

Test Report No. : UL-RPT-RP-14978163-116-FCC-WLAN 5GHz

Applicant * : Robert Bosch GmbH
Model No. * : CTP3NA
FCC ID * : 2AUXS-CTP3NA
Technology * : WLAN 5 GHz (802.11 a, n, ac, ax)
Test Standard(s) : **FCC Parts 15.207, 15.209(a) & 15.407**

For details of applied tests refer to test result summary

1. This test report shall not be reproduced in full or partial, without the written approval of UL International Germany GmbH.
2. The results in this report apply only to the sample tested.
3. The test results in this report are traceable to the national or international standards.
4. Test Report Version 1.0
5. Result of the tested sample: **PASS**
6. All information marked with a (*) were provided by customer / applicant or authorized representative



Prepared by: Muhammad Faiq Khan
Title: Project Engineer
Date: 09 November 2023



Approved by: Rachid, Acharkaoui
Title: Operations Manager
Date: 09 November 2023



Deutsche
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D-PL-19381-02-00

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The tests reported herein have been performed in
accordance with its' terms of accreditation.

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1. Customer Information *

1.1.Applicant Information

Company Name:	Robert Bosch GmbH
Company Address:	Robert-Bosch-Platz 1 70839 Gerlingen GERMANY
Contact Person:	Karin Silberhorn
Contact E-Mail Address:	karin.silberhorn@de.bosch.com
Contact Phone No.:	+49 5121-49-7662

1.2.Manufacturer Information

Company Name:	Robert Bosch GmbH
Company Address:	Robert-Bosch-Platz 1 70839 Gerlingen GERMANY
Contact Person:	Karin Silberhorn
Contact E-Mail Address:	karin.silberhorn@de.bosch.com
Contact Phone No.:	+49 5121-49-7662

2. Summary of Testing

2.1. General Information

Applied Standards

Specification Reference:	47CFR15.407 and 47CFR15.403
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart E (Unlicensed National Information Infrastructure Devices) – Sections 15.403 and 15.407
Specification Reference:	47CFR15.207 and 47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209

Location

Location of Testing:	UL International Germany GmbH Hedelfinger Str. 61 70327 Stuttgart Germany
Test Firm Registration:	399704

Date information

Order Date:	19 September 2023
EUT arrived:	20 September 2023
Test Dates:	20 September 2023 to 28 September 2023
EUT returned:	-/-

2.2. Summary of Test Results

Clause	Measurement (5.15-5.85 GHz band)	Complied	Did not comply	Not performed	Not applicable
Part 15.207	Transmitter AC Conducted Emissions ⁽¹⁾	☐	☐	☐	☒
Part 15.403(i)	Transmitter 26 dB Emission Bandwidth ⁽³⁾	☐	☐	☒	☐
Part 15.35(c)	Transmitter Duty Cycle ⁽²⁾	☒	☐	☐	☐
Part 15.407(a)(1)(iv)	Transmitter Maximum Conducted Output Power ⁽³⁾	☐	☐	☒	☐
Part 15.407(a)(1)(iv)	Transmitter Peak Power Spectral Density ⁽³⁾	☐	☐	☒	☐
Part 15.407(b)/15.209(a)	Transmitter Out of Band Radiated Emissions	☒	☐	☐	☐
Part 15.407(b)/15.209(a)	Transmitter Band Edge Radiated Emissions	☒	☐	☐	☐
Part 15.407(g)	Transmitter Frequency Stability ⁽³⁾ (Temperature & Voltage Variation)	☐	☐	☒	☐
Part 15.407(h)(1)	Transmitter Power Control ⁽³⁾	☐	☐	☒	☐

Decision rule:

If the decision rule is not included in the applied customer specification or testing standard, the binary statement for simple acceptance, as defined in ILAC G8: 2019 Section 4.2.1, is applied as the decision rule for a pass/ fail statement.

If the measured value is on the limit, the result is defined as a pass. In this case the risk of a false positive is 50%. For further information regarding risk assessment refer to ILAC G8: 2019.

Note(s):

1. The EUT is vehicular equipment and will be powered by the battery of the vehicle, therefore no AC conduct emission tests are required.
2. The measurement was performed to assist the other average measurements.
3. At the client's request, only partial testing was performed for the radiated spurious emissions and the band edge radiated emissions as the EUT is a host product that contains a pre-certified radio module (Model: ATC6NPL002C)

2.3. Methods and Procedures

Reference:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Reference:	FCC KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 December 14, 2017
Title:	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT) *

Brand Name:	Bosch
Model Name:	CTP3NA
Model Number:	CTP3NA Ext
Test Sample Serial Number:	1150003350
Hardware Version:	C2
Software Version:	DAIMLER_CTP3_ISTANBUL_RC2_HF2_S.010
FCC ID:	2AUXS-CTP3NA

3.2. Description of EUT *

The equipment under test was an In-Vehicle-Telematic-Unit, contains Model Name: CTP3NA, supporting WLAN 2.4 GHz, WLAN 5 GHz, Bluetooth LE and Bluetooth BR/EDR technologies.

While testing WLAN 5GHz all other supported radio technologies were either switched off or were in idle mode.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Technology Tested:	WLAN (IEEE 802.11a,n, ac, ax) / Digital Transmission System	
Type of Unit:	Transceiver	
Supported Modulation Types:	OFDM	
Tested Data rates:	802.11a	54 Mbit/s (SISO)
	802.11ax HT20	MCS0 (SISO)
	802.11ax HT40	MCS0 (SISO)
	802.11ax HT80	MCS0 (SISO)
Power Supply Requirement(s): *	24 V DC via external power supply	
Declared Antenna Gain:	6.2 dBi	
Antenna Type:	combinatorial Antenna	
Antenna Details:	A 006 820 39 75	
Transceiver Frequency Band:	5150 MHz to 5850 MHz	
Nominal Channel Bandwidth *	20 MHz	
Transmit Channels Tested: BW 20 MHz	Channel Number	Channel Frequency (MHz)
	36	5180
	40	5200
	48	5240
	52	5260
	60	5300
	64	5320
	100	5500
	116	5580
	140	5700
	149	5745
	157	5785
	165	5825
Nominal Channel Bandwidth *	40 MHz	
Transmit Channels Tested: BW 40 MHz	Channel Number	Channel Frequency (MHz)
	62	5310
	102	5510
	134	5670
Nominal Channel Bandwidth *	80 MHz	
Transmit Channels Tested: BW 80 MHz	Channel Number	Channel Frequency (MHz)
	42	5210
	155	5775

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

A. Support Equipment (In-house)

Item	Description	Brand Name	Model Name or Number	Serial Number
1	-/-	-/-	-/-	-/-

B. Support Equipment (Manufacturer supplied) *

Item	Description	Brand Name	Model Name or Number	Serial Number
1	Laptop	Fujitsu	H770	DS1U006875

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

☒ Transmitter / Modulated Carrier Continuous Transmissions Mode WLAN 2.4 GHz, Worst Case:

- 802.11a | 20 MHz | 54 Mbps | Channel 36 | 5180 MHz ^{(1) (2)}
- 802.11a | 20 MHz | 54 Mbps | Channel 40 | 5200 MHz ⁽¹⁾
- 802.11ax (SU) | 80 MHz | MCS0 | Channel 42 | 5210 MHz ⁽²⁾
- 802.11a | 20 MHz | 54 Mbps | Channel 48 | 5240 MHz ⁽¹⁾
- 802.11ax (SU) | 20 MHz | MCS0 | Channel 48 | 5240 MHz ⁽¹⁾
- 802.11a | 20 MHz | 54 Mbps | Channel 52 | 5260 MHz ⁽¹⁾
- 802.11a | 20 MHz | 54 Mbps | Channel 60 | 5300 MHz ⁽¹⁾
- 802.11ax (SU) | 40 MHz | MCS0 | Channel 62 | 5310 MHz ⁽²⁾
- 802.11ax (RU52) | 20 MHz | MCS0 | Channel 60 | 5300 MHz ⁽¹⁾
- 802.11a | 20 MHz | 54 Mbps | Channel 64 | 5320 MHz ^{(1) (2)}
- 802.11a | 20 MHz | 54 Mbps | Channel 100 | 5500 MHz ^{(1) (2)}
- 802.11ax (SU) | 40 MHz | MCS0 | Channel 102 | 5510 MHz ⁽²⁾
- 802.11a | 20 MHz | 54 Mbps | Channel 116 | 5580 MHz ⁽¹⁾
- 802.11ax (RU52) | 20 MHz | MCS0 | Channel 60 | 5670 MHz ⁽¹⁾
- 802.11a | 20 MHz | 54 Mbps | Channel 140 | 5700 MHz ^{(1) (2)}
- 802.11a | 20 MHz | 54 Mbps | Channel 149 | 5745 MHz ^{(1) (2)}
- 802.11ax (RU996_67) | 80 MHz | MCS0 | Channel 155 | 5775 MHz ⁽²⁾
- 802.11a | 20 MHz | 54 Mbps | Channel 157 | 5785 MHz ⁽¹⁾
- 802.11a | 20 MHz | 54 Mbps | Channel 165 | 5825 MHz ^{(1) (2)}
- 802.11ax (RU52) | 20 MHz | MCS0 | Channel 165 | 5825 MHz ⁽¹⁾

⁽¹⁾ According to customer declaration the unwanted (spurious) radiated emissions measurement was performed on this mode.

⁽²⁾ According to customer declaration this mode was used for Band edge measurements.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

EUT Power Supply:

- The EUT was powered with 24V DC via an external AC/DC power supply

Test Mode Activation:

- The EUT can be connected to the Test laptop via USB supplied by the customer.
- The test modes were activated by the terminal software "Kitty". The commands to setup the respective modes and power were defined by the customer.

Radiated Measurements:

- As per the applicant's declaration &/operational description of the EUT, the EUT is a tabletop equipment for its intended application. Therefore, EUT's test setup placement was performed in accordance with ANSI C63.10 section 6.2.3.2 & section 6.12 Figure 4.
- The worst-case position was declared by the customer.
- Radiated measurements below 30 MHz were performed with the EUT positioned on the turn table and rotating 360 degrees while the loop antenna height was set at 100 cm.
- Radiated measurements above 30 MHz were performed with the EUT positioned on the turn table and rotating 360° while the antenna height varies from 1 to 4 m over the measurement frequency range.
- R&S® EMC32 V11.30 Software was used for the Radiated spurious emission measurements.

Duty Cycle Correction Details:

- As the continuous transmission of the EUT ($D \geq 98\%$) can be achieved and EUT was transmitting continuously at Duty Cycles of 98 % (duty cycle variations are less than $\pm 2\%$ at the respective data rate) for ax-mode HT40 MCS0. Therefore, No Duty Cycle Correction Factors were added to all average measurements.
- As the continuous transmission of the EUT ($D \geq 98\%$) cannot be achieved and EUT was transmitting continuously at Duty Cycles of 91.95 % and 42.07% (duty cycle variations are less than $\pm 2\%$ at the respective data rate) for A-mode HT20 54Mbps and ax-mode HT80 MCS0 respectively. Therefore, Duty Cycle Correction Factor of 0.36 dB and 8.94 dB was added to all average measurements, to compute the corrected average values of the emissions that would have been measured had the test been performed at 100% Duty Cycle.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 6 *Measurement Uncertainty* for details.

In accordance with DAkkS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter Duty Cycle

Test Summary:

Test Engineer:	Muhammad Faiq Khan	Test Date:	21 September 2023 & 28 September 2023
Test Sample Serial Number:	1150003350		
Test Site Identification	SR 1/2		

FCC Reference:	Part 15.35(c)
Test Method Used:	FCC KDB 789033 D02 Section II.B.2.b)

Environmental Conditions:

Temperature (°C):	23.8 to 24.8
Relative Humidity (%):	45.1 to 52.1

Notes:

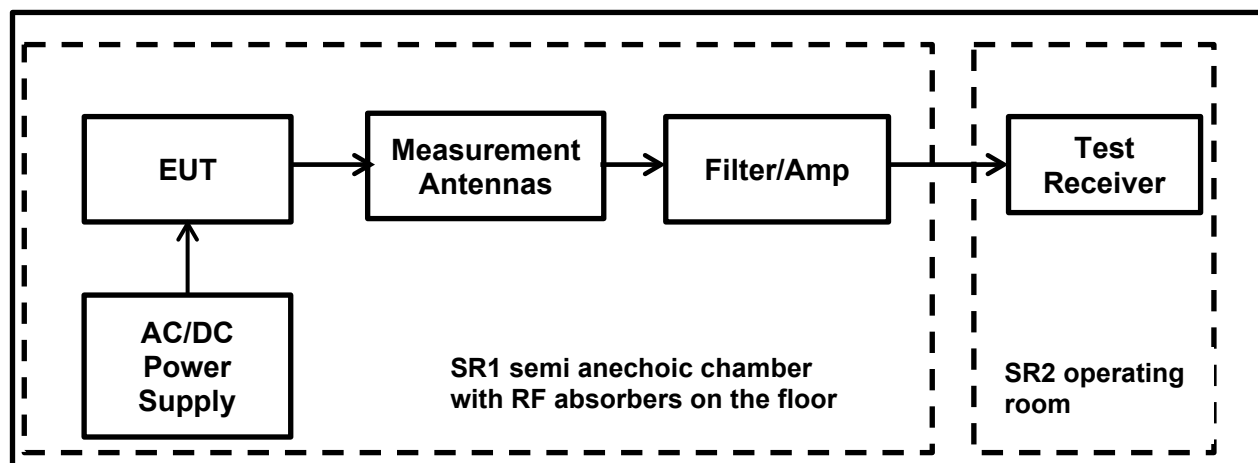
- The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by using the following calculation:

$$\text{Duty Cycle (\%)} = 100 \times [\text{On Time (T}_{\text{ON}})] / [\text{Period(T}_{\text{ON}} + \text{T}_{\text{OFF}}) \text{ or } 100\text{ms whichever is the lesser}]$$

$$\text{Duty Cycle Correction Factor} = 10 \log 1 / [\text{On Time (T}_{\text{ON}})] / [\text{Period(T}_{\text{ON}} + \text{T}_{\text{OFF}}) \text{ or } 100\text{ms whichever is the lesser}]$$

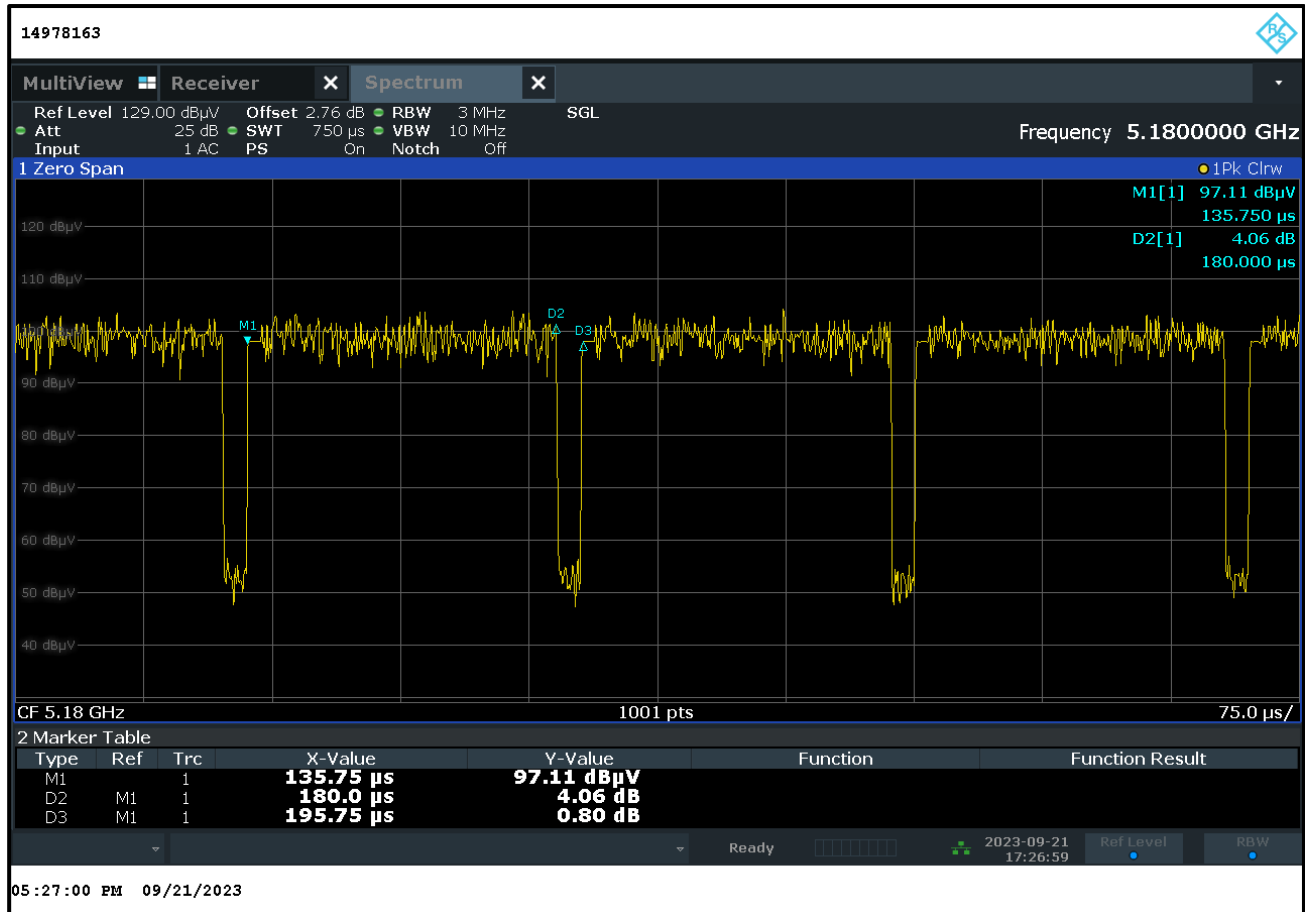
- Duty Cycle Correction Factor for a-mode 54 Mbps: 0.36dB
- Duty Cycle Correction Factor for ax-mode HT80 MCS0: 13.20dB

Test Setup:



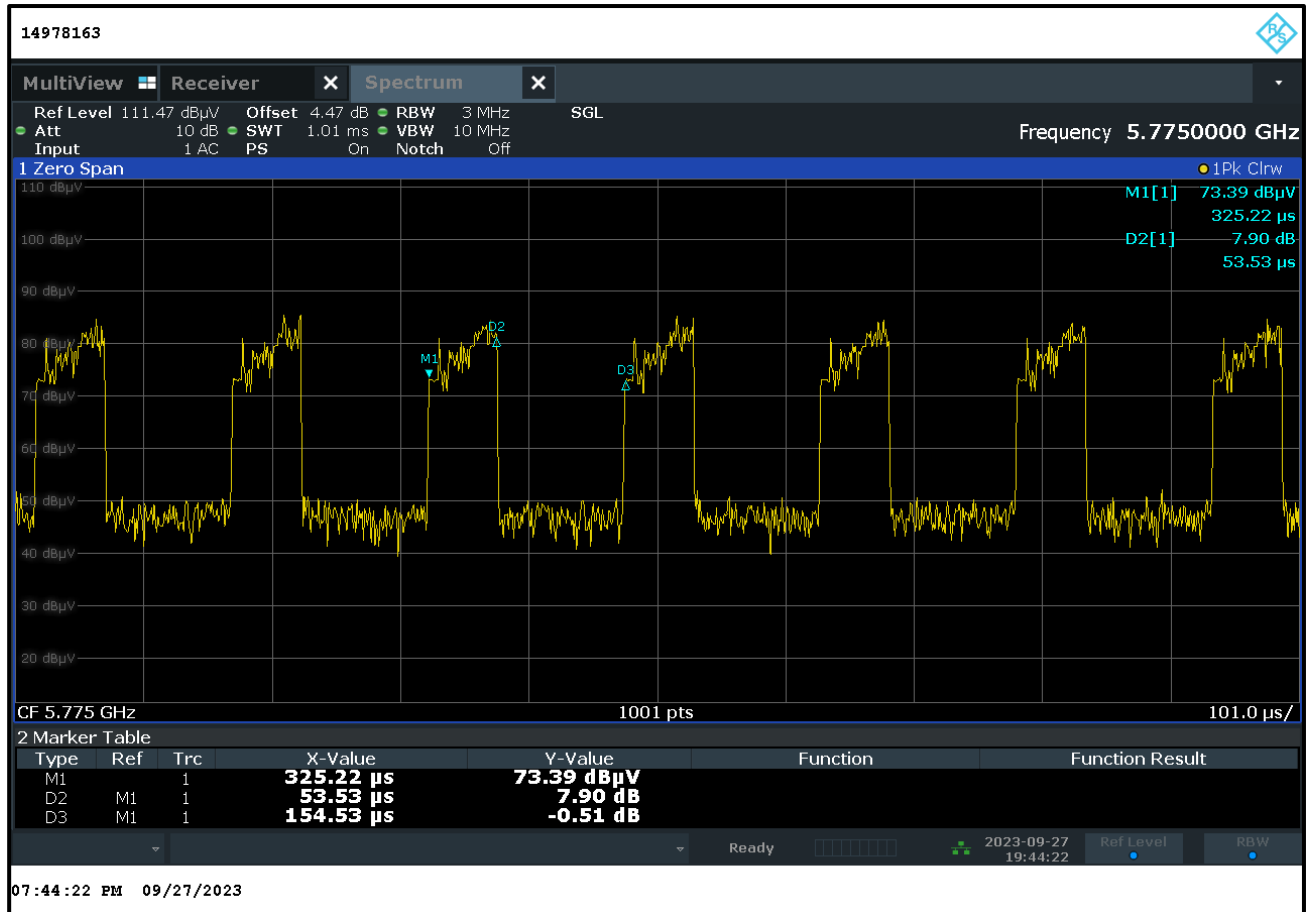
Transmitter Duty Cycle (continued)**Results: AC-DC Power Supply 802.11a / 20 MHz / 54 Mbps**

Pulse On Time (T _{ON}) (ms)	Pulse Period (T _{ON} + T _{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
0.18000	0.19575	91.95	0.36

**Result: Pass**

Transmitter Duty Cycle (continued)**Results: AC-DC Power Supply / 802.11ax / 80 MHz / MCS0**

Pulse On Time (T _{ON}) (ms)	Pulse Period (T _{ON} + T _{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
0.05353	0.15453	34.76	13.20

**Result: Pass**

5.2.2. Transmitter Out of Band Radiated Emissions (5.15-5.850 GHz band operation)**Test Summary:**

Test Engineer:	Abbas Al-Hussainy	Test Date:	26 September 2023
Test Sample Serial Number:	1150003350		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.407(b)(1),(9) & 15.209(a)
Test Method Used:	FCC KDB 789033 II .G.1, II .G.2, II .G.3 & II .G.4. & ANSI C63.10 Sections 6.3 and 6.4
Frequency Range:	9 kHz to 30 MHz

Environmental Conditions:

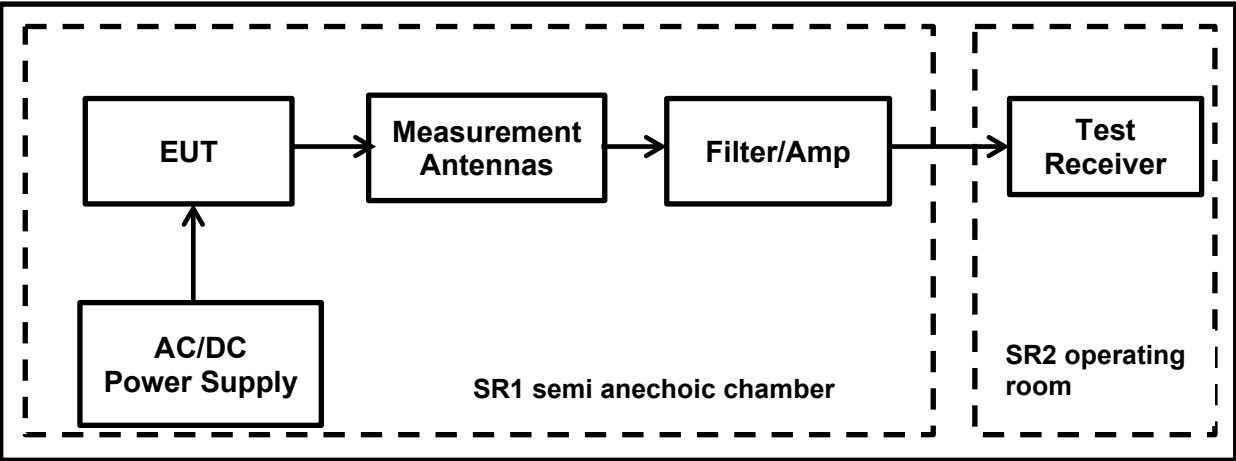
Temperature (°C):	24.5
Relative Humidity (%):	46

Note(s):

- In accordance with FCC KDB 414788 D01 Radiated Test Site & ANSI C63.10 clause 5.2 an alternative test site that can demonstrate equivalence to a open area test site may be used. Therefore, the measurement was performed in a Semi Anechoic Chamber. (The OATS / SAC comparison data is available upon request).
- The limits are specified at a test distances of 30 and 300 metres. However, as specified in FCC Section 15.31 (f)(2) & ANSI C63.10 clause 6.4.3, measurements may be performed at a closer distance and the measured level extrapolated to the specified measurement distance using the method described in clauses 6.4.4, specifically sub-clause 6.4.4.1 which specifies that the measured level shall be extrapolated to the specified distance by conservatively presuming that the field strength decays at 40 dB/decade.
- Therefore the limit values are extrapolated to a measurement distance of 3 m.
 - 9 kHz- 490 kHz: limits extrapolated from 300 m to 3 m by adding 80 dB at 40 dB/decade.
 - 490kHz-1705 kHz: limits extrapolated from 30 m to 3 m by adding 40 dB /decade.
- All emissions shown on the pre-scan plots were investigated and found to be below system noise floor.
- Measurements below 30 MHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) at a distance of 3 m. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. The measurement loop antenna height was 100 cm.
- Pre-scans were performed and markers placed on the highest measured levels. The test receiver was set to:
 - Frequency range: 9 kHz-150kHz : RBW: 300 Hz /VBW: 1 kHz
 - Frequency range: 150 kHz – 30 MHz: RBW: 10 kHz /VBW: 30 kHz
 - Detector: Max-Peak detector
 - Trace Mode: Max Hold

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

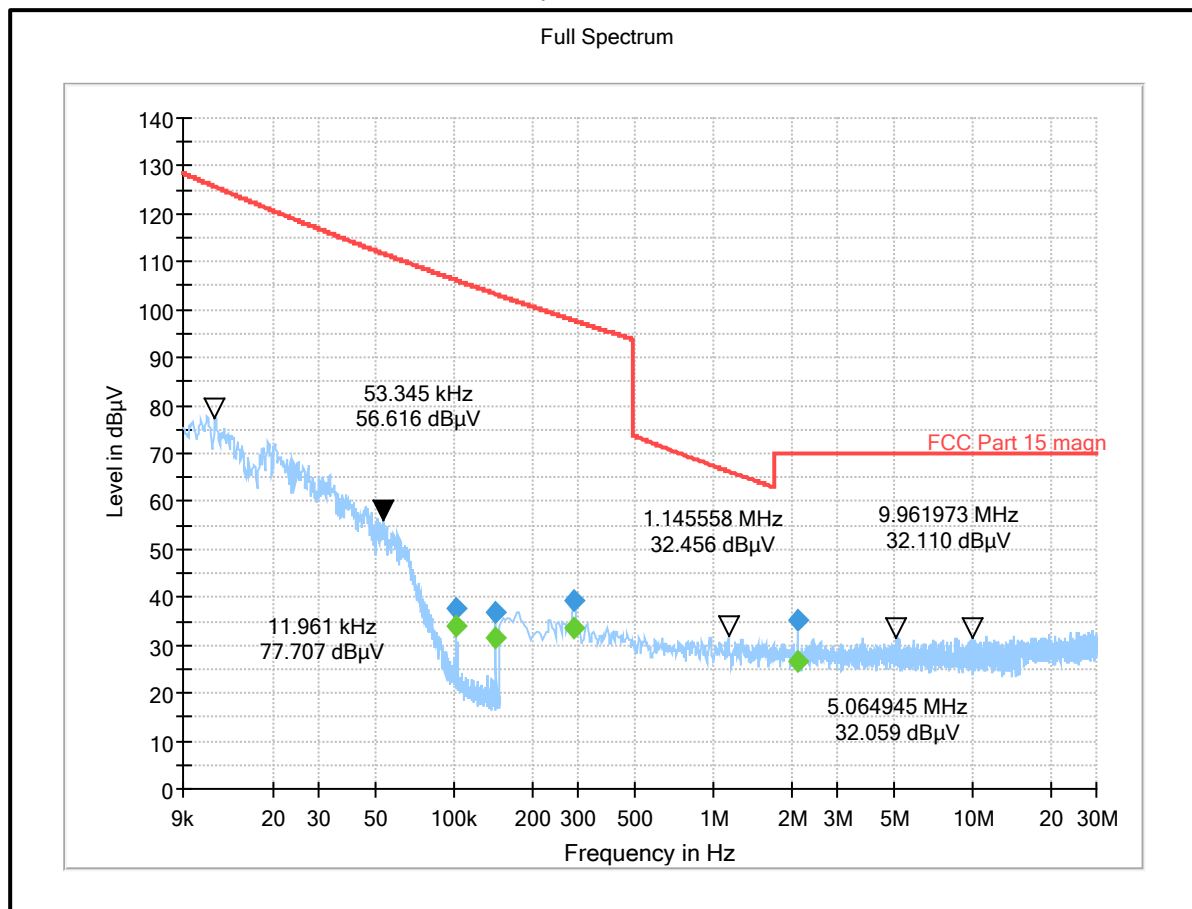
Test Setup:



Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11ax (SU) / 20 MHz / MCS0 / Channel 48**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.101496	90° to EUT	37.58	106.18	68.60	Complied
0.144783	0° to EUT	37.01	103.25	66.24	Complied
0.288915	0° to EUT	39.32	97.78	58.46	Complied
2.108040	90° to EUT	35.04	70.00	34.96	Complied

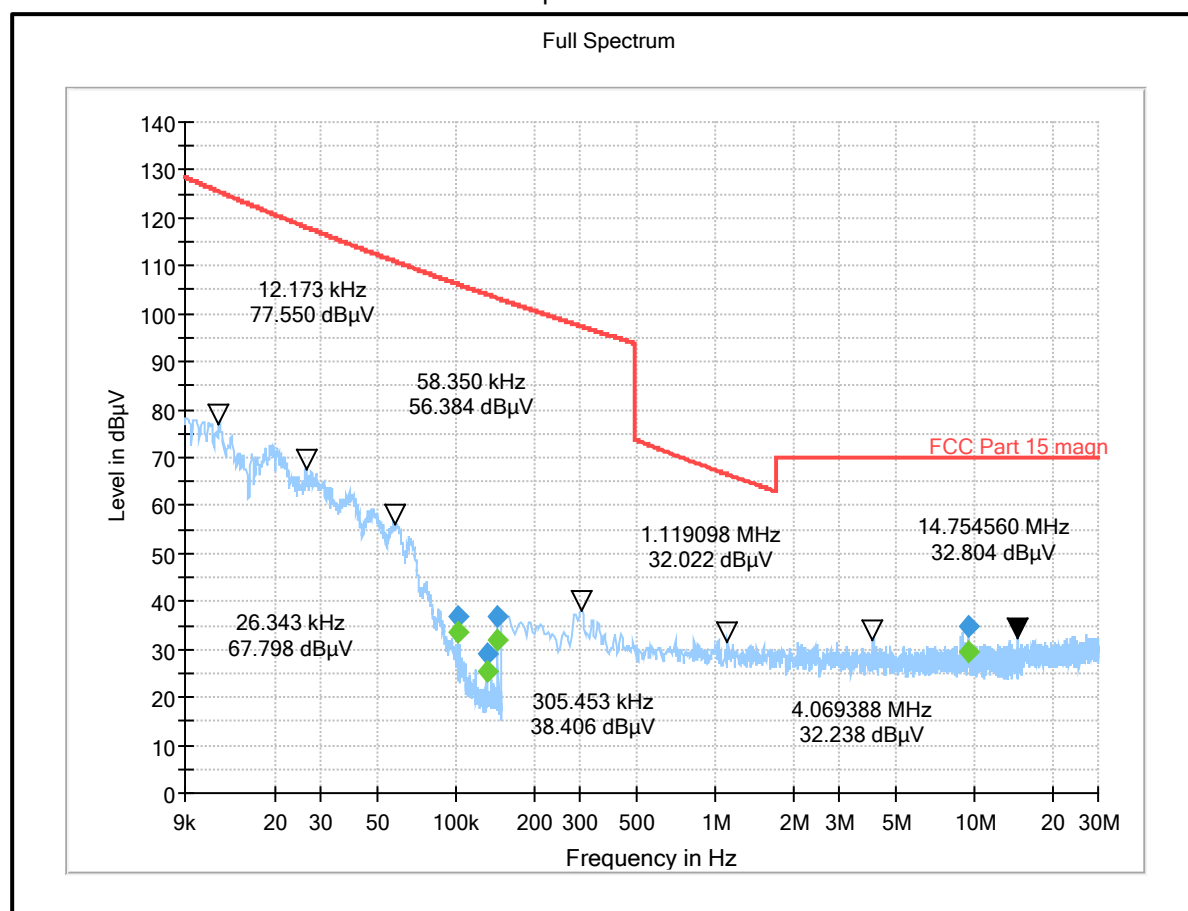
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11ax (RU52-38) / 20 MHz / MCS0 / Channel 60**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.101849	90° to EUT	36.94	106.15	69.21	Complied
0.131106	0° to EUT	29.07	104.06	74.99	Complied
0.144783	0° to EUT	37.03	103.25	66.22	Complied
9.473010	90° to EUT	34.76	70.00	35.24	Complied

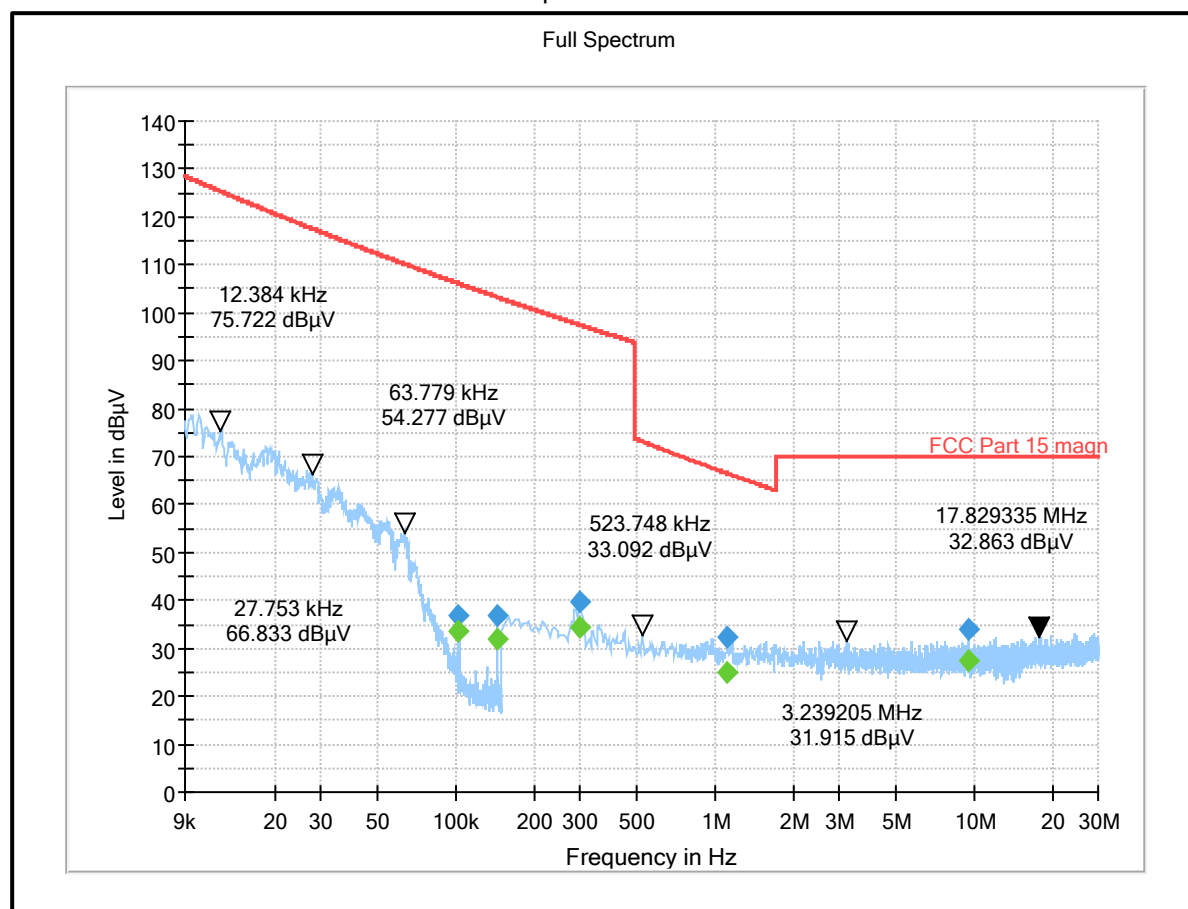
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11ax (RU52-38) / 40 MHz / MCS0 / Channel 134**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.101849	90° to EUT	36.87	106.15	69.28	Complied
0.144783	0° to EUT	36.93	103.25	66.32	Complied
0.302145	0° to EUT	39.54	97.44	57.90	Complied
1.112483	0° to EUT	32.41	66.49	34.08	Complied
9.470503	90° to EUT	33.81	70.00	36.19	Complied

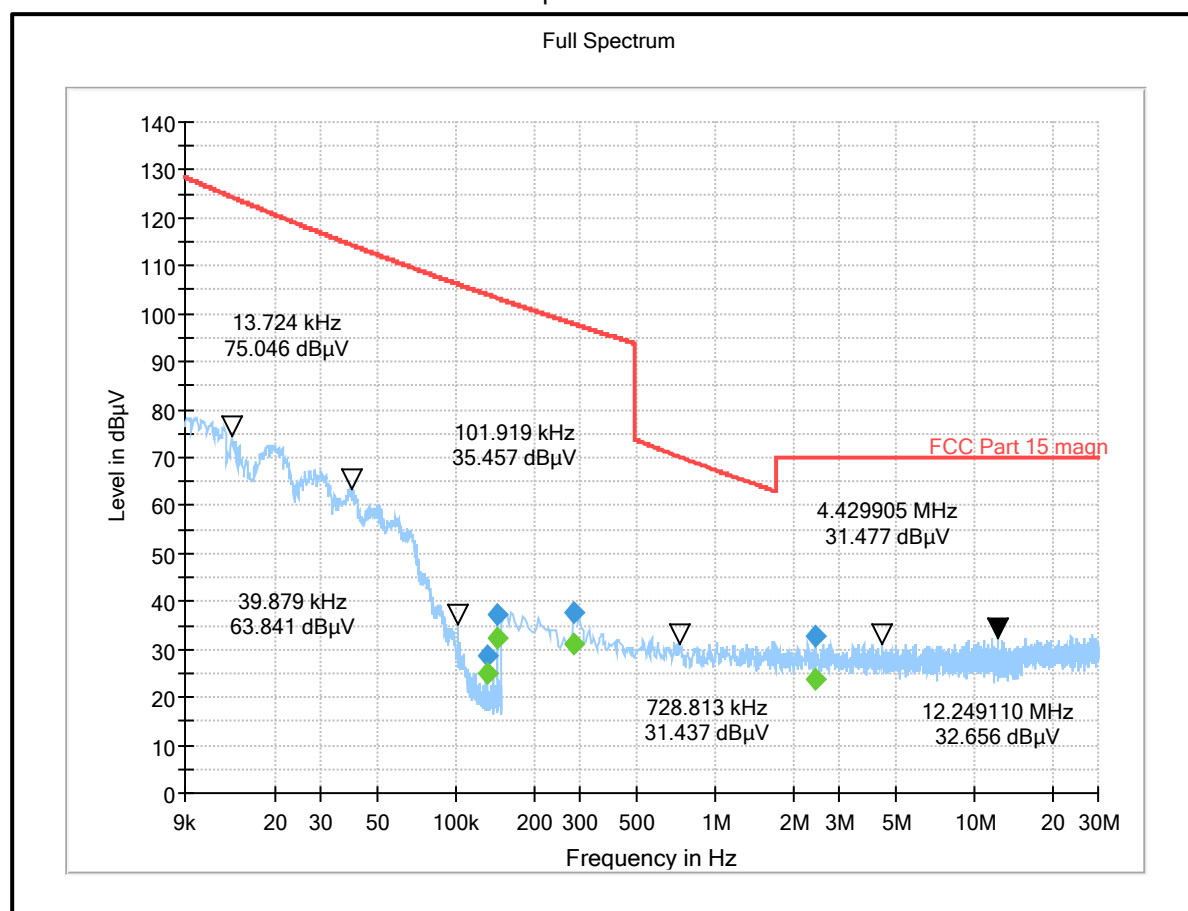
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11ax (RU52-38) / 20 MHz / MCS0 / Channel 165**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.131036	0° to EUT	28.74	104.07	75.33	Complied
0.144783	0° to EUT	37.14	103.25	66.11	Complied
0.285608	0° to EUT	37.86	97.87	60.01	Complied
2.435483	0° to EUT	32.76	70.00	37.24	Complied

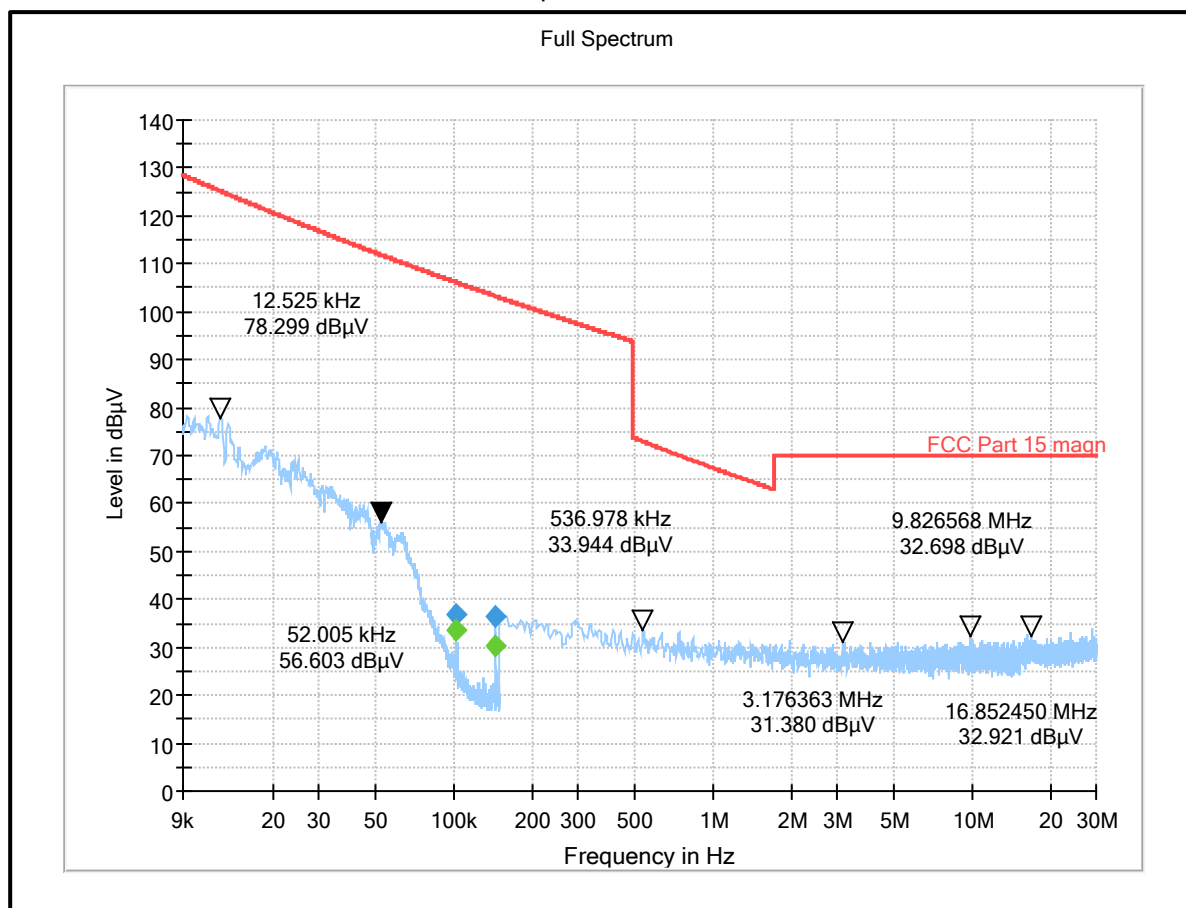
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 36**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.101496	90° to EUT	36.88	106.18	69.30	Complied
0.144854	90° to EUT	36.33	103.25	66.92	Complied

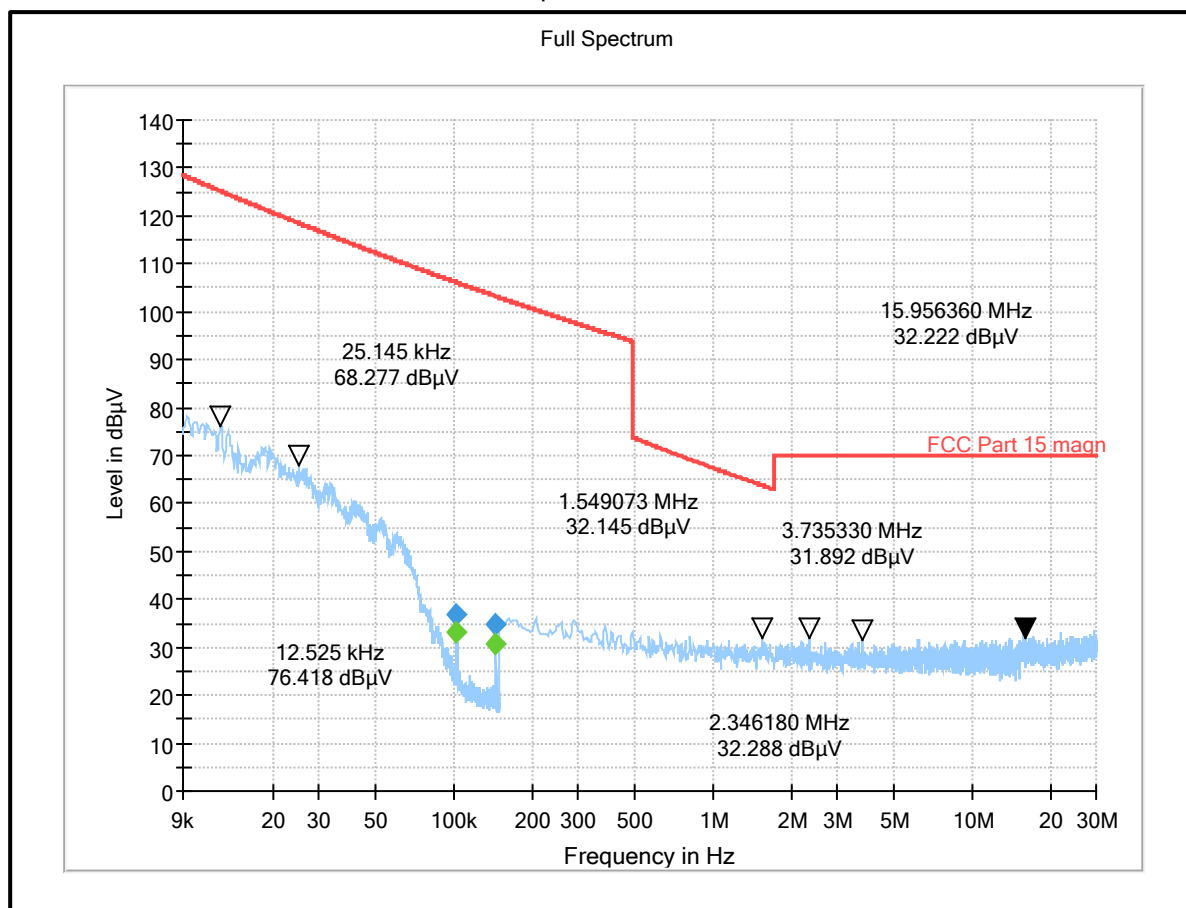
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 40**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.101496	90° to EUT	36.95	106.18	69.23	Complied
0.145206	90° to EUT	34.70	103.23	68.53	Complied

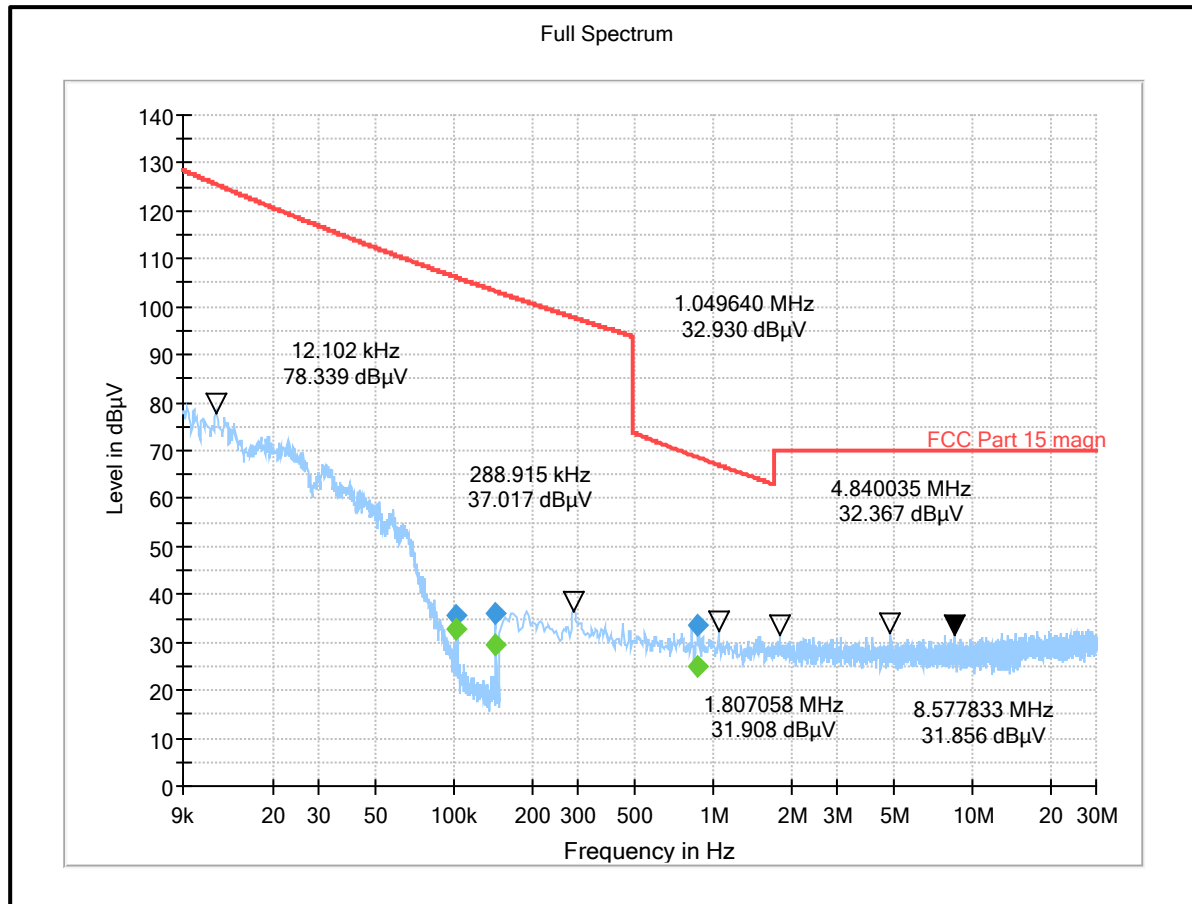
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 48**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.101426	90° to EUT	35.52	106.19	70.67	Complied
0.144854	0° to EUT	36.13	103.25	67.12	Complied
0.871035	90° to EUT	33.66	68.59	34.93	Complied

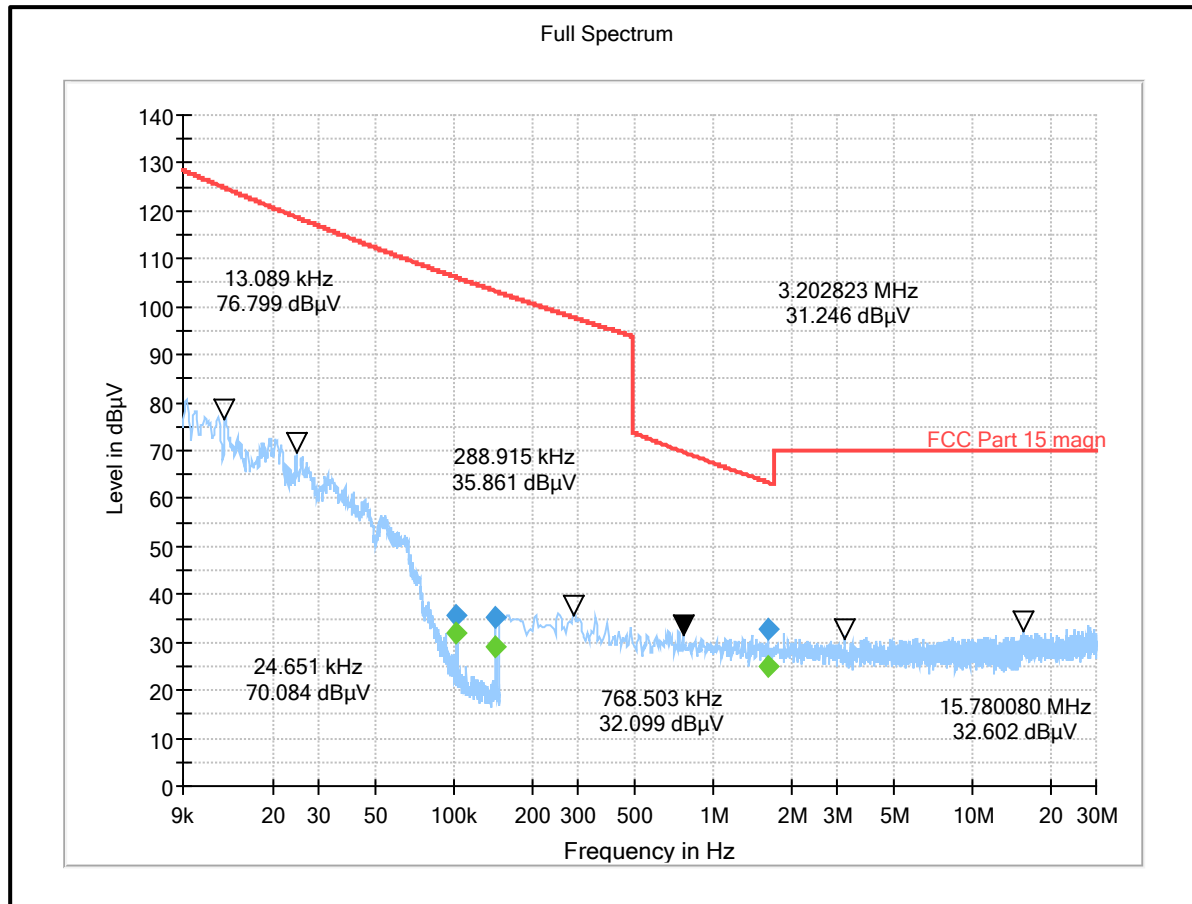
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 52**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.101496	90° to EUT	35.59	106.18	70.59	Complied
0.144854	0° to EUT	35.33	103.25	67.92	Complied
1.625145	90° to EUT	32.89	63.36	30.47	Complied

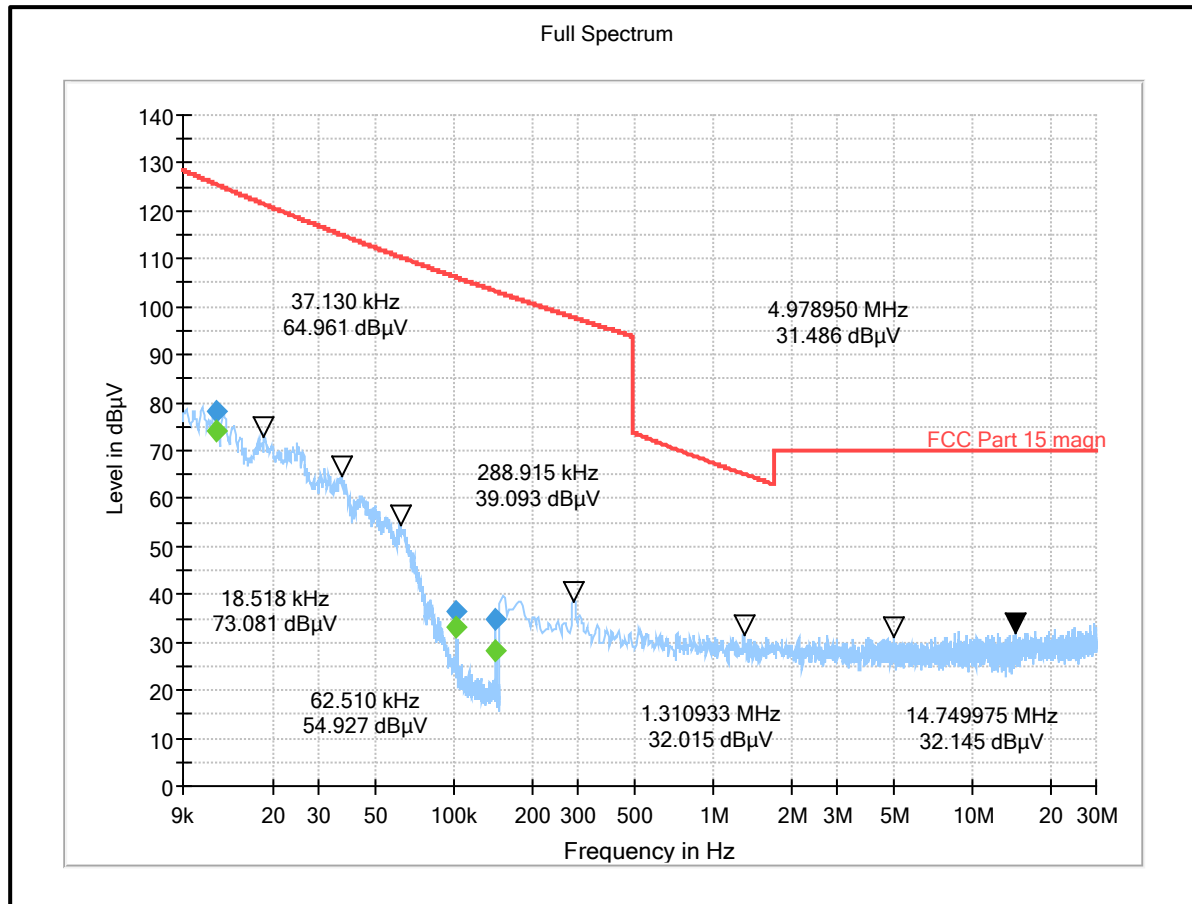
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 60**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.012102	90° to EUT	78.17	125.54	47.37	Complied
0.101426	90° to EUT	36.30	106.19	69.89	Complied
0.144783	0° to EUT	34.75	103.25	68.50	Complied

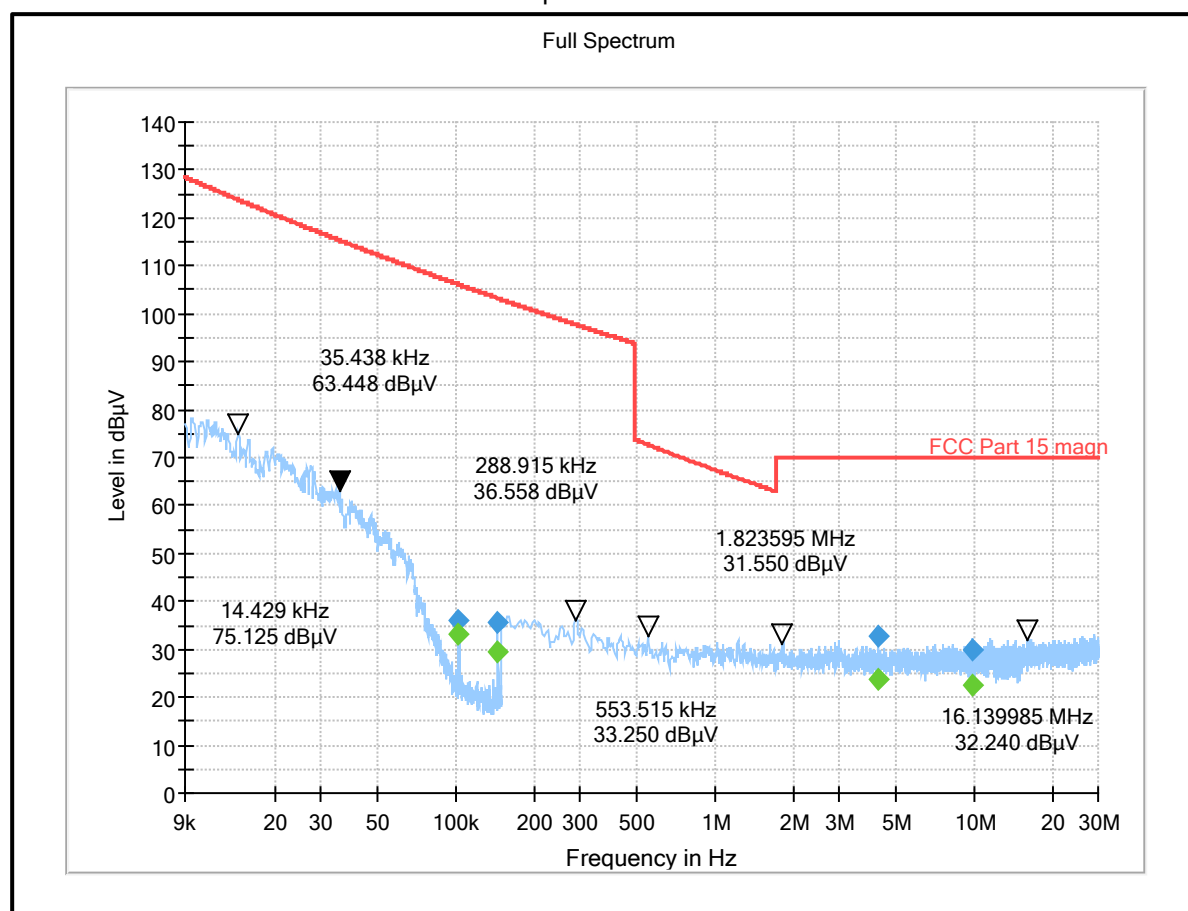
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 64**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.101426	90° to EUT	35.89	106.19	70.30	Complied
0.144854	0° to EUT	35.76	103.25	67.49	Complied
4.241378	90° to EUT	32.73	70.00	37.27	Complied
9.778925	90° to EUT	30.00	70.00	40.00	Complied

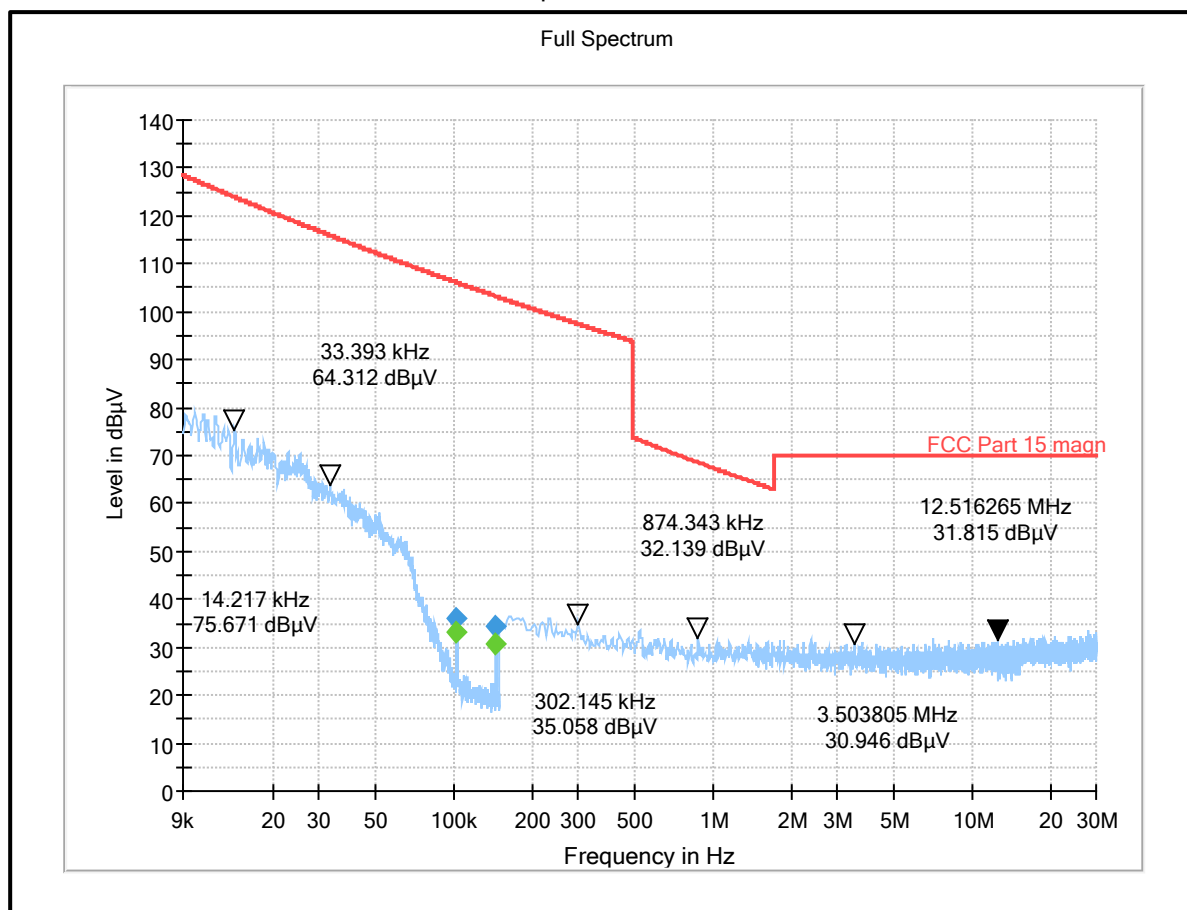
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 100**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.101426	90° to EUT	35.98	106.19	70.21	Complied
0.145347	0° to EUT	34.44	103.22	68.78	Complied

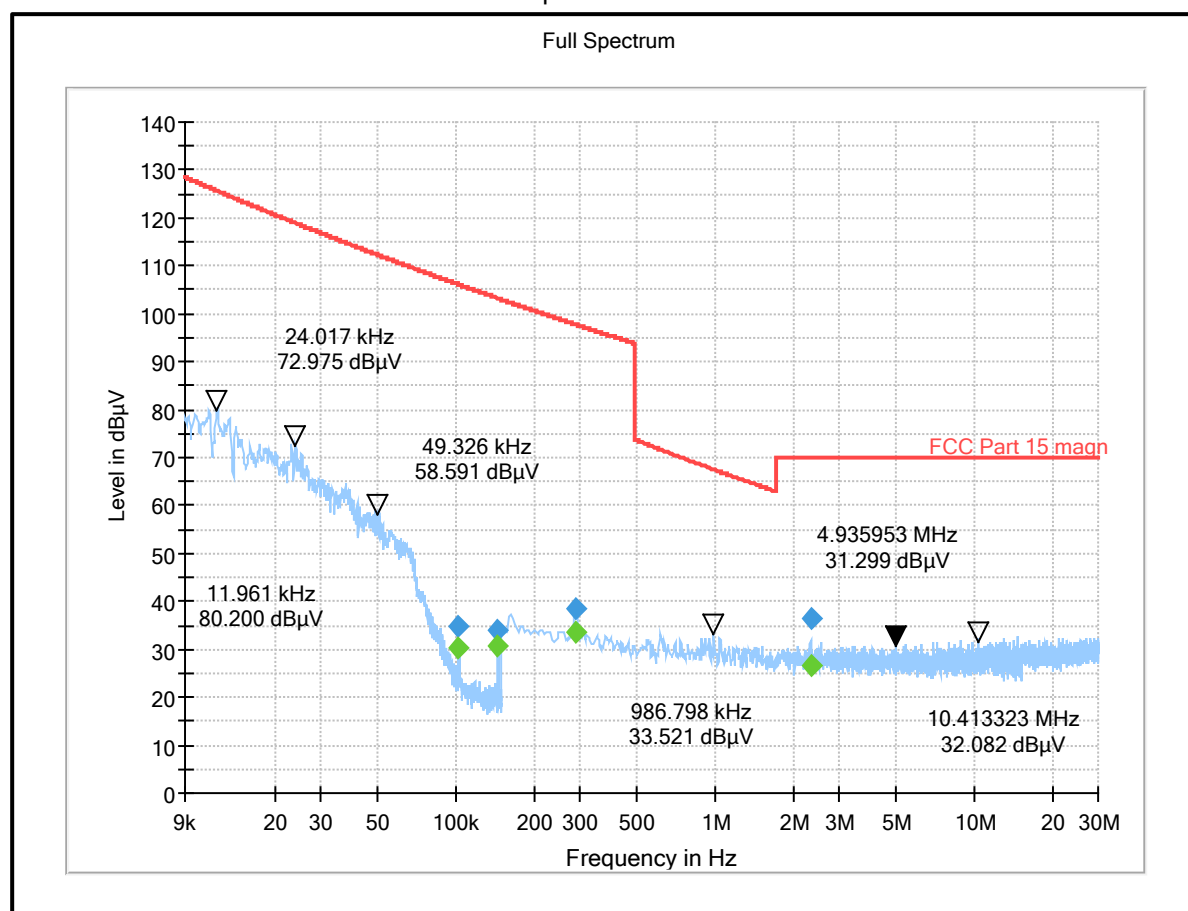
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 116**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.102201	90° to EUT	34.65	106.12	71.47	Complied
0.145347	0° to EUT	33.90	103.22	69.32	Complied
0.288915	0° to EUT	38.58	97.78	59.20	Complied
2.329643	90° to EUT	36.45	70.00	33.55	Complied

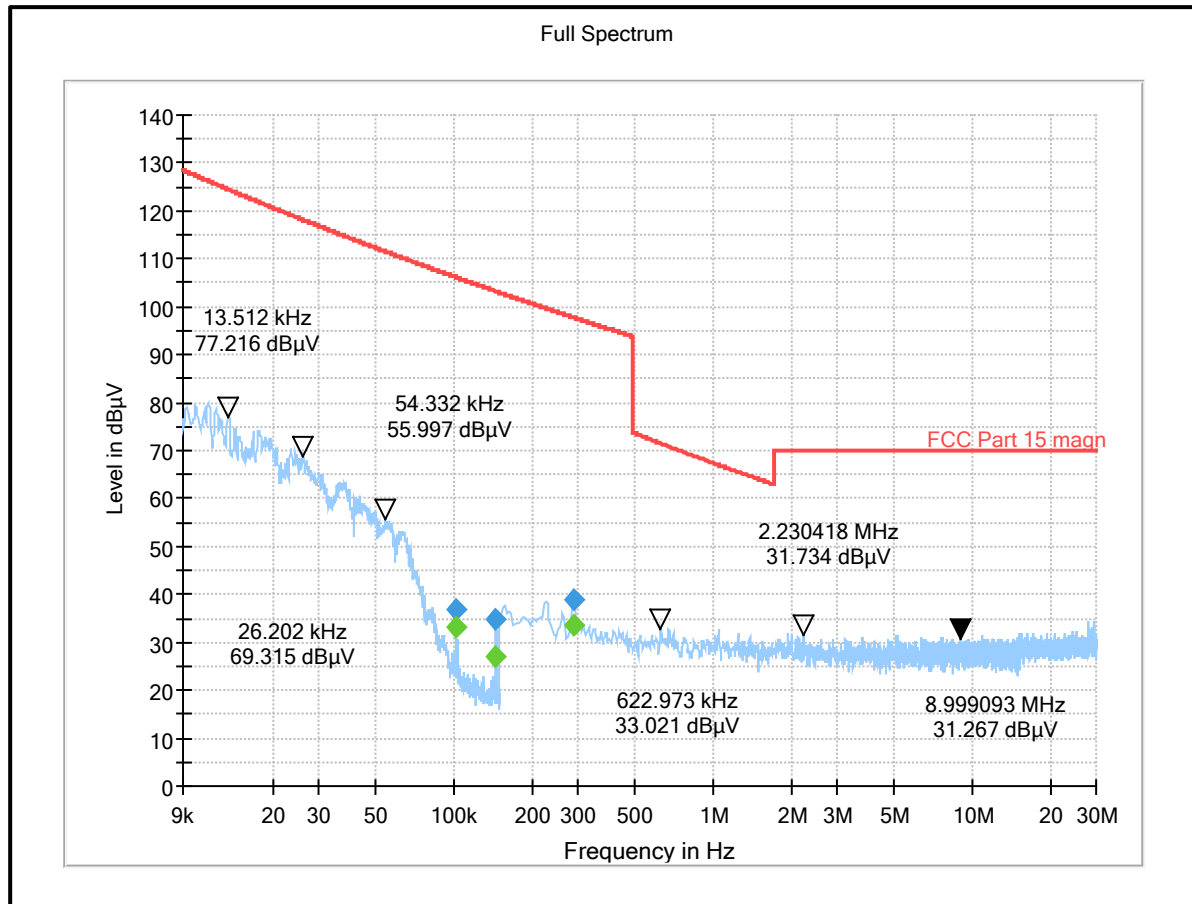
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 140**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.102131	90° to EUT	36.77	106.13	69.36	Complied
0.144854	0° to EUT	34.70	103.25	68.55	Complied
0.288915	90° to EUT	38.96	97.78	58.82	Complied

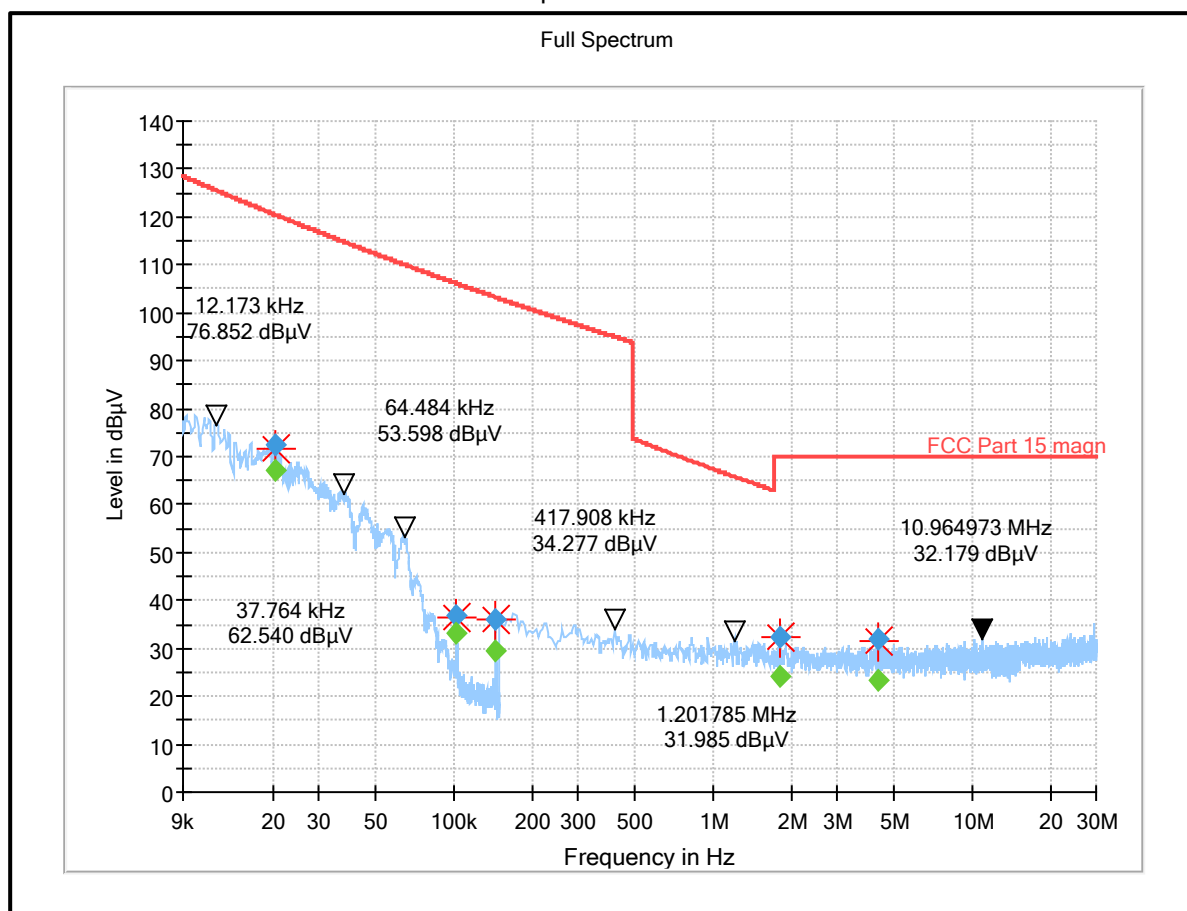
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 149**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.020351	90° to EUT	72.57	120.50	47.93	Complied
0.102131	90° to EUT	36.88	106.13	69.25	Complied
0.144854	0° to EUT	36.04	103.25	67.21	Complied
1.797.135	90° to EUT	32.39	70.00	37.61	Complied
4.363.755	90° to EUT	32.05	70.00	37.95	Complied

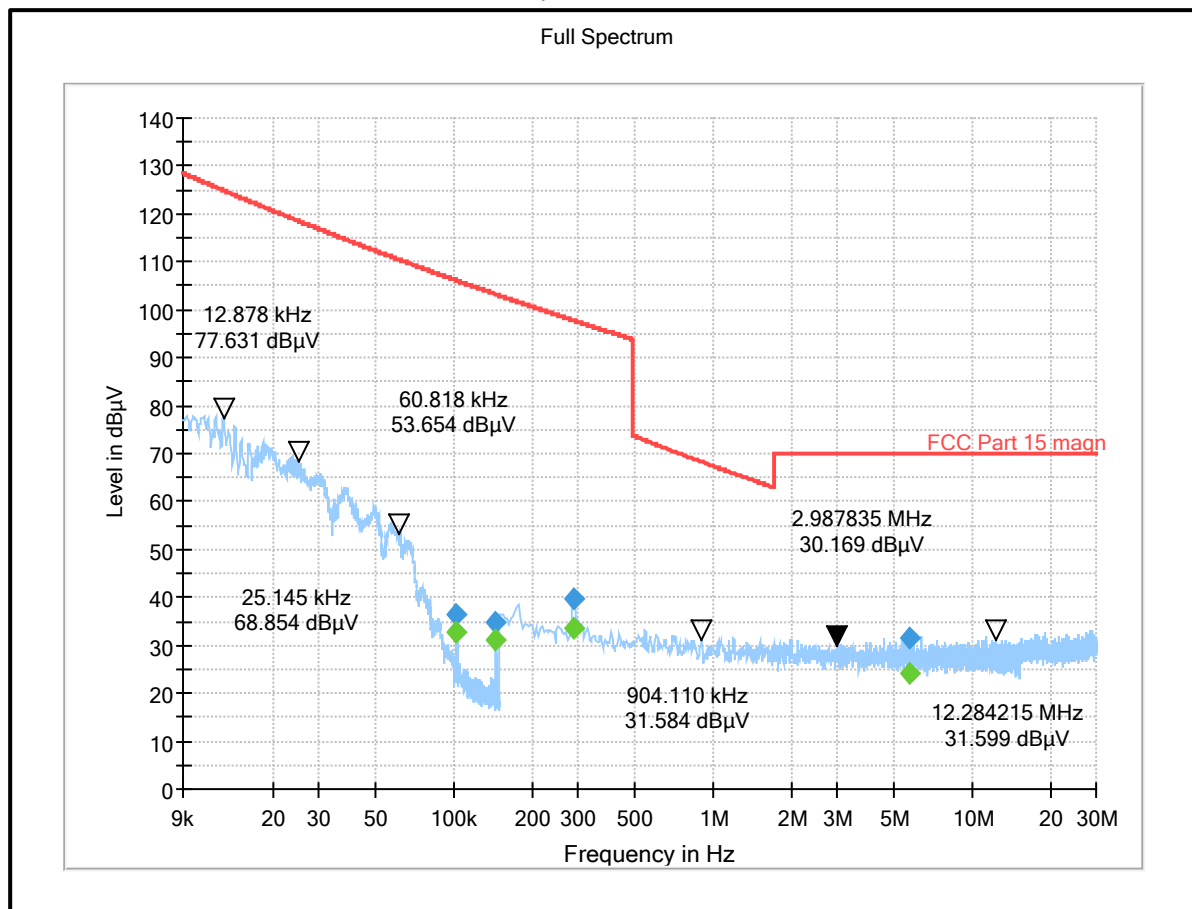
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 157**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.102060	90° to EUT	36.35	106.13	69.78	Complied
0.145065	0° to EUT	34.94	103.24	68.30	Complied
0.288915	0° to EUT	39.60	97.78	58.18	Complied
5.723.138	0° to EUT	31.58	70.00	38.42	Complied

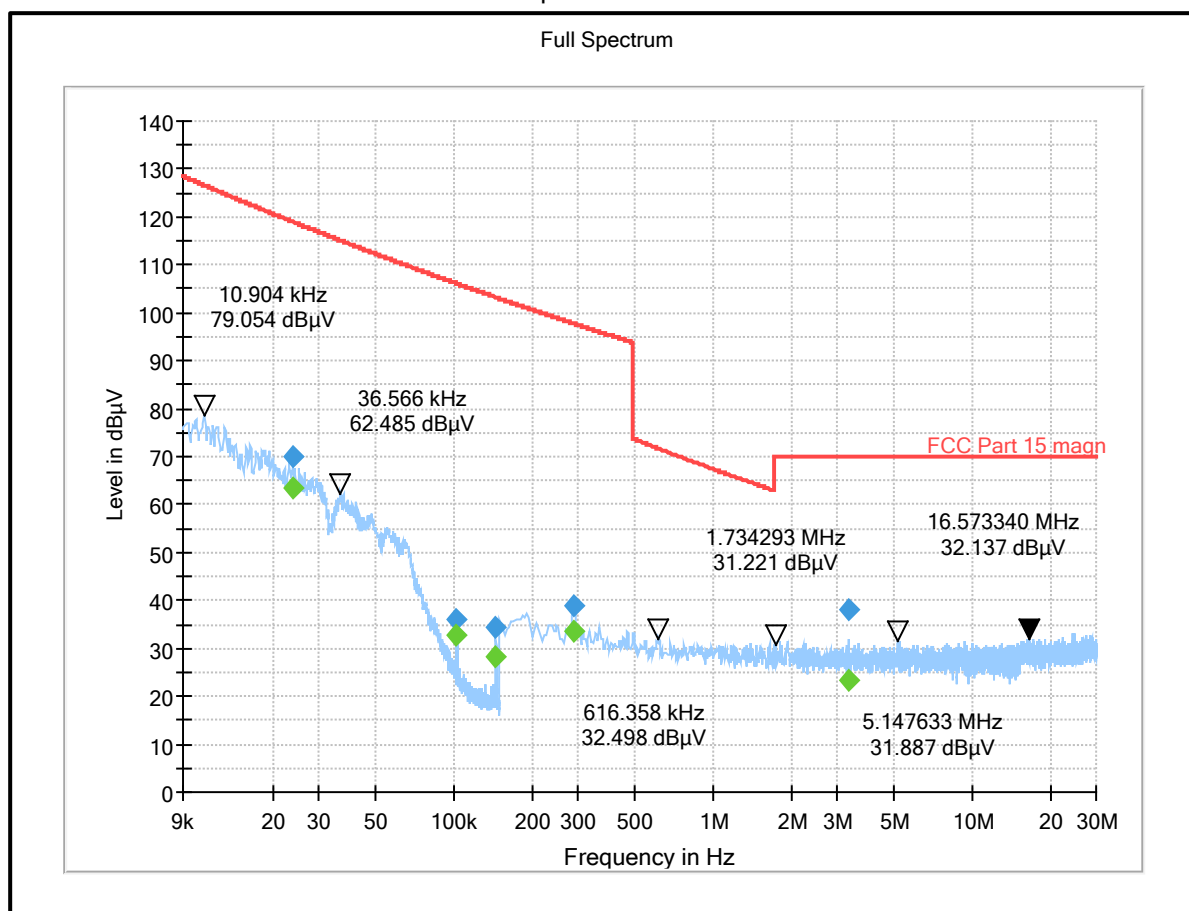
Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 165**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.023876	90° to EUT	69.91	119.00	49.09	Complied
0.102131	90° to EUT	36.05	106.13	70.08	Complied
0.144924	0° to EUT	34.36	103.24	68.88	Complied
0.288915	0° to EUT	39.01	97.78	58.77	Complied
3.315.278	90° to EUT	37.94	70.00	32.06	Complied

Plot: Radiated Transmitter spurious emission from 9 kHz – 30 MHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Test Summary:**

Test Engineer:	Abbas Al-Hussainy	Test Date:	22, 27 & 28 September 2023
Test Sample Serial Number:	1150003350		
Test Site Identification	SR 1/2		

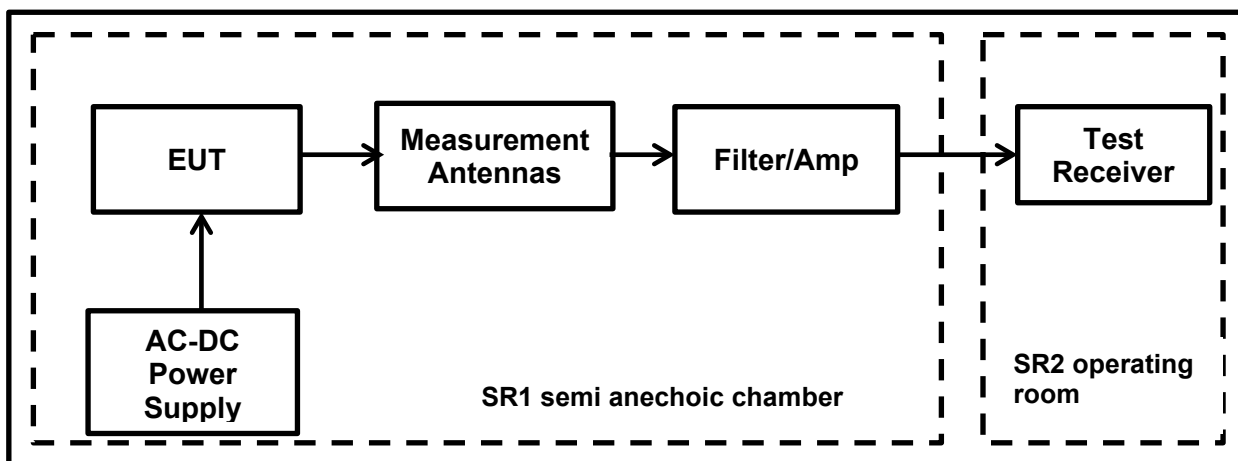
FCC Reference:	Parts 15.407(b)(1),(9) & 15.209(a)
Test Method Used:	FCC KDB 789033 II .G.1, II .G.2, II .G.3 & II .G.4 & ANSI C63.10 Sections 6.3 and 6.5
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	23.2 to 24.7
Relative Humidity (%):	45.2 to 51

Note(s):

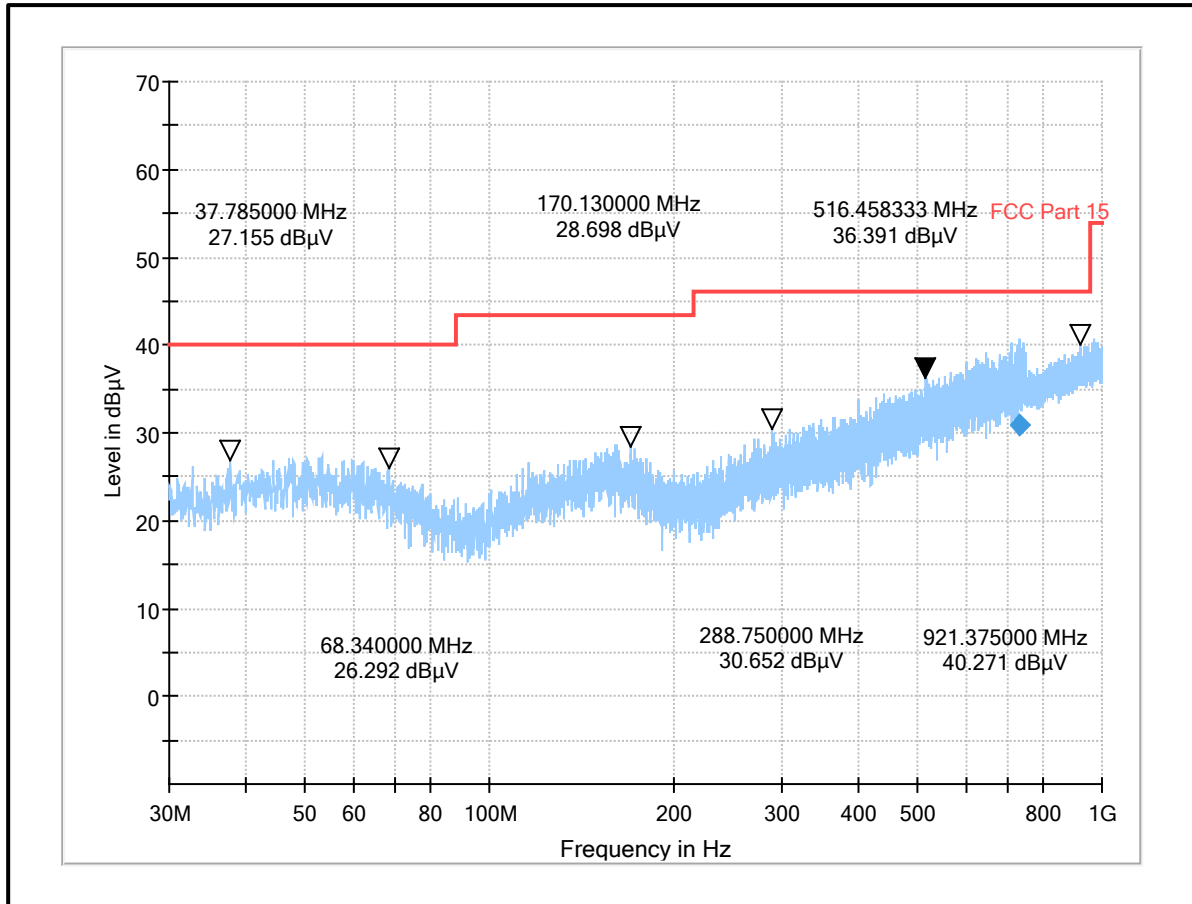
1. Measurements below 1 GHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) at a distance of 3 m. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 m to 4 m.
2. Pre-scans were performed and markers placed on the highest measured levels. The test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.
3. All emissions shown on the pre-scan plots were investigated and found to be below system noise floor.

Test Setup:

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11ax (SU) / 20 MHz / MCS0 / Channel 48**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
733.750000	Vertical	30.91	46.00	15.09	Complied

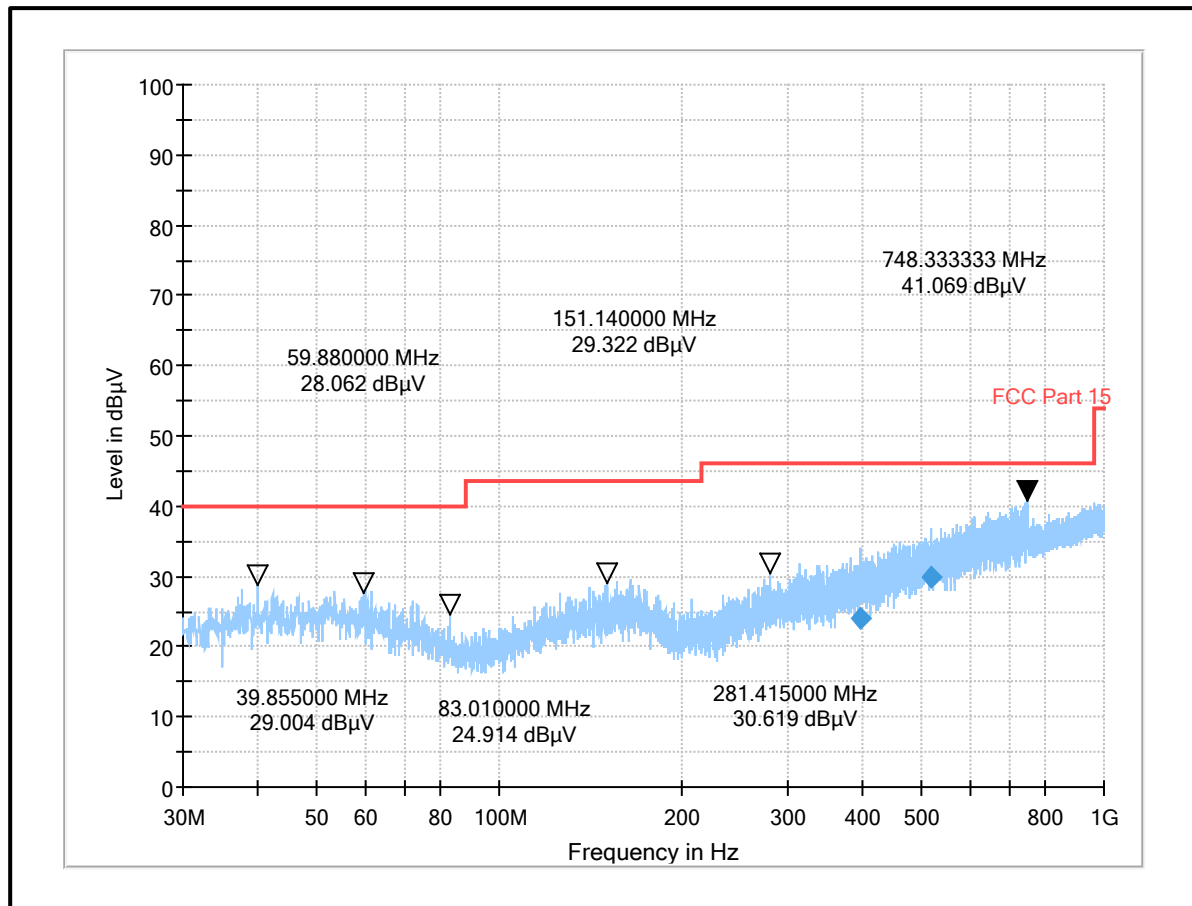
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11ax (RU52-38) / 20 MHz / MCS0 / Channel 60**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
394.333333	Horizontal	24.05	46.00	21.95	Complied
516.166667	Horizontal	29.97	46.00	16.03	Complied

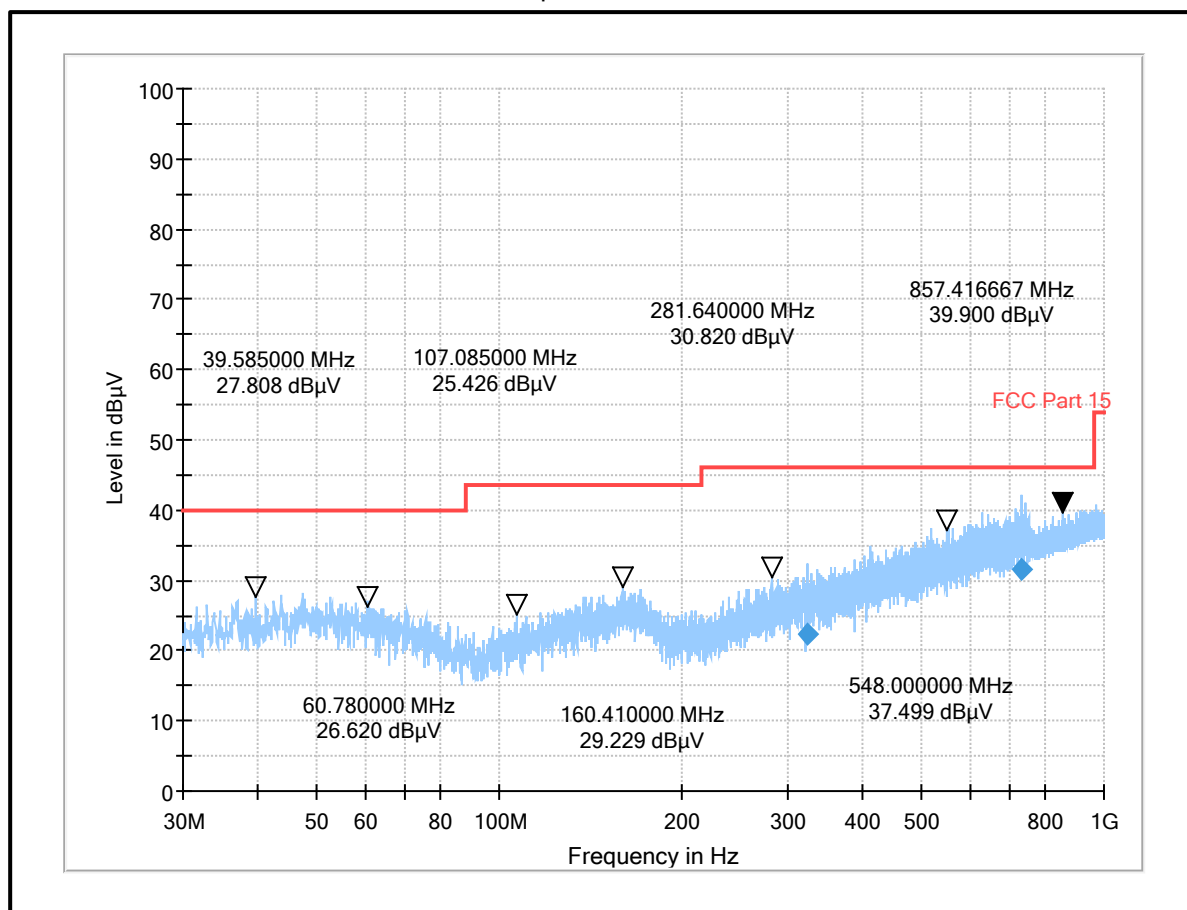
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11ax (RU52-38) / 40 MHz / MCS0 / Channel 134**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
322.666667	Vertical	22.37	46.00	23.63	Complied
730.708333	Horizontal	31.62	46.00	14.38	Complied

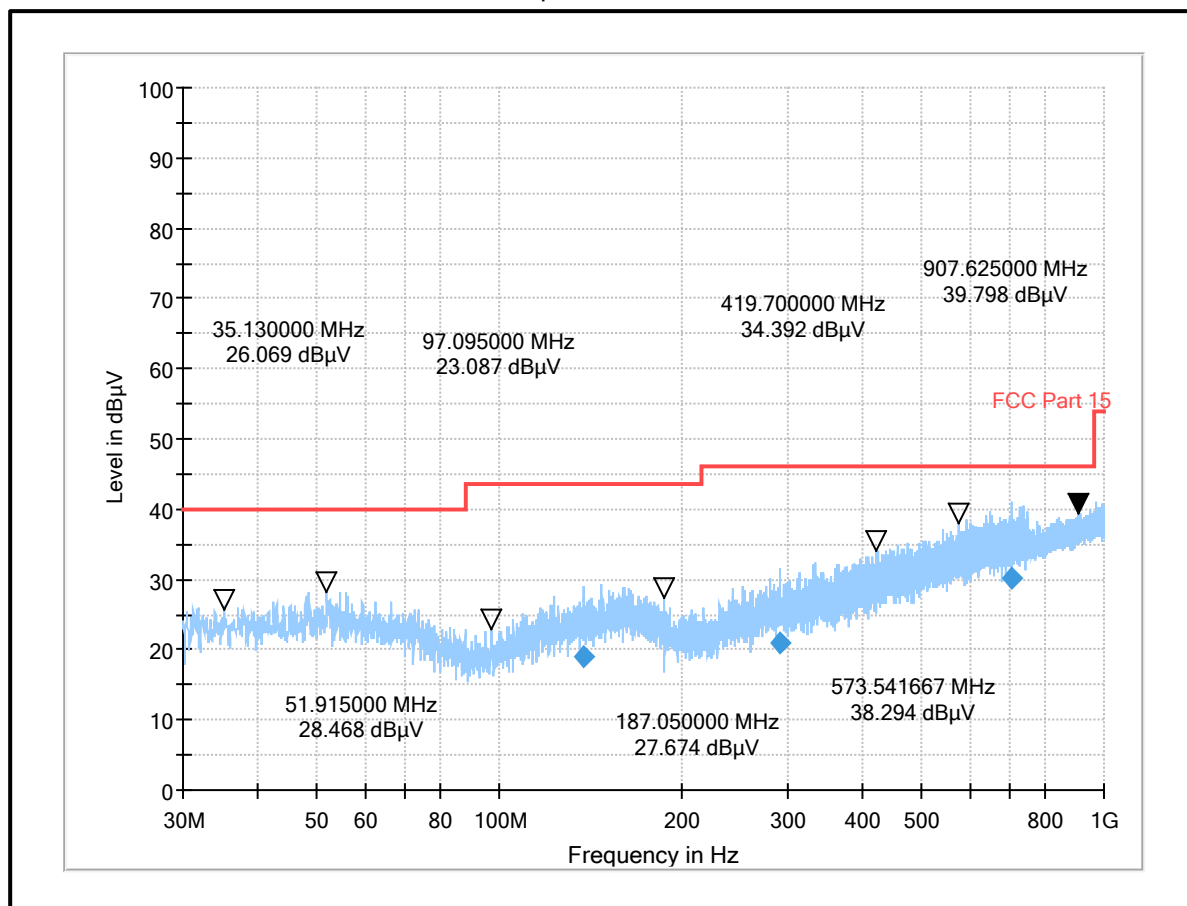
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11ax (RU52-38) / 20 MHz / MCS0 / Channel 165**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
137.640000	Horizontal	18.89	43.50	24.61	Complied
290.460000	Vertical	20.85	46.00	25.15	Complied
703.125000	Vertical	30.14	46.00	15.86	Complied

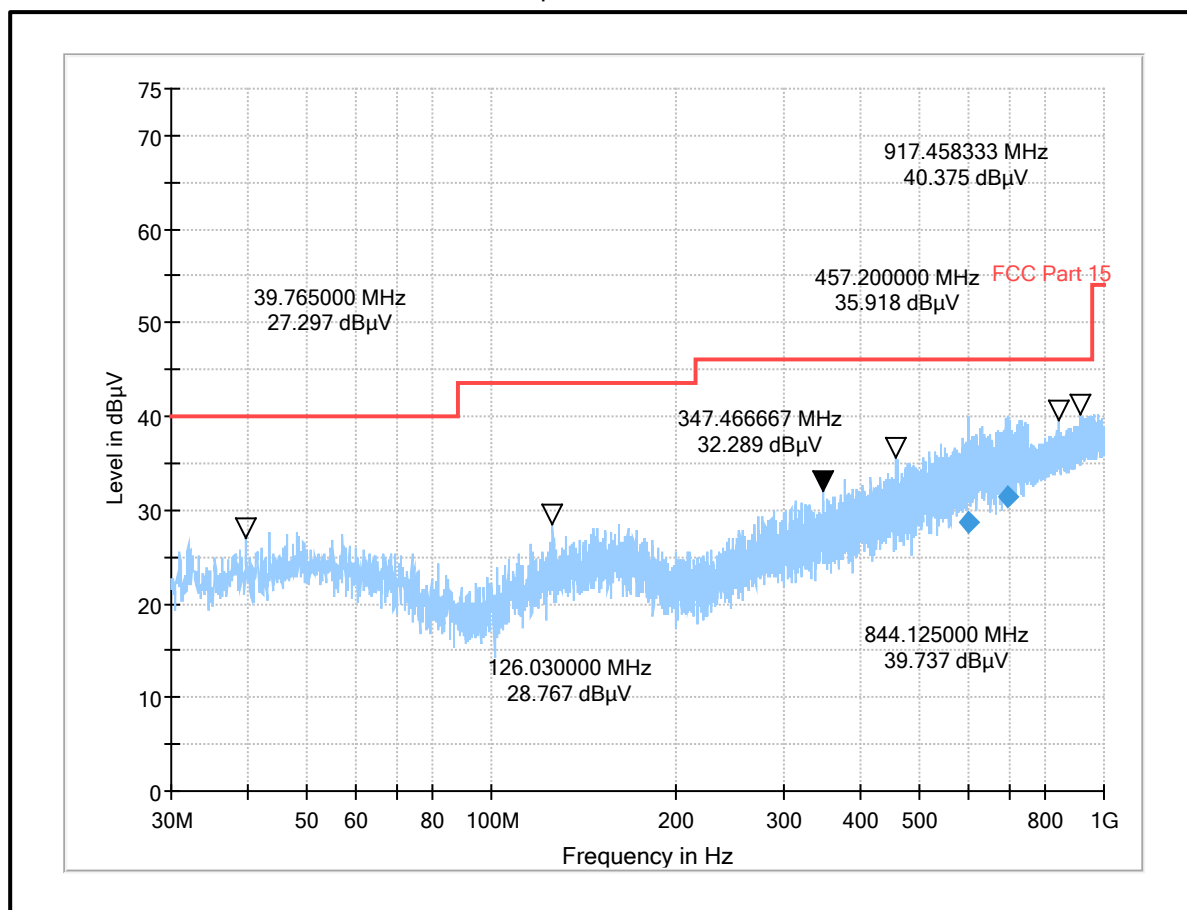
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 36**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
600.333333	Horizontal	28.71	46.00	17.29	Complied
694.125000	Vertical	31.34	46.00	14.66	Complied

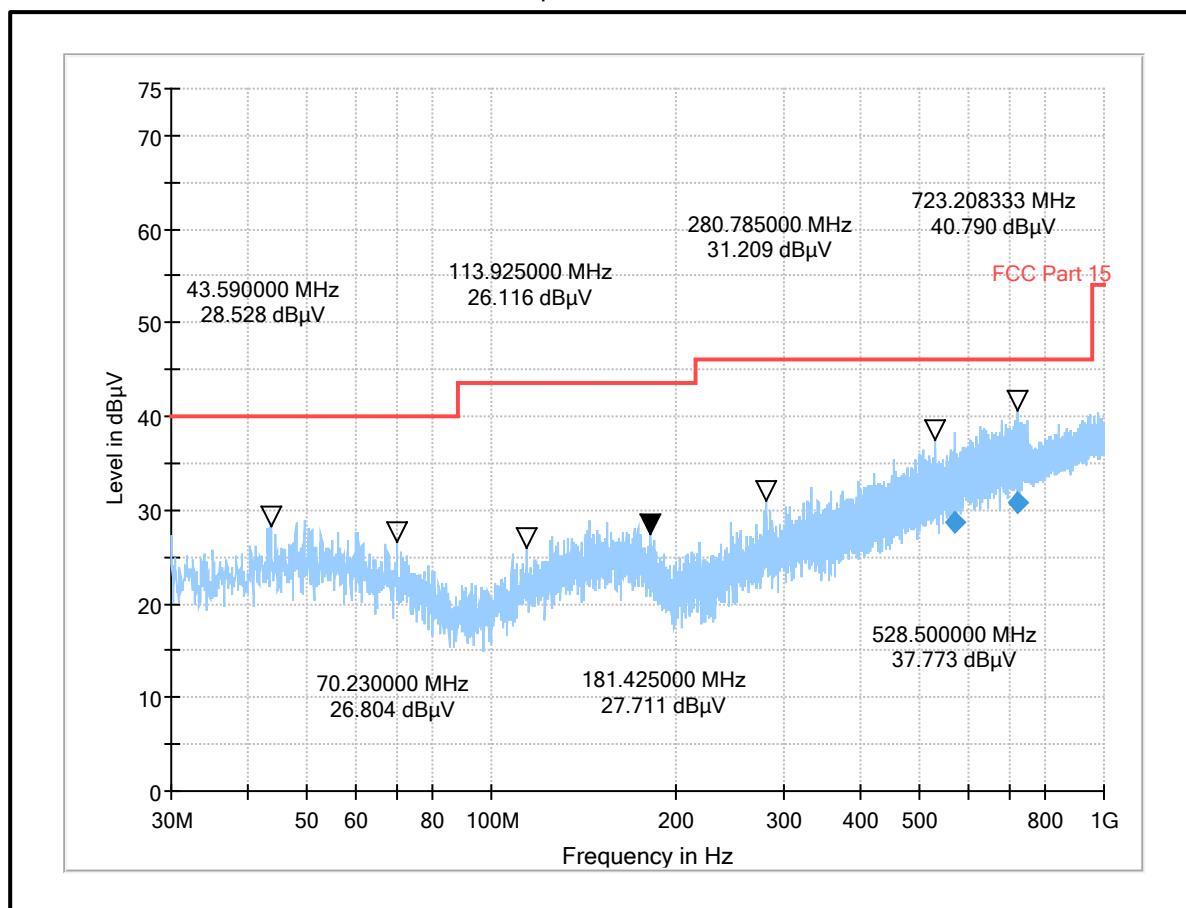
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 40**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
570.625000	Horizontal	28.61	46.00	17.39	Complied
723.208333	Vertical	30.71	46.00	15.29	Complied

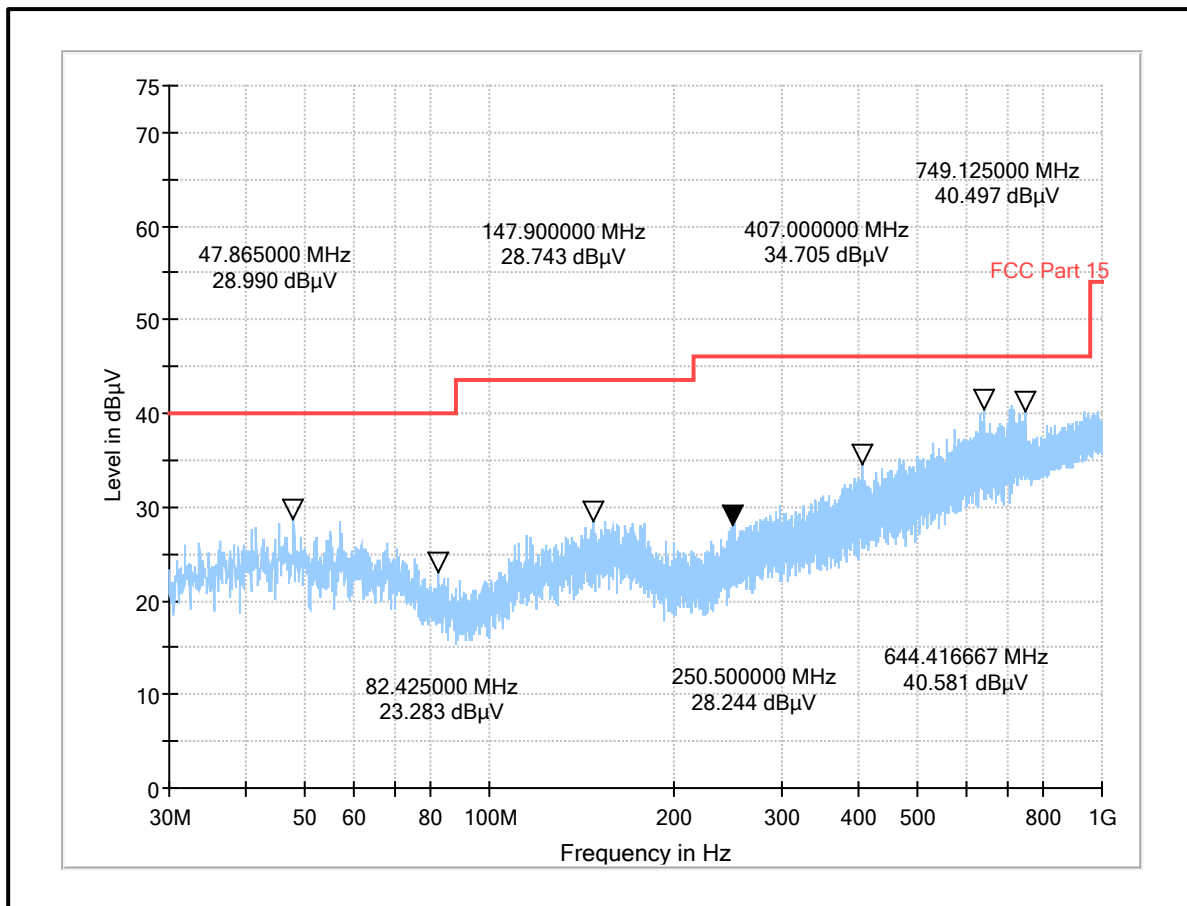
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 48**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
No critical emissions were detected					

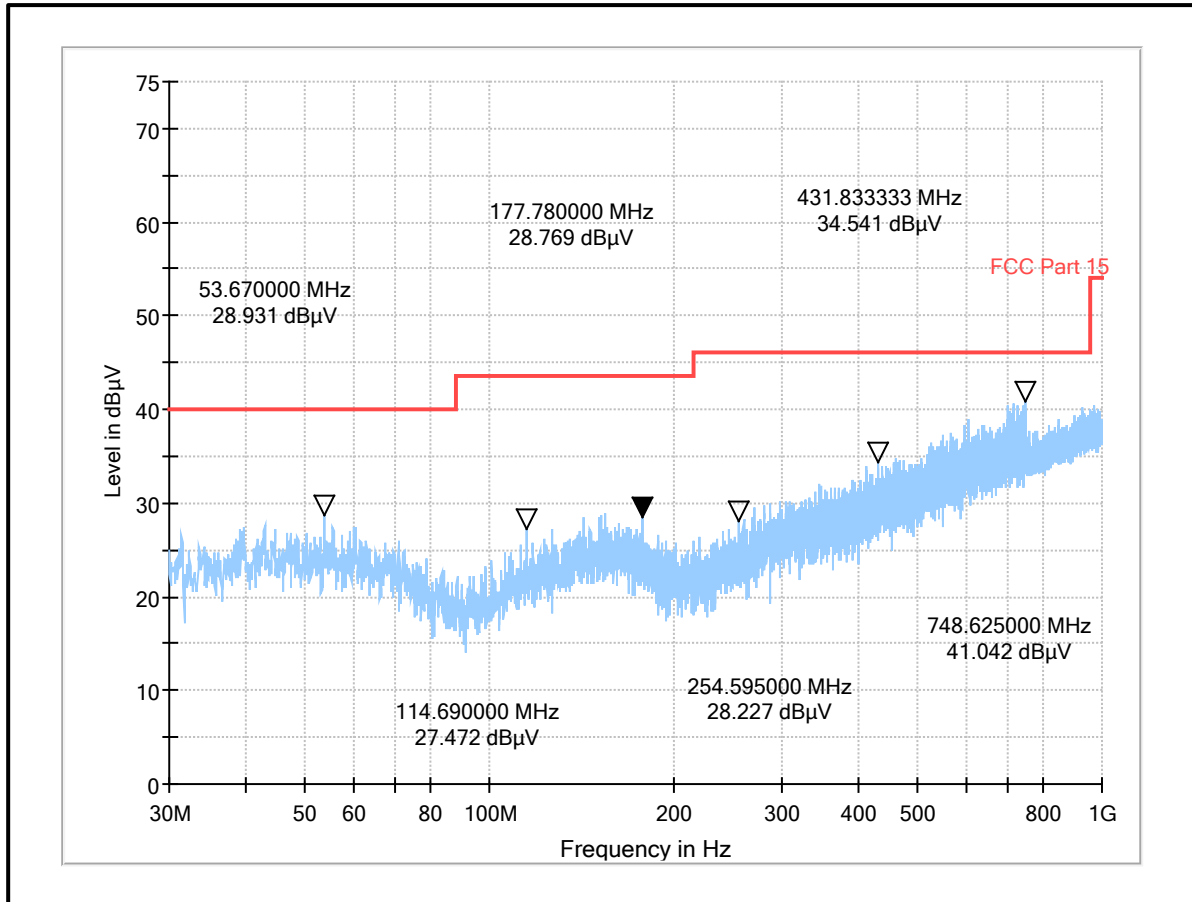
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 52**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
No critical emissions were detected					

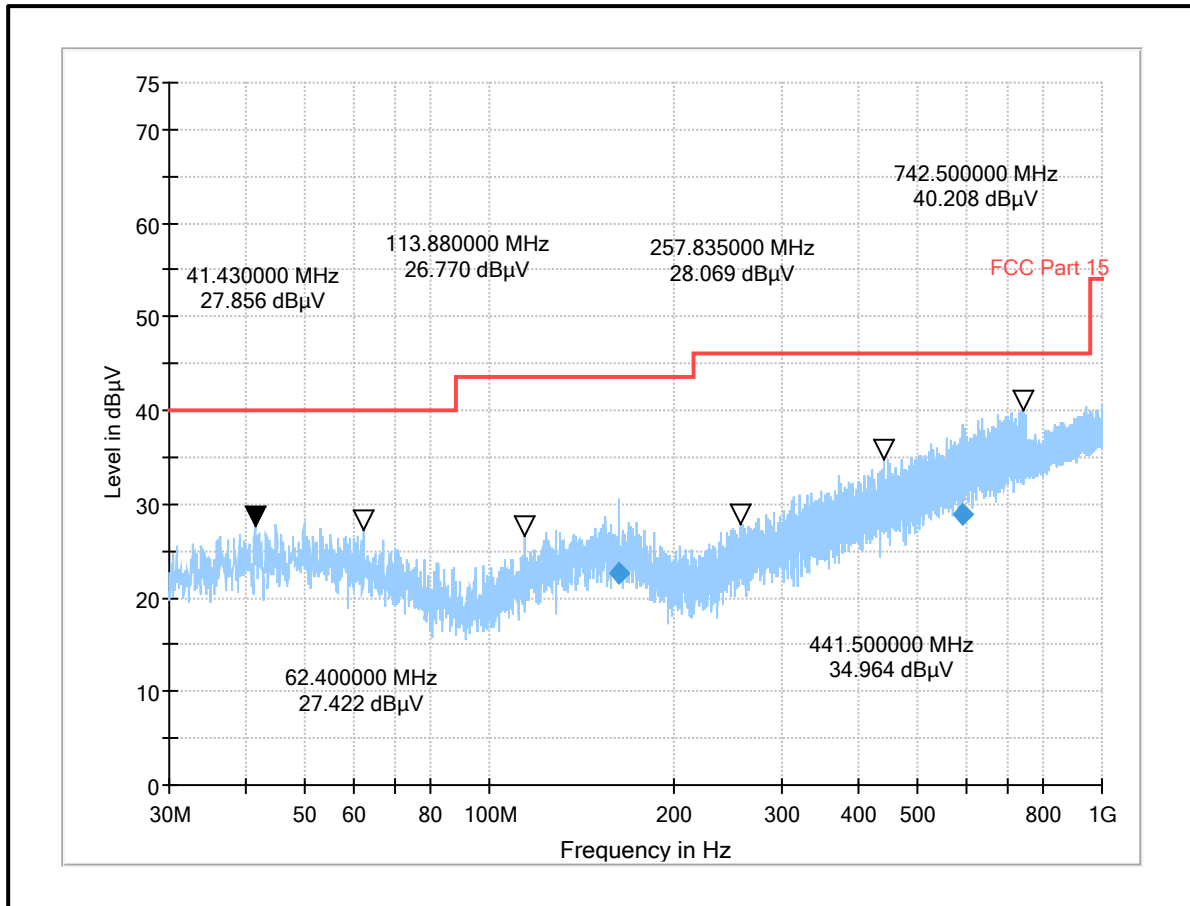
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 60**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
163.110000	Vertical	22.60	43.50	20.90	Complied
592.291667	Horizontal	28.97	46.00	17.03	Complied

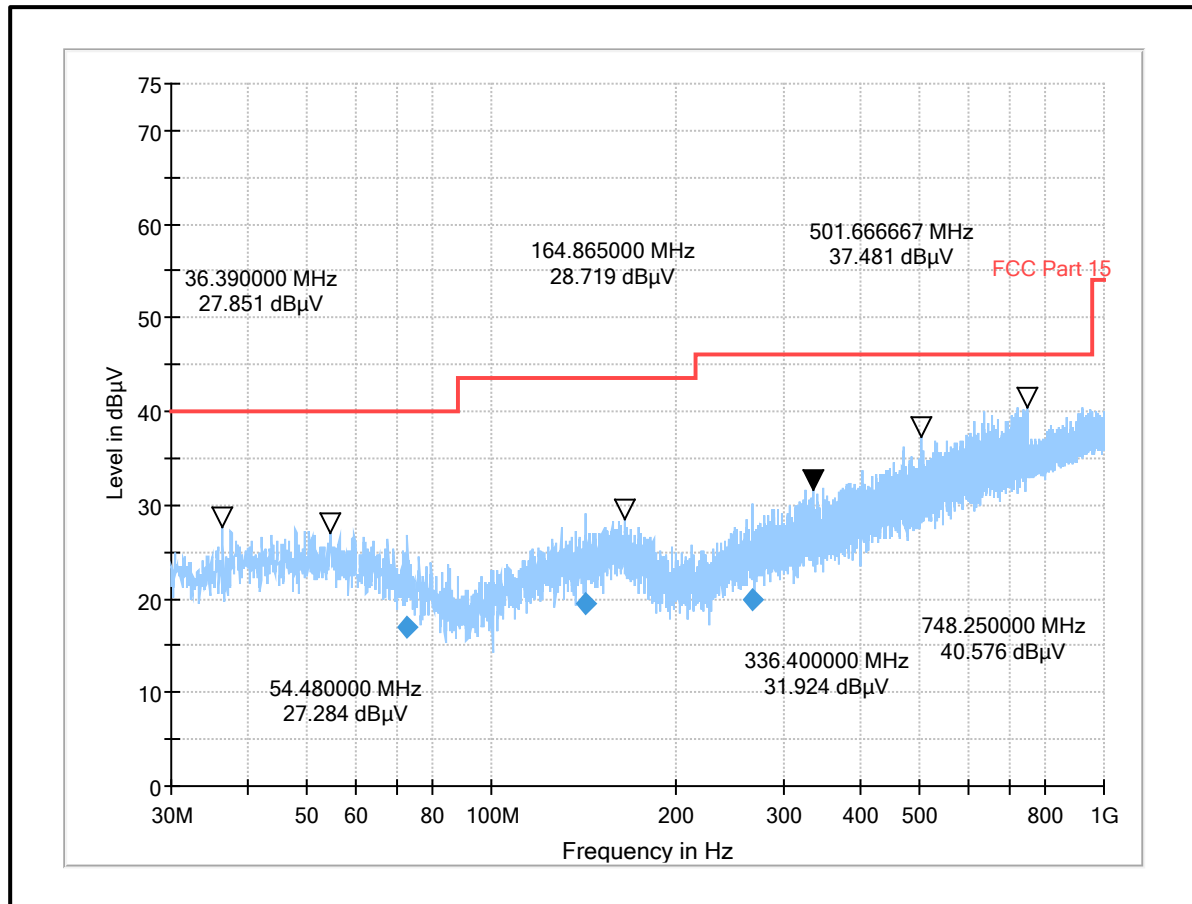
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 64**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
72.975000	Horizontal	17.07	40.00	22.93	Complied
142.005000	Horizontal	19.42	43.50	24.08	Complied
265.890000	Horizontal	19.80	46.00	26.20	Complied

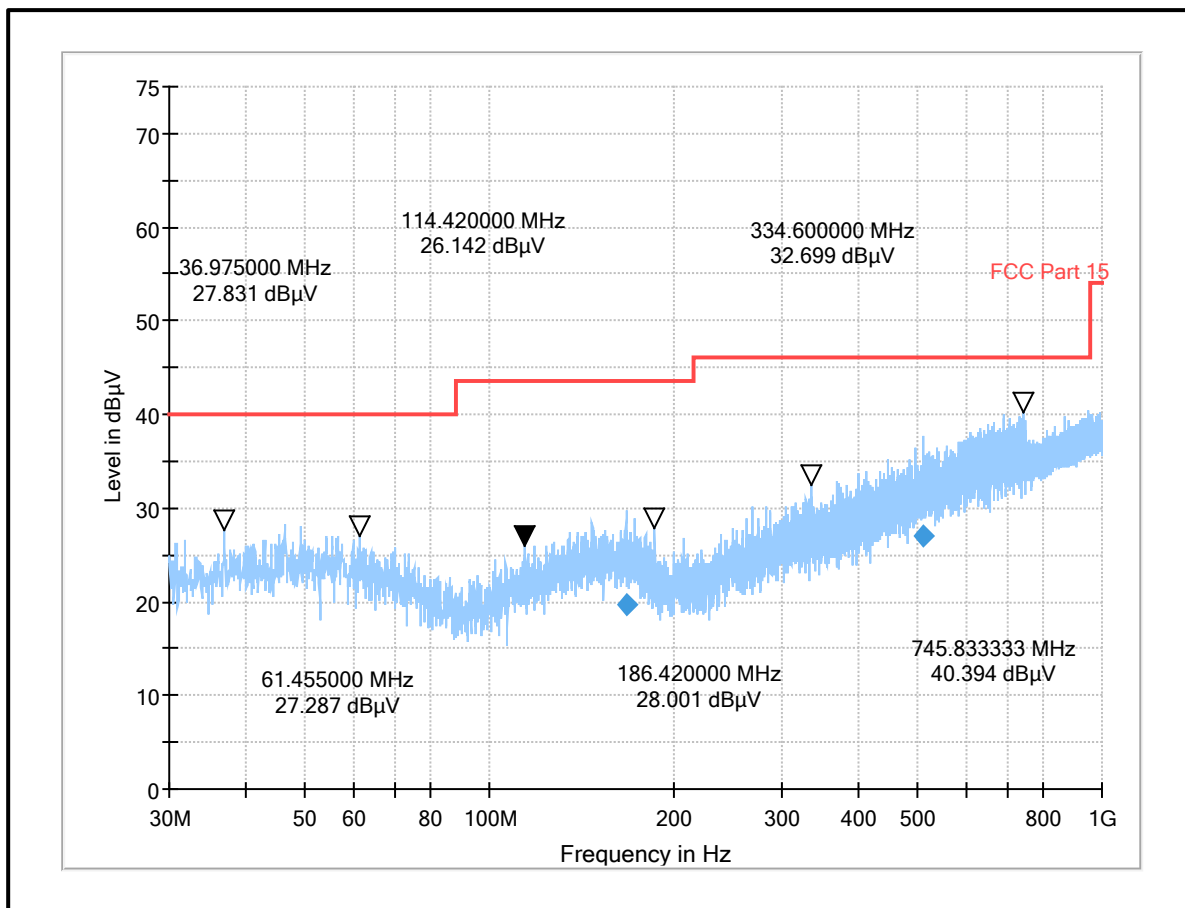
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 100**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
166.980000	Vertical	19.62	43.50	23.88	Complied
511.583333	Vertical	27.12	46.00	18.88	Complied

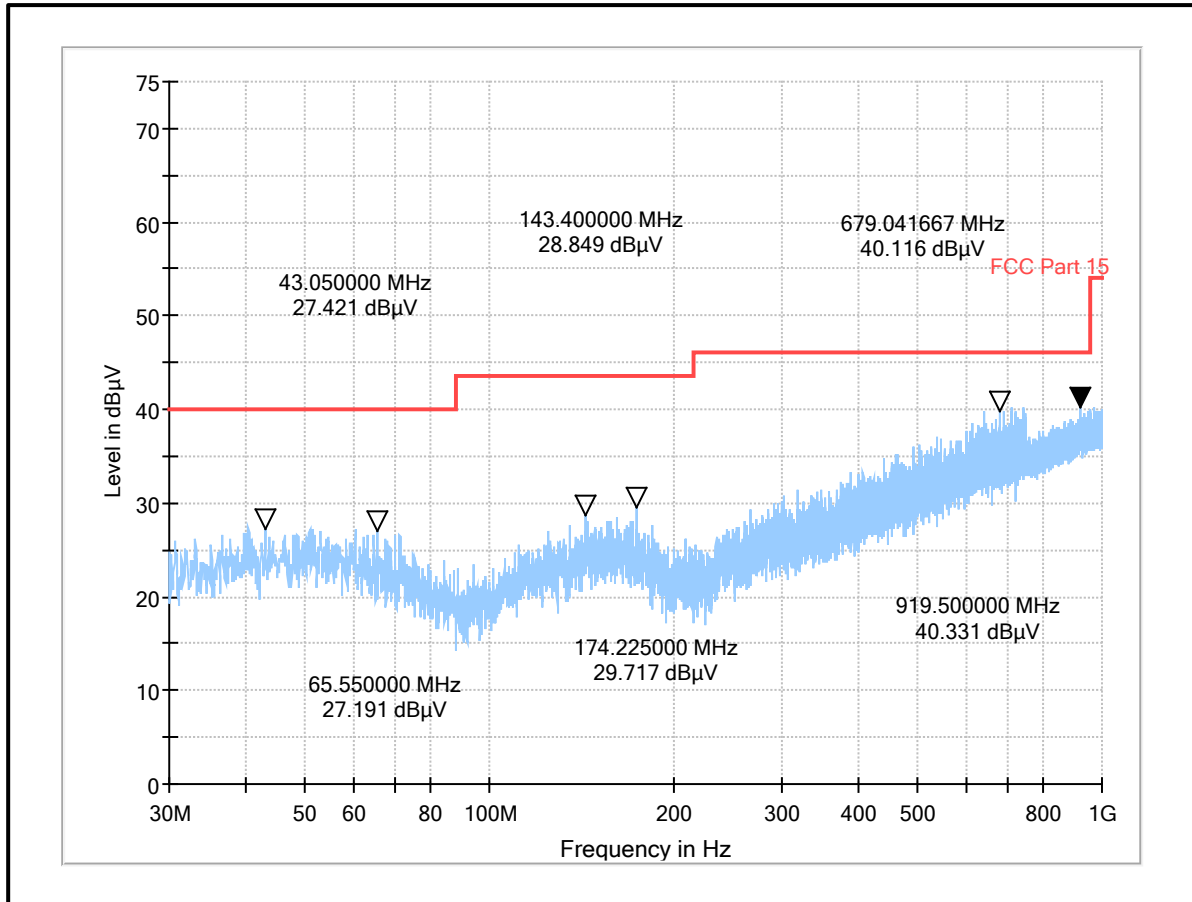
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 116**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
No critical emissions were detected					

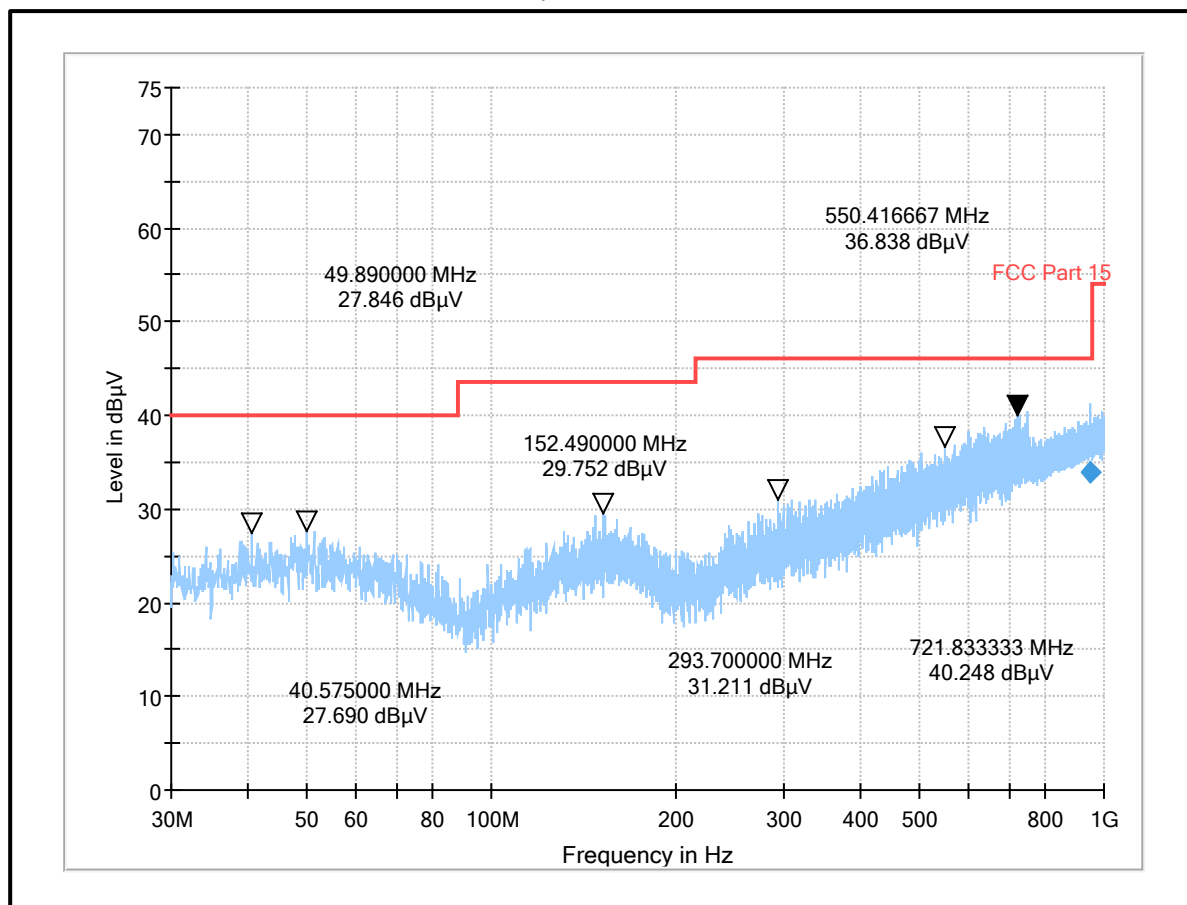
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 140**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
946.458333	Vertical	34.02	46.00	11.98	Complied

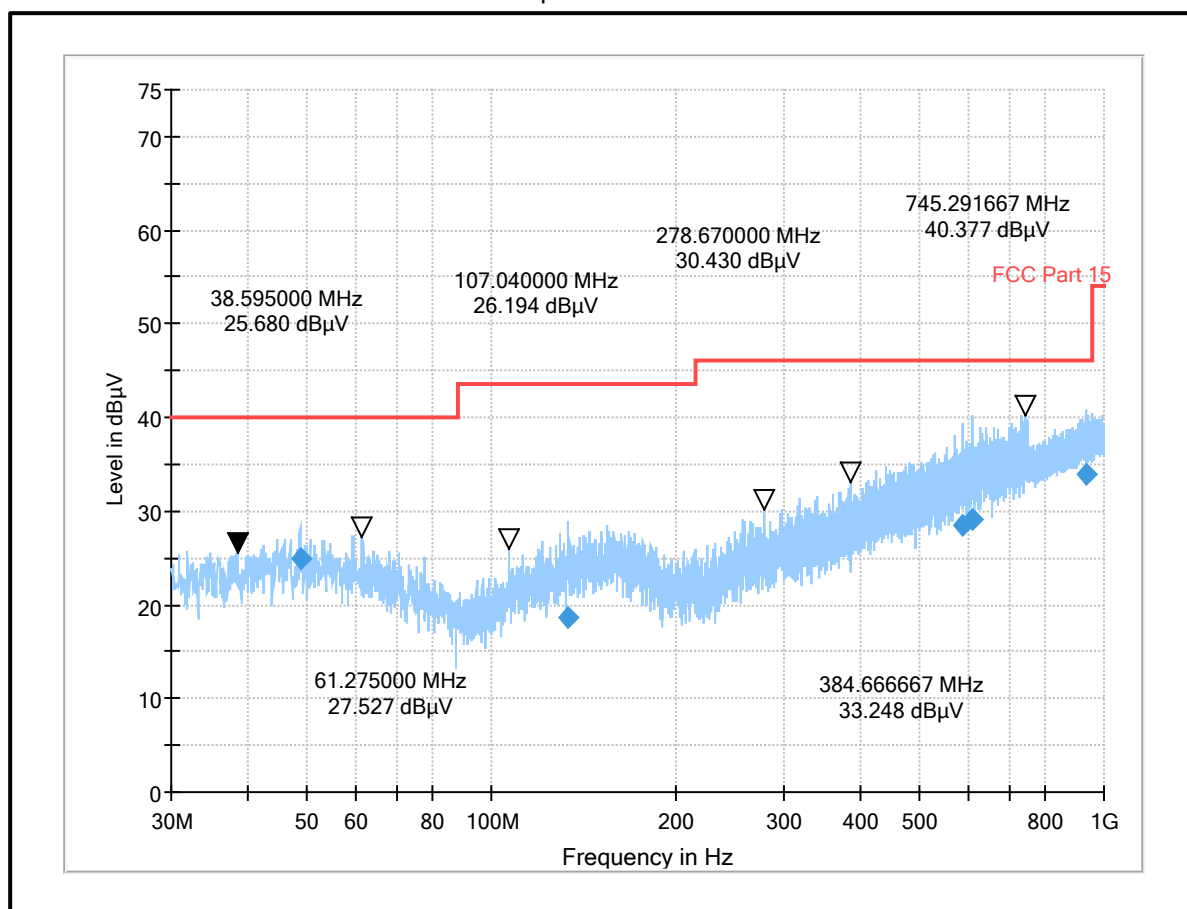
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 149**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
48.675000	Vertical	24.86	40.00	15.14	Complied
133.545000	Vertical	18.68	43.50	24.82	Complied
586.291667	Vertical	28.56	46.00	17.44	Complied
611.000000	Horizontal	29.10	46.00	16.90	Complied
932.291667	Horizontal	33.97	46.00	12.03	Complied

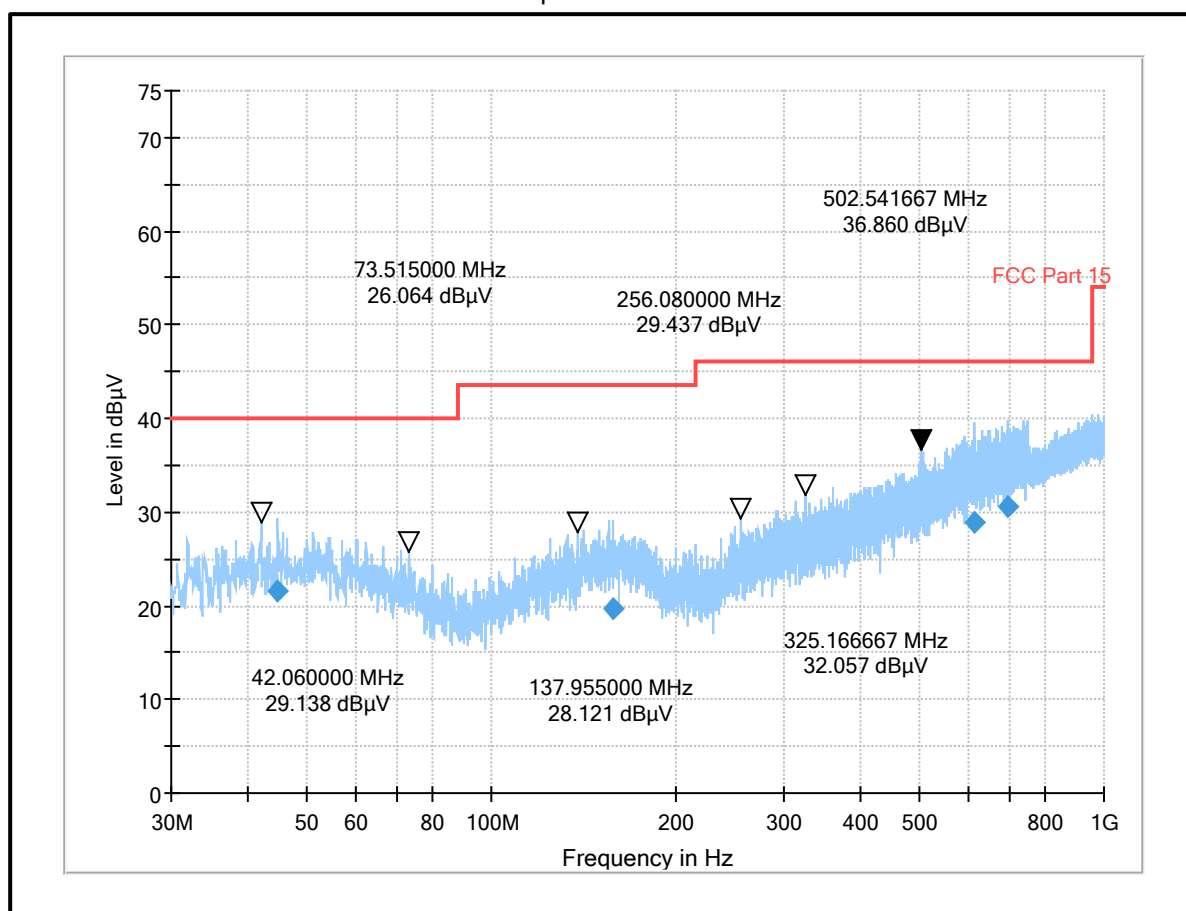
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 157**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
44.805000	Vertical	21.56	40.00	18.44	Complied
157.800000	Horizontal	19.78	43.50	23.72	Complied
616.458333	Vertical	28.93	46.00	17.07	Complied
695.708333	Horizontal	30.68	46.00	15.32	Complied

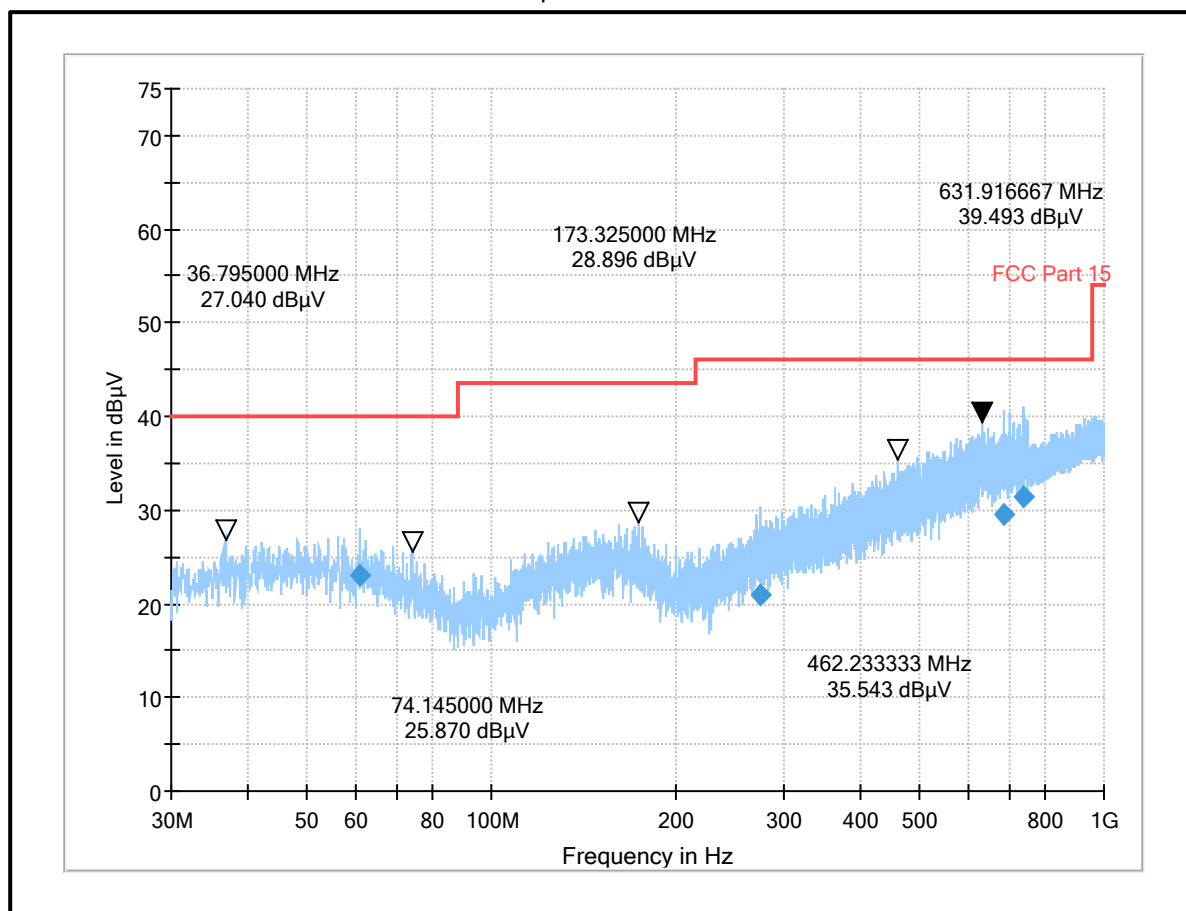
Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 165**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
61.050000	Vertical	22.95	40.00	17.05	Complied
274.980000	Horizontal	20.88	46.00	25.12	Complied
684.625000	Vertical	29.46	46.00	16.54	Complied
741.208333	Horizontal	31.39	46.00	14.61	Complied

Plot: Radiated Transmitter spurious emission from 30 MHz – 1GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Test Summary:**

Test Engineer:	Abbas Al-Hussainy	Test Date:	20 to 28 September 2023
Test Sample Serial Number:	1150003350		
Test Site Identification	SR 1/2		

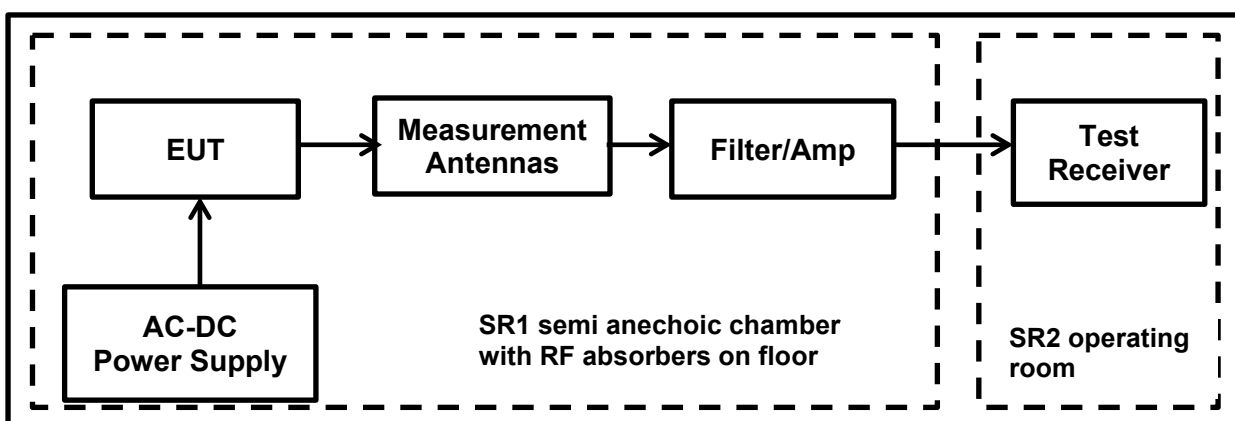
FCC Reference:	Parts 15.407(b)(1),(8) & 15.209(a)
Test Method Used:	FCC KDB 789033 II .G.1, II .G.2, II .G.3, II .G.5 &, II .G.6 ANSI C63.10:2013 Sections 6.3 and 6.6
Frequency Range	1 GHz to 40 GHz

Environmental Conditions:

Temperature (°C):	22 to 25
Relative Humidity (%):	44 to 55

Note(s):

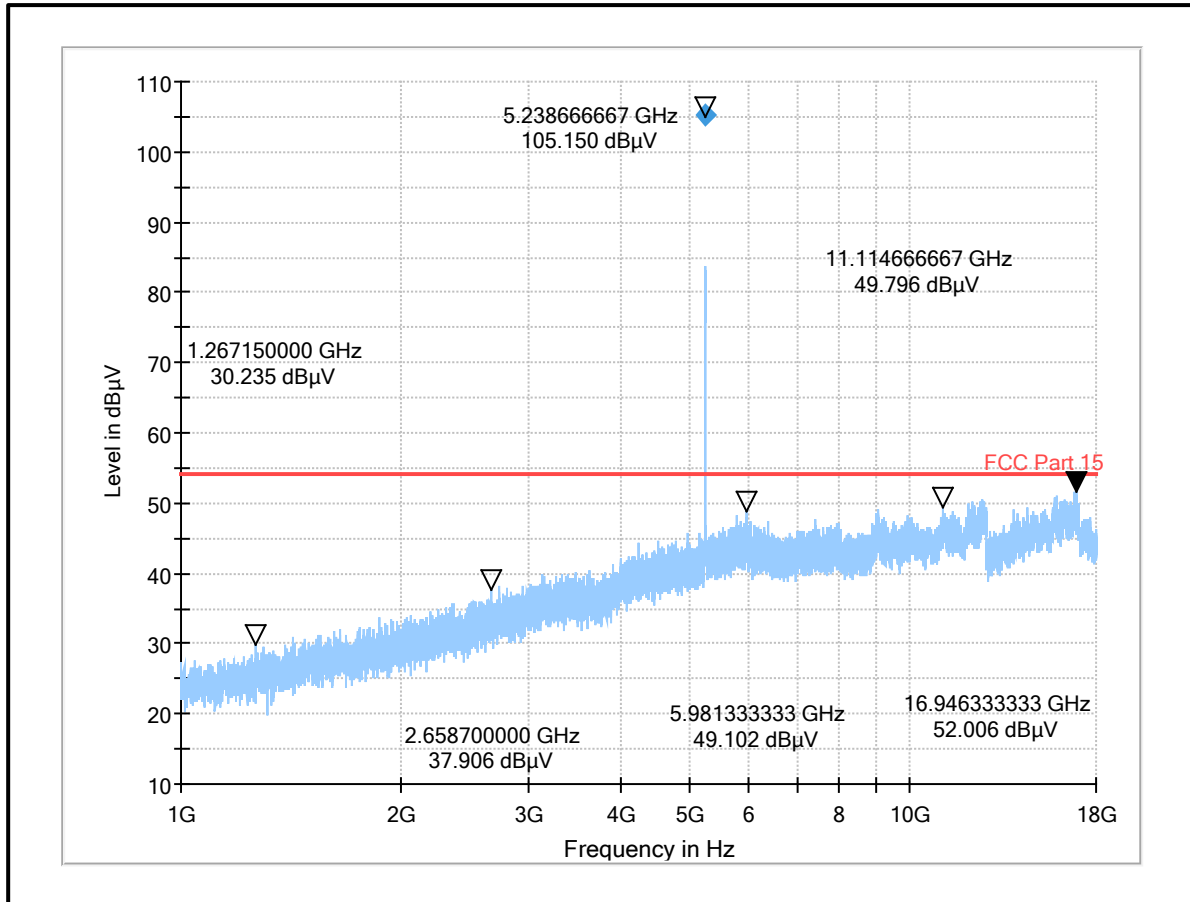
1. The emissions shown at frequencies approximately 5.15-5.85 GHz on the 1 GHz to 18 GHz plots are the EUT fundamental for the tested channel.
2. Pre-scans above 1 GHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) with absorber on the floor at a distance of 3 m. The EUT was placed at a height of 1.5 m above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 m above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) with absorber on the floor at a distance of 3 m. The EUT was placed at a height of 1.5 m above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 m to 4 m.
3. Pre-scans were performed and a marker placed on the highest measured level of the appropriate plot. The test receiver resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. The sweep time was set to auto.
4. For frequency range between 1 GHz to 18 GHz, no critical emissions were found. All emissions shown on the pre-scans were investigated and found to be below the noise floor of the measurement system.
5. For frequency range between 18 GHz and 40 GHz, no critical emissions were found. All emissions shown on the pre-scans were investigated and found to be below the noise floor of the measurement system.

Test Setup:

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11ax (SU) / 20 MHz / MCS0 / Channel 48**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
No critical emissions were detected					

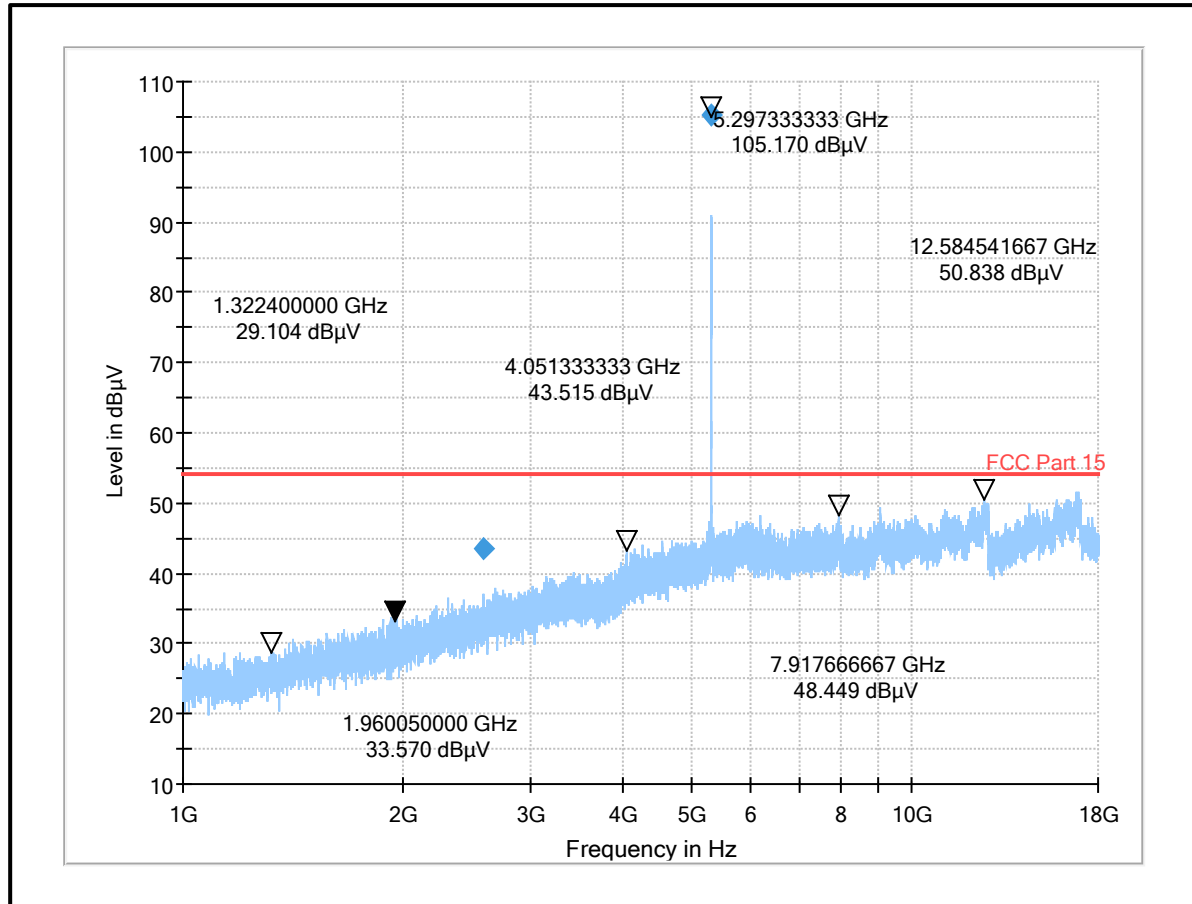
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11ax (RU52-38) / 20 MHz / MCS0 / Channel 60**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2583.616667	Vertical	43.45	54.00	10.55	Complied

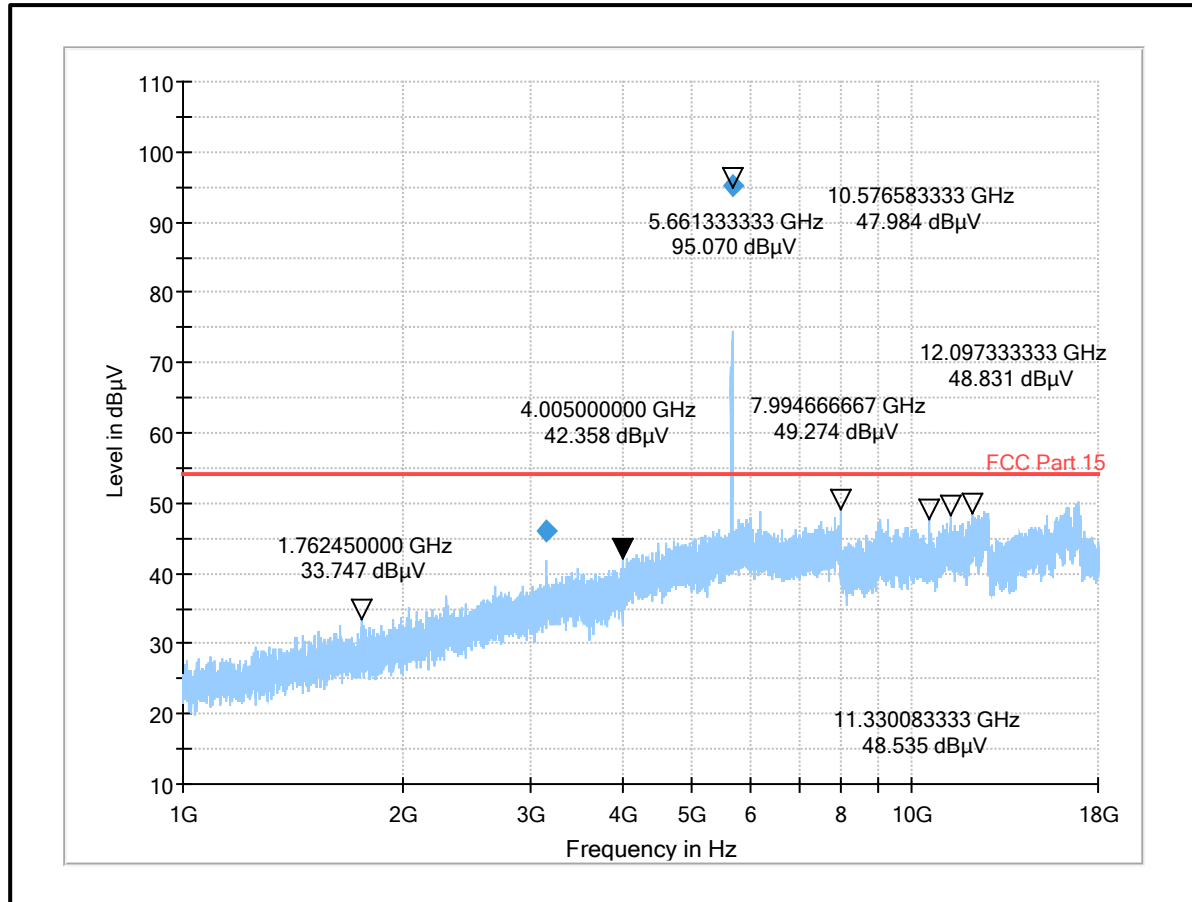
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11ax (RU52-38) / 40 MHz / MCS0 / Channel 134**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
3148.583333	Horizontal	45.90	54.00	8.10	Complied

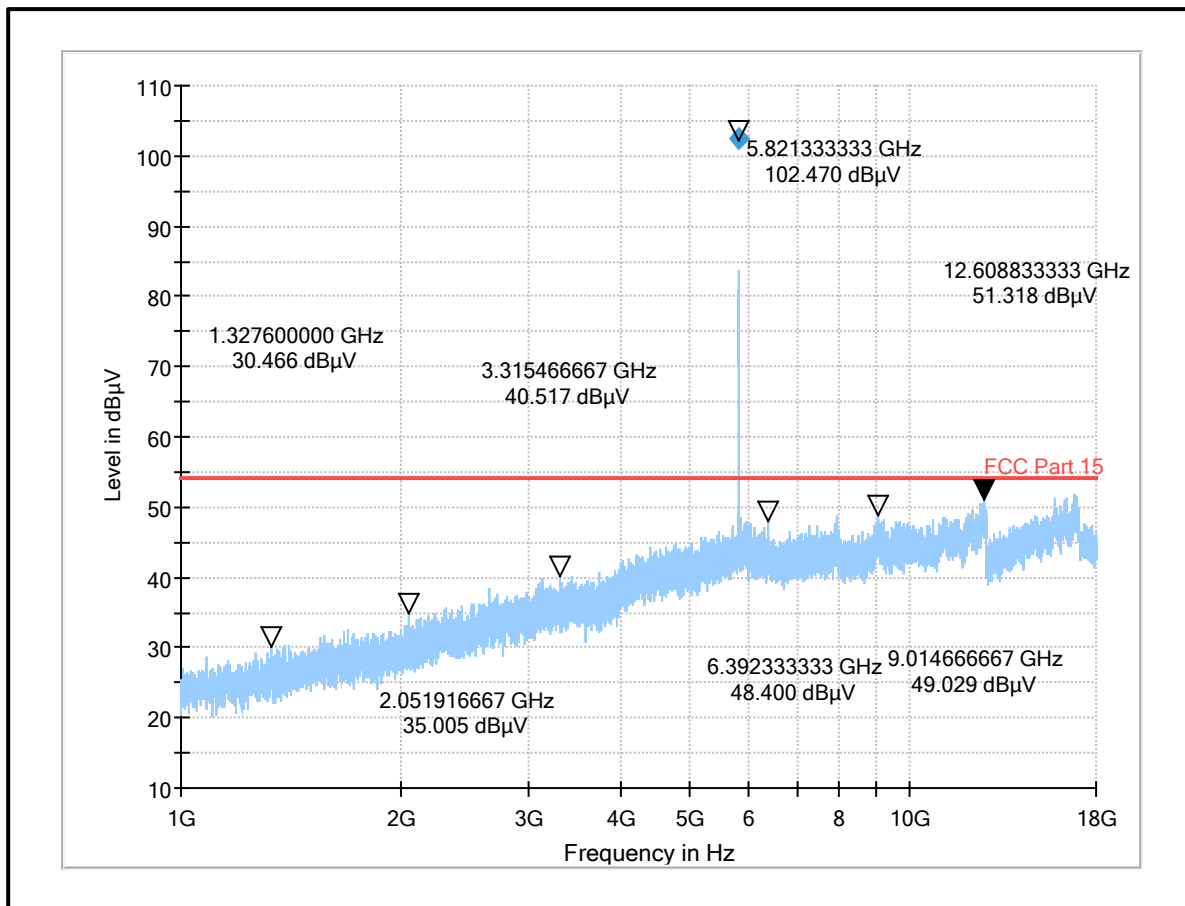
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11ax (RU52-38) / 20 MHz / MCS0 / Channel 165**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
No critical emissions were detected					

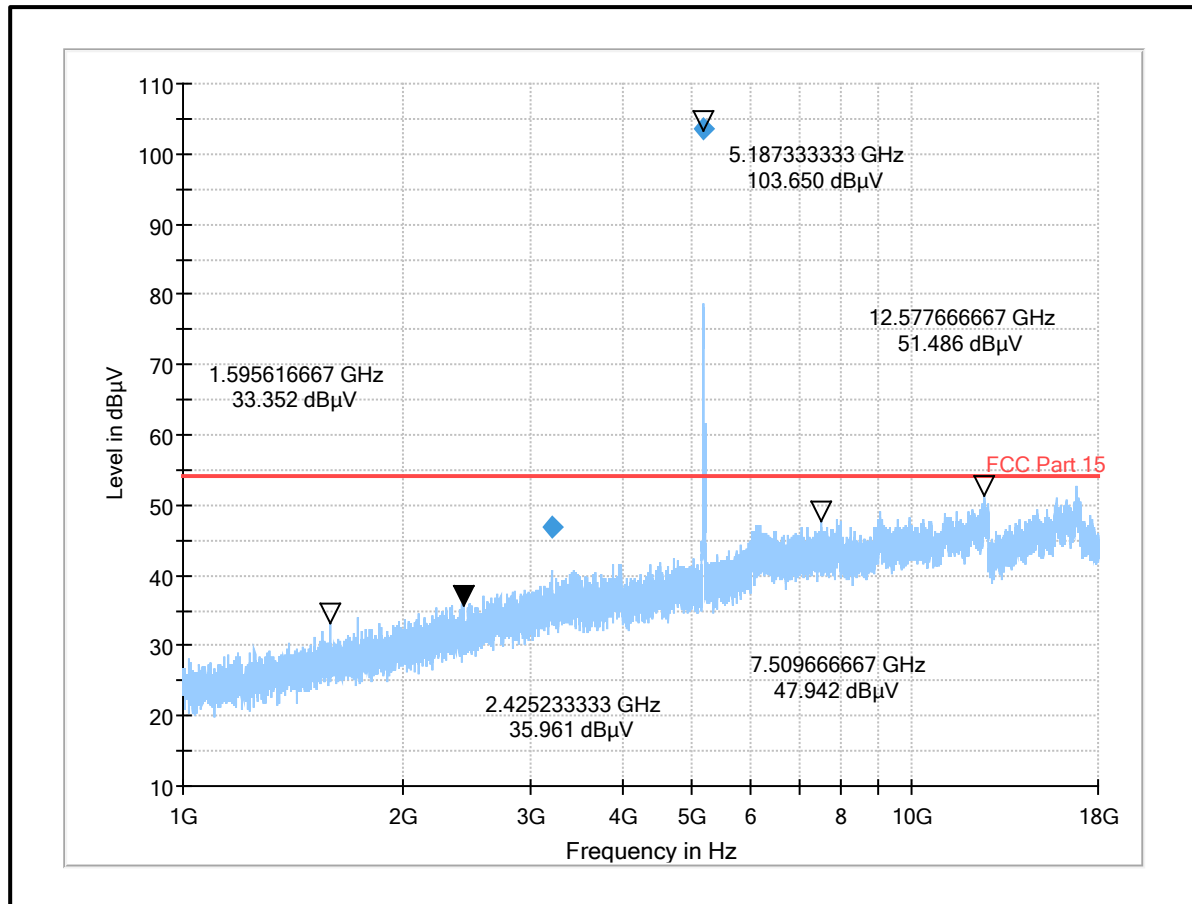
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 36**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
3199.583333	Horizontal	46.76	54.00	7.24	Complied

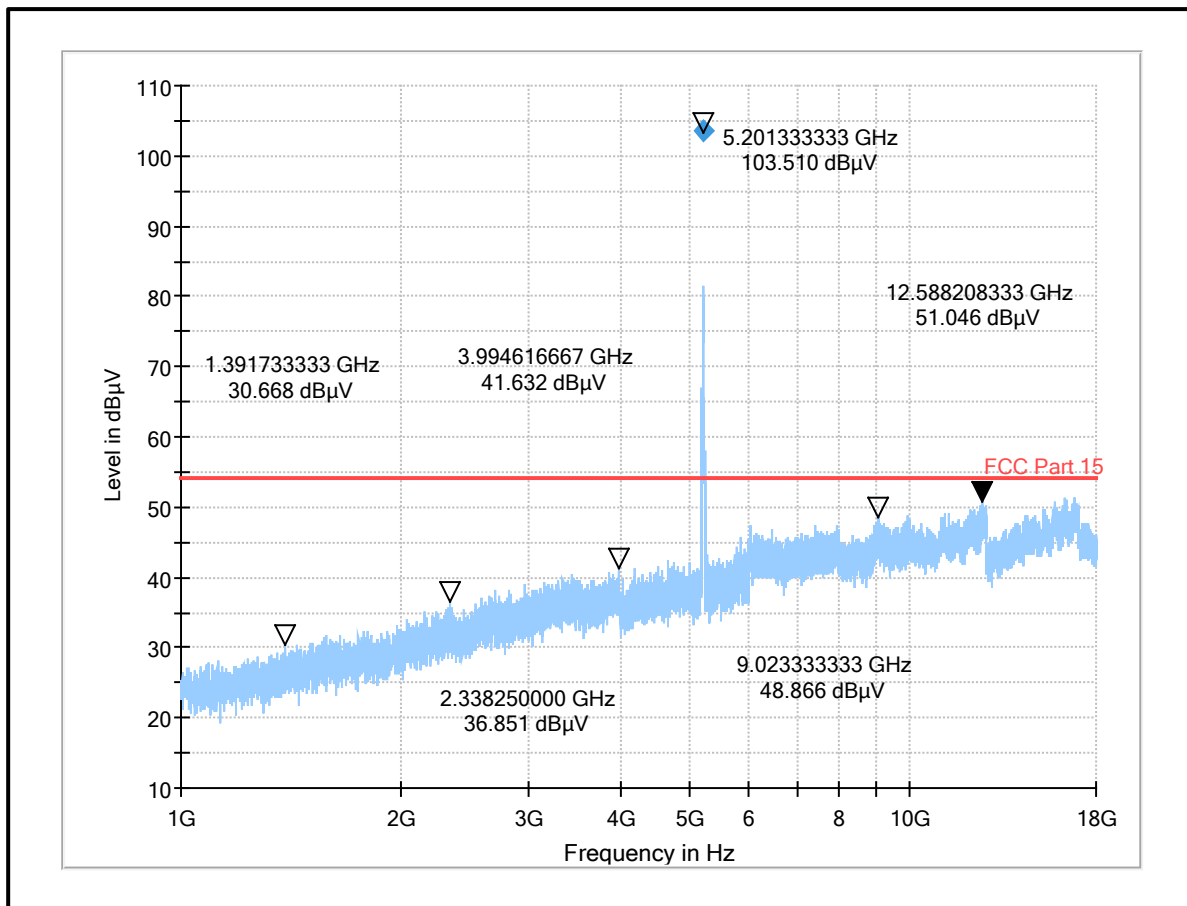
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 40**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
No critical emissions were detected					

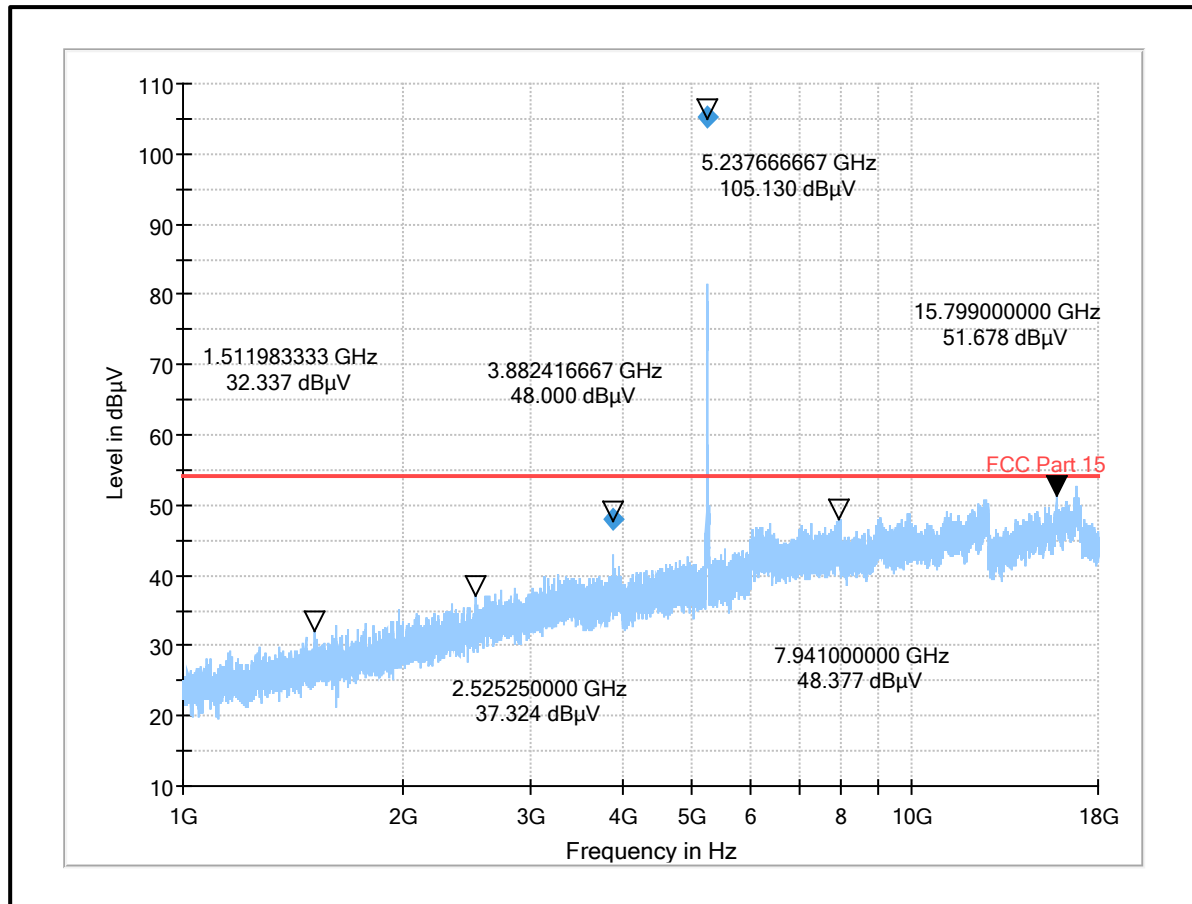
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 48**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
3882.416667	Vertical	48.00	54.00	6.00	Complied

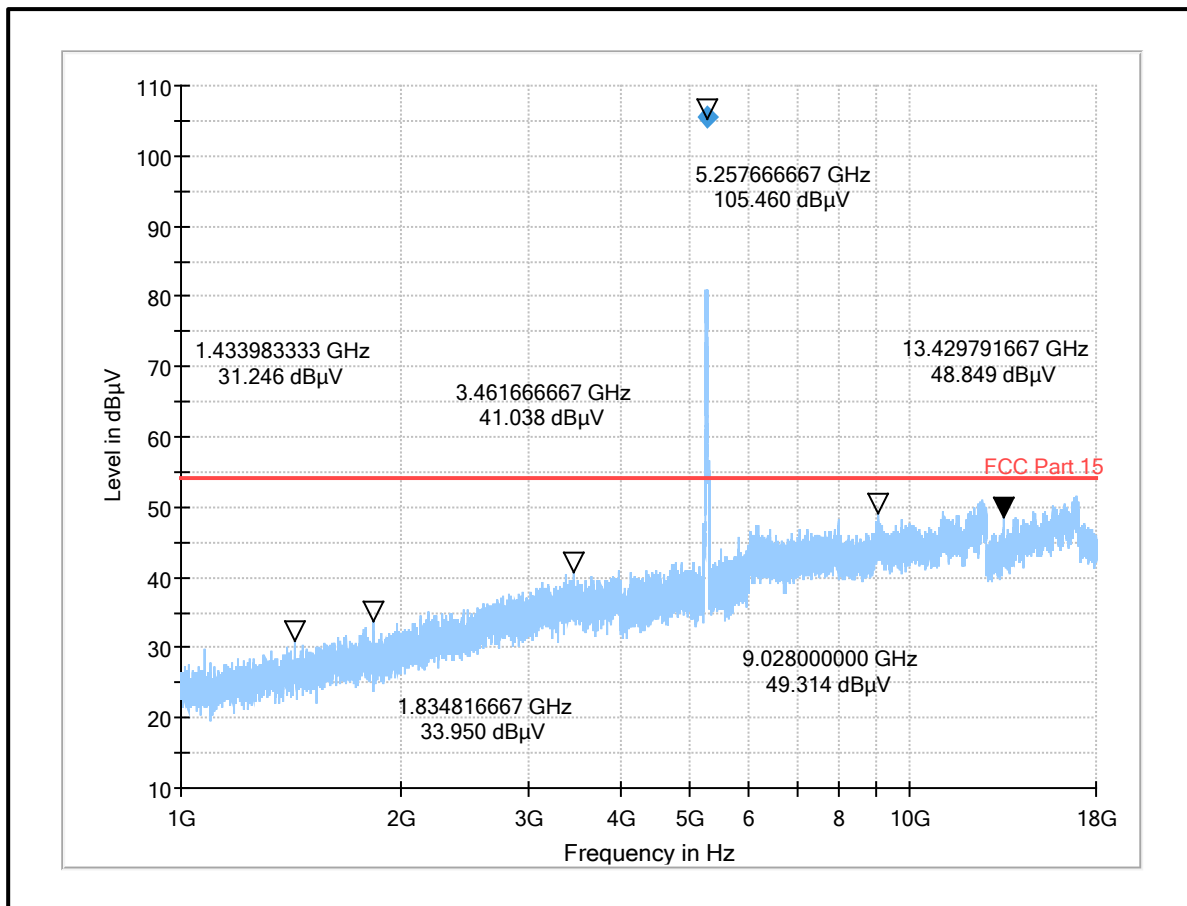
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 52**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
No critical emissions were detected					

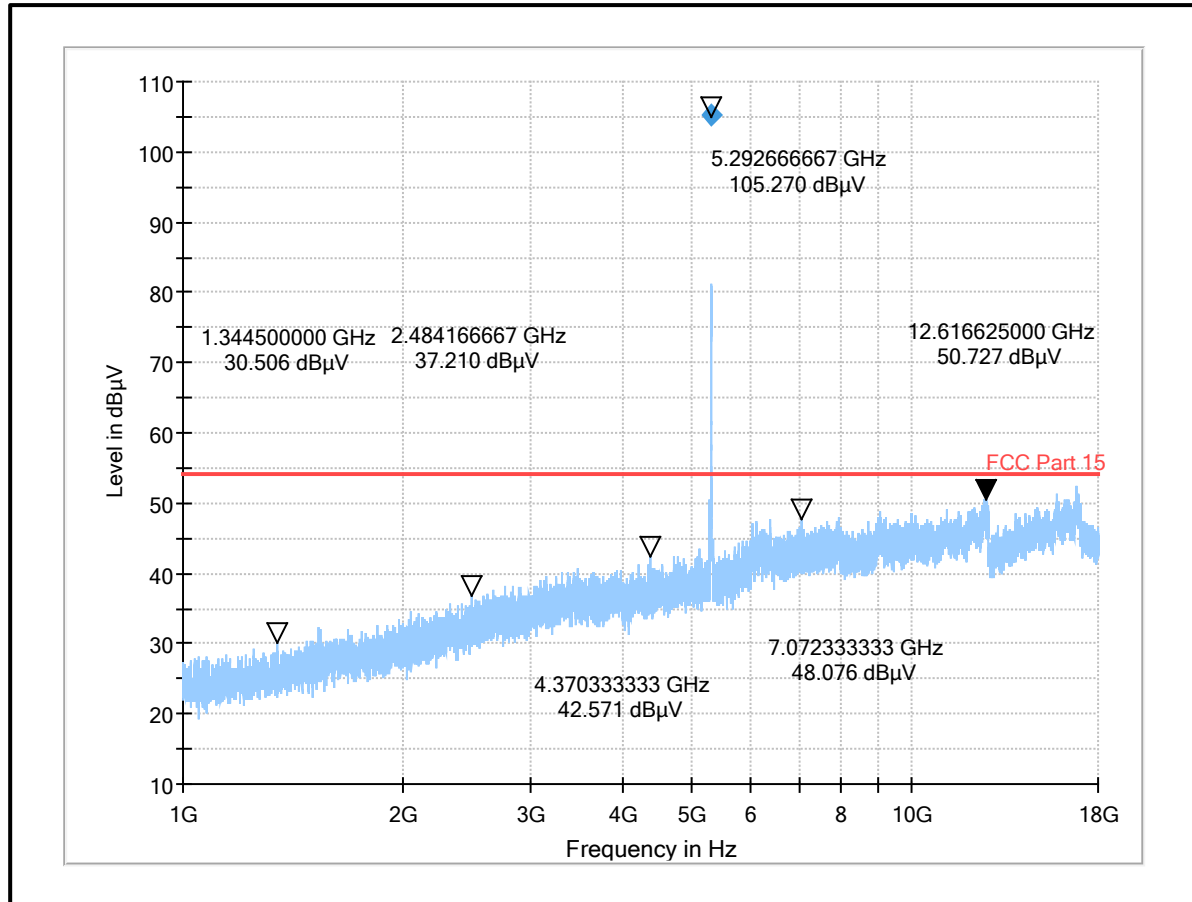
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 60**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
No critical emissions were detected					

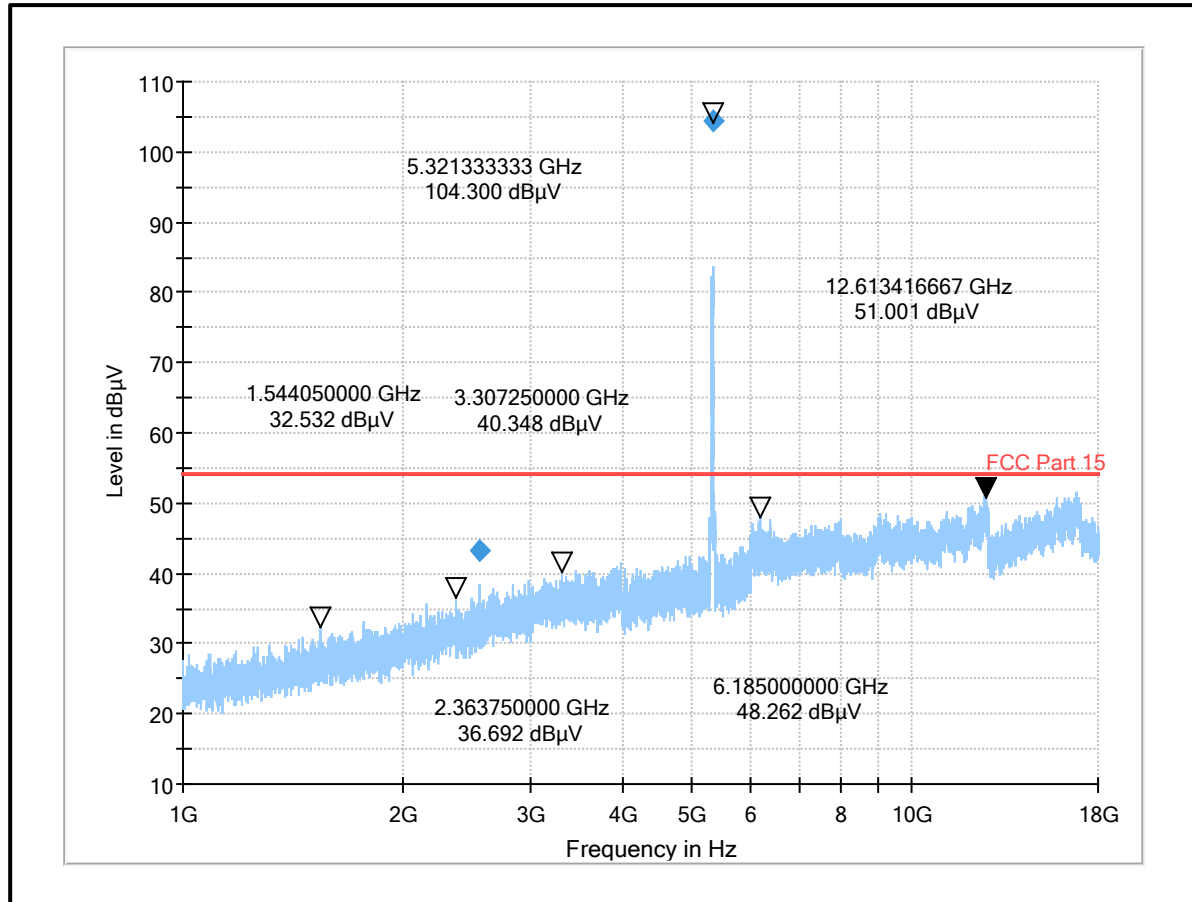
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 64**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2543.950000	Vertical	43.14	54.00	10.86	Complied

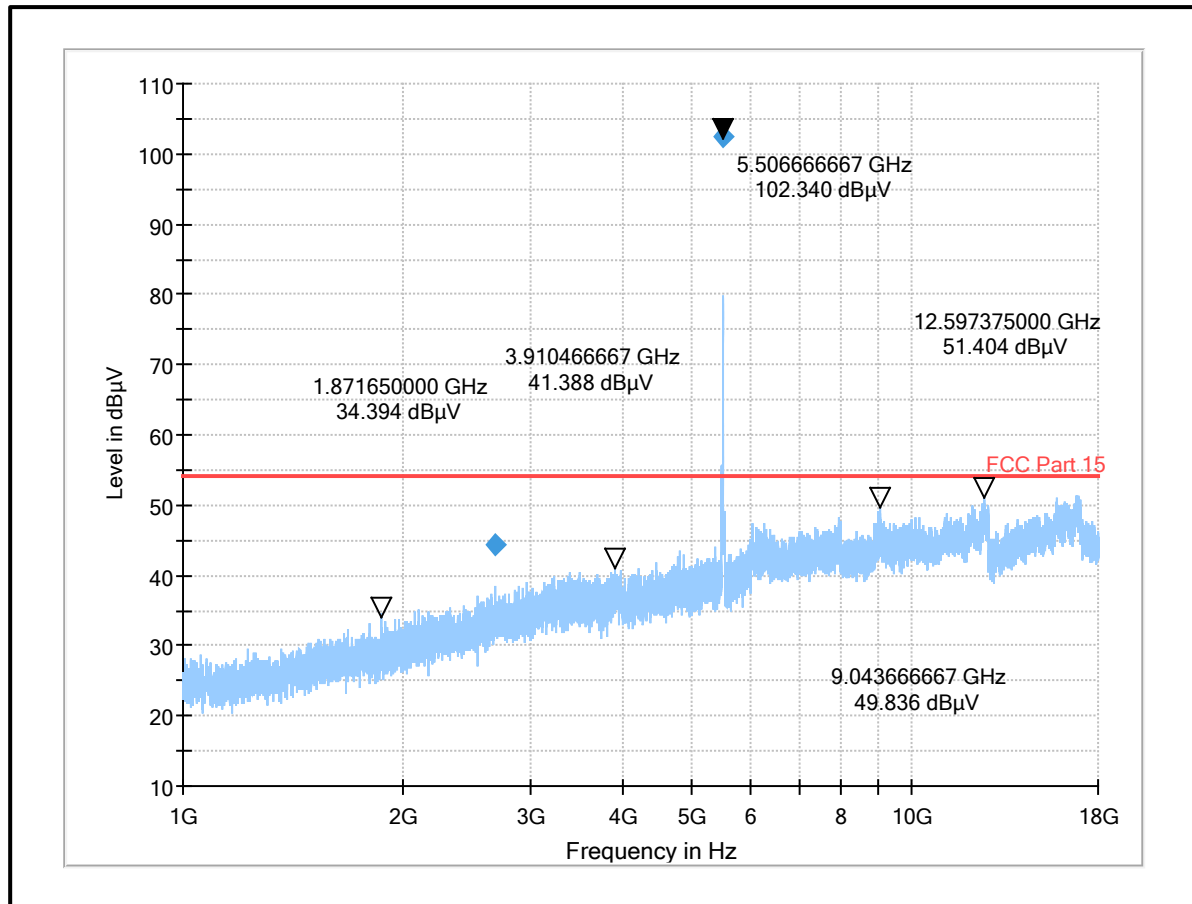
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 100**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2687.600000	Horizontal	44.31	54.00	9.69	Complied

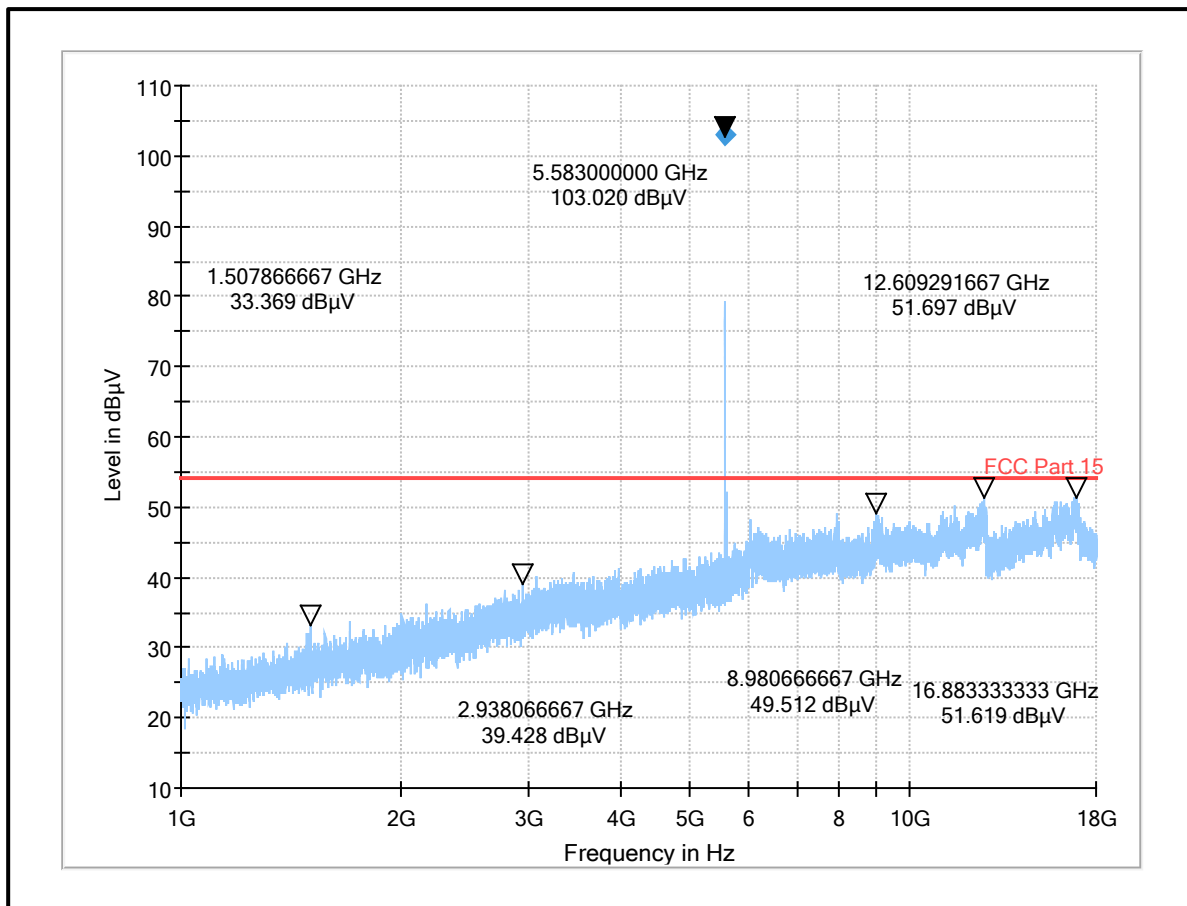
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 116**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
No critical emissions were detected					

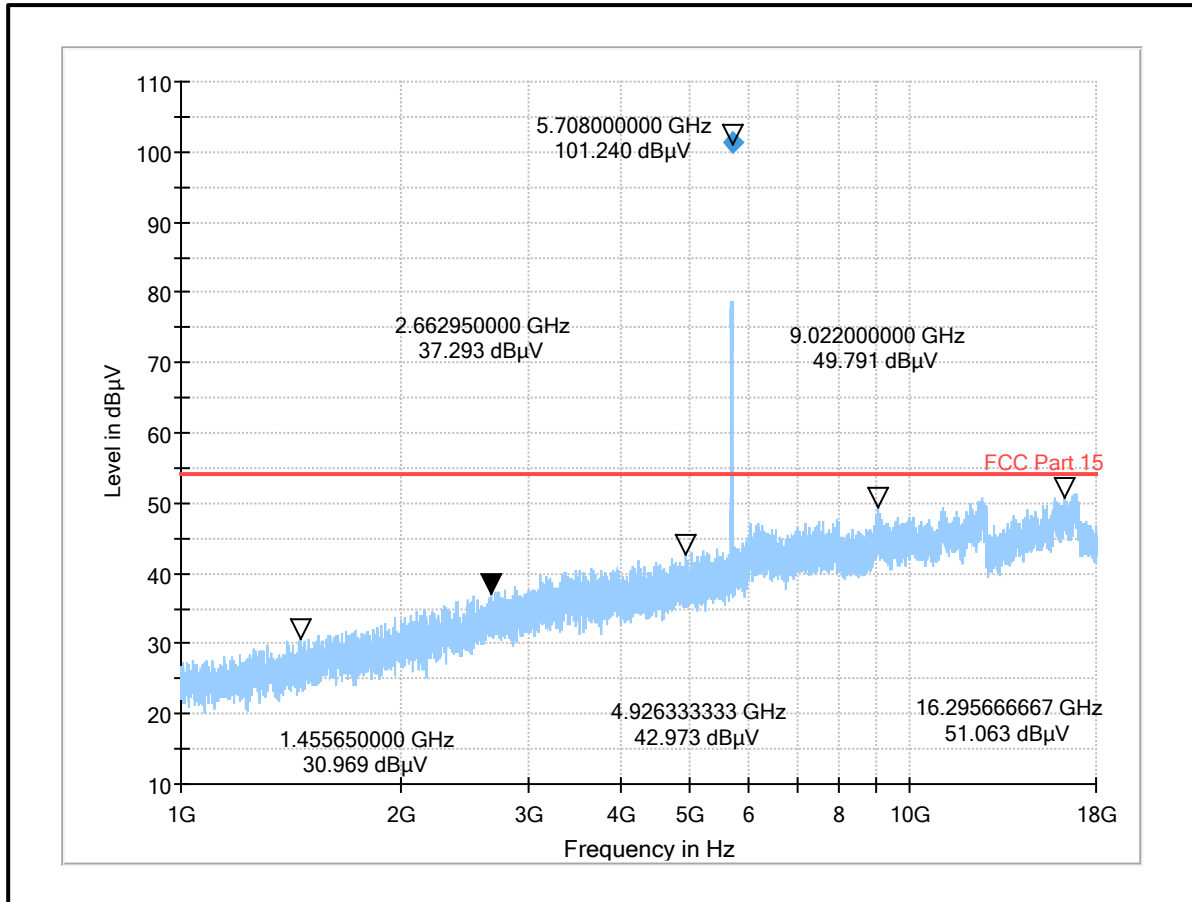
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 140**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
No critical emissions were detected					

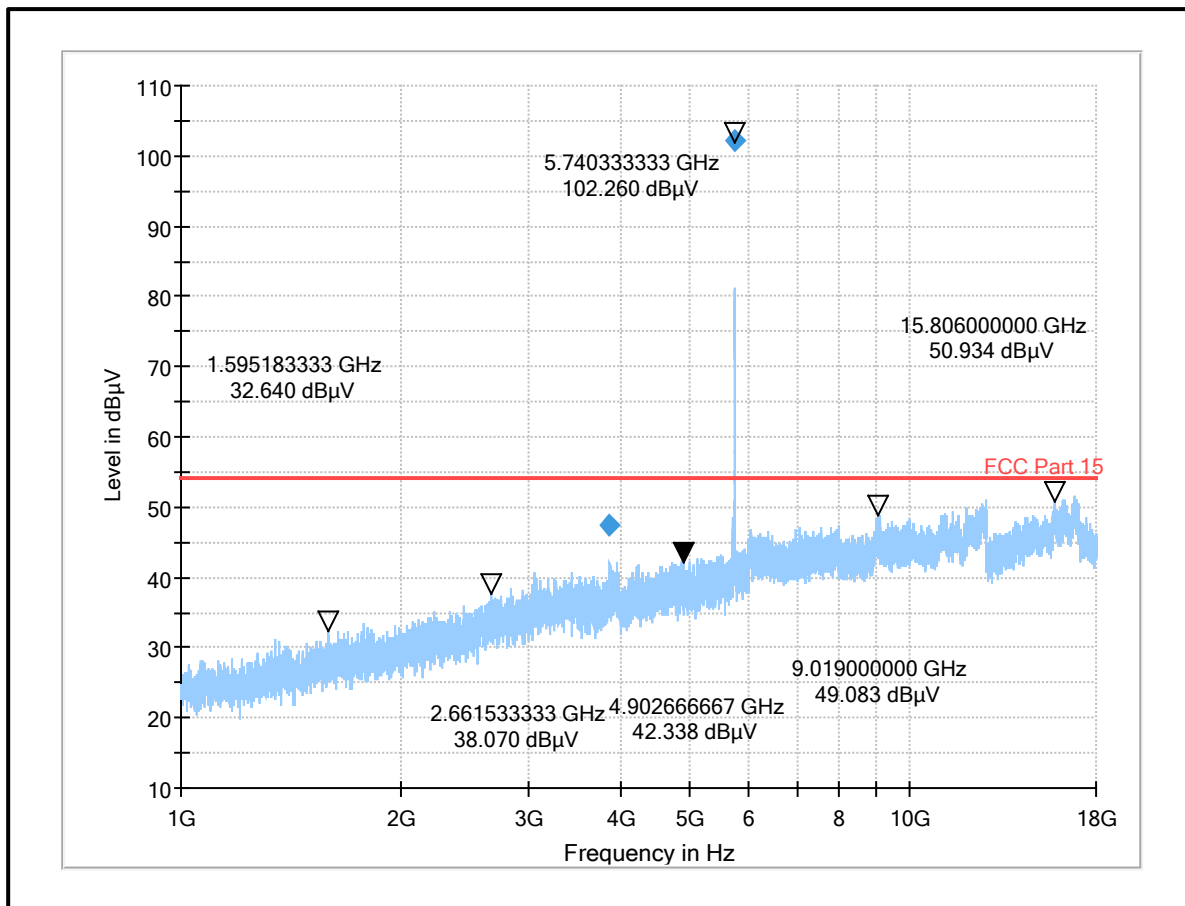
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 149**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
3877.600000	Vertical	47.43	54.00	6.57	Complied

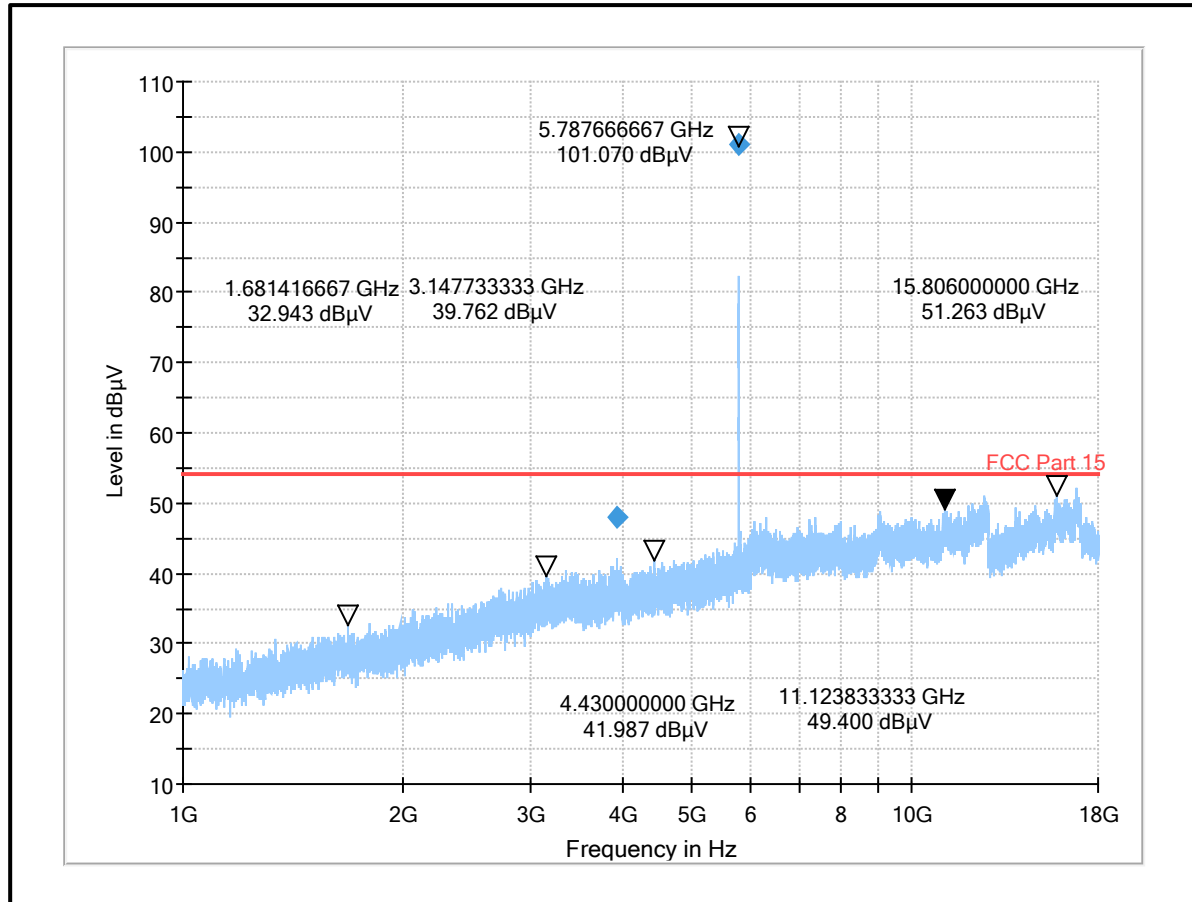
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 157**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
3933.416667	Horizontal	47.88	54.00	6.12	Complied

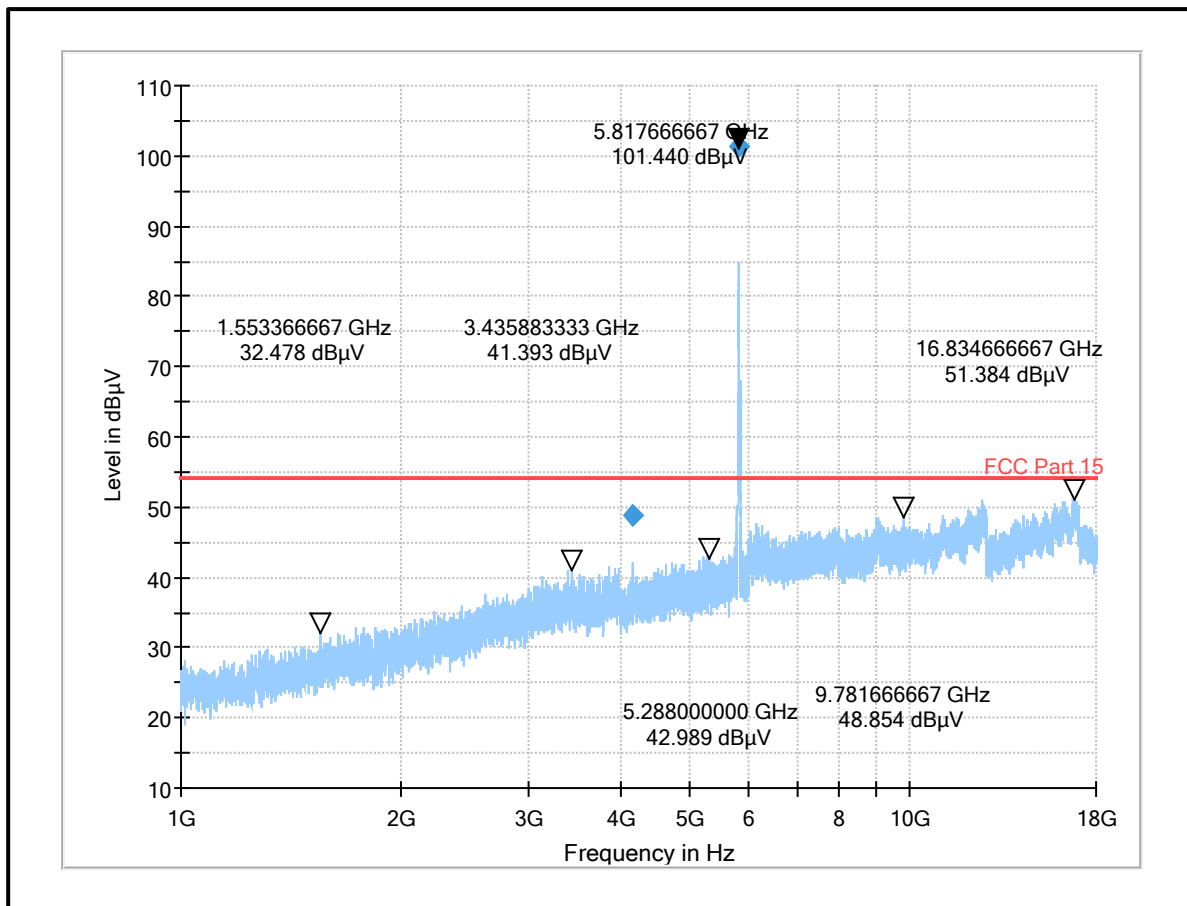
Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)**Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 165**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4167.333333	Horizontal	48.95	54.00	5.05	Complied

Plot: Radiated Transmitter spurious emission from 1 GHz – 18 GHz

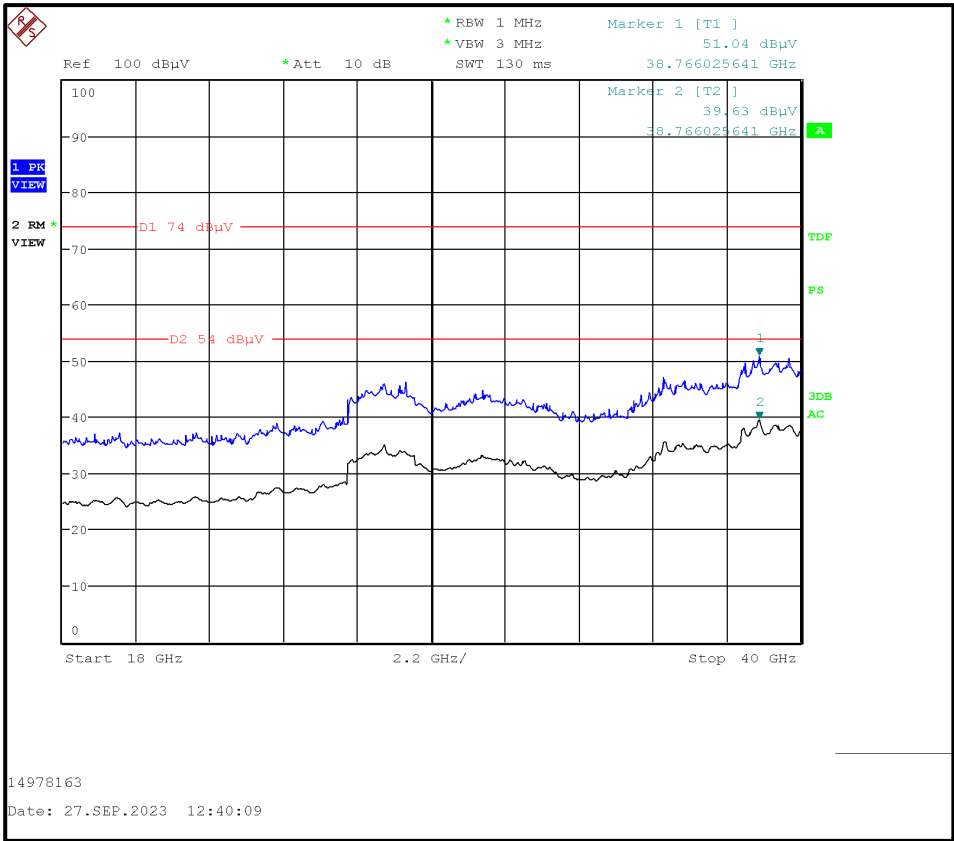
**Result: Pass/**

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11ax (SU) / 20 MHz / MCS0 / Channel 48

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



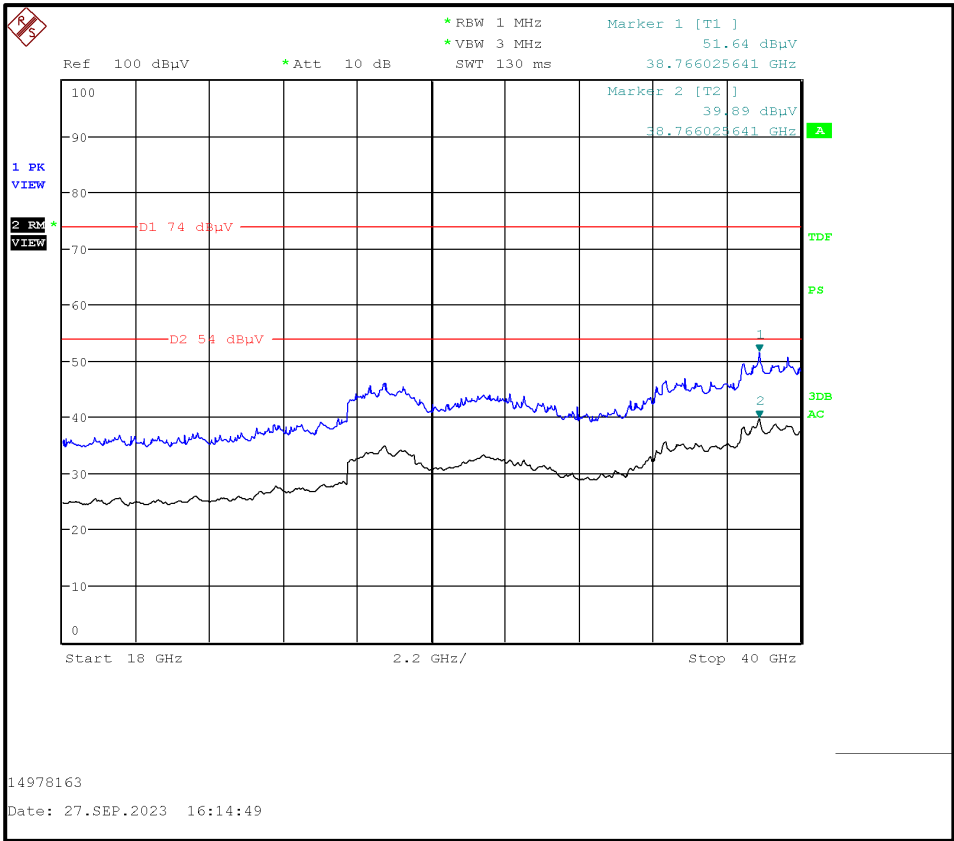
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11ax (RU52-38) / 20 MHz / MCS0 / Channel 60

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



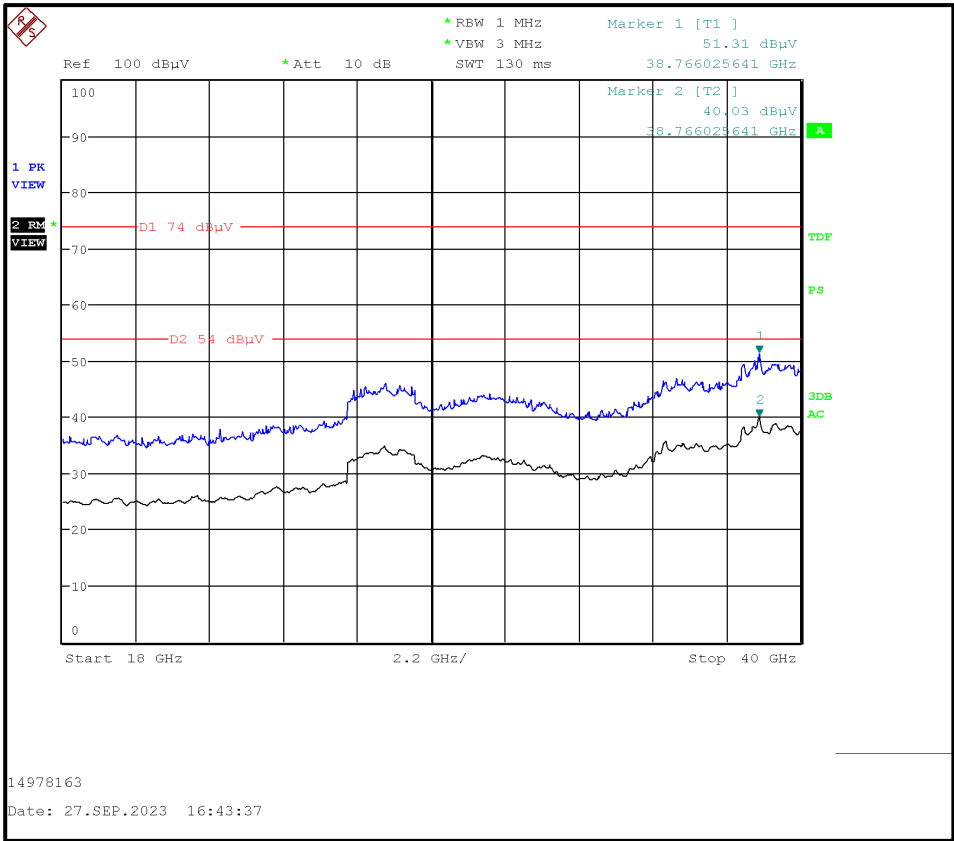
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11ax (RU52-38) / 40 MHz / MCS0 / Channel 134

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



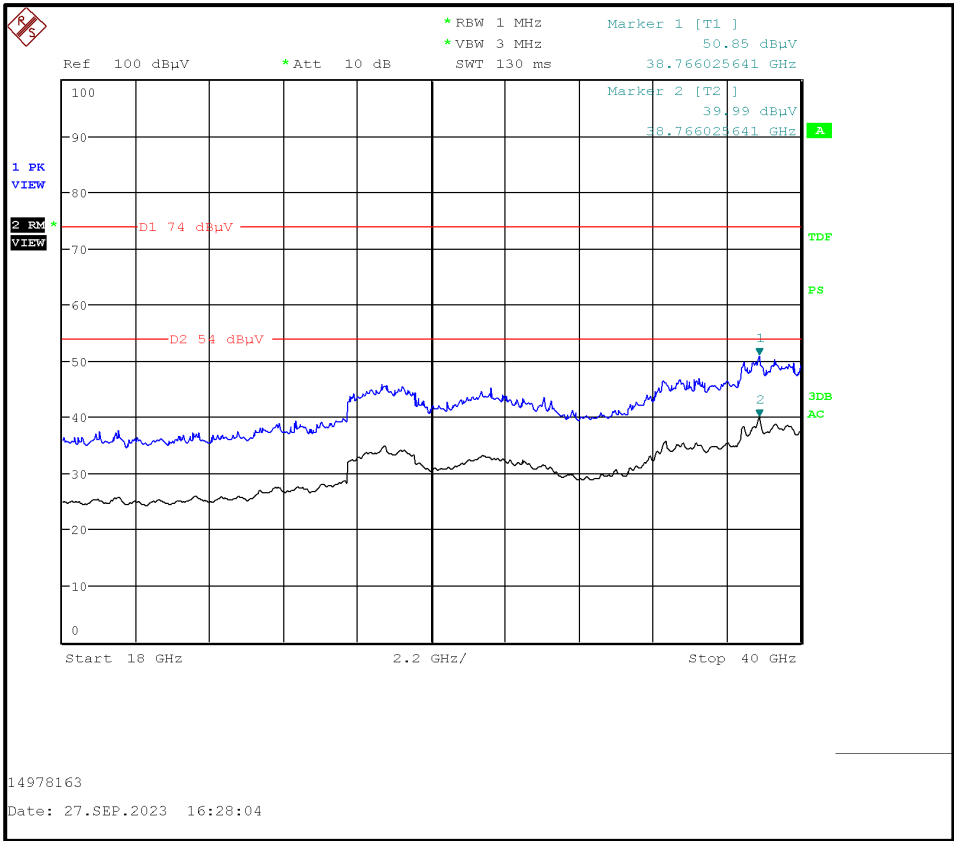
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11ax (RU52-38) / 20 MHz / MCS0 / Channel 165

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



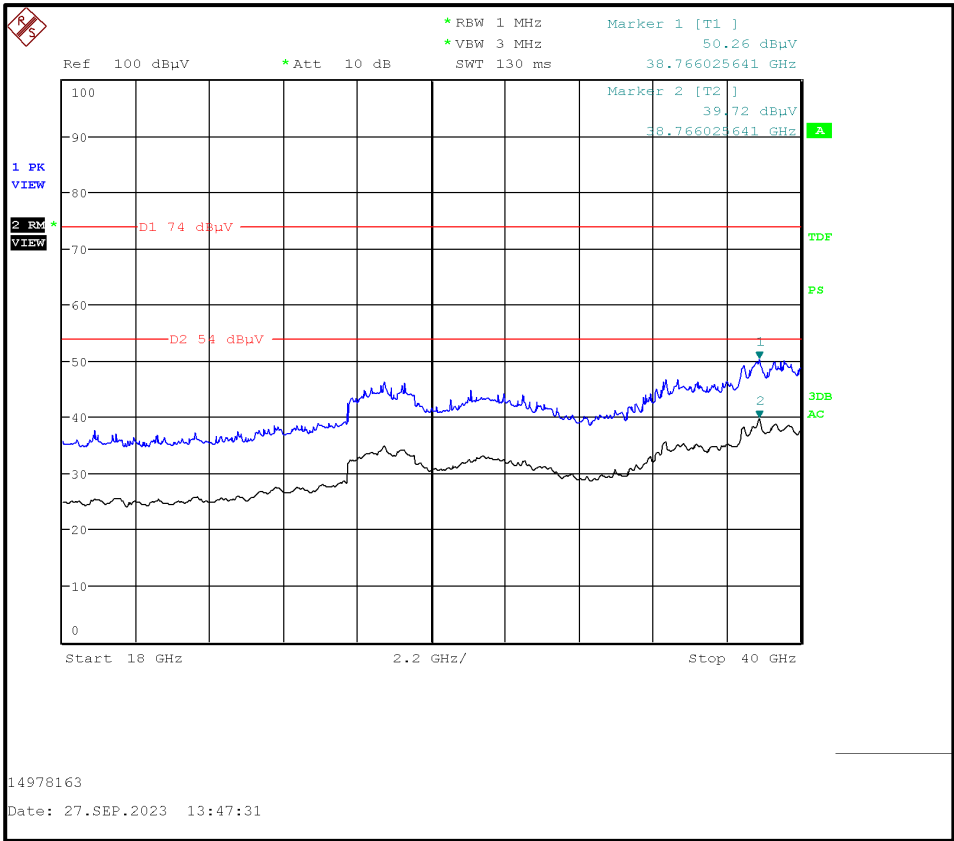
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 36

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



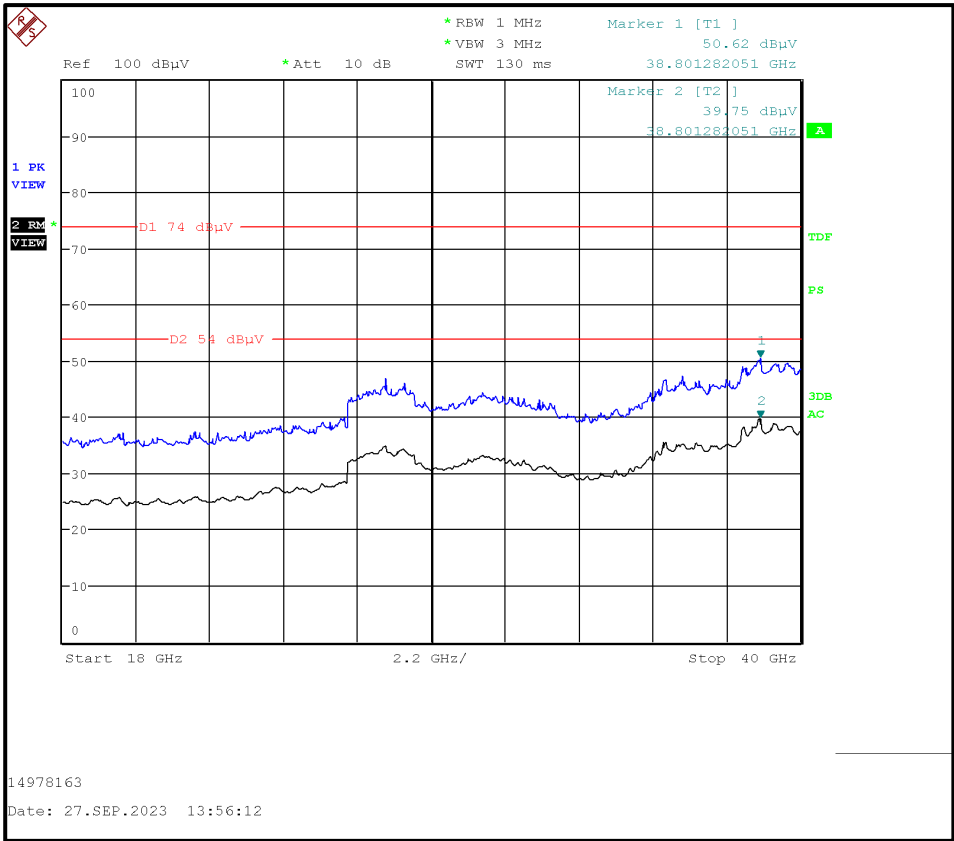
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 40

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



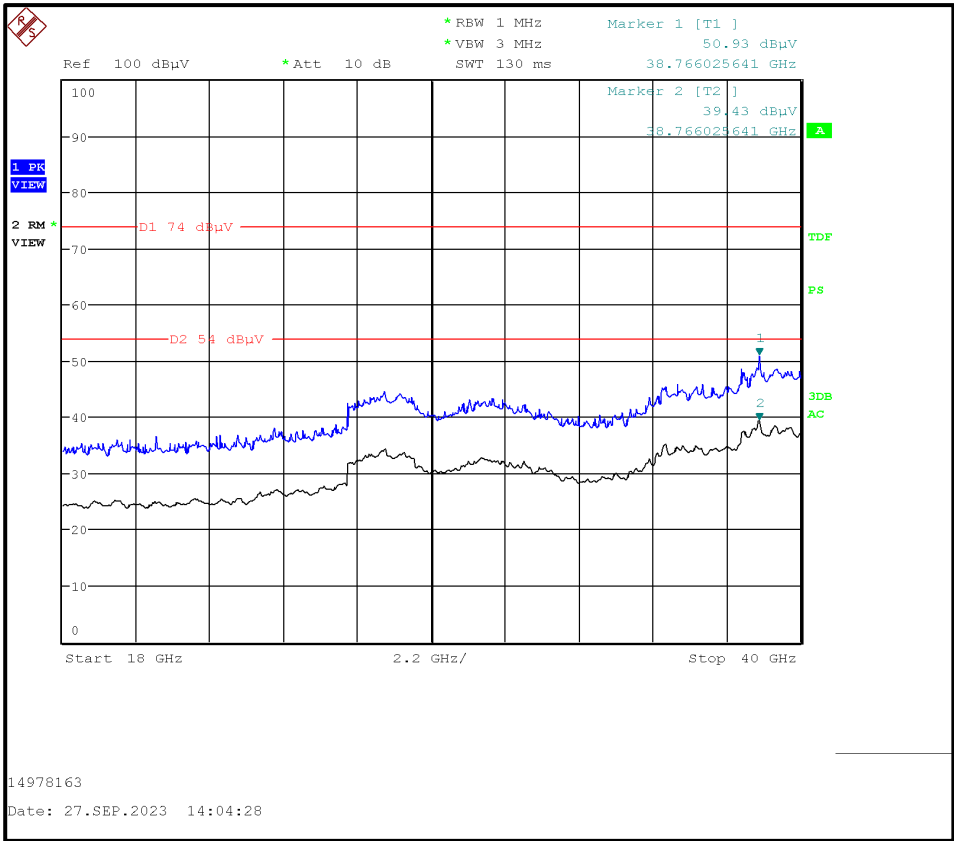
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 48

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



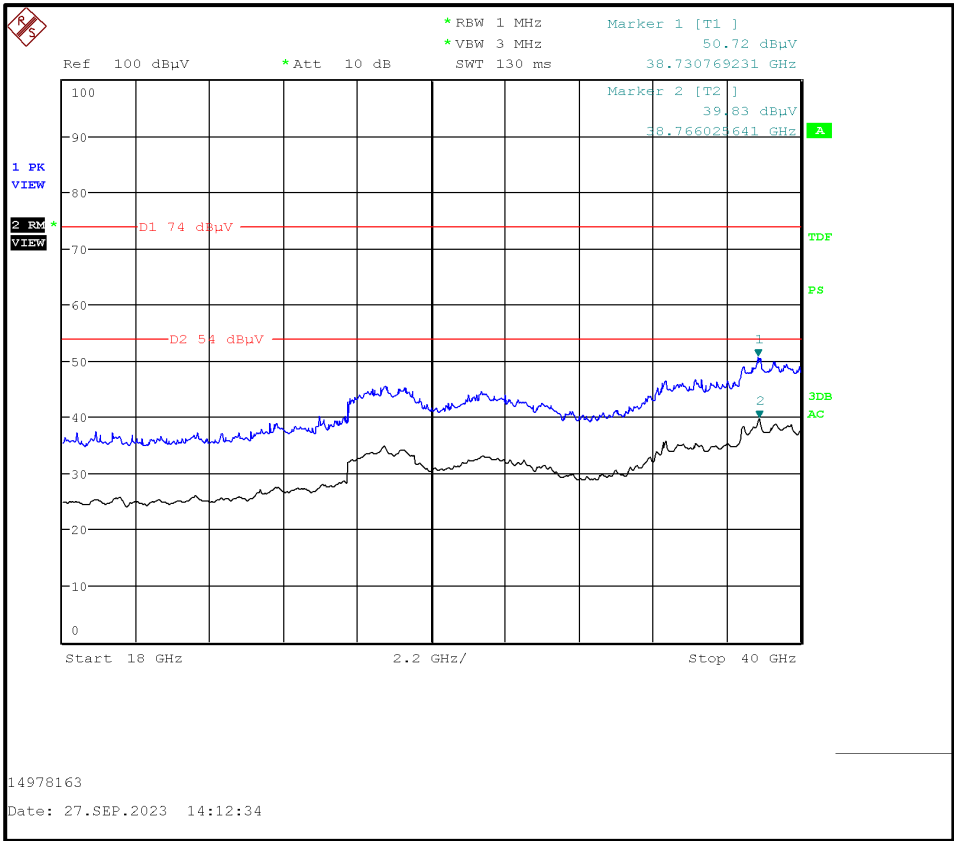
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 52

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



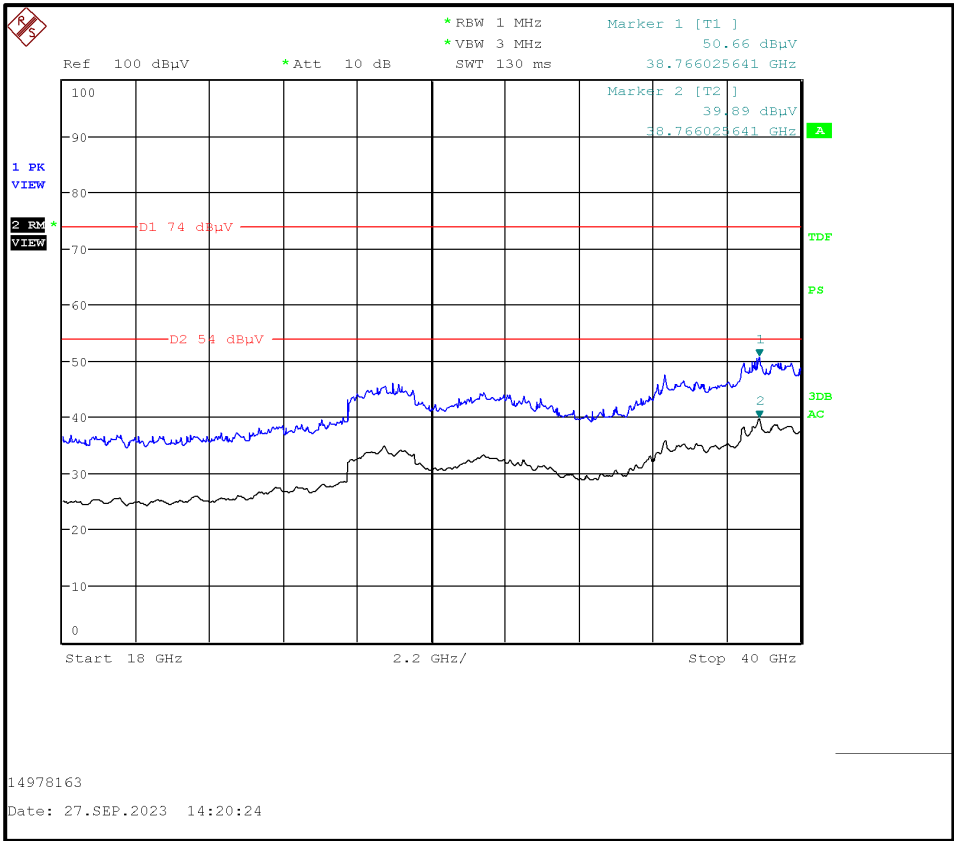
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 60

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



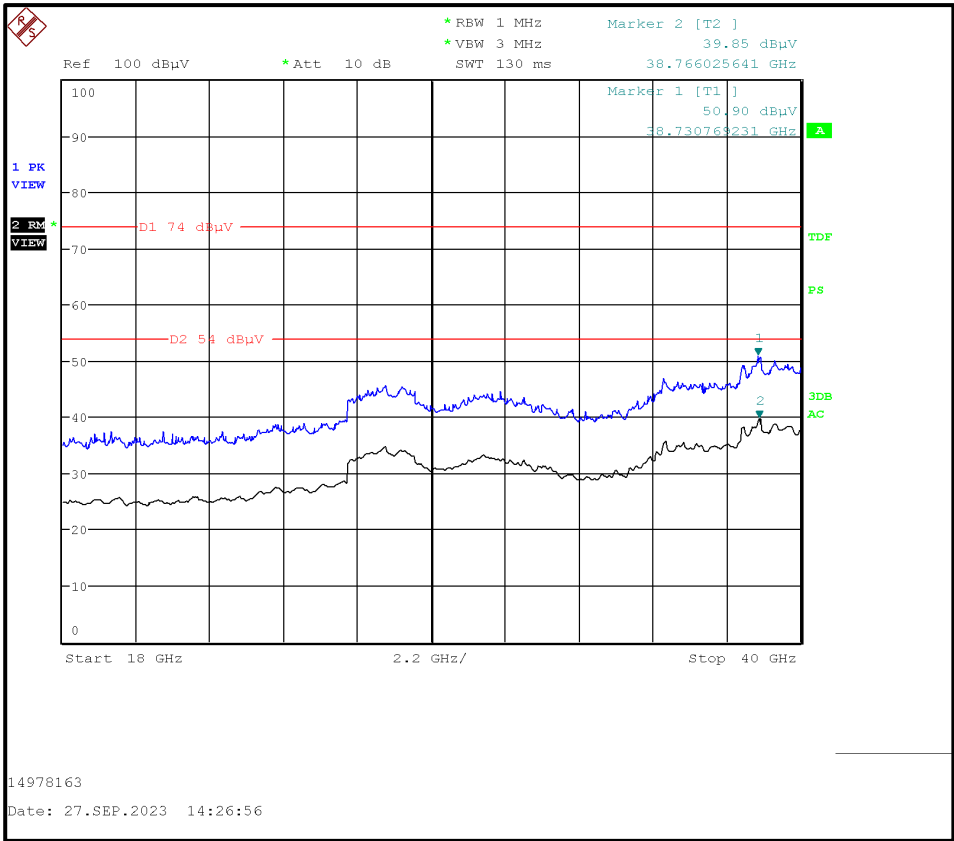
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 64

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



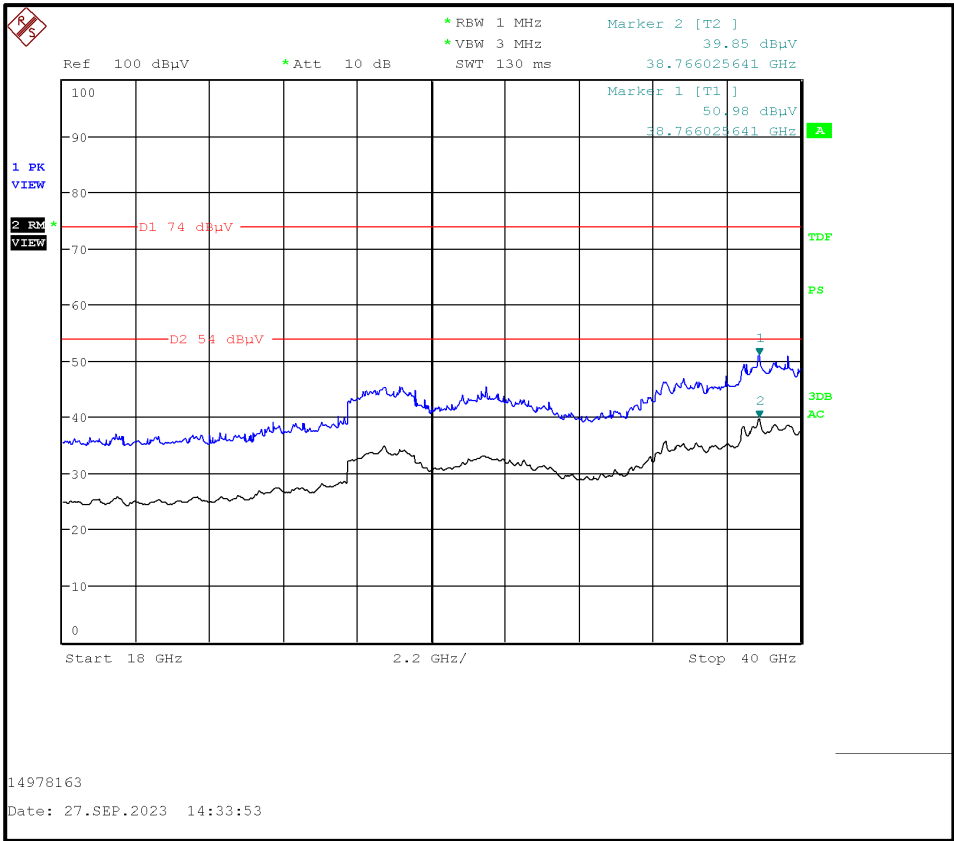
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 100

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



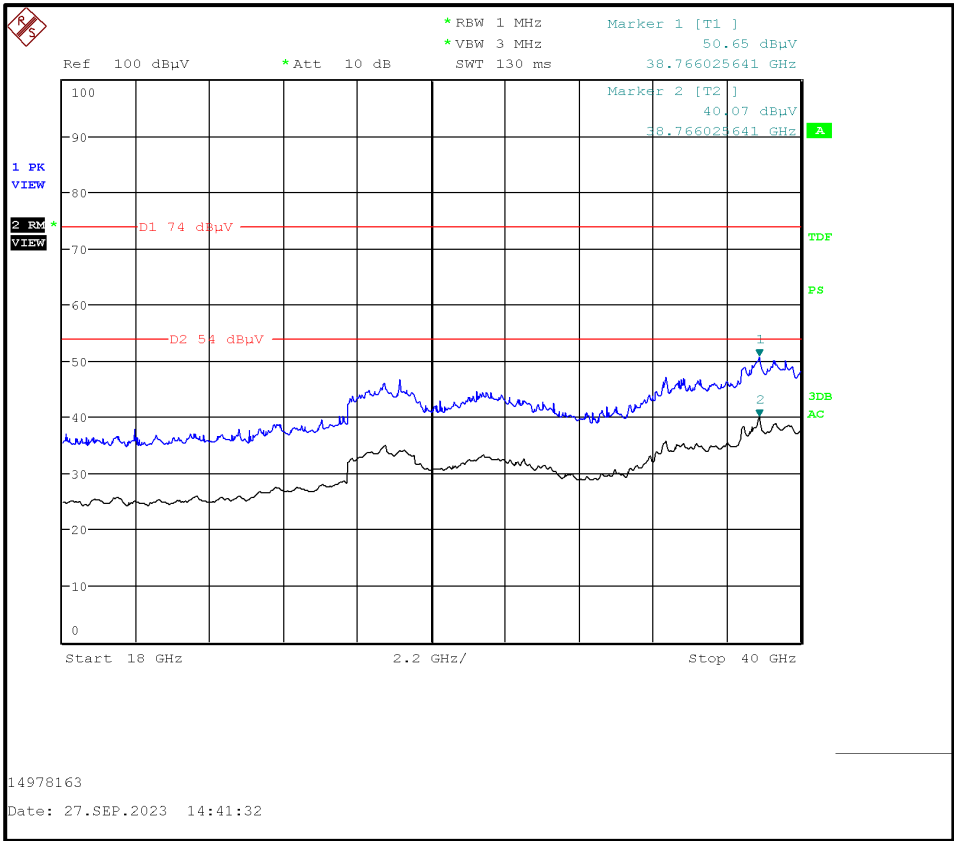
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 116

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



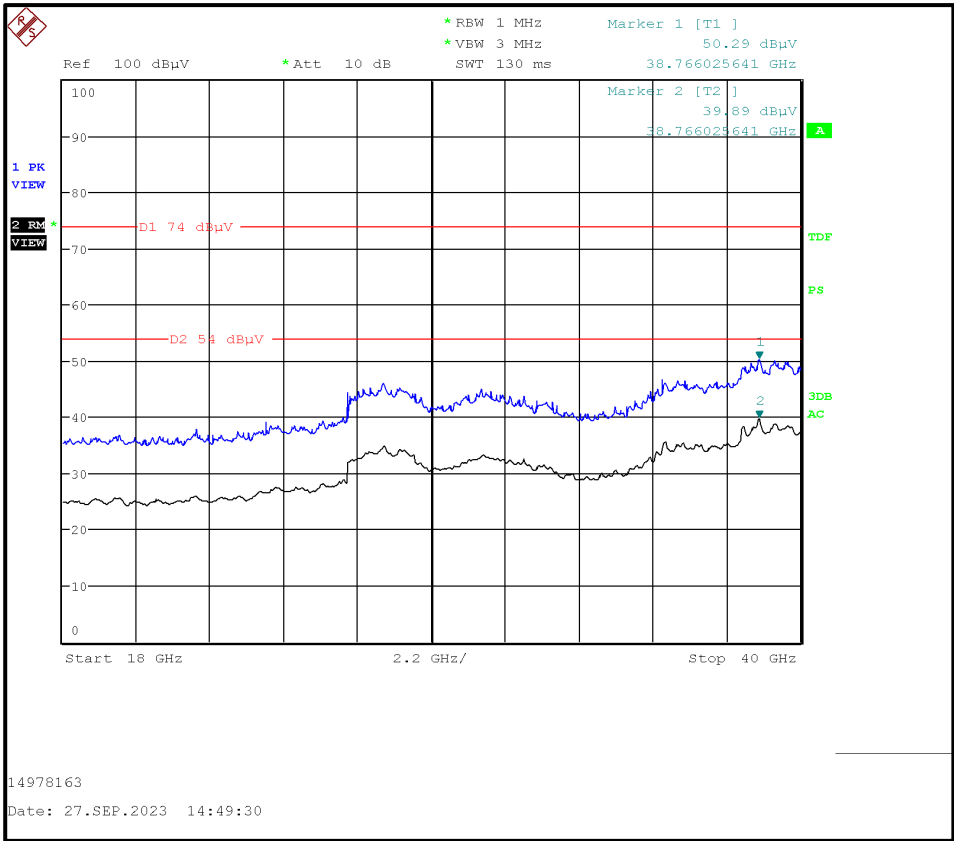
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 140

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



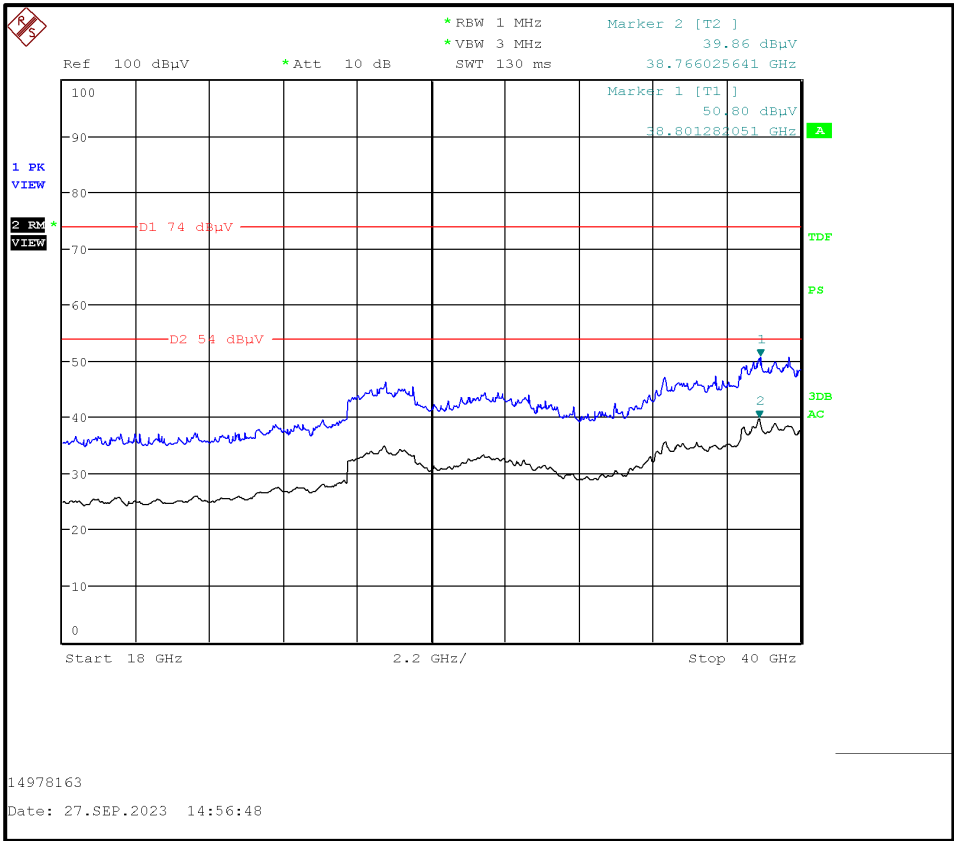
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 149

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



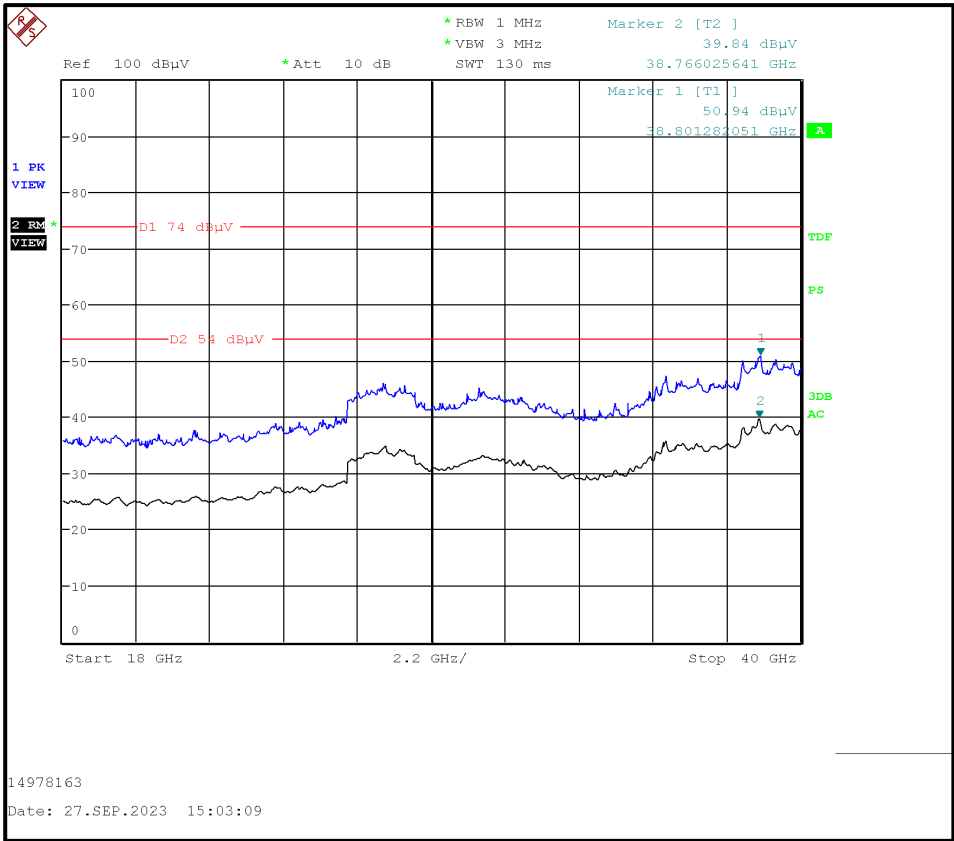
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 157

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



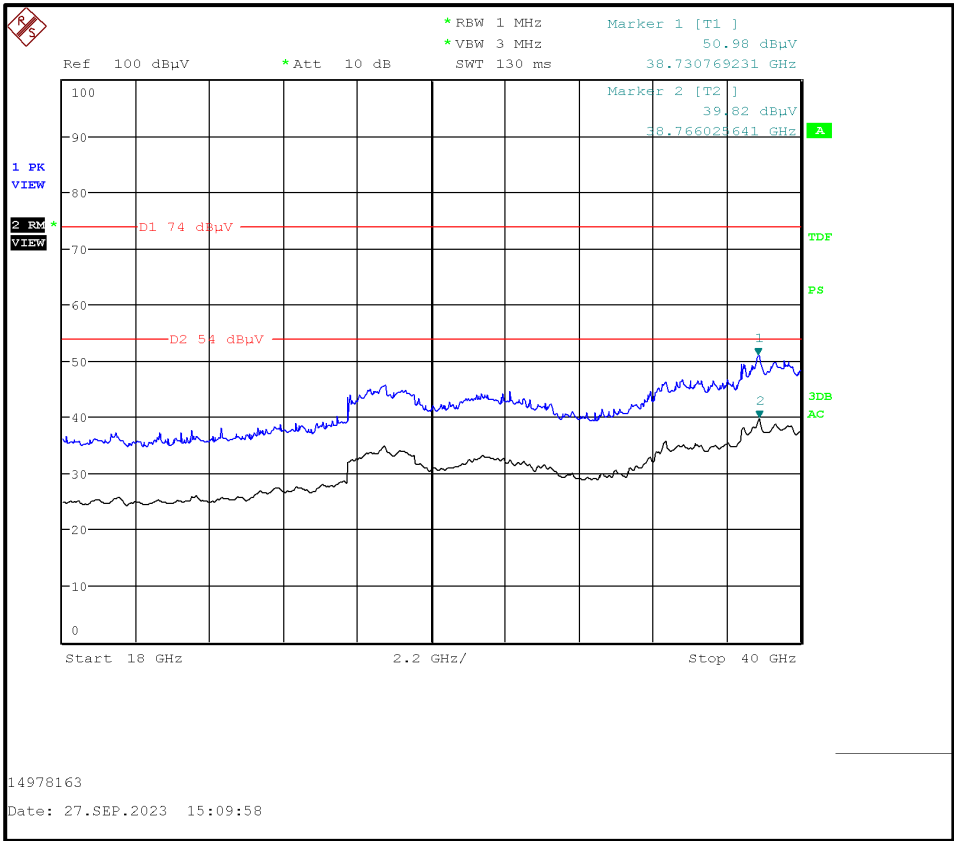
Result: Pass/

Transmitter Out of Band Radiated Emissions (5.15-5.85 GHz band operation) (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 54 Mbps / Channel 165

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
No critical emissions were detected					

Plot: Radiated Transmitter spurious emission from 18 GHz – 40 GHz



Result: Pass/

5.2.3. Transmitter Band Edge Radiated Emissions**Test Summary:**

Test Engineer:	Abbas Al-Hussainy	Test Date:	20 to 28 September 2023
Test Sample Serial Number:	1150003350		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.407(b)(1),(8), 15.205 & 15.209(a)
Test Method Used:	FCC KDB 789033 D02 Section II.G.1, II.G.2, II.G.3, II.G.5 & II.G.6 ANSI C63.10 Sections 6.3 and 6.6

Environmental Conditions:

Temperature (°C):	22 to 25
Relative Humidity (%):	44 to 55

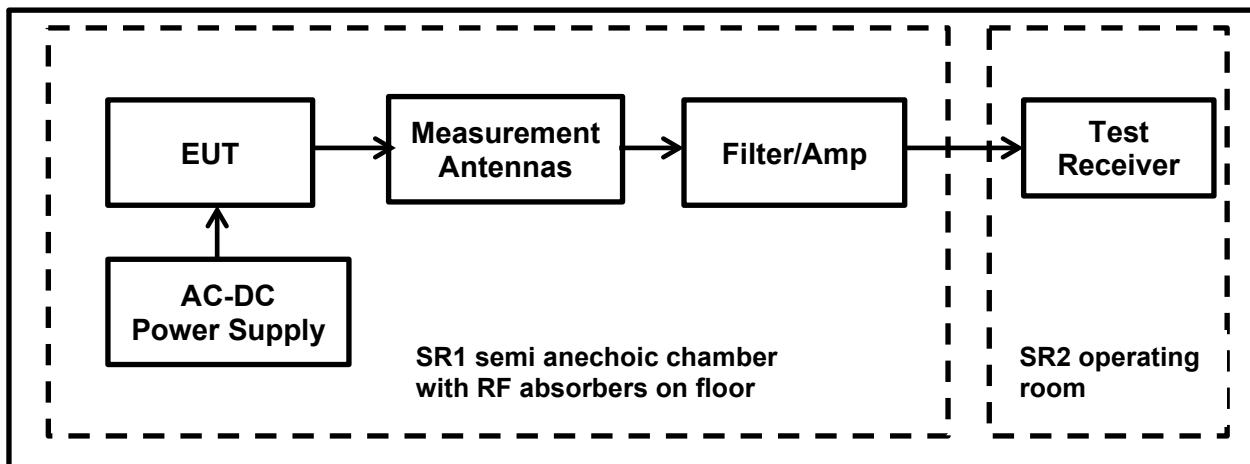
Notes:

1. According to FCC KDB 789033 D02 Section II.G.5 & II.G.6 Transmitter Band Edge Radiated Emissions were performed.)
2. The test receiver was set to RBW: 1 MHz | VBW: 3 MHz | Sweep time: Auto | Trace mode: max hold | Span: large enough to capture unwanted band edge emissions with trace stabilizations.
3. In accordance with KDB 789033 Section II.D.v), Method AD (vi), the average measurements were performed using an increased number of sweeps. A value of 300 was used for all measurements as this number ensured that the requirement $\text{Sweep} \geq 2 \times \text{Span} / \text{RBW}$ is met.
4. Transmitter Band Edge Radiated Emissions were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) with absorbers on the ground at a distance of 3 meters. The EUT was placed at a height of 1.5 meters above the test chamber floor in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna with tilting function enabled over the range 1 meter to 4 meters above the test chamber floor, in line with the EUT.
5. The maximum emissions around band edges were searched & are indicated with a marker placed on them.
6. For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz also for transmitters operating in the 5.47–5.725 GHz band: All emissions outside of the 5.47–5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz. However, there are restricted bands of operation below the lower band edge at 4.5-5.15 GHz and also at 5.35-5.46 GHz therefore the provisions of FCC Part 15.205 apply.
7. For unwanted emissions measured with Peak detector there are two limit possibilities:
 - According to FCC 15.209 peak limit (above 1 GHz) is 74 dBµV/m (restricted band limit)
 - According to FCC 15.407(b)(4)(i) peak limit is 68.2 dBµV/m (non-restricted band limit)
8. *Therefore, for UNII-1 unwanted emissions in restricted as well non restricted bands, measured with Peak detector lowest limit 68.2 dBµV/m has been applied.
9. Field strength measurements using peak and average detectors were performed in the restricted bands below 5.15 GHz and above 5.35 GHz.
10. For transmitters operating in the 5.725-5.850GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Transmitter Band Edge Radiated Emissions (continued)**Notes:**

11. As all radiated band edge measurements have been performed with R.B.W. 1 MHz; the limits in dBm / MHz can be converted to dBμV/m by adding a conversion factor of 95.2 (in accordance with KDB 789033 G.2.d)(iii)).
12. In accordance with ANSI C63.10 Section 12.7.7.2 Method AD g), for average measurements, data rates where the EUT was transmitting < 98% duty cycle, the duty cycle correction factor calculated in section 5.2.3 was added to the measured result.
13. As the continuous transmission of the EUT ($D \geq 98\%$) cannot be achieved and EUT was transmitting with different duty cycles w.r.t to different modes. Duty Cycle Correction Factors were added to all average measurements respectively according to the modes used to compensate as if it was transmitting with 100% duty cycle.

Mode	Duty cycle	Correction factor
a-mode	91.95	0.36
ac80-mode	34.76	13.20

Test Setup:

Transmitter Band Edge Radiated Emissions (continued)**Results: AC-DC Power Supply / UNII-1 & UNII-2A / 802.11a / 20 MHz / 54 Mbps****Results: CH36 / Lower Band Edge / Peak**

Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
5148.80	57.58	68.20*	10.62	Complied
5150.00	57.22	68.20*	10.98	Complied

Results: CH36 / Lower Band Edge / Average

Frequency (MHz)	Average Level (dB μ V/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
5145.50	40.65	0.36	41.01**	54.00	12.99	Complied
5150.00	40.02	0.36	40.38**	54.00	13.62	Complied

Results: CH48 / Upper Band Edge / Peak

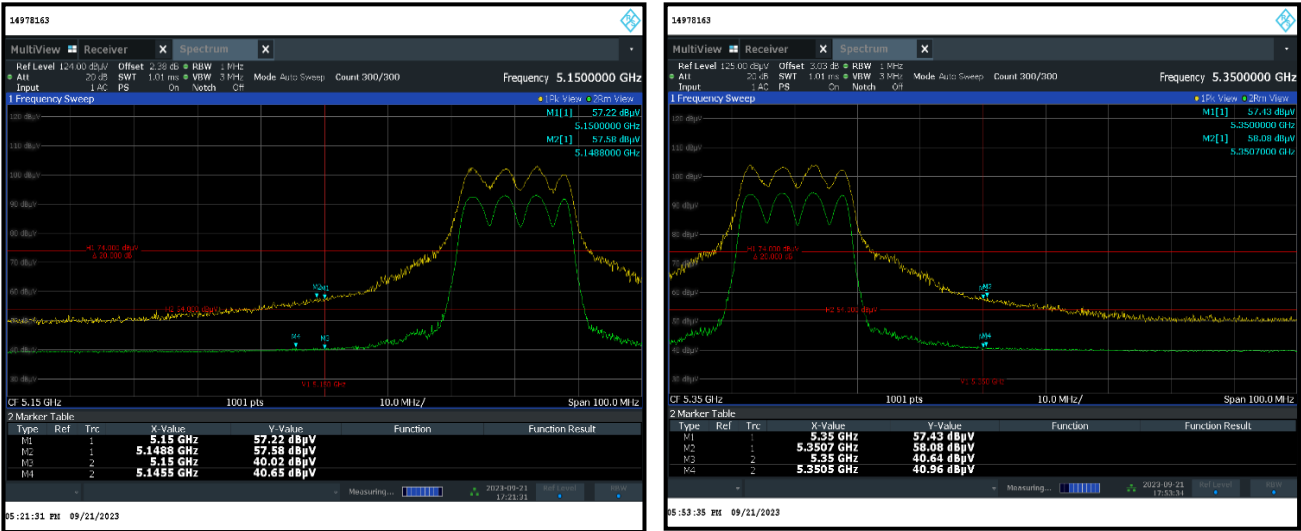
Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
5350.00	57.43	68.20*	10.77	Complied
5350.70	58.08	68.20*	10.12	Complied

Results: CH48 / Upper Band Edge / Average

Frequency (MHz)	Average Level (dB μ V/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
5350.00	40.64	0.36	41.00**	54.00	13.00	Complied
5350.50	40.96	0.36	41.32**	54.00	12.68	Complied

Transmitter Band Edge Radiated Emissions (continued)

Results: AC-DC Power Supply / UNII-1 & UNII-2A / 802.11a / 20 MHz / 54 Mbps



Lower Band Edge Measurement

Upper Band Edge Measurement

Result: Pass



Transmitter Band Edge Radiated Emissions (continued)**Results: AC-DC Power Supply / UNII-1 / 802.11ax (SU) / 80 MHz / MCS0****Results: CH42 / Lower Band Edge / Peak**

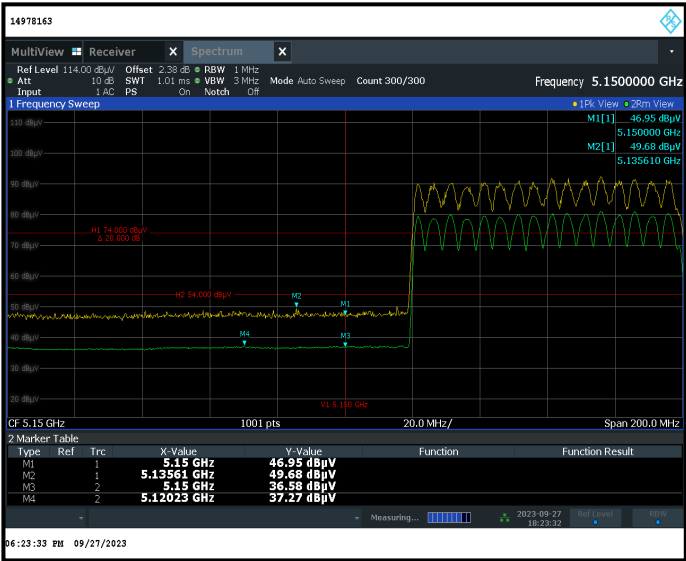
Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
5135.61	49.68	68.20*	18.52	Complied
5150.00	46.95	68.20*	21.25	Complied

Results: CH42 / Lower Band Edge / Average

Frequency (MHz)	Average Level (dB μ V/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
5120.23	37.27	13.20	50.47**	54.00	3.53	Complied
5150.00	36.58	13.20	49.78**	54.00	4.22	Complied

Transmitter Band Edge Radiated Emissions (continued)

AC-DC Power Supply / 802.11ax (SU) / UNII-1 / 802.11a / 80 MHz / MCS0



Lower Band Edge Measurement

Result: Pass

Transmitter Band Edge Radiated Emissions (continued)**Results: AC-DC Power Supply / UNII-2A / 802.11ax (SU) / 40 MHz / MCS0****Results: CH62 / Upper Band Edge / Peak**

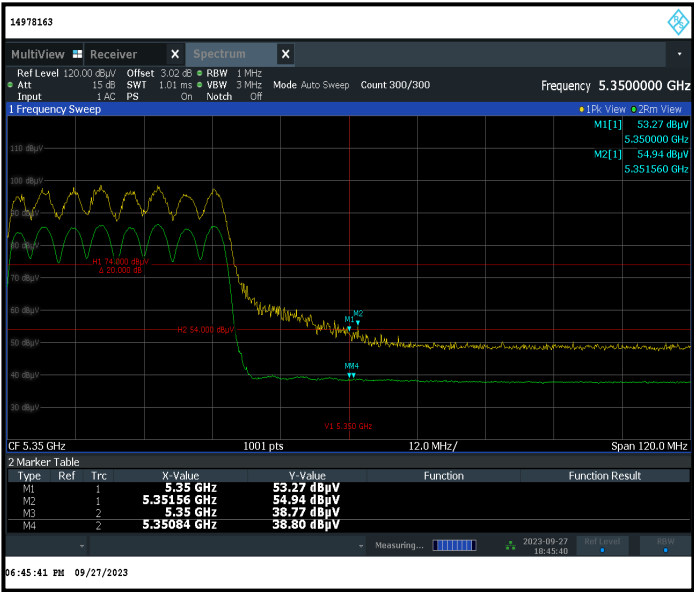
Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
5351.56	54.94	68.20*	13.26	Complied
5350.00	53.27	68.20*	14.93	Complied

Results: CH62 / Upper Band Edge / Average

Frequency (MHz)	Average Level (dB μ V/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
5350.84	38.80	13.20	52.00**	54.00	2.00	Complied
5350.00	38.77	13.20	51.97**	54.00	2.03	Complied

Transmitter Band Edge Radiated Emissions (continued)

Results: AC-DC Power Supply / 802.11ax (SU) / UNII-2A / 802.11a / 40 MHz / MCS0



Upper Band Edge Measurement

Result: Pass



Transmitter Band Edge Radiated Emissions (continued)**Results: AC-DC Power Supply / UNII-2C / 802.11a / 20 MHz / 54 Mbps****Results: CH100 / Lower Band Edge / Peak**

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5469.00	57.95	68.20*	10.25	Complied
5470.00	56.60	68.20*	11.60	Complied

Results: CH100 / Lower Band Edge / Average

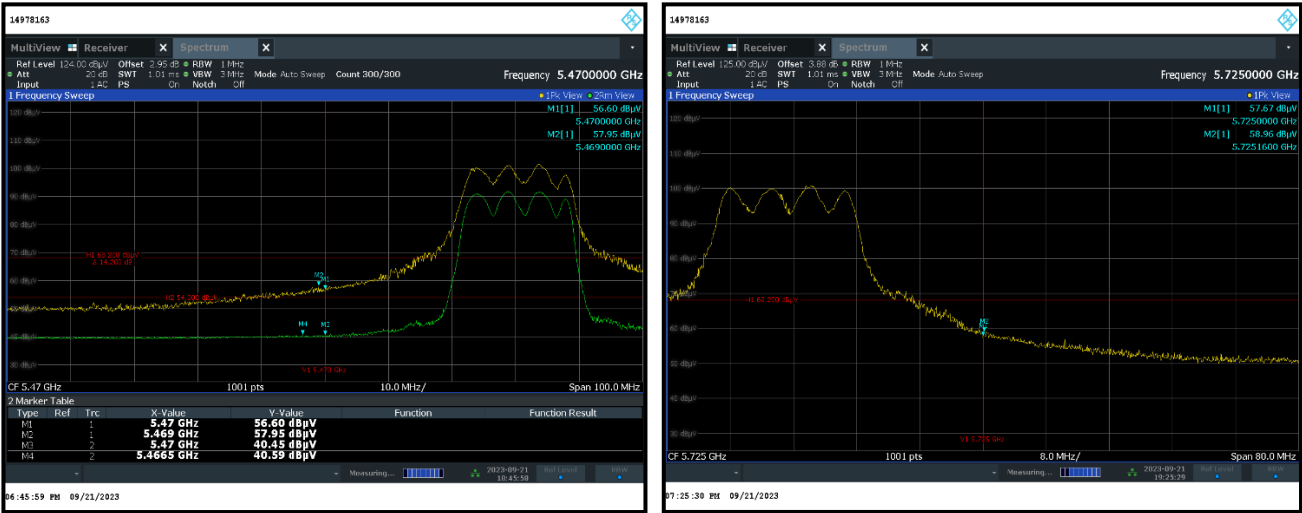
Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
5466.50	40.59	0.36	40.95**	54.00	13.05	Complied
5470.00	40.45	0.36	40.81**	54.00	13.19	Complied

Results: CH140 / Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5725.16	58.96	68.20*	9.24	Complied
5725.00	57.67	68.20*	10.53	Complied

Transmitter Band Edge Radiated Emissions (continued)

Results: AC-DC Power Supply / UNII-2C / 802.11a / 20 MHz / 54 Mbps



Lower Band Edge Measurement

Upper Band Edge Measurement

Result: Pass



Transmitter Band Edge Radiated Emissions (continued)**Results: AC-DC Power Supply / UNII-2C / 802.11ax (SU) / 40 MHz / MCS0****Results: CH102 / Lower Band Edge / Peak**

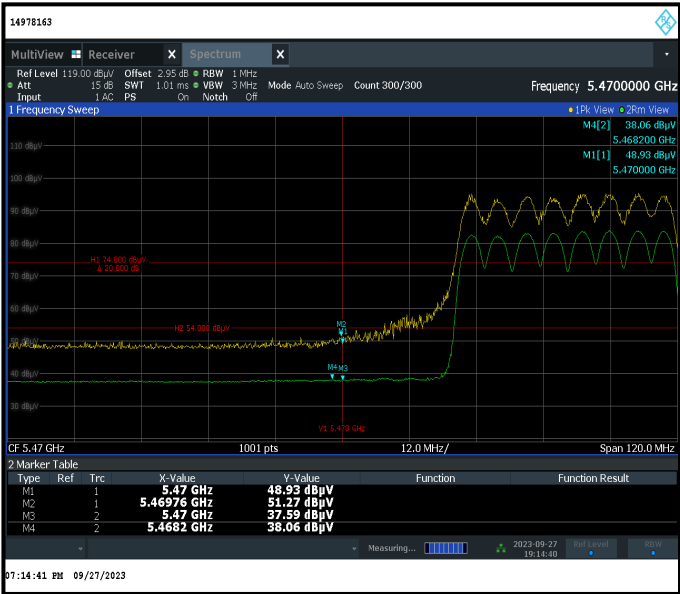
Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5469.76	51.27	68.20*	16.93	Complied
5470.00	48.93	68.20*	19.27	Complied

Results: CH102 / Lower Band Edge / Average

Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
5468.20	38.06	54.00	15.94	Complied
5470.00	37.59	54.00	16.41	Complied

Transmitter Band Edge Radiated Emissions (continued)

Results: AC-DC Power Supply / UNII-2C / 802.11ax (SU) / 40 MHz / MCS0



Lower Band Edge Measurement

Result: Pass

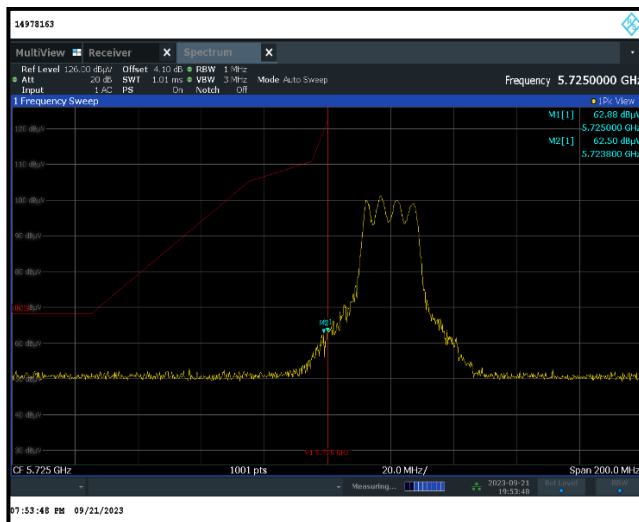
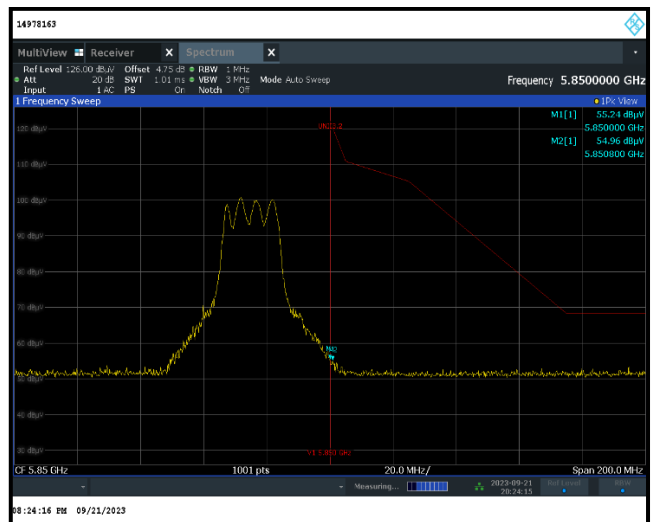


Transmitter Band Edge Radiated Emissions (continued)**Results: AC-DC Power Supply / UNII-3 / 802.11a / 20 MHz / 54 Mbps****Results: CH149 / Lower Band Edge**

Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
5723.80	62.50	110.8	48.30	Complied
5725.00	62.88	122.2	59.32	Complied

Results: CH165 / Upper Band Edge

Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
5480.80	54.96	110.8	55.84	Complied
5850.00	55.24	122.2	66.96	Complied

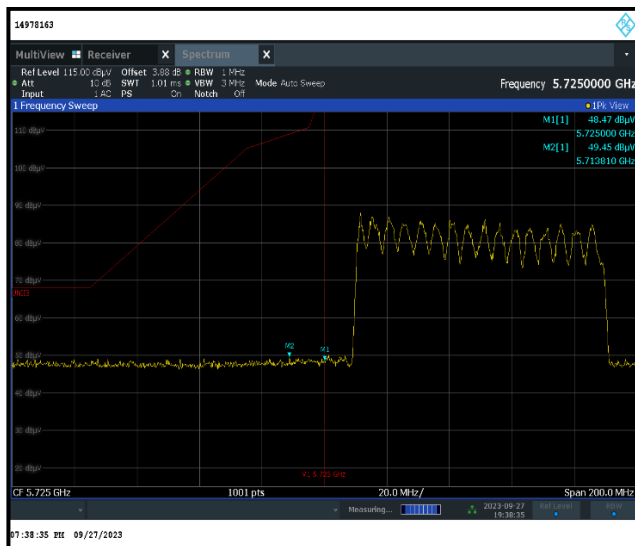
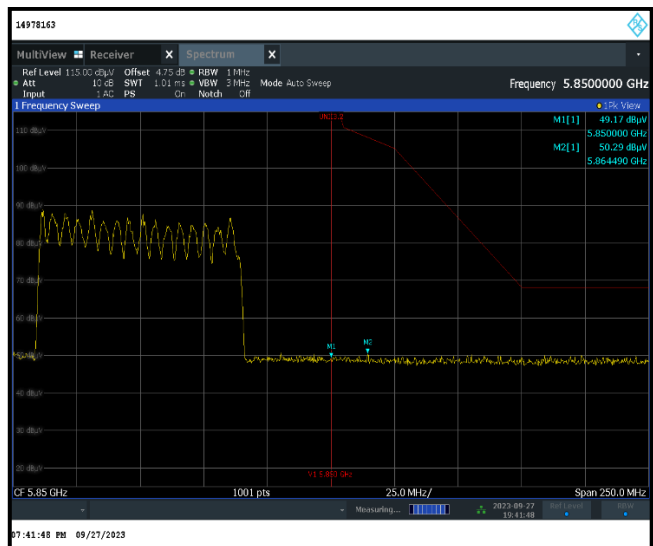
Plots: AC-DC Power Supply / UNII-3 / 802.11a / 20 MHz / 54 Mbps**Lower Band Edge Measurement****Upper Band Edge Measurement****Result: Pass**

Transmitter Band Edge Radiated Emissions (continued)**Results: AC-DC Power Supply / UNII-3 / 802.11ax (RU996-67) / 80 MHz / MCS0****Results: CH155 / Lower Band Edge**

Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
5713.81	49.45	110.8	61.35	Complied
5725.00	48.47	122.2	73.73	Complied

Results: CH155 / Upper Band Edge

Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
5864.49	50.29	110.8	60.51	Complied
5850.00	49.17	122.2	73.03	Complied

Plots: AC-DC Power Supply / UNII-3 / 802.11ax (RU996-67) / 80 MHz / MCS0**Lower Band Edge Measurement****Upper Band Edge Measurement****Result: Pass**

6. Measurement Uncertainty

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Confidence Level (%)	Calculated Uncertainty
Radiated Spurious Emissions	95%	±3.10 dB
Band Edge Radiated Emissions	95%	±3.10 dB
Transmitter Duty Cycle	95%	±3.4%

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Used equipment

Test site: SR 1/2

ID	Manufacturer	Type	Model	Serial	Calibration Date	Cal. Cycle (months)
1	Rohde & Schwarz	Antenna, Loop	HFH2-Z2	831247/012	18/07/2023	36
377	BONN Elektronik	Amplifier, Low Noise Pre	BLMA 0118-1A	025294B	18/07/2023	12
423	Bonn Elektronik	Amplifier, Low Noise Pre	BLMA 1840-1A	55929	18/07/2023	12
460	Deisel	Turntable	DT 4250 S	n/a	n/a	n/a
465	Schwarzbeck	Antenna, Trilog Broadband	VULB 9168	9168-240	02/09/2020	42
496	Rohde & Schwarz	Antenna, log. - periodical	HL050	100297	22/08/2022	24
588	Maturo	Controller	NCD	029/7180311	n/a	n/a
591	Rohde & Schwarz	Receiver	ESU 40	100244/040	13/07/2023	12
669	Rohde & Schwarz	EMI Test Receiver	ESW 44	103087	13/07/2023	18
607	Schwarzbeck	Antenna broadband horn antenna	BBHA 9170	9170-561	15/10/2019	48
608	Rohde & Schwarz	Switch Matrix	OSP 120	101227	lab verification	n/a
628	Maturo	Antenna mast	CAM 4.0-P	224/19590716	n/a	n/a
629	Maturo	Kippeinrichtung	KE 2.5-R-M	MAT002	n/a	n/a
-/-	Testo	Thermo-Hygrometer	608-H1	01	lab verification	n/a
328	SPS	AC/DC power distribution system	PAS 5000	A2464 00/2 0200	lab verification	n/a
1603665	Siemens Matsushita Components	semi-anechoic chamber SR1/ 2	-/-	B83117-A1421-T161	n/a	n/a
681	Maturo	Antenna mast, tilting	BAM4.5-P	402/0718.1	n/a	n/a

8. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	100	-	Initial Version