

# FCC and ISED Test Report

Hirschmann Car Communication GmbH  
Broadcast Reception RF Amplifier,  
Model: 920534D

In accordance with FCC 47 CFR Part 15B and  
ICES-003

Prepared for: Hirschmann Car Communication GmbH  
Stuttgarter Straße 45 – 51  
72654 Neckartenzlingen  
GERMANY



Add value.  
Inspire trust.

FCC ID: XTJ920534D

IC: 8653A-920534D

## COMMERCIAL-IN-CONFIDENCE

Document 75947743-02 Issue 02

### SIGNATURE

| NAME        | JOB TITLE       | RESPONSIBLE FOR      | ISSUE DATE    |
|-------------|-----------------|----------------------|---------------|
| Andy Lawson | Senior Engineer | Authorised Signatory | 26 March 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 and ICES-003. The sample tested was found to comply with the requirements defined in the applied rules.

| RESPONSIBLE FOR | NAME         | DATE          | SIGNATURE |
|-----------------|--------------|---------------|-----------|
| Testing         | Colin McKean | 26 March 2020 |           |

FCC Accreditation

90987 Octagon House, Fareham Test Laboratory

ISED Accreditation

12669A Octagon House, Fareham Test Laboratory

### EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15B: 2018 and ICES-003: 2016 for the tests detailed in section 1.3.



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TÜV SÜD Group Company

Phone: +44 (0) 1489 558100  
Fax: +44 (0) 1489 558101  
[www.tuv-sud.co.uk](http://www.tuv-sud.co.uk)

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



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# 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                          | 29 January 2020 |
| 2     | Added FCC ID and Industry Canada ID. | 26 March 2020   |

**Table 1**

## 1.2 Introduction

|                               |                                                          |
|-------------------------------|----------------------------------------------------------|
| Applicant                     | Hirschmann Car Communication GmbH                        |
| Manufacturer                  | Hirschmann Car Communication GmbH                        |
| Model Number(s)               | 920534D                                                  |
| Serial Number(s)              | 00014                                                    |
| Hardware Version(s)           | V 1.0                                                    |
| Software Version(s)           | Not Applicable                                           |
| Number of Samples Tested      | 2                                                        |
| Test Specification/Issue/Date | FCC 47 CFR Part 15B: 2018<br>ICES-003: 2016              |
| Order Number                  | 5000963170                                               |
| Date                          | 13-December-2019                                         |
| Date of Receipt of EUT        | 17-December-2019, 15-January-2020 and<br>16-January-2020 |
| Start of Test                 | 20-December-2019                                         |
| Finish of Test                | 16-January-2020                                          |
| Name of Engineer(s)           | Colin McKean                                             |
| Related Document(s)           | ANSI C63.4: 2014                                         |



### 1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15B and ICES-003 is shown below.

| Section                                  | Specification Clause |          | Test Description               | Result | Comments/Base Standard |
|------------------------------------------|----------------------|----------|--------------------------------|--------|------------------------|
|                                          | Part 15B             | ICES-003 |                                |        |                        |
| Configuration and Mode: DC Powered - DAB |                      |          |                                |        |                        |
| 2.1                                      | 15.109               | 6.2      | Radiated Disturbance – Class B | Pass   | ANSI C63.4: 2014       |

**Table 2**



#### 1.4 Declaration of Build Status

| MAIN EUT                                                                                   |                                          |  |  |
|--------------------------------------------------------------------------------------------|------------------------------------------|--|--|
| MANUFACTURING DESCRIPTION                                                                  | Broadcast reception Amplifier            |  |  |
| MANUFACTURER                                                                               | Hirschmann Car Communication GmbH        |  |  |
| MODEL                                                                                      | 920534D                                  |  |  |
| PART NUMBER                                                                                | DAB                                      |  |  |
| HARDWARE VERSION                                                                           | V1.0                                     |  |  |
| SOFTWARE VERSION                                                                           | Not Applicable                           |  |  |
| PSU VOLTAGE/FREQUENCY/CURRENT                                                              | 8V/ 55mA                                 |  |  |
| HIGHEST INTERNALLY GENERATED FREQUENCY                                                     | 240 MHz                                  |  |  |
| FCC ID (if applicable)                                                                     | XTJ920534D                               |  |  |
| INDUSTRY CANADA ID (if applicable)                                                         | 8653A-920534D                            |  |  |
| TECHNICAL DESCRIPTION<br>(a brief technical description of the intended use and operation) | Broadcast reception rf-amplifier for DAB |  |  |
| COUNTRY OF ORIGIN                                                                          | Hungary                                  |  |  |
| RF CHARACTERISTICS (if applicable)                                                         |                                          |  |  |
| TRANSMITTER FREQUENCY OPERATING RANGE (MHz)                                                | --                                       |  |  |
| RECEIVER FREQUENCY OPERATING RANGE (MHz)                                                   | --                                       |  |  |
| INTERMEDIATE FREQUENCIES                                                                   | --                                       |  |  |
| EMISSION DESIGNATOR(S): (i.e. G1D, GXW)                                                    |                                          |  |  |
| MODULATION TYPES: (i.e. GMSK, QPSK)                                                        | --                                       |  |  |
| OUTPUT POWER (W or 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: Christoph Seikel

Position held: Manager Requirements & Homologation

Date 19.12.2019

## 1.5 Product Information

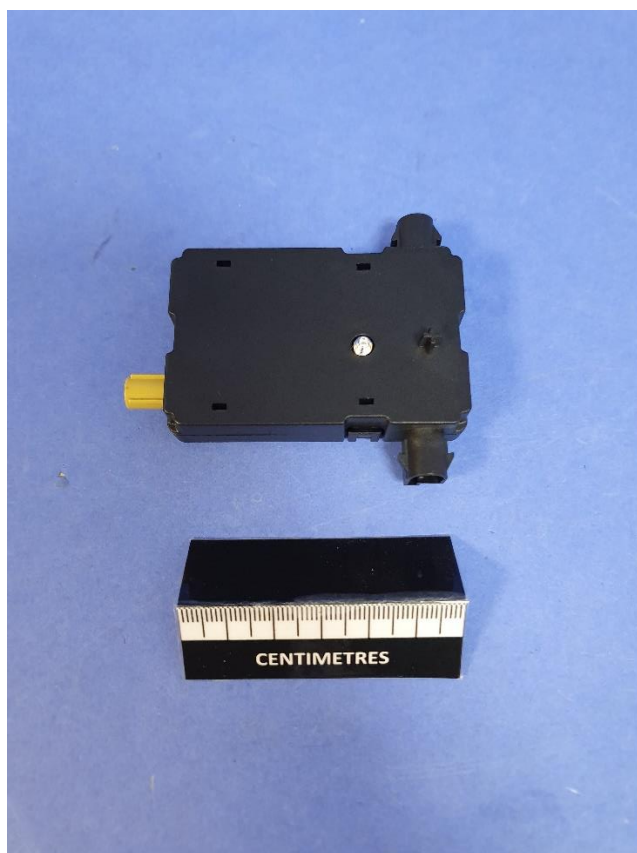
### 1.5.1 Technical Description

The primary function of the EUT is a Broadcast Reception Amplifier.

The EUT has functionality to amplify commercial DAB broadcast transmissions.



**Figure 1 - Receiver Amplifier - Front Face**



**Figure 2 - Receiver Amplifier - Rear Face**

### 1.5.2 EUT Port/Cable Identification

| Port                                           | Max Cable Length specified | Usage                               | Type     | Screened |
|------------------------------------------------|----------------------------|-------------------------------------|----------|----------|
| Configuration and Mode: DC Powered – All Modes |                            |                                     |          |          |
| Signal Port                                    | < 3 m                      | RF Signal Input                     | Co-Axial | Yes      |
| Power and Signal Port                          | < 3 m                      | RF Signal Output and DC Power Input | Co-Axial | Yes      |

**Table 3**

### 1.5.3 Test Configuration

| Configuration | Description                                                                                                                                                                                                                                                    |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DC Powered    | The EUTs RF input was connected to a DAB signal generator.<br>The EUTs RF output was connected to a mini-circuits combiner which supplied DC power to the EUT and routed the RF output signal from the EUT to a typical vehicle commercial broadcast receiver. |

**Table 4**



#### 1.5.4 Modes of Operation

| Mode | Description                                                                                                                |
|------|----------------------------------------------------------------------------------------------------------------------------|
| DAB  | A DAB broadcast 1 kHz signal was fed to the RF input of the EUT, and the output was demodulated by the broadcast receiver. |

**Table 5**

#### 1.6 Deviations from the Standard

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

#### 1.7 EUT Modification Record

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

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

| Modification State                   | Description of Modification still fitted to EUT | Modification Fitted By | Date Modification Fitted |
|--------------------------------------|-------------------------------------------------|------------------------|--------------------------|
| Model: 920534D, Serial Number: 00014 |                                                 |                        |                          |
| 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: DC Powered - DAB |                     |               |
| Radiated Disturbance                     | Colin McKean        | 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  
ICES-003, Clause 6.2

#### 2.1.2 Equipment Under Test and Modification State

920534D, S/N: 00014 - Modification State 0

#### 2.1.3 Date of Test

20-December-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.

#### 2.1.5 Example Calculation

Below 1 GHz:

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

Above 1 GHz:

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

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



2.1.6 Example Test Setup Diagram

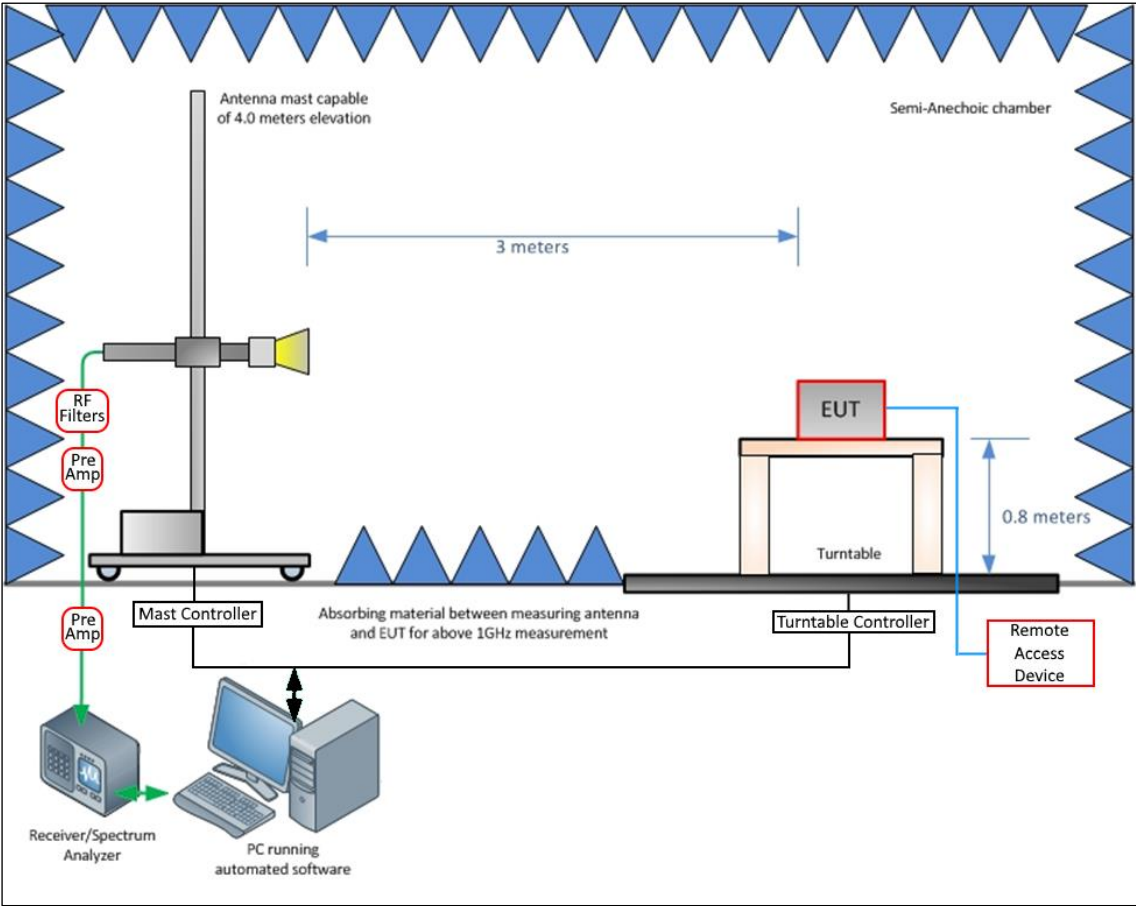


Figure 3 - Radiated Disturbance Example Test Setup

2.1.7 Environmental Conditions

Ambient Temperature      20.0 °C  
Relative Humidity          42.0 %

2.1.8 Specification Limits

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

Table 8

## 2.1.9 Test Results

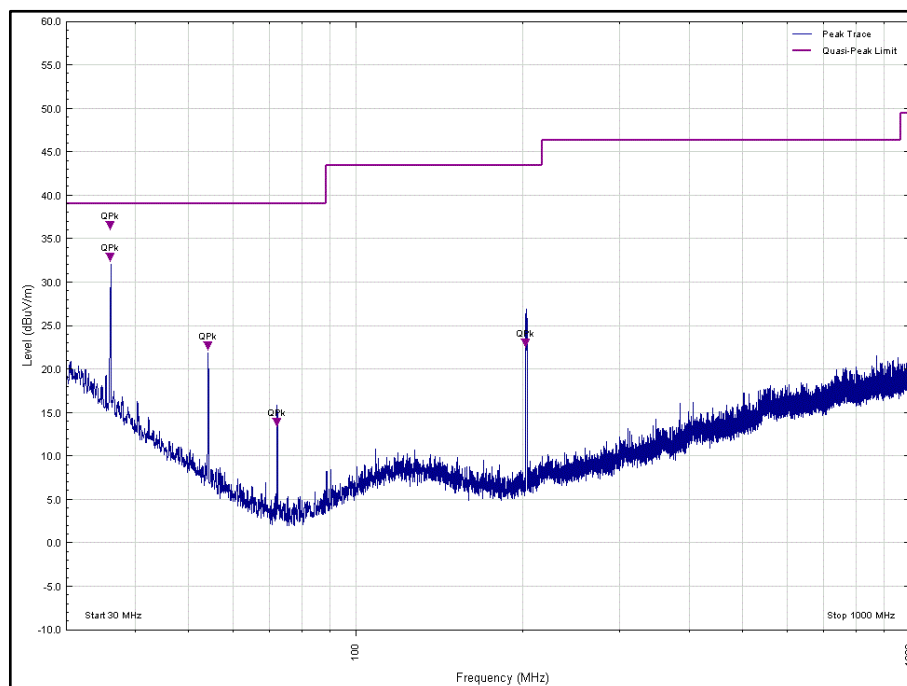
**Results for Configuration and Mode: DC Powered - DAB.**

**The test was performed in accordance with the Class A limits.**

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

Detailed results are shown below.

Frequency Range of Test: 30 MHz to 1 GHz



**Figure 4 - Graphical Results - Vertical Polarity**

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Detector | Angle (°) | Height (cm) | Polarisation | Orientation |
|-----------------|----------------|----------------|-------------|----------|-----------|-------------|--------------|-------------|
| 36.058          | 32.2           | 39.1           | -6.9        | Q-Peak   | 122       | 339         | Vertical     | -           |
| 36.065          | 35.8           | 39.1           | -3.3        | Q-Peak   | 118       | 389         | Vertical     | -           |
| 54.089          | 22.0           | 39.1           | -17.1       | Q-Peak   | 91        | 100         | Vertical     | -           |
| 72.186          | 13.2           | 39.1           | -25.9       | Q-Peak   | 112       | 100         | Vertical     | -           |
| 202.645         | 22.2           | 43.5           | -21.3       | Q-Peak   | 158       | 103         | Vertical     | -           |

**Table 9**

No other measurements were made as all other peak emissions seen were greater than 10 dB below the test limit.



Frequency Range of Test: 30 MHz to 1 GHz

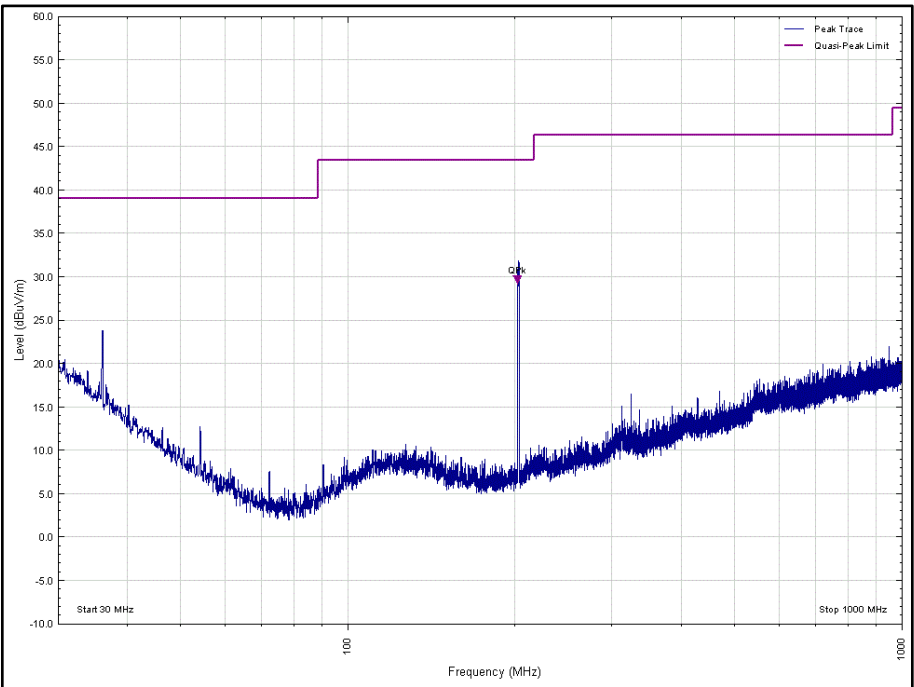


Figure 5 - Graphical Results - Horizontal Polarity

| Frequency (MHz) | Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Detector | Angle (°) | Height (cm) | Polarisation | Orientation |
|-----------------|----------------|----------------|-------------|----------|-----------|-------------|--------------|-------------|
| 202.692         | 29.0           | 43.5           | -14.5       | Q-Peak   | 133       | 100         | Horizontal   | -           |

Table 10

No other measurements were made as all other peak emissions seen were greater than 10 dB below the test limit.



Frequency Range of Test: 1 GHz to 8 GHz - Peak

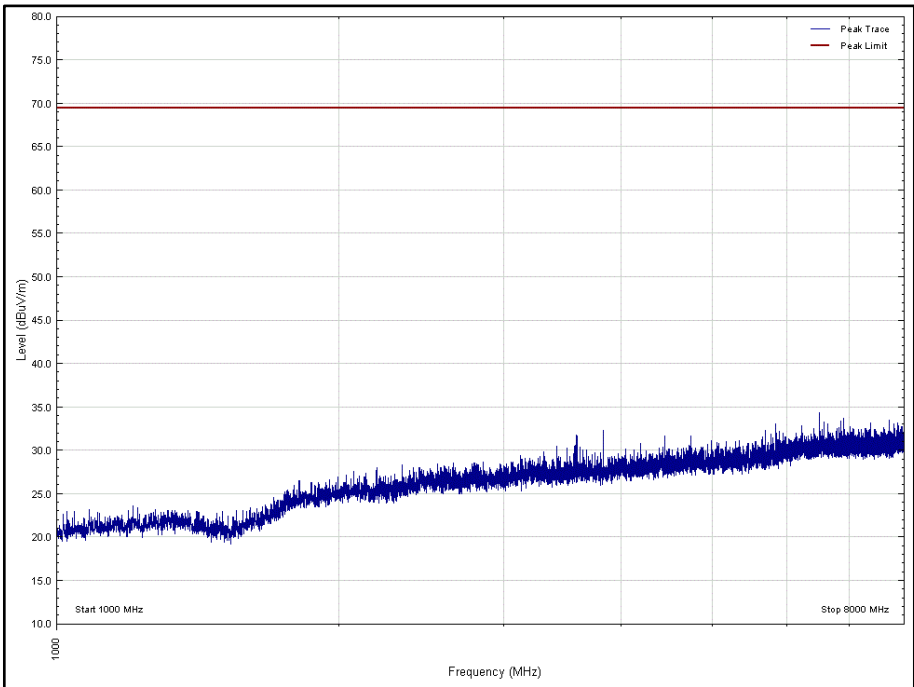


Figure 6 - Graphical Results - Vertical Polarity

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

Table 11

\*No formal measurements were made as all peak emissions seen were greater than 10 dB below the test limit.



Frequency Range of Test: 1 GHz to 8 GHz – CISPR Average

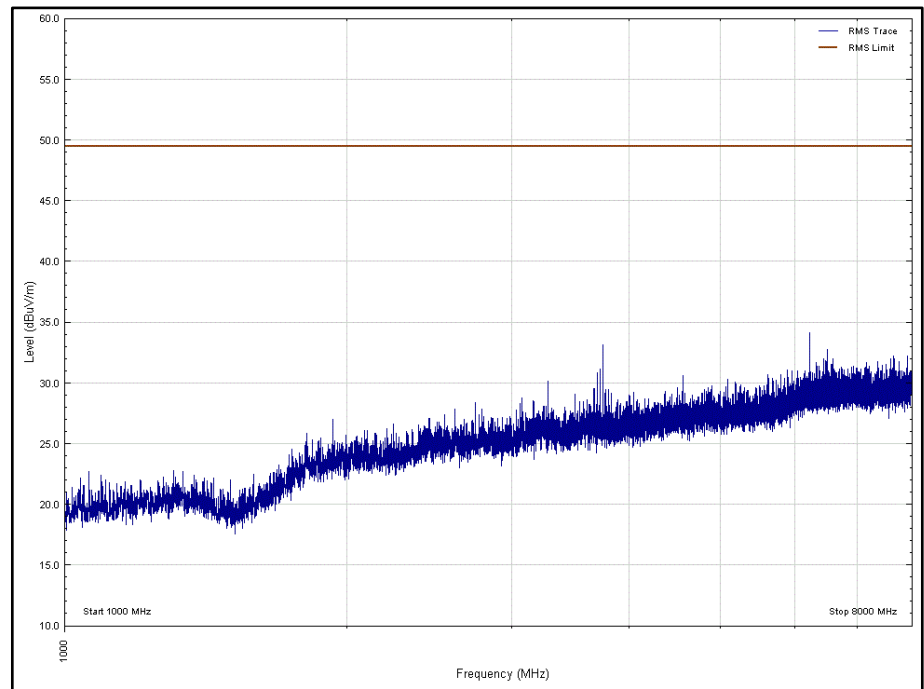


Figure 7 - Graphical Results - Vertical Polarity

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

Table 12

\*No formal measurements were made as all peak emissions seen were greater than 10 dB below the test limit.



Frequency Range of Test: 1 GHz to 8 GHz - Peak

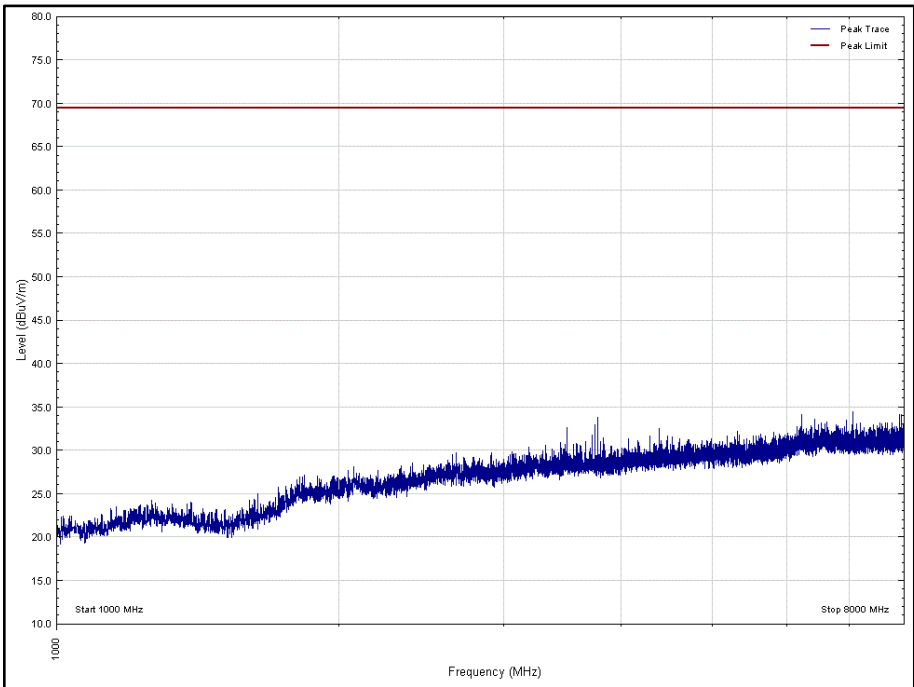


Figure 8 - Graphical Results - Horizontal Polarity

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

Table 13

\*No formal measurements were made as all peak emissions seen were greater than 10 dB below the test limit.



Frequency Range of Test: 1 GHz to 8 GHz – CISPR Average

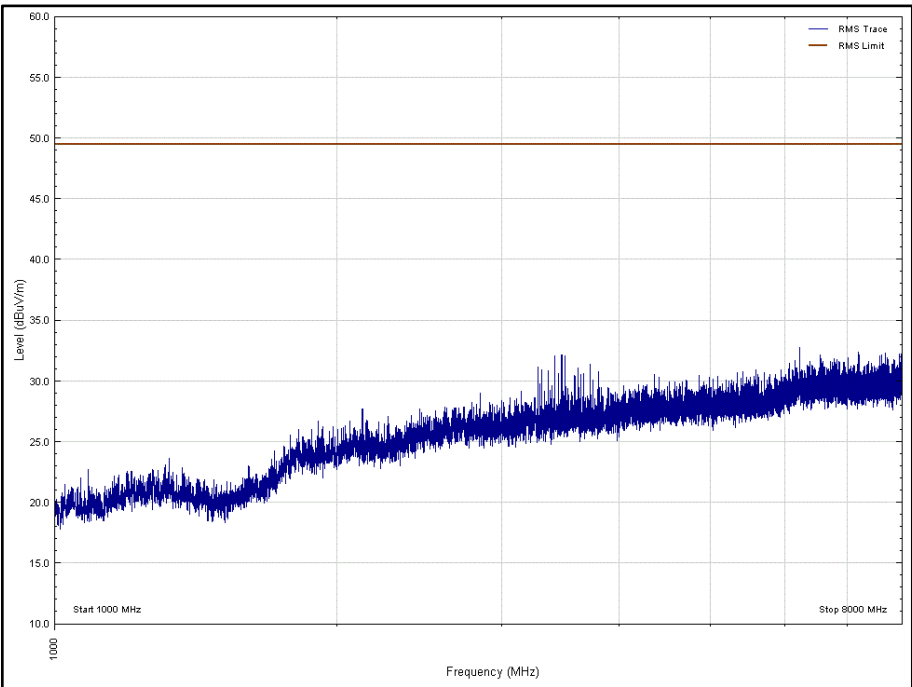


Figure 9 - Graphical Results - Horizontal Polarity

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

Table 14

\*No formal measurements were made as all peak emissions seen were greater than 10 dB below the test limit.



**Figure 10 - Test Setup - Below 1 GHz**



**Figure 11 - Test Setup - Above 1 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     |
| EmX Emissions Software                    | TUV SUD             | EmX V.V1.5.3      | 5125  | -                           | Software        |
| EMI Test Receiver                         | Rohde & Schwarz     | ESW44             | 5382  | 12                          | 08-Oct-2020     |
| Turntable Controller                      | Inn-Co GmbH         | CO 1000           | 1606  | -                           | TU              |
| Mast Controller                           | Maturo GmbH         | NCD               | 4810  | -                           | TU              |
| Tilt Antenna Mast                         | Maturo GmbH         | TAM 4.0-P         | 4811  | -                           | TU              |
| 1GHz to 8GHz Low Noise Amplifier          | Wright Technologies | APS04-0085        | 4365  | 12                          | 14-Nov-2020     |
| Antenna with permanent attenuator (Bilog) | Chase               | CBL6143           | 2904  | 24                          | 30-Sep-2021     |
| Double Ridged Waveguide Horn Antenna      | ETS-Lindgren        | 3117              | 4722  | 12                          | 05-Mar-2020     |
| '2.92 mm' - '2.92 mm' RF Cable (2 m)      | Rhophase            | KPS-1503-2000-KPS | 3695  | 12                          | 11-Jun-2020     |
| 1.5 m 40GHz RF Cable                      | Scott Cables        | KPS-1501-2000-KPS | 5127  | 6                           | 20-Jan-2020     |
| 8 Meter Cable                             | Teledyne            | PR90-088-8MTR     | 5212  | 12                          | 30-Aug-2020     |

**Table 10**

TU – Traceability Unscheduled



### 3 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, $\pm 5.2$ dB<br>1 GHz to 40 GHz, Horn Antenna, $\pm 6.3$ dB |

**Table 11**

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.