

FCC Test Report

MiX Telematics International (Pty) Ltd
Telematics Unit, Model: MiX 6AMB-4G-B

In accordance with FCC 47 CFR Part 15C
(915 MHz Transceiver)

Prepared for: MiX Telematics International (Pty) Ltd
Blaauwklip Office Park 2
Cnr Strand & Webersvalley Roads
Stellenbosch
South Africa



FCC ID: 2AFMS-6AMB4G

COMMERCIAL-IN-CONFIDENCE

Document 75949089-13 Issue 01

SIGNATURE			
NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Neil Rousell	Senior Engineer	Authorised Signatory	24 February 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 with FCC 47 CFR Part 15C. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Graeme Lawler	24 February 2021	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY

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

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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	24 February 2021

Table 1

1.2 Introduction

Applicant	MiX Telematics International (Pty) Ltd
Manufacturer	MiX Telematics International (Pty) Ltd
Model Number(s)	MiX 6AMB-4G-B
Manufacturer Declared Variant(s)	MiX 6AMB-4G
Serial Number(s)	66000181
Hardware Version(s)	1
Software Version(s)	V2.0.4
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C: 2019
Order Number	P0093632
Date	20-May-2020
Date of Receipt of EUT	19-January-2021
Start of Test	20-January-2021
Finish of Test	25-January-2021
Name of Engineer(s)	Graeme Lawler and Tony Hubbard
Related Document(s)	ANSI C63.10 (2013) 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 15C is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: 915 MHz Transceiver				
2.1	15.205	Restricted Band Edges	Pass	
2.2	15.247 (d)	Authorised Band Edges	Pass	
2.3	15.247 (d) and 15.205	Spurious Radiated Emissions	Pass	

Table 2



1.1 Manufacturer Declared Variant(s)



Stellenbosch 28 Jan 2021

To: Whom it may concern

From: MIX Telematics International (Pty) Ltd
Blaauwklip Office Park 2, CNR Strand & Webbers Valley
Stellenbosch – South Africa

Subject: Declaration of Similarity

MIX Telematics International (Pty) Ltd, hereby also declare that the battery and non-battery variants, present the same electrical, physical and electro-mechanics characteristics, the same PCB (AW20006A-1D), layout and components. The only difference between them is that the **"-B"** models have an Internal backup battery plugged in, allowing the device to work after the disconnection of the vehicle's battery.

The following product variants (with part numbers) are available:

Part Number	Official Product Name	Description	Series
U0042MT	MIX 6AMB-4G	MIX 6000 MK2 6AMB-4G Electronic Unit	MIX 6000 MK2
U0044MT	MIX 6AMB-4G-B	MIX 6000 MK2 6AMB-4G-B Electronic Unit with Backup Battery	MIX 6000 MK2

Tabel 1. Variants in the MIX 6AMB-4G/-B Series of Products

We remain at your disposal for any clarifications that may become necessary.

Sincerely,

Certification Manager: TC Bothma

Blaauwklip Office Park 2, CNR Strand & Webbers Valley – Stellenbosch – South Africa



1.2 Application Form

Equipment Description

Technical Description: (Please provide a brief description of the intended use of the equipment including the technologies the product supports)	The MiX 6AMB-4G is a high-end Fleet product that incorporates the latest market trends. It supports LTE CAT 4 with 2G/3G fall-back, 3-Axis Accelerometer, WiFi, Bluetooth, 433 or 915 MHz Short Range Device and GNSS. The MiX 6AMB-4G-B is the same design, but it also includes a backup battery. The kit consists of: Main Harness MP10, External LTE Antenna PA8, PUCK Antenna and Code Plug Socket Harness CP4	
Manufacturer:	MiX Telematics (Pty) Ltd.	
Model:	MiX 6AMB-4G-B	
Part Number:	U0044MT	
Hardware Version:	1	
Software Version:	2.0.4	
FCC ID of the product under test – see guidance here	2AFMS-6AMB4G	
IC ID of the product under test	Not Applicable	

Intentional Radiators

Technology	GSM850	GSM1900	WCDMA BAND II	WCDMA BAND IV	WCDMA BAND V
Frequency Range (MHz to MHz)	824-849	1850-1910	1850-1910	1710-1755	824-849
Conducted Declared Output Power (dBm)	33 27	30 26	24	24	24
Antenna Gain (dBi)	2.29	1.59	1.59	2	2.29
Supported Bandwidth(s) (MHz) (e.g 1 MHz, 20 MHz, 40 MHz)	296Kbps (DL) 236.8Kbps (UL)	296Kbps (DL) 236.8Kbps (UL)	60	45	25
Modulation Scheme(s) (e.g GFSK, QPSK etc)	GMSK, 8PSK	GMSK, 8PSK	QPSK, 16QAM, 64QAM	QPSK, 16QAM, 64QAM	QPSK, 16QAM, 64QAM
ITU Emission Designator (see guidance here)	247KGXW 245KG7W	249KGXW 249KG7W	4M15F9W	4M14F9W	4M13F9W
Bottom Frequency (MHz)	824.2	1850.2	1852.4	1712.4	826.4
Middle Frequency (MHz)	837	1880	1880	1732.4	836.4
Top Frequency (MHz)	848.8	1909.8	1907.6	1752.6	846.6



Technology	SRD 915	SRD2400 BT/BLE	SRD2400 WiFi
Frequency Range (MHz to MHz)	902-928	2400-2483.5	2400-2483.5
Conducted Declared Output Power (dBm)	20	6	15.6
Antenna Gain (dBi)	0	3	3
Supported Bandwidth(s) (MHz) (e.g 1 MHz, 20 MHz, 40 MHz)	0.025	1	20
Modulation Scheme(s) (e.g GFSK, QPSK etc)	2FSK	GFSK 8-DPSK	GFSK (BDR) (1 Mbit/s); $\pi/4$ -DQPSK (EDR) (2 Mbit/s); 8-PSK (EDR) (3 Mbits/s)
ITU Emission Designator (see guidance here)	38K2F7D	1M10F1D	16M7D1D
Bottom Frequency (MHz)	902	2402	2412
Middle Frequency (MHz)	915	2440	2437
Top Frequency (MHz)	928	2480	2467

Technology	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 7	LTE Band 12
Frequency Range (MHz to MHz)	1850-1910	1710-1755	824-849	2500-2570	699-716
Conducted Declared Output Power (dBm)	23±2	23±2	23±2	23±2	23±2
Antenna Gain (dBi)	1.59	4.2	2.29	3	3.26
Supported Bandwidth(s) (MHz) (e.g 1 MHz, 20 MHz, 40 MHz)	1.4, 3, 5,10,15, 20	1.4, 3, 5,10,15, 20	1.4, 3, 5,10,15	5,10,15, 20	1.4, 3, 5,10
Modulation Scheme(s) (e.g GFSK, QPSK etc)	QPSK, 16QAM	QPSK, 16QAM	QPSK, 16QAM	QPSK, 16QAM	QPSK, 16QAM
ITU Emission Designator (see guidance here)	17M9G7D 17M9W7D 1M09W7D	17M9G7D 17M9W7D 1M09W7D	8M93G7D 8M93W7D2M 70G7D 1M09W7D	17M9G7D 17M9W7D 4M49W7D	8M93G7D 8M93W7D 1M09W7D
Bottom Frequency (MHz)	1850	1710	824	2500	699
Middle Frequency (MHz)	1880	1732.5	836.5	2535	707.5
Top Frequency (MHz)	1910	1755	849	2570	716



Technology	LTE Band 13	LTE Band 25	LTE Band 26	LTE Band 38	LTE Band 41
Frequency Range (MHz to MHz)	777-787	1850-1915	814-849	2570-2620	2496-2690
Conducted Declared Output Power (dBm)	23±2	23±2	23±2	23±2	23±2
Antenna Gain (dBi)	4.45	1.59	2.53	2.06	3
Supported Bandwidth(s) (MHz) (e.g 1 MHz, 20 MHz, 40 MHz)	5,10	1.4, 3, 5,10,15, 20	1.4, 3, 5,10	5,10,15, 20	5,10,15, 20
Modulation Scheme(s) (e.g GFSK, QPSK etc)	QPSK, 16QAM	QPSK, 16QAM	QPSK, 16QAM	QPSK, 16QAM	QPSK, 16QAM
ITU Emission Designator (see guidance here)	8M91G7D 8M91W7D 4M48G7D 4M49W7D	17M9G7D 17M9W7D 8M91G7D 1M09W7D	8M91G7D 8M91W7D 1M09G7D 1M09W7D 13M5G7D 13M4W7D 4M49W7D	17M8G7D 17M8W7D 8M91G7D	17M9G7D 17M9W7D 8M91G7D 4M50W7D
Bottom Frequency (MHz)	777	1850	814	2570	2496
Middle Frequency (MHz)	782	1882.5	831.5	2595	2593
Top Frequency (MHz)	787	1915	849	2620	2690

Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	2690 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	699 MHz
Class A Digital Device (Use in commercial, industrial or business environment) <input type="checkbox"/>	
Class B Digital Device (Use in residential environment only) <input checked="" type="checkbox"/>	



AC Power Source

AC supply frequency:	N/A	Hz
Voltage	N/A	V
Max current:	N/A	A
Single Phase <input type="checkbox"/> Three Phase <input type="checkbox"/>		

DC Power Source

Nominal voltage:	13.8/27.6	V
Extreme upper voltage:	32	V
Extreme lower voltage:	10.5	V
Max current:	7.5A absolute max (7.5A Fused) 3.5A typical	A

Battery Power Source

Voltage:	3.2	V
End-point voltage:	2.5	V (Point at which the battery will terminate)
Alkaline <input type="checkbox"/> Leclanche <input type="checkbox"/> Lithium <input checked="" type="checkbox"/> Nickel Cadmium <input type="checkbox"/> Lead Acid* <input checked="" type="checkbox"/> *(Vehicle regulated)		
Other <input type="checkbox"/>	Please detail:	

Charging

Can the EUT transmit whilst being charged	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Temperature

Minimum temperature:	-20	°C
Maximum temperature:	+60 (limited by backup battery) Else +80	°C



Antenna Characteristics

Antenna connector <input checked="" type="checkbox"/>			State impedance	50	Ohm
Temporary antenna connector <input type="checkbox"/>			State impedance		Ohm
Integral antenna <input checked="" type="checkbox"/>	Type:	SRD915	Gain	0	dBi
External antenna <input checked="" type="checkbox"/>	Type:	LTE Primary LTE Diversity Bluetooth/WiFi GNSS	Gain	2.84 (3G); 2.44 (4G) 2 3 RX	dBi
For external antenna only: Standard Antenna Jack <input type="checkbox"/> If yes, describe how user is prohibited from changing antenna (if not professional installed): Equipment is only ever professionally installed <input type="checkbox"/> Non-standard Antenna Jack <input checked="" type="checkbox"/>					

Ancillaries (if applicable)

Manufacturer:	CHM	Part Number:	440FT0033
Model:	Main Harness MP10	Country of Origin:	South Africa
Manufacturer:	Jinchang Electron Global Service	Part Number:	A0050MT
Model:	PUCK Antenna, LTE, WiFi/Bluetooth and GNSS Combination Antenna (JCE305)	Country of Origin:	China
Manufacturer:	RF Design	Part Number:	A0049MT
Model:	External LTE antenna PA8 Fakra connector	Country of Origin:	South Africa
Manufacturer:	CHM	Part Number:	440FT0032
Model:	Code Plug Harness with socket CP4	Country of Origin:	South Africa
Manufacturer:	CHM	Part Number:	A0041MT
Model:	Auxiliary Harness AX5 (optional)	Country of Origin:	South Africa
Manufacturer:	CHM	Part Number:	440FT0931
Model:	Serial Harness SR1 (optional)	Country of Origin:	South Africa

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

Name: Christo Bothma
 Position held: Certification Manager
 Date: 17 February 2021



1.3 Product Information

1.3.1 Technical Description

The MiX 6AMB-4G is a high-end Fleet product that incorporates the latest market trends. It supports LTE CAT 4 with 2G/3G fallback, 3-Axis Accelerometer, WiFi, Bluetooth, 433 or 915 MHz Short Range Device and GNSS. The MiX 6AMB-4G-B is the same design, but it also includes a backup battery.

1.4 Deviations from the Standard

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

1.5 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: MiX 6AMB-4G-B, Serial Number: 66000181			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.6 Test Location

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

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: 915 MHz Transceiver		
Restricted Band Edges	Graeme Lawler	UKAS
Authorised Band Edges	Tony Hubbard	UKAS
Spurious Radiated 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 Restricted Band Edges

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.205

2.1.2 Equipment Under Test and Modification State

MiX 6AMB-4G-B, S/N: 66000181 - Modification State 0

2.1.3 Date of Test

20-January-2021

2.1.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.10.5.

2.1.5 Environmental Conditions

Ambient Temperature	21.3 °C
Relative Humidity	41.9 %



2.1.6 Test Results

915 MHz Transceiver

Mode	Frequency (MHz)	Measured Frequency (MHz)	Peak Level (dB μ V/m)
Static	902.4	614.00	37.06
Static	927.4	991.43	41.65

Table 5 - Restricted Band Edge Results

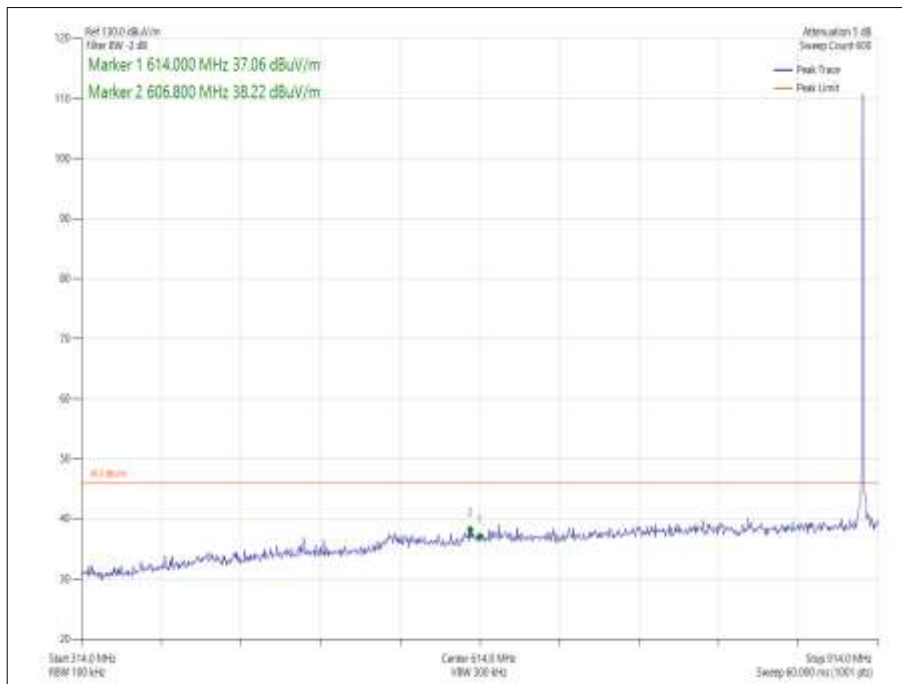


Figure 1 – Static, 902.4 MHz - Measured Frequency 614.00 MHz – Peak

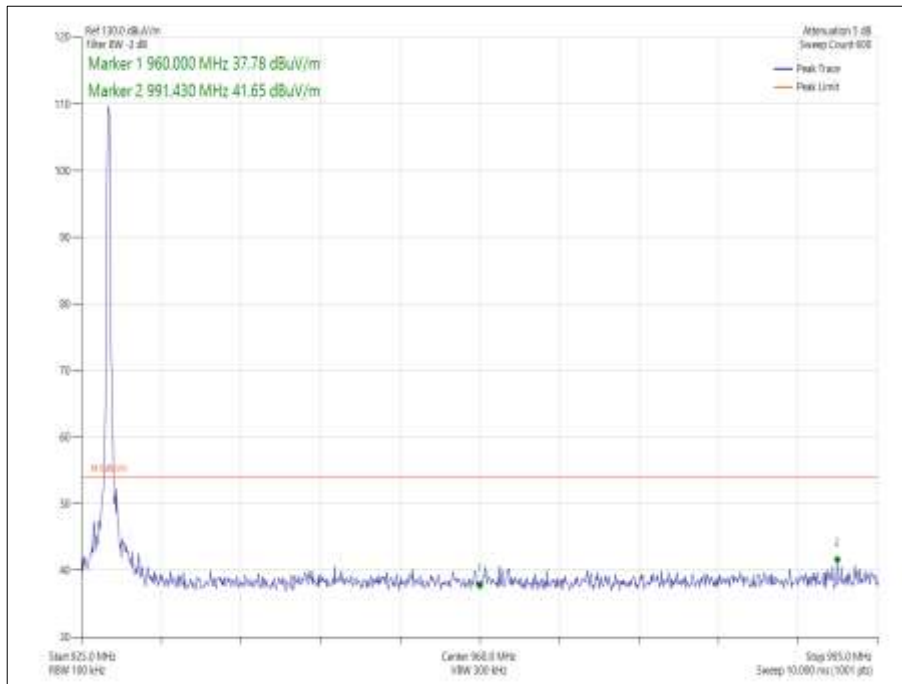


Figure 2 – Static, 927.4 MHz - Measured Frequency 991.43 MHz - Peak

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$ at 3 m)	Field Strength ($\text{dB}\mu\text{V}/\text{m}$ at 3 m)
30 to 88	100	40.00
88 to 216	150	43.52
216 to 960	200	46.02
Above 960	500	53.98

Table 6



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
DC Power Supply	Hewlett Packard	6269B	326	-	O/P Mon
Antenna with permanent attenuator (Bilog)	Schaffner	CBL6143	287	24	14-Oct-2022
Comb Generator	Schaffner	RSG1000	3034	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	14-Jan-2022
Multimeter	Fluke	175	4427	12	16-Mar-2021
EmX Emissions Software	TUV SUD	V2.1.1 V.V2.1.1	5125	-	N/A - Software
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
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 7

TU – Traceability Unscheduled
 O/P Mon – Output Monitored Using Calibrated Test Equipment



2.2 Authorised Band Edges

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d)

2.2.2 Equipment Under Test and Modification State

MiX 6AMB-4G-B, S/N: 66000181 - Modification State 0

2.2.3 Date of Test

20-January-2021 to 21-January-2021

2.2.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.10.4.

2.2.5 Environmental Conditions

Ambient Temperature 21.3 - 22.1 °C
 Relative Humidity 39.8 - 41.9 %

2.2.6 Test Results

915 MHz Transceiver

Mode	Frequency (MHz)	Measured Frequency (MHz)	Level (dBc)
Static	902	902	-38.38
Static	928	928	-60.88
Hopping	902	902	-34.77
Hopping	928	928	-64.96

Table 8 - Authorised Band Edge Results

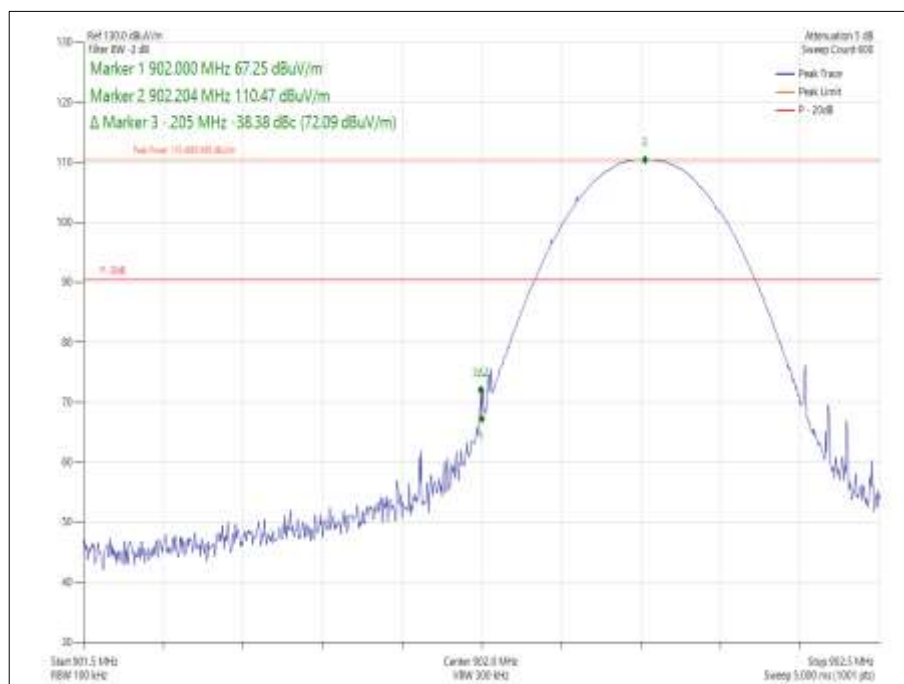


Figure 3 – Static, 902 MHz - Measured Frequency 902 MHz

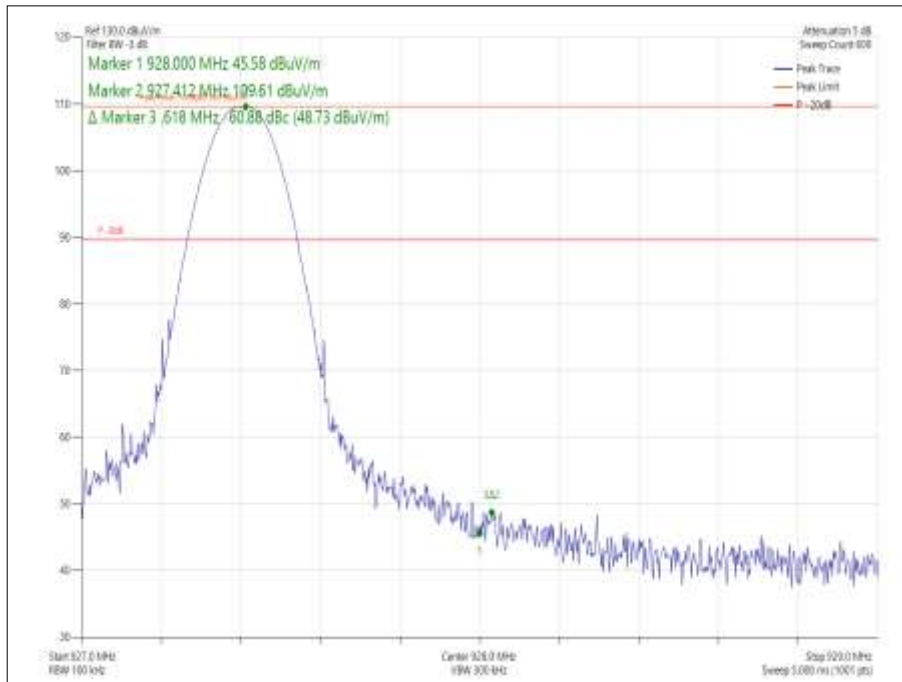


Figure 4 – Static, 928 MHz - Measured Frequency 928 MHz

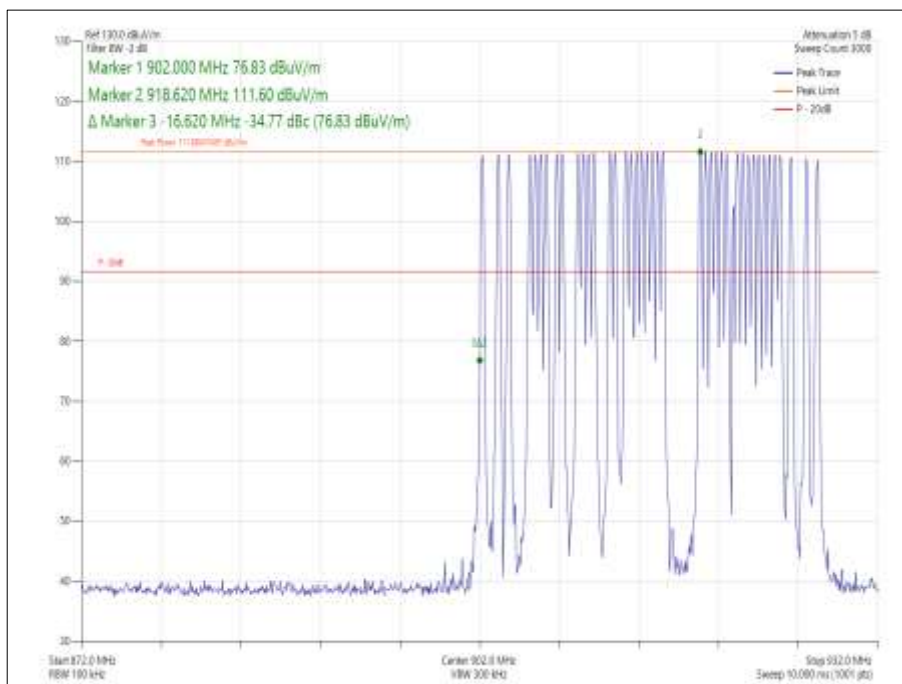


Figure 5 – Hopping, 902 MHz - Measured Frequency 902 MHz

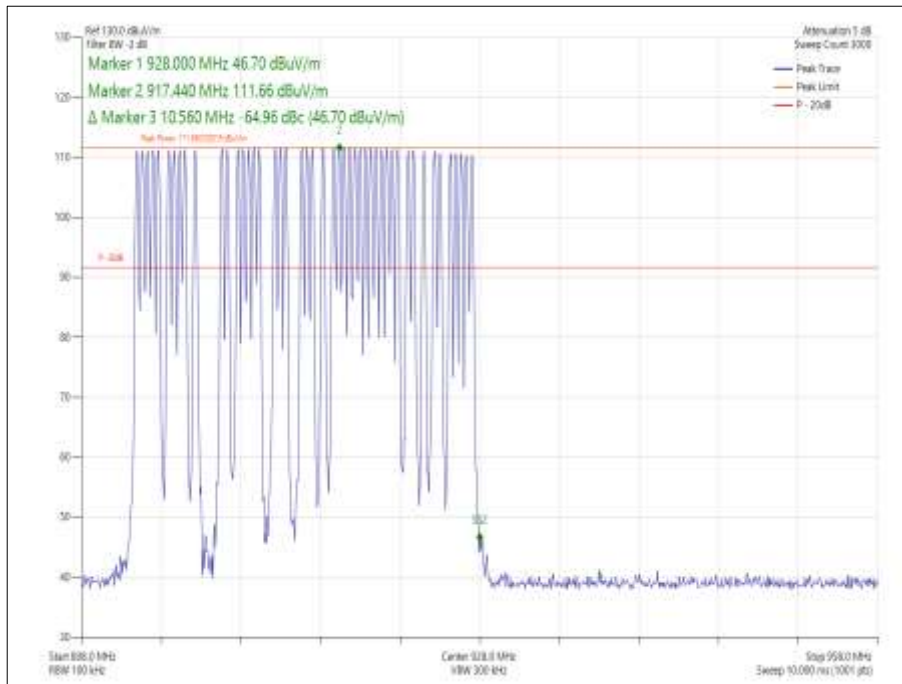


Figure 6 – Hopping, 928 MHz - Measured Frequency 928 MHz

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.



2.2.7 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
DC Power Supply	Hewlett Packard	6269B	326	-	O/P Mon
Antenna with permanent attenuator (Bilog)	Schaffner	CBL6143	287	24	14-Oct-2022
Comb Generator	Schaffner	RSG1000	3034	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	14-Jan-2022
Multimeter	Fluke	175	4427	12	16-Mar-2021
EmX Emissions Software	TUV SUD	V2.1.1 V.V2.1.1	5125	-	N/A - Software
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
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 9

TU – Traceability Unscheduled
 O/P Mon – Output Monitored Using Calibrated Test Equipment



2.3 Spurious Radiated Emissions

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d) and 15.205

2.3.2 Equipment Under Test and Modification State

MiX 6AMB-4G-B, S/N: 66000181 - Modification State 0

2.3.3 Date of Test

24-January-2021 to 25-January-2021

2.3.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.3, 6.5 and 6.6.

The EUT was placed on the non-conducting platform in a manner typical of a normal installation. As the EUT 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.

Ports on the EUT were terminated with loads as described in ANSI C63.4 clause 6.2.4. For multiple connectors of the same type, additional interconnecting cables were connected and pre-scans were performed to determine whether the level of the emissions were increased by >2 dB. For frequencies > 1 GHz, plots for average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.5 to characterize the EUT.

This EUT employs pulsed operation. To determine the average value of pulsed emissions within restricted bands, testing was performed in accordance with ANSI C63.10, clause 7.5.

The Duty Cycle Correction Factor (DCCF) was calculated as:

$$20 \log (8.2\text{ms}/100\text{ms}) = 21.7\text{dB}$$

The plots shown are the characterization of the EUT. The limits on the plots represent the most stringent case for restricted bands, (74/54 dBuV/m) when compared to 20 dBc outside restricted bands. The limits shown have been used as a threshold to determine where further measurements are necessary. Where results are within 10 dB of the limits shown on the plots, further investigation was carried out and reported in results tables.

The following conversion can be applied to convert from dB μ V/m to μ V/m:
 $10^{(\text{Field Strength in dB}\mu\text{V/m}/20)}$.

Where formal measurements have been necessary, the results have been presented in the emissions table.

2.3.5 Example Test Setup Diagram

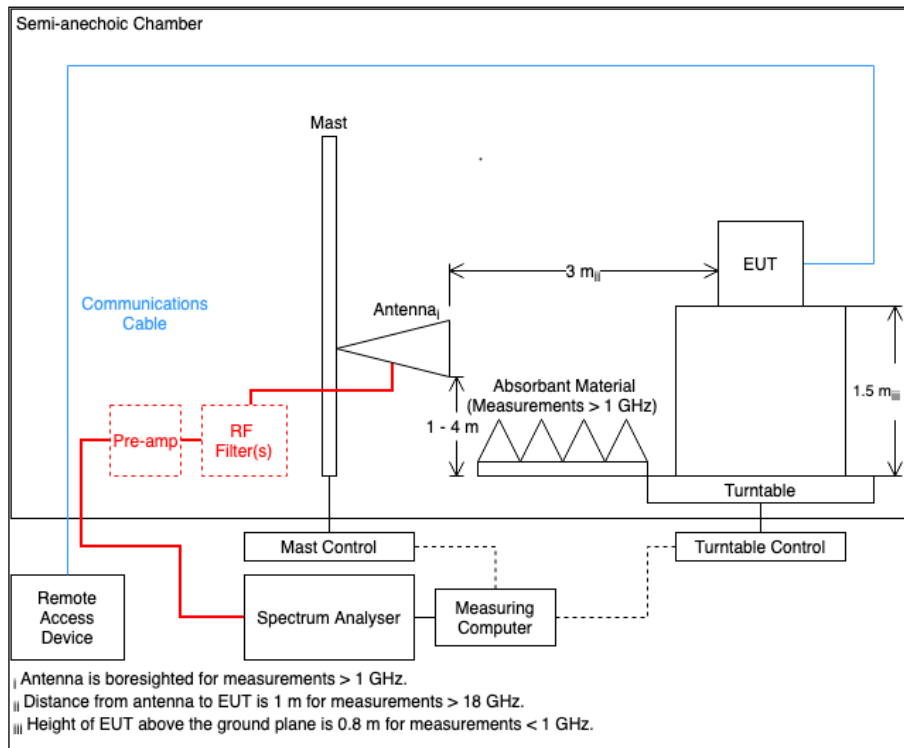


Figure 7

2.3.6 Environmental Conditions

Ambient Temperature 24.7 - 24.8 °C
Relative Humidity 21.4 - 21.5 %



2.3.7 Test Results

915 MHz Transceiver

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
38.174	31.74	40.00	8.26	Q-Peak	90	100	Vertical	X
38.211	37.46	40.00	2.54	Q-Peak	36	243	Vertical	Y
38.226	39.91	40.00	0.09	Q-Peak	83	194	Vertical	Z
38.162	35.41	40.00	4.59	Q-Peak	260	247	Horizontal	Z

Table 10 - 902.2 MHz, 30 MHz to 1 GHz

No other emissions were detected within 10 dB of the limit.

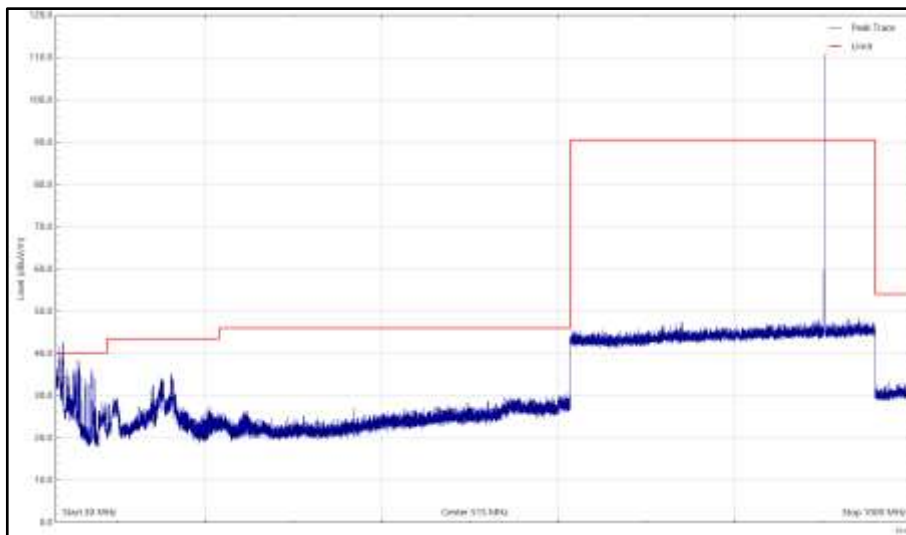


Figure 8 - 902.2 MHz, 30 MHz to 1 GHz, Vertical, EUT Orientation X

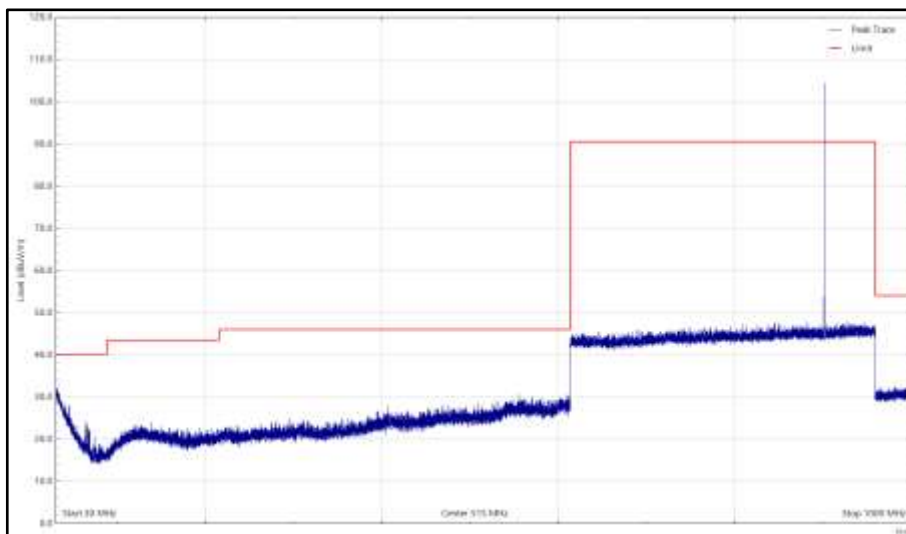


Figure 9 - 902.2 MHz, 30 MHz to 1 GHz, Horizontal, EUT Orientation X

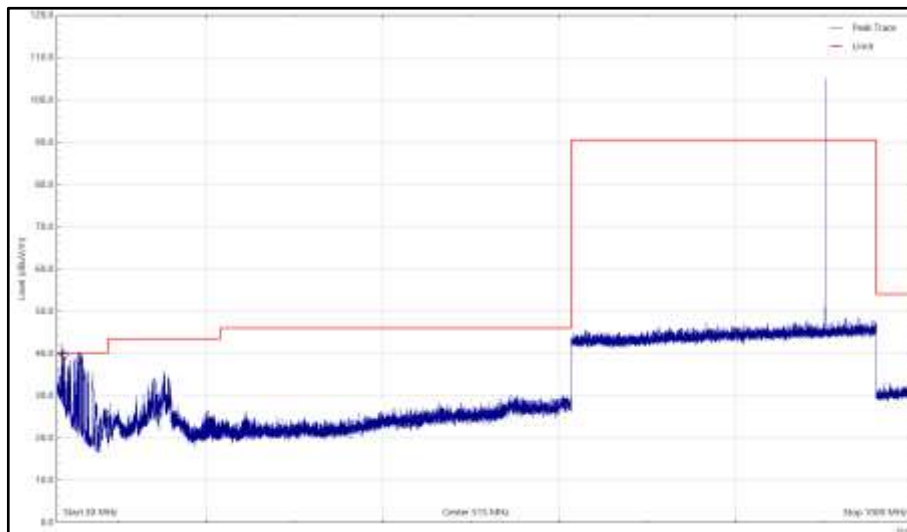


Figure 10 - 902.2 MHz, 30 MHz to 1 GHz, Vertical, EUT Orientation Y

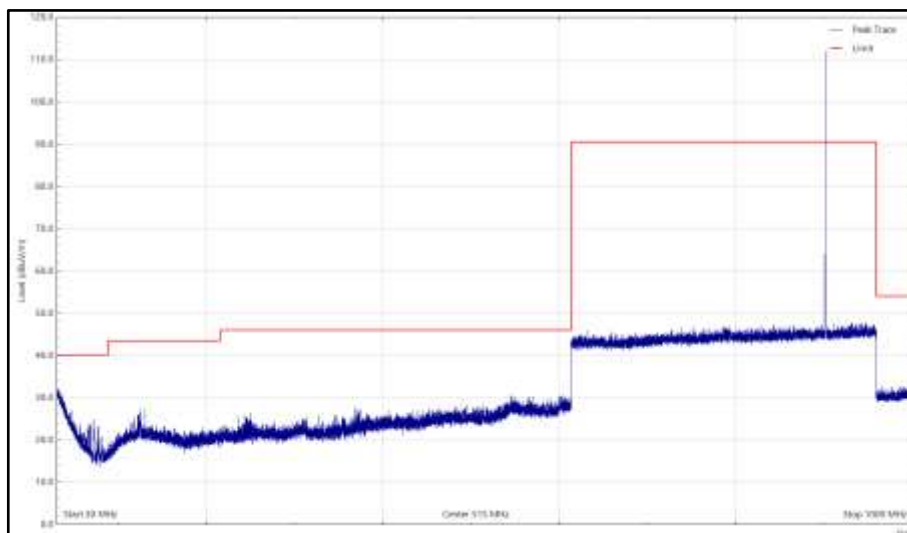


Figure 11 - 902.2 MHz, 30 MHz to 1 GHz, Horizontal, EUT Orientation Y

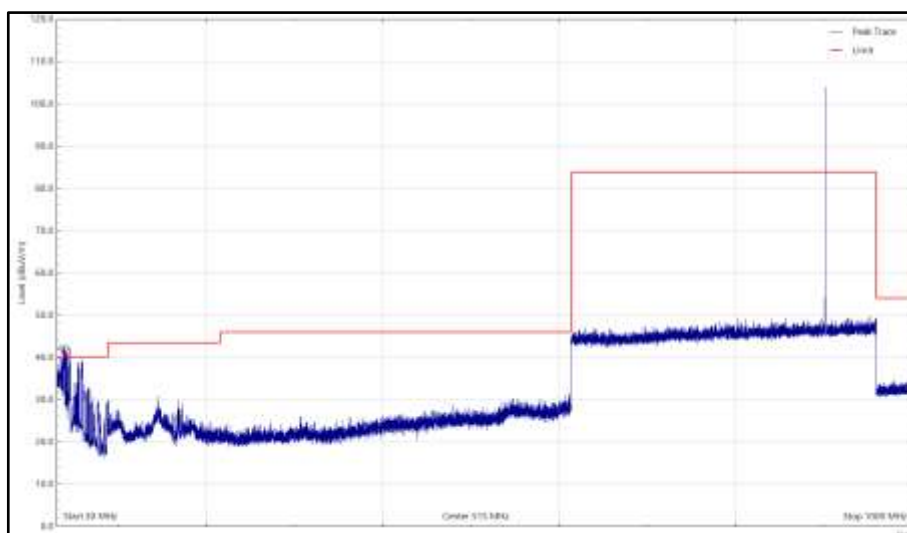


Figure 12 - 902.2 MHz, 30 MHz to 1 GHz, Vertical, EUT Orientation Z

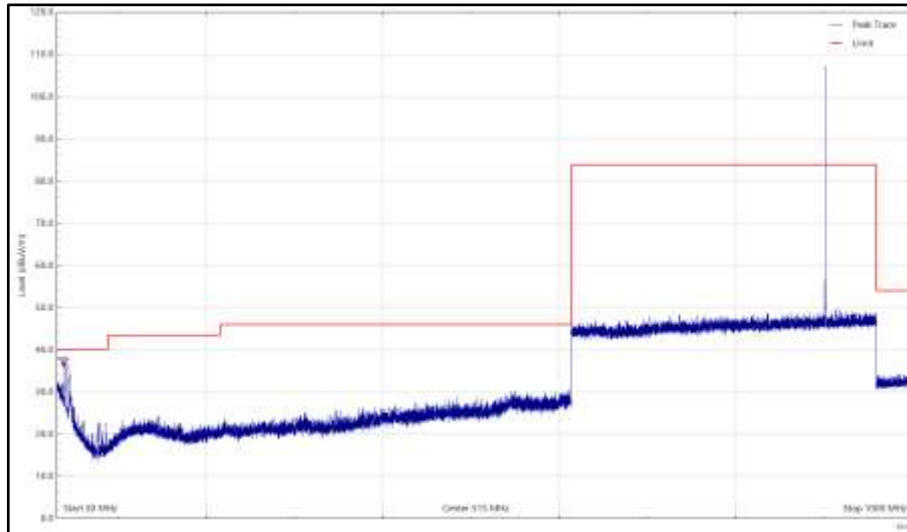


Figure 13 - 902.2 MHz, 30 MHz to 1 GHz, Horizontal, EUT Orientation Z



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
2706.547	68.12	73.98	5.86	Peak	32	116	Vertical	X
2706.547	46.40	53.98	7.58	Average	32	116	Vertical	X
2706.635	66.01	73.98	7.97	Peak	308	104	Vertical	Y
2706.635	44.29	53.98	9.69	Average	308	104	Vertical	Y
2706.548	68.75	73.98	5.23	Peak	25	100	Horizontal	Y
2706.548	47.03	53.98	6.95	Average	25	100	Horizontal	Y
2706.624	69.73	73.98	4.25	Peak	6	234	Vertical	Z
2706.624	48.01	53.98	5.97	Average	6	234	Vertical	Z
2706.490	64.64	73.98	9.34	Peak	311	104	Horizontal	Z

Table 11 – 902.2 MHz, 1 GHz to 10 GHz

No other emissions were detected within 10 dB of the limit.

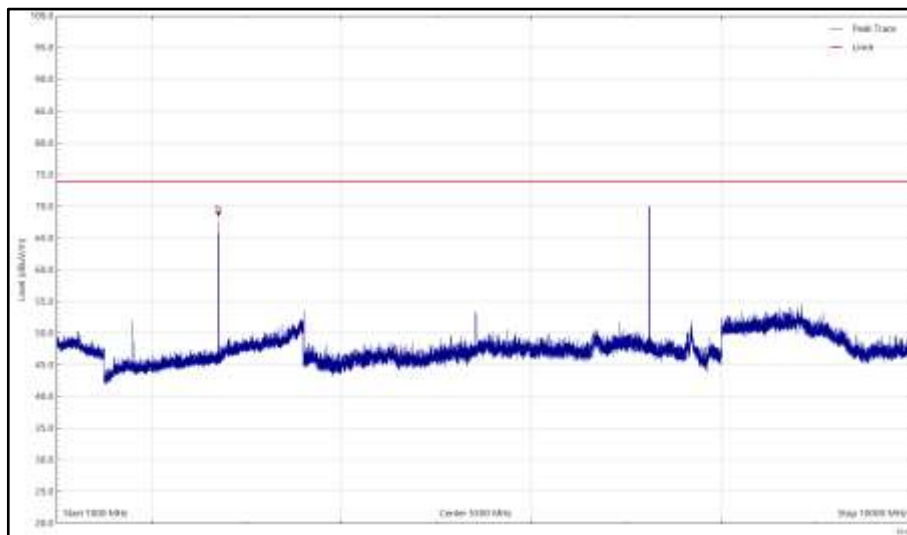


Figure 14 – 902.2 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation X - Peak

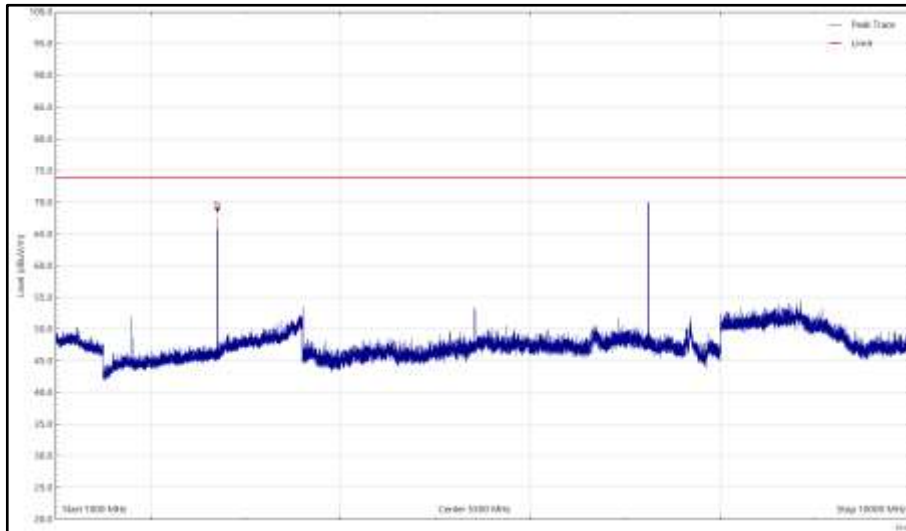


Figure 15 – 902.2 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation X - Average

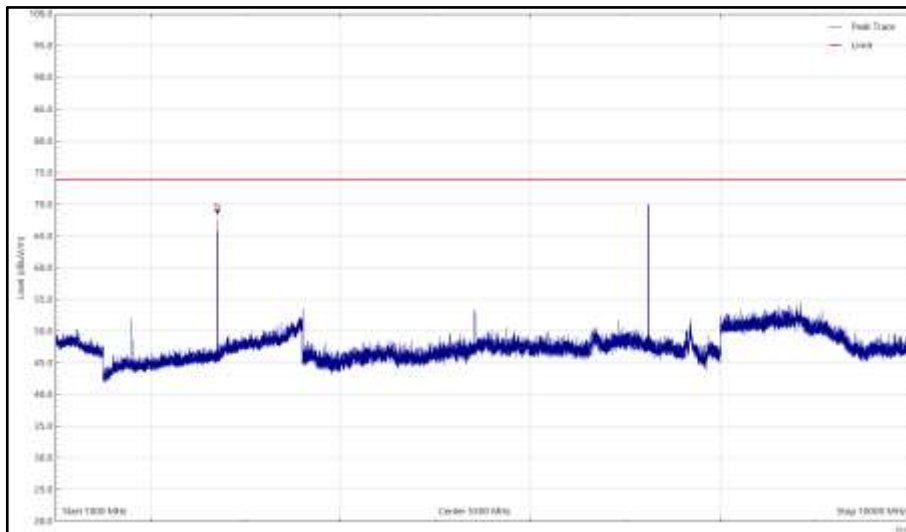


Figure 16 – 902.2 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation X - Peak

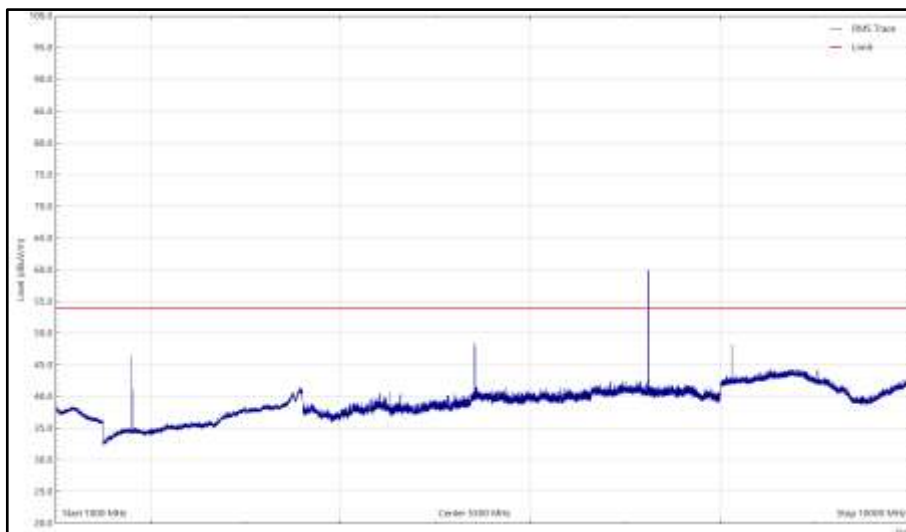


Figure 17 – 902.2 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation X - Average

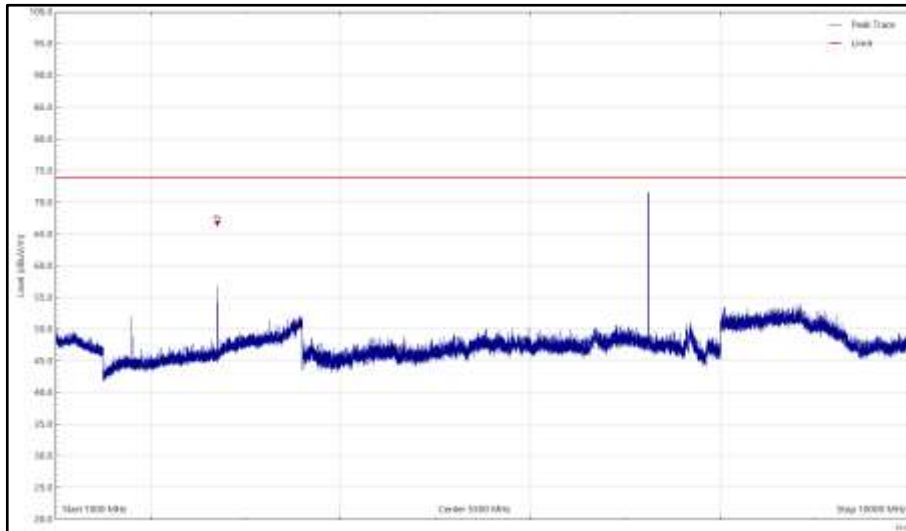


Figure 18 – 902.2 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation Y - Peak

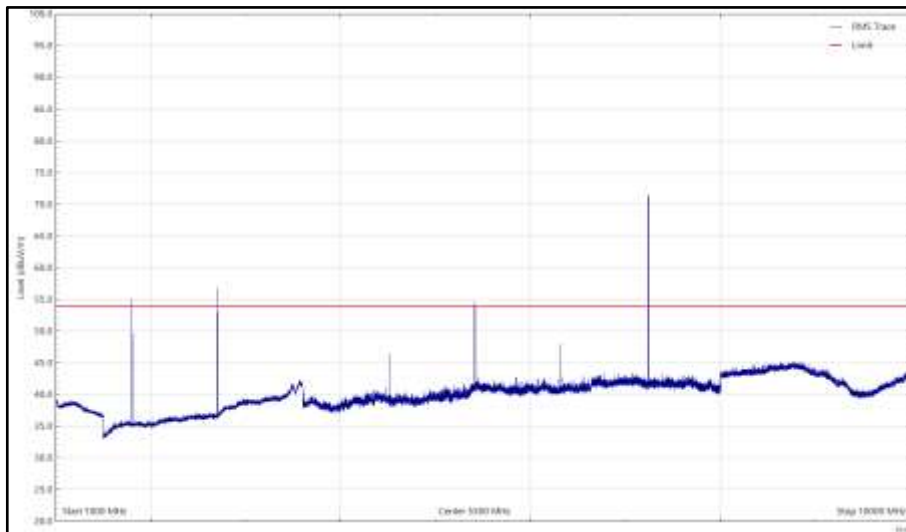


Figure 19 – 902.2 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation Y - Average

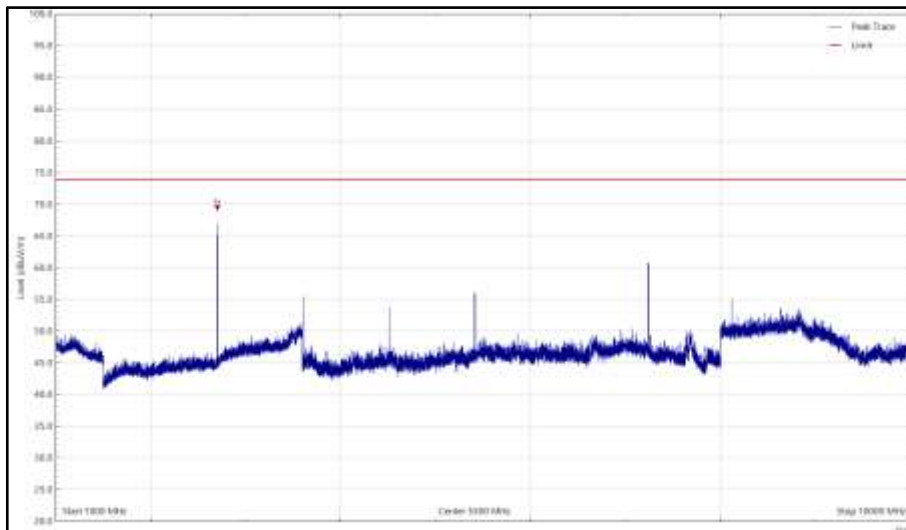


Figure 20 – 902.2 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation Y - Peak

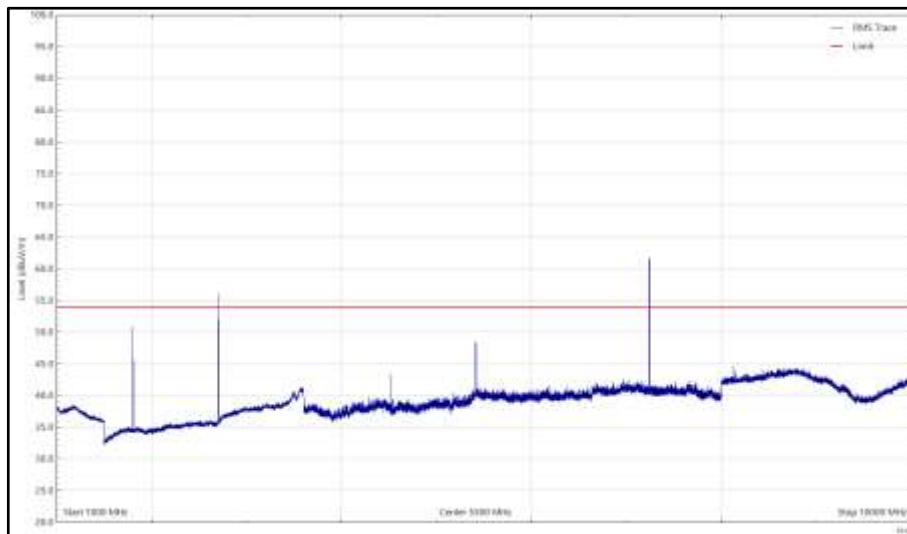


Figure 21 – 902.2 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation Y - Average

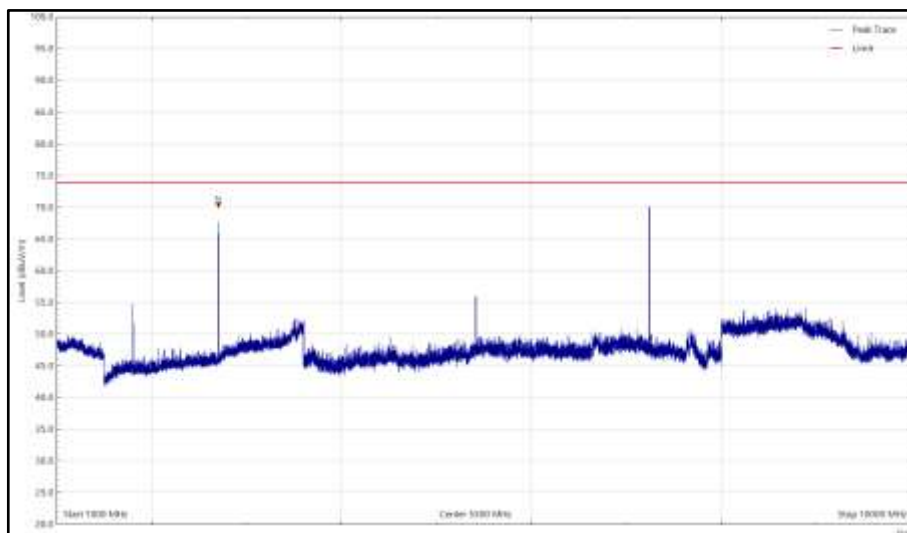


Figure 22 – 902.2 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation Z - Peak

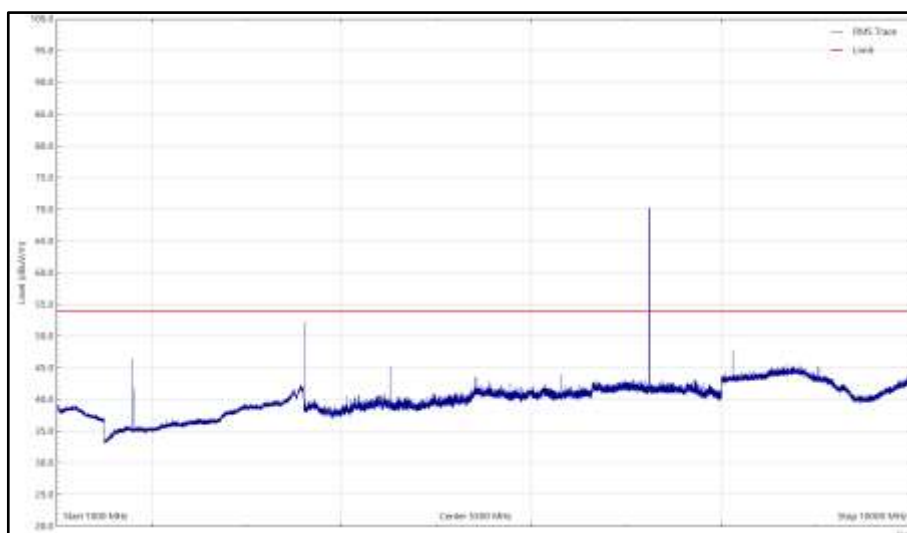


Figure 23 – 902.2 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation Z - Average

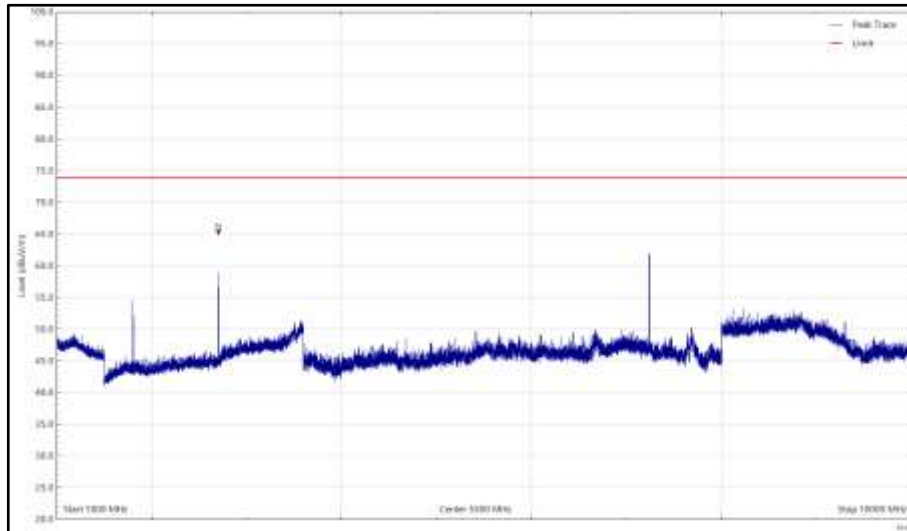


Figure 24 – 902.2 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation Z - Peak

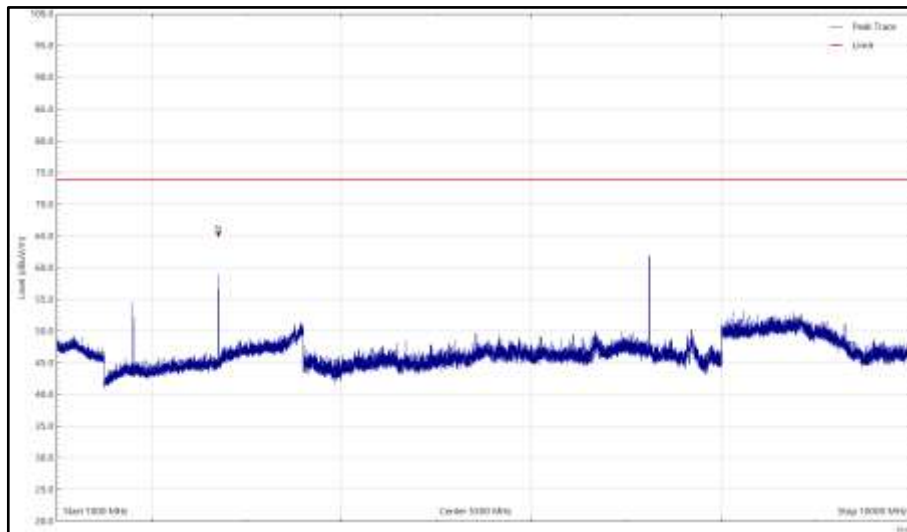


Figure 25 – 902.2 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation Z - Average



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
38.249	33.88	40.00	6.12	Q-Peak	6	211	Vertical	X
38.184	30.97	40.00	9.03	Q-Peak	130	100	Vertical	Y
37.546	39.75	40.00	0.25	Q-Peak	85	196	Vertical	Z
37.584	38.25	40.00	1.75	Q-Peak	71	255	Horizontal	Z

Table 12 – 915.0 MHz, 30 MHz to 1 GHz

No other emissions were detected within 10 dB of the limit.

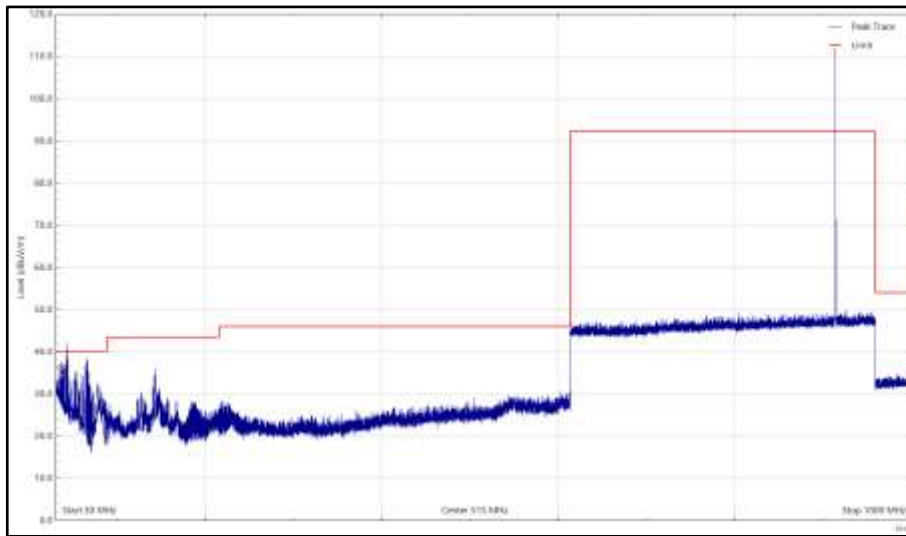


Figure 26 – 915.0 MHz, 30 MHz to 1 GHz, Vertical, EUT Orientation X

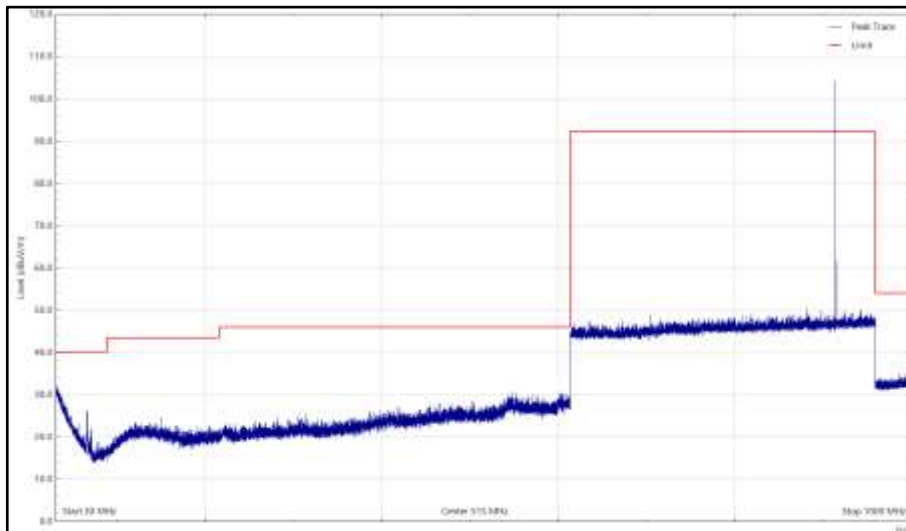


Figure 27 – 915.0 MHz, 30 MHz to 1 GHz, Horizontal, EUT Orientation X

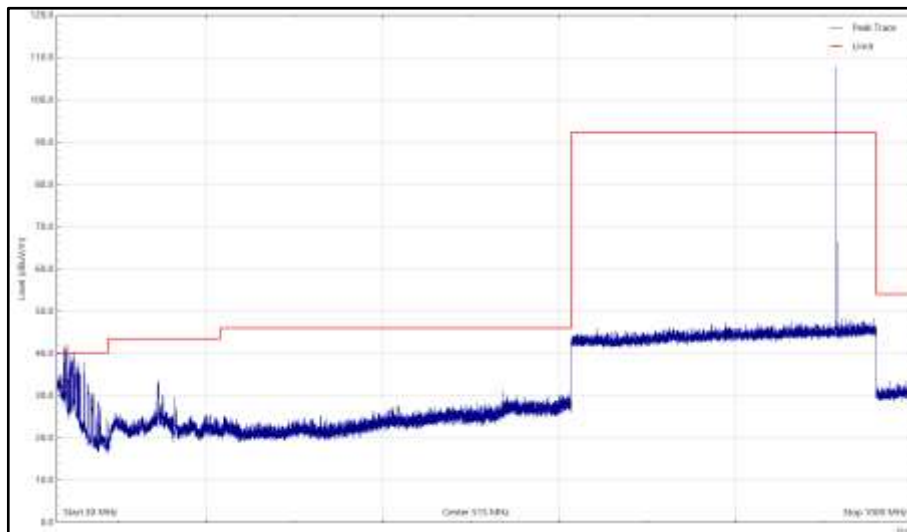


Figure 28 – 915.0 MHz, 30 MHz to 1 GHz, Vertical, EUT Orientation Y

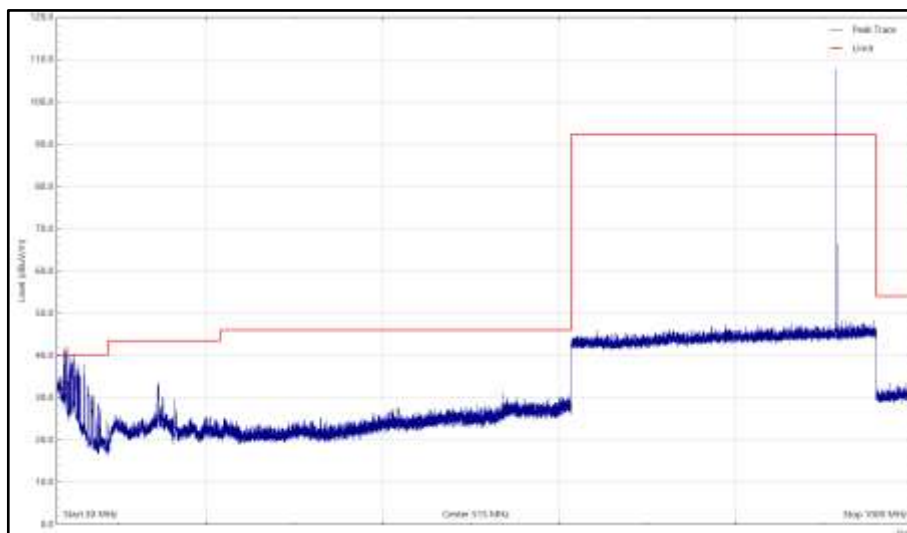


Figure 29 – 915.0 MHz, 30 MHz to 1 GHz, Horizontal, EUT Orientation Y

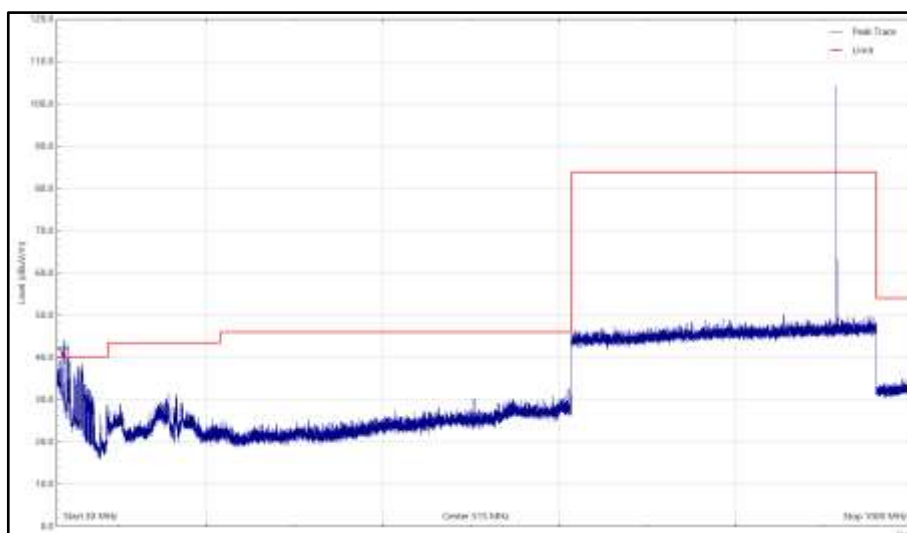


Figure 30 – 915.0 MHz, 30 MHz to 1 GHz, Vertical, EUT Orientation Z

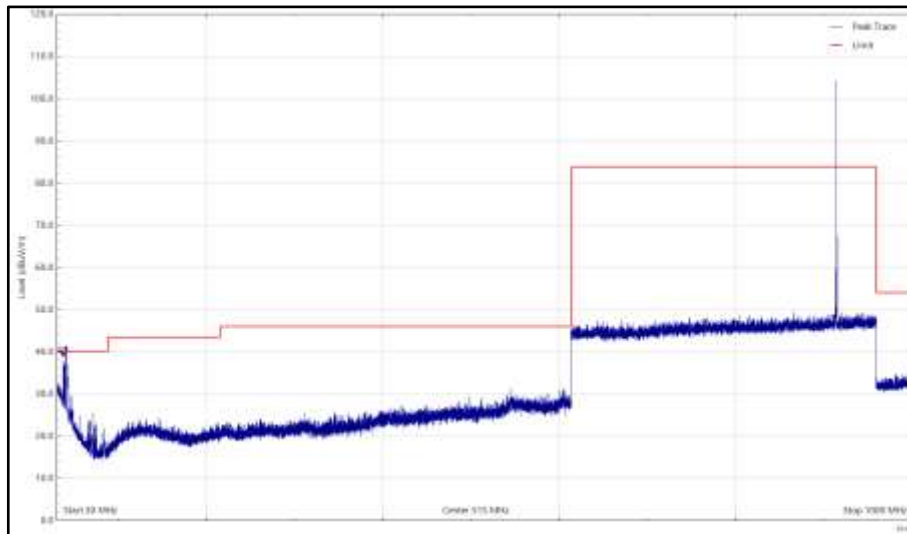


Figure 31 – 915.0 MHz, 30 MHz to 1 GHz, Horizontal, EUT Orientation Z



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
2744.902	64.26	73.98	9.72	Peak	187	100	Vertical	Y
2745.038	65.67	73.98	8.31	Peak	151	100	Horizontal	Y
2745.015	69.40	73.98	4.58	Peak	360	336	Vertical	Z
2745.015	47.68	53.98	6.30	Average	360	336	Vertical	Z
2745.031	64.19	73.98	9.79	Peak	312	100	Horizontal	Z

Table 13 – 915.0 MHz, 1 GHz to 10 GHz

No other emissions were detected within 10 dB of the limit.

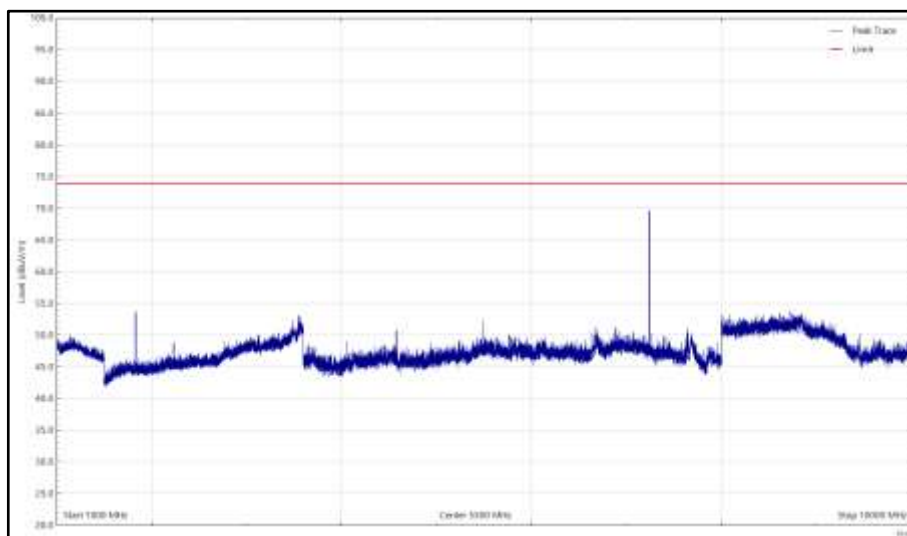


Figure 32 – 915.0 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation X - Peak

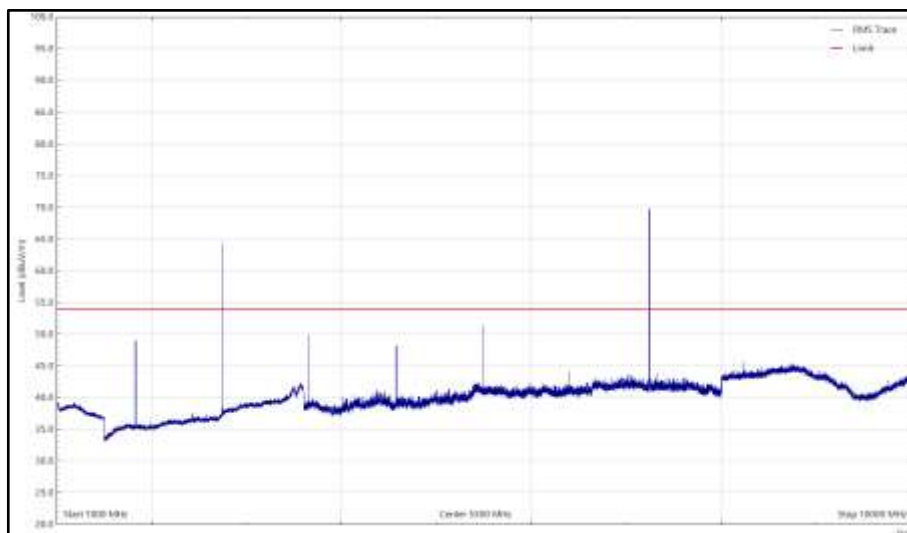


Figure 33 – 915.0 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation X - Average

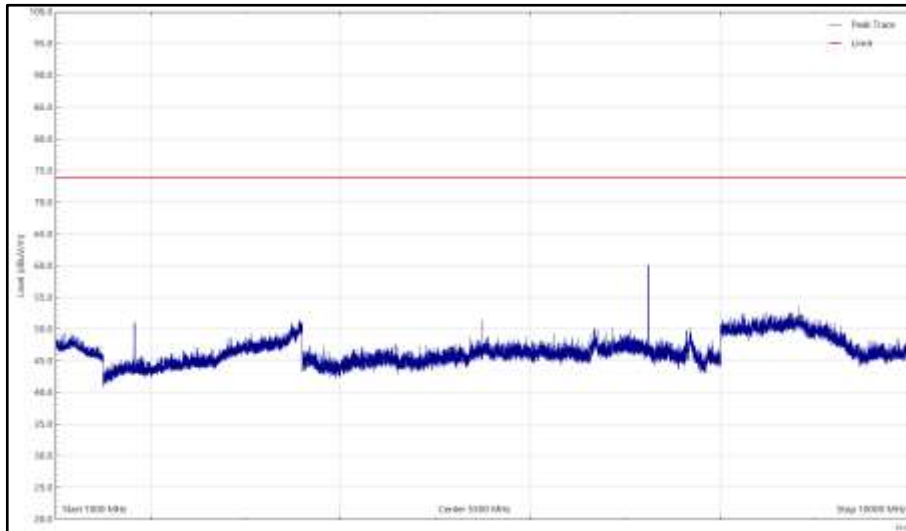


Figure 34 – 915.0 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation X - Peak

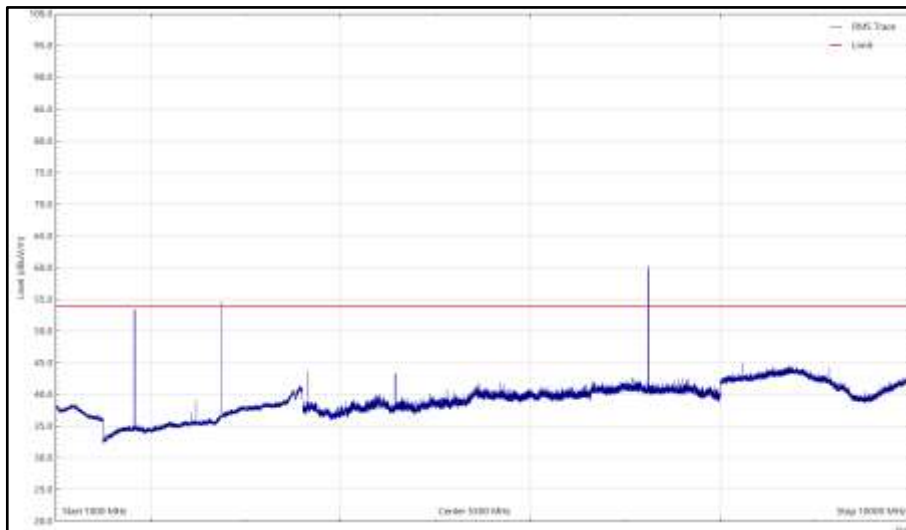


Figure 35 – 915.0 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation X - Average

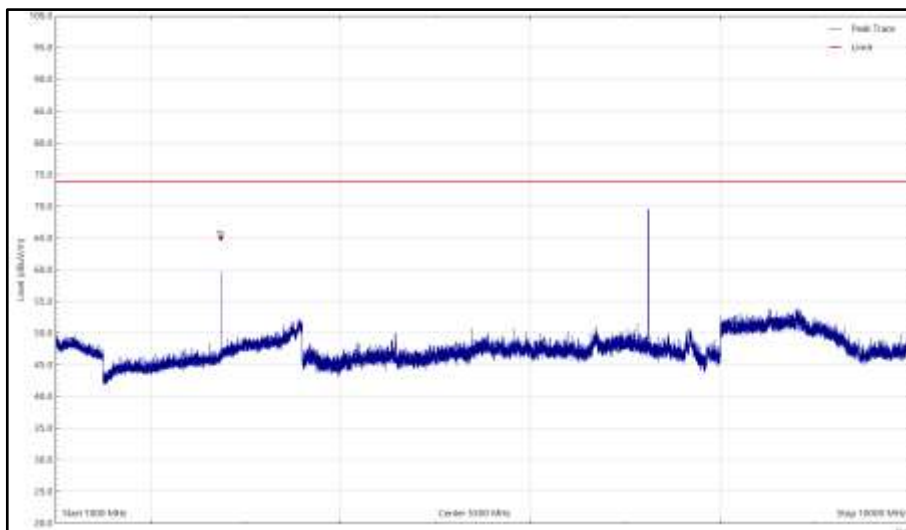


Figure 36 – 915.0 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation Y - Peak

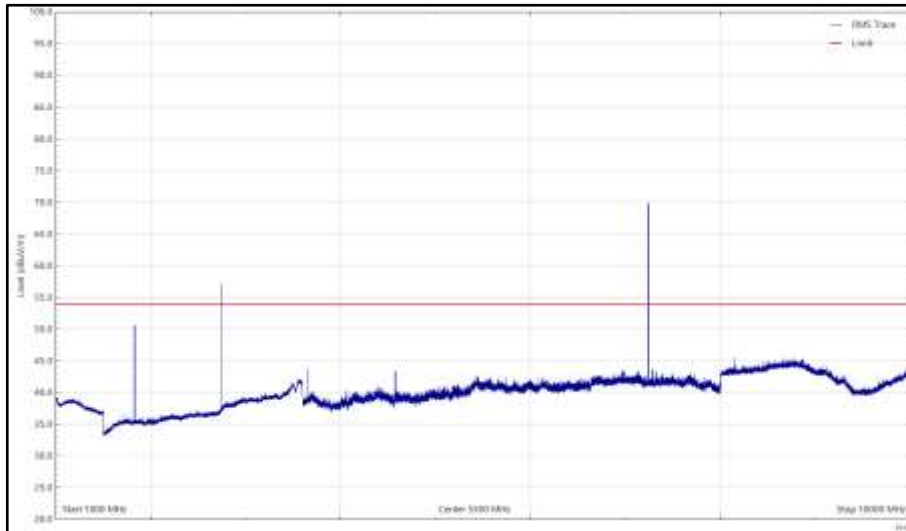


Figure 37 – 915.0 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation Y - Average

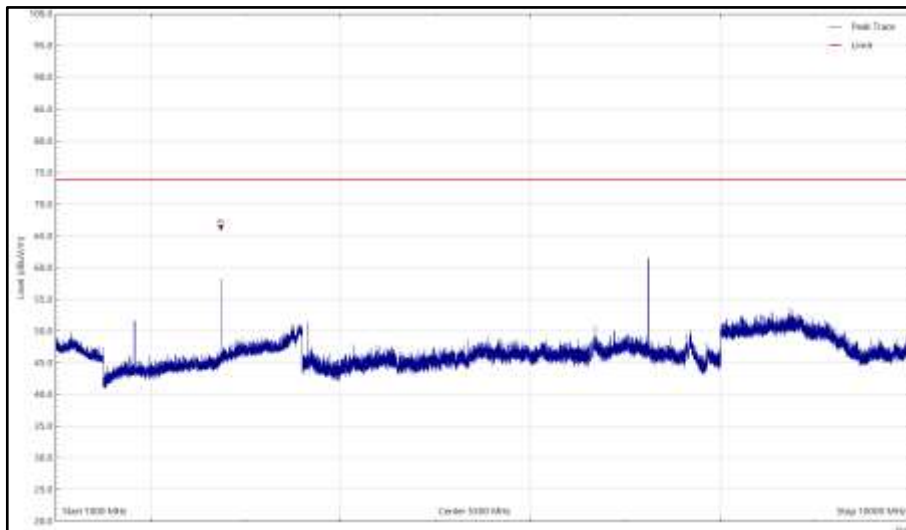


Figure 38 – 915.0 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation Y - Peak

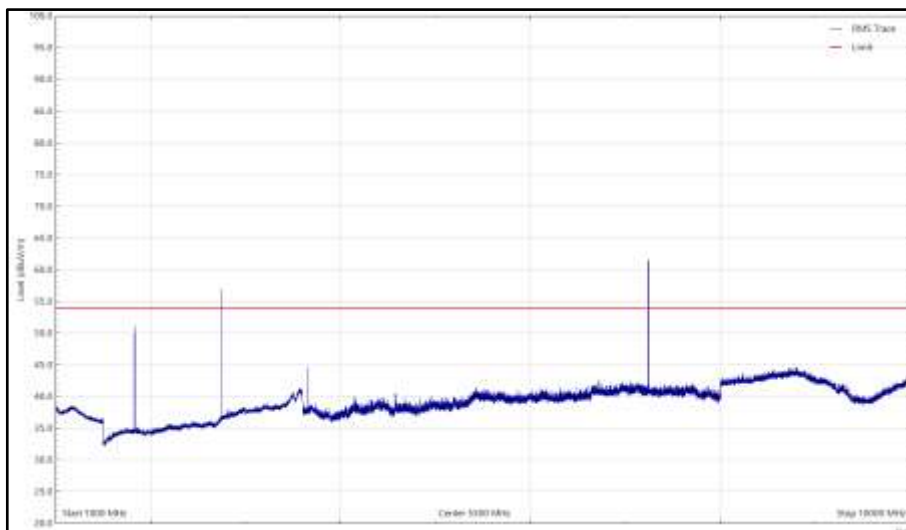


Figure 39 – 915.0 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation Y - Average

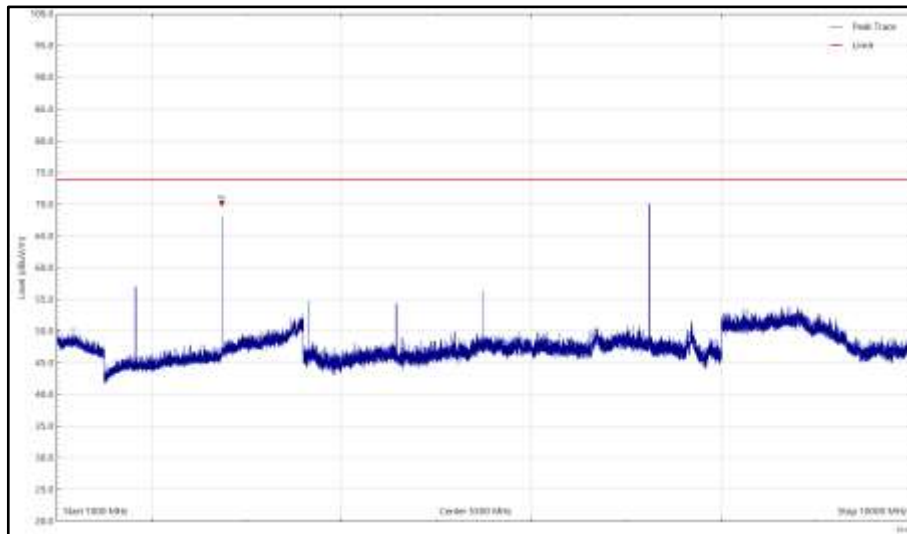


Figure 40 – 915.0 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation Z - Peak

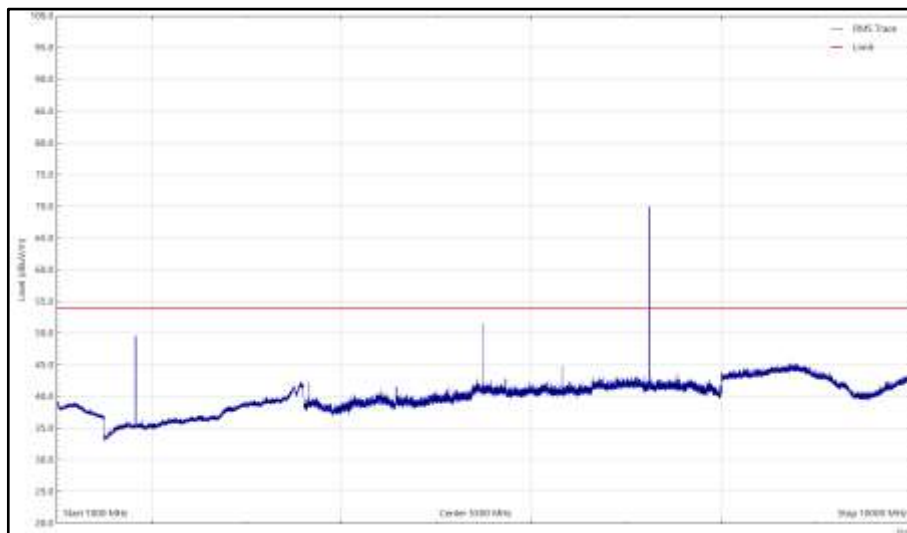


Figure 41 – 915.0 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation Z - Average

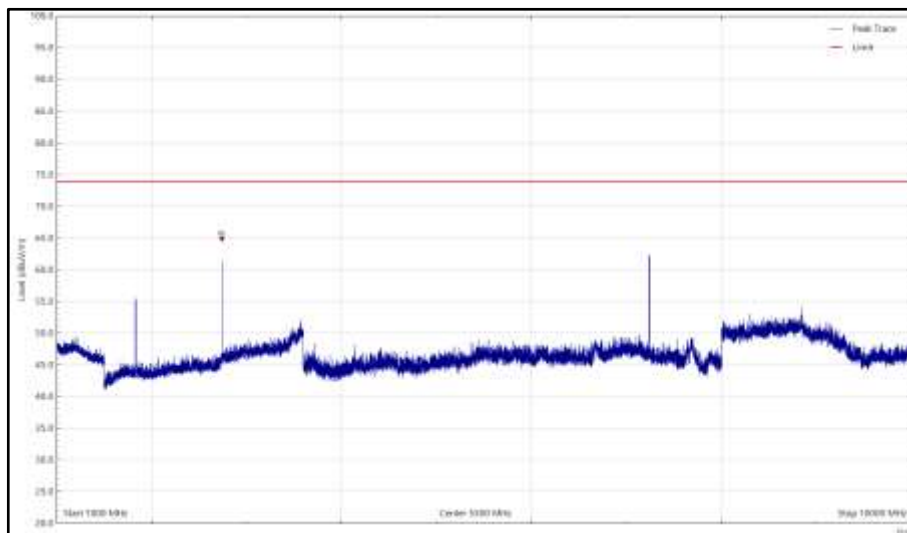




Figure 42 – 915.0 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation Z - Peak

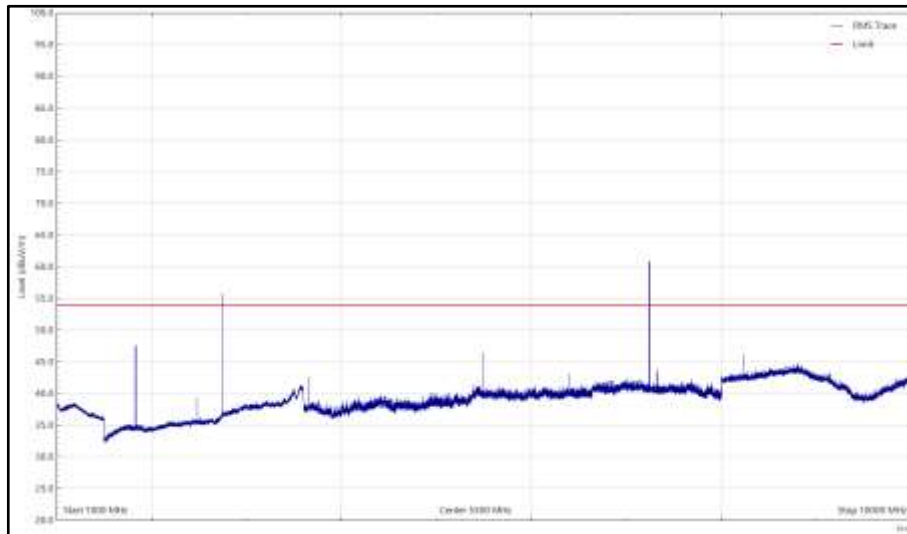


Figure 43 – 915.0 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation Z - Average



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
38.208	32.16	40.00	7.84	Q-Peak	145	187	Vertical	X
38.215	30.03	40.00	9.97	Q-Peak	301	194	Vertical	Y
38.239	39.25	40.00	0.75	Q-Peak	82	193	Vertical	Z
37.526	36.39	40.00	3.61	Q-Peak	7	252	Horizontal	Z

Table 14 – 927.4 MHz, 30 MHz to 1 GHz

No other emissions were detected within 10 dB of the limit.

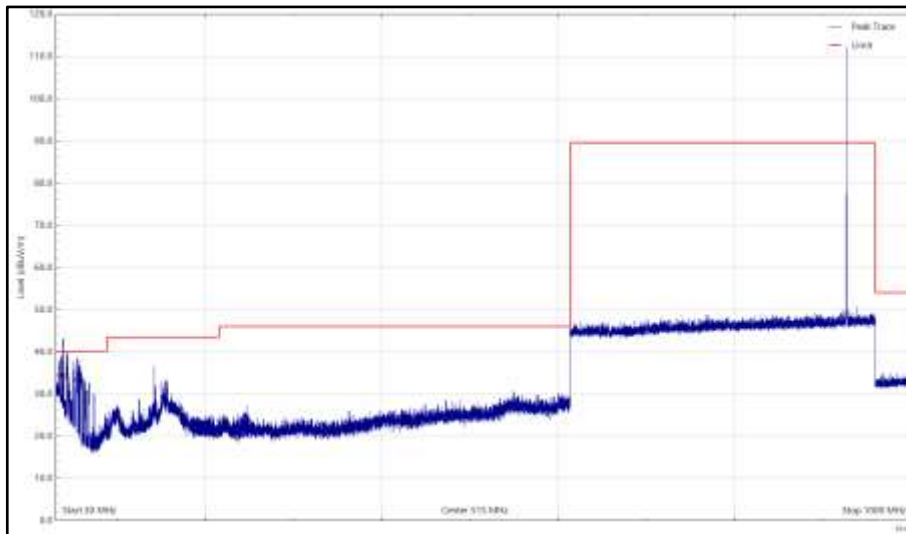


Figure 44 – 927.4 MHz, 30 MHz to 1 GHz, Vertical, EUT Orientation X

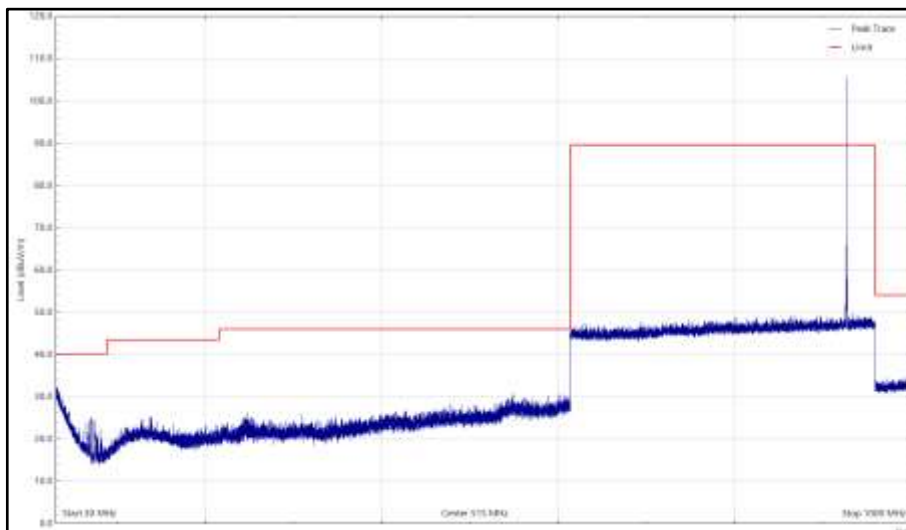


Figure 45 – 927.4 MHz, 30 MHz to 1 GHz, Horizontal, EUT Orientation X

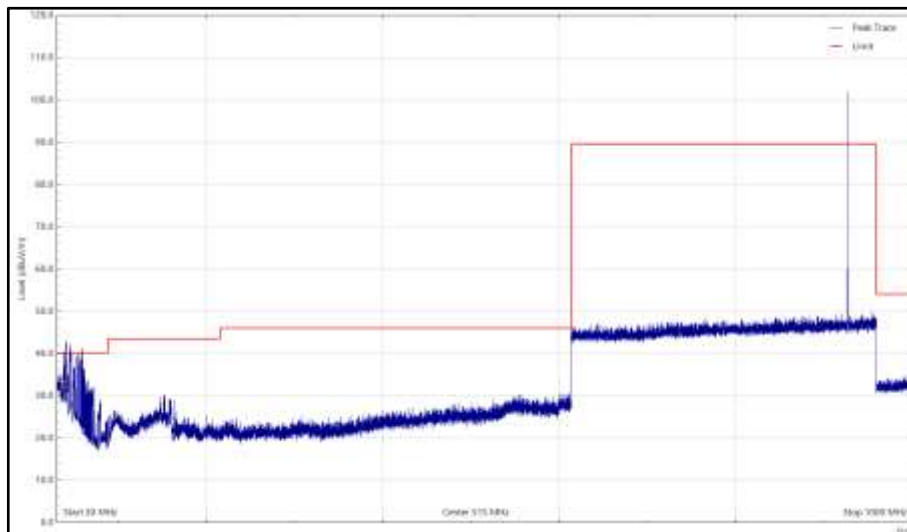


Figure 46 – 927.4 MHz, 30 MHz to 1 GHz, Vertical, EUT Orientation Y

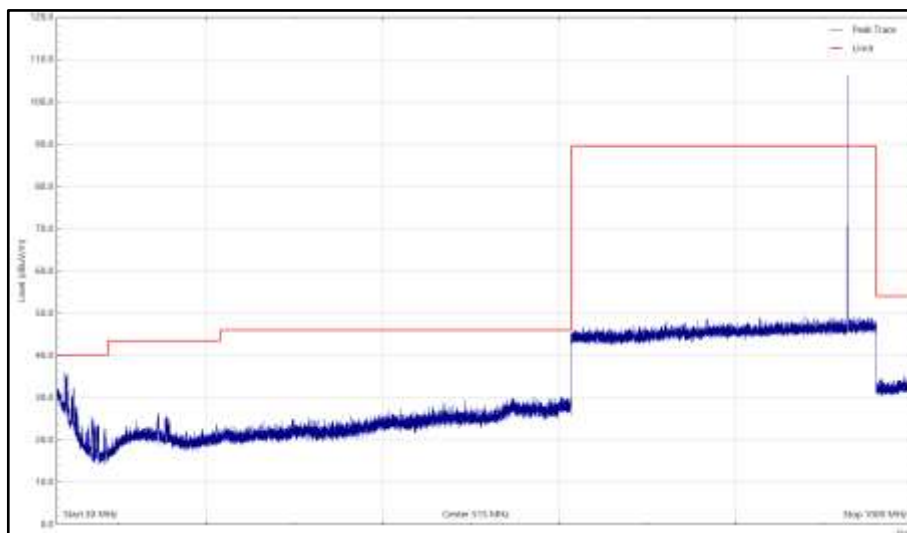


Figure 47 – 927.4 MHz, 30 MHz to 1 GHz, Horizontal, EUT Orientation Y

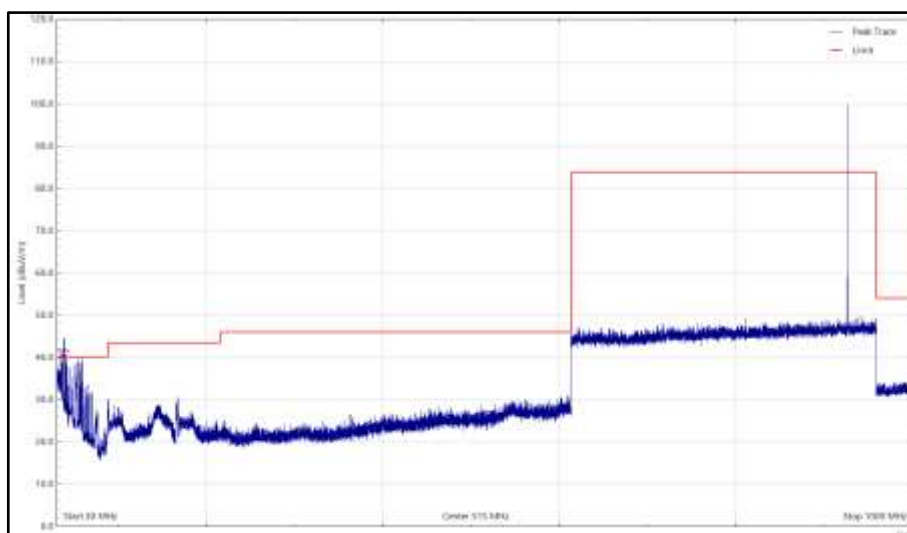


Figure 48 – 927.4 MHz, 30 MHz to 1 GHz, Vertical, EUT Orientation Z

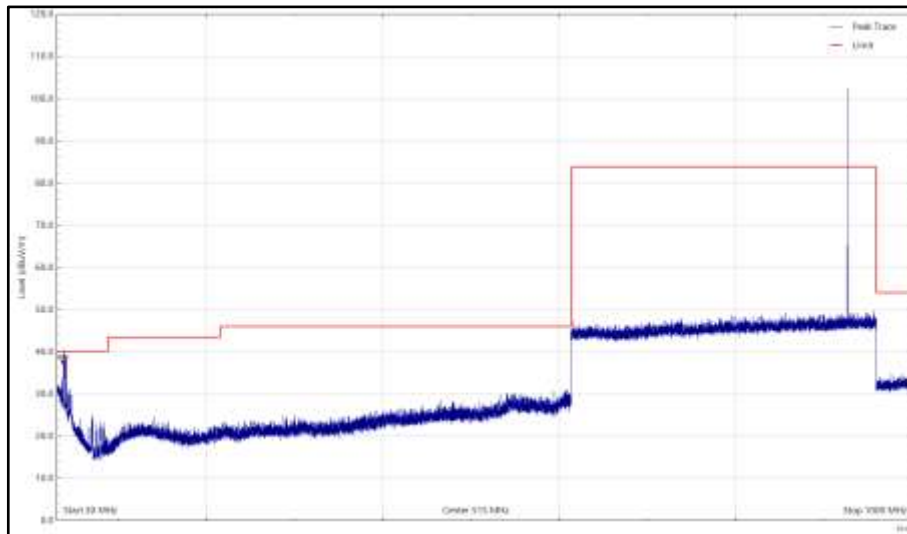


Figure 49 – 927.4 MHz, 30 MHz to 1 GHz, Horizontal, EUT Orientation Z



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
2782.218	67.85	73.98	6.13	Peak	93	100	Vertical	X
2782.218	46.13	53.98	7.85	Average	93	100	Vertical	X
2782.200	64.65	73.98	9.33	Peak	191	100	Horizontal	Y
2782.195	70.77	73.98	3.21	Peak	360	207	Vertical	Z
2782.195	49.05	53.98	4.93	Average	360	207	Vertical	Z

Table 15 – 927.4 MHz, 1 GHz to 10 GHz

No other emissions were detected within 10 dB of the limit.

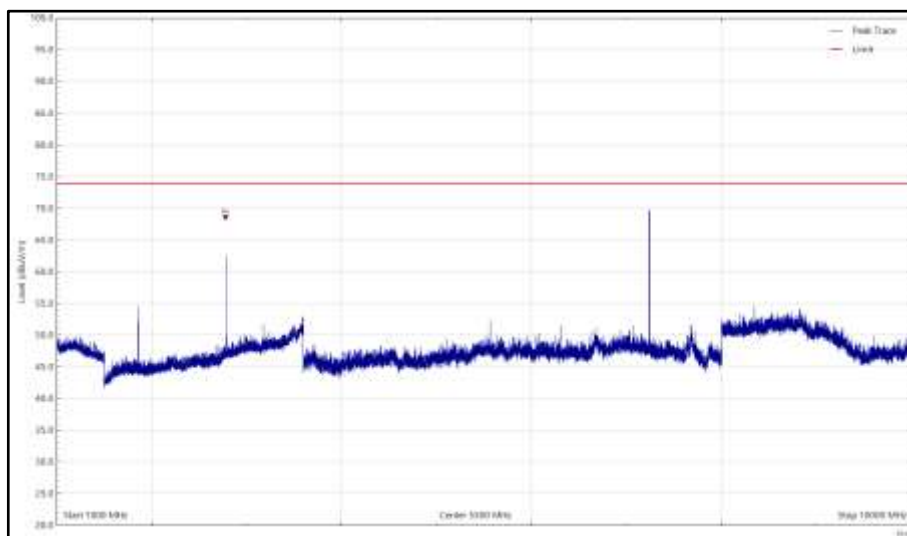


Figure 50 – 927.4 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation X - Peak

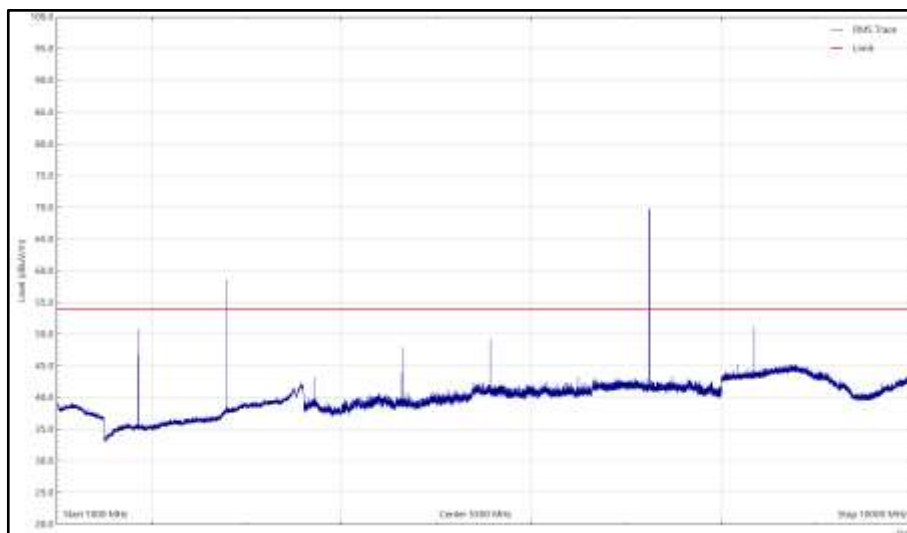


Figure 51 – 927.4 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation X - Average

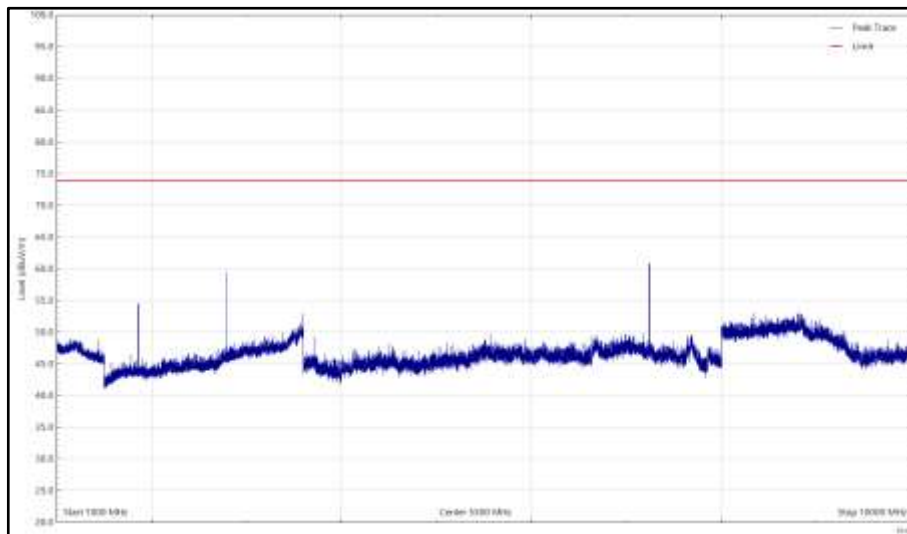


Figure 52 – 927.4 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation X - Peak

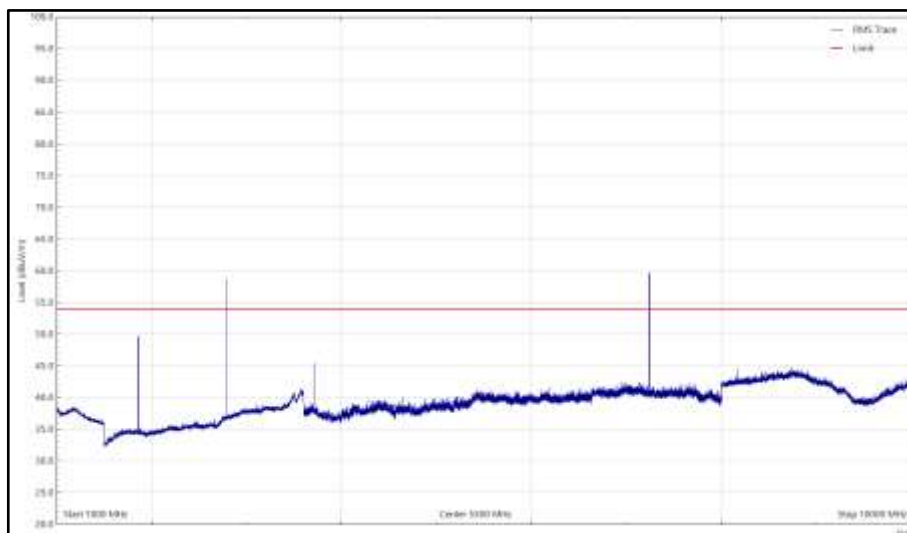


Figure 53 – 927.4 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation X - Average

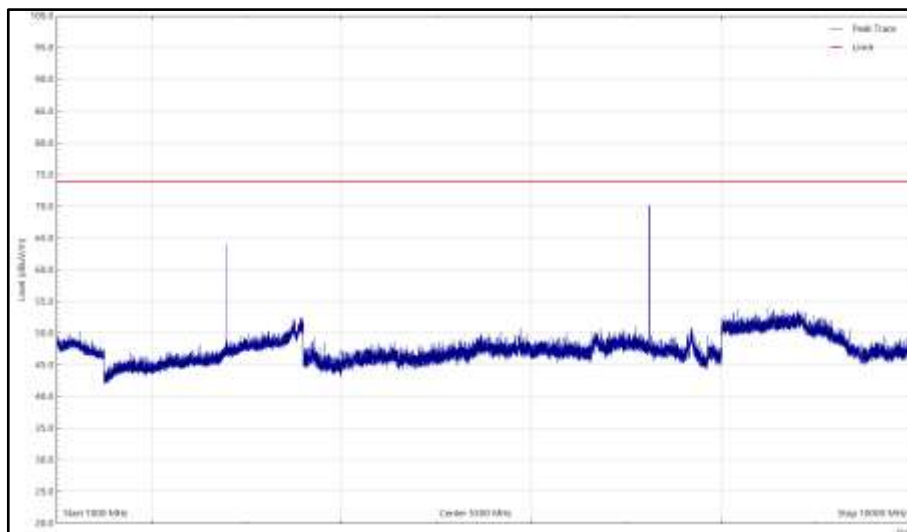


Figure 54 – 927.4 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation Y - Peak

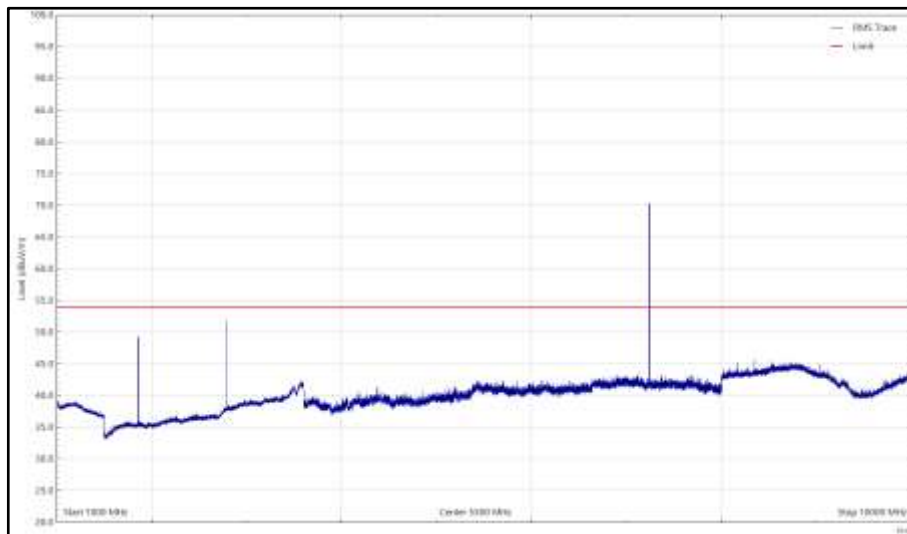


Figure 55 – 927.4 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation Y - Average

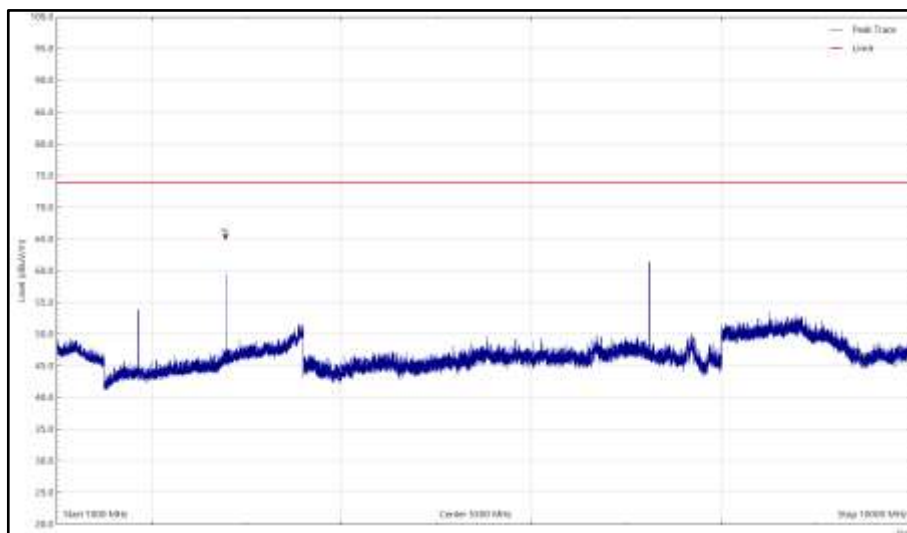


Figure 56 – 927.4 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation Y - Peak

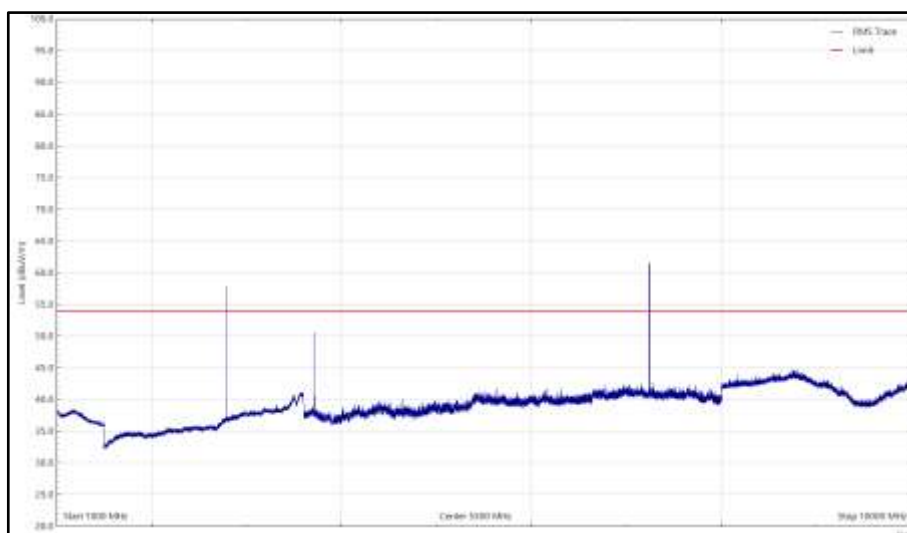


Figure 57 – 927.4 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation Y - Average

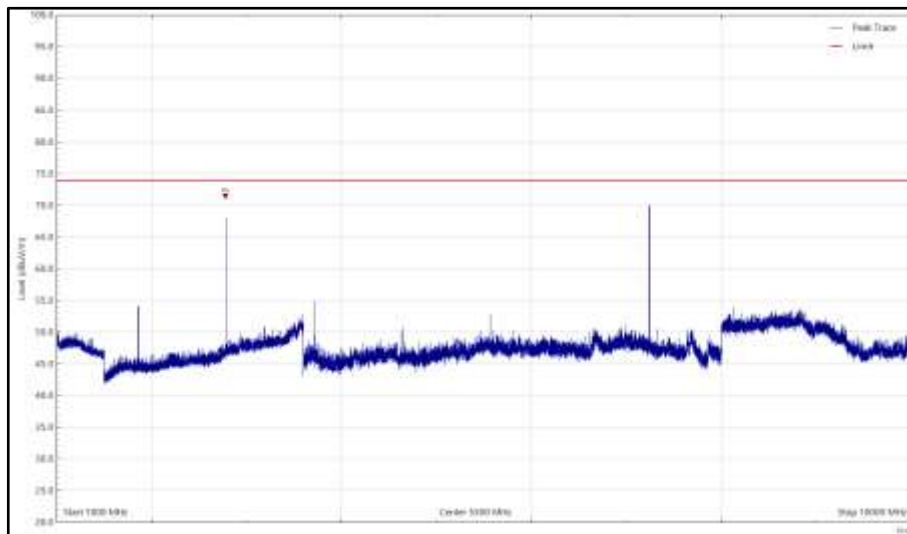


Figure 58 – 927.4 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation Z - Peak

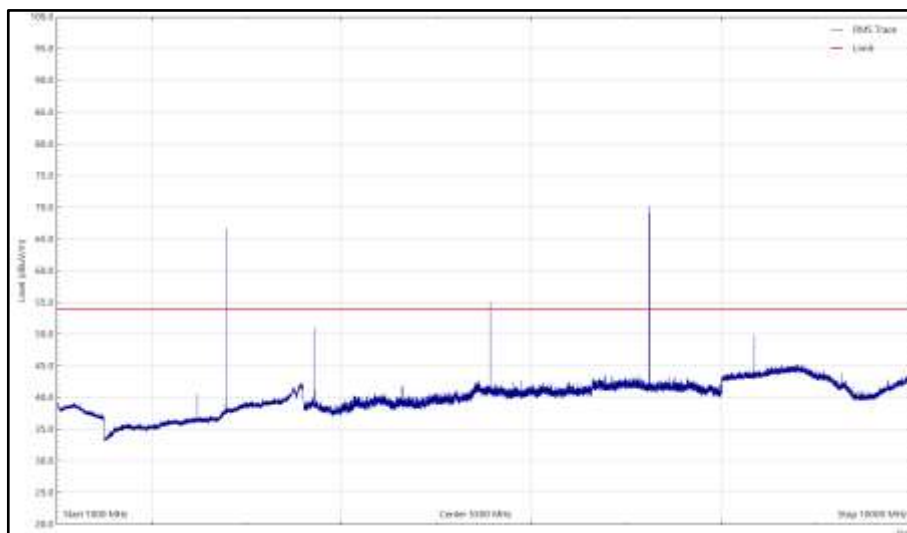


Figure 59 – 927.4 MHz, 1 GHz to 10 GHz, Vertical, EUT Orientation Z - Average

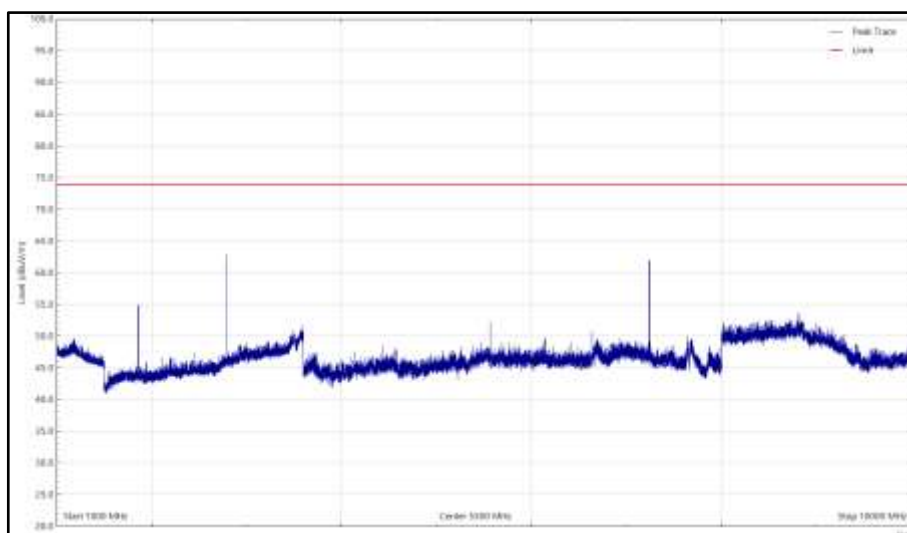


Figure 60 – 927.4 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation Z - Peak

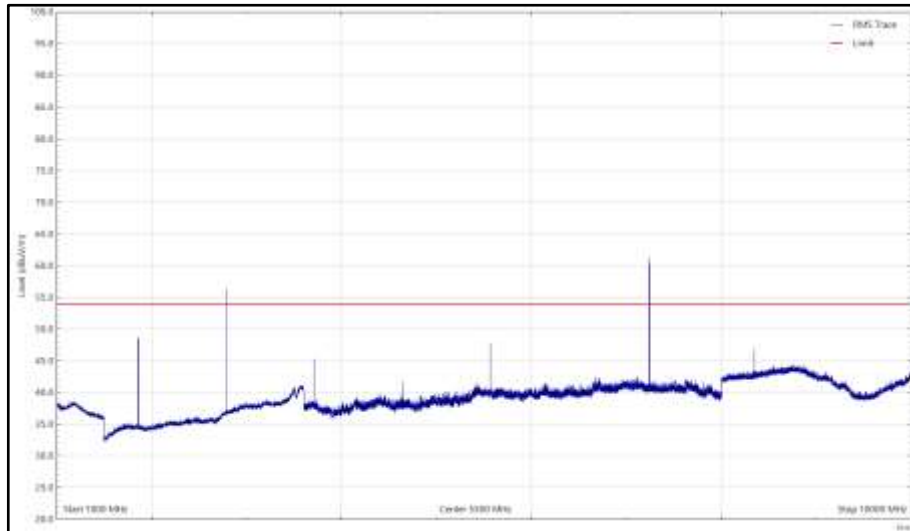


Figure 61 – 927.4 MHz, 1 GHz to 10 GHz, Horizontal, EUT Orientation Z - Average



Figure 62 - Test Setup - 30 MHz to 1 GHz - X Orientation



Figure 63 - Test Setup - 30 MHz to 1 GHz - Y Orientation



Figure 64 - Test Setup - 30 MHz to 1 GHz - Z Orientation

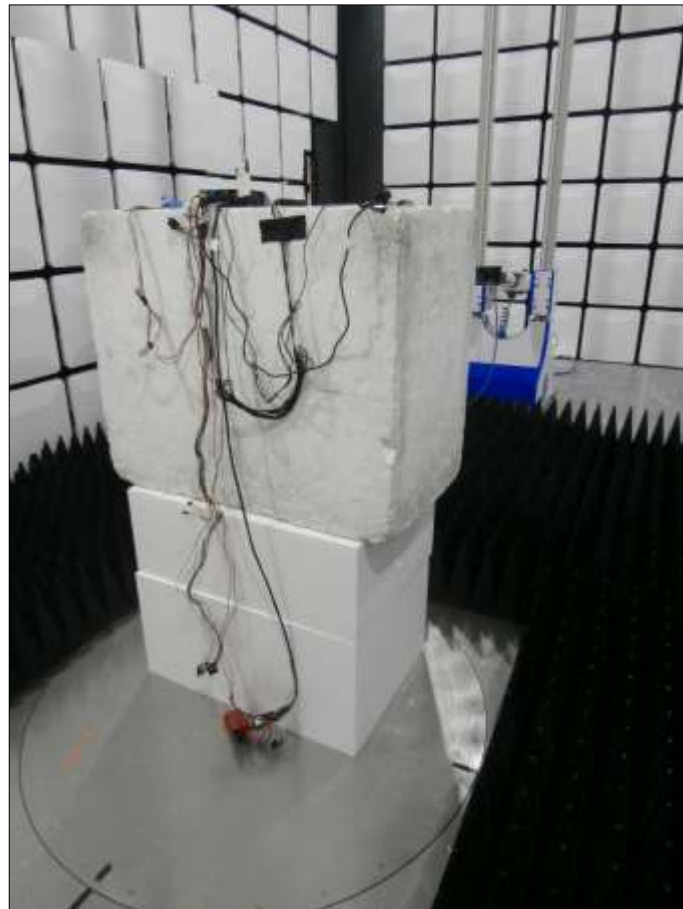


Figure 65 - Test Setup - 1 GHz to 10 GHz - X Orientation



Figure 66 - Test Setup - 1 GHz to 10 GHz - Y Orientation

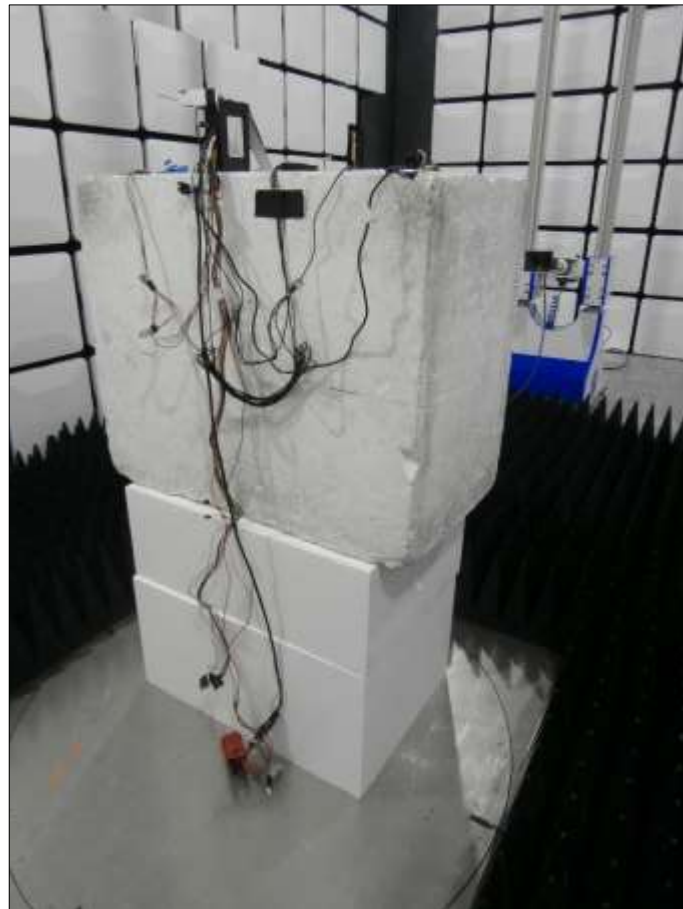


Figure 67 - Test Setup - 1 GHz to 10 GHz - Z Orientation

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).



2.3.8 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
Antenna with permanent attenuator (Bilog)	Schaffner	CBL6143	287	24	14-Oct-2022
DC Power Supply	Hewlett Packard	6269B	326	-	TU
Multimeter	Iso-tech	IDM101	2424	12	14-Dec-2021
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	14-Jan-2022
EmX Emissions Software	TUV SUD	V2.1.1 V.V2.1.1	5125	-	N/A - Software
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 16

TU – Traceability Unscheduled



3 Measurement Uncertainty

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

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

Table 17

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.