FCC and ISED Test Report

Hirschmann Car Communication GmbH
Broadcast Reception Amplifier,
Model: 920691A

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: XTJ920691A IC: 8653A-920691A

COMMERCIAL-IN-CONFIDENCE

Document 75948575-07 Issue 01

SIGNATURE			
AJ Lawson.			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Andy Lawson	Senior Engineer	Authorised Signatory	29 April 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	William Mayo	29 April 2020	
Supervision	Martin Perry	29 April 2020	

FCC Accreditation
217472 Bearley Test Laboratory

ISED Accreditation
12669A Bearley Test Laboratory

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15B: 2019 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 April 2020

Table 1

1.2 Introduction

Applicant	Hirschmann Car Communication GmbH
Manufacturer	Hirschmann Car Communication GmbH
Model Number(s)	All Samples - 920691A
Serial Number(s)	Sample 1 - 40347272-00020-14 – Variant A (AM FM1 DAB1) Sample 2 - 40347270-00017-14 – Variant B (AM FM1)
Hardware Version(s)	V1.0
Software Version(s)	Not applicable
Number of Samples Tested	1 of each variant
Test Specification/Issue/Date	FCC 47 CFR Part 15B: 2019 ICES-003: 2016
Order Number Date	1000433208 10-March-2020
Date of Receipt of EUT	20-March-2020
Start of Test	03-April-2020
Finish of Test	16-April-2020
Name of Engineer(s)	William Mayo (Supervised by Martin Perry)
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: Sample 1 (Variant A, AM, FM1 and DAB1) DC Powered - AM					
2.1	15.109	6.2	Radiated Disturbance	Pass	ANSI C63.4: 2014
Configuration and Mode: Sample 1 (Variant A, AM, FM1 and DAB1) DC Powered - FM					
2.1	15.109	6.2	Radiated Disturbance	Pass	ANSI C63.4: 2014
Configuration and Mode: Sample 1 (Variant A, AM, FM1 and DAB1) DC Powered - DAB					
2.1	15.109	6.2	Radiated Disturbance	Pass	ANSI C63.4: 2014
Configuration and Mode: Sample 2 (Variant B, AM and FM1) DC Powered - AM					
2.1	15.109	6.2	Radiated Disturbance	Pass	ANSI C63.4: 2014
Configuration and Mode: Sample 2 (Variant B, AM and FM1) DC Powered - FM					
2.1	15.109	6.2	Radiated Disturbance	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)*	Broadcast reception rf-amplifier, to be used with in car commercial radio receiver
Manufacturer:	Hirschmann Car Communication GmbH
Model:	920691A
Part Number:	AM FM1 DAB1
Hardware Version:	V1.0
Software Version:	Not applicable
FCC ID (if applicable)	XTJ920691A
IC ID (if applicable)	8653A-920691A

Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	240 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	0.52 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:	N/A	Hz
Voltage	N/A	V
Max current:	N/A	A
Single Phase ☐ Three Phase ☐		

DC Power Source

Nominal voltage:	8	V
Extreme upper voltage:	8.4	V
Extreme lower voltage:	7.6	V
Max current:	95	mA

Battery Power Source

Voltage:	N/A	V
End-point voltage:	N/A	V *(Point at which the battery will terminate)*
Alkaline ☐ Leclanche ☐ Lithium ☐ Nickel Cadmium ☐ Lead Acid* ☐ **(Vehicle regulated)*		
Other ☐ Please detail:		

Charging

Can the EUT transmit whilst being charged	Yes ☐ No ☐

Temperature

Minimum temperature:	-40	°C
Maximum temperature:	85	°C

Antenna Characteristics

Antenna connector ☒			State impedance	50	Ohm
Temporary antenna connector ☐			State impedance		Ohm
Integral antenna ☐	Type:		Gain		dBi
External antenna ☒	Type:	monopole	Gain	3	dBi
For external antenna only: Standard Antenna Jack ☐ If yes, describe how user is prohibited from changing antenna (if not professional installed): Equipment is only ever professionally installed ☒ Non-standard Antenna Jack ☐					

Ancillaries (if applicable)

Manufacturer:		Part Number:	
Model:		Country of Origin:	

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

Name: Christoph Seikel
Position held: Manager Requirements & Homologations
Date: 16.03.2020

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment)*	Broadcast reception rf-amplifier, to be used with in car commercial radio receiver
Manufacturer:	Hirschmann Car Communication GmbH
Model:	920691A
Part Number:	AM FM1
Hardware Version:	V1.0
Software Version:	Not applicable
FCC ID (if applicable)	XTJ920691A
IC ID (if applicable)	8653A-920691A

Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	108 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	0.52 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:	N/A	Hz
Voltage	N/A	V
Max current:	N/A	A
Single Phase ☐ Three Phase ☐		

DC Power Source

Nominal voltage:	8	V
Extreme upper voltage:	8.4	V
Extreme lower voltage:	7.6	V
Max current:	95	mA

Battery Power Source

Voltage:	N/A	V
End-point voltage:	N/A	V *(Point at which the battery will terminate)*
Alkaline ☐ Leclanche ☐ Lithium ☐ Nickel Cadmium ☐ Lead Acid* ☐ **(Vehicle regulated)*		
Other ☐ Please detail:		

Charging

Can the EUT transmit whilst being charged	Yes ☐ No ☐

Temperature

Minimum temperature:	-40	°C
Maximum temperature:	85	°C

Antenna Characteristics

Antenna connector ☒			State impedance	50	Ohm
Temporary antenna connector ☐			State impedance		Ohm
Integral antenna ☐	Type:		Gain		dBi
External antenna ☒	Type:	monopole	Gain	3	dBi
For external antenna only: Standard Antenna Jack ☐ If yes, describe how user is prohibited from changing antenna (if not professional installed): Equipment is only ever professionally installed ☒ Non-standard Antenna Jack ☐					

Ancillaries (if applicable)

Manufacturer:		Part Number:	
Model:		Country of Origin:	

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

Name: Christoph Seikel
Position held: Manager Requirements & Homologations
Date: 16.03.2020

1.5 Product Information

1.5.1 Technical Description

The primary function of the EUTs are as Broadcast Reception Amplifiers.

The EUTs have the functionality to amplify commercial AM and FM1 or AM, FM1 and DAB1 broadcast transmissions.

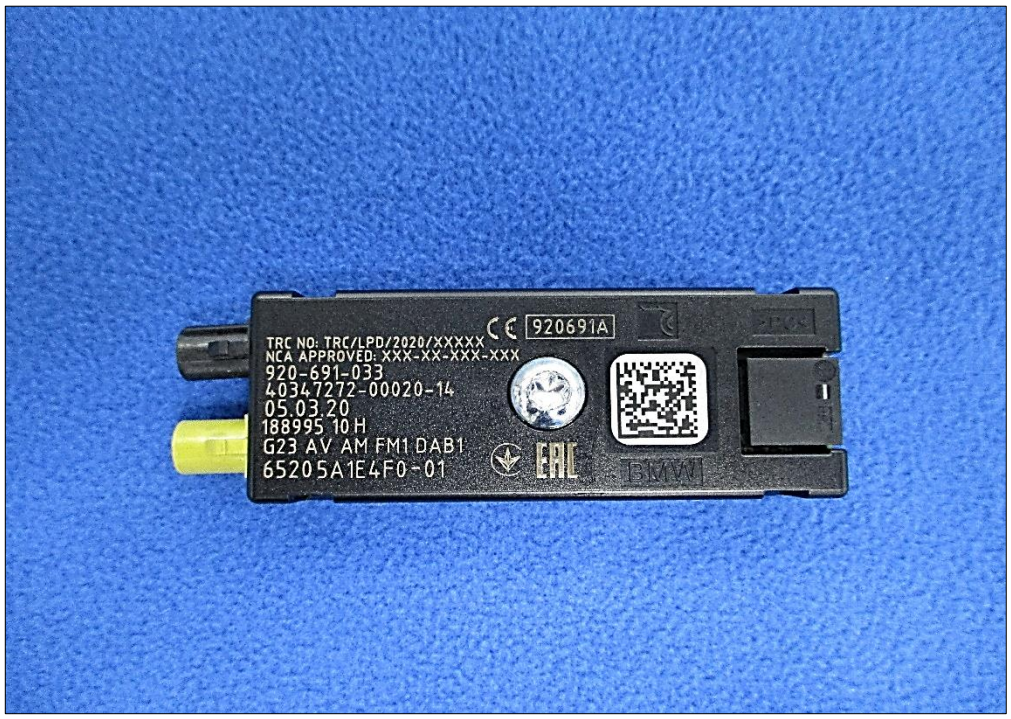

Figure 1 - Receiver Amplifier - Front Face – Sample 1 (Variant A – AM, FM1 and DAB1)

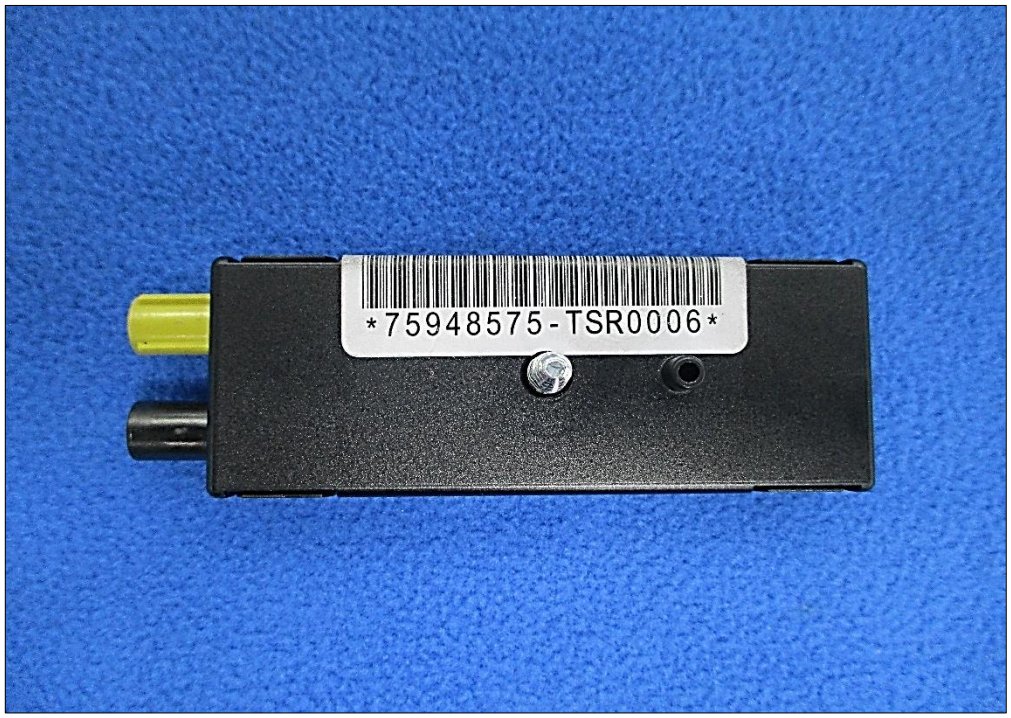

Figure 2 - Receiver Amplifier - Rear Face – Sample 1 (Variant A – AM, FM1 and DAB1)

Figure 3 - Receiver Amplifier - Front Face – Sample 2 (Variant B - AM and FM1)

Figure 4 - Receiver Amplifier - Rear Face – Sample 2 (Variant B - AM and FM1)

1.5.2 EUT Port/Cable Identification

Port	Max Cable Length specified	Usage	Type	Screened
Configuration and Mode: DC Powered - All Modes				
RF Input Port (Sample 1)	< 3 m	RF Signal Input	Coaxial	Yes
Power and Signal Port (Sample 1)	< 3 m	RF Signal Output and DC Power Input	Coaxial	Yes
RF Input Port (Sample 2)	< 3 m	RF Signal Input	Coaxial	Yes
Power and Signal Port (Sample 2)	< 3 m	RF Signal Output and DC Power Input	Coaxial	Yes

Table 3

1.5.3 Test Configuration

Configuration	Description
Sample 1 (Variant A, AM, FM1 and DAB1) DC Powered	The EUT was powered from an 8 V DC power supply. The EUTs RF input was connected to either a DAB signal generator or Marconi AM\FM 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. The receiver used was a Sony DSX-A500BD, serial number 1507536.
Sample 2 (Variant B, AM and FM1) DC Powered	The EUT was powered from an 8 V DC power supply. The EUTs RF input was connected to a Marconi AM\FM 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. The receiver used was a Sony DSX-A500BD, serial number 1507536.

Table 4

1.5.4 Modes of Operation

Mode	Description
AM	An AM modulated 1 kHz signal was fed to the RF input of the EUT, and the RF output of the EUT was demodulated by the broadcast receiver.
FM	An FM modulated 1 kHz signal was fed to the RF input of the EUT, and the RF output of the EUT was demodulated by the broadcast receiver.
DAB	A DAB broadcast 1 kHz signal was fed to the RF input of the EUT, and the RF output of the EUT 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: 920691A, Serial Number: 40347272-00020-14 – Variant A (AM FM1 DAB1)			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: 920691A, Serial Number: 40347270-00017-14 – Variant B (AM FM1)			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 6

1.8 Test Location

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

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: Sample 1 (Variant A, AM, FM1 and DAB1) DC Powered - AM		
Radiated Disturbance	William Mayo (Supervised by Martin Perry)	UKAS
Configuration and Mode: Sample 1 (Variant A, AM, FM1 and DAB1) DC Powered - FM		
Radiated Disturbance	William Mayo (Supervised by Martin Perry)	UKAS
Configuration and Mode: Sample 1 (Variant A, AM, FM1 and DAB1) DC Powered - DAB		
Radiated Disturbance	William Mayo (Supervised by Martin Perry)	UKAS
Configuration and Mode: Sample 2 (Variant B, AM and FM1) DC Powered - AM		
Radiated Disturbance	William Mayo (Supervised by Martin Perry)	UKAS
Configuration and Mode: Sample 2 (Variant B, AM and FM1) DC Powered - FM		
Radiated Disturbance	William Mayo (Supervised by Martin Perry)	UKAS

Table 7

Office Address:

Snitterfield Road
Bearley
Warwickshire
CV37 OEX
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

Sample 1, 920691A, S/N: 40347272-00020-14 – Variant A (AM FM1 DAB1) - Modification State 0
Sample 2, 920691A, S/N: 40347270-00017-14 – Variant B (AM FM1) - Modification State 0

2.1.3 Date of Test

03-April-2020 to 16-April-2020

2.1.4 Test Method

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

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

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.

Using a list of the highest emissions detected during the pre-scan along with their bearing and associated antenna polarisation, the EUT was then 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

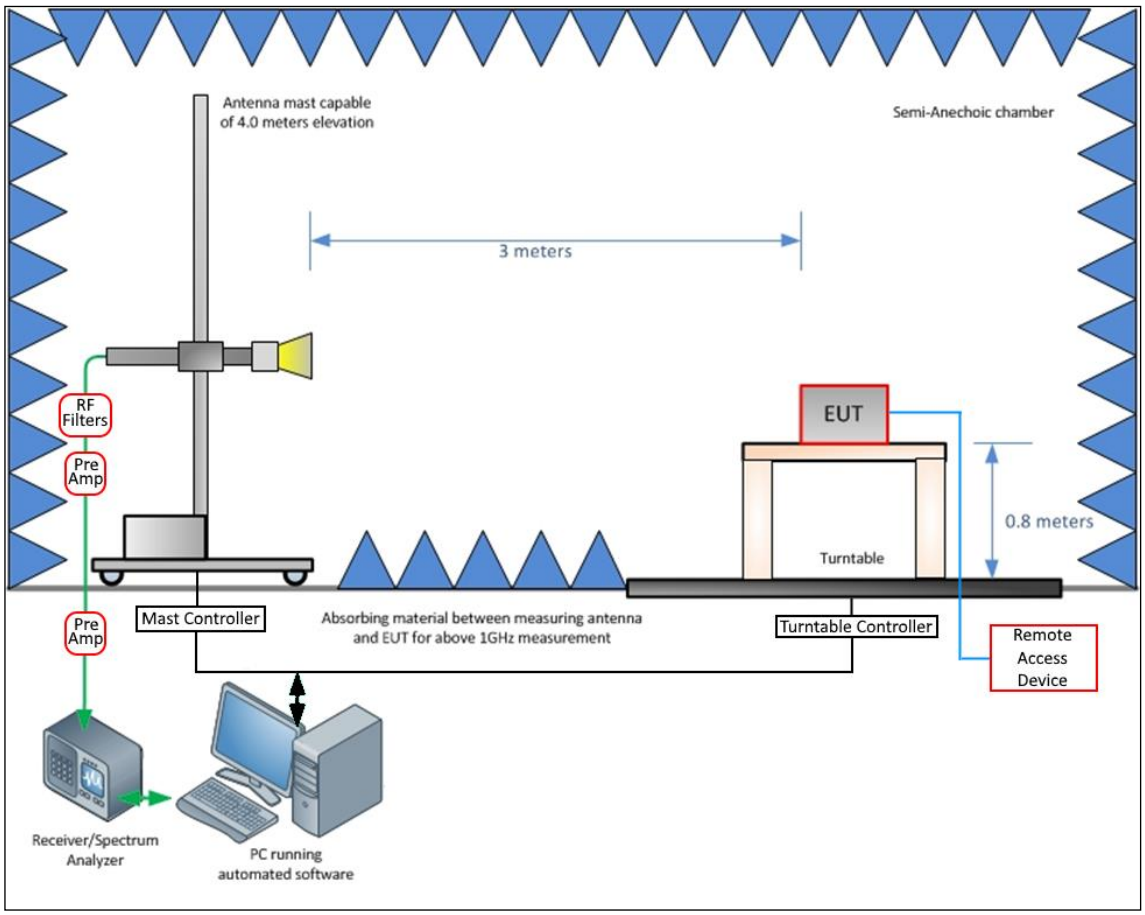

Figure 5 - Radiated Disturbance Example Test Setup

2.1.7 Environmental Conditions

Ambient Temperature	16.8 - 20.2 °C
Relative Humidity	35.0 - 38.0 %

2.1.8 Specification Limits

Required Specification Limits, Field Strength (Class B @ 3 m)		
Frequency Range (MHz)	Test Limit (µV/m)	Test Limit (dBµV/m)
30 to 88	100	40.0
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0
Supplementary information: Note 1. Quasi-peak detector to be used for measurements below 1 GHz. Note 2. CISPR Average detector to be used for measurements above 1 GHz. Note 3. 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: Sample 1 (Variant A, AM, FM1 and DAB1) DC Powered – AM.

The test was performed in accordance with the Class B limits.

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

Detailed results are shown below.

AM Broadcast Receiver Test
AM Carrier Frequency: 954 MHz

Highest frequency generated or used within the EUT: 240 MHz
Which necessitates an upper frequency test limit of: 2 GHz

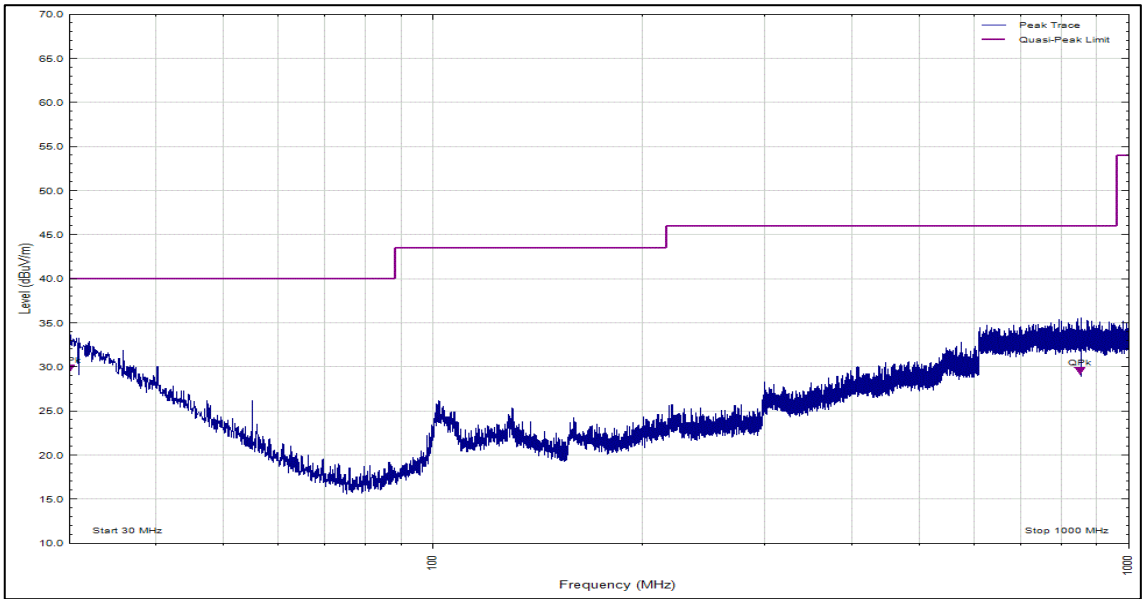

Figure 6 - 30 MHz to 1 GHz, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
30.075	29.2	40.0	-10.9	Q-Peak	158	100	Horizontal	-
851.076	28.9	46.0	-17.1	Q-Peak	0	336	Horizontal	-

Table 10

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

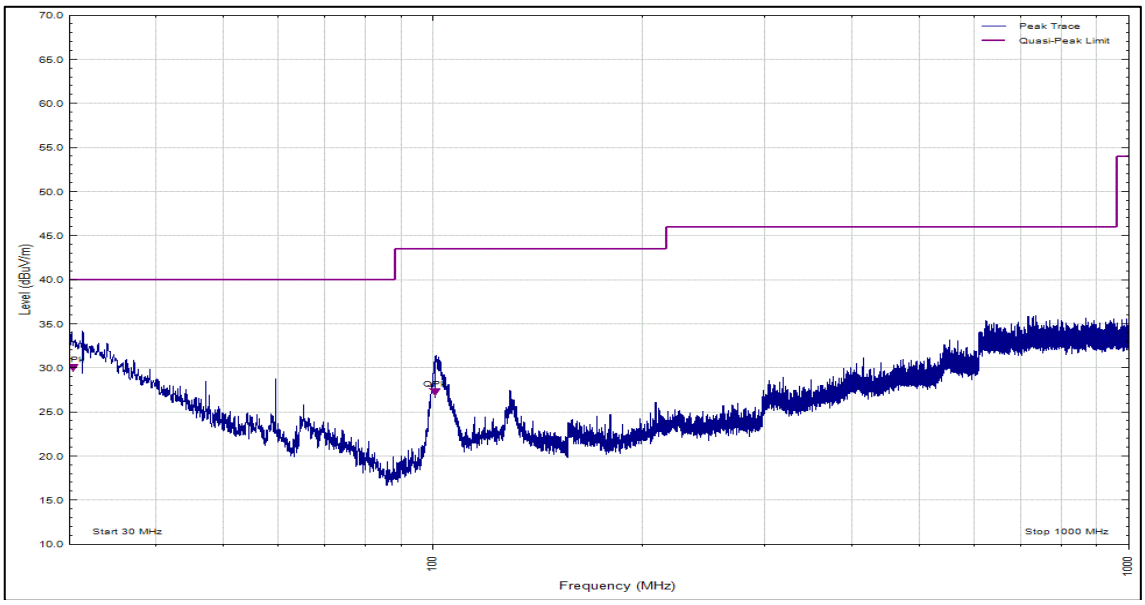

Figure 7 - 30 MHz to 1 GHz, Vertical

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
30.424	29.4	40.0	-10.6	Q-Peak	1	301	Vertical	-
100.763	26.6	43.5	-16.9	Q-Peak	53	109	Vertical	-

Table 10

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

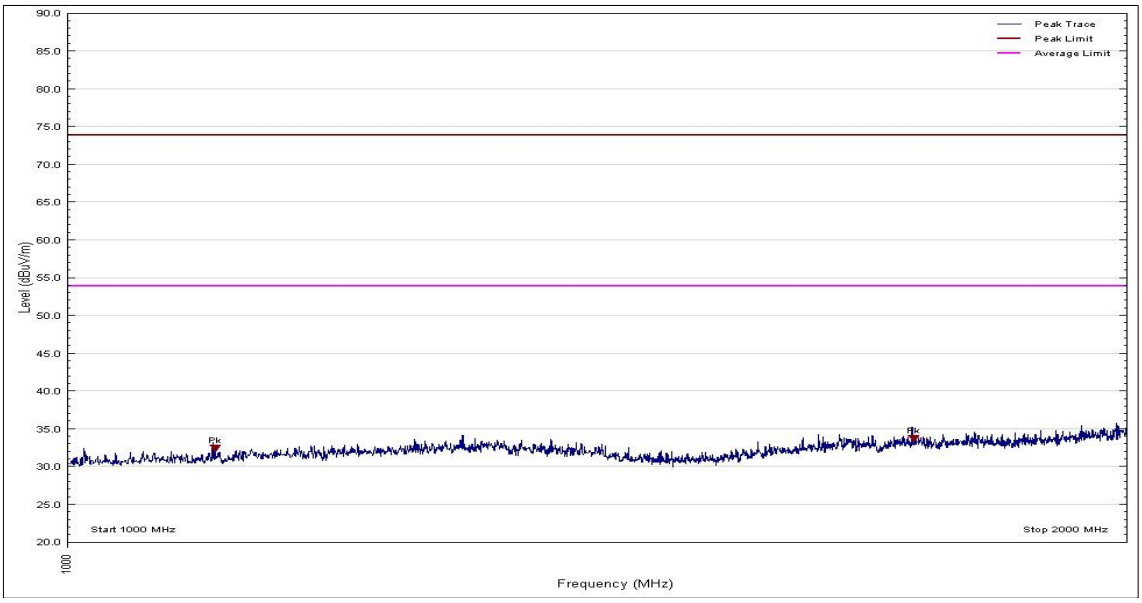

Figure 8 - 1 GHz to 2 GHz, Peak, Horizontal

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

Table 9

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

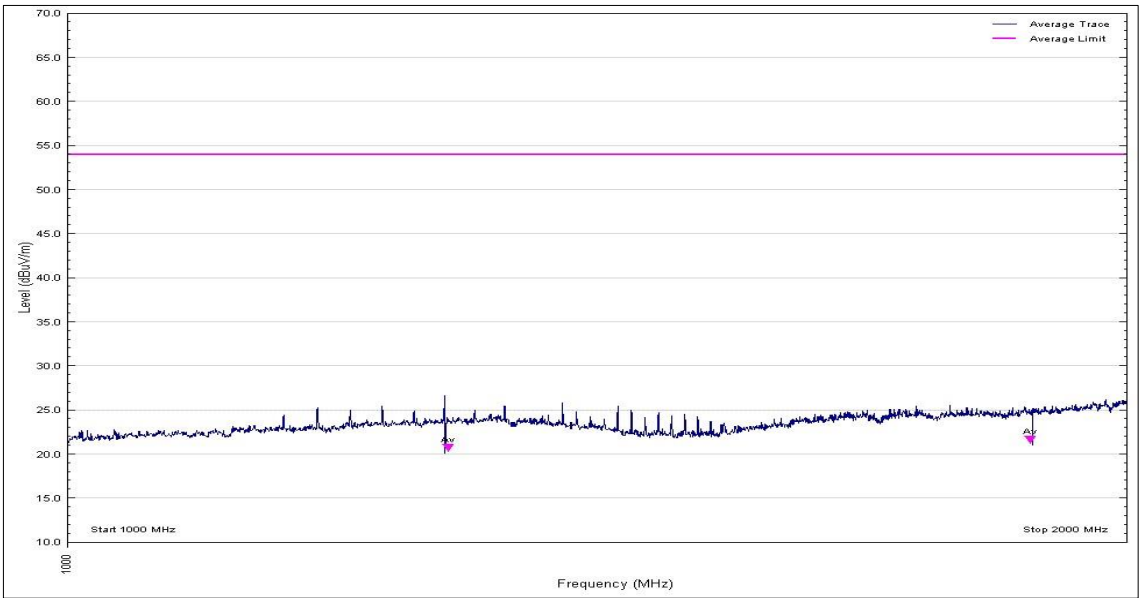

Figure 9 - 1 GHz to 2 GHz, CISPR Average, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
1282.904	20.1	54.0	-33.9	CISPR Average	1	255	Horizontal	-
1878.612	21.0	54.0	-33.0	CISPR Average	22	276	Horizontal	-

Table 10

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

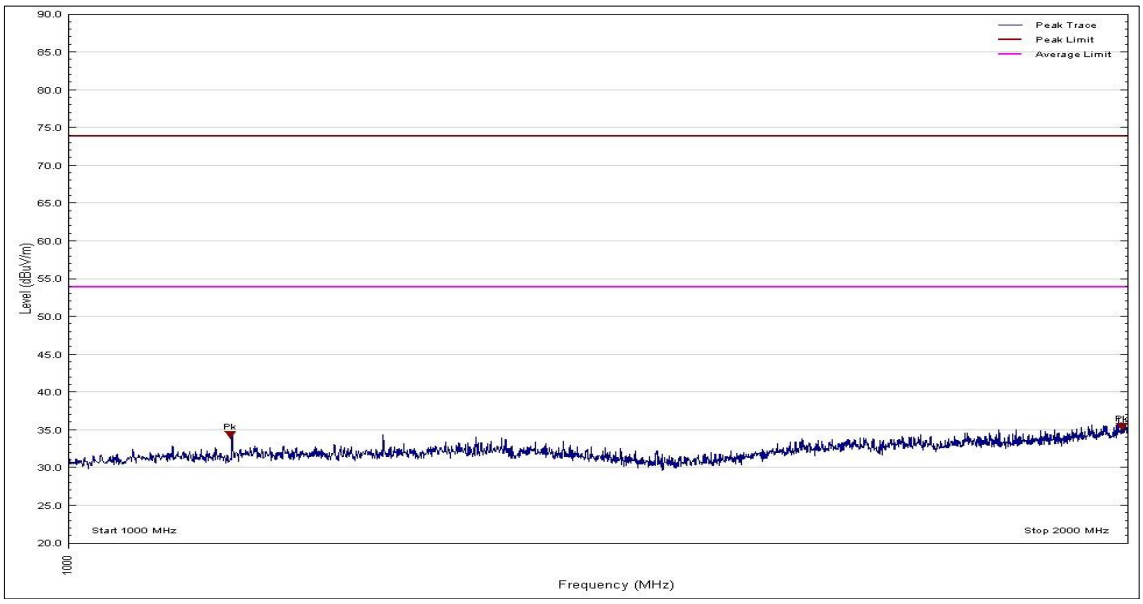

Figure 10 - 1 GHz to 2 GHz, Peak, Vertical

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

Table 11

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

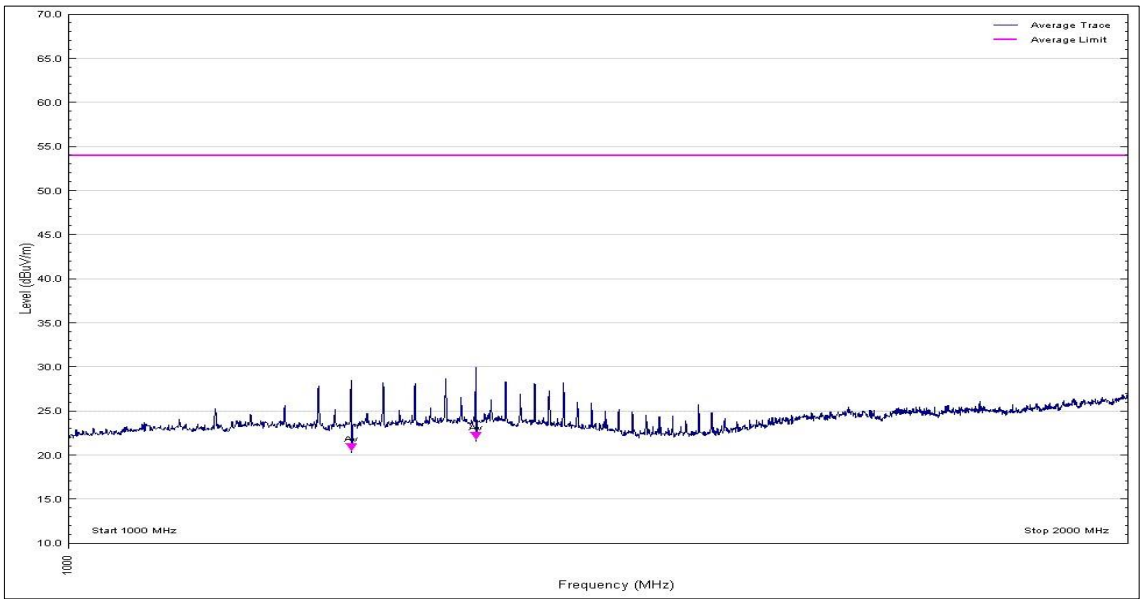

Figure 11 - 1 GHz to 2 GHz, CISPR Average, Vertical

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
1203.389	20.3	54.0	-33.7	CISPR Average	0	107	Vertical	-
1305.710	21.6	54.0	-32.4	CISPR Average	338	104	Vertical	-

Table 12

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

Results for Configuration and Mode: Sample 1 (Variant A, AM, FM1 and DAB1) DC Powered – FM.

The test was performed in accordance with the Class B limits.

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

Detailed results are shown below.

FM Broadcast Receiver Test
FM Carrier Frequency: 100 MHz

Highest frequency generated or used within the EUT: 240 MHz
Which necessitates an upper frequency test limit of: 2 GHz

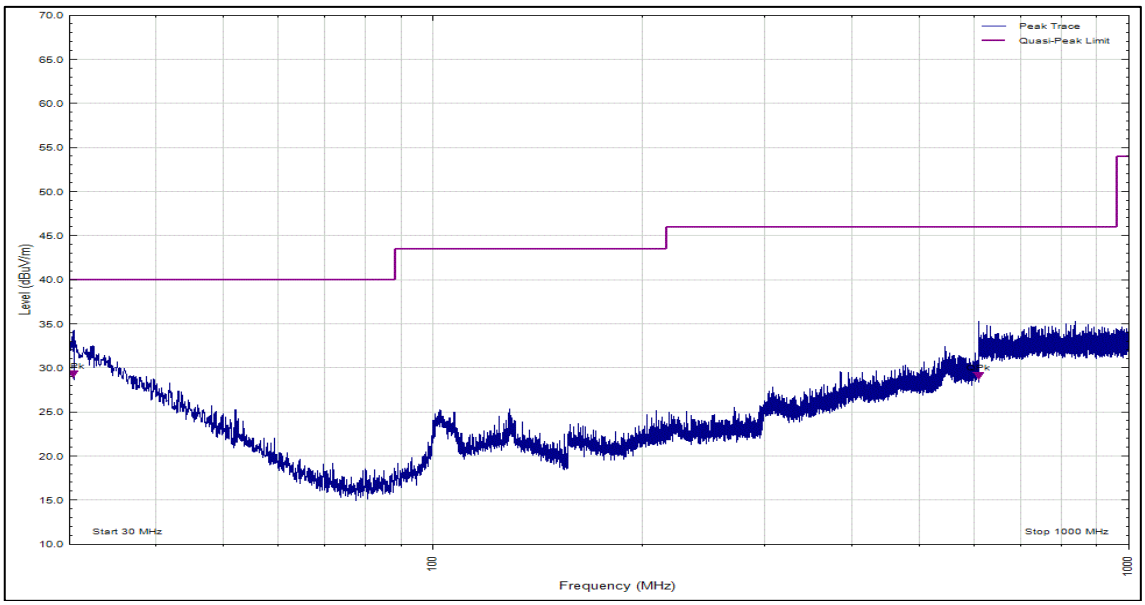

Figure 12 - 30 MHz to 1 GHz, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
30.450	28.6	40.0	-11.4	Q-Peak	4	396	Horizontal	-
608.920	28.4	46.0	-17.6	Q-Peak	75	100	Horizontal	-

Table 13

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

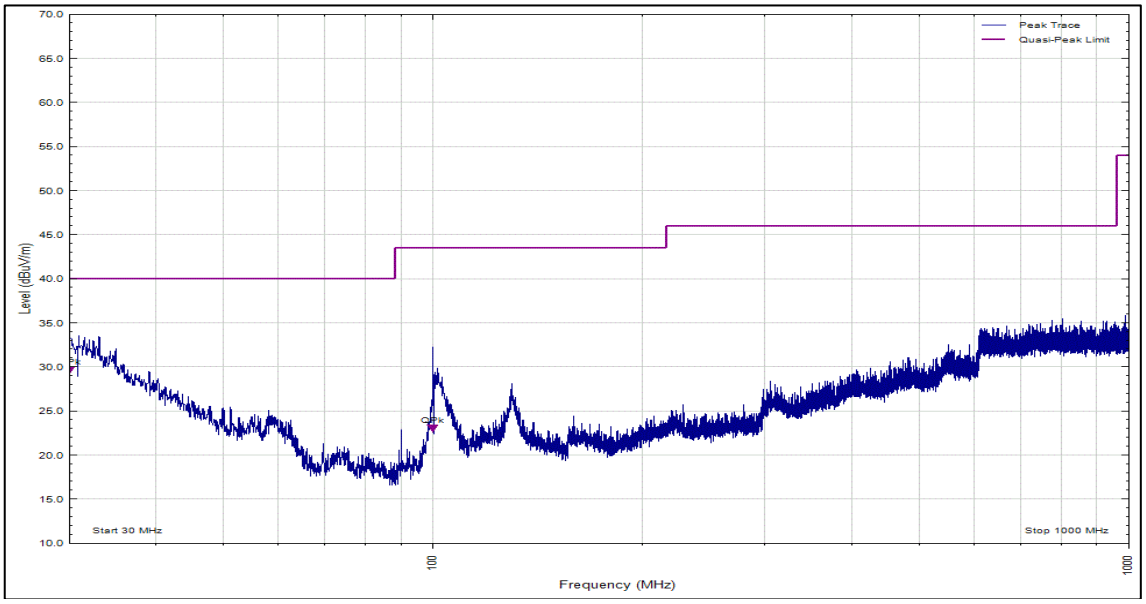

Figure 13 - 30 MHz to 1 GHz, Vertical

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
30.109	29.0	40.0	-11.0	Q-Peak	65	324	Vertical	-
100.008	22.4	43.5	-21.1	Q-Peak	10	309	Vertical	-

Table 14

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

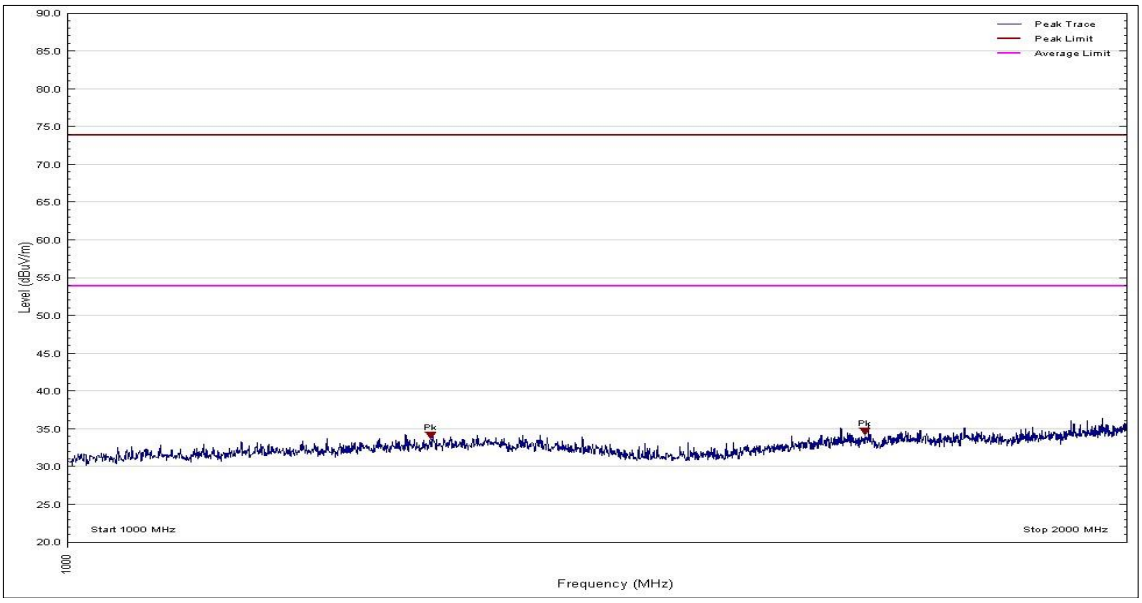

Figure 14 - 1 GHz to 2 GHz, Peak, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
1268.464	33.4	74.0	-40.6	Peak	225	133	Horizontal	-
1685.823	33.9	74.0	-40.1	Peak	60	390	Horizontal	-

Table 15

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

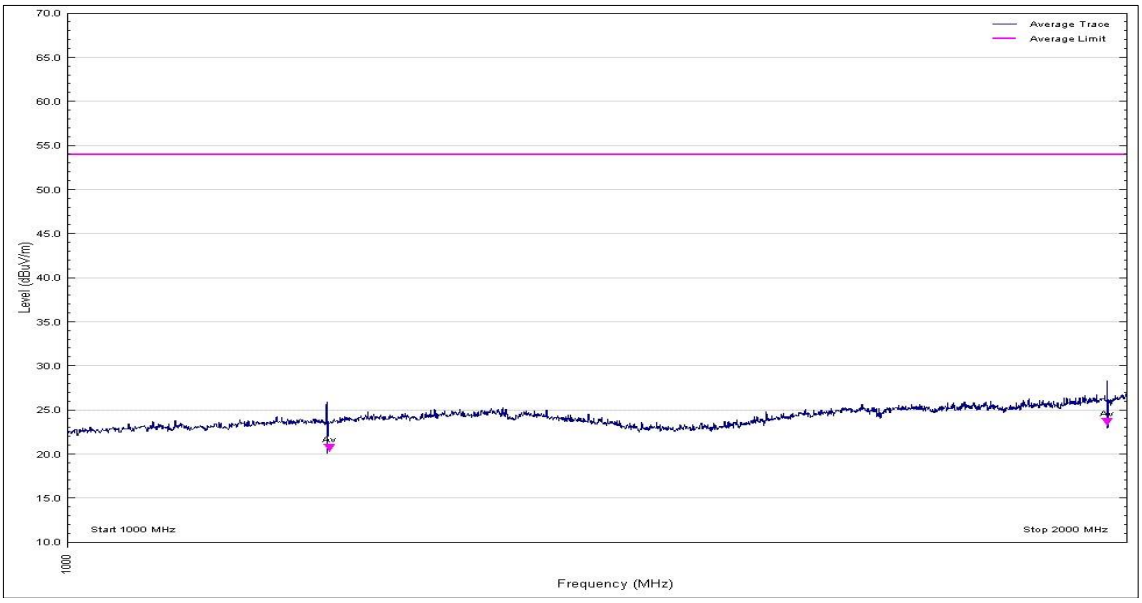

Figure 15 - 1 GHz to 2 GHz, CISPR Average, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
1187.331	20.1	54.0	-33.9	CISPR Average	0	256	Horizontal	-
1974.550	23.0	54.0	-31.0	CISPR Average	186	132	Horizontal	-

Table 16

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

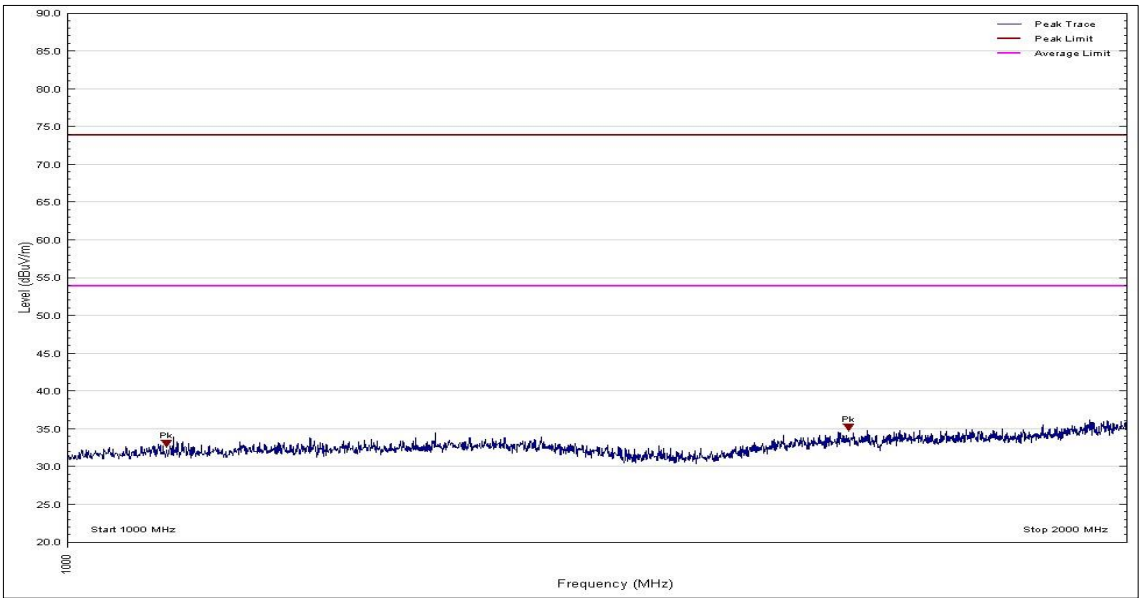

Figure 16 - 1 GHz to 2 GHz, Peak, Vertical

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
1067.284	32.3	74.0	-41.7	Peak	208	100	Vertical	-
1667.744	34.4	74.0	-39.6	Peak	1	256	Vertical	-

Table 17

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

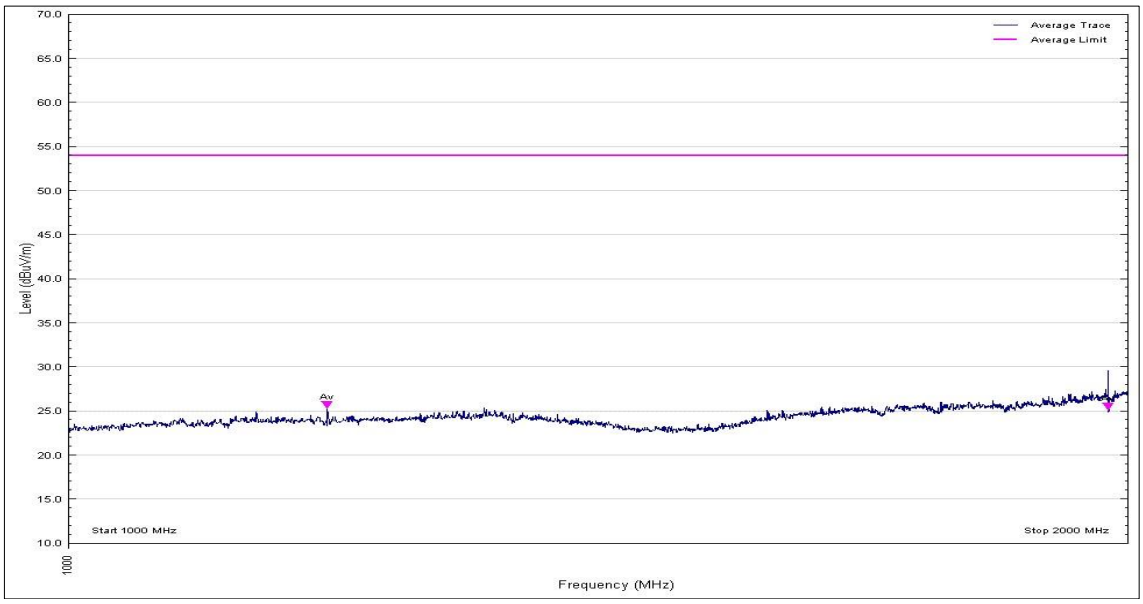

Figure 17 - 1 GHz to 2 GHz, CISPR Average, Vertical

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
1184.975	25.1	54.0	-28.9	CISPR Average	219	208	Vertical	-
1975.120	24.8	54.0	-29.2	CISPR Average	134	110	Vertical	-

Table 18

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

Results for Configuration and Mode: Sample 1 (Variant A, AM, FM1 and DAB1) DC Powered – DAB.

The test was performed in accordance with the Class B limits.

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

Detailed results are shown below.

DAB Broadcast Receiver Test
DAB Carrier Frequency: 202.928 MHz

Highest frequency generated or used within the EUT: 240 MHz
Which necessitates an upper frequency test limit of: 2 GHz

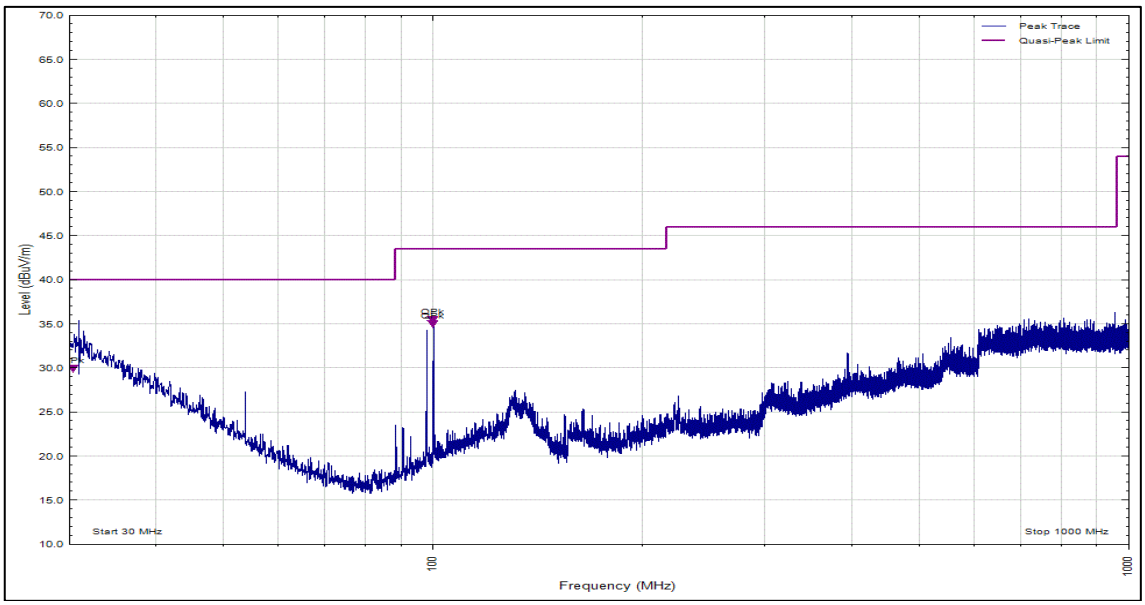

Figure 18 - 30 MHz to 1 GHz, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
30.377	29.3	40.0	-10.7	Q-Peak	102	196	Horizontal	-
100.092	34.8	43.5	-8.7	Q-Peak	7	339	Horizontal	-
100.123	34.3	43.5	-9.2	Q-Peak	305	347	Horizontal	-

Table 19

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

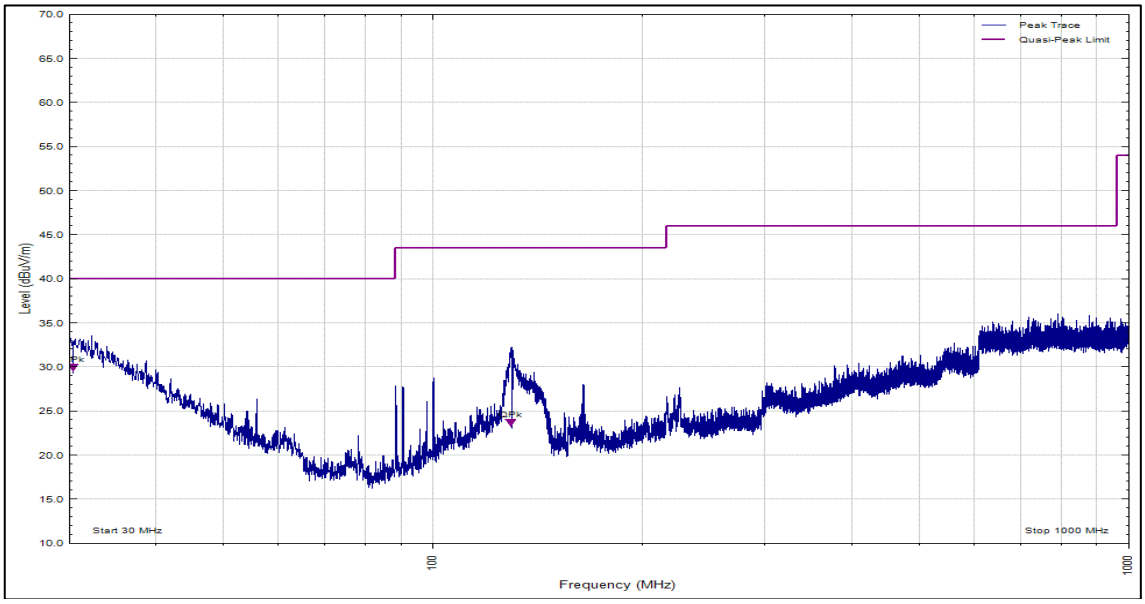

Figure 19 - 30 MHz to 1 GHz, Vertical

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
30.403	29.3	40.0	-10.7	Q-Peak	100	112	Vertical	-
129.264	23.0	43.5	-20.5	Q-Peak	138	102	Vertical	-

Table 20

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

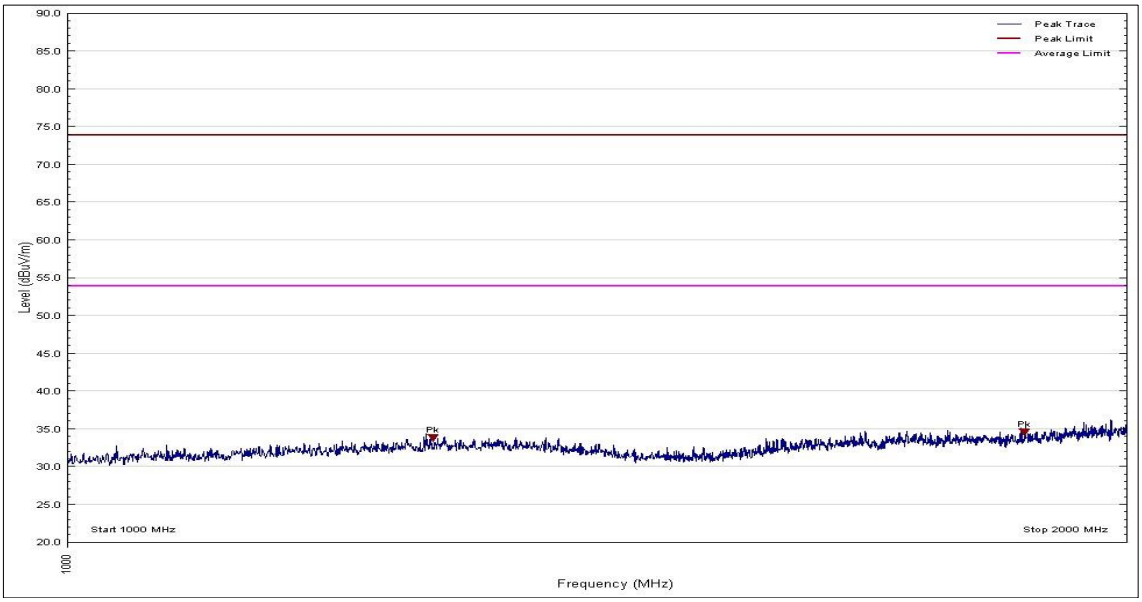

Figure 20 - 1 GHz to 2 GHz, Peak, Horizontal

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

Table 21

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

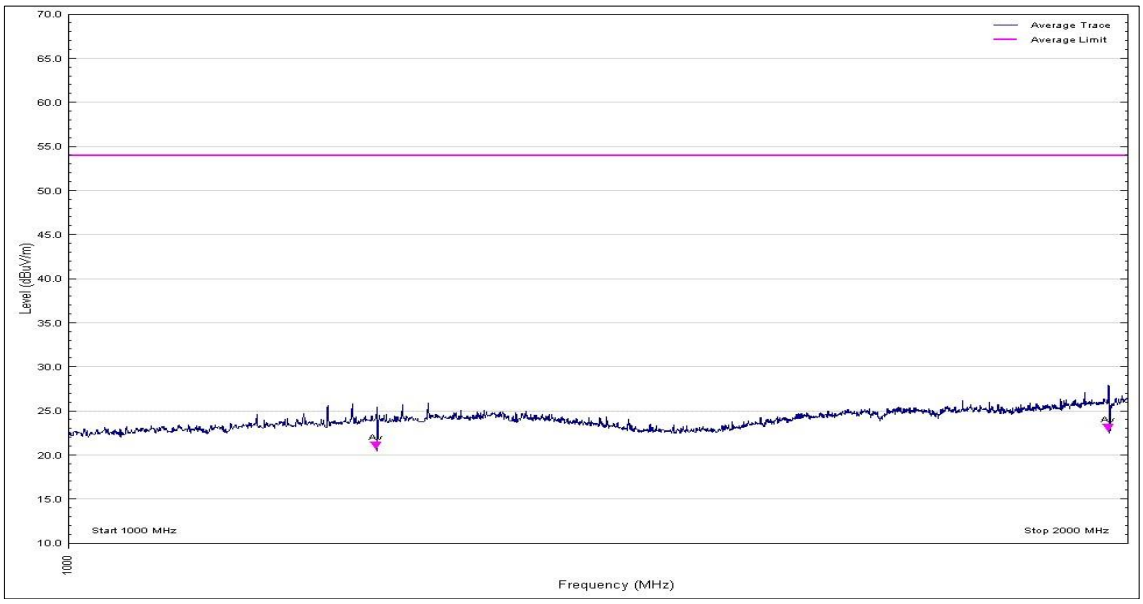

Figure 21 - 1 GHz to 2 GHz, CISPR Average, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
1222.799	20.5	54.0	-33.6	CISPR Average	0	365	Horizontal	-
1974.680	22.4	54.0	-31.6	CISPR Average	212	400	Horizontal	-

Table 22

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

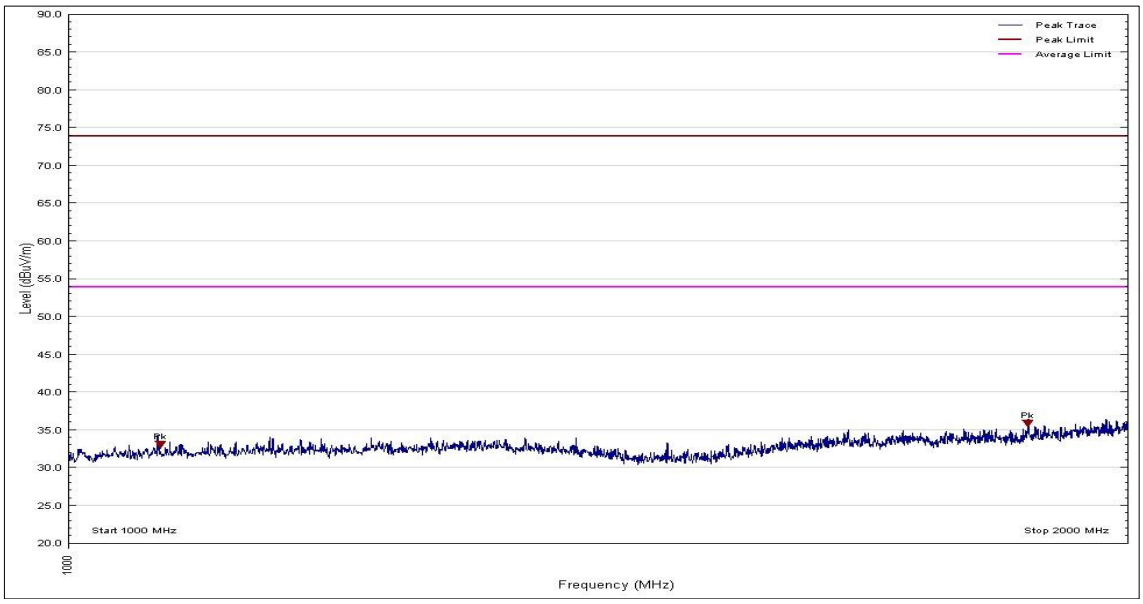

Figure 22 - 1 GHz to 2 GHz, Peak, Vertical

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

Table 23

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

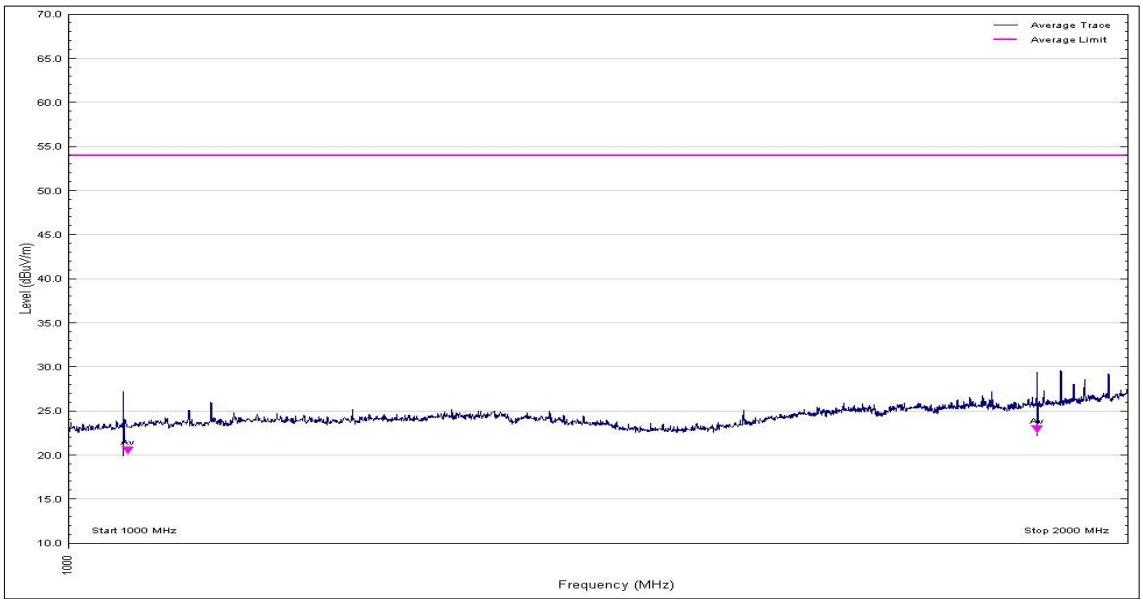

Figure 23 - 1 GHz to 2 GHz, CISPR Average, Vertical

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
1040.278	19.9	54.0	-34.1	CISPR Average	135	128	Vertical	-
1885.990	22.3	54.0	-31.8	CISPR Average	143	236	Vertical	-

Table 24

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

Results for Configuration and Mode: Sample 2 (Variant B, AM and FM1) DC Powered – AM.

The test was performed in accordance with the Class B limits.

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

Detailed results are shown below.

AM Broadcast Receiver Test
AM Carrier Frequency: 954 MHz

Highest frequency generated or used within the EUT: 108 MHz
Which necessitates an upper frequency test limit of: 2 GHz

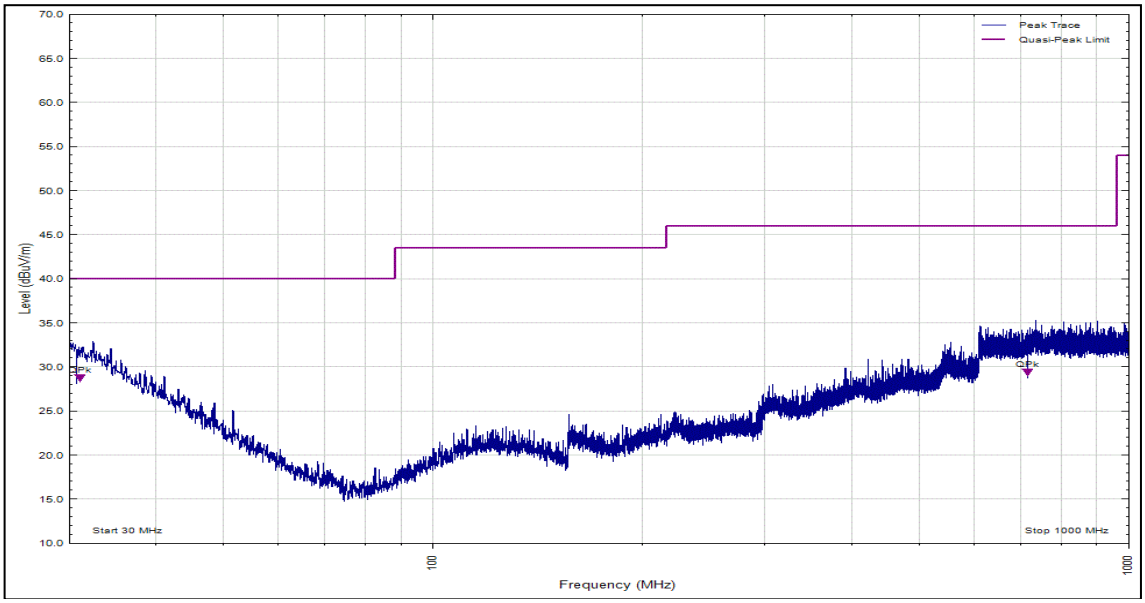

Figure 24 - 30 MHz to 1 GHz, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
31.157	28.1	40.0	-11.9	Q-Peak	0	106	Horizontal	-
717.187	28.8	46.0	-17.2	Q-Peak	125	100	Horizontal	-

Table 25

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

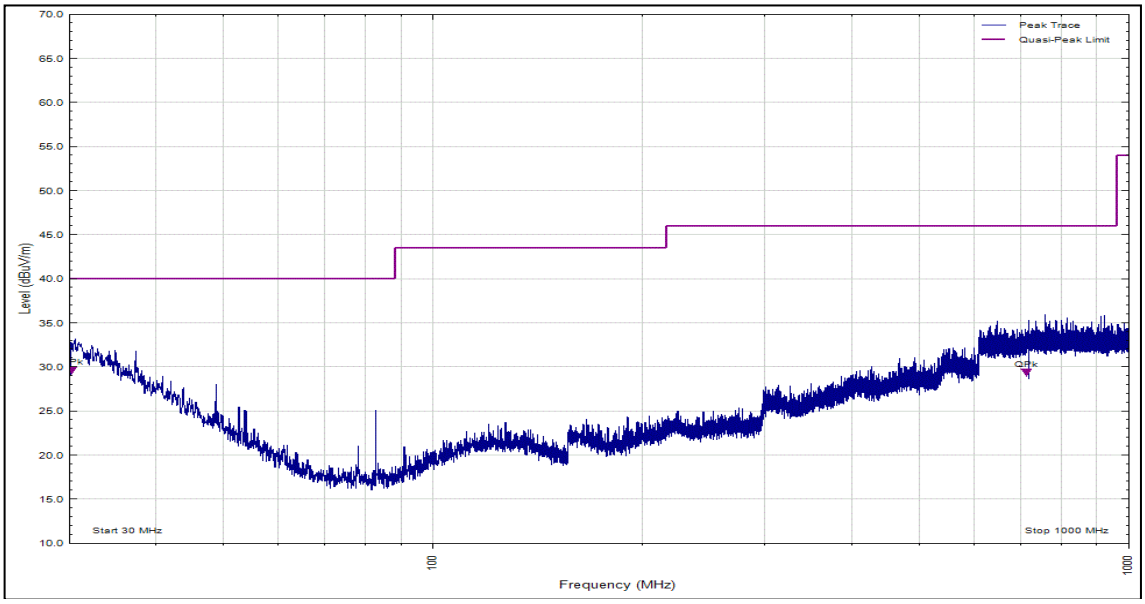

Figure 25 - 30 MHz to 1 GHz, Vertical

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
30.271	29.0	40.0	-11.0	Q-Peak	188	267	Vertical	-
37.320	31.8	40.0	-8.2	Q-Peak	0	100	Vertical	-
48.721	28.1	40.0	-11.9	Q-Peak	0	100	Vertical	-
714.552	28.7	46.0	-17.3	Q-Peak	282	398	Vertical	-

Table 26

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

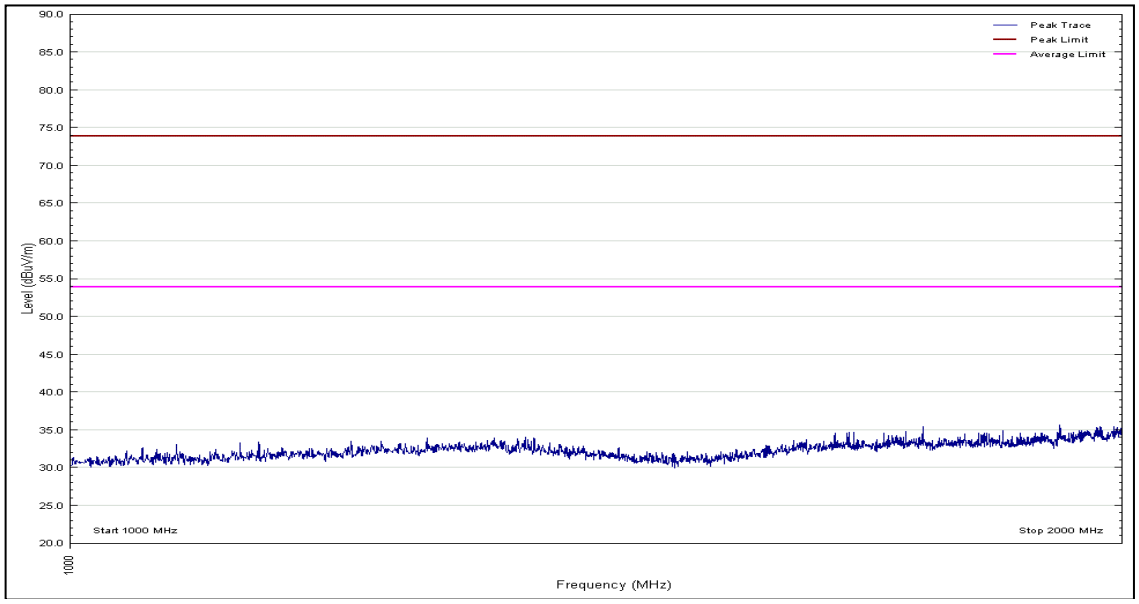

Figure 26 - 1 GHz to 2 GHz, Peak, Horizontal

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

Table 27

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

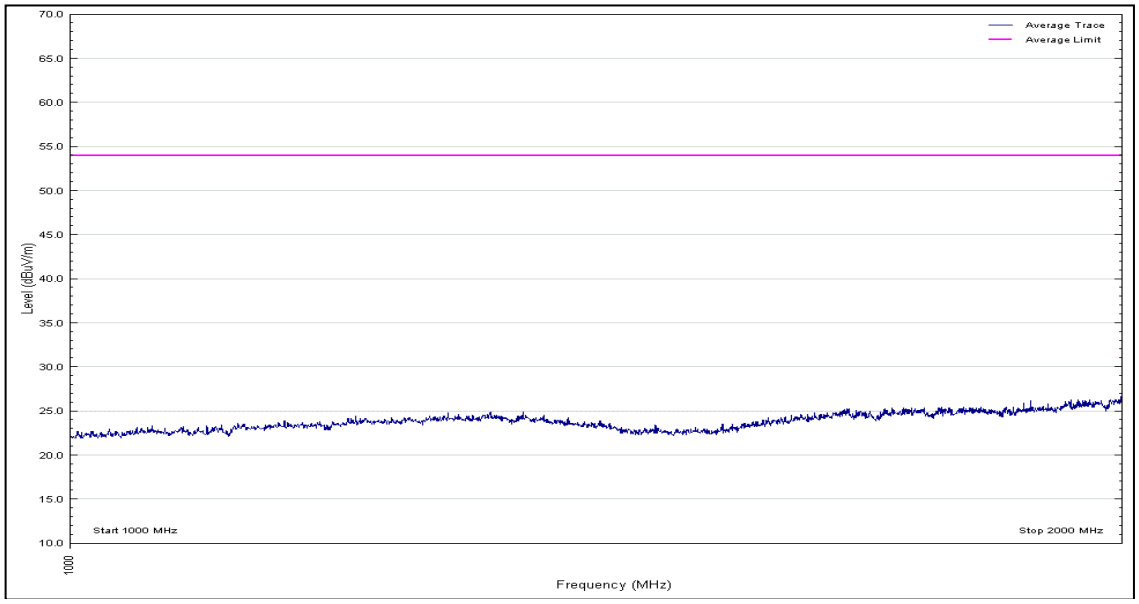

Figure 27 - 1 GHz to 2 GHz, CISPR Average, Horizontal

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

Table 28

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

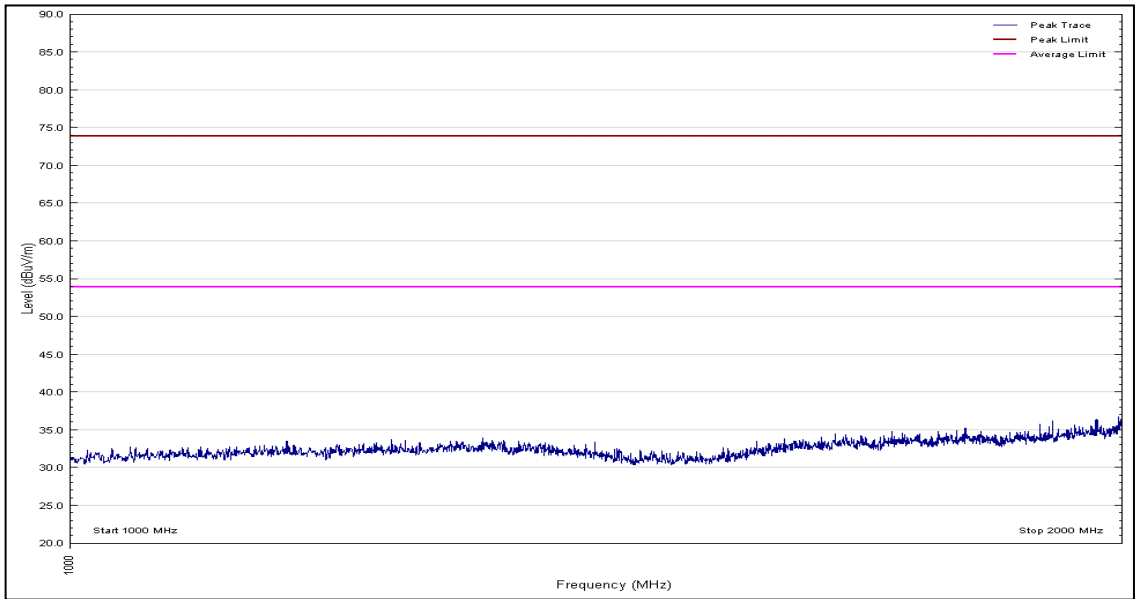

Figure 28 - 1 GHz to 2 GHz, Peak, Vertical

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

Table 29

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

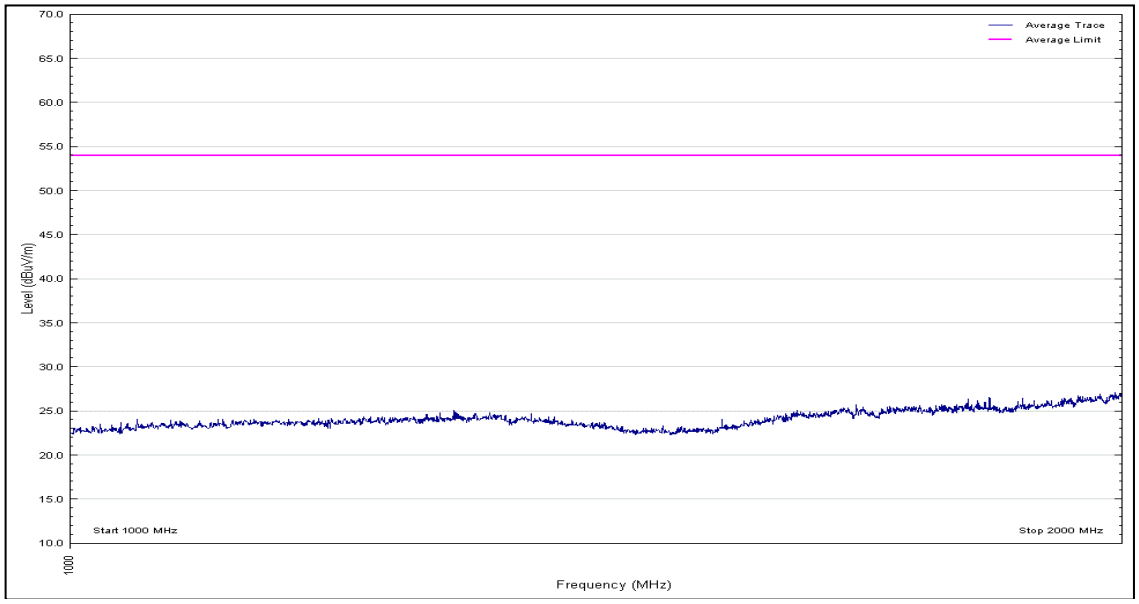

Figure 29 - 1 GHz to 2 GHz, CISPR Average, Vertical

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

Table 30

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

Results for Configuration and Mode: Sample 2 (Variant B, AM and FM1) DC Powered – FM.

The test was performed in accordance with the Class B limits.

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

Detailed results are shown below.

FM Broadcast Receiver Test
FM Carrier Frequency: 100 MHz

Highest frequency generated or used within the EUT: 108 MHz
Which necessitates an upper frequency test limit of: 2 GHz

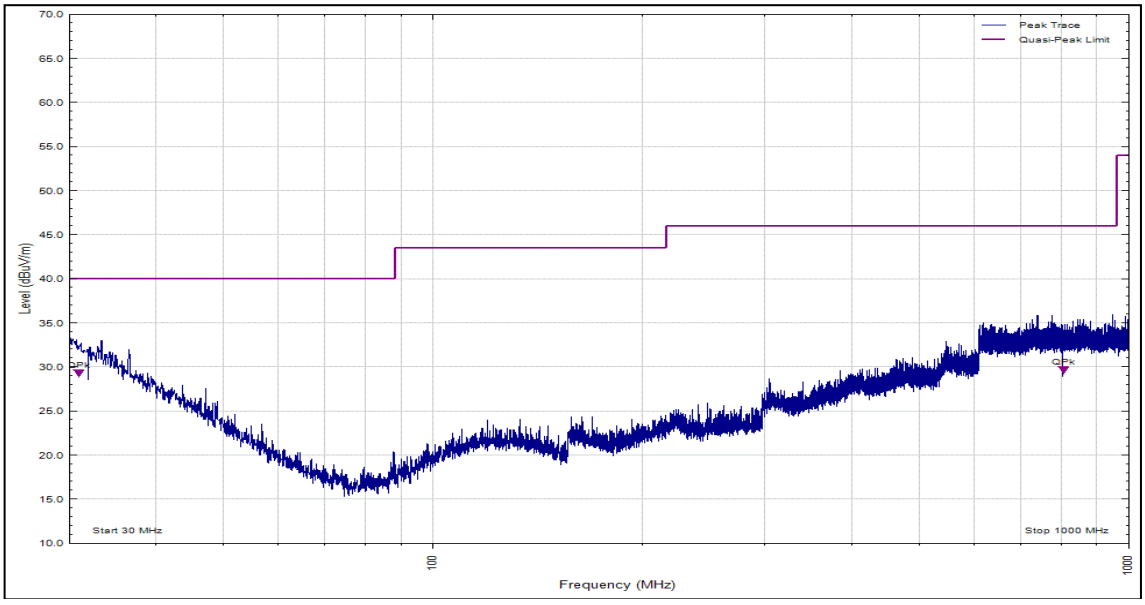

Figure 30 - 30 MHz to 1 GHz, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
31.000	28.6	40.0	-11.4	Q-Peak	81	321	Horizontal	-
806.230	29.0	47.0	-18.0	Q-Peak	70	267	Horizontal	-

Table 31

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

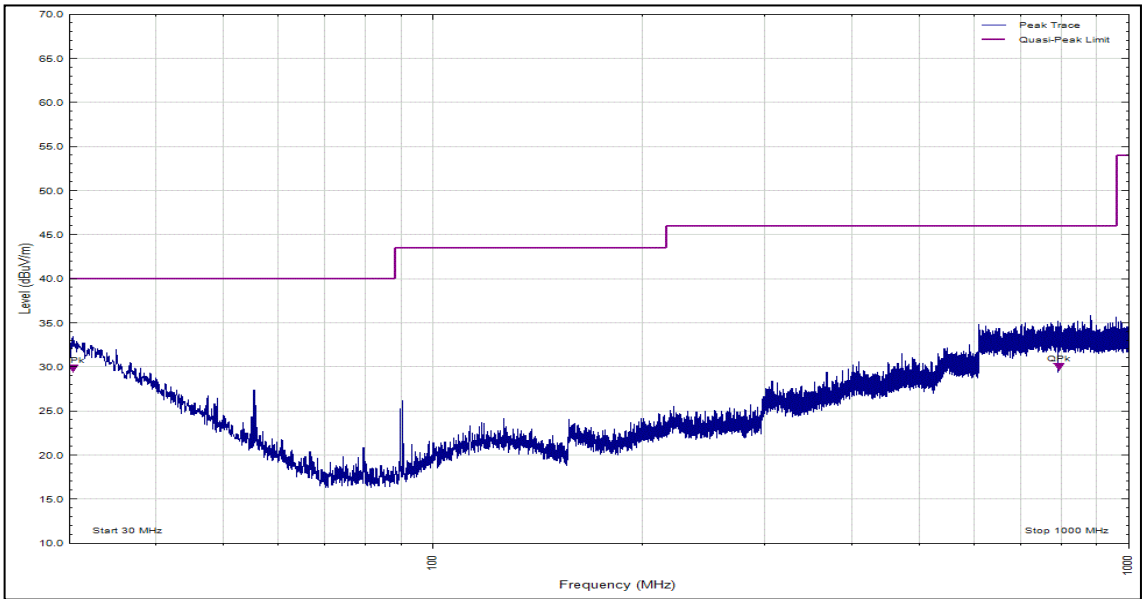

Figure 31 - 30 MHz to 1 GHz, Vertical

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
30.357	29.2	40.0	-10.8	Q-Peak	105	321	Vertical	-
794.983	29.4	47.0	-17.6	Q-Peak	105	323	Vertical	-

Table 32

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

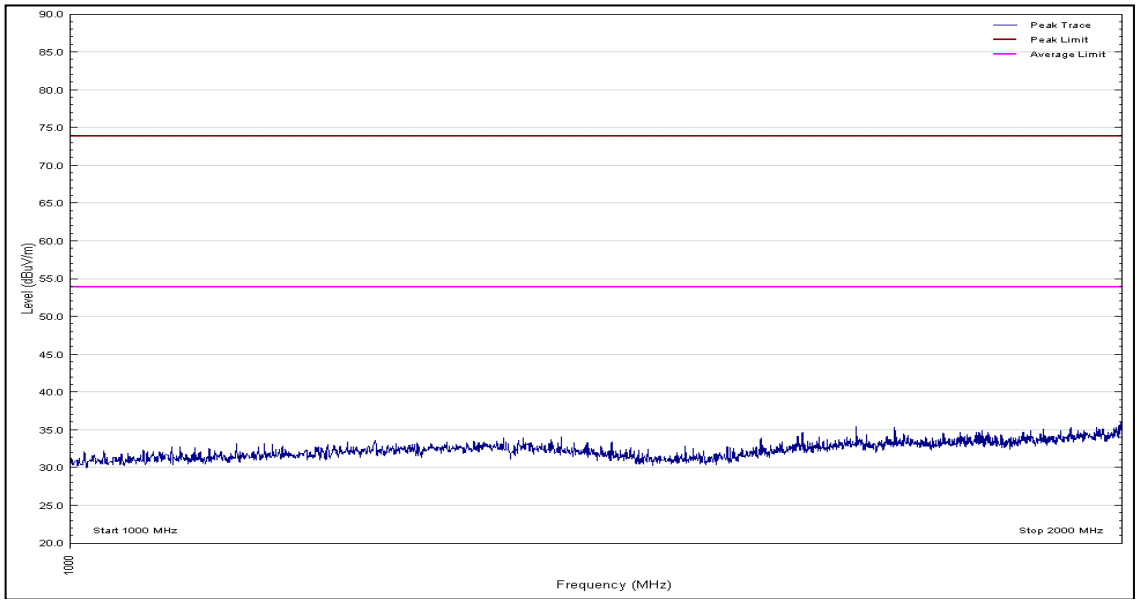

Figure 32 - 1 GHz to 2 GHz, Peak, Horizontal

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

Table 33

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

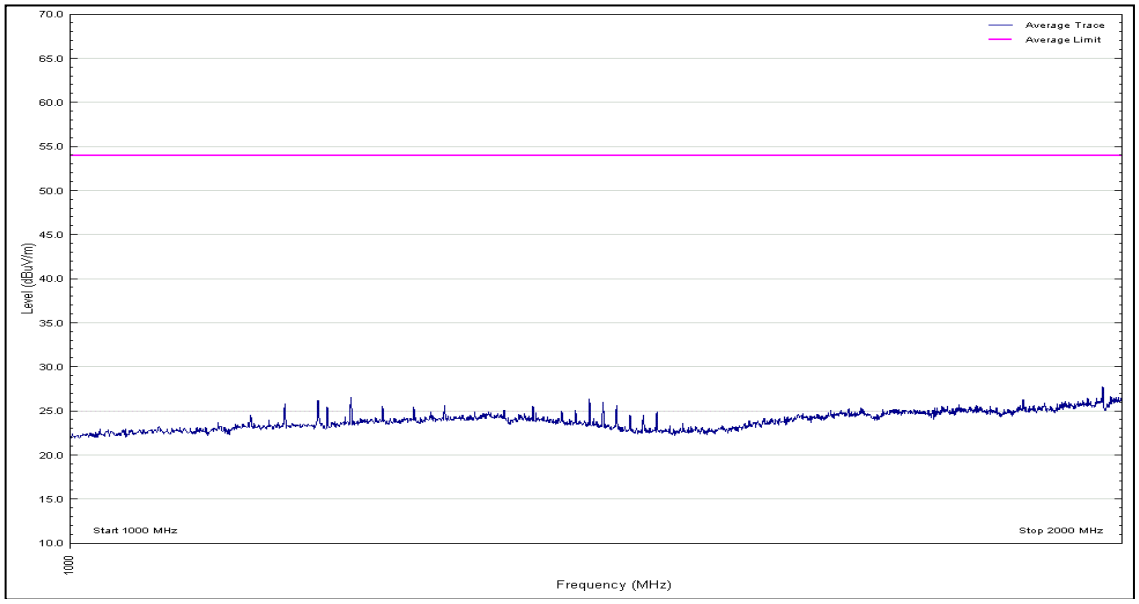

Figure 33 - 1 GHz to 2 GHz, CISPR Average, Horizontal

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

Table 34

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

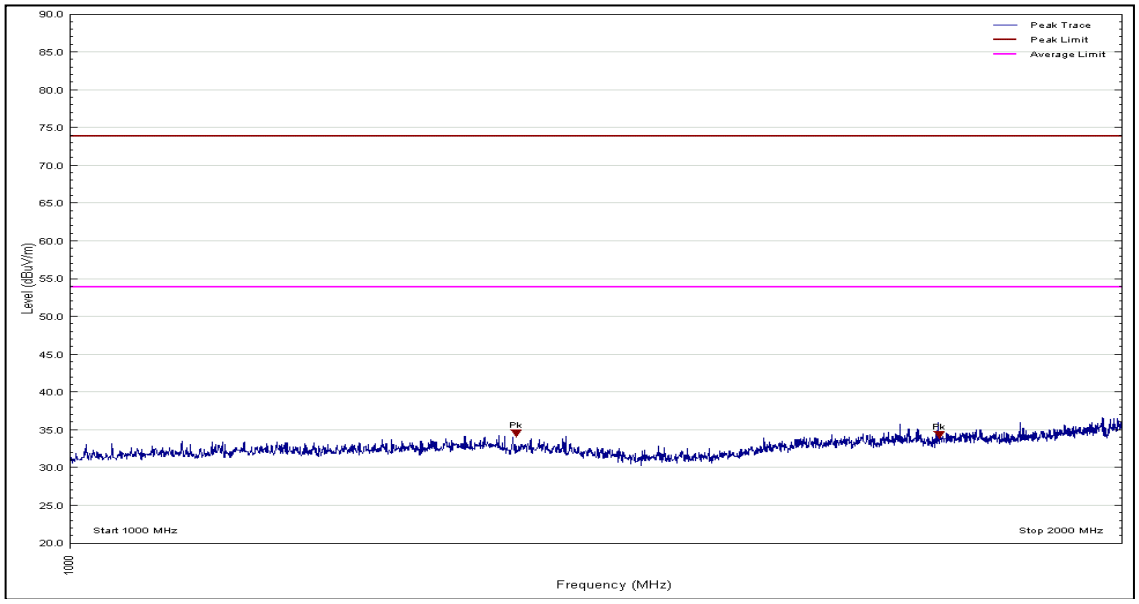

Figure 34 - 1 GHz to 2 GHz, Peak, Vertical

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
1342.781	33.8	74.0	-40.2	Peak	247	142	Vertical	-
1774.572	33.5	74.0	-40.5	Peak	187	101	Vertical	-

Table 35

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

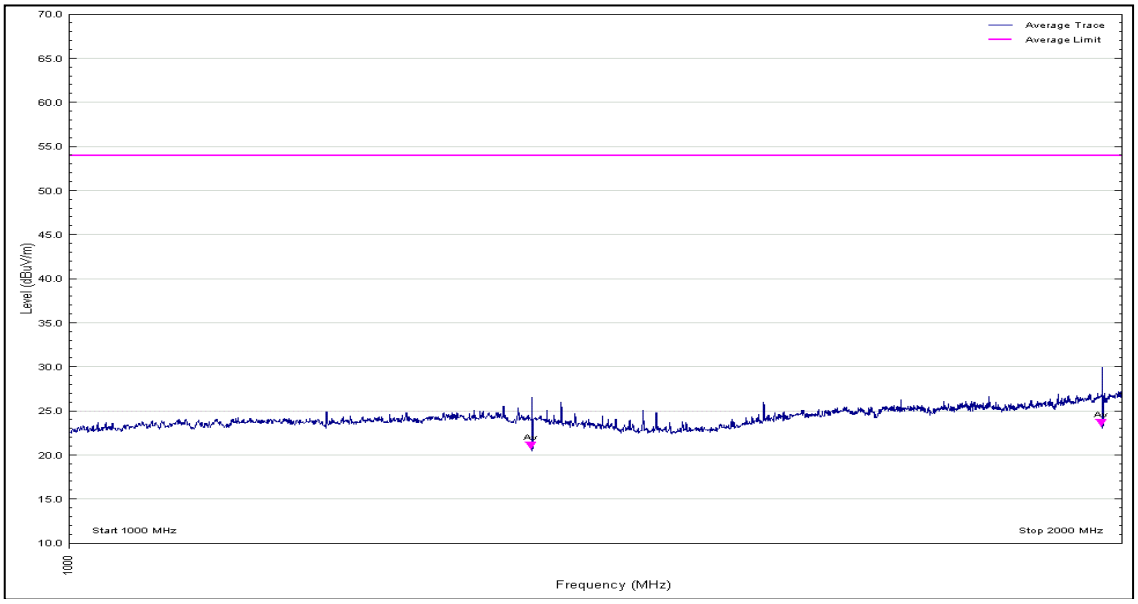

Figure 35 - 1 GHz to 2 GHz, CISPR Average, Vertical

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

Table 36

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

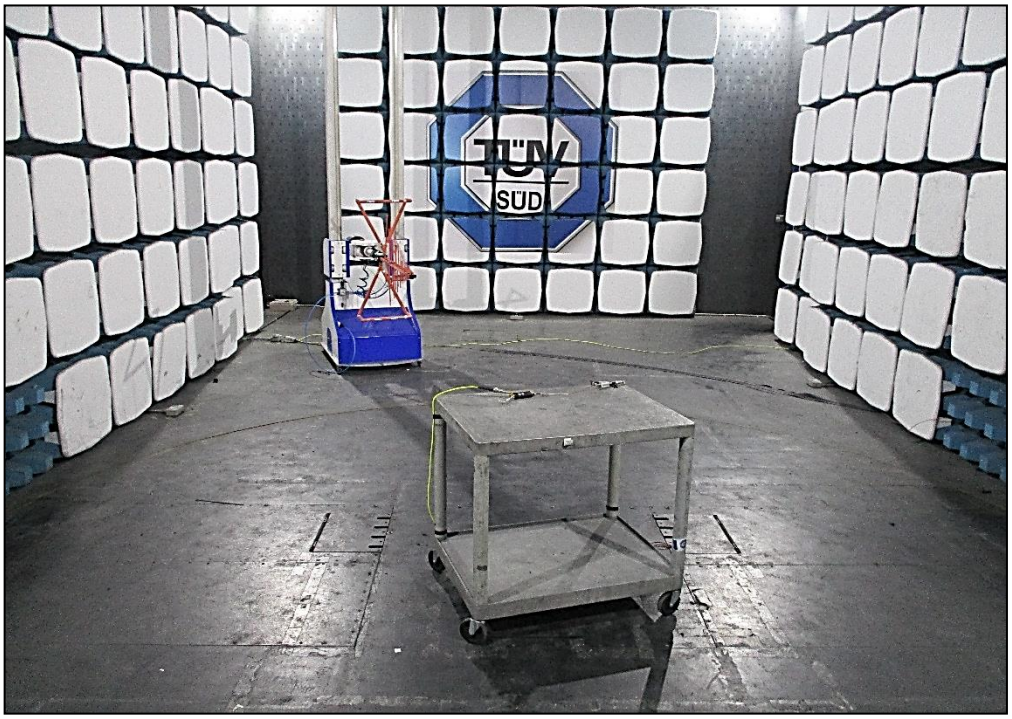

Figure 36 - Test Setup - 30 MHz to 1 GHz

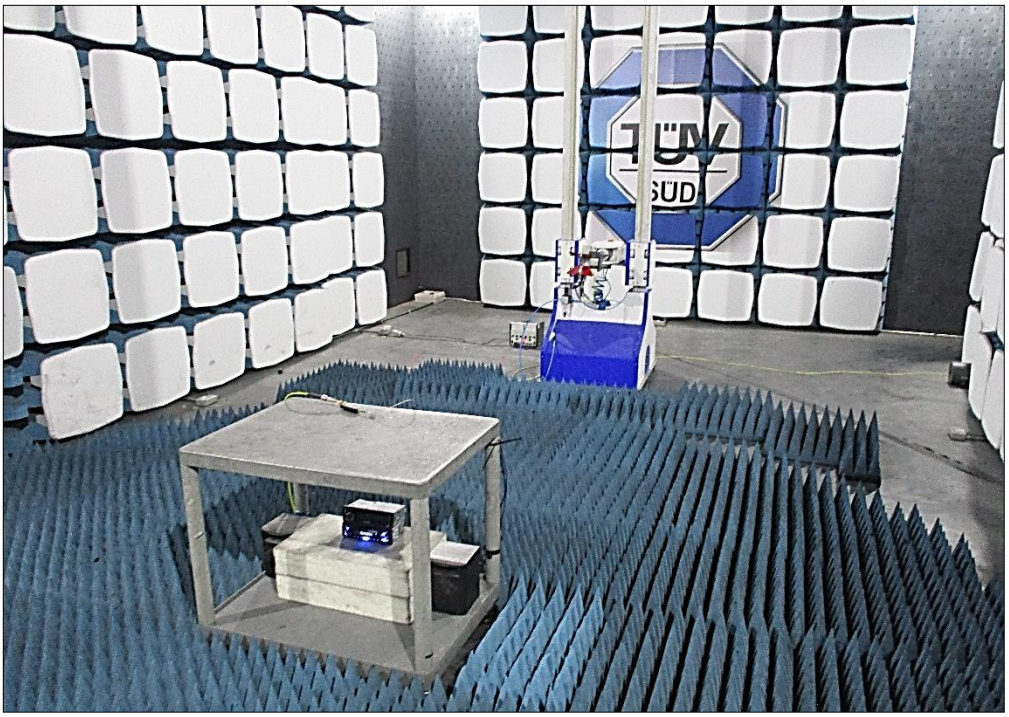

Figure 37 - Test Setup - 1 GHz to 2 GHz

2.1.10 Test Location and Test Equipment Used

This test was carried out in Bearley EMC Chamber 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMC 3m Semi Anechoic Chamber	Rainford	Hybrid	4160	36	16-Dec-2021
EmX Emissions Software	TUV SUD	V1.5.7	5125	-	Software
EMI Receiver	Keysight Technologies	N9038A MXE	4974	12	11-Feb-2021
Mast Controller	Maturo Gmbh	NCD	3917	-	TU
Turntable Controller	Maturo	Maturo NCD	5275	-	TU
Bilog Antenna	Schaffner	CBL6143	1858	24	11-Apr-2021
1-8 GHz Amplifier	Wright Technologies	APS04-0085	4674	12	12-Aug-2020
1 - 18GHz DRG Horn	ETS-Lindgren	3117	4737	24	28-Jul-2021
Cable (18GHz N Type 3m)	Rosenberger	LU7-036-3000	5163	12	06-Dec-2020
Emissions Cable 10m	Unknown	117882	5302	12	12-Jul-2020
Power Supply	Farnell	LT30-2	1673	-	TU

Table 37

TU – Traceability Unscheduled

3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Absorbing Clamp 30MHz to 300MHz	Robert Luthi	MDS 9	20	12	16-Sep-2020
Signal Generator	Marconi	2024	1699	12	14-Feb-2021
DAB/DVB Test System	DekTec	DTA-2115B	4882	-	O/P Mon

Table 38

4 Incident Reports

No incidents reports were raised.

5 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 39

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.