# FCC Test Report

## MiX Telematics International (Pty) Ltd
## Telematics Unit, Model: MiX 6AMB-4G-B

## In accordance with FCC 47 CFR Part 15B

Prepared for: MiX Telematics International (Pty) Ltd
Blaauwklip Office Park 2
Cnr Strand & Webersvalley Roads
Stellenbosch
South Africa

FCC ID: 2AFMS-6AMB4G

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## COMMERCIAL-IN-CONFIDENCE

Document 75949089-02 Issue 01

| SIGNATURE | | | |
|---|---|---|---|
| AJ Lawson | | | |
| **NAME** | **JOB TITLE** | **RESPONSIBLE FOR** | **ISSUE DATE** |
| Andy Lawson | Senior Engineer | Authorised Signatory | 18 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 | 18 February 2021 | |

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

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



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# Contents

# 1 Report Summary

## 1.1 Report Modification Record

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

| Issue | Description of Change | Date of Issue |
|---|---|---|
| 1 | First Issue | 18 February 2021 |

**Table 1**

## 1.2 Introduction

| | |
|---|---|
| Applicant | MiX Telematics International (Pty) Ltd |
| Manufacturer | MiX Telematics International (Pty) Ltd |
| Model Number(s) | MiX 6AMB-4G-B |
| Manufacturer Declared Variant(s) | MiX 6AMB-4G |
| Serial Number(s) | 66000180 |
| Hardware Version(s) | 1 |
| Software Version(s) | 2.0.4 |
| Number of Samples Tested | 1 |
| Test Specification/Issue/Date | FCC 47 CFR Part 15B: 2019 |
| Order Number<br>Date | P0093632<br>20-May-2020 |
| Date of Receipt of EUT | 05-January-2021 |
| Start of Test | 07-February-2021 |
| Finish of Test | 07-February-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 is shown below.

| Section | Specification Clause | Test Description | Result | Comments/Base Standard |
|---|---|---|---|---|
| Configuration and Mode: DC Powered - Idle | | | | |
| 2.1 | 15.109 | Radiated Disturbance | Pass | ANSI C63.4: 2014 |

**Table 2**

## 1.4 Manufacturer Declared Variant(s)

**Stellenbosch 28 Jan 2021**

To: Whom it may concern

From: MiX Telematics International (Pty) Ltd
Blaauwklip Office Park 2, CNR Strand & Webbers Valley
Stellenbosch – South Africa

**Subject**: Dedaration of Similarity

**MiX Telematics International (Pty) Ltd**, hereby also dedare that the battery and non-battery variants, present the same electrical, physical and electro mechanics characteristics, the same PCB (AWZ0006A-1D), layout and components. The only difference between them is that the "**-B**" models have an internal backup battery plugged in, allowing the device to work after the disconnection of the vehicle´s battery.

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

| Part Number | Official Product Name | Description | Series |
|---|---|---|---|
| U0042MT | MiX 6AMB-4G | MiX 6000 MK2 6AMB-4G Electronic Unit | MiX 6000 MK2 |
| U0044MT | MiX 6AMB-4G-B | MiX 6000 MK2 6AMB-4G-B Electronic Unit with Backup Battery | MiX 6000 MK2 |

Tabel 1 Variants in the MiX 6AMB-4G/-B Series of Products

We remain at your disposal for any clarifications that may become necessary.

Sincerely,

Certification Manager: TC Bothma

Blaauwklip Office Park 2, CNR Strand & Webbers Valley – Stellenbosch – South Africa

## 1.5 Application Form

Equipment Description

| | |
|---|---|
| Technical Description:<br>*(Please provide a brief description of the intended use of the equipment including the technologies the product supports)* | The MiX 6AMB-4G is a high-end Fleet product that incorporates the latest market trends. It supports LTE CAT 4 with 2G/3G fall-back, 3-Axis Accelerometer, Wi-Fi, Bluetooth, 433 or 915 MHz Short Range Device and GNSS. The MiX 6AMB-4G-B is the same design, but it also includes a backup battery.<br><br>The kit consists of:<br>Main Harness MP10, External LTE Antenna PA8, PUCK Antenna and Code Plug Socket Harness CP4 |
| Manufacturer: | MiX Telematics (Pty) Ltd. |
| Model: | MiX 6AMB-4G-B |
| Part Number: | U0044MT |
| Hardware Version: | 1 |
| Software Version: | 2.0.4 |
| FCC ID of the product under test – see guidance here | 2AFMS-6AMB4G |
| IC ID of the product under test | Not Applicable |

**Table 3**

Intentional Radiators

| Technology | GSM850 | GSM1900 | WCDMA BAND II | WCDMA BAND IV | WCDMA BAND V |
|---|---|---|---|---|---|
| Frequency Range (MHz to MHz) | 824.2-848.8 | 1850.2-1909.8 | 1852.4-1907.6 | 1712.4-1752.6 | 826.4-846.6 |
| Conducted Declared Output Power (dBm) | 33<br>27 | 30<br>26 | 24 | 24 | 24 |
| Antenna Gain (dBi) | 2.29 | 1.59 | 1.59 | 2 | 2.29 |
| Supported Bandwidth(s) (MHz)<br>(e.g. 1 MHz, 20 MHz, 40 MHz) | 296Kbps (DL)<br>236.8Kbps (UL) | 296Kbps (DL)<br>236.8Kbps (UL) | 60 | 45 | 25 |
| Modulation Scheme(s)<br>(e.g. GFSK, QPSK etc) | GMSK, 8PSK | GMSK, 8PSK | QPSK,<br>16QAM,<br>64QAM | QPSK,<br>16QAM,<br>64QAM | QPSK,<br>16QAM,<br>64QAM |
| ITU Emission Designator (see guidance here) | 247KGXW<br>245KG7W | 249KGXW<br>249KG7W | 4M15F9W | 4M14F9W | 4M13F9W |
| Bottom Frequency (MHz) | 824.2 | 1850.2 | 1850 | 1710 | 824 |
| Middle Frequency (MHz) | 837 | 1880 | 1880 | 1732.5 | 836.5 |
| Top Frequency (MHz) | 848.8 | 1909.8 | 1910 | 1755 | 849 |

**Table 4**

| Technology | SRD 915 | SRD2400 BT/BLE | SRD2400 WiFi |
|---|---|---|---|
| Frequency Range (MHz to MHz) | 902-928 | 2402-2480 | 2412-2467 |
| Conducted Declared Output Power (dBm) | 20 | 6 | 15.6 |
| Antenna Gain (dBi) | 0 | 3 | 3 |
| Supported Bandwidth(s) (MHz) (e.g. 1 MHz, 20 MHz, 40 MHz) | 0.025 | 1 | 20<br>40 |
| Modulation Scheme(s) (e.g. GFSK, QPSK etc) | 2FSK | GFSK<br>8-DPSK | GFSK (BDR) (1 Mbit/s);<br>π/4-DQPSK (EDR) (2 Mbit/s);<br>8-PSK (EDR) (3 Mbits/s) |
| ITU Emission Designator (see guidance here) | 38K2F7D | 1M10F1D | 16M7D1D |
| Bottom Frequency (MHz) | 902 | 2402 | 2412 |
| Middle Frequency (MHz) | 915 | 2440 | 2439.5 |
| Top Frequency (MHz) | 928 | 2480 | 2467 |

**Table 5**

| Technology | LTE Band 2 | LTE Band 4 | LTE Band 5 | LTE Band 7 | LTE Band 12 |
|---|---|---|---|---|---|
| Frequency Range (MHz to MHz) | 1850-1910 | 1710-1755 | 824-849 | 2500-2570 | 699-716 |
| Conducted Declared Output Power (dBm) | 23±2 | 23±2 | 23±2 | 23±2 | 23±2 |
| Antenna Gain (dBi) | 1.59 | 4.2 | 2.29 | 3 | 3.26 |
| Supported Bandwidth(s) (MHz) (e.g. 1 MHz, 20 MHz, 40 MHz) | 1.4, 3, 5,10,15, 20 | 1.4, 3, 5,10,15, 20 | 1.4, 3, 5,10,15 | 5,10,15, 20 | 1.4, 3, 5,10 |
| Modulation Scheme(s) (e.g. GFSK, QPSK etc) | QPSK<br>16QAM | QPSK<br>16QAM | QPSK<br>16QAM | QPSK<br>16QAM | QPSK<br>16QAM |
| ITU Emission Designator (see guidance here) | 17M9G7D<br>17M9W7D<br>1M09W7D | 17M9G7D<br>17M9W7D<br>1M09W7D | 8M93G7D<br>8M93W7D2M70G7D<br>1M09W7D | 17M9G7D<br>17M9W7D<br>4M49W7D | 8M93G7D<br>8M93W7D<br>1M09W7D |
| Bottom Frequency (MHz) | 1850 | 1710 | 824 | 2500 | 699 |
| Middle Frequency (MHz) | 1880 | 1732.5 | 836.5 | 2535 | 707.5 |
| Top Frequency (MHz) | 1910 | 1755 | 849 | 2570 | 716 |

**Table 6**

| Technology | LTE Band 13 | LTE Band 25 | LTE Band 26 | LTE Band 38 | LTE Band 41 |
|---|---|---|---|---|---|
| Frequency Range (MHz to MHz) | 777-787 | 1850-1915 | 814-849 | 2570-2620 | 2496-2690 |
| Conducted Declared Output Power (dBm) | 23±2 | 23±2 | 23±2 | 23±2 | 23±2 |
| Antenna Gain (dBi) | 4.45 | 1.59 | 2.53 | 2.06 | 3 |
| Supported Bandwidth(s) (MHz) (e.g. 1 MHz, 20 MHz, 40 MHz) | 5,10 | 1.4, 3, 5,10,15, 20 | 1.4, 3, 5,10 | 5,10,15, 20 | 5,10,15, 20 |
| Modulation Scheme(s) (e.g. GFSK, QPSK etc) | QPSK<br>16QAM | QPSK<br>16QAM | QPSK<br>16QAM | QPSK<br>16QAM | QPSK<br>16QAM |
| ITU Emission Designator (see guidance here) | 8M91G7D<br>8M91W7D<br>4M48G7D<br>4M49W7D | 17M9G7D<br>17M9W7D<br>8M91G7D<br>1M09W7D | 8M91G7D<br>8M91W7D<br>1M09G7D<br>1M09W7D<br>13M5G7D<br>13M4W7D<br>4M49W7D | 17M8G7D<br>17M8W7D<br>8M91G7D | 17M9G7D<br>17M9W7D<br>8M91G7D<br>4M50W7D |
| Bottom Frequency (MHz) | 777 | 1850 | 814 | 2570 | 2496 |
| Middle Frequency (MHz) | 782 | 1882.5 | 831.5 | 2595 | 2593 |
| Top Frequency (MHz) | 787 | 1915 | 849 | 2620 | 2690 |

**Table 7**

Un-intentional Radiators

| | |
|---|---|
| Highest frequency generated or used in the device or on which the device operates or tunes | 2690 MHz |
| Lowest frequency generated or used in the device or on which the device operates or tunes | 699 MHz |
| Class A Digital Device (Use in commercial, industrial or business environment) ☐<br>Class B Digital Device (Use in residential environment only) ☒ | |

**Table 8**

AC Power Source

| | | |
|---|---|---|
| AC supply frequency: | N/A | Hz |
| Voltage | N/A | V |
| Max current: | N/A | A |
| Single Phase ☐ Three Phase ☐ | | |

**Table 9**

DC Power Source

| | | |
|---|---|---|
| Nominal voltage: | 13.8/27.6 | V |
| Extreme upper voltage: | 32 | V |
| Extreme lower voltage: | 10.5 | V |
| Max current: | 7.5A absolute max (7.5A Fused) 3.5A typical | A |

**Table 10**

Battery Power Source

| | | |
|---|---|---|
| Voltage: | 3.2 | V |
| End-point voltage: | 2.5 | V *(Point at which the battery will terminate)* |
| Alkaline ☐ Leclanche ☐ Lithium ☒ Nickel Cadmium ☐ Lead Acid* ☒ **(Vehicle regulated)* | | |
| Other ☐ Please detail: | | |

**Table 11**

Charging

| | |
|---|---|
| Can the EUT transmit whilst being charged | Yes ☒ No ☐ |

**Table 12**

Temperature

| | | |
|---|---|---|
| Minimum temperature: | -20 | °C |
| Maximum temperature: | +60 (limited by backup battery)<br>Else +80 | °C |

**Table 13**

Antenna Characteristics

| | | | | | |
|---|---|---|---|---|---|
| Antenna connector ☒ | | | State impedance | 50 | Ohm |
| Temporary antenna connector ☐ | | | State impedance | | Ohm |
| Integral antenna ☒ | Type: | SRD915 | Gain | 0 | dBi |
| External antenna ☒ | Type: | LTE Primary<br>LTE Diversity<br>Bluetooth/WiFi<br>GNSS | Gain | 2.84 (3G); 2.44 (4G)<br>2<br>3<br>RX | dBi |
| For external antenna only:<br>Standard Antenna Jack ☐ If yes, describe how user is prohibited from changing antenna (if not professional installed):<br>Equipment is only ever professionally installed ☐<br>Non-standard Antenna Jack ☒ | | | | | |

**Table 14**

Ancillaries (if applicable)

| | | | |
|---|---|---|---|
| Manufacturer: | CHM | Part Number: | 440FT0033 |
| Model: | Main Harness MP10 | Country of Origin: | South Africa |
| Manufacturer: | Jinchang Electron Global Service | Part Number: | A0050MT |
| Model: | PUCK Antenna, LTE, WiFi/Bluetooth and GNSS Combination Antenna (JCE305) | Country of Origin: | China |
| Manufacturer: | RF Design | Part Number: | A0049MT |
| Model: | External LTE antenna PA8 Fakra connector | Country of Origin: | South Africa |
| Manufacturer: | CHM | Part Number: | 440FT0032 |
| Model: | Code Plug Harness with socket CP4 | Country of Origin: | South Africa |
| Manufacturer: | CHM | Part Number: | A0041MT |
| Model: | Auxiliary Harness AX5 (optional) | Country of Origin: | South Africa |
| Manufacturer: | CHM | Part Number: | 440FT0931 |
| Model: | Serial Harness SR1 (optional) | Country of Origin: | South Africa |

**Table 15**

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

Name: Christo Bothma
Position held: Certification Manager
Date: 26 Nov 2020

## 1.6 Product Information

### 1.6.1 Technical Description

The Equipment Under Test (EUT) was a MiX Telematics International (Pty) Ltd, Model: MiX 46MB-4G-B.

The primary function of the EUT is a fleet product that incorporates the latest market trends.

It consists mainly of an on-board computer, an LTE modem with 2G fallback, a GNSS, an accelerometer, Low Energy Bluetooth, I/O, 2 x CAN, 2 x RS232, 4 x positive drives and 434 / 915 MHz short range transceiver.

### 1.6.2 EUT Port/Cable Identification

| Port | Max Cable Length specified | Usage | Type | Screened |
|---|---|---|---|---|
| Configuration and Mode: DC Powered - Idle | | | | |
| DC Input | 1 m | Power | Power | No |
| DC Input +ve | 1 m | Power | Power | No |
| DC Input -ve | 1 m | Power | Power | No |
| PUK Antenna - Wi-Fi | 3 m | Connection to Antenna | Signal | Yes |
| PUK Antenna - GNSS | 3 m | Connection to Antenna | Signal | Yes |
| PUK Antenna - LTE Diversity | 3 m | Connection to Antenna | Signal | Yes |
| Blade Antenna | 3 m | Connection to Antenna | Signal | Yes |
| Code Plug | 1.15 m | Connection to Code Plug | Signal | No |
| Serial Comms | 1.47 m | Data | Signal | No |
| Auxiliary Harness | 1.5 m | Data | Signal | No |
| Main Harness | 1.5 m | Power and Data | Signal and Power | No |

**Table 16**

### 1.6.3 Test Configuration

| Configuration | Description |
|---|---|
| DC Powered | Powered via DC power supply at 13.8 V DC, connected via an optical can link to the support Laptop running MiX test software (MiX Test Application:MIX6000 MK2 LTE). |

**Table 17**

### 1.6.4 Modes of Operation

| Mode | Description |
|---|---|
| Idle | All EUTs RF modules in an idle state. EUT performance is being monitored by test PC with customers test software. The following script was executed in the customers test software: RE - Receivers in RX, Magix9, CP-TEST,CAN-LOOP,Charger-50. |

**Table 18**

## 1.7 Deviations from the Standard

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

## 1.8 EUT Modification Record

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

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

| Modification State | Description of Modification still fitted to EUT | Modification Fitted By | Date Modification Fitted |
|---|---|---|---|
| Model: MiX 6AMB-4G-B, Serial Number: 66000180 | | | |
| 0 | As supplied by the customer | Not Applicable | Not Applicable |

**Table 19**

## 1.9 Test Location

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

| Test Name | Name of Engineer(s) | Accreditation |
|---|---|---|
| Configuration and Mode: DC Powered - Idle | | |
| Radiated Disturbance | Graeme Lawler | UKAS |

**Table 20**

Office Address:

Octagon House
Concorde Way
Segensworth North
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

### 2.1.2 Equipment Under Test and Modification State

MiX 6AMB-4G-B, S/N: 66000180 - Modification State 0

### 2.1.3 Date of Test

07-February-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

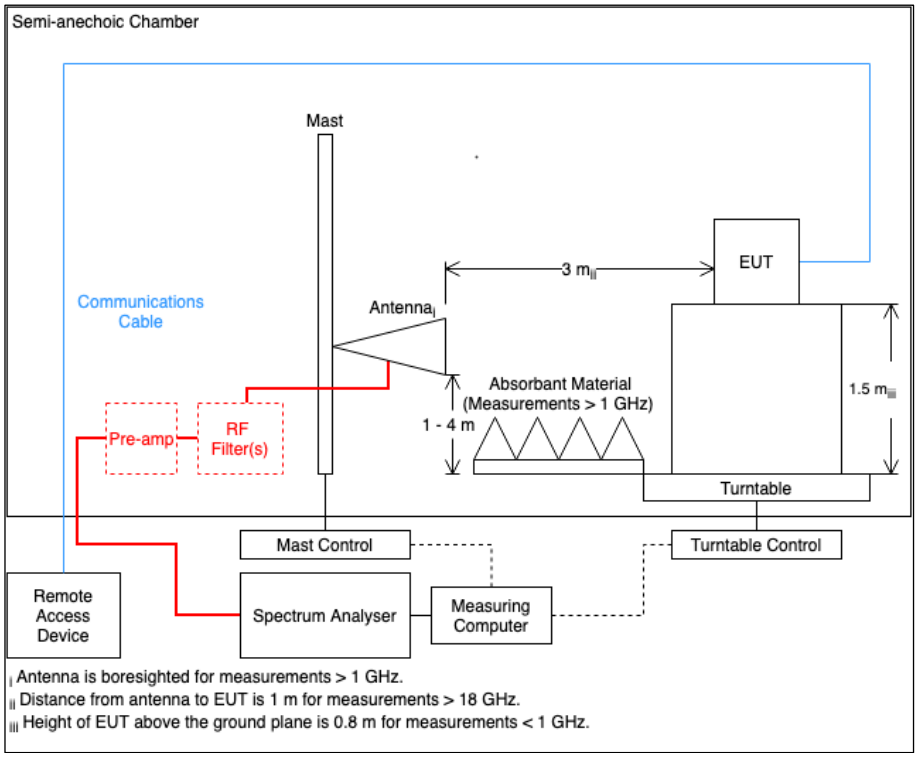


**Figure 1**

### 2.1.7 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 22.2 °C |
| Relative Humidity | 26.9 % |

### 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:**<br>Note 1. A Quasi-peak detector is to be used for measurements below 1 GHz.<br>Note 2. A CISPR Average detector is to be used for measurements above 1 GHz.<br>Note 3. The Peak test limit above 1 GHz is 20 dB higher than the CISPR Average test limit. | | |

**Table 21**

### 2.1.9 Test Results

**Results for Configuration and Mode: DC Powered - 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.

Highest frequency generated or used within the EUT: 2690 MHz
Which necessitates an upper frequency test limit of: 14 GHz

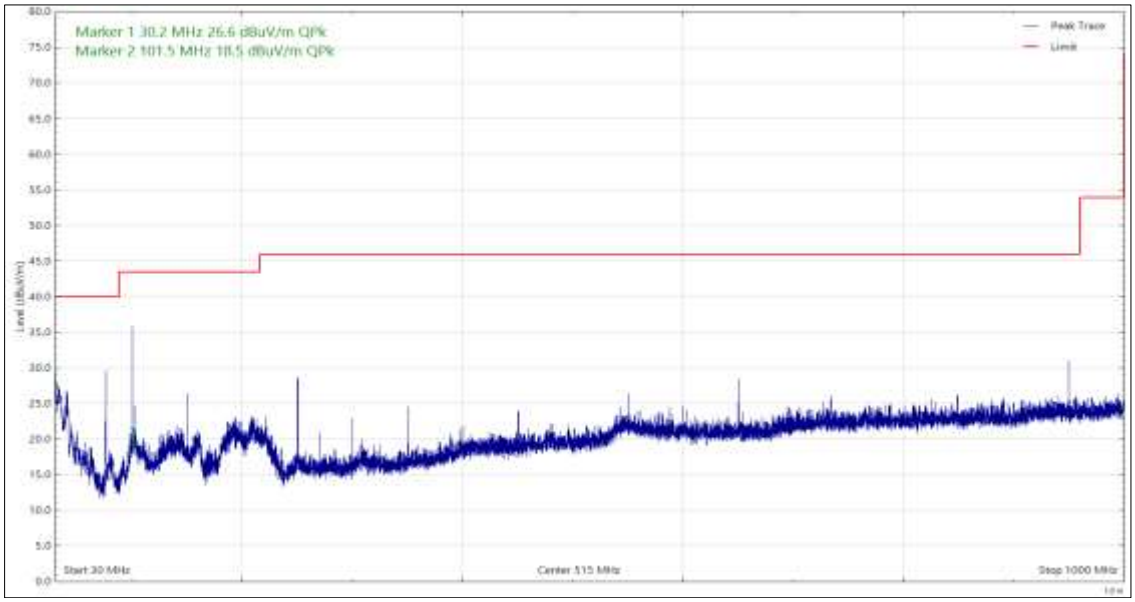


**Figure 2 - 30 MHz to 1 GHz, Quasi-Peak, Vertical, X Orientation**

| Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Angle (°) | Height (cm) | Polarisation | Orientation |
|---|---|---|---|---|---|---|---|---|
| 30.230 | 26.6 | 40.0 | -13.4 | Q-Peak | 7 | 379 | Vertical | X |
| 101.495 | 18.5 | 43.5 | -25.0 | Q-Peak | 30 | 106 | Vertical | X |

**Table 22**

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.

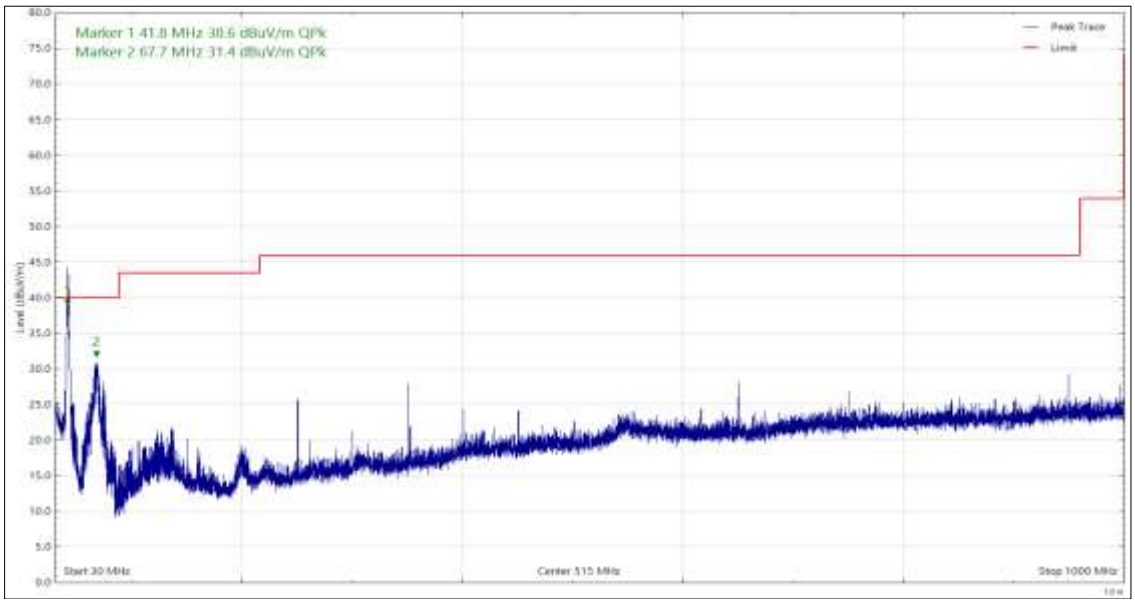


**Figure 3 - 30 MHz to 1 GHz, Quasi-Peak, Horizontal, X Orientation**

| Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Angle (°) | Height (cm) | Polarisation | Orientation |
|---|---|---|---|---|---|---|---|---|
| 41.807 | 38.6 | 40.0 | -1.4 | Q-Peak | 177 | 100 | Horizontal | X |
| 67.660 | 31.4 | 40.0 | -8.6 | Q-Peak | 198 | 393 | Horizontal | X |

**Table 23**

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.

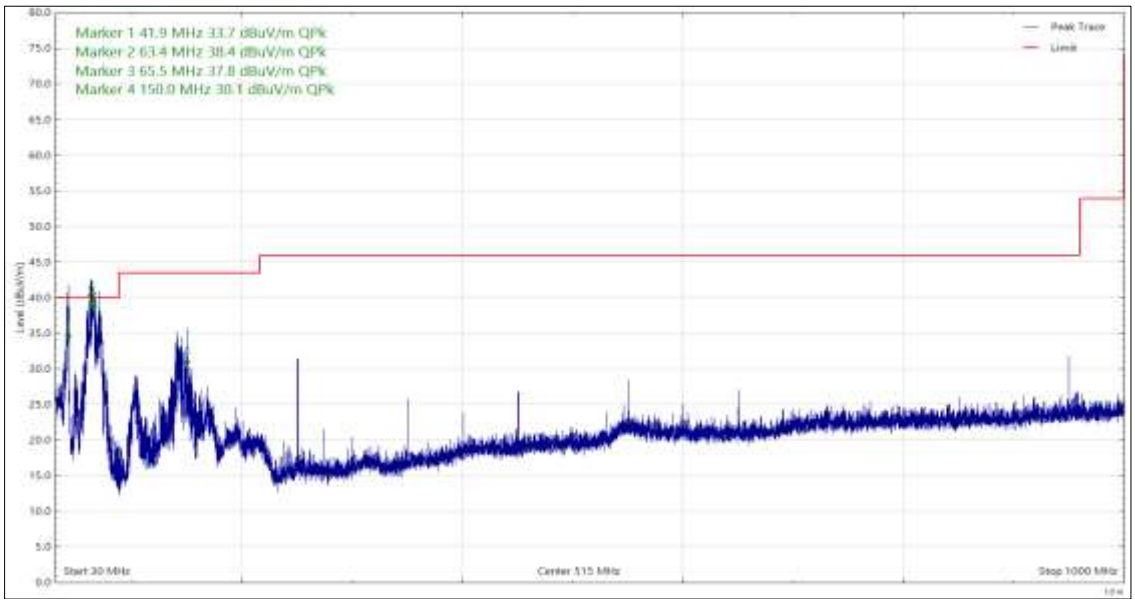


**Figure 4 - 30 MHz to 1 GHz, Quasi-Peak, Vertical, Y Orientation**

| Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Angle (°) | Height (cm) | Polarisation | Orientation |
|---|---|---|---|---|---|---|---|---|
| 41.881 | 33.7 | 40.0 | -6.4 | Q-Peak | 194 | 105 | Vertical | Y |
| 63.352 | 38.4 | 40.0 | -1.6 | Q-Peak | 57 | 100 | Vertical | Y |
| 65.507 | 37.8 | 40.0 | -2.2 | Q-Peak | 159 | 108 | Vertical | Y |
| 150.016 | 30.1 | 43.5 | -13.4 | Q-Peak | 202 | 100 | Vertical | Y |

**Table 24**

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.

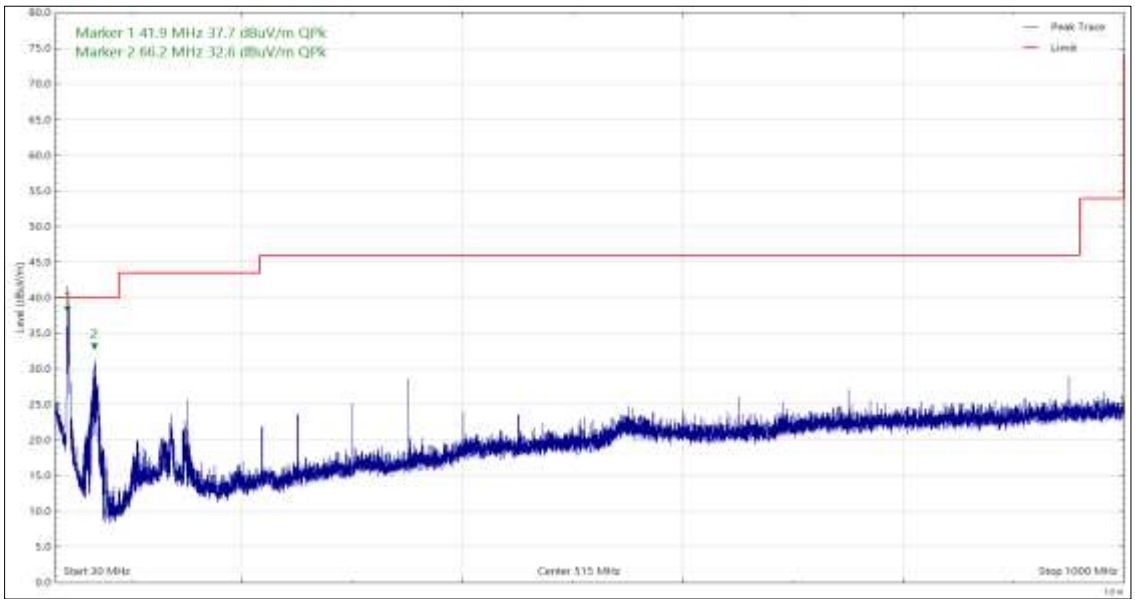


**Figure 5 - 30 MHz to 1 GHz, Quasi-Peak, Horizontal, Y Orientation**

| Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Angle (°) | Height (cm) | Polarisation | Orientation |
|---|---|---|---|---|---|---|---|---|
| 41.859 | 37.7 | 40.0 | -2.4 | Q-Peak | 152 | 103 | Horizontal | Y |
| 66.204 | 32.6 | 40.0 | -7.5 | Q-Peak | 178 | 397 | Horizontal | Y |

**Table 25**

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.

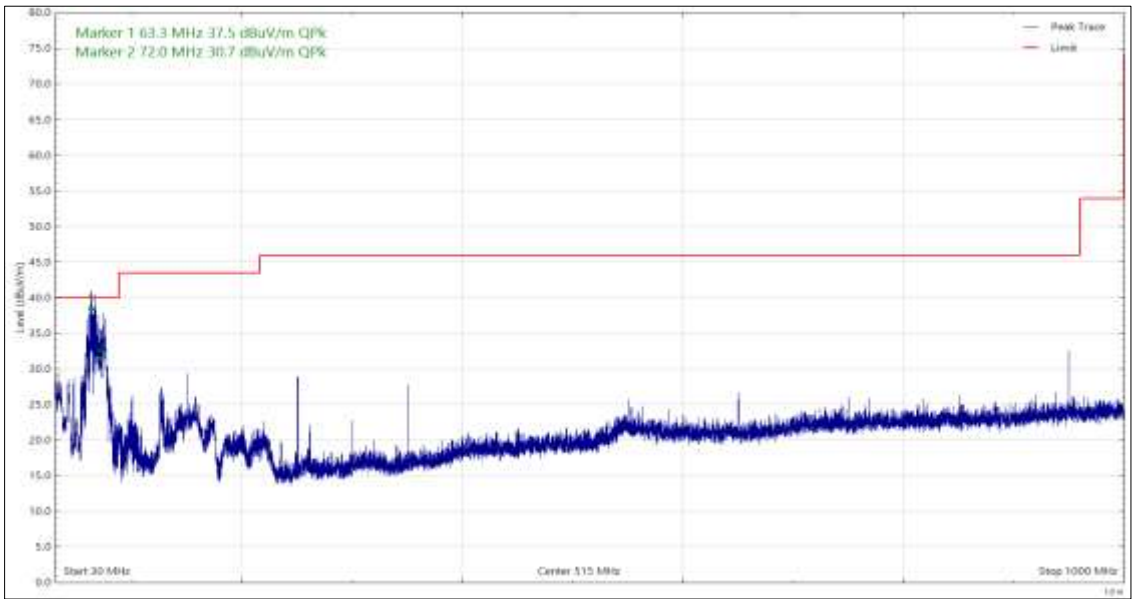


**Figure 6 - 30 MHz to 1 GHz, Quasi-Peak, Vertical, Z Orientation**

| Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Angle (°) | Height (cm) | Polarisation | Orientation |
|---|---|---|---|---|---|---|---|---|
| 63.344 | 37.5 | 40.0 | -2.5 | Q-Peak | 341 | 135 | Vertical | Z |
| 72.000 | 30.7 | 40.0 | -9.3 | Q-Peak | 224 | 175 | Vertical | Z |

**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.

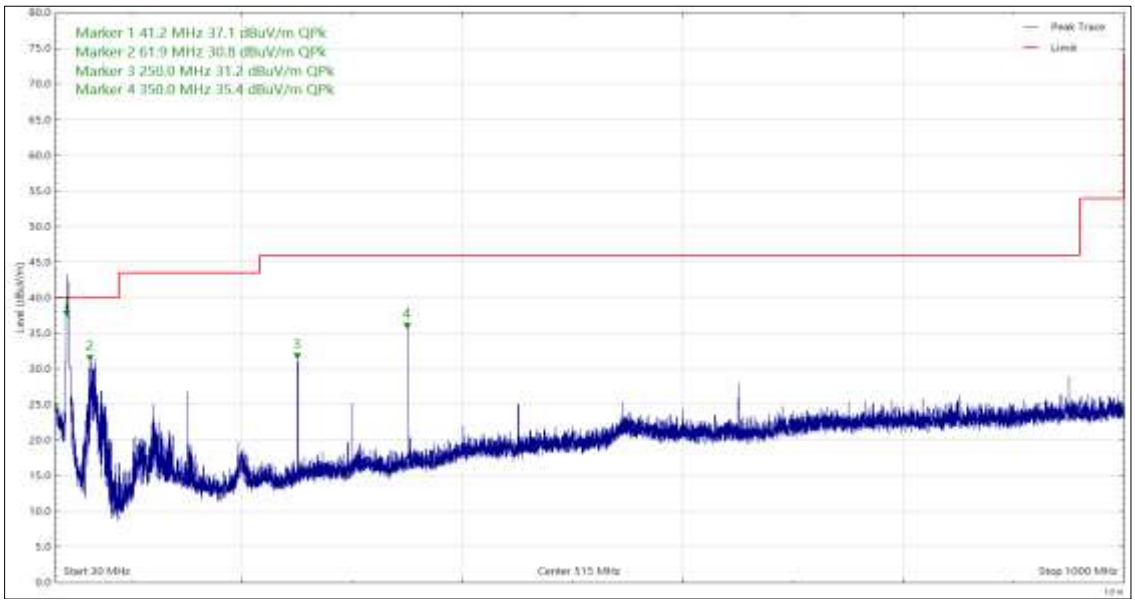


**Figure 7 - 30 MHz to 1 GHz, Quasi-Peak, Horizontal, Z Orientation**

| Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Angle (°) | Height (cm) | Polarisation | Orientation |
|---|---|---|---|---|---|---|---|---|
| 41.190 | 37.1 | 40.0 | -2.9 | Q-Peak | 194 | 108 | Horizontal | Z |
| 61.875 | 30.8 | 40.0 | -9.2 | Q-Peak | 204 | 309 | Horizontal | Z |
| 250.001 | 31.2 | 46.0 | -14.9 | Q-Peak | 266 | 128 | Horizontal | Z |
| 350.007 | 35.4 | 46.0 | -10.6 | Q-Peak | 277 | 103 | Horizontal | Z |

**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.

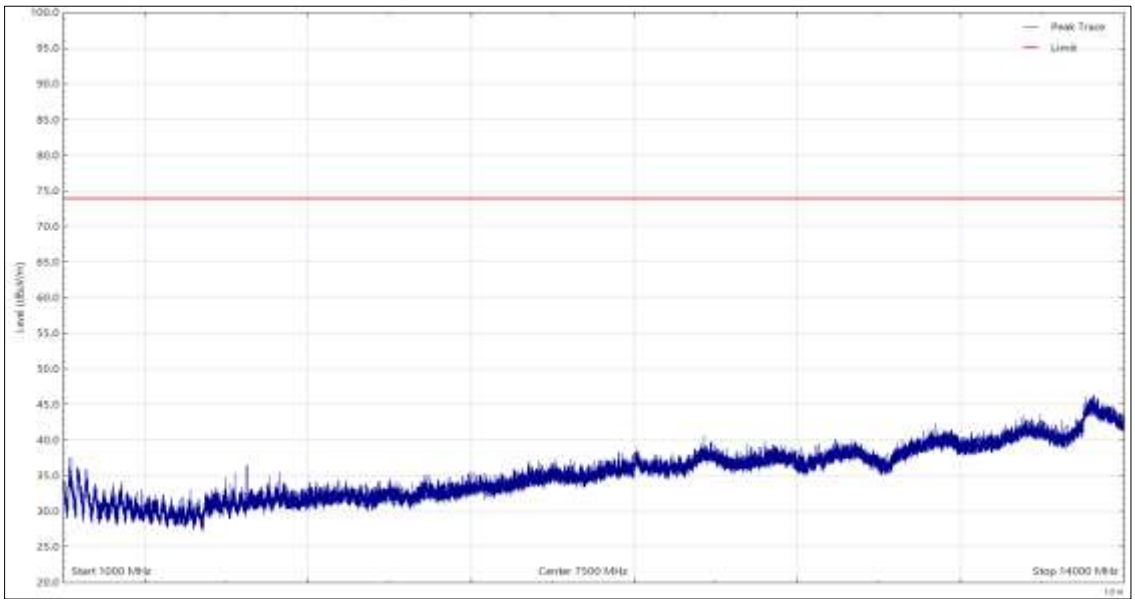


**Figure 8 - 1 GHz to 14 GHz, Peak, Vertical, X Orientation**

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

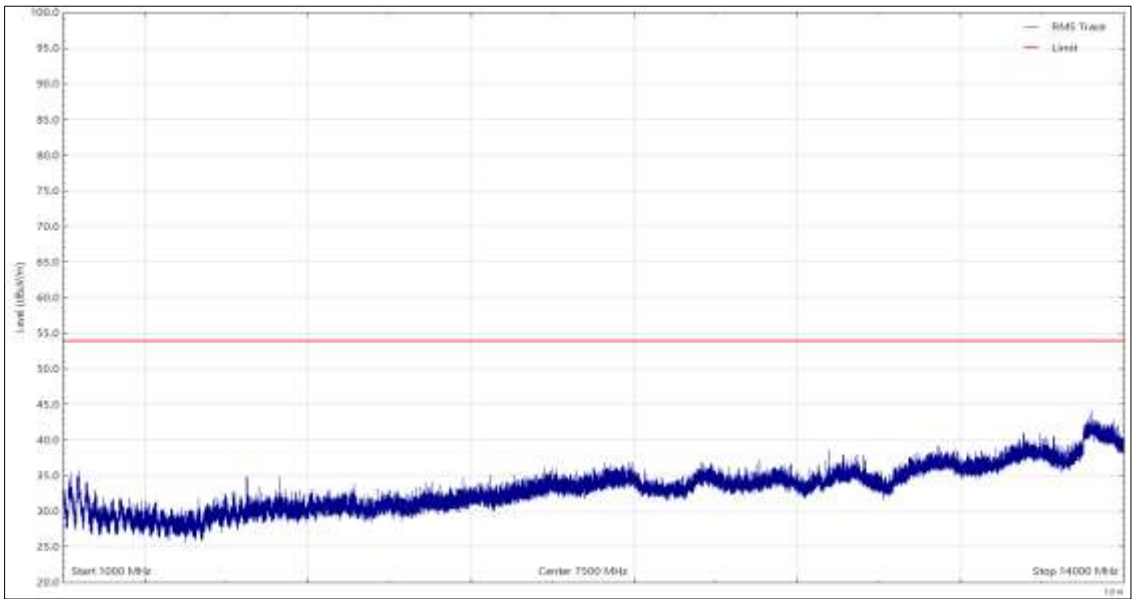


**Figure 9 - 1 GHz to 14 GHz, CISPR Average, Vertical, X Orientation**

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

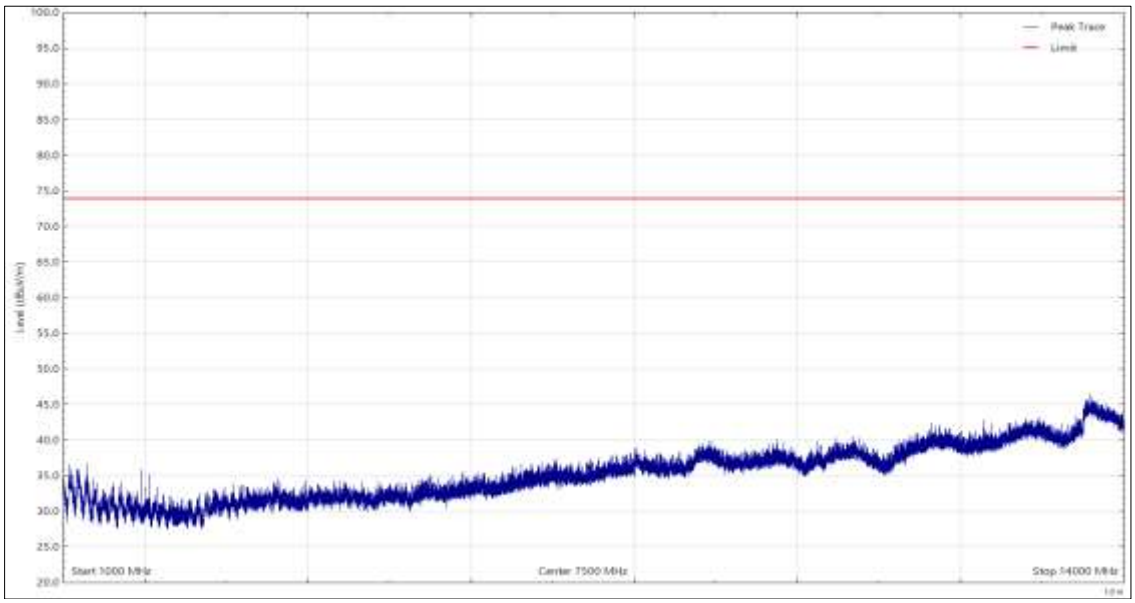


**Figure 10 - 1 GHz to 14 GHz, Peak, Horizontal, X Orientation**

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

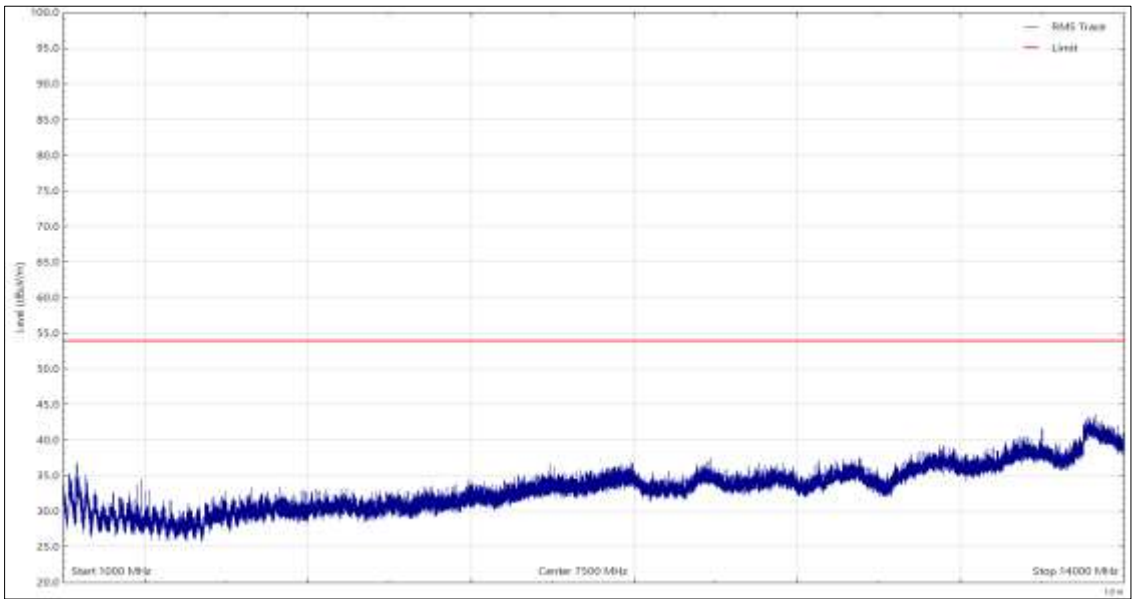


**Figure 11 - 1 GHz to 14 GHz, CISPR Average, Horizontal, X Orientation**

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

**Table 31**

*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.

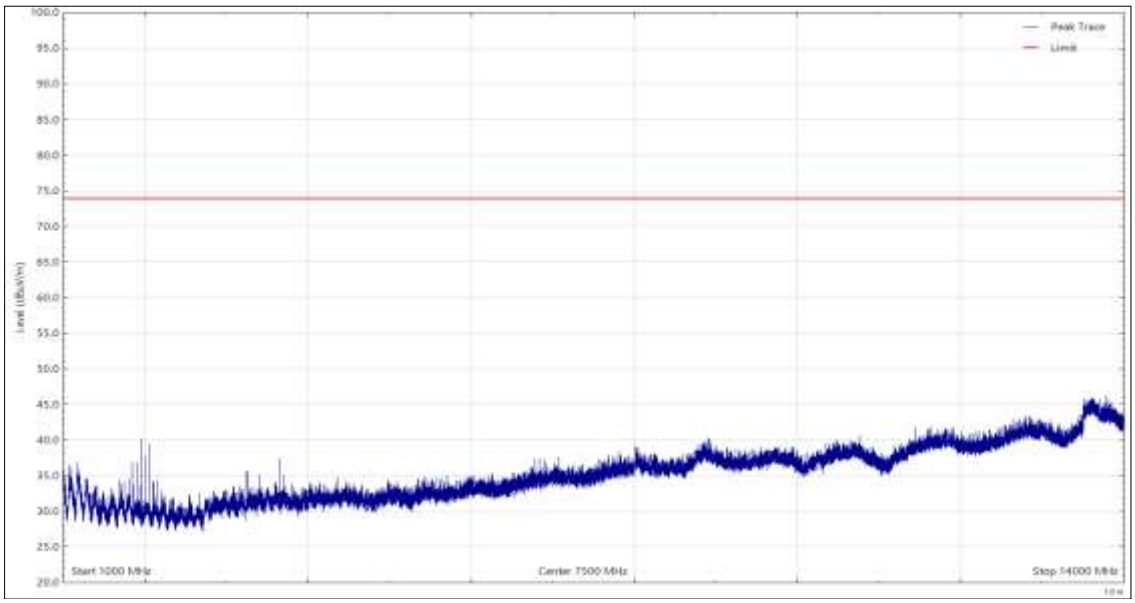


**Figure 12 - 1 GHz to 14 GHz, Peak, Vertical, Y Orientation**

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

**Table 32**

*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.

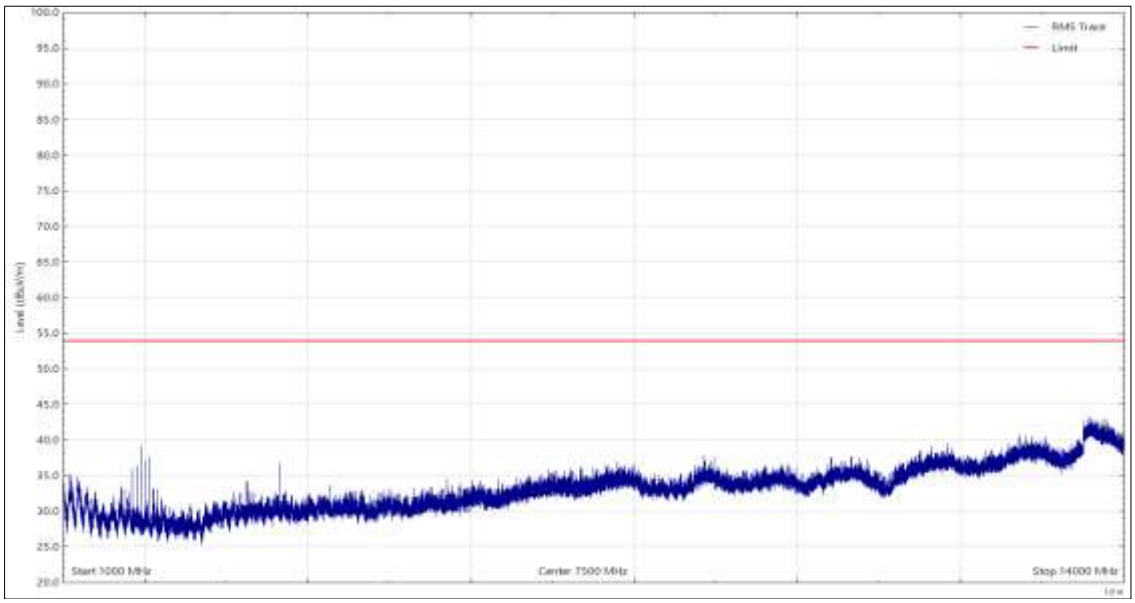


**Figure 13 - 1 GHz to 14 GHz, CISPR Average, Vertical, Y Orientation**

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

**Table 33**

*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.

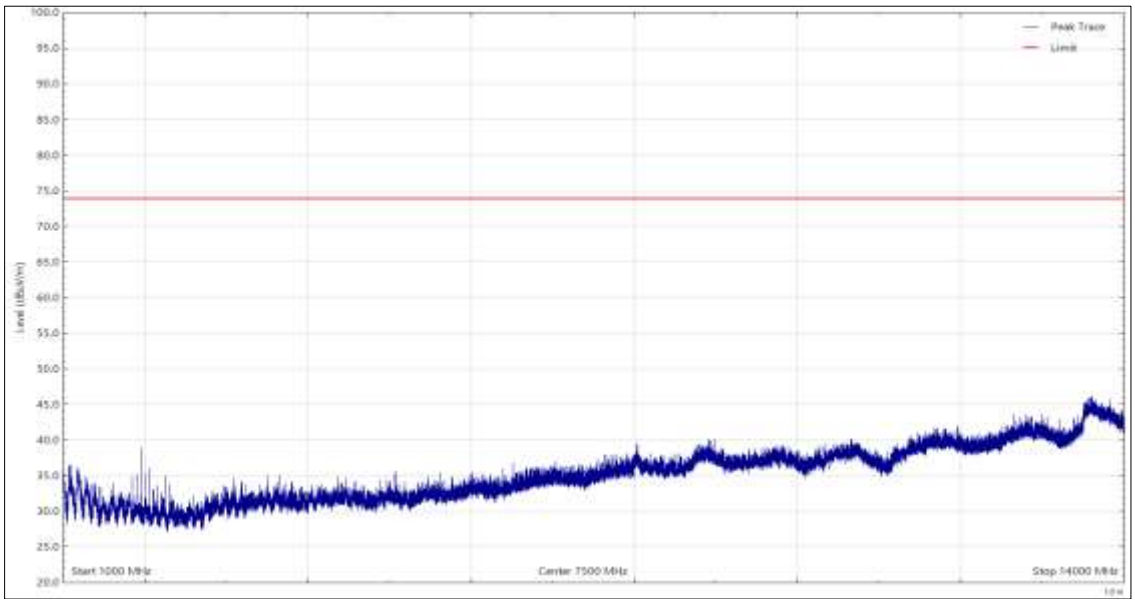


**Figure 14 - 1 GHz to 14 GHz, Peak, Horizontal, Y Orientation**

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

**Table 34**

*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.

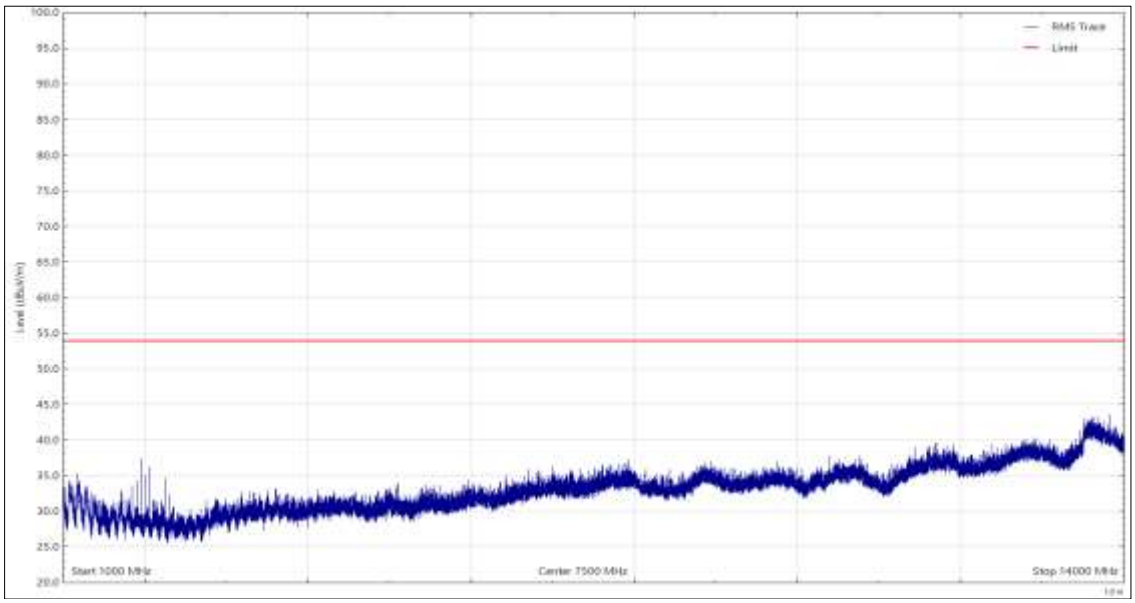


**Figure 15 - 1 GHz to 14 GHz, CISPR Average, Horizontal, Y Orientation**

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

**Table 35**

*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.

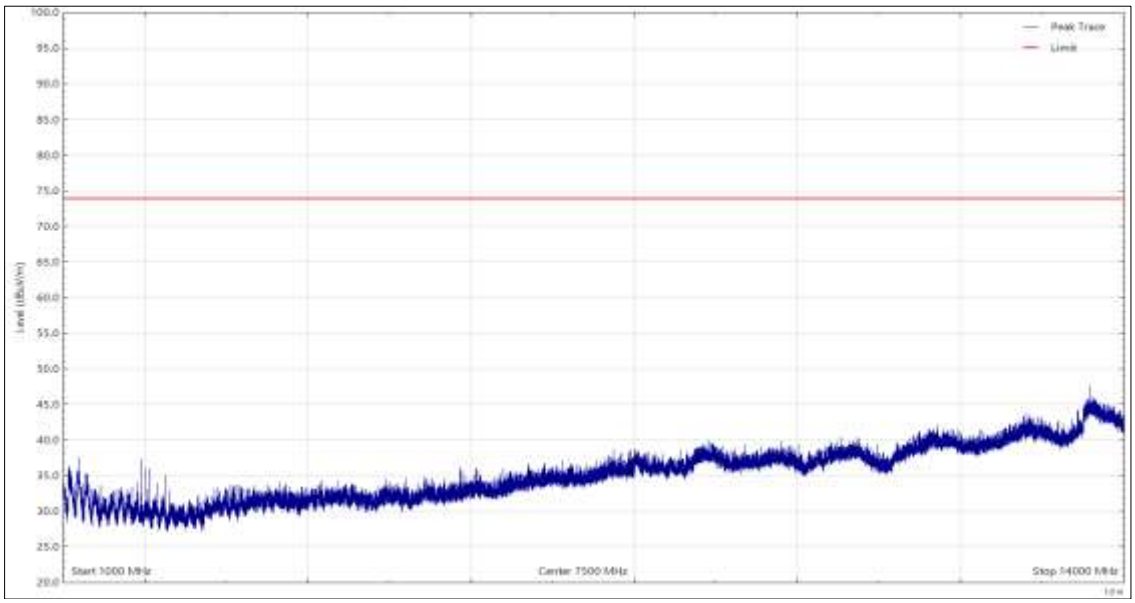


**Figure 16 - 1 GHz to 14 GHz, Peak, Vertical, Z Orientation**

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

**Table 36**

*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.

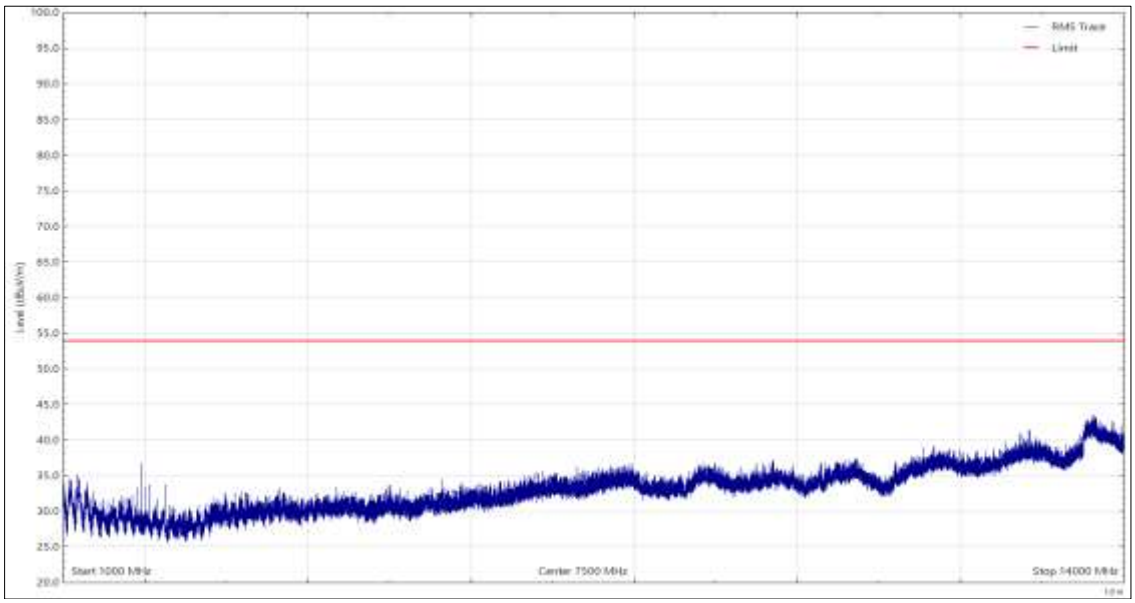


**Figure 17 - 1 GHz to 14 GHz, CISPR Average, Vertical, Z Orientation**

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

**Table 37**

*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.

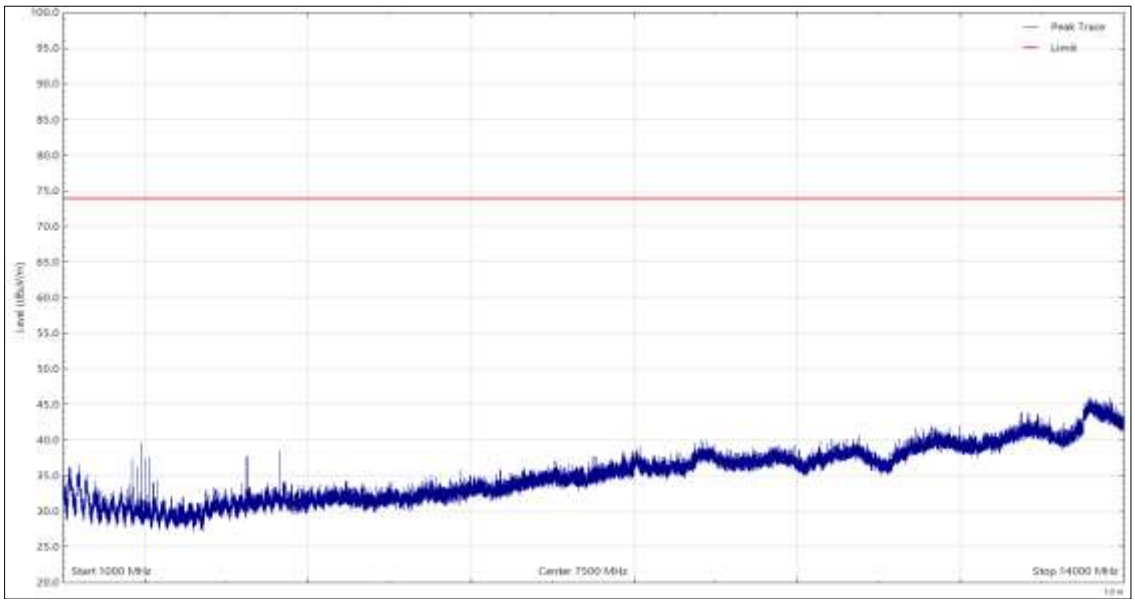


**Figure 18 - 1 GHz to 14 GHz, Peak, Horizontal, Z Orientation**

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

**Table 38**

*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.

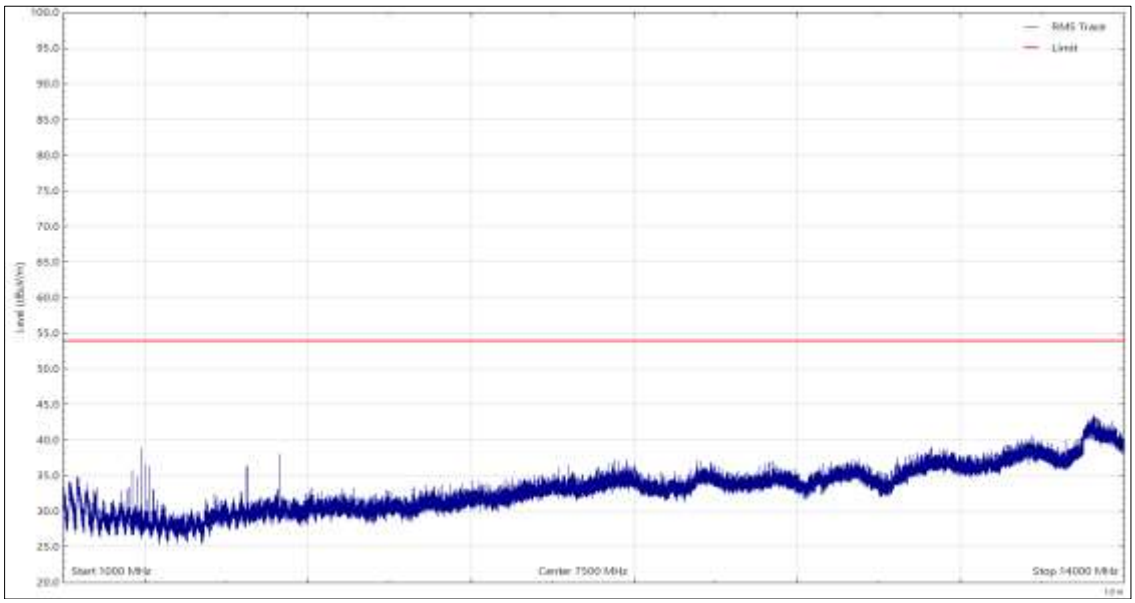


**Figure 19 - 1 GHz to 14 GHz, CISPR Average, Horizontal, Z Orientation**

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

**Table 39**

*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.

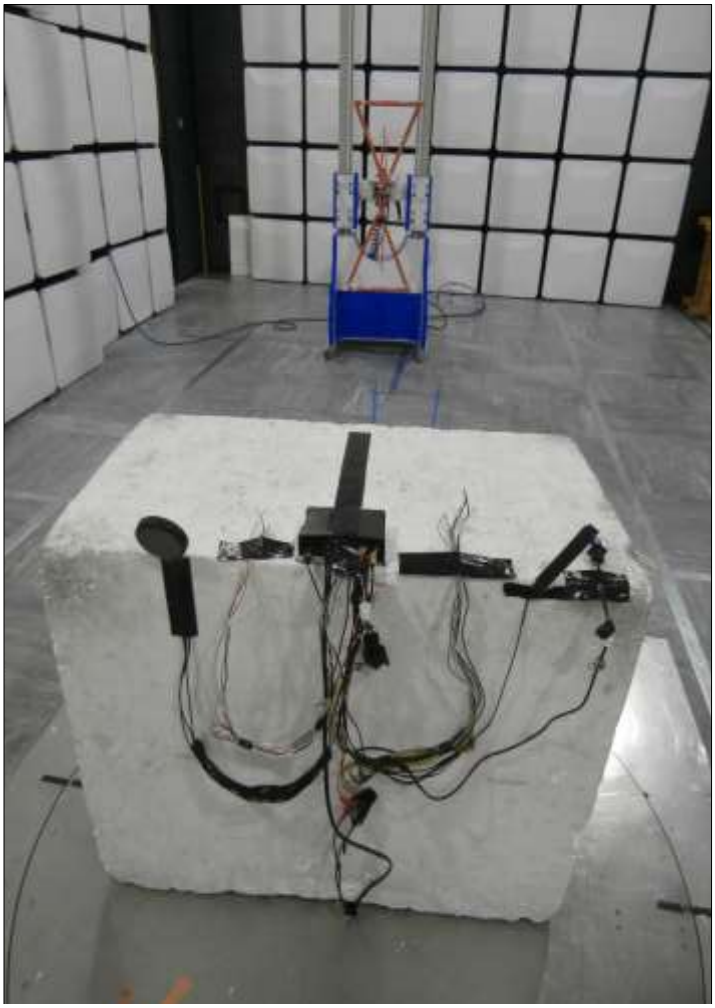

**Figure 20 - Test Setup - 30 MHz to 1 GHz - X - Orientation**

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

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

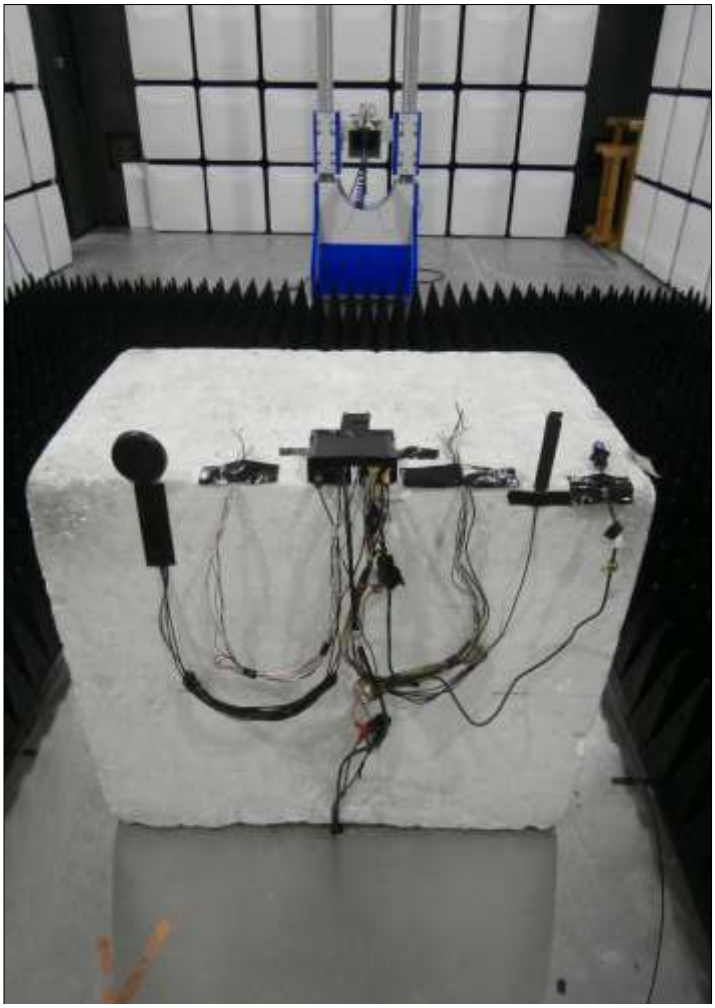

**Figure 23 - Test Setup - 1 GHz to 14 GHz - X - Orientation**

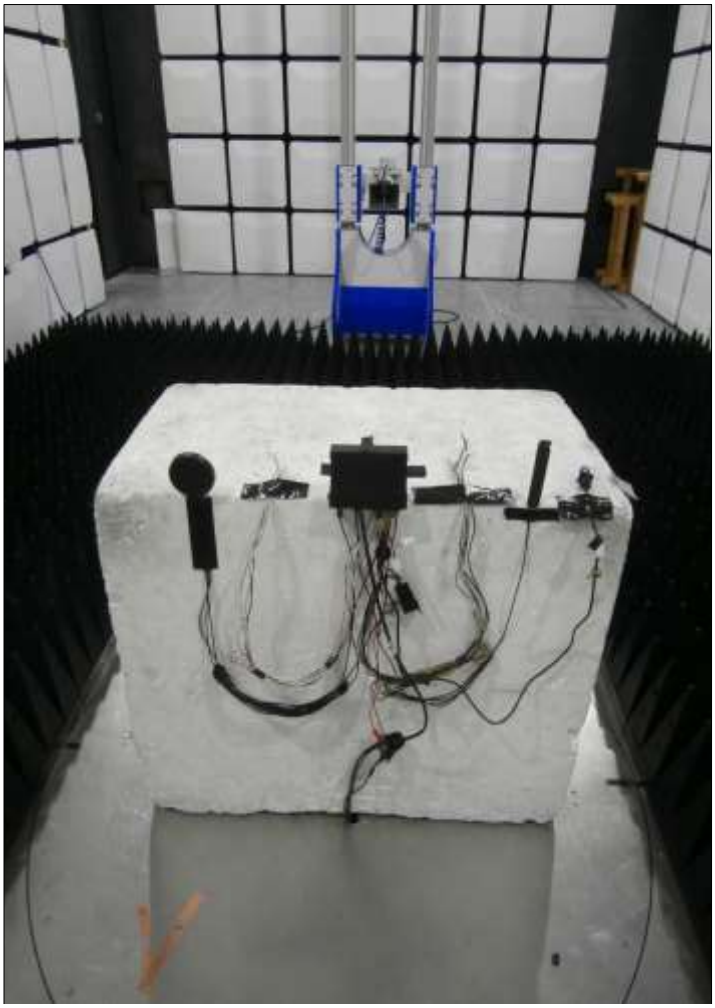

**Figure 24 - Test Setup - 1 GHz to 14 GHz - Y - Orientation**

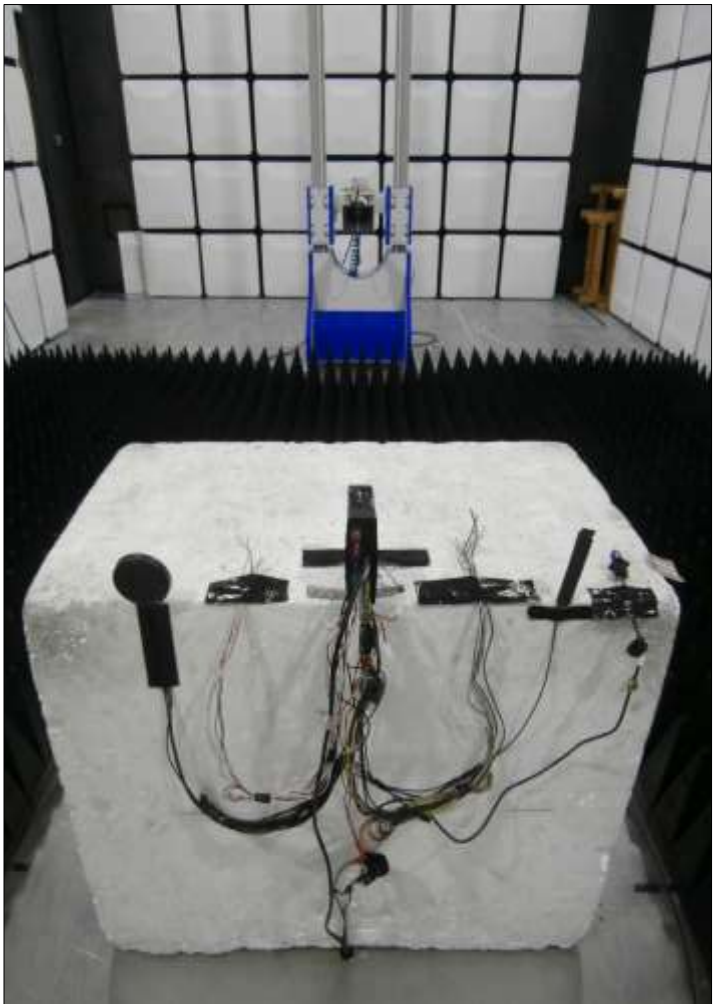

**Figure 25 - Test Setup - 1 GHz to 14 GHz - Z - Orientation**

### 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 Due |
|---|---|---|---|---|---|
| 3m Semi Anechoic Chamber | MVG | EMC-3 | 5621 | 36 | 11-Aug-2023 |
| EmX Emissions Software | TUV SUD | V2.1.0 | 5125 | - | Software |
| Test Receiver | Rohde & Schwarz | ESW44 | 5379 | 12 | 15-Dec-2021 |
| 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 |
| Tilt Antenna Mast TAM 4.0-P | Maturo Gmbh | Turntable 1.5 SI-2t | 5614 | - | TU |
| 3.5 mm 2m Cable | Junkosha | MWX221-02000DMS | 5428 | 12 | 15-Oct-2021 |
| 1m K-Type Cable | Junkosha | MWX241-01000KMSKMS/A | 5511 | 12 | 03-Apr-2021 |
| 8m N Type Cable | Junkosha | MWX221-08000NMSNMS/B | 5519 | 12 | 24-Mar-2021 |
| 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 40**

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 | 18-Mar-2021 |

**Table 41**

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<br>1 GHz to 40 GHz, Horn Antenna, ±6.3 dB |

**Table 42**

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.