FCC Radio Test Report

FCC ID	:	**2BE5ALIVAX3A**
Equipment	:	**Box PC**
Brand Name	:	**LIVA**
Model Name	:	**LIVA X3A**
Applicant	:	**ECS Industrial Computer Co., Ltd. 9F, No. 22,Sec. 3, Zhongshan N. Rd., Zhongshan Dist., Taipei City 104427 , Taiwan (R.O.C)**
Manufacturer	:	**ECS Industrial Computer Co., Ltd. 9F, No. 22,Sec. 3, Zhongshan N. Rd., Zhongshan Dist., Taipei City 104427 , Taiwan (R.O.C)**
Standard	:	**47 CFR FCC Part 15.247**

The product was received on Jan. 30, 2024, and testing was started from Mar. 02, 2024 and completed on Mar. 10, 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.)

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PHOTOGRAPHS OF EUT V01

History of this test report

Report No.	Version	Description	Issued Date
FR412914AL	01	Initial issue of report	Apr. 19, 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)	Bluetooth Mode	Ch. Frequency (MHz)	Channel Number
2400-2483.5	LE	2402-2480	0-39 [40]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	BT-LE(125kbps)	1.0	1TX
2.4-2.4835GHz	BT-LE(500kbps)	1.0	1TX
2.4-2.4835GHz	BT-LE(1Mbps)	1.0	1TX
2.4-2.4835GHz	BT-LE(2Mbps)	2.0	1TX

Note:
- Bluetooth LE uses a GFSK (125kbps/500kbps/1Mbps/2Mbps) modulation.
- BWch is the nominal channel bandwidth.
- Bluetooth LE 125k/500k/1Mbps uses the same modulation, and 1Mbps was found to be the worst case scenario which was performed full test and recorded in this test report.

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector
1	VSO	JC1Q02078	Dipole	SMA FEMALE
2	VSO	JC1Q02078	Dipole	SMA FEMALE

Ant.	Port	Gain (dBi)					
		2.4G	UNII-1	UNII-2A	UNII-2C	UNII-3	BT
1	1	2	3.4	3.6	4.1	4.4	2
2	2	2	3.4	3.6	4.1	4.4	-

Note 1: The EUT has two antennas.

For 2.4GHz function:

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

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

For BT function:

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

Ant. 1 (port 1) could transmit/receive.

For 5GHz function:

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

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

1.1.3 EUT Information

Operational Condition				
EUT Power Type	From AC Adapter			
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
BT-LE(1Mbps)	0.849	0.71	2.124m	1k
BT-LE(2Mbps)	0.57	2.44	1.07m	1k

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

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	Edward Wang	19.5~23.4°C / 50~54%	10/Mar/2024
RF Conducted	TH07-HY	Raven Chien	22.2~23.4°C / 50~57%	07/Mar/2024
Radiated	03CH03-HY	Edward Wang	19.5~23.4°C / 50~54%	02/Mar/2024~10/Mar/2024
☐ Wen 33rd.St. (**TAF:** 3785)	**ADD:** No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)			
	TEL: 886-3-318-0787		**FAX:** 886-3-318-0287	
Test site Designation No. TW0008 with FCC.				

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	Microsoft Windows V6.1

Mode	Power Setting
BT-LE(1Mbps)	-
2402MHz	Default
2440MHz	Default
2480MHz	Default
BT-LE(2Mbps)	-
2402MHz	Default
2440MHz	Default
2480MHz	Default

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

2.3 Accessories

Accessories				
AC Adapter	**Brand Name**	FSP	**Model Name**	FSP045-RBBN3
	Power Rating	I/P: 100 - 240Vac, 1.5A, O/P: 19Vdc, 2.37A		
	DC Power Cord	1.2 meter, shielded cable, with ferrite core		
	AC Power cord	1.8 meter, non-shielded cable, w/o ferrite core		
mounting bracket	**Brand Name**	LIVA	**Model Name**	20-060-XR1031
DIN rail clip	**Brand Name**	LIVA	**Model Name**	20-060PXR1011
Optional Box 1 (PoE function)	**Brand Name**	LIVA	**Model Name**	RT7670
Optional Box 2 (LTE function) (without module)	**Brand Name**	LIVA	**Model Name**	LTE BOX

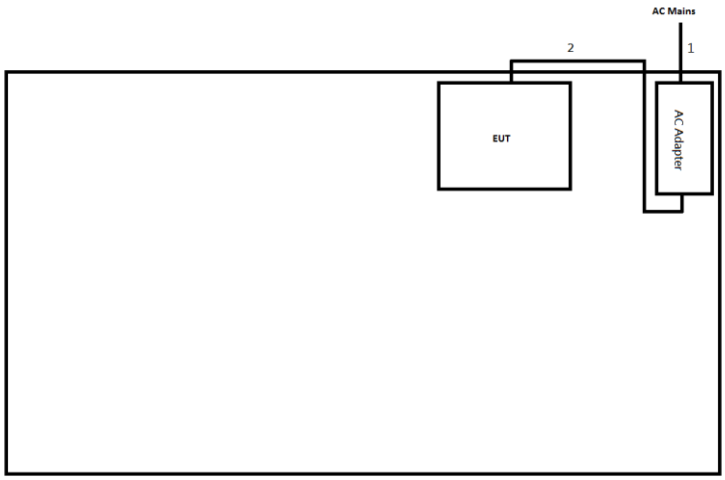
Reminder: Regarding to more detail and other information, please refer to user manual.

2.4 Support Equipment

Support Equipment – Conducted					
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**	**Remark**
1	Notebook	DELL	E5410	-	-
2	Adapter for NB	DELL	HA65NM130	-	-

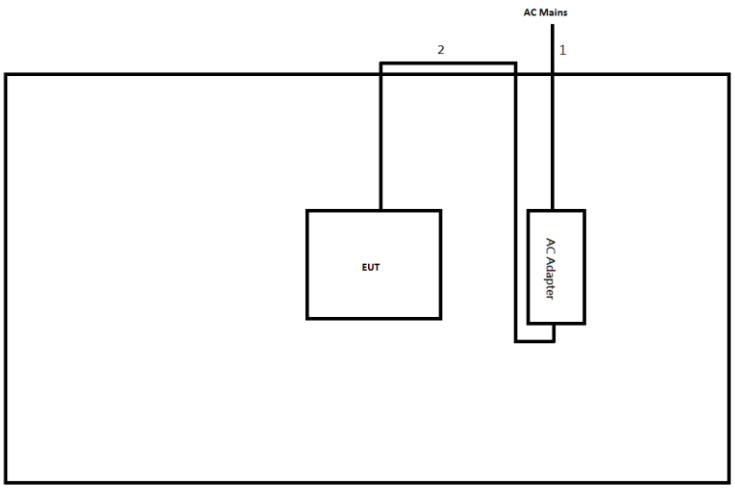
2.5 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Item	Connection	Shielded	Length(m)
1	Power cord	No	1.8
2	DC Power Cable	Yes	1.2

Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length(m)
1	Power cord	No	1.8
2	DC Power Cable	Yes	1.2

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

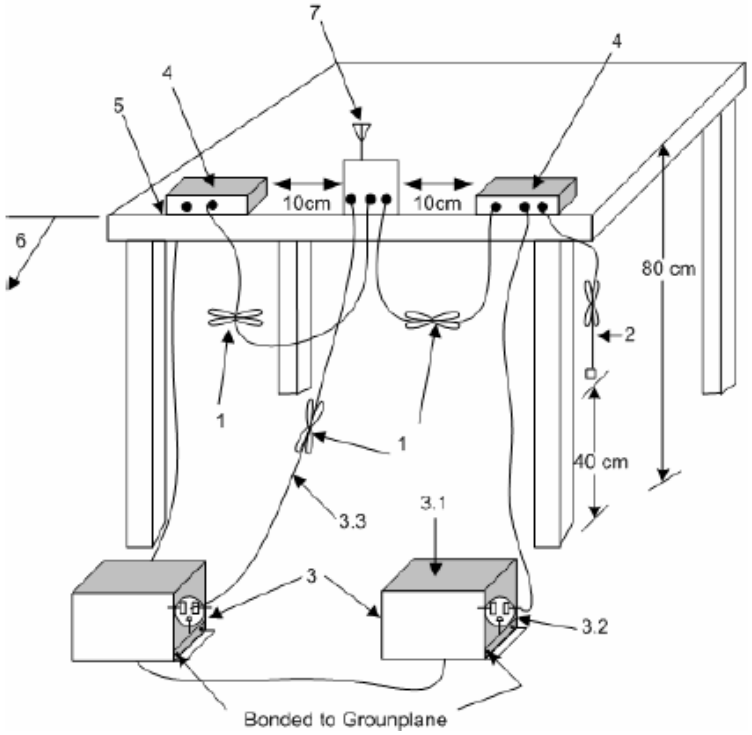
Test Method
▪ Refer as ANSI C63.10-2013, clause 6.2 foray power-line conducted emissions.

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

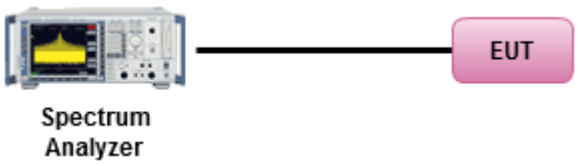
Refer a test equipment and calibration data table in this test report.

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 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

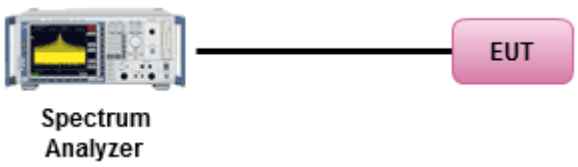
3.4.2 Measuring Instruments

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

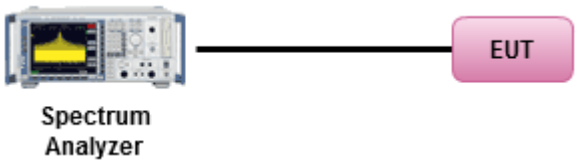
Refer a test equipment and calibration data table in this test report.

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 below30 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.
▪ 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.

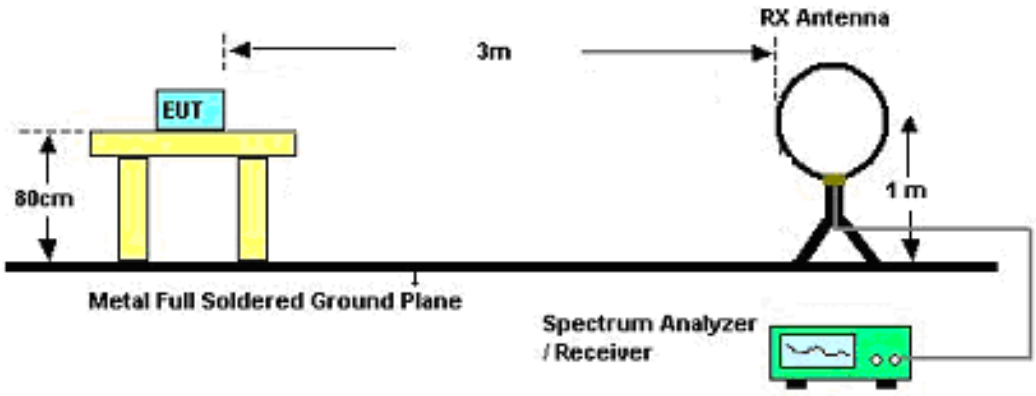
3.6.4 Measurement Results Calculation

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

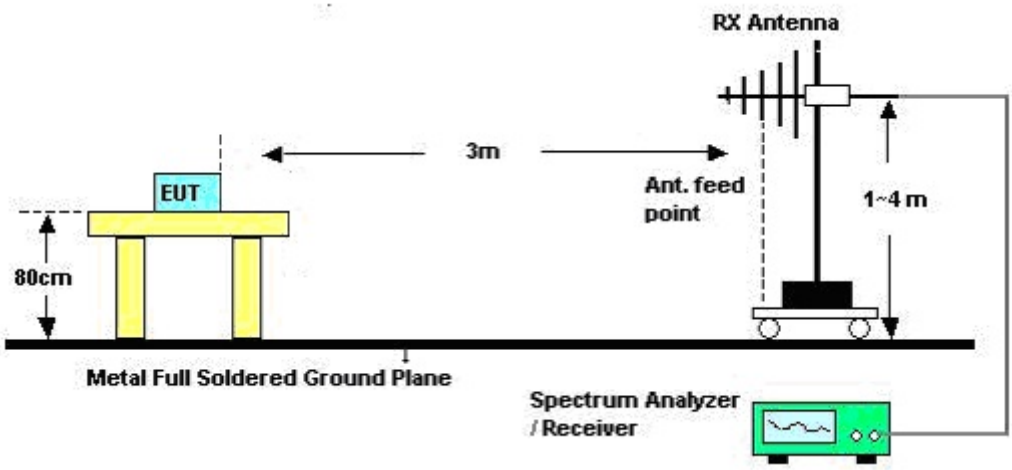
3.6.5 Test Setup

Emissions in Restricted Frequency Bands

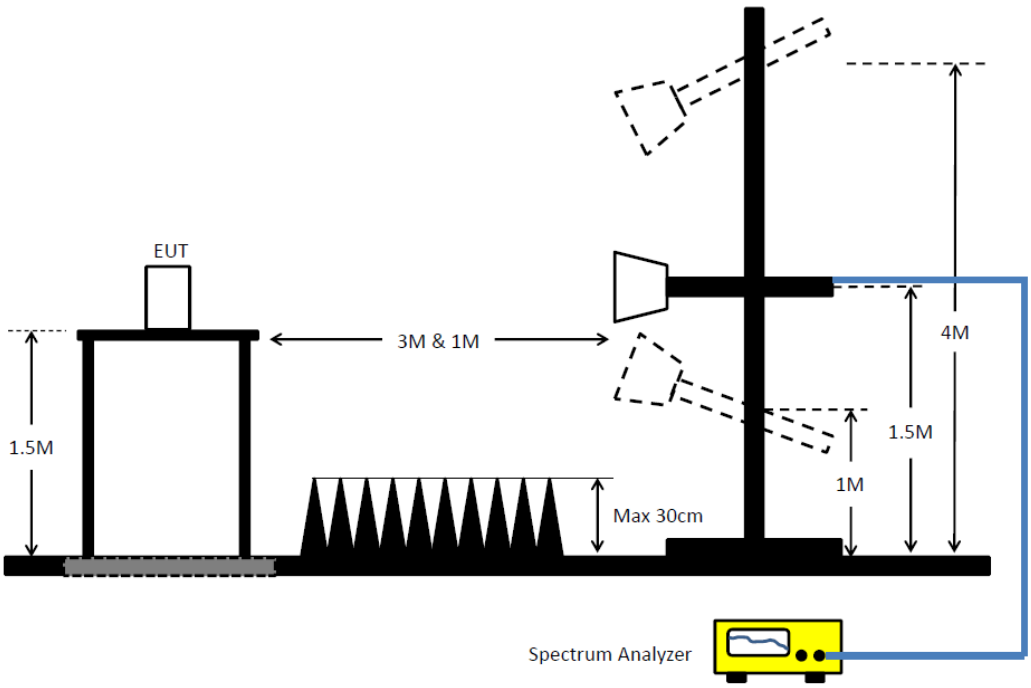
9kHz ~30MHz



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	16/May/2023	15/May/2024
Two-Line V-Network	R&S	ENV 216	101295	9kHz ~ 30MHz	05/Feb/2024	04/Feb/2025
RF Cable 5m	TITAN	TITAN	CO04-cable-01	9kHz ~ 200MHz	27/Feb/2024	26/Feb/2025
Impuls Begrenzer Pulse Limiter	SCHWARZBECK	VTSD 9561-F	9561-F041	9kHz ~ 30MHz	18/Oct/2023	17/Oct/2024
Sporton	SENSE-EMI	V5.11.3	NA	NA	NA	NA

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	101515	9kHz~40GHz	02/Feb/2024	01/Feb/2025
SMB100A Signal Generator	R&S	SMB100A	181147	100kHz~40GHz	20/Oct/2023	19/Oct/2024
Power Meter	Anritsu	ML2495A	1517010	300MHz~40GHz	15/Dec/2023	14/Dec/2024
Pulse Sensor	Anritsu	MA2411B	1339407	300MHz~40GHz	15/Dec/2023	14/Dec/2024
SENSE-15247_FS	Sporton	V5.11.16	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	SIDT FRANKONIA	SAC-3M	03CH03-HY	1GHz~18GHz 3m	28/Jul/2023	27/Jul/2024
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	30/Jul/2023	29/Jul/2024
EMI Test Receiver	R&S	ESR3	102051	9kHz~3.6GHz	16/May/2023	15/May/2024
Signal Analyzer	R&S	FSV40	101500	10Hz~40GHz	26/Oct/2023	25/Oct/2024
Loop Antenna	TESEQ	HLA 6120	31244	9kHz~30MHz	23/Mar/2023	22/Mar/2024
Bilog Antenna & 6dB Attenuator	SCHAFFNER / EMCI	CBL6112B / N-6-05	22237 / AT-N-0603	30MHz~1GHz	15/Oct/2023	14/Oct/2024
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	02267	1GHz~18GHz	04/Oct/2023	03/Oct/2024
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	01248	18GHz ~ 40GHz	21/Aug/2023	20/Aug/2024
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz~30MHz	13/Jun/2023	12/Jun/2024
RF Cable-R03m	Jye Bao	RG142	03CH03-cable-02	30MHz~1GHz	13/Jun/2023	12/Jun/2024
RF CABLE 5+8 m	HUBER+SUHNER	SUOFLEX 104	03CH03-cable-03	1GHz~40GHz	20/Feb/2024	19/Feb/2025
Amplifier	Aglient	8447D	2944A08033	100kHz~1.3GHz	14/Sep/2023	13/Sep/2024
Microwave Preamplifier	Agilent	8449B	3008A02326	1GHz~26.5GHz	26/Jul/2023	25/Jul/2024
Microwave Preamplifier	EMC INSTRUMENTS	EM18G40G	060604	18GHz ~ 40GHz	16/Mar/2023	15/Mar/2024
SENSE-15247_FS	Sporton	V5.11.16	N/A	N/A	N/A	N/A

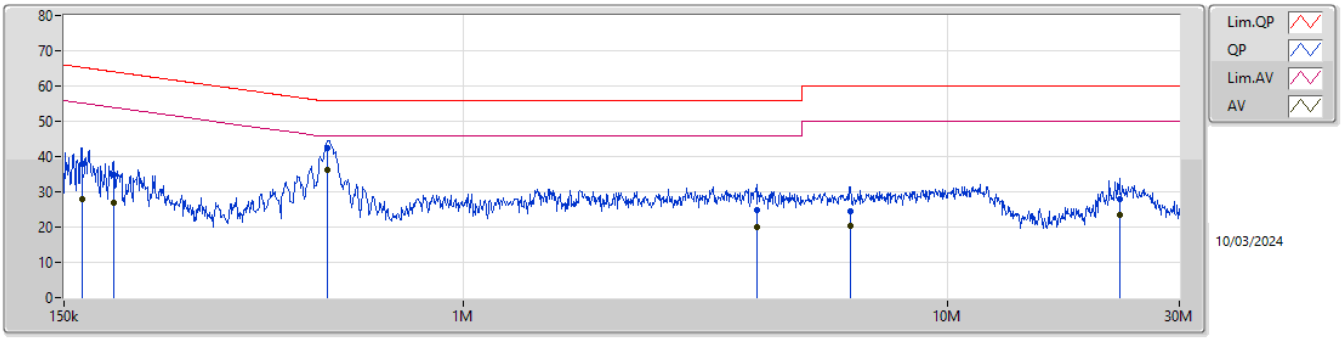
Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	AV	529.596k	37.99	46.00	-8.01	Neutral

Result

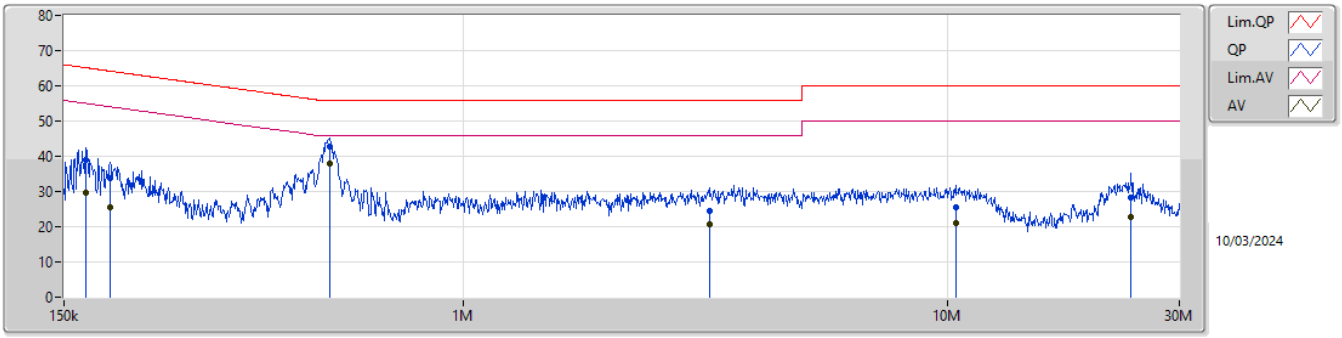
Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	QP	163.117k	37.94	65.31	-27.37	Line
Mode 1	Pass	AV	163.117k	27.87	55.31	-27.44	Line
Mode 1	Pass	QP	189.837k	34.92	64.05	-29.13	Line
Mode 1	Pass	AV	189.837k	26.95	54.05	-27.10	Line
Mode 1	Pass	QP	523.291k	42.36	56.00	-13.64	Line
Mode 1	Pass	AV	523.291k	36.28	46.00	-9.72	Line
Mode 1	Pass	QP	4.024M	24.80	56.00	-31.20	Line
Mode 1	Pass	AV	4.024M	20.16	46.00	-25.84	Line
Mode 1	Pass	QP	6.293M	24.45	60.00	-35.55	Line
Mode 1	Pass	AV	6.293M	20.33	50.00	-29.67	Line
Mode 1	Pass	QP	22.575M	27.87	60.00	-32.13	Line
Mode 1	Pass	AV	22.575M	23.47	50.00	-26.53	Line
Mode 1	Pass	QP	166.406k	38.83	65.14	-26.31	Neutral
Mode 1	Pass	AV	166.406k	29.55	55.14	-25.59	Neutral
Mode 1	Pass	QP	186.83k	33.70	64.18	-30.48	Neutral
Mode 1	Pass	AV	186.83k	25.53	54.18	-28.65	Neutral
Mode 1	Pass	QP	529.596k	42.68	56.00	-13.32	Neutral
Mode 1	Pass	AV	529.596k	37.99	46.00	-8.01	Neutral
Mode 1	Pass	QP	3.218M	24.59	56.00	-31.41	Neutral
Mode 1	Pass	AV	3.218M	20.61	46.00	-25.39	Neutral
Mode 1	Pass	QP	10.365M	25.60	60.00	-34.40	Neutral
Mode 1	Pass	AV	10.365M	21.03	50.00	-28.97	Neutral
Mode 1	Pass	QP	23.873M	28.26	60.00	-31.74	Neutral
Mode 1	Pass	AV	23.873M	22.85	50.00	-27.15	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	163.117k	37.94	65.31	-27.37	19.42	Line	-	18.52	9.61	0.07	9.74
AV	163.117k	27.87	55.31	-27.44	19.42	Line	-	8.45	9.61	0.07	9.74
QP	189.837k	34.92	64.05	-29.13	19.39	Line	-	15.53	9.61	0.09	9.69
AV	189.837k	26.95	54.05	-27.10	19.39	Line	-	7.56	9.61	0.09	9.69
QP	523.291k	42.36	56.00	-13.64	19.49	Line	-	22.87	9.61	0.11	9.77
AV	523.291k	36.28	46.00	-9.72	19.49	Line	-	16.79	9.61	0.11	9.77
QP	4.024M	24.80	56.00	-31.20	19.50	Line	-	5.30	9.64	0.07	9.79
AV	4.024M	20.16	46.00	-25.84	19.50	Line	-	0.66	9.64	0.07	9.79
QP	6.293M	24.45	60.00	-35.55	19.50	Line	-	4.95	9.65	0.06	9.79
AV	6.293M	20.33	50.00	-29.67	19.50	Line	-	0.83	9.65	0.06	9.79
QP	22.575M	27.87	60.00	-32.13	19.52	Line	-	8.35	9.55	0.13	9.84
AV	22.575M	23.47	50.00	-26.53	19.52	Line	-	3.95	9.55	0.13	9.84

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	166.406k	38.83	65.14	-26.31	19.42	Neutral	-	19.41	9.62	0.07	9.73
AV	166.406k	29.55	55.14	-25.59	19.42	Neutral	-	10.13	9.62	0.07	9.73
QP	186.83k	33.70	64.18	-30.48	19.39	Neutral	-	14.31	9.61	0.08	9.70
AV	186.83k	25.53	54.18	-28.65	19.39	Neutral	-	6.14	9.61	0.08	9.70
QP	529.596k	42.68	56.00	-13.32	19.49	Neutral	-	23.19	9.61	0.11	9.77
AV	529.596k	37.99	46.00	-8.01	19.49	Neutral	-	18.50	9.61	0.11	9.77
QP	3.218M	24.59	56.00	-31.41	19.50	Neutral	-	5.09	9.63	0.08	9.79
AV	3.218M	20.61	46.00	-25.39	19.50	Neutral	-	1.11	9.63	0.08	9.79
QP	10.365M	25.60	60.00	-34.40	19.53	Neutral	-	6.07	9.69	0.05	9.79
AV	10.365M	21.03	50.00	-28.97	19.53	Neutral	-	1.50	9.69	0.05	9.79
QP	23.873M	28.26	60.00	-31.74	19.67	Neutral	-	8.59	9.69	0.13	9.85
AV	23.873M	22.85	50.00	-27.15	19.67	Neutral	-	3.18	9.69	0.13	9.85

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
BT-LE(1Mbps)	745k	1.065M	1M07F1D	618.75k	1.05M
BT-LE(2Mbps)	1.538M	2.094M	2M09F1D	1.398M	2.075M

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

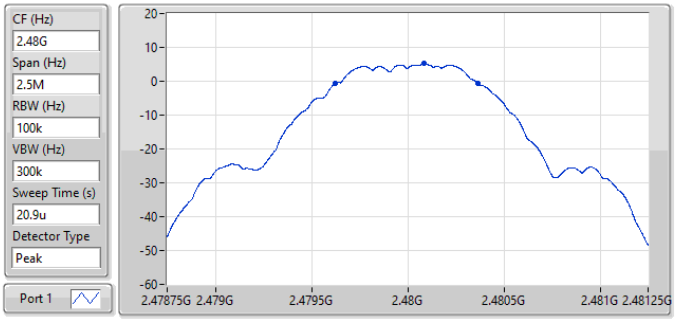
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	500k	618.75k	1.05M
2440MHz	Pass	500k	741.25k	1.065M
2480MHz	Pass	500k	745k	1.052M
BT-LE(2Mbps)	-	-	-	-
2402MHz	Pass	500k	1.528M	2.094M
2440MHz	Pass	500k	1.538M	2.075M
2480MHz	Pass	500k	1.398M	2.093M

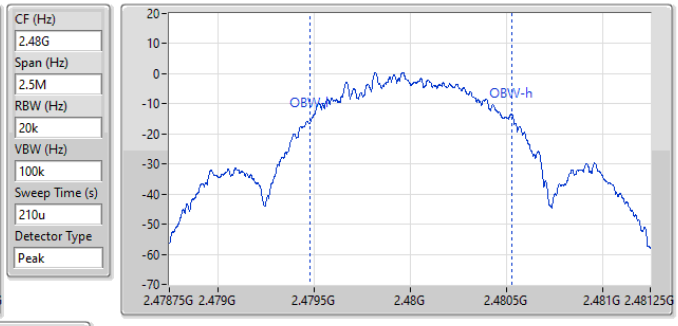
Port X-N dB = Port X 6dB down bandwidth;
Port X-OBW = Port X 99% occupied bandwidth

2.4-2.4835GHz_BT-LE(1Mbps) **EBW-DTS**

2480MHz

07/03/2024



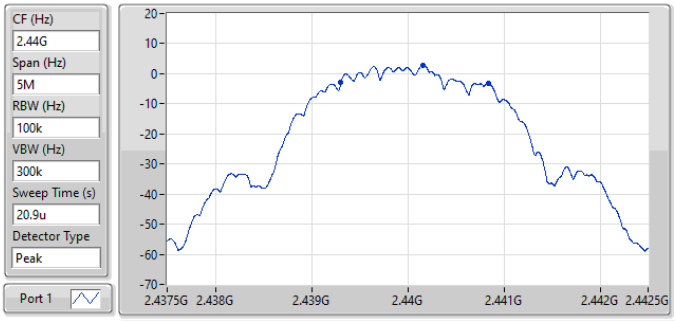


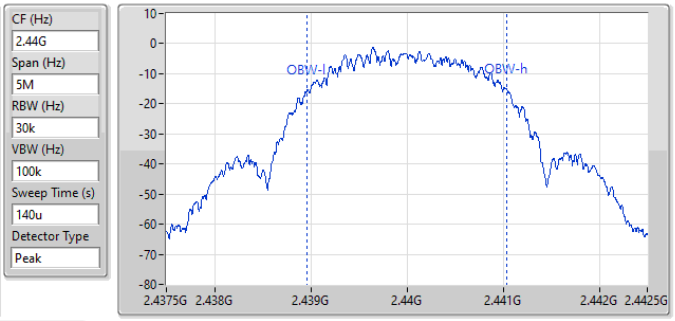
6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
745k	2.479621G	2.480366G	1.052M	2.479478G	2.48053G	500k	1

2.4-2.4835GHz_BT-LE(2Mbps) **EBW-DTS**

2440MHz

07/03/2024





6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.538M	2.439308G	2.440845G	2.075M	2.438964G	2.441039G	500k	1

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	7.15	0.00519
BT-LE(2Mbps)	6.89	0.00489

Result

Mode	Result	DG (dBi)	Total Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	2.00	6.47	30.00
2440MHz	Pass	2.00	7.15	30.00
2480MHz	Pass	2.00	7.08	30.00
BT-LE(2Mbps)	-	-	-	-
2402MHz	Pass	2.00	6.21	30.00
2440MHz	Pass	2.00	6.89	30.00
2480MHz	Pass	2.00	6.79	30.00

DG = Directional Gain; Port X = Port X output power

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-9.87
BT-LE(2Mbps)	-13.55

RBW = 3kHz;

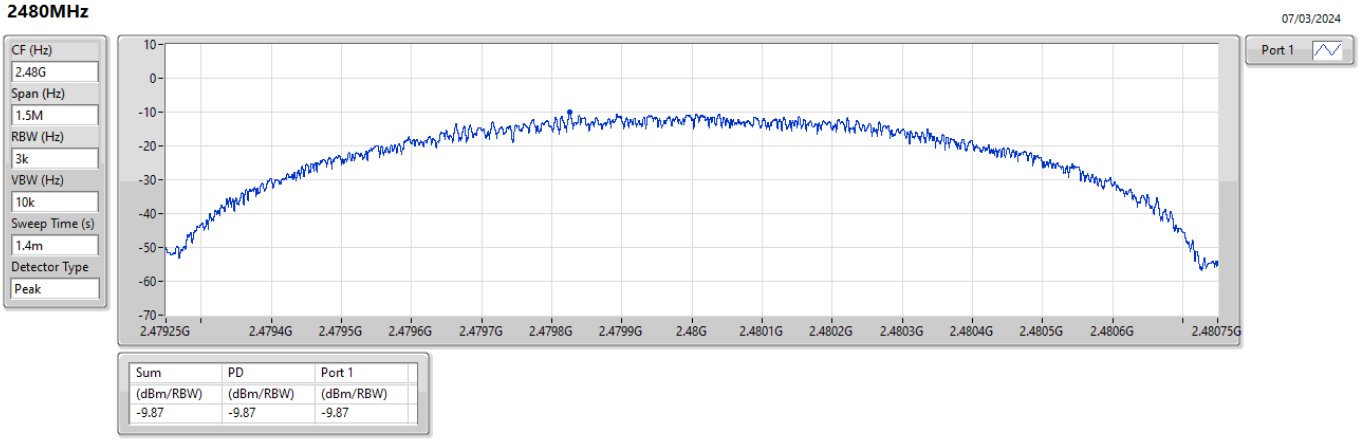
Result

Mode	Result	DG (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	2.00	-11.26	8.00
2440MHz	Pass	2.00	-10.66	8.00
2480MHz	Pass	2.00	-9.87	8.00
BT-LE(2Mbps)	-	-	-	-
2402MHz	Pass	2.00	-13.76	8.00
2440MHz	Pass	2.00	-13.96	8.00
2480MHz	Pass	2.00	-13.55	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;

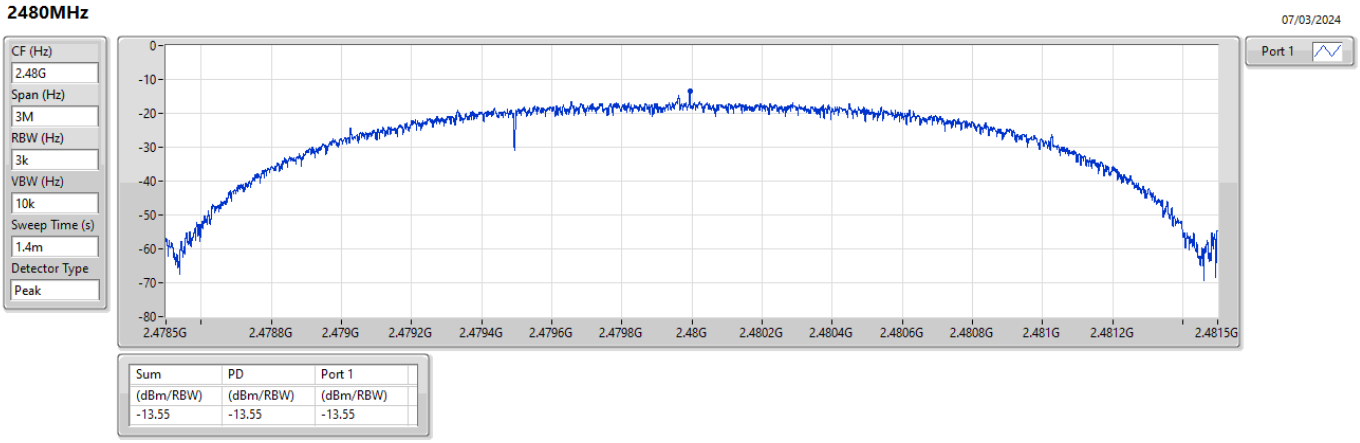
2.4-2.4835GHz_BT-LE(1Mbps) **PSD**

2480MHz



2.4-2.4835GHz_BT-LE(2Mbps) **PSD**

2480MHz



Summary

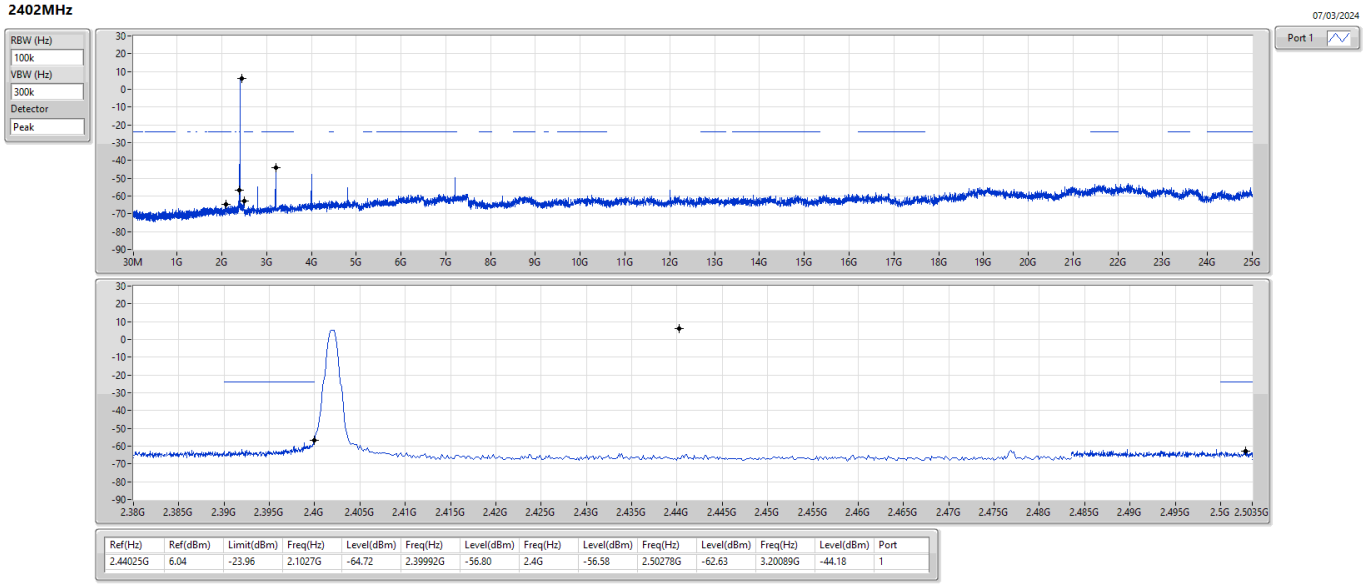
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	2.44025G	6.04	-23.96	2.1027G	-64.72	2.39992G	-56.80	2.4G	-56.58	2.50278G	-62.63	3.20089G	-44.18	1
BT-LE(2Mbps)	Pass	2.43991G	5.76	-24.24	2.03808G	-65.16	2.4G	-38.93	2.4G	-33.91	2.50154G	-63.03	3.20089G	-43.59	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
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.44025G	6.04	-23.96	2.1027G	-64.72	2.39992G	-56.80	2.4G	-56.58	2.50278G	-62.63	3.20089G	-44.18	1
2440MHz	Pass	2.44025G	6.04	-23.96	2.03338G	-64.03	2.39452G	-62.08	2.4G	-67.01	2.50246G	-63.18	3.25151G	-46.35	1
2480MHz	Pass	2.44025G	6.04	-23.96	2.06745G	-65.04	2.39008G	-62.00	2.4G	-66.48	2.50202G	-61.92	3.30494G	-48.72	1
BT-LE(2Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.43991G	5.76	-24.24	2.03808G	-65.16	2.4G	-38.93	2.4G	-33.91	2.50154G	-63.03	3.20089G	-43.59	1
2440MHz	Pass	2.43991G	5.76	-24.24	1.63153G	-65.62	2.39164G	-62.72	2.4G	-67.07	2.50226G	-62.96	3.25151G	-46.50	1
2480MHz	Pass	2.43991G	5.76	-24.24	2.06745G	-64.80	2.39672G	-62.87	2.4G	-67.85	2.50346G	-61.27	3.30494G	-48.58	1

2.4-2.4835GHz_BT-LE(1Mbps) **CSENdB-DTS**

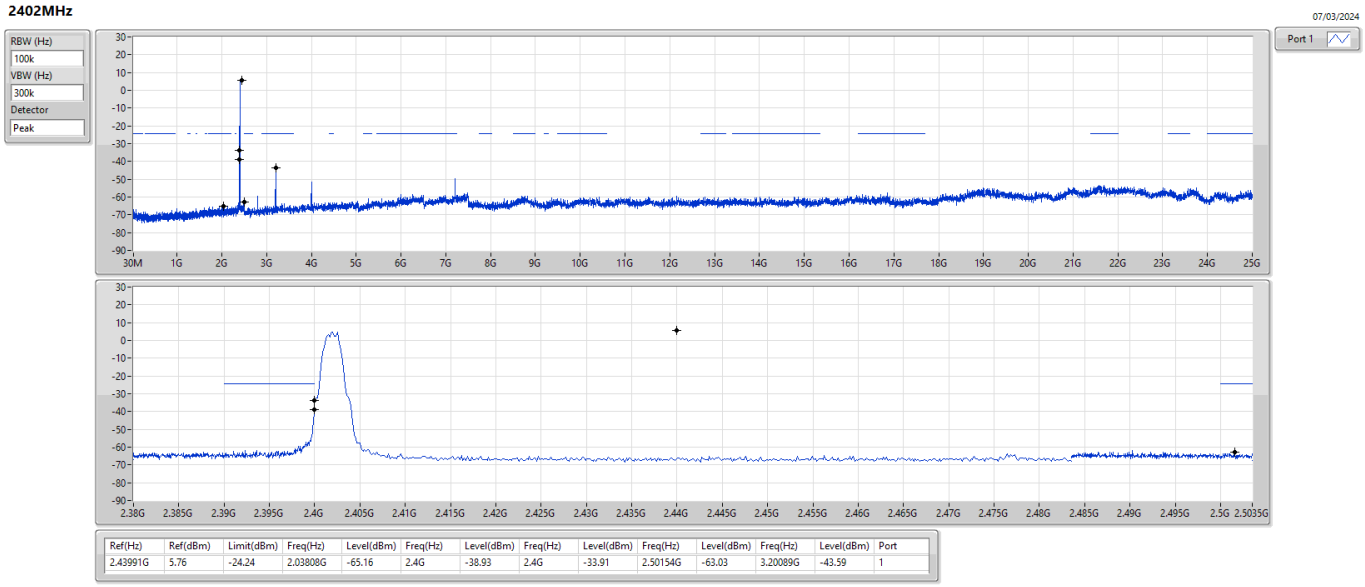
2402MHz



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
2.44025G	6.04	-23.96	2.1027G	-64.72	2.39992G	-56.80	2.4G	-56.58	2.50278G	-62.63	3.20089G	-44.18	1

2.4-2.4835GHz_BT-LE(2Mbps) **CSENdB-DTS**

2402MHz



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
2.43991G	5.76	-24.24	2.03808G	-65.16	2.4G	-38.93	2.4G	-33.91	2.50154G	-63.03	3.20089G	-43.59	1

Summary

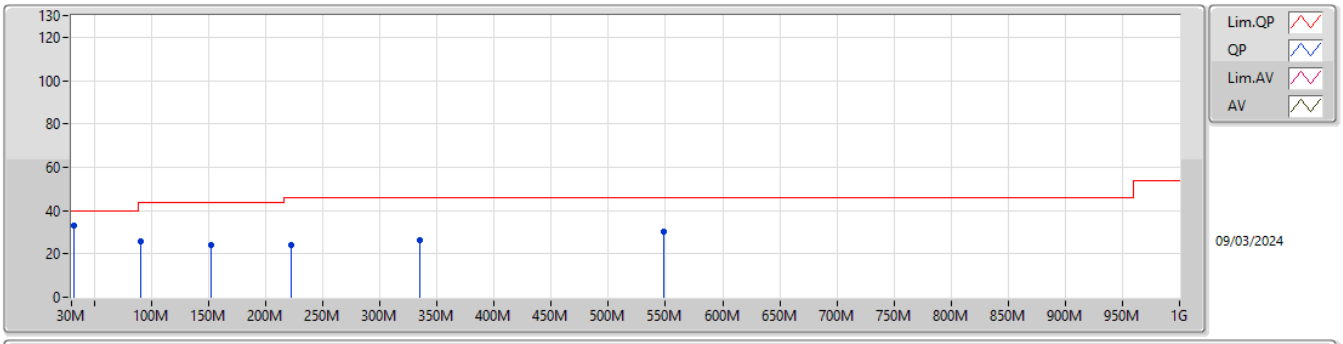
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-
BT-LE(2Mbps)	Pass	PK	31.94M	33.10	40.00	-6.90	3	Vertical	360	1.00

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
BT-LE(2Mbps)	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	31.94M	33.10	40.00	-6.90	3	Vertical	360	1.00
2440MHz	Pass	PK	90.14M	25.80	43.50	-17.70	3	Vertical	360	1.00
2440MHz	Pass	PK	152.22M	23.96	43.50	-19.54	3	Vertical	360	1.00
2440MHz	Pass	PK	222.06M	23.89	46.00	-22.11	3	Vertical	360	1.00
2440MHz	Pass	PK	334.58M	26.27	46.00	-19.73	3	Vertical	360	1.00
2440MHz	Pass	PK	547.98M	30.38	46.00	-15.62	3	Vertical	360	1.00
2440MHz	Pass	PK	30M	24.41	40.00	-15.59	3	Horizontal	0	1.00
2440MHz	Pass	PK	154.16M	21.64	43.50	-21.86	3	Horizontal	0	1.00
2440MHz	Pass	PK	224M	30.76	46.00	-15.24	3	Horizontal	0	1.00
2440MHz	Pass	PK	326.82M	30.12	46.00	-15.88	3	Horizontal	0	1.00
2440MHz	Pass	PK	392.78M	29.95	46.00	-16.05	3	Horizontal	0	1.00
2440MHz	Pass	PK	540.22M	30.38	46.00	-15.62	3	Horizontal	0	1.00

2.4-2.4835GHz_BT-LE(2Mbps)

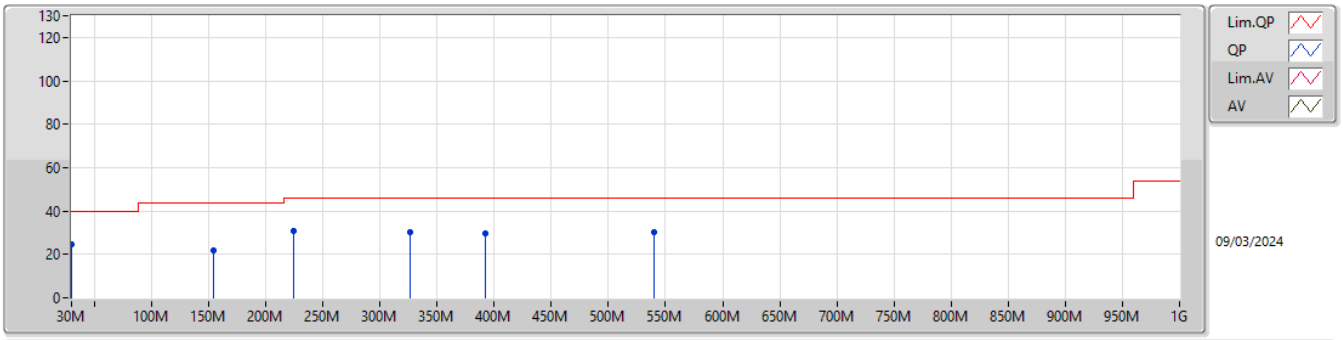
2440MHz_Adapter



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	33.10	40.00	-6.90	-4.03	3	Vertical	360	1.00	37.13	22.60	0.95	27.58
PK	90.14M	25.80	43.50	-17.70	-11.54	3	Vertical	360	1.00	37.34	14.35	1.56	27.45
PK	152.22M	23.96	43.50	-19.54	-9.85	3	Vertical	360	1.00	33.81	15.36	2.04	27.25
PK	222.06M	23.89	46.00	-22.11	-10.06	3	Vertical	360	1.00	33.95	14.54	2.48	27.08
PK	334.58M	26.27	46.00	-19.73	-4.98	3	Vertical	360	1.00	31.25	18.98	3.09	27.05
PK	547.98M	30.38	46.00	-15.62	0.43	3	Vertical	360	1.00	29.95	24.70	3.98	28.25

2.4-2.4835GHz_BT-LE(2Mbps)

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	24.41	40.00	-15.59	-3.18	3	Horizontal	0	1.00	27.59	23.49	0.92	27.59
PK	154.16M	21.64	43.50	-21.86	-9.95	3	Horizontal	0	1.00	31.59	15.24	2.05	27.24
PK	224M	30.76	46.00	-15.24	-9.91	3	Horizontal	0	1.00	40.67	14.68	2.49	27.08
PK	326.82M	30.12	46.00	-15.88	-5.12	3	Horizontal	0	1.00	35.24	18.86	3.05	27.03
PK	392.78M	29.95	46.00	-16.05	-3.40	3	Horizontal	0	1.00	33.35	20.62	3.34	27.36
PK	540.22M	30.38	46.00	-15.62	0.43	3	Horizontal	0	1.00	29.95	24.67	3.96	28.20

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	AV	2.484G	46.24	54.00	-7.76	3	Vertical	107	1.01
BT-LE(2Mbps)	Pass	AV	2.4835G	46.55	54.00	-7.45	3	Vertical	106	1.00

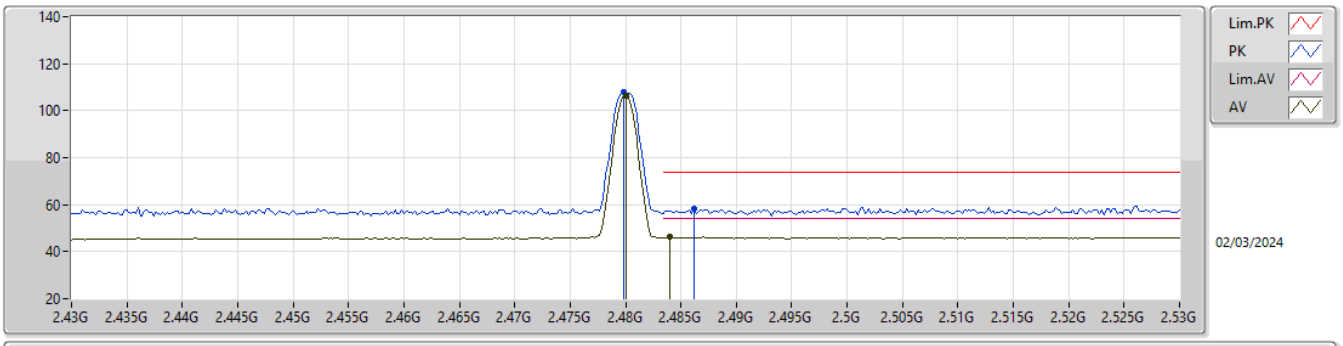
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	AV	2.364G	45.28	54.00	-8.72	3	Vertical	104	1.27
2402MHz	Pass	AV	2.402G	106.11	Inf	-Inf	3	Vertical	104	1.27
2402MHz	Pass	PK	2.362G	57.67	74.00	-16.33	3	Vertical	104	1.27
2402MHz	Pass	PK	2.4018G	107.31	Inf	-Inf	3	Vertical	104	1.27
2402MHz	Pass	AV	2.3896G	45.22	54.00	-8.78	3	Horizontal	43	1.09
2402MHz	Pass	AV	2.402G	96.58	Inf	-Inf	3	Horizontal	43	1.09
2402MHz	Pass	PK	2.3604G	57.45	74.00	-16.55	3	Horizontal	43	1.09
2402MHz	Pass	PK	2.4018G	97.84	Inf	-Inf	3	Horizontal	43	1.09
2402MHz	Pass	AV	4.80392G	41.30	54.00	-12.70	3	Vertical	161	2.48
2402MHz	Pass	PK	4.80455G	50.27	74.00	-23.73	3	Vertical	161	2.48
2402MHz	Pass	AV	4.80389G	33.94	54.00	-20.06	3	Horizontal	203	1.12
2402MHz	Pass	PK	4.80198G	46.83	74.00	-27.17	3	Horizontal	203	1.12
2440MHz	Pass	AV	2.3736G	45.11	54.00	-8.89	3	Vertical	106	1.31
2440MHz	Pass	AV	2.44G	106.55	Inf	-Inf	3	Vertical	106	1.31
2440MHz	Pass	AV	2.4948G	46.08	54.00	-7.92	3	Vertical	106	1.31
2440MHz	Pass	PK	2.3596G	57.65	74.00	-16.35	3	Vertical	106	1.31
2440MHz	Pass	PK	2.44G	107.92	Inf	-Inf	3	Vertical	106	1.31
2440MHz	Pass	PK	2.4956G	58.36	74.00	-15.64	3	Vertical	106	1.31
2440MHz	Pass	AV	2.366G	45.10	54.00	-8.90	3	Horizontal	12	1.23
2440MHz	Pass	AV	2.44G	97.37	Inf	-Inf	3	Horizontal	12	1.23
2440MHz	Pass	AV	2.4844G	46.02	54.00	-7.98	3	Horizontal	12	1.23
2440MHz	Pass	PK	2.3668G	58.37	74.00	-15.63	3	Horizontal	12	1.23
2440MHz	Pass	PK	2.4396G	98.64	Inf	-Inf	3	Horizontal	12	1.23
2440MHz	Pass	PK	2.4904G	58.79	74.00	-15.21	3	Horizontal	12	1.23
2440MHz	Pass	AV	4.88008G	38.46	54.00	-15.54	3	Vertical	173	2.03
2440MHz	Pass	AV	7.31919G	38.87	54.00	-15.13	3	Vertical	293	1.44
2440MHz	Pass	PK	4.88033G	49.67	74.00	-24.33	3	Vertical	173	2.03
2440MHz	Pass	PK	7.31781G	52.04	74.00	-21.96	3	Vertical	293	1.44
2440MHz	Pass	AV	4.8803G	33.87	54.00	-20.13	3	Horizontal	197	1.50
2440MHz	Pass	AV	7.31883G	38.86	54.00	-15.14	3	Horizontal	139	2.41
2440MHz	Pass	PK	4.87931G	47.43	74.00	-26.57	3	Horizontal	197	1.50
2440MHz	Pass	PK	7.32205G	51.99	74.00	-22.01	3	Horizontal	139	2.41
2480MHz	Pass	AV	2.48G	106.46	Inf	-Inf	3	Vertical	107	1.01
2480MHz	Pass	AV	2.484G	46.24	54.00	-7.76	3	Vertical	107	1.01
2480MHz	Pass	PK	2.4798G	107.76	Inf	-Inf	3	Vertical	107	1.01
2480MHz	Pass	PK	2.4862G	58.50	74.00	-15.50	3	Vertical	107	1.01
2480MHz	Pass	AV	2.48G	95.18	Inf	-Inf	3	Horizontal	329	1.48
2480MHz	Pass	AV	2.4908G	46.05	54.00	-7.95	3	Horizontal	329	1.48
2480MHz	Pass	PK	2.48G	96.43	Inf	-Inf	3	Horizontal	329	1.48
2480MHz	Pass	PK	2.5G	58.27	74.00	-15.73	3	Horizontal	329	1.48
2480MHz	Pass	AV	4.96G	36.44	54.00	-17.56	3	Vertical	146	2.44
2480MHz	Pass	AV	7.43775G	38.41	54.00	-15.59	3	Vertical	237	1.36
2480MHz	Pass	PK	4.96051G	48.50	74.00	-25.50	3	Vertical	146	2.44
2480MHz	Pass	PK	7.43912G	50.65	74.00	-23.35	3	Vertical	237	1.36
2480MHz	Pass	AV	4.95974G	33.53	54.00	-20.47	3	Horizontal	276	1.01
2480MHz	Pass	AV	7.43845G	38.31	54.00	-15.69	3	Horizontal	122	1.55
2480MHz	Pass	PK	4.95824G	46.73	74.00	-27.27	3	Horizontal	276	1.01
2480MHz	Pass	PK	7.43984G	51.04	74.00	-22.96	3	Horizontal	122	1.55
BT-LE(2Mbps)	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	AV	2.3748G	45.16	54.00	-8.84	3	Vertical	105	1.31
2402MHz	Pass	AV	2.402G	103.46	Inf	-Inf	3	Vertical	105	1.31
2402MHz	Pass	PK	2.3618G	57.89	74.00	-16.11	3	Vertical	105	1.31
2402MHz	Pass	PK	2.4026G	107.24	Inf	-Inf	3	Vertical	105	1.31
2402MHz	Pass	AV	2.3852G	45.10	54.00	-8.90	3	Horizontal	43	1.09
2402MHz	Pass	AV	2.402G	93.89	Inf	-Inf	3	Horizontal	43	1.09
2402MHz	Pass	PK	2.3616G	57.46	74.00	-16.54	3	Horizontal	43	1.09
2402MHz	Pass	PK	2.4016G	97.82	Inf	-Inf	3	Horizontal	43	1.09
2402MHz	Pass	AV	4.80489G	38.66	54.00	-15.34	3	Vertical	161	2.18
2402MHz	Pass	PK	4.80284G	50.17	74.00	-23.83	3	Vertical	161	2.18
2402MHz	Pass	AV	4.80298G	33.29	54.00	-20.71	3	Horizontal	60	1.16

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
2402MHz	Pass	PK	4.80526G	47.11	74.00	-26.89	3	Horizontal	60	1.16
2440MHz	Pass	AV	2.3568G	45.12	54.00	-8.88	3	Vertical	106	1.30
2440MHz	Pass	AV	2.44G	104.15	Inf	-Inf	3	Vertical	106	1.30
2440MHz	Pass	AV	2.4864G	45.93	54.00	-8.07	3	Vertical	106	1.30
2440MHz	Pass	PK	2.3828G	57.89	74.00	-16.11	3	Vertical	106	1.30
2440MHz	Pass	PK	2.4396G	108.04	Inf	-Inf	3	Vertical	106	1.30
2440MHz	Pass	PK	2.4896G	58.76	74.00	-15.24	3	Vertical	106	1.30
2440MHz	Pass	AV	2.3868G	45.06	54.00	-8.94	3	Horizontal	0	1.94
2440MHz	Pass	AV	2.44G	94.33	Inf	-Inf	3	Horizontal	0	1.94
2440MHz	Pass	AV	2.49G	45.89	54.00	-8.11	3	Horizontal	0	1.94
2440MHz	Pass	PK	2.35G	58.43	74.00	-15.57	3	Horizontal	0	1.94
2440MHz	Pass	PK	2.4404G	98.04	Inf	-Inf	3	Horizontal	0	1.94
2440MHz	Pass	PK	2.4856G	57.86	74.00	-16.14	3	Horizontal	0	1.94
2440MHz	Pass	AV	4.87907G	36.99	54.00	-17.01	3	Vertical	168	2.52
2440MHz	Pass	AV	7.32132G	38.95	54.00	-15.05	3	Vertical	337	1.50
2440MHz	Pass	PK	4.88086G	48.94	74.00	-25.06	3	Vertical	168	2.52
2440MHz	Pass	PK	7.3197G	52.10	74.00	-21.90	3	Vertical	337	1.50
2440MHz	Pass	AV	4.88123G	33.84	54.00	-20.16	3	Horizontal	326	2.78
2440MHz	Pass	AV	7.31991G	38.90	54.00	-15.10	3	Horizontal	333	1.85
2440MHz	Pass	PK	4.88171G	46.65	74.00	-27.35	3	Horizontal	326	2.78
2440MHz	Pass	PK	7.32215G	53.11	74.00	-20.89	3	Horizontal	333	1.85
2480MHz	Pass	AV	2.4798G	103.65	Inf	-Inf	3	Vertical	106	1.00
2480MHz	Pass	AV	2.4835G	46.55	54.00	-7.45	3	Vertical	106	1.00
2480MHz	Pass	PK	2.4806G	107.76	Inf	-Inf	3	Vertical	106	1.00
2480MHz	Pass	PK	2.499G	59.66	74.00	-14.34	3	Vertical	106	1.00
2480MHz	Pass	AV	2.48G	92.38	Inf	-Inf	3	Horizontal	328	1.48
2480MHz	Pass	AV	2.4872G	46.00	54.00	-8.00	3	Horizontal	328	1.48
2480MHz	Pass	PK	2.4796G	96.37	Inf	-Inf	3	Horizontal	328	1.48
2480MHz	Pass	PK	2.4902G	58.72	74.00	-15.28	3	Horizontal	328	1.48
2480MHz	Pass	AV	4.9608G	36.27	54.00	-17.73	3	Vertical	141	2.24
2480MHz	Pass	AV	7.43906G	38.49	54.00	-15.51	3	Vertical	133	2.34
2480MHz	Pass	PK	4.96103G	49.42	74.00	-24.58	3	Vertical	141	2.24
2480MHz	Pass	PK	7.44027G	52.22	74.00	-21.78	3	Vertical	133	2.34
2480MHz	Pass	AV	4.95785G	33.72	54.00	-20.28	3	Horizontal	107	1.50
2480MHz	Pass	AV	7.44102G	38.50	54.00	-15.50	3	Horizontal	334	2.96
2480MHz	Pass	PK	4.96096G	47.13	74.00	-26.87	3	Horizontal	107	1.50
2480MHz	Pass	PK	7.43774G	51.59	74.00	-22.41	3	Horizontal	334	2.96

2.4-2.4835GHz_BT-LE(1Mbps)

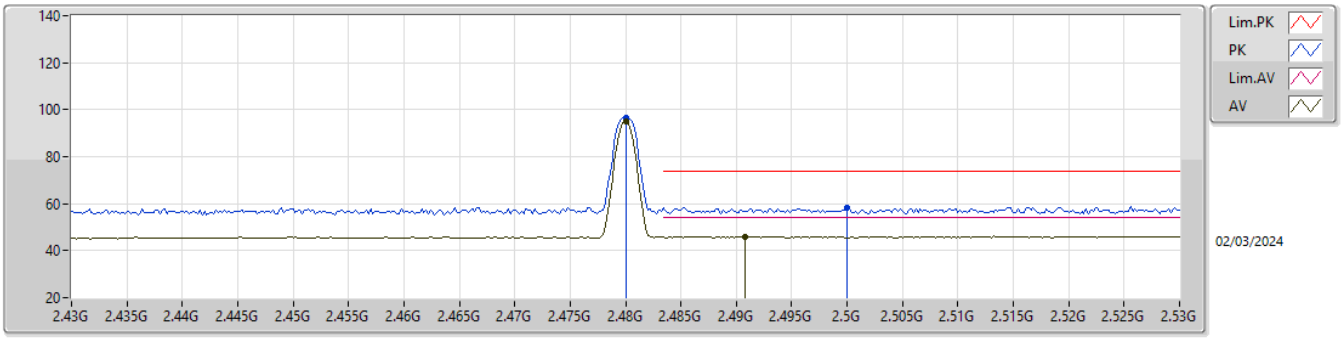
2480MHz_TX



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	106.46	Inf	-Inf	33.21	3	Vertical	107	1.01	73.25	27.70	5.51	-
AV	2.484G	46.24	54.00	-7.76	33.26	3	Vertical	107	1.01	12.98	27.74	5.52	-
PK	2.4798G	107.76	Inf	-Inf	33.21	3	Vertical	107	1.01	74.55	27.70	5.51	-
PK	2.4862G	58.50	74.00	-15.50	33.28	3	Vertical	107	1.01	25.22	27.76	5.52	-

2.4-2.4835GHz_BT-LE(1Mbps)

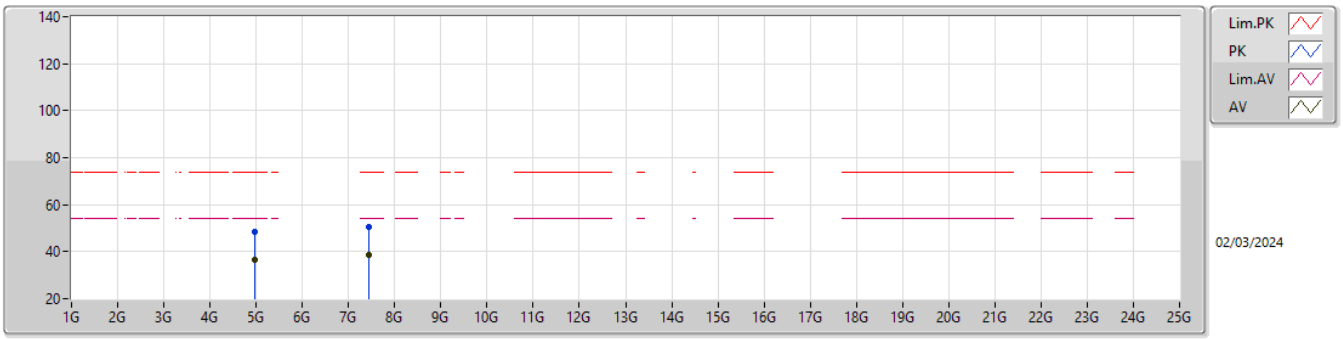
2480MHz_TX



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	95.18	Inf	-Inf	33.21	3	Horizontal	329	1.48	61.97	27.70	5.51	-
AV	2.4908G	46.05	54.00	-7.95	33.32	3	Horizontal	329	1.48	12.73	27.80	5.52	-
PK	2.48G	96.43	Inf	-Inf	33.21	3	Horizontal	329	1.48	63.22	27.70	5.51	-
PK	2.5G	58.27	74.00	-15.73	33.34	3	Horizontal	329	1.48	24.93	27.80	5.54	-

2.4-2.4835GHz_BT-LE(1Mbps)

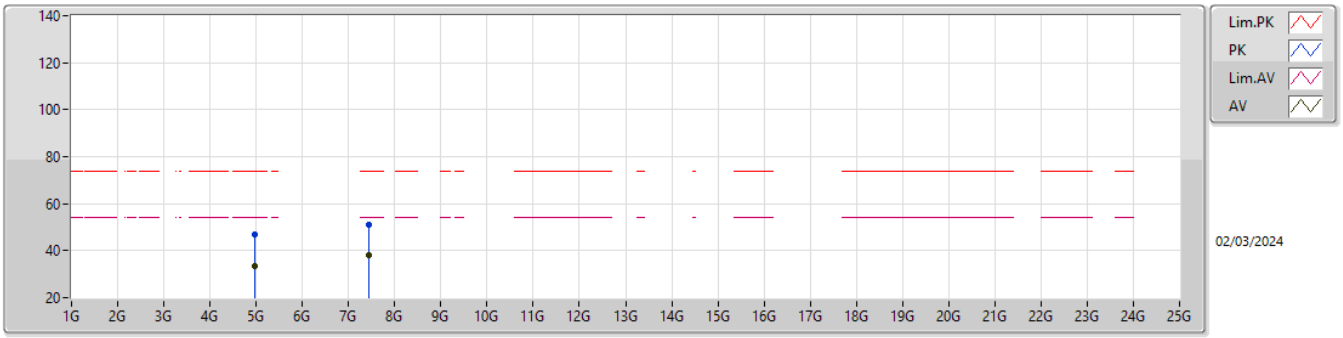
2480MHz_TX



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	4.96G	36.44	54.00	-17.56	6.85	3	Vertical	146	2.44	29.59	32.86	7.98	33.99
AV	7.43775G	38.41	54.00	-15.59	11.53	3	Vertical	237	1.36	26.88	36.32	9.56	34.35
PK	4.96051G	48.50	74.00	-25.50	6.85	3	Vertical	146	2.44	41.65	32.86	7.98	33.99
PK	7.43912G	50.65	74.00	-23.35	11.53	3	Vertical	237	1.36	39.12	36.32	9.56	34.35

2.4-2.4835GHz_BT-LE(1Mbps)

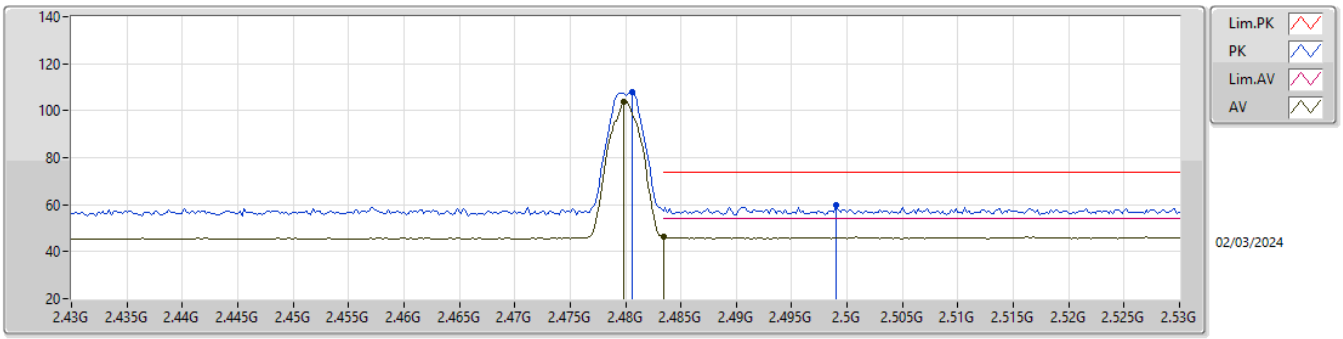
2480MHz_TX



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	4.95974G	33.53	54.00	-20.47	6.85	3	Horizontal	276	1.01	26.68	32.86	7.98	33.99
AV	7.43845G	38.31	54.00	-15.69	11.53	3	Horizontal	122	1.55	26.78	36.32	9.56	34.35
PK	4.95824G	46.73	74.00	-27.27	6.83	3	Horizontal	276	1.01	39.90	32.85	7.98	34.00
PK	7.43984G	51.04	74.00	-22.96	11.53	3	Horizontal	122	1.55	39.51	36.32	9.56	34.35

2.4-2.4835GHz_BT-LE(2Mbps)

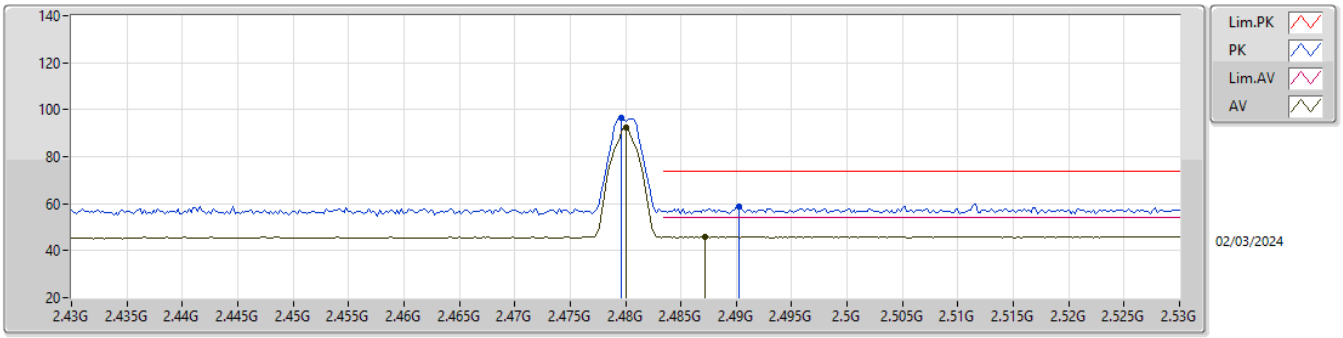
2480MHz_TX



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	2.4798G	103.65	Inf	-Inf	33.21	3	Vertical	106	1.00	70.44	27.70	5.51	-
AV	2.4835G	46.55	54.00	-7.45	33.25	3	Vertical	106	1.00	13.30	27.74	5.51	-
PK	2.4806G	107.76	Inf	-Inf	33.22	3	Vertical	106	1.00	74.54	27.71	5.51	-
PK	2.499G	59.66	74.00	-14.34	33.33	3	Vertical	106	1.00	26.33	27.80	5.53	-

2.4-2.4835GHz_BT-LE(2Mbps)

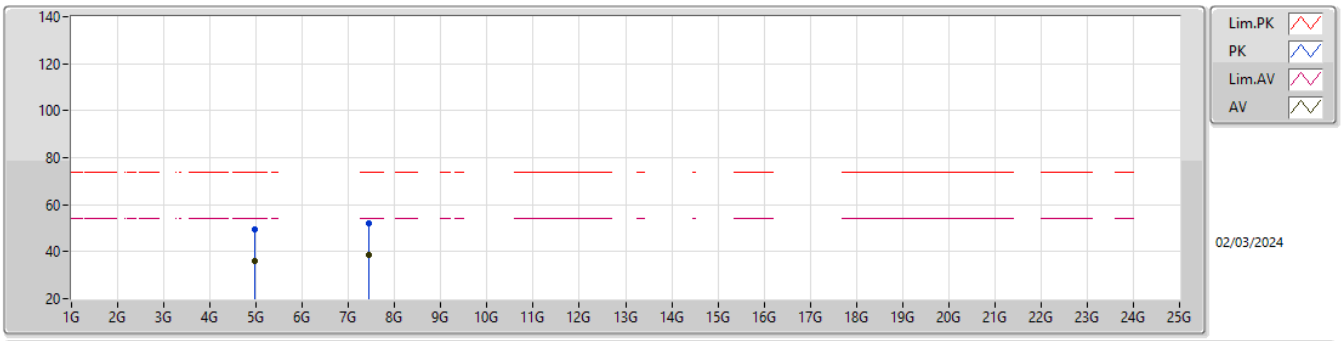
2480MHz_TX



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	92.38	Inf	-Inf	33.21	3	Horizontal	328	1.48	59.17	27.70	5.51	-
AV	2.4872G	46.00	54.00	-8.00	33.29	3	Horizontal	328	1.48	12.71	27.77	5.52	-
PK	2.4796G	96.37	Inf	-Inf	33.21	3	Horizontal	328	1.48	63.16	27.70	5.51	-
PK	2.4902G	58.72	74.00	-15.28	33.32	3	Horizontal	328	1.48	25.40	27.80	5.52	-

2.4-2.4835GHz_BT-LE(2Mbps)

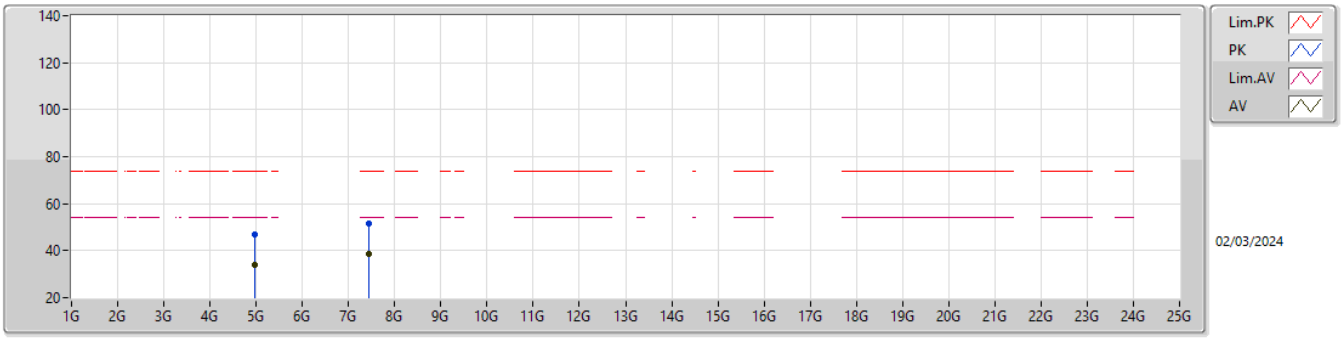
2480MHz_TX



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	4.9608G	36.27	54.00	-17.73	6.85	3	Vertical	141	2.24	29.42	32.86	7.98	33.99
AV	7.43906G	38.49	54.00	-15.51	11.53	3	Vertical	133	2.34	26.96	36.32	9.56	34.35
PK	4.96103G	49.42	74.00	-24.58	6.86	3	Vertical	141	2.24	42.56	32.87	7.98	33.99
PK	7.44027G	52.22	74.00	-21.78	11.53	3	Vertical	133	2.34	40.69	36.32	9.56	34.35

2.4-2.4835GHz_BT-LE(2Mbps)

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	4.95785G	33.72	54.00	-20.28	6.83	3	Horizontal	107	1.50	26.89	32.85	7.98	34.00
AV	7.44102G	38.50	54.00	-15.50	11.53	3	Horizontal	334	2.96	26.97	36.32	9.56	34.35
PK	4.96096G	47.13	74.00	-26.87	6.86	3	Horizontal	107	1.50	40.27	32.87	7.98	33.99
PK	7.43774G	51.59	74.00	-22.41	11.53	3	Horizontal	334	2.96	40.06	36.32	9.56	34.35