





# **FCC C2PC Test Report**

FCC ID : SQG-BL54L15

Equipment : Bluetooth LE + 802.15.4 + NFC module

Model No. : BL54L10

Brand Name : Ezurio

Applicant : Ezurio LLC

Address : W66N220 Commerce Court, Cedarburg, WI

53012, USA

Standard : 47 CFR FCC Part 15.247

Received Date : Mar. 12, 2025

Tested Date : Mar. 17 ~ Mar. 20, 2025

We, International Certification Corporation, would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by: Approved by:

Along Che๗/ Assistant Manager Gary Chang / N

Report No.: FR4D2002-01 Page: 1 of 16



## **Table of Contents**

1	GENERAL DESCRIPTION	5
1.1	Information	
1.2	Local Support Equipment List	
1.3	Test Setup Chart	
1.4	The Equipment List	
1.5	Test Standards	10
1.6	Reference Guidance	10
1.7	Deviation from Test Standard and Measurement Procedure	10
1.8	Measurement Uncertainty	10
2	TEST CONFIGURATION	11
2.1	Testing Facility	11
2.2	The Worst Test Modes and Channel Details	11
3	TRANSMITTER TEST RESULTS	12
3.1	Conducted Output Power	12
3.2	Unwanted Emissions into Restricted Frequency Bands	13
3.3	AC Power Line Conducted Emissions	
4	TEST LABORATORY INFORMATION	16

**Appendix A. Conducted Output Power** 

Appendix B. Unwanted Emissions into Restricted Frequency Bands

**Appendix C. AC Power Line Conducted Emissions** 



## **Release Record**

Report No.	Version	Description	Issued Date
FR4D2002-01	Rev. 01	Initial issue	Apr. 02, 2025

Report No.: FR4D2002-01 Page : 3 of 16



## **Summary of Test Results**

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emission	[dBuV]: 18.721MHz 33.07 (Margin -16.93dB) - AV	Pass
15.247(d)	Unwanted Emissions	[dBuV/m at 3m]: 12.4GHz	Pass
15.209	Onwanted Emissions	45.15 (Margin -8.85dB) - AV	F a 5 5
15.247(b)(3)	Conducted Output Power	Max Power [dBm]: 6.70	Pass

#### **Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

#### **Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Report No.: FR4D2002-01 Page: 4 of 16



## 1 General Description

### 1.1 Information

This is a Class II Permissive Change report (C2PC).

This report is issued as a supplementary report to original report no. FR4D2002. The modifications are concerned with the following items.

- Adding 2<sup>nd</sup> source of RF chip (Nordic / nRF54L10 QFN) with different memory capacity.
- New model name for above change.

## 1.1.1 Specification of the Equipment under Test (EUT)

RF General Information						
Frequency Range (MHz)	Channel Number	Data Rate				
2400-2483.5	802.15.4	2405-2480	11-26 [16]	250kbps		

Note 1: RF output power specifies that Maximum Peak Conducted Output Power.

Note 2: 802.15.4 uses O-QPSK modulation

#### 1.1.2 Antenna Details

External Antenna list for BL54L10 MHF4 module variant (453-00226)

Manufacturer	Model	Part Number	Туре	Connector	2400-2500 (MHz)	2400-2480 (MHz)
Ezurio	NanoBlue	EBL2400A1-10 MH4L	PCB Dipole	IPEX MHF4	2 dBi	-
Ezurio	FlexPIFA	001-0022	FlexPIFA	IPEX MHF4L	-	2 dBi
Mag.Layers	EDA-8709-2G4C 1-B27-CY	0600-00057	Dipole	IPEX MHF4	2.32 dBi	-
Ezurio	mFlexPIFA	EFA2400A3S-10 MH4L	PIFA	IPEX MHF4L	-	2 dBi
Ezurio	i-FlexPIFATM Mini Series	EFG2401A3S-1 0MH4L	i-FlexPIFA	IPEX MHF4L	-	2 dBi
Ezurio	Ezurio NFC	0600-00061	Coiled Inductor	FFC/FPC Connector	-	-

Integrated Antenna BL54L10 PCB printed antenna module variant (453-00225)

Manufacturer	Model	Part Number	Туре	Connector	2400-2500 (MHz)
Ezurio	BL54L15 Printed PCB Antenna	N/A	Printed PCB	N/A	0 dBi
Ezurio	Ezurio NFC	0600-00061	Coiled Inductor	FFC/FPC Connector	-

Report No.: FR4D2002-01 Page: 5 of 16



## 1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	1.8Vdc from host

#### 1.1.4 Accessories

N/A

### 1.1.5 Channel List

Channel No.	Frequency (MHz)
11	2405
12	2410
13	2415
14	2420
15	2425
16	2430
17	2435
18	2440
19	2445
20	2450
21	2455
22	2460
23	2465
24	2470
25	2475
26	2480

## 1.1.6 Test Tool and Duty Cycle

Test Tool	PuTTY, Version: 0.60		
Mode	Duty Cycle of Test Signal (%) Duty Factor (dB)		
802.15.4	100.00%	0.00	

## 1.1.7 Power Index of Test Tool

Test Frequency (MHz)	802.15.4 Power Index
2405	pos7dBm
2440	pos7dBm
2475	pos7dBm
2480	pos7dBm

Report No.: FR4D2002-01 Page: 6 of 16

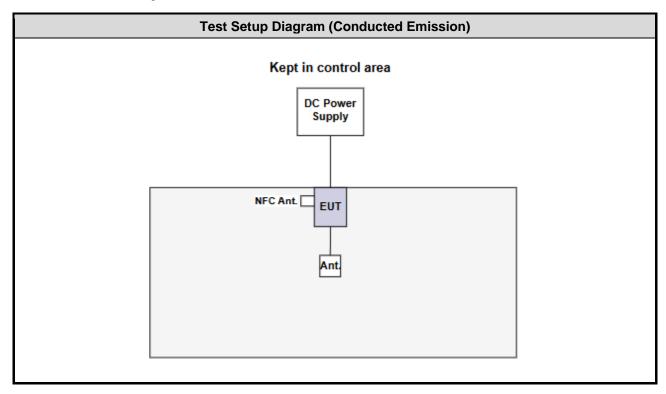


## 1.2 Local Support Equipment List

	Support Equipment List						
No.	No. Equipment Brand Model FCC ID Remarks						
1	Laptop	DELL	Latitude E5400	DoC			
2	50 ohm load				Provided by applicant.		

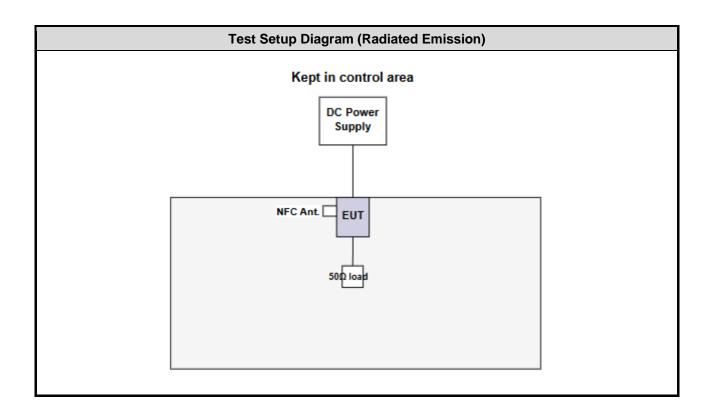
Note: The support laptop was disconnected from EUT and was removed from test table after sending command from laptop to control EUT to transmit continuously.

## 1.3 Test Setup Chart



Report No.: FR4D2002-01 Page: 7 of 16





Report No.: FR4D2002-01 Page: 8 of 16



## 1.4 The Equipment List

Test Item	Conducted Emission							
Test Site	Site Conduction room 1 / (CO01-WS)							
Tested Date	Mar. 17, 2025							
Instrument	Brand	Brand Model No. Serial No. Calibration Date Calibration Until						
Receiver	R&S ESR3 101658 Feb. 25, 2025 Feb.							
LISN	R&S	ENV216	101579	May 09, 2024	May 08, 2025			
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127667	Feb. 05, 2025	Feb. 04, 2026			
DC POWER SOURCE	GW INSTEK	GPC-6030D	GES855395	Nov. 06, 2024	Nov. 05, 2025			
50 ohm terminal NA 50 01 Jun. 19, 2024 Ju					Jun. 18, 2025			
Measurement Software AUDIX e3 6.120210k NA NA NA								

Test Item	Radiated Emission						
Test Site	966 chamber3 / (03CH03-WS)						
Tested Date	Mar. 17, 2025						
Instrument	Brand	Model No.	Model No. Serial No. Calibration Date Calibratio				
Receiver	R&S	ESR3	101657	Mar. 11, 2025	Mar. 10, 2026		
Spectrum Analyzer	R&S	FSV40	101499	Apr. 02, 2024	Apr. 01, 2025		
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 05, 2024	Nov. 04, 2025		
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Jul. 02, 2024	Jul. 01, 2025		
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Dec. 20, 2024	Dec. 19, 2025		
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 18, 2024	Nov. 17, 2025		
Preamplifier	EMC	EMC02325	980187	Jun. 27, 2024	Jun. 26, 2025		
Preamplifier	EMC	EMC118A45SE	980897	Aug. 05, 2024	Aug. 04, 2025		
Preamplifier	EMC	EMC184045SE	980903	Jul. 30, 2024	Jul. 29, 2025		
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 02, 2024	Oct. 01, 2025		
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800 -001	Sep. 20, 2024	Sep. 19, 2025		
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Sep. 20, 2024	Sep. 19, 2025		
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Sep. 20, 2024	Sep. 19, 2025		
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Sep. 20, 2024	Sep. 19, 2025		
RF cable-8M	EMC	EMC104-SM-SM-8000	181107	Sep. 20, 2024	Sep. 19, 2025		
HIGHPASS FILTER	WI	WHK3.1-18G-10SS	43	Sep. 20, 2024	Sep. 19, 2025		
Measurement Software	Sporton	SENSE-15247_FS	V5.11	NA	NA		
Measurement Software	Sporton	SENSE-EMI	V5.11	NA	NA		
Measurement Software	Sporton	SENSE-15247_EMI	V5.11	NA	NA		
Note: Calibration Inter	rval of instruments liste	d above is one year.					

Report No.: FR4D2002-01 Page: 9 of 16



Test Item	RF Conducted					
Test Site	(TH01-WS)					
Tested Date	Mar. 20, 2025					
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until	
Spectrum Analyzer	R&S	FSV40	101910	Apr. 18, 2024	Apr. 17, 2025	
Power Meter	Anritsu	ML2495A	1241002	Nov. 26, 2024	Nov. 25, 2025	
Power Sensor	Anritsu	MA2411B	1207366	Nov. 26, 2024	Nov. 25, 2025	
Attenuator	Pasternack	PE7005-10	10-2	Oct. 04, 2024	Oct. 03, 2025	
Measurement Software	Sporton	SENSE-15247_FS	V5.11	NA	NA	
Note: Calibration Inter	Note: Calibration Interval of instruments listed above is one year.					

### 1.5 Test Standards

47 CFR FCC Part 15.247 ANSI C63.10-2013

### 1.6 Reference Guidance

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

### 1.7 Deviation from Test Standard and Measurement Procedure

None

## 1.8 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Measurement Uncertainty					
Parameters	Uncertainty				
Bandwidth	±34.130 Hz				
Conducted power	±0.808 dB				
Power density	±0.583 dB				
Conducted emission	±2.715 dB				
AC conducted emission	±2.92 dB				
Unwanted Emission ≤ 1GHz	±3.96 dB				
Unwanted Emission > 1GHz	±4.51 dB				

Report No.: FR4D2002-01 Page : 10 of 16



## 2 Test Configuration

## 2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site CO01-WS, TH01-WS	
Address of Test Site	No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)
Test Site	03CH03-WS
Address of Test Site	No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

FCC Designation No.: TW0009FCC site registration No.: 207696

➤ ISED#: 10807C

➤ CAB identifier: TW2732

## 2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration
AC Power Line Conducted Emission	O-QPSK	2440	250kbps	
Unwanted Emissions ≤ 1GHz	O-QPSK	2440	250kbps	
Unwanted Emissions >1GHz	O-QPSK	2480	250kbps	
Conducted Output Power				
6dB bandwidth	O-QPSK	2405 / 2440 / 2475 / 2480	250kbps	
Power spectral density				

### NOTE:

Report No.: FR4D2002-01 Page: 11 of 16

<sup>1.</sup> The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **X-plane** results were found as the worst case and were shown in this report.



## 3 Transmitter Test Results

## 3.1 Conducted Output Power

### 3.1.1 Limit of Conducted Output Power

Conducted power shall not exceed 1Watt.

Antenna gain <= 6dBi, no any corresponding reduction is in output power limit.

Antenna gain > 6dBi

Non Fixed, point to point operations.

The conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB

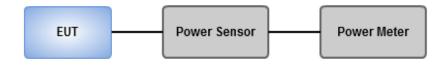
Fixed, point to point operations

Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point Operations, maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

#### 3.1.2 Test Procedures

A broadband RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

### 3.1.3 Test Setup



#### 3.1.4 Test Results

Ambient Condition	21°C / 66%	Tested By	Akun Chung

Refer to Appendix A.

Report No.: FR4D2002-01 Page: 12 of 16



## 3.2 Unwanted Emissions into Restricted Frequency Bands

#### 3.2.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit					
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)		
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300		
0.490~1.705	24000/F(kHz)	33.8 - 23	30		
1.705~30.0	30	29	30		
30~88	100	40	3		
88~216	150	43.5	3		
216~960	200	46	3		
Above 960	500	54	3		

#### Note 1:

Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit **Note 2:** 

Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

#### 3.2.2 Test Procedures

- 1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
- 2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
- 3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

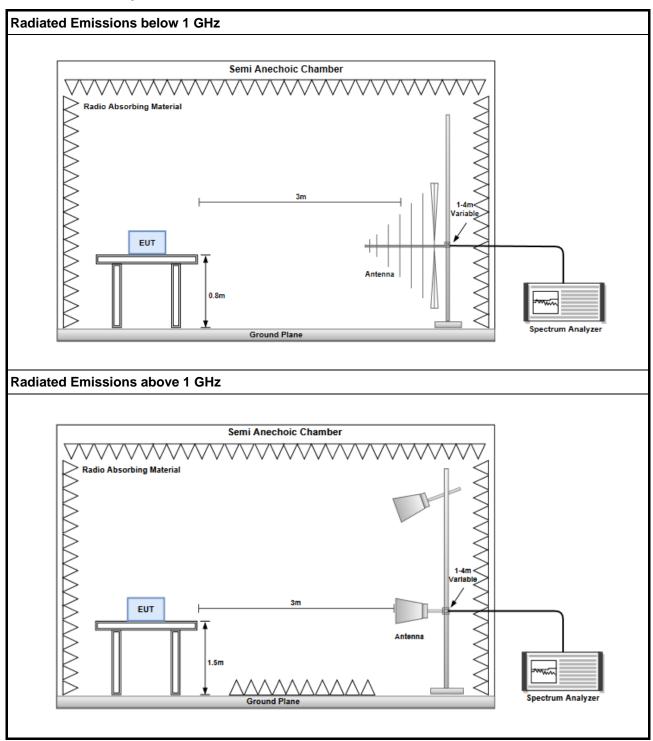
#### Note:

- 1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
- 2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
- RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

Report No.: FR4D2002-01 Page : 13 of 16



## 3.2.3 Test Setup



### 3.2.4 Test Results

Ambient Condition	21°C / 62%	Tested By	Sean Yu
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Refer to Appendix B.

Report No.: FR4D2002-01 Page: 14 of 16



#### 3.3 AC Power Line Conducted Emissions

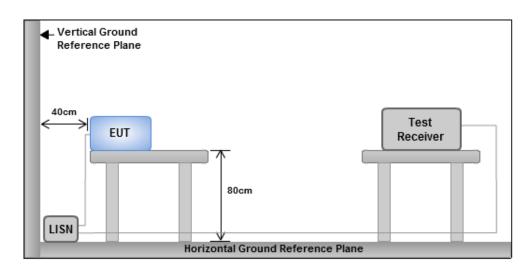
#### 3.3.1 Limit of AC Power Line Conducted Emissions

Conducted Emissions Limit					
Frequency Emission (MHz) Quasi-Peak Average					
0.15-0.5	66 - 56 *	56 - 46 *			
0.5-5	56	46			
5-30 60 50					
Note 1: * Decreases with the logarithm of the frequency.					

#### 3.3.2 Test Procedures

- 1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
- 2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50  $\Omega$  LISN port.
- 3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
- 4. This measurement was performed with AC 120V / 60Hz.

#### 3.3.3 Test Setup



Note: 1. Support units were connected to second LISN.

Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

### 3.3.4 Test Results

Refer to Appendix C.

Report No.: FR4D2002-01 Page : 15 of 16



## 4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corporation (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <a href="http://www.icertifi.com.tw">http://www.icertifi.com.tw</a>.

#### Linkou

Tel: 886-2-2601-1640 No.30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan (R.O.C.)

#### Kwei Shan

Tel: 886-3-271-8666
No.3-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)
No.2-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)

#### Kwei Shan Site II

Tel: 886-3-271-8640 No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666 Fax: 886-3-318-0345

Email: ICC\_Service@icertifi.com.tw

==END==

Report No.: FR4D2002-01 Page : 16 of 16



## Conducted Output Power (Peak)

Appendix A.1

Summary

Mode	Total Power	Total Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
802.15.4	6.70	0.00468

#### Result

Mode	Result	Antenna Gain (dBi)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
802.15.4	-	-	-	-	-	-
2405MHz	Pass	2.32	6.70	30.00	9.02	36.00
2440MHz	Pass	2.32	6.70	30.00	9.02	36.00
2475MHz	Pass	2.32	6.64	30.00	8.96	36.00
2480MHz	Pass	2.32	6.62	30.00	8.94	36.00



## Conducted Output Power (Average)

Appendix A.2

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.15.4	6.60	0.00457

#### Result

Mode	Result	Antenna Gain (dBi)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	
802.15.4	-	-	-	-	-	-	
2405MHz	Pass	2.32	6.60	-	8.92	-	
2440MHz	Pass	2.32	6.60	-	8.92	-	
2475MHz	Pass	2.32	6.54	-	8.86	-	
2480MHz	Pass	2.32	6.52	-	8.84	-	

Note: Average power is for reference only.



## Unwanted Emissions into Restricted Frequency Bands Below 1GHz

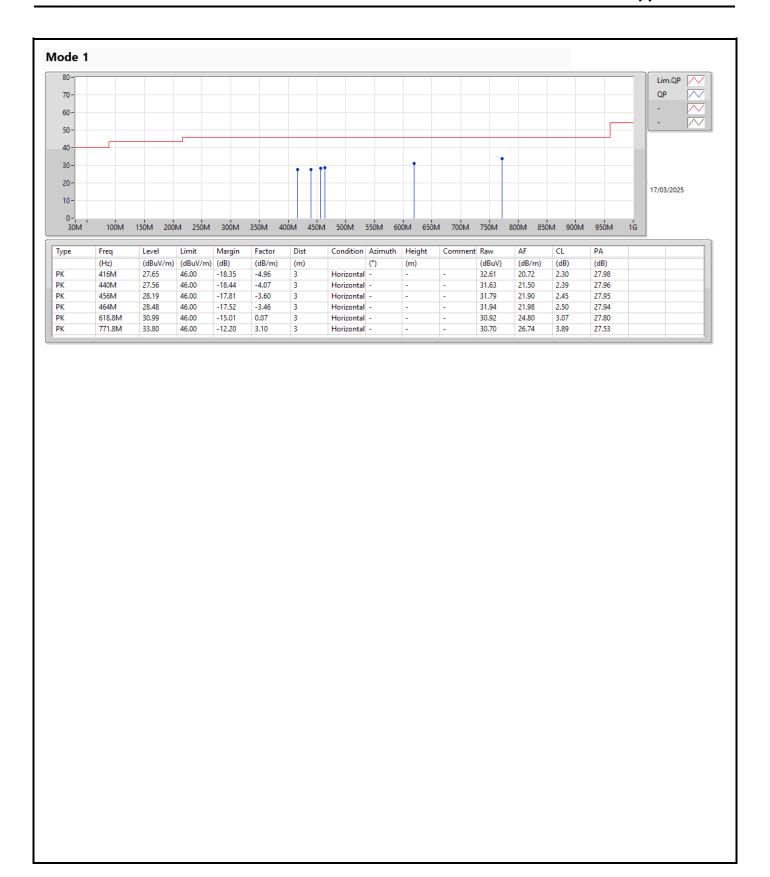
Appendix B.1

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition	
Mode 1	Pass	PK	771.8M	33.80	46.00	-12.20	Horizontal	

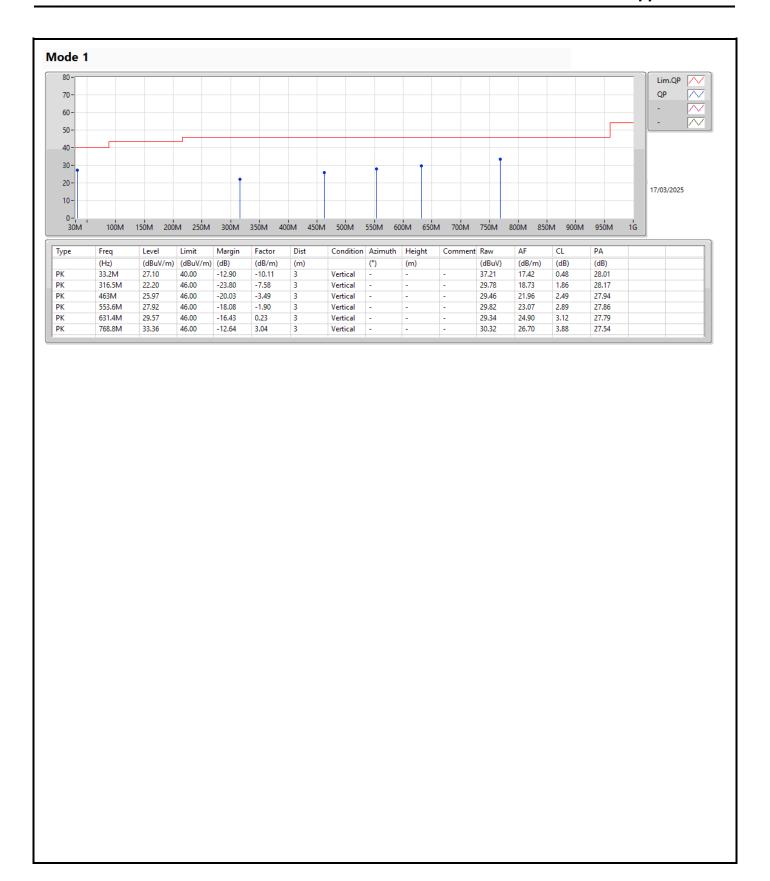
## Unwanted Emissions into Restricted Frequency Bands Below 1GHz

Appendix B.1



## Unwanted Emissions into Restricted Frequency Bands Below 1GHz

Appendix B.1





# Unwanted Emissions into Restricted Frequency Bands Above 1GHz

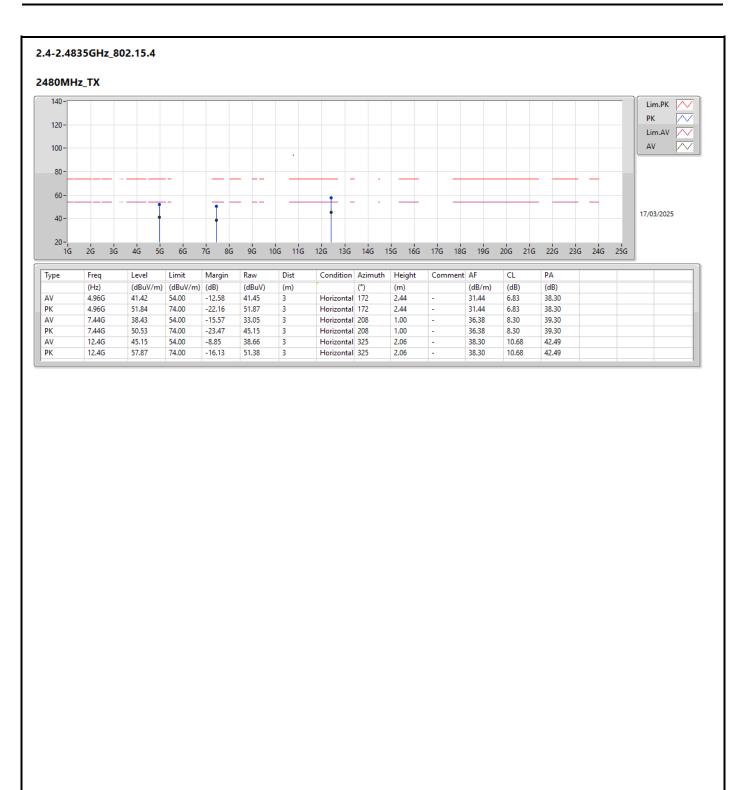
Appendix B.2

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
802.15.4_1MHz_Nss1_1TX	Pass	AV	12.4G	45.15	54.00	-8.85	3	Horizontal	325	2.06	-

## Unwanted Emissions into Restricted Frequency Bands Above 1GHz

Appendix B.2



## Unwanted Emissions into Restricted Frequency Bands Above 1GHz

Appendix B.2

