FCC and ISED Test Report

Sepura Limited
TETRA Radio, Model: SC2024

In accordance with FCC 47 CFR Part 2, FCC 47 CFR Part 90, ISED RSS-119 and ISED RSS-GEN (TETRA)

Add value.
Inspire trust.

Prepared for: Sepura Limited
9000 Cambridge Research Park
Beach Drive
Waterbeach
Cambridge, CB25 9TL
United Kingdom

FCC ID: XX6SC2024M IC: 8739A-SC2024M

COMMERCIAL-IN-CONFIDENCE

Document 75958800-03 Issue 02

SIGNATURE			
Ryan Henley			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Ryan Henley	Business Development Manager	Authorised Signatory	18 July 2023

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 2, FCC 47 CFR Part 90, ISED RSS-119 and ISED RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Neil Rousell	18 July 2023	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

ISED Accreditation
12669A Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 2: 2021, FCC 47 CFR Part 90: 2021, ISED RSS-119: Issue 12 (05-2015) and ISED RSS-GEN: Issue 5 (04-2018) + A2 (02-2021) for the tests detailed in section 1.3.

TÜV SÜD
is a trading name of TUV SUD Ltd
Registered in Scotland at East Kilbride,
Glasgow G75 0QF, United Kingdom
Registered number: SC215164

TUV SUD Ltd is a
TÜV SÜD Group Company

Phone: +44 (0) 1489 558100
Fax: +44 (0) 1489 558101
www.tuvsud.com/en

TÜV SÜD
Octagon House
Concorde Way
Fareham
Hampshire PO15 5RL
United Kingdom

Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	12-July-2023
2	Add Changes from the client to the atennna gains	18-July-2023

Table 1

1.2 Introduction

Applicant	Sepura Limited
Manufacturer	Sepura Limited
Model Number(s)	SC2024
Serial Number(s)	1PR002235GK6959
Hardware Version(s)	PLX-2116515-01 (H/W mod state 11)
Software Version(s)	1810 002 07367
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 90: 2021 FCC 47 CFR Part 2: 2021 ISED RSS-119: Issue 12 (05-2015) ISED RSS-GEN: Issue 5 (04-2018) + A2 (02-2021)
Order Number	PLC-PO026057-1
Date	16-June-2023
Date of Receipt of EUT	02-February-2023
Start of Test	16-February-2023
Finish of Test	06-July-2023
Name of Engineer(s)	Neil Rousell
Related Document(s)	ANSI C63.26: 2015

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 2, FCC 47 CFR Part 90, ISED RSS-119 and ISED RSS-GEN is shown below.

Section	Specification Clause				Test Description	Result	Comments/Base Standard
	Part 2	Part 90	RSS-119	RSS-GEN			
Configuration and Mode: TETRA - 450-470 MHz							
2.1	2.1046	90.205	5.4	6.12	Maximum Conducted Output Power	Pass	Test results taken from report 75957666-01
2.2	2.1047	90.207	5.2	-	Types of Emissions	Satisfactory	
2.3	2.1049	90.209	5.5	6.7	Bandwidth Limitations	Pass	
2.4	2.1051	90.210	5.8	6.13	Spurious Emissions at Antenna Terminals	Pass	Test results taken from report 75957666-01
2.5	2.1053	90.210	5.8	6.13	Radiated Spurious Emissions	Pass	Test results taken from report 75957666-01
2.6	-	90.221	5.8.9.1	-	Adjacent Channel Power	Pass	
2.7	-	90.214	5.9	-	Transient Frequency Behaviour	Pass	
2.8	2.1055	90.213	5.3	6.11	Frequency Stability	Pass	Test results taken from report 75958800-01
Configuration and Mode: TETRA - 403-430 MHz							
2.1	2.1046	90.205	5.4	6.12	Maximum Conducted Output Power	Pass	Test results taken from report 75957666-01

Section	Specification Clause				Test Description	Result	Comments/Base Standard
	Part 2	Part 90	RSS-119	RSS-GEN			
2.2	2.1047	90.207	5.2	-	Types of Emissions	Satisfactory	
2.3	2.1049	90.209	5.5	6.7	Bandwidth Limitations	Pass	
2.4	2.1051	90.210	5.8	6.13	Spurious Emissions at Antenna Terminals	Pass	Test results taken from report 75957666-01
2.5	2.1053	90.210	5.8	6.13	Radiated Spurious Emissions	Pass	Test results taken from report 75957666-01
2.7	-	90.214	5.9	-	Transient Frequency Behaviour	Pass	
2.8	2.1055	90.213	5.3	6.11	Frequency Stability	Pass	Test results taken from report 75958800-01

Table 2

NOTE: Whilst the product supports TETRA 403 MHz to 470 MHz the bands permitted by Canada / US are:

- Canada 406.1 MHz to 430 MHz & 450 MHz to 470 MHz
- US 450 MHz to 470 MHz

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)*	The SC2024 hand-portable terminal is a TETRA enabled radio with Bluetooth and Wi-Fi capability
Manufacturer:	Sepura Limited
Model:	SC2024
Part Number:	SC2024
Hardware Version:	PLX-2116515-01 (H/W mod state 11)
Software Version:	1810 002 07367
FCC ID of the product under test – see guidance here	XX6SC2024M
IC ID of the product under test – see guidance here	8739A-SC2024M

Table 3

Intentional Radiators

Technology	TETRA	Bluetooth	WLAN 802.11b	WLAN 802.11g	WLAN 802.11n	BLE
Frequency Range (MHz to MHz)	403 to 470	2402-2480	2412-2462	2412-2462	2412-2462	2402-2480
Conducted Declared Average Output Power (dBm)	35	8	17	17	17	7.5
Antenna Gain (dBi)	≤1.0	2.5	2.5	2.5	2.5	2.5
Supported Bandwidth(s) (MHz) (e.g. 1 MHz, 20 MHz, 40 MHz)	0.025	1	20	20	20	2
Modulation Scheme(s) (e.g. GFSK, QPSK etc)	π/4 DQPSK	GFSK / π/4-DPSK / 8-DPSK	CCK / DBPSK / DQPSK	OFDM (BPSK / QPSK / 16-QAM / 64-QAM)	BPSK / QPSK / 16-QAM / 64-QAM)	GFSK
ITU Emission Designator (see guidance here) (not mandatory for Part 15 devices)	22K0DXW, 20K0DXW	1M01F1D 1M01G1D	19M7G1D	19M7G1D	19M7D1D	1M81F1D
Bottom Frequency (MHz)	403	2402	2412	2412	2412	2402
Middle Frequency (MHz)	436.5	2441	2437	2437	2437	2441
Top Frequency (MHz)	470	2480	2462	2462	2462	2480

Table 4

Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	2480 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	32.768 kHz
Class A Digital Device (Use in commercial, industrial or business environment) ☒ Class B Digital Device (Use in residential environment only) ☐	

Table 5

AC Power Source

AC supply frequency:		Hz
Voltage		V
Max current:		A
Single Phase ☐ Three Phase ☐		

Table 6

DC Power Source

Nominal voltage:	7.4	V
Extreme upper voltage:	7.4	V
Extreme lower voltage:	6.2	V
Max current:	2	A

Table 7

Battery Power Source

Voltage:	7.4	V
End-point voltage:	6.2	V *(Point at which the battery will terminate)*
Alkaline ☐ Leclanche ☐ Lithium ☒ Nickel Cadmium ☐ Lead Acid* ☐ **(Vehicle regulated)*		
Other ☐ Please detail:		

Table 8

Charging

Can the EUT transmit whilst being charged	Yes ☒ No ☐

Table 9

Temperature

Minimum temperature:	-20	°C
Maximum temperature:	+60	°C

Table 10

Cable Loss

Adapter Cable Loss (Conducted sample)	N/A	dB

Table 11

Antenna Characteristics

Antenna connector ☒			State impedance	50	Ohm
Temporary antenna connector ☐			State impedance		Ohm
Integral antenna ☐	Type:		Gain		dBi
External antenna ☒	Type:	300-00499 Extended helical (407-473 MHz)	Gain	≤ 0.8	dBi
External antenna ☒	Type:	300-01031 Quarter wave whip (410-430 MHz)	Gain	≤ 1.0	dBi
External antenna ☒	Type:	300-01032 Quarter wave whip (450-470 MHz)	Gain	≤ 0.3	dBi

For external antenna only:

Standard Antenna Jack ☒ If yes, describe how user is prohibited from changing antenna (if not professional installed):

Equipment is only ever professionally installed ☒

Non-standard Antenna Jack ☐

All part 15 applications will need to show how the antenna gain was derived either from a manufacturer data sheet or a measurement. Where the gain of the antenna is inherently accounted for as a result of the measurement, such as field strength measurements on a part 15.249 or 15.231 device, so the gain does not necessarily need to be verified. However, enough information regarding the construction of the antenna shall be provided. Such information maybe photographs, length of wire antenna etc.

Two TETRA antennas are supplied for radiated tests:

300-00499 (for 406.1-410 MHz and 450-470 MHz testing)
300-01031 (for 410-430 MHz testing

The antenna port on top of the radio is 50 Ohm impendence and can be used for conducted tests

Table 12

Ancillaries (if applicable)

Manufacturer:	Sepura	Part Number:	300-01384
Model:	Programming lead	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-01852
Model:	Standard Battery	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-01853
Model:	High Power Battery	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-01930
Model:	1+1 Charger	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-00389
Model:	RSM	Country of Origin:	Unknown

Table 13

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

Name: Chris Beecham
Position held: Conformance Engineer
Date: 08 February 2023

1.5 Product Information

1.5.1 Technical Description

The SC2024 hand-portable terminal is a TETRA enabled radio with Bluetooth and Wi-Fi capability

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: SC2024, Serial Number: 1PR002235GK6959			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 14

1.8 Test Location

TÜV SÜD conducted the following tests at our Octagon House Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: TETRA - 400 MHz		
Maximum Conducted Output Power	Pier-Angelo Lorusso	UKAS
Types of Emissions	Neil Rousell	UKAS
Bandwidth Limitations	Neil Rousell	UKAS
Spurious Emissions at Antenna Terminals	Pier-Angelo Lorusso	UKAS
Radiated Spurious Emissions	Pier-Angelo Lorusso	UKAS
Transient Frequency Power	Neil Rousell	UKAS
Configuration and Mode: TETRA - 450-470 MHz		
Maximum Conducted Output Power	Pier-Angelo Lorusso	UKAS
Types of Emissions	Neil Rousell	UKAS
Bandwidth Limitations	Neil Rousell	UKAS
Spurious Emissions at Antenna Terminals	Pier-Angelo Lorusso	UKAS
Radiated Spurious Emissions	Pier-Angelo Lorusso	UKAS
Adjacent Channel Power	Neil Rousell	UKAS
Transient Frequency Power	Neil Rousell	UKAS
Frequency Stability	Neil Rousell	UKAS

Table 15

Office Address:

TÜV SÜD
Octagon House
Concorde Way
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 Maximum Conducted Output Power

2.1.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.205
FCC 47 CFR Part 2, Clause 2.1046
ISED RSS-119, Clause 5.4
ISED RSS-GEN, Clause 6.12

2.1.2 Equipment Under Test and Modification State

SC2024, S/N: 1PR002235GK6959 - Modification State 0

2.1.3 Date of Test

26-April-2023

2.1.4 Test Method

The test was applied in accordance with the test method requirements of FCC 47 CFR Part 90, ISED RSS-119, and ISED RSS-GEN with reference to ANSI C63.26, clause 5.2.4.3.3.

The EUT was configured to transmit on maximum power on the bottom, middle and top channels in burst mode. The EUT was connected to a spectrum analyser via a cable and 30 dB of attenuation. The path loss was measured using a network analyser and entered as a reference level offset in the spectrum analyser including the manufacturers declared maximum antenna gain. The RBW of the spectrum analyser was set to 30 kHz and the video bandwidth to 100 kHz with the trace set to max hold using a RMS Max detector and the result was recorded.

2.1.5 Environmental Conditions

Ambient Temperature	21.3 °C
Relative Humidity	34.3 %

2.1.6 Test Results

TETRA 403 MHz to 430 MHz

Parameter	406.125 MHz	418.050 MHz	429.975 MHz
Conducted Output Power (dBm)	35.23	35.19	35.27
Manufacturer Declared Power (dBm)	35.0	35.0	35.0
Δ from manufacturer Power (dB)	0.23	0.19	0.27
Antenna Gain (dBd)	-1.35	-1.15	-1.15
ERP (dBm)	33.88	34.04	34.12

Table 16 - ERP

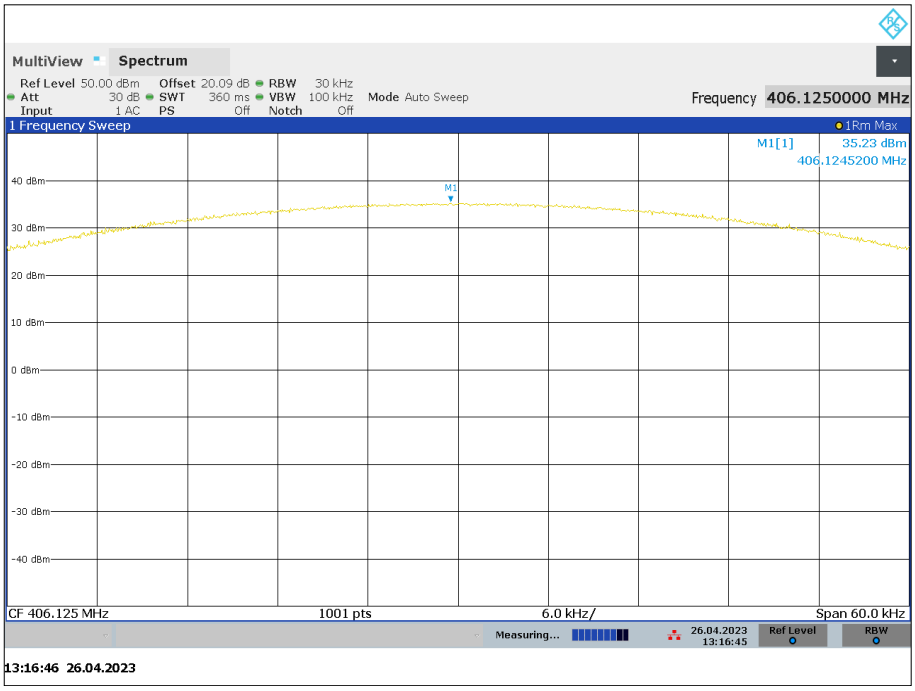

Figure 1 - 406.125 MHz

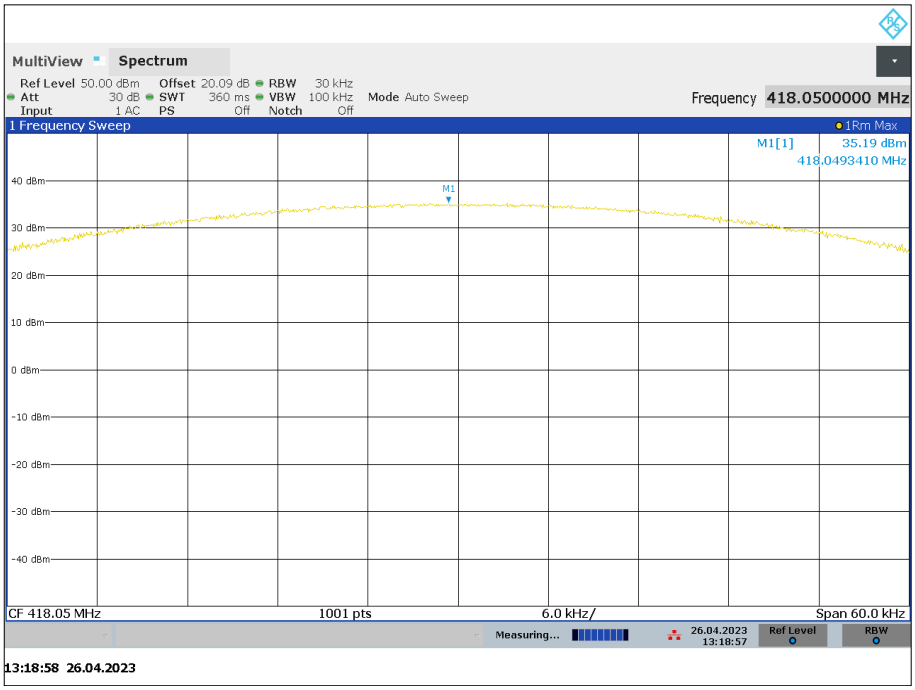

Figure 2 - 418.050 MHz

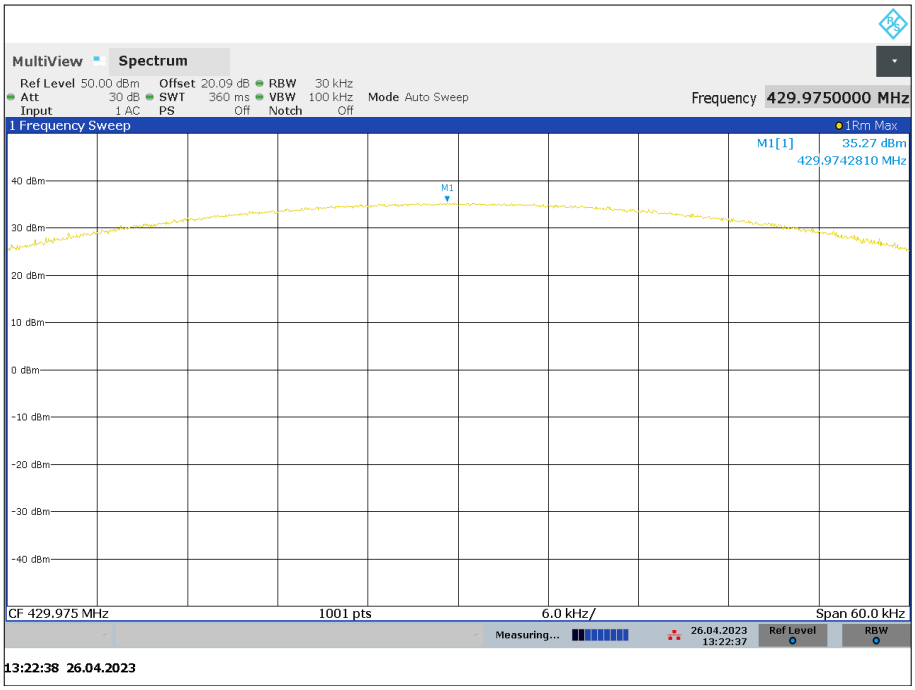

Figure 3 - 429.975 MHz

TETRA 450 MHz to 470 MHz

Parameter	450.025 MHz	460.025 MHz	469.975 MHz
Conducted Output Power (dBm)	35.24	35.28	35.25
Manufacturer Declared Power (dBm)	35.0	35.0	35.0
Δ from manufacturer Power (dB)	0.24	0.28	0.25
Antenna Gain (dBd)	-1.35	-1.35	-1.35
ERP (dBm)	33.89	33.93	33.90

Table 17 - ERP

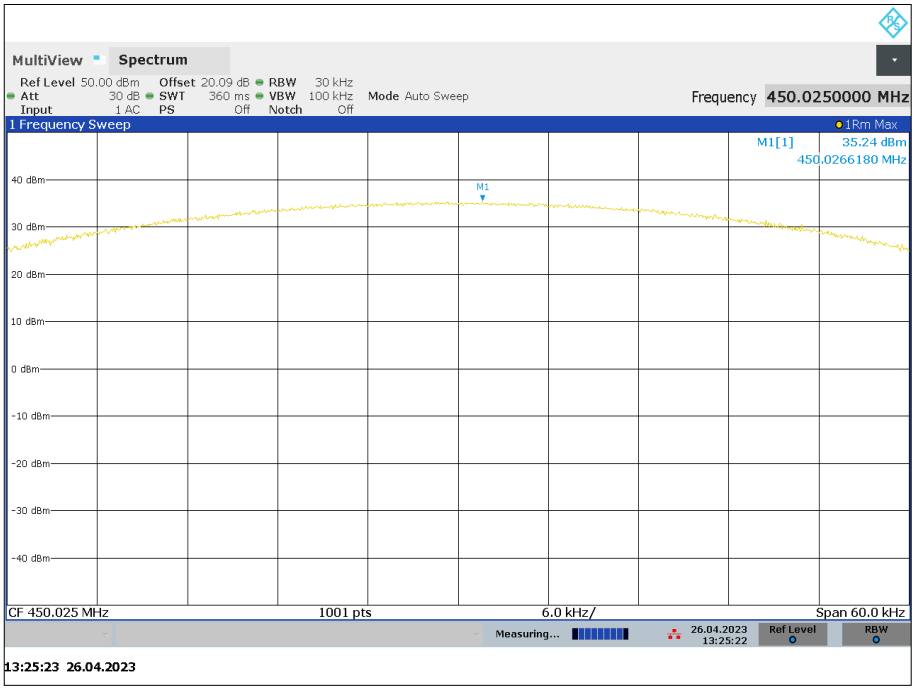

Figure 4 - 450.025 MHz

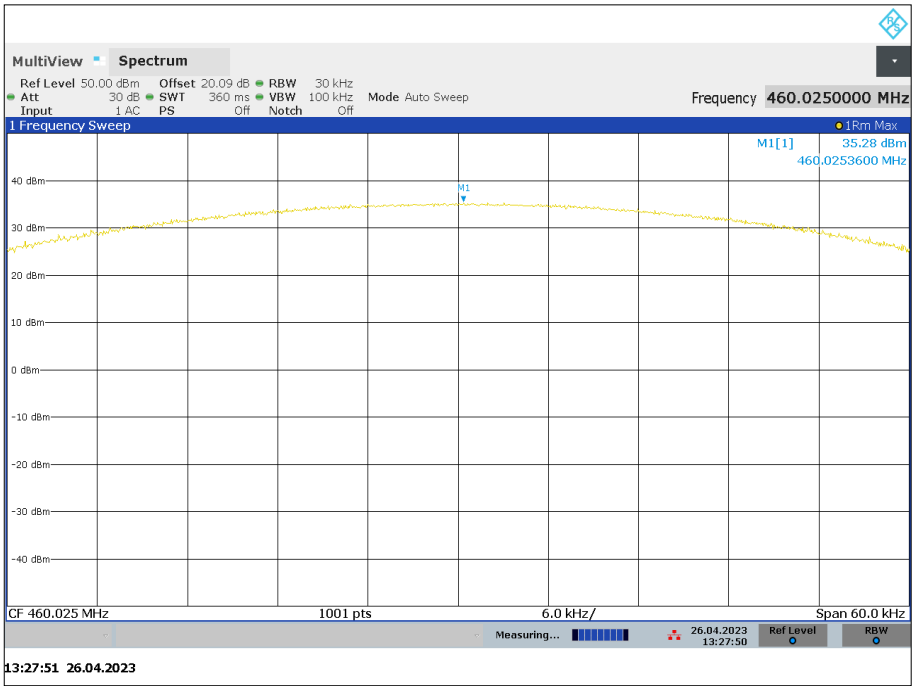

Figure 5 - 460.025 MHz

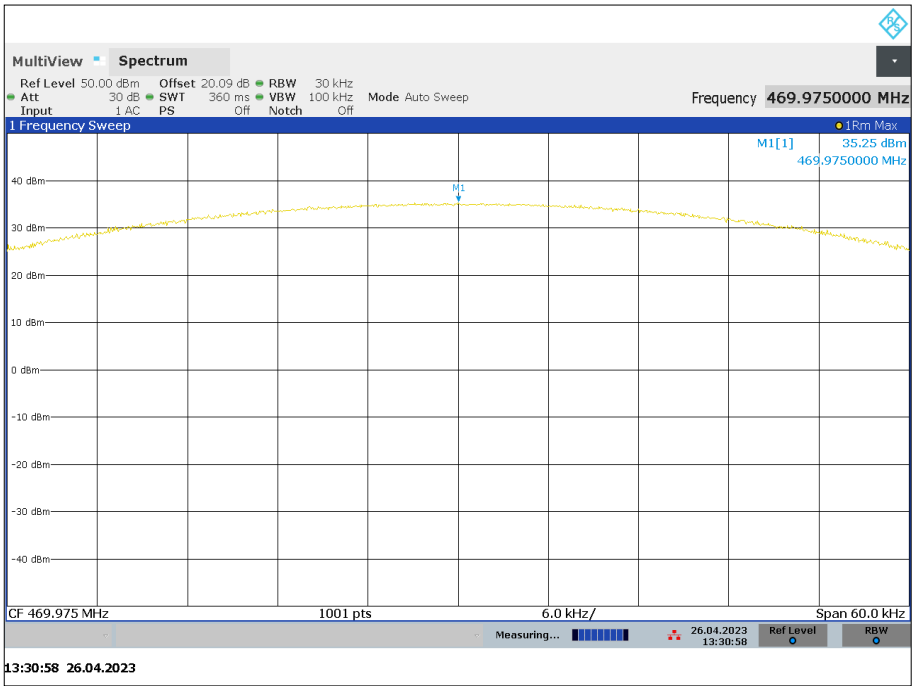

Figure 6 - 469.975 MHz

FCC 47 CFR Part 90, Limit Clause 90.205

Frequency (MHz)	Limit
< 25	1000 W
25 to 50	300 W
72 to 76	300 W
150 to 174	Refer to 90.205 (d) of the specification
217 to 220	Refer to 90.259 of the specification
220 to 222	Refer to 90.729 of the specification
421 to 430	Refer to 90.279 of the specification
450 to 470	Refer to 90.205 (h) of the specification
470 to 512	Refer to 90.307 and 90.309 of the specification
758 to 775 and 788 to 805	Refer to 90.541 and 90.542 of the specification
806 to 824, 851 to 869, 869 to 901 and 935 to 940	Refer to 90.635 of the specification
902 to 927.25	LMS systems operating pursuant to subpart M of the specification: 30 W
927.25 to 928	LMS equipment: 300 W
929 to 930	Refer to 90.494 of the specification
1427 to 1429.5 and 1429.5 to 1432	Refer to 90.259 of the specification
2450 to 2483.5	5 W
4940 to 4990	Refer to 90.1215 of the specification
5850 to 5925	Refer to subpart M of the specification
All other frequency bands	On a case-by-case basis

Table 18 - FCC Limits for Maximum ERP

90.205 (s): The output power shall not exceed by more than 20 percent either the output power shown in the Radio Equipment List [available in accordance with 90.203(a)(1) for transmitters included in this list or when not so listed, the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

ISED RSS-119, Limit Clause 5.4

The output power shall be within ±1 dB of the manufacturer's rated power listed in the equipment specifications.

Frequency (MHz)	Transmitter Output Power (W)	
	Base/Fixed Equipment	Mobile Equipment
27.41 to 28 and 29.7 to 50	300	30
72 to 76	No Limit	1
138 to 174	111100	60
217 to 217 and 219 to 220	See SRSP-512 for ERP limit	30*
220 to 222	110	50
406.1 to 430 and 450 to 470	See SRSP-511 for ERP limit	60
768 to 776 and 798 to 806	110	30 3 W ERP for portable equipment
806 to 821, 851 to 866, 821 to 824 and 866 to 869	110	30
896 to 901 and 935 to 940	110	60
929 to 930 and 931 to 932	110	30
928 to 929, 952 to 953, 932 to 932.5 and 941 to 941.5	110	30
932.5 to 935 ad 941.5 to 944	110	30
*Equipment is generally authorised for effective radiated power (ERP) of less than 5 W.		

Table 19 - ISED for Transmitter Output Power

2.1.7 Test Location and Test Equipment Used

This test was carried out in RF Chamber 11.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Hygrometer	Rotronic	A1	2138	12	28-Sep-2023
Receiver	Rohde & Schwarz	ESW44	5084	12	17-May-2023
Attenuator 5W 20dB DC-18GHz	Aaren	AT40A-4041-D18-20	5500	12	04-May-2023
Cable (SMA to SMA 1m)	Junkosha	MWX221-01000AMSAMS/A	5516	12	23-Oct-2023

Table 20

2.2 Types of Emissions

2.2.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1047
FCC 47 CFR Part 90, Clause 90.207
ISED RSS-119, Clause 5.2

2.2.2 Equipment Under Test and Modification State

SC2024, S/N: 1PR002235GK6959 - Modification State 0

2.2.3 Date of Test

05-July-2023

2.2.4 Test Method

This test was performed using a modulated carrier output from the EUT and measured on a spectrum analyser. The trace plots were recorded.

2.2.5 Environmental Conditions

Ambient Temperature	22.3 °C
Relative Humidity	53.3 %

2.2.6 Test Results

TETRA – 450 MHz to 470 MHz

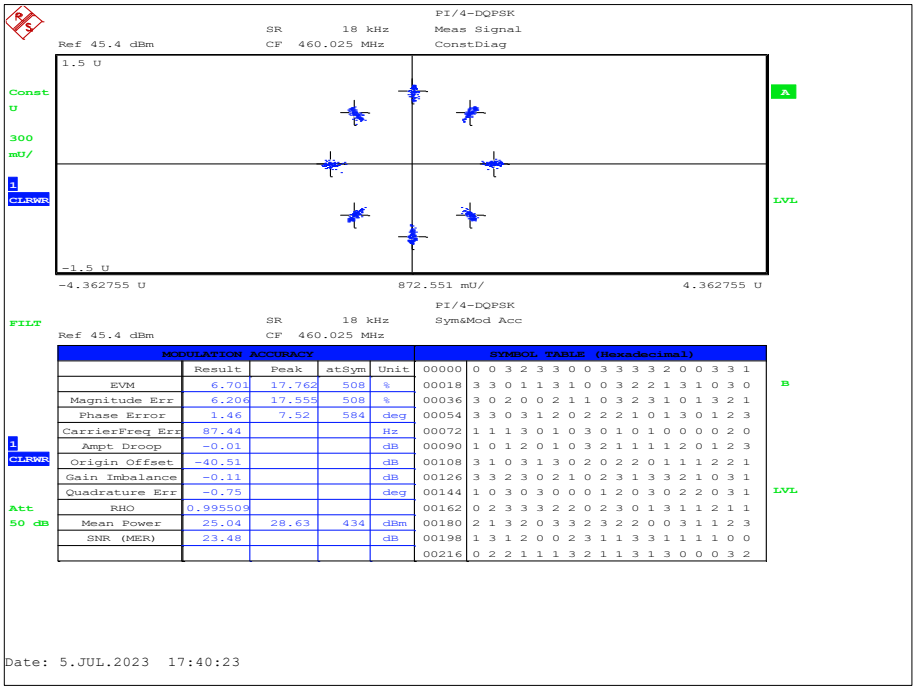

Figure 7 - Modulation Accuracy

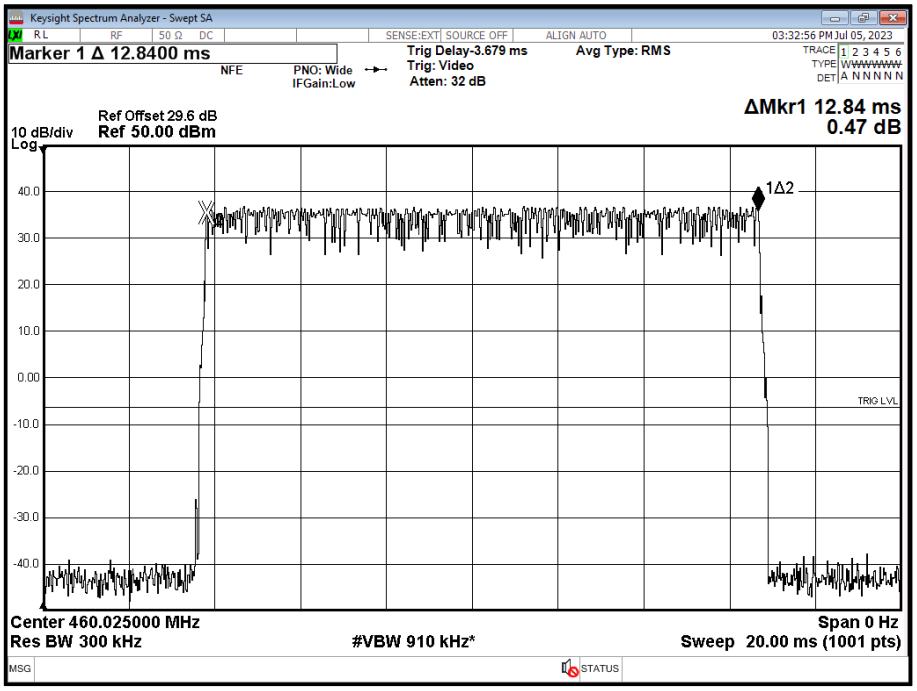

Figure 8 - Burst Length

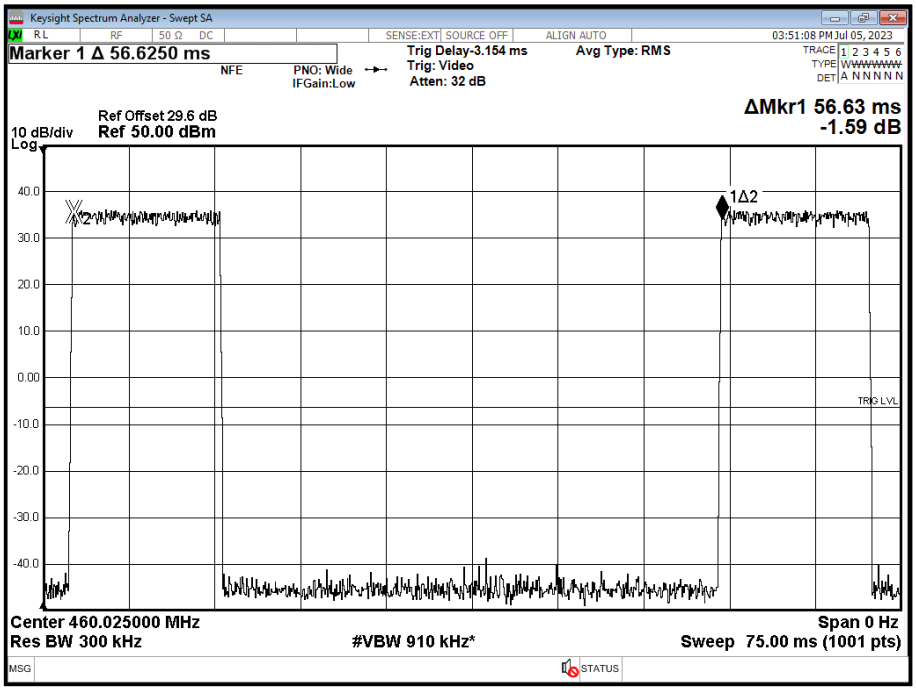

Figure 9 - Burst Duty Cycle

TETRA – 403 MHz to 430 MHz

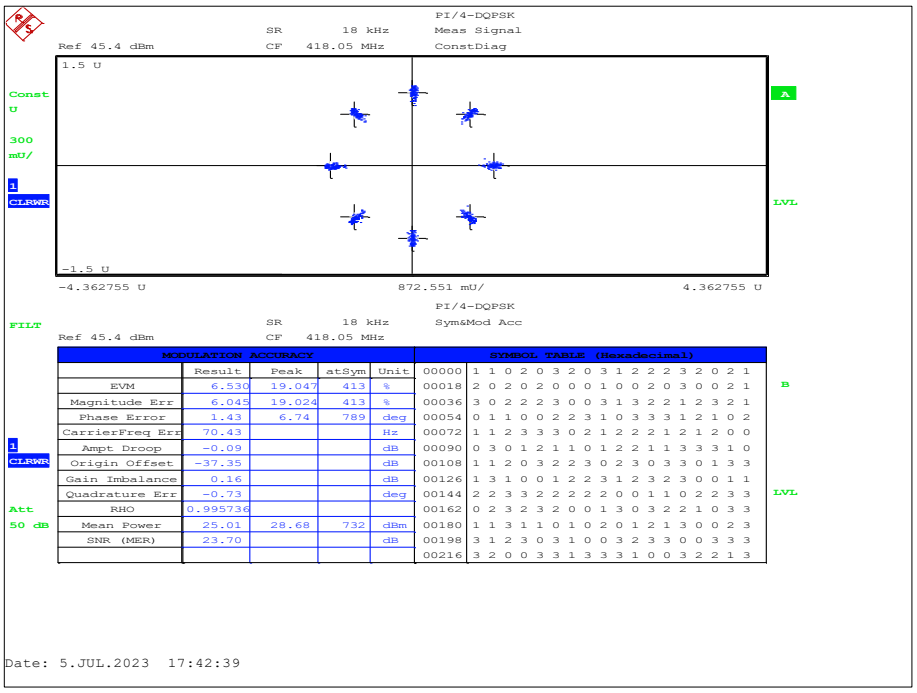

Figure 10 - Modulation Accuracy

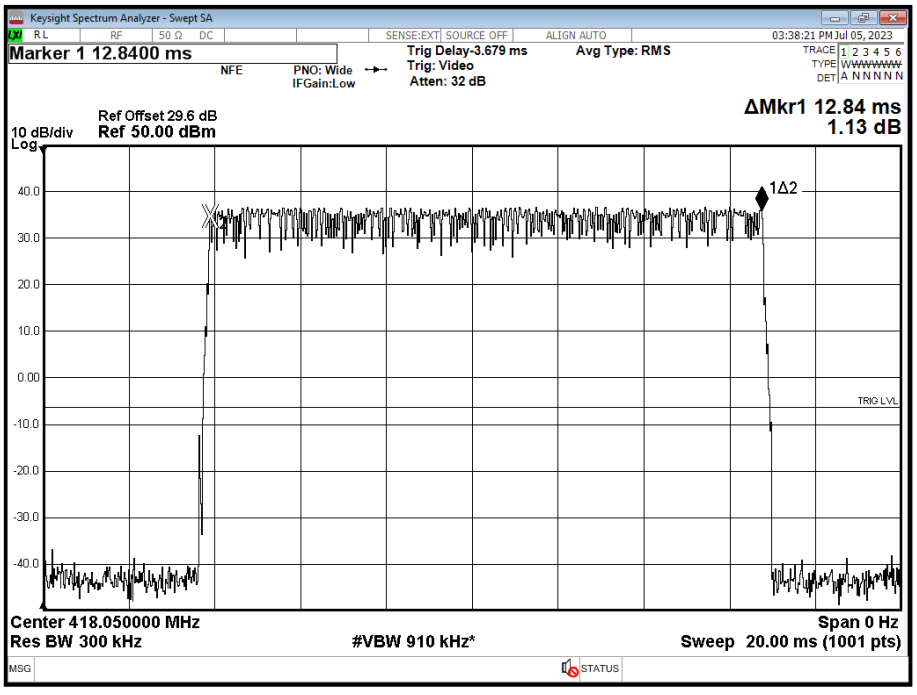

Figure 11 - Burst length

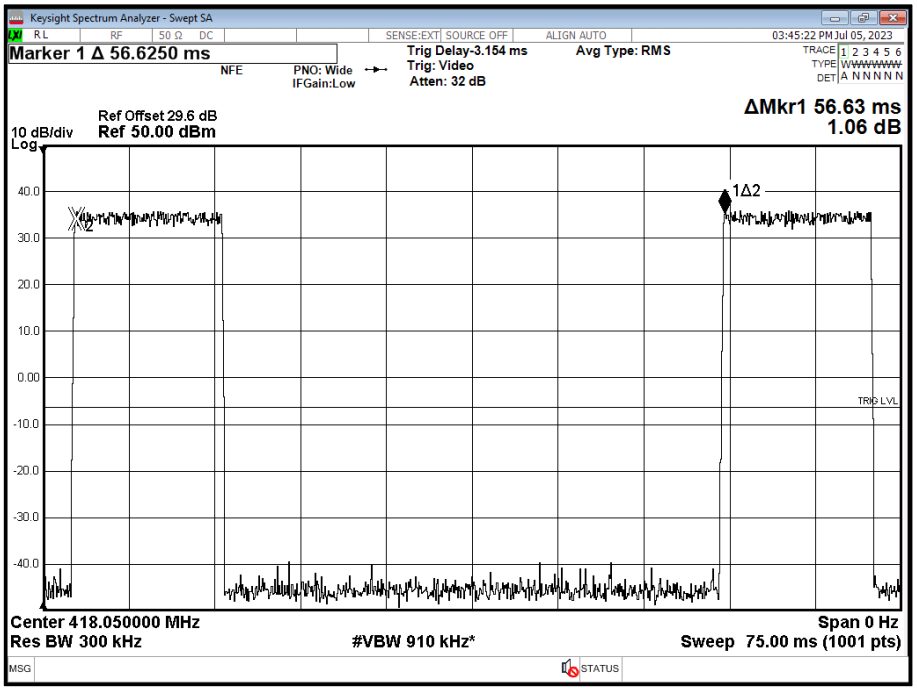

Figure 12 - Burst Duty Cycle

FCC 47 CFR Part 90, Limit Clause 90.207

As per FCC Part 90.207 (b) through (n).

FCC 47 CFR Part 2, Limit Clause 2.1047

Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

ISED RSS-119, Limit Clause 5.3

Equipment that operates in the bands 768-776 MHz and 798-806 MHz shall use digital modulation. Mobile and portable transmitters that operate in these bands may have analogue modulation capability only as a secondary mode in addition to their primary digital mode. However, mobile and portable transmitters that operate only on the low-power channels as defined in SRSP-511 may employ any type of modulation.

2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
HygroPalm	Rotronic	HygroPalm 0	3484	12	30-Aug-2023
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	09-May-2024
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	13-Jul-2023
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	16-Jan-2024
Attenuator 5W 30dB DC-18GHz	Aaren	AT40A-4041-D18-30	5502	12	14-Jun-2024

Table 21

2.3 Bandwidth Limitations

2.3.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049
FCC 47 CFR Part 90, Clause 90.209
ISED RSS-119, Clause 5.5
ISED RSS-GEN, Clause 6.7

2.3.2 Equipment Under Test and Modification State

SC2024, S/N: 1PR002235GK6959 - Modification State 0

2.3.3 Date of Test

05-July-2023

2.3.4 Test Method

The test was applied in accordance with the test method requirements of FCC 47 CFR Part 90, Industry Canada RSS-119, and ISED RSS-GEN with reference to ANSI C63.26, Clause 5.4.

2.3.5 Environmental Conditions

Ambient Temperature	22.3 °C
Relative Humidity	53.3 %

2.3.6 Test Results

TETRA – 403 MHz to 430 MHz

99% Occupied Bandwidth (kHz)		
406.125 MHz	418.050 MHz	429.975 MHz
21.25	21.25	21.22

Table 22

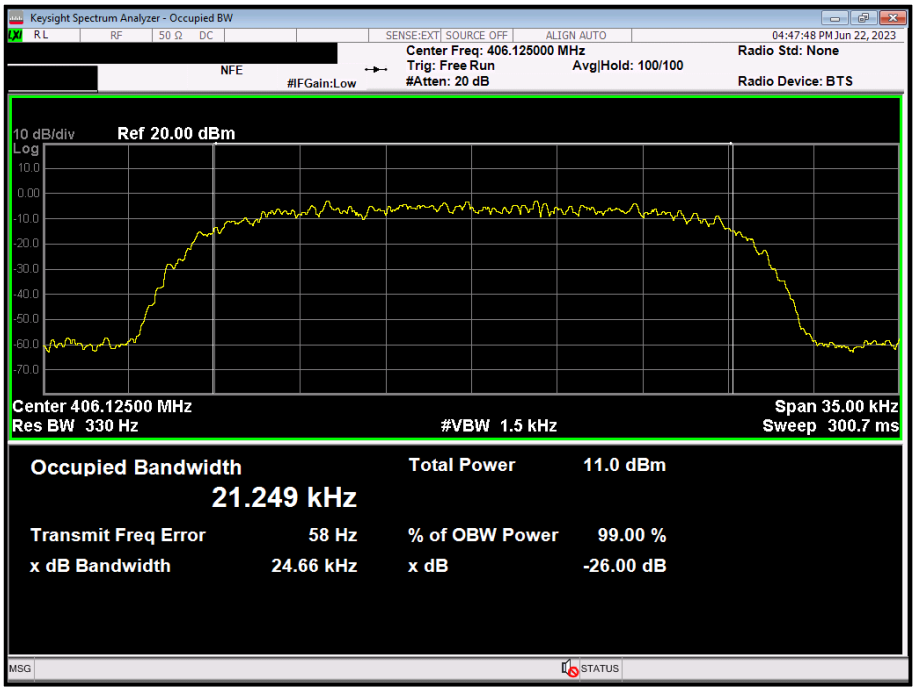

Figure 13 - 406.125 MHz

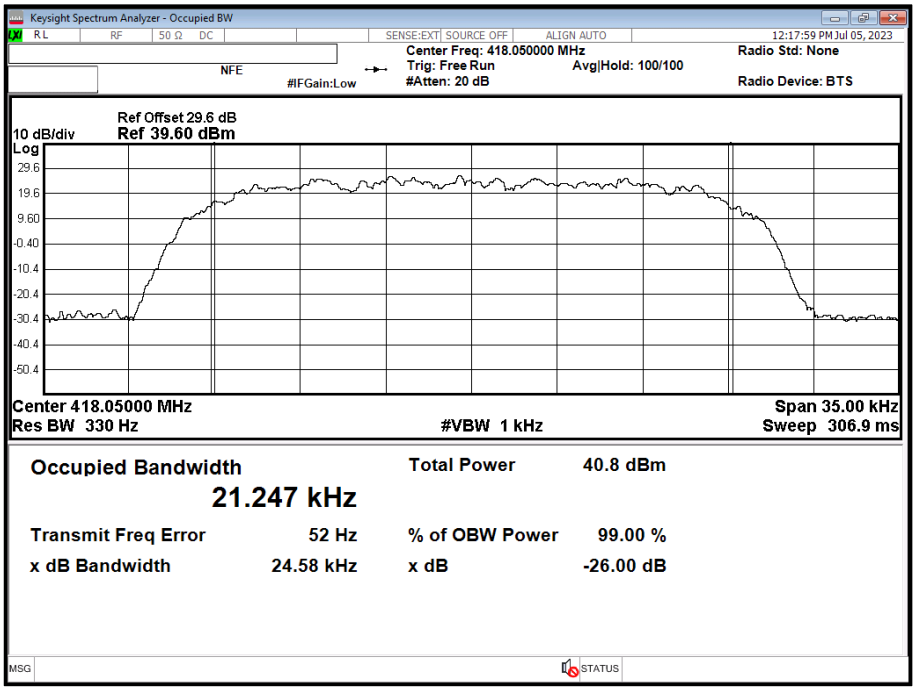

Figure 14 - 418.050 MHz

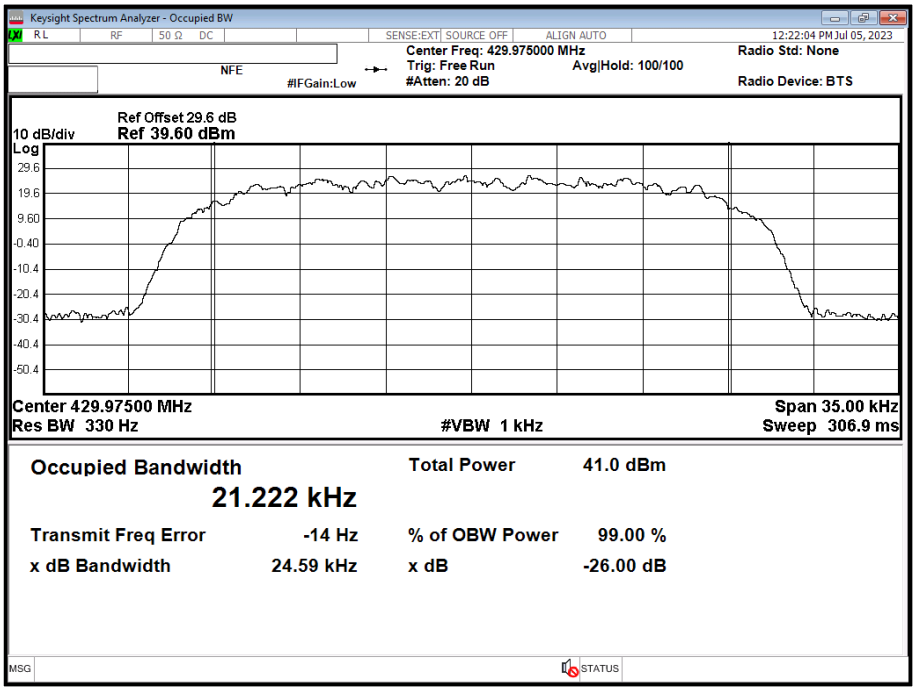

Figure 15 - 429.975 MHz

TETRA – 450 MHz to 470 MHz

450.025 MHz	460.025 MHz	469.975 MHz
21.19 kHz	21.24 kHz	21.21 kHz

Table 23

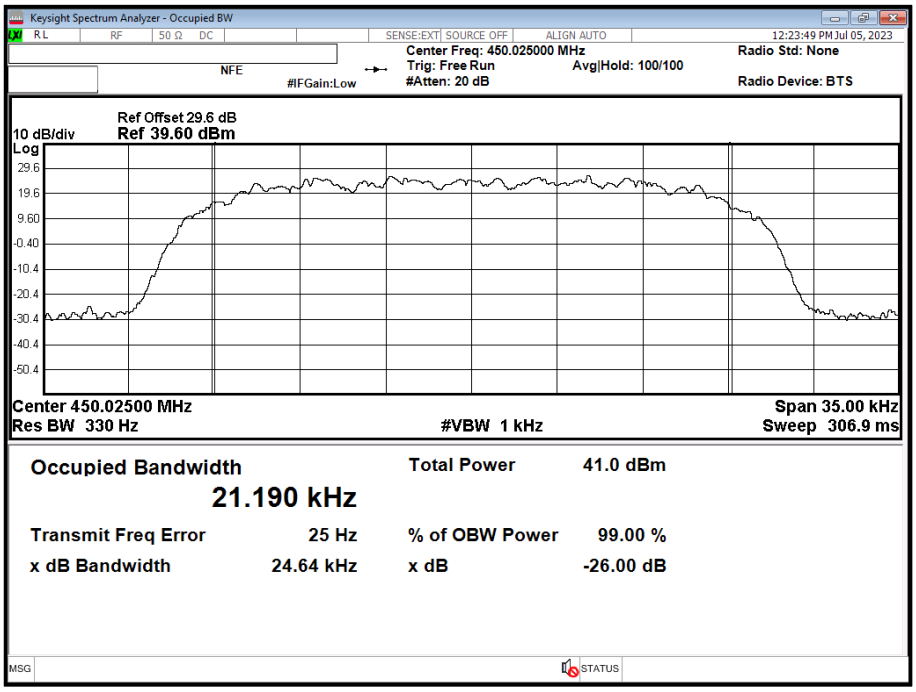

Figure 16 - 450.025 MHz

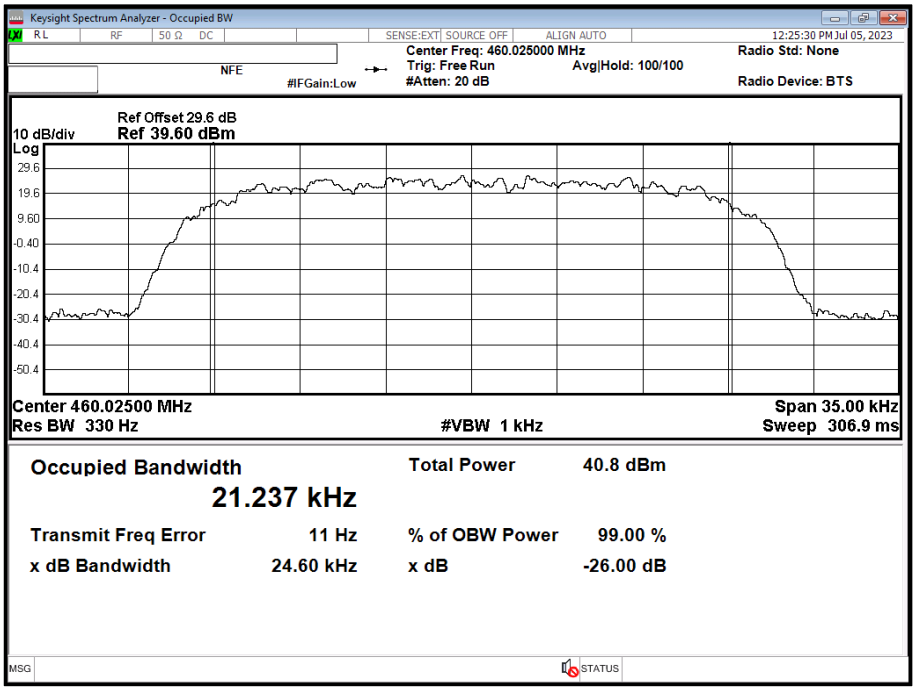

Figure 17 - 460.025 MHz

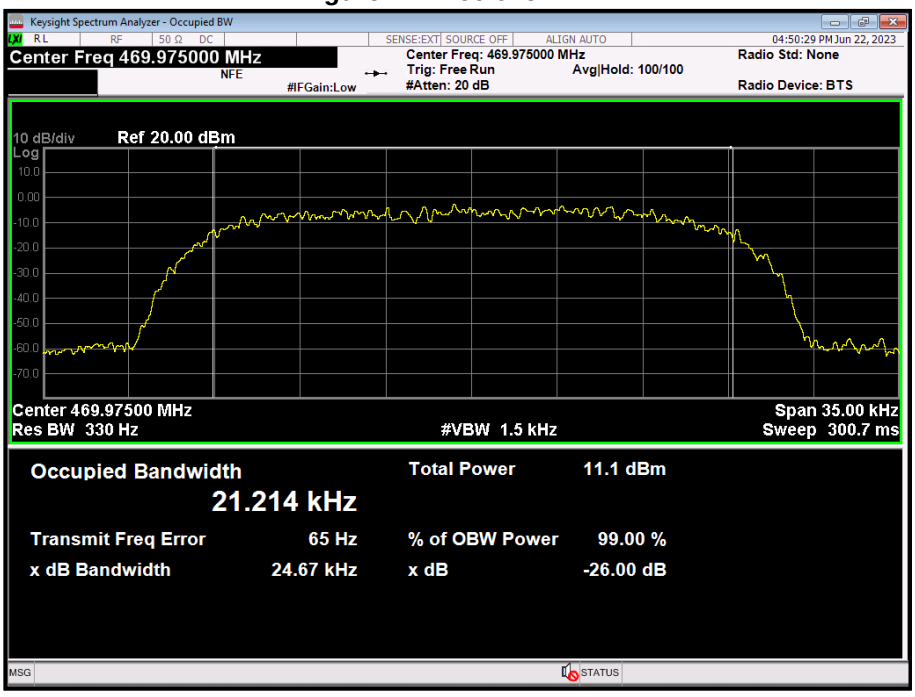

Figure 18 - 469.975 MHz

FCC 47 CFR Part 90, Limit Clause 90.209

< 0.022 MHz

ISED RSS-119, Limit Clause 5.5

The maximum permissible occupied bandwidth shall not exceed the authorized bandwidth specified in table 3 of the test specification for the equipment's frequency band as specified below.

0.022 MHz

2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
HygroPalm	Rotronic	HygroPalm 0	3484	12	30-Aug-2023
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	13-Jul-2023
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	16-Jan-2024
Attenuator 5W 30dB DC-18GHz	Aaren	AT40A-4041-D18-30	5502	12	14-Jun-2024

Table 24

2.4 Spurious Emissions at Antenna Terminals

2.4.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 90, Clause 90.210
ISED RSS-119, Clause 5.8
ISED RSS-GEN, Clause 6.13

2.4.2 Equipment Under Test and Modification State

SC2024, S/N: 1PR002235GK6959 - Modification State 0

2.4.3 Date of Test

04-April-2023 to 25-May-2023

2.4.4 Test Method

For emissions where the frequency is removed less than 250 % of the authorised bandwidth measurements were performed conducted as follows:

The EUT was connected to a spectrum analyser via a cable and attenuator. The path loss between the EUT and analyser was calibrated using a network analyser and entered into the spectrum analyser as a reference level offset. The reference level for the mask was established with an RBW approximately 2 or 3 times the emission bandwidth. The RBW was then reduced to at least 1 % of the emission bandwidth, with a VBW of 3 times RBW.

For compliance with RSS-119 clause 5.8, emission mask Y was applied for both 406.1-430 MHz and 450-470 MHz. For compliance with FCC Part 90.210, emission mask B was applied in the 450-470 MHz range only.

For emissions where the frequency is removed more than 250 % of the authorized bandwidth measurements were performed both conducted and radiated as follows:

Conducted: A network analyser was used to measure the path loss and the worst case was entered as a reference level offset into the spectrum analyser. The EUT was connected to a spectrum analyser via an attenuator, filter and cable. Between 600 MHz and 5 GHz a 600 MHz high pass filter was used. The spectrum analyser was configured with an RBW of 1 kHz for 9kHz to 150kHz, 10kHz for 150kHz to 30MHz, 100kHz for 30 to 1MHz and 1 MHz for frequencies greater than 1 GHz with the trace set to max hold using a peak detector.

In the 450-470 MHz band, the limit in RSS-119, emission mask Y limit of “55 + 10 log10(p)” was considered the most stringent limit and therefore shown on the plots in the section below.

2.4.5 Environmental Conditions

Ambient Temperature	20.3 - 23.0 °C
Relative Humidity	30.7 - 42.9 %

2.4.6 Test Results

TETRA - 403 MHz to 430 MHz

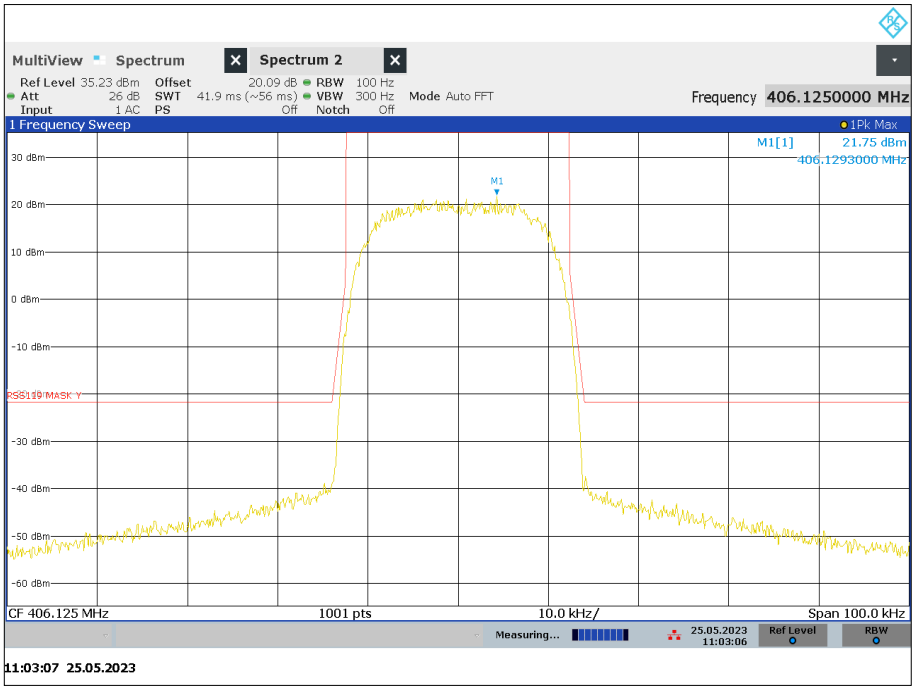

Figure 19 - 406.125 MHz, Transmitter Mask Y

Figure 20 - 418.050 MHz, Transmitter Mask Y

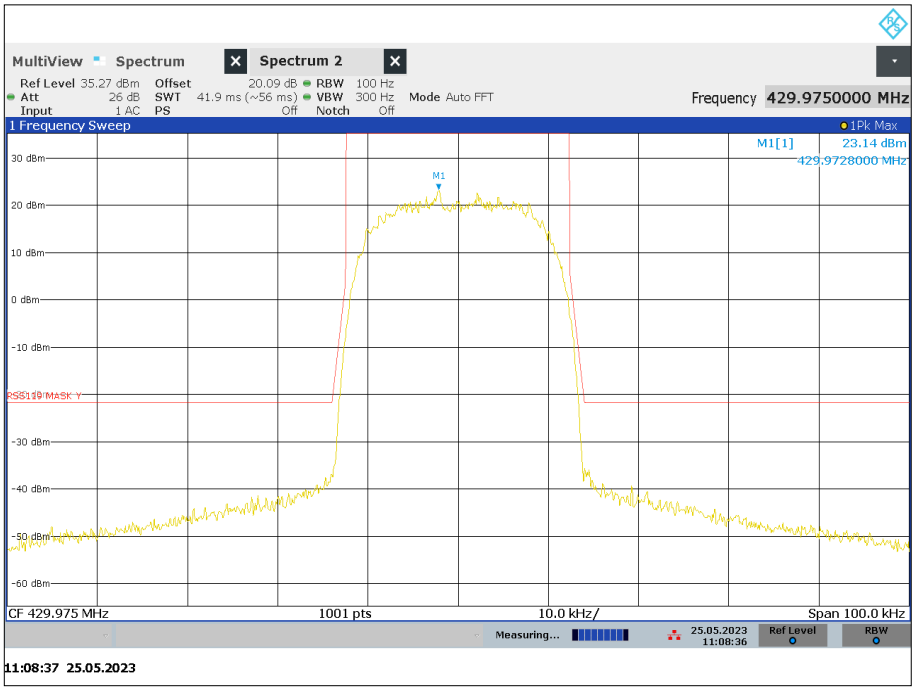

Figure 21 - 429.975 MHz, Transmitter Mask Y

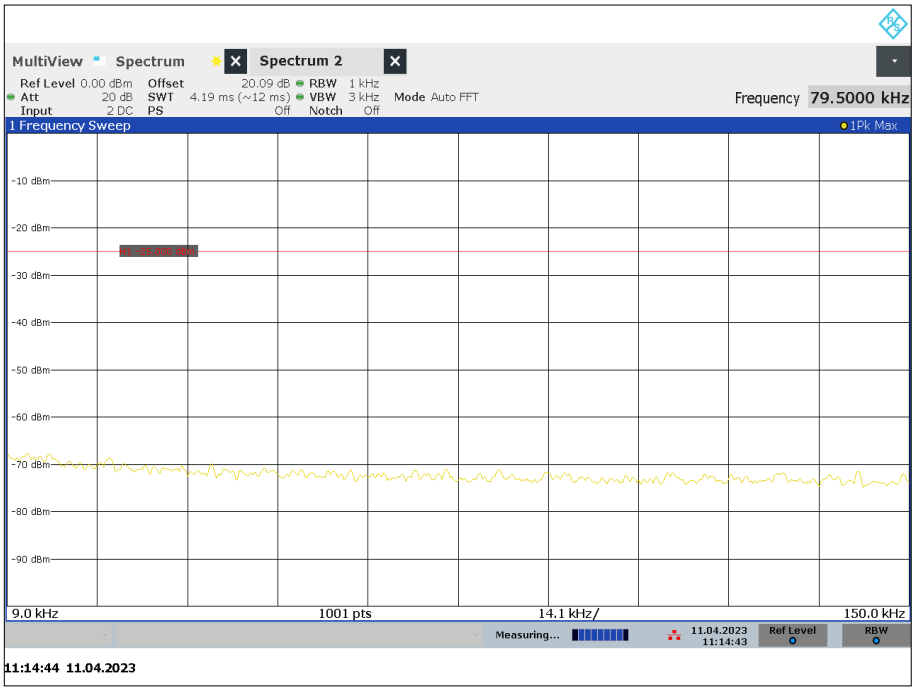

Figure 22 - 406.125 MHz, 9 kHz to 150 kHz Mask Y

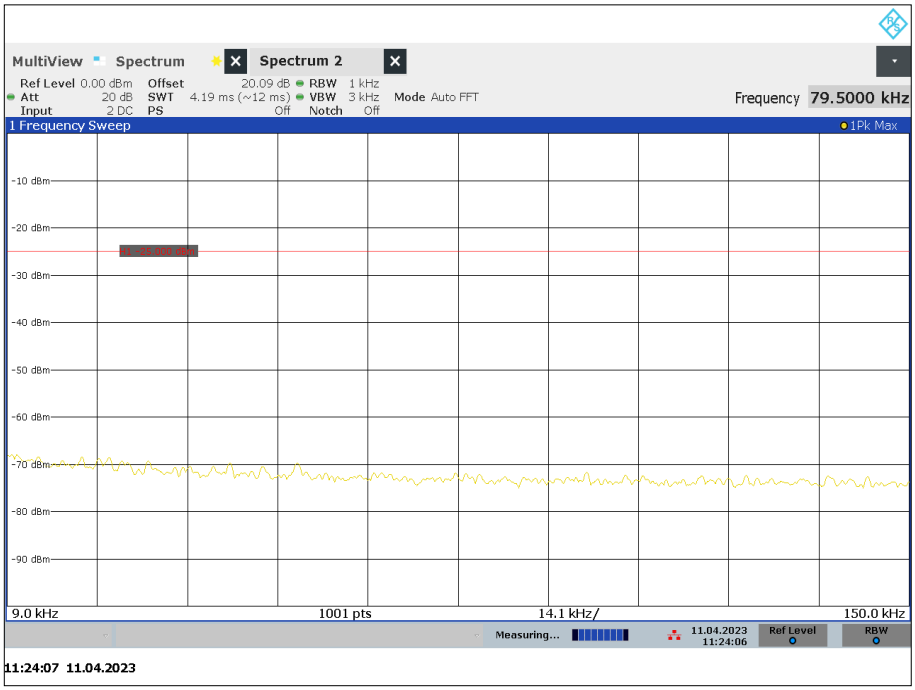

Figure 23 - 418.050 MHz, 9 kHz to 150 kHz Mask Y

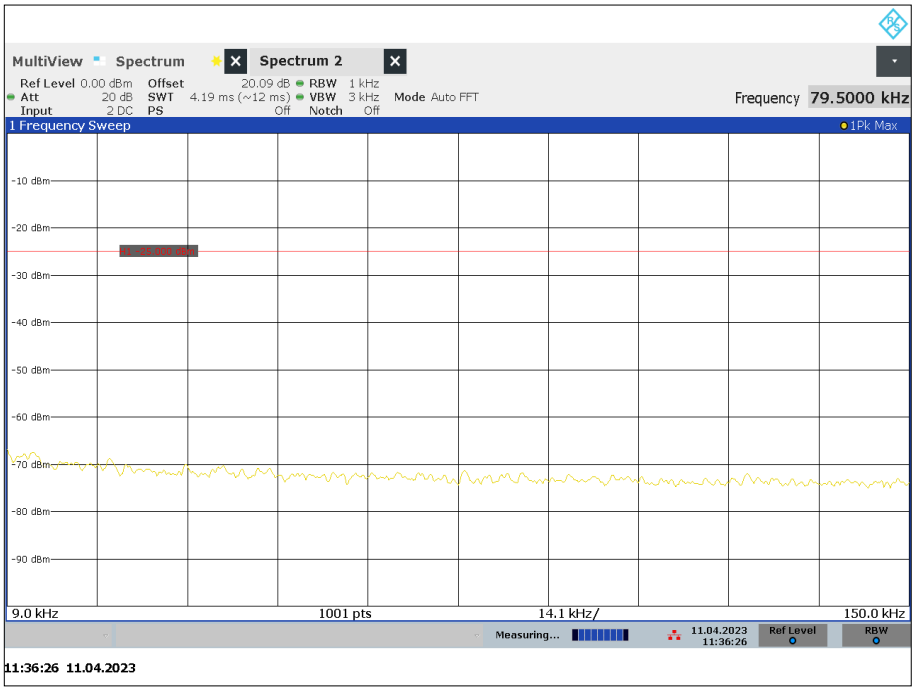

Figure 24 - 429.975 MHz - 9 kHz to 150 kHz Mask Y

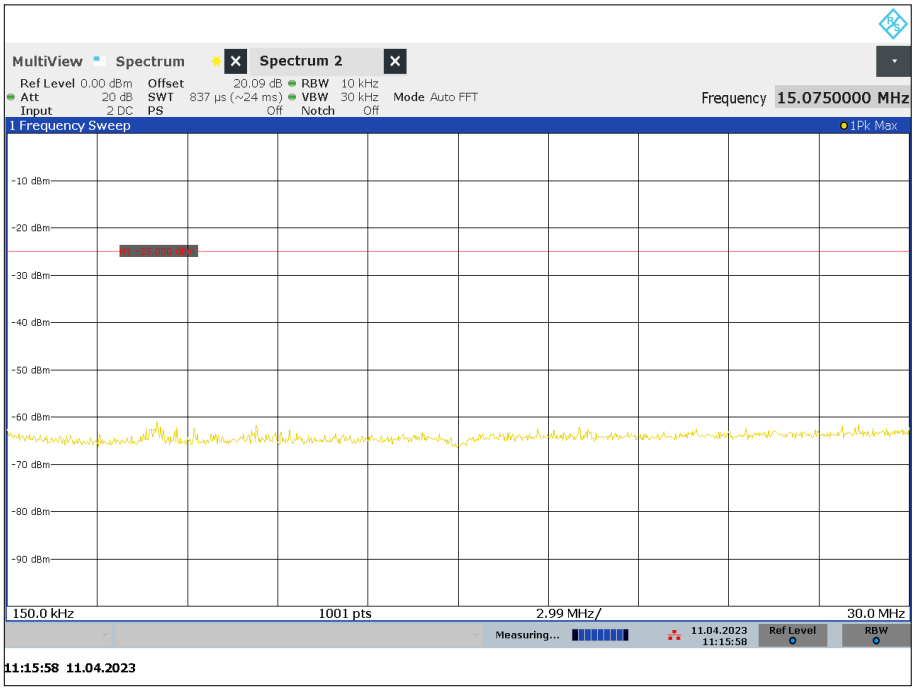

Figure 25 - 406.125 MHz, 150 kHz to 30 MHz Mask Y

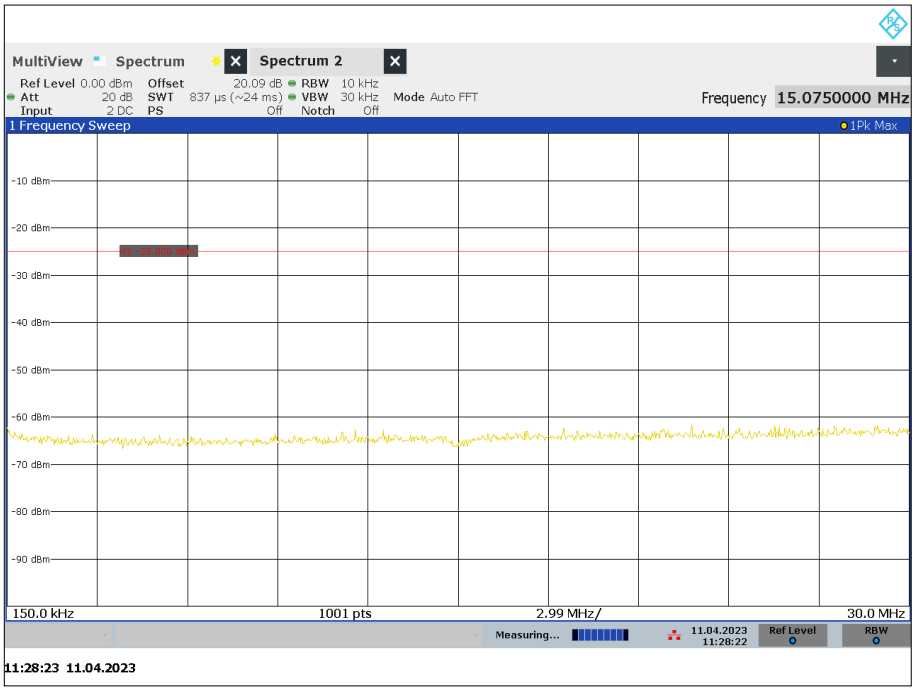

Figure 26 - 418.050 MHz, 150 kHz to 30 MHz Mask Y

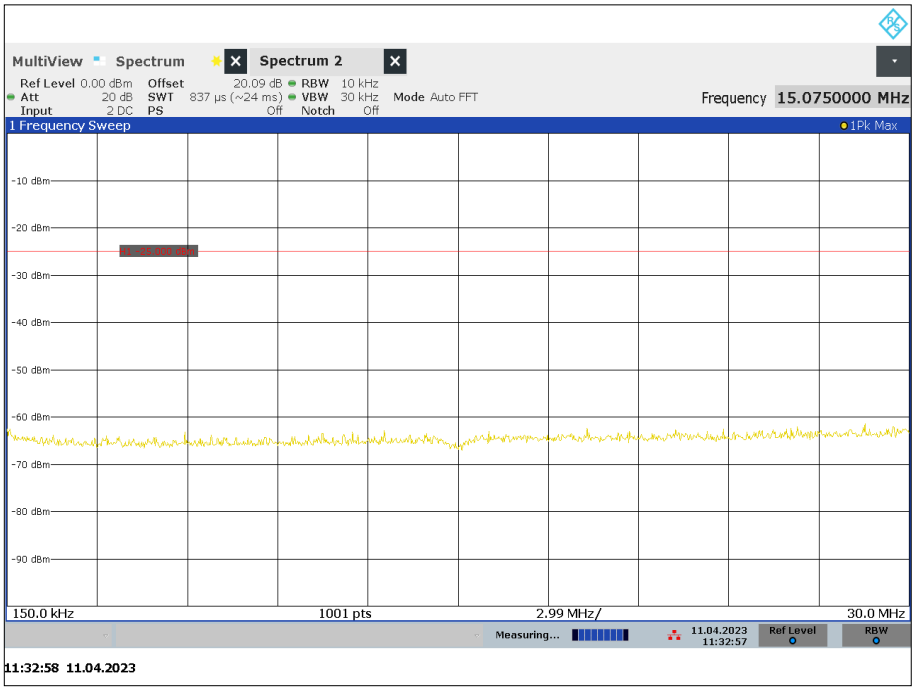

Figure 27 - 429.975 MHz - 150 kHz to 30 MHz Mask Y

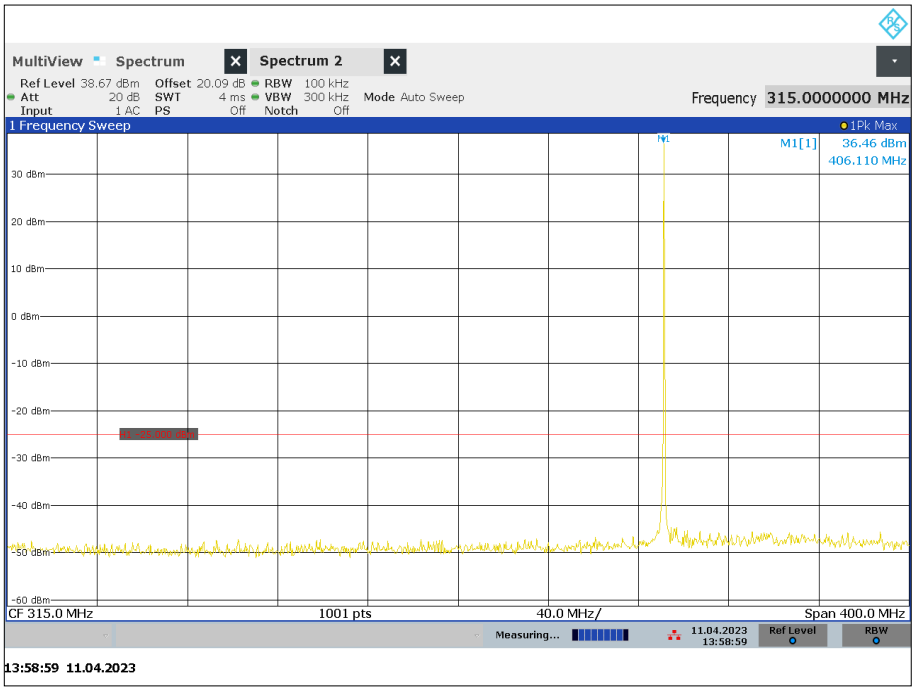

Figure 28 - 406.125 MHz, 30 MHz to 600 MHz Mask Y

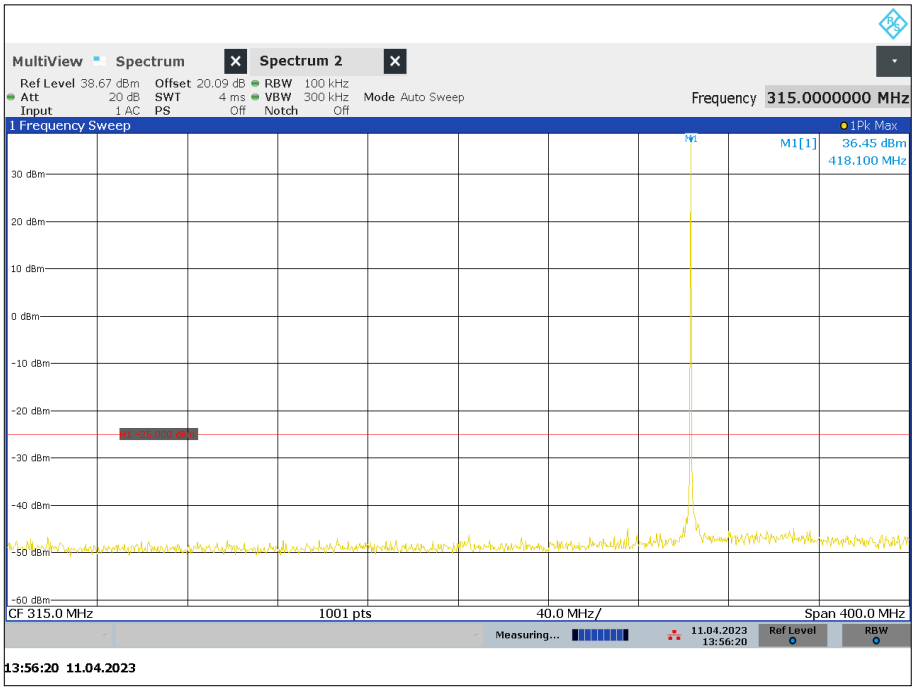

Figure 29 - 418.050 MHz, 30 MHz to 600 MHz Mask Y

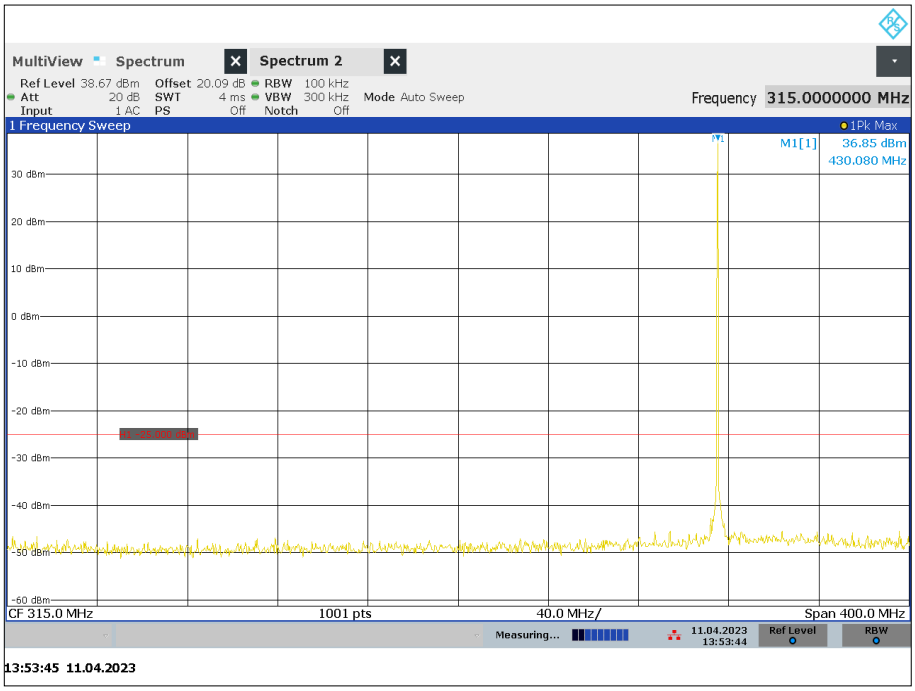

Figure 30 - 429.975 MHz - 30 MHz to 600 MHz Mask Y

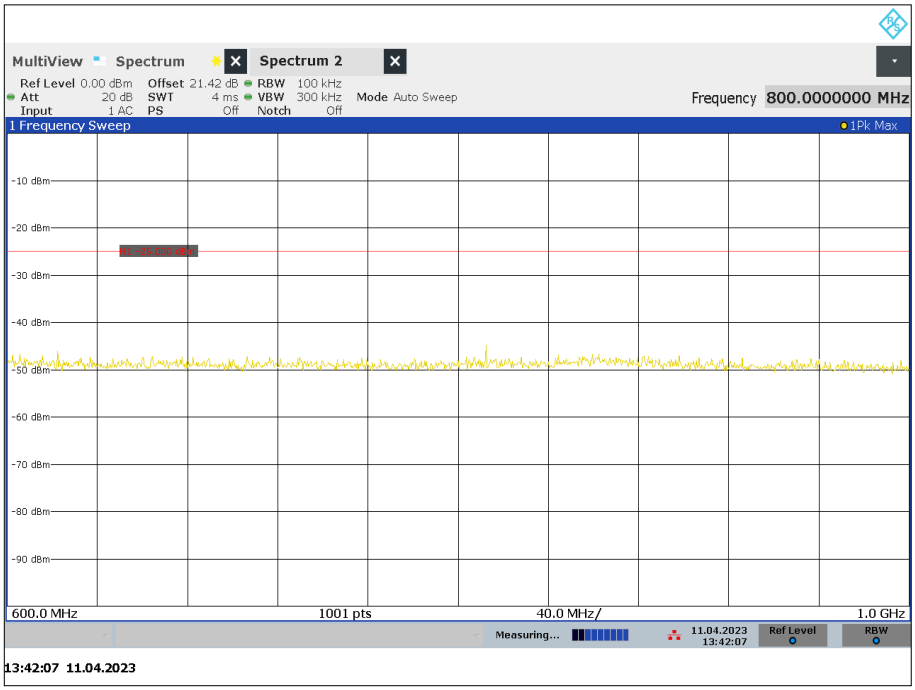

Figure 31 - 406.125 MHz, 600 MHz to 1 GHz Mask Y

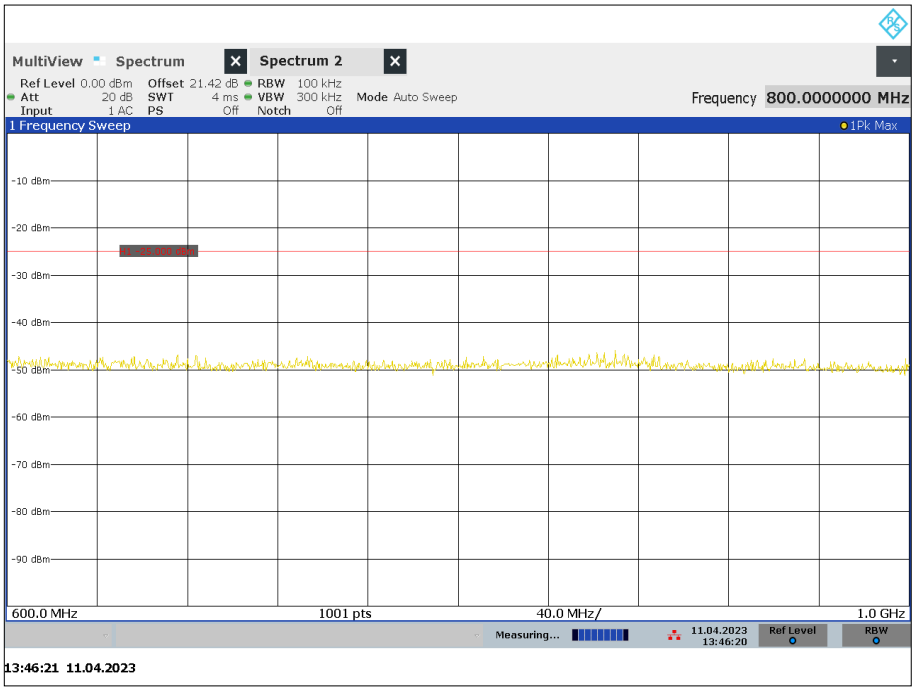

Figure 32 - 418.050 MHz, 600 MHz to 1 GHz Mask Y

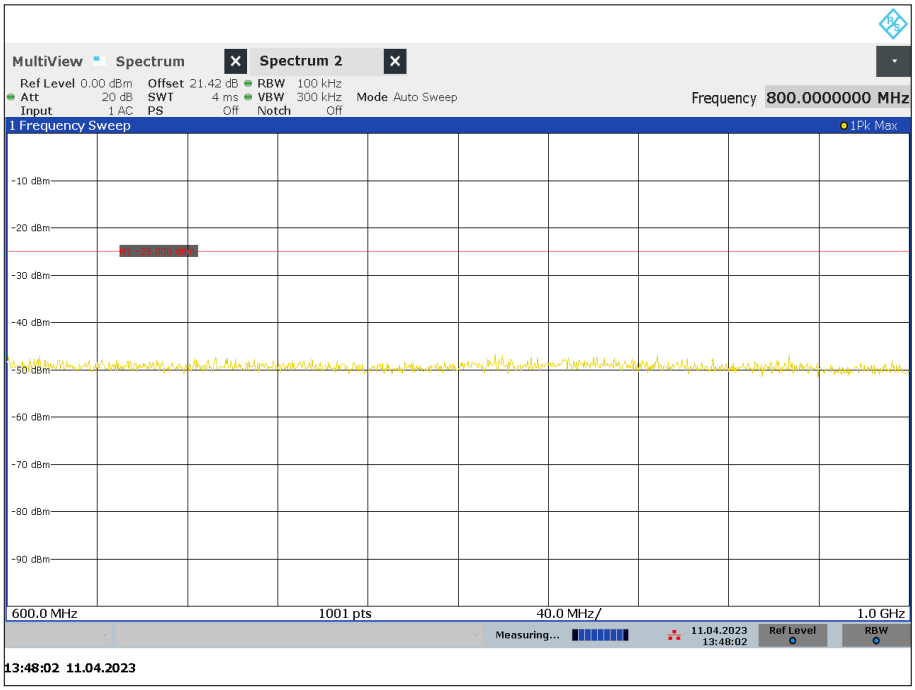

Figure 33 - 429.975 MHz - 600 MHz to 1 GHz Mask Y

Figure 34 - 406.125 MHz, 1 GHz to 5 GHz Mask Y

Figure 35 - 418.050 MHz, 1 GHz to 5 GHz Mask Y

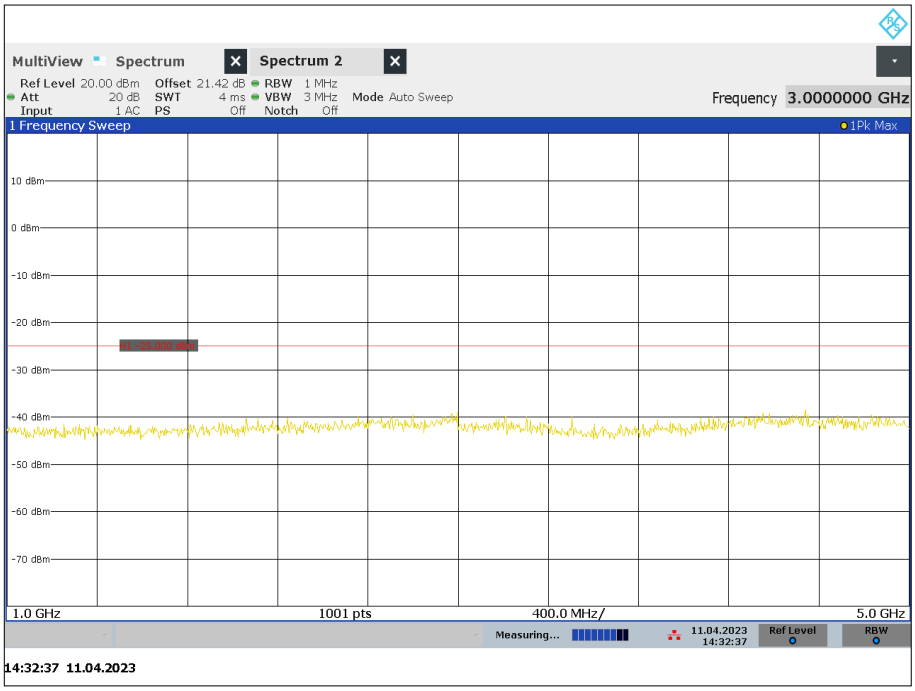

Figure 36 - 429.975 MHz - 1 GHz to 5 GHz Mask Y

TETRA - 450 MHz to 470 MHz

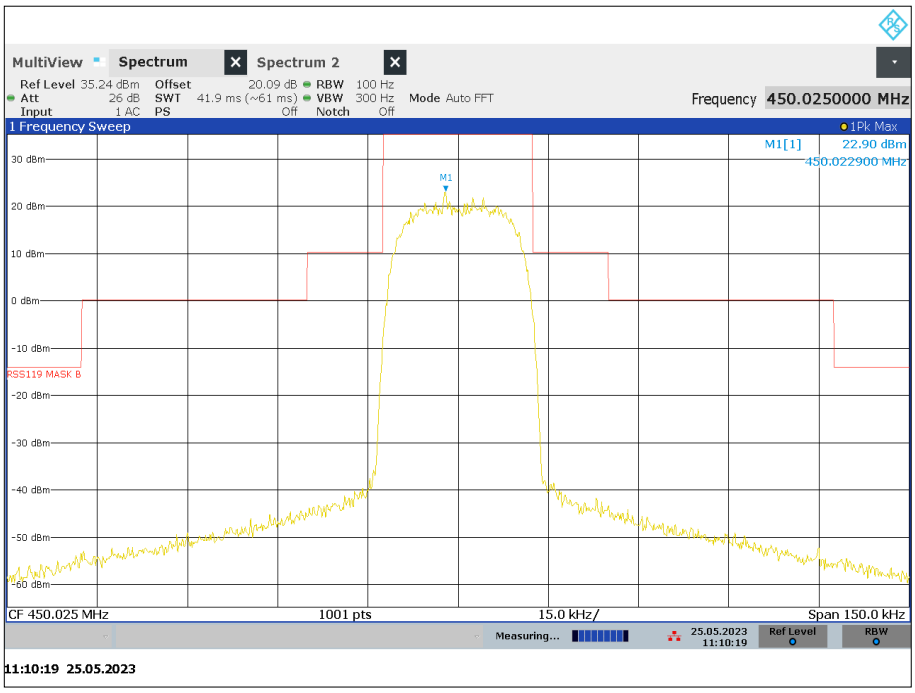

Figure 37 - 450.025 MHz, Transmitter Mask B

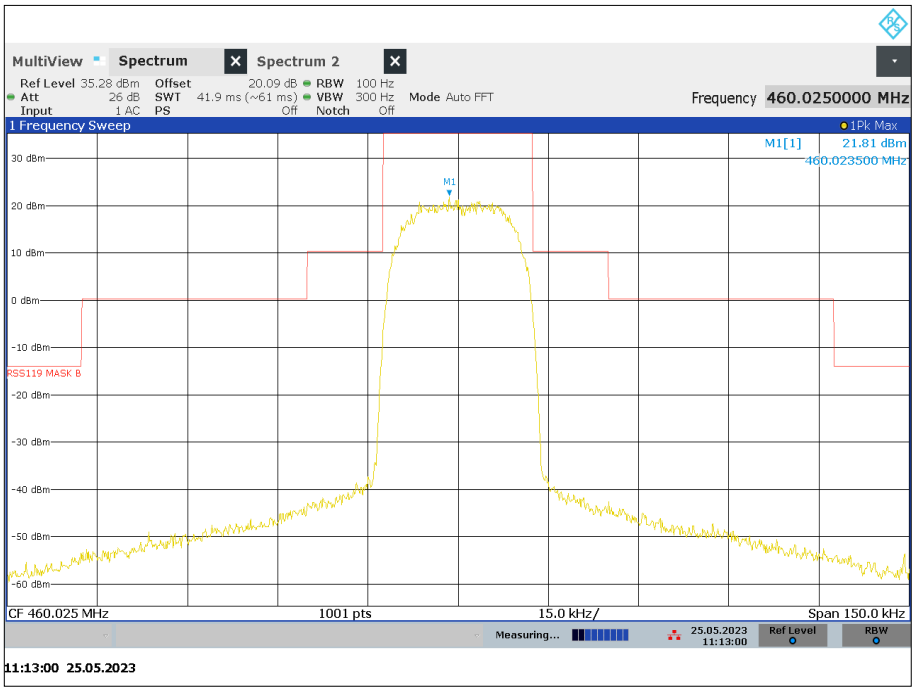

Figure 38 - 460.025 MHz, Transmitter Mask B

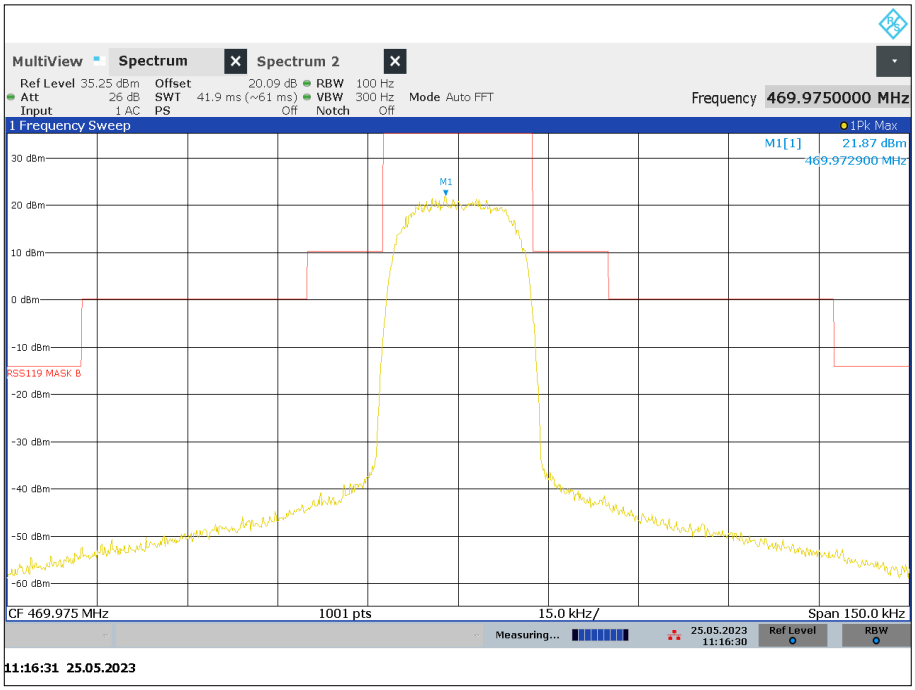

Figure 39 - 469.975 MHz, Transmitter Mask B

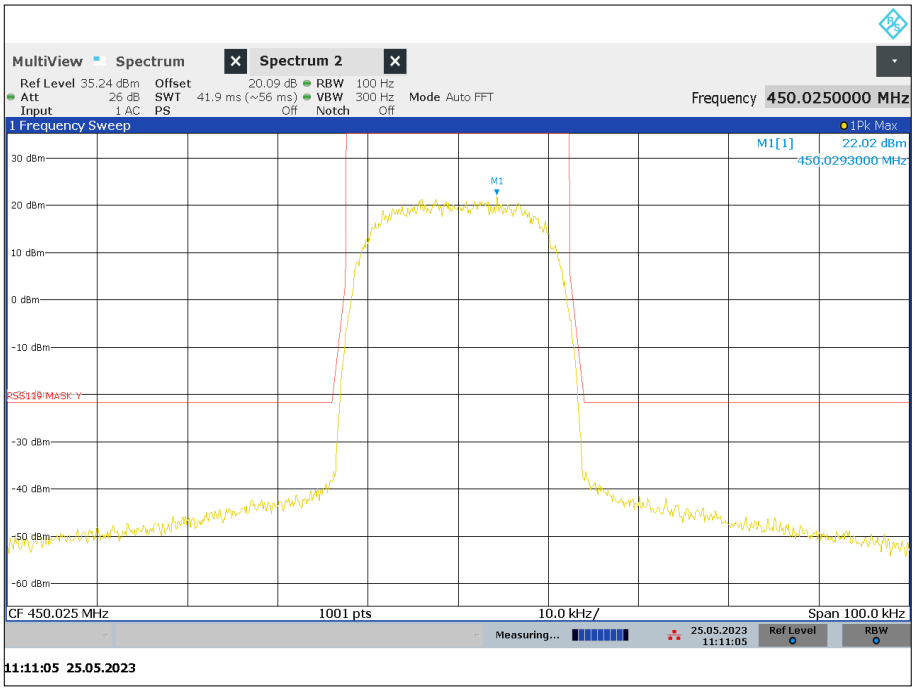

Figure 40 - 450.025 MHz, Transmitter Mask Y

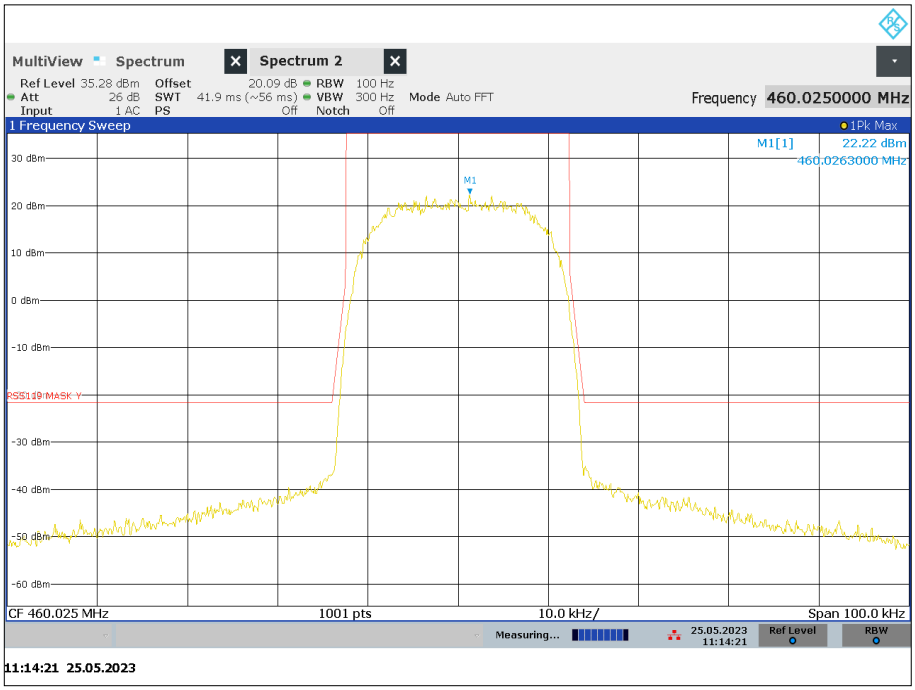

Figure 41 - 460.025 MHz, Transmitter Mask Y

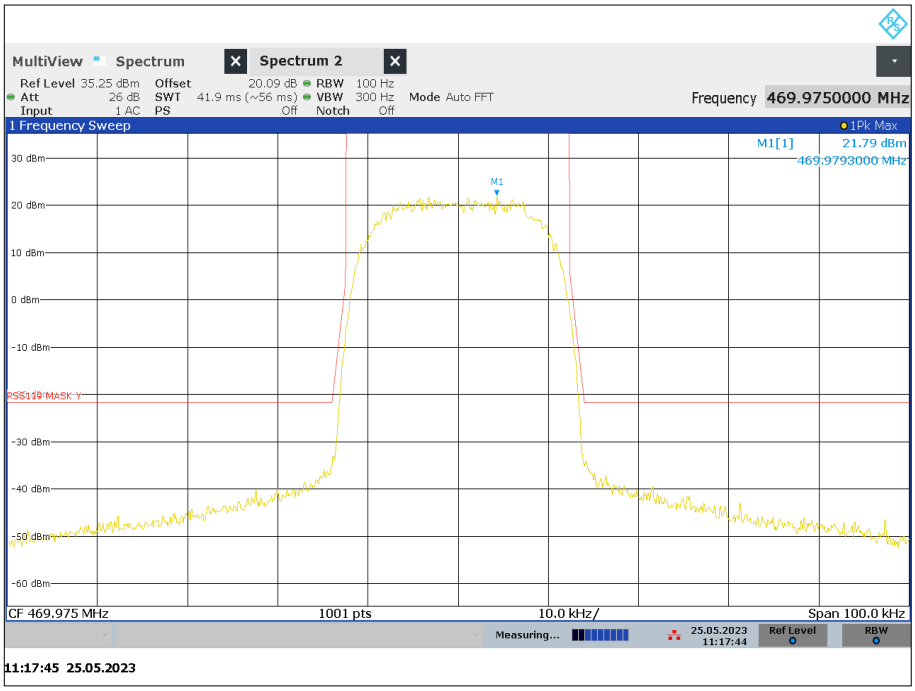

Figure 42 - 469.975 MHz, Transmitter Mask Y

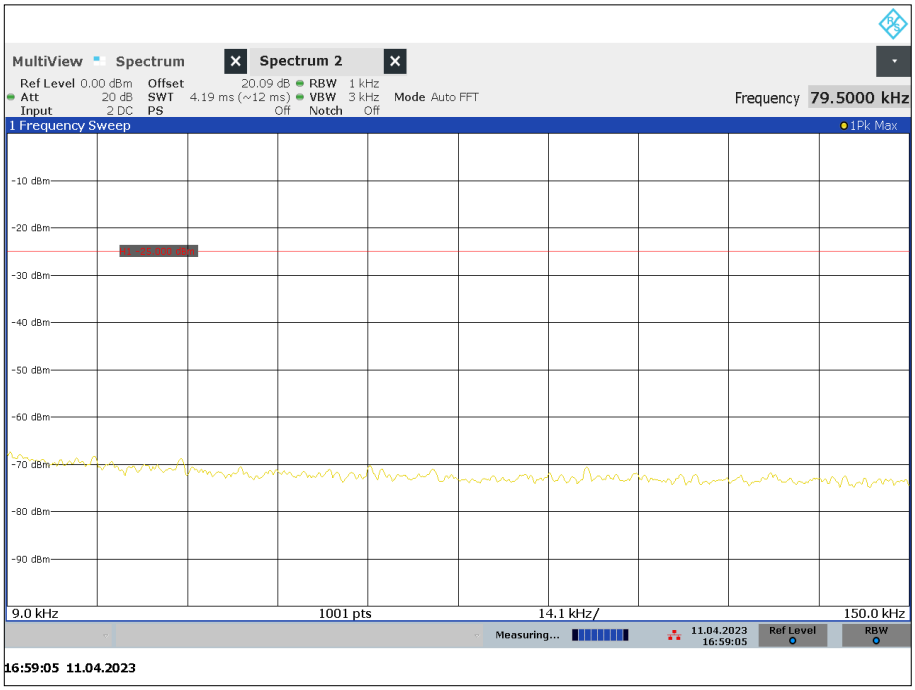

Figure 43 - 450.025 MHz, 9 kHz to 150 kHz Mask Y

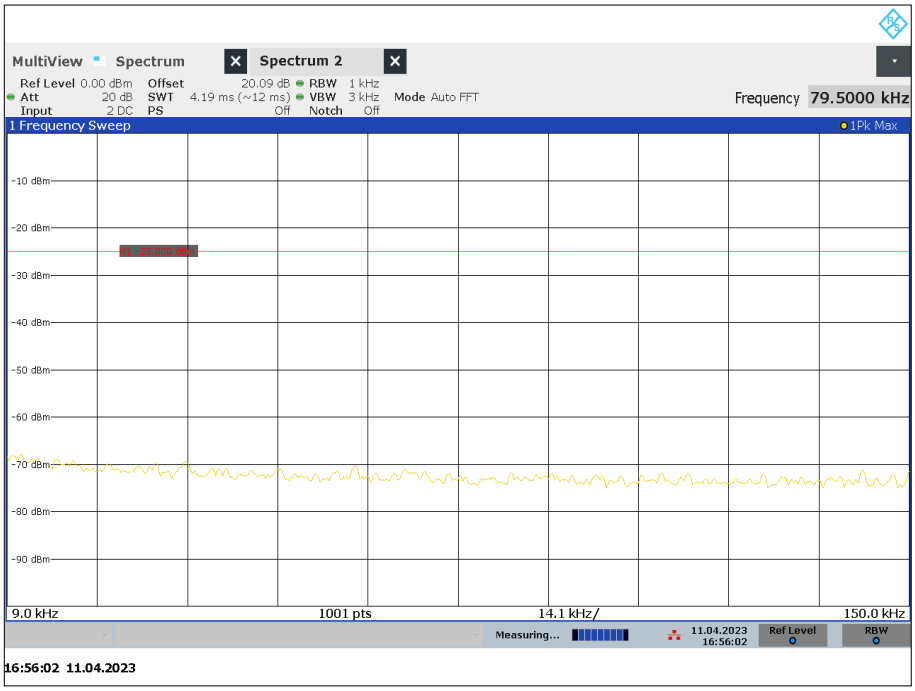

Figure 44 - 460.025 MHz, 9 kHz to 150 kHz Mask Y

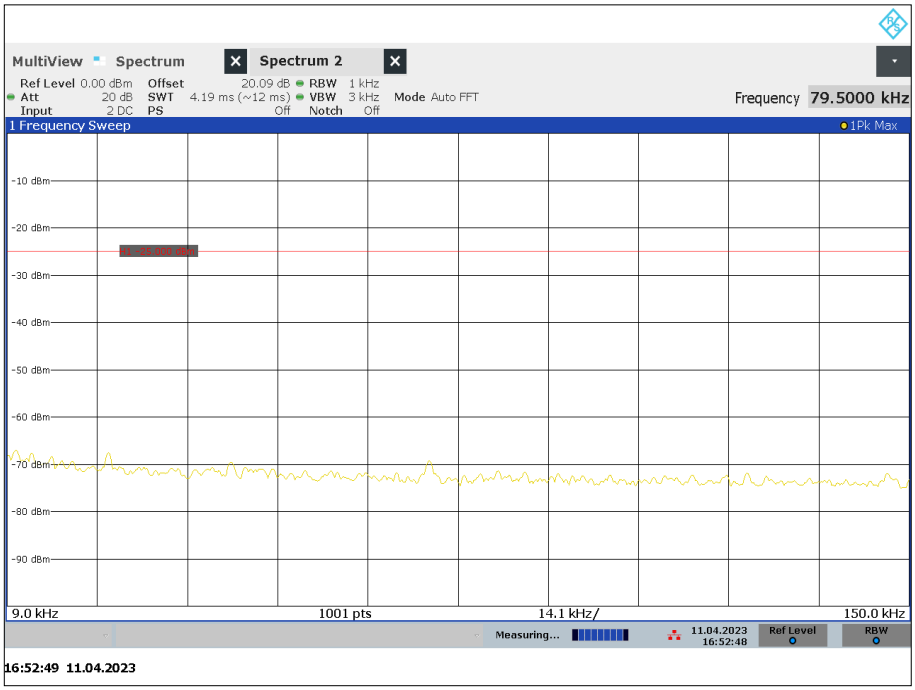

Figure 45 - 469.975 MHz - 9 kHz to 150 kHz Mask Y

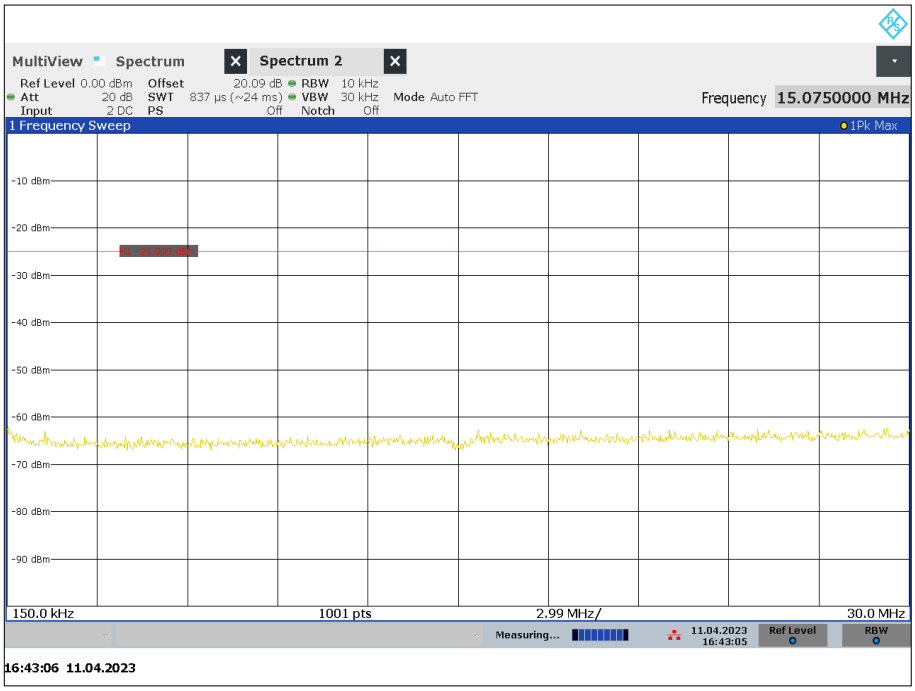

Figure 46 - 450.025 MHz, 150 kHz to 30 MHz Mask Y

Figure 47 - 460.025 MHz, 150 kHz to 30 MHz Mask Y

Figure 48 - 469.975 MHz - 150 kHz to 30 MHz Mask Y

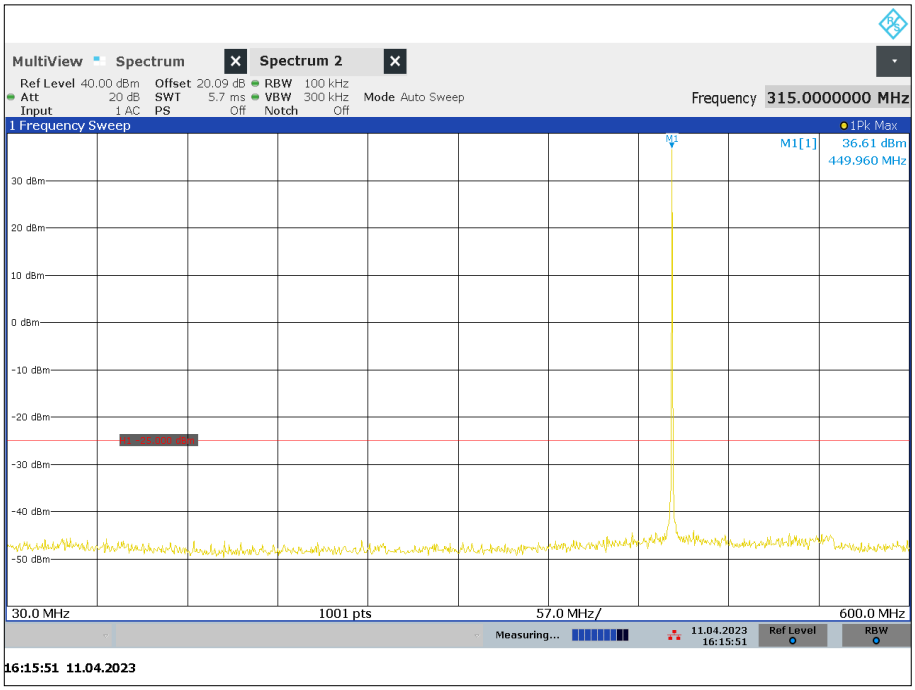

Figure 49 - 450.025 MHz, 30 MHz to 600 MHz Mask Y

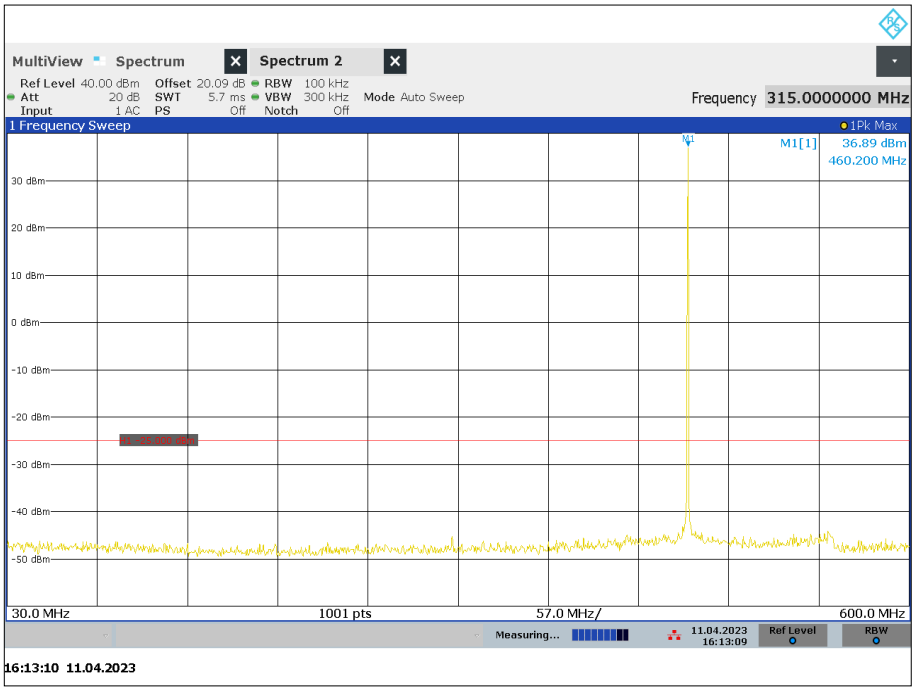

Figure 50 - 460.025 MHz, 30 MHz to 600 MHz Mask Y

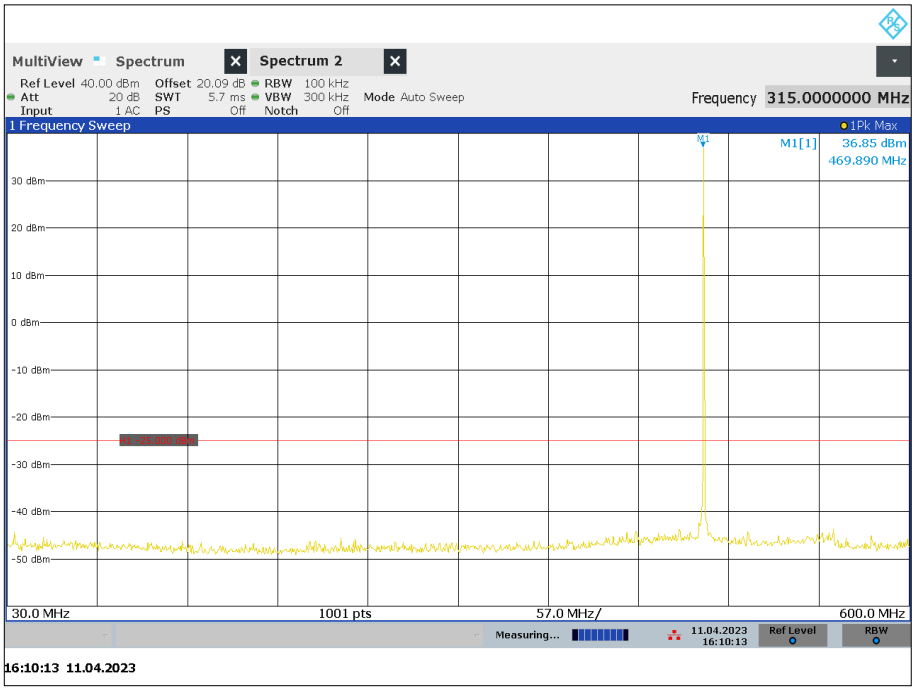

Figure 51 - 469.975 MHz - 30 MHz to 600 MHz Mask Y

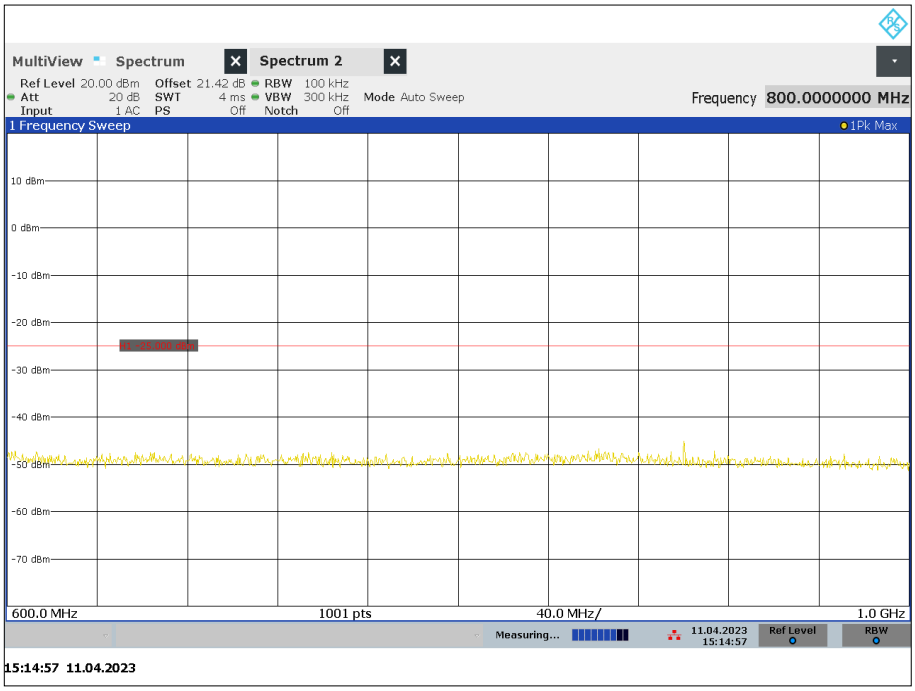

Figure 52 - 450.025 MHz, 600 MHz to 1 GHz Mask Y

Figure 53 - 460.025 MHz, 600 MHz to 1 GHz Mask Y

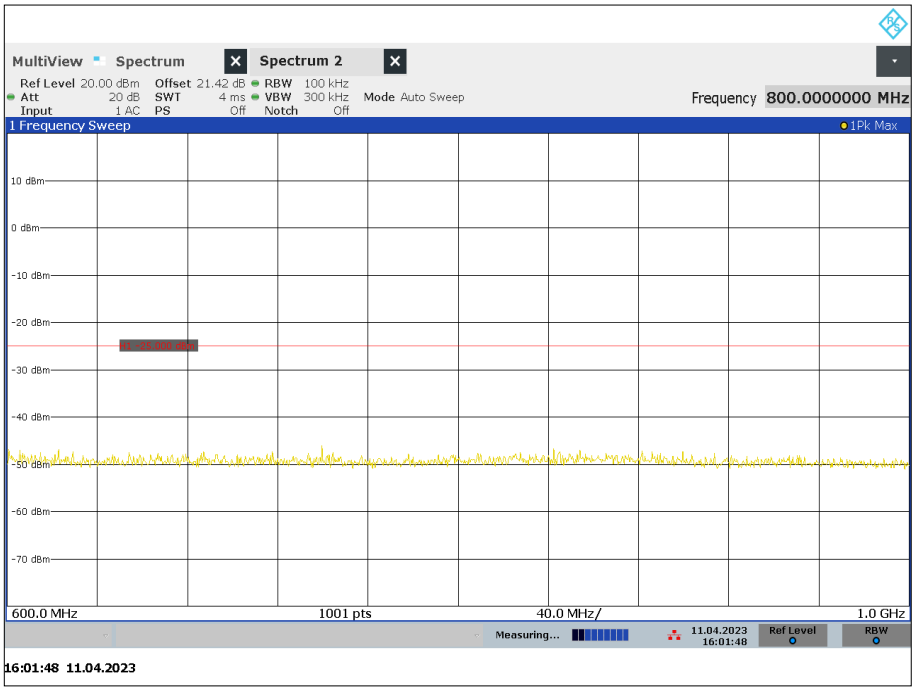

Figure 54 - 469.975 MHz - 600 MHz to 1 GHz Mask Y

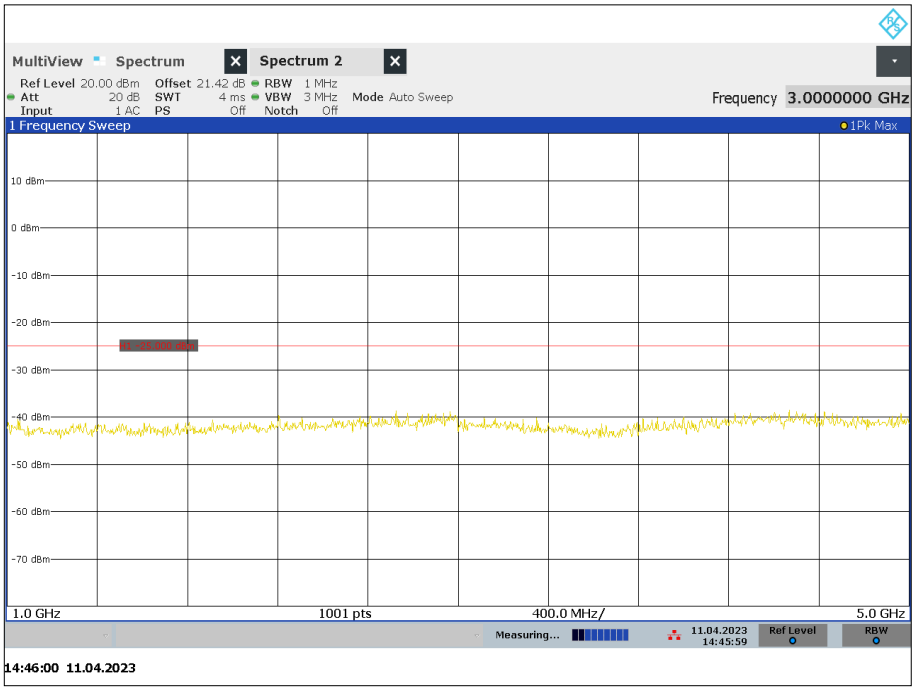

Figure 55 - 450.025 MHz, 1 GHz to 5 GHz Mask Y

Figure 56 - 460.025 MHz, 1 GHz to 5 GHz Mask Y

Figure 57 - 469.975 MHz - 1 GHz to 5 GHz Mask Y

FCC 47 CFR Part 90, Limit Clause 90.210

The EUT shall comply with emission mask B as per FCC 47 CFR Part 90, clause 90.210.

ISED RSS-119, Limit Clause 5.8

The EUT shall comply with emission mask Y as per ISED RSS-119, clause 5.8.

2.4.7 Test Location and Test Equipment Used

This test was carried out in RF Chamber 11.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Hygrometer	Rotronic	A1	2138	12	28-Sep-2023
Filter (Hi Pass)	Mini-Circuits	NHP-600	2834	12	19-Jan-2024
EMI Test Receiver	Rohde & Schwarz	ESW44	5084	12	12-July-2023
1 GHz High Pass Filter	Mini-Circuits	NHP 1000+	5260	12	20-Aug-2023
Thermo-Hygro-Barometer	PCE Instruments	OCE-THB-40	5470	12	20-Apr-2024
Attenuator 5W 20dB DC-18GHz	Aaren	AT40A-4041-D18-20	5497	12	18-Apr-2024
Attenuator 5W 20dB DC-18GHz	Aaren	AT40A-4041-D18-20	5500	12	21-May-2023
Cable (SMA to SMA 1m)	Junkosha	MWX221-01000AMSAMS/A	5516	12	23-Oct-2023

Table 25

2.5 Radiated Spurious Emissions

2.5.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1053
FCC 47 CFR Part 90, Clause 90.210
ISED RSS-119, Clause 5.8
ISED RSS-GEN, Clause 6.13

2.5.2 Equipment Under Test and Modification State

SC2024, S/N: 1PR002235GK6959 - Modification State 0

2.5.3 Date of Test

29-March-2023 to 03-April-2023

2.5.4 Test Method

A preliminary profile of the Radiated Spurious Emissions was obtained up to the 10th harmonic by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Testing was performed in accordance with ANSI C63.26, Clause 5.5.

Prescans and final measurements were performed using the direct field strength method.

In the 450-470 MHz band, the limit in RSS-119, emission mask Y limit of “55 + 10 log10(p)” was considered the most stringent limit and therefore shown on the plots in the section below.

Field strength measurements were performed and then converted to Equivalent Power Measurements in accordance with ANSI C63.26, Clause 5.2.7 equation c)

Example calculation:

E (dBµV/m) = EIRP (dBm) − 20log(D) + 104.8 where (D) is the measurement distance.

E (dBuV/m) = -25.0 (dBm) - 20log(3) + 104.8 =

E (dBµV/m) = 70.2

2.5.5 Example Test Setup Diagram

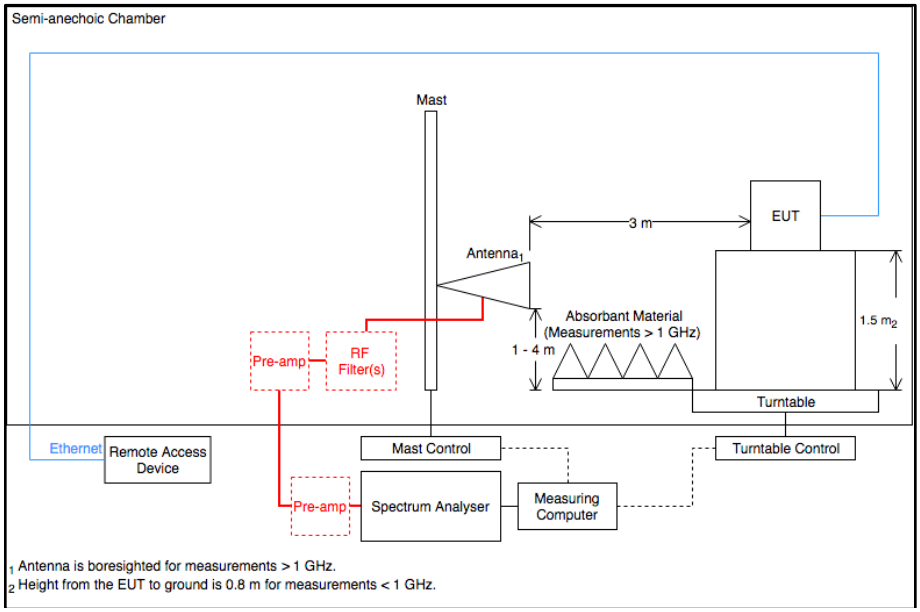

Figure 58 – Test Setup Diagram

2.5.6 Environmental Conditions

Ambient Temperature	18.4 - 21.2 °C
Relative Humidity	34.6 - 51.2 %

2.5.7 Test Results

TETRA 403 MHz to 430 MHz

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

Table 26 - 406.125 MHz

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

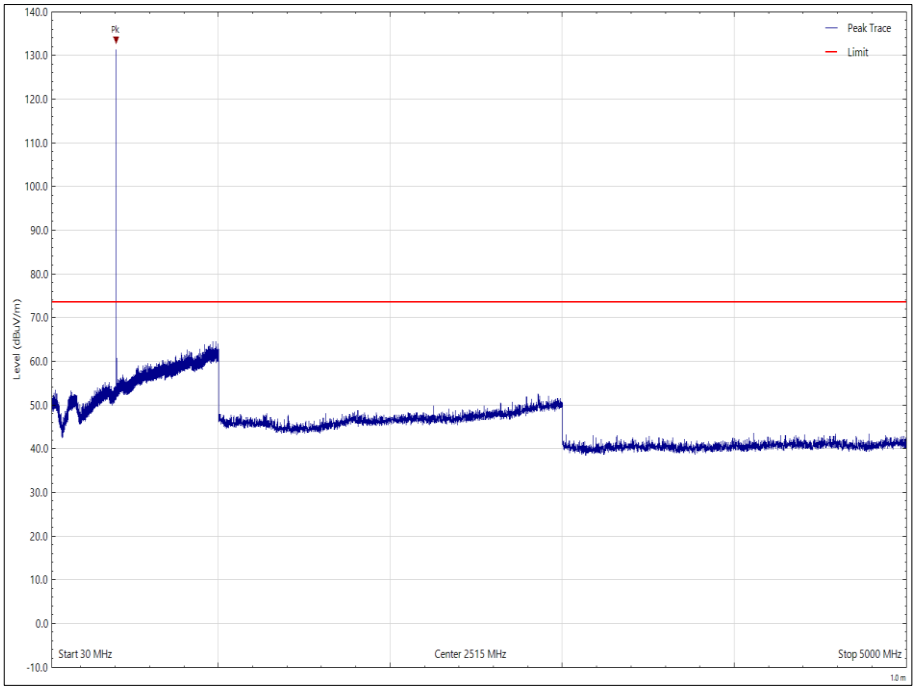

Figure 59 - 406.125 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation X

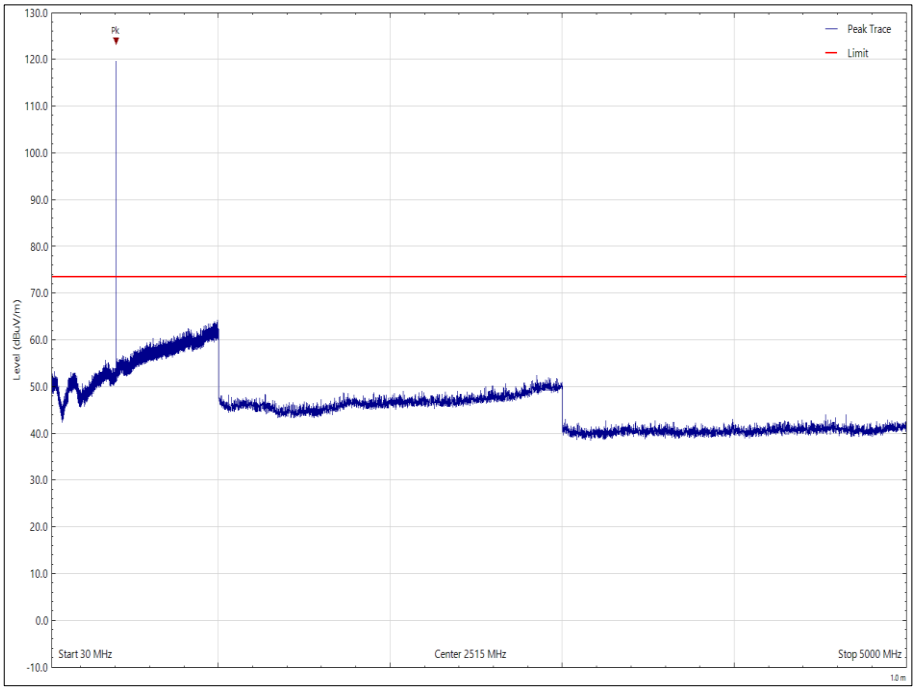

Figure 60 - 406.125 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation X

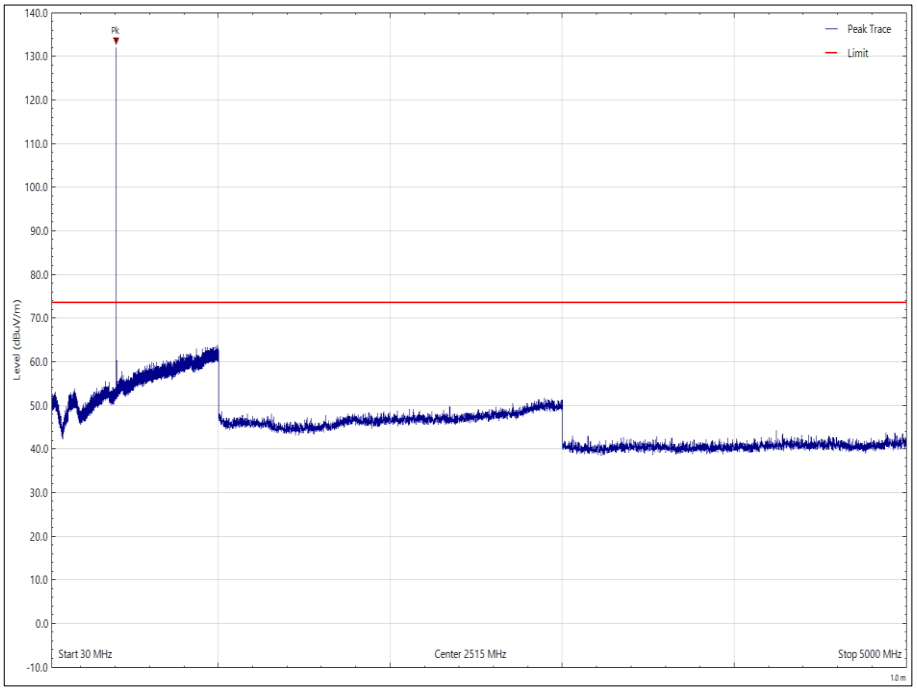

Figure 61 - 406.125 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation Y

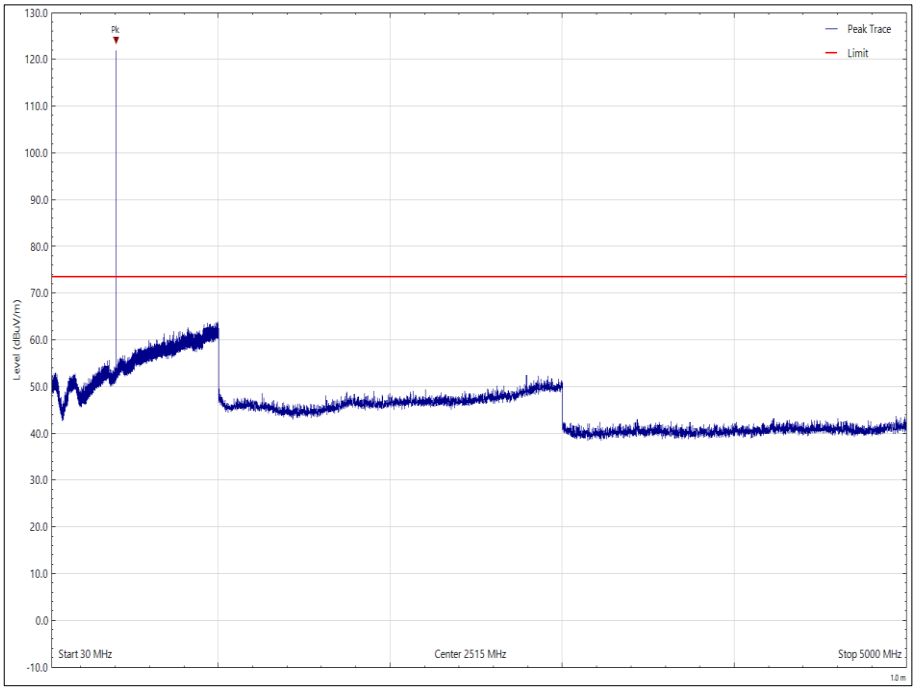

Figure 62 - 406.125 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation Y

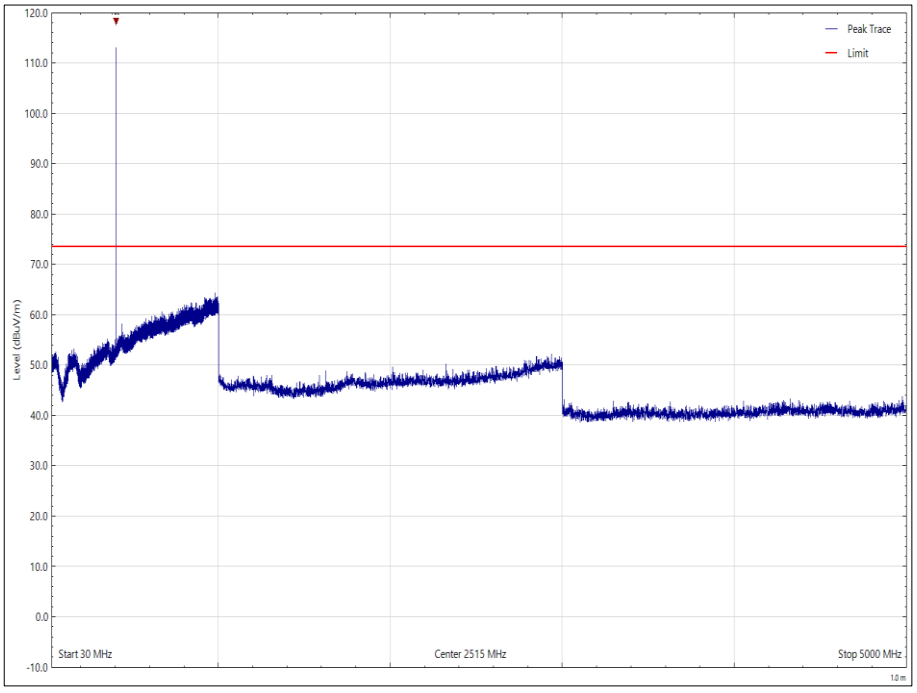

Figure 63 - 406.125 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation Z

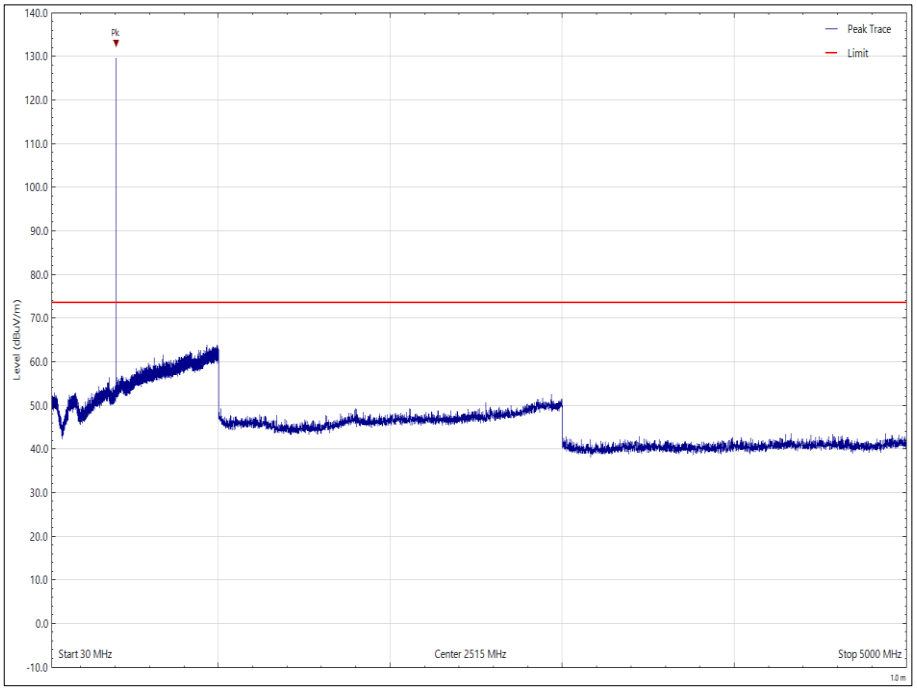

Figure 64 - 406.125 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation Z

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

Table 27 - 418.050 MHz

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

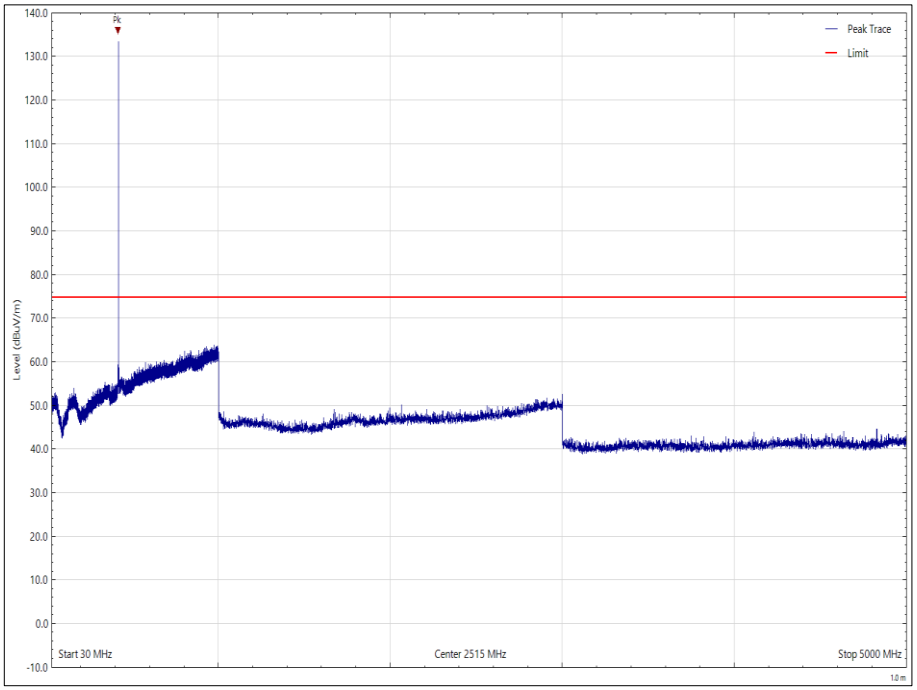

Figure 65 - 418.050 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation X

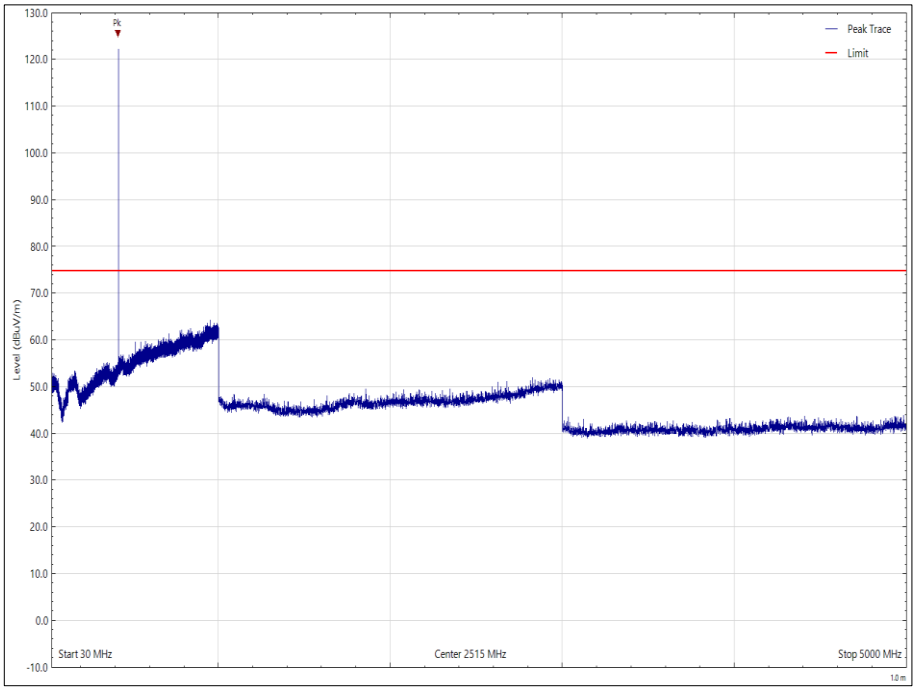

Figure 66 - 418.050 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation X

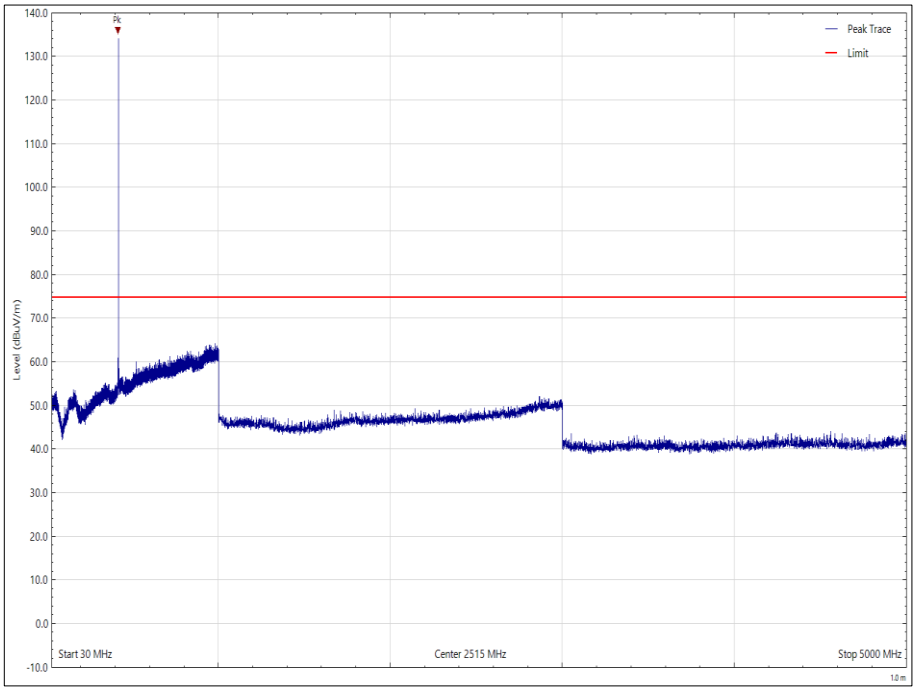

Figure 67 - 418.050 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation Y

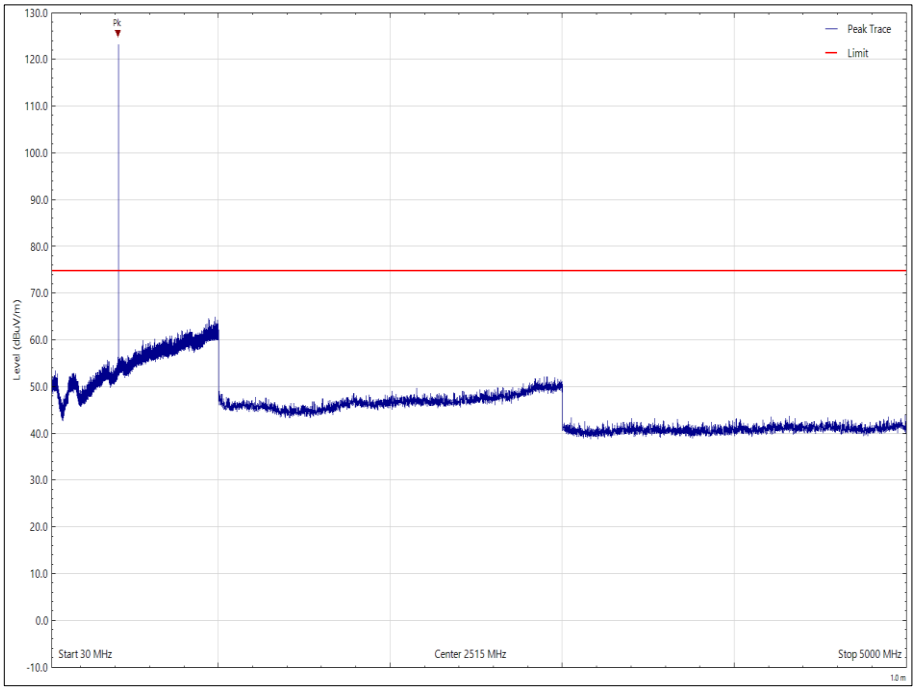

Figure 68 - 418.050 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation Y

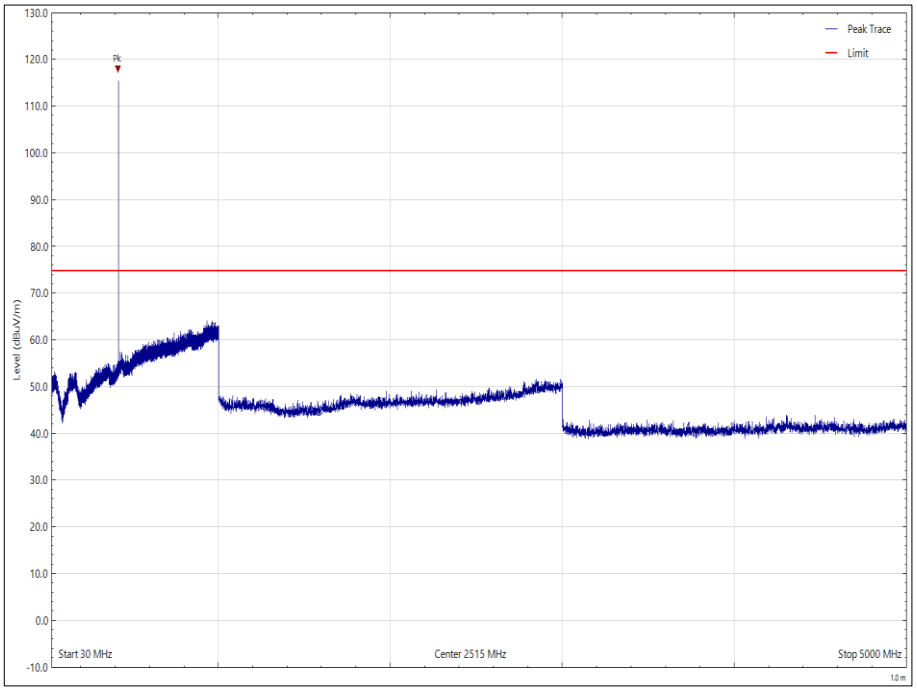

Figure 69 - 418.050 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation Z

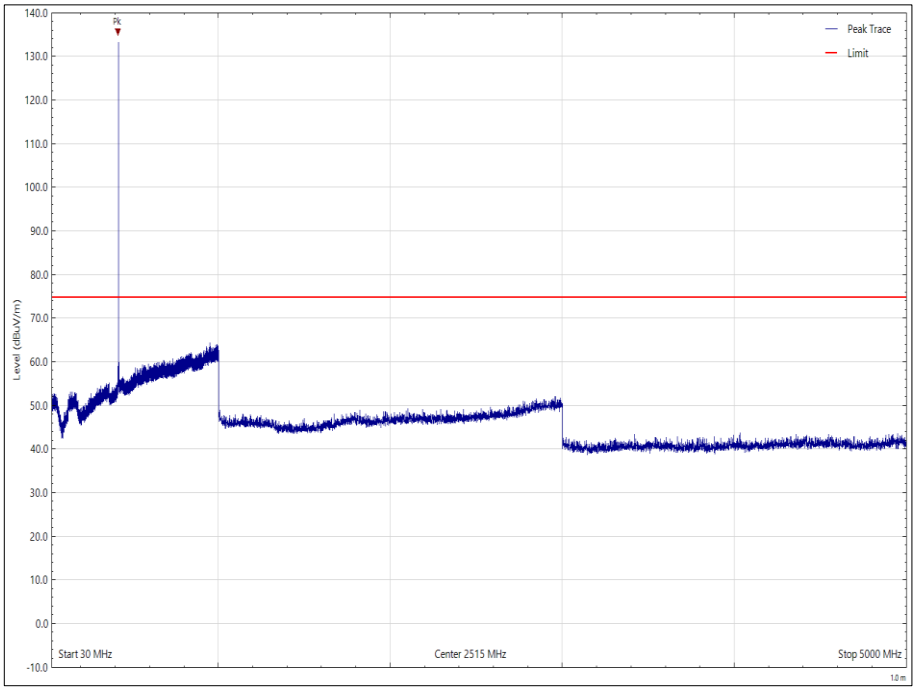

Figure 70 - 418.050 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation Z

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

Table 28 - 429.975 MHz

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

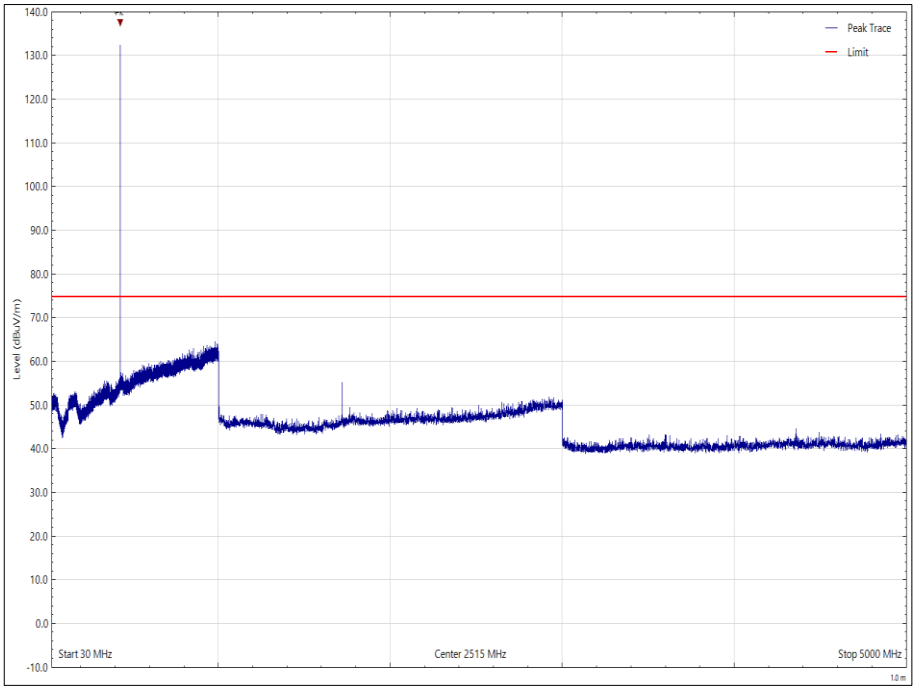

Figure 71 - 429.975 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation X

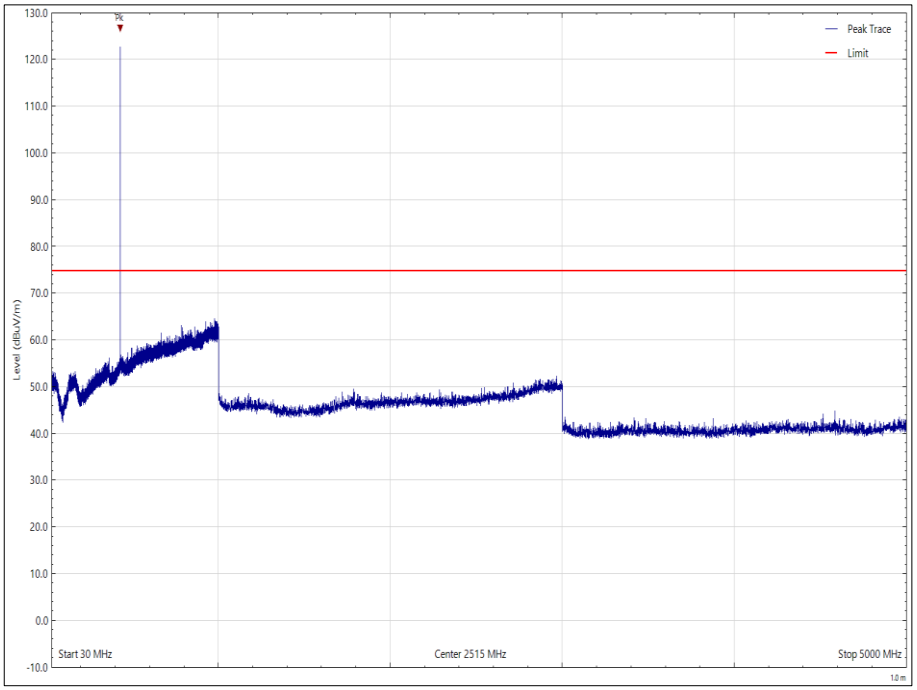

Figure 72 - 429.975 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation X

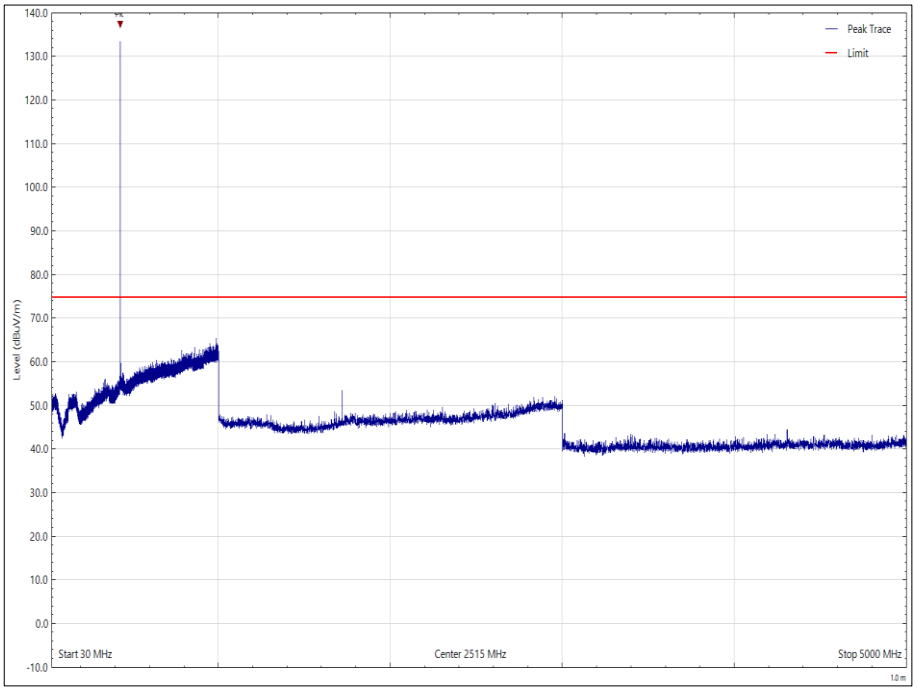

Figure 73 - 429.975 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation Y

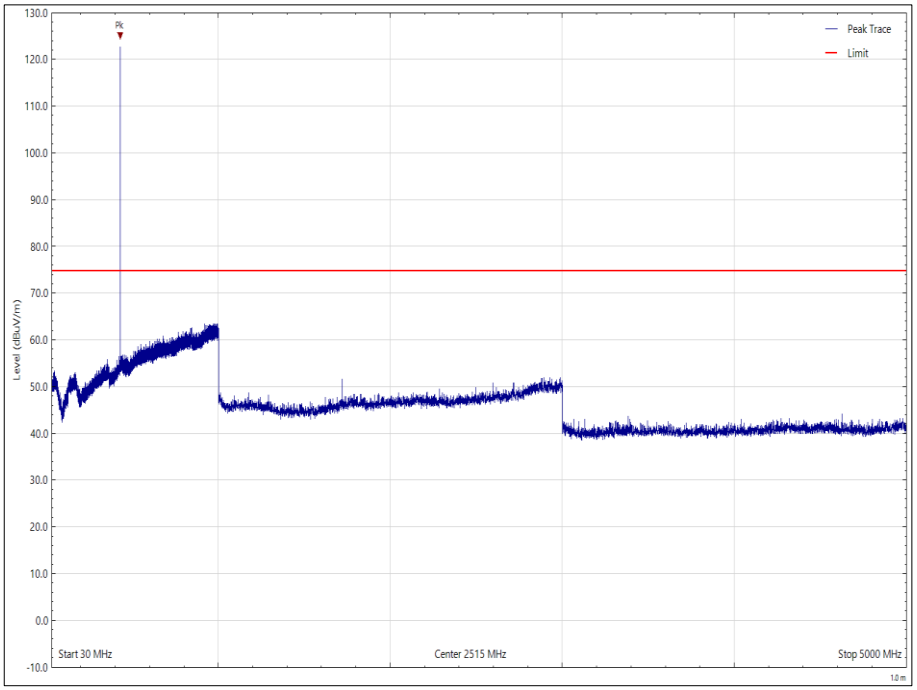

Figure 74 - 429.975 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation Y

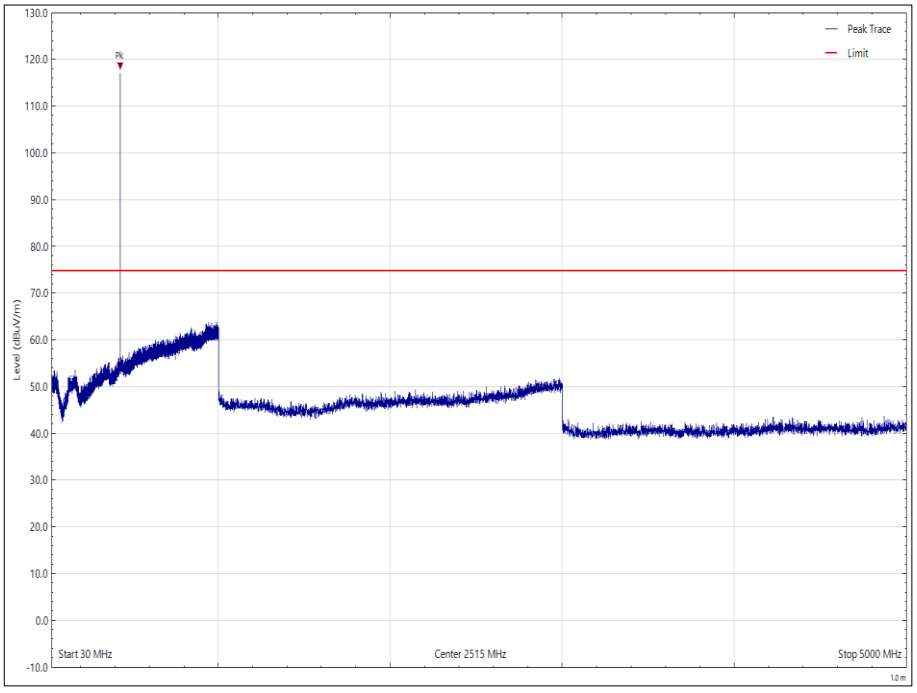

Figure 75 - 429.975 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation Z

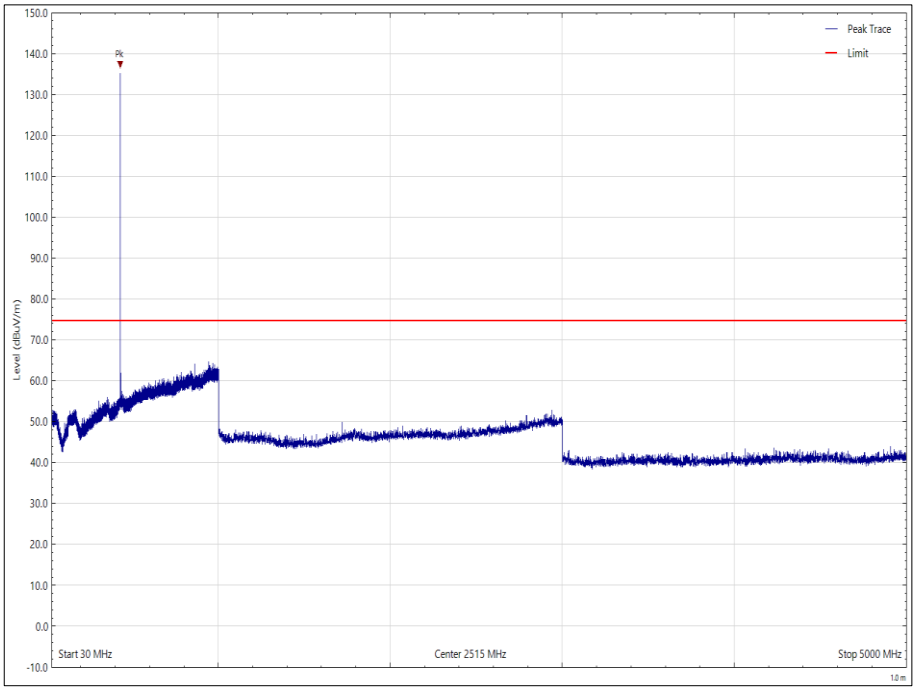

Figure 76 - 429.975 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation Z

ISED RSS-119, Limit Clause 5.8

The EUT shall comply with emission mask Y as per ISED RSS-119. clause 5.8.10.

TETRA 450 MHz to 470 MHz

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

Table 29 - 450.025 MHz

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

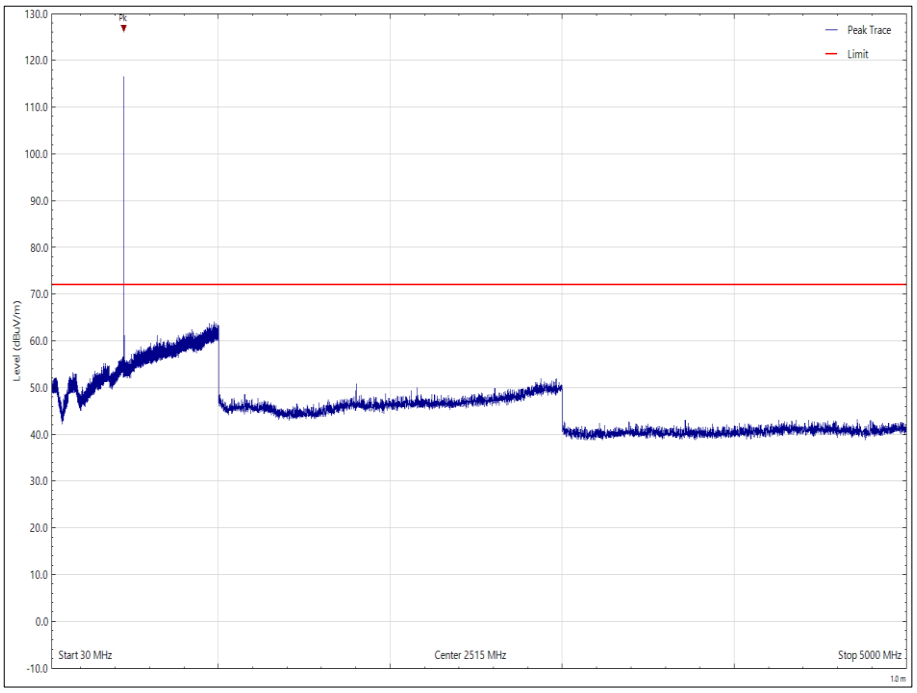

Figure 77 - 450.025 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation X

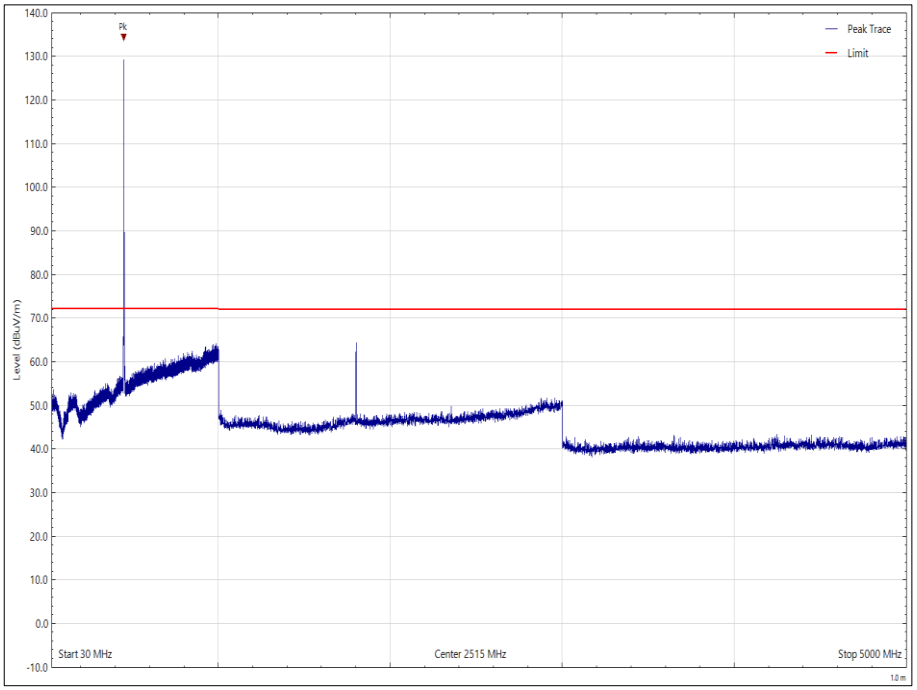

Figure 78 - 450.025 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation X

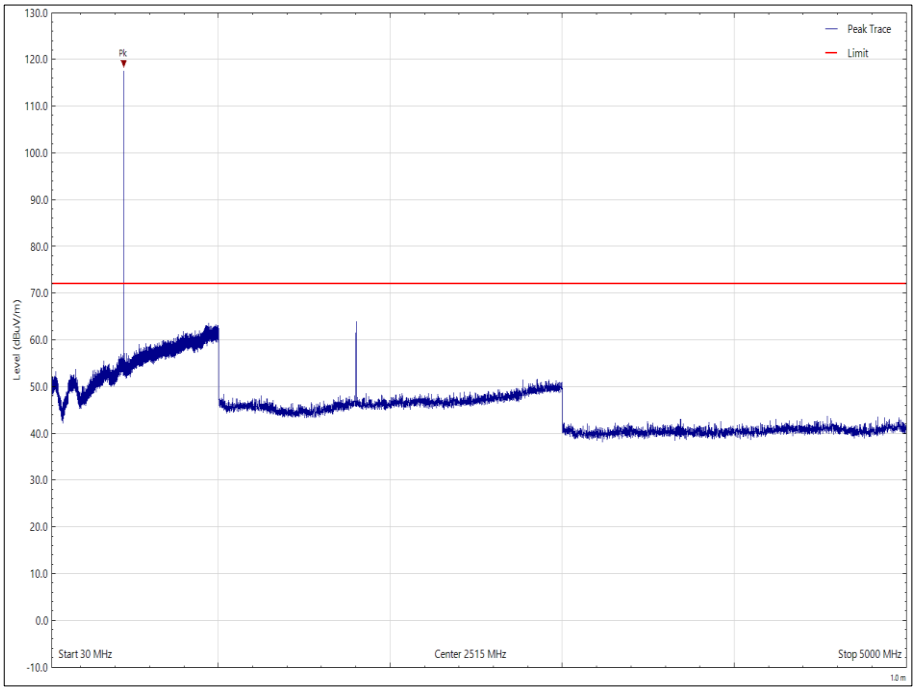

Figure 79 - 450.025 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation Y

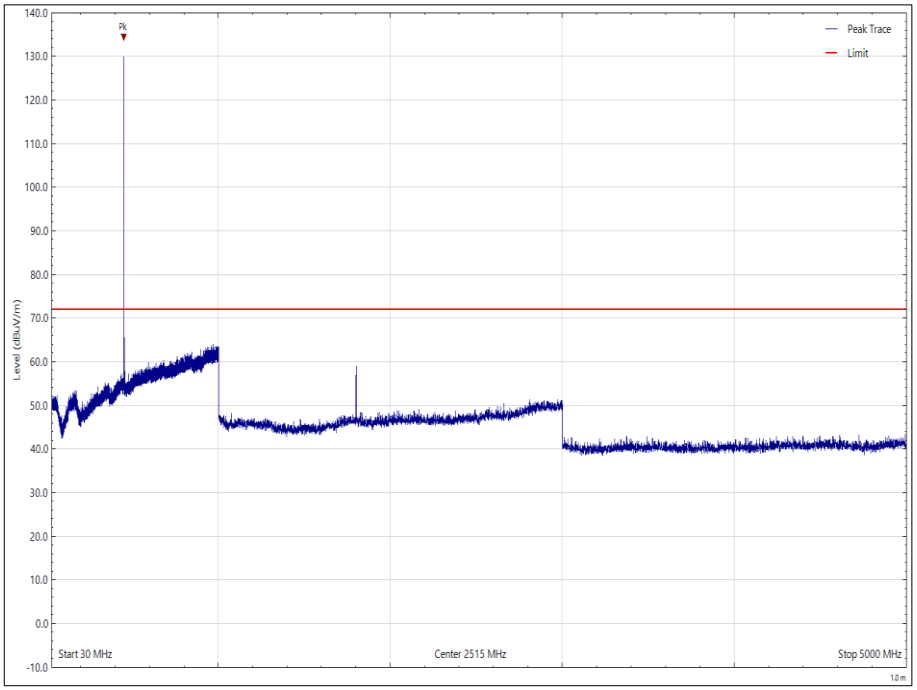

Figure 80 - 450.025 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation Y

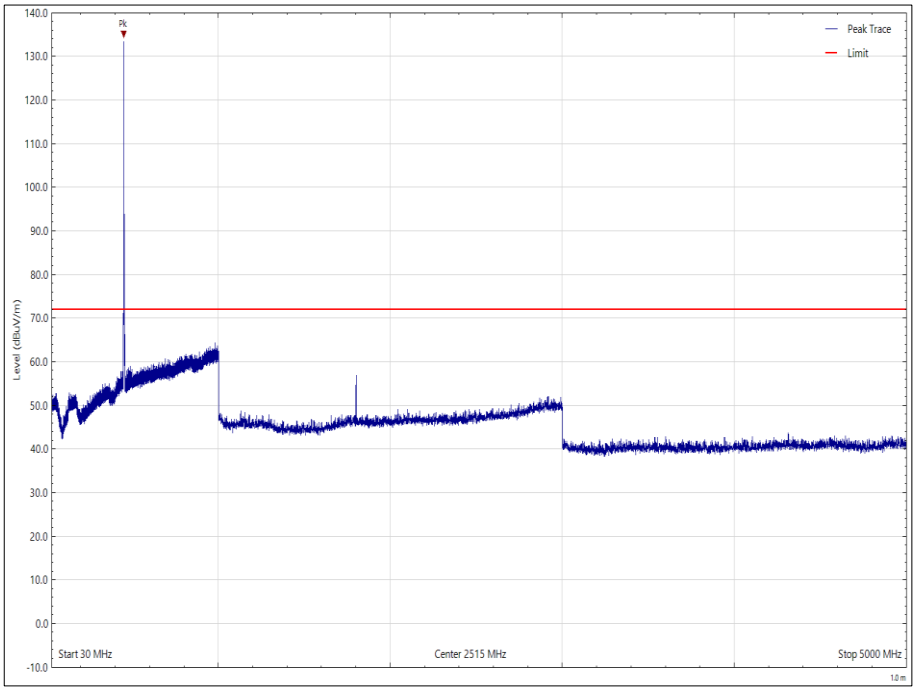

Figure 81 - 450.025 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation Z

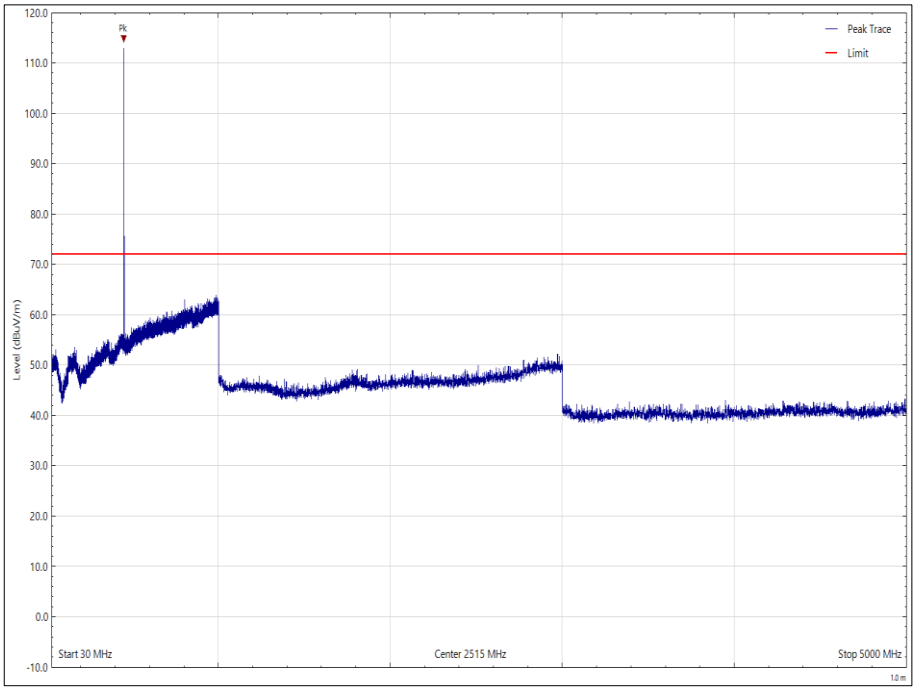

Figure 82 - 450.025 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation Z

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

Table 30 - 460.025 MHz

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

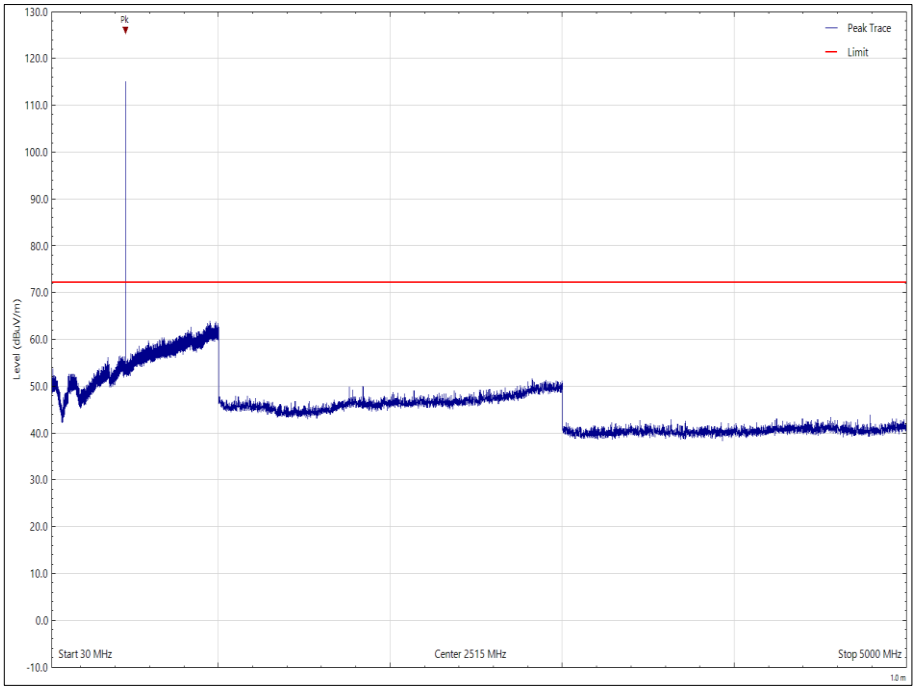

Figure 83 – 460.025 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation X

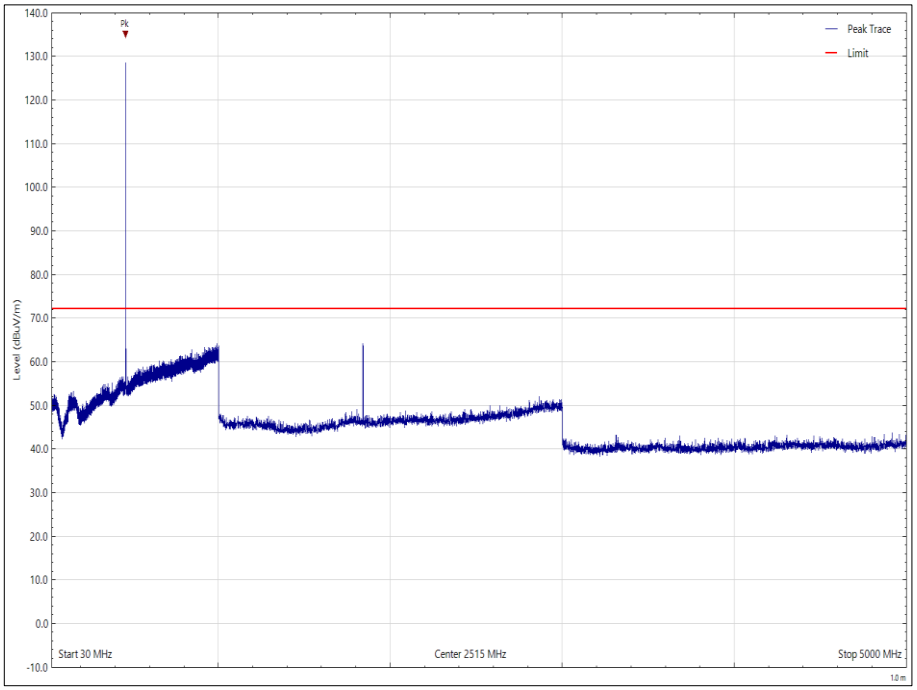

Figure 84 – 460.025 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation X

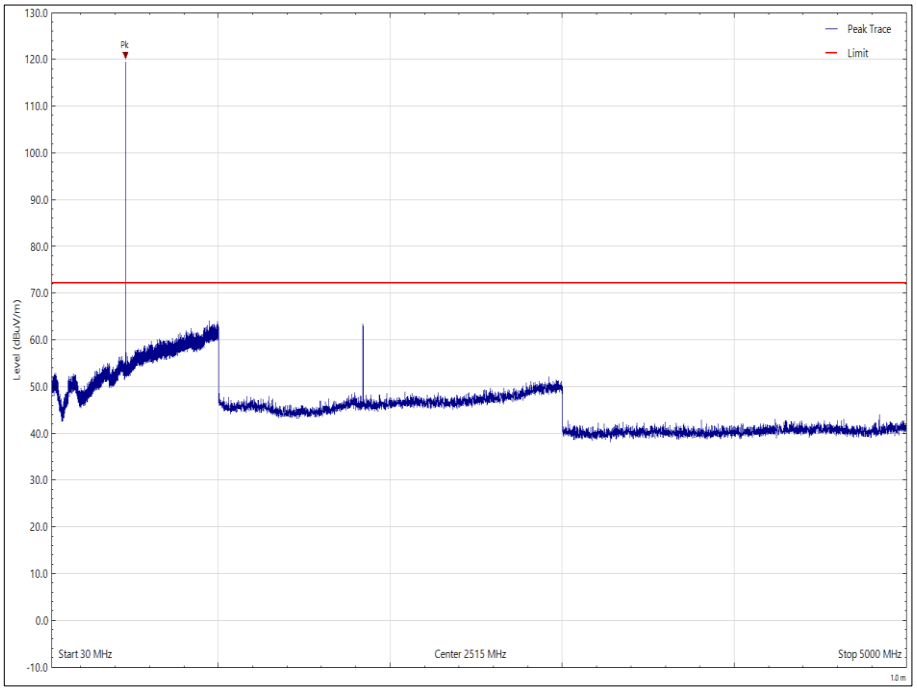

Figure 85 – 460.025 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation Y

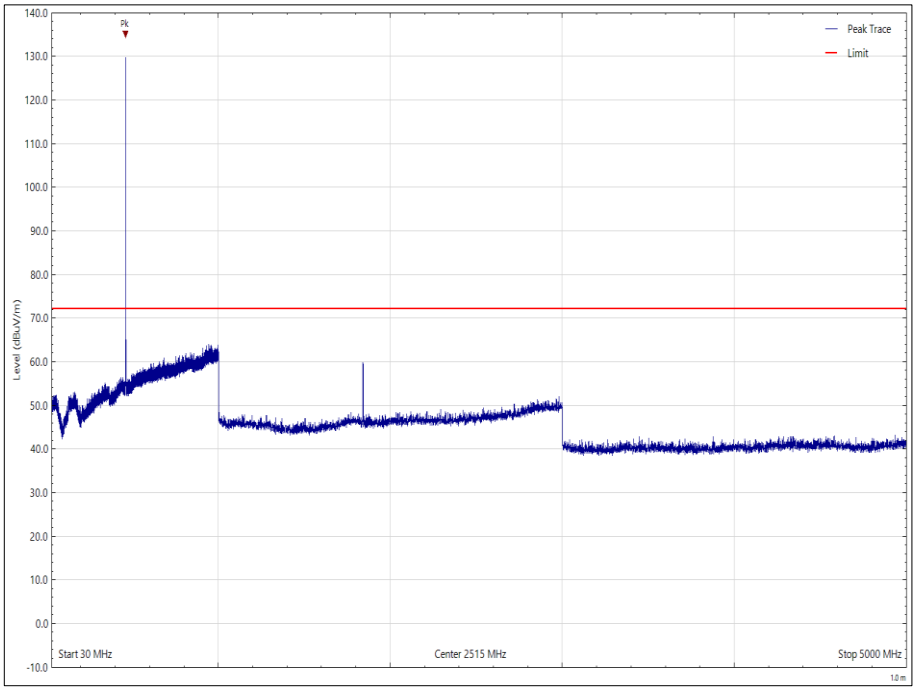

Figure 86 – 460.025 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation Y

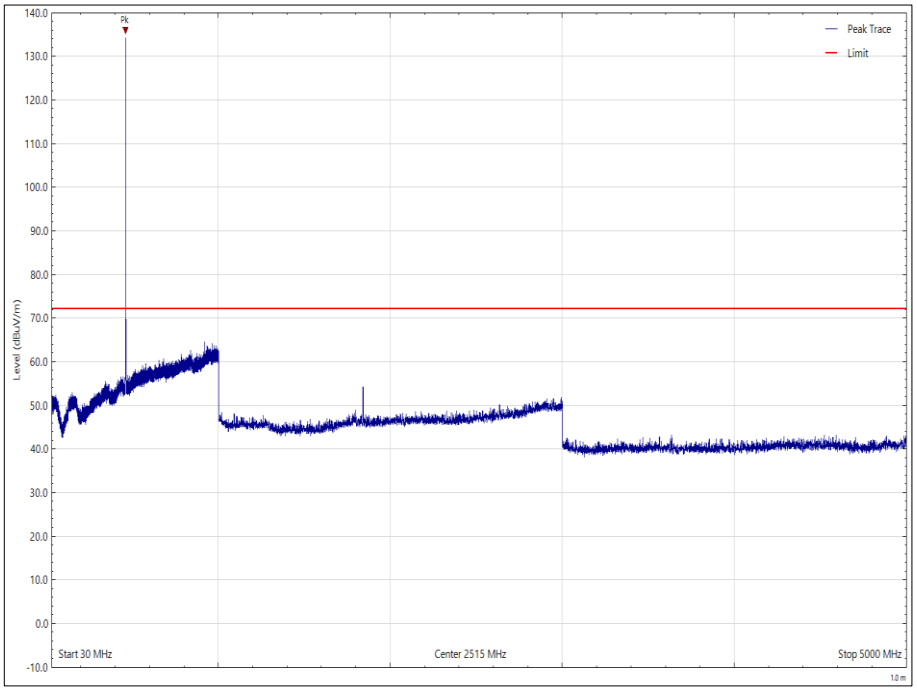

Figure 87 – 460.025 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation Z

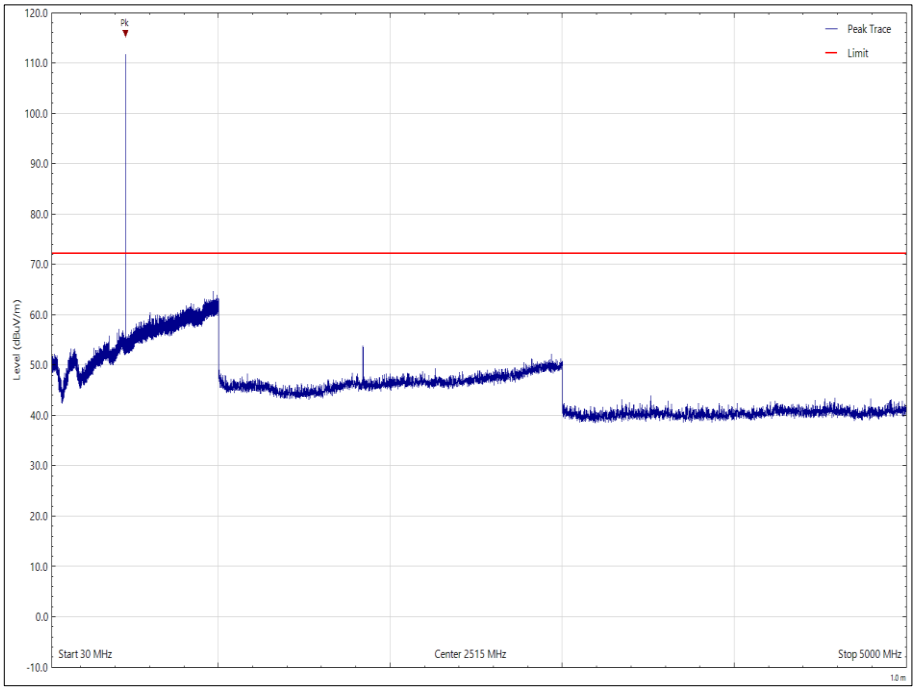

Figure 88 – 460.025 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation Z

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

Table 31 - 469.975 MHz

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

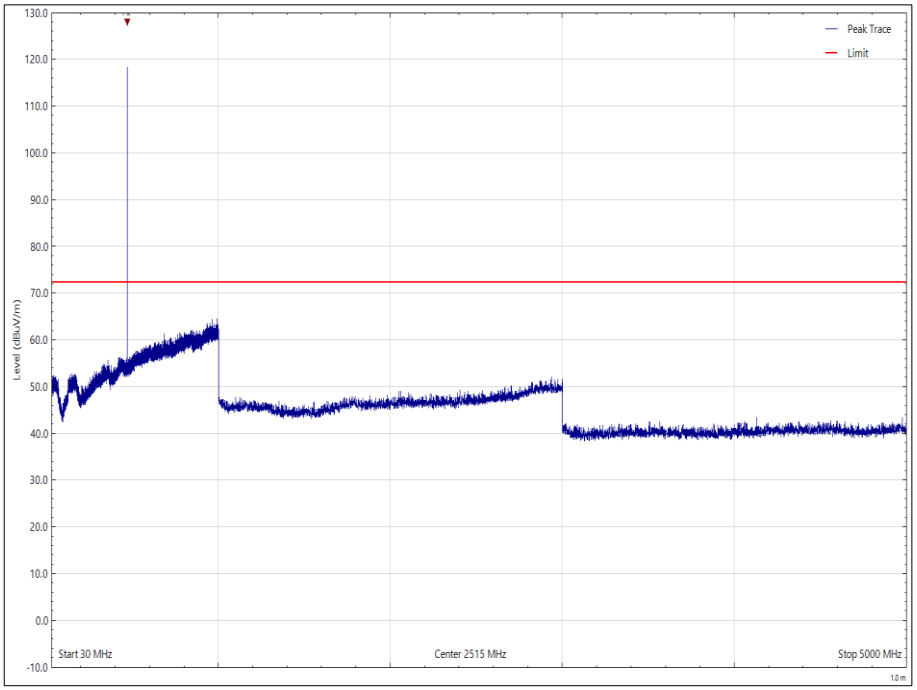

Figure 89 - 469.975 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation X

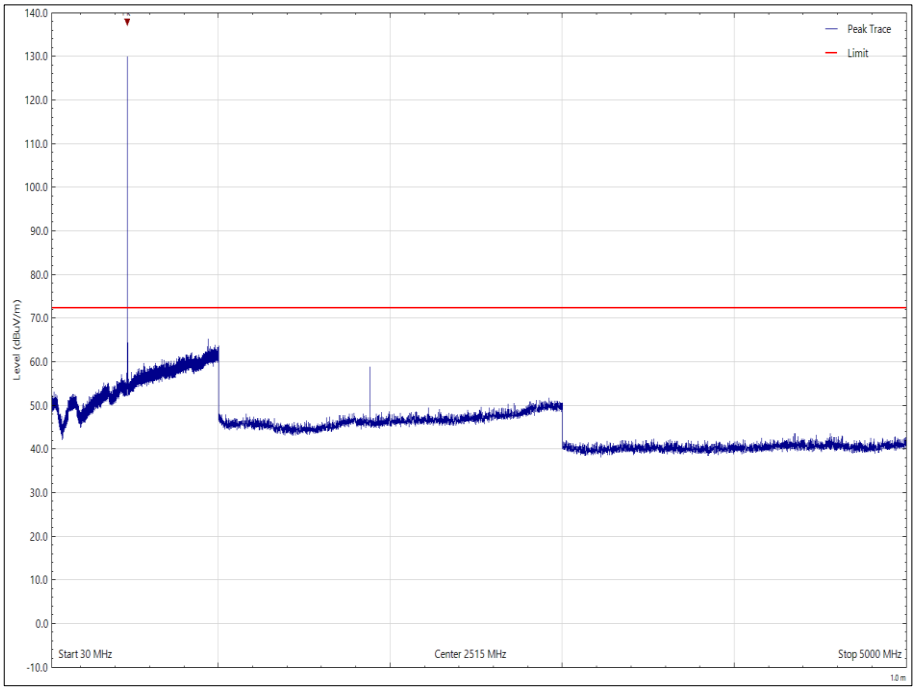

Figure 90 - 469.975 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation X

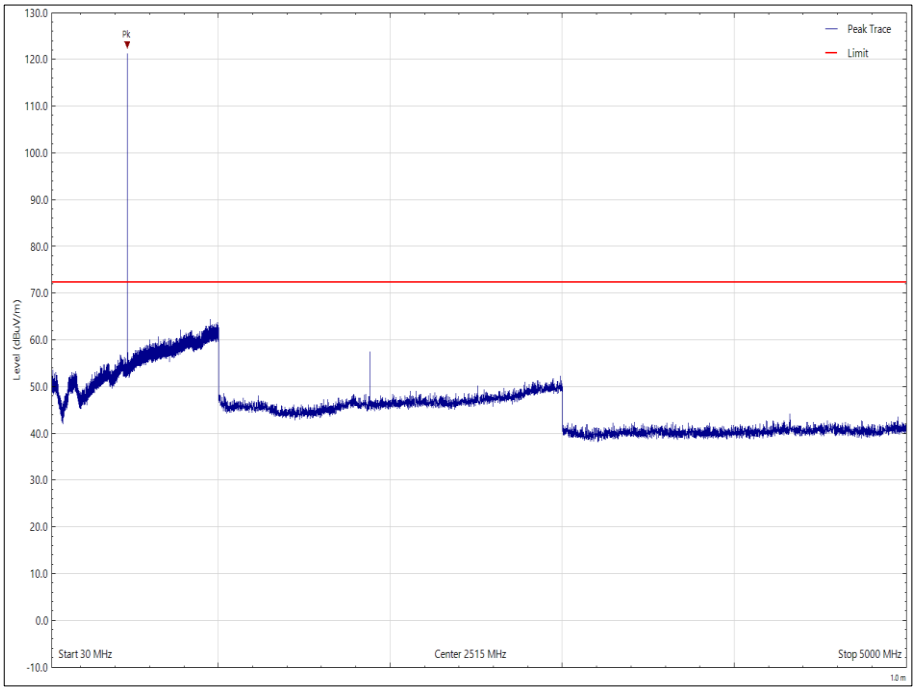

Figure 91 - 469.975 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation Y

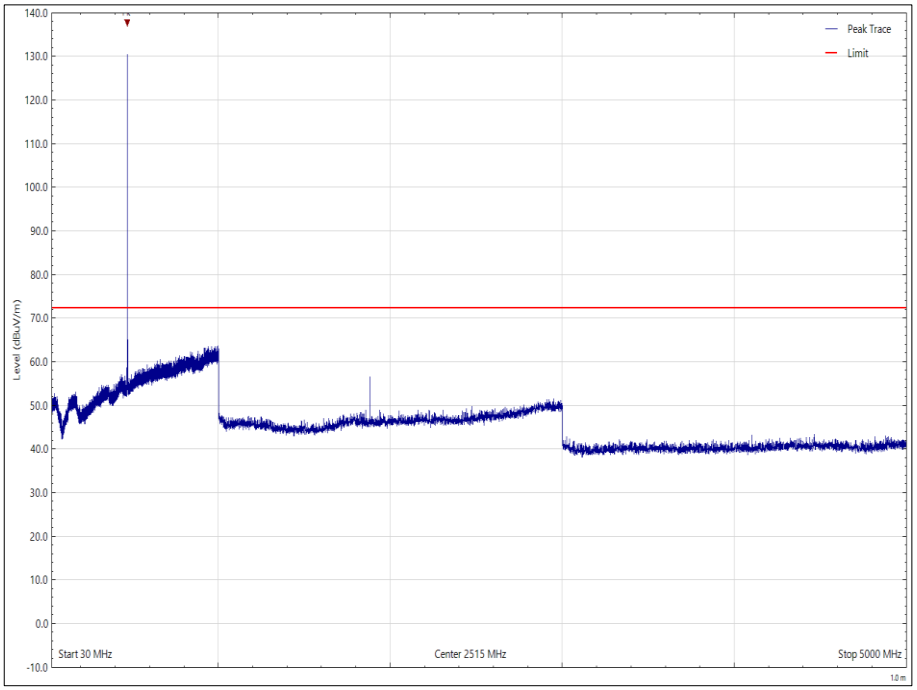

Figure 92 - 469.975 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation Y

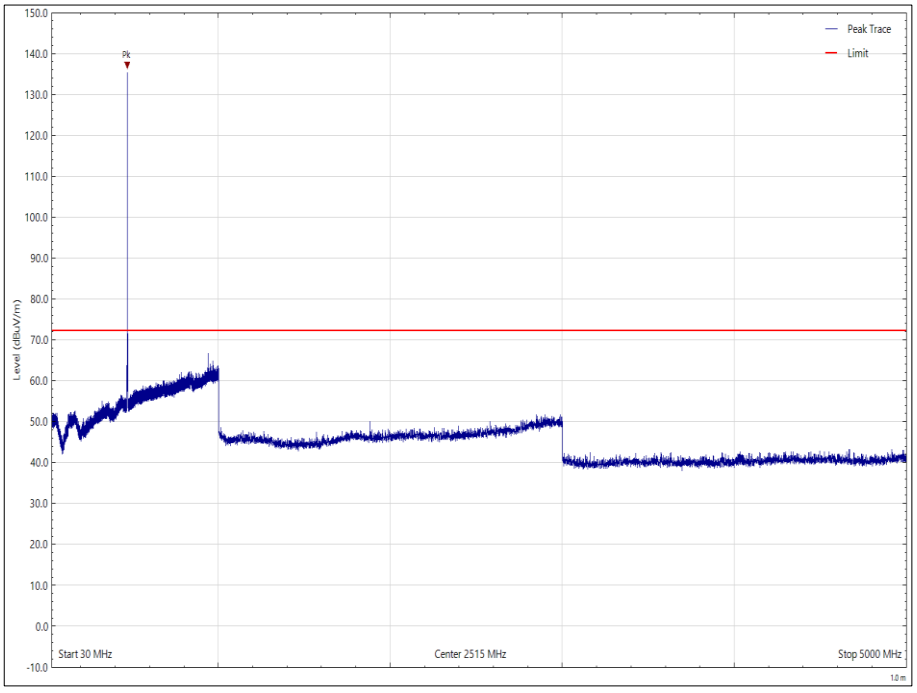

Figure 93 - 469.975 MHz - 30 MHz to 5 GHz, Horizontal, EUT Orientation Z

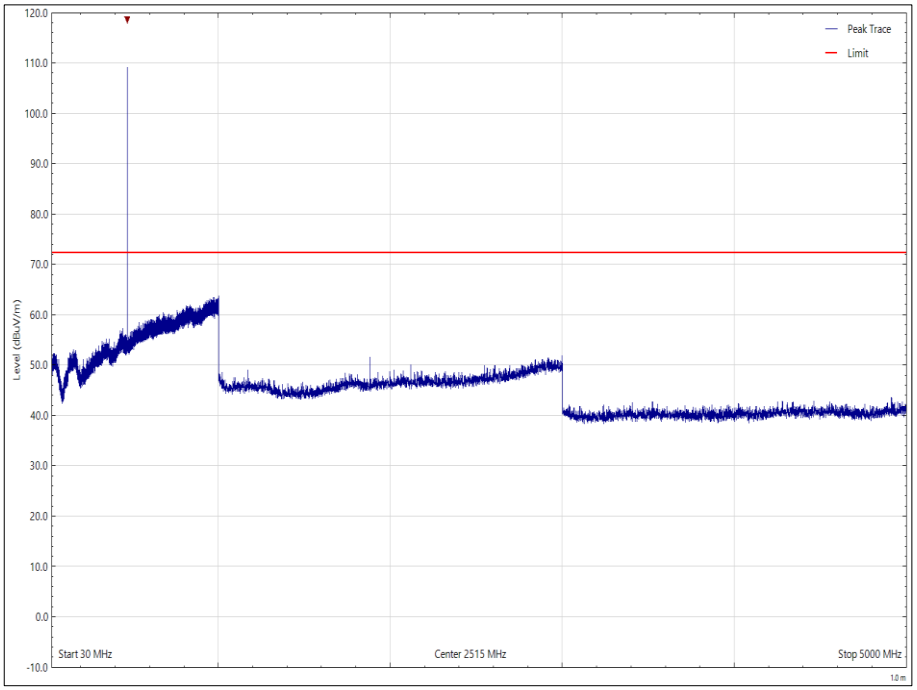

Figure 94 - 469.975 MHz - 30 MHz to 5 GHz, Vertical, EUT Orientation Z

FCC 47 CFR Part 90, Limit Clause 90.210

The EUT shall comply with emission mask B as per FCC 47 CFR Part 90, clause 90.210.

ISED RSS-119, Limit Clause 5.8

The EUT shall comply with emission mask Y as per ISED RSS-119. clause 5.8.10.

2.5.8 Test Location and Test Equipment Used

This test was carried out in RF Chamber 11.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Hygrometer	Rotronic	A1	2138	12	28-Sep-2023
EMI Test Receiver	Rohde & Schwarz	ESW44	5084	12	17-May-2023
Emissions Software	TUV SUD	EmX V3.1.11	5125	-	Software
Screened Room (11)	Rainford	Rainford	5136	36	24-Nov-2024
Mast	Maturo	TAM 4.0-P	5158	-	TU
Mast and Turntable Controller	Maturo	Maturo NCD	5159	-	TU
Turntable	Maturo	TT 15WF	5160	-	TU
Antenna (DRG 1-10.5GHz)	Schwarzbeck	BBHA9120B	5215	12	28-May-2023
Pre-Amp 1 - 26.5 GHz	Agilent Technologies	8449B	5445	12	12-May-2023
Cable (SMA to SMA 1m)	Junkosha	MWX221-01000AMSAMS/A	5516	12	23-Oct-2023
3 GHz High pass Filter	Wainwright	WHKX12-2580-3000-18000-80SS	5547	12	11-May-2023
Cable (K Type 2m)	Junkosha	MWX241-02000KMSKMS/B	5936	12	14-May-2023
TRILOG Super Broadband Test Antenna	Schwarzbeck	VULB 9168	5942	24	03-Feb-2024
Attenuator 4dB	Pasternack	PE7074-4	6202	24	16-Jul-2024
Cable (N to N 8m)	Junkosha	MWX221-08000NMSNMS/B	6331	12	16-Feb-2024

Table 32

TU - Traceability Unscheduled

2.6 Adjacent Channel Power

2.6.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.221
ISED RSS-119, Clause 5.8.9.1

2.6.2 Equipment Under Test and Modification State

SC2024, S/N: 1PR002235GK6959 - Modification State 0

2.6.3 Date of Test

05-July-2023

2.6.4 Test Method

This test was performed conducted on the modulated carrier output from the EUT, measured using a spectrum analyser. The spectrum analyser was set to the transmit frequency, span to 0.2 MHz to measure the 3 x 25 kHz adjacent channels below and above the carrier.

A measurement integration bandwidth of 18 kHz was set, and the measurement used the Adjacent Channel Power function of the spectrum analyser.

2.6.5 Environmental Conditions

Ambient Temperature	22.3 °C
Relative Humidity	53.3 %

2.6.6 Test Results

TETRA – 450 MHz to 470 MHz

Offset (kHz)	Adjacent Channel Power (dB)		
	450.025 MHz	460.025 MHz	469.975 MHz
-25	-63.04	-62.93	-62.8
+25	-62.56	-62.67	-62.4
-50	-70.89	-70.44	-70.7
+50	-70.78	-70.34	-70.5
-75	-76.53	-76.32	-76.7
+75	-76.65	-76.31	-76.6

Table 33

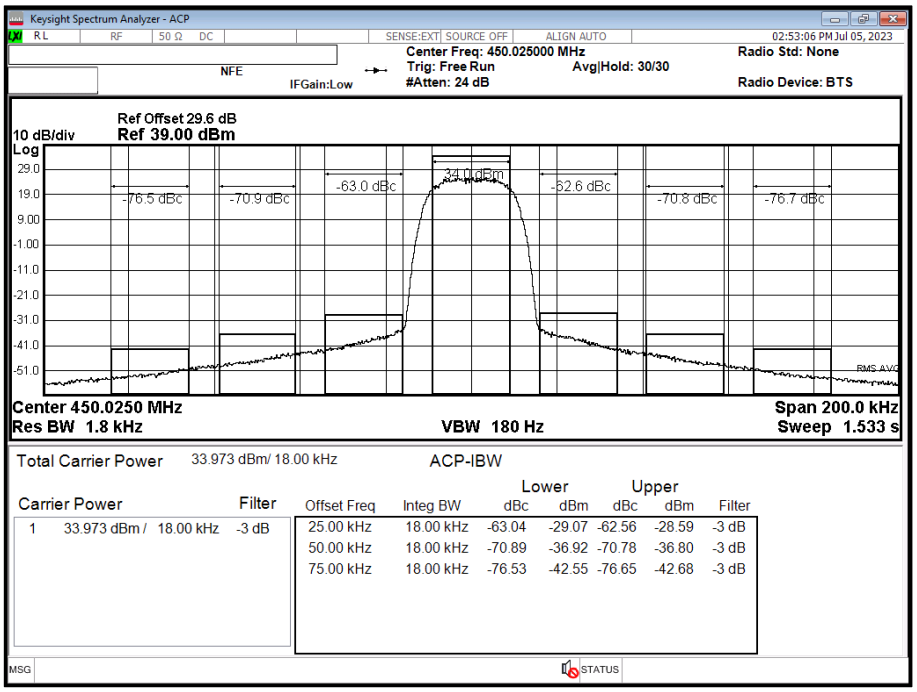

Figure 95 - 450.025 MHz

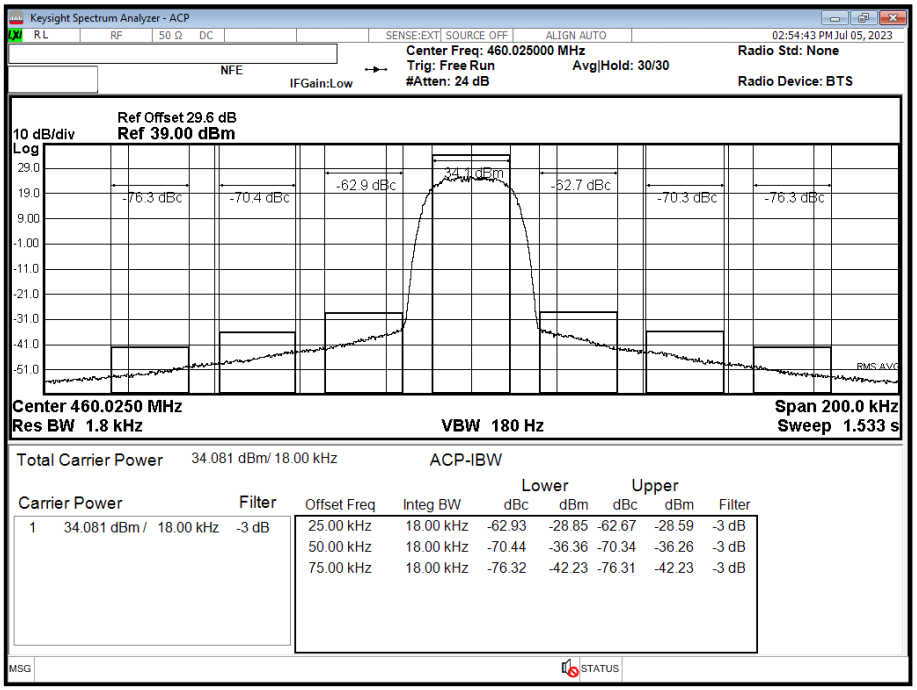

Figure 96 - 460.025 MHz

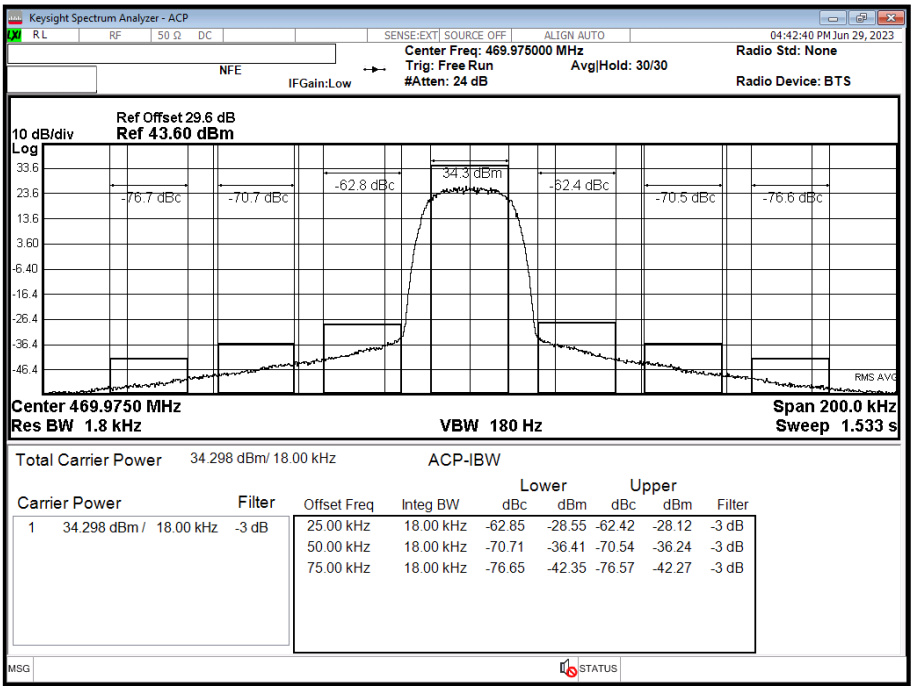

Figure 75 - 469.975 MHz

FCC Part 90, Limit Clause 90.221(b)

Frequency Offset	Maximum ACP (dBc) for devices ≤ 1W	Maximum ACP (dBc) for devices > 1W
25 kHz	-55	-60
50 kHz	-70	-70
75 kHz	-70	-70

Table 34

NOTE: In any case, no requirement in excess of -36 dBm shall apply.

ISED RSS-119. Limit Clause 5.8.9.1

The ACP of transmitters operating in the bands 768-776 MHz and 798-806 MHz shall comply with the requirements for various transmitter channel sizes provided in tables 13 to 16 of the specification.

2.6.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
HygroPalm	Rotronic	HygroPalm 0	3484	12	30-Aug-2023
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	06-Mar-2024
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	06-Mar-2024
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	13-Jul-2023
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	16-Jan-2024
Attenuator 5W 30dB DC-18GHz	Aaren	AT40A-4041-D18-30	5502	12	14-Jun-2024

Table 35

2.7 Transient Frequency Behaviour

2.7.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.214
ISED RSS-119, Clause 5.9

2.7.2 Equipment Under Test and Modification State

SC2024, S/N: 1PR002235GK6959 - Modification State 0

2.7.3 Date of Test

06-July-2023

2.7.4 Test Method

This test was performed on bottom, middle and top frequencies using an unmodulated carrier output from the EUT and measured on a spectrum analyser in accordance with TIA Standard 603 (Referenced in Industry Canada RSS-119, Clause 5.9).

The EUT configuration application used to transmit an unmodulated signal was 2.25 kHz higher than the nominal centre frequency of the channel. Therefore, the trace plots recorded were centered on 2.25 kHz higher than the bottom, middle and top nominal centre frequencies.

2.7.5 Environmental Conditions

Ambient Temperature	22.9 °C
Relative Humidity	52.1 %

2.7.6 Test Results

TETRA – 450 MHz to 470 MHz

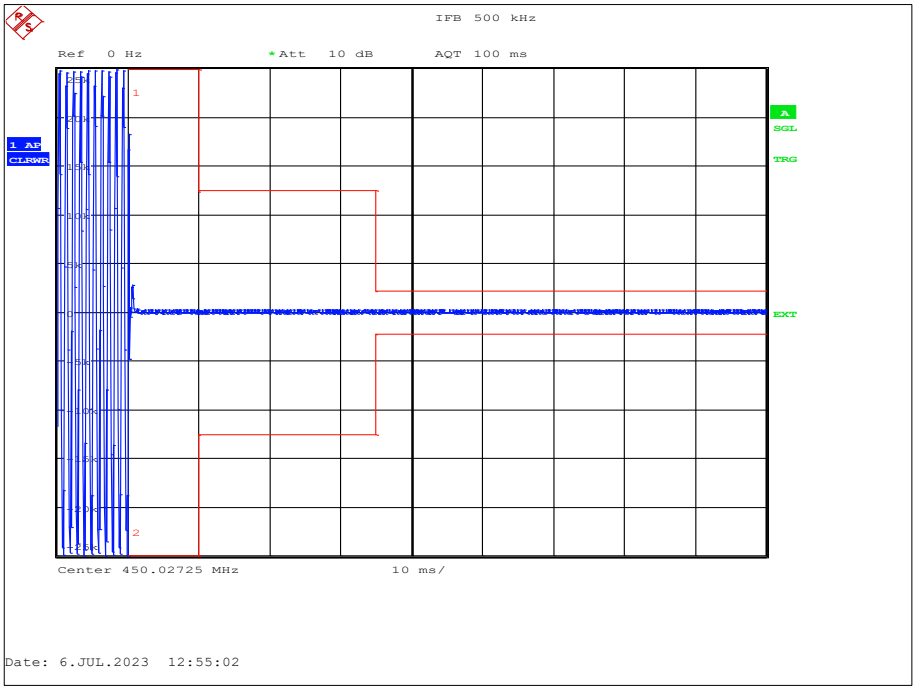

Figure 97 - 450.025 MHz, Switch On Transients

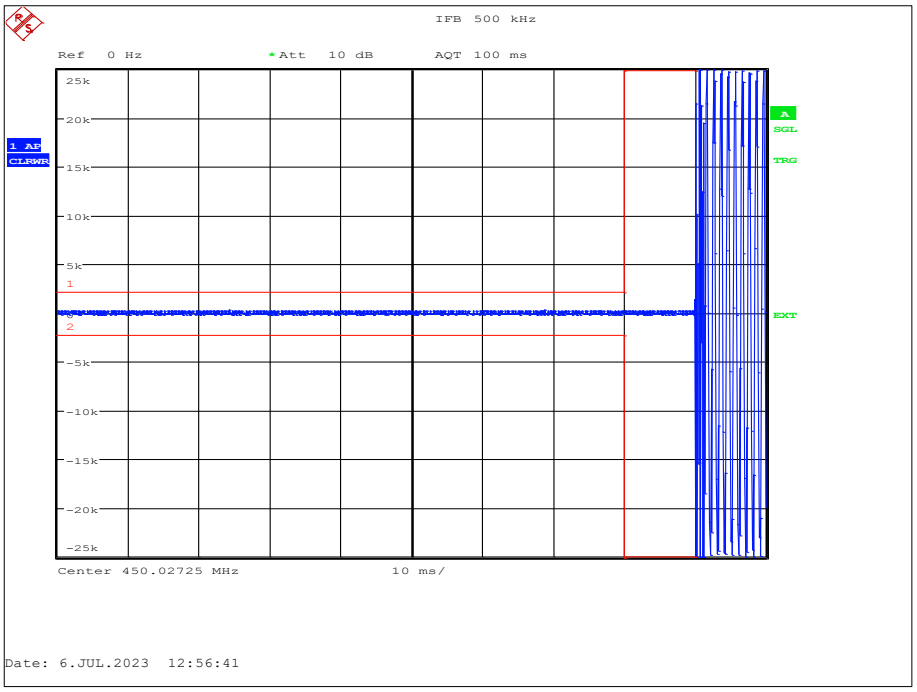

Figure 98- 450.025 MHz, Switch Off Transients

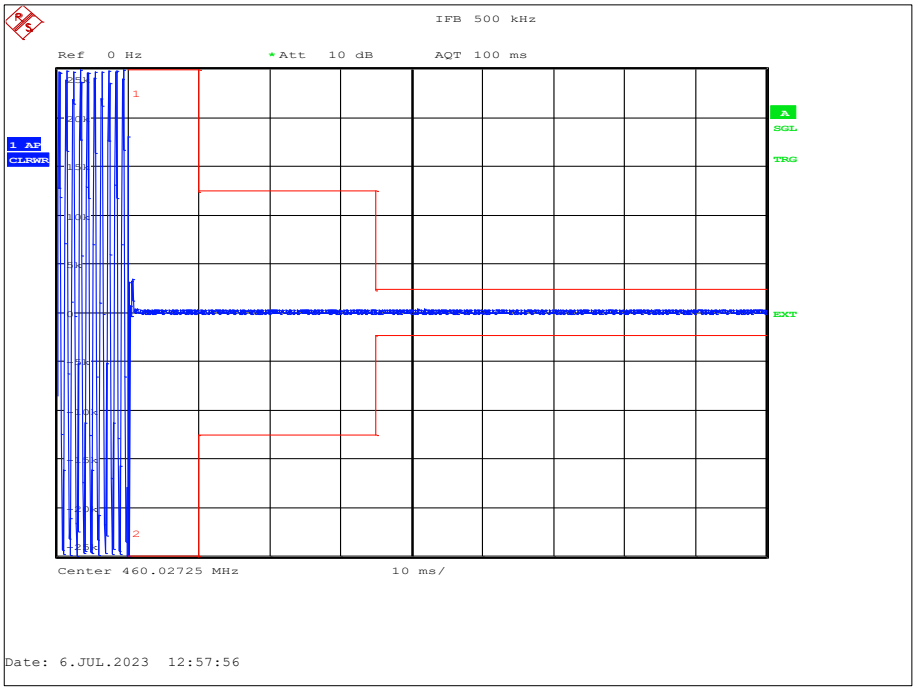

Figure 99 - 460.025 MHz, Switch On Transients

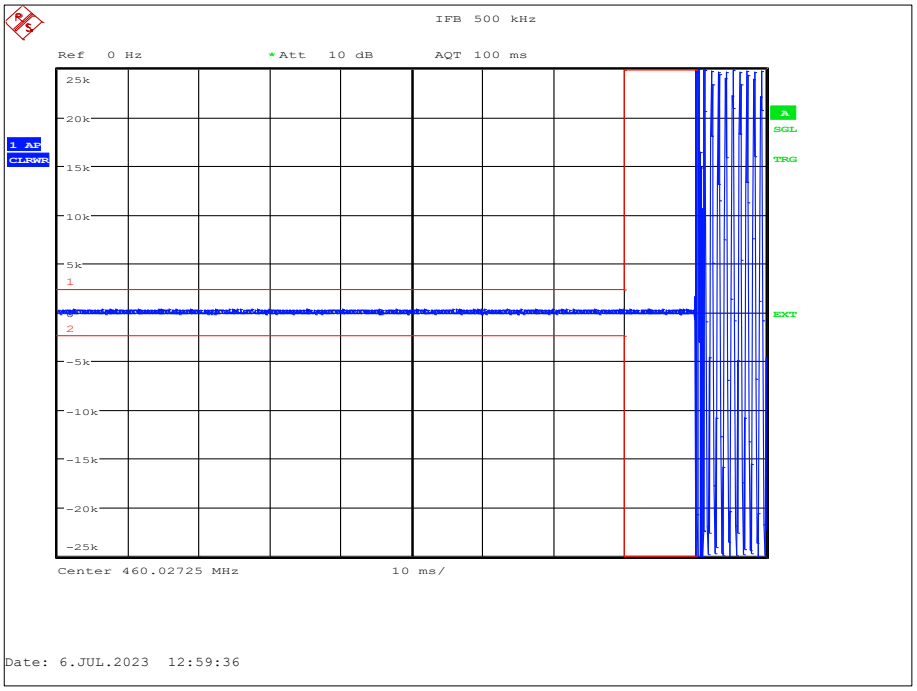

Figure 100- 460.025 MHz, Switch Off Transients

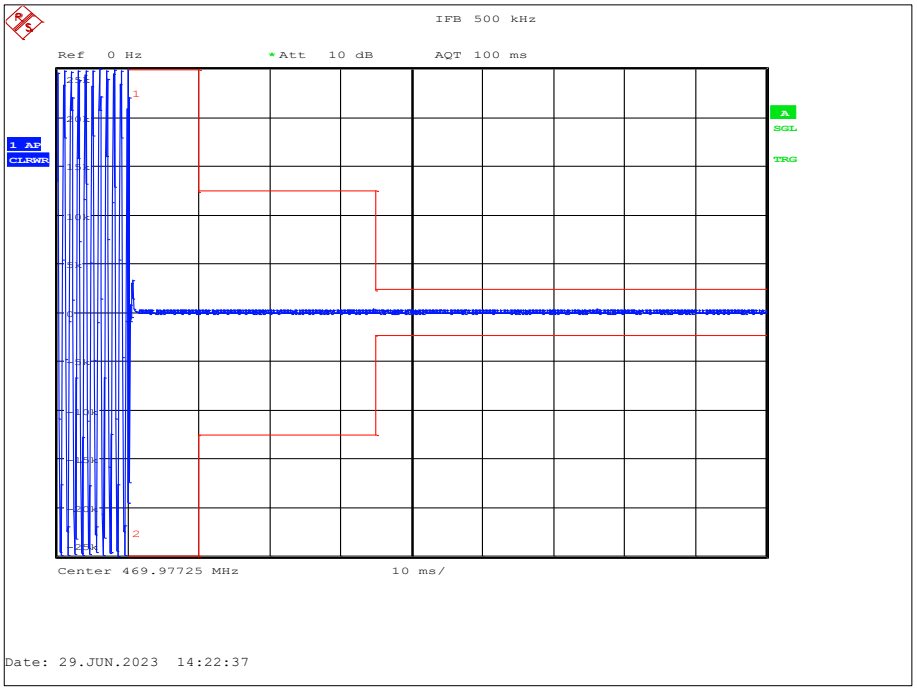

Figure 101 - 469.975 MHz, Switch On Transients

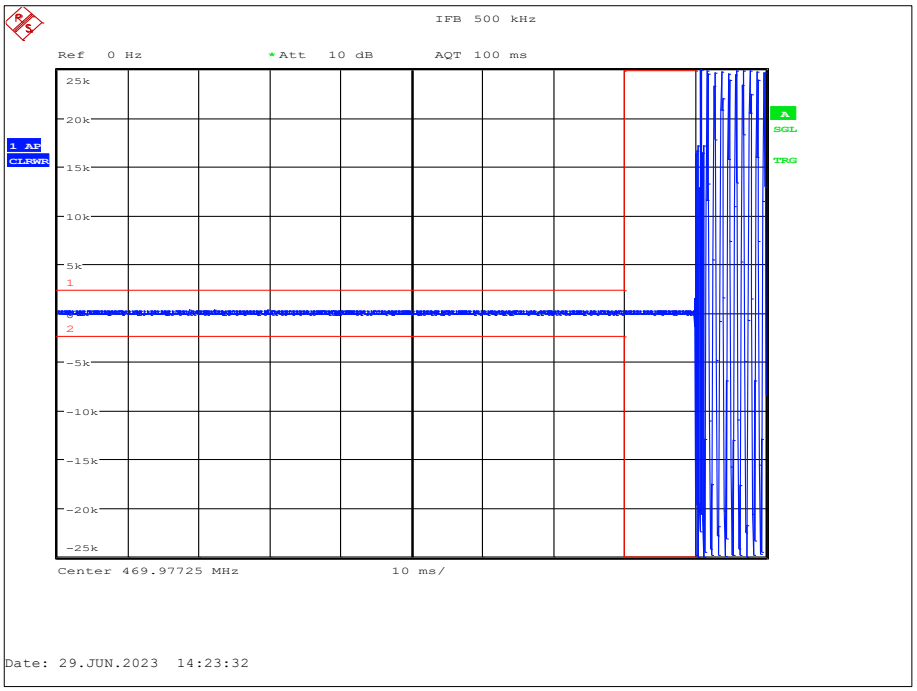

Figure 102- 469.975 MHz, Switch Off Transients

TETRA – 406 MHz to 430 MHz

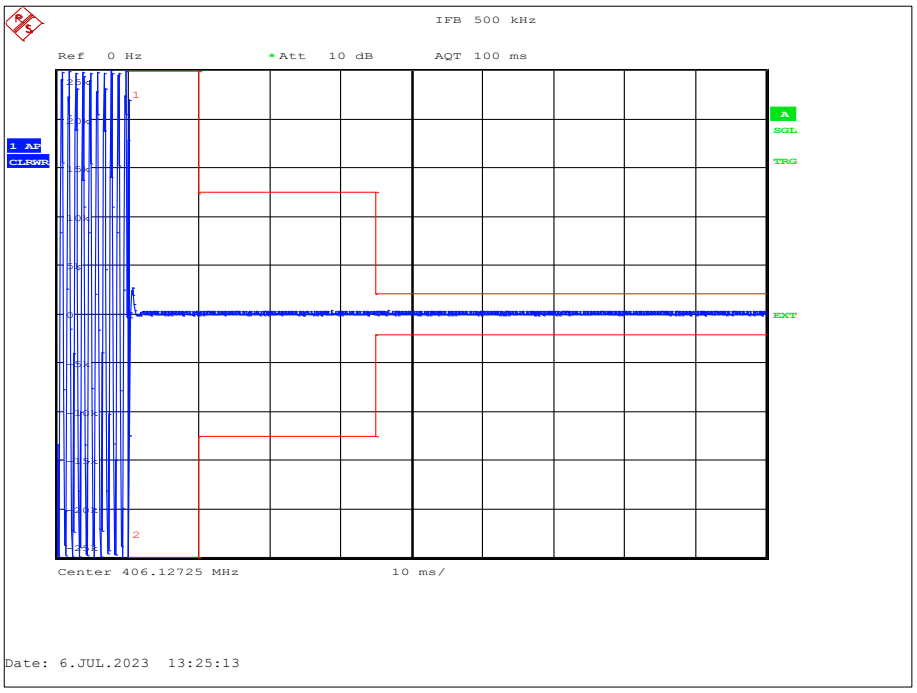

Figure 103 - 406.125 MHz, Switch On Transients

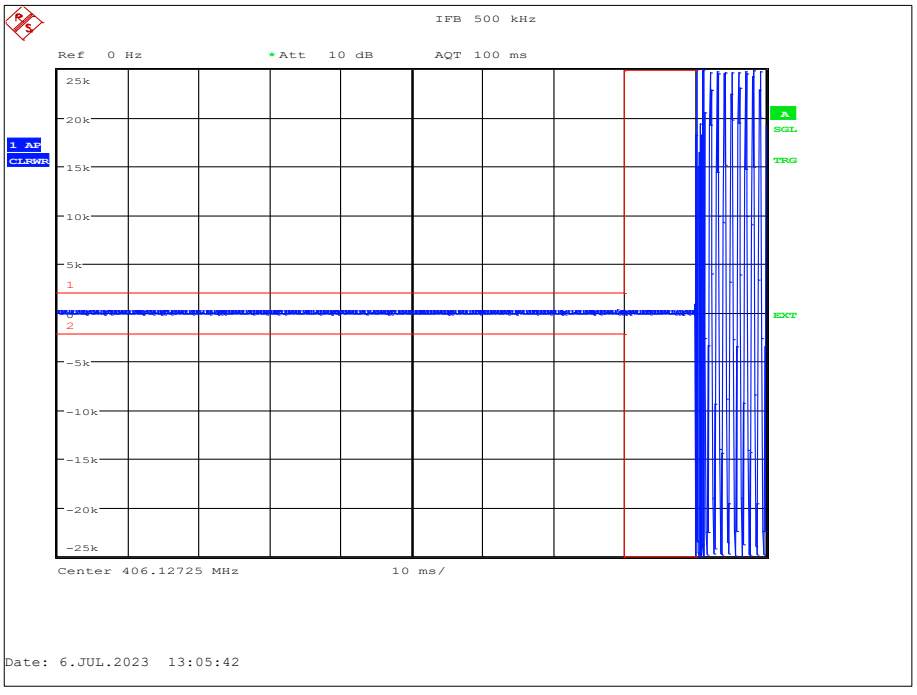

Figure 104- 406.125 MHz, Switch Off Transients

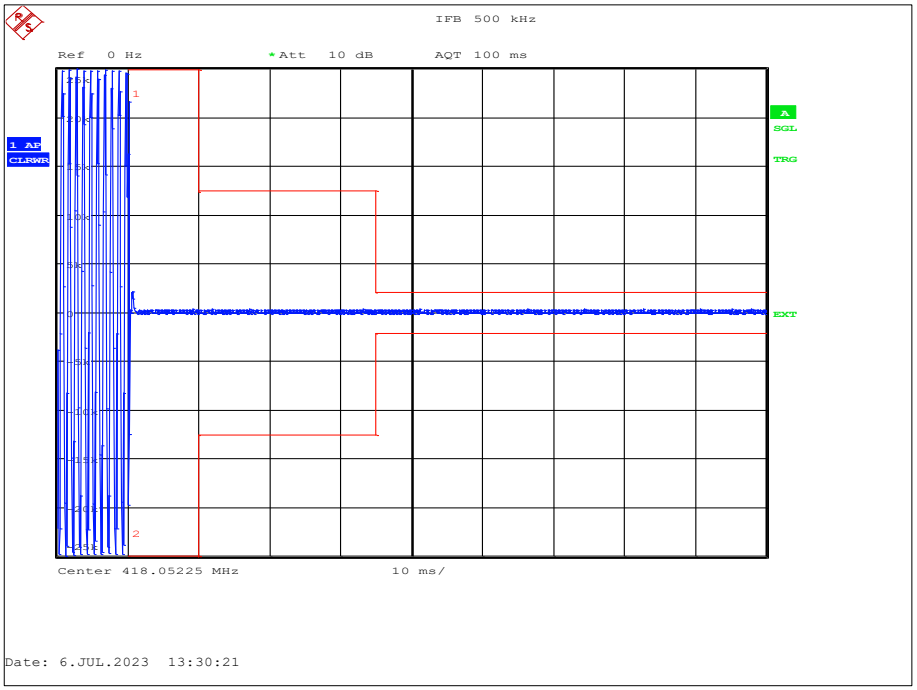

Figure 105 - 418.050 MHz, Switch On Transients

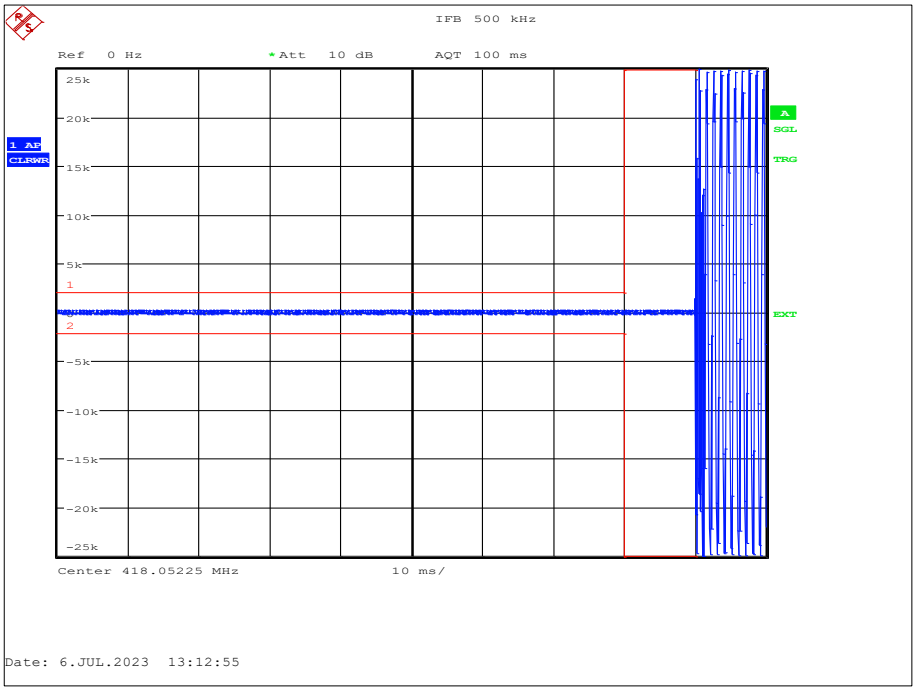

Figure 106- 418.050 MHz, Switch Off Transients

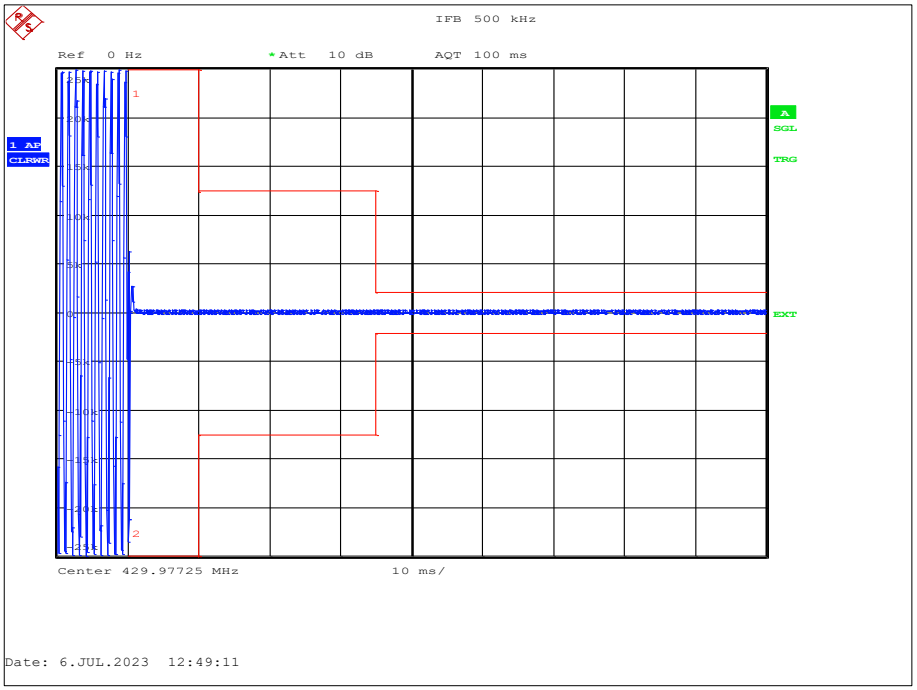

Figure 107 - 429.975 MHz, Switch On Transients

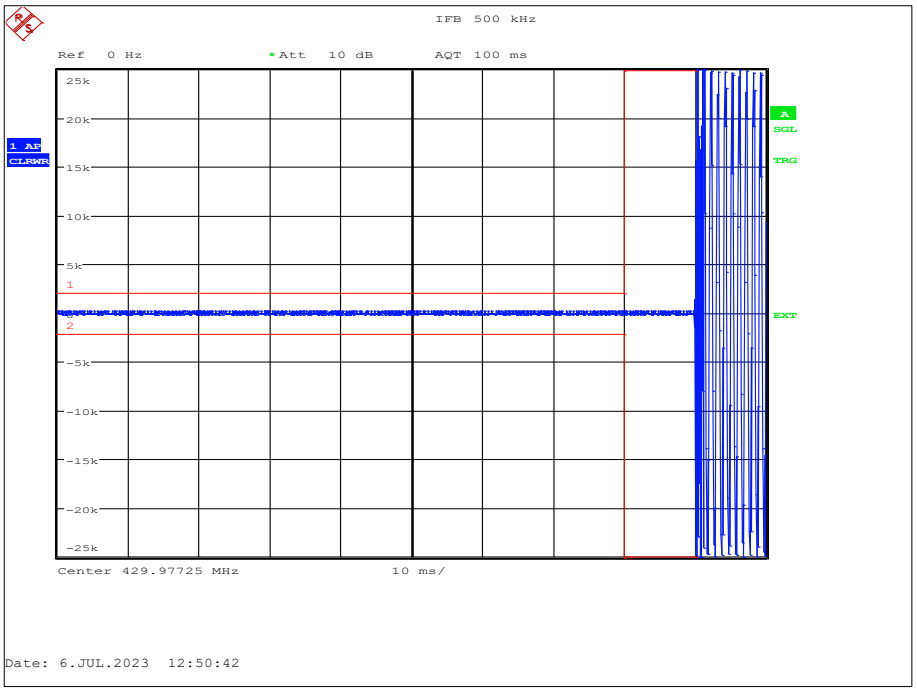

Figure 108- 429.975 MHz, Switch Off Transients

FCC 47 CFR Part 90, Limit Clause 90.214

Time Interval	Maximum Frequency Difference	150 to 174 MHz	421 to 512 MHz
Transient Frequency Behaviour for Equipment Designed to Operate on 25 kHz Channels			
T_1	± 25.0 kHz	5.0 ms	10.0 ms
T_2	± 12.5 kHz	20.0 ms	25.0 ms
T_3	± 25.0 kHz	5.0 ms	10.0 ms
Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz Channels			
T_1	± 12.5 kHz	5.0 ms	10.0 ms
T_2	± 6.25 kHz	20.0 ms	25.0 ms
T_3	± 12.5 kHz	5.0 ms	10.0 ms
Transient Frequency Behaviour for Equipment Designed to Operate on 6.25 kHz Channels			
T_1	± 6.25 kHz	5.0 ms	10.0 ms
T_2	± 3.125 kHz	20.0 ms	25.0 ms
T_3	± 6.25 kHz	5.0 ms	10.0 ms

Table 36

ISED RSS-119, Limit Clause 5.9

Channel Bandwidth (kHz)	Time Intervals	Maximum Frequency Difference (kHz)	Transient Duration Limit (ms)	
			138 to 174 MHz	406.1 to 512 MHz
25.0	t_1	± 25.0	5	10
	t_2	±12.5	20	25
	t_3	± 25.0	5	10
12.5	t_1	± 12.5	5	10
	t_2	± 6.25	20	25
	t_3	± 12.5	5	10
6.25	t_1	± 6.25	5	10
	t_2	± 3.125	20	25
	t_3	± 6.25	5	10

Table 37

2.7.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Power Splitter	Weinschel	1870A	3204	12	28-Nov-2023
HygroPalm	Rotronic	HygroPalm 0	3484	12	30-Aug-2023
Signal Generator, 9kHz - 3GHz	Rohde & Schwarz	SMA 100A	3504	12	11-Oct-2023
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	09-May-2024
Combiner/Splitter	Weinschel	1506A	3877	12	08-Aug-2023
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	13-Jul-2023
Attenuator 5W 30dB DC-18GHz	Aaren	AT40A-4041-D18-30	5502	12	14-Jun-2024

Table 38

2.8 Frequency Stability

2.8.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1055
FCC 47 CFR Part 90, Clause 90.213,
ISED RSS-119, Clause 5.3
ISED RSS-GEN, Clause 6.11

2.8.2 Equipment Under Test and Modification State

SC2024, S/N: 1PR002235GK6959 - Modification State 0

2.8.3 Date of Test

23-June-2023

2.8.4 Test Method

This test was performed in accordance with ANSI C63.26, Clause 5.6. and the requirements of FCC 47 CFR Part 2, Clause 2.1055 (a)(1), (d)(2).

The EUT was set to transmit on maximum power with an unmodulated carrier on bottom, middle and top channels. The EUT was connected to a frequency counter using an external 10 MHz frequency reference and the frequency of the assigned channel recorded. In accordance with FCC 47 CFR, Clause 2.1055, the temperature was varied from -30 °C to +50 °C in 10 ° steps at nominal voltage and at ambient temperature for both nominal and endpoint voltage.

2.8.5 Environmental Conditions

Ambient Temperature	22.5 °C
Relative Humidity	60.6 %

2.8.6 Test Results

TETRA – 403 MHz to 430 MHz and 450 MHz to 470 MHz

Voltage (Volts)	Frequency Error (ppm)	
	406.125 MHz	469.975 MHz
6.2	0.17	0.17
7.4	0.17	0.17

Table 39 - Frequency Stability Under Voltage Variations

Temperature (°C)	Frequency Error (ppm)	
	406.125 MHz	469.975 MHz
+50.0	0.19	0.18
+40.0	0.25	0.24
+30.0	0.20	0.21
+20.0	0.17	0.17
+10.0	0.13	0.17
0	0.06	0.04
-10.0	0.02	0.04
-20.0	-0.01	-0.01
-30.0	-0.01	-0.03

Table 40 - Frequency Stability Under Temperature Variations

FCC 47 CFR Part 90, Limit Clause 90.213

5.0 ppm

ISED RSS-119, Limit Clause 5.3

1.0 ppm

2.8.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Counter	Hewlett Packard	53181A	159	12	02-Aug-2023
Climatic Chamber	Votsch	VT4002	161	-	O/P Mon
Multimeter	Iso-tech	IDM101	2424	12	20-Feb-2024
HygroPalm	Rotronic	HygroPalm 0	3484	12	30-Aug-2023
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	13-Jul-2023
Quad Power Supply	Rohde & Schwarz	HMP4040	4955	-	O/P Mon
Attenuator 5W 30dB DC-18GHz	Aaren	AT40A-4041-D18-30	5502	12	14-Jun-2024
Meter	ETI Ltd	Therma Elite	6326	12	27-Mar-2024

Table 41

O/P Mon – Output Monitored using calibrated equipment

3 Photographs

3.1 Test Setup Photographs

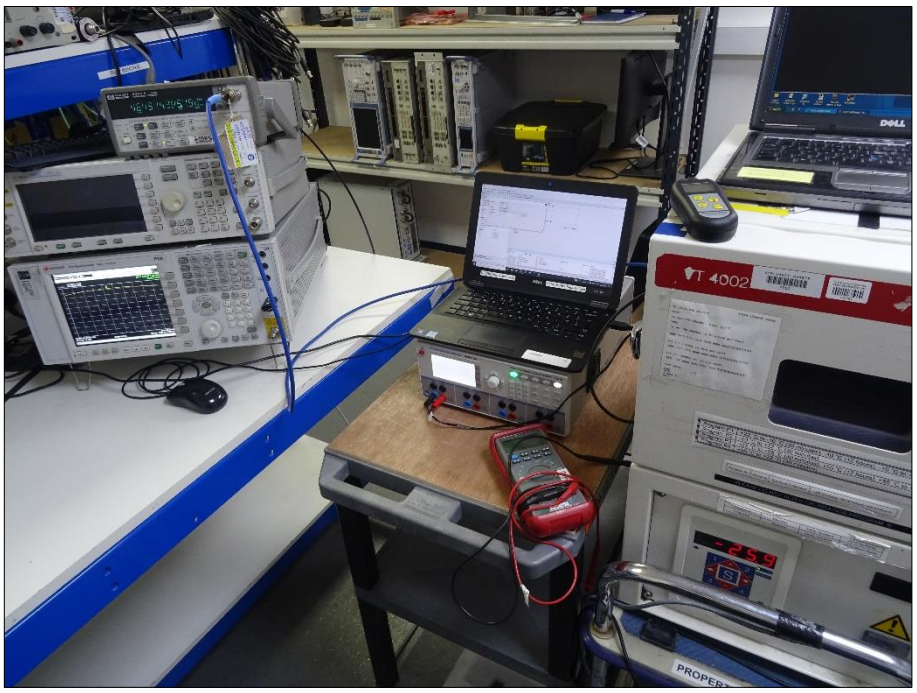

Figure 109 – Test Setup Photos

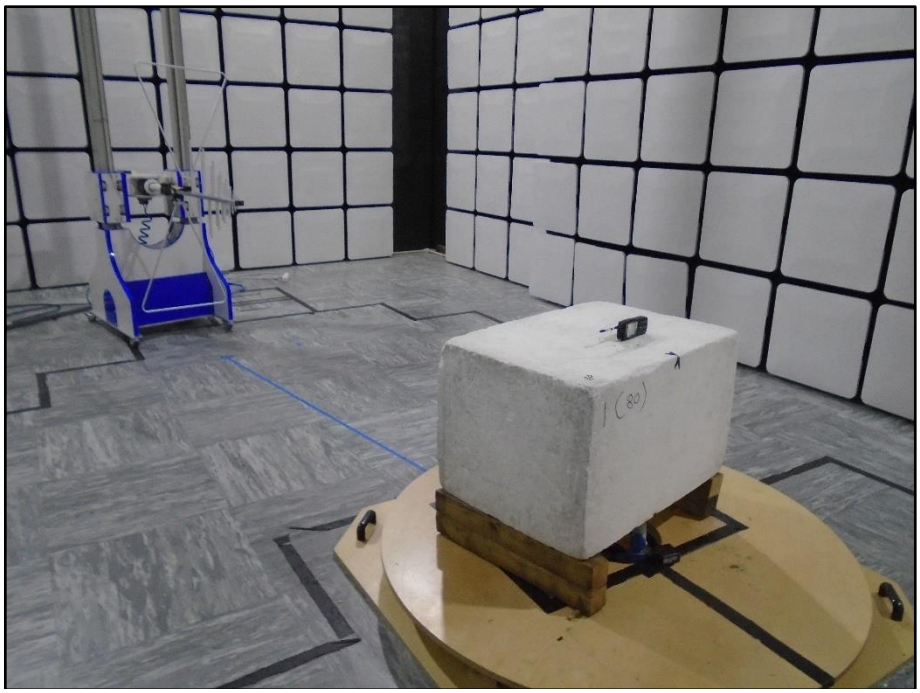

Figure 110 – Test Setup, 30 MHz to 1 GHz X Orientation

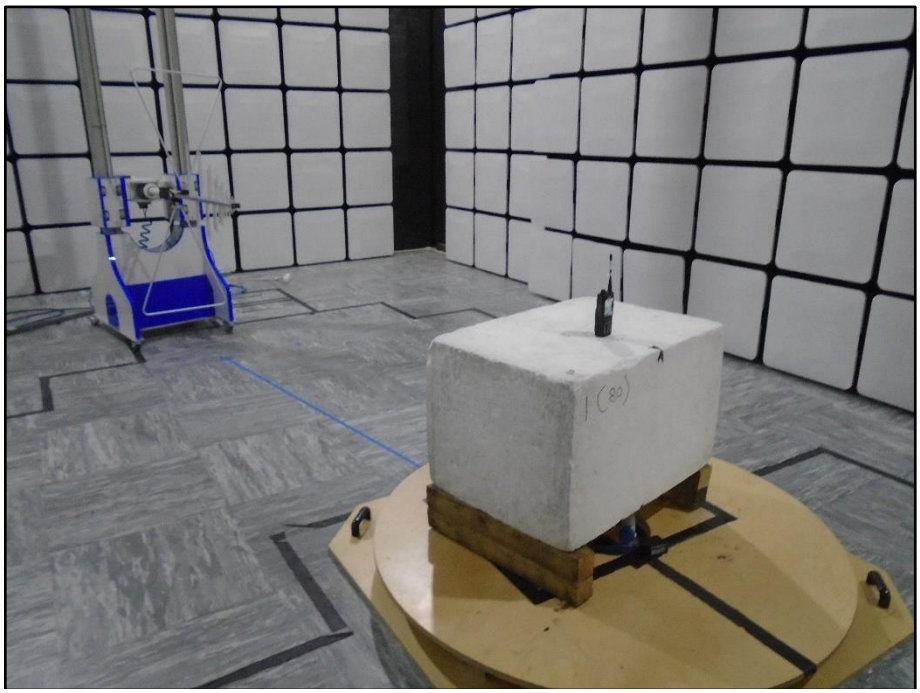

Figure 111 – Test Setup, 30 MHz to 1 GHz Y Orientation

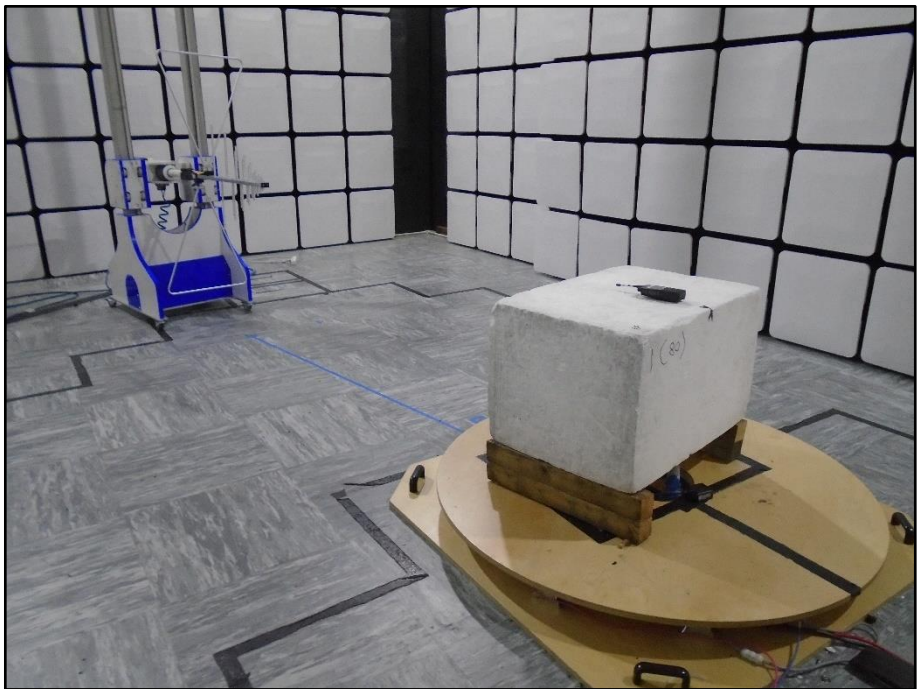

Figure 112 – Test Setup, 30 MHz to 1 GHz Z Orientation

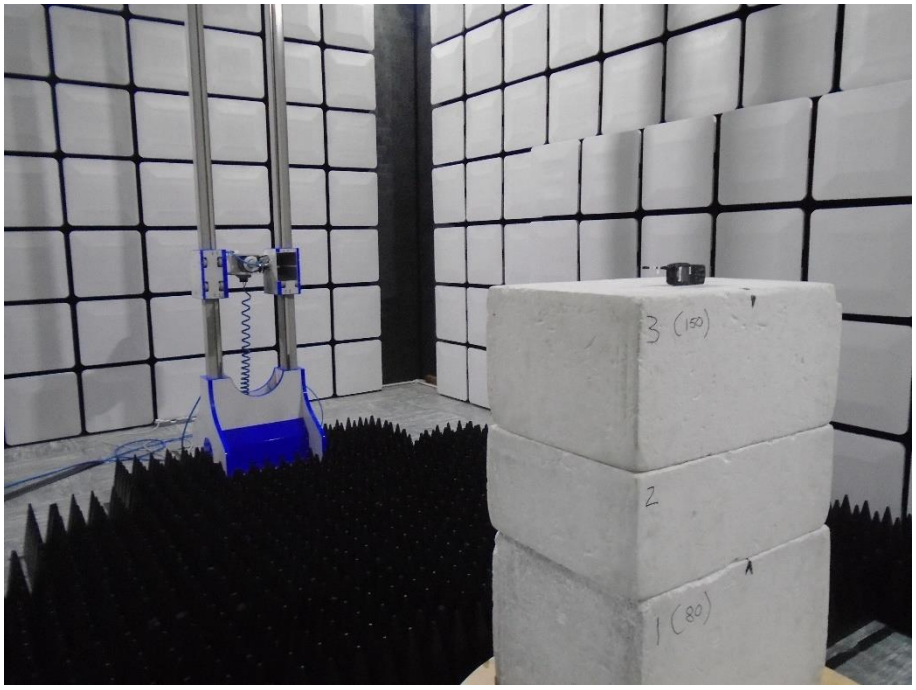

Figure 113 – Test Setup, 30 MHz to 1 GHz X Orientation

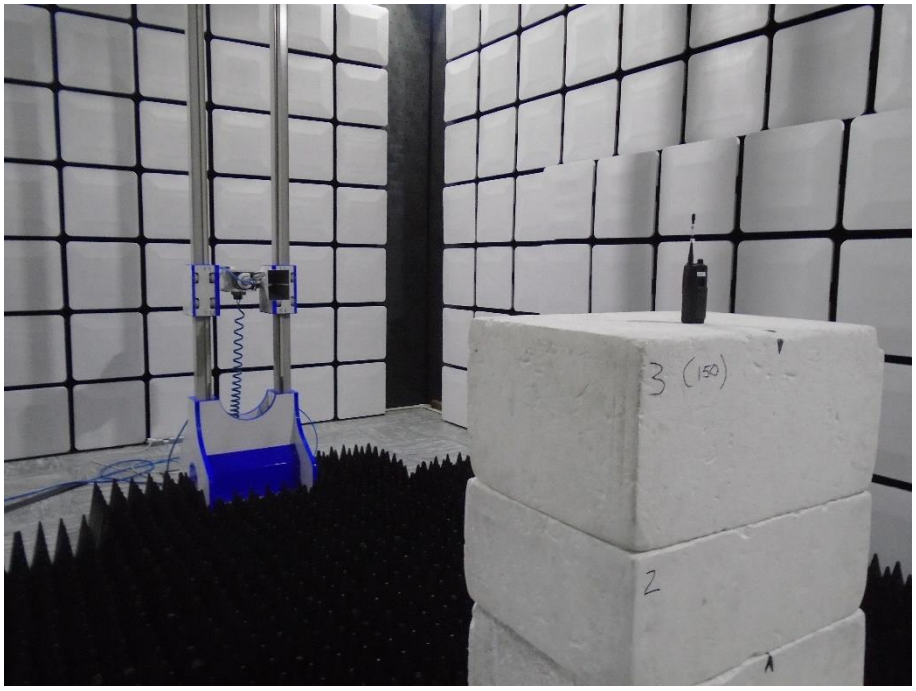

Figure 114 – Test Setup, 30 MHz to 1 GHz Y Orientation

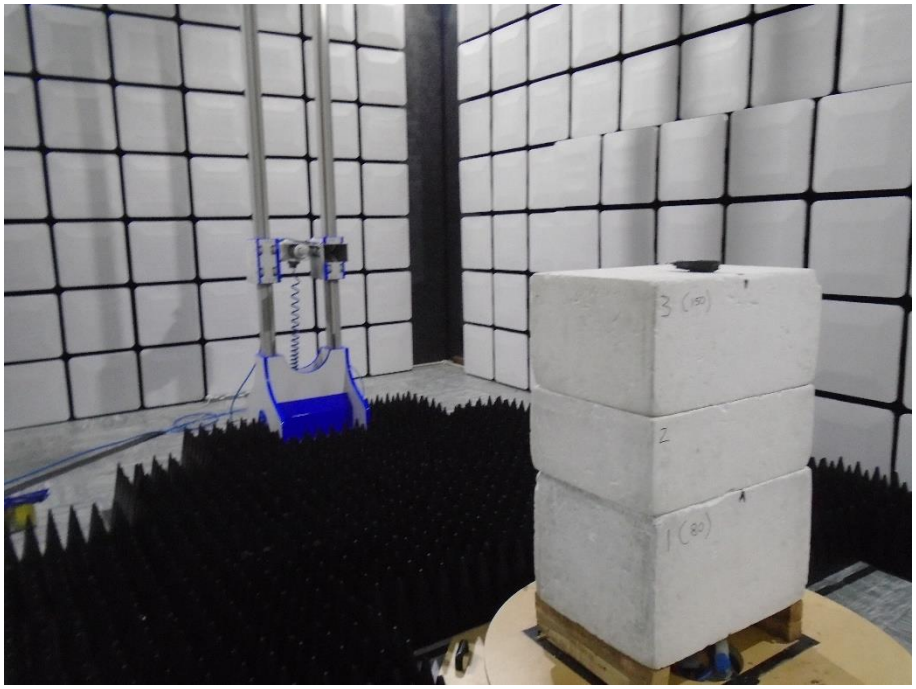

Figure 115 – Test Setup, 30 MHz to 1 GHz Z Orientation

4 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
Adjacent Channel Power	± 3.0 dB
Types of Emissions	-
Bandwidth Limitations	± 58.05 Hz
Transient Frequency Behaviour	± 0.2 Hz
Maximum Conducted Output Power	± 3.2 dB
Radiated Spurious Emissions	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 18 GHz: ± 6.3 dB
Spurious Emissions at Antenna Terminals	± 3.45 dB

Table 42

Measurement Uncertainty Decision Rule – Accuracy Method

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115:2021, Clause 4.4.3 (Procedure 2). The measurement results are directly compared with the test limit to determine conformance with the requirements of the standard.

Risk: The uncertainty of measurement about the measured result is negligible with regard to the final pass/fail decision. The measurement result can be directly compared with the test limit to determine conformance with the requirement (compare IEC Guide 115). The level of risk to falsely accept and falsely reject items is further described in ILAC-G8.