



# TEST REPORT

**Test Report No. : UL-RPT-RP13646664-316A**

**Manufacturer** : Signify (China) Investment Co. Ltd.  
**Model No. / PMN** : Wall Switch Module  
**HVIN** : 9290030171  
**FCC ID** : 2AGBW9290030171X  
**ISED Certification No.** : 20812-30171X  
**Technology** : Zigbee (IEEE 802.15.4)  
**Test Standard(s)** : FCC Parts 15.209(a) & 15.247,  
Innovation, Science and Economic Development Canada  
RSS-247 Issue 2 February 2017 & RSS-Gen Issue 5 February 2021  
**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 4.0 supersedes all previous versions.

**Date of Issue:** 27 April 2021

**Checked by:**

Ben Mercer  
Lead Project Engineer, Radio Laboratory

**Company Signatory:**

Sarah Williams  
RF 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>	Signify Netherlands B.V.
<b>Address:</b>	High Tech Campus 48 Eindhoven 5656 AE Netherland

## **Manufacturer Information**

<b>Company Name:</b>	Signify (China) Investment Co. Ltd.
<b>Address:</b>	Building 9 No. 888 Tianlin Road, 200233 Shanghai

## **Report Revision History**

<b>Version Number</b>	<b>Issue Date</b>	<b>Revision Details</b>	<b>Revised By</b>
1.0	19/04/2021	Initial Version	Ben Mercer
2.0	26/04/2021	Customer details updated	Ben Mercer
3.0	26/04/2021	Updated FCC site registration and corrected serial numbers in section 4.1	Ben Mercer
4.0	27/04/2021	Manufacturer details added	Ben Mercer

## **Table of Contents**

<b>Customer Information .....</b>	<b>2</b>
<b>Manufacturer Information .....</b>	<b>2</b>
<b>Report Revision History .....</b>	<b>2</b>
<b>1. Attestation of Test Results .....</b>	<b>4</b>
1.1. Description of EUT	4
1.2. General Information	4
1.3. Summary of Test Results	5
1.4. Deviations from the Test Specification	5
<b>2. Summary of Testing .....</b>	<b>6</b>
2.1. Facilities and Accreditation	6
2.2. Methods and Procedures	6
2.3. Calibration and Uncertainty	7
2.4. Test and Measurement Equipment	8
<b>3. Equipment Under Test (EUT) .....</b>	<b>10</b>
3.1. Identification of Equipment Under Test (EUT)	10
3.2. Modifications Incorporated in the EUT	11
3.3. Additional Information Related to Testing	12
3.4. Description of Available Antenna	12
3.5. Description of Test Setup	13
<b>4. Antenna Port Test Results .....</b>	<b>15</b>
4.1. Transmitter Minimum 6 dB Bandwidth	15
4.2. Transmitter 99% Occupied Bandwidth	17
4.3. Transmitter Maximum Peak Output Power	19
<b>5. Radiated Test Results .....</b>	<b>22</b>
5.1. Transmitter Radiated Emissions <1 GHz	22
5.2. Transmitter Radiated Emissions >1 GHz	24
5.3. Transmitter Band Edge Radiated Emissions	27

## **1. Attestation of Test Results**








### **1.1. Description of EUT**

The equipment under test was a lighting control unit, which contains Zigbee (802.15.4) technology.

### **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>FCC Lab. Designation No.:</b>	UK2011
<b>ISED Site Registration:</b>	20903
<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>	09 February 2021 to 18 February 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 15.247(e)	RSS-247 5.2(b)	Transmitter Power Spectral Density	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. 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 to be equal to the measured total 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	
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 DTS Meas Guidance v05 April 2, 2019
<b>Title:</b>	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under Section 15.247

## **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”.

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
Conducted Maximum Peak Output Power	2.4 GHz to 2.4835 GHz	95%	±1.13 dB
Minimum 6 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±4.59 %
99% Emission Bandwidth	2.4 GHz to 2.4835 GHz	95%	±3.92 %
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±3.30 dB
Radiated Spurious Emissions	1 GHz to 26.5 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**

<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>
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 March 2021	12
G0614	Signal Generator	Rohde & Schwarz	SMB100A	177687	19 May 2023	36

### **Test Equipment Used for Transmitter 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>
M2003	Thermohygrometer	Testo	608-H1	45046641	10 Dec 2021	12
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	21 Oct 2021	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	07 Dec 2021	12
A2951	Pre-Amplifier	Com Power Corp	PAM-103	441141	25 Jan 2022	12
A2948	Pre-Amplifier	Com Power	PAM-118A	551087	21 Oct 2021	12
A3142	Pre-Amplifier	Schwarzbeck	BBV 9718 B	00020	21 Oct 2021	12
A2893	Pre-Amplifier	Schwarzbeck	BBV 9721	9721-021	28 Oct 2021	12
A490	Antenna	Chase	CBL6111A	1590	05 Jun 2021	12
A2889	Antenna	Schwarzbeck	BBHA 9120 B	00653	23 Oct 2021	12
A2890	Antenna	Schwarzbeck	HWRD 750	014	26 Oct 2021	12
A2892	Antenna	Schwarzbeck	BBHA 9170	9170-727	28 Oct 2021	12
A2916	Attenuator	AtlanTecRF	AN18W5-10	832827#2	01 Feb 2022	12
A2914	High Pass Filter	AtlanTecRF	AFH-03000	2155	01 Feb 2022	12
A3036	Low Pass Filter	AtlanTecRF	AFL-02000	15062902848	01 Feb 2022	12
A2947	High Pass Filter	AtlanTecRF	AFH-07000	1601900001	01 Feb 2022	12



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

<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>
M2003	Thermohygrometer	Testo	608-H1	45046641	10 Dec 2021	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
A2948	Pre-Amplifier	Com Power	PAM-118A	551087	21 Oct 2021	12
A2889	Antenna	Schwarzbeck	BBHA 9120 B	00653	23 Oct 2021	12
A2916	Attenuator	AtlanTecRF	AN18W5-10	832827#2	01 Feb 2022	12

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

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

<b>Brand Name:</b>	Philips
<b>Model No / PMN:</b>	Wall Switch Module
<b>HVIN:</b>	9290030171
<b>Test Sample Serial Number:</b>	3635575 #8 ( <i>Radiated Sample #1</i> )
<b>Hardware Version:</b>	733 951 00
<b>Software Version:</b>	737 672 01
<b>Firmware Version:</b>	450 839 01
<b>FCC ID:</b>	2AGBW9290030171X
<b>ISED Certification Number:</b>	20812-30171X

<b>Brand Name:</b>	Philips
<b>Model No / PMN:</b>	Wall Switch Module
<b>HVIN:</b>	9290030171
<b>Test Sample Serial Number:</b>	3635575 #11 ( <i>Radiated Sample #2</i> )
<b>Hardware Version:</b>	733 951 00
<b>Software Version:</b>	737 672 01
<b>Firmware Version:</b>	450 839 01
<b>FCC ID:</b>	2AGBW9290030171X
<b>ISED Certification Number:</b>	20812-30171X

<b>Brand Name:</b>	Philips
<b>Model No / PMN:</b>	Wall Switch Module
<b>HVIN:</b>	9290030171
<b>Test Sample Serial Number:</b>	3635575 #15 ( <i>Radiated Sample #3</i> )
<b>Hardware Version:</b>	733 951 00
<b>Software Version:</b>	737 672 01
<b>Firmware Version:</b>	450 839 01
<b>FCC ID:</b>	2AGBW9290030171X
<b>ISED Certification Number:</b>	20812-30171X

**Identification of Equipment Under Test (EUT) (continued)**

<b>Brand Name:</b>	Philips
<b>Model Name or Number:</b>	Wall Switch Module
<b>Test Sample Serial Number:</b>	3635575 #6 ( <i>Conducted Sample #1</i> )
<b>Hardware Version:</b>	733 951 00
<b>Software Version:</b>	737 672 01
<b>Firmware Version:</b>	450 839 01
<b>FCC ID:</b>	2AGBW9290030171X
<b>ISED Certification Number:</b>	20812-30171X

<b>Brand Name:</b>	20812-30171X
<b>Model Name or Number:</b>	Wall Switch Module
<b>Test Sample Serial Number:</b>	3635575 #9 ( <i>Conducted Sample #2</i> )
<b>Hardware Version:</b>	733 951 00
<b>Software Version:</b>	737 672 01
<b>Firmware Version:</b>	450 839 01
<b>FCC ID:</b>	2AGBW9290030171X
<b>ISED Certification Number:</b>	20812-30171X

<b>Brand Name:</b>	Philips
<b>Model Name or Number:</b>	Wall Switch Module
<b>Test Sample Serial Number:</b>	3635575 #13 ( <i>Conducted Sample #3</i> )
<b>Hardware Version:</b>	733 951 00
<b>Software Version:</b>	737 672 01
<b>Firmware Version:</b>	450 839 01
<b>FCC ID:</b>	2AGBW9290030171X
<b>ISED Certification Number:</b>	20812-30171X

**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>	IEEE 802.15.4 (Digital Transmission System)		
<b>Type of Unit:</b>	Transceiver		
<b>Modulation:</b>	O-QPSK		
<b>Data Rate:</b>	250 kb/s		
<b>Power Supply Requirement(s):</b>	Nominal	3.0 VDC	
<b>Maximum Conducted Output Power:</b>	1.8 dBm		
<b>Antenna Gain:</b>	0.0 dBi		
<b>Transmit Frequency Range:</b>	2405 MHz to 2480 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	11	2405
	Middle	18	2440
	Top	26	2480

### 3.4. Description of Available Antenna

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

Frequency Range (MHz)	Antenna Gain (dBi)
2400-2480	0.0

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

#### **Support Equipment**

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

<b>Description:</b>	DC Power Supply
<b>Brand Name:</b>	TTi
<b>Model Name or Number:</b>	EL303R
<b>Serial Number:</b>	395819

#### **Operating Modes**

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

- Continuously transmitting a modulated signal at maximum power on the bottom, middle and top channels as required.

#### **Configuration and Peripherals**

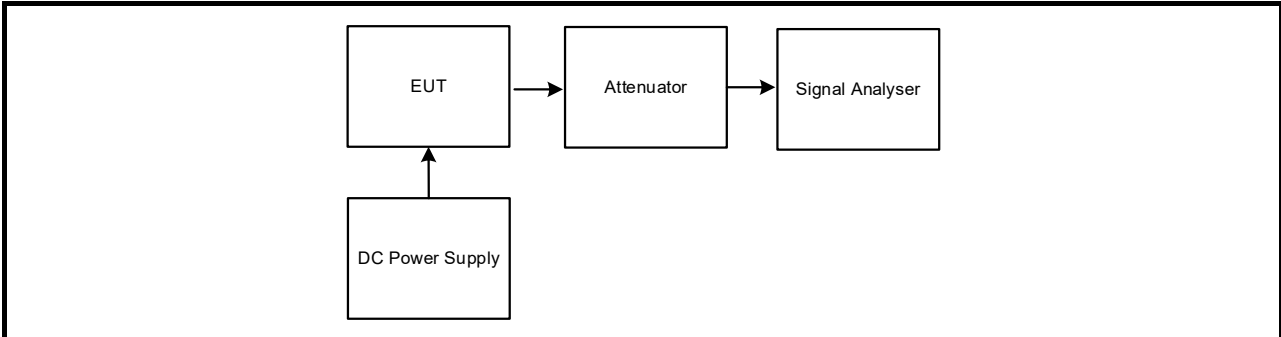
The EUT was tested in the following configuration(s):

- Transmitter Maximum Peak Output Power, 99% Occupied Bandwidth and Minimum 6 dB Bandwidth tests were performed with the EUT powered from a 3V CR2450 Coin Cell Battery whilst simultaneously connected to a DC power supply to prevent quick battery drain.
- Three different EUT samples (one for each transmit channel) were used. The EUT did not require any software tool or external hardware to be controlled.
- Transmitter radiated spurious emissions tests were performed with the EUT powered from a 3V CR2450 Coin Cell Battery. There were no ports to terminate.

**Test Setup Diagrams**

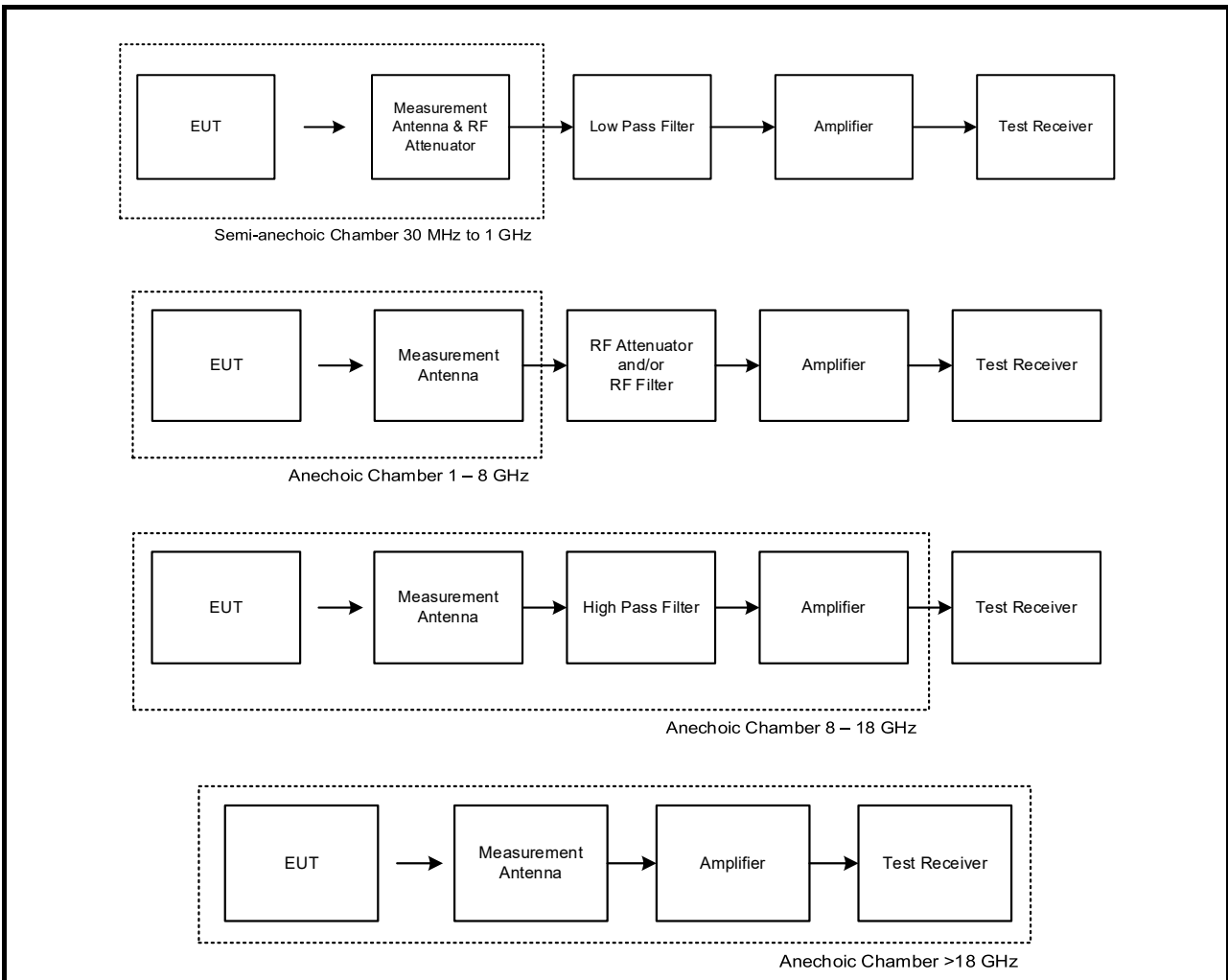
**Conducted Tests:**

**Test Setup for Conducted Transmitter Tests**



**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>	16 February 2021
<b>Test Sample Serial Number:</b>	3634475 #6, 3634475 #9 & 3634475 #13		

<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>	24
<b>Relative Humidity (%):</b>	34

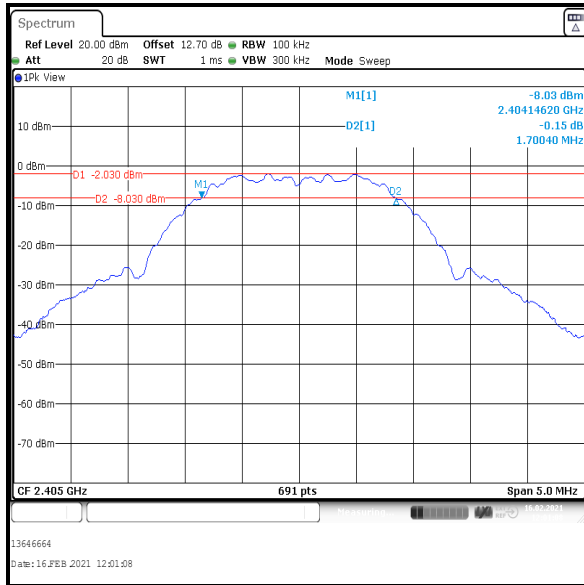
#### **Note(s):**

1. 6 dB DTS bandwidth tests were performed using a spectrum analyser in accordance with ANSI C63.10 Section 11.8.1 Option 1 measurement procedure. The spectrum 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 spectrum analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset was entered on the spectrum analyser to compensate for the loss of the attenuator and RF cable.

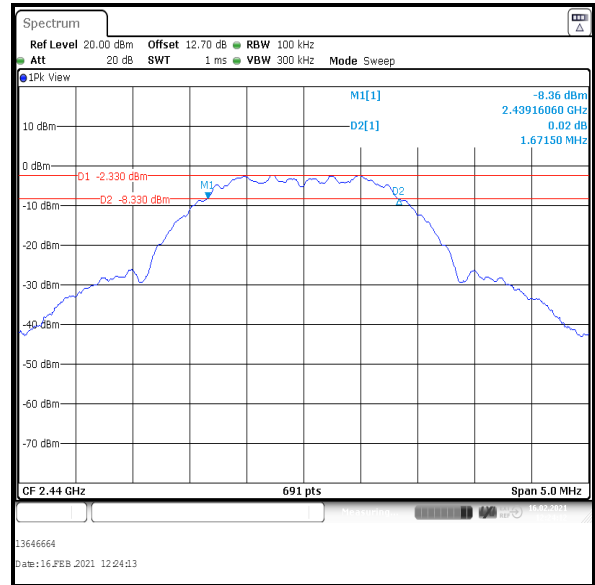
**Transmitter Minimum 6 dB Bandwidth (continued)**

**Results:**

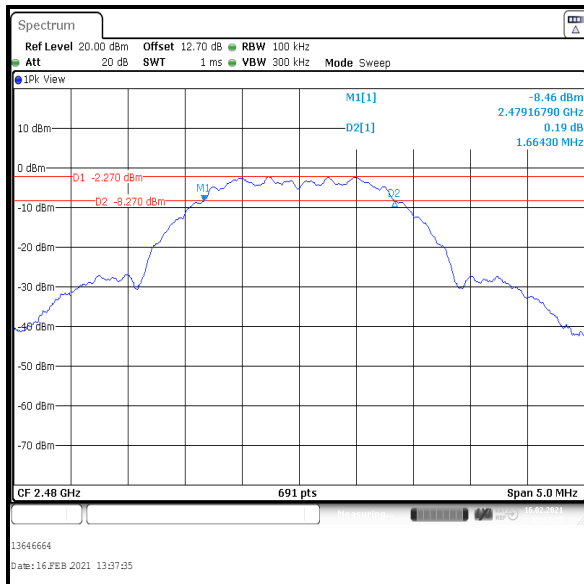
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	1700.400	≥500	1200.400	Complied
Middle	1671.500	≥500	1171.500	Complied
Top	1664.300	≥500	1164.300	Complied



**Bottom Channel**



**Middle Channel**



**Top Channel**



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

### **Test Summary:**

<b>Test Engineer:</b>	Chanthu Thevarajah	<b>Test Date:</b>	17 February 2021
<b>Test Sample Serial Number:</b>	3634475 #6, 3634475 #9 & 3634475 #13		

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

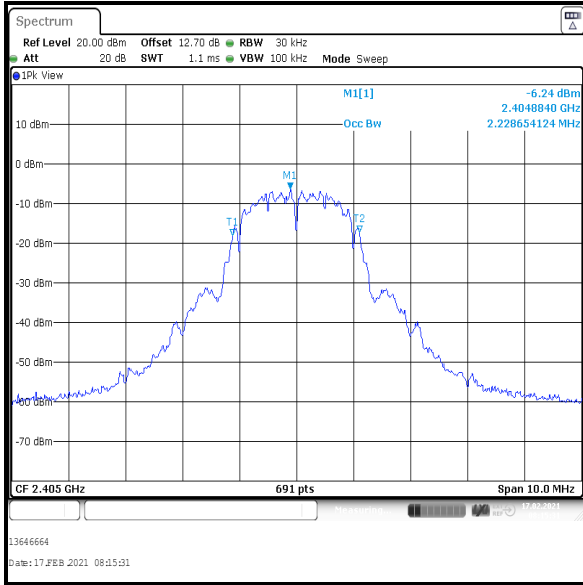
### **Note(s):**

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  $\geq 3$  times the resolution bandwidth. The span was set to capture all products of the modulation process including emission skirts.
2. The spectrum 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 10 MHz. The spectrum analyser function set the measurements to be made at 99% of the emission bandwidth. The results are given in the tables below.
3. The spectrum analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset was entered on the spectrum analyser to compensate for the loss of the attenuator and RF cable.

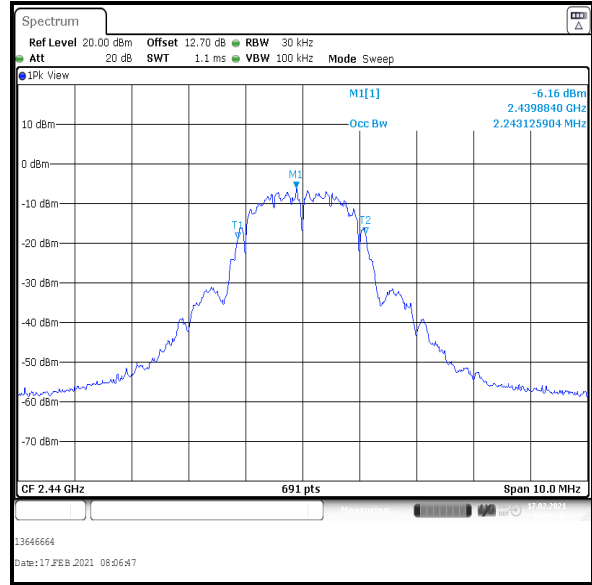
**Transmitter 99% Occupied Bandwidth (continued)**

**Results:**

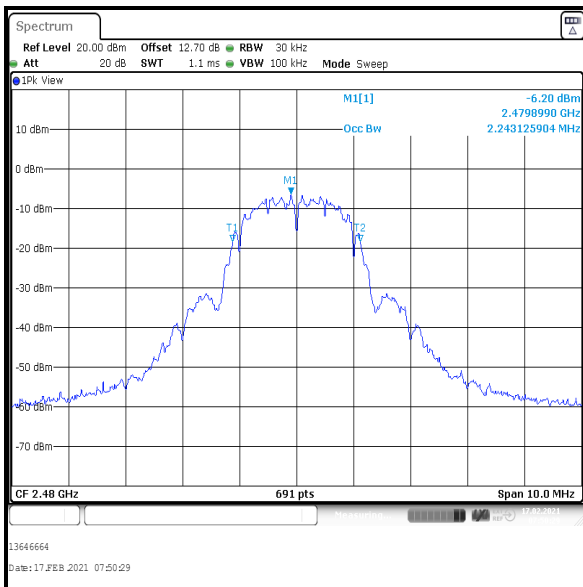
Channel	99% Occupied Bandwidth (kHz)
Bottom	2228.654
Middle	2243.126
Top	2243.126



**Bottom Channel**



**Middle Channel**



**Top Channel**

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

#### **Test Summary:**

<b>Test Engineer:</b>	Chanthu Thevarajah	<b>Test Date:</b>	16 February 2021
<b>Test Sample Serial Number:</b>	3634475 #6, 3634475 #9 & 3634475 #13		

<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>	24
<b>Relative Humidity (%):</b>	37

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

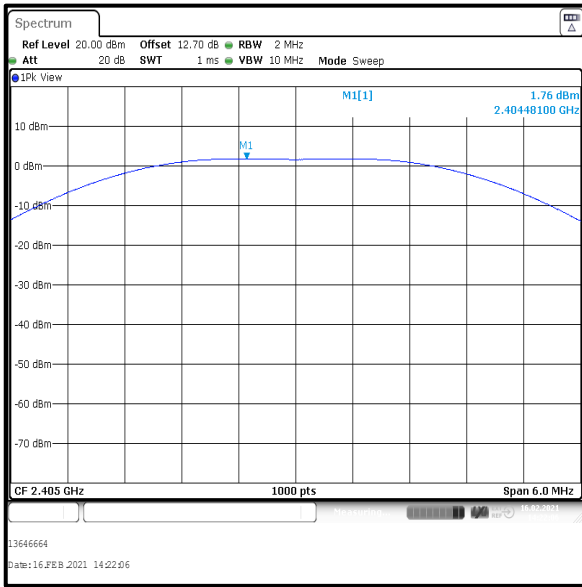
1. Conducted power tests were performed using a spectrum analyser in accordance with ANSI C63.10 Section 11.9.1.1 with the RBW  $\geq$  DTS bandwidth procedure.
2. The signal analyser resolution bandwidth was set to 2 MHz and video bandwidth of 10 MHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The span was set to 6 MHz. A marker was placed at the peak of the signal and the results recorded in the table below.
3. The spectrum analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset was entered on the spectrum 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:**

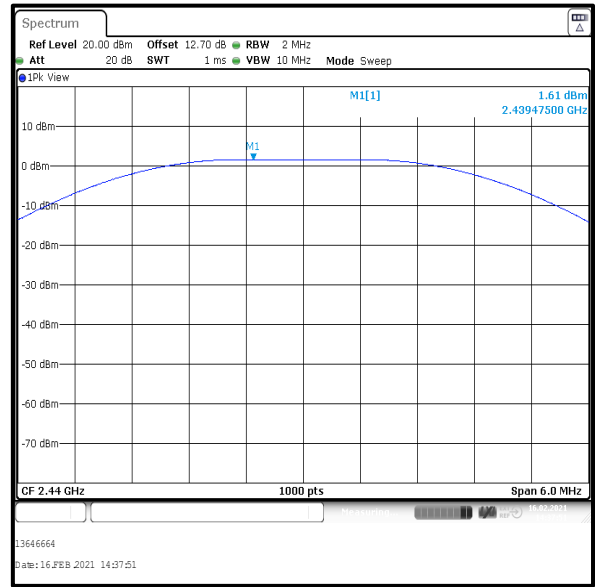
Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	1.8	30.0	28.2	Complied
Middle	1.6	30.0	28.4	Complied
Top	1.5	30.0	28.5	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	1.8	0.0	1.8	36.0	34.2	Complied
Middle	1.6	0.0	1.6	36.0	34.4	Complied
Top	1.5	0.0	1.5	36.0	34.5	Complied

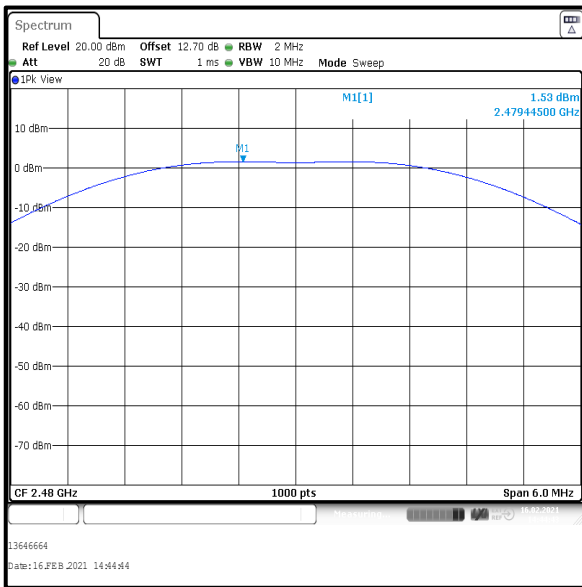
**Transmitter Maximum Peak Output Power (continued)**



**Bottom Channel**



**Middle Channel**



**Top Channel**

## **5. Radiated Test Results**

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

#### **Test Summary:**

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	18 February 2021
<b>Test Sample Serial Number:</b>	3634475 #11		

<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>	23
<b>Relative Humidity (%):</b>	29

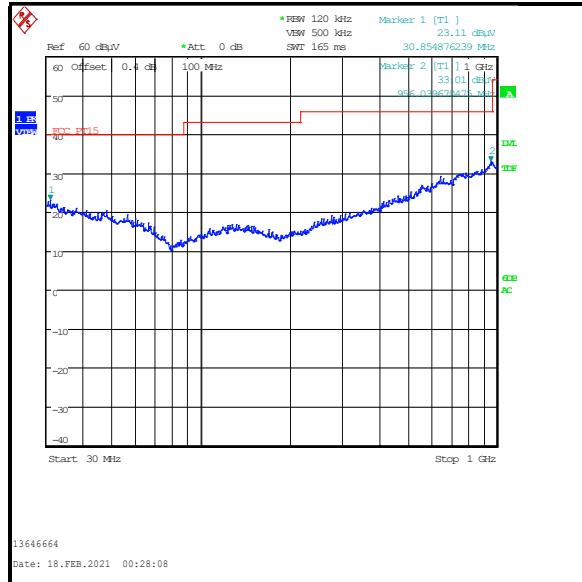
#### **Note(s):**

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. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table below.
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.

**Transmitter Radiated Emissions (continued)**

**Results: Middle Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
956.040	Vertical	33.0	46.0	13.0	Complied



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

### **Test Summary:**

<b>Test Engineer:</b>	Nick Steele	<b>Test Dates:</b>	09 February 2021 & 10 February 2021
<b>Test Sample Serial Numbers:</b>	3634475 #8, 3634475 #11 & 3634475 #15		

<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>	KDB 558074 Sections 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>	25

### **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 other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
3. The emission shown on the 1 GHz to 3 GHz plot is the EUT fundamental.
4. Pre-scans and final measurements above 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 1.5 metres above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
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. \* -20 dBc limit applies in non-restricted bands as the conducted output power measurements were performed using a peak detector.



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

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
9622.019	Vertical	36.6	67.0*	30.4	Complied

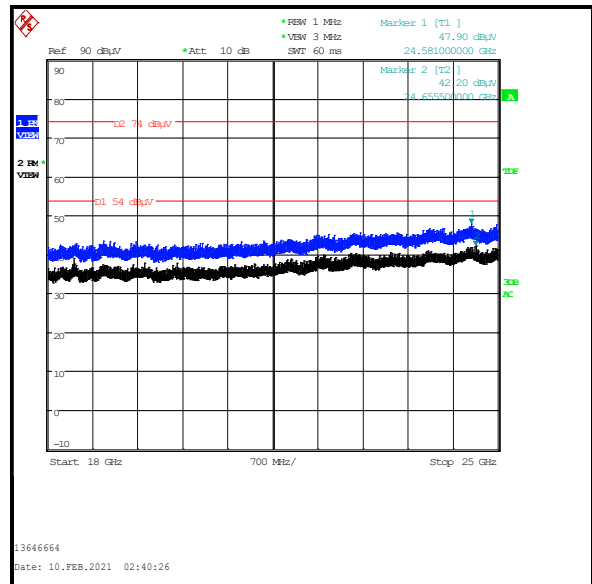
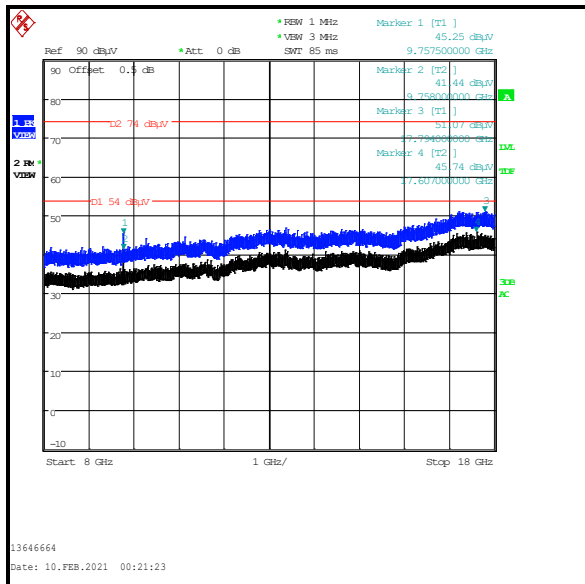
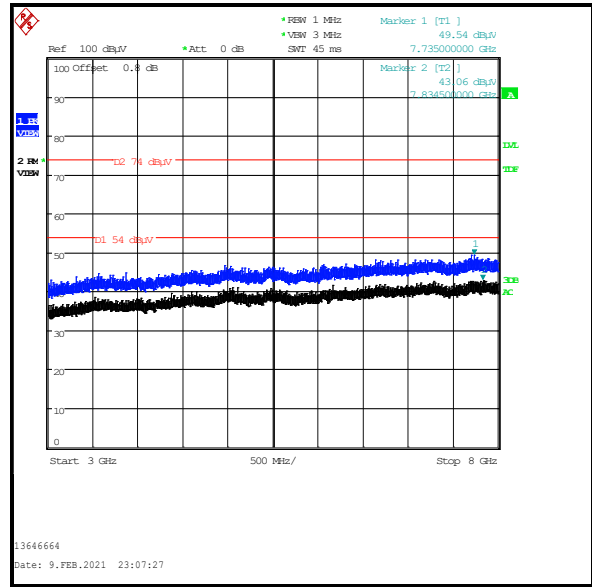
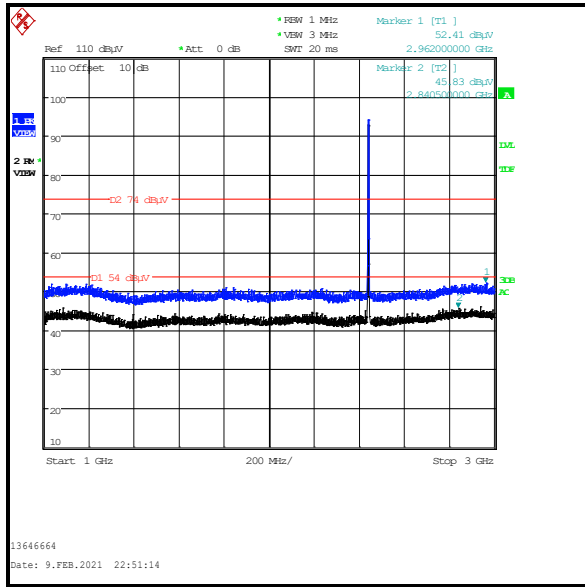
**Results: Peak / Middle Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
9757.885	Vertical	38.8	69.9*	31.1	Complied

**Results: Peak / Top Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
9917.933	Vertical	39.9	68.2*	28.3	Complied

**Transmitter Radiated Emissions (continued)**



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

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

#### **Test Summary:**

<b>Test Engineer:</b>	Nick Steele	<b>Test Dates:</b>	09 February 2021 & 10 February 2021
<b>Test Sample Serial Numbers:</b>	3634475 #8 & 3634475 #15		

<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>	25

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

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. 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 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.
3. 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 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.
4. 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.
5. \* -20 dBc limit.

**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
2393.109	Vertical	41.0	67.0*	26.0	Complied
2400.000	Vertical	39.8	67.0*	27.2	Complied
2483.500	Vertical	57.6	74.0	16.4	Complied

**Results: Average**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.500	Vertical	49.8	54.0	4.2	Complied

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

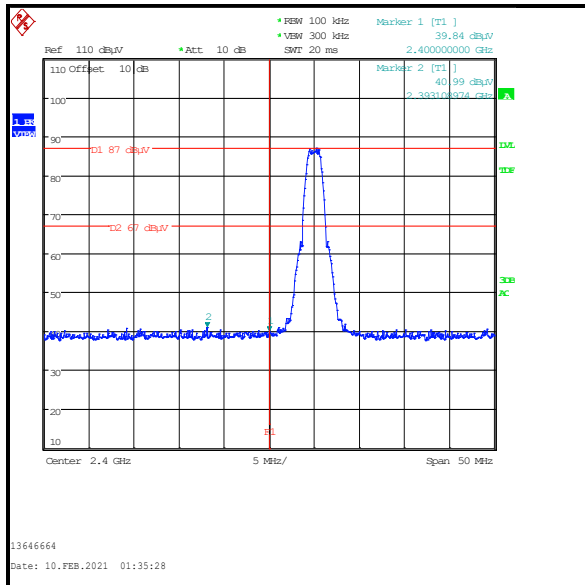
Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2320.256	Vertical	50.8	74.0	23.2	Complied

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

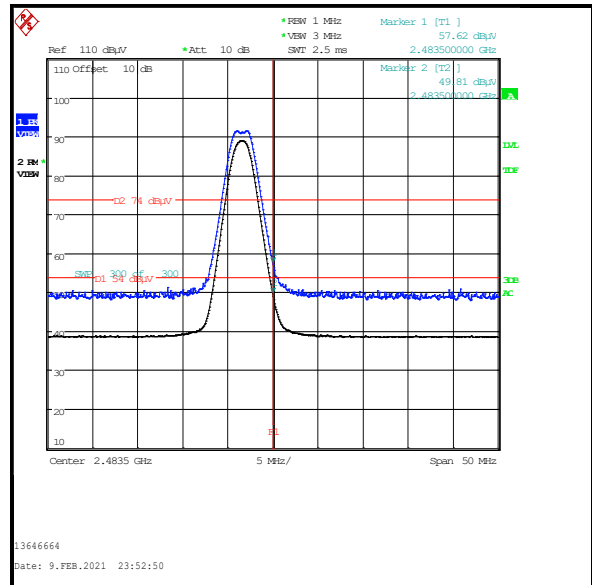
Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2388.333	Vertical	39.0	54.0	15.0	Complied

### Transmitter Band Edge Radiated Emissions (continued)

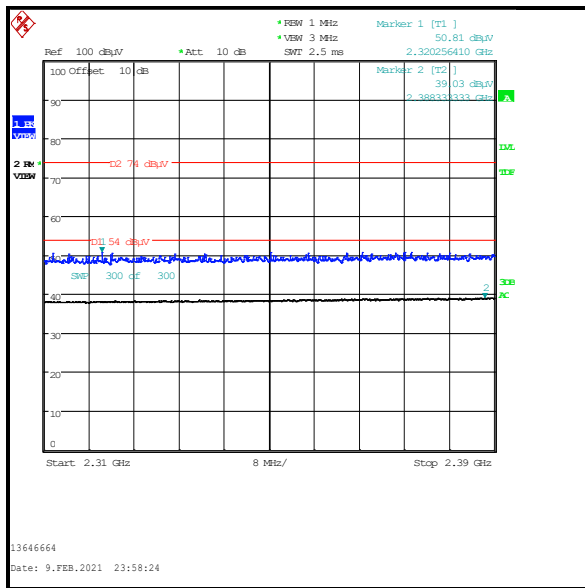
#### Results:



Lower Band Edge



Upper Band Edge



2310 MHz to 2390 MHz Restricted Band

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