TEST REPORT

Test Report No. : UL-RPT-RP-12818389-316-FCC

Applicant	:	AirPatrol OÜ
Model No.	:	AirPatrol WiFi
FCC ID	:	2ATKUAPW42
Technology	:	WLAN
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: Krume, Ivanov
Title: Laboratory Engineer
Date: 30 September 2019

Approved by: Ajit, Phadtare
Title: Lead Test Engineer
Date: 30 September 2019

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.

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1. Customer Information

1.1.Applicant Information

Company Name:	AirPatrol OÜ
Company Address:	Sihi 42, 11622, Tallinn, Estonia
Company Phone No.:	+37254533777
Company E-Mail:	info@airpatrol.eu
Contact Person:	Daniel Dordett
Contact E-Mail Address:	daniel@airpatrol.eu
Contact Phone No.:	+37254533777

1.2.Manufacturer Information

Company Name:	AirPatrol OÜ
Company Address:	Sihi 42, 11622, Tallinn, Estonia
Company Phone No.:	+37254533777
Company E-Mail:	info@airpatrol.eu
Contact Person:	Daniel Dordett
Contact E-Mail Address:	daniel@airpatrol.eu
Contact Phone No.:	+37254533777

2. Summary of Testing

2.1. General Information

Applied Standards

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
Test Firm Registration:	399704

Location

Location of Testing:	UL International Germany GmbH Hedelfinger Str. 61 70327 Stuttgart Germany

Date information

Order Date:	16 April 2019
EUT arrived:	26 April 2019
Test Dates:	21 May 2019 to 25 June 2019
EUT returned:	-/-

2.2. Summary of Test Results

Clause	Measurement	Complied	Did not comply	Not performed	Not applicable
Part 15.207	Transmitter AC Conducted Emissions	☒	☐	☐	☐
Part 15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth	☐	☐	☒	☐
Part 15.35(c)	Transmitter Duty Cycle	☐	☐	☒	☐
Part 15.247(e)	Transmitter Power Spectral Density	☐	☐	☒	☐
Part 15.247(b)(3)	Transmitter Maximum (Average) Output Power	☐	☐	☒	☐
Part 15.247(d) & 15.209(a)	Transmitter Radiated Emissions	☒	☐	☐	☐
Part 15.247(d) & 15.209(a)	Transmitter Band Edge Radiated Emissions	☒	☐	☐	☐

Note(s):

2.3. Methods and Procedures

Reference:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Reference:	KDB 558074 D01 DTS Meas Guidance v05r02 March 3, 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:	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:	AirPatrol
Model Name or Number:	AirPatrol WiFi
Serial Number:	208905 (Radiated Sample)
Hardware Version Number:	4.2.2
Software Version:	test software
FCC ID:	2ATKUAPW42

3.2. Description of EUT

The equipment under test was a Heat pump and air conditioner (AC) controller that contains a FCC approved Wi-Fi module.

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 802.11b,g,n) / Digital Transmission System		
Type of Unit:	Transceiver		
Modulation:	DBPSK, DQPSK, BPSK, QPSK, 16QAM & 64QAM		
Data Rate:	802.11b (SISO) : 1, 2, 5.5 & 11 Mbps		
	802.11g (SISO) : 6, 9,12, 18, 24,36,48,54 Mbps		
	802.11n HT20 (SISO) : MCS0 to MCS7		
Power Supply Requirement(s):	Nominal	5 V DC via Switching Adapter	
Maximum measured Conducted Output Power:	--		
Maximum Antenna Gain:	-2.0 dBi		
Antenna Type:	Inverted F		
Antenna Details:	PCB Trace Antenna		
Transmit Frequency Range:	2412 MHz to 2462 MHz		
Transmit Channels Tested:	**Channel ID**	**RF Channel**	**Channel Frequency (MHz)**
	Bottom	1	2412
	Middle	6	2437
	Top	11	2462

3.5. Support Equipment

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

A. Support Equipment (Manufacturer supplied)

Item	Description	Brand Name	Model Name or Number	Serial Number
1	Switching Adapter, 5 V DC 1A	Shenzen Frecom Electronics Co., LTD.	FPS005EUC-050100	Not stated

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):
☒ Continuous transmissions with a modulated carrier at maximum power on the bottom, middle and top channels

4.2. Configuration and Peripherals

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

- The EUT was powered with 5 V DC using 120 VAC AC/DC switching adapter and USB cable connected to the Micro-USB port of the EUT.
- The EUT was configured to the test mode with the test instructions “APW 4.x.x Test software descriptions.pdf” Version 1.0 Dated 05.04.2019 provided by the customer.
- EUT’s Pairing & Test Buttons were used to enable a continuous transmission modes and to select the required test channels with pre-programmed worst data rates and modulation schemes.
- The customer provide following pre-programmed worst data rates used for all measurements:
  - 802.11b – 5.5 Mbps | Power Setting : 17 dBm
  - 802.11g – 36 Mbps | Power Setting : 13 dBm
  - 802.11n HT20 SISO – MCS0 | Power Setting : 12 dBm
- The EUT was made to transmit continuously with a duty cycle of more than 98 %. Therefore no duty cycle corrections are required for radiated emissions measured with Average detector.
- Before starting final radiated spurious emission measurements “worst case verification” with the EUT in Standing-position & Laying-position was performed by Lab.
- The EUT in Standing-position was found to be the worst case therefore this report includes relevant results.
- Radiated spurious emissions were performed with the EUT positioned on the turn table and rotating 360 degrees while the antenna height varies from 1 to 4 m over the measurement frequency range.
- EMC32 V10.1.0 Software was used for the Radiated spurious emission measurement.
- For AC-Conducted line emissions measurements the Toyo EMI Software EP5/CE Ver 4.0.1. was used.

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:	M. Asim Shahzad	**Test Date:**	05 June 2019
Test Sample Serial Number:	208905		
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):	20
Relative Humidity (%):	33

Settings of the Instrument

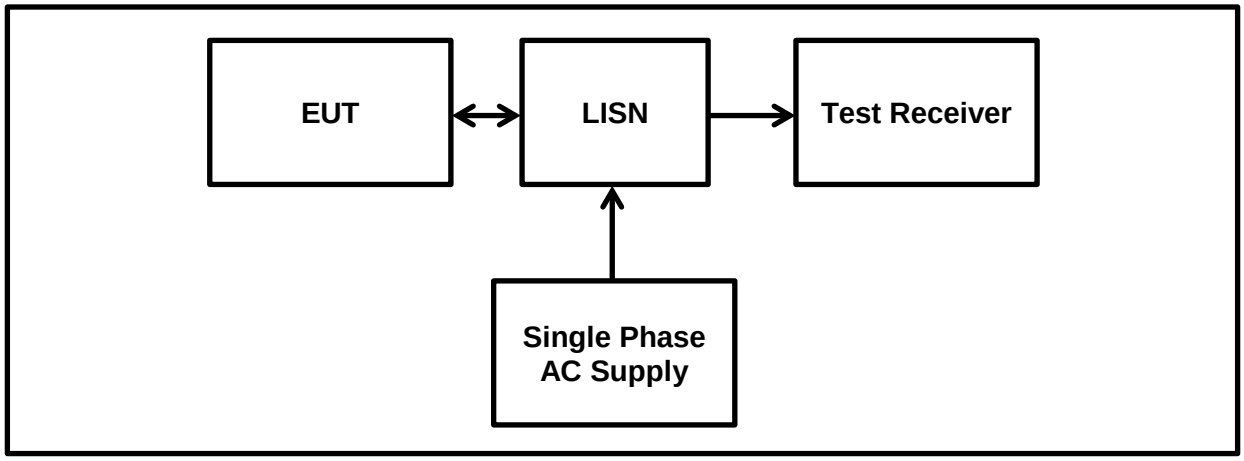
Detector	Quasi Peak/ Average Peak

Note(s):

1. Measurement software used: Toyo EMI Software; CE measurement software EP5/CE Ver 4.0.1.
2. The EUT was connected to an AC/DC switching adapter via a USB cable.
3. In accordance with FCC KDB 174176 Q4; the AC/DC switching adapter was connected to 120 VAC 60 Hz single phase supply via a LISN.
4. The EUT was configured on Middle Channel | 802.11b – 5.5 Mbps | Power Setting : 17 dBm
5. 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.
6. 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.
7. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
8. The final measured value, for the given emission, in the table below incorporates the cable loss. Calculation: Level = test receiver reading + path loss (cable attenuation + correction LISN).

Transmitter AC Conducted Spurious Emissions (continued)

Test setup:



Results: Live / Quasi Peak / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.16868	Live	43.8	65	21.2	Complied
0.2	Live	40.5	63.6	23.1	Complied
0.30574	Live	32.2	60.1	27.9	Complied
0.51785	Live	23.3	56	32.7	Complied
0.78378	Live	21.1	56	34.9	Complied
3.21565	Live	17.9	56	38.1	Complied

Results: Live / Average / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.16868	Live	26.1	55	28.9	Complied
0.2	Live	23.8	53.6	29.8	Complied
0.30574	Live	20.6	50.1	29.5	Complied
0.51785	Live	15.9	46	30.1	Complied
0.78378	Live	16	46	30	Complied
3.21565	Live	14.8	46	31.2	Complied

Results: Neutral / Quasi Peak / 120 VAC 60 Hz

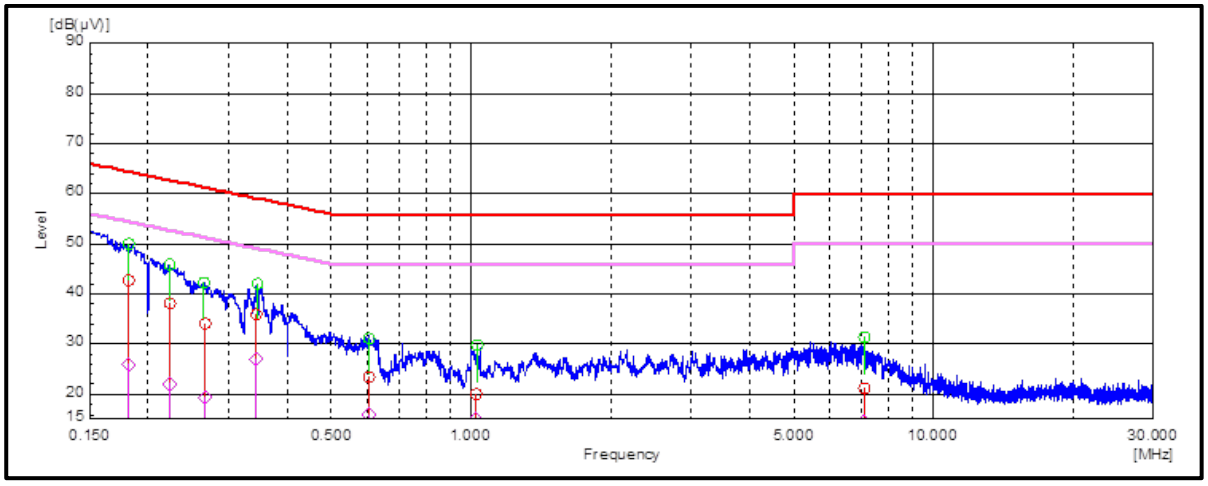
Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.18184	Neutral	42.7	64.4	21.7	Complied
0.22363	Neutral	38.2	62.7	24.5	Complied
0.26645	Neutral	34.1	61.2	27.1	Complied
0.34317	Neutral	35.9	59.1	23.2	Complied
0.60376	Neutral	23.5	56	32.5	Complied
1.02906	Neutral	19.9	56	36.1	Complied

Results: Neutral / Average / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.18184	Neutral	25.8	54.4	28.6	Complied
0.22363	Neutral	22.1	52.7	30.6	Complied
0.26645	Neutral	19.4	51.2	31.8	Complied
0.34317	Neutral	27.2	49.1	21.9	Complied
0.60376	Neutral	15.8	46	30.2	Complied
1.02906	Neutral	15.1	46	30.9	Complied

Result: Pass

Plot: Live and Neutral Line



Note: These plot is a pre-scans and for indication purposes only. For final measurements, see accompanying tables.

5.2.2. Transmitter Radiated Emissions

Test Summary:

Test Engineer:	Krume Ivanov	**Test Date:**	23 May 2019
Test Sample Serial Number:	208905		
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 referring 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

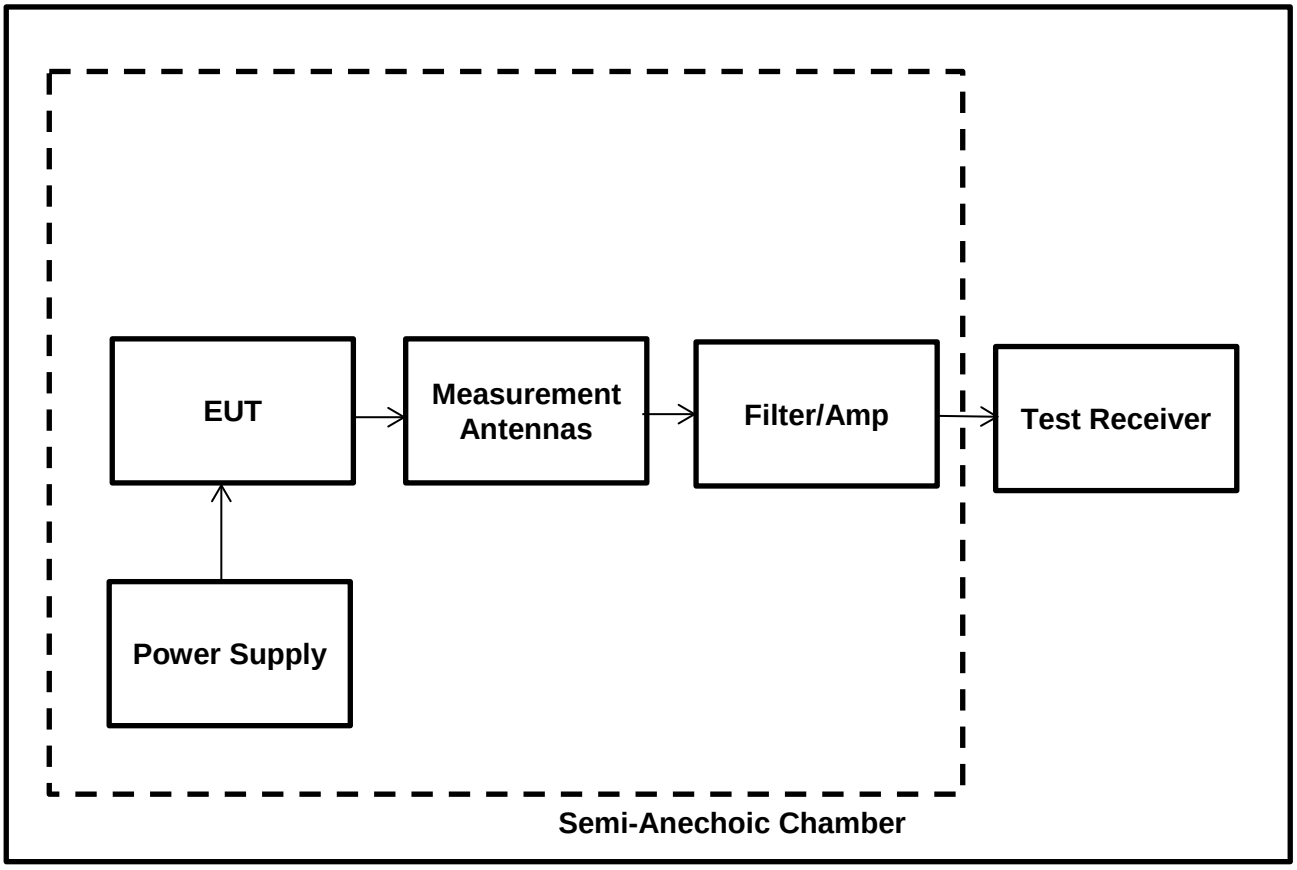
Environmental Conditions:

Temperature (°C):	27
Relative Humidity (%):	39

Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. The preliminary scans showed similar emission levels below 1 GHz, for each mode & channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the middle channel only in b-mode (HT20).
3. All emissions shown on the pre-scan plots were investigated and found to be ambient or > 20 dB below the appropriate limit.
4. 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.
5. 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.
6. Final measurements were performed on the marker frequencies and the results entered into the table below. The test receiver resolution bandwidth was set to 120 kHz, using a CISPR quasi-peak detector and span big enough to see the whole emission.

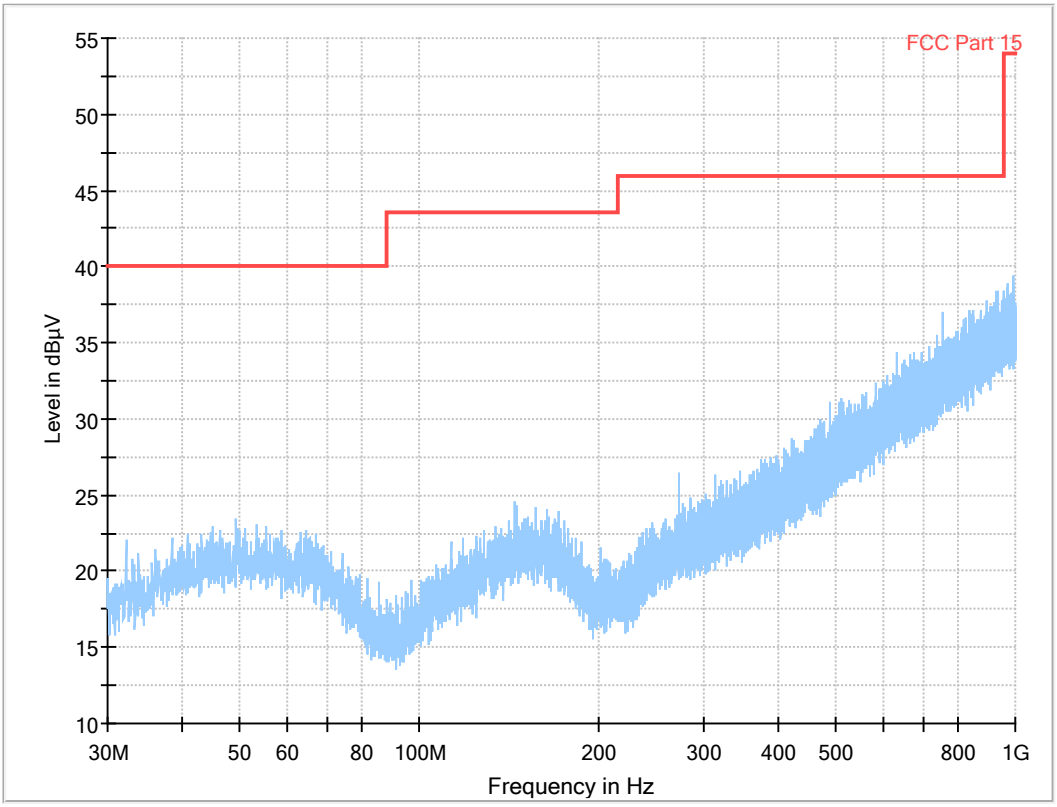
Test Setup:


EUT
Measurement Antennas
Filter/Amp
Test Receiver
Power Supply
Semi-Anechoic Chamber

Results: Peak Method / Bottom Channel / 802.11b / 20 MHz / 5.5 Mbps / PWL 17 dBm

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

Plot:30 MHz-1 GHz: Bottom Channel / 802.11b / 20 MHz / 5.5 Mbps / PWL 17 dBm



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

Result: Pass

Test Summary:

Test Engineer:	Krume Ivanov	**Test Date:**	21 May 2019 & 25 June 2019
Test Sample Serial Number:	208905		
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 referring 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:

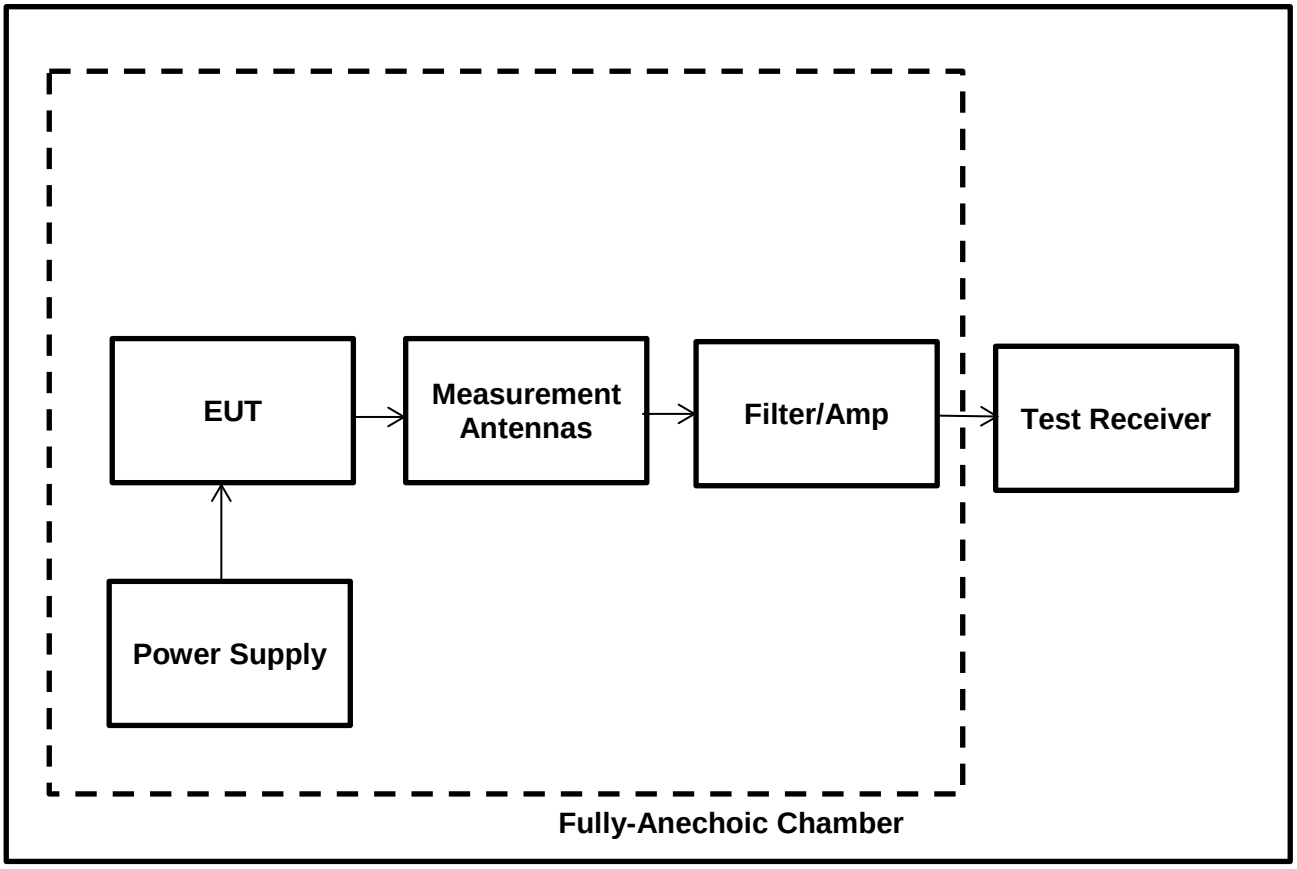
Temperature (°C):	27 & 20
Relative Humidity (%):	39 & 22

Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak and average noise floor readings of the measuring receiver were recorded as shown in the tables below.
3. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the appropriate limit or below the measurement system noise floor.
4. The emission shown approximately at 2.4-2.4835 GHz on the 1 GHz to 18 GHz plot is the EUT fundamental.
5. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 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 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 metre to 4 metres.
6. 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.
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.
7. The preliminary scans showed similar emission levels above 18 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the middle channel only in b-mode (HT20).

Transmitter Radiated Emissions (continued)

Test Setup:



Transmitter Radiated Emissions (continued)

Results: Peak Method / Bottom Channel / 802.11b / 20 MHz / 5.5 Mbps / PWL 17 dBm

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
No critical spurious was found					

Results: Peak Method / Middle Channel / 802.11b / 20 MHz / 5.5 Mbps / PWL 17 dBm

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
No critical spurious was found					

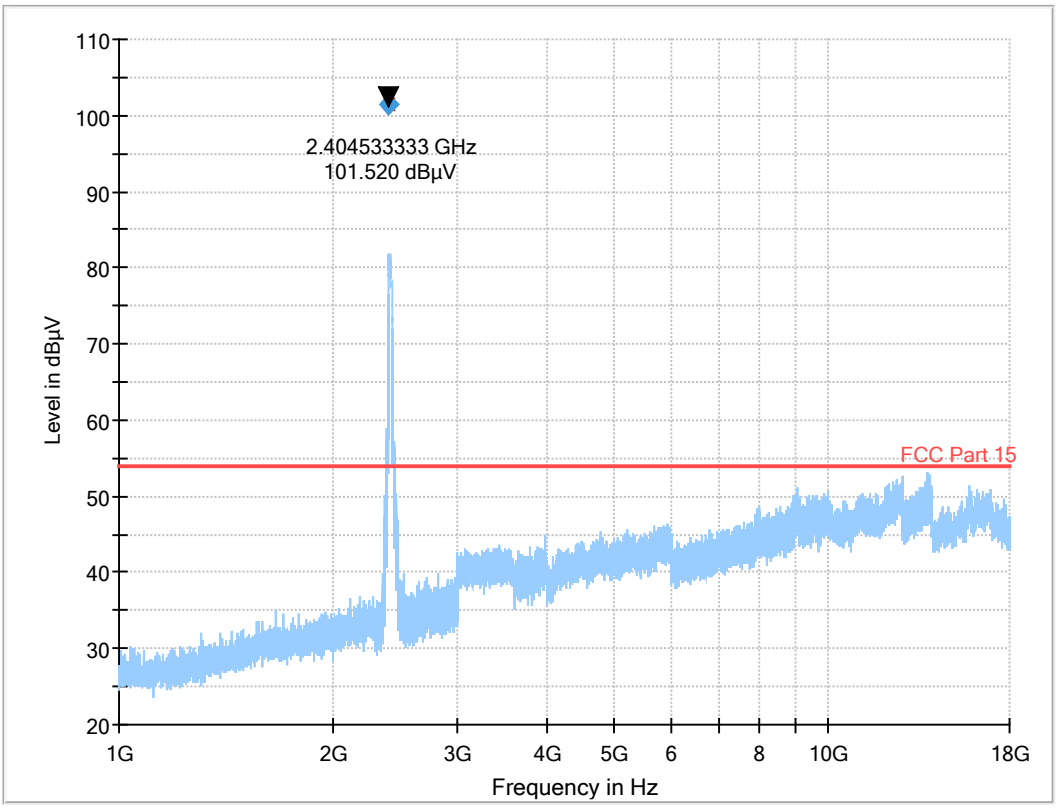
Results: Peak Method / Top Channel / 802.11b / 20 MHz / 5.5 Mbps / PWL 17 dBm

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
No critical spurious was found					

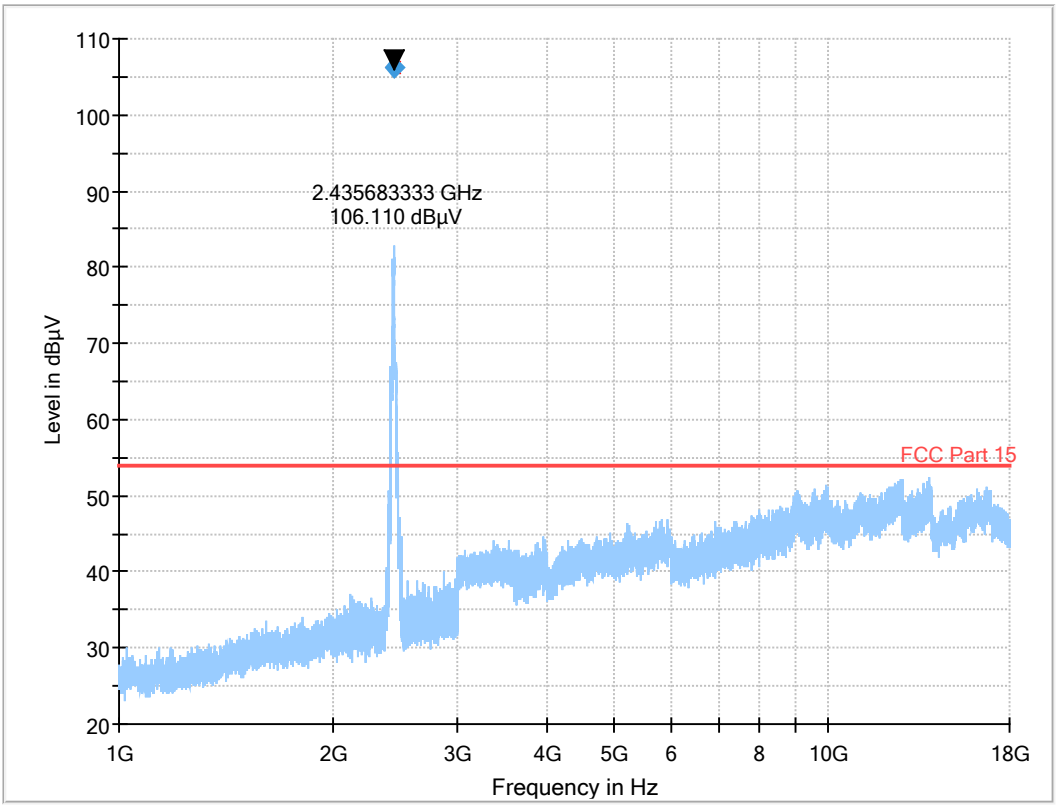
Result: **Pass**

Transmitter Radiated Emissions (continued)

Plot: 1 GHz – 18 GHz: Bottom Channel / 802.11b / 20 MHz / 5.5 Mbps / PWL 17 dBm

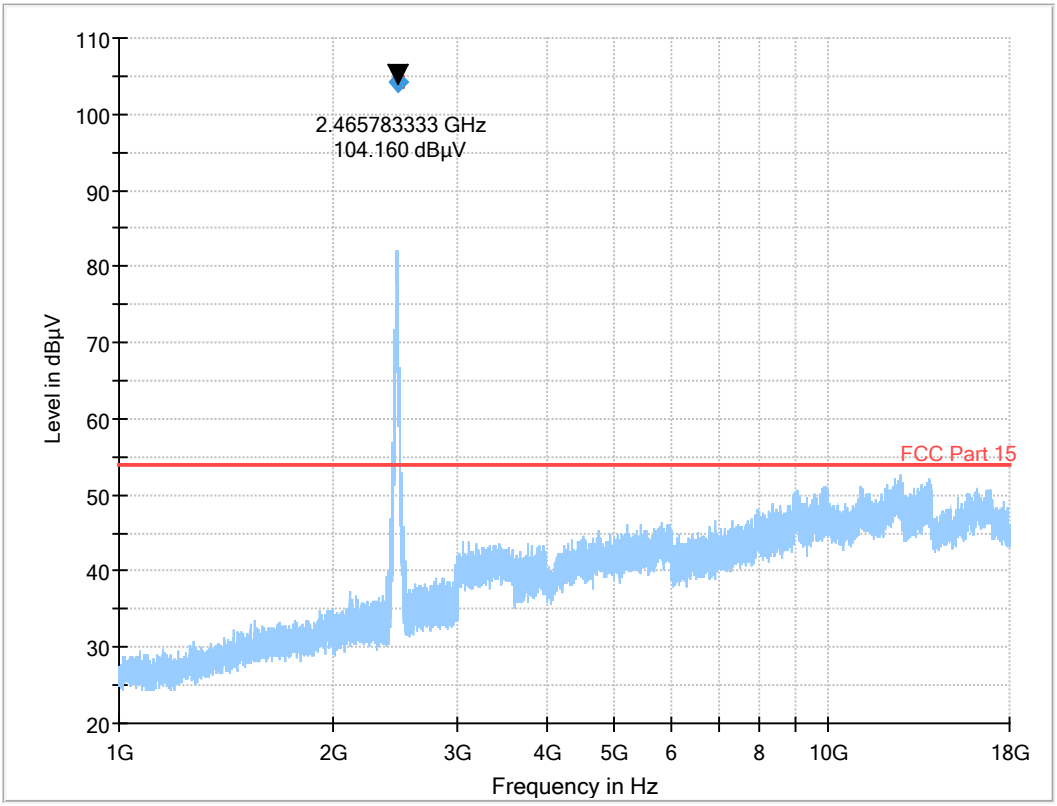


Plot: 1 GHz – 18 GHz: Middle Channel / 802.11b / 20 MHz / 5.5 Mbps / PWL 17 dBm



Transmitter Radiated Emissions (continued)

Plot: 1 GHz – 18 GHz: Top Channel / 802.11b / 20 MHz / 5.5 Mbps / PWL 17 dBm



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

Transmitter Radiated Emissions (continued)

Results: Peak Method / Bottom Channel / 802.11g / 20 MHz / 36 Mbps /PWL 13 dBm

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
No critical spurious was found					

Results: Peak Method / Middle Channel / 802.11g / 20 MHz / 36 Mbps /PWL 13 dBm

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
No critical spurious was found					

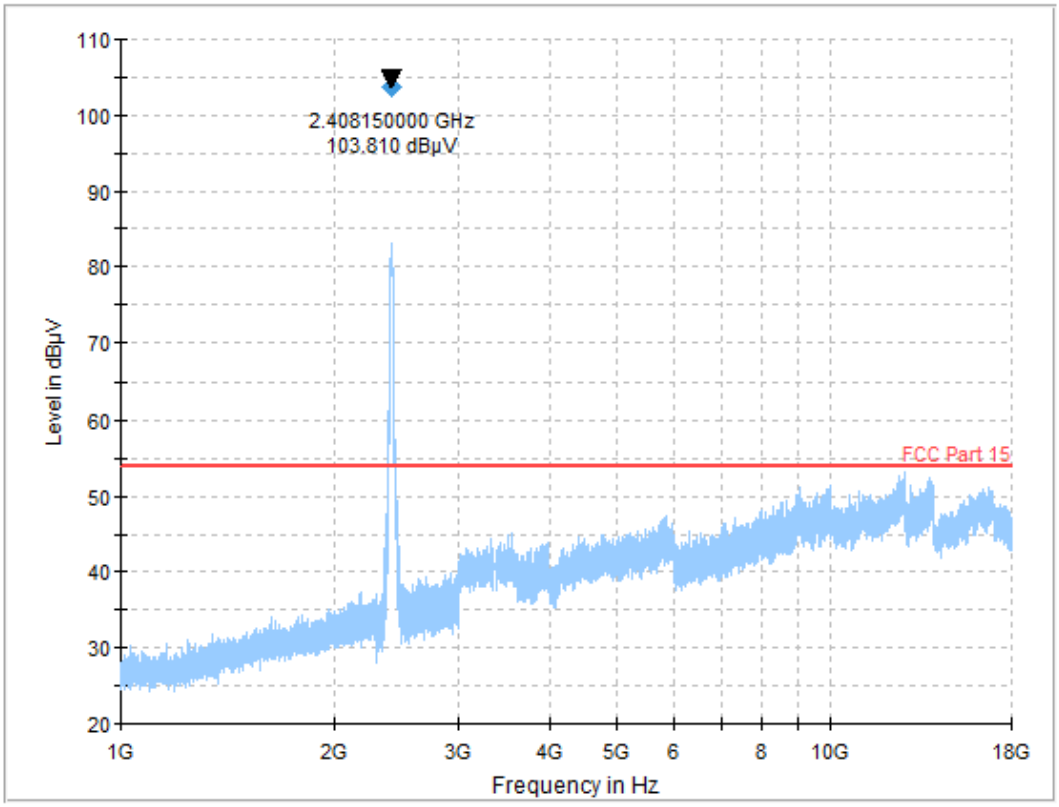
Results: Peak Method / Top Channel / 802.11g / 20 MHz / 36 Mbps /PWL 13 dBm

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
No critical spurious was found					

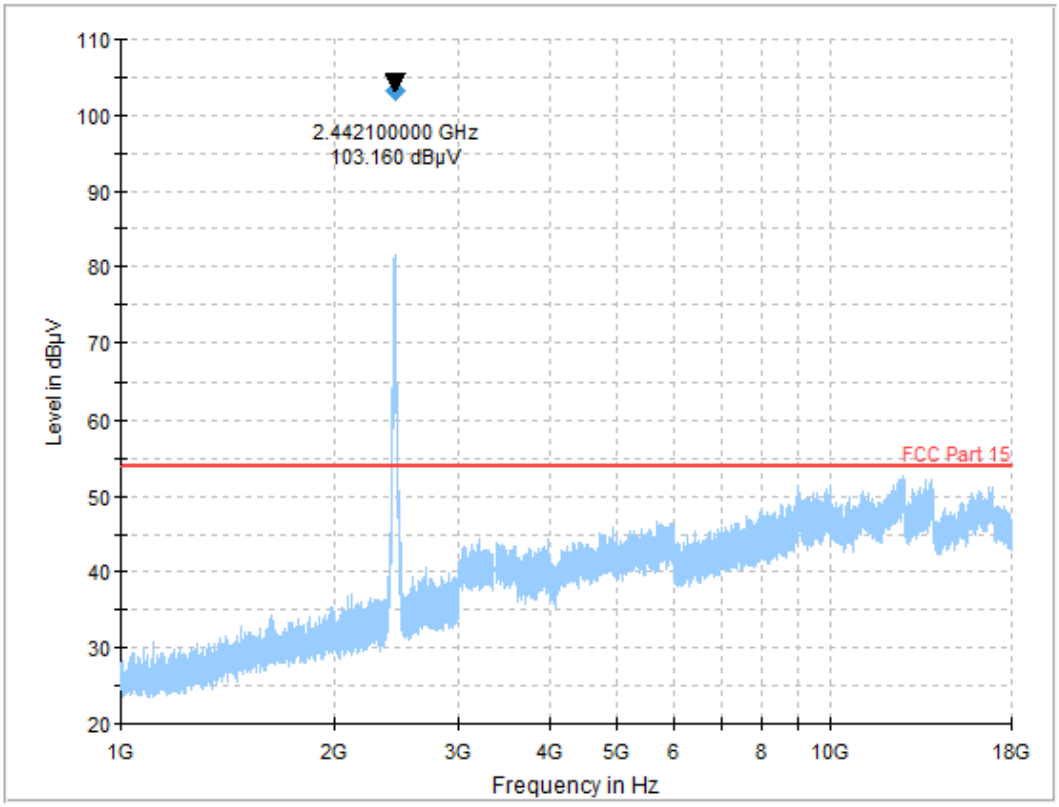
Result: Pass

Transmitter Radiated Emissions (continued)

Plot: 1 GHz – 18 GHz : Bottom Channel / 802.11g / 20 MHz / 36 Mbps /PWL 13 dBm

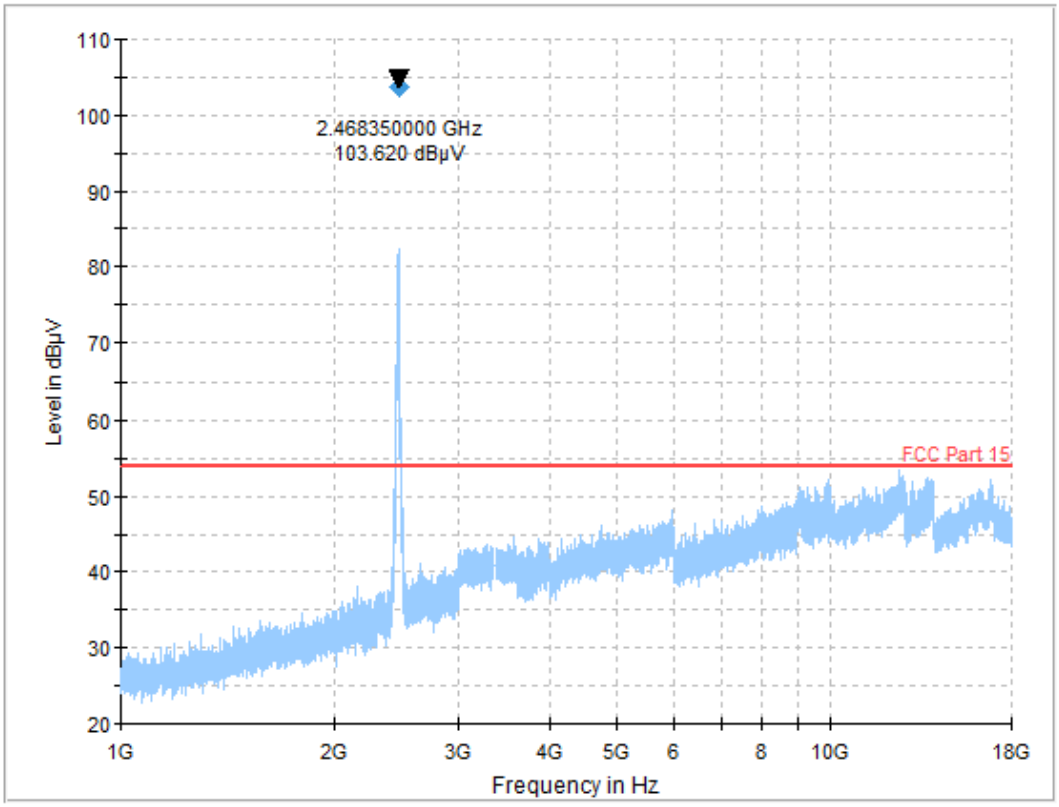


Plot: 1 GHz – 18 GHz : Middle Channel / 802.11g / 20 MHz / 36 Mbps /PWL 13 dBm



Transmitter Radiated Emissions (continued)

Plot: 1 GHz – 18 GHz : Top Channel / 802.11g / 20 MHz / 36 Mbps /PWL 13 dBm



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

Transmitter Radiated Emissions (continued)

Results: Peak Method / Bottom Channel / 802.11n / 20 MHz / MCS0 /PWL 12 dBm

Frequency (MHz)	Antenna Polarization	Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)	Result
No critical spurious was found					

Results: Peak Method / Middle Channel / 802.11n / 20 MHz / MCS0 /PWL 12 dBm

Frequency (MHz)	Antenna Polarization	Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)	Result
No critical spurious was found					

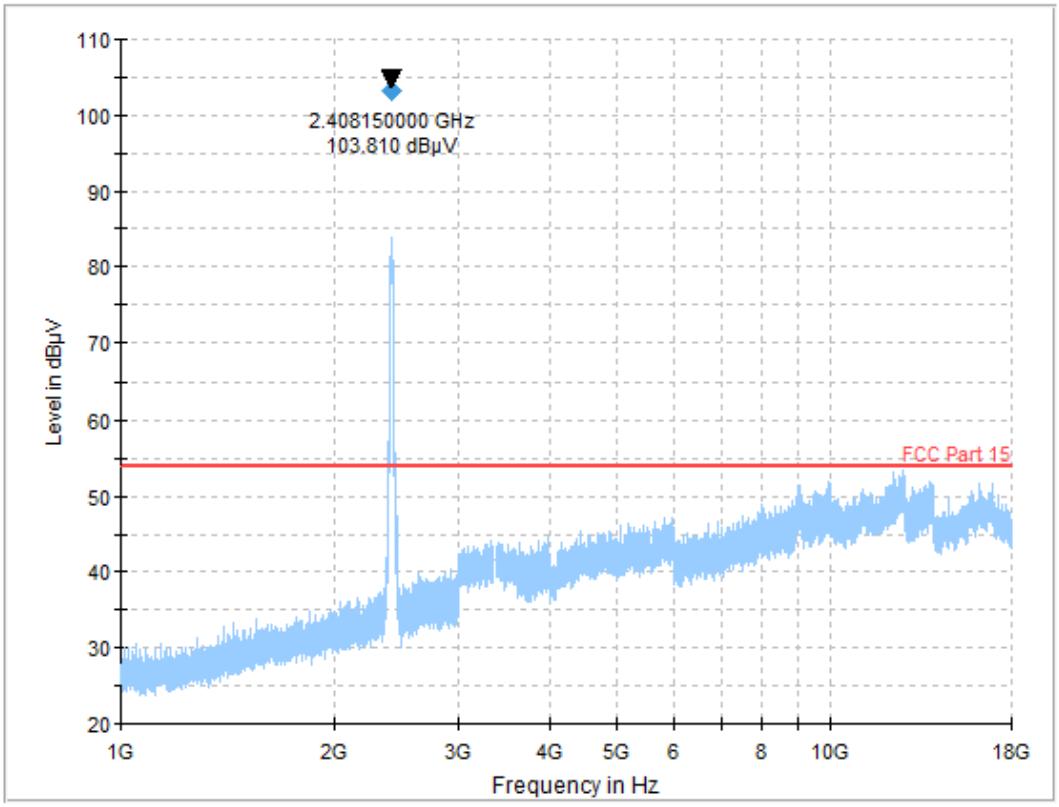
Results: Peak Method / Top Channel / 802.11n / 20 MHz / MCS0 /PWL 12 dBm

Frequency (MHz)	Antenna Polarization	Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)	Result
No critical spurious was found					

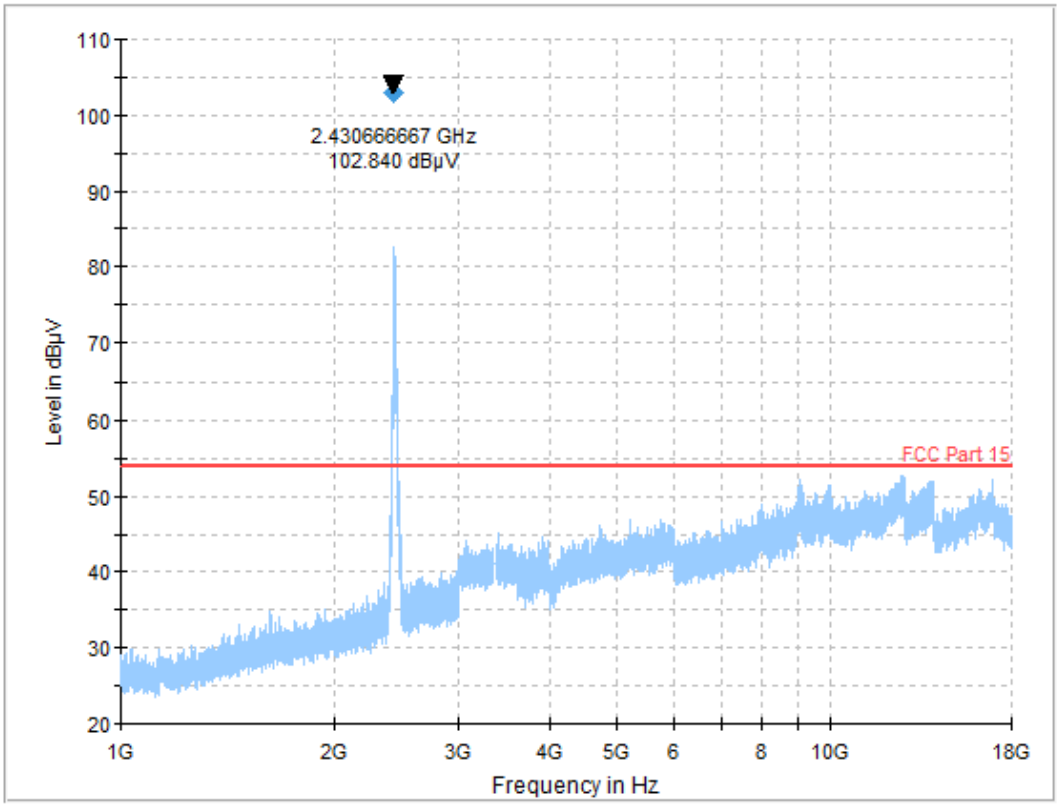
Result: Pass

Transmitter Radiated Emissions (continued)

Plot: 1 GHz – 18 GHz: Bottom Channel / 802.11n / 20 MHz / MCS0 /PWL 12 dBm

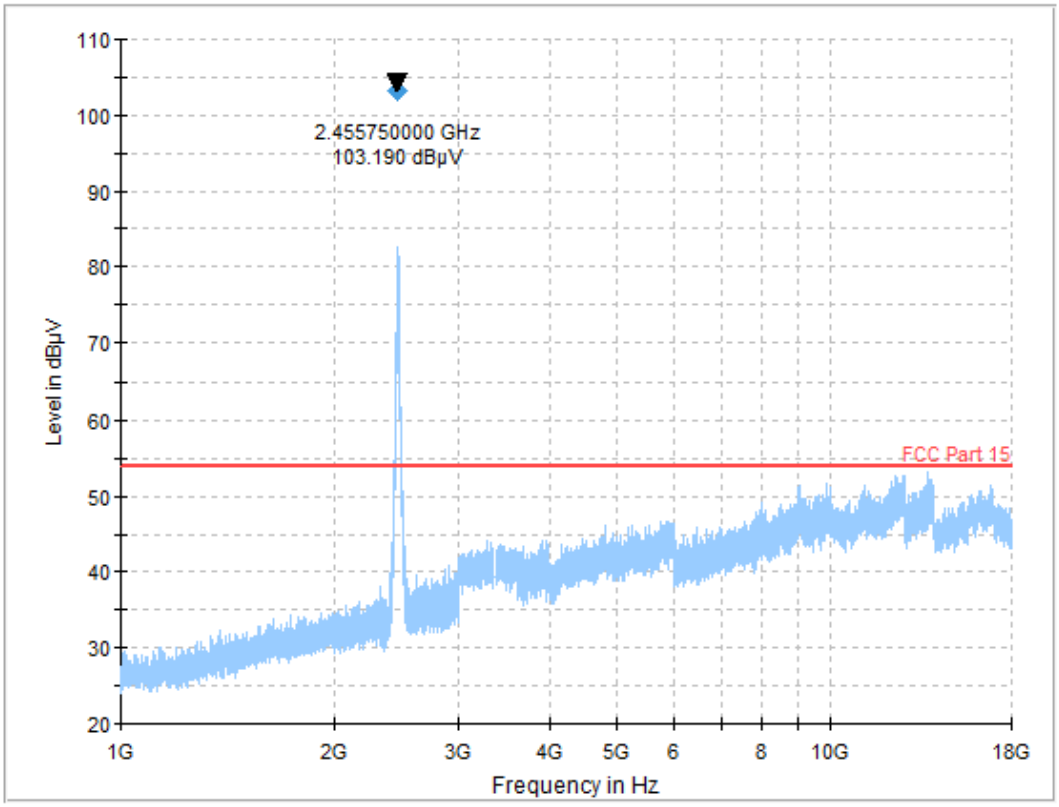


Plot: 1 GHz – 18 GHz: Middle Channel / 802.11n / 20 MHz / MCS0 /PWL 12 dBm



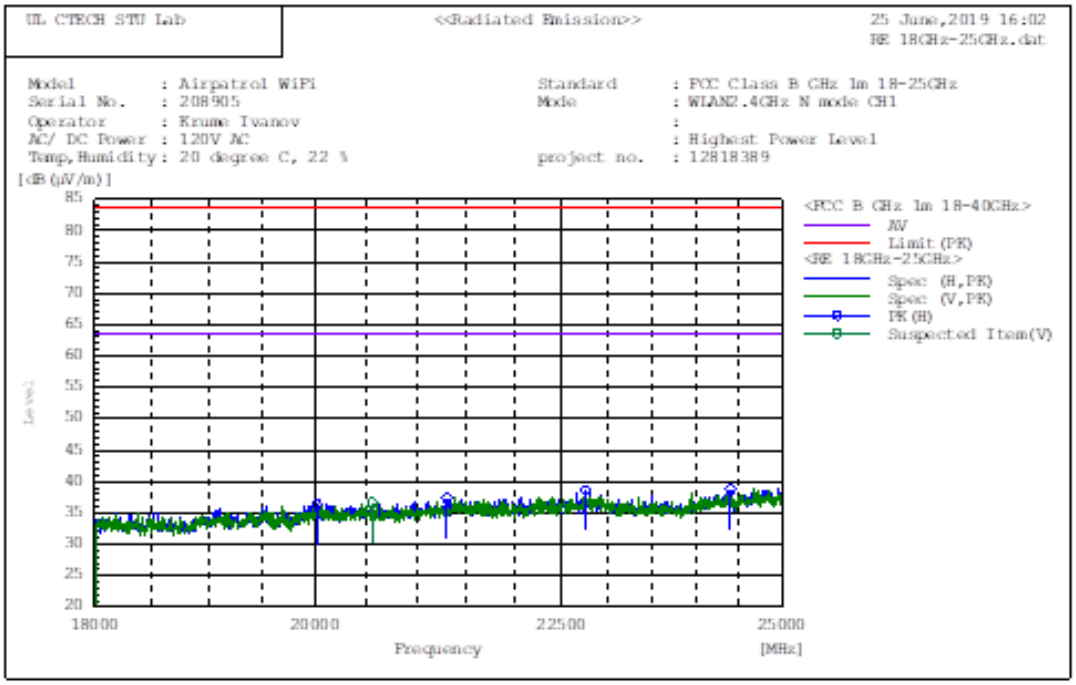
Transmitter Radiated Emissions (continued)

Plot: 1 GHz – 18 GHz: Top Channel / 802.11n / 20 MHz / MCS0 /PWL 12 dBm



Transmitter Radiated Emissions (continued)

Plot: 18 GHz – 25 GHz: Middle Channel / 802.11b / 20 MHz / 5.5 Mbps / PWL 17 dBm



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

5.2.3. Transmitter Band Edge Radiated Emissions

Test Summary:

Test Engineer:	Krume Ivanov	**Test Date:**	23 May 2019
Test Sample Serial Number:	208905		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 Sections 8.7 referring ANSI C63.10:2013 Section 6.10.4, 6.10.5 & Section 11.11, 11.2 ,11.13

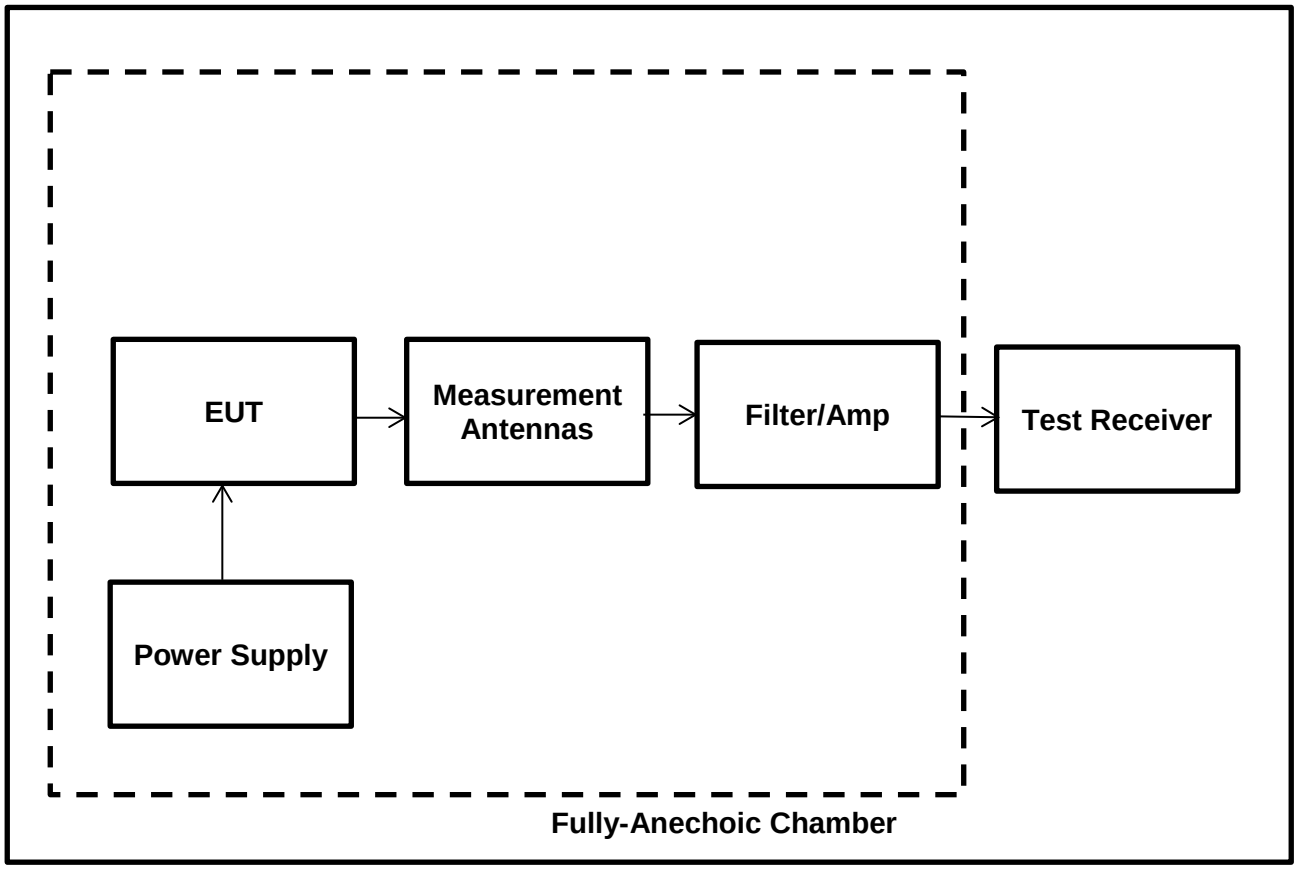
Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	37

Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. Assuming the maximum average conducted output power was previously measured. In accordance with FCC KDB 558074 Section 8.7 lower band edge measurement was performed with a peak detector and the -30 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. 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 10 Hz. 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 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.
5. 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. Peak and average measurements were performed with their respective detectors. Markers were placed on the highest point on each trace.
6. *In accordance with FCC KDB 558074 Sections 8.7.3 referring ANSI C63.10-2013 Section 11.13.3 Integration method was used for upper band edge measurement.
   - Top Channel / 802.11g / 20 MHz / 36 Mbps / PWL 13 dBm
   - Top Channel / 802.11n / 20 MHz / SISO / MCS0 / PWL 12 dBm

Test Setup:


EUT
Measurement Antennas
Filter/Amp
Test Receiver
Power Supply
Fully-Anechoic Chamber

Transmitter Band Edge Radiated Emissions (Continued)

Results: 802.11b / 20 MHz / SISO / 5.5 Mbps / PWL 17 dBm

Results: Lower Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	-30 dBc Limit (dBµV/m)	Margin (dB)	Result
2397.47	48.68	62.97	14.29	Complied
2400.00	44.07	62.97	18.90	Complied

Results: Lower Band Edge / Restricted Band / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2331.79	51.53	74.0	22.47	Complied

Results: Lower Band Edge / Restricted Band / Average

Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2331.92	47.18	54.0	6.82	Complied

Results: Upper Band Edge / Restricted Band / Peak

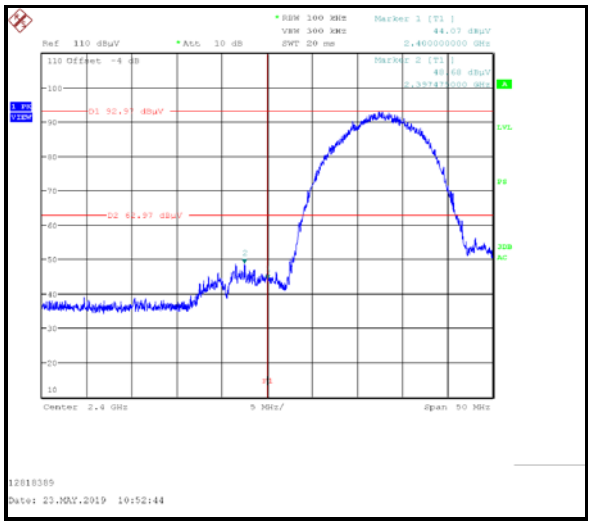
Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2483.50	48.25	74.0	25.75	Complied
2484.46	50.06	74.0	23.94	Complied

Results: Upper Band Edge / Restricted Band / Average

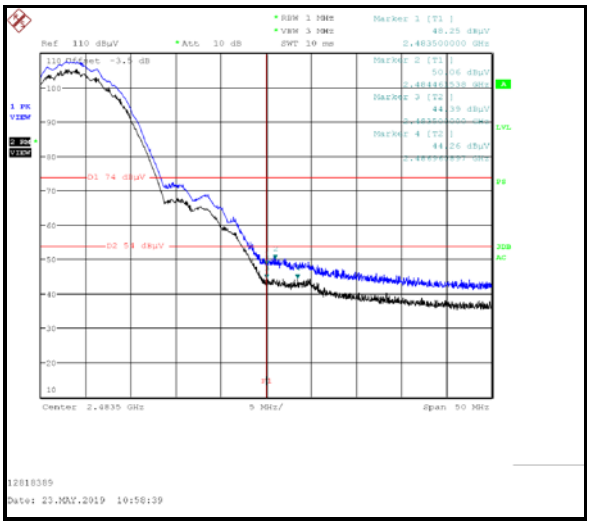
Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2483.50	44.39	54.0	9.61	Complied
2484.46	44.26	54.0	9.74	Complied

Transmitter Band Edge Radiated Emissions (Continued)

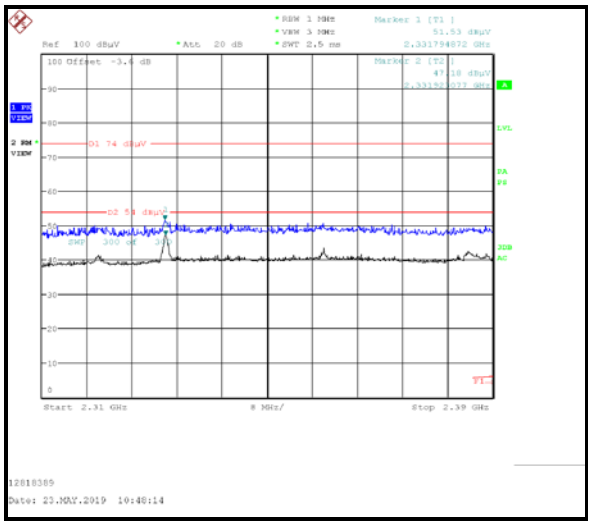
Results: 802.11b / 20 MHz / SISO / 5.5 Mbps / PWL 17 dBm



Lower Band Edge Peak Measurement



Upper Band Edge Peak and Average Measurement



2310 MHz to 2390 MHz Restricted Band Plot

Transmitter Band Edge Radiated Emissions (Continued)

Results: 802.11g / 20 MHz / SISO / 36 Mbps / PWL 13 dBm

Results: Lower Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	-30 dBc Limit (dBµV/m)	Margin (dB)	Result
2400.00	53.20	63.49	10.29	Complied
2399.47	55.30	63.49	8.19	Complied

Results: Lower Band Edge / Restricted Band / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2389.74	64.13	74.0	9.87	Complied

Results: Lower Band Edge / Restricted Band / Average

Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2387.17	50.58	54.0	3.42	Complied

Results: Upper Band Edge / Restricted Band / Peak

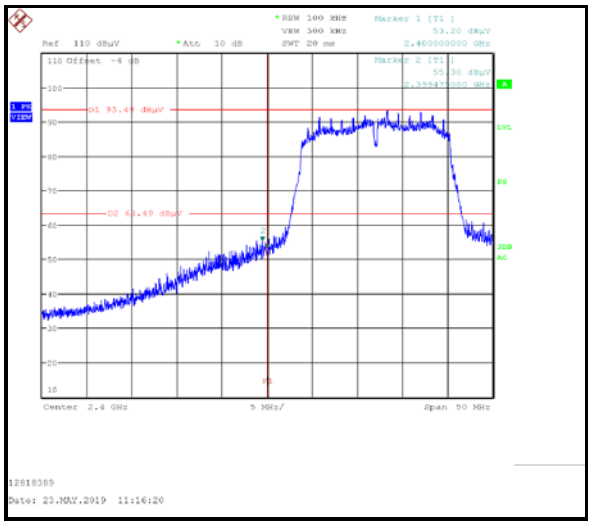
Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2483.50	71.95	74.0	2.05	Complied
2483.58	71.95	74.0	2.05	Complied

Results: Upper Band Edge / Restricted Band / Average

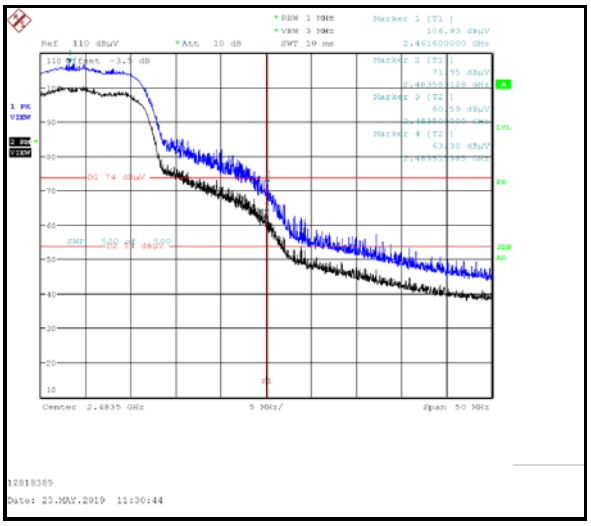
Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2484.00	53.48*	54.0	0.52	Complied

Transmitter Band Edge Radiated Emissions (Continued)

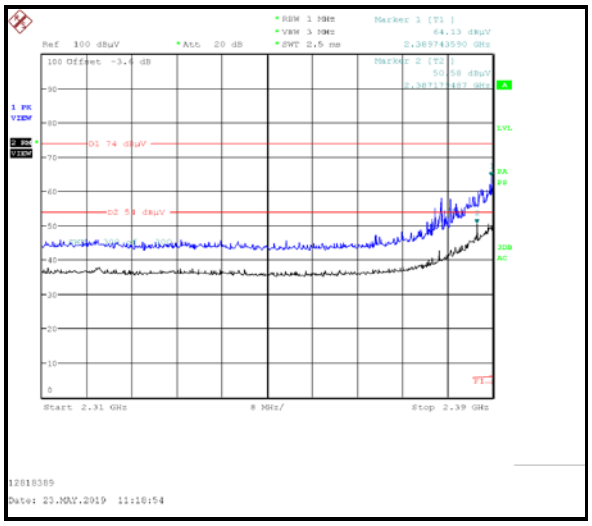
Results: Peak / 802.11g / 20 MHz / SISO / 36 Mbps / PWL 13 dBm



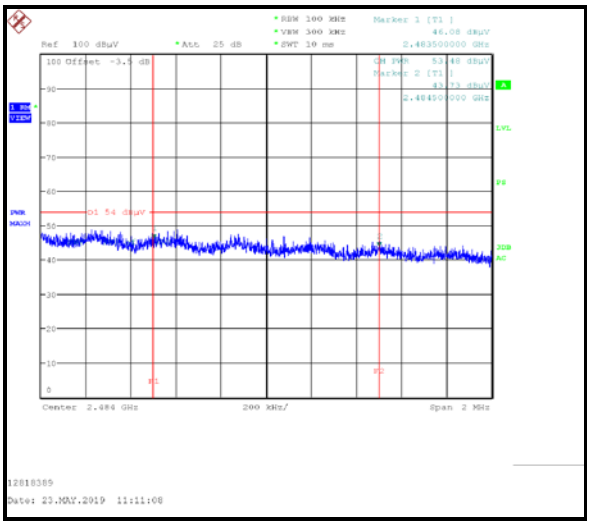
Lower Band Edge Peak Measurement



Upper Band Edge Peak and Average Measurement



2310 MHz to 2390 MHz Restricted Band Plot



Upper Band Edge Average Measurement Integration Method

Transmitter Band Edge Radiated Emissions (Continued)

Results: 802.11n / 20 MHz / SISO / MCS0 / PWL 12 dBm

Results: Lower Band Edge / Peak

Frequency (MHz)	Peak Level (dBµV/m)	-30 dBc Limit (dBµV/m)	Margin (dB)	Result
2400.00	51.00	62.23	11.23	Complied
2399.31	51.13	62.23	11.10	Complied

Results: Lower Band Edge / Restricted Band / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2390.00	54.86	74.0	19.14	Complied

Results: Lower Band Edge / Restricted Band / Average

Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2389.87	44.05	54.0	9.95	Complied

Results: Upper Band Edge / Restricted Band / Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2483.50	62.94	74.0	11.06	Complied
2485.16	63.56	74.0	10.44	Complied

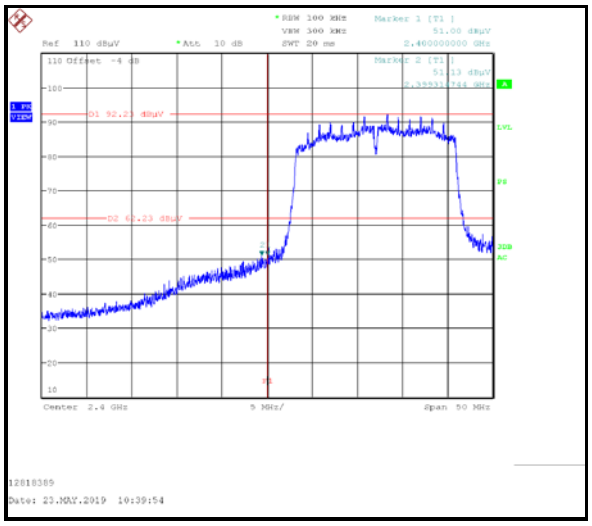
Results: Upper Band Edge / Restricted Band / Average

Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2484.00	46.61*	54.0	7.39	Complied

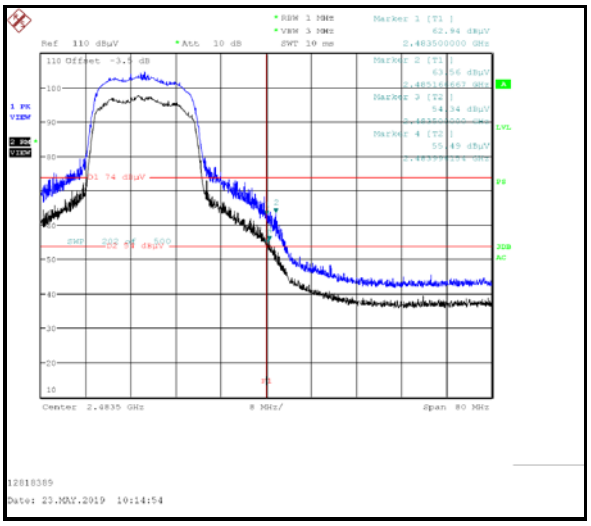
Result: Pass

Transmitter Band Edge Radiated Emissions (Continued)

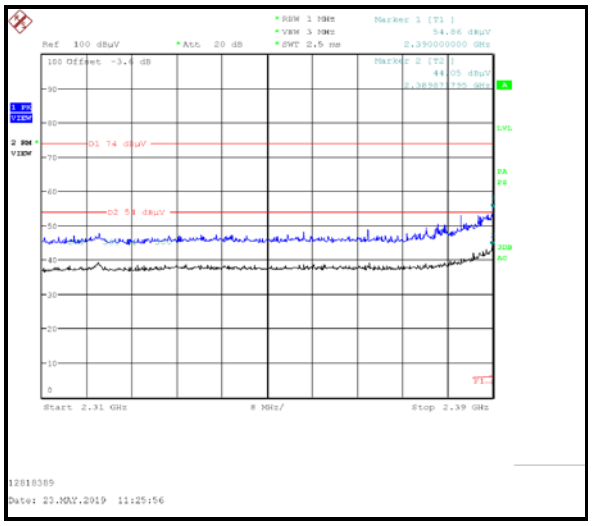
Results: 802.11n / 20 MHz / SISO / MCS0 / PWL 12 dBm



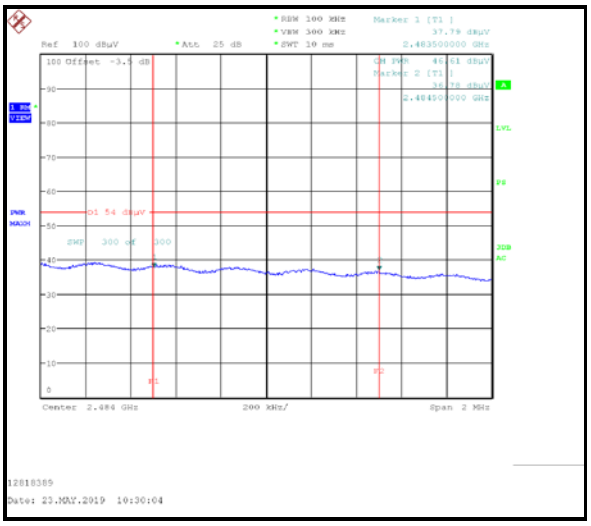
Lower Band Edge Peak Measurement



Upper Band Edge Peak and Average Measurement



2310 MHz to 2390 MHz Restricted Band Plot



Upper Band Edge Average Measurement Integration Method

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
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 No.	Calibration Date	Cal. Cycle
377	BONN Elektronik	Amplifier, Low Noise Pre	BLMA 0118-1A	025294B	7/12/2018	12
383	Rohde & Schwarz	Antenna, Rod	HFH2-Z1	890151/11	7/14/2017	24
423	Bonn Elektronik	Amplifier, Low Noise Pre	BLMA 1840-1A	055929	7/12/2018	12
460	Deisl	Turntable	DT 4250 S		n/a	n/a
465	Schwarzbeck	Antenna, Trilog Broadband	VULB 9168	9168-240	8/8/2016	36
495	Rohde & Schwarz	Antenna, Log.- Periodical	HL050	100296	7/20/2016	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	7/12/2018	12
607	Schwarzbeck	Antenna, Horn	BBHA 9170	BBHA9170561	07/01/2016	36
608	Rohde & Schwarz	Switch Matrix	OSP 120	101227	4/8/2014	60
615	Wainwright Instruments	Highpass Filter 1GHz	WHKX12-	3	Lab verification	n/a
620	Bonn Elektronik	pre-amplifier	BLNA 0110-01N	1510111	7/12/2017	24
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

Test site: SR 7/8

ID	Manufacturer	Type	Model	Serial No.	Calibration Date	Cal. Cycle
22	Rohde & Schwarz	Artificial Mains	50 Ohm// 50uH	831767/014	7/11/2018	12
215	Rohde & Schwarz	Artificial Mains Network	9 kHz - 30 MHz; 3 phase	879675/002	7/11/2018	12
349	Rohde & Schwarz	Receiver, EMI Test	20 Hz - 7 GHz	836697/009	7/10/2018	12
616	Rohde & Schwarz	ISN	8 wire ISN for CAT6	101656	7/12/2018	12

8. Report Revision History

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

--- END OF REPORT ---