FCC and ISED Test Report

Sepura Limited
TETRA Handheld Radio, Model SC2021

In accordance with FCC 47 CFR Part 15C, ISED RSS-247 and ISED RSS-GEN
(2.4 GHz Bluetooth / WLAN)

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

FCC ID: XX6SC2021M IC: 8739A-SC2021M

COMMERCIAL-IN-CONFIDENCE

Document 75961387-03 Issue 01

SIGNATURE			
S. Mun			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Steve Marshall	Senior Engineer	Authorised Signatory	24 September 2024

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	George Williams	24 September 2024	GWilliams
	Pier-Angelo Lorusso	24 September 2024	

FCC Accreditation
492497/UK2010 Octagon House, Fareham Test Laboratory

ISED Accreditation
12669A/UK0003 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: 2023, ISED RSS-247: Issue 3 (2023-08) and ISED RSS-GEN: Issue 5 (2018-04) + A2 (2021-02) for the tests detailed in section 1.3.

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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	24-September-2024

Table 1

1.2 Introduction

Applicant	Sepura Limited
Manufacturer	Sepura Limited
Model Number(s)	SC2021
Serial Number(s)	1PR002417GKZ790 1PR002417GKZ793
Hardware Version(s)	PLX-2V16515-03 (Mod State 12 Rev B024)
Software Version(s)	1807 009 07367
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 15C: 2023 ISED RSS-247: Issue 3 (2023-08) ISED RSS-GEN: Issue 5 (2018-04) + A2 (2021-02)
Order Number	PLC-PO029056
Date	06-May-2024
Date of Receipt of EUT	18-June-2024
Start of Test	01-August-2024
Finish of Test	21-August-2024
Name of Engineer(s)	George Williams and Pier-Angelo Lorusso
Related Document(s)	ANSI C63.10 (2020) ANSI C63.4 (2014) KDB 484596 D01 Referencing Test Data v02r03

1.3 Brief Summary of Results

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

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15C	RSS-247	RSS-GEN			
Configuration and Mode: 2.4 GHz Bluetooth - BR/EDR						
2.1	15.247 (b)	5.4	6.12	Maximum Conducted Output Power	Pass	ANSI C63.10 (2020) Spot check measurement as per KDB 484596 D01 Referencing Test Data v02r03
2.2	15.247 (d) & 15.209	3.3 & 5.5	6.13 & 8.9	Spurious Radiated Emissions	Pass	ANSI C63.10 (2020) ANSI C63.4 (2014) Spot check measurement as per KDB 484596 D01 Referencing Test Data v02r03
Configuration and Mode: 2.4 GHz WLAN -						
2.2	15.247 (d) & 15.209	3.3 & 5.5	6.13 & 8.9	Spurious Radiated Emissions	Pass	ANSI C63.10 (2020) ANSI C63.4 (2014) Spot check measurement as per KDB 484596 D01 Referencing Test Data v02r03
2.1	15.247 (b)	5.4	6.12	Maximum Conducted Output Power	Pass	ANSI C63.10 (2020) Spot check measurement as per KDB 484596 D01 Referencing Test Data v02r03

Table 2

1.4 Application Form

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment including the technologies the product supports)*	The SC2021 is a portable TETRA radio with GNSS, Bluetooth and WLAN functionality. It has a TETRA frequency range of 136-174 MHz.		
Manufacturer:	Sepura Limited		
Model:	SC2021		
Part Number:	SC2021		
Hardware Version:	PLX-2V16515-03 (Mod State 12 Rev B024)		
Software Version:	1807 009 07367		
FCC ID of the product under test – see guidance here		XX6SC2021M	
IC ID of the product under test – see guidance here		8739A-SC2021M	
Device Category	Mobile ☐	Portable ☒	Fixed ☐
Equipment is fitted with an Audio Low Pass Filter		Yes ☒	No ☐

Table 3

Intentional Radiators

Technology	TETRA	BT Classic / EDR	BLE	WLAN 802.11b	WLAN 802.11g	WLAN 802.11n
Frequency Range (MHz to MHz)	136-174	2402-2480	2402-2480	2412-2462	2412-2462	2412-2462
Conducted Declared Output Power (dBm)	34.3 average	7.34 peak	3.2 average	15.9 average	15.3 average	15.7 average
Antenna Gain (dBi)	1. -6.24 2. 5	2.5	2.5	2.5	2.5	2.5
Supported Bandwidth(s) (MHz) (e.g. 1 MHz, 20 MHz, 40 MHz)	20 kHz	1M20	2M11	11M7	16M9	18M2
Modulation Scheme(s) (e.g. GFSK, QPSK etc)	π/4 DQPSK	GFSK / π/4 DQPSK / 8-DPSK	GFSK	CCK / DBPSK / DQPSK	OFDM	OFDM
ITU Emission Designator (see guidance here) (not mandatory for Part 15 devices)	19K1DXW	1M20F1D	2M11F1D	11M7G1W	16M9D7W	18M2D7W
Bottom Frequency (MHz)	136	2402	2402	2412	2412	2412
Middle Frequency (MHz)	155	2441	2440	2437	2437	2437
Top Frequency (MHz)	174	2480	2480	2462	2462	2462

Table 4

Two antenna gains are given:

1. The maximum free space dBi for the specified frequency range of antennas used in a handheld system using the top antenna connector.
2. The maximum dBi provided by the antenna manufacturer for antennas used in a vehicle system using the rear connector.

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:	6.29	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 ☐ for TETRA			State impedance	50	Ohm
Temporary antenna connector ☐			State impedance		Ohm
Integral antenna ☒ for BT and WLAN	Type:	Inverted F	Gain	2.5	dBi
External antenna ☒	Type:	300-02070 helical (handheld system)	Gain	-6.9	dBi
External antenna ☒	Type:	300-02071 helical (handheld system)	Gain	-6.24	dBi
External antenna ☒	Type:	300-02072 helical (handheld system)	Gain	-6.93	dBi
External antenna ☒	Type:	300-02073 helical (handheld system)	Gain	-14.6	dBi
External antenna ☒	Type:	AVGHB-H4 ⅝ Wave (vehicle system)	Gain	5	dBi
External antenna ☒	Type:	AVGHB-H5 ⅝ Wave (vehicle system)	Gain	5	dBi
External antenna ☒	Type:	AVGHB-H6 ⅝ Wave (vehicle system)	Gain	5	dBi
External antenna ☒	Type:	AVGHB-H7 ⅝ Wave (vehicle system)	Gain	5	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.					

Table 12

Ancillaries (if applicable)

Manufacturer:	Sepura Limited	Part Number:	300-01123
Model:	CSM	Country of Origin:	Made in Taiwan
Manufacturer:	Sepura Limited	Part Number:	300-01930
Model:	1+1 Charger	Country of Origin:	Made in China

Table 13

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

Name: Chris Beecham
Position held: Conformance Engineer
Date: 07 August 2024

1.5 Product Information

1.5.1 Technical Description

The SC2021 is a portable TETRA radio with GNSS, Bluetooth and WLAN functionality.
It has a TETRA frequency range of 136-174 MHz.

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: SC2021, Serial Number: 1PR002417GKZ793			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: SC2021, Serial Number: 1PR002417GKZ790			
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: 2.4 GHz Bluetooth - BR/EDR		
Maximum Conducted Output Power	George Williams	UKAS
Spurious Radiated Emissions	Pier-Angelo Lorusso	UKAS
Configuration and Mode: 2.4 GHz WLAN -		
Spurious Radiated Emissions	Pier-Angelo Lorusso	UKAS
Maximum Conducted Output Power	George Williams	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 15C, Clause 15.247
ISED RSS-247, Clause 5.4
ISED RSS-GEN, Clause 6.12

2.1.2 Equipment Under Test and Modification State

SC2021, S/N: 1PR002417GKZ793 - Modification State 0

2.1.3 Date of Test

21-August-2024

2.1.4 Test Method

2.4 GHz Bluetooth - BR/EDR
The test was performed in accordance with ANSI C63.10 clause 7.8.5 using a spectrum analyser.

The EUT was powered by a 7.4V ,Nickel Cadmium, battery supplied by the manufacturer for the duration of the test.

2.4 GHz WLAN -
The test was performed in accordance with ANSI C63.10 clause 11.9.2.2.2 Method AVGSA-1.

The EUT was powered by a 7.4V, Nickel Cadmium, battery supplied by the manufacturer for the duration of the test.

2.1.5 Environmental Conditions

Ambient Temperature	17.8 °C
Relative Humidity	69.5 %

2.1.6 Test Results

2.4 GHz Bluetooth - BR/EDR

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.1.2
Additional Reference(s):	-		

Table 16

DUT Configuration			
Mode:	Bluetooth Classic GFSK	Duty Cycle (%):	-
Antenna Configuration:	SISO	DCCF (dB):	-
Active Port(s):	-	Peak Antenna Gain (dBi):	2.5
Supply Voltage:	Battery	TX Mode:	Continuous Modulated Packet Bursts

Table 17

Test Frequency (MHz)	DUT Setting	Maximum Conducted Output Power (dBm)	Limit (dBm)	Margin (dB)
2402	DH5	8.04	30.00	-21.96
2441	DH5	8.02	30.00	-21.98
2480	DH5	8.10	30.00	-21.90

Table 18 - FCC Maximum Conducted (peak) Output Power Results

Test Frequency (MHz)	DUT Setting	Maximum Conducted Output Power (dBm)	Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
2402	DH5	8.04	30.00	-21.96	10.54	36.00	-25.46
2441	DH5	8.02	30.00	-21.98	10.52	36.00	-25.48
2480	DH5	8.10	30.00	-21.90	10.60	36.00	-26.40

Table 19 - ISED Maximum Conducted (peak) Output Power Results

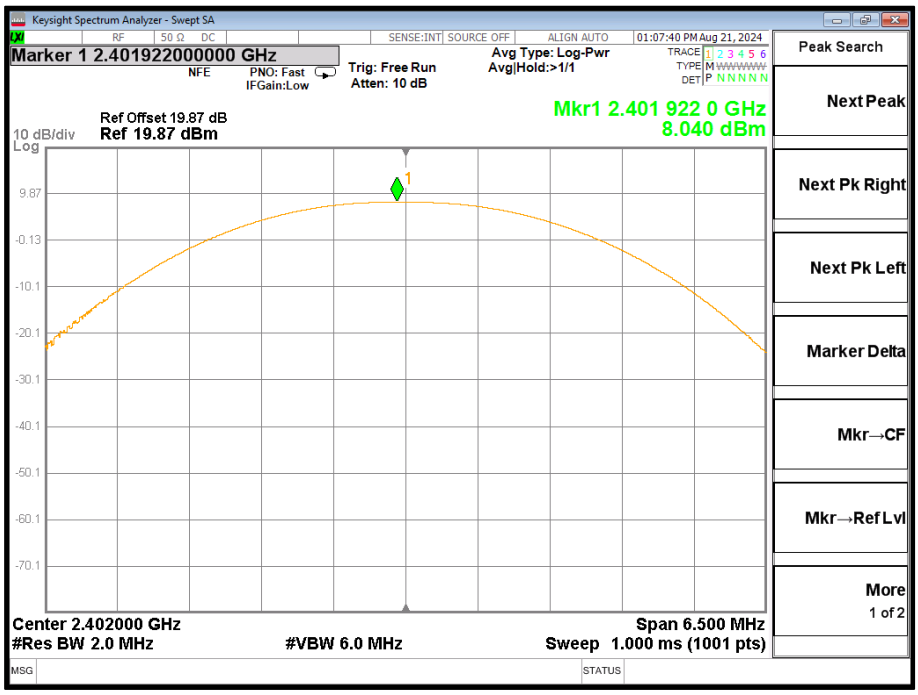

Figure 1 - 2402 MHz, GFSK

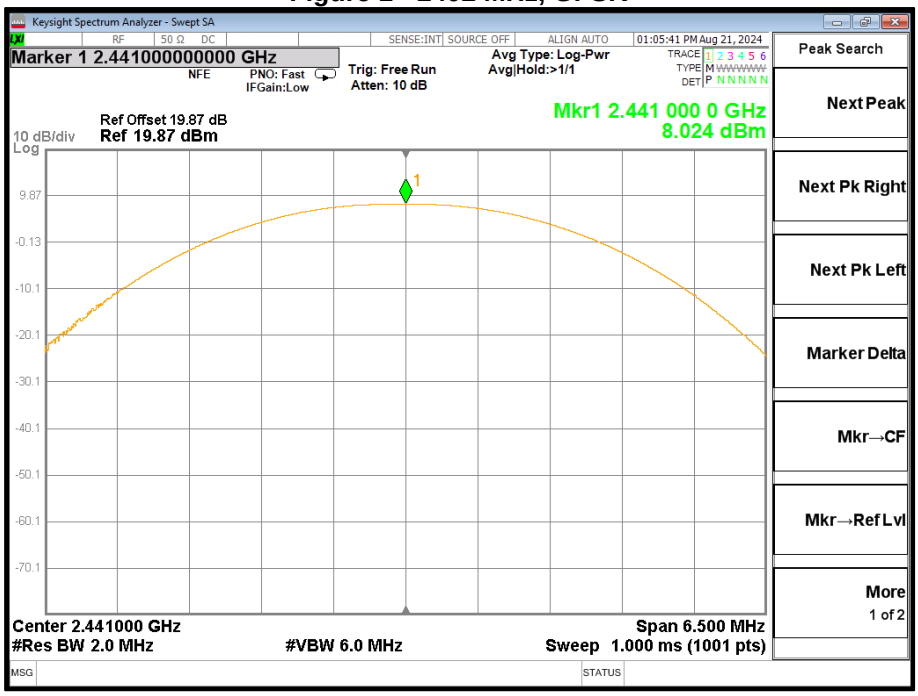

Figure 2 - 2441 MHz, GFSK

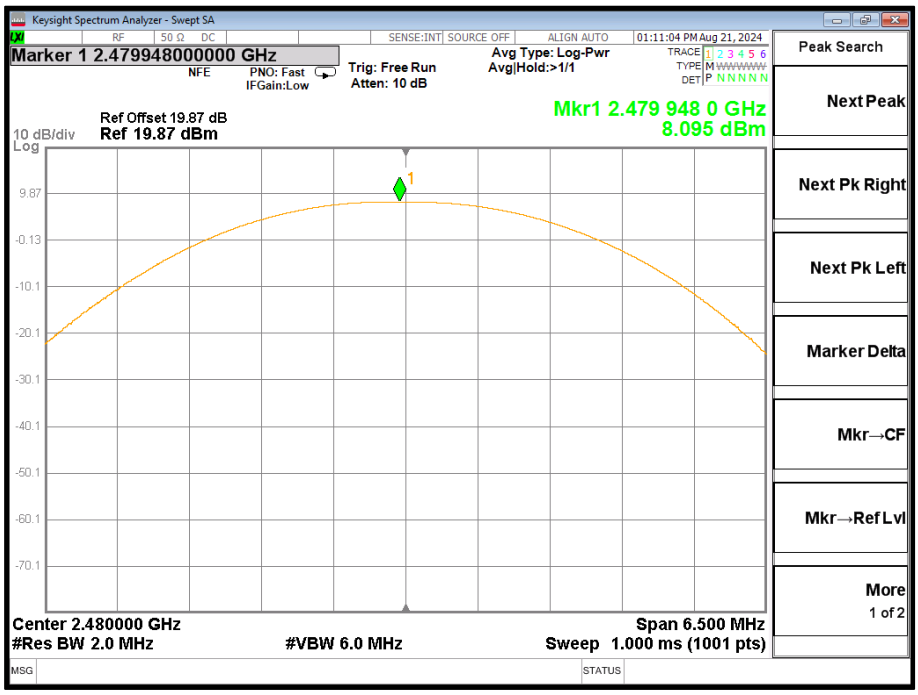

Figure 3 - 2480 MHz, GFSK

FCC 47 CFR Part 15, Limit Clause 15.247 (b)(1) and (a)(1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

ISED RSS-247, Limit Clause 5.4 (b) and 5.1(b)

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channel; the maximum peak conducted output power shall not exceed 0.125 W if the hopset uses less than 75 hopping channel. The e.i.r.p. shall not exceed 4 W except as provided in section 5.4(e) of the specification.

FHSs shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, FHSs operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125 W.

FCC 47 CFR Part 15, Limit Clause 15.247 (b)(2)

For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels.

ISED RSS-247, Limit Clause 5.4 (a)

For FHSs operating in the band 902-928 MHz, the maximum peak conducted output power shall not exceed 1.0 W, and the e.i.r.p. shall not exceed 4 W if the hopset uses 50 or more hopping channels; the maximum peak conducted output power shall not exceed 0.25 W and the e.i.r.p. shall not exceed 1 W if the hopset uses less than 50 hopping channels.

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 DTSs 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.

2.4 GHz WLAN -

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.2.2
Additional Reference(s):	-		

Table 20

DUT Configuration			
Mode:	802.11b	Duty Cycle (%):	100.0
Data Rate:	1 Mbps	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	2.5
Supply Voltage:	Battery	TX Mode:	Continuous Modulated Stream

Table 21

Test Frequency (MHz)	Power Index	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
		A	B	C	D	∑		
2412 (CH1)	17.00	16.06	-	-	-	-	30.00	-13.94
2437 (CH6)	17.00	16.04	-	-	-	-	30.00	-13.96
2462 (CH11)	17.00	15.98	-	-	-	-	30.00	-14.02

Table 22 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Power Index	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
		A	B	C	D	∑					
2412 (CH1)	17.00	16.06	-	-	-	-	30.00	-13.94	18.56	36.00	-17.44
2437 (CH6)	17.00	16.04	-	-	-	-	30.00	-13.96	18.54	36.00	-17.46
2462 (CH11)	17.00	15.98	-	-	-	-	30.00	-14.02	18.48	36.00	-17.52

Table 23 - ISED Maximum Conducted (average) Output Power Results

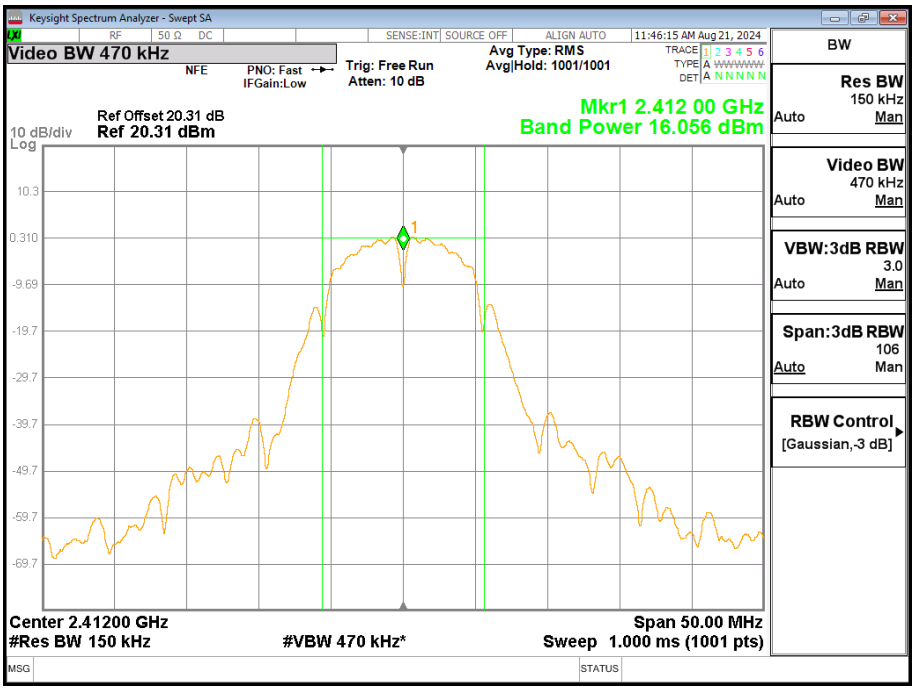

Figure 4 - 2412 MHz (CH1)

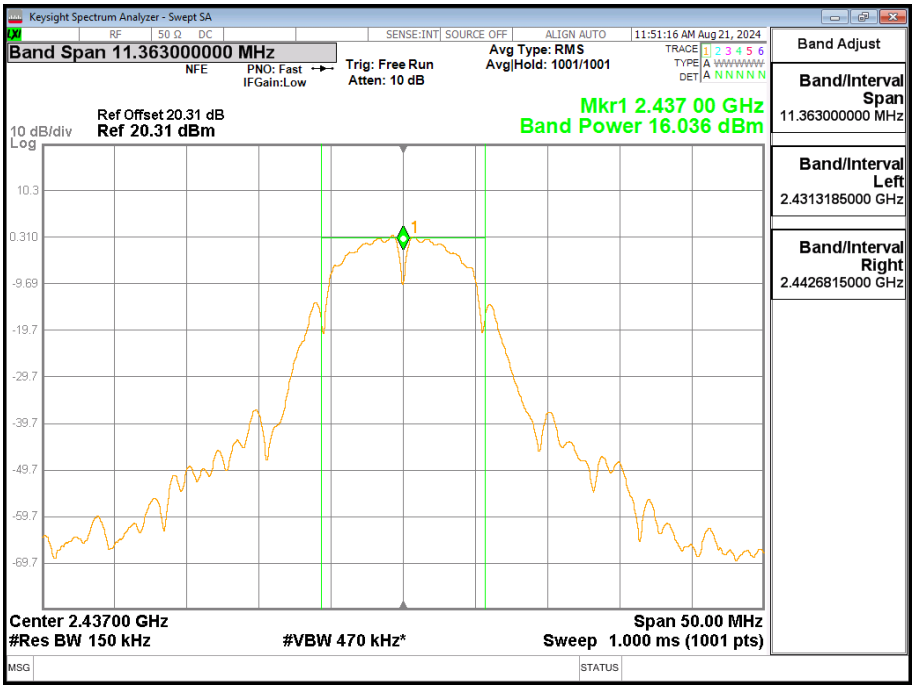

Figure 5 - 2437 MHz (CH6)

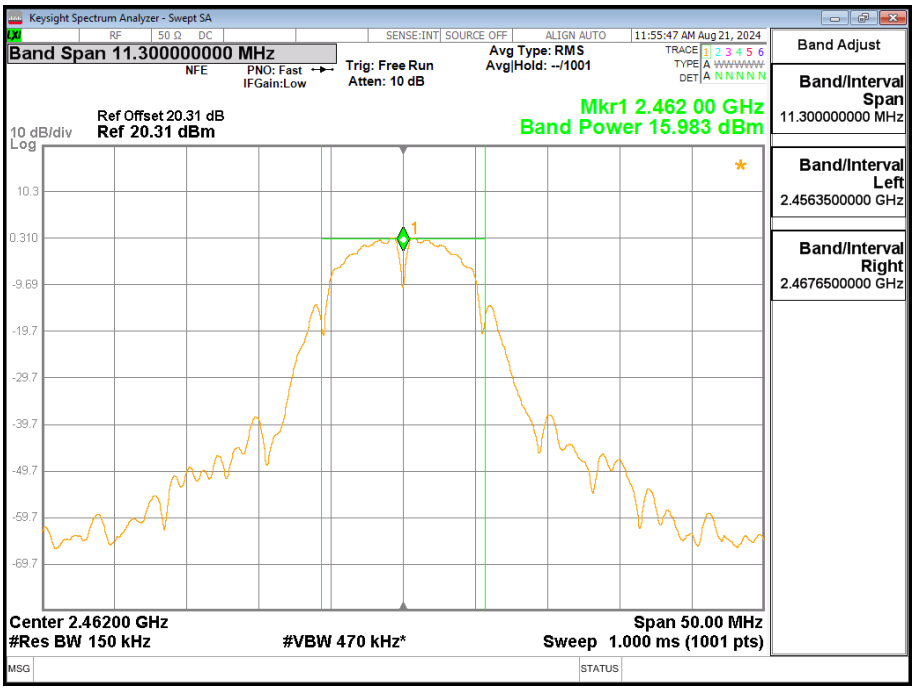

Figure 6 - 2462 MHz (CH11)

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.2.2
Additional Reference(s):	-		

Table 24

DUT Configuration			
Mode:	802.11g	Duty Cycle (%):	100.0
Data Rate:	6 Mbps	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	2.5
Supply Voltage:	Battery	TX Mode:	Continuous Modulated Stream

Table 25

Test Frequency (MHz)	Power Index	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
		A	B	C	D	∑		
2412 (CH1)	17.00	15.13	-	-	-	-	30.00	-14.87
2437 (CH6)	17.00	15.42	-	-	-	-	30.00	-14.58
2462 (CH11)	17.00	15.39	-	-	-	-	30.00	-14.61

Table 26 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Power Index	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
		A	B	C	D	∑					
2412 (CH1)	17.00	15.13	-	-	-	-	30.00	-14.87	17.63	36.00	-18.37
2437 (CH6)	17.00	15.42	-	-	-	-	30.00	-14.58	17.92	36.00	-18.08
2462 (CH11)	17.00	15.39	-	-	-	-	30.00	-14.61	17.89	36.00	-18.11

Table 27 - ISED Maximum Conducted (average) Output Power Results

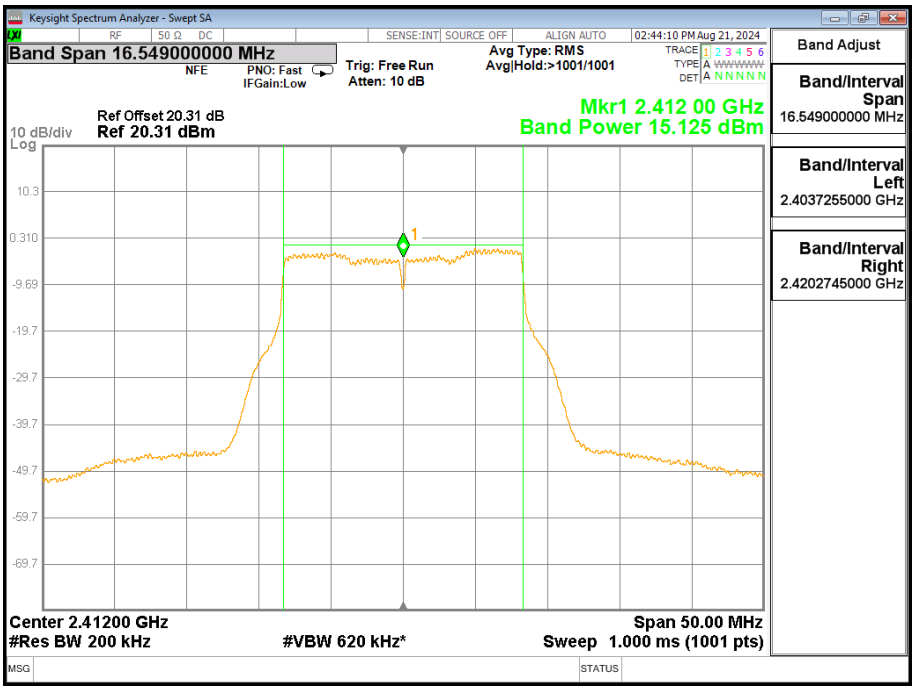

Figure 7 - 2412 MHz (CH1)

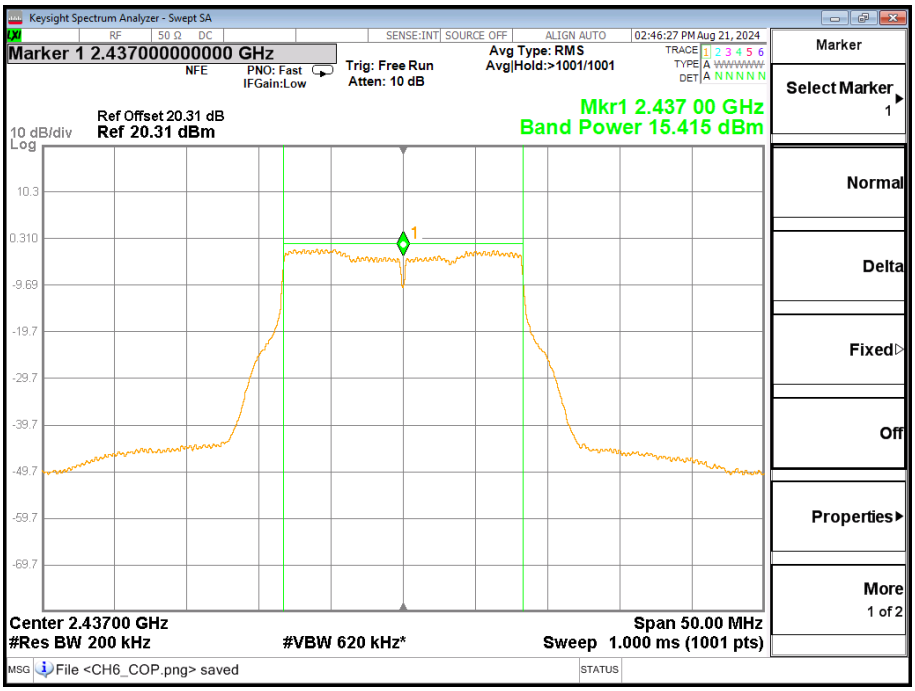

Figure 8 - 2437 MHz (CH6)

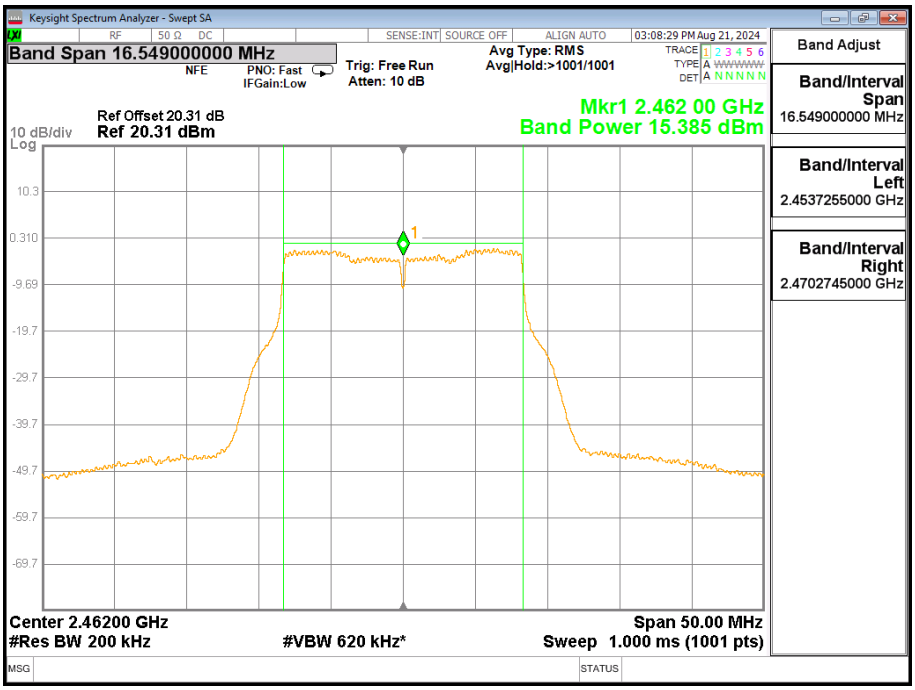

Figure 9 - 2462 MHz (CH11)

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.2.2
Additional Reference(s):	-		

Table 28

DUT Configuration			
Mode:	802.11n HT20	Duty Cycle (%):	100.0
Data Rate:	MCS 0	DCCF (dB):	-
Antenna Configuration:	SISO	Peak Antenna Gain (dBi):	2.5
Supply Voltage:	6.0V	TX Mode:	Continuous Modulated Stream

Table 29

Test Frequency (MHz)	Power Index	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
		A	B	C	D	∑		
2412 (CH1)	17.00	15.23	-	-	-	-	30.00	-14.77
2437 (CH6)	17.00	15.44	-	-	-	-	30.00	-14.56
2462 (CH11)	17.00	15.46	-	-	-	-	30.00	-14.54

Table 30 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Power Index	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
		A	B	C	D	∑					
2412 (CH1)	17.00	15.23	-	-	-	-	30.00	-14.77	17.73	36.00	-18.27
2437 (CH6)	17.00	15.44	-	-	-	-	30.00	-14.56	17.94	36.00	-18.06
2462 (CH11)	17.00	15.46	-	-	-	-	30.00	-14.54	17.96	36.00	-18.04

Table 31 - ISED Maximum Conducted (average) Output Power Results

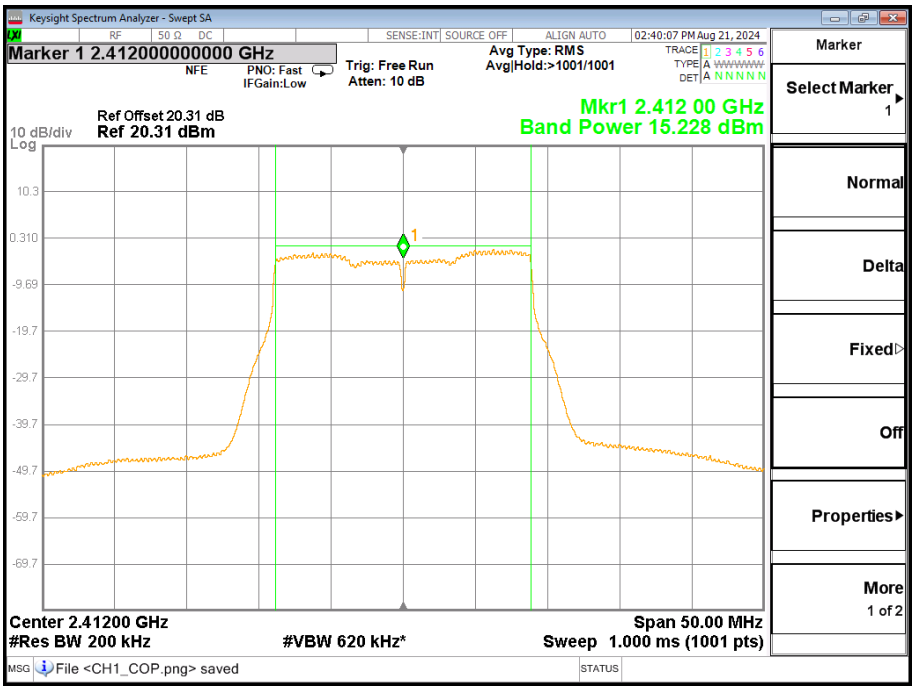

Figure 10 - 2412 MHz (CH1)

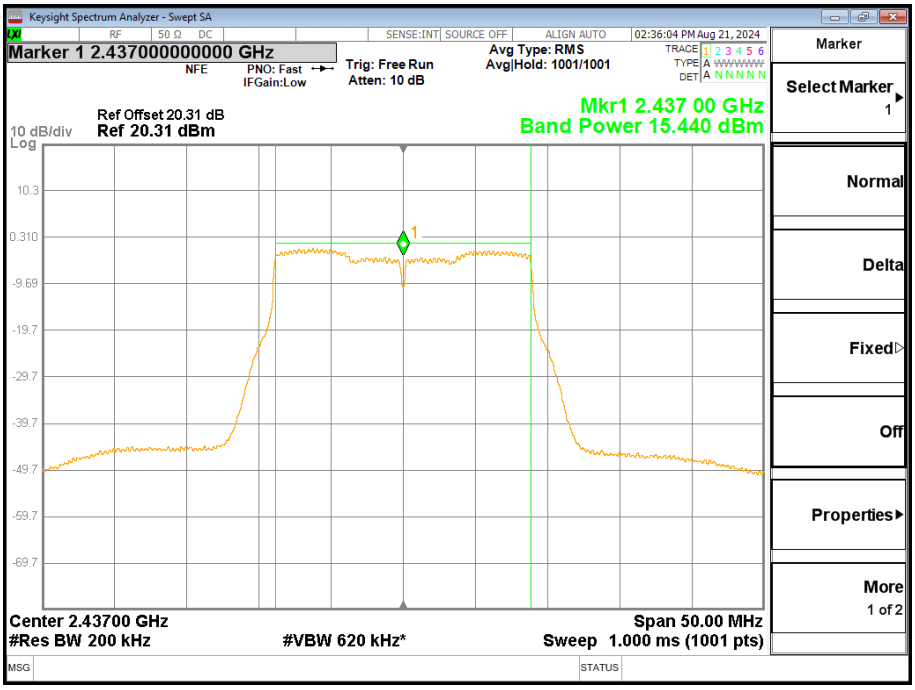

Figure 11 - 2437 MHz (CH6)

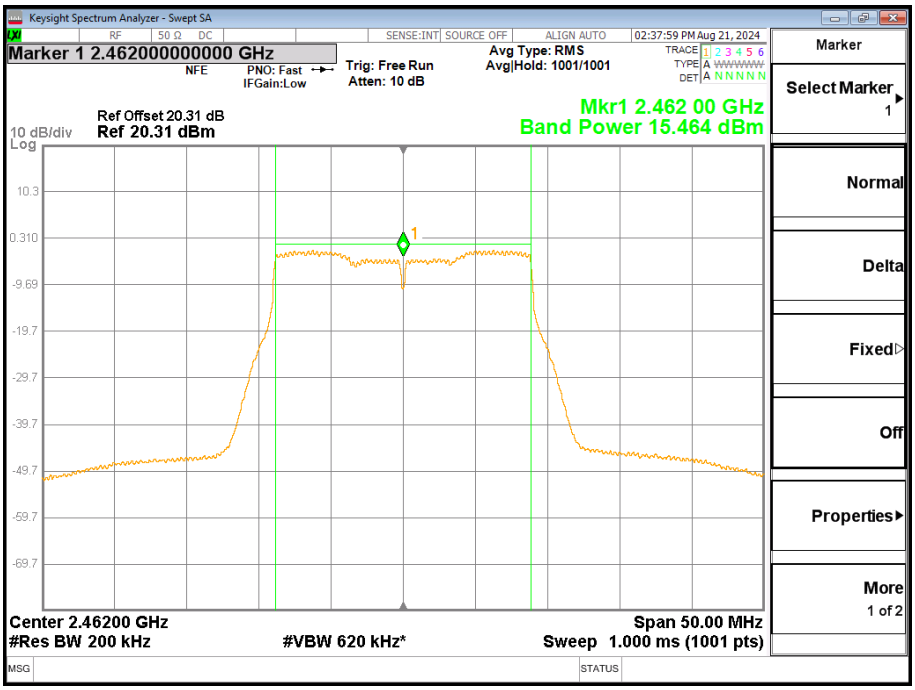

Figure 12 - 2462 MHz (CH11)

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 DTSs 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.

FCC 47 CFR Part 15, Limit Clause 15.247 (b)(2)

For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels.

ISED RSS-247, Limit Clause 5.4 (a)

For FHSs operating in the band 902-928 MHz, the maximum peak conducted output power shall not exceed 1.0 W, and the e.i.r.p. shall not exceed 4 W if the hopset uses 50 or more hopping channels; the maximum peak conducted output power shall not exceed 0.25 W and the e.i.r.p. shall not exceed 1 W if the hopset uses less than 50 hopping channels.

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 DTSs 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.

2.1.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Attenuator (10dB, 10W)	Bird	8343-100	478	12	15-Jul-2025
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	18-Apr-2025
Hygrometer	Rotronic	HP21	4741	12	30-May-2025
Cable (40 GHz)	Rosenberger	LU1-001-1000	5022	12	04-Feb-2025
3.5 mm 1m Cable	Junkosha	MWX221-01000DMS	5417	12	06-Jun-2025
Coaxial Fixed Attenuator DC-18GHz 5W 10dB	RF-Lambda	RFS5G18B10SMP	6179	12	11-Oct-2024
Attenuator 5W 30dB DC-18GHz	Aaren	AT40A-4041-D18-30	6559	12	18-Jun-2025

Table 32

2.2 Spurious Radiated Emissions

2.2.1 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

2.2.2 Equipment Under Test and Modification State

SC2021, S/N: 1PR002417GKZ790 - Modification State 0

2.2.3 Date of Test

01-August-2024 to 06-August-2024

2.2.4 Test Method

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

Measurements were only performed over the frequency range specified in FCC Part 15.35(b) as required by KDB 484596 D01.

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. As the EUT was considered pretested, only the worst-case mode and orientation was tested.

Ports on the EUT were terminated with loads as described in ANSI C63.4 clause 6.2.4.

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^(Field Strength in dBµV/m/20).

Above 18 GHz, the measurement distance was reduced to 1 m. The limit line was increased by 20*LOG(3/1) = 9.54 dB.

At a measurement distance of 1 meter the limit line was increased by 20*LOG(3/1) = 9.54 dB.

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

2.2.5 Example Test Setup Diagram

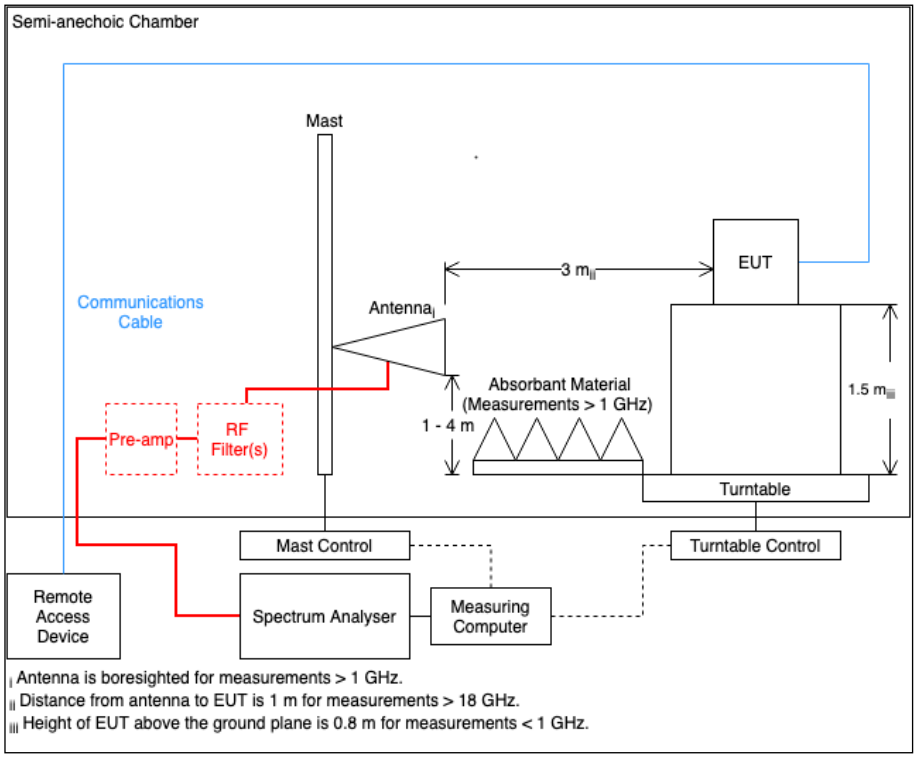

Figure 13

2.2.6 Environmental Conditions

Ambient Temperature	18.3 - 24.3 °C
Relative Humidity	49.7 - 56.7 %

2.2.7 Test Results

2.4 GHz WLAN – 802.11g

For WLAN testing, spot checking was performed the worst case mode/channel and orientation was identified as being Channel 1 = 2412 MHz , 802.11g, 6MB/s , Z Plane.

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

Table 33 - CH1_G_6MBPS_Z Plane, 2412 MHz, 1 to 25 GHz

*No emissions found within 10 dB of the limit.

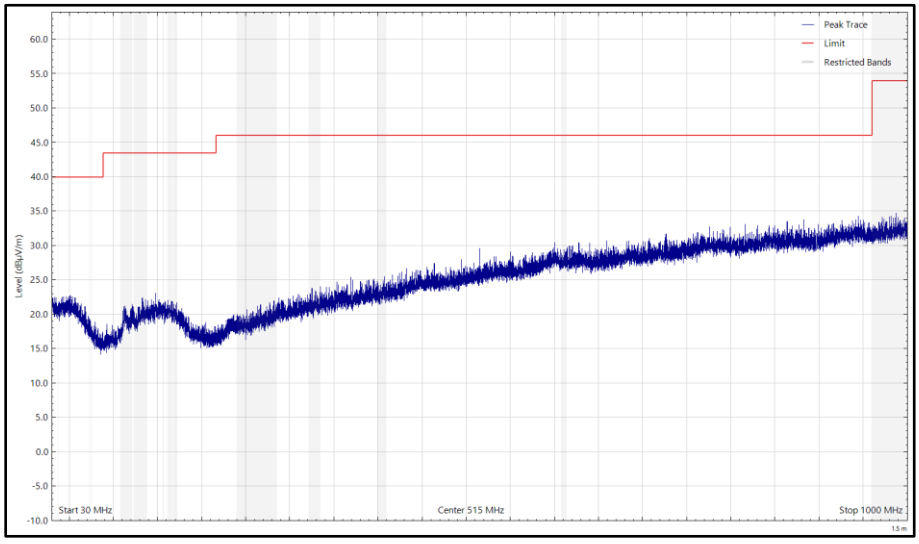

Figure 14 - CH1_G_6MBPS_Z Plane, 2412 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

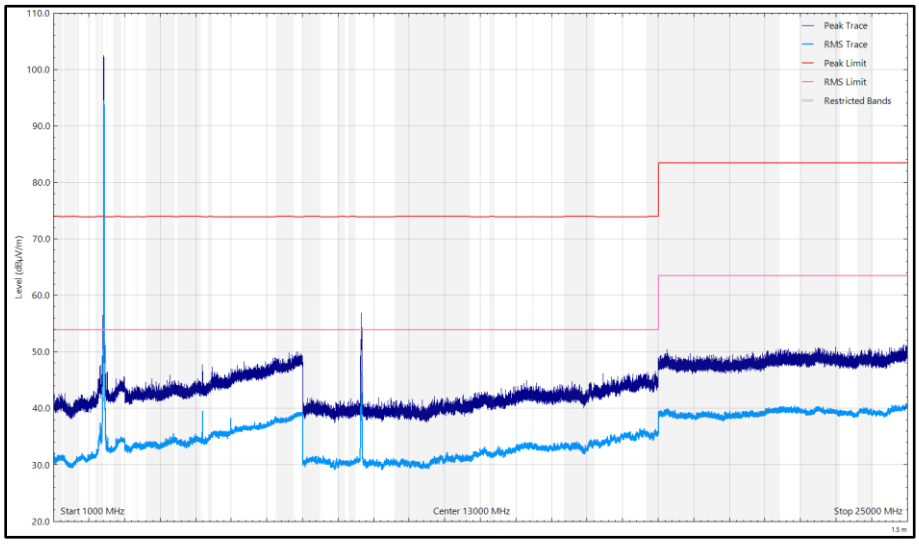

Figure 15 - CH1_G_6MBPS_Z Plane, 2412 MHz, 1 GHz to 25 GHz, Horizontal

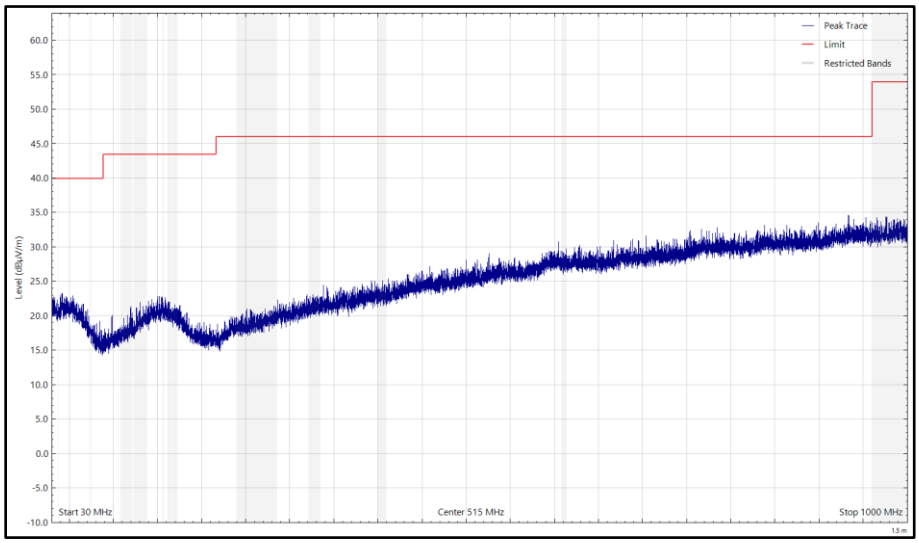

Figure 16 - CH1_G_6MBPS_Z Plane, 2412 MHz, 30 MHz to 1 GHz, Vertical (Peak)

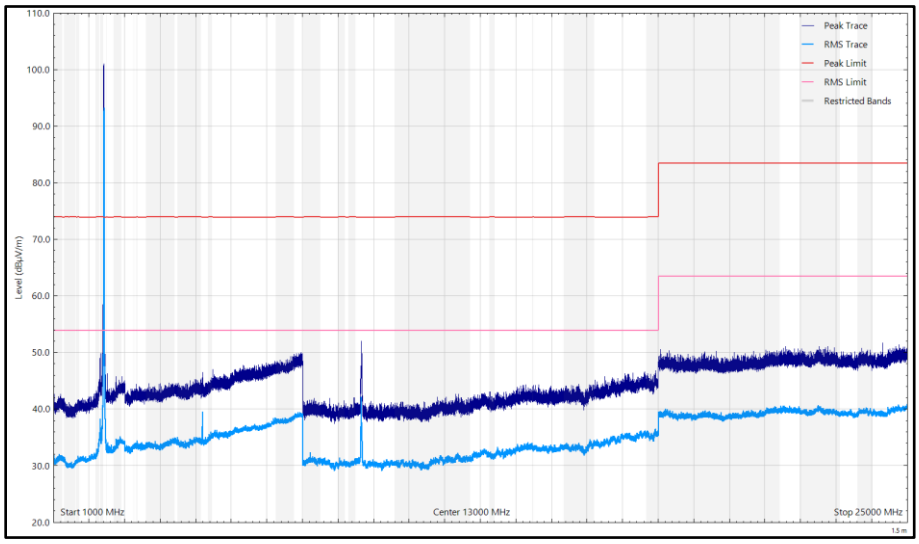

Figure 17 - CH1_G_6MBPS_Z Plane, 2412 MHz, 1 GHz to 25 GHz, Vertical

Testing was performed on the configurations and Data Rate which resulted in the highest conducted output power and highest power spectral density as stated in ANSI C63.10, clause 5.6.2.2 (b). The Data Rate used during testing was 6 Mbps.

2.4 GHz BT – BD/EDR

For BT testing, spot checking was performed the worst case mode/channel and orientation was identified as being Channel 78 = 2480 MHz, 3-DH5, Z plane.

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

Table 34 - CH78_3DH5_EDR_3MBPS, 2480 MHz, 30 MHz to 25 GHz

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

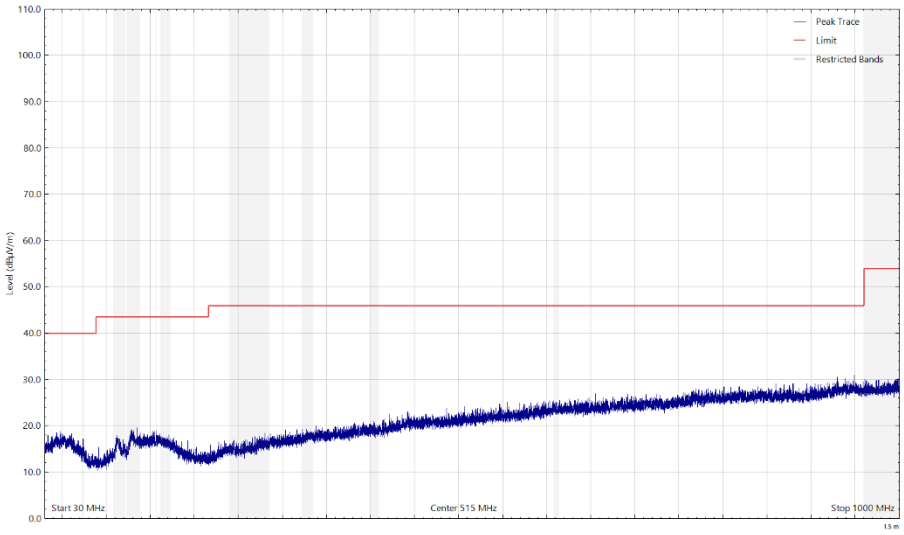

Figure 18 – CH78_3DH5_EDR_3MBPS, 2480 MHz, 30 MHz to 1 GHz, Horizontal, Z Orientation

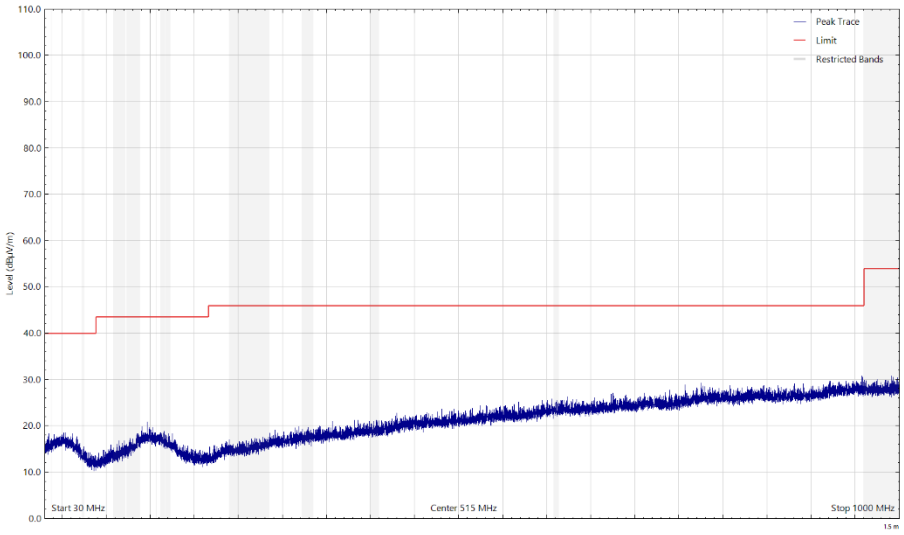

Figure 19 - CH78_3DH5_EDR_3MBPS, 2480 MHz, 30 MHz to 1 GHz, Vertical, Z Orientation

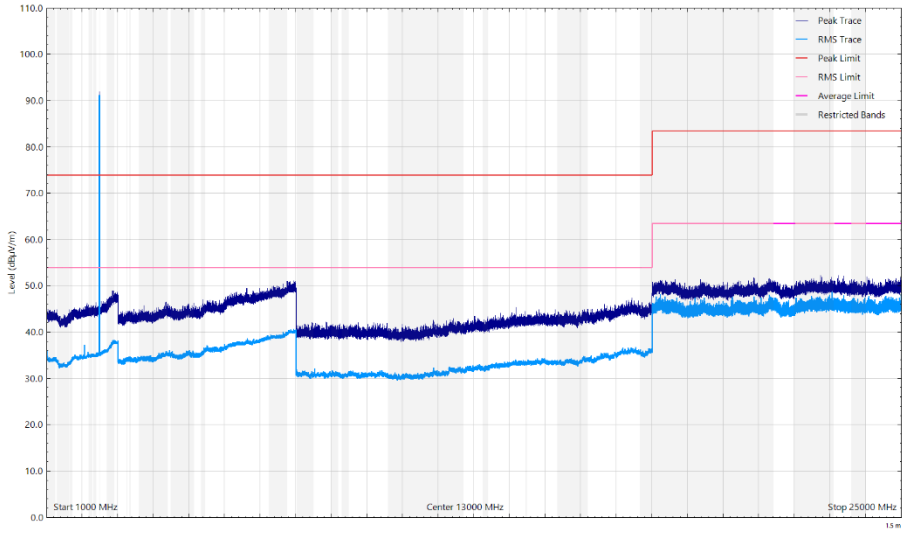

Figure 20 - CH78_3DH5_EDR_3MBPS, 2480 MHz, 1 to 25 GHz, Horizontal, Z Orientation - Peak / Average

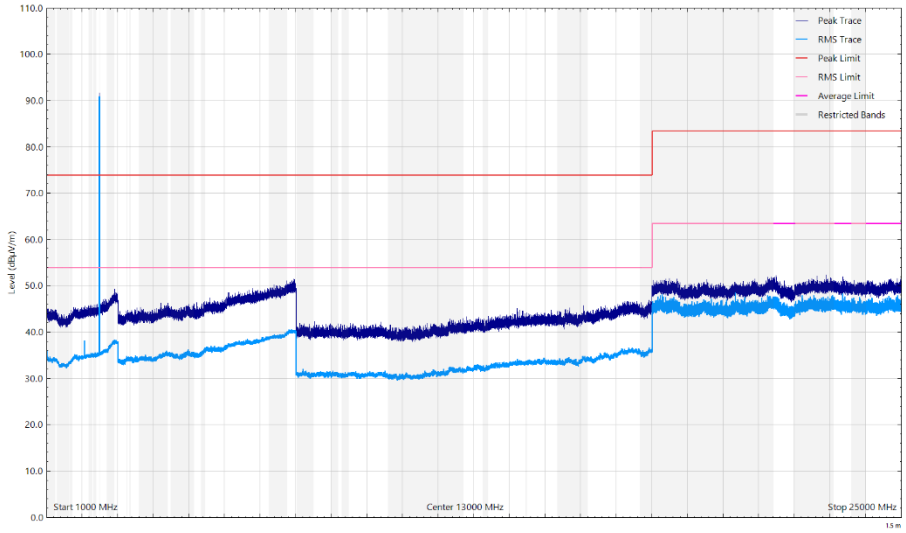

Figure 21 - CH78_3DH5_EDR_3MBPS, 2480 MHz, 1 to 25 GHz, Vertical, Z Orientation - Peak / Average

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.Test

2.2.8 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
Antenna (DRG, 18 GHz to 40 GHz)	Link Microtek Ltd	AM180HA-K-TU2	230	24	23-Sep-2024
Pre-Amplifier (18 GHz to 40 GHz)	Narda	NARDA DB02-0447	237	12	04-Dec-2024
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
True RMS Multimeter	Fluke	179	4006	12	22-Mar-2025
Test Receiver	Rohde & Schwarz	ESW44	5084	12	04-Nov-2024
Emissions Software	TUV SUD	EmX V3.4.2	5125	-	Software
3m Semi-Anechoic Chamber	Rainford	RF Chamber 11	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 GHz to 10.5 GHz)	Schwarzbeck	BBHA9120B	5215	12	14-Jul-2025
Antenna (DRG, 7.5 GHz to 18 GHz)	Schwarzbeck	HWRD750	5216	12	14-Jul-2025
3 GHz High pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	5220	12	03-Apr-2025
Pre-Amplifier (1 GHz to 26.5 GHz)	Agilent Technologies	8449B	5445	12	23-May-2025
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5481	12	13-May-2025
Cable (K-Type to K-Type, 1 m)	Junkosha	MWX241-01000KMSKMS/A	5512	12	23-May-2025
Cable (SMA to SMA, 2 m)	Junkosha	MWX221-02000AMSAMS/A	5518	12	18-Apr-2025
Cable (K-Type to K-Type, 2 m)	Junkosha	MWX241-02000KMSKMS/A	5524	12	29-Oct-2024
7 GHz High pass Filter	Wainwright	WHKX12-5850-6800-18000-80SS	5550	12	30-May-2025
Pre-Amplifier (8 GHz to 18 GHz)	Wright Technologies	APS06-0061	5595	12	26-Oct-2024
Antenna (Tri-log, 30 MHz to 1 GHz)	Schwarzbeck	VULB 9168	5942	24	24-May-2026
Cable (N to N 8m)	Junkosha	MWX221-08000NMSNMS/B	6330	12	17-Feb-2025

Table 35

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

3 Photographs

3.1 Test Setup Photographs

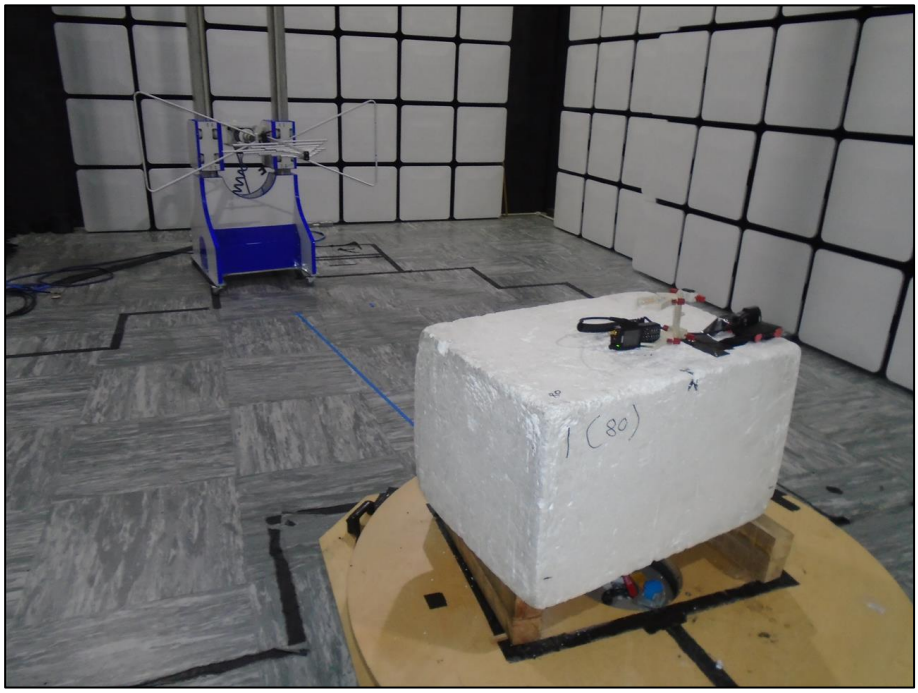

Figure 22 - Test Setup - 30 MHz to 1 GHz

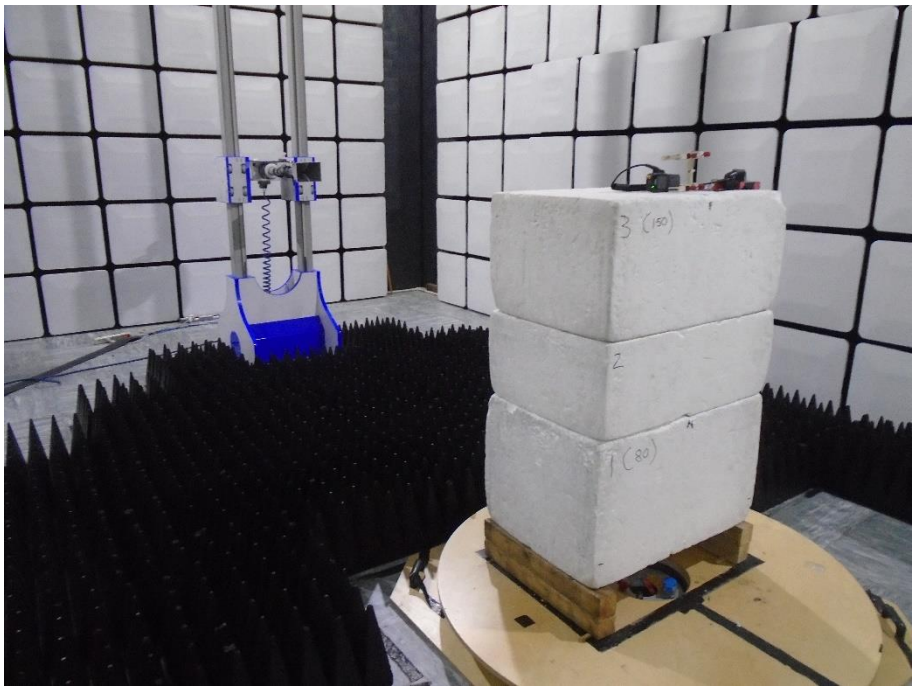

Figure 23 - Test Setup - 1 GHz to 8 GHz

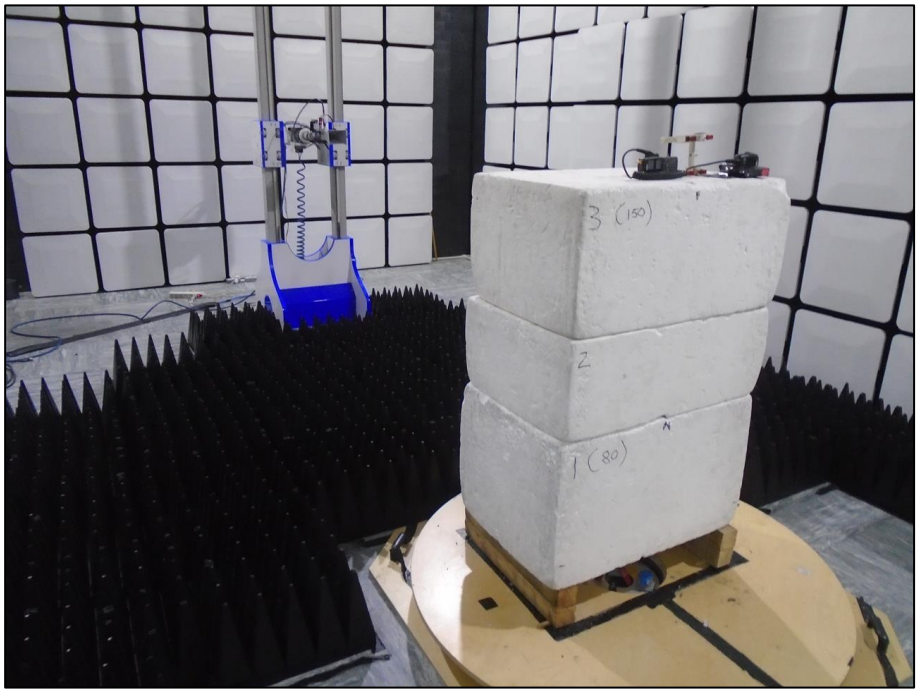

Figure 24 - Test Setup - 8 GHz to 18 GHz

Figure 25 - Test Setup - 18 GHz to 25 GHz

4 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
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

Table 36

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.