

FCC Test Report

SmartSky Networks. LLC

ABR Transceiver, Model: Not Applicable

In accordance with FCC 47 CFR Part 15C, ISED

RSS-247 and ISED RSS-GEN

(2.4 GHz Transmitter)

Prepared for: SmartSky Networks. LLC
430 Davis Drive
Suite 350
Morrisville
NC, 27560, USA



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FCC ID: 2APND-ABR2

COMMERCIAL-IN-CONFIDENCE

Document 75955247-02 Issue 01

SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Matthew Russell	Senior Engineer (RF)	Authorised Signatory	25 October 2022

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, ISED RSS-247 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	Graeme Lawler	25 October 2022	
Testing	Daniel Cameron	25 October 2022	

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: 2020, ISED RSS-247: Issue 2 (02-2017) and ISED RSS-GEN: Issue 5 (04-2018) + A2 (02-2021) for the tests detailed in section 1.3.



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Contents

1	Report Summary	2
1.1	Report Modification Record	2
1.2	Introduction	2
1.3	Brief Summary of Results	3
1.4	Application Form	4
1.5	Product Information	7
1.6	Deviations from the Standard	7
1.7	EUT Modification Record	7
1.8	Test Location	8
2	Test Details	9
2.1	Restricted Band Edges	9
2.2	Emission Bandwidth	17
2.3	Maximum Conducted Output Power	35
2.4	Spurious Radiated Emissions	43
2.5	Authorised Band Edges	89
2.6	Power Spectral Density	95
3	Photographs	103
3.1	Test Setup Photographs	103
4	Test Equipment Information	106
4.1	Customer Support Equipment	106
5	Measurement Uncertainty	107



1 Report Summary

1.1 Report Modification Record

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

Issue	Description of Change	Date of Issue
1	First Issue	25 October 2022

Table 1

1.2 Introduction

Applicant	SmartSky Networks. LLC
Manufacturer	Avidyne, Inc.
Model Number(s)	Not Applicable
Serial Number(s)	1819V0007
Hardware Version(s)	G
Software Version(s)	Rocket 3.8.18
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C: 2020 ISED RSS-247: Issue 2 (02-2017) ISED RSS-GEN: Issue 5 (04-2018) + A2 (02-2021)
Order Number	76011
Date	28-March-2022
Date of Receipt of EUT	13-May-2022
Start of Test	18-May-2022
Finish of Test	24-July-2022
Name of Engineer(s)	Graeme Lawler and Daniel Cameron
Related Document(s)	ANSI C63.10 (2020) KDB 662911 D01 v02r01



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C, ISSED RSS-247 and ISSED RSS-GEN is shown below.

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	FCC Part 15C	RSS-247	RSS-GEN			
Configuration and Mode: 3RB - 4.5MHz						
2.1	15.205	3.3	8.10	Restricted Band Edges	Pass	
2.2	15.247 (a)(2)	5.2	6.7	Emission Bandwidth	Pass	
2.3	15.247 (b)	5.4	6.12	Maximum Conducted Output Power	Pass	
2.4	15.247 (d) and 15.209	3.3 and 5.5	6.13 and 8.9	Spurious Radiated Emissions	Pass	
2.5	15.247 (d)	5.5	-	Authorised Band Edges	Pass	
2.6	15.247 (e)	5.2	6.12	Power Spectral Density	Pass	
Configuration and Mode: FRB - 9 MHz						
2.1	15.205	3.3	8.10	Restricted Band Edges	Pass	
2.2	15.247 (a)(2)	5.2	6.7	Emission Bandwidth	Pass	
2.3	15.247 (b)	5.4	6.12	Maximum Conducted Output Power	Pass	
2.4	15.247 (d) and 15.209	3.3 and 5.5	6.13 and 8.9	Spurious Radiated Emissions	Pass	
2.5	15.247 (d)	5.5	-	Authorised Band Edges	Pass	
2.6	15.247 (e)	5.2	6.12	Power Spectral Density	Pass	

Table 2



1.4 Application Form

Equipment Description

Technical Description: <i>(Please provide a brief description of the intended use of the equipment including the technologies the product supports)</i>	The EUT is an air based 2.4GHz transceiver intended to communicate with ground stations	
Manufacturer:	Avidyne, Inc.	
Model:	N/A	
Part Number:	3243489-201	
Hardware Version:	G	
Software Version:	Rocket 3.8.18	
FCC ID of the product under test – see guidance here	2APND-ABR2	
IC ID of the product under test – see guidance here	N/A	

Table 3

Intentional Radiators

Technology	LTE-based	LTE-based	LTE-based
Frequency Range (MHz to MHz)	2410.3 to 2435.3	2412.8 to 2432.8	2408.57 to 2437.03
Conducted Declared Output Power (dBm)	30 (with no cable loss) 33 (with 3dB cable loss)	30 (with no cable loss) 33 (with 3dB cable loss)	30 (with no cable loss) 33 (with 3dB cable loss)
Antenna Gain (dBi)	4.25 or 6.08	4.25 or 6.08	4.25 or 6.08
Supported Bandwidth(s) (MHz) (e.g. 1 MHz, 20 MHz, 40 MHz)	5MHz nominal (4.5 MHz actual)	10MHz nominal (9 MHz actual)	540kHz
Modulation Scheme(s) (e.g. GFSK, QPSK etc)	QPSK, QAM-16	QPSK, QAM-16	QPSK, QAM-16
ITU Emission Designator (see guidance here) (not mandatory for Part 15 devices)	N/A	N/A	N/A
Bottom Frequency (MHz)	2410.3	2412.8	2408.57
Middle Frequency (MHz)	2420.3 or 2425.3	2422.8	2422.8
Top Frequency (MHz)	2435.3	2432.8	2437.03

Table 4



Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	9893 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	200kHz
Class A Digital Device (Use in commercial, industrial or business environment) <input checked="" type="checkbox"/>	
Class B Digital Device (Use in residential environment only) <input type="checkbox"/>	

Table 5

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"/>		

Table 6

DC Power Source

Nominal voltage:	28	V
Extreme upper voltage:	32	V
Extreme lower voltage:	22	V
Max current:	9	A

Table 7

Battery Power Source

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

Table 8

Charging

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

Table 9

Temperature

Minimum temperature:	-55	°C
Maximum temperature:	70	°C

Table 10



Cable Loss

Adapter Cable Loss (Conducted sample)	3.2	dB
--	-----	----

Table 11

Antenna Characteristics

Antenna connector <input checked="" type="checkbox"/>	State impedance	50	Ohm
Temporary antenna connector <input type="checkbox"/>	State impedance		Ohm
Integral antenna <input type="checkbox"/>	Type:		Gain
External antenna <input checked="" type="checkbox"/>	Type:	2 part phased array	Gain
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 checked="" type="checkbox"/> Non-standard Antenna Jack <input type="checkbox"/>			

Table 12

Ancillaries (if applicable)

Manufacturer:	Not supplied	Part Number:	
Model:		Country of Origin:	

Table 13

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

Name: Leah Ward
 Position held: DSP Engineer
 Date: 2021/01/10



1.5 Product Information

1.5.1 Technical Description

The EUT is an air based 2.4 GHz transceiver intended to communicate with ground stations.

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: Not Applicable, Serial Number: 1819V0007			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 14



1.8 Test Location

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

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: 3RB - 4.5MHz		
Restricted Band Edges	Graeme Lawler	UKAS
Maximum Conducted Output Power	Daniel Cameron	UKAS
Spurious Radiated Emissions	Graeme Lawler	UKAS
Authorised Band Edges	Graeme Lawler	UKAS
Power Spectral Density	Daniel Cameron	UKAS
Emission Bandwidth	Daniel Cameron	UKAS
Configuration and Mode: FRB - 9 MHz		
Restricted Band Edges	Graeme Lawler	UKAS
Maximum Conducted Output Power	Daniel Cameron	UKAS
Spurious Radiated Emissions	Graeme Lawler	UKAS
Authorised Band Edges	Graeme Lawler	UKAS
Power Spectral Density	Daniel Cameron	UKAS
Emission Bandwidth	Daniel Cameron	UKAS

Table 15

Office Address:

TÜV SÜD
Octagon House
Concorde Way
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
ISED RSS-247, Clause 3.3
ISED RSS-GEN, Clause 8.10

2.1.2 Equipment Under Test and Modification State

Not Applicable, S/N: 1819V0007 - Modification State 0

2.1.3 Date of Test

29-May-2022 to 30-May-2022

2.1.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.10.5 and 11.12.1.

Plots for average measurements were taken in accordance with ANSI C63.10, clause 11.12.2.5.2.

It has been necessary to notch the fundamental to avoid overloading the measuring analyser during measurement of restricted band edges for the 3 resource block modes. This will make the carrier appear irregular. Any loss at the restricted band edge frequency has been compensated as a reference level offset in the analyser.

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

2.1.5 Environmental Conditions

Ambient Temperature	22.5 - 24.0 °C
Relative Humidity	31.3 - 38.5 %



2.1.6 Test Results

3RB - 4.5MHz

Mode	Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	2410.3 - Patch	2390	56.50	44.25
Static	2435.3 - Patch	2483.5	54.92	44.39
Static	2410.3 - Yagi	2390	55.17	44.17
Static	2435.3 - Yagi	2483.5	55.20	44.26

Table 16

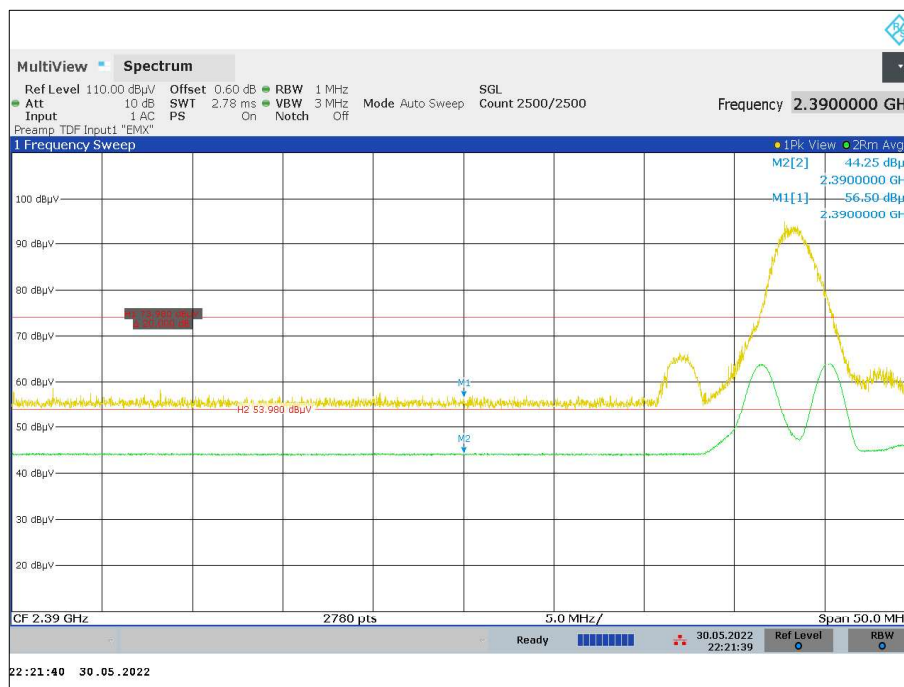


Figure 1 - 2410.3 - Patch MHz - Band Edge Frequency 2390 MHz



Figure 2 - 2435.3 - Patch MHz - Band Edge Frequency 2483.5 MHz

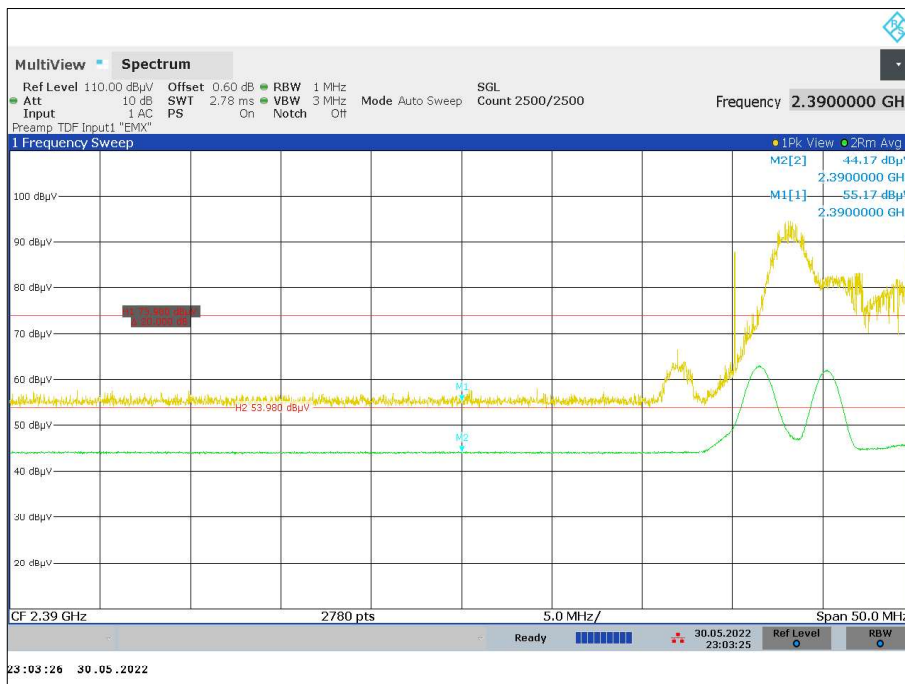


Figure 3 - 2410.3 - Yagi MHz - Band Edge Frequency 2390 MHz



Figure 4 - 2435.3 - Yagi MHz - Band Edge Frequency 2483.5 MHz



FRB - 9 MHz

Mode	Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	2412.8 - Patch	2390	58.11	47.10
Static	2432.8 - Patch	2483.5	60.08	47.86
Static	2412.8 - Yagi	2390	57.37	46.90
Static	2432.8 - Yagi	2483.5	60.21	47.70

Table 17

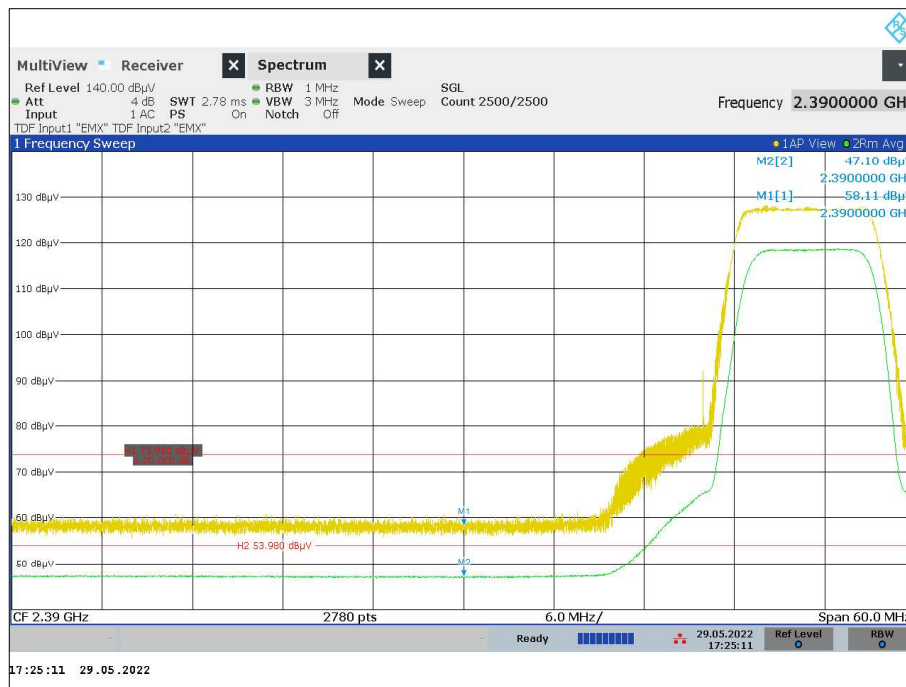


Figure 5 - 2412.8 - Patch MHz - Band Edge Frequency 2390 MHz

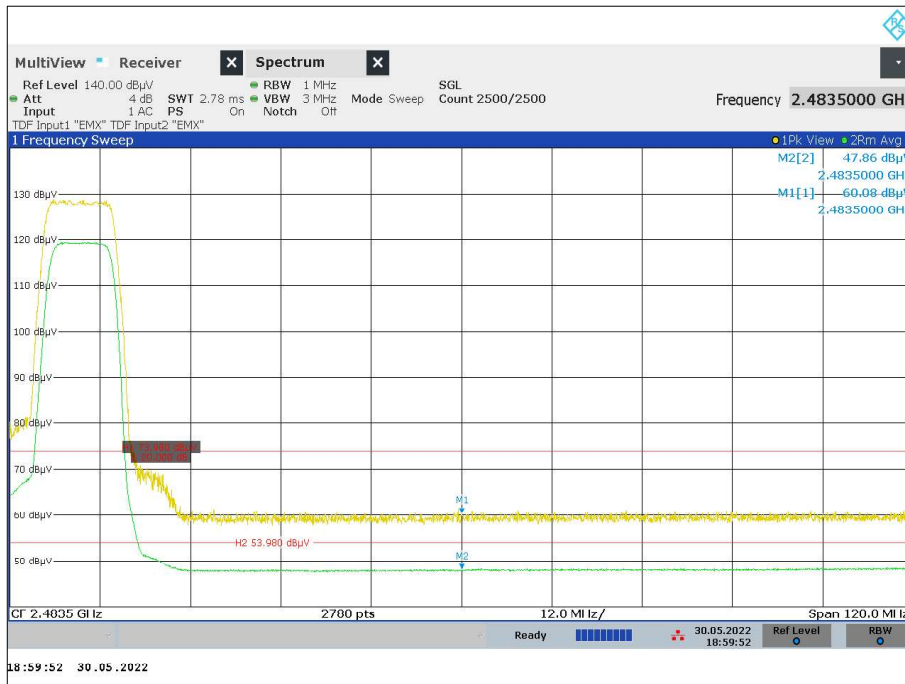


Figure 6 - 2432.8 - Patch MHz - Band Edge Frequency 2483.5 MHz

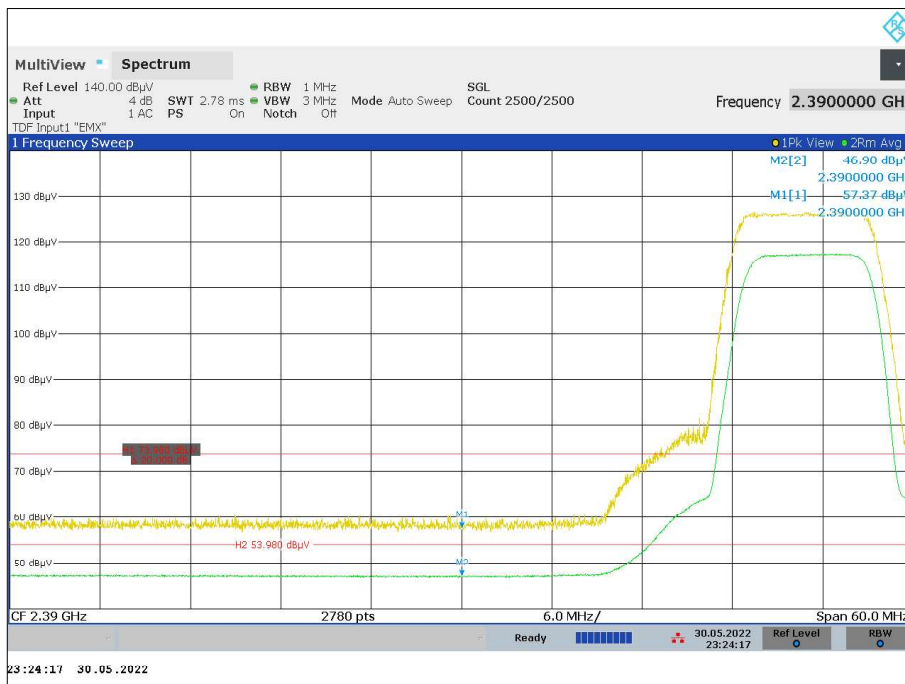


Figure 7 - 2412.8 - Yagi MHz - Band Edge Frequency 2390 MHz

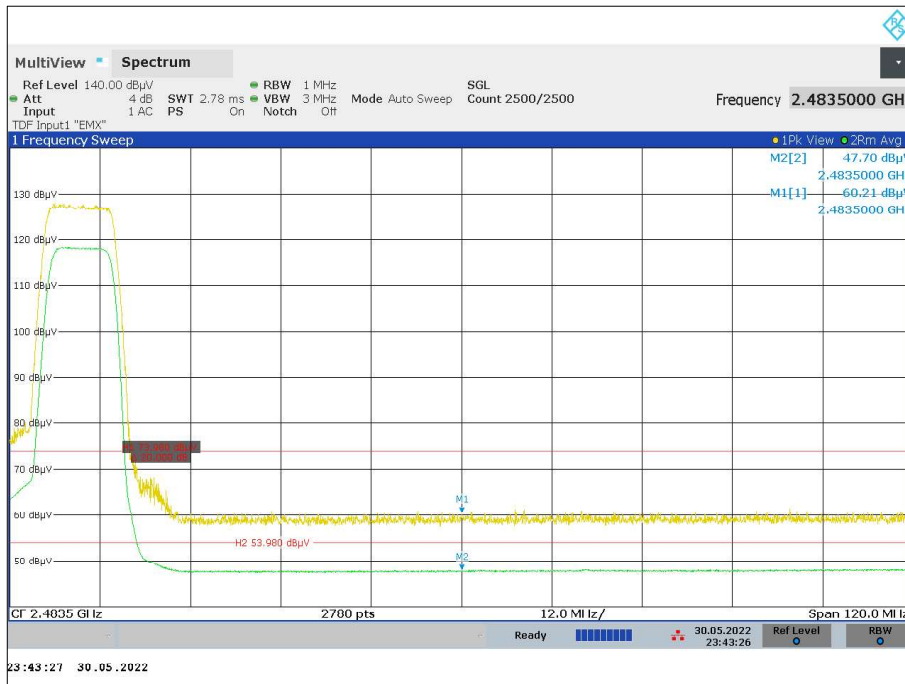


Figure 8 - 2432.8 - Yagi MHz - Band Edge Frequency 2483.5 MHz

FCC 47 CFR Part 15, Limit Clause 15.209

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

Table 18

ISED RSS-GEN, Limit Clause 8.9

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

Table 19

*Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.



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 Expiry Date
Tuneable Notch Filter	K&L Microwave	5TNF-1500/3000-N/N	435	-	TU
Multimeter	Fluke	79 Series III	611	12	21-Dec-2022
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	24-Feb-2023
Cable (SMA to SMA, 2 m)	Rhophase	3PS-1801A-2000-3PS	4113	12	27-Jan-2023
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Feb-2023
Cable (N-Type to N-Type, 8 m)	Teledyne	PR90-088-8MTR	5212	12	06-Sep-2022
Thermo-hygro-Barometer	PCE Instruments	PCE-THB-40	5472	12	25-Mar-2023
Antenna (DRG 1-10.5GHz)	Schwarzbeck	BBHA9120B	5611	12	15-Oct-2022
Turntable & Mast Controller	Maturo Gmbh	NCD/498/2799.01	5612	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	5613	-	TU
Turntable	Maturo Gmbh	Turntable 1.5 SI-2t	5614	-	TU
Screened Room (12)	MVG	EMC-3	5621	36	11-Aug-2023
Test Receiver	Rohde & Schwarz	ESW44	5914	12	21-Feb-2023

Table 20

TU – Traceability Unscheduled



2.2 Emission Bandwidth

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(2)
ISED RSS-247, Clause 5.2
ISED RSS-GEN, Clause 6.7

2.2.2 Equipment Under Test and Modification State

Not Applicable, S/N: 1819V0007 - Modification State 0

2.2.3 Date of Test

18-May-2022 to 20-May-2022

2.2.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.8.1 for 6 dB BW and 6.9.3 for 99% occupied bandwidth measurements.

2.2.5 Environmental Conditions

Ambient Temperature	23.3 - 23.4 °C
Relative Humidity	43.2 - 48.5 %



2.2.6 Test Results

3RB - 4.5MHz

Protocol	6 dB Bandwidth (MHz)	
	Minimum	Maximum
LTE 3 Resource Blocks 4.50 MHz	0.615	0.645

Table 21 - 6 dB Bandwidth Summary Results

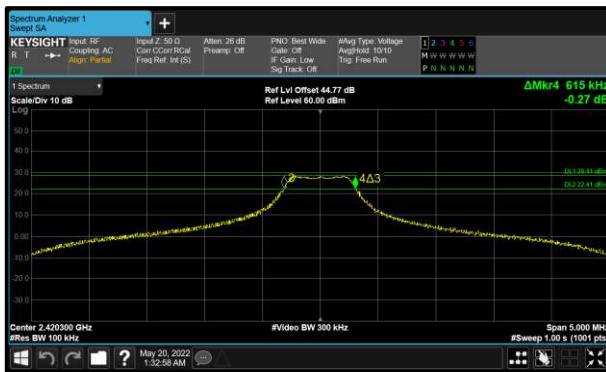


Figure 9 - LTE 3 Resource Blocks 4.50 MHz
 Minimum 6 dB EBW



Figure 10 - LTE 3 Resource Blocks 4.50 MHz
 Maximum 6 dB EBW

Protocol	99% Bandwidth (MHz)	
	Minimum	Maximum
LTE 3 Resource Blocks 4.50 MHz	1.020	1.170

Table 22 - 99% Bandwidth Summary Results



Figure 11 - LTE 3 Resource Blocks 4.50 MHz
 Minimum 99% OBW



Figure 12 - LTE 3 Resource Blocks B 4.50 MHz
 Maximum 99% OBW



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE 3 Resource Blocks 4.50 MHz	Duty Cycle (%):	-
Modulation:	QPSK	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	0.635	-	-	-	≥500.0
2420.3	0.635	-	-	-	≥500.0
2435.3	0.620	-	-	-	≥500.0

Table 23 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	1.170	-	-	-	-
2420.3	1.130	-	-	-	-
2435.3	1.070	-	-	-	-

Table 24 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE 3 Resource Blocks 4.50 MHz	Duty Cycle (%):	-
Modulation:	QPSK	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	0.630	-	-	-	≥500.0
2420.3	0.630	-	-	-	≥500.0
2435.3	0.645	-	-	-	≥500.0

Table 25 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	1.120	-	-	-	-
2420.3	1.055	-	-	-	-
2435.3	1.100	-	-	-	-

Table 26 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE 3 Resource Blocks 4.50 MHz	Duty Cycle (%):	-
Modulation:	16 QAM	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	0.625	-	-	-	≥500.0
2420.3	0.635	-	-	-	≥500.0
2435.3	0.630	-	-	-	≥500.0

Table 27 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	1.100	-	-	-	-
2420.3	1.125	-	-	-	-
2435.3	1.065	-	-	-	-

Table 28 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE 3 Resource Blocks 4.50 MHz	Duty Cycle (%):	-
Modulation:	16 QAM	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	0.625	-	-	-	≥500.0
2420.3	0.615	-	-	-	≥500.0
2435.3	0.625	-	-	-	≥500.0

Table 29 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	1.110	-	-	-	-
2420.3	1.065	-	-	-	-
2435.3	1.020	-	-	-	-

Table 30 - 99% Bandwidth Results



FRB - 9 MHz

Protocol	6 dB Bandwidth (MHz)	
	Minimum	Maximum
LTE Full Resource Blocks 4.5 MHz BW	3.920	4.160
LTE Full Resource Blocks 9 MHz BW	8.560	8.720

Table 31 - 6 dB Bandwidth Summary Results



Figure 13 - LTE Full Resource Blocks 4.5 MHz BW Minimum 6 dB EBW



Figure 14 - LTE Full Resource Blocks 4.5 MHz BW Maximum 6 dB EBW

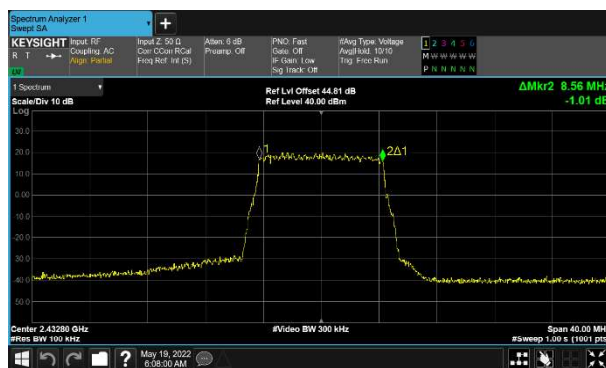


Figure 15 - LTE Full Resource Blocks 9 MHz BW Minimum 6 dB EBW



Figure 16 - LTE Full Resource Blocks 9 MHz BW Maximum 6 dB EBW



Protocol	99% Bandwidth (MHz)	
	Minimum	Maximum
LTE Full Resource Blocks 4.5 MHz BW	3.920	3.960
LTE Full Resource Blocks 9 MHz BW	8.560	8.600

Table 32 - 99% Bandwidth Summary Results

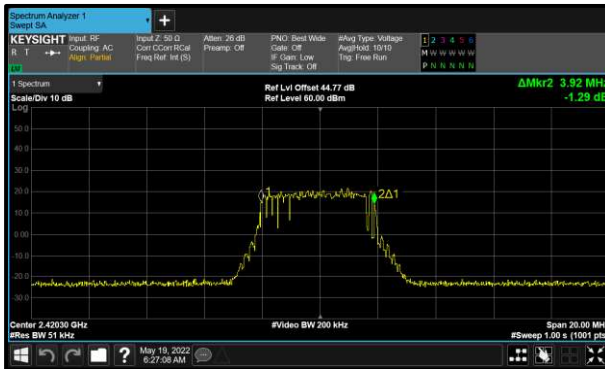


Figure 17 - LTE Full Resource Blocks 4.5 MHz BW Minimum 99% OBW



Figure 18 - LTE Full Resource Blocks 4.5 MHz BW Maximum 99% OBW

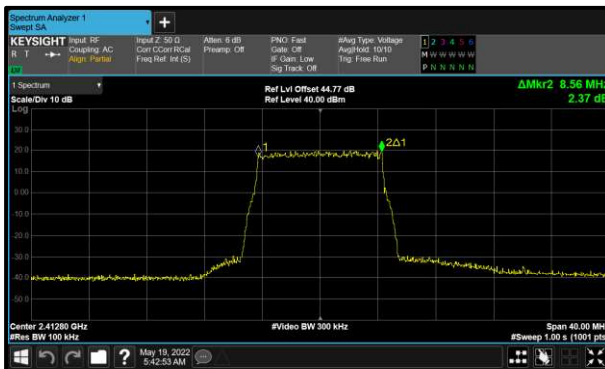


Figure 19 - LTE Full Resource Blocks 9 MHz BW Minimum 99% OBW



Figure 20 - LTE Full Resource Blocks 9 MHz BW Maximum 99% OBW



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 4.5 MHz BW	Duty Cycle (%):	-
Modulation:	QPSK	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	3.960	-	-	-	≥500.0
2420.3	4.000	-	-	-	≥500.0
2435.3	4.160	-	-	-	≥500.0

Table 33 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	3.940	-	-	-	-
2420.3	3.920	-	-	-	-
2435.3	3.940	-	-	-	-

Table 34 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 4.5 MHz BW	Duty Cycle (%):	-
Modulation:	QPSK	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	4.160	-	-	-	≥500.0
2420.3	4.000	-	-	-	≥500.0
2435.3	4.000	-	-	-	≥500.0

Table 35 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	3.960	-	-	-	-
2420.3	3.920	-	-	-	-
2435.3	3.940	-	-	-	-

Table 36 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 4.5 MHz BW	Duty Cycle (%):	-
Modulation:	16 QAM	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	3.960	-	-	-	≥500.0
2420.3	4.000	-	-	-	≥500.0
2435.3	4.020	-	-	-	≥500.0

Table 37 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	3.940	-	-	-	-
2420.3	3.940	-	-	-	-
2435.3	3.940	-	-	-	-

Table 38 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 4.5 MHz BW	Duty Cycle (%):	-
Modulation:	16 QAM	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	3.920	-	-	-	≥500.0
2420.3	3.960	-	-	-	≥500.0
2435.3	3.940	-	-	-	≥500.0

Table 39 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2410.3	3.940	-	-	-	-
2420.3	3.940	-	-	-	-
2435.3	3.940	-	-	-	-

Table 40 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 9 MHz BW	Duty Cycle (%):	-
Modulation:	QPSK	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2413	8.680	-	-	-	≥500.0
2423	8.640	-	-	-	≥500.0
2433	8.720	-	-	-	≥500.0

Table 41 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2413	8.600	-	-	-	-
2423	8.600	-	-	-	-
2433	8.560	-	-	-	-

Table 42 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 9 MHz BW	Duty Cycle (%):	-
Modulation:	QPSK	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2413	8.720	-	-	-	≥500.0
2423	8.640	-	-	-	≥500.0
2433	8.680	-	-	-	≥500.0

Table 43 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2413	8.600	-	-	-	-
2423	8.560	-	-	-	-
2433	8.600	-	-	-	-

Table 44 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 9 MHz BW	Duty Cycle (%):	-
Modulation:	16 QAM	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2413	8.680	-	-	-	≥500.0
2423	8.700	-	-	-	≥500.0
2433	8.680	-	-	-	≥500.0

Table 45 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2413	8.560	-	-	-	-
2423	8.580	-	-	-	-
2433	8.560	-	-	-	-

Table 46 - 99% Bandwidth Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (a)(2)	Test Method(s):	C63.10 6.9.3 C63.10 11.8.1
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 9 MHz BW	Duty Cycle (%):	-
Modulation:	16 QAM	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	6 dB Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2413	8.640	-	-	-	≥500.0
2423	8.640	-	-	-	≥500.0
2433	8.680	-	-	-	≥500.0

Table 47 - 6 dB Bandwidth Results

Test Frequency (MHz)	99% Bandwidth (MHz)				Limit (kHz)
	A	B	C	D	
2413	8.600	-	-	-	-
2423	8.600	-	-	-	-
2433	8.600	-	-	-	-

Table 48 - 99% Bandwidth Results



FCC 47 CFR Part 15, Limit Clause 15.247(a)(2) and ISED RSS-247, Clause 5.2(a)

The minimum 6 dB Bandwidth shall be at least 500 kHz.



2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
Directional Coupler	Krytar	1850	58	-	TU
Multimeter	Fluke	79 Series III	611	12	21-Dec-2022
Hygrometer	Rotronic	I-1000	3220	12	05-Nov-2022
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	24-Feb-2023
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Feb-2023
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	30-Jun-2022
3.5 mm 2m Cable	Junkosha	MWX221-02000DMS	5429	12	23-Jun-2022
Signal Analyser	Keysight Technologies	N9020B	5919	24	13-Mar-2024
Signal Conditioning Unit	TUV SUD	SCU003	5932	12	10-May-2023

Table 49

TU – Traceability Unscheduled



2.3 Maximum Conducted Output Power

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (b)
ISED RSS-247, Clause 5.4
ISED RSS-GEN, Clause 6.12

2.3.2 Equipment Under Test and Modification State

Not Applicable, S/N: 1819V0007 - Modification State 0

2.3.3 Date of Test

18-May-2022 to 19-May-2022

2.3.4 Test Method

The test was performed in accordance with ANSI C63.10 clause 11.9.2.3.2 Method AVGPM-G.

2.3.5 Environmental Conditions

Ambient Temperature	23.3 - 23.4 °C
Relative Humidity	43.2 - 48.5 %



2.3.6 Test Results

3RB - 4.5MHz

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE 3 Resource Blocks 4.50 MHz	Duty Cycle (%):	100.0
Modulation:	QPSK	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	4.25
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2410.3	27.91	-	-	-	-	30.00	-2.09
2420.3	28.27	-	-	-	-	30.00	-1.73
2435.3	28.08	-	-	-	-	30.00	-1.92

Table 50 - FCC Maximum Conducted (average) Output Power Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE 3 Resource Blocks 4.50 MHz	Duty Cycle (%):	100.0
Modulation:	QPSK	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	6.08
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2410.3	27.89	-	-	-	-	29.92	-2.03
2420.3	28.30	-	-	-	-	29.92	-1.62
2435.3	28.09	-	-	-	-	29.92	-1.83

Table 51 - FCC Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE 3 Resource Blocks 4.50 MHz	Duty Cycle (%):	100.0
Modulation:	16 QAM	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	4.25
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2410.3	27.96	-	-	-	-	30.00	-2.04
2420.3	28.22	-	-	-	-	30.00	-1.78
2435.3	27.99	-	-	-	-	30.00	-2.01

Table 52 - FCC Maximum Conducted (average) Output Power Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE 3 Resource Blocks 4.50 MHz	Duty Cycle (%):	100.0
Modulation:	16 QAM	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	6.08
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2410.3	27.91	-	-	-	-	29.92	-2.01
2420.3	28.32	-	-	-	-	29.92	-1.60
2435.3	28.11	-	-	-	-	29.92	-1.81

Table 53 - FCC Maximum Conducted (average) Output Power Results



FRB - 9 MHz

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 4.5 MHz BW	Duty Cycle (%):	100.0
Modulation:	QPSK	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	4.25
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2410.3	27.86	-	-	-	-	30.00	-2.14
2420.3	28.19	-	-	-	-	30.00	-1.81
2435.3	27.93	-	-	-	-	30.00	-2.07

Table 54 - FCC Maximum Conducted (average) Output Power Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 4.5 MHz BW	Duty Cycle (%):	100.0
Modulation:	QPSK	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	6.08
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2410.3	27.83	-	-	-	-	29.92	-2.09
2420.3	28.12	-	-	-	-	29.92	-1.80
2435.3	27.86	-	-	-	-	29.92	-2.06

Table 55 - FCC Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 4.5 MHz BW	Duty Cycle (%):	100.0
Modulation:	16 QAM	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	4.25
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2410.3	27.84	-	-	-	-	30.00	-2.16
2420.3	28.13	-	-	-	-	30.00	-1.87
2435.3	27.87	-	-	-	-	30.00	-2.13

Table 56 - FCC Maximum Conducted (average) Output Power Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 4.5 MHz BW	Duty Cycle (%):	100.0
Modulation:	16 QAM	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	6.08
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2410.3	27.40	-	-	-	-	29.92	-2.52
2420.3	28.11	-	-	-	-	29.92	-1.81
2435.3	27.87	-	-	-	-	29.92	-2.05

Table 57 - FCC Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 9 MHz BW	Duty Cycle (%):	100.0
Modulation:	QPSK	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	4.25
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2413	28.11	-	-	-	-	30.00	-1.89
2423	28.38	-	-	-	-	30.00	-1.62
2433	28.25	-	-	-	-	30.00	-1.75

Table 58 - FCC Maximum Conducted (average) Output Power Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 9 MHz BW	Duty Cycle (%):	100.0
Modulation:	QPSK	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	6.08
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2413	28.08	-	-	-	-	29.92	-1.84
2423	28.27	-	-	-	-	29.92	-1.65
2433	28.11	-	-	-	-	29.92	-1.81

Table 59 - FCC Maximum Conducted (average) Output Power Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 9 MHz BW	Duty Cycle (%):	100.0
Modulation:	16 QAM	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	4.25
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2413	28.15	-	-	-	-	30.00	-1.85
2423	28.05	-	-	-	-	30.00	-1.95
2433	28.11	-	-	-	-	30.00	-1.89

Table 60 - FCC Maximum Conducted (average) Output Power Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 9 MHz BW	Duty Cycle (%):	100.0
Modulation:	16 QAM	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	6.08
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	Σ		
2413	28.12	-	-	-	-	29.92	-1.80
2423	28.33	-	-	-	-	29.92	-1.59
2433	28.12	-	-	-	-	29.92	-1.80

Table 61 - FCC Maximum Conducted (average) Output Power Results



FCC 47 CFR Part 15, Limit Clause 15.247 (b)(3)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

ISED RSS-247, Limit Clause 5.4 (d)

For DTSSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e) of the specification.

2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
Directional Coupler	Krytar	1850	58	-	TU
Multimeter	Fluke	79 Series III	611	12	21-Dec-2022
Hygrometer	Rotronic	I-1000	3220	12	05-Nov-2022
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	24-Feb-2023
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Feb-2023
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	30-Jun-2022
3.5 mm 2m Cable	Junkosha	MWX221-02000DMS	5429	12	23-Jun-2022
Signal Analyser	Keysight Technologies	N9020B	5919	24	13-Mar-2024
USB Power Sensors, 50MHz to 8GHz	Boonton	RTP5008	5921	12	17-Feb-2023
Signal Conditioning Unit	TUV SUD	SCU003	5932	12	10-May-2023

Table 62

TU – Traceability Unscheduled



2.4 Spurious Radiated Emissions

2.4.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d) and 15.209
ISED RSS-247, Clause 3.3 and 5.5
ISED RSS-GEN, Clause, 6.13 and 8.9

2.4.2 Equipment Under Test and Modification State

Not Applicable, S/N: 1819V0007 - Modification State 0

2.4.3 Date of Test

01-June-2022 to 24-July-2022

2.4.4 Test Method

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

For frequencies > 1 GHz, plots for average measurements were taken in accordance with ANSI C63.10, clause 11.12.2.5.2.

The EUT was placed on the non-conducting platform in a manner typical of a normal installation. Ports on the EUT were terminated with loads as described in ANSI C63.4 clause 6.2.4. For EUT's with multiple connectors of the same type, additional interconnecting cables were connected, and pre-scans performed to determine whether the level of the emissions were increased by >2 dB.

The plots shown are the characterisation 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 dBµV/m to µV/m:

$10^{(\text{Field Strength in dB}\mu\text{V/m}/20)}$.

To determine the emission characteristic of the EUT above 18 GHz, the test antenna was swept over all faces of the EUT whilst observing a spectral display. The frequency of any emissions of interest was noted for formal measurement at the correct measurement distance of 1m. This procedure was repeated for all relevant transmit operating channels.

Above 18 GHz, the measurement distance was reduced to 1 m. The limit line was increased by $20 \cdot \text{LOG}(3/1) = 9.54$ dB.

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

2.4.5 Example Test Setup Diagram

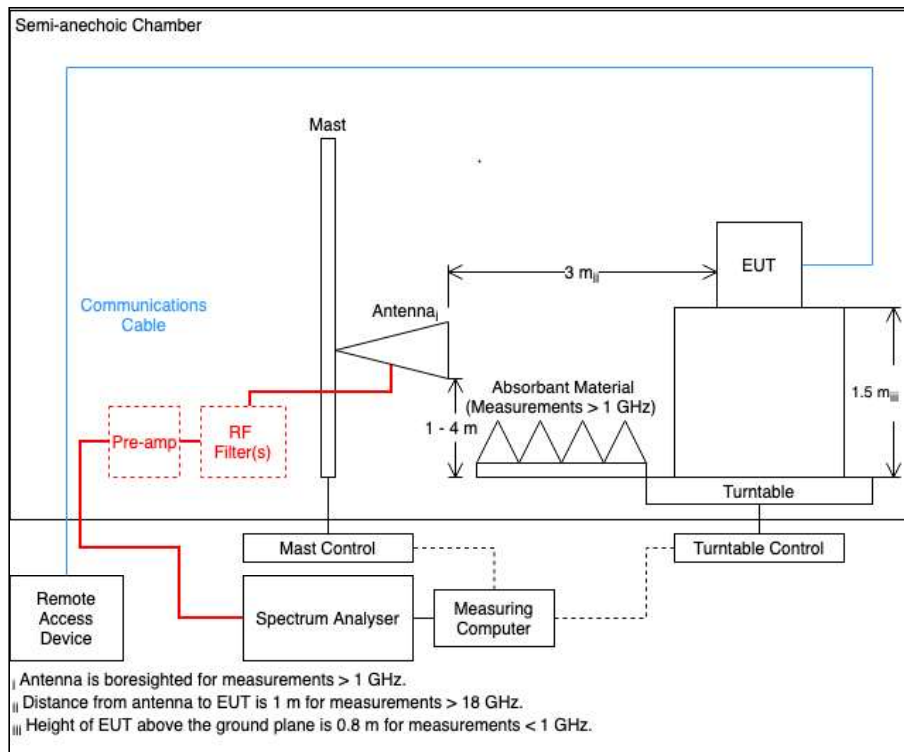


Figure 21

2.4.6 Environmental Conditions

Ambient Temperature 18.6 - 24.7 °C
Relative Humidity 42.6 - 60.8 %



2.4.7 Test Results

3RB - 4.5MHz

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
37.808	37.9	40.0	-2.1	Q-Peak	201	108	Vertical
74.687	32.5	40.0	-7.5	Q-Peak	2	110	Vertical
108.805	33.7	43.5	-9.8	Q-Peak	0	104	Vertical
134.376	36.8	43.5	-6.8	Q-Peak	107	100	Vertical
149.260	28.5	43.5	-15.1	Q-Peak	45	103	Vertical
163.064	30.3	43.5	-13.2	Q-Peak	154	235	Horizontal
163.939	35.9	43.5	-7.7	Q-Peak	115	100	Vertical
167.951	31.7	43.5	-11.8	Q-Peak	134	100	Vertical
2499.974	47.5	54.0	-6.5	RMS	87	348	Vertical
4820.542	51.0	54.0	-3.0	RMS	356	197	Horizontal
4820.598	44.5	54.0	-9.5	RMS	196	110	Vertical
4820.605	71.0	74.0	-3.0	Peak	356	197	Horizontal

Table 63 - LTE - 3RB - Yagi, 2410.3 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

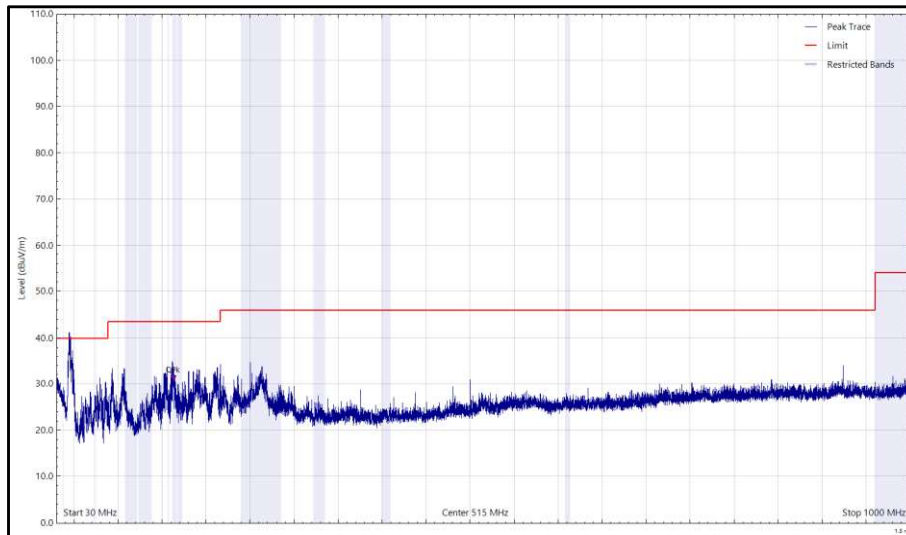


Figure 22 - LTE - 3RB - Yagi, 2410.3 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

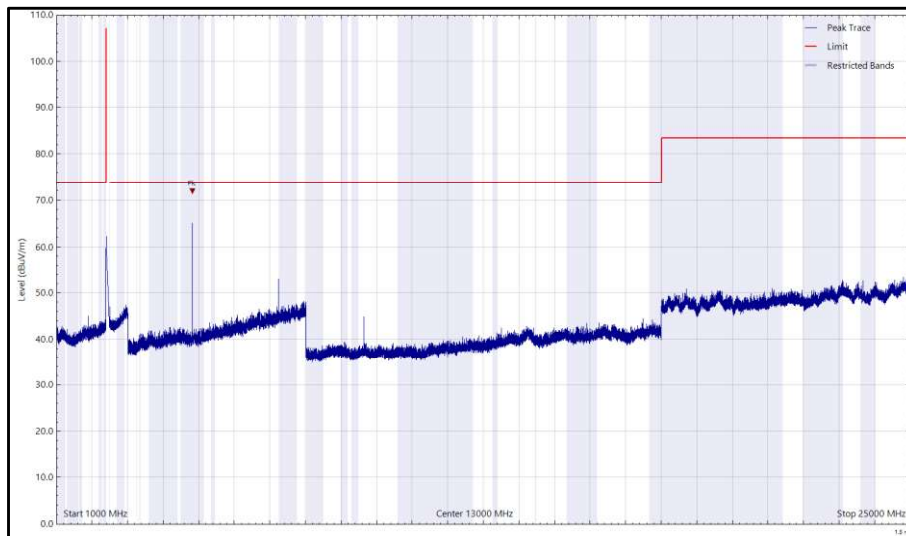


Figure 23 - LTE - 3RB - Yagi, 2410.3 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

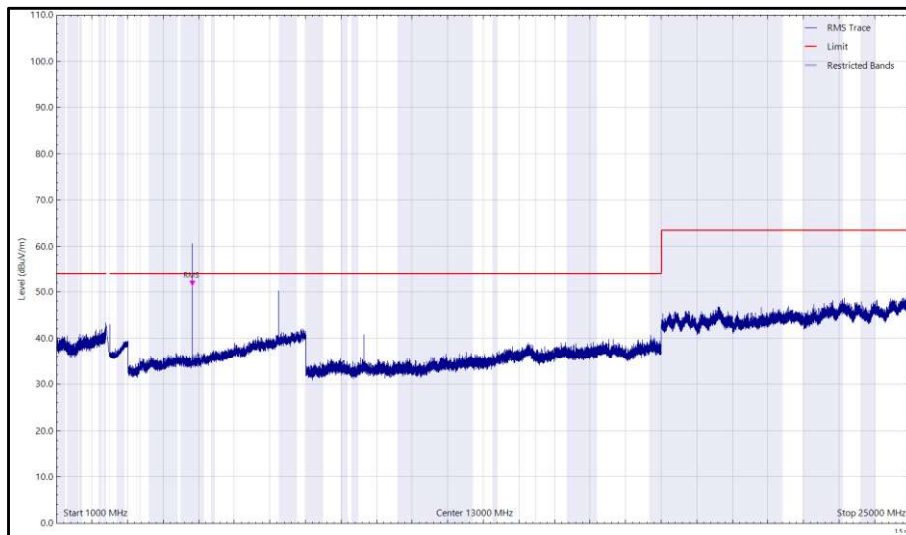


Figure 24 - LTE - 3RB - Yagi, 2410.3 MHz, 1 GHz to 25 GHz, Horizontal (rms)

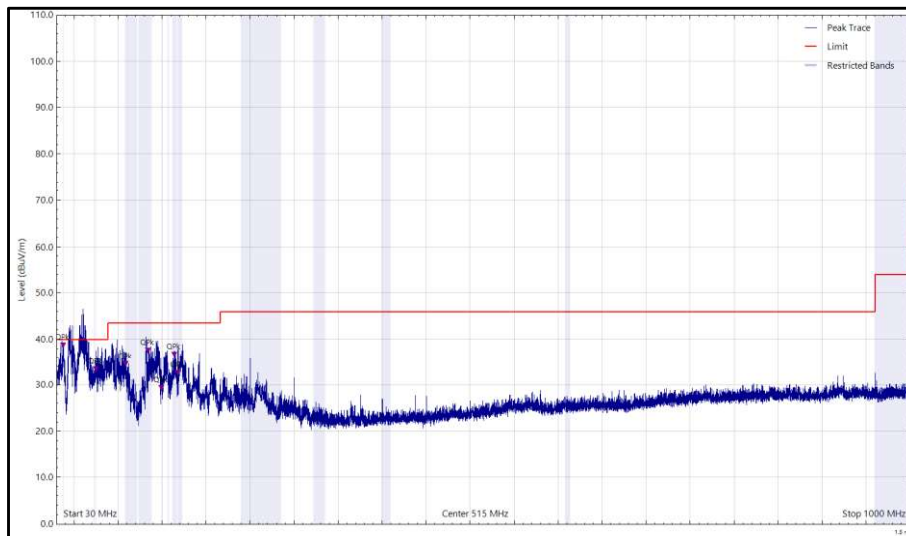


Figure 25 - LTE - 3RB - Yagi, 2410.3 MHz, 30 MHz to 1 GHz, Vertical (Peak)

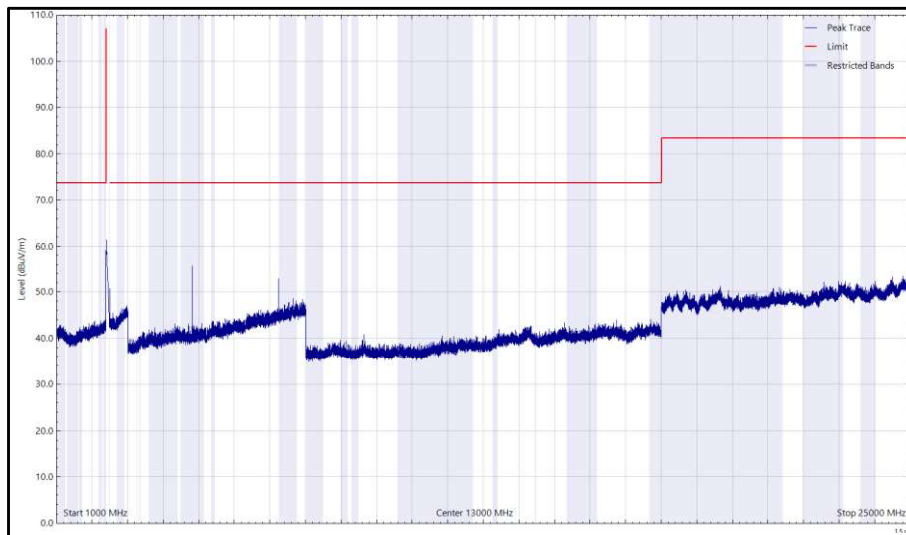


Figure 26 - LTE - 3RB - Yagi, 2410.3 MHz, 1 GHz to 25 GHz, Vertical (Peak)

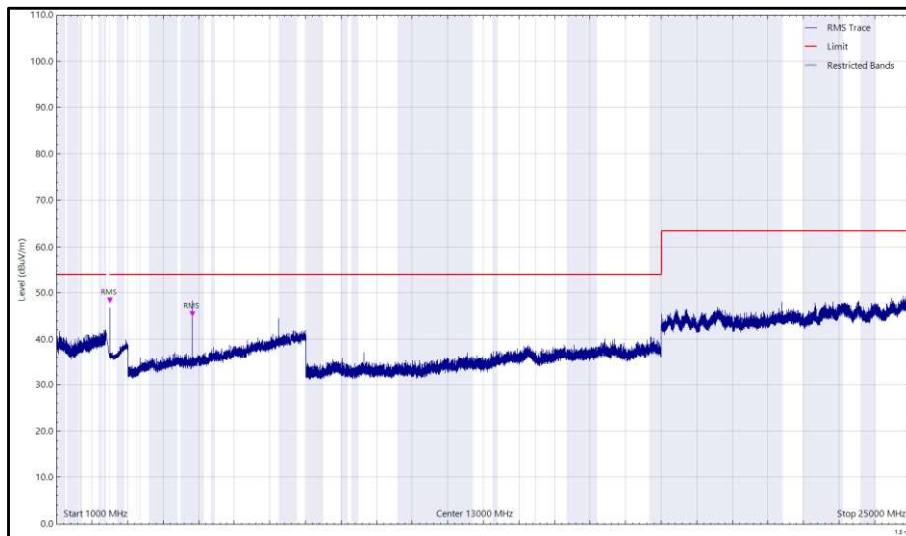


Figure 27 - LTE - 3RB - Yagi, 2410.3 MHz, 1 GHz to 25 GHz, Vertical (rms)



Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
38.093	32.9	40.0	-7.1	Q-Peak	212	110	Vertical
74.550	35.1	40.0	-5.0	Q-Peak	236	100	Vertical
74.564	32.8	40.0	-7.2	Q-Peak	276	395	Horizontal
108.792	40.6	43.5	-2.9	Q-Peak	266	100	Vertical
134.377	33.1	43.5	-10.4	Q-Peak	9	100	Vertical
149.973	22.3	43.5	-21.2	Q-Peak	29	114	Horizontal
164.424	33.6	43.5	-10.0	Q-Peak	241	101	Vertical
2499.997	48.1	54.0	-5.8	RMS	83	365	Vertical
2500.000	44.7	54.0	-9.3	RMS	328	215	Horizontal
4840.597	48.7	54.0	-5.3	RMS	185	100	Horizontal
4840.621	43.3	54.0	-10.7	RMS	282	186	Vertical

Table 64 - LTE - 3RB - Yagi, 2420.3 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

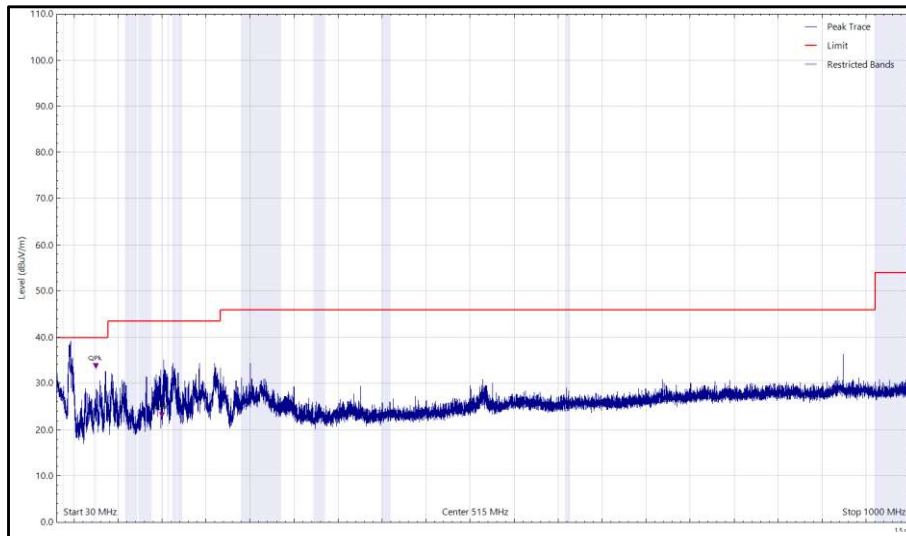


Figure 28 - LTE - 3RB - Yagi, 2420.3 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

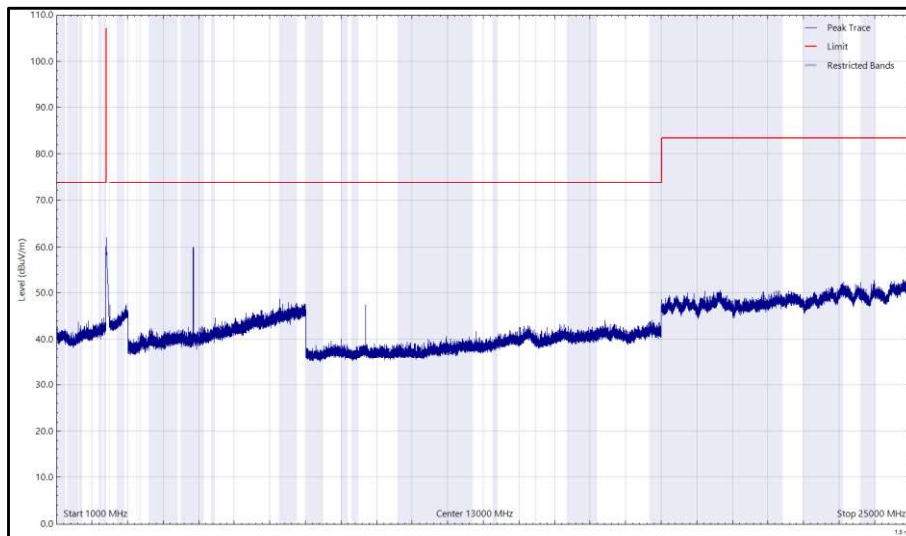


Figure 29 - LTE - 3RB - Yagi, 2420.3 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

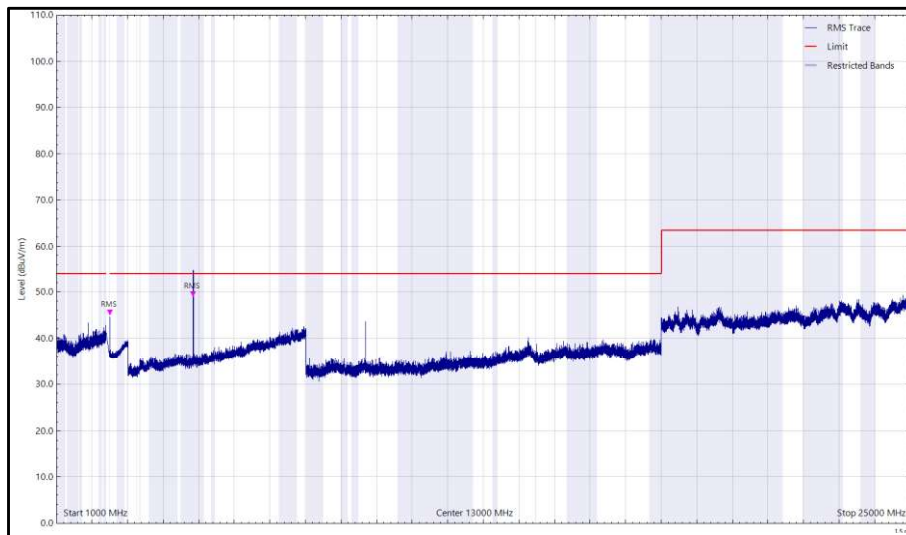


Figure 30 - LTE - 3RB - Yagi, 2420.3 MHz, 1 GHz to 25 GHz, Horizontal (rms)

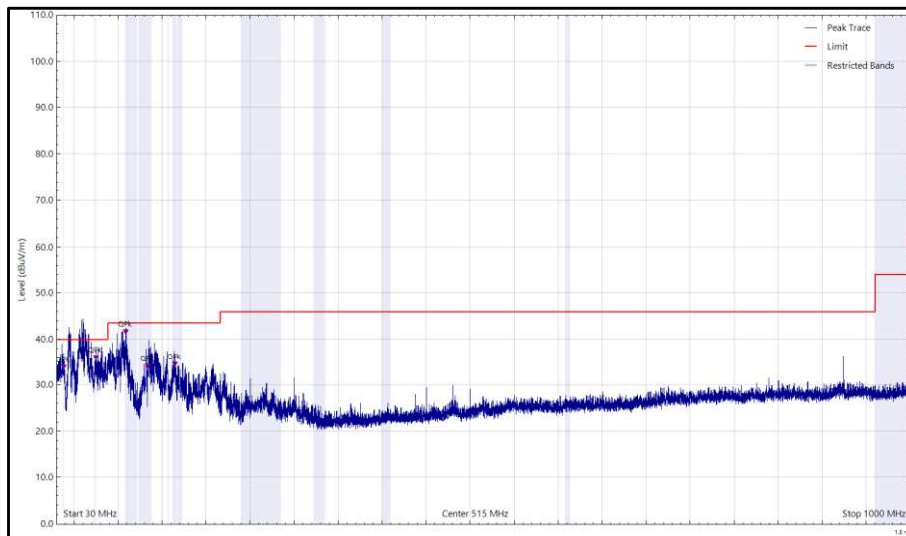


Figure 31 - LTE - 3RB - Yagi, 2420.3 MHz, 30 MHz to 1 GHz, Vertical (Peak)

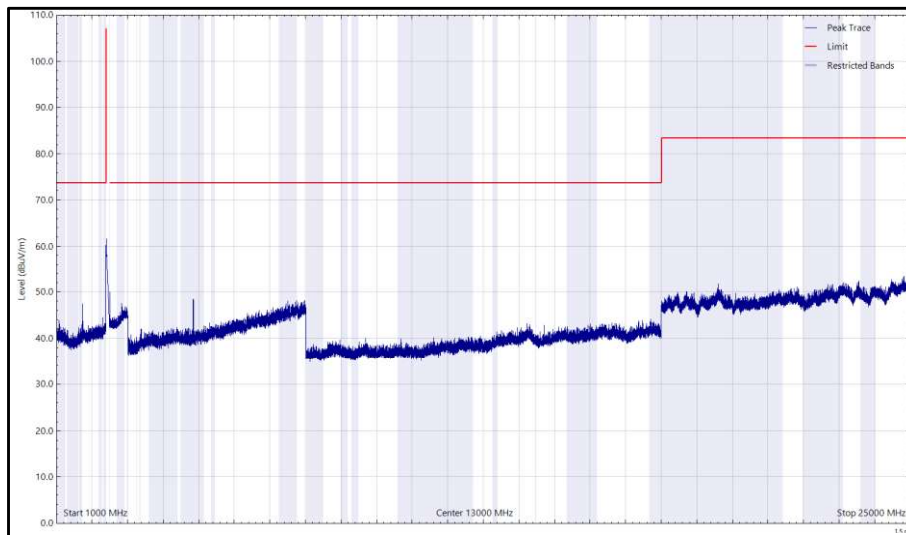


Figure 32 - LTE - 3RB - Yagi, 2420.3 MHz, 1 GHz to 25 GHz, Vertical (Peak)

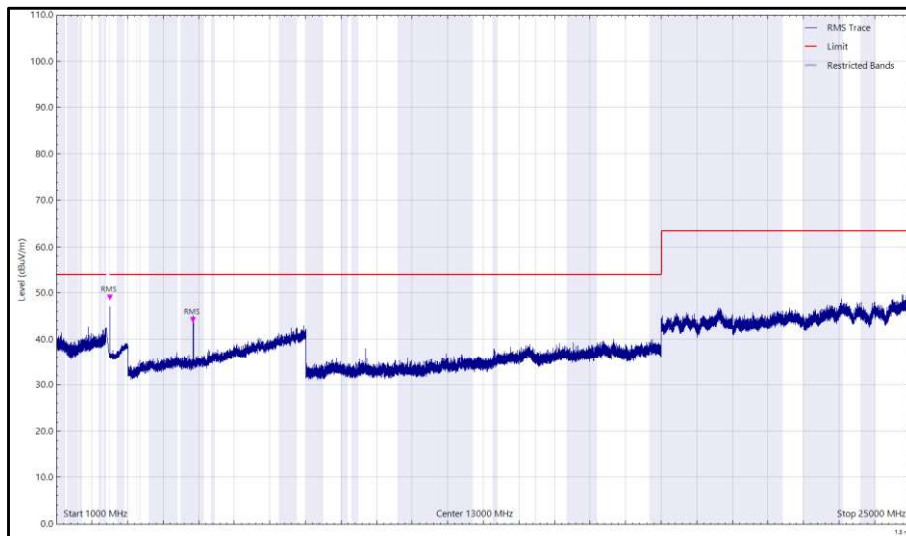


Figure 33 - LTE - 3RB - Yagi, 2420.3 MHz, 1 GHz to 25 GHz, Vertical (rms)



Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
37.788	33.9	40.0	-6.1	Q-Peak	120	100	Vertical
74.564	34.9	40.0	-5.2	Q-Peak	322	110	Vertical
108.803	41.6	43.5	-1.9	Q-Peak	232	100	Vertical
131.764	26.9	43.5	-16.6	Q-Peak	3	104	Vertical
2499.951	43.4	54.0	-10.6	RMS	330	100	Horizontal
2500.000	49.0	54.0	-5.0	RMS	277	284	Vertical
4870.587	45.2	54.0	-8.8	RMS	315	185	Horizontal

Table 65 - LTE - 3RB - Yagi, 2435.3 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

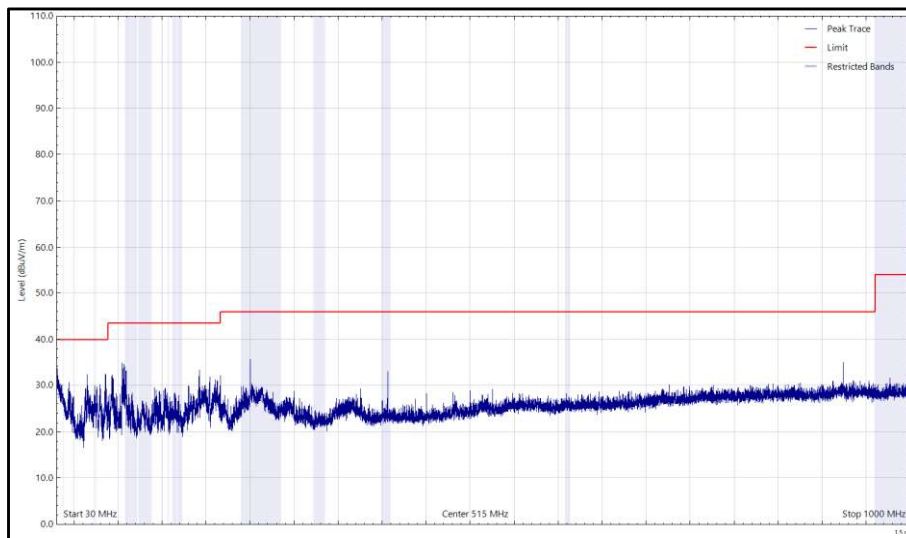


Figure 34 - LTE - 3RB - Yagi, 2435.3 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

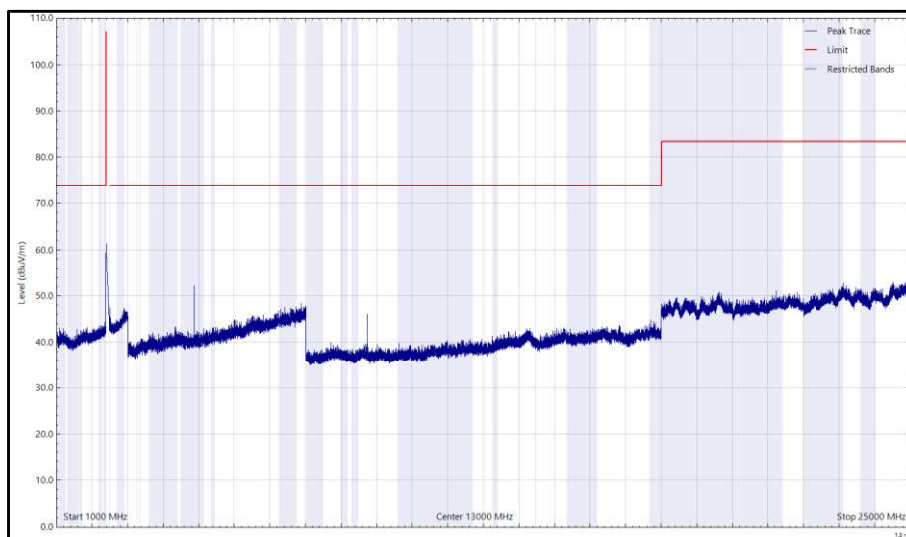


Figure 35 - LTE - 3RB - Yagi, 2435.3 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

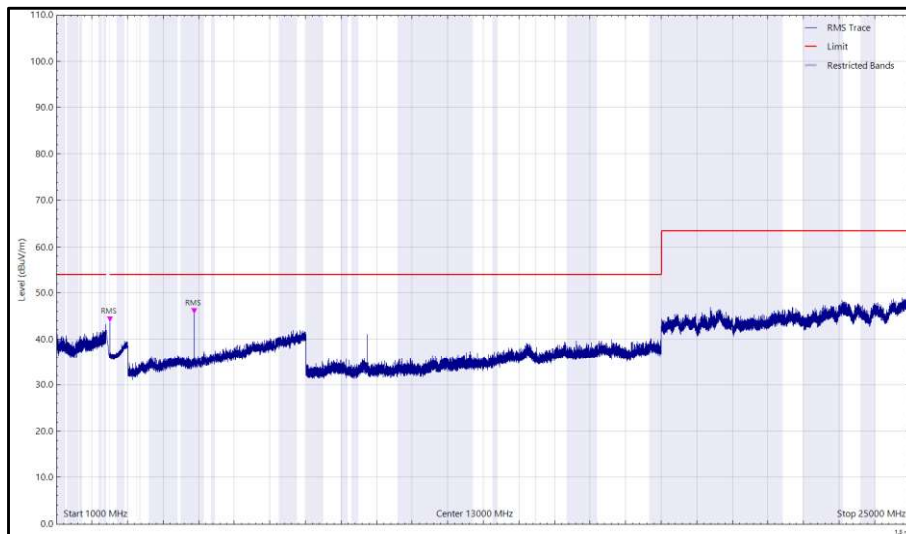


Figure 36 - LTE - 3RB - Yagi, 2435.3 MHz, 1 GHz to 25 GHz, Horizontal (rms)

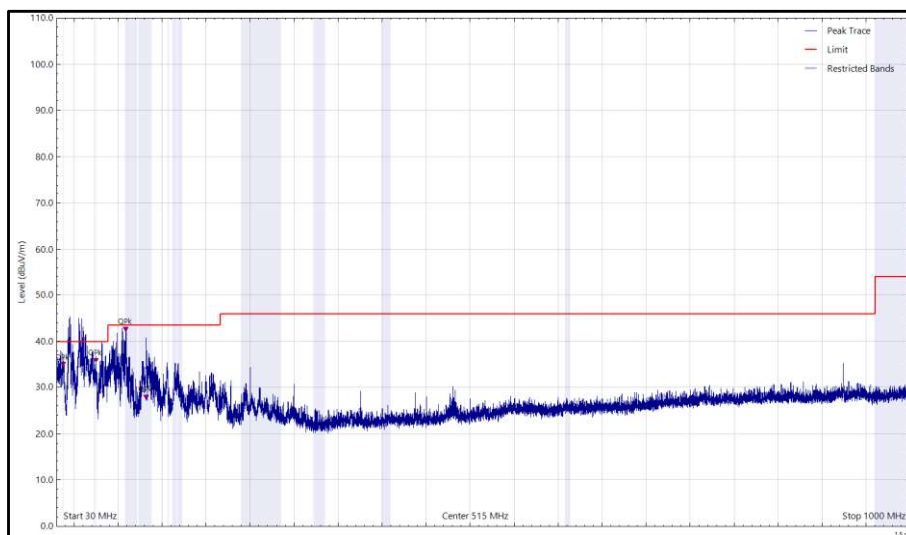


Figure 37 - LTE - 3RB - Yagi, 2435.3 MHz, 30 MHz to 1 GHz, Vertical (Peak)

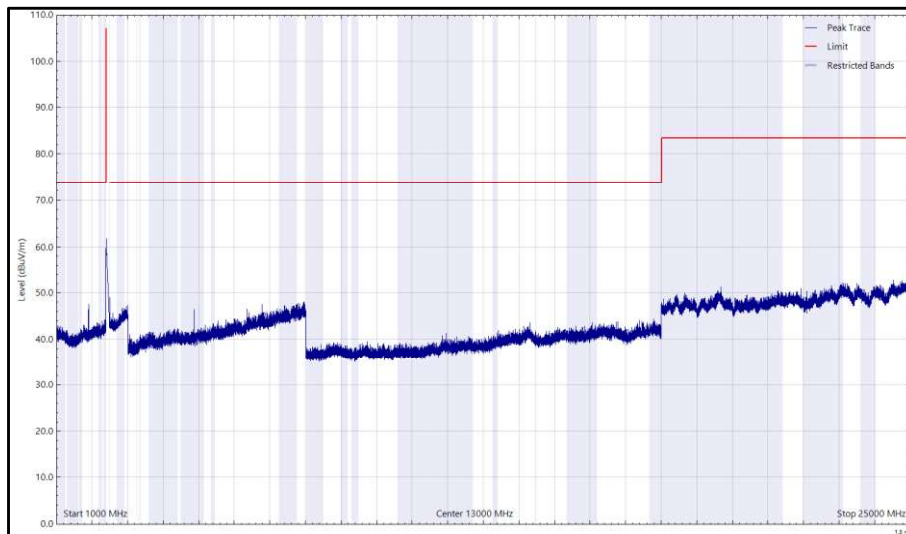


Figure 38 - LTE - 3RB - Yagi, 2435.3 MHz, 1 GHz to 25 GHz, Vertical (Peak)

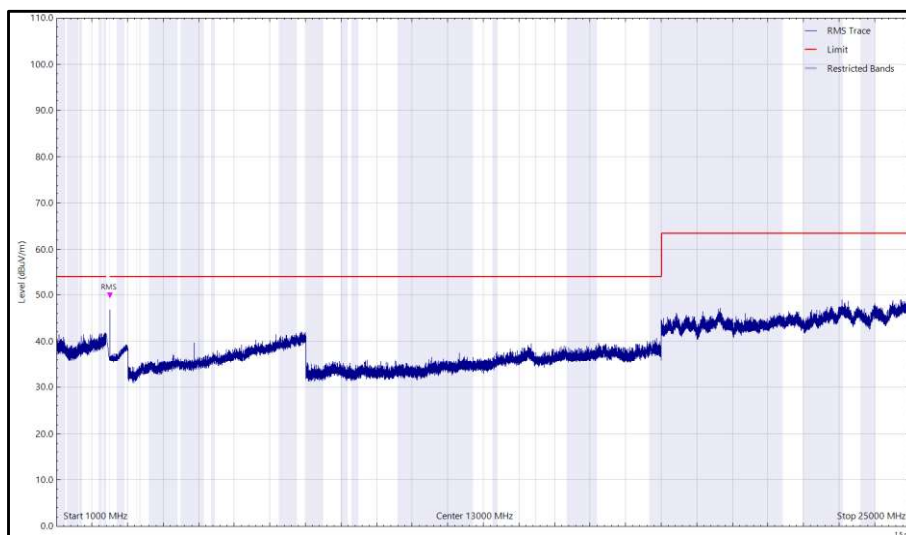


Figure 39 - LTE - 3RB - Yagi, 2435.3 MHz, 1 GHz to 25 GHz, Vertical (rms)



Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
37.530	35.9	40.0	-4.1	Q-Peak	160	183	Vertical
73.181	31.6	40.0	-8.4	Q-Peak	314	152	Vertical
74.560	35.2	40.0	-4.8	Q-Peak	272	380	Horizontal
108.789	34.1	43.5	-9.4	Q-Peak	232	100	Vertical
137.165	33.2	43.5	-10.3	Q-Peak	240	106	Vertical
149.925	33.1	43.5	-10.4	Q-Peak	360	100	Vertical
2500.000	43.3	54.0	-10.7	RMS	331	303	Horizontal
2500.000	48.1	54.0	-5.9	RMS	348	234	Vertical
4820.477	51.2	54.0	-2.8	RMS	14	191	Horizontal
4820.592	40.0	54.0	-14.0	RMS	77	110	Vertical

Table 66 - LTE - 3RB - Patch, 2410.3 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

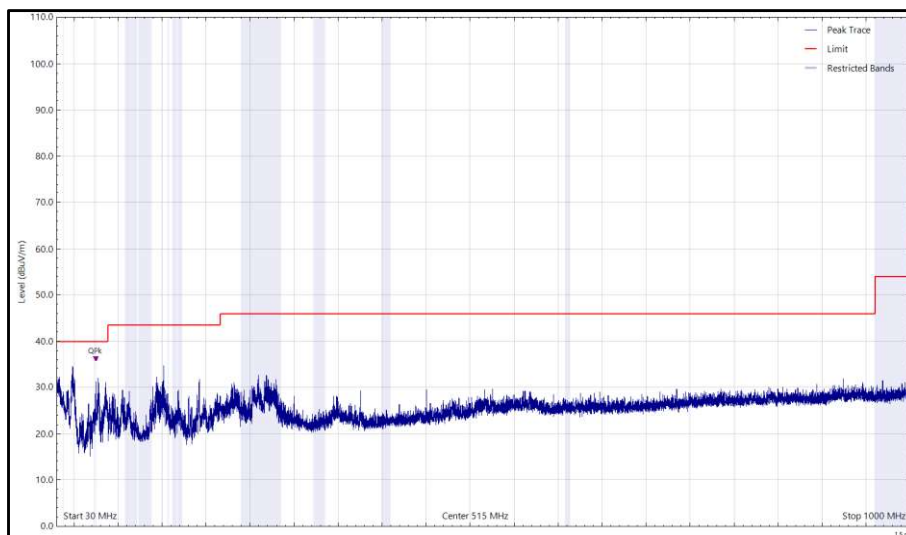


Figure 40 - LTE - 3RB - Patch, 2410.3 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

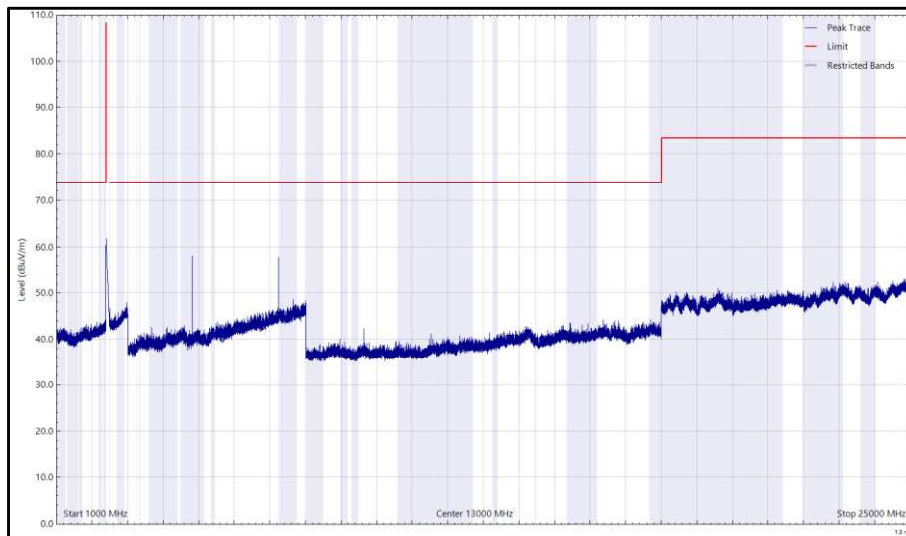


Figure 41 - LTE - 3RB - Patch, 2410.3 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

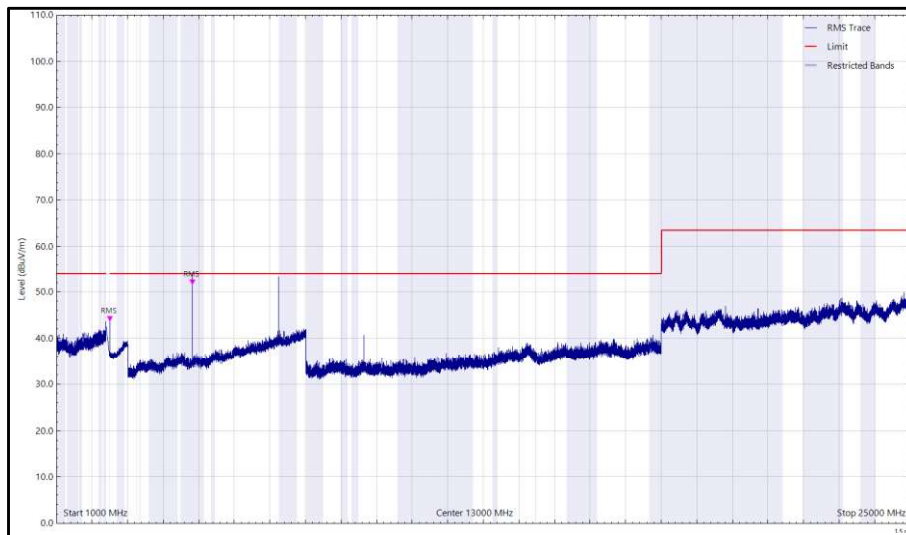


Figure 42 - LTE - 3RB - Patch, 2410.3 MHz, 1 GHz to 25 GHz, Horizontal (rms)

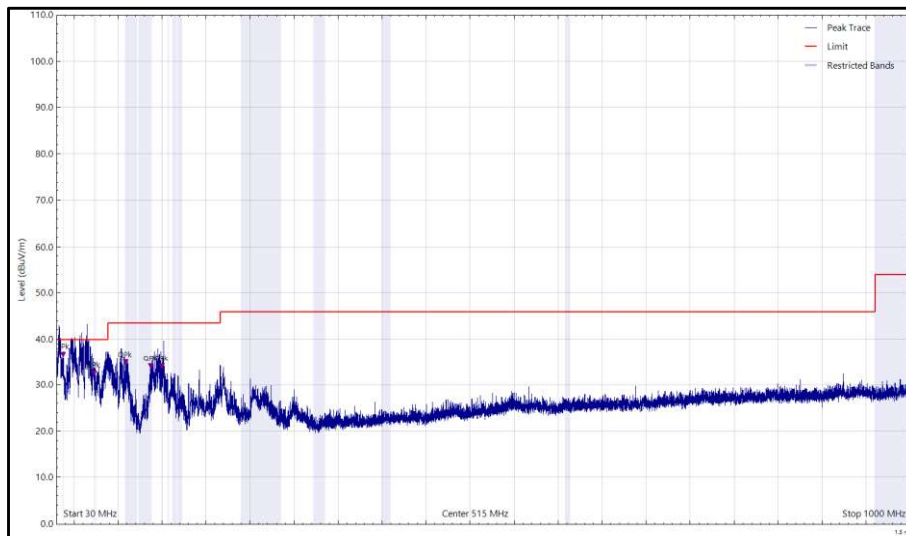


Figure 43 - LTE - 3RB - Patch, 2410.3 MHz, 30 MHz to 1 GHz, Vertical (Peak)

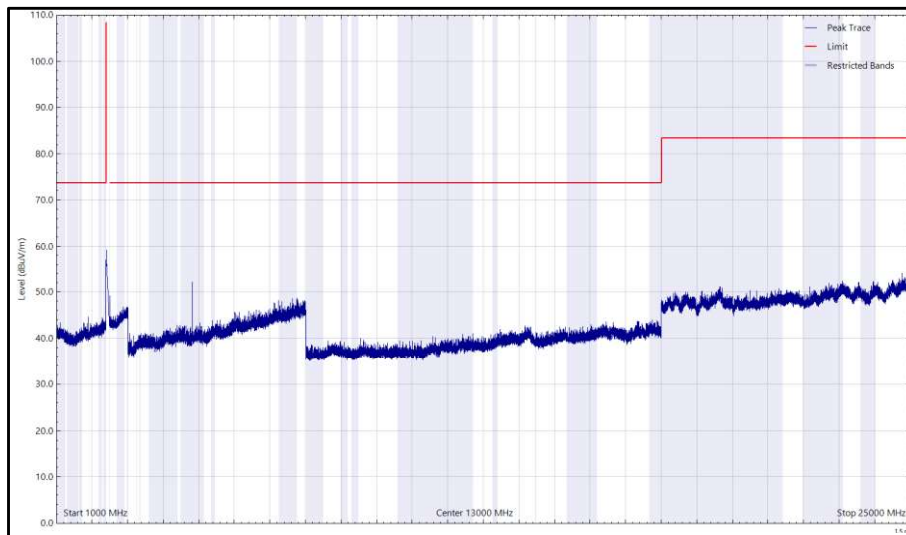


Figure 44 - LTE - 3RB - Patch, 2410.3 MHz, 1 GHz to 25 GHz, Vertical (Peak)

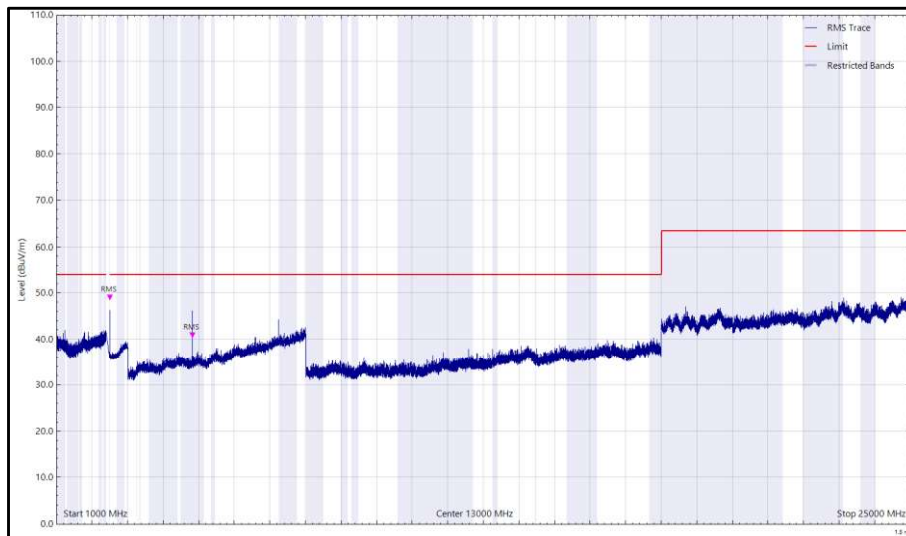


Figure 45 - LTE - 3RB - Patch, 2410.3 MHz, 1 GHz to 25 GHz, Vertical (rms)



Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
37.509	35.8	40.0	-4.2	Q-Peak	195	100	Vertical
73.933	31.7	40.0	-8.3	Q-Peak	232	100	Vertical
74.551	34.9	40.0	-5.1	Q-Peak	266	390	Horizontal
108.804	34.7	43.5	-8.8	Q-Peak	360	100	Vertical
136.913	35.9	43.5	-7.6	Q-Peak	212	110	Vertical
149.899	35.0	43.5	-8.5	Q-Peak	356	108	Vertical
2500.000	48.2	54.0	-5.8	RMS	277	241	Vertical
2500.000	43.5	54.0	-10.4	RMS	330	164	Horizontal
4840.552	44.9	54.0	-9.1	RMS	315	133	Horizontal
4840.570	34.2	54.0	-19.8	RMS	260	108	Vertical

Table 67 - LTE - 3RB - Patch, 2420.3 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

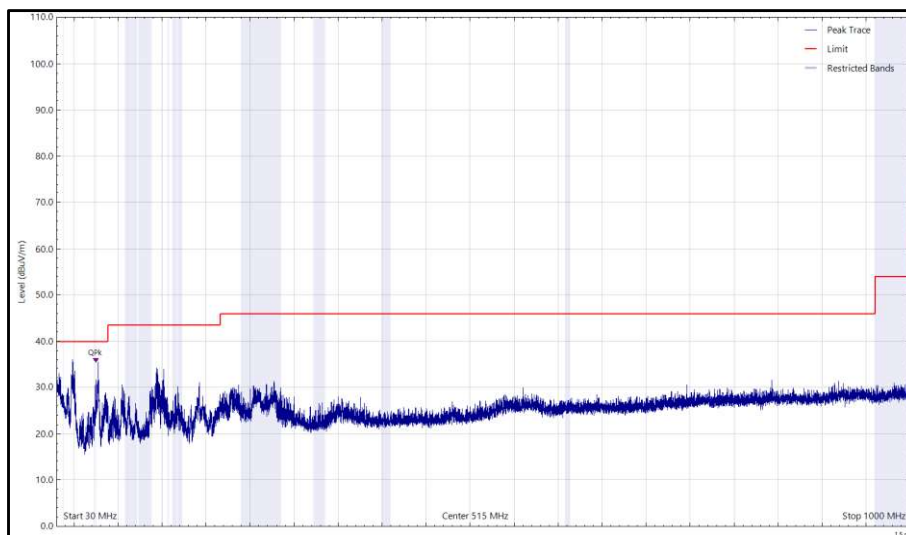


Figure 46 - LTE - 3RB - Patch, 2420.3 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

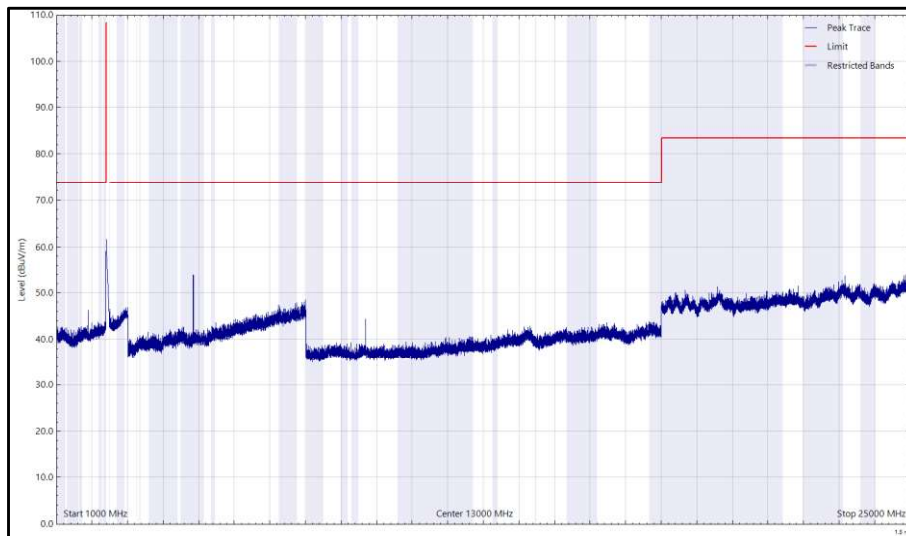


Figure 47 - LTE - 3RB - Patch, 2420.3 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

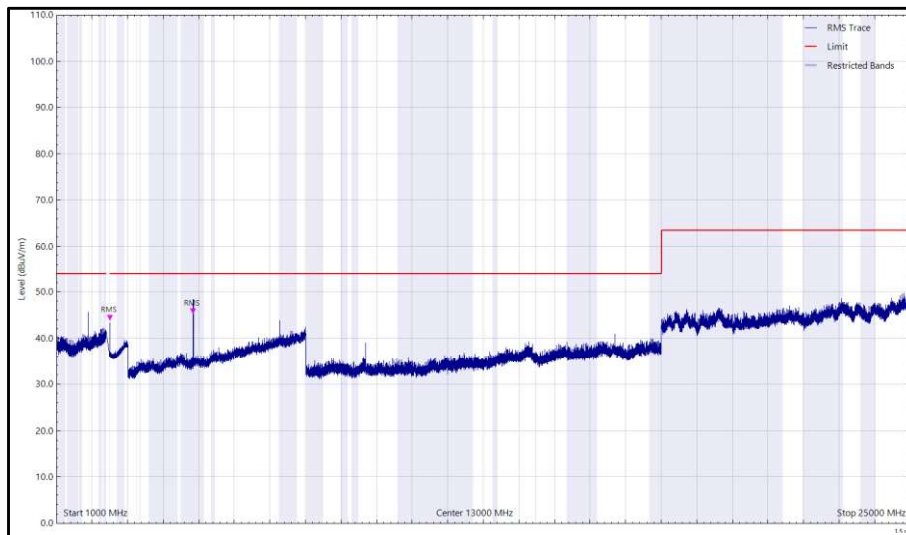


Figure 48 - LTE - 3RB - Patch, 2420.3 MHz, 1 GHz to 25 GHz, Horizontal (rms)

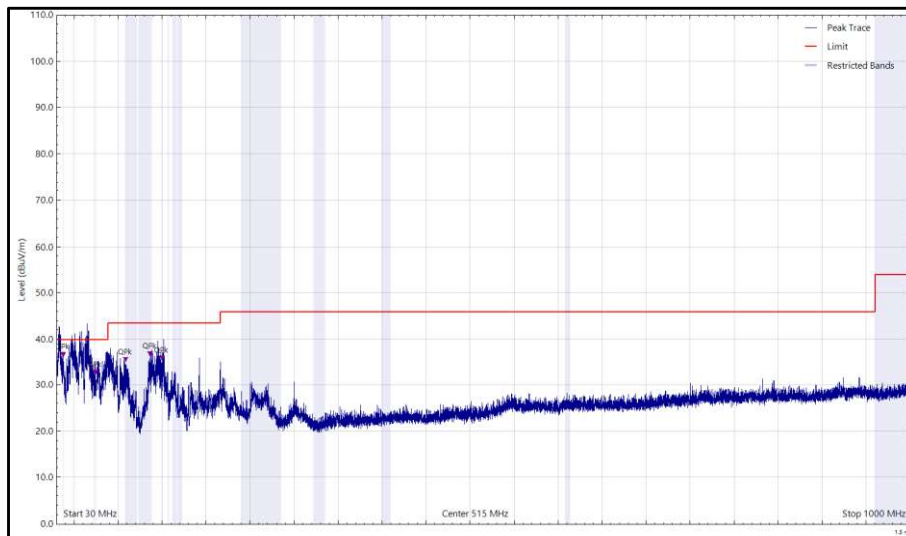


Figure 49 - LTE - 3RB - Patch, 2420.3 MHz, 30 MHz to 1 GHz, Vertical (Peak)

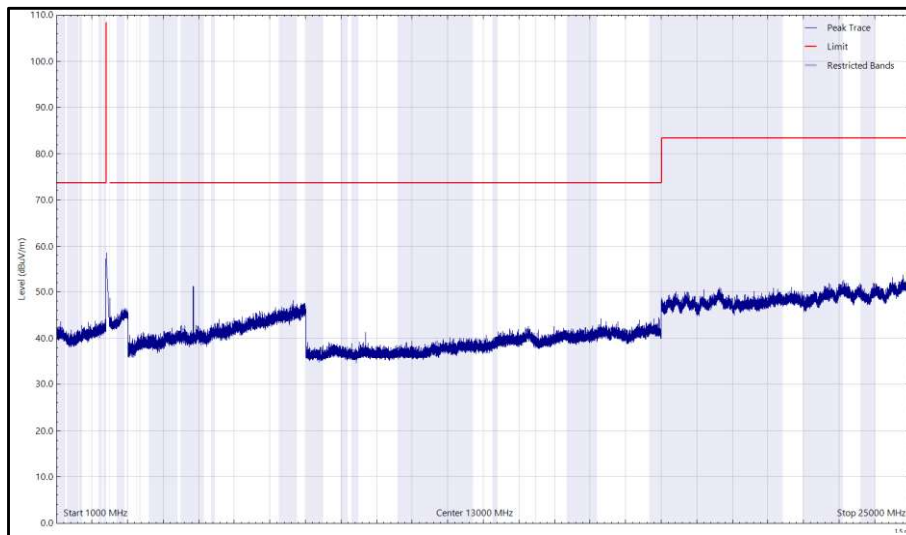


Figure 50 - LTE - 3RB - Patch, 2420.3 MHz, 1 GHz to 25 GHz, Vertical (Peak)

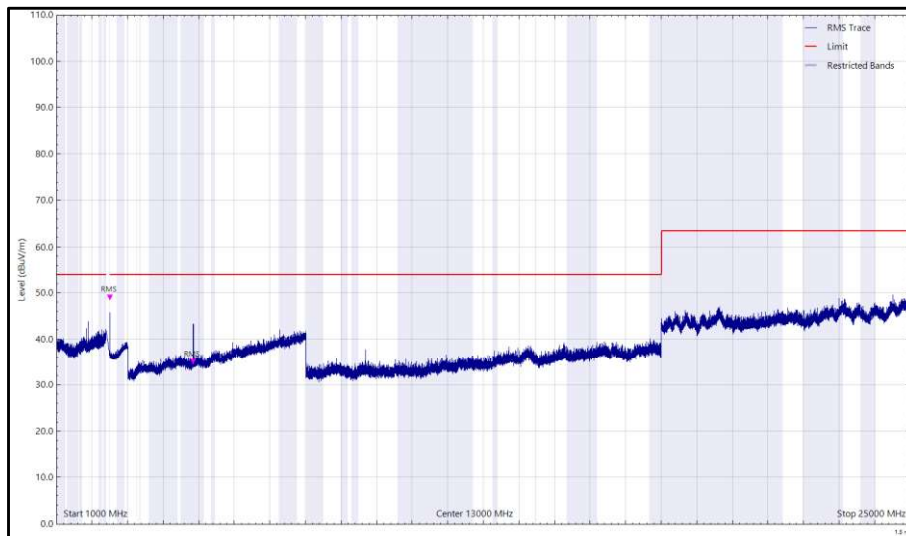


Figure 51 - LTE - 3RB - Patch, 2420.3 MHz, 1 GHz to 25 GHz, Vertical (rms)



Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
38.052	30.8	40.0	-9.2	Q-Peak	151	160	Vertical
73.131	31.7	40.0	-8.3	Q-Peak	360	105	Vertical
74.572	35.1	40.0	-4.9	Q-Peak	275	396	Horizontal
108.789	33.2	43.5	-10.3	Q-Peak	174	105	Vertical
136.882	35.6	43.5	-7.9	Q-Peak	128	100	Vertical
149.341	33.3	43.5	-10.2	Q-Peak	349	100	Vertical
2499.993	47.5	54.0	-6.4	RMS	347	228	Vertical
7305.887	37.7	54.0	-16.3	RMS	23	110	Horizontal

Table 68 - LTE - 3RB - Patch, 2435.3 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

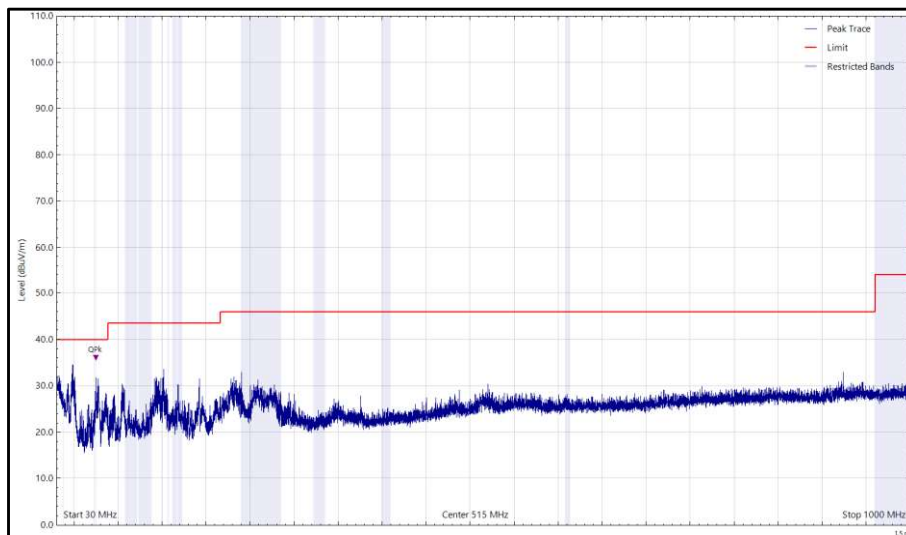


Figure 52 - LTE - 3RB - Patch, 2435.3 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

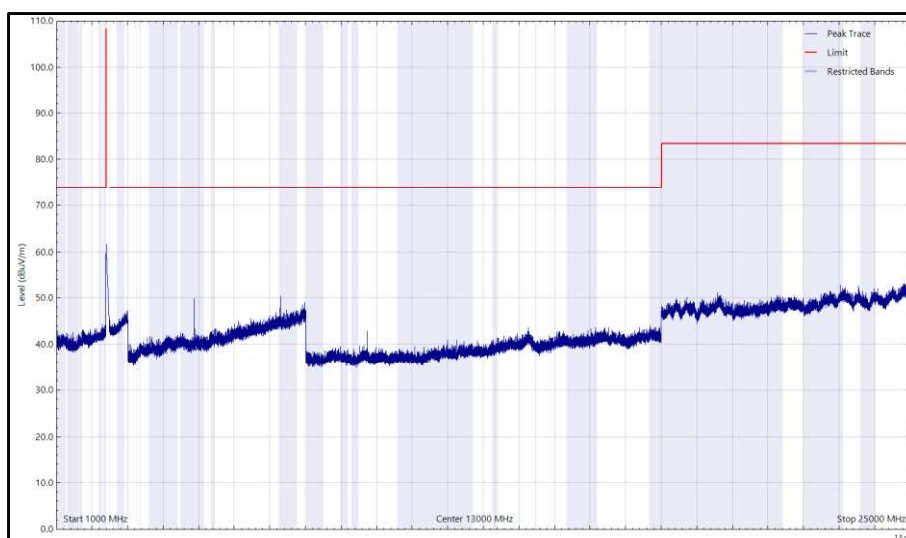


Figure 53 - LTE - 3RB - Patch, 2435.3 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

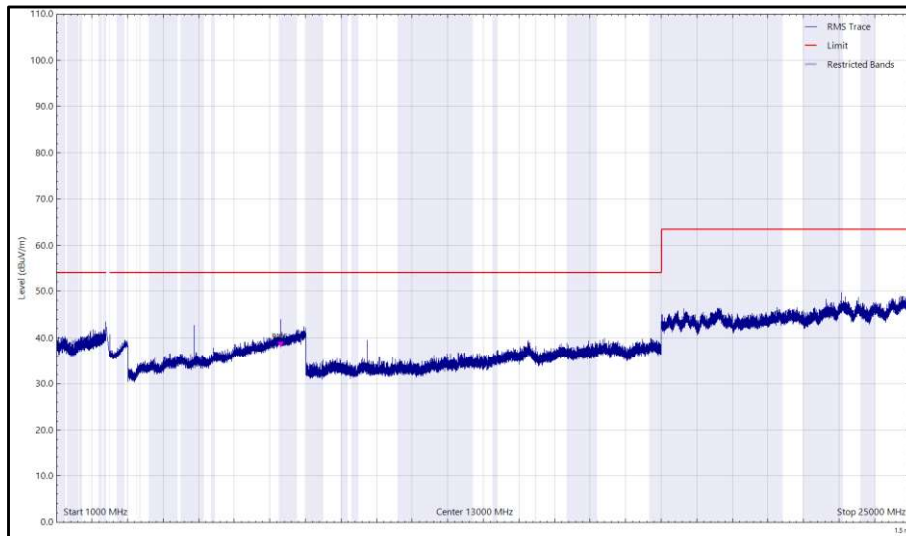


Figure 54 - LTE - 3RB - Patch, 2435.3 MHz, 1 GHz to 25 GHz, Horizontal (rms)

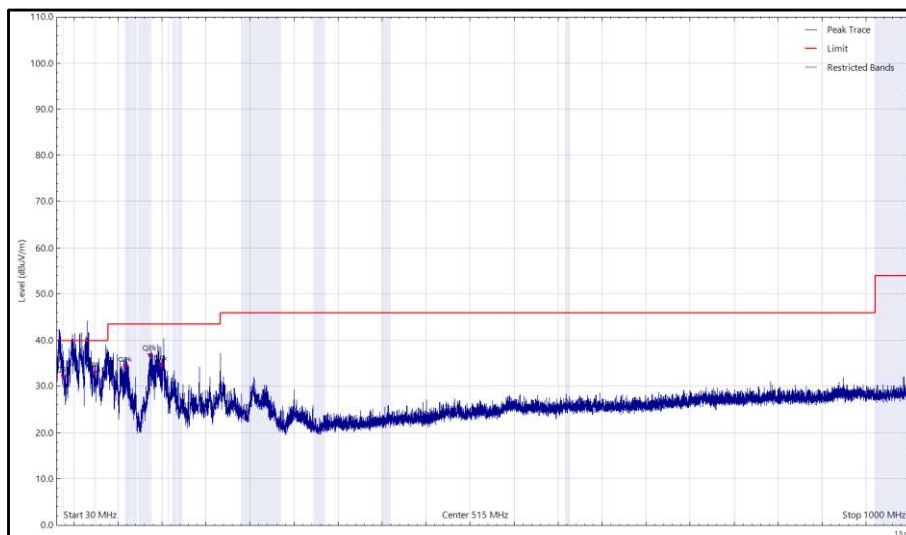


Figure 55 - LTE - 3RB - Patch, 2435.3 MHz, 30 MHz to 1 GHz, Vertical (Peak)

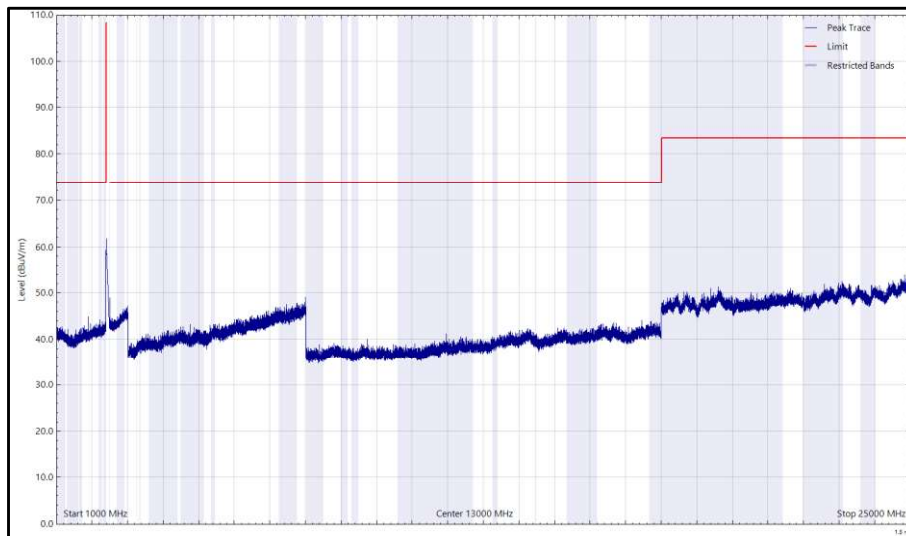


Figure 56 - LTE - 3RB - Patch, 2435.3 MHz, 1 GHz to 25 GHz, Vertical (Peak)

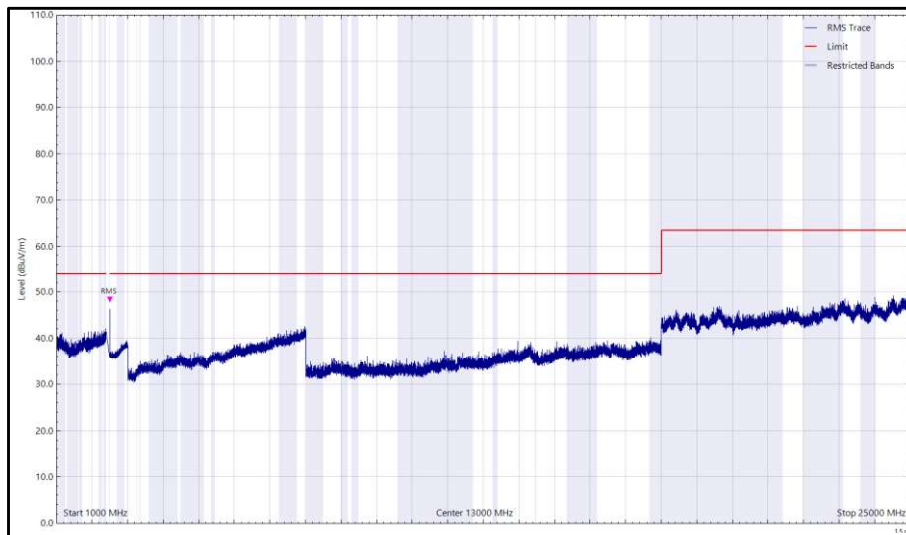


Figure 57 - LTE - 3RB - Patch, 2435.3 MHz, 1 GHz to 25 GHz, Vertical (rms)



FRB - 9 MHz

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
38.105	35.1	40.0	-4.9	Q-Peak	84	100	Vertical
75.152	31.6	40.0	-8.4	Q-Peak	135	123	Vertical
108.823	40.4	43.5	-3.1	Q-Peak	235	108	Vertical
134.392	38.4	43.5	-5.1	Q-Peak	307	110	Vertical
163.084	33.5	43.5	-10.0	Q-Peak	348	110	Vertical
2499.959	46.6	54.0	-7.4	RMS	72	363	Vertical
2499.974	44.3	54.0	-9.7	RMS	330	211	Horizontal
4825.463	43.8	54.0	-10.1	RMS	360	106	Horizontal

Table 69 - LTE - Full RB - Yagi, 2412.8 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

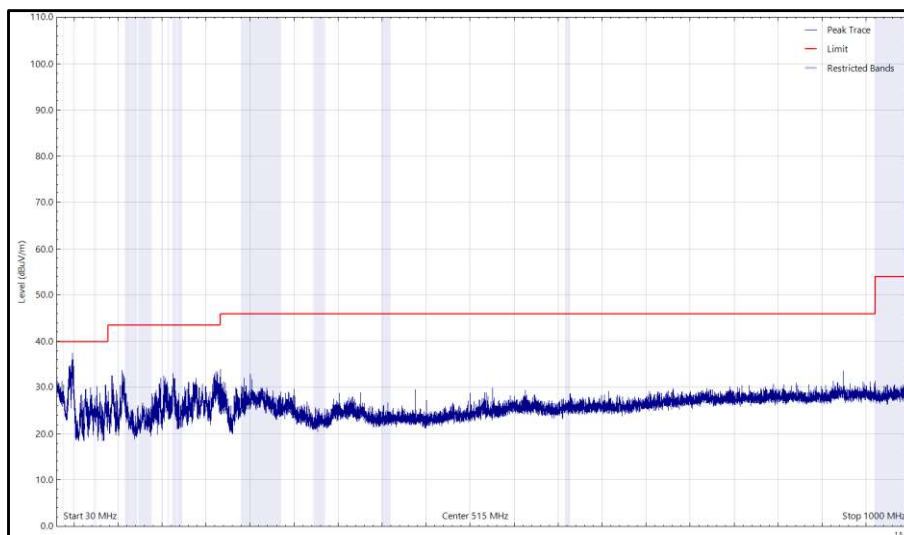


Figure 58 - LTE - Full RB - Yagi, 2412.8 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

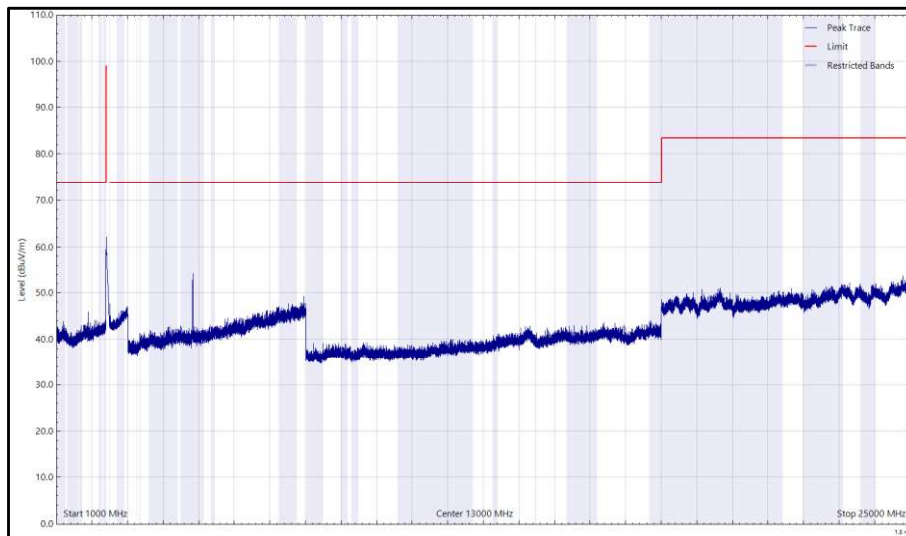


Figure 59 - LTE - Full RB - Yagi, 2412.8 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

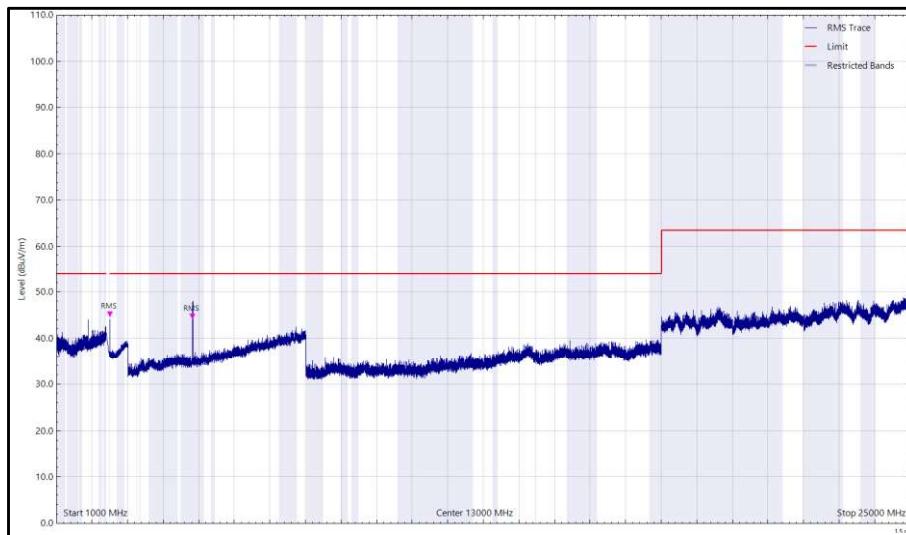


Figure 60 - LTE - Full RB - Yagi, 2412.8 MHz, 1 GHz to 25 GHz, Horizontal (rms)

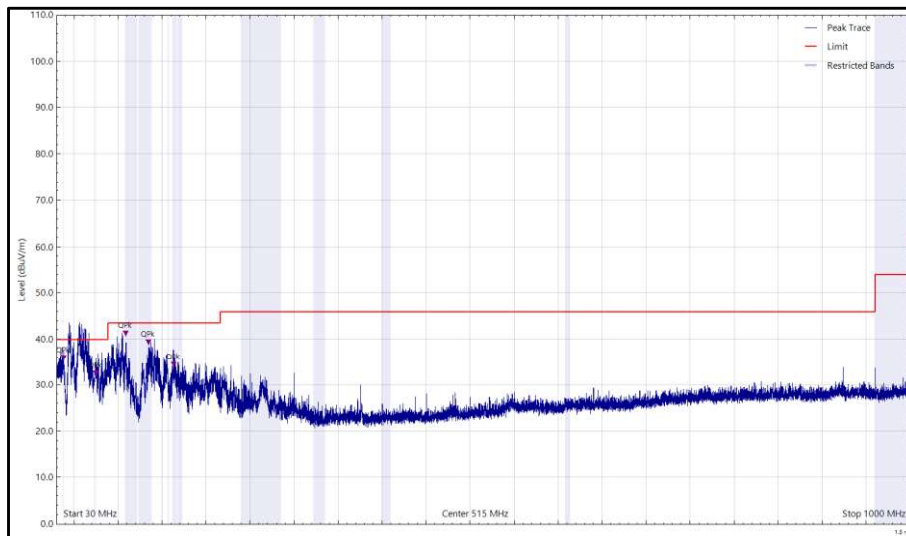


Figure 61 - LTE - Full RB - Yagi, 2412.8 MHz, 30 MHz to 1 GHz, Vertical (Peak)

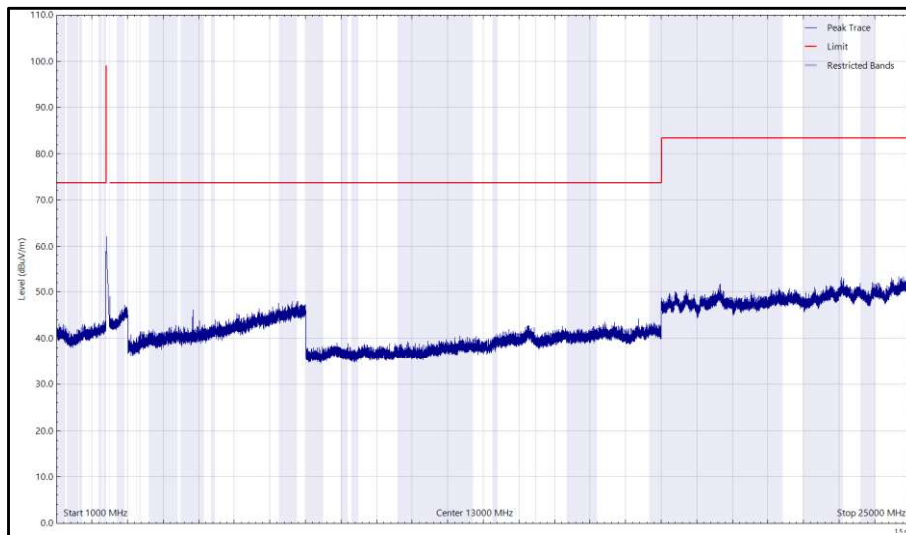


Figure 62 - LTE - Full RB - Yagi, 2412.8 MHz, 1 GHz to 25 GHz, Vertical (Peak)

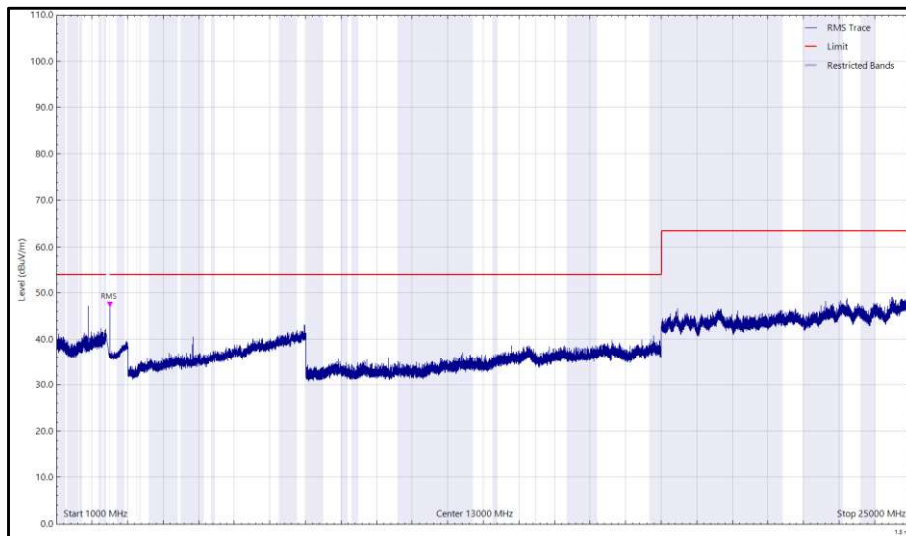


Figure 63 - LTE - Full RB - Yagi, 2412.8 MHz, 1 GHz to 25 GHz, Vertical (rms)



Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
37.772	33.9	40.0	-6.1	Q-Peak	133	100	Vertical
74.577	36.2	40.0	-3.8	Q-Peak	262	109	Vertical
108.811	40.7	43.5	-2.8	Q-Peak	259	102	Vertical
134.348	33.8	43.5	-9.7	Q-Peak	231	107	Vertical
156.525	29.2	43.5	-14.3	Q-Peak	159	103	Vertical
2499.984	43.3	54.0	-10.7	RMS	332	100	Horizontal
2500.000	46.7	54.0	-7.3	RMS	305	197	Vertical

Table 70 - LTE - Full RB - Yagi, 2422.8 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

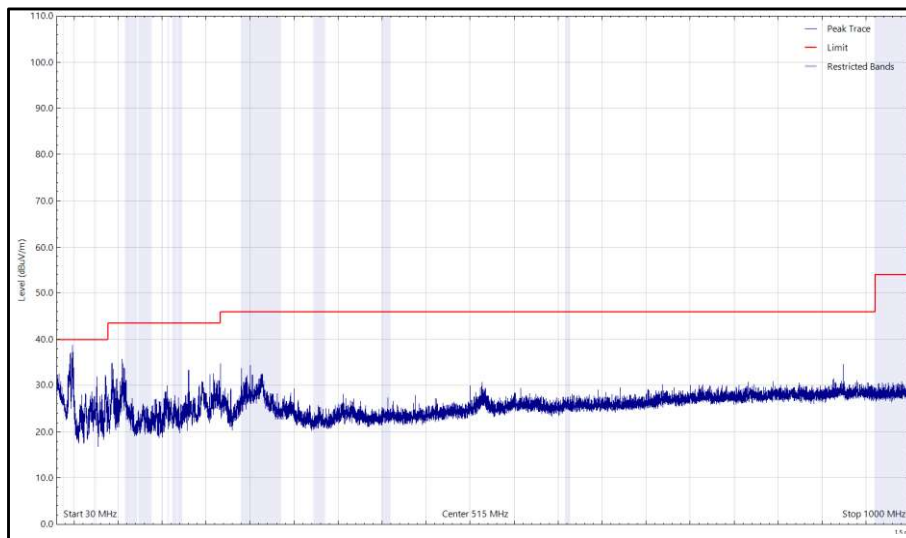


Figure 64 - LTE - Full RB - Yagi, 2422.8 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

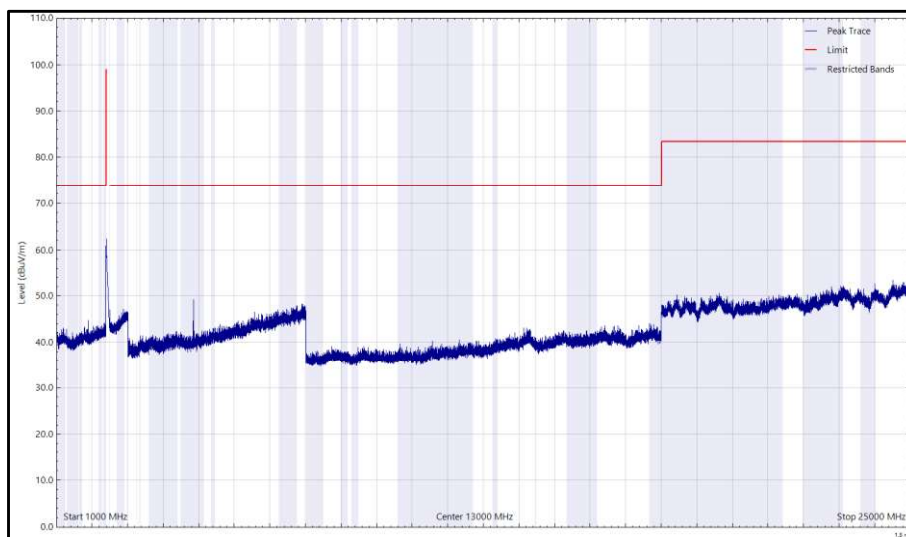


Figure 65 - LTE - Full RB - Yagi, 2422.8 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

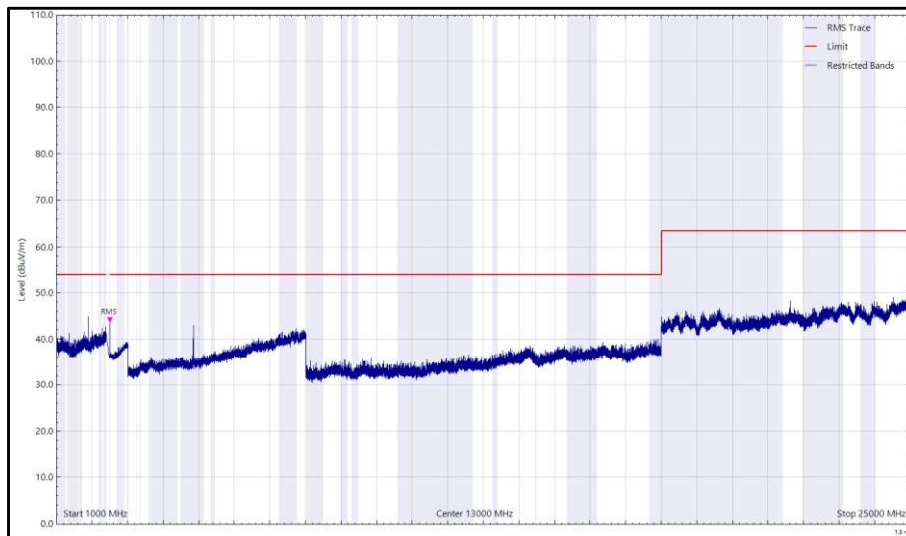


Figure 66 - LTE - Full RB - Yagi, 2422.8 MHz, 1 GHz to 25 GHz, Horizontal (rms)

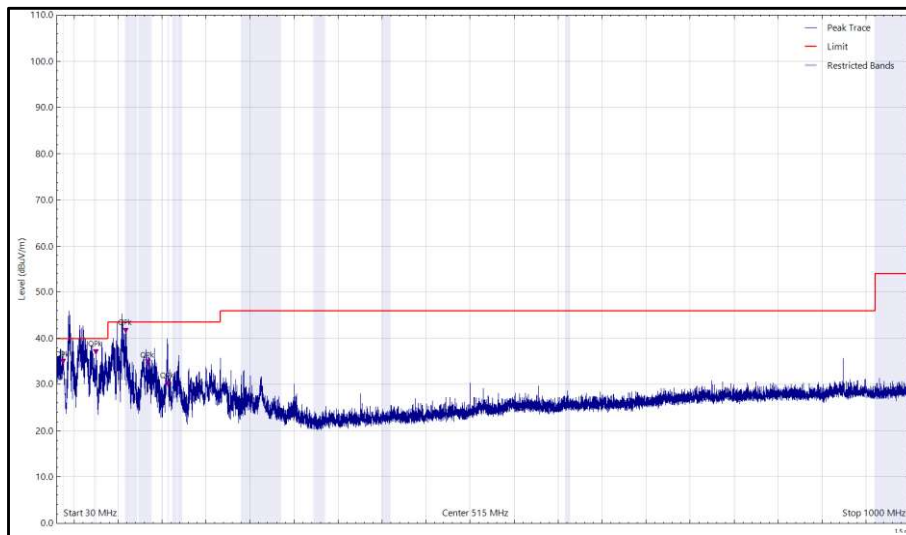


Figure 67 - LTE - Full RB - Yagi, 2422.8 MHz, 30 MHz to 1 GHz, Vertical (Peak)

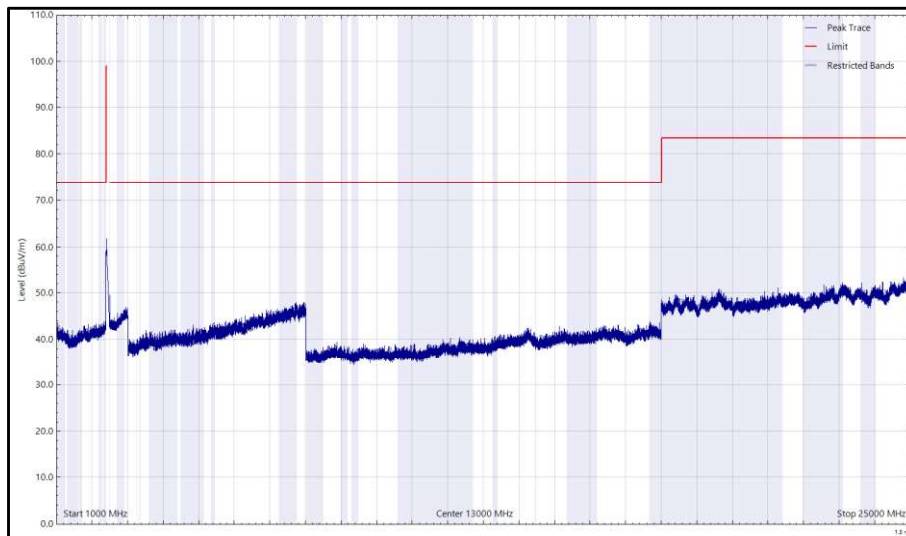


Figure 68 - LTE - Full RB - Yagi, 2422.8 MHz, 1 GHz to 25 GHz, Vertical (Peak)

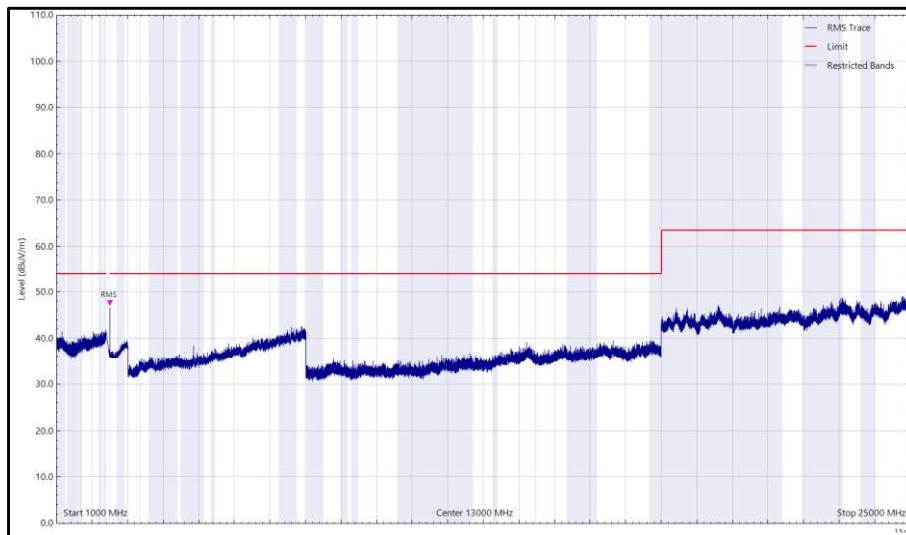


Figure 69 - LTE - Full RB - Yagi, 2422.8 MHz, 1 GHz to 25 GHz, Vertical (rms)



Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
37.809	34.3	40.0	-5.7	Q-Peak	127	100	Vertical
73.147	29.8	40.0	-10.2	Q-Peak	126	108	Vertical
74.555	35.2	40.0	-4.8	Q-Peak	101	390	Horizontal
108.797	40.3	43.5	-3.2	Q-Peak	227	100	Vertical
134.365	35.9	43.5	-7.6	Q-Peak	288	100	Vertical
149.942	31.8	43.5	-11.7	Q-Peak	171	230	Horizontal
156.525	28.1	43.5	-15.4	Q-Peak	295	100	Vertical
2499.999	44.5	54.0	-9.5	RMS	330	212	Horizontal
2500.000	47.2	54.0	-6.8	RMS	307	196	Vertical

Table 71 - LTE - Full RB - Yagi, 2432.8 MHz, 30 MHz to 18 GHz

No other emissions found within 10 dB of the limit.

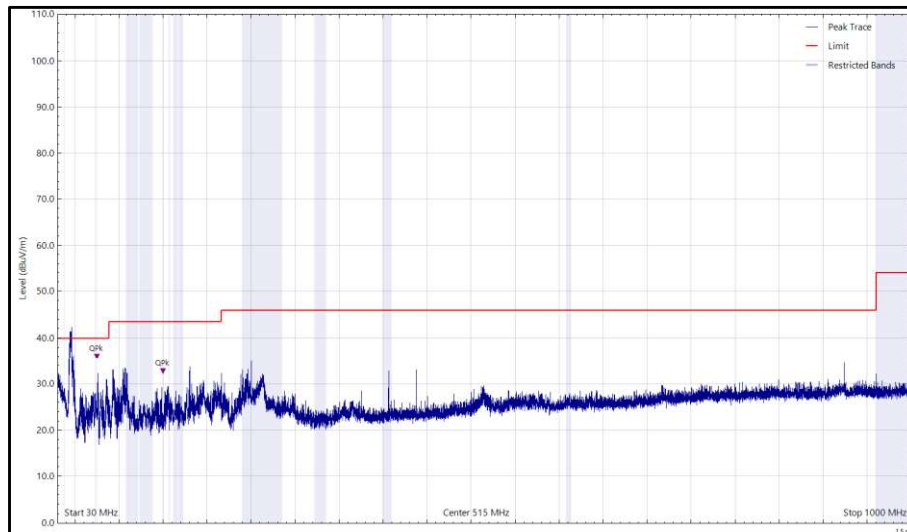


Figure 70 - LTE - Full RB - Yagi, 2432.8 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

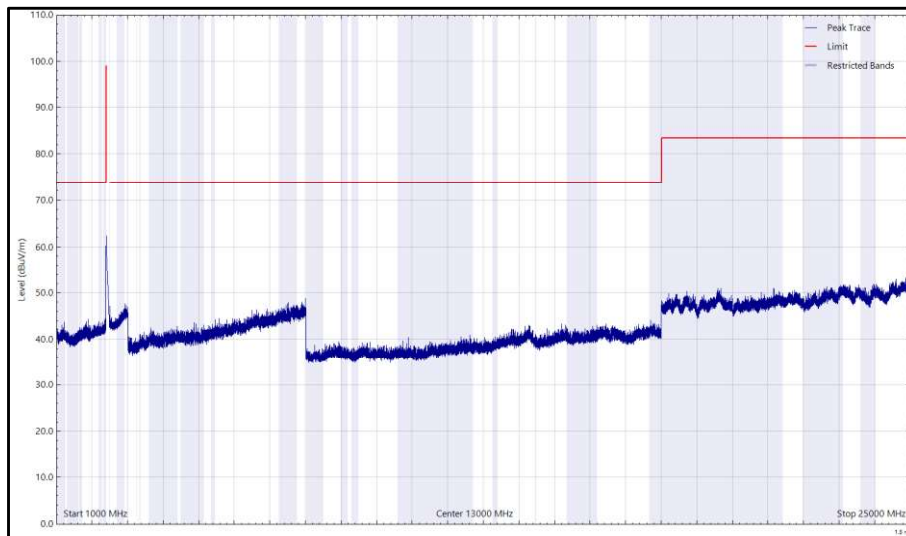


Figure 71 - LTE - Full RB - Yagi, 2432.8 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

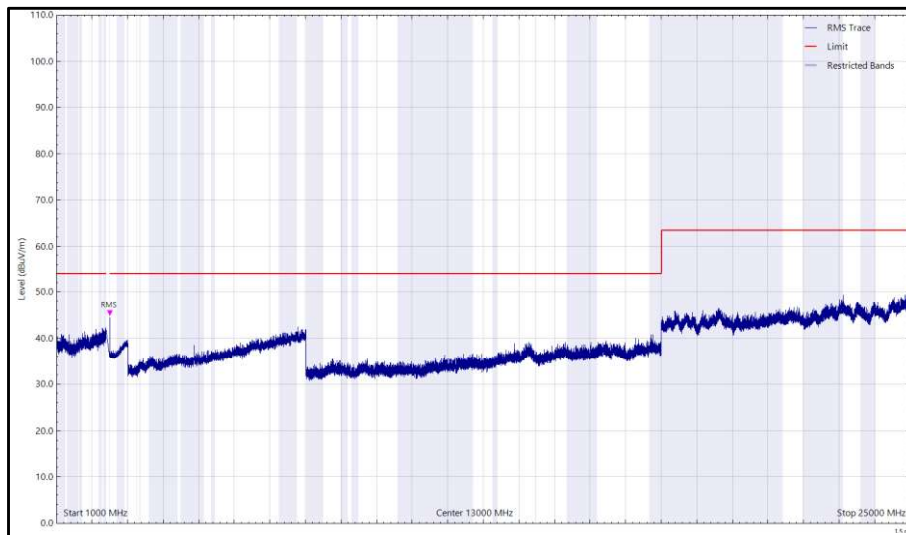


Figure 72 - LTE - Full RB - Yagi, 2432.8 MHz, 1 GHz to 25 GHz, Horizontal (rms)

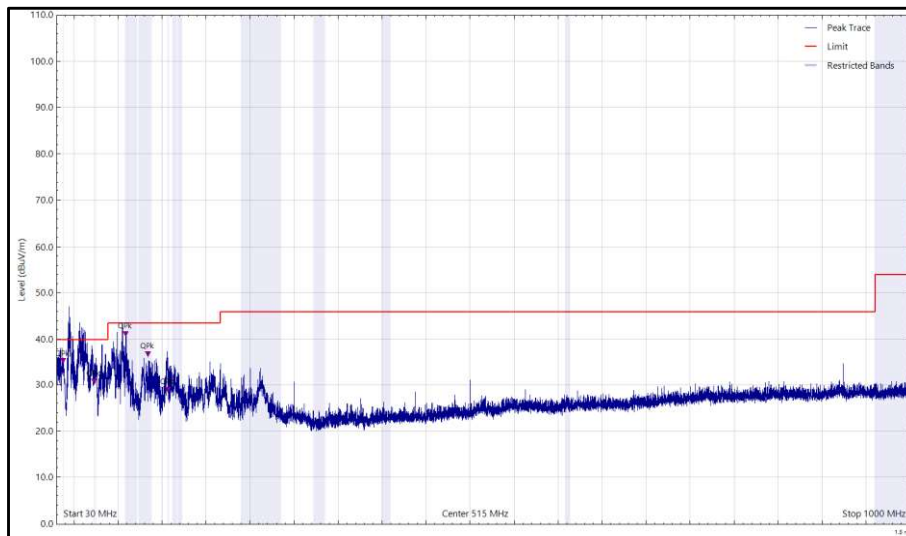


Figure 73 - LTE - Full RB - Yagi, 2432.8 MHz, 30 MHz to 1 GHz, Vertical (Peak)

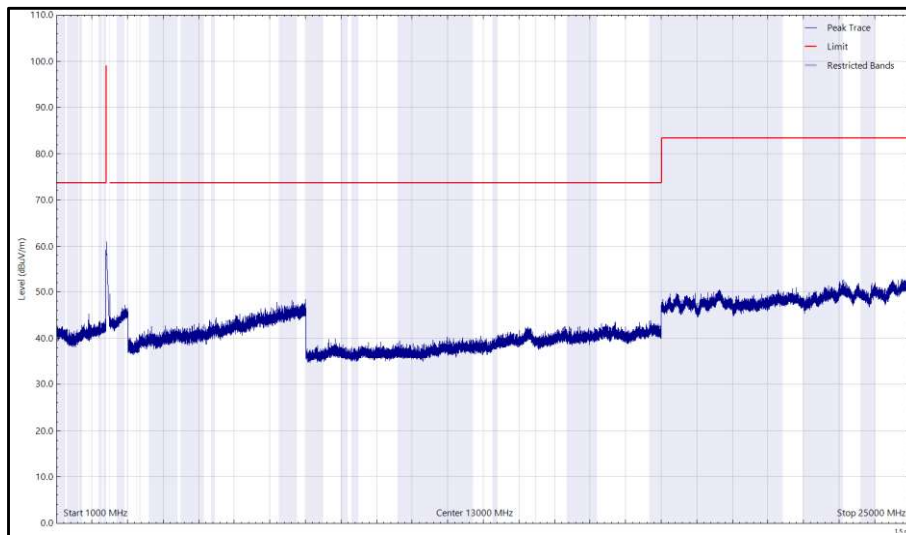


Figure 74 - LTE - Full RB - Yagi, 2432.8 MHz, 1 GHz to 25 GHz, Vertical (Peak)

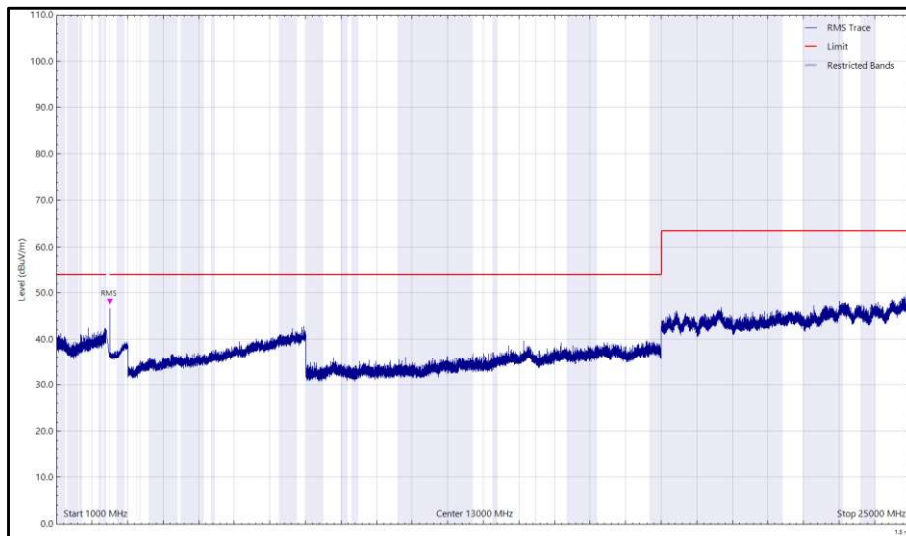


Figure 75 - LTE - Full RB - Yagi, 2432.8 MHz, 1 GHz to 25 GHz, Vertical (rms)



Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
37.531	32.5	40.0	-7.5	Q-Peak	180	119	Vertical
73.198	32.1	40.0	-8.0	Q-Peak	277	104	Vertical
110.735	32.1	43.5	-11.4	Q-Peak	332	106	Vertical
137.157	38.1	43.5	-5.4	Q-Peak	267	109	Vertical
149.325	26.3	43.5	-17.2	Q-Peak	360	105	Vertical
2499.965	40.7	54.0	-13.3	RMS	331	173	Horizontal
2500.000	46.0	54.0	-8.0	RMS	346	254	Vertical

Table 72 - LTE - Full RB - Patch, 2412.8 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

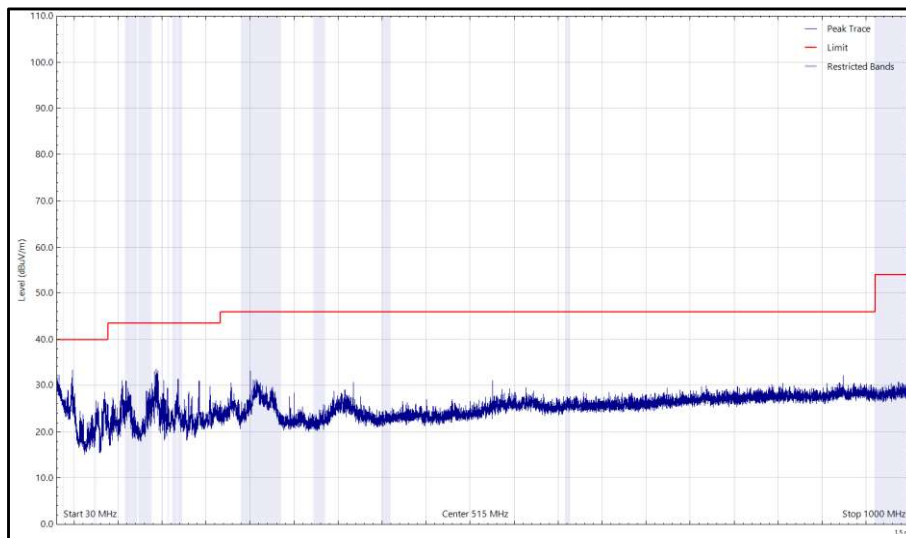


Figure 76 - LTE - Full RB - Patch, 2412.8 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

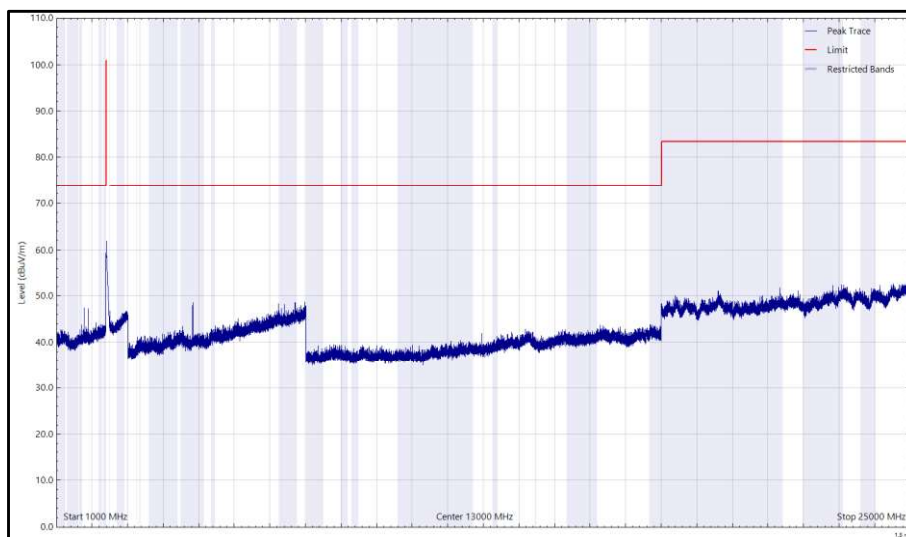


Figure 77 - LTE - Full RB - Patch, 2412.8 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

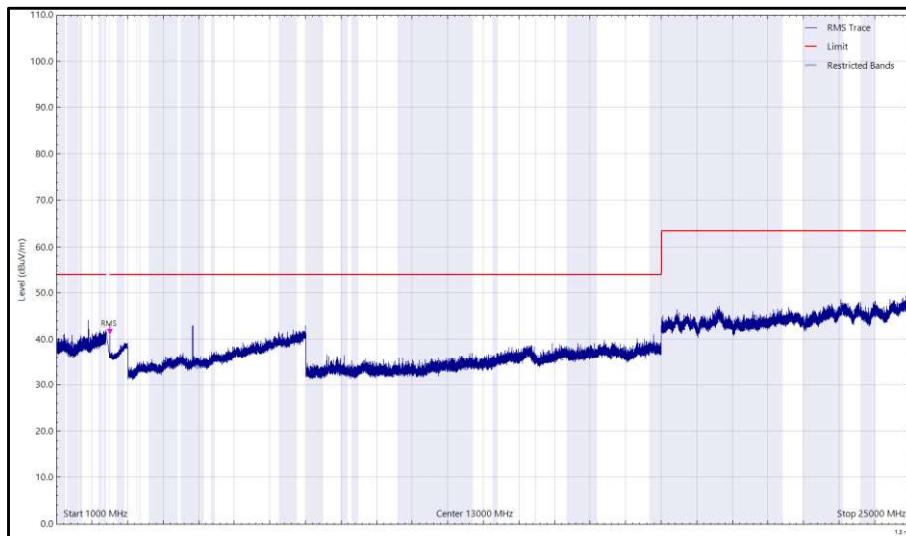


Figure 78 - LTE - Full RB - Patch, 2412.8 MHz, 1 GHz to 25 GHz, Horizontal (rms)

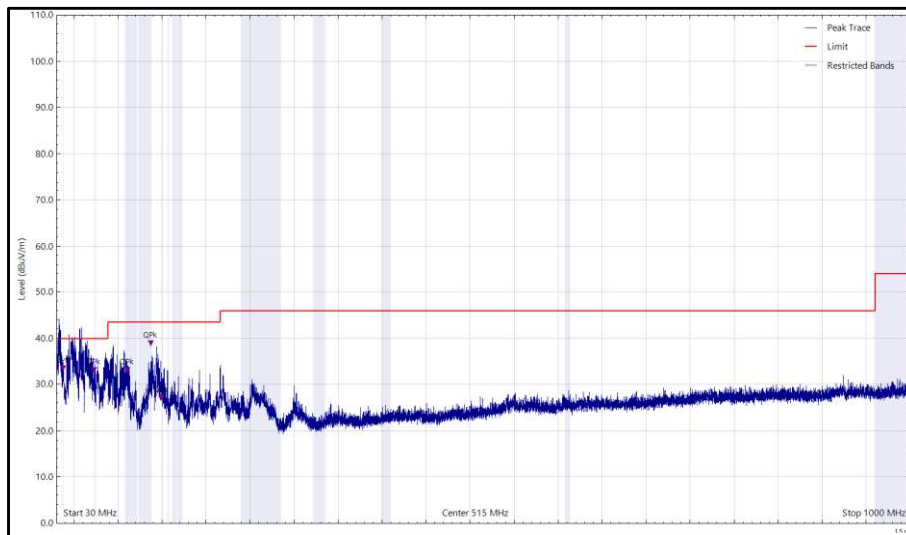


Figure 79 - LTE - Full RB - Patch, 2412.8 MHz, 30 MHz to 1 GHz, Vertical (Peak)

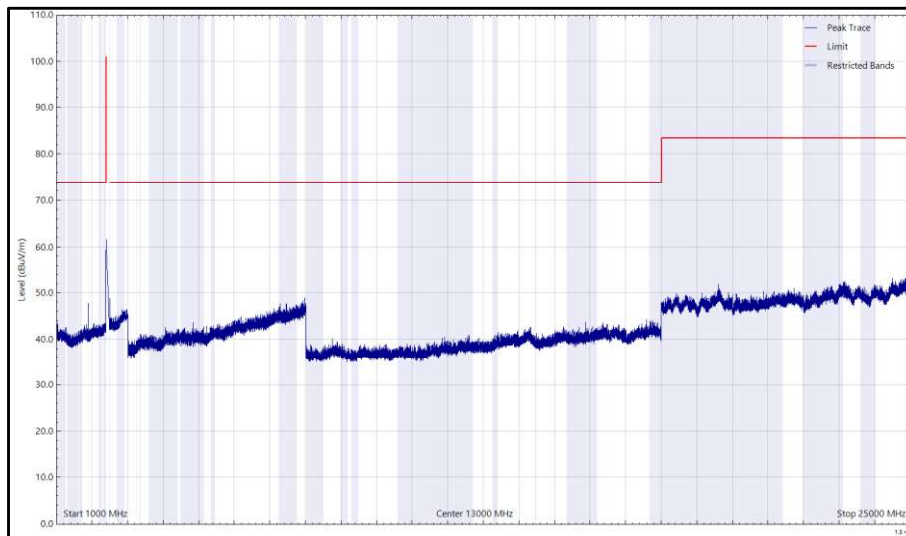


Figure 80 - LTE - Full RB - Patch, 2412.8 MHz, 1 GHz to 25 GHz, Vertical (Peak)

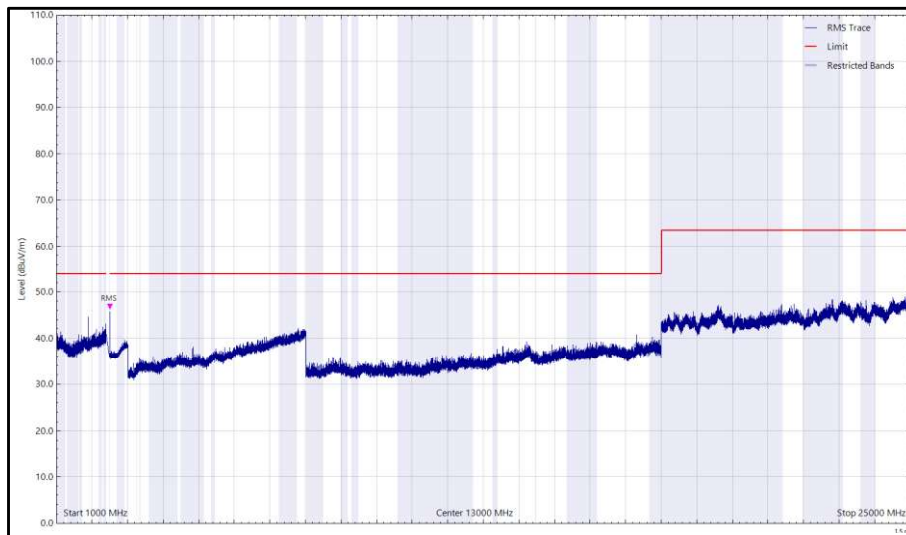


Figure 81 - LTE - Full RB - Patch, 2412.8 MHz, 1 GHz to 25 GHz, Vertical (rms)



Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
37.545	30.5	40.0	-9.5	Q-Peak	158	100	Vertical
73.174	31.1	40.0	-8.9	Q-Peak	360	109	Vertical
108.792	34.9	43.5	-8.7	Q-Peak	186	110	Vertical
137.165	40.1	43.5	-3.5	Q-Peak	268	100	Vertical
2499.973	45.1	54.0	-8.9	RMS	314	160	Vertical
2500.000	42.3	54.0	-11.7	RMS	332	299	Horizontal

Table 73 - LTE - Full RB - Patch, 2422.8 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

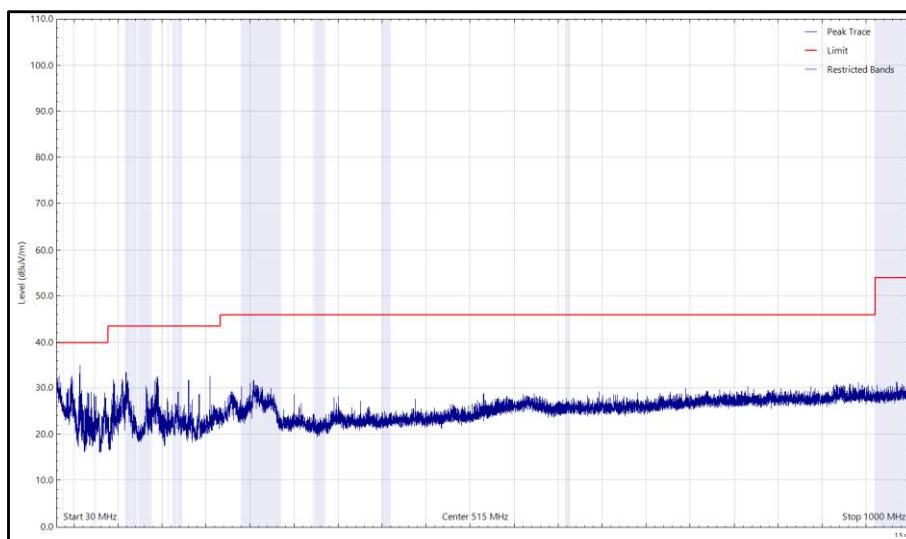


Figure 82 - LTE - Full RB - Patch, 2422.8 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

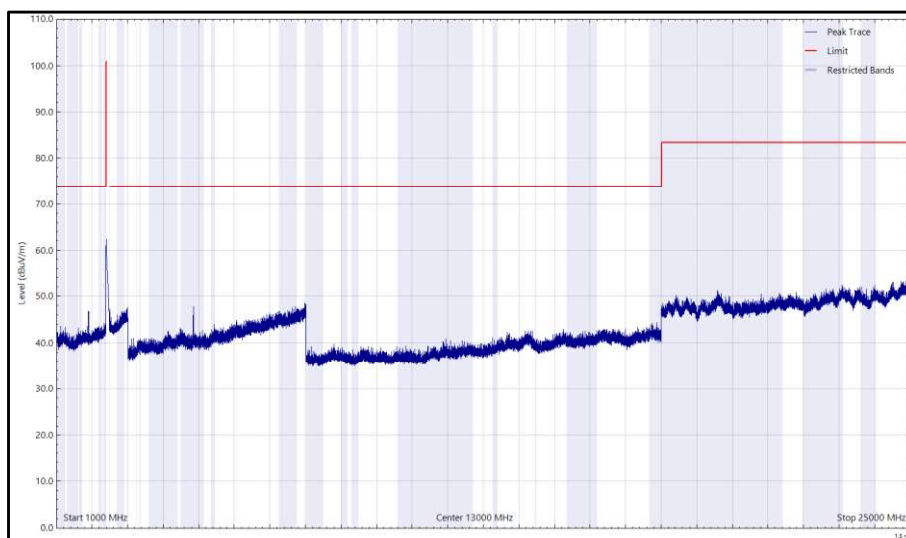


Figure 83 - LTE - Full RB - Patch, 2422.8 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

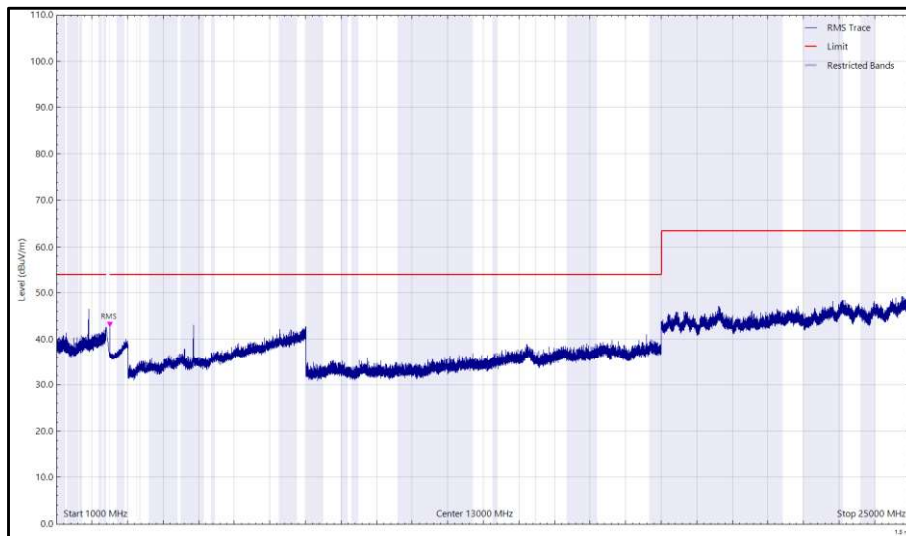


Figure 84 - LTE - Full RB - Patch, 2422.8 MHz, 1 GHz to 25 GHz, Horizontal (rms)

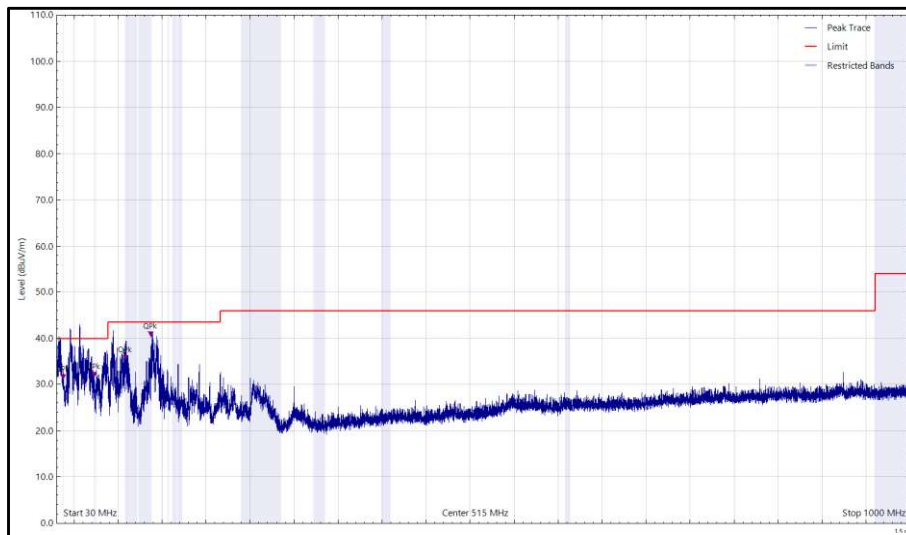


Figure 85 - LTE - Full RB - Patch, 2422.8 MHz, 30 MHz to 1 GHz, Vertical (Peak)

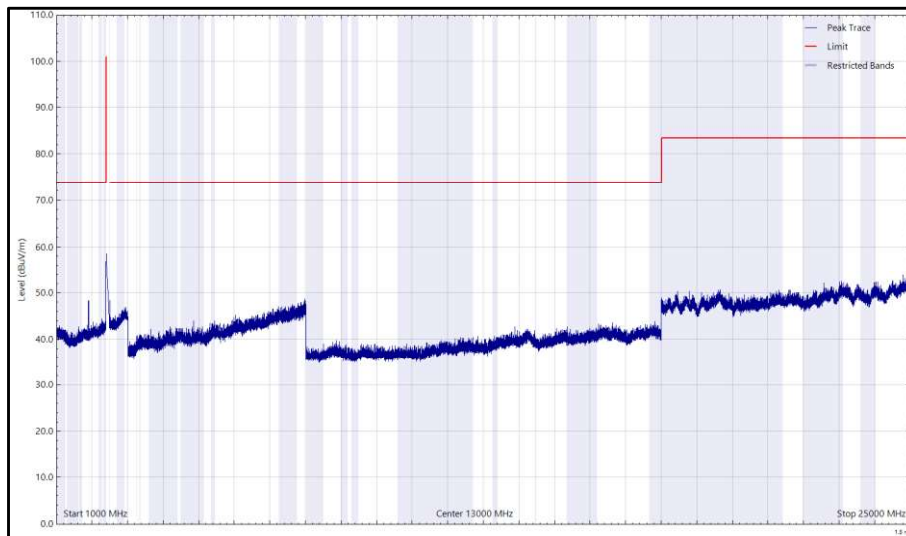


Figure 86 - LTE - Full RB - Patch, 2422.8 MHz, 1 GHz to 25 GHz, Vertical (Peak)

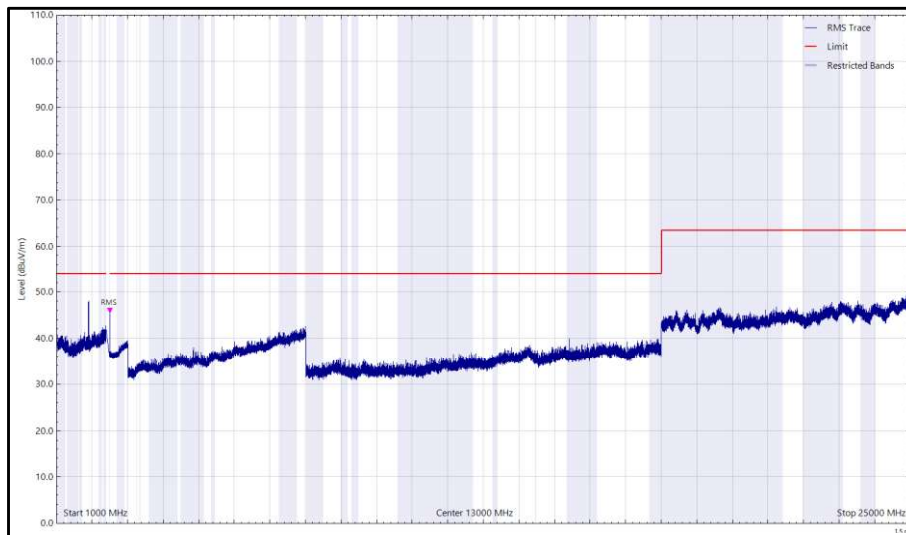


Figure 87 - LTE - Full RB - Patch, 2422.8 MHz, 1 GHz to 25 GHz, Vertical (rms)



Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
38.079	32.8	40.0	-7.2	Q-Peak	144	100	Vertical
73.138	30.4	40.0	-9.6	Q-Peak	360	110	Vertical
108.790	34.0	43.5	-9.5	Q-Peak	179	108	Vertical
132.930	36.1	43.5	-7.4	Q-Peak	262	105	Vertical
149.015	32.7	43.5	-10.8	Q-Peak	0	105	Vertical
2499.969	43.0	54.0	-11.0	RMS	93	153	Horizontal
2499.977	46.5	54.0	-7.5	RMS	110	196	Vertical

Table 74 - LTE - Full RB - Patch, 2432.8 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

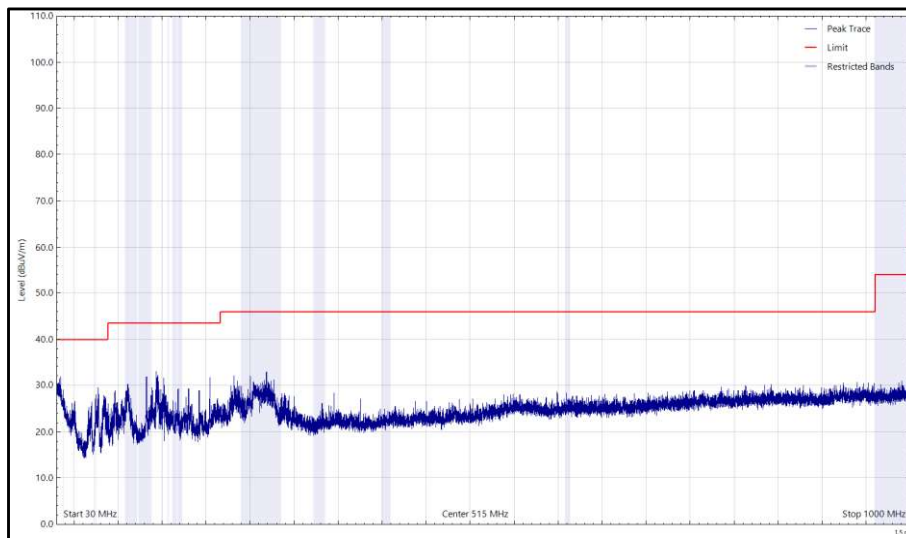


Figure 88 - LTE - Full RB - Patch, 2432.8 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

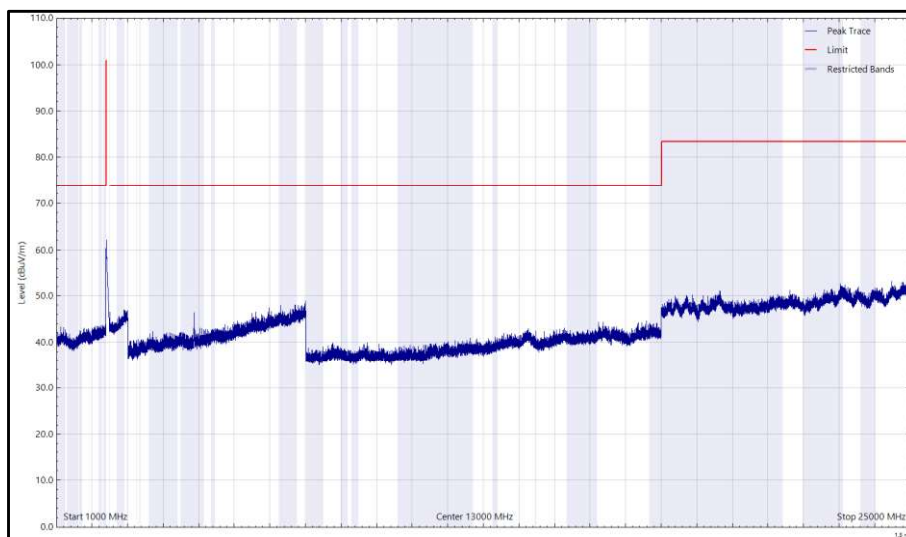


Figure 89 - LTE - Full RB - Patch, 2432.8 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

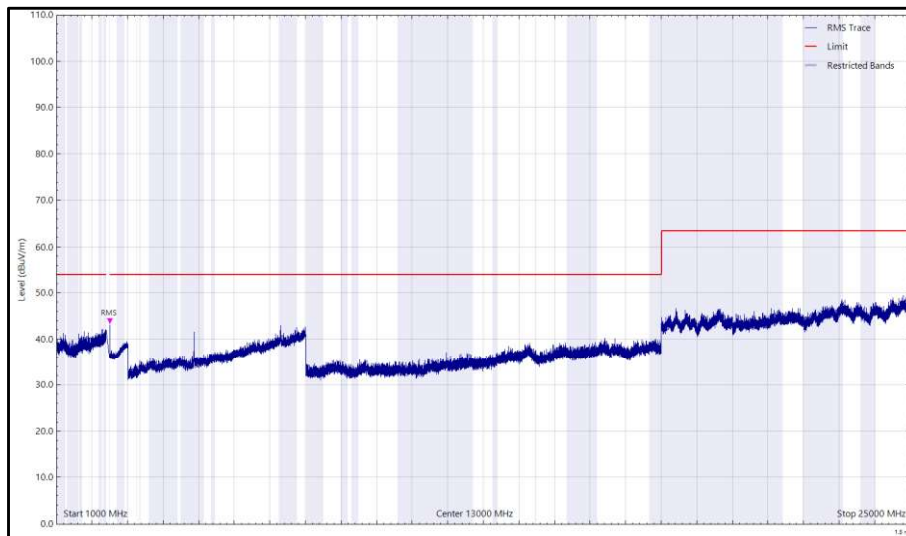


Figure 90 - LTE - Full RB - Patch, 2432.8 MHz, 1 GHz to 25 GHz, Horizontal (rms)

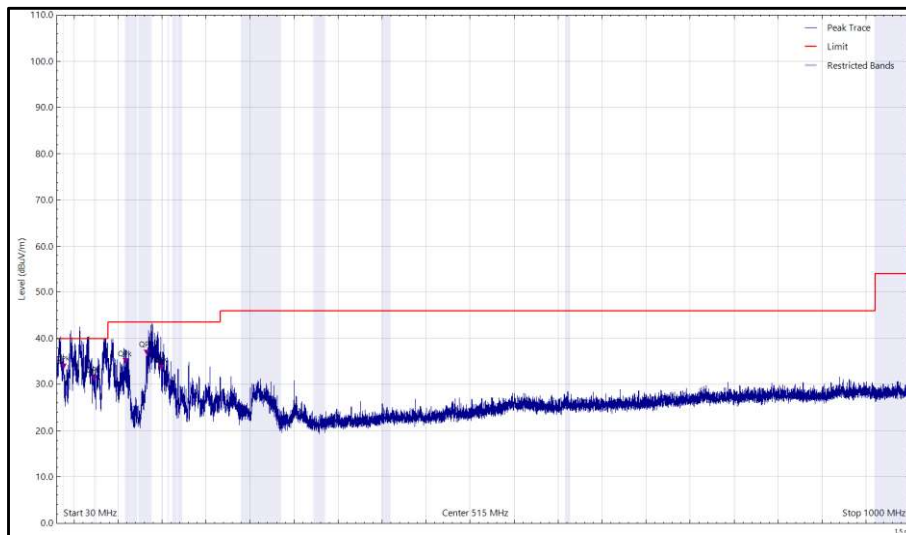


Figure 91 - LTE - Full RB - Patch, 2432.8 MHz, 30 MHz to 1 GHz, Vertical (Peak)

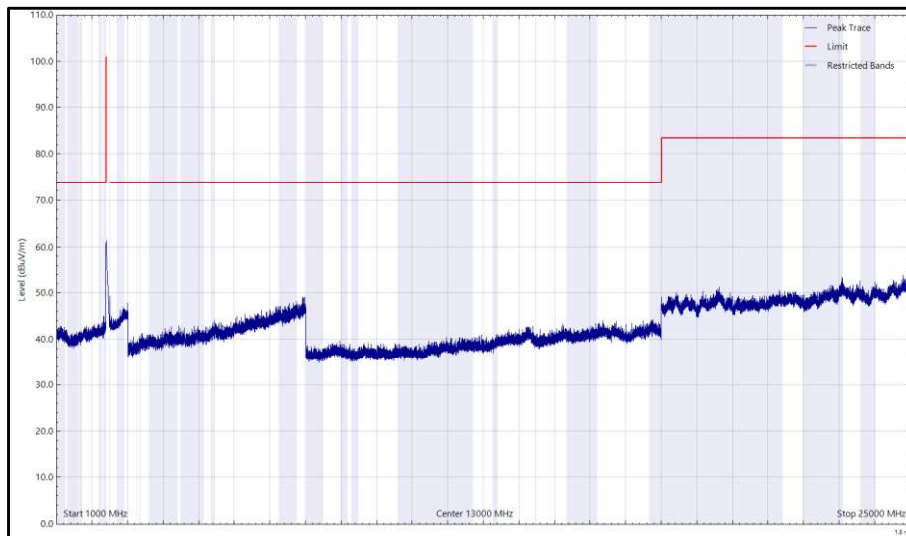


Figure 92 - LTE - Full RB - Patch, 2432.8 MHz, 1 GHz to 25 GHz, Vertical (Peak)

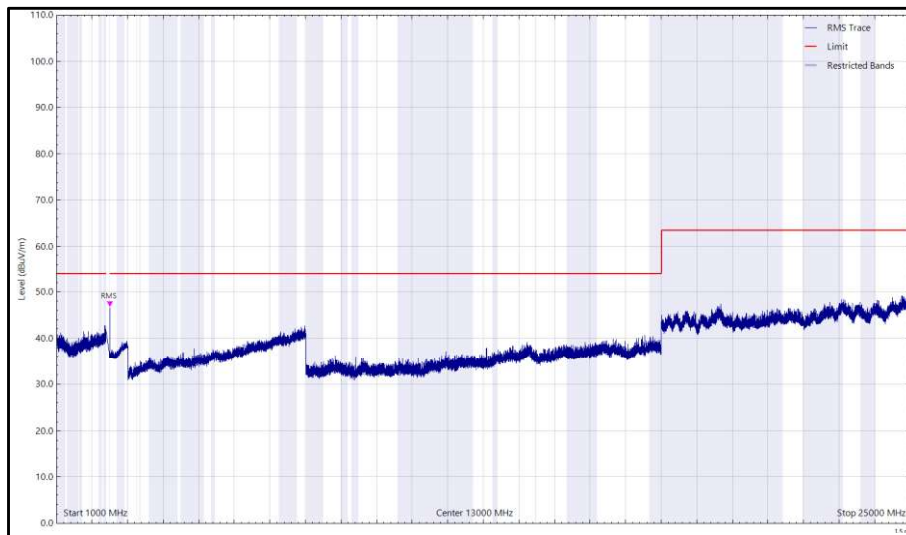


Figure 93 - LTE - Full RB - Patch, 2432.8 MHz, 1 GHz to 25 GHz, Vertical (rms)



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)

ISED RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

In addition, radiated emissions which fall in the restricted bands, as defined in RSS-GEN, clause 8.10, must also comply with the radiated emission limits specified in RSS-GEN clause 8.9.



2.4.8 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 Expiry Date
Antenna with attenuator (Bilog, 30 MHz to 3 GHz)	Schaffner	CBL6143	287	24	14-Oct-2022
Multimeter	Fluke	79 Series III	611	12	21-Dec-2022
Comb Generator	Schaffner	RSG1000	3034	-	TU
Cable (SMA to SMA, 2 m)	Rhophase	3PS-1801A-2000-3PS	4113	12	27-Jan-2023
Cable (N-Type to N-Type, 1 m)	Rosenberger	LU7-036-1000	5031	12	23-Jul-2022
Band Reject Filter - 2.425 GHz	Wainwright	WRCGV14-2390-2400-2450-2460-50SS	5067	12	29-Sep-2022
Emissions Software	TUV SUD	EmX V3.1.2 V.3.1.2	5125	-	Software
Cable (N-Type to N-Type, 8 m)	Teledyne	PR90-088-8MTR	5212	12	06-Sep-2022
Antenna (DRG, 15 GHz to 40 GHz)	Schwarzbeck	BBHA 9170	5217	12	25-Jan-2023
Pre-Amplifier (18 GHz to 40 GHz)	Schwarzbeck	BBV 9721	5218	12	25-Jan-2023
Pre-Amplifier (1 GHz to 18 GHz)	Schwarzbeck	BBV 9718 C	5350	12	22-Sep-2022
Cable (N-Type to N-Type, 8 m)	Teledyne	PR90-088-8MTR	5450	6	06-Oct-2022
Thermo-hygro-Barometer	PCE Instruments	PCE-THB-40	5472	12	25-Mar-2023
3 GHz High pass Filter	Wainwright	WHKX12-2580-3000-18000-80SS	5547	12	11-May-2023
Antenna (DRG 1-10.5GHz)	Schwarzbeck	BBHA9120B	5611	12	15-Oct-2022
Turntable & Mast Controller	Maturo Gmbh	NCD/498/2799.01	5612	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	5613	-	TU
Turntable	Maturo Gmbh	Turntable 1.5 SI-2t	5614	-	TU
Screened Room (12)	MVG	EMC-3	5621	36	11-Aug-2023
Test Receiver	Rohde & Schwarz	ESW44	5914	12	21-Feb-2023

Table 75

TU – Traceability Unscheduled



2.5 Authorised Band Edges

2.5.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d)
ISED RSS-247, Clause 5.5

2.5.2 Equipment Under Test and Modification State

Not Applicable, S/N: 1819V0007 - Modification State 0

2.5.3 Date of Test

29-May-2022 to 30-May-2022

2.5.4 Test Method

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

2.5.5 Environmental Conditions

Ambient Temperature	22.5 - 24.0 °C
Relative Humidity	31.3 - 38.5 %



2.5.6 Test Results

3RB - 4.5MHz

Mode	Frequency (MHz)	Band Edge Frequency (MHz)	Level (dBc)
Static	2410.3 - Patch	2400	-74.99
Static	2410.3 - Yagi	2400	-73.94

Table 76

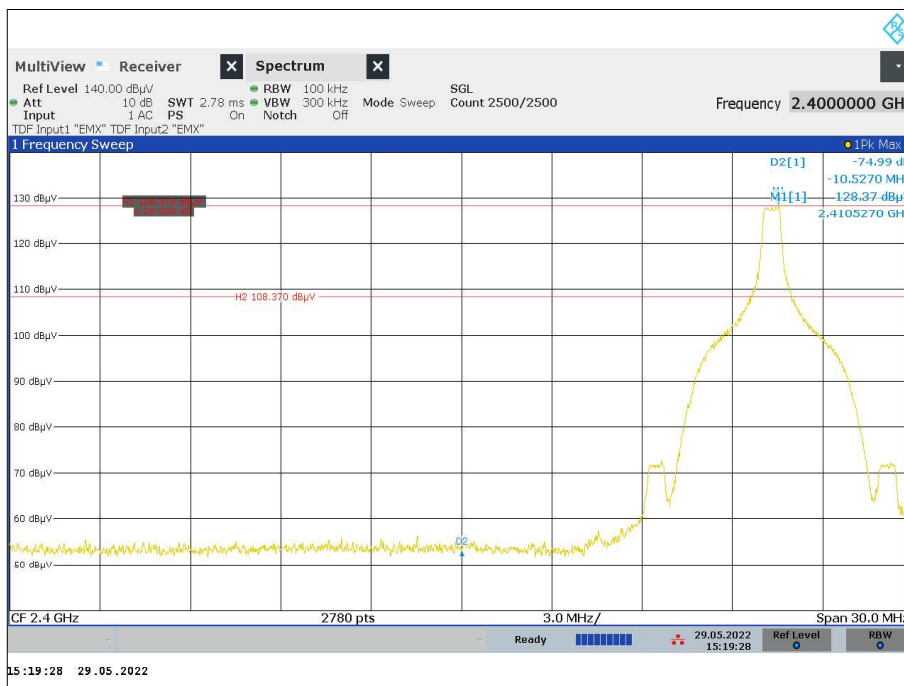


Figure 94 - Static, 2410.3 - Patch MHz - Band Edge Frequency 2400 MHz

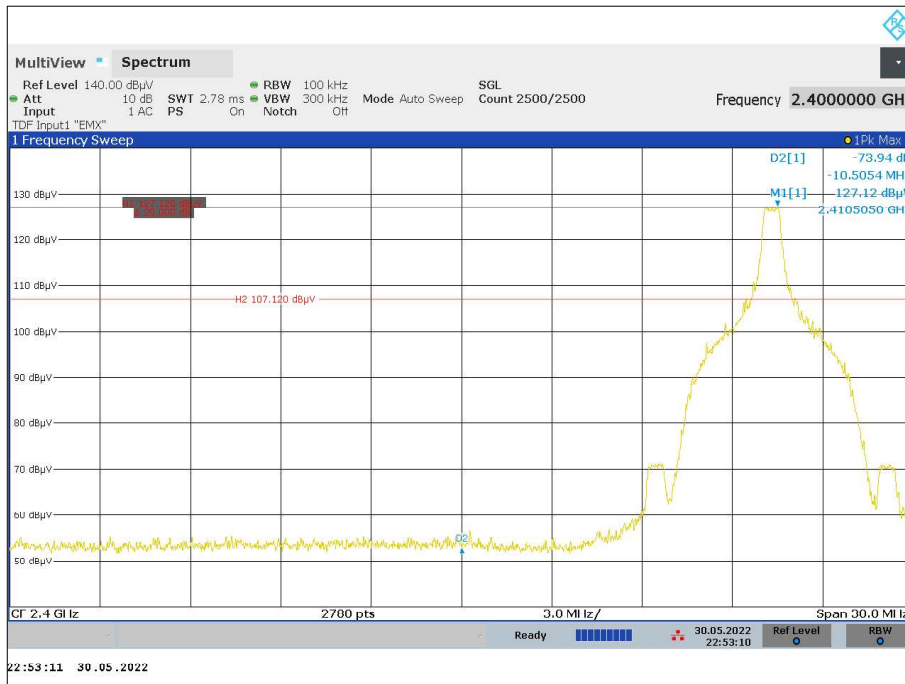


Figure 95 - Static, 2410.3 - Yagi MHz - Band Edge Frequency 2400 MHz



FRB - 9 MHz

Mode	Frequency (MHz)	Band Edge Frequency (MHz)	Level (dBc)
Static	2412.8 - Patch	2400	-68.15
Static	2412.8 - Yagi	2400	-66.22

Table 77

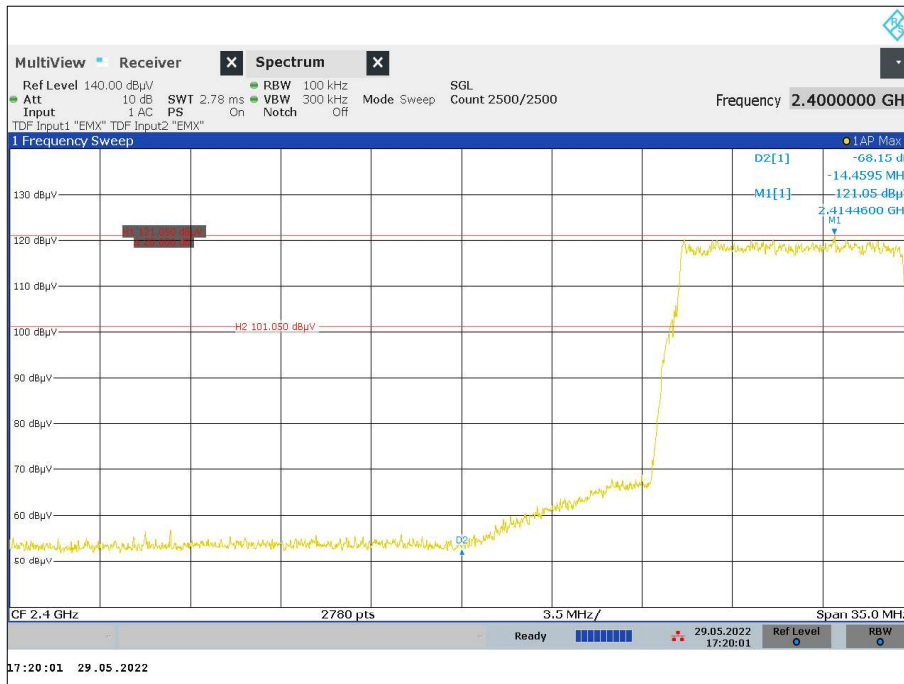


Figure 96 - Static, 2412.8 - Patch MHz - Band Edge Frequency 2400 MHz

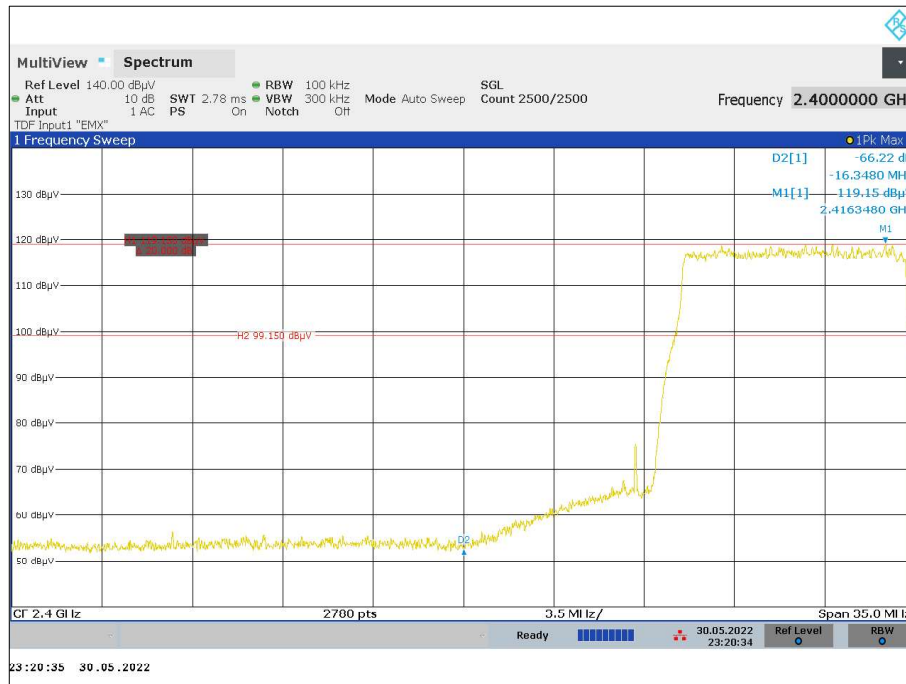


Figure 97 - Static, 2412.8 - Yagi MHz - Band Edge Frequency 2400 MHz

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.

ISED RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.



2.5.7 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 Expiry Date
Multimeter	Fluke	79 Series III	611	12	21-Dec-2022
Cable (SMA to SMA, 2 m)	Rhophase	3PS-1801A-2000-3PS	4113	12	27-Jan-2023
Cable (N-Type to N-Type, 8 m)	Teledyne	PR90-088-8MTR	5212	12	06-Sep-2022
Thermo-hygro-Barometer	PCE Instruments	PCE-THB-40	5472	12	25-Mar-2023
Antenna (DRG 1-10.5GHz)	Schwarzbeck	BBHA9120B	5611	12	15-Oct-2022
Turntable & Mast Controller	Maturo Gmbh	NCD/498/2799.01	5612	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	5613	-	TU
Turntable	Maturo Gmbh	Turntable 1.5 SI-2t	5614	-	TU
Screened Room (12)	MVG	EMC-3	5621	36	11-Aug-2023

Table 78

TU – Traceability Unscheduled



2.6 Power Spectral Density

2.6.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (e)
ISED RSS-247, Clause 5.2
ISED RSS-GEN, Clause 6.12

2.6.2 Equipment Under Test and Modification State

Not Applicable, S/N: 1819V0007 - Modification State 0

2.6.3 Date of Test

18-May-2022 to 19-May-2022

2.6.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.10.5.

2.6.5 Environmental Conditions

Ambient Temperature	23.3 - 23.4 °C
Relative Humidity	43.2 - 48.5 %



2.6.6 Test Results

3RB - 4.5MHz

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE 3 Resource Blocks 4.50 MHz	Duty Cycle (%):	100.0
Modulation:	QPSK	DCCF (dB):	0.00
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2410.3	3.0	7.23	-	-	-	-	8.00	-0.77
2420.3	3.0	7.60	-	-	-	-	8.00	-0.40
2435.3	3.0	7.59	-	-	-	-	8.00	-0.41

Table 79 - Maximum Power Spectral Density Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE 3 Resource Blocks 4.50 MHz	Duty Cycle (%):	100.0
Modulation:	QPSK	DCCF (dB):	0.00
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2410.3	3.0	7.44	-	-	-	-	8.00	-0.56
2420.3	3.0	7.67	-	-	-	-	8.00	-0.33
2435.3	3.0	7.13	-	-	-	-	8.00	-0.87

Table 80 - Maximum Power Spectral Density Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE 3 Resource Blocks 4.50 MHz	Duty Cycle (%):	100.0
Modulation:	16 QAM	DCCF (dB):	0.00
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2410.3	3.0	7.23	-	-	-	-	8.00	-0.77
2420.3	3.0	6.95	-	-	-	-	8.00	-1.05
2435.3	3.0	7.40	-	-	-	-	8.00	-0.60

Table 81 - Maximum Power Spectral Density Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE 3 Resource Blocks 4.50 MHz	Duty Cycle (%):	100.0
Modulation:	16 QAM	DCCF (dB):	0.00
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2410.3	3.0	7.01	-	-	-	-	8.00	-0.99
2420.3	3.0	7.69	-	-	-	-	8.00	-0.31
2435.3	3.0	7.33	-	-	-	-	8.00	-0.67

Table 82 - Maximum Power Spectral Density Results



FRB - 9 MHz

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 4.5 MHz BW	Duty Cycle (%):	100.0
Modulation:	QPSK	DCCF (dB):	0.00
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2410.3	3.0	-0.25	-	-	-	-	8.00	-8.25
2420.3	3.0	-0.16	-	-	-	-	8.00	-8.16
2435.3	3.0	-0.25	-	-	-	-	8.00	-8.25

Table 83 - Maximum Power Spectral Density Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 4.5 MHz BW	Duty Cycle (%):	100.0
Modulation:	QPSK	DCCF (dB):	0.00
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2410.3	3.0	-0.69	-	-	-	-	8.00	-8.69
2420.3	3.0	-0.29	-	-	-	-	8.00	-8.29
2435.3	3.0	-0.94	-	-	-	-	8.00	-8.94

Table 84 - Maximum Power Spectral Density Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 4.5 MHz BW	Duty Cycle (%):	100.0
Modulation:	16 QAM	DCCF (dB):	0.00
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2410.3	3.0	-0.50	-	-	-	-	8.00	-8.50
2420.3	3.0	-0.11	-	-	-	-	8.00	-8.11
2435.3	3.0	-0.48	-	-	-	-	8.00	-8.48

Table 85 - Maximum Power Spectral Density Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 4.5 MHz BW	Duty Cycle (%):	100.0
Modulation:	16 QAM	DCCF (dB):	0.00
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2410.3	3.0	-0.67	-	-	-	-	8.00	-8.67
2420.3	3.0	-0.83	-	-	-	-	8.00	-8.83
2435.3	3.0	-0.50	-	-	-	-	8.00	-8.50

Table 86 - Maximum Power Spectral Density Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 9 MHz BW	Duty Cycle (%):	100.0
Modulation:	QPSK	DCCF (dB):	0.00
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2413	3.0	-3.33	-	-	-	-	8.00	-11.33
2423	3.0	-3.13	-	-	-	-	8.00	-11.13
2433	3.0	-3.32	-	-	-	-	8.00	-11.32

Table 87 - Maximum Power Spectral Density Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 9 MHz BW	Duty Cycle (%):	100.0
Modulation:	QPSK	DCCF (dB):	0.00
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2413	3.0	-2.44	-	-	-	-	8.00	-10.44
2423	3.0	-2.86	-	-	-	-	8.00	-10.86
2433	3.0	-2.33	-	-	-	-	8.00	-10.33

Table 88 - Maximum Power Spectral Density Results



Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 9 MHz BW	Duty Cycle (%):	100.0
Modulation:	16 QAM	DCCF (dB):	0.00
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Yagi)	Active Chain(s):	0

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2413	3.0	-3.24	-	-	-	-	8.00	-11.24
2423	3.0	-3.78	-	-	-	-	8.00	-11.78
2433	3.0	-3.02	-	-	-	-	8.00	-11.02

Table 89 - Maximum Power Spectral Density Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	-		

DUT Configuration			
Mode:	LTE Full Resource Blocks 9 MHz BW	Duty Cycle (%):	100.0
Modulation:	16 QAM	DCCF (dB):	0.00
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	-
Active Port(s):	A (Patch)	Active Chain(s):	0

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2413	3.0	-3.91	-	-	-	-	8.00	-11.91
2423	3.0	-3.26	-	-	-	-	8.00	-11.26
2433	3.0	-3.55	-	-	-	-	8.00	-11.55

Table 90 - Maximum Power Spectral Density Results



Figure 100 - Test Setup - 18 GHz to 25 GHz



4 Test Equipment Information

4.1 Customer Support Equipment

Instrument	Manufacturer	Type No	Serial Number	Calibration Period (months)	Calibration Due
DC PSU	Tenma	72-2925	202011033	-	TU
DC PSU	Tenma	72-2940	202002004	-	TU
DC PSU	Tenma	72-2940	082501465	-	TU

Figure 101

TU – Traceability Unscheduled



5 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
Maximum Conducted Output Power	± 1.38 dB
Spurious Radiated Emissions	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
Power Spectral Density	± 1.49 dB
Emission Bandwidth	± 358.56 kHz

Table 92

Measurement Uncertainty Decision Rule – Accuracy Method

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. (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.