FCC and ISED Test Report

Ericsson AB (EAB) Radio Unit, Product Name: Radio 2012 B29

In accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 27, ISED RSS-GEN and ISED RSS-130 (NR)

Add value.
Inspire trust.

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

FCC: TA8AKRC161914
ISED ID: 287AB-AS161914

COMMERCIAL-IN-CONFIDENCE

Document 75951082-02 Issue 01

SIGNATURE			
			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Steve Scarfe	Senior Engineer	Authorised Signatory	25 March 2021

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 FCC CFR 47 Part 2, FCC CFR 47 Part 27, ISED RSS-GEN and ISED RSS-130. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Graeme Lawler	25 March 2021	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

ISED Accreditation
IC#12669A Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with compliance FCC CFR 47 Part 2, FCC CFR 47 Part 27, ISED RSS-GEN and ISED RSS-130 for the tests detailed in section 1.3.

ACCREDITATION
Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation. Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS 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	25 March 2021

Table 1

1.2 Introduction

Applicant	Ericsson AB (EAB)
Manufacturer	Ericsson AB (EAB)
Product Name(s)	Radio 2012 B29
Product Number(s)	KRC 161 914/1
IC Model Name	AS161914
Serial Number(s)	E23C233732
Hardware Version(s)	CXP9017316/7 Rev R84KA
Software Version(s)	R5B
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 2: 2019 FCC CFR 47 Part 27: 2019 ISED RSS-GEN: Issue 5: 2019 ISED RSS-130: Issue 2: 2019
Non-Tested Variants	KRC 161 914/3
Test Plan/Issue/Date	Radio 2012 B29 for FCC ISED test plan V 0.8
Order Number Date	9400786352 14-October-2020
Date of Receipt of EUT	01-February-2021
Start of Test	01-March-2021
Finish of Test	02-March-2021
Name of Engineer(s)	Graeme Lawler
Related Document(s)	ANSI C63.26:2015 KDB 971168 D01 v03r01

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 27, ISED RSS-GEN and ISED RSS-130 is shown below.

Section	Specification Clause				Test Description	Result	Comments/Base Standard
	Part 27	Part 2	RSS-GEN	RSS-130			
Configuration and Mode: DC Powered - LTE 1 Carrier							
2.1	27.53	2.1053	6.13	4.7	Radiated Spurious Emissions	Pass	KDB 971168 D01 v03r01 ANSI C63.26:2015
Configuration and Mode: DC Powered - LTE 2 Carriers							
2.1	27.53	2.1053	6.13	4.7	Radiated Spurious Emissions	Pass	KDB 971168 D01 v03r01 ANSI C63.26:2015
Configuration and Mode: DC Powered – LTE 3 Carriers							
2.1	27.53	2.1053	6.13	4.7	Radiated Spurious Emissions	Pass	KDB 971168 D01 v03r01 ANSI C63.26:2015
Configuration and Mode: DC Powered - NR 1 Carrier							
2.1	27.53	2.1053	6.13	4.7	Radiated Spurious Emissions	Pass	KDB 971168 D01 v03r01 ANSI C63.26:2015
Configuration and Mode: DC Powered - NR 2 Carriers							
2.1	27.53	2.1053	6.13	4.7	Radiated Spurious Emissions	Pass	KDB 971168 D01 v03r01 ANSI C63.26:2015

Table 2

1.4 Application Form

Equipment Description			
Technical Description: (Please provide a brief description of the intended use of the equipment including the technologies the product supports)	Multi Standard Remote Radio		
Manufacturer:	Ericsson AB		
Model:	Radio 2012 B29		
Part Number:	KRC 161 914/1		
	KRC 161 914/3		
Hardware Version:	R5B		
Software Version:	CXP9017316/7 R84KA		
FCC ID of the product under test	TA8AKRC161914		
IC ID of the product under test	287AB-AS161914		
Intentional Radiators			
Technology	NB IoT	LTE	NR
Frequency Range (MHz to MHz)	717-728 MHz	717-728 MHz	717-728 MHz
Conducted Declared Output Power (dBm)	43	46	46
Antenna Gain (dBi)	16	16	16
Supported Bandwidth(s) (MHz)	200 kHz	5, 10 MHz	3, 5, 10 MHz
Modulation Scheme(s)(e.g GFSK, QPSK etc)	QPSK	QPSK, 16QAM, 64QAM, 256QAM	QPSK, 16QAM, 64QAM, 256QAM
ITU Emission Designator (see guidance here) (not mandatory for Part 15 devices)	NB IoT 200 kHz BW channel: 209KW7D	LTE 5 MHz BW channel: 5M00W7D LTE 10 MHz BW channel: 10M0W7D	NR 5 MHz BW channel:4M47W7D NR 10 MHz BW channel: 9M29W7D
Bottom Frequency (MHz)	717.2	718.5	719.5
Middle Frequency (MHz)	722.5	722.5	722.5
Top Frequency (MHz)	727.8	726.5	725.5
Unintentional Radiators			
Highest frequency generated or used in the device or on which the device operates or tunes	CPRI 10,1 Gbit/s		
Lowest frequency generated or used in the device or on which the device operates or tunes if <30MHz	-		
Class A Digital Device (Use in commercial, industrial or business environment)	No		
Class B Digital Device (Use in residential environment only)	Yes		
AC Power Supply			
AC supply frequency:	-		Hz
Voltage	-		V
Max current:	-		A
Single Phase - Yes/No	Three Phase - Yes/No		
DC Power Supply			
Nominal voltage:	-48V		
Extreme upper voltage:	-36V		
Extreme lower voltage:	-58.5V		
Max current:	20A		
Temperature			
Minimum temperature:	-40°C		
Maximum temperature:	55°C		

Equipment Description					
Antenna Characteristics					
Antenna connector - Yes/~~No~~	State impedance			50	Ohm
Temporary antenna connector - ~~Yes~~/No	State impedance			N/A	Ohm
Integral antenna - ~~Yes~~/No	Type:	N/A	Gain	N/A	dBi
External antenna - Yes/~~No~~	Type:	Outdoor Directional Single-band Antenna	Gain	16	dBi
For external antenna only:					
Standard Antenna Jack	~~Yes~~/No	If yes, describe how user is prohibited from changing antenna (if not professional installed):			
Equipment is only ever professionally installed	Yes/~~No~~				
Non-standard Antenna Jack	Yes/~~No~~				
Note	The radio 2012 has no internal antenna. It has no RX and only TX.				
Antenna detail specification	Not Applicable				
Ancillaries					
Manufacturer:	Model:	Part Number:	Country of Origin:		
CT10	LPC 102487/1	T01F265031	Sweden		
Delta PSU AC 02	BML 901 250/1	BW96903167	Sweden		
Port/Cable Identification					
Port	Type	Usage	Max Cable Length specified		
Alarm/Fan	Signal cable	Signal cable connected to the the alarm/fan port	Refer to part no. RPM 513 2350/15000		
ALD	RET Cable, RET, and Signal Cable	RET-cable 1/TSR 484 21/3000 connected to the ALD -port and also a signal cable which is connected to the RET ATM200-A20	Refer to part no. 1/TSR 484 21/3000, ATM200-A20		
I hereby declare that I am entitled to sign on behalf of the manufacturer and that the information supplied is correct and complete.					
Name:	Maria Shoaib				
Position held:	Regulatory Approval Engineer				
Email address:	maria.shoaib@ericsson.com				
Telephone number:	46724675234				
Date:	23/03/2021				

No responsibility will be accepted by TÜV SÜD UK Limited as to the accuracy of the information declared in this document by the manufacturer.

1.5 Product Information

1.5.1 Technical Description

The Equipment under test (EUT) was an Ericsson AB Radio 2012 B29 Radio Unit working in the public mobile service from 717-728 MHz band which provides communication connections to the 717-728 MHz network.

1.5.2 Test Setup Diagram(s)

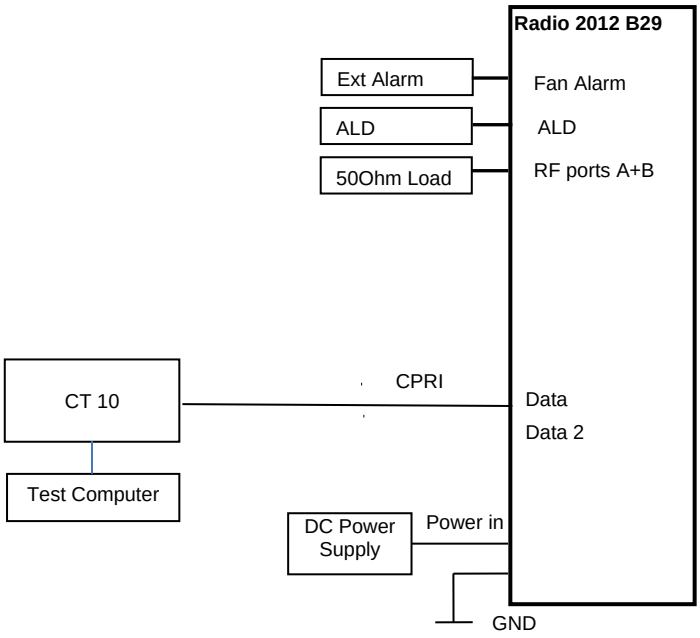

Figure 1

1.5.3 EUT Configuration and Rationale for Radiated Spurious Emissions

The EUT was mounted in a fixed position corresponding to its final installation position.

1.6 Deviations from the Standard

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

1.7 Additional Information

Ericsson have provided the following details about the variants of the Radio 2012 B29
*KRC 161 914/1 - has 4 ports with 2 ports antenna ports and 2 ports are the diplexer ports.
KRC 161 914/3 – has 2 antenna ports, no diplexer, new NEBS cover, different overlay.

Note*: Tests have been performed on this unit.

The Test Plan is based on the TUV SUD Document FCC and ISED Test Plan Rationale for Base Station Equipment.
Pre-testing was performed in accordance with the Test Plan to establish the worst-case Port, modulation schemes and bandwidths.
The port with the highest power, worst case port = Port A
Worst case modulation was QPSK (LTE), 16QAM (NR)
Worst case bandwidth was 5 MHz (LTE, NR)

1.8 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: Radio 2012 B29, Serial Number: E23C233732			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.9 Test Location

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

Test Name	Name of Engineer(s)	Accreditation
Radiated Spurious Emissions	Graeme Lawler	UKAS

Table 4

Office Address:

Octagon House
Concorde Way
Segensworth North
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 Radiated Spurious Emissions

2.1.1 Specification Reference

FCC 47 CFR Part 27, Clause 27.53(g)
FCC 47 Part 2, Clause 2.1053
ISED RSS-GEN, Clause 6.13
ISED RSS-130, Clause 4.7

2.1.2 Equipment Under Test and Modification State

Radio 2012 B29, S/N: E23C233732- Modification State 0

2.1.3 Date of Test

01-02 March 2021

2.1.4 Test Method

The test was performed in accordance with ANSI C63.26 Clause 5. The EUT was configured as defined in ANSI C63.26, clause 5.5.2.3.2.

As a result of the conducted measurements that were performed on the EUT, it was established that LTE and NR 5 MHz were the bandwidth configurations which gave the highest output power and therefore deemed to be worst case operating modes. Testing was performed on the Top, Middle and Bottom channels for single carrier. Testing was performed on Middle channel only for multicarrier, as described in the Test Plan, the result was within 10 dB of the single carrier result and therefore Middle and Top channel testing was not performed.

The EUT was set up on a support replicating typical installation conditions at a height of 0.8 m above the reference ground plane for measurements below 1GHz, (see setup photos) within a semi-anechoic chamber on a remotely controlled turntable. Above 1 GHz, the height was increased to 1.5 m above the reference ground plane.

Pre-scan and final measurements were made using a Field Strength method in accordance with ANSI C63.26 Clause 5.5.4. The readings were maximized by adjusting the antenna height, polarization and turntable azimuth, in accordance with the specification. Final results were then converted to eirp and are displayed in the plots below. The correction for field strength measurements to eirp at 3 m was 95.2 dB. An RBW of 1 MHz and VBW of 3 MHz was used for all measurements with a Peak detector and trace set to Max Hold. In all cases below where the limit line is exceeded – this is the intentional transmit frequency.

2.1.5 Environmental Conditions

Ambient Temperature	25.8°C
Relative Humidity	23.9%

2.1.6 Test Results

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 5 - LTE-1C-5 MHz-Bot, 719.5 MHz, 30 MHz to 8 GHz

*No emissions found within 10 dB of the limit.

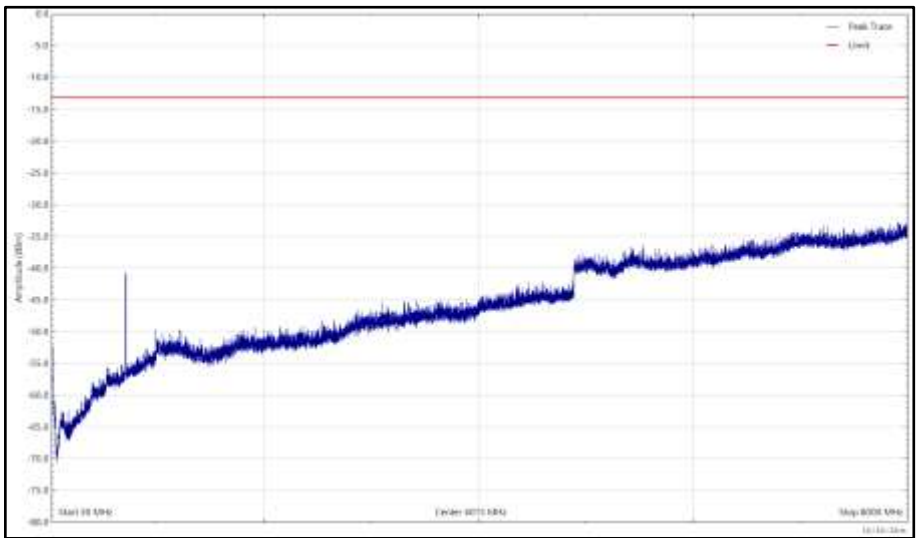

Figure 2 - LTE-1C-5 MHz-Bot, 719.5 MHz, 30 MHz to 8 GHz, Horizontal (Peak)

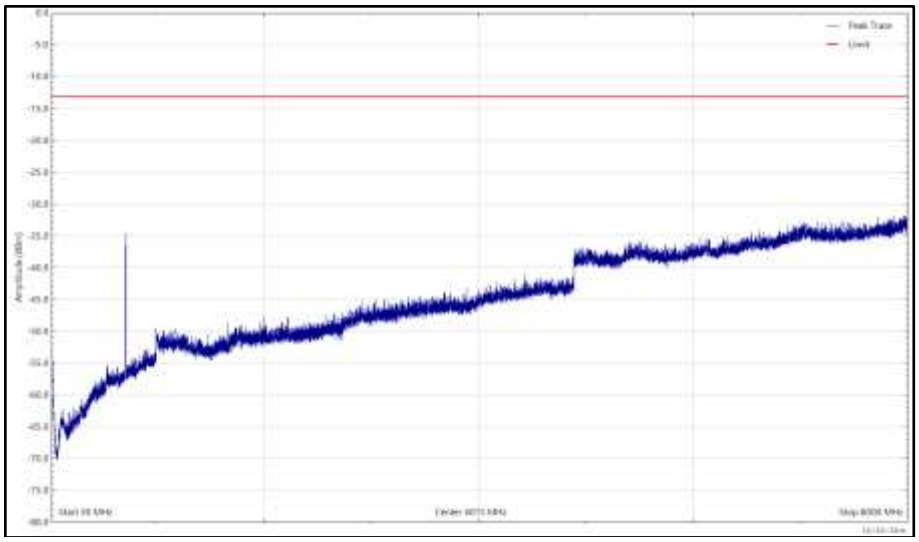

Figure 3 - LTE-1C-5 MHz-Bot, 719.5 MHz, 30 MHz to 8 GHz, Vertical (Peak)

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 6 - LTE-1C-5 MHz-Mid, 722.5 MHz, 30 MHz to 8 GHz

*No emissions found within 10 dB of the limit.

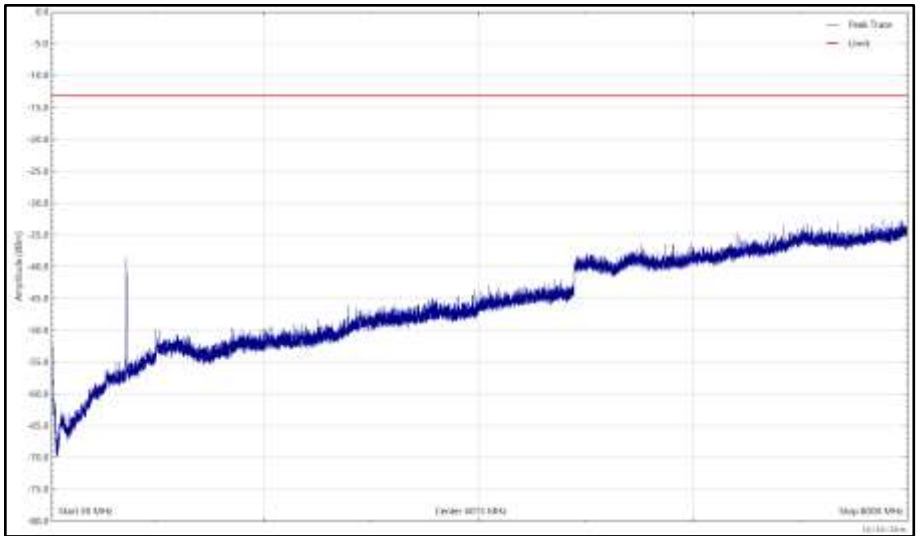

Figure 4 - LTE-1C-5 MHz-Mid, 722.5 MHz, 30 MHz to 8 GHz, Horizontal (Peak)

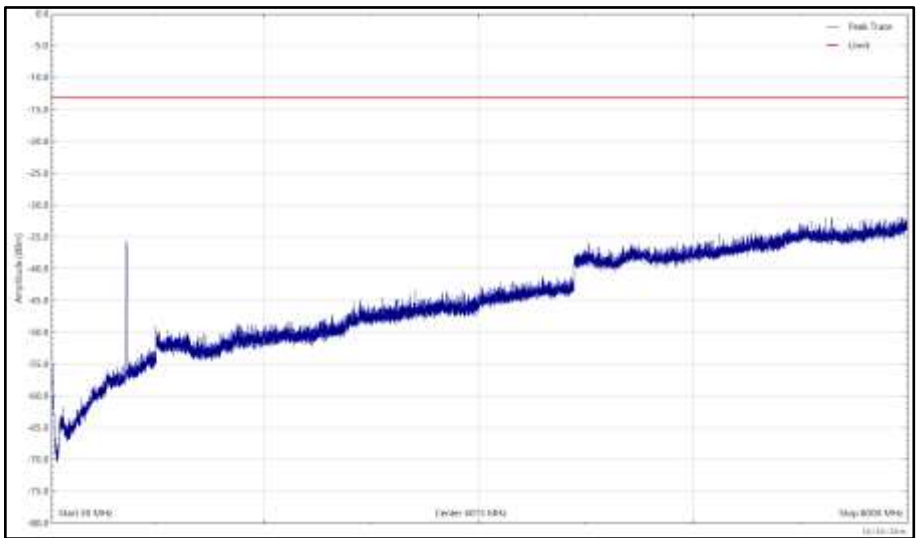

Figure 5 - LTE-1C-5 MHz-Mid, 722.5 MHz, 30 MHz to 8 GHz, Vertical (Peak)

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 7 - LTE-1C-5 MHz-Top, 725.5 MHz, 30 MHz to 8 GHz

*No emissions found within 10 dB of the limit.

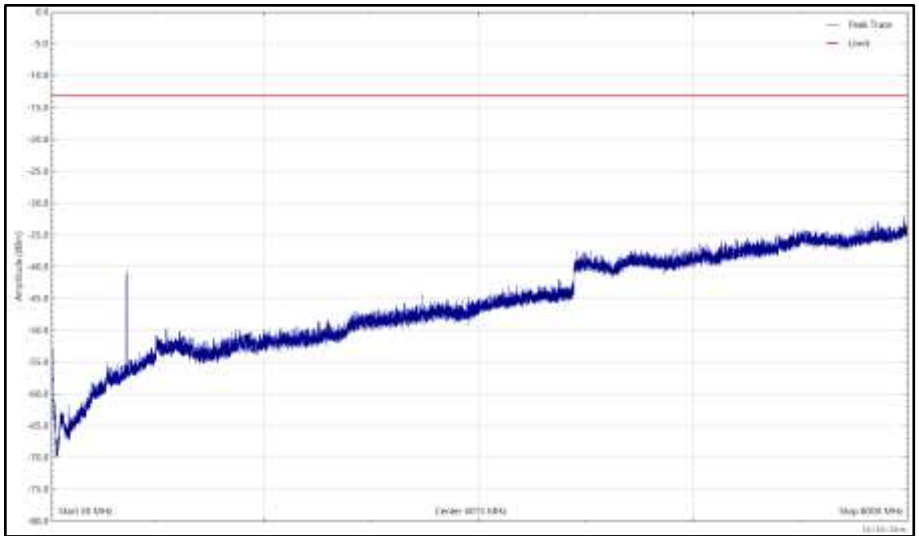

Figure 6 - LTE-1C-5 MHz-Top, 725.5 MHz, 30 MHz to 8 GHz, Horizontal (Peak)

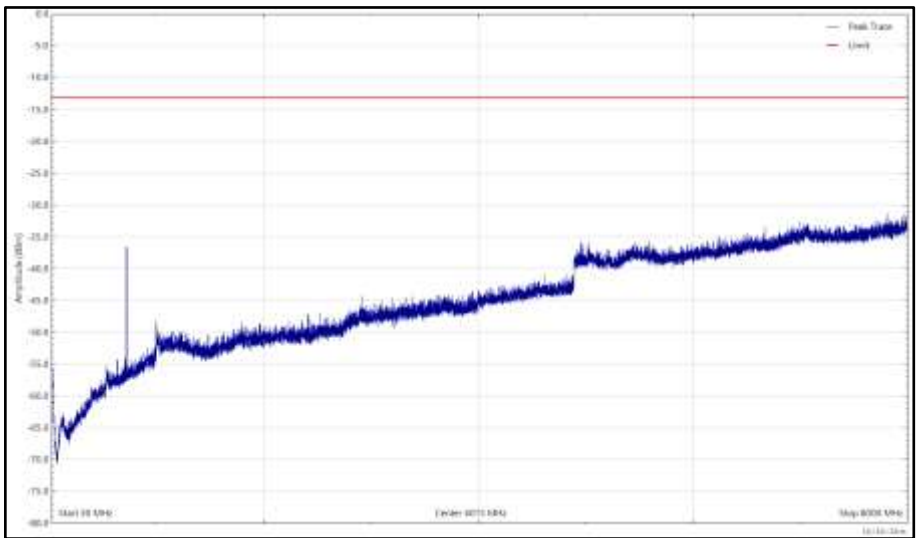

Figure 7 - LTE-1C-5 MHz-Top, 725.5 MHz, 30 MHz to 8 GHz, Vertical (Peak)

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 8 - LTE-2C-5 MHz-Mid, 719.5&725.5 MHz, 30 MHz to 8 GHz

*No emissions found within 10 dB of the limit.

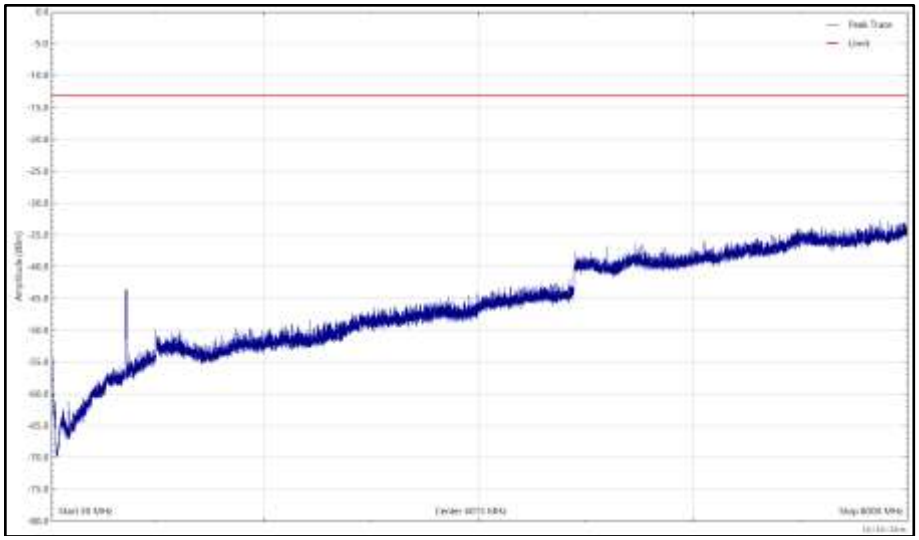

Figure 8 - LTE-2C-5 MHz-Mid, 719.5&725.5 MHz, 30 MHz to 8 GHz, Horizontal (Peak)

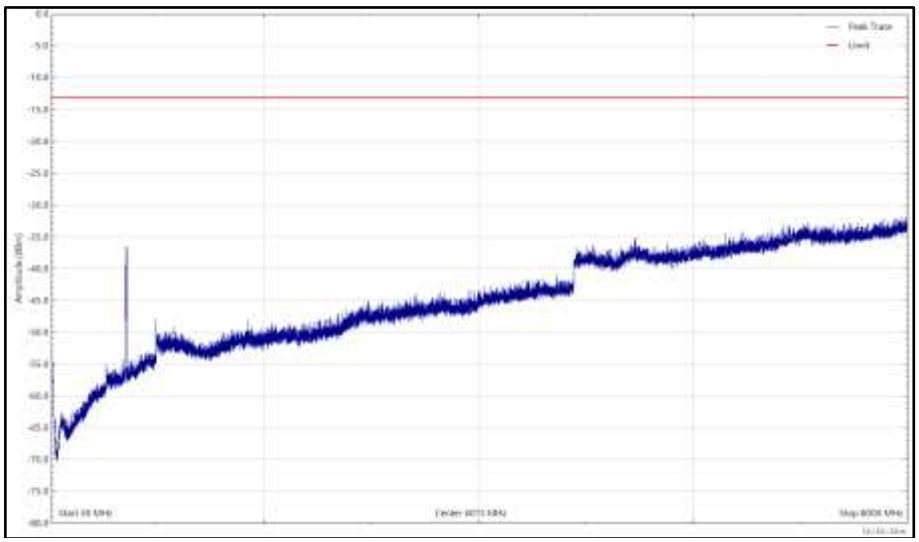

Figure 9 - LTE-2C-5 MHz-Mid, 719.5&725.5 MHz, 30 MHz to 8 GHz, Vertical (Peak)

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 9 - LTE-3C-3MHz-Mid, 718.5&722.5&726.5 MHz, 30 MHz to 8 GHz

*No emissions found within 10 dB of the limit.

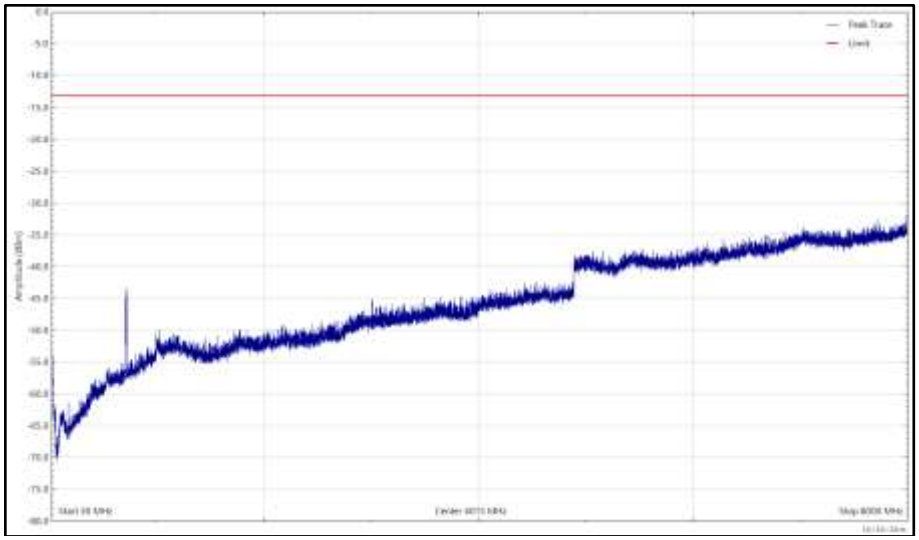

Figure 10 - LTE-3C-3MHz-Mid, 718.5&722.5&726.5 MHz, 30 MHz to 8 GHz, Horizontal (Peak)

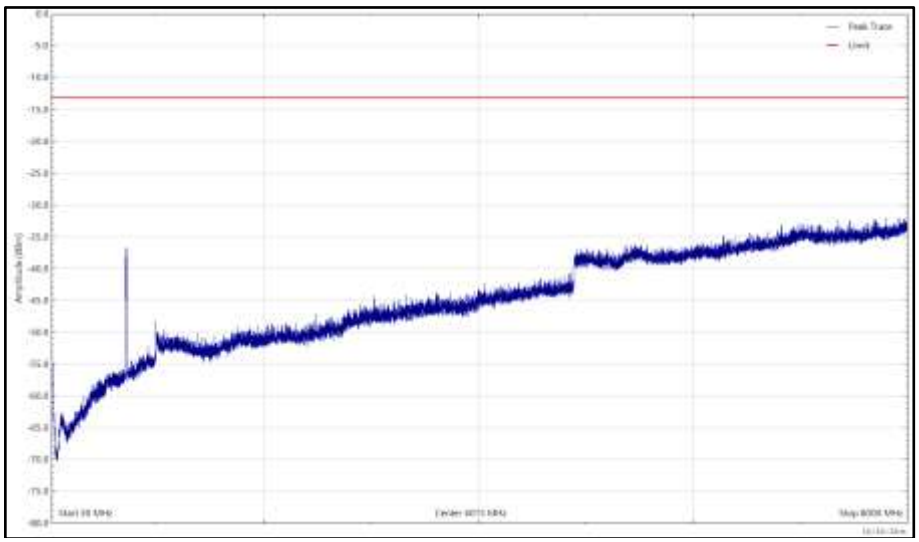

Figure 11 - LTE-3C-3MHz-Mid, 718.5&722.5&726.5 MHz, 30 MHz to 8 GHz, Vertical (Peak)

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 10 - NR-1C-5 MHz-Bot, 719.5 MHz, 30 MHz to 8 GHz

*No emissions found within 10 dB of the limit.

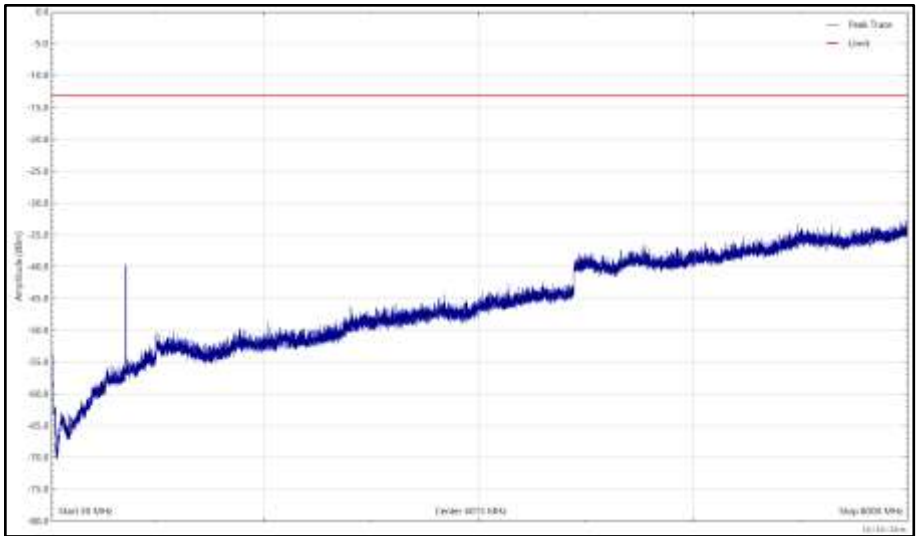

Figure 12 - NR-1C-5 MHz-Bot, 719.5 MHz, 30 MHz to 8 GHz, Horizontal (Peak)

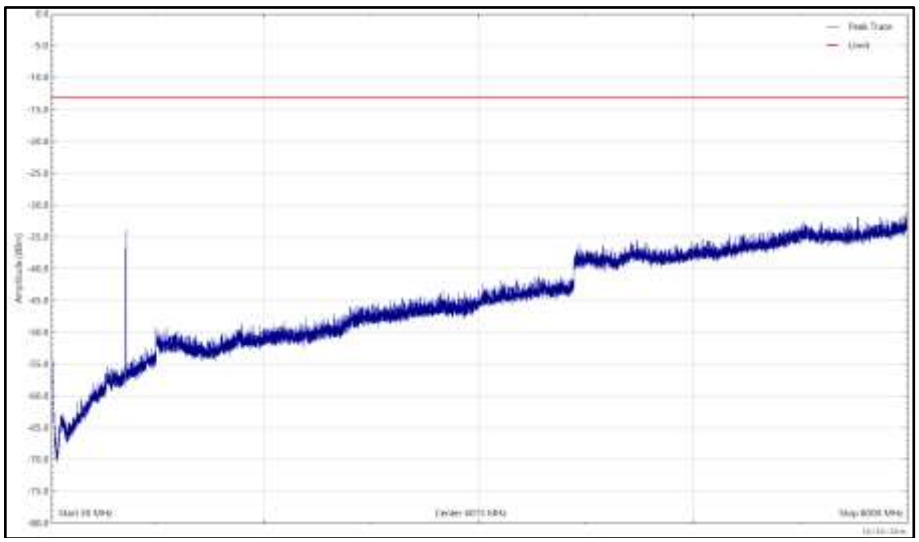

Figure13 - NR-1C-5 MHz-Bot, 719.5 MHz, 30 MHz to 8 GHz, Vertical (Peak)

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 11 - NR-1C-5 MHz-Mid, 722.5 MHz, 30 MHz to 8 GHz

*No emissions found within 10 dB of the limit.

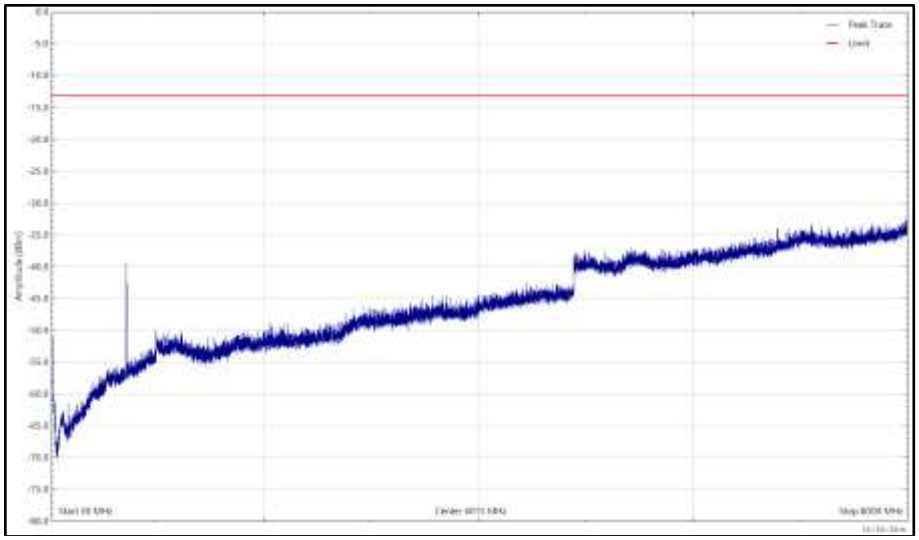

Figure 14 - NR-1C-5 MHz-Mid, 722.5 MHz, 30 MHz to 8 GHz, Horizontal (Peak)

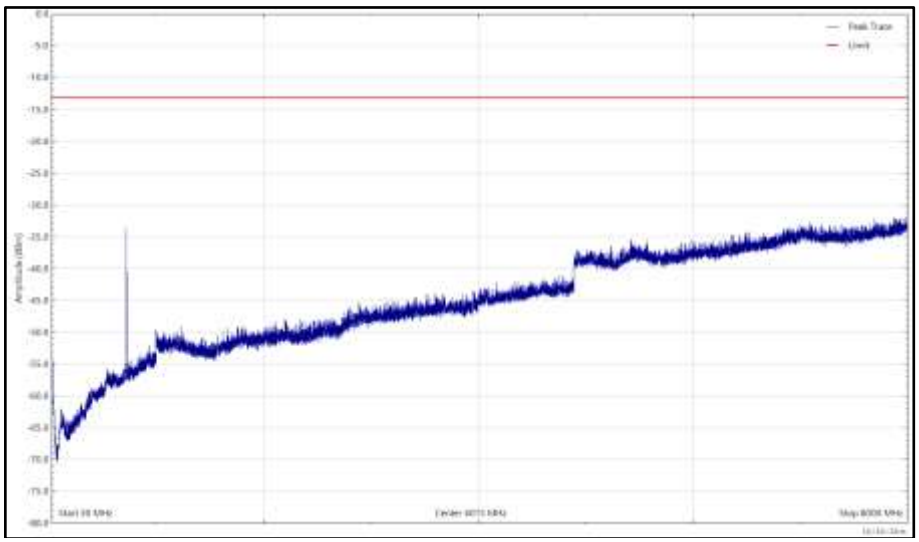

Figure 15 - NR-1C-5 MHz-Mid, 722.5 MHz, 30 MHz to 8 GHz, Vertical (Peak)

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 12 - NR-1C-5 MHz-Top, 725.5 MHz, 30 MHz to 8 GHz

*No emissions found within 10 dB of the limit.

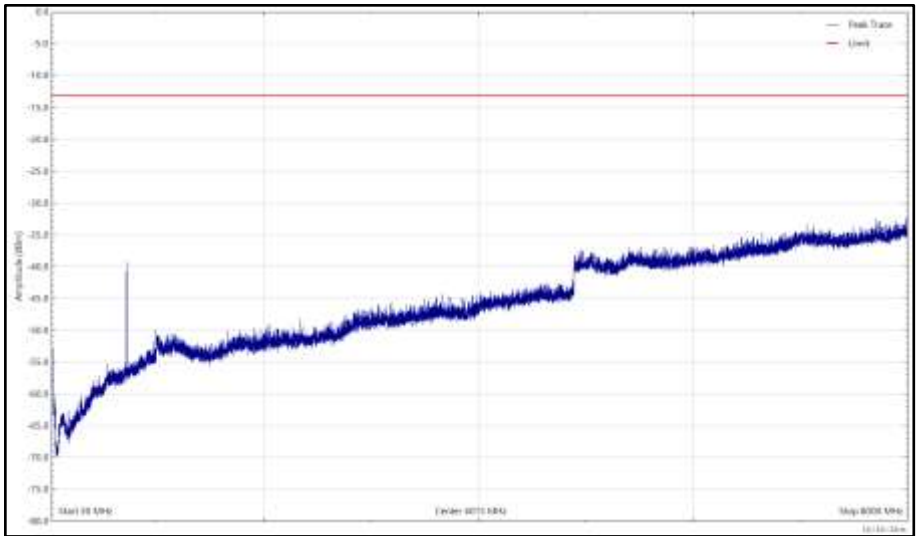

Figure 16 - NR-1C-5 MHz-Top, 725.5 MHz, 30 MHz to 8 GHz, Horizontal (Peak)

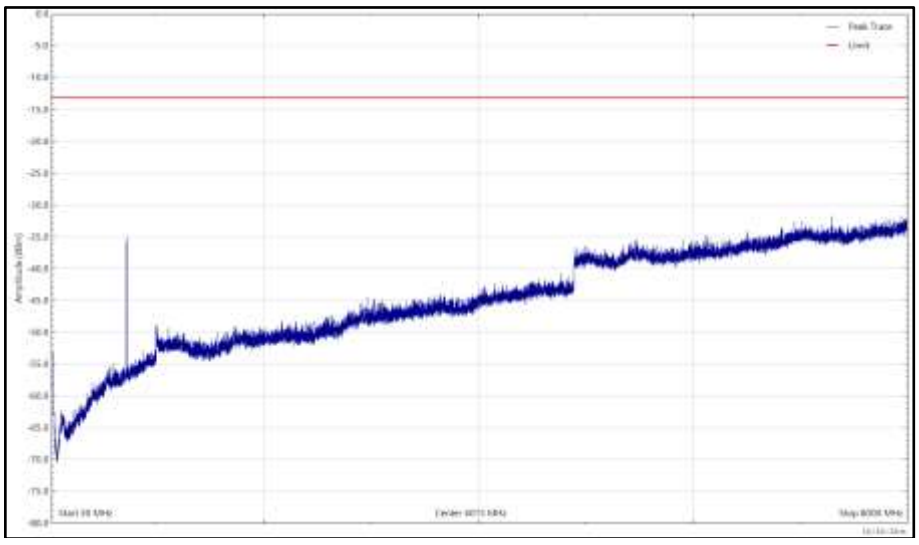

Figure 17 - NR-1C-5 MHz-Top, 725.5 MHz, 30 MHz to 8 GHz, Vertical (Peak)

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
*							

Table 13 - NR-2C-5 MHz-Mid, 719.5&725.5 MHz, 30 MHz to 8 GHz

*No emissions found within 10 dB of the limit.

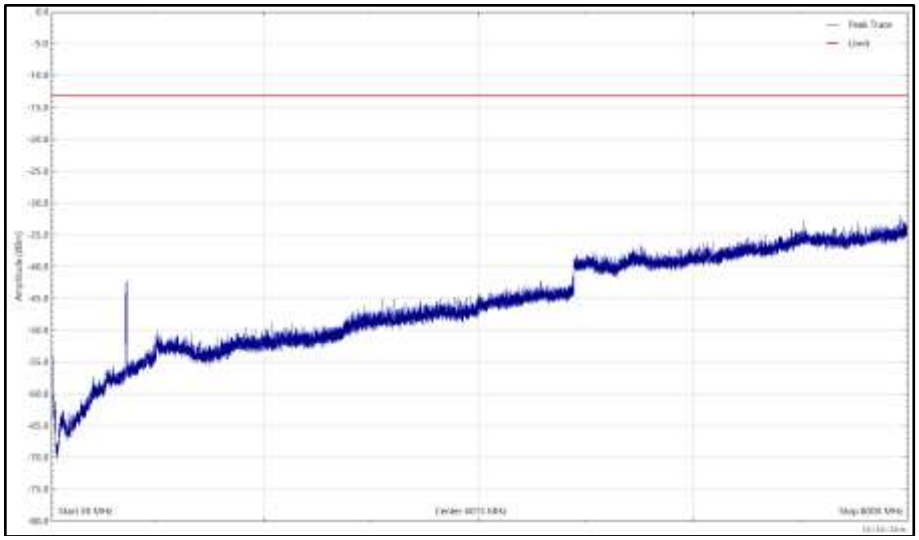

Figure18 - NR-2C-5 MHz-Mid, 719.5&725.5 MHz, 30 MHz to 8 GHz, Horizontal (Peak)

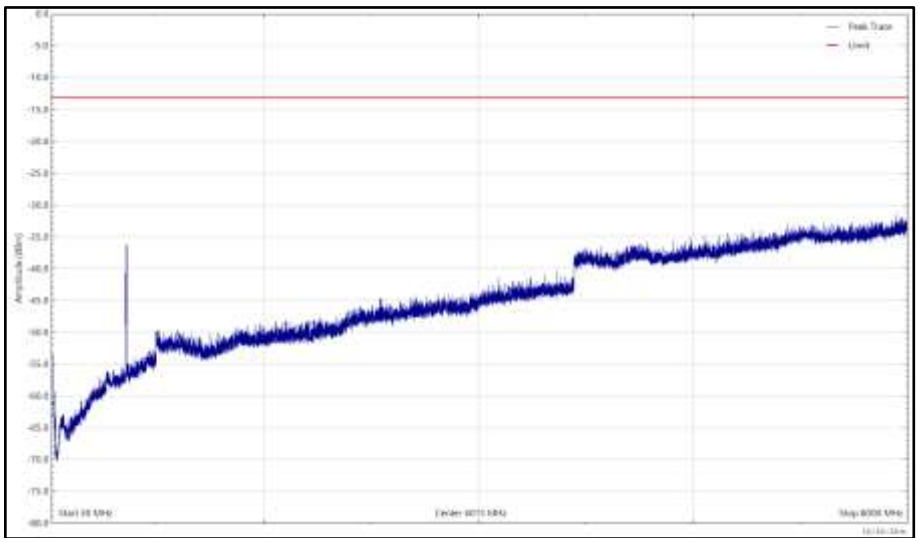

Figure 19 - NR-2C-5 MHz-Mid, 719.5&725.5 MHz, 30 MHz to 8 GHz, Vertical (Peak)

FCC 47 CFR Part 27, Limit Clause 27.53(g) and RSS-130 Clause 4.7.1

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB

2.1.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 12.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
3m Semi Anechoic Chamber	MVG	EMC-3	5621	36	11-Aug-2023
Antenna with permanent attenuator (Bilog)	Schaffner	CBL6143	287	24	14-Oct-2022
Comb Generator	Schaffner	RSG1000	3034	-	TU
Multimeter	Fluke	175	4427	12	16-Mar-2021
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
EmX Emissions Software	TUV SUD	V2.1.1 V.V2.1.1	5125	-	N/A - Software
Test Receiver	Rohde & Schwarz	ESW44	5379	12	15-Dec-2021
3.5 mm 2m Cable	Junkosha	MWX221-02000DMS	5428	12	15-Oct-2021
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5481	12	18-Mar-2021
8m N Type Cable	Junkosha	MWX221-08000NMSNMS/B	5519	12	24-Mar-2021
Broadband Horn Antenna (1-10 GHz)	Schwarzbeck	BBHA 9120 B	5611	12	22-Sep-2021
Turntable & Mast Controller	Maturo Gmbh	NCD/498/2799.01	5612	-	TU
Tilt Antenna Mast TAM 4.0-P	Maturo Gmbh	TAM 4.0-P	5613	-	TU
Turntable	Maturo Gmbh	Turntable 1.5 SI-2t	5614	-	TU
3m Semi Anechoic Chamber	MVG	EMC-3	5621	36	11-Aug-2023

Table 14

TU – Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment

3 Photographs

3.1 Test Setup Photographs

Figure 2 – 30 MHz to 1 GHz

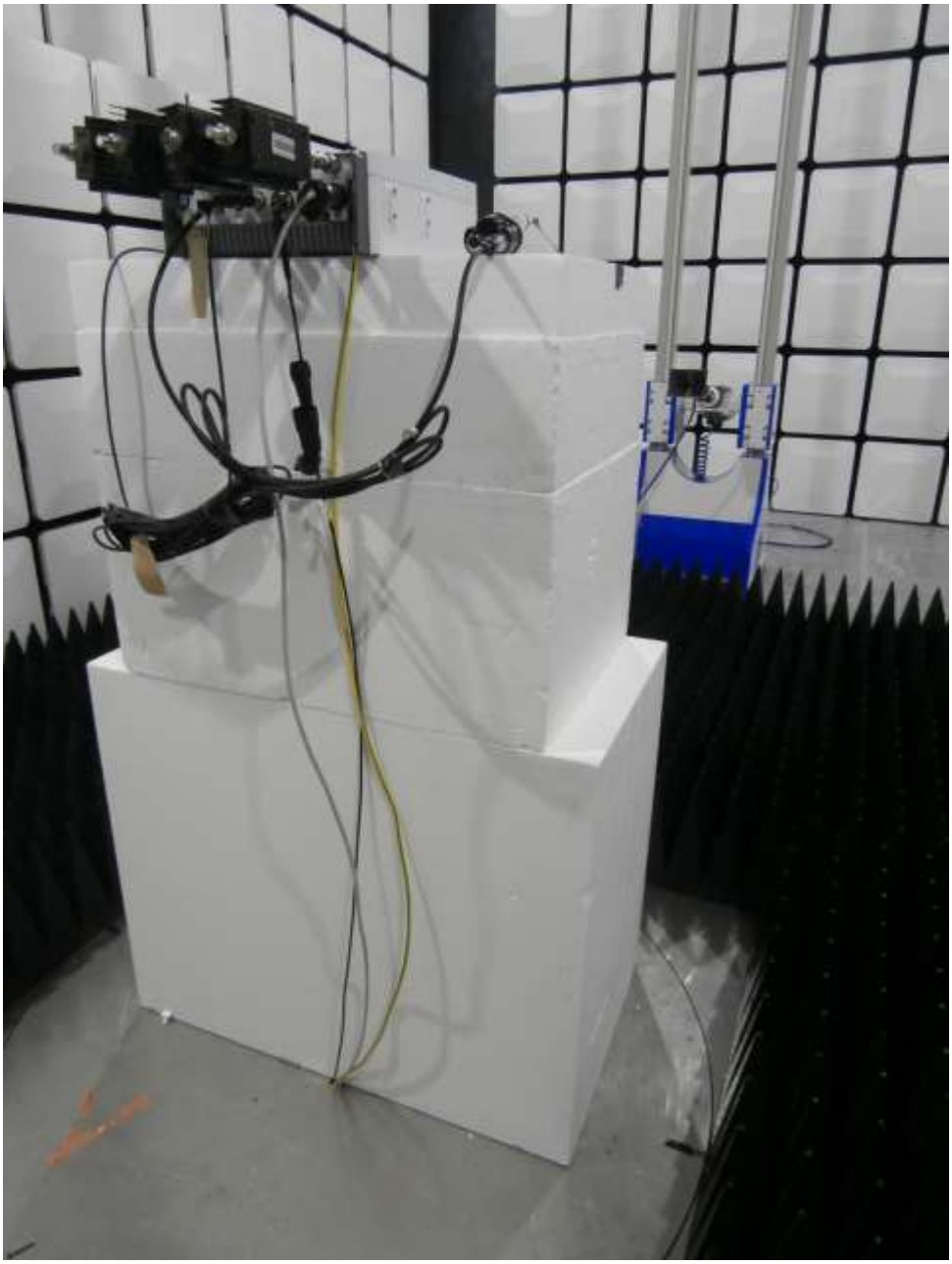

Figure 21– 1 GHz to 8 GHz

4 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
Radiated Spurious Emissions	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 40 GHz: ± 6.3 dB

Table 515

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.