



# TEST REPORT

**Test Report No. :** UL-RPT-RP12743305-116A V2.0

**Customer** : Columbia Care LLC  
**Model No.** : PR0D053  
**FCC ID** : 2ATRMPR0D053  
**Technology** : *Bluetooth* – Low Energy  
**Test Standard(s)** : FCC Parts 15.209(a) & 15.247

**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 1.0.

**Date of Issue:** 24 April 2020

**Checked by:**

Ben Mercer  
Senior Test Engineer, Radio Laboratory

**Company Signatory:**

Sarah Williams  
Senior Test Engineer, Radio Laboratory  
UL VS LTD



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## UL VS LTD

Unit 1-3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, UK  
Telephone: +44 (0)1256 312000  
Facsimile: +44 (0)1256 312001

**Customer Information**

<b>Company Name:</b>	Columbia Care LLC
<b>Address:</b>	321 Billerica Road Suite 201 Chelmsford MA 01824 USA

**Report Revision History**

<b>Version Number</b>	<b>Issue Date</b>	<b>Revision Details</b>	<b>Revised By</b>
1.0	28/08/2019	Initial Version	Ben Mercer
2.0	24/04/2020	AC Conducted Emissions results removed	Ben Mercer

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## 1. Attestation of Test Results







### 1.1. Description of EUT

The equipment under test was a vaporiser that incorporated a *Bluetooth* Low Energy module.

### 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>Site Registration:</b>	621311
<b>Location of Testing:</b>	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
<b>Test Dates:</b>	01 April 2019 to 04 April 2019

### 1.3. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth	
Part 15.35(c)	Transmitter Duty Cycle	Note 1
Part 15.247(b)(3)	Transmitter Maximum Peak Output Power	
Part 15.247(e)	Transmitter Power Spectral Density	Note 2
Part 15.247(d)/15.209(a)	Transmitter Radiated Emissions	
Part 15.247(d)/15.209(a)	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 the emissions. The EUT cannot transmit continuously and sweep triggering/signal gating cannot be implemented.
2. In accordance with ANSI C63.10 Section 11.10.1, PSD measurements are not required if the maximum conducted output power is less than the PSD limit of 8 dBm / 3 kHz. The PSD level is therefore deemed be equal to the measured output power.

### 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	-

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 15.247 Meas Guidance v05r02 April 02, 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	2.4 GHz to 2.4835 GHz	95%	±1.14 %
Minimum 6 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±4.59 %
Conducted Maximum Peak Output Power	2.4 GHz to 2.4835 GHz	95%	±1.13 dB
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±4.65 dB
Radiated Spurious Emissions	1 GHz to 25 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 Transmitter Conducted Tests

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1996	Signal Analyser	Rohde & Schwarz	FSV13	100975	16 Jan 2020	12
G0628	Signal Generator	Rohde & Schwarz	SMBV100A	261847	01 Sep 2020	36
M1267	Power Sensor	Rohde & Schwarz	NRV-Z52	100155	20 Apr 2020	24
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	20 Apr 2020	24
A2525	Attenuator	AtlanTecRF	AN18W5-10	832827#3	Calibrated before use	-
M2004	Thermohygrometer	Testo	608-H1	45056425	06 Jan 2020	12

### Test Equipment Used for Transmitter Duty Cycle Tests

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	3m RSE Chamber	Rainford EMC	N/A	N/A	04 Oct 2019	12
M1630	Test Receiver	Rohde & Schwarz	ESU40	100233	20 Sep 2019	12
A3155	Pre-Amplifier	Com-Power	PAM-118A	18040037	14 Sep 2019	12
A3138	Antenna	Schwarzbeck	BBHA 9120 B	00702	03 Oct 2019	12
A2523	Attenuator	AtlanTechRF	AN18W5-10	832827#1	04 Mar 2020	12

**Test and Measurement Equipment (continued)****Test Equipment Used for Transmitter Radiated Emissions Tests**

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	3m RSE Chamber	Rainford EMC	N/A	N/A	04 Oct 2019	12
M1630	Test Receiver	Rohde & Schwarz	ESU40	100233	20 Sep 2019	12
A3154	Pre-Amplifier	Com-Power	PAM-103	18020012	14 Sep 2019	12
A3155	Pre-Amplifier	Com-Power	PAM-118A	18040037	14 Sep 2019	12
A2896	Pre-Amplifier	Schwarzbeck	BBV 9721	9721 - 023	08 Feb 2020	12
A3141	Pre-Amplifier	Schwarzbeck	BBV 9718 B	00021	21 Nov 2019	12
A3138	Antenna	Schwarzbeck	BBHA 9120 B	00702	03 Oct 2019	12
A3139	Antenna	Schwarzbeck	HWRD750	00027	04 Oct 2019	12
A2895	Antenna	Schwarzbeck	BBHA 9170	9170-728	08 Feb 2020	12
A553	Antenna	Chase	CBL6111A	1593	08 Oct 2019	12
A3112	Attenuator	AtlanTechRF	AN18-06	219706#2	Calibrated before use	12
A2523	Attenuator	AtlanTechRF	AN18W5-10	832827#1	04 Mar 2020	12
A3093	High Pass Filter	AtlanTechRF	AFH-03000	18051800077	29 Jun 2019	12
A3095	High Pass Filter	AtlanTechRF	AFH-07000	18051600012	29 Jun 2019	12
A3085	Low Pass Filter	AtlanTecRF	AFL-02000	18051600014	29 Jun 2019	12

**Test Equipment Used for Transmitter Band Edge Radiated Emissions Tests**

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	3m RSE Chamber	Rainford EMC	N/A	N/A	04 Oct 2019	12
M1630	Test Receiver	Rohde & Schwarz	ESU40	100233	20 Sep 2019	12
A3155	Pre-Amplifier	Com-Power	PAM-118A	18040037	14 Sep 2019	12
A3138	Antenna	Schwarzbeck	BBHA 9120 B	00702	03 Oct 2019	12
A2523	Attenuator	AtlanTechRF	AN18W5-10	832827#1	04 Mar 2020	12



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

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

<b>Brand Name:</b>	Prodose
<b>Model Name or Number:</b>	PR0D053
<b>Test Sample Serial Number:</b>	2 ( <i>Conducted Sample</i> )
<b>Hardware Version:</b>	1
<b>Software Version:</b>	1
<b>FCC ID:</b>	2ATRMPR0D053

<b>Brand Name:</b>	Prodose
<b>Model Name or Number:</b>	PR0D053
<b>Test Sample Serial Number:</b>	3 ( <i>Radiated Sample</i> )
<b>Hardware Version:</b>	1
<b>Software Version:</b>	1
<b>FCC ID:</b>	2ATRMPR0D053

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

No modifications were applied to the EUT during testing.

### 3.3. Additional Information Related to Testing

Technology Tested:	Bluetooth Low Energy (Digital Transmission System)		
Type of Unit:	Transceiver		
Channel Spacing:	2 MHz		
Modulation:	GFSK		
Data Rate:	1 Mbps		
Power Supply Requirement(s):	Nominal	3.7 VDC	
Maximum Conducted Output Power:	-3.2 dBm		
Transmit Frequency Range:	2402 MHz to 2480 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	37	2402
	Middle	17	2440
	Top	39	2480

### 3.4. Description of Available Antennas

The radio utilizes an integrated antenna, with the following maximum gain:

Frequency Range (MHz)	Antenna Gain (dBi)
2400-2480	1.5

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

#### **Support Equipment**

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

<b>Description:</b>	Test Laptop
<b>Brand Name:</b>	Dell
<b>Model Name or Number:</b>	XPS
<b>Serial Number:</b>	41VD1G2

<b>Description:</b>	USB Cable. Length 0.2 metre. Quantity 1.
<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 to UART Cable. Length 1.8 metres. Quantity 1.
<b>Brand Name:</b>	FTDI Chip
<b>Model Name or Number:</b>	TTL-232R-3V3
<b>Serial Number:</b>	174908867

<b>Description:</b>	AC to DC USB Power Adaptor
<b>Brand Name:</b>	Anker 40 Watt 5-Port USB
<b>Model Name or Number:</b>	71AN7105
<b>Serial Number:</b>	AK-2124112

<b>Description:</b>	USB Type B to Type C Cable. Length 1.0 metre. Quantity 1.
<b>Brand Name:</b>	Anker
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	Test Laptop
<b>Brand Name:</b>	Lenovo
<b>Model Name or Number:</b>	L440
<b>Serial Number:</b>	R9-019EA1 14/04

## **Operating Modes**

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

- Transmitting at maximum power in *Bluetooth* LE mode with modulation, maximum possible data length available and Pseudorandom Bit Sequence 9.

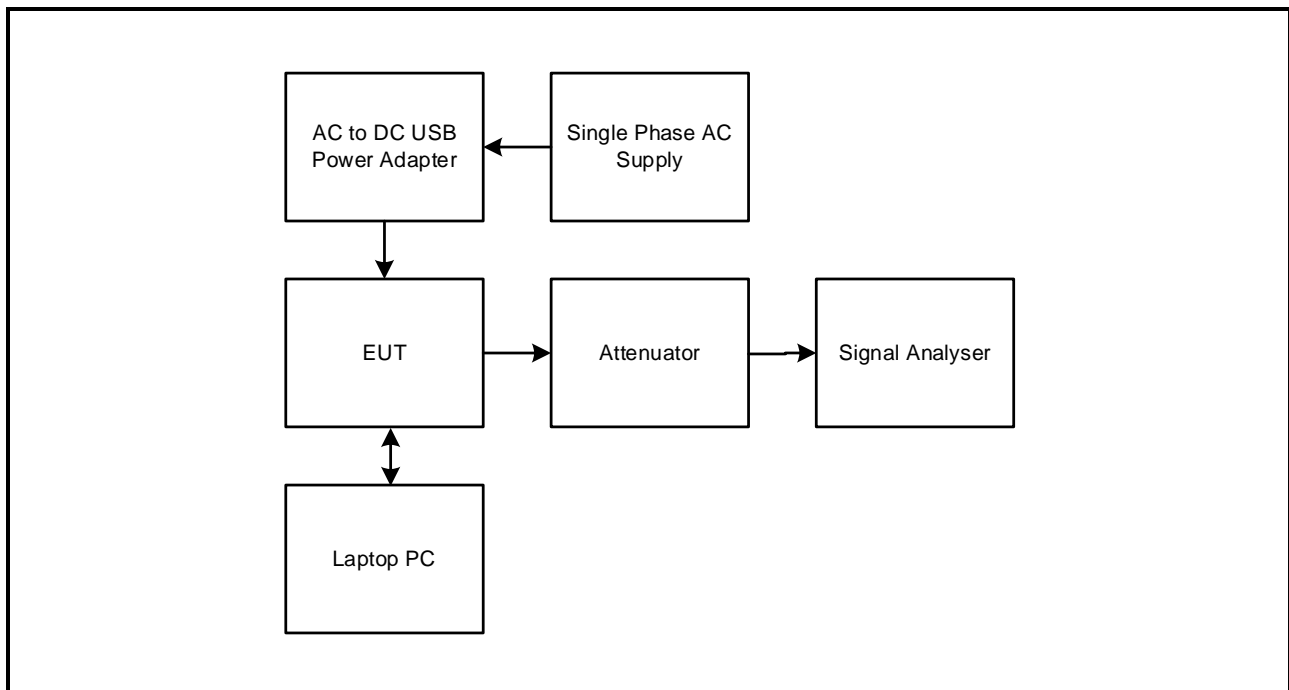
## **Configuration and Peripherals**

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

- The EUT was controlled with a laptop PC running a Python script (test.py) supplied by the customer. The channels, packet lengths and settings were applied using the script as required. The laptop PC was connected to the EUT via the USB to UART cable.
- The EUT was powered from a 5 V AC to DC USB power adapter connected to a 120 VAC 60 Hz single phase mains supply, unless otherwise stated..
- Radiated measurements were performed with the EUT in the worst case orientation/position. Tests were performed with the EUT connected to the AC to DC USB power adaptor and a test laptop via the USB to UART cable.

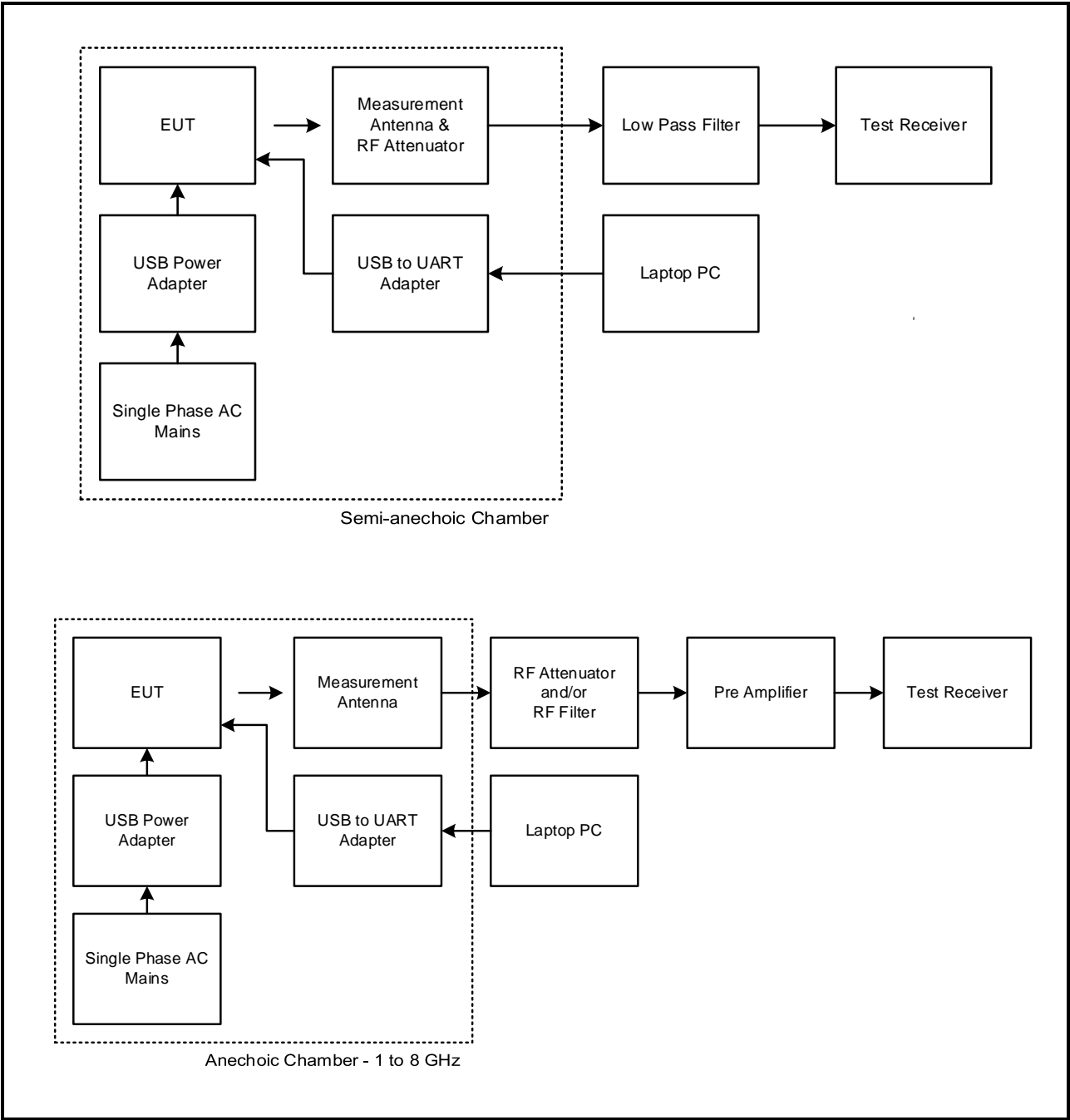
## **Test Setup Diagrams**

### **Conducted Tests:**



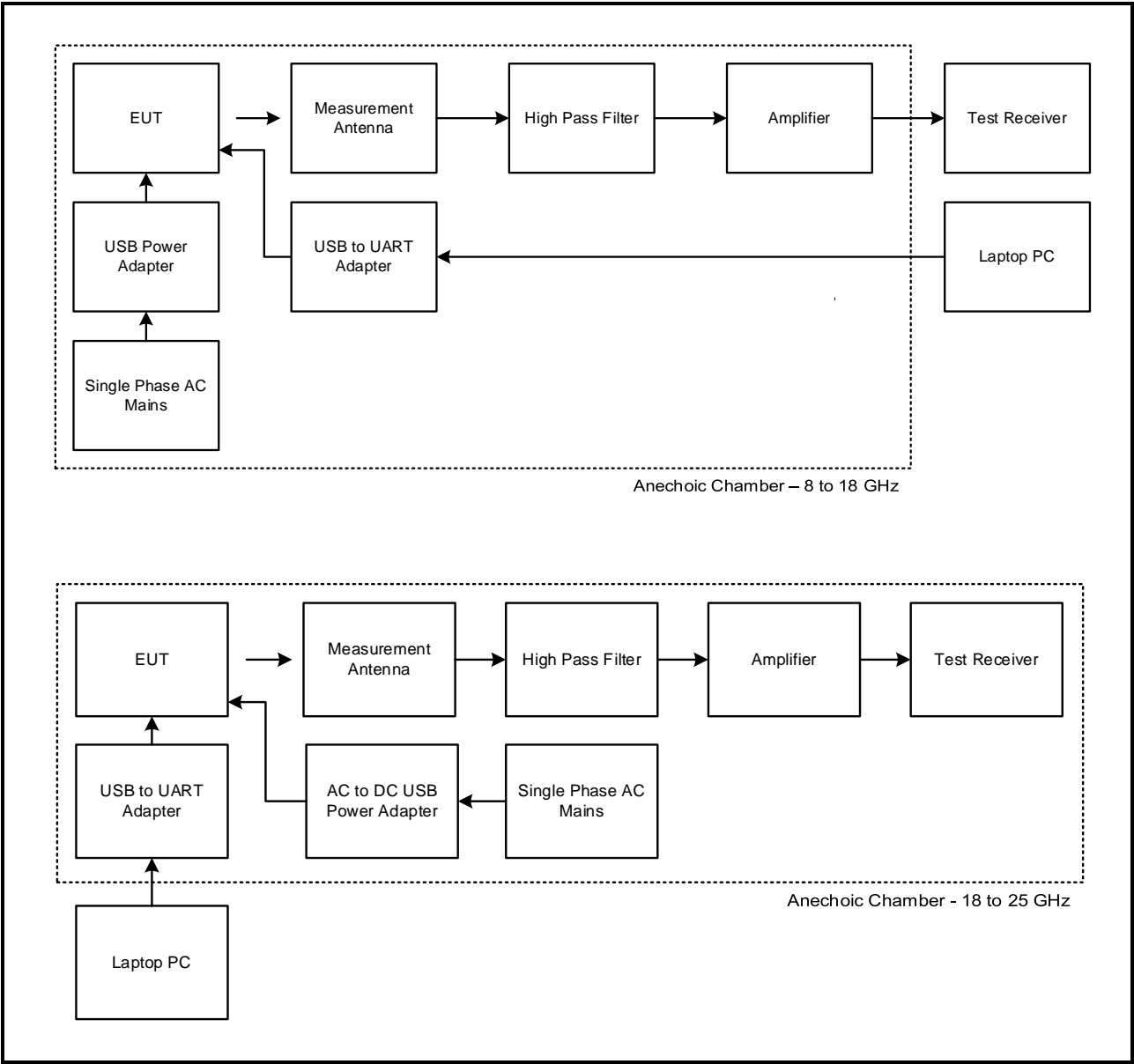
Test Setup Diagrams (continued)

Radiated Tests:



Test Setup Diagrams (continued)

Radiated Tests:



## **4. Antenna Port Test Results**

### **4.1. Transmitter Minimum 6 dB Bandwidth**

#### **Test Summary:**

<b>Test Engineer:</b>	Victor Carmon	<b>Test Date:</b>	04 April 2019
<b>Test Sample Serial Number:</b>	2		

<b>FCC Reference:</b>	Part 15.247(a)(2)
<b>Test Method Used:</b>	FCC KDB 558074 Section 8.2 referencing ANSI C63.10 Section 11.8.1

#### **Environmental Conditions:**

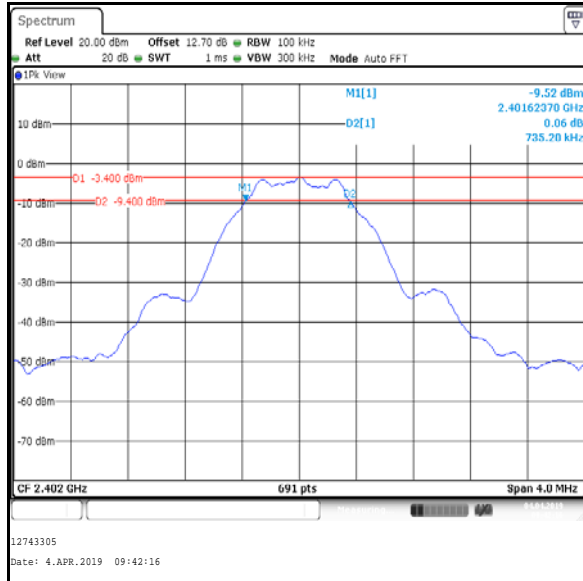
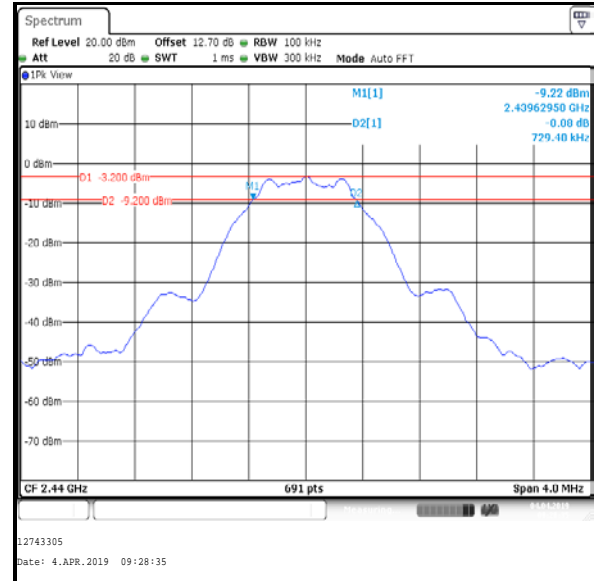
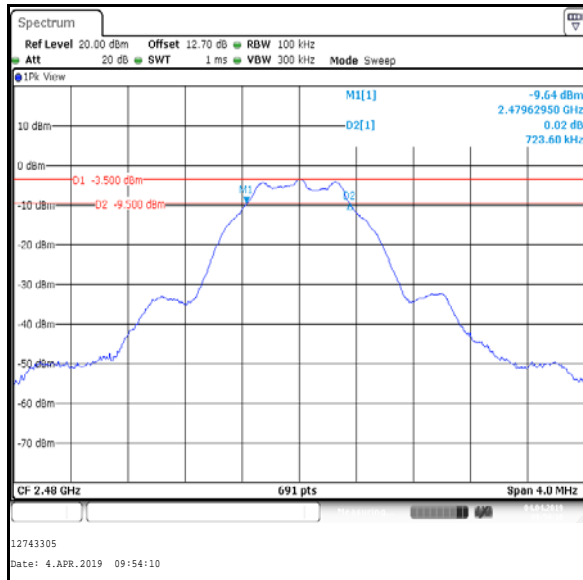
<b>Temperature (°C):</b>	20
<b>Relative Humidity (%):</b>	34

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

1. 6 dB DTS bandwidth tests were performed using a signal analyser in accordance with ANSI C63.10 Section 11.8.1 Option 1 measurement procedure. The signal analyser resolution bandwidth was set to 100 kHz and video bandwidth to 300 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The DTS bandwidth was measured at 6 dB down from the peak of the signal.
2. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable.

**Transmitter Minimum 6 dB Bandwidth (continued)****Results:**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	735.200	≥500	235.200	Complied
Middle	729.400	≥500	229.400	Complied
Top	723.600	≥500	223.600	Complied

**Bottom Channel****Middle Channel****Top Channel**



## **4.2. Transmitter Maximum Peak Output Power**

### **Test Summary:**

<b>Test Engineer:</b>	Victor Carmon	<b>Test Date:</b>	04 April 2019
<b>Test Sample Serial Number:</b>	2		

<b>FCC Reference:</b>	Part 15.247(b)(3)
<b>Test Method Used:</b>	FCC KDB 558074 Section 8.3.1.1 referencing ANSI C63.10 Section 11.9.1.1

### **Environmental Conditions:**

<b>Temperature (°C):</b>	20
<b>Relative Humidity (%):</b>	34

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

1. Conducted power tests were performed using a signal analyser in accordance with ANSI C63.10 Section 11.9.1.1 RBW  $\geq$  DTS bandwidth procedure.
2. The signal analyser resolution bandwidth was set to 1 MHz and video bandwidth to 3 MHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The span was set to 5 MHz. A marker was placed at the peak of the signal and the results recorded in the tables below.
3. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset was entered on the signal analyser to compensate for the loss of the attenuator and RF cable.
4. The conducted power was added to the declared antenna gain to obtain the EIRP.

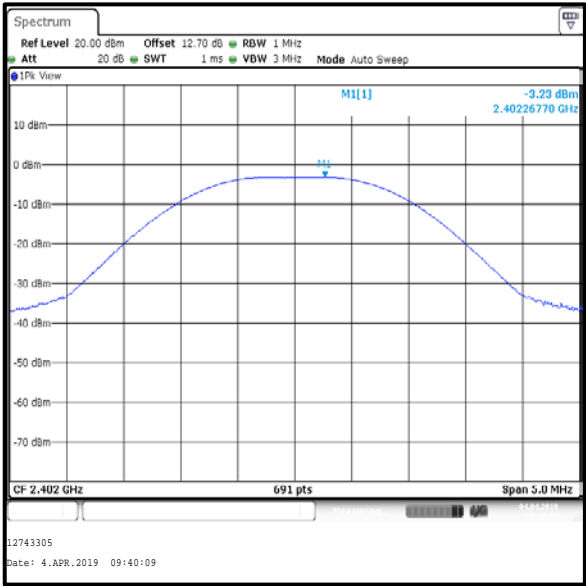
**Transmitter Maximum Peak Output Power (continued)****Results:**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-3.2	30.0	33.2	Complied
Middle	-3.2	30.0	33.2	Complied
Top	-3.3	30.0	33.3	Complied

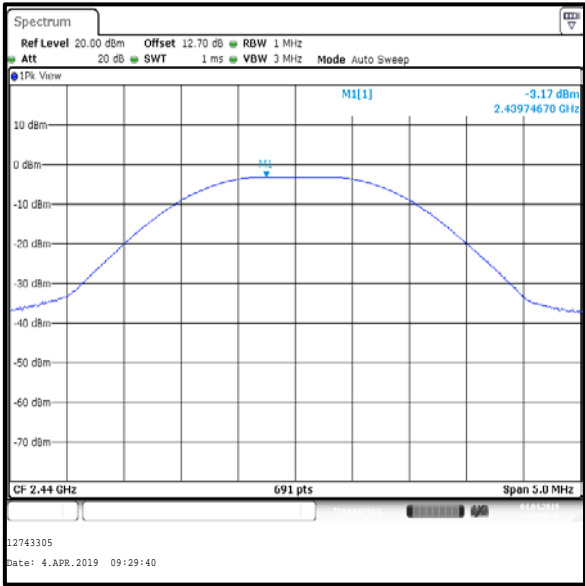
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-3.2	1.5	-1.7	36.0	37.7	Complied
Middle	-3.2	1.5	-1.7	36.0	37.7	Complied
Top	-3.3	1.5	-1.8	36.0	37.8	Complied

Transmitter Maximum Peak Output Power (continued)

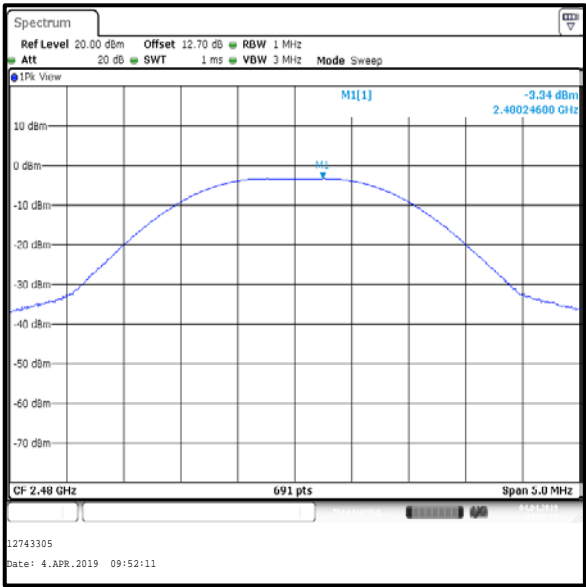
Results:



Bottom Channel



Middle Channel



Top Channel

## **5. Radiated Test Results**

### **5.1. Transmitter Duty Cycle**

### Test Summary:

<b>Test Engineer:</b>	Mohamed Toubella	<b>Test Date:</b>	01 April 2019
<b>Test Sample Serial Number:</b>	3		

<b>FCC Reference:</b>	Part 15.35(c)
<b>Test Method Used:</b>	FCC KDB 558074 Section 6

### Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	37

**Note(s):**

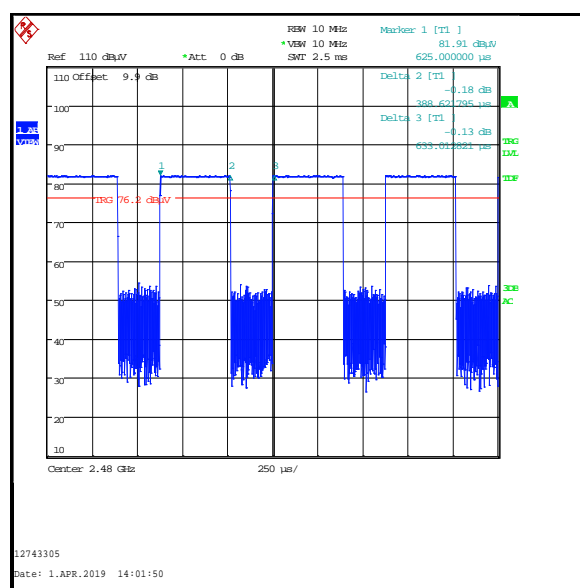
1. In order to assist with the determination of the average level of spurious emissions field strength, measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter. The transmitter duty cycle was measured using a spectrum analyser in the time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

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

$$10 \log (1 / (388.622 \mu s / 633.013 \mu s)) = 2.1 \text{ dB}$$

### Results: LE

Pulse Duration ( $\mu\text{s}$ )	Period ( $\mu\text{s}$ )	Duty Cycle (dB)
388.622	633.013	2.1



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

### **Test Summary:**

<b>Test Engineer:</b>	Mohamed Toubella	<b>Test Date:</b>	04 April 2019
<b>Test Sample Serial Number:</b>	3		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Test Method Used:</b>	ANSI C63.10 Sections 6.3, 6.5, 11.11 & 11.12
<b>Frequency Range</b>	30 MHz to 1000 MHz

### **Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	37

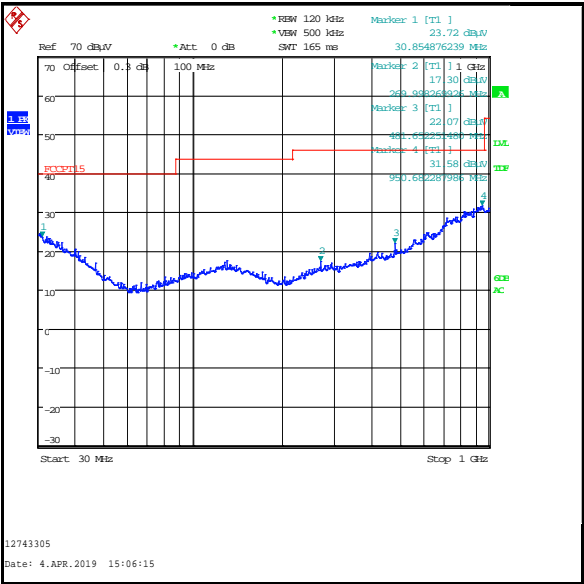
### **Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. 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 emissions shown on the pre-scans were investigated and found to be ambient, > 20 dB below the appropriate limit or below the noise floor of the measurement system. Therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.
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 120 kHz and video bandwidth 500 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.

Transmitter Radiated Emissions (continued)

Results: Peak / Middle Channel

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
950.602	Horizontal	31.6	46.0	14.4	Complied



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

#### **Test Summary:**

<b>Test Engineer:</b>	Mohamed Toubella	<b>Test Dates:</b>	01 April 2019 & 04 April 2019
<b>Test Sample Serial Number:</b>	3		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Test Method Used:</b>	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 to 24
<b>Relative Humidity (%):</b>	37 to 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 emission shown on the 1 GHz to 3 GHz plot is the EUT fundamental.
3. All other emissions shown on the pre-scans were investigated and found to be ambient, > 20 dB below the appropriate limit or below the noise floor of the measurement system.
4. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0001) 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 fully 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.
5. 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.
6. \*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 reference level for the emission in the non-restricted band was established by following KDB 558074 Section 11.2 procedure.
8. \*\* -20 dBc limit applies in non-restricted band as the conducted output power measurements were performed using a peak detector.

**Transmitter Radiated Emissions (continued)****Results: Peak / Bottom Channel**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
4804.344	Horizontal	50.1	54.0*	3.9	Complied
7205.984	Horizontal	53.9	70.9**	17.0	Complied

**Results: Peak / Middle Channel**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
4879.700	Horizontal	48.4	54.0*	5.6	Complied
7319.779	Horizontal	55.6	74.0	18.4	Complied

**Results: Average / Middle Channel**

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
7319.226	Horizontal	51.0	54.0	3.0	Complied

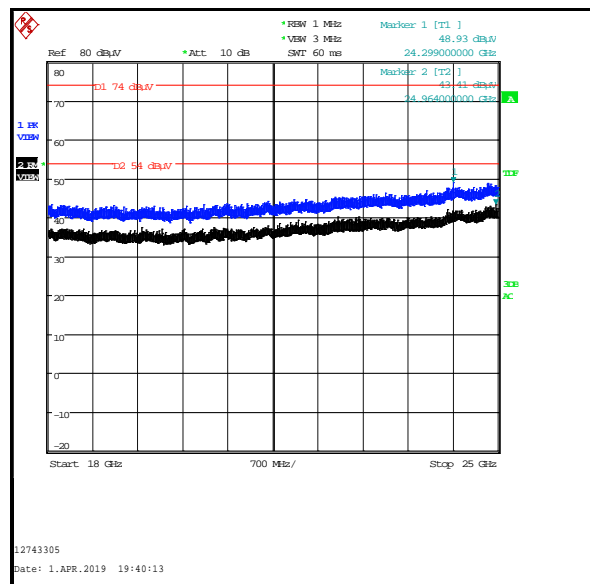
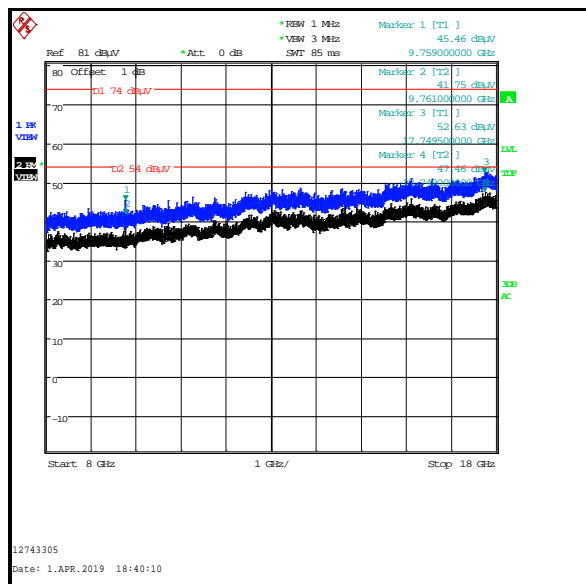
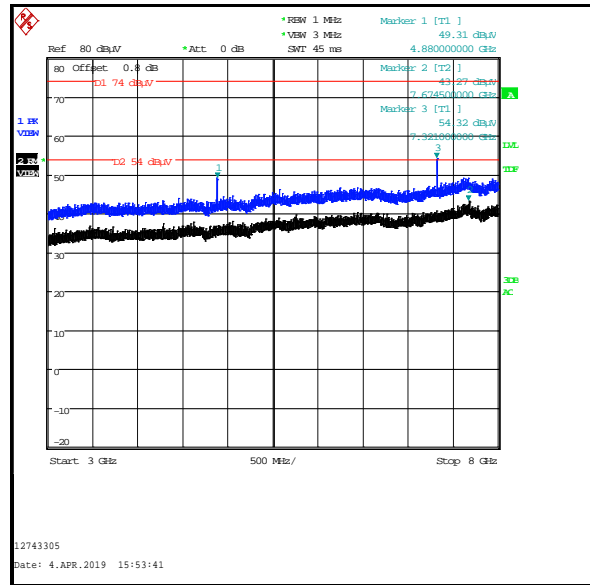
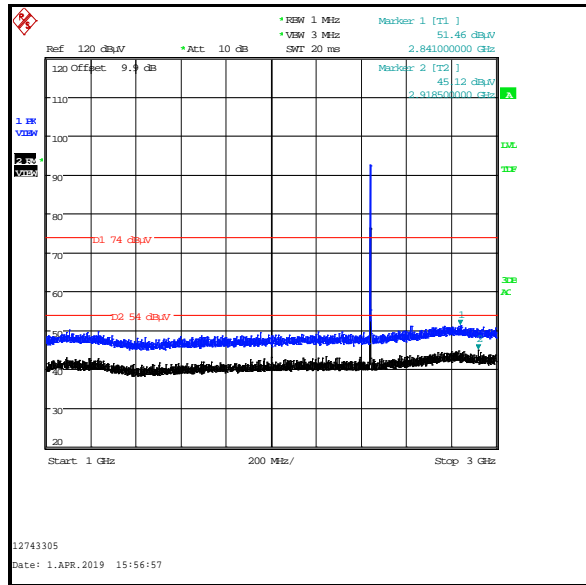
**Results: Peak / Top Channel**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
4960.481	Horizontal	52.0	54.0*	2.0	Complied
7440.737	Horizontal	56.1	74.0	17.9	Complied

**Results: Average / Top Channel**

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
7439.279	Horizontal	51.6	54.0	2.4	Complied



**Transmitter Radiated Emissions (continued)**

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

## 5.4. Transmitter Band Edge Radiated Emissions

### Test Summary:

Test Engineer:	Mohamed Toubella	Test Dates:	01 April 2019 & 04 April 2019
Test Sample Serial Number:	3		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	ANSI C63.10 Sections 11.11, 11.12, 11.13 & Notes below

### Environmental Conditions:

Temperature (°C):	23 to 24
Relative Humidity (%):	37 to 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 maximum peak conducted output power was previously measured. In accordance with ANSI C63.10 Section 11.11.1(a), the lower band edge measurement was performed with a peak detector and the -20 dBc limit applied.
3. 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 to 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. As the maximum peak conducted output power was measured using an peak detector in accordance with ANSI C63.10 Section 11.9.1.1 an out-of-band limit line was placed 20 dB (ANSI C63.10 Section 11.11.1(a)) below the peak level. A marker was placed on the band edge spot frequencies. Marker frequency and levels were recorded.
4. 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 to 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 to 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. 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 peak and RMS detectors respectively. Markers were placed on the highest point on each trace.
6. \* -20 dBc limit.
7. In accordance with ANSI C63.10 Section 12.2.5.2, average measurements the EUT was transmitting at <98% duty cycle, the duty cycle correction factor calculated in Section 5.1 of this test report was added to the measured result

**Transmitter Band Edge Radiated Emissions (continued)****Results: Peak**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.000	Vertical	47.8	70.9*	23.1	Complied
2483.500	Vertical	59.6	74.0	14.4	Complied

**Results: Average**

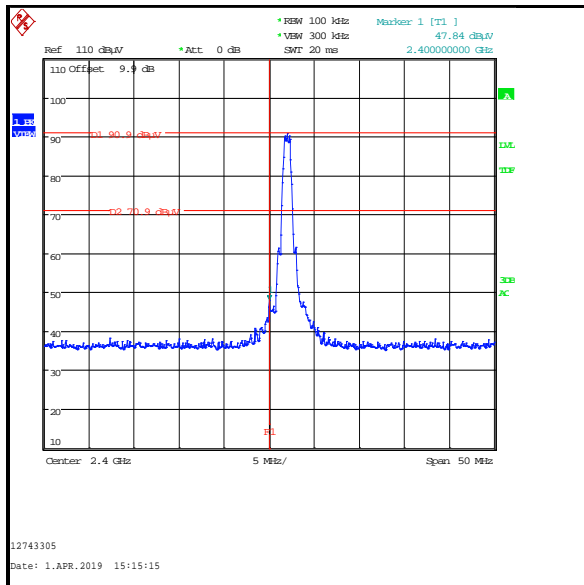
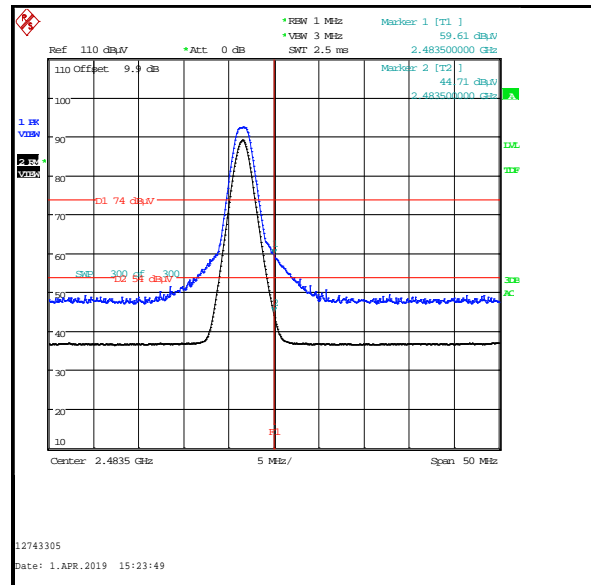
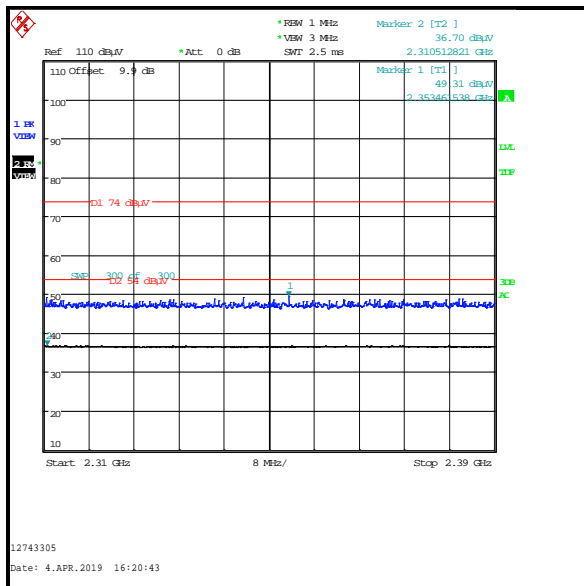
Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Duty cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.500	Vertical	44.7	2.1	46.8	54.0	7.2	Complied

**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
2353.462	Vertical	49.3	74.0	24.7	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
2310.513	Vertical	36.7	2.1	38.8	54.0	15.2	Complied

**Transmitter Band Edge Radiated Emissions (continued)****Results: LE****Lower Band Edge****Upper Band Edge****2310 MHz to 2390 MHz Restricted Band****--- END OF REPORT ---**