FCC Test Report

Bioself Technology Limited
Vagus Nerve Stimulation Product, Model: Sensate

In accordance with FCC 47 CFR Part 15B

Prepared for: Bioself Technology Limited
21 Constable Close, Lawford, Manningtree,
Essex, CO11 2LD, UNITED KINGDOM

FCC ID: 2AS9ESEN231

COMMERCIAL-IN-CONFIDENCE

Document 75950095-01 Issue 01

SIGNATURE			
NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Andy Lawson	Senior Engineer	Authorised Signatory	11 February 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. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Graeme Lawler	11 February 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: 2019 for the tests detailed in section 1.3.

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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

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	11 February 2021

Table 1

1.2 Introduction

Applicant	Bioself Technology Limited
Manufacturer	Bioself Technology Limited
Model Number(s)	Sensate
Serial Number(s)	Not serialised (0075950095-TSR0001)
Hardware Version(s)	2.3.1
Software Version(s)	1.0
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 15B: 2019
Order Number Date	TUV001 23-September-2020
Date of Receipt of EUT	05-October-2020
Start of Test	06-December-2020
Finish of Test	06-December-2020
Name of Engineer(s)	Graeme Lawler
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 is shown below.

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

Table 2

1.4 Customer Supplied Form

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment including the technologies the product supports)*	Sensate is used for enhanced meditation to assist users in managing stress. It mechanically vibrates against the sternum of a user at mainly sub-audible frequencies of acoustic vibration under 150 Hz, playing back this sub-audible 'sound-track' from internal memory, in sync with audible soundtracks played back to the user from the Sensate app. The app runs on a selection of mobile devices (iOS and Android) and audio to sub-audio Synchronisation is managed via Bluetooth Low Energy communication to the Sensate device.
Manufacturer:	Bioself Technology Ltd
Model:	Sensate 2
Part Number:	n/a
Hardware Version:	2.3.1
Software Version:	1.0
FCC ID of the product under test – see guidance here	2AS9ESEN231
IC ID of the product under test – see guidance here	n/a

Intentional Radiators

Technology	Bluetooth Low Energy
Frequency Range (MHz to MHz)	2400 MHz - 2483.5 MHz
Conducted Declared Output Power (dBm)	0
Antenna Gain (dBi)	0
Supported Bandwidth(s) (MHz) (e.g. 1 MHz, 20 MHz, 40 MHz)	1 MHz
Modulation Scheme(s) (e.g. GFSK, QPSK etc)	GFSK
ITU Emission Designator (see guidance here)	1M12F1D
Bottom Frequency (MHz)	2402 MHz
Middle Frequency (MHz)	2442 MHz
Top Frequency (MHz)	2480 MHz

Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	2. 5 GHz max
Lowest frequency generated or used in the device or on which the device operates or tunes	> 30 MHz
~~Class A Digital Device (Use in commercial, industrial or business environment) ☐~~ Class B Digital Device (Use in residential environment only) ☐X	

AC Power Source

AC supply frequency:	50	Hz
Voltage	230	V
Max current:	<5	A
Single Phase ☐ Three Phase ☐		

DC Power Source

Nominal voltage:	5.0	V
Extreme upper voltage:	N/A	V
Extreme lower voltage:	N/A	V
Max current:	1	A

Battery Power Source

Voltage:	3.7 (Nominal) (4.2 Max)	V
End-point voltage:	3.1	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:	10.0	°C
Maximum temperature:	40.0	°C

Antenna Characteristics

Antenna connector ☐			State impedance	50	Ohm
Temporary antenna connector ☐			State impedance		Ohm
Integral antenna ☒	Type:	2450BM15A0002E	Gain	0	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: Ben Wynn
Position held: CTO
Date: 09/02/2021

1.5 Product Information

1.5.1 Technical Description

The equipment under test (EUT) was a Bioself, Sensate, Vagus Nerve Stimulation Product.

The EUT is used for enhanced meditation to assist users in managing stress. It mechanically vibrates against the sternum of a user at mainly sub-audible frequencies of acoustic vibration under 150 Hz, playing back this sub-audible ‘sound-track’ from internal memory, in sync with audible soundtracks played back to the user from the Sensate app. The app runs on a selection of mobile devices (iOS and Android) and audio to sub-audio Synchronisation is managed via Bluetooth Low Energy communication to the Sensate device.

1.5.2 EUT Port/Cable Identification

Port	Max Cable Length specified	Usage	Type	Screened
Configuration and Mode: Charging via AC/DC Adaptor - Idle				
AC Mains - Neutral	N/A – See Note	AC Power for the EUT	Neutral	No
AC Mains - Live	N/A – See Note	AC Power for the EUT	Live	No

Table 3

Note: N/A as the USB charger plugged directly into the socket.

1.5.3 Test Configuration

Configuration	Description
Charging via AC/DC Adaptor	The EUT was connected to a Samsung Travel Adapter Model EP-TA20UWE via a 1.0 metre long USB cable for charging. This charger was not supplied by the customer.

Table 4

1.5.4 Modes of Operation

Mode	Description
Idle	Communication was established via Bluetooth between the EUT and a Mobile Handset running the Sensate Application. This synchronises the playback of audio soundtracks on the Mobile Handset with Sub-Audio vibrations played back on the EUT.

Table 5

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
Model: Sensate, Serial Number: Not serialised (0075950095-TSR0001)			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 6

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 via AC/DC Adaptor - Idle		
Conducted Disturbance at Mains Terminals	Graeme Lawler	UKAS
Radiated Disturbance	Graeme Lawler	UKAS

Table 7

Office Address:

Octagon House
Concorde Way
Segensworth North
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, Clause 15.107

2.1.2 Equipment Under Test and Modification State

Sensate, S/N: Not serialised (0075950095-TSR0001) - Modification State 0

2.1.3 Date of Test

06-December-2020

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

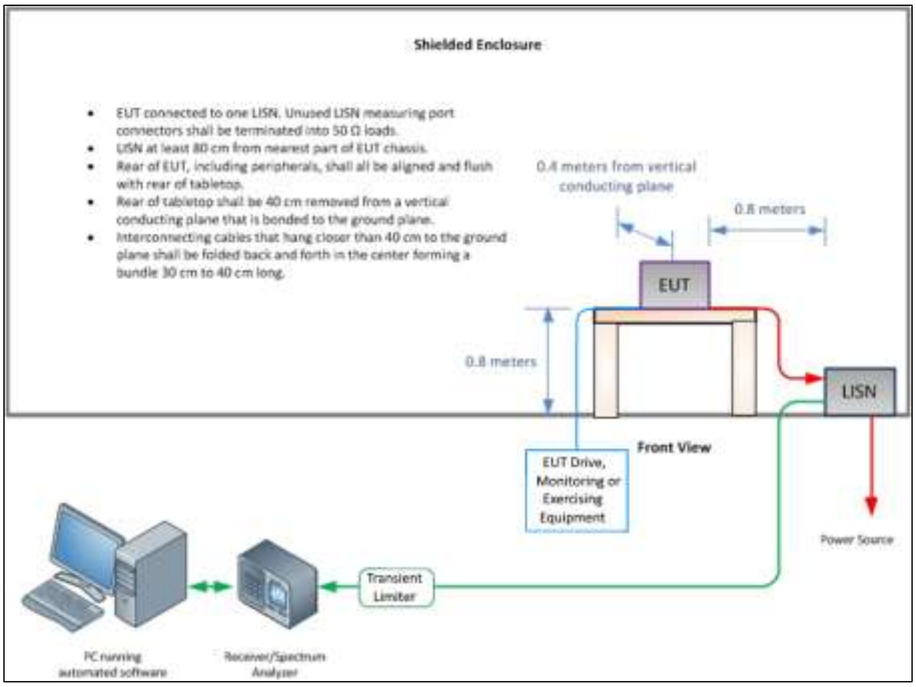

Figure 1 - Conducted Disturbance

2.1.7 Environmental Conditions

Ambient Temperature	18.3 °C
Relative Humidity	37.4 %

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 8

2.1.9 Test Results

Results for Configuration and Mode: Charging via AC/DC Adaptor - Idle

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.

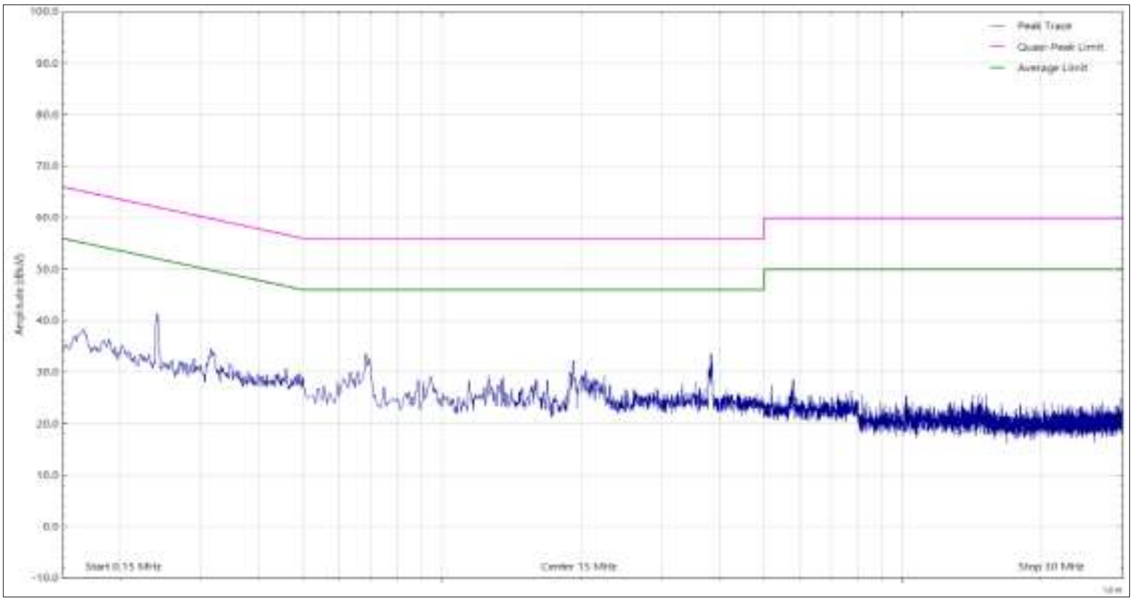

Figure 2 - Graphical Results - AC Mains - Neutral

Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Margin (dB)	CISPR Average Level (dBµV)	CISPR Average Limit (dBµV)	CISPR Average Margin (dB)
*						

Table 9

*No 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.

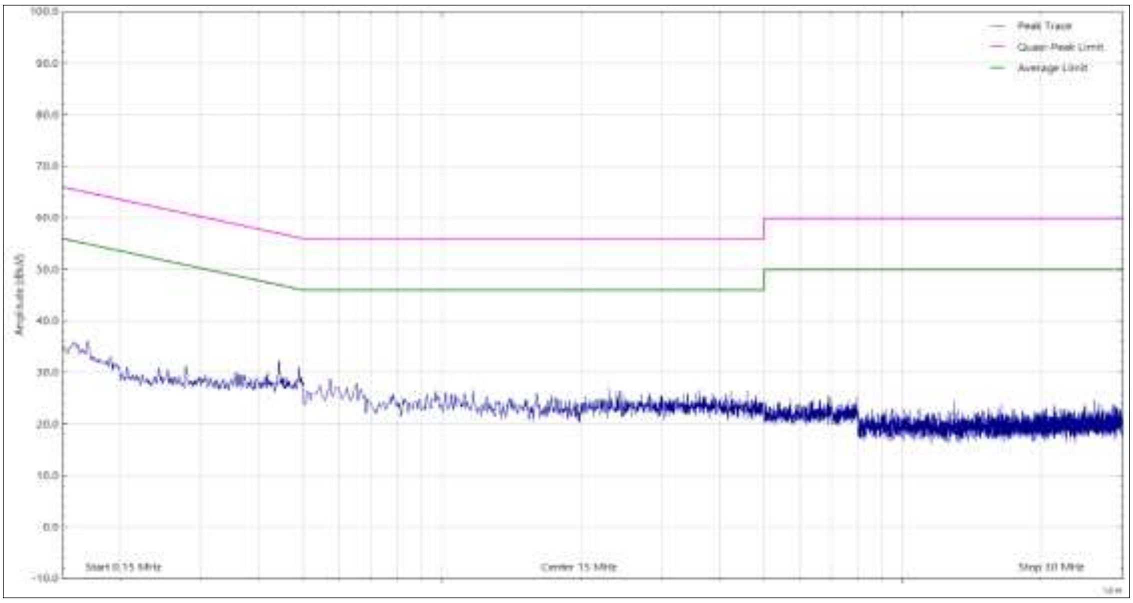

Figure 3 - Graphical Results - AC Mains - Live

Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Margin (dB)	CISPR Average Level (dBµV)	CISPR Average Limit (dBµV)	CISPR Average Margin (dB)
*						

Table 10

*No 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 4 - 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 Due
3m Semi Anechoic Chamber	MVG	EMC-3	5621	36	11-Aug-2023
EmX Emissions Software	TUV SUD	V2.0.1	5125	-	Software
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	03-Jan-2021
Transient Limiter	Hewlett Packard	11947A	2377	12	26-Feb-2021
Cable (18 GHz)	Rosenberger	LU7-071-2000	5106	12	09-Dec-2020
8m N Type Cable	Junkosha	MWX221-08000NMSNMS/B	5519	12	24-Mar-2021
N-Type to 2.92mm Cable	APC Technology	RFF24919	5443	12	10-Mar-2021
LISN	Rohde & Schwarz	ESH3-Z5	1390	12	27-Jan-2021
Termination (50ohm)	Diamond Antenna	DL-30N	5465	12	27-Feb-2021

Table 11

2.2 Radiated Disturbance

2.2.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.109

2.2.2 Equipment Under Test and Modification State

Sensate, S/N: Not serialised (0075950095-TSR0001) - Modification State 0

2.2.3 Date of Test

06-December-2020

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

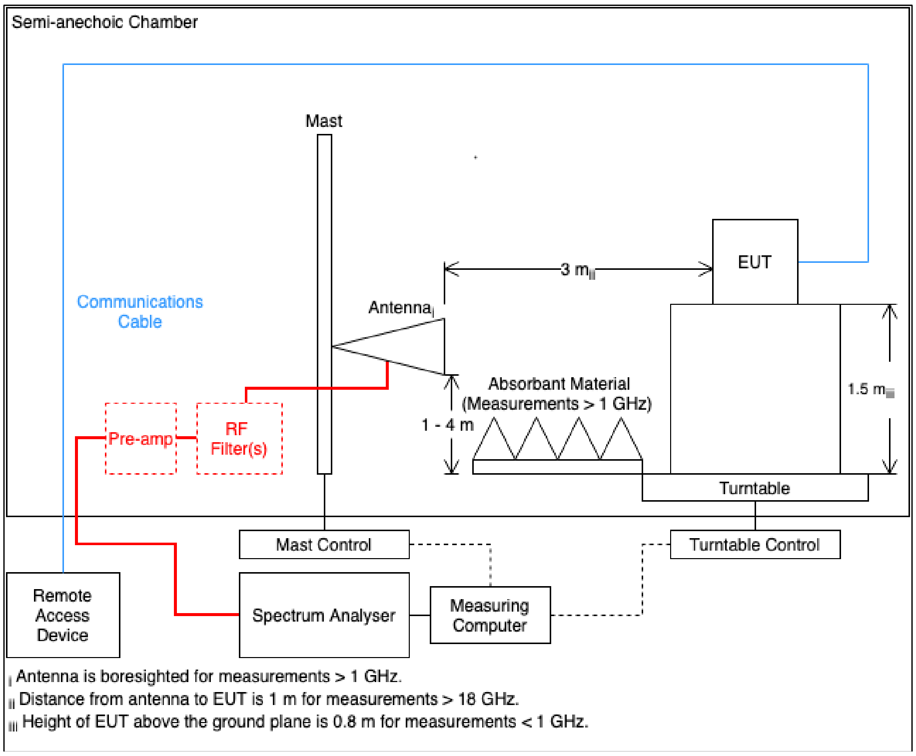

Figure 5

2.2.7 Environmental Conditions

Ambient Temperature 18.3 °C
Relative Humidity 37.4 %

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 12

2.2.9 Test Results

Results for Configuration and Mode: Charging via AC/DC Adaptor.

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: 2.5 GHz
Which necessitates an upper frequency test limit of: 13.00 GHz

The EUT was 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.

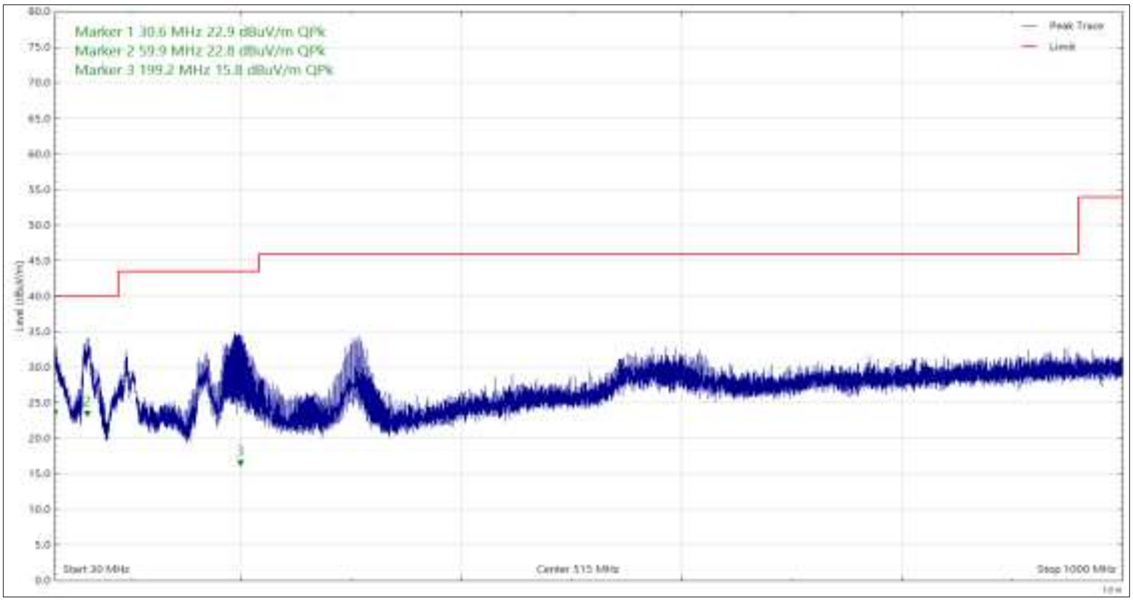

Figure 6 - 30 MHz to 1 GHz, Quasi-Peak, Vertical - X Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
30.623	22.9	40.0	-17.1	Q-Peak	10	272	Vertical	30.623
59.938	22.8	40.0	-17.2	Q-Peak	154	100	Vertical	59.938
199.200	15.8	43.5	-27.7	Q-Peak	104	102	Vertical	199.200

Table 13

No other 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.

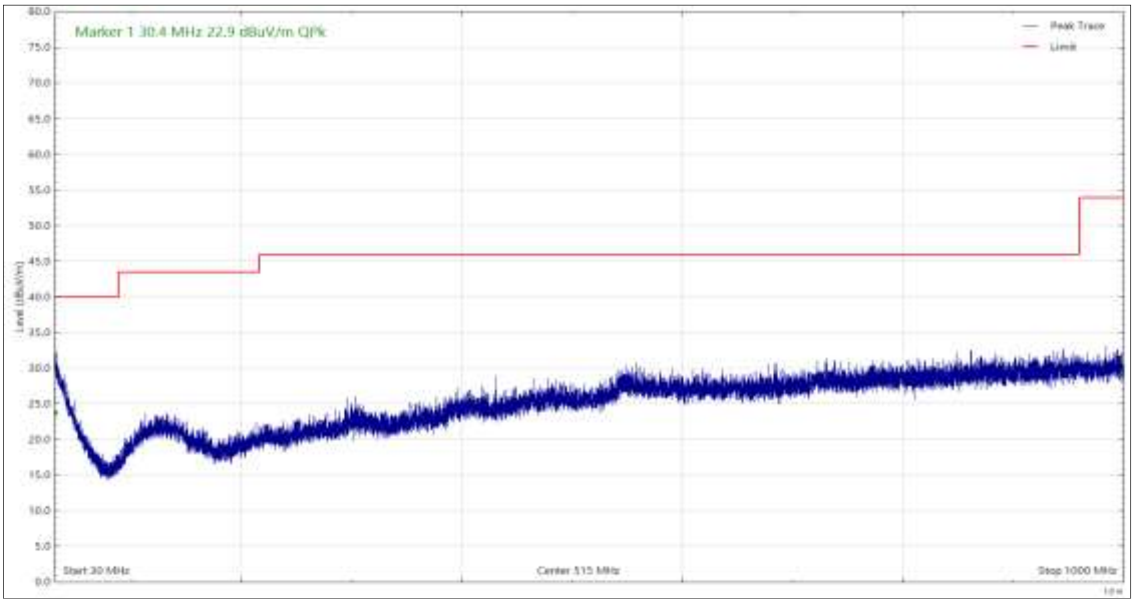

Figure 7 - 30 MHz to 1 GHz, Quasi-Peak, Horizontal - X Orientation

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
30.351	22.9	40.0	-17.1	Q-Peak	350	219	Horizontal

Table 14

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.

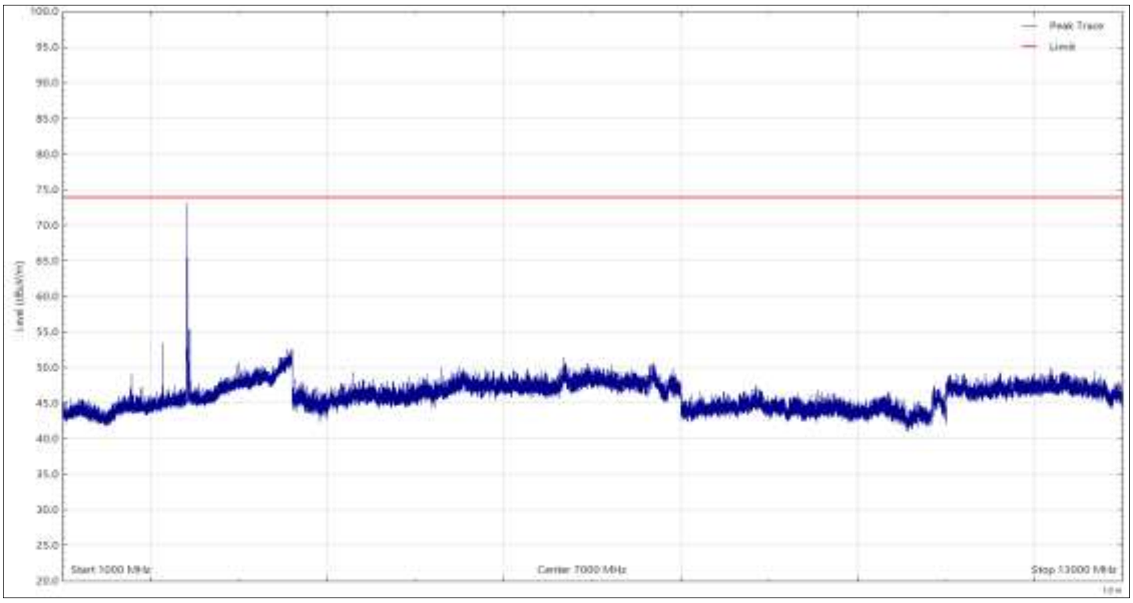

Figure 8 - 1 GHz to 13 GHz, Peak, Vertical - X Orientation

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

Table 15

*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.

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

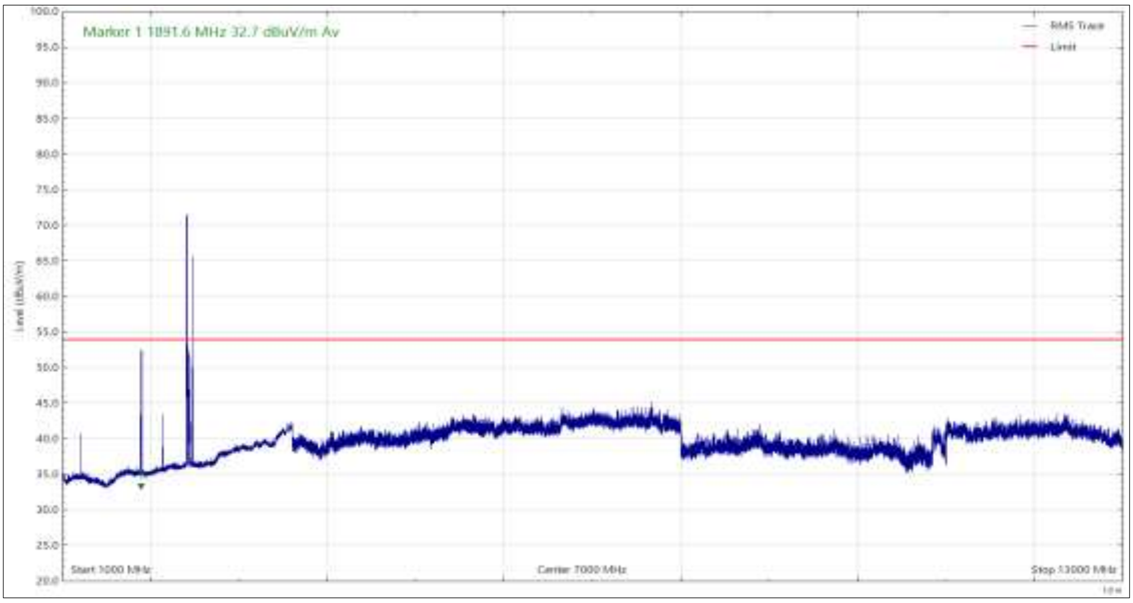

Figure 9 - 1 GHz to 13 GHz, CISPR Average, Vertical - X Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
1891.615	32.7	54.0	-21.3	CISPR Avg	358	383	Vertical	1891.615

Table 16

No other 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.

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

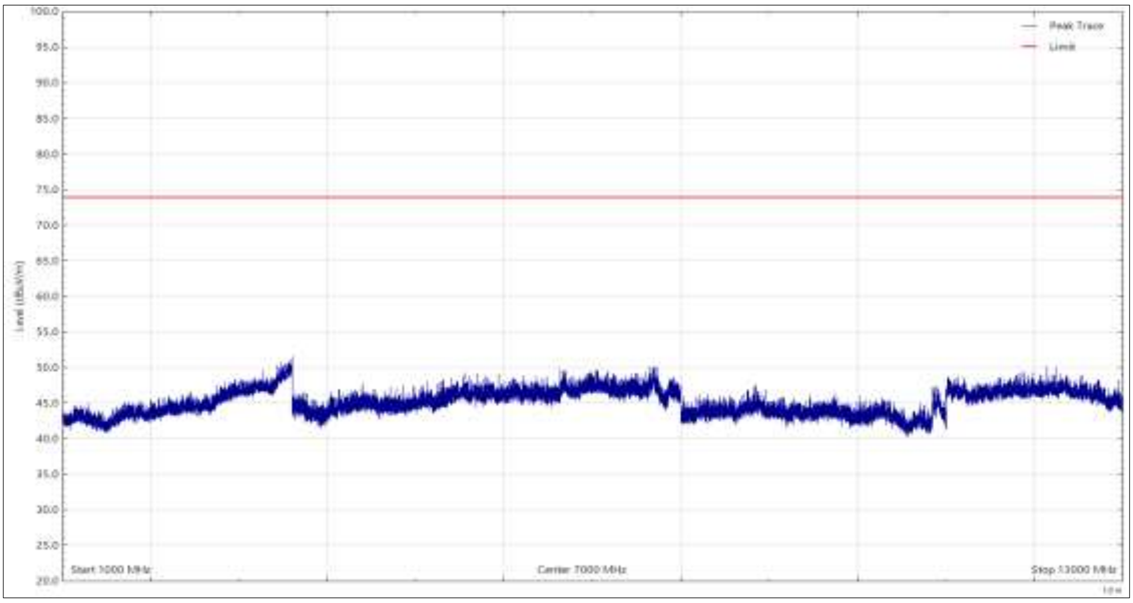

Figure 10 - 1 GHz to 13 GHz, Peak, Horizontal - X Orientation

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

Table 17

*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.

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

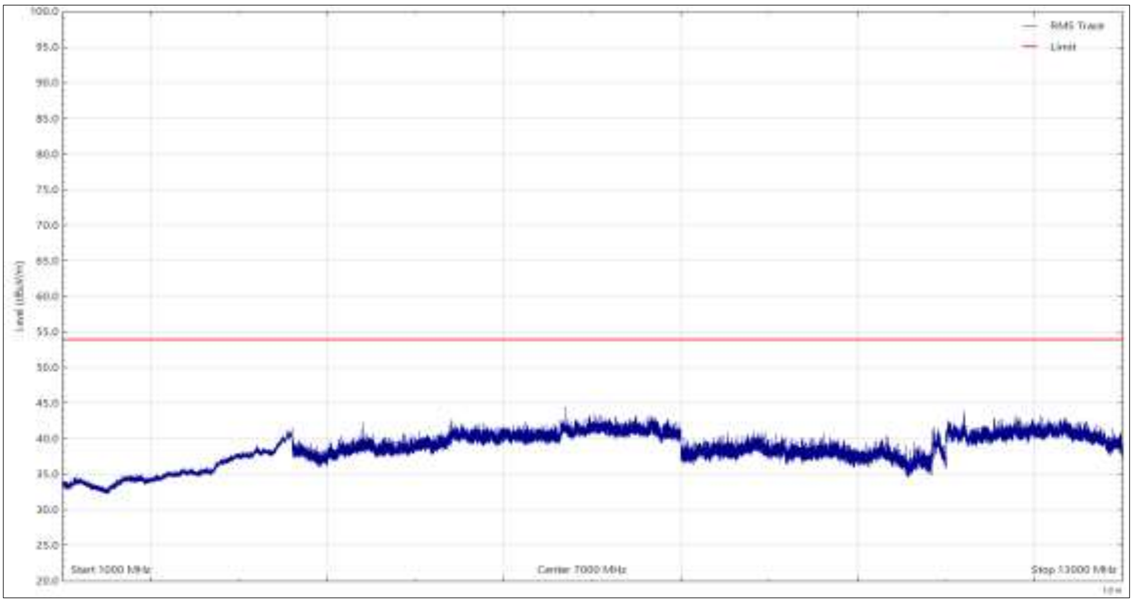

Figure 11 - 1 GHz to 13 GHz, CISPR Average, Horizontal - X Orientation

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

Table 18

*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.

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

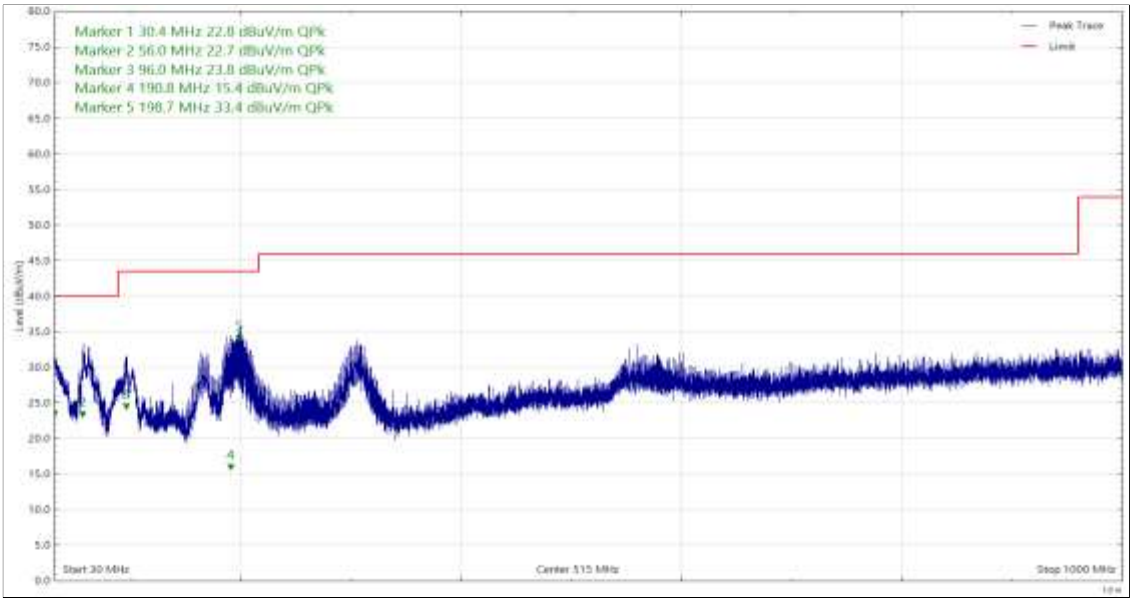

Figure 12 - 30 MHz to 1 GHz, Quasi-Peak, Vertical - Y Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
30.447	22.8	40.0	-17.2	Q-Peak	150	123	Vertical	30.447
56.028	22.7	40.0	-17.3	Q-Peak	221	129	Vertical	56.028
95.970	23.8	43.5	-19.7	Q-Peak	89	100	Vertical	95.970
190.797	15.4	43.5	-28.2	Q-Peak	127	100	Vertical	190.797
198.660	33.4	43.5	-10.1	Q-Peak	306	100	Vertical	198.660

Table 19

No other 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.

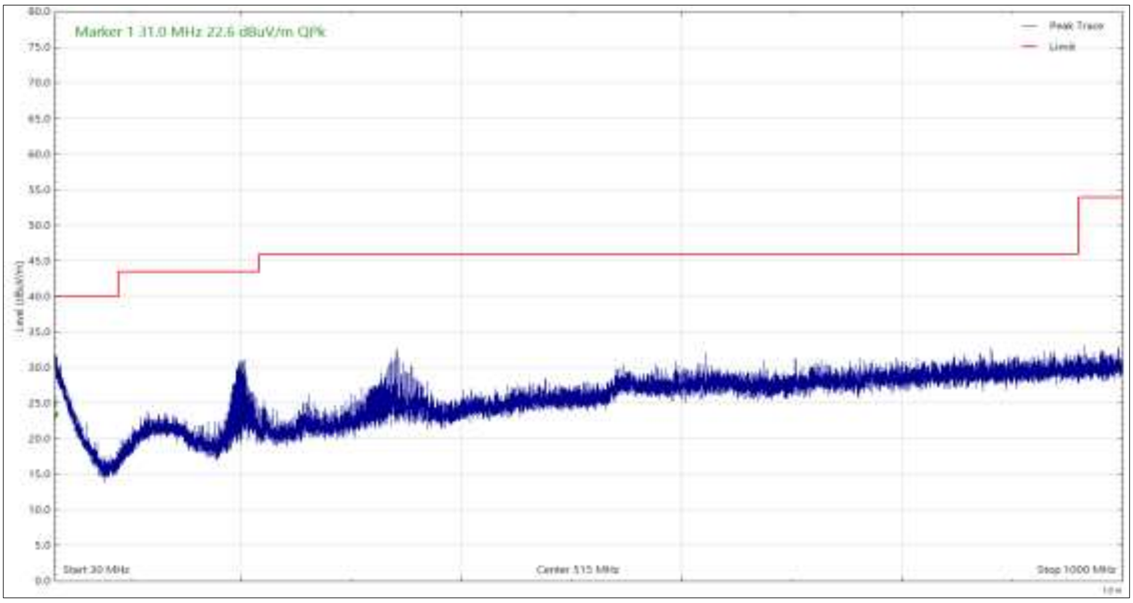

Figure 13 - 30 MHz to 1 GHz, Quasi-Peak, Horizontal - Y Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
30.979	22.6	40.0	-17.4	Q-Peak	2	250	Horizontal	30.979

Table 20

No other 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.

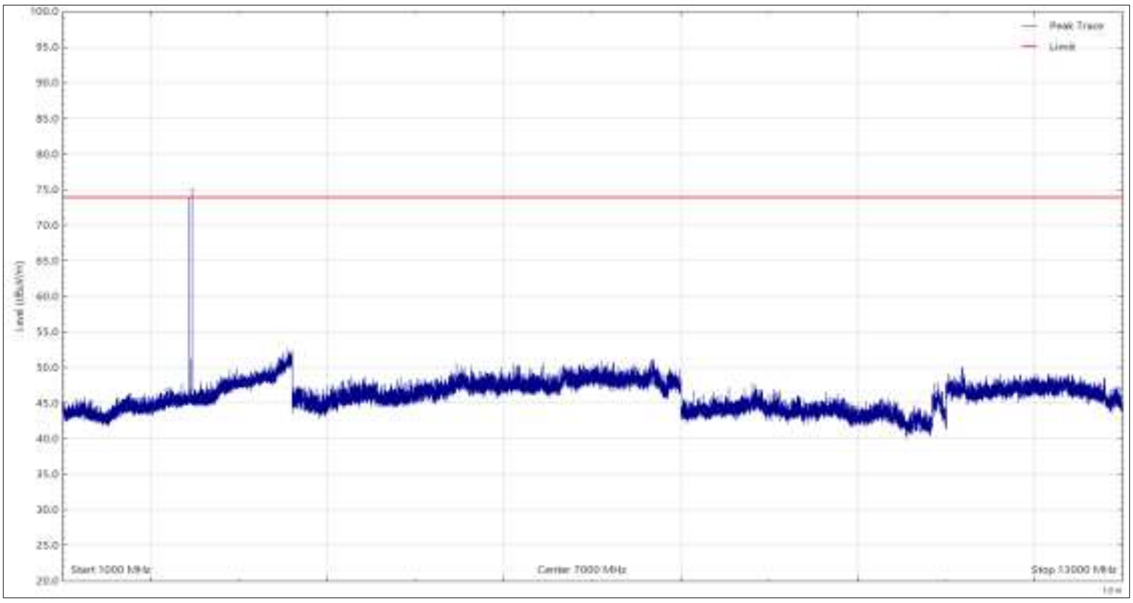

Figure 14 - 1 GHz to 13 GHz, Peak, Vertical - Y Orientation

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

Table 21

*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.

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

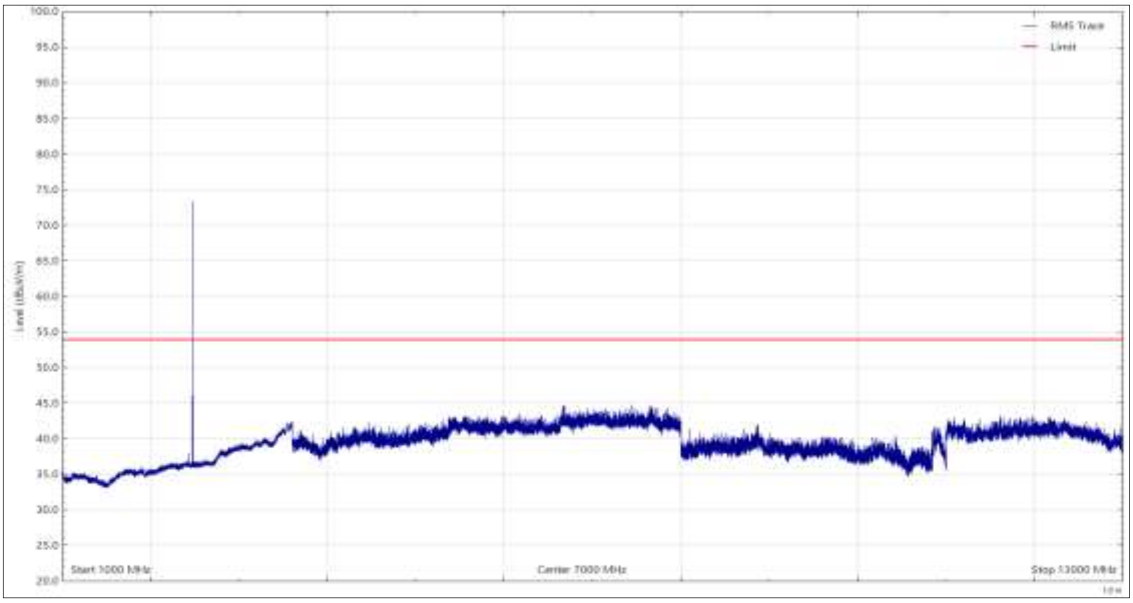

Figure 15 - 1 GHz to 13 GHz, CISPR Average, Vertical - Y Orientation

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

Table 22

*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.

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

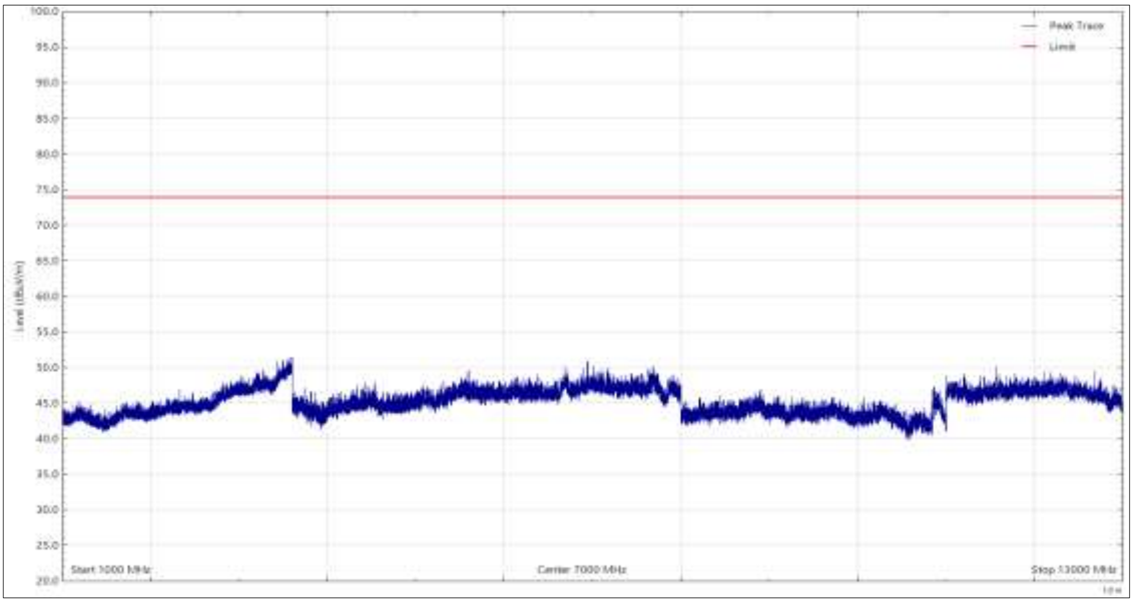

Figure 16 - 1 GHz to 13 GHz, Peak, Horizontal - Y Orientation

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

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.

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

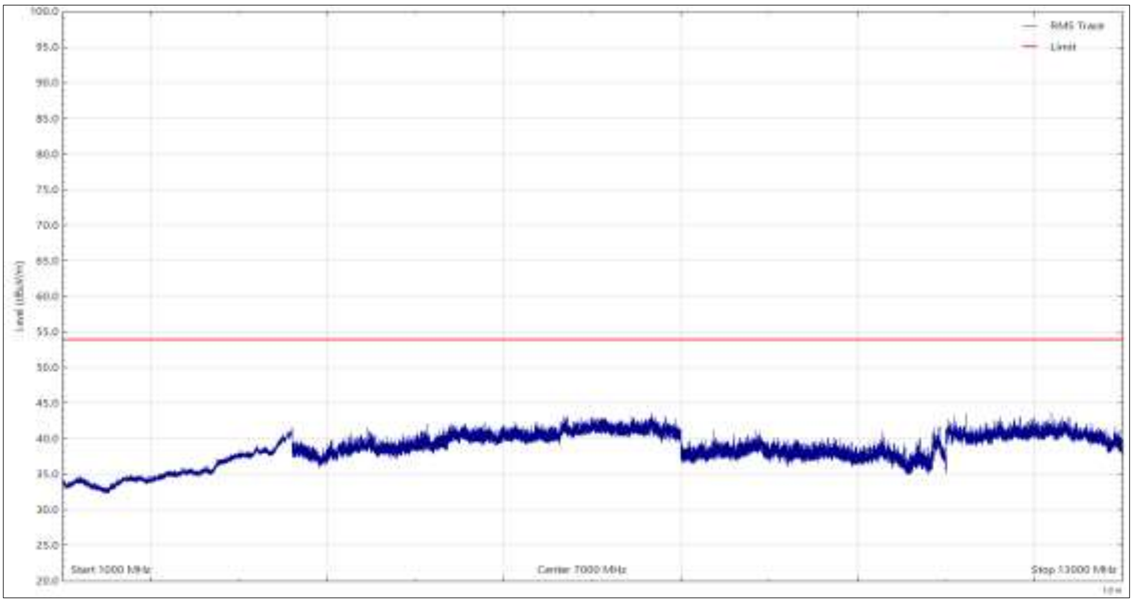

Figure 17 - 1 GHz to 13 GHz, CISPR Average, Horizontal - Y Orientation

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

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.

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

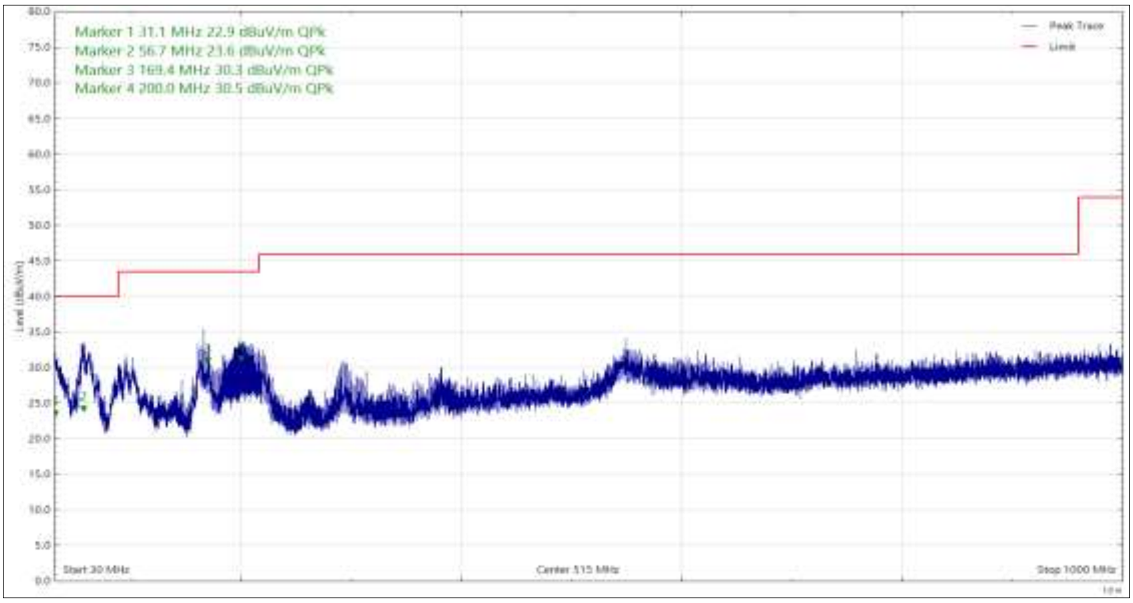

Figure 18 - 30 MHz to 1 GHz, Quasi-Peak, Vertical - Z Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
31.097	22.9	40.0	-17.1	Q-Peak	244	293	Vertical	31.097
56.665	23.6	40.0	-16.5	Q-Peak	358	100	Vertical	56.665
169.361	30.3	43.5	-13.2	Q-Peak	323	100	Vertical	169.361
200.030	30.5	43.5	-13.0	Q-Peak	16	101	Vertical	200.030

Table 25

No other 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.

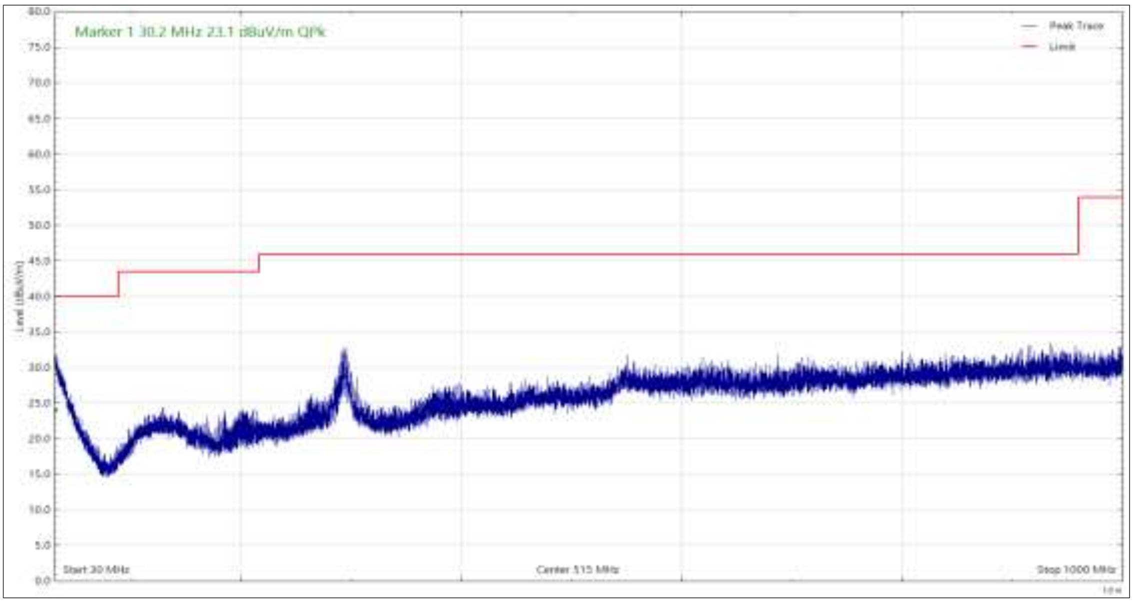

Figure 19 - 30 MHz to 1 GHz, Quasi-Peak, Horizontal - Z Orientation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
30.154	23.1	40.0	-16.9	Q-Peak	54	100	Horizontal	30.154

Table 26

No other 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.

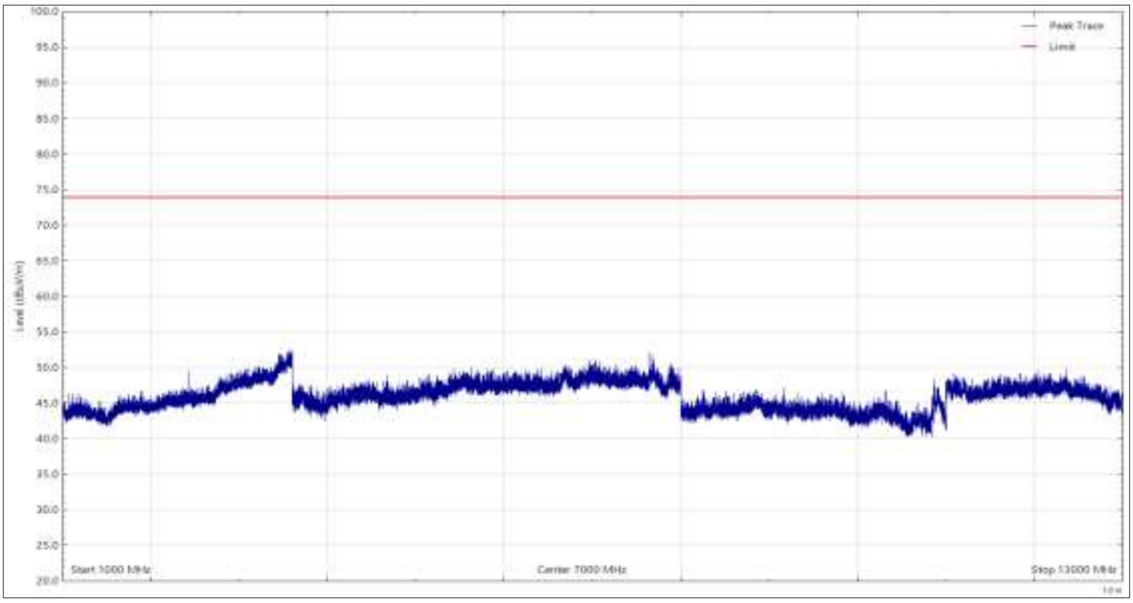

Figure 20 - 1 GHz to 13 GHz, Peak, Vertical - Z Orientation

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

Table 27

*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.

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

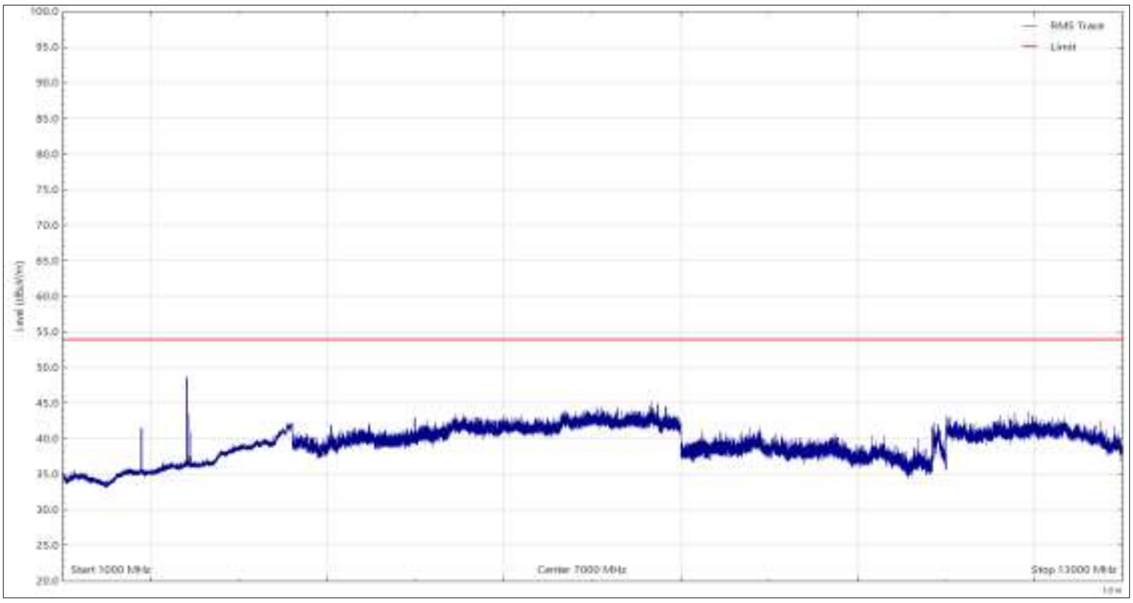

Figure 21 - 1 GHz to 13 GHz, CISPR Average, Vertical - Z Orientation

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

Table 28

*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.

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

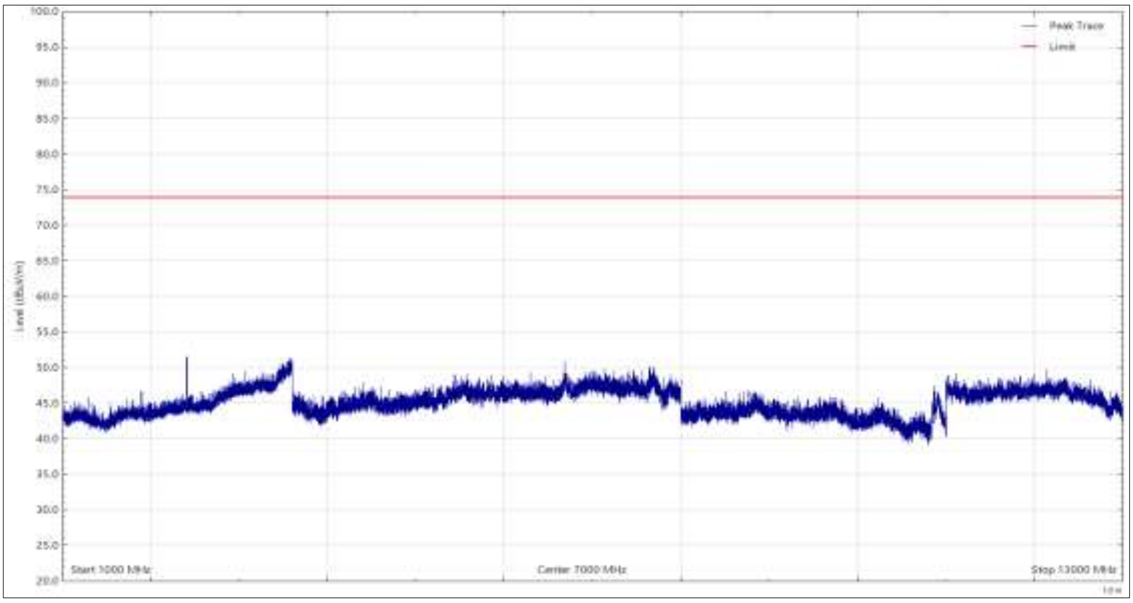

Figure 22 - 1 GHz to 13 GHz, Peak, Horizontal - Z Orientation

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

Table 29

*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.

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

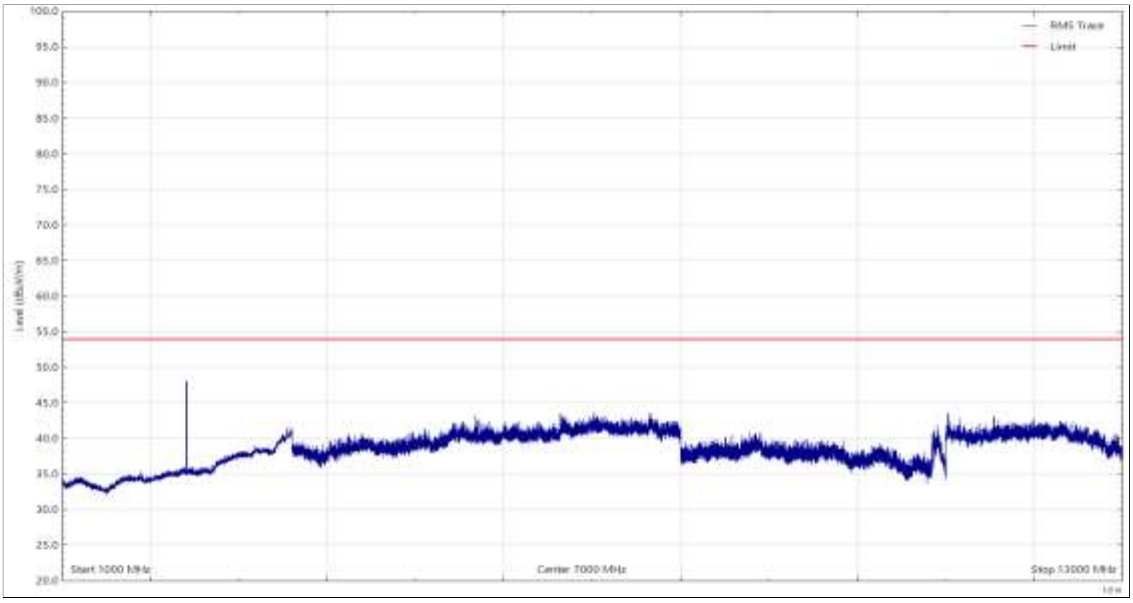

Figure 23 - 1 GHz to 13 GHz, CISPR Average, Horizontal - Z Orientation

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

Table 30

*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.

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

Figure 24 - Test Setup - 30 MHz to 1 GHz - X Orientation

Figure 25 - Test Setup - 30 MHz to 1 GHz - Y Orientation

Figure 26 - Test Setup - 30 MHz to 1 GHz - Z Orientation

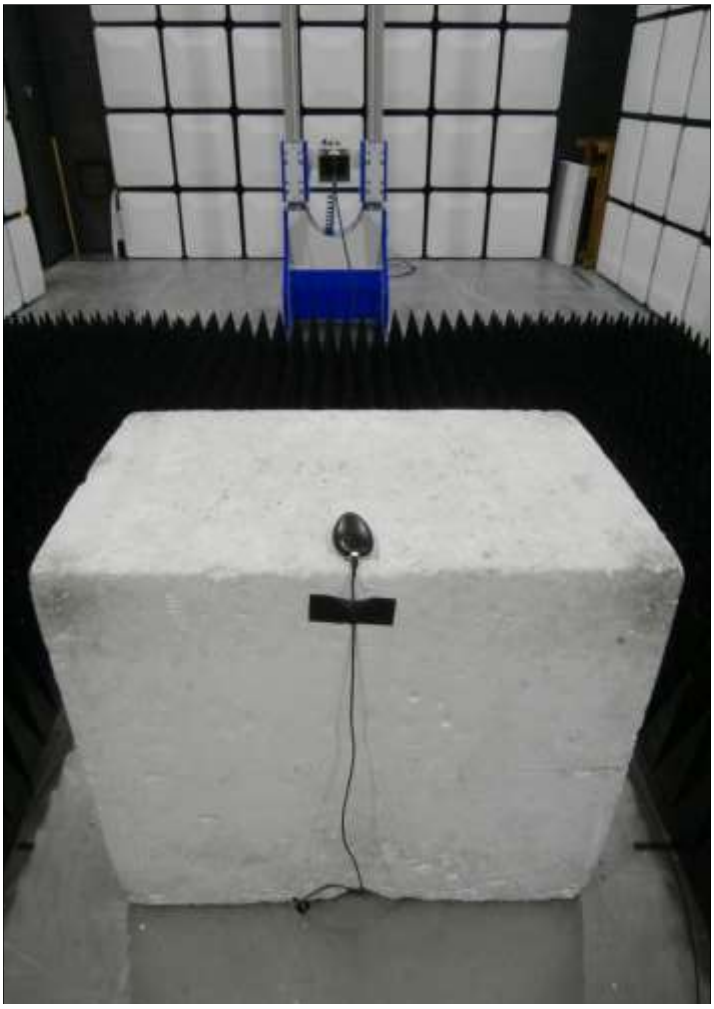

Figure 27 - Test Setup - 1 GHz to 13 GHz - X Orientation

Figure 28 - Test Setup - 1 GHz to 13 GHz - Y Orientation

Figure 29 - Test Setup - 1 GHz to 13 GHz - Z Orientation

2.2.10 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
3m Semi Anechoic Chamber	MVG	EMC-3	5621	36	11-Aug-2023
EmX Emissions Software	TUV SUD	V2.0.1	5125	-	Software
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	03-Jan-2021
Cable (18 GHz)	Rosenberger	LU7-071-2000	5106	12	09-Dec-2020
1m -SMA Cable	Junkosha	MWX221-01000AMSAMS/A	5515	12	01-Apr-2021
8m N Type Cable	Junkosha	MWX221-08000NMSNMS/B	5519	12	24-Mar-2021
Pre-Amplifier	Phase One	PS04-0086	1533	12	04-Feb-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
DRG Horn Antenna (7.5-18GHz)	Schwarzbeck	HWRD750	5610	12	22-Sep-2021

Table 31

TU – Traceability Unscheduled

3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Multimeter	Iso-tech	IDM101	2424	12	12-Dec-2020
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5481	12	18-Mar-2021

Table 32

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 33

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

<u>Measurement Uncertainty Decision Rule</u>

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.