FCC and ISEDC Test Report

Paxton Access Ltd
Smart Electronic Lock,
Model: Paxton 10 PaxLock Pro (900-630BL)

In accordance with FCC 47 CFR Part 15C, ISEDC RSS-247 and ISEDC RSS-GEN

Add value.
Inspire trust.

Prepared for: Paxton Access Ltd
Paxton House
Home Farm Road
Brighton
BN1 9HU
United Kingdom

FCC ID: USE900650 IC: 10217A-900650

COMMERCIAL-IN-CONFIDENCE

Document 75947459-02 Issue 01

SIGNATURE			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Matthew Russell	RF Team Leader	Authorised Signatory	21 February 2020

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C, ISEDC RSS-247 and ISEDC RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Francis Kane	21 February 2020	
Testing	Ibrahim Bukhari	21 February 2020	
Testing	Graeme Lawler	21 February 2020	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

ISEDC Accreditation
12669A Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15C: 2018, ISEDC RSS-247: Issue 2 (2017-02) and ISEDC RSS-GEN: Issue 5 (2018-04) + A1 (2019-03) for the tests detailed in section 1.3.

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ACCREDITATION

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TÜV SÜD
is a trading name of TUV SUD Ltd
Registered in Scotland at East Kilbride,
Glasgow G75 0QF, United Kingdom
Registered number: SC215164

TUV SUD Ltd is a
TÜV SÜD Group Company

Phone: +44 (0) 1489 558100
Fax: +44 (0) 1489 558101
www.tuv-sud.co.uk

TÜV SÜD
Octagon House
Concorde Way
Fareham
Hampshire PO15 5RL
United Kingdom

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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	21 February 2020

Table 1

1.2 Introduction

Applicant	Paxton Access Ltd
Manufacturer	Paxton Access Ltd
Model Number(s)	Paxton 10 PaxLock Pro (900-630BL)
Manufacturer's Declared Variant(s)	Paxton 10 PaxLock Pro (900-640WT) Paxton 10 PaxLock Pro (900-640BL) Paxton 10 PaxLock Pro (900-650WT) Paxton 10 PaxLock Pro (900-650BL) Paxton 10 PaxLock Pro (900-620WT) Paxton 10 PaxLock Pro (900-620BL) Paxton 10 PaxLock Pro (900-630WT)
Serial Number(s)	Not Serialised (75947459-TSR0025) Not Serialised (75947459-TSR0027)
Hardware Version(s)	z-pl33_rev4 ppc-pl33C
Software Version(s)	216
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 15C: 2018 ISEDC RSS-247: Issue 2 (2017-02) ISEDC RSS-GEN: Issue 5 (2018-04) + A1 (2019-03)
Order Number Date	188838 07-November-2019
Date of Receipt of EUT	10-December-2019
Start of Test	07-January-2020
Finish of Test	21-February-2020
Name of Engineer(s)	Francis Kane, Ibrahim Bukhari and Graeme Lawler
Related Document(s)	ANSI C63.10 (2013)

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C, ISEDC RSS-247 and ISEDC RSS-GEN is shown below.

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15C	RSS-247	RSS-GEN			
Configuration and Mode: 2.4 GHz Bluetooth Low Energy						
-	15.203	-	-	Antenna Requirement	N/T	Refer to application form.
2.1	15.247 (b)	5.4	6.12	Maximum Conducted Output Power	Pass	ANSI C63.10 (2013)
2.2	15.247 (a)(2)	5.2	6.7	Emission Bandwidth	Pass	ANSI C63.10 (2013)
2.3	15.247 (d) and 15.205	5.5	6.13	Spurious Radiated Emissions	Pass	ANSI C63.10 (2013)
2.4	15.247 (d)	5.5	-	Authorised Band Edges	Pass	ANSI C63.10 (2013)
2.5	15.205	-	8.10	Restricted Band Edges	Pass	ANSI C63.10 (2013)
2.6	15.247 (e)	5.2	6.12	Power Spectral Density	Pass	ANSI C63.10 (2013)

Table 2

N/T – Not Tested

1.4 Application Form

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment)*	The Paxlock is the battery powered smart electronic lock providing both access control and reader functions. The unit combines a 125 kHz and 13.56 MHz proximity reader, a wireless Bluetooth interface 2.4 GHz and a locking mechanism. PaxLock is a complete standalone system, there's nothing to wire together and no mains connection is required. The unit is powered by four replaceable AA batteries. The purpose of the equipment is to receive validated user input via a radio signal from a passive proximity token (card or keyfob) and then provide a digital output to the internal locking mechanism for access control. An event of this process is then transmitted to the PC through the wireless interface and stored as an archive. User's access rights are configured at the PC and the PaxLock unit is then updated as required using the same wireless method.
Manufacturer:	Paxton Access Limited
Model:	900-640WT Paxton 10 PaxLock Pro - Mortise, Galaxy, white 900-640BL Paxton 10 PaxLock Pro - Mortise, Galaxy, black 900-650WT Paxton 10 PaxLock Pro - Mortise, Eclipse, white 900-650BL Paxton 10 PaxLock Pro - Mortise, Eclipse, black 900-620WT Paxton 10 PaxLock Pro - Latch, Galaxy, white 900-620BL Paxton 10 PaxLock Pro - Latch, Galaxy, black 900-630WT Paxton 10 PaxLock Pro - Latch, Eclipse, white 900-630BL Paxton 10 PaxLock Pro - Latch, Eclipse, black
Part Number:	900-640WT Paxton 10 PaxLock Pro - Mortise, Galaxy, white 900-640BL Paxton 10 PaxLock Pro - Mortise, Galaxy, black 900-650WT Paxton 10 PaxLock Pro - Mortise, Eclipse, white 900-650BL Paxton 10 PaxLock Pro - Mortise, Eclipse, black 900-620WT Paxton 10 PaxLock Pro - Latch, Galaxy, white 900-620BL Paxton 10 PaxLock Pro - Latch, Galaxy, black 900-630WT Paxton 10 PaxLock Pro - Latch, Eclipse, white 900-630BL Paxton 10 PaxLock Pro - Latch, Eclipse, black
Hardware Version:	z-pl33_rev4 ppc-pl33C
Software Version:	216
FCC ID (if applicable)	USE900650
IC ID (if applicable)	10217A-900650

Intentional Radiators

Technology	Bluetooth low energy
Frequency Band (MHz)	2400 to 2483.5
Conducted Declared Output Power (dBm)	<10
Antenna Gain (dBi)	4
Supported Bandwidth(s) (MHz)	40 channels of 2MHz total 80MHz bandwidth
Modulation Scheme(s)	GFSK
ITU Emission Designator	1M00F1D
Bottom Frequency (MHz)	2400.0
Middle Frequency (MHz)	2440.0
Top Frequency (MHz)	2483.5

Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	2483.5 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	125 kHz
Class A Digital Device (Use in commercial, industrial or business environment) ☐ Class B Digital Device (Use in residential environment only) ☒	

AC Power Source

AC supply frequency:		Hz
Voltage		V
Max current:		A
Single Phase ☐ Three Phase ☐		

DC Power Source

Nominal voltage:		V
Extreme upper voltage:		V
Extreme lower voltage:		V
Max current:		A

Battery Power Source

Voltage:	6	V
End-point voltage:	6	V *(Point at which the battery will terminate)*
Alkaline ☒ Leclanche ☐ Lithium ☐ Nickel Cadmium ☐ Lead Acid* ☐ **(Vehicle regulated)*		
Other ☐ Please detail:		

Charging

Can the EUT transmit whilst being charged	Yes ☐ No ☒

Temperature

Minimum temperature:	-20 (External variant)	°C
Maximum temperature:	+55 (External variant)	°C

Antenna Characteristics

Antenna connector ☐			State impedance		Ohm
Temporary antenna connector ☐			State impedance		Ohm
Integral antenna ☒	Type:	Chip Antenna WE-MCA	Gain	4	dBi
External antenna ☐	Type:		Gain		dBi
For external antenna only: Standard Antenna Jack ☐ If yes, describe how user is prohibited from changing antenna (if not professional installed): Equipment is only ever professionally installed ☐ Non-standard Antenna Jack ☐					

Ancillaries (if applicable)

Manufacturer:		Part Number:	
Model:		Country of Origin:	

I hereby declare that the information supplied is correct and complete.

Name: Kevin Feeney
Position held: Compliance Engineer
Date: 19.02.2020

1.5 Manufacturer's Declared Variants

Paxton

13-Feb-20

Variants of Paxlock

The only difference between the Paxlock variants is the mechanical design. The electronics is identical throughout the product variations and so the operation of each product is also identical.

The mechanical variations of the Paxlock being released in the US are as follows.

The two main mechanical variants are the "Latch" version which uses a tubular **"Latch"** and the **"Mortice"** version which uses a Yale Mortice lock and cylinder.

These two variants come in two styles of handle namely "Galaxy" and "Eclipse".

Also, each of the above come in two fascia colours White "WT" and Black "BL" these are suffixed.

Therefore, there are eight mechanical variants of the product in total.

The samples tested by **TUV SUD** are electronically identical and operate identically to all the other variants of the product which are shown below.

Sales code	PaxLock Pro - Latch
900-620WT	Paxton 10 PaxLock Pro - Latch, Galaxy, white
900-620BL	Paxton 10 PaxLock Pro - Latch, Galaxy, black
900-630WT	Paxton 10 PaxLock Pro - Latch, Eclipse, white
900-630BL	Paxton 10 PaxLock Pro - Latch, Eclipse, black
Sales code	**PaxLock Pro - Mortise**
900-640WT	Paxton 10 PaxLock Pro - Mortise, Galaxy, white
900-640BL	Paxton 10 PaxLock Pro - Mortise, Galaxy, black
900-650WT	Paxton 10 PaxLock Pro - Mortise, Eclipse, white
900-650BL	Paxton 10 PaxLock Pro - Mortise, Eclipse, black

Kevin Feeney
System Compliance Engineer

1.6 Product Information

1.6.1 Technical Description

The Paxlock is the battery powered smart electronic lock providing both access control and reader functions. The unit combines a 125 kHz and 13.56 MHz proximity reader, a wireless bluetooth interface 2.4 GHz and a locking mechanism.

PaxLock is a complete standalone system, there's nothing to wire together and no mains connection is required. The unit is powered by four replaceable AA batteries.

The purpose of the equipment is to receive validated user input via a radio signal from a passive proximity token (card or keyfob) and then provide a digital output to the internal locking mechanism for access control. An event of this process is then transmitted to the PC through the wireless interface and stored as an archive. User's access rights are configured at the PC and the PaxLock unit is then updated as required using the same wireless method.

1.7 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.8 EUT Modification Record

The table below details modifications made to the EUT during the test programme.

The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Model: Paxton 10 PaxLock Pro, Serial Number: Not Serialised (75947459-TSR0025)			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: Paxton 10 PaxLock Pro, Serial Number: Not Serialised (75947459-TSR0027)			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.9 Test Location

TÜV SÜD conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: 2.4 GHz Bluetooth Low Energy		
Maximum Conducted Output Power	Francis Kane	UKAS
Emission Bandwidth	Ibrahim Bukhari	UKAS
Spurious Radiated Emissions	Graeme Lawler	UKAS
Authorised Band Edges	Graeme Lawler	UKAS
Restricted Band Edges	Graeme Lawler	UKAS
Power Spectral Density	Ibrahim Bukhari	UKAS

Table 4

Office Address:

Octagon House
Concorde Way
Segensworth North
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 Maximum Conducted Output Power

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (b)
ISEDC RSS-247, Clause 5.4
ISEDC RSS-GEN, Clause 6.12

2.1.2 Equipment Under Test and Modification State

Paxton 10 PaxLock Pro, S/N: Not Serialised (75947459-TSR0025) - Modification State 0

2.1.3 Date of Test

23-January-2020 to 21-February-2020

2.1.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 11.9.1.1.

2.1.5 Environmental Conditions

Ambient Temperature	19.8-22.1 °C
Relative Humidity	32.8-38.4 %

2.1.6 Test Results

2.4 GHz Bluetooth Low Energy

Testing was performed on the modulation/packet type with the highest conducted output power. This modulation/packet type was GFSK/DH1.

Frequency (MHz)	Maximum Output Power	
	dBm	mW
2402	10.16	10.38
2440	9.66	9.25
2480	8.88	7.73

Table 5 - Maximum Conducted Output Power Results

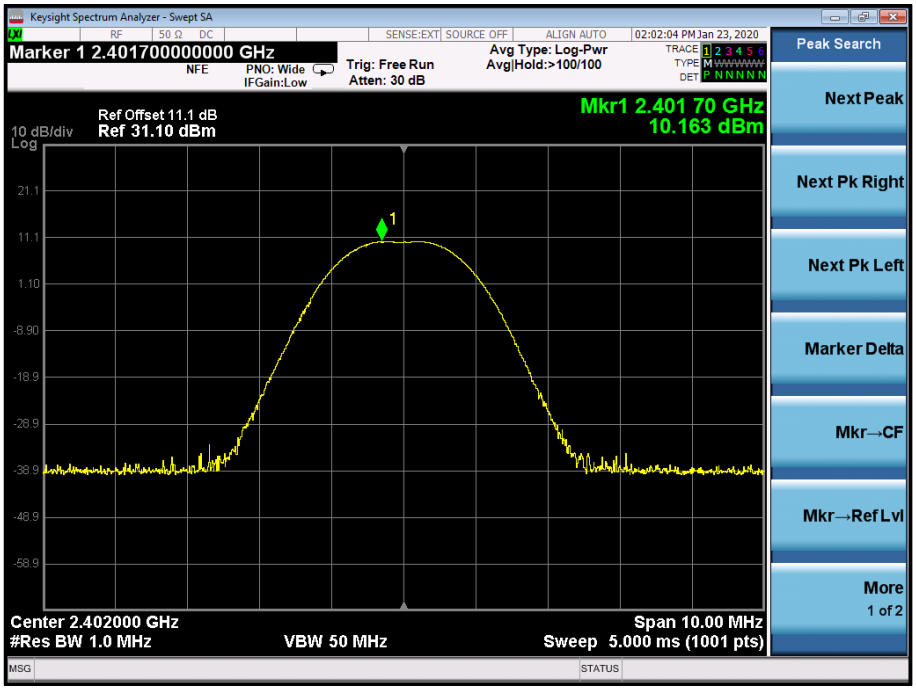


Figure 1 - 2402 MHz - Maximum Output Power

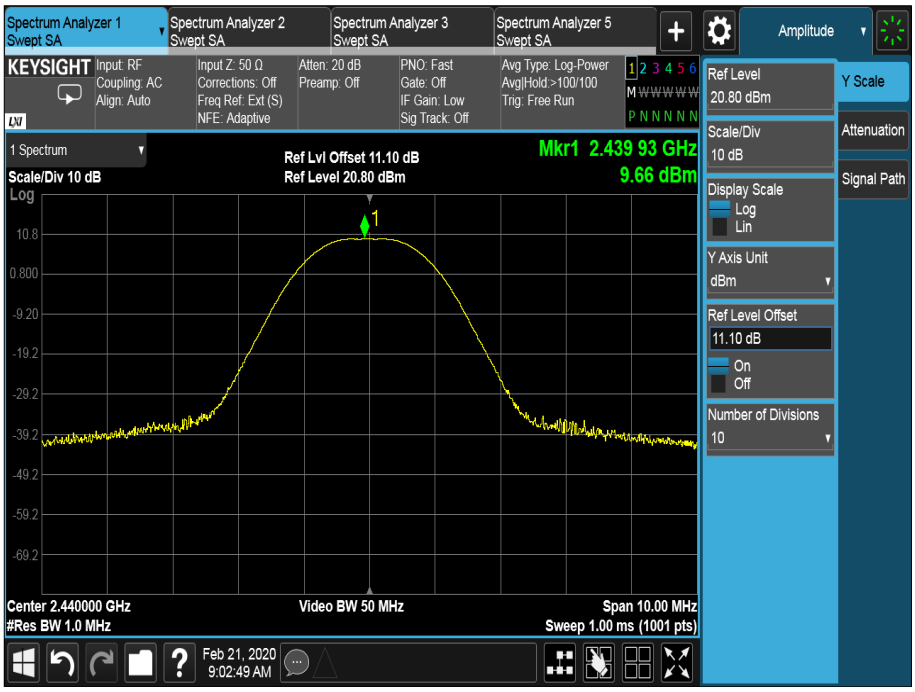


Figure 2 - 2440 MHz - Maximum Output Power

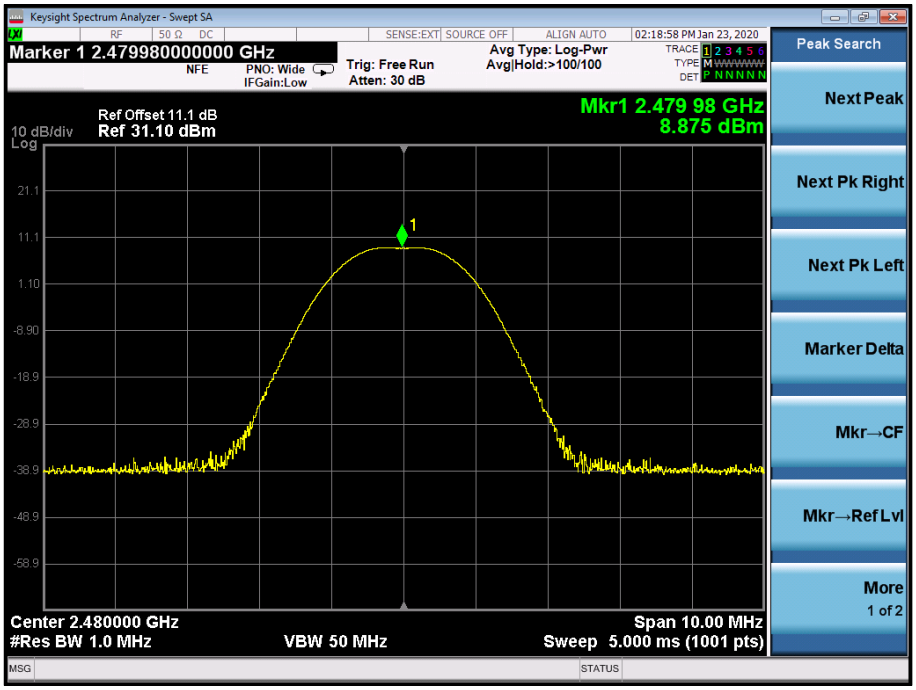


Figure 3 - 2480 MHz - Maximum Output Power

<u>FCC 47 CFR Part 15, Limit Clause 15.247 (b)(3)</u>

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

<u>Industry Canada RSS-247, Limit Clause 5.4 (b)</u>

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e) of the specification.

2.1.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
10dB/1W SMA Attenuator dc - 18GHz	Sealectro	60-674-1010-89	395	-	O/P Mon
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	21-Oct-2020
EXA	Keysight Technologies	N9010B	4968	24	23-Dec-2021
Hygrometer	Rotronic	HP21	5004	12	02-Oct-2020
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020
Electronic Calibration Module	Keysight Technologies	85093C	5188	12	21-May-2020

Table 6

O/P Mon – Output monitored using calibrated equipment.

2.2 Emission Bandwidth

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(2)
ISEDC RSS-247, Clause 5.2
ISEDC RSS-GEN, Clause 6.7

2.2.2 Equipment Under Test and Modification State

Paxton 10 PaxLock Pro, S/N: Not Serialised (75947459-TSR0025) - Modification State 0

2.2.3 Date of Test

28-January-2020

2.2.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.8.2.

2.2.5 Environmental Conditions

Ambient Temperature	23.9 °C
Relative Humidity	24.9 %

2.2.6 Test Results

2.4 GHz Bluetooth Low Energy

Frequency (MHz)	99% Occupied Bandwidth (kHz)	6 dB Bandwidth (kHz)
2402	1047.6	680.6
2440	1051.5	674.7
2480	1051.3	672.8

Table 7 - Emission Bandwidth Results

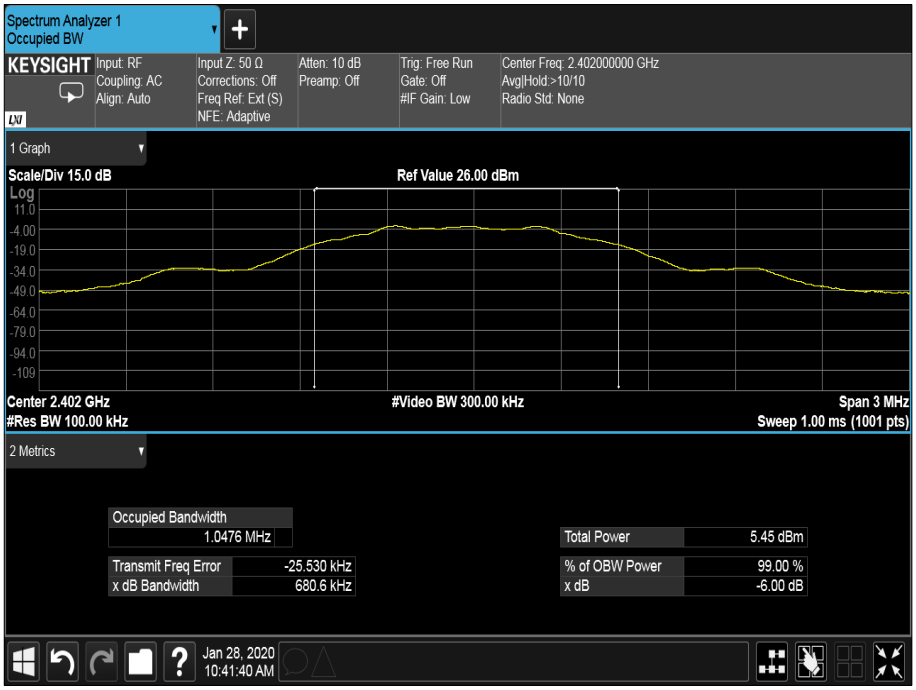


Figure 4 - 2402 MHz – Emission Bandwidth

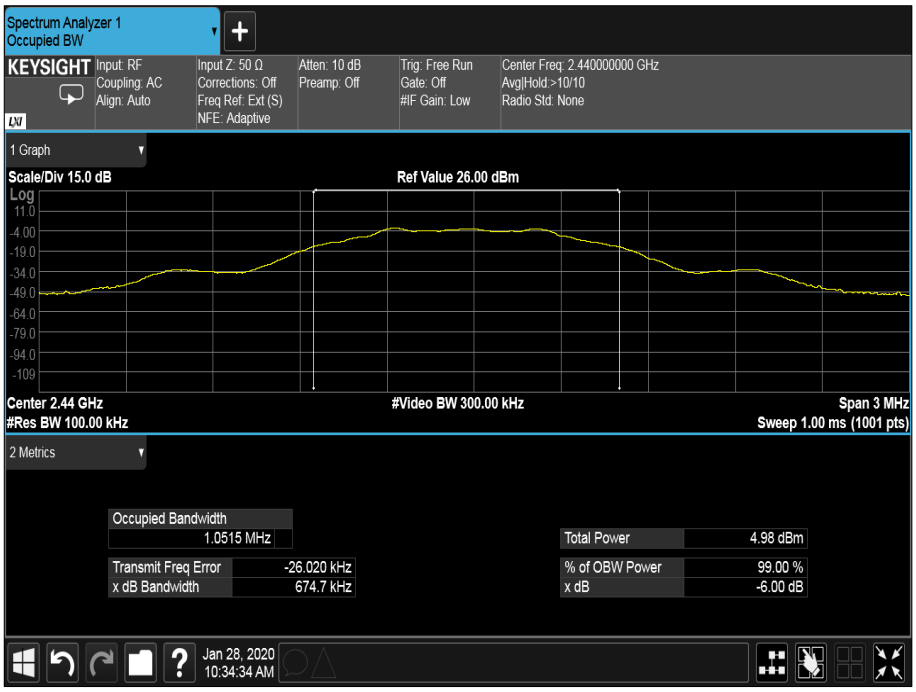


Figure 5 - 2440 MHz – Emission Bandwidth

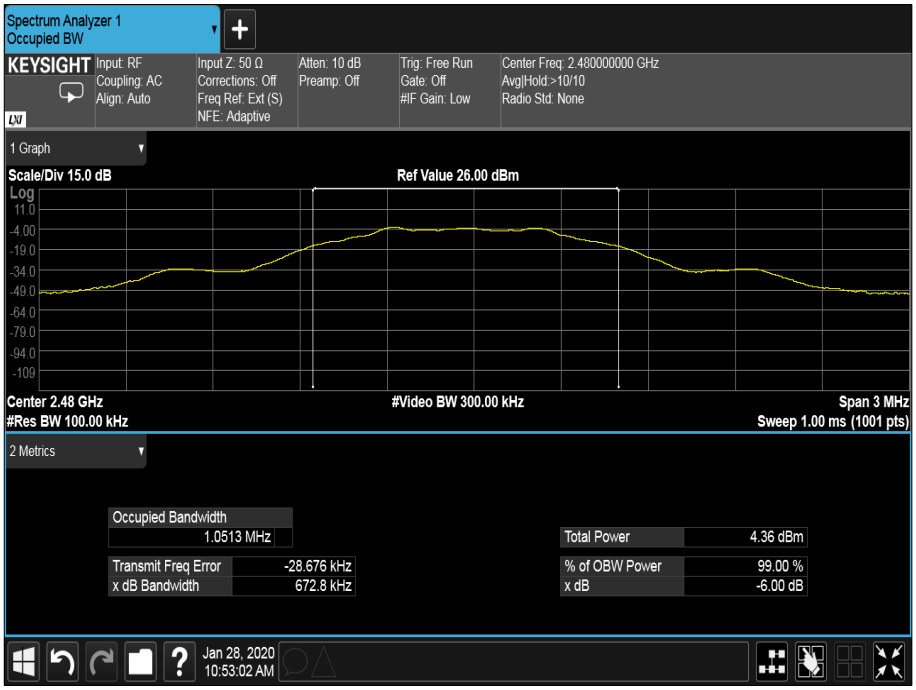


Figure 6 - 2480 MHz – Emission Bandwidth

FCC 47 CFR Part 15, Limit Clause 15.247(a)(2) and ISEDC RSS-247, Clause 5.2(a)

The minimum 6 dB Bandwidth shall be at least 500 kHz.

2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
10dB/1W SMA Attenuator dc - 18GHz	Sealectro	60-674-1010-89	395	-	O/P Mon
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
EXA	Keysight Technologies	N9010B	4968	24	23-Dec-2021
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020
Electronic Calibration Module	Keysight Technologies	85093C	5188	12	21-May-2020

Table 8

O/P Mon – Output monitored using calibrated equipment.

2.3 Spurious Radiated Emissions

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d) and 15.205
ISEDC RSS-247, Clause 5.5
ISEDC RSS-GEN, Clause 6.13

2.3.2 Equipment Under Test and Modification State

Paxton 10 PaxLock Pro, S/N: Not Serialised (75947459-TSR0027) - Modification State 0

2.3.3 Date of Test

07-January-2020 to 08-January-2020

2.3.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.3, 6.5 and 6.6.

The EUT was placed on the non-conducting platform in a manner typical of a normal installation. For an EUT which could reasonable be used in multiple planes, pre-scans were performed with the EUT orientated in X, Y and Z planes with reference to the ground plane.

Ports on the EUT were terminated with loads as described in ANSI C63.4 clause 6.2.4. For EUT's with multiple connectors of the same type, additional interconnecting cables were connected and pre-scans performed to determine whether the level of the emissions were increased by >2 dB.

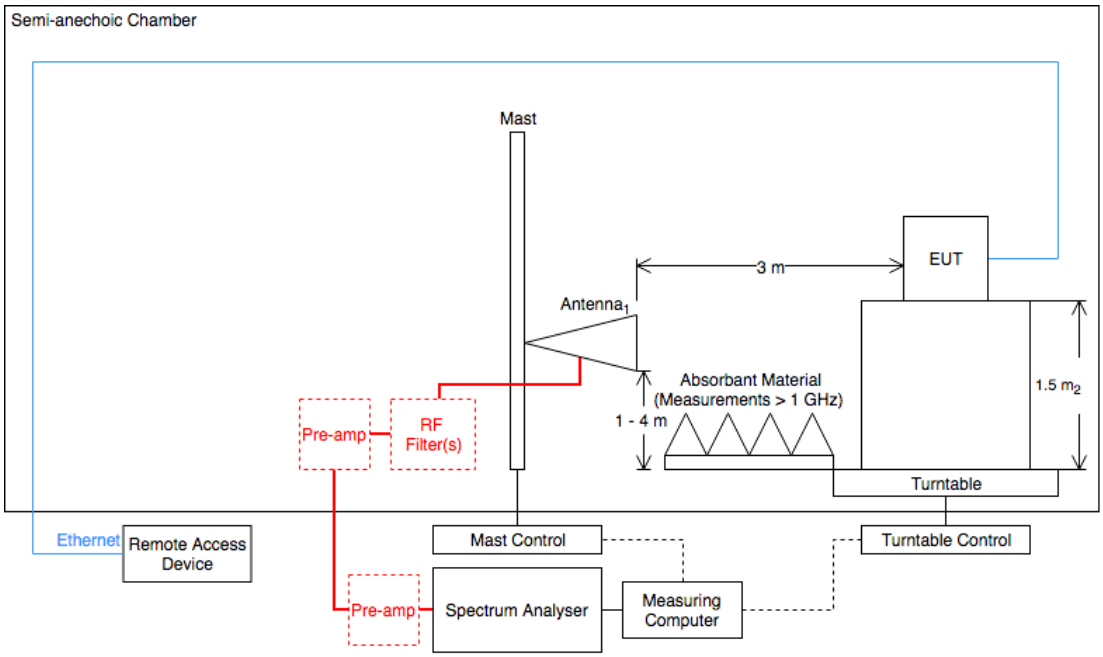
For frequencies > 1 GHz, plots for average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.5 to characterize the EUT. Where emissions were detected, final average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.2.

The plots shown are the characterization of the EUT. The limits on the plots represent the most stringent case for restricted bands, (74/54 dBuV/m) when compared to 20 dBc outside restricted bands. The limits shown have been used as a threshold to determine where further measurements are necessary. Where results are within 10 dB of the limits shown on the plots, further investigation was carried out and reported in results tables.

The following conversion can be applied to convert from dBµV/m to µV/m:
10^(Field Strength in dBµV/m/20).

To determine the emission characteristic of the EUT above 18 GHz, the test antenna was swept over all faces of the EUT whilst observing a spectral display. The frequency of any emissions of interest was noted for formal measurement at the correct measurement distance of 1m. This procedure was repeated for all relevant transmit operating channels.

At a measurement distance of 1 meter the limit line was increased by 20*LOG(3/1) = 9.54 dB. Where formal measurements have been necessary, the results have been presented in the emissions table.



1 Antenna is boresighted for measurements < 1 GHz.
2 Height from the EUT to ground is 0.8 m for measurements < 1 GHz.

Figure 7 - Radiated Emissions Test Setup Diagram

2.3.5 Environmental Conditions

Ambient Temperature	18.9 °C
Relative Humidity	47.1 %

2.3.6 Test Results

2.4 GHz Bluetooth Low Energy

Modulation/Packet Type: GFSK/DH1

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 9 - 30 MHz to 1 GHz – 2402.0 MHz

* No emissions were detected within 10 dB of the limit.

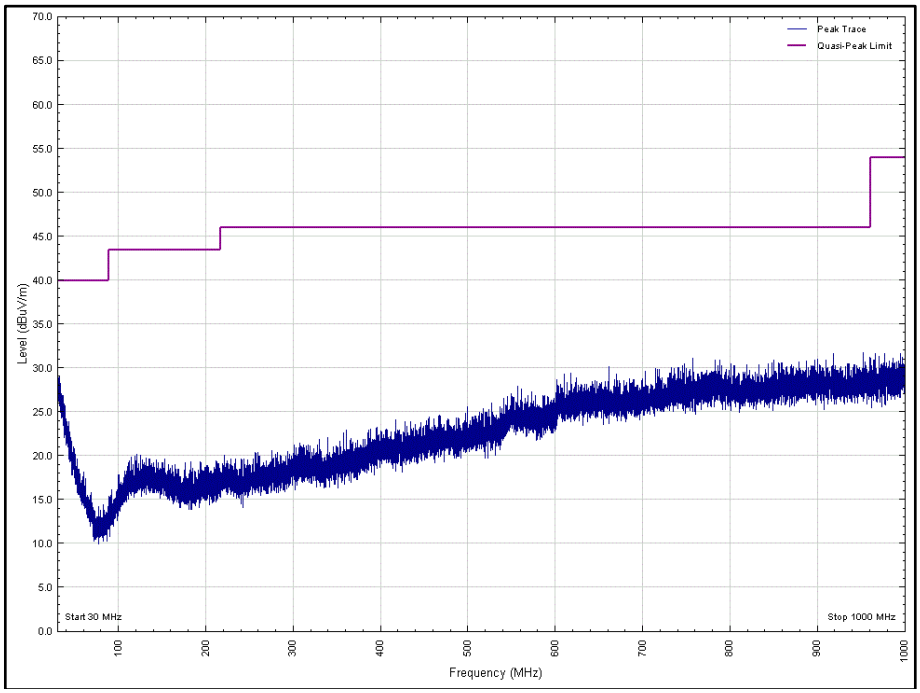


Figure 8 – 30 MHz to 1 GHz, 2402.0 MHz, Vertical

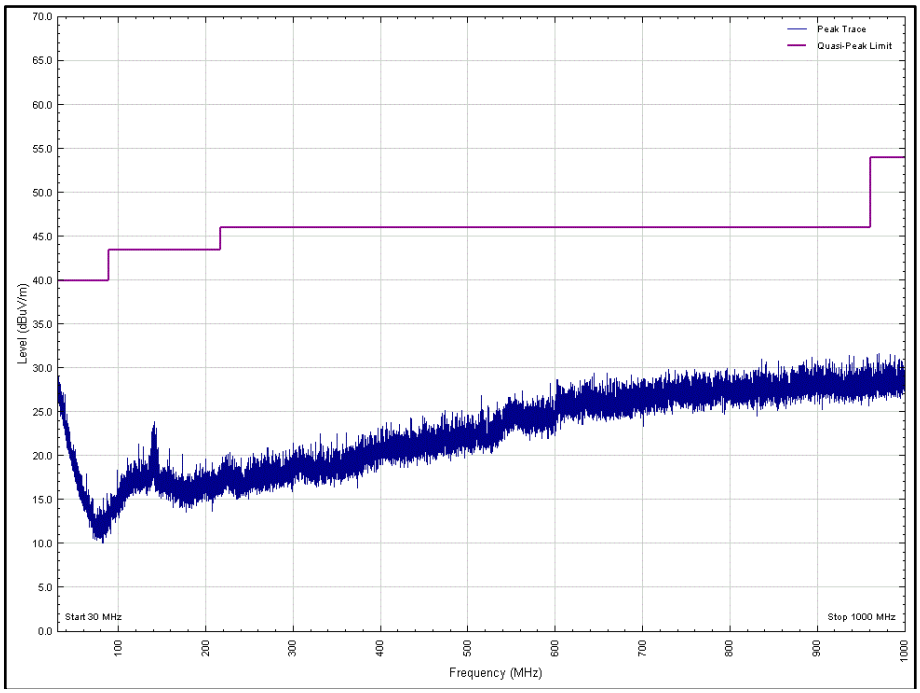


Figure 9 – 30 MHz to 1 GHz, 2402.0 MHz, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 10 - 1 GHz to 25 GHz – 2402.0 MHz

* No emissions were detected within 10 dB of the limit.

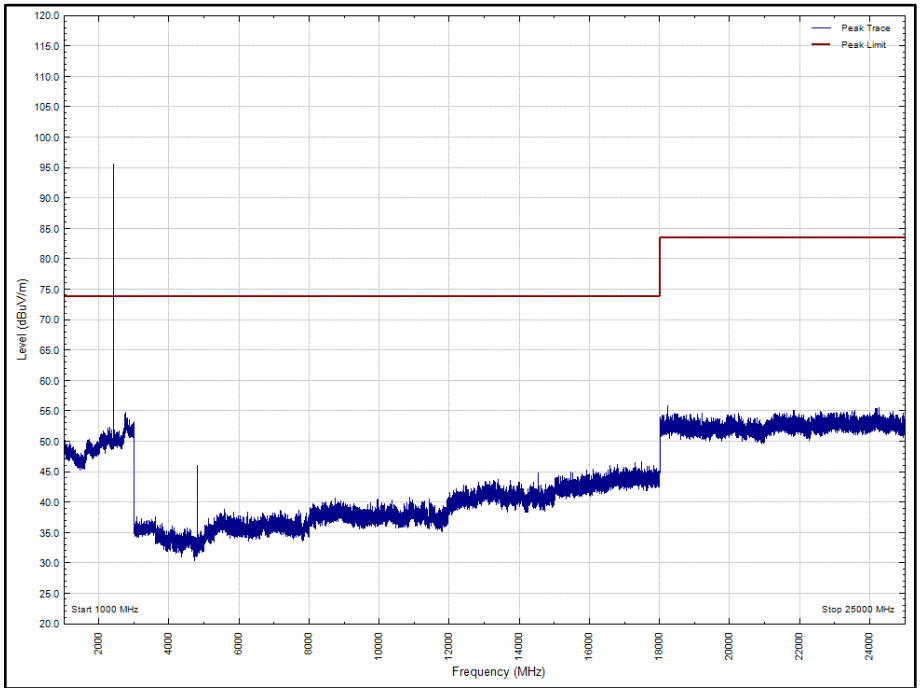


Figure 10 – 1 GHz to 25 GHz, 2402.0 MHz, Vertical, Peak

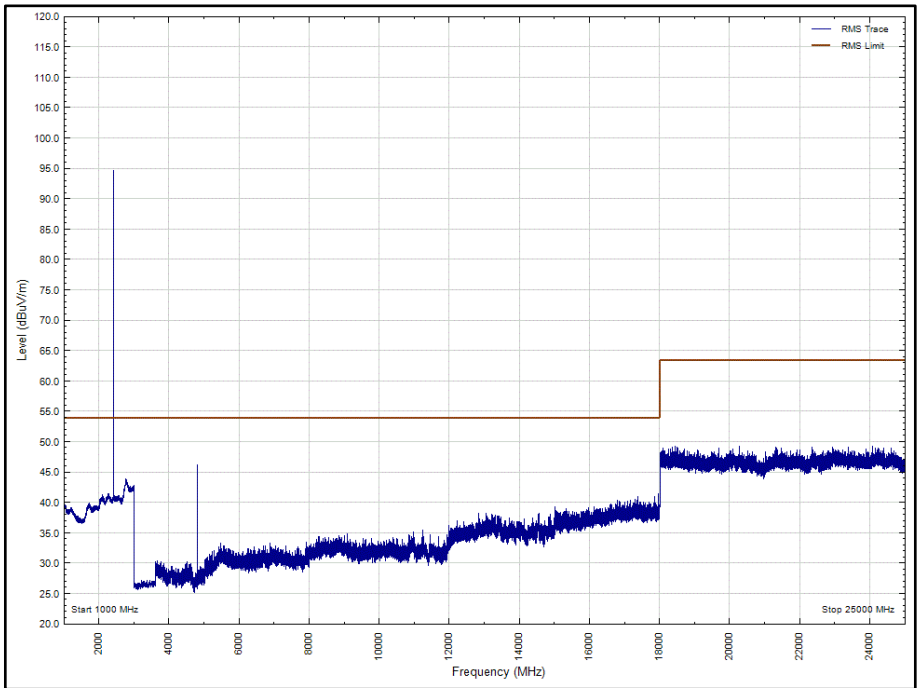


Figure 11 – 1 GHz to 25 GHz, 2402.0 MHz, Vertical, Average

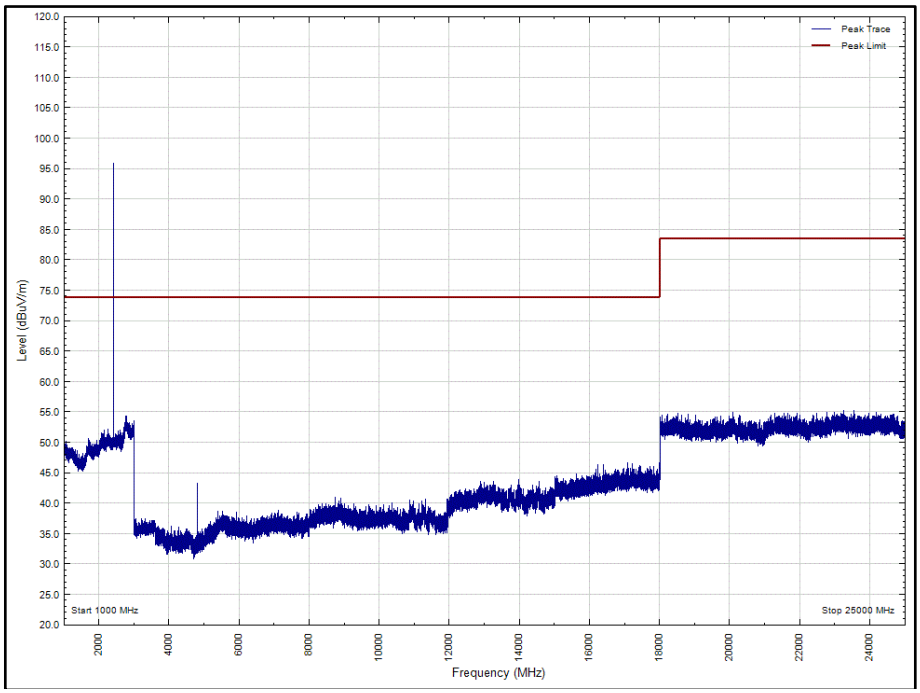


Figure 12 –1 GHz to 25 GHz, 2402.0 MHz, Horizontal, Peak

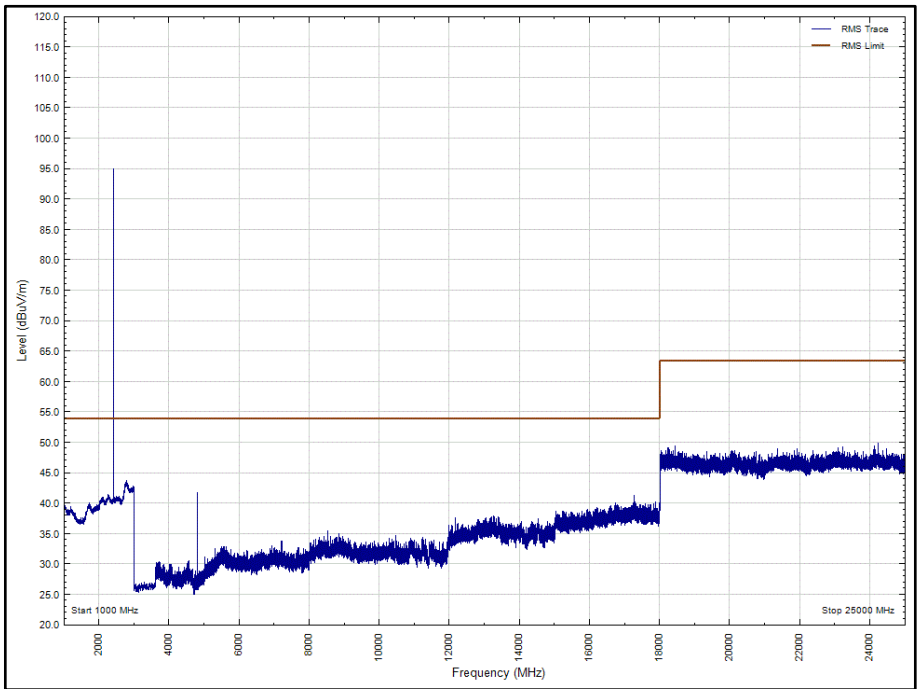


Figure 13 –1 GHz to 25 GHz, 2402.0 MHz, Horizontal, Average

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 11 - 30 MHz to 1 GHz – 2440.0 MHz

* No emissions were detected within 10 dB of the limit.

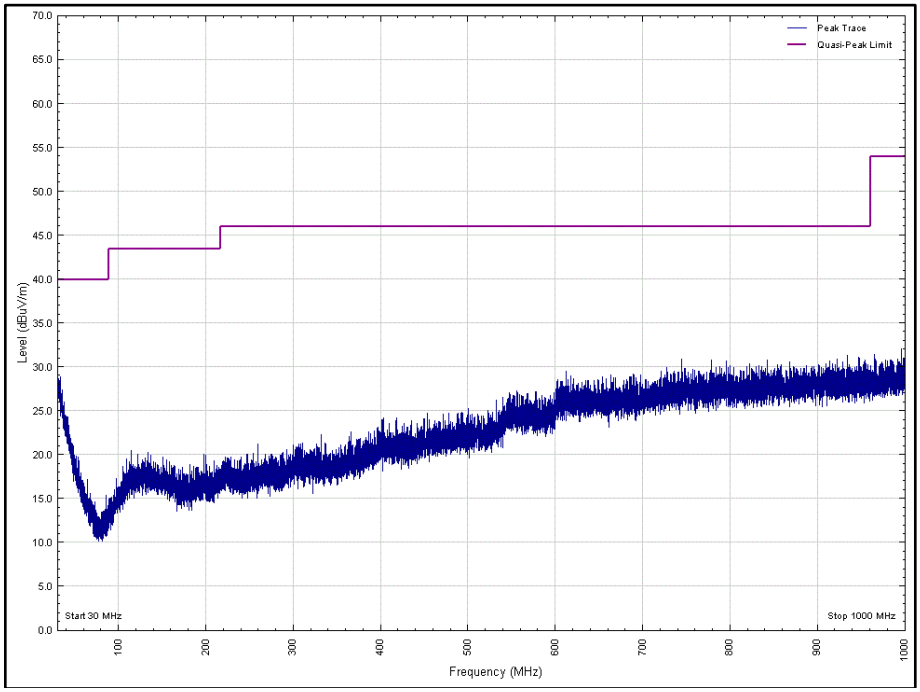


Figure 14 – 30 MHz to 1 GHz, 2440.0 MHz, Vertical

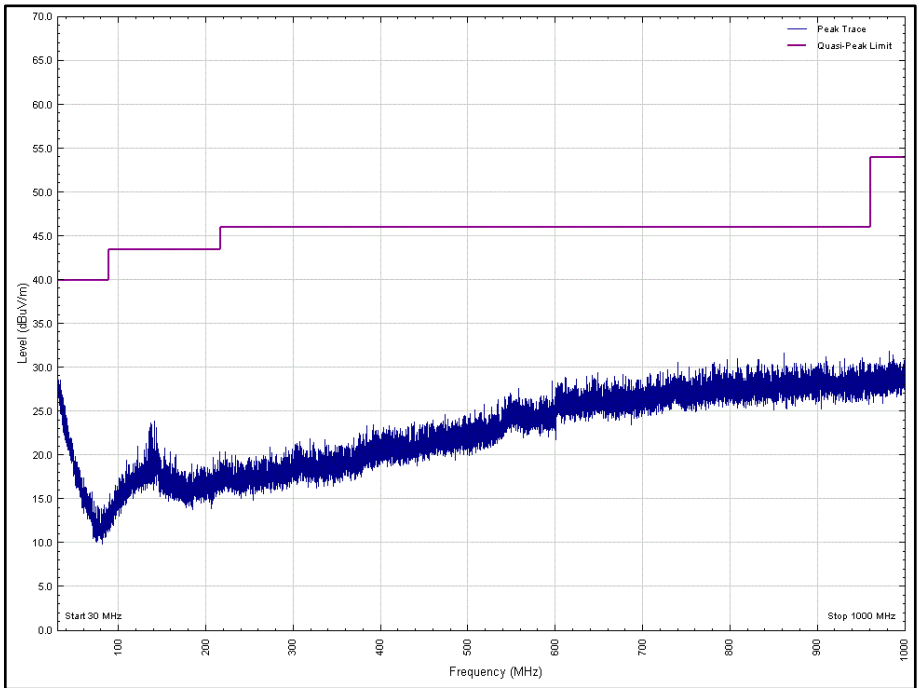


Figure 15 – 30 MHz to 1 GHz, 2440.0 MHz, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 12 - 1 GHz to 25 GHz – 2440.0 MHz

* No emissions were detected within 10 dB of the limit.

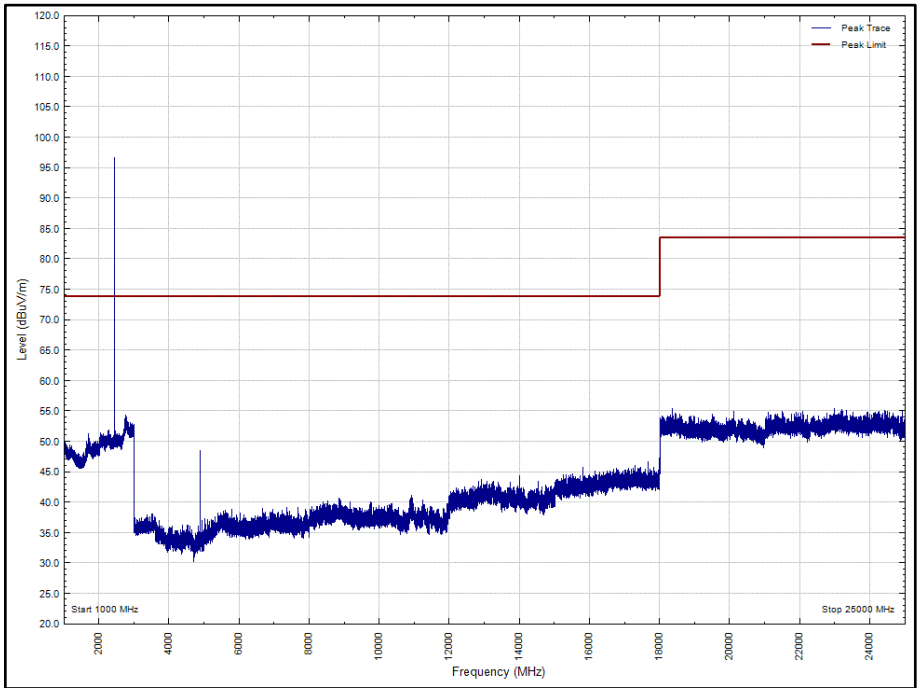


Figure 16 – 1 GHz to 25 GHz, 2440.0 MHz, Vertical - Peak

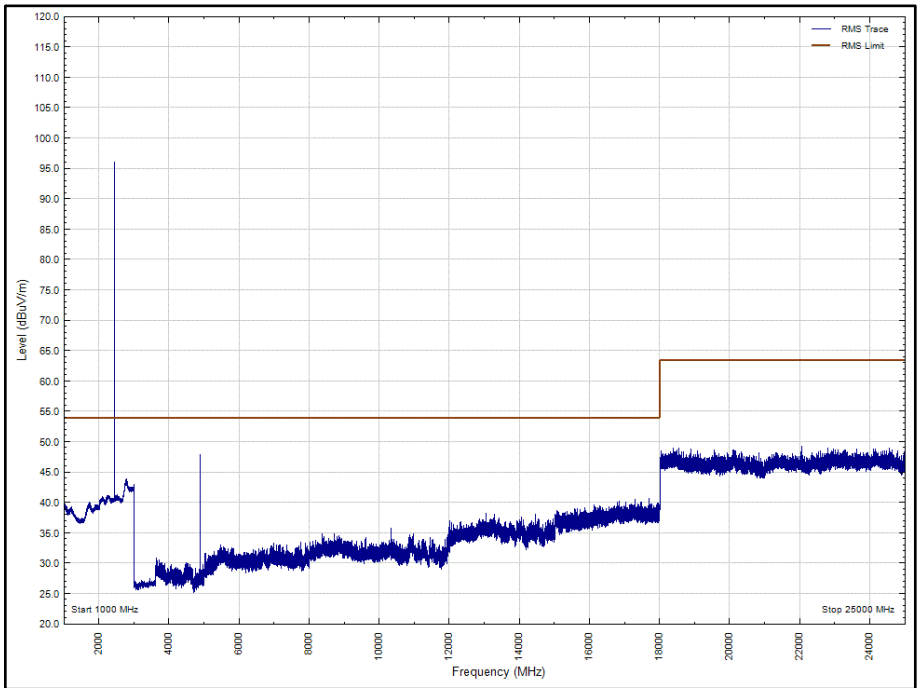


Figure 17 – 1 GHz to 25 GHz, 2440.0 MHz, Vertical – Average

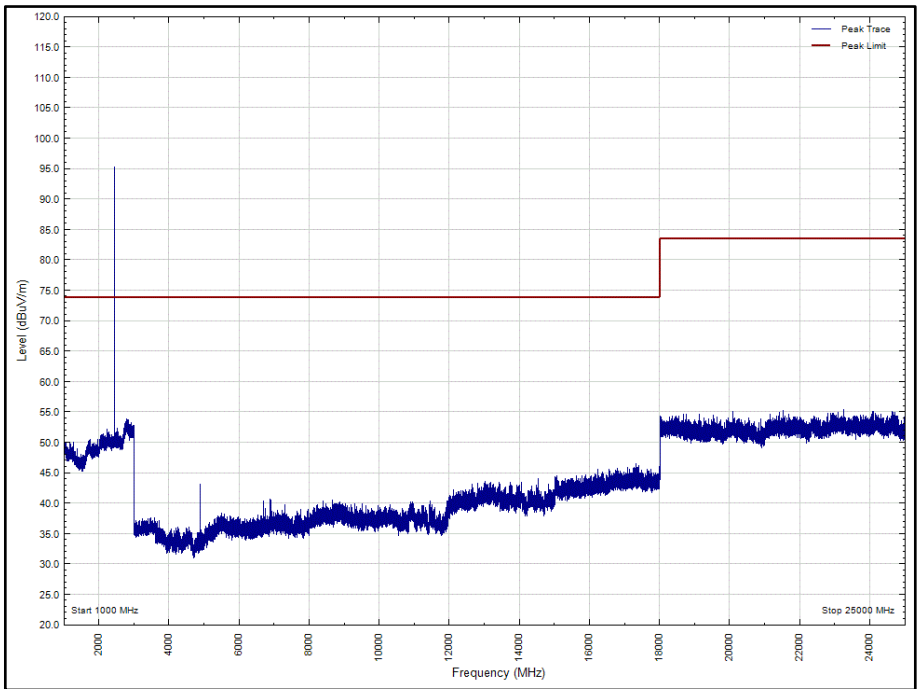


Figure 18 –1 GHz to 25 GHz, 2440.0 MHz, Horizontal - Peak

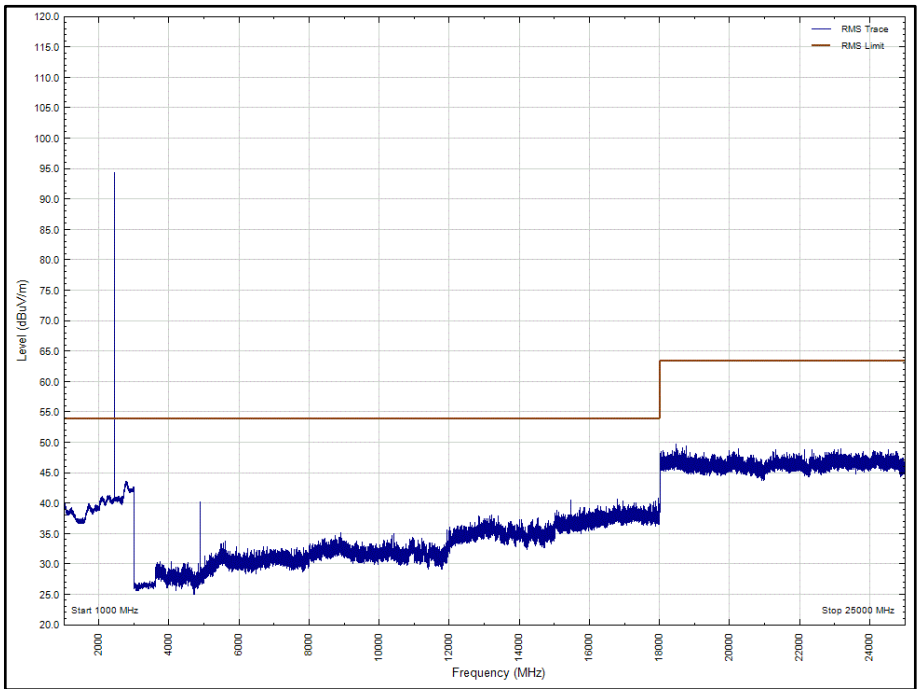


Figure 19 –1 GHz to 25 GHz, 2440.0 MHz, Horizontal - Average

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 13 - 30 MHz to 1 GHz – 2480.0 MHz

* No emissions were detected within 10 dB of the limit.

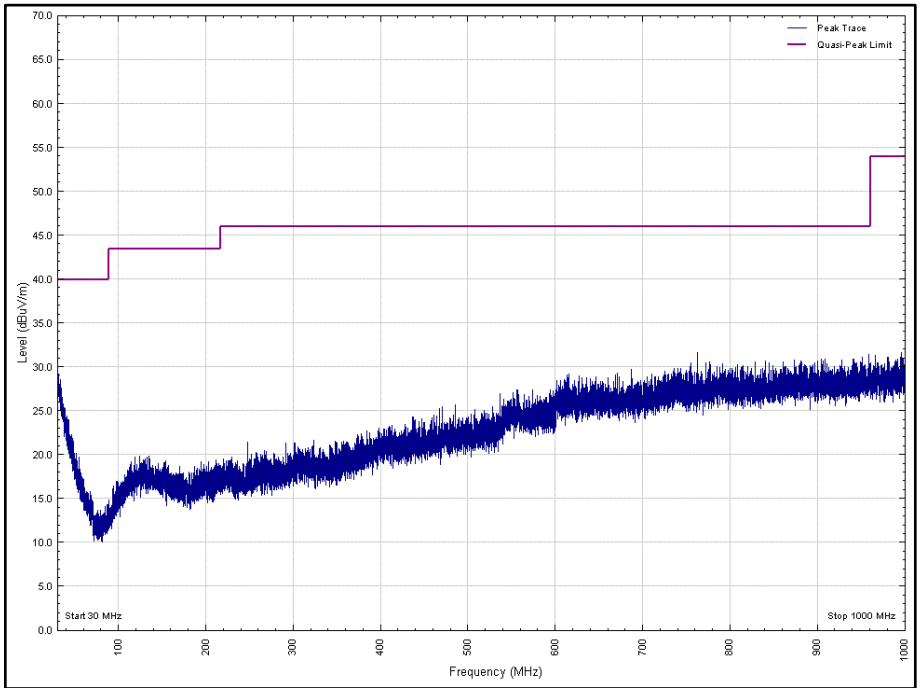


Figure 20 – 30 MHz to 1 GHz, 2480.0 MHz, Vertical

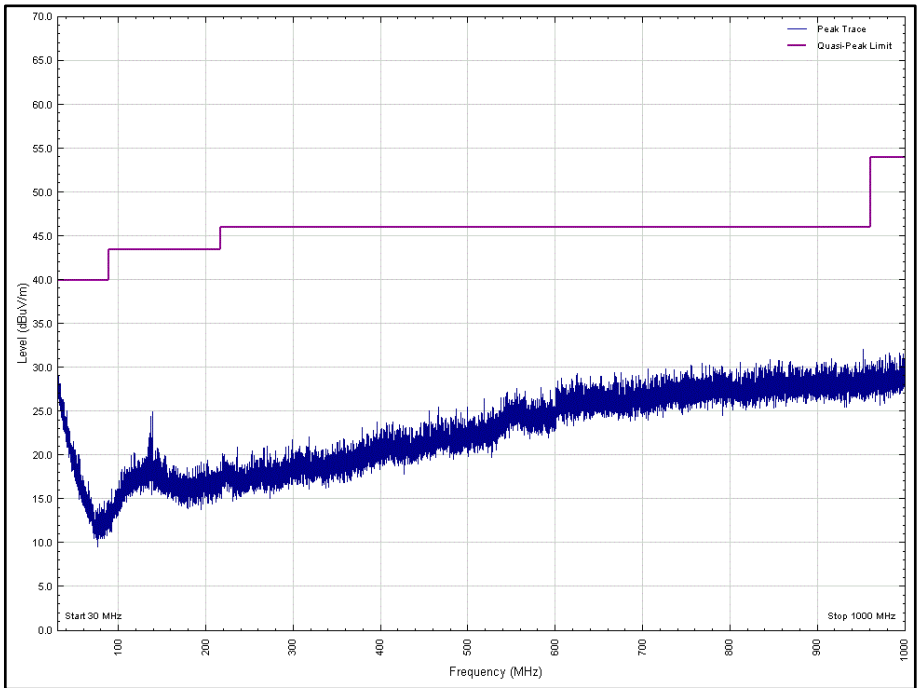


Figure 21 – 30 MHz to 1 GHz, 2480.0 MHz, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 14 - 1 GHz to 25 GHz – 2480.0 MHz

* No emissions were detected within 10 dB of the limit.

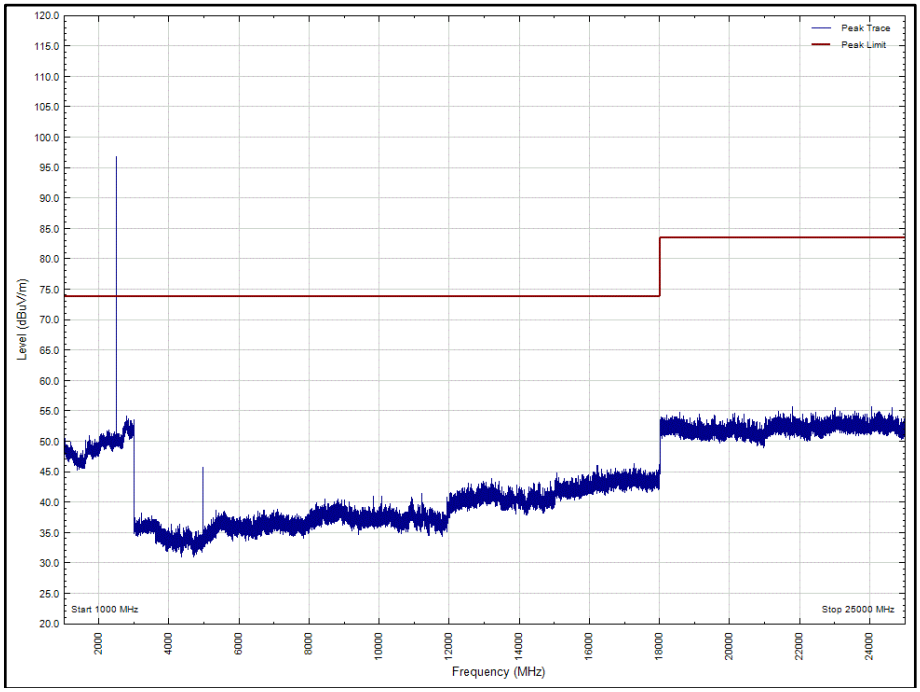


Figure 22 – 1 GHz to 25 GHz, 2480.0 MHz, Vertical - Peak

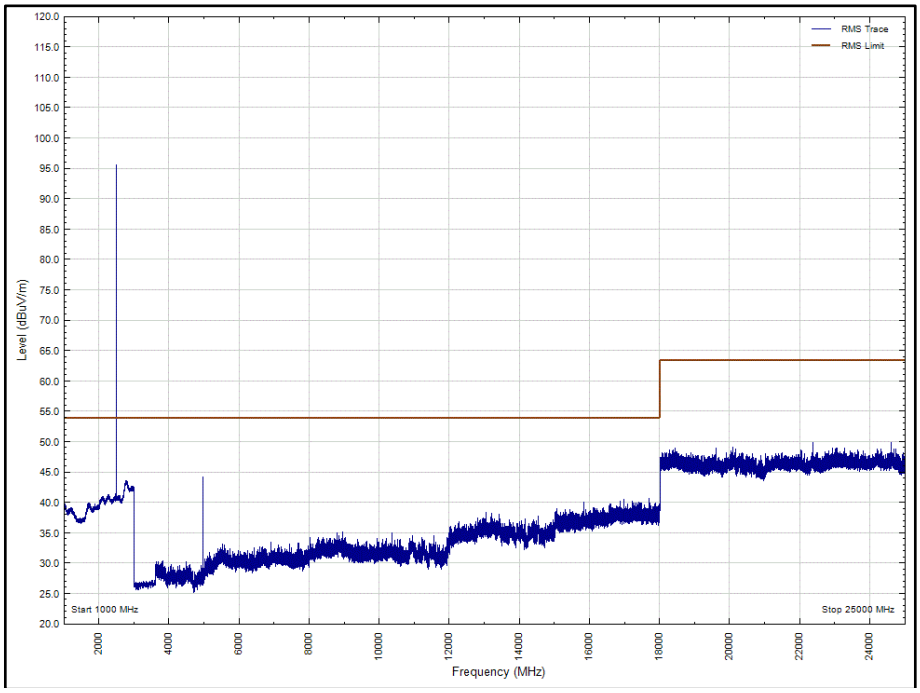


Figure 23 – 1 GHz to 25 GHz, 2480.0 MHz, Vertical – Average

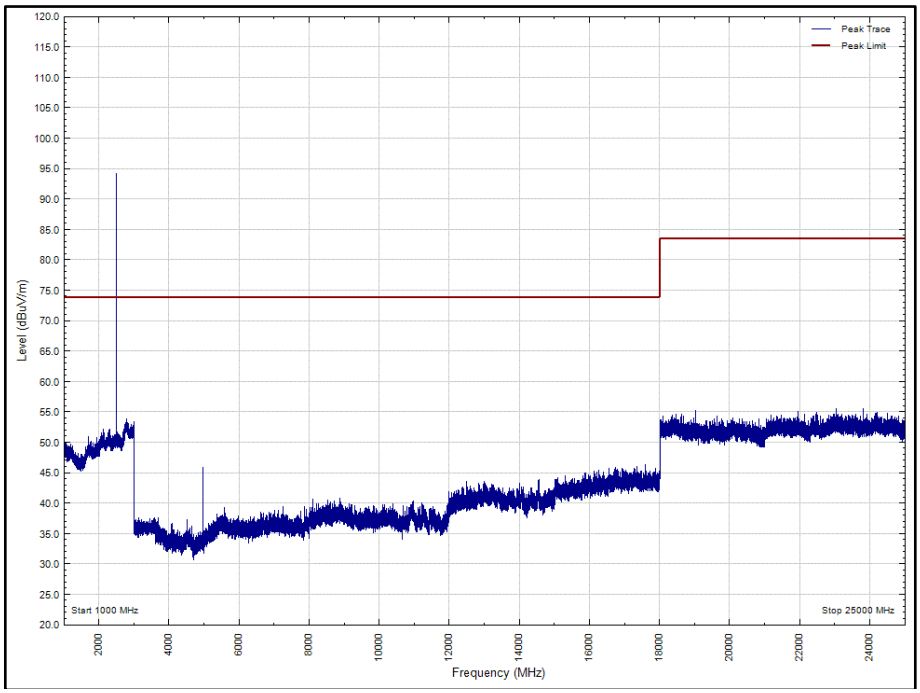


Figure 24 –1 GHz to 25 GHz, 2480.0 MHz, Horizontal - Peak

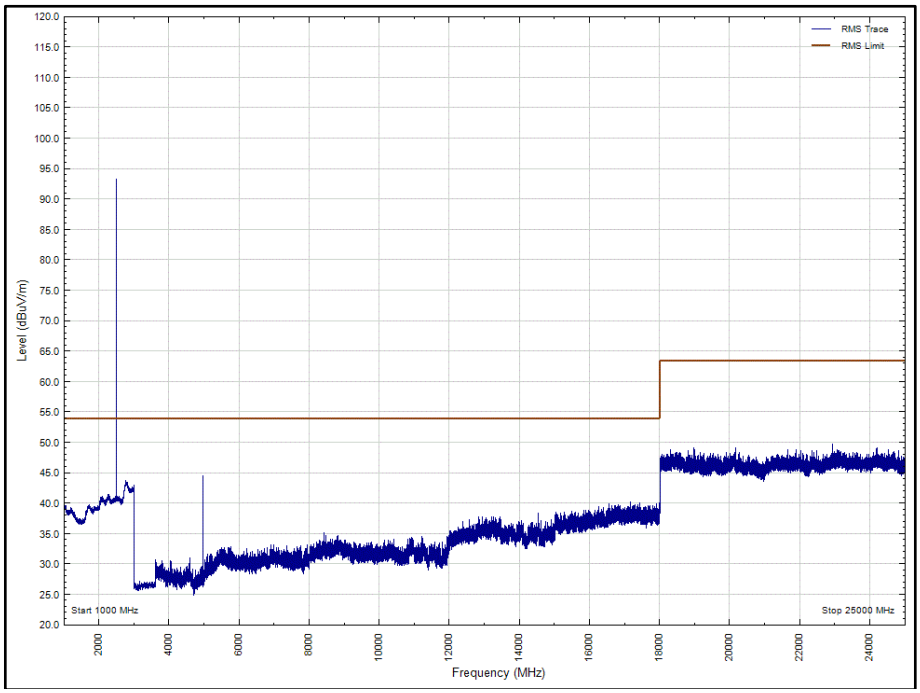


Figure 25 –1 GHz to 25 GHz, 2480.0 MHz, Horizontal, Average

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in 15.209(a)

ISEDC RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

2.3.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Antenna 18-40GHz (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	02-May-2020
Pre-Amplifier	Phase One	PS04-0086	1533	12	08-Feb-2020
18GHz - 40GHz Pre-Amplifier	Phase One	PSO4-0087	1534	12	05-Feb-2020
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Comb Generator	Schaffner	RSG1000	3034	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	03-Jan-2021
'2.92mm' - '2.92mm' RF Cable (2m)	Rhophase	KPS-1503-2000-KPS	3695	12	11-Jun-2020
Cable 1503 2M 2.92(P)m 2.92(P)m	Rhophase	KPS-1503A-2000-KPS	4293	12	08-Nov-2020
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	14-Nov-2020
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	TU
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	11-Mar-2020
Hygrometer	Rotronic	HP21	4989	12	02-May-2020
Cable (18 GHz)	Rosenberger	LU7-071-1000	5099	12	06-Oct-2020
EmX Emissions Software	TUV SUD	EmX	5125	-	Software
1.5m 40GHz RF Cable	Scott Cables	KPS-1501-2000-KPS	5127	6	20-Jan-2020
8 Meter Cable	Teledyne	PR90-088-8MTR	5212	12	30-Aug-2020
3 GHz High pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	5220	12	15-Feb-2020
Antenna (DRG Horn 7.5-18GHz)	Schwarzbeck	HWRD750	5348	12	04-Sep-2020

Table 15

TU - Traceability Unscheduled

2.4 Authorised Band Edges

2.4.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d)
ISEDC RSS-247, Clause 5.5

2.4.2 Equipment Under Test and Modification State

Paxton 10 PaxLock Pro, S/N: Not Serialised (75947459-TSR0027) - Modification State 0

2.4.3 Date of Test

07-January-2020

2.4.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.10.4.

2.4.5 Environmental Conditions

Ambient Temperature	18.8 °C
Relative Humidity	45.0 %

2.4.6 Test Results

2.4 GHz Bluetooth Low Energy

Modulation	Frequency (MHz)	Measured Frequency (MHz)	Level (dBc)
GFSK/DH1	2402.0	2400.0	-50.24

Table 16 - Authorised Band Edge Results

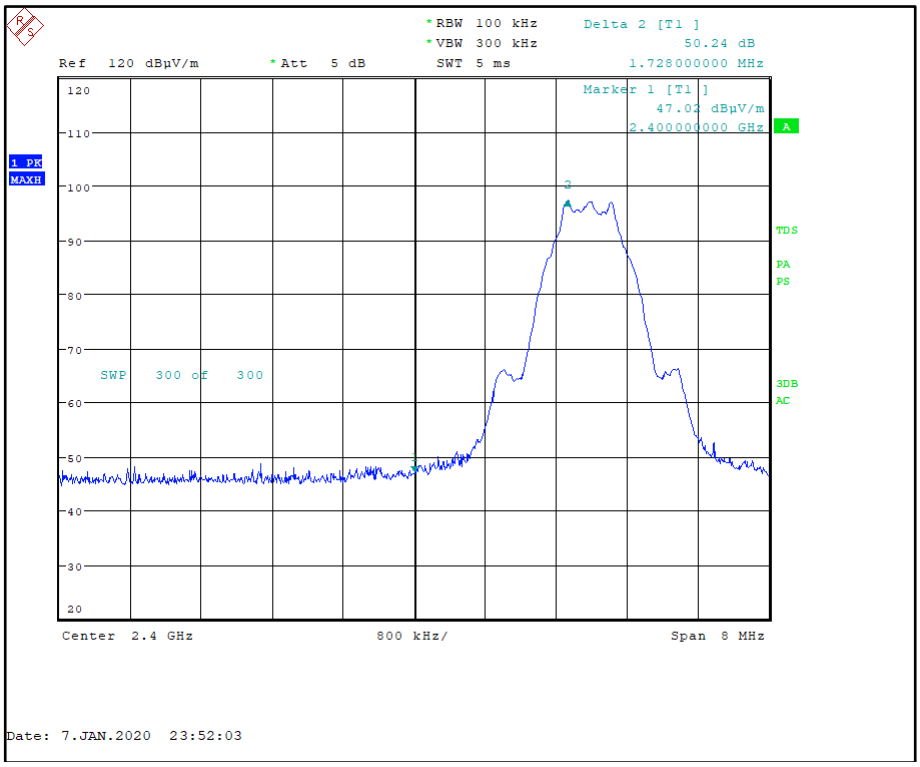


Figure 26 – GFSK/DH1- 2402.0 MHz - Measured Frequency 2400.0 MHz

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

ISEDC RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

2.4.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	03-Jan-2021
'2.92mm' - '2.92mm' RF Cable (2m)	Rhophase	KPS-1503-2000-KPS	3695	12	11-Jun-2020
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	TU
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	11-Mar-2020
Hygrometer	Rotronic	HP21	4989	12	02-May-2020
8 Meter Cable	Teledyne	PR90-088-8MTR	5212	12	30-Aug-2020

Table 17

TU - Traceability Unscheduled

2.5 Restricted Band Edges

2.5.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.205
ISEDC RSS-GEN, Clause 8.10

2.5.2 Equipment Under Test and Modification State

Paxton 10 PaxLock Pro, S/N: Not Serialised (75947459-TSR0027) - Modification State 0

2.5.3 Date of Test

07-January-2020

2.5.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.10.5.

Plots for average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.3. These are shown for information purposes and were used to determine the worst case measurement point. Final average measurements were then taken in accordance with ANSI C63.10 clause 4.1.4.2.2. to obtain the measurement result recorded in the test results tables. The following conversion can be applied to convert from dBµV/m to µV/m:
10^(Field Strength in dBµV/m/20).

2.5.5 Environmental Conditions

Ambient Temperature	18.8 °C
Relative Humidity	45.0 %

2.5.6 Test Results

2.4 GHz Bluetooth Low Energy

Modulation	Frequency (MHz)	Measured Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
GFSK/DH1	2402.0	2390.0	55.84	42.93
GFSK/DH1	2480.0	2483.5	59.84	43.35

Table 18 - Restricted Band Edge Results

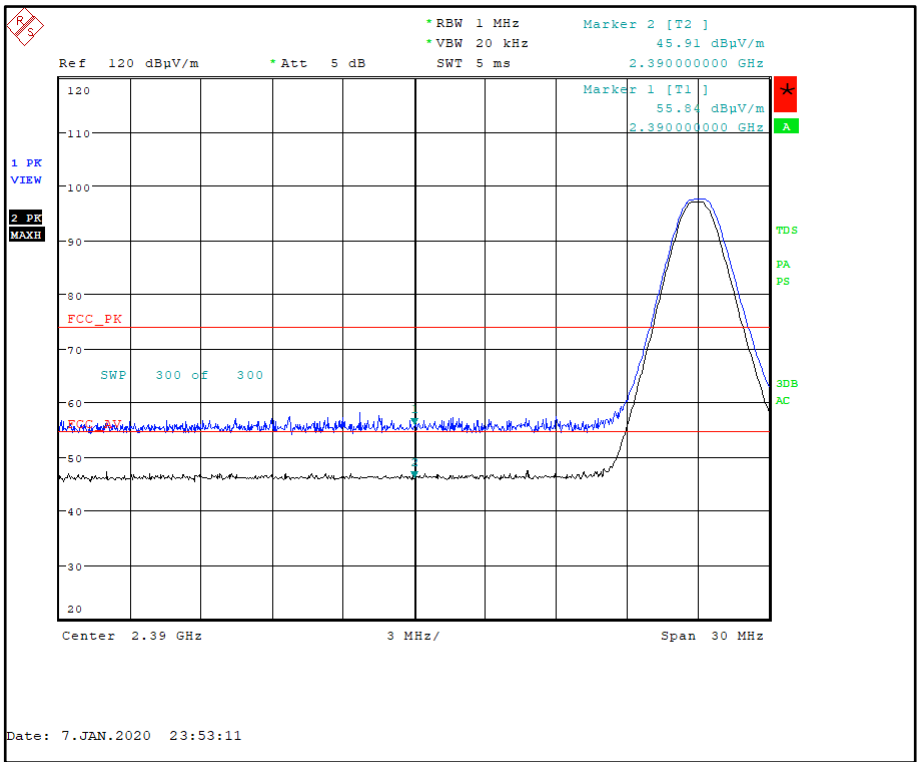


Figure 27 - GFSK/DH1 – 2402.0 MHz - Measured Frequency 2390.0 MHz

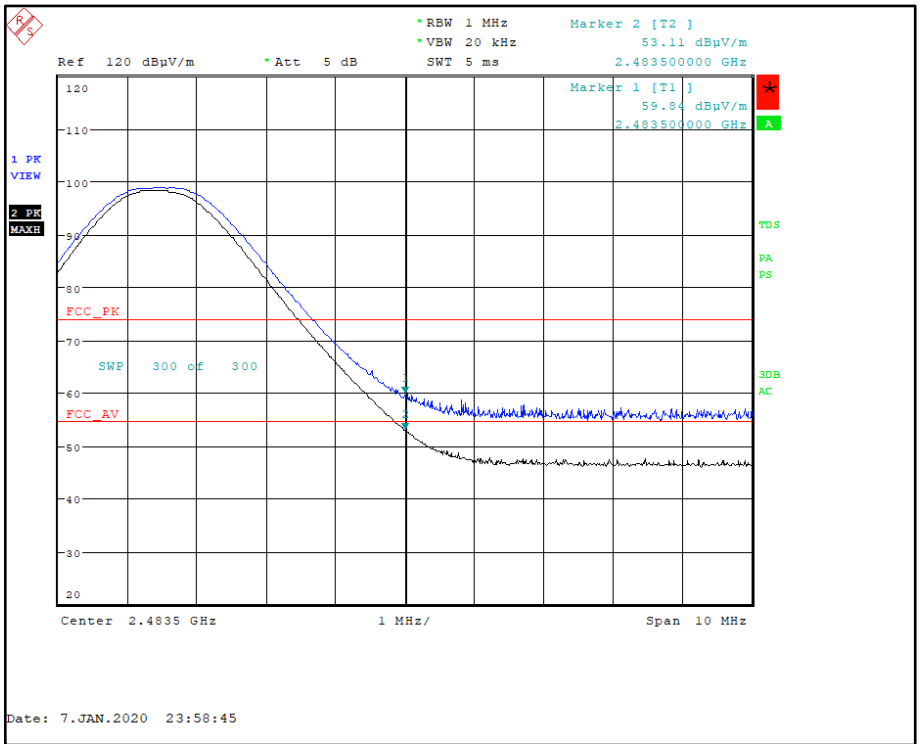


Figure 28 - GFSK/DH1 – 2480.0 MHz - Measured Frequency 2483.5 MHz

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength (µV/m at 3 m)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Table 19

ISEDC RSS-GEN, Limit Clause 8.9

Frequency (MHz)	Field Strength (µV/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

Table 20

*Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

2.5.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	03-Jan-2021
'2.92mm' - '2.92mm' RF Cable (2m)	Rhophase	KPS-1503-2000-KPS	3695	12	11-Jun-2020
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	TU
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	11-Mar-2020
Hygrometer	Rotronic	HP21	4989	12	02-May-2020
8 Meter Cable	Teledyne	PR90-088-8MTR	5212	12	30-Aug-2020

Table 21

TU - Traceability Unscheduled

2.6 Power Spectral Density

2.6.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (e)
ISEDC RSS-247, Clause 5.2
ISEDC RSS-GEN, Clause 6.12

2.6.2 Equipment Under Test and Modification State

Paxton 10 PaxLock Pro, S/N: Not Serialised (75947459-TSR0025) - Modification State 0

2.6.3 Date of Test

28-January-2020

2.6.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.10.2.

2.6.5 Environmental Conditions

Ambient Temperature	22.4 °C
Relative Humidity	26.7 %

2.6.6 Test Results

2.4 GHz Bluetooth Low Energy

Frequency (MHz)	Power Spectral Density (dBm)	Measurement Bandwidth (kHz)
2402.0	-8.93	15
2440.0	-9.44	15
2480.0	-9.96	15

Table 22 - Power Spectral Density

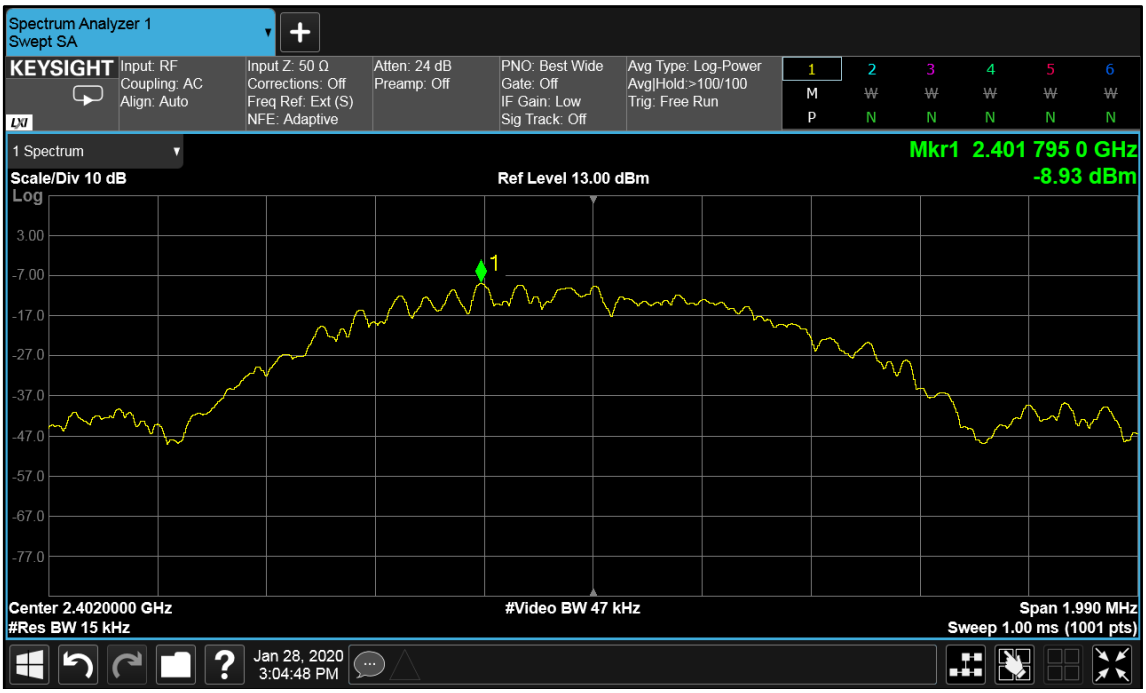


Figure 29 – 2402.0 MHz

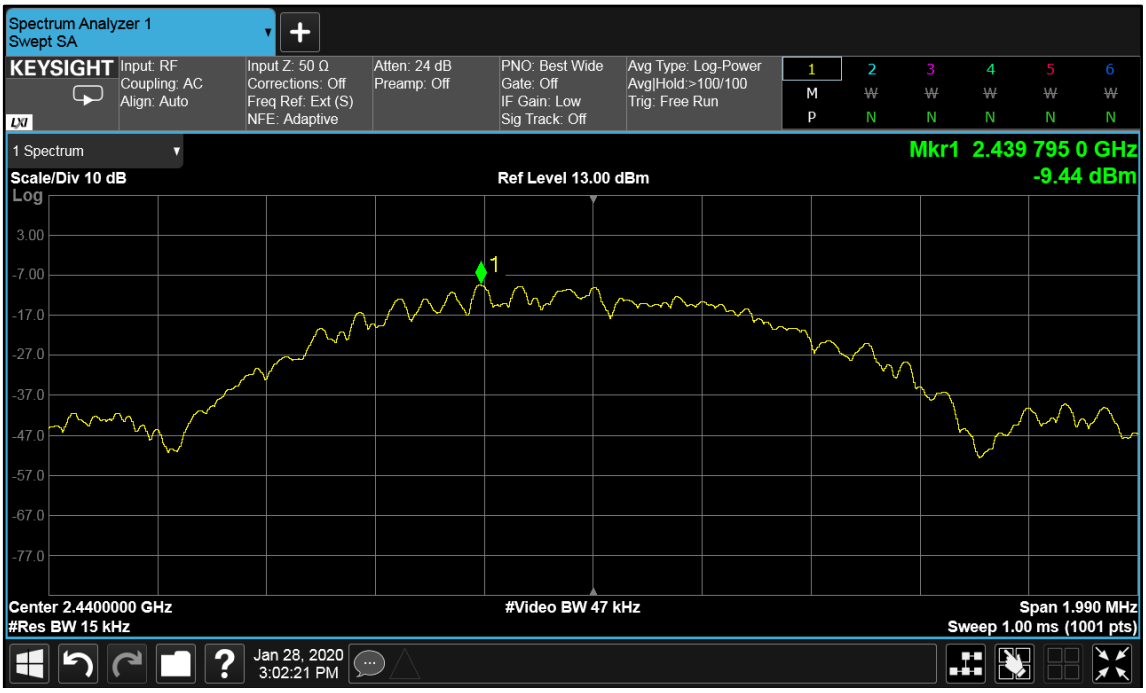


Figure 30 – 2440.0 MHz

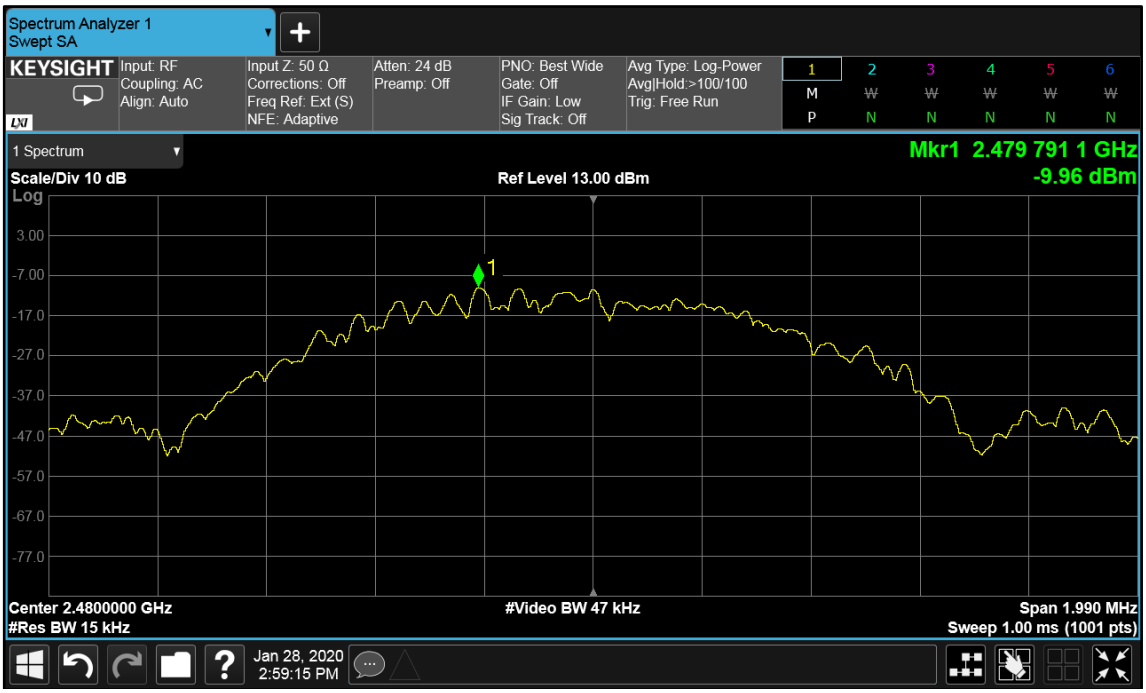


Figure 31 – 2480.0 MHz

FCC 47 CFR Part 15, Limit Clause 15.247 (e)

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

ISEDC RSS-247, Limit Clause 5.2(b)

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

2.6.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
10dB/1W SMA Attenuator dc - 18GHz	Sealectro	60-674-1010-89	395	-	O/P Mon
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
EXA	Keysight Technologies	N9010B	4968	24	23-Dec-2021
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020
Electronic Calibration Module	Keysight Technologies	85093C	5188	12	21-May-2020

Table 23

O/P Mon – Output monitored using calibrated equipment.

3 Photographs

3.1 Test Setup Photographs

Figure 32 - 30 MHz to 1 GHz

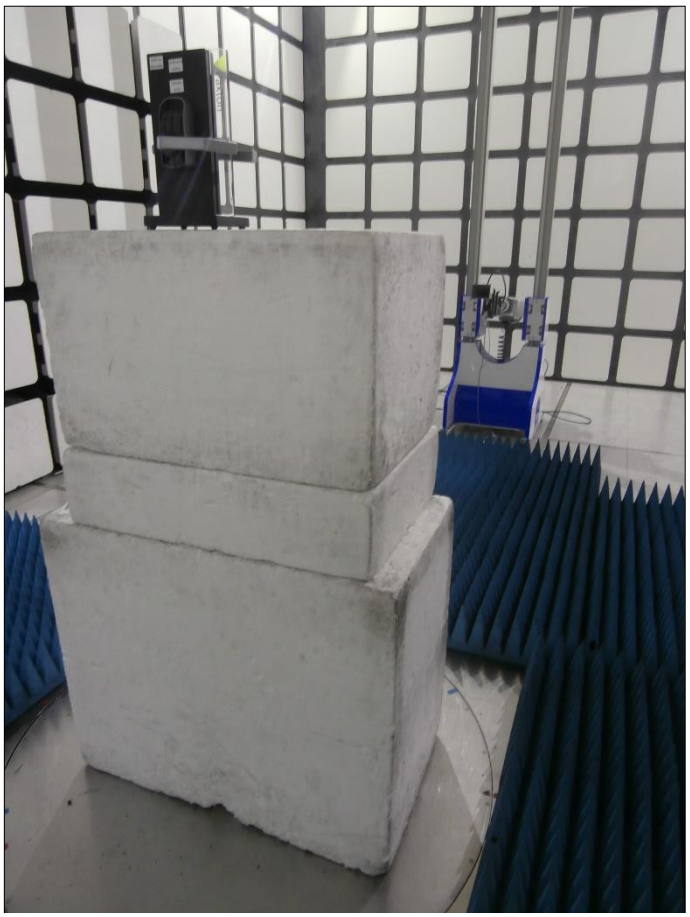


Figure 33 - 1 GHz to 18 GHz

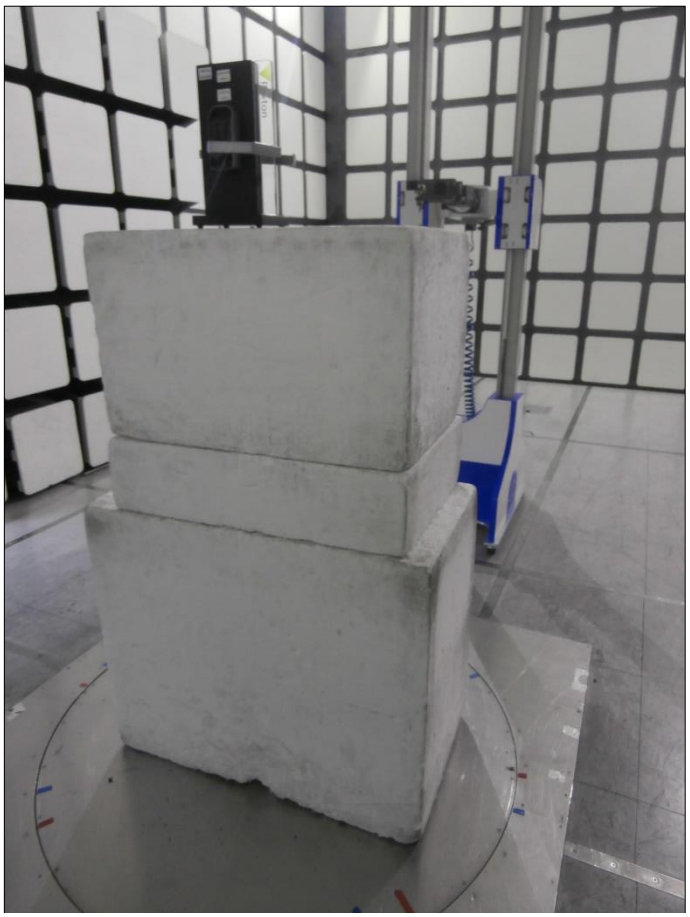


Figure 34 - 18 GHz to 25 GHz

4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Power Spectral Density	± 3.2 dB
Restricted Band Edges	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 40 GHz: ± 6.3 dB
Authorised Band Edges	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 40 GHz: ± 6.3 dB
Spurious Radiated Emissions	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 40 GHz: ± 6.3 dB
Antenna Requirement	-
Emission Bandwidth	± 41.575 kHz
Maximum Conducted Output Power	± 3.2 dB

Table 24

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.