



# TEST REPORT

**Test Report No. : UL-RPT-RP12888381-716A**

**Customer** : Accesso Technology Group Plc  
**Model No. / HVIN** : 57136-1, 57136-2 and 57136-3  
**PMN** : Prism V2  
**FCC ID** : 2AKCM-57136  
**ISED Certification No.** : 21963-57136  
**Technology** : *Bluetooth* – Low Energy  
**Test Standard(s)** : FCC Parts 15.247(a)(2), 15.247(b)(3) & 15.35(c),  
Innovation, Science and Economic Development Canada  
RSS-247 Issue 2 Section 5.2(a), 5.4(d)  
RSS-Gen 6.7, 6.12 & 8.2  
**Test Laboratory** : UL International (UK) 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:** 2 August 2021

**Checked by:**

Ben Mercer  
Lead Project Engineer, Radio Laboratory

**Company Signatory:**

Sarah Williams  
Operations Leader, Radio Laboratory



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**UL International (UK) Ltd**

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

## **Customer Information**

<b>Company Name:</b>	Accesso Technology Group Plc
<b>Address:</b>	Unit 5 The Pavilions Twyford Berkshire RG10 9NN United Kingdom

## **Report Revision History**

<b>Version Number</b>	<b>Issue Date</b>	<b>Revision Details</b>	<b>Revised By</b>
1.0	16/06/2021	Initial Version	Ben Mercer
2.0	27/07/2021	Implemented changes requested by TCB	Ben Mercer
3.0	02/08/2021	Implemented changes requested by TCB	Ben Mercer

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## **1 Attestation of Test Results**








### **1.1 Description of EUT**

The equipment under test was a wrist worn wireless booking device. It contains a *Bluetooth* LE transceiver and a 915 MHz LoRaWAN transceiver.

### **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 February 2021
<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 Site Registration:</b>	685609
<b>ISED Site Registration:</b>	20903
<b>FCC Lab. Designation No.:</b>	UK2011
<b>ISED CABID:</b>	UK0001
<b>Location of Testing:</b>	Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
<b>Test Dates:</b>	04 February 2021 to 31 March 2021

### **1.3 Summary of Test Results**

<b>FCC Reference (47CFR)</b>	<b>ISED Canada Reference</b>	<b>Measurement</b>	<b>Result</b>
Part 15.247(a)(2)	RSS-Gen 6.7 / RSS-247 5.2(a)	Transmitter Minimum 6 dB Bandwidth	
N/A	RSS-Gen 6.7	Transmitter 99% Occupied Bandwidth	
Part 15.35(c)	RSS-Gen 8.2	Transmitter Duty Cycle	Note 1
Part 15.247(b)(3)	RSS-Gen 6.12 / RSS- 247 5.4(d)	Transmitter Maximum Peak Output Power	
Part 15.247(d) / 15.209(a)	RSS-Gen 6.13 & 8.9 / RSS-247 5.5	Transmitter Radiated Emissions	
Part 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 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	X

UL International (UK) 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 2, 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 & 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	2.4 GHz to 2.4835 GHz	95%	±1.14 %
Minimum 6 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±4.59 %
99% Occupied Bandwidth	2.4 GHz to 2.4835 GHz	95%	±3.92 %
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%	±3.30 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 Conducted Tests

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2002	Thermohygrometer	Testo	608-H1	45041825	10 Dec 2021	12
A3118	Attenuator	AtlanTecRF	AN18-10	237378#2	Calibrated before use	-
M1883	Signal Analyser	Rohde & Schwarz	FSV30	103084	19 Mar 2021	12
G0614	Signal Generator	Rohde & Schwarz	SMB100A	177687	19 May 2023	36

Note: All equipment was within calibration at the time of test

### Test Equipment Used for Transmitter Radiated Emissions Tests

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0001	5m RSE Chamber	Rainford	N/A	N/A	14 Oct 2021	12
M2044	Test Receiver	Rohde & Schwarz	ESU26	100122	03 Sep 2021	12
M2040	Thermohygrometer	Testo	608-H1	45124934	10 Dec 2021	12
A3179	Pre Amplifier	Agilent	8449B	3008A00934	29 Sep 2021	12
A3155	Pre Amplifier	Com-Power	PAM-118A	18040037	29 Sep 2021	12
A2131	Low Pass Filter	AtlanTecRF	AFL-02000	JFB1004-002	18 Nov 2021	12
A3093	High Pass Filter	AtlanTecRF	AFH-0300	18051800077	03 Feb 2022	12
A2523	Attenuator	AtlanTecRF	AN18W5-10	832827#1	03 Feb 2022	12
A3095	High Pass Filter	AtlanTecRF	AFH-07000	18051600012	03 Feb 2022	12
A3139	Antenna	Schwarzbeck	HWRD750	00027	06 Oct 2021	12
A3138	Antenna	Schwarzbeck	BBHA 9120 B	00702	06 Oct 2021	12
A2553	Antenna	Chase	CBL6111A	1593	14 Oct 2020	12
K0017	3m RSE Chamber	Rainford	N/A	N/A	21 Oct 2021	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	07 Dec 2021	12
M2003	Thermohygrometer	Testo	608-H1	45046641	10 Dec 2021	12
A2889	Antenna	Schwarzbeck	BBHA 9120 B	BBHA 9120B653	23 Oct 2021	12
A2916	Attenuator	AtlanTecRF	AN18W5-10	832827#1	01 Feb 2022	12
A2890	Antenna	Schwarzbeck	HWRD 750	014	26 Oct 2021	12
A2947	High Pass Filter	AtlanTecRF	AFH-07000	1601900001	01 Feb 2022	12
A2863	Pre Amplifier	Agilent	8449B	3008A02100	21 Oct 2021	12
A3142	Pre Amplifier	Schwarzbeck	BBV 9718 B	00020	21 Oct 2021	12



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

<b>Asset No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Calibration Due</b>	<b>Cal. Interval (Months)</b>
K0017	3m RSE Chamber	Rainford	N/A	N/A	21 Oct 2021	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	07 Dec 2021	12
M2003	Thermohygrometer	Testo	608-H1	45046641	10 Dec 2021	12
A2863	Pre Amplifier	Agilent	8449B	3008A02100	21 Oct 2021	12
A2889	Antenna	Schwarzbeck	BBHA 9120 B	BBHA 9120B653	23 Oct 2021	12
A2916	Attenuator	AtlanTecRF	AN18W5-10	832827#1	01 Feb 2022	12
K0001	5m RSE Chamber	Rainford	N/A	N/A	14 Oct 2021	12
M2044	Test Receiver	Rohde & Schwarz	ESU26	100122	03 Sep 2021	12
A2863	Pre Amplifier	Agilent	8449B	3008A02100	21 Oct 2021	12
A3138	Antenna	Schwarzbeck	BBHA 9120 B	00702	06 Oct 2021	12
M2040	Thermohygrometer	Testo	608-H1	45124934	10 Dec 2021	12
A2523	Attenuator	AtlanTecRF	AN18W5-10	832827#1	03 Feb 2022	12

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

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

<b>Brand Name / PMN:</b>	Prism V2
<b>Model Number / HVIN:</b>	57136-2
<b>Test Sample Serial Number:</b>	200033 ( <i>Conducted sample #1</i> )
<b>Hardware Version:</b>	57136-3002 REV-E3
<b>Firmware Version:</b>	Prism 2.1 Factory Test V3.62
<b>FCC ID:</b>	2AKCM-57136
<b>ISED Certification Number:</b>	21963-57136

<b>Brand Name / PMN:</b>	Prism V2
<b>Model Number / HVIN:</b>	57136-2
<b>Test Sample Serial Number:</b>	200066 ( <i>Radiated sample #1</i> )
<b>Hardware Version:</b>	57136-3002 REV-E3
<b>Firmware Version:</b>	Prism 2.1 Factory Test V3.62
<b>FCC ID:</b>	2AKCM-57136
<b>ISED Certification Number:</b>	21963-57136

<b>Brand Name / PMN:</b>	Prism V2
<b>Model Number / HVIN:</b>	57136-2
<b>Test Sample Serial Number:</b>	200049 ( <i>Radiated sample #2</i> )
<b>Hardware Version:</b>	57136-3002 REV-E3
<b>Firmware Version:</b>	Prism 2.1 Factory Test V3.62
<b>FCC ID:</b>	2AKCM-57136
<b>ISED Certification Number:</b>	21963-57136

#### **3.2 Untested Variants**

The customer declared that model numbers 57136-1 and 57136-3 are electrically and functionally identical to 57136-2, with only the bezel colour and laser printing differing between models.

#### **3.3 Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

### **3.4 Additional Information Related to Testing**

<b>Technology Tested:</b>	<i>Bluetooth</i> Low Energy (Digital Transmission System)		
<b>Type of Unit:</b>	Transceiver		
<b>Channel Spacing:</b>	2 MHz		
<b>Modulation:</b>	GFSK		
<b>Data Rate:</b>	1 Mbps		
<b>Power Supply Requirement(s):</b>	Nominal	3.0 VDC	
<b>Maximum Conducted Output Power:</b>	0.8 dBm		
<b>Transmit Frequency Range:</b>	2402 MHz to 2480 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	37	2402
	Middle	38	2426
	Top	39	2480

### **3.5 Description of Available Antennas**

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

<b>Type</b>	<b>Model</b>	<b>Frequency Range (MHz)</b>	<b>Antenna Gain (dBi)</b>
Chip	2450AT07A0100	2400-2480	-1.5

### **3.6 Description of Test Setup**

#### **Support Equipment**

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

<b>Description:</b>	Laptop
<b>Brand Name:</b>	HP
<b>Model Name or Number:</b>	ProBook 6550b
<b>Serial Number:</b>	CNU1010CP1

<b>Description:</b>	NFC Reader
<b>Brand Name:</b>	Feig Electronic
<b>Model Name or Number:</b>	CPR44-02-4SCUSB
<b>Serial Number:</b>	5706423

#### **Operating Modes**

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

- Transmitting at maximum power in *Bluetooth* LE mode with modulation, an interval of 500ms and in continuous Random Data mode.

#### **Configuration and Peripherals**

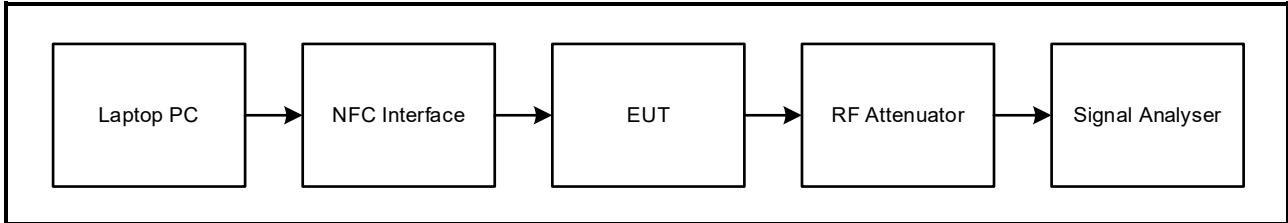
The EUT was tested in the following configuration(s):

- A test laptop with the customer's test application was used to place the EUT into *Bluetooth* LE test mode via a NFC interface and cable. The application was used to enable continuous transmission and to select the test channels & packet types as required. The customer supplied instructions to configure the EUT into test mode "FCC Script Instructions.pdf".
- The EUT was configured to transmit 500 packets of continuous random data, with an interval of 500ms.
- The EUT incorporates a chip antenna. A modified sample was supplied with an external antenna connector to facilitate conducted measurements.
- During conducted tests, the EUT was powered by an external battery pack connected to the EUT by soldered cable.
- During radiated tests, the EUT was powered from an internal 3.0 V battery.
- Transmitter radiated spurious emissions tests were performed with the EUT in the worst case orientation/position with respect to emissions. There were no ports to terminate.

**Test Setup Diagrams**

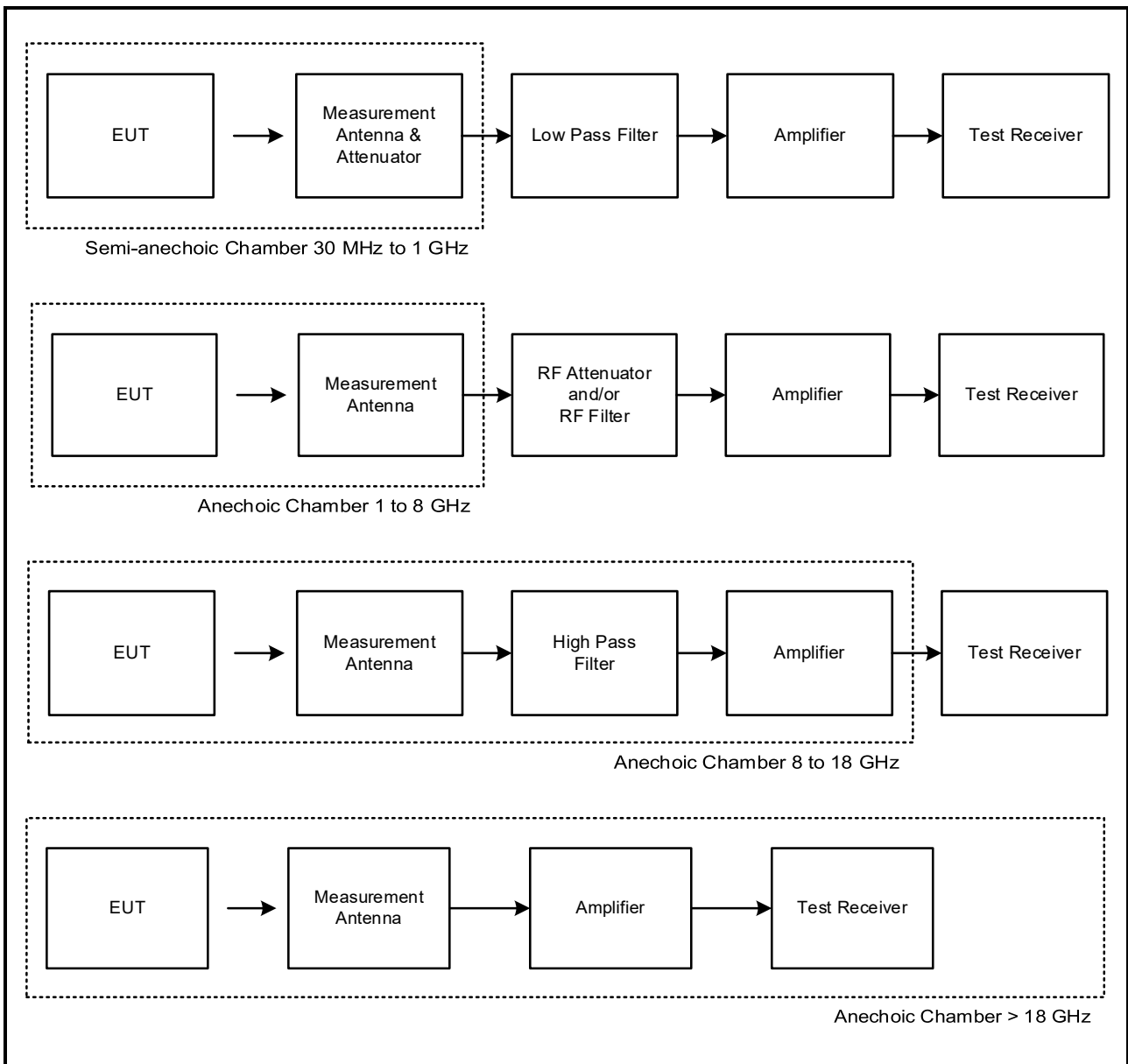
**Conducted Tests:**

**Test Setup for Transmitter Minimum 6 dB Bandwidth, Duty Cycle, Power Spectral Density & Maximum Peak Output Power**



**Radiated Tests:**

**Test Setup for Transmitter Radiated Emissions**



## **4 Antenna Port Test Results**

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

#### **Test Summary:**

<b>Test Engineer:</b>	Chanthu Thevarajah	<b>Test Date:</b>	11 February 2021
<b>Test Sample Serial Number:</b>	200033		

<b>FCC Reference:</b>	Part 15.247(a)(2)
<b>ISED Canada Reference:</b>	RSS-Gen 6.7 / RSS-247 5.2(a)
<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>	23
<b>Relative Humidity (%):</b>	25

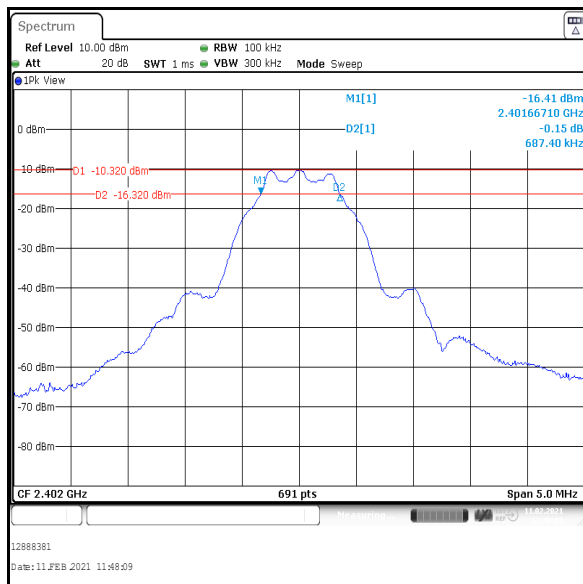
#### **Note(s):**

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 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 coax cable.

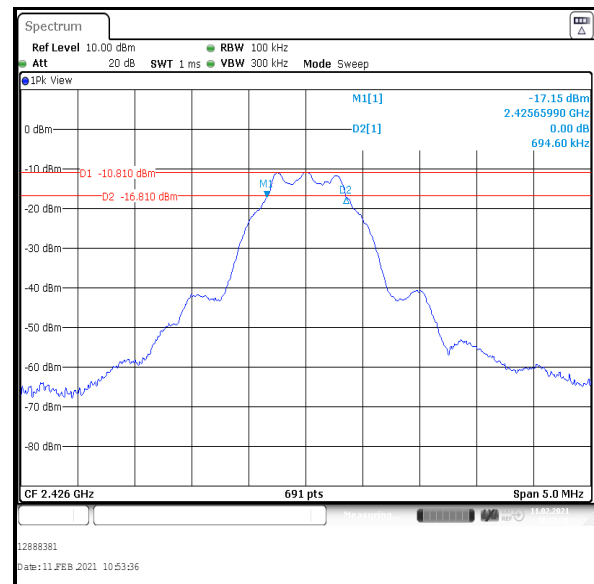
**Transmitter Minimum 6 dB Bandwidth (continued)**

**Results:**

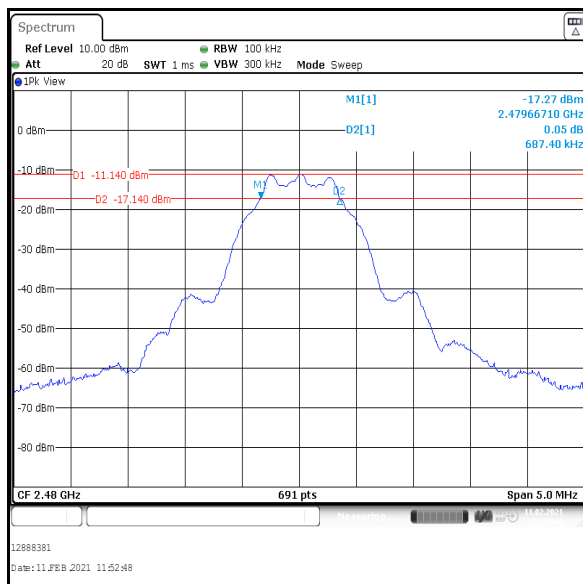
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	687.400	≥500	187.400	Complied
Middle	694.600	≥500	194.600	Complied
Top	687.400	≥500	187.400	Complied



**Bottom Channel**



**Middle Channel**



**Top Channel**

## **4.2 Transmitter 99% Occupied Bandwidth**

### **Test Summary:**

<b>Test Engineer:</b>	Chanthu Thevarajah	<b>Test Date:</b>	11 February 2021
<b>Test Sample Serial Number:</b>	200033		

<b>FCC Reference:</b>	N/A
<b>ISED Canada Reference:</b>	RSS-Gen 6.7
<b>Test Method Used:</b>	RSS-Gen 6.7 and Notes below

### **Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	25

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

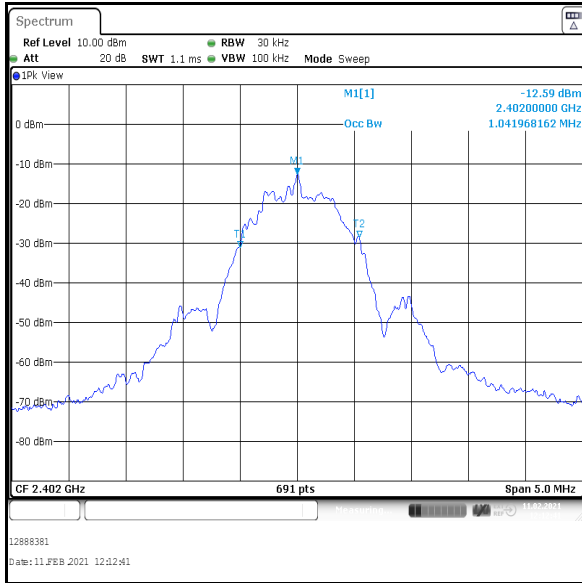
1. The 99% emission bandwidth was measured using the signal analyser occupied bandwidth function. The resolution bandwidth was set in the range of 1% to 5% of the occupied bandwidth and the video bandwidth set to 3 times the resolution bandwidth. The span was set to capture all products of the modulation process including emission skirts.
2. The signal analyser resolution bandwidth was set to 30 kHz and video bandwidth 100 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The span was set to 5 MHz. The signal analyser function set the measurements to be made at 99% of the emission bandwidth. The results are given in the tables below.
3. The signal analyser was connected to the RF port on the EUT using suitable attenuation and coax cable.



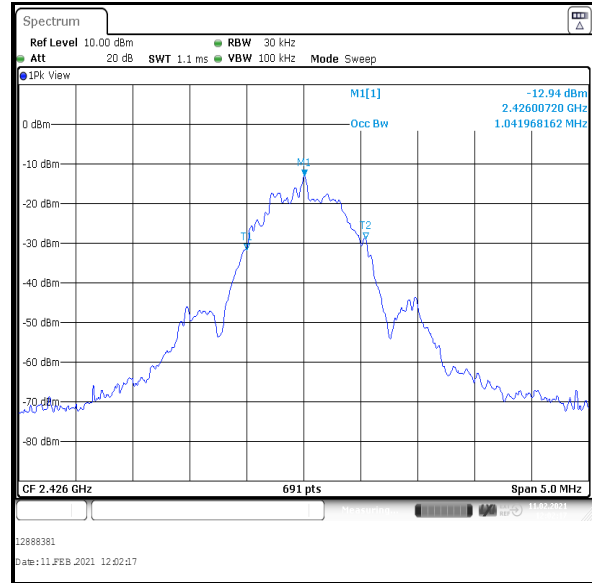
**Transmitter 99% Occupied Bandwidth (continued)**

**Results:**

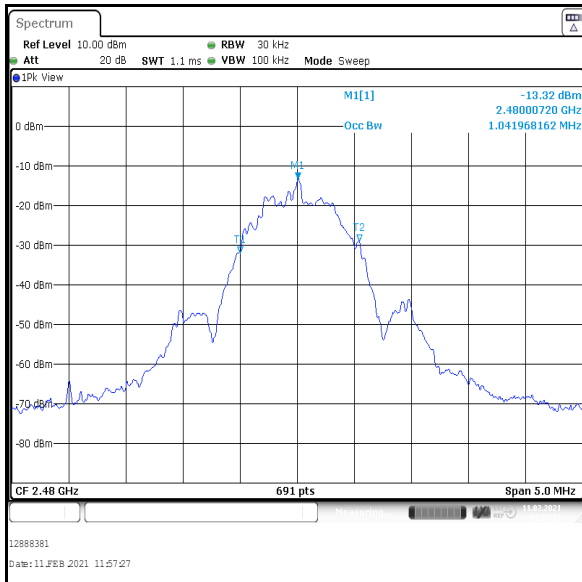
Channel	99% Occupied Bandwidth (kHz)
Bottom	1041.968
Middle	1041.968
Top	1041.968



**Bottom Channel**



**Middle Channel**



**Top Channel**

### 4.3 Transmitter Duty Cycle

#### Test Summary:

<b>Test Engineer:</b>	Chanthu Thevarajah	<b>Test Date:</b>	05 February 2021
<b>Test Sample Serial Number:</b>	200033		

<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>	24
<b>Relative Humidity (%):</b>	36

#### Note(s):

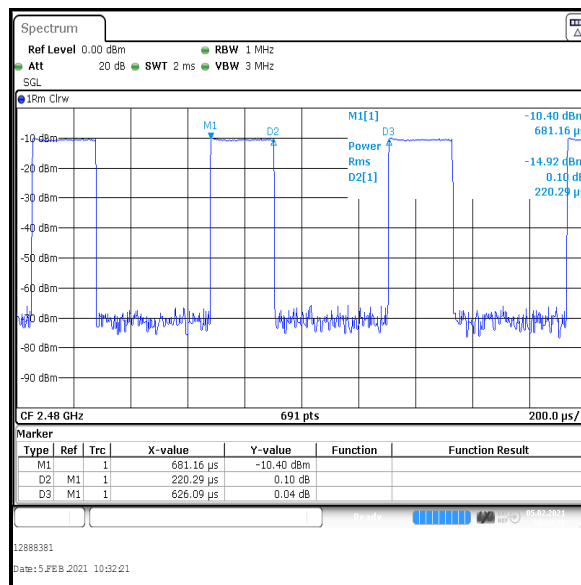
- In order to assist with the determination of the average level of spurious emissions field strength in LE mode, measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter. The transmitter duty cycle was measured using a spectrum/signal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

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

$$\text{Duty cycle: } 10 \log (1 / (220.290 \mu\text{s} / 626.090 \mu\text{s})) = 4.5 \text{ dB}$$

#### Results:

Pulse Duration (µs)	Period (µs)	Duty Cycle (dB)
220.290	626.090	4.5



#### **4.4 Transmitter Maximum Peak Output Power**

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

<b>Test Engineer:</b>	Chanthu Thevarajah	<b>Test Date:</b>	11 February 2021
<b>Test Sample Serial Number:</b>	200033		

<b>FCC Reference:</b>	Part 15.247(b)(3)
<b>ISED Canada Reference:</b>	RSS-Gen 6.12 / RSS-247 5.4(d)
<b>Test Method Used:</b>	FCC KDB 558074 Section 8.3.1.1 referencing ANSI C63.10 Section 11.9.1.1 and Notes below

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

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	25

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

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

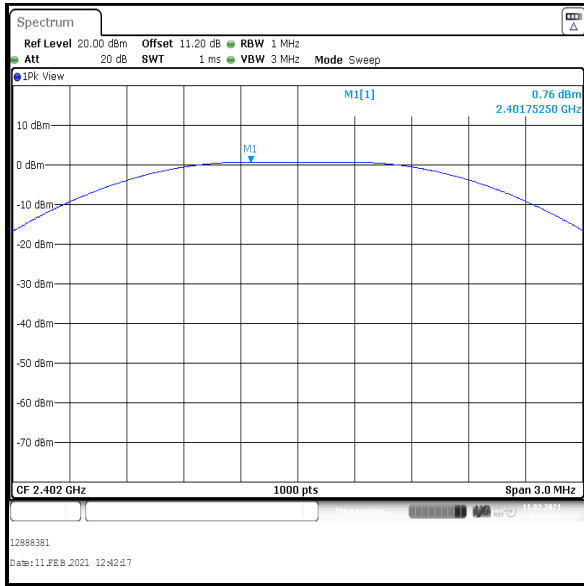
**Transmitter Maximum Peak Output Power (continued)****Results:**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	0.8	30.0	29.2	Complied
Middle	0.4	30.0	29.6	Complied
Top	-0.1	30.0	30.1	Complied

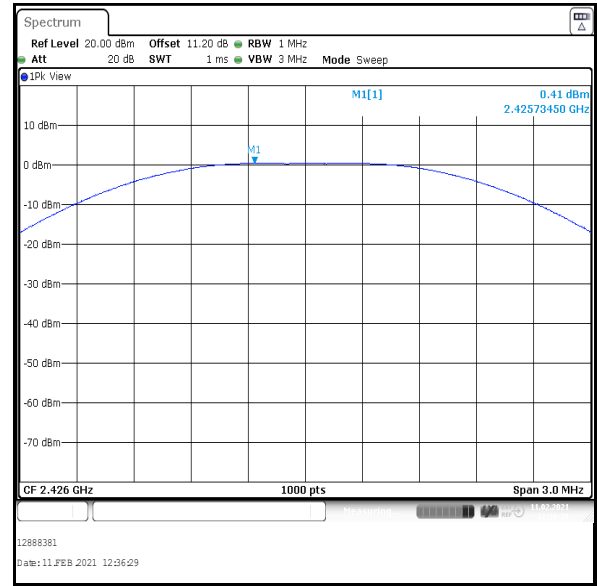
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	0.8	-1.5	-0.7	36.0	36.7	Complied
Middle	0.4	-1.5	-1.1	36.0	37.1	Complied
Top	-0.1	-1.5	-1.6	36.0	37.6	Complied

### Transmitter Maximum Peak Output Power (continued)

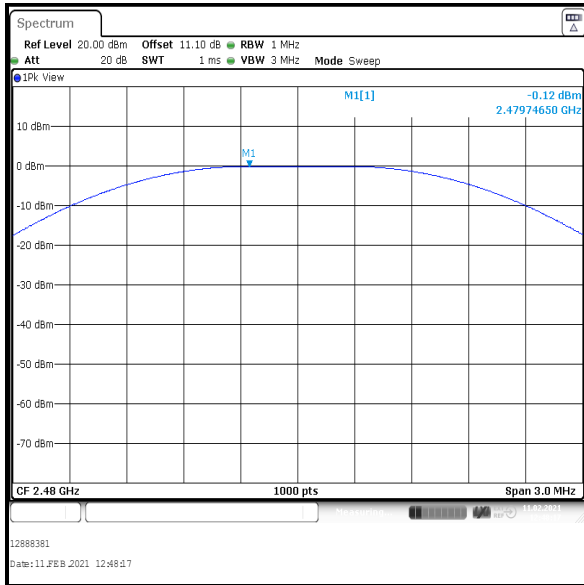
#### Results:



Bottom Channel



Middle Channel



Top Channel

## **5 Radiated Test Results**

### **5.1 Transmitter Radiated Emissions <1 GHz**

#### **Test Summary:**

<b>Test Engineer:</b>	John Ferdinand	<b>Test Date:</b>	04 February 2021
<b>Test Sample Serial Number:</b>	200066		

<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>	ANSI C63.10 Sections 6.3 and 6.5
<b>Frequency Range</b>	30 MHz to 1000 MHz

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	22
<b>Relative Humidity (%):</b>	39

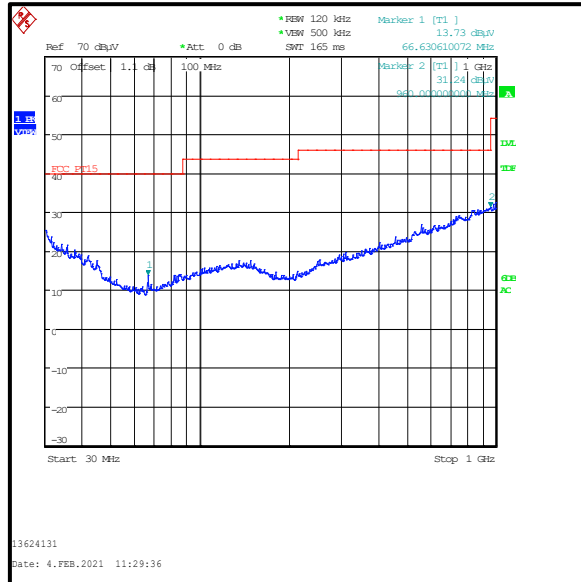
#### **Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. 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.
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. 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.
6. The plot in this section displays an incorrect project number.

**Transmitter Radiated Emissions (continued)**

**Results: Peak / Middle Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
960.000	Horizontal	31.2	46.0	14.8	Complied



## **5.2 Transmitter Radiated Emissions >1 GHz**

### **Test Summary:**

<b>Test Engineer:</b>	John Ferdinand	<b>Test Date:</b>	04 February 2021
<b>Test Sample Serial Numbers:</b>	200066 & 200049		

<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>	22 to 24
<b>Relative Humidity (%):</b>	38 to 41

### **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. 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 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 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.
4. Pre-scans were performed and a marker placed on the highest measured level of the appropriate plot. The test receiver resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. The sweep time was set to auto. Peak and average measurements were performed with their respective detectors during the pre-scan measurements.
5. All other emissions shown on the pre-scans were investigated and found to be ambient, >20 dB below the applicable limit or below the noise floor of the measurement system.
6. The 8 GHz to 18 GHz plot in this section displays an incorrect project number.



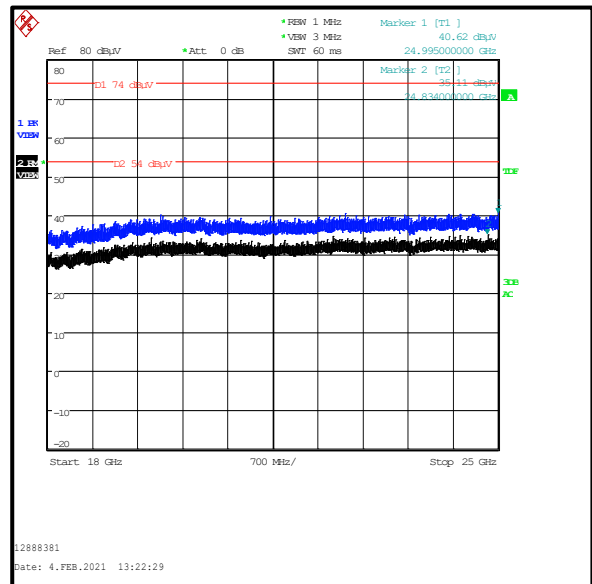
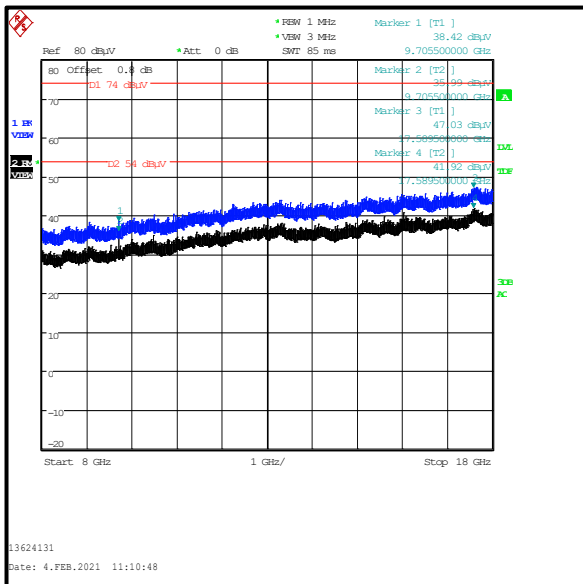
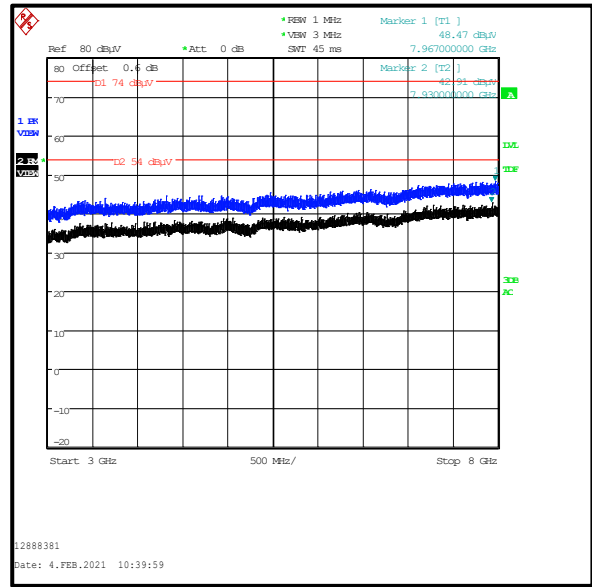
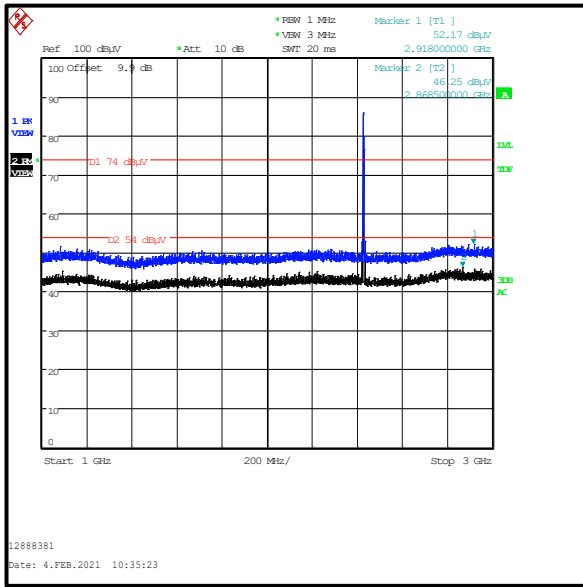
**Transmitter Radiated Emissions (continued)****Results: Peak / Middle Channel**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
9703.000	Horizontal	38.5	67.6	29.1	Complied

**Results: Peak / Top Channel**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
9918.973	Horizontal	41.7	64.0	22.3	Complied

**Transmitter Radiated Emissions (continued)**



### **5.3 Transmitter Band Edge Radiated Emissions**

#### **Test Summary:**

<b>Test Engineer:</b>	John Ferdinand	<b>Test Dates:</b>	04 February 2021 & 31 March 2021
<b>Test Sample Serial Number:</b>	34887221 & 34887222		

<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>	22 to 25
<b>Relative Humidity (%):</b>	36 to 41

**Transmitter Band Edge Radiated Emissions (continued)****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 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 a 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 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.
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. For the upper band edge average result, the EUT had a duty cycle <98%. The duty cycle correction factor has been applied and the corrected level is shown below:

*Upper band edge average result + duty cycle = Corrected band edge level*

*Corrected band edge level at 2483.5 MHz: 40.9 + 4.5 = 45.4 dB $\mu$ V/m*

**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
2393.990	Horizontal	50.0	66.8*	16.8	Complied
2400.000	Horizontal	43.2	66.8*	23.6	Complied
2483.500	Horizontal	53.4	74.0	20.6	Complied
2487.907	Horizontal	55.0	74.0	19.0	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	Horizontal	40.9	4.5	45.4	54.0	8.6	Complied
2488.147	Horizontal	42.8	4.5	47.3	54.0	6.7	Complied

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

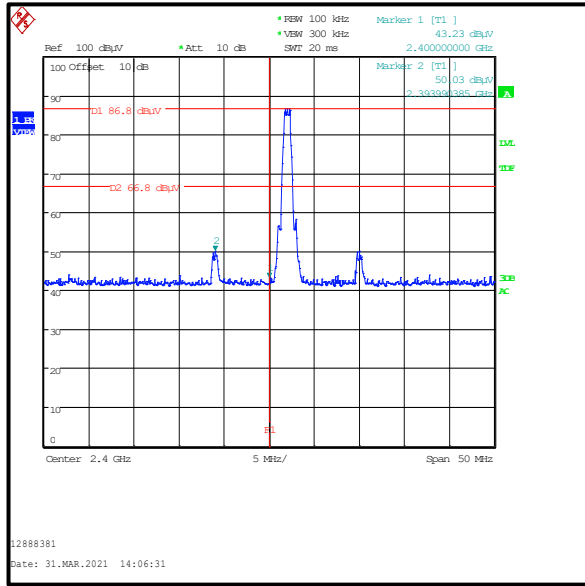
Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2377.821	Horizontal	51.4	74.0	22.6	Complied

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

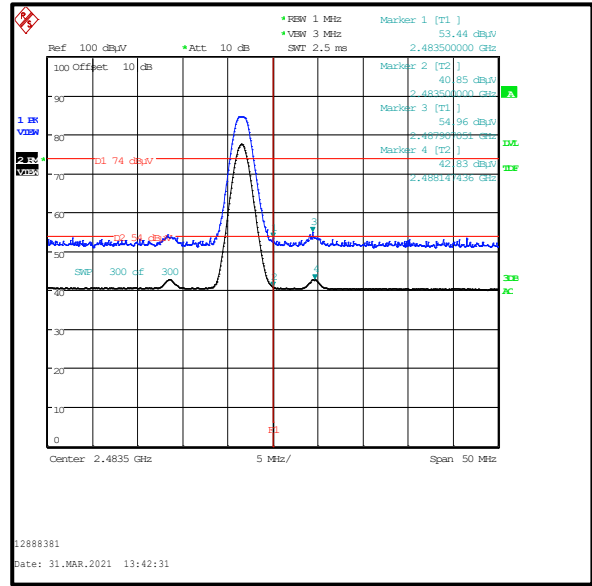
Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Duty cycle correction (dB)	Corrected Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2378.333	Horizontal	39.1	4.5	43.6	54.0	10.4	Complied

### Transmitter Band Edge Radiated Emissions (continued)

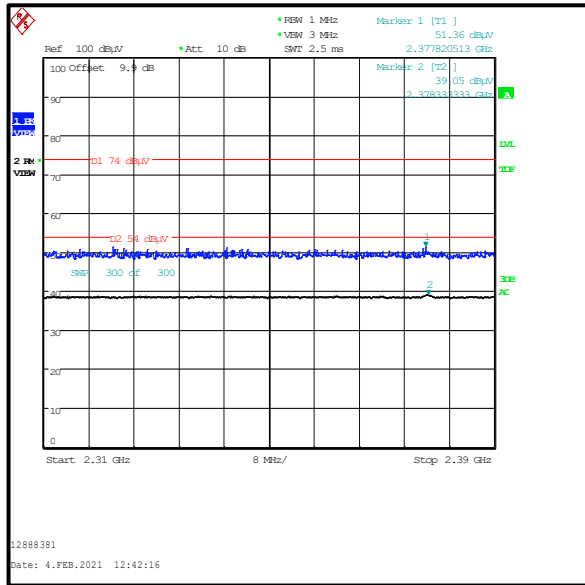
#### Results:



Lower Band Edge



Upper Band Edge



2310 MHz to 2390 MHz Restricted Band

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