

ISED CABid: ES1909

Test Report No:
NIE: 64614RRF.005A1

Test Report

USA FCC Part 15.407, 15.209

CANADA RSS-247, RSS-Gen

(*) Identification of item tested	Infotainment Head Unit
(*) Trademark	Marelli
(*) Model and /or type reference	HUAIDP10BY
Other identification of the product	HW version: PRS4 SW version: PI14 FCC ID: RX2HUAIDP10BY IC: 4983A-HUAIDP10BY
(*) Features	Bluetooth, WLAN 5GHz Channel #149
Applicant	Marelli Europe S.p.A. Viale A. Borletti 61/63 – Corbetta (MI) - 20011 Italy
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
Date of issue	2021-11-09
Report template No	FDT08_23 (*) "Data provided by the client"

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Competences and guarantees

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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.

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Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification 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 HUAIDP10BY is an Infotainment Head Unit, with Bluetooth and Wi-Fi.

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 N°	Description	Model	Serial N°	Date of reception
64614/277	Infotainment Head Unit	HUAIDP10BY	--	2021/03/04
64614/005	Harness	--	--	2020/10/23

Auxiliary elements used with the Sample S/01:

Control N°	Description	Model	Serial N°	Date of reception
64614/004	PCB (AIDA TLS_10)	--	--	2020/10/23
64614/006	H-MTD Cable	--	--	2020/10/23
64614/007	H-MTD Cable	--	--	2020/10/23
64614/009	FAKRA Cable	--	--	2020/10/23
64614/010	FAKRA Cable	--	--	2020/10/23
64614/011	Connecting Cable	--	--	2020/10/23
64614/012	Connecting Cable	--	--	2020/10/23
64614/014	Connecting Cable	--	--	2020/10/23
64614/015	Connecting Cable	--	--	2020/10/23
64614/016	USB Cable	--	--	2020/10/23
64614/019	Ethernet Cable	--	--	2020/10/23
64614/021	Ethernet USB Adapter	--	--	2020/10/23

Sample S/01 has undergone the following test(s): The Radiated tests indicated in the Appendix B

- Sample S/02 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
64614/281	Infotainment Head Unit	HUAIDP10BY	103D3A00DC3R	2021/03/04
64614/005	Harness	--	--	2020/10/23

Auxiliary elements used with the Sample S/01:

Control N°	Description	Model	Serial N°	Date of reception
64614/019	Ethernet Cable	--	--	2020/10/23
64614/021	Ethernet USB Adapter	--	--	2020/10/23
64614/034	Reducer MAIN HARNESS	--	--	2020/11/04

Sample S/02 has undergone the following test(s): The Conducted tests indicated in the Appendixes A, B.

Test sample description

Ports..... :	Port name and description	Cable			
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾
		-	☐	☐	☐
-		☐	☐	☐	
Supplementary information to the ports..... :	-				
Rated power supply	Voltage and Frequency				
	☒ DC: 13.5Vdc				
Rated Power..... :	-				
Clock frequencies..... :	-				
Other parameters	-				
Software version..... :	-				
Hardware version	-				
Dimensions in cm (W x H x D) ... :	-				
Mounting position	☐ 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

Marelli Europe S.p.A.

Viale A. Borletti 61/63 – Corbetta (MI) - 20011 Italy

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-06-11
Date (finish)	2021-11-08

Document history

Report number	Date	Description
64614RRF.005	2021-10-08	First release.
64614RRF.005A1	2021-11-09	Second release due to include measurements with bandwidth of 40MHz and 80MHz. This modification test report cancels and replaces the test report 64614RRF.005

Environmental conditions

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

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

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

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

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

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

Remarks and comments

The tests have been performed by the technical personnel: José Manuel Jiménez, Pablo Redondo, Javier Miguel Nadales.

Used instrumentation:

Radiated Measurements:

	Last Calibration	Due Calibration
1. Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N/A	N/A
2. Shielded Room ETS LINDGREN S101	N/A	N/A
3. Biconical/Log Antenna 30MHz - 6 GHz ETS LINDGREN 3142E	2020/10	2023/10
4. RF Preamplifier 40 dB, 10 MHz - 6 GHz BONN ELEKTRONIK BLNA 0160-01N	2021/03	2022/03
5. EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7	2021/11	2023/11
6. Horn Antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D	2020/08	2023/08
7. Horn Antenna 18-40 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9170	2020/05	2023/05
8. RF Preamplifier G>40dB, 1-18GHz BONN ELEKTRONIK BLMA 0118-1M	2021/06	2022/06
9. Pre-amplifier G>30dB 18-40 GHz BONN ELEKTRONIK BLMA 1840-3G	2019/11	2021/11
10. Signal and Spectrum Analyzer 10 Hz - 40 GHz ROHDE AND SCHWARZ FSV40	2020/03	2022/03
11. DC Power Supply 30V/5A KEYSIGHT TECHNOLOGIES U8002A	N/A	N/A
12. Digital Multimeter, FLUKE 175	2020/11	2021/11

Conducted Measurements

	Last Calibration	Due Calibration
1. Shielded Room ETS LINDGREN S101	N/A	N/A
2. Signal and Spectrum Analyzer ROHDE AND SCHWARZ FSV 40	2021/02	2023/02
3. Open Switch Unit up to 18 GHz ROHDE AND SCHWARZ OSP 150	N/A	N/A
4. OPEN SWITCH UNIT UP TO 7.5 GHz	2021/08	2023/08
5. DC Power Supply, 30V/5A KEYSIGHT TECHNOLOGIES U8002A	N/A	N/A
6. Digital Multimeter, FLUKE 175	2020/11	2021/11

Testing verdicts

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

Summary

A. Common requirements for all bands

FCC PART 15 PARAGRAPH / RSS-247		
Requirement – Test case	Verdict	Remark
Duty Cycle	P	
Transmitter 99% Occupied Bandwidth	P	
<u>Supplementary information and remarks:</u> None.		

B. 5.725 GHz – 5.85 GHz Band

FCC PART 15 PARAGRAPH / RSS-247		
Requirement – Test case	Verdict	Remark
FCC 15.407 (e) / RSS-247 Clause 6.2.4.1	6 dB Bandwidth.	P
FCC 15.407 (a)(3) / RSS-247 6.2.4.1	Transmitter Maximum conducted Output Power	P
FCC 15.407 (a)(3) / RSS-247 Clause 6.2.4.1	Transmitter Maximum Power Spectral Density	P
FCC 15.407 (b) (4) / RSS-247 6.2.4.2	Transmitter Band Edge Radiated Emissions	P
FCC 15.407 (b) (4) (6) / RSS-247 6.2.4.2	Transmitter Out of Band Radiated Emissions	P
<u>Supplementary information and remarks:</u> None.		

Appendix A: Test Common requirements for all bands

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Transmitter Duty Cycle

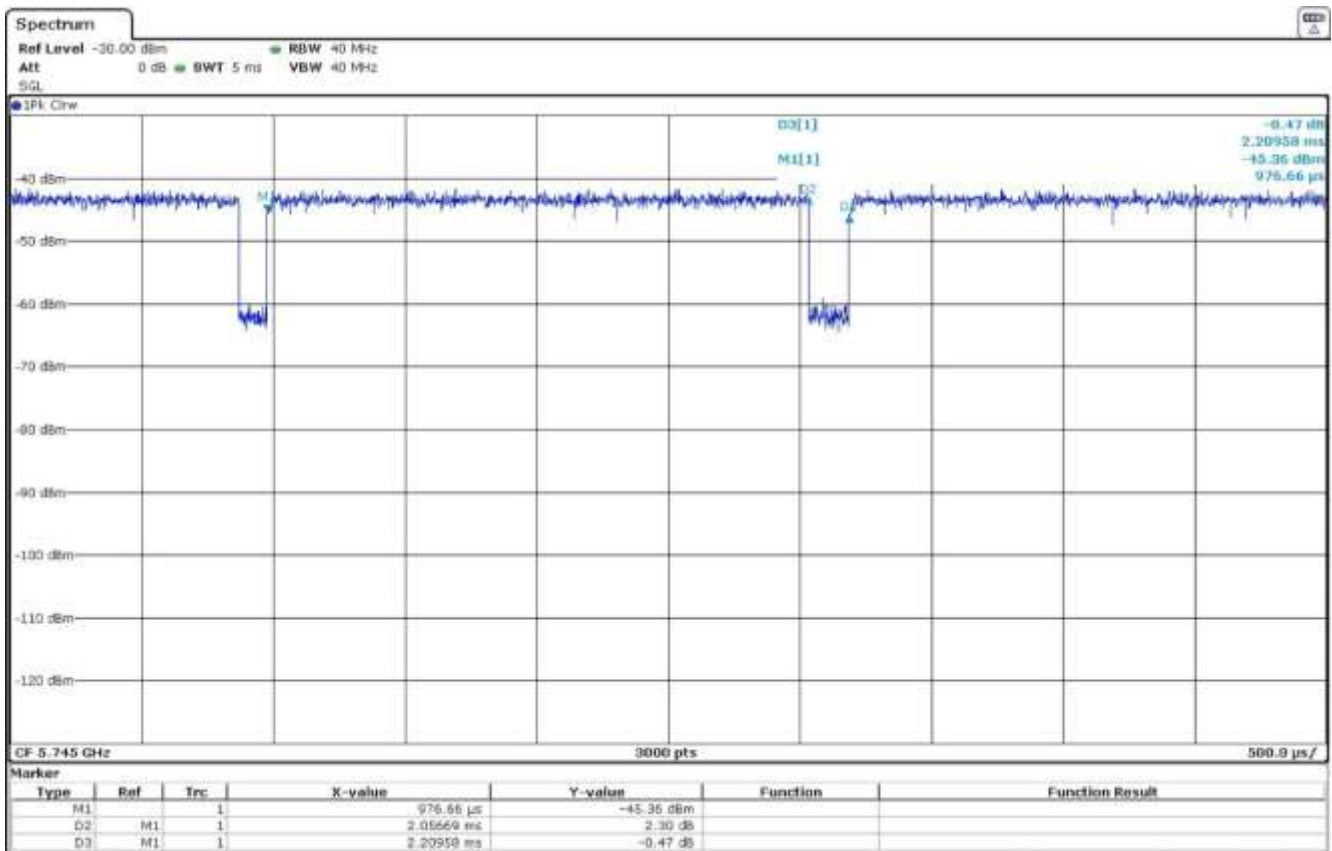
RESULTS:

The results below are for data rates with a duty cycle less than 98%. The results for all rest of modes having a value > 98%.

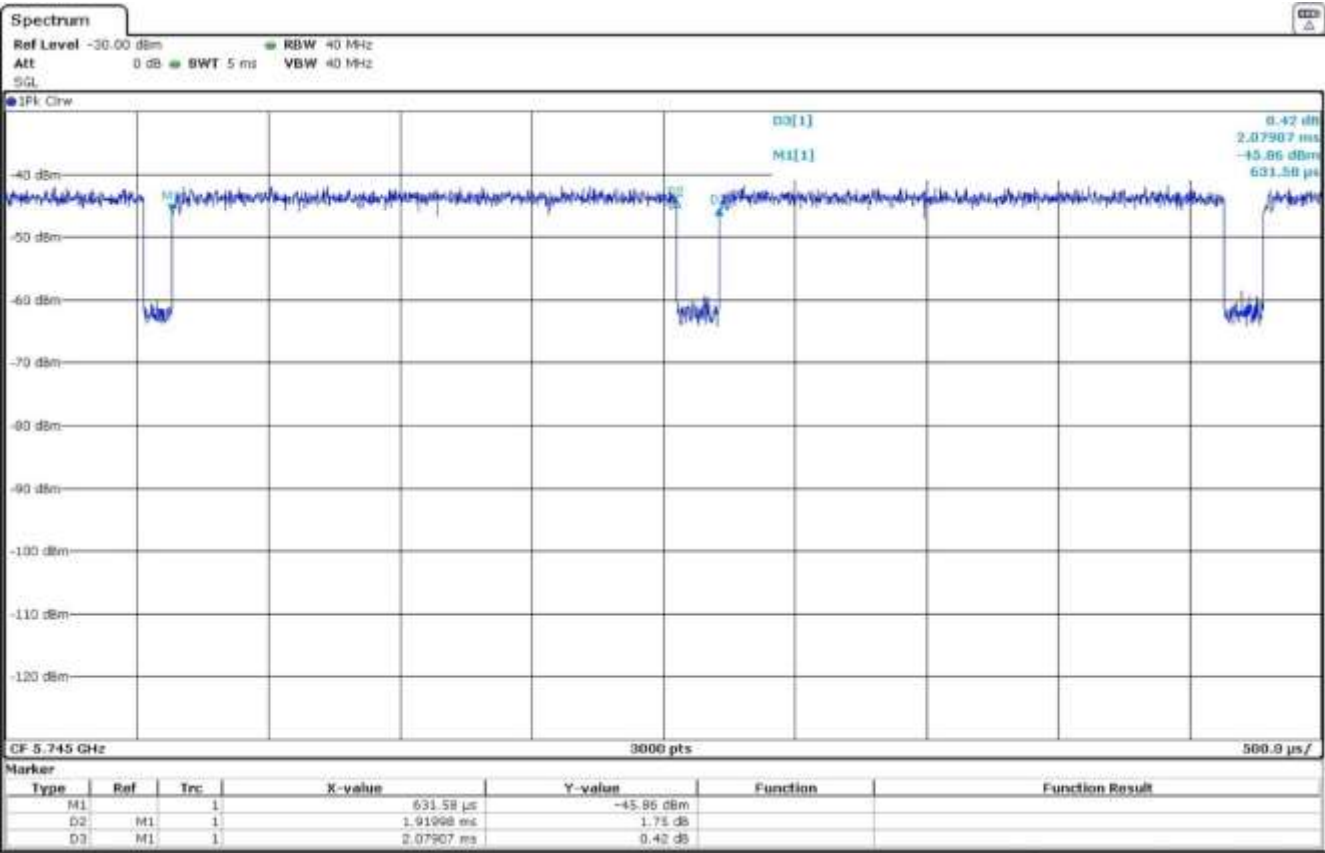
- SISO:**

Mode	Sub-band U-NII-3		
	Pulse Duration (ms)	Period (ms)	Duty Cycle Correction (dB)
802.11a20	2.05669	2.20958	0.31
802.11n20	1.91998	2.07907	0.35
802.11ac20	1.92498	2.09454	0.37
802.11n40	0.94570	1.04310	0.43
802.11ac40	0.95023	1.04787	0.42
802.11ac80	0.42644	0.62372	1.65

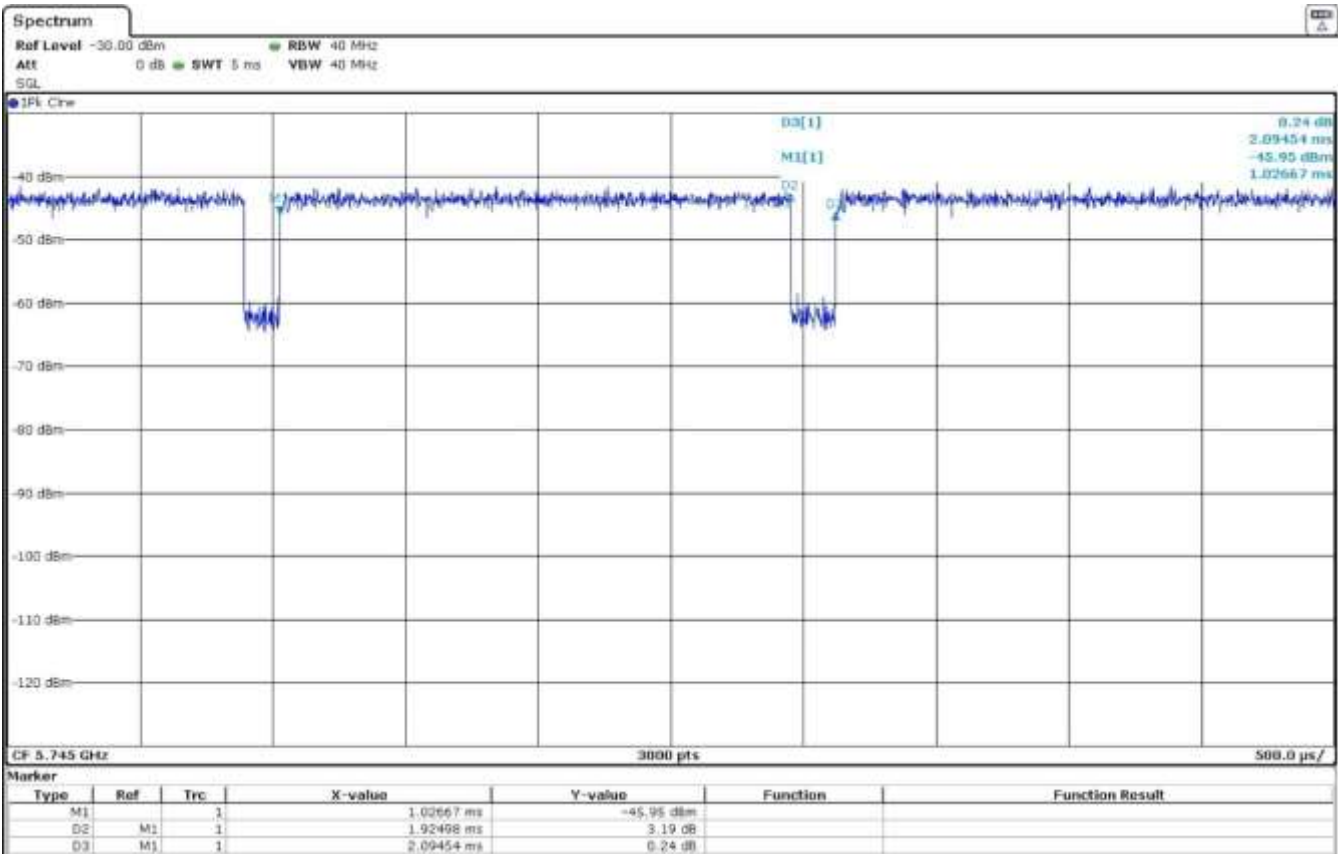
SISO 802.11 a20 (U-NII-3):



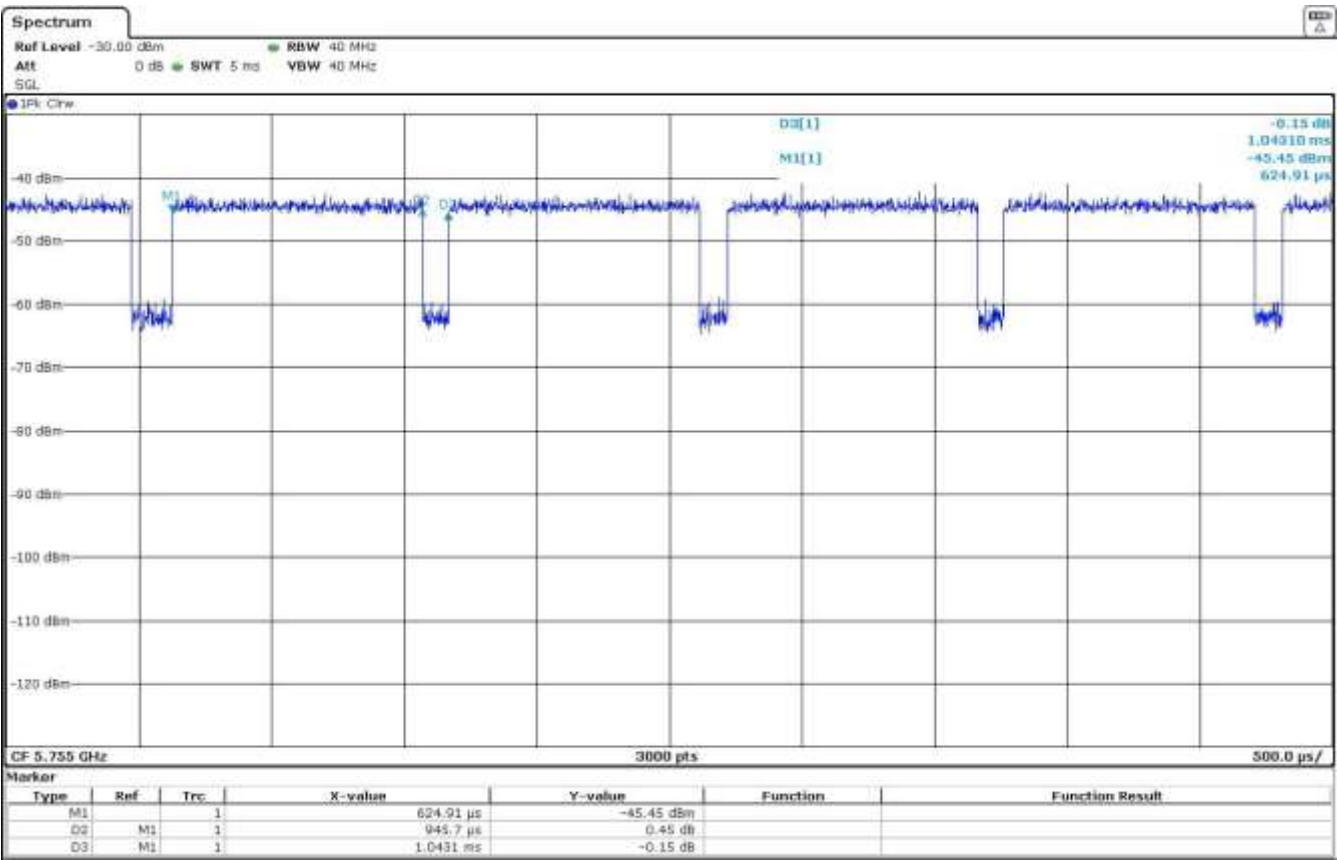
SISO 802.11 n20 (U-NII-3):



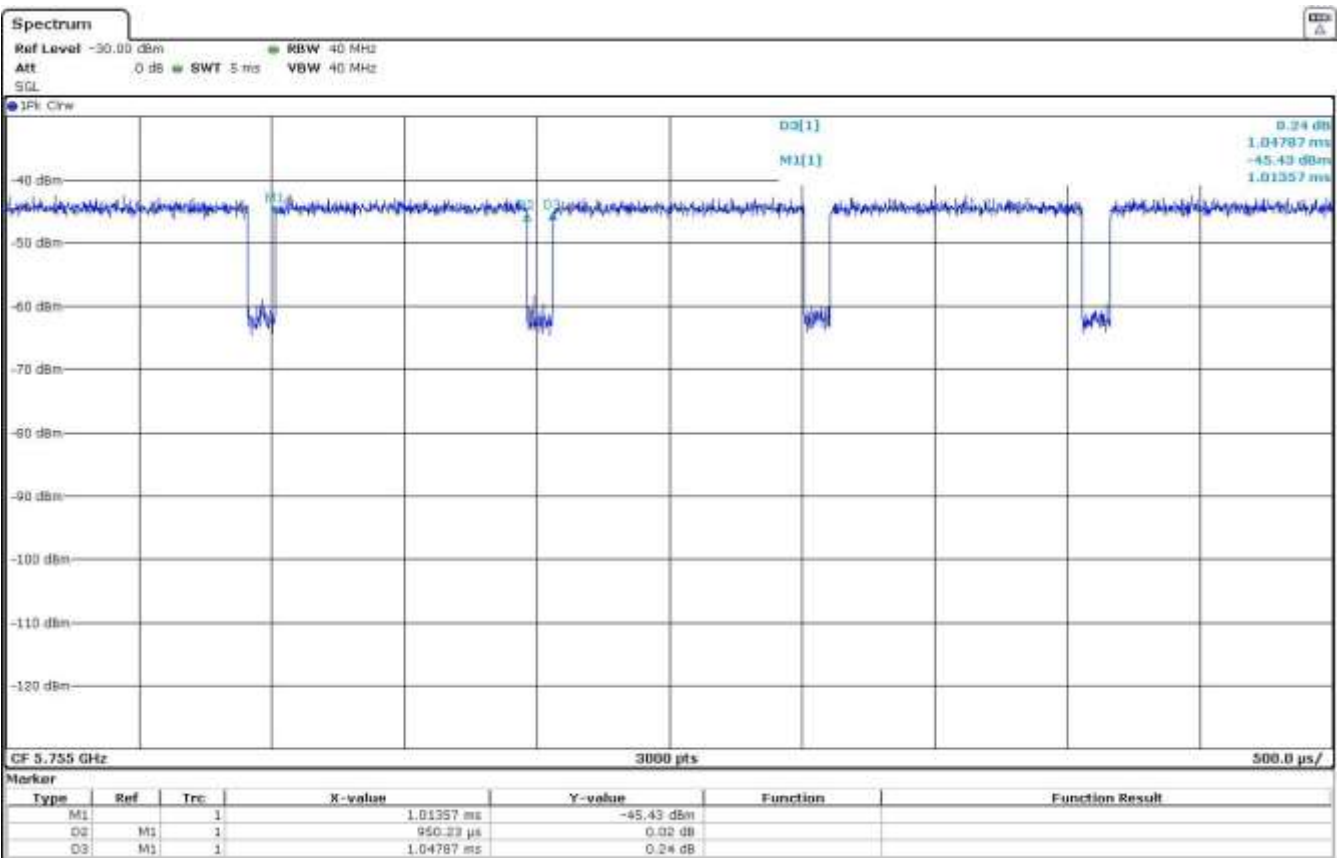
SISO 802.11 ac20 (U-NII-3):



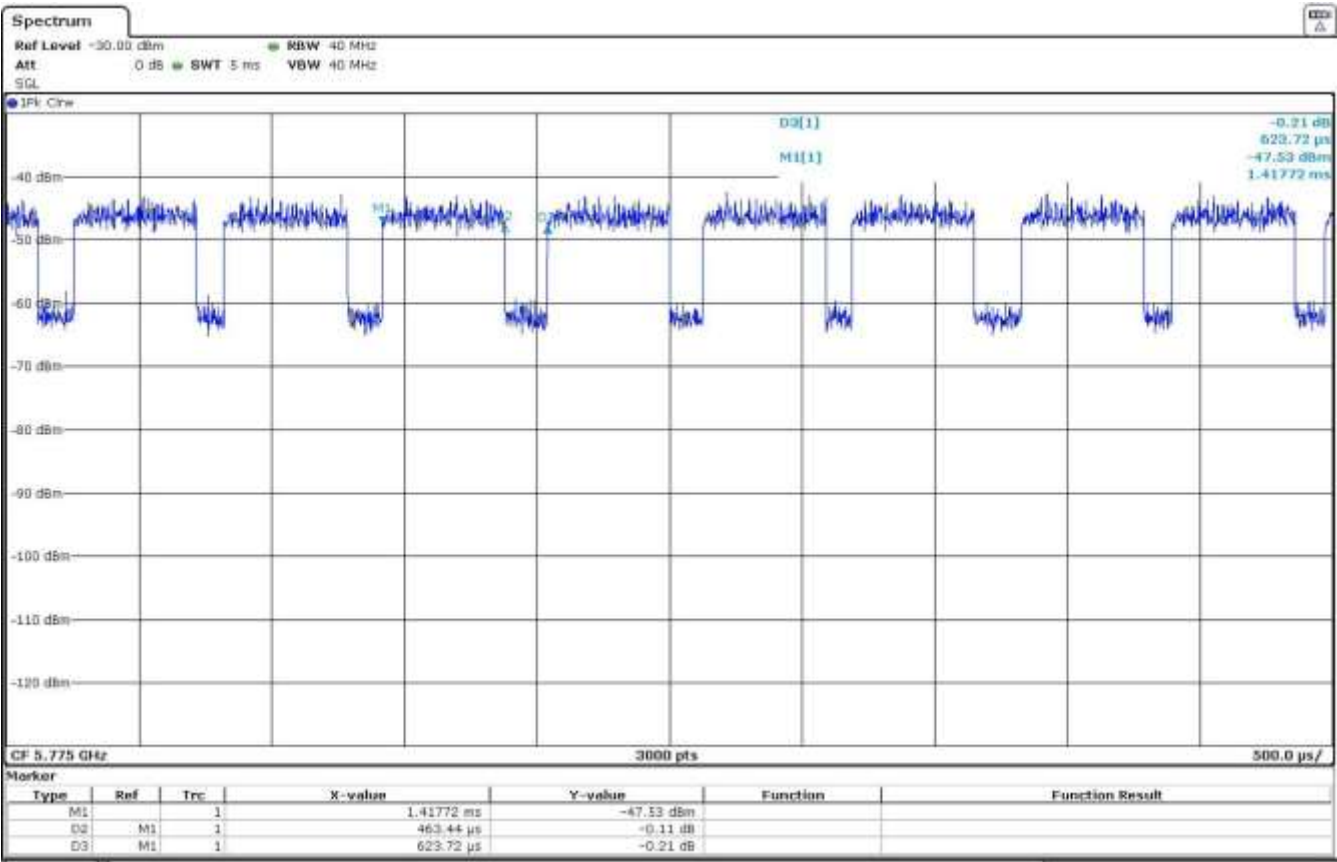
SISO 802.11 n40 (U-NII-3):



SISO 802.11 ac40 (U-NII-3):



SISO 802.11 ac80 (U-NII-3):



Transmitter 99% Occupied Bandwidth

RESULTS:

The following modes and data rates were selected based on preliminary testing that identified those corresponding to the worst-cases:

- 802.11 a20: 6 Mbit/s.
- 802.11 n HT20: MCS0.
- 802.11 n HT40: MCS0.
- 802.11 ac VHT20: MCS0
- 802.11 ac VHT40: MCS0
- 802.11 ac VHT80: MCS0

U-NII-3 (5725-5850 MHz)

SISO 802.11 a20:

Channels	Low Channel 149 (5745 MHz)
99% Occupied Bandwidth (MHz)	16.30
Measurement uncertainty (%)	<± 1.41

SISO 802.11 n20 (HT20):

Channels	Low Channel 149 (5745 MHz)
99% Occupied Bandwidth (MHz)	17.40
Measurement uncertainty (%)	<± 1.41

SISO 802.11 ac20:

Channels	Low Channel 149 (5745 MHz)
99% Occupied Bandwidth (MHz)	17.40
Measurement uncertainty (%)	<± 1.41

SISO 802.11 n40:

Channels	Low Channel 151 (5755 MHz)
99% Occupied Bandwidth (MHz)	36.25
Measurement uncertainty (%)	<± 1.41

SISO 802.11 ac40:

Channels	Low Channel 151 (5755 MHz)
99% Occupied Bandwidth (MHz)	36.25
Measurement uncertainty (%)	<± 1.41

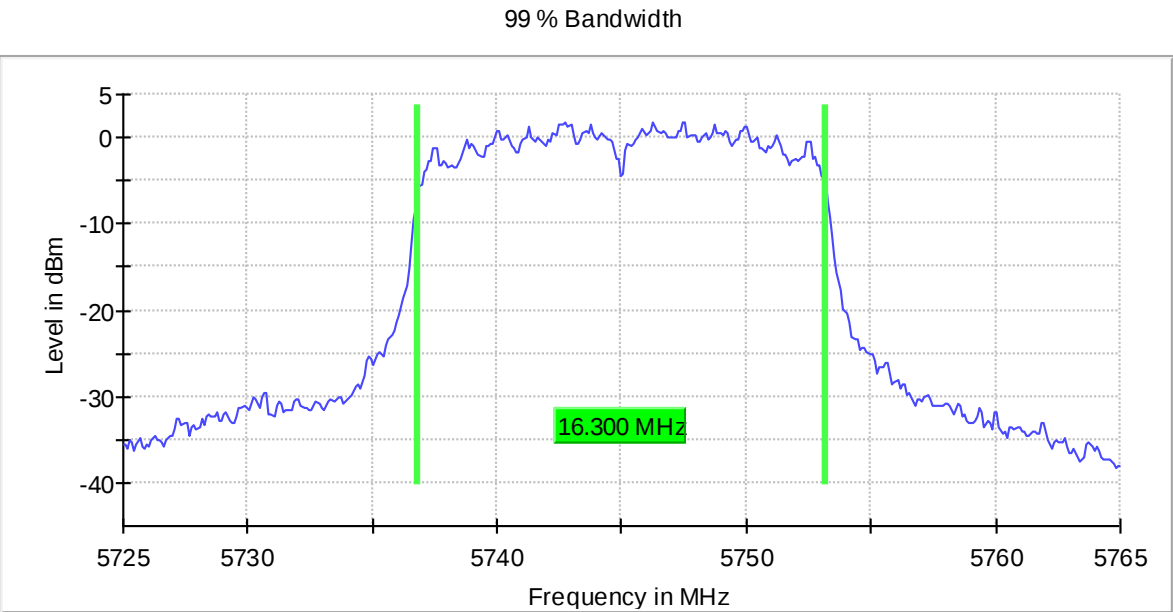
SISO 802.11 ac80:

Channels	Middle Channel 155 (5775 MHz)
99% Occupied Bandwidth (MHz)	75.50
Measurement uncertainty (%)	<± 1.41

U-NII-3 (5725-5850 MHz)

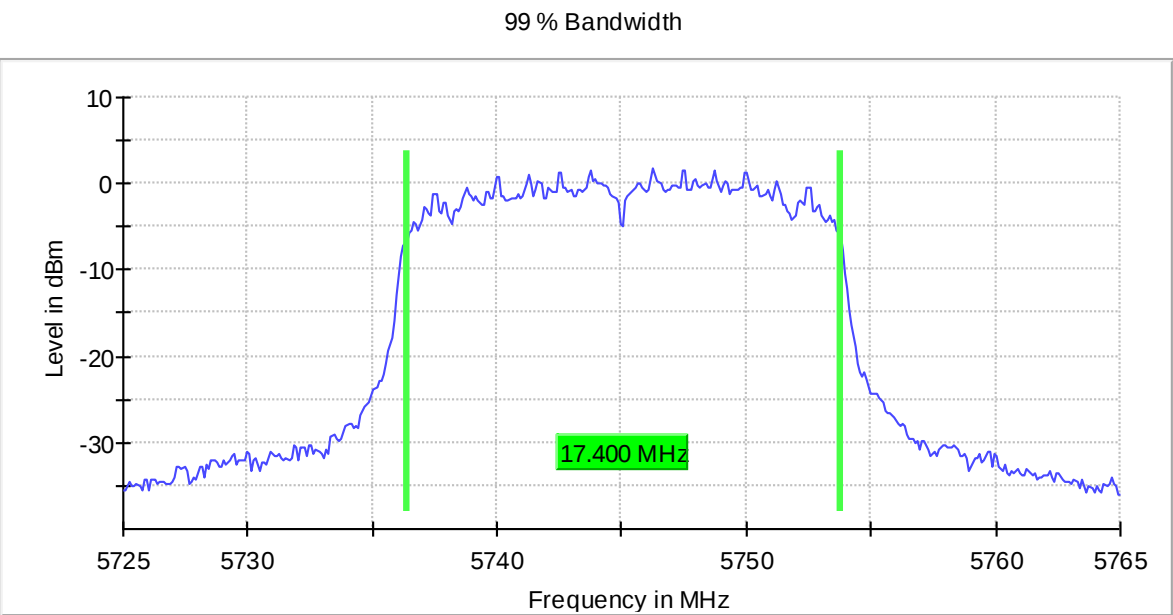
SISO 802.11 a20:

- Low Channel 149 (5745 MHz):



SISO 802.11 n20 (HT20):

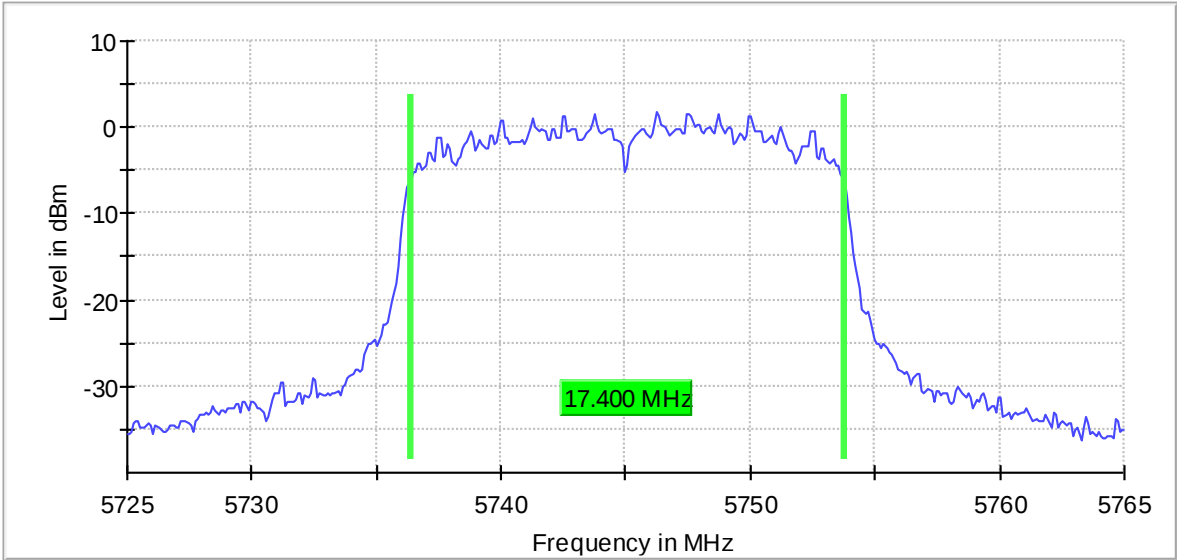
- Low Channel 149 (5745 MHz):



SISO 802.11 ac20 (VHT20):

- Low Channel 149 (5745 MHz):

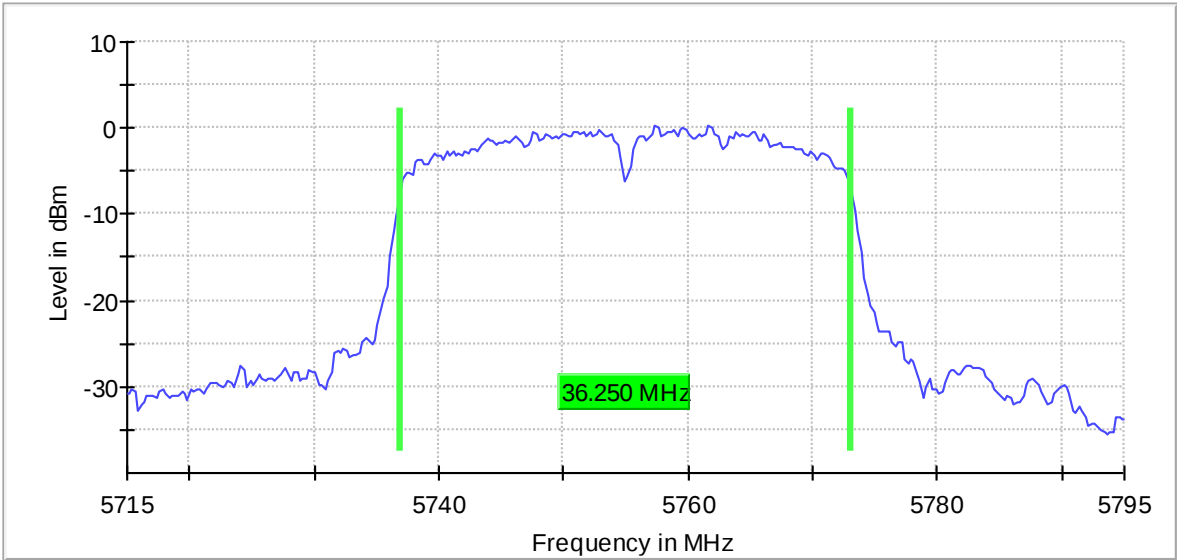
99 % Bandwidth



SISO 802.11 n40 (HT40):

- Low Channel 151 (5755 MHz):

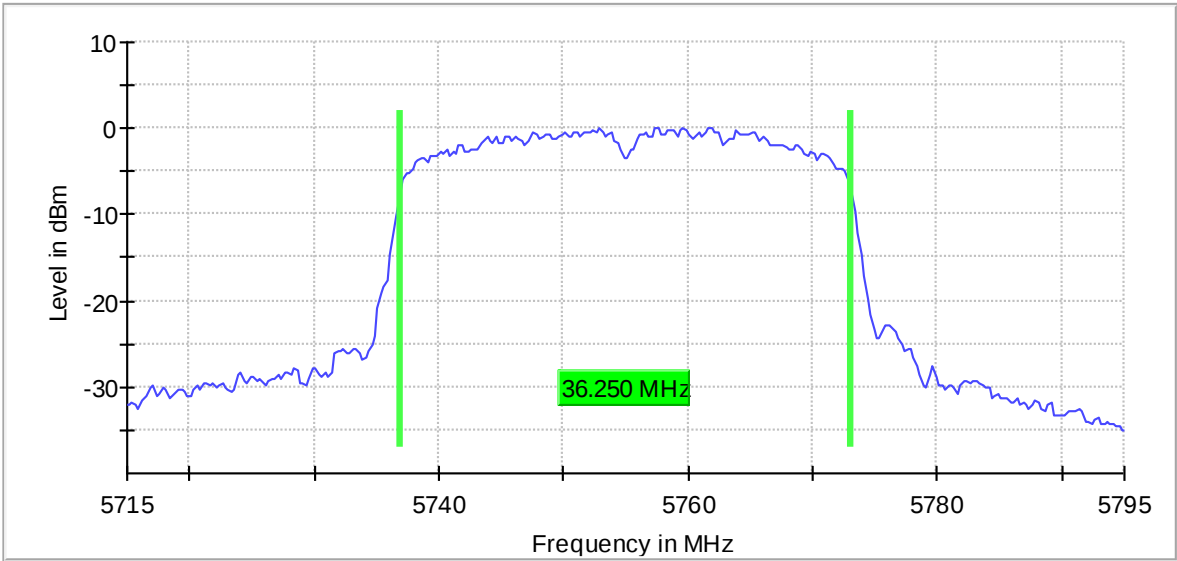
99 % Bandwidth



SISO 802.11 ac40 (VHT40):

- Low Channel 151 (5755 MHz):

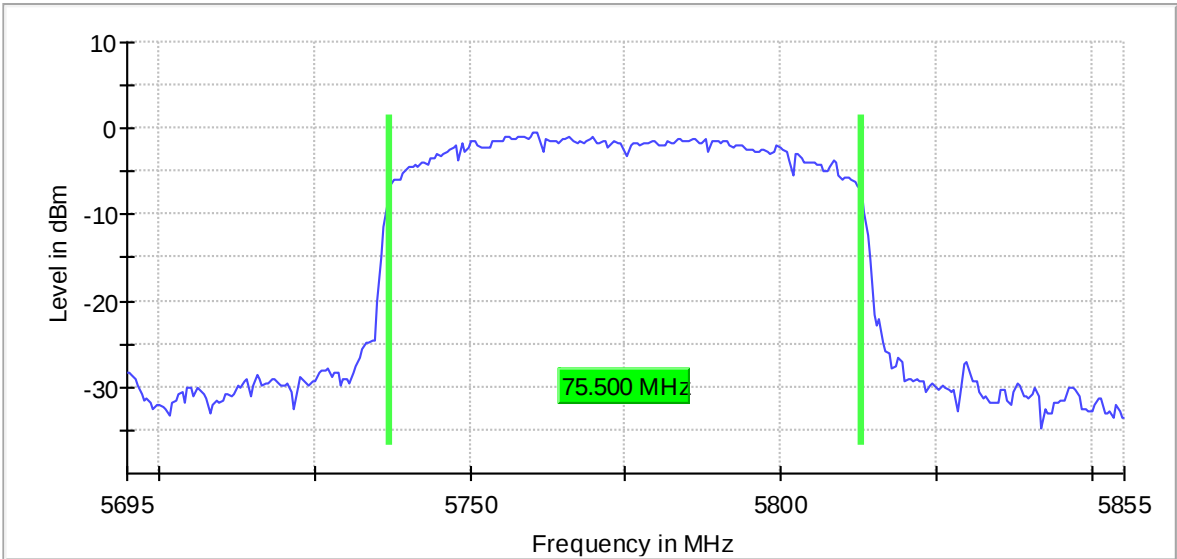
99 % Bandwidth



SISO 802.11 ac80 (VHT80):

- Middle Channel 155 (5775 MHz):

99 % Bandwidth



Appendix B: Tests results for the U-NII-3 Band 5.725 – 5.85 GHz

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TEST CONDITIONS

POWER SUPPLY:

V nominal: 13.5 Vdc
Type of Power Supply: DC External (Car Battery).

ANTENNAS:

Type of Antenna: Integral.
Maximum Declared Antenna Gain: 0 dBi

Technology Tested:	WLAN (IEEE 802.11 a/n/ac): U-NII-3 Band	
Modes:	802.11 a20: 6, 9, 12, 18, 24, 36, 48 & 54 Mbps	
	802.11 n HT20: MCS0 to MCS7	
	802.11 ac VHT20: MCS0 to MCS8	
Setting of cores / ports:	1.	
Beamforming:	No	
Frequency Range:	5725 MHz to 5850 MHz	
Channel Spacing:	20 MHz	
Transmit Channels	Channel	Channel Frequency (MHz)
	Low: 149	5745

Technology Tested:	WLAN (IEEE 802.11 n/ac): U-NII-3 Band	
Modes:	802.11n HT40: MCS0 to MCS7	
	802.11ac VHT40: MCS0 to MCS9	
Setting of cores / ports:	1.	
Beamforming:	No	
Frequency Range:	5725 MHz to 5850 MHz	
Channel Spacing:	40 MHz	
Transmit Channels	Channel	Channel Frequency (MHz)
	Low: 151	5755

Technology Tested:	WLAN (IEEE 802.11 ac): U-NII-3 Band	
Modes:	802.11ac VHT80: MCS0 to MCS9	
Setting of cores / ports:	1.	
Beamforming:	No	
Frequency Range:	5725 MHz to 5850 MHz	
Channel Spacing:	80 MHz	
Transmit Channels	Channel	Channel Frequency (MHz)
	Middle: 155	5775

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 individually 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 scripts to configure the EUT. The customer supplied a document containing the setup instructions.

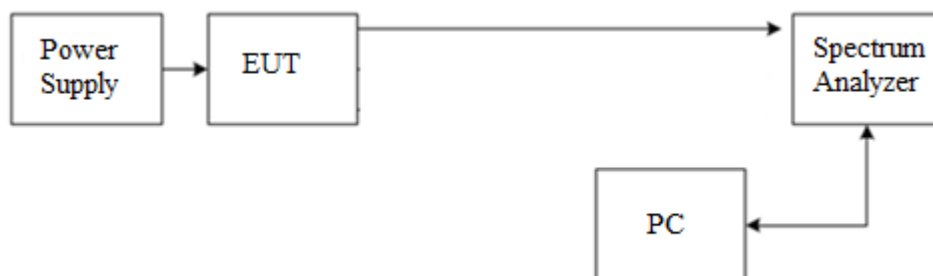
The worst-cases for testing were identified for output power and spurious levels at the band edges which were selected based on preliminary testing that correspond to next data rates:

- 802.11 a20: 6 Mbit/s.
- 802.11 n HT20: MCS0.
- 802.11 n HT40: MCS0.
- 802.11 ac VHT20: MCS0
- 802.11 ac VHT40: MCS0
- 802.11 ac VHT80: MCS0

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:



The DC supply voltage is applied using an external power supply.

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.

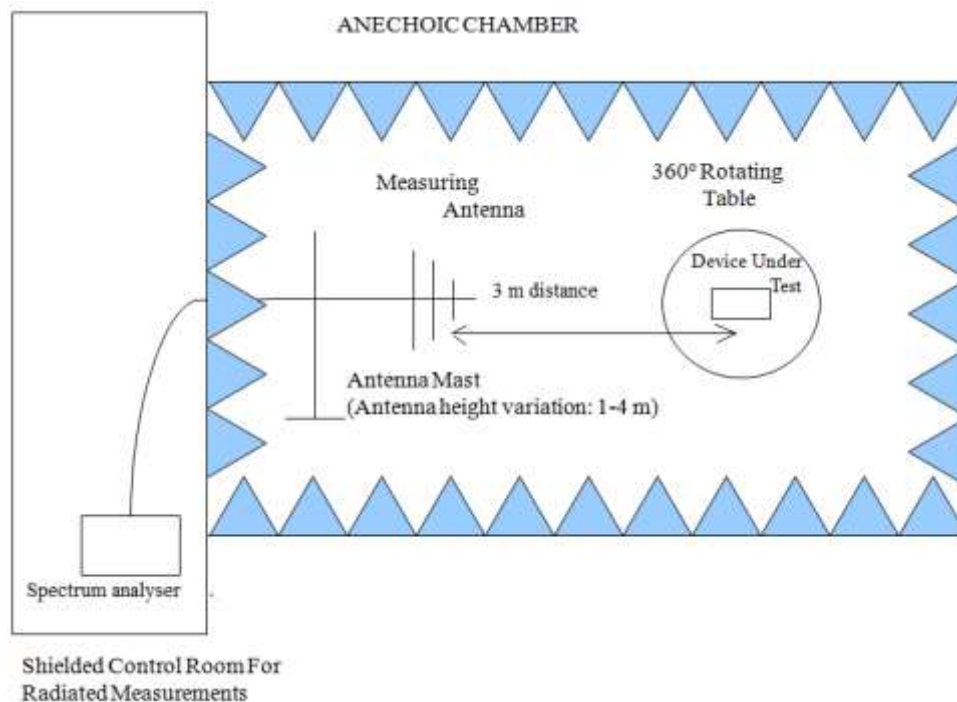
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find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

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

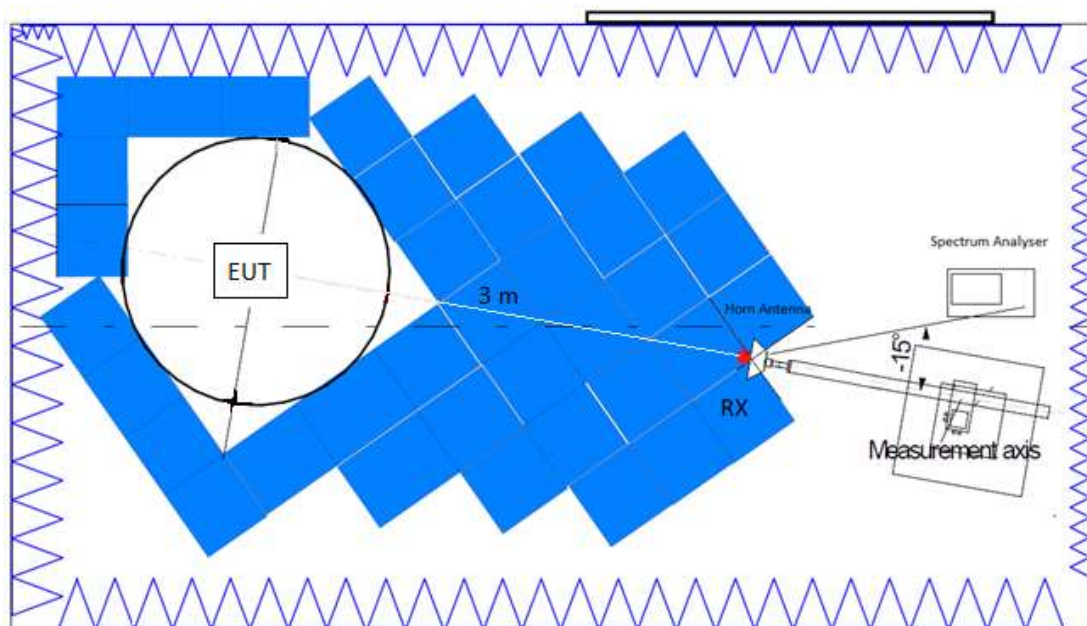
A resolution bandwidth / video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

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

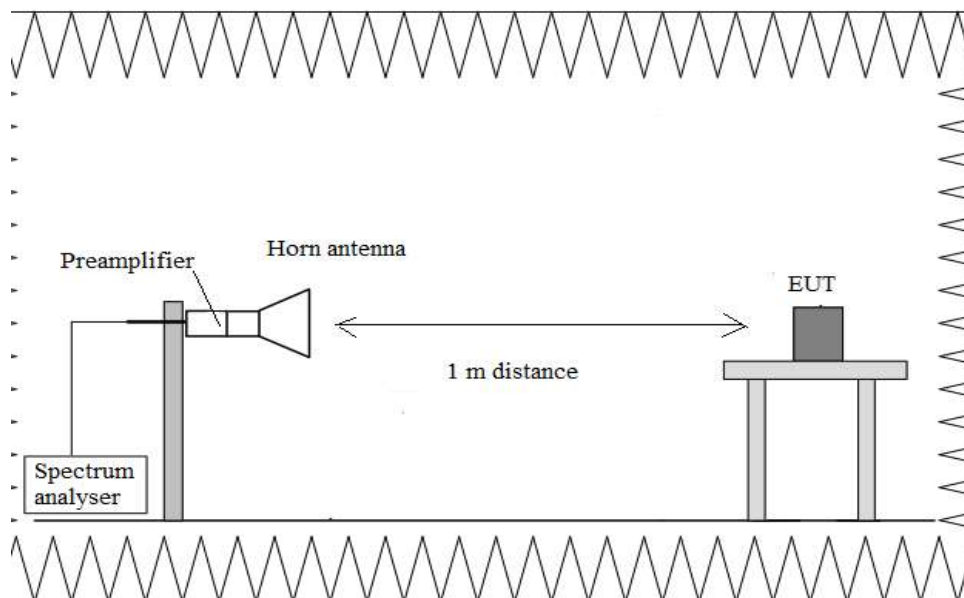
Radiated measurements setup $f < 1$ GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz up to 40 GHz:



FCC 15.407 (e) / RSS-247 6.2.4.1. 6 dB Bandwidth

SPECIFICATION:

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS:

The following modes and data rates were selected based on preliminary testing that identified those corresponding to the worst-cases:

- 802.11 a20: 6 Mbit/s.
- 802.11 n HT20: MCS0.
- 802.11 n HT40: MCS0.
- 802.11 ac VHT20: MCS0
- 802.11 ac VHT40: MCS0
- 802.11 ac VHT80: MCS0

SISO 802.11 a20:

	Low Channel 149 (5745 MHz)
6 dB Bandwidth (MHz)	15.25
Measurement uncertainty (%)	<± 1.14

SISO 802.11 n20 (HT20):

	Low Channel 149 (5745 MHz)
6 dB Bandwidth (MHz)	15.25
Measurement uncertainty (%)	<± 1.14

SISO 802.11 ac20 (VHT20):

	Low Channel 149 (5745 MHz)
6 dB Bandwidth (MHz)	15.25
Measurement uncertainty (%)	<± 1.14

SISO 802.11 n40 (HT40):

	Low Channel 151 (5755 MHz)
6 dB Bandwidth (MHz)	35.15
Measurement uncertainty (%)	<± 1.14

SISO 802.11 ac40 (VHT40):

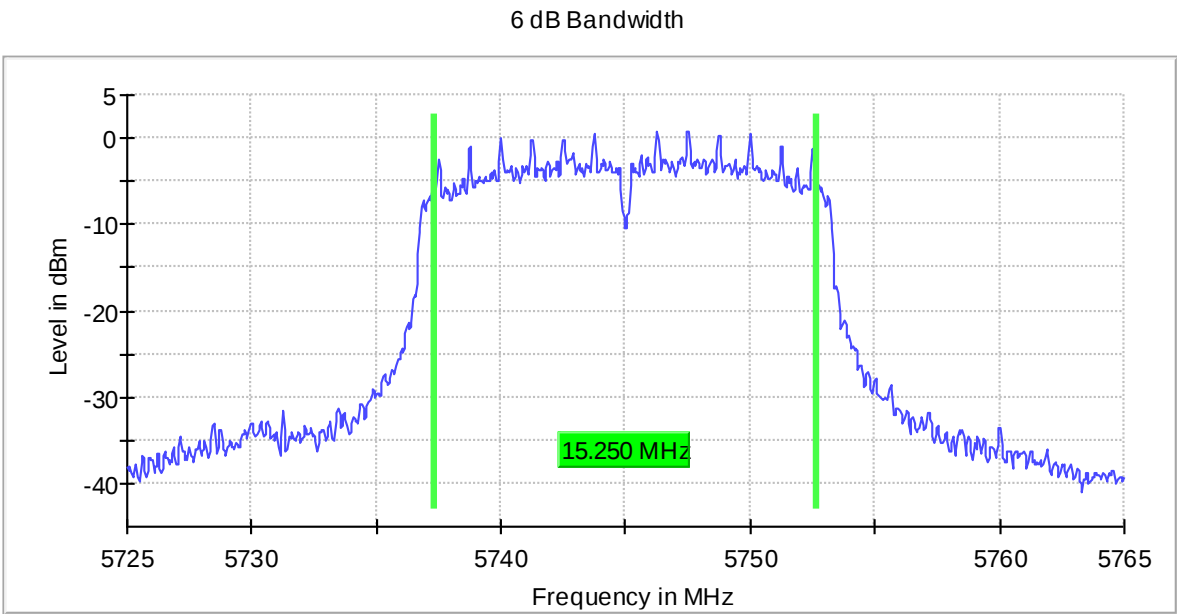
	Low Channel 151 (5755 MHz)
6 dB Bandwidth (MHz)	35.15
Measurement uncertainty (%)	<± 1.14

SISO 802.11 ac80 (VHT80):

	Middle Channel 155 (5775 MHz)
6 dB Bandwidth (MHz)	75.15
Measurement uncertainty (%)	<± 1.14

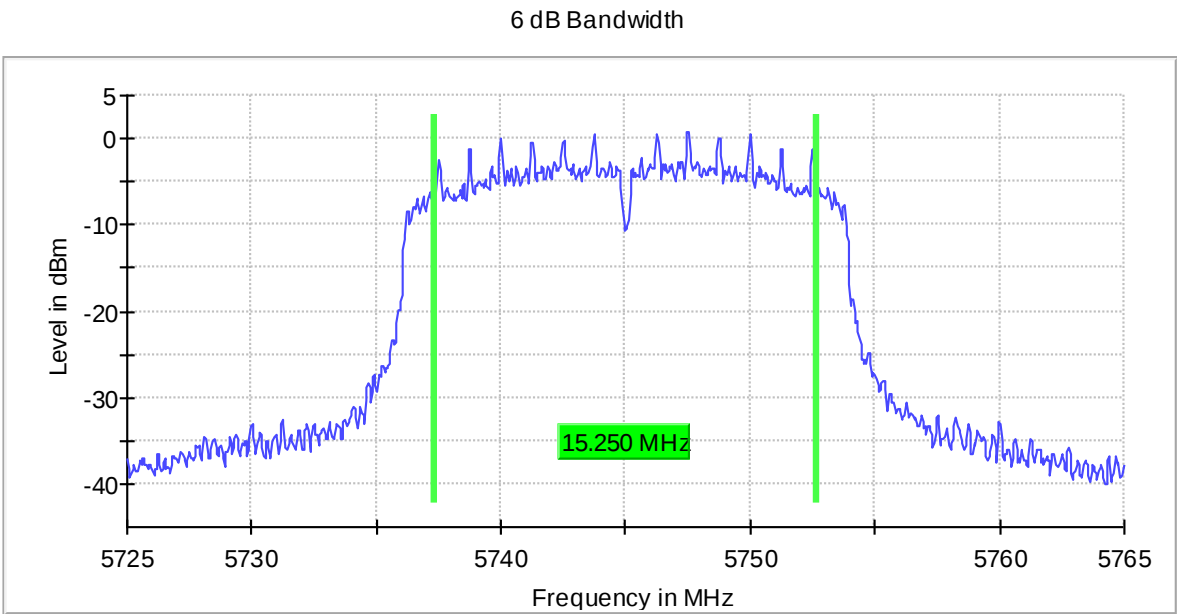
SISO 802.11 a20:

- Low Channel 149:



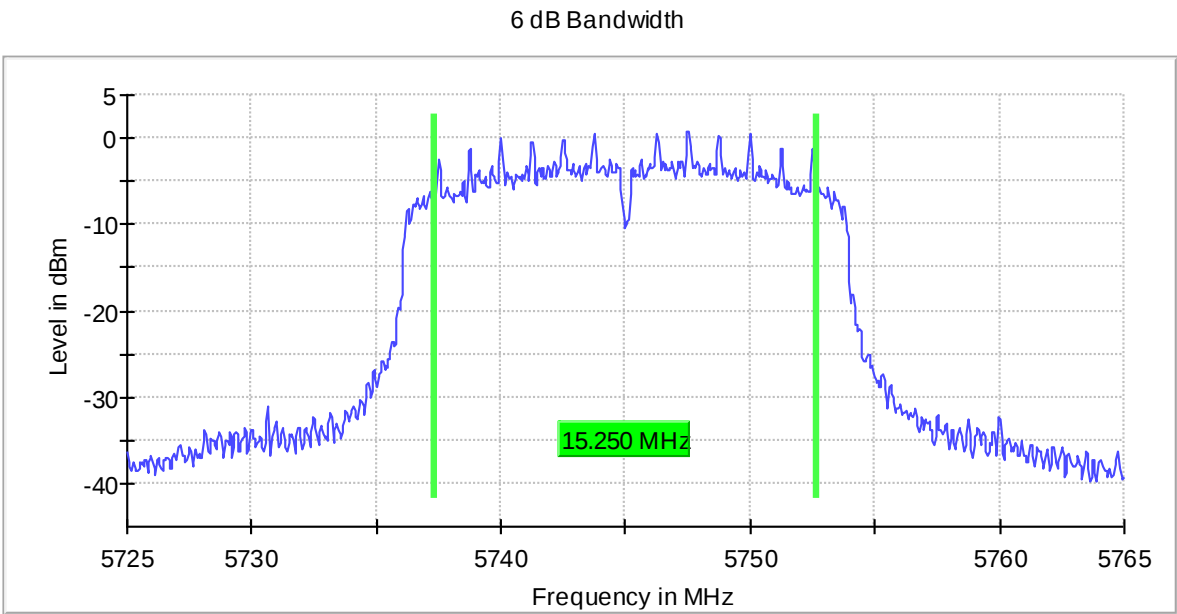
SISO 802.11 n20 (HT20):

- Low Channel 149:



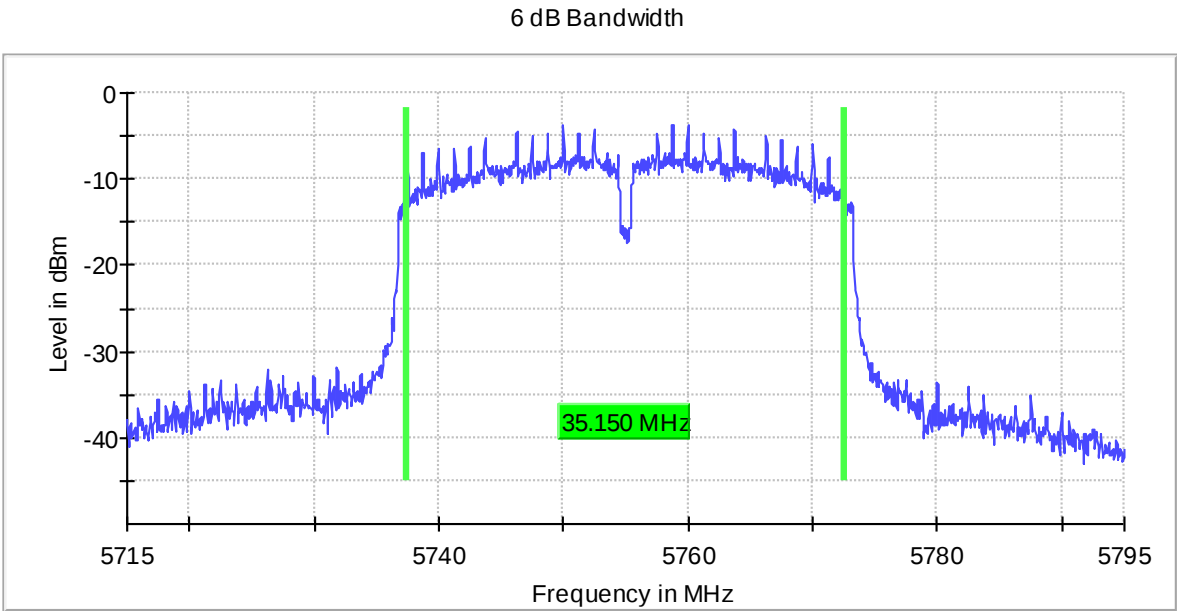
SISO 802.11 ac20 (VHT20):

- Low Channel 149:



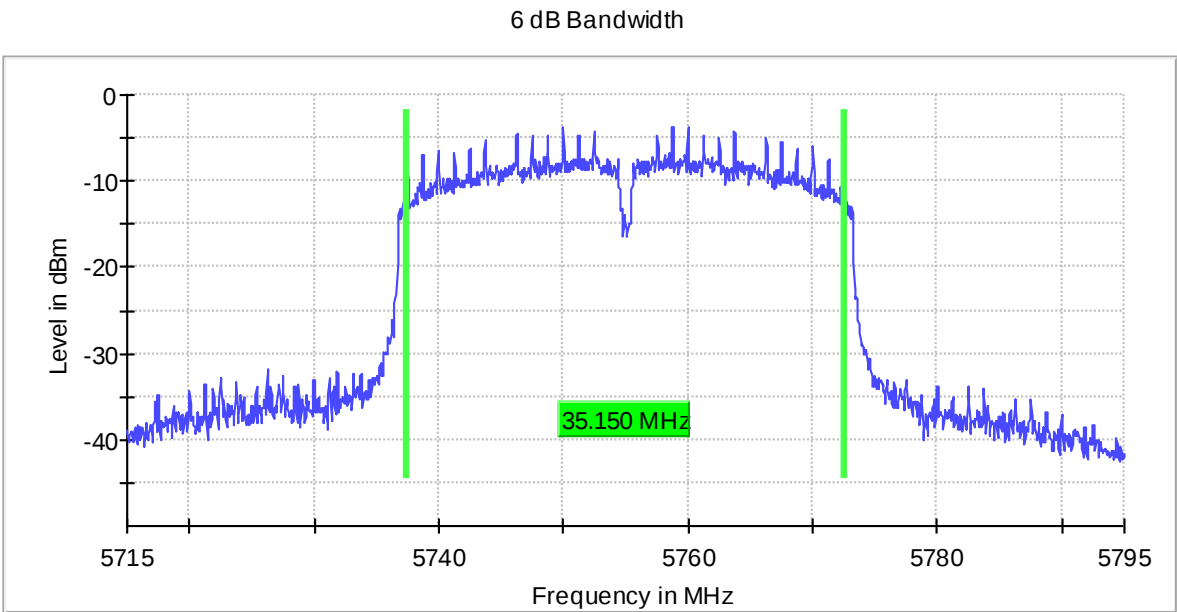
SISO 802.11 n40 (HT40):

- Low Channel 151:



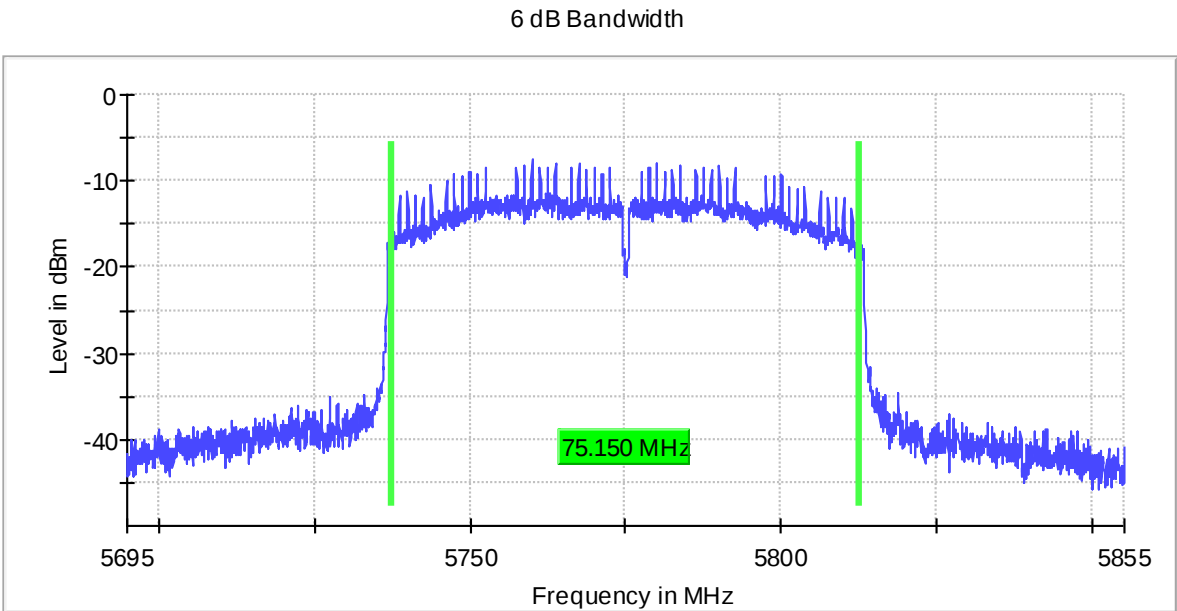
SISO 802.11 ac40 (VHT40):

- Low Channel 151:



SISO 802.11 ac80 (VHT80):

- Middle Channel 155:



FCC 15.407 (a)(3) / RSS-247 6.2.4.1. Maximum Conducted Output Power

SPECIFICATION:

FCC 15.407 / RSS-247: For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W (30 dBm). If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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 calculated in Appendix A 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).

Maximum Declared Antenna Gain: 0 dBi

For all SISO modes of operation, the antenna gain is less than 6dBi.

SISO 802.11 a20:

	Low Channel 149 (5745 MHz)
Maximum Corrected Conducted Power (dBm)	11.16
Maximum EIRP Corrected Conducted Power (dBm)	11.16
Measurement uncertainty (dB)	<± 0.99

SISO 802.11 n20 (HT20):

	Low Channel 149 (5745 MHz)
Maximum Corrected Conducted Power (dBm)	10.85
Maximum EIRP Corrected Conducted Power (dBm)	10.85
Measurement uncertainty (dB)	<± 0.99

SISO 802.11 ac20 (VHT20):

	Low Channel 149 (5745 MHz)
Maximum Corrected Conducted Power (dBm)	10.87
Maximum EIRP Corrected Conducted Power (dBm)	10.87
Measurement uncertainty (dB)	<± 0.99

SISO 802.11 n40 (HT40):

	Low Channel 151 (5755 MHz)
Maximum Corrected Conducted Power (dBm)	9.42
Maximum EIRP Corrected Conducted Power (dBm)	9.42
Measurement uncertainty (dB)	<± 0.99

SISO 802.11 ac40 (VHT40):

	Low Channel 151 (5755 MHz)
Maximum Corrected Conducted Power (dBm)	9.49
Maximum EIRP Corrected Conducted Power (dBm)	9.49
Measurement uncertainty (dB)	<± 0.99

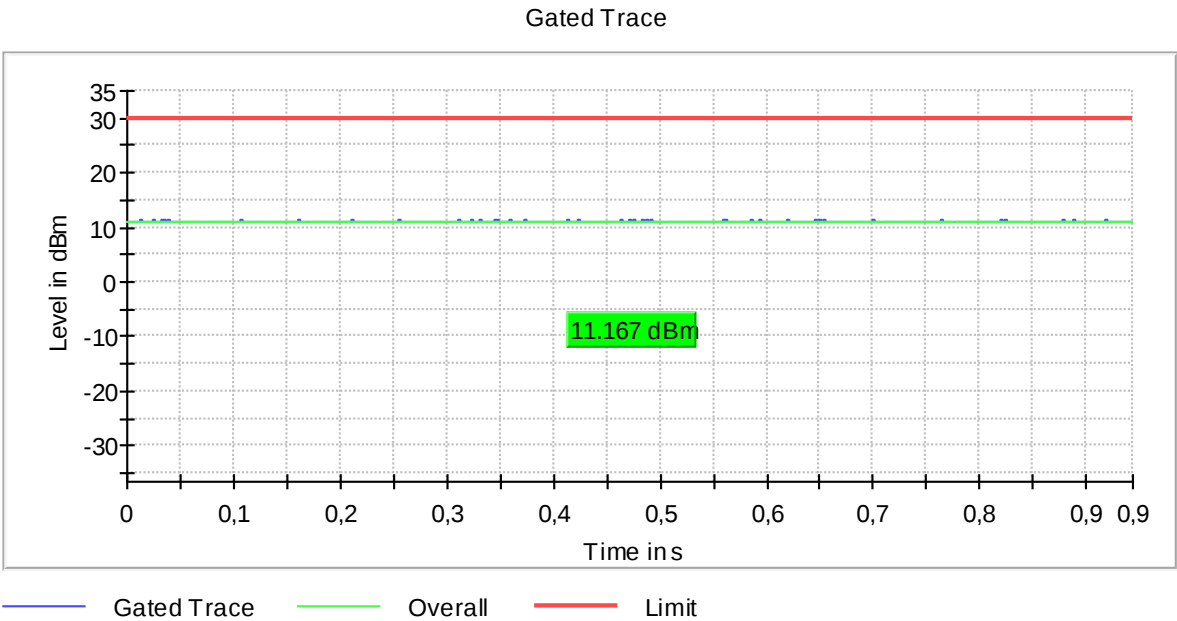
SISO 802.11 ac80 (VHT80):

	Middle Channel 155 (5775 MHz)
Maximum Corrected Conducted Power (dBm)	7.89
Maximum EIRP Corrected Conducted Power (dBm)	7.89
Measurement uncertainty (dB)	<± 0.99

Verdict: PASS

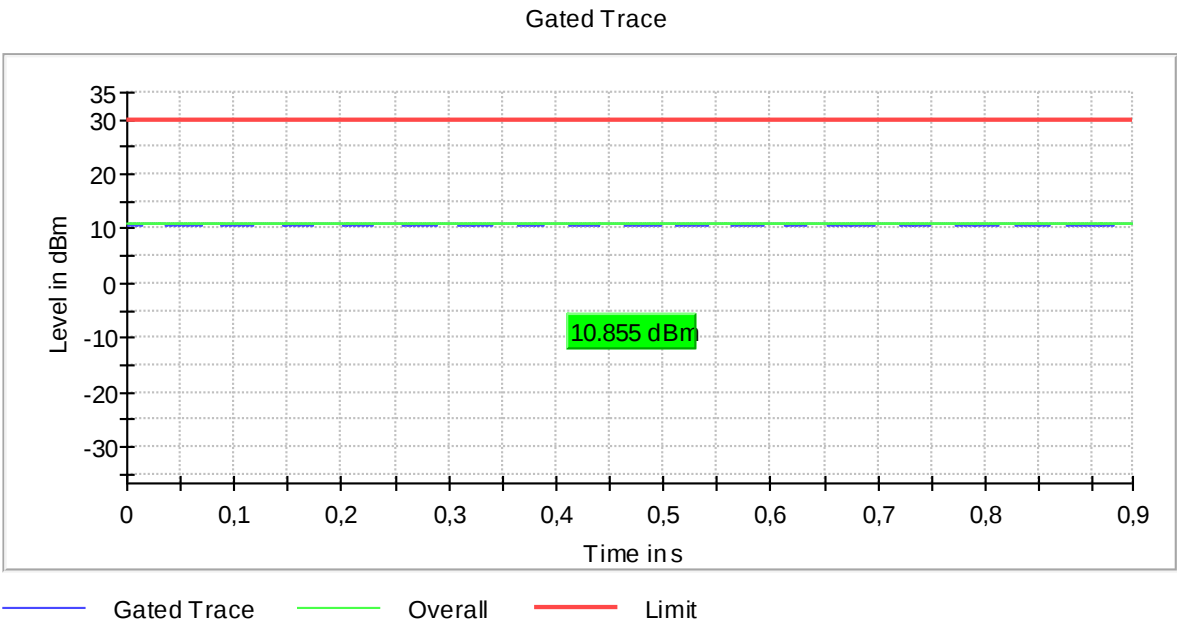
SISO 802.11 a20:

- Low Channel 149:



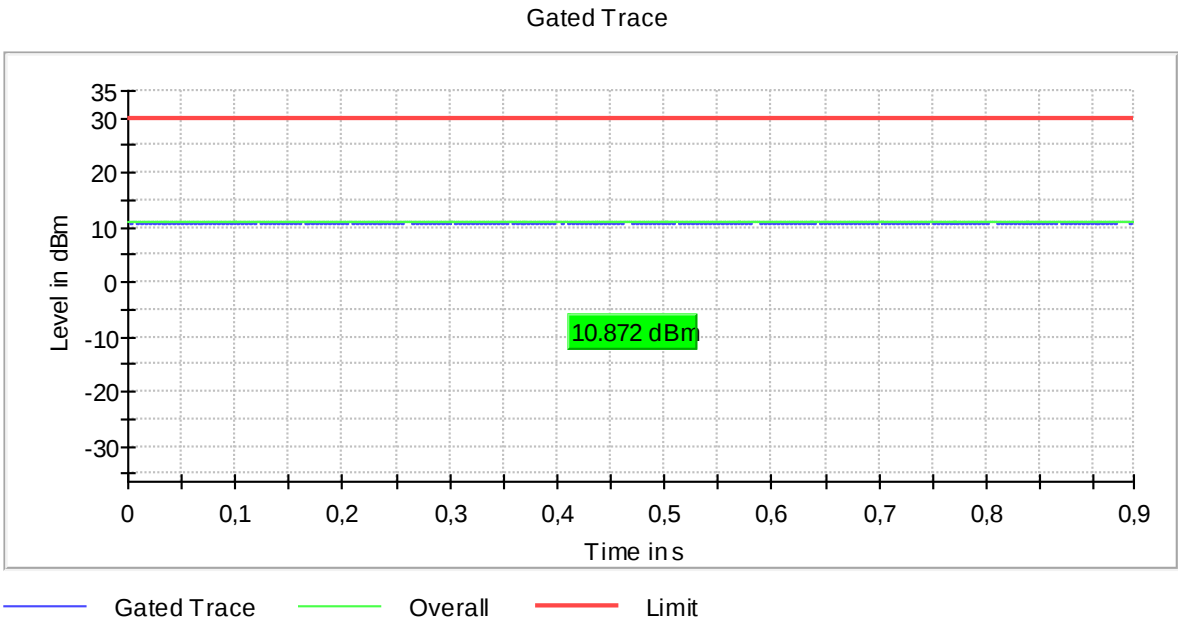
SISO 802.11 n20 (HT20):

- Low Channel 149:



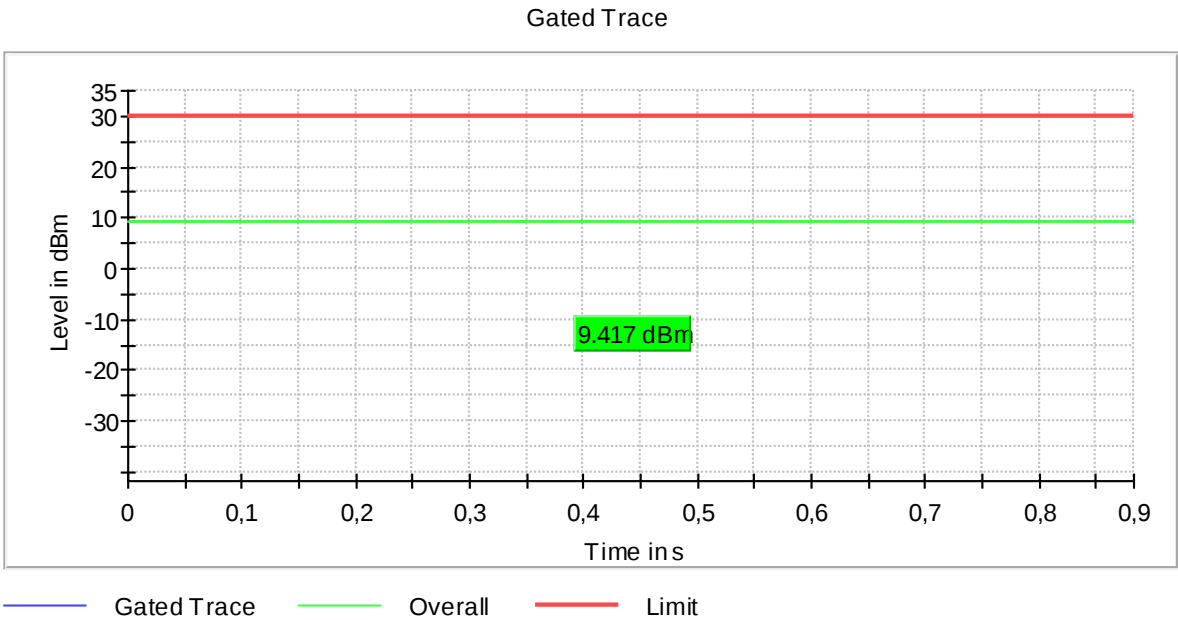
SISO 802.11 ac20 (VHT20):

- Low Channel 149:



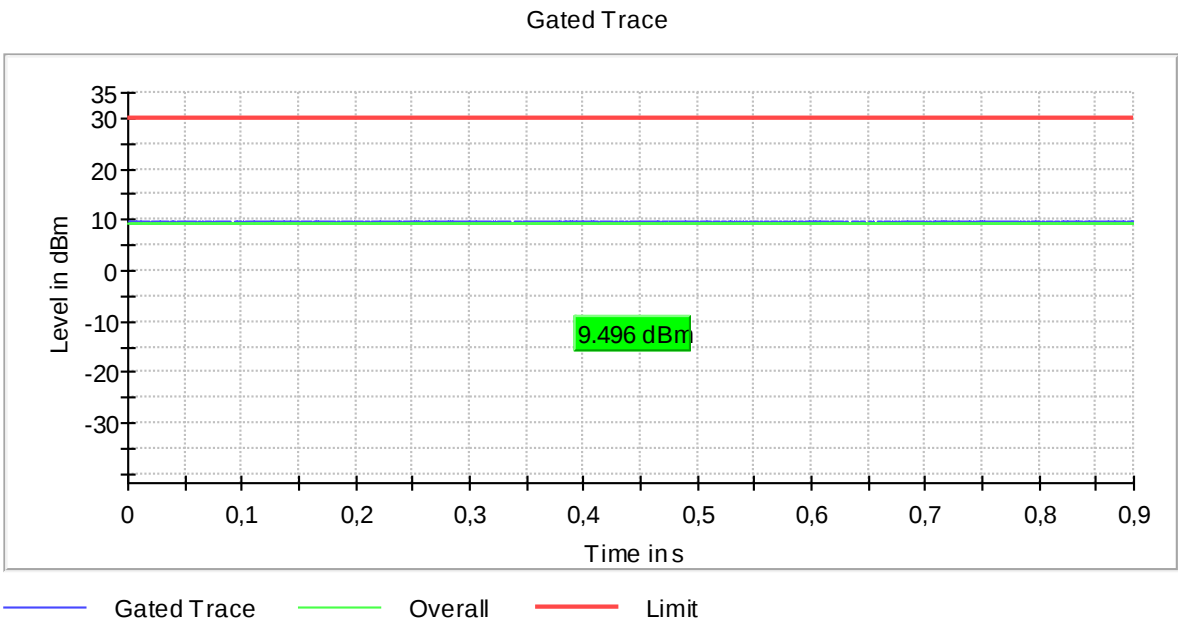
SISO 802.11 n40 (HT40):

- Low Channel 151:



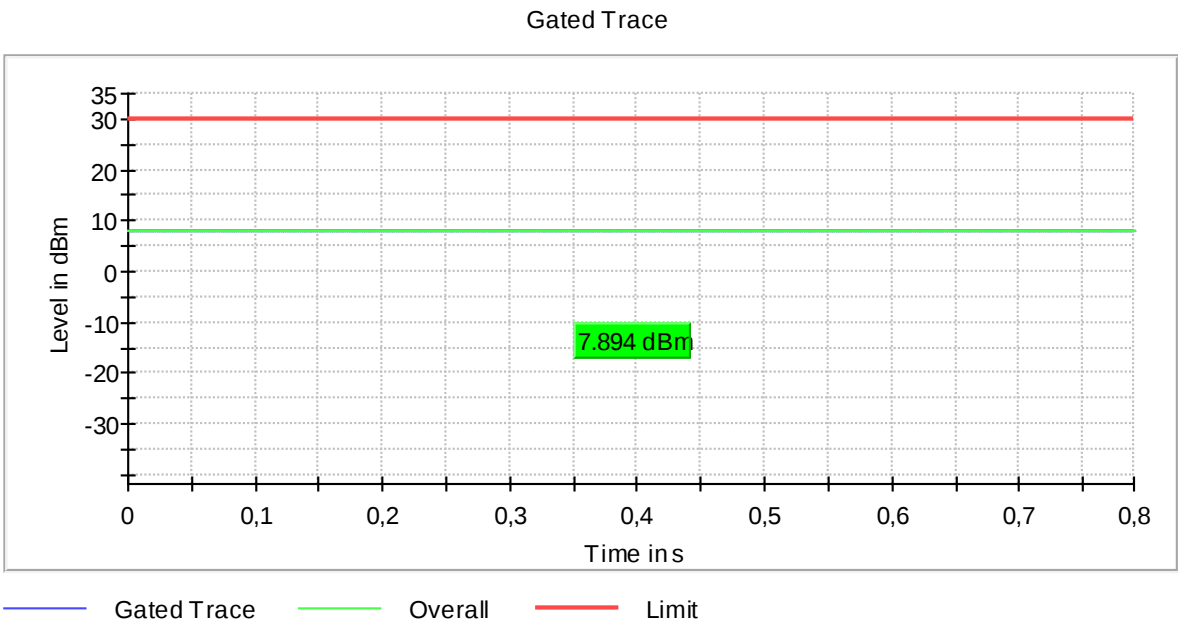
SISO 802.11 ac40 (VHT40):

- Low Channel 151:



SISO 802.11 ac80 (VHT80):

- Middle Channel 155:



FCC 15.407 (a)(3) / RSS-247 6.2.4.1. Maximum Power Spectral Density

SPECIFICATION:

FCC 15.407 / RSS-247: The maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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.

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 789033 D02 General UNII Test Procedures New Rules v02r01.

SISO 802.11 a20:

	Low Channel 149 (5745 MHz)
Maximum Corrected Conducted PSD (dBm)	-2.89
Maximum EIRP Corrected Conducted PSD (dBm)	-2.89
Measurement uncertainty (dB)	<± 0.99

SISO 802.11 n20 (HT20):

	Low Channel 149 (5745 MHz)
Maximum Corrected Conducted PSD (dBm)	-3.37
Maximum EIRP Corrected Conducted PSD (dBm)	-3.37
Measurement uncertainty (dB)	<± 0.99

SISO 802.11 ac20 (VHT20):

	Low Channel 149 (5745 MHz)
Maximum Corrected Conducted PSD (dBm)	-3.16
Maximum EIRP Corrected Conducted PSD (dBm)	-3.16
Measurement uncertainty (dB)	<± 0.99

SISO 802.11 n40 (HT40):

	Low Channel 151 (5755 MHz)
Maximum Corrected Conducted PSD (dBm)	-7.94
Maximum EIRP Corrected Conducted PSD (dBm)	-7.94
Measurement uncertainty (dB)	<± 0.99

SISO 802.11 ac40 (VHT40):

	Low Channel 151 (5755 MHz)
Maximum Corrected Conducted PSD (dBm)	-7.99
Maximum EIRP Corrected Conducted PSD (dBm)	-7.99
Measurement uncertainty (dB)	<± 0.99

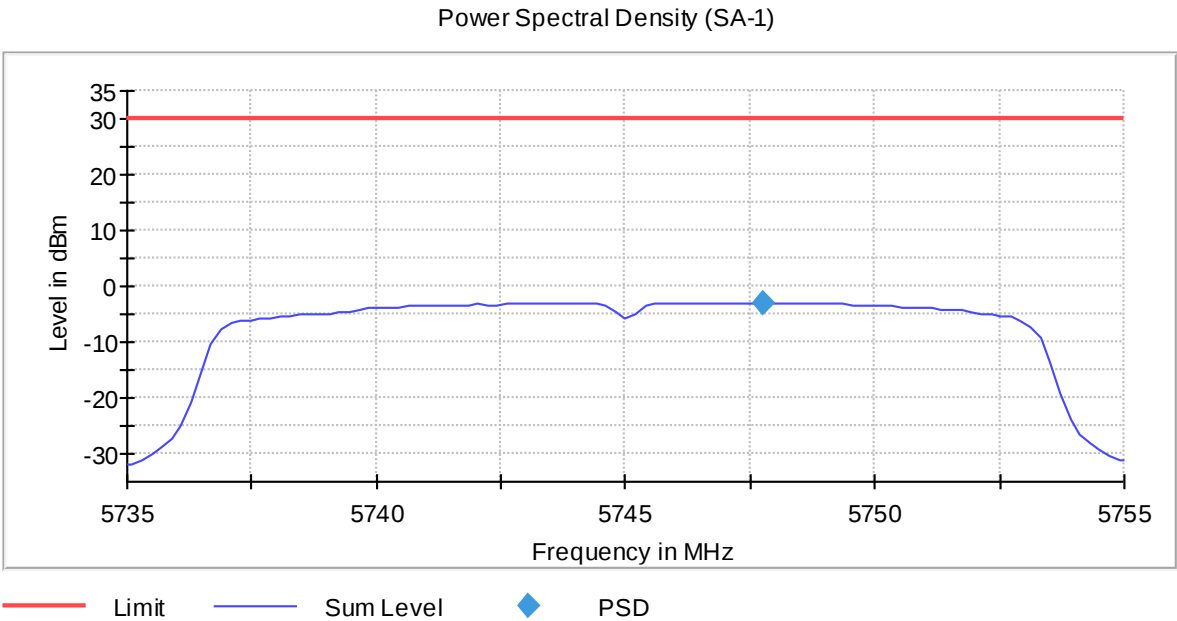
SISO 802.11 ac80 (VHT80):

	Middle Channel 155 (5775 MHz)
Maximum Corrected Conducted PSD (dBm)	-12.73
Maximum EIRP Corrected Conducted PSD (dBm)	-12.73
Measurement uncertainty (dB)	<± 0.99

Verdict: PASS

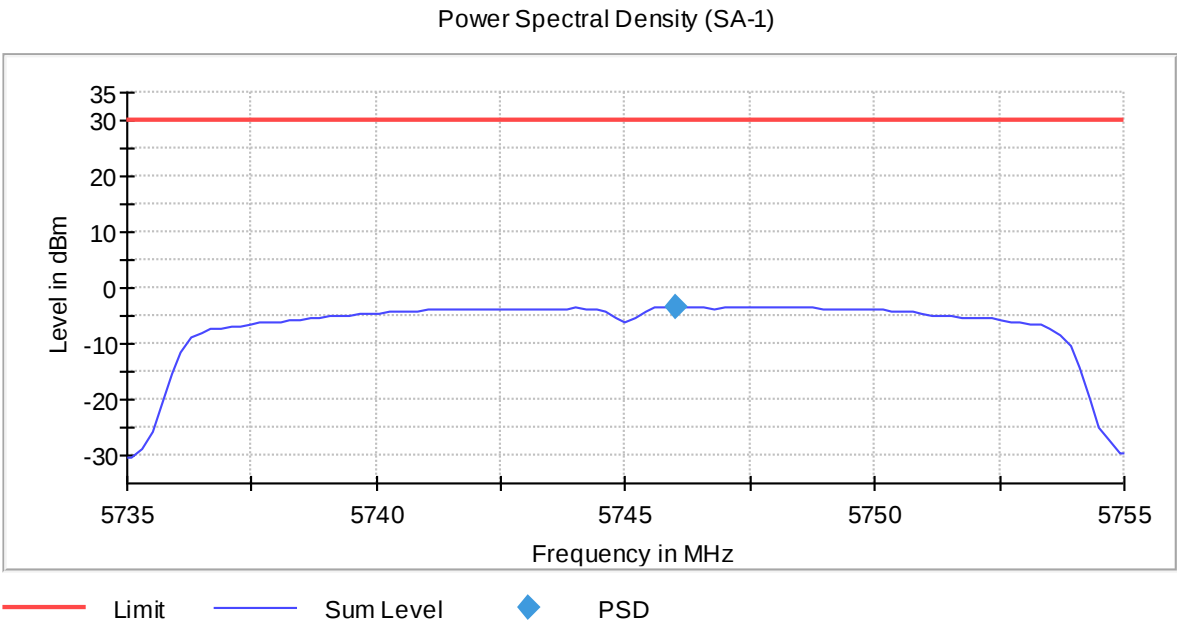
SISO 802.11 a20:

- Low Channel 149:



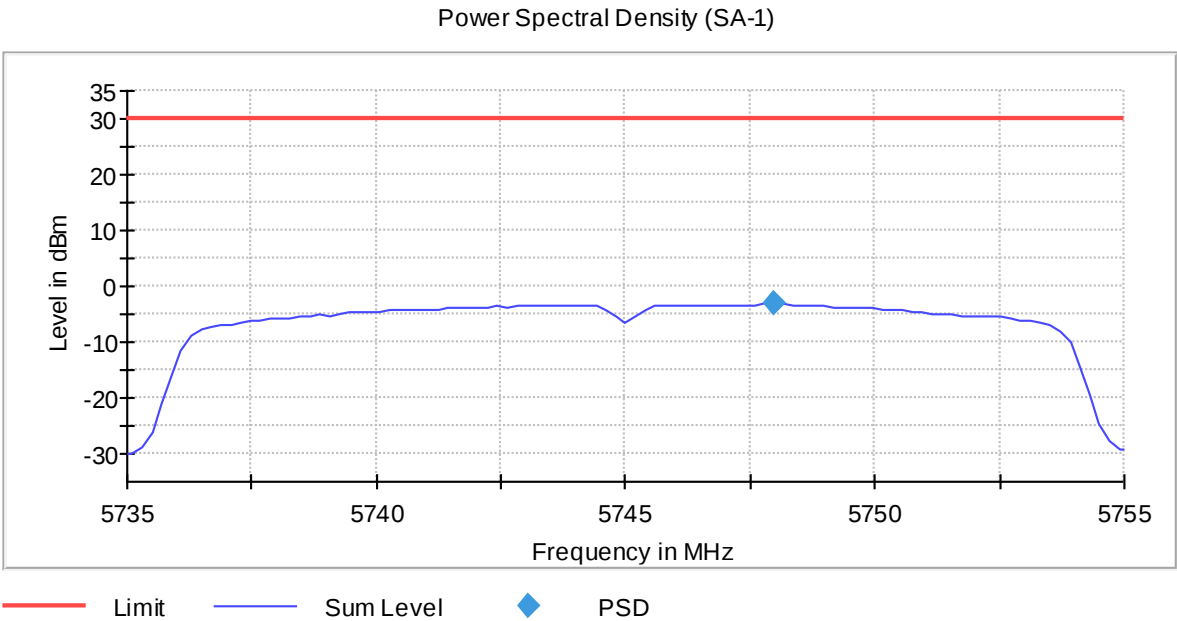
SISO 802.11 n20 (HT20):

- Low Channel 149:



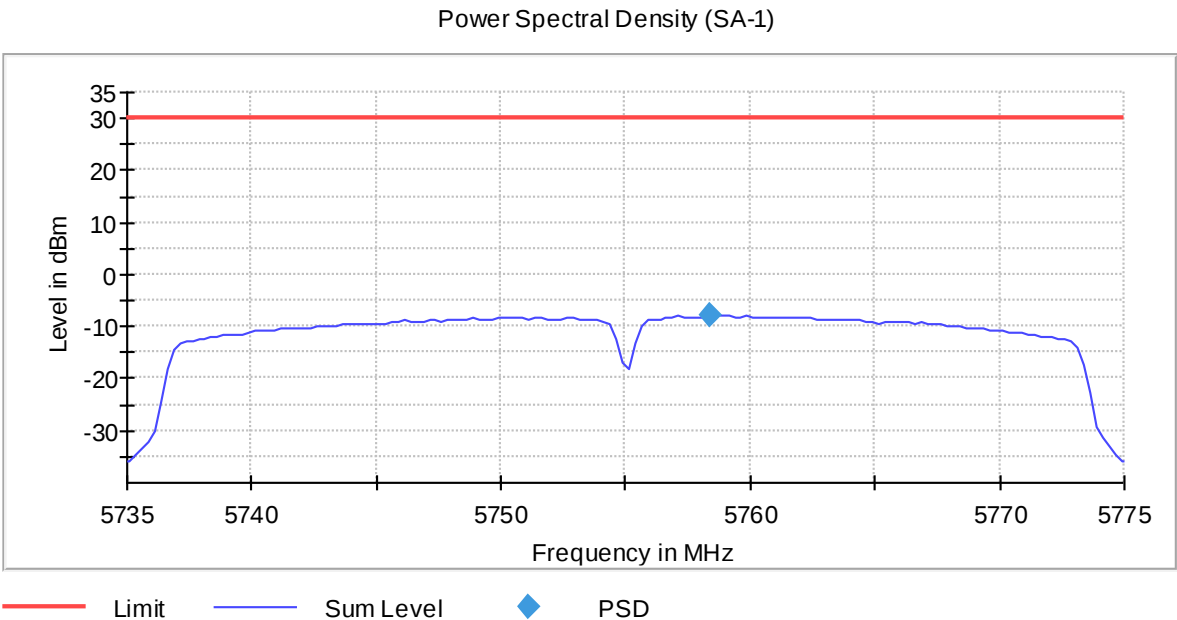
SISO 802.11 ac20 (VHT20):

- Low Channel 149:



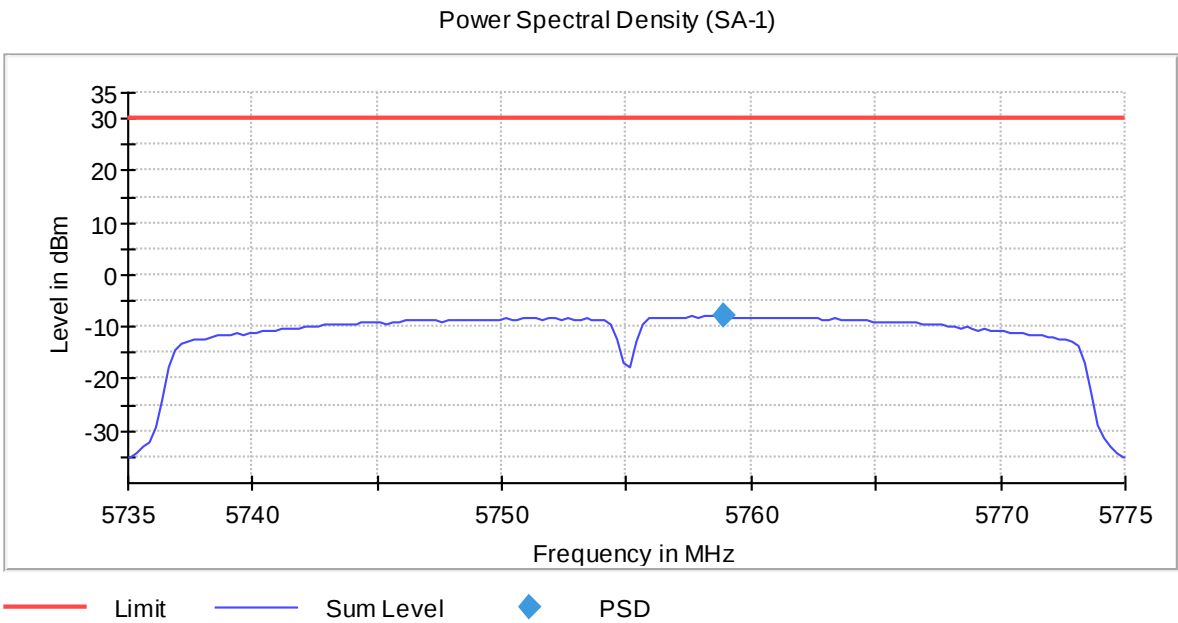
SISO 802.11 n40 (HT40):

- Low Channel 151:



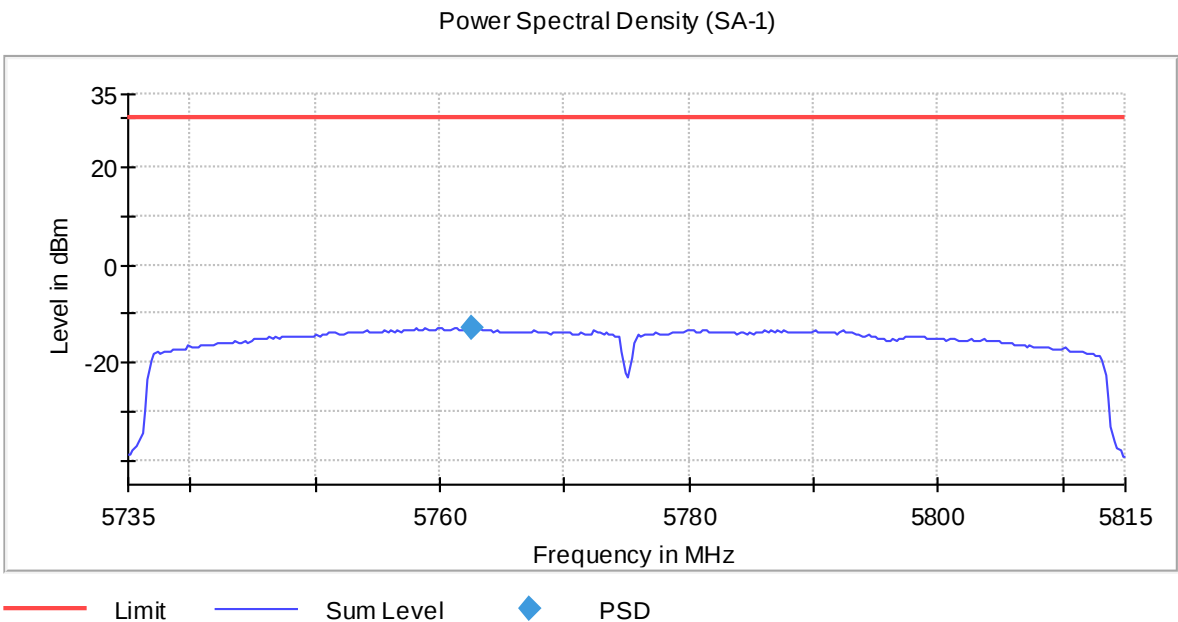
SISO 802.11 ac40 (VHT40):

- Low Channel 151:



SISO 802.11 ac80 (VHT80):

- Middle Channel 155:



FCC Section 15.407(b)(4)(6) /RSS-247 6.2.4.2. Transmitter Out of Band Radiated Emissions and Transmitter Band Edge Radiated Emissions.

SPECIFICATION:

For transmitters operating in the 5.725–5.85 GHz band: All emissions shall be limited to a level of –27 dBm/MHz (68.23 dBμV/m at 3 m distance) at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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 360° 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 17 GHz-40 GHz and a distance of 3m for frequency range 30MHz-17GHz.

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

OUT OF BAND EMISSIONS: For spurious emissions outside of the U-NII-3 band edge mask of 5.65-5.925 GHz, the OFDM worst-case mode was determined after preliminary measurements of the E.I.R.P. density (radiated). Test performed on the worst-case mode on the Low Channel.

SISO:

- **Worst-case:** **802.11 a20** (bit rate 6 Mbps).
- RF Output Power: +14 dBm

Frequency range 30 MHz - 1 GHz:

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

Spurious frequencies operating (radiated) detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBμV/m)	Polarization	Detector
74.9595	20.74	V	Quasi-Peak
825.5940	35.05	H	Quasi-Peak
959.9875	35.76	V	Quasi-Peak

Measurement Uncertainty (dB) $< \pm 5.17$

Frequency range 1 - 40 GHz:

The results in the next tables show the maximum measured levels in the 1-40 GHz range except the 5.65-5.725 GHz and 5.85-5.925GHz adjacent bands. The results in the adjacent bands was evaluated on the next section.

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.

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

Spurious frequency (GHz)	Emission Level (dBμV/m)	Polarization	Detector
7.6600	50.74	H	Peak
11.4921	59.76	V	Peak
	46.74		Average
34.1879	51.96	V	Peak

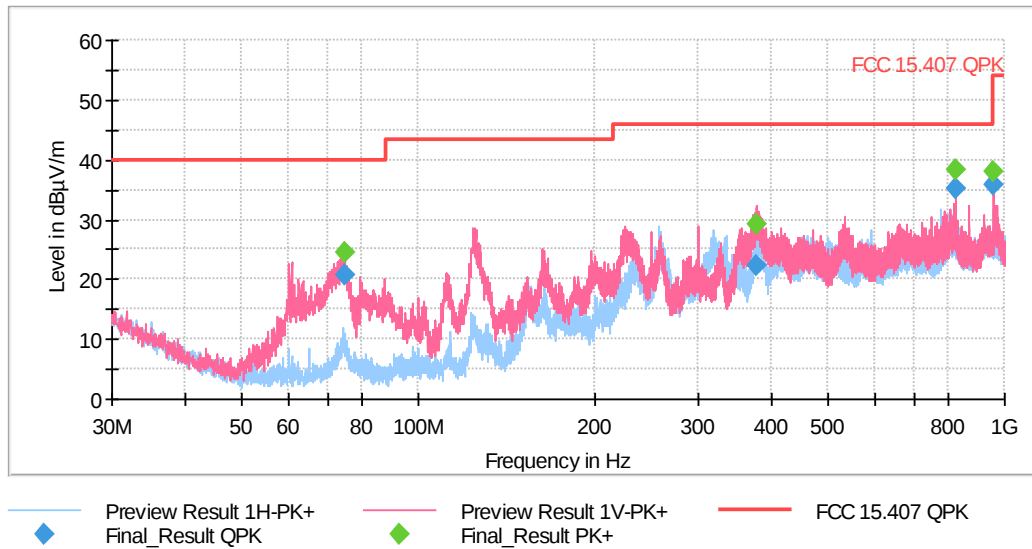
Measurement Uncertainty (dB) $< \pm 4.11$ for $1 \text{ GHz} < f < 7 \text{ GHz}$
 $< \pm 5.13$ for $7 \text{ GHz} < f < 17 \text{ GHz}$
 $< \pm 4.81$ for $17 \text{ GHz} < f < 26.5 \text{ GHz}$
 $< \pm 5.14$ for $26.5 \text{ GHz} < f < 40 \text{ GHz}$

Verdict: PASS

SISO:

FREQUENCY RANGE 30 MHz - 1 GHz:

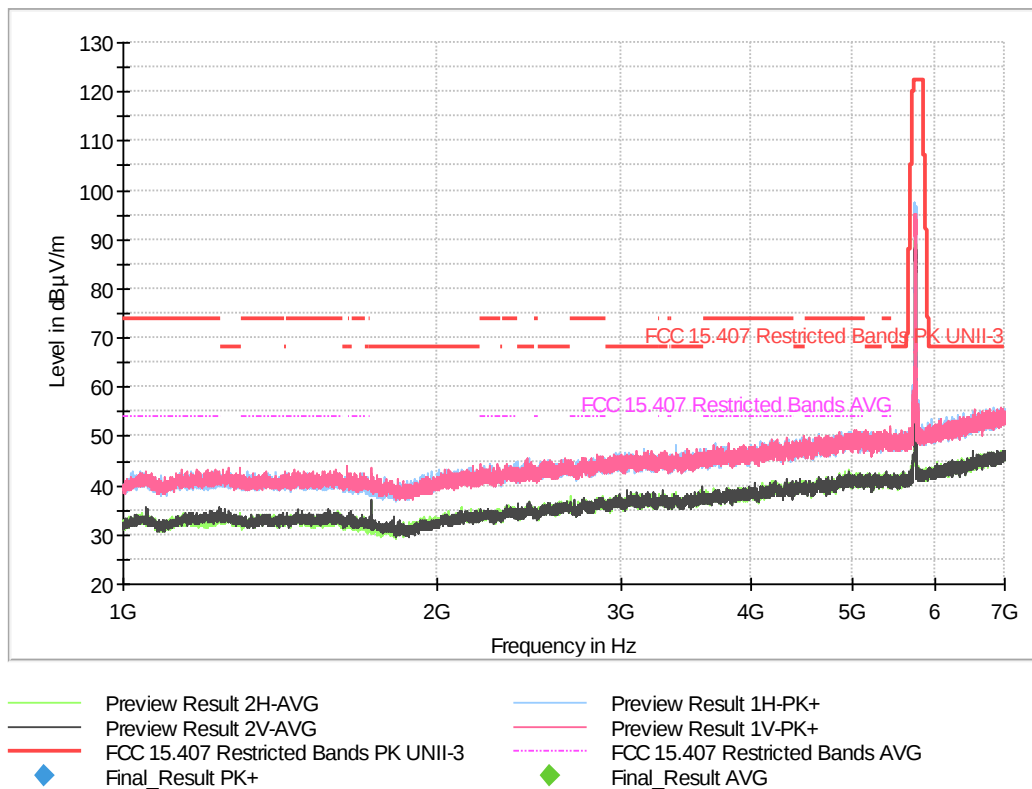
This plot is valid for the Low Channel and all the modulation modes.



FREQUENCY RANGE 1 - 7 GHz:

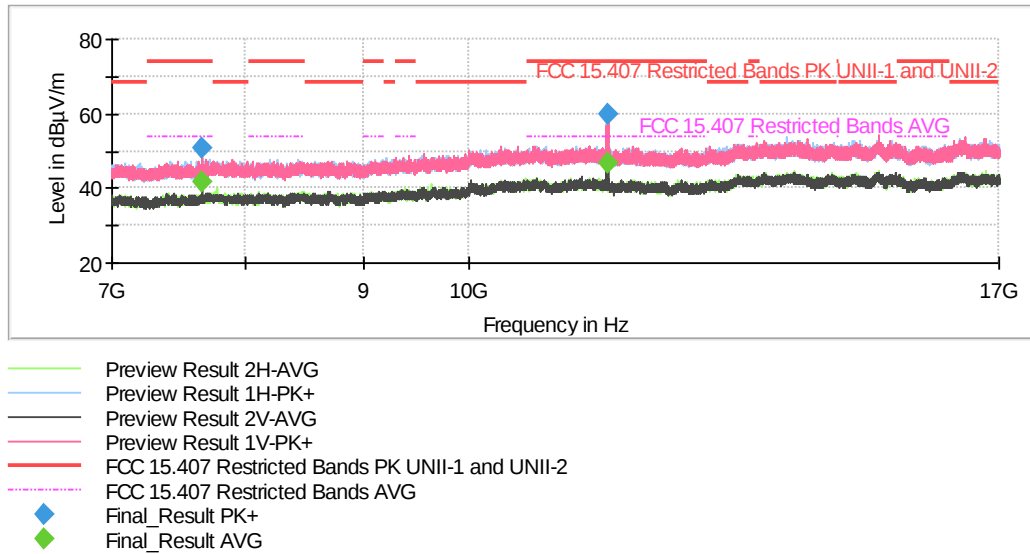
- Low Channel:

Full Spectrum



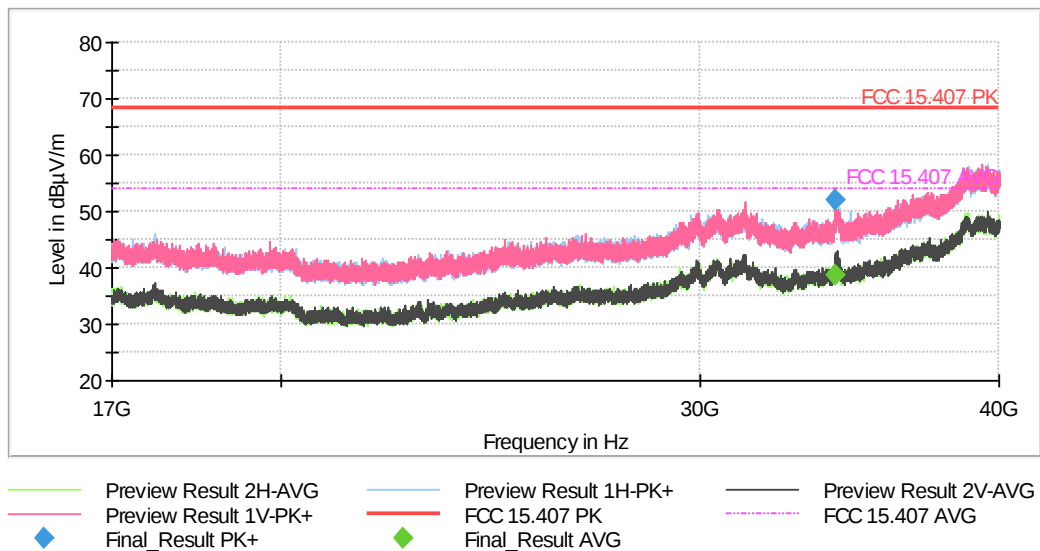
FREQUENCY RANGE 7 - 17 GHz:

- Low Channel:



FREQUENCY RANGE 17 - 40 GHz:

- Low Channel:



BAND EDGE EMISSIONS:

SISO 802.11 a20. Spurious emissions inside of the mask 5.65-5.925 GHz:

- LOW CHANNEL 149 (5745 MHz):

No spurious frequencies at less than 20 dB below the limit.

SISO 802.11 n20. Spurious emissions inside of the mask 5.65-5.925 GHz:

- LOW CHANNEL 149 (5745 MHz):

No spurious frequencies at less than 20 dB below the limit.

SISO 802.11 ac20. Spurious emissions inside of the mask 5.65-5.925 GHz:

- LOW CHANNEL 149 (5745 MHz):

No spurious frequencies at less than 20 dB below the limit.

SISO 802.11 n40. Spurious emissions inside of the mask 5.65-5.925 GHz:

- LOW CHANNEL 151 (5755 MHz):

No spurious frequencies at less than 20 dB below the limit.

SISO 802.11 ac40. Spurious emissions inside of the mask 5.65-5.925 GHz:

- LOW CHANNEL 151 (5755 MHz):

No spurious frequencies at less than 20 dB below the limit.

SISO 802.11 ac80. Spurious emissions inside of the mask 5.65-5.925 GHz:

- LOW CHANNEL 151 (5755 MHz):

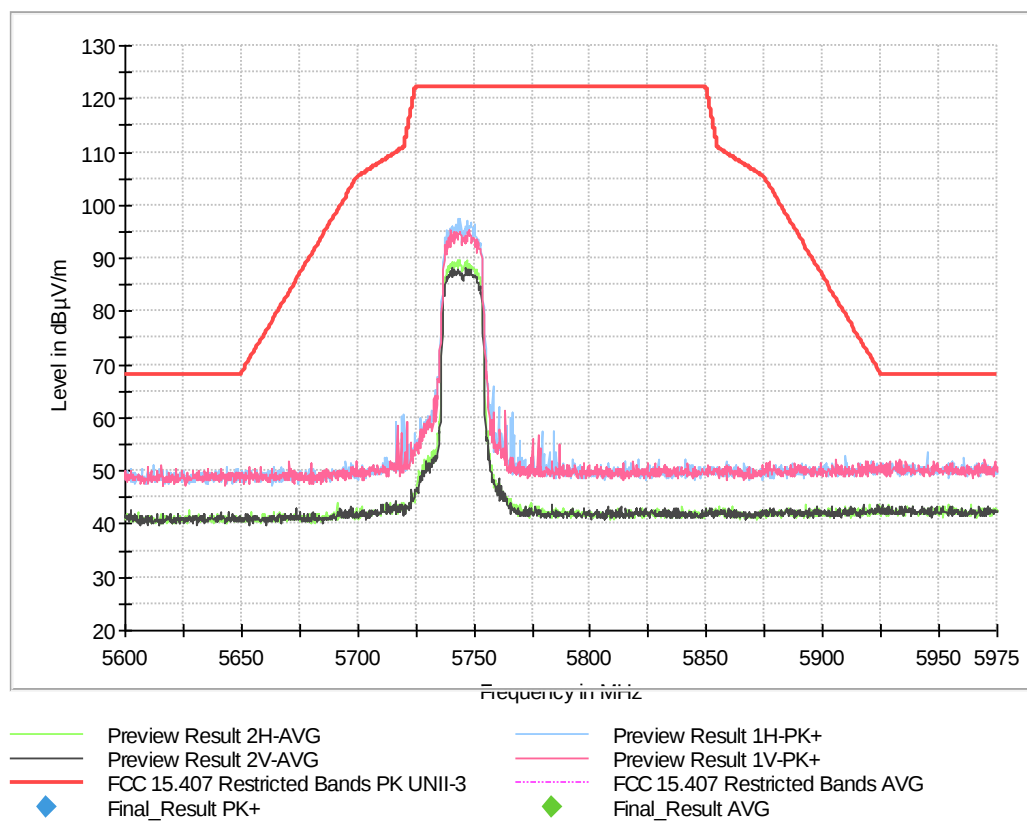
No spurious frequencies at less than 20 dB below the limit.

Measurement Uncertainty (dB) $< \pm 5.13$

Verdict: PASS

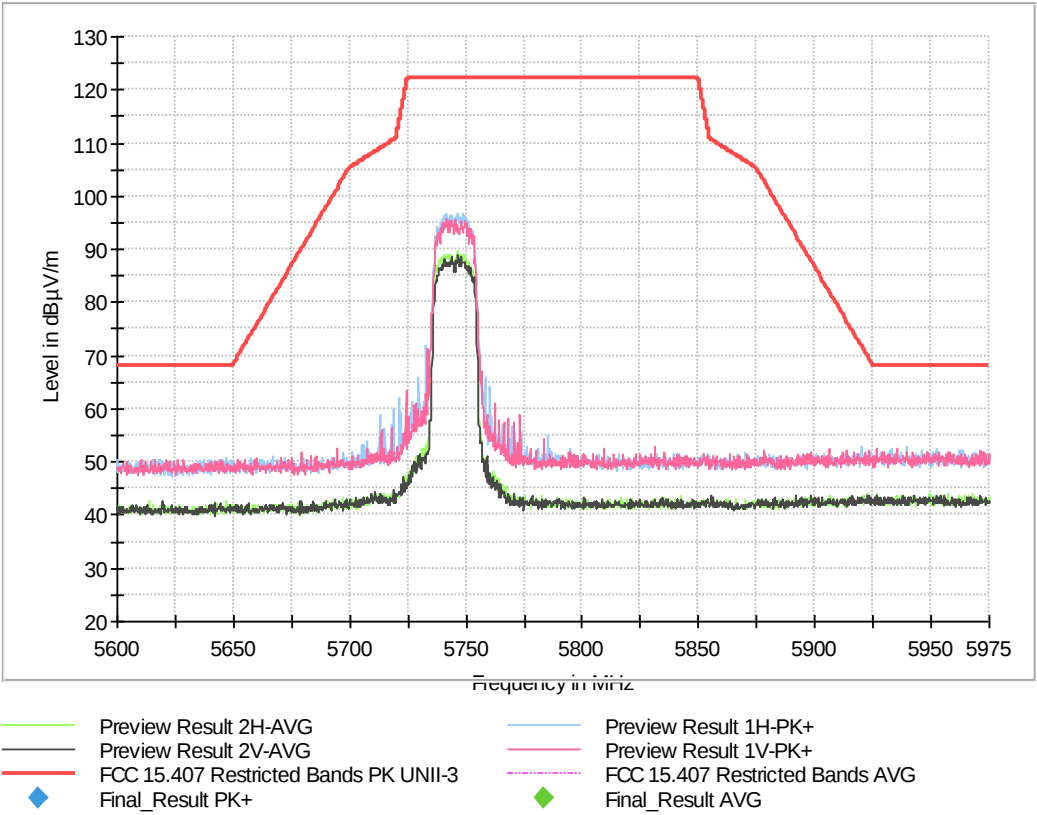
SISO 802.11 a20:

- Low Channel 149 (5745 MHz):



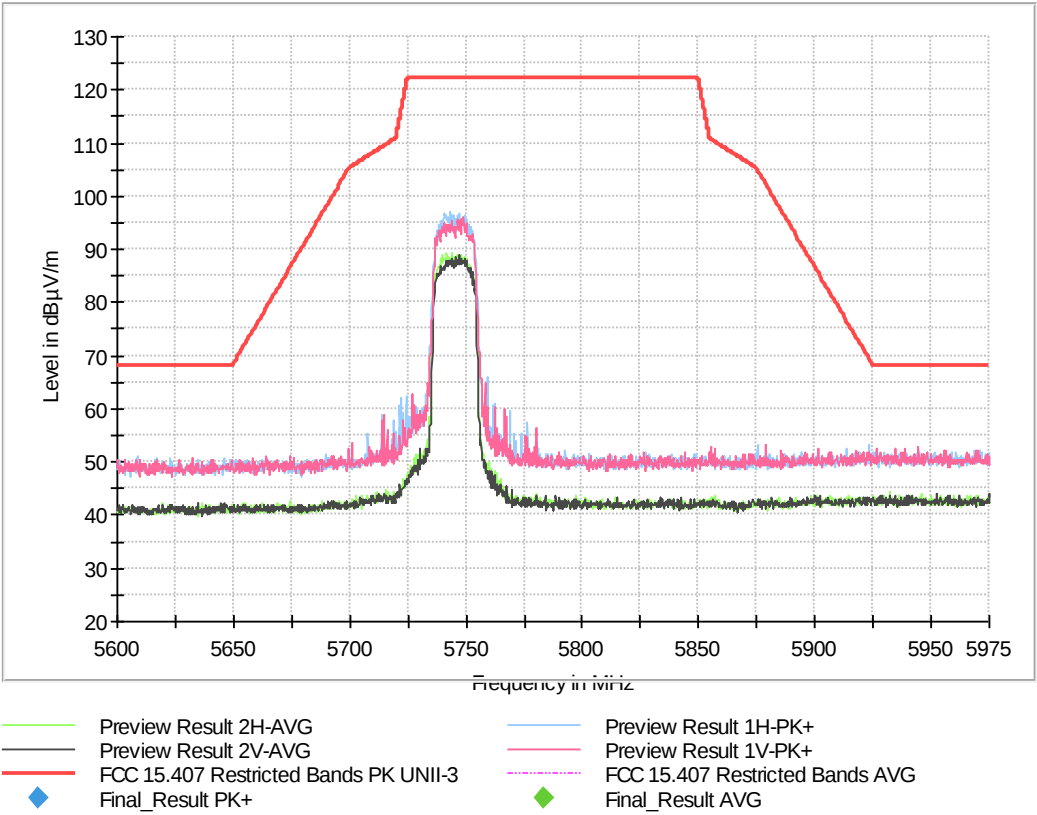
SISO 802.11 n20:

- Low Channel 149 (5745 MHz):



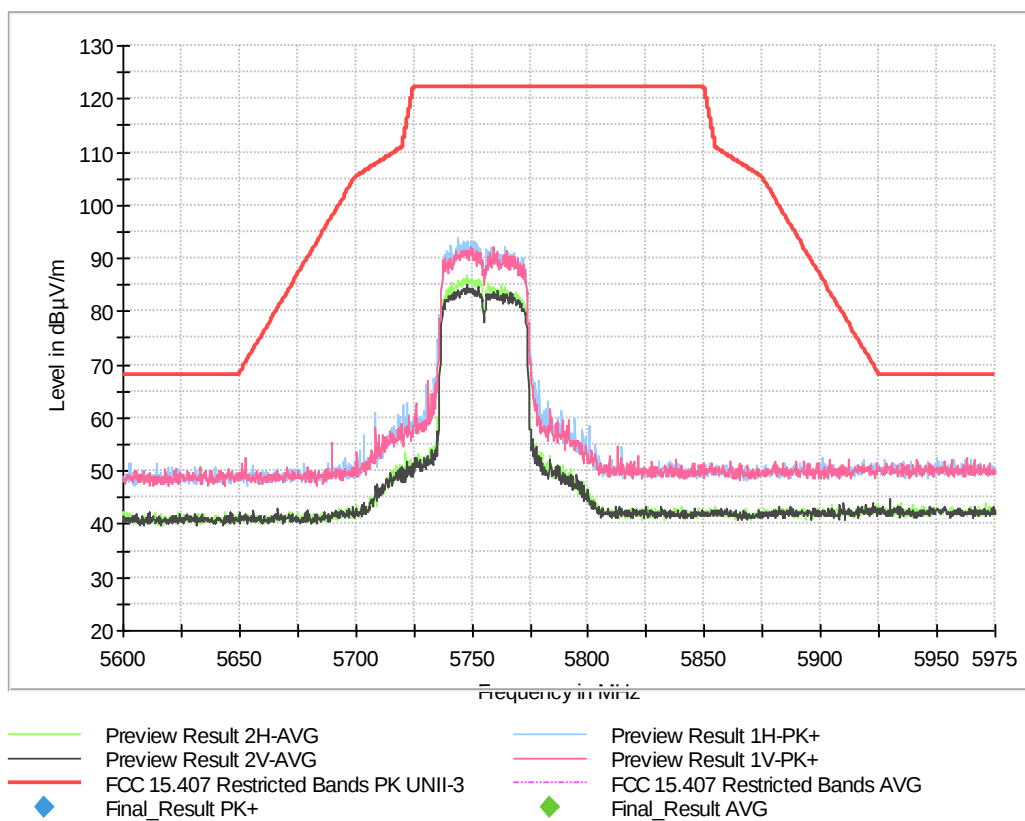
SISO 802.11 ac20:

- Low Channel 149 (5745 MHz):



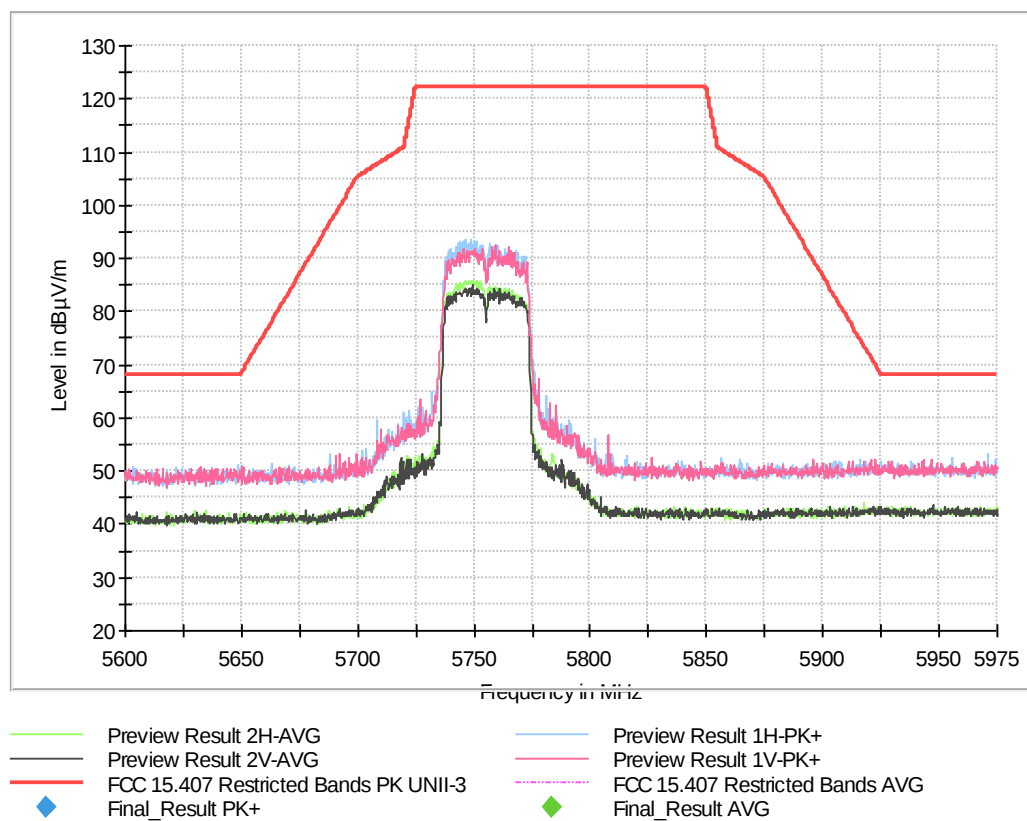
SISO 802.11 n40:

- Low Channel 151 (5755 MHz):



SISO 802.11 ac40:

- Low Channel 151 (5755 MHz):



SISO 802.11 ac80:

- Low Channel 155 (5775 MHz):

