

# Report on the FCC Testing of:

Fortecho Solutions Ltd  
433 MHz RFiD Reader, Model: FS-1000

In accordance with FCC 47 CFR Part 15B

Prepared for: Fortecho Solutions Ltd  
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London, SW6 3BN  
UNITED KINGDOM

FCC ID: 2ATM6-FS1000



Add value.  
Inspire trust.

## COMMERCIAL-IN-CONFIDENCE

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### SIGNATURE

| NAME       | JOB TITLE     | RESPONSIBLE FOR      | ISSUE DATE       |
|------------|---------------|----------------------|------------------|
| Kim Archer | Sales Manager | Authorised Signatory | 26 November 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 15B. 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 | Test Engineer | Testing         | 26 November 2019 |

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 Declaration of Build Status .....4
  - 1.5 Product Information .....5
  - 1.6 Deviations from the Standard.....6
  - 1.7 EUT Modification Record .....7
  - 1.8 Test Location .....7
- 2 Test Details .....8**
  - 2.1 Radiated Disturbance.....8
- 3 Incident Reports ..... 16**
- 4 Measurement Uncertainty ..... 17**



# 1 Report Summary

## 1.1 Report Modification Record

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

| Issue | Description of Change | Date of Issue    |
|-------|-----------------------|------------------|
| 1     | First Issue           | 26 November 2019 |

**Table 1**

## 1.2 Introduction

|                               |                           |
|-------------------------------|---------------------------|
| Applicant                     | Fortecho Solutions Ltd    |
| Manufacturer                  | Fortecho Solutions Ltd    |
| Model Number(s)               | FS-1000                   |
| Serial Number(s)              | 0048-003-098              |
| Hardware Version(s)           | HW-03                     |
| Software Version(s)           | 1.74                      |
| Number of Samples Tested      | 1                         |
| Test Specification/Issue/Date | FCC 47 CFR Part 15B: 2018 |
| Order Number                  | 0429                      |
| Date                          | 01-May-2019               |
| Date of Receipt of EUT        | 10-June-2019              |
| Start of Test                 | 09-July-2019              |
| Finish of Test                | 09-July-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: USB Powered – RFID Receive mode / Ethernet Ping / USB Address |                      |                                 |        |                        |
| 2.1                                                                                   | 15.109               | Radiated Disturbance – Class A. | Pass   | ANSI C63.4: 2014       |

**Table 2**



#### 1.4 Declaration of Build Status

| MAIN EUT                                                                         |                                                   |  |  |
|----------------------------------------------------------------------------------|---------------------------------------------------|--|--|
| MANUFACTURING DESCRIPTION                                                        | Fortecho RFID Reader 433MHz                       |  |  |
| MANUFACTURER                                                                     | Fortecho Solutions Ltd                            |  |  |
| MODEL NAME/NUMBER                                                                | FS1000-433                                        |  |  |
| PART NUMBER                                                                      |                                                   |  |  |
| SERIAL NUMBER                                                                    | 0048-003-098                                      |  |  |
| HARDWARE VERSION                                                                 | HW-03                                             |  |  |
| SOFTWARE VERSION                                                                 | 1.74                                              |  |  |
| PSU VOLTAGE/FREQUENCY/CURRENT                                                    | 12V                                               |  |  |
| HIGHEST INTERNALLY GENERATED / USED FREQUENCY                                    | 434.790 MHz                                       |  |  |
| FCC ID (if applicable)                                                           | 2ATM6-FS1000                                      |  |  |
| INDUSTRY CANADA ID (if applicable)                                               | Not Applicable                                    |  |  |
| TECHNICAL DESCRIPTION<br>(a brief description of the intended use and operation) | Active RFID reader used for reading Fortecho Tags |  |  |
| COUNTRY OF ORIGIN                                                                | UK                                                |  |  |
| RF CHARACTERISTICS (if applicable)                                               |                                                   |  |  |
| TRANSMITTER FREQUENCY<br>OPERATING RANGE (MHz)                                   | 433 MHz                                           |  |  |
| RECEIVER FREQUENCY OPERATING<br>RANGE (MHz)                                      | 433 MHz ISM band                                  |  |  |
| INTERMEDIATE FREQUENCIES                                                         |                                                   |  |  |
| EMISSION DESIGNATOR(S):<br>(i.e. G1D, GXW)                                       |                                                   |  |  |
| MODULATION TYPES:<br>(i.e. GMSK, QPSK)                                           | 2GFSK                                             |  |  |
| OUTPUT POWER (W or dBm)                                                          | 10 dBm                                            |  |  |
| SEPARATE BATTERY/POWER SUPPLY (if applicable)                                    |                                                   |  |  |
| MANUFACTURING DESCRIPTION                                                        |                                                   |  |  |
| MANUFACTURER                                                                     |                                                   |  |  |
| TYPE                                                                             |                                                   |  |  |
| PART NUMBER                                                                      |                                                   |  |  |
| PSU VOLTAGE/FREQUENCY/CURRENT                                                    |                                                   |  |  |
| COUNTRY OF ORIGIN                                                                |                                                   |  |  |
| MODULES (if applicable)                                                          |                                                   |  |  |
| MANUFACTURING DESCRIPTION                                                        |                                                   |  |  |
| MANUFACTURER                                                                     |                                                   |  |  |
| TYPE                                                                             |                                                   |  |  |
| POWER                                                                            |                                                   |  |  |
| FCC ID                                                                           |                                                   |  |  |
| INDUSTRY CANADA ID                                                               |                                                   |  |  |
| EMISSION DESIGNATOR                                                              |                                                   |  |  |
| DHSS/FHSS/COMBINED OR OTHER                                                      |                                                   |  |  |
| COUNTRY OF ORIGIN                                                                |                                                   |  |  |
| ANCILLARIES (if applicable)                                                      |                                                   |  |  |
| MANUFACTURING DESCRIPTION                                                        |                                                   |  |  |
| MANUFACTURER                                                                     |                                                   |  |  |
| TYPE                                                                             |                                                   |  |  |
| PART NUMBER                                                                      |                                                   |  |  |
| SERIAL NUMBER                                                                    |                                                   |  |  |
| COUNTRY OF ORIGIN                                                                |                                                   |  |  |

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

Name: Will Damerell  
Position held: Technical Director  
Date: 25 November 2019

## 1.5 Product Information

### 1.5.1 Technical Description

The Equipment Under Test (EUT) was a Fortecho Solutions, active RFiD reader used for Fortecho tags.

The primary function of the EUT is to provide monitoring for theft, damage and dangerous environmental changes. Additionally, the EUT has functionality for wireless monitoring that can be integrated with existing security infrastructures including CCTV, SMS, VMS, digital mobile radio and intruder detection systems.

A full description and detailed product specification details are available from the manufacturer.



Figure 1 - Reader 433 MHz - General View



**Figure 2 - Reader 433 MHz - Rear View**

#### **1.5.2 EUT Port/Cable Identification**

| Port                                               | Max Cable Length specified | Usage                        | Type     | Screened |
|----------------------------------------------------|----------------------------|------------------------------|----------|----------|
| Configuration and Mode: USB Powered – Receive mode |                            |                              |          |          |
| USB                                                | > 3m                       | EUT power and exercising EUT | USB      | Yes      |
| Wired Network                                      | > 3m                       | Pinging IP address           | Ethernet | No       |

**Table 3**

#### **1.5.3 Test Configuration**

The EUT was powered via its USB port for test purposes but in normal use it is battery powered hence no Mains / USB adapter power line conducted emissions tests were performed.

#### **1.5.4 Modes of Operation**

The ethernet port was exercised by pinging the IP address of the EUT.

The USB port was exercised by continuously requesting the MAC address of the EUT.

RFID in Rx Mode.

#### **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: 0048-003-098 |                                                 |                        |                          |
| 0                           | As supplied by the customer                     | Not Applicable         | Not Applicable           |

**Table 4**

## 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: USB Powered – RFID Receive mode – Ethernet Ping – USB Address |                     |               |
| Radiated Disturbance                                                                  | Graeme Lawler       | UKAS          |

**Table 5**

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

FS-1000, S/N: 0048-003-098 - Modification State 0

#### 2.1.3 Date of Test

09-July-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.

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.

Class A emission limits were used to determine compliance.

#### 2.1.5 Example Calculation

Below 1GHz:

Quasi-Peak level (dB $\mu$ V/m) = Receiver level (dB $\mu$ V/m) + Correction Factor (dB)

Margin (dB) = Limit (dB $\mu$ V/m) – Quasi-Peak level (dB $\mu$ V/m)

Above 1GHz:

CISPR Average level (dB $\mu$ V/m) = Receiver level (dB $\mu$ V/m) + Correction Factor (dB)

Margin (dB) = Limit (dB $\mu$ V/m) – CISPR Average level (dB $\mu$ V/m)

Peak level (dB $\mu$ V/m) = Receiver level (dB $\mu$ V/m) + Correction Factor (dB)

Margin (dB) = Limit (dB $\mu$ V/m) – Peak level (dB $\mu$ V/m)



## 2.1.9 Test Results

### Results for Configuration and Mode: USB Powered – RFID Rx / Ethernet Ping / USB Address.

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: 434.790 MHz  
Which necessitates an upper frequency test limit of: 2 GHz

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

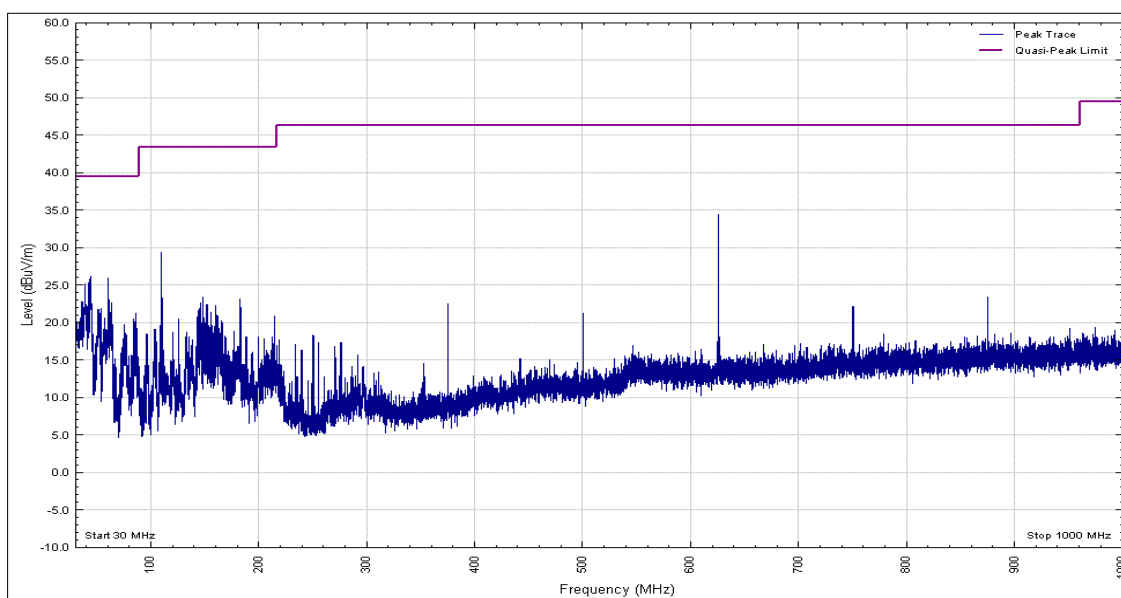


Figure 4 - Graphical Results - Vertical Polarity

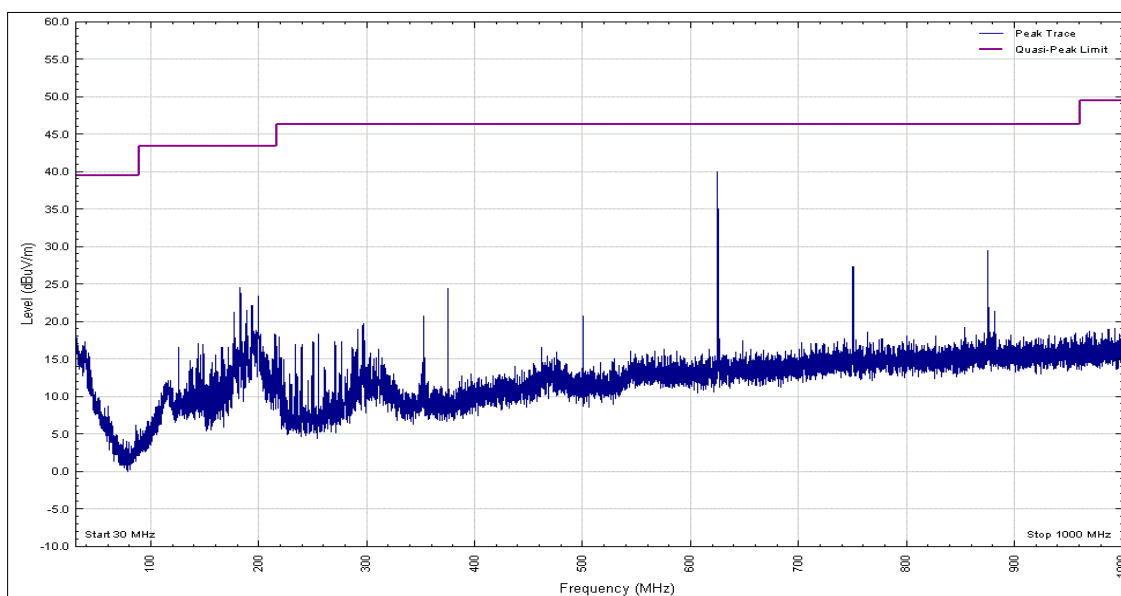


Figure 5 - Graphical Results - Horizontal Polarity



| Frequency (MHz) | Level | Limit | Margin | Detector | Unit   | Angle (°) | Height (cm) | Polarisation |
|-----------------|-------|-------|--------|----------|--------|-----------|-------------|--------------|
| 625.008         | 40.08 | 46.44 | -6.36  | Peak     | dBuV/m | 118       | 132         | Horizontal   |

Table 7

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

Frequency Range of Test: 1 GHz to 2 GHz - Peak - X Orientation

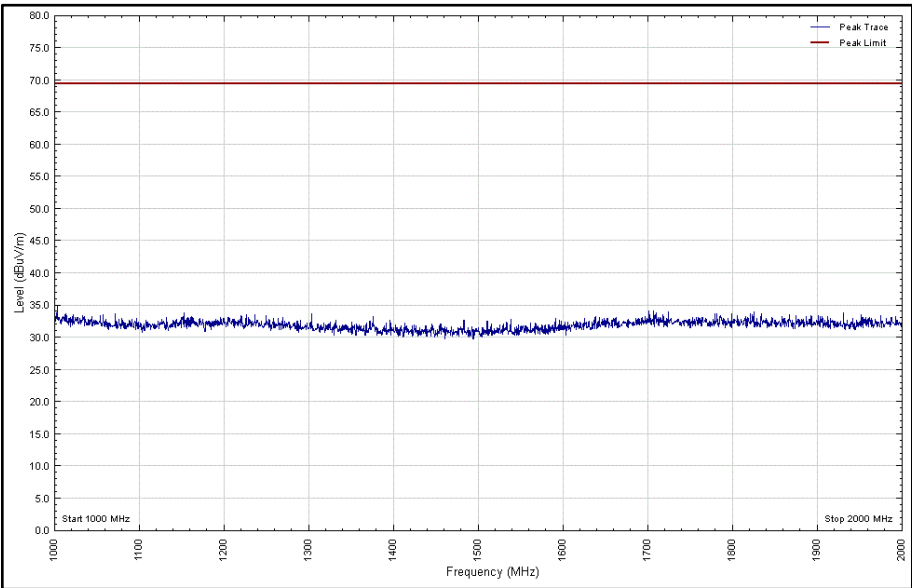


Figure 6 - Graphical Results - Vertical Polarity

Frequency Range of Test: 1 GHz to 2 GHz - Average - X Orientation

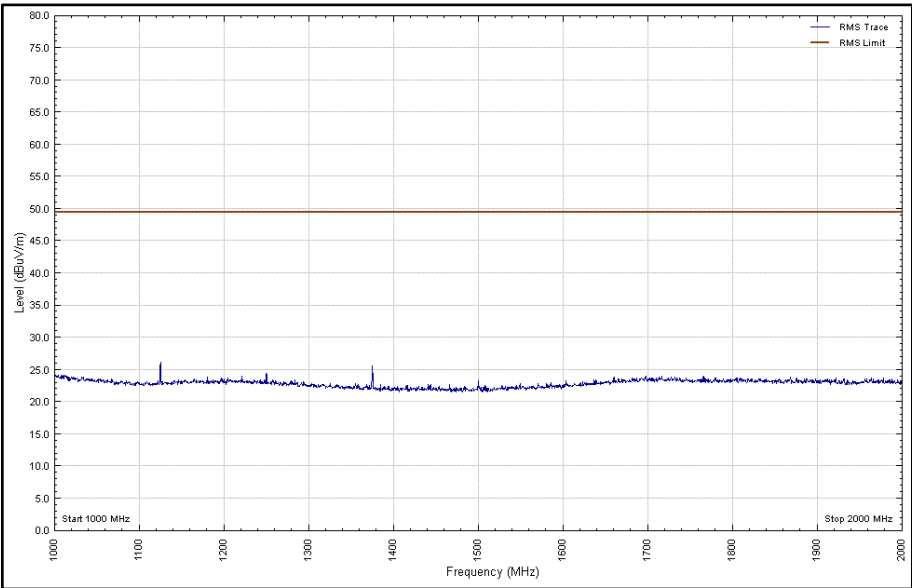


Figure 7 - Graphical Results – Vertical Polarity



Frequency Range of Test: 1 GHz to 2 GHz - Peak - X Orientation

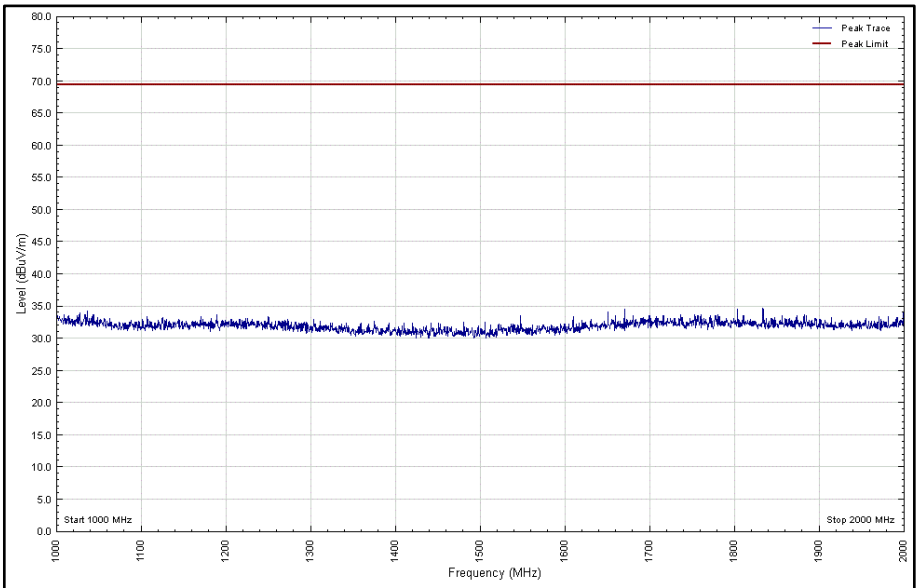


Figure 8 - Graphical Results – Horizontal Polarity

Frequency Range of Test: 1 GHz to 2 GHz - Average - X Orientation

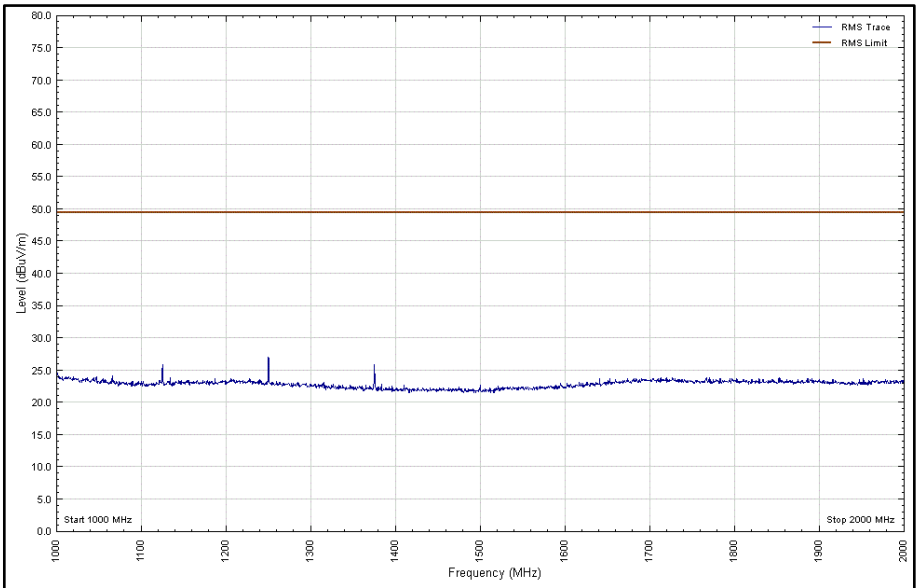
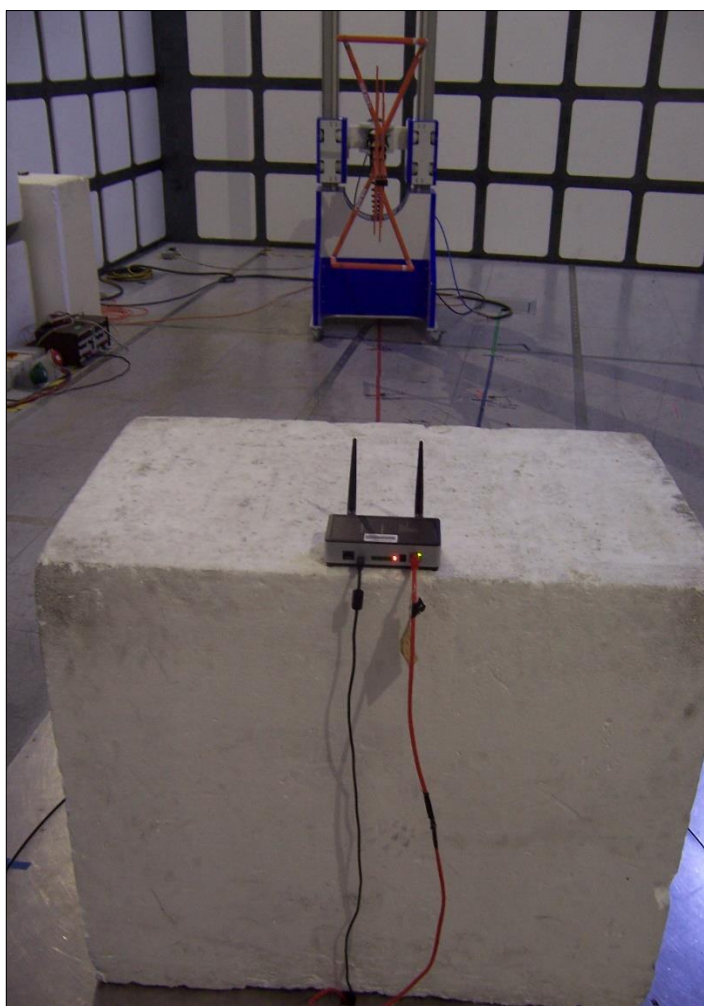
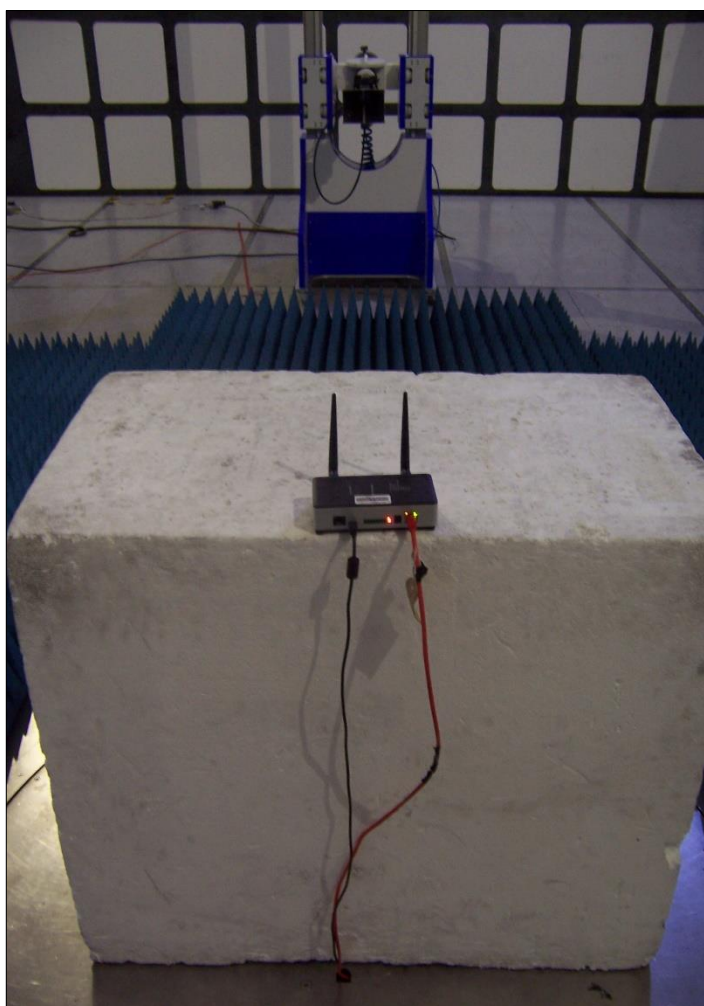


Figure 9 - Graphical Results - Horizontal Polarity



**Figure 10 – Test Setup - Radiated Disturbance (30 MHz to 1 GHz)**



**Figure 11 – Test Setup - Radiated Disturbance (1 GHz to 2 GHz)**



### 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 |
|-------------------------------------------|-----------------|-------------------|-------|-----------------------------|-----------------|
| Screened Room (5)                         | Rainford        | Rainford          | 1545  | 36                          | 23-Jan-2021     |
| Turntable Controller                      | Inn-Co GmbH     | CO 1000           | 1606  | -                           | TU              |
| Hygrometer                                | Rotronic        | A1                | 2677  | 12                          | 20-Feb-2020     |
| Digital Multimeter                        | Iso-tech        | IDM-101           | 2895  | 12                          | 04-Oct-2019     |
| Antenna with permanent attenuator (Bilog) | Chase           | CBL6143           | 2904  | 24                          | 08-Aug-2019     |
| Comb Generator                            | Schaffner       | RSG1000           | 3034  | -                           | TU              |
| EMI Test Receiver                         | Rohde & Schwarz | ESU40             | 3506  | 12                          | 17-Dec-2019     |
| Cable (Rx, Km-Km 2m)                      | Scott Cables    | KPS-1501-2000-KPS | 4526  | 6                           | 11-Dec-2019     |
| 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                          | 04-Oct-2019     |
| EmX Software                              | TUV SUD         | EmX V.1.4.7       | 5125  | -                           | Software        |

**Table 8**

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

Table 9

Worst case error for both Time and Frequency measurement 12 parts in 10<sup>6</sup>.  
All measurement uncertainties have been calculated using CISPR guidelines.