



# TEST REPORT

**Test Report No. :** UL-RPT-RP13170021-216A V3.0

**Customer** : Winnow Solutions Ltd  
**Model No.** : Winnow Vision 3.0  
**FCC ID** : 2AUM4WV03  
**Technology** : WLAN  
**Test Standard(s)** : FCC Parts 15.35(c), 15.209(a) & 15.407(b)

**Test Laboratory** : UL International (UK) Ltd, Basingstoke, Hampshire, RG24 8AH, United Kingdom

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3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 3.0 supersedes all previous versions.

**Date of Issue:** 05 July 2021

**Checked by:**

Ben Mercer  
Lead Project Engineer, Radio Laboratory

**Company Signatory:**

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RF Operations Leader, Radio Laboratory



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**Customer Information**

<b>Company Name:</b>	Winnow Solutions Ltd
<b>Address:</b>	41 Pitfield Street, London, N1 6DA, UK

**Report Revision History**

<b>Version Number</b>	<b>Issue Date</b>	<b>Revision Details</b>	<b>Revised By</b>
1.0	01/04/2020	Initial Version	Ben Mercer
2.0	06/05/2020	Removed ISED references at TCB request	Ben Mercer
3.0	05/07/2021	Added MIMO results at TCB request	Sarah Williams

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## 1 Attestation of Test Results





### 1.1 Description of EUT

The equipment under test was a 2.4 GHz and 5.15 to 5.35 GHz WLAN module.

### 1.2 General Information

<b>Specification Reference:</b>	47CFR15.407
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart E (Unlicensed National Information Infrastructure Devices) – Section 15.407
<b>Specification Reference:</b>	47CFR15.209
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.209
<b>Site Registration:</b>	685609
<b>FCC Lab. Designation No.:</b>	UK2011
<b>Location of Testing:</b>	Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
<b>Test Dates:</b>	20 January 2020 to 28 April 2021

### 1.3 Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.35(c)	Transmitter Duty Cycle	Note 1
Part 15.407(b) / 15.209(a)	Transmitter Out of Band Radiated Emissions	
Part 15.407(b) / 15.209(a)	Transmitter Band Edge Radiated Emissions	
<b>Key to Results</b>		
 = Complied  = Did not comply		

#### Note(s):

- The measurement was performed to assist in the calculation of the level of emissions as the EUT employs pulsed operation.

### 1.4 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 specifications identified above.

## **2 Summary of Testing**

### **2.1 Facilities and Accreditation**

The test site and measurement facilities used to collect data are located at Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom. The following table identifies which facilities were utilised for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

Site 1	X
Site 2	
Site 17	X

UL International (UK) Ltd is accredited by the United Kingdom Accreditation Service (UKAS). UKAS is one of the signatories to the International Laboratory Accreditation Co-operation (ILAC) Arrangement for the mutual recognition of test reports. The tests reported herein have been performed in accordance with its terms of accreditation.

### **2.2 Methods and Procedures**

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

## **2.3 Calibration and Uncertainty**

### **Measuring Instrument Calibration**

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

### **Measurement Uncertainty & Decision Rule**

#### **Overview**

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

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

#### **Decision Rule**

The decision rule applied is based upon the accuracy method criteria. The measurement uncertainty is met and the result is considered in conformance with the requirement criteria if the observed value is within the prescribed limit.

#### **Measurement Uncertainty**

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".

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
Duty Cycle	5.15 GHz to 5.35 GHz	95%	±1.14 %
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±3.30 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	±2.94 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.

## 2.4 Test and Measurement Equipment

### Test Equipment Used for Duty Cycle / Transmitter Band Edge Radiated Emissions

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	21 Oct 2021	12
M2003	Thermohygrometer	Testo	608-H1	45046641	10 Dec 2021	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	07 Dec 2021	12
A2863	Pre-Amplifier	Agilent	8449B	3008A02100	21 Oct 2021	12
A2889	Antenna	Schwarzbeck	BBHA 9120 B	BBHA 9120 B 653	23 Oct 2021	12
A2916	Attenuator	AtlanTecRF	AN18W5-10	832827#1	01 Feb 2022	12
K0001	3m RSE Chamber	Rainford EMC	N/A	N/A	16 Oct 2020	12
M2040	Thermohygrometer	Testo	608-H1	45124934	07 Jan 2021	12
M2044	Test Receiver	Rohde & Schwarz	ESU26	100122	01 Apr 2020	12
A3179	Pre-Amplifier	Agilent	8449B	3008A00934	09 Oct 2020	12
A3138	Antenna	Schwarzbeck	BBHA 9120 B	00702	04 Oct 2020	12
A2523	Attenuator	AtlanTecRF	AN18W5-10	832827#1	04 Mar 2020	12

### Test Equipment Used for Transmitter Radiated Emissions

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	01 Aug 2020	12
M2003	Thermohygrometer	Testo	608-H1	45046641	07 Jan 2021	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	20 Jan 2021	12
A3167	Pre-Amplifier	Com-Power	PAM-103	18020010	08 Aug 2020	12
A2863	Pre-Amplifier	Agilent	8449B	3008A02100	08 Aug 2020	12
A3142	Pre-Amplifier	Schwarzbeck	BBV 9718 B	00020	08 Aug 2020	12
A2893	Pre-Amplifier	Schwarzbeck	BBV 9721	9721-021	31 July 2020	12
A3161	Antenna	Teseq	CBL6111D	50859	07 Jan 2021	12
A2889	Antenna	Schwarzbeck	BBHA 9120 B	BBHA 9120 B 653	08 Aug 2020	12
A2890	Antenna	Schwarzbeck	HWRD 750	014	08 Aug 2020	12
A2892	Antenna	Schwarzbeck	BBHA 9170	9170-727	01 Aug 2020	12
A2916	Attenuator	AtlanTecRF	AN18W5-10	832827#1	06 Feb 2021	12
A2131	Low Pass Filter	AtlanTecRF	AFL-02000	JFB1004-002	07 Nov 2020	12
A3014	High Pass Filter	AtlanTecRF	AFH-06000	17042400007	05 Feb 2021	12

Note: All test equipment was within it's calibration period at the time of test.

### **3 Equipment Under Test (EUT)**

#### **3.1 Identification of Equipment Under Test (EUT)**

<b>Brand Name:</b>	Winnow Vision Gen3
<b>Model Name:</b>	Winnow Vision 3.0
<b>Test Sample Serial Number:</b>	1424819028087
<b>Hardware Version:</b>	WV03-01
<b>Software Version:</b>	0.6.5
<b>FCC ID:</b>	2AUM4WV03

#### **3.2 Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

#### **3.3 Additional Information Related to Testing**

<b>Technology Tested:</b>	WLAN (IEEE 802.11a,n,ac) / U-NII	
<b>Type of Unit:</b>	Transceiver	
<b>Modulation:</b>	BPSK, QPSK, 16QAM, 64QAM & 256QAM	
<b>Data rates:</b>	802.11a	6, 9, 12, 18, 24, 36, 48 & 54 Mbps (SISO)
	802.11n HT20	MCS0 to MCS7 (1 spatial stream), with or without CDD MCS8 to MCS15 (2 spatial streams)
	802.11n HT40	MCS0 to MCS7 (1 spatial stream), with or without CDD MCS8 to MCS15 (2 spatial streams)
	802.11ac VHT20	MCS0 to MCS8 (1 or 2 spatial streams) (SISO, or MIMO with CDD)
	802.11ac VHT40	MCS0 to MCS9 (1 or 2 spatial streams) (SISO, or MIMO with CDD)
	802.11ac VHT80	MCS0 to MCS9 (1 or 2 spatial streams) (SISO, or MIMO with CDD)
<b>Power Supply Requirement(s):</b>	Nominal	120 VAC 60 Hz



**Additional Information Related to Testing (continued)**

<b>Channel Spacing:</b>	20 MHz		
<b>Transmit Frequency Band:</b>	5150 MHz to 5250 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	36	5180
	Middle	40	5200
	Top	48	5240
<b>Transmit Frequency Band:</b>	5250 MHz to 5350 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	52	5260
	Middle	56	5280
	Top	64	5320
<b>Channel Spacing:</b>	40 MHz		
<b>Transmit Frequency Band:</b>	5150 MHz to 5250 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	38	5190
	Top	46	5230
<b>Transmit Frequency Band:</b>	5250 MHz to 5350 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	54	5270
	Top	62	5310
<b>Channel Spacing:</b>	80 MHz		
<b>Transmit Frequency Band:</b>	5150 MHz to 5250 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Single	42	5210
<b>Transmit Frequency Band:</b>	5250 MHz to 5350 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Single	58	5290

### **3.4 Description of Available Antennas**

The radio utilizes an external antenna with the following maximum gains:

<b>Manufacturer</b>	<b>Model Number</b>	<b>Type</b>	<b>Frequency Range (MHz)</b>	<b>Antenna Gain (dBi)</b>
Siretta	Tango 23	Omni	5150 to 5250	5.0
Siretta	Tango 23	Omni	5250 to 5350	5.0

### **3.5 Description of Test Setup**

#### **Support Equipment**

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

<b>Description:</b>	Dual Band Wireless Router
<b>Brand Name:</b>	ASUS
<b>Model Name or Number:</b>	RT-AX88U
<b>Serial Number:</b>	JBIUHP000173 (UL Asset No. A3202)

<b>Description:</b>	Laptop PC
<b>Brand Name:</b>	Lenovo
<b>Model Name or Number:</b>	ThinkPad L480
<b>Serial Number:</b>	PF1EHZQ0 (UL Asset No. RPT002)

<b>Description:</b>	Ethernet Cable. Quantity 1. Length 2 m.
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	Ethernet Cable. Quantity 1. Length 3 m.
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	USB 2.0 Hub
<b>Brand Name:</b>	Hama
<b>Model Name or Number:</b>	00078498
<b>Serial Number:</b>	21825891500

<b>Description:</b>	3 Port HDMI Switch
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	Ethernet Router
<b>Brand Name:</b>	Netgear
<b>Model Name or Number:</b>	DG834G v3
<b>Serial Number:</b>	1JX167B008C4A

**Support Equipment (continued)**

<b>Description:</b>	USB Cable. Quantity 1. Length 3 m.
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	HDMI Cable. Quantity 1. Length 3 m.
<b>Brand Name:</b>	Maplin
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

**Operating Modes**

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

- Continuously transmitting with a modulated carrier at maximum power on the bottom, middle and top channels as required using the supported data rates/modulation types.

**Configuration and Peripherals**

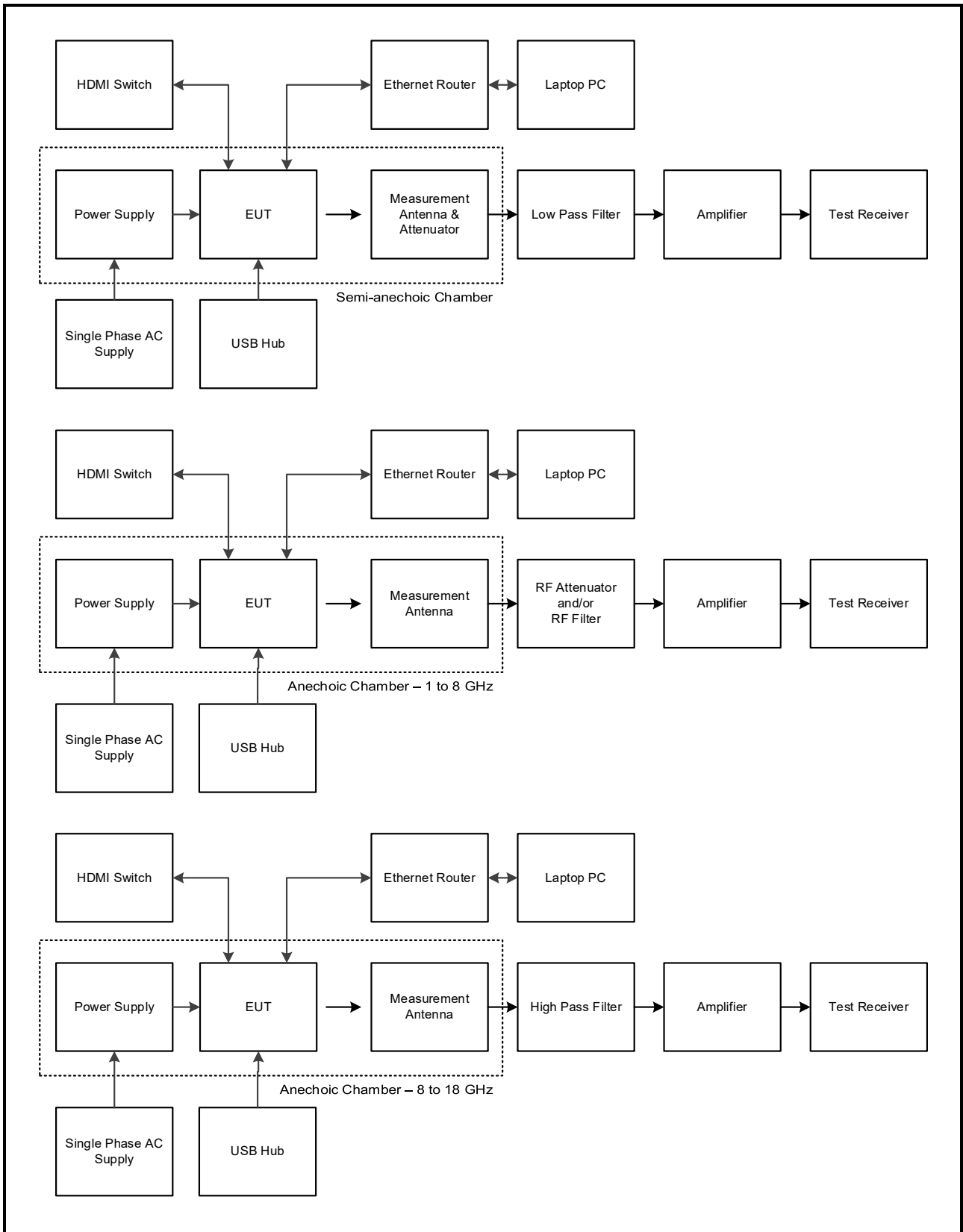
The EUT was tested in the following configuration(s):

- The EUT was connected to a laptop PC via a DHCP router which were both placed in the ante-chamber. A terminal application running on the laptop PC was used to enable continuous transmission and select the test channel, data rate and modulation schemes as required. The customer supplied a document containing the setup instructions 'NEW Intructions\_Winnow-tx2-connection-instructions\_29-10-19 & WLAN\_Android\_TX\_Commands.pdf'
- The EUT was powered from a 120 VAC 60 Hz single phase mains supply.
- The customer declared the following worst case modes to be tested:
  - 802.11a - BPSK / 6 Mbps
  - 802.11n HT20 SISO - BPSK / MCS0
  - 802.11n HT40 SISO - BPSK / MCS0
  - 802.11ac VHT80 SISO - BPSK / MCS0x1
  - 802.11n HT20 MIMO - BPSK / MCS0
  - 802.11n HT40 MIMO - BPSK / MCS0
  - 802.11ac VHT80 MIMO - BPSK / MCS0x1
- Testing was performed using the power settings defined in the supplied document 'Jetson\_TX2\_WWSafe\_Power\_Q\_Table.pdf'.
- Transmitter spurious emissions were performed with the EUT transmitting with a data rate of 6 Mbps (802.11a). This was found to be the worst case mode with regards to emissions after preliminary investigations and, as this mode emits the highest transmit output & spectral density power level, it was deemed to be the worst case.
- Transmitter radiated spurious emissions tests were performed with the EUT position in its worst case orientation with respect to emissions. All active ports were terminated.

**Test Setup Diagrams**

**Radiated Tests:**

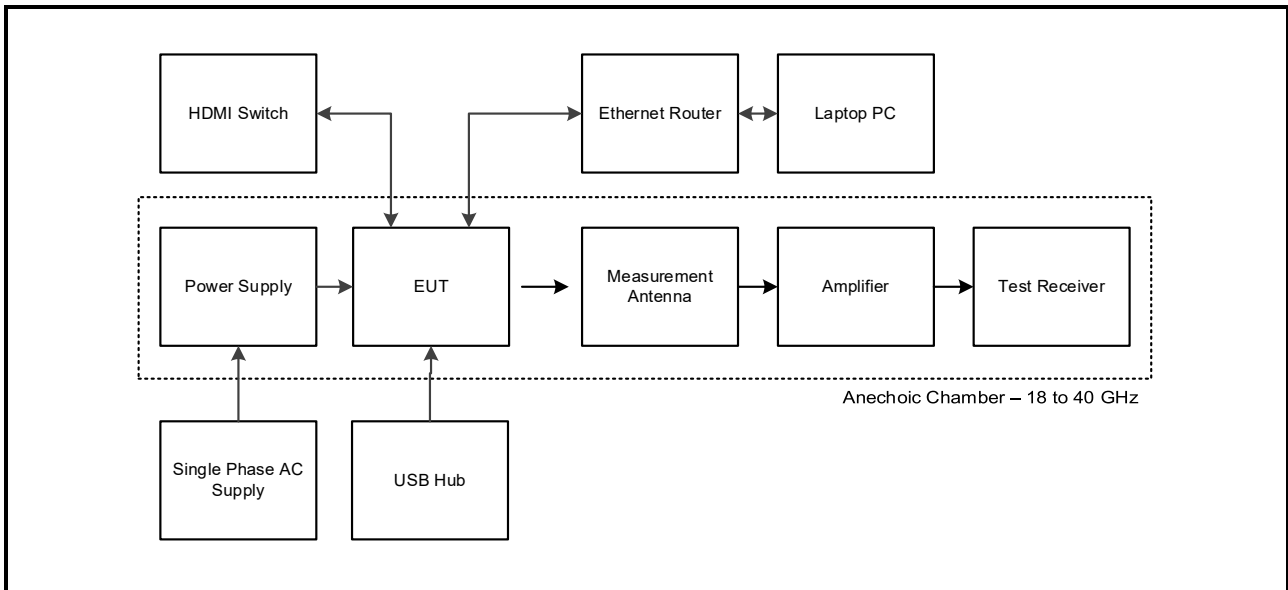
**Test Setup for Transmitter Radiated Tests**



**Test Setup Diagrams (continued)**

**Radiated Tests:**

**Test Setup for Transmitter Radiated Tests**



## 4 Radiated Test Results

### 4.1 Transmitter Duty Cycle

#### Test Summary:

<b>Test Engineer:</b>	Mohamed Toubella	<b>Test Dates:</b>	27 Febuary 2020 & 05 March 2020
<b>Test Sample Serial Number:</b>	1424819028087		

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

#### Environmental Conditions:

<b>Temperature (°C):</b>	20 to 22
<b>Relative Humidity (%):</b>	30 to 36

#### Note(s):

- In order to assist with the determination of the average level of 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:

$$10 \log 1 / (\text{On Time} / [\text{Period or } 100\text{ms whichever is the lesser}]).$$

$$802.11a / 6 \text{ Mbps duty cycle: } 10 \log (1 / (1.432 \text{ ms} / 1.535 \text{ ms})) = 0.3 \text{ dB}$$

$$802.11n \text{ HT20} / \text{MCS0 duty cycle: } 10 \log (1 / (1.326 \text{ ms} / 1.430 \text{ ms})) = 0.3 \text{ dB}$$

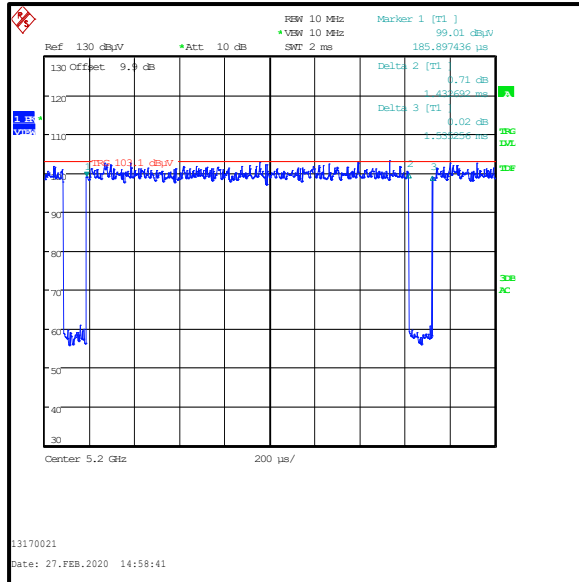
$$802.11n \text{ HT40} / \text{MCS0 duty cycle: } 10 \log (1 / (662.580 \mu\text{s} / 770.673 \mu\text{s})) = 0.7 \text{ dB}$$

$$802.11ac \text{ VHT80} / \text{MCS0x1 duty cycle: } 10 \log (1 / (191.506 \mu\text{s} / 294.071 \mu\text{s})) = 1.9 \text{ dB}$$

**Transmitter Duty Cycle (continued)**

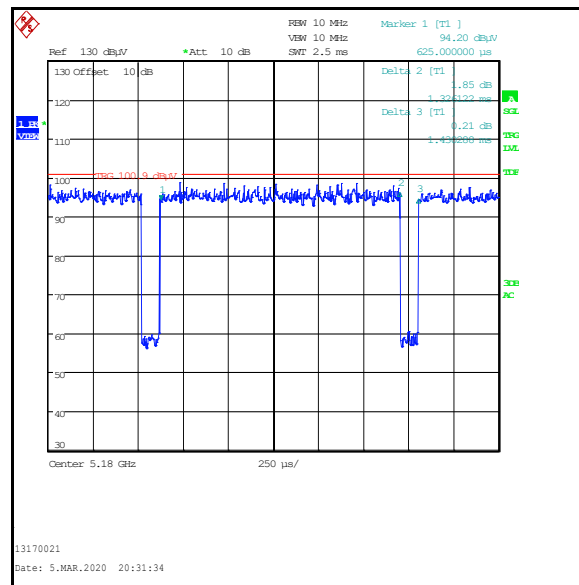
**Results: 802.11a - BPSK / 6 Mbps**

Pulse Duration (ms)	Period (ms)	Duty Cycle (dB)
1.432	1.535	0.3



**Results: 802.11n HT20 - BPSK / MCS0**

Pulse Duration (ms)	Period (ms)	Duty Cycle (dB)
1.326	1.430	0.3

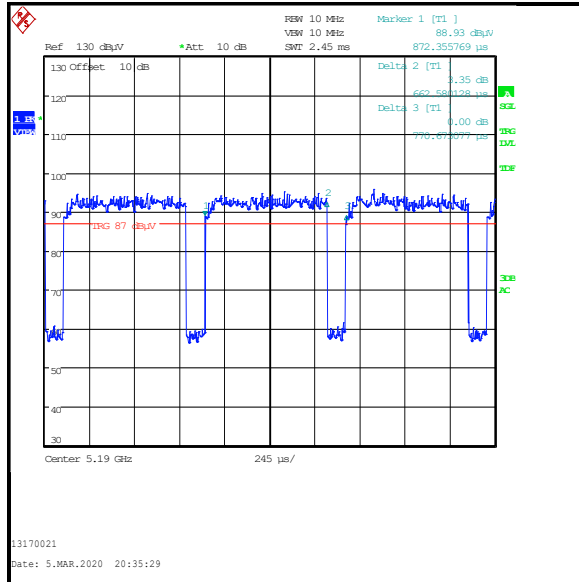




**Transmitter Duty Cycle (continued)**

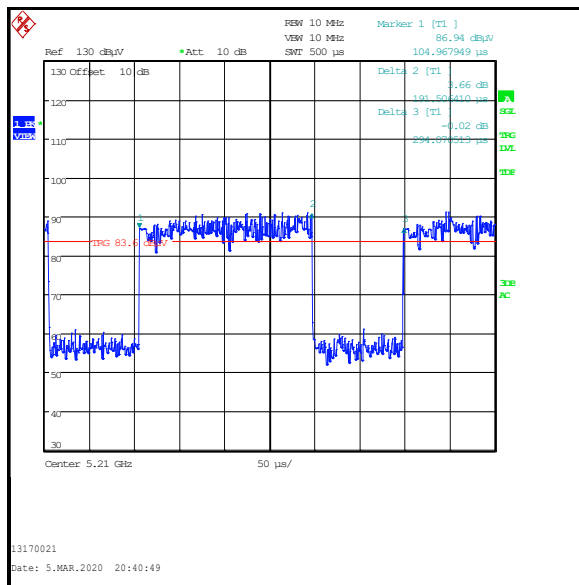
**Results: 802.11n HT40 - BPSK / MCS0**

Pulse Duration (µs)	Period (µs)	Duty Cycle (dB)
662.580	770.673	0.7



**Results: 802.11ac VHT80 - BPSK / MCS0x1**

Pulse Duration (µs)	Period (µs)	Duty Cycle (dB)
191.506	294.071	1.9



## **4.2 Transmitter Out of Band Radiated Emissions <1 GHz**

### **Test Summary:**

<b>Test Engineer:</b>	Mohamed Toubella	<b>Test Date:</b>	26 February 2020
<b>Test Sample Serial Number:</b>	1424819028087		

<b>FCC Reference:</b>	Parts 15.407(b)(2),(6),(7) & 15.209(a)
<b>Test Method Used:</b>	KDB 789033 II.G. & ANSI C63.10 Sections 6.3 and 6.5
<b>Frequency Range:</b>	30 MHz to 1000 MHz

### **Environmental Conditions:**

<b>Temperature (°C):</b>	20
<b>Relative Humidity (%):</b>	36

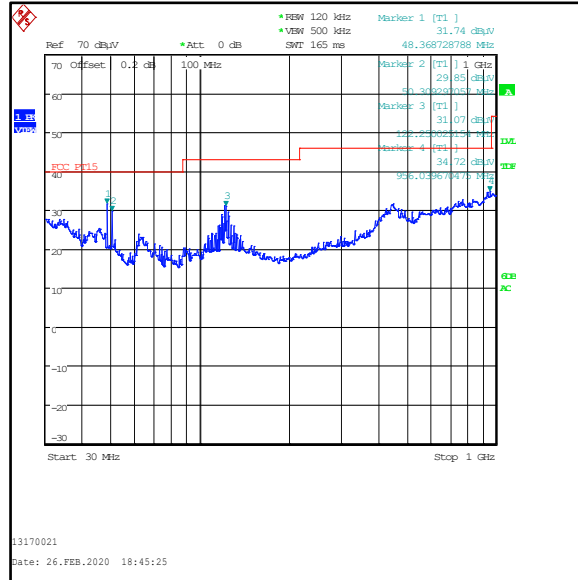
### **Note(s):**

1. The final measured value, for the given emission in the field strength result tables, incorporates the calibrated antenna factor and cable loss.
2. Pre-scans were performed with the EUT transmitting in the band 5.25 to 5.35 GHz band with a configuration of 802.11a / 6 Mbps on middle channel in this band as it produced the highest power spectral density and was therefore deemed worst case. An inquiry was made to the FCC and the response was pre-scans could be performed in the band with the highest power spectral density and all final measurements should be performed on any emissions seen in each band.
3. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the middle channel only.
4. All emissions shown on the pre-scan were investigated and found to be ambient, >20 dB below the applicable limit or below the measurement system noise floor. The highest noise floor reading has been recorded in the table below.
5. 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.
6. Pre-scans were performed and markers placed on the highest measured levels. The test receiver resolution bandwidth was set to 120 kHz and video bandwidth 500 kHz. The sweep time was set to auto. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.

**Transmitter Out of Band Radiated Emissions (5.25-5.35 GHz band operation) (continued)**

**Results: Quasi-Peak / Peak / Middle Channel / 802.11a / 6 Mbps**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
956.039	Horizontal	34.7	46.0	11.3	Complied



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

### **4.3 Transmitter Out of Band Radiated Emissions >1 GHz**

#### **4.3.1 5.15-5.25 GHz band**

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

##### **Test Summary:**

<b>Test Engineers:</b>	Tom Sleigh & Mohamed Toubella	<b>Test Dates:</b>	25 February 2020 & 26 February 2020
<b>Test Sample Serial Number:</b>	1424819028087		

<b>FCC Reference:</b>	Part 15.407(b)(1),(7) & 15.209(a)
<b>Test Method Used:</b>	KDB 789033 II.G. & ANSI C63.10 Sections 6.3 and 6.6
<b>Frequency Range:</b>	1 GHz to 40 GHz

##### **Environmental Conditions:**

<b>Temperature (°C):</b>	20 to 22
<b>Relative Humidity (%):</b>	30 to 36

##### **Note(s):**

1. FCC Part 15.407(b)(1) / RSS-247 6.2.1.2 states for transmitters operating in the band 5.15 to 5.25 GHz: all emissions outside of the 5.15 to 5.35 GHz band will not exceed -27 dBm/MHz. FCC Part 15.205 / RSS-Gen 8.10 states the limits for restricted bands of operation.
2. Pre-scans were performed with the EUT transmitting in the band 5.25 to 5.35 GHz band with a data rate of 802.11a / 6 Mbps on middle channel in this band as it produced the highest outpower and power spectral density and was therefore deemed worst case. An inquiry was made to the FCC and the response was pre-scans could be performed in the band with the highest power spectral density and all final measurements should be performed on any emissions seen in each band.
3. The final measured value, for the given emission in the field strength result tables, incorporates the calibrated antenna factor and cable loss.
4. All other emissions shown on the pre-scan plots were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
5. The emission shown at approximately 5200 MHz on the 1 GHz to 6 GHz plot is the EUT fundamental.
6. Appropriate RF filters and attenuators were used during pre-scans and final measurements. Insertion losses were entered on the spectrum analyser as RF levels offsets.
7. Measurements were performed across the two restricted bands closest to the bands of operation with the EUT transmitting on the bottom channel in the 5.15 to 5.25 GHz band and top channel in the 5.25 to 5.35 GHz band. Plots are included in this section of the test report. Peak and average measurements were made.
8. Measurements above 1 GHz were performed in a fully anechoic chamber (Asset Number K0017) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres 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.
9. 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. Peak and average measurements were performed with their respective detectors during the pre-scan measurements.

**Transmitter Out of Band Radiated Emissions (5.15-5.25 GHz band operation) (continued)****Results: Field Strength / Peak / Bottom Channel**

Frequency (MHz)	Antenna Polarity	Level (dBuV)	Limit (dBuV)	Margin (dB)	Result
15543.160	Horizontal	57.1	74.0	16.9	Complied

**Results: Field Strength / Average / Bottom Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
15540.460	Horizontal	42.6	54.0	11.4	Complied

**Results: Field Strength / Peak / Middle Channel**

Frequency (MHz)	Antenna Polarity	Level (dBuV)	Limit (dBuV)	Margin (dB)	Result
15591.262	Horizontal	57.6	74.0	16.4	Complied

**Results: Field Strength / Average / Middle Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
15590.000	Horizontal	41.2	54.0	12.8	Complied

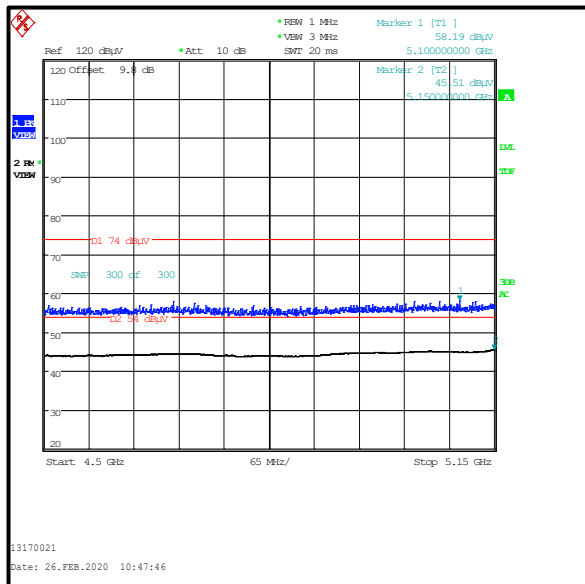
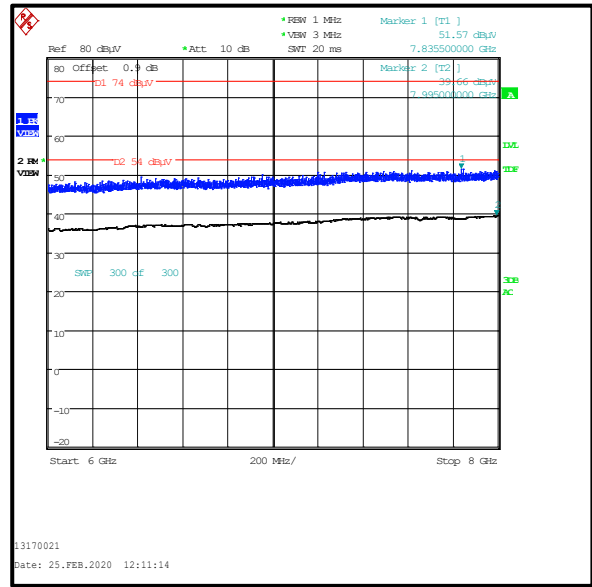
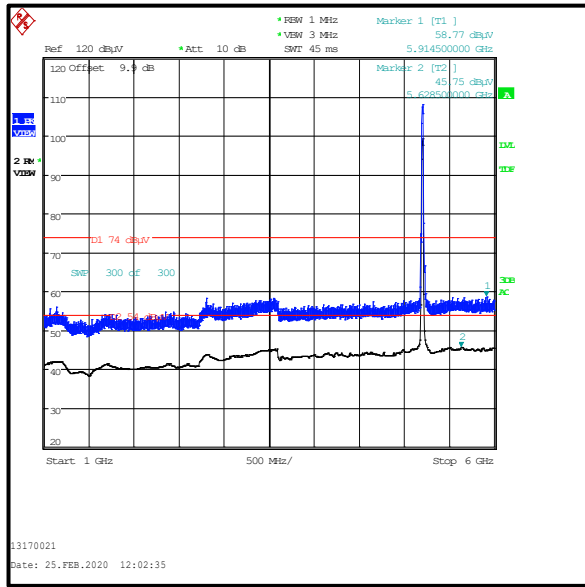
**Results: Field Strength / Peak / Top Channel**

Frequency (MHz)	Antenna Polarity	Level (dBuV)	Limit (dBuV)	Margin (dB)	Result
15723.140	Horizontal	58.7	74.0	15.3	Complied

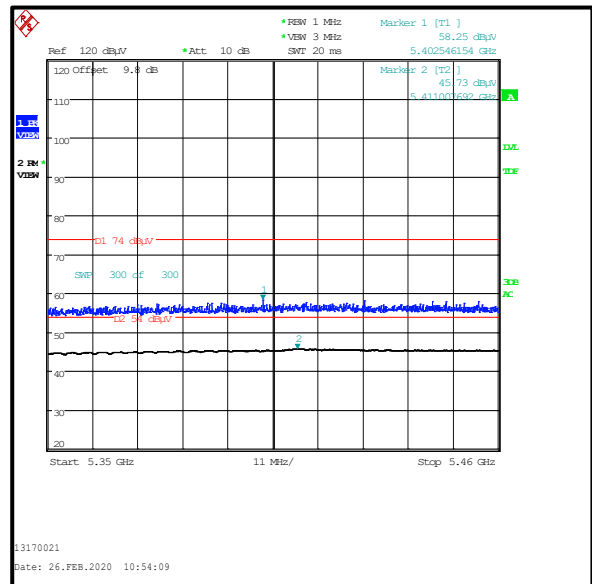
**Results: Field Strength / Average / Top Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
15717.840	Horizontal	43.7	54.0	10.3	Complied

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

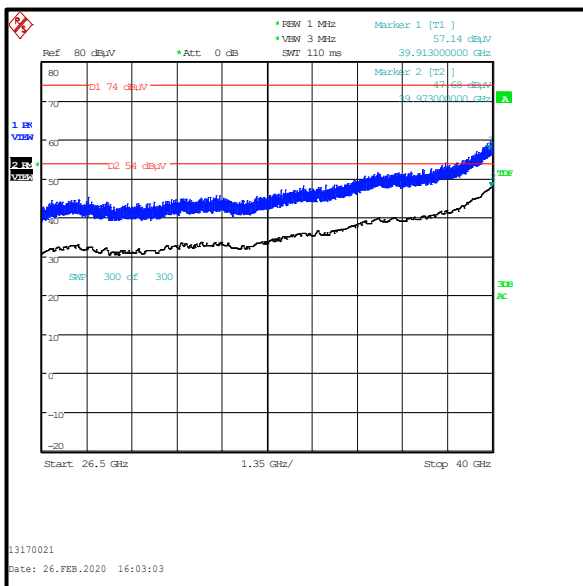
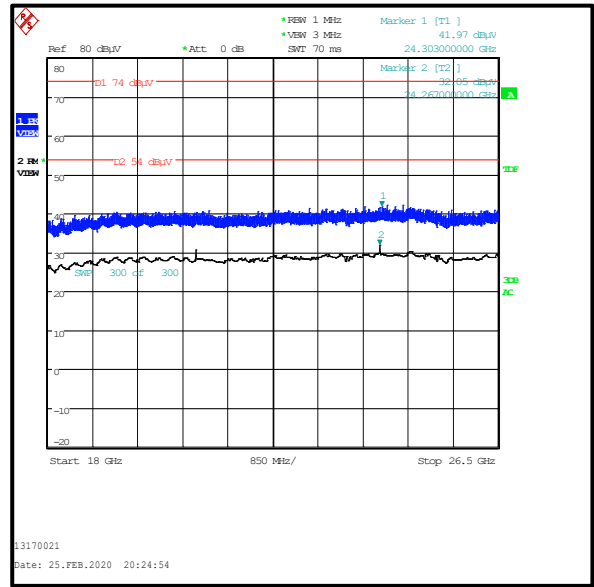
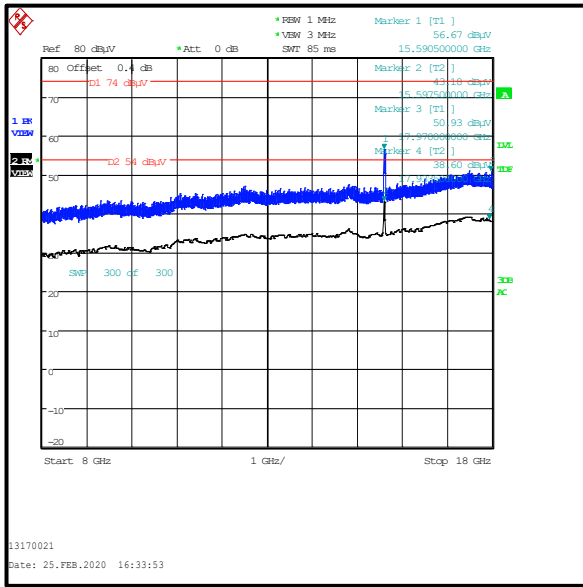


**Restricted Band 4.5 GHz to 5.15 GHz**



**Restricted Band 5.35 GHz to 5.46 GHz**

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



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

**4.3.2 5.25-5.35 GHz band****Transmitter Out of Band Radiated Emissions (5.25-5.35 GHz band operation)****Test Summary:**

<b>Test Engineers:</b>	Tom Sleigh & Mohamed Toubella	<b>Test Dates:</b>	25 Febuary 2020 & 26 Febuary 2020
<b>Test Sample Serial Number:</b>	1424819028087		

<b>FCC Reference:</b>	Part 15.407(b)(2),(7) & 15.209(a)
<b>Test Method Used:</b>	KDB 789033 II.G. & ANSI C63.10 Sections 6.3 and 6.6
<b>Frequency Range:</b>	1 GHz to 40 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	20 to 22
<b>Relative Humidity (%):</b>	30 to 36

**Note(s):**

1. FCC Part 15.407(b)(2) / RSS-247 6.2.2.2 states for transmitters operating in the band 5.25 to 5.35 GHz: all emissions outside of the 5.15-5.35 GHz band will not exceed -27 dBm/MHz. FCC Part 15.205 / RSS-Gen 8.10 states the limits for restricted bands of operation.
2. Pre-scans were performed with the EUT transmitting on the middle channel in this band. An inquiry was made to the FCC and the response was pre-scans could be performed in the band with the highest conducted output power (802.11a / 6 Mbps) and all final measurements should be performed on any emission seen for each band.
3. The final measured value, for the given emission in the field strength result tables, incorporates the calibrated antenna factor and cable loss.
4. All other emissions shown on the pre-scan plots were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
5. The emission shown at approximately 5280 MHz on the 1 GHz to 6 GHz plot is the EUT fundamental.
6. 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.
7. Measurements were performed across the two restricted bands closest to the bands of operation with the EUT transmitting on the bottom channel in the 5.15 to 5.25 GHz band and top channel in the 5.25 to 5.35 GHz band. Plots are included in this section of the test report. Peak and average measurements were made.
8. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0017) 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.
9. 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. Peak and average measurements were performed with their own appropriate detectors during the pre-scan measurements.



**Transmitter Out of Band Radiated Emissions (5.25-5.35 GHz band operation) (continued)****Results: Field Strength / Peak / Bottom Channel**

Frequency (MHz)	Antenna Polarity	Level (dBuV)	Limit (dBuV)	Margin (dB)	Result
15783.240	Horizontal	59.3	74.0	14.7	Complied

**Results: Field Strength / Average / Bottom Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
15775.880	Horizontal	44.4	54.0	9.6	Complied

**Results: Field Strength / Peak / Middle Channel**

Frequency (MHz)	Antenna Polarity	Level (dBuV)	Limit (dBuV)	Margin (dB)	Result
15840.475	Horizontal	56.4	74.0	17.6	Complied

**Results: Field Strength / Average / Middle Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
15842.600	Horizontal	44.6	54.0	9.4	Complied

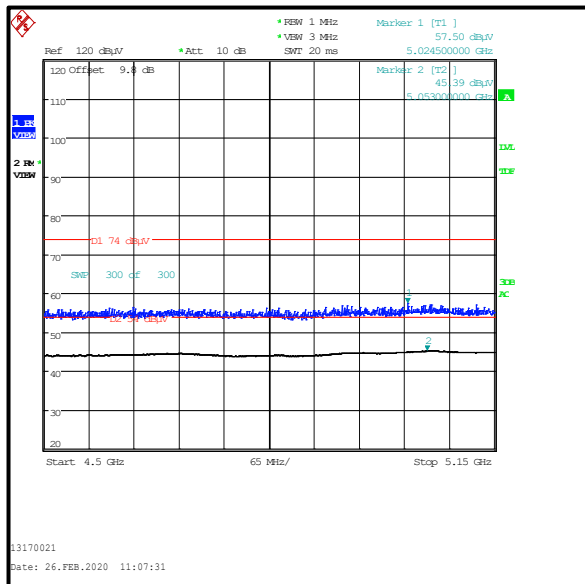
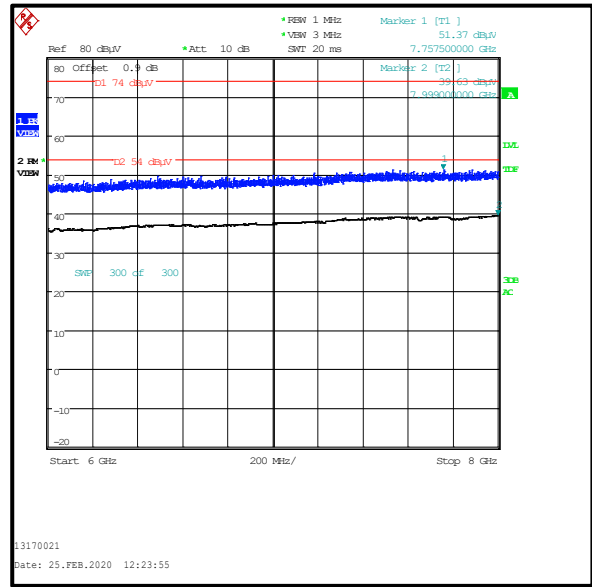
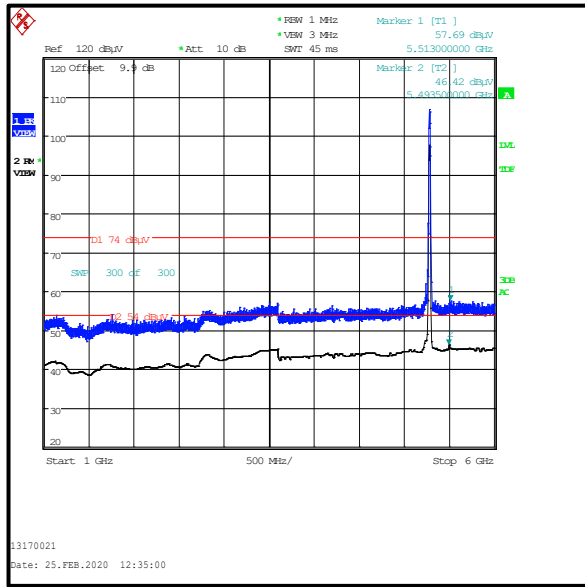
**Results: Field Strength / Peak / Top Channel**

Frequency (MHz)	Antenna Polarity	Level (dBuV)	Limit (dBuV)	Margin (dB)	Result
15962.880	Horizontal	57.1	74.0	16.9	Complied

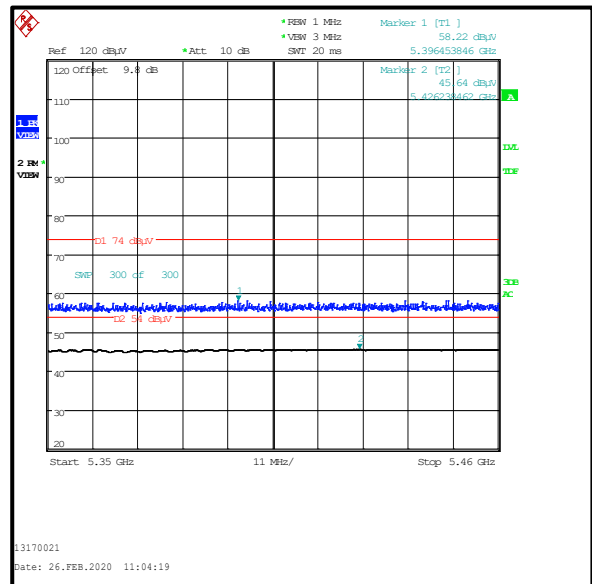
**Results: Field Strength / Average / Top Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
15956.880	Horizontal	43.6	54.0	10.4	Complied

**Transmitter Out of Band Radiated Emissions (5.25-5.35 GHz band operation) (continued)**

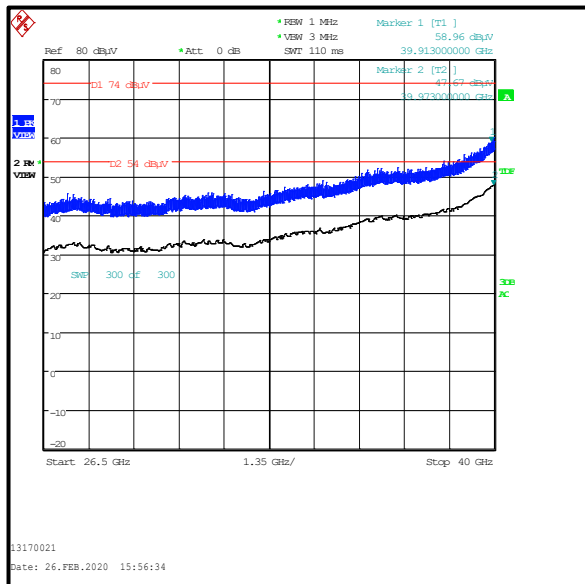
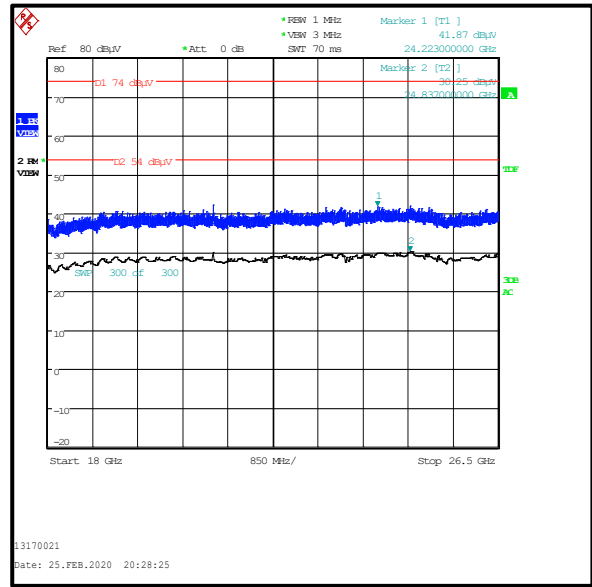
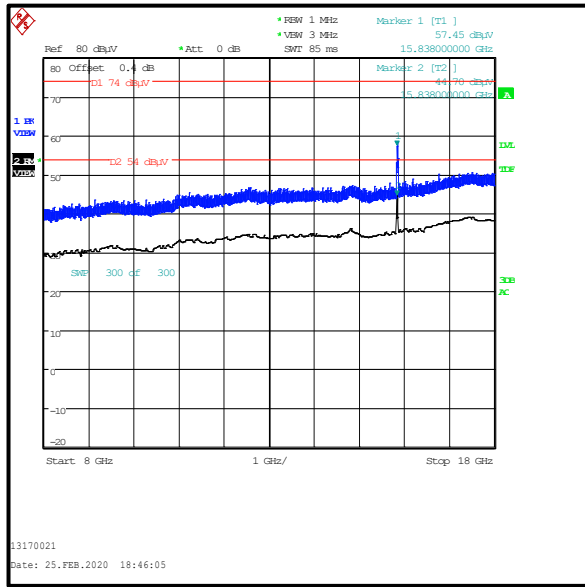


**Restricted Band 4.5 GHz to 5.15 GHz**



**Restricted Band 5.35 GHz to 5.46 GHz**

**Transmitter Out of Band Radiated Emissions (5.25-5.35 GHz band operation) (continued)**



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

## **4.4 Transmitter Band Edge Radiated Emissions**

### **4.4.1 5.15-5.25 GHz band**

#### **Test Summary:**

<b>Test Engineers:</b>	Tom Sleigh, Jose Bayona & Mohamed Toubella	<b>Test Dates:</b>	20 January 2020 to 28 April 2021
<b>Test Sample Serial Number:</b>	1424819028087		

<b>FCC Reference:</b>	Parts 15.407(b)(1),(7), 15.205 & 15.209(a)
<b>Test Method Used:</b>	ANSI C63.10 Section 6.10 & KDB 789033 II.G section 5 and 6

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	24 to 25
<b>Relative Humidity (%):</b>	26 to 39

#### **Note(s):**

1. The following modes were tested:
  - 802.11a - BPSK / 6 Mbps
  - 802.11n HT20 SISO - BPSK / MCS0
  - 802.11n HT40 SISO - BPSK / MCS0
  - 802.11ac VHT80 SISO - BPSK / MCS0x1
  - 802.11n HT20 MIMO - BPSK / MCS0
  - 802.11n HT40 MIMO - BPSK / MCS0
  - 802.11ac VHT80 MIMO - BPSK / MCS0x1
2. Lower band edge measurements were performed with the EUT transmitting on the bottom channel. Upper band edge measurements were performed with the EUT transmitting on the top channel.
3. For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. However, there are restricted bands of operation below the lower band edge at 4.5-5.15 GHz and also above the upper band edge at 5.35-5.46 GHz therefore the provisions of FCC Part 15.205 / RSS-Gen 8.10 apply. Tests were performed in these restricted bands of operation, the results are included in the transmitter 5.15 to 5.25 GHz band radiated spurious emission section of this test report.
4. Field strength measurements using peak and average detectors were performed in the restricted bands below 5.15 GHz and above 5.35 GHz. Field strength and EIRP results were found to be compliant with the restricted band limits and Part 15.407 out-of-band limits.
5. For all average measurements in this section, 300 sweeps were used. This satisfies the requirement for the minimum number of sweep points, as stated in KDB 789033 Section II.G.6.c) Method AD (vi).
6. In accordance with KDB 789033 Section II.G.6.c) Method AD (vii), for average measurements, data rates where the EUT was transmitting <98% duty cycle, the duty cycle correction factor calculated in section 4.1 was added to the measured result.

**Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued)**

**Results: 802.11a / SISO / BPSK / 6 Mbps**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5149.359	62.3	74.0	11.7	Complied
5150	61.4	74.0	12.6	Complied

**Results: Upper Band Edge / Peak**

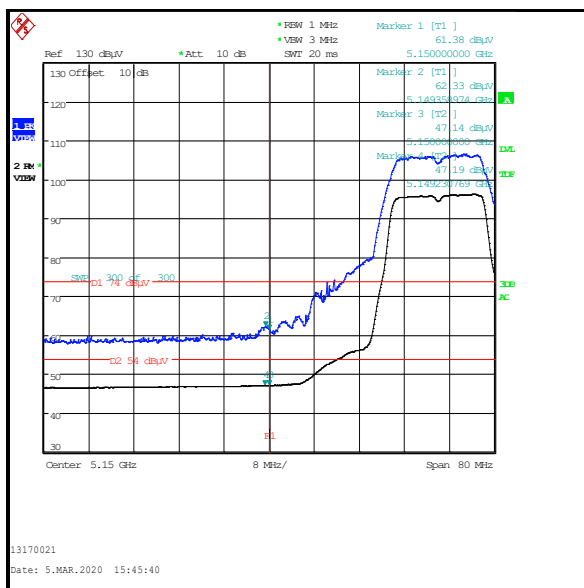
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	57.9	74.0	16.1	Complied
5420.769	60.3	74.0	13.7	Complied

**Results: Lower Band Edge / Average**

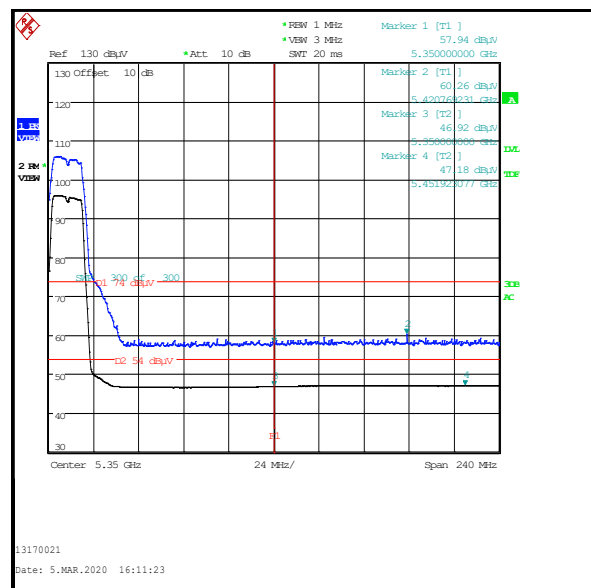
Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5149.231	47.2	0.3	47.5	54.0	6.5	Complied
5150	47.1	0.3	47.4	54.0	6.6	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	46.9	0.3	47.2	54.0	6.8	Complied
5451.923	47.2	0.3	47.5	54.0	6.5	Complied



Lower Band Edge



Upper Band Edge

**Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued)**

**Results: 802.11n / HT20 / SISO / BPSK / MCS0**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5145.513	62.0	74.0	12.0	Complied
5150	60.7	74.0	13.3	Complied

**Results: Upper Band Edge / Peak**

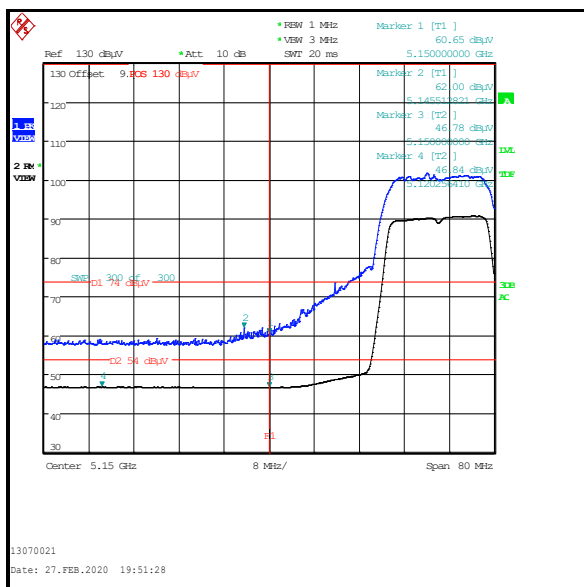
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	57.0	74.0	17.0	Complied
5441.538	59.1	74.0	14.9	Complied

**Results: Lower Band Edge / Average**

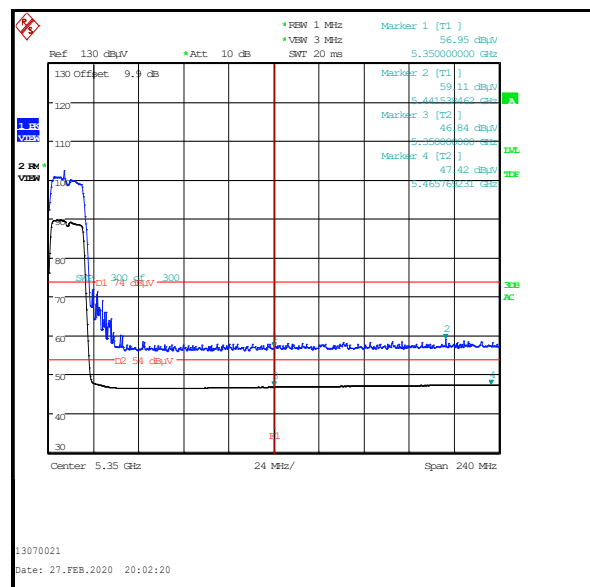
Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5150	46.8	0.3	47.1	54.0	6.9	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	46.8	0.3	47.1	54.0	6.9	Complied
5465.769	47.4	0.3	47.7	54.0	6.3	Complied



**Lower Band Edge**



**Upper Band Edge**

**Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued)**

**Results: 802.11n / HT20 / MIMO / BPSK / MCS0**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5146.933	64.7	74.0	9.3	Complied
5150	62.4	74.0	11.6	Complied

**Results: Upper Band Edge / Peak**

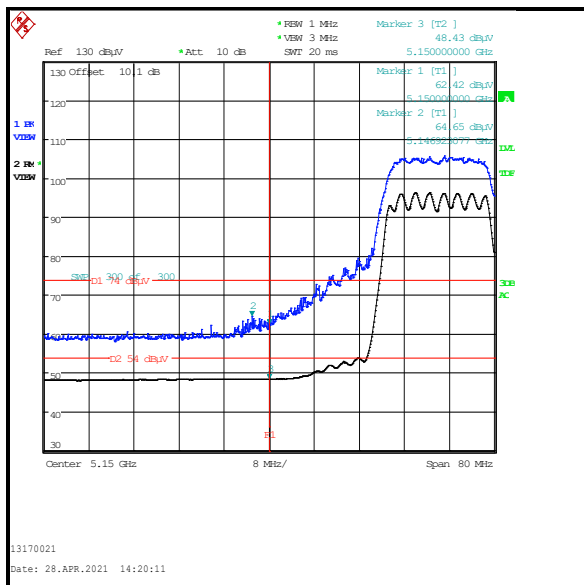
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	56.7	74.0	17.3	Complied
5436.922	59.0	74.0	15.0	Complied

**Results: Lower Band Edge / Average**

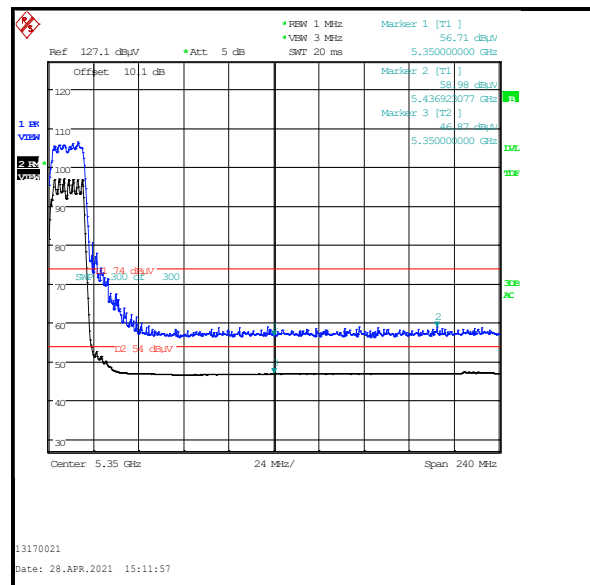
Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5150	48.4	0.3	48.7	54.0	5.3	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	46.9	0.3	47.2	54.0	6.8	Complied



Lower Band Edge



Upper Band Edge

**Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued)**

**Results: 802.11n / HT40 / SISO / BPSK / MCS0**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5149.615	66.0	74.0	8.0	Complied
5150	65.5	74.0	8.5	Complied

**Results: Upper Band Edge / Peak**

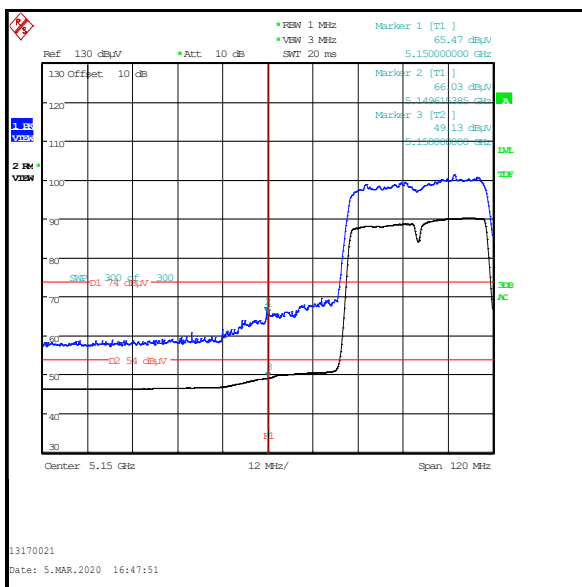
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	57.2	74.0	16.8	Complied
5462.179	60.0	74.0	14.0	Complied

**Results: Lower Band Edge / Average**

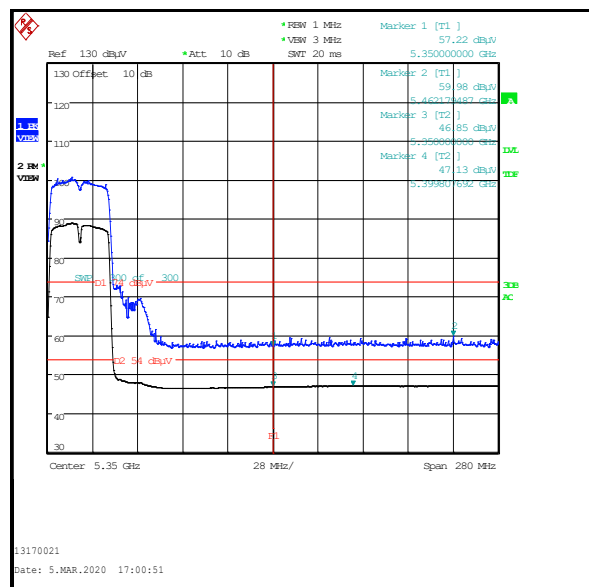
Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5150	49.1	0.7	49.8	54.0	4.2	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	46.9	0.7	47.6	54.0	6.4	Complied
5399.808	47.1	0.7	47.8	54.0	6.2	Complied



Lower Band Edge



Upper Band Edge



**Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued)**

**Results: 802.11n / HT40 / MIMO / BPSK / MCS0**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5146.154	68.8	74.0	5.2	Complied
5150	66.9	74.0	7.1	Complied

**Results: Upper Band Edge / Peak**

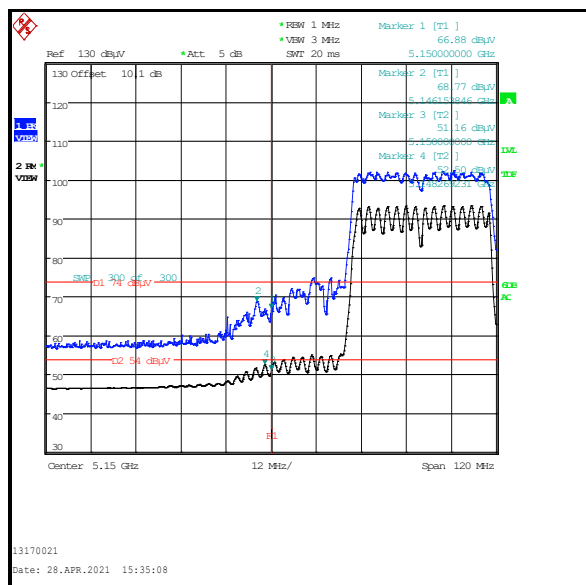
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	57.3	74.0	16.7	Complied

**Results: Lower Band Edge / Average**

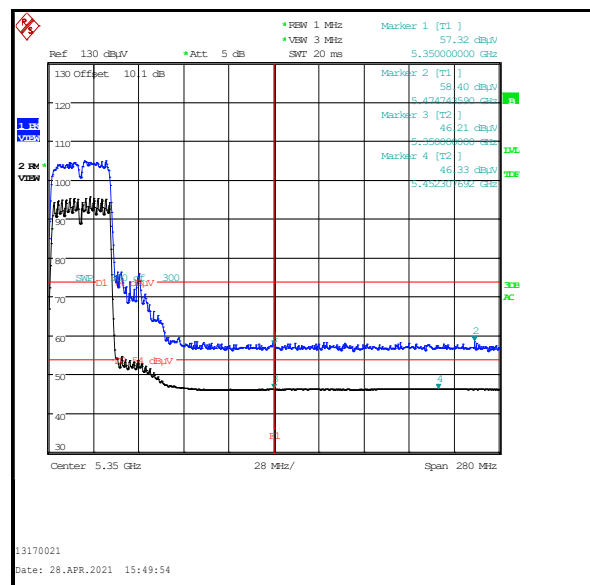
Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5148.269	52.5	0.7	53.2	54.0	0.8	Complied
5150	51.2	0.7	51.9	54.0	2.1	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	46.2	0.7	46.9	54.0	7.1	Complied
5452.308	46.3	0.7	47.0	54.0	7.0	Complied



Lower Band Edge



Upper Band Edge

**Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued)**

**Results: 802.11ac / VHT80 / SISO / BPSK / MCS0x1**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5137.500	62.9	74.0	11.1	Complied
5150	60.7	74.0	13.3	Complied

**Results: Upper Band Edge / Peak**

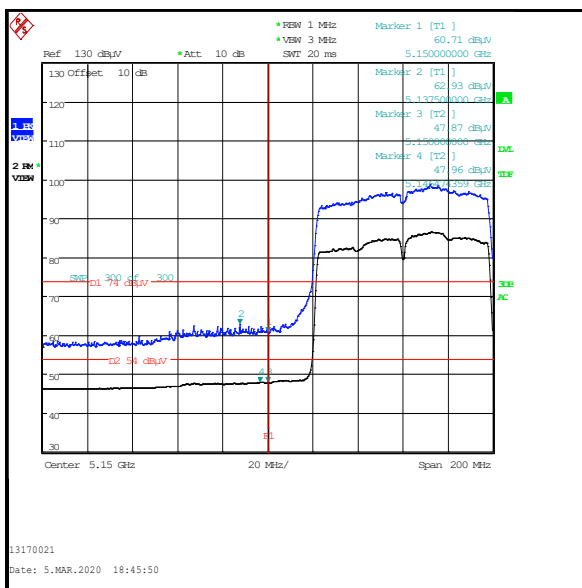
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	58.9	74.0	15.1	Complied
5505.192	62.8	74.0	11.2	Complied

**Results: Lower Band Edge / Average**

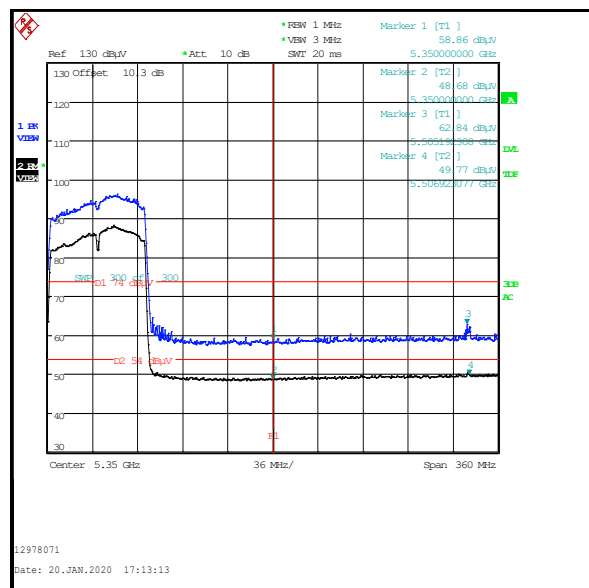
Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5146.474	48.0	1.9	49.9	54.0	4.1	Complied
5150	47.9	1.9	49.8	54.0	4.2	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	48.7	1.9	50.6	54.0	3.4	Complied
5506.923	49.8	1.9	51.7	54.0	2.3	Complied



Lower Band Edge



Upper Band Edge

**Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued)**

**Results: 802.11ac / VHT80 / MIMO / BPSK / MCS0x1**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5141.667	64.6	74.0	9.4	Complied
5150	63.9	74.0	10.1	Complied

**Results: Upper Band Edge / Peak**

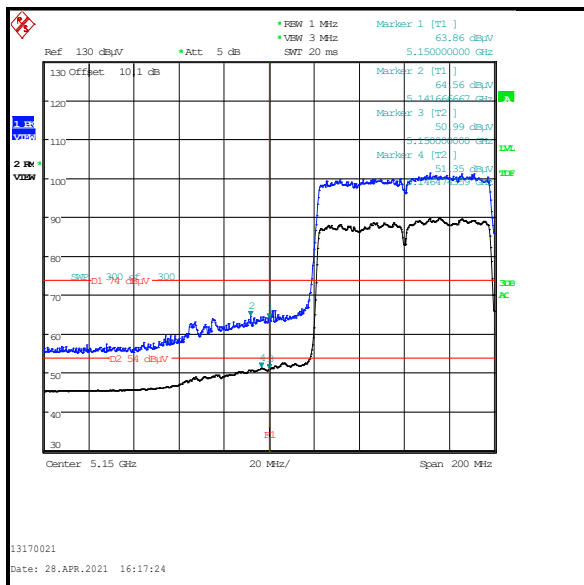
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	57.1	74.0	16.9	Complied

**Results: Lower Band Edge / Average**

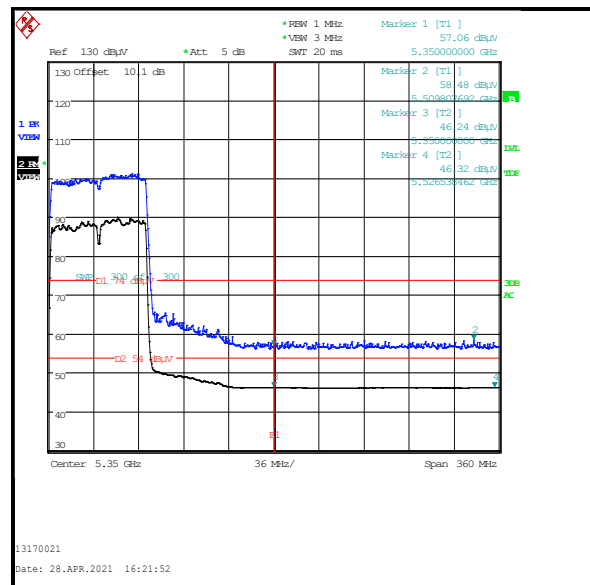
Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5146.474	51.4	1.9	53.3	54.0	0.7	Complied
5150	51.0	1.9	52.9	54.0	1.1	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	46.2	1.9	48.1	54.0	5.9	Complied



Lower Band Edge



Upper Band Edge

**Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band)****4.4.2 5.25-5.35 GHz band****Test Summary:**

<b>Test Engineers:</b>	Tom Sleigh, Jose Bayona& Mohamed Toubella	<b>Test Dates:</b>	26 February 2020 to 28 April 2021
<b>Test Sample Serial Number:</b>	1424819028087		

<b>FCC Reference:</b>	Parts 15.407(b)(1),(7), 15.205 & 15.209(a)
<b>Test Method Used:</b>	ANSI C63.10 Section 6.10 & KDB 789033 II.G section 5 and 6

**Environmental Conditions:**

<b>Temperature (°C):</b>	24 to 25
<b>Relative Humidity (%):</b>	26 to 39

**Note(s):**

1. The following modes were tested:
  - 802.11a - BPSK / 6 Mbps
  - 802.11n HT20 SISO - BPSK / MCS0
  - 802.11n HT40 SISO - BPSK / MCS0
  - 802.11ac VHT80 SISO - BPSK / MCS0x1
  - 802.11n HT20 MIMO - BPSK / MCS0
  - 802.11n HT40 MIMO - BPSK / MCS0
  - 802.11ac VHT80 MIMO - BPSK / MCS0x1
2. Lower band edge measurements were performed with the EUT transmitting on the bottom channel. Upper band edge measurements were performed with the EUT transmitting on the top channel.
3. For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. However, there are restricted bands of operation below the lower band edge at 4.5-5.15 GHz and also above the upper band edge at 5.35-5.46 GHz therefore the provisions of FCC Part 15.205 / RSS-Gen 8.10 apply. Tests were performed in these restricted bands of operation with the EUT transmitting on the bottom and top channels within 5.25-5.35 GHz band, the results are included in the transmitter 5.25-5.35 GHz band radiated spurious emissions section of this test report.
4. Field strength measurements using peak and average detectors were performed in the restricted bands below 5.15 GHz and above 5.35 GHz. Field strength and EIRP results were found to be compliant with the restricted band limits and Part 15.407 out-of-band limits.
5. For all average measurements in this section, 300 sweeps were used. This satisfies the requirement for the minimum number of sweep points, as stated in KDB 789033 Section II.G.6.c) Method AD (vi).
6. In accordance with KDB 789033 Section II.G.6.c) Method AD (vii), for average measurements, data rates where the EUT was transmitting <98% duty cycle, the duty cycle correction factor calculated in section 4.1 was added to the measured result.

**Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)**

**Results: 802.11a / SISO / BPSK / 6 Mbps**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5092.308	58.6	74.0	15.4	Complied
5150	57.9	74.0	16.1	Complied

**Results: Upper Band Edge / Peak**

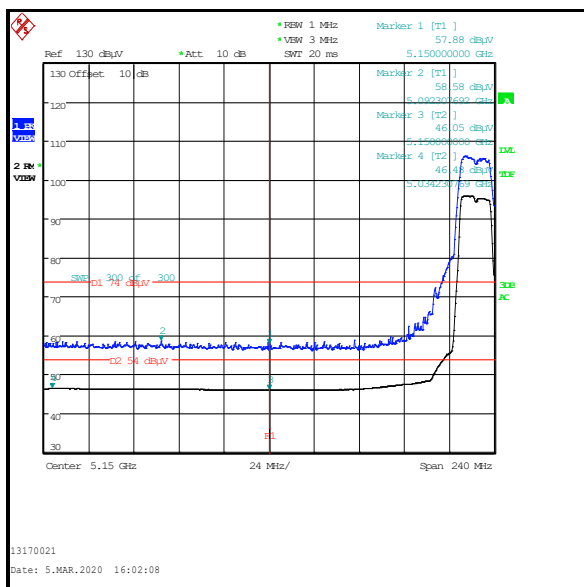
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	61.8	74.0	12.2	Complied
5350.769	62.4	74.0	11.6	Complied

**Results: Lower Band Edge / Average**

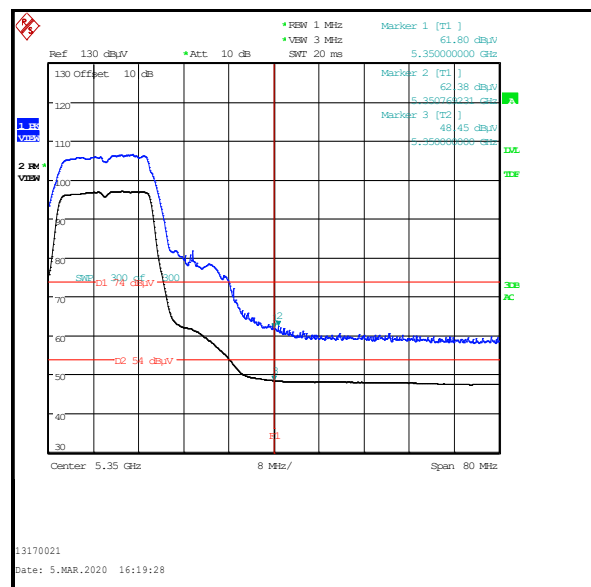
Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5034.231	46.5	0.3	46.8	54.0	7.2	Complied
5150	46.1	0.3	46.4	54.0	7.6	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	48.5	0.3	48.8	54.0	5.2	Complied



Lower Band Edge



Upper Band Edge

**Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)**

**Results: 802.11n / HT20 / SISO / BPSK / MCS0**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5139.231	58.4	74.0	15.6	Complied
5150	56.9	74.0	17.1	Complied

**Results: Upper Band Edge / Peak**

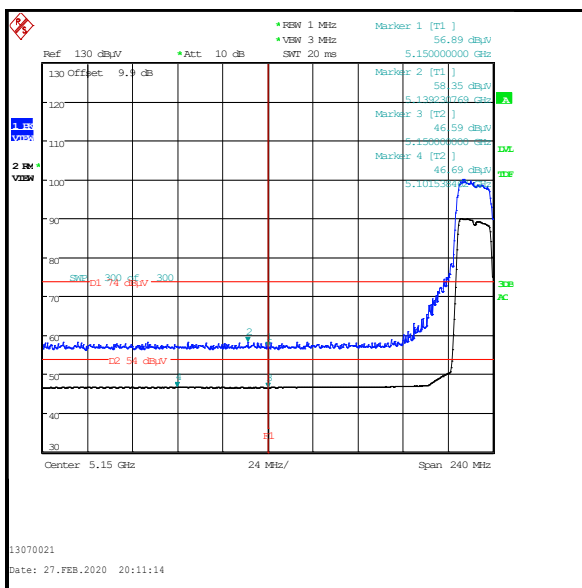
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	59.9	74.0	14.1	Complied
5350.256	61.9	74.0	12.1	Complied

**Results: Lower Band Edge / Average**

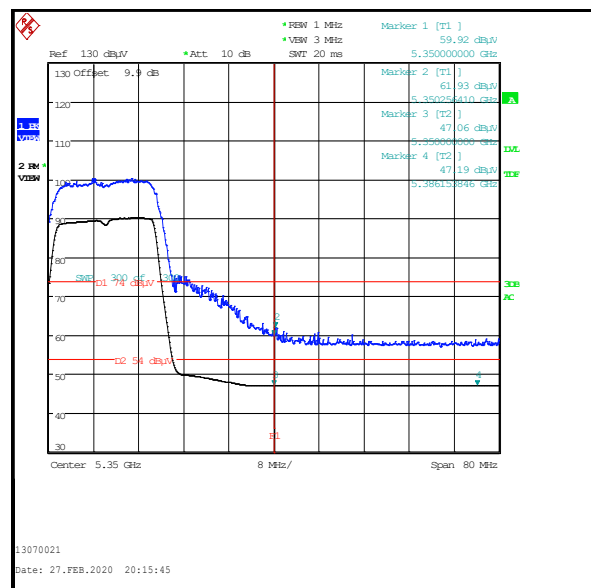
Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5101.538	46.7	0.3	47.0	54.0	7.0	Complied
5150	46.6	0.3	46.9	54.0	7.1	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	47.1	0.3	47.4	54.0	6.6	Complied
5386.154	47.2	0.3	47.5	54.0	6.5	Complied



Lower Band Edge



Upper Band Edge

**Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)**

**Results: 802.11n / HT20 / MIMO / BPSK / MCS0**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5060.000	58.4	74.0	15.6	Complied
5150	56.0	74.0	18.0	Complied

**Results: Upper Band Edge / Peak**

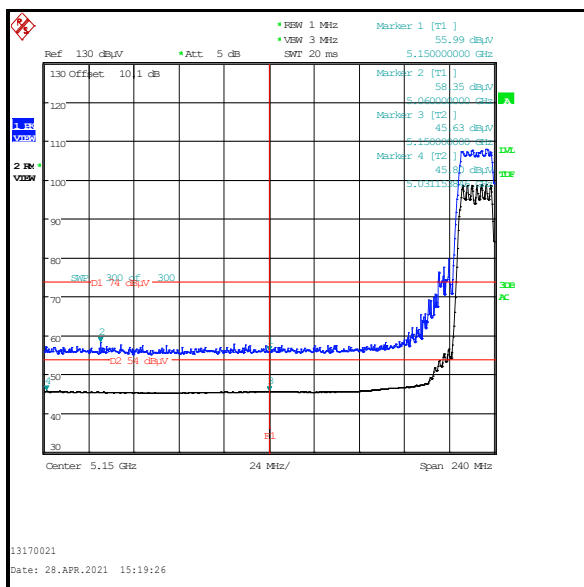
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	62.8	74.0	11.2	Complied
5350.641	66.4	74.0	7.6	Complied

**Results: Lower Band Edge / Average**

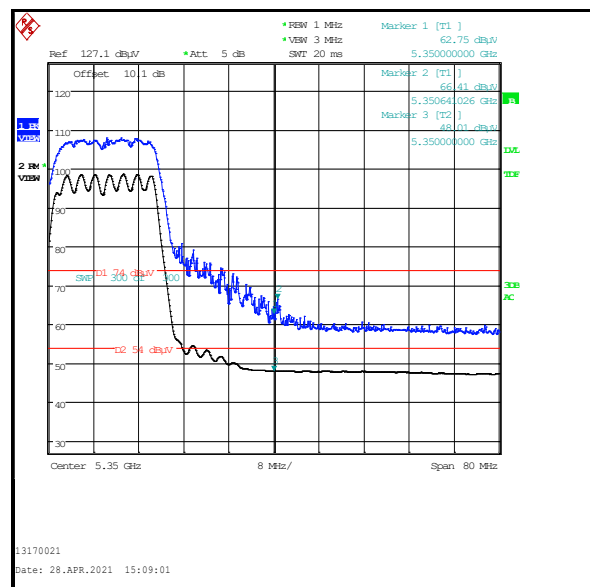
Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5031.154	45.8	0.3	46.1	54.0	7.9	Complied
5150	45.6	0.3	45.9	54.0	8.1	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	48.0	0.3	48.3	54.0	5.7	Complied



Lower Band Edge



Upper Band Edge

**Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)**

**Results: 802.11n / HT40 / SISO / BPSK / MCS0**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5053.974	59.3	74.0	14.7	Complied
5150	56.9	74.0	17.1	Complied

**Results: Upper Band Edge / Peak**

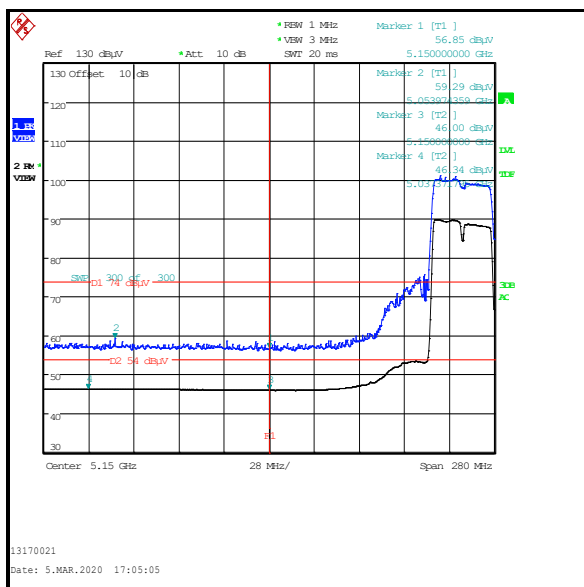
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	67.8	74.0	6.2	Complied
5351.923	68.9	74.0	5.1	Complied

**Results: Lower Band Edge / Average**

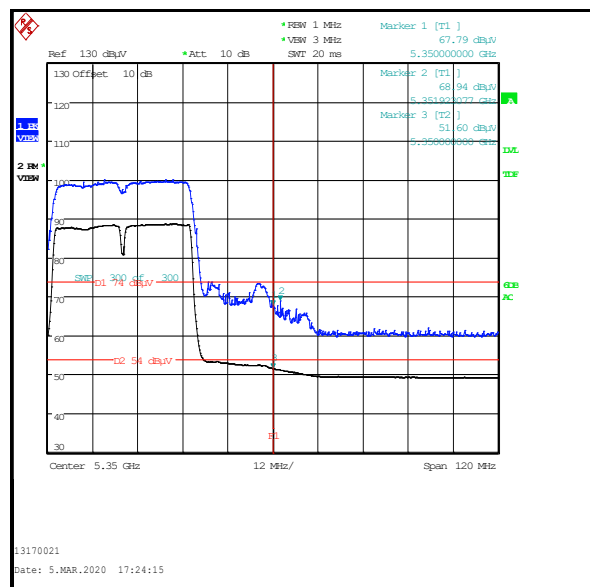
Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5037.372	46.3	0.7	47.0	54.0	7.0	Complied
5150	46.0	0.7	46.7	54.0	7.3	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5350	51.6	0.7	52.3	54.0	1.7	Complied



Lower Band Edge



Upper Band Edge



**Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)**

**Results: 802.11n / HT40 / MIMO / BPSK / MCS0**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5040.962	58.2	74.0	15.8	Complied
5150	57.5	74.0	16.5	Complied

**Results: Upper Band Edge / Peak**

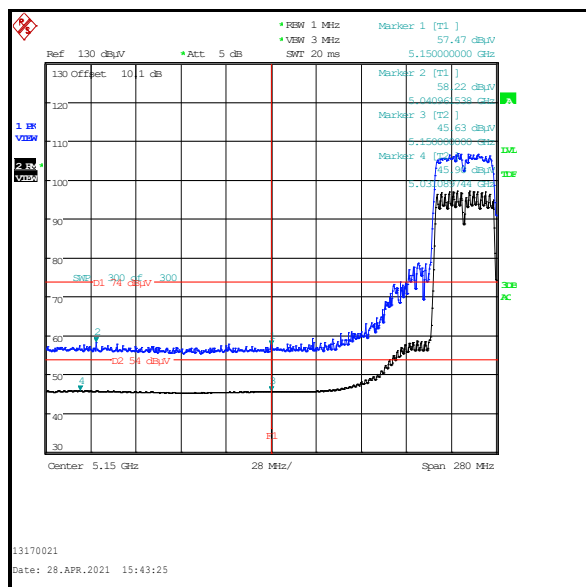
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	70.5	74.0	3.5	Complied

**Results: Lower Band Edge / Average**

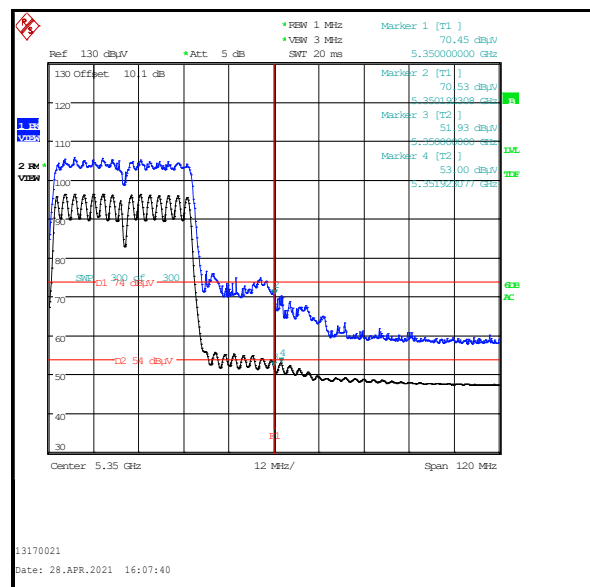
Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5031.090	45.9	0.7	46.6	54.0	7.4	Complied
5150	45.6	0.7	46.3	54.0	7.7	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	51.9	0.7	52.6	54.0	1.4	Complied
5351.923	53.0	0.7	53.7	54.0	0.3	Complied



Lower Band Edge



Upper Band Edge

**Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)**

**Results: 802.11ac / VHT80 / SISO / BPSK / MCS0x1**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5071.250	59.0	74.0	15.0	Complied
5150	57.6	74.0	16.4	Complied

**Results: Upper Band Edge / Peak**

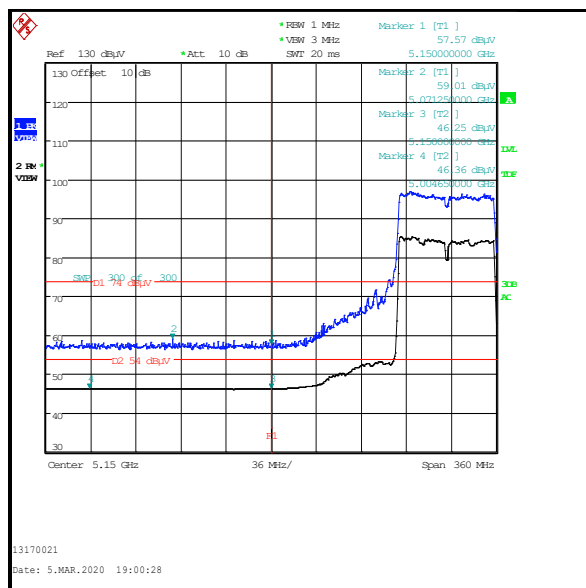
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	64.4	74.0	9.6	Complied
5353.205	66.0	74.0	8.0	Complied

**Results: Lower Band Edge / Average**

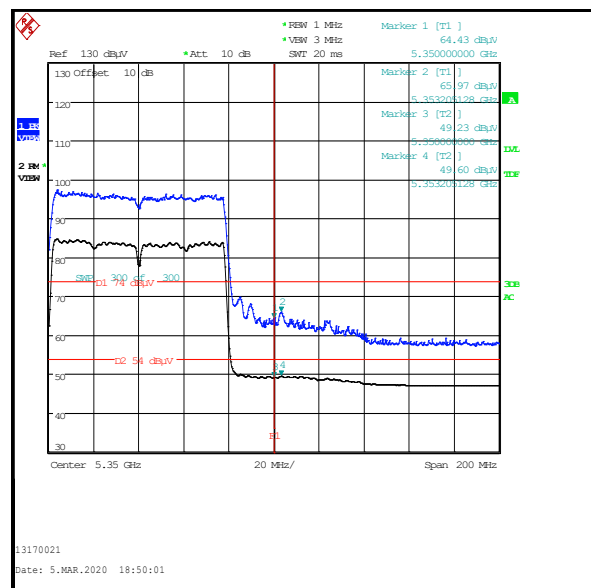
Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5004.650	46.4	1.9	48.3	54.0	5.7	Complied
5150	46.3	1.9	48.2	54.0	5.8	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	49.2	1.9	51.1	54.0	2.9	Complied
5353.205	49.6	1.9	51.5	54.0	2.5	Complied



Lower Band Edge



Upper Band Edge

**Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)**

**Results: 802.11ac / VHT80 / MIMO / BPSK / MCS0x1**

**Results: Lower Band Edge / Peak**

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5141.346	59.3	74.0	14.7	Complied
5150	58.1	74.0	15.9	Complied

**Results: Upper Band Edge / Peak**

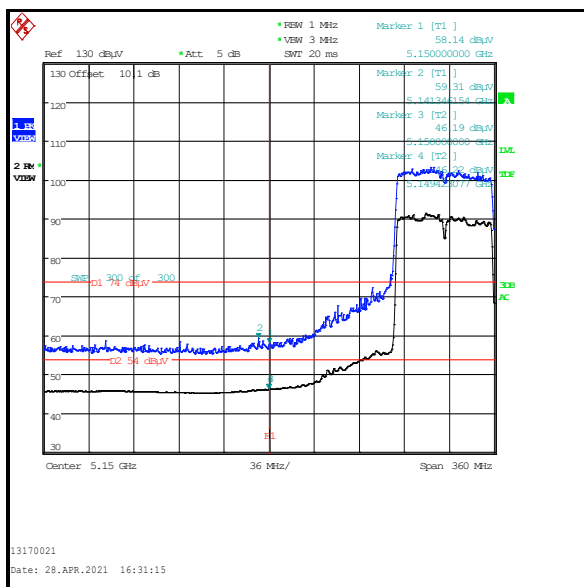
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	64.8	74.0	9.2	Complied
5350.641	66.7	74.0	7.3	Complied

**Results: Lower Band Edge / Average**

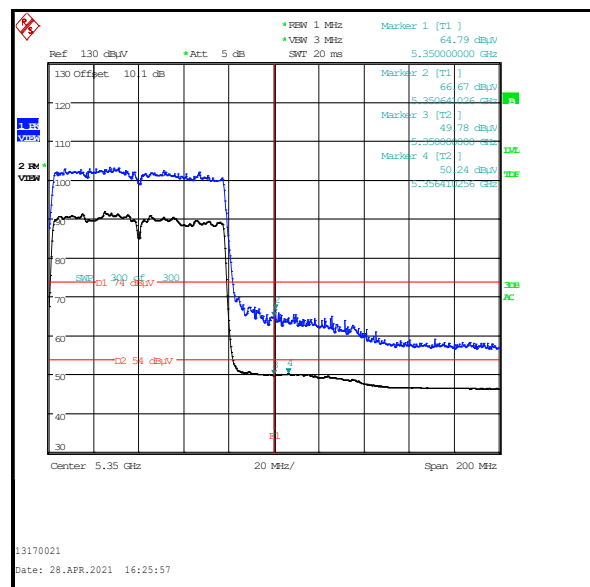
Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5150	46.2	1.9	48.1	54.0	5.9	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Level (dBμV/m)	Duty Cycle correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
5350	49.8	1.9	51.7	54.0	2.3	Complied
5356.410	50.2	1.9	52.1	54.0	1.9	Complied



Lower Band Edge



Upper Band Edge

--- END OF REPORT ---