TEST REPORT

Test Report No.: UL-RPT-RP-14208157-416-FCC

Applicant	:	SECO SPA
Model No.	:	SYS-C31-DMV-01-IO
FCC ID	:	Contains FCC ID: 2ALZB-AW276
Technology	:	WLAN 2.4 GHz (802.11 b, g, n)
Test Standard(s)	:	FCC Parts 15.207, 15.209(a) & 15.247 For details of applied tests refer to test result summary

1. This test report shall not be reproduced in full or partial, without the written approval of UL International Germany GmbH.
2. The results in this report apply only to the sample tested.
3. The test results in this report are traceable to the national or international standards.
4. Test Report Version 1.0
5. Result of the tested sample: **PASS**

Prepared by: Muhammad Faiq, Khan
Title: Project Engineer
Date: 01 December 2022

Approved by: Rachid, Acharkaoui
Title: Operations Manager
Date: 01 December 2022

Deutsche Akkreditierungsstelle D-PL-19381-02-00

This laboratory is accredited by DAkkS.
The tests reported herein have been performed in accordance with its' terms of accreditation.

UL INTERNATIONAL GERMANY GMBH
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STU.CTECHLab@ul.com

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1. Customer Information

1.1. Applicant Information

Company Name:	SECO SPA
Company Address:	via Achille Grandini N-20, Arezzo, ITALY
Contact Person:	Mr. Giacomo Nucci / Mr. Giacomo Martini
Contact E-Mail Address:	giacomo.nucci@seco.com / giacomo.martini@seco.com
Contact Phone No.:	+39 057 5269 79

1.2. Manufacturer Information

Company Name:	SECO SPA
Company Address:	via Achille Grandini N-20, Arezzo, ITALY
Contact Person:	Mr. Giacomo Nucci / Mr. Giacomo Martini
Contact E-Mail Address:	giacomo.nucci@seco.com / giacomo.martini@seco.com
Contact Phone No.:	+39 057 5269 79

2. Summary of Testing

2.1. General Information

Applied FCC Rule Part(s)

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.247
Specification Reference:	47CFR15.207 and 47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209

Location

Location of Testing:	UL International Germany GmbH Hedelfinger Strasse. 61, 70327 Stuttgart, GERMANY
Registration Number:	399704

Date Information

Order Date:	09 February 2022
EUT Arrived:	19 April 2022
Test Dates:	03 May 2022 to 20 May 2022
EUT Returned:	-/-

2.2. Summary of Test Results

DIGITAL TRANSMISSION SYSTEMS (DTS): 2400-2483.5 MHz					
FCC Part 15 Clause	Compliance Test Description	Test Result			
		C	N.C.	N.P.	N.A.
15.207	Transmitter AC Power Line Conducted Emissions	☒	☐	☐	☐
15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth (2)	☐	☐	☒	☐
15.35(c)	Transmitter Duty Cycle (1)	☒	☐	☐	☐
15.247(b)(3)	Transmitter Maximum Peak Output Power (2)	☐	☐	☒	☐
15.247(e)	Transmitter Power Spectral Density (2)	☐	☐	☒	☐
15.247(d) & 15.209(a)	Transmitter Conducted Emissions (2)	☐	☐	☒	☐
15.247(d) & 15.209(a)	Transmitter Radiated Emissions (2)	☒	☐	☐	☐
15.247(d) & 15.209(a)	Transmitter Band Edge Radiated Emissions (2)	☒	☐	☐	☐
C: COMPLIED | N.C.: NOT COMPLIED | N.P.: NOT PERFORMED | N.A.: NOT APPLICABLE					
Decision rule: Where not otherwise specified or communicated in writing, statements of conformity (e.g. Pass/Fail) are established according to the following decision rule: considering that the applied test standards take measurement uncertainty into account, acceptance limit equals the tolerance limit (Accuracy Method). This leads to a maximum 50% of false accept or false reject when the measured value equals the tolerance limit. See ILAC-G8:09/2019 for further details.					

Note(s):

1. The measurement was performed to assist the average measurements.
2. At the clients request, only partial testing was performed as the EUT is a host product that contains a pre-certified radio module.

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 558074 D01 DTS Meas Guidance v05r02 April 2, 2019
Title:	Guidance for compliance measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 of the FCC rules
Reference:	FCC KDB 174176 D01 Line Conducted FAQ v01r01 June 3, 2015
Title:	AC Power-Line Conducted Emissions Frequently Asked Questions

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:	DMVI
Model Name or Number:	SYS-C31-DMV-01-IO
Test Sample Serial Number:	220405435 (RF Test Sample)
Hardware Version Number:	IO
Firmware Version Number:	C31DMVYY.BBB
FCC ID:	Contains FCC ID: 2ALZB-AW276

3.2. Description of EUT

The equipment under test was an industrial PC gateway Model: SYS-C31-DMV-01-IO that contains a pre-certified radio module which supports 2.4 GHz WLAN, 5 GHz WLAN, Bluetooth BR/EDR and Bluetooth Low Energy RF technologies.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Category of Equipment:	WLAN 2.4 GHz (IEEE 802.11b, g, n)		
Type of Radio Device:	Transceiver		
Power Supply Requirement(s):	Nominal	12V DC via external power supply	
Supported Transmit Operating Mode(s):	802.11b/g HT20 802.11n HT20 / HT40		
Worst Case Data Rate(s):	802.11b	1 Mbps (SISO) (Note 1)	
	802.11g	6 Mbps (SISO) (Note 1)	
	802.11n HT20	MCS0 (SISO) (Note 1)	
	802.11n HT40	MCS0 (SISO) (Note 1)	
Worst Case Modulation Type(s):	802.11g	BPSK (Note 1) (Note 2)	
	802.11n HT20	BPSK (Note 1) (Note 2)	
	802.11n HT40	BPSK (Note 1) (Note 2)	
Nominal Channel Bandwidth:	20 MHz 40 MHz		
Maximum RF Output Power:	26.80 dBm (Note 3)		
Antenna Type:	OEM Multifunctional Antenna Board		
Antenna Gain:	(Blue Channel)	(Red Channel)	
	2.1 dBi	2.7 dBi	
Transmit Frequency Range:	2412 MHz to 2462 MHz		
Transmit Channels Tested:	**ID**	**Channel**	**Frequency (MHz)**
Nominal Channel Bandwidth: 20 MHz	Bottom	1(Note 2)	2412
	Middle	7	2442
	Top	11	2462
Nominal Channel Bandwidth: 40 MHz	Bottom	3(Note 2)	2412
	Middle	7	2442
	Top	9	2462
(Note 1) Since the module is FCC pre-certified the worst-case data rates were determined from the module report, serial number RF161216E08,on the basis of the highest conducted output power forFCC ID: UAY-W8997-M1216.			
(Note 2) In accordance with FCC KDB 996369 D04 Section 3.4 (b) Host Product testing has been performed on unwanted (spurious) radiated emissions on the worst-case modulation and channel per frequency.			
(Note 3) Value taken from test report, serial number RF161216E08, for pre-certified radio module FCC ID: UAY-W8997-M1216			

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	Laboratory DC Power Supply	GW	GPS-1850D	7662217
2	Test Laptop with Test software: Tera Term	HP	ProBook 650	5CG6143YWB

B. Support Equipment (Manufacturer supplied)

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

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):
☒ Transmitter / Modulated Carrier Continuous Transmissions Mode WLAN 2.4 GHz, Worst Case: • 802.11b I 20 MHz | 1 Mbps | PWR 35 (Note 1) (Note 2) • 802.11g I 20 MHz I 6 Mbps | PWR 21 (Note 1) (Note 2) (Note 3) • 802.11n I 20 MHz I MCS0 | PWR 20 (Note 1) (Note 2) (Note 3) • 802.11n I 40 MHz I MCS0 | PWR 16 (Note 1) (Note 2) (Note 3)
(Note 1) Multiple power levels were investigated before determining the final above mentioned power levels for each mode. The customer confirmed to use these power levels for the respective modes.
(Note 2) These worst-case data rates were taken from test report, serial number RF161216E08, for pre-certified radio module FCC ID: UAY-W8997-M1216
(Note 3) In accordance with FCC KDB 996369 D04 Section 3.4 (b) the Host Product testing has been performed on unwanted (spurious) radiated emissions on the worst-case modulation and channel per frequency range as shown in test report, serial number RF161216E08, for pre-certified radio module FCC ID: UAY-W8997-M1216in

4.2. Configuration and Peripherals

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

- The applicant or manufacturer supplied test setup instructions "SYS-C31-DMV___Test_Radio_guidance_00" issued on 22 April 2022 was used to configure the EUT.

EUT Power Supply:

- The EUT was powered with 12V DC via an external AC/DC power supply

Test Mode Activation:

- The EUT can be connected with the Test laptop via USB-UART cables supplied by the customer. The cable was used only for configuration and was removed during the measurement.
- The test modes were activated by the terminal software ''Tera Term''. The commands to setup the respective modes and power were defined by the customer in the setup instructions.

AC Conducted Emissions Measurements:

- The EUT RF sample with antenna was used for AC conducted emissions measurements.
- The measurements were carried out with 120 VAC/60Hz & 240 VAC/60Hz.
- The Toyo EMI Software EP5/CE Ver 4.0.1. was used for these measurements.

Radiated Measurements:

- The EUT RF sample with antenna was used for radiated spurious emissions measurements.
- As per the applicant's declaration &/operational description of the EUT, the EUT is a tabletop equipment for its intended application. Therefore, EUT's test setup placement was performed in accordance with ANSI C63.10 section 6.2.3.2 & section 6.12 Figure 4.
- The EUT with its integrated antenna was evaluated for its worst-case position w.r.t to maximum radiated power measured and it was found that EUT in Standing position is the worst-case. Therefore, this report includes relevant results.
- The position of the Antenna was 90° vertical in the z-axis from the EUT.
- Radiated measurements below 30 MHz were performed with the EUT positioned on the turn table and rotating 360 degrees while the loop antenna height was set at 100 cm.
- Radiated measurements above 30 MHz were performed with the EUT positioned on the turn table and rotating 360° while the antenna height varies from 1 to 4 m over the measurement frequency range.
- R&S® EMC32 V11.30 Software was used for the Radiated spurious emission measurements.

Duty Cycle Correction Details:

- As the continuous transmission of the EUT ($D \geq 98\%$) cannot be achieved and EUT was transmitting continuously at different Duty Cycles with respect to the selected modes (duty cycle variations are less than ±2% at the respective data rate). Therefore, Duty Cycle Correction Factors were added to all average measurements according to the below table, to compute the corrected average values of the emissions that would have been measured had the test been performed at 100% Duty Cycle.

Data rate	Duty cycle	Correction factor
	(%)	(dB)
b-HT20-mode	86.41	0.63
g-HT20-mode	76.55	1.20
n-HT20-mode	83.48	0.78
n-HT40-mode	73.41	1.34

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 AC Conducted Spurious Emissions

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	20 May 2022
Test Sample Serial Number:	220405435 (RF Test Sample)		
Test Site Identification	SR 7/8		

FCC Reference:	Part 15.207
Test Method Used:	ANSI C63.10 Section 6.2 / FCC KDB 174176 and notes below

Environmental Conditions:

Temperature (°C):	25.6
Relative Humidity (%):	48.7

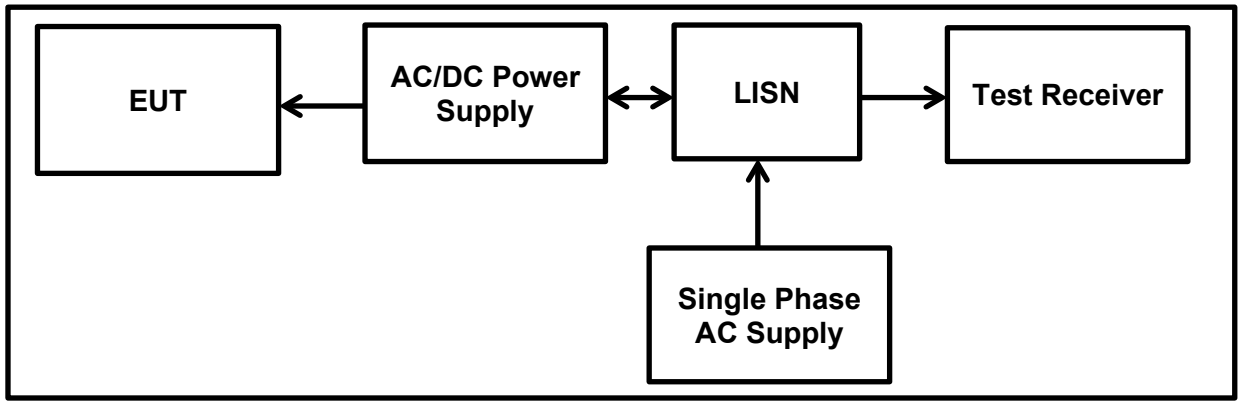
Settings of the Instrument

Detector:	Quasi Peak/ Average Peak

Note(s):

1. In accordance with FCC KDB 174176 Q4, tests were also performed with a 240 VAC 60 Hz single phase supply as this was within the voltage range marked on the 100-240 VAC~50/60 Hz power supply.
2. The EUT was powered via AC/DC power supply which was connected with the LISN during the measurement.
3. The EUT was configured on 802.11g I 20 MHz| 6 Mbps | PWR 21 | Bottom Channel
4. Pre-scans were performed, and markers placed on the highest live and neutral measured levels. Final measurements were performed on the marker frequencies and the results entered into the tables below.
5. The final measured value, for the given emission, in the table below incorporates the cable loss.
6. All other emissions shown on the pre-scan plot were investigated. Only the highest 6 emissions have been reported in the tables below in accordance with ANSI C63.10 section 6.2.5.
7. Measurements were performed in shielded room (SR7/ 8 Asset Number 1603671). The EUT was placed at a height of 80 cm above the reference ground plane and in a distance of 40 cm from the vertical ground plane at the edge of the table.
8. Measurement software used: Toyo EMI Software; CE measurement software EP5/CE Ver 4.0.1.

Test Setup:



Transmitter AC Conducted Spurious Emissions (continued)

Results: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel

Results: Live / Quasi Peak / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.151140	Live	33.50	65.90	32.40	Complied
0.614080	Live	17.70	56.00	38.30	Complied
0.885520	Live	16.70	56.00	39.30	Complied
9.791800	Live	31.00	60.00	29.00	Complied
12.348550	Live	31.40	60.00	28.60	Complied
14.057170	Live	40.00	60.00	20.00	Complied
14.586820	Live	40.00	60.00	20.00	Complied
14.950150	Live	38.30	60.00	21.70	Complied

Results: Live / Average / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.151140	Live	14.20	55.90	41.70	Complied
0.614080	Live	6.00	46.00	40.00	Complied
0.885520	Live	4.40	46.00	41.60	Complied
9.791800	Live	26.20	50.00	23.80	Complied
12.348550	Live	26.00	50.00	24.00	Complied
14.057170	Live	33.30	50.00	16.70	Complied
14.586820	Live	33.20	50.00	16.80	Complied
14.950150	Live	31.80	50.00	18.20	Complied

Results: Neutral / Quasi Peak / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.151600	Neutral	33.00	65.90	32.90	Complied
0.189060	Neutral	28.10	64.10	36.00	Complied
0.821330	Neutral	17.50	56.00	38.50	Complied
9.813530	Neutral	30.00	60.00	30.00	Complied
12.448040	Neutral	31.10	60.00	28.90	Complied
13.848350	Neutral	38.50	60.00	21.50	Complied
14.206560	Neutral	40.80	60.00	19.20	Complied
14.875800	Neutral	38.40	60.00	21.60	Complied

Transmitter AC Conducted Spurious Emissions (continued)

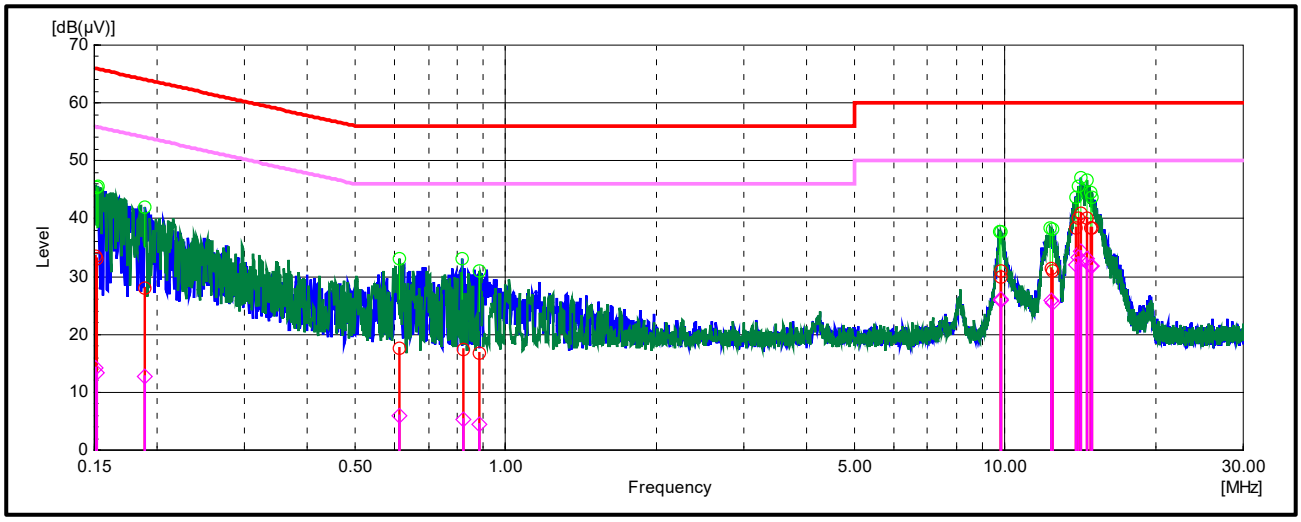
Results: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel

Results: Neutral / Average / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.151600	Neutral	13.30	55.90	42.60	Complied
0.189060	Neutral	12.60	54.10	41.50	Complied
0.821330	Neutral	5.30	46.00	40.70	Complied
9.813530	Neutral	25.80	50.00	24.20	Complied
12.448040	Neutral	25.40	50.00	24.60	Complied
13.848350	Neutral	32.00	50.00	18.00	Complied
14.206560	Neutral	34.40	50.00	15.60	Complied
14.875800	Neutral	31.90	50.00	18.10	Complied

Result: Pass

Plot: Live and Neutral Line / 120 VAC 60 Hz



Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter AC Conducted Spurious Emissions (continued)

Results: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel

Results: Live / Quasi Peak / 240 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.305780	Live	26.00	60.10	34.10	Complied
0.329640	Live	26.60	59.50	32.90	Complied
0.344500	Live	27.30	59.10	31.80	Complied
0.351690	Live	27.50	58.90	31.40	Complied
0.356210	Live	27.50	58.80	31.30	Complied
0.396740	Live	28.20	57.90	29.70	Complied
0.433650	Live	28.80	57.20	28.40	Complied
0.473660	Live	27.60	56.40	28.80	Complied
0.610520	Live	21.80	56.00	34.20	Complied
13.993140	Live	38.10	60.00	21.90	Complied
14.300450	Live	38.00	60.00	22.00	Complied
14.596840	Live	38.20	60.00	21.80	Complied

Results: Live / Average / 240 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.305780	Live	9.80	50.10	40.30	Complied
0.329640	Live	9.30	49.50	40.20	Complied
0.344500	Live	8.80	49.10	40.30	Complied
0.351690	Live	8.80	48.90	40.10	Complied
0.356210	Live	8.30	48.80	40.50	Complied
0.396740	Live	7.90	47.90	40.00	Complied
0.433650	Live	7.90	47.20	39.30	Complied
0.473660	Live	7.30	46.40	39.10	Complied
0.610520	Live	6.70	46.00	39.30	Complied
13.993140	Live	31.50	50.00	18.50	Complied
14.300450	Live	31.90	50.00	18.10	Complied
14.596840	Live	32.00	50.00	18.00	Complied

Transmitter AC Conducted Spurious Emissions (continued)

Results: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel

Results: Neutral / Quasi Peak / 240 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.292910	Neutral	25.40	60.40	35.00	Complied
0.315620	Neutral	26.20	59.80	33.60	Complied
0.338990	Neutral	27.50	59.20	31.70	Complied
0.344540	Neutral	27.60	59.10	31.50	Complied
0.385530	Neutral	28.80	58.20	29.40	Complied
0.420420	Neutral	28.70	57.40	28.70	Complied
0.450940	Neutral	28.90	56.90	28.00	Complied
0.506810	Neutral	24.70	56.00	31.30	Complied
14.021590	Neutral	39.00	60.00	21.00	Complied
14.306260	Neutral	39.20	60.00	20.80	Complied
14.410270	Neutral	38.00	60.00	22.00	Complied
14.593640	Neutral	38.90	60.00	21.10	Complied

Results: Neutral / Average / 240 VAC 60 Hz

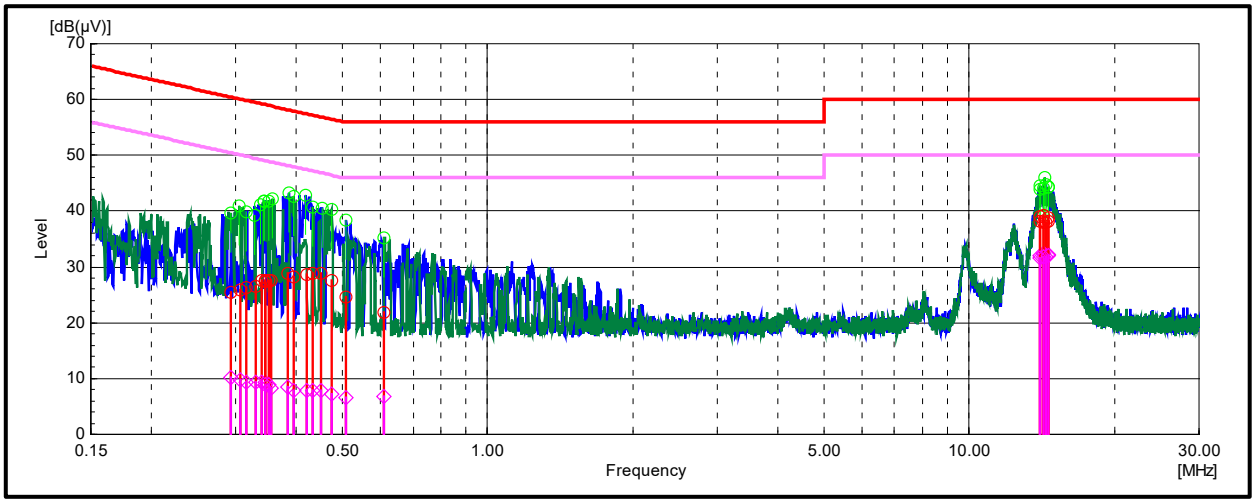
Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.292910	Neutral	10.30	50.40	40.10	Complied
0.315620	Neutral	9.30	49.80	40.50	Complied
0.338990	Neutral	9.30	49.20	39.90	Complied
0.344540	Neutral	9.30	49.10	39.80	Complied
0.385530	Neutral	8.40	48.20	39.80	Complied
0.420420	Neutral	7.90	47.40	39.50	Complied
0.450940	Neutral	7.90	46.90	39.00	Complied
0.506810	Neutral	6.60	46.00	39.40	Complied
14.021590	Neutral	32.00	50.00	18.00	Complied
14.306260	Neutral	32.50	50.00	17.50	Complied
14.410270	Neutral	31.80	50.00	18.20	Complied
14.593640	Neutral	32.10	50.00	17.90	Complied

Result: Pass

Transmitter AC Conducted Spurious Emissions (continued)

Results: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel

Plot: Live and Neutral Line / 240 VAC 60 Hz



Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

5.2.2. Transmitter Duty Cycle

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	05 May 2022
Test Sample Serial Number:	220405435 (RF Test Sample)		
Test Site Identification	SR 1/2		

FCC Reference:	Part 15.35(c)
Test Method Used:	FCC KDB 558074 Section 6.0 referencing ANSI C63.10 Section 11.6

Environmental Conditions:

Temperature (°C):	24.0
Relative Humidity (%):	43.2

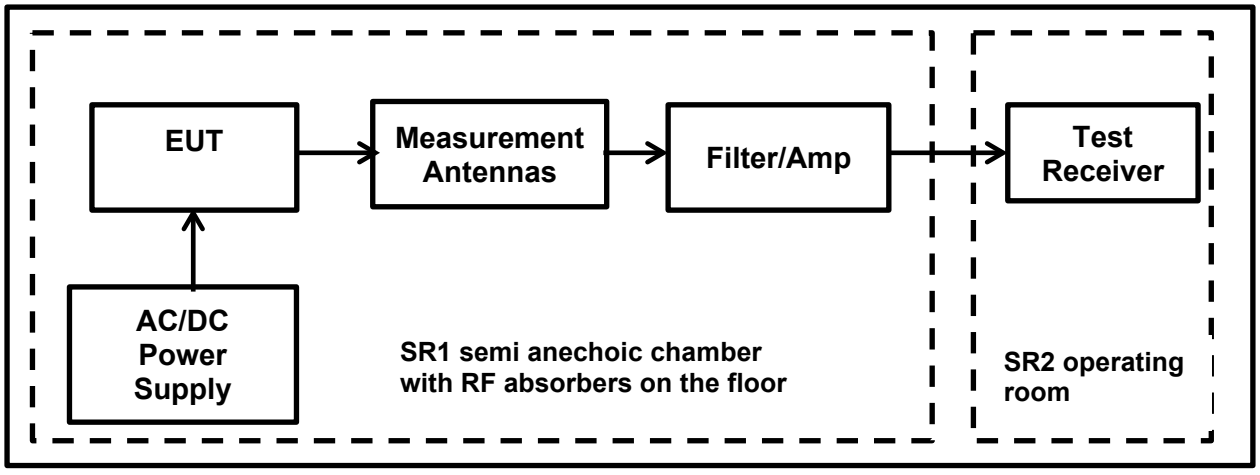
Note(s):

1. In order to assist with the determination of the average level of fundamental and spurious emissions field strength, measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter. The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by using the following calculation:

   Duty Cycle (%) = 100 X [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]

Test Setup:



Transmitter Duty Cycle (continued)

Results: 802.11b / 20 MHz / 1 Mbps / PWR 35 / Bottom Channel

Pulse On Time (T_{ON}) (ms)	Pulse Period (T_{ON} +T_{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
18.70	21.64	86.41	0.63

Result: Pass

Transmitter Duty Cycle (continued)

Results: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel

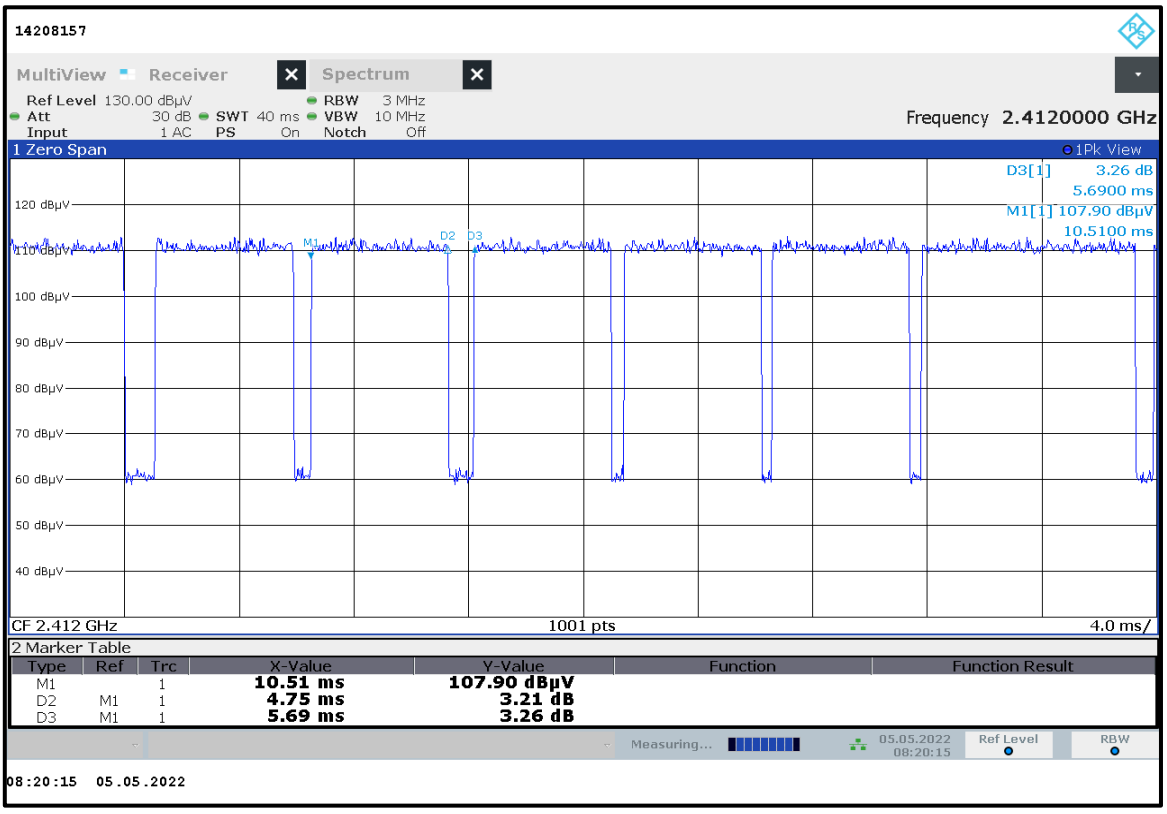
Pulse On Time (T_{ON}) (ms)	Pulse Period (T_{ON} +T_{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
3.10	4.09	76.55	1.20

Result: Pass

Transmitter Duty Cycle (continued)

Results: 802.11n / 20 MHz / MCS0 / PWR 20 / Bottom Channel

Pulse On Time (T_{ON}) (ms)	Pulse Period (T_{ON} +T_{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
4.75	5.69	83.48	0.78



Result: Pass

Transmitter Duty Cycle (continued)

Results: 802.11n / 40 MHz / MCS0 / PWR 16 / Bottom Channel

Pulse On Time (T_{ON}) (ms)	Pulse Period (T_{ON} +T_{OFF}) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
2.32	3.16	73.41	1.34

Result: Pass

5.2.3. Transmitter Radiated Emissions

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	16 May 2022
Test Sample Serial Number:	220405435 (RF Test Sample)		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 Sections 8.5 & 8.6 referencing ANSI C63.10 Sections 11.11 and 11.12 ANSI C63.10:2013 Sections 6.3 and 6.4
Frequency Range	9 kHz to 30 MHz

Environmental Conditions:

Temperature (°C):	25.1
Relative Humidity (%):	46.9

Notes:

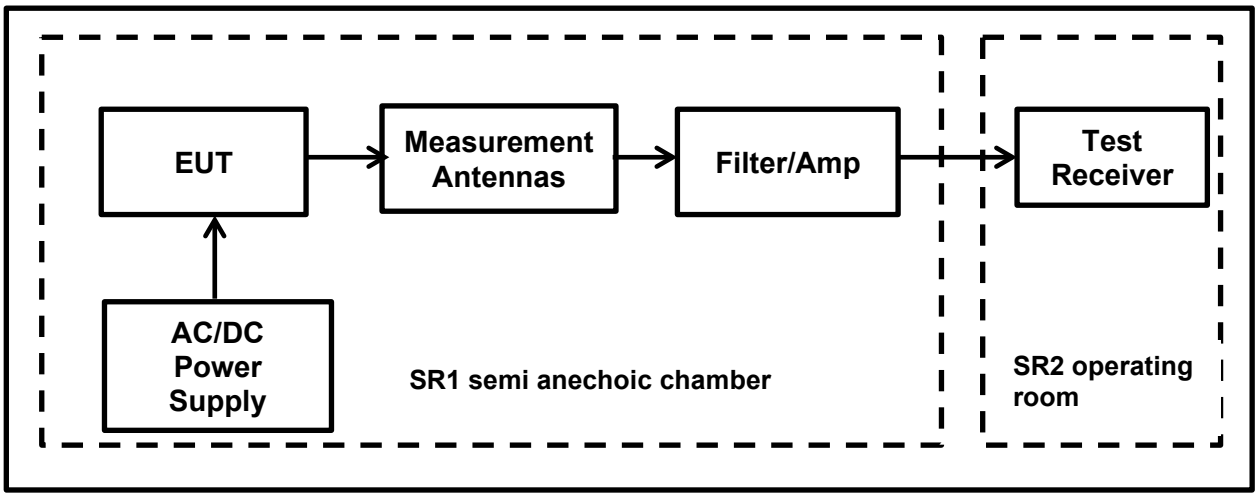
1. In accordance with FCC KDB 414788 D01 Radiated Test Site & ANSI C63.10 clause 5.2 an alternative test site that can demonstrate equivalence to an open area test site may be used. Therefore, the measurement was performed in a Semi Anechoic Chamber. (The OATS / SAC comparison data is available upon request).
2. 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, measurements were performed at a measurement distance of 3 m.
3. 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.
   - 490 kHz-1705 kHz: limits extrapolated from 30 m to 3 m by adding 40 dB at 40 dB /decade.
4. Measurements below 30 MHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) at a distance of 3 m. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. The measurement loop antenna height was 100 cm.
5. In accordance with FCC KDB 996369 D04 Section 3.4 (b) the Host Product testing has been performed on unwanted (spurious) radiated emissions on the worst-case modulation and channel per frequency range as shown in original filing.
6. The radiated emissions measurements were performed with the EUT set to the following worst-case mode.
   - WLAN 2.4 GHz | g-Mode | 20 MHz| 6 Mbps | Bottom channel | PWR 21
   - WLAN 2.4 GHz | n-Mode | 20 MHz| MCS0 | Bottom channel | PWR 20
   - WLAN 2.4 GHz | n-Mode | 40 MHz| MCS0 | Bottom channel | PWR 16
7. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
8. All other emissions shown on the pre-scan plot were investigated and found to be below the measurement system noise floor.

Transmitter Radiated Emissions (continued)

Notes:

9. 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: 1 kHz /VBW: 3 kHz
    - Frequency range: 150 kHz – 30 MHz: RBW: 10 kHz /VBW: 30 kHz
    - Detector: Max-Peak detector
    - Trace Mode: Max Hold

Test Setup:

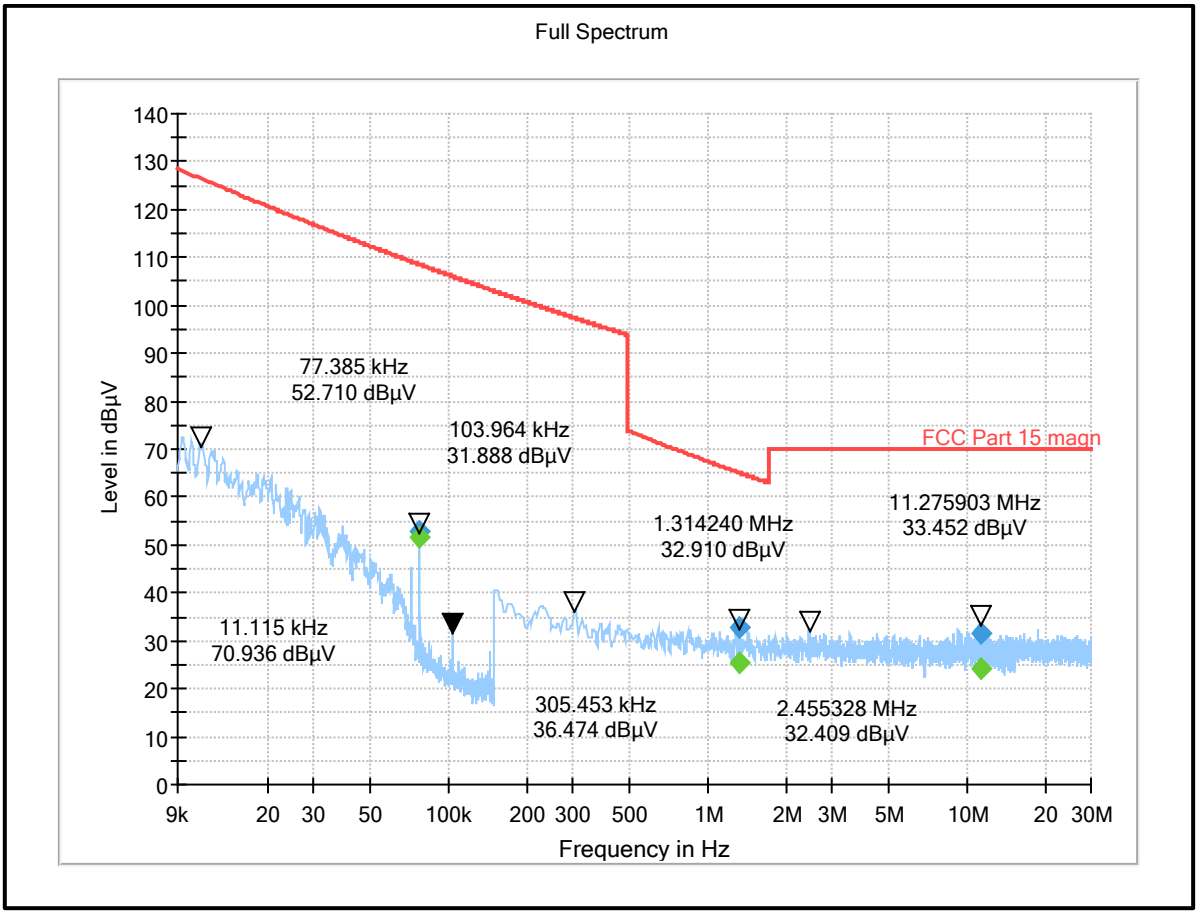


Transmitter Radiated Emissions (continued)

Results: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel

Frequency (MHz)	Loop Antenna Orientation	MaxPeak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
0.077385	0° to the EUT	52.71	108.47	55.76	Complied
1.314240	0° to the EUT	32.91	65.09	32.18	Complied
11.270888	90° to the EUT	31.68	70.00	38.32	Complied

Plot: 9 kHz – 30 MHz: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel



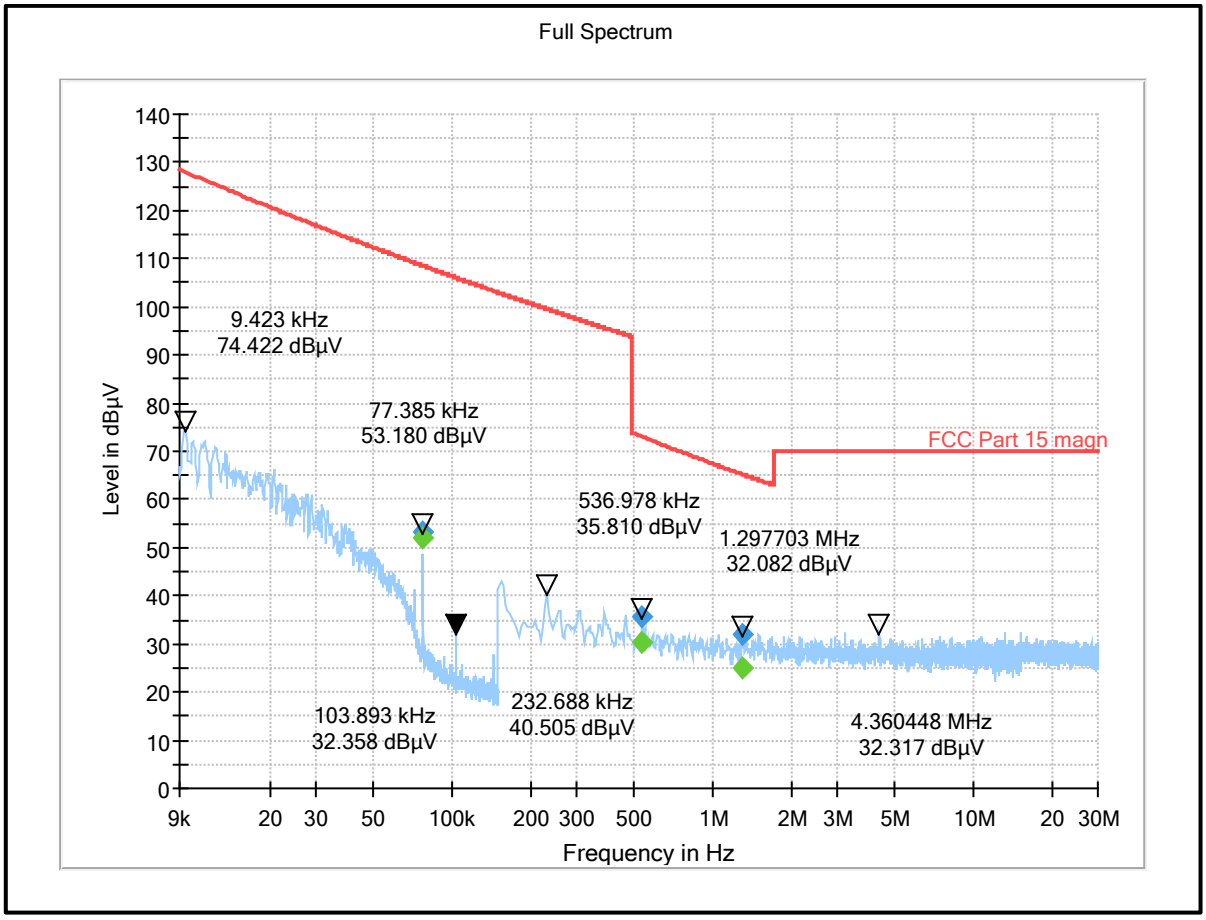
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11n / 20 MHz / MCS0 / PWR 20 / Bottom Channel

Frequency (MHz)	Loop Antenna Orientation	MaxPeak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
0.077385	0° to the EUT	53.18	108.47	55.29	Complied
0.536978	0° to the EUT	35.81	72.95	37.14	Complied
1.291088	0° to the EUT	31.78	65.24	33.46	Complied

Plot: 9 kHz – 30 MHz: 802.11n / 20 MHz / MCS0 / PWR 20 / Bottom Channel



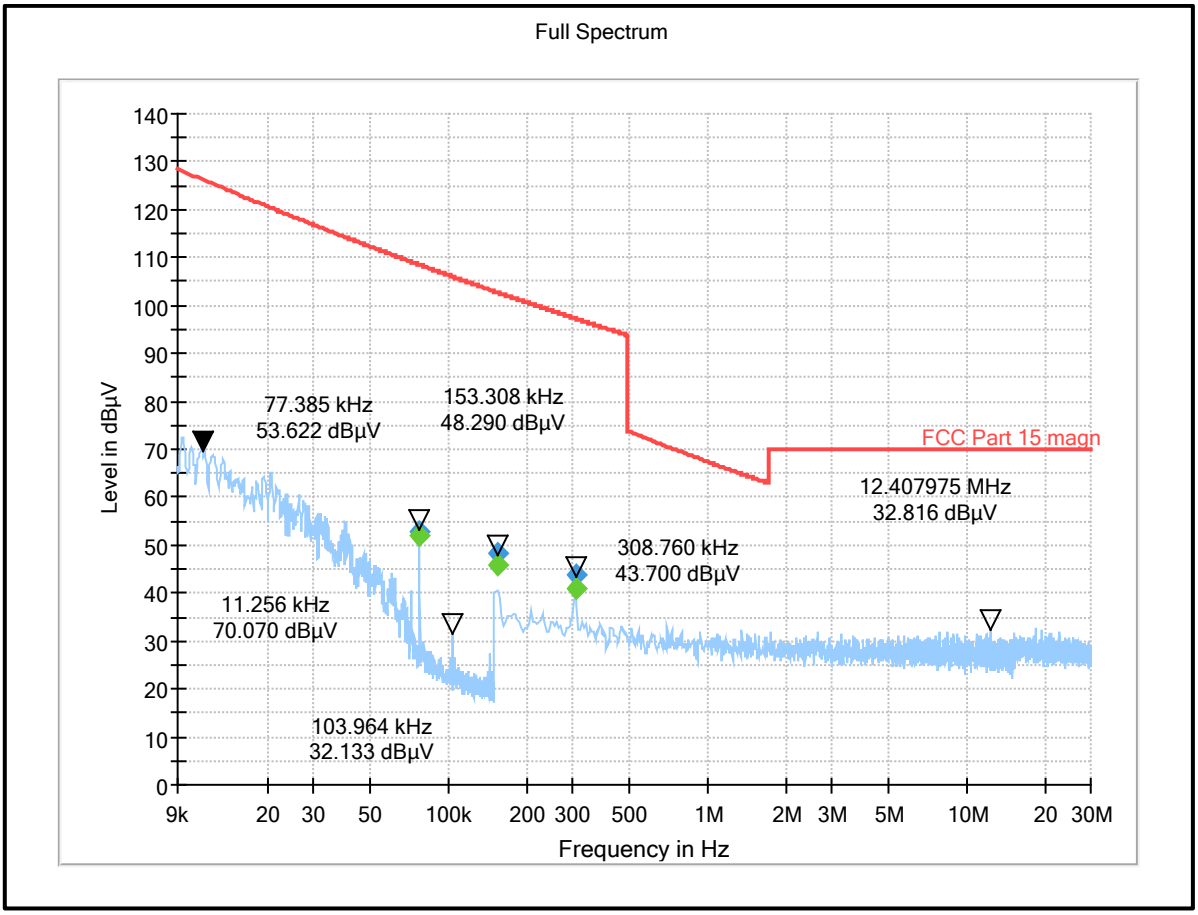
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11n / 40 MHz / MCS0 / PWR 16 / Bottom Channel

Frequency (MHz)	Loop Antenna Orientation	MaxPeak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
0.077385	0° to the EUT	51.91	108.47	55.53	Complied
0.536978	0° to the EUT	45.84	102.79	54.50	Complied
1.291088	0° to the EUT	40.75	97.27	53.57	Complied

Plot: 9 kHz – 30 MHz: 802.11n / 40 MHz / MCS0 / PWR 16 / Bottom Channel



Result: Pass

Transmitter Radiated Emissions (continued)

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	14 May 2022
Test Sample Serial Number:	220405435 (RF Test Sample)		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 Sections 8.5 & 8.6 referencing ANSI C63.10 Sections 11.11 and 11.12 ANSI C63.10:2013 Sections 6.3 and 6.5
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

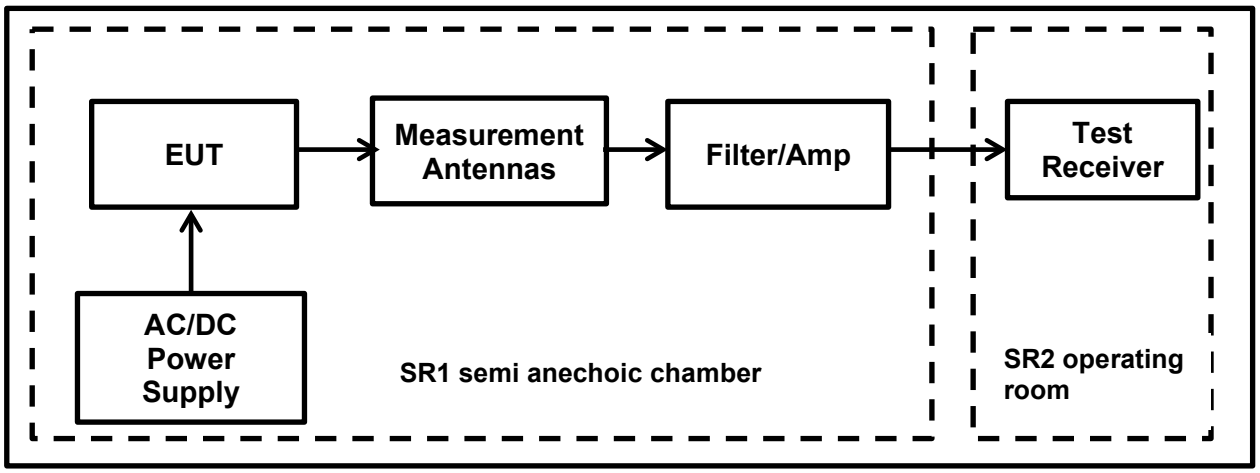
Temperature (°C):	24.6
Relative Humidity (%):	43.9

Note(s):

1. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. 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 metre to 4 metres.
2. In accordance with FCC KDB 996369 D04 Section 3.4 (b) the Host Product testing has been performed on unwanted (spurious) radiated emissions on the worst-case modulation and channel per frequency range as shown in original filing.
3. The radiated emissions measurements were performed with the EUT set to the following worst-case mode.
   - WLAN 2.4 GHz | g-Mode | 20 MHz| 6 Mbps | Bottom channel | PWR 21
   - WLAN 2.4 GHz | n-Mode | 20 MHz| MCS0 | Bottom channel | PWR 20
   - WLAN 2.4 GHz | n-Mode | 40 MHz| MCS0 | Bottom channel | PWR 16
4. 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.
5. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
6. All other emissions shown on the pre-scan plot were investigated and found to be below the measurement system noise floor.

Transmitter Radiated Emissions (continued)

Test Setup:

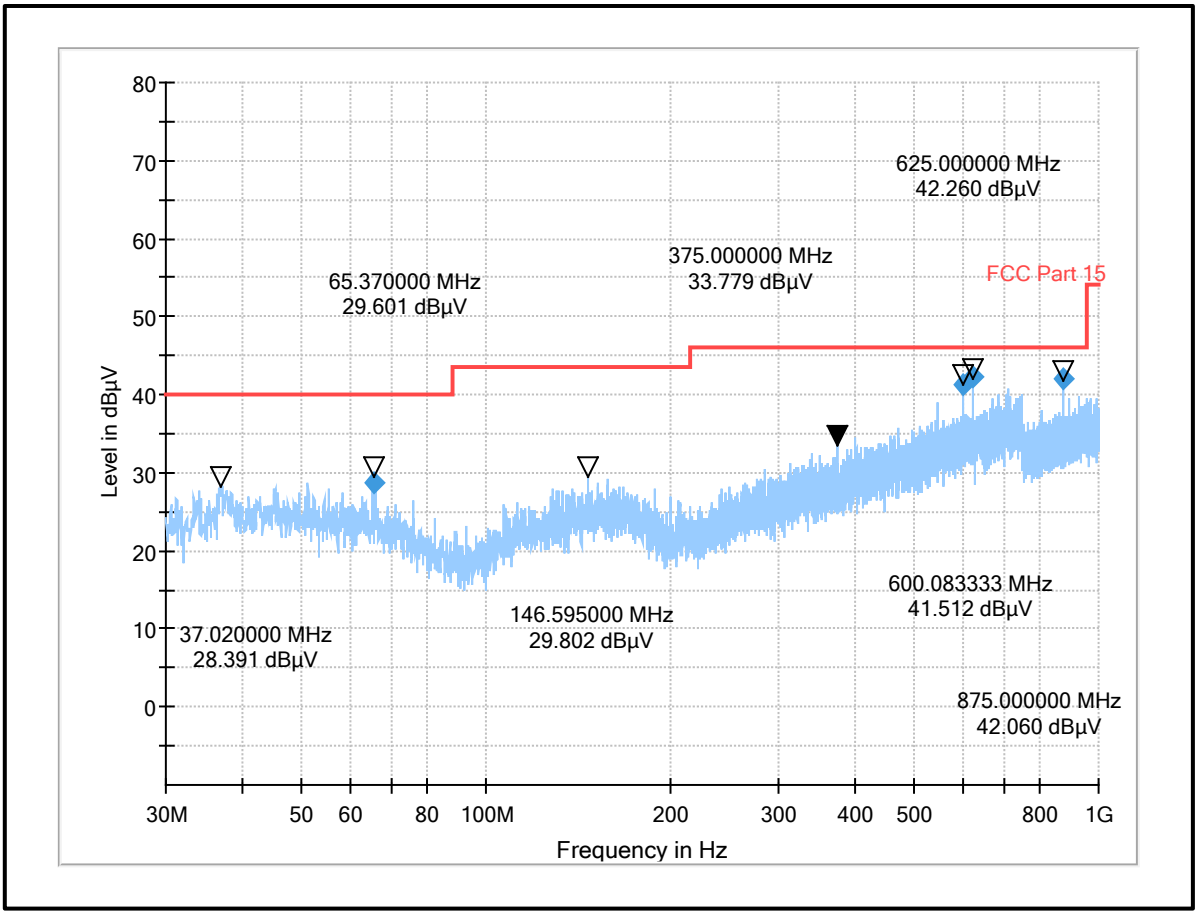


Transmitter Radiated Emissions (continued)

Results: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel

Frequency (MHz)	Antenna Polarization	MaxPeak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
65.370000	Vertical	28.64	40.00	11.36	Complied
600.041667	Horizontal	41.39	46.00	4.61	Complied
625.000000	Horizontal	42.26	46.00	3.74	Complied
875.000000	Vertical	42.06	46.00	3.94	Complied

Plot: 30 MHz – 1GHz: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel



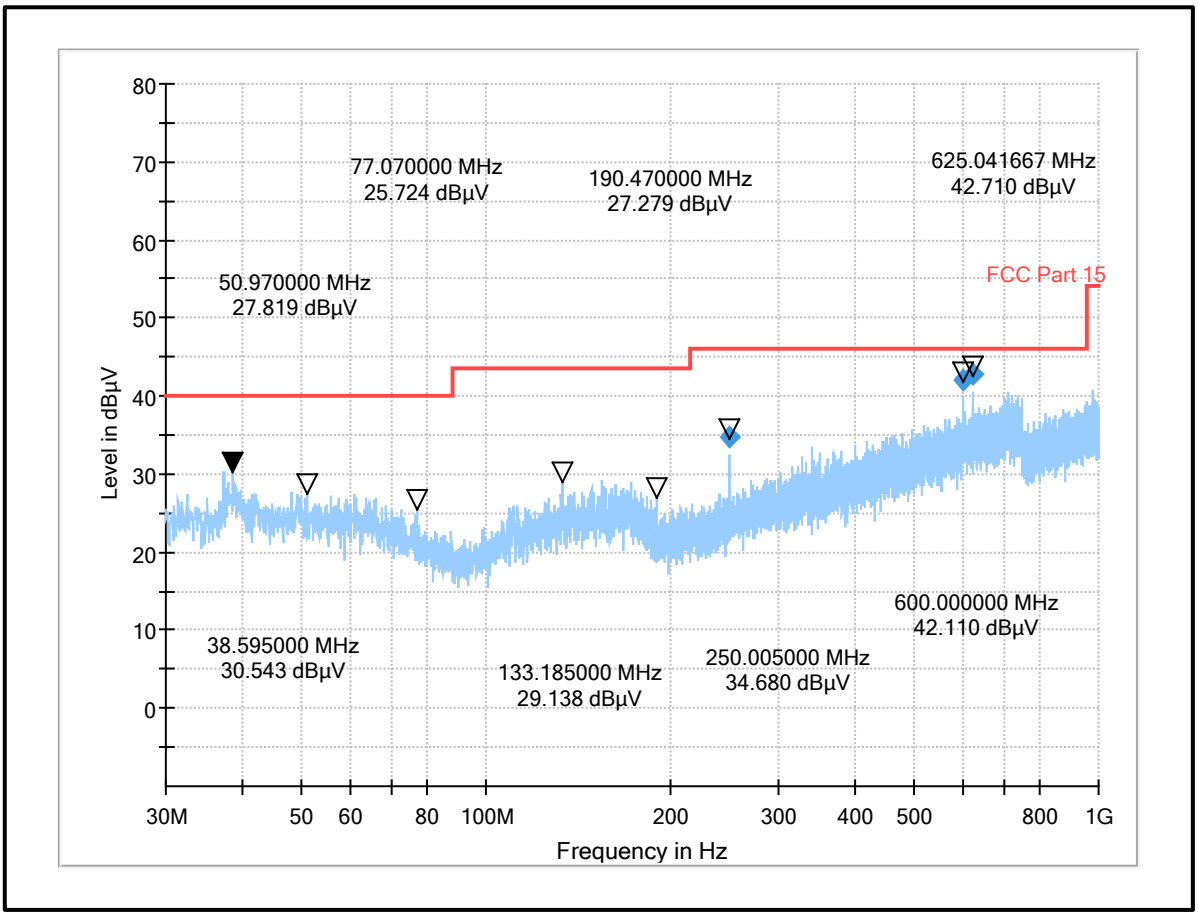
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11n / 20 MHz / MCS0 / PWR 20 / Bottom Channel

Frequency (MHz)	Antenna Polarization	MaxPeak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
250.005000	Horizontal	34.68	46.00	11.32	Complied
600.000000	Horizontal	42.11	46.00	3.89	Complied
625.041667	Horizontal	42.71	46.00	3.29	Complied

Plot: 30 MHz – 1GHz: 802.11n / 20 MHz / MCS0 / PWR 20 / Bottom Channel



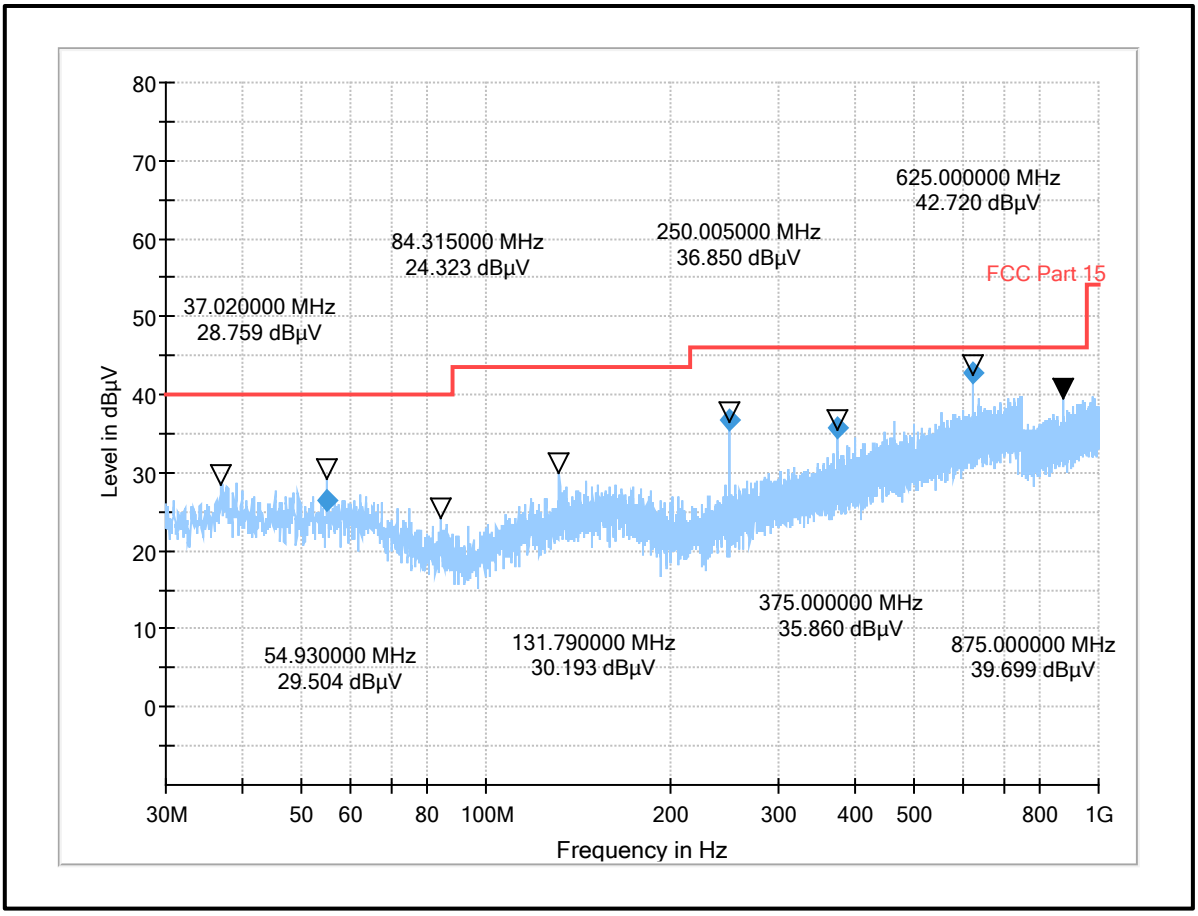
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11n / 40 MHz / MCS0 / PWR 16 / Bottom Channel

Frequency (MHz)	Antenna Polarization	MaxPeak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
54.930000	Vertical	26.36	40.00	13.64	Complied
250.005000	Vertical	36.85	46.00	9.15	Complied
375.000000	Vertical	35.85	46.00	10.15	Complied
625.000000	Horizontal	42.72	46.00	3.28	Complied

Plot: 30 MHz – 1GHz: 802.11n / 40 MHz / MCS0 / PWR 16 / Bottom Channel



Result: Pass

Transmitter Radiated Emissions (continued)

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	09 May 2022
Test Sample Serial Number:	220405435 (RF Test Sample)		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 Sections 8.5 & 8.6 referencing ANSI C63.10 Sections 11.11 and 11.12 ANSI C63.10:2013 Sections 6.3 and 6.6
Frequency Range:	1 GHz to 25 GHz

Environmental Conditions:

Temperature (°C):	23.9
Relative Humidity (%):	45.0

Notes:

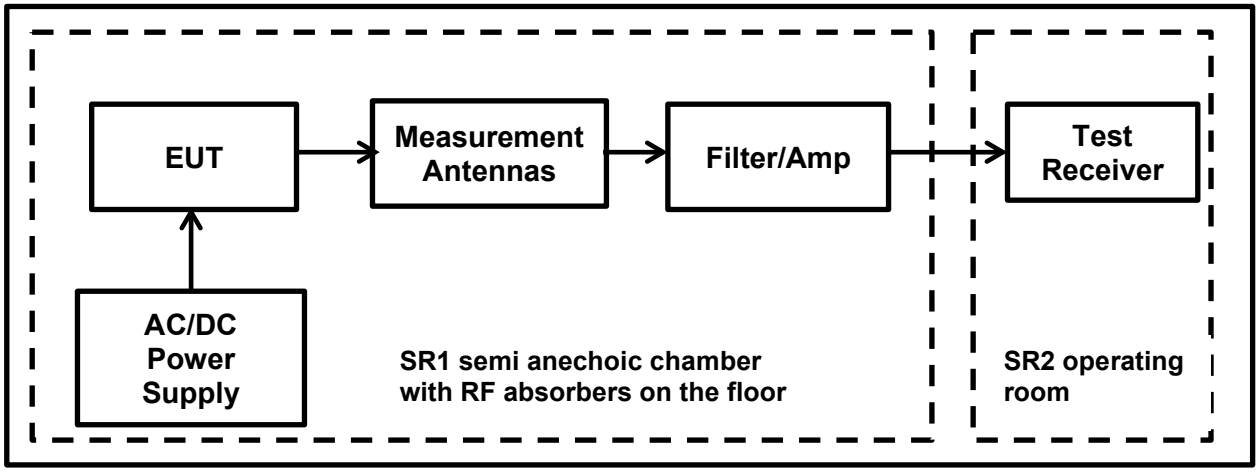
1. Pre-scans above 1 GHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) with RF absorbers on the floor at a distance of 3 m. The EUT was placed at a height of 1.5 m above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a 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.
2. In accordance with FCC KDB 996369 D04 Section 3.4 (b) the Host Product testing has been performed on unwanted (spurious) radiated emissions on the worst-case modulation and channel per frequency range as shown in original filing.
3. The radiated emissions measurements were performed on Bottom, Middle and Top channels with the EUT set to the following worst-case mode.
   - WLAN 2.4 GHz | g-Mode | 20 MHz| 6 Mbps | PWR 21
   - WLAN 2.4 GHz | n-Mode | 20 MHz| MCS0 | PWR 20
   - WLAN 2.4 GHz | n-Mode | 40 MHz| MCS0 | PWR 16
4. 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.
5. The emissions shown at frequencies approximately 2.4 GHz to 2.4835 GHz on the 1 GHz to 18 GHz plots are the EUT fundamental for the tested channel.
6. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
7. In accordance with ANSI C63.10 Section 6.6.4.3 (Note 1), if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.
8. In accordance with ANSI C63.10-2013 Section 5.3.3 & 6.5.3 measurements above 18 GHz were performed at closer distance (1 m); because at specified measurement distance (3m) for compliance the instrumentation noise floor was typically close to the radiated emission limit.

Transmitter Radiated Emissions (continued)

Notes:

9. The radiated emissions measurements above 18 GHz were performed with EUT set to following worst-case mode.
   - WLAN 2.4 GHz | g-Mode | 20 MHz| 6 Mbps | Bottom channel | PWR 21
   - WLAN 2.4 GHz | n-Mode | 20 MHz| MCS0 | Bottom channel | PWR 20
   - WLAN 2.4 GHz | n-Mode | 40 MHz| MCS0 | Bottom channel | PWR 16
10. In accordance with ANSI C63.10-2013 Section 5.3.3 & 6.5.3 measurements above 18 GHz were performed at closer distance (1 m); because at specified measurement distance (3m) for compliance the instrumentation noise floor was typically close to the radiated emission limit.
11. For frequency range between 18 GHz and 26.5 GHz, no critical emissions were found. All emissions shown on the pre-scans were investigated and found to be below the noise floor of the measurement system

Test Setup:

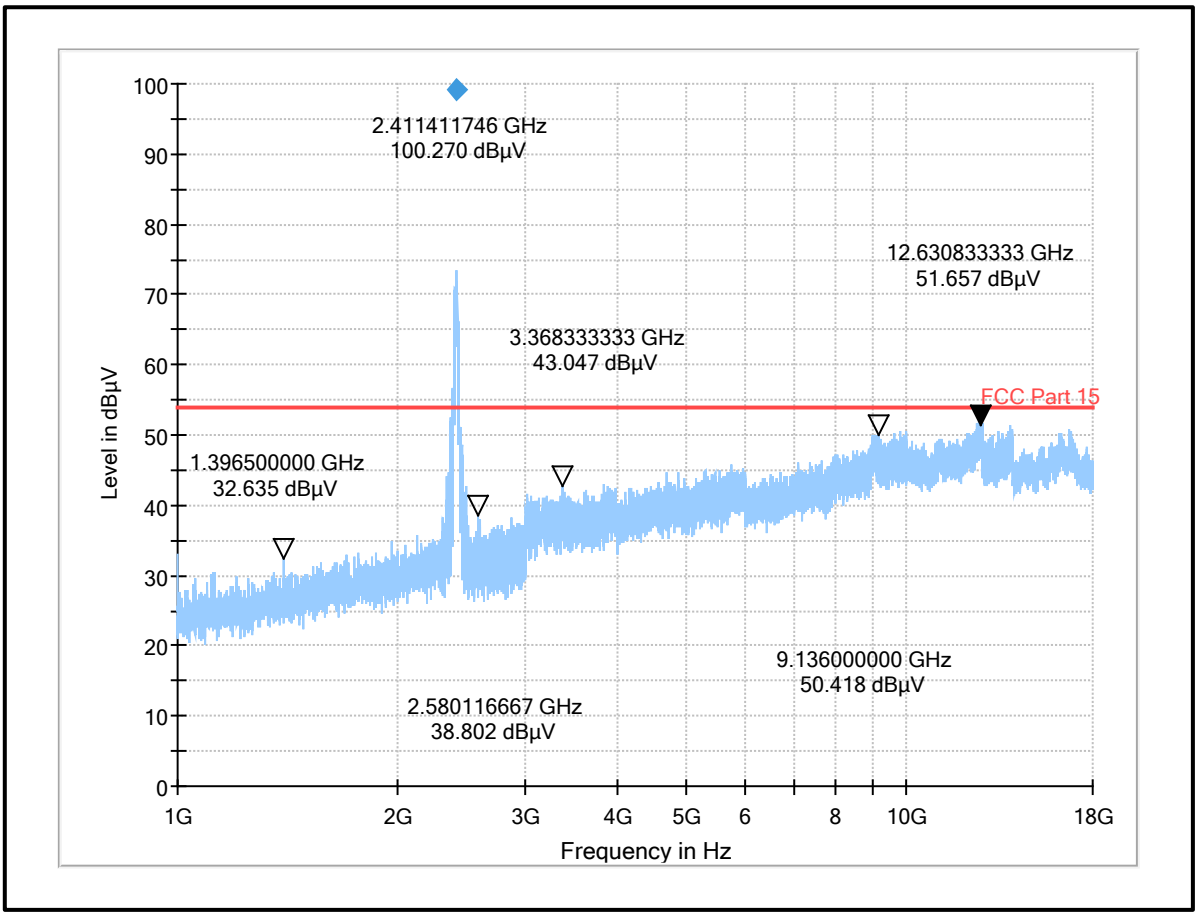


Transmitter Radiated Emissions (continued)

Results: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel

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

Plot: 1 GHz – 18GHz: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel



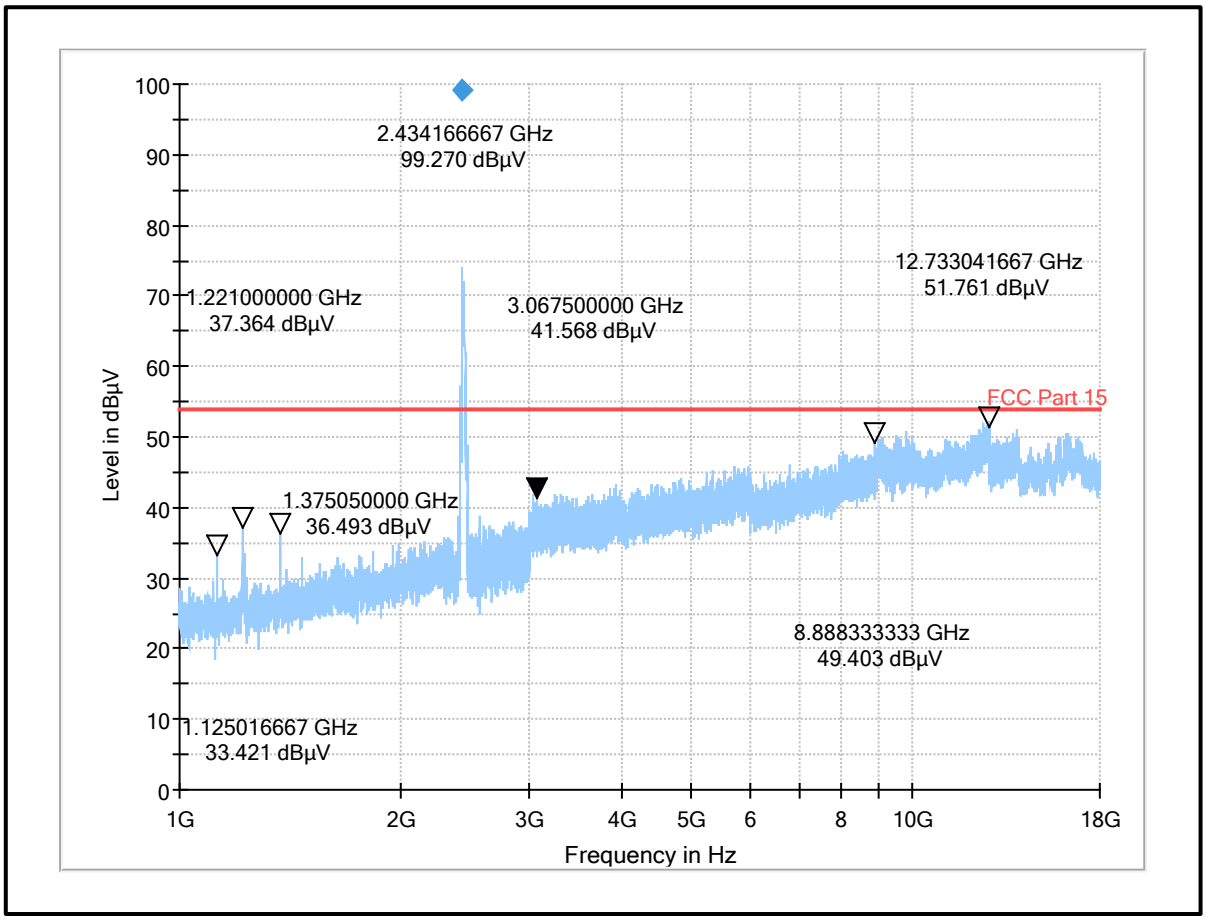
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Middle Channel

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

Plot: 1 GHz – 18GHz: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Middle Channel



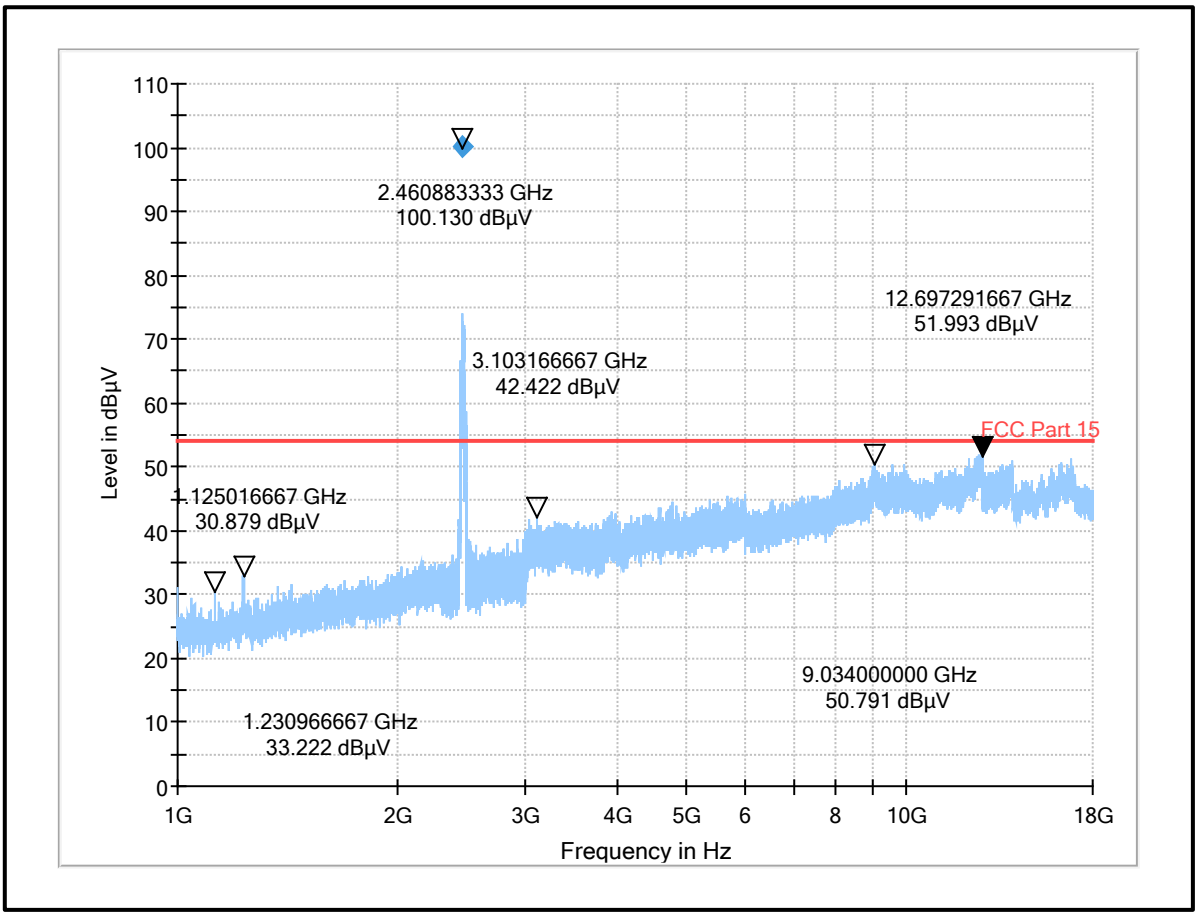
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Top Channel

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

Plot: 1 GHz – 18GHz: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Top Channel



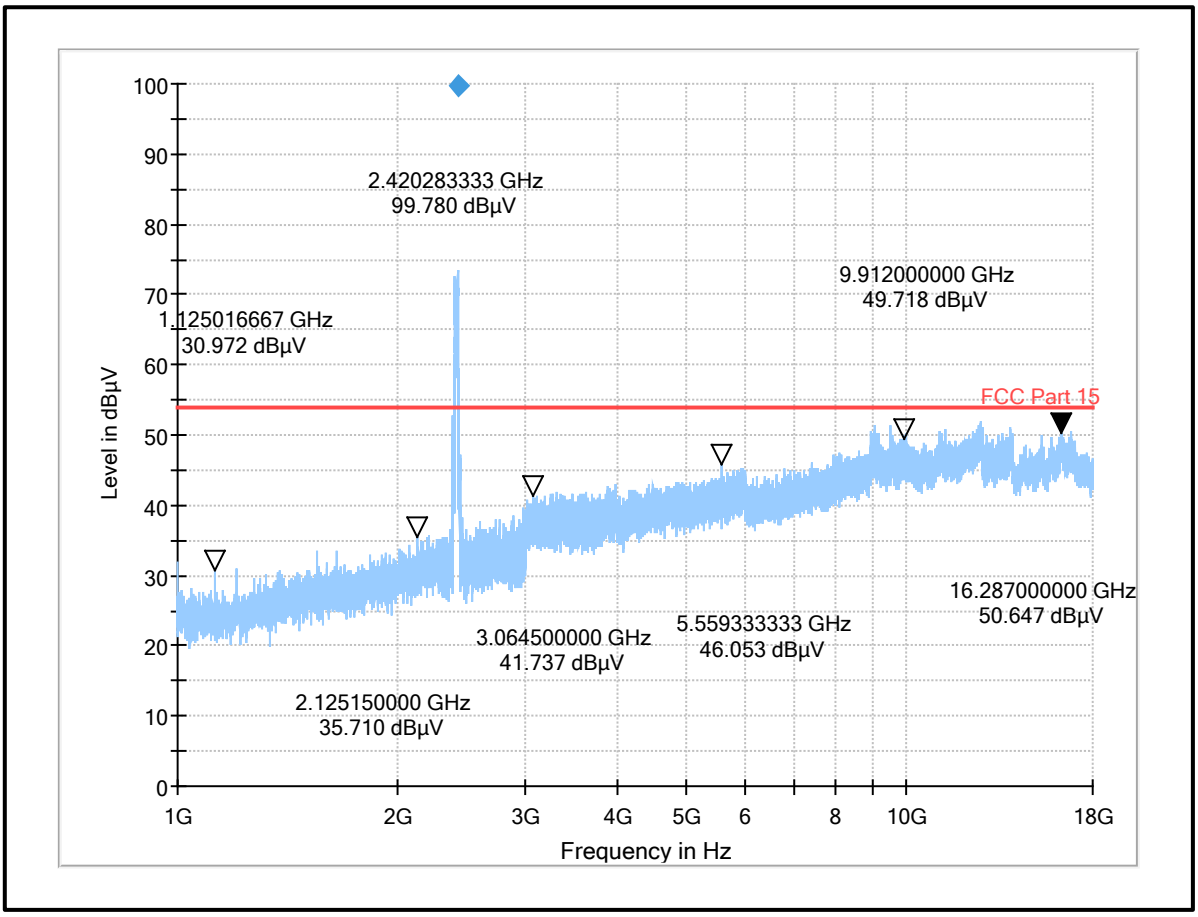
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11n / 20 MHz / MCS0 / PWR 20 / Bottom Channel

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

Plot: 1 GHz – 18GHz: 802.11n / 20 MHz / MCS0 / PWR 20 / Bottom Channel



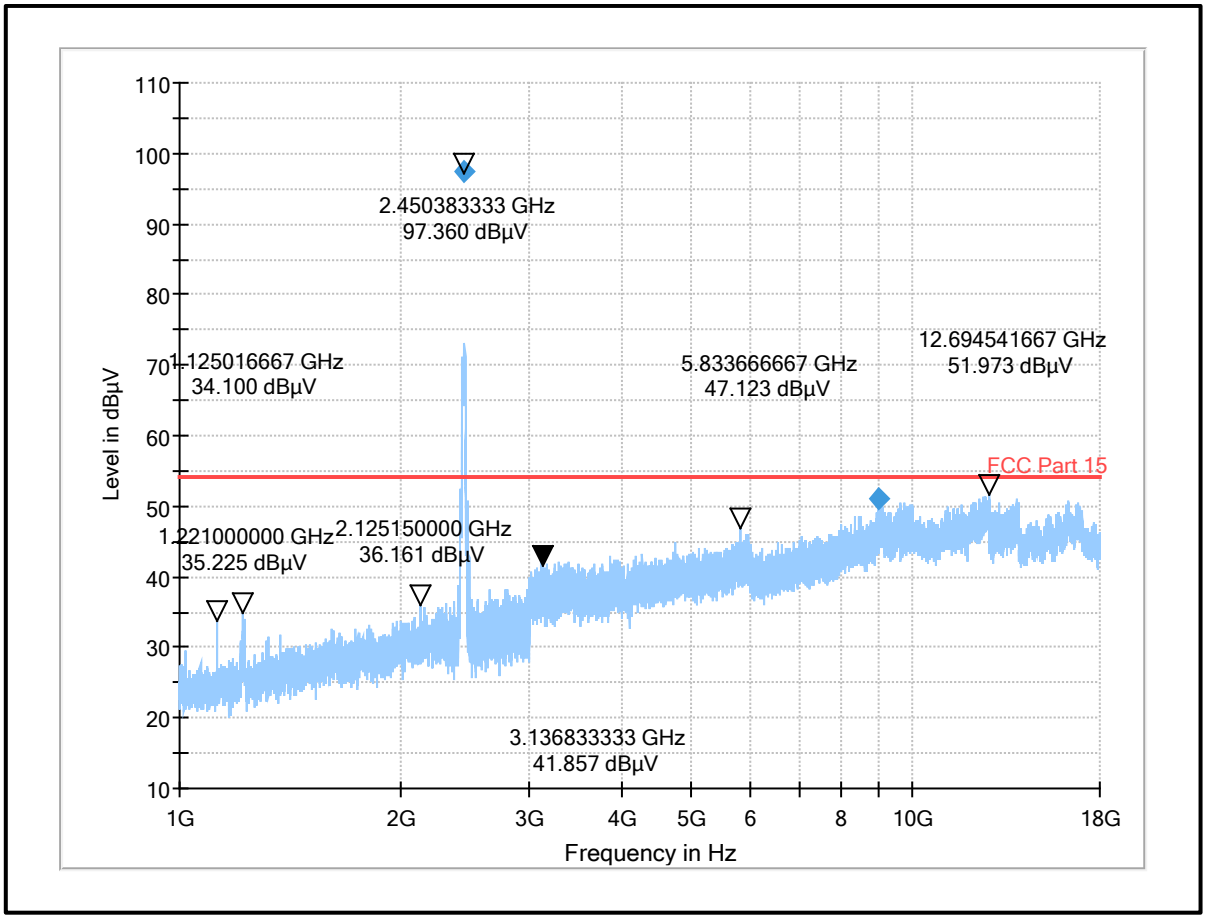
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11n / 20 MHz / MCS0 / PWR 20 / Middle Channel

Frequency (MHz)	Antenna Polarization	MaxPeak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
9009.666667	Vertical	50.94	54.00	3.06	Complied*

Plot: 1 GHz – 18GHz: 802.11n / 20 MHz / MCS0 / PWR 20 / Middle Channel



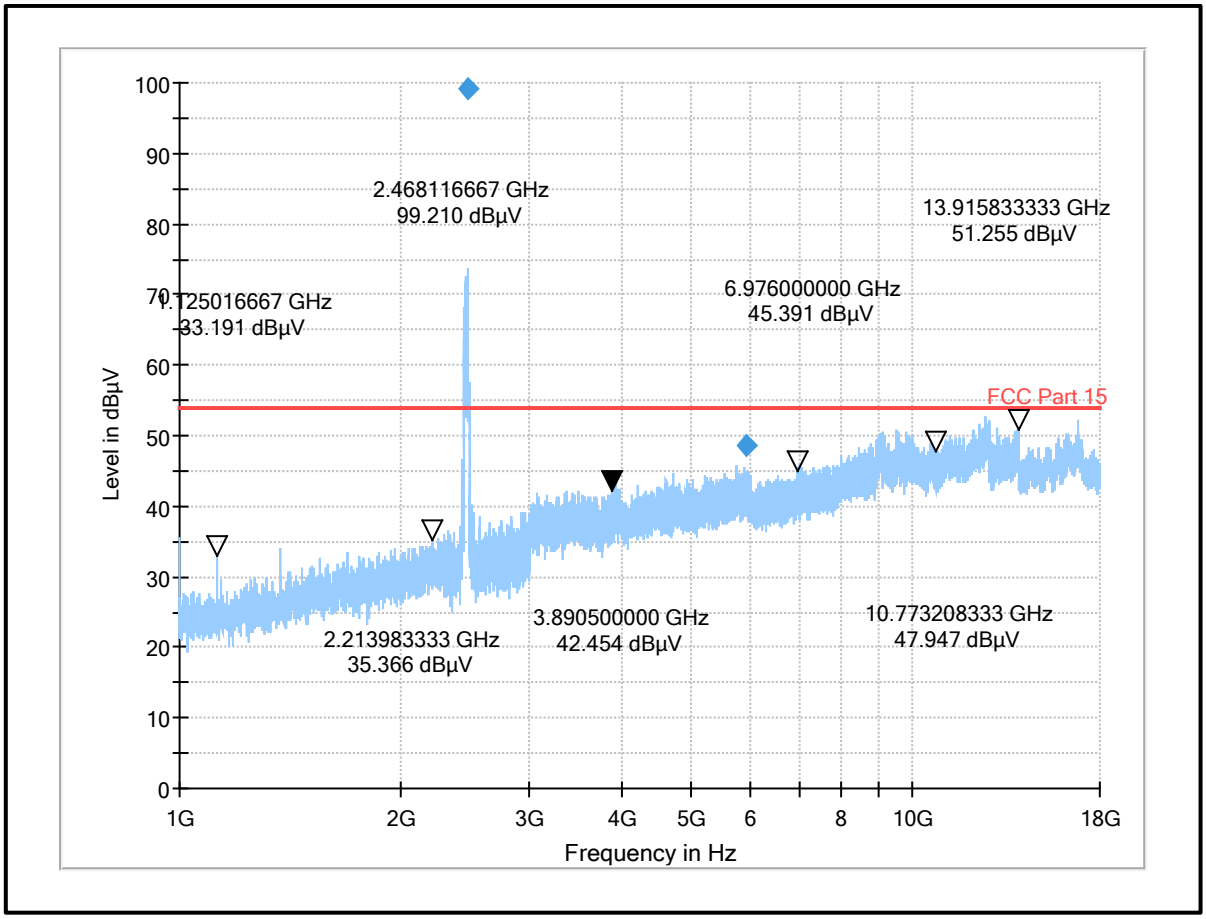
Result: Pass with measurement uncertainty

Transmitter Radiated Emissions (continued)

Results: 802.11n / 20 MHz / MCS0 / PWR 20 / Top Channel

Frequency (MHz)	Antenna Polarization	MaxPeak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
5935.333333	Vertical	48.49	54.00	5.51	Complied*

Plot: 1 GHz – 18GHz: 802.11n / 20 MHz / MCS0 / PWR 20 / Top Channel



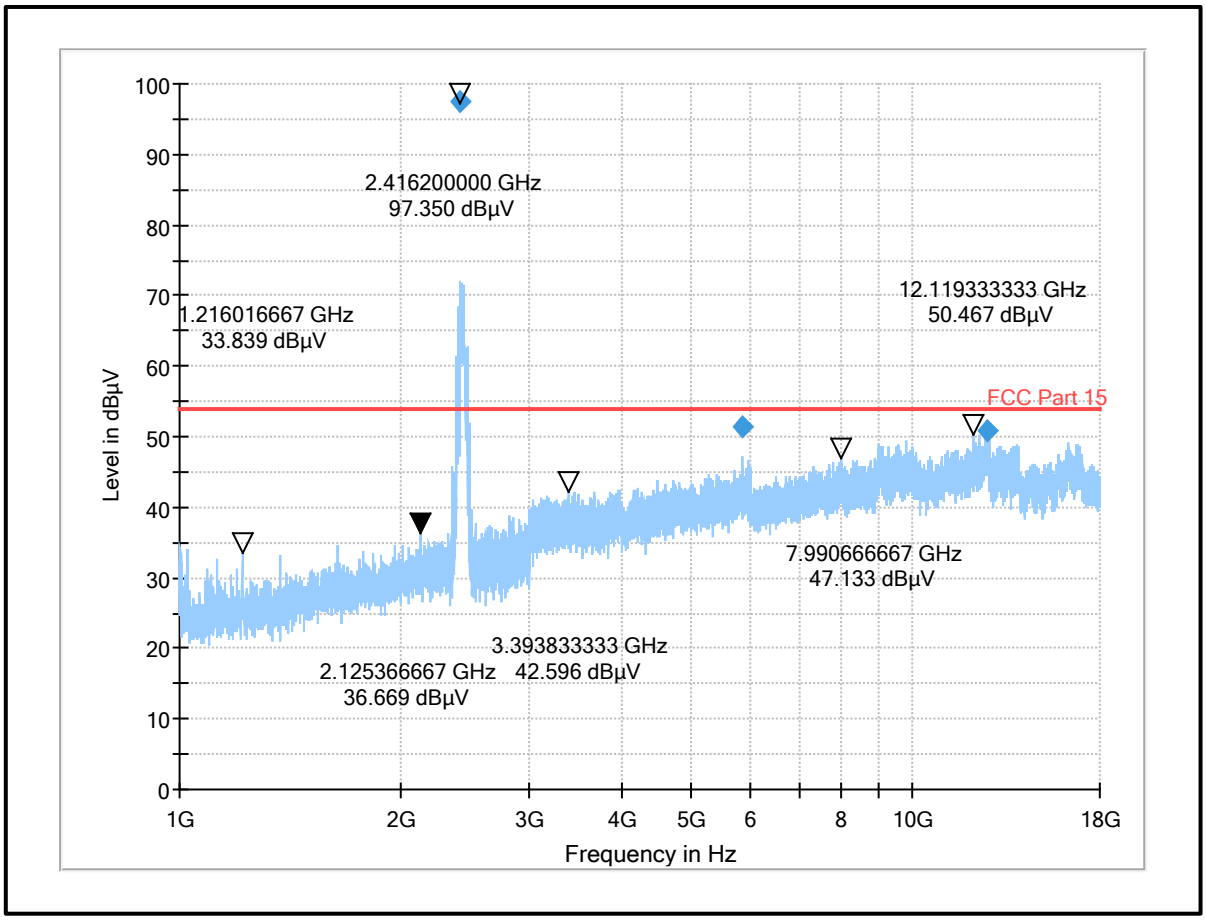
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11n / 40 MHz / MCS0 / PWR 16 / Bottom Channel

Frequency (MHz)	Antenna Polarization	MaxPeak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
5860.666667	Vertical	51.36	54.00	2.64	Complied*
12675.291667	Vertical	50.94	54.00	3.06	Complied*

Plot: 1 GHz – 18GHz: 802.11n / 40 MHz / MCS0 / PWR 16 / Bottom Channel



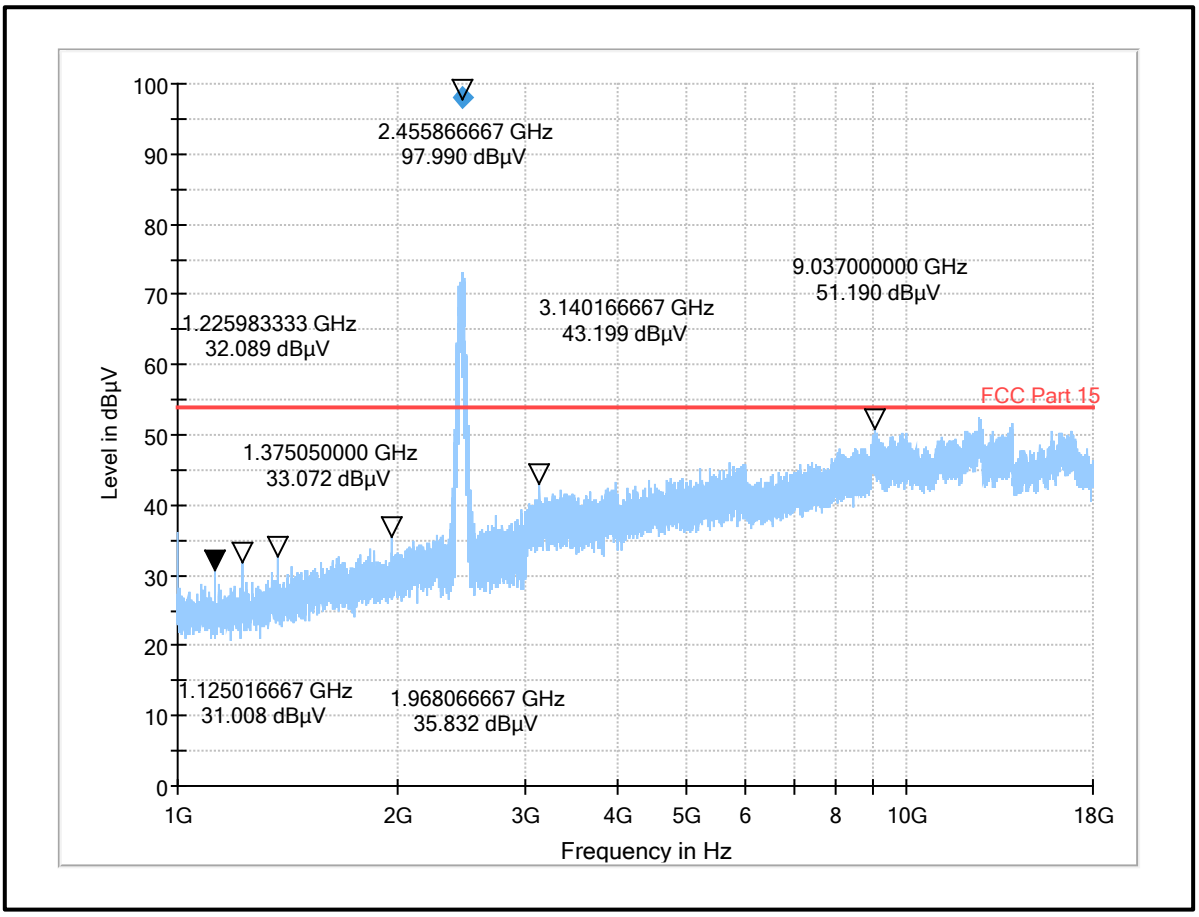
Result: Pass with measurement uncertainty

Transmitter Radiated Emissions (continued)

Results: 802.11n / 40 MHz / MCS0 / PWR 16 / Middle Channel

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

Plot: 1 GHz – 18GHz: 802.11n / 40 MHz / MCS0 / PWR 16 / Middle Channel



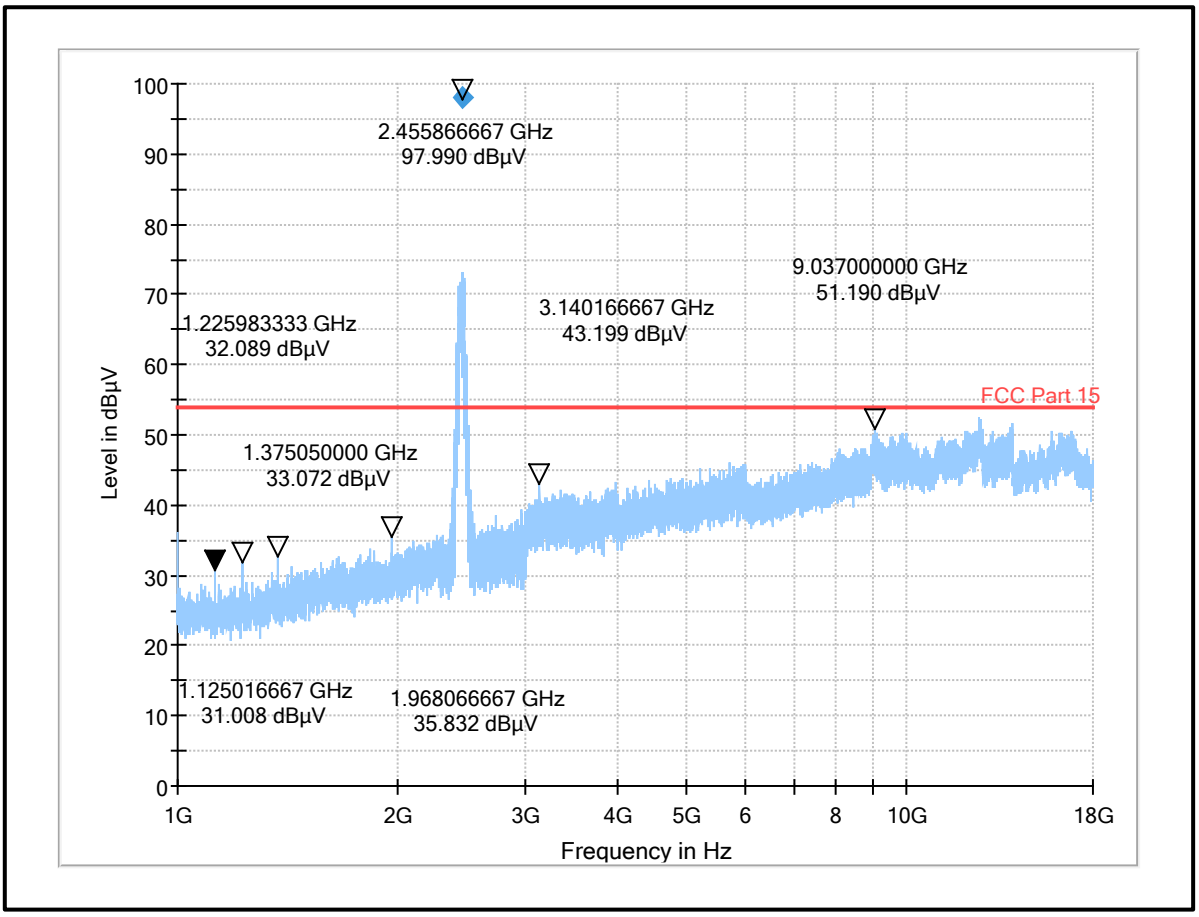
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11n / 40 MHz / MCS0 / PWR 16 / Middle Channel

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

Plot: 1 GHz – 18GHz: 802.11n / 40 MHz / MCS0 / PWR 16 / Middle Channel



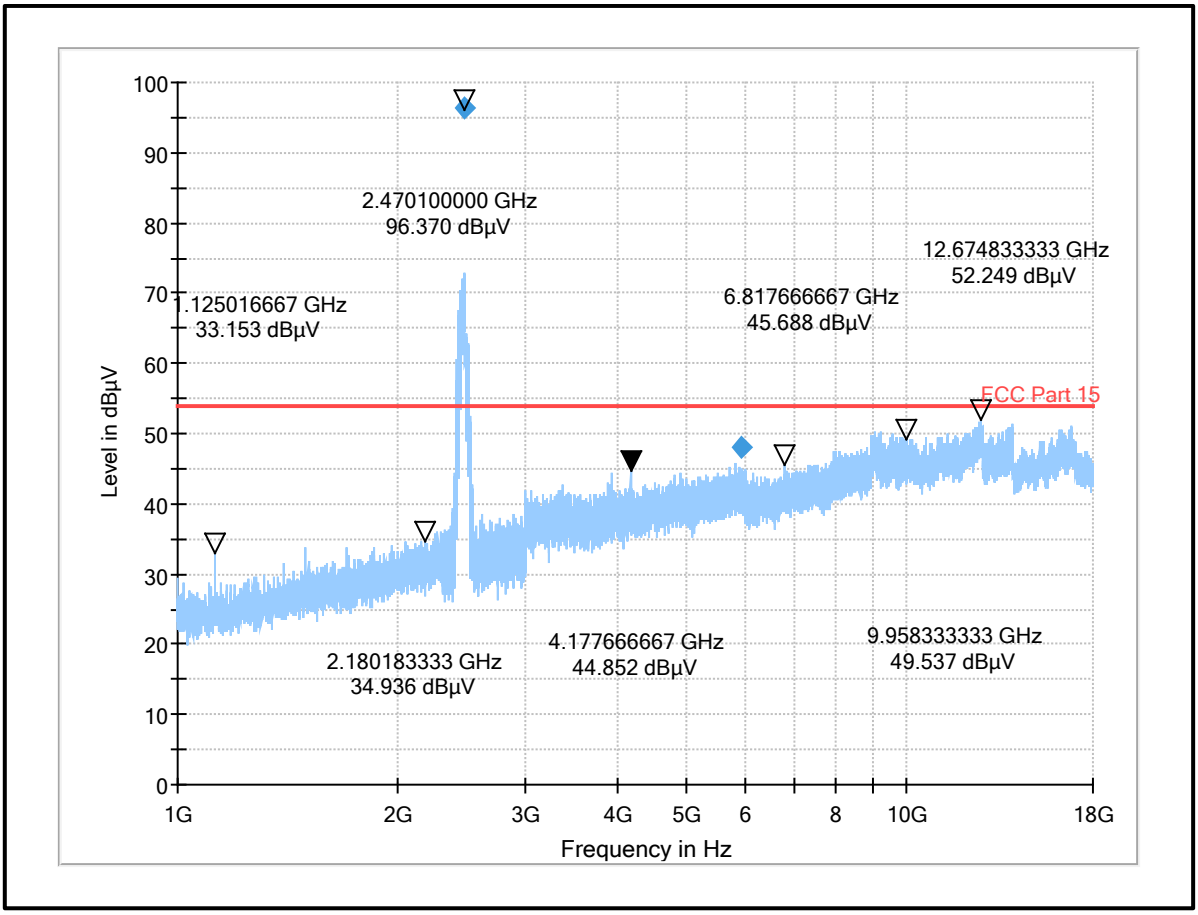
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11n / 40 MHz / MCS0 / PWR 16 / Top Channel

Frequency (MHz)	Antenna Polarization	MaxPeak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
5925.000000	Horizontal	47.97	54.00	6.03	Complied*

Plot: 1 GHz – 18GHz: 802.11n / 40 MHz / MCS0 / PWR 16 / Top Channel



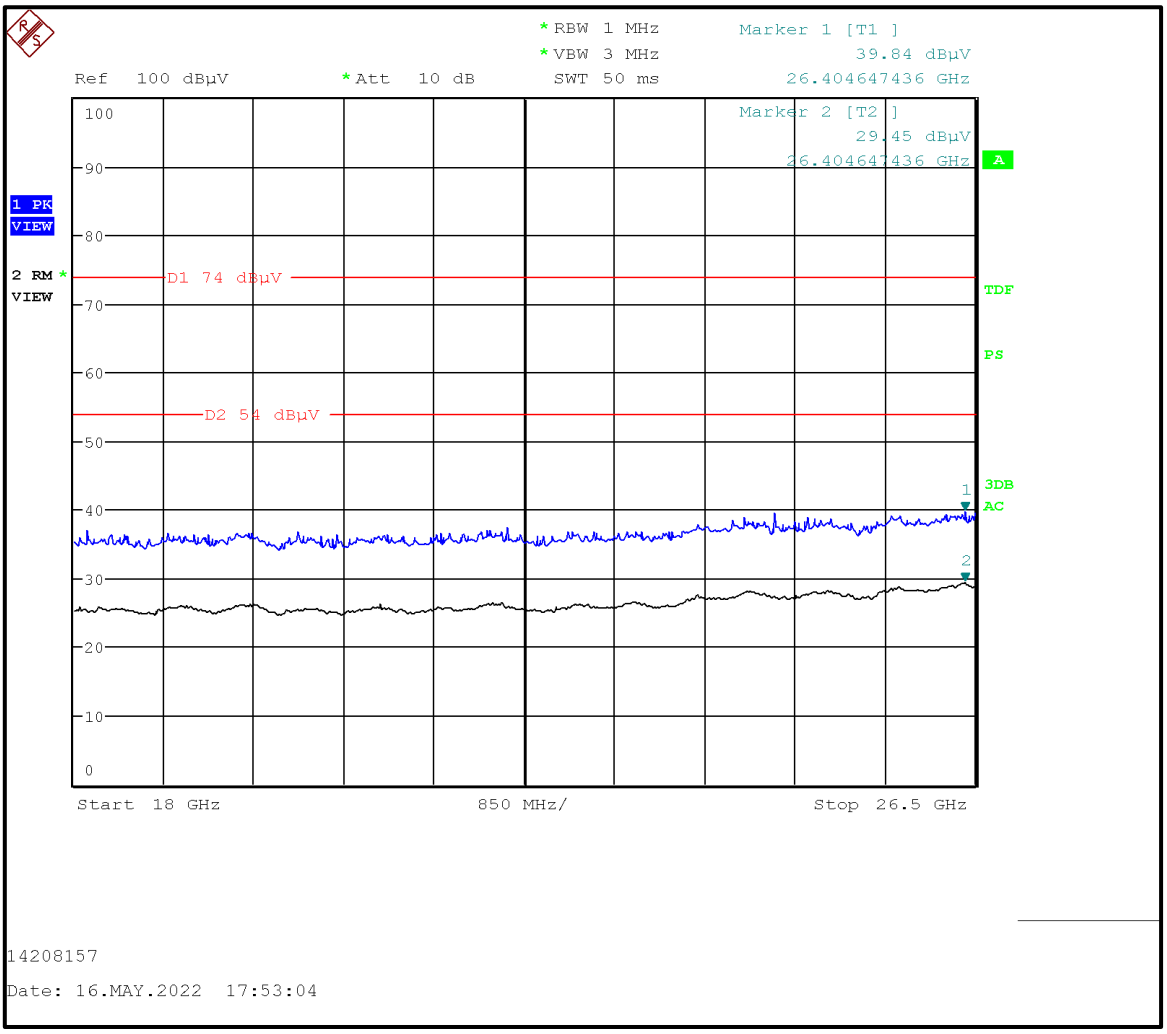
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
All emissions were below the level of the measurement system noise floor.					

Plot: 18 GHz – 25 GHz: 802.11g / 20 MHz / 6 Mbps / PWR 21 / Bottom Channel



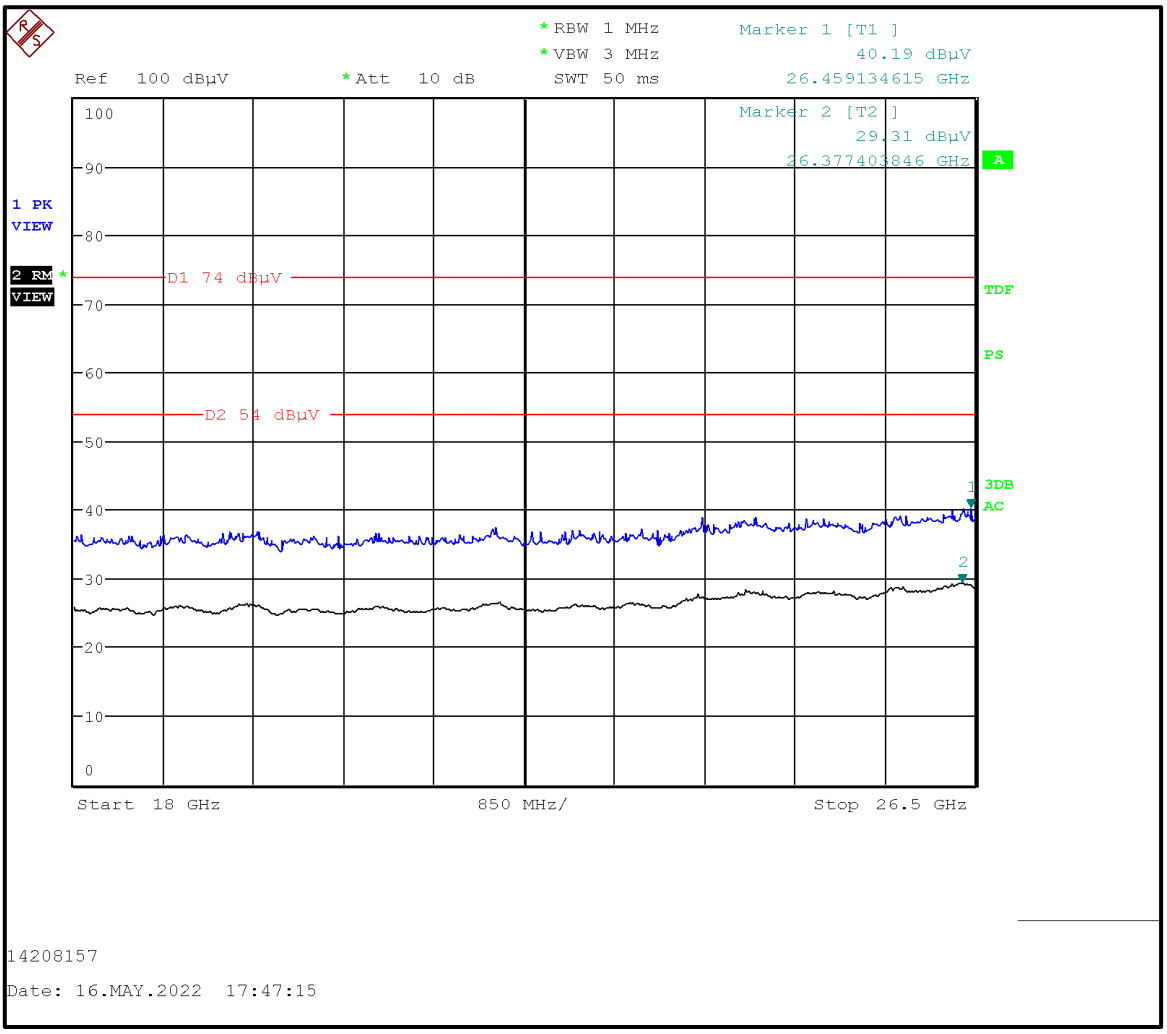
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11n / 20 MHz / MCS0 / PWR 20 / Bottom Channel

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
All emissions were below the level of the measurement system noise floor.					

Plot: 18 GHz – 25 GHz: 802.11n / 20 MHz / MCS0 / PWR 20 / Bottom Channel



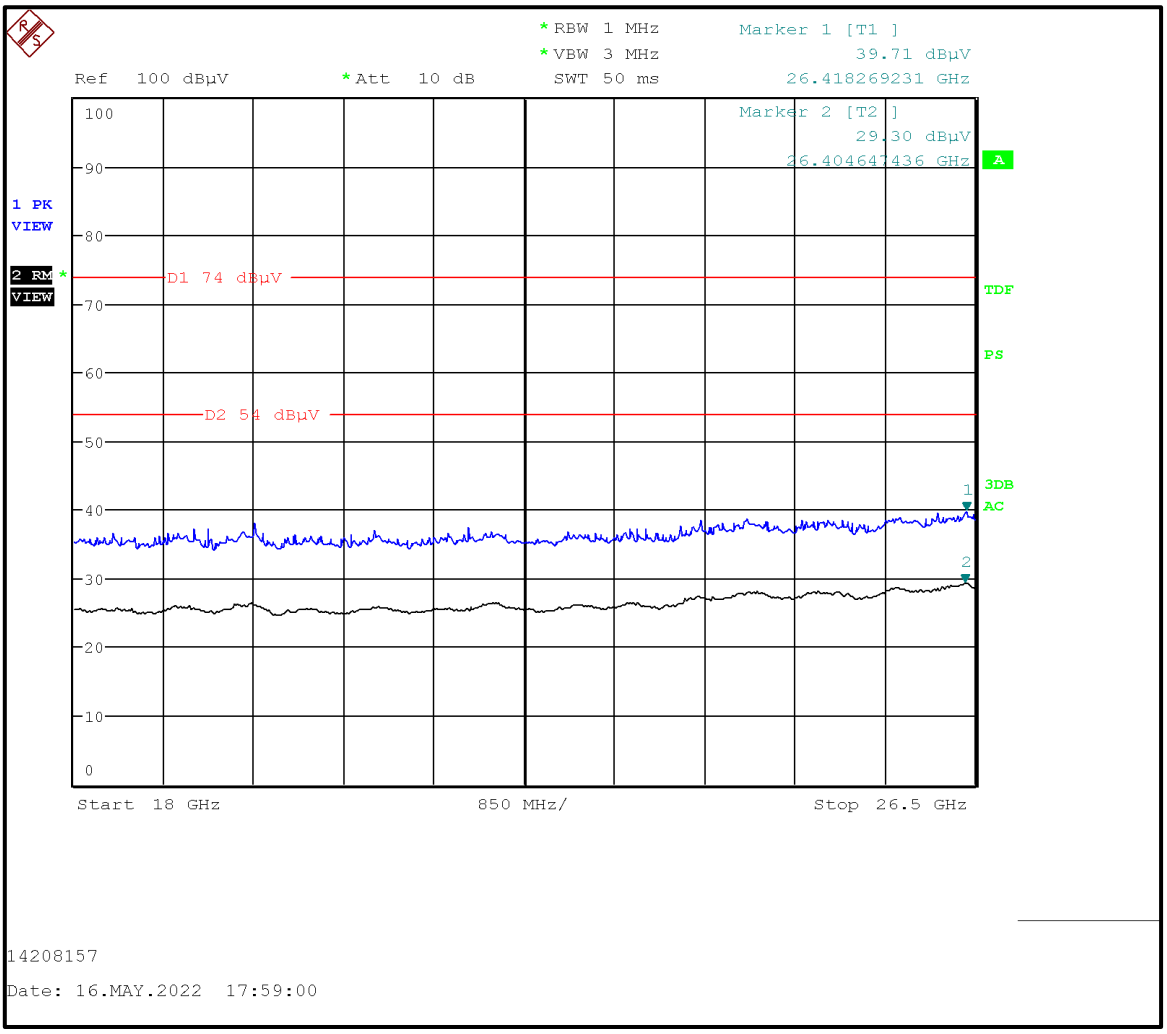
Result: Pass

Transmitter Radiated Emissions (continued)

Results: 802.11n / 40 MHz / MCS0 / PWR 16 / Bottom Channel

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
All emissions were below the level of the measurement system noise floor.					

Plot: 18 GHz – 25 GHz: 802.11n / 40 MHz / MCS0 / PWR 16 / Bottom Channel



Result: Pass

5.2.4. Transmitter Band Edge Radiated Emissions

Test Summary:

Test Engineer:	Muhammad Faiq Khan	**Test Date:**	03 May 2022 & 05 May 2022
Test Sample Serial Number:	220405435 (RF Test Sample)		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	DTS emissions in non-restricted frequency bands: FCC KDB 558074 Section 8.5 referencing ANSI C63.10:2013 Sections 11.11
	DTS emissions in restricted frequency bands: FCC KDB 558074 Section 8.6 referencing ANSI C63.10:2013 Sections 11.12
	ANSI C63.10:2013 Sections 6.10.4, 6.10.5

Environmental Conditions:

Temperature (°C):	23.8 to 24.6
Relative Humidity (%):	39.7 to 47.1

Notes:

1. The measurements were in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) with RF absorbers 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. Maximum emission levels were determined by height searching the measurement antenna over the range 1 m to 4 m
2. As the lower band edge falls within a non-restricted band, measurements were performed in accordance with FCC KDB 558074 Section 8.5 referencing ANSI C63.10 Section 11.11.
   As the maximum peak conducted output power was previously measured, in accordance with ANSI C63.10 Section 11.11.1(a) lower band edge measurement was performed with a peak detector and the -20 dBc limit applied.
3. As the lower band edge falls within a non-restricted band, only peak measurements are required. 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. The test receiver was left to sweep for a sufficient length of time in order to maximise the carrier level and out-of-band emissions. A marker and corresponding reference level line were placed on the peak of the carrier. Marker frequencies and levels were recorded.
4. The restricted band peak measurements were performed in accordance with ANSI C63.10 Section 11.12.2.4.
5. As the upper band edge falls within a restricted band both peak and average measurements were recorded by placing a marker at the edge of the band. For peak measurements the test receiver resolution bandwidth was set to 1 MHz and the video bandwidth 3 MHz A peak detector was used, sweep time was set to auto and trace mode was Max Hold. For average measurements the test receiver resolution bandwidth was set to 1 MHz and the video bandwidth 3 MHz and RMS detector in linear power averaging mode was used. The test receiver was left to sweep for 300 sweeps in order to maximise the carrier level and out-of-band emissions. A marker was placed on the band edge spot frequencies and a second marker placed on the highest emission level in the adjacent restricted band of operation (where a higher-level emission was present). Marker frequencies and levels were recorded.
6. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.

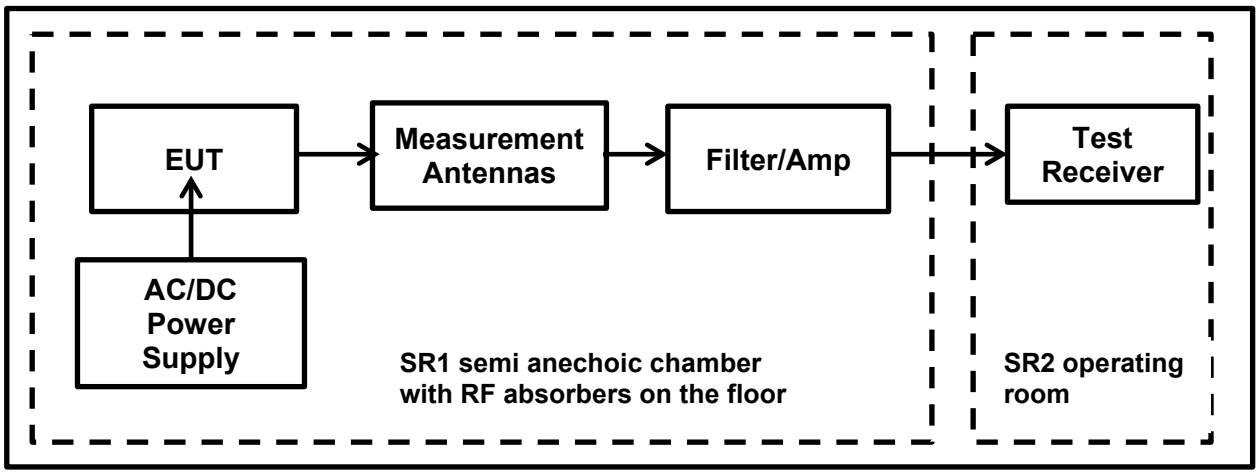
Transmitter Band Edge Radiated Emissions (continued)

Notes:

7. There is a restricted band 10 MHz below the lower band edge. The test receiver was set up as follows: the RBW set to 1 MHz, the VBW set to 3 MHz, with the sweep time set to auto couple. The test receiver was left to sweep for 300 sweeps in order to maximise the emissions. Peak and average measurements were performed with their respective detectors. Markers were placed on the highest point on each trace.
8. The Final radiated emissions measurements were performed on Bottom, Middle and Top channels with the EUT set to the following worst-case mode.
    - WLAN 2.4 GHz | b-Mode | 20 MHz| 1 Mbps | PWR 35
    - WLAN 2.4 GHz | g-Mode | 20 MHz| 6 Mbps | PWR 21
    - WLAN 2.4 GHz | n-Mode | 20 MHz| MCS0 | PWR 20
    - WLAN 2.4 GHz | n-Mode | 40 MHz| MCS0 | PWR 16
9. **As the continuous transmission of the EUT (D ≥ 98%) cannot be achieved and EUT was transmitting continuously at different Duty Cycles with respect to the selected modes (duty cycle variations are less than ±2% at the respective data rate). Therefore, Duty Cycle Correction Factors were added to all average measurements according to the below table, to compute the corrected average values of the emissions that would have been measured had the test been performed at 100% Duty Cycle.

Data rate	Duty cycle	Correction factor
	(%)	(dB)
b-HT20-mode	86.41	0.63
g-HT20-mode	76.55	1.20
n-HT20-mode	83.48	0.78
n-HT40-mode	73.41	1.34

Test Setup:



Transmitter Band Edge Radiated Emissions (continued)

Results: 802.11b / 20 MHz / 1 Mbps / PWR 35

Results: Lower Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	-20 dBc Limit (dBµV/m)	Margin (dB)	Result
2396.95	78.31	81.89	3.58	Complied
2400.00	61.29	81.89	20.60	Complied

Results: 2310 to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2385.96	56.49	74.00	17.51	Complied

Results: 2310 to 2390 MHz Restricted Band / Average

Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level** (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2389.32	48.94	0.63	49.57	54.00	4.43	Complied

Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2483.50	48.55	74.00	25.45	Complied
2485.57	50.15	74.00	23.85	Complied

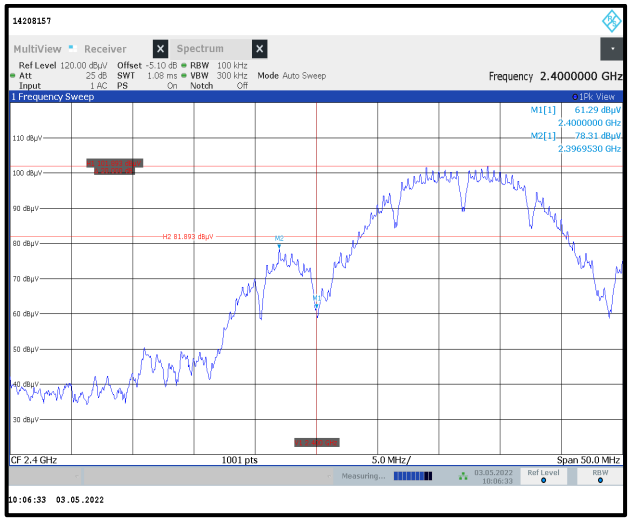
Results: Upper Band Edge / Average

Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level** (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2483.50	38.32	0.63	38.95	54.00	15.05	Complied
2485.81	40.45	0.63	41.08	54.00	12.92	Complied

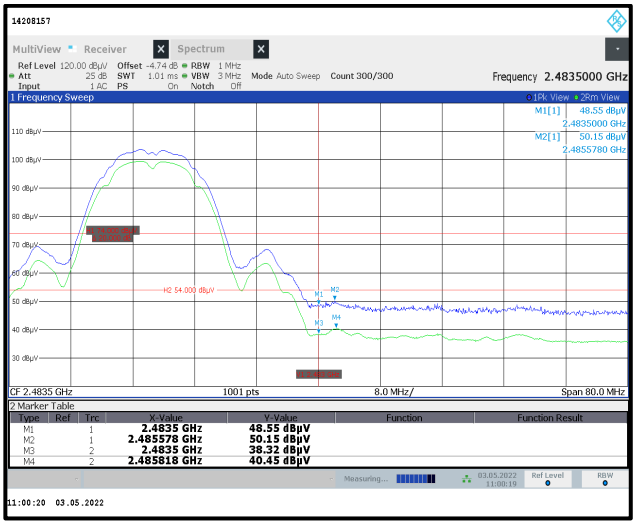
Result: Pass

Transmitter Band Edge Radiated Emissions (continued)

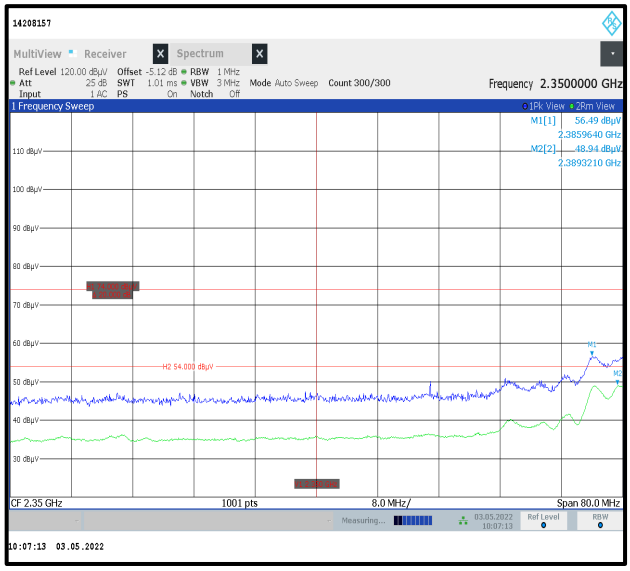
Results: 802.11b / 20 MHz / 1 Mbps / PWR 35



Lower Band Edge Peak Measurement



Upper Band Edge Measurement



2310 MHz to 2390 MHz Restricted Band Plot

Transmitter Band Edge Radiated Emissions (continued)

Results: 802.11g / 20 MHz / 6 Mbps / PWR 21

Results: Lower Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	-20 dBc Limit (dBµV/m)	Margin (dB)	Result
2396.95	62.25	74.86	12.61	Complied
2400.00	63.36	74.86	11.50	Complied

Results: 2310 to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2389.72	72.50	74.00	1.50	Complied

Results: 2310 to 2390 MHz Restricted Band / Average

Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level** (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2389.96	51.68	1.20	52.88	54.00	1.12	Complied

Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2483.50	58.29	74.00	15.71	Complied
2484.21	60.15	74.00	13.85	Complied

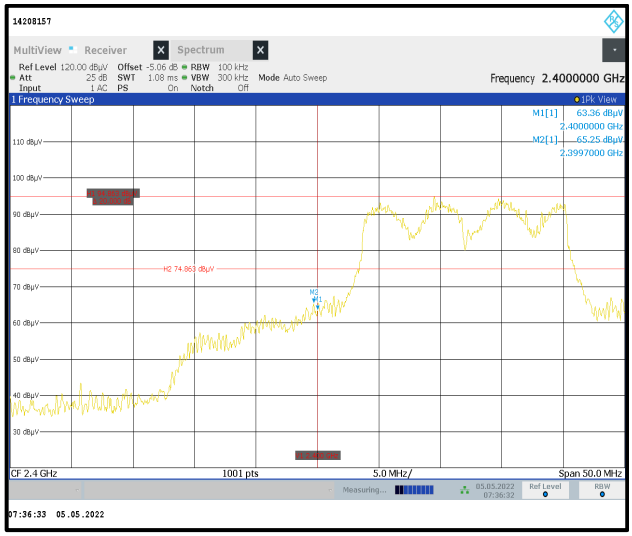
Results: Upper Band Edge / Average

Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level** (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2483.50	44.18	1.20	45.38	54.00	8.62	Complied
2483.58	44.18	1.20	45.38	54.00	8.62	Complied

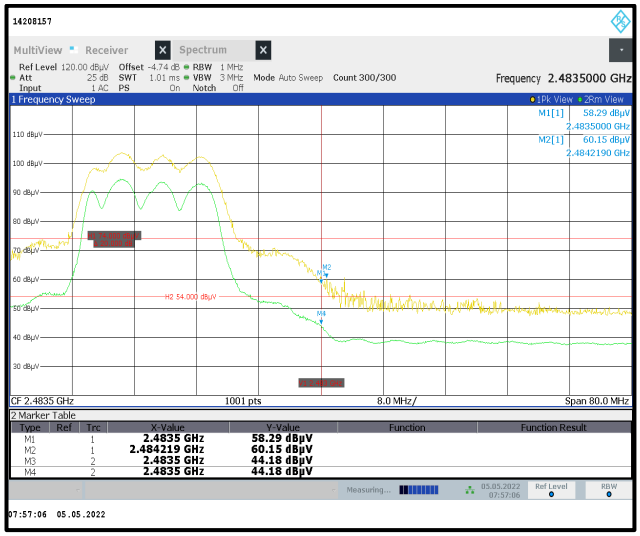
Result: Pass

Transmitter Band Edge Radiated Emissions (continued)

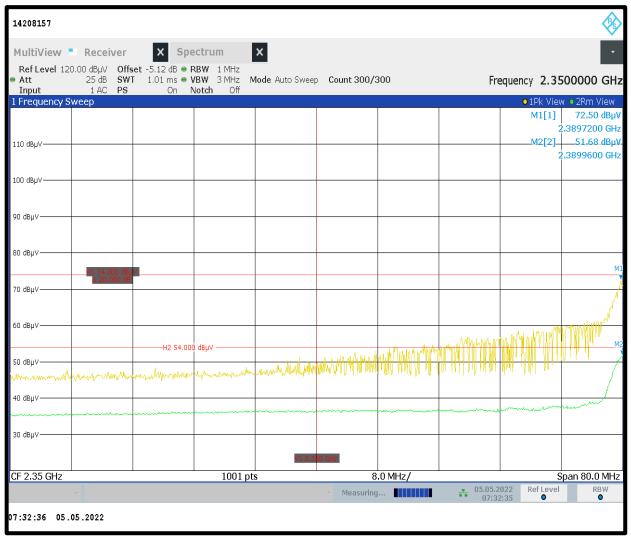
Results: 802.11g / 20 MHz / 6 Mbps / PWR 21



Lower Band Edge Peak Measurement



Upper Band Edge Measurement



2310 MHz to 2390 MHz Restricted Band Plot

Transmitter Band Edge Radiated Emissions (continued)

Results: 802.11n / 20 MHz / MCS0 / PWR 20

Results: Lower Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	-20 dBc Limit (dBµV/m)	Margin (dB)	Result
2398.95	63.31	74.86	11.55	Complied
2400.00	61.10	74.86	13.76	Complied

Results: 2310 to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2389.88	70.13	74.00	3.87	Complied

Results: 2310 to 2390 MHz Restricted Band / Average

Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level** (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2389.88	51.71	0.78	52.49	54.00	1.51	Complied

Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2483.50	62.06	74.00	11.94	Complied
2484.21	63.14	74.00	10.86	Complied

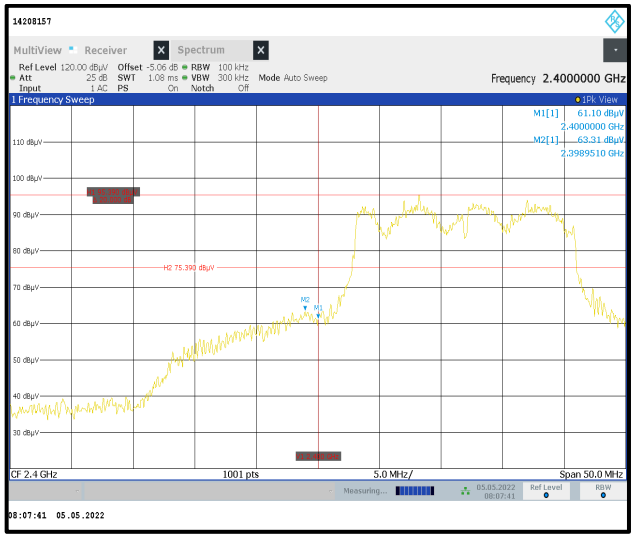
Results: Upper Band Edge / Average

Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level** (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2483.50	45.74	0.78	46.52	54.00	7.48	Complied
2483.58	45.53	0.78	46.31	54.00	7.69	Complied

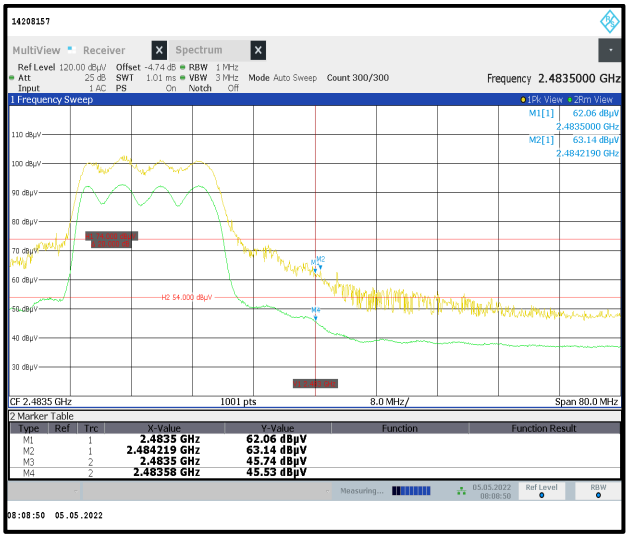
Result: Pass

Transmitter Band Edge Radiated Emissions (continued)

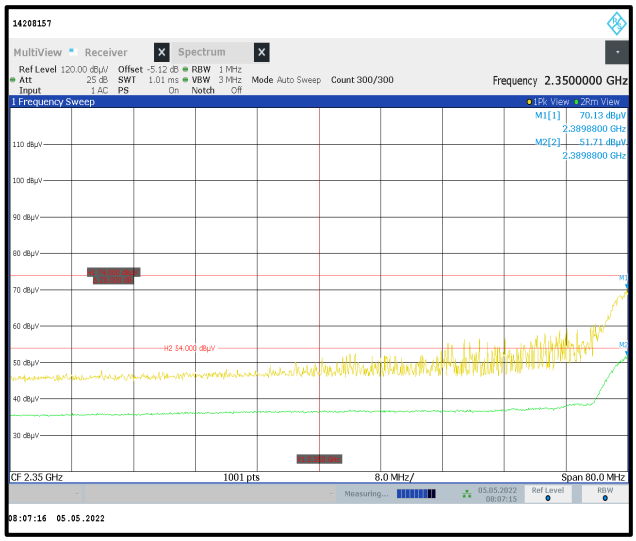
Results: 802.11n / 20 MHz / MCS0 / PWR 20



Lower Band Edge Peak Measurement



Upper Band Edge Measurement



2310 MHz to 2390 MHz Restricted Band Plot

Transmitter Band Edge Radiated Emissions (continued)

Results: 802.11n / 40 MHz / MCS0 / PWR 16

Results: Lower Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	-20 dBc Limit (dBµV/m)	Margin (dB)	Result
2398.15	52.66	71.76	19.10	Complied
2400.00	45.99	71.76	25.77	Complied

Results: 2310 to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2388.52	63.55	74.00	10.45	Complied

Results: 2310 to 2390 MHz Restricted Band / Average

Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level** (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2389.00	44.78	1.34	46.12	54.00	7.88	Complied

Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2483.50	72.69	74.00	1.31	Complied
2484.21	63.50	74.00	10.50	Complied

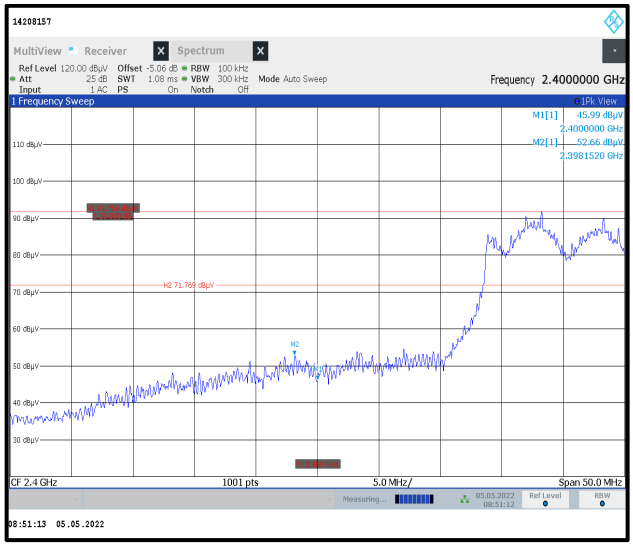
Results: Upper Band Edge / Average

Frequency (MHz)	Average Level (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level** (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2483.50	50.48	1.34	51.82	54.00	2.18	Complied
2483.58	50.52	1.34	51.86	54.00	2.14	Complied

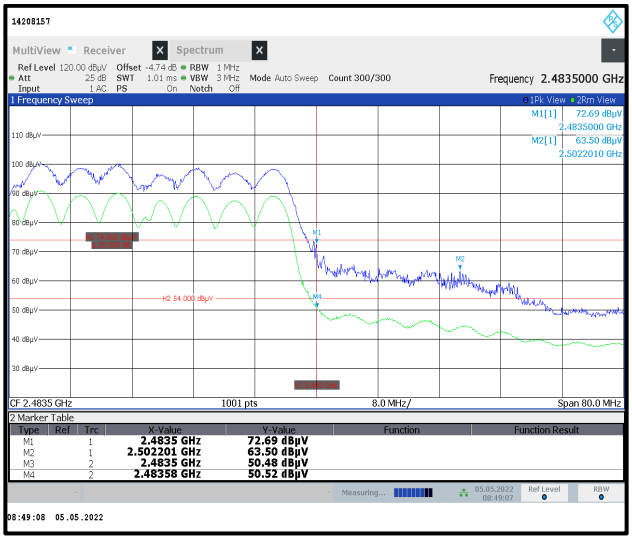
Result: Pass

Transmitter Band Edge Radiated Emissions (continued)

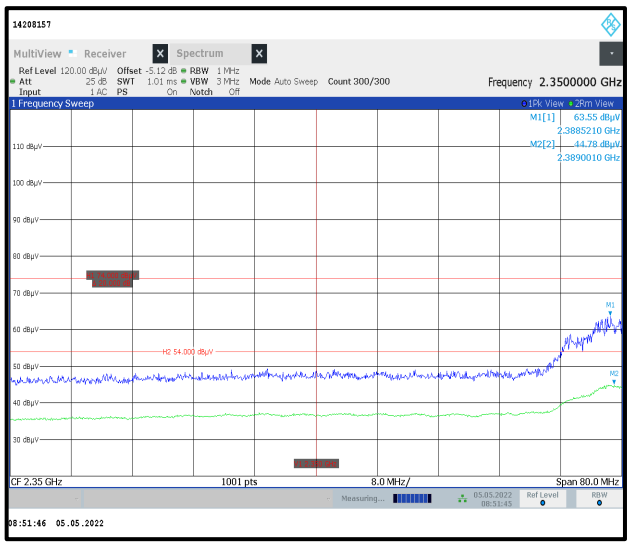
Results: 802.11n / 40 MHz / MCS0 / PWR 16



Lower Band Edge Peak Measurement



Upper Band Edge Measurement



2310 MHz to 2390 MHz Restricted Band Plot

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
Transmitter Duty Cycle	95%	±3.4%
Radiated Spurious Emissions	95%	±3.10 dB
Band Edge Radiated Emissions	95%	±3.10 dB

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	10/07/2020	36
377	BONN Elektronik	Amplifier, Low Noise Pre	BLMA 0118-1A	025294B	14/07/2021	12
423	Bonn Elektronik	Amplifier, Low Noise Pre	BLMA 1840-1A	55929	16/07/2021	12
460	Deisel	Turntable	DT 4250 S	n/a	n/a	n/a
452	Schwarzbeck	Antenna, Trilog Broadband	VULB 9168	9168-240	02/09/2020	24
496	Rohde & Schwarz	Antenna, log. - periodical	HL050	100297	05/08/2020	36
607	Schwarzbeck	Antenna broadband horn antenna	BBHA 9170	9170-561	15/10/2019	36
587	Maturo	antenna mast, tilting	TAM 4.0-E	011/7180311	n/a	n/a
588	Maturo	Controller	NCD	029/7180311	n/a	n/a
591	Rohde & Schwarz	Receiver	ESU 40	100244/040	28/06/2021	12
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

Test site: SR 7/8

ID	Manufacturer	Type	Model	Serial	Calibration Date	Cal. Cycle (months)
23	Rohde & Schwarz	Artificial Mains	ESH3-Z5	831767/013	14/07/2021	12
28	Rohde & Schwarz	Passive Probe	ESH2-Z3	none	11/07/2019	36
349	Rohde & Schwarz	Receiver, EMI Test	ESIB7	836697/009	13/07/2021	12
351	Rohde & Schwarz	network, Artificial Mains	ESH3-Z5	862770/018	14/07/2021	12
564	Teseq	Impedance stabilisation network (ISN)	ISN T800	26076	14/07/2021	24
616	Rohde & Schwarz	ISN	ENY81-CA6	101656	07/07/2020	36
-/-	Testo	Thermo-Hygrometer	608-H1	08	lab verification	n/a
327	SPS	AC/DC power distribution system	PAS 5000	A2464 00/1 0200	lab verification	n/a

8. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	61	-	Initial Version

--- END OF REPORT ---