FCC Test Report

MiX Telematics International (Pty) Ltd
Telematics Unit, Model: MiX 46MC-4G-B

In accordance with FCC CFR 47 Part 15C, FCC CFR 47 Part 22 and FCC CFR 47 Part 24

Prepared for: MiX Telematics Europe Ltd
Cherry Orchard North
Kembrey Business Park
Swindon
Wiltshire
SN2 8UH
United Kingdom

FCC ID: 2AFMS-4XMCXG

COMMERCIAL-IN-CONFIDENCE

Document 75948420-05 Issue 02

SIGNATURE			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Stephen Marshal	Senior Engineer	Authorised Signatory	16 April 2021

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 CFR 47 Part 15C, FCC CFR 47 Part 22 and FCC CFR 47 Part 24. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Graeme Lawler	16 April 2021	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC CFR 47 Part 15C: 2019, FCC CFR 47 Part 22: 2019 and FCC CFR 47 Part 24: 2019 for the tests detailed in section 1.3.

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Contents

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	05 May 2020
2	To include additional declared variants	16 April 2021

Table 1

1.2 Introduction

Applicant	MiX Telematics Europe Ltd
Manufacturer	MiX Telematics International (Pty) Ltd
Model Number(s)	MiX 46MC-4G-B
Manufacturer Declared Variant(s)	MiX 46MC-4G MiX 460C-4G-B MiX 460C-4G
Serial Number(s)	52000102
Hardware Version(s)	1
Software Version(s)	4.8
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15: 2019 FCC CFR 47 Part 22: 2019 FCC CFR 47 Part 24: 2019
Order Number Date	P0093369 20-February-2020
Date of Receipt of EUT	02-March-2020
Start of Test	18-March-2020
Finish of Test	22-March-2020
Name of Engineer(s)	Graeme Lawler
Related Document(s)	ANSI C63.26: 2015

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 15C, FCC CFR 47 Part 22, FCC CFR 47 Part 24 and FCC CFR 47 Part 27 is shown below.

Section	Specification Clause				Test Description	Result	Comments/Base Standard
	Part 15C	Part 22	Part 24	Part 27			
Configuration and Mode: Bluetooth Low Energy + 915 MHz SRD + LTE FDD Band 2							
2.1	15.247 (d) and 15.205		24.238 (a)	-	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	ANSI C63.26: 2015
Configuration and Mode: Bluetooth Low Energy + 915 MHz SRD + LTE FDD Band 4							
2.1	15.247 (d) and 15.205	-	-	27.53 (h)	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	ANSI C63.26: 2015
Configuration and Mode: Bluetooth Low Energy + 915 MHz SRD + LTE FDD Band 5							
2.1	15.247 (d) and 15.205	22.917 (a)		-	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	ANSI C63.26: 2015
Configuration and Mode: Bluetooth Low Energy + 915 MHz SRD + LTE FDD Band 12							
2.1	15.247 (d) and 15.205	-	-	27.53 (g)	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	ANSI C63.26: 2015

Table 2

1.4 Application Form

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment)*	The MiX 46MC-4G is a fleet product that incorporates the latest market trends. It consists mainly of an on-board computer, an LTE CAT M1 modem with 2G fall-back, a GNSS, an accelerometer, Low Energy Bluetooth, I/O, 2 x CAN, 2 x RS232, 4 x positive drives and 434 / 915 MHz short range transceiver.
Manufacturer:	MiX Telematics International (Pty) Ltd.
Model:	MiX 46MC-4G; MiX 46MC-4G-B
Part Number:	440FT0194; 440FT0195
Hardware Version:	1
Software Version:	4.8
FCC ID (if applicable)	2AFMS-4XMCXG
IC (if applicable)	

Intentional Radiators

Technology	LTE Band 12	LTE Band 13	LTE Band 5	LTE Band 4	LTE Band 3	LTE Band 2	SRD915	SRD2400
Frequency Band (MHz)	699-716	777-787	824-849	1710-1755	1710-1785	1880-1910	902-928	2400-2480
Conducted Declared Output Power (dBm)	23	23	23	23	23	23	20	7
Antenna Gain (dBi)	0.76	1.39	0.21	1.46	1.46	2.07	0	1.4
Supported Bandwidth(s) (MHz)	1.4	1.4	1.4	1.4	1.4	1.4	0.025	1
Modulation Scheme(s)	QPSK/ 16-QAM	QPSK/ 16-QAM	QPSK/ 16-QAM	QPSK/ 16-QAM	QPSK/ 16-QAM	QPSK/ 16-QAM	2FSK	GFSK
ITU Emission Designator	1M40W7D	1M40W7D	1M40W7D	1M40W7D	1M40W7D	1M40W7D	38K4F7D	1M00G7D
Bottom Frequency (MHz)	699	777	824	1710	1710	1850	902	2402
Middle Frequency (MHz)	707.5	782	836.5	1747.5	1747.5	1880	915	2440
Top Frequency (MHz)	716	787	849	1755	1785	1910	928	2480

Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	2480 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	699 MHz
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:	N/A	Hz
Voltage	N/A	V
Max current:	N/A	A
Single Phase ☐ Three Phase ☐		

DC Power Source

Nominal voltage:	13.8/27.6 V DC	V
Extreme upper voltage:	32	V
Extreme lower voltage:	10.5	V
Max current:	2A typical; 4.5A absolute max (7.5A Fused)	A

Battery Power Source

Voltage:	3.2	V
End-point voltage:	3.2	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	°C
Maximum temperature:	60	°C

Antenna Characteristics

Antenna connector ☒			State impedance	50	Ohm
Temporary antenna connector ☐			State impedance		Ohm
Integral antenna ☒	Type:	LTE BLE SRD915 GNSS	Gain	3 1.4 0 4	dBi
External antenna ☒	Type:	GNSS	Gain	4	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:	MiX Telematics	Part Number:	440FT0033
Model:	Main Harness MP10	Country of Origin:	South Africa
Manufacturer:	MiX Telematics	Part Number:	440FT0032
Model:	Code Plug Harness with Socket CP4	Country of Origin:	South Africa
Manufacturer:	MiX Telematics	Part Number:	440FT0931
Model:	Serial Harness SR1	Country of Origin:	South Africa
Manufacturer:	RF Design	Part Number:	440FT0933
Model:	External GNSS Antenna PA2	Country of Origin:	South Africa

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

Name: Ben van der Merwe
Position held: Senior RF Engineer
Date: 29 April 2020

1.5 Manufacturer's Declared Variant(s)

The following product variants (with part numbers) are available:

Part ID	Official Name	Description
440FT0194	MiX 46MC-4G	MiX 4000 LTE with 2G fall back (Model 46MC-4G) Electronic Unit; with Magix 434MHz and 915MHz support.
440FT0195	MiX 46MC-4G-B	MiX 4000 LTE with 2G fall back (Model 46MC-4G-B) Electronic Unit with Battery (plugged in) with Magix 434MHz and 915MHz support.

The variants MiX 46MC-4G and MiX 46MC-4G-B, present the same electrical, physical and electro mechanics characteristics, the same PCB (440AWZ124), layout and components.

The only difference between them is that the model MiX 46MC-4G-B has an internal backup battery, allowing the device to work after the disconnection of the vehicle´s battery.

The following variants use the same PCB (440AWZ124) and circuit (440CDZ192), but it is not utilizing the Short Range Device feature (434 MHz) (components not populated):

Assembly Number	Assembly Name	Description
U0095MT	MiX 460C-4G	MiX 460C-4G Electronic Unit with u-blox SARA-R412M modem; No on-board Magix support
U0097MT	MiX 460C-4G-B	MiX 460C-4G with Backup Battery Electronic Unit with u-blox SARA-R412M modem; No on-board Magix support

1.6 Product Information

1.6.1 Technical Description

The MiX 46MC-4G is a fleet product that incorporates the latest market trends. It consists mainly of an on-board computer, an LTE CAT M1 modem with 2G fallback, a GNSS, an accelerometer, Bluetooth Low Energy, I/O, 2 x CAN, 2 x RS232, 4 x positive drives and 434 / 915 MHz short range transceiver.

1.6.2 Test Setup Diagram(s)

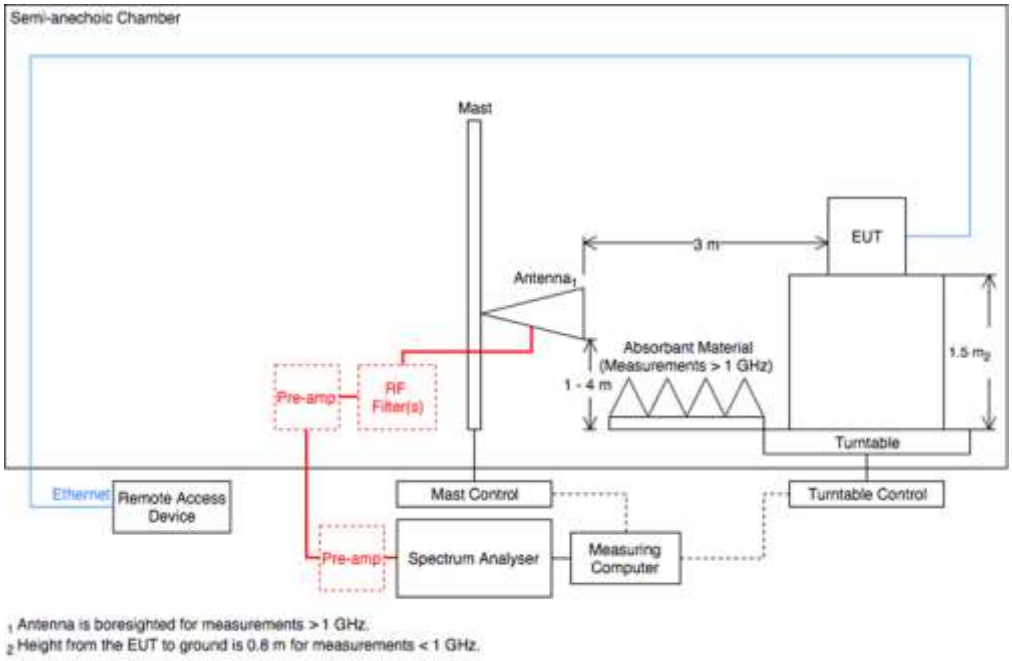

Table 3

1.6.3 EUT Configuration and Rationale for Radiated Spurious Emissions

The EUT was placed on a non-conducting platform in a manner typical of a normal installation. The EUT would be fitted 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

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: MiX 46MC-4G-B, Serial Number: 52000102			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 4

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: Bluetooth Low Energy + 915 MHz SRD + LTE FDD Band 2		
Radiated Spurious Emissions (Simultaneous Transmission)	Graeme Lawler	UKAS
Configuration and Mode: Bluetooth Low Energy + 915 MHz SRD + LTE FDD Band 4		
Radiated Spurious Emissions (Simultaneous Transmission)	Graeme Lawler	UKAS
Configuration and Mode: Bluetooth Low Energy + 915 MHz SRD + LTE FDD Band 5		
Radiated Spurious Emissions (Simultaneous Transmission)	Graeme Lawler	UKAS
Configuration and Mode: Bluetooth Low Energy + 915 MHz SRD + LTE FDD Band 12		
Radiated Spurious Emissions (Simultaneous Transmission)	Graeme Lawler	UKAS

Table 5

Office Address:

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

2 Test Details

2.1 Radiated Spurious Emissions (Simultaneous Transmission)

2.1.1 Specification Reference

FCC CFR 47 Part, Clause 15.247 (d) and 15.205
FCC CFR 47 Part, Clause 22.917 (a)
FCC CFR 47 Part, Clause 24.238 (a)
FCC CFR 47 Part, Clause 27.53 (g)
FCC CFR 47 Part, Clause 27.53 (h)

2.1.2 Equipment Under Test and Modification State

MiX 46MC-4G-B, S/N: 52000102 - Modification State 0

2.1.3 Date of Test

18-March-2020 to 22-March-2020

2.1.4 Test Method

Testing was performed in accordance with ANSI C63.26, clause 5.5.

Prescans and final measurements were performed using the direct field strength method.

A preliminary profile of the Spurious Radiated Emissions was obtained up to the 10th harmonic by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

The Regulatory limit of -13dBm / MHz has been converted to a field strength limit in accordance with ANSI C63.26 clause 5.2.7 equation c)
Example calculation

E (dBuV/m) = EIRP (dBm) - 20log(d) + 104.8 where (d) is the measurement distance.
E (dBuV/m) = -13 - 20log(3) + 104.8
E (dBuV/m) = 82.26

2.1.5 Environmental Conditions

Ambient Temperature	18.0 - 19.9 °C
Relative Humidity	29.1 - 48.1 %

2.1.6 Test Results

Bluetooth Low Energy + 915 MHz SRD + LTE FDD Band 2

The EUT was configured for simultaneous transmission in the following mode of operation:

Technology	Frequency Band (MHz)	Channel Frequency (MHz)
Short Range Device	902 to 928	915.0
Bluetooth Low Energy	2400 to 2483.5	2440.0
LTE FDD Band 2	1850 to 1910	1880.0

Table 6 - Modes of Operation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
965.500	75.40	82.26	6.86	Peak	55	117	Vertical	X

Table 7 - 30 MHz to 25 GHz Emissions Results

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

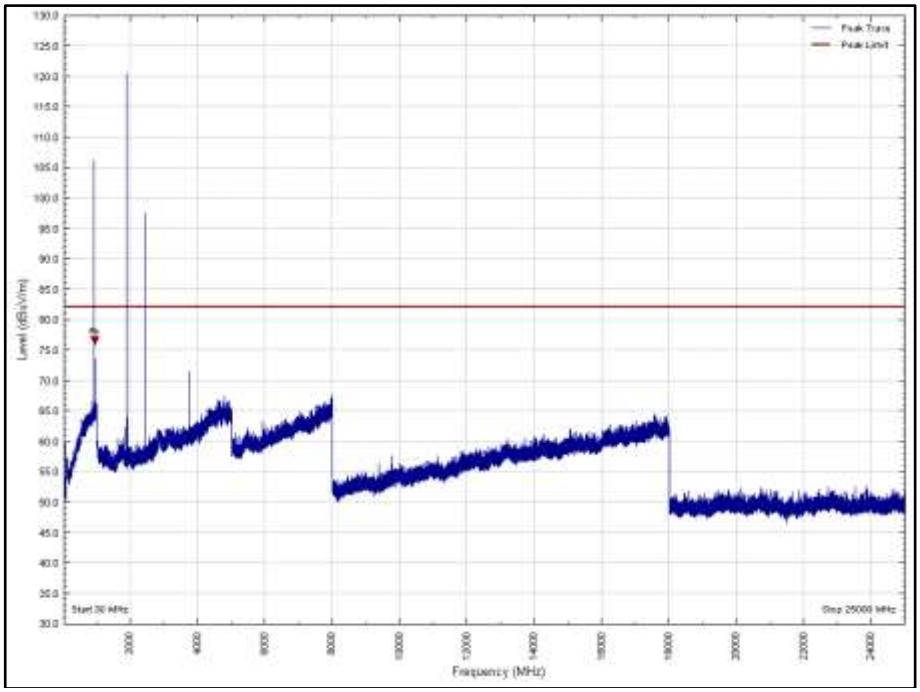

Figure 1 - 30 MHz to 25 GHz, Vertical, X Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
965.463	74.49	82.26	7.77	Peak	218	198	Horizontal	X

Table 8 - 30 MHz to 25 GHz Emissions Results

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

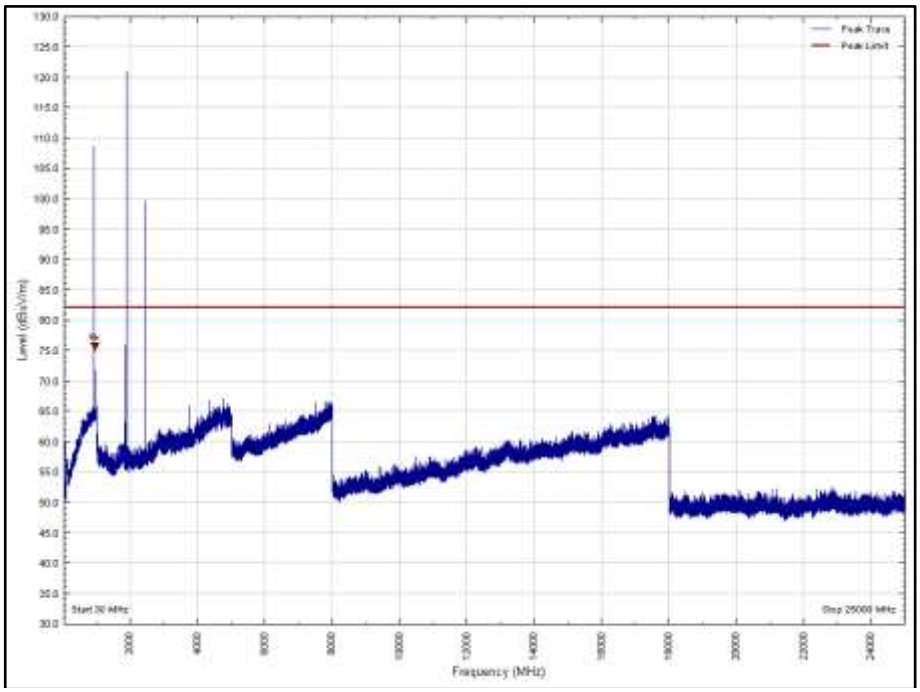

Figure 2 - 30 MHz to 25 GHz, Horizontal, X Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
965.416	75.59	82.26	6.67	Peak	166	104	Vertical	Y

Table 9 - 30 MHz to 25 GHz Emissions Results

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

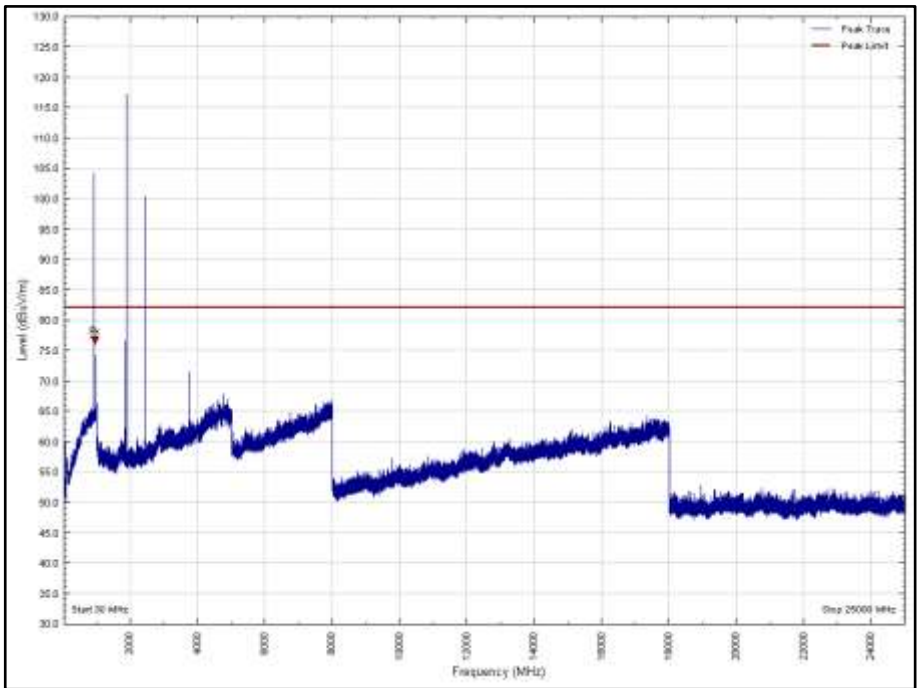

Figure 3 - 30 MHz to 25 GHz, Vertical, Y Orientation

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

Table 10 - 30 MHz to 25 GHz Emissions Results

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

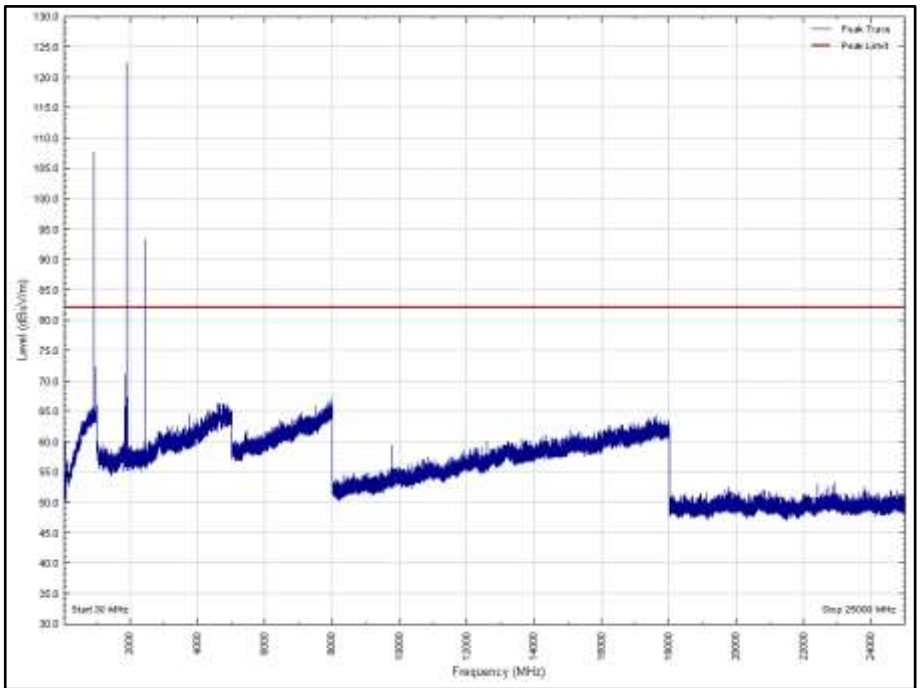

Figure 4 - 30 MHz to 25 GHz, Horizontal, Y Orientation

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

Table 11 - 30 MHz to 25 GHz Emissions Results

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

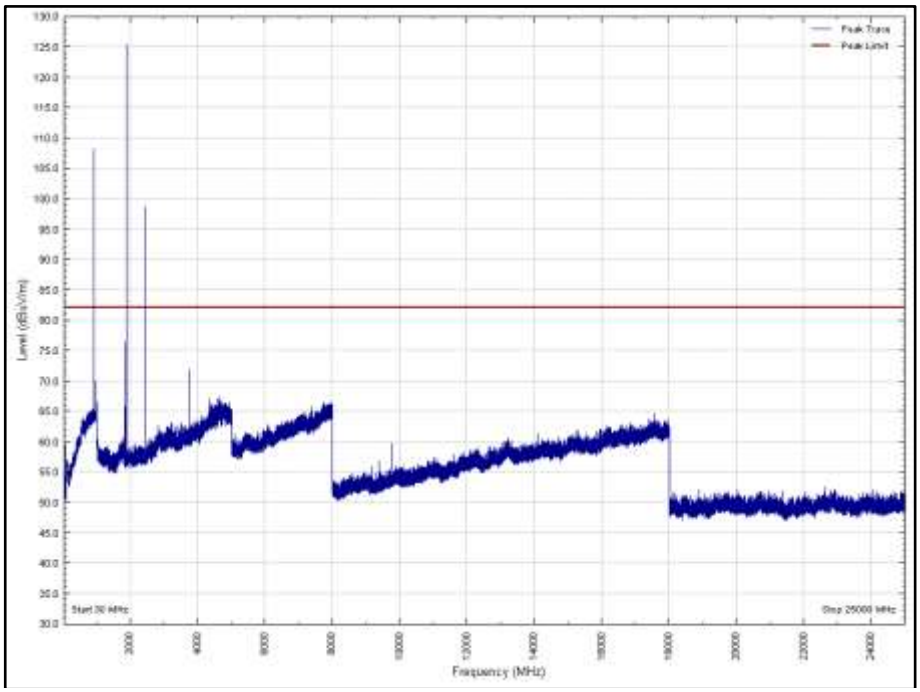

Figure 5 - 30 MHz to 25 GHz, Vertical, Z Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
965.500	74.25	82.26	8.01	Peak	118	192	Horizontal	Z

Table 12 - 30 MHz to 25 GHz Emissions Results

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

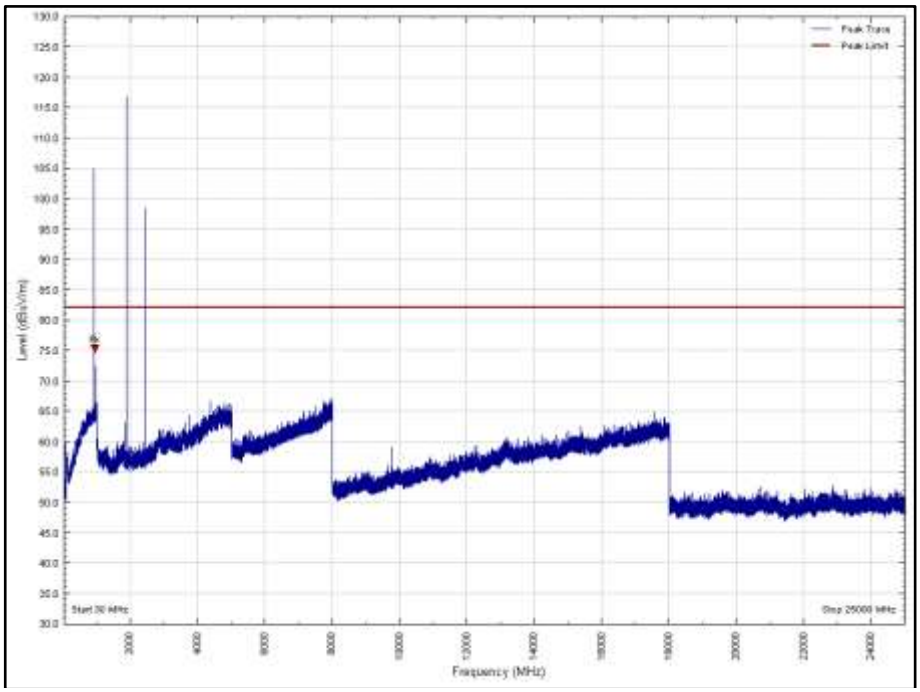

Figure 6 - 30 MHz to 25 GHz, Horizontal, Z Orientation

Bluetooth Low Energy + 915 MHz SRD + LTE FDD Band 4

The EUT was configured for simultaneous transmission in the following mode of operation:

Technology	Frequency Band (MHz)	Channel Frequency (MHz)
Short Range Device	902 to 928	915.0
Bluetooth Low Energy	2400 to 2483.5	2440.0
LTE FDD Band 4	1710 to 1755	1732.5

Table 13 - Modes of Operation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
817.237	72.38	82.26	9.88	Peak	180	283	Vertical	X
1830.078	73.48	82.26	8.78	Peak	96	160	Vertical	X

Table 14 - 30 MHz to 25 GHz Emissions Results

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

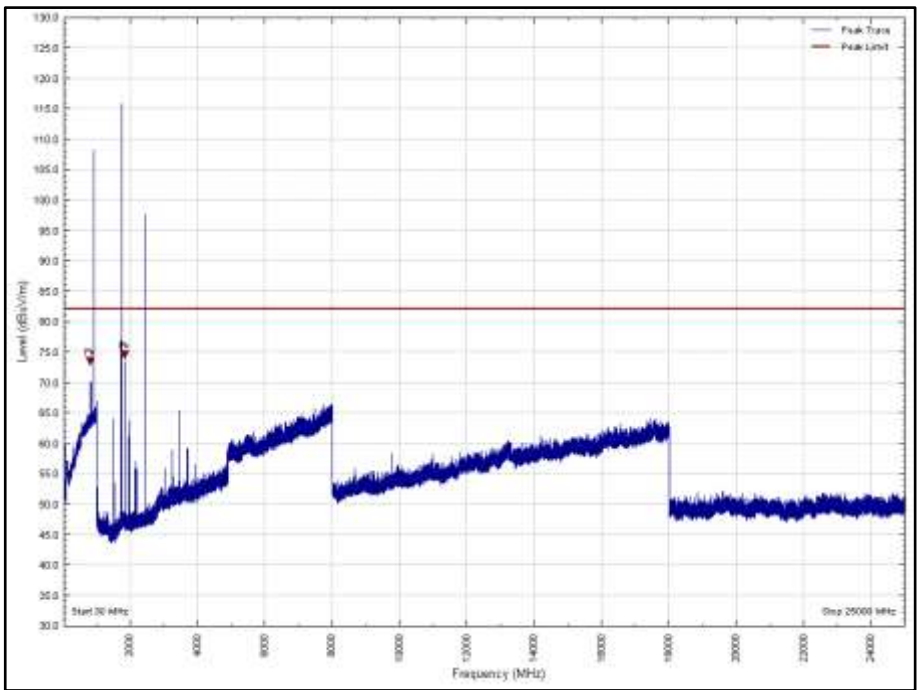

Figure 7 - 30 MHz to 25 GHz, Vertical, X Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
817.347	73.84	82.26	8.42	Peak	105	100	Horizontal	X
1830.012	73.00	82.26	9.26	Peak	339	329	Horizontal	X

Table 15 - 30 MHz to 25 GHz Emissions Results

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

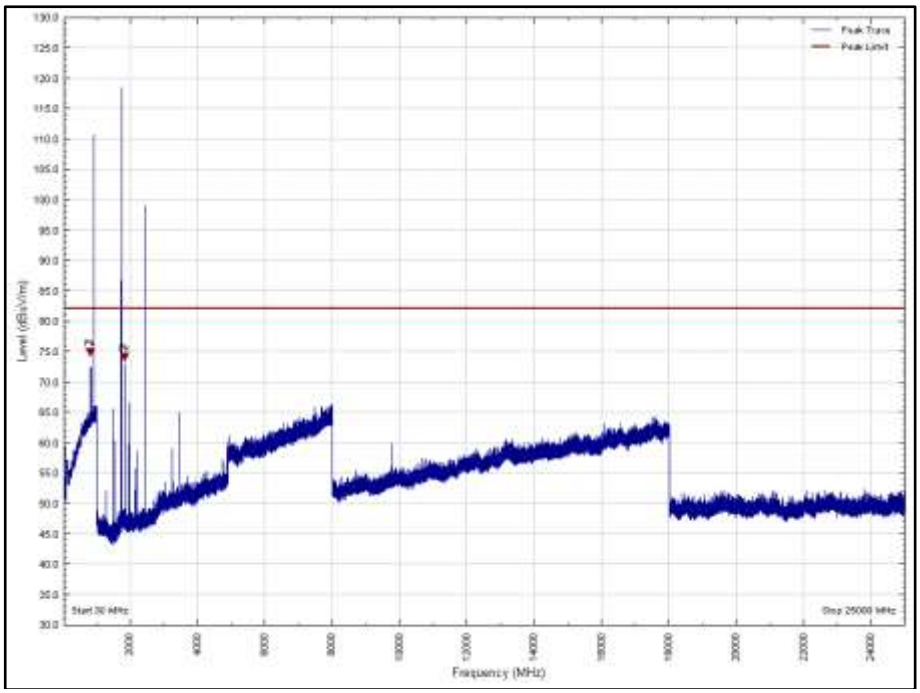

Figure 8 - 30 MHz to 25 GHz, Horizontal, X Orientation

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

Table 16 - 30 MHz to 25 GHz Emissions Results

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

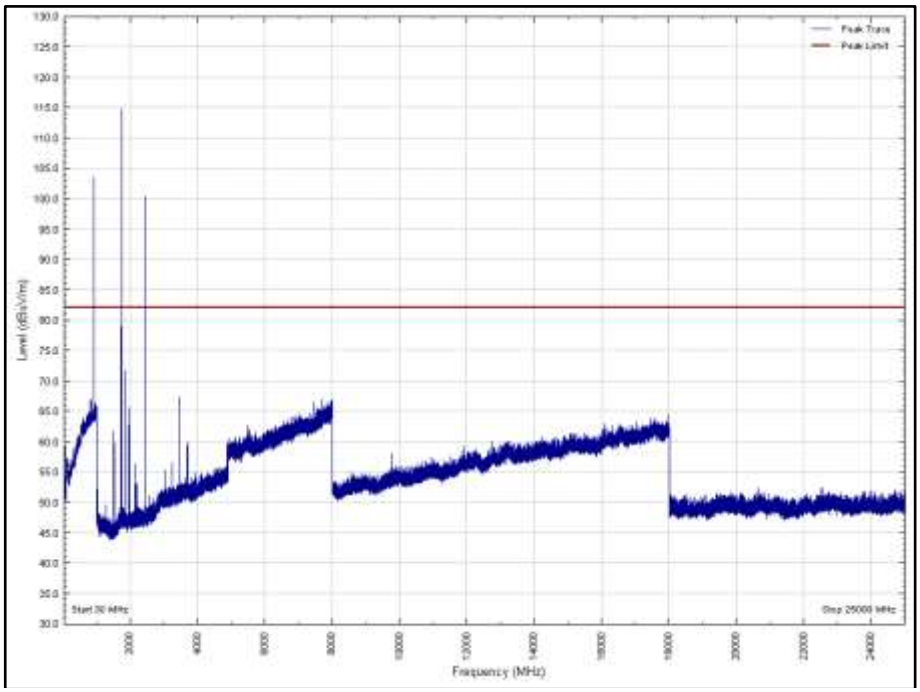

Figure 9 - 30 MHz to 25 GHz, Vertical, Y Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
817.374	74.29	82.26	7.97	Peak	255	100	Horizontal	Y

Table 17 - 30 MHz to 25 GHz Emissions Results

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

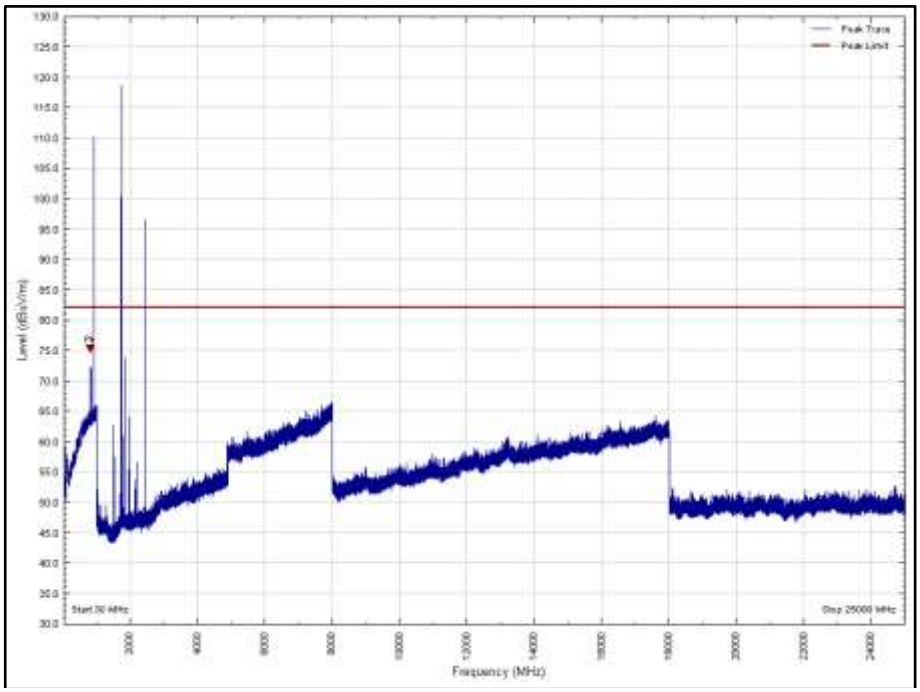

Figure 10 - 30 MHz to 25 GHz, Horizontal, Y Orientation

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

Table 18 - 30 MHz to 25 GHz Emissions Results

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

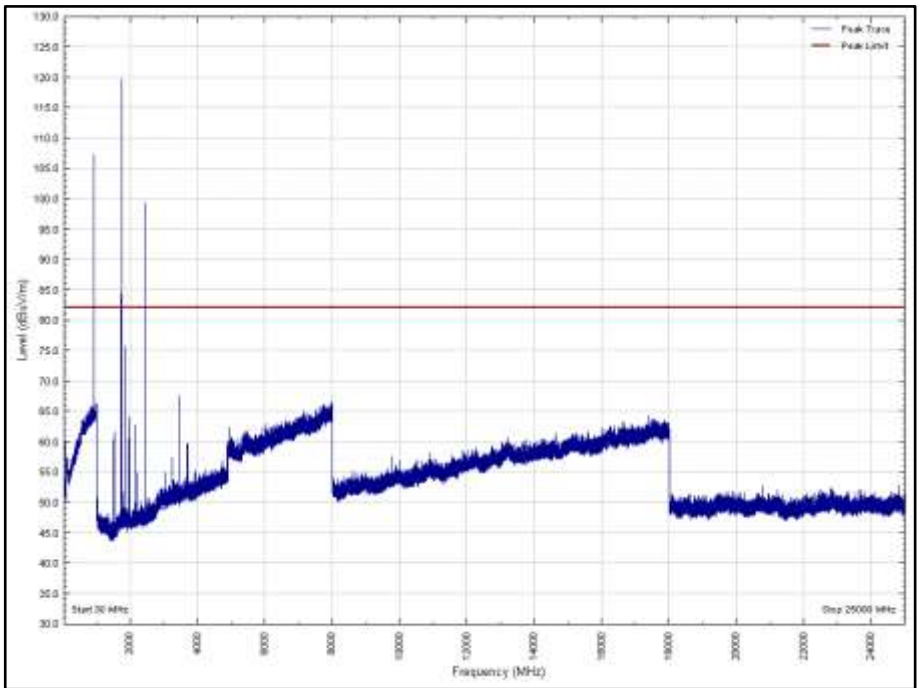

Figure 11 - 30 MHz to 25 GHz, Vertical, Z Orientation

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

Table 19 - 30 MHz to 25 GHz Emissions Results

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

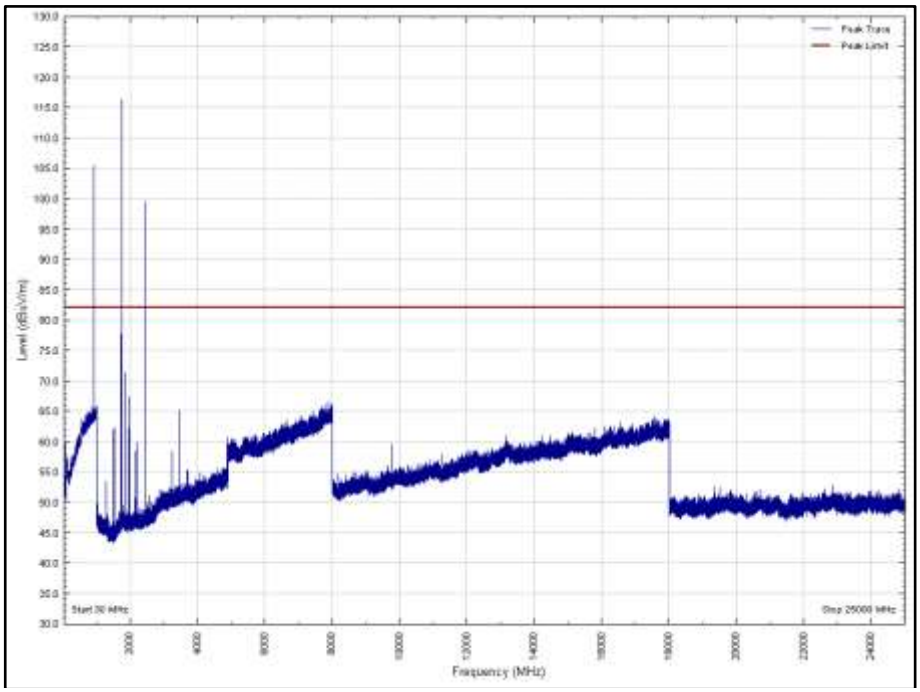

Figure 12 - 30 MHz to 25 GHz, Horizontal, Z Orientation

Bluetooth Low Energy + 915 MHz SRD + LTE FDD Band 5

The EUT was configured for simultaneous transmission in the following mode of operation:

Technology	Frequency Band (MHz)	Channel Frequency (MHz)
Short Range Device	902 to 928	915.0
Bluetooth Low Energy	2400 to 2483.5	2440.0
LTE FDD Band and 5	824 to 849	836.5

Table 20 - Modes of Operation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
757.626	76.74	82.26	5.52	Peak	22	191	Vertical	X

Table 21 - 30 MHz to 25 GHz Emissions Results

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

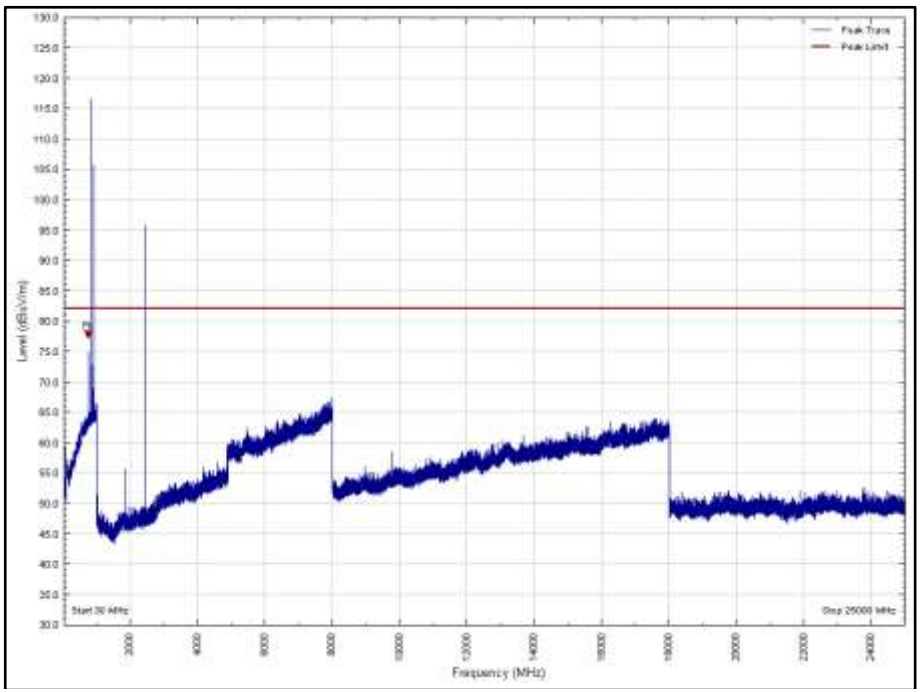

Figure 13 - 30 MHz to 25 GHz, Vertical, X Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
758.26	79.05	82.26	3.21	Peak	222	271	Horizontal	X

Table 22 - 30 MHz to 25 GHz Emissions Results

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

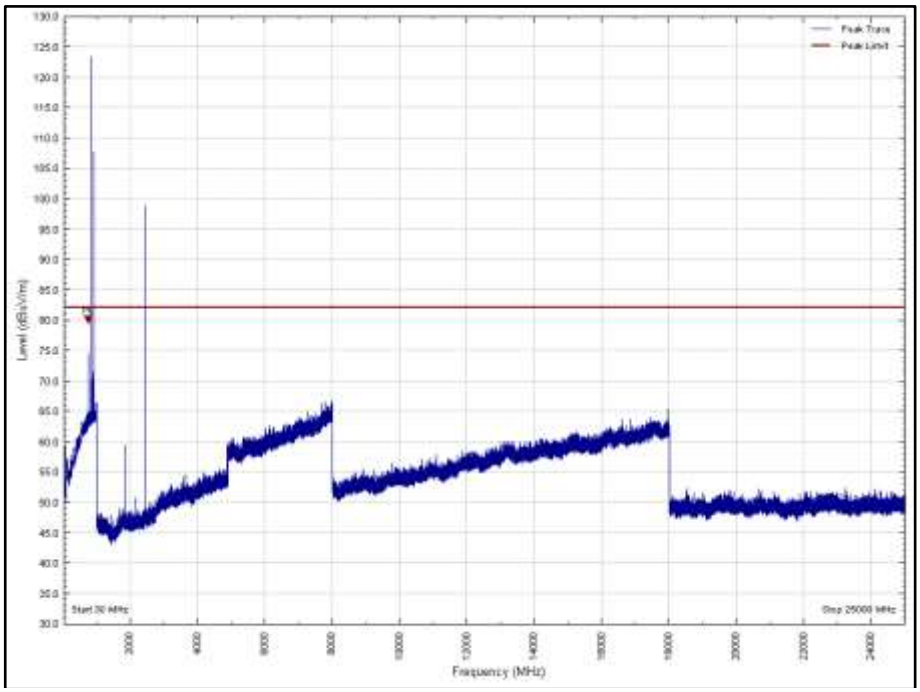

Figure 14 - 30 MHz to 25 GHz, Horizontal, X Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
758.505	77.73	82.26	4.53	Peak	186	386	Vertical	Y

Table 23 - 30 MHz to 25 GHz Emissions Results

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

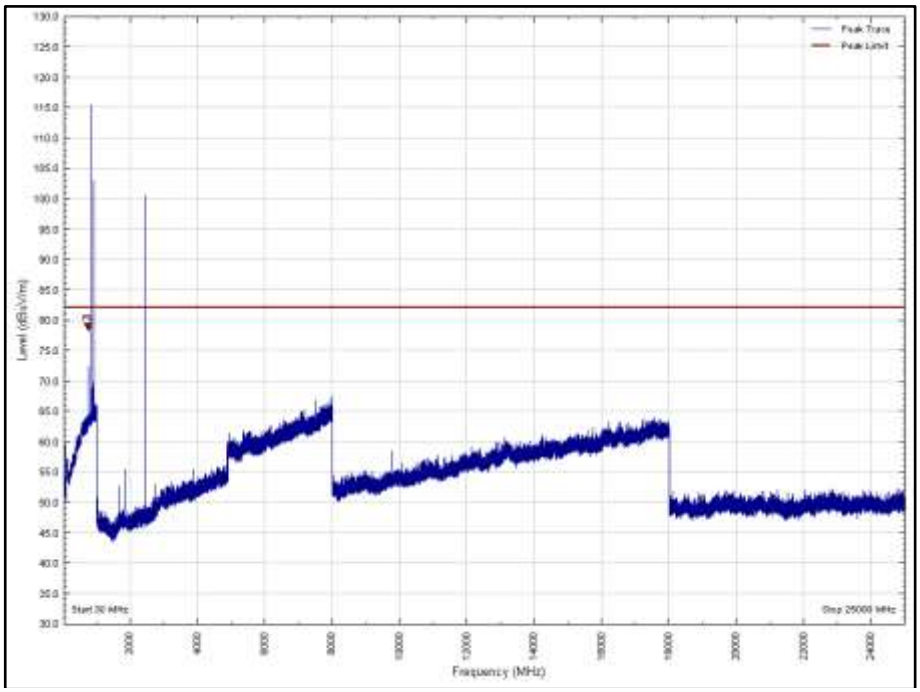

Figure 15 - 30 MHz to 25 GHz, Vertical, Y Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
758.368	78.53	82.26	3.73	Peak	329	115	Horizontal	Y

Table 24 - 30 MHz to 25 GHz Emissions Results

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

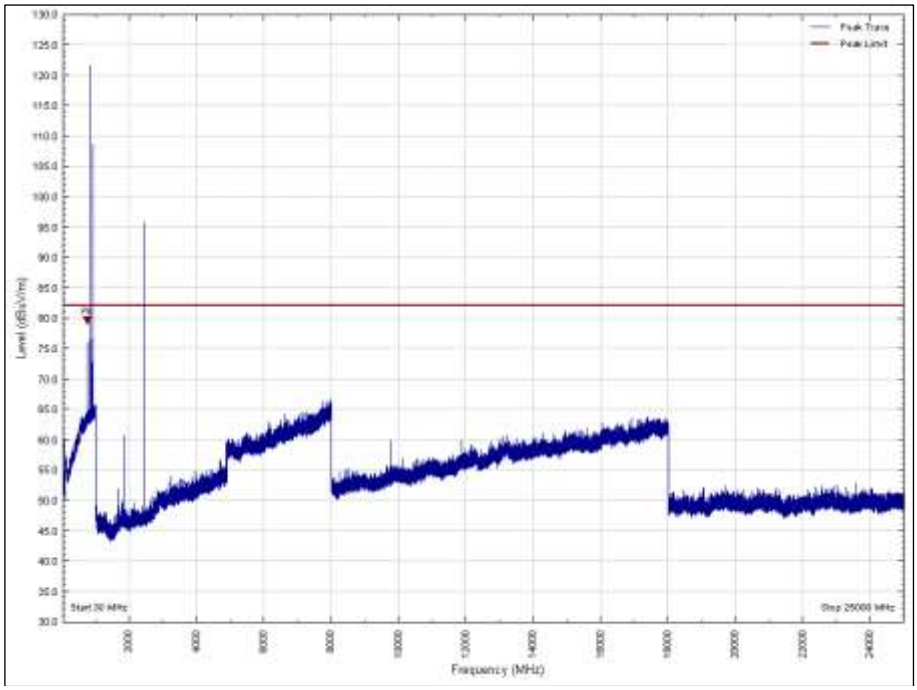

Figure 16 - 30 MHz to 25 GHz, Horizontal, Y Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
758.421	75.80	82.26	6.46	Peak	358	100	Vertical	Z

Table 25 - 30 MHz to 25 GHz Emissions Results

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

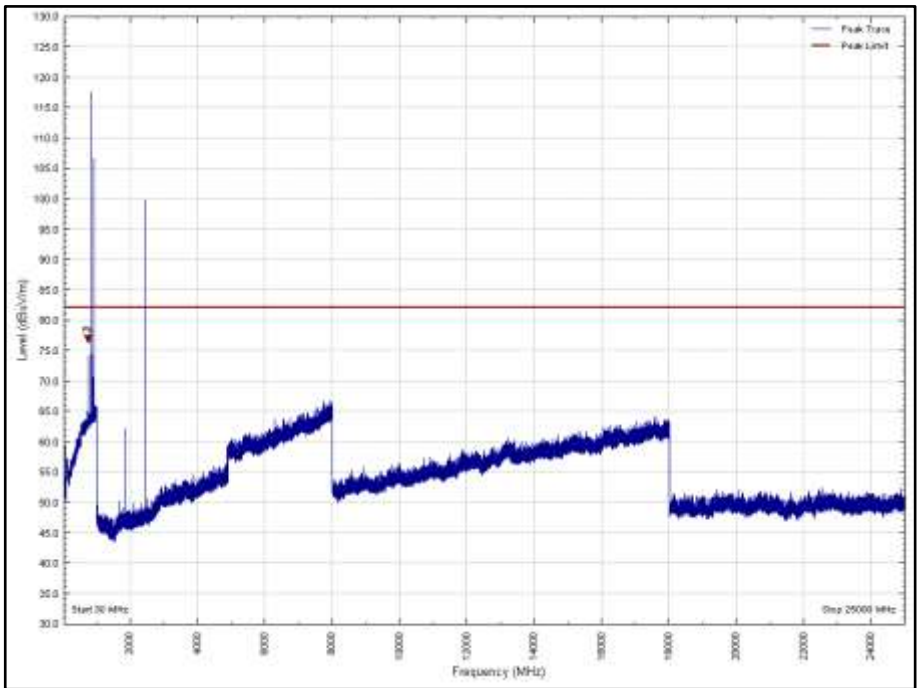

Figure 17 - 30 MHz to 25 GHz, Vertical, Z Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
758.526	79.09	82.26	3.17	Peak	191	278	Horizontal	Z

Table 26 - 30 MHz to 25 GHz Emissions Results

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

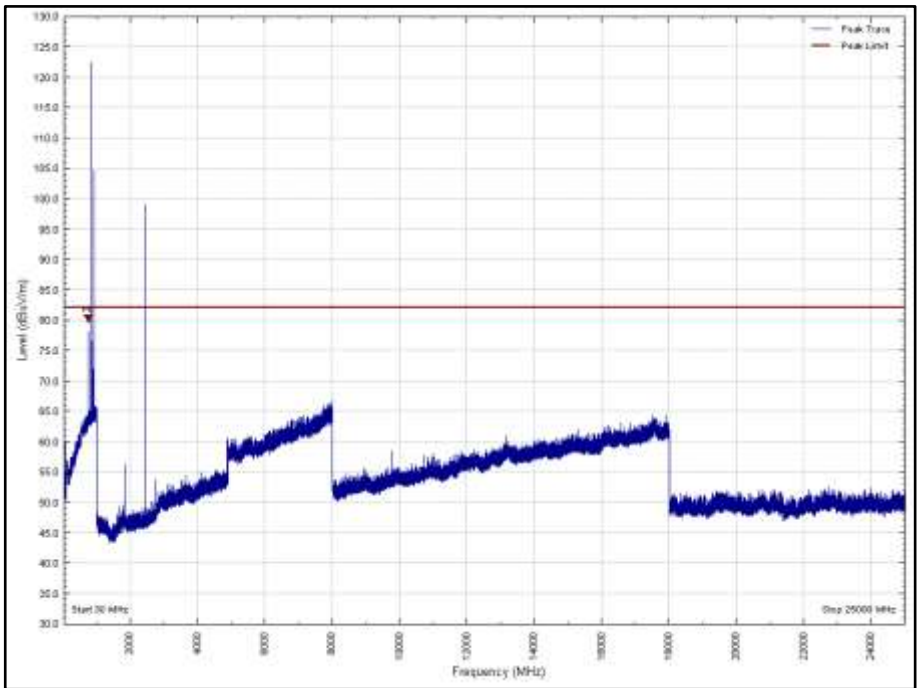

Figure 18 - 30 MHz to 25 GHz, Horizontal, Z Orientation

Bluetooth Low Energy + 915 MHz SRD + LTE FDD Band 12

The EUT was configured for simultaneous transmission in the following mode of operation:

Technology	Frequency Band (MHz)	Channel Frequency (MHz)
Short Range Device	902 to 928	915.0
Bluetooth Low Energy	2400 to 2483.5	2440.0
LTE FDD Band and 12	699 to 716	707.5

Table 27 - Modes of Operation

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

Table 28 - 30 MHz to 25 GHz Emissions Results

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

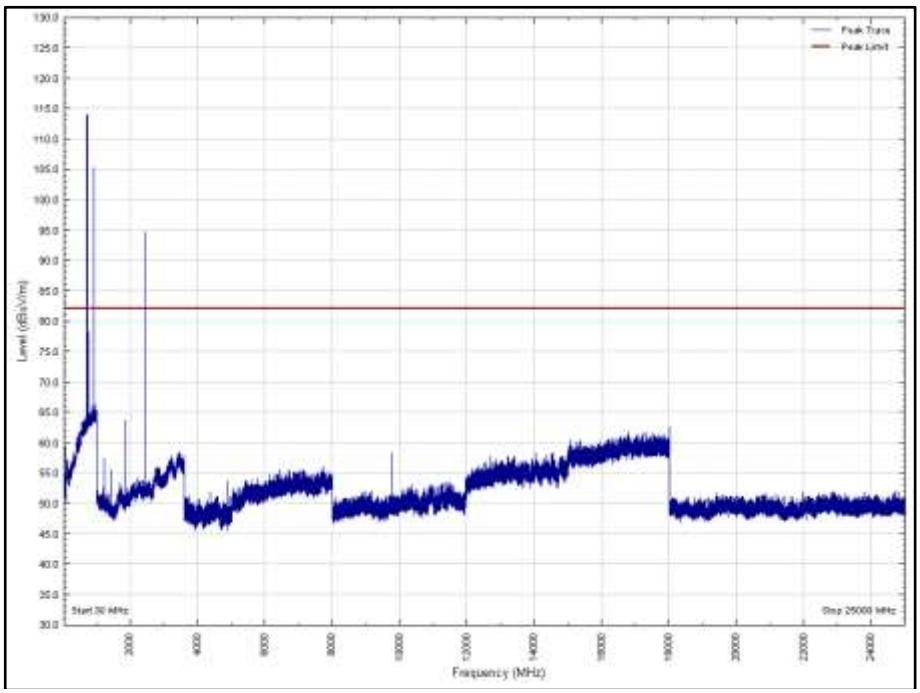

Figure 19 - 30 MHz to 25 GHz, Vertical, X Orientation

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

Table 29 - 30 MHz to 25 GHz Emissions Results

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

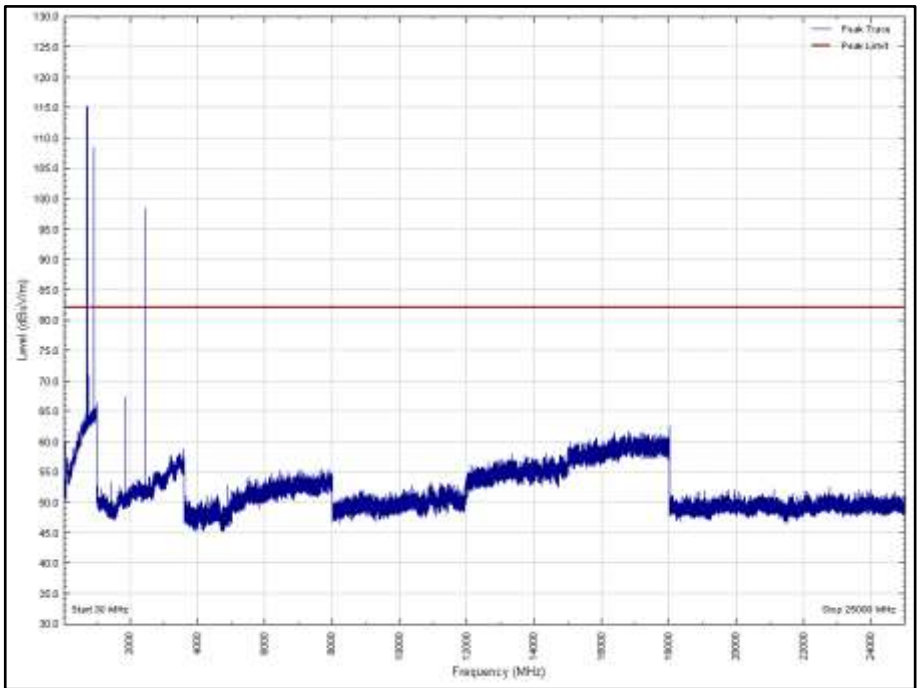

Figure 20 - 30 MHz to 25 GHz, Horizontal, X Orientation

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

Table 30 - 30 MHz to 25 GHz Emissions Results

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

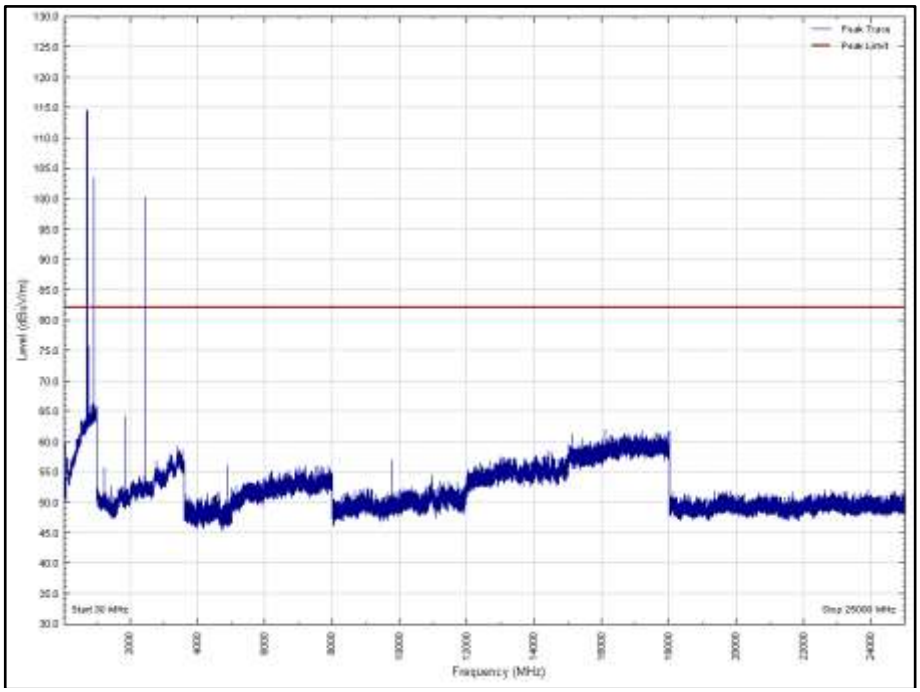

Figure 21 - 30 MHz to 25 GHz, Vertical, Y Orientation

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

Table 31 - 30 MHz to 25 GHz Emissions Results

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

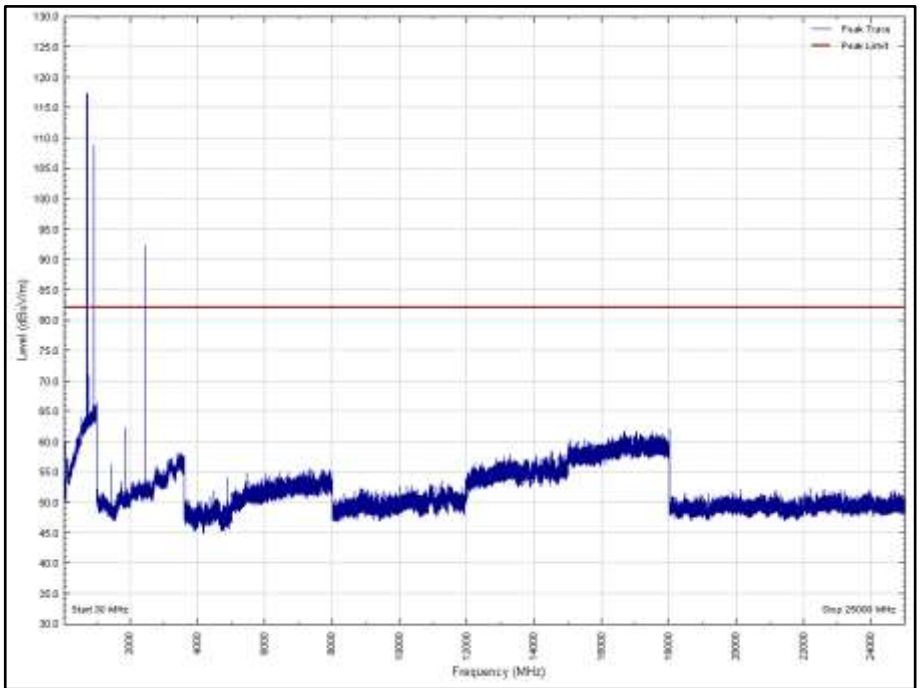

Figure 22 - 30 MHz to 25 GHz, Horizontal, Y Orientation

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

Table 32 - 30 MHz to 25 GHz Emissions Results

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

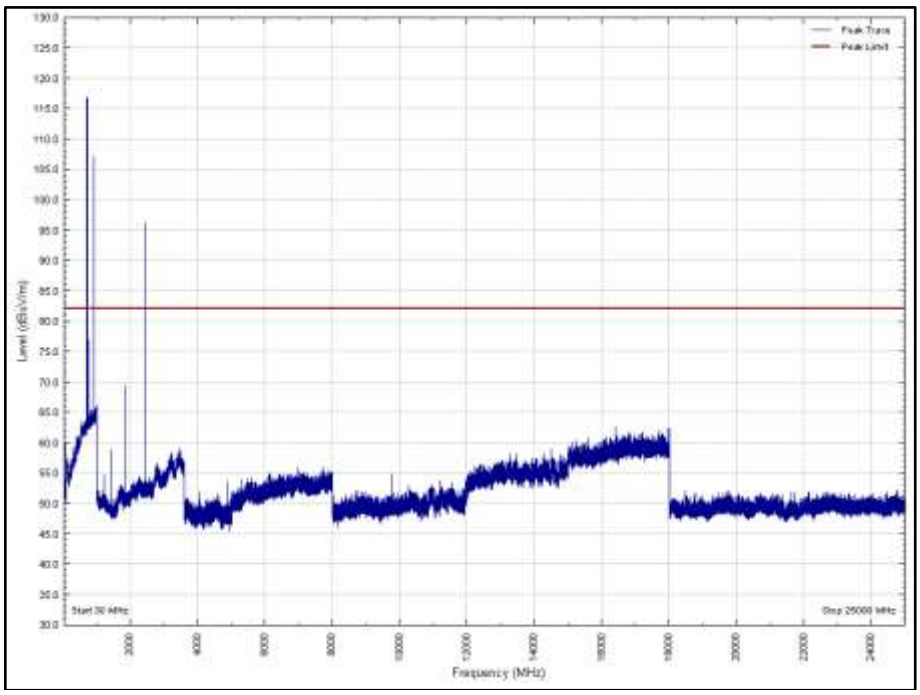

Figure 23 - 30 MHz to 25 GHz, Vertical, Z Orientation

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

Table 33 - 30 MHz to 25 GHz Emissions Results

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

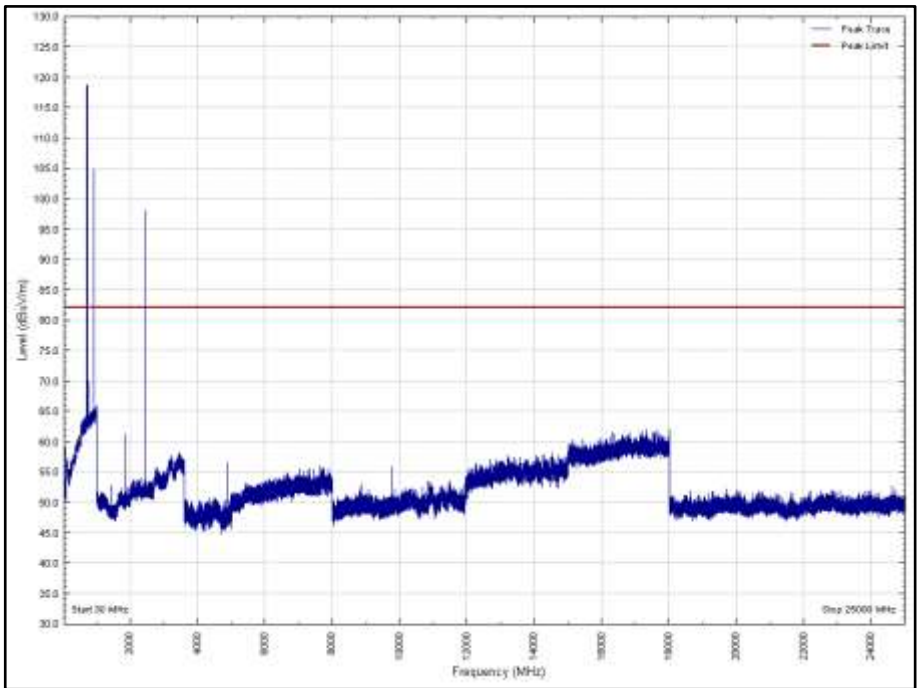

Figure 24 - 30 MHz to 25 GHz, Horizontal, Z Orientation

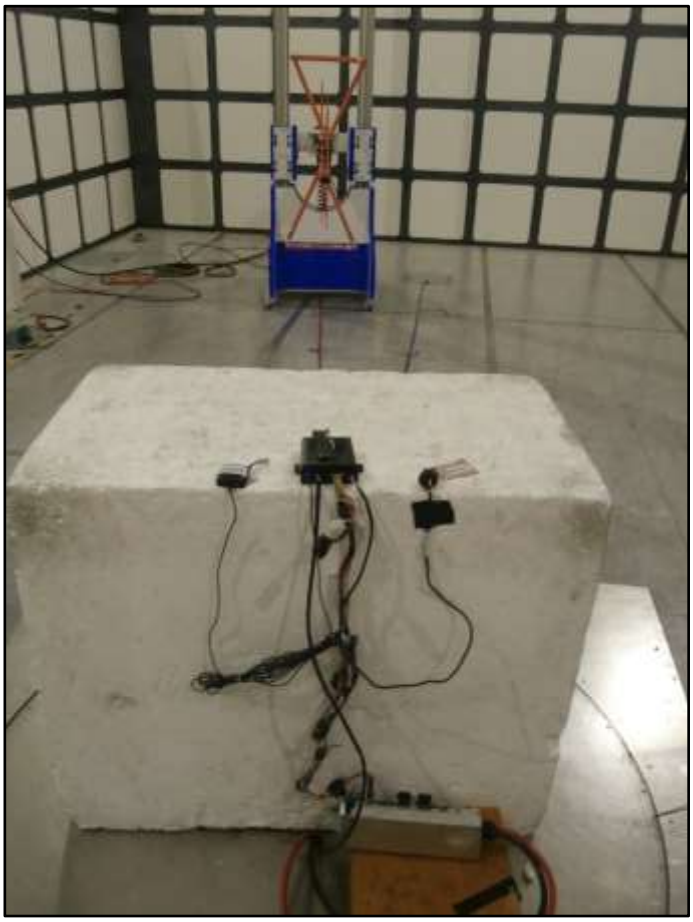

Figure 25 – Test Setup – 30 MHz to 1 GHz, X Orientation

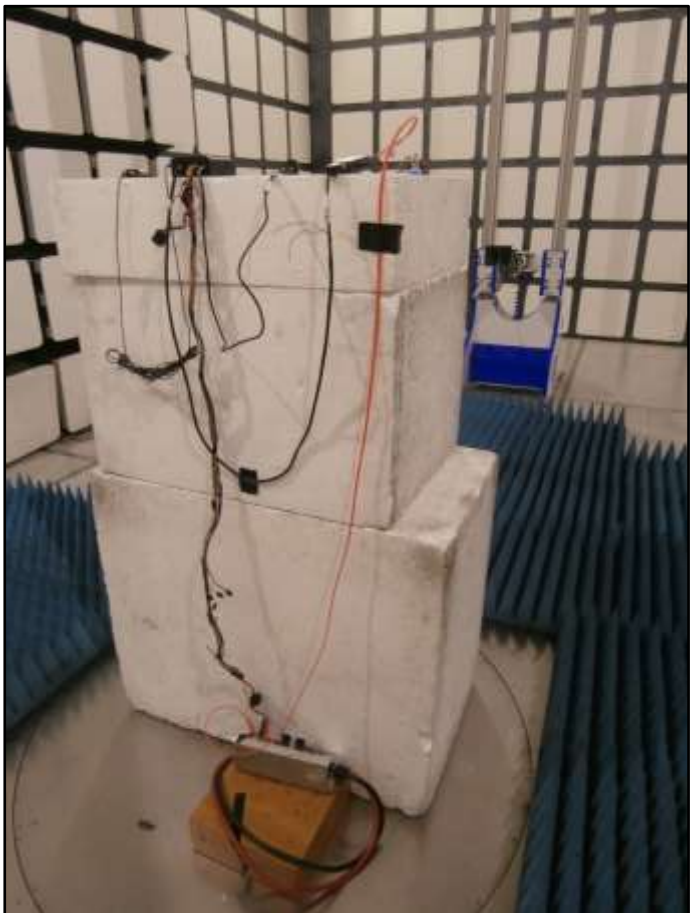

Figure 26 – Test Setup – 1 GHz to 18 GHz, X Orientation

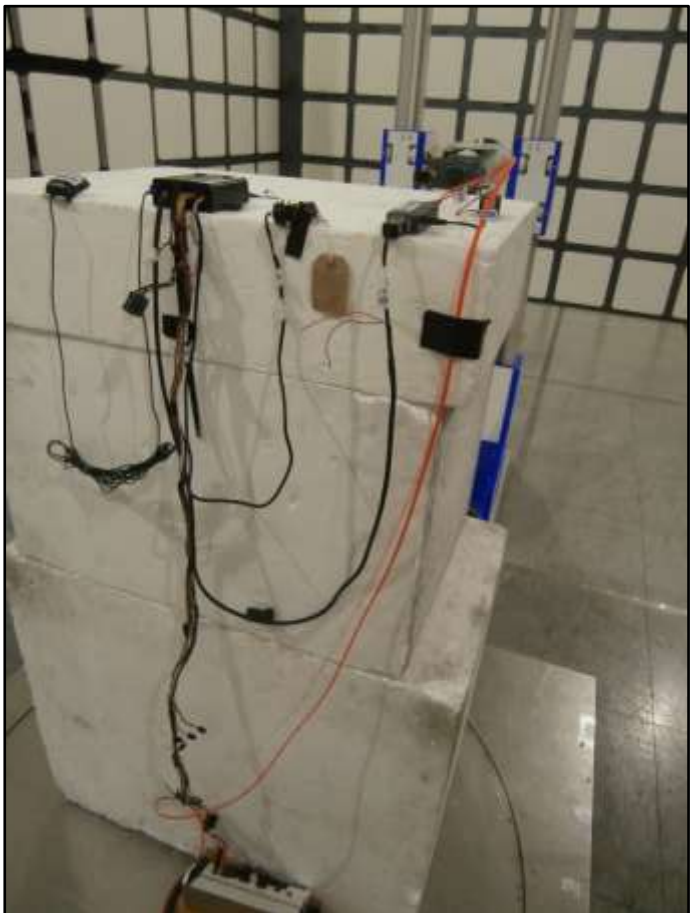

Figure 27 – Test Setup – 18 GHz to 25 GHz, X Orientation

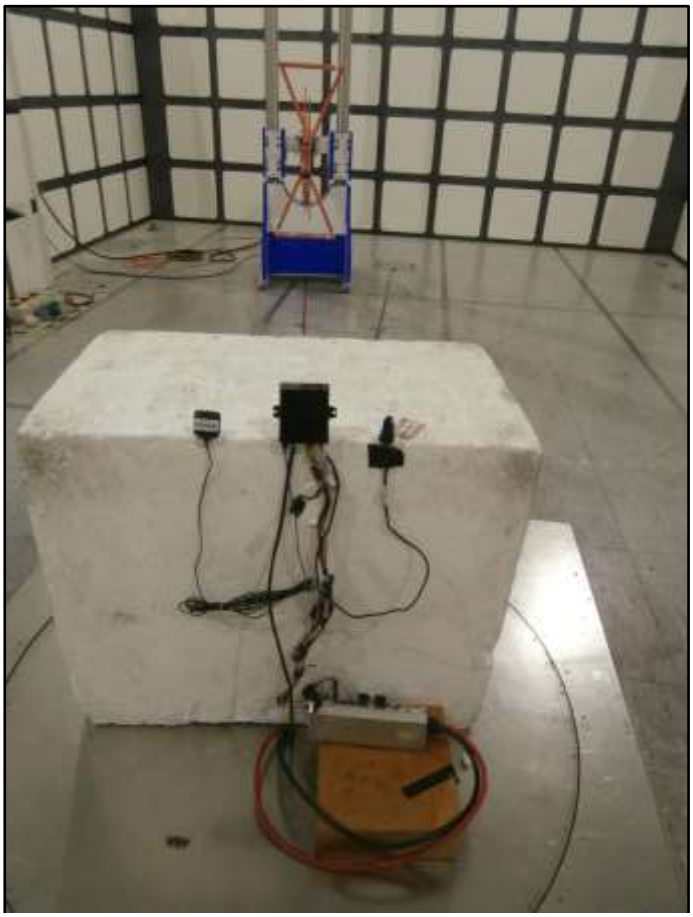

Figure 28 – Test Setup – 30 MHz to 1 GHz, Y Orientation

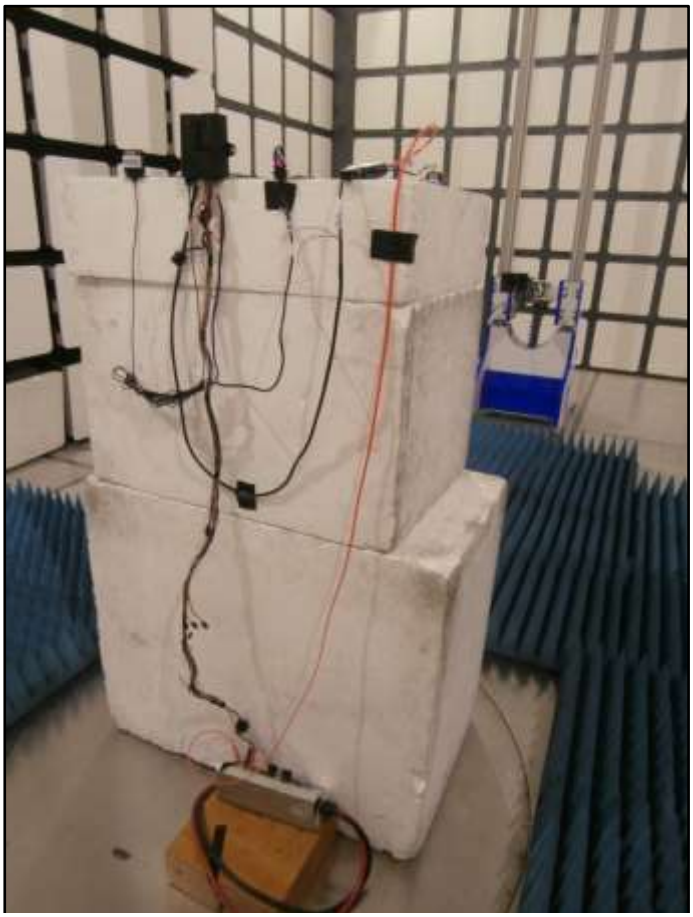

Figure 29 – Test Setup – 1 GHz to 18 GHz, Y Orientation

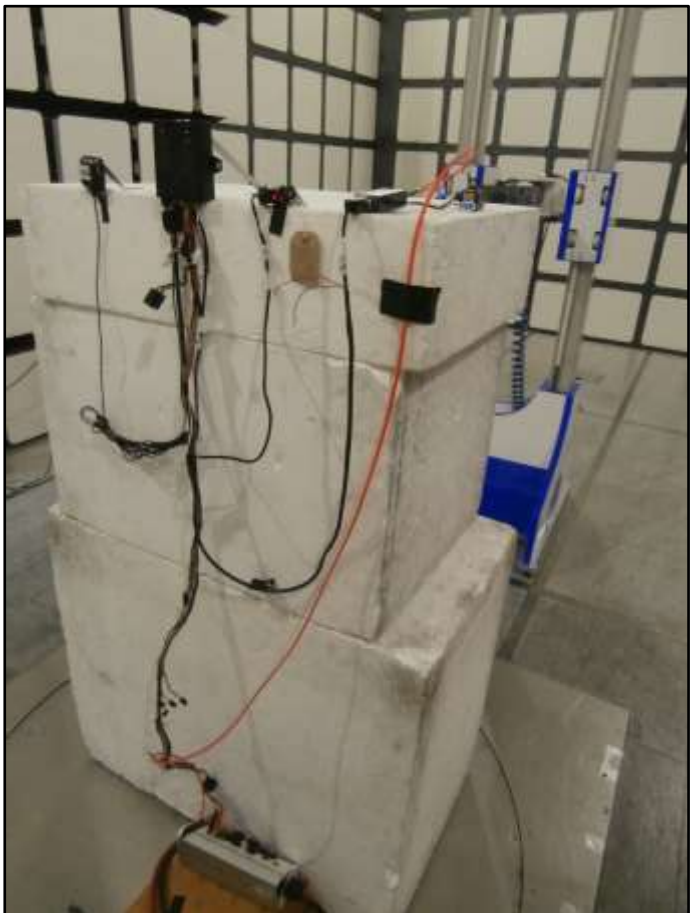

Figure 30 – Test Setup – 18 GHz to 25 GHz, Y Orientation

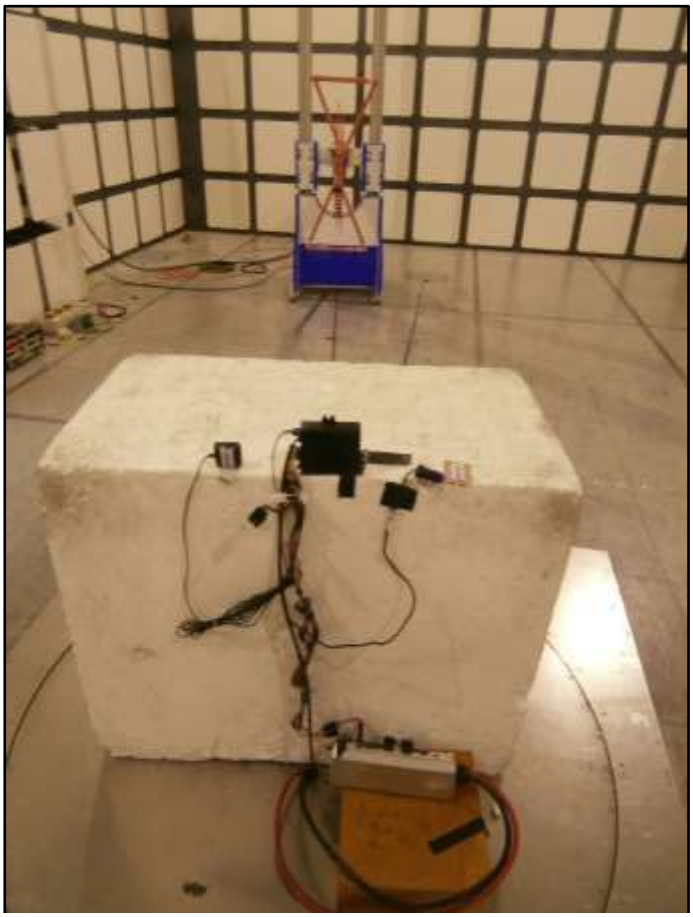

Figure 31 – Test Setup – 30 MHz to 1 GHz, Z Orientation

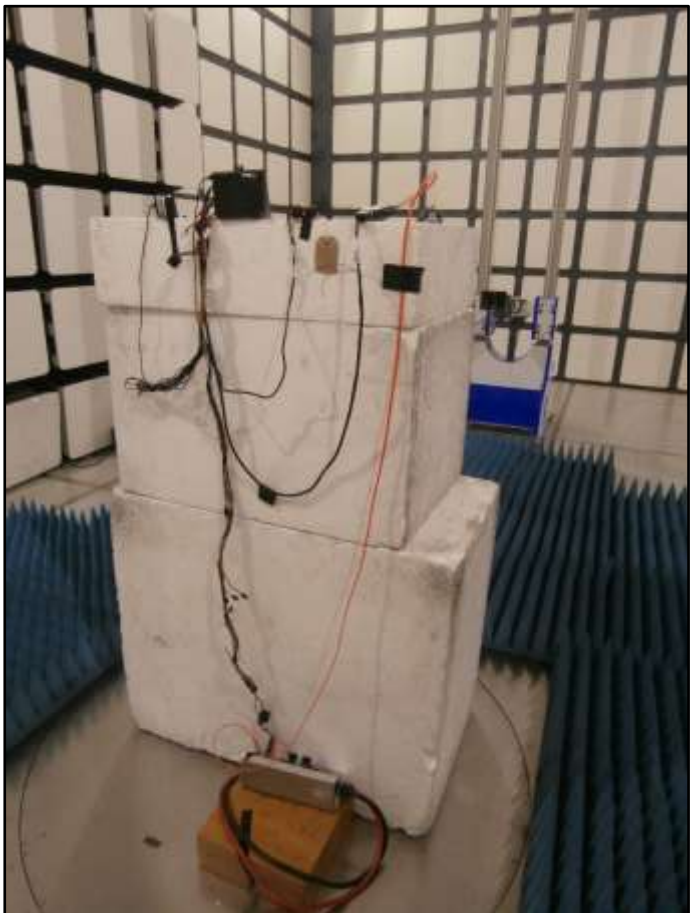

Figure 32 – Test Setup – 1 GHz to 18 GHz, Z Orientation

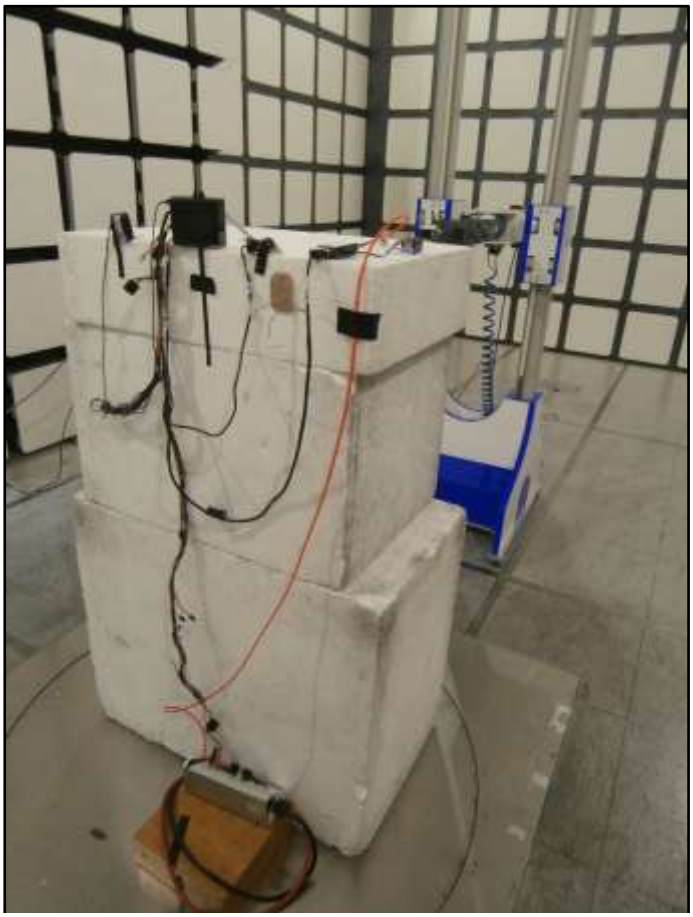

Figure 33 – Test Setup – 18 GHz to 25 GHz, Z Orientation

FCC 47 CFR Parts 15.247(d), 15.205, 22.917(a), 24.238(a), 27.53 (h) and 27.53 (g)

The least stringent limit from the applicable rule parts was used to determine compliance for Radiated Emissions testing of multiple transmission sources.

The least stringent applicable limit was:

Clause	Limit
Part 22.917 (a), 24.238(a), 27.53 (g) and 27.53 (h)	-13 dBm (EIRP) / 82.26 dBµV/m at 3m.

Table 34 - Limit Table

2.1.7 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
18GHz - 40GHz Pre-Amplifier	Phase One	PSO4-0087	1534	12	18-Feb-2021
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
DC Power Supply	Hewlett Packard	6269B	1909	-	TU
Antenna with permanent attenuator (Bilog)	Chase	CBL6143	2904	24	30-Sep-2021
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
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	6	09-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	10-Mar-2021
Hygrometer	Rotronic	HP21	4989	12	02-May-2020
EmX Emissions Software	TUV SUD	EmX V.V1.5.8	5125	-	Software
8 Meter Cable	Teledyne	PR90-088-8MTR	5212	12	30-Aug-2020
Cellular Signalling Box	Keysight Technologies	UXM	5267	12	05-Mar-2021
Antenna (DRG Horn 7.5-18GHz)	Schwarzbeck	HWRD750	5348	12	04-Sep-2020
EMI Test Receiver	Rohde & Schwarz	ESW44	5527	12	Class 1 (Ext)

Table 35

TU – Traceability Unscheduled

3 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
Radiated Spurious Emissions (Simultaneous Transmission)	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 40 GHz: ± 6.3 dB

Table 36

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.