



TEST REPORT

No.B23N00973-WLAN 5GHz

for

Robert Bosch GmbH

Virtual Cockpit Unit

Model Name: VCURH1

with

Hardware Version: C3

Software Version: SQBR4-20

FCC ID: 2AUXS-VCURH1

Issued Date: 2023-10-18

Designation Number: CN1210

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
B23N00973-WLAN 5GHz	Rev.0	1st edition	2023-10-18

Note: the latest revision of the test report supersedes all previous versions.



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1. Summary of Test Report

1.1. Test Items

Description	Virtual Cockpit Unit
Model Name	VCURH1
Applicant's name	Robert Bosch GmbH
Manufacturer's Name	Robert Bosch GmbH

1.2. Test Standards

FCC Part15-2021; ANSI C63.10-2013; KDB789033-V02r01; KDB 662911-V02r01.

1.3. Test Result

Pass

Please refer to "5.2. Test Results"

1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road,
Futian District, Shenzhen, Guangdong, P. R. China 518000

1.5. Project data

Testing Start Date:	2023-07-25
Testing End Date:	2023-09-28

1.6. Signature

Lin Zechuang

(Prepared this test report)

An Ran

(Reviewed this test report)

Zhang Bojun

(Approved this test report)



2. Client Information

2.1. Applicant Information

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2.2. Manufacturer Information

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Address: Robert-Bosch-Str. 200, 31139 Hildesheim, Germany
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Telephone: +49 5121 49-2608
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Virtual Cockpit Unit
Model Name	VCURH1
RF Protocol	IEEE 802.11a,802.11n-HT20/40,802.11ac-VHT20/40/80,802.11ax-HE20/40/80
WLAN Frequency Range	ISM Bands: 5150MHz~5250MHz; 5725MHz~5850MHz.
Type of modulation	OFDM/OFDMA
Antenna Type	Integrated antenna
Antenna Gain	SISO: Antenna 0: 4.9dBi; Antenna 1: 2.22dBi. Directional Gain: 6.7dBi (see Note1)
Power Supply	13.5V DC by External Power Supply
FCC ID	2AUXS-VCURH1
Device Type	Client/Master
Condition of EUT as received	No abnormality in appearance

Note1: The device is connected with two antennas (RF0 and RF1).

Internal antenna(RF0) has no antenna connector. External antenna(RF1) uses a unique Single High-Speed FAKRA Mini 1 pin-Rosenberger connector. The internal antenna RF0 is shared with Wifi via Time Division Multiplexing. The antennas are used with the following frequencies.

- RF0(Ant0) is for internal antenna which supports BT and Wifi (2.4GHz and 5GHz).
- RF1(Ant1) is for external antenna which supports only Wifi (2.4GHz and 5GHz).

According to customer description, antenna gain calculation for WLAN modes as described in KDB 662911 D01, sub-clause F)2)d)(i).

Directional gain = $10 \log [(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / NANT] \text{dBi} = 10 \log [(10^{4.9/20} + 10^{2.22/20})^2 / 2] \text{dBi} = 6.7 \text{dBi}$.

Note2: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Shenzhen Academy of Information and Communications Technology.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of Receipt
UT02aa	9000012	C3	SQBR4-20	2023-07-01
UT04aa	9000005	C3	SQBR4-20	2023-06-28

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

UT02aa is used for conduction test, UT04aa is used for radiation test.

3.3. Internal Identification of AE used during the test

AE No.	Description	AE ID*
AE1	DC power supply	Aa01a
AE2	Data Cable	Ca01a
AE3	Power Cable	Ba01a



AE4	OptoUSB-2.0 Transceiver	Ha01a
AE1		
Model	PCR1000LA	
Manufacturer	KIKUSUI	
AE2		
Model	J6 HSAL-II	
Manufacturer	MOLEX	
AE3		
Model	J2 56 way STAK50H SYSTEM	
Manufacturer	/	
AE4		
Model	OptoUSB-2.0	
Manufacturer	Messtechnik	

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

3.4. General Description

The Equipment under Test (EUT) is a model of Virtual Cockpit Unit with integrated antenna.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.



4. REFERENCE DOCUMENTS

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

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

Reference	Title	Version
FCC Part15	FCC CFR 47,Part 15,Subpart C FCC CFR 47,Part 15,Subpart E	2021
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013
KDB 789033	GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E	V02r01
KDB 662911	Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)	V02r01



5. Test Results

5.1. Testing Environment

Normal Temperature: 15~35°C

Relative Humidity: 20~75%

5.2. Test Results

No.	Test cases	Sub-clause of Part15E	Verdict
0	Maximum Output Power	15.407(a)	P
1	Power Spectral Density	15.407(a)	P
2	Occupied 26dB Bandwidth	15.403(i)	/
3	Occupied 6dB Bandwidth	15.407(e)	P
4	99% Occupied Bandwidth	15.403	/
5	Band edge compliance	15.209	P
6	Radiated Spurious Emissions	15.209	P
7	Transmit Power Control	15.407	NA

See **ANNEX A** for details.

Note: According to the definition of the application description, the device will automatically discontinue transmission in case of either absence of information to transmit or operational failure.

5.3. Statements

SAICT has evaluated the test cases requested by the applicant/manufacture as listed in section 5.2 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2

Disclaimer:

A. After confirmation with the customer, the sample information provided by the customer may affect the validity of the measurement results in this report, and the impact and consequences arising therefrom shall be borne by the customer.

B. The samples in this report are provided by the customer, and the test results are only applicable to the samples received.



6. Test Equipments Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Calibration Period
1	Vector Signal Analyzer	FSV40	100903	Rohde & Schwarz	2022-12-29	1 year
2	Power Sensor	U2021XA	MY55430013	Keysight	2022-12-29	1 year
3	Data Acquisition	U2531A	TW55443507	Keysight	/	/
4	RF Control Unit	JS0806-2	21C8060398	Tonscend	2023-05-08	1 year
5	Shielding Room	S81	CT000986-1344	ETS-Lindgren	2021-09-13	5 years

Radiated test system

9K-30MHz, 30MHz-1GHz, 18GHz-40GHz:

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Calibration Period
1	Test Receiver	ESR7	101676	Rohde & Schwarz	2022-11-24	1 year
2	Spectrum Analyzer	FSV40	101192	Rohde & Schwarz	2023-01-12	1 year
3	BiLog Antenna	3142E	0224831	ETS-Lindgren	2021-05-28	3years
4	Horn Antenna	3117	00066577	ETS-Lindgren	2022-04-18	3 years
5	Horn Antenna	QSH-SL-18-26 -S-20	17013	Q-par	2023-02-02	3 years
6	Horn Antenna	QSH-SL-18-40 -K-SG	15979	Q-par	2021-01-30	3 years
7	Anechoic Chamber	FACT3-2.0	1285	ETS-Lindgren	2023-05-29	2 years
8	Loop Antenna	HLA6120	35779	TESEQ	2022-05-13	3 years

1GHz-18GHz:

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Calibration Period
1	Test Receiver	FSV40-N	101655	Rohde & Schwarz	2023-05-03	1 year
2	BiLog Antenna	VULB 9163	9163-330	Schwarzbeck	2021-03-23	3 year
3	Horn Antenna	3117	00227733	ETS-lindgren	2023-03-16	3 years
4	Anechoic Chamberr	SAC3-1.2	TJ2359-Q19 22	ETS-Lindgren	2022-09-05	2 years
5	Filter	HPF_3G18G- SMA	SKET	/	/	/
6	Filter	HPF_6.3G21G -SMA	SKET	/	/	/

Test software

No.	Equipment	Manufacturer	Version
1	JS1120-3	Tonscend	3.3
2	EMC32	Rohde & Schwarz	10.50.40

EUT is engineering software provided by the customer to control the transmitting signal.
The EUT was programmed to be in continuously transmitting mode.



7. Laboratory Environment

Shielded room

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω

Anechoic chamber (FACT3-2.0)

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	<±4 dB, 3 m distance, from 30 to 1000 MHz
Voltage Standing Wave Ratio (VSWR)	≤ 6 dB, from 1 to 18 GHz, 3m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

Anechoic chamber (SAC3-1.2)

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Voltage Standing Wave Ratio (VSWR)	≤ 6 dB, from 1 to 18 GHz, 3m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

**8. Measurement Uncertainty**

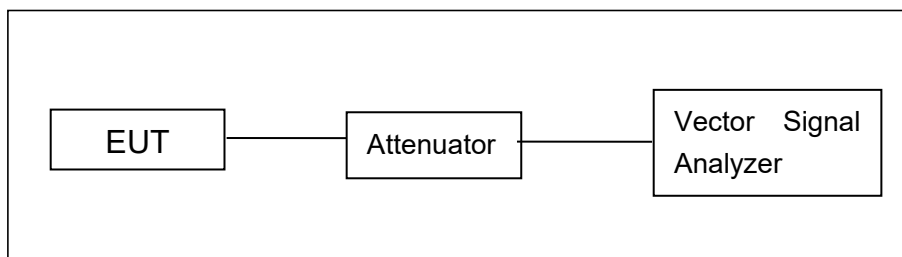
Test Name	Uncertainty ($k=2$)	
1. Maximum output Power	1.36dB	
2. Peak Power Spectral Density	1.36dB	
3. Occupied 26dB Bandwidth	4.56kHz	
4. Occupied 6dB Bandwidth	4.56kHz	
5. 99% Occupied Bandwidth	4.56kHz	
6. Band Edges Compliance	4.68dB	
7. Transmitter Spurious Emission - Radiated	$9\text{kHz} \leq f < 30\text{MHz}$	1.70dB
	$30\text{MHz} \leq f < 1\text{GHz}$	4.80dB
	$1\text{GHz} \leq f < 18\text{GHz}$	4.88dB
	$18\text{GHz} \leq f \leq 40\text{GHz}$	2.36dB

ANNEX A: Detailed Test Results

A.1. Measurement Method

Conducted Measurements

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

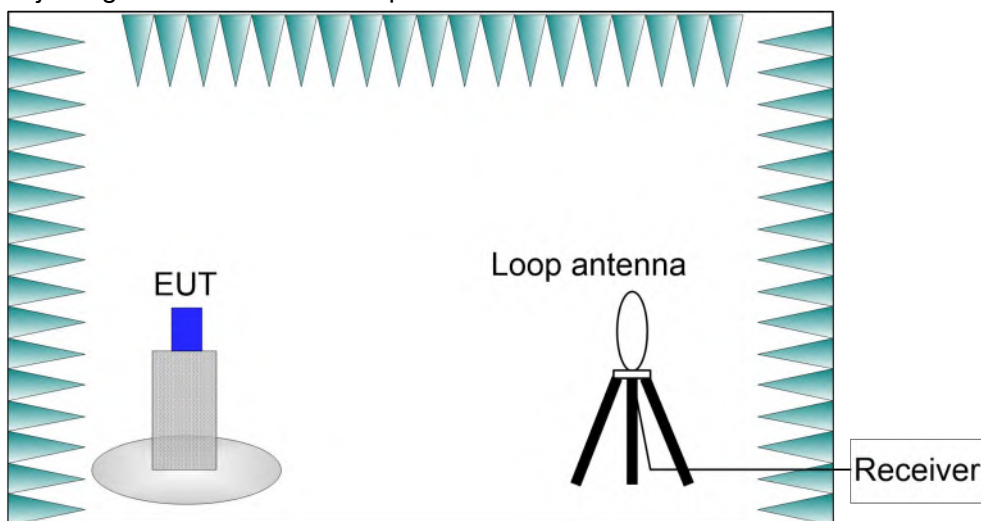


Radiated Emission Measurements

Test setup:

9kHz-30MHz:

The EUT are measured in a anechoic chamber. The EUT is placed on a non-conductive stand of 80cm high, the External antenna of EUT and EUT are placed 50cm apart center to center on the same plane, and at a measurement distance of 3m from the receiving antenna. The center of the receiving loop antenna is 1.0 meter above the ground. The test setup refers to figure below. During the tests, Detected emissions were maximized at each frequency by rotating the EUT and adjusting the receiver antenna polarization.

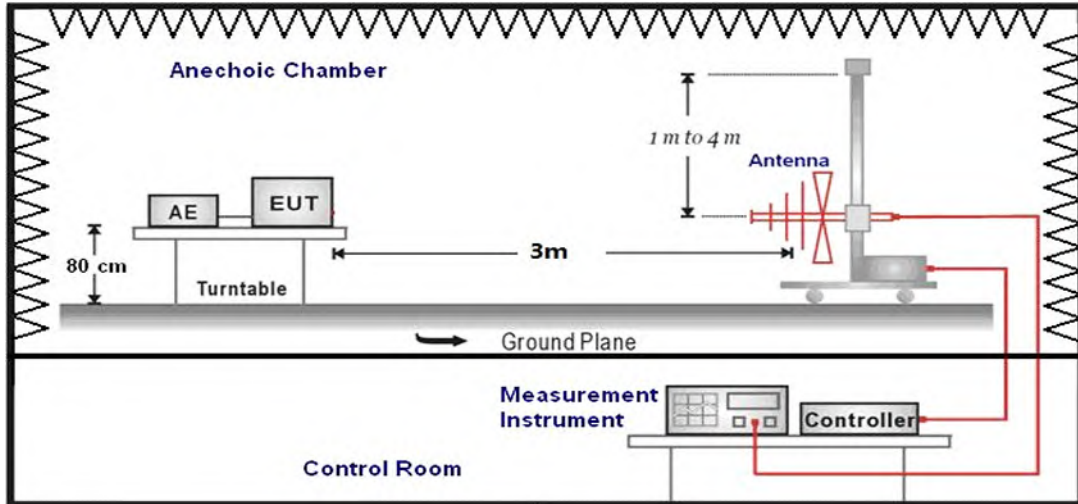


30MHz-1GHz:

The EUT are measured in a anechoic chamber. The EUT is placed on a non-conductive stand of 80cm high, the external antenna of EUT and EUT are placed 50cm apart center to center on the

same plane, and at a measurement distance of 3m from the receiving antenna. The center of the receiving antenna is 1.0 meter to 4.0 meter above the ground. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT and adjusting the receiver antenna polarization.

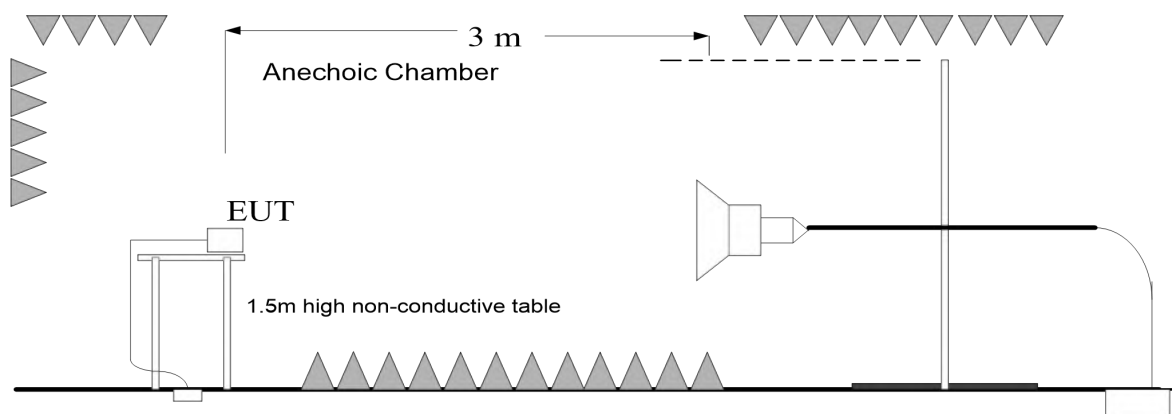
30MHz-1GHz:



1GHz-40GHz:

The EUT are measured in an anechoic chamber. The EUT is placed on a non-conductive stand of 1.5 meter high, the External antenna of EUT and EUT are placed 50cm apart center to center on the same plane, and at a measurement distance of 3m from the receiving antenna. The center of the receiving loop antenna is 1.5 meter above the ground. The test setup refers to figure below. During the tests, Detected emissions were maximized at each frequency by rotating the EUT and adjusting the receiver antenna polarization.

1GHz-40GHz:





A.2. Maximum output Power

Measurement Limit and Method:

Standard	Frequency (MHz)	Limit (dBm)
FCC CRF Part 15.407(a)	5150MHz~5250MHz	29.3 (master device)
		23.3 (client device)
	5725MHz~5850MHz	29.3

Note: The directional gain is greater than 6dBi, the limits need to be reduced as required.

$$P_{out} = P_{limit} - (G_{Tx} - 6) = P_{limit} - 0.7dB.$$

Measurement of method: See ANSI C63.10-2013-Clause 12.3.3.2.

Method PM-G is a measurement using a gated RF average power meter.

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Measurement Results:

SISO:

Mode	Frequency (MHz)	RF output power (dBm)		Conclusion
		Ant0	Ant1	
802.11a	5180MHz (CH36)	11.91	7.92	P
	5200MHz (CH40)	12.07	8.03	P
	5240MHz (CH48)	11.72	8.11	P
	5745MHz (CH149)	16.89	13.43	P
	5785MHz (CH157)	16.80	13.44	P
	5825MHz (CH165)	16.93	13.57	P
802.11n-HT20	5180MHz (CH36)	11.82	7.81	P
	5200MHz (CH40)	12.00	7.88	P
	5240MHz (CH48)	11.63	8.01	P
	5745MHz (CH149)	17.22	13.87	P
	5785MHz (CH157)	17.15	13.84	P
	5825MHz (CH165)	17.23	13.95	P
802.11ac-VHT20	5180MHz (CH36)	11.79	7.82	P
	5200MHz (CH40)	11.97	7.86	P
	5240MHz (CH48)	11.62	8.04	P
	5745MHz (CH149)	17.21	13.88	P
	5785MHz (CH157)	17.16	13.85	P
	5825MHz (CH165)	17.23	13.98	P
802.11ax-HE20	5180MHz (CH36)	11.98	7.95	P
	5200MHz (CH40)	12.16	8.01	P
	5240MHz (CH48)	11.77	8.15	P
	5745MHz (CH149)	17.32	13.98	P



	5785MHz (CH157)	17.21	13.93	P
	5825MHz (CH165)	17.30	14.08	P
802.11n-HT40	5190MHz (CH38)	12.29	8.18	P
	5230MHz (CH46)	11.92	8.42	P
	5755MHz (CH151)	16.46	13.18	P
	5795MHz (CH159)	16.63	13.42	P
802.11ac-VHT40	5190MHz (CH38)	12.28	8.17	P
	5230MHz (CH46)	11.92	8.36	P
	5755MHz (CH151)	16.44	13.23	P
	5795MHz (CH159)	16.60	13.43	P
802.11ax-HE40	5190MHz (CH38)	12.19	8.13	P
	5230MHz (CH46)	11.80	8.24	P
	5755MHz (CH151)	16.33	13.14	P
	5795MHz (CH159)	16.56	13.34	P
802.11ac-VHT80	5210MHz (CH42)	12.01	7.96	P
	5775MHz (CH155)	15.59	12.47	P
802.11ax-HE80	5210MHz (CH42)	12.00	7.96	P
	5775MHz (CH155)	15.54	12.46	P

MIMO:

Mode	Frequency (MHz)	RF output power (dBm)			Conclusion
		Ant0	Ant1	Sum	
802.11n-HT20	5180MHz (CH36)	11.96	7.90	13.40	P
	5200MHz (CH40)	12.14	7.97	13.55	P
	5240MHz (CH48)	11.75	8.08	13.30	P
	5745MHz (CH149)	17.12	13.87	18.80	P
	5785MHz (CH157)	17.19	13.84	18.84	P
	5825MHz (CH165)	17.23	14.03	18.93	P
802.11ac-VHT20	5180MHz (CH36)	11.89	7.90	13.35	P
	5200MHz (CH40)	12.10	7.92	13.50	P
	5240MHz (CH48)	11.71	8.06	13.27	P
	5745MHz (CH149)	17.09	13.80	18.76	P
	5785MHz (CH157)	17.14	13.86	18.81	P
	5825MHz (CH165)	17.22	13.95	18.90	P
802.11ax-HE20	5180MHz (CH36)	12.04	7.98	13.48	P
	5200MHz (CH40)	12.20	8.05	13.61	P
	5240MHz (CH48)	11.82	8.17	13.38	P
	5745MHz (CH149)	17.17	13.95	18.86	P
	5785MHz (CH157)	17.20	13.99	18.90	P
	5825MHz (CH165)	17.30	14.07	18.99	P
802.11n-HT40	5190MHz (CH38)	12.40	8.24	13.81	P
	5230MHz (CH46)	12.04	8.47	13.62	P
	5755MHz (CH151)	16.38	13.12	18.06	P



	5795MHz (CH159)	16.62	13.27	18.27	P
802.11ac-VHT40	5190MHz (CH38)	12.38	8.26	13.80	P
	5230MHz (CH46)	12.01	8.44	13.59	P
	5755MHz (CH151)	16.37	13.13	18.06	P
	5795MHz (CH159)	16.60	13.30	18.27	P
802.11ax-HE40	5190MHz (CH38)	12.27	8.13	13.69	P
	5230MHz (CH46)	11.93	8.33	13.50	P
	5755MHz (CH151)	16.34	13.00	17.99	P
	5795MHz (CH159)	16.40	13.19	18.10	P
802.11ac-VHT80	5210MHz (CH42)	12.12	8.06	13.56	P
	5775MHz (CH155)	15.42	12.33	17.15	P
802.11ax-HE80	5210MHz (CH42)	12.10	8.01	13.53	P
	5775MHz (CH155)	15.41	12.30	17.14	P

Note:

According to the applicant information, the output power between Client and Master is the same. The data rate 6Mbps (11a mode), MCS0 (11n mode), MCS0 (11ac mode) and MCS0 (11ax mode) are selected as the worst case. 802.11ax-HE20, 802.11n-HT40 and 802.11ac-VHT80 are selected as the worst-case (**SISO-Antenna0 and MIMO**). The following cases and test graphs are performed with this condition.

The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

Conclusion: PASS



A.3. Peak Power Spectral Density (conducted)

Measurement of method: See KDB 789033 D02 v02r01, Section F.

Measurement Limit:

Standard	Frequency (MHz)	Limit
FCC CRF Part 15.407(a)	5150MHz~5250MHz	16.3dBm/MHz (master device)
		10.3dBm/MHz (client device)
	5725MHz~5850MHz	29.3dBm/500kHz

Note: The directional gain is greater than 6dBi, the limits need to be reduced as required.

$$P_{out} = P_{limit} - (G_{Tx} - 6) = P_{limit} - 0.7dB.$$

Measurement Results:

SISO-Ant0:

Mode	Frequency (MHz)	Power Spectral Density(dBm/MHz)	Conclusion
802.11ax-HE20	5180MHz (CH36)	-0.81	P
	5200MHz (CH40)	-1.17	P
	5240MHz (CH48)	-0.93	P
802.11ax-HE20 (RU26)	5180MHz (CH36)	8.53	P
	5240MHz (CH48)	7.89	P
802.11n-HT40	5190MHz (CH38)	-3.75	P
	5230MHz (CH46)	-3.94	P
802.11ax-HE40 (RU26)	5190MHz (CH38)	8.58	P
	5230MHz (CH46)	8.07	P
802.11ac-VHT80	5210MHz (CH42)	-7.33	P
802.11ax-HE80 (RU26)	5210MHz (CH42)	8.32	P
		7.86	P
Mode	Frequency (MHz)	Power Spectral Density (dBm/500kHz)	Conclusion
802.11ax-HE20	5745MHz (CH149)	0.87	P
	5785MHz (CH157)	1.58	P
	5825MHz (CH165)	1.34	P
802.11ax-HE20 (RU26)	5745MHz (CH149)	10.60	P
	5825MHz (CH165)	10.47	P
802.11n-HT40	5755MHz (CH151)	-2.68	P
	5795MHz (CH159)	-2.23	P
802.11ax-HE40 (RU26)	5755MHz (CH151)	9.98	P
	5795MHz (CH159)	10.42	P
802.11ac-VHT80	5775MHz (CH155)	-6.29	P
802.11ax-HE80 (RU26)	5775MHz (CH155)	9.30	P
		8.95	P



MIMO:

Mode	Frequency (MHz)	Power Spectral Density(dBm/MHz)	Conclusion
802.11ax-HE20	5180MHz (CH36)	0.92	P
	5200MHz (CH40)	0.24	P
	5240MHz (CH48)	0.61	P
802.11n-HT40	5190MHz (CH38)	-2.05	P
	5230MHz (CH46)	-2.23	P
802.11ac-VHT80	5210MHz (CH42)	-5.75	P
Mode	Frequency (MHz)	Power Spectral Density (dBm/500kHz)	Conclusion
802.11ax-HE20	5745MHz (CH149)	2.86	P
	5785MHz (CH157)	3.23	P
	5825MHz (CH165)	3.26	P
802.11n-HT40	5755MHz (CH151)	-0.68	P
	5795MHz (CH159)	-0.34	P
802.11ac-VHT80	5775MHz (CH155)	-4.35	P

Note: **Ant0** is the port with the worst result in SISO.

According to the customer description, RU26 is the worst RU type of 802.11ax.

For CH42(CH155) of 11ax-HE80(RU26), RU26-left and RU26-right were tested.

Conclusion: PASS

A.4. Occupied 26dB Bandwidth (conducted)

Measurement of method: See KDB 789033 D02 v02r01, Section C.1.

Measurement Limit:

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

Measurement Result:

SISO-Ant0:

Mode	Frequency (MHz)	Occupied 26dB Bandwidth(MHz)		Conclusion
		Fig.	Value	
802.11ax-HE20	5180MHz(Ch36)	Fig.1	20.84	/
	5200MHz(Ch40)	Fig.2	20.68	/
	5240MHz(Ch48)	Fig.3	20.88	/
802.11n-HT40	5190MHz(Ch38)	Fig.4	39.52	/
	5230MHz(Ch46)	Fig.5	39.76	/
802.11ac-VHT80	5210MHz(Ch42)	Fig.6	82.08	/

See below for test graphs.

Conclusion: PASS

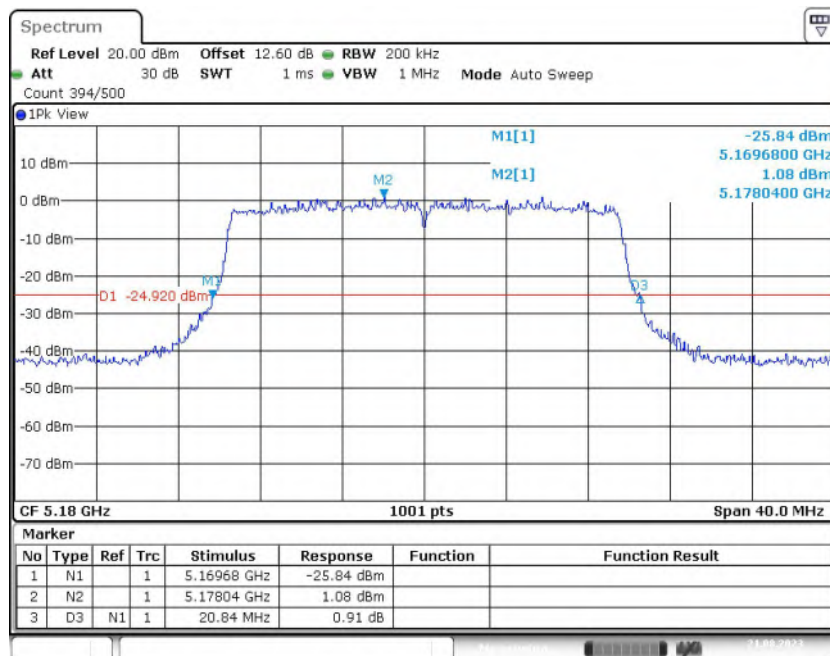


Fig. 1 Occupied 26dB Bandwidth (802.11ax-HE20, 5180MHz)

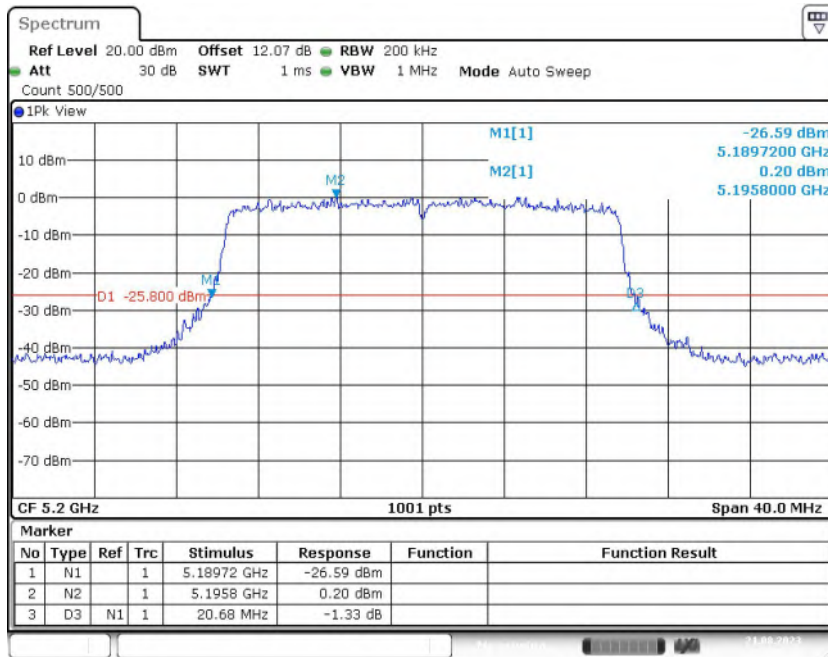


Fig. 2 Occupied 26dB Bandwidth (802.11ax-HE20, 5200MHz)

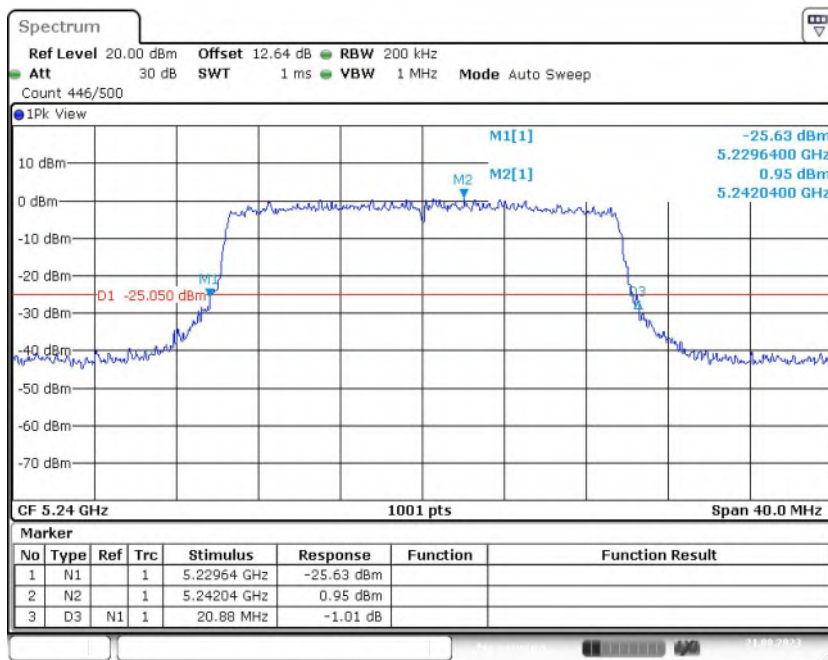


Fig. 3 Occupied 26dB Bandwidth (802.11ax-HE20, 5240MHz)

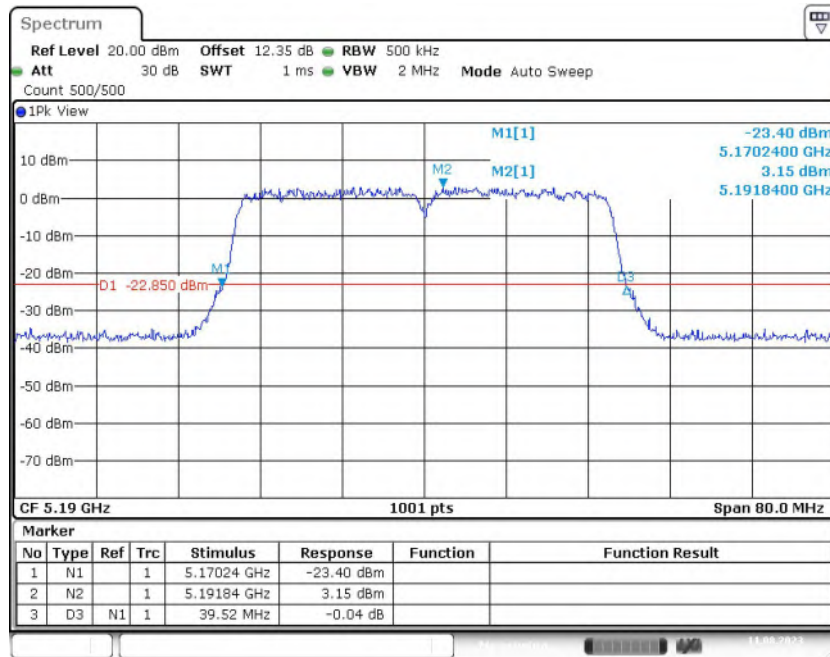


Fig. 4 Occupied 26dB Bandwidth (802.11n-HT40, 5190MHz)

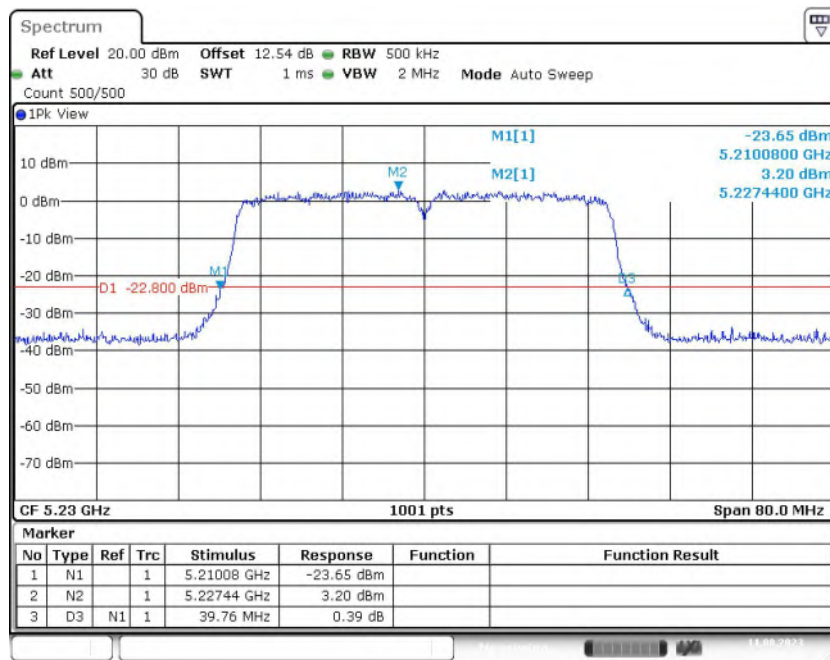


Fig. 5 Occupied 26dB Bandwidth (802.11n-HT40, 5230MHz)

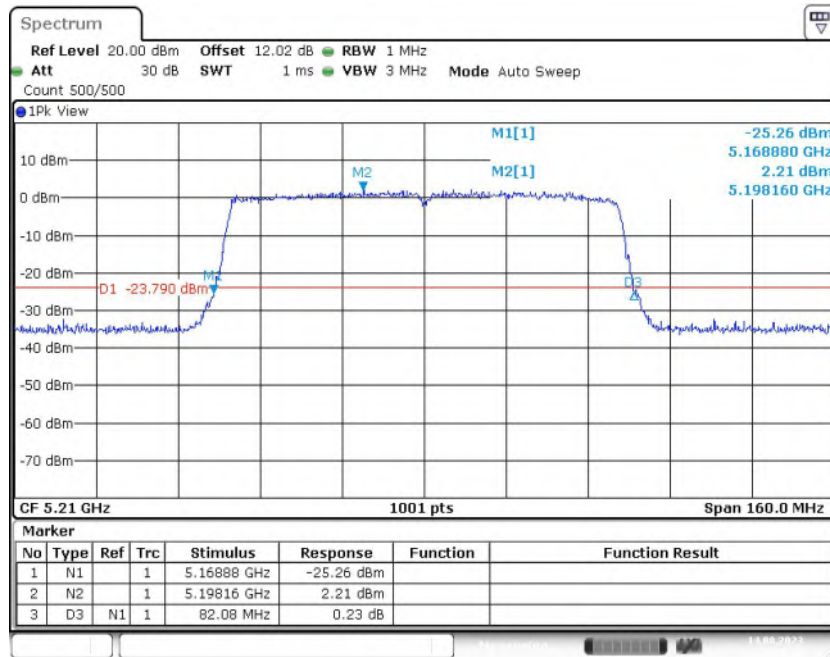


Fig. 6 Occupied 26dB Bandwidth (802.11ac-VHT80, 5210MHz)



A.5. Occupied 6dB Bandwidth (conducted)

Measurement of method: See KDB 789033 D02 v02r01, Section C.2.

Measurement Limit:

Standard	Limit (MHz)
FCC 47 CFR Part 15.407 (e)	≥ 0.5

Measurement Result:

SISO-Ant0:

Mode	Frequency (MHz)	Occupied 6dB Bandwidth(MHz)		Conclusion
		Fig.	Value	
802.11ax-HE20	5745MHz(Ch149)	Fig.7	18.56	P
	5785MHz(Ch157)	Fig.8	18.48	P
	5825MHz(Ch165)	Fig.9	18.88	P
802.11n-HT40	5755MHz(Ch151)	Fig.10	36.08	P
	5795MHz(Ch159)	Fig.11	36.16	P
802.11ac-VHT80	5775MHz(Ch155)	Fig.12	75.52	P

See below for test graphs.

Conclusion: PASS

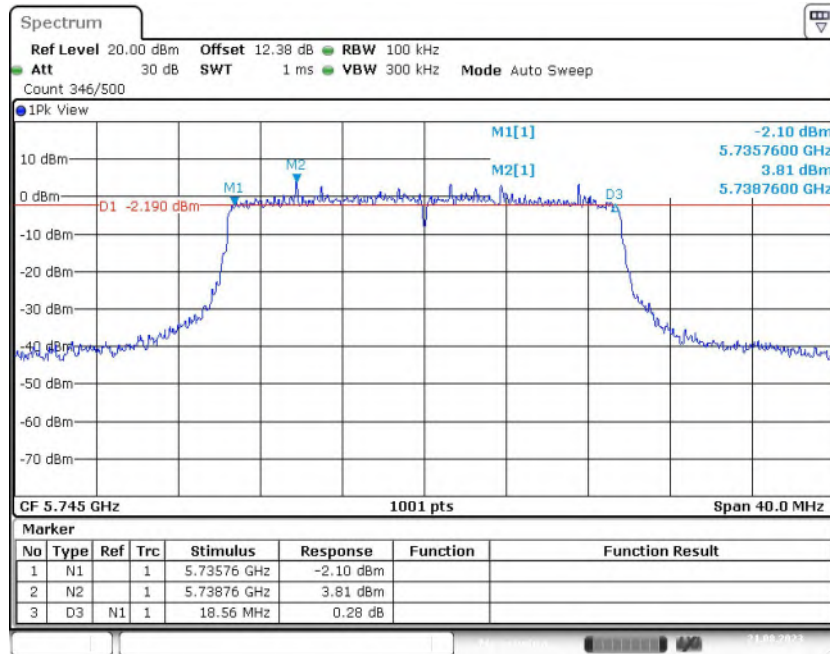


Fig. 7 Occupied 6dB Bandwidth (802.11ax-HE20, 5745MHz)

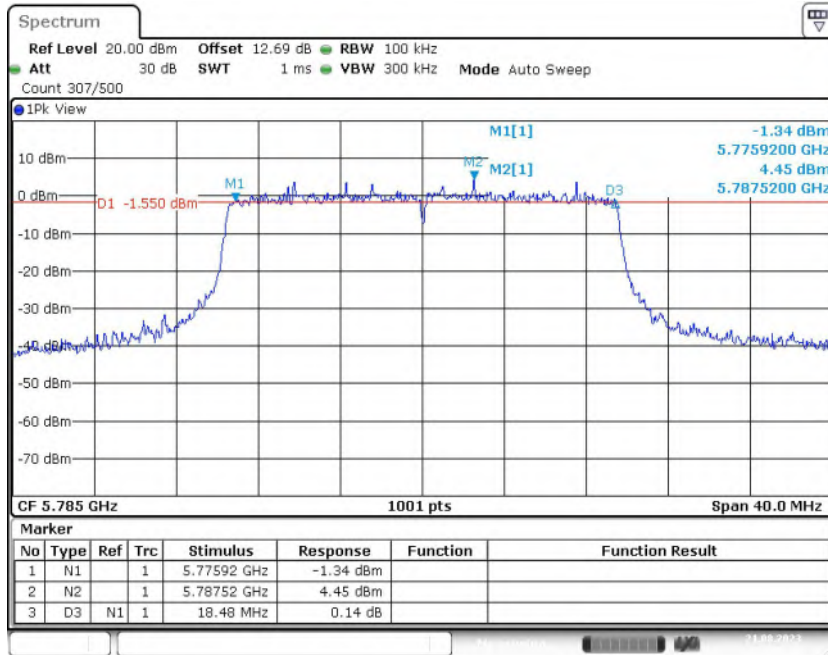


Fig. 8 Occupied 6dB Bandwidth (802.11ax-HE20, 5785MHz)

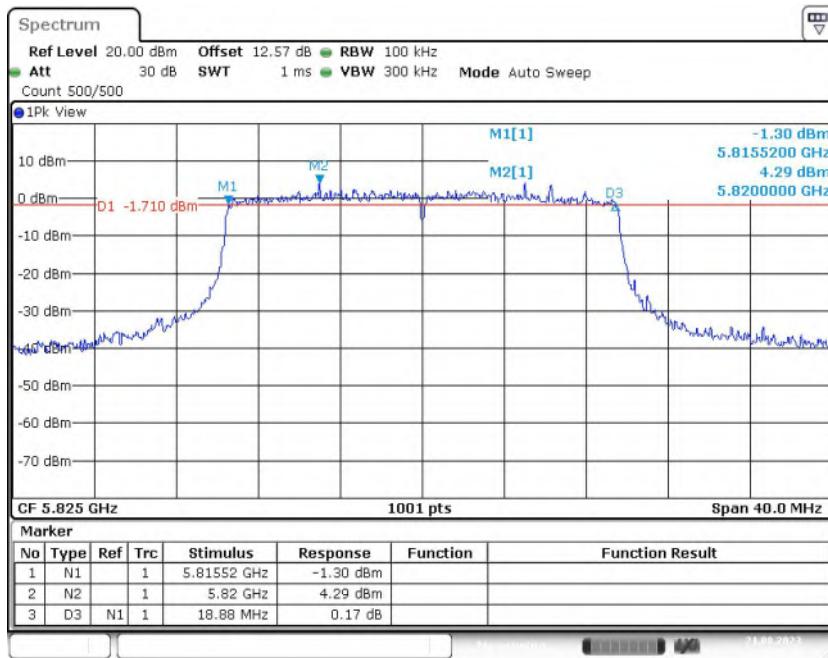


Fig. 9 Occupied 6dB Bandwidth (802.11ax-HE20, 5825MHz)

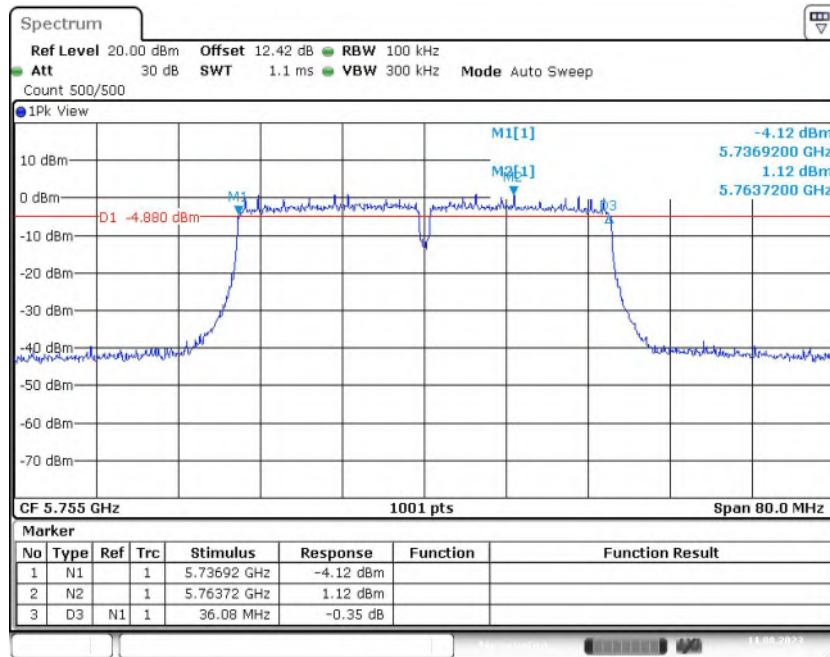


Fig. 10 Occupied 6dB Bandwidth (802.11n-HT40, 5755MHz)

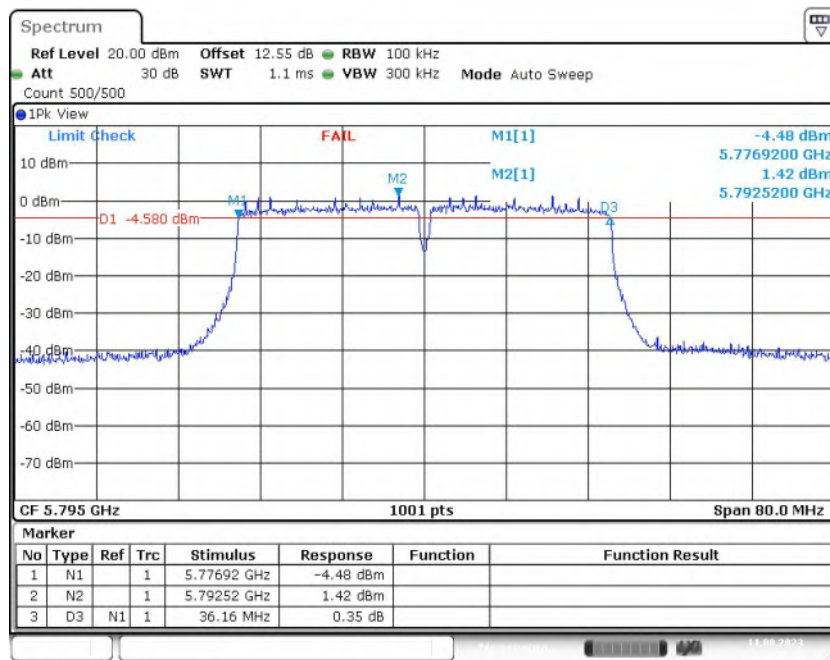


Fig. 11 Occupied 6dB Bandwidth (802.11n-HT40, 5795MHz)

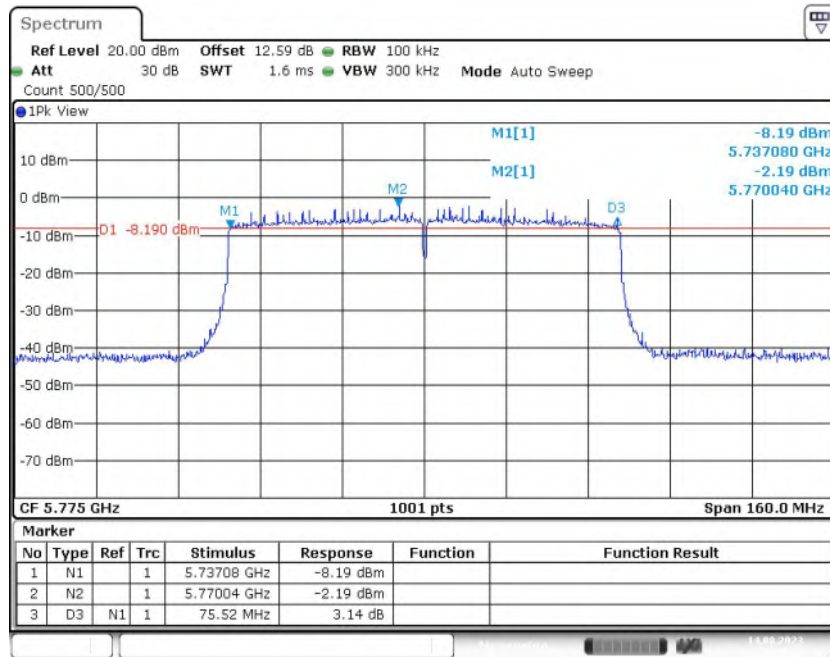


Fig. 12 Occupied 6dB Bandwidth (802.11ac-VHT80, 5775MHz)



A.6. 99% Occupied Bandwidth (conducted)

Measurement of method: See KDB 789033 D02 v02r01, Section D.

Measurement Limit:

Standard	Limit (MHz)
FCC 47 CFR Part 15.403	/

Measurement Result:

SISO-Ant0:

Mode	Frequency (MHz)	99% Occupied Bandwidth(MHz)		Conclusion
		Fig.	Value	
802.11ax-HE20	5180MHz(CH36)	Fig.13	19.02	/
	5200MHz(CH40)	Fig.14	18.98	/
	5240MHz(CH48)	Fig.15	18.98	/
	5745MHz(CH149)	Fig.16	19.02	/
	5785MHz(CH157)	Fig.17	18.98	/
	5825MHz(CH165)	Fig.18	18.98	/
802.11n-HT40	5190MHz(CH38)	Fig.19	36.20	/
	5230MHz(CH46)	Fig.20	36.20	/
	5755MHz(CH151)	Fig.21	36.20	/
	5795MHz(CH159)	Fig.22	36.28	/
802.11ac-VHT80	5210MHz(CH42)	Fig.23	75.76	/
	5775MHz(CH155)	Fig.24	75.60	/

See below for test graphs.

Conclusion: **PASS**

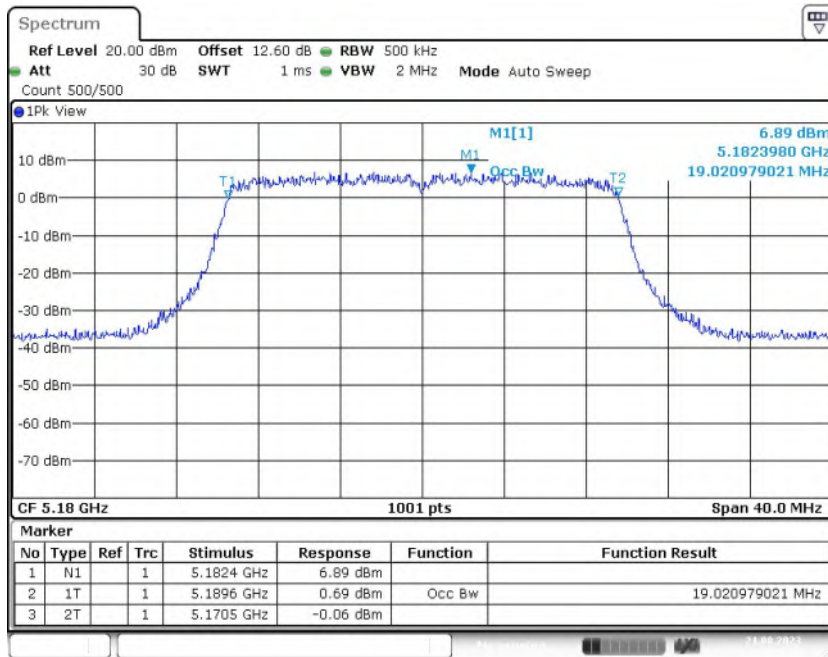


Fig. 13 99% Occupied Bandwidth (802.11ax-HE20, 5180MHz)

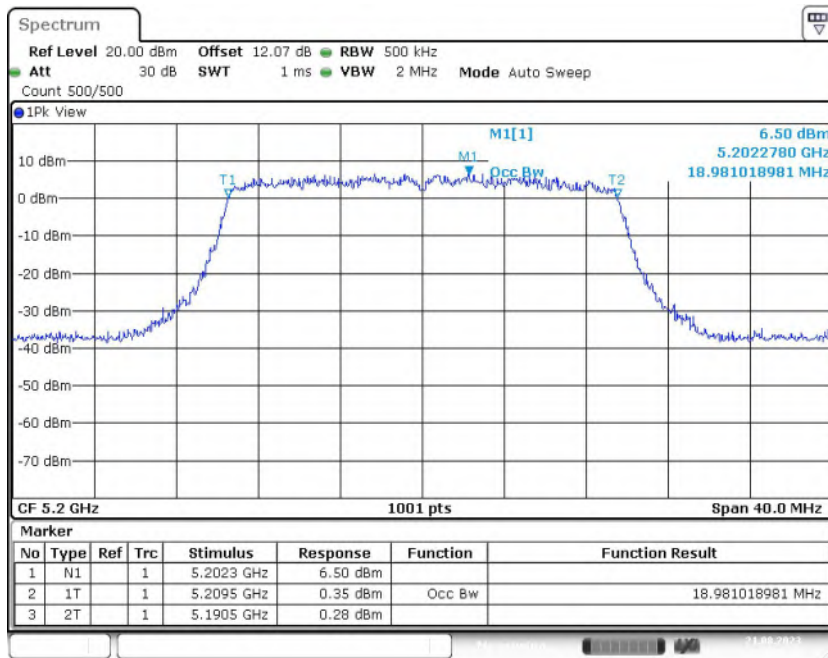


Fig. 14 99% Occupied Bandwidth (802.11ax-HE20, 5200MHz)

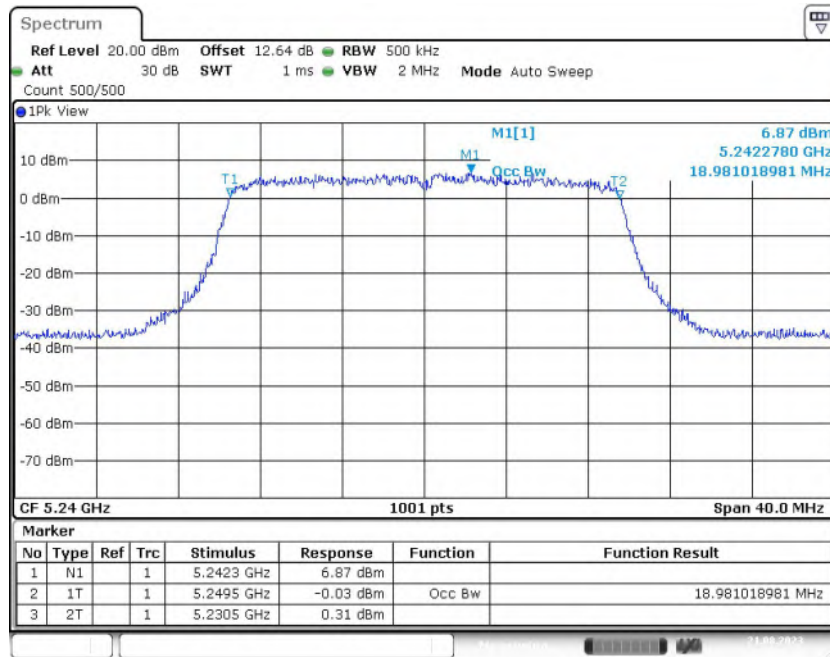


Fig. 15 99% Occupied Bandwidth (802.11ax-HE20, 5240MHz)

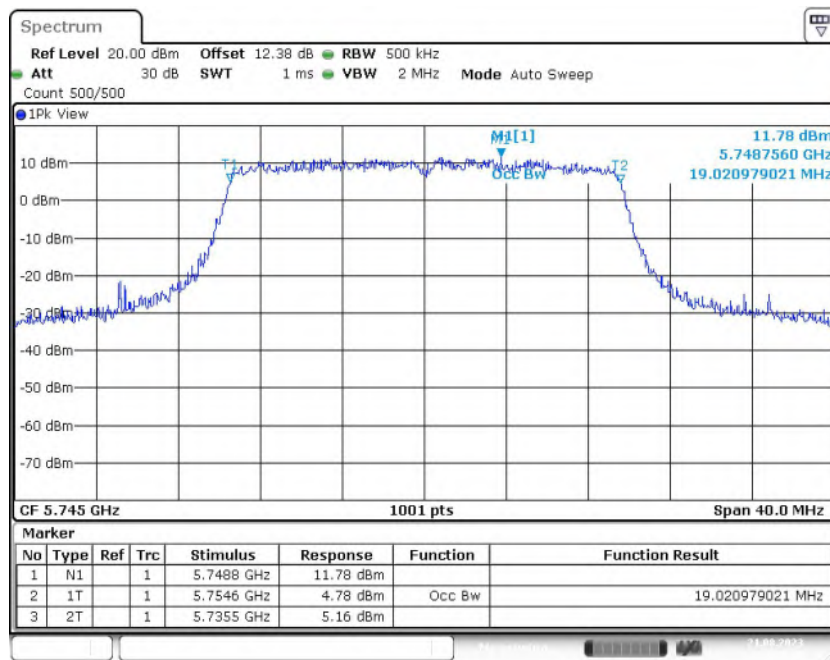


Fig. 16 99% Occupied Bandwidth (802.11ax-HE20, 5745MHz)

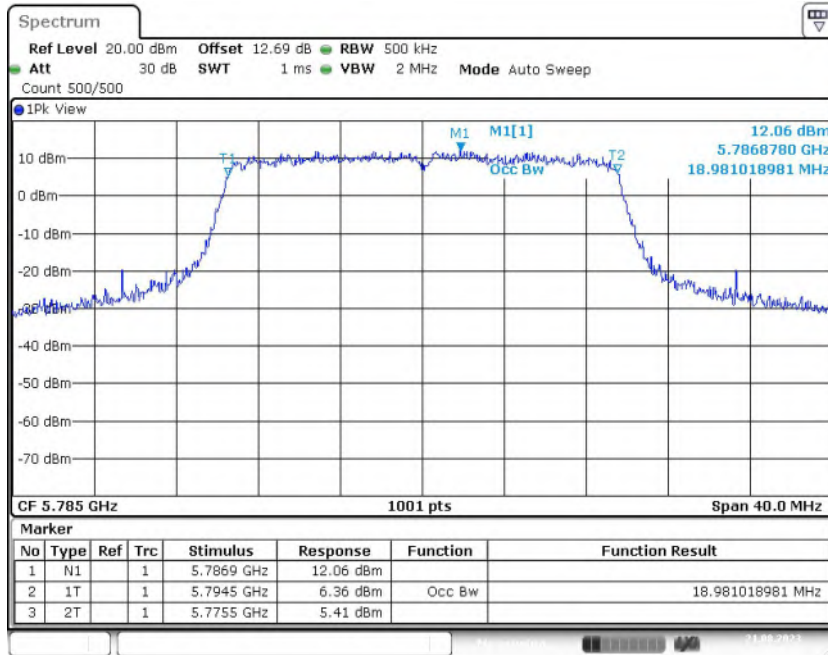


Fig. 17 99% Occupied Bandwidth (802.11ax-HE20, 5785MHz)

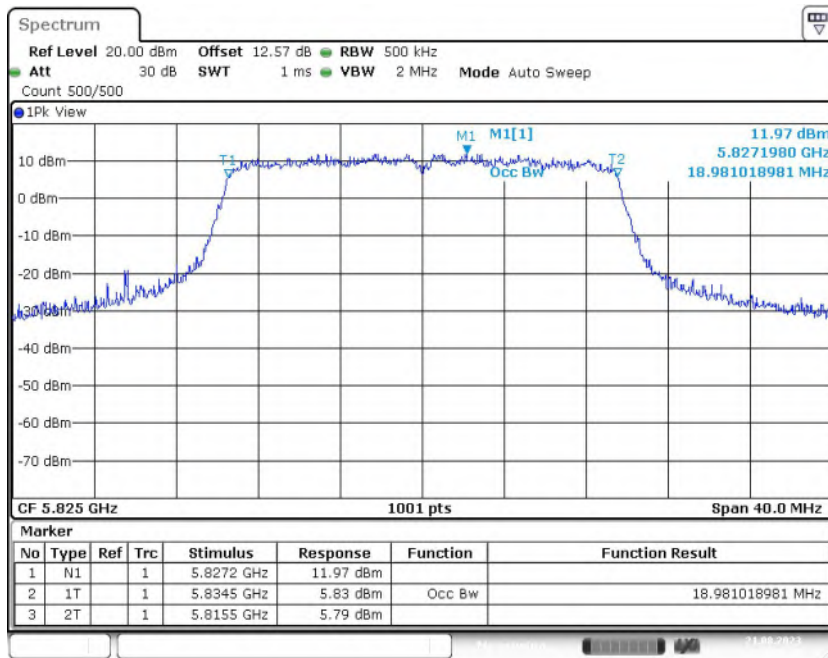


Fig. 18 99% Occupied Bandwidth (802.11ax-HE20, 5825MHz)

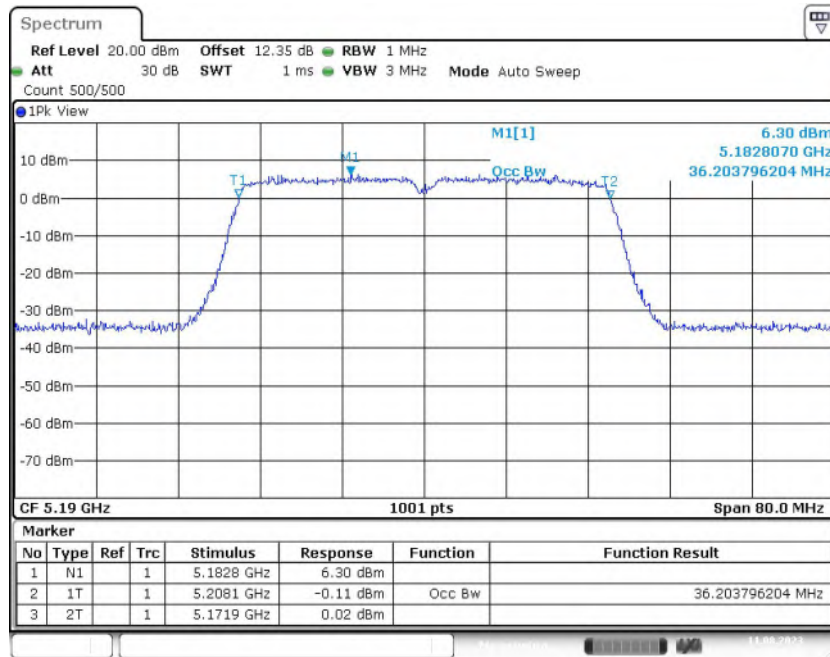


Fig. 19 99% Occupied Bandwidth (802.11n-HT40, 5190MHz)

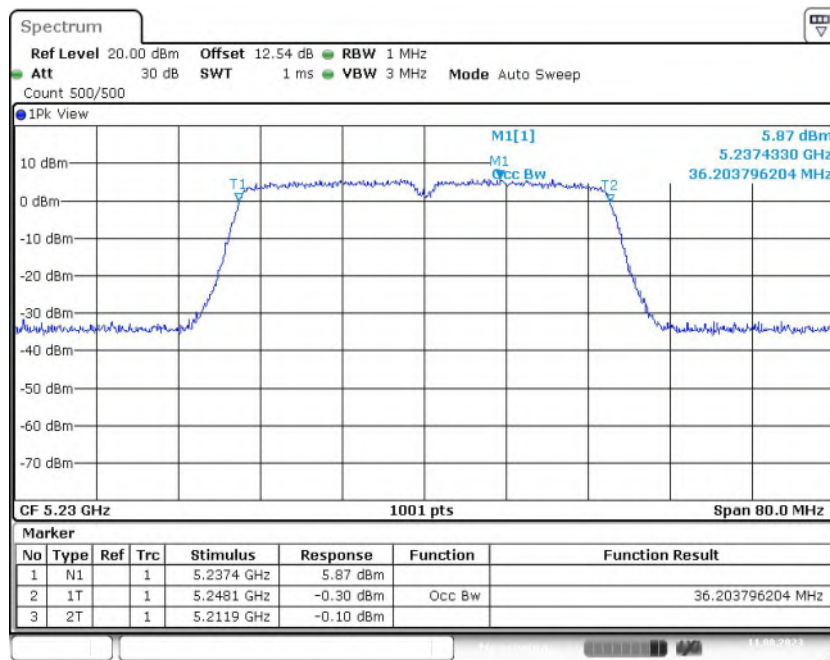


Fig. 20 99% Occupied Bandwidth (802.11n-HT40, 5230MHz)

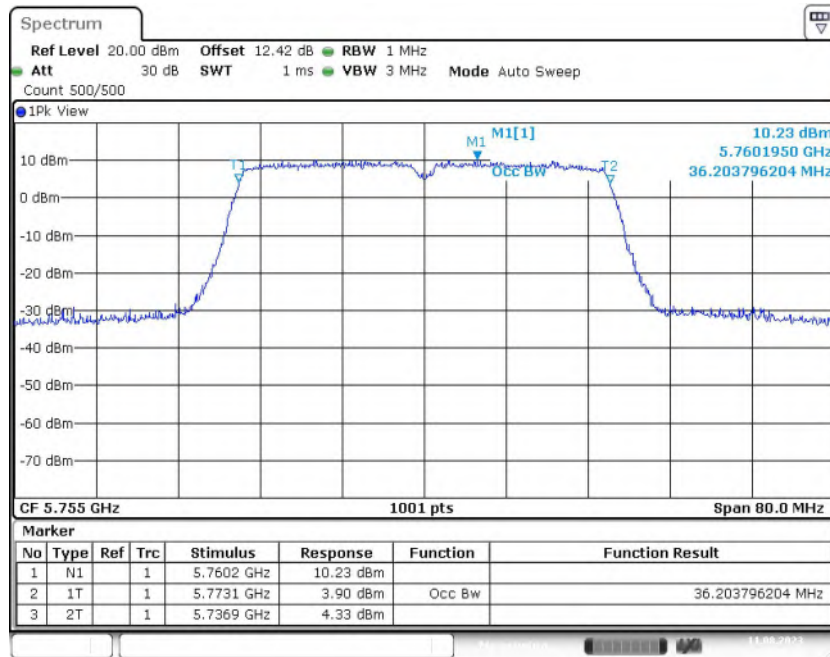


Fig. 21 99% Occupied Bandwidth (802.11n-HT40, 5755MHz)

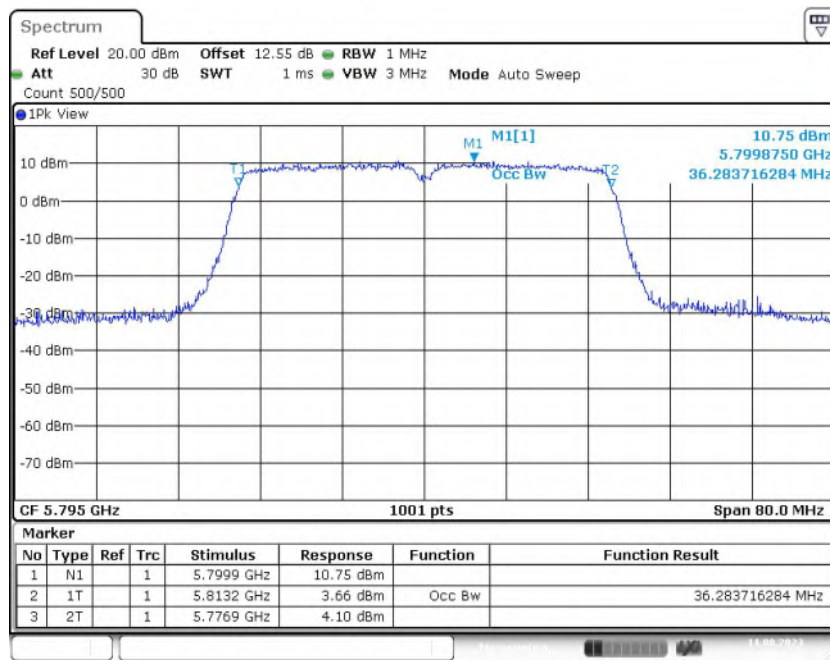


Fig. 22 99% Occupied Bandwidth (802.11n-HT40, 5795MHz)

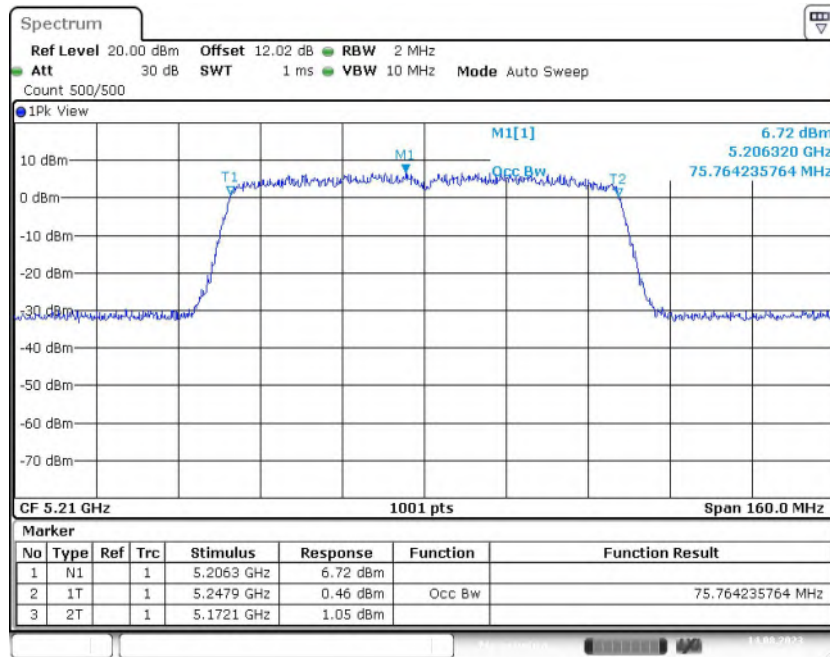


Fig. 23 99% Occupied Bandwidth (802.11ac-VHT80, 5210MHz)

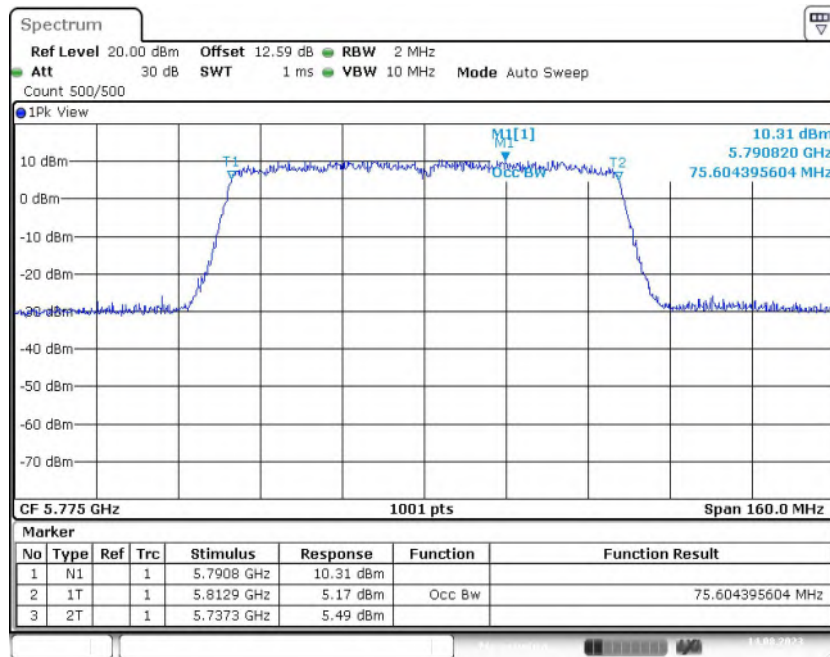


Fig. 24 99% Occupied Bandwidth (802.11ac-VHT80, 5775MHz)



A.7. Band Edges Compliance

Method of Measurement: See ANSI C63.10-clause 6.10.

Measurement Limit:

Standard	Limit (dB μ V/m)	
	FCC 47 CFR Part 15.209	Peak
Average		54

The measurement is made according to KDB 789033

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

Measurement Result:

SISO-Ant0:

Mode	Frequency (MHz)	Test Results	Conclusion
802.11ax-HE20	5180MHz(CH36)	Fig.25	P
	5745MHz(CH149)	Fig.26	P
	5825MHz(CH165)	Fig.27	P
802.11ax-HE20 (RU26)	5180MHz(CH36)	Fig.28	P
	5745MHz(CH149)	Fig.29	P
	5825MHz(CH165)	Fig.30	P
802.11n-HT40	5190MHz(CH38)	Fig.31	P
	5755MHz(CH151)	Fig.32	P
	5795MHz(CH159)	Fig.33	P
802.11ax-HE40 (RU26)	5190MHz(CH38)	Fig.34	P
	5755MHz(CH151)	Fig.35	P
	5795MHz(CH159)	Fig.36	P
802.11ac-VHT80	5210MHz(CH42)	Fig.37	P
	5775MHz(CH155)	Fig.38	P
802.11ax-HE80 (RU26)	5210MHz(CH42)	Fig.39	P
	5775MHz(CH155)	Fig.40	P

MIMO:

Mode	Frequency (MHz)	Test Results	Conclusion
802.11ax-HE20	5180MHz(CH36)	Fig.41	P
	5745MHz(CH149)	Fig.42	P
	5825MHz(CH165)	Fig.43	P
802.11n-HT40	5190MHz(CH38)	Fig.44	P
	5755MHz(CH151)	Fig.45	P
	5795MHz(CH159)	Fig.46	P
802.11ac-VHT80	5210MHz(CH42)	Fig.47	P
	5775MHz(CH155)	Fig.48	P

Note: Both RF ports were tested, and **Ant0** is the port with the worst result in SISO.
According to the customer description, RU26 is the worst RU type of 802.11ax.

See below for test graphs.

Conclusion: **PASS**

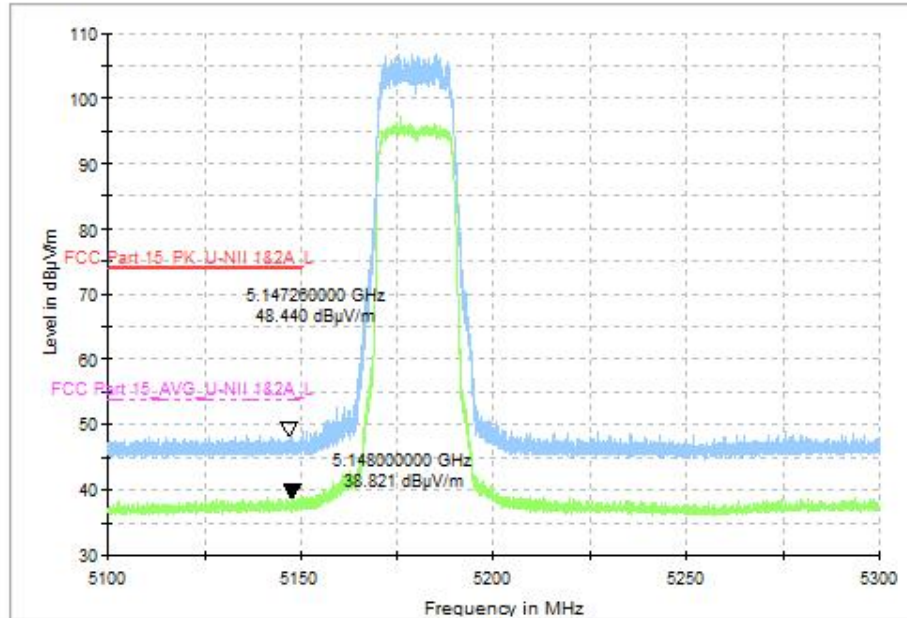


Fig. 25 Band Edges (802.11ax-HE20, CH36 5180MHz)

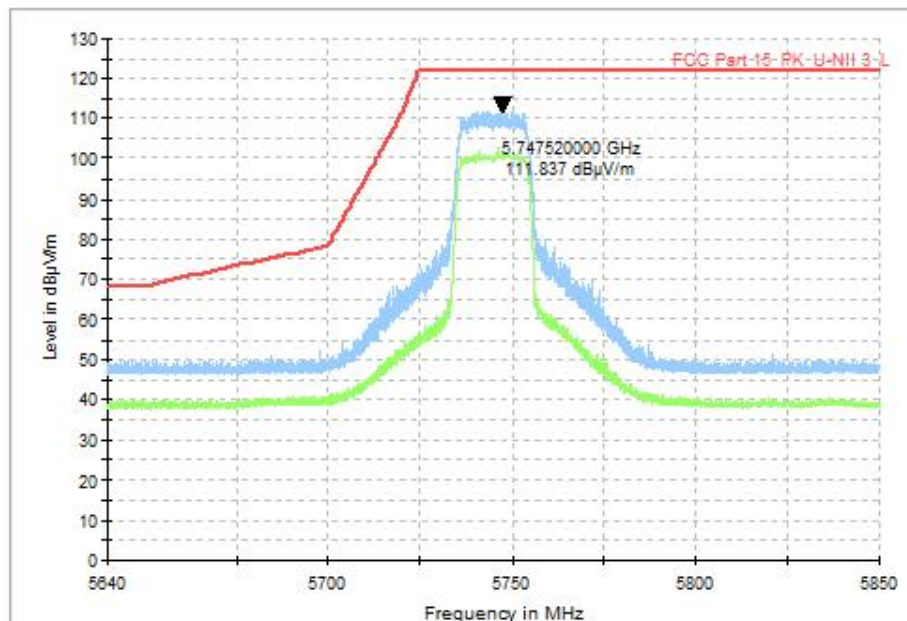


Fig. 26 Band Edges (802.11ax-HE20, CH149 5745MHz)

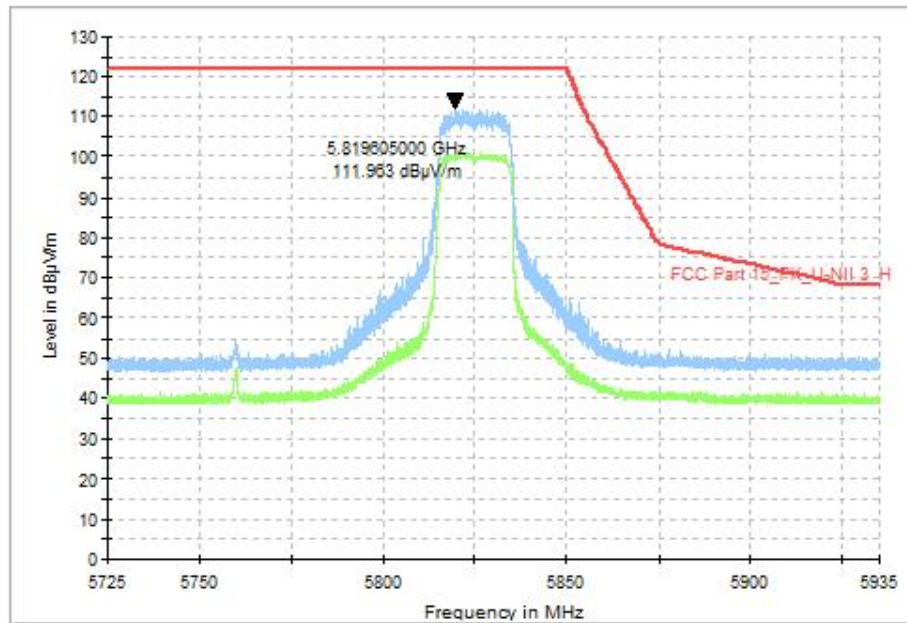


Fig. 27 Band Edges (802.11ax-HE20, CH165 5825MHz)

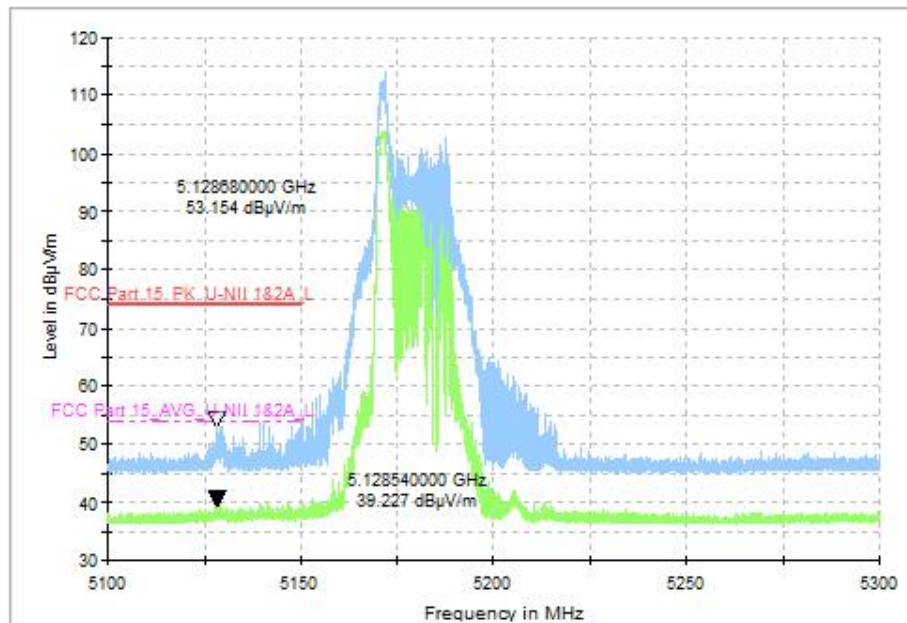


Fig. 28 Band Edges (802.11ax-HE20(RU26), CH36 5180MHz)

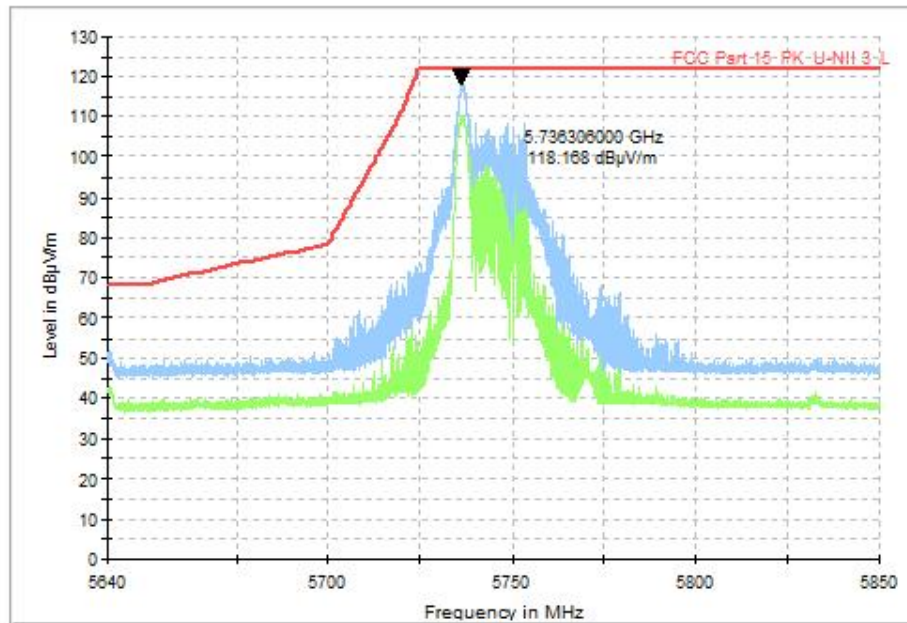


Fig. 29 Band Edges (802.11ax-HE20(RU26), CH149 5745MHz)

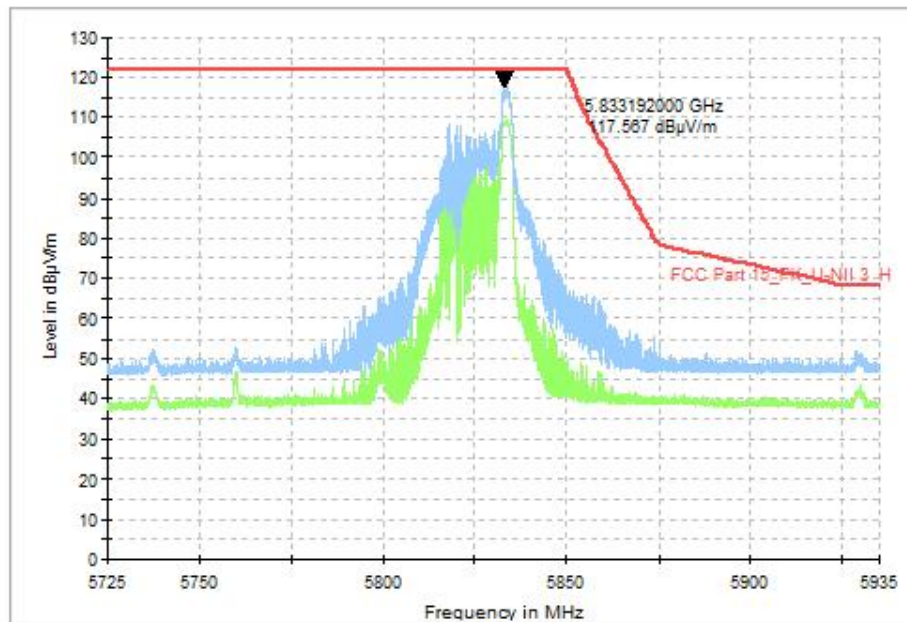


Fig. 30 Band Edges (802.11ax-HE20(RU26), CH165 5825MHz)

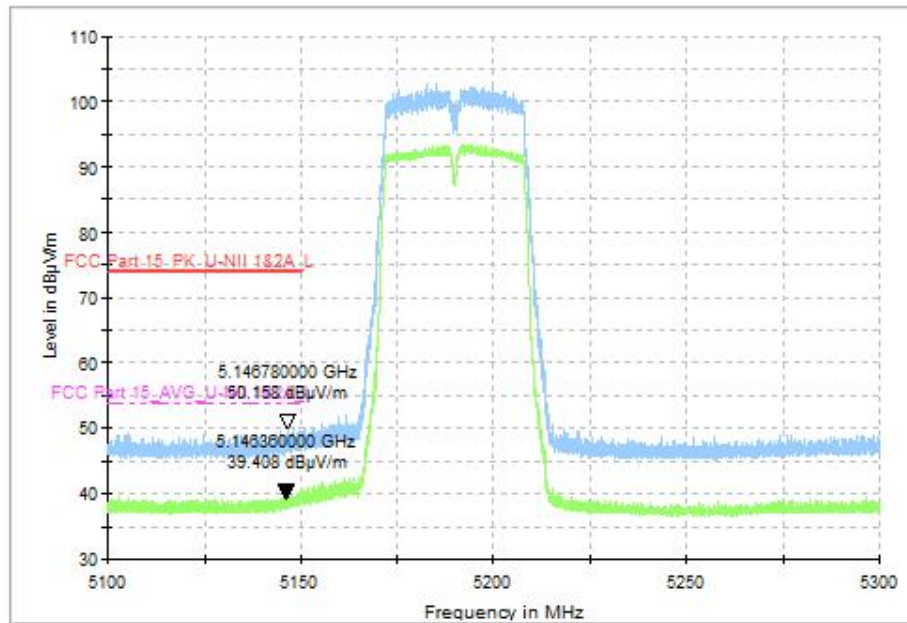


Fig. 31 Band Edges (802.11n-HT40, CH38 5190MHz)

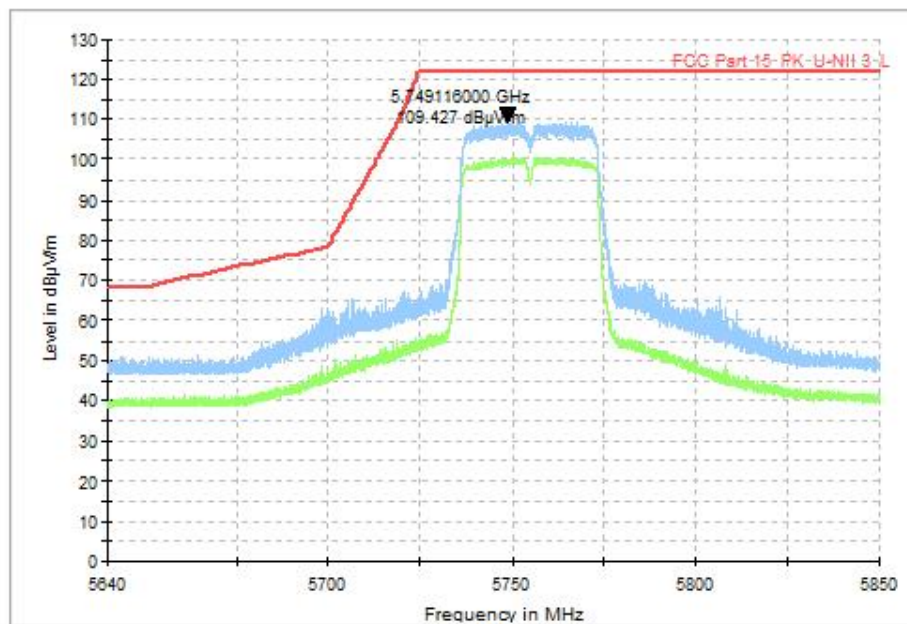


Fig. 32 Band Edges (802.11n-HT40, CH151 5755MHz)

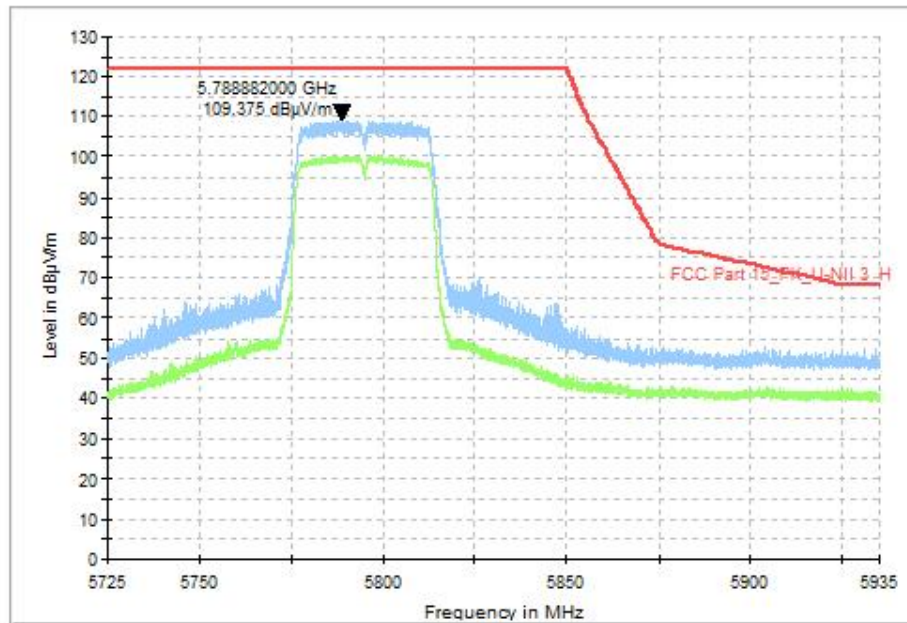


Fig. 33 Band Edges (802.11n-HT40, CH159 5795MHz)

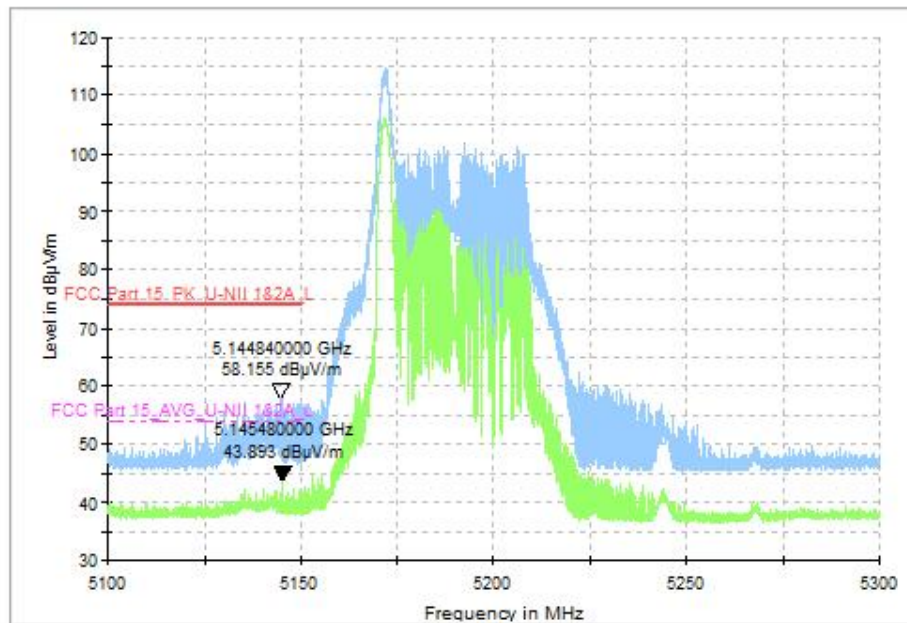


Fig. 34 Band Edges (802.11ax-HE40(RU26), CH38 5190MHz)

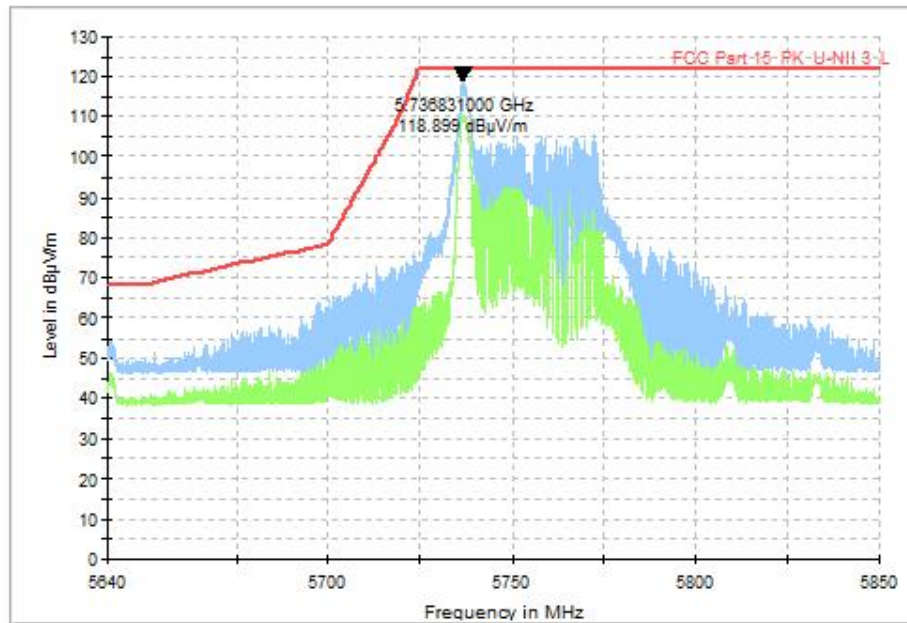


Fig. 35 Band Edges (802.11ax-HE40(RU26), CH151 5755MHz)

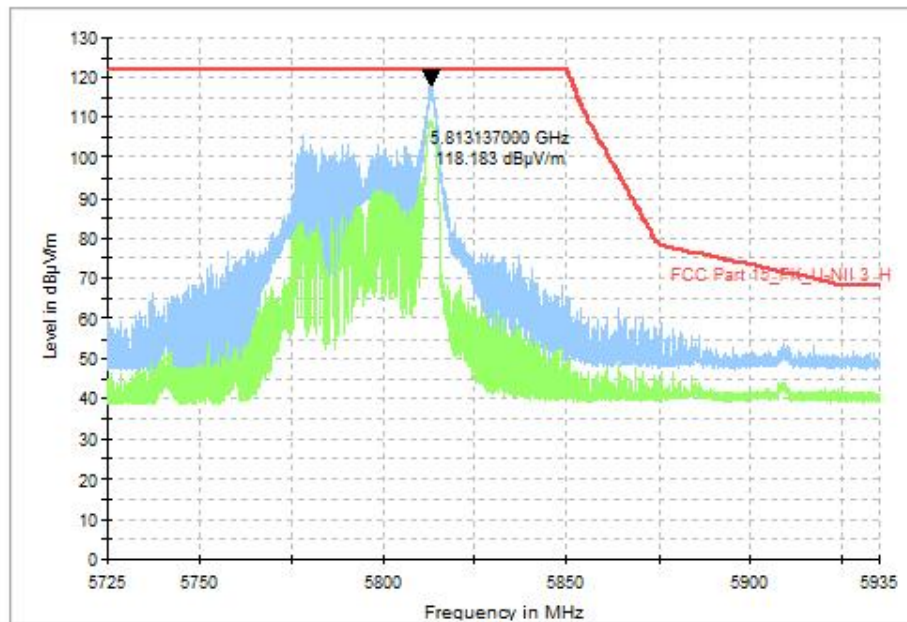


Fig. 36 Band Edges (802.11ax-HE40(RU26), CH159 5795MHz)

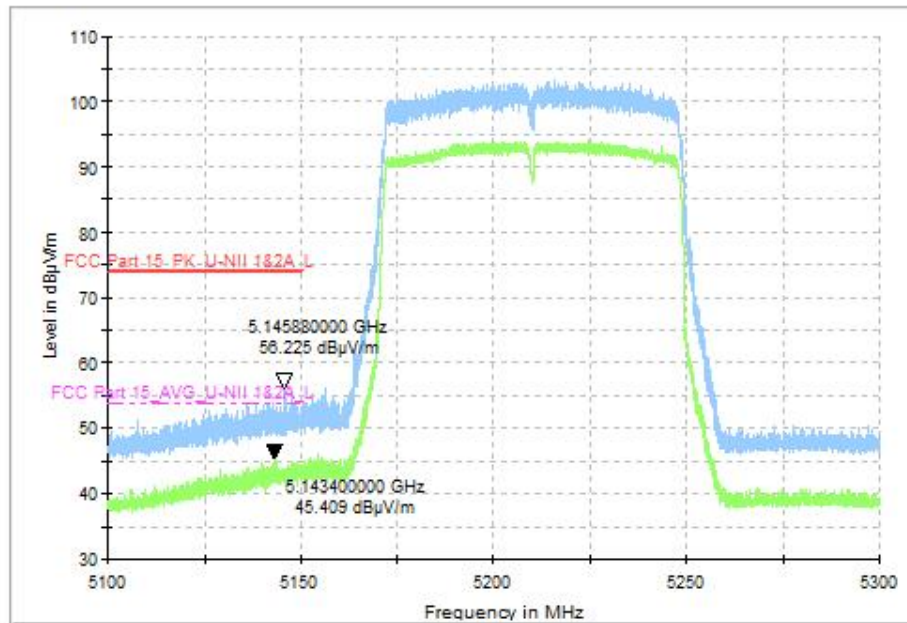


Fig. 37 Band Edges (802.11ac-VHT80, CH42 5210MHz)

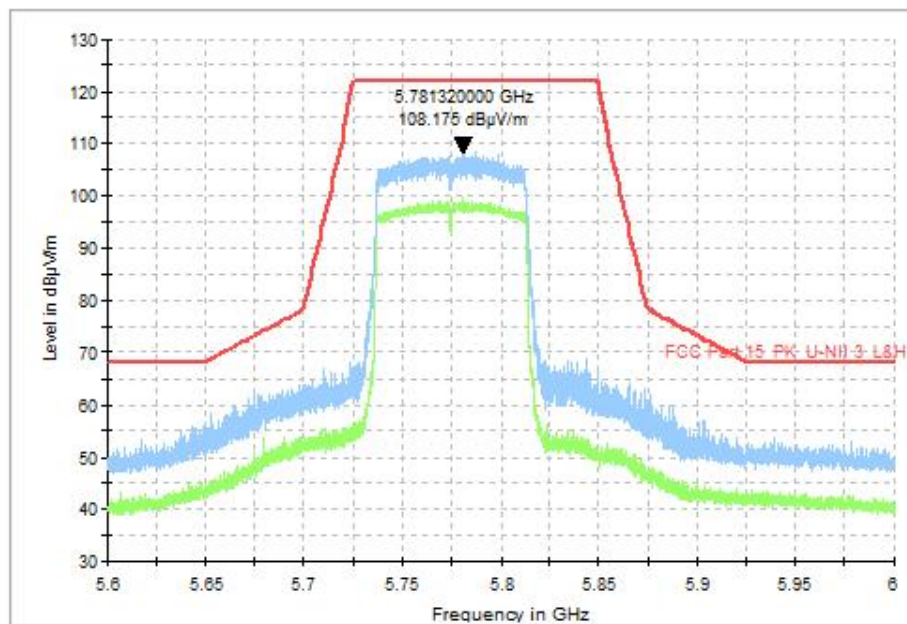


Fig. 38 Band Edges (802.11ac-VHT80, CH155 5775MHz)

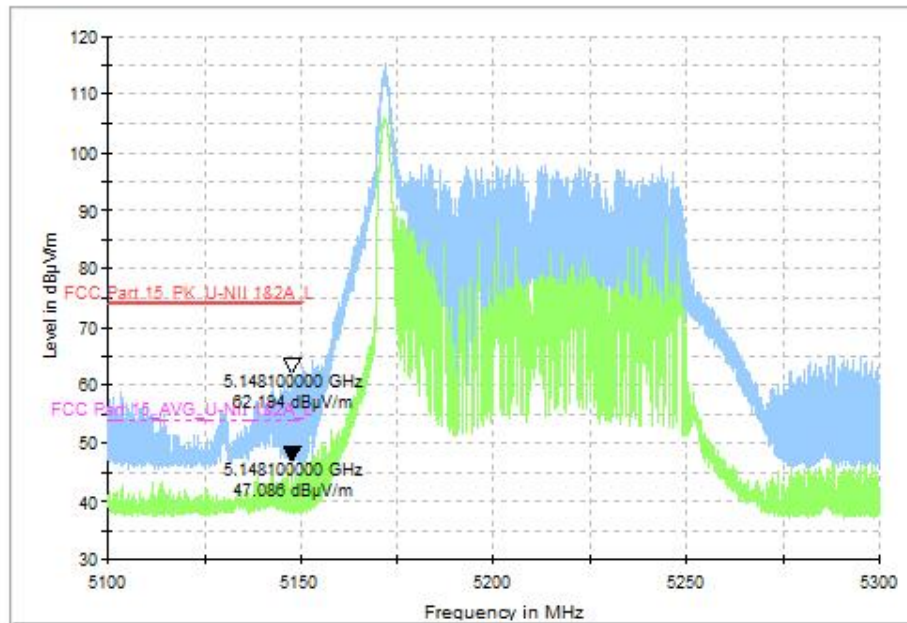


Fig. 39 Band Edges (802.11ax-HE80(RU26), CH42 5210MHz)

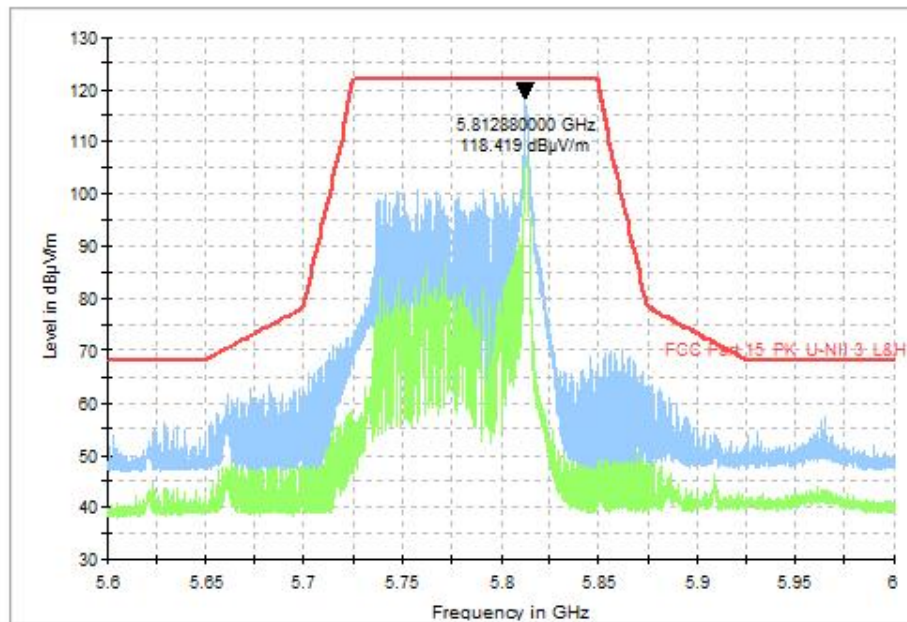


Fig. 40 Band Edges (802.11ax-HE80(RU26), CH155 5775MHz)

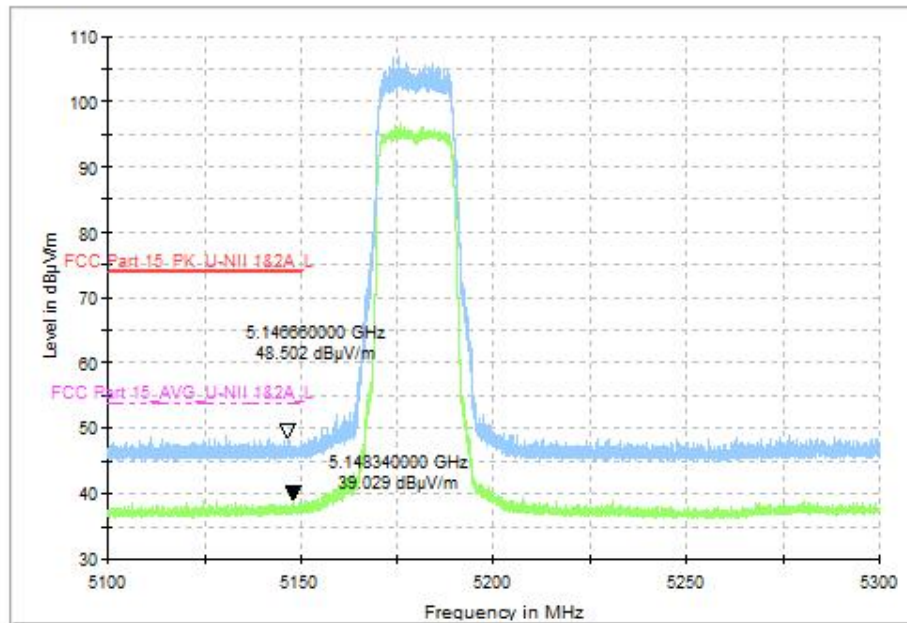


Fig. 41 Band Edges (802.11ax-HE20, CH36 5180MHz), MIMO

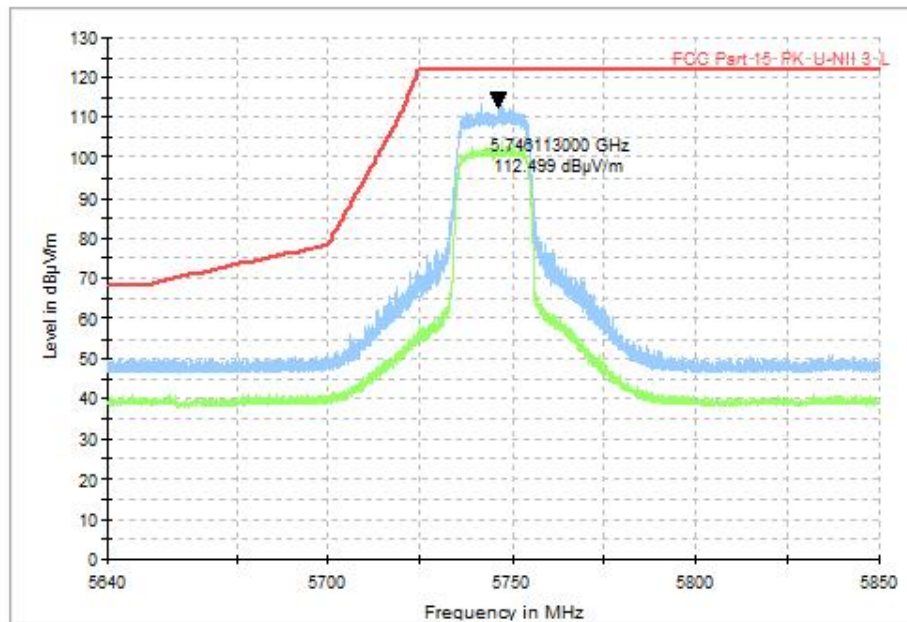


Fig. 42 Band Edges (802.11ax-HE20, CH149 5745MHz), MIMO

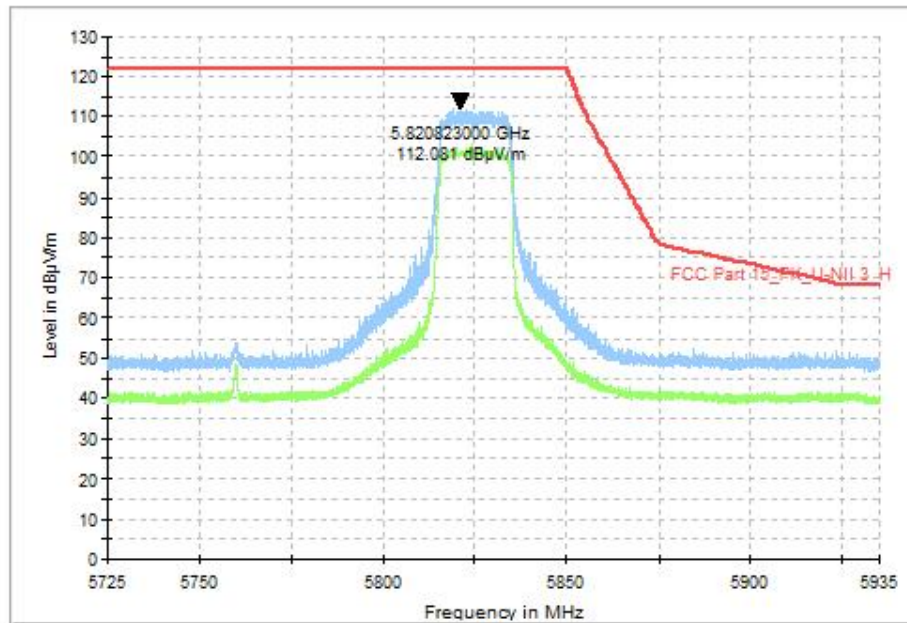


Fig. 43 Band Edges (802.11ax-HE20, CH165 5825MHz), MIMO

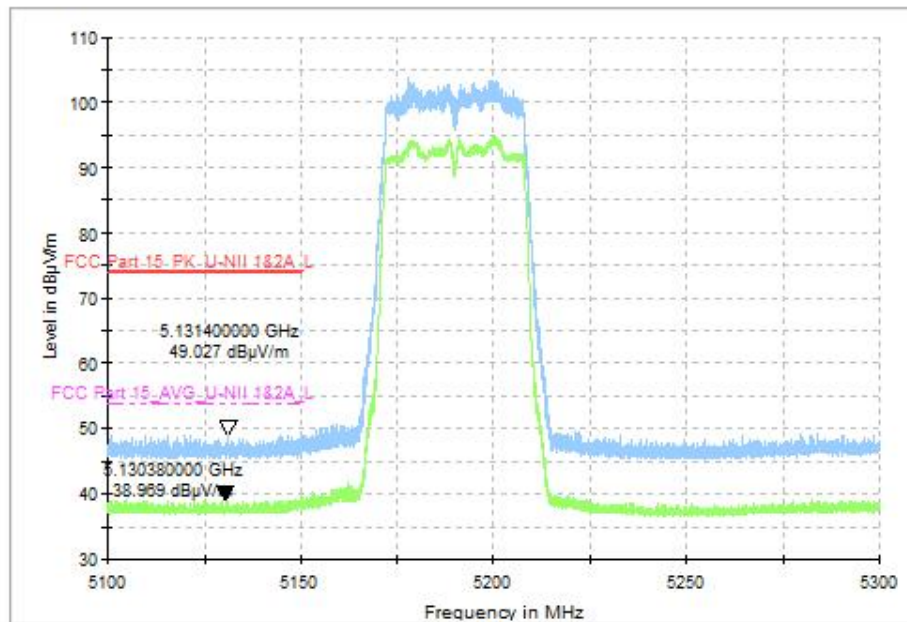


Fig. 44 Band Edges (802.11n-HT40, CH38 5190MHz), MIMO

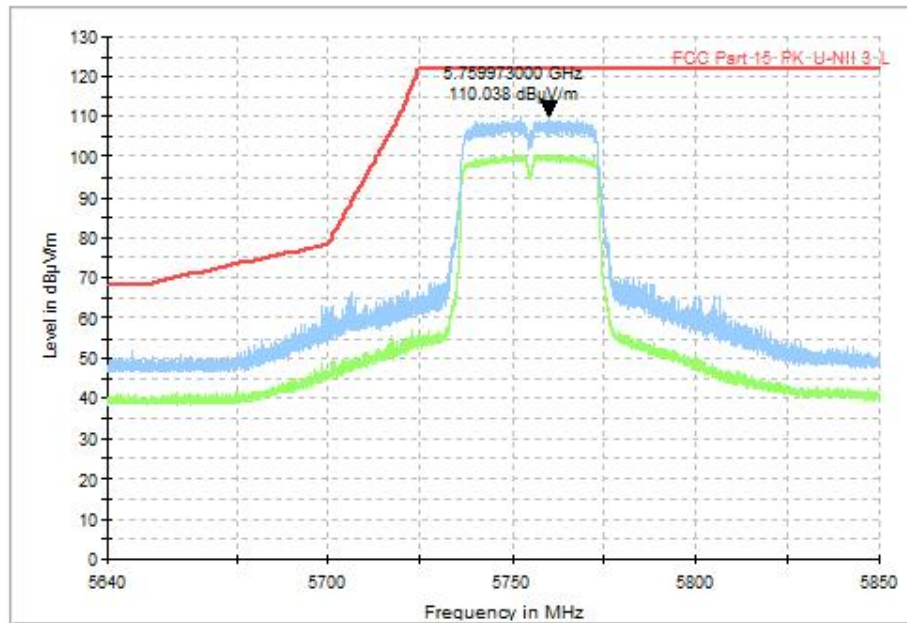


Fig. 45 Band Edges (802.11n-HT40, CH151 5755MHz), MIMO

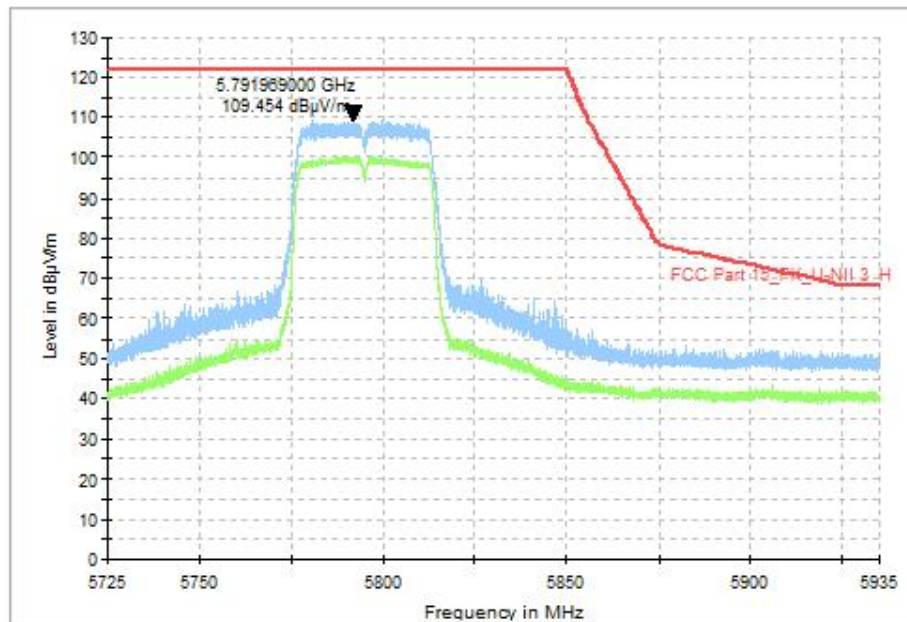


Fig. 46 Band Edges (802.11n-HT40, CH159 5795MHz), MIMO

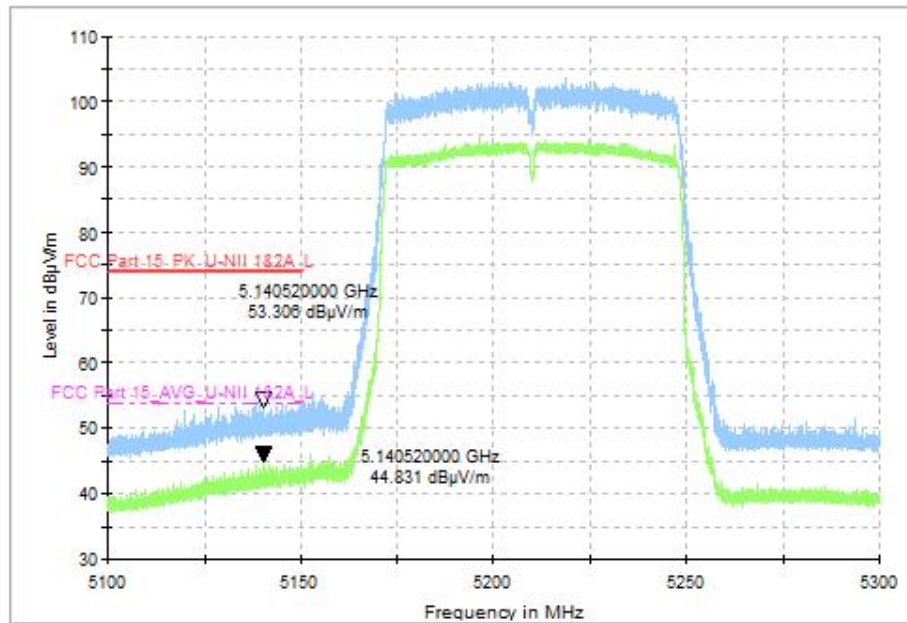


Fig. 47 Band Edges (802.11ac-VHT80, CH22 5210MHz), MIMO

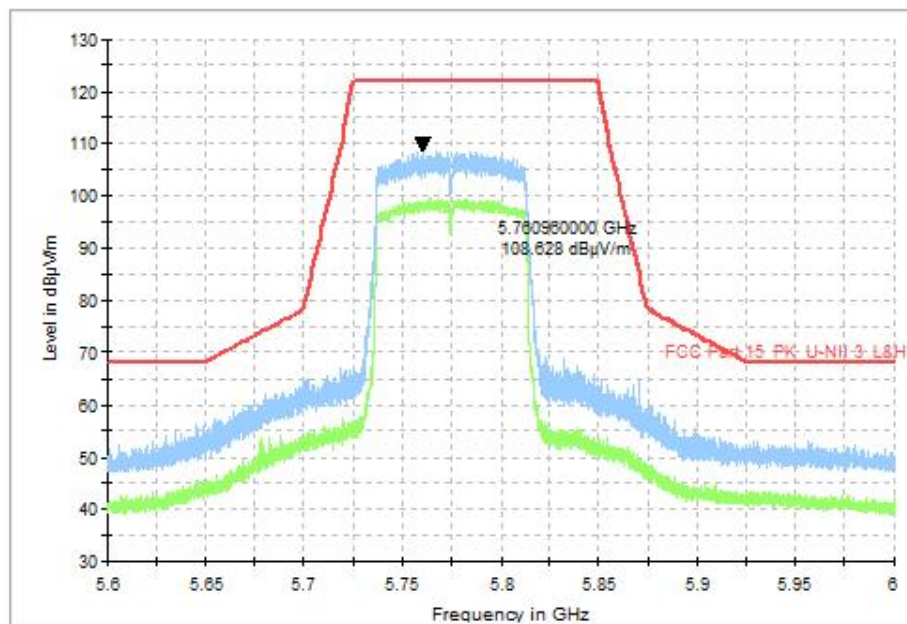


Fig. 48 Band Edges (802.11ac-VHT80, CH155 5775MHz), MIMO



A.8. Transmitter Spurious Emission

Measurement of method: See KDB 789033 D02 v02r01, Section G.3, G.4, G.5 and G.6.

Measurement Limit:

Standard	Limit (dBµV/m)	
FCC 47 CFR Part 15.209	Peak	74
	Average	54

The measurement is made according to KDB 789033.

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

Limit in restricted band:

Frequency of emission (MHz)	Field strength (dBµV/m)	Measurement distance (m)
30-88	40.0	3
88-216	43.5	3
216-960	46.0	3
Above 960	54.0	3

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

The measurement results include the horizontal polarization and vertical polarization measurements. For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases were recorded in this report.

Measurement Result:

SISO-Ant0:

Mode	Frequency (MHz)	Frequency Range	Test Results	Conclusion
802.11ax -HE20	5180MHz(CH36)	1 GHz ~18 GHz	Fig.49	P
	5200MHz(CH40)	1 GHz ~18 GHz	Fig.50	P
	5240MHz(CH48)	1 GHz ~18 GHz	Fig.51	P
	5745MHz(CH149)	1 GHz ~18 GHz	Fig.52	P
	5785MHz(CH157)	1 GHz ~18 GHz	Fig.53	P
	5825MHz(CH165)	1 GHz ~18 GHz	Fig.54	P
802.11ax -HE20 (RU26)	5180MHz(CH36)	1 GHz ~18 GHz	Fig.55	P
	5240MHz(CH48)	1 GHz ~18 GHz	Fig.56	P
	5745MHz(CH149)	1 GHz ~18 GHz	Fig.57	P
	5825MHz(CH165)	1 GHz ~18 GHz	Fig.58	P
802.11n -HT40	5190MHz(CH38)	1 GHz ~18 GHz	Fig.59	P
	5230MHz(CH46)	1 GHz ~18 GHz	Fig.60	P
	5755MHz(CH151)	1 GHz ~18 GHz	Fig.61	P
	5795MHz(CH159)	1 GHz ~18 GHz	Fig.62	P
802.11ax	5190MHz(CH38)	1 GHz ~18 GHz	Fig.63	P



-HE40 (RU26)	5230MHz(CH46)	1 GHz ~18 GHz	Fig.64	P
	5755MHz(CH151)	1 GHz ~18 GHz	Fig.65	P
	5795MHz(CH159)	1 GHz ~18 GHz	Fig.66	P
802.11ac -VHT80	5210MHz(CH42)	1 GHz ~18 GHz	Fig.67	P
	5775MHz(CH155)	1 GHz ~18 GHz	Fig.68	P
802.11ax -HE80 (RU26)	5210MHz(CH42)	1 GHz ~18 GHz	Fig.69	P
	5775MHz(CH155)	1 GHz ~18 GHz	Fig.70	P
All channels		30 MHz ~1 GHz	Fig.71	P
		18 GHz ~26.5 GHz	Fig.72	P
		26.5GHz~40GHz	Fig.73	P

MIMO:

Mode	Frequency (MHz)	Frequency Range	Test Results	Conclusion
802.11ax -HE20	5180MHz(CH36)	1 GHz ~18 GHz	Fig.74	P
	5200MHz(CH40)	1 GHz ~18 GHz	Fig.75	P
	5240MHz(CH48)	1 GHz ~18 GHz	Fig.76	P
	5745MHz(CH149)	1 GHz ~18 GHz	Fig.77	P
	5785MHz(CH157)	1 GHz ~18 GHz	Fig.78	P
	5825MHz(CH165)	1 GHz ~18 GHz	Fig.79	P
802.11n -HT40	5190MHz(CH38)	1 GHz ~18 GHz	Fig.80	P
	5230MHz(CH46)	1 GHz ~18 GHz	Fig.81	P
	5755MHz(CH151)	1 GHz ~18 GHz	Fig.82	P
802.11ac -VHT80	5795MHz(CH159)	1 GHz ~18 GHz	Fig.83	P
	5210MHz(CH42)	1 GHz ~18 GHz	Fig.84	P
All channels	5775MHz(CH155)	1 GHz ~18 GHz	Fig.85	P
	30 MHz ~1 GHz		Fig.86	P
	18 GHz ~26.5 GHz		Fig.87	P
		26.5GHz~40GHz	Fig.88	P

The following configurations are the worst for Bluetooth+WLAN simultaneous transmission.

Mode	Frequency (MHz)	Frequency Range	Test Results	Conclusion
DH5 & 802.11ac -VHT80	2402(CH0) & 5210MHz(CH42)	30 MHz ~1 GHz	Fig.89	P
		1 GHz ~18 GHz	Fig.90	P
		18 GHz ~26.5 GHz	Fig.91	P
		26.5GHz~40GHz	Fig.92	P

Note: Both RF ports were tested, and **Ant0** is the port with the worst result in SISO. According to the customer description, RU26 is the worst RU type of 802.11ax.



Worst Case Result:

SISO-Ant0:

802.11ax-HE20 CH149

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7262.769231	47.15	74.00	26.85	V	6.4
8265.230769	52.08	74.00	21.92	V	6.7
10983.230769	48.09	74.00	25.91	V	11.2
11847.692308	47.68	74.00	26.32	V	12.7
15870.923077	52.48	74.00	21.52	V	15.4
17894.769231	56.02	74.00	17.98	V	21.4

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7262.769231	36.53	54.00	17.47	V	6.4
8265.230769	41.00	54.00	13.00	V	6.7
10983.230769	37.47	54.00	16.53	V	11.2
11847.692308	37.85	54.00	16.15	V	12.7
15870.923077	41.37	54.00	12.63	V	15.4
17894.769231	45.15	54.00	8.85	V	21.4

802.11ax-HE20(RU26) CH149

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7627.846154	49.44	74.00	24.56	H	6.3
8283.230769	48.04	74.00	25.96	V	6.8
11189.538462	47.44	74.00	26.56	H	11.1
12431.538462	49.65	74.00	24.35	V	13.0
15895.846154	51.06	74.00	22.94	V	15.5
17910.923077	55.78	74.00	18.22	V	21.4

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7627.846154	39.33	54.00	14.67	H	6.3
8283.230769	36.62	54.00	17.39	V	6.8
11189.538462	37.27	54.00	16.73	H	11.1
12431.538462	38.62	54.00	15.38	V	13.0
15895.846154	40.96	54.00	13.04	V	15.5
17910.923077	45.70	54.00	8.30	V	21.4

**802.11n-HT40 CH159**

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
7445.538462	45.76	74.00	28.24	V	6.9
8264.769231	46.01	74.00	27.99	V	6.7
10924.615385	47.88	74.00	26.12	V	10.9
12425.076923	48.26	74.00	25.74	V	13.0
15892.615385	52.02	74.00	21.98	V	15.5
17904.923077	56.58	74.00	17.42	V	21.4

Frequency (MHz)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
7445.538462	33.89	54.00	20.11	V	6.9
8264.769231	34.78	54.00	19.22	V	6.7
10924.615385	37.21	54.00	16.79	V	10.9
12425.076923	38.48	54.00	15.52	V	13.0
15892.615385	41.43	54.00	12.57	V	15.5
17904.923077	45.60	54.00	8.40	V	21.4

802.11ax-HE40(RU26) CH151

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
7665.230769	51.43	74.00	22.57	V	6.3
8116.153846	50.37	74.00	23.63	V	6.7
10946.769231	48.43	74.00	25.57	V	10.7
11861.076923	49.20	74.00	24.80	V	12.5
15874.153846	51.89	74.00	22.11	V	15.6
17925.692308	56.81	74.00	17.19	V	21.7

Frequency (MHz)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
7665.230769	41.40	54.00	12.60	V	6.3
8116.153846	39.93	54.00	14.07	V	6.7
10946.769231	36.98	54.00	17.02	V	10.7
11861.076923	38.96	54.00	15.04	V	12.5
15874.153846	41.41	54.00	12.59	V	15.6
17925.692308	45.62	54.00	8.38	V	21.7



802.11ac-VHT80 CH155

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7652.307692	52.70	74.00	21.30	V	6.3
8242.153846	53.40	74.00	20.60	V	6.7
10912.153846	47.74	74.00	26.26	V	10.8
11876.307692	50.80	74.00	23.20	V	12.9
15932.307692	52.03	74.00	21.97	V	15.7
17893.384615	55.45	74.00	18.55	V	21.5

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7652.307692	42.22	54.00	11.78	V	6.3
8242.153846	42.71	54.00	11.29	V	6.7
10912.153846	37.60	54.00	16.40	V	10.8
11876.307692	39.94	54.00	14.06	V	12.9
15932.307692	41.66	54.00	12.34	V	15.7
17893.384615	45.32	54.00	8.68	V	21.5

802.11ax-HE80(RU26) CH155

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7594.153846	50.17	74.00	23.83	V	6.6
8183.538462	49.99	74.00	24.01	V	6.7
10966.153846	48.03	74.00	25.97	V	10.9
11830.615385	51.67	74.00	22.33	V	12.3
15966.000000	53.03	74.00	20.97	V	16.1
17899.846154	58.63	74.00	15.37	V	21.8

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7594.153846	39.91	54.00	14.09	V	6.6
8183.538462	38.99	54.00	15.01	V	6.7
10966.153846	37.25	54.00	16.75	V	10.9
11830.615385	38.80	54.00	15.20	V	12.3
15966.000000	41.65	54.00	12.35	V	16.1
17899.846154	45.75	54.00	8.25	V	21.8



MIMO:

802.11ax-HE20 CH165

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7692.461539	48.77	74.00	25.23	V	6.5
8261.538462	51.95	74.00	22.06	V	6.7
10913.538462	46.66	74.00	27.34	V	10.8
11712.461539	49.07	74.00	24.93	V	12.0
15879.692308	52.00	74.00	22.00	V	15.4
17917.846154	55.21	74.00	18.79	H	21.4

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7692.461539	37.96	54.00	16.04	V	6.5
8261.538462	41.35	54.00	12.65	V	6.7
10913.538462	37.01	54.00	16.99	V	10.8
11712.461539	38.16	54.00	15.84	V	12.0
15879.692308	41.72	54.00	12.28	V	15.4
17917.846154	44.21	54.00	9.79	H	21.4

802.11n-HT40 CH159

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7442.769231	44.17	74.00	29.83	V	6.9
8270.769231	45.23	74.00	28.77	V	6.7
10864.615385	47.26	74.00	26.74	V	10.5
12380.769231	48.64	74.00	25.36	V	12.9
15918.461539	52.35	74.00	21.65	V	15.6
17893.384615	56.26	74.00	17.74	V	21.5

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7442.769231	33.91	54.00	20.09	V	6.9
8270.769231	34.82	54.00	19.18	V	6.7
10864.615385	36.71	54.00	17.29	V	10.5
12380.769231	38.32	54.00	15.68	V	12.9
15918.461539	41.57	54.00	12.43	V	15.6
17893.384615	45.15	54.00	8.85	V	21.5



802.11ac-VHT80 CH155

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7466.769231	50.95	74.00	23.05	V	6.9
8191.846154	54.33	74.00	19.67	V	6.6
11240.307692	48.25	74.00	25.75	V	11.2
11901.692308	48.44	74.00	25.56	V	12.7
15918.000000	52.68	74.00	21.32	V	15.6
17896.615385	56.64	74.00	17.36	V	21.4

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
7466.769231	39.54	54.00	14.46	V	6.9
8191.846154	43.48	54.00	10.52	V	6.6
11240.307692	38.10	54.00	15.90	V	11.2
11901.692308	37.73	54.00	16.27	V	12.7
15918.000000	41.56	54.00	12.44	V	15.6
17896.615385	45.39	54.00	8.61	V	21.4

Bluetooth+WLAN simultaneous transmission:

DH5 CH0 & 802.11ac-VHT80 CH42

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
4983.600000	55.77	74.00	18.23	H	2.6
7691.076923	54.13	74.00	19.87	V	6.5
9956.307692	55.10	68.20	13.10	H	9.3
11202.923077	48.88	74.00	25.12	V	11.1
11866.153846	49.81	74.00	24.19	V	12.8
15916.153846	52.88	74.00	21.12	H	15.6
17914.615385	56.22	74.00	17.78	V	21.4

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
4983.600000	38.23	54.00	15.77	H	2.6
7691.076923	43.03	54.00	10.97	V	6.5
9956.307692	38.04	54.00	15.96	H	9.3
11202.923077	38.58	54.00	15.42	V	11.1
11866.153846	39.65	54.00	14.35	V	12.8
15916.153846	41.39	54.00	12.61	H	15.6
17914.615385	45.48	54.00	8.52	V	21.4

Note:

A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss. P_{Mea} is the field

strength recorded from the instrument. The measurement results are obtained as described below:

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

See below for test graphs.

Conclusion: **PASS**

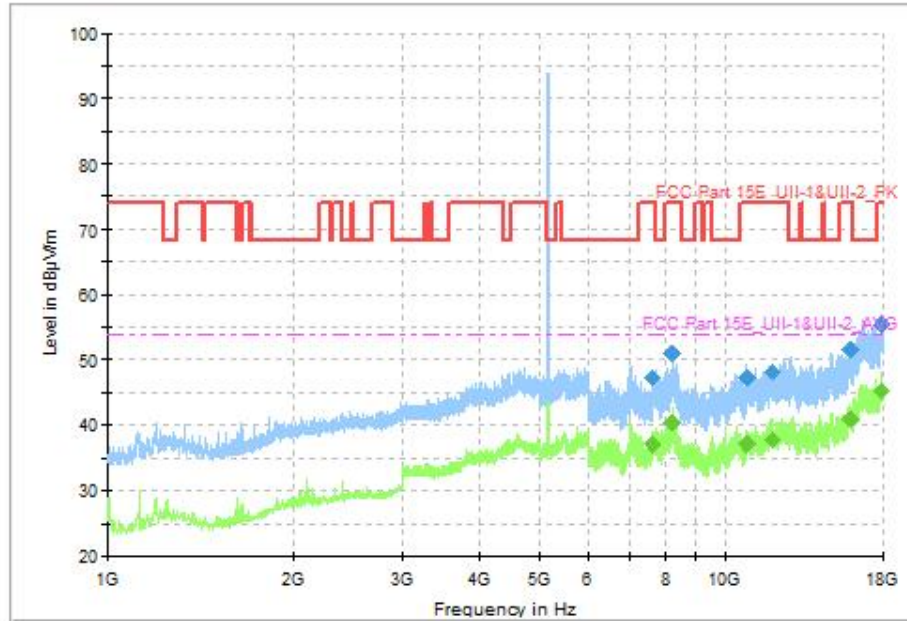


Fig. 49 Transmitter Spurious Emission (802.11ax-HE20, CH36 5180MHz, 1GHz-18GHz)

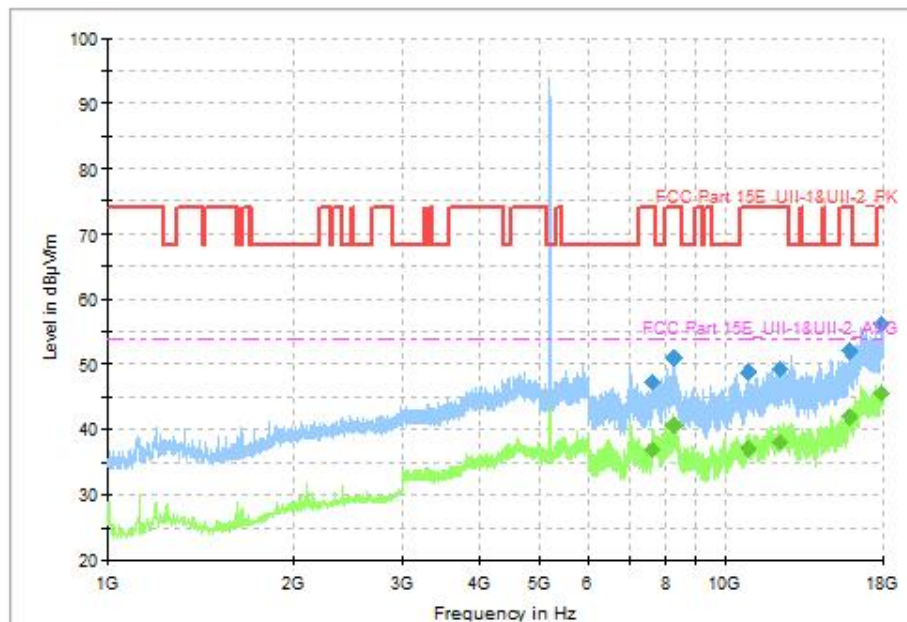


Fig. 50 Transmitter Spurious Emission (802.11ax-HE20, CH40 5200MHz, 1GHz-18GHz)

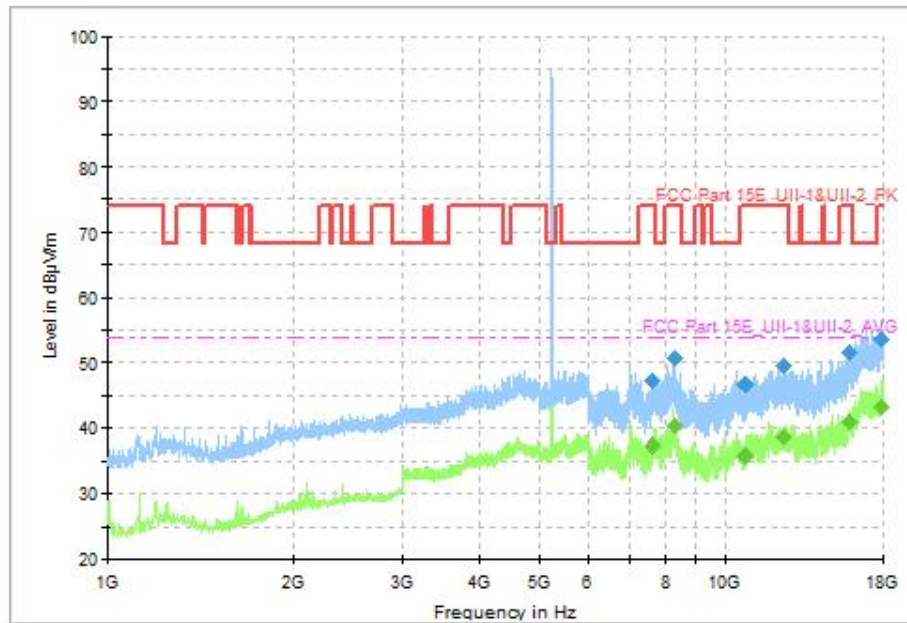


Fig. 51 Transmitter Spurious Emission (802.11ax-HE20, CH48 5240MHz, 1GHz-18GHz)

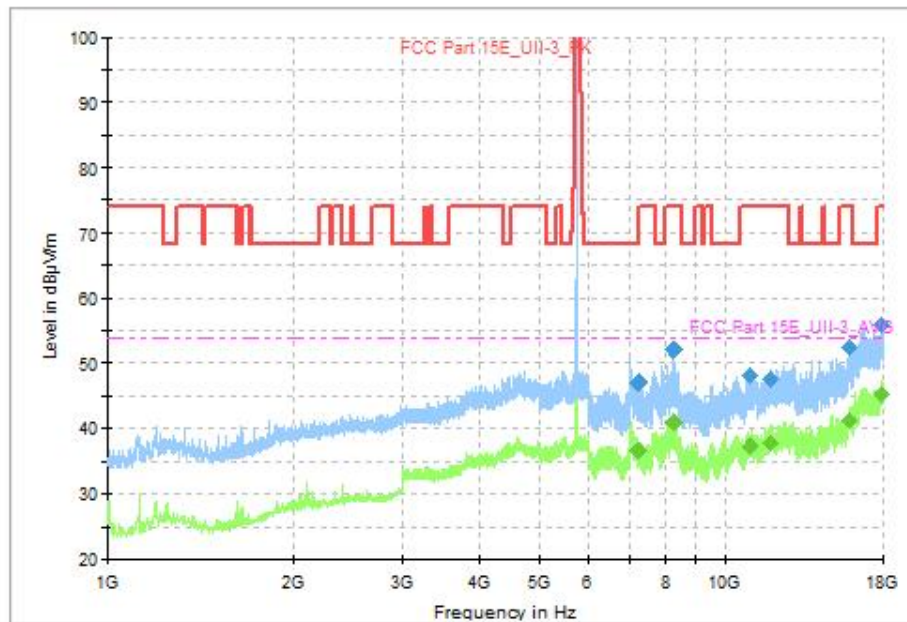


Fig. 52 Transmitter Spurious Emission (802.11ax-HE20, CH149 5745MHz, 1GHz-18GHz)

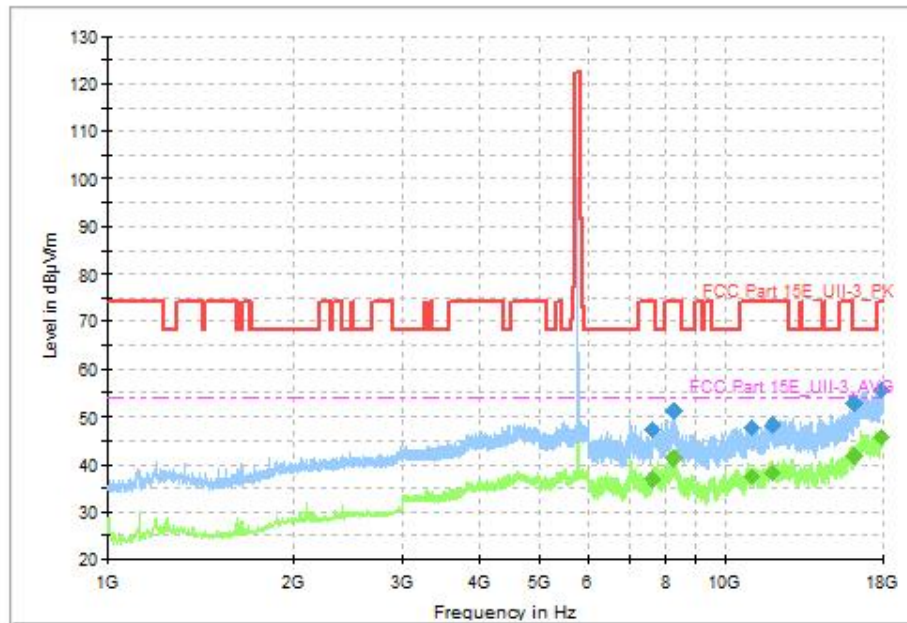


Fig. 53 Transmitter Spurious Emission (802.11ax-HE20, CH157 5785MHz, 1GHz-18GHz)

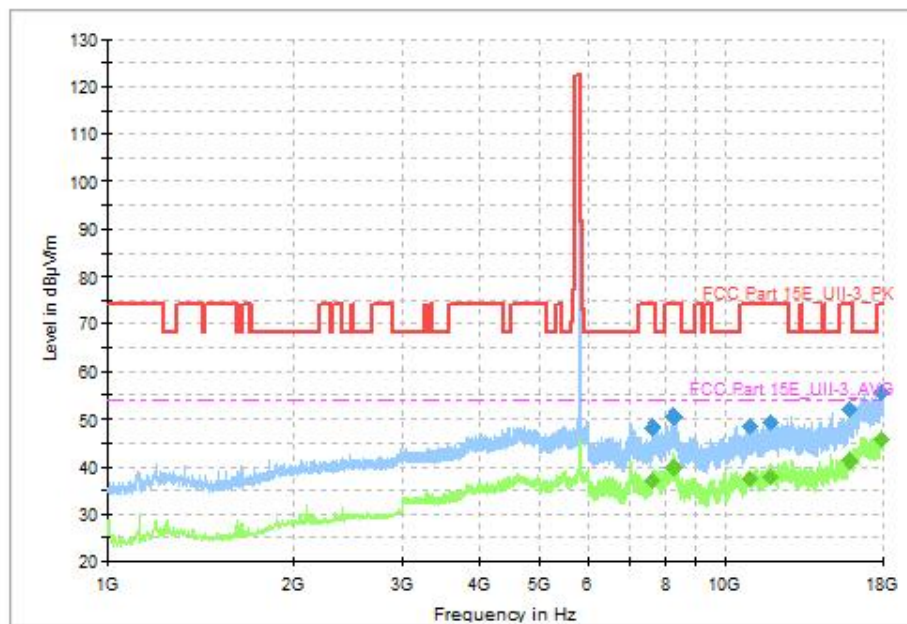


Fig. 54 Transmitter Spurious Emission (802.11ax-HE20, CH165 5825MHz, 1GHz-18GHz)

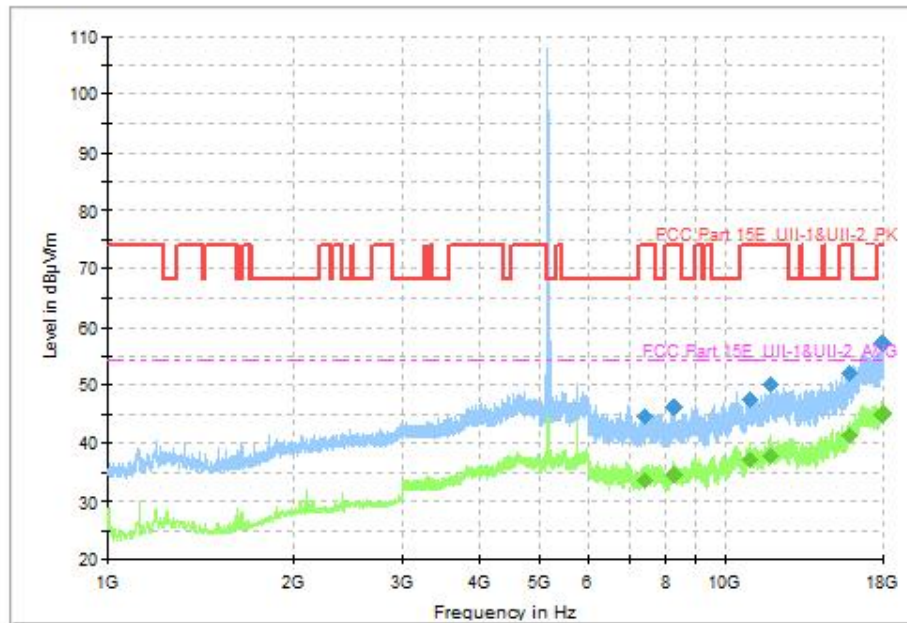


Fig. 55 Transmitter Spurious Emission (802.11ax-HE20(RU26), CH36 5180MHz, 1GHz-18GHz)

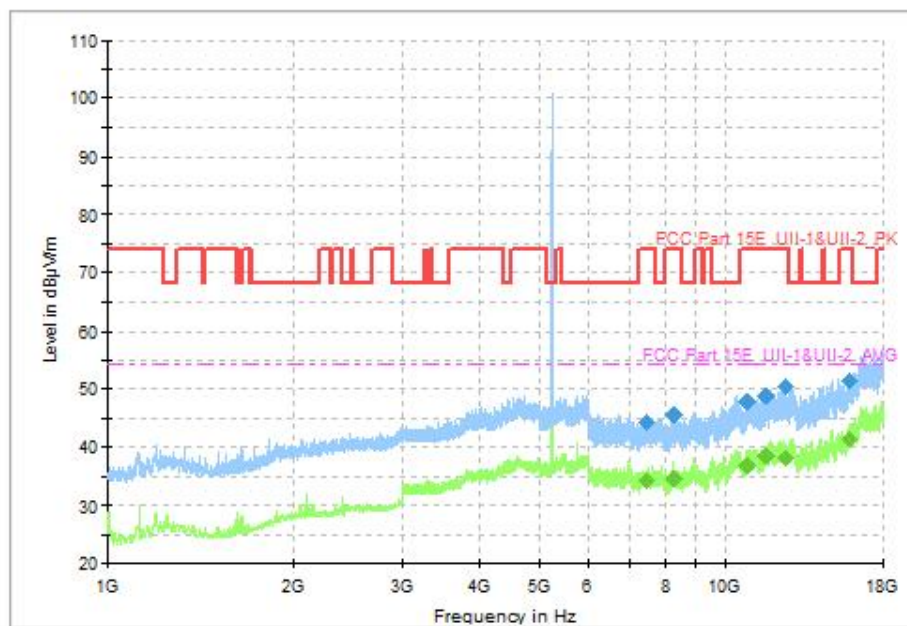


Fig. 56 Transmitter Spurious Emission (802.11ax-HE20(RU26), CH48 5240MHz, 1GHz-18GHz)

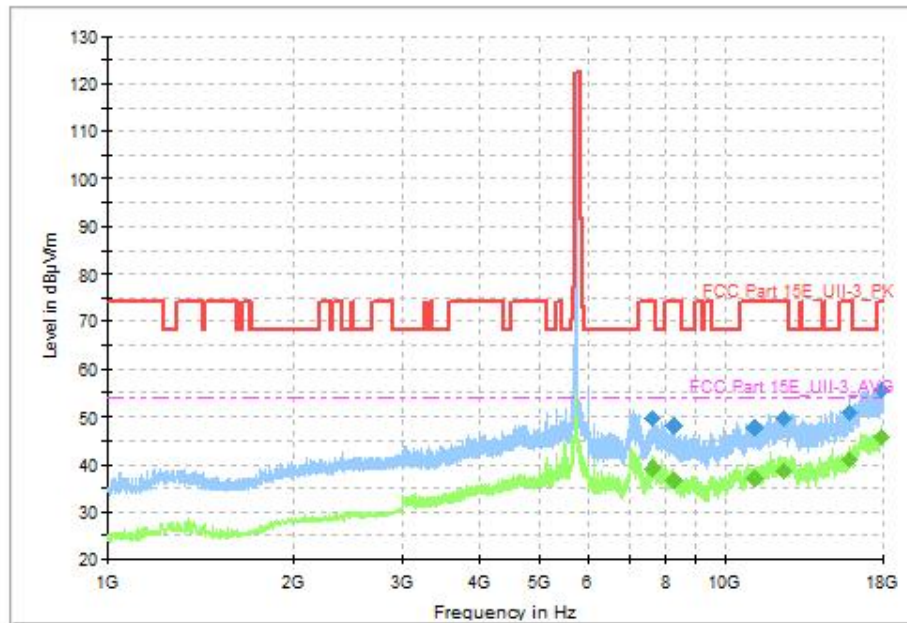


Fig. 57 Transmitter Spurious Emission (802.11ax-HE20(RU26), CH149 5745MHz, 1GHz-18GHz)

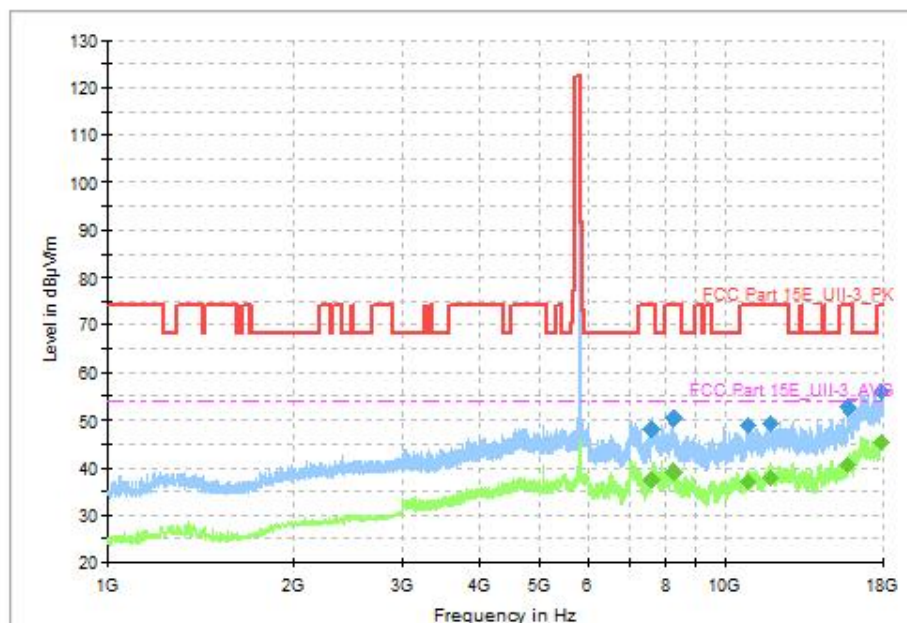


Fig. 58 Transmitter Spurious Emission (802.11ax-HE20(RU26), CH165 5825MHz, 1GHz-18GHz)

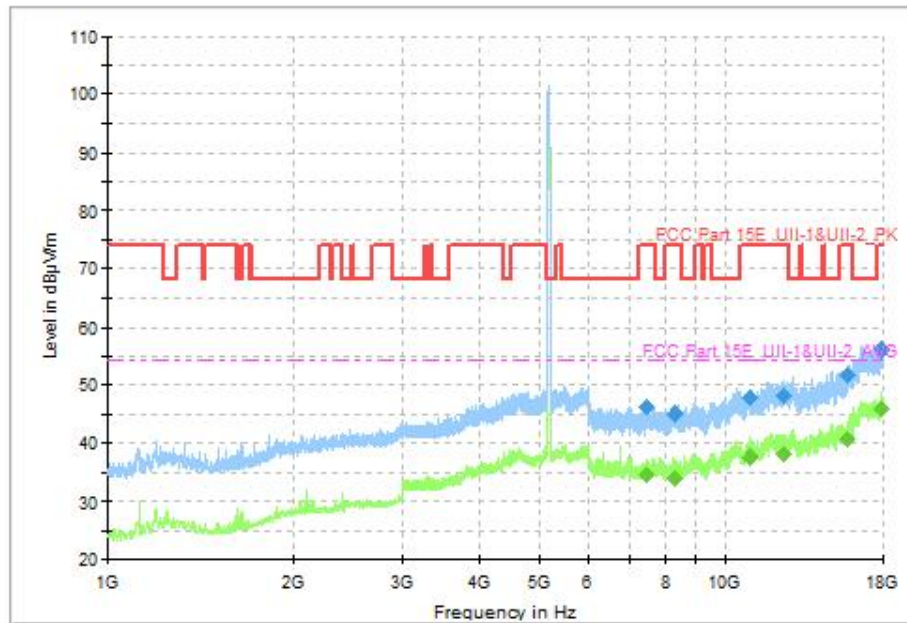


Fig. 59 Transmitter Spurious Emission (802.11n-HT40, CH38 5190MHz, 1GHz-18GHz)

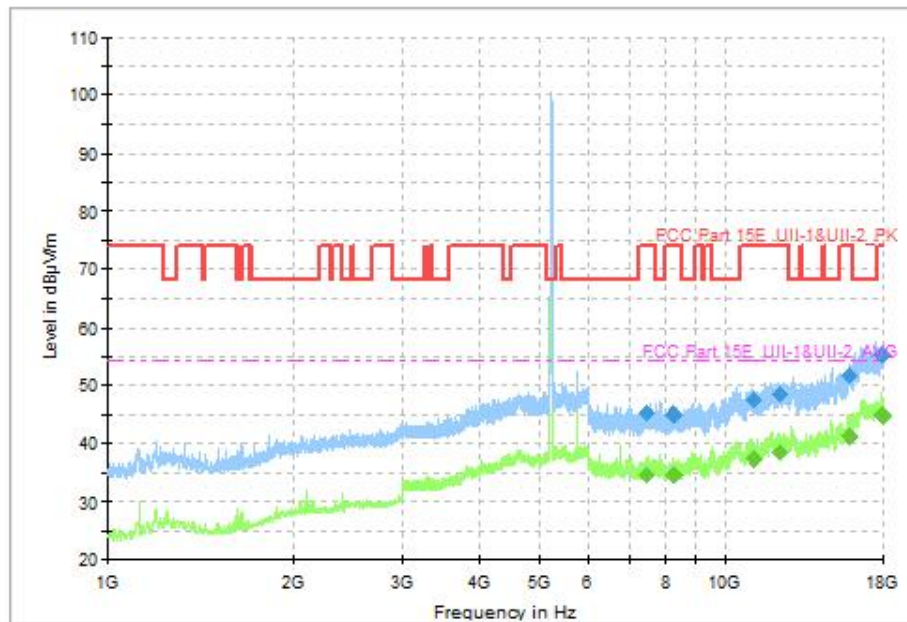


Fig. 60 Transmitter Spurious Emission (802.11n-HT40, CH46 5230MHz, 1GHz-18GHz)

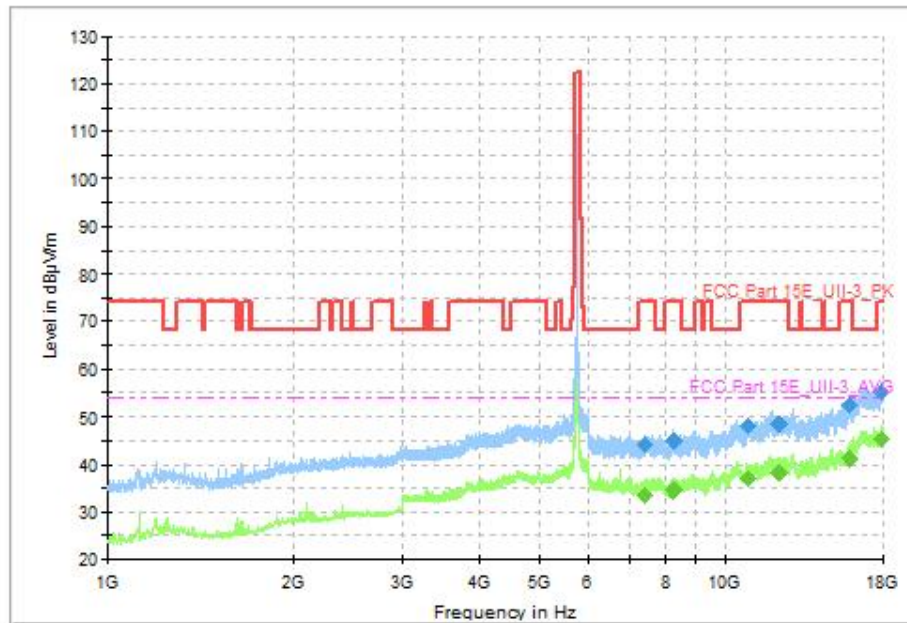


Fig. 61 Transmitter Spurious Emission (802.11n-HT40, CH151 5755MHz, 1GHz-18GHz)

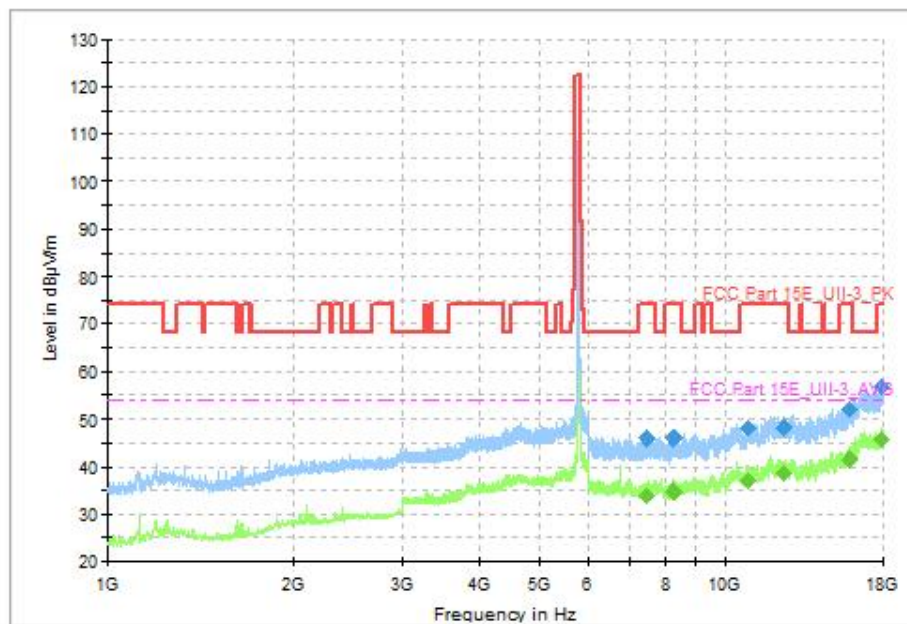


Fig. 62 Transmitter Spurious Emission (802.11n-HT40, CH159 5795MHz, 1GHz-18GHz)

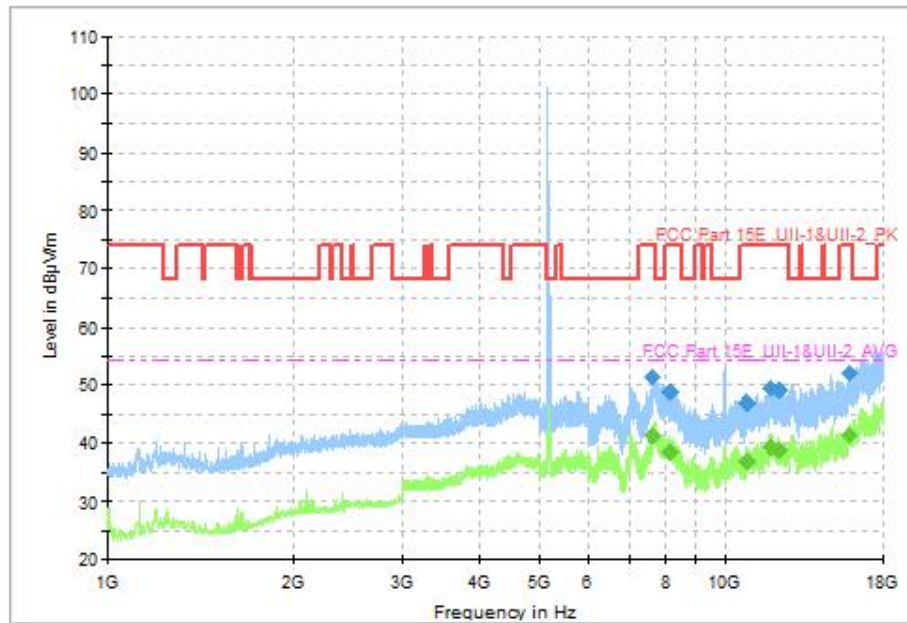


Fig. 63 Transmitter Spurious Emission (802.11ax-HE40(RU26), CH38 5190MHz, 1GHz-18GHz)

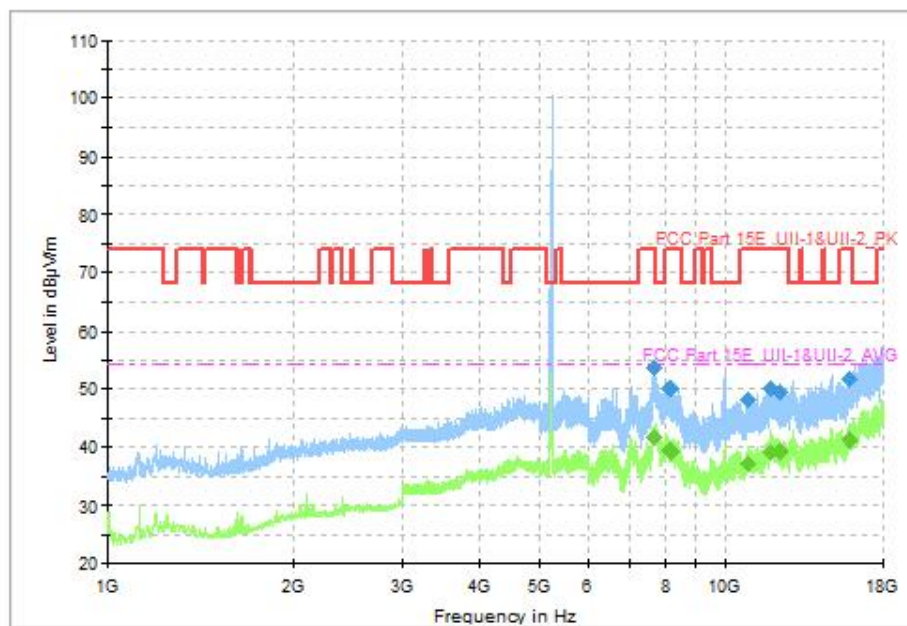


Fig. 64 Transmitter Spurious Emission (802.11ax-HE40(RU26), CH46 5230MHz, 1GHz-18GHz)

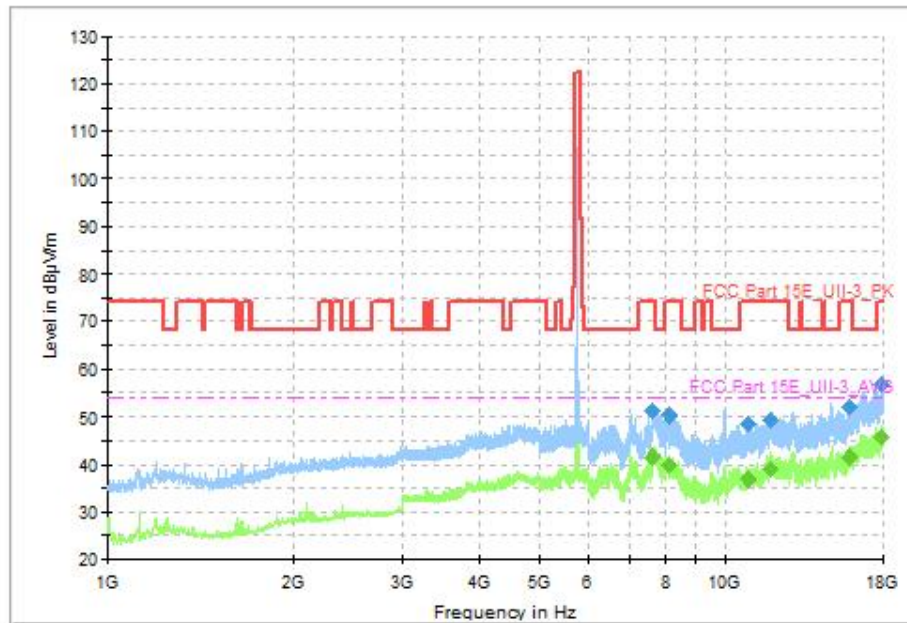


Fig. 65 Transmitter Spurious Emission (802.11ax-HE40(RU26), CH151 5755MHz, 1GHz-18GHz)

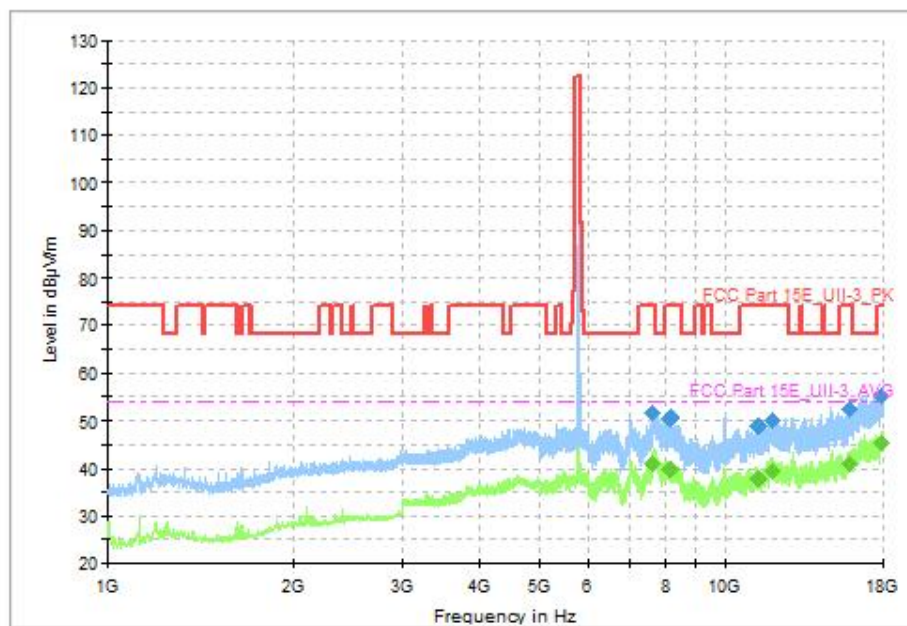


Fig. 66 Transmitter Spurious Emission (802.11ax-HE40(RU26), CH159 5795MHz, 1GHz-18GHz)

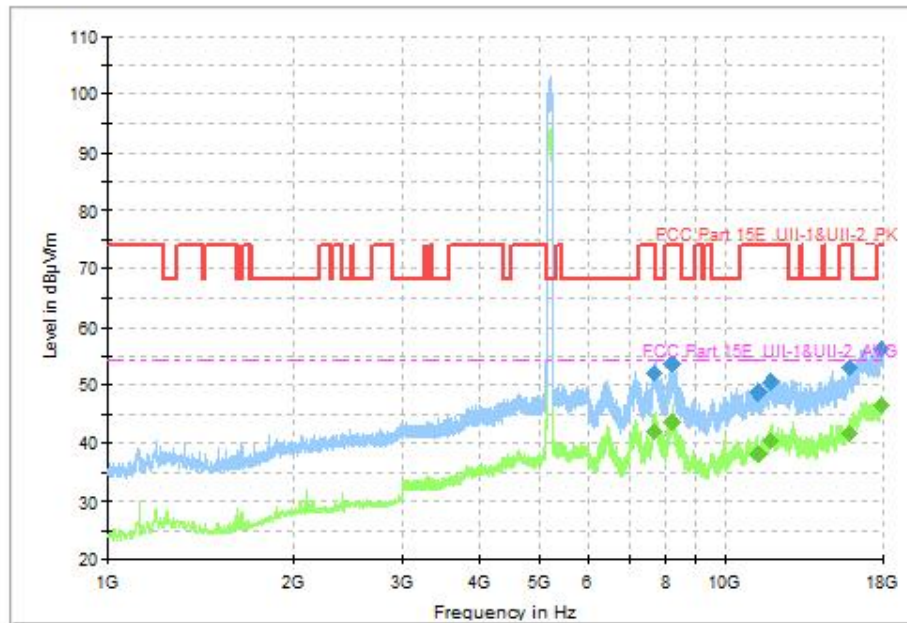


Fig. 67 Transmitter Spurious Emission (802.11ac-VHT80, CH42 5210MHz, 1GHz-18GHz)

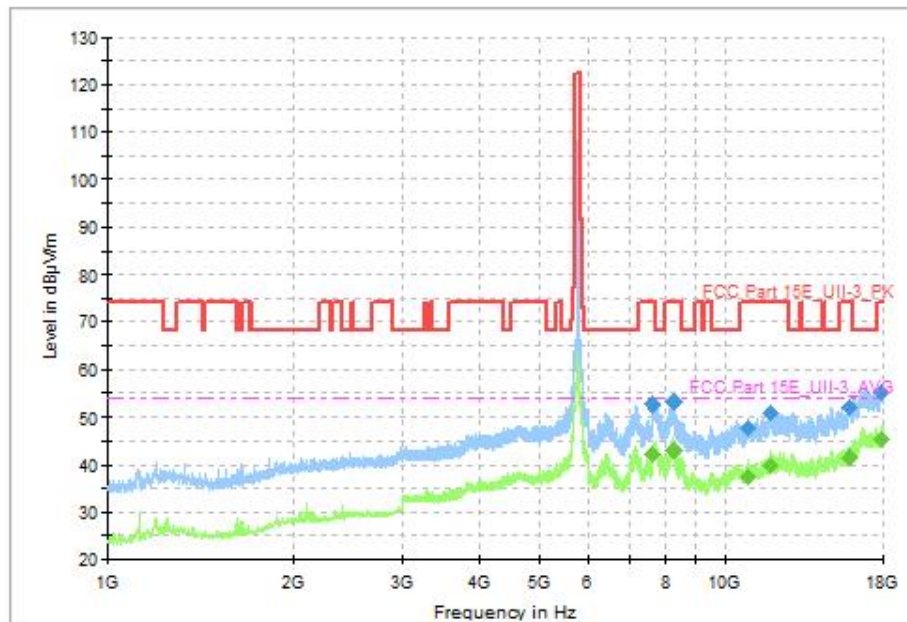


Fig. 68 Transmitter Spurious Emission (802.11ac-VHT80, CH155 5775MHz, 1GHz-18GHz)

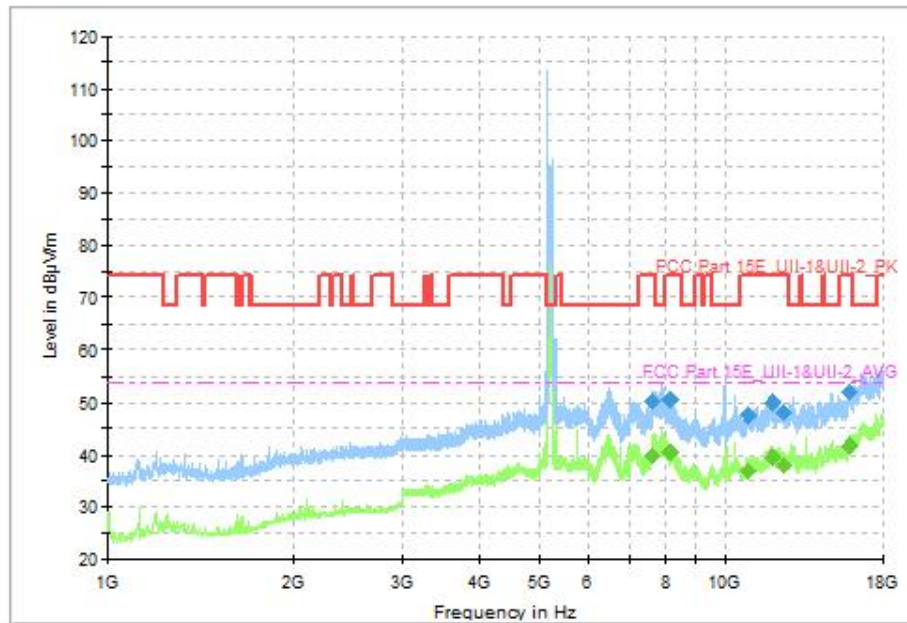


Fig. 69 Transmitter Spurious Emission (802.11ax-HE80(RU26), CH42 5210MHz, 1GHz-18GHz)

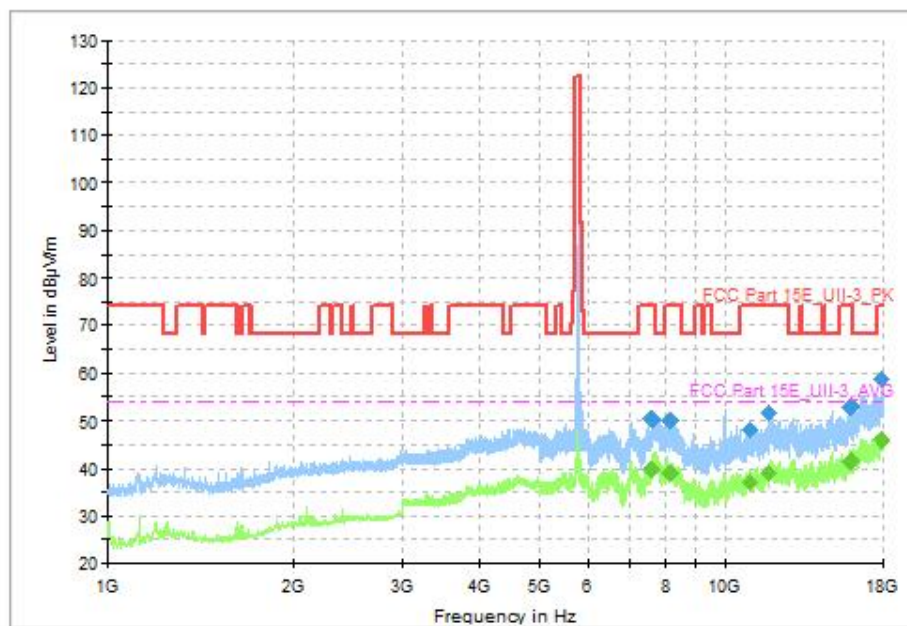


Fig. 70 Transmitter Spurious Emission (802.11ax-HE80(RU26), CH155 5775MHz, 1GHz-18GHz)

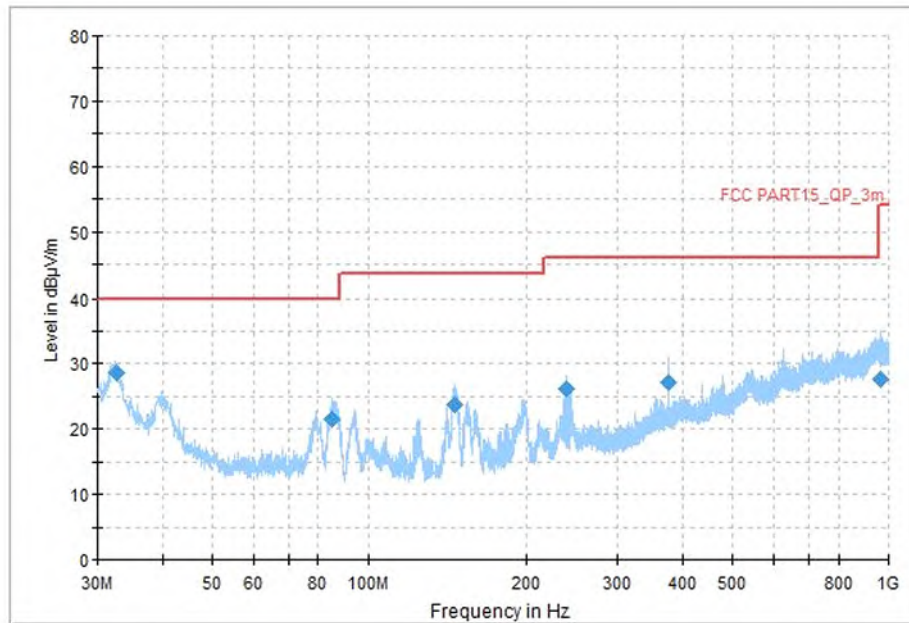


Fig. 71 Transmitter Spurious Emission (All channel, 30MHz~1GHz)

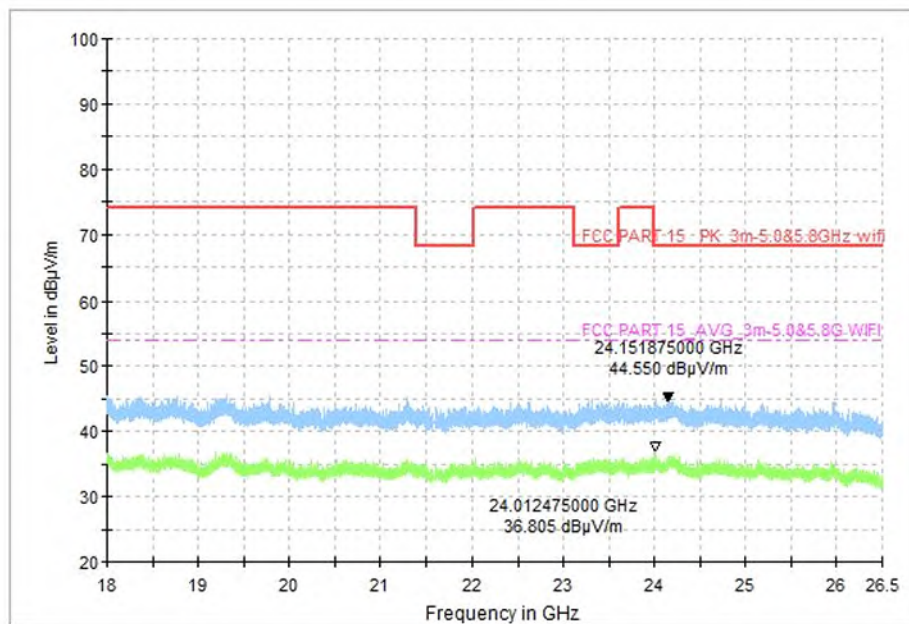


Fig. 72 Transmitter Spurious Emission (All channel, 18GHz~26.5GHz)

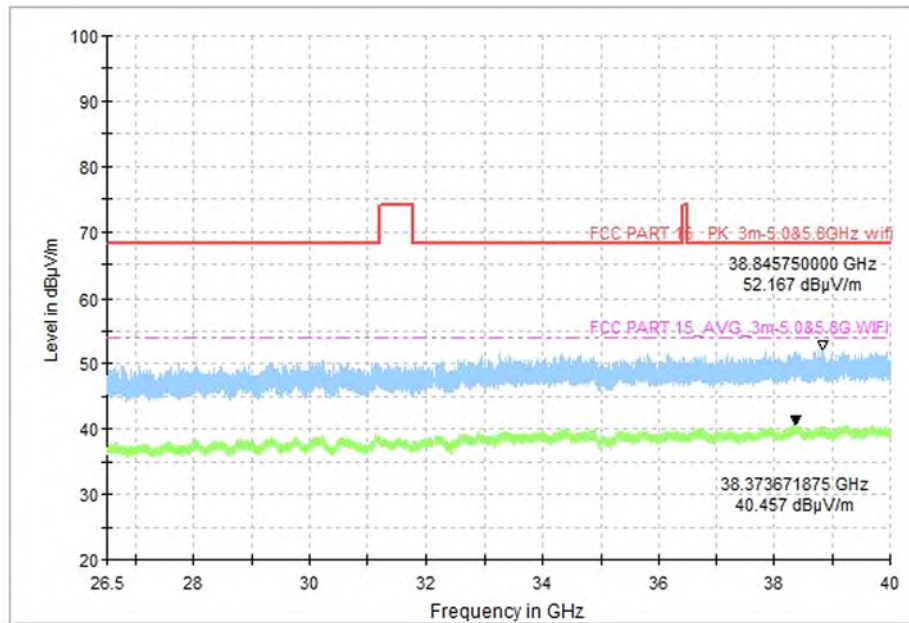


Fig. 73 Transmitter Spurious Emission (All channel, 26.5GHz~40GHz)

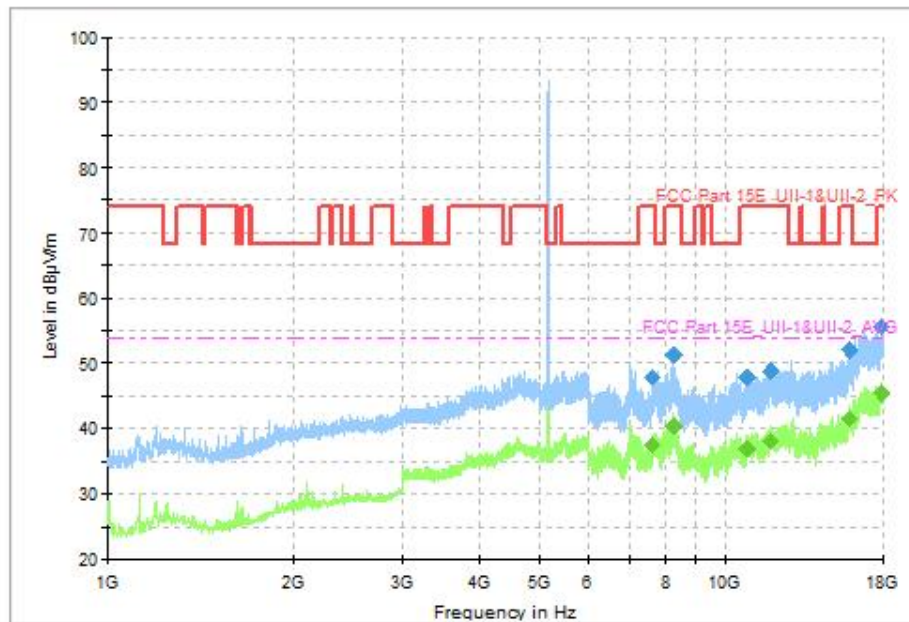


Fig. 74 Transmitter Spurious Emission (802.11ax-HE20, CH36 5180MHz, 1GHz-18GHz), MIMO

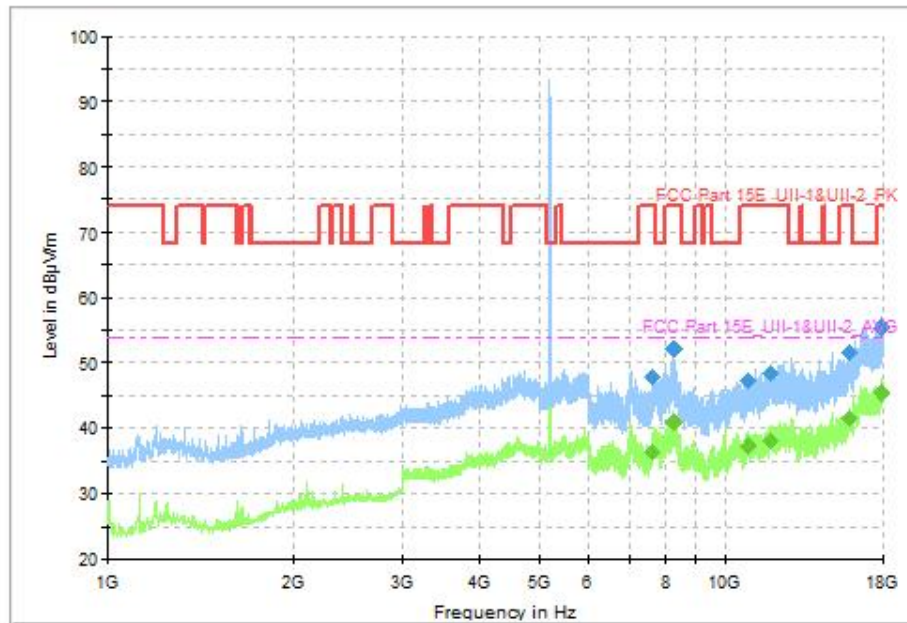


Fig. 75 Transmitter Spurious Emission (802.11ax-HE20, CH40 5200MHz, 1GHz-18GHz), MIMO

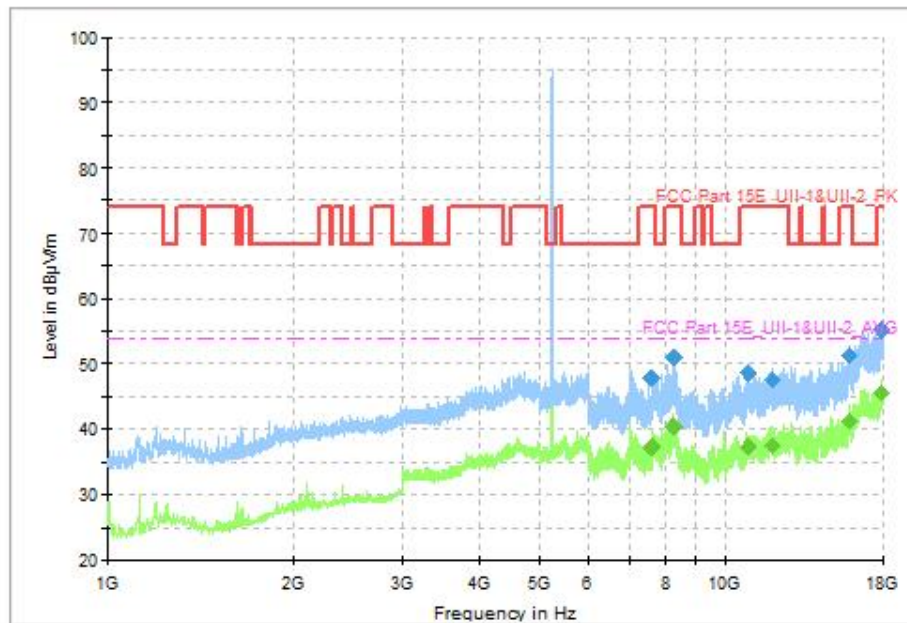


Fig. 76 Transmitter Spurious Emission (802.11ax-HE20, CH48 5240MHz, 1GHz-18GHz), MIMO

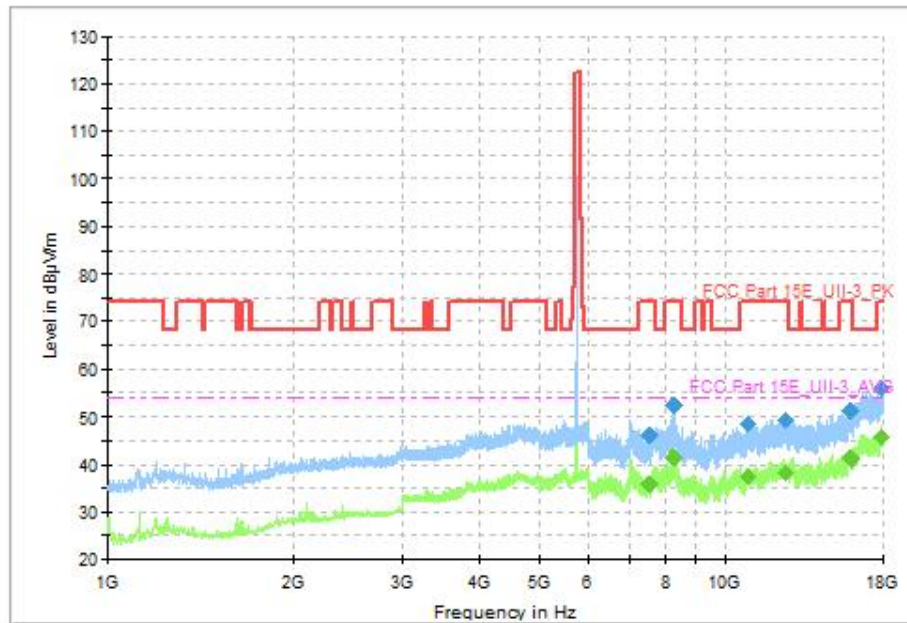


Fig. 77 Transmitter Spurious Emission (802.11ax-HE20, CH149 5745MHz, 1GHz-18GHz), MIMO

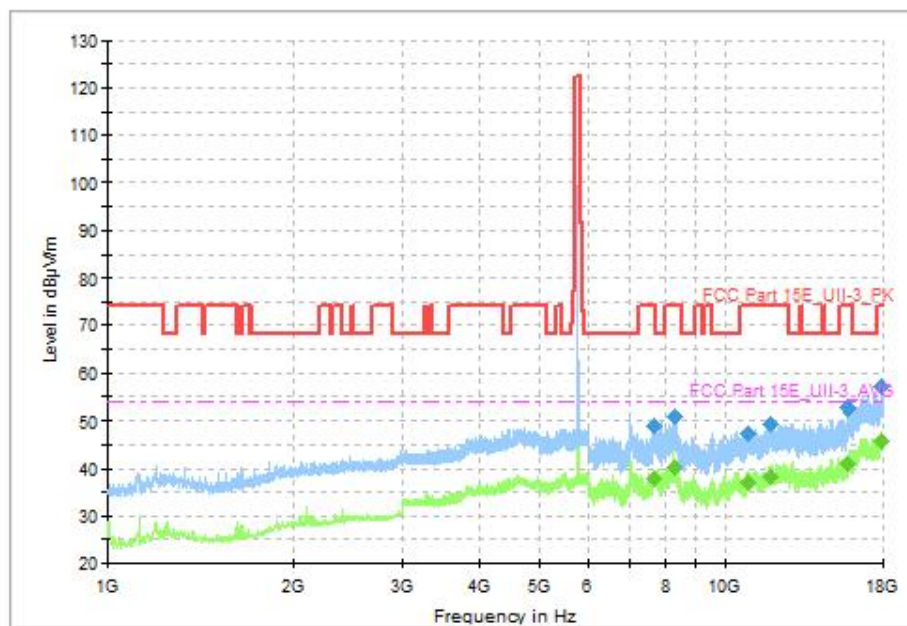


Fig. 78 Transmitter Spurious Emission (802.11ax-HE20, CH157 5785MHz, 1GHz-18GHz), MIMO

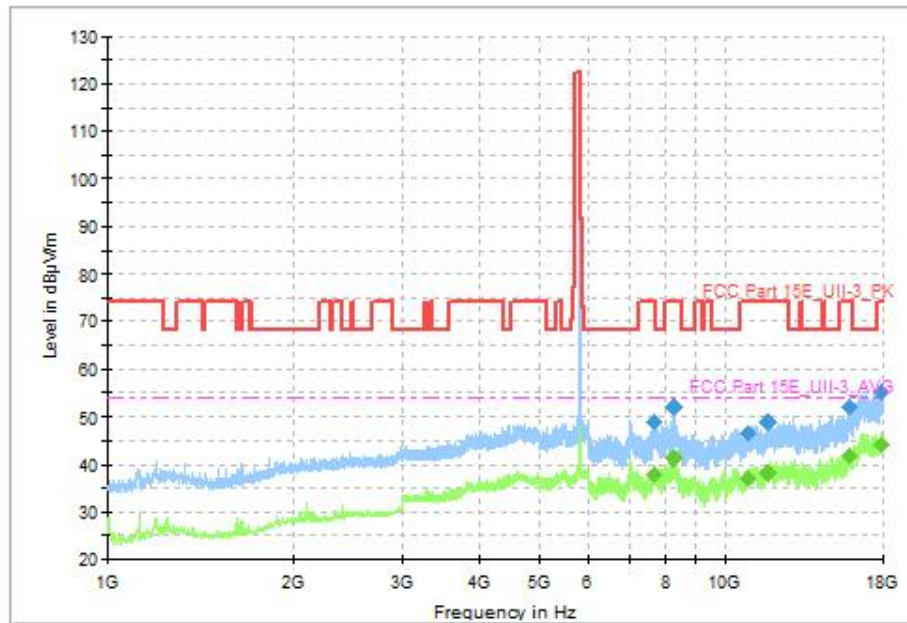


Fig. 79 Transmitter Spurious Emission (802.11ax-HE20, CH165 5825MHz, 1GHz-18GHz), MIMO

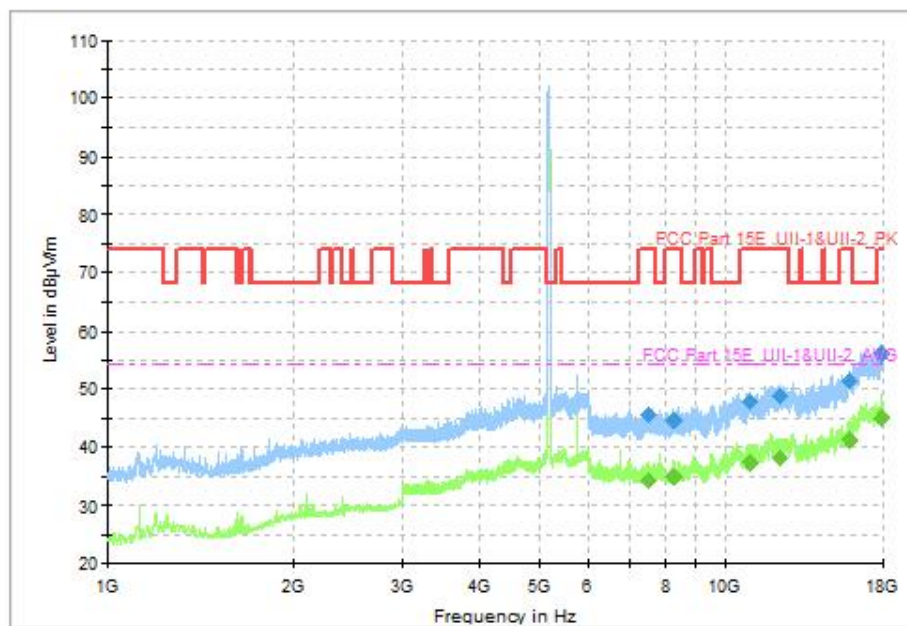


Fig. 80 Transmitter Spurious Emission (802.11n-HT40, CH38 5190MHz, 1GHz-18GHz), MIMO

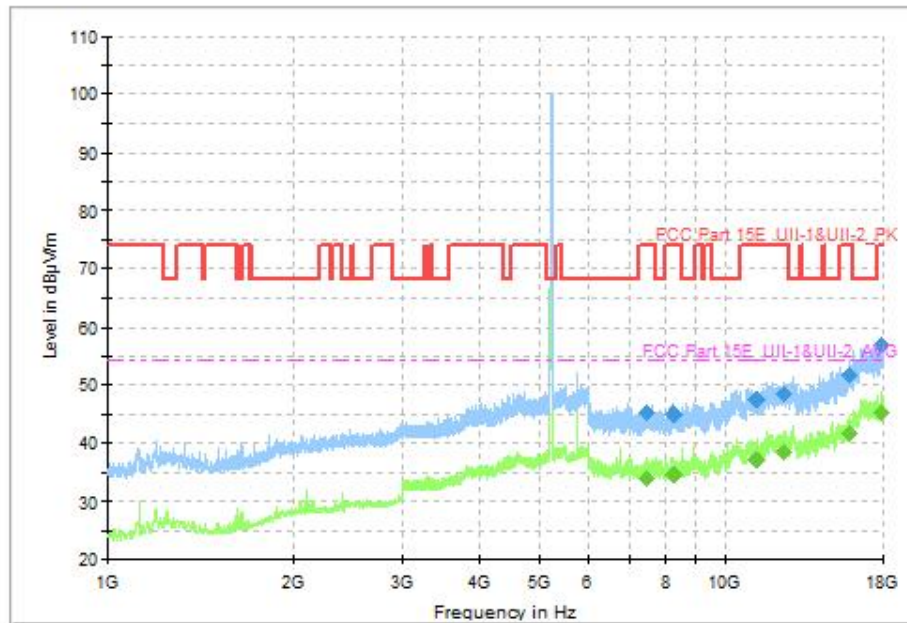


Fig. 81 Transmitter Spurious Emission (802.11n-HT40, CH46 5230MHz, 1GHz-18GHz), MIMO

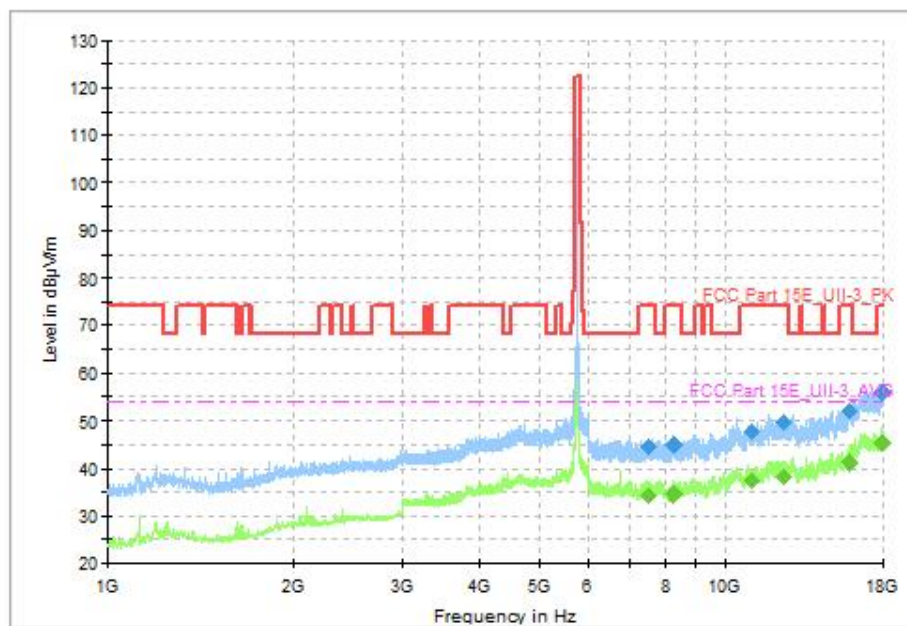


Fig. 82 Transmitter Spurious Emission (802.11n-HT40, CH151 5755MHz, 1GHz-18GHz), MIMO

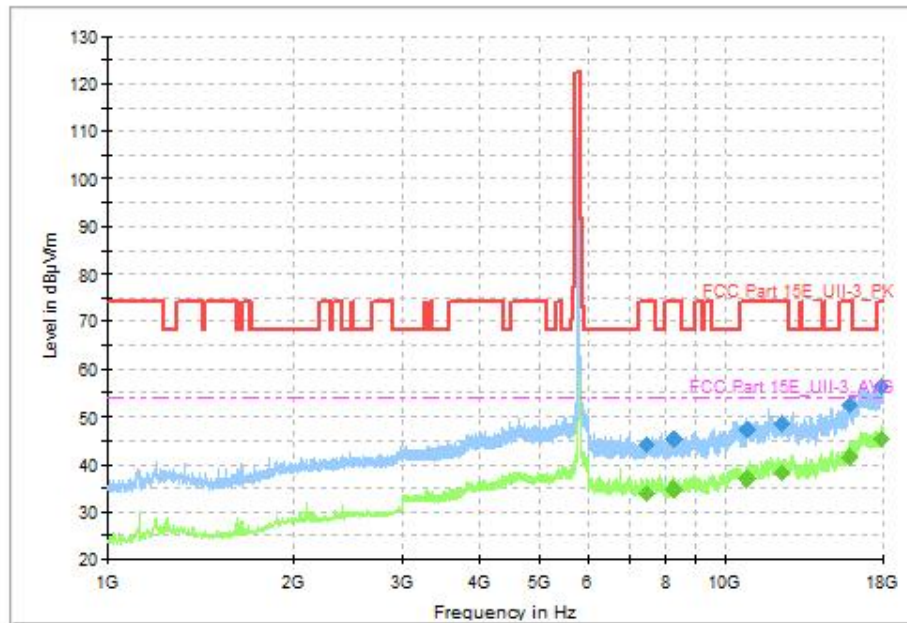
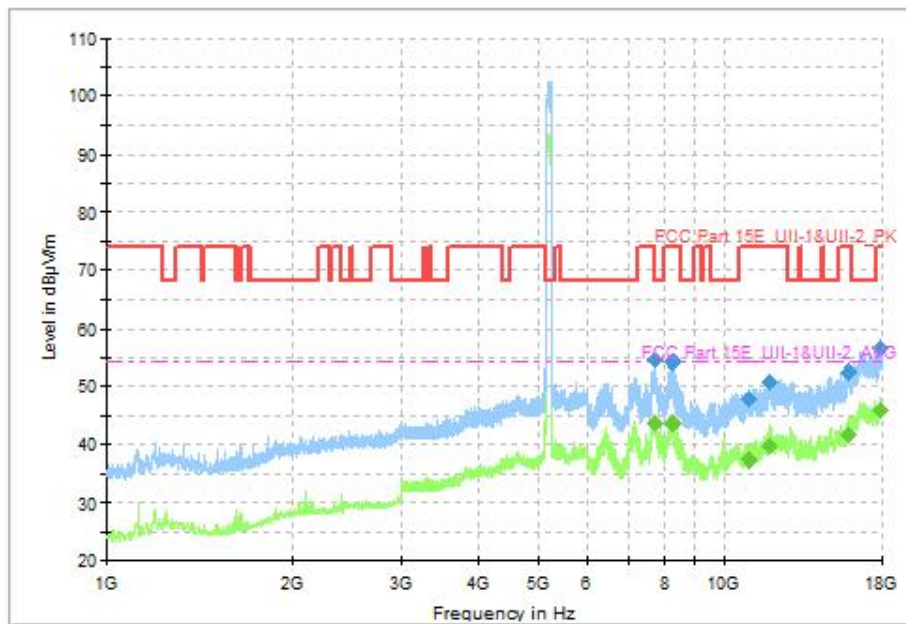


Fig. 83 Transmitter Spurious Emission (802.11n-HT40, CH159 5795MHz, 1GHz-18GHz), MIMO



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Fig. 84 Transmitter Spurious Emission (802.11ac-VHT80, CH42 5210MHz, 1GHz-18GHz), MIMO

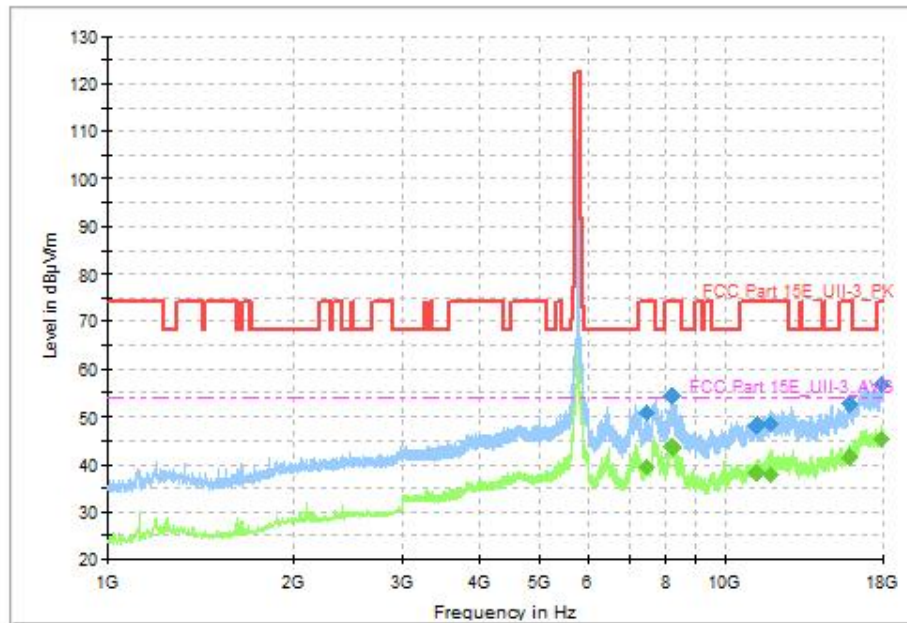


Fig. 85 Transmitter Spurious Emission (802.11ac-VHT80, CH155 5775MHz, 1GHz-18GHz), MIMO

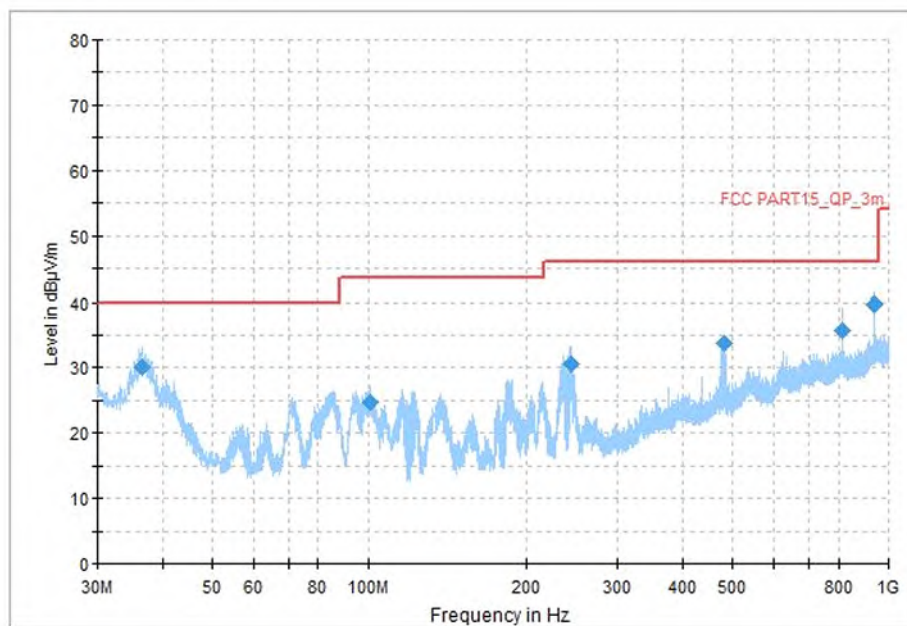


Fig. 86 Transmitter Spurious Emission (All channel, 30MHz~1GHz), MIMO

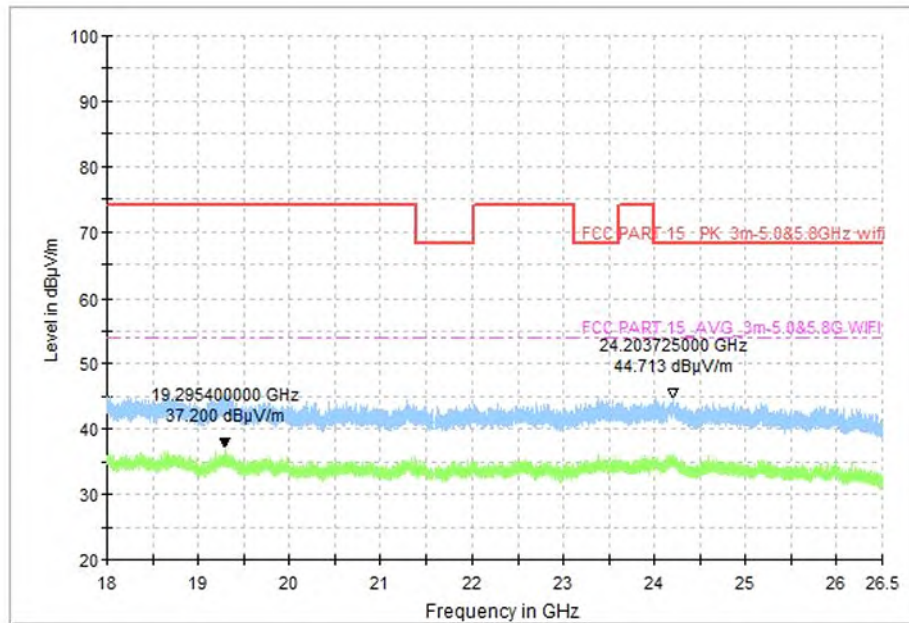


Fig. 87 Transmitter Spurious Emission (All channel, 18GHz~26.5GHz), MIMO

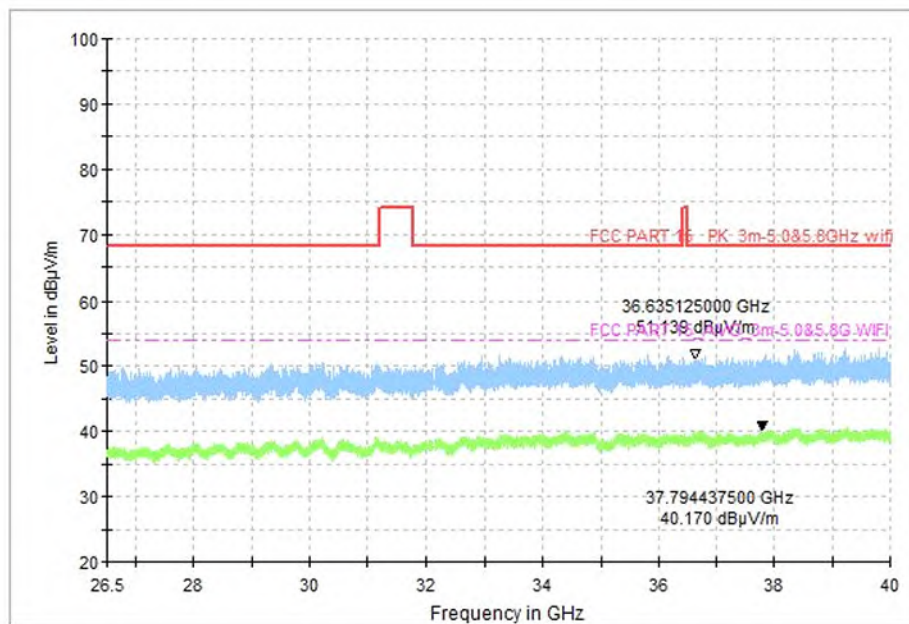


Fig. 88 Transmitter Spurious Emission (All channel, 26.5GHz~40GHz), MIMO

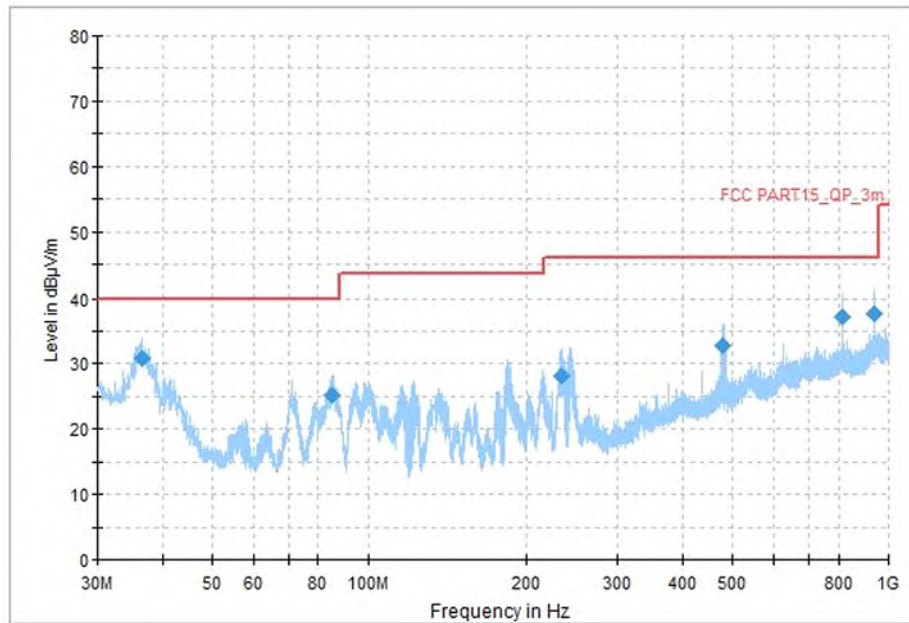


Fig. 89 Transmitter Spurious Emission (DH5 & 802.11ac-VHT80, CH0 2402MHz & CH42 5210MHz, 30MHz~1GHz)

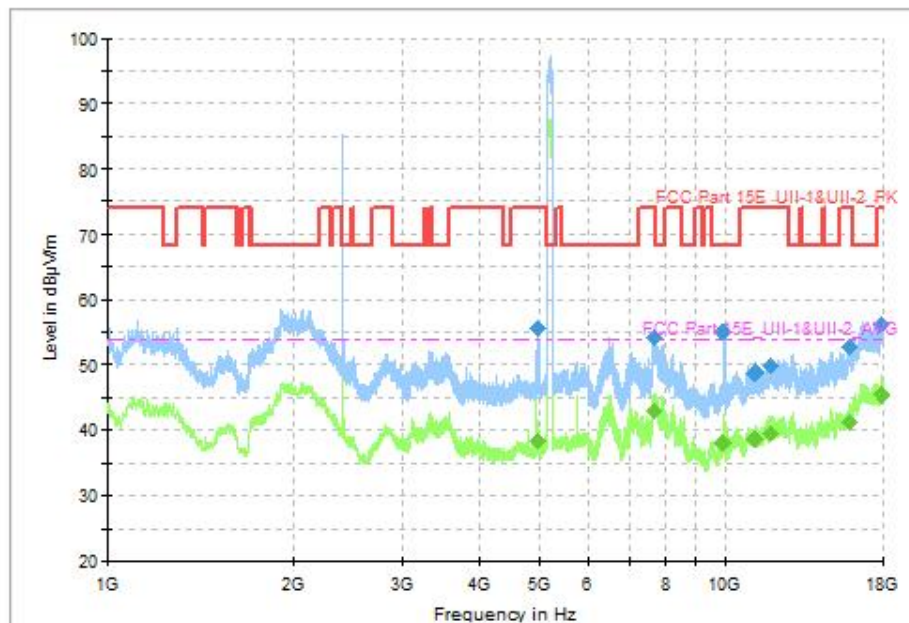


Fig. 90 Transmitter Spurious Emission (DH5 & 802.11ac-VHT80, CH0 2402MHz & CH42 5210MHz, 1GHz-18GHz)

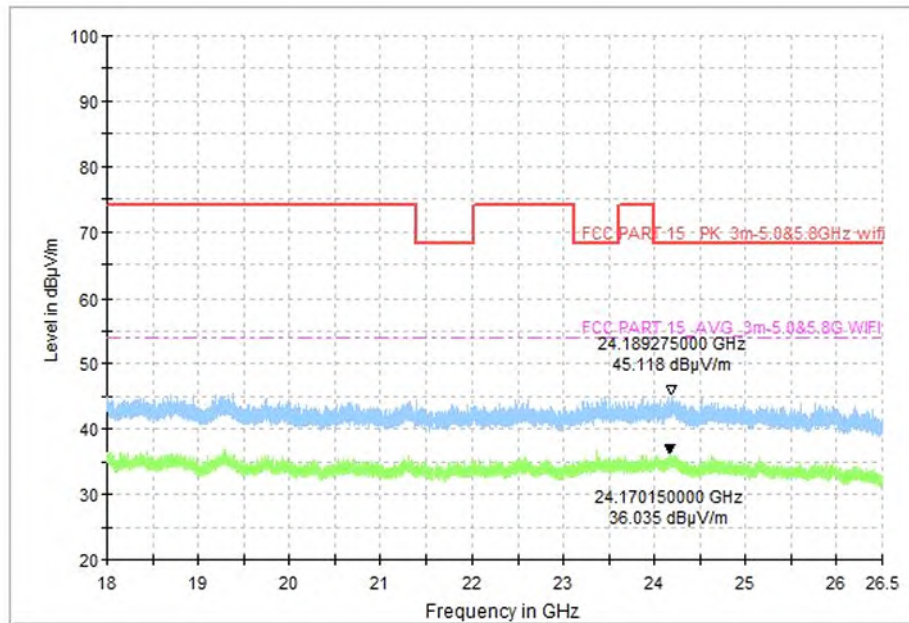


Fig. 91 Transmitter Spurious Emission (DH5 & 802.11ac-VHT80, CH0 2402MHz & CH42 5210MHz, 18GHz~26.5GHz)

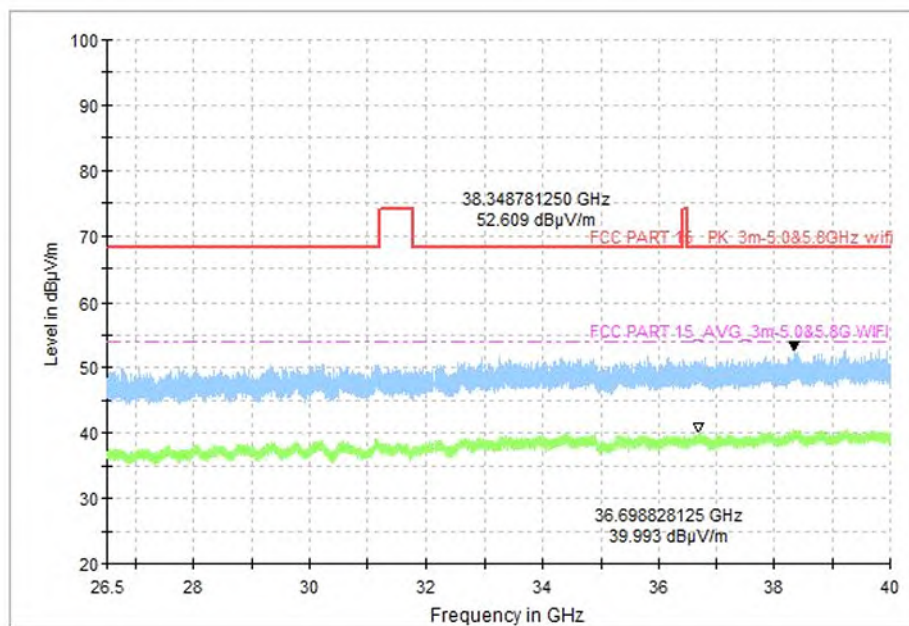


Fig. 92 Transmitter Spurious Emission (DH5 & 802.11ac-VHT80, CH0 2402MHz & CH42 5210MHz, 26.5GHz~40GHz)

**A.9. Radiated Spurious Emissions < 30MHz****Method of Measurement: See ANSI C63.10-clause 6.4.****Measurement Limit (15.209, 9kHz-30MHz):**

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

The measurement is made according to KDB 789033.

Note: The measurement distance during the test is 3m. The limit used in plots recalculated based on the extrapolation factor of 40 dB/decade.

Measurement Result (Worst case):**SISO-Ant0:**

Mode	Frequency Range	Test Results	Conclusion
All Channel	9 kHz ~30 MHz	Fig.93	P

MIMO:

Mode	Frequency Range	Test Results	Conclusion
All Channel	9 kHz ~30 MHz	Fig.94	P

The following configurations are the worst for Bluetooth+WLAN simultaneous transmission.

Mode	Frequency (MHz)	Frequency Range	Test Results	Conclusion
DH5 & 802.11ac-VHT80	2402(CH0) & 5210MHz(CH42)	9 kHz ~30 MHz	Fig.95	P

See below for test graphs.**Conclusion: PASS**

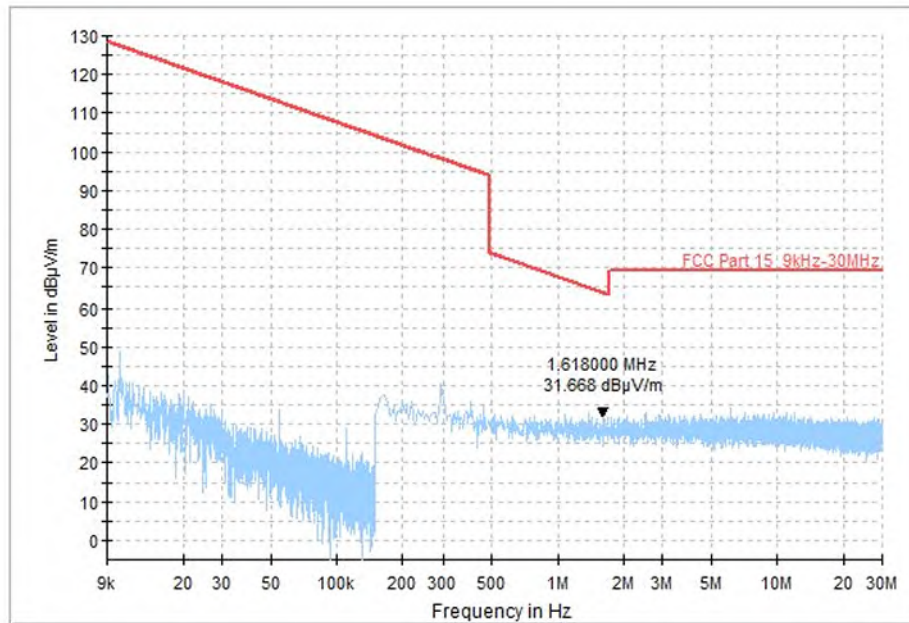


Fig. 93 Radiated Spurious Emission (All Channel, 9 kHz ~30 MHz)

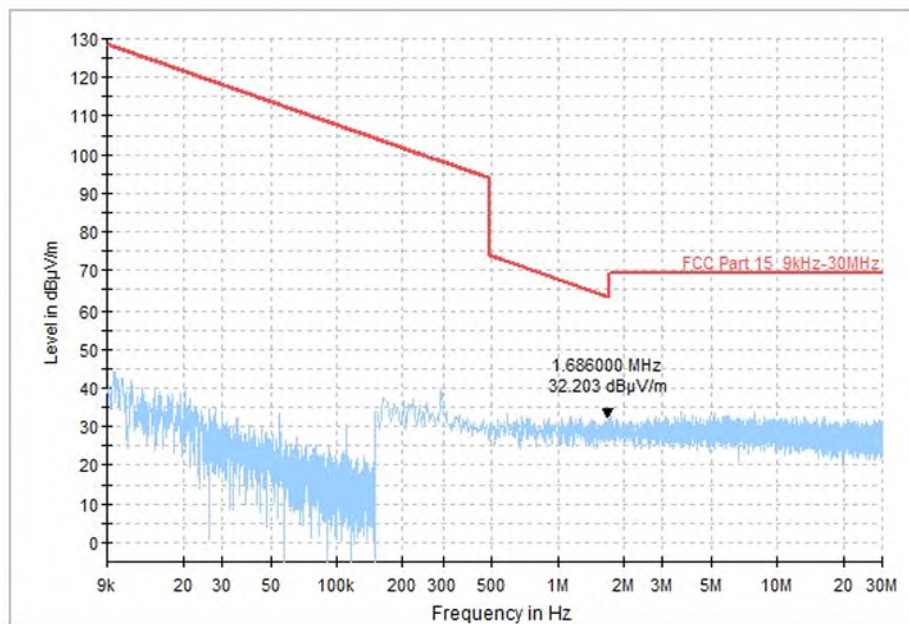


Fig. 94 Radiated Spurious Emission (All Channel, 9 kHz ~30 MHz), MIMO

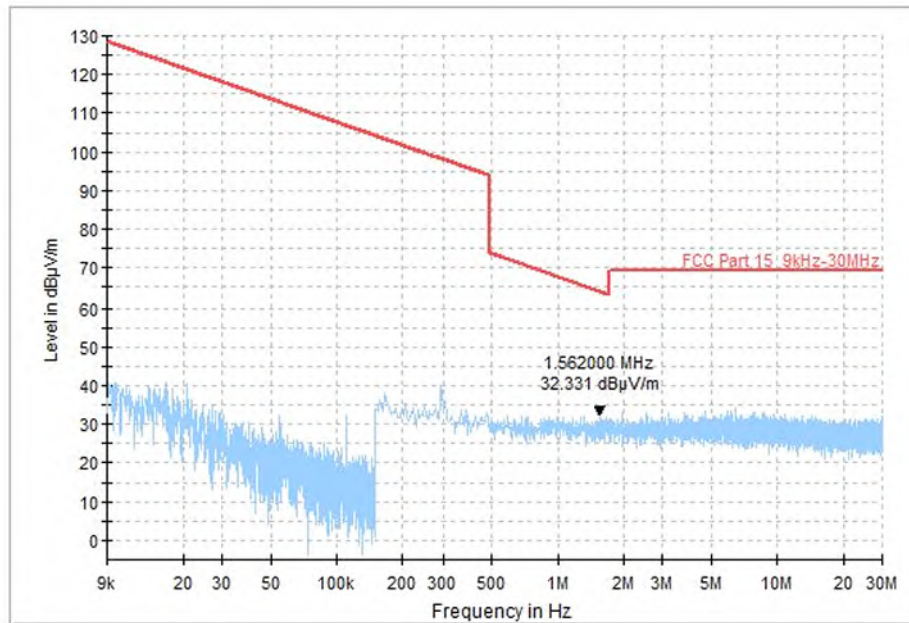


Fig. 95 Radiated Spurious Emission (DH5 & 802.11ac-VHT80, CH0 2402MHz & CH42 5210MHz, 9KHz~30MHz)



A.10. Power control

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

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