FCC Test Report

Axnes Aviation AS
Transceiver, Model: MP30

In accordance with FCC 47 CFR Part 15B

Prepared for: Axnes Aviation AS
Terje Lovasvei 1
Grimstad
N-4879
NORWAY

FCC ID: 2AOHPMP30A

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Document Number: 75946122-02 | Issue: 01

SIGNATURE			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Kim Archer	Sales Manager	Authorised Signatory	06 January 2020

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	06 January 2020	

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: 2018 for the tests detailed in section 1.3.

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Contents

1 Report Summary 2

1.1 Report Modification Record 2
1.2 Introduction 2
1.3 Brief Summary of Results 3
1.4 Application Form 4
1.5 Product Information 6
1.6 Deviations from the Standard 7
1.7 EUT Modification Record 7
1.8 Test Location 7

2 Test Details 8

2.1 Radiated Disturbance 8

3 Incident Reports 35

4 Measurement Uncertainty 36

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	06 January 2020

Table 1

1.2 Introduction

Applicant	Axnes Aviation AS
Manufacturer	Axnes Aviation AS
Model Number(s)	MP30
Serial Number(s)	010 300
Hardware Version(s)	R10
Software Version(s)	AXS-SW-0511
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15B: 2018
Order Number	802298
Date	22-May-2019
Date of Receipt of EUT	23-May-2019
Start of Test	04-September-2019
Finish of Test	04-September-2019
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: Battery - UHF Receive, Bluetooth Receive				
2.1	15.109	Radiated Disturbance – Class A	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)*	Crew unit for use in the PNG wireless intercom extension family. Connects to crews helmet or headset. Relays voice and data between crew member and vehicle intercom. Operates in the UHF band.
Manufacturer:	Axnes AS
Model:	MP30
Part Number:	AXS-HH-D0200-BGN-C3
Hardware Version:	R10
Software Version:	AXS-SW-0511
FCC ID (if applicable)	2AOHPMP30A
IC ID (if applicable)	Not Applicable

Intentional Radiators

Technology	UHF	UHF	Bluetooth
Frequency Band (MHz)	406.1 - 430.0	450-470	2402-2480
Conducted Declared Output Power (dBm)	26	26	7.56
Antenna Gain (dBi)	5.1	5.1	3.29
Supported Bandwidth(s) (MHz)	0.025	0.025	1 MHz
Modulation Scheme(s)	8PSK/16QAM	8PSK/16QAM	GFSK/8DPSK/π/4 DQPSK
ITU Emission Designator	20K0D7W	20K0D7W	1M00DXW
Bottom Frequency (MHz)	406.1	450	2402
Middle Frequency (MHz)	423	460	2441
Top Frequency (MHz)	430	470	2480

Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	2480 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	12 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: Click to edit (Hz)	
Click to edit V	Max current: Click to edit A
Single Phase ☐ Three Phase ☐	

DC Power Source

Nominal voltage: Click to edit V
Extreme upper voltage: Click to edit V
Extreme lower voltage: Click to edit V
Max current: Click to edit. A

Battery Power Source

Voltage: 3.8 V
End-point voltage: 3.6 V *(Point at which the battery will terminate)*
Alkaline ☐ Leclanche ☒ Lithium ☐ Nickel Cadmium ☐ Lead Acid* ☐ **(Vehicle regulated)*
Other ☐ Please detail: Click to edit

Charging

Can the EUT transmit whilst being charged	Yes ☒ No ☐

Temperature

Minimum temperature: -20 °C	Maximum temperature: 50 °C

Antenna Characteristics

Antenna connector ☐ State impedance Click to edit Ohm
Temporary antenna connector ☐ State impedance Click to edit Ohm
Integral antenna ☒ Type monopole State impedance 5.1 dBi
External antenna ☐ Type Click to edit State impedance Click to edit dBi

Ancillaries (if applicable)

Manufacturer: Click to edit	Part Number: Click to edit
Model: Click to edit	Country of Origin: Click to edit

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

Name: Petter Johnsen
Position held: CTO
Date: 09 December 2019

1.5 Product Information

1.5.1 Technical Description

Crew unit for use in the PNG wireless intercom extension family. Connects to crew's helmet or headset. Relays voice and data between crew member and vehicle intercom. Operates in the UHF band.

1.5.2 EUT Configuration and Rationale for Radiated Spurious Emissions

The EUT was placed on the non-conducting platform in a manner typical of a normal installation. 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.

1.5.3 EUT Port/Cable Identification

Port	Max Cable Length specified	Usage	Type	Screened
Configuration and Mode: Battery - UHF Receive, Bluetooth Receive				
Mic/Speaker Port	Not Specified	Connect to accessory to be used as a mic/speaker.	MP30 connector: Nexus: TJT-120 Headset connector: U174	No

Table 3

1.5.4 Test Configuration

Configuration	Description
Battery Powered	-

Table 4

1.5.5 Modes of Operation

Mode	Description
UHF Receive, Bluetooth Receive	The UHF and Bluetooth receivers were in a receive mode, no input signals were applied.

Table 5

1.6 Deviations from the Standard

The EUT was tested as a battery powered device. The manufacturer requested that testing was not to be performed in a charging cradle accessory. Charger cradle accessories are subject to a separate certification program.

No other 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: MP30: Serial Number: 010 300			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 6

1.8 Test Location

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

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: Battery - UHF Receive, Bluetooth Receive		
Radiated Disturbance	Graeme Lawler	UKAS

Table 7

Office Address:

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

2 Test Details

2.1 Radiated Disturbance

2.1.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.109

2.1.2 Equipment Under Test and Modification State

MP30, S/N: 010 300 - Modification State 0

2.1.3 Date of Test

04-September-2019

2.1.4 Test Method

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

The EUT was tested stand alone with the charging cable removed with a fully charged battery. 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.

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

Using a list of the highest emissions detected during the pre-scan along with their bearing and associated antenna polarisation, the EUT was 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/m) + Correction Factor (dB)
Margin (dB) = Limit (dBµV/m) – Quasi-Peak level (dBµV/m)

Above 1 GHz:

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

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

2.1.6 Test Setup Diagram

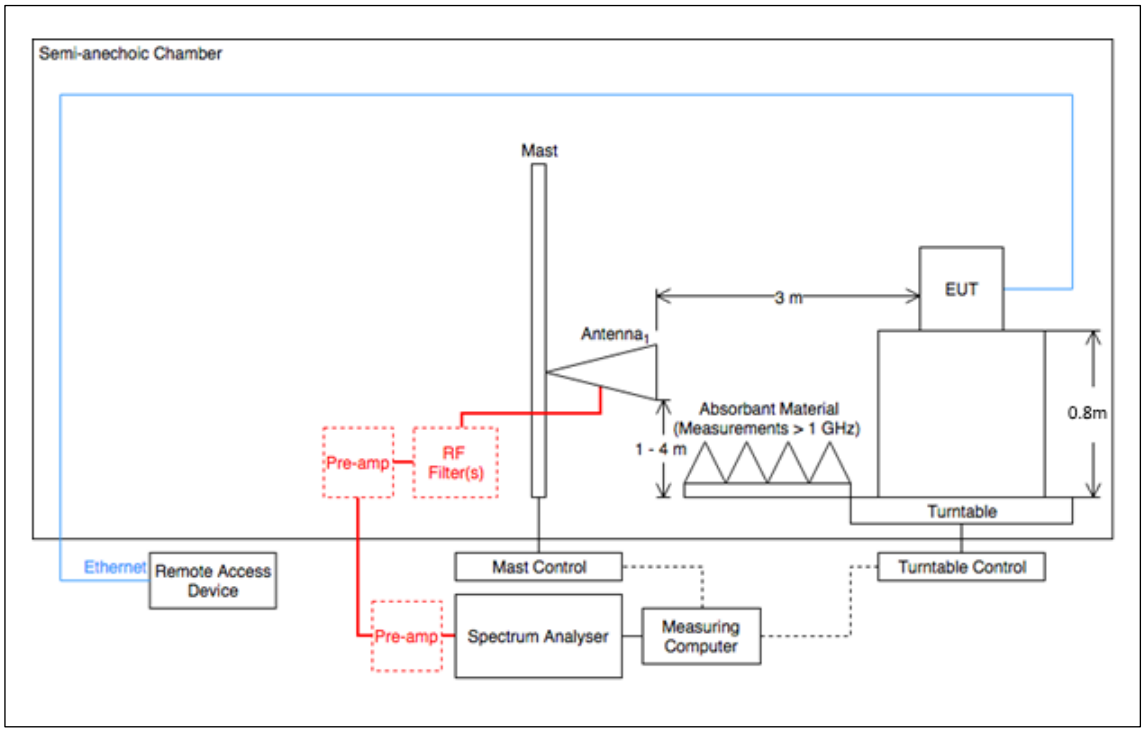

Figure 1 - Radiated Disturbance Test Setup

2.1.7 Environmental Conditions

Ambient Temperature	17.0 °C
Relative Humidity	73.8 %

2.1.8 Specification Limits

Required Specification Limits, Field Strength (Class A @ 10m)		
Frequency Range (MHz)	(µV/m)	(dBµV/m)
30 to 88	90	39.1
88 to 216	150	43.5
216 to 960	210	46.4
Above 960	300	49.5
Supplementary information: Quasi-peak detector to be used for measurements below 1 GHz CISPR Average detector to be used for measurements above 1 GHz Peak test limit above 1 GHz is 20 dB higher than the CISPR Average test limit.		

Table 8

2.1.9 Test Results

Results for Configuration and Mode: Battery - UHF Receive, Bluetooth Receive.

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

Tested to Class A Test Limits.

Detailed results are shown below.

Highest frequency generated or used within the EUT: 2480 MHz
Which necessitates an upper frequency test limit of: 13 GHz

Frequency Range of Test: 30 MHz to 1 GHz - X Orientation

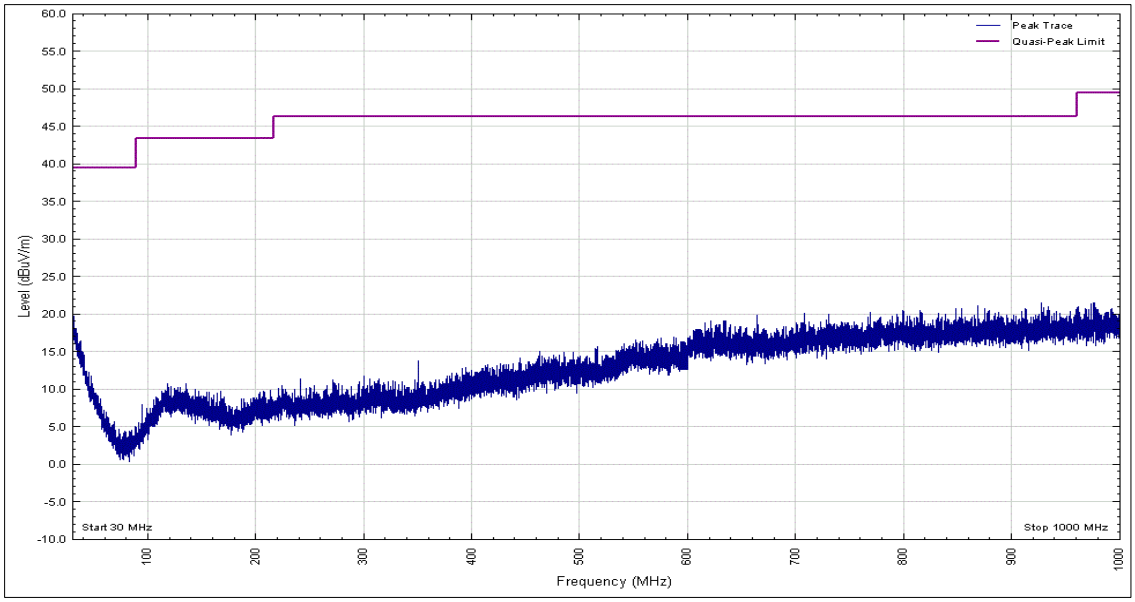

Figure 2 - Graphical Results - Vertical Polarity

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

Table 9

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

Frequency Range of Test: 30 MHz to 1 GHz - X Orientation

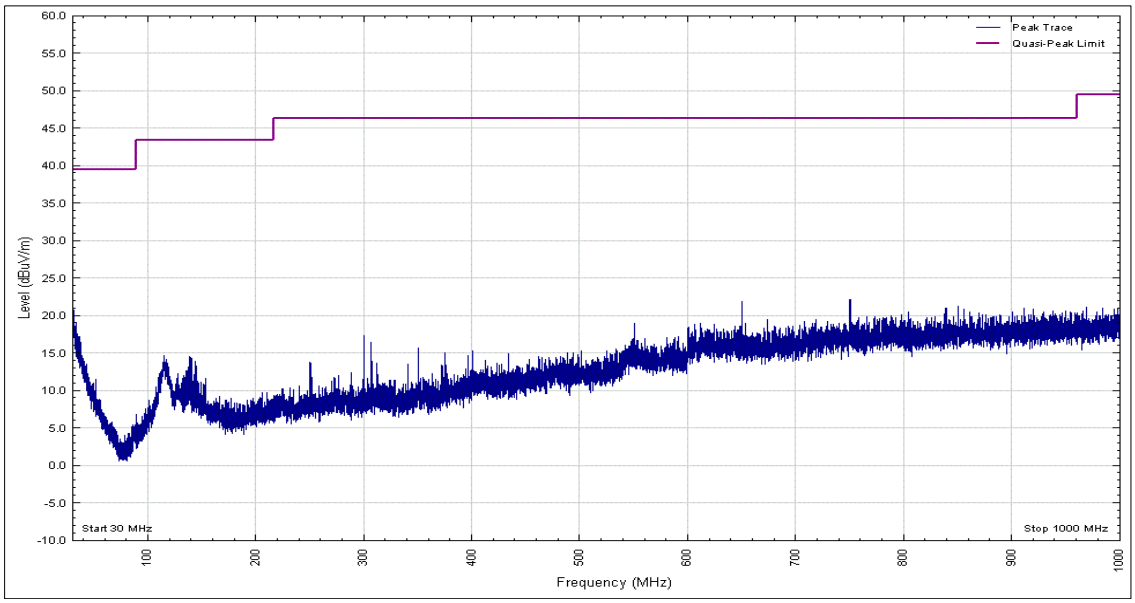

Figure 3 - Graphical Results - Horizontal Polarity

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

Table 10

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

Frequency Range of Test: 1 GHz to 13 GHz - Peak - X Orientation

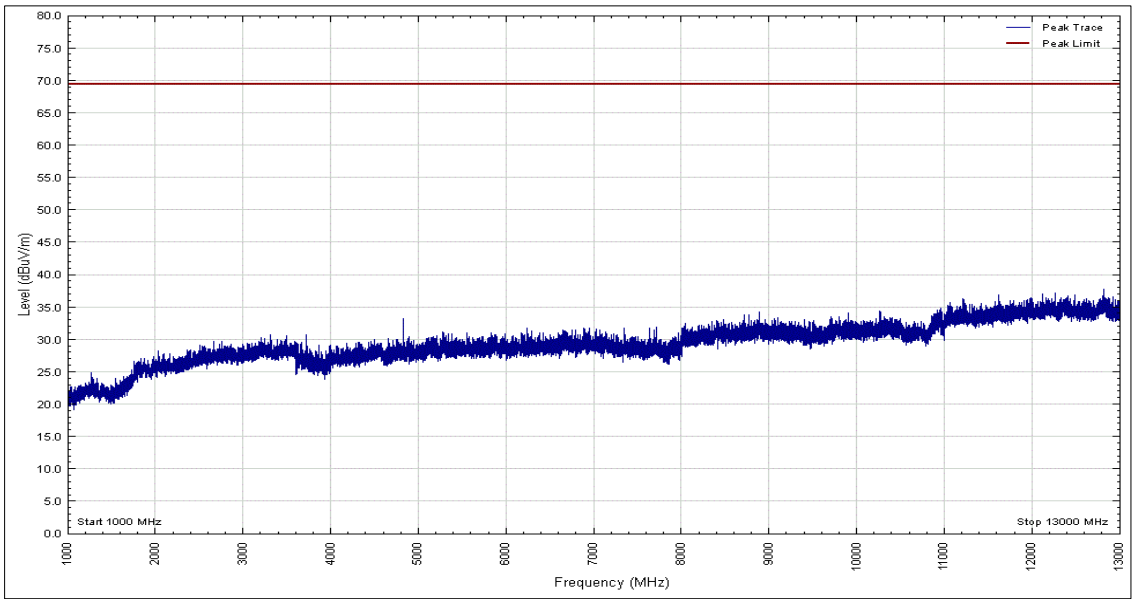

Figure 4 - Graphical Results - Vertical Polarity

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

Table 11

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

Frequency Range of Test: 1 GHz to 13 GHz - Average - X Orientation

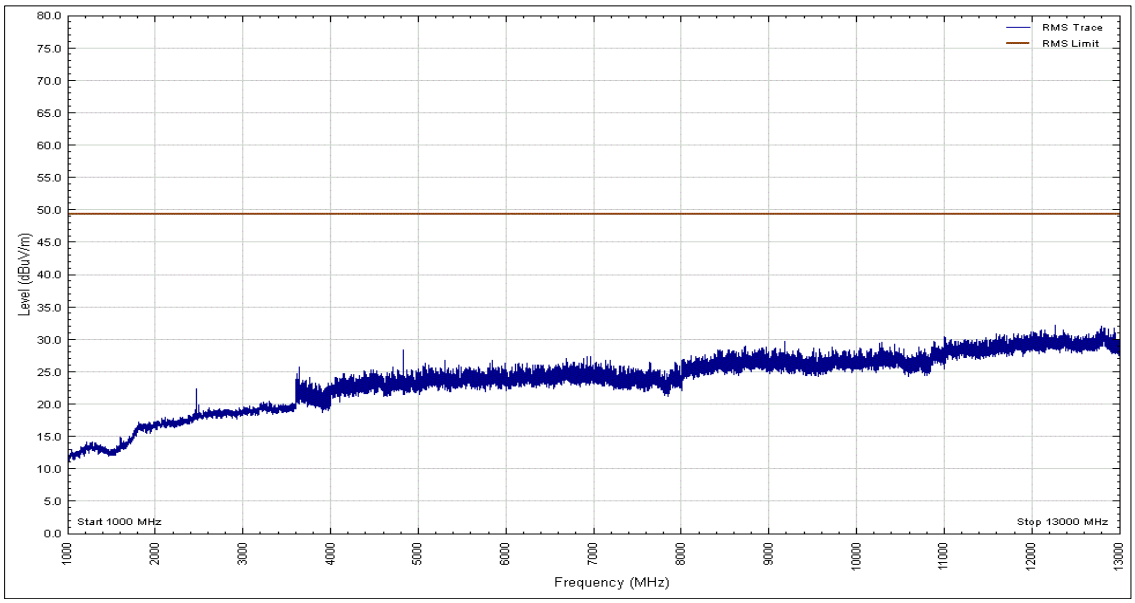

Figure 5 - Graphical Results - Vertical Polarity

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

Table 12

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

Frequency Range of Test: 1 GHz to 13 GHz - Peak - X Orientation

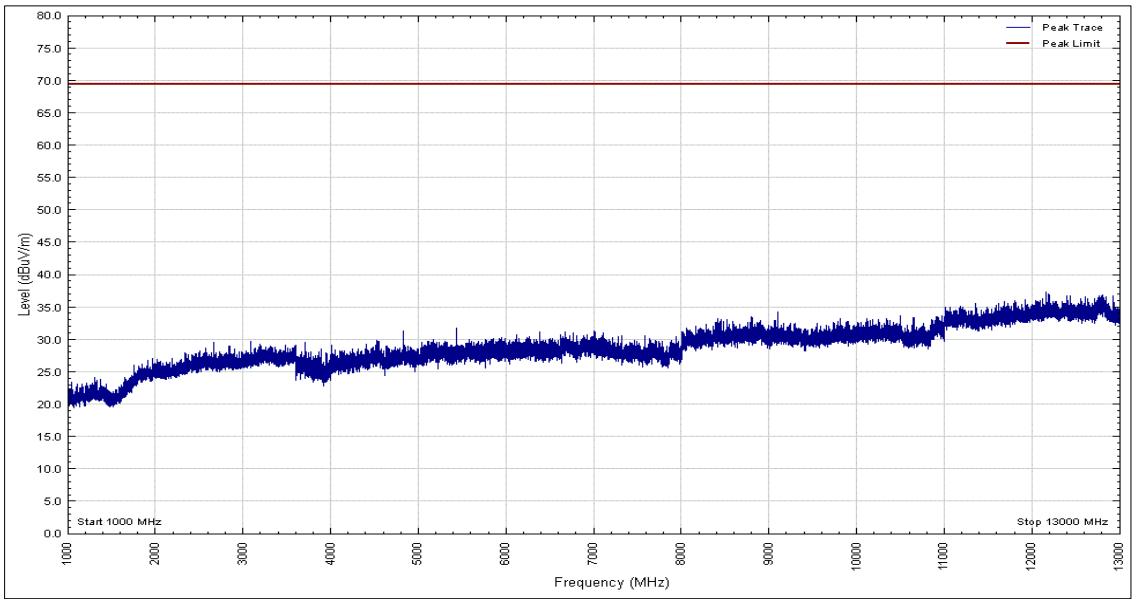

Figure 6 - Graphical Results - Horizontal Polarity

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

Table 13

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

Frequency Range of Test: 1 GHz to 13 GHz - Average - X Orientation

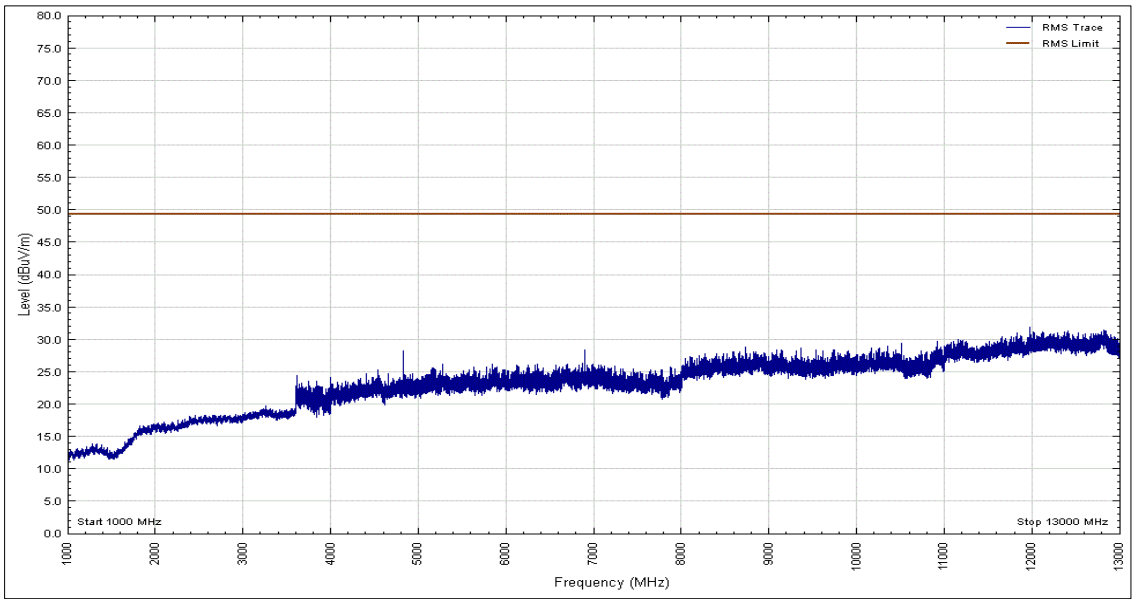

Figure 7 - Graphical Results - Horizontal Polarity

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

Table 14

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

Frequency Range of Test: 30 MHz to 1 GHz - Y Orientation

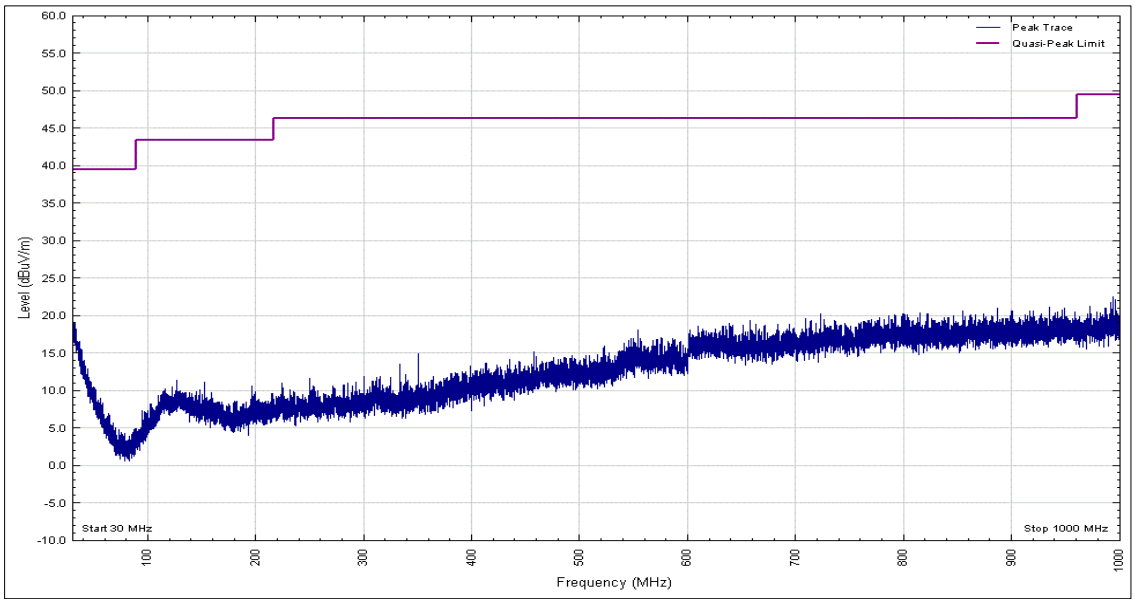

Figure 8 - Graphical Results - Vertical Polarity

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

Table 15

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

Frequency Range of Test: 30 MHz to 1 GHz - Y Orientation

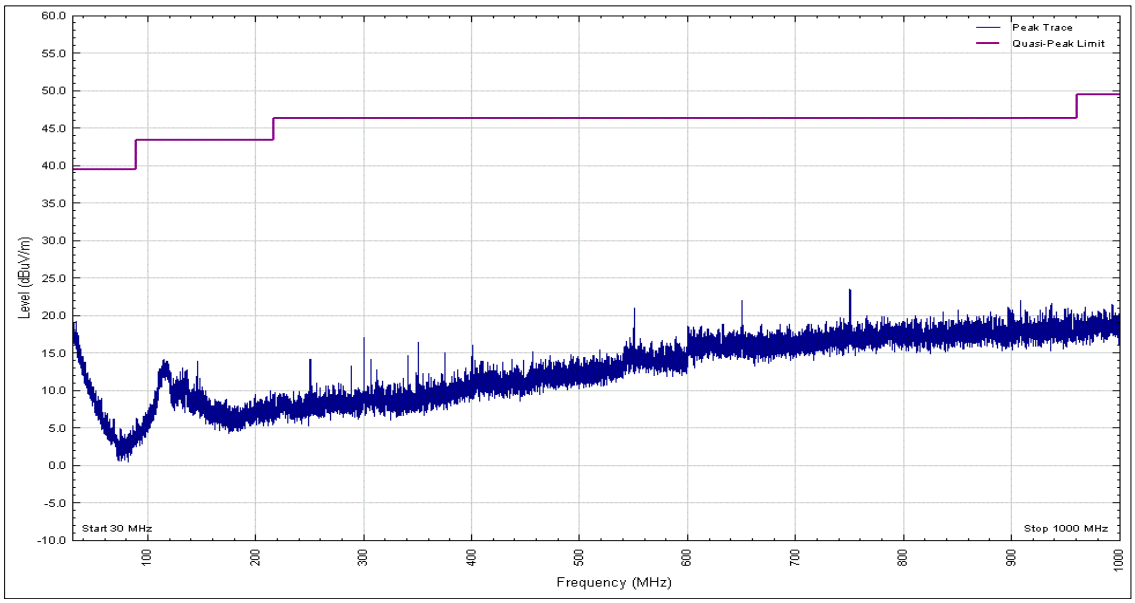

Figure 9 - Graphical Results - Horizontal Polarity

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

Table 16

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

Frequency Range of Test: 1 GHz to 13 GHz - Peak - Y Orientation

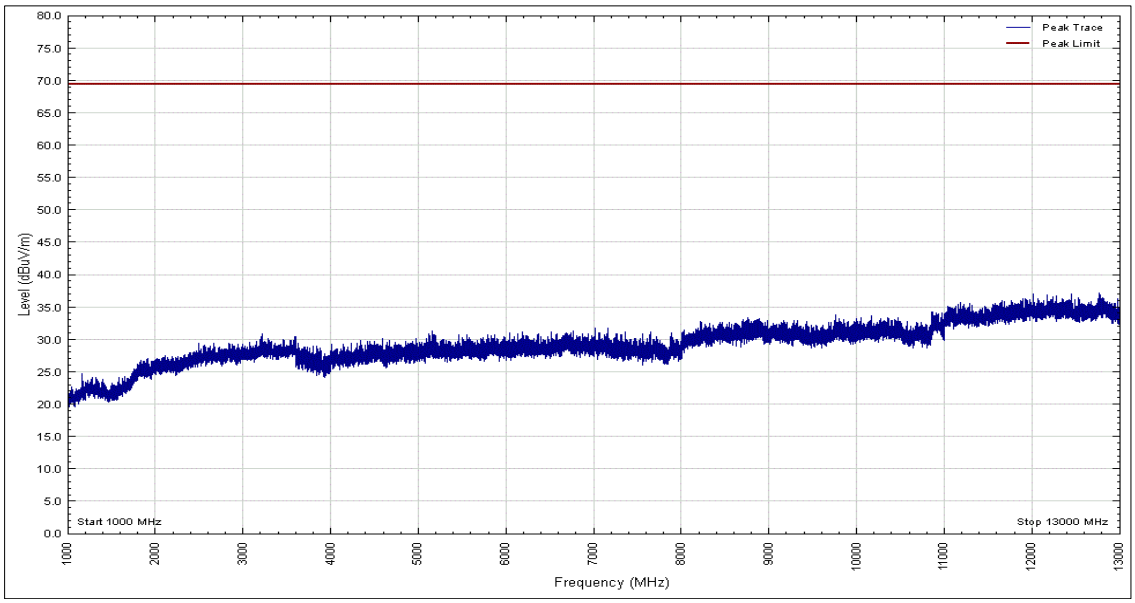

Figure 10 - Graphical Results - Vertical Polarity

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

Table 17

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

Frequency Range of Test: 1 GHz to 13 GHz - Average - Y Orientation

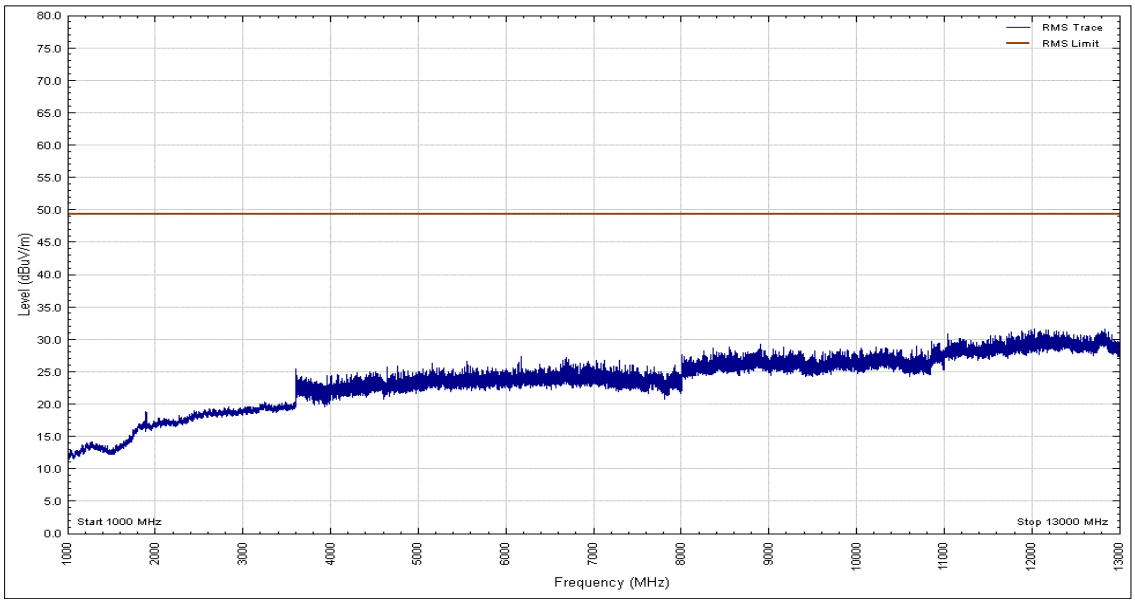

Figure 11 - Graphical Results - Vertical Polarity

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

Table 18

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

Frequency Range of Test: 1 GHz to 13 GHz - Peak - Y Orientation

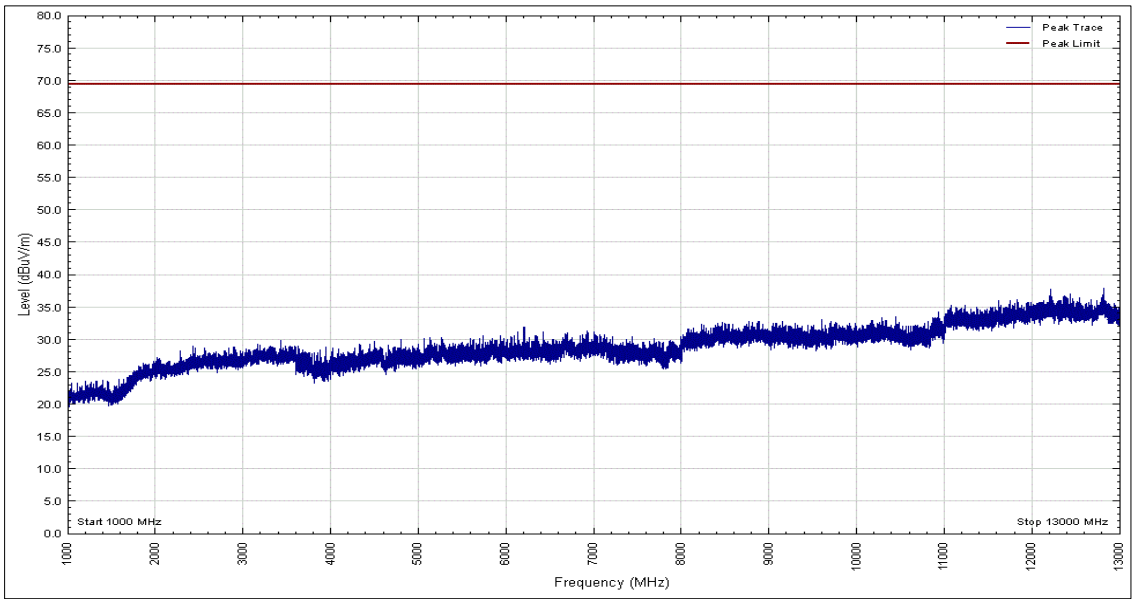

Figure 12 - Graphical Results - Horizontal Polarity

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

Table 19

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

Frequency Range of Test: 1 GHz to 13 GHz - Average - Y Orientation

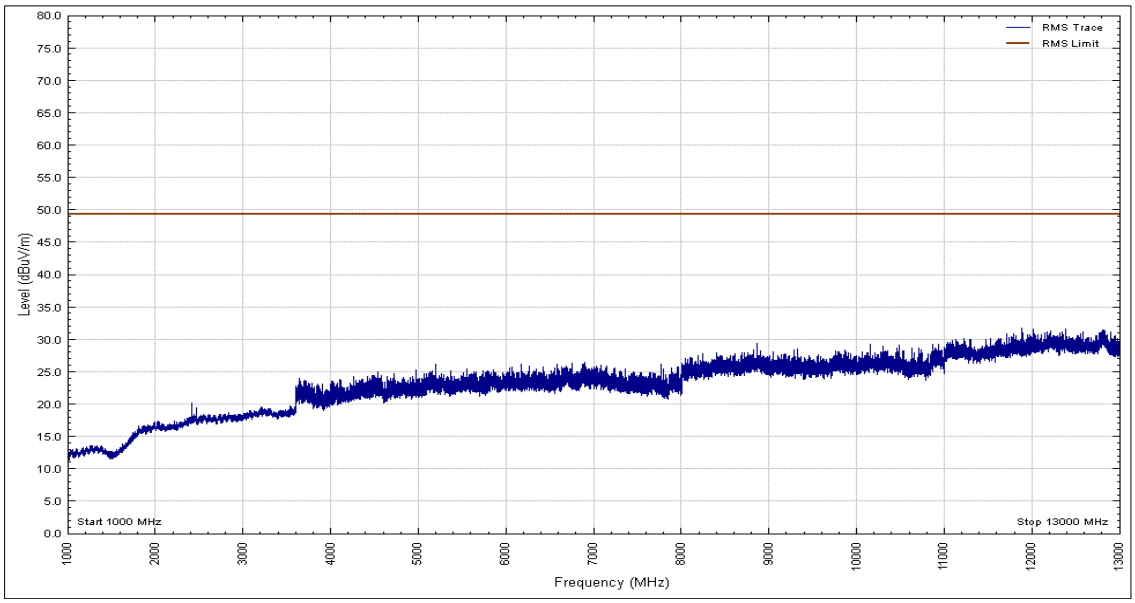

Figure 13 - Graphical Results - Horizontal Polarity

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

Table 20

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

Frequency Range of Test: 30 MHz to 1 GHz - Z Orientation

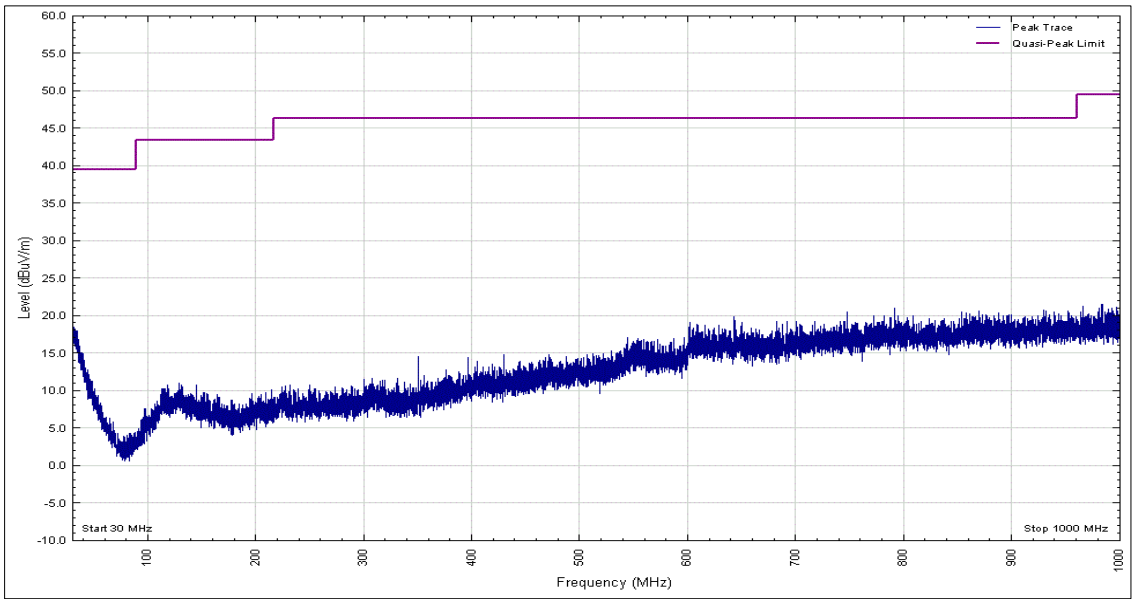

Figure 14 - Graphical Results - Vertical Polarity

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

Table 21

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

Frequency Range of Test: 30 MHz to 1 GHz - Z Orientation

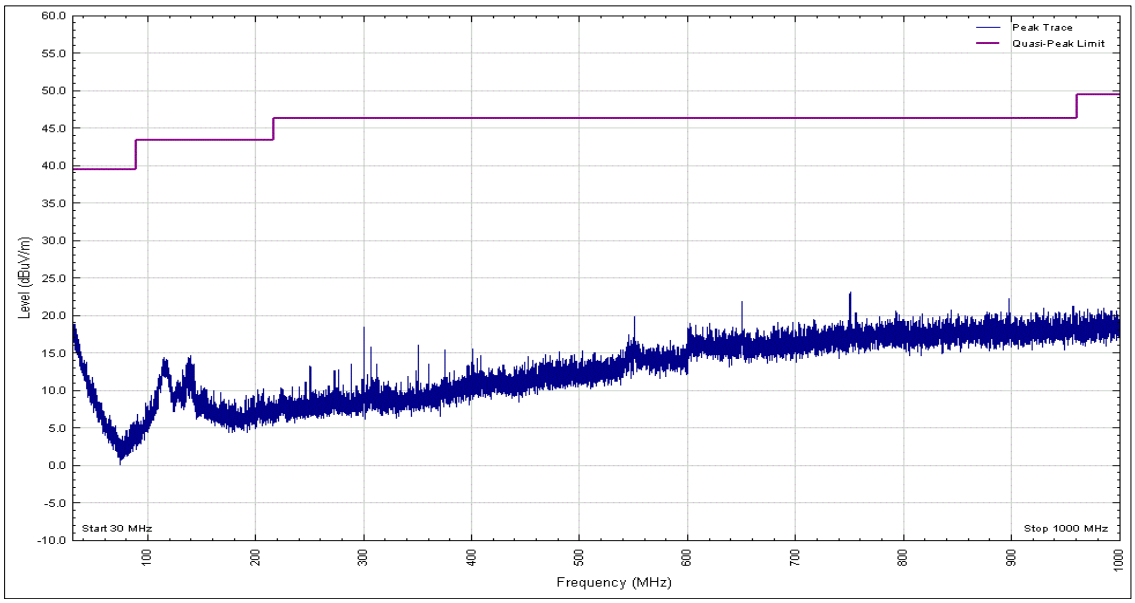

Figure 15 - Graphical Results - Horizontal Polarity

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

Table 22

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

Frequency Range of Test: 1 GHz to 13 GHz - Peak - Z Orientation

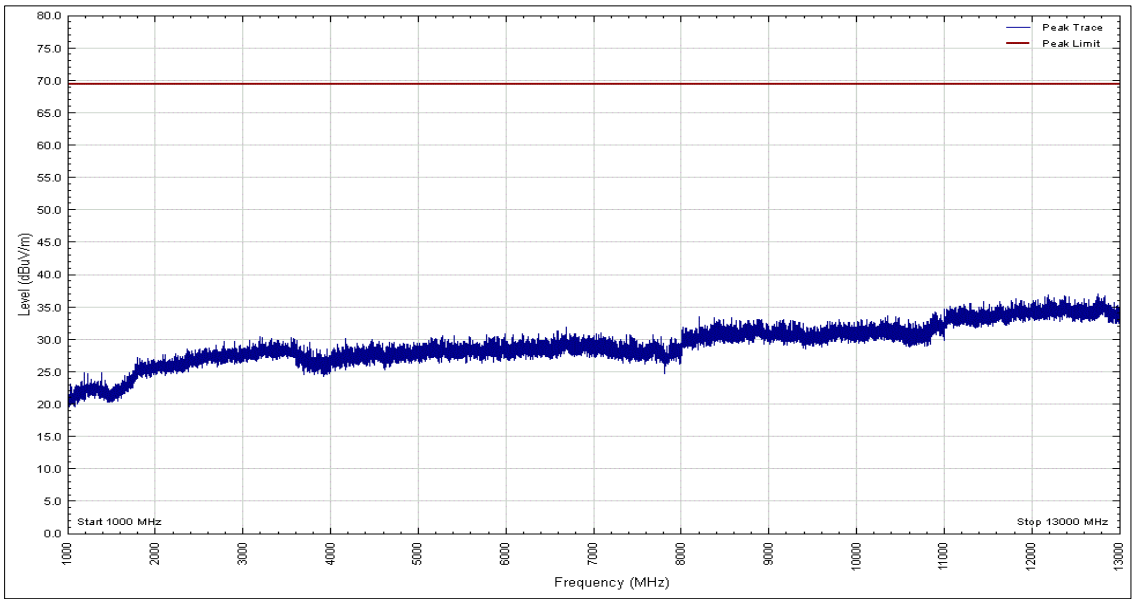

Figure 16 - Graphical Results - Vertical Polarity

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

Table 23

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

Frequency Range of Test: 1 GHz to 13 GHz - Average - Z Orientation

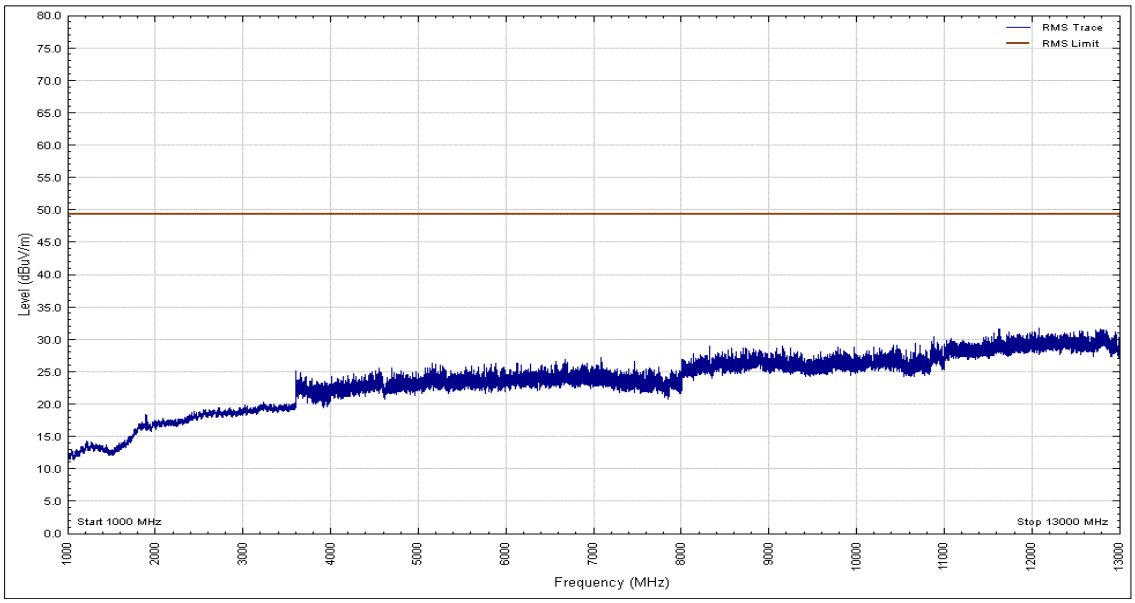

Figure 17 - Graphical Results - Vertical Polarity

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

Table 24

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

Frequency Range of Test: 1 GHz to 13 GHz - Peak - Z Orientation

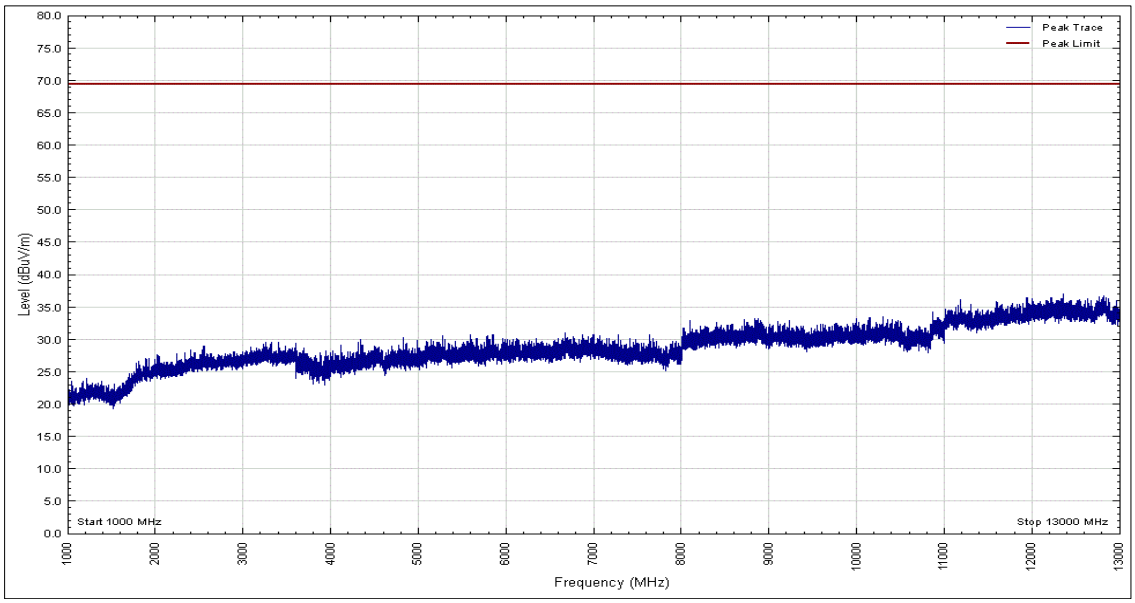

Figure 18 - Graphical Results - Horizontal Polarity

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

Table 25

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

Frequency Range of Test: 1 GHz to 13 GHz - Average - Z Orientation

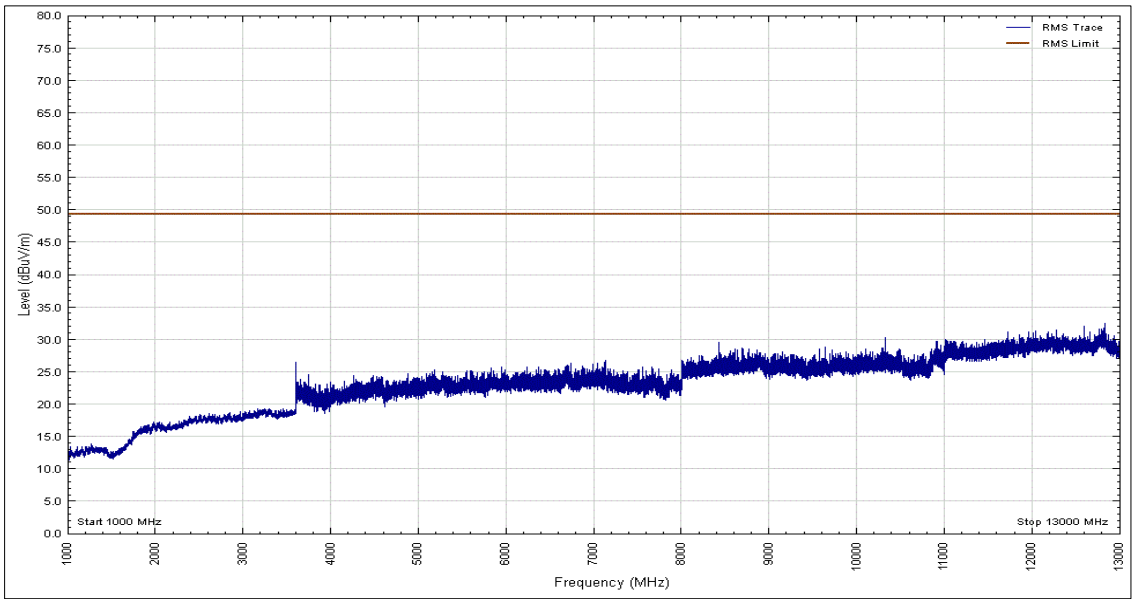

Figure 19 - Graphical Results - Horizontal Polarity

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

Table 26

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

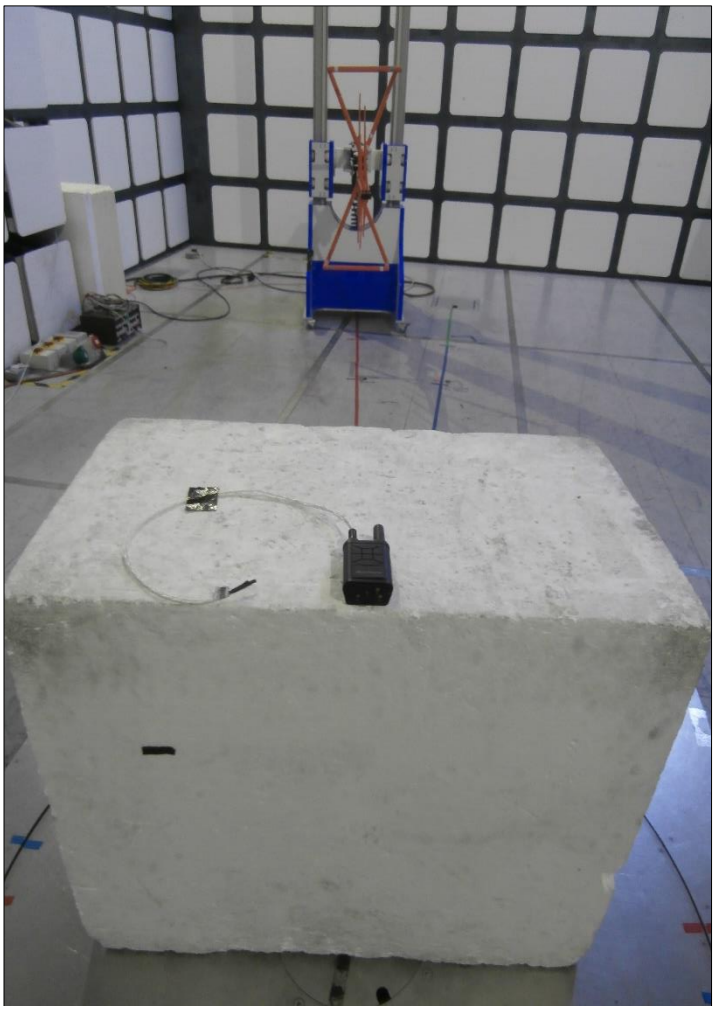

Figure 20 - Test Setup 30 MHz to 1 GHz - X Orientation

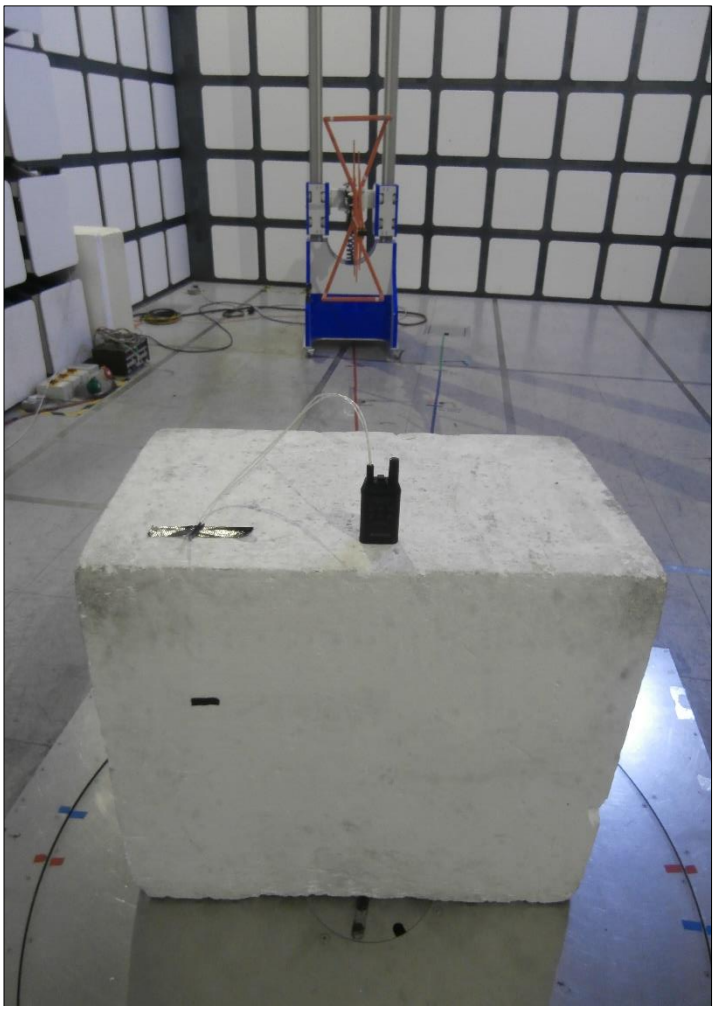

Figure 21 - Test Setup 30 MHz to 1 GHz - Y Orientation

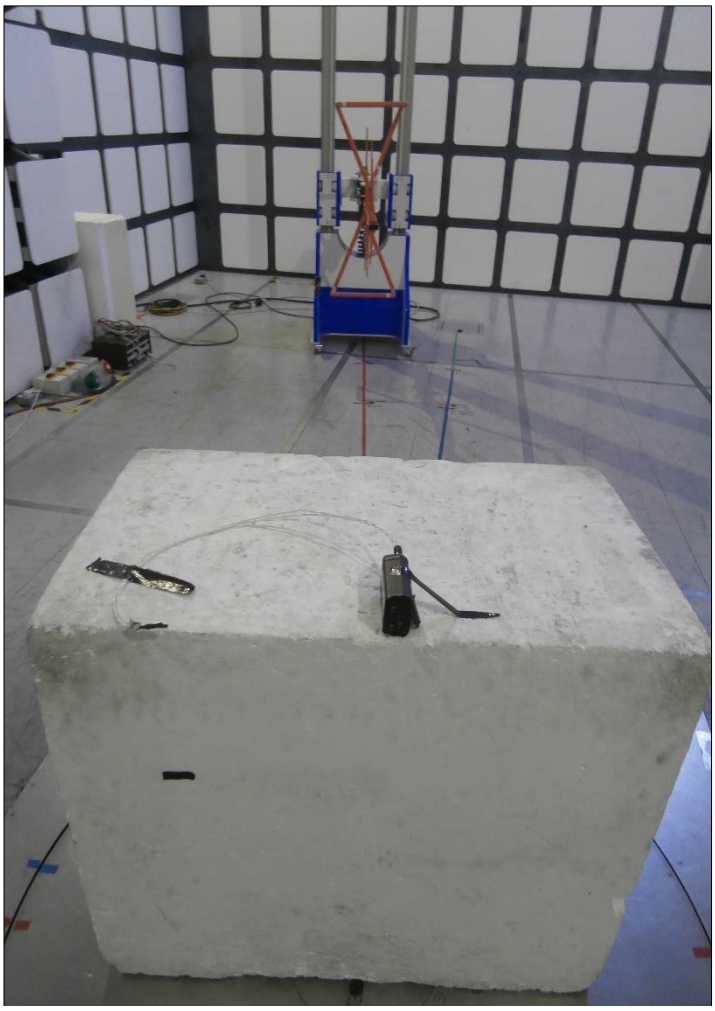

Figure 22 - 30 MHz to 1 GHz - Z Orientation

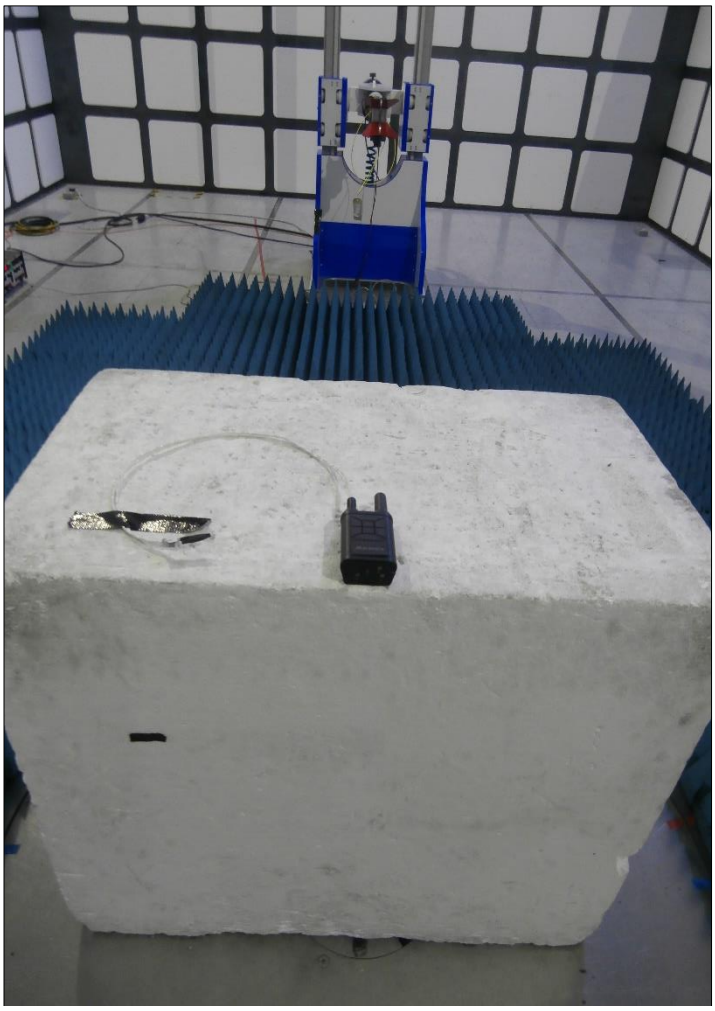

Figure 23 - Test Setup 1 GHz to 13 GHz - X Orientation

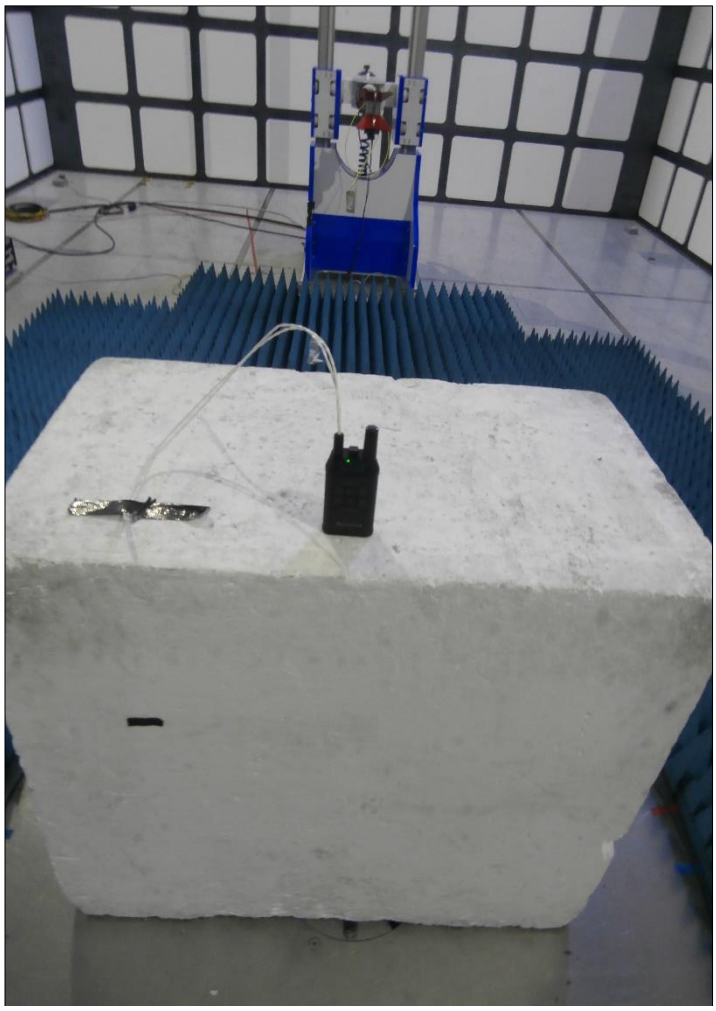

Figure 24 - Test Setup 1 GHz to 13 GHz - Y Orientation

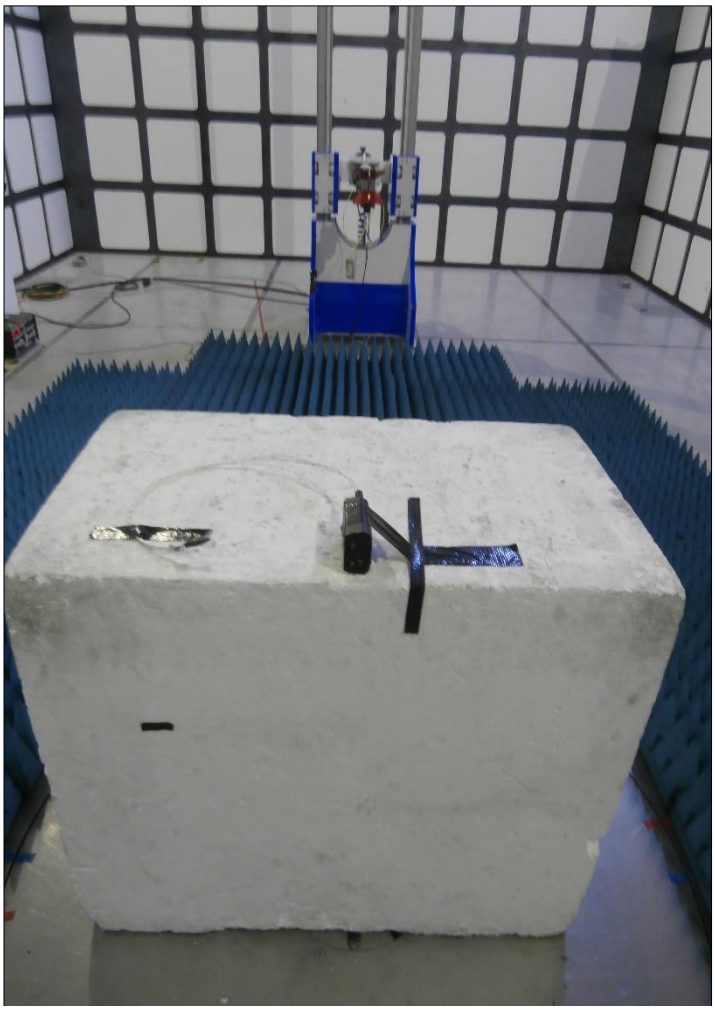

Figure 25 – Test Setup 1 GHz to 13 GHz - Z Orientation

2.1.10 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Antenna with permanent attenuator (Bilog)	Schaffner	CBL6143	287	24	15-May-2020
Pre-Amplifier	Phase One	PS04-0086	1533	12	08-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
Comb Generator	Schaffner	RSG1000	3034	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	17-Dec-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	05-Mar-2020
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	TU
8m N-Type RF Cable	Teledyne	PR90-088-8MTR	5093	12	04-Oct-2019
1.5m 40GHz RF Cable	Scott Cables	KPS-1501-2000-KPS	5127	6	11-Dec-2019

Table 27

TU - Traceability Unscheduled

3 Incident Reports

No incidents reports were raised.

4 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.
All measurement uncertainties have been calculated using CISPR guidelines.