



Solutions

TEST REPORT

Test Report No.: UL-RPT-RP-14642160-7316-FCC

Applicant * : Visteon Electronics Germany GmbH
Model No. * : DDU
FCC ID * : 2AA98-DDU
Technology * : WLAN 5 GHz (802.11 a, n, ac)
Test Standard(s) : **FCC Parts 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 2.0 supersede Version 1.3 with immediate effect**
Test Report No. UL-RPT-RP-14642160-7316-FCC Version 2.0, Issue Date 12 FEBRUARY 2024 replaces
Test Report No. UL-RPT-RP-14642160-7316-FCC Version 1.3, Issue Date 30 JANUARY 2024, which is no longer valid.
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: 12 February 2024

Approved by: Rachid Acharkaoui
Title: Operations Manager
Date: 12 February 2024



Deutsche
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This laboratory is accredited by DAkkS.
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:	Visteon Electronics Germany GmbH
Company Address:	Amalienbadstr.41a 76227, Karlsruhe Germany
Contact Person:	Nikhil Patil
Contact E-Mail Address:	+49-162-1332246
Contact Phone No.:	nikhil.patil@visteon.com

1.2.Manufacturer Information

Company Name:	Visteon Electronics Germany GmbH
Company Address:	Amalienbadstr.41a 76227, Karlsruhe Germany
Contact Person:	Nikhil Patil
Contact E-Mail Address:	+49-162-1332246
Contact Phone No.:	nikhil.patil@visteon.com

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:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section15.209

Location

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

Date information

Order Date:	05 January 2023
EUT Arrived:	19 June 2023
Test Dates:	01 September 2023 to 02 February 2024
EUT Returned:	-/-

2.2. Summary of Test Results

Clause	Measurement (5.15-5.25 GHz band)	Complied	Did not comply	Not performed	Not applicable
Part 15.207	Transmitter AC Conducted Emissions ⁽¹⁾	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Part 15.403(i)	Transmitter 26 dB Emission Bandwidth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.35(c)	Transmitter Duty Cycle ⁽²⁾	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.407(e)	Transmitter 6 dB Emission Bandwidth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.407(a)(1)(iv)	Transmitter Maximum Conducted Output Power	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.407(a)(1)(iv)	Transmitter Peak Power Spectral Density	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.407(b)/15.209(a)	Transmitter Out of Band Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.407(b)/15.209(a)	Transmitter Band Edge Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.407(g)	Transmitter Frequency Stability ⁽³⁾ (Temperature & Voltage Variation)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.407(h)(1)	Transmitter Power Control ⁽⁴⁾	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>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.</p>					

Note(s):

1. The EUT is vehicle equipment and will be powered by the battery of the vehicle, therefore no AC conducted emission tests are required.
2. The measurement was performed to assist in the calculation of the level of emissions.
3. As per applicant’s user manual Frequency stability is better than ± 20 ppm which ensures that the signal remains in the allocated bands under all operational conditions stated in the user manual.
4. Not applicable as EUT does not support operations in 5.25-5.35 GHz band and the 5.47-5.725 GHz band.

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:	VISTEON
Model Name or Number:	DDU
Test Sample Serial Number:	DDU-ADV, ADVC200008 (Radiated Test Sample)
Hardware Version Number:	000C
Firmware Version Number:	n/a
FCC ID:	2AA98-DDU

Brand Name:	VISTEON
Model Name or Number:	DDU
Test Sample Serial Number:	DDU-ADV, ADVC200009 (Conducted Test Sample)
Hardware Version Number:	000C
Firmware Version Number:	n/a
FCC ID:	2AA98-DDU

3.2. Description of EUT *

The equipment under test was an In-Vehicle-Infotainment, contains Model Name: DDU supporting WLAN 5 GHz a-, n-, ac-modes operations in 5150-5250 MHz U-NII-1 and 5725-5850 MHz U-NII-3 bands.

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) / Digital Transmission System		
Type of Unit:	Transceiver		
Supported Modulation Types:	OFDM		
Supported Data rates:	802.11a	6,9,12,18,24,36,48,54 Mbit/s (SISO)	
	802.11n HT20/40	MCS0 - MCS7 (SISO)	
	802.11ac VHT20/40/80	MCS0 – MCS9 (SISO)	
Power Supply Requirement(s):	28 V DC		
Antenna Type:	External Antenna		
Antenna Description:	Impedance 50 Ohms		
Declared Antenna Gain:	0.0 dBi		
Measured Maximum Conducted Output Power:	16.84 dBm		
Transceiver Frequency Band:	5150 MHz to 5250 MHz [U-NII-1 Band]		
Nominal Channel Bandwidth	20 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	36	5180
	Middle	44	5220
	Top	48	5240
Nominal Channel Bandwidth	40 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	38	5190
	Top	46	5230
Nominal Channel Bandwidth	80 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Middle	42	5210

Additional Information Related to Testing * (continued)

Transceiver Frequency Band:	5725 MHz to 5850 MHz [U-NII-3 Band]		
Nominal Channel Bandwidth	20 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	149	5745
	Middle	157	5785
	Top	165	5825
Nominal Channel Bandwidth	40 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	151	5755
	Top	159	5795
Nominal Channel Bandwidth	80 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Middle	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	Laptop with Qualcomm Radio Control Tool QRCT Ver 4.0.211.0	HP	Probook 650 G1	5CG6143YWB

B. Support Equipment (Manufacturer supplied) *

Item	Description	Brand Name	Model Name or Number	Serial Number
1	Driver Truck Display With Antenna	Visteon	Scania 2886824	-/-

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

Continuously transmitting modulated carrier with maximum power setting and a combination of: ^{*(1)}

- a-Mode | 6,9,12,18,24,36,48,54 Mbps | Packet size 1500 | Power Level 13 | SISO
- n-Mode HT20/40 | MCS0 - MCS7 | Packet size 1500 | Power Level 13 | SISO
- ac-Mode VHT20 | MCS0 - MCS9 | Packet size 1500 | Power Level 12 | SISO
- ac-Mode VHT40/80 | MCS0 - MCS9 | Packet size 1500 | Power Level 10 | SISO

^{*(1)} According to the RF output power following data rates were determined to be the worst cases per mode and therefore, all further measurements were performed only with these worst-case modes.

- a-mode: 48 Mbps
- n-mode HT20: MCS6 (UNII-I)
- n-mode HT20: MCS7 (UNII-3)
- ac-mode VHT20: MCS6

4.2. Configuration and Peripherals

- The customer supplied document containing the setup instructions "Procedure_for_running_RF_test_using_QRCT_Scania.pdf" was used for configuration.

EUT Power Supply:

- The EUT was powered with 28V DC via an external AC/DC power supply.

Test Mode Activation:

- The EUT can be connected with the Test laptop via USB cables supplied by the customer.
- The test modes were activated by Qualcomm Radio Control Tool.

Conducted Measurements:

- All conducted measurements were carried out by using conducted sample with SMA RF Cable soldered on the antenna output of the DUT by customer.

Radiated Measurements:

- Radiated measurements were performed with the radiated test sample with the external antenna.
- The EUT with its external antenna was evaluated for the worst-case position w.r.t to maximum radiated power measured and following position of the EUT and antenna was found out to be the worst case. Therefore, this report includes relevant results.
 - Worst-case: EUT laying and the external antenna in standing position
- 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.
- As the continuous transmission of the EUT (D ≥ 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.

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 26 dB Emission Bandwidth

Test Summary:

Test Engineer:	Muhammad Faiq Khan	Test Date:	7 September 2023 to 02 February 2024
Test Sample Serial Number:	DDU-ADV, ADV200009 (Conducted Test Sample)		
Test Site Identification	SR 9		

FCC Reference:	Part 15.403(i)
Test Method Used:	FCC KDB 789033 D02 Section II.C.1.

Environmental Conditions:

Temperatures (°C):	21.0 to 23.8
Relative Humidity (%):	49.0 to 58.1

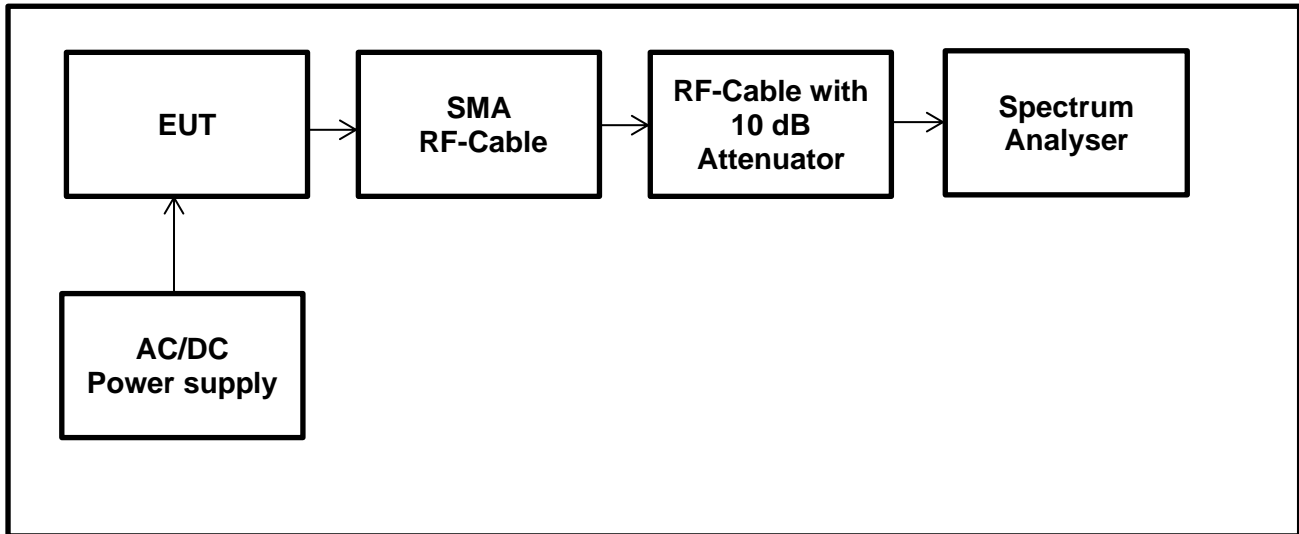
Notes:

1. All configurations supported by the EUT were investigated on the one channel in accordance with KDB 789033 Section II.C.1. Emission Bandwidth (EBW) test procedure.
2. The spectrum analyser resolution bandwidth was set to approximately 1% of the emission bandwidth and video bandwidth approximately 3 x RBW. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The Emission Bandwidth was measured at 26 dB down from the peak of the signal.
3. Measurements performed only with worst-case data rates.
4. Final measurements were performed using the below configurations on the bottom, middle and top channels.
5. The RF port on the EUT was connected to the spectrum analyser using suitable attenuation and RF cable. The measured values takes into consideration the external attenuation correction factors.
 - The SMA (Female) RF Cable soldered on PCB with maximum attenuation of 0.7 dB at the tested frequencies.
 - The RF cable attenuation maximum 1.4 dB@ 5 GHz from the EUT to Analyzer including the 10 dB attenuation at the input of Spectrum Analyzer

Therefore, total a reference level offset 12.1 dB was added to each of the at the tested frequencies conducted plots.

Transmitter 26 dB Emission Bandwidth (continued)

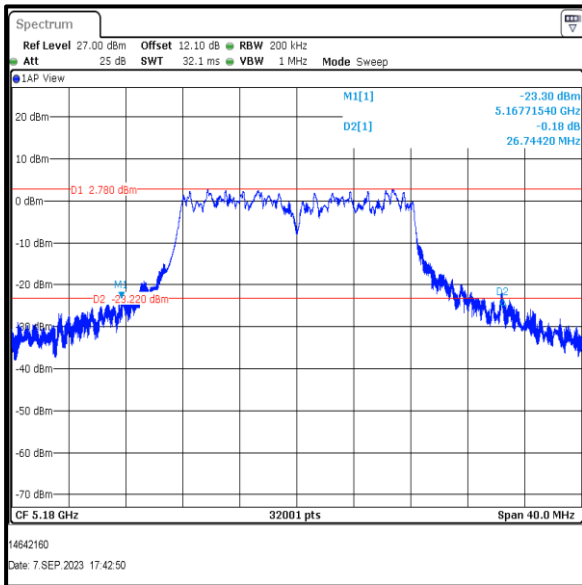
Test Setup (AC-DC Power Supply):



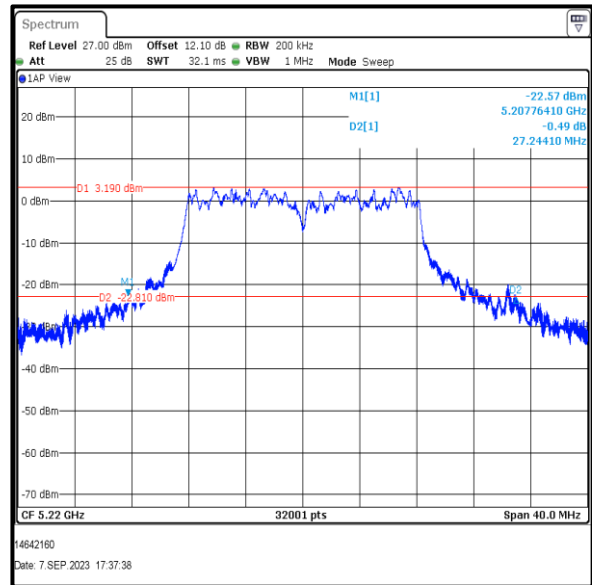
Transmitter 26 dB Emission Bandwidth (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 48 Mbps / PWR 13 / UNII-1

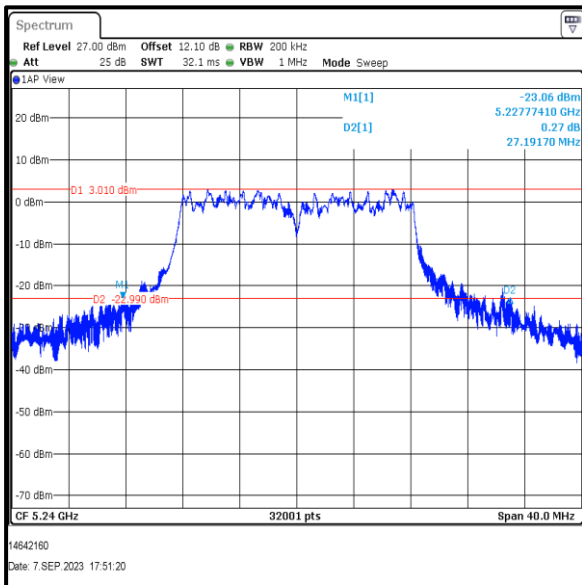
Channel	26 dB Emission Bandwidth (MHz)
Bottom	26.744
Middle	27.244
Top	27.192



Bottom



Middle



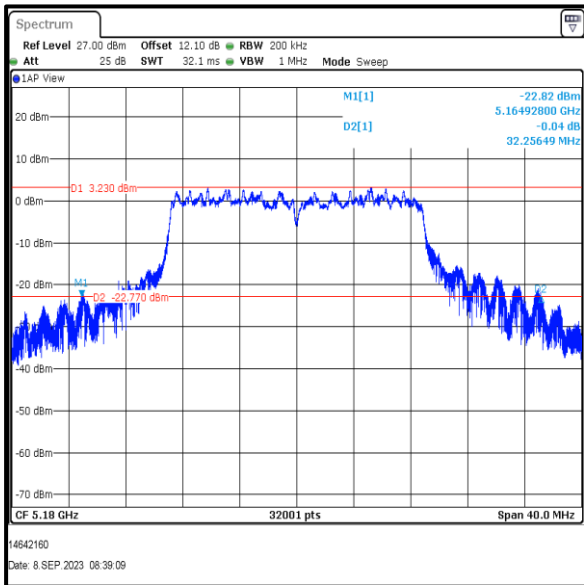
Top

Result: Pass

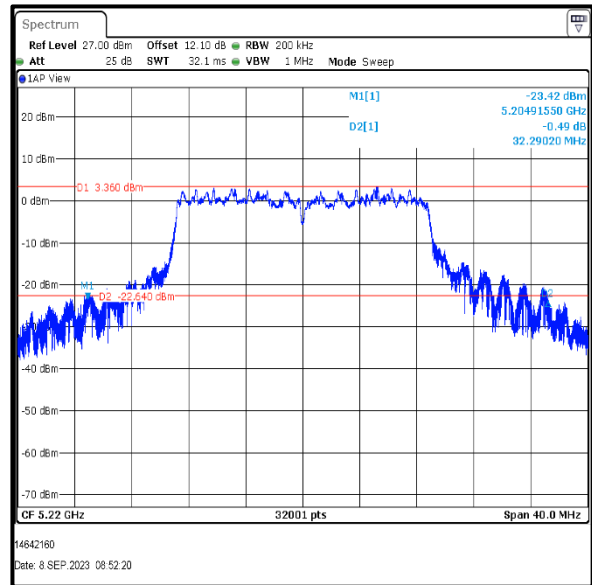
Transmitter 26 dB Emission Bandwidth (continued)

Results: AC-DC Power Supply / 802.11n / 20 MHz / MCS6 / PWR 13 / UNII-1

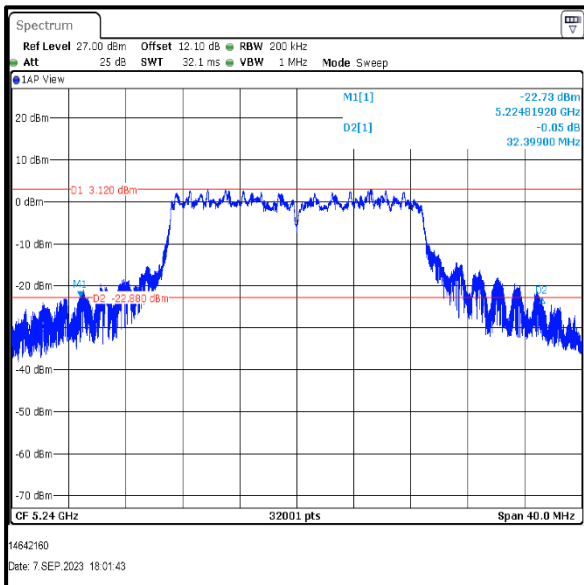
Channel	26 dB Emission Bandwidth (MHz)
Bottom	32.256
Middle	32.290
Top	32.399



Bottom



Middle



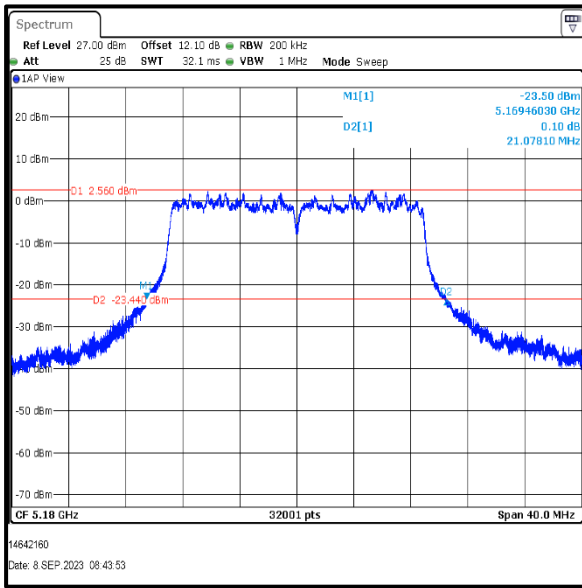
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Result: Pass

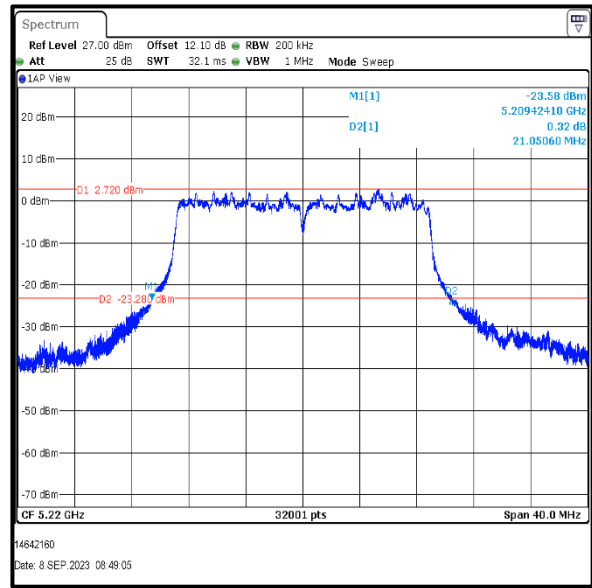
Transmitter 26 dB Emission Bandwidth (continued)

Results: AC-DC Power Supply / 802.11ac / 20 MHz / MCS6 / PWR 12 / UNII-1

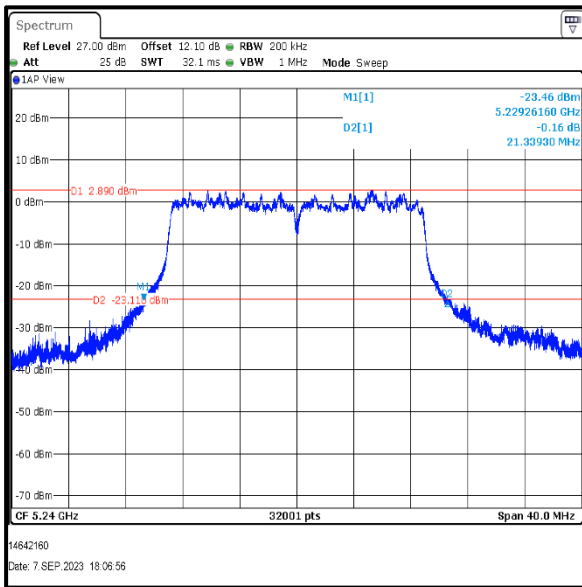
Channel	26 dB Emission Bandwidth (MHz)
Bottom	21.078
Middle	21.051
Top	21.339



Bottom



Middle



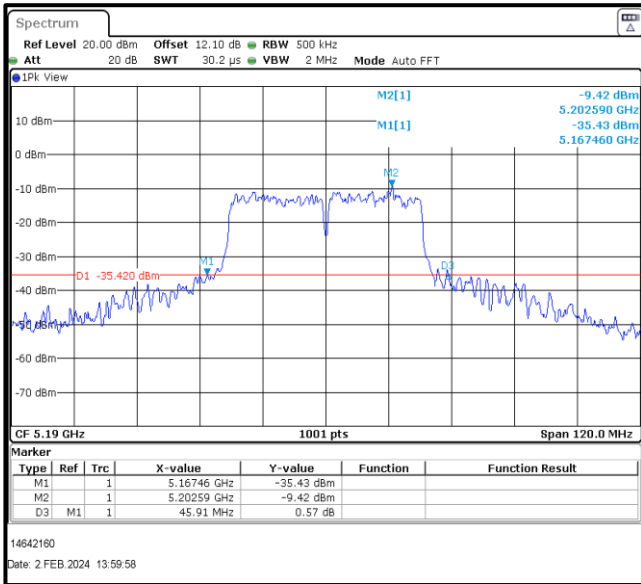
Top

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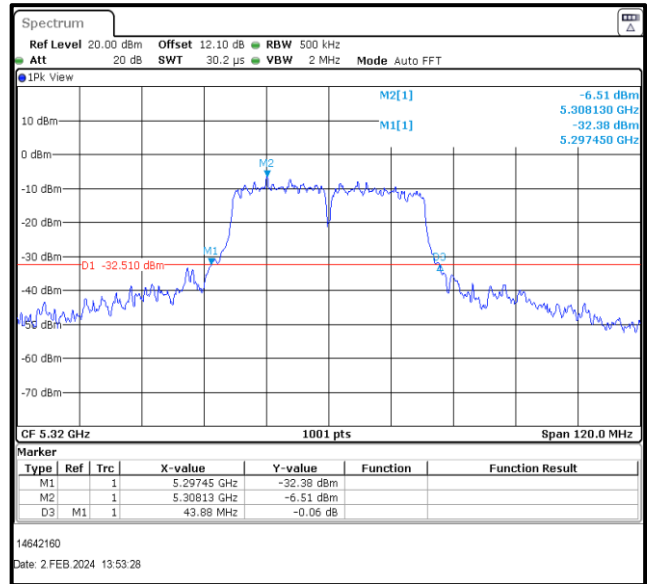
Transmitter 26 dB Emission Bandwidth (continued)

Results: AC-DC Power Supply / 802.11n / 40 MHz / MCS4 / PWR 13 / UNII-1

Channel	26 dB Emission Bandwidth (MHz)
Bottom	45.91
Top	43.88



Bottom



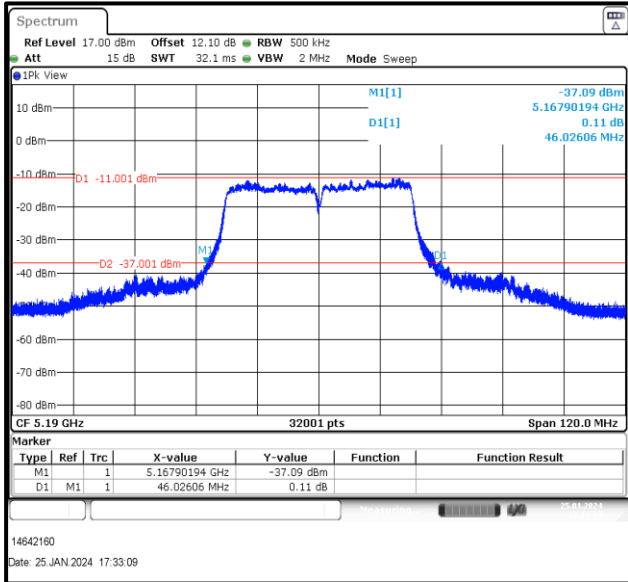
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Result: Pass

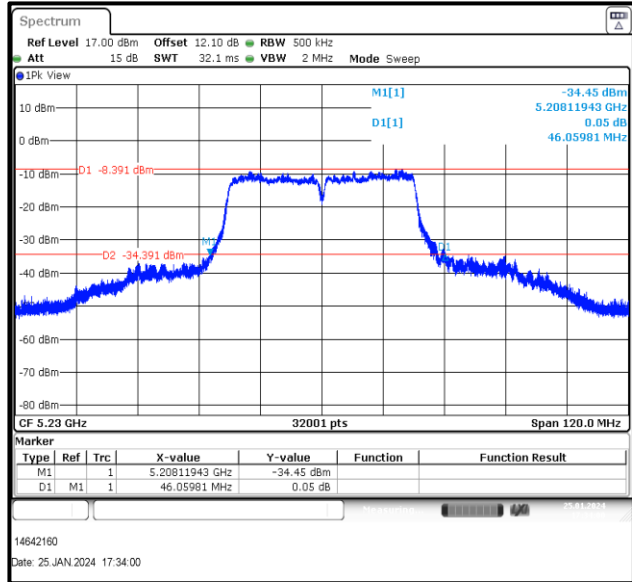
Transmitter 26 dB Emission Bandwidth (continued)

Results: AC-DC Power Supply / 802.11ac / 40 MHz / MCS3 / PWR 10 / UNII-1

Channel	26 dB Emission Bandwidth (MHz)
Bottom	46.02
Top	46.05



Bottom



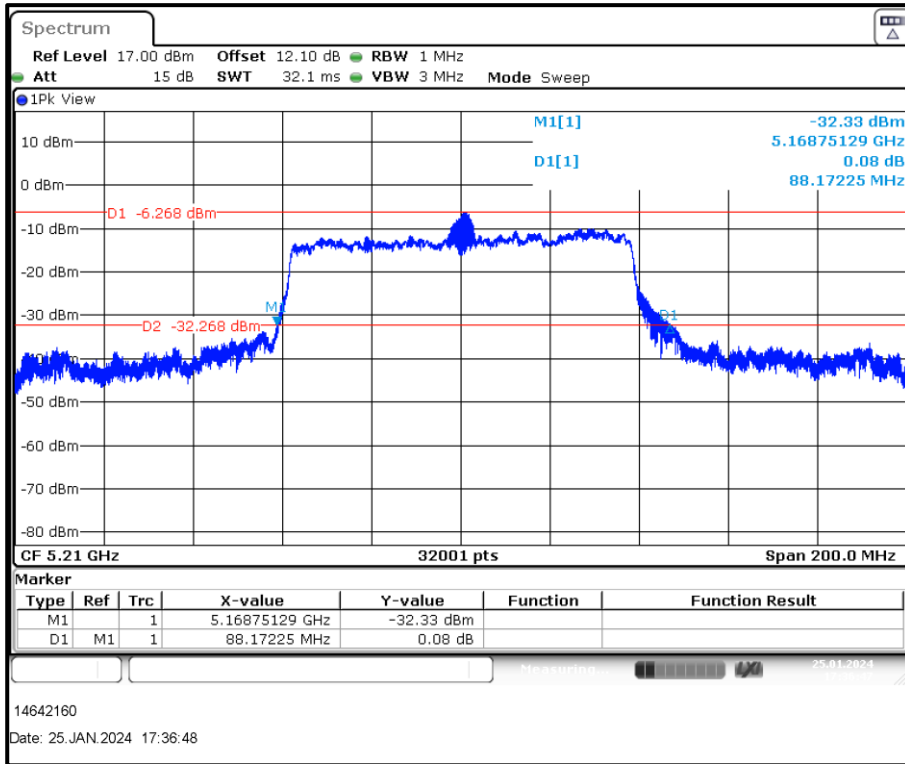
Top

Result: Pass

Transmitter 26 dB Emission Bandwidth (continued)

Results: AC-DC Power Supply / 802.11ac / 80 MHz / MCS5 / PWR 10 / UNII-1

Channel	26 dB Emission Bandwidth (MHz)
Single	88.17

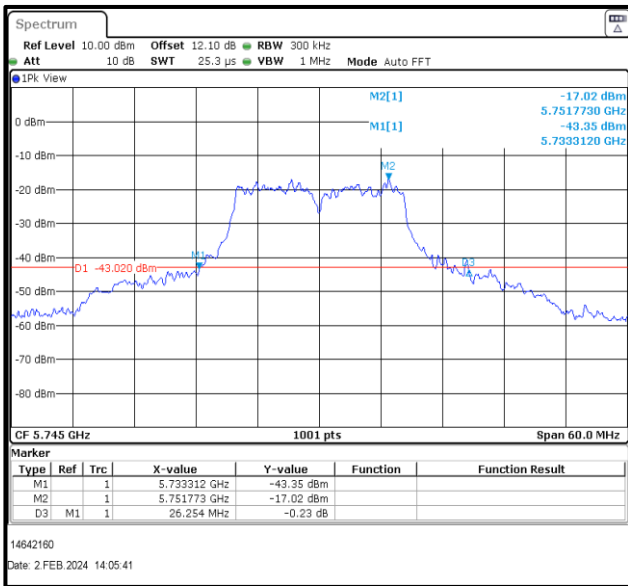


Result: Pass

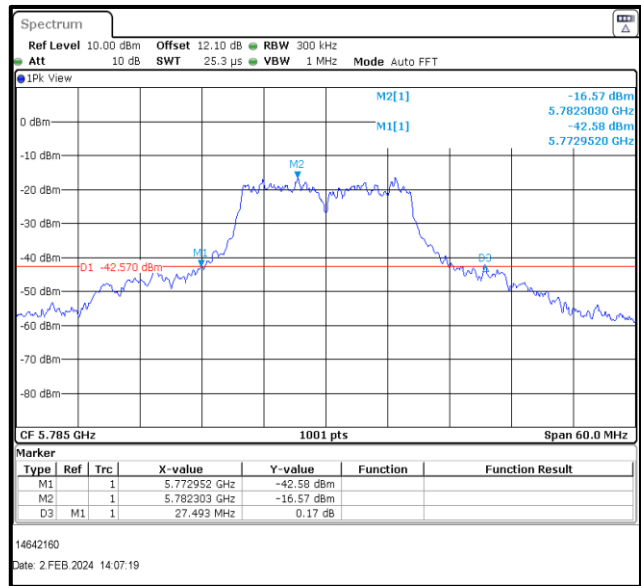
Transmitter 26 dB Emission Bandwidth (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 48 Mbps / PWR 13 / UNII-3

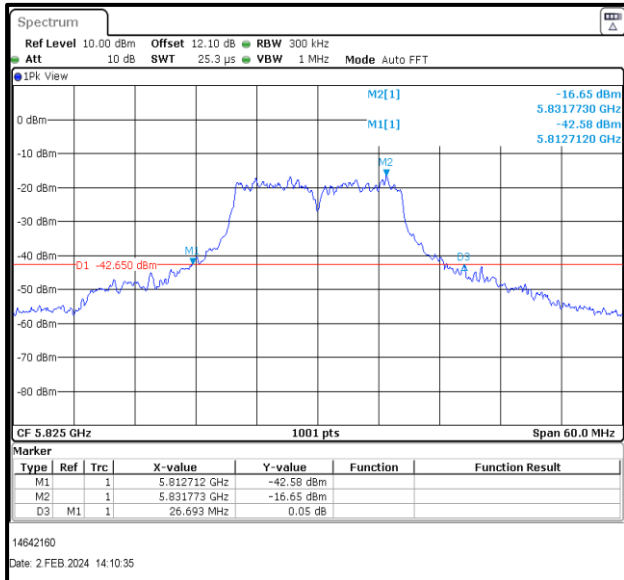
Channel	26 dB Emission Bandwidth (MHz)
Bottom	26.25
Middle	27.49
Top	26.69



Bottom



Middle



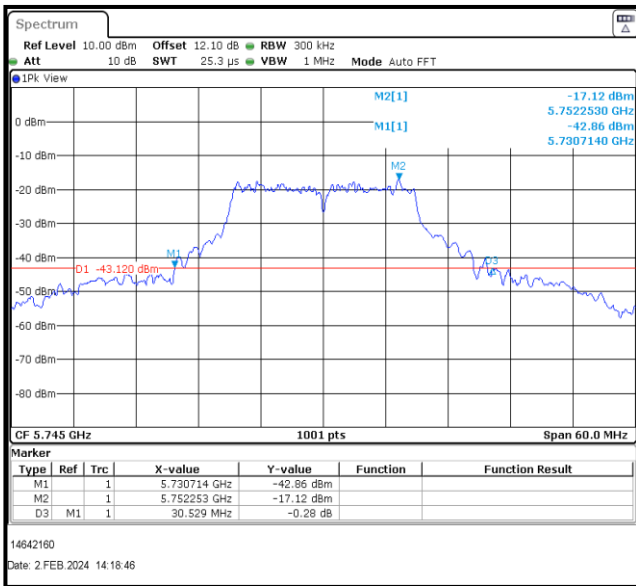
Top

Result: Pass

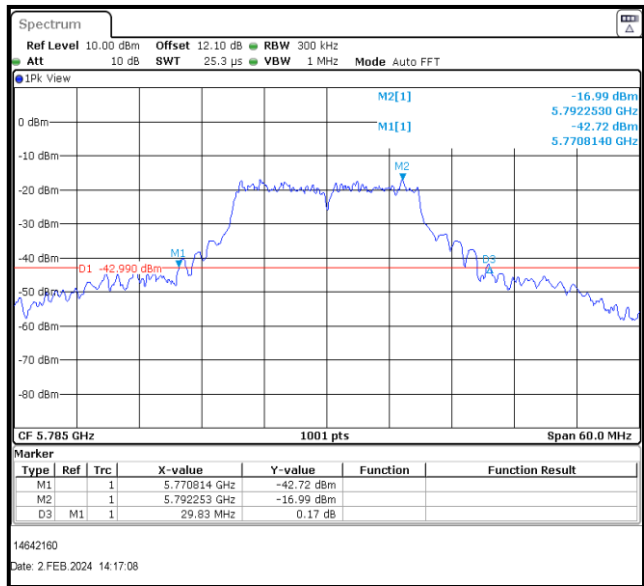
Transmitter 26 dB Emission Bandwidth (continued)

Results: AC-DC Power Supply / 802.11n / 20 MHz / MCS7 / PWR 13 / UNII-3

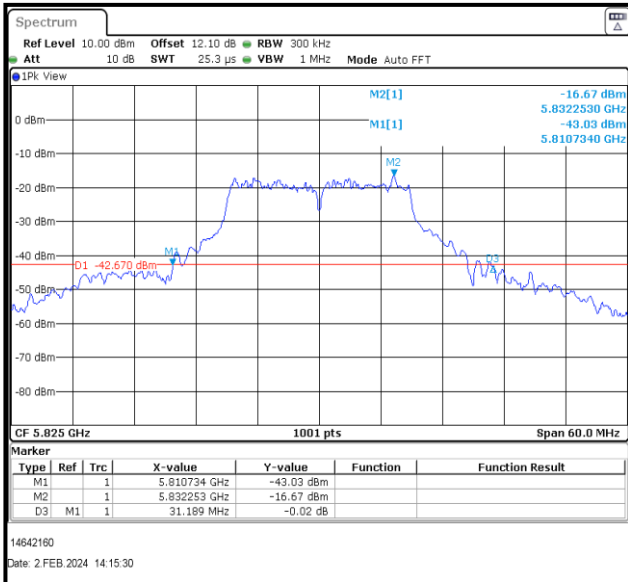
Channel	26 dB Emission Bandwidth (MHz)
Bottom	30.52
Middle	29.83
Top	31.18



Bottom



Middle



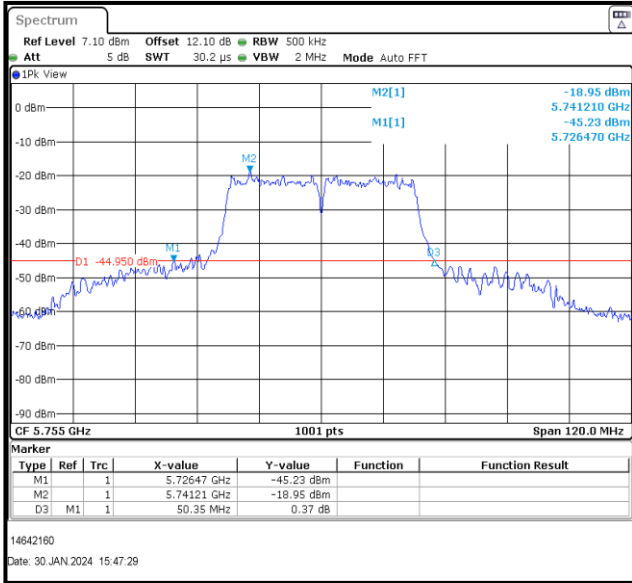
Top

Result: Pass

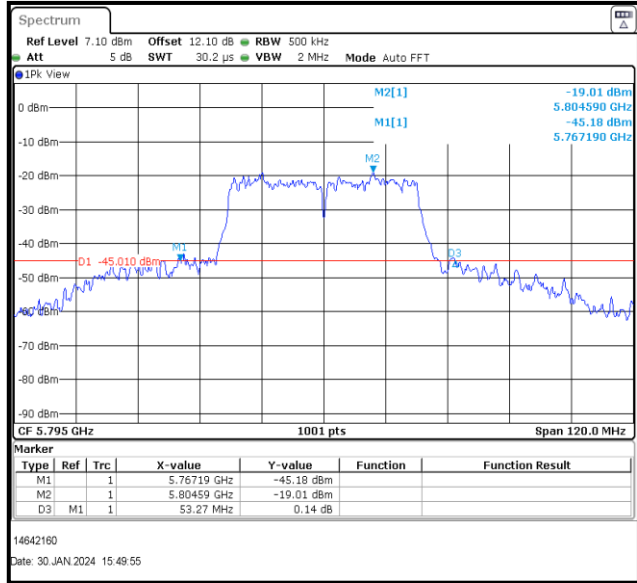
Transmitter 26 dB Emission Bandwidth (continued)

Results: AC-DC Power Supply / 802.11n / 40 MHz / MCS3 / PWR 13 / UNII-3

Channel	26 dB Emission Bandwidth (MHz)
Bottom	50.35
Top	53.27



Bottom



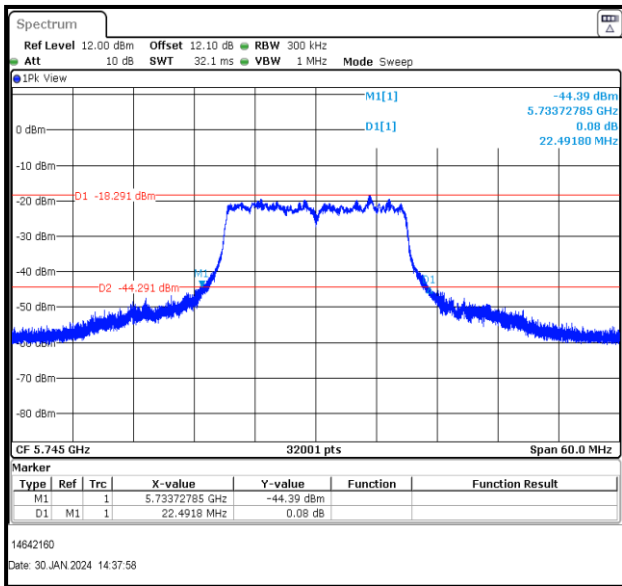
Top

Result: Pass

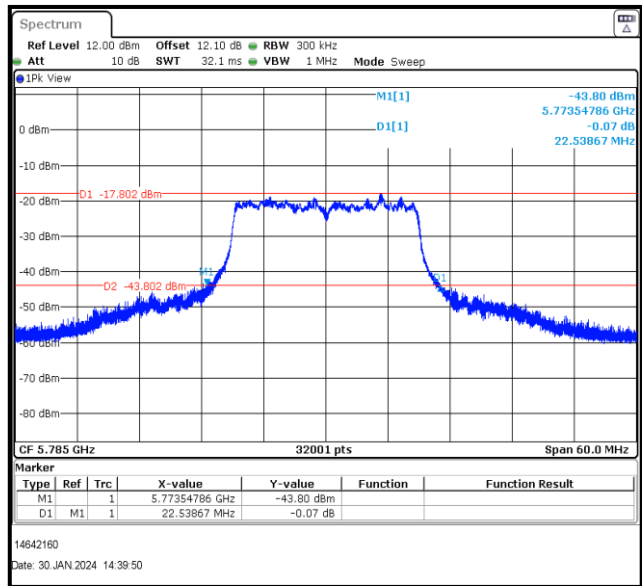
Transmitter 26 dB Emission Bandwidth (continued)

Results: AC-DC Power Supply / 802.11ac / 20 MHz / MCS6 / PWR 12 / UNII-3

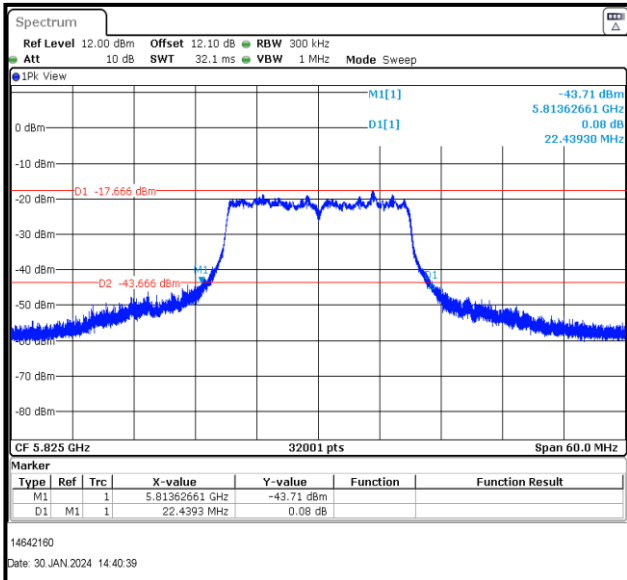
Channel	26 dB Emission Bandwidth (MHz)
Bottom	22.49
Middle	22.53
Top	22.43



Bottom



Middle



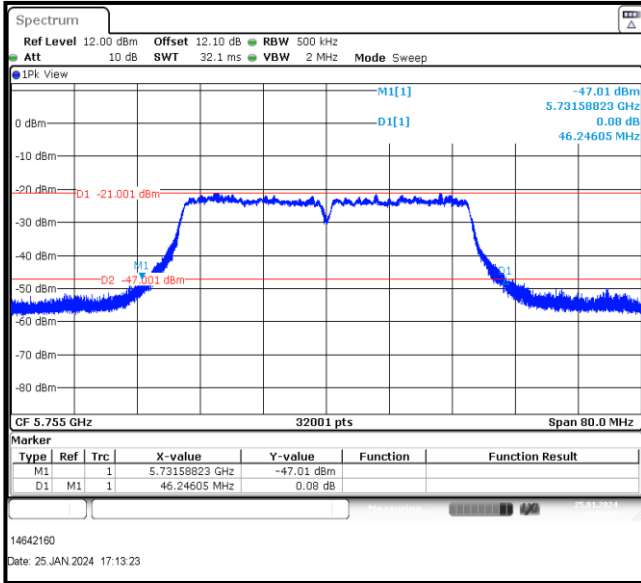
Top

Result: Pass

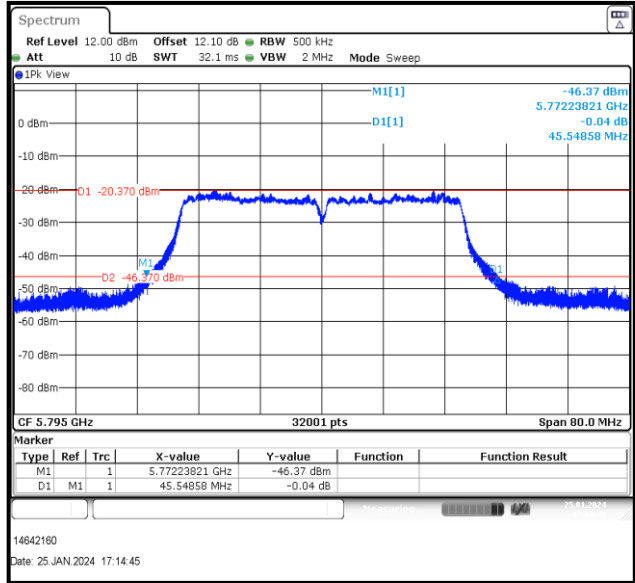
Transmitter 26 dB Emission Bandwidth (continued)

Results: AC-DC Power Supply / 802.11ac / 40 MHz / MCS3 / PWR 10 / UNII-3

Channel	26 dB Emission Bandwidth (MHz)
Bottom	46.24
Top	45.54



Bottom



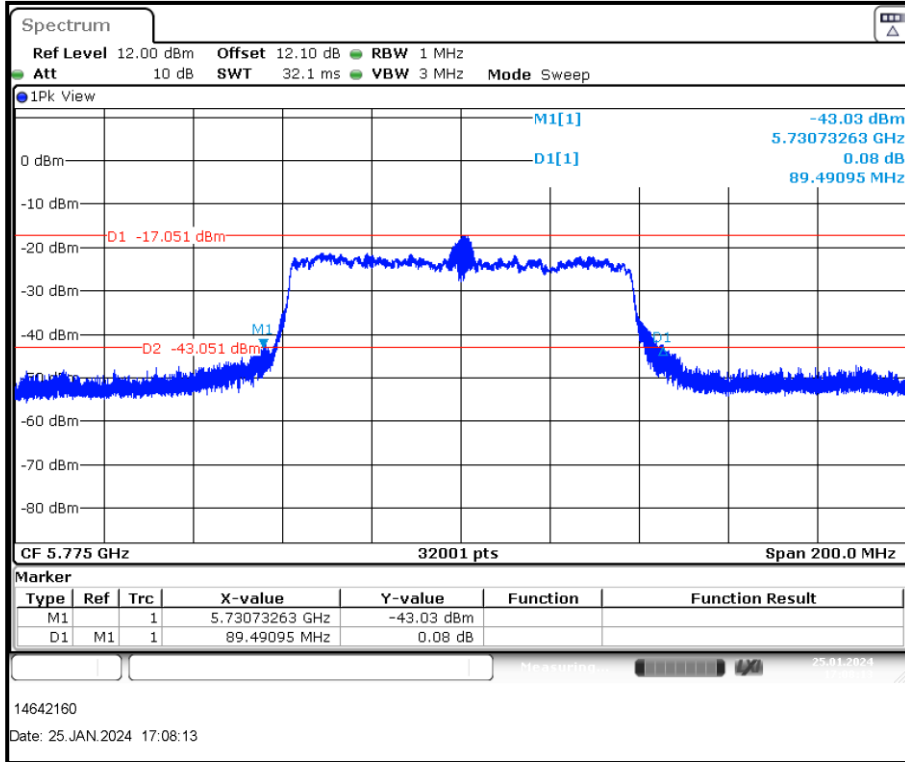
Top

Result: Pass

Transmitter 26 dB Emission Bandwidth (continued)

Results: AC-DC Power Supply / 802.11ac / 80 MHz / MCS5 / PWR 10 / UNII-3

Channel	26 dB Emission Bandwidth (MHz)
Single	89.49



Result: Pass

5.2.2. Transmitter Duty Cycle

Test Summary:

Test Engineer:	Muhammad Faiq Khan	Test Date:	8 September 2023 to 02 February 2024
Test Sample Serial Number:	DDU-ADV, ADV200009 (Conducted Test Sample)		
Test Site Identification	SR 9		

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

Environmental Conditions:

Temperature (°C):	21.0 to 23.8
Relative Humidity (%):	49.0 to 58.1

Notes:

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

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

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

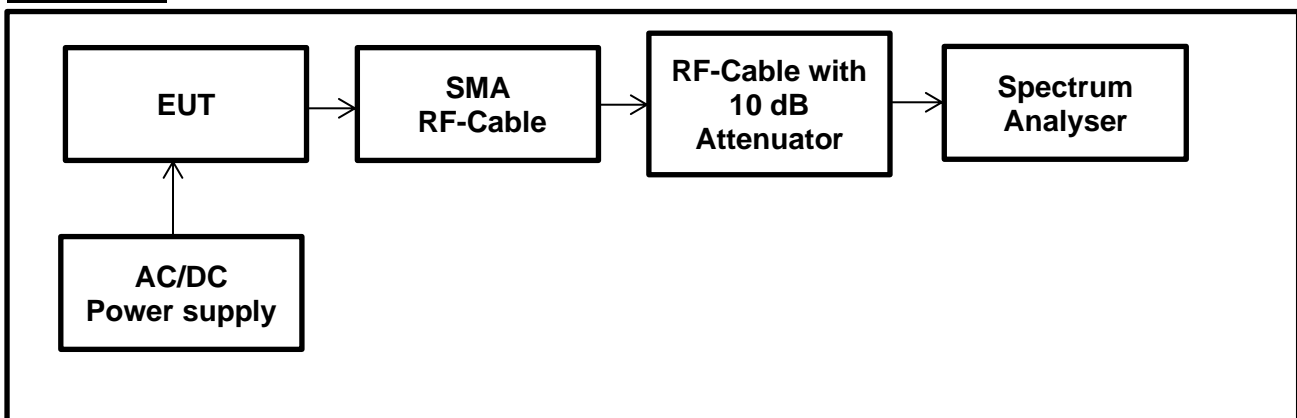
- Duty Cycle Correction Factor for UNII-1 a-mode 48 Mbps: 1.82 dB
- Duty Cycle Correction Factor for UNII-1 n-mode HT20 MCS6: 2.19 dB
- Duty Cycle Correction Factor for UNII-1 ac-mode VHT20 MCS6: 2.35 dB
- Duty Cycle Correction Factor for UNII-3 a-mode 48 Mbps: 1.93 dB
- Duty Cycle Correction Factor for UNII-3 n-mode HT20 MCS7: 2.35 dB
- Duty Cycle Correction Factor for UNII-3 ac-mode VHT20 MCS6: 2.35 dB

- The RF port on the EUT was connected to the spectrum analyser using suitable attenuation and RF cable. The measured values takes into consideration the external attenuation correction factors.

- The SMA (Female) RF Cable soldered on PCB with maximum attenuation of 0.7 dB at the tested frequencies.
- The RF cable attenuation maximum 1.4 dB@5GHz from the EUT to Analyzer including the 10 dB attenuation at the input of Spectrum Analyzer

Therefore, total a reference level offset 12.1 dB was added to each of the at the tested frequencies conducted plots.

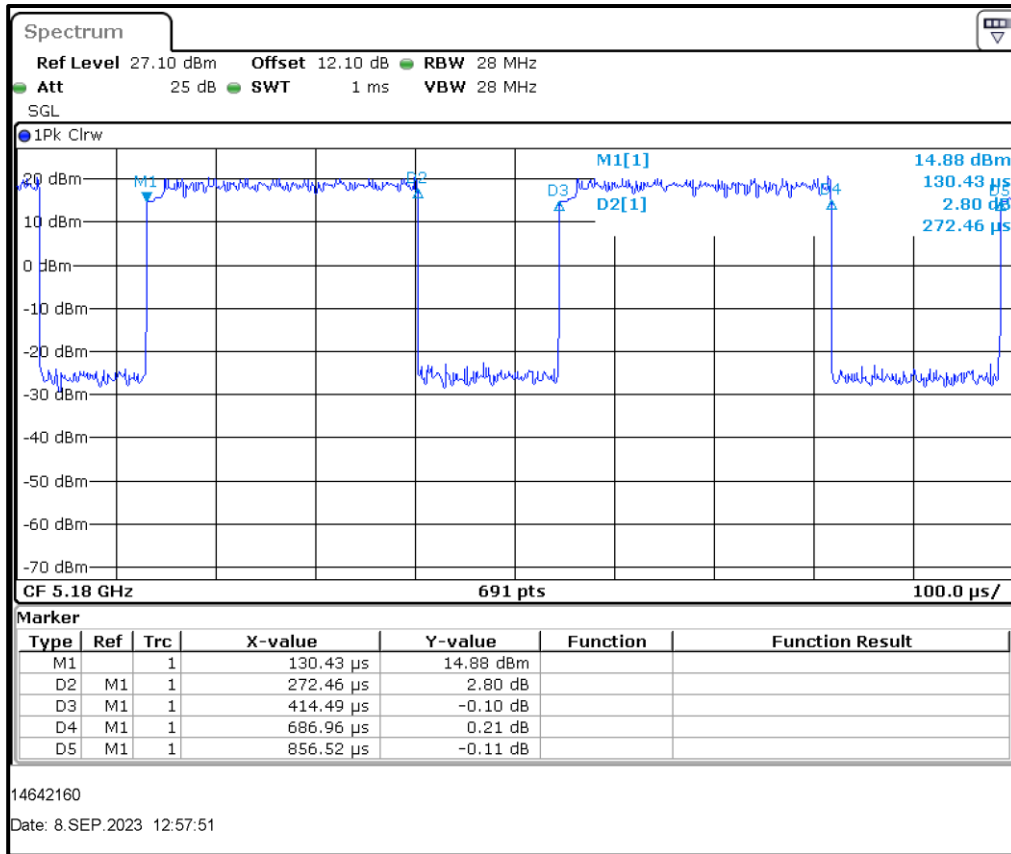
Test Setup:



Transmitter Duty Cycle (continued)

Results: AC-DC Power Supply U-NII-1 802.11a / 20 MHz / 48 Mbps / PWR 13

Pulse On Time (T _{ON}) (ms)	Pulse Period (T _{ON} + T _{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
0.27246	0.41449	65.73	1.82

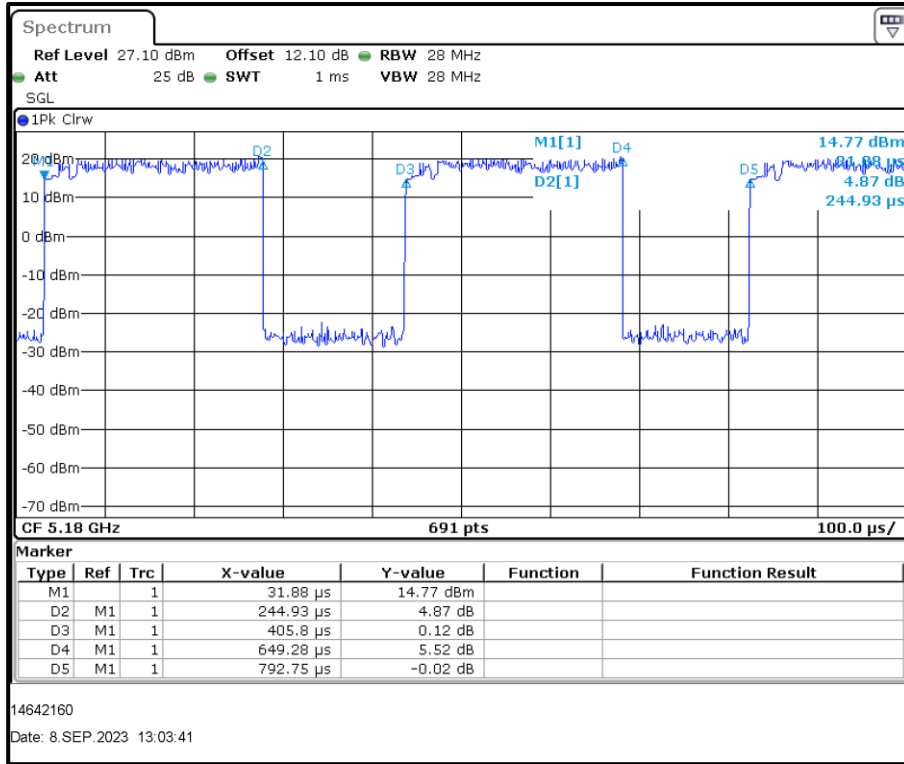


Result: Pass

Transmitter Duty Cycle (continued)

Results: AC-DC Power Supply U-NII-1 802.11n / 20 MHz / MCS6 / PWR 13

Pulse On Time (T _{ON}) (ms)	Pulse Period (T _{ON} + T _{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
0.24493	0.4058	60.35	2.19

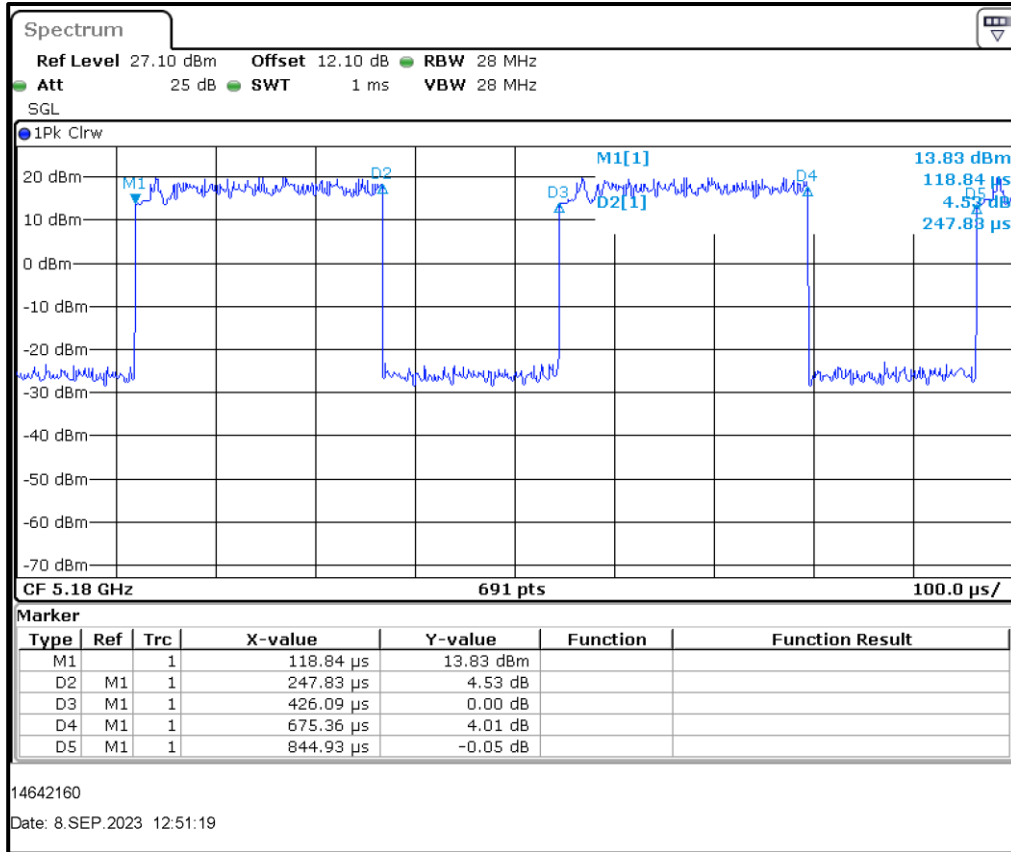


Result: Pass

Transmitter Duty Cycle (continued)

Results: AC-DC Power Supply U-NII-1 802.11ac / 20 MHz / MCS6 / PWR 12

Pulse On Time (T _{ON}) (ms)	Pulse Period (T _{ON} + T _{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
0.24783	0.42609	58.16	2.35

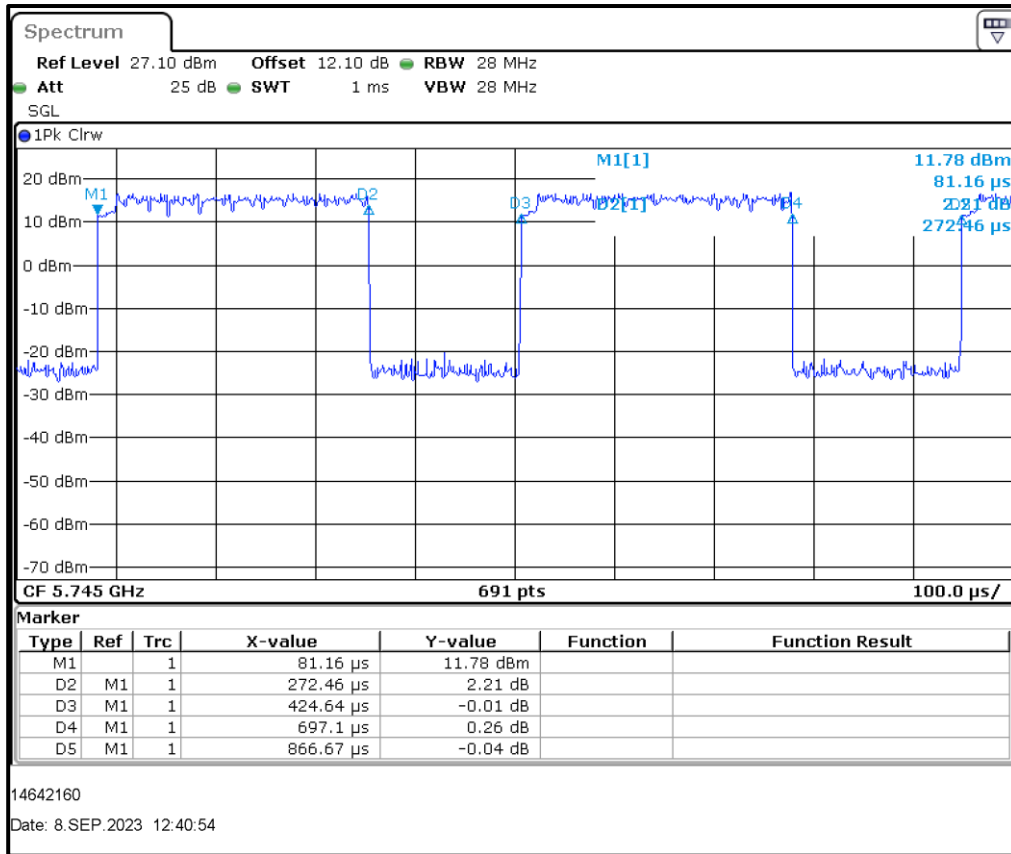


Result: Pass

Transmitter Duty Cycle (continued)

Results: AC-DC Power Supply U-NII-3 802.11a / 20 MHz / 48 Mbps / PWR 13

Pulse On Time (T _{ON}) (ms)	Pulse Period (T _{ON} + T _{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
0.27246	0.42464	64.16	1.93

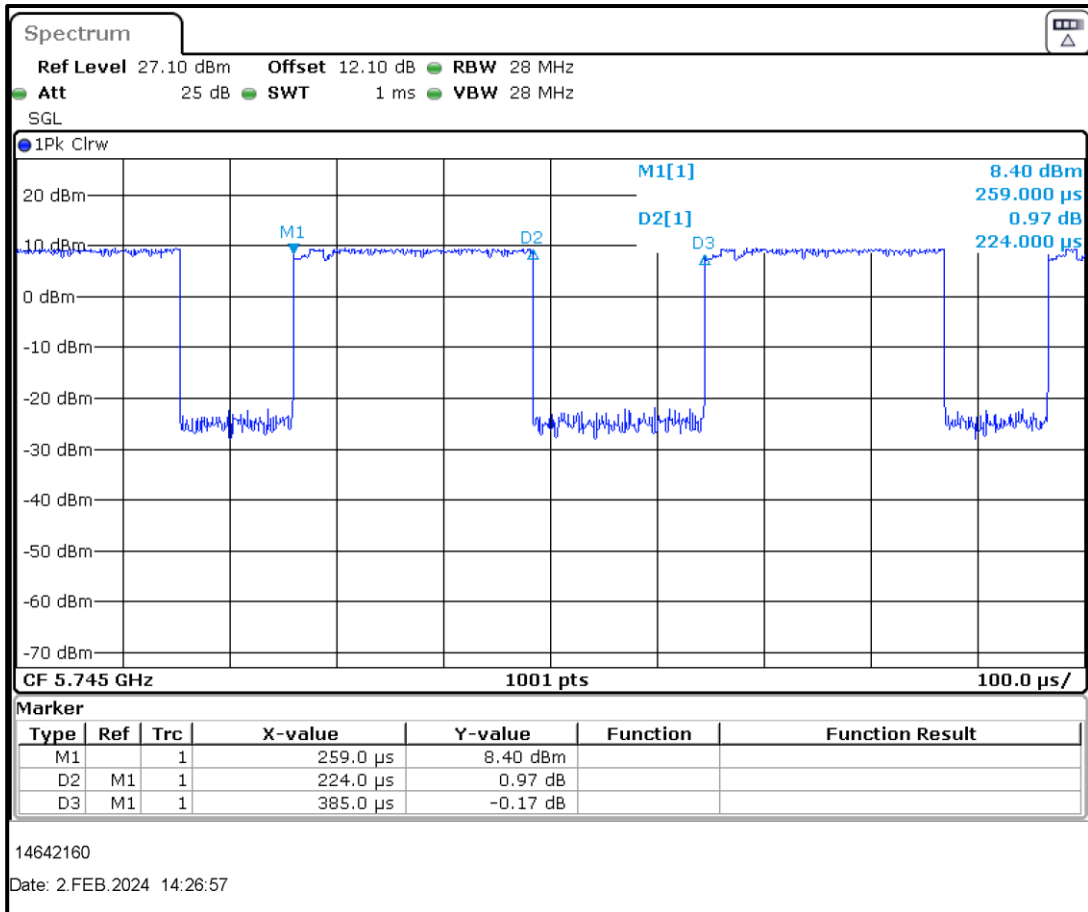


Result: Pass

Transmitter Duty Cycle (continued)

Results: AC-DC Power Supply U-NII-3 802.11n / 20 MHz / MCS7 / PWR 13

Pulse On Time (T _{ON}) (ms)	Pulse Period (T _{ON} + T _{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
0.224	0.385	58.18	2.35

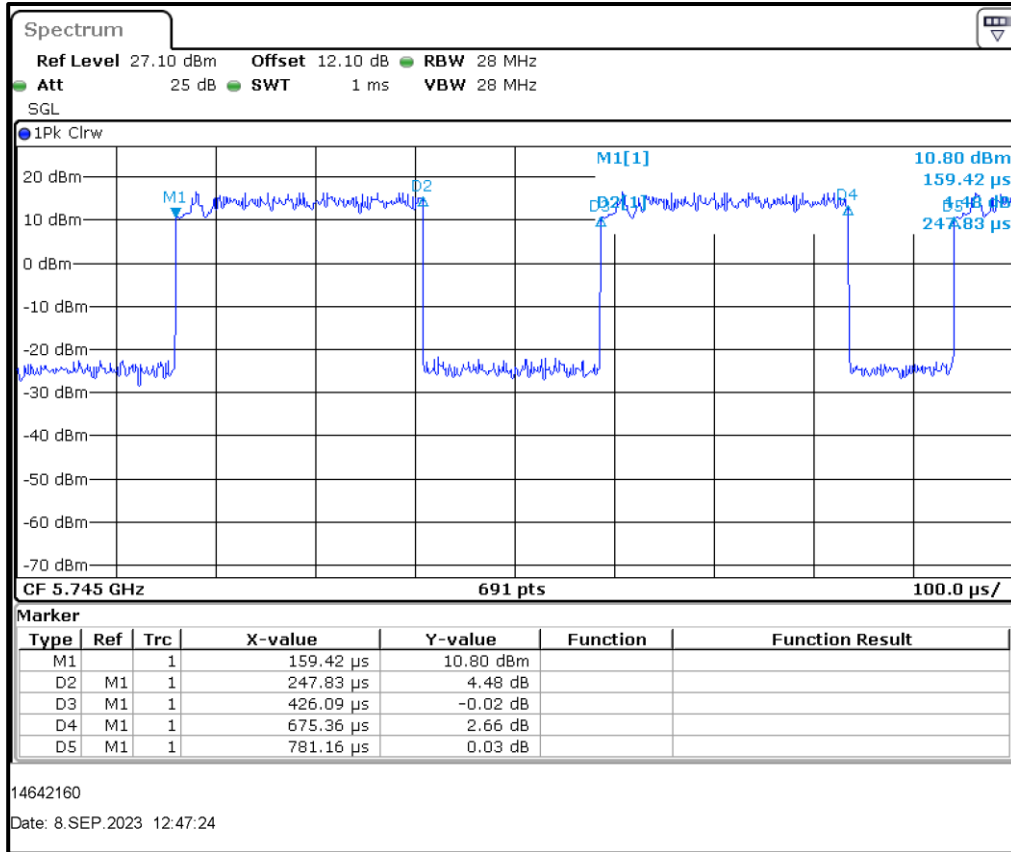


Result: Pass

Transmitter Duty Cycle (continued)

Results: AC-DC Power Supply U-NII-3 802.11ac / 20 MHz / MCS6 / PWR 12

Pulse On Time (T _{ON}) (ms)	Pulse Period (T _{ON} + T _{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
0.24783	0.42609	58.16	2.35



Result: Pass

5.2.3. Transmitter Minimum 6 dB Bandwidth

Test Summary:

Test Engineer:	Muhammad Faiq Khan	Test Date:	14 October 2023 to 25 January 2024
Test Sample Serial Number:	DDU-ADV, ADV200009 (Conducted Test Sample)		
Test Site Identification	SR 9		

FCC Reference:	Part 15.407(e)
Test Method Used:	FCC KDB 789033 D02 Section II.C.2

Environmental Conditions:

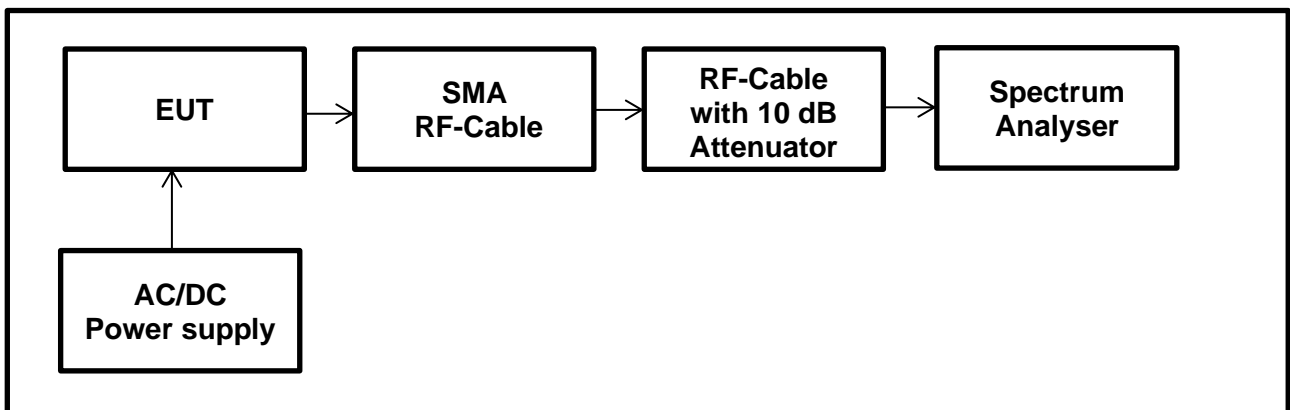
Temperature (°C):	21.0
Relative Humidity (%):	44.9 to 49.0

Notes:

1. The spectrum analyser resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The DTS bandwidth was measured at 6 dB down from the peak of the signal.
2. The RF port on the EUT was connected to the spectrum analyser using suitable attenuation and RF cable. The measured values takes into consideration the external attenuation correction factors.
 - The SMA (Female) RF Cable soldered on PCB with maximum attenuation of 0.7 dB at the tested frequencies.
 - The RF cable attenuation maximum 1.4 dB@ 5 GHz from the EUT to Analyzer including the 10 dB attenuation at the input of Spectrum Analyzer

Therefore, total a reference level offset 12.1 dB was added to each of the at the tested frequencies conducted plots.

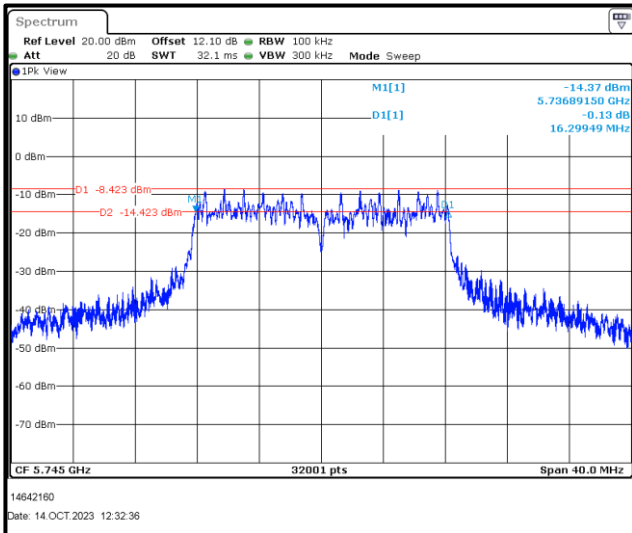
Test Setup:



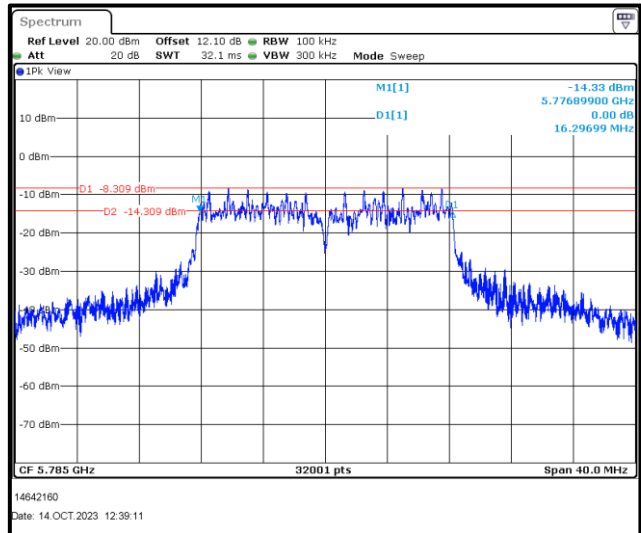
Transmitter Minimum 6 dB Bandwidth (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 48 Mbps / PWR 13 / UNII-3

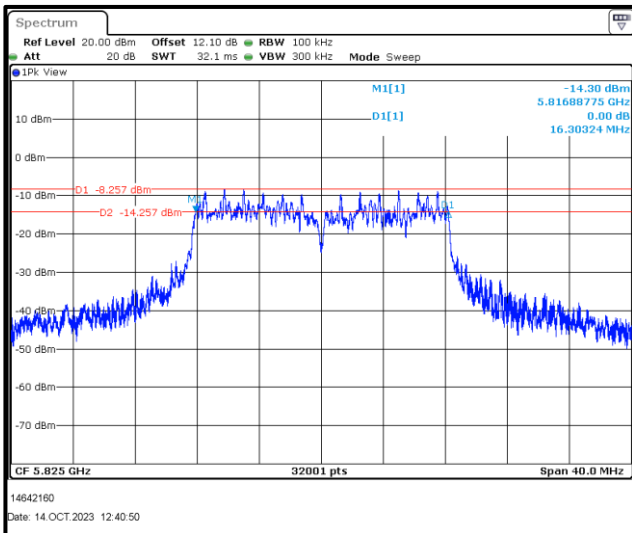
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom (CH 149)	16299.49	≥ 500	15799.49	Complied
Middle (CH 157)	16296.99	≥ 500	15796.99	Complied
Top (CH 165)	16303.24	≥ 500	15803.24	Complied



Bottom Channel



Middle Channel



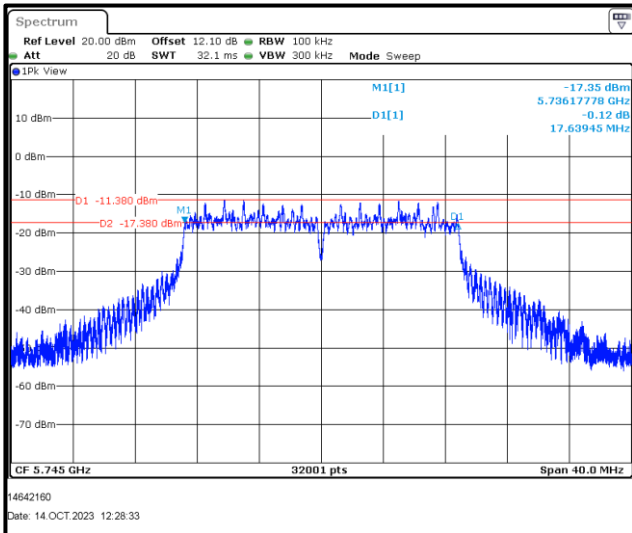
Top Channel

Result: **Pass**

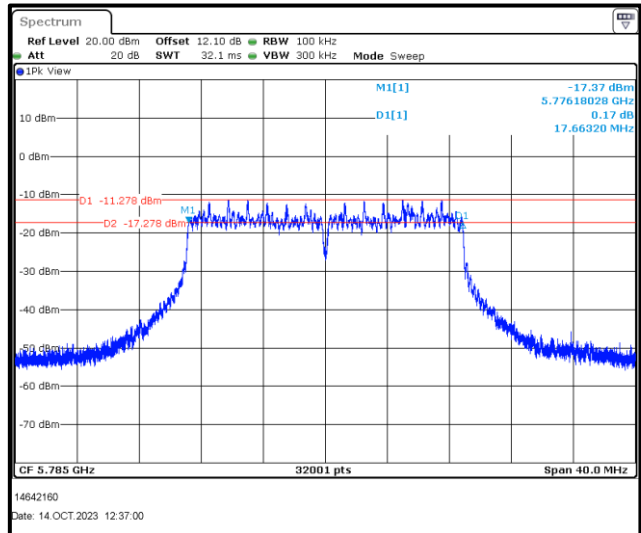
Transmitter Minimum 6 dB Bandwidth (continued)

Results: AC-DC Power Supply / 802.11n / 20 MHz / MCS6 / PWR 13 / UNII-3

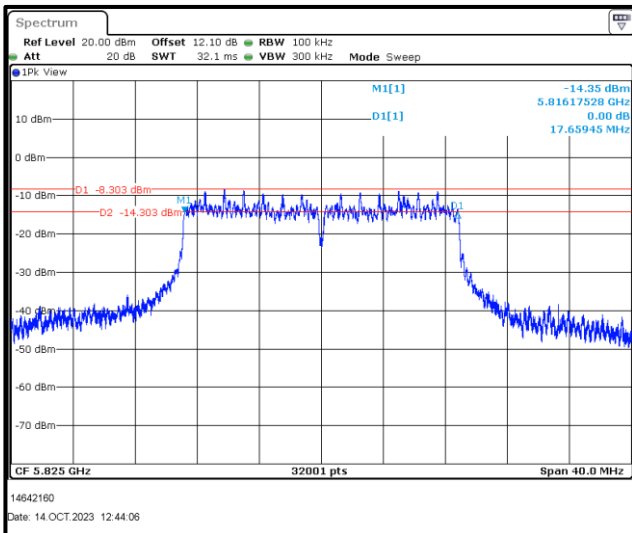
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom (CH 149)	17639.45	≥ 500	17139.45	Complied
Middle (CH 157)	17663.20	≥ 500	17163.20	Complied
Top (CH 165)	17659.45	≥ 500	17159.45	Complied



Bottom Channel



Middle Channel



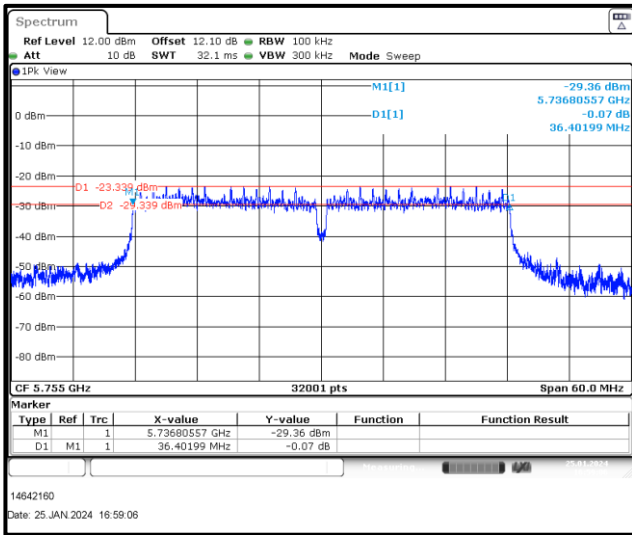
Top Channel

Result: **Pass**

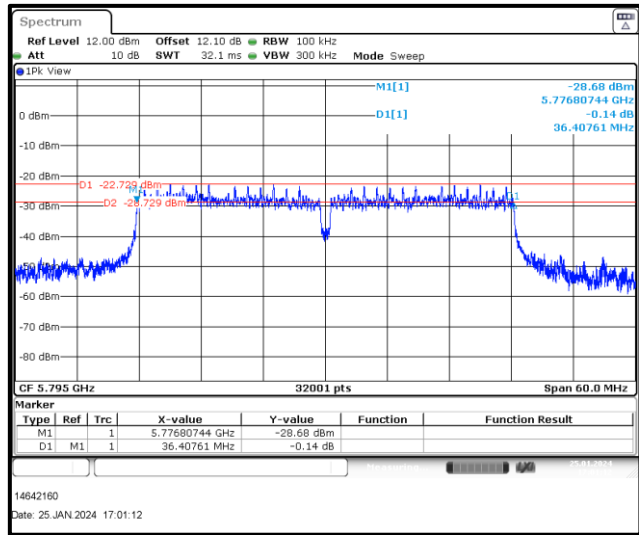
Transmitter Minimum 6 dB Bandwidth (continued)

Results: AC-DC Power Supply / 802.11n / 40 MHz / MCS3 / PWR 13 / UNII-3

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom (CH 151)	36401.99	≥ 500	35901.99	Complied
Top (CH 159)	36407.61	≥ 500	35907.61	Complied



Bottom Channel



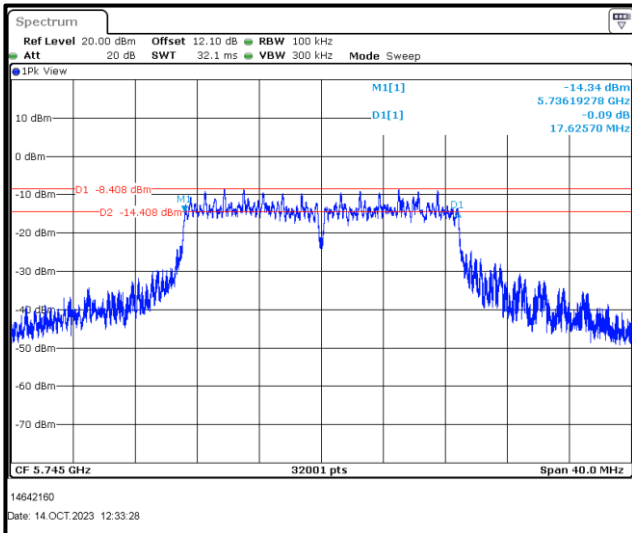
Top Channel

Result: **Pass**

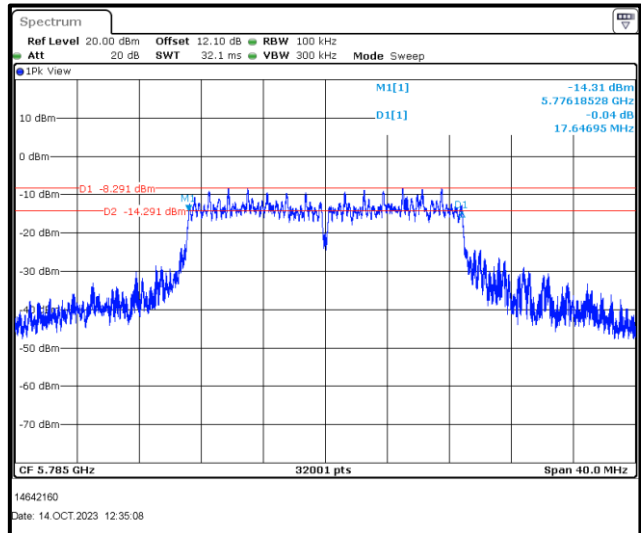
Transmitter Minimum 6 dB Bandwidth (continued)

Results: AC-DC Power Supply / 802.11ac / 20 MHz / MCS6 / PWR 12 / UNII-3

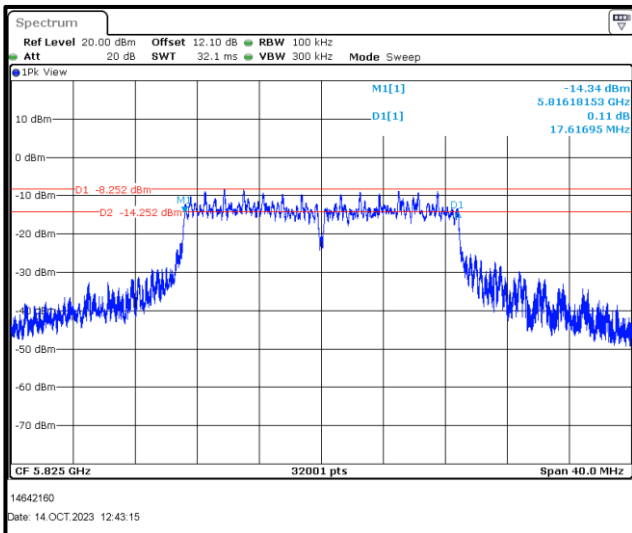
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom (CH 149)	17625.70	≥ 500	17125.70	Complied
Middle (CH 157)	17646.95	≥ 500	17146.95	Complied
Top (CH 165)	17616.95	≥ 500	17116.95	Complied



Bottom Channel



Middle Channel



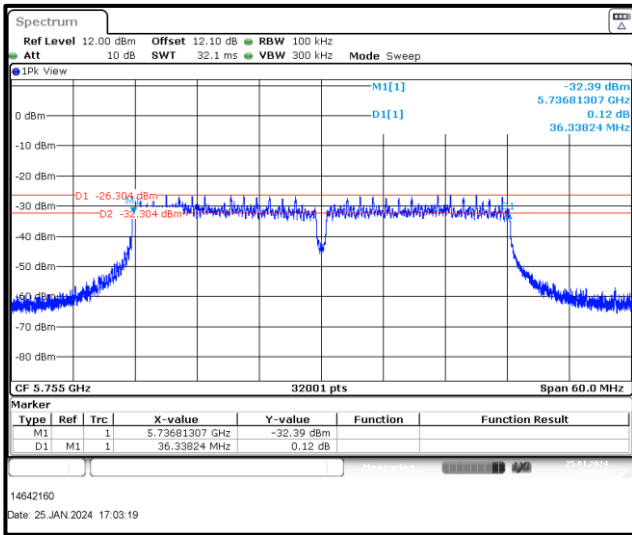
Top Channel

Result: **Pass**

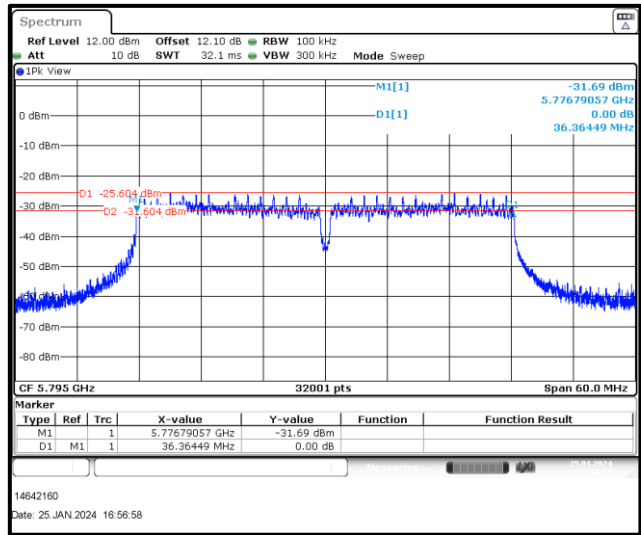
Transmitter Minimum 6 dB Bandwidth (continued)

Results: AC-DC Power Supply / 802.11ac / 40 MHz / MCS3 / PWR 10 / UNII-3

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom (CH 151)	36338.24	≥ 500	35838.24	Complied
Top (CH 159)	36364.49	≥ 500	35864.49	Complied



Bottom Channel



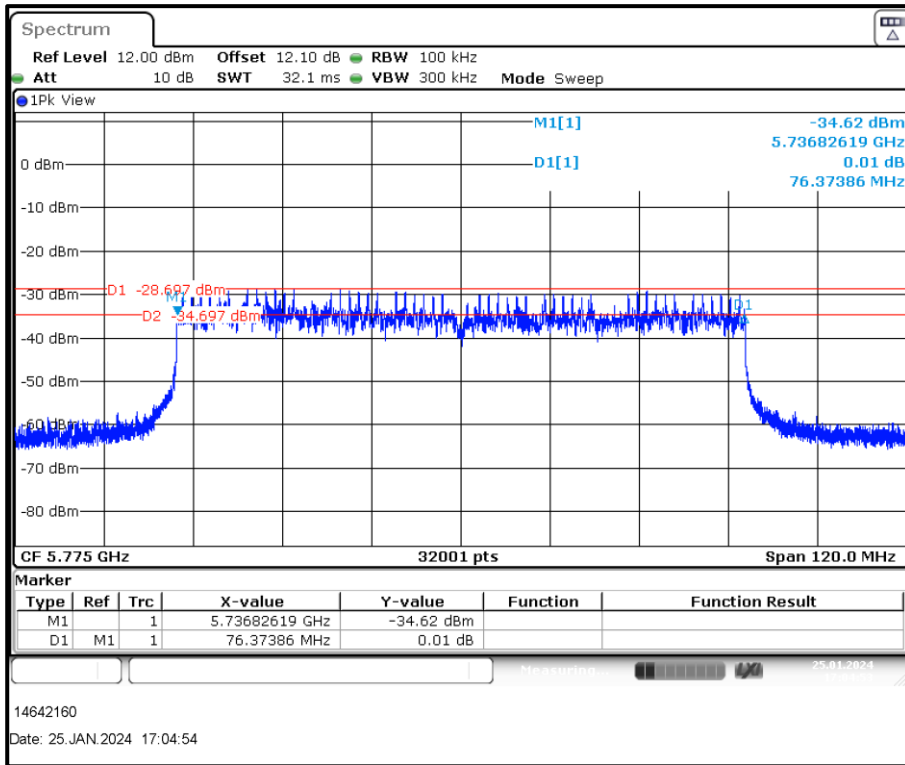
Top Channel

Result: **Pass**

Transmitter Minimum 6 dB Bandwidth (continued)

Results: AC-DC Power Supply / 802.11ac / 80 MHz / MCS5 / PWR 10 / UNII-3

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Single (CH 155)	76373.86	≥ 500	75873.86	Complied



Result: Pass

5.2.4. Transmitter Maximum Conducted Output Power**Test Summary:**

Test Engineer:	Muhammad Faiq Khan	Test Date:	5 September 2023 & 6 September 2023
Test Sample Serial Number:	DDU-ADV, ADV200009 (Conducted Test Sample)		
Test Site Identification	SR 9		

FCC Reference:	Part 15.407(a)(1)(iv)
Test Method Used:	FCC KDB 789033 D02 Section II.E.3.a)

Environmental Conditions:

Temperature (°C):	23.4 to 23.6
Relative Humidity (%):	55.0 to 55.4

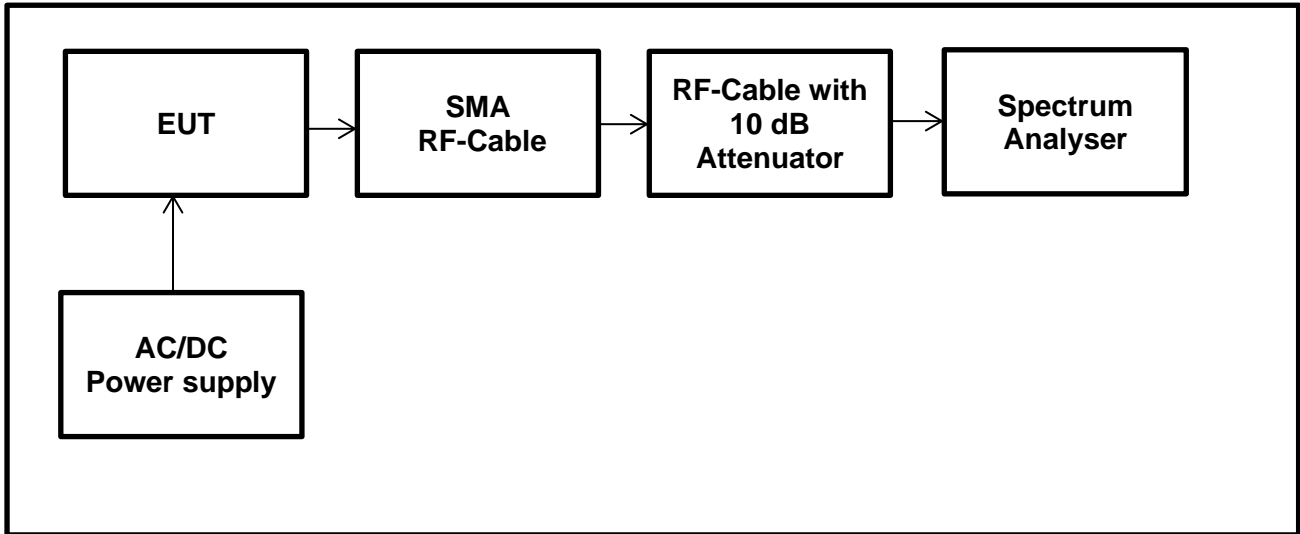
Notes:

- The RF port on the EUT was connected to the spectrum analyser using suitable attenuation and RF cable. The measured values takes into consideration the external attenuation correction factors.
 - The SMA (Female) RF Cable soldered on PCB with maximum attenuation of 0.7 dB at the tested frequencies.
 - The RF cable attenuation maximum 1.4 dB@ 5GHz from the EUT to Analyzer including the 10 dB attenuation at the input of Spectrum Analyzer

Therefore, total a reference level offset 12.1 dB was added to each of the at the tested frequencies conducted plots.

Transmitter Maximum Conducted Output Power (continued)

Test Setup (AC-DC Power Supply):



Transmitter Maximum Conducted Output Power (continued)

Results: AC-DC Power Supply / U-NII-1 / 802.11a / 20 MHz / PWR 13

Operational bands:	a-mode		
Channel no.:	36	44	48
b-mode			
6Mbit	2.808	3.574	3.117
9Mbit	2.806	3.402	3.076
12Mbit	3.175	3.694	3.362
18Mbit	2.747	3.364	2.936
24Mbit	3.696	3.793	3.627
36Mbit	3.766	3.942	3.659
48Mbit	4.523	4.735	4.388
54Mbit	3.865	4.003	3.773

Operational bands:	a-mode		
Limits [dBm]	24.00		
Limit Check:	Limit Check:		
Highest conducted power value over channels and modulations:	4.735		
Path loss	12.10		
Declared antenna Gain max:	0.00	0.00	0.00
EIRP	16.84		
Margin to Limit EIRP:	7.17		
Verdict:	pass		

Result: Pass

Transmitter Maximum Conducted Output Power (continued)

Results: AC-DC Power Supply / U-NII-1 / 802.11n / 20 MHz / PWR 13

Operational bands:	n20-mode (20 MHz)		
Channel no.:	36	44	48
g-mode			
MCS0	2.733	3.318	3.009
MCS1	2.512	3.163	2.904
MCS2	2.074	2.605	2.410
MCS3	3.402	3.770	3.475
MCS4	3.178	3.391	3.160
MCS5	3.387	3.659	3.475
MCS6	3.705	4.067	3.697
MCS7	3.620	3.913	3.618

Operational bands:	n-mode		
Limits [dBm]	24.00		
Limit Check:	Limit Check:		
Highest conducted power value over channels and modulations:	4.067		
Path loss	12.10		
Declared antenna Gain max:	0.00	0.00	0.00
EIRP	16.17		
Margin to Limit EIRP:	7.83		
Verdict:	pass		

Result: Pass

Transmitter Maximum Conducted Output Power (continued)

Results: AC-DC Power Supply / U-NII-1 / 802.11n / 40 MHz / PWR 13

Operational bands:		n-mode (40 MHz)		
Channel no.:	38	46		
n-mode				
MCS0	2.608	2.602		
MCS1	2.277	2.567		
MCS2	2.431	2.753		
MCS3	3.160	3.379		
MCS4	3.390	3.647		
MCS5	2.448	2.814		
MCS6	3.108	3.437		
MCS7	2.962	3.216		
Operational bands:		n-mode		
Limits [dBm]	24.00			
Limit Check:	Limit Check:			
Highest conducted power value over channels and modulations:	3.647			
Path loss	12.10			
Declared antenna Gain max:	0.00	0.00	0.00	
EIRP	15.75			
Margin to Limit EIRP:	8.25			
Verdict:	pass			

Result: Pass

Transmitter Maximum Conducted Output Power (continued)

Results: AC-DC Power Supply / U-NII-1 / 802.11ac / 20 MHz / PWR 12

Operational bands:		ac-mode (20 MHz)		
Channel no.:		36	44	48
ac-mode				
MCS0		1.766	2.212	1.828
MCS1		1.607	2.035	1.718
MCS2		1.244	1.686	1.654
MCS3		2.698	3.362	3.061
MCS4		2.361	3.178	2.939
MCS5		2.417	3.067	2.831
MCS6		2.965	3.431	3.344
MCS7		2.800	3.233	2.910
MCS8		2.716	3.359	3.055
MCS9		2.428	3.157	2.869
Operational bands:		ac-mode		
Limits [dBm]		24.00		
Limit Check:		Limit Check:		
Highest conducted power value over channels and modulations:		3.431		
Path loss		12.10		
Declared antenna Gain max:		0.00	0.00	0.00
EIRP		15.53		
Margin to Limit EIRP:		8.47		
Verdict:		pass		

Result: Pass

Transmitter Maximum Conducted Output Power (continued)

Results: AC-DC Power Supply / U-NII-1 / 802.11ac / 40 MHz / PWR 10

Operational bands:		ac-mode (40 MHz)		
Channel no.:	38	46		
ac-mode				
MCS0	-0.337	0.165		
MCS1	-0.456	-0.087		
MCS2	-0.642	-0.307		
MCS3	0.407	0.919		
MCS4	0.267	0.675		
MCS5	0.279	0.609		
MCS6	-0.102	0.241		
MCS7	0.113	0.507		
MCS8	0.346	0.629		
MCS9	-0.038	0.316		
Operational bands:		ac-mode		
Limits [dBm]	24.00			
Limit Check:	Limit Check:			
Highest conducted power value over channels and modulations:	0.919			
Path loss	12.10			
Declared antenna Gain max:	0.00	0.00	0.00	
EIRP	13.02			
Margin to Limit EIRP:	10.98			
Verdict:	pass			

Result: Pass

Transmitter Maximum Conducted Output Power (continued)

Results: AC-DC Power Supply / U-NII-1 / 802.11ac / 80 MHz / PWR 10

Operational bands:		ac-mode (80 MHz)		
Channel no.:	42			
ac-mode				
MCS0	-0.469			
MCS1	-0.936			
MCS2	-0.684			
MCS3	-0.033			
MCS4	0.001			
MCS5	1.250			
MCS6	-0.411			
MCS7	0.724			
MCS8	0.478			
MCS9	0.388			
Operational bands:		ac-mode		
Limits [dBm]	24.00			
Limit Check:		Limit Check:		
Highest conducted power value over channels and modulations:	1.250			
Path loss	12.10			
Declared antenna Gain max:	0.00	0.00	0.00	
EIRP	13.35			
Margin to Limit EIRP:	10.65			
Verdict:	pass			

Result: Pass

Transmitter Maximum Conducted Output Power (continued)

Results: AC-DC Power Supply / U-NII-3 / 802.11a / 20 MHz / PWR 13

Operational bands:	a-mode (20 MHz)		
Channel no.:	149	157	165
a-mode 20 MHz			
6Mbit	-0.505	-0.041	-0.444
9Mbit	-0.172	-0.080	-0.195
12Mbit	-0.340	0.254	-0.133
18Mbit	-0.588	-0.065	-0.589
24Mbit	0.078	0.419	0.216
36Mbit	0.234	0.330	0.237
48Mbit	0.856	1.233	1.009
54Mbit	0.314	0.628	0.435
Operational bands:	a-mode		
Limits [dBm]	30.00		
Limit Check:	Limit Check:		
Highest conducted power value over channels and modulations:	1.233		
Path loss	12.10		
Declared antenna Gain max:			
EIRP	13.33		
Margin to Limit EIRP:	16.67		
Verdict:	pass		

Result: Pass

Transmitter Maximum Conducted Output Power (continued)

Results: AC-DC Power Supply / U-NII-3 / 802.11n / 20 MHz / PWR 13

Operational bands:		n-mode (20 MHz)		
Channel no.:		149	157	165
n-mode 20MHz				
MCS0		-0.579	-0.086	0.435
MCS1		-0.705	-0.251	-0.728
MCS2		-1.182	-0.661	-1.209
MCS3		-0.007	0.431	0.175
MCS4		-0.267	0.147	-0.109
MCS5		-0.034	0.286	0.124
MCS6		0.249	0.307	0.284
MCS7		0.134	0.466	0.198
Operational bands:				
		n-mode		
Limits [dBm]	30.00			
Limit Check:				
Highest conducted power value over channels and modulations:	0.466			
Path loss	12.10			
Declared antenna Gain max:				
EIRP	12.57			
Margin to Limit EIRP:	17.43			
Verdict:	pass			

Result: Pass

Transmitter Maximum Conducted Output Power (continued)

Results: AC-DC Power Supply / U-NII-3 / 802.11n / 40 MHz / PWR 13

Operational bands:		n-mode (40 MHz)	
Channel no.:	151	159	
n-mode 40 MHz			
MCS0	-0.579	-0.208	
MCS1	-1.042	-0.359	
MCS2	-0.859	-0.250	
MCS3	-0.231	0.273	
MCS4	-0.231	0.253	
MCS5	-0.838	-0.226	
MCS6	-0.384	0.158	
MCS7	-0.658	-0.096	
Operational bands:		n-mode	
Limits [dBm]	30.00		
Limit Check:	Limit Check:		
Highest conducted power value over channels and modulations:	0.273		
Path loss	12.10		
Declared antenna Gain max:			
EIRP	12.37		
Margin to Limit EIRP:	17.63		
Verdict:	pass		

Result: Pass

Transmitter Maximum Conducted Output Power (continued)

Results: AC-DC Power Supply / U-NII-3 / 802.11ac / 20 MHz / PWR 12

Operational bands:		ac-mode (20 MHz)		
Channel no.:		149	157	165
ac-mode 20 MHz				
MCS0		-1.479	-0.959	-1.421
MCS1		-1.639	-1.052	-1.555
MCS2		-1.991	-1.452	-1.912
MCS3		-0.673	-0.189	-0.604
MCS4		-0.920	-0.322	-0.749
MCS5		-0.894	-0.392	-0.793
MCS6		-0.493	-0.032	-0.311
MCS7		-0.876	-0.375	-0.601
MCS8		-0.652	-0.162	-0.565
MCS9		-0.973	-0.401	-0.737
Operational bands:		ac-mode		
Limits [dBm]		30.00		
Limit Check:		Limit Check:		
Highest conducted power value over channels and modulations:		-0.032		
Path loss		12.10		
Declared antenna Gain max:				
EIRP		12.07		
Margin to Limit EIRP:		17.93		
Verdict:		pass		

Result: Pass

Transmitter Maximum Conducted Output Power (continued)

Results: AC-DC Power Supply / U-NII-3 / 802.11ac / 40 MHz / PWR 10

Operational bands:		ac-mode (40 MHz)	
Channel no.:	151	159	
ac-mode 40 MHz			
MCS0	-3.675	-2.879	
MCS1	-3.766	-3.172	
MCS2	-3.981	-3.348	
MCS3	-2.855	-2.258	
MCS4	-2.930	-2.376	
MCS5	-3.119	-2.479	
MCS6	-3.416	-2.788	
MCS7	-3.166	-2.648	
MCS8	-2.988	-2.442	
MCS9	-3.328	-2.600	
Operational bands:		ac-mode	
Limits [dBm]	30.00		
Limit Check:		Limit Check:	
Highest conducted power value over channels and modulations:	-2.258		
Path loss	12.10		
Declared antenna Gain max:			
EIRP	9.84		
Margin to Limit EIRP:	20.16		
Verdict:	pass		

Result: Pass

Transmitter Maximum Conducted Output Power (continued)

Results: AC-DC Power Supply / U-NII-3 / 802.11ac / 80 MHz / PWR 10

Operational bands:		ac-mode (80 MHz)	
Channel no.:	155		
ac-mode 80 MHz			
MCS0	-3.726		
MCS1	-4.121		
MCS2	-4.005		
MCS3	-3.244		
MCS4	-3.266		
MCS5	-2.094		
MCS6	-3.761		
MCS7	-2.621		
MCS8	-2.773		
MCS9	-2.948		
Operational bands:		ac-mode	
Limits [dBm]	30.00		
Limit Check:	Limit Check:		
Highest conducted power value over channels and modulations:	-2.094		
Path loss	12.10		
Declared antenna Gain max:			
EIRP	10.01		
Margin to Limit EIRP:	19.99		
Verdict:	pass		

Result: Pass

5.2.5. Transmitter Maximum Power Spectral Density**Test Summary:**

Test Engineer:	Muhammad Faiq Khan	Test Date:	8 September 2023 to 02 February 2024
Test Sample Serial Number:	DDU-ADV, ADVC200009 (Conducted Test Sample)		
Test Site Identification	SR 9		

FCC Reference:	Part 15.407(a)(1)(iv)
Test Method Used:	FCC KDB 789033 D02 Section II.F. referencing Section II.E.2.d)

Environmental Conditions:

Temperature (°C):	21.0 to 23.8
Relative Humidity (%):	49.0 to 58.1

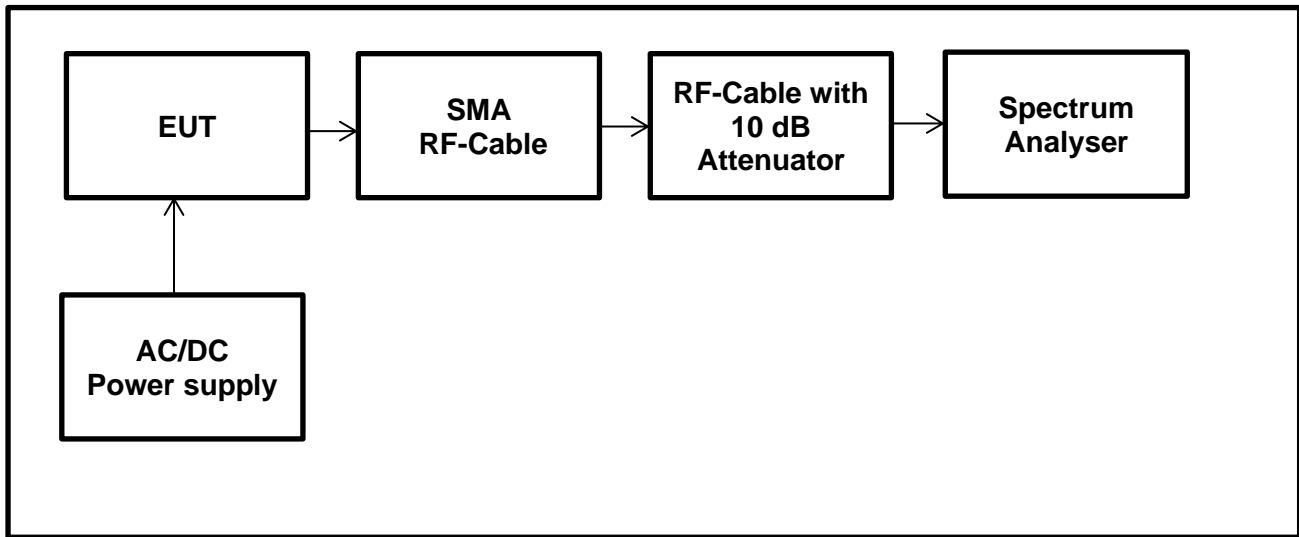
Notes:

1. Transmitter Maximum Power Spectral Density tests were performed using a spectrum analyser in accordance with KDB 789033 II. F referencing Section II. E.2.d).
2. Method SA-2: The resolution bandwidth was set to 1 MHz/ 500 kHz and video bandwidth 3 MHz / 2 MHz. An RMS detector was used and sweep time set to auto and 300 traces performed. The span was set to 30 MHz so as to encompass the entire 99% occupied bandwidth. A marker was placed at the peak of the measured level. The peak level is recorded in the tables below.
3. As the EUT was transmitting at <98% duty cycle, the calculated duty cycle in section 5.2.3 was added to the measured power values in order to compute the average power during the actual transmission time.
4. The RF port on the EUT was connected to the spectrum analyser using suitable attenuation and RF cable. The measured values takes into consideration the external attenuation correction factors.
 - The SMA (Female) RF Cable soldered on PCB with maximum attenuation of 0.7 dB at the tested frequencies.
 - The RF cable attenuation maximum 1.4 dB@5GHz from the EUT to Analyzer including the 10 dB attenuation at the input of Spectrum Analyzer

Therefore, total a reference level offset 12.1 dB was added to each of the at the tested frequencies conducted plots.

Transmitter Maximum Power Spectral Density (continued)

Test Setup (AC-DC Power Supply):



Transmitter Maximum Power Spectral Density (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 48 Mbps / PWR 13 / UNII-1

Conducted Power Limit Comparison:

Channel	Conducted Average PSD (dBm /MHz)	Duty Cycle Correction Factor (dB)	Corrected Conducted Average PSD (dBm /MHz)	Conducted PSD Limit (dBm/ MHz)	Margin (dB)	Result
Bottom	0.90	1.82	2.72	11.00	8.28	Complied
Middle	1.55	1.82	3.37	11.00	7.63	Complied
Top	1.40	1.82	3.22	11.00	7.78	Complied

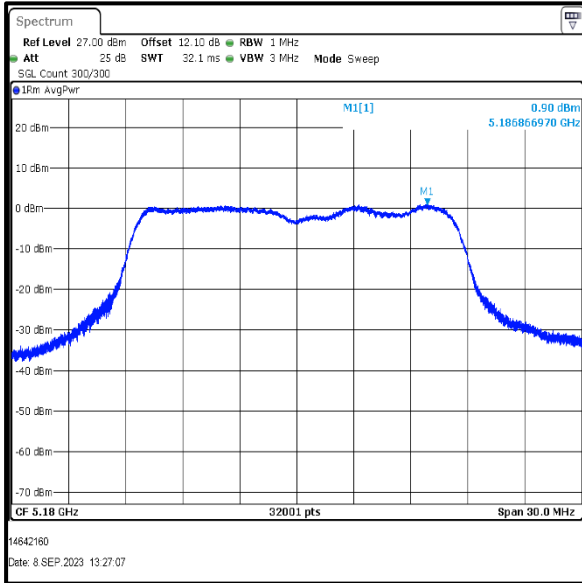
De Facto EIRP Limit Comparison:

Channel	Corrected Conducted Average PSD (dBm /MHz)	Directional Antenna Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit (dBm/ MHz)	Margin (dB)	Result
Bottom	2.72	0.0	2.72	17.00	14.28	Complied
Middle	3.37	0.0	3.37	17.00	13.63	Complied
Top	3.22	0.0	3.22	17.00	13.78	Complied

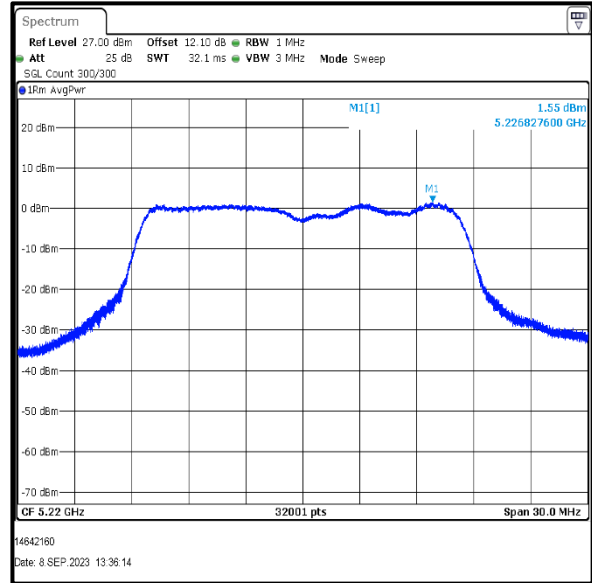
Result: Pass

Transmitter Maximum Power Spectral Density (continued)

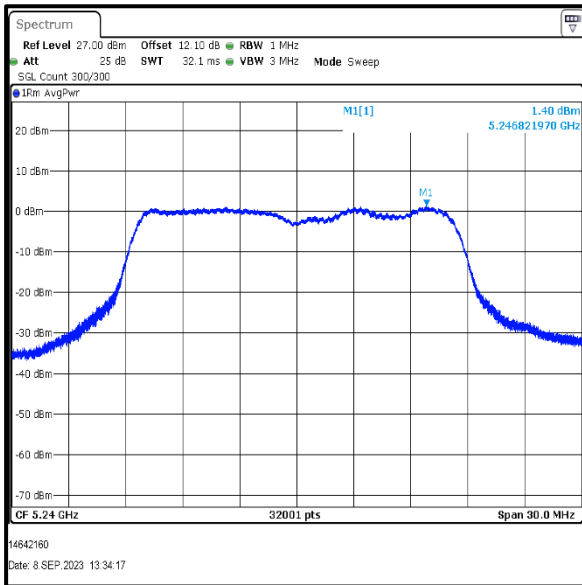
Results: AC-DC Power Supply / 802.11a / 20 MHz / 48 Mbps / PWR 13 / UNII-1



Bottom



Middle



Top

Result: Pass

Transmitter Maximum Power Spectral Density (continued)

Results: AC-DC Power Supply / 802.11n / 20 MHz / MCS6 / PWR 13 / UNII-1

Conducted Power Limit Comparison:

Channel	Conducted Average PSD (dBm /MHz)	Duty Cycle Correction Factor (dB)	Corrected Conducted Average PSD (dBm /MHz)	Conducted PSD Limit (dBm/ MHz)	Margin (dB)	Result
Bottom	0.09	2.19	2.28	11.00	8.72	Complied
Middle	0.55	2.19	2.74	11.00	8.26	Complied
Top	0.39	2.19	2.58	11.00	8.42	Complied

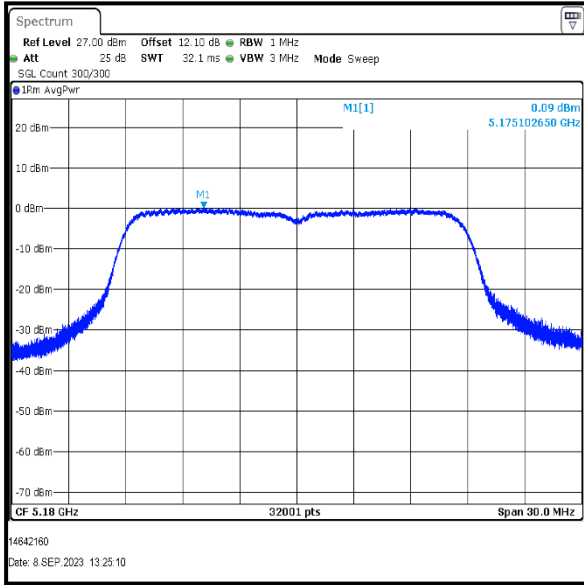
De Facto EIRP Limit Comparison:

Channel	Corrected Conducted Average PSD (dBm /MHz)	Directional Antenna Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit (dBm/ MHz)	Margin (dB)	Result
Bottom	2.28	0.0	2.28	17.00	14.72	Complied
Middle	2.74	0.0	2.74	17.00	14.26	Complied
Top	2.58	0.0	2.58	17.00	14.42	Complied

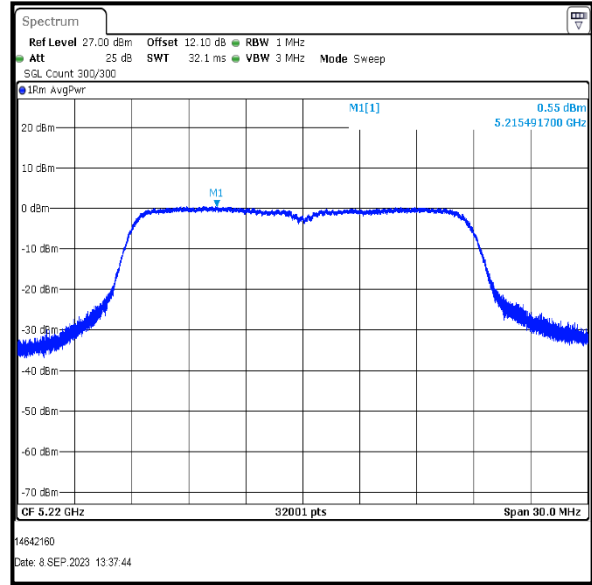
Result: Pass

Transmitter Maximum Power Spectral Density (continued)

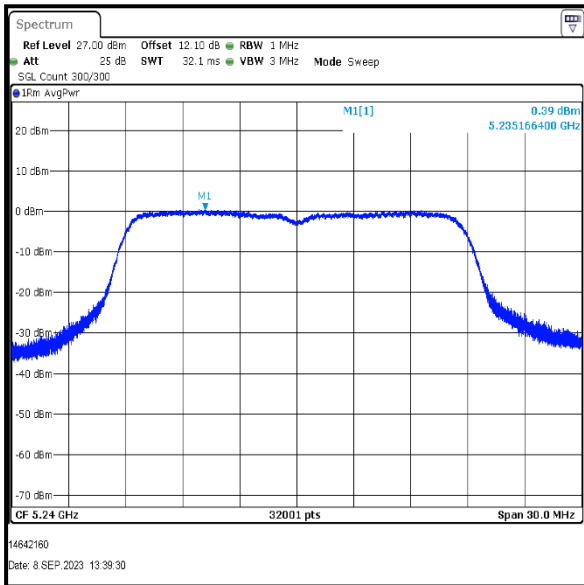
Results: AC-DC Power Supply / 802.11n / 20 MHz / MCS6 / PWR 13 / UNII-1



Bottom



Middle



Top

Result: Pass

Transmitter Maximum Power Spectral Density (continued)

Results: AC-DC Power Supply / 802.11ac / 20 MHz / MCS6 / PWR 12 / UNII-1

Conducted Power Limit Comparison:

Channel	Conducted Average PSD (dBm /MHz)	Duty Cycle Correction Factor (dB)	Corrected Conducted Average PSD (dBm /MHz)	Conducted PSD Limit (dBm/ MHz)	Margin (dB)	Result
Bottom	-0.76	2.35	1.59	11.00	9.41	Complied
Middle	-0.32	2.35	2.03	11.00	8.97	Complied
Top	-0.42	2.35	1.93	11.00	9.07	Complied

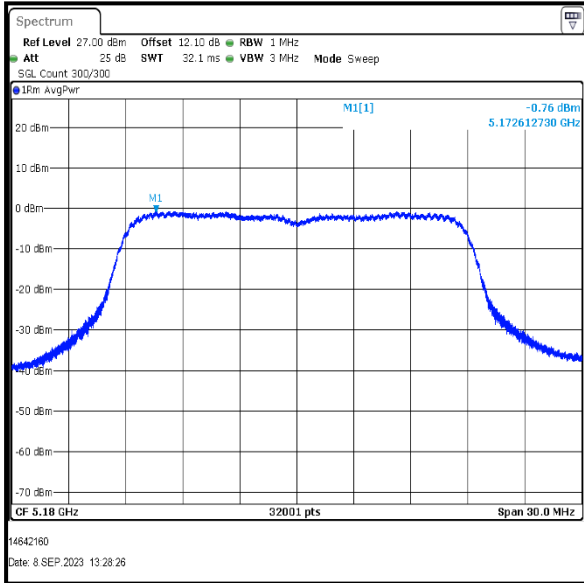
De Facto EIRP Limit Comparison:

Channel	Corrected Conducted Average PSD (dBm /MHz)	Directional Antenna Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit (dBm/ MHz)	Margin (dB)	Result
Bottom	1.59	0.0	1.59	17.00	15.41	Complied
Middle	2.03	0.0	2.03	17.00	14.97	Complied
Top	1.93	0.0	1.93	17.00	15.07	Complied

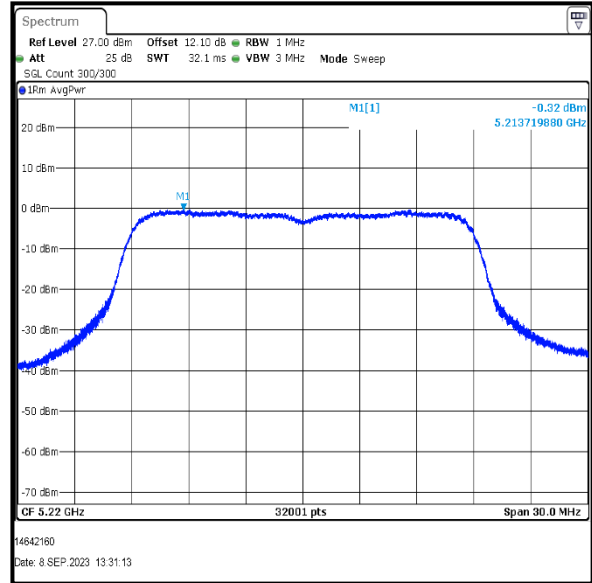
Result: Pass

Transmitter Maximum Power Spectral Density (continued)

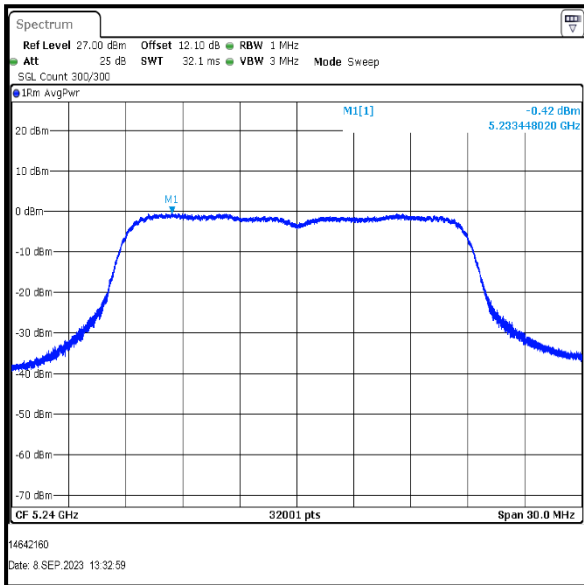
Results: AC-DC Power Supply / 802.11ac / 20 MHz / MCS6 / PWR 12 / UNII-1



Bottom



Middle



Top

Result: Pass

Transmitter Maximum Power Spectral Density (continued)

Results: AC-DC Power Supply / 802.11a / 20 MHz / 48 Mbps / PWR 13 / UNII-3

Conducted Power Limit Comparison:

Channel	Conducted Average PSD (dBm /kHz)	Duty Cycle Correction Factor (dB)	Corrected Conducted Average PSD (dBm /kHz)	Conducted PSD Limit (dBm/ 500kHz)	Margin (dB)	Result
Bottom	-5.02	1.93	-3.09	30.00	33.09	Complied
Middle	-2.25	1.93	-0.32	30.00	30.32	Complied
Top	-4.73	1.93	-2.80	30.00	32.80	Complied

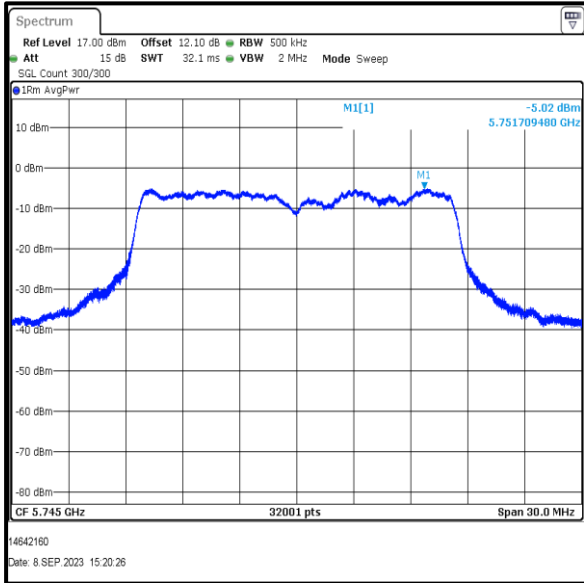
De Facto EIRP Limit Comparison:

Channel	Corrected Conducted Average PSD (dBm /MHz)	Directional Antenna Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit (dBm/ MHz)	Margin (dB)	Result
Bottom	-3.09	0.0	-3.09	30.00	33.09	Complied
Middle	-0.32	0.0	-0.32	30.00	30.32	Complied
Top	-2.80	0.0	-2.80	30.00	32.80	Complied

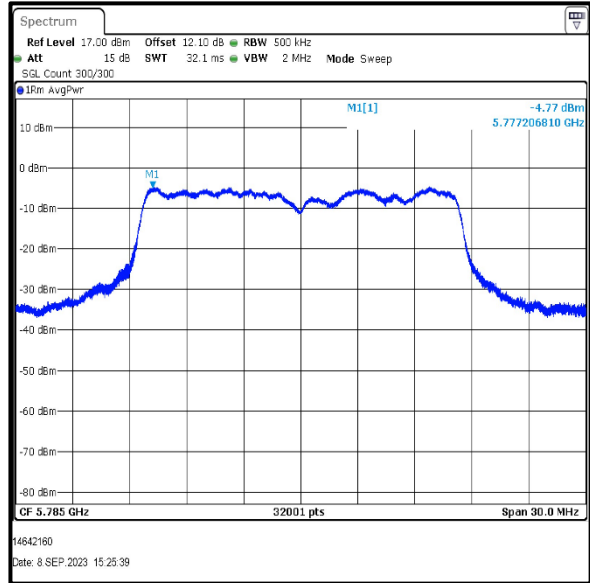
Result: Pass

Transmitter Maximum Power Spectral Density (continued)

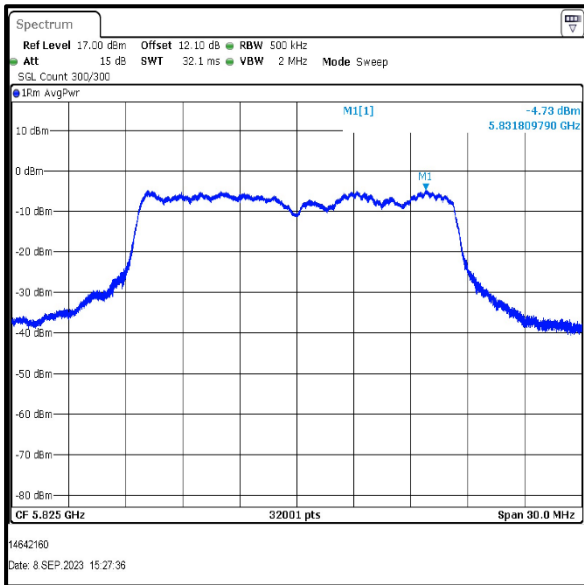
Results: AC-DC Power Supply / 802.11a / 20 MHz / 48 Mbps / PWR 13 / UNII-3



Bottom



Middle



Top

Result: Pass

Transmitter Maximum Power Spectral Density (continued)

Results: AC-DC Power Supply / 802.11n / 20 MHz / MCS7 / PWR 13 / UNII-3

Conducted Power Limit Comparison:

Channel	Conducted Average PSD (dBm /kHz)	Duty Cycle Correction Factor (dB)	Corrected Conducted Average PSD (dBm /kHz)	Conducted PSD Limit (dBm/ 500kHz)	Margin (dB)	Result
Bottom	-4.14	2.35	-1.79	30.00	31.79	Complied
Middle	-4.63	2.35	-2.28	30.00	32.28	Complied
Top	-3.90	2.35	-1.55	30.00	31.55	Complied

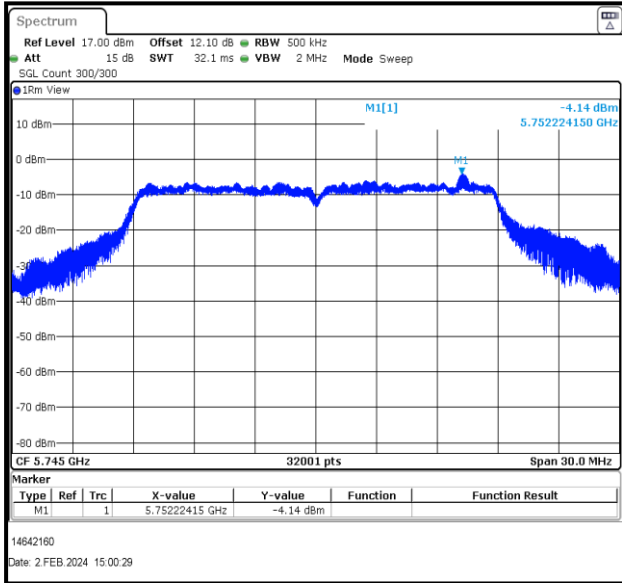
De Facto EIRP Limit Comparison:

Channel	Corrected Conducted Average PSD (dBm /MHz)	Directional Antenna Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit (dBm/ MHz)	Margin (dB)	Result
Bottom	-1.79	0.0	-1.79	30.00	31.79	Complied
Middle	-2.28	0.0	-2.28	30.00	32.28	Complied
Top	-1.55	0.0	-1.55	30.00	31.55	Complied

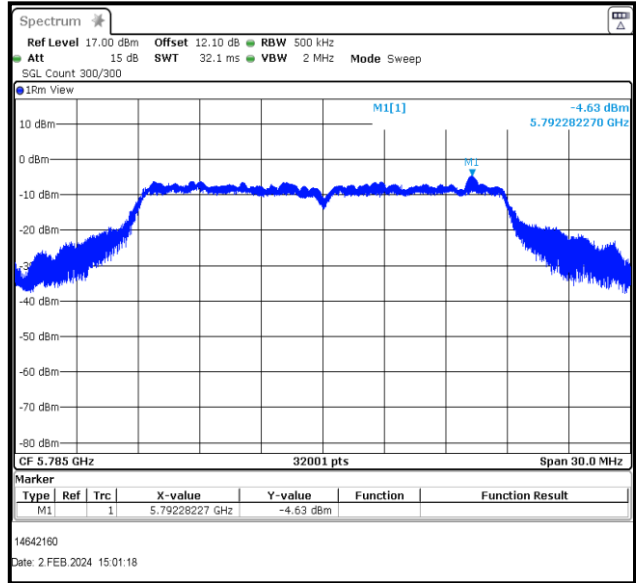
Result: Pass

Transmitter Maximum Power Spectral Density (continued)

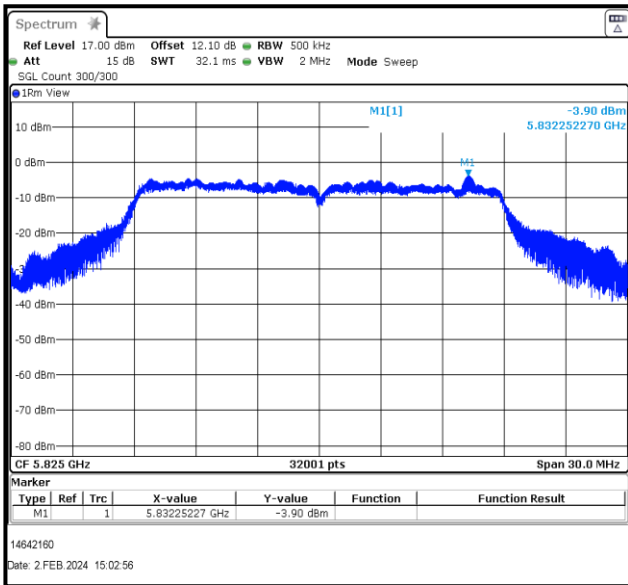
Results: AC-DC Power Supply / 802.11n / 20 MHz / MCS7 / PWR 13 / UNII-3



Bottom



Middle



Top

Result: Pass

Transmitter Maximum Power Spectral Density (continued)

Results: AC-DC Power Supply / 802.11ac / 20 MHz / MCS6 / PWR 12 / UNII-3

Conducted Power Limit Comparison:

Channel	Conducted Average PSD (dBm /kHz)	Duty Cycle Correction Factor (dB)	Corrected Conducted Average PSD (dBm /kHz)	Conducted PSD Limit (dBm/ 500 kHz)	Margin (dB)	Result
Bottom	-6.69	2.35	-4.34	30.00	34.34	Complied
Middle	-6.18	2.35	-3.83	30.00	33.83	Complied
Top	-6.64	2.35	-4.29	30.00	34.29	Complied

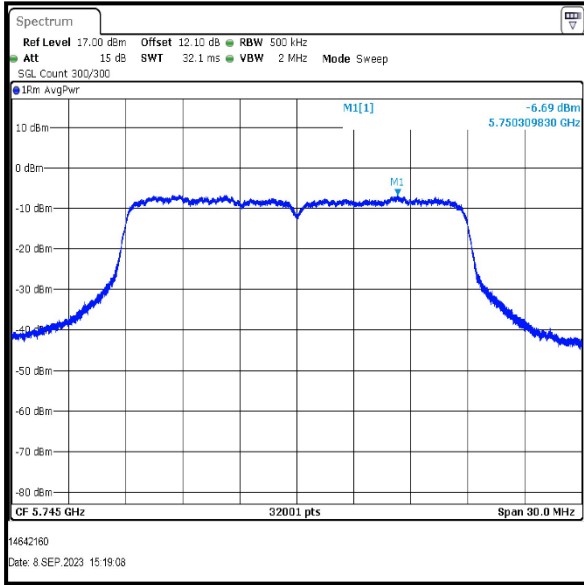
De Facto EIRP Limit Comparison:

Channel	Corrected Conducted Average PSD (dBm /MHz)	Directional Antenna Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit (dBm/ MHz)	Margin (dB)	Result
Bottom	-4.34	0.0	-4.34	30.00	34.34	Complied
Middle	-3.83	0.0	-3.83	30.00	33.83	Complied
Top	-4.29	0.0	-4.29	30.00	34.29	Complied

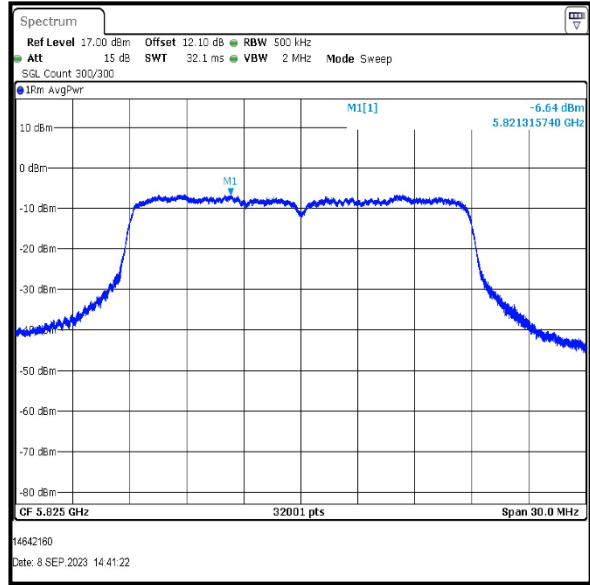
Result: Pass

Transmitter Maximum Power Spectral Density (continued)

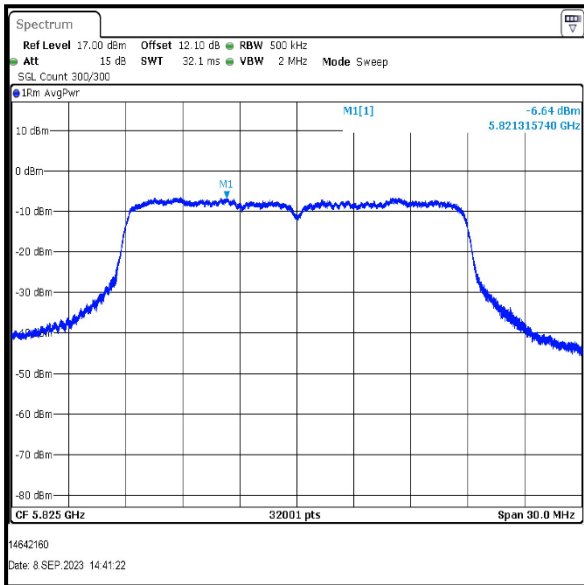
Results: AC-DC Power Supply / 802.11ac / 20 MHz / MCS6 / PWR 12 / UNII-3



Bottom



Middle



Top

Result: Pass

5.2.6. Transmitter Out of Band Radiated Emissions (5.15-5.25 GHz band operation)**Test Summary:**

Test Engineer:	Abbas Al-Hussainy	Test Date:	14 September 2023
Test Sample Serial Number:	DDU-ADV, ADVG200008 (Radiated Test Sample)		
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:

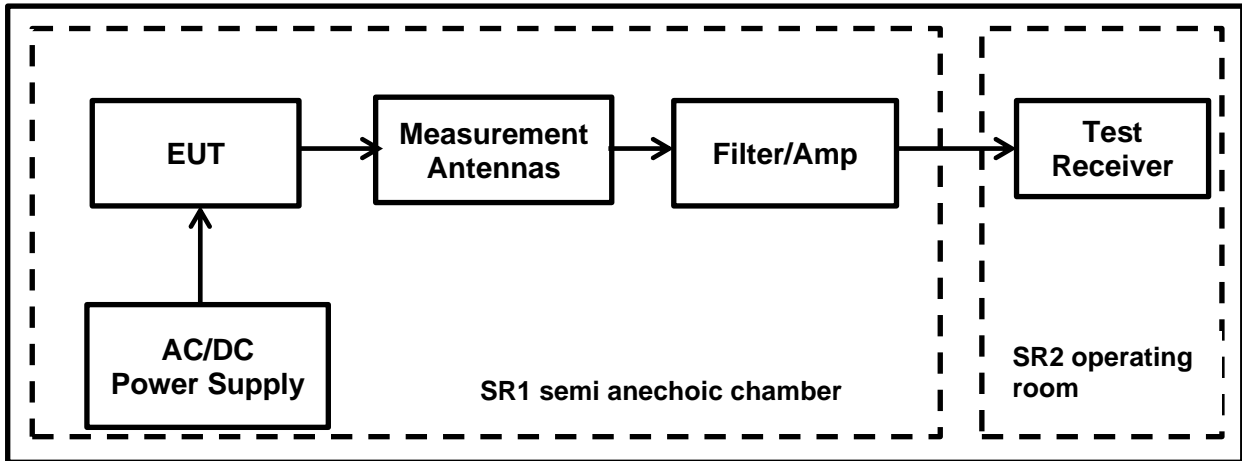
Temperature (°C):	25.7
Relative Humidity (%):	51.1

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 an 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.
- The measurement was performed with the following worst-case mode.
 - WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13
- 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 80 cm.
- Pre-scans were performed, and markers placed on the highest measured levels. The test receiver was set to:
 - Frequency range: 9 kHz-150 kHz: 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 (5.15-5.25 GHz band operation) (continued)

Test Setup:

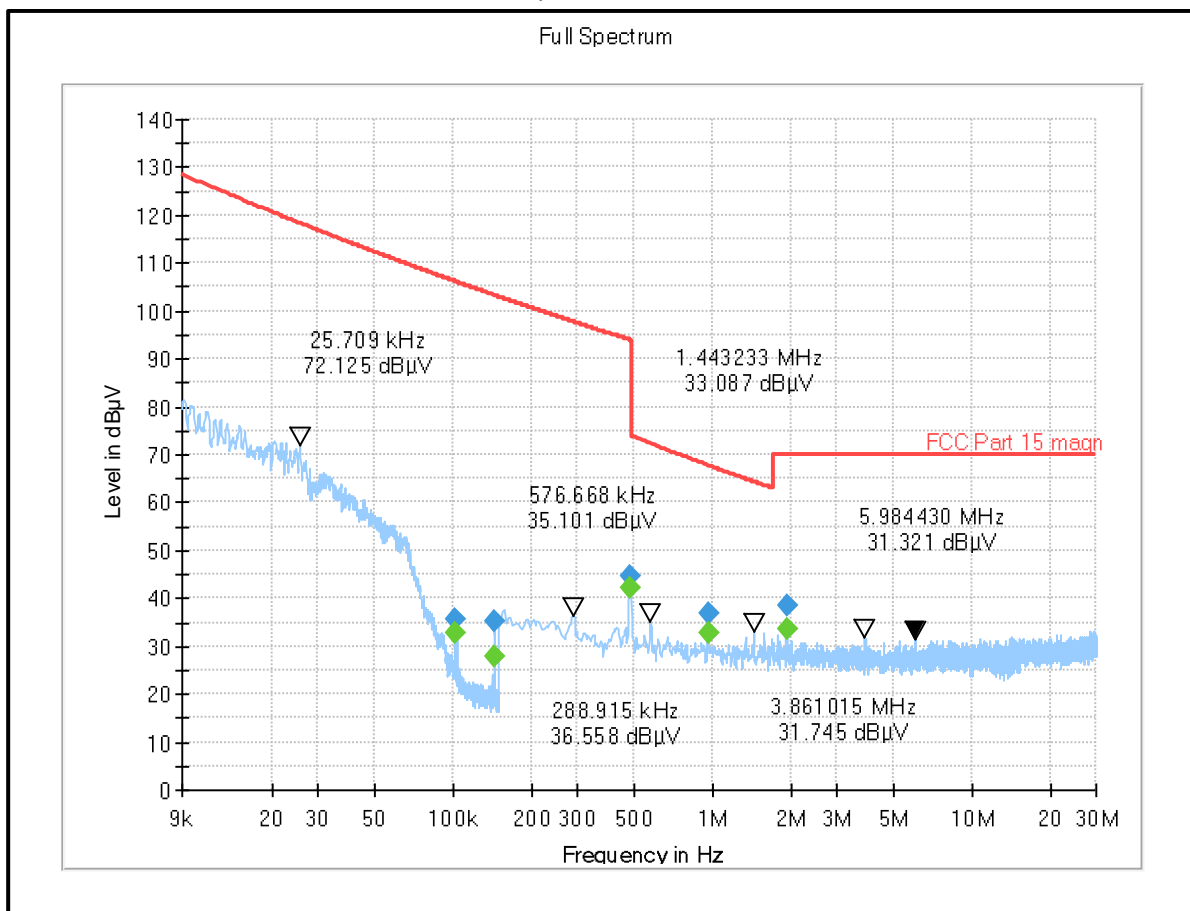


Transmitter Out of Band Radiated Emissions (5.15-5.25 GHz band operation) (continued)

Results: WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.101708	90° to EUT	35.63	106.16	70.53	Complied
0.144854	0° to EUT	35.34	103.25	67.91	Complied
0.480750	0° to EUT	44.59	93.94	49.35	Complied
0.960338	0° to EUT	36.73	67.74	31.01	Complied
1.922820	0° to EUT	38.45	70.00	31.55	Complied

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



Result: Pass

Transmitter Out of Band Radiated Emissions (5.15-5.25 GHz band operation) (continued)

Test Summary:

Test Engineer:	Abbas Al-Hussainy	Test Date:	14 September 2023
Test Sample Serial Number:	DDU-ADV, ADVG200008 (Radiated Test Sample)		
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

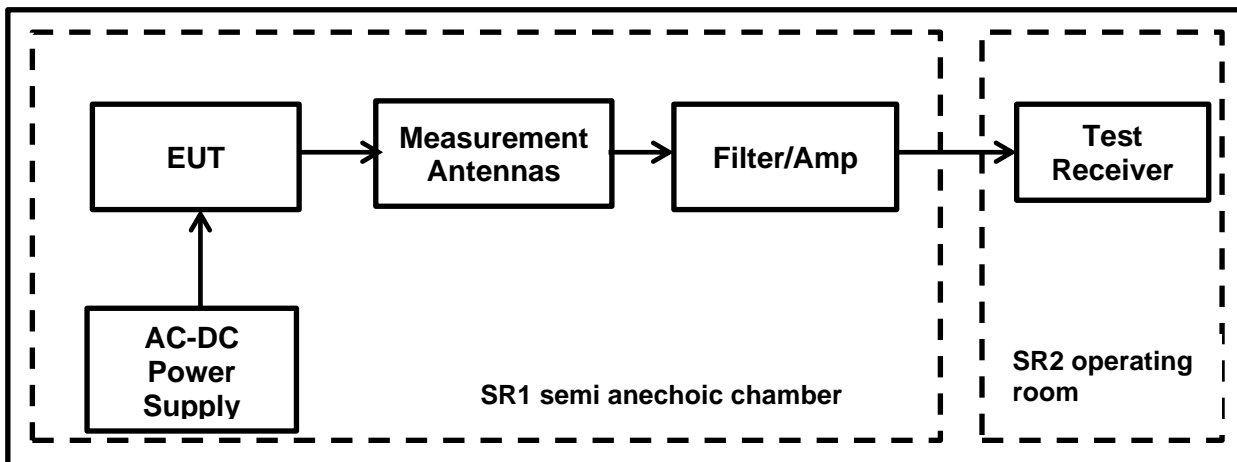
Environmental Conditions:

Temperature (°C):	25.7
Relative Humidity (%):	51.1

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. The preliminary scans showed similar emission levels below 1000 MHz, for each channel & modes(a,n) of operation. Therefore final radiated emissions measurements were performed with the EUT set to the top channel only.
4. The measurement was performed with the following worst-case mode.
 - WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13
5. All emissions shown on the pre-scan plots were investigated and found to be below system noise floor.

Test Setup:

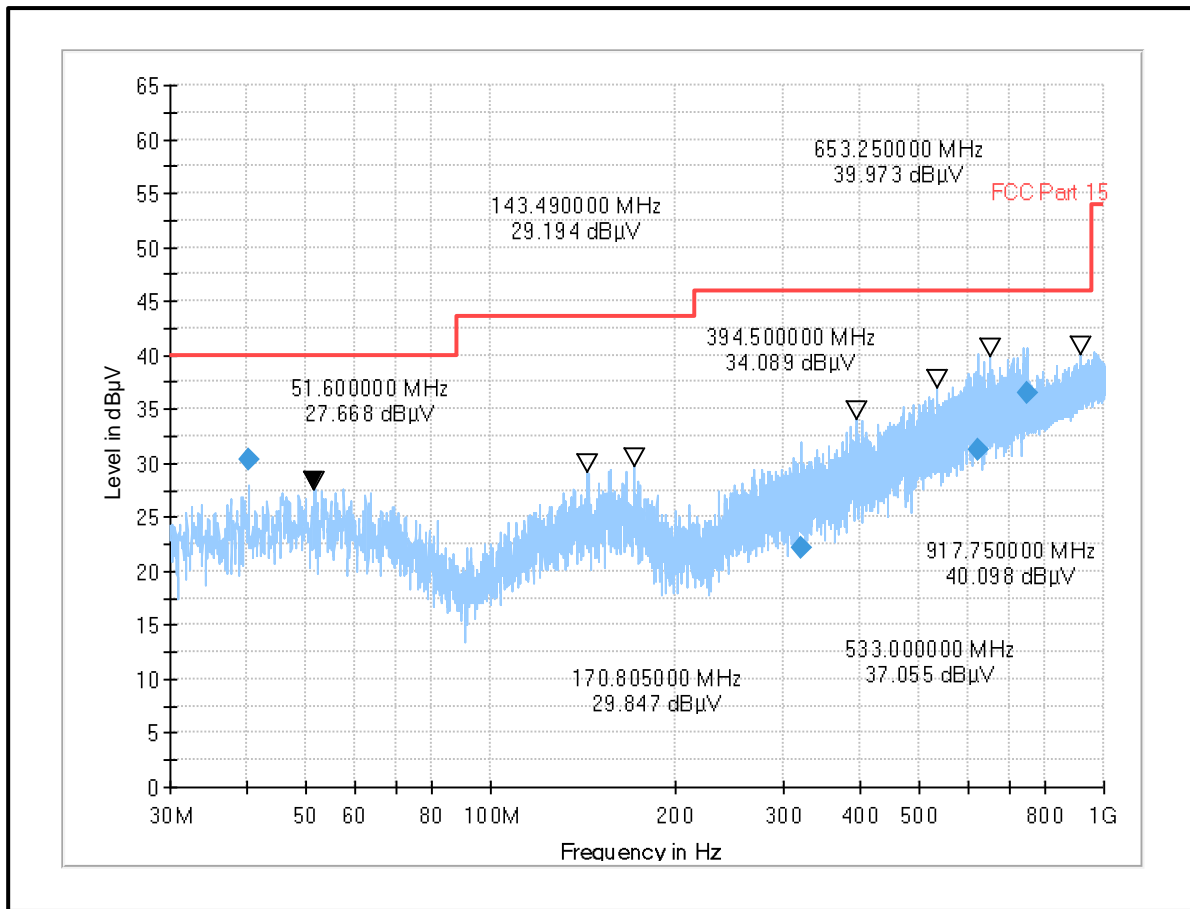


Transmitter Out of Band Radiated Emissions (5.15-5.25 GHz band operation) (continued)

Results: WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
40.215000	Vertical	30.24	40.00	9.76	Complied
321.366667	Horizontal	22.23	46.00	23.77	Complied
625.000000	Horizontal	31.21	46.00	14.79	Complied
749.083333	Vertical	36.43	46.00	9.57	Complied

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



Result: Pass

Transmitter Out of Band Radiated Emissions (5.15-5.25 GHz band operation) (continued)**Test Summary:**

Test Engineer:	Abbas Al-Hussainy	Test Date:	06 & 11 September 2023
Test Sample Serial Number:	DDU-ADV, ADV200008 (Radiated Test Sample)		
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:

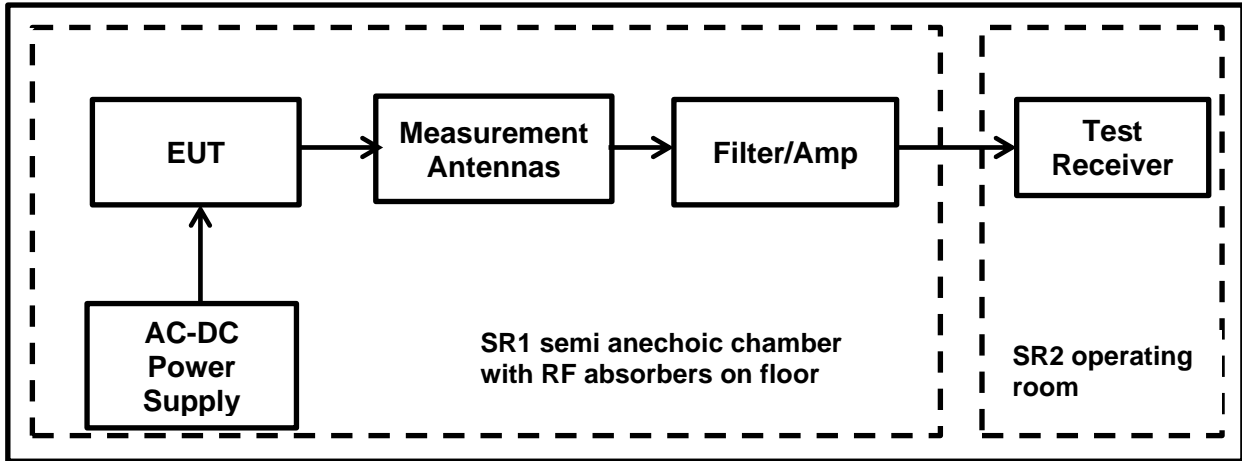
Temperature (°C):	24.0 to 25.7
Relative Humidity (%):	48.3 to 51.1

Note(s):

- The emissions shown at frequencies approximately 5.15-5.25 GHz on the 1 GHz to 18 GHz plots are the EUT fundamental for the tested channel.
- 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.
- 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.
- The measurement was performed with the following worst-case mode.
 - WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13
- 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.
- The preliminary scans showed similar emission levels above 18 GHz, for each channel & modes of operation. Therefore, final radiated emissions measurements were performed with the EUT set to the top channel only.
- 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.

Transmitter Out of Band Radiated Emissions (5.15-5.25 GHz band operation) (continued)

Test Setup:

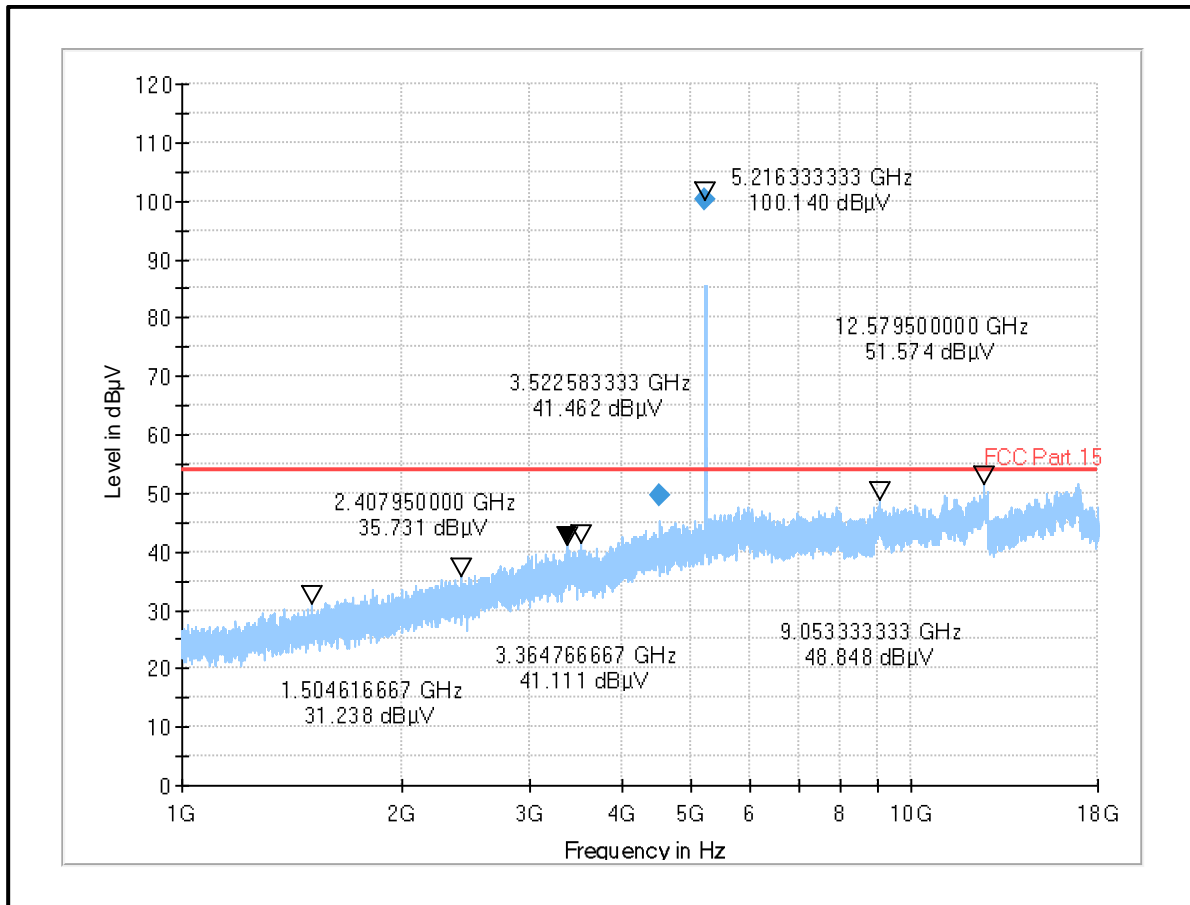


Transmitter Out of Band Radiated Emissions (5.15-5.25 GHz band operation) (continued)

Results: WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13

Frequency (MHz)	Antenna Polarization	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
4501.666667	Horizontal	49.72	54.00	4.28	Complied

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



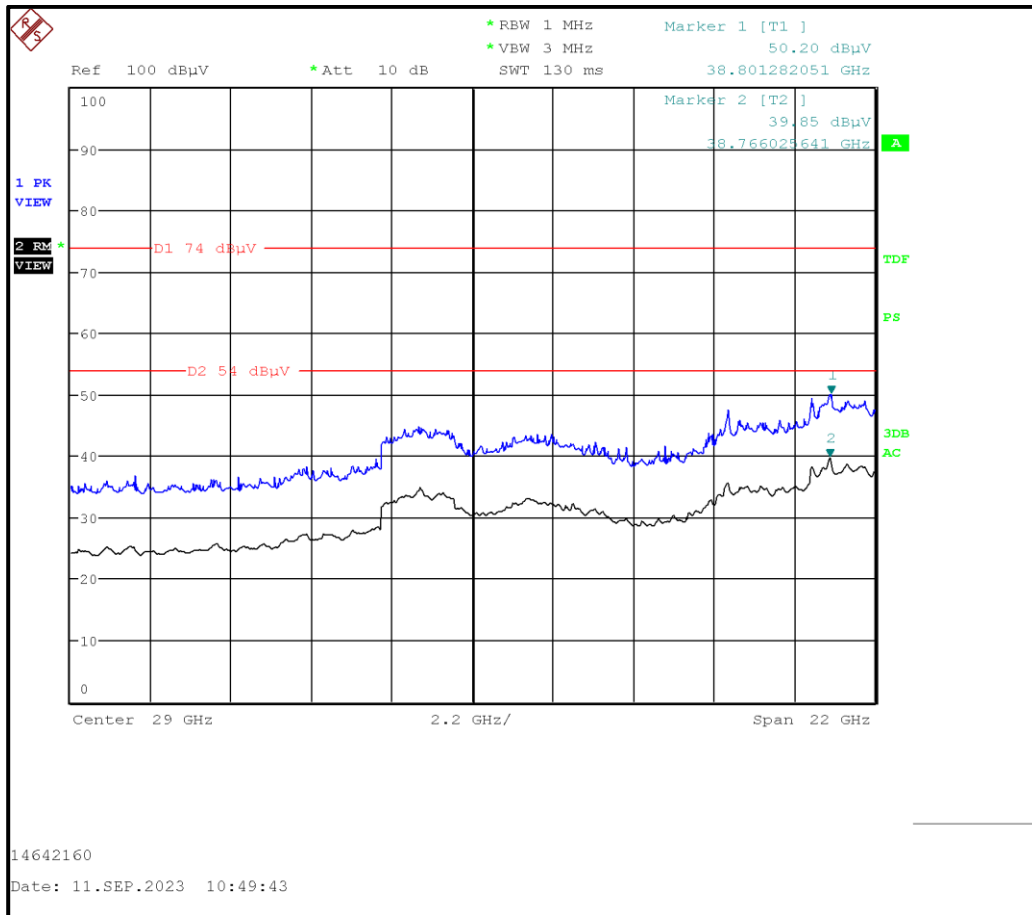
Result: Pass

Transmitter Out of Band Radiated Emissions (5.15-5.25 GHz band operation) (continued)

Results: WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13

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

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



Result: Pass

5.2.7. Transmitter Out of Band Radiated Emissions (5.725-5.850 GHz band operation)**Test Summary:**

Test Engineer:	Abbas Al-Hussainy	Test Date:	14 September 2023
Test Sample Serial Number:	DDU-ADV, ADVG200009 (Radiated Test Sample)		
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:

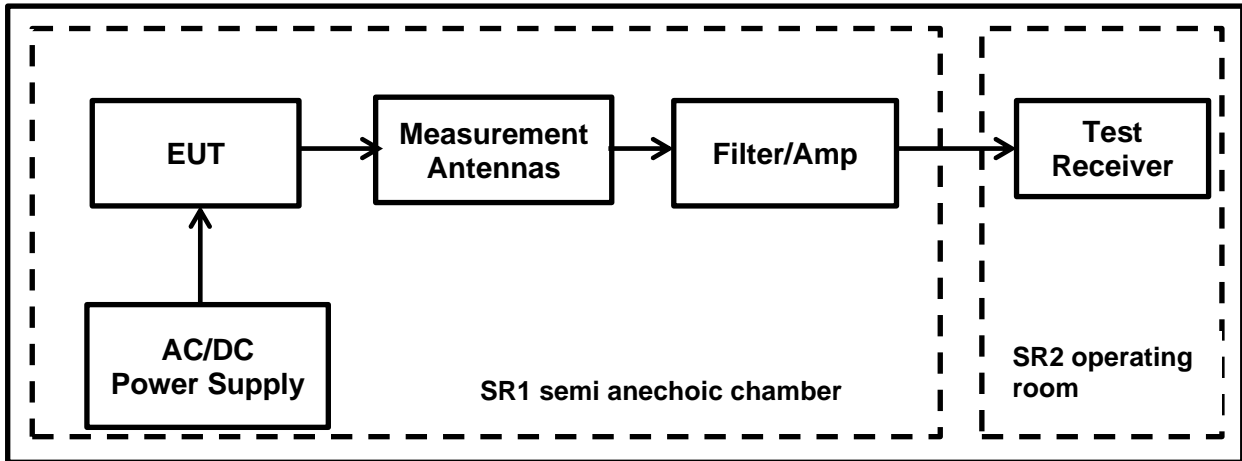
Temperature (°C):	25.8
Relative Humidity (%):	51.1

Note(s):

8. 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 an 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).
9. 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.
10. 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.
11. The measurement was performed with the following worst-case mode.
 - WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13
12. All emissions shown on the pre-scan plots were investigated and found to be below system noise floor.
13. 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 80 cm.
14. 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 (5.725-5.850 GHz band operation) (continued)

Test Setup:

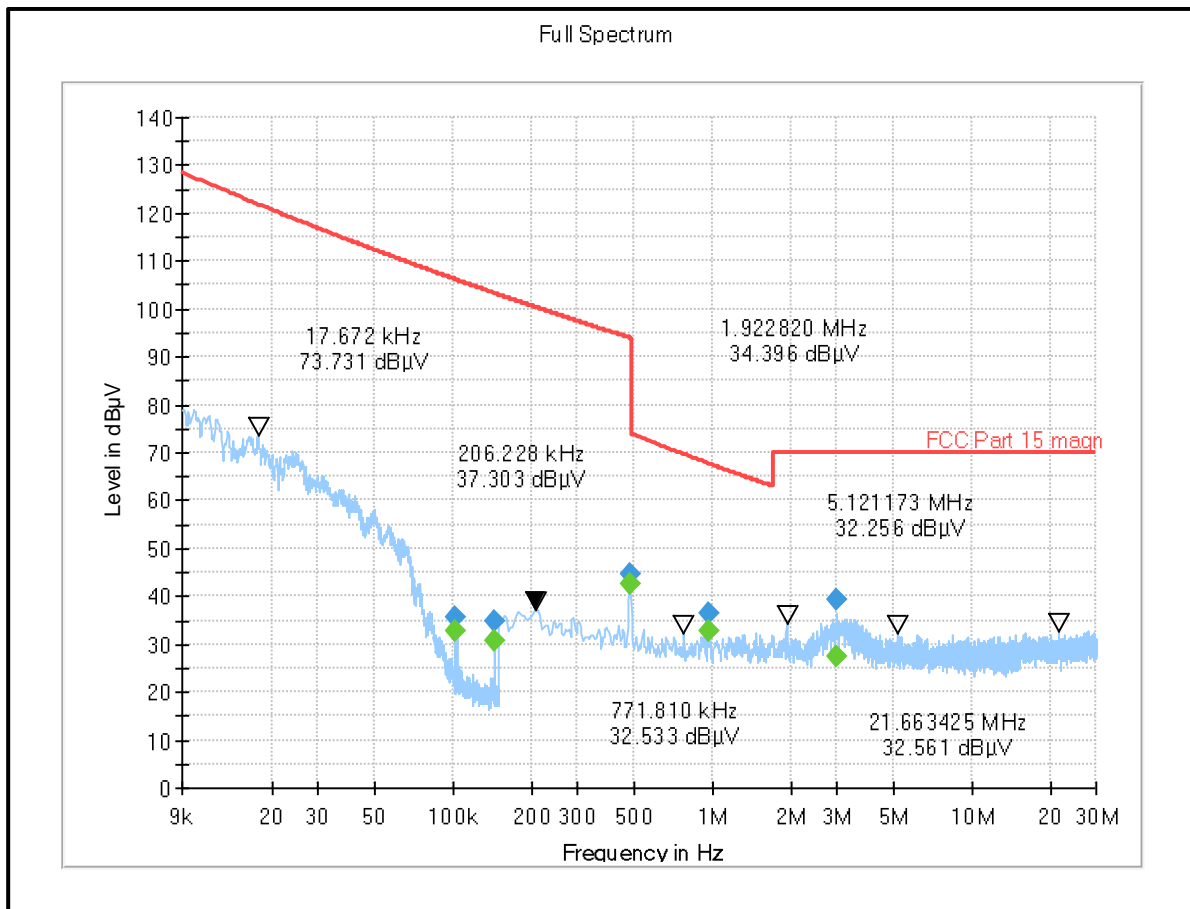


Transmitter Out of Band Radiated Emissions (5.725-5.850 GHz band operation) (continued)

Results: WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.101708	90° to EUT	35.77	106.16	70.39	Complied
0.144360	0° to EUT	34.87	103.28	68.41	Complied
0.480750	0° to EUT	44.66	93.94	49.28	Complied
0.960338	0° to EUT	36.63	67.74	31.11	Complied
2.984528	90° to EUT	39.16	70.00	30.84	Complied

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



Result: Pass

Transmitter Out of Band Radiated Emissions (5.725-5.850 GHz band operation) (continued)

Test Summary:

Test Engineer:	Abbas Al-Hussainy	Test Date:	14 September 2023
Test Sample Serial Number:	DDU-ADV, ADVG200008 (Radiated Test Sample)		
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

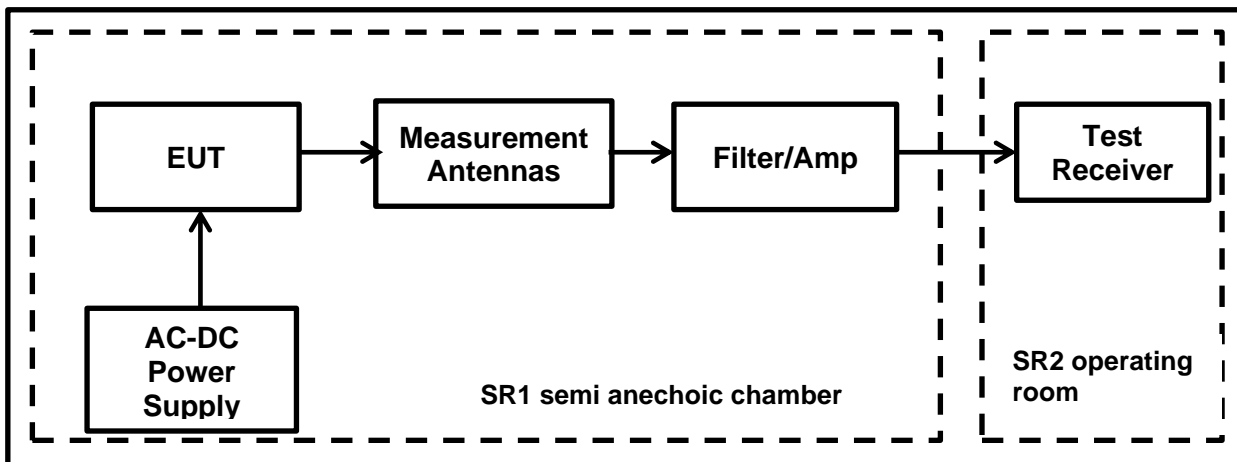
Environmental Conditions:

Temperature (°C):	25.8
Relative Humidity (%):	51.1

Note(s):

6. 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.
7. 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.
8. The preliminary scans showed similar emission levels below 1000 MHz, for each channel & modes(a,n) of operation. Therefore, final radiated emissions measurements were performed with the EUT set to the top channel only.
9. The measurement was performed with the following worst-case mode.
 - WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13
10. All emissions shown on the pre-scan plots were investigated and found to be below system noise floor.

Test Setup:

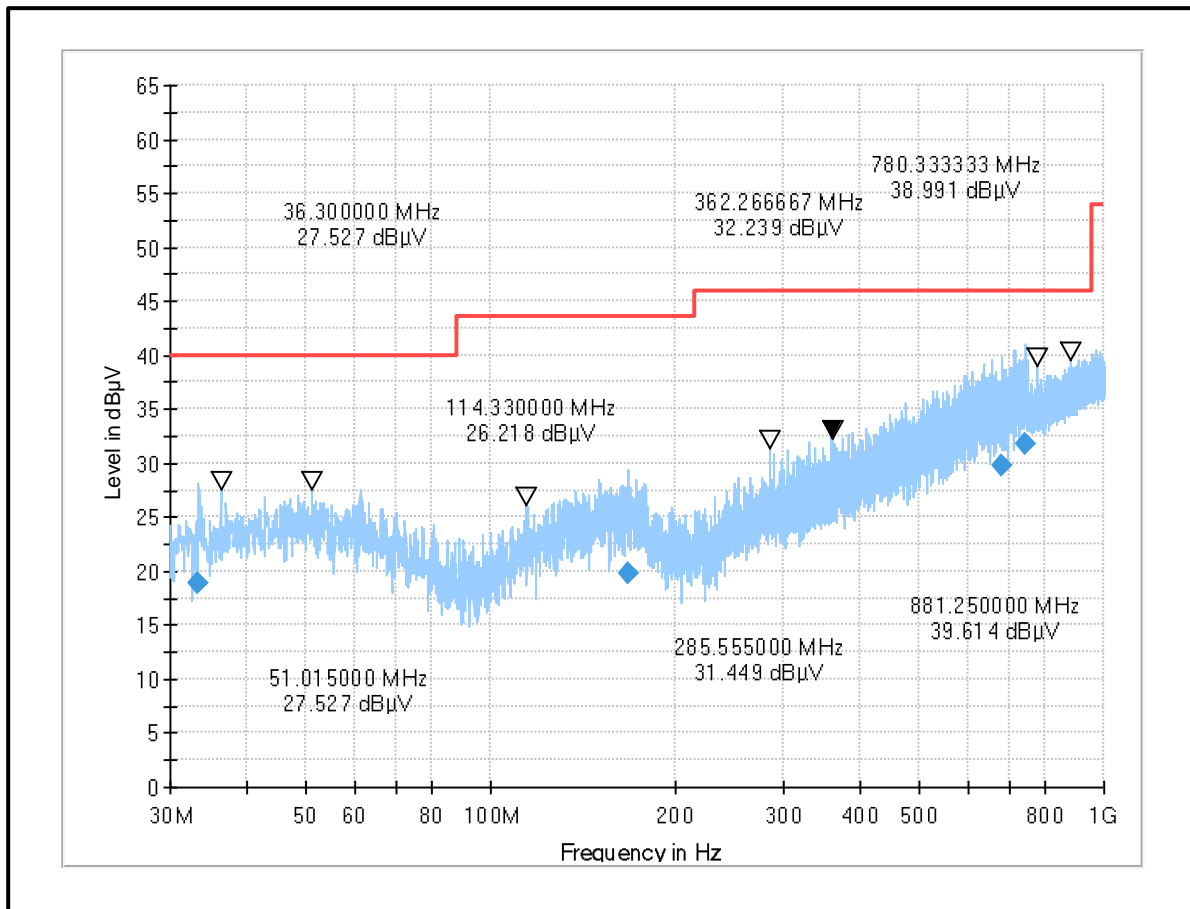


Transmitter Out of Band Radiated Emissions (5.725-5.850 GHz band operation) (continued)

Results: WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
33.375000	Vertical	18.90	40.00	21.10	Complied
167.655000	Horizontal	19.84	43.50	23.66	Complied
680.416667	Horizontal	29.83	46.00	16.17	Complied
745.666667	Vertical	31.81	46.00	14.19	Complied

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



Result: Pass

Transmitter Out of Band Radiated Emissions (5.725-5.850 GHz band operation) (continued)**Test Summary:**

Test Engineer:	Abbas Al-Hussainy	Test Date:	06 & 11 September 2023
Test Sample Serial Number:	DDU-ADV, ADV200008 (Radiated Test Sample)		
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:

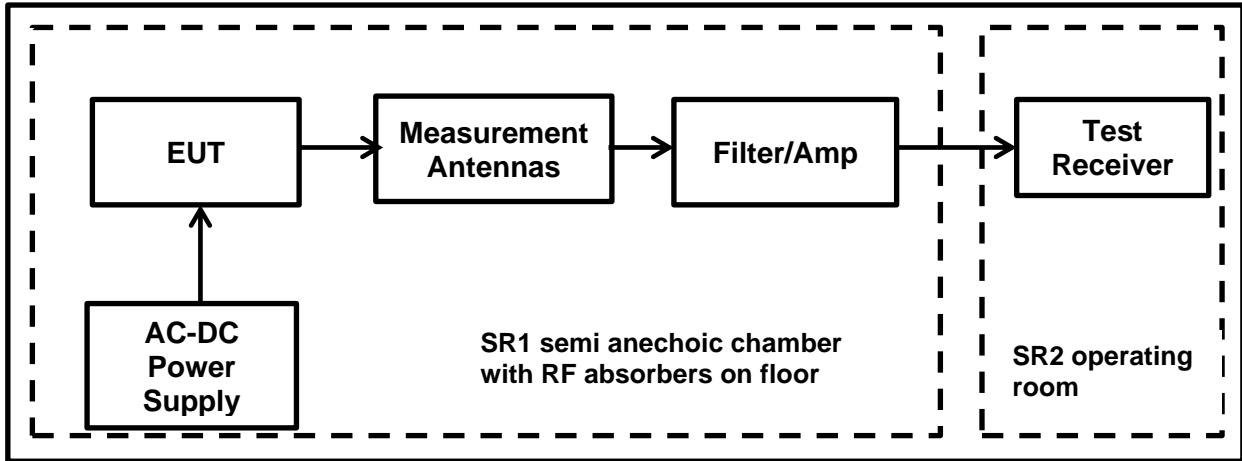
Temperature (°C):	24.0 to 25.7
Relative Humidity (%):	48.3 to 51.1

Note(s):

8. The emissions shown at frequencies approximately 5.725-5.850 GHz on the 1 GHz to 18 GHz plots are the EUT fundamental for the tested channel.
9. 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.
10. 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.
11. The measurement was performed with the following worst-case mode.
 - WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13
12. 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.
13. The preliminary scans showed similar emission levels above 18 GHz, for each channel & modes of operation. Therefore, final radiated emissions measurements were performed with the EUT set to the top channel only.
14. 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.

Transmitter Out of Band Radiated Emissions (5.725-5.850 GHz band operation) (continued)

Test Setup:

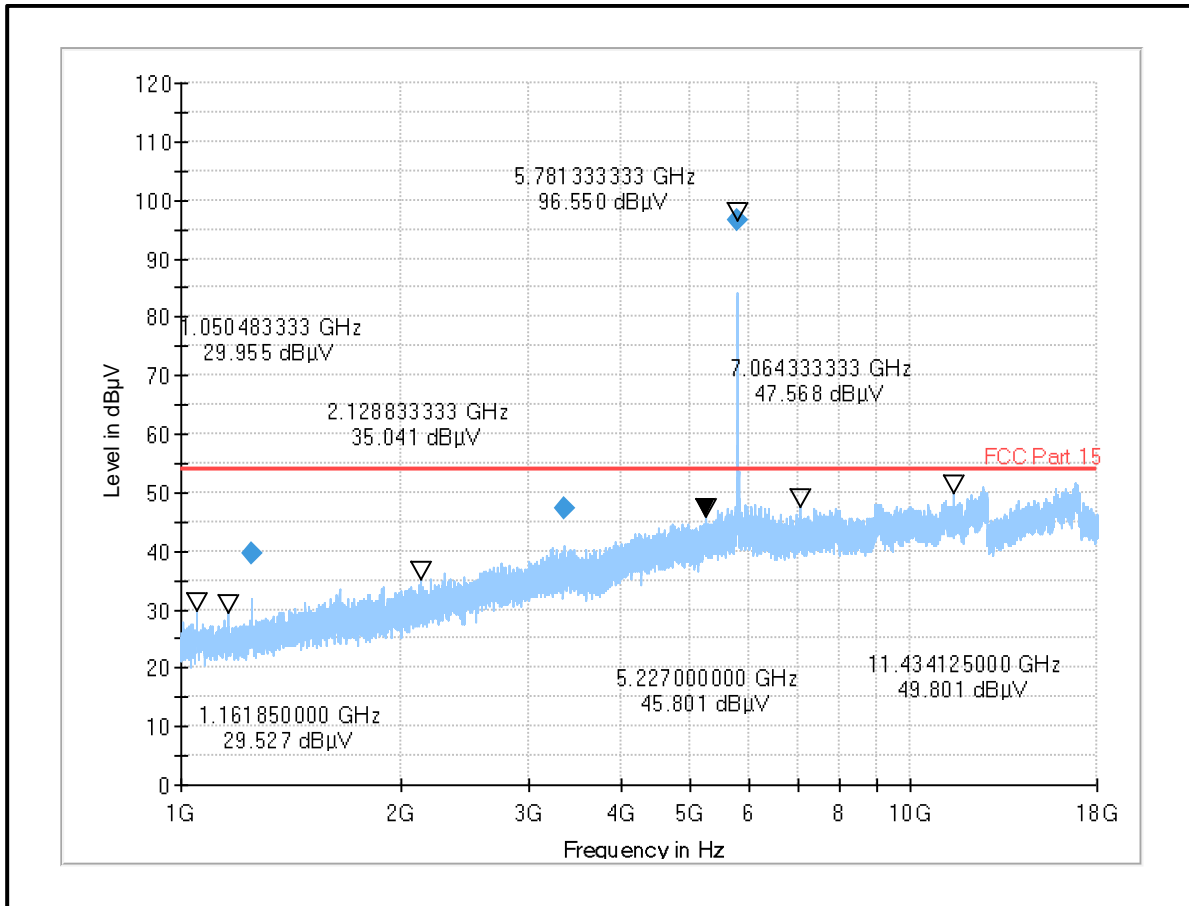


Transmitter Out of Band Radiated Emissions (5.725-5.850 GHz band operation) (continued)

Results: WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
1250.033333	Vertical	39.56	54.00	14.44	Complied
3361.083333	Vertical	47.26	54.00	6.74	Complied

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



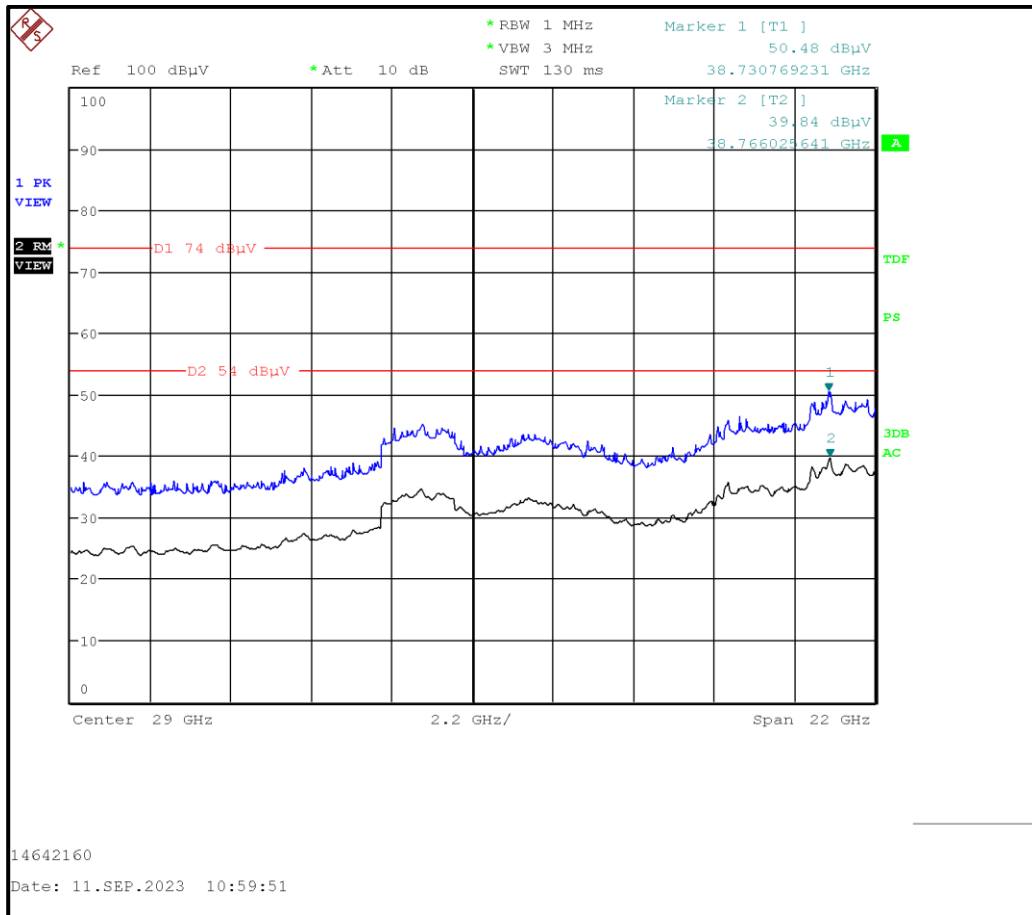
Result: Pass

Transmitter Out of Band Radiated Emissions (5.725-5.850 GHz band operation) (continued)

Results: WLAN 5 GHz / 802.11 a / 20 MHz / 48 Mbps / Middle Channel / PWR 13

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

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



Result: Pass

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

Test Engineer:	Abbas Al-Hussainy	Test Date:	06 & 12 September 2023
Test Sample Serial Number:	DDU-ADV, ADVC200008 (Radiated Test Sample)		
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):	24.0 to 25.5
Relative Humidity (%):	44.0 to 52.0

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. 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 dB μ V/m (restricted band limit)
 - According to FCC 15.407(b)(4)(i) peak limit is 68.2 dB μ V/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 dB μ V/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.

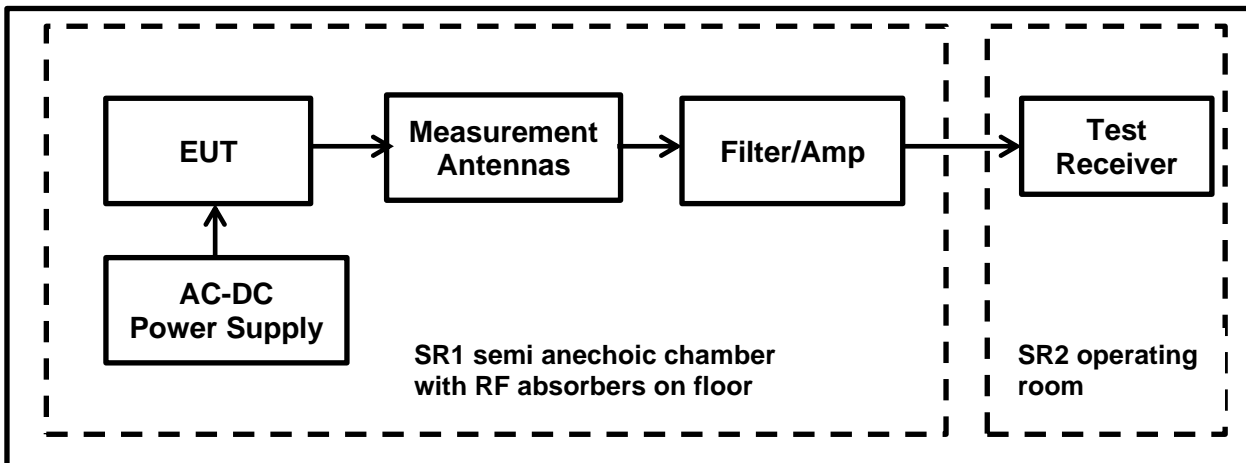
Transmitter Band Edge Radiated Emissions (continued)

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 ≥ 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	65.73	1.82
n20-mode	60.36	2.19
ac20-mode	58.16	2.35

Test Setup:



Transmitter Band Edge Radiated Emissions (continued)

Results: AC-DC Power Supply / UNII-1 / 802.11a / 20 MHz / 48 Mbps / PWR 13

Results: CH36 / Lower Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5149.84	60.42	68.20*	7.78	Complied
5150.00	58.85	68.20*	9.35	Complied

Results: CH36 / 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
5149.76	41.92	1.82	43.74**	54.00	10.26	Complied
5150.00	41.88	1.82	43.70**	54.00	10.30	Complied

Results: CH48 / Upper Band Edge / Peak

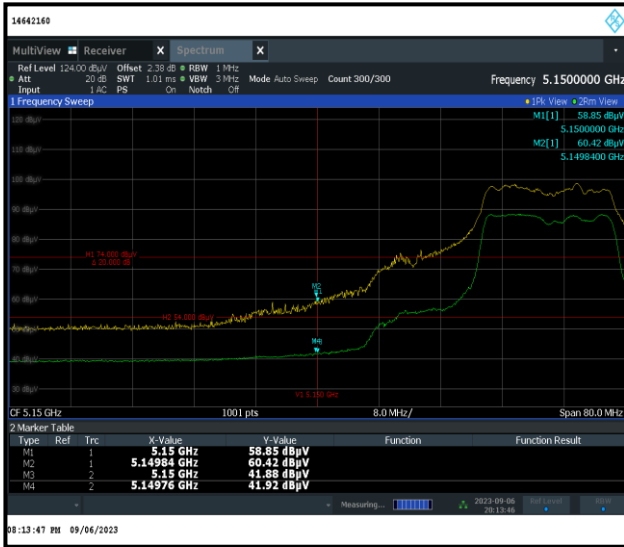
Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5350.00	51.15	68.20*	17.05	Complied
5470.78	52.85	68.20*	15.35	Complied

Results: CH48 / Upper Band Edge / Average

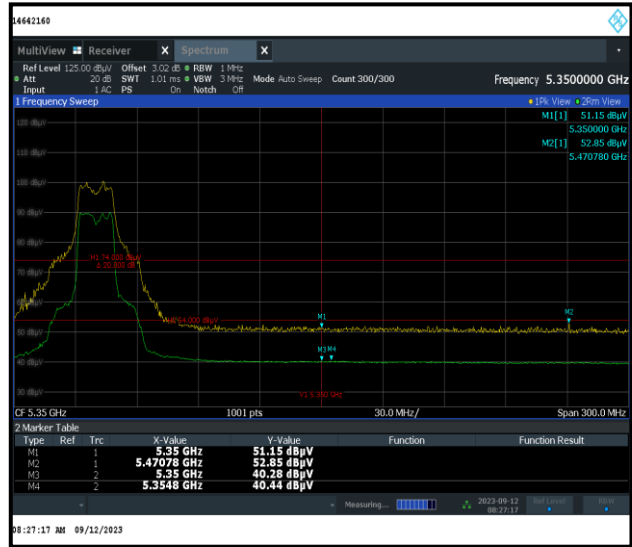
Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
5350.00	40.28	1.82	42.10**	54.00	11.90	Complied
5354.80	40.44	1.82	42.26**	54.00	11.74	Complied

Transmitter Band Edge Radiated Emissions (continued)

Results: AC-DC Power Supply / UNII-1 / 802.11a / 20 MHz / 48 Mbps / PWR 13



Lower Band Edge Measurement



Upper Band Edge Measurement

Result: **Pass**

Transmitter Band Edge Radiated Emissions (continued)

Results: AC-DC Power Supply / UNII-1 / 802.11n / 20 MHz / MCS6 / PWR 13

Results: CH36 / Lower Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5149.36	62.92	68.20*	5.28	Complied
5150.00	61.15	68.20*	7.05	Complied

Results: CH36 / 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
5149.44	42.76	2.19	44.95**	54.00	9.05	Complied
5150.00	42.28	2.19	44.47**	54.00	9.53	Complied

Results: CH48 / Upper Band Edge / Peak

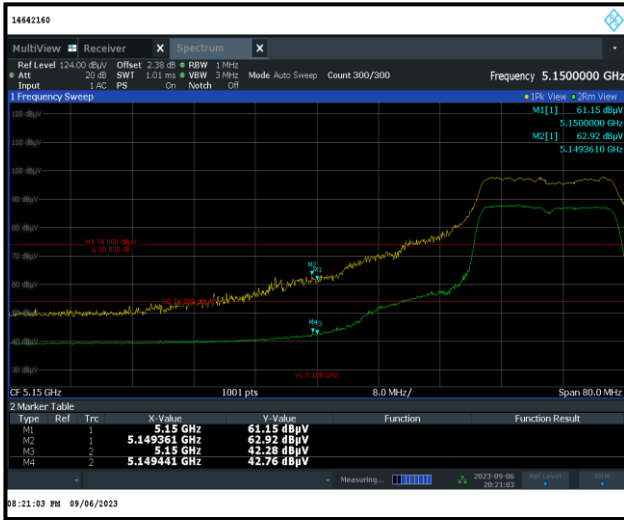
Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5350.00	50.29	68.20*	17.91	Complied
5403.95	52.38	68.20*	15.82	Complied

Results: CH48 / Upper Band Edge / Average

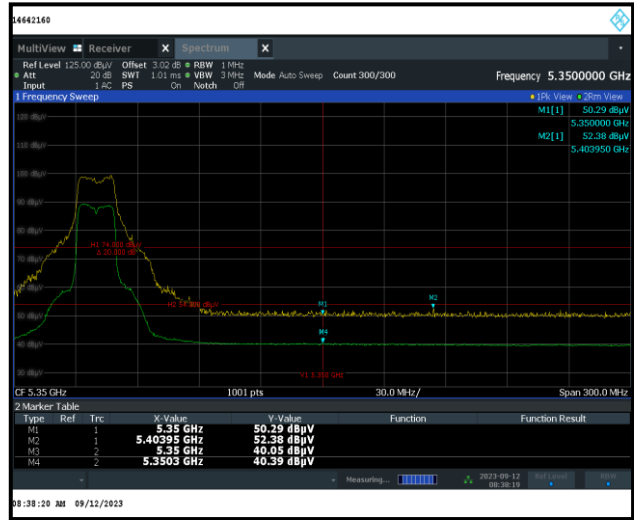
Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
5350.00	40.05	2.19	42.24**	54.00	11.76	Complied
5350.30	40.39	2.19	42.58**	54.00	11.42	Complied

Transmitter Band Edge Radiated Emissions (continued)

Results: AC-DC Power Supply / UNII-1 / 802.11n / 20 MHz / MCS6 / PWR 13



Lower Band Edge Measurement



Upper Band Edge Measurement

Result: **Pass**

Transmitter Band Edge Radiated Emissions (continued)

Results: AC-DC Power Supply / UNII-1 / 802.11ac / 20 MHz / MCS6 / PWR 12

Results: CH36 / Lower Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5149.92	56.25	68.20*	11.95	Complied
5150.00	56.80	68.20*	11.40	Complied

Results: CH36 / 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
5149.92	41.33	2.35	43.68**	54.00	10.32	Complied
5150.00	40.94	2.35	43.29**	54.00	10.71	Complied

Results: CH48 / Upper Band Edge / Peak

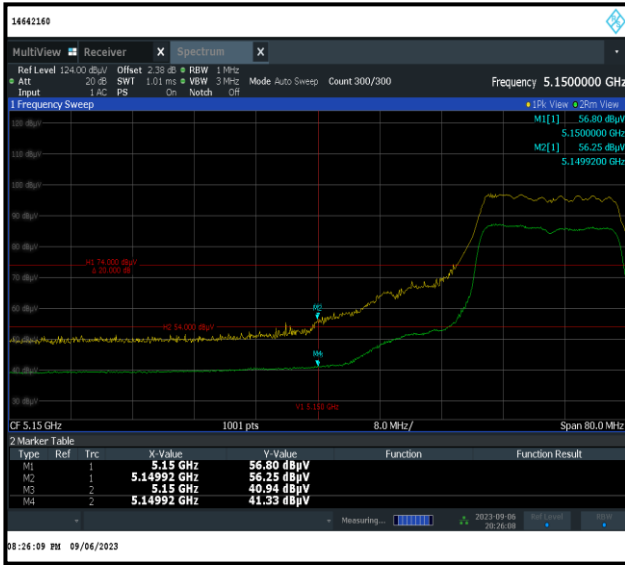
Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5350.00	50.28	68.20*	17.92	Complied
5404.25	52.49	68.20*	15.71	Complied

Results: CH48 / Upper Band Edge / Average

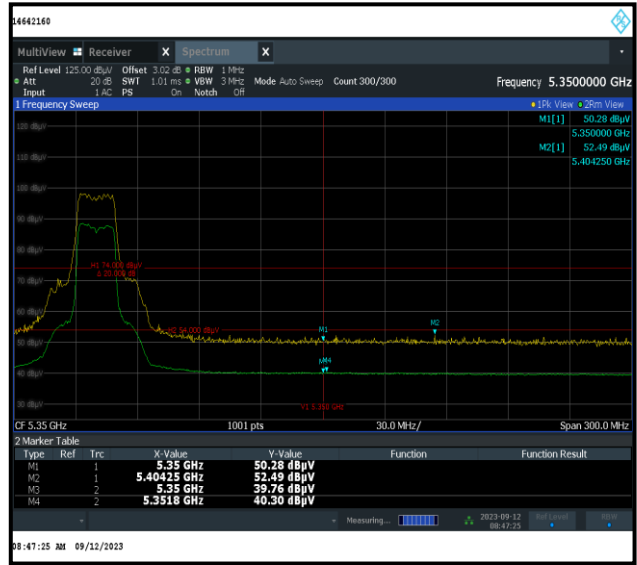
Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
5350.00	39.76	2.35	42.11**	54.00	11.89	Complied
5351.80	40.30	2.35	42.65**	54.00	11.35	Complied

Transmitter Band Edge Radiated Emissions (continued)

Results: AC-DC Power Supply / UNII-1 / 802.11ac / 20 MHz / MCS6 / PWR 12



Lower Band Edge Measurement



Upper Band Edge Measurement

Result: **Pass**

Transmitter Band Edge Radiated Emissions (continued)

Results: AC-DC Power Supply / UNII-3 / 802.11a / 20 MHz / 48 Mbps / PWR 13

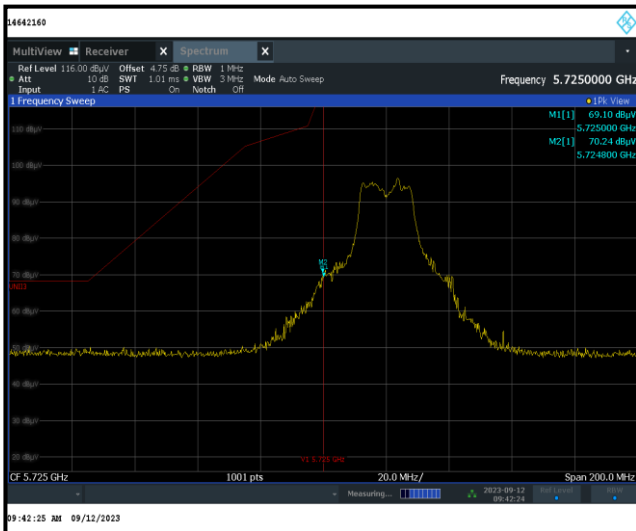
Results: CH149 / Lower Band Edge

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5724.80	70.24	121.7	51.46	Complied
5725.00	69.10	122.2	53.10	Complied

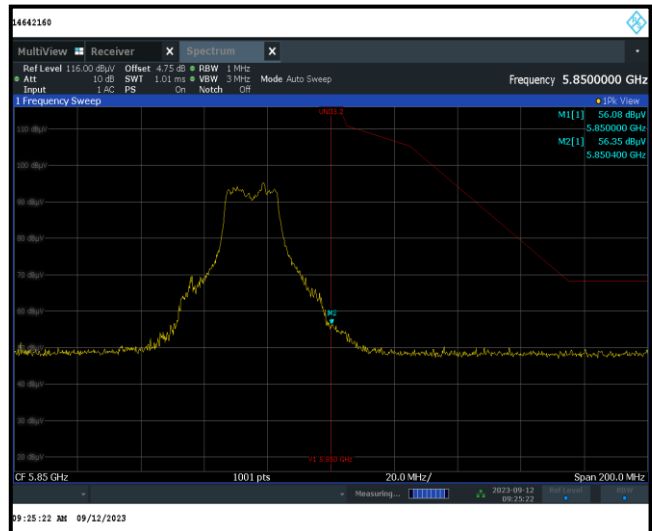
Results: CH165 / Upper Band Edge

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5850.40	56.35	121.3	64.95	Complied
5850.00	56.08	122.2	66.12	Complied

Plots: AC-DC Power Supply / UNII-3 / 802.11a / 20 MHz / 48 Mbps / PWR 13



Lower Band Edge Measurement



Upper Band Edge Measurement

Result: **Pass**

Transmitter Band Edge Radiated Emissions (continued)

Results: AC-DC Power Supply / UNII-3 / 802.11n / 20 MHz / MCS7 / PWR 13

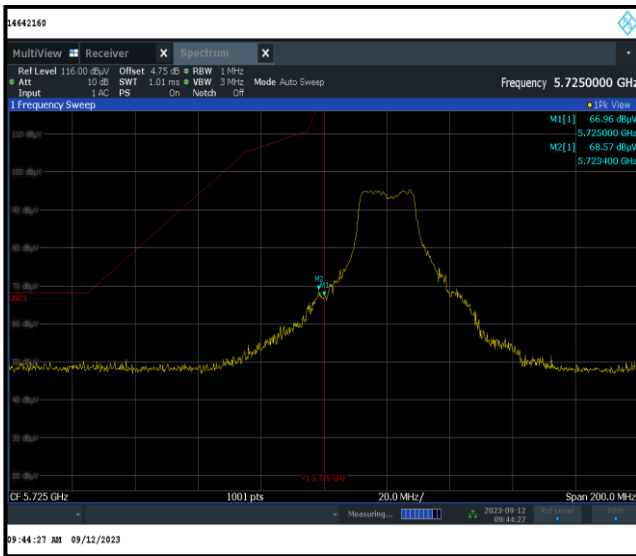
Results: CH149 / Lower Band Edge

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5723.40	68.57	118.6	50.03	Complied
5725.00	66.96	122.2	55.24	Complied

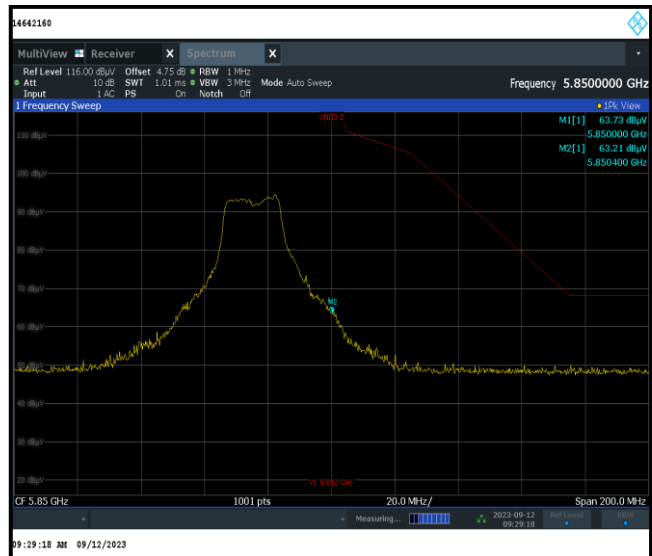
Results: CH165 / Upper Band Edge

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5850.40	63.21	121.3	58.09	Complied
5850.00	63.73	122.2	58.47	Complied

Plots: AC-DC Power Supply / UNII-3 / 802.11n / 20 MHz / MCS7 / PWR 13



Lower Band Edge Measurement



Upper Band Edge Measurement

Result: **Pass**

Transmitter Band Edge Radiated Emissions (continued)

Results: AC-DC Power Supply / UNII-3 / 802.11ac / 20 MHz / MCS6 / PWR 12

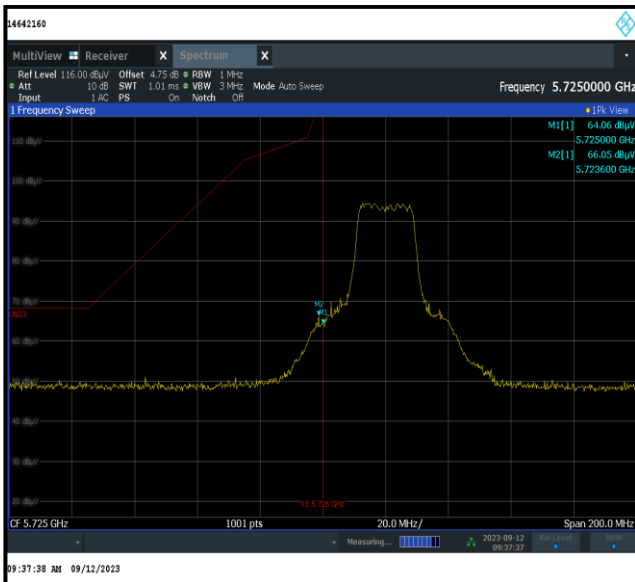
Results: CH149 / Lower Band Edge

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5723.60	66.05	119.0	52.95	Complied
5725.00	64.06	122.2	58.14	Complied

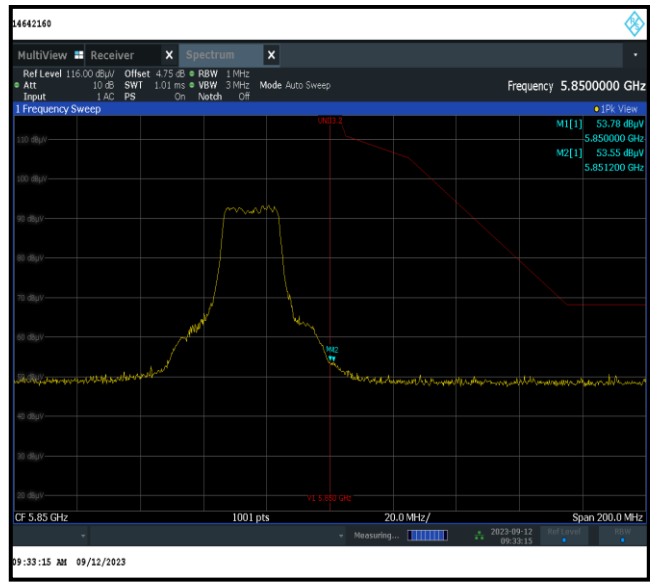
Results: CH165 / Upper Band Edge

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
5851.20	53.55	119.5	65.95	Complied
5850.00	53.78	122.2	68.42	Complied

Plots: AC-DC Power Supply / UNII-3 / 802.11ac / 20 MHz / MCS6 / PWR 12



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
AC Conducted Spurious Emissions	95%	±2.49 dB
Conducted Maximum Peak Output Power	95%	±0.59 dB
Conducted Maximum Power Spectral Density	95%	±0.59 dB
Radiated Spurious Emissions	95%	±3.10 dB
Band Edge Radiated Emissions	95%	±3.10 dB
Transmitter Duty Cycle	95%	±3.4%
26 dB Bandwidth	95%	±0.87 %

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
495	Rohde & Schwarz	Antenna, log. - periodical	HL050	100296	06/08/2021	36
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

Test site: SR 9

ID	Manufacturer	Type	Model	Serial	Calibration Date	Cal. Cycle (months)
445	Huber & Suhner	RF Attenuator (10dB)	6810.17.AC	--	lab verification	12
637	Rohde & Schwarz	Spectrum Analyzer	FSV40	101587	12/07/2023	12
636	Rohde & Schwarz	Switching Unit Power Meter	OSP-B157W8	101698	15/07/2022	24
-/-	Testo	Thermo-Hygrometer	608-H1	07	lab verification	n/a
-/-	Huber & Suhner	RF Cable (upto 18GHz)	-/-	-/-	lab verification	n/a
327	SPS	AC/DC power distribution system	PAS 5000	A2464 00/1 0200	lab verification	n/a
1603668	Siemens Matsushita Components	shielded room		B83117-B1422-T161	n/a	n/a

8. APPENDIX A: UNTESTED VARIANTS

The tested EUT corresponds to the sample DDU-ADV (with part number VPPFEF-20B337-**) which was declared to be the worst-case scenario by customer. The other possible samples associated to model DDU are as follows:

Sample reference	Visteon Part No
DDU-MID	VPPFEF-20B337-**
DDU-BSC	VPPFEF-20B337-**

9. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	87	-	Initial Version
1.1	8	3.4	Additional information table updated
	70-80	5.2.7	Test Method and notes updated
1.2	1 & 5	-	Test standards updated
	8	3.5	Support equipment (Manufacturer supplied) updated
1.3	4.1	10	Table updated
	5.2.1	12 - 25	Notes and Results updated
	5.2.2	26	Notes updated
	5.2.2	28	Results updated
	5.2.3	33 - 39	Included 6dB Bandwidth Measurements
	5.2.5	62 - 66	Results table updated
	5.2.8	94 - 96	Results table updated
Test Report Version 2.0 supersede Version 1.3 with immediate effect Test Report No. UL-RPT-RP-14642160-7316-FCC Version 2.0, Issue Date 12 FEBRUARY 2024 replaces Test Report No. UL-RPT-RP-14642160-7316-FCC Version 1.3, Issue Date 30 JANUARY 2024, which is no longer valid.			
2.0	as below	as below	Current Version
	12 - 21	5.2.1	Notes and results updated
	26-28	5.2.2	Notes and results header updated
	31	5.2.2	Results updated
	62	5.2.5	Results table updated
	64 - 65	5.2.5	Results updated

--- END OF REPORT ---