Report on the FCC and IC Testing of:

Frontier Smart Technologies Limited

Minuet 2 Module (FS5352) and Minuet 2 Voice Reference Platform (FS6626)

In accordance with FCC 47 CFR Part 15, ISEDC RSS-247 and ISEDC RSS-GEN (Simultaneous Transmission)

Prepared for: Frontier Smart Technologies Limited
Ashwell Point
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Cambridge
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UNITED KINGDOM

Add value.
Inspire trust.

FCC ID: YYX-FS5352 IC: 11458A-FS5352

COMMERCIAL-IN-CONFIDENCE

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SIGNATURE			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Ryan Henley	Sales Manager – RF and Telecoms	Authorised Signatory	13 September 2019

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 15, ISEDC RSS-247 and ISEDC RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

SIGNATURE			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Graeme Lawler	Engineer	Testing	13 September 2019

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC2932B-1 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15: 2018, ISEDC RSS-247: Issue 2 (02-2017) and RSS-GEN Issue 5 (2018-04) 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	28 August 2019
2	To amend the customer address	13 September 2019

Table 1

1.2 Introduction

Applicant	Frontier Smart Technologies Limited
Manufacturer	Frontier Smart Technologies Limited
Model Number(s)	Minuet 2 Module FS5352 Minuet 2 Voice Reference Platform FS6626
Serial Number(s)	RAD113254 – Minuet 2 Module Radiated FCC Test Sample
Hardware Version(s)	Minuet 2 Module: Rev4 Minuet 2 Voice Reference Platform: ES1
Software Version(s)	NS2
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15: 2018 ISEDC RSS-247: Issue 2 (02-2017) ISEDC RSS-GEN Issue 5 (2018-04)
Order Number Date	FS190532 22-May-2019
Date of Receipt of EUT	11-June-2019 and 14-June-2019
Start of Test	15-July-2019
Finish of Test	16-July-2019
Name of Engineer(s)	Graeme Lawler

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15, ISEDC RSS-247 and ISEDC RSS-GEN is shown below.

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15	RSS-247	RSS-GEN			
Configuration and Mode: Bluetooth (2402 MHz, DH5) + 5 GHz WiFi (5500 MHz, 802.11a, 6 Mbps)						
2.1	15.247 (d), 15.407 (b) and 15.205	5.5 and 6.2	6.13	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	
Configuration and Mode: Bluetooth (2402 MHz, DH5) + 2.4 GHz WiFi (2462 MHz, 802.11b, 11 Mbps)						
2.1	15.247 (d) and 15.205	5.5	6.13	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	

Table 2

1.4 Application Form

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment)*	Minuet 2 is a module, which when installed in a consumer audio product enables high-quality audio streaming over Wi-Fi, Bluetooth, Ethernet and can be activated via voice commands. Where appropriate the Minuet 2 module is tested in the Minuet 2 Voice Reference Platform.
Manufacturer:	Frontier Smart Technologies Limited
Model:	Minuet 2 module (FS5352)
Part Number:	Minuet 2 module: HA-FS5352-xxxxxx (where xxxxxxx denotes the customer variant e.g. HA-FS5352-000001)
Hardware Version:	Minuet 2 module: Rev4
Software Version:	NS2
FCC ID (if applicable)	YYX-FS5352
IC ID (if applicable)	11458A-FS5352

Intentional Radiators

Technology	Bluetooth	WLAN 2.4GHz	WLAN 5GHz
Frequency Band (MHz)	2400-2483.5	2402-2482	5150-5350, 5470-5825
Conducted Declared Output Power (dBm)	6.5	16.5	16.5
Antenna Gain (dBi)	2.3	2.3	2.2 (5150-5250) 3.5 (5250-5350 MHz) 4.6 (5470-5725 MHz) 3.1 (5725-5825 MHz)
Supported Bandwidth(s) (MHz)	1, 2	20	20,40, 80
Modulation Scheme(s)	GFSK, DQPSK, 8-DPSK	BPSK, QPSK, 16-QAM, 64-QAM	BPSK, QPSK, 16-QAM, 64-QAM
ITU Emission Designator	1M00D, 2M00D	20M00D	20M00D, 40M00D, 80M00D
Bottom Frequency (MHz)	2400	2412	5180
Middle Frequency (MHz)	2441	2437	5500
Top Frequency (MHz)	2480	2472	5825

Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	5825 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	2402 MHz
Class A Digital Device (Use in commercial, industrial or business environment) ☑ Class B Digital Device (Use in residential environment only) ☑	

AC Power Source

AC supply frequency: 50 or 60 (Hz)	
100 - 240 V	Max current: 0.8 A
Single Phase ☑ Three Phase ☐	

DC Power Source

Nominal voltage: 5 V
Extreme upper voltage: 5.25 V
Extreme lower voltage: 4.75 V
Max current: 2 A

Battery Power Source

Voltage: 11.1 V
End-point voltage: 8.1 V *(Point at which the battery will terminate)*
Alkaline ☐ Leclanche ☐ Lithium ☐ Nickel Cadmium ☐ Lead Acid* ☐ **(Vehicle regulated)*
Other ☑ Please detail: Lithium-ion Polymer

Charging

Can the EUT transmit whilst being charged	Yes ☑ No ☐

Temperature

Minimum temperature: 0 °C	Maximum temperature: 70 °C

Antenna Characteristics

Antenna connector ☑ State impedance 50 Ohm
Temporary antenna connector ☐ State impedance Click to edit Ohm
Integral antenna ☐ Type Click to edit State impedance Click to edit dBi
External antenna ☑ Type PCB antenna State impedance 50 Ohm

Ancillaries (if applicable)

Manufacturer: Southstar	Part Number: N12-2128-R0A
Model: SW700M（SW750M)	Country of Origin: China

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

Name: Abdul Wahed Dewan
Position held: Principal RF Engineer
Date: 27/08/2019

1.5 Product Information

1.5.1 Technical Description

Minuet 2 is a module, which when installed in a consumer audio product enables high-quality audio streaming over Wi-Fi and Bluetooth and can be activated via voice commands. Where appropriate the Minuet 2 module is tested in the Minuet 2 Voice Reference Platform.

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
Serial Number: RAD113254			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

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: Bluetooth (2441 MHz, 3DH5) + 5 GHz WiFi (5500 MHz, 802.11a, 6 Mbps)		
Radiated Spurious Emissions (Simultaneous Transmission)	Graeme Lawler	UKAS
Configuration and Mode: Bluetooth (2441 MHz, 3DH5) + 2.4 GHz WiFi (2437 MHz, 802.11b, 11 Mbps)		
Radiated Spurious Emissions (Simultaneous Transmission)	Graeme Lawler	UKAS

Table 4

Office Address:

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

2 Test Details

2.1 Radiated Spurious Emissions (Simultaneous Transmission)

2.1.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.247 (d), 15.407 (b) and 15.205
ISEDC RSS-247. Clause 5.5 and 6.2
ISEDC RSS-GEN, Clause 6.13

2.1.2 Equipment Under Test and Modification State

Minuet 2 Module (FS5352), S/N: RAD113254 - Modification State 0

2.1.3 Date of Test

15-July-2019 to 16-July-2019

2.1.4 Test Method

This test was performed in accordance with ANSI C63.10-2013 clause 6.3, 6.5 and 6.6.
The EUT was placed on the non-conducting platform in a manner typical of a normal installation. 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.

Ports on the EUT were terminated with loads as described in ANSI C63.4 clause 6.2.4. For EUT's with multiple connectors of the same type, additional interconnecting cables were connected and pre-scans performed to determine whether the level of the emissions were increased by >2 dB. For frequencies > 1 GHz, plots for average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.5 to characterize the EUT. Where emissions were detected, final average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.2.

The plots shown are the characterization of the EUT. The limits on the plots represent the most stringent case for restricted bands, (74/54 dBuV/m) when compared to 20 dBc outside restricted bands. The limits shown have been used as a threshold to determine where further measurements are necessary. Where results are within 10 dB of the limits shown on the plots, further investigation was carried out and reported in results tables.

The following conversion can be applied to convert from dBµV/m to µV/m:

10^(Field Strength in dBµV/m/20).

To determine the emission characteristic of the EUT above 18 GHz, the test antenna was swept over all faces of the EUT whilst observing a spectral display. The frequency of any emissions of interest was noted for formal measurement at the correct measurement distance of 1m. This procedure was repeated for all relevant transmit operating channels.

At a measurement distance of 1 meter the limit line was increased by 20*LOG(3/1) = 9.54 dB. Representative noise floor plots are presented in the plot section of the report for one operating channel only.

Where formal measurements have been necessary, the results have been presented in the emissions table.

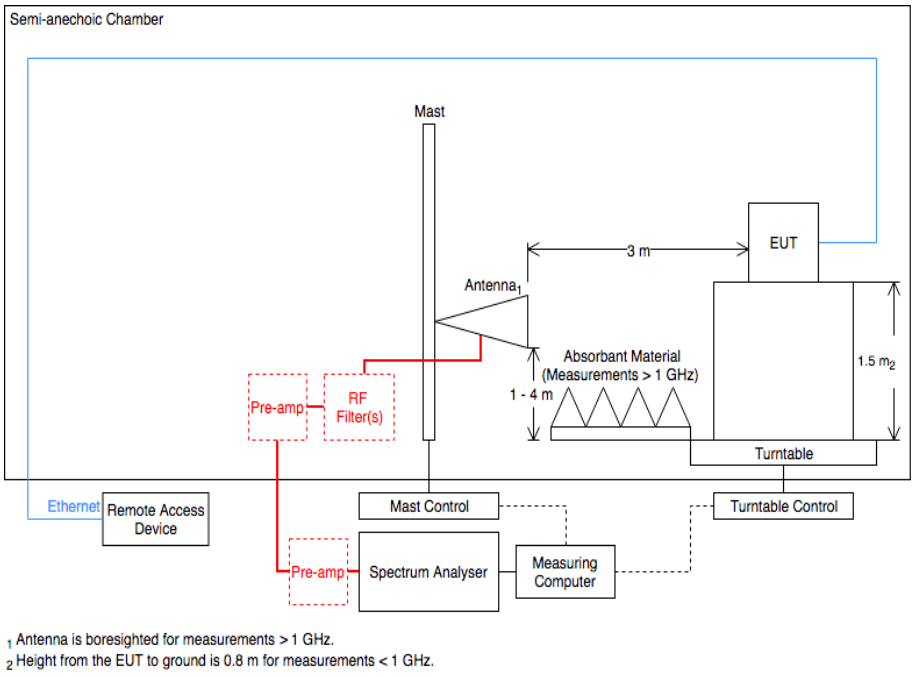

Figure 1 – Radiated Emissions Test Setup Diagram

2.1.5 Environmental Conditions

Ambient Temperature	16.5 °C
Relative Humidity	62.8 %

2.1.6 Test Results

Bluetooth (2402 MHz, DH5) + 5 GHz WiFi (5500 MHz, 802.11a and 6 Mbps)

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

Technology	Frequency Band (MHz)	Channel Frequency (MHz)
Bluetooth (DH5)	2400 MHz to 2483.5 MHz	2402 MHz
WLAN (802.11a)	5470 to 5725 MHz (U-NII 2c)	5500 MHz

Table 5 - Modes of Operation

Frequency (MHz)	Level	Limit	Margin	Detector	Unit	Angle (°)	Height (cm)	Polarisation
4804.340	49.5	54.0	-4.5	Peak	dBuV/m	90	187	Horizontal
4882.335	46.0	54.0	-8.1	Peak	dBuV/m	90	100	Horizontal
16495.090	60.8	68.2	-7.4	Peak	dBuV/m	64	209	Vertical
16495.270	61.0	68.2	-7.2	Peak	dBuV/m	248	100	Horizontal

Table 6 - 30 MHz to 1 GHz Emissions Results – X Orientation

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

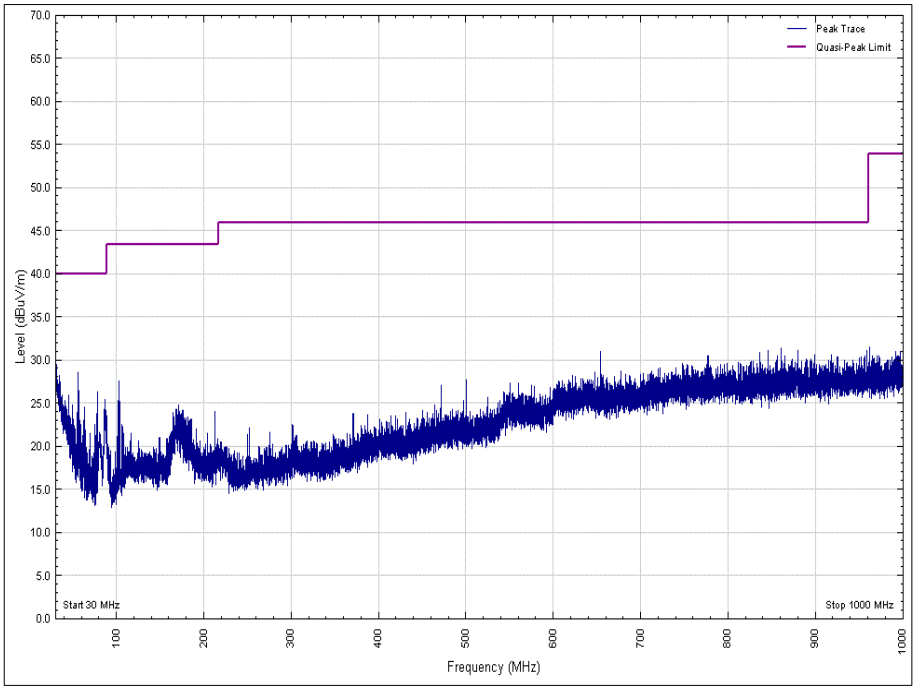

Figure 2 - 30 MHz to 1 GHz – Vertical – X Orientation

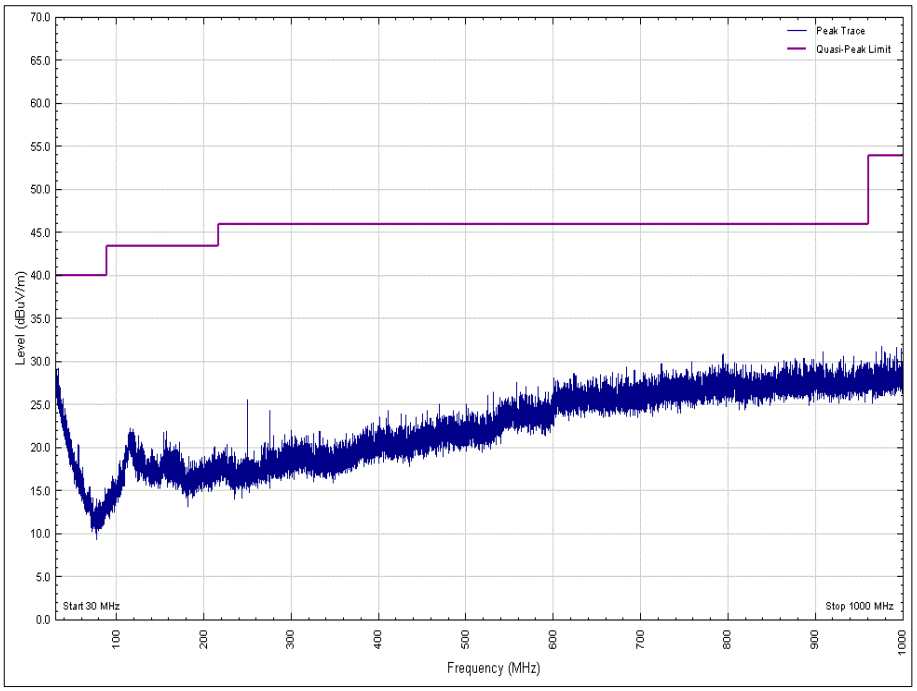

Figure 3 - 30 MHz to 1 GHz - Horizontal – X Orientation

Frequency (MHz)	Level	Limit	Margin	Detector	Unit	Angle (°)	Height (cm)	Polarisation
16501.325	58.4	68.2	-9.8	Peak	dBuV/m	177	100	Horizontal
16503.660	60.7	68.2	-7.5	Peak	dBuV/m	78	102	Vertical

Table 7 - 30 MHz to 1 GHz Emissions Results – Y Orientation

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

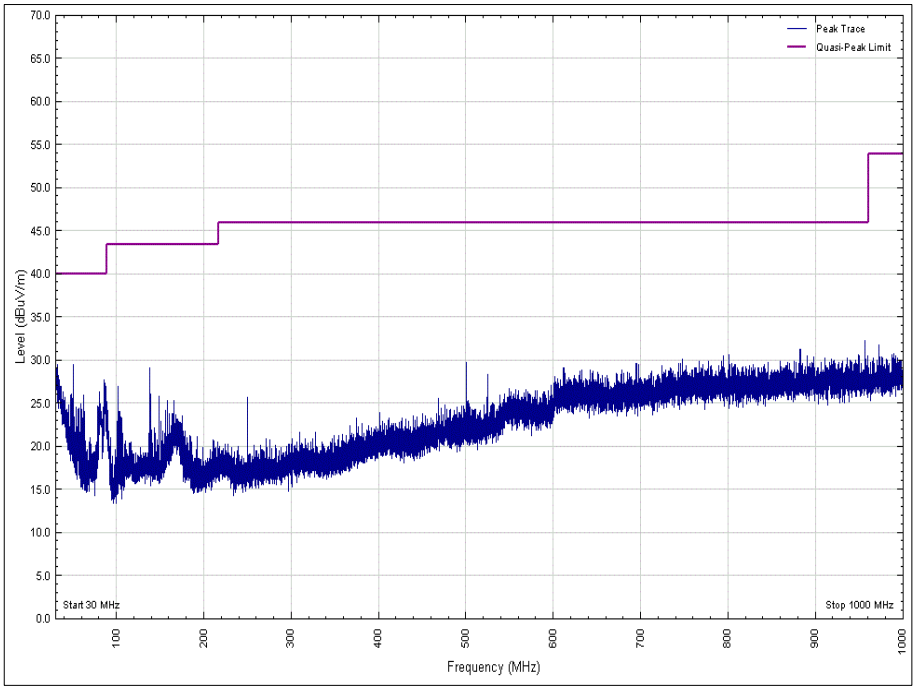

Figure 4 - 30 MHz to 1 GHz – Vertical – Y Orientation

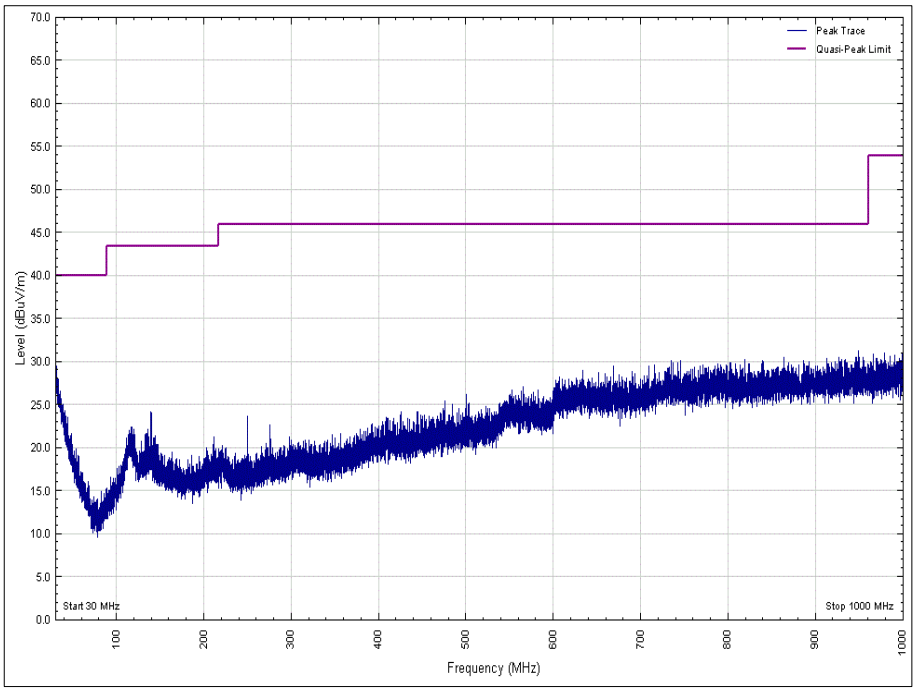

Figure 5 - 30 MHz to 1 GHz – Horizontal – Y Orientation

Frequency (MHz)	Level	Limit	Margin	Detector	Unit	Angle (°)	Height (cm)	Polarisation
4882.275	44.5	54.0	-9.5	Peak	dBuV/m	107	100	Horizontal
16495.185	59.8	68.2	-8.4	Peak	dBuV/m	100	393	Horizontal

Table 8 - 30 MHz to 1 GHz Emissions Results – Z Orientation

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

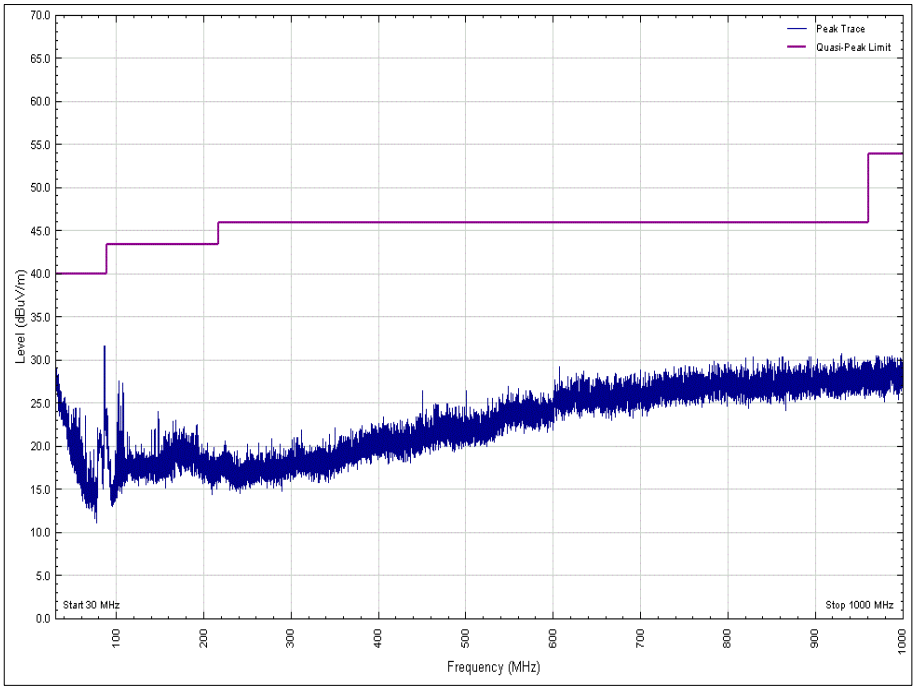

Figure 6 - 30 MHz to 1 GHz – Vertical – Z Orientation

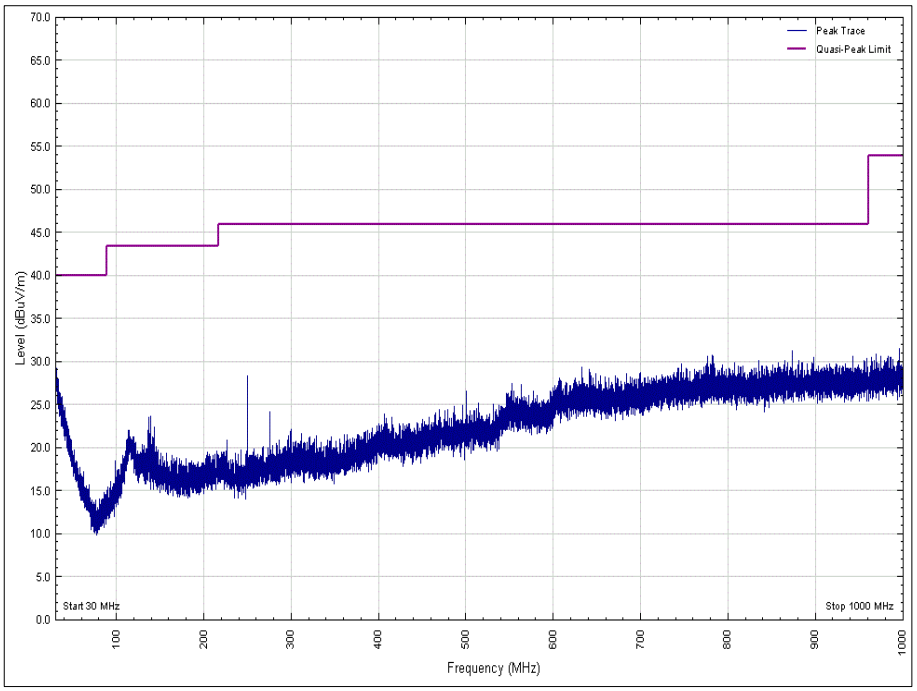

Figure 7 - 30 MHz to 1 GHz – Horizontal – Z Orientation

Frequency (GHz)	Result (µV/m)		Limit (µV/m)		Margin (µV/m)	
	Peak	Average	Peak	Average	Peak	Average
4.804340	-	49.97	-	53.98	-	4.01

Table 9 - 1 GHz to 40 GHz Emissions Results - X Orientation

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

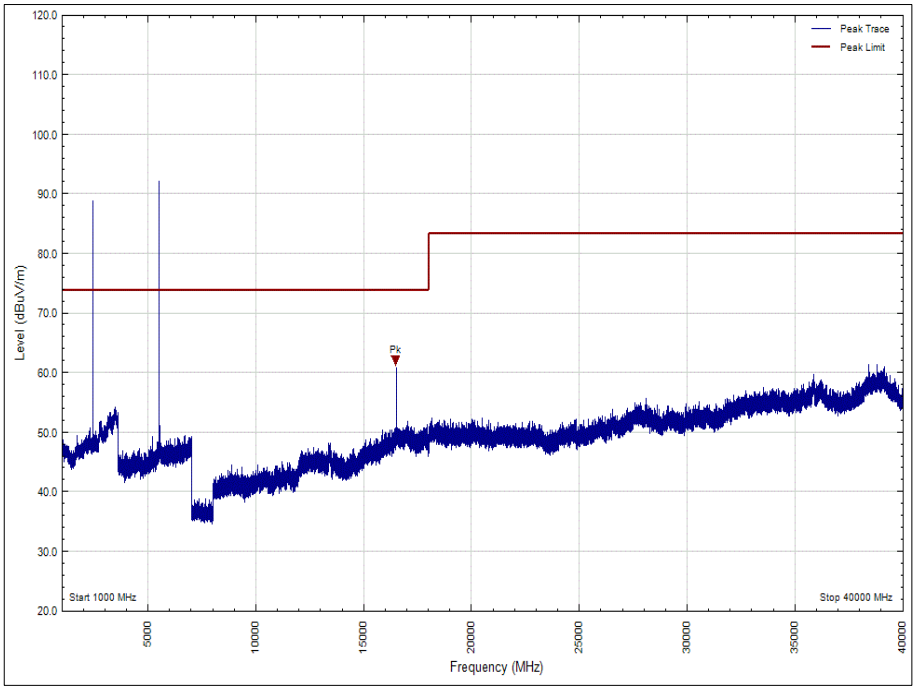

Figure 8 - 1 GHz to 40 GHz - X Orientation - Peak, Polarisation: Vertical

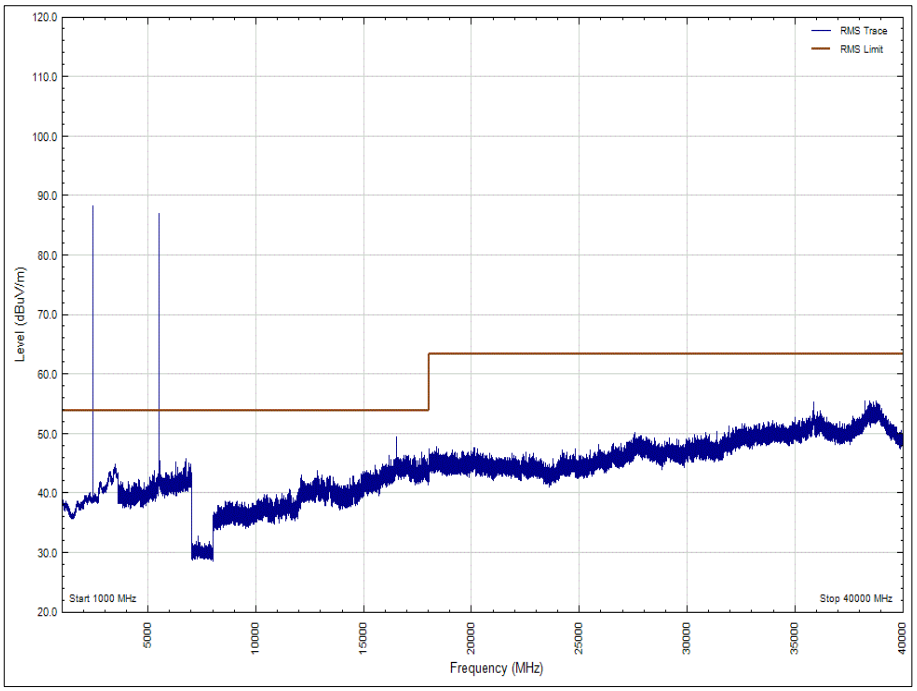

Figure 9 - 1 GHz to 40 GHz - X Orientation - Average, Polarisation: Vertical

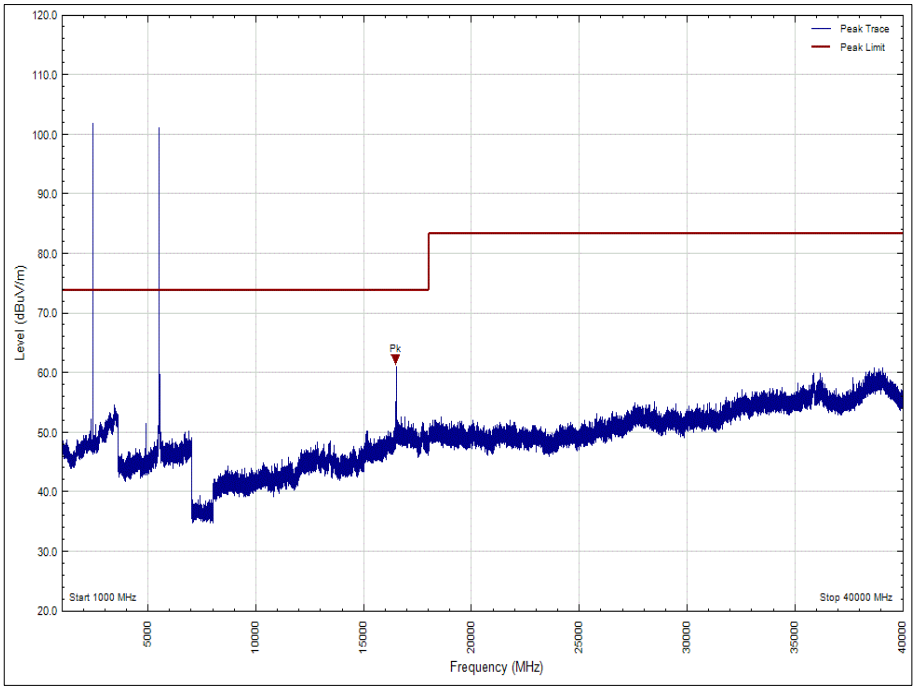

Figure 10 - 1 GHz to 40 GHz - X Orientation - Peak, Polarisation: Horizontal

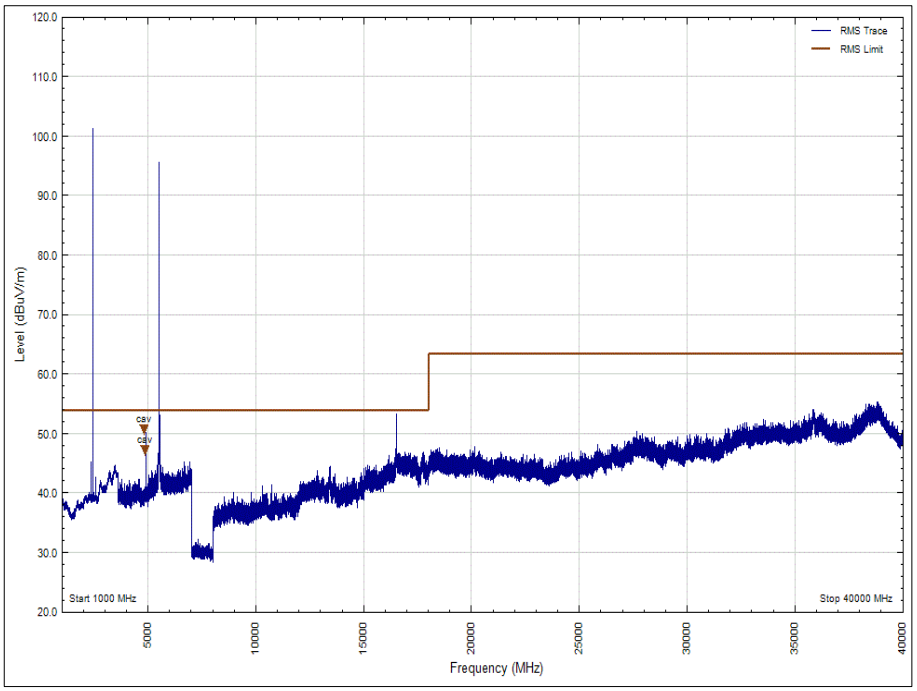

Figure 11 - 1 GHz to 40 GHz - X Orientation - Average, Polarisation: Horizontal

Frequency (GHz)	Result (µV/m)		Limit (µV/m)		Margin (µV/m)	
	Peak	Average	Peak	Average	Peak	Average
*						

Table 10 - 1 GHz to 18 GHz Emissions Results - Y Orientation

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

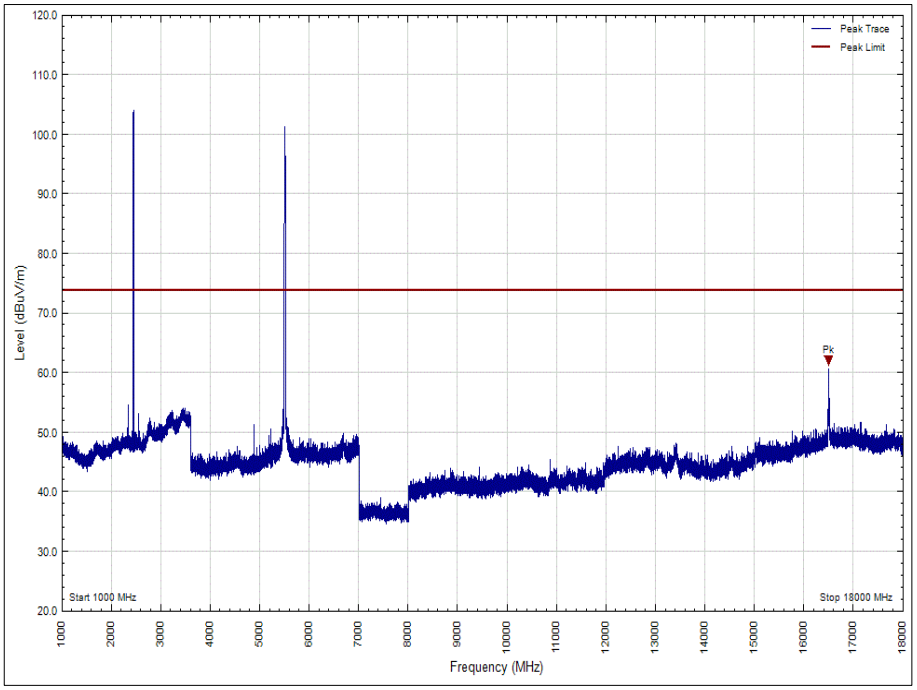

Figure 12 - 1 GHz to 18 GHz - Y Orientation - Peak, Polarisation: Vertical

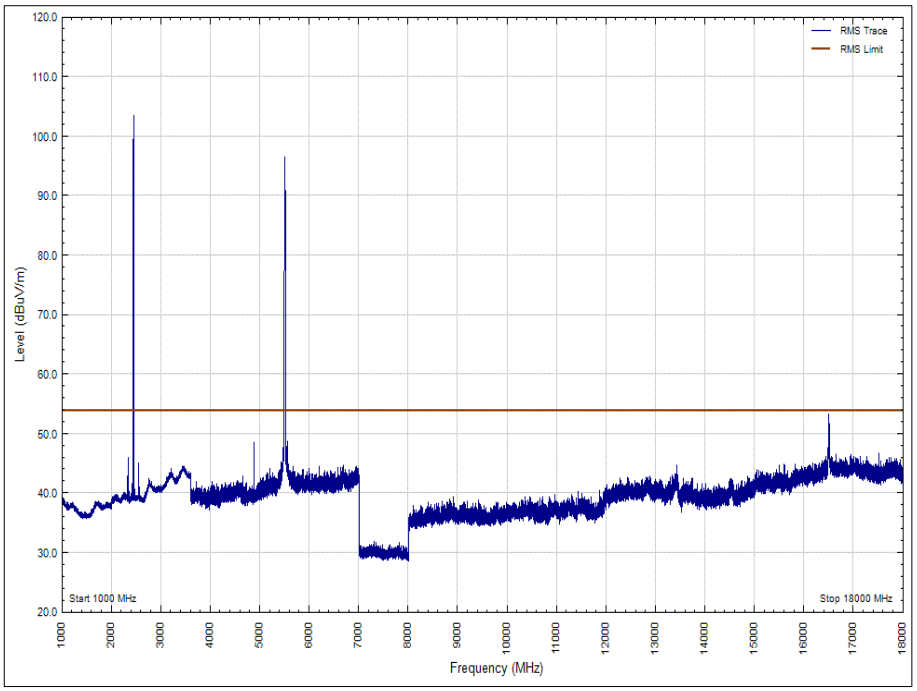

Figure 13 - 1 GHz to 18 GHz - Y Orientation - Average, Polarisation: Vertical

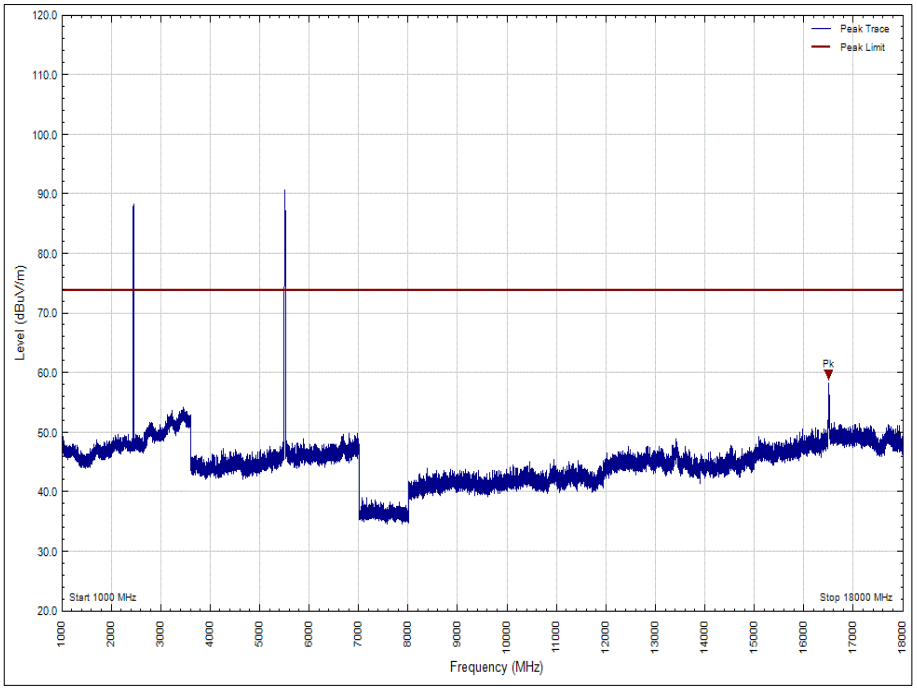

Figure 14 - 1 GHz to 18 GHz - Y Orientation - Peak, Polarisation: Horizontal

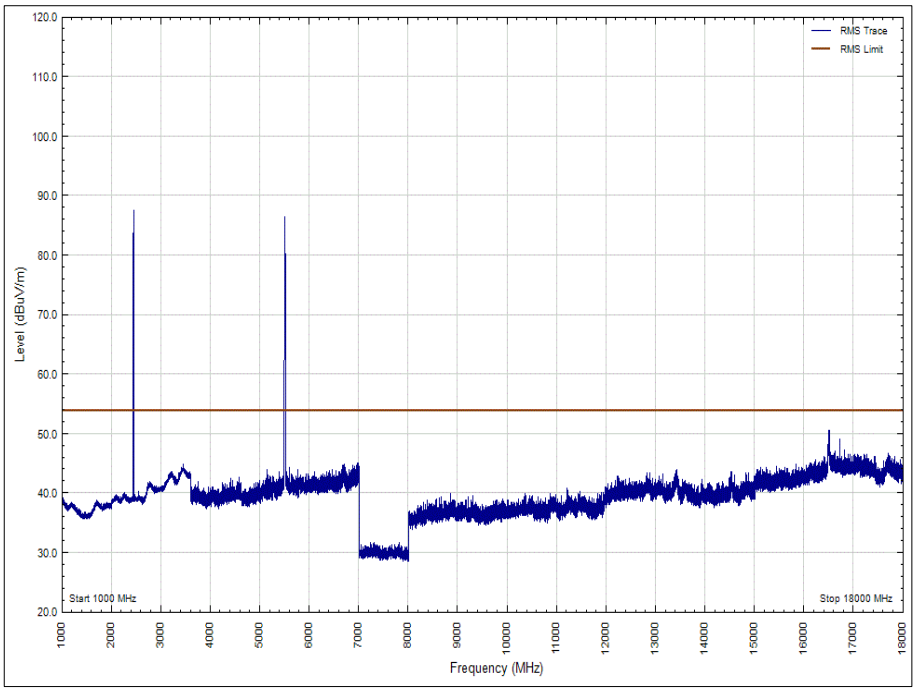

Figure 15 - 1 GHz to 18 GHz - Y Orientation - Average, Polarisation: Horizontal

Frequency (GHz)	Result (µV/m)		Limit (µV/m)		Margin (µV/m)	
	Peak	Average	Peak	Average	Peak	Average
*						

Table 11 - 1 GHz to 18 GHz Emissions Results – Z Orientation

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

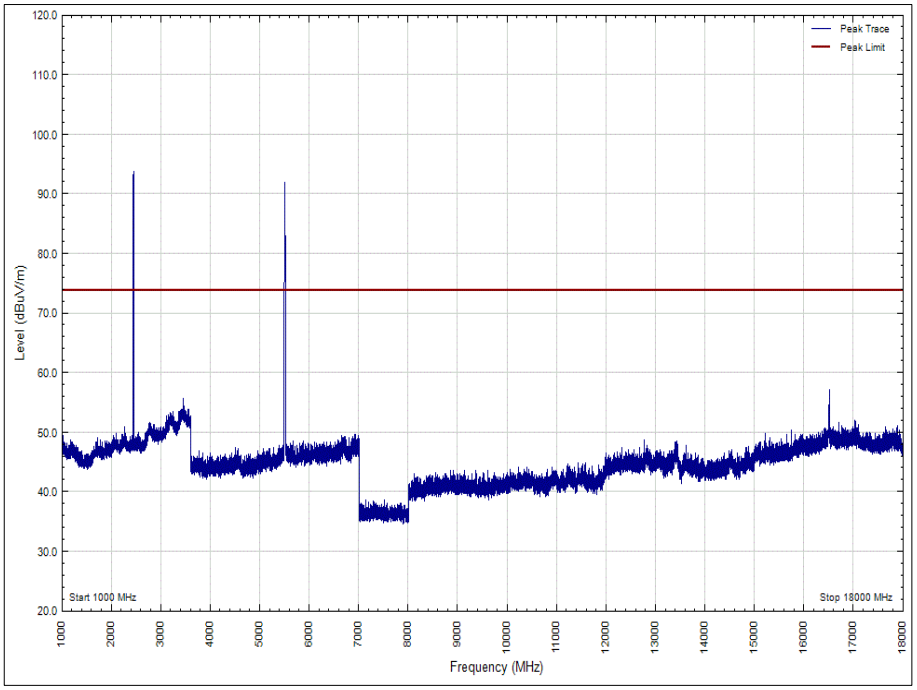

Figure 16 - 1 GHz to 18 GHz - Z Orientation - Peak, Polarisation: Vertical

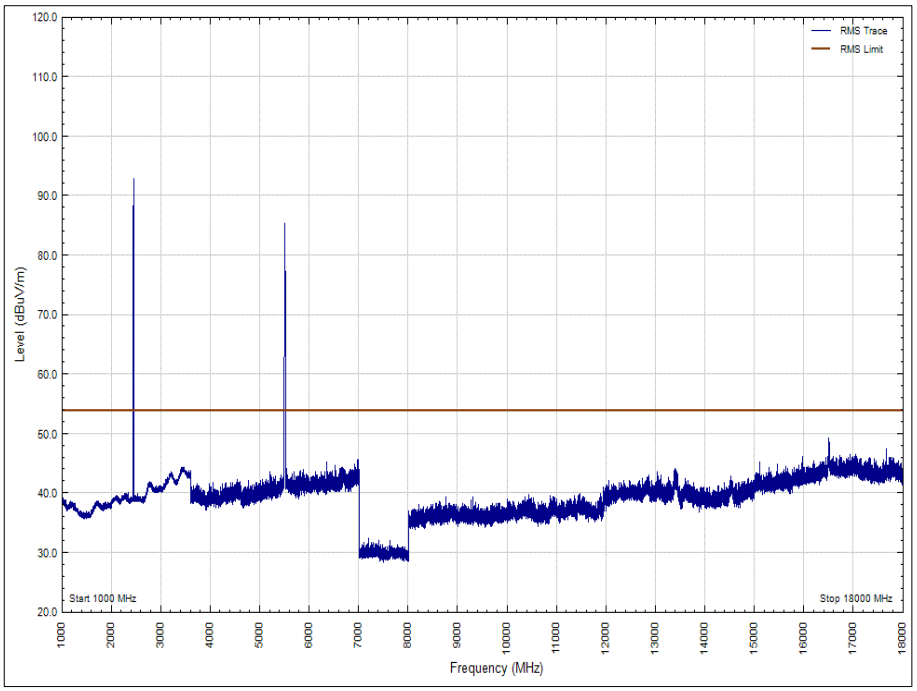

Figure 17 - 1 GHz to 18 GHz - Z Orientation - Average, Polarisation: Vertical

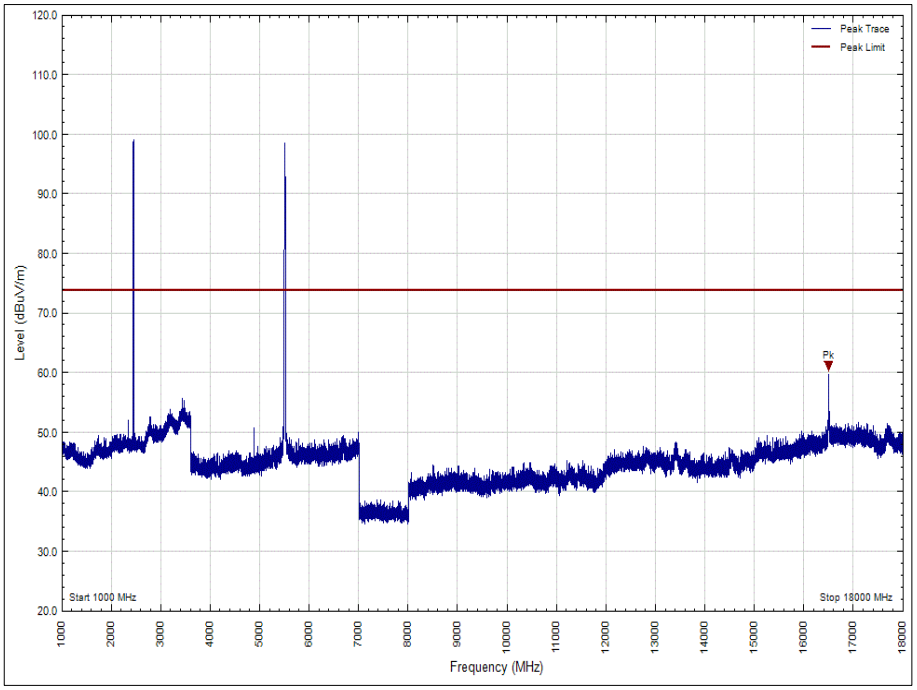

Figure 18 - 1 GHz to 18 GHz - Z Orientation - Peak, Polarisation: Horizontal

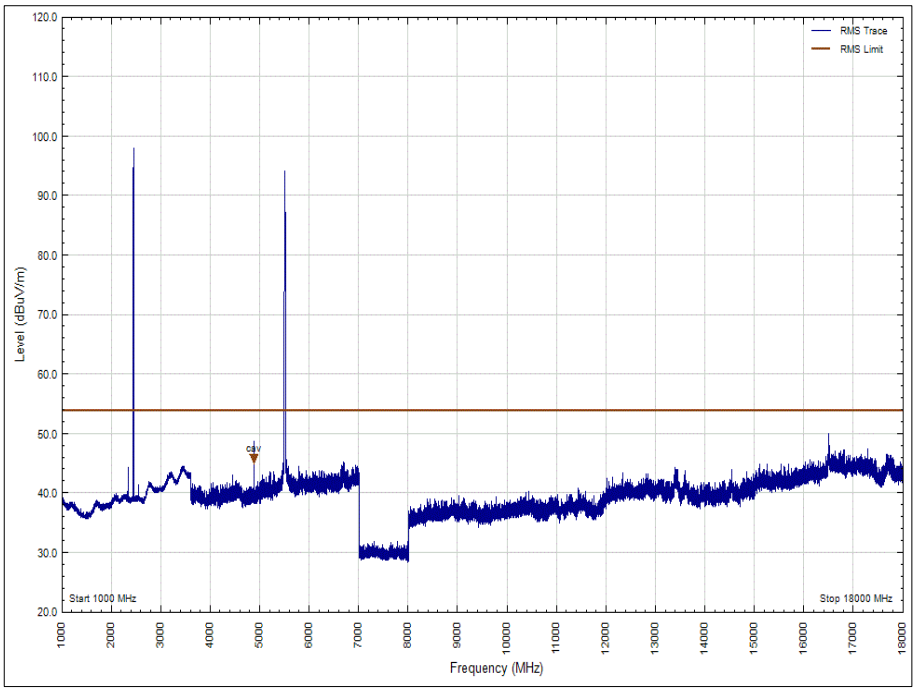

Figure 19 - 1 GHz to 18 GHz - Z Orientation - Average, Polarisation: Horizontal

FCC 47 CFR Parts 15.247(d), 15.407(b), 15.205

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

The least stringent applicable limit was:

Rule Part	Limit
Part 15.205 and Part 15.247 (d) and 15.407	Peak: 74 dBµV/m at 3m, Average 54 dBµV/m at 3m inside restricted bands and -20dBc or -27 dBm EIRP outside of restricted bands

Table 12 - Limit Table

ISEDC RSS-247 Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the
100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

ISEDC RSS-247, Limit Clause 6.2

The output power and e.i.r.p. of the equipment wanted emission shall be measured in terms of average value.

The power and e.i.r.p. of the equipment unwanted emission shall be measured in peak value.
However, the equipment is required to comply with the provisions in RSS-Gen with respect to emissions falling within restricted frequency bands which are listed in the same standard.
If the transmission is in bursts, the provisions of RSS-Gen for pulsed operation shall apply.
The outermost carrier frequencies or channels shall be used when measuring unwanted emissions.
Such carrier or channel centre frequencies are to be indicated in the test report.

ISEDC RSS-GEN, Limit Clause 8.10 Table 7

Peak: 74 dBµV/m at 3m, Average 54 dBµV/m at 3m inside restricted bands.

Bluetooth (2402 MHz, DH5) + 2.4 GHz WiFi (2462 MHz, 802.11b and 11 Mbps)

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

Technology	Frequency Band (MHz)	Channel Frequency (MHz)
Bluetooth	2400 MHz to 2483.5 MHz	2402 MHz
802.11b	2400 MHz to 2483.5 MHz	2462 MHz

Table 13 - Modes of Operation

Frequency (MHz)	Level	Limit	Margin	Detector	Unit	Angle (°)	Height (cm)	Polarisation
4924.035	45.0	54.0	-9.0	Peak	dBuV/m	231	100	Horizontal

Table 14 - 30 MHz to 1 GHz Emissions Results – X Orientation

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

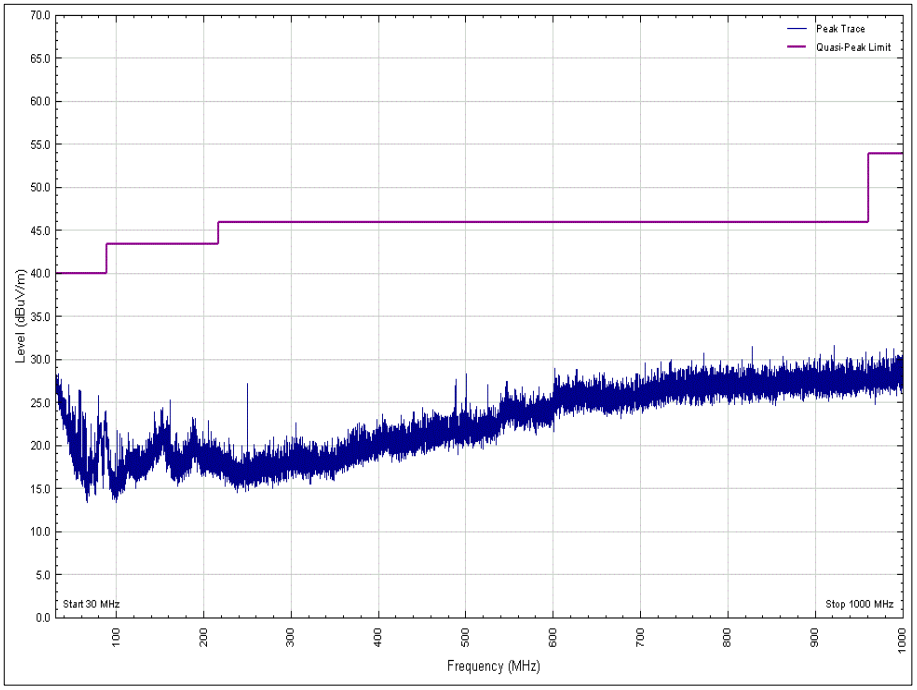

Figure 20 - 30 MHz to 1 GHz – Vertical – X Orientation

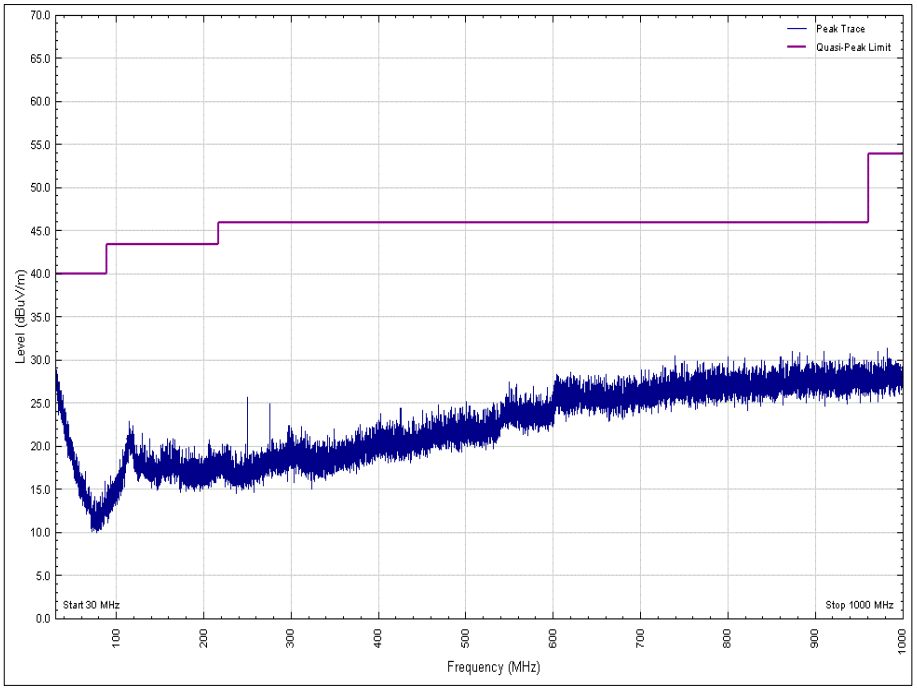

Figure 21 - 30 MHz to 1 GHz – Horizontal – X Orientation

Frequency (MHz)	Level	Limit	Margin	Detector	Unit	Angle (°)	Height (cm)	Polarisation
4923.925	45.0	54.0	-9.0	Peak	dBuV/m	69	100	Vertical

Table 15 - 30 MHz to 1 GHz Emissions Results – Y Orientation

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

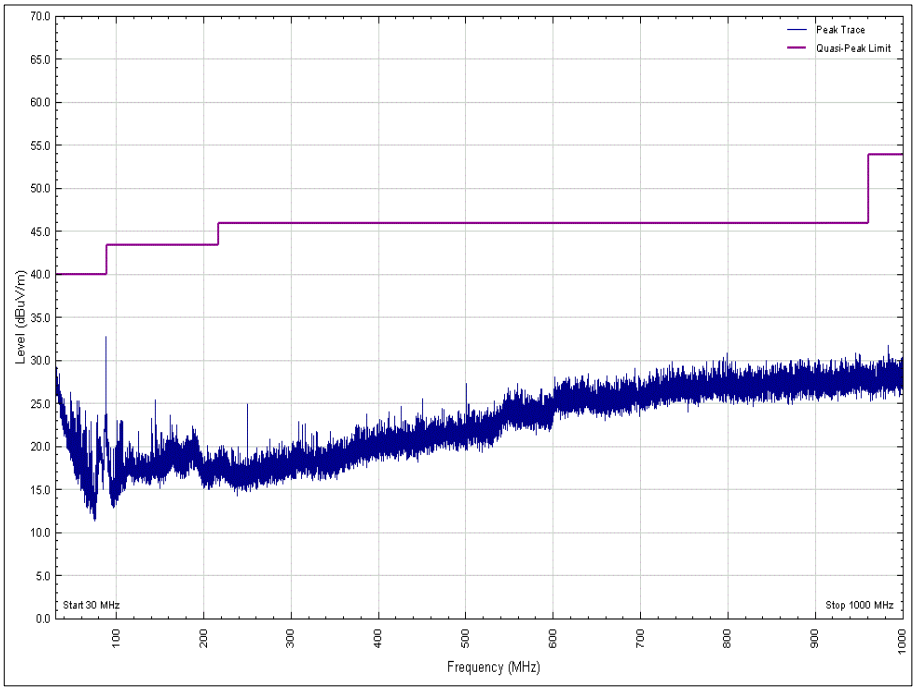

Figure 22 - 30 MHz to 1 GHz – Vertical – Y Orientation

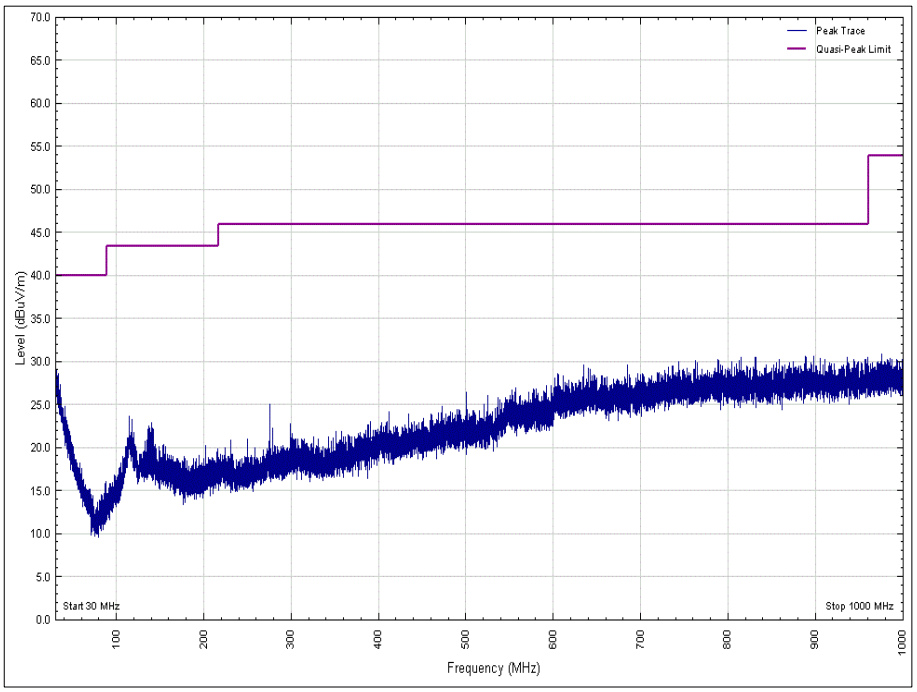

Figure 23 - 30 MHz to 1 GHz – Horizontal – Y Orientation

Frequency (MHz)	Level	Limit	Margin	Detector	Unit	Angle (°)	Height (cm)	Polarisation
*								

Table 16 - 30 MHz to 1 GHz Emissions Results – Z Orientation

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

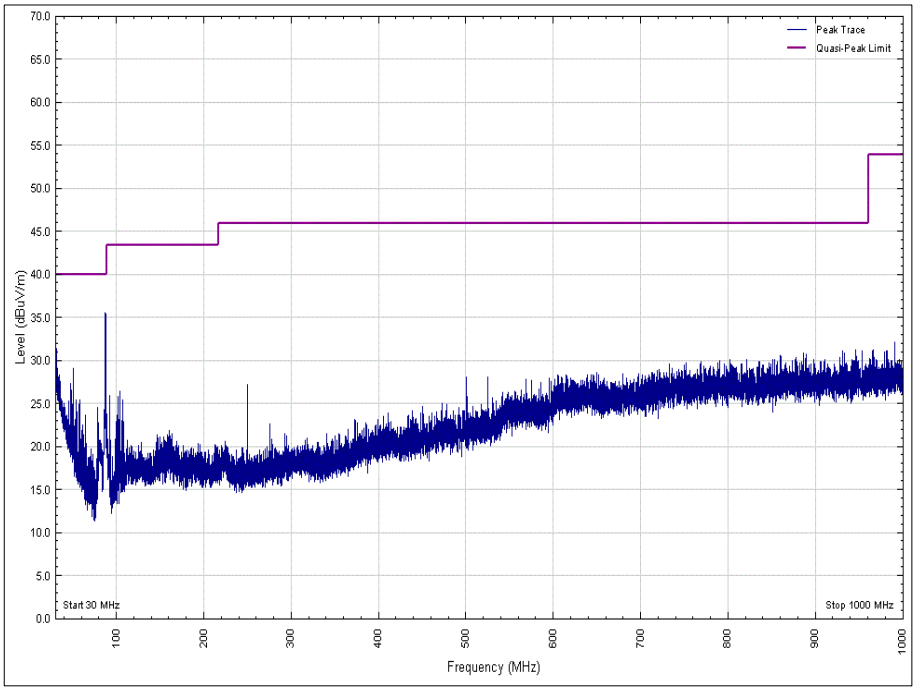

Figure 24 - 30 MHz to 1 GHz – Vertical – Z Orientation

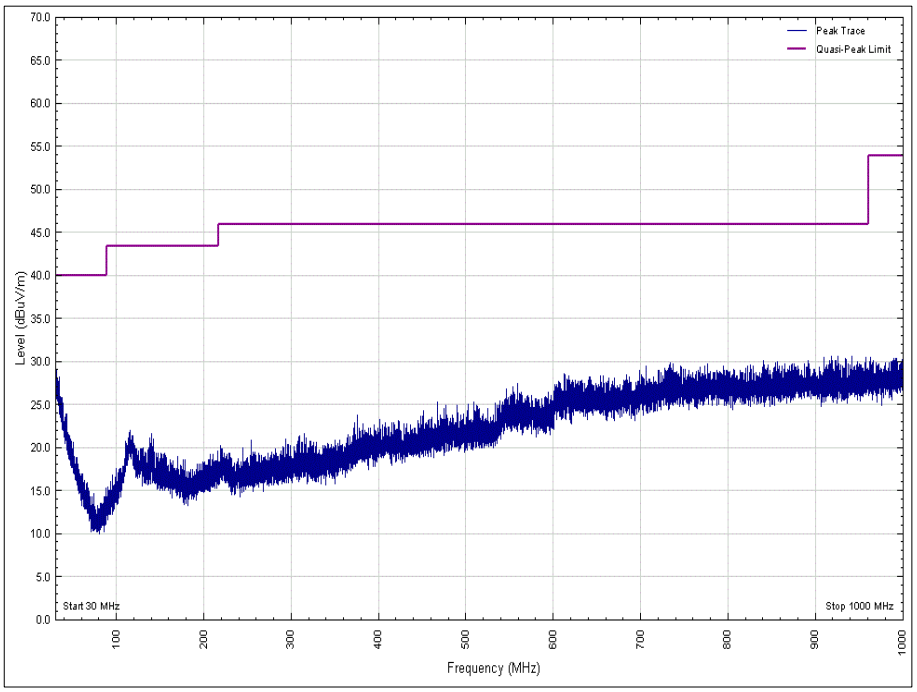

Figure 25 - 30 MHz to 1 GHz – Horizontal Vertical – Z Orientation

Frequency (GHz)	Result (µV/m)		Limit (µV/m)		Margin (µV/m)	
	Peak	Average	Peak	Average	Peak	Average
4.923925	-	45.52	-	53.98	-	8.46

Table 17 - 1 GHz to 25 GHz Emissions Results - X Orientation

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

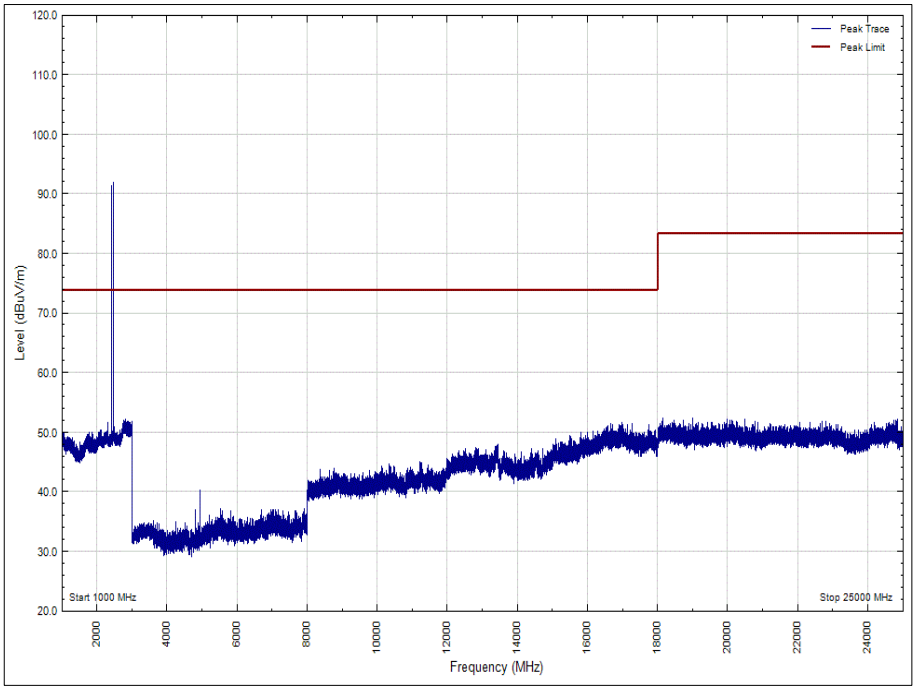

Figure 26 - 1 GHz to 25 GHz - X Orientation - Peak, Polarisation: Vertical

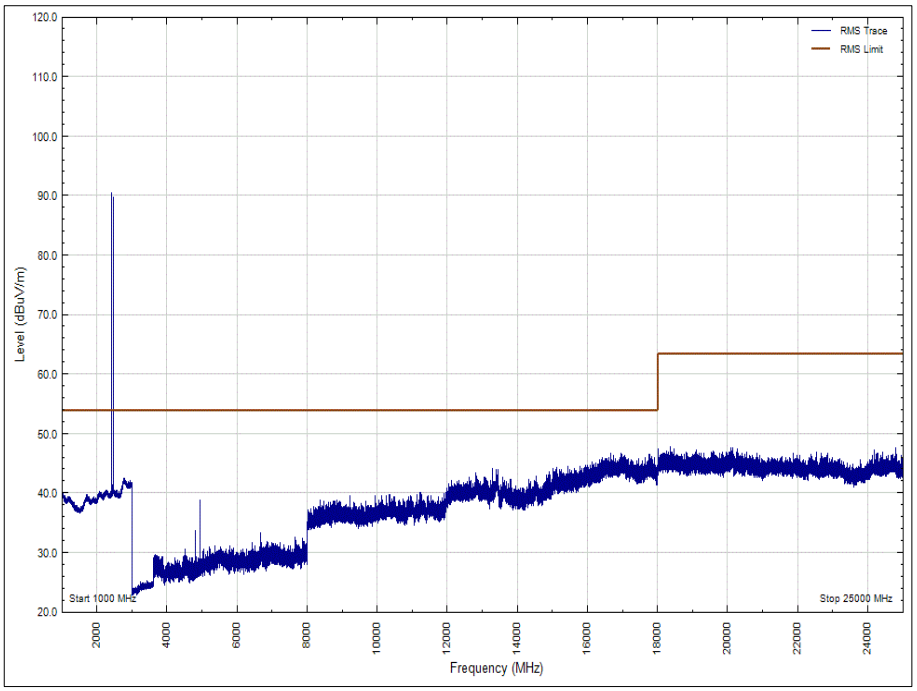

Figure 27 - 1 GHz to 25 GHz - X Orientation - Average, Polarisation: Vertical

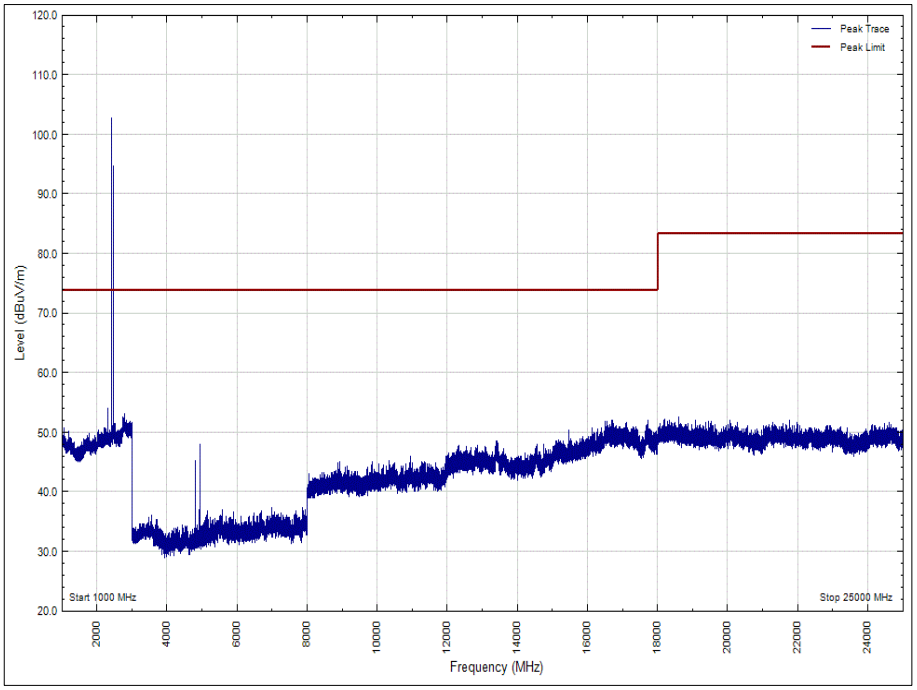

Figure 28 - 1 GHz to 25 GHz - X Orientation - Peak, Polarisation: Horizontal

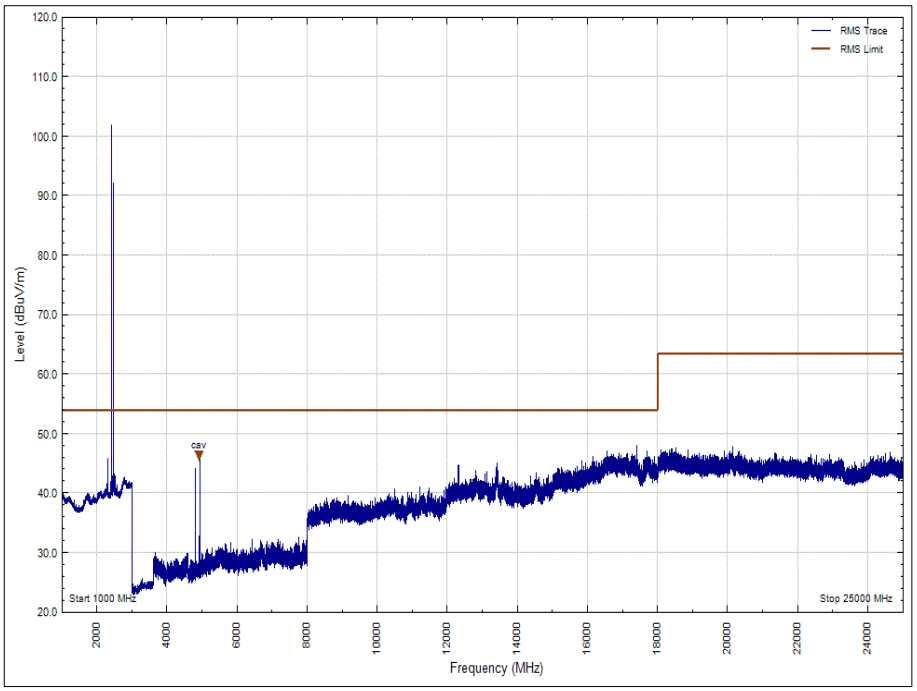

Figure 29 - 1 GHz to 25 GHz - X Orientation - Average, Polarisation: Horizontal

Frequency (GHz)	Result (µV/m)		Limit (µV/m)		Margin (µV/m)	
	Peak	Average	Peak	Average	Peak	Average
*						

Table 18 - 1 GHz to 18 GHz Emissions Results – Y Orientation

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

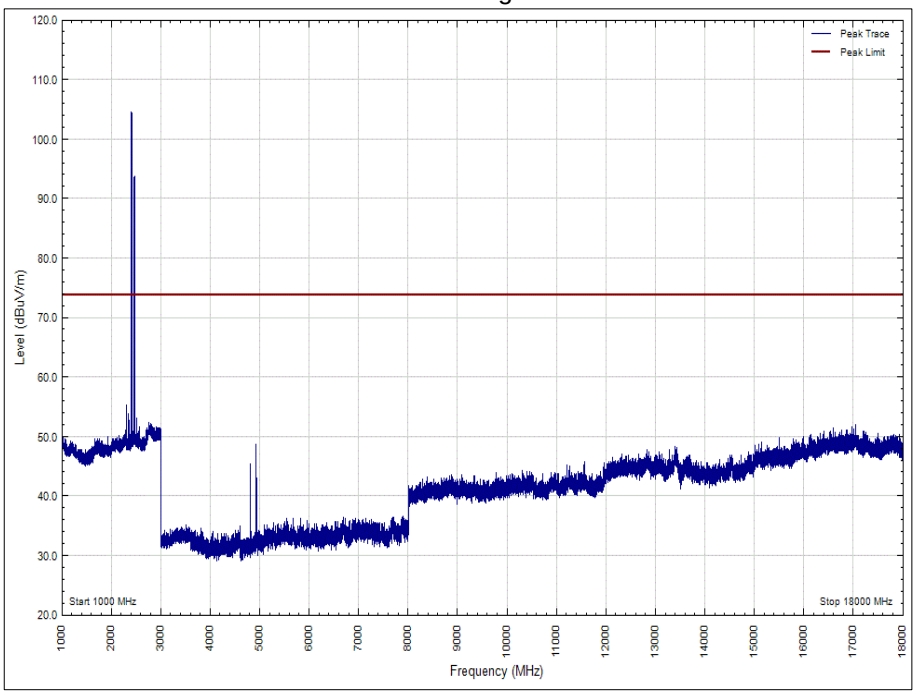

Figure 30 - 1 GHz to 18 GHz - Y Orientation - Peak, Polarisation: Vertical

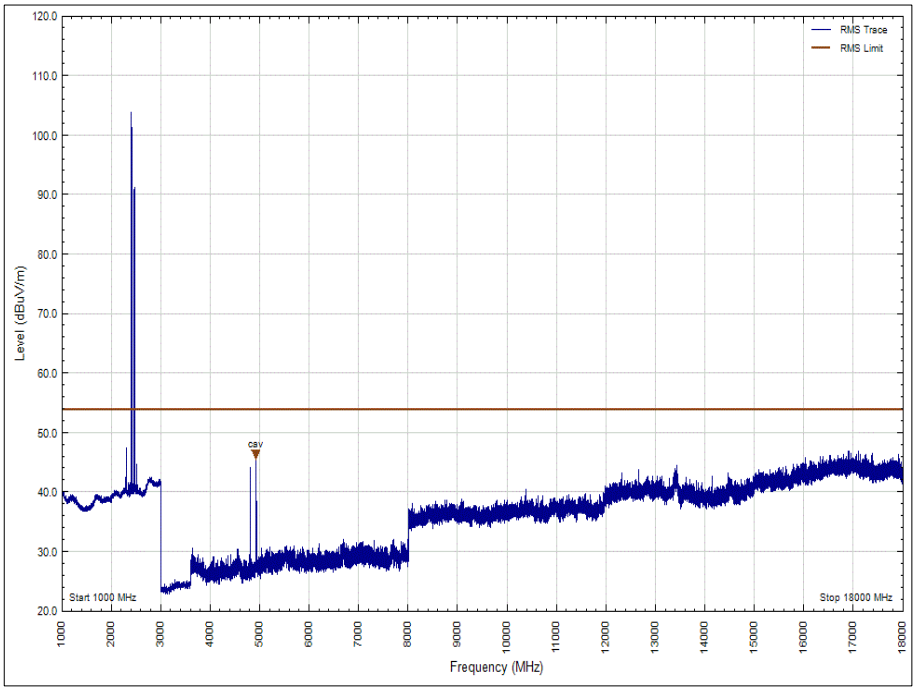

Figure 31 - 1 GHz to 18 GHz - Y Orientation - Average, Polarisation: Vertical

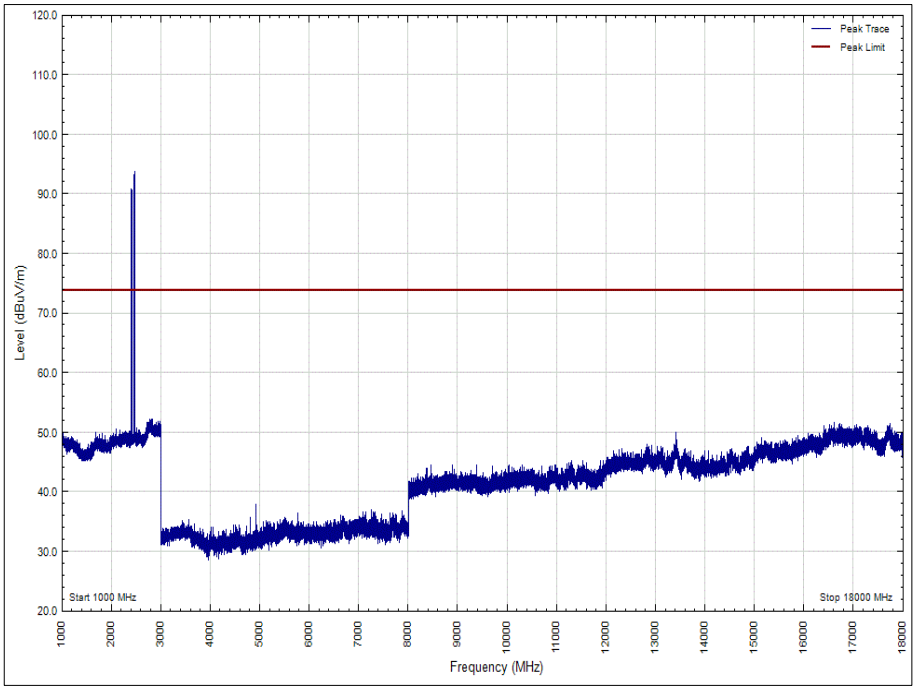

Figure 32 - 1 GHz to 18 GHz - Y Orientation - Peak, Polarisation: Horizontal

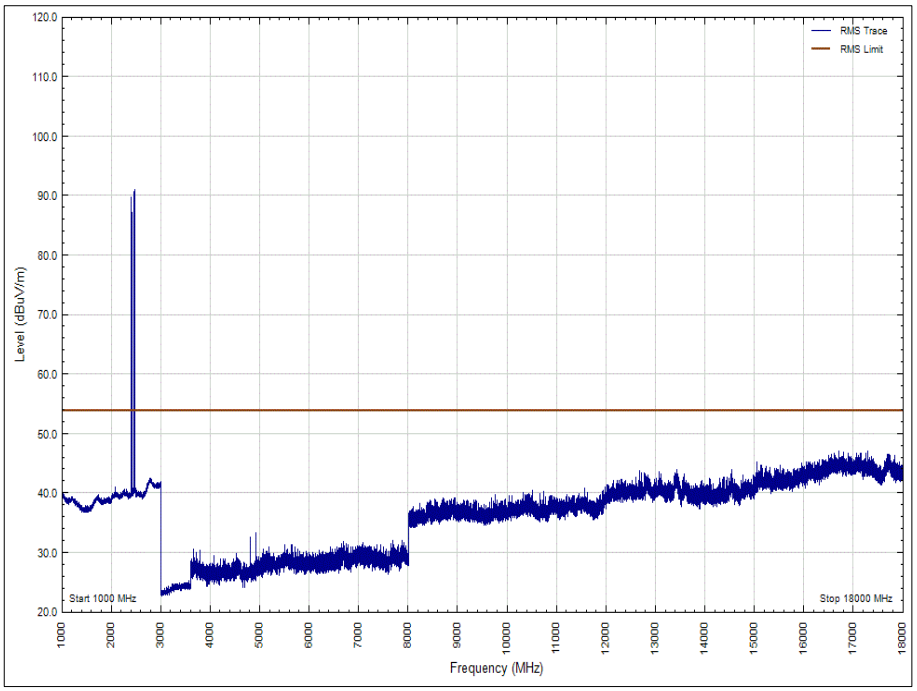

Figure 33 - 1 GHz to 18 GHz - Y Orientation - Average, Polarisation: Horizontal

Frequency (GHz)	Result (µV/m)		Limit (µV/m)		Margin (µV/m)	
	Peak	Average	Peak	Average	Peak	Average
*						

Table 19 - 1 GHz to 18 GHz Emissions Results – Y Orientation

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

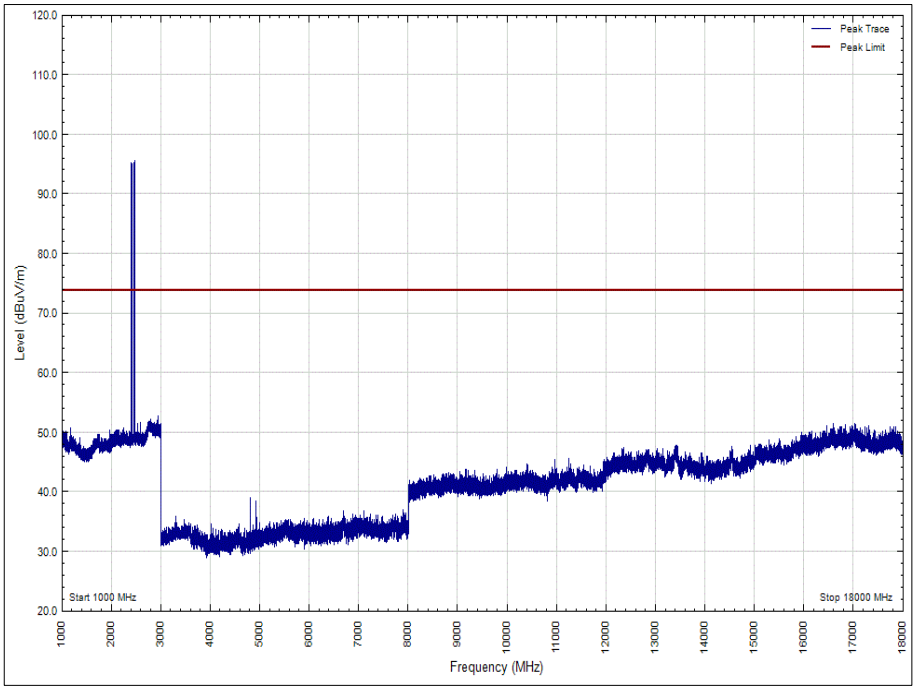

Figure 34 - 1 GHz to 18 GHz - Z Orientation - Peak, Polarisation: Vertical

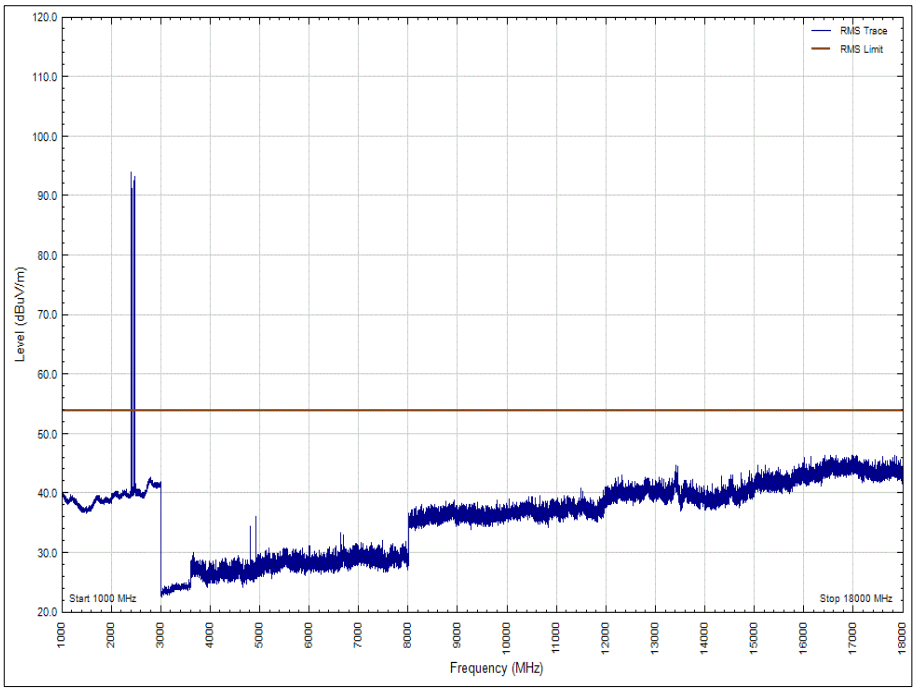

Figure 35 - 1 GHz to 18 GHz - Z Orientation - Average, Polarisation: Vertical

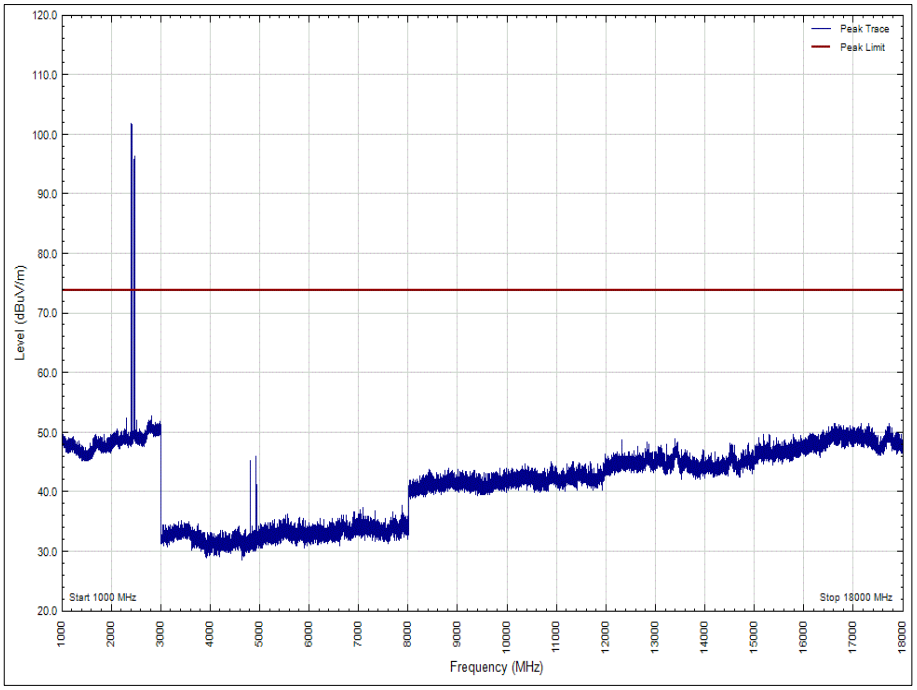

Figure 36 - 1 GHz to 18 GHz - Z Orientation - Peak, Polarisation: Horizontal

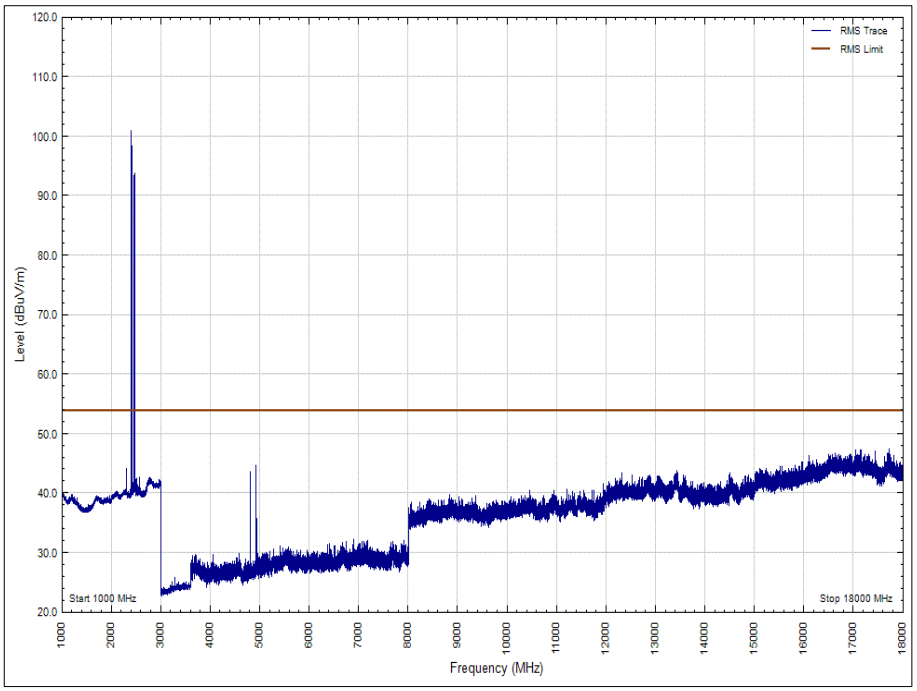

Figure 37 - 1 GHz to 18 GHz - Z Orientation - Average, Polarisation: Horizontal

FCC 47 CFR Parts 15.247(d), 15.407(b) and 15.205,

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

The least stringent applicable limit was:

Rule Part	Limit
Part 15.205, 15.407 and 15.247 (d)	Peak: 74 dBµV/m at 3m, Average 54 dBµV/m at 3m inside restricted bands and -20dBc at 3m outside of restricted bands

Table 20 - Limit Table

ISEDC RSS-247 Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

ISEDC RSS-GEN, Limit Clause 8.10 Table 7

Peak: 74 dBµV/m at 3m, Average 54 dBµV/m at 3m inside restricted bands.

2.1.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Antenna 18-40GHz (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	2-May-2020
Filter (High Pass)	Lorch	SHP7-7000-SR	566	12	6-Jun-2020
Pre-Amplifier	Phase One	PS04-0086	1533	12	8-Feb-2020
18GHz - 40GHz Pre-Amplifier	Phase One	PSO4-0087	1534	12	5-Feb-2020
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygromer	Rotronic	A1	2677	12	20-Feb-2020
Antenna with permanent attenuator (Bilog)	Chase	CBL6143	2904	24	8-Aug-2019
Comb Generator	Schaffner	RSG1000	3034	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	17-Dec-2019
Cable 1503 2M 2.92(P)m 2.92(P)m	Rhophase	KPS-1503A-2000-KPS	4293	12	26-Oct-2019
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	25-Oct-2019
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	11-Dec-2019
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	5-Mar-2020
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	TU
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	11-Mar-2020
4dB Attenuator	Pasternack	PE7047-4	4935	24	28-Nov-2019
8m N-Type RF Cable	Teledyne	PR90-088-8MTR	5093	12	4-Oct-2019
Cable (18 GHz)	Rosenberger	LU7-071-2000	5109	12	5-Oct-2019
EmX Software	TUV SUD	EmX V.1.4.6	5125	-	N/A - Software
1.5m 40GHz RF Cable	Scott Cables	KPS-1501-2000-KPS	5127	6	11-Dec-2019
3 GHz High pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	5220	12	15-Feb-2020

Table 21

TU – Traceability Unscheduled

3 Photographs

3.1 Test Setup Photographs

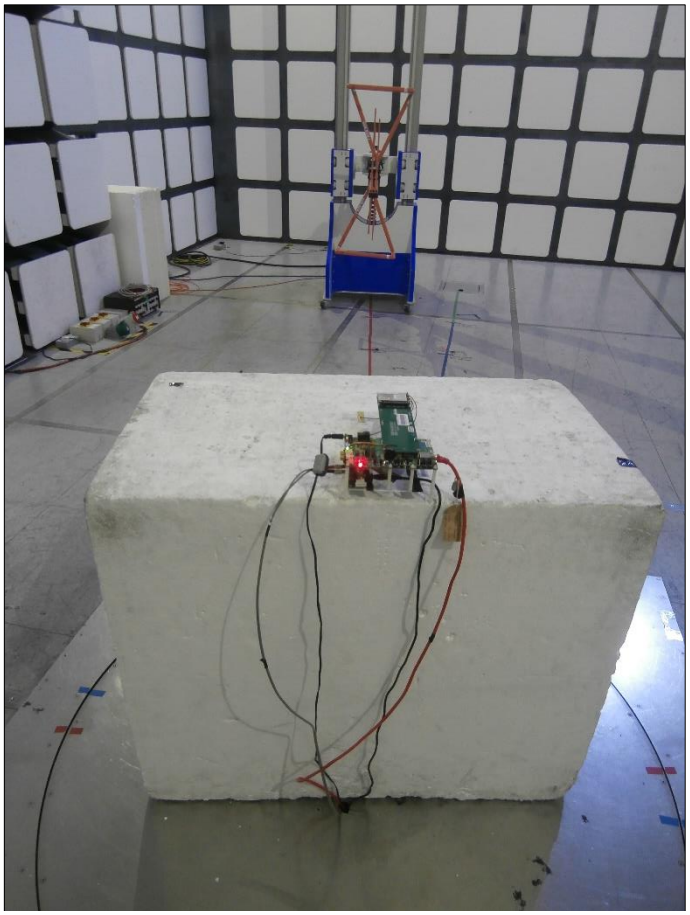

Figure 38 - 30 MHz to 1 GHz - X Orientation

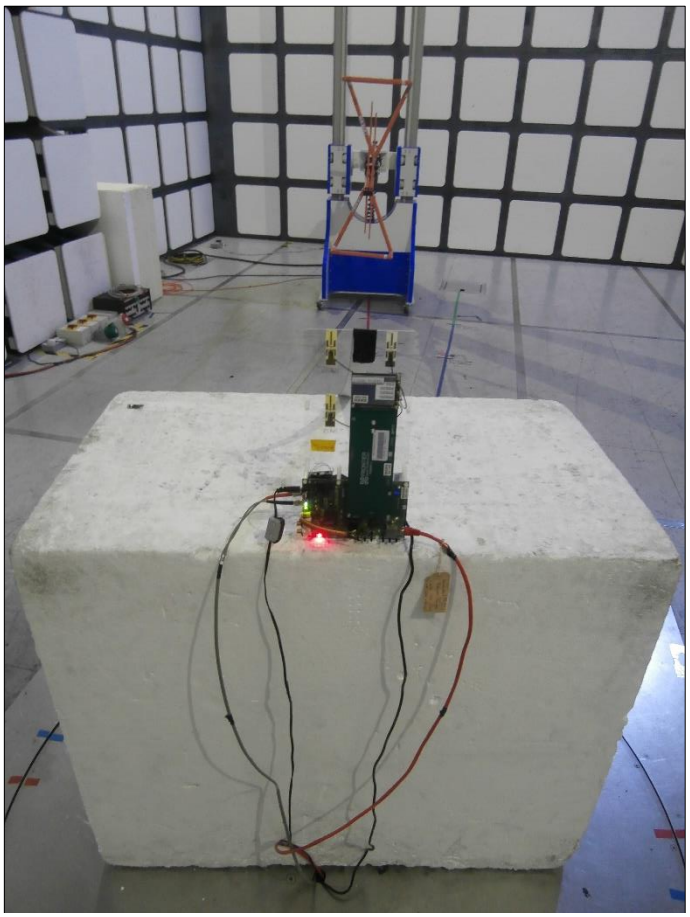

Figure 39 - 30 MHz to 1 GHz - Y Orientation

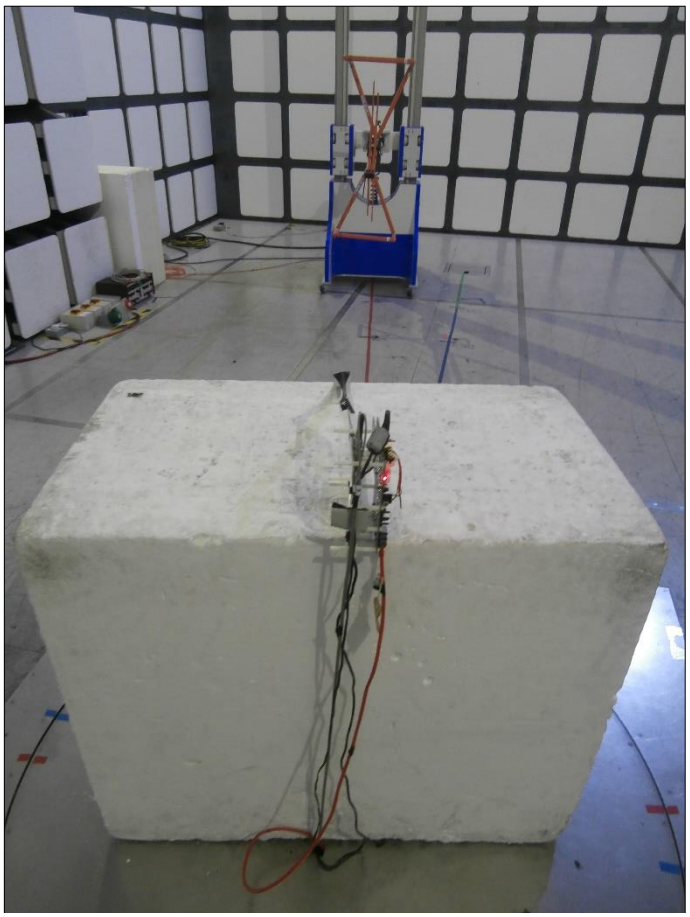

Figure 40 - 30 MHz to 1 GHz - Z Orientation

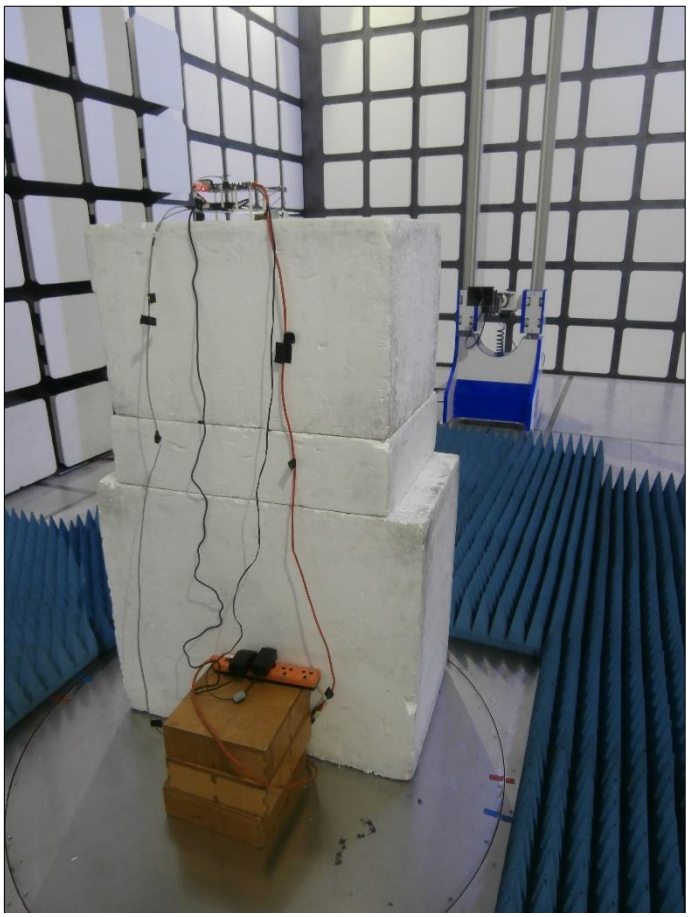

Figure 41 - 1 GHz to 8 GHz - X Orientation

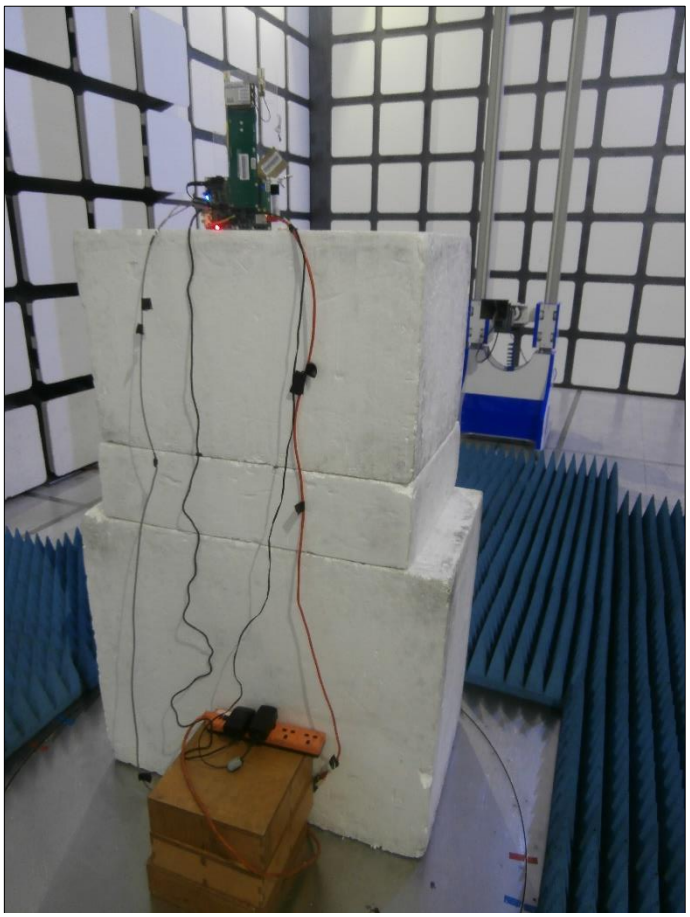

Figure 42 - 1 GHz to 8 GHz - Y Orientation

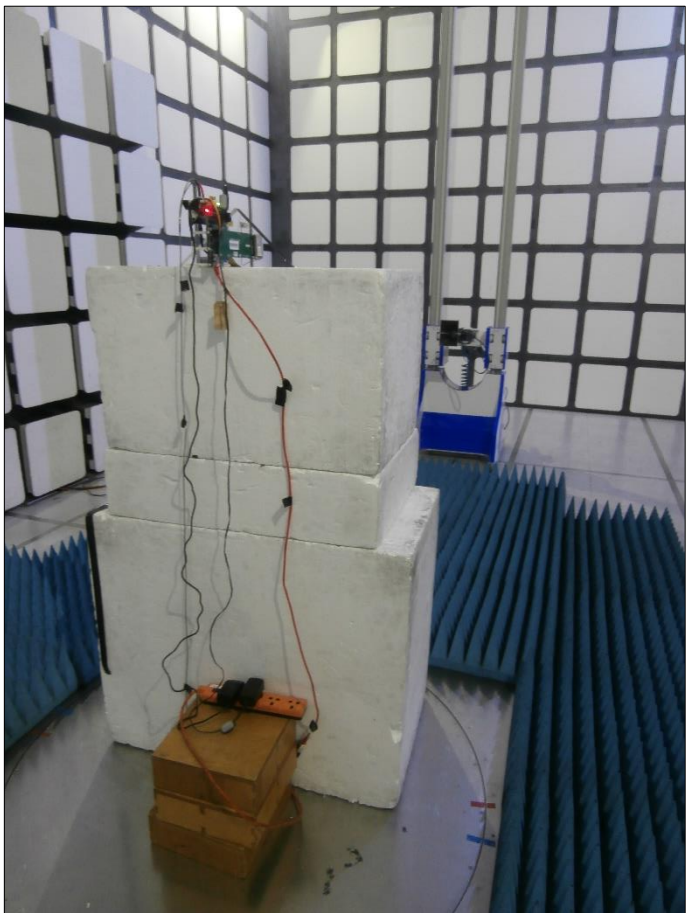

Figure 43 - 1 GHz to 8 GHz - Z Orientation

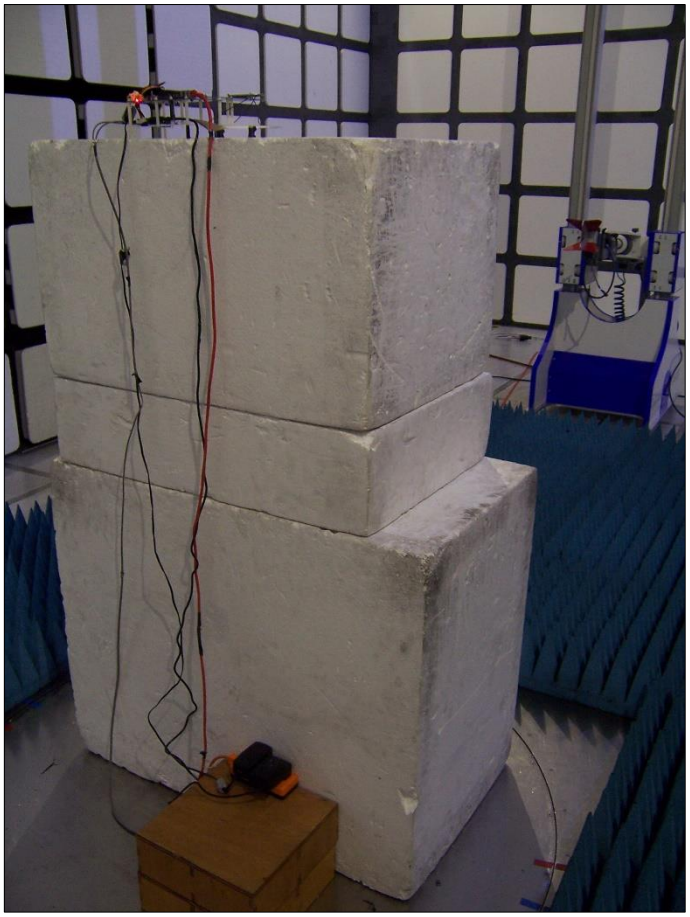

Figure 44 - 8 GHz to 18 GHz - X Orientation

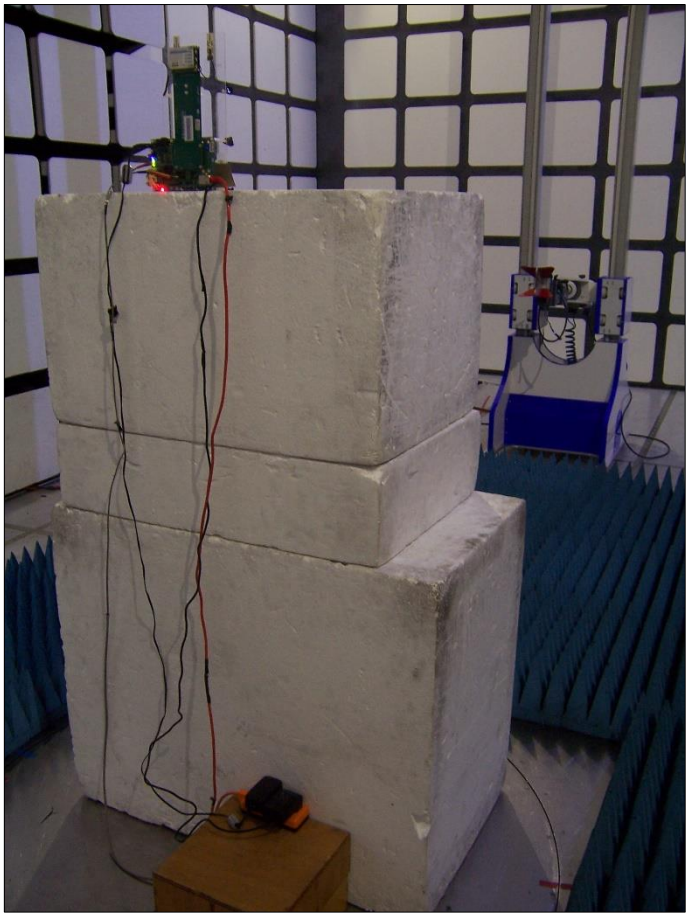

Figure 45 - 8 GHz to 18 GHz - Y Orientation

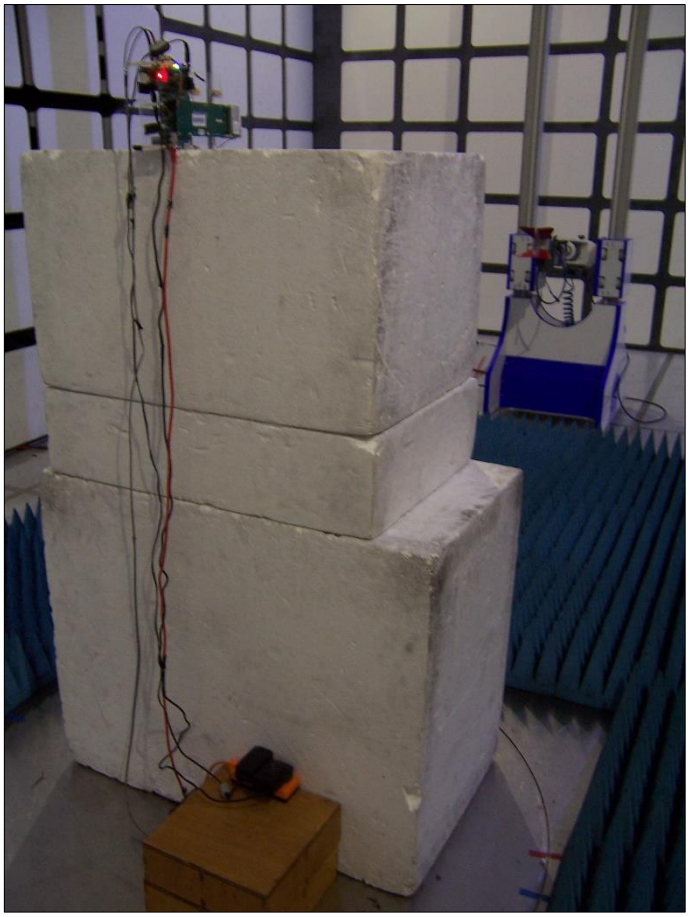

Figure 46 - 8 GHz to 18 GHz - Z Orientation

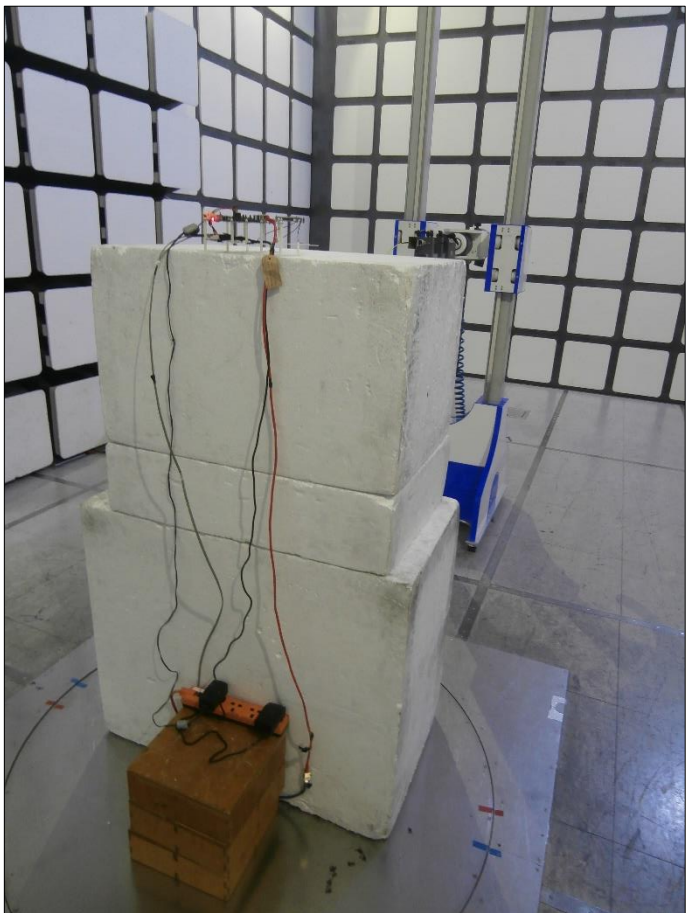

Figure 47 - 18 GHz to 25 GHz - X Orientation

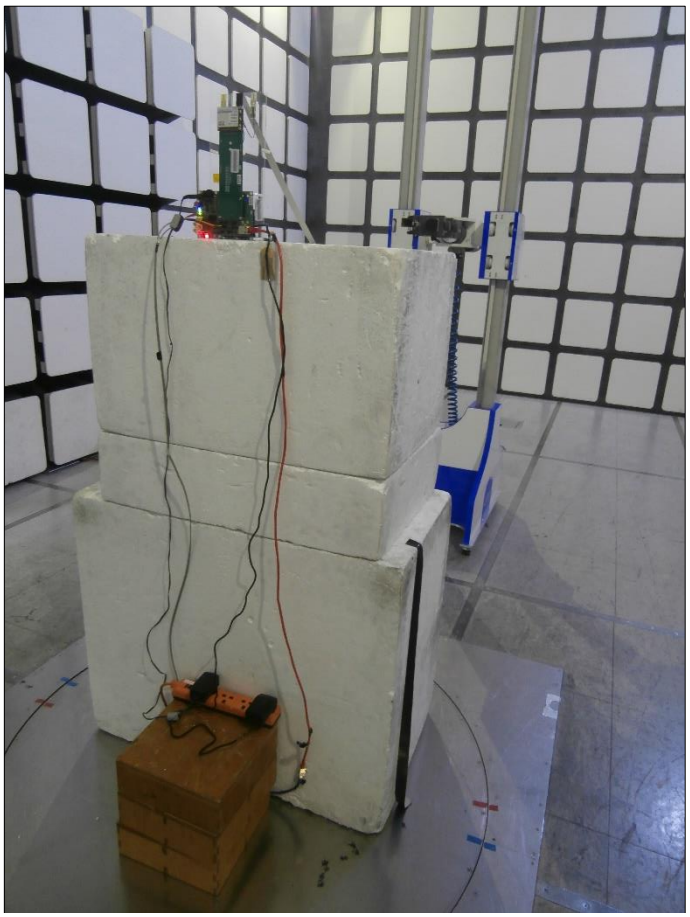

Figure 48 - 18 GHz to 25 GHz - Y Orientation

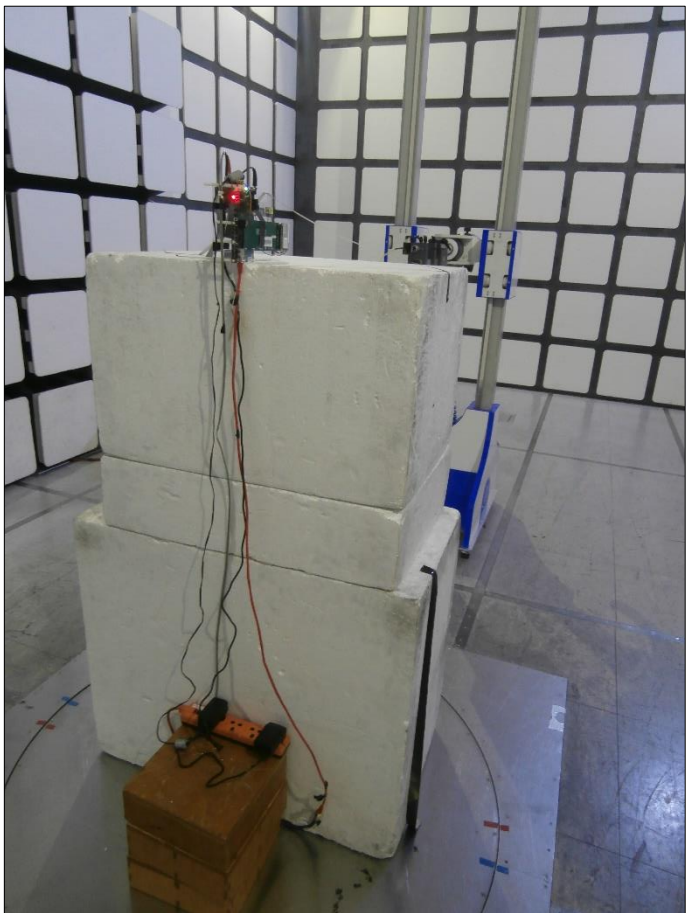

Figure 49 - 18 GHz to 25 GHz - Z Orientation

>

4 Measurement Uncertainty

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

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

Table 22