



# TEST REPORT

**Test Report No. : UL-RPT-RP12447929-216A V3.0**

**Customer** : Grundium Oy  
**Model No. / HMN** : OCUS  
**FCC ID** : Contains FCC ID: 2AQ5IOCUS1  
**ISED Certification No.** : Contains IC: 24290-OCUS1  
**Technology** : WLAN  
**Test Standard(s)** : FCC Parts 15.205(a), 15.209(a) & 15.247(d)  
ISED Canada RSS-247 5.5 &  
RSS-Gen 6.13, 8.9 & 8.10  
**Test Laboratory** : UL VS LTD, Basingstoke, Hampshire, RG24 8AH, United Kingdom

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2. The results in this report apply only to the sample(s) tested.
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:** 27 March 2019

**Checked by:**

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**Company Signatory:**

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## **Customer Information**

<b>Company Name:</b>	Grundium Oy
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## **Report Revision History**

<b>Version Number</b>	<b>Issue Date</b>	<b>Revision Details</b>	<b>Revised By</b>
1.0	13/03/2019	Initial Version	Ben Mercer
2.0	21/03/2019	Admin update	Ben Mercer
3.0	27/03/2019	Antenna gain corrected	Ben Mercer

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## 1. Attestation of Test Results

### 1.1. Description of EUT

The equipment under test was a digital microscope scanner that contains a FCC / ISED Canada certified 2.4 GHz and 5 GHz WLAN module (FCC ID: 2AQ5I0CUS1 and IC: 24290-OCUS1).

### 1.2. General Information

<b>Specification Reference:</b>	47CFR15.247
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.247
<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>Specification Reference:</b>	RSS-Gen Issue 5 April 2018
<b>Specification Title:</b>	General Requirements for Compliance of Radio Apparatus
<b>Specification Reference:</b>	RSS-247 Issue 2 February 2017
<b>Specification Title:</b>	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
<b>FCC Test Firm Registration No.:</b>	621311
<b>ISED Canada Site Registration No.:</b>	3245B-2 & 3245B-3
<b>Test Dates:</b>	28 February 2019 to 03 March 2019

### 1.3. Summary of Test Results

FCC Reference (47CFR)	ISED Canada Reference	Measurement	Result
15.35(c)	RSS-Gen 8.2	Transmitter Duty Cycle	Note 1
15.247(d) / 15.209(a)	RSS-Gen 6.13, 8.9 & 8.10 / RSS-247 5.5	Transmitter Radiated Emissions	✓
15.247(d) / 15.209(a)	RSS-Gen 6.13, 8.9 & 8.10 / RSS-247 5.5	Transmitter Band Edge Radiated Emissions	✓
<b>Key to Results</b>			
 = Complied	 = Did not comply		

#### Note(s):

1. The measurement was performed to assist in the calculation of the level of average emissions. The EUT cannot transmit continuously and sweep triggering/signal gating cannot be implemented.

### 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 specification 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 VS LTD is accredited by UKAS. 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 558074 D01 DTS Meas Guidance v05r01 February 11, 2019
<b>Title:</b>	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

## **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**

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 measured (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.

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	Range	Confidence Level (%)	Calculated Uncertainty
Duty Cycle	2412 MHz to 2462 MHz	95%	$\pm 1.14 \%$
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	$\pm 4.65 \text{ dB}$
Radiated Spurious Emissions	1 GHz to 25 GHz	95%	$\pm 2.94 \text{ dB}$

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 Transmitter Duty Cycle**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	16 Feb 2020	12
M2003	Thermohygrometer	Testo	608-H1	45046641	06 Jan 2020	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	10 Aug 2019	12
A2948	Pre Amplifier	Com-Power	PAM-118A	551087	12 Feb 2020	12
A2889	Antenna	Schwarzbeck	BBHH 9120 B 653	BBHA 9120 B 653	12 Feb 2020	12

### **Test Equipment Used for Transmitter Radiated Emissions**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2040	Thermohygrometer	Testo	608-H1	45124934	06 Jan 2020	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	04 Oct 2019	12
M2044	Test Receiver	Rohde & Schwarz	ESU26	100122	17 Apr 2019	12
A3155	Amplifier	Com-Power	PAM-118A	18040037	14 Sep 2019	12
A3138	Antenna	Schwarzbeck	BBHA 9120 B	00702	03 Oct 2019	12
A2523	Attenuator	AtlanTecRF	AN18W5-10	832827#1	04 Mar 2020	12
A3093	High Pass Filter	AtlanTechRF	AFH-03000	18051800077	29 Jun 2019	12
A3139	Antenna	Schwarzbeck	HWRD750	00027	04 Oct 2019	12
A3095	High Pass Filter	AtlanTechRF	AFH-07000	18051600012	29 Jun 2019	12
A3141	Pre Amplifier	Schwarzbeck	BBV 9718 B	00021	21 Nov 2019	12
A2896	Antenna	Schwarzbeck	BBV 9721	9721 – 023	08 Feb 2020	12
A2895	Antenna	Schwarzbeck	BBHA 9170	9170-728	08 Feb 2020	12
M2003	Thermohygrometer	Testo	608-H1	45046641	06 Jan 2020	12
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	16 Feb 2020	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	10 Aug 2019	12
A490	Antenna	Chase	CBL6111A	1590	03 Apr 2019	12
A3167	Pre Amplifier	Com-Power	PAM-103	18020010	11 Feb 2020	12
A2131	Low Pass Filter	AtlanTechRF	AFL-02000	JFB1004-002	20 Feb 2020	12

**Test and Measurement Equipment (continued)****Test Equipment Used for 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	16 Feb 2020	12
M2003	Thermohygrometer	Testo	608-H1	45046641	06 Jan 2020	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	10 Aug 2019	12
A2948	Pre Amplifier	Com-Power	PAM-118A	551087	12 Feb 2020	12
A2889	Antenna	Schwarzbeck	BBHH 9120 B 653	BBHA 9120 B 653	12 Feb 2020	12
A2916	Attenuator	AtlantecRF	AN18W5-10	832827#1	20 Feb 2020	12

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

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

<b>Brand Name:</b>	Grundium Oy
<b>Model No. / HMN:</b>	OCUS
<b>Test Sample Serial Number:</b>	MGU-00001-000035 ( <i>Radiated sample</i> )
<b>Hardware Version:</b>	A.02.02.02
<b>Software Version:</b>	1.0.146
<b>FCC ID:</b>	Contains FCC ID: 2AQ5IOCUS1
<b>ISED Certification Number:</b>	Contains IC: 24290-OCUS1

#### **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 802.11b,g,n) / Digital Transmission System				
<b>Type of Unit:</b>	Transceiver				
<b>Modulation Type:</b>	DBPSK, DQPSK, BPSK, QPSK, 16QAM & 64QAM				
<b>Data Rates:</b>	802.11b	1, 2, 5.5 & 11 Mbit/s (SISO)			
	802.11g	6, 9, 12, 18, 24, 36, 48 & 54 Mbit/s (SISO)			
	802.11n HT20	MCS0 to MCS7 (SISO)			
<b>Power Supply Requirement(s):</b>	Nominal	12.0 VDC via 120 VAC 60 Hz adaptor			
<b>Channel Spacing:</b>	20 MHz				
<b>Transmit Frequency Range:</b>	2412 MHz to 2462 MHz				
<b>Transmit Channels Tested:</b>	Channel ID	Channel Number	Channel Frequency (MHz)		
	Bottom	1	2412		
	Middle	6	2437		
	Top	11	2462		

### **3.4. Description of Available Antenna**

The EUT incorporates 2 integrated antennas.

The antenna assembly consists of a feed board and an antenna board. The EUT chassis runs between the boards and is connected to ground. 2 Pogo pins carry RF from the feed board to the antenna board through holes in the EUT chassis. The antenna board contains 2 PCB stripe antennas. Antenna 1 is used for diversity (Rx only). Antenna 2 is the transmitting antenna, and has the following maximum gain:

Manufacturer	Model	Type	Frequency Range (MHz)	Antenna Gain (dBi)
Radientum Oy	Not stated	Dipole (Integrated)	2400 to 2480	-2.8

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

#### **Support Equipment**

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

<b>Brand Name:</b>	Lenovo
<b>Description:</b>	Laptop
<b>Model Name or Number:</b>	L480
<b>Serial Number:</b>	PF1EHZQQ

<b>Brand Name:</b>	Asus
<b>Description:</b>	Ethernet Router
<b>Model Name or Number:</b>	RT-AX88U
<b>Serial Number:</b>	JBIUHP000173

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

<b>Brand Name:</b>	Maplin
<b>Description:</b>	USB Cable. Length 2 m. Quantity 1.
<b>Model Name or Number:</b>	Not Stated
<b>Serial Number:</b>	Not Stated

<b>Brand Name:</b>	Belkin
<b>Description:</b>	USB Hub
<b>Model Name or Number:</b>	F5U 404-BLK
<b>Serial Number:</b>	Not Stated

<b>Brand Name:</b>	XP Power
<b>Description:</b>	AC/DC Power Adapter
<b>Model Name or Number:</b>	AFM45US12
<b>Serial Number:</b>	1727-01442

## **Operating Modes**

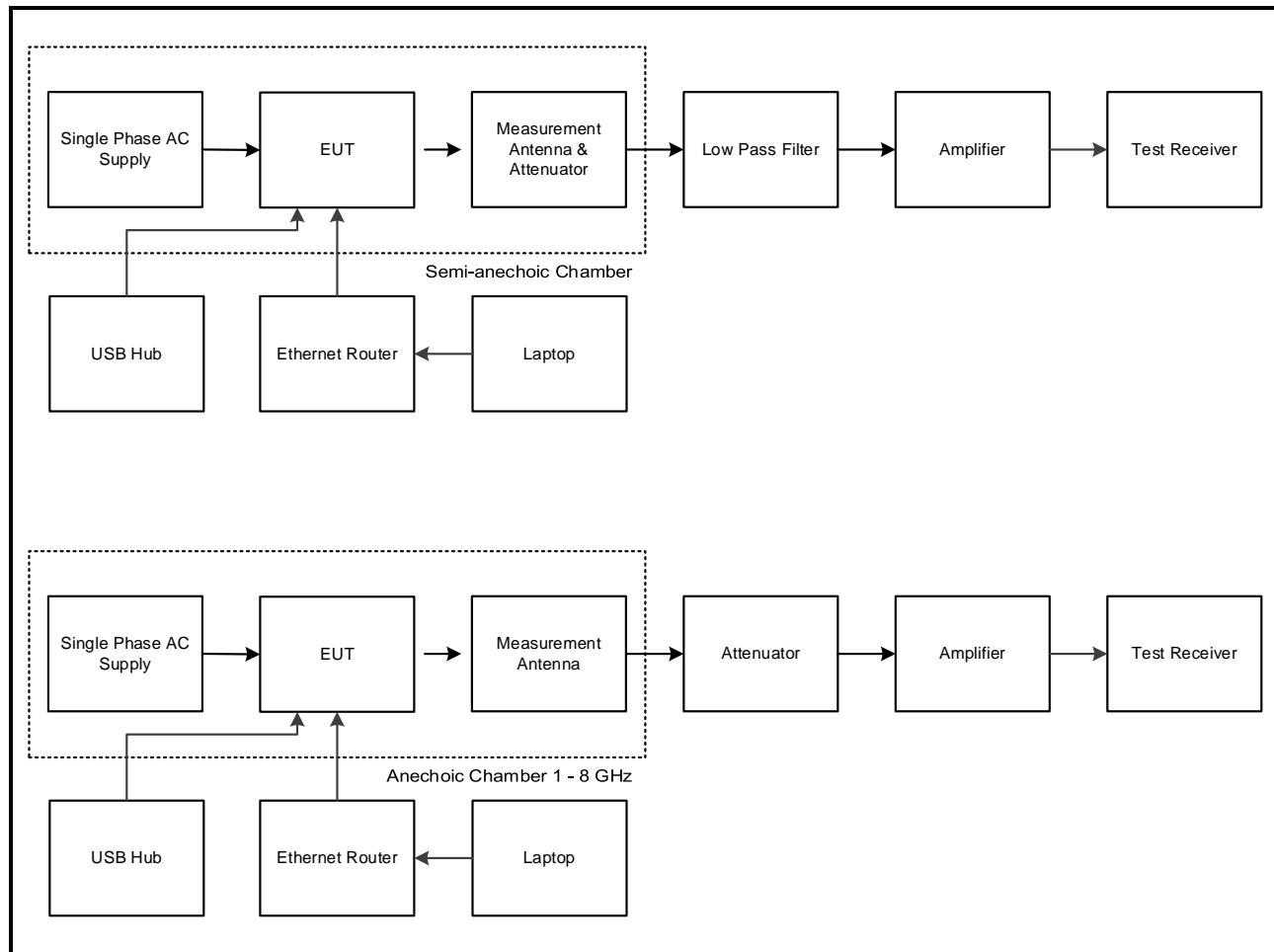
The EUT was tested in the following operating mode(s):

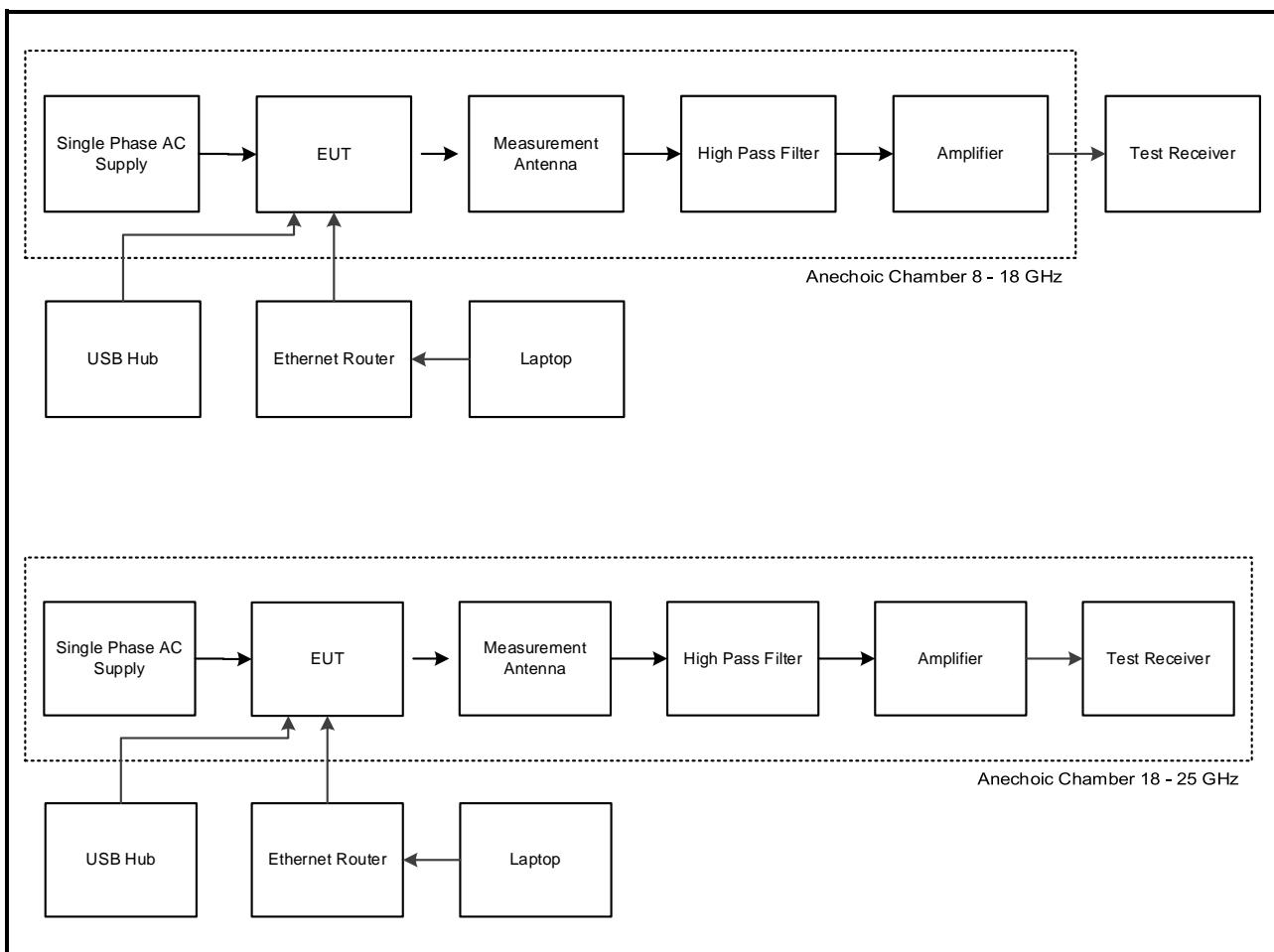
- Continuously transmitting with a modulated carrier at maximum power on the relevant channels as required using the supported data rates/modulation types.

## **Configuration and Peripherals**

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

- The customer requested the following worst case data rates to be used for all measurements:
  - 802.11b / SISO / 1 Mbit/s
  - 802.11g / SISO / 6 Mbit/s
  - 802.11n HT20 / SISO / MCS0
- The EUT has two separate antennas which correspond to two separate antenna ports. Port 1 and Port 2 correspond to antenna 1 and antenna 2 respectively. Only Port 2 is an active transmitter.
- Transmitter spurious emissions were performed with the EUT transmitting with a data rate of 6 Mbit/s (802.11b). This was found to be the worst case modulation scheme with regards to emissions after preliminary investigations and, as this mode emits the highest output power level, it was deemed to be the worst case.
- The EUT was powered from an AC/DC power adapter connected to a 120 VAC 60 Hz single phase mains supply.
- Transmitter radiated spurious emissions tests were performed with the AC/DC power adapter connected to the EUT, and the USB and Ethernet ports terminated.
- The customer supplied instructions for controlling the device in a document titled “WLAN\_TX\_Commands.docx”.
- Testing was performed using the power settings defined in the customer supplied document titled “Jetson\_TX2\_WWSafe\_Power\_Q\_Table.pdf”.

**Test Setup Diagrams****Radiated Tests:****Test Setup for Transmitter Radiated Emissions**

**Test Setup for Transmitter Radiated Emissions (continued)**

## **4. Radiated Test Results**

### **4.1. Transmitter Duty Cycle**

#### **Test Summary:**

<b>Test Engineer:</b>	Mark Perry	<b>Test Date:</b>	03 March 2019
<b>Test Sample Serial Number:</b>	MGU-00001-000035		

<b>FCC Reference:</b>	Part 15.35(c)
<b>ISED Canada Reference:</b>	RSS-Gen 8.2
<b>Test Method Used:</b>	FCC KDB 558074 Section 6 referencing ANSI C63.10 Section 11.6

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	39

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

1. 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:

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

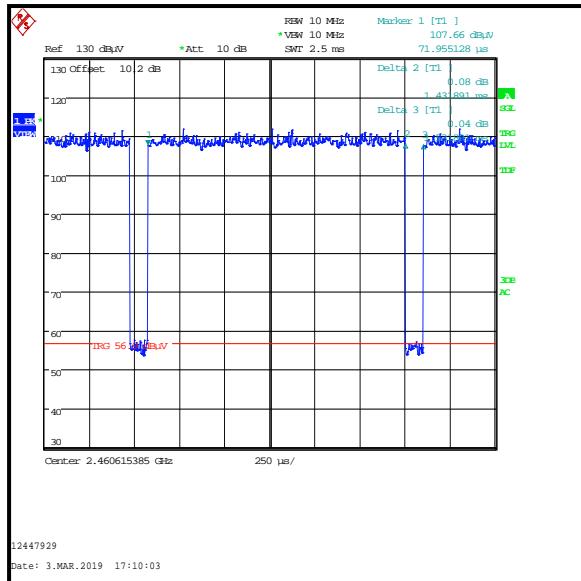
$$802.11g / \text{SISO} / 6 \text{ Mbit/s duty cycle: } 10 \log (1 / (1.432 / 1.532)) = 0.3 \text{ dB}$$

$$802.11n \text{ HT20 / SISO / MCS0 duty cycle: } 10 \log (1 / (1.340 / 1.440)) = 0.3 \text{ dB}$$

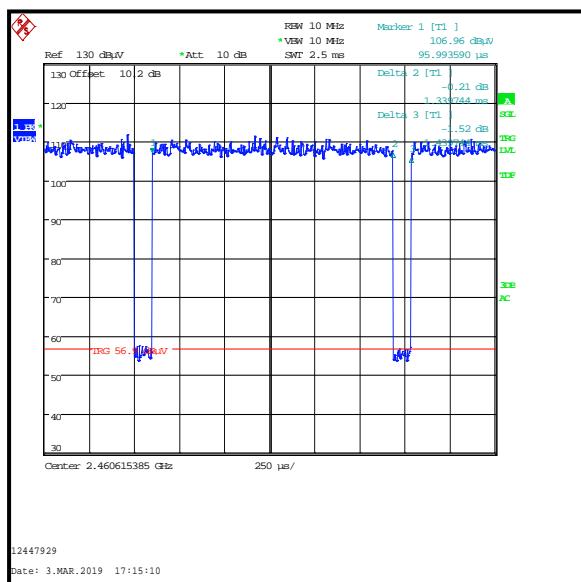
2. For 802.11b, the duty cycle was measured and found to be greater than 98%. Plots for this measurement are archived on the UL VS Ltd IT server and available for inspection upon request.

**Transmitter Duty Cycle (continued)****Results: 802.11g / SISO / 6 Mbit/s**

Pulse Duration (ms)	Period (ms)	Duty Cycle (dB)
1.432	1.532	0.3

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

Pulse Duration (ms)	Period (ms)	Duty Cycle (dB)
1.340	1.440	0.3



## **4.2. Transmitter Radiated Emissions <1 GHz**

### **Test Summary:**

<b>Test Engineer:</b>	Marco Zunarelli	<b>Test Date:</b>	28 February 2019
<b>Test Sample Serial Number:</b>	MGU-00001-000035		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>ISED Canada Reference:</b>	RSS-Gen 6.13 & RSS-247 5.5
<b>Test Method Used:</b>	ANSI C63.10 Sections 6.3 and 6.5
<b>Frequency Range</b>	30 MHz to 1000 MHz

### **Environmental Conditions:**

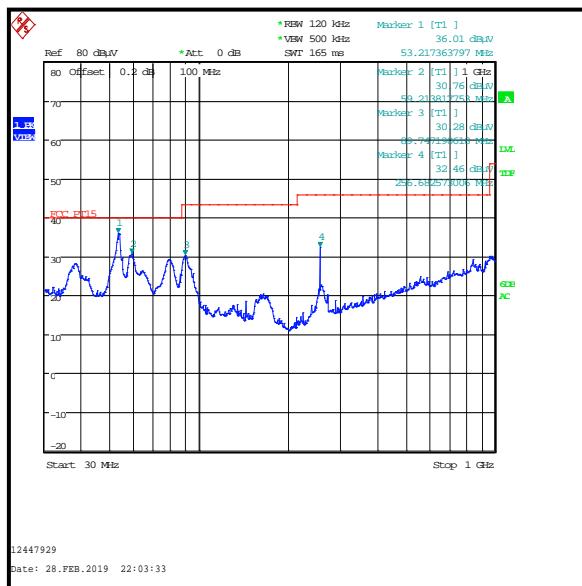
<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	38

### **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 channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the middle channel only.
3. 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 and therefore not recorded.
4. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0017) 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 120 kHz and video bandwidth 500 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 wide enough to see the whole emission.

**Transmitter Radiated Emissions (continued)****Results: Middle Channel / 802.11b / SISO / 1 Mbit/s**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
38.415	Vertical	24.7	40.0	15.3	Complied
53.676	Vertical	31.3	40.0	8.7	Complied
59.214	Vertical	27.4	40.0	12.6	Complied
78.866	Vertical	26.2	40.0	13.8	Complied
90.762	Vertical	25.6	43.5	17.9	Complied
256.001	Vertical	31.2	46.0	14.8	Complied



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

### **4.3. Transmitter Radiated Emissions >1 GHz**

#### **Test Summary:**

<b>Test Engineer:</b>	Marco Zunarelli	<b>Test Date:</b>	28 February 2019
<b>Test Sample Serial Number:</b>	MGU-00001-000035		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>ISED Canada Reference:</b>	RSS-Gen 6.13, 8.9 & RSS-247 5.5
<b>Test Method Used:</b>	FCC KDB 558074 Sections 8.1 c)3), 8.5 & 8.6 referencing ANSI C63.10 Sections 6.3, 6.6, 11.11 & 11.12
<b>Frequency Range</b>	1 GHz to 25 GHz

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	35

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

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. Pre-scans were performed with the EUT set to middle channel.
3. All 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. Therefore the highest peak and average noise floor readings of the measuring receiver were recorded as shown in the tables below.
4. The emission shown on the 1 GHz to 3 GHz plot is the EUT fundamental.
5. 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.
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.

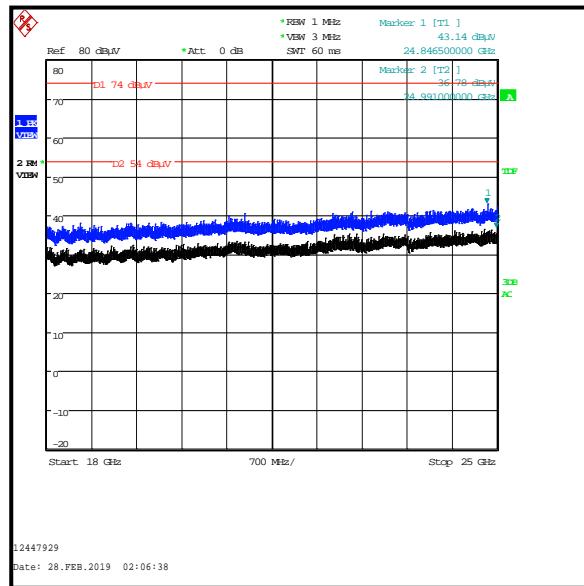
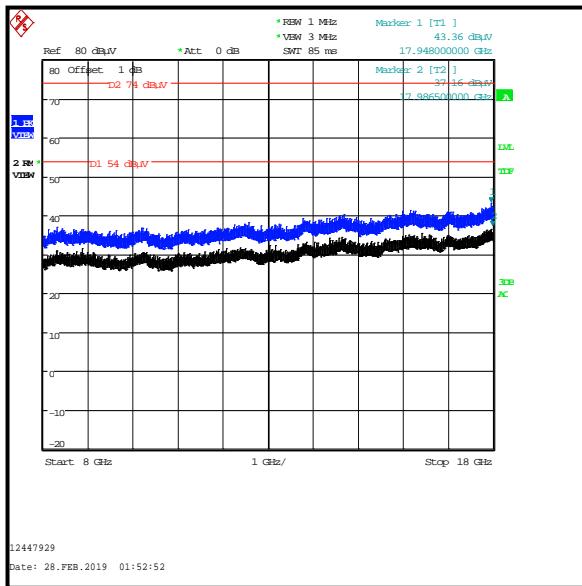
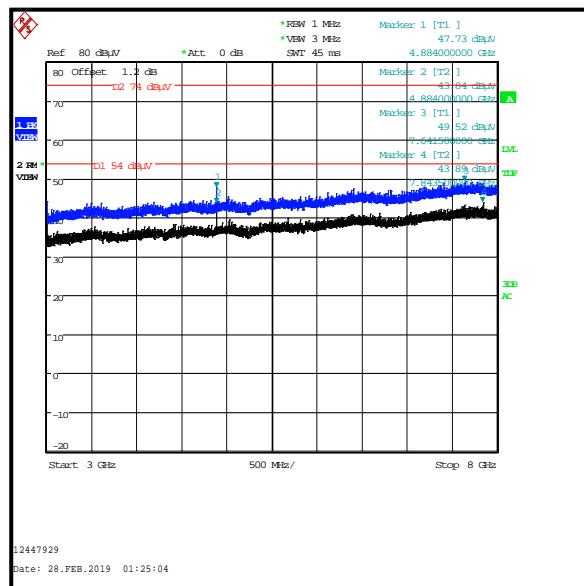
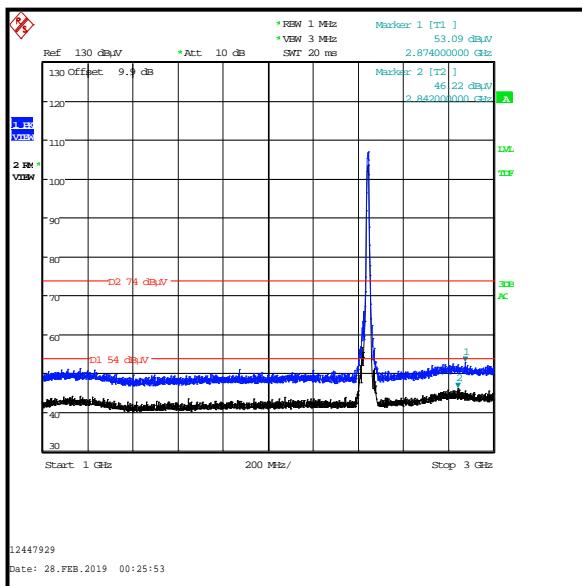
#### **Results: Peak**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
2874.000	Vertical	53.1	74.0	20.9	Complied

#### **Results: Average**

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
2842.000	Vertical	46.2	54.0	7.8	Complied

## Transmitter Radiated Emissions (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**

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

<b>Test Engineer:</b>	Mark Perry	<b>Test Date:</b>	03 March 2019
<b>Test Sample Serial Number:</b>	MGU-00001-000035		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>ISED Canada Reference:</b>	RSS-Gen 6.13, 8.9, 8.10 & RSS-247 5.5
<b>Test Method Used:</b>	KDB 558074 Section 8.7 referencing ANSI C63.10 Sections 11.11, 11.12 & 11.13

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

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	38

**Transmitter Band Edge Radiated Emissions (continued)****Note(s):**

1. The customer declared the following data rates to be used for all measurements as:

- o 802.11b / SISO / DBPSK / 1 Mbit/s
- o 802.11g / SISO / BPSK / 6 Mbit/s
- o 802.11n HT20 / SISO / BPSK / MCS0

Final measurements were performed with the above configurations.

2. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
3. It is not known if the maximum conducted output power was previously measured as a peak or average value. In accordance with ANSI C63.10 Section 11.11.1(b), the lower band edge measurement was performed with a peak detector and the -30 dBc limit applied, as this represents the worst case.
4. As the lower band edge is adjacent to a non-restricted band, only peak measurements are required. In accordance with ANSI C63.10 Section 11.11.1, the test method in Section 11.11.3 was followed: 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. A out-of-band limit line was placed 30 dB (ANSI C63.10 Section 11.11.1(b)) below the peak level. A marker was placed on the band edge spot frequencies and a second marker placed on the highest emission level in the adjacent non-restricted band of operation (where a higher level emission was present). Marker frequencies and levels were recorded.
5. As the upper band edge is adjacent to a restricted band both peak and average measurements were recorded by placing a marker at the edge of the band. For peak measurements the test receiver resolution bandwidth was set to 1 MHz and the video bandwidth 3 MHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. For average measurements the test receiver resolution bandwidth was set to 1 MHz and the video bandwidth 3 MHz. An RMS detector was used, sweep time was set to auto and trace mode was trace averaging over 300 sweeps. A marker was placed on the band edge spot frequencies and a second marker placed on the highest emission level in the adjacent restricted band of operation (where a higher level emission was present). Marker frequencies and levels were recorded.
6. 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.

**Transmitter Band Edge Radiated Emissions (continued)****Results: 802.11b / SISO / DBPSK / 1 Mbit/s****Results: Lower Band Edge**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	-30 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400	Vertical	68.3	75.0	6.7	Complied

**Results: Upper Band Edge / Peak**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	54.1	74.0	19.9	Complied
2484.061	Vertical	55.3	74.0	18.7	Complied

**Results: Upper Band Edge / Average**

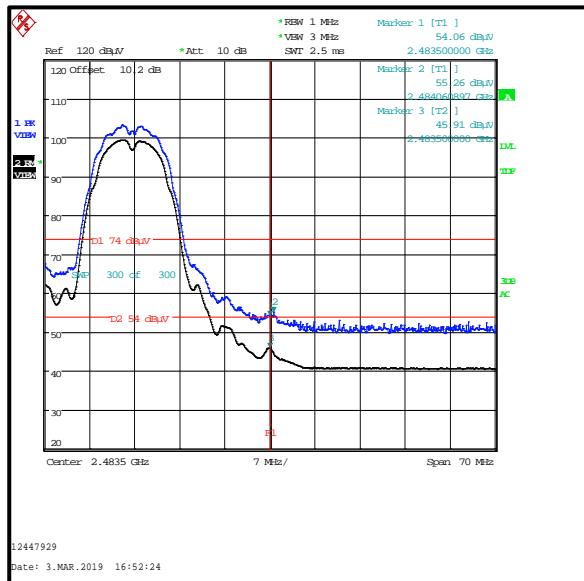
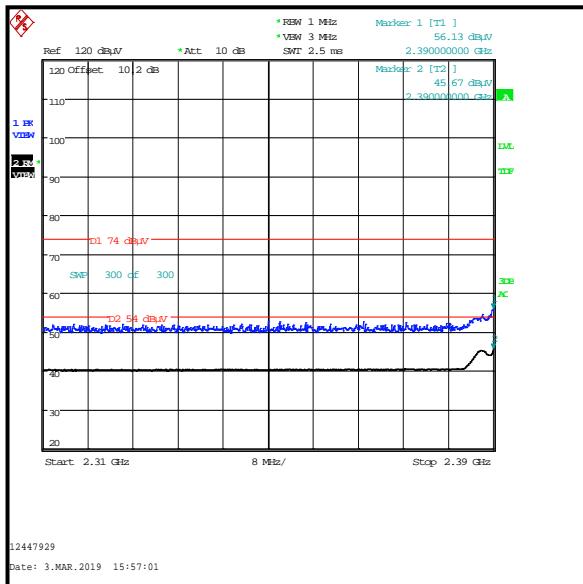
Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	45.9	54.0	8.1	Complied

**Results: 2310 MHz to 2390 MHz Restricted Band / Peak**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2390	Vertical	56.1	74.0	17.9	Complied

**Results: 2310 MHz to 2390 MHz Restricted Band / Average**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2390	Vertical	45.7	54.0	8.3	Complied

**Transmitter Band Edge Radiated Emissions (continued)****Results: 802.11b / SISO / DBPSK / 1 Mbit/s****Lower Band Edge****Upper Band Edge****2310 MHz to 2390 MHz Restricted Band**

**Transmitter Band Edge Radiated Emissions (continued)****Results: 802.11g / SISO / BPSK / 6 Mbit/s****Results: Lower Band Edge**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	-30 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
2399.519	Vertical	61.2	67.7	6.5	Complied
2400	Vertical	58.4	67.7	9.3	Complied

**Results: Upper Band Edge / Peak**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	64.3	74.0	9.7	Complied
2483.612	Vertical	64.5	74.0	9.5	Complied

**Results: Upper Band Edge / Average**

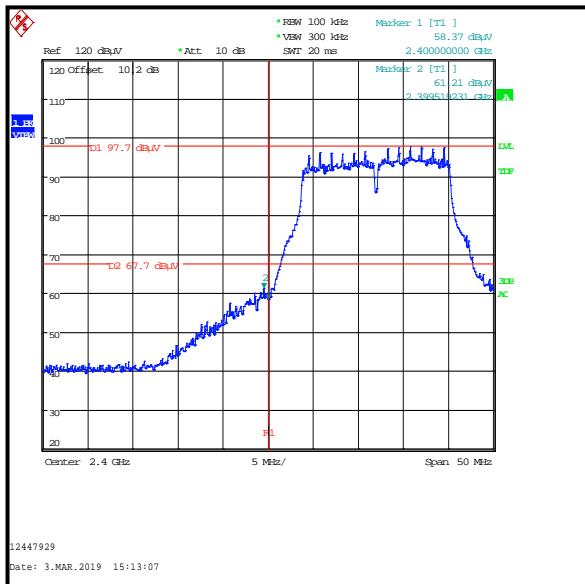
Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	50.8	0.3	51.1	54.0	2.9	Complied

**Results: 2310 MHz to 2390 MHz Restricted Band / Peak**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2390	Vertical	61.1	74.0	12.9	Complied

**Results: 2310 MHz to 2390 MHz Restricted Band / Average**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2390	Vertical	44.6	0.3	44.9	54.0	9.1	Complied

**Transmitter Band Edge Radiated Emissions (continued)****Results: 802.11g / SISO / BPSK / 6 Mbit/s****Lower Band Edge****Upper Band Edge****2310 MHz to 2390 MHz Restricted Band**

**Transmitter Band Edge Radiated Emissions (continued)****Results: 802.11n HT20 / SISO / BPSK / MCS0****Results: Lower Band Edge**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	-30 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
2399.519	Vertical	58.1	67.3	9.2	Complied
2400	Vertical	56.4	67.3	10.9	Complied

**Results: Upper Band Edge / Peak**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	65.5	74.0	8.5	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	50.3	0.3	50.6	54.0	3.4	Complied

**Results: 2310 MHz to 2390 MHz Restricted Band / Peak**

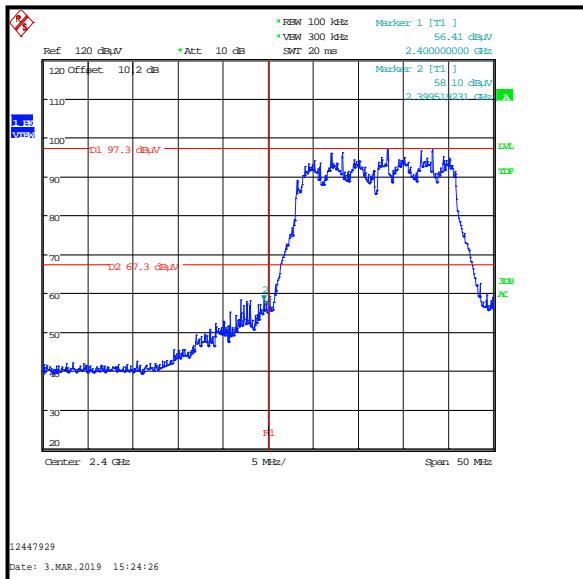
Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2390	Vertical	62.1	74.0	11.9	Complied

**Results: 2310 MHz to 2390 MHz Restricted Band / Average**

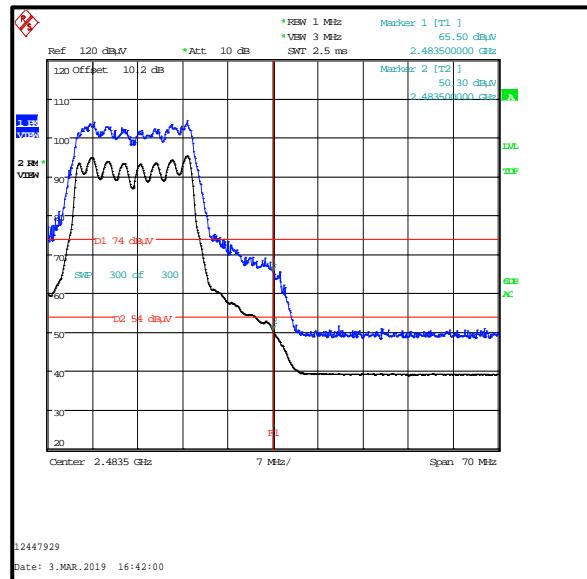
Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Duty Cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2390	Vertical	44.1	0.3	44.4	54.0	9.6	Complied

## **Transmitter Band Edge Radiated Emissions (continued)**

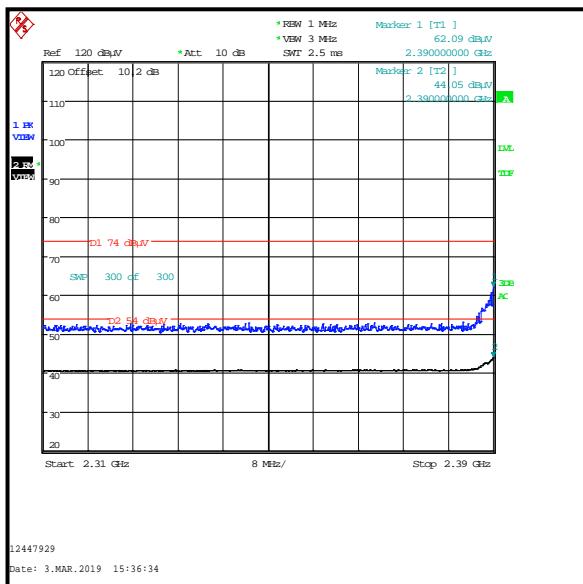
## **Results: 802.11n HT20 / SISO / BPSK / MCS0**



## Lower Band Edge



## Upper Band Edge



**2310 MHz to 2390 MHz Restricted Band**

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