FCC and ISED Test Report

XYZ Reality Limited
Atom Hard Hat augmented reality system and Charging Station.

In accordance with FCC 47 CFR Part 15B and ICES-003

Prepared for: XYZ Reality Ltd
Unit G0, G02, 338-346
Goswell Road
Angel
Clerkenwell
EC1V 7LQ
United Kingdom

FCC ID: 2A3C5-TBA IC: Not Applicable

COMMERCIAL-IN-CONFIDENCE

Document 75952587-02 Issue 01

SIGNATURE			
AJ Lawson.			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Andy Lawson	EMC Chief Engineer	Authorised Signatory	20 December 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 47 CFR Part 15B and ICES-003. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Colin McKean	20 December 2021	
Testing	Matthew Dawkins	20 December 2021	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

ISED 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 15B and ICES-003: 2020 and Issue 7: 2020 for the tests detailed in section 1.3.

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.tuvsud.com/en

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

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	20 December 2021

Table 1

1.2 Introduction

Applicant	XYZ Reality Ltd
Manufacturer	XYZ Reality Ltd
Model Number(s)	XYZ-12-01
Serial Number(s)	Not serialised (Storix-ID 599374-41) Not serialised (Storix-ID 599374-97) Not serialised (Storix-ID 599374-21) Not serialised (Storix-ID 599374-104)
Hardware Version(s)	Not Applicable
Software Version(s)	Windows Certification Build
Number of Samples Tested	4
Test Specification/Issue/Date	FCC 47 CFR Part 15B and ICES-003: 2020 and Issue 7: 2020
Order Number Date	XYZ0179 21-June-2021
Date of Receipt of EUT	06-September-2021
Start of Test	08-September-2021
Finish of Test	15-September-2021
Name of Engineer(s)	Colin McKean and Matthew Dawkins
Related Document(s)	ANSI C63.4: 2014

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15B and ICES-003 is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: Charging Station AC Powered - Charging				
2.1	15.107 and 3.1	Conducted Disturbance at Mains Terminals	Pass	ANSI C63.4: 2014
2.2	15.109 and 3.2	Radiated Disturbance	Pass	ANSI C63.4: 2014

Table 2

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: Headset and Hand controller Battery Powered, Beacon AC Powered – Linked				
2.1	15.107 and 3.1	Conducted Disturbance at Mains Terminals	Pass	ANSI C63.4: 2014

Table 3

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: Headset and Hand controller Battery Powered, Beacon USB Powered – Linked				
2.1	15.107 and 3.1	Conducted Disturbance at Mains Terminals	Pass	ANSI C63.4: 2014

Table 4

Configuration and Mode: Headset, Hand controller and Beacon Battery Powered - Linked				
Section	Specification Clause	Test Description	Result	Comments/Base Standard
2.2	15.109 and 3.2	Radiated Disturbance	Pass	ANSI C63.4: 2014

Table 5

Configuration and Mode: Headset and Hand controller Battery Powered, Beacon AC Powered, USB Port Loaded - Linked				
Section	Specification Clause	Test Description	Result	Comments/Base Standard
2.2	15.109 and 3.2	Radiated Disturbance	Pass	ANSI C63.4: 2014

Table 6

1.4 Declaration of Build Status

MAIN EUT			
MANUFACTURING DESCRIPTION	Protective Hard Hat with integrated eye protection and augmented reality		
MANUFACTURER	XYZ Reality Ltd		
MODEL	Atom Hard Hat		
PART NUMBER	XYZ-12-01		
HARDWARE VERSION	Not Applicable		
SOFTWARE VERSION	Windows Certification Build		
PSU VOLTAGE/FREQUENCY/CURRENT	Internal (removeable), Li Ion Battery 7.4V		
HIGHEST INTERNALLY GENERATED FREQUENCY	25 MHz		
FCC ID (if applicable)	2A3C5-TBA (contains FCC ID PD992260NG)		
INDUSTRY CANADA ID (if applicable)	N/A (Contains IC 1000M-9260NG)		
TECHNICAL DESCRIPTION (a brief technical description of the intended use and operation)	Protective hard Hat with integrated eye protection and augmented reality		
COUNTRY OF ORIGIN	United Kingdom		
RF CHARACTERISTICS (if applicable)			
TRANSMITTER FREQUENCY OPERATING RANGE (MHz)	2402-2480 2412-2472		
RECEIVER FREQUENCY OPERATING RANGE (MHz)	2402-2480 2412-2472		
INTERMEDIATE FREQUENCIES			
EMISSION DESIGNATOR(S): https://fccid.io/Emissions-Designator/	1M00F1D, 20M3D1W, 40M3D1W		
MODULATION TYPES: (i.e. GMSK, QPSK)	GFSK, DQPSK, OFDM, OFDM-HT, CCK		
OUTPUT POWER (W or dBm)	FCC 20 dBm ± 1 dB ETSI 16 dBm ± 1 dB BTLE 5.5 dBm ± 2 dB		
SEPARATE BATTERY/POWER SUPPLY (if applicable)			
MANUFACTURING DESCRIPTION	Atom 7.4V Li iON Battery		
MANUFACTURER	XYZ Reality Ltd		
TYPE	Li Ion		
PART NUMBER	XYZ-32-01		
PSU VOLTAGE/FREQUENCY/CURRENT	7.4V		
COUNTRY OF ORIGIN	United Kingdom		
MODULES (if applicable)			
MANUFACTURING DESCRIPTION	M.2 module (AC-9260)	M.2 module (AC-9260)	nRF24LU1P
MANUFACTURER	Intel	Intel	Nordic Semi
TYPE	WLAN 2.4 GHz	BTLE	Proprietary 2.4 GHz
POWER	FCC 20 dBm ± 1 dB ETSI 16 dBm ± 1 dB	5.5 dBm ± 2 dB	0 dBm
FCC ID	PD992260NG	PD992260NG	
INDUSTRY CANADA ID	1000M-9260NG	1000M-9260NG	
EMISSION DESIGNATOR	20M3D1W / 40M3D1W	1M00F1D	1M00F1D
DHSS/FHSS/COMBINED OR OTHER			
COUNTRY OF ORIGIN			
ANCILLARIES (if applicable)			
MANUFACTURING DESCRIPTION	Atom Controller	Atom Tracking Beacon	Atom Charging Station
MANUFACTURER	XYZ Reality Ltd	XYZ Reality Ltd	XYZ Reality Ltd
TYPE			
PART NUMBER	XYZ-22-01	XYZ-52-01	XYZ-42-01
SERIAL NUMBER	N/A	N/A	N/A
COUNTRY OF ORIGIN	United Kingdom	United Kingdom	United Kingdom

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

Name: Dave Williams
Position held: Director of Engineering, DitroniX Ltd
Date: 04 November 2021

1.5 Product Information

1.5.1 Technical Description

The Equipment under test (EUT) was a XYZ reality, Atom hard hat system comprising of:

- Beacon, Model: XYZ-52-01
- Charging Station, Model: XYZ-42-01
- Hard Hat, Model: XYZ-12-01
- Controller, Model: XYZ-22-01

The EUT is Protective hard hat with integrated eye protection and augmented reality.

Additionally, the EUT connects to the listed auxiliaries using Bluetooth and Wi-Fi.

Figure 1 - Hat General View

Figure 2 – Hat Rear View

Figure 3 - Controller General View

Figure 4 – Controller Rear View

Figure 5 – Beacon General View

Figure 6 – Beacon Rear View

Figure 7 – Charging Station General View

1.5.2 EUT Port/Cable Identification

Port	Max Cable Length specified	Usage	Type	Screened
Configuration and Mode: Charging Station AC Powered - Charging				
AC Power Port	3 Meters	Power	115 V AC 60 Hz AC Power Supply	No
Configuration and Mode: Headset and Hand controller Battery Powered, Beacon AC Powered - Linked				
AC Power Port	3 Meters	Power	AC to DC Power Supply	No
Configuration and Mode: Headset and Hand controller Battery Powered, Beacon USB Powered - Linked				
AC Power Port	3 Meters	Power	AC to DC Power Supply	No
USB Port	3 Meters	Power	AC to USB-C Adapter	Yes
Configuration and Mode: Headset and Hand controller Battery Powered, Beacon AC Powered, USB Port Loaded - Linked				
AC Power Port	3 Meters	Power	AC to DC Power Supply	No
USB Port	3 Meters	Power	AC to USB-C Adapter	Yes
Configuration and Mode: Headset, Hand controller and Beacon Battery Powered - Linked				
No cables were attached to the system under test.				

Table 7

1.5.3 Test Configuration

Configuration	Description
Charging Station AC Powered	The Charging Station was powered from a 115 V 60 Hz AC Mains Supply.
Headset and Hand controller Battery Powered, Beacon AC Powered	The Headset and Hand Controller were powered from their internal batteries. The Beacon was powered from a 115 V 60 Hz AC to DC mains adapter
Headset and Hand controller Battery Powered, Beacon AC Powered, USB Port Loaded	The Headset and Hand Controller were powered from their internal batteries. The Beacon was powered from a 115 V 60 Hz AC to DC mains adapter. A USB cable and hub were attached to the Beacons USB-C port.
Headset and Hand controller Battery Powered, Beacon USB Powered	The Headset, Hand Controller were powered by their internal batteries. The Beacon was powered from an AC to USB adapter using a USB-C cable.
Headset, Hand controller and Beacon Battery Powered	The Headset, Hand Controller and Beacon were powered by their internal batteries.

Table 8

1.5.4 Modes of Operation

Mode	Description
Charging	The EUT was charging 8 batteries.
Linked	The headset was communicating with a router using a Wi-Fi link, and with the hand controller using Bluetooth. The hand controller was communicating with the Beacon using an ISM band comms link.

Table 9

1.6 Deviations from the Standard

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

1.7 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
Beacon, Model: XYZ-52-01, Serial Number: Not serialised (Storix-ID 599374-104)			
0	As supplied by the customer	Not Applicable	Not Applicable
Charging Station, Model: XYZ-42-01, Serial Number: Not serialised (Storix-ID 599374-41)			
0	As supplied by the customer	Not Applicable	Not Applicable
Hard Hat, Model: XYZ-12-01, Serial Number: Not serialised (Storix-ID 599374-97)			
0	As supplied by the customer	Not Applicable	Not Applicable
Controller, Model: XYZ-22-01, Serial Number: Not serialised (Storix-ID 599374-21)			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 10

1.8 Test Location

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

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: Charging Station AC Powered - Charging		
Conducted Disturbance at Mains Terminals	Colin McKean	UKAS
Radiated Disturbance	Colin McKean	UKAS

Table 11

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: Headset and Hand controller Battery Powered, Beacon AC Powered - Linked		
Conducted Disturbance at Mains Terminals	Colin McKean	UKAS

Table 12

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: Headset and Hand controller Battery Powered, Beacon USB Powered - Linked		
Conducted Disturbance at Mains Terminals	Colin McKean	UKAS

Table 13

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: Headset and Hand controller Battery Powered, Beacon AC Powered, USB Port Loaded - Linked		
Radiated Disturbance	Colin McKean	UKAS

Table 14

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: Headset, Hand controller and Beacon Battery Powered - Linked		
Radiated Disturbance	Colin McKean	UKAS

Table 15

Office Address:

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

2 Test Details

2.1 Conducted Disturbance at Mains Terminals

2.1.1 Specification Reference

FCC 47 CFR Part 15B and ICES-003, Clause 15.107 and 3.1

2.1.2 Equipment Under Test and Modification State

Charging Station,	S/N: Not serialised (Storix-ID 599374-041) - Modification State 0
Hard Hat,	S/N: Not serialised (Storix-ID 599374-097) - Modification State 0
Controller,	S/N: Not serialised (Storix-ID 599374-021) - Modification State 0
Beacon,	S/N: Not serialised (Storix-ID 599374-104) - Modification State 0

2.1.3 Date of Test

08-September-2021 to 15-September-2021

2.1.4 Test Method

The EUT was setup according to ANSI C63.4, clause 5.2.

The EUT was placed on a non-conductive table 0.8 m above a reference ground plane. A vertical coupling plane was placed 0.4 m from the EUT boundary

A Line Impedance Stabilisation Network (LISN) was directly bonded to the ground-plane. The EUT was located so that the distance between the boundary of the EUT and the closest surface of the LISN was 0.8 m.

Interconnecting cables that hanged closer than 0.4 m to the ground plane were folded back and forth in the centre forming a bundle 0.3 m to 0.4 m long.

Input and output cables were terminated with equipment or loads representative of real usage conditions.

The EUT was configured to give the highest level of emissions within reason of a typical installation as described by the manufacturer.

2.1.5 Example Calculation

Quasi-Peak level (dBµV) = Receiver level (dBµV) + Correction Factor (dB)
Margin (dB) = Quasi-Peak level (dBµV) - Limit (dBµV)

CISPR Average level (dBµV) = Receiver level (dBµV) + Correction Factor (dB)
Margin (dB) = CISPR Average level (dBµV) - Limit (dBµV)

2.1.6 Example Test Setup Diagram

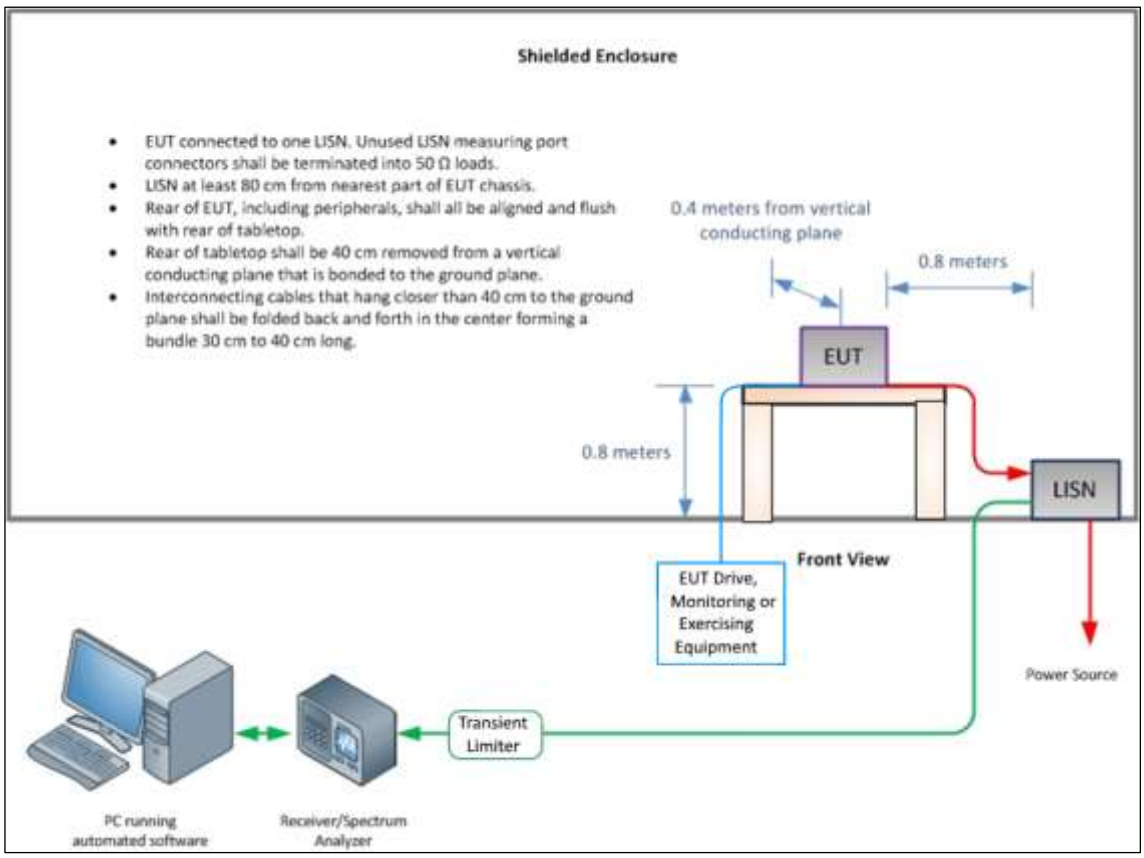

Figure 8 - Conducted Disturbance

2.1.7 Environmental Conditions

Ambient Temperature	22.3 - 23.2 °C
Relative Humidity	54.8 - 56.4 %

2.1.8 Specification Limits

Required Specification Limits - Class B			
Line Under Test	Frequency Range (MHz)	Quasi-Peak Test Limit (dBµV)	CISPR Average Test Limit (dBµV)
AC Power Port	0.15 to 0.5	66 to 56(1)	56 to 46(1)
	0.5 to 5	56	46
	5 to 30	60	50
Supplementary information: Note 1. Decreases with the logarithm of the frequency.			

Table 16

2.1.9 Test Results

Results for Configuration and Mode: Charging Station AC Powered – Charging

This test was performed to the requirements of the Class B limits.
Performance assessment of the EUT made during this test: Pass.
Detailed results are shown below.

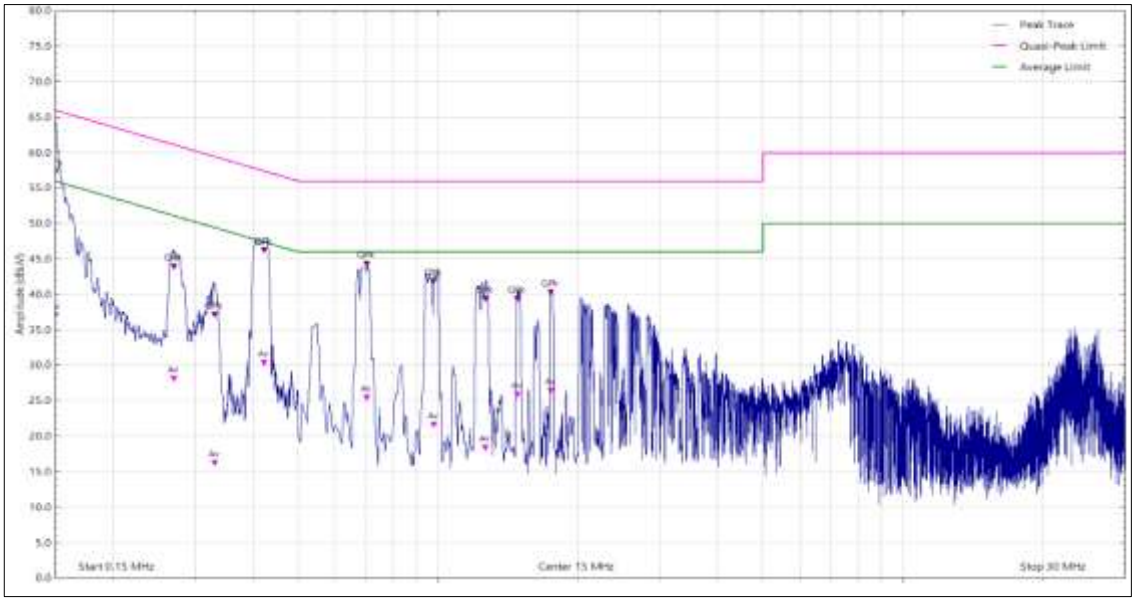

Figure 9 - Graphical Results - Live Line

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.150	57.9	66.0	-8.2	Q-Peak
0.150	37.9	56.0	-18.1	CISPR Avg
0.268	43.3	61.2	-17.9	Q-Peak
0.268	28.0	51.2	-23.2	CISPR Avg
0.329	36.7	59.5	-22.8	Q-Peak
0.329	15.6	49.5	-33.9	CISPR Avg
0.420	30.7	47.4	-16.7	CISPR Avg
0.420	46.2	57.4	-11.2	Q-Peak
0.691	26.0	46.0	-20.0	CISPR Avg
0.691	43.8	56.0	-12.2	Q-Peak
0.980	41.6	56.0	-14.4	Q-Peak
0.980	21.3	46.0	-24.7	CISPR Avg
1.253	18.3	46.0	-27.7	CISPR Avg
1.253	39.1	56.0	-16.9	Q-Peak
1.481	39.9	56.0	-16.1	Q-Peak
1.481	27.1	46.0	-18.9	CISPR Avg
1.790	38.2	56.0	-17.8	Q-Peak
1.790	16.5	46.0	-29.5	CISPR Avg

Table 17

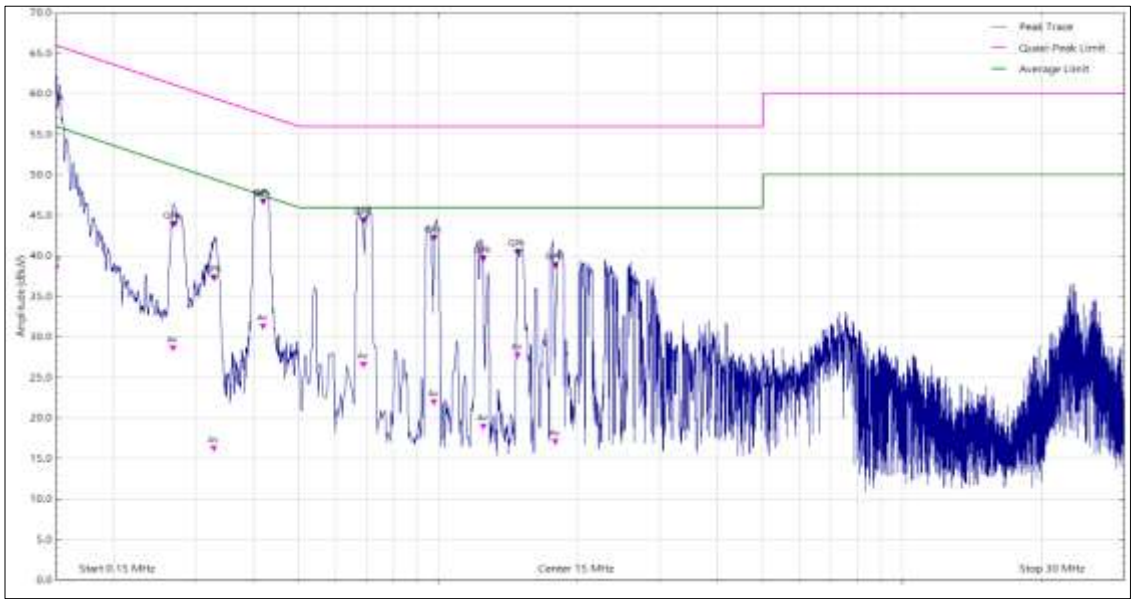

Figure 10 - Graphical Results - Neutral Line

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.150	36.4	56.0	-19.6	CISPR Avg
0.150	56.6	66.0	-9.4	Q-Peak
0.270	27.4	51.1	-23.7	CISPR Avg
0.270	43.2	61.1	-17.9	Q-Peak
0.331	36.5	59.4	-22.9	Q-Peak
0.331	15.6	49.4	-33.8	CISPR Avg
0.423	45.6	57.4	-11.8	Q-Peak
0.423	29.7	47.4	-17.7	CISPR Avg
0.703	24.8	46.0	-21.2	CISPR Avg
0.703	43.6	56.0	-12.4	Q-Peak
0.979	21.0	46.0	-25.1	CISPR Avg
0.979	41.2	56.0	-14.8	Q-Peak
1.263	17.7	46.0	-28.3	CISPR Avg
1.263	38.7	56.0	-17.3	Q-Peak
1.484	25.2	46.0	-20.8	CISPR Avg
1.484	38.7	56.0	-17.3	Q-Peak
1.751	25.8	46.0	-20.3	CISPR Avg
1.751	39.6	56.0	-16.4	Q-Peak

Table 18

Figure 11 - Test Setup

Results for Configuration and Mode: Headset and Hand controller Battery Powered, Beacon AC Powered - Linked

This test was performed to the requirements of the Class B limits.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

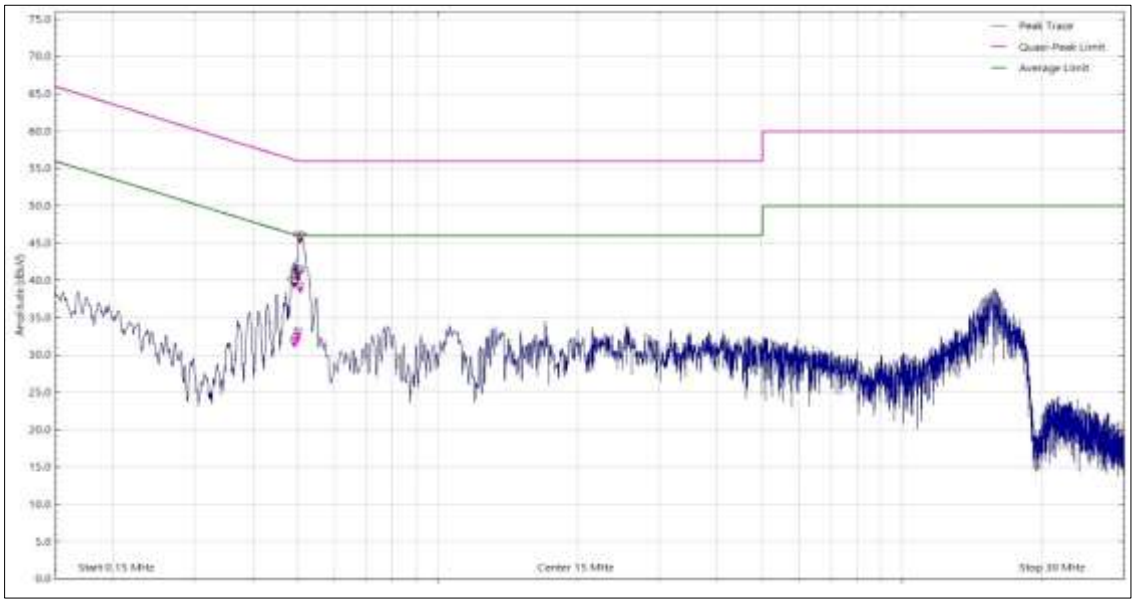

Figure 12 - Graphical Results - Live Line

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.492	38.7	56.1	-17.4	Q-Peak
0.492	30.7	46.1	-15.4	CISPR Avg
0.499	39.7	56.0	-16.3	Q-Peak
0.499	31.4	46.0	-14.6	CISPR Avg
0.500	40.2	56.0	-15.8	Q-Peak
0.500	32.0	46.0	-14.0	CISPR Avg
0.507	44.7	56.0	-11.3	Q-Peak
0.507	38.1	46.0	-7.9	CISPR Avg

Table 19

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 6 dB below the CISPR Average test limit.

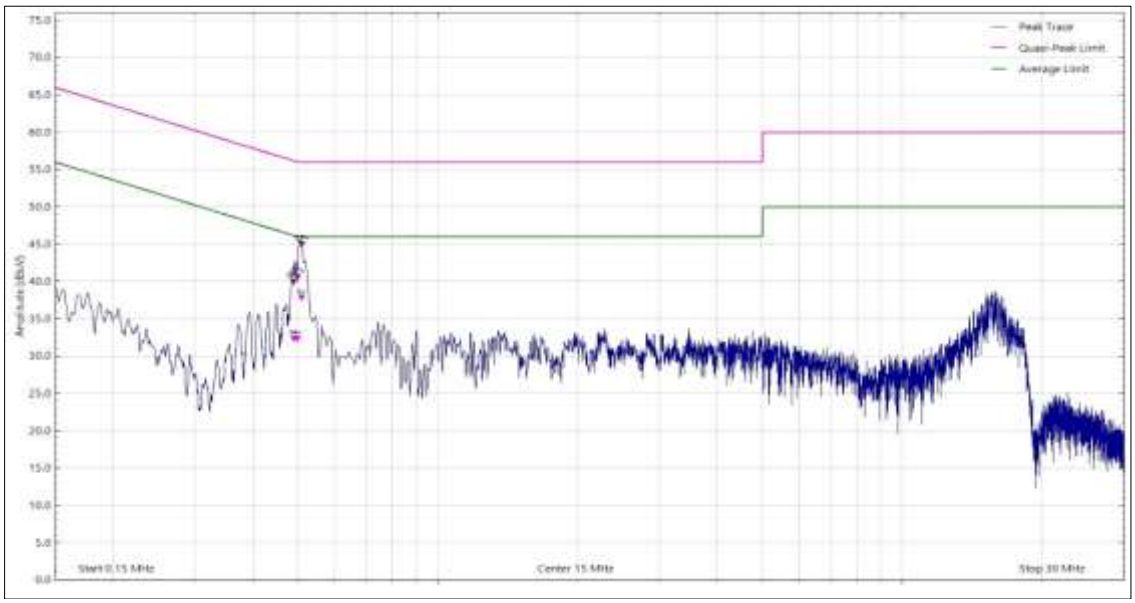

Figure 13 - Graphical Results - Neutral Line

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.491	39.3	56.1	-16.8	Q-Peak
0.491	31.8	46.1	-14.3	CISPR Avg
0.499	40.0	56.0	-16.0	Q-Peak
0.499	31.7	46.0	-14.3	CISPR Avg
0.510	44.4	56.0	-11.6	Q-Peak
0.510	37.2	46.0	-8.8	CISPR Avg

Table 20

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 6 dB below the CISPR Average test limit.

Figure 14 - Test Setup

Results for Configuration and Mode: Headset and Hand controller Battery Powered, Beacon USB Powered - Linked

This test was performed to the requirements of the Class B limits.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

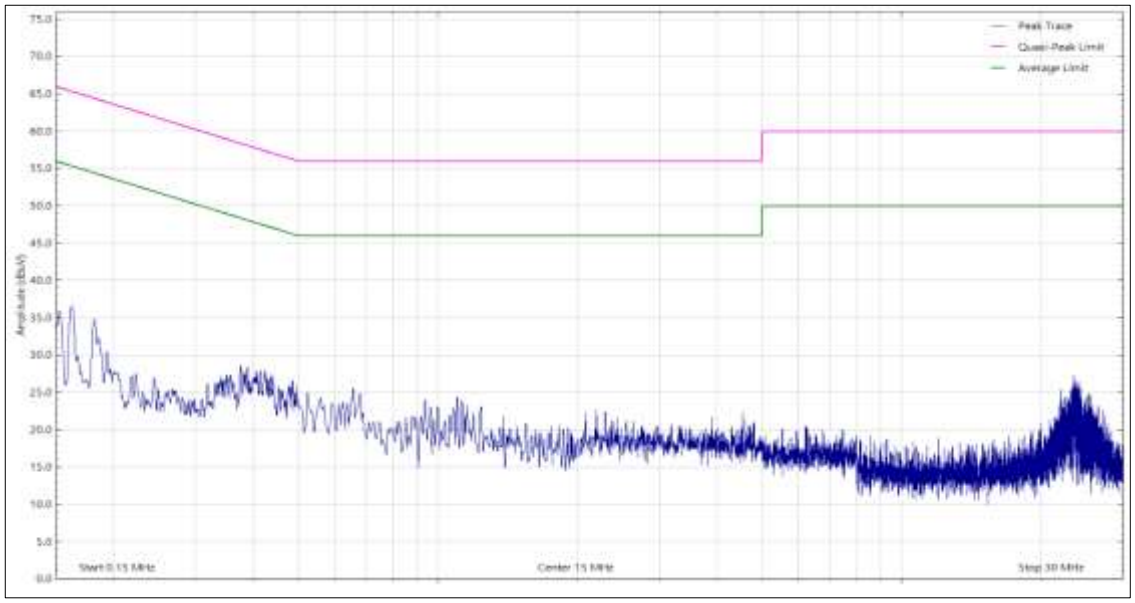

Figure 15 - Graphical Results - Live Line

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
*				

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 6 dB below the CISPR Average test limit.

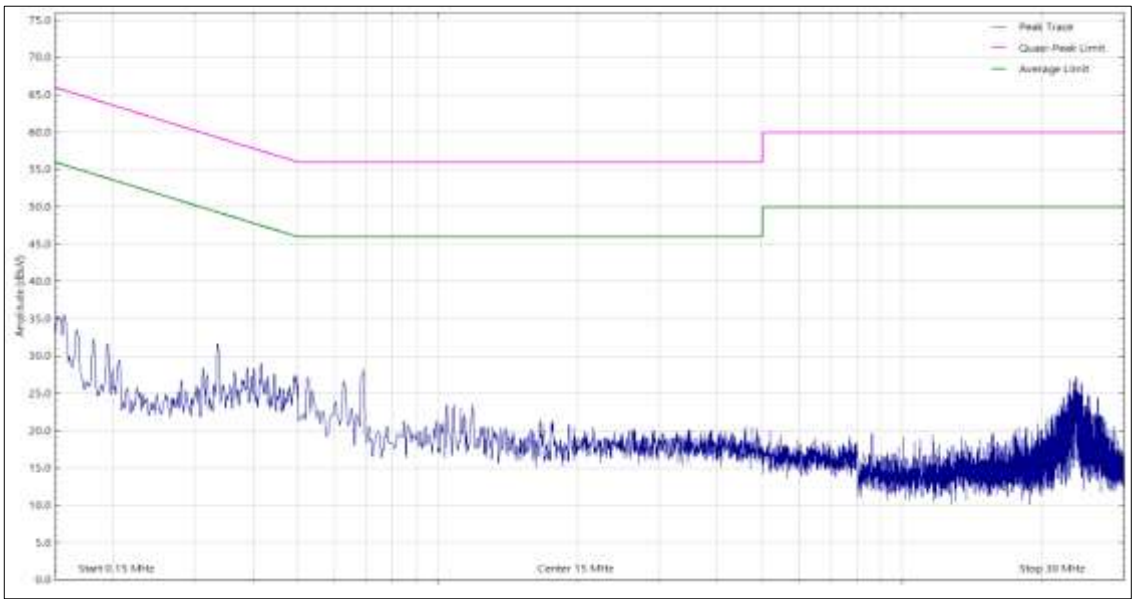

Figure 16 - Graphical Results - Neutral Line

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
*				

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 6 dB below the CISPR Average test limit.

Figure 17 - Test Setup

2.1.10 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 12.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Screened Room (12)	MVG	EMC-3	5621	36	11-Aug-2023
EmX Emissions Software	TUV SUD	V2.1.11	5125	-	Software
Test Receiver	Rohde & Schwarz	ESU40	3506	12	18-Mar-2022
Transient Limiter	Hewlett Packard	11947A	2378	12	12-Oct-2021
Cable (SMA to SMA, 2 m)	Junkosha	MWX221-02000DMS	5428	12	15-Oct-2021
Cable (N-Type to N-Type, 8 m)	Teledyne	PR90-088-8MTR	5450	6	08-Mar-2022
LISN	Rohde & Schwarz	ESH3-Z5	1390	12	28-Jan-2022

Table 21

2.2 Radiated Disturbance

2.2.1 Specification Reference

FCC 47 CFR Part 15B and ICES-003, Clause 15.109 and 3.2

2.2.2 Equipment Under Test and Modification State

Charging Station,	S/N: Not serialised (Storix-ID 599374-041) - Modification State 0
Hard Hat,	S/N: Not serialised (Storix-ID 599374-097) - Modification State 0
Controller,	S/N: Not serialised (Storix-ID 599374-021) - Modification State 0
Beacon,	S/N: Not serialised (Storix-ID 599374-104) - Modification State 0

2.2.3 Date of Test

08-September-2021 to 15-September-2021

2.2.4 Test Method

The EUT was set up on a non-conductive table 0.8 m above a reference ground plane within a semi-anechoic chamber on a remotely controlled turntable.

A pre-scan of the EUT emissions profile using a peak detector was made at a 3 m antenna distance whilst varying the antenna-to-EUT azimuth and polarisation.

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.

Using a list of the highest emissions detected during the pre-scan along with their bearing and associated antenna polarisation, the EUT was then formally measured using a Quasi-Peak, Peak or CISPR Average detector as appropriate.

The readings were maximised by adjusting the antenna height, polarisation and turntable azimuth, in accordance with the specification.

2.2.5 Example Calculation

Below 1 GHz:

Quasi-Peak level (dBµV/m) = Receiver level (dBµV) + Correction Factor (dB/m)
Margin (dB) = Quasi-Peak level (dBµV/m) - Limit (dBµV/m)

Above 1 GHz:

CISPR Average level (dBµV/m) = Receiver level (dBµV) + Correction Factor (dB/m)
Margin (dB) = CISPR Average level (dBµV/m) - Limit (dBµV/m)

Peak level (dBµV/m) = Receiver level (dBµV) + Correction Factor (dB/m)
Margin (dB) = Peak level (dBµV/m) - Limit (dBµV/m)

2.2.6 Example Test Setup Diagram

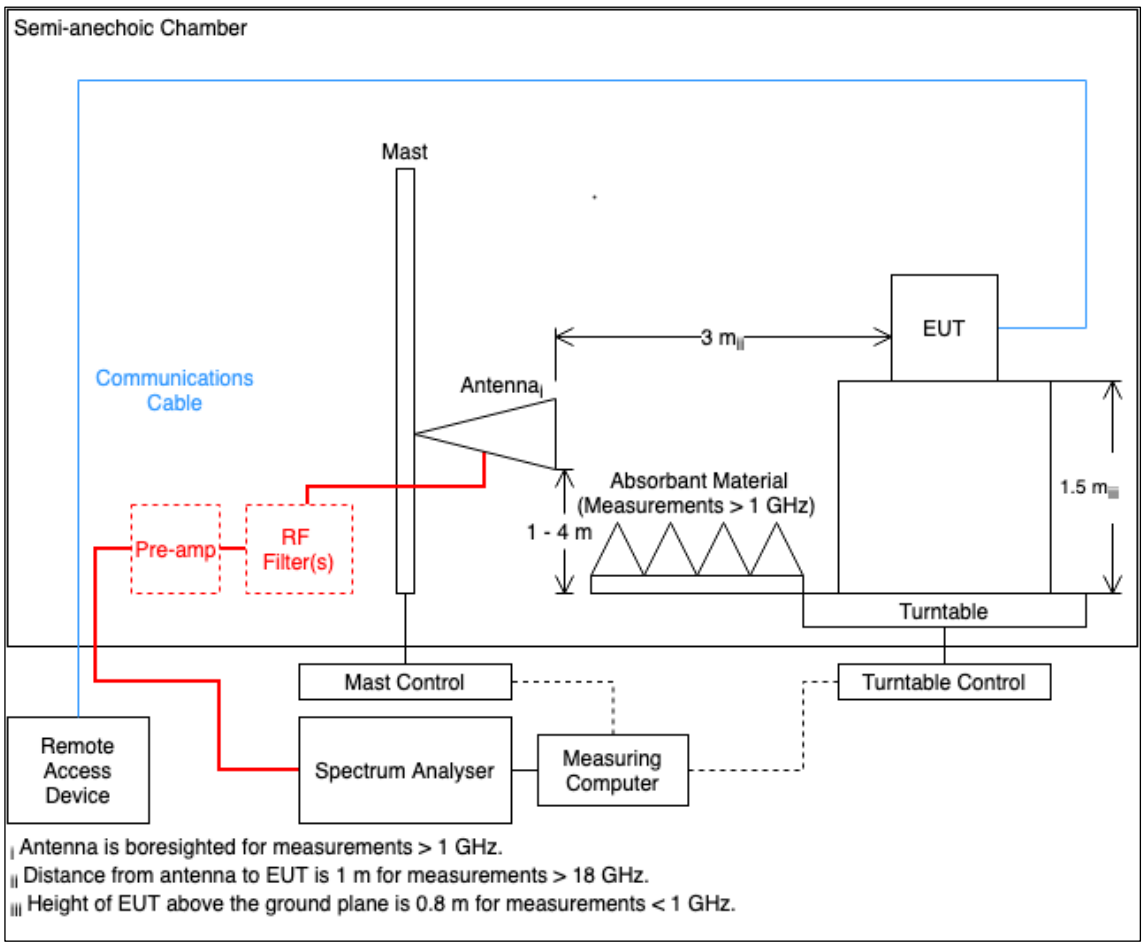

Figure 18

2.2.7 Environmental Conditions

Ambient Temperature	21.2 - 22.5 °C
Relative Humidity	56.3 - 65.4 %

2.2.8 Specification Limits

Required Specification Limits, Field Strength - Class B Test Limit at a 3 m Measurement Distance		
Frequency Range (MHz)	Test Limit (µV/m)	Test Limit (dBµV/m)
30 to 88	100	40.0
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0
Supplementary information: Note 1. A Quasi-peak detector is to be used for measurements below 1 GHz. Note 2. A CISPR Average detector is to be used for measurements above 1 GHz. Note 3. The Peak test limit above 1 GHz is 20 dB higher than the CISPR Average test limit.		

Table 22

2.2.9 Test Results

Results for Configuration and Mode: Charging Station AC Powered – Charging

This test was performed to the requirements of the Class B limits.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Highest frequency generated or used within the EUT: Not Supplied
Which necessitates an upper frequency test limit of: 1 GHz

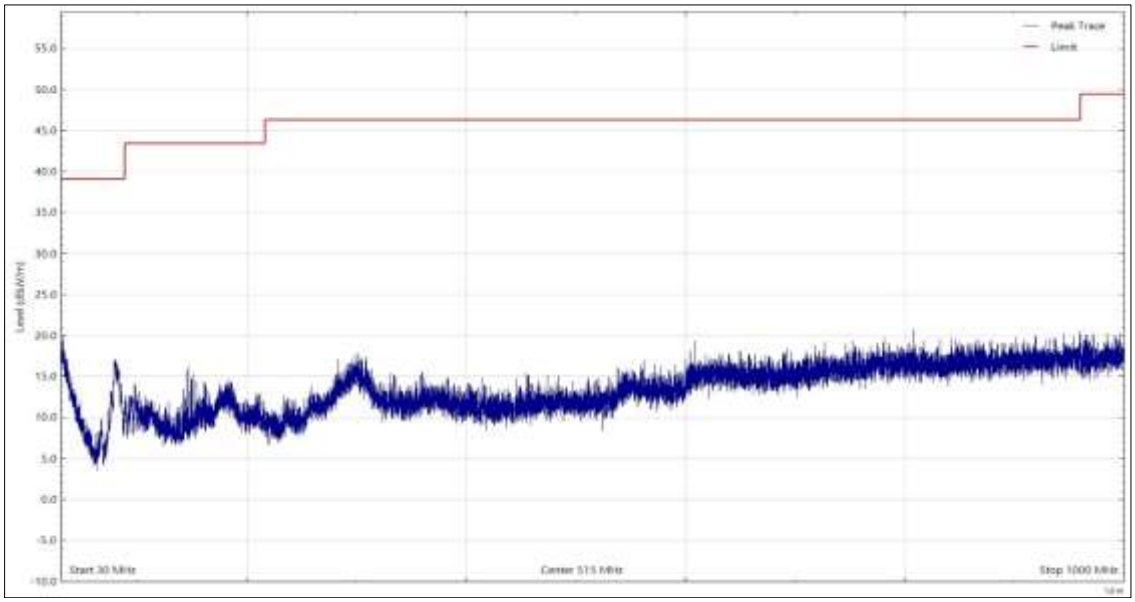

Figure 19 - 30 MHz to 1 GHz, Quasi-Peak, Horizontal

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

Table 23

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

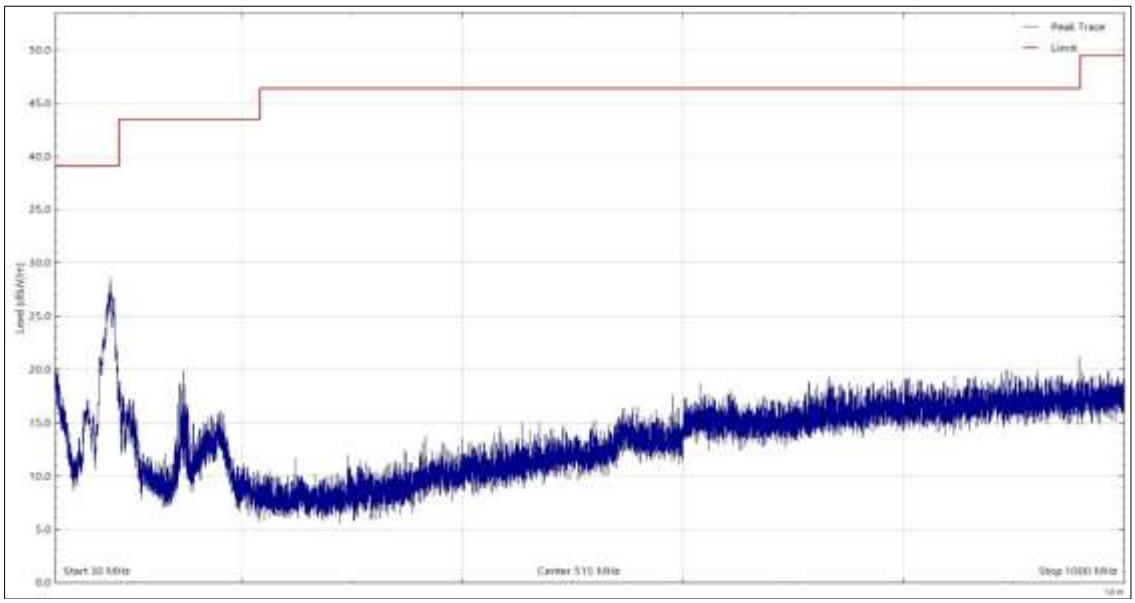

Figure 20 - 30 MHz to 1 GHz, Quasi-Peak, Vertical

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

Table 24

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

Figure 21 - Test Setup - 30 MHz to 1 GHz

Results for Configuration and Mode: Headset and Hand controller Battery Powered, Beacon AC Powered, USB Port Loaded - Linked

This test was performed to the requirements of the Class B limits.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Highest frequency generated or used within the EUT: 2.4 GHz
Which necessitates an upper frequency test limit of: 18 GHz

The EUT is handheld, body-worn, or ceiling-mounted equipment and has therefore been tested in three different orientations in accordance with ANSI C63.4, Clause 6.3.2.1.

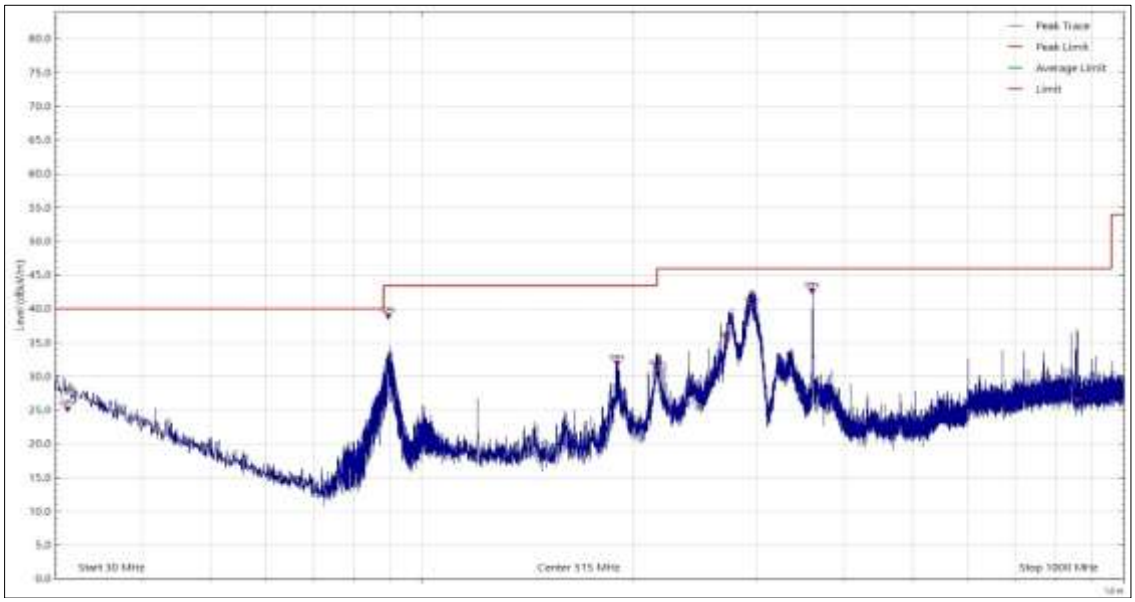

Figure 22 - 30 MHz to 1 GHz, Horizontal - X Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
31.272	24.42	40	-15.58	Q-Peak	100	355	Horizontal
89.482	38.19	43.5	-5.31	Q-Peak	208	222	Horizontal
189.899	31.18	43.5	-12.32	Q-Peak	110	313	Horizontal
216.012	30.37	46	-15.63	Q-Peak	125	353	Horizontal
272.266	34.56	46	-11.44	Q-Peak	100	340	Horizontal
295.590	39.8	46	-6.2	Q-Peak	102	38	Horizontal
360.047	41.9	46	-4.1	Q-Peak	105	307	Horizontal
857.182	25.67	46	-20.33	Q-Peak	186	108	Horizontal

Table 25

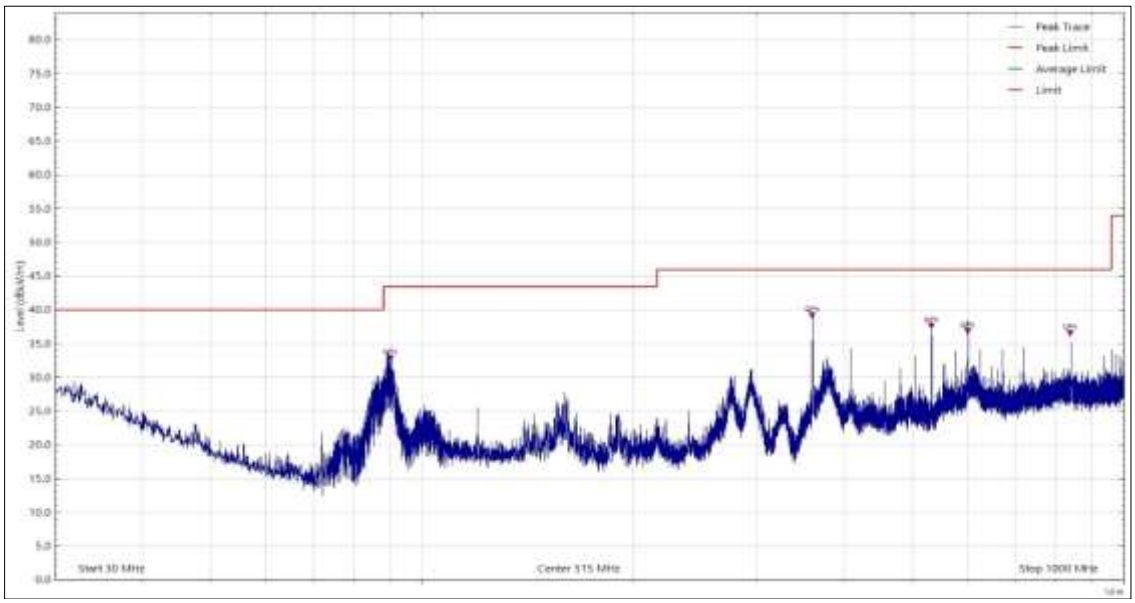

Figure 23 - 30 MHz to 1 GHz, Vertical - X Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
90.200	32.19	43.5	-11.31	Q-Peak	153	100	Vertical
359.973	38.49	46	-7.51	Q-Peak	288	100	Vertical
532.025	36.88	46	-9.12	Q-Peak	257	100	Vertical
599.958	36.17	46	-9.83	Q-Peak	222	100	Vertical
840.006	35.9	46	-10.1	Q-Peak	73	233	Vertical

Table 26

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

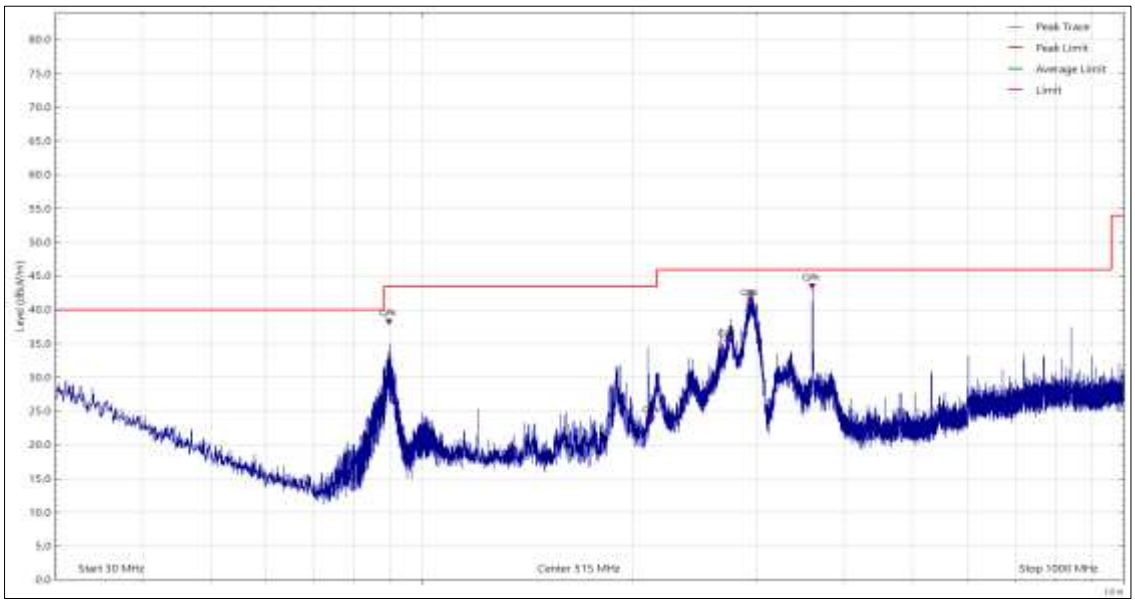

Figure 24 - 30 MHz to 1 GHz, Horizontal - Y Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
89.854	37.5	43.5	-6.0	Q-Peak	282	250	Horizontal
212.732	23.2	43.5	-20.3	Q-Peak	241	100	Horizontal
272.630	34.5	46.0	-11.6	Q-Peak	74	103	Horizontal
294.109	40.5	46.0	-5.5	Q-Peak	155	105	Horizontal
360.000	42.8	46.0	-3.3	Q-Peak	18	100	Horizontal

Table 27

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

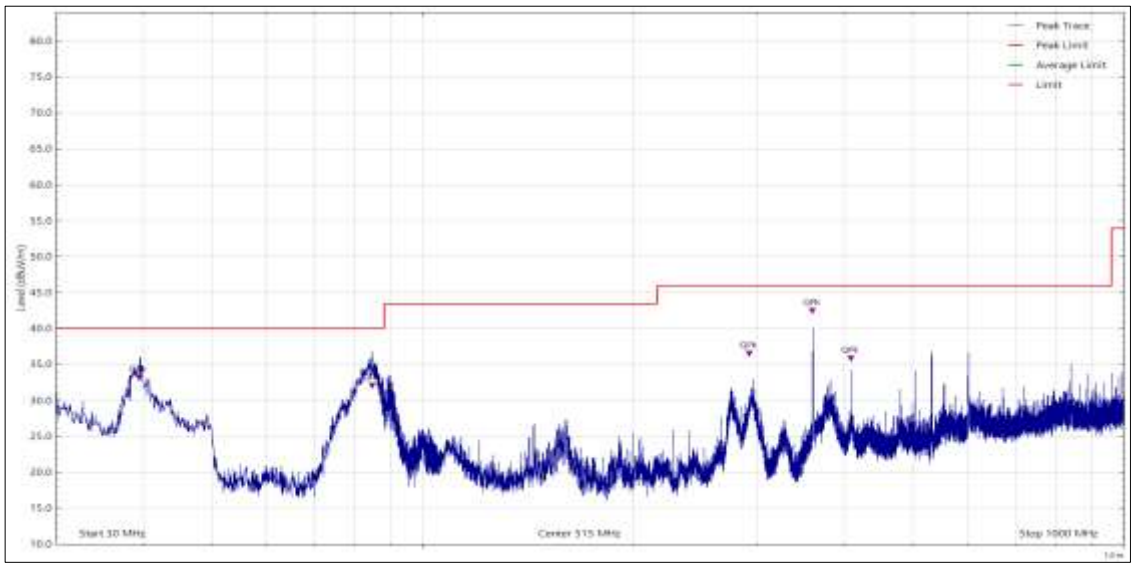

Figure 25- 30 MHz to 1 GHz, Vertical - Y Orientation

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
39.464	32.6	40.0	-7.4	Q-Peak	194	100	Vertical
84.853	31.4	43.5	-12.1	Q-Peak	198	100	Vertical
292.161	35.9	46.0	-10.1	Q-Peak	250	303	Vertical
359.979	41.9	46.0	-4.1	Q-Peak	194	163	Vertical
407.987	35.2	46.0	-10.8	Q-Peak	230	100	Vertical

Table 28

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

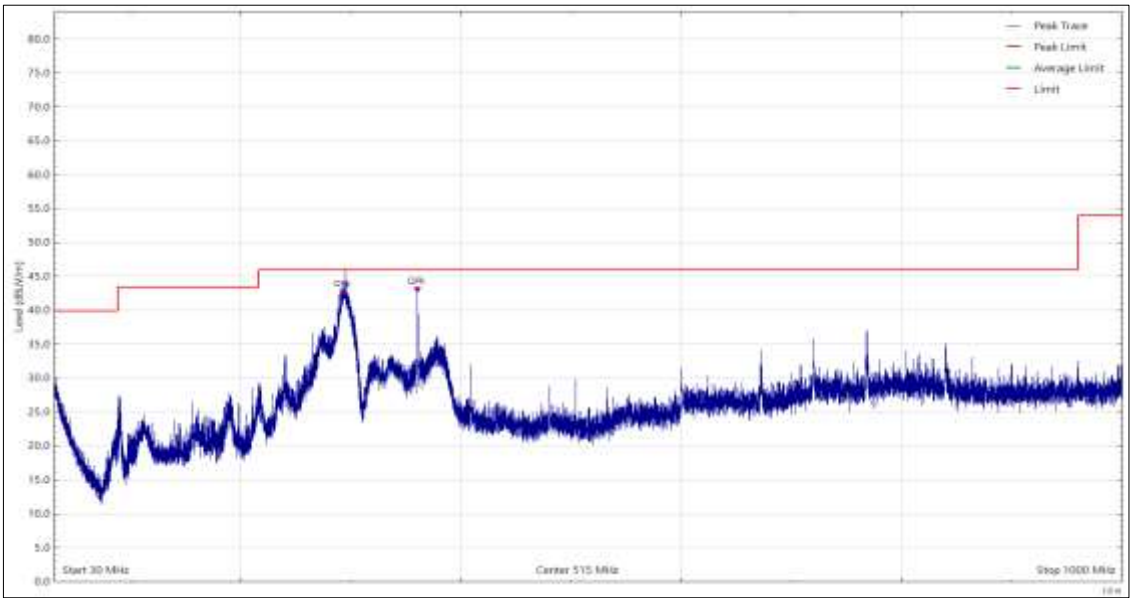

Figure 26 - 30 MHz to 1 GHz, Horizontal - Z Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
294.109	40.5	46	-5.5	Q-Peak	155	105	Horizontal
360.000	42.75	46	-3.25	Q-Peak	18	100	Horizontal

Table 29

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

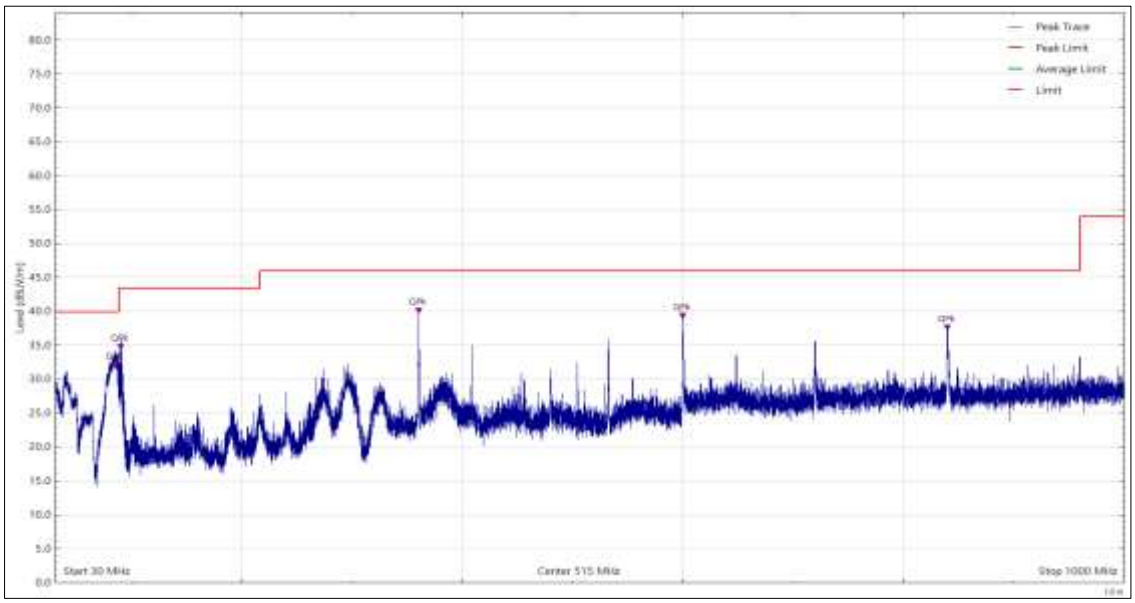

Figure 27 - 30 MHz to 1 GHz, Vertical - Z Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
85.043	31.3	40.0	-8.7	Q-Peak	263	100	Vertical
89.501	34.0	43.5	-9.5	Q-Peak	295	100	Vertical
359.993	39.3	46.0	-6.7	Q-Peak	350	100	Vertical
599.994	38.6	46.0	-7.4	Q-Peak	37	100	Vertical
840.069	36.9	46.0	-9.1	Q-Peak	360	100	Vertical

Table 30

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

Figure 28 - Test Setup - 30 MHz to 1 GHz

Results for Configuration and Mode: Headset, Hand controller and Beacon Battery Powered - Linked

This test was performed to the requirements of the Class B limits.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Highest frequency generated or used within the EUT: 2.4 GHz
Which necessitates an upper frequency test limit of: 18 GHz

The EUT is handheld, body-worn, or ceiling-mounted equipment and has therefore been tested in three different orientations in accordance with ANSI C63.4, Clause 6.3.2.1.

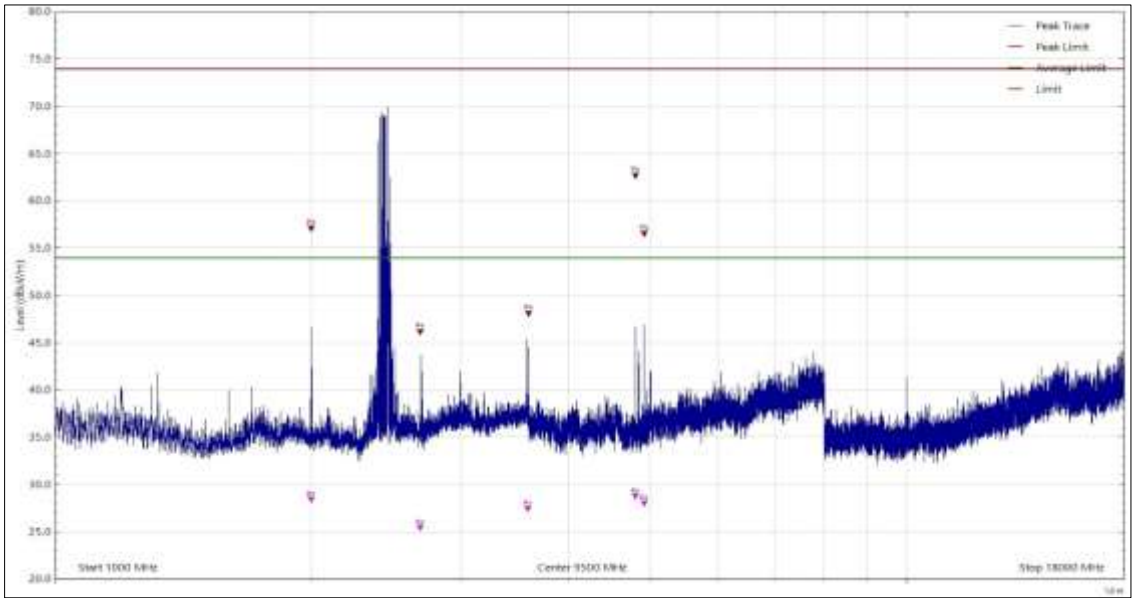

Figure 29 - 1 GHz to 18 GHz, Horizontal - X Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
1999.842	56.5	74.0	-17.5	Peak	184	125	Horizontal
1999.912	27.9	54.0	-26.1	CISPR Avg	184	125	Horizontal
2687.948	45.6	74.0	-28.4	Peak	221	105	Horizontal
2688.367	24.9	54.0	-29.1	CISPR Avg	221	105	Horizontal
3595.995	26.9	54.0	-27.1	CISPR Avg	192	100	Horizontal
3599.935	47.5	74.0	-26.5	Peak	192	100	Horizontal
4803.377	28.3	54.0	-25.8	CISPR Avg	22	169	Horizontal
4803.655	62.1	74.0	-11.9	Peak	22	169	Horizontal
4918.744	27.5	54.0	-26.5	CISPR Avg	48	104	Horizontal
4919.143	56.0	74.0	-18.0	Peak	48	104	Horizontal

Table 31

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

The emission seen at 2.4 GHz is an intentionally generated transmission from the EUT and is therefore not subject to the test limit.

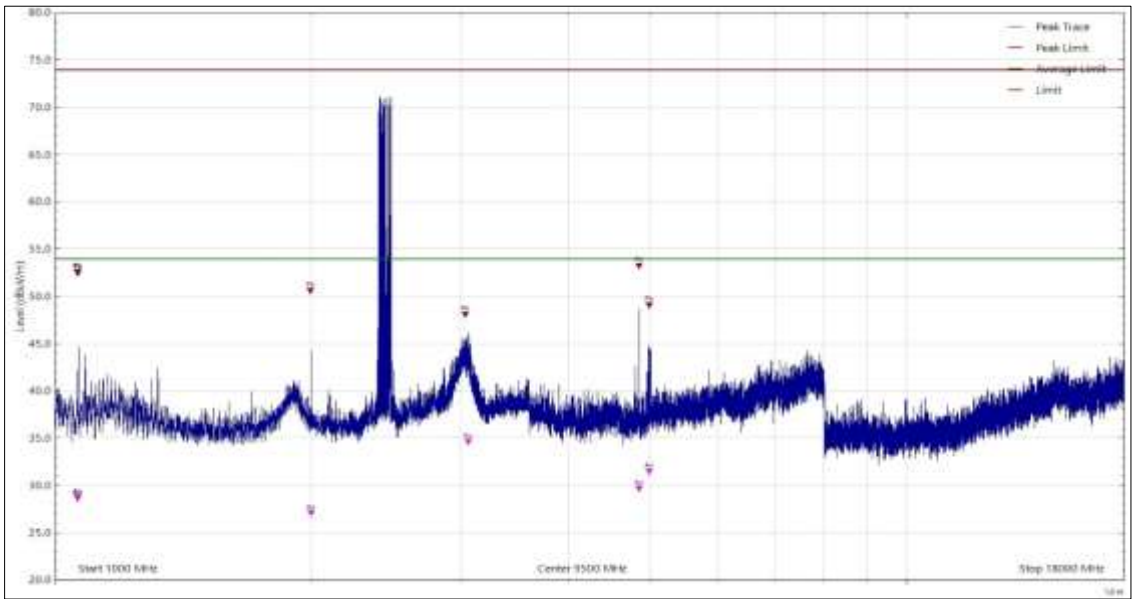

Figure 30 - 1 GHz to 18 GHz, Vertical - X Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
1063.625	28.3	54.0	-25.7	CISPR Avg	322	123	Vertical
1063.965	28.2	54.0	-25.9	CISPR Avg	318	100	Vertical
1996.985	50.1	74.0	-23.9	Peak	317	103	Vertical
1999.385	26.6	54.0	-27.4	CISPR Avg	317	103	Vertical
3034.209	47.6	74.0	-26.5	Peak	307	100	Vertical
3057.672	34.1	54.0	-19.9	CISPR Avg	307	100	Vertical
4851.565	29.2	54.0	-24.8	CISPR Avg	108	110	Vertical
4852.055	52.7	74.0	-21.3	Peak	108	110	Vertical
4988.235	48.6	74.0	-25.5	Peak	18	120	Vertical
4988.649	31.0	54.0	-23.0	CISPR Avg	18	120	Vertical

Table 32

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

The emission seen at 2.4 GHz is an intentionally generated transmission from the EUT and is therefore not subject to the test limit.

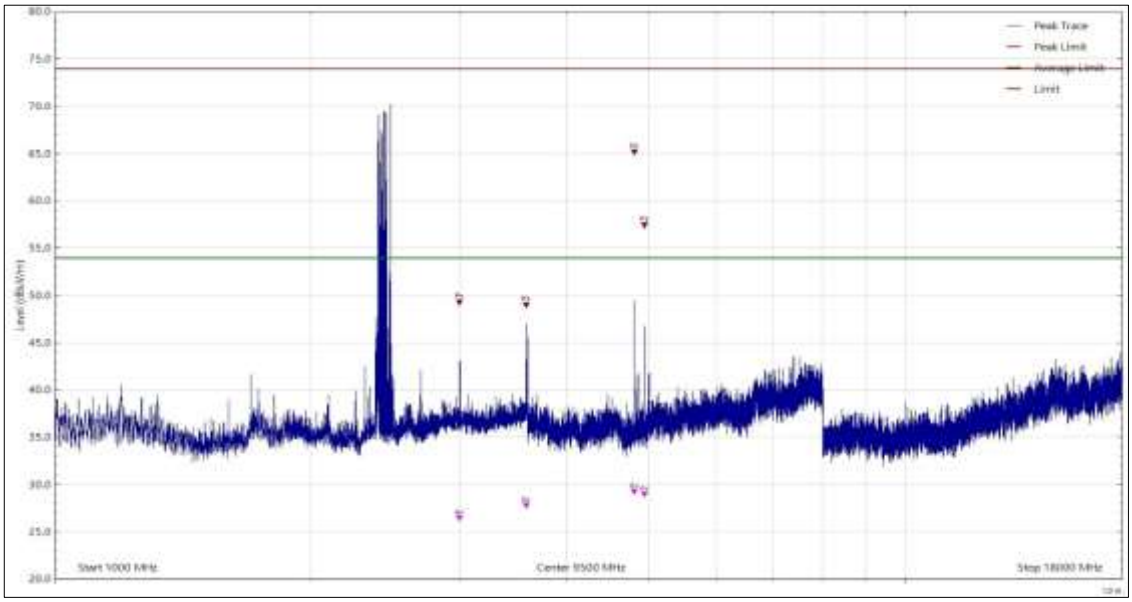

Figure 31 - 1 GHz to 18 GHz, Horizontal - Y Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2990.814	25.9	54.0	-28.1	CISPR Avg	276	139	Horizontal
2990.963	48.7	74.0	-25.3	Peak	276	139	Horizontal
3583.002	48.5	74.0	-25.6	Peak	277	107	Horizontal
3586.879	27.3	54.0	-26.7	CISPR Avg	277	107	Horizontal
4803.583	28.8	54.0	-25.2	CISPR Avg	100	100	Horizontal
4804.413	64.7	74.0	-9.3	Peak	100	100	Horizontal
4944.205	28.5	54.0	-25.5	CISPR Avg	119	109	Horizontal
4945.623	56.9	74.0	-17.1	Peak	119	109	Horizontal

Table 33

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

The emission seen at 2.4 GHz is an intentionally generated transmission from the EUT and is therefore not subject to the test limit.

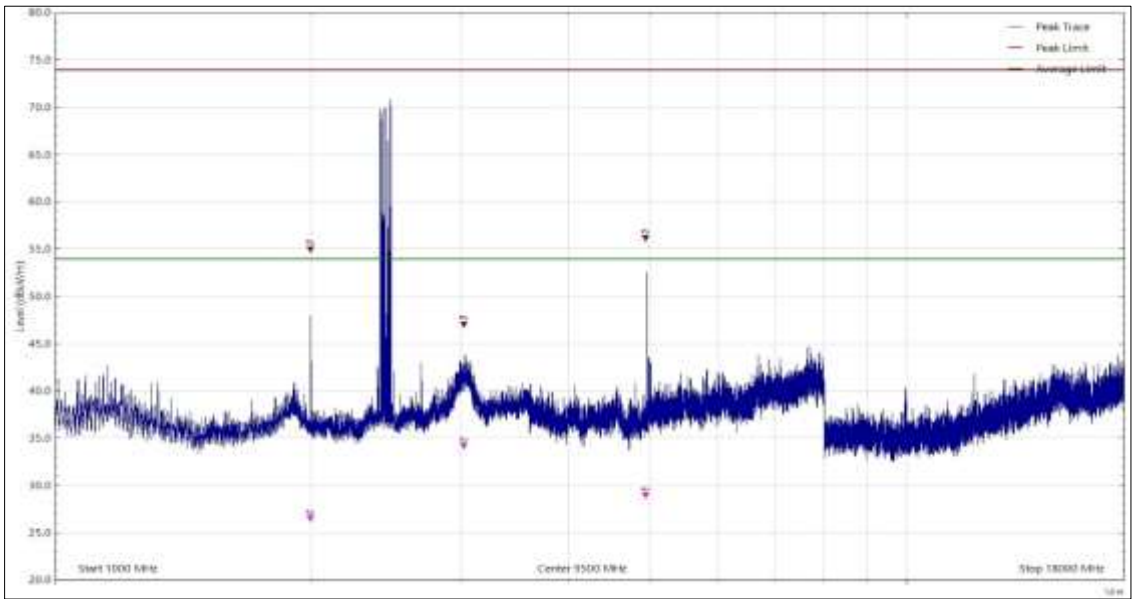

Figure 32 - 1 GHz to 18 GHz, Vertical - Y Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
1996.909	54.5	74.0	-19.6	Peak	262	198	Vertical
1994.072	26.0	54.0	-28.0	CISPR Avg	262	198	Vertical
3022.888	46.6	74.0	-27.5	Peak	36	168	Vertical
3023.704	33.7	54.0	-20.3	CISPR Avg	36	168	Vertical
4945.568	55.6	74.0	-18.4	Peak	74	121	Vertical
4945.675	28.5	54.0	-25.5	CISPR Avg	74	121	Vertical

Table 34

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

The emission seen at 2.4 GHz is an intentionally generated transmission from the EUT and is therefore not subject to the test limit.

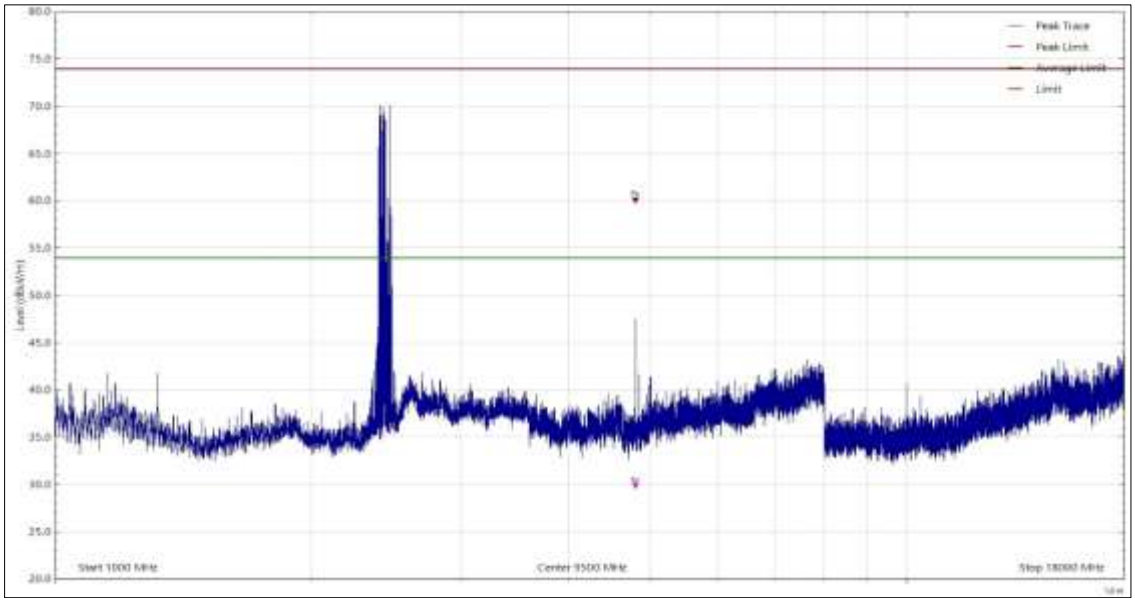

Figure 33 - 1 GHz to 18 GHz, CISPR Average, Horizontal - Z Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
4803.434	59.5	74.0	-14.5	Peak	177	100	Horizontal
4803.902	29.4	54.0	-24.7	CISPR Avg	177	100	Horizontal

Table 35

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

The emission seen at 2.4 GHz is an intentionally generated transmission from the EUT and is therefore not subject to the test level.

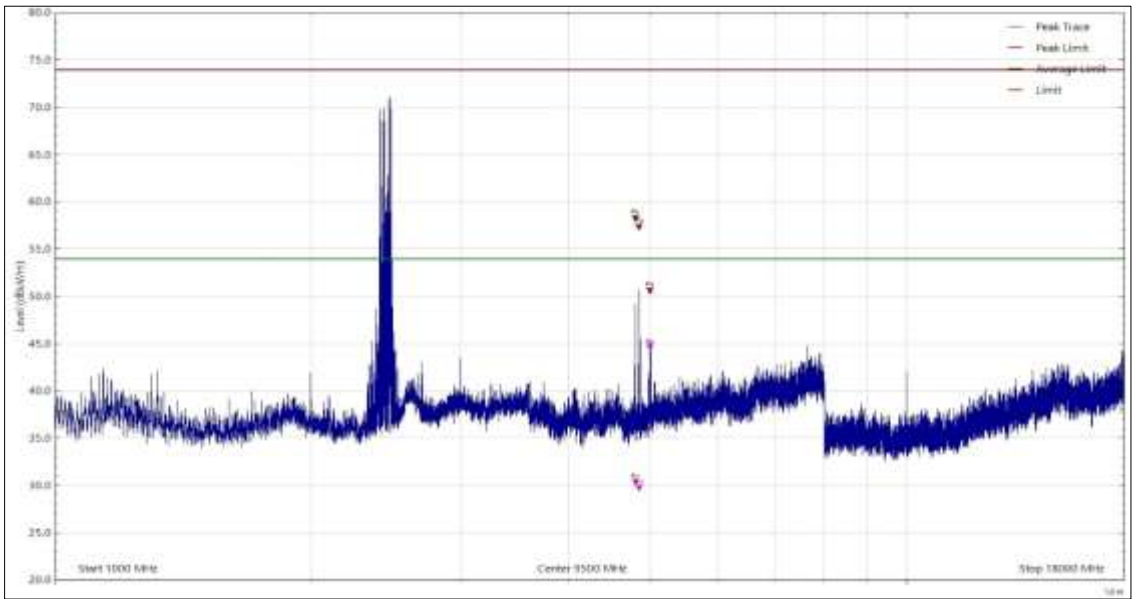

Figure 34 - 1 GHz to 18 GHz, CISPR Average, Vertical - Z Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
4804.296	29.9	54.0	-24.1	CISPR Avg	96	100	Vertical
4804.419	57.8	74.0	-16.3	Peak	96	100	Vertical
4851.479	29.2	54.0	-24.8	CISPR Avg	93	108	Vertical
4852.254	56.8	74.0	-17.2	Peak	93	108	Vertical
4999.607	44.1	54.0	-9.9	CISPR Avg	338	140	Vertical
4999.654	50.1	74.0	-23.9	Peak	338	140	Vertical

Table 36

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

The emission seen at 2.4 GHz is an intentionally generated transmission from the EUT and is therefore not subject to the test level.

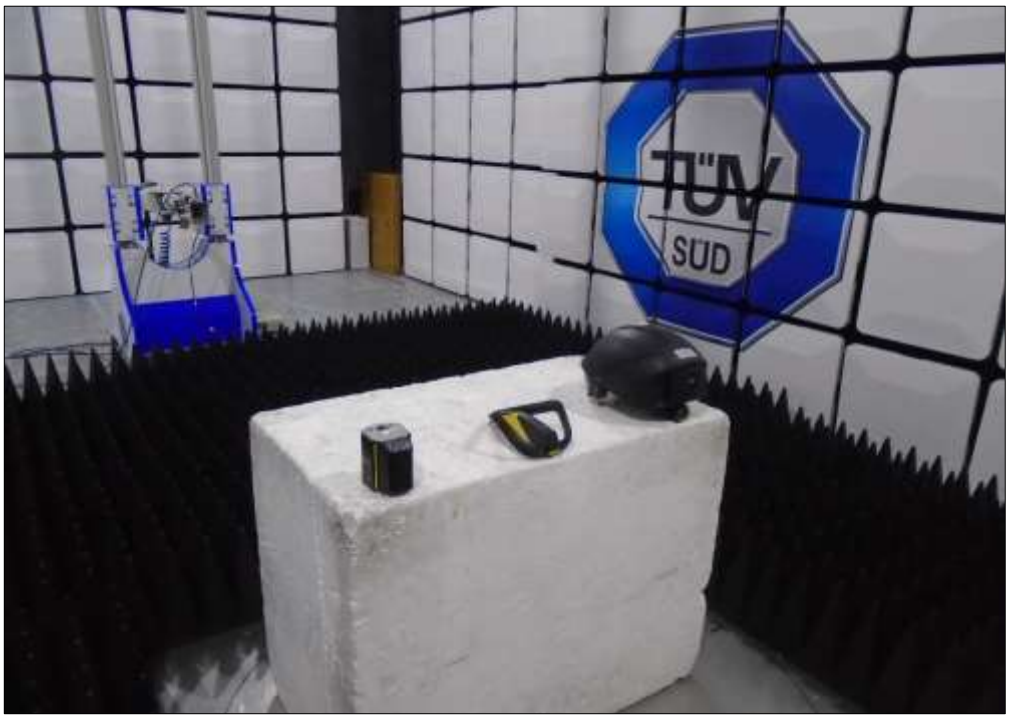

Figure 35 - Test Setup - 1 GHz to 18 GHz

2.2.10 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 12.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
3m Semi Anechoic Chamber	MVG	EMC-3	5621	36	11-Aug-2023
EmX Emissions Software	TUV SUD	V2.1.11	5125	-	Software
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	18-Mar-2022
Turntable & Mast Controller	Maturo Gmbh	NCD/498/2799.01	5612	-	TU
Tilt Antenna Mast TAM 4.0-P	Maturo Gmbh	TAM 4.0-P	5613	-	TU
Turntable	Maturo Gmbh	Turntable 1.5 SI-2t	5614	-	TU
Cable (18 GHz)	Rosenberger	LU7-036-1000	5031	12	23-Jul-2022
3.5 mm 2m Cable	Junkosha	MWX221-02000DMS	5428	12	15-Oct-2021
8 Meter Cable	Teledyne	PR90-088-8MTR	5450	6	08-Mar-2022
Preamplifier (30dB 1GHz to 18GHz)	Schwarzbeck	BBV 9718 C	5350	12	21-Sep-2021
Antenna with permanent attenuator (Bilog)	Schaffner	CBL6143	287	24	14-Oct-2022
Broadband Horn Antenna (1-10 GHz)	Schwarzbeck	BBHA 9120 B	5611	12	22-Sep-2021

Table 37

TU - Traceability Unscheduled

3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Antenna (Double Ridge Guide, 1 GHz to 18 GHz)	EMCO	3115	235	-	TU
Spectrum Analyser	Agilent Technologies	E7405A	1410	12	14-Oct-2021
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5481	12	31-Mar-2022
8m N Type Cable	Junkosha	MWX221-08000NMSNMS/B	5519	12	15-Mar-2022

Table 38

TU - Traceability Unscheduled

4 Incident Reports

No incidents reports were raised.

5 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
Conducted Disturbance at Mains Terminals	150 kHz to 30 MHz, LISN, ±3.7 dB
Radiated Disturbance	30 MHz to 1 GHz, Bilog Antenna, ±5.2 dB 1 GHz to 40 GHz, Horn Antenna, ±6.3 dB

Table 39

Worst case error for both Time and Frequency measurement 12 parts in 10^6.

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.