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45461654 R2.0

Test Report Date:

28 April 2021

Project Number:

1532

EMC Test Report - New Filing

Applicant:



Myriota

**Myriota Pty Ltd.
Level 1, McEwin Building
Lot 14, North Terrace
Adelaide, SA 5000
Australia**



Myriota

**Myriota Canada
260 Holiday Inn Drive
Unit 30, Building B
Cambridge, ON, N3C 4E8**

FCC ID:

2ATKL-DB2-25

Product Model Number / HVIN

DB2-25

IC Registration Number

25148-DB225

Host Marketing Name / HMN

Developer Toolkit

In Accordance With:

FCC 47 CFR Part 15 Subpart B
Unintentional Radiators

Approved By:

Ben Hewson, President

Celltech Labs Inc.
21-364 Lougheed Rd.
Kelowna, BC, V1X 7R8
Canada



Test Lab Certificate: 2470.01



**Industry
Canada**

IC Registration 3874A-1



FCC Registration: CA3874

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Table of Contents

1.0 DOCUMENT CONTROL.....	4
2.0 CLIENT AND DUT INFORMATION	5
3.0 SCOPE.....	6
4.0 TEST RESULT SUMMARY	7
5.0 NORMATIVE REFERENCES	8
6.0 FACILITIES AND ACCREDITATIONS	9
7.0 RADIATED RX EMISSIONS.....	10
APPENDIX A – TEST SETUP DRAWINGS AND EQUIPMENT	24
APPENDIX B – EQUIPMENT LIST AND CALIBRATION.....	26
APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY.....	27
END OF REPORT.....	28

Table of Figures

Figure A.1 – Test Setup Radiated Emissions Measurements 30 – 1000MHz.....	25
Figure A.2 – Test Setup Radiated Emissions Measurements 30 – 1000MHz w/ Signal Substitution.....	25
Figure A.3 – Test Setup Radiated Emissions Measurements 1 – 18GHz.....	25

Table of Plots

Plot 7.1 – Radiated Rx Emissions, 30 – 1000MHz, Antenna A, Horizontal.....	11
Plot 7.2 – Radiated Rx Emissions, 30 – 1000MHz, Antenna A, Vertical.....	12
Plot 7.3 – Radiated Rx Emissions, 1 – 3GHz, Antenna A, Horizontal.....	13
Plot 7.4 – Radiated Rx Emissions, 1 – 3GHz, Antenna A, Vertical.....	14
Plot 7.5 – Radiated Rx Emissions, 3 – 5GHz, Antenna A, Horizontal.....	15
Plot 7.6 – Radiated Rx Emissions, 3 – 5GHz, Antenna A, Vertical.....	16
Plot 7.7 – Radiated Rx Emissions, 30 – 1000MHz, Antenna B, Horizontal.....	17
Plot 7.8 – Radiated Rx Emissions, 30 – 1000MHz, Antenna B, Vertical.....	18
Plot 7.9 – Radiated Rx Emissions, 1 – 3GHz, Antenna B, Horizontal.....	19
Plot 7.10 – Radiated Rx Emissions, 1 – 3GHz, Antenna B, Vertical.....	20
Plot 7.11 – Radiated Rx Emissions, 3 – 5GHz, Antenna B, Horizontal.....	21
Plot 7.12 – Radiated Rx Emissions, 3 – 5GHz, Antenna B, Vertical.....	22

Table of Tables

Table 7.1 – Summary of Radiated Rx Emissions Measurements (RMS).....	23
Table A.1 – Setup - Radiated Emissions Equipment.....	24

1.0 DOCUMENT CONTROL

Revision History				
Samples Tested By:		Date(s) of Evaluation:		
Report Prepared By:		Report Reviewed By:		
Report Revision	Description of Revision	Revised Section	Revised By	Revision Date
0.1	Initial Report	n/a	Art Voss	15 February
0.2	Draft Release	n/a	Art Voss	25 April 2021
1.0	Initial Release	n/a	Art Voss	26 April 2021
2.0	Revised Product Description	2.0	Art Voss	28 April 2020

2.0 CLIENT AND DUT INFORMATION

Client Information	
Applicant Name (FCC)	Myriota Pty Ltd
Applicant Address (FCC)	Level 1, McEwin Building
	Lot 14, North Terrace
	Adelaide, SA 5000, Australia
Applicant Name (ISED)	Myriota Canada
Applicant Address (ISED)	260 Holiday Inn Drive
	Unit 30, Building B
	Cambridge, ON, N3C 4E8, Canada
DUT (Host) Information	
Device Identifier(s):	FCC ID: 2ATKL-DB2-25
	ISED ID: 25148-DB225
Device Type:	Product Developer's Tool Kit
Host Device Model(s) / HVIN:	DB2-25
Host Marketing Name / HMN:	Developer Toolkit
Host Firmware Version ID Number / FVIN:	-
Test Sample Serial No.:	T/A Sample - Identical Prototype
Antenna Make and Model:	n/a
Antenna Type and Gain:	n/a
DUT Power Source:	3VDC Alkaline Battery
DUT Dimensions [LxWxD] (mm)	HL x W x D: 130mm x 90mm x 40mm
Deviation(s) from standard/procedure:	None
Modification of DUT:	None
Integrated Module Information	
Module Manufacturer:	Myriota Pty Ltd
Device Identifier(s):	FCC ID: 2ATKL-M2-24
	IC ID: 25148-M224
Device Type:	Satellite Communications Module
Module Device Model(s) / HVIN:	M2-24
Module Product Marketing Name / PMN:	Myriota Module
Host Firmware Version ID Number / FVIN:	-
Equipment Class (FCC):	Licensed Non-Broadcast Station Transmitter (TNB)
Equipment Class (ISED):	Mobile Earth Station
Transmit Frequency Range:	399.907 - 400.043MHz
Test Channels:	n/a
Manuf. Max. Rated Output Power:	0.5W (27dBm)

Information regarding antenna type and gain provided by applicant.

3.0 SCOPE

Preface:

This Certification Report was prepared on behalf of:

Myriota Pty Ltd

„(the '*Applicant*')", in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

Device:

The DB2-25, FCC ID: 2ATKL-DB2-25, IC ID: 25148-DB225, is a developer's tool kit intended as a development aid for 3rd party product development using Myriota's certified module, FCC ID: 2ATKL-M2-24, IC ID: 25148-M224. The DB2-25 contains no other transmitters.

Requirement:

As per FCC 47 CFR 2§909, certification is required. Since the *Equipment* integrates a previously certified module and contains no other transmitter, only evaluation to FCC 47 CFR 15 Subpart B is required. This *Equipment* was evaluated with the same two antennas that were evaluated with the M2-24 module. As per FCC 47 CFR §2.10931 an RF Exposure (MPE) evaluation is required for this *Equipment* and the results of the RF Exposure (MPE) evaluation appear in a separate report.

Application:

This is an application new certification.

4.0 TEST RESULT SUMMARY

TEST SUMMARY						
Section	Description of Test	Procedure Reference	Applicable Rule Part(s) FCC	Applicable Rule Part(s) ISED	Test Date	Result
11.0	Radiated Rx Spurious Emissions	ANSI C63.4-2014	§2.1053 §15B	RSS-Gen ICES-003	29 Jan 2021	Pass

Test Station Day Log					
Date	Ambient Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Test Station	Tests Performed Section(s)
29 Jan 2021	0.0	91	101.1	OATS	7

EMC - EMC Test Bench

OATS - Open Area Test Site

LISN - LISN Test Area

IMM - Immunity Test Area

SAC - Semi-Anechoic Chamber

TC - Temperature Chamber

ESD - ESD Test Bench

RI - Radiated Immunity Chamber

I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.



Art Voss, P.Eng.
Technical Manager
Celltech Labs Inc.

26 April 2021

Date



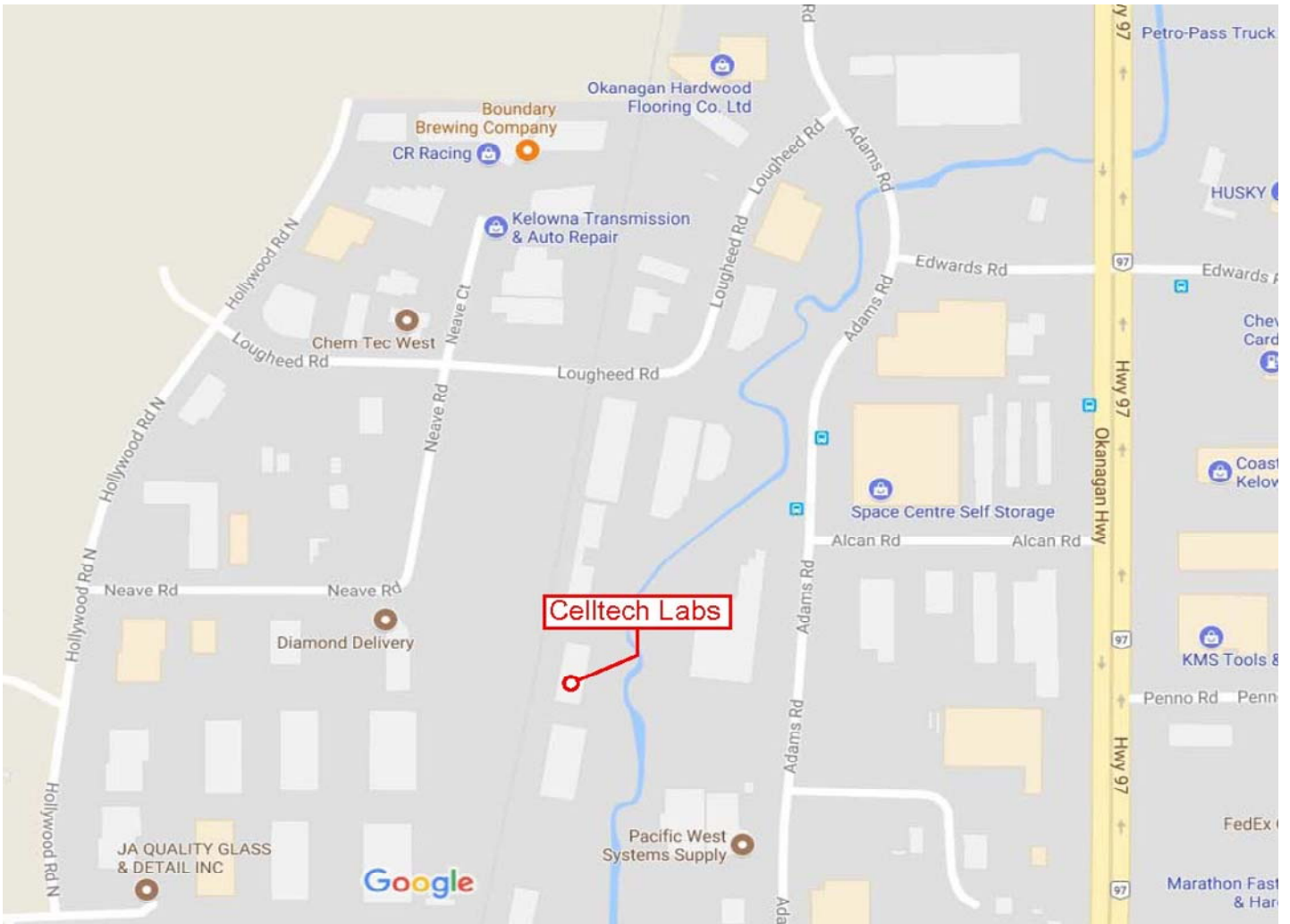
5.0 NORMATIVE REFERENCES

Normative References	
ISO/IEC 17025:2017	General requirements for the competence of testing and calibration laboratories
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
CFR	Code of Federal Regulations Title 47: Telecommunication Part 2: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR	Code of Federal Regulations Title 47: Telecommunication Part 15 Subpart B: Unintentional Radiators
ISED	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification RSS-Gen Issue 5: General Requirements and Information for the Certification of Radiocommunication Equipment
ISED	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification ICES-003 Information Technology Equipment (Including Digital Apparatus) — Issue 6, Jan 2016 Limits and Methods of Measurement

6.0 FACILITIES AND ACCREDITATIONS

Facility and Accreditation:

The facilities used to evaluate this device outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site (OATS) conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number CA3874 and Innovation, Science and Economic Development Canada under Test Site File Number ISED 3874A-1. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.



7.0 RADIATED RX EMISSIONS

Test Procedure

Normative Reference FCC 47 CFR §15.109, ICES-003(6.2)
ANSI C64.4-2014

Limits

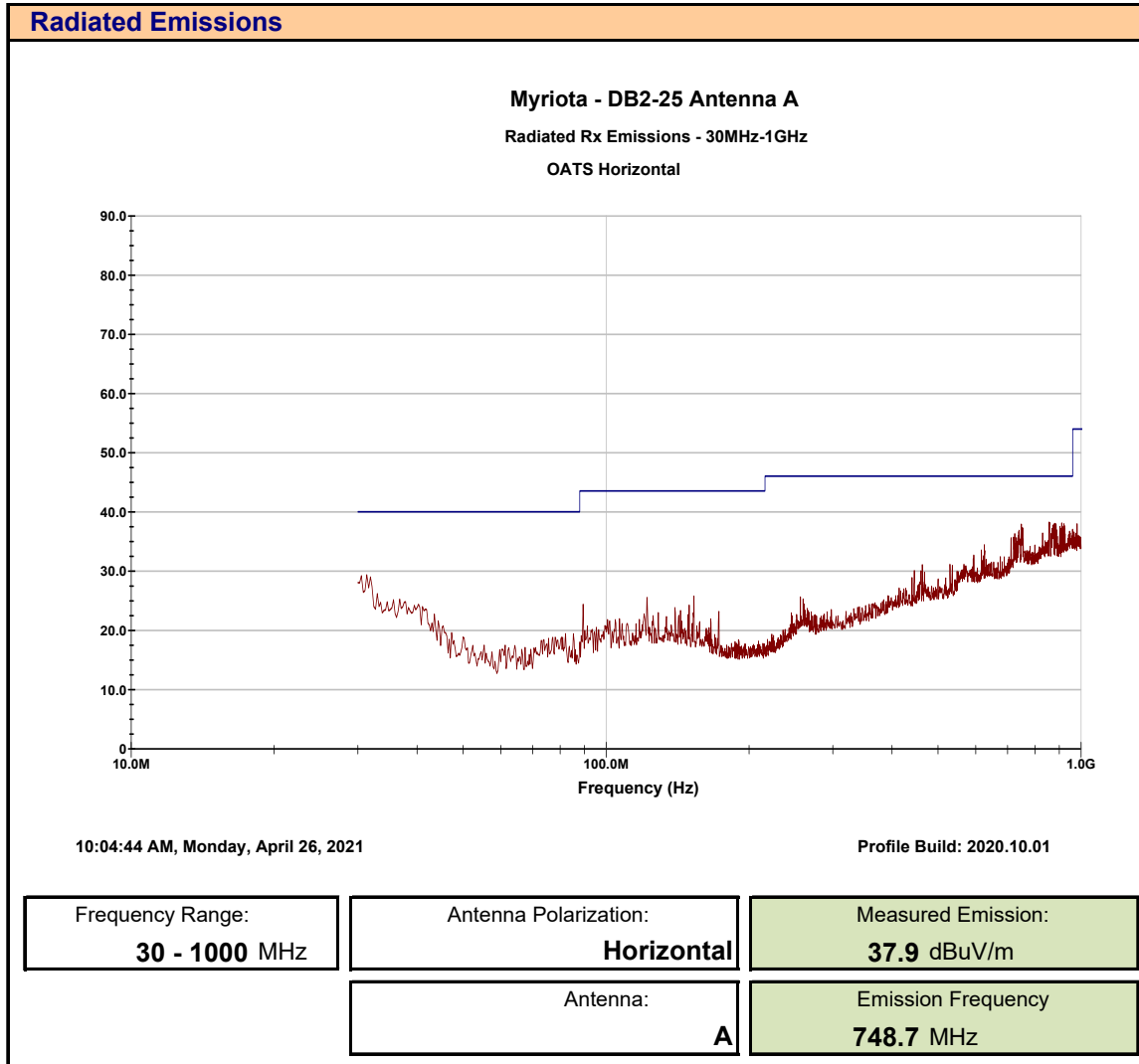
47 CFR §15.109	(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values: 30-88MHz: 40dBuV/m 88-216MHz: 43.5dBuV/m 216-960MHz: 46dBuV/m > 960MHz: 54dBuV/m
ICES-003(6.2.1)	6.2.1 - Radiated Emissions Limits Below 1 GHz Class B: ITE that does not meet the conditions for Class A operation shall comply with the Class B radiated limits set out in Table 5 determined at a distance of 3 metres. 30-88MHz: 40dBuV/m 88-216MHz: 43.5dBuV/m 216-960MHz: 46dBuV/m > 960MHz: 54dBuV/m

Test Setup Appendix A Figure A.1

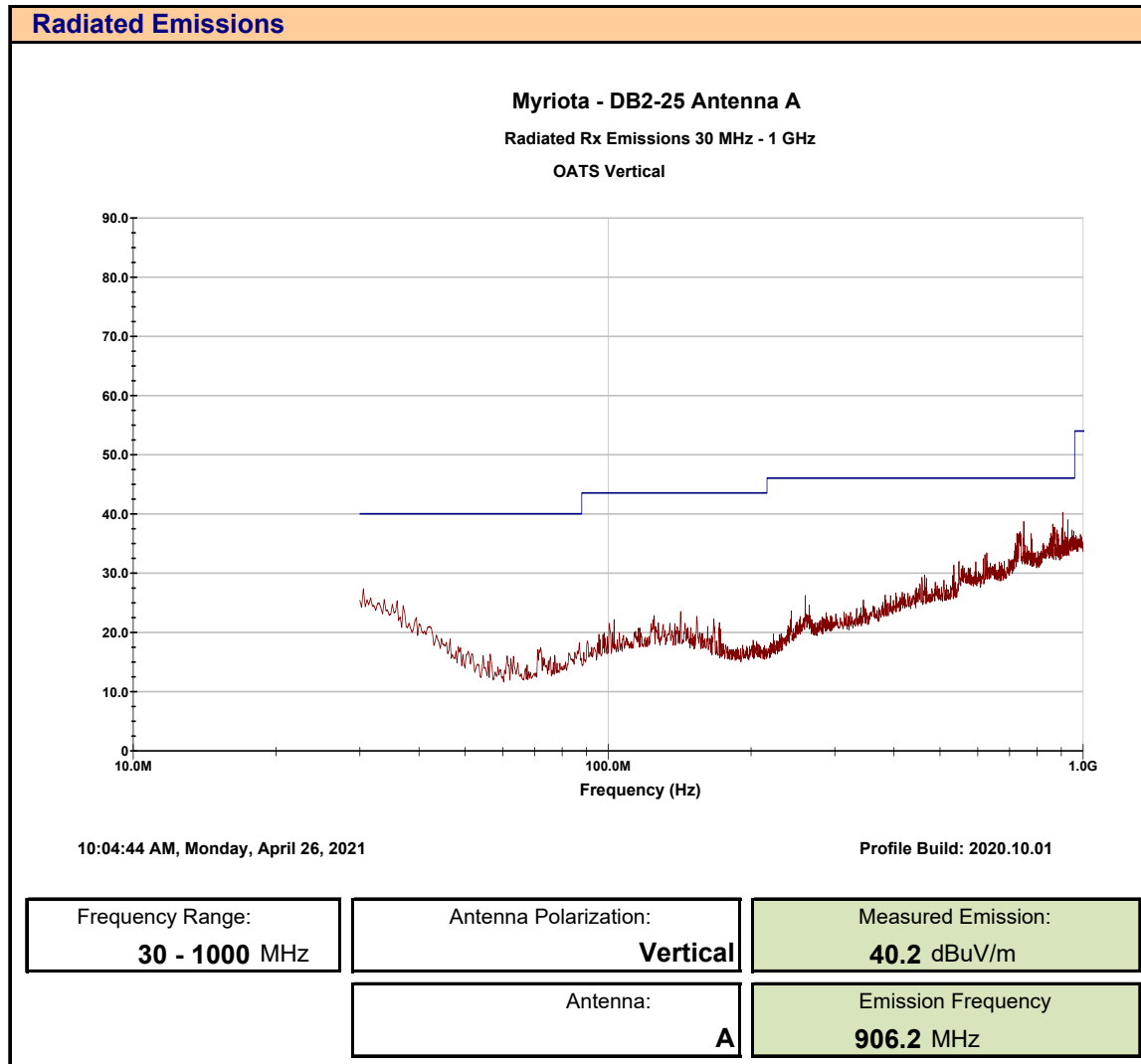
Measurement Procedure

The DUT was set up as per ANSI C63.4:2014. Emissions were scanned between 30MHz and 5GHz. The turntable was rotated 360 degrees and the antenna was elevated to 4m to optimize the measured emissions. The DUT was evaluated with the same two antennas that were evaluated with the M2-24 Module.

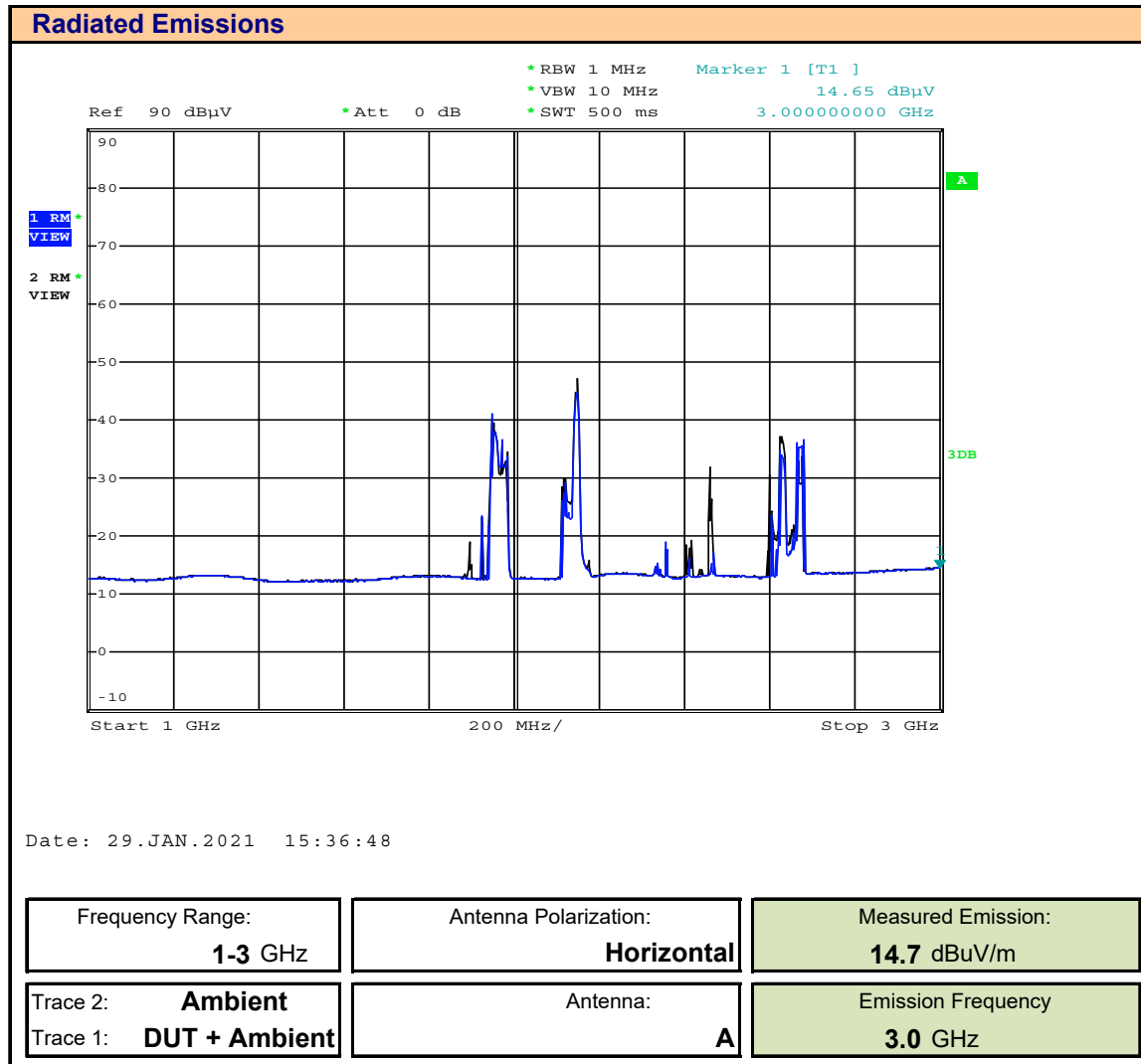
Plot 7.1 – Radiated Rx Emissions, 30 – 1000MHz, Antenna A, Horizontal



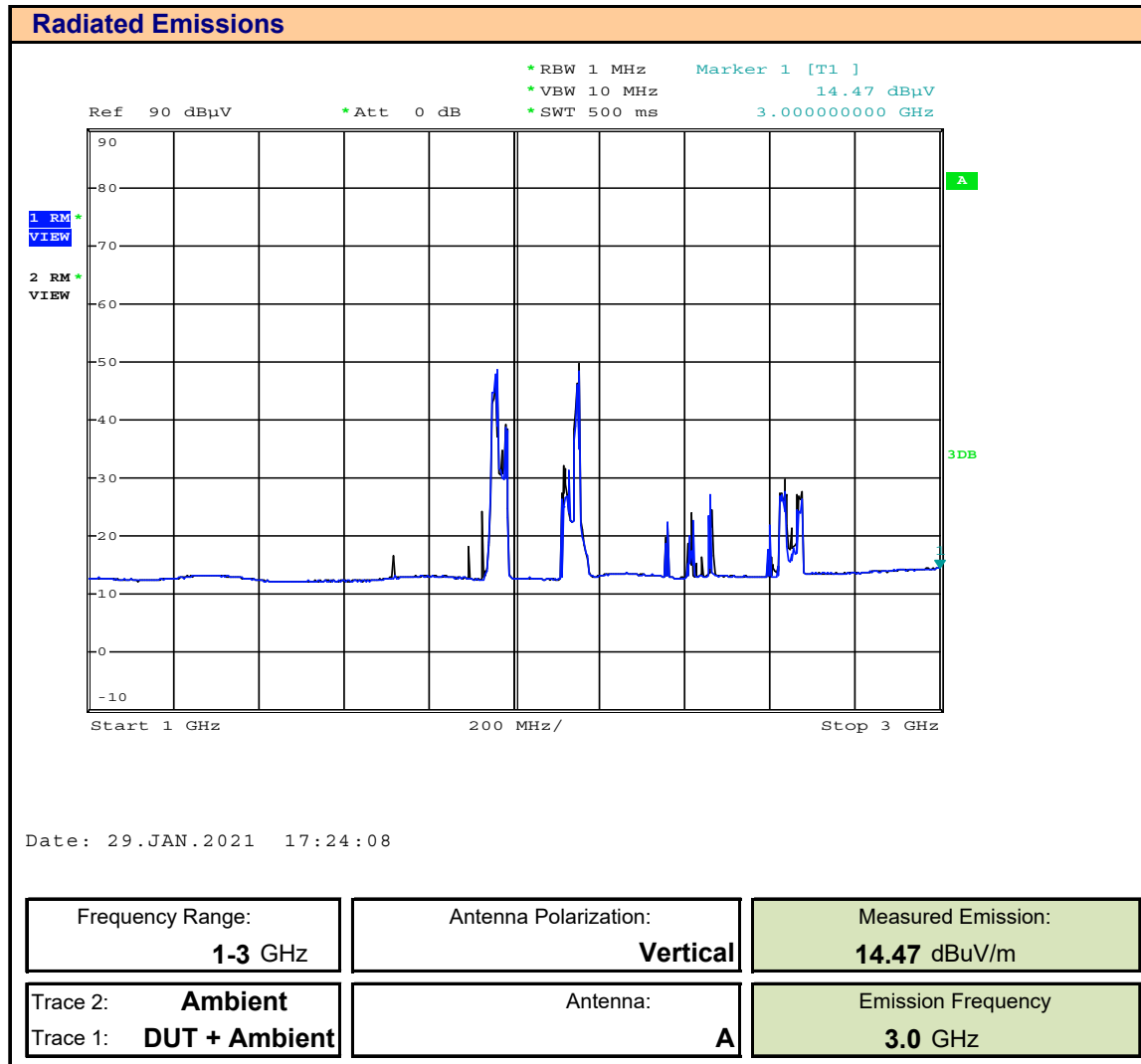
Plot 7.2 – Radiated Rx Emissions, 30 – 1000MHz, Antenna A, Vertical



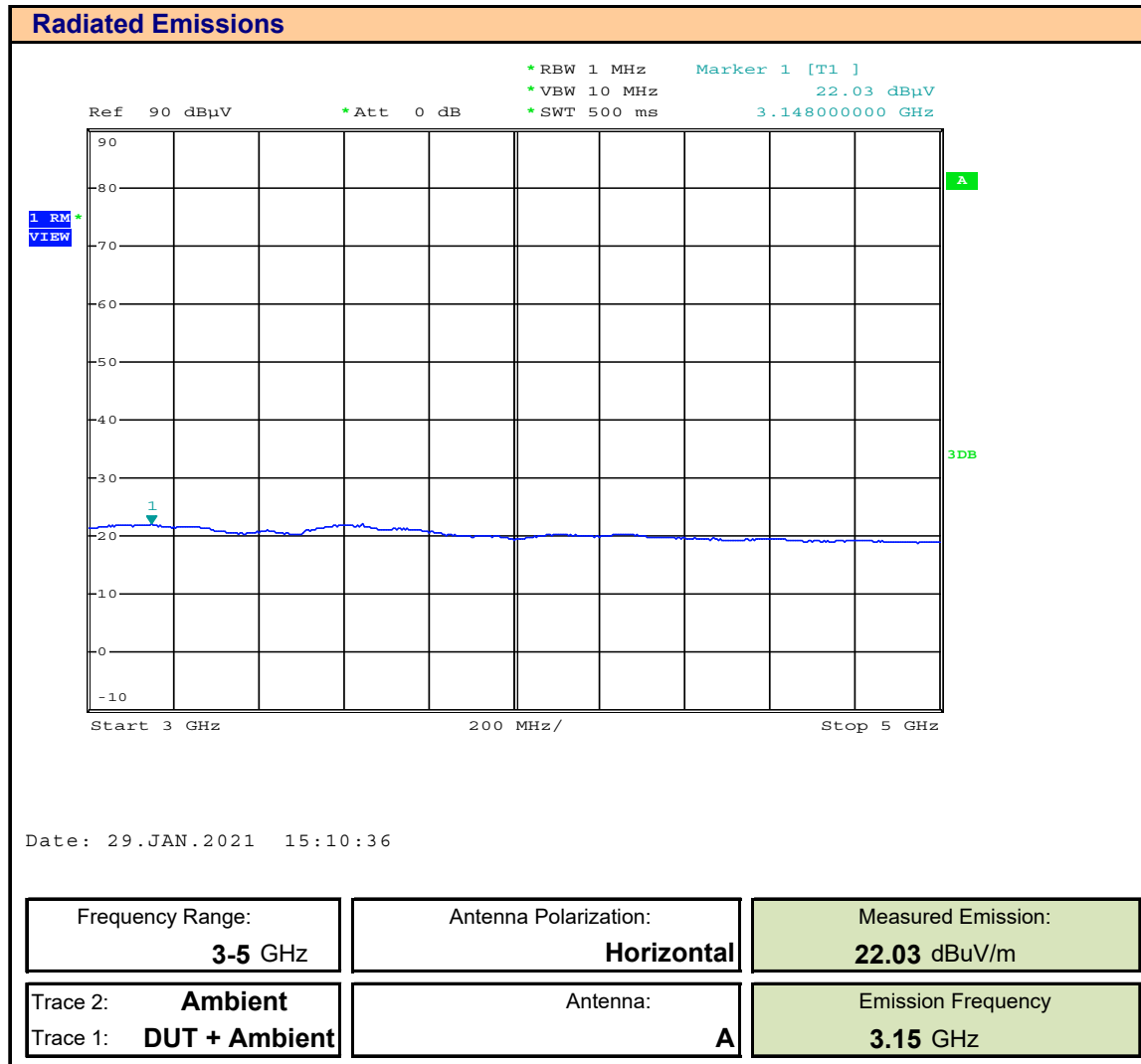
Plot 7.3 – Radiated Rx Emissions, 1 – 3GHz, Antenna A, Horizontal



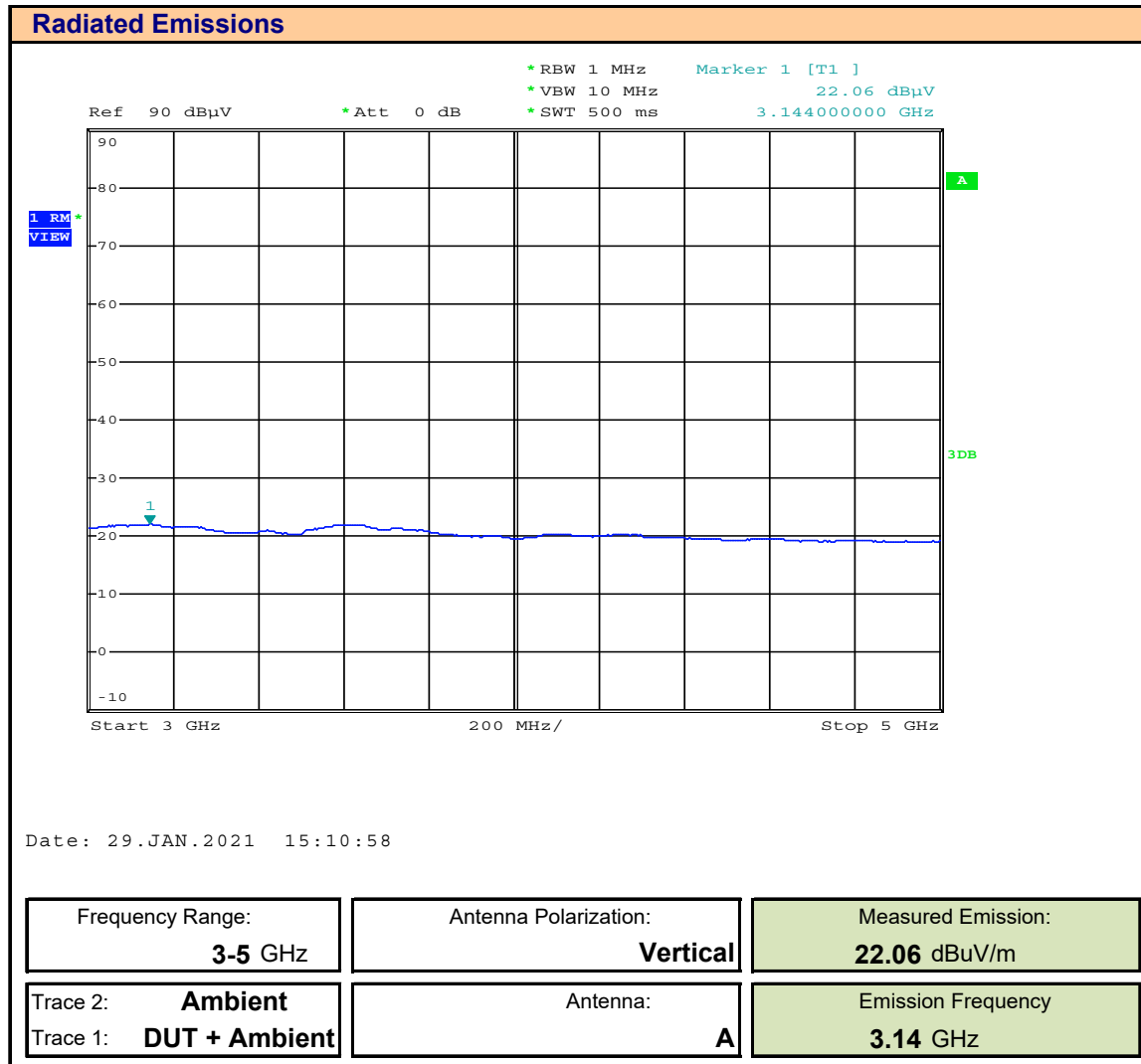
Plot 7.4 – Radiated Rx Emissions, 1 – 3GHz, Antenna A, Vertical



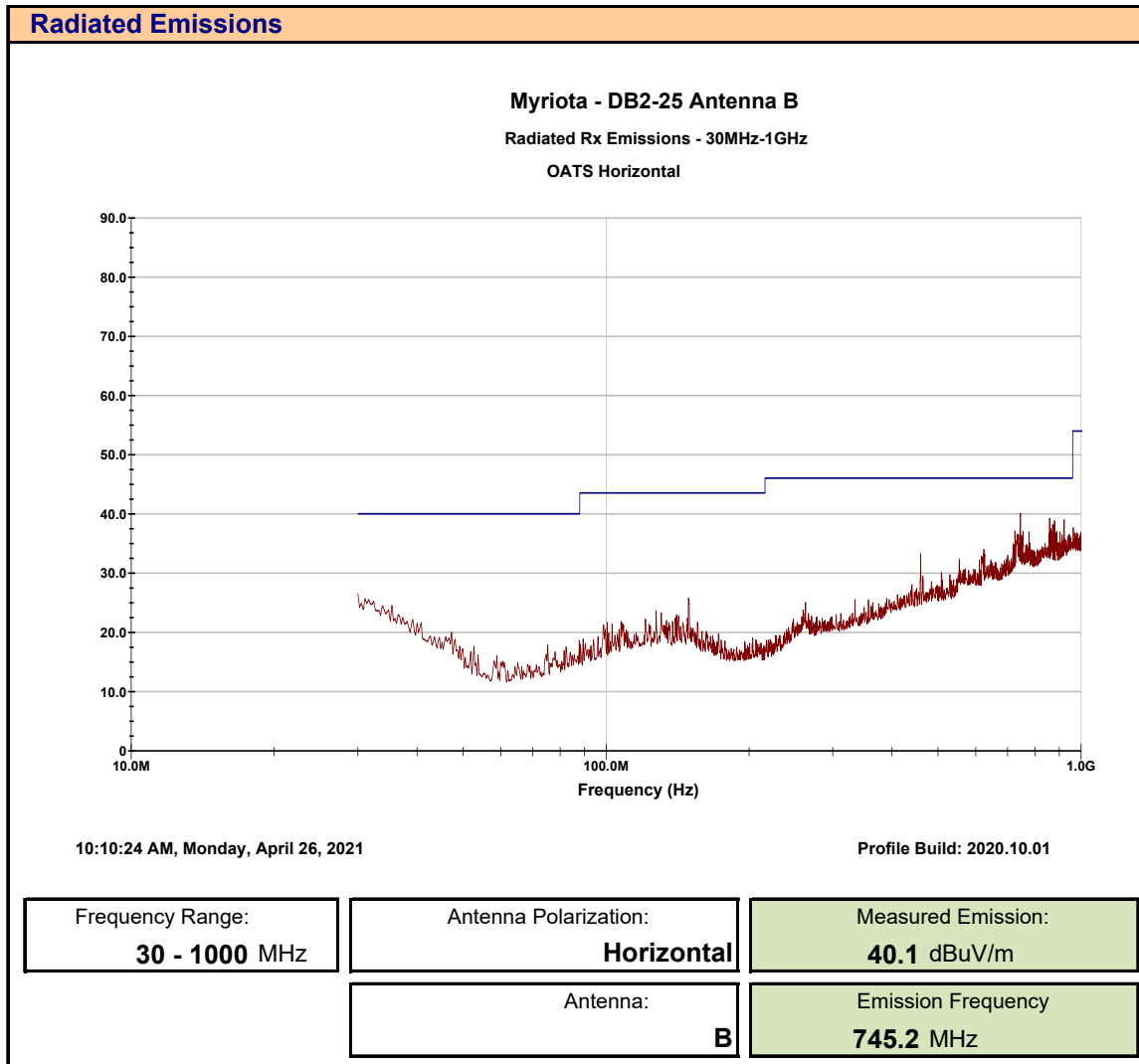
Plot 7.5 – Radiated Rx Emissions, 3 – 5GHz, Antenna A, Horizontal



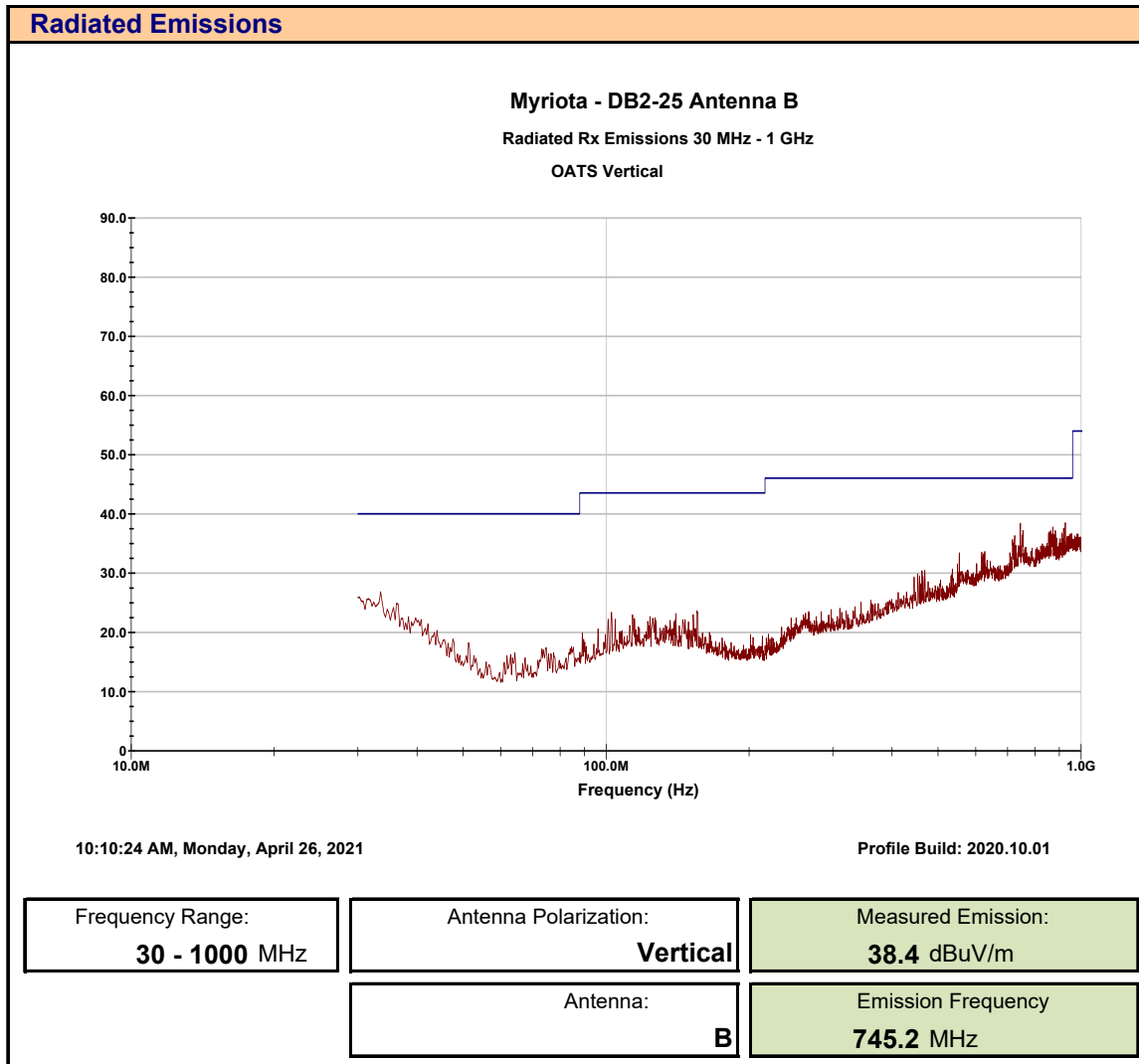
Plot 7.6 – Radiated Rx Emissions, 3 – 5GHz, Antenna A, Vertical



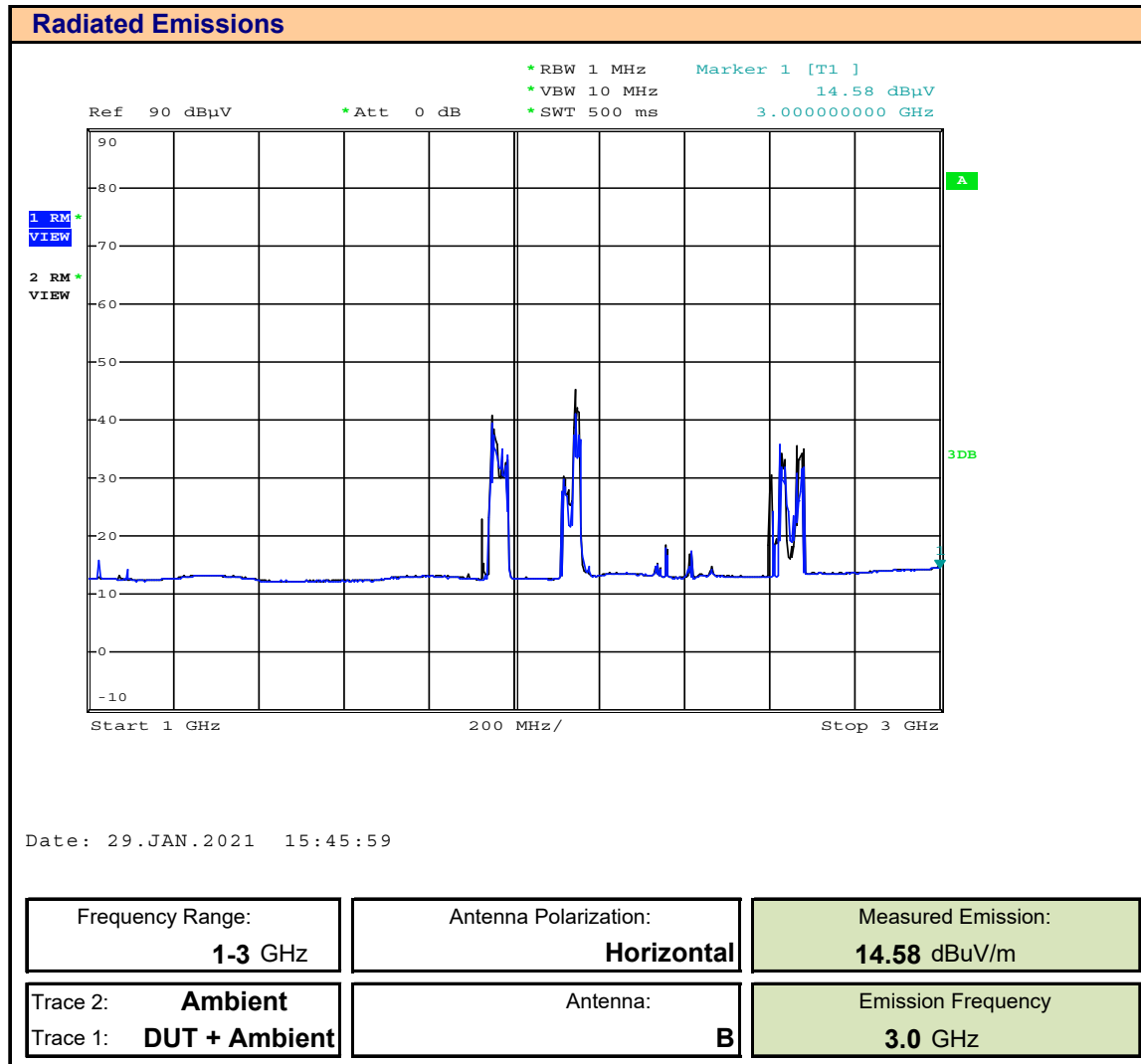
Plot 7.7 – Radiated Rx Emissions, 30 – 1000MHz, Antenna B, Horizontal



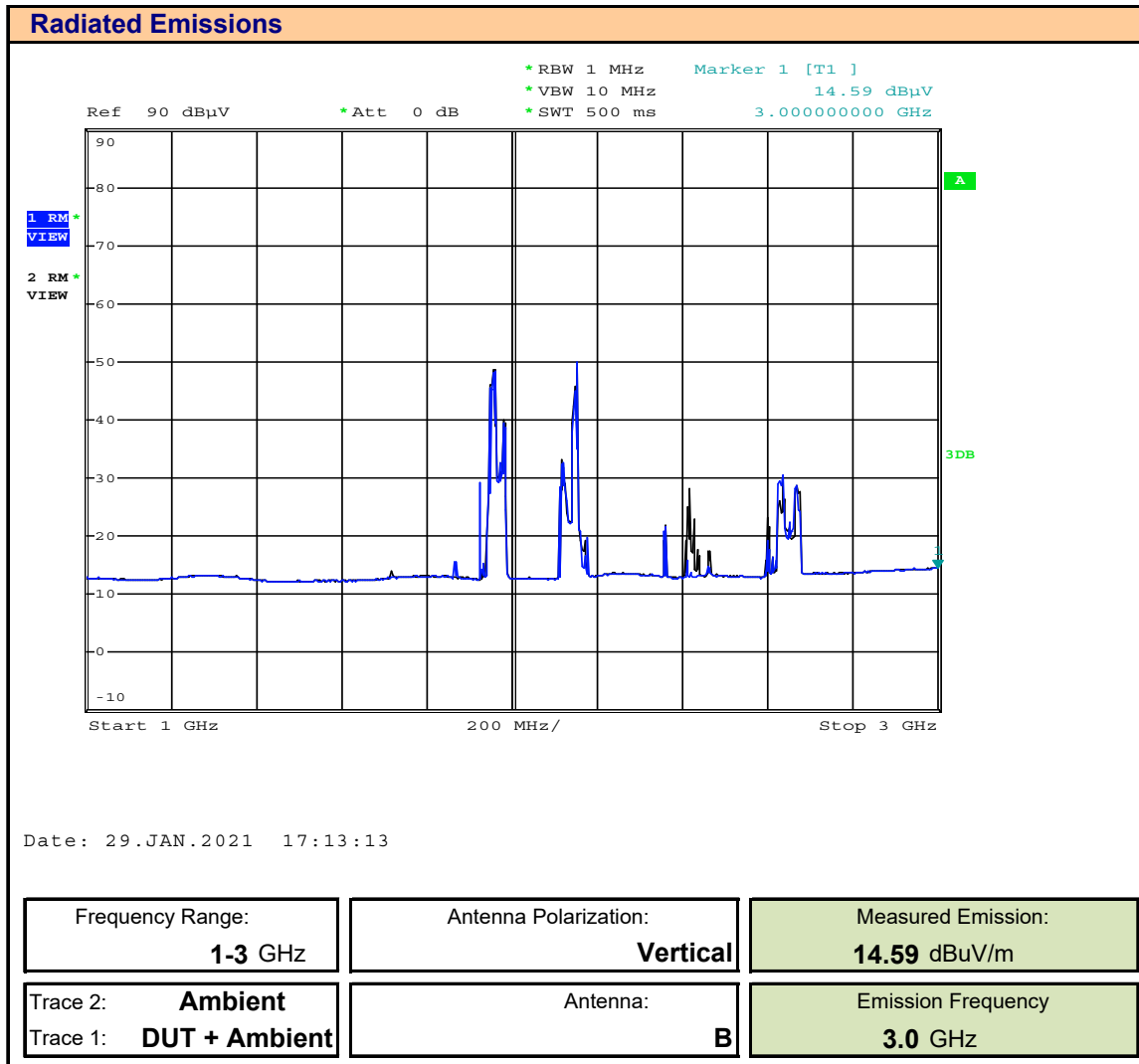
Plot 7.8 – Radiated Rx Emissions, 30 – 1000MHz, Antenna B, Vertical



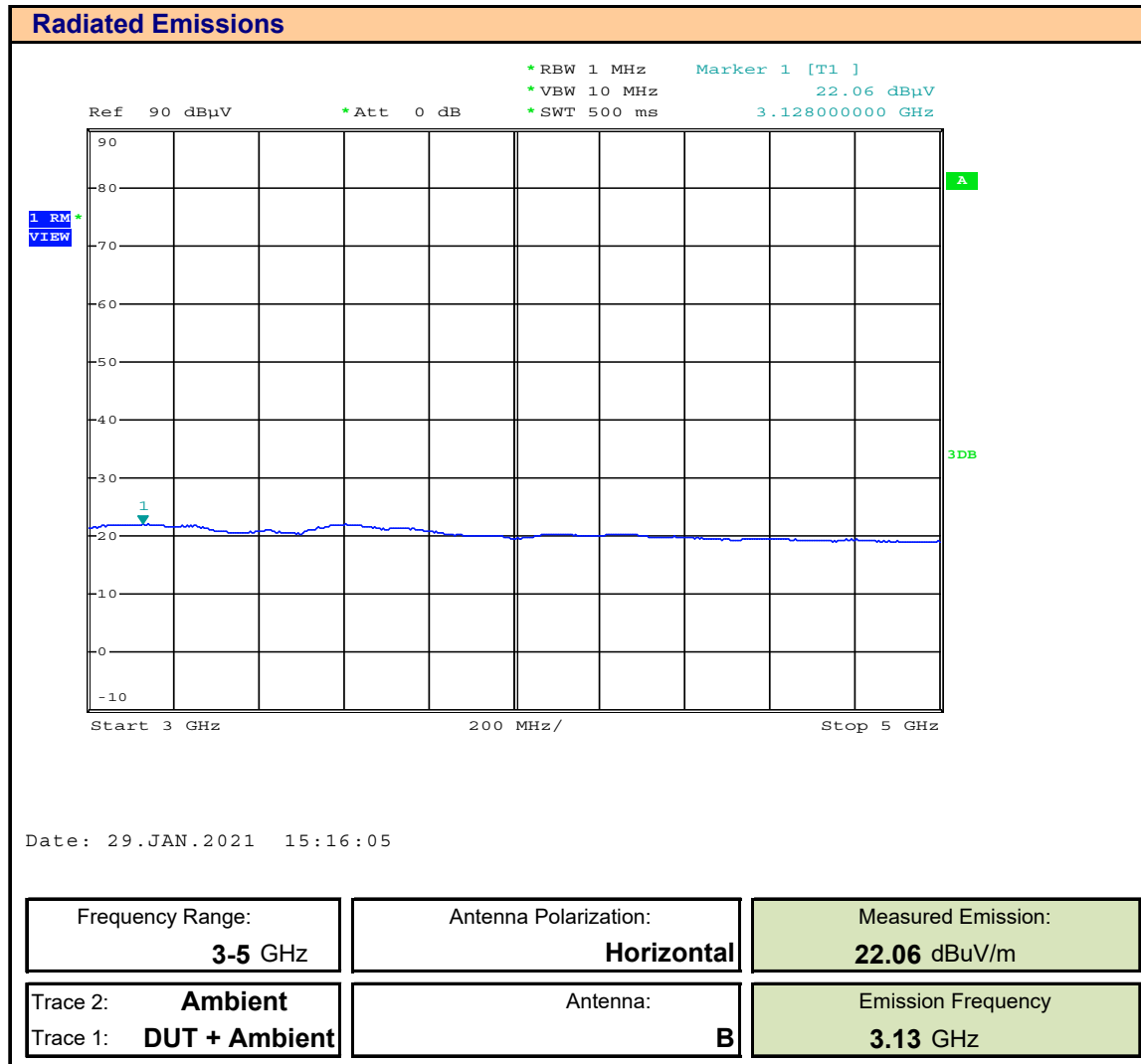
Plot 7.9 – Radiated Rx Emissions, 1 – 3GHz, Antenna B, Horizontal



Plot 7.10 – Radiated Rx Emissions, 1 – 3GHz, Antenna B, Vertical



Plot 7.11 – Radiated Rx Emissions, 3 – 5GHz, Antenna B, Horizontal



Plot 7.12 – Radiated Rx Emissions, 3 – 5GHz, Antenna B, Vertical

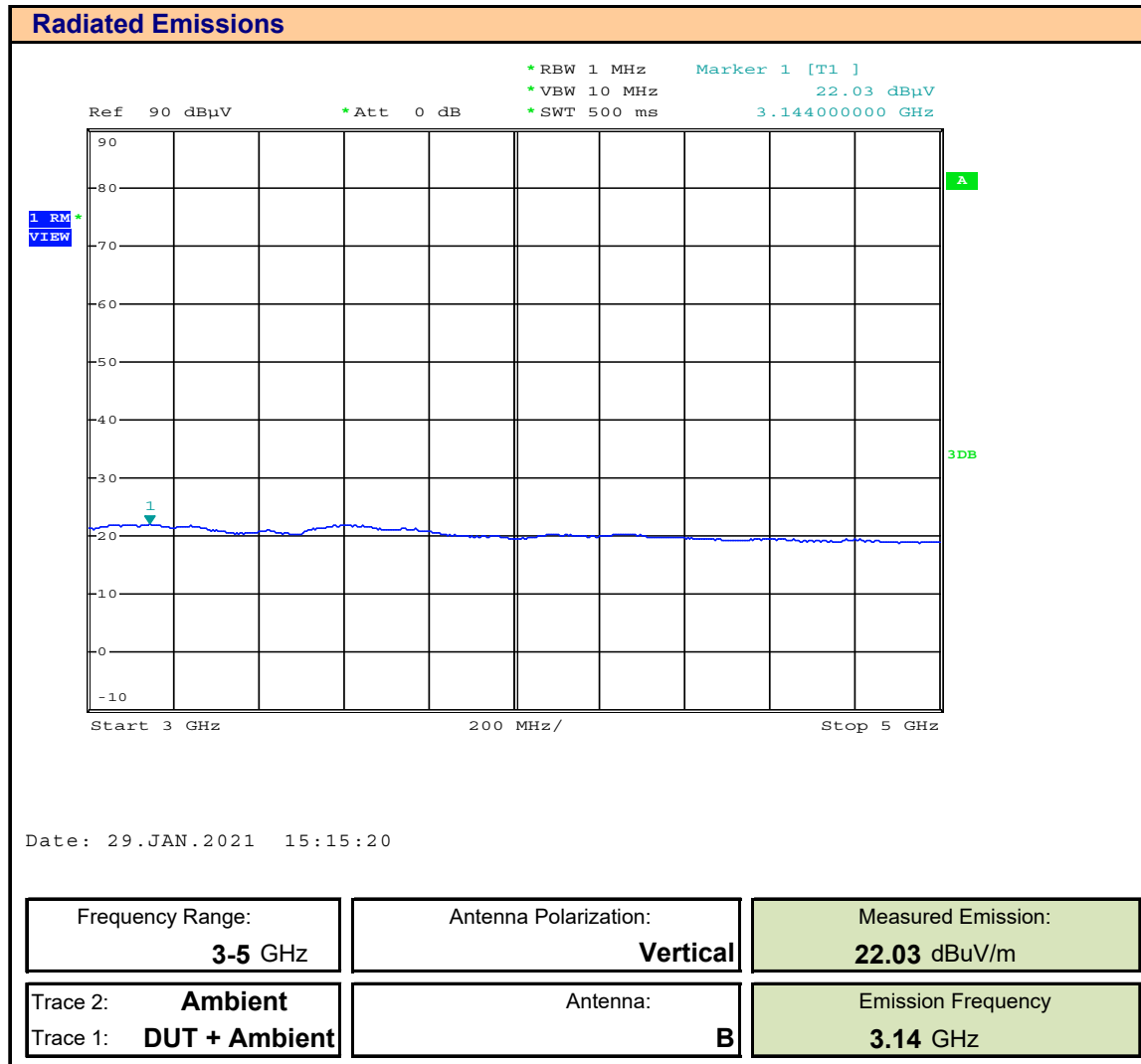


Table 7.1 – Summary of Radiated Rx Emissions Measurements (RMS)

§15.109, ICES-003 (6.2)								
Emission Frequency (MHz)	DUT Antenna	Antenna Polarization	Measured Emission [E _{Meas}] (dBuV)	Cable Loss [L _C] (dB)	Antenna Correction [ACF] (dB)	Corrected Emission [E _{Corr}] (W)	Limit @3m [Limit] (dBuV/m)	Margin [Margin] (dB)
* 748.7 MHz	A	Horizontal	37.92			37.92	46.0	8.1
* 906.2 MHz		Vertical	40.21			40.21	46.0	5.8
** 3.0 GHz		Horizontal	14.65	1.00	30.16	45.81	54.0	8.2
** 3.0 GHz		Vertical	14.47	1.00	30.16	45.63	54.0	8.4
** 3.15 GHz		Horizontal	22.03	1.00	30.78	53.81	54.0	0.2
** 3.14 GHz		Vertical	22.06	1.00	30.78	53.84	54.0	0.2
* 745.2 MHz	B	Horizontal	40.08			40.08	46.0	5.9
* 745.2 MHz		Vertical	38.40			38.40	46.0	7.6
** 3.0 GHz		Horizontal	14.58	1.00	30.16	45.74	54.0	8.3
** 3.0 GHz		Vertical	14.59	1.00	30.16	45.75	54.0	8.3
** 3.13 GHz		Horizontal	22.06	1.00	30.78	53.84	54.0	0.2
** 3.14 GHz		Vertical	22.03	1.00	30.78	53.81	54.0	0.2
Results:							Complies	

* Measurement Compensated for Cable Loss and Antenna Correction Factor

$$E_{\text{Corr}} = E_{\text{Meas}} + L_C + \text{ACF}$$

$$\text{Margin} = \text{Limit} - E_{\text{Corr}}$$

** Emissions Shown are Noise Floor

APPENDIX A – TEST SETUP DRAWINGS AND EQUIPMENT

Table A.1 – Setup - Radiated Emissions Equipment

Equipment List			
Asset Number	Manufacturer	Model Number	Description
00051	HP	8566B	Spectrum Analyzer
00049	HP	85650A	Quasi-peak Adapter
00047	HP	85685A	RF Preselector
00072	EMCO	2075	Mini-mast
00073	EMCO	2080	Turn Table
00071	EMCO	2090	Multi-Device Controller
00265	Miteq	JS32-00104000-58-5P	Microwave L/N Amplifier
00241	R&S	FSU40	Spectrum Analyzer
00050	Chase	CBL-6111A	Bilog Antenna
00275	Coaxis	LMR400	25m Cable
00276	Coaxis	LMR400	4m Cable
00278	TILE	34G3	TILE Test Software
00034	ETS	3115	Double Ridged Guide Horn

CNR: Calibration Not Required

COU: Calibrate On Use

Figure A.1 – Test Setup Radiated Emissions Measurements 30 – 1000MHz

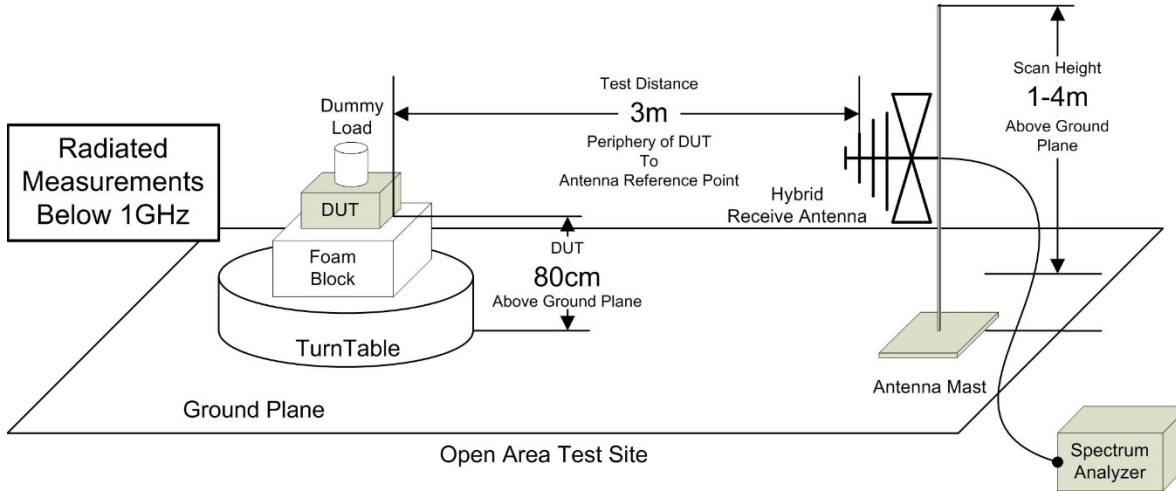


Figure A.2 – Test Setup Radiated Emissions Measurements 30 – 1000MHz w/ Signal Substitution

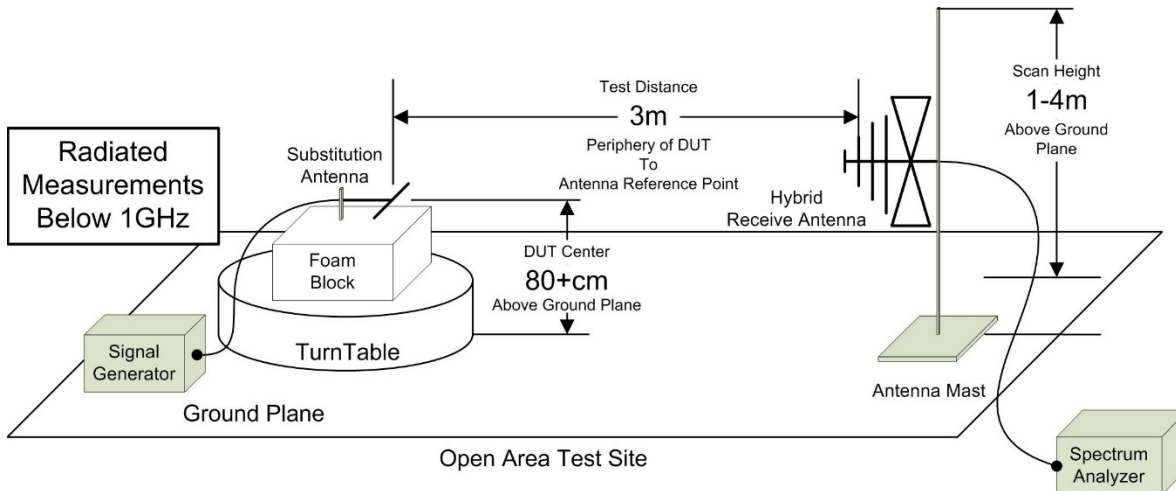
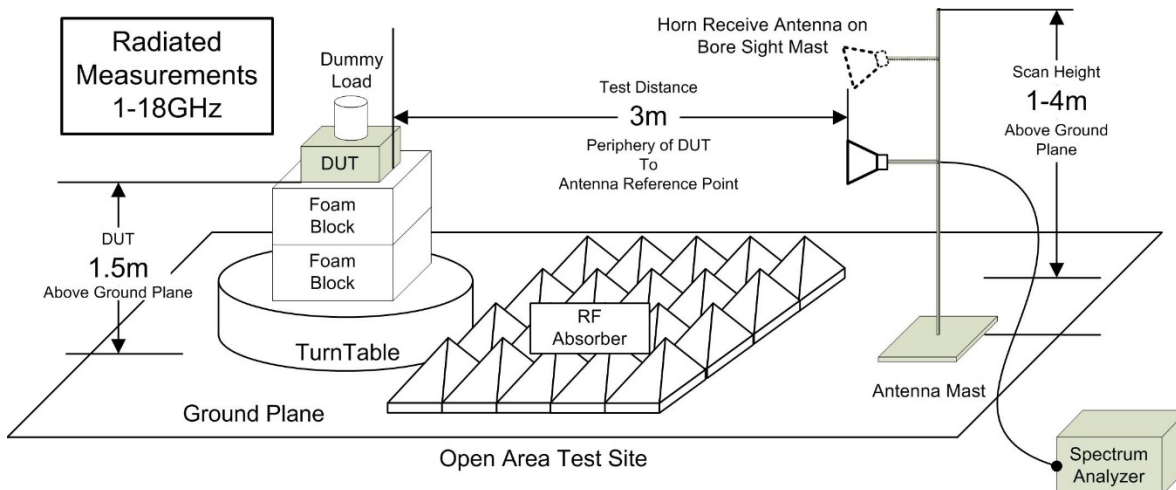


Figure A.3 – Test Setup Radiated Emissions Measurements 1 – 18GHz



APPENDIX B – EQUIPMENT LIST AND CALIBRATION

Equipment List							
Asset Number	Manufacturer	Model Number	Serial Number	Description	Last Calibrated	Calibration Interval	Calibration Due
00050	Chase	CBL-6111A	1607	Bilog Antenna	3 Jan 2019	Triennial	3 Jan 2022
00034	ETS	3115	6267	Double Ridged Guide Horn	26 Nov 2018	Triennial	26 Nov 2021
00333	HP	85685A	3010A01095	RF Preselector	23 Jun 2020	Triennial	30 Jun 2023
00049	HP	85650A	2043A00162	Quasi-peak Adapter	23 Jun 2020	Triennial	23 Jun 2023
00051	HP	8566B	2747A05510	Spectrum Analyzer	23 Jun 2020	Triennial	23 Jun 2023
00241	R&S	FSU40	100500	Spectrum Analyzer	15 May 2018	Triennial	15 May 2021
00071	EMCO	2090	9912-1484	Multi-Device Controller	n/a	n/a	n/a
00072	EMCO	2075	0001-2277	Mini-mast	n/a	n/a	n/a
00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable	COU	n/a	COU
00275	TMS	LMR400	n/a	25m Cable	COU	n/a	COU
00278	TILE	34G3	n/a	TILE Test Software	NCR	n/a	NCR

NCR: No Calibration Required

COU: Calibrate On Use

APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY

CISPR 16-4 Measurement Uncertainty (U_{LAB})

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence interval using a coverage factor of $k=2$

Radiated Emissions 30MHz - 200MHz

$$U_{LAB} = 5.14\text{dB} \quad U_{CISPR} = 6.3\text{dB}$$

Radiated Emissions 200MHz - 1000MHz

$$U_{LAB} = 5.90\text{dB} \quad U_{CISPR} = 6.3\text{dB}$$

Radiated Emissions 1GHz - 6GHz

$$U_{LAB} = 4.80\text{dB} \quad U_{CISPR} = 5.2\text{dB}$$

Radiated Emissions 6GHz - 18GHz

$$U_{LAB} = 5.1\text{dB} \quad U_{CISPR} = 5.5\text{dB}$$

Power Line Conducted Emissions 9kHz to 150kHz

$$U_{LAB} = 2.96\text{dB} \quad U_{CISPR} = 3.8\text{dB}$$

Power Line Conducted Emissions 150kHz to 30MHz

$$U_{LAB} = 3.12\text{dB} \quad U_{CISPR} = 3.4\text{dB}$$

If the calculated uncertainty U_{lab} is **less** than U_{CISPR} then:

- | | |
|---|---|
| 1 | Compliance is deemed to occur if NO measured disturbance exceeds the disturbance limit |
| 2 | Non-Compliance is deemed to occur if ANY measured disturbance EXCEEDS the disturbance limit |

If the calculated uncertainty U_{lab} is **greater** than U_{CISPR} then:

- | | |
|---|--|
| 3 | Compliance is deemed to occur if NO measured disturbance, increased by ($U_{lab} - U_{CISPR}$), exceeds the disturbance limit |
| 4 | Non-Compliance is deemed to occur if ANY measured disturbance, increased by ($U_{lab} - U_{CISPR}$), EXCEEDS the disturbance limit |

Other Measurement Uncertainties (U_{LAB})

RF Conducted Emissions 9kHz - 40GHz

$$U_{LAB} = 1.0\text{dB} \quad U_{CISPR} = \text{n/a}$$

Frequency/Bandwidth 9kHz - 40GHz

$$U_{LAB} = 0.1\text{ppm} \quad U_{CISPR} = \text{n/a}$$

Temperature

$$U_{LAB} = 1^{\circ}\text{C} \quad U_{CISPR} = \text{n/a}$$

END OF REPORT