FCC Test Report

Ericsson AB (EAB) Antenna Integrated Radio Unit, Product Name: AIR 6449 B41

In accordance with FCC 47 CFR Part 15B

Prepared for: Ericsson AB (EAB)
Isafjordsgatan 10
Kista - Sweden
164 80
SWEDEN

FCC ID: TA8AKRD901141

COMMERCIAL-IN-CONFIDENCE

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Document 75948804-02 Issue 01

SIGNATURE			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Steve Scarfe	Supervisor	Authorised Signatory	21 May 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. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Hector Trujillo	21 May 2020	
Supervision	Jack Tuckwell	21 May 2020	

FCC Accreditation

563983 Delta Test Laboratory, Vasteras

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15B: 2019 for the tests detailed in section 1.3.

SWEDAC ACKREDITERING
Accred. no. 10363
Testing
ISO/IEC 17025

ACCREDITATION

Our Swedac Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our Swedac Accreditation. Results of tests not covered by our Swedac Accreditation Schedule are marked NSA (Not Swedac Accredited).

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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	21 May 2020

Table 1

1.2 Introduction

Applicant	Ericsson AB (EAB)
Manufacturer	Ericsson AB (EAB)
Product Name(s)	AIR 6449 B41
Product Number(s)	KRD 901 141/2
Serial Number(s)	C82A592337
Hardware Version(s)	R1D
Software Version(s)	RBS SW: CXP 201 0052/1 R62A116 Radio SW CXP 2030039/1_R31A107b5
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15B: 2019
Order Number Date	9400764568 09-April-2020
Date of Receipt of EUT	07-May-2020
Start of Test	23-April-2020
Finish of Test	30-April-2020
Name of Engineer(s)	Hector Trujillo, supervised by Jack Tuckwell
Related Document(s)	ANSI C63.4: 2014

1.3 Brief Summary of Results

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

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: AC Powered - Transmitters Idle				
2.1	15.107	Conducted Disturbance at Mains Terminals	Pass	ANSI C63.4: 2014
Configuration and Mode: DC Powered - Transmitters Idle				
2.2	15.109	Radiated Disturbance	Pass	ANSI C63.4: 2014

Table 2

1.4 Declaration of Build Status

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment)*	Antenna Integrated Radio Unit
Manufacturer:	Ericsson AB
Model:	AIR 6449 B41
Part Number:	KRD 901 141/2* (with un-security software and RDNB board for testing purpose) KRD 901 141/21 (with security software and RDNB board for testing purpose) KRD 901 141/1 (with un-security software and antenna) KRD 901 141/11** (with security software and antenna) Note*: Tests have been performed on this unit. Note**: This will be the marketed, sold unit.
Hardware Version:	R1D
Software Version:	RBS SW: CXP 201 0052/1 R62A116 Radio SW CXP 2030039/1_R31A107b5
FCC ID (if applicable)	TA8AKRD901141
IC ID (if applicable)	Not applicable

Intentional Radiators

Technology	NR	LTE
Frequency Band (MHz)	2496 to 2690	2496 to 2690
Conducted Declared Output Power (dBm)	36 dBm/MHz, max 55 dBm	36 dBm/MHz, max 55 dBm
Antenna Gain (dBi)	23.8	23.8
Supported Bandwidth(s) (MHz)	20, 40, 60, 80, 100 MHz, SCS: 30 kHz	10, 20
Modulation Scheme(s)	QPSK, 16QAM, 64QAM, 256QAM	QPSK, 16QAM, 64QAM, 256QAM
ITU Emission Designator	18M3W7D 37M9W7D 57M9W7D 77M4W7D 97M3W7D 176MW7D	8M95W7D 17M9W7D 57M7W7D
Bottom Frequency (MHz)	2496 MHz	2496 MHz
Middle Frequency (MHz)	2593.02 MHz	2593 MHz
Top Frequency (MHz)	2690 MHz	2690 MHz

Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	CPRI 10,3 Gbit/s
Lowest frequency generated or used in the device or on which the device operates or tunes	
Class A Digital Device (Use in commercial, industrial or business environment) ☐ Class B Digital Device (Use in residential environment only) ☒	

DC Power Source

Nominal voltage:	-54.5	V
Extreme upper voltage:	-58.5	V
Extreme lower voltage:	-36.0	V
Max current:	50	A

Temperature

Minimum temperature:	-40.0	°C
Maximum temperature:	+55.0	°C

Antenna Characteristics

Antenna connector ☐			State impedance		Ohm
Temporary antenna connector ☒			State impedance	50	Ohm
Integral antenna ☒	Type:	AAS (Advanced antenna system)	Gain	23.8	dBi
External antenna ☐	Type:		Gain		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)

Equipment	Type / Model	Manufacturer	Serial no.
BB6630	KDU137848/1 R2C	Ericsson	B441835831
BB6630	KDU137848/1 R2F	Ericsson	B23A321194
Test computer	Mac mini	Apple	BAMS-1001997578
NI PXIe-1085		National Instruments	BAMS-1001634290
MXI-Express	NI PXIe-8301	National Instruments	
Vector Signal Transceiver	NI PXIe-5840	National Instruments	BAMS-1001964826
Sync box	LPC 107 043/1, R2A	Ericsson	BAMS1001718939
Netgear gigabit switch	-	Netgear	--
10W Termination, 50Ω	49-40-33		--
Power supply -48V DC	SM 52-30	Delta Elektronika	BAMS 1000635944
PDU 02 01	PDU 02 01	Ericsson	C941024013
Power 6302	BML 901 367/1	Ericsson	BR84705513

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

Name: Linda Grell

Position held: Regulatory Engineer

Date: 20 May 2020

1.5 Product Information

1.5.1 Technical Description

The Equipment under test (EUT) was an Ericsson AB AIR 6449 B41 Antenna Integrated Radio Unit working in the public mobile service from 2496 to 2690 MHz band which provides communication connections to the 2496 to 2690 MHz network.

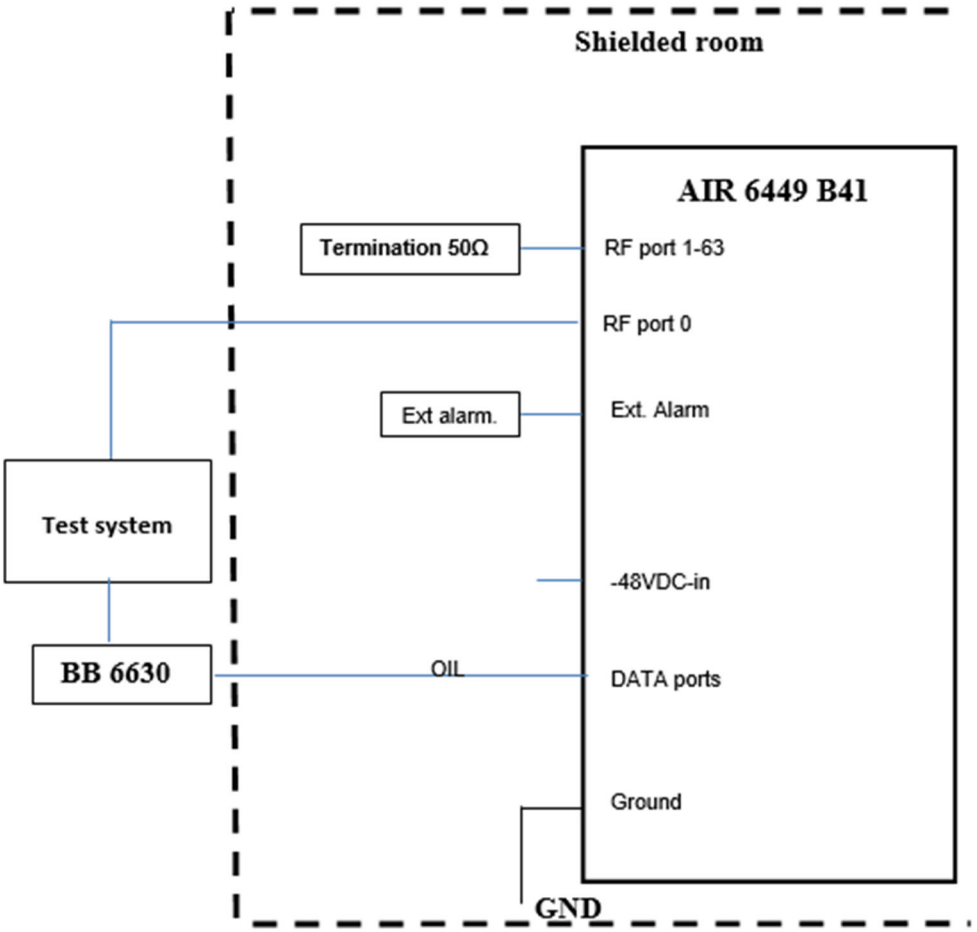

Figure 1

1.5.2 EUT Port/Cable Identification

Port	Max Cable Length specified	Usage	Type	Screened
Configuration and Mode: DC Powered - Transmitters Idle				
AC Power	0.8 m	Power	115 V 60 Hz AC Mains Power	No
DC Power	1m	Power	-48 V DC	No

Table 3

1.5.3 Test Configuration

Configuration	Description
AC Powered	The EUT was powered from a -48 V DC Supply. The DC was supplied from a representative AC-DC supply for testing purposes
DC Powered	The EUT was powered from a -48 V DC Supply.

Table 4

1.5.4 Modes of Operation

Mode	Description
Transmitters Idle	The EUT in idle mode with no RF activated but the communication to the baseband via CPRI was connected. All digital parts were activated however the EUT did not transmit RF.

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: AIR 6449, Serial Number: C82A592337			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 6

1.8 Test Location

TÜV SÜD conducted the following tests at the Delta Test Facility, Elektronicgatan 47, Vasteras, Sweden.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: AC Powered - Transmitters Idle		
Conducted Disturbance at Mains Terminals	Hector Trujillo, supervised by Jack Tuckwell	Swedac
Configuration and Mode: DC Powered - Transmitters Idle		
Radiated Disturbance	Hector Trujillo, supervised by Jack Tuckwell	Swedac

Table 7

2 Test Details

2.1 Conducted Disturbance at Mains Terminals

2.1.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.107

2.1.2 Equipment Under Test and Modification State

AIR 6449, S/N: C82A592337 - Modification State 0

2.1.3 Date of Test

23-April-2020

2.1.4 Test Method

The EUT was setup according to ANSI C63.4, clause 5.2.

The EUT was set up on a support replicating typical installation conditions at a height of 1.5 m above the reference ground plane. A vertical coupling plane was placed 0.4 m from the EUT boundary.
A Line Impedance Stabilisation Network (LISN) was directly bonded to the ground-plane. The EUT was located so that the distance between the boundary of the EUT and the closest surface of the LISN was 0.8 m.

Interconnecting cables that hanged closer than 0.4 m to the ground plane were folded back and forth in the centre forming a bundle 0.3 m to 0.4 m long.

Input and output cables were terminated with equipment or loads representative of real usage conditions.

The EUT was configured to give the highest level of emissions within reason of a typical installation as described by the manufacturer.

2.1.5 Example Calculation

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

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

2.1.6 Example Test Setup Diagram

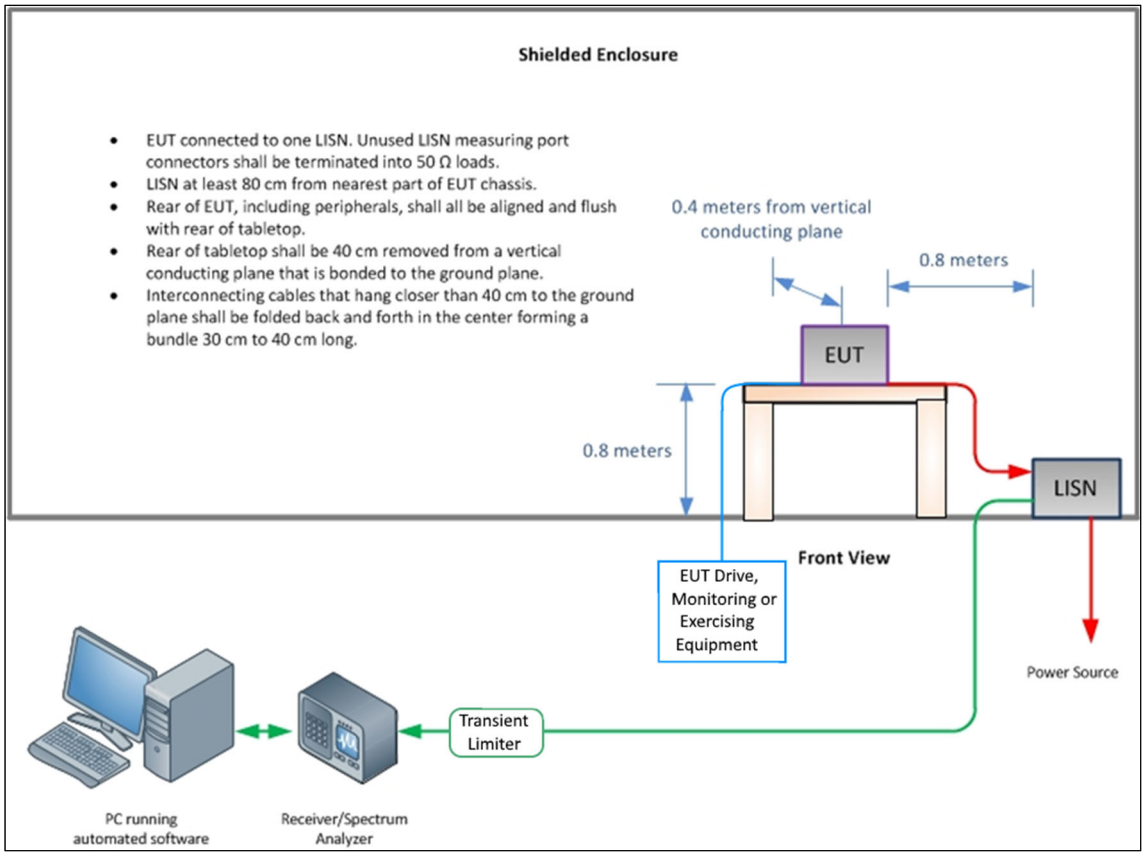

Figure 2 - Conducted Disturbance Example Test Setup

2.1.7 Environmental Conditions

Ambient Temperature	22.6 °C
Relative Humidity	28.5 %

2.1.8 Specification Limits

Required Specification Limits (Class B)			
Line Under Test	Frequency Range (MHz)	Quasi-peak (dBµV)	CISPR Average (dBµV)
AC Power Port	0.15 to 0.5	66 to 56*	56 to 46*
	0.5 to 5	56	46
	5 to 30	60	50
Supplementary information: *Decreases with the logarithm of the frequency.			

Table 8

2.1.9 Test Results

Results for Configuration and Mode: AC Powered - Transmitters Idle.

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.

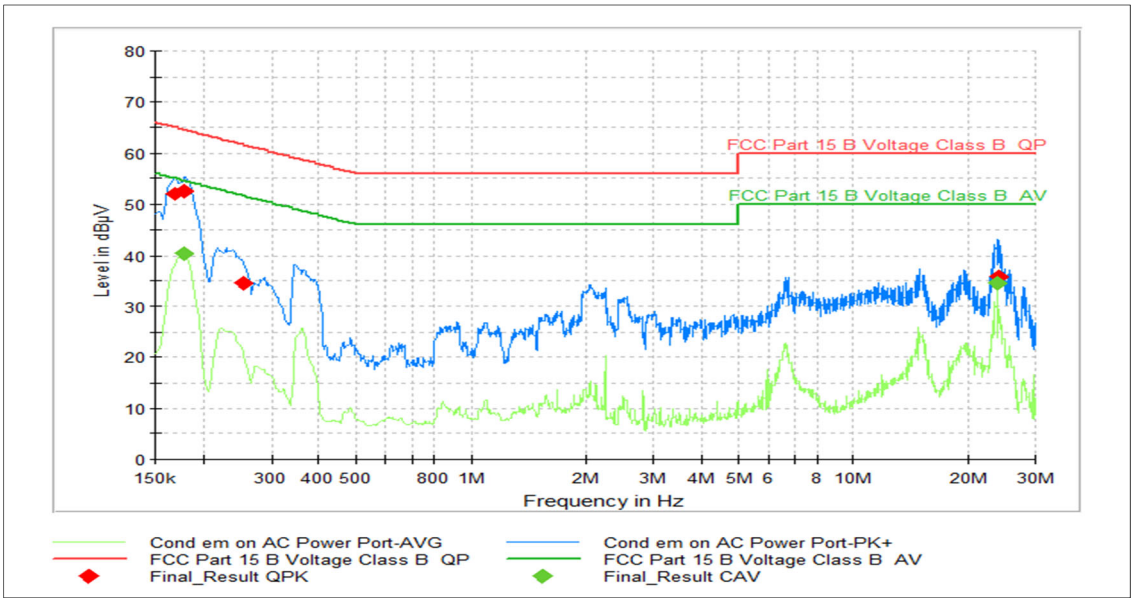

Figure 3 - Graphical Results - AC Power Composite

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dB)	CISPR Average Level (dBµV)	CISPR Average Limit (dBµV)	CISPR Average Margin (dB)	Line Under Test
0.168000	51.95	65.06	13.11	-	-	-	L1
0.177000	-	-	-	40.44	54.63	14.19	L1
0.177000	52.56	64.63	12.07	-	-	-	N
0.255750	34.65	61.57	26.92	-	-	-	L1
23.608500	-	-	-	34.51	50.00	15.49	L1
23.835750	35.79	60.00	24.21	-	-	-	L1

Table 9

No other measurements were made as all other peak emissions seen during the pre-scan were greater than 6 dB below the CISPR Average test limit.

2.1.10 Test Location and Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
LISN	R&S	ESH2-Z5	35042	12	14-01-21
Pulse limiter	R&S	ESH3-Z2	36062	12	14-01-21
ESU	Rhode and Schwarz	ESU 26	36020	12	15-01-21
Hygrometer	Rotronic	HP21	4410	12	13-Jun-2020
Digital Voltmeter	Fluke	79	3057	12	19-Aug-2020

Table 10

2.2 Radiated Disturbance

2.2.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.109

2.2.2 Equipment Under Test and Modification State

AIR 6449, S/N: C82A592337 - Modification State 0

2.2.3 Date of Test

23-April-2020 to 30-April-2020

2.2.4 Test Method

The EUT was set up on a support replicating typical installation conditions at a height of 1.5 m above the 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.

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.

2.2.5 Example Calculation

Below 1 GHz:

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

Above 1 GHz:

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

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

2.2.6 Example Test Setup Diagram

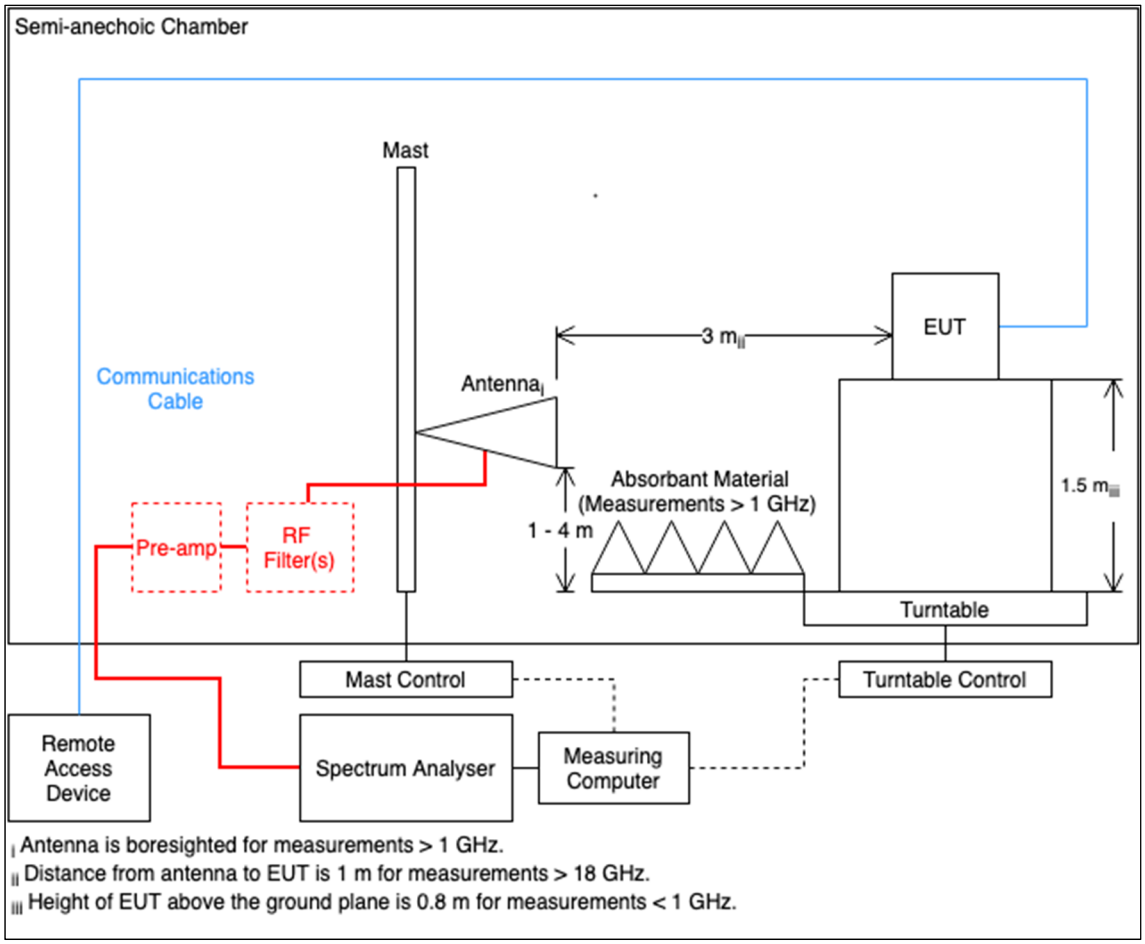

Figure 4

2.2.7 Environmental Conditions

Ambient Temperature	21.8 - 22.6 °C
Relative Humidity	28.0 - 29.2 %

2.2.8 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 11

2.2.9 Test Results

Results for Configuration and Mode: DC Powered - Transmitters Idle.

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.

Highest frequency generated or used within the EUT: 10 GHz
Which necessitates an upper frequency test limit of: 40 GHz

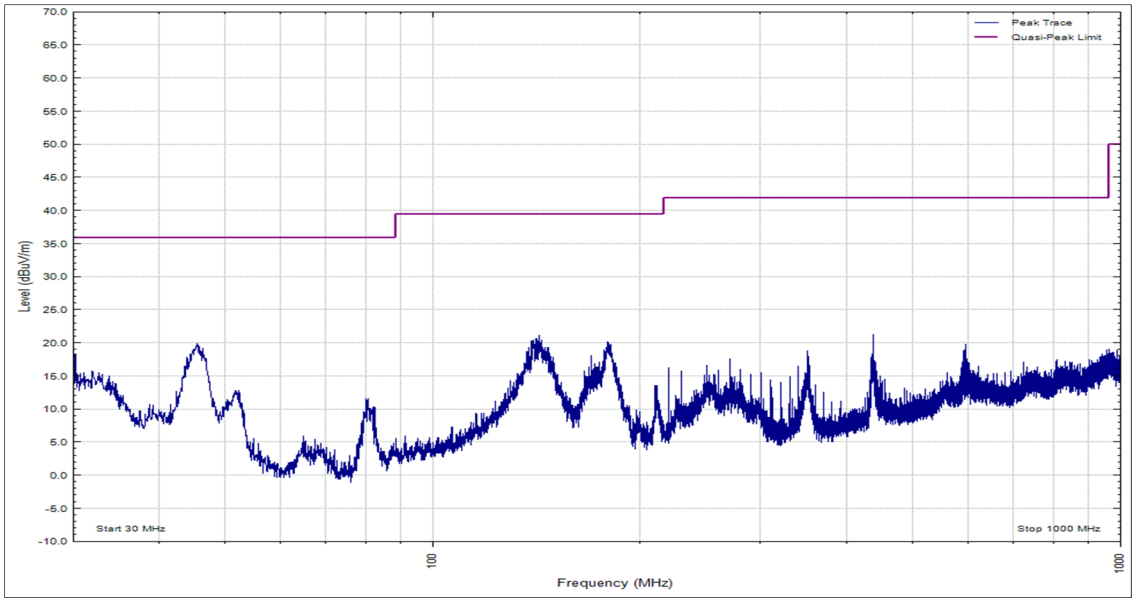

Figure 5 - 30 MHz to 1 GHz, Quasi-Peak, Horizontal

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

Table 12

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

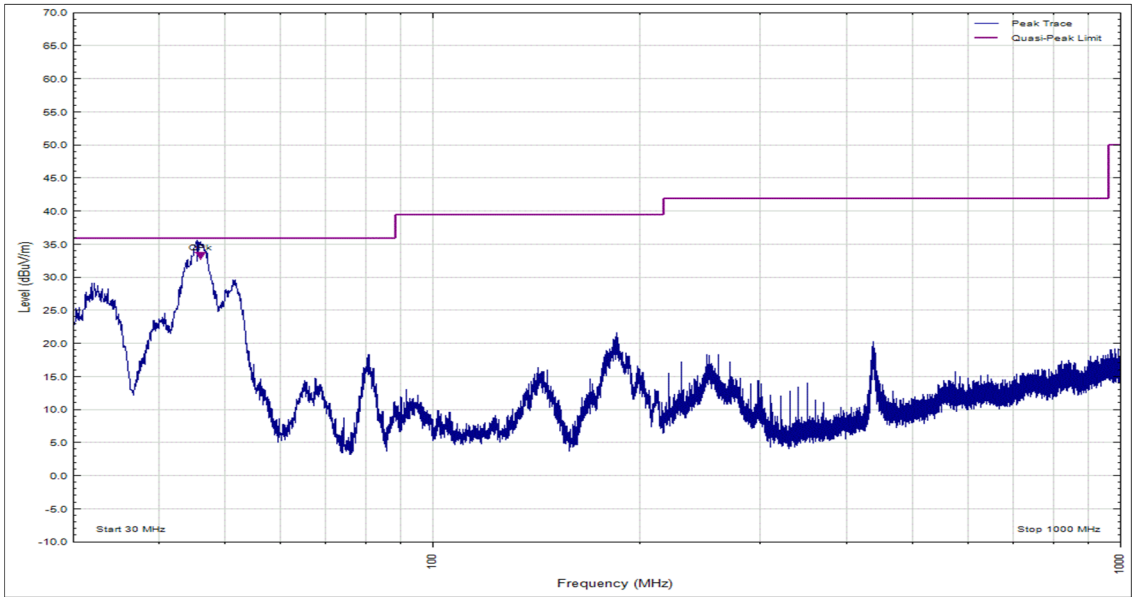

Figure 6 - 30 MHz to 1 GHz, Quasi-Peak, Vertical

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
45.947	32.4	40.0	-7.6	Q-Peak	360	100	Vertical

Table 13

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

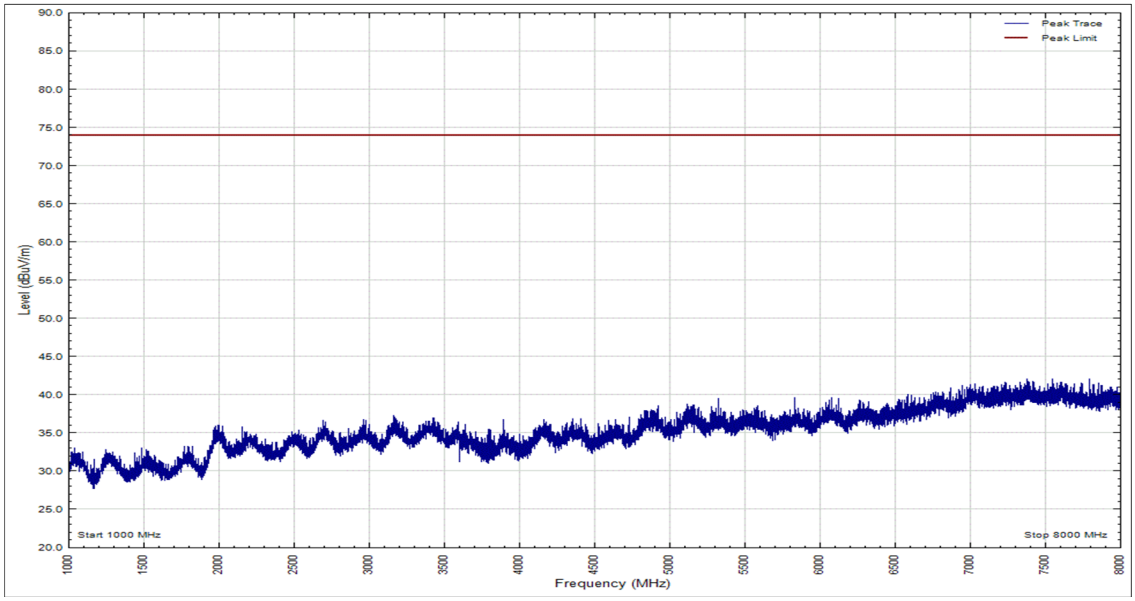

Figure 7 - 1 GHz to 8 GHz, Peak, Horizontal

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

Table 14

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

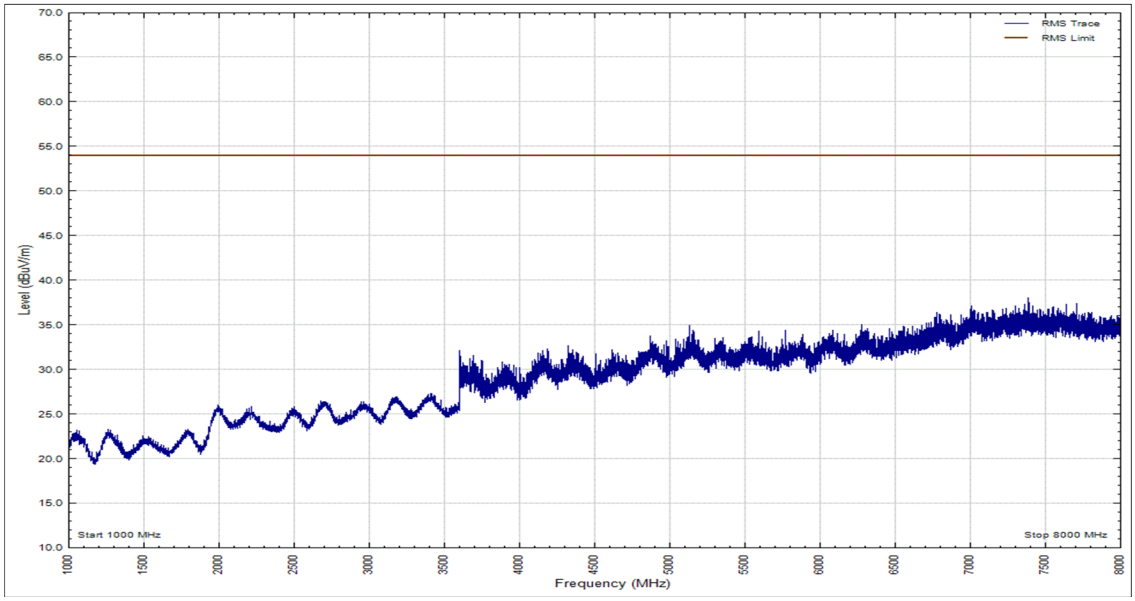

Figure 8 - 1 GHz to 8 GHz, CISPR Average, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
3585.325	23.2	54	-30.8	CISPR Average	10	100	Horizontal

Table 15

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

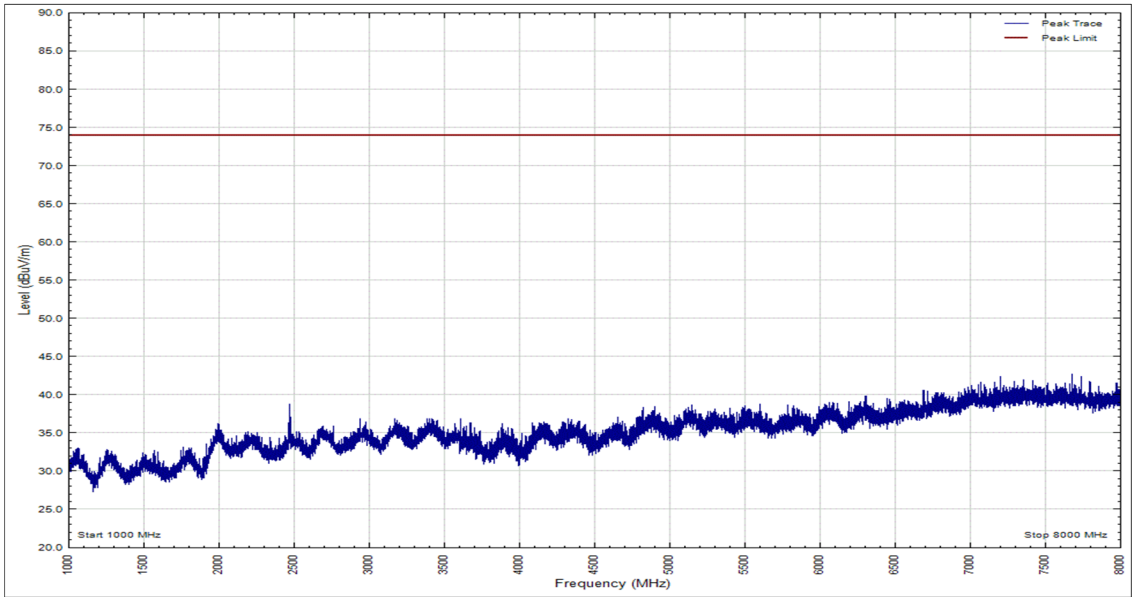

Figure 9 - 1 GHz to 8 GHz, Peak, Vertical

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

Table 16

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

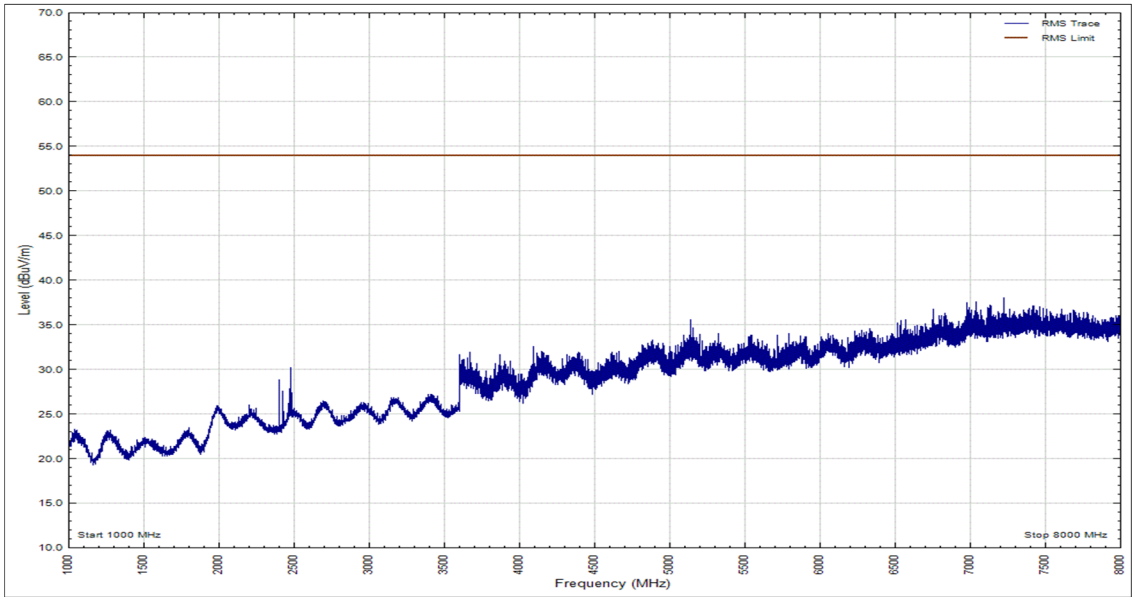

Figure 10 - 1 GHz to 8 GHz, CISPR Average, Vertical

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
3672.915	23.48	54	30.52	CISPR Average	35	318	Vertical

Table 17

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

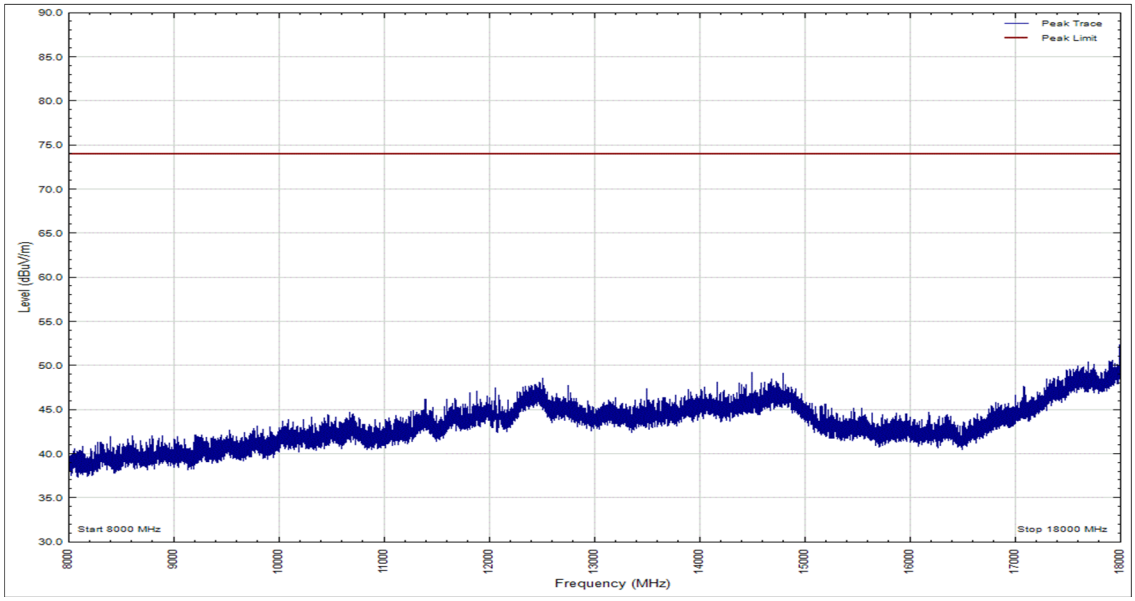

Figure 11 - 8 GHz to 18 GHz, Peak, Horizontal

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

Table 18

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

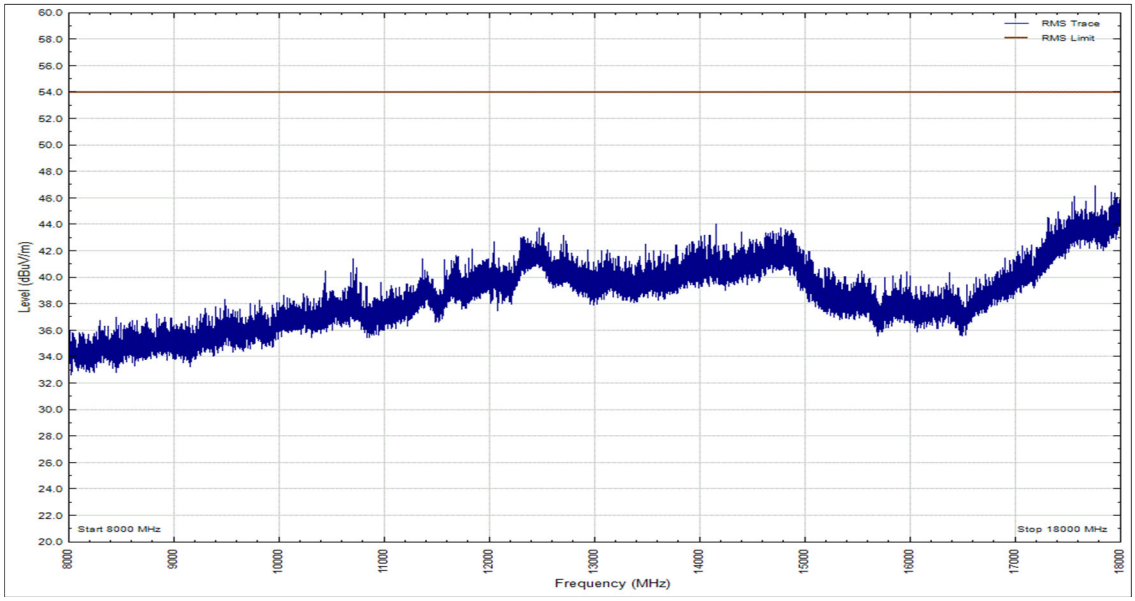

Figure 12 - 8 GHz to 18 GHz, CISPR Average, Horizontal

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
14161.560	35.43	54	-19.57	CISPR Average	357	100	Horizontal
17764.200	38.00	54	-16.00	CISPR Average	324	100	Horizontal
17930.875	38.73	54	-15.27	CISPR Average	326	102	Horizontal
17814.655	38.09	54	-15.91	CISPR Average	189	100	Horizontal

Table 19

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

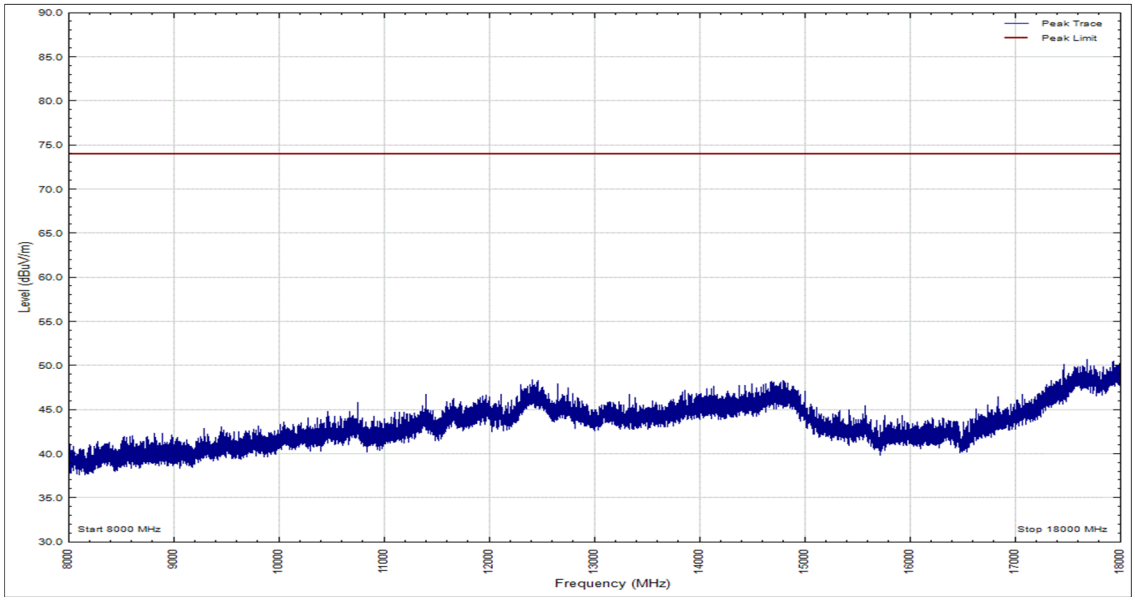

Figure 13 - 8 GHz to 18 GHz, Peak, Vertical

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

Table 20

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

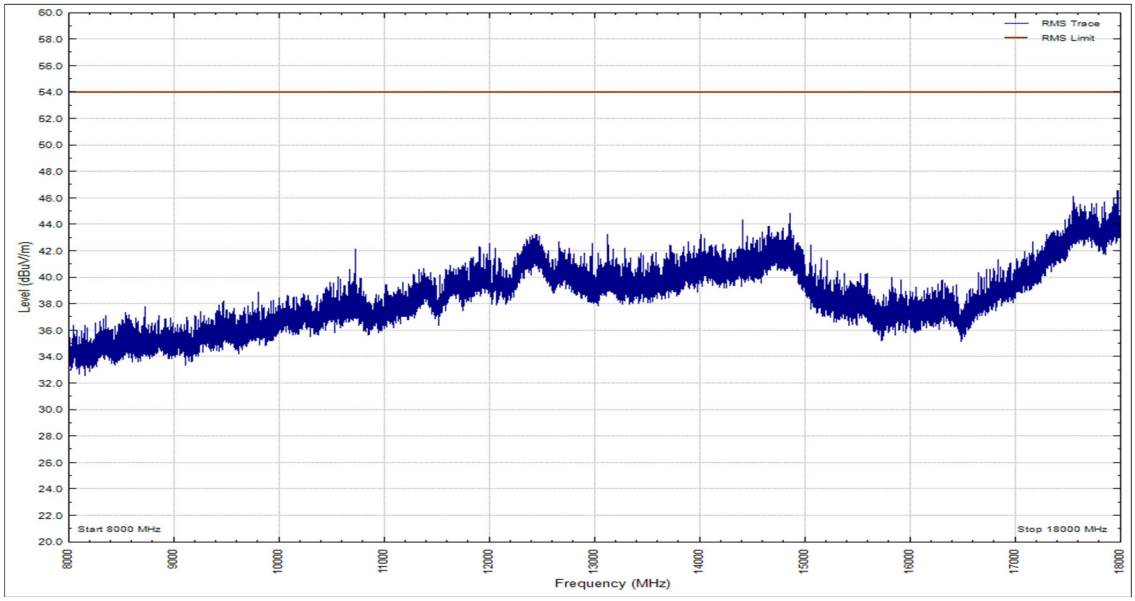

Figure 14 - 8 GHz to 18 GHz, CISPR Average, Vertical

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
10709.230	32.55	54	-21.45	CISPR Average	64	108	Vertical
11903.600	34.32	54	-20.68	CISPR Average	121	284	Vertical
14851.140	36.3	54	-17.70	CISPR Average	253	202	Vertical
14400.725	35.66	54	-18.34	CISPR Average	23	100	Vertical
17976.455	39.1	54	-14.9	CISPR Average	105	100	Vertical
17554.675	38.43	54	-15.57	CISPR Average	51	100	Vertical

Table 21

No other final measurements were made as all other peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

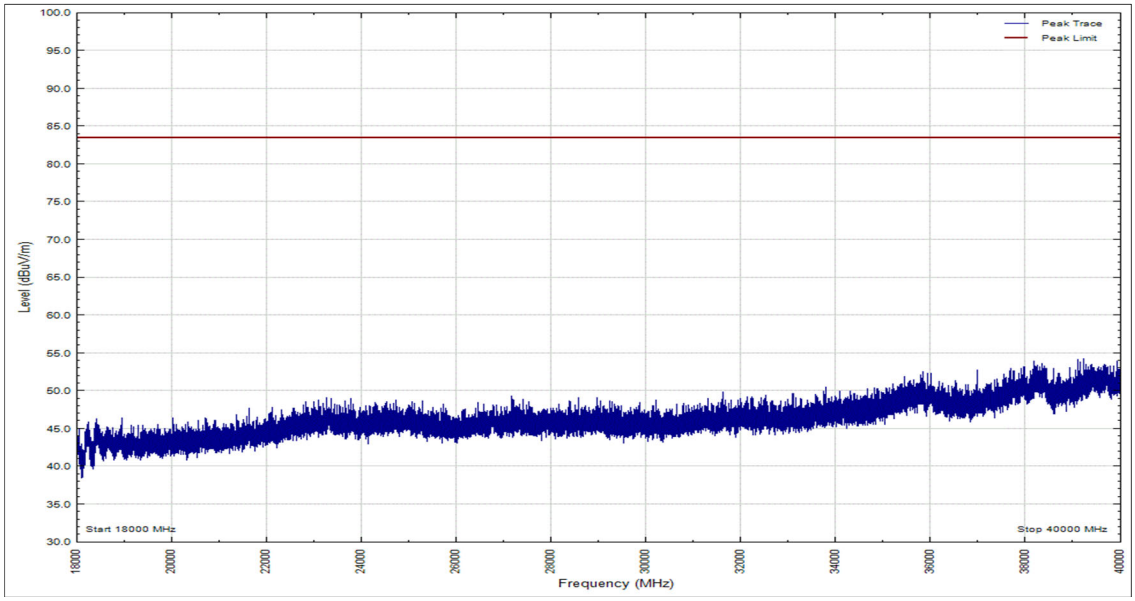

Figure 15 - 18 GHz to 40 GHz, Peak, Horizontal

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

Table 22

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

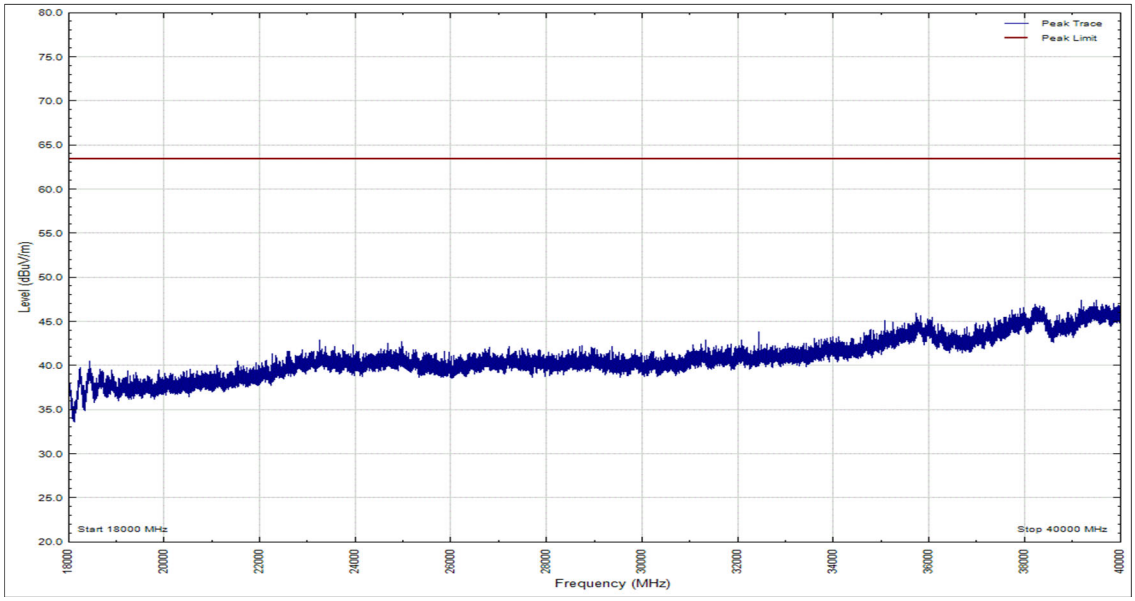

Figure 16 - 18 GHz to 40 GHz, CISPR Average, Horizontal

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

Table 23

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

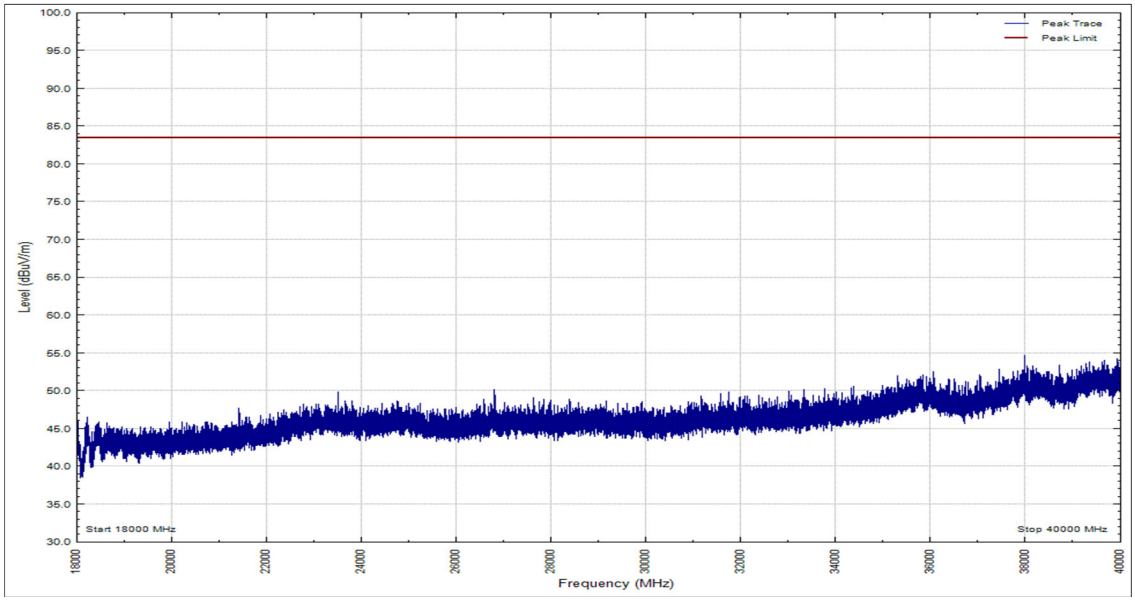

Figure 17 - 18 GHz to 40 GHz, Peak, Vertical

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

Table 24

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

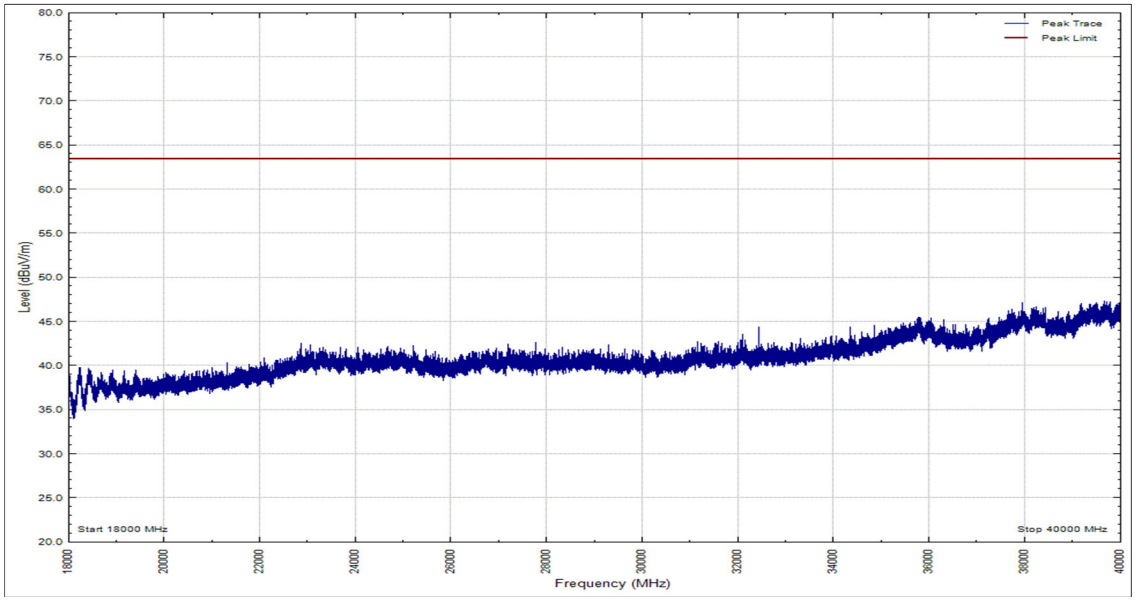

Figure 18 - 18 GHz to 40 GHz, CISPR Average, Vertical

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

Table 25

*No final measurements were made as all peak emissions seen above the measurement system noise floor during the pre-scan were greater than 10 dB below the test limit.

Figure 19 - Test Setup - 30 MHz to 1 GHz

Figure 20 - Test Setup - 1 GHz to 18 GHz

Figure 21 - Test Setup - 18 GHz to 40 GHz

2.2.10 Test Location and Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Biog antenna	Chase	CBL6111A	IE-B928	12	24-07-20
Cable	Unknown	N Type	K:W18.03_3m	12	27-08-20
Preamp <1GHz	Force		36150	12	28-08-20
Cable	Sucoflex	SMA	70469	12	20-04-20
7 GHz HiPass	Micro-tronics	HPM 15120	36068	12	13-08-20
Amplifier	Quinstar	Unknown	36021	12	13-08-20
ESU	Rhode and Schwarz	ESU 26	36020	12	15-01-21
PXA 1	Keysight	PXA N9030B	BAMS-1002020934	12	02-01-21
PXA 2	Keysight	PXA N9030B	BAMS-1002016870	12	05-12-20
Antenna	Schwarzbeck	BBHA 9170	5217		09-07-20
Cable 5m K-type	Rosenberger	LU7-133-5000	5219	12	12-11-20
Pre-Amp	Schwarzbeck	BBV 9721	5218	12	09-07-20
Hygrometer	Rotronic	HP21	4410	12	13-Jun-2020
Digital Voltmeter	Fluke	79	3057	12	19-Aug-2020

Table 26

3 Incident Reports

No incidents reports were raised.

4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Conducted Disturbance at Mains Terminals	150 kHz to 30 MHz, LISN, ±3.7 dB
Radiated Disturbance	30 MHz to 1 GHz, Bilog Antenna, ±5.2 dB 1 GHz to 40 GHz, Horn Antenna, ±6.3 dB

Table 27

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.