	63.58	63.58	H	Peak
	44.38	44.65		Average
5568.000000	58.29	58.29	H	Peak
	48.52	48.79		Average
8750.000000	49.80	49.80	V	Peak
	37.12	37.39		Average
9648.000000	51.46	51.46	V	Peak
	38.18	38.45		Average
10600.000000	52.25	52.25	V	Peak
	39.86	40.13		Average

- HIGH CHANNEL. Spurious frequencies detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Corrected Emission Level (dBµV/m)	Polarization	Detector
3750.000000	50.84	50.84	V	Peak
	39.28	39.55		Average
5053.500000	57.28	57.28	H	Peak
	44.15	44.42		Average
5439.500000	63.86	63.86	H	Peak
	44.76	45.03		Average
5760.000000	57.22	57.22	H	Peak
	46.89	47.16		Average
8750.000000	50.21	50.21	V	Peak
	38.69	38.96		Average
9648.000000	53.00	53.00	V	Peak
	42.33	42.6		Average

10640.000000	53.13	53.13	V	Peak
	41.05	41.32		Average

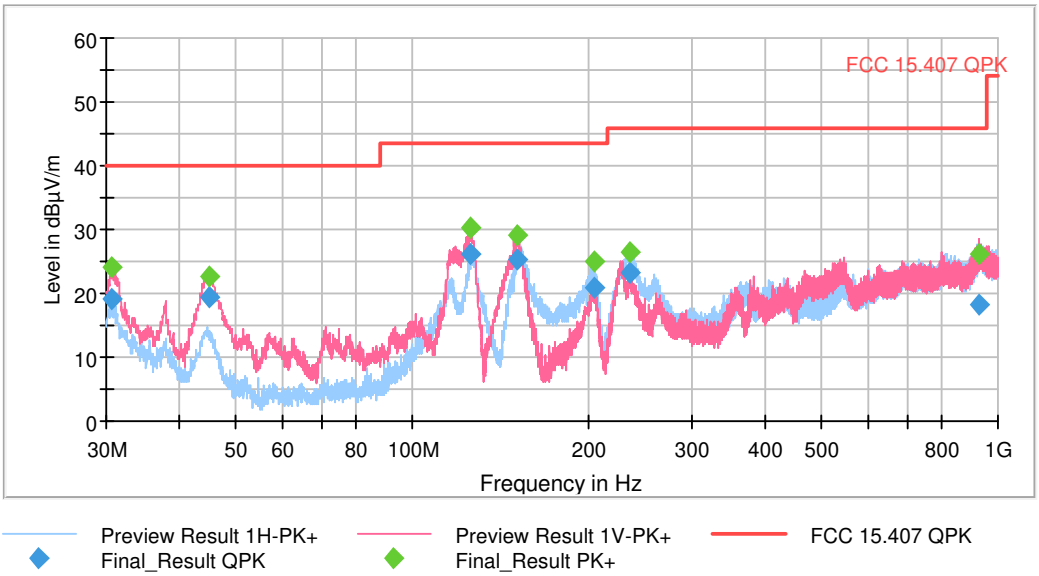
Measurement Uncertainty (dB): 1 GHz <± f < 17 GHz: <± 4.6
17 GHz <± f <± 26.5 GHz: <± 4.89
26.5 GHz <± f <± 40 GHz: <± 5.14

Verdict: PASS

MIMO worst-case:

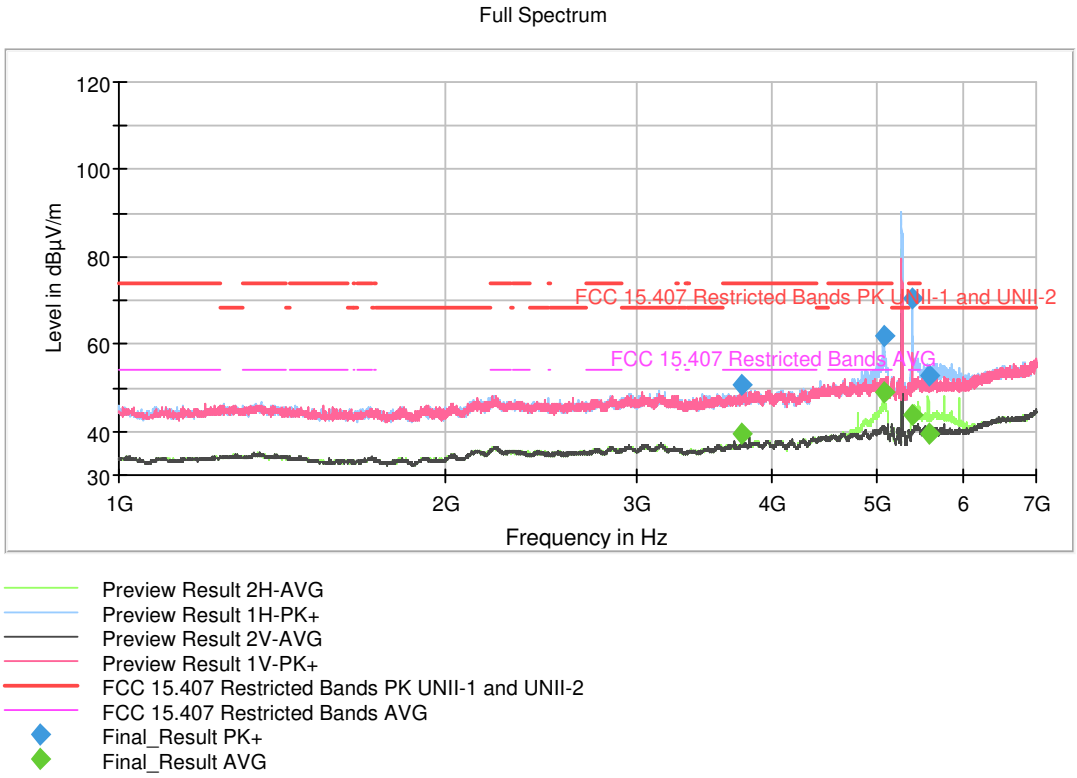
FREQUENCY RANGE 30 MHz - 1 GHz (MIMO worst-case):

This plot is valid for the Low, Middle and High Channels and all the modulation modes.



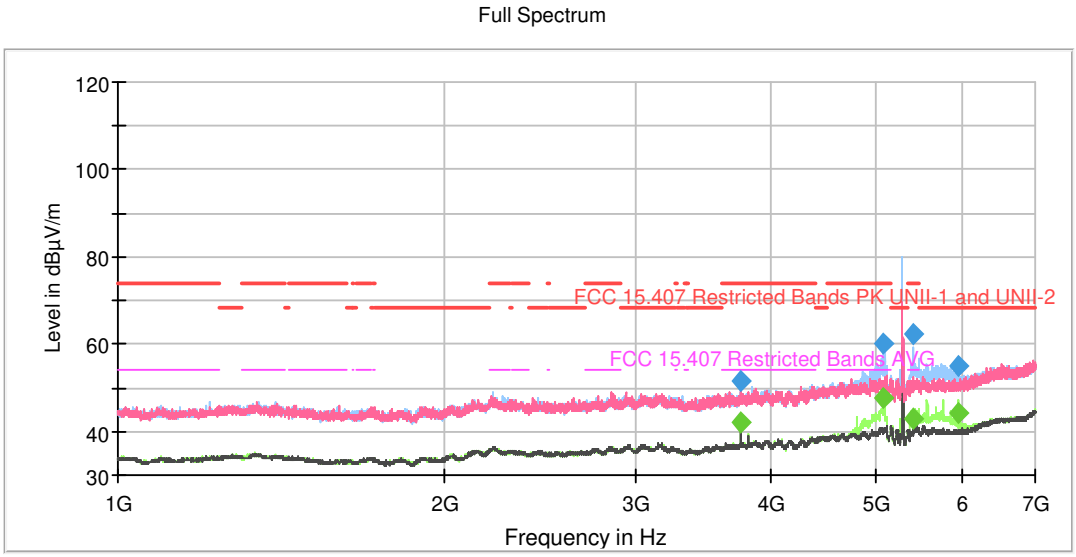
FREQUENCY RANGE 1 - 7 GHz (MIMO worst-case):

- Low Channel:



Note: The peak shown in the plot above the limit is the carrier frequency.

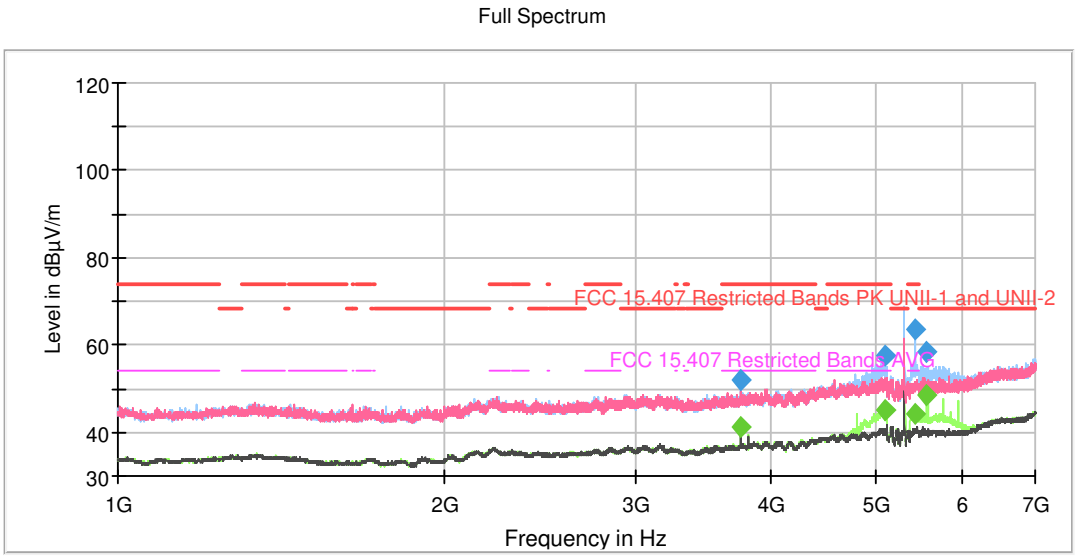
- Low+1 Channel:



Preview Result 2H-AVG
Preview Result 1H-PK+
Preview Result 2V-AVG
Preview Result 1V-PK+
FCC 15.407 Restricted Bands PK UNII-1 and UNII-2
FCC 15.407 Restricted Bands AVG
Final_Result PK+
Final_Result AVG

Note: The peak shown in the plot above the limit is the carrier frequency.

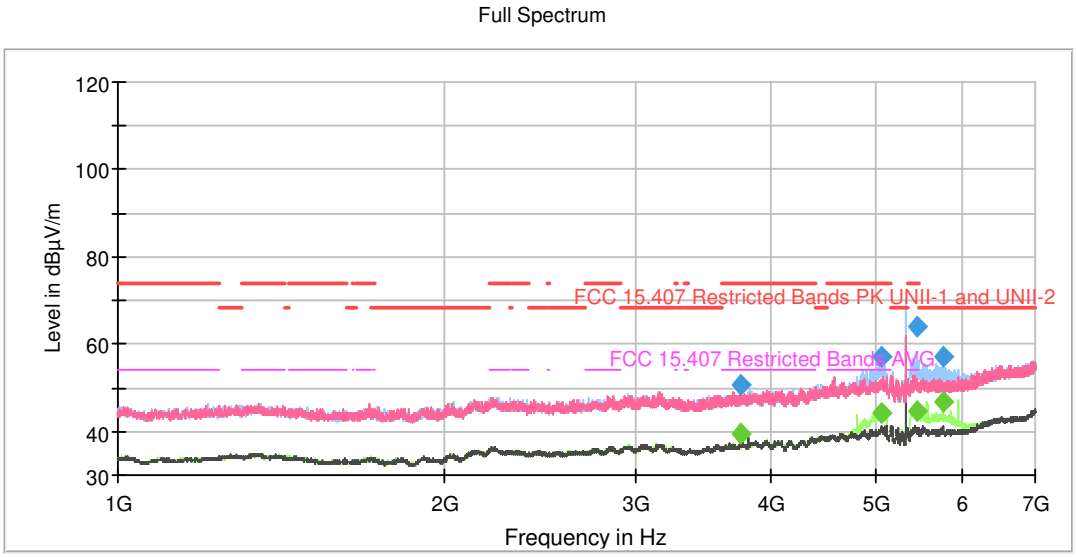
- High-1 Channel:



Preview Result 2H-AVG
Preview Result 1H-PK+
Preview Result 2V-AVG
Preview Result 1V-PK+
FCC 15.407 Restricted Bands PK UNII-1 and UNII-2
FCC 15.407 Restricted Bands AVG
Final_Result PK+
Final_Result AVG

Note: The peak shown in the plot above the limit is the carrier frequency.

- High Channel:

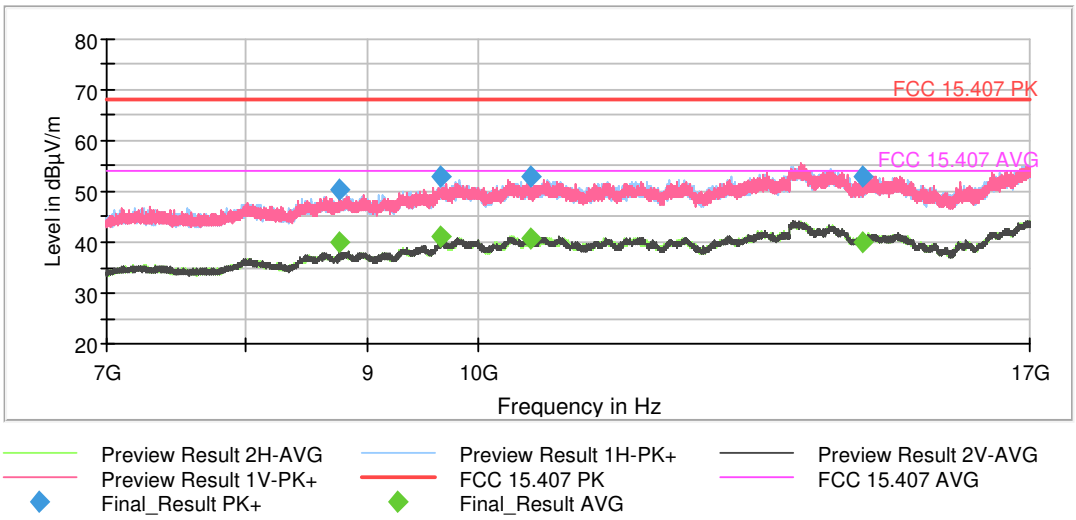


Preview Result 2H-AVG
Preview Result 1H-PK+
Preview Result 2V-AVG
Preview Result 1V-PK+
FCC 15.407 Restricted Bands PK UNII-1 and UNII-2
FCC 15.407 Restricted Bands AVG
Final_Result PK+
Final_Result AVG

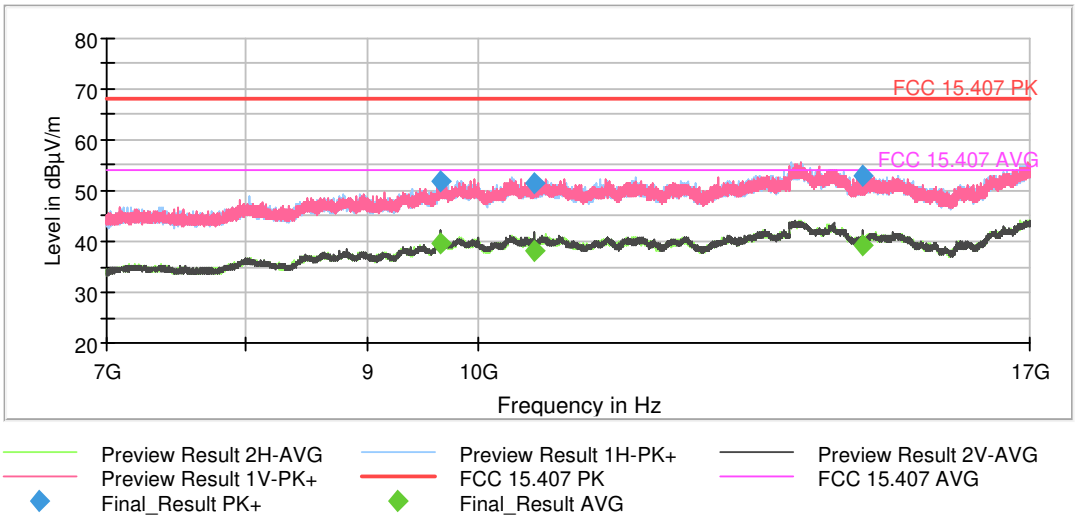
Note: The peak shown in the plot above the limit is the carrier frequency.

FREQUENCY RANGE 7 - 17 GHz (MIMO worst-case):

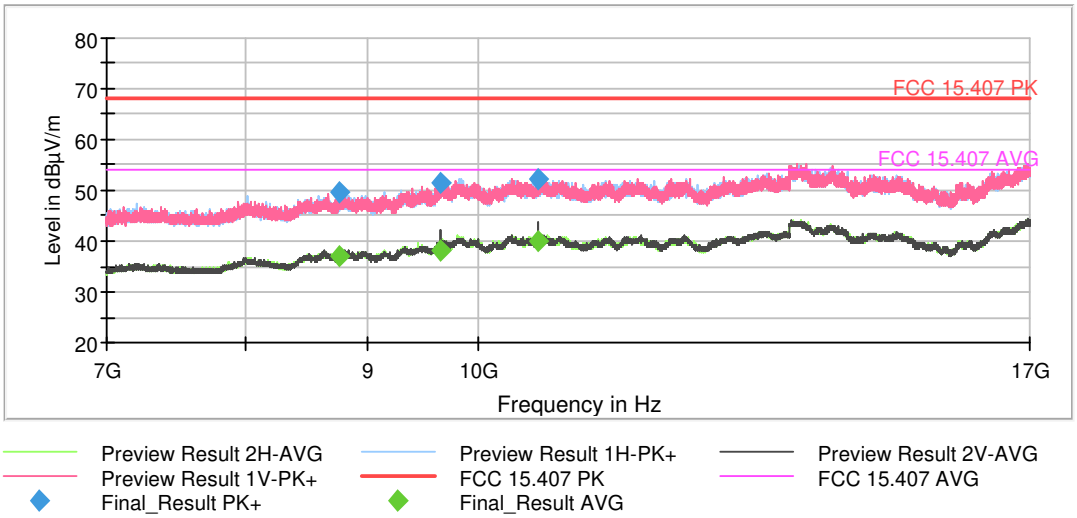
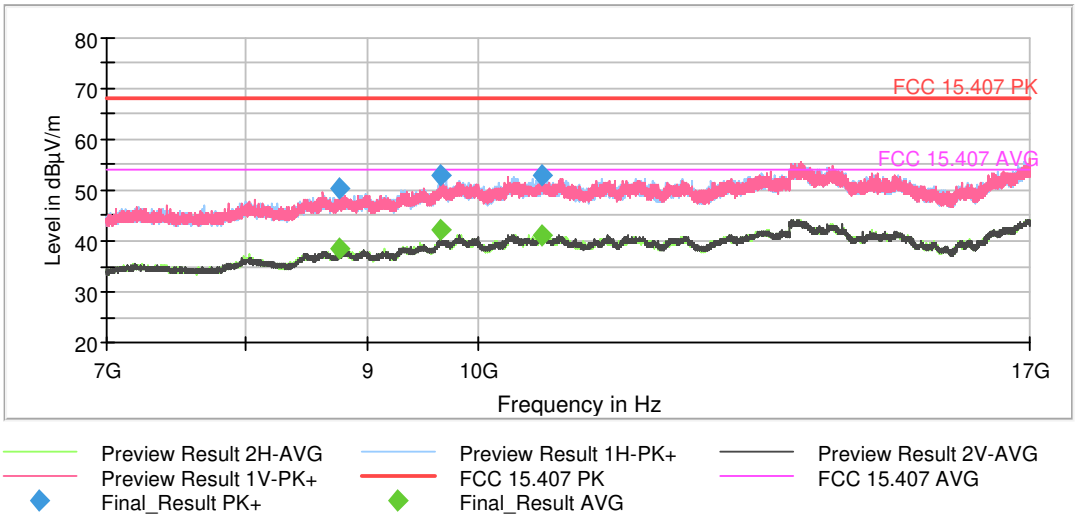
- Low Channel:



- Low+1 Channel:



- High-1 Channel:



- High Channel: