FCC and ISEDC Test Report

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

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

Add value.
Inspire trust.

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

FCC ID: XTJ920534D IC: 8653A-920534D

COMMERCIAL-IN-CONFIDENCE

Document 75947743-02 Issue 02

SIGNATURE			
AJ Lawson.			
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

ISEDC 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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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	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 ICES-003: 2016
Order Number Date	5000963170 13-December-2019
Date of Receipt of EUT	17-December-2019, 15-January-2020 and 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 (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

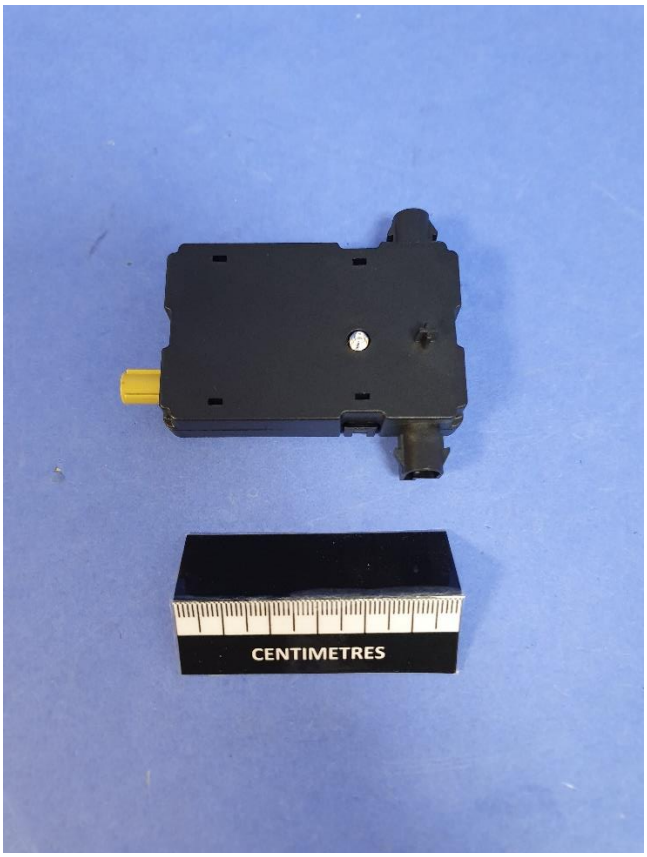

Figure 2 - Receiver Amplifier - Rear Face

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. 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 (dBµV/m) = Receiver level (dBµV) + Correction Factor (dB)
Margin (dB) = Quasi-Peak level (dBµV/m) - Limit (dBµV/m)

Above 1 GHz:

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

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

2.1.6 Example Test Setup Diagram

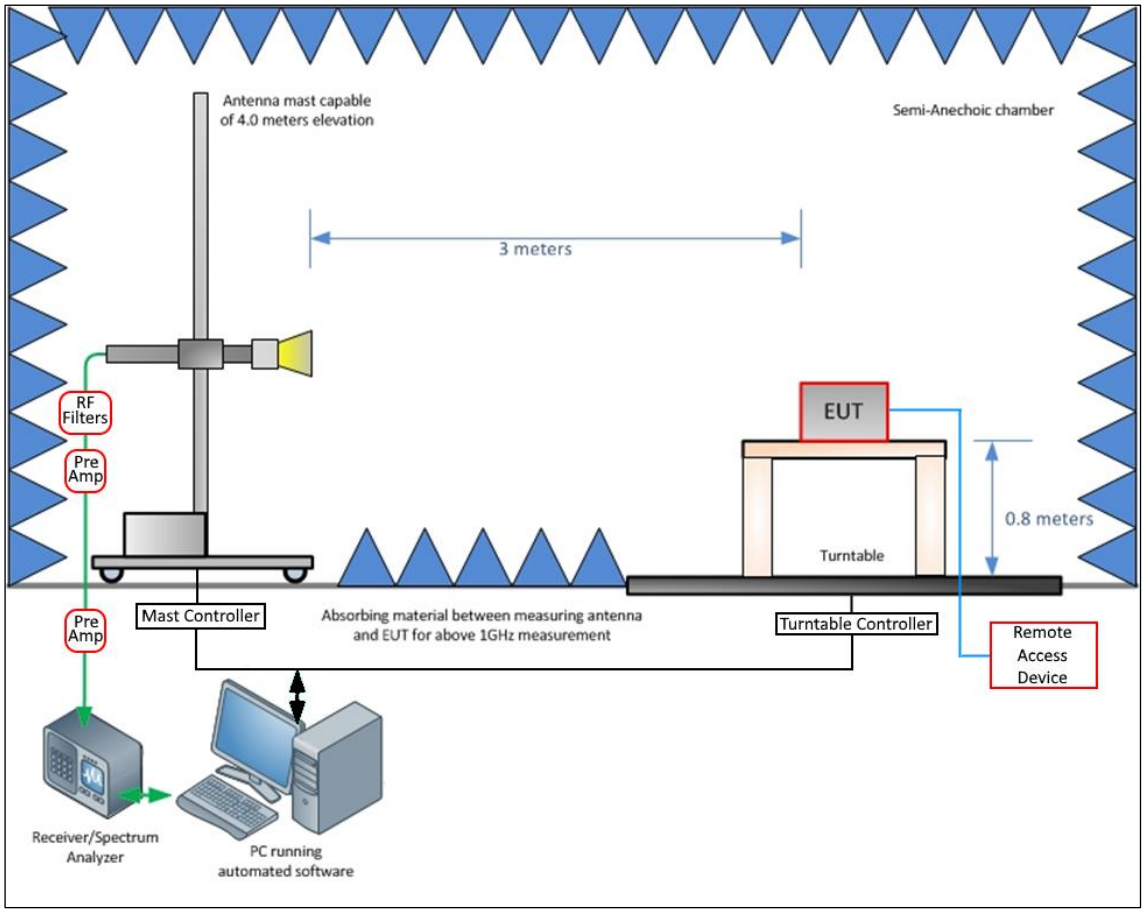

Figure 3 - Radiated Disturbance Example Test Setup

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)	(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: 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

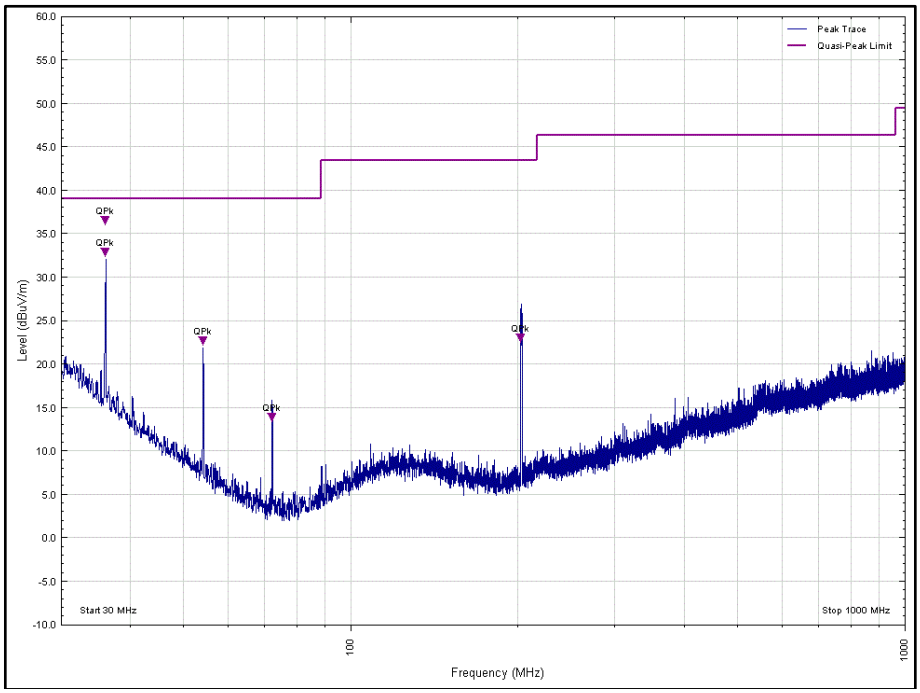

Figure 4 - Graphical Results - Vertical Polarity

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

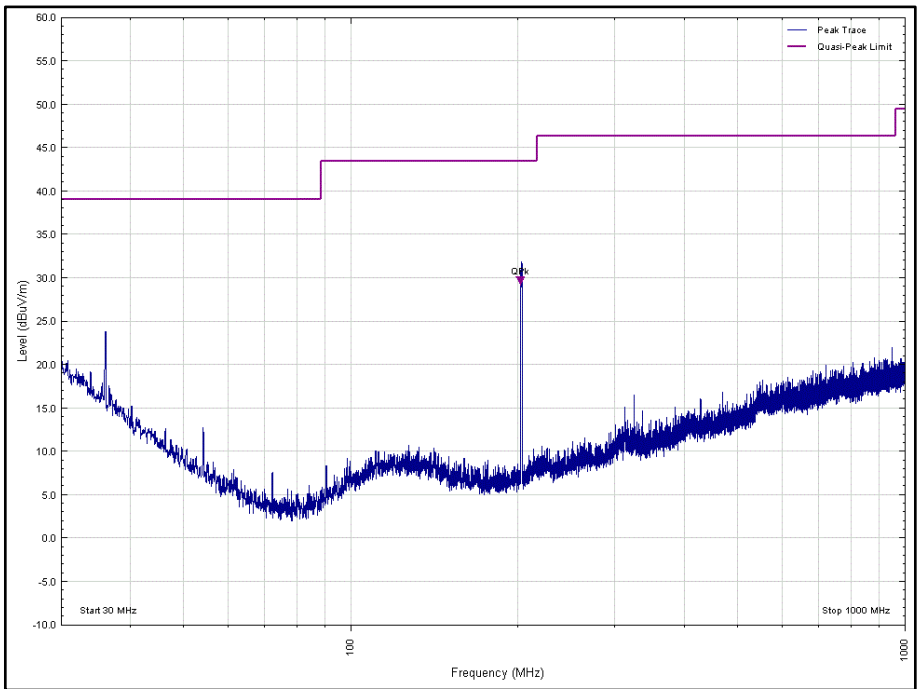

Figure 5 - Graphical Results - Horizontal Polarity

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

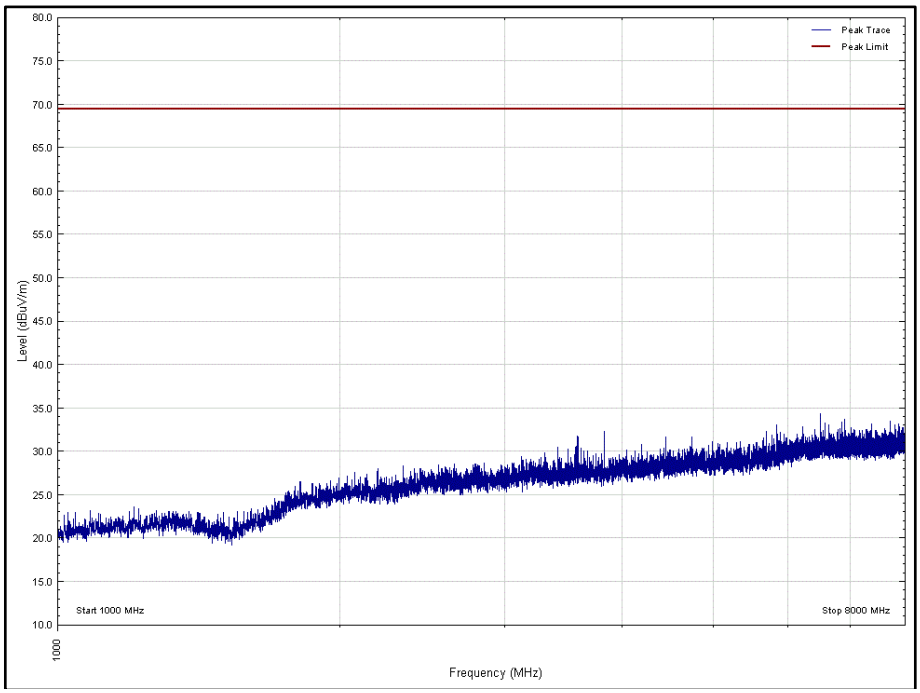

Figure 6 - Graphical Results - Vertical Polarity

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

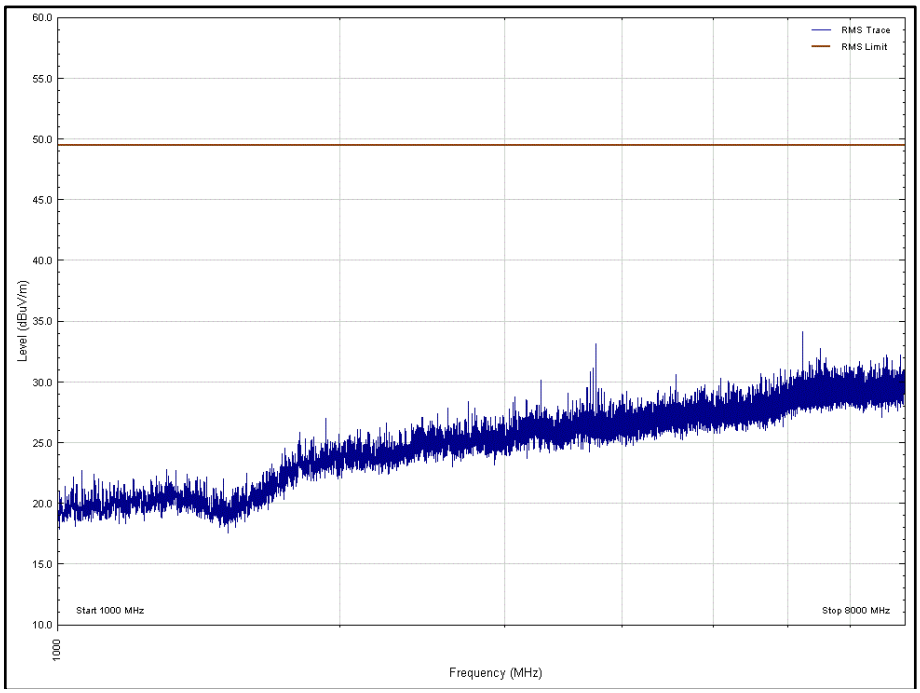

Figure 7 - Graphical Results - Vertical Polarity

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

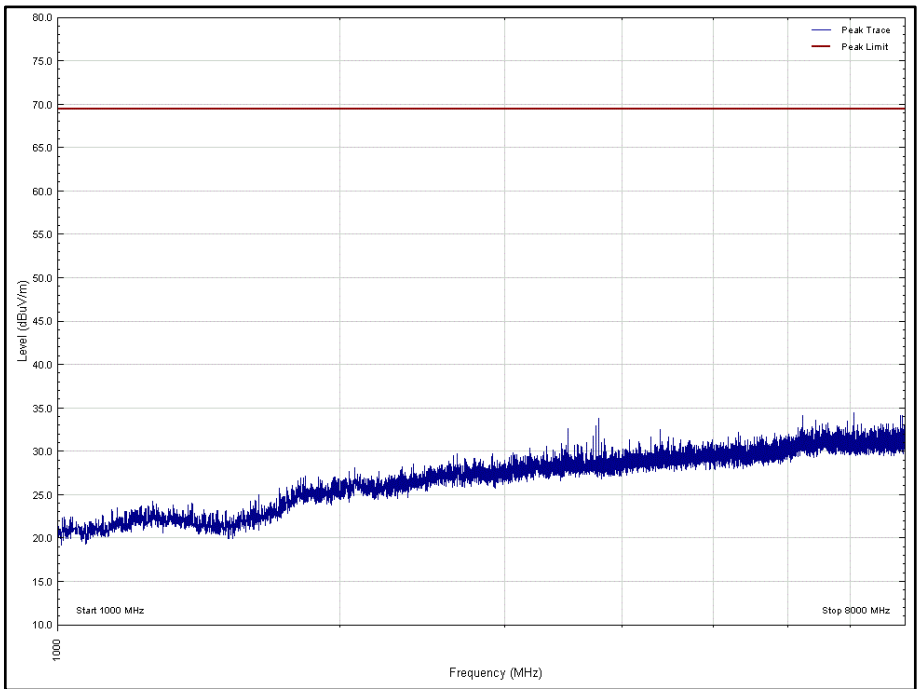

Figure 8 - Graphical Results - Horizontal Polarity

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

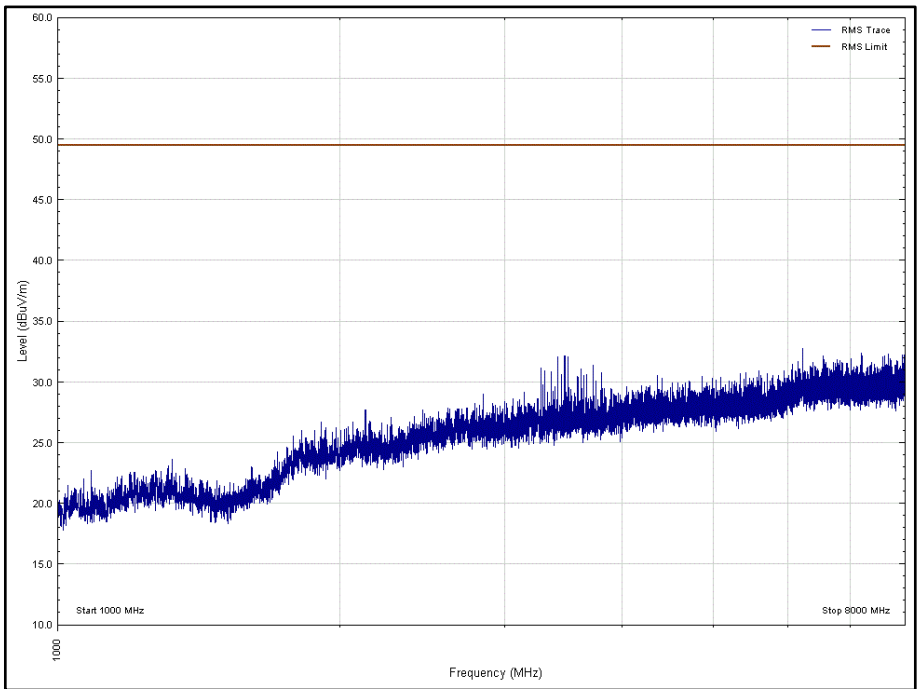

Figure 9 - Graphical Results - Horizontal Polarity

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, ±5.2 dB 1 GHz to 40 GHz, Horn Antenna, ±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.