FCC Radio Test Report

FCC ID	:	**TVE-240602**
Equipment	:	**Secured Wireless Access Point**
Brand Name	:	**FORTINET**
Model Name	:	**FortiAP 243Kxxxxxxxxx, FAP-243Kxxxxxxxxx, FORTIAP-243Kxxxxxxxxx (Where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)**
Applicant	:	**Fortinet, Inc. 909 Kifer Road, Sunnyvale, CA 94086, USA**
Manufacturer	:	**Fortinet, Inc. 909 Kifer Road, Sunnyvale, CA 94086, USA**
Standard	:	**47 CFR FCC Part 15.247**

The product was received on May 24, 2024, and testing was started from Jun. 07, 2024 and completed on Jun. 29, 2024. We, SPORTON INTERNATIONAL INC. Hsinhua Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Hsinhua Laboratory, the test report shall not be reproduced except in full.

Approved by: Jackson Tsai

SPORTON INTERNATIONAL INC. Hsinhua Laboratory

No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)

Table of Contents

HISTORY OF THIS TEST REPORT 3

SUMMARY OF TEST RESULT 4

1 GENERAL DESCRIPTION 5

1.1 Information 5
1.2 Testing Applied Standards 8
1.3 Testing Location Information 8
1.4 Measurement Uncertainty 8

2 TEST CONFIGURATION OF EUT 9

2.1 Test Channel Mode 9
2.2 The Worst Case Measurement Configuration 10
2.3 Accessories 11
2.4 Support Equipment 11
2.5 Test Setup Diagram 12

3 TRANSMITTER TEST RESULT 13

3.1 AC Power-line Conducted Emissions 13
3.2 DTS Bandwidth 15
3.3 Maximum Conducted Output Power 16
3.4 Power Spectral Density 18
3.5 Emissions in Non-restricted Frequency Bands 19
3.6 Emissions in Restricted Frequency Bands 20

4 TEST EQUIPMENT AND CALIBRATION DATA 24

APPENDIX A. TEST RESULTS OF AC POWER-LINE CONDUCTED EMISSIONS

APPENDIX B. TEST RESULTS OF DTS BANDWIDTH

APPENDIX C. TEST RESULTS OF MAXIMUM CONDUCTED OUTPUT POWER

APPENDIX D. TEST RESULTS OF POWER SPECTRAL DENSITY

APPENDIX E. TEST RESULTS OF EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

APPENDIX F. TEST RESULTS OF EMISSIONS IN RESTRICTED FREQUENCY BANDS

APPENDIX G. TEST RESULTS OF RADIATED EMISSION CO-LOCATION

APPENDIX H. TEST PHOTOS

PHOTOGRAPHS OF EUT V01

History of this test report

Report No.	Version	Description	Issued Date
FR411229-01AZ	01	Initial issue of report	Oct. 17, 2024

Summary of Test Result

Report Clause	Ref. Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.247(a)	DTS Bandwidth	PASS	-
3.3	15.247(b)	Maximum Conducted Output Power	PASS	-
3.4	15.247(e)	Power Spectral Density	PASS	-
3.5	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	-
3.6	15.247(d)	Emissions in Restricted Frequency Bands	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:
None

Reviewed by: Barry Hsiao

Report Producer: Ann Hou

1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std.	Ch. Frequency (MHz)	Channel Number
2400-2483.5	802.15.4	2405-2480	11-26 [16]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	Zigbee	5	1TX

Note:.
- Zigbee uses a O-QPSK (250kbps) modulation for DSSS.
- BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Group	Ant.	Brand	Model Name	Antenna Type	Connector	Support
A	1	AWAN	7102A0668000	Dipole	Reverse SMA	2.4G+5G
	2	AWAN	7102A0668000	Dipole	Reverse SMA	2.4G+5G
	3	AWAN	7102A0669000	Dipole	Reverse SMA	2.4G+5G+6G
	4	AWAN	7102A0669000	Dipole	Reverse SMA	2.4G+5G+6G
	5	AWAN	7102A0667000	Dipole	Reverse SMA	6G
	6	AWAN	7102A0667000	Dipole	Reverse SMA	6G
-	7	Enrack	7102A1239000	PIFA	I-Pex	BT+Zigbee
B	8	Master Wave	7102A1334000	Dipole	Reverse SMA	2.4G+5G
	9	Master Wave	7102A1334000	Dipole	Reverse SMA	2.4G+5G
	10	Master Wave	7102A1335000	Dipole	Reverse SMA	2.4G+5G+6G
	11	Master Wave	7102A1335000	Dipole	Reverse SMA	2.4G+5G+6G
	12	Master Wave	7102A1333000	Dipole	Reverse SMA	6G
	13	Master Wave	7102A1333000	Dipole	Reverse SMA	6G

Ant.	Port	Gain (dBi)					Remark	
		2.4G	5G	6G	BT	Zigbee		
1	1	3.53	5.51	-	-	-	Radio 1 2.4G only 2*2	Radio 2 5G 2*2
2	2	3.40	5.34	-	-	-		
3	1	3.27	5.21	5.32	-	-	Radio 3 (Scan radio) 2.4G/5G/6G 2*2	
4	2	3.47	5.05	5.10	-	-		

Ant.	Port	Gain (dBi)					Remark	
		2.4G	5G	6G	BT	Zigbee		
5	1	-	-	5.20	-	-	Radio 2 6G 2*2	
6	2	-	-	5.03	-	-		
7	1	-	-	-	4.82	4.82	-	
8	1	3.19	5.14	-	-	-	Radio 1 2.4G only 2*2	Radio 2 5G 2*2
9	2	3.27	5.13	-	-	-		
10	1	3.13	5.03	4.66	-	-	Radio 3 (Scan radio) 2.4G/5G/6G 2*2	
11	2	3.03	5.03	4.82	-	-		
12	1	-	-	5.01	-	-	Radio 2 6G 2*2	
13	2	-	-	4.89	-	-		

Note 1: The EUT has thirteen antennas.

Note 2: EUT can match with above antennas for using. Higher gain in each group of antennas was used to perform the worst configuration and result of that was recorded as the final test result.

Note 3: Directional gain information

	Maximum Output Power	Power Spectral Density
Non-BF	Directional gain = Max.gain + array gain. For power measurements on IEEE 802.11 devices Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4	$DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{ss}}\left\{\sum_{n=1}^{N_{ant}} g_{j,n}\right\}^2}{N_{ant}}\right]$
BF	$DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{ss}}\left\{\sum_{n=1}^{N_{ant}} g_{j,n}\right\}^2}{N_{ant}}\right]$	$DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{ss}}\left\{\sum_{n=1}^{N_{ant}} g_{j,n}\right\}^2}{N_{ant}}\right]$

For 2.4GHz function:

< Radio 1>

For IEEE 802.11 b/g/n/VHT/ax/be mode (2TX/2RX)

Ant. 1 (port 1) and Ant. 2 (port 2) or Ant. 8 (port 1) and Ant. 9 (port 2) could transmit/receive simultaneously.

< Radio 3><Scan>

For IEEE 802.11 b/g/n/VHT/ax mode (2RX)

Ant. 3 (port 1) and Ant. 4 (port 2) or Ant. 10 (port 1) and Ant. 11 (port 2) can be used as receiving.

For 5GHz function:

< Radio 2>

For IEEE 802.11 a/n/ac/ax/be mode (2TX/2RX)

Ant. 1 (port 1) and Ant. 2 (port 2) or Ant. 8 (port 1) and Ant. 9 (port 2) could transmit/receive simultaneously.

< Radio 3><Scan>

For IEEE 802.11 a/n/ac/ax mode (2RX)

Ant. 3 (port 1) and Ant. 4 (port 2) or Ant. 10 (port 1) and Ant. 11 (port 2) can be used as receiving.

For 6GHz function:

< Radio 2>

For IEEE 802.11 ax/be mode (2TX/2RX)

Ant. 5 (port 1) and Ant. 6 (port 2) or Ant. 12 (port 1) and Ant. 13 (port 2) could transmit/receive simultaneously.

< Radio 3><Scan>

For IEEE 802.11 ax mode (2RX)

Ant. 3 (port 1) and Ant. 4 (port 2) or Ant. 10 (port 1) and Ant. 11 (port 2) can be used as receiving.

For Bluetooth function:

For IEEE 802.15.1 Bluetooth mode (1TX/1RX)

Only Ant.7 can be used as transmitting/receiving.

For Zigbee function:

For IEEE 802.15.4 mode (1TX/1RX)

Only Ant.7 can be used as transmitting/receiving.

1.1.3 EUT Information

Operational Condition				
EUT Power Type	From AC Adapter / PoE			
EUT Function	☒	Point-to-multipoint	☐	Point-to-point

Type of EUT		
☒	Stand-alone	
☐	Combined (EUT where the radio part is fully integrated within another device)	
	Combined Equipment - Brand Name / Model No.:	…
☐	Plug-in radio (EUT intended for a variety of host systems)	
	Host System - Brand Name / Model No.:	…
☐	Other:	

1.1.4 Mode Test Duty Cycle

Mode	DC	DCF (dB)	T (s)	VBW (Hz)_1/T
Zigbee	1	0	n/a (DC>=0.98)	n/a (DC>=0.98)

Note. If DC < 0.98, the DCF was added while measuring Output power and PSD.

1.1.5 Table for Multiple Listing

The brand/model names in the following table are all refer to the identical product.

Brand Name	Model Name	Description
FORTINET	FortiAP 243Kxxxxxxxxx, FAP-243Kxxxxxxxxx, FORTIAP-243Kxxxxxxxxx (Where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)	All the models are identical, the difference model served as marketing strategy.

From the above models, model: FAP-243K was selected as representative model for the test and its data was recorded in this report.

1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR FCC Part 15
- ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of TAF:

- KDB 558074 D01 v05r02
- KDB 414788 D01 v01r01

1.3 Testing Location Information

Test Lab.：Sporton International Inc. Hsinhua Laboratory				
☒ Hsinhua (**TAF:** 3785)	**ADD:** No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)			
	TEL: 886-3-327-3456		**FAX:** 886-3-327-0973	
Test site Designation No. TW3785 with FCC.				
Test Condition	**Test Site No.**	**Test Engineer**	**Test Environment**	**Test Date**
AC Conduction	CO04-HY	Wayne Chiu	22.4~22.8°C / 52~57%	29/Jun/2024
☒ Wenhua 3rd. (**TAF:** 3785)	**ADD:** No. 58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Guishan Dist. Taoyuan City 333, Taiwan (R.O.C.)			
	TEL: 886-3-327-0868			
Test site Designation No. TW0036 with FCC.				
Test Condition	**Test Site No.**	**Test Engineer**	**Test Environment**	**Test Date**
Radiated	03CH25-HY	Lego Lin	22.9~23.6°C / 59~63%	07/Jun/2024~15/Jun/2024
Radiated (Co-location)	03CH24-HY	Henry Ho	22.5~22.7°C / 52~53%	25/Jun/2024
RF Conducted	TH06-HY	Johnny Yu	22.6~23.2°C / 53~57%	17/Jun/2024

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Test Items	**Uncertainty**	**Remark**
AC Power-line Conducted Emissions	4.53 dB	Confidence levels of 95%
Bandwidth	3 MHz	Confidence levels of 95%
Maximum Conducted Output Power	2 dB	Confidence levels of 95%
Power Spectral Density	2 dB	Confidence levels of 95%
Emissions in Non-restricted Frequency Bands	0.14 dB	Confidence levels of 95%
Emissions in Restricted Frequency Bands	4.8 dB	Confidence levels of 95%
Temperature	0.41 °C	Confidence levels of 95%
Humidity	3.4 %	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Channel Mode

Test Software Version	Dos

Mode	Power Setting
Zigbee	-
2405MHz	200
2440MHz	200
2475MHz	200
2480MHz	174

2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	CTX
1	Adapter mode

The Worst Case Mode for Following Conformance Tests	
Tests Item	DTS Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in Non-restricted Frequency Bands
Test Condition	Conducted measurement at transmit chains

The Worst Case Mode for Following Conformance Tests			
Tests Item	Emissions in Restricted Frequency Bands		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
Operating Mode < 1GHz	CTX		
1	Adapter mode		
Operating Mode > 1GHz	CTX		
Orthogonal Planes of EUT	**X Plane**	**Y Plane**	**Z Plane**
Worst Planes of EUT		V	

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis
Test Condition	Radiated measurement
Operating Mode	CTX
1	Radio 1_2.4G+ Radio 2_5G+Bluetooth
2	Radio 1_2.4G+ Radio 2_5G+Zigbee
Refer to Sporton Test Report No.: FA411229-01 for Co-location RF Exposure Evaluation and Appendix G for Radiated Emission Co-location.	

2.3 Accessories

Accessories				
BRACKET,METAL CLIP CEILING,RVAQ-AP43	Brand Name	WNC	Model Name	6B.SRVAQ.00N
BRACKET,CEILING RAIL 1	Brand Name	WNC	Model Name	3S.005AL.111
BRACKET,CEILING RAIL 2	Brand Name	WNC	Model Name	3S.005AK.111
Antenna 1 for 2/5GHz*2	Brand Name	AWAN	Model Name	7102A0668000
Antenna 1 for 2/5/6GHz*2	Brand Name	AWAN	Model Name	7102A0669000
Antenna 1 for 6GHz*2	Brand Name	AWAN	Model Name	7102A0667000
Antenna 2 for 2/5GHz*2	Brand Name	Master Wave	Model Name	7102A1334000
Antenna 2 for 2/5/6GHz*2	Brand Name	Master Wave	Model Name	7102A1335000
Antenna 2.for 6GHz*2	Brand Name	Master Wave	Model Name	7102A1333000

Reminder: Regarding to more detail and other information, please refer to user manual.

2.4 Support Equipment

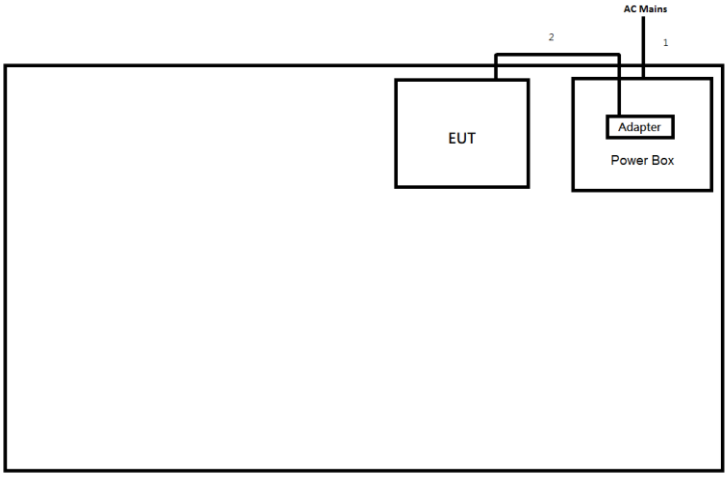
Support Equipment – AC Conduction					
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**	**Remark**
1	AC Adapter	ASIAN POWER DEVICES INC.	WA-48A12R	-	Provided by Customer

Support Equipment – Conducted					
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**	**Remark**
1	Notebook	DELL	E5410	-	-
2	AC Adapter	ASIAN POWER DEVICES INC.	WA-48A12R	-	Provided by Customer

Support Equipment – Radiated					
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**	**Remark**
1	AC Adapter	ASIAN POWER DEVICES INC.	WA-48A12R	-	Provided by Customer

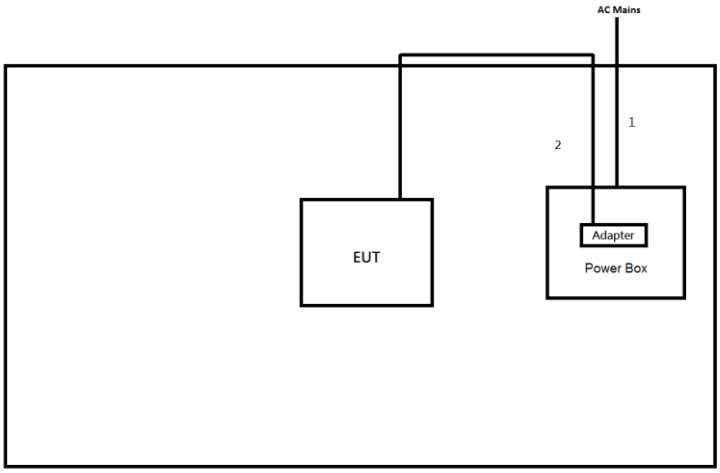
2.5 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Item	Connection	Shielded	Length(m)
1	AC power cable	No	1.0
2	DC power cable	No	1.5

Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length(m)
1	AC power cable	No	1.8
2	DC power cable	No	1.5

3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line 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.		

3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

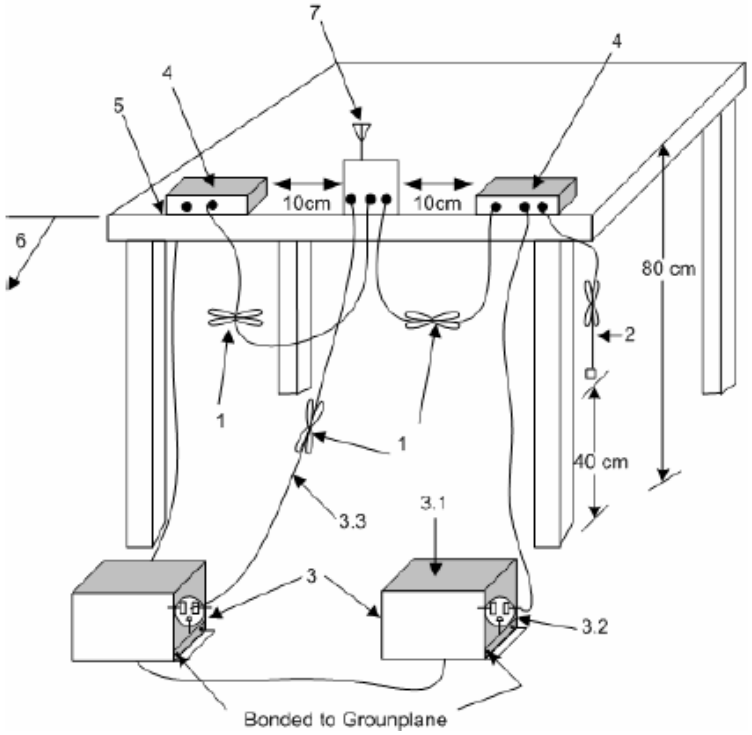
Test Method
☒ Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

3.1.4 Measurement Results Calculation

The measured Level is calculated using:
Corrected Reading: Raw(Read Level) +LISN(LISN Factor) + CL(Cable Loss) + AT(Attenuator).

3.1.5 Test Setup

AC Power-line Conducted Emissions



1—Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.
2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50Ω loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
3.1—All other equipment powered from additional LISN(s).
3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
3.3—LISN at least 80 cm from nearest part of EUT chassis.
4—Non-EUT components of EUT system being tested.
5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.
6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

3.1.6 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit
Systems using digital modulation techniques:
▪ 6 dB bandwidth ≥ 500 kHz.

3.2.2 Measuring Instruments

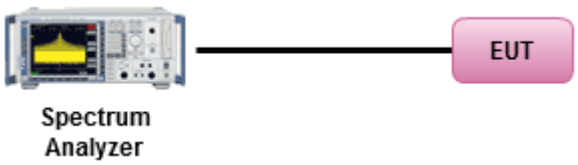
Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method	
▪ For the emission bandwidth shall be measured using one of the options below:	
	☒ Refer as KDB 558074, clause 8.2 (11.8 of ANSI C63.10) DTS bandwidth measurement.
	☐ Refer as RSS-Gen, clause 6.7 for for occupied bandwidth testing.
	☐ Refer as ANSI C63.10, clause 6.9.3 for occupied bandwidth testing.

3.2.4 Test Setup

Emission Bandwidth



3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit		
	▪ If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)	
	▪ Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)$ dBm	
	▪ Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm	
	▪ Smart antenna system (SAS):	
		- Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm
		- Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm
		- Aggregate power on all beams: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3 + 8$dB dBm
e.i.r.p. Power Limit:		
▪ 2400-2483.5 MHz Band		
	▪ Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)	
	▪ Point-to-point systems (P2P): $P_{eirp} \leq MAX(36, [P_{Out} + G_{TX}])$ dBm	
	▪ Smart antenna system (SAS)	
		- Single beam: $P_{eirp} \leq MAX(36, P_{Out} + G_{TX})$ dBm
		- Overlap beam: $P_{eirp} \leq MAX(36, P_{Out} + G_{TX})$ dBm
		- Aggregate power on all beams: $P_{eirp} \leq MAX(36, [P_{Out} + G_{TX} + 8])$ dBm
P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, **G_{TX}** = the maximum transmitting antenna directional gain in dBi.		

3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

Test Method	
▪ Maximum Peak Conducted Output Power	
	☐ Refer as KDB 558074, clause 8.3.1.1 (11.9.1.1 of ANSI C63.10) RBW ≥ EBW method.
	☐ Refer as KDB 558074, clause 8.3.1.2 (11.9.1.2 of ANSI C63.10) integrated band power method.
	☐ Refer as KDB 558074, clause 8.3.1.3 (11.9.1.3 of ANSI C63.10) peak power meter.
▪ Maximum Average Conducted Output Power	
	☐ Refer as KDB 558074, clause 8.3.2.2 (11.9.2.2 of ANSI C63.10) using a spectrum analyzer.
	☒ Refer as KDB 558074, clause 8.3.2.3 (11.9.2.3 of ANSI C63.10) using a power meter.
▪ For conducted measurement.	
	▪ If the EUT supports multiple transmit chains using options given below: Refer as KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
	▪ If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \ldots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$

3.3.4 Test Setup

Maximum Conducted Output Power (Power Meter)

3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

Power Spectral Density Limit
▪ Power Spectral Density (PSD) ≤ 8 dBm/3kHz

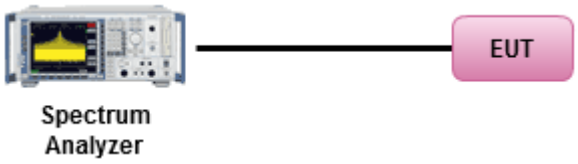
3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

Test Method		
▪ Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).		
	☒ Refer as KDB 558074, clause 8.4 (11.10 of ANSI C63.10) Max. PSD.	
▪ For conducted measurement.		
	▪ If The EUT supports multiple transmit chains using options given below:	
		▪ Measure and sum the spectra across the outputs. Refer as KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.

3.4.4 Test Setup

Power Spectral Density


3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit	
RF output power procedure	**Limit (dB)**
Peak output power procedure	20
Average output power procedure	30
Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak level. Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average level.	

3.5.2 Measuring Instruments

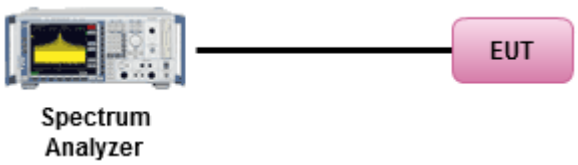
Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

Test Method
▪ Refer as KDB 558074, clause 8.5 (11.11 of ANSI C63.10) for non-restricted frequency bands.

3.5.4 Test Setup

Emissions in Non-restricted Frequency Bands



3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

3.6 Emissions in Restricted Frequency Bands

3.6.1 Emissions in Restricted Frequency Bands Limit

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: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

3.6.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

Test Method	
▪ The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].	
▪ Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.	
▪ For the transmitter unwanted emissions shall be measured using following options below:	
	▪ Refer as KDB 558074, clause 8.6 (11.12 of ANSI C63.10) for restricted frequency bands.
▪ For the transmitter band-edge emissions shall be measured using following options below:	
	▪ Refer as KDB 558074 clause 8.7.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.
	▪ Refer as KDB 558074, clause 8.7.2 (6.10.6 of ANSI C63.10) for marker-delta method for band-edge measurements.
	▪ Refer as KDB 558074, clause 8.7.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
▪ Use the following spectrum analyzer settings:	
	▪ Set RBW=100 kHz for f < 1 GHz; VBW=3 * RBW; Sweep = auto; Detector function = peak; Trace = max hold.
	▪ Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement. For average measurement, refer as 1.1.4.
▪ KDB 414788 Open-Field Test Sites and Chamber Correlation Justification.	
	▪ Based on FCC 15.31(f)(2): measurements may be performed at a distance closer than that specified in regulations; however, an attempt should be made to avoid making measurements in the near field.
	▪ Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

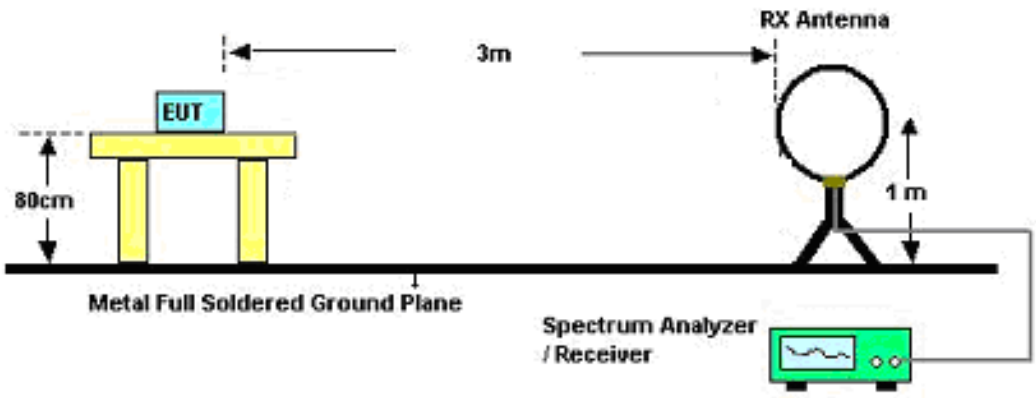
3.6.4 Measurement Results Calculation

The measured Level is calculated using:
Corrected Reading: Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamp Factor)

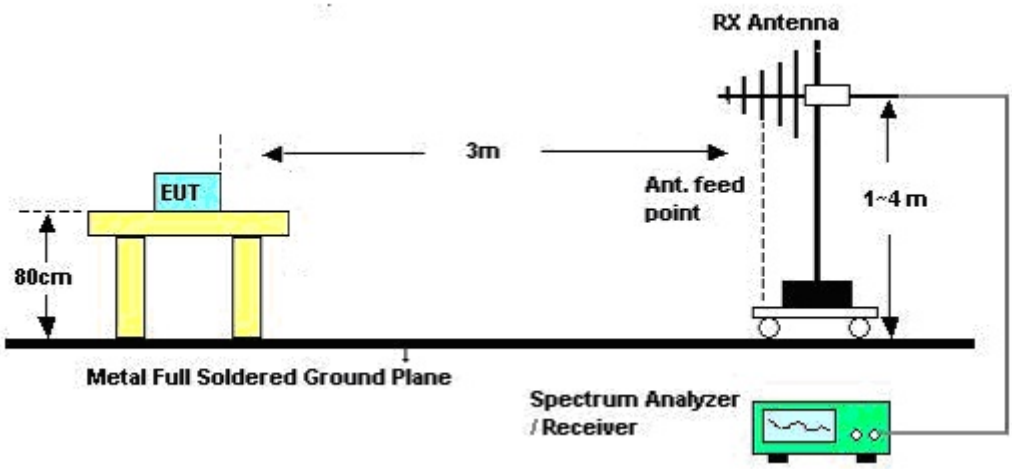
3.6.5 Test Setup

Emissions in Restricted Frequency Bands

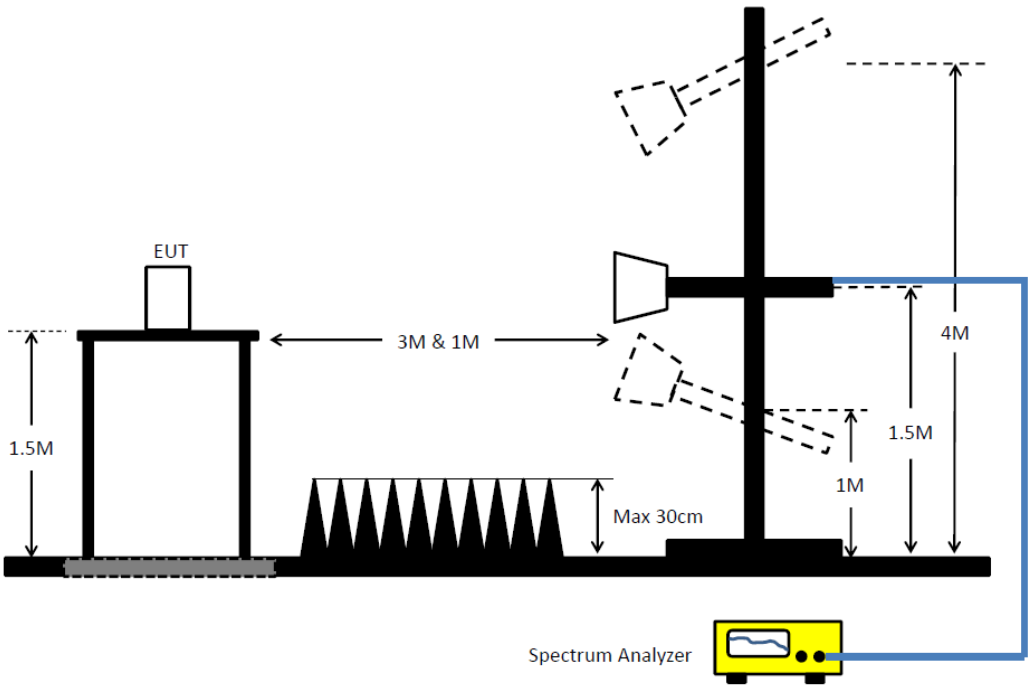
9kHz ~30MHz



30MHz~1GHz



Above 1GHz



3.6.6 Test Result of Emissions in Restricted Frequency Bands (Below 30MHz)

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

3.6.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

4 Test Equipment and Calibration Data

Instrument for AC Conduction

Instrument	Manufacturer /Brand	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR	102051	9kHz ~ 3.6GHz	17/May/2024	16/May/2025
LISN(Artificial Mains Network)	SCHWARZBECK	NSLK 8127	8127477	9kHz ~ 30MHz	12/Apr/2024	11/Apr/2025
RF Cable 5m	TITAN	TITAN	CO04-cable-01	9 kHz~200MHz	27/Feb/2024	26/Feb/2025
Pulse Limiter	SCHWARZBECK	VTSD 9561-F	9561-F041	9kHz ~ 30MHz	18/Oct/2023	17/Oct/2024
Software	Sporton	SENSE-EMI	V5.11.3	-	NCR	NCR

NCR: No Calibration Required

Instrument for Conducted Test

Instrument	Manufacturer /Brand	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV 40	101029	10Hz~40GHz	30/Oct/2023	29/Oct/2024
SMB100A Signal Generator	R&S	SMB100A	181147	100kHz~40GHz	20/Oct/2023	19/Oct/2024
Power Meter	Anritsu	ML2495A	1124009	300MHz~40GHz	01/Apr/2024	31/Mar/2025
Pulse Sensor	Anritsu	MA2411B	1027452	300MHz~40GHz	02/Apr/2024	01/Apr/2025
SENSE-15247_FS	Sporton	V5.11.18	N/A	N/A	N/A	N/A

Instrument for Radiated Test

Instrument	Manufacturer /Brand	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH25-HY	30MHz~1GHz 3m	03/Aug/2023	02/Aug/2024
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH25-HY	1GHz~18GHz 3m	09/Aug/2023	08/Aug/2024
EMI Test Receiver	ROHDE & SCHWARZ	ESR	102318	9kHz~3.6GHz	27/Dec/2023	26/Dec/2024
Signal Analyzer	ROHDE&SCHWARZ	FSV3044	101410	10Hz~44GHz	17/Nov/2023	16/Nov/2024
Loop Antenna	TESEQ	HLA 6120	31244	9kHz~30MHz	19/Mar/2024	18/Mar/2025
Bilog Antenna & 6dB Attenuator	TESEQ & VGT	CBL 6111D & VFA 04002-06	63537/001	30MHz~1GHz	30/May/2024	29/May/2025
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	02876	1GHz~18GHz	12/Jul/2023	11/Jul/2024
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	01248	18GHz~40GHz	21/Aug/2023	20/Aug/2024
RF Cable	HUBER+SUHNER	SUOFLEX 104	CB007	9kHz~1GHz	24/Apr/2024	23/Apr/2025
RF Cable	HUBER+SUHNER	SUOFLEX 104	CB007	1GHz~40GHz	23/Apr/2024	22/Apr/2025
Preamplifier	SGH	PRAMP 903	20230515-1	25MHz~3GHz	24/May/2024	23/May/2025
Preamplifier	SGH	PRAMP 118-H	20230515-3	1GHz ~18GHz	24/May/2024	23/May/2025
Amplifier	EM	EM18G40GA	060874	18GHz ~ 40GHz	15/Apr/2024	14/Apr/2025
SENSE-15247-DTS	Sporton	V5.11.18	NA	NA	NA	NA

Instrument for Radiated Test (Co-location)

Instrument	Manufacturer /Brand	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH24-HY	30MHz~1GHz 3m	17/Aug/2023	16/Aug/2024
Signal Analyzer	ROHDE&SCHWARZ	FSV3044	101345	10Hz~44GHz	10/Aug/2023	09/Aug/2024
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	02744	1GHz~18GHz	17/Aug/2023	16/Aug/2024
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	01248	18GHz~40GHz	21/Aug/2023	20/Aug/2024
RF Cable	HUBER+SUHNER	SUOFLEX 102	CB001	1GHz~40GHz	19/Jun/2024	18/Jun/2025
Amplifier	EM	EM01G18G	060870	1GHz ~18GHz	10/Aug/2023	09/Aug/2024
Microwave Premplifier	EMC INSTRUMENTS	EM18G40G	060604	18GHz ~ 40GHz	19/Apr/2024	18/Apr/2025
SENSE-EMI	Sporton	V5.11	N/A	N/A	N/A	N/A

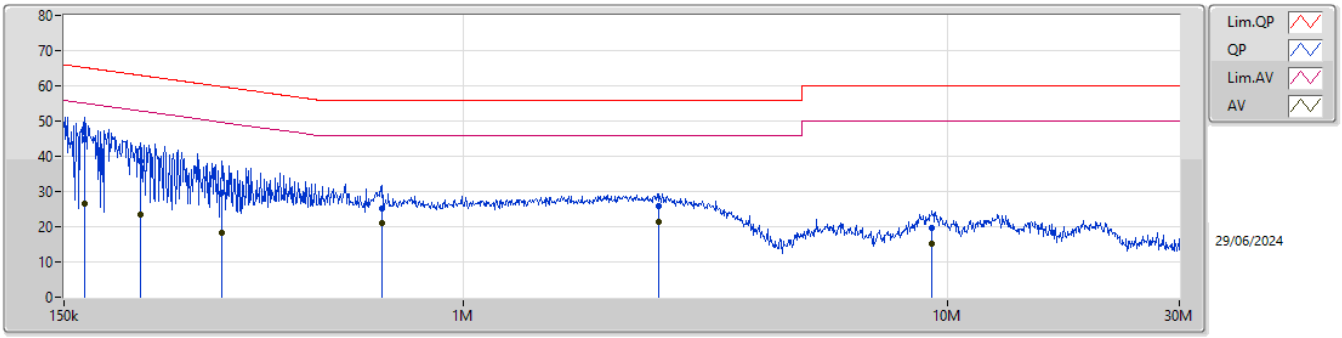
Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	QP	165.082k	44.71	65.20	-20.49	Line

Result

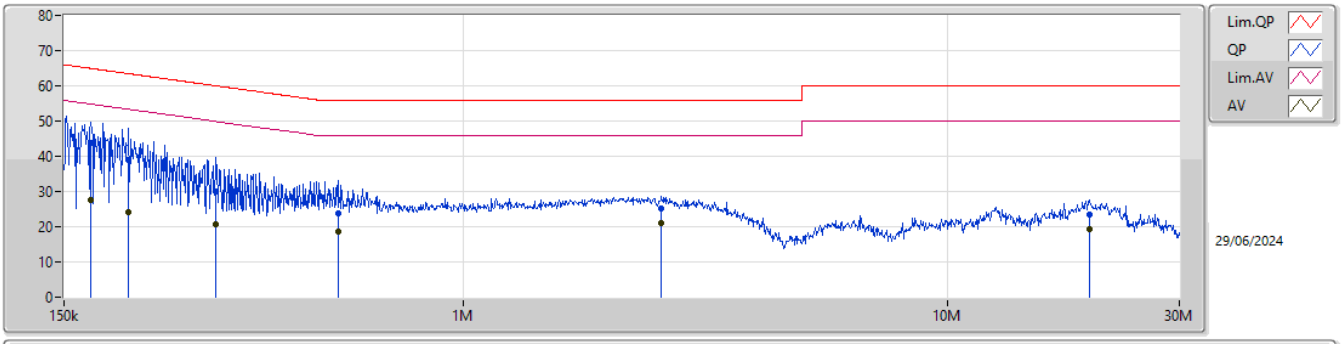
Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition	Comments
Mode 1	Pass	QP	165.082k	44.71	65.20	-20.49	Line	-
Mode 1	Pass	AV	165.082k	26.39	55.20	-28.81	Line	-
Mode 1	Pass	QP	215.704k	38.57	62.98	-24.41	Line	-
Mode 1	Pass	AV	215.704k	23.56	52.98	-29.42	Line	-
Mode 1	Pass	QP	317.709k	29.63	59.77	-30.14	Line	-
Mode 1	Pass	AV	317.709k	18.41	49.77	-31.36	Line	-
Mode 1	Pass	QP	681.033k	25.24	56.00	-30.76	Line	-
Mode 1	Pass	AV	681.033k	20.92	46.00	-25.08	Line	-
Mode 1	Pass	QP	2.533M	25.77	56.00	-30.23	Line	-
Mode 1	Pass	AV	2.533M	21.54	46.00	-24.46	Line	-
Mode 1	Pass	QP	9.269M	19.52	60.00	-40.48	Line	-
Mode 1	Pass	AV	9.269M	15.28	50.00	-34.72	Line	-
Mode 1	Pass	QP	170.439k	43.93	64.93	-21.00	Neutral	-
Mode 1	Pass	AV	170.439k	27.69	54.93	-27.24	Neutral	-
Mode 1	Pass	QP	203.98k	38.92	63.44	-24.52	Neutral	-
Mode 1	Pass	AV	203.98k	24.07	53.44	-29.37	Neutral	-
Mode 1	Pass	QP	308.954k	30.11	60.00	-29.89	Neutral	-
Mode 1	Pass	AV	308.954k	20.61	50.00	-29.39	Neutral	-
Mode 1	Pass	QP	551.165k	23.90	56.00	-32.10	Neutral	-
Mode 1	Pass	AV	551.165k	18.48	46.00	-27.52	Neutral	-
Mode 1	Pass	QP	2.563M	25.08	56.00	-30.92	Neutral	-
Mode 1	Pass	AV	2.563M	21.09	46.00	-24.91	Neutral	-
Mode 1	Pass	QP	19.553M	23.38	60.00	-36.62	Neutral	-
Mode 1	Pass	AV	19.553M	19.29	50.00	-30.71	Neutral	-

Conducted Emissions at Powerline_Mode 1



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	165.082k	44.71	65.20	-20.49	9.84	Line	-	34.87	0.04	0.07	9.73
AV	165.082k	26.39	55.20	-28.81	9.84	Line	-	16.55	0.04	0.07	9.73
QP	215.704k	38.57	62.98	-24.41	9.82	Line	-	28.75	0.04	0.09	9.69
AV	215.704k	23.56	52.98	-29.42	9.82	Line	-	13.74	0.04	0.09	9.69
QP	317.709k	29.63	59.77	-30.14	9.89	Line	-	19.74	0.05	0.11	9.73
AV	317.709k	18.41	49.77	-31.36	9.89	Line	-	8.52	0.05	0.11	9.73
QP	681.033k	25.24	56.00	-30.76	9.94	Line	-	15.30	0.06	0.10	9.78
AV	681.033k	20.92	46.00	-25.08	9.94	Line	-	10.98	0.06	0.10	9.78
QP	2.533M	25.77	56.00	-30.23	9.98	Line	-	15.79	0.08	0.10	9.80
AV	2.533M	21.54	46.00	-24.46	9.98	Line	-	11.56	0.08	0.10	9.80
QP	9.269M	19.52	60.00	-40.48	10.04	Line	-	9.48	0.20	0.05	9.79
AV	9.269M	15.28	50.00	-34.72	10.04	Line	-	5.24	0.20	0.05	9.79

Conducted Emissions at Powerline_Mode 1



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	170.439k	43.93	64.93	-21.00	9.86	Neutral	-	34.07	0.06	0.08	9.72
AV	170.439k	27.69	54.93	-27.24	9.86	Neutral	-	17.83	0.06	0.08	9.72
QP	203.98k	38.92	63.44	-24.52	9.83	Neutral	-	29.09	0.06	0.09	9.68
AV	203.98k	24.07	53.44	-29.37	9.83	Neutral	-	14.24	0.06	0.09	9.68
QP	308.954k	30.11	60.00	-29.89	9.91	Neutral	-	20.20	0.07	0.11	9.73
AV	308.954k	20.61	50.00	-29.39	9.91	Neutral	-	10.70	0.07	0.11	9.73
QP	551.165k	23.90	56.00	-32.10	9.95	Neutral	-	13.95	0.07	0.11	9.77
AV	551.165k	18.48	46.00	-27.52	9.95	Neutral	-	8.53	0.07	0.11	9.77
QP	2.563M	25.08	56.00	-30.92	10.00	Neutral	-	15.08	0.10	0.10	9.80
AV	2.563M	21.09	46.00	-24.91	10.00	Neutral	-	11.09	0.10	0.10	9.80
QP	19.553M	23.38	60.00	-36.62	10.34	Neutral	-	13.04	0.39	0.12	9.83
AV	19.553M	19.29	50.00	-30.71	10.34	Neutral	-	8.95	0.39	0.12	9.83

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
Zigbee	1.85M	2.268M	2M27G1D	1.6M	2.23M

Max-N dB = Maximum 6dB down bandwidth; Max-OBW = Maximum 99% occupied bandwidth;
Min-N dB = Minimum 6dB down bandwidth; Min-OBW = Minimum 99% occupied bandwidth

Result

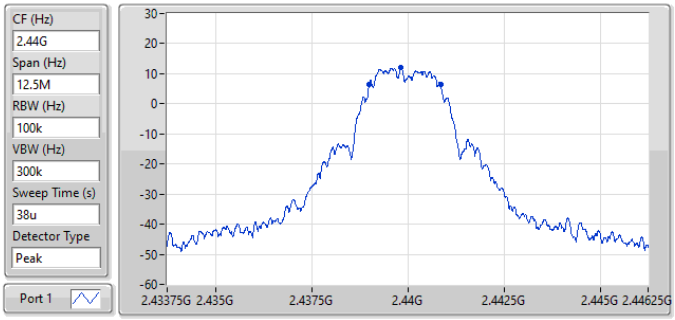
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
Zigbee	-	-	-	-
2405MHz	Pass	500k	1.6M	2.249M
2440MHz	Pass	500k	1.85M	2.23M
2475MHz	Pass	500k	1.844M	2.268M
2480MHz	Pass	500k	1.613M	2.236M

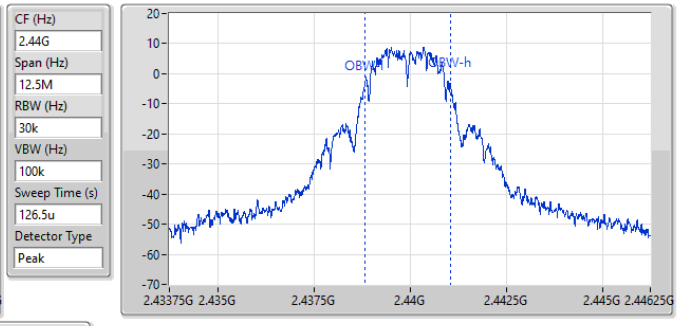
Port X-N dB = Port X 6dB down bandwidth;
Port X-OBW = Port X 99% occupied bandwidth

2.4-2.4835GHz_Zigbee **EBW-DTS**

2440MHz

17/06/2024





6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.85M	2.439006G	2.440856G	2.23M	2.438819G	2.441049G	500k	1

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
Zigbee	17.80	0.06026

Result

Mode	Result	DG (dBi)	Total Power (dBm)	Power Limit (dBm)
Zigbee	-	-	-	-
2405MHz	Pass	4.82	17.72	30.00
2440MHz	Pass	4.82	17.74	30.00
2475MHz	Pass	4.82	17.80	30.00
2480MHz	Pass	4.82	15.16	30.00

DG = Directional Gain; Port X = Port X output power;
Inf = There's no restriction for the limit.

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
Zigbee	2.14

RBW = 3kHz;

Result

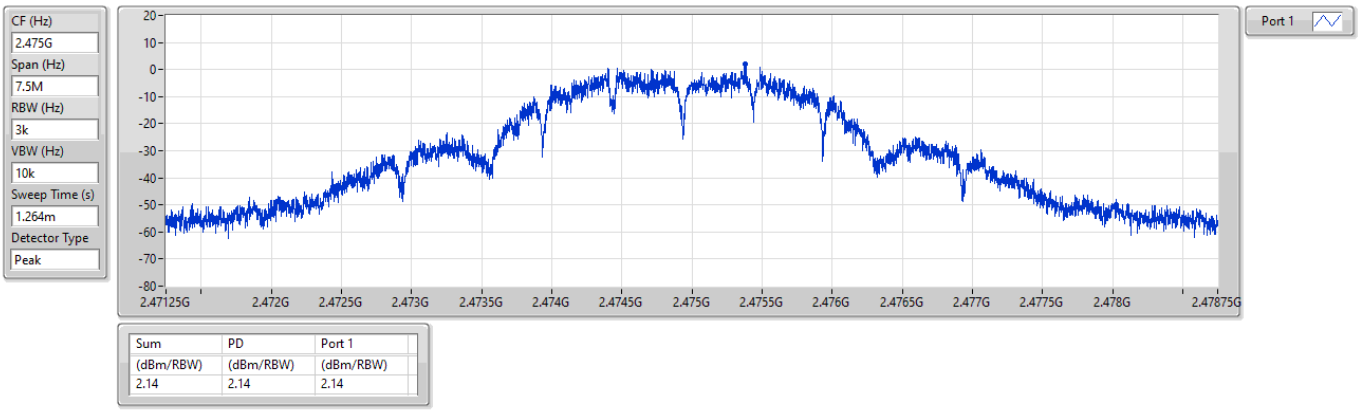
Mode	Result	DG (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
Zigbee	-	-	-	-
2405MHz	Pass	4.82	1.74	8.00
2440MHz	Pass	4.82	2.12	8.00
2475MHz	Pass	4.82	2.14	8.00
2480MHz	Pass	4.82	-0.90	8.00

DG = Directional Gain; RBW = 3kHz;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X Power Density;
Inf = There's no restriction for the limit.

2.4-2.4835GHz_Zigbee **PSD**

2475MHz

17/06/2024



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
2.14	2.14	2.14

Summary

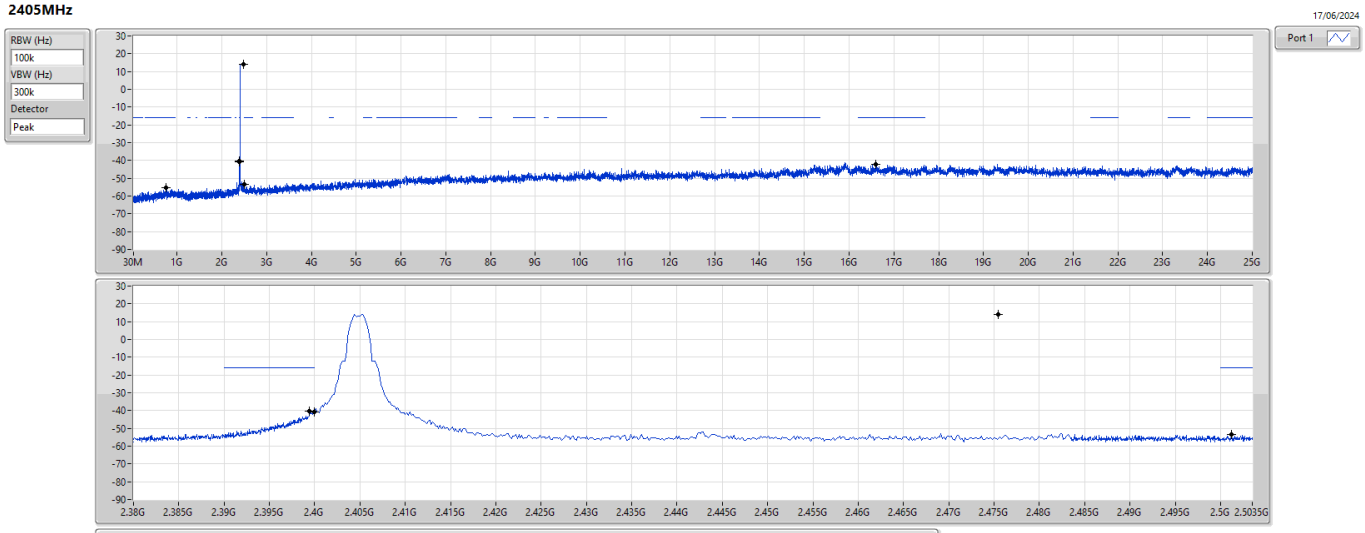
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zigbee	Pass	2.47548G	14.15	-15.85	750.28M	-55.35	2.39944G	-40.54	2.4G	-40.73	2.50122G	-53.29	16.59475G	-42.12	1

Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
Zigbee	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	2.47548G	14.15	-15.85	750.28M	-55.35	2.39944G	-40.54	2.4G	-40.73	2.50122G	-53.29	16.59475G	-42.12	1
2440MHz	Pass	2.47548G	14.15	-15.85	944.15M	-55.41	2.39988G	-53.57	2.4G	-56.34	2.5017G	-53.82	17.60428G	-41.63	1
2475MHz	Pass	2.47548G	14.15	-15.85	2.07803G	-55.77	2.39772G	-52.70	2.4G	-55.38	2.50026G	-53.33	17.62115G	-41.51	1
2480MHz	Pass	2.47548G	14.15	-15.85	2.07333G	-55.76	2.3988G	-53.46	2.4G	-57.04	2.50218G	-53.61	23.31839G	-41.00	1

2.4-2.4835GHz_Zigbee **CSENdB-DTS**

2405MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.47548G	14.15	-15.85	750.28M	-55.35	2.39944G	-40.54	2.4G	-40.73	2.50122G	-53.29	16.59475G	-42.12	1

Summary

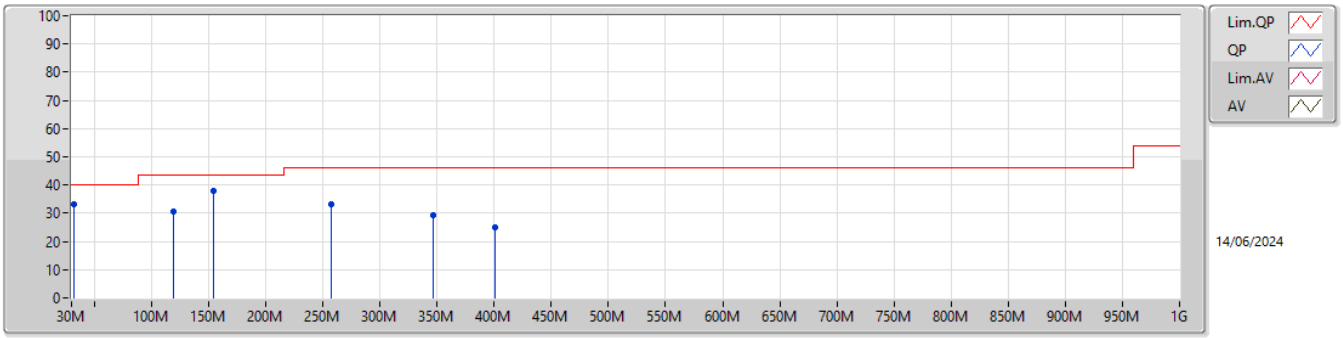
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-
Zigbee	Pass	PK	154.16M	37.85	43.50	-5.65	3	Vertical	0	1.00

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
Zigbee	-	-	-	-	-	-	-	-	-	-
2440MHz_Adapter	Pass	PK	31.94M	32.98	40.00	-7.02	3	Vertical	0	1.00
2440MHz_Adapter	Pass	PK	119.24M	30.42	43.50	-13.08	3	Vertical	0	1.00
2440MHz_Adapter	Pass	PK	154.16M	37.85	43.50	-5.65	3	Vertical	0	1.00
2440MHz_Adapter	Pass	PK	256.98M	33.26	46.00	-12.74	3	Vertical	0	1.00
2440MHz_Adapter	Pass	PK	346.22M	29.31	46.00	-16.69	3	Vertical	0	1.00
2440MHz_Adapter	Pass	PK	400.54M	24.85	46.00	-21.15	3	Vertical	0	1.00
2440MHz_Adapter	Pass	PK	30M	21.97	40.00	-18.03	3	Horizontal	360	1.00
2440MHz_Adapter	Pass	PK	152.22M	37.12	43.50	-6.38	3	Horizontal	360	1.00
2440MHz_Adapter	Pass	PK	253.1M	33.87	46.00	-12.13	3	Horizontal	360	1.00
2440MHz_Adapter	Pass	PK	346.22M	29.09	46.00	-16.91	3	Horizontal	360	1.00
2440MHz_Adapter	Pass	PK	402.48M	24.09	46.00	-21.91	3	Horizontal	360	1.00
2440MHz_Adapter	Pass	PK	476.2M	23.27	46.00	-22.73	3	Horizontal	360	1.00

2.4-2.4835GHz_Zigbee

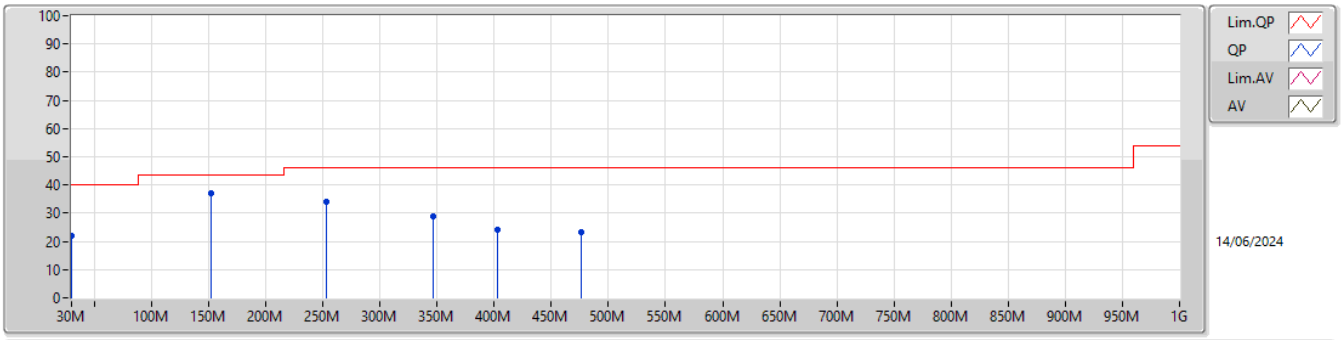
2440MHz_Adapter



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	(dBuV)	(dB)	(dB)	(dB)
PK	31.94M	32.98	40.00	-7.02	-20.11	3	Vertical	0	1.00	53.09	23.74	0.45	44.30
PK	119.24M	30.42	43.50	-13.08	-26.21	3	Vertical	0	1.00	56.63	17.51	0.83	44.55
PK	154.16M	37.85	43.50	-5.65	-26.53	3	Vertical	0	1.00	64.38	17.05	0.98	44.56
PK	256.98M	33.26	46.00	-12.74	-23.58	3	Vertical	0	1.00	56.84	19.61	1.16	44.35
PK	346.22M	29.31	46.00	-16.69	-22.37	3	Vertical	0	1.00	51.68	20.49	1.29	44.15
PK	400.54M	24.85	46.00	-21.15	-20.57	3	Vertical	0	1.00	45.42	22.00	1.45	44.02

2.4-2.4835GHz_Zigbee

2440MHz_Adapter



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	(dBuV)	(dB)	(dB)	(dB)
PK	30M	21.97	40.00	-18.03	-19.10	3	Horizontal	360	1.00	41.07	24.72	0.45	44.27
PK	152.22M	37.12	43.50	-6.38	-26.60	3	Horizontal	360	1.00	63.72	16.98	0.98	44.56
PK	253.1M	33.87	46.00	-12.13	-24.16	3	Horizontal	360	1.00	58.03	19.05	1.15	44.36
PK	346.22M	29.09	46.00	-16.91	-22.37	3	Horizontal	360	1.00	51.46	20.49	1.29	44.15
PK	402.48M	24.09	46.00	-21.91	-20.50	3	Horizontal	360	1.00	44.59	22.07	1.45	44.02
PK	476.2M	23.27	46.00	-22.73	-18.64	3	Horizontal	360	1.00	41.91	23.69	1.58	43.91

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-
Zigbee	Pass	AV	2.4835G	53.90	54.00	-0.10	3	Horizontal	54	2.11

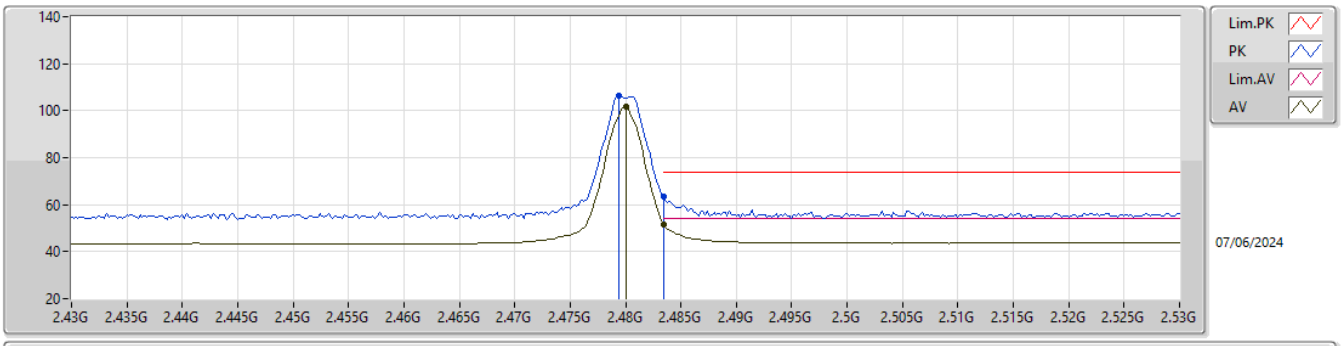
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
Zigbee	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	AV	2.3898G	43.01	54.00	-10.99	3	Vertical	11	1.14
2405MHz	Pass	AV	2.405G	103.91	Inf	-Inf	3	Vertical	11	1.14
2405MHz	Pass	PK	2.3562G	56.23	74.00	-17.77	3	Vertical	11	1.14
2405MHz	Pass	PK	2.4044G	108.14	Inf	-Inf	3	Vertical	11	1.14
2405MHz	Pass	AV	2.3664G	43.18	54.00	-10.82	3	Horizontal	60	1.95
2405MHz	Pass	AV	2.405G	106.65	Inf	-Inf	3	Horizontal	60	1.95
2405MHz	Pass	PK	2.3676G	55.78	74.00	-18.22	3	Horizontal	60	1.95
2405MHz	Pass	PK	2.4044G	110.89	Inf	-Inf	3	Horizontal	60	1.95
2405MHz	Pass	AV	4.80891G	30.38	54.00	-23.62	3	Vertical	18	1.50
2405MHz	Pass	PK	4.80886G	42.58	74.00	-31.42	3	Vertical	18	1.50
2405MHz	Pass	AV	4.80883G	29.63	54.00	-24.37	3	Horizontal	0	2.10
2405MHz	Pass	PK	4.80858G	42.47	74.00	-31.53	3	Horizontal	0	2.10
2440MHz	Pass	AV	2.3808G	43.00	54.00	-11.00	3	Vertical	15	1.00
2440MHz	Pass	AV	2.44G	105.42	Inf	-Inf	3	Vertical	15	1.00
2440MHz	Pass	AV	2.5G	43.72	54.00	-10.28	3	Vertical	15	1.00
2440MHz	Pass	PK	2.3528G	56.07	74.00	-17.93	3	Vertical	15	1.00
2440MHz	Pass	PK	2.4396G	109.66	Inf	-Inf	3	Vertical	15	1.00
2440MHz	Pass	PK	2.486G	57.68	74.00	-16.32	3	Vertical	15	1.00
2440MHz	Pass	AV	2.3852G	43.00	54.00	-11.00	3	Horizontal	45	2.01
2440MHz	Pass	AV	2.44G	107.20	Inf	-Inf	3	Horizontal	45	2.01
2440MHz	Pass	AV	2.5G	43.79	54.00	-10.21	3	Horizontal	45	2.01
2440MHz	Pass	PK	2.3796G	56.46	74.00	-17.54	3	Horizontal	45	2.01
2440MHz	Pass	PK	2.4392G	111.48	Inf	-Inf	3	Horizontal	45	2.01
2440MHz	Pass	PK	2.4996G	56.85	74.00	-17.15	3	Horizontal	45	2.01
2440MHz	Pass	AV	4.88087G	28.36	54.00	-25.64	3	Vertical	310	1.73
2440MHz	Pass	AV	7.3214G	38.85	54.00	-15.15	3	Vertical	35	1.48
2440MHz	Pass	PK	4.87884G	41.50	74.00	-32.50	3	Vertical	310	1.73
2440MHz	Pass	PK	7.3182G	50.83	74.00	-23.17	3	Vertical	35	1.48
2440MHz	Pass	AV	4.88093G	27.68	54.00	-26.32	3	Horizontal	49	1.03
2440MHz	Pass	AV	7.31831G	38.18	54.00	-15.82	3	Horizontal	337	1.50
2440MHz	Pass	PK	4.87888G	41.88	74.00	-32.12	3	Horizontal	49	1.03
2440MHz	Pass	PK	7.32129G	50.48	74.00	-23.52	3	Horizontal	337	1.50
2475MHz	Pass	AV	2.475G	104.22	Inf	-Inf	3	Vertical	360	1.02
2475MHz	Pass	AV	2.4835G	44.90	54.00	-9.10	3	Vertical	360	1.02
2475MHz	Pass	PK	2.4744G	108.40	Inf	-Inf	3	Vertical	360	1.02
2475MHz	Pass	PK	2.485G	57.08	74.00	-16.92	3	Vertical	360	1.02
2475MHz	Pass	AV	2.475G	106.85	Inf	-Inf	3	Horizontal	52	2.13
2475MHz	Pass	AV	2.4835G	45.74	54.00	-8.26	3	Horizontal	52	2.13
2475MHz	Pass	PK	2.4744G	111.05	Inf	-Inf	3	Horizontal	52	2.13
2475MHz	Pass	PK	2.4838G	58.59	74.00	-15.41	3	Horizontal	52	2.13
2475MHz	Pass	AV	4.94886G	29.68	54.00	-24.32	3	Vertical	23	1.50
2475MHz	Pass	AV	7.4234G	37.13	54.00	-16.87	3	Vertical	61	1.50
2475MHz	Pass	PK	4.95066G	42.75	74.00	-31.25	3	Vertical	23	1.50
2475MHz	Pass	PK	7.42664G	49.79	74.00	-24.21	3	Vertical	61	1.50
2475MHz	Pass	AV	4.95084G	30.60	54.00	-23.40	3	Horizontal	61	1.05
2475MHz	Pass	AV	7.42338G	38.08	54.00	-15.92	3	Horizontal	340	1.50
2475MHz	Pass	PK	4.95074G	42.68	74.00	-31.32	3	Horizontal	61	1.05
2475MHz	Pass	PK	7.42298G	50.41	74.00	-23.59	3	Horizontal	340	1.50
2480MHz	Pass	AV	2.48G	101.98	Inf	-Inf	3	Vertical	354	1.04
2480MHz	Pass	AV	2.4835G	51.70	54.00	-2.30	3	Vertical	354	1.04
2480MHz	Pass	PK	2.4794G	106.13	Inf	-Inf	3	Vertical	354	1.04
2480MHz	Pass	PK	2.4835G	63.28	74.00	-10.72	3	Vertical	354	1.04
2480MHz	Pass	AV	2.48G	104.89	Inf	-Inf	3	Horizontal	54	2.11
2480MHz	Pass	AV	2.4835G	53.90	54.00	-0.10	3	Horizontal	54	2.11
2480MHz	Pass	PK	2.4794G	109.08	Inf	-Inf	3	Horizontal	54	2.11
2480MHz	Pass	PK	2.4835G	65.48	74.00	-8.52	3	Horizontal	54	2.11
2480MHz	Pass	AV	4.96095G	29.82	54.00	-24.18	3	Vertical	22	1.50
2480MHz	Pass	AV	7.44139G	36.26	54.00	-17.74	3	Vertical	55	1.50
2480MHz	Pass	PK	4.95917G	44.40	74.00	-29.60	3	Vertical	22	1.50
2480MHz	Pass	PK	7.44149G	48.63	74.00	-25.37	3	Vertical	55	1.50

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
2480MHz	Pass	AV	4.96091G	29.98	54.00	-24.02	3	Horizontal	65	1.09
2480MHz	Pass	AV	7.44154G	36.41	54.00	-17.59	3	Horizontal	341	1.39
2480MHz	Pass	PK	4.95869G	42.51	74.00	-31.49	3	Horizontal	65	1.09
2480MHz	Pass	PK	7.43813G	48.98	74.00	-25.02	3	Horizontal	341	1.39

2.4-2.4835GHz_Zigbee

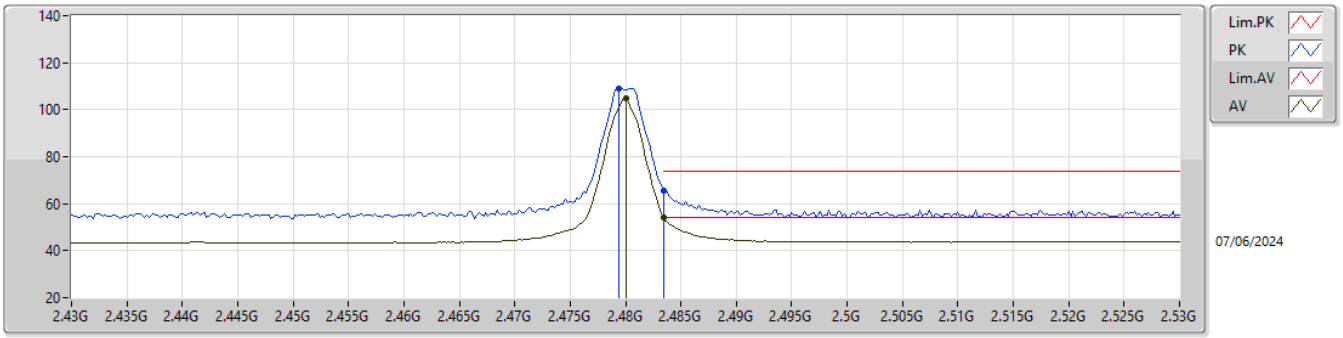
2480MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	(dBuV)	(dB)	(dB)	(dB)
AV	2.48G	101.98	Inf	-Inf	31.10	3	Vertical	354	1.04	70.88	27.90	3.20	-
AV	2.4835G	51.70	54.00	-2.30	31.15	3	Vertical	354	1.04	20.55	27.94	3.21	-
PK	2.4794G	106.13	Inf	-Inf	31.09	3	Vertical	354	1.04	75.04	27.89	3.20	-
PK	2.4835G	63.28	74.00	-10.72	31.15	3	Vertical	354	1.04	32.13	27.94	3.21	-

2.4-2.4835GHz_Zigbee

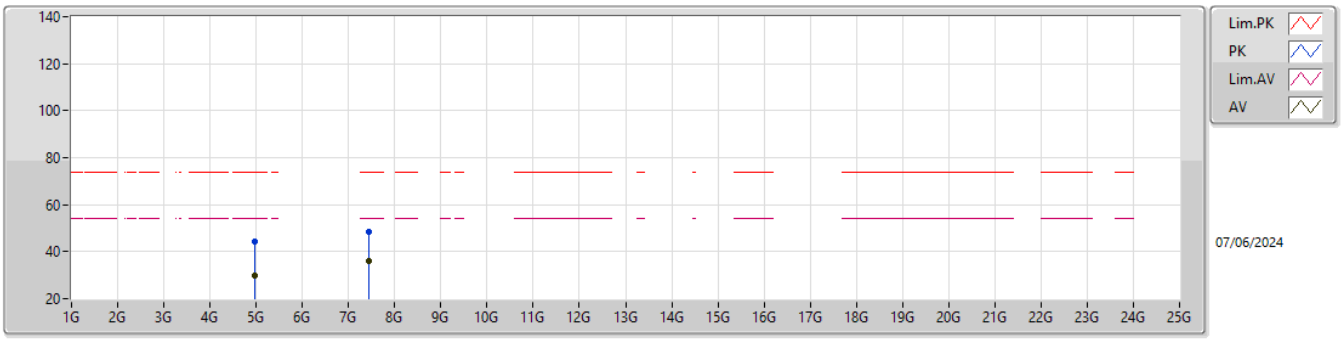
2480MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	(dBuV)	(dB)	(dB)	(dB)
AV	2.48G	104.89	Inf	-Inf	31.10	3	Horizontal	54	2.11	73.79	27.90	3.20	-
AV	2.4835G	53.90	54.00	-0.10	31.15	3	Horizontal	54	2.11	22.75	27.94	3.21	-
PK	2.4794G	109.08	Inf	-Inf	31.09	3	Horizontal	54	2.11	77.99	27.89	3.20	-
PK	2.4835G	65.48	74.00	-8.52	31.15	3	Horizontal	54	2.11	34.33	27.94	3.21	-

2.4-2.4835GHz_Zigbee

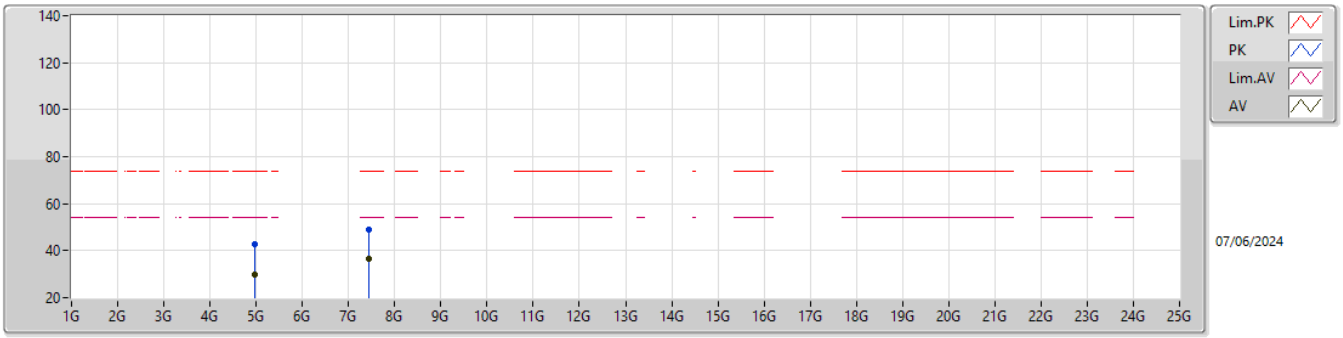
2480MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	(dBuV)	(dB)	(dB)	(dB)
AV	4.96095G	29.82	54.00	-24.18	-6.03	3	Vertical	22	1.50	35.85	33.31	4.70	44.04
AV	7.44139G	36.26	54.00	-17.74	-1.01	3	Vertical	55	1.50	37.27	36.53	6.03	43.57
PK	4.95917G	44.40	74.00	-29.60	-6.05	3	Vertical	22	1.50	50.45	33.29	4.70	44.04
PK	7.44149G	48.63	74.00	-25.37	-1.01	3	Vertical	55	1.50	49.64	36.53	6.03	43.57

2.4-2.4835GHz_Zigbee

2480MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)	(dBuV)	(dB)	(dB)	(dB)
AV	4.96091G	29.98	54.00	-24.02	-6.03	3	Horizontal	65	1.09	36.01	33.31	4.70	44.04
AV	7.44154G	36.41	54.00	-17.59	-1.01	3	Horizontal	341	1.39	37.42	36.53	6.03	43.57
PK	4.95869G	42.51	74.00	-31.49	-6.06	3	Horizontal	65	1.09	48.57	33.29	4.69	44.04
PK	7.43813G	48.98	74.00	-25.02	-0.98	3	Horizontal	341	1.39	49.96	36.55	6.04	43.57

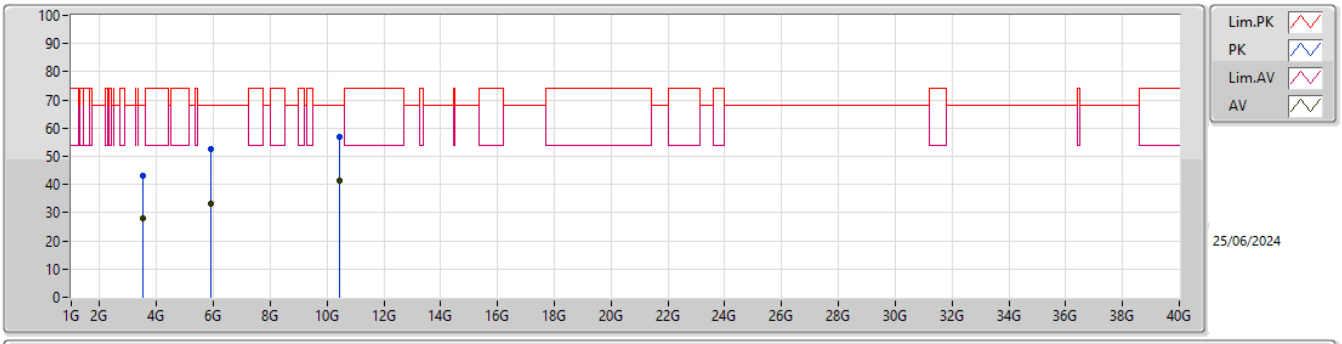
Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	PK	10.15519G	57.30	68.20	-10.90	Horizontal
Mode 2	Pass	PK	10.4542G	56.87	68.20	-11.33	Vertical

Result

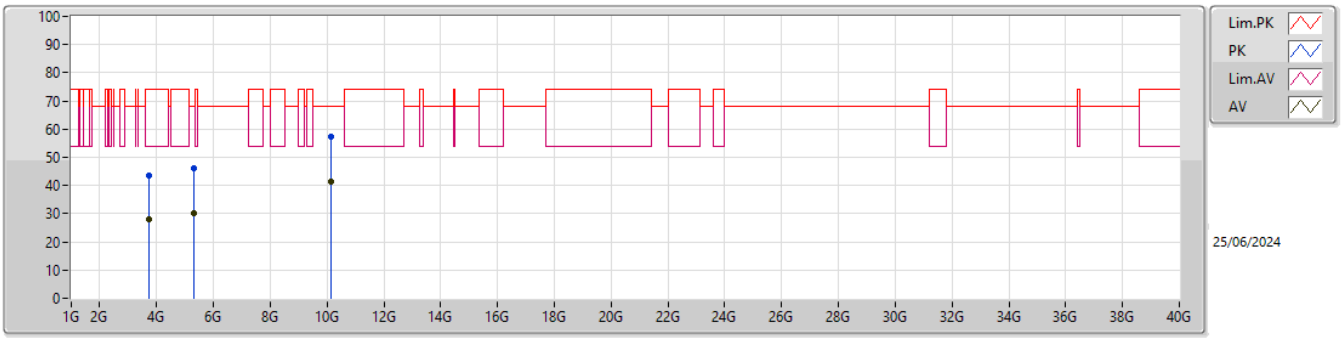
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
Mode 1	Pass	AV	3.52555G	27.81	68.20	-40.39	3	Vertical	46	1.81
Mode 1	Pass	AV	5.8998G	33.02	68.20	-35.18	3	Vertical	249	1.81
Mode 1	Pass	AV	10.42568G	41.20	68.20	-27.00	3	Vertical	54	1.18
Mode 1	Pass	PK	3.52555G	43.15	68.20	-25.05	3	Vertical	46	1.81
Mode 1	Pass	PK	5.8998G	52.78	68.20	-15.42	3	Vertical	249	1.81
Mode 1	Pass	PK	10.42568G	57.04	68.20	-11.16	3	Vertical	54	1.18
Mode 1	Pass	AV	3.75029G	28.09	54.00	-25.91	3	Horizontal	58	2.12
Mode 1	Pass	AV	5.29941G	29.97	68.20	-38.23	3	Horizontal	99	2.38
Mode 1	Pass	AV	10.15519G	41.41	68.20	-26.79	3	Horizontal	129	2.11
Mode 1	Pass	PK	3.75029G	43.42	74.00	-30.58	3	Horizontal	58	2.12
Mode 1	Pass	PK	5.29941G	45.93	68.20	-22.27	3	Horizontal	99	2.38
Mode 1	Pass	PK	10.15519G	57.30	68.20	-10.90	3	Horizontal	129	2.11
Mode 2	Pass	AV	3.07287G	27.63	68.20	-40.57	3	Vertical	103	1.93
Mode 2	Pass	AV	7.79388G	37.12	68.20	-31.08	3	Vertical	222	1.36
Mode 2	Pass	AV	10.4542G	41.33	68.20	-26.87	3	Vertical	147	2.45
Mode 2	Pass	PK	3.07287G	43.50	68.20	-24.70	3	Vertical	103	1.93
Mode 2	Pass	PK	7.79388G	53.06	68.20	-15.14	3	Vertical	222	1.36
Mode 2	Pass	PK	10.4542G	56.87	68.20	-11.33	3	Vertical	147	2.45
Mode 2	Pass	AV	3.06823G	27.85	68.20	-40.35	3	Horizontal	177	2.41
Mode 2	Pass	AV	6.48987G	33.96	68.20	-34.24	3	Horizontal	227	2.31
Mode 2	Pass	AV	10.05356G	40.64	68.20	-27.56	3	Horizontal	255	1.52
Mode 2	Pass	PK	3.06823G	43.18	68.20	-25.02	3	Horizontal	177	2.41
Mode 2	Pass	PK	6.48987G	55.32	68.20	-12.88	3	Horizontal	227	2.31
Mode 2	Pass	PK	10.05356G	55.92	68.20	-12.28	3	Horizontal	255	1.52

Radiated Emissions above 1GHz_Mode 1



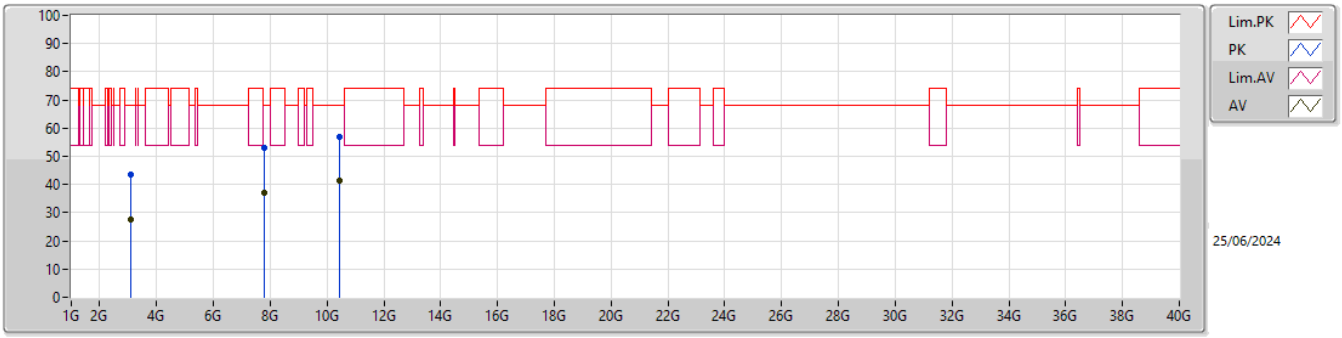
Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB/m)	(m)		(°)	(m)	(dBuV)	(dB/m)	(dB)	(dB)
AV	3.52555G	27.81	68.20	-40.39	-1.03	3	Vertical	46	1.81	28.84	29.65	6.63	37.31
AV	5.8998G	33.02	68.20	-35.18	5.85	3	Vertical	249	1.81	27.17	34.50	8.39	37.04
AV	10.42568G	41.20	68.20	-27.00	12.63	3	Vertical	54	1.18	28.57	39.10	11.05	37.52
PK	3.52555G	43.15	68.20	-25.05	-1.03	3	Vertical	46	1.81	44.18	29.65	6.63	37.31
PK	5.8998G	52.78	68.20	-15.42	5.85	3	Vertical	249	1.81	46.93	34.50	8.39	37.04
PK	10.42568G	57.04	68.20	-11.16	12.63	3	Vertical	54	1.18	44.41	39.10	11.05	37.52

Radiated Emissions above 1GHz_Mode 1



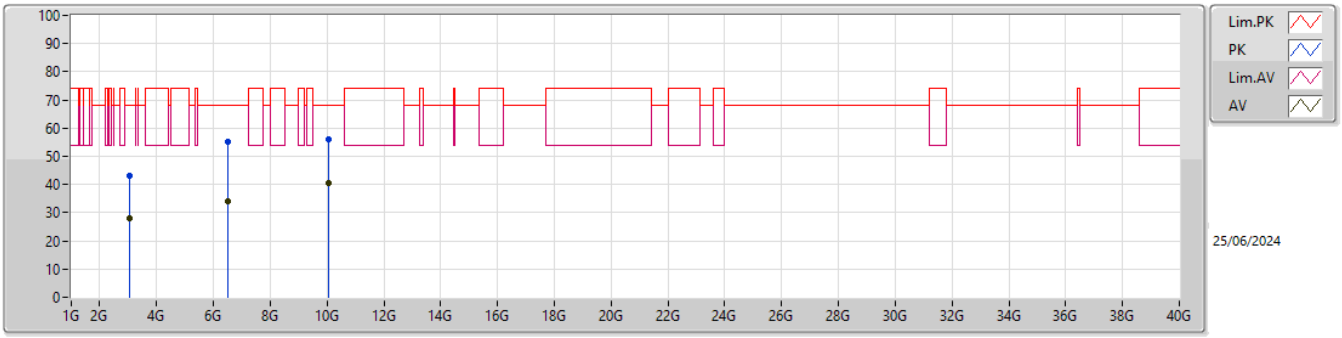
Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB/m)	(m)		(°)	(m)	(dBuV)	(dB/m)	(dB)	(dB)
AV	3.75029G	28.09	54.00	-25.91	-0.42	3	Horizontal	58	2.12	28.51	30.20	6.83	37.45
AV	5.29941G	29.97	68.20	-38.23	3.73	3	Horizontal	99	2.38	26.24	33.00	8.01	37.28
AV	10.15519G	41.41	68.20	-26.79	12.54	3	Horizontal	129	2.11	28.87	39.00	11.12	37.58
PK	3.75029G	43.42	74.00	-30.58	-0.42	3	Horizontal	58	2.12	43.84	30.20	6.83	37.45
PK	5.29941G	45.93	68.20	-22.27	3.73	3	Horizontal	99	2.38	42.20	33.00	8.01	37.28
PK	10.15519G	57.30	68.20	-10.90	12.54	3	Horizontal	129	2.11	44.76	39.00	11.12	37.58

Radiated Emissions above 1GHz_Mode 2



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB/m)	(m)		(°)	(m)	(dBuV)	(dB/m)	(dB)	(dB)
AV	3.07287G	27.63	68.20	-40.57	9.93	3	Vertical	103	1.93	28.82	29.70	6.14	37.03
AV	7.79388G	37.12	68.20	-31.08	9.95	3	Vertical	222	1.36	27.17	37.08	9.73	36.86
AV	10.4542G	41.33	68.20	-26.87	12.62	3	Vertical	147	2.45	28.71	39.09	11.04	37.51
PK	3.07287G	43.50	68.20	-24.70	-1.19	3	Vertical	103	1.93	44.69	29.70	6.14	37.03
PK	7.79388G	53.06	68.20	-15.14	9.95	3	Vertical	222	1.36	43.11	37.08	9.73	36.86
PK	10.4542G	56.87	68.20	-11.33	12.62	3	Vertical	147	2.45	44.25	39.09	11.04	37.51

Radiated Emissions above 1GHz_Mode 2



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB/m)	(m)		(°)	(m)	(dBuV)	(dB/m)	(dB)	(dB)
AV	3.06823G	27.85	68.20	-40.35	-1.18	3	Horizontal	177	2.41	29.03	29.70	6.14	37.02
AV	6.48987G	33.96	68.20	-34.24	7.55	3	Horizontal	227	2.31	26.41	35.44	8.88	36.77
AV	10.05356G	40.64	68.20	-27.56	12.54	3	Horizontal	255	1.52	28.10	39.00	11.15	37.61
PK	3.06823G	43.18	68.20	-25.02	-1.18	3	Horizontal	177	2.41	44.36	29.70	6.14	37.02
PK	6.48987G	55.32	68.20	-12.88	7.55	3	Horizontal	227	2.31	47.77	35.44	8.88	36.77
PK	10.05356G	55.92	68.20	-12.28	12.54	3	Horizontal	255	1.52	43.38	39.00	11.15	37.61