FCC and ISED Test Report

Sensium Healthcare Ltd.
Vitals Patch, Model: Vitals Patch US

In accordance with FCC 47 CFR Part 15B and ISED RSS-GEN (Short Range Device)

Add value.
Inspire trust.

Prepared for: Sensium Healthcare Ltd.
115 Olympic Avenue
Building 3
Milton Park
Abingdon
Oxfordshire
OX14 4SA
UNITED KINGDOM

FCC ID: AEJSH202165 IC: 27456-SH202165

COMMERCIAL-IN-CONFIDENCE

Document 75952927-01 Issue 01

SIGNATURE			
AJ Lawson.			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Andy Lawson	Senior Engineer	Authorised Signatory	26 August 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 ISED RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Graeme Lawler	26 August 2021	G. Lawler.

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: 2020 and ISEDC RSS-GEN: Issue 5 and A1 (2019-03) for the tests detailed in section 1.3.

TÜV SÜD
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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	26 August 2021

Table 1

1.2 Introduction

Applicant	Sensium Healthcare Ltd.
Manufacturer	Sensium Healthcare Ltd.
Model Number(s)	Vitals Patch US
Serial Number(s)	HEX ID: 39 7F 8C 68 91 A4
Hardware Version(s)	SH202165-US Issue A
Software Version(s)	PAT_US_915MHz_64K_P_CUS1_FW1-0-6
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 15B: 2020 ISED RSS-GEN: Issue 5 and A1 (2019-03)
Order Number Date	5813 23-July-2021
Date of Receipt of EUT	28-July-2021
Start of Test	27-July-2021
Finish of Test	28-July-2021
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 and ISED RSS-GEN is shown below.

Section	Specification Clause		Test Description	Result	Comments/Base Standard
	Part 15B	RSS-GEN			
Configuration and Mode: Battery Powered - Idle Mode					
2.1	15.109	7.1	Radiated Disturbance	Pass	ANSI C63.4: 2014

Table 2

1.4 Application Form

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment including the technologies the product supports)*	The SH202165 SensiumVitals Patch is a disposable device which is worn on the body and measures heart rate, respiratory rate, axillary temperature, posture and activity every 2 minutes and transmits this via its 902 MHz – 928 MHz SRD link.
Manufacturer:	Sensium Healthcare Ltd.
Model:	Vitals Patch US
Part Number:	SH202165-US
Hardware Version:	SH202165-US Issue A
Software Version:	PAT_US_915MHz_64K_P_CUS1_FW1-0-6
FCC ID of the product under test – see guidance here	AEJSH202165
IC ID of the product under test – see guidance here	27456-SH202165

Intentional Radiators

Technology	Proprietary
Frequency Range (MHz to MHz)	902-928 MHz
Conducted Declared Output Power (dBm)	-4 dBm
Antenna Gain (dBi)	0.45
Supported Bandwidth(s) (MHz) (e.g. 1 MHz, 20 MHz, 40 MHz)	120 kHz
Modulation Scheme(s) (e.g. GFSK, QPSK etc)	FSK
ITU Emission Designator (see guidance here) (not mandatory for Part 15 devices)	120KFD
Bottom Frequency (MHz)	902.2 MHz
Middle Frequency (MHz)	915 MHz
Top Frequency (MHz)	927.8 MHz

Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	927.8 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	
Class A Digital Device (Use in commercial, industrial or business environment) ☒ Class B Digital Device (Use in residential environment only) ☐	

Battery Power Source

Voltage:	3.6	V
End-point voltage:	2.3	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:	15	°C
Maximum temperature:	40	°C

Cable Loss

Adapter Cable Loss (Conducted sample)	N/A	dB

Antenna Characteristics

Antenna connector ☐			State impedance		Ohm
Temporary antenna connector ☐			State impedance		Ohm
Integral antenna ☒	Type:	Printed Flex antenna	Gain	0.45	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: Paul Dodds
Position held: RF Compliance Engineer
Date: 29 July 2021

1.5 Product Information

1.5.1 Technical Description

The SH202165 SensiumVitals Patch is a disposable device which is worn on the body and measures heart rate, respiratory rate, axillary temperature, posture and activity every 2 minutes and transmits this via its 902 MHz – 928 MHz SRD link.

1.5.2 Test Configuration

Configuration	Description
Battery Powered	The EUT was powered by its internal battery and no cables attached.

Table 3

1.5.3 Modes of Operation

Mode	Description
Idle Mode	The transmitter was set to idle and all other internal processes were operating.

Table 4

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: Vitals Patch US, Serial Number: HEX ID: 39 7F 8C 68 91 A4			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 5

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: Battery Powered - Idle Mode		
Radiated Disturbance	Graeme Lawler	UKAS

Table 6

Office Address:

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

2 Test Details

2.1 Radiated Disturbance

2.1.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.109
ISED RSS-GEN, Clause 7.1

2.1.2 Equipment Under Test and Modification State

Vitals Patch US, S/N: HEX ID: 39 7F 8C 68 91 A4 - Modification State 0

2.1.3 Date of Test

27-July-2021 to 28-July-2021

2.1.4 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.

2.1.5 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)

2.1.6 Example Test Setup Diagram

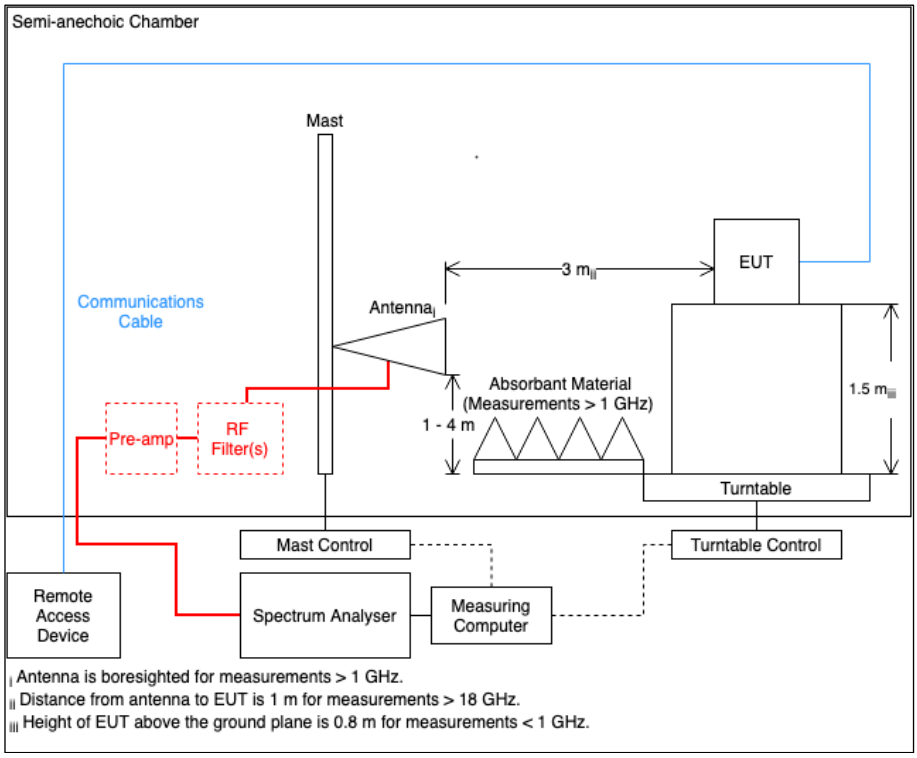

Figure 1

2.1.7 Environmental Conditions

Ambient Temperature	20.4 - 20.7 °C
Relative Humidity	68.1 - 72.9 %

2.1.8 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 7

2.1.9 Test Results

Results for Configuration and Mode: Battery Powered - Idle Mode.

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: 927.8 MHz
Which necessitates an upper frequency test limit of: 5 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.

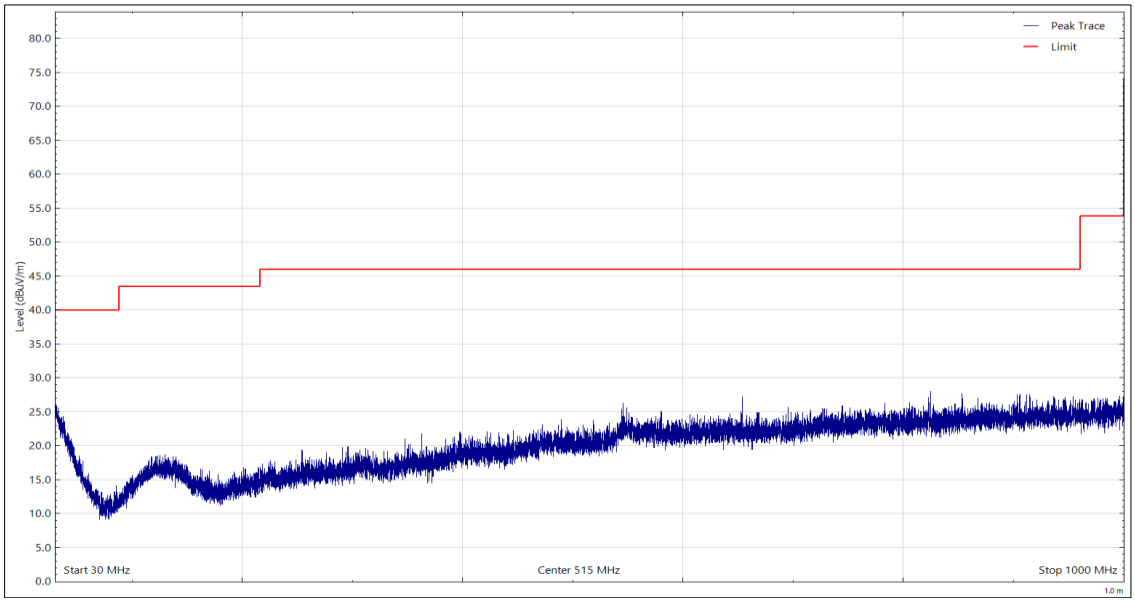

Figure 2 - 30 MHz to 1 GHz, Quasi-Peak, Vertical - X Orientation

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

Table 8

*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.

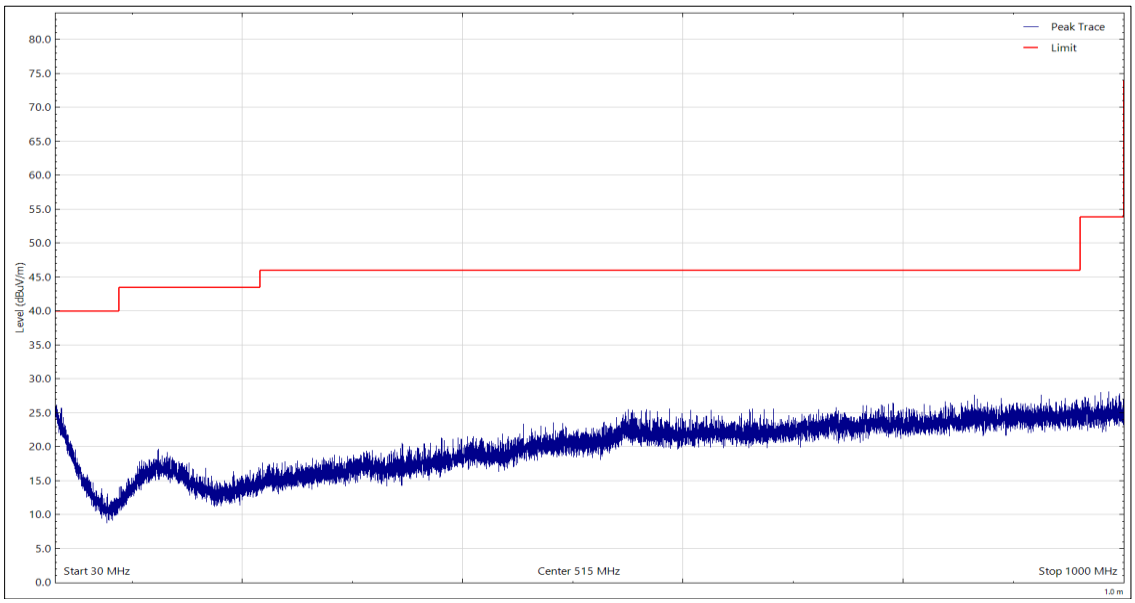

Figure 3 - 30 MHz to 1 GHz, Quasi-Peak, Horizontal - X Orientation

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

Table 9

*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.

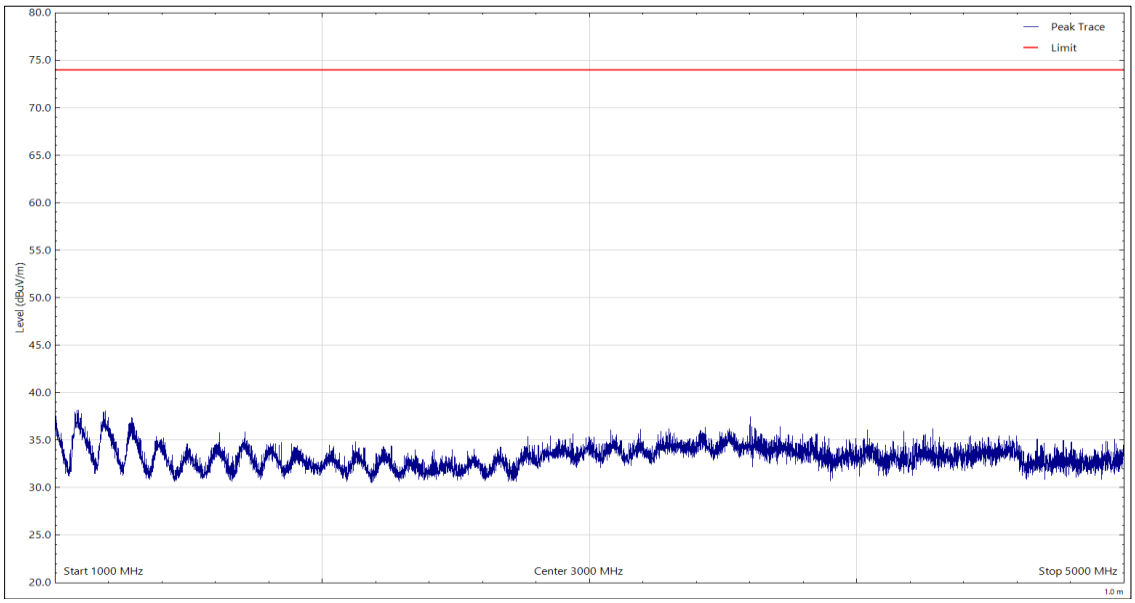

Figure 4 - 1 GHz to 5 GHz, Peak, Vertical - X Orientation

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

Table 10

*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.

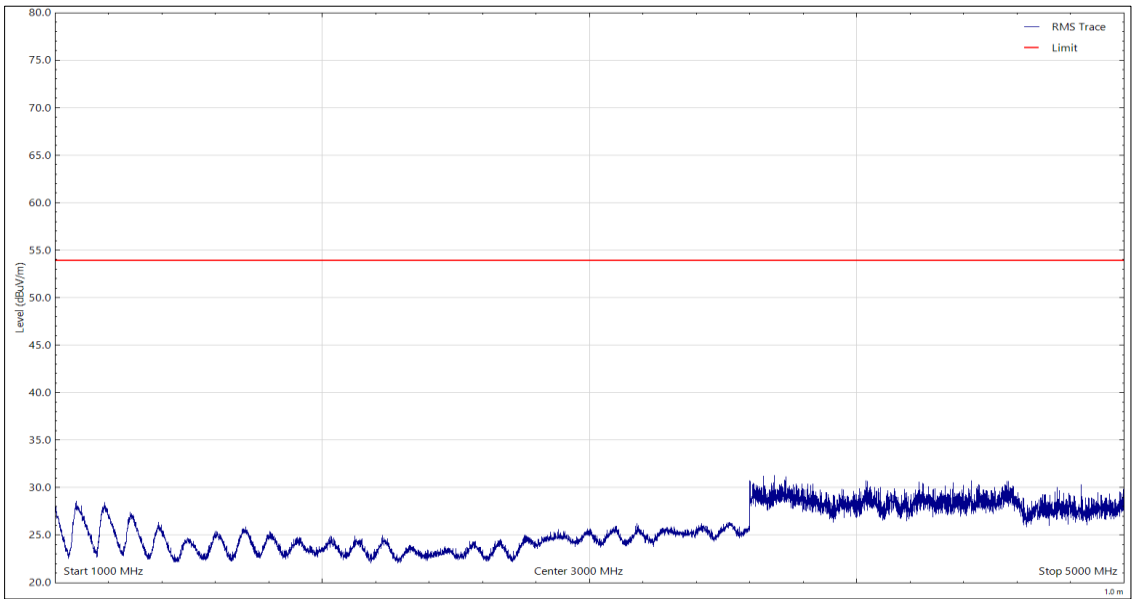

Figure 5 - 1 GHz to 5 GHz, CISPR Average, Vertical - X Orientation

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

Table 11

*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.

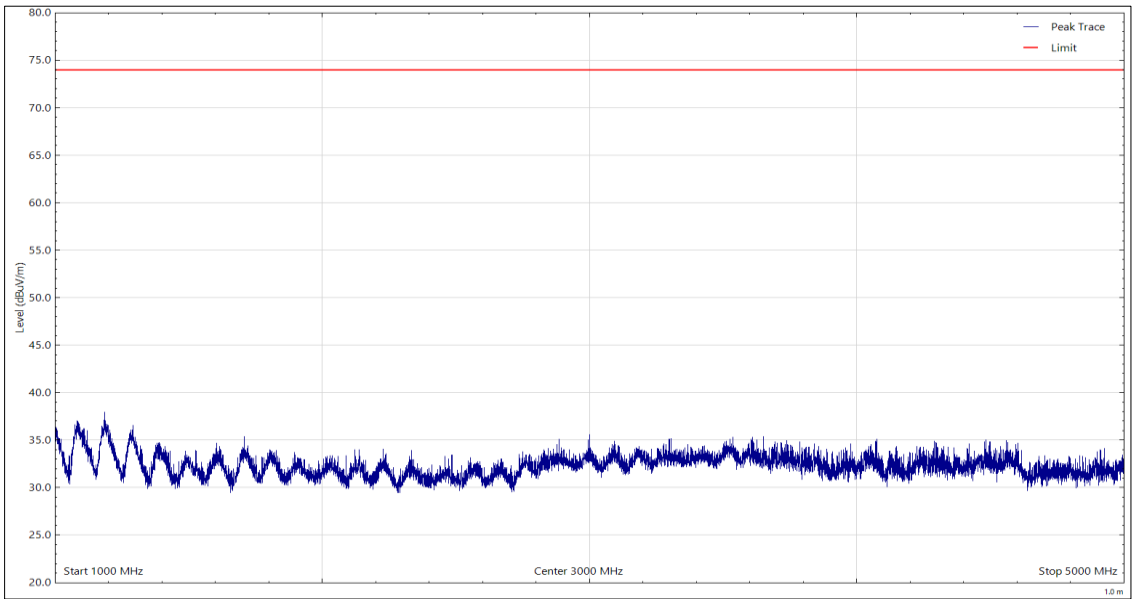

Figure 6 - 1 GHz to 5 GHz, Peak, Horizontal - X Orientation

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

Table 12

*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.

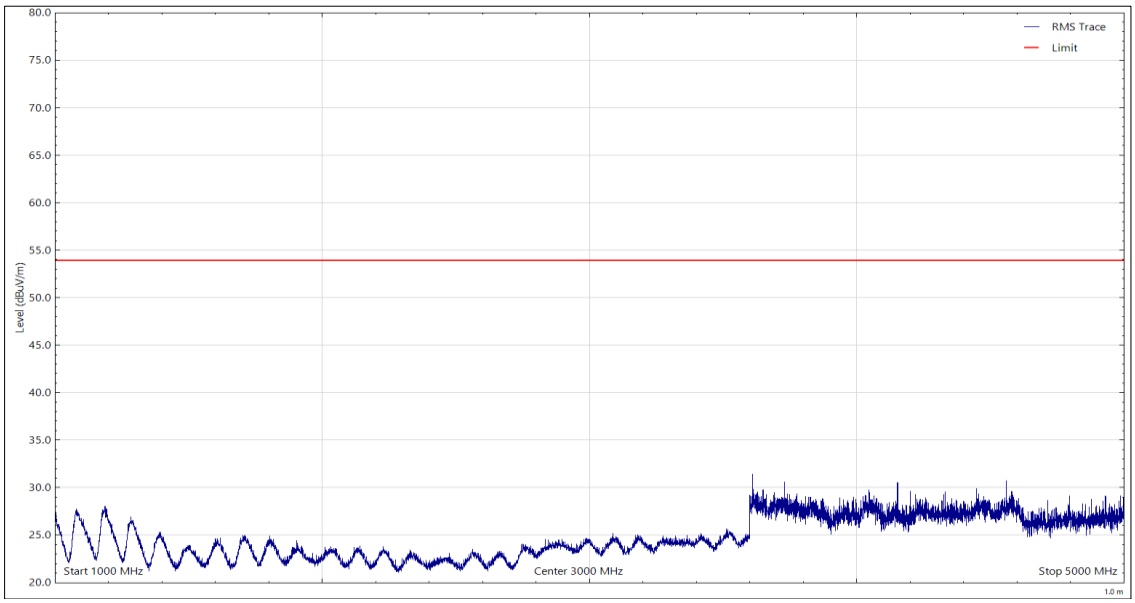

Figure 7 - 1 GHz to 5 GHz, CISPR Average, Horizontal - X Orientation

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

Table 13

*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.

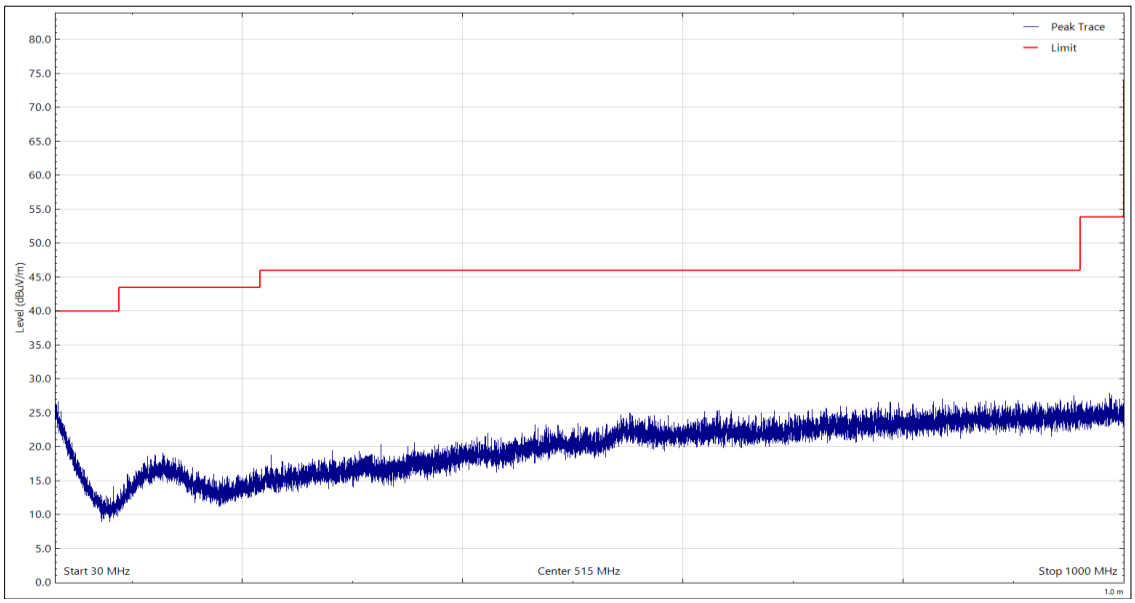

Figure 8 - 30 MHz to 1 GHz, Quasi-Peak, Vertical - Y Orientation

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

Table 14

*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.

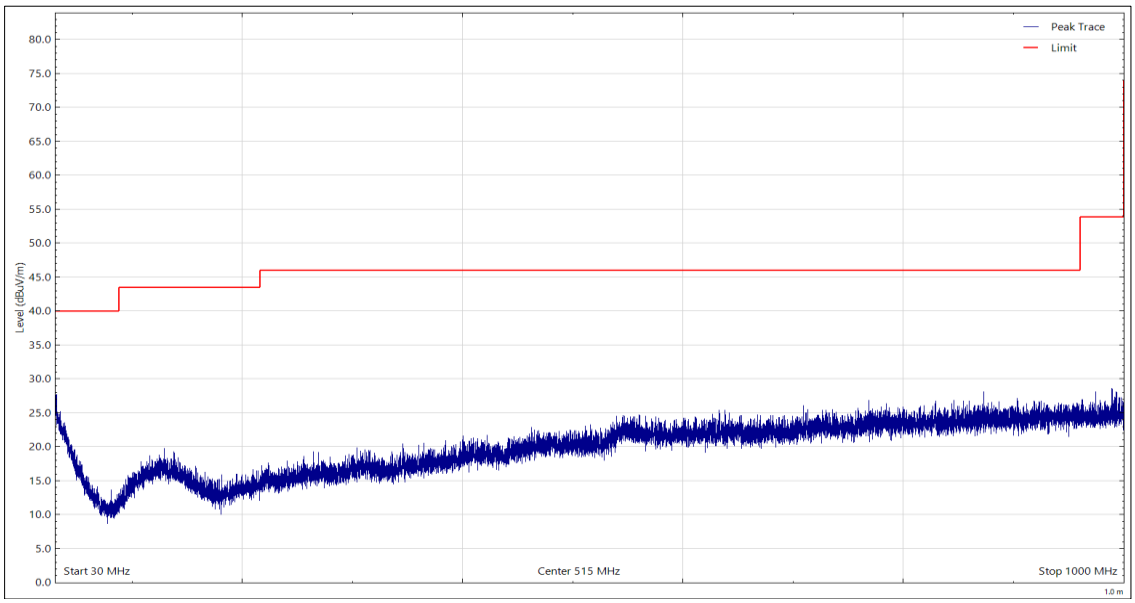

Figure 9 - 30 MHz to 1 GHz, Quasi-Peak, Horizontal - Y Orientation

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

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.

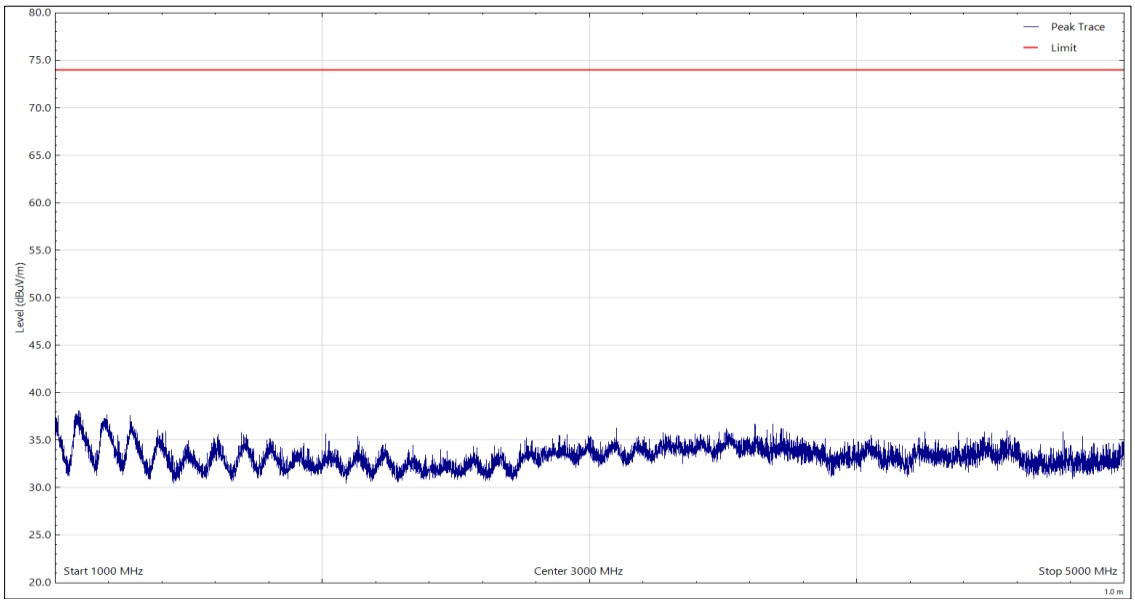

Figure 10 - 1 GHz to 5 GHz, Peak, Vertical - Y Orientation

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

Table 16

*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.

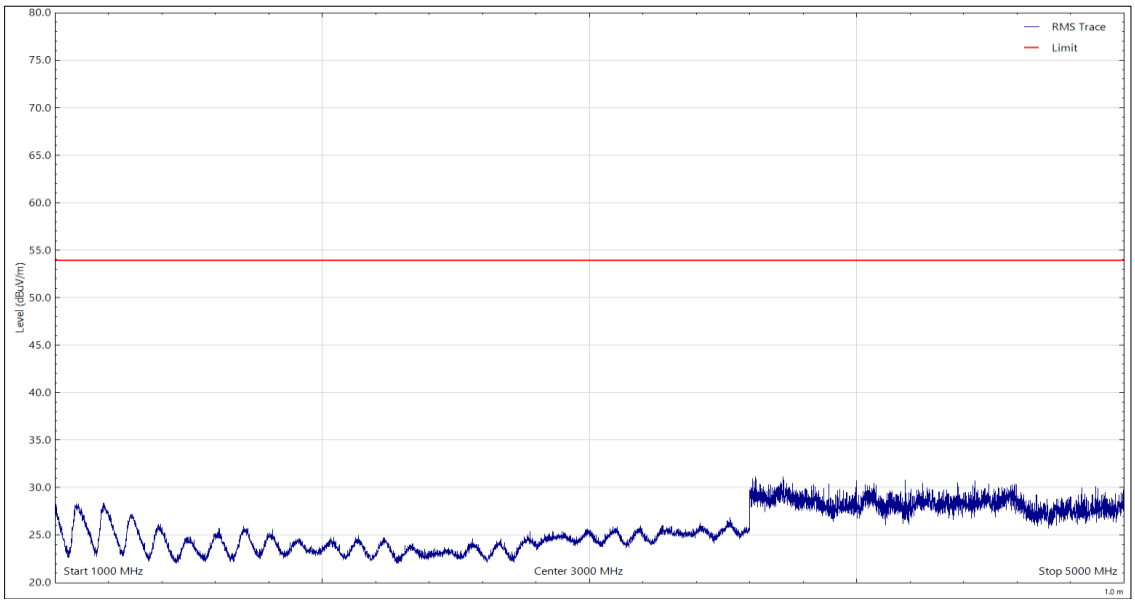

Figure 11 - 1 GHz to 5 GHz, CISPR Average, Vertical - Y Orientation

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

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.

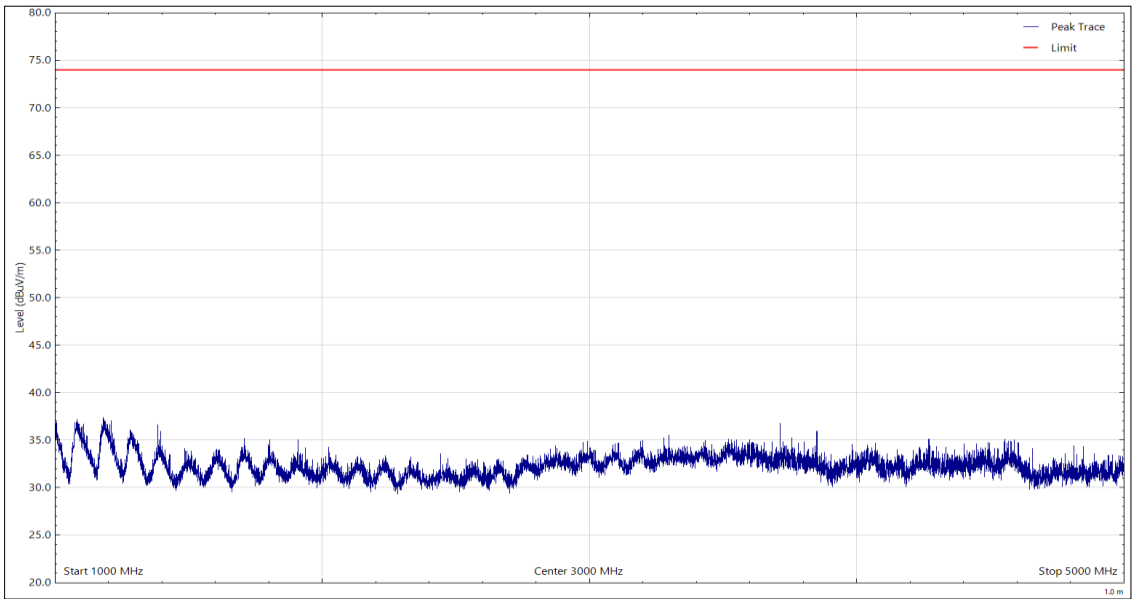

Figure 12 - 1 GHz to 5 GHz, Peak, Horizontal - Y Orientation

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

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.

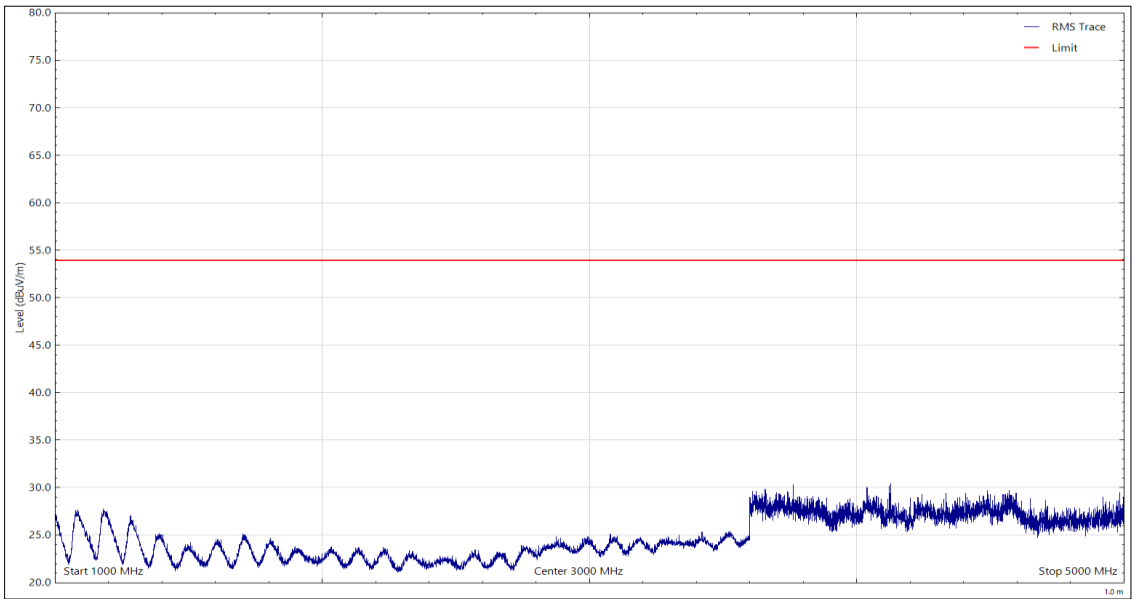

Figure 13 - 1 GHz to 5 GHz, CISPR Average, Horizontal - Y Orientation

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

Table 19

*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.

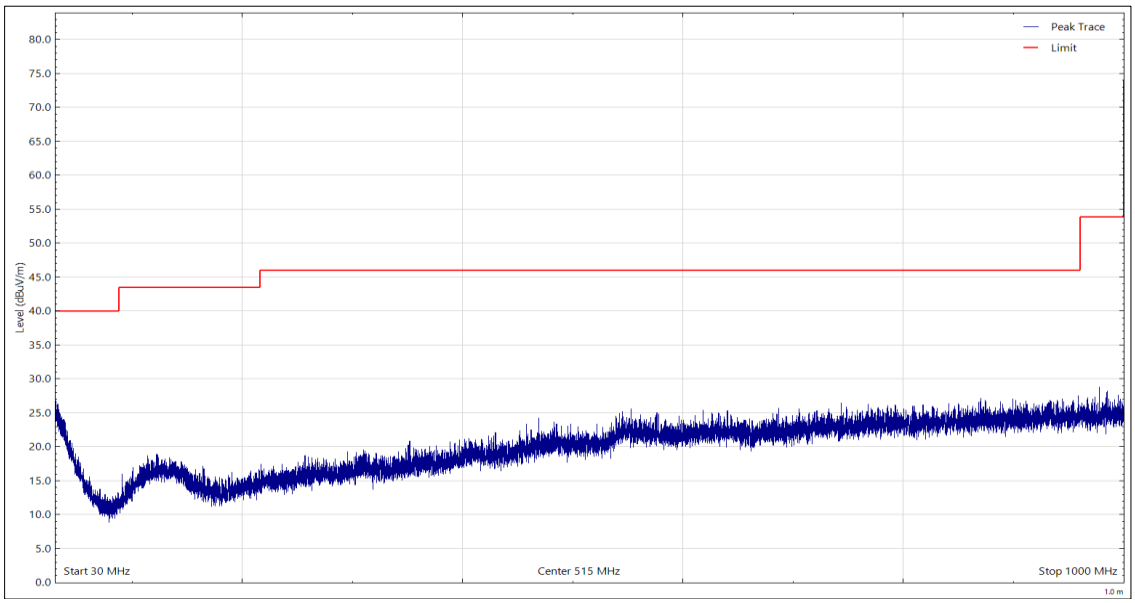

Figure 14 - 30 MHz to 1 GHz, Quasi-Peak, Vertical - Z Orientation

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

Table 20

*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.

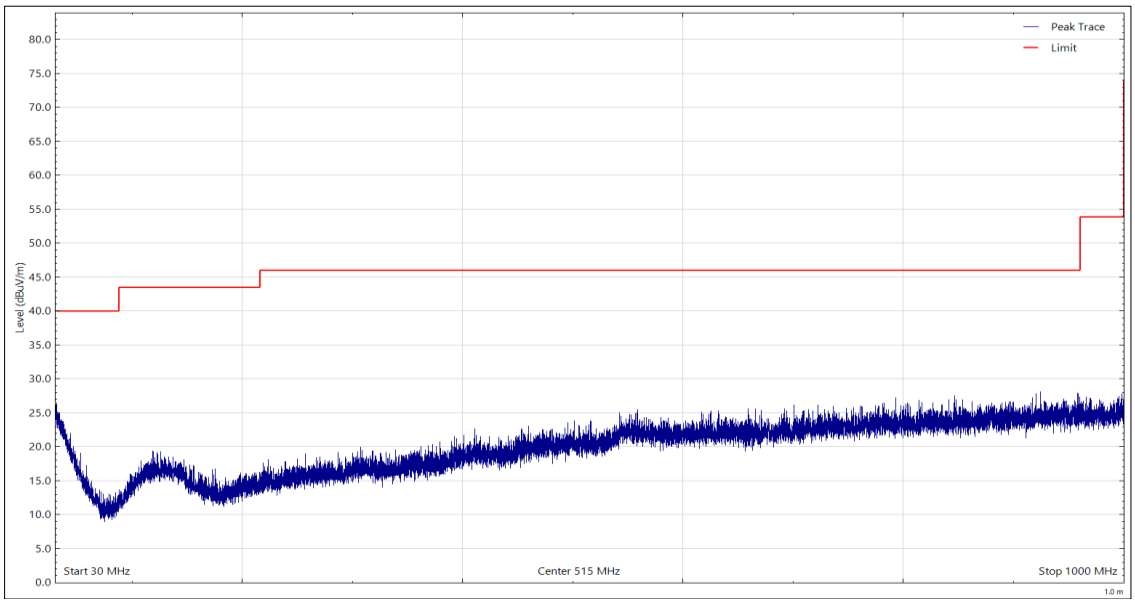

Figure 15 - 30 MHz to 1 GHz, Quasi-Peak, Horizontal - Z Orientation

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

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.

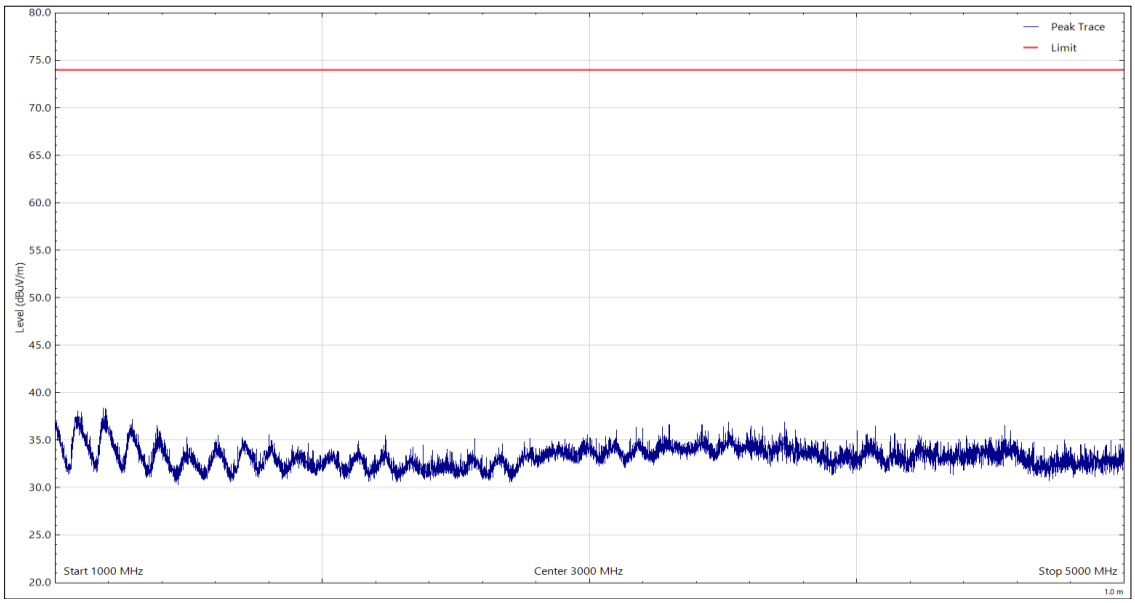

Figure 16 - 1 GHz to 5 GHz, Peak, Vertical - Z Orientation

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

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.

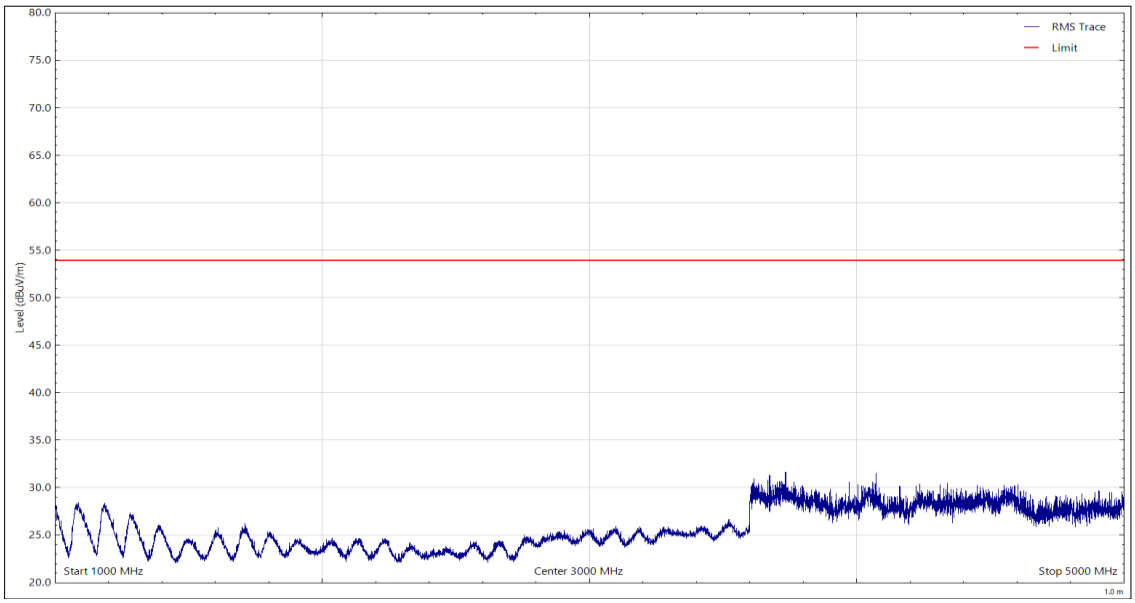

Figure 17 - 1 GHz to 5 GHz, CISPR Average, Vertical - Z Orientation

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/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.

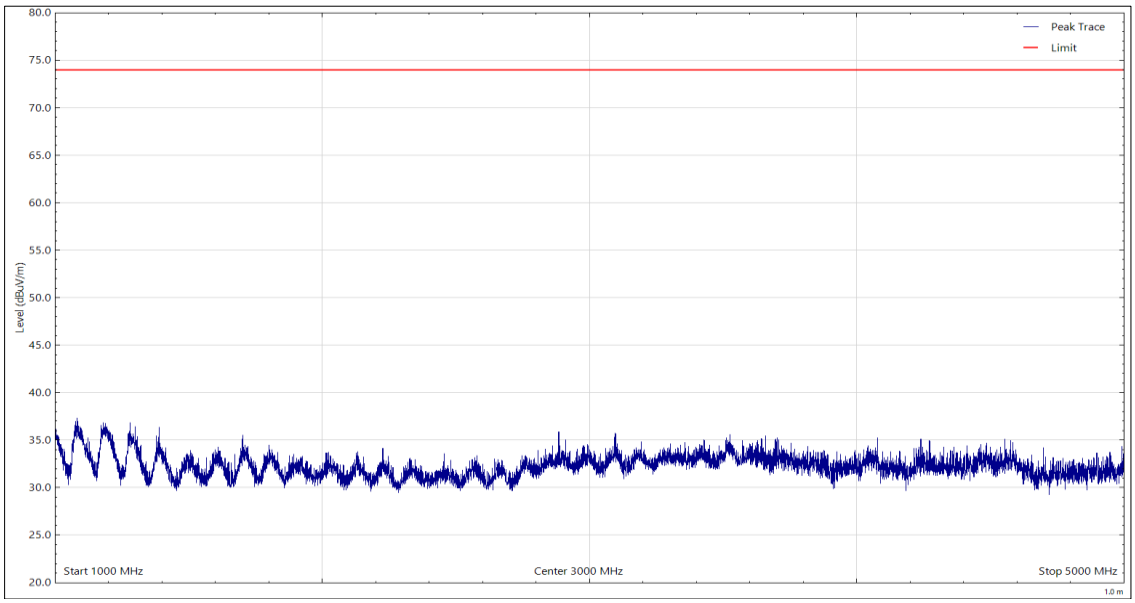

Figure 18 - 1 GHz to 5 GHz, Peak, Horizontal - Z Orientation

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/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.

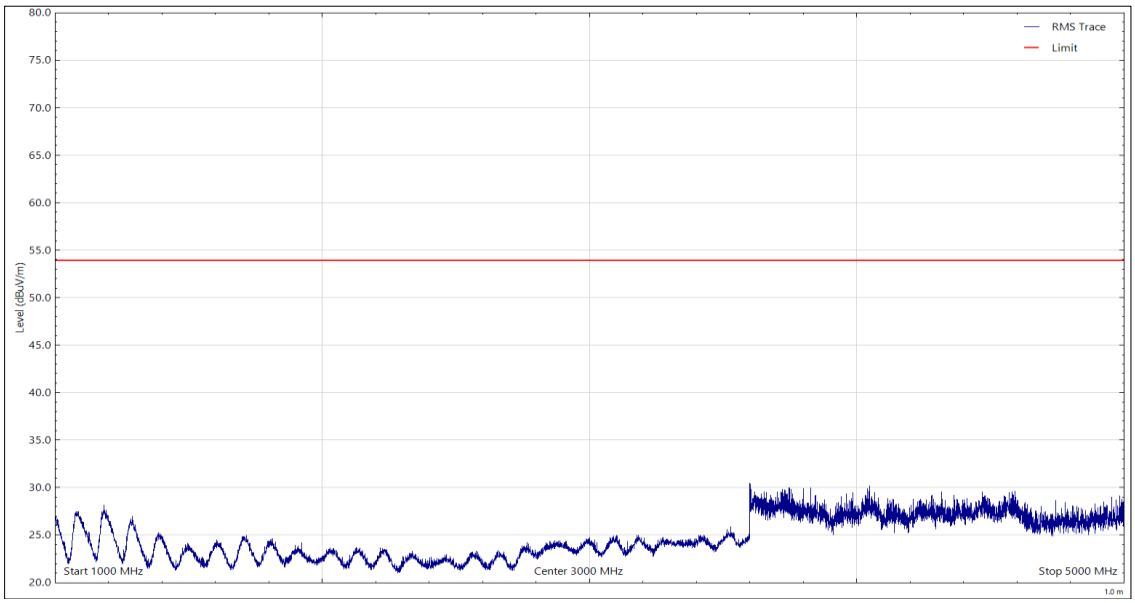

Figure 19 - 1 GHz to 5 GHz, CISPR Average, Horizontal - Z Orientation

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

Table 25

*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 - Test Setup - 30 MHz to 1 GHz - X Orientation

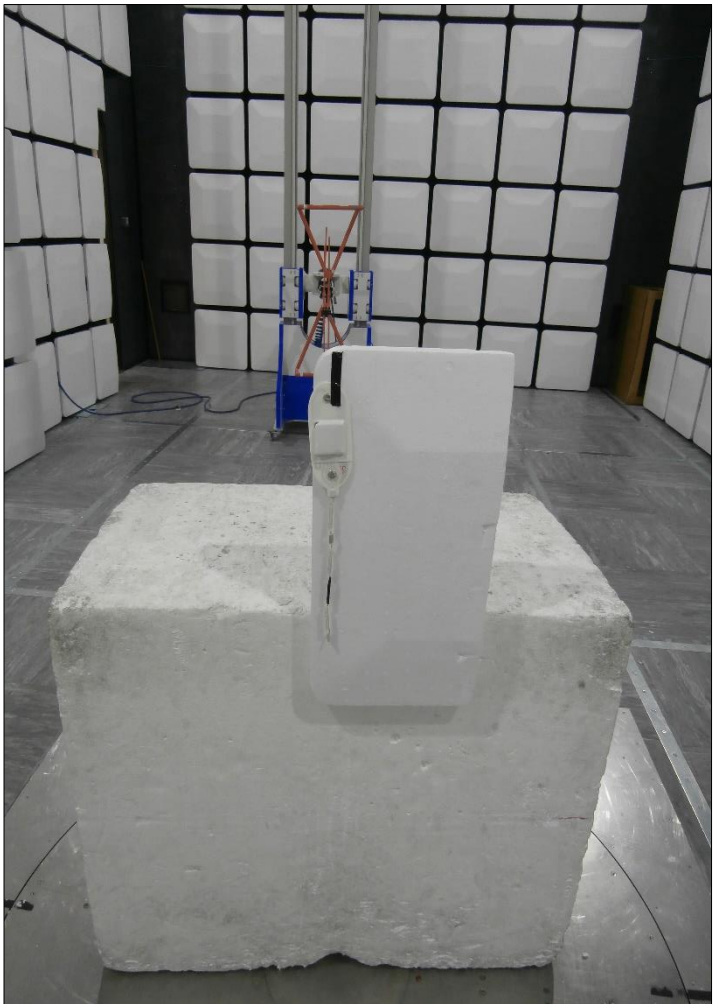

Figure 21 - Test Setup - 30 MHz to 1 GHz - Y Orientation

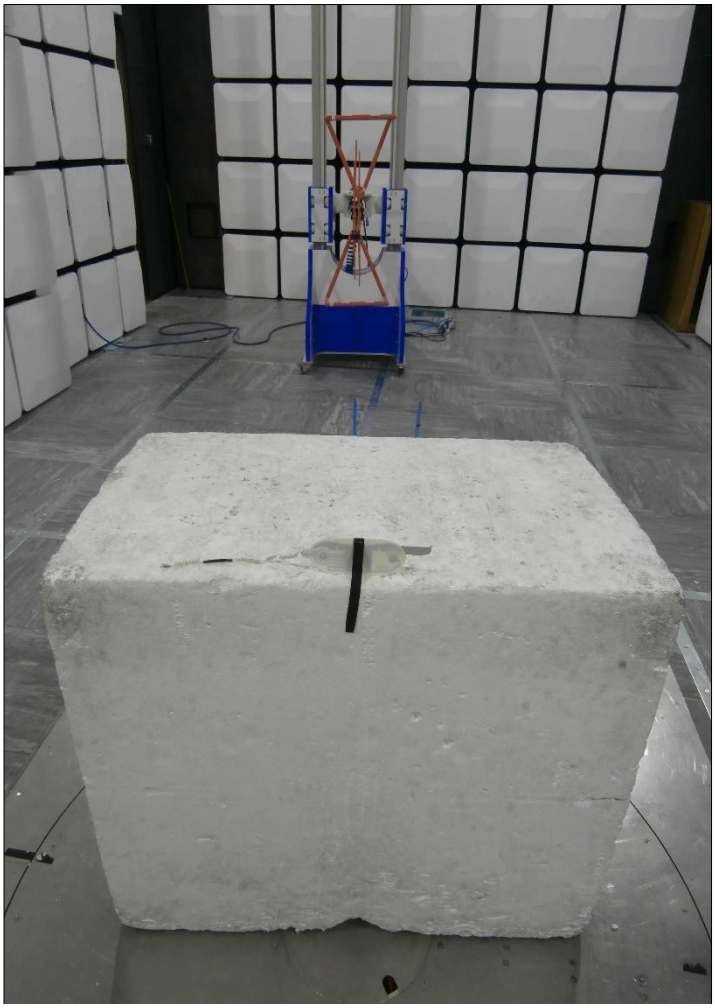

Figure 22 - Test Setup - 30 MHz to 1 GHz - Z Orientation

Figure 23 - Test Setup - 1 GHz to 5 GHz - X Orientation

Figure 24 - Test Setup - 1 GHz to 5 GHz - Y Orientation

Figure 25 - Test Setup - 1 GHz to 5 GHz - Z Orientation

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
3m Semi Anechoic Chamber	MVG	EMC-3	5621	36	11-Aug-2023
EmX Emissions Software	TUV SUD	V2.1.10	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 Assembly - 18GHz 8m	Junkosha	MWX221-08000NMSNMS/B	5732	6	05-Feb-2022
3.5 mm 2m Cable	Junkosha	MWX221-02000DMS	5428	12	15-Oct-2021
1 Meter Cable	Teledyne	PR90-088-1MTR	5193	12	02-Aug-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
DRG Horn Antenna (7.5-18GHz)	Schwarzbeck	HWRD750	5610	12	22-Sep-2021

Table 26

TU - Traceability Unscheduled

3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Comb Generator	Schaffner	RSG1000	3034	-	TU
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5481	12	31-Mar-2022

Table 27

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
Radiated Disturbance	30 MHz to 1 GHz, Bilog Antenna, ±5.2 dB 1 GHz to 40 GHz, Horn Antenna, ±6.3 dB

Table 28

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.