

FCC Radio Test Report

FCC ID : 2ADPT-BOBEEPASS
Equipment : Smart Card
Brand Name : SMARTdisplayer
Model Name : BobeePass
Applicant : SmartDisplayer Technology
No. 2-1,Gongjian Rd.,Qidu Dist,Keelung City,Taiwan
Manufacturer : SmartDisplayer Technology
No. 2-1,Gongjian Rd.,Qidu Dist,Keelung City,Taiwan
Standard : 47 CFR FCC Part 15.247

The product was received on Jun. 16, 2022, and testing was started from Jun. 25, 2022 and completed on Jun. 29, 2022. 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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Summary of Test Result

Report Clause	Ref.Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
-	15.207	AC Power-line Conducted Emissions	Not Required	Only employ battery power.
3.1	15.247(a)	DTS Bandwidth	PASS	-
3.2	15.247(b)	Maximum Conducted Output Power	PASS	-
3.3	15.247(e)	Power Spectral Density	PASS	-
3.4	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	-
3.5	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: Ben Tseng

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(1Mbps)	1.0	1TX

Note:

- ♦ Bluetooth LE uses a GFSK (1Mbps) modulation.
- ♦ BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	SmartDisplayer	BobeePass	PCB antenna	N/A	2.09

Note 1: The EUT has one antenna.

For BT function:

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

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

1.1.3 EUT Information

Operational Condition			
EUT Power Type	From Battery		
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) $\geq 1/T$
BT-LE(1Mbps)	0.627	2.03	391.875u	3k

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
RF Conducted	TH06-HY	Edward	22.1~23.6°C / 53~61%	25/Jun/2022
Radiated	03CH03-HY	Edward	22.3~26.9°C / 50~60%	28/Jun/2022~29/Jun/2022
☐ 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
Radiated Emission (9kHz ~ 30MHz)	2.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.0 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 6.1
-----------------------	---------

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

2.2 The Worst Case Measurement Configuration

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	Battery mode		
Operating Mode > 1GHz	CTX		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT	V		

2.3 Accessories

Accessories				
Battery	Brand Name	SmartDisplayer	Model Name	CF042039(B)
	Power Rating	3 Vdc, 25 mAh	Type	Li-ion

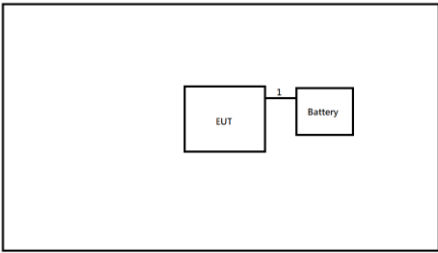
Reminder: Regarding to more detail and other information, please refer to user manual.

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	-	-
3	Fixture	SmartDisplayer	A2	-	Provided by Customer
4	Fixture	SmartDisplayer	A3	-	Provided by Customer
5	Battery	Panasonic	R6NT(R6P UM-3n)	-	-

Support Equipment – Radiated					
No.	Equipment	Brand Name	Model Name	FCC ID	Remark
1	Fixture	SmartDisplayer	A2	-	Provided by Customer
2	Fixture	SmartDisplayer	A3	-	Provided by Customer
3	Battery	Panasonic	R6NT(R6P UM-3n)	-	-

2.5 Test Setup Diagram

Test Setup Diagram - Radiated Test			
			
Item	Connection	Shielded	Length(m)
1	DC Power cable	No	0.15

3 Transmitter Test Result

3.1 DTS Bandwidth

3.1.1 6dB Bandwidth Limit

6dB Bandwidth Limit	
Systems using digital modulation techniques:	
▪	6 dB bandwidth $\geq$ 500 kHz.

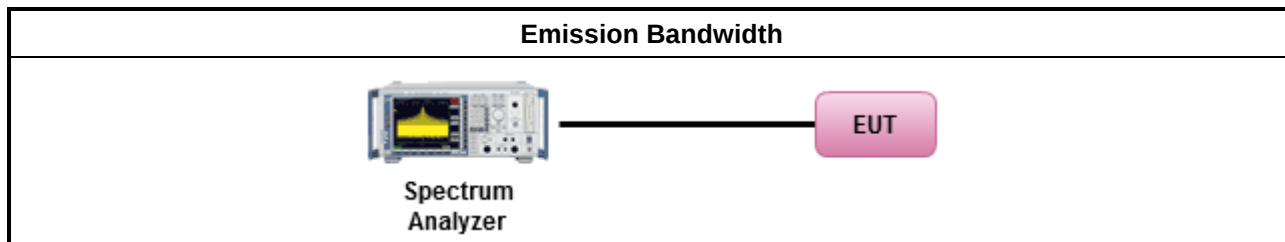
3.1.2 Measuring Instruments

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

3.1.3 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.

3.1.4 Test Setup



3.1.5 Test Result of Emission Bandwidth

Refer as Appendix A

3.2 Maximum Conducted Output Power

3.2.1 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): $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX}])$ dBm
	Smart antenna system (SAS)
	- Single beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	- Overlap beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	- Aggregate power on all beams: $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX} + 8])$ 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.	

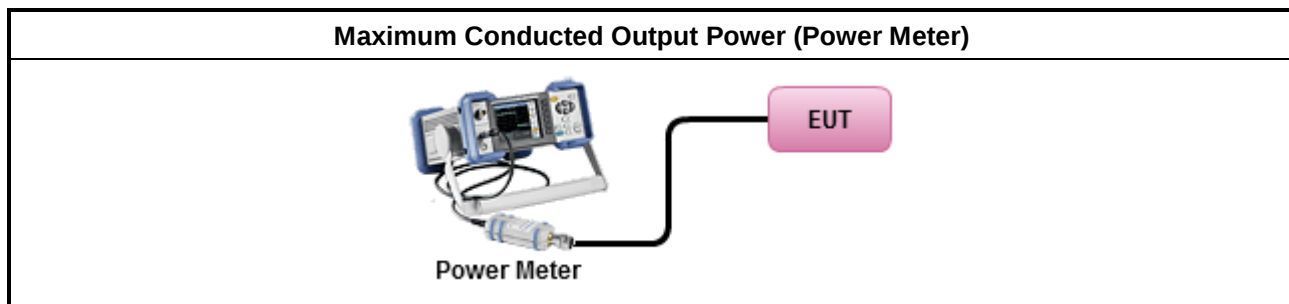
3.2.2 Measuring Instruments

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

3.2.3 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: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$	

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Refer as Appendix B

3.3 Power Spectral Density

3.3.1 Power Spectral Density Limit

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

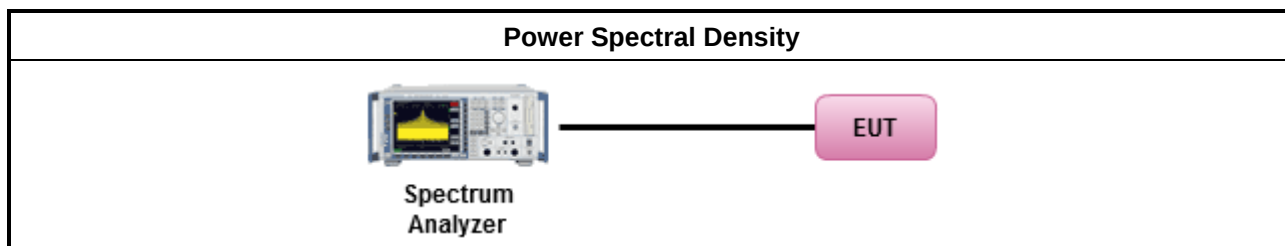
3.3.2 Measuring Instruments

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

3.3.3 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.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Refer as Appendix C

3.4 Emissions in Non-restricted Frequency Bands

3.4.1 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.	

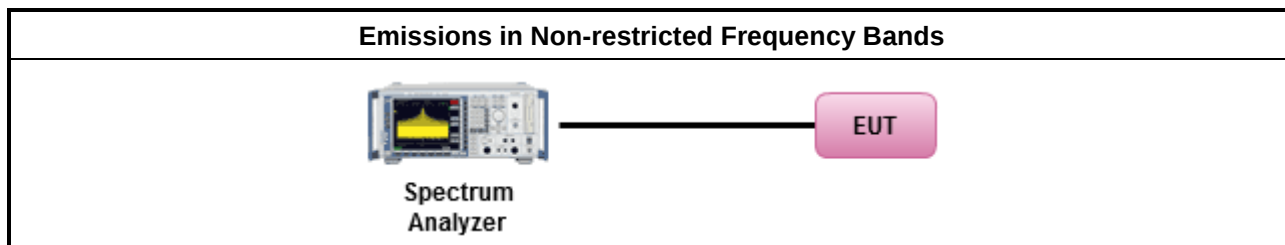
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

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

3.4.4 Test Setup



3.4.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix D

3.5 Emissions in Restricted Frequency Bands

3.5.1 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.

3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

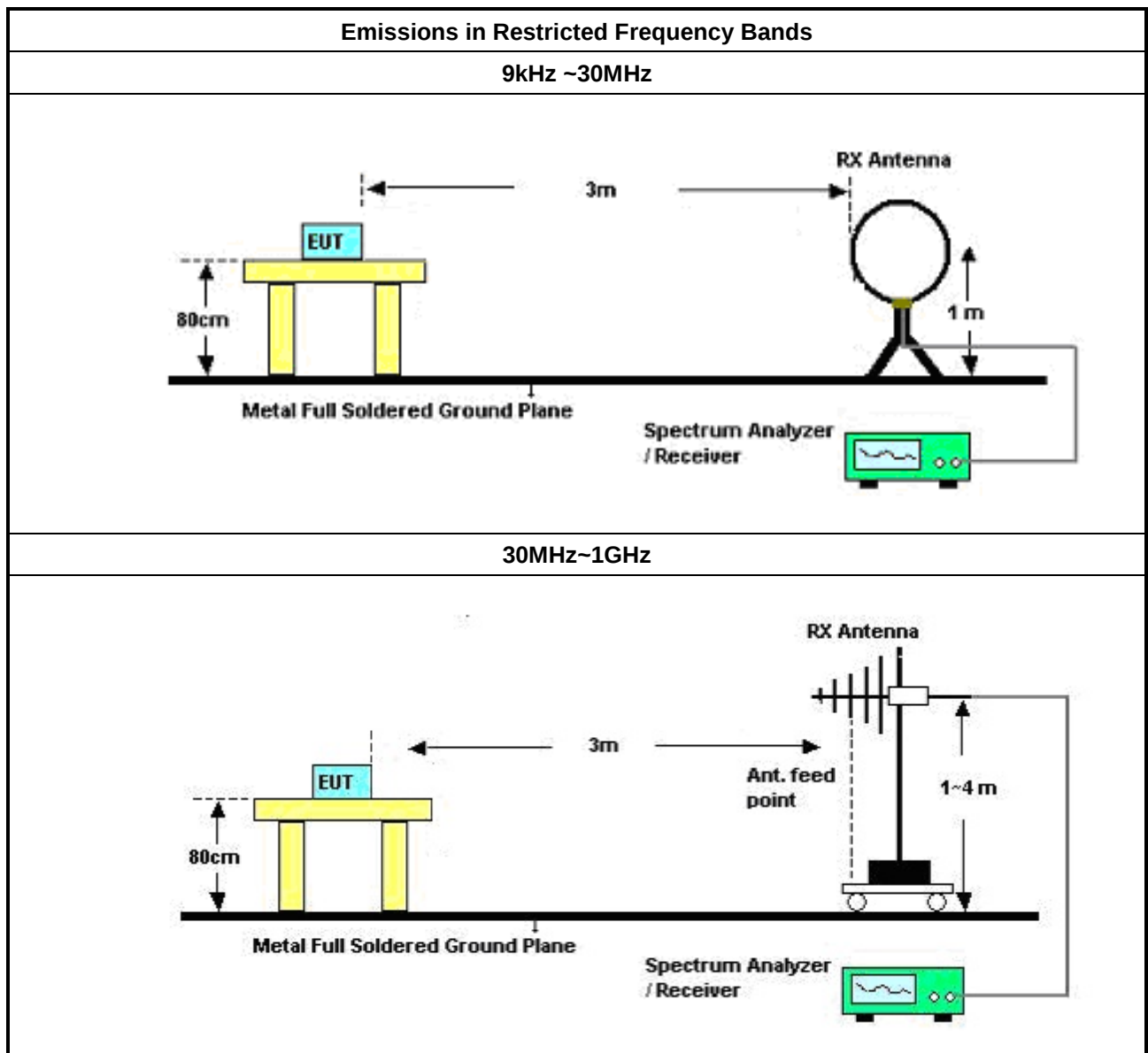
Test Method	
	- The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor]. - Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
	- For the transmitter unwanted 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 $f \geq 1$ 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.

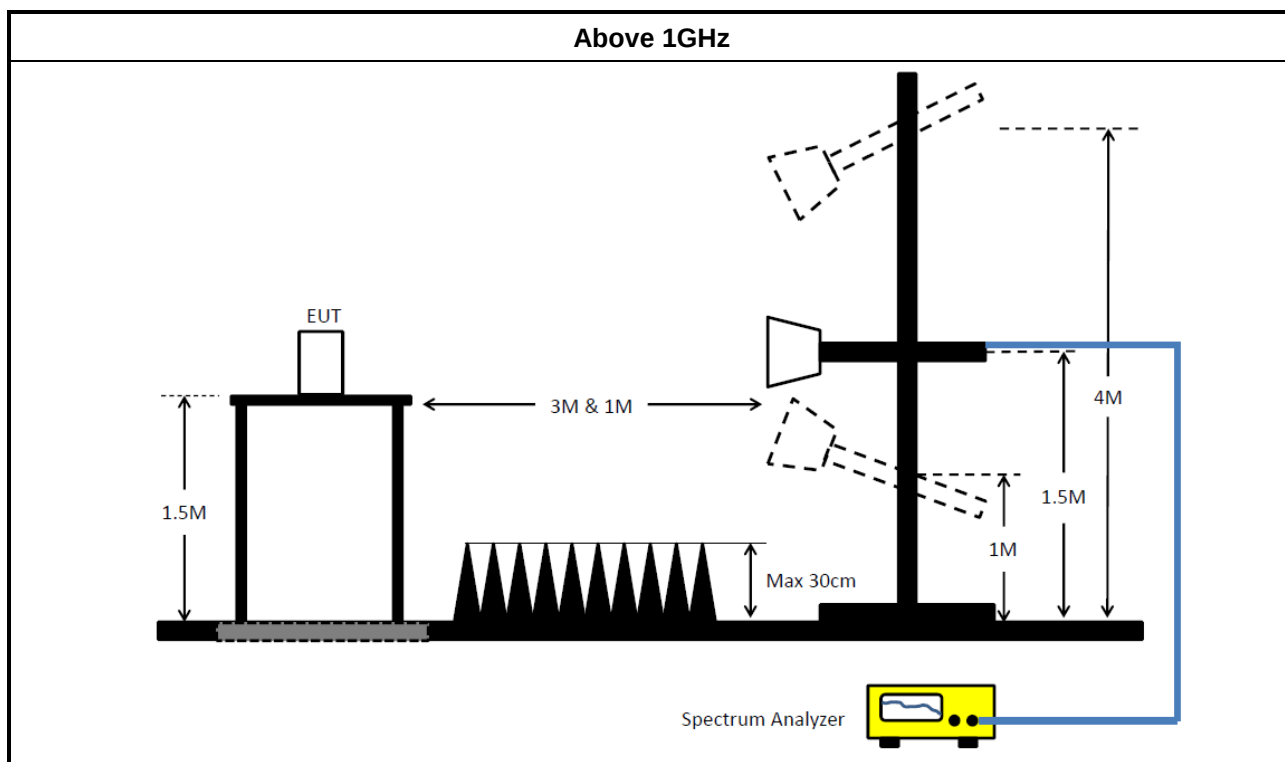
3.5.4 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamplifier Factor)

3.5.5 Test Setup





3.5.6 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.

3.5.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix E

4 Test Equipment and Calibration Data

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	20/Oct/2021	19/Oct/2022
SMB100A Signal Generator	R&S	SMB100A	181147	100kHz~40GHz	21/Oct/2021	20/Oct/2022
Pulse Sensor	Anritsu	MA2411B	1027452	300MHz~40GHz	25/Mar/2022	24/Mar/2023
Power Meter	Anritsu	ML2495A	1124009	300MHz~40GHz	25/Mar/2022	24/Mar/2023
SENSE-15247_FS	Sporton	V5.10.7.16	NA	NA	NA	NA

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	30MHz~1GHz 3m	03/Aug/2021	02/Aug/2022
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	1GHz~18GHz 3m	03/Aug/2021	02/Aug/2022
Signal Analyzer	R&S	FSV40	101500	10Hz~40GHz	12/Oct/2021	11/Oct/2022
Amplifier	HP	8447D	2944A08033	10kHz~1.3GHz	08/Apr/2022	07/Apr/2023
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	02267	1GHz ~18GHz	14/Sep/2021	13/Sep/2022
Bilog Antenna & 6dB Attenuator	SCHAFFNER / EMCI	CBL6112B / N-6-05	22237 / AT-N-0603	30MHz~1GHz	17/Oct/2021	16/Oct/2022
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz~30MHz	13/Jun/2022	12/Jun/2023
RF Cable-R03m	Jye Bao	RG142	MY37335/4+CB021-1+CB021-2	30MHz~1GHz	22/Mar/2022	21/Mar/2023
RF CABLE 5+6m	HUBER+SUHNER	SUOFLEX 104	SN MY38596/4+SN 804300/4	1GHz~40GHz	28/Jul/2021	27/Jul/2022
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170221	15GHz~40GHz	18/Mar/2022	17/Mar/2023
Microwave Prempplier	EMC INSTRUMENTS	EM18G40G	060604	18GHz ~ 40GHz	08/Mar/2022	07/Mar/2023
Loop Antenna	TESEQ	HLA 6120	31244	9kHz~30MHz	18/Mar/2022	17/Mar/2023
EMI Test Receiver	R&S	ESR3	102052	9kHz~3.6GHz	13/May/2022	12/May/2023
Microwave Preamplifier	Agilent	8449B	3008A02326	1GHz~26.5GHz	15/Jul/2021	14/Jul/2022
SENSE-FS	Sporton	v5.10.7.14	NA	NA	NA	NA



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)	721.25k	1.058M	1M06F1D	706.25k	1.054M

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

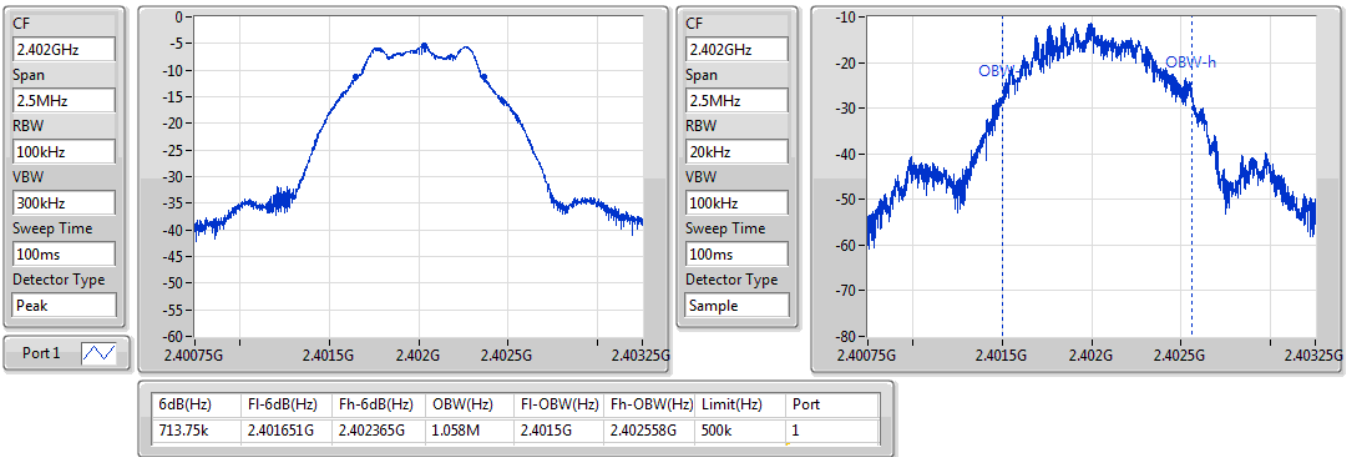
**Result**

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	500k	713.75k	1.058M
2440MHz	Pass	500k	706.25k	1.054M
2480MHz	Pass	500k	721.25k	1.056M

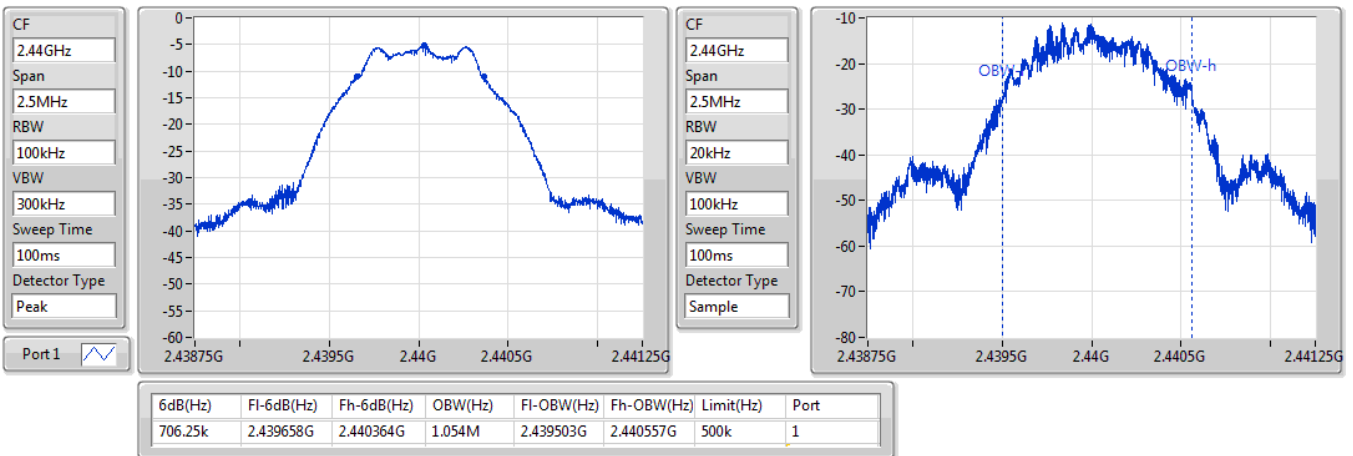
Port X-N dB = Port X 6dB down bandwidth;
Port X-OBW = Port X 99% occupied bandwidth

BT-LE(1Mbps)
2402MHz

25/06/2022

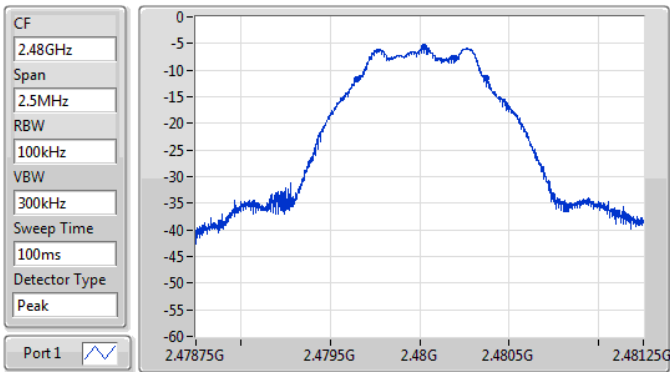

BT-LE(1Mbps)
2440MHz

25/06/2022



BT-LE(1Mbps)

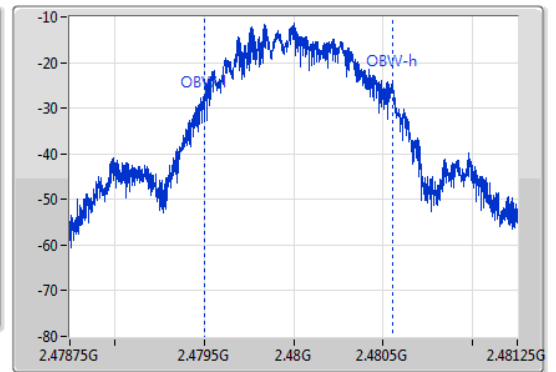
2480MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
721.25k	2.479649G	2.48037G	1.056M	2.4795G	2.480556G	500k	1

EBW-DTS

25/06/2022





Summary

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	-4.28	0.00037



Average Power-DTS

Appendix B

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	2.09	-4.36	30.00
2440MHz	Pass	2.09	-4.28	30.00
2480MHz	Pass	2.09	-4.99	30.00

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



Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-19.87

RBW = 3kHz;



Result

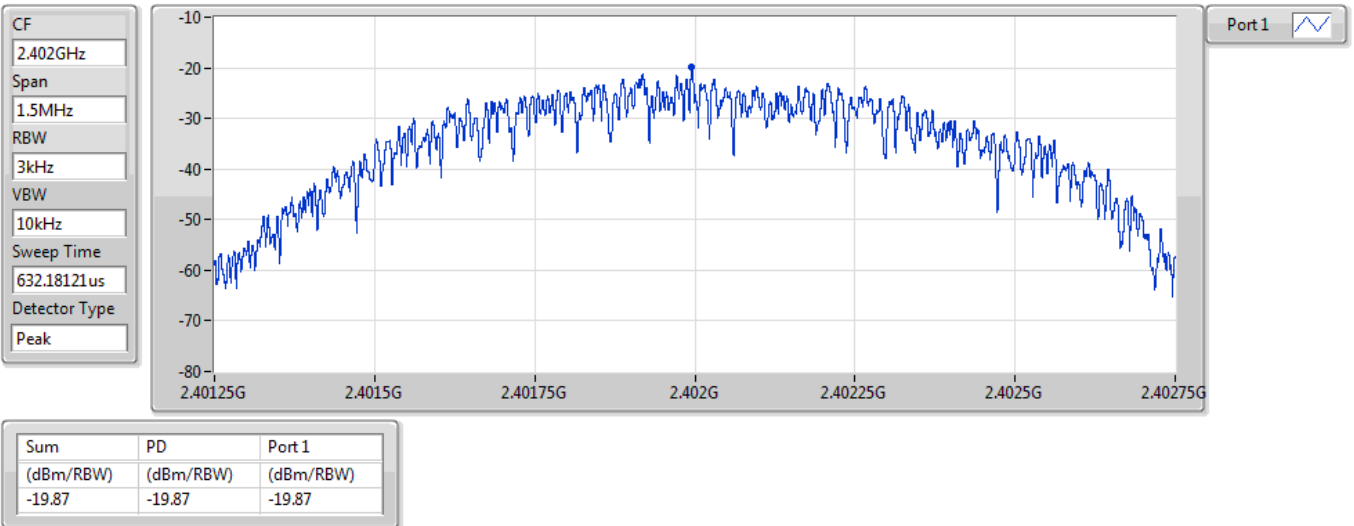
Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	2.09	-19.87	8.00
2440MHz	Pass	2.09	-19.90	8.00
2480MHz	Pass	2.09	-20.60	8.00

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;

BT-LE(1Mbps)

2402MHz

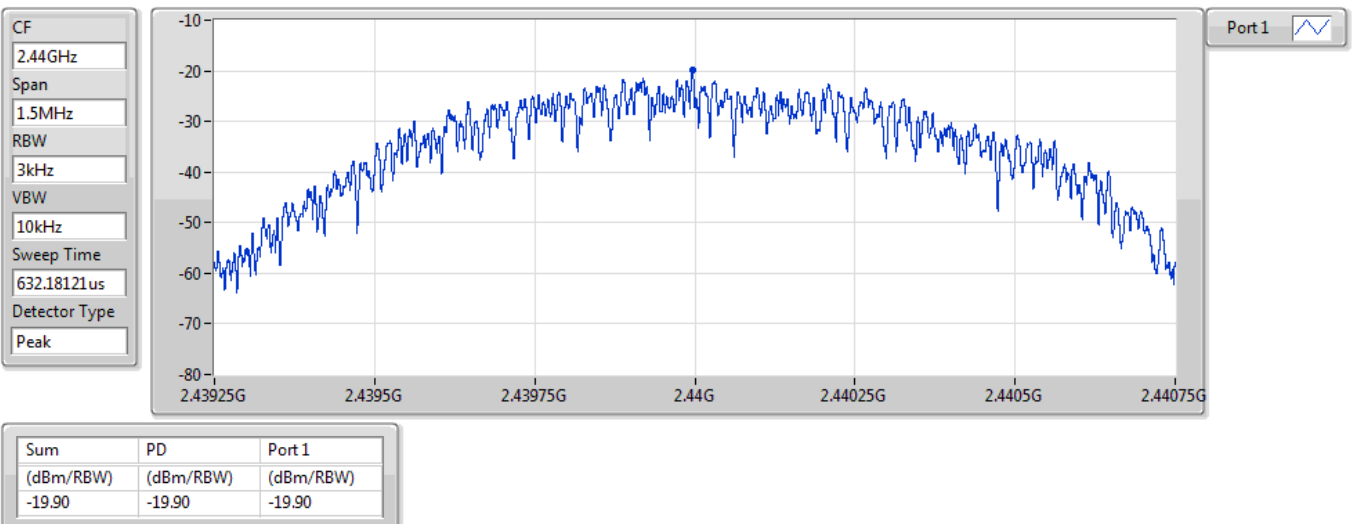
25/06/2022



BT-LE(1Mbps)

2440MHz

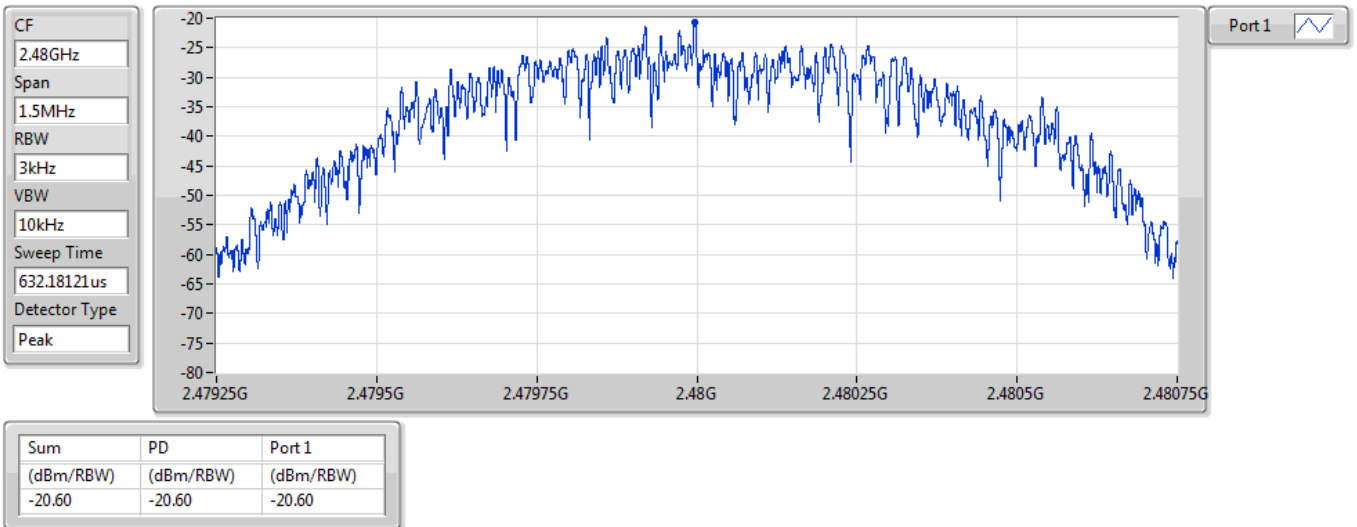
25/06/2022



BT-LE(1Mbps)

2480MHz

25/06/2022





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	2.402G	-5.54	-35.54	2.3048G	-54.48	2.39996G	-42.71	2.4G	-41.24	2.50318G	-51.66	24.03265G	-41.92	1

Result

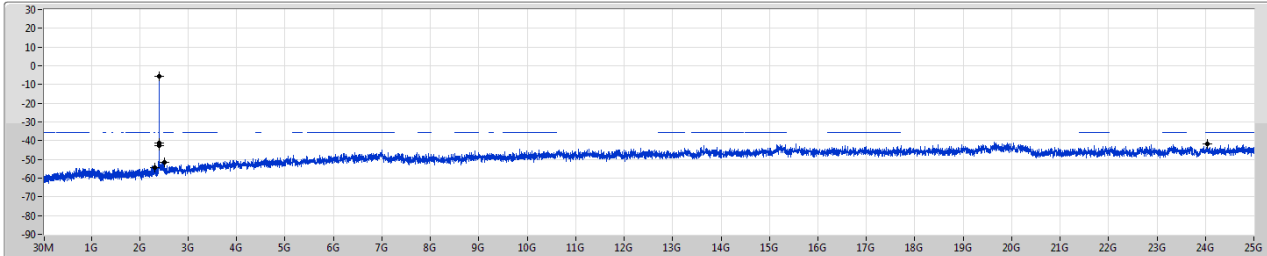
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.402G	-5.54	-35.54	2.3048G	-54.48	2.39996G	-42.71	2.4G	-41.24	2.50318G	-51.66	24.03265G	-41.92	1
2440MHz	Pass	2.44008G	-5.17	-35.17	2.3001G	-54.43	2.3932G	-52.92	2.4G	-54.93	2.50334G	-51.62	15.19996G	-41.30	1
2480MHz	Pass	2.48016G	-5.80	-35.80	2.10623G	-53.85	2.39952G	-52.49	2.4G	-55.01	2.50146G	-51.56	24.78066G	-41.90	1

BT-LE(1Mbps)

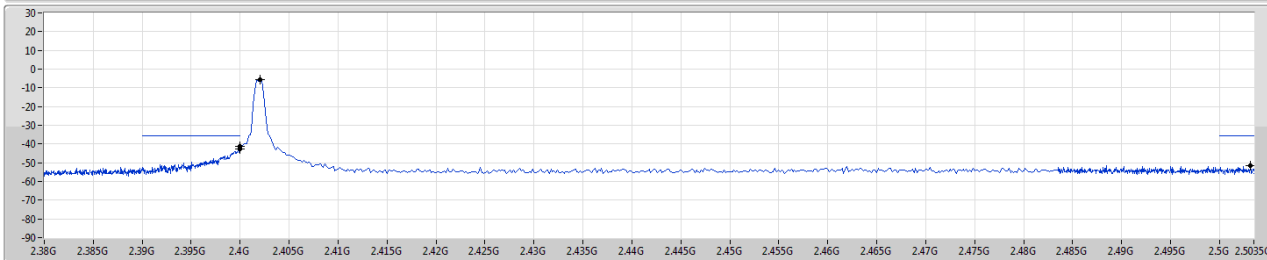
CSEndB-DTS

2402MHz

25/06/2022



Port1



RBW (Hz)
100k
VBW (Hz)
300k
Detector
Peak

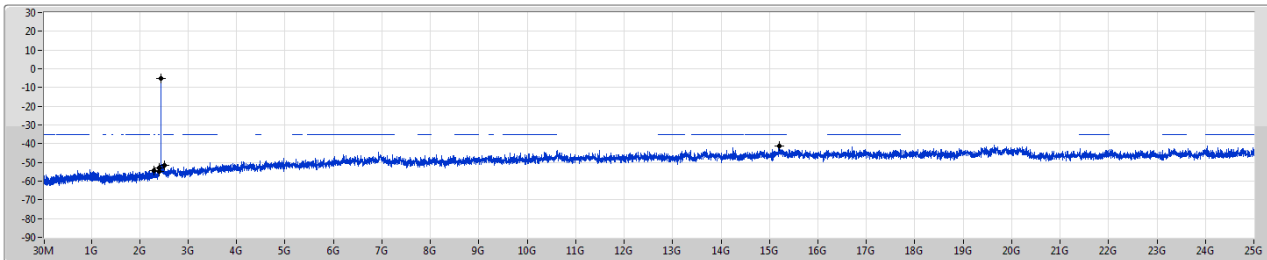
Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.402G	-5.54	-35.54	2.3048G	-54.48	2.39996G	-42.71	2.4G	-41.24	2.50318G	-51.66	2.40265G	-41.92	1

BT-LE(1Mbps)

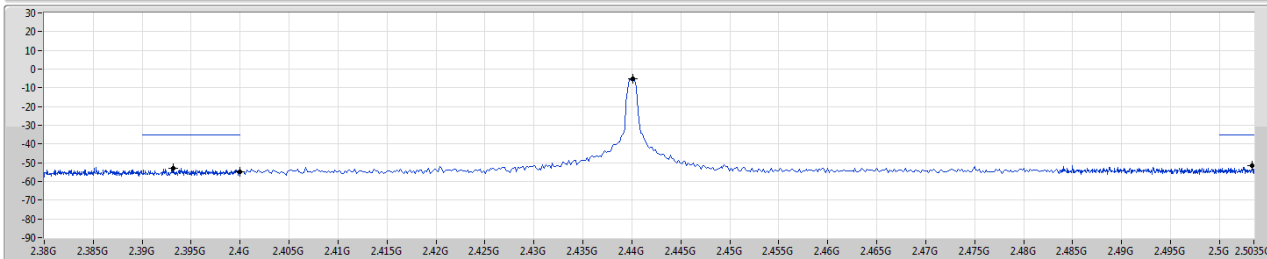
CSEndB-DTS

2440MHz

25/06/2022



Port1



RBW (Hz)
100k
VBW (Hz)
300k
Detector
Peak

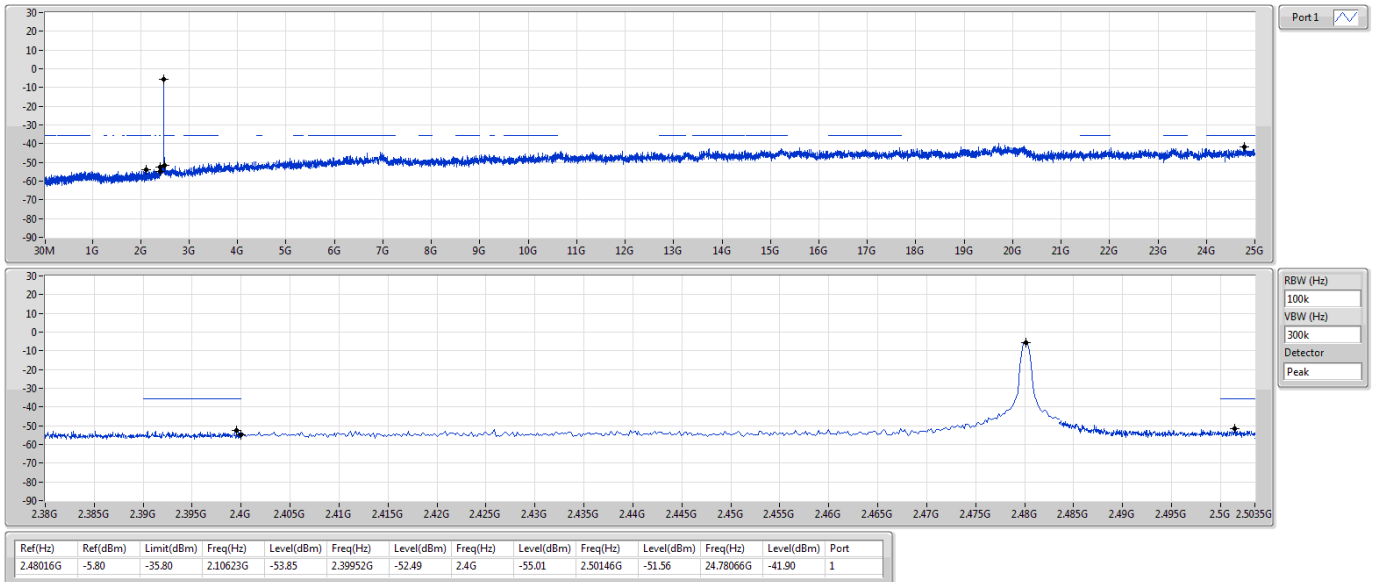
Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.44008G	-5.17	-35.17	2.3001G	-54.43	2.3932G	-52.92	2.4G	-54.93	2.50334G	-51.62	2.44096G	-41.30	1

BT-LE(1Mbps)

CSEndB-DTS

2480MHz

25/06/2022





Summary

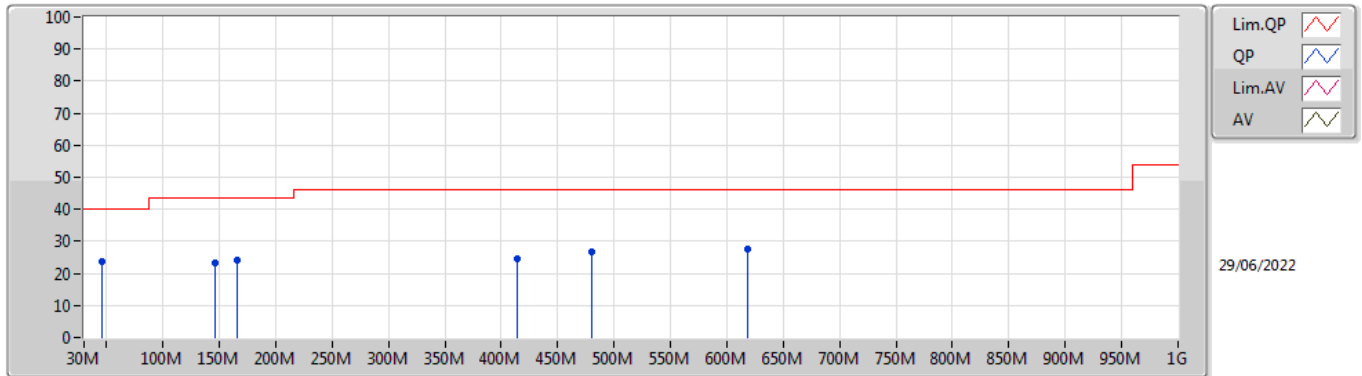
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	PK	45.52M	23.74	40.00	-16.26	3	Vertical	360	1.00	-

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	45.52M	23.74	40.00	-16.26	3	Vertical	360	1.00	-
2440MHz	Pass	PK	146.4M	23.46	43.50	-20.04	3	Vertical	360	1.00	-
2440MHz	Pass	PK	165.8M	24.21	43.50	-19.29	3	Vertical	360	1.00	-
2440MHz	Pass	PK	414.12M	24.56	46.00	-21.44	3	Vertical	360	1.00	-
2440MHz	Pass	PK	480.08M	26.63	46.00	-19.37	3	Vertical	360	1.00	-
2440MHz	Pass	PK	617.82M	27.50	46.00	-18.50	3	Vertical	360	1.00	-
2440MHz	Pass	PK	30M	22.74	40.00	-17.26	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	146.4M	23.74	43.50	-19.76	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	274.44M	22.99	46.00	-23.01	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	439.34M	25.22	46.00	-20.78	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	511.12M	26.40	46.00	-19.60	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	600.36M	27.40	46.00	-18.60	3	Horizontal	0	1.00	-

BT-LE(1Mbps)

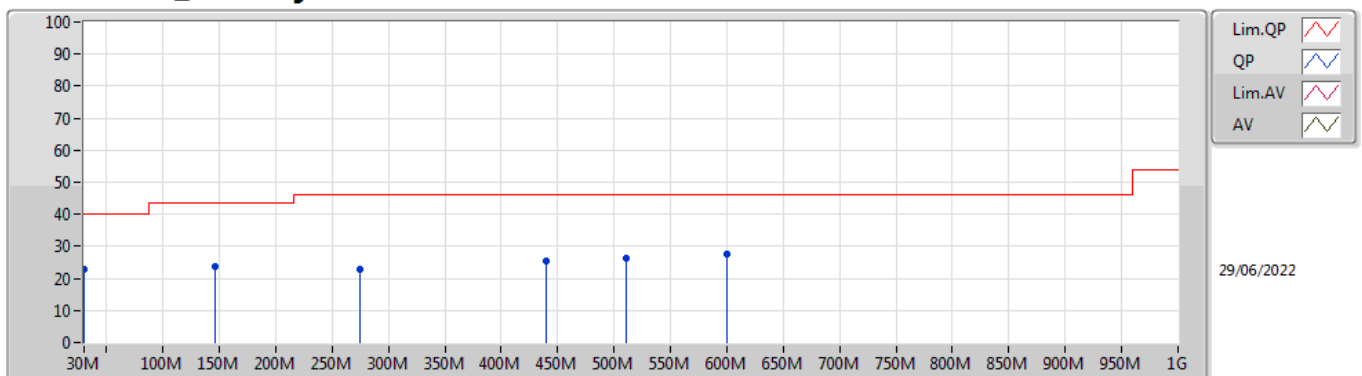
2440MHz_Battery



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	45.52M	23.74	40.00	-16.26	-11.39	3	Vertical	360	1.00	-	35.13	15.03	1.09	27.51
PK	146.4M	23.46	43.50	-20.04	-9.49	3	Vertical	360	1.00	-	32.95	15.69	1.98	27.16
PK	165.8M	24.21	43.50	-19.29	-10.08	3	Vertical	360	1.00	-	34.29	14.88	2.12	27.08
PK	414.12M	24.56	46.00	-21.44	-2.20	3	Vertical	360	1.00	-	26.76	21.65	3.44	27.29
PK	480.08M	26.63	46.00	-19.37	-1.30	3	Vertical	360	1.00	-	27.93	22.67	3.72	27.69
PK	617.82M	27.50	46.00	-18.50	0.29	3	Vertical	360	1.00	-	27.21	24.00	4.27	27.98

BT-LE(1Mbps)

2440MHz_Battery



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	30M	22.74	40.00	-17.26	-2.94	3	Horizontal	0	1.00	-	25.68	23.76	0.88	27.58
PK	146.4M	23.74	43.50	-19.76	-9.49	3	Horizontal	0	1.00	-	33.23	15.69	1.98	27.16
PK	274.44M	22.99	46.00	-23.01	-6.10	3	Horizontal	0	1.00	-	29.09	17.78	2.77	26.65
PK	439.34M	25.22	46.00	-20.78	-1.98	3	Horizontal	0	1.00	-	27.20	21.95	3.55	27.48
PK	511.12M	26.40	46.00	-19.60	-1.17	3	Horizontal	0	1.00	-	27.57	22.80	3.85	27.82
PK	600.36M	27.40	46.00	-18.60	0.02	3	Horizontal	0	1.00	-	27.38	23.76	4.21	27.95



Summary

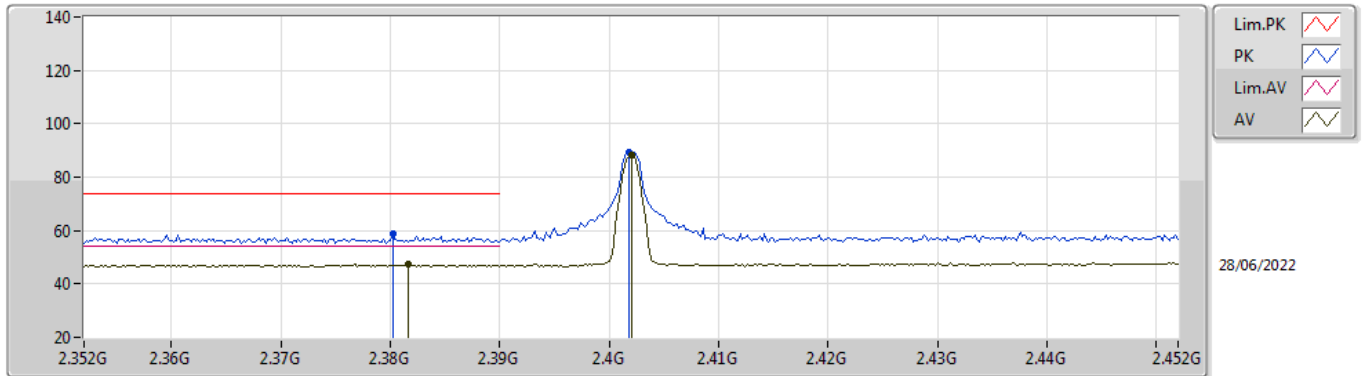
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	AV	2.5G	48.27	54.00	-5.73	3	Horizontal	277	1.25	-

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	AV	2.3816G	47.17	54.00	-6.83	3	Vertical	280	2.06	-
2402MHz	Pass	AV	2.402G	88.16	Inf	-Inf	3	Vertical	280	2.06	-
2402MHz	Pass	PK	2.3802G	58.76	74.00	-15.24	3	Vertical	280	2.06	-
2402MHz	Pass	PK	2.4018G	89.15	Inf	-Inf	3	Vertical	280	2.06	-
2402MHz	Pass	AV	2.3714G	47.37	54.00	-6.63	3	Horizontal	91	1.10	-
2402MHz	Pass	AV	2.402G	86.50	Inf	-Inf	3	Horizontal	91	1.10	-
2402MHz	Pass	PK	2.3828G	58.95	74.00	-15.05	3	Horizontal	91	1.10	-
2402MHz	Pass	PK	2.4018G	87.55	Inf	-Inf	3	Horizontal	91	1.10	-
2402MHz	Pass	AV	4.80368G	43.99	54.00	-10.01	3	Vertical	310	2.73	-
2402MHz	Pass	PK	4.8045G	50.34	74.00	-23.66	3	Vertical	310	2.73	-
2402MHz	Pass	AV	4.80375G	44.73	54.00	-9.27	3	Horizontal	324	1.10	-
2402MHz	Pass	PK	4.80448G	50.78	74.00	-23.22	3	Horizontal	324	1.10	-
2440MHz	Pass	AV	2.3572G	47.34	54.00	-6.66	3	Vertical	281	1.82	-
2440MHz	Pass	AV	2.44G	86.77	Inf	-Inf	3	Vertical	281	1.82	-
2440MHz	Pass	AV	2.4948G	48.24	54.00	-5.76	3	Vertical	281	1.82	-
2440MHz	Pass	PK	2.388G	57.73	74.00	-16.27	3	Vertical	281	1.82	-
2440MHz	Pass	PK	2.4396G	87.76	Inf	-Inf	3	Vertical	281	1.82	-
2440MHz	Pass	PK	2.4864G	58.86	74.00	-15.14	3	Vertical	281	1.82	-
2440MHz	Pass	AV	2.3456G	47.14	54.00	-6.86	3	Horizontal	280	1.25	-
2440MHz	Pass	AV	2.44G	87.03	Inf	-Inf	3	Horizontal	280	1.25	-
2440MHz	Pass	AV	2.4936G	48.00	54.00	-6.00	3	Horizontal	280	1.25	-
2440MHz	Pass	PK	2.3668G	57.84	74.00	-16.16	3	Horizontal	280	1.25	-
2440MHz	Pass	PK	2.4396G	88.05	Inf	-Inf	3	Horizontal	280	1.25	-
2440MHz	Pass	PK	2.4988G	58.90	74.00	-15.10	3	Horizontal	280	1.25	-
2440MHz	Pass	AV	4.8799G	41.82	54.00	-12.18	3	Vertical	335	1.39	-
2440MHz	Pass	AV	7.3196G	38.10	54.00	-15.90	3	Vertical	23	2.31	-
2440MHz	Pass	PK	4.88003G	49.12	74.00	-24.88	3	Vertical	335	1.39	-
2440MHz	Pass	PK	7.32045G	49.86	74.00	-24.14	3	Vertical	23	2.31	-
2440MHz	Pass	AV	4.8797G	43.64	54.00	-10.36	3	Horizontal	337	1.27	-
2440MHz	Pass	AV	7.3202G	38.10	54.00	-15.90	3	Horizontal	108	1.82	-
2440MHz	Pass	PK	4.88042G	49.86	74.00	-24.14	3	Horizontal	337	1.27	-
2440MHz	Pass	PK	7.3201G	49.24	74.00	-24.76	3	Horizontal	108	1.82	-
2480MHz	Pass	AV	2.48G	87.57	Inf	-Inf	3	Vertical	280	1.55	-
2480MHz	Pass	AV	2.496G	48.25	54.00	-5.75	3	Vertical	280	1.55	-
2480MHz	Pass	PK	2.4802G	88.54	Inf	-Inf	3	Vertical	280	1.55	-
2480MHz	Pass	PK	2.4835G	64.08	74.00	-9.92	3	Vertical	280	1.55	-
2480MHz	Pass	AV	2.48G	87.98	Inf	-Inf	3	Horizontal	277	1.25	-
2480MHz	Pass	AV	2.5G	48.27	54.00	-5.73	3	Horizontal	277	1.25	-
2480MHz	Pass	PK	2.4804G	89.02	Inf	-Inf	3	Horizontal	277	1.25	-
2480MHz	Pass	PK	2.4835G	63.67	74.00	-10.33	3	Horizontal	277	1.25	-
2480MHz	Pass	AV	4.95957G	39.35	54.00	-14.65	3	Vertical	290	1.80	-
2480MHz	Pass	AV	7.43996G	37.89	54.00	-16.11	3	Vertical	177	1.24	-
2480MHz	Pass	PK	4.96031G	48.30	74.00	-25.70	3	Vertical	290	1.80	-
2480MHz	Pass	PK	7.43957G	48.87	74.00	-25.13	3	Vertical	177	1.24	-
2480MHz	Pass	AV	4.9596G	41.96	54.00	-12.04	3	Horizontal	278	1.38	-
2480MHz	Pass	AV	7.44027G	37.81	54.00	-16.19	3	Horizontal	151	2.23	-
2480MHz	Pass	PK	4.96031G	49.22	74.00	-24.78	3	Horizontal	278	1.38	-
2480MHz	Pass	PK	7.4401G	49.21	74.00	-24.79	3	Horizontal	151	2.23	-

BT-LE(1Mbps)

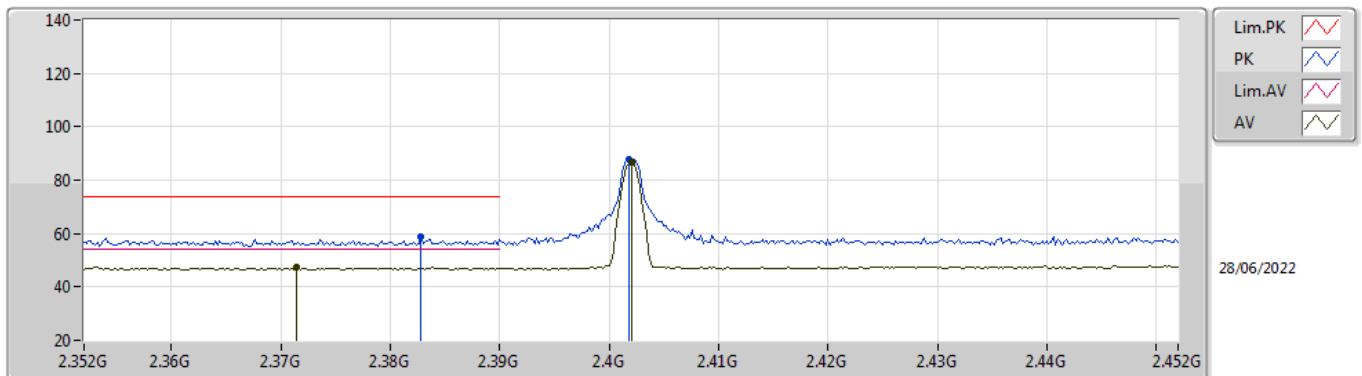
2402MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.3816G	47.17	54.00	-6.83	31.72	3	Vertical	280	2.06	-	15.45	27.36	4.36	-
AV	2.402G	88.16	Inf	-Inf	31.79	3	Vertical	280	2.06	-	56.37	27.41	4.38	-
PK	2.3802G	58.76	74.00	-15.24	31.72	3	Vertical	280	2.06	-	27.04	27.36	4.36	-
PK	2.4018G	89.15	Inf	-Inf	31.79	3	Vertical	280	2.06	-	57.36	27.41	4.38	-

BT-LE(1Mbps)

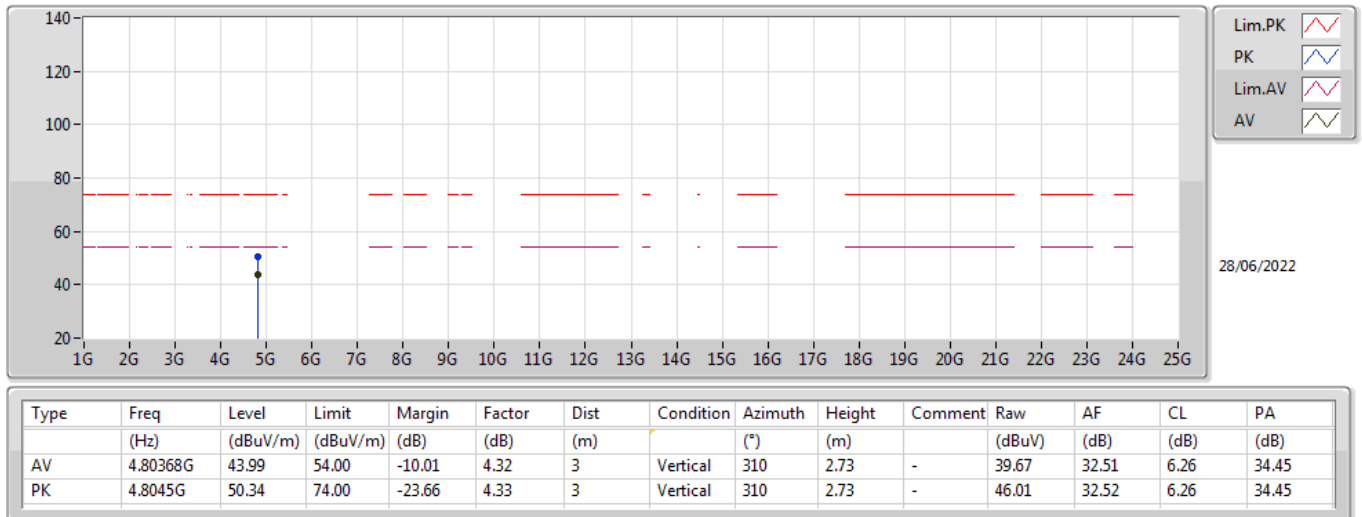
2402MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.3714G	47.37	54.00	-6.63	31.69	3	Horizontal	91	1.10	-	15.68	27.34	4.35	-
AV	2.402G	86.50	Inf	-Inf	31.79	3	Horizontal	91	1.10	-	54.71	27.41	4.38	-
PK	2.3828G	58.95	74.00	-15.05	31.73	3	Horizontal	91	1.10	-	27.22	27.37	4.36	-
PK	2.4018G	87.55	Inf	-Inf	31.79	3	Horizontal	91	1.10	-	55.76	27.41	4.38	-

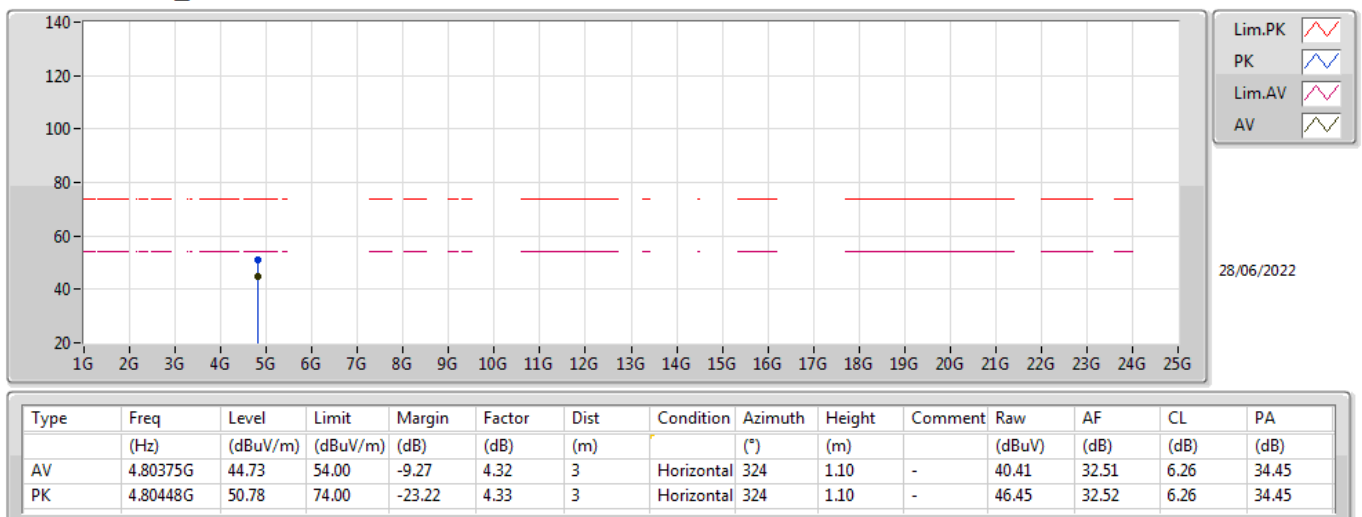
BT-LE(1Mbps)

2402MHz_TX



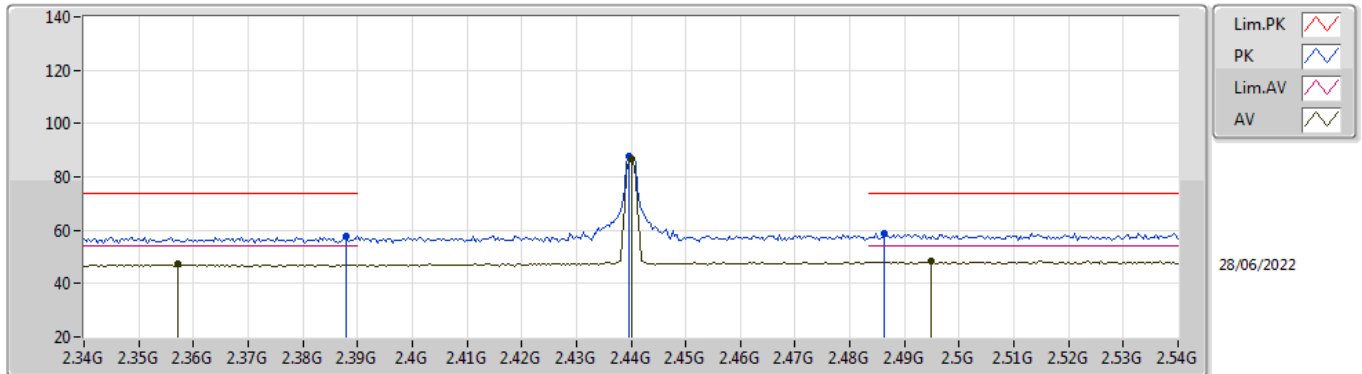
BT-LE(1Mbps)

2402MHz_TX



BT-LE(1Mbps)

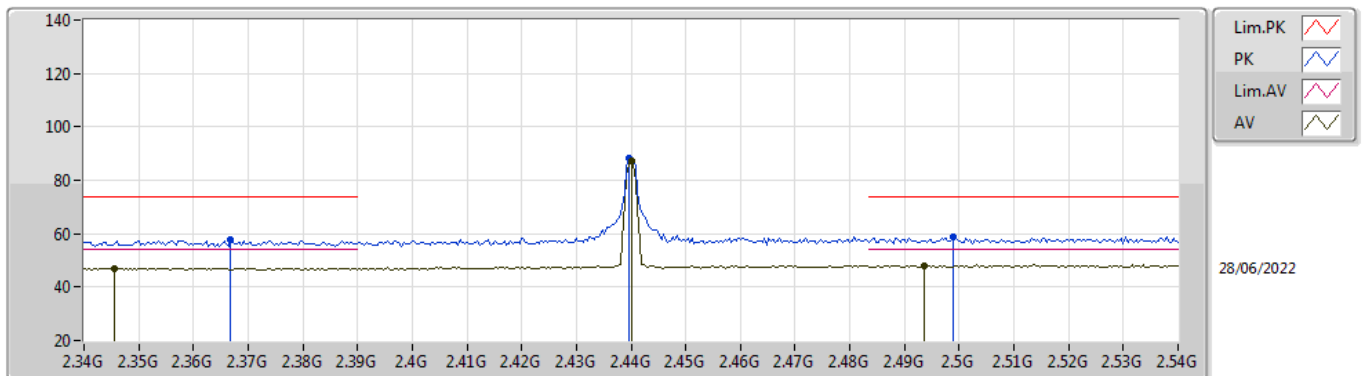
2440MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.3572G	47.34	54.00	-6.66	31.65	3	Vertical	281	1.82	-	15.69	27.31	4.34	-
AV	2.44G	86.77	Inf	-Inf	32.00	3	Vertical	281	1.82	-	54.77	27.56	4.44	-
AV	2.4948G	48.24	54.00	-5.76	32.39	3	Vertical	281	1.82	-	15.85	27.87	4.52	-
PK	2.388G	57.73	74.00	-16.27	31.75	3	Vertical	281	1.82	-	25.98	27.38	4.37	-
PK	2.4396G	87.76	Inf	-Inf	32.00	3	Vertical	281	1.82	-	55.76	27.56	4.44	-
PK	2.4864G	58.86	74.00	-15.14	32.33	3	Vertical	281	1.82	-	26.53	27.82	4.51	-

BT-LE(1Mbps)

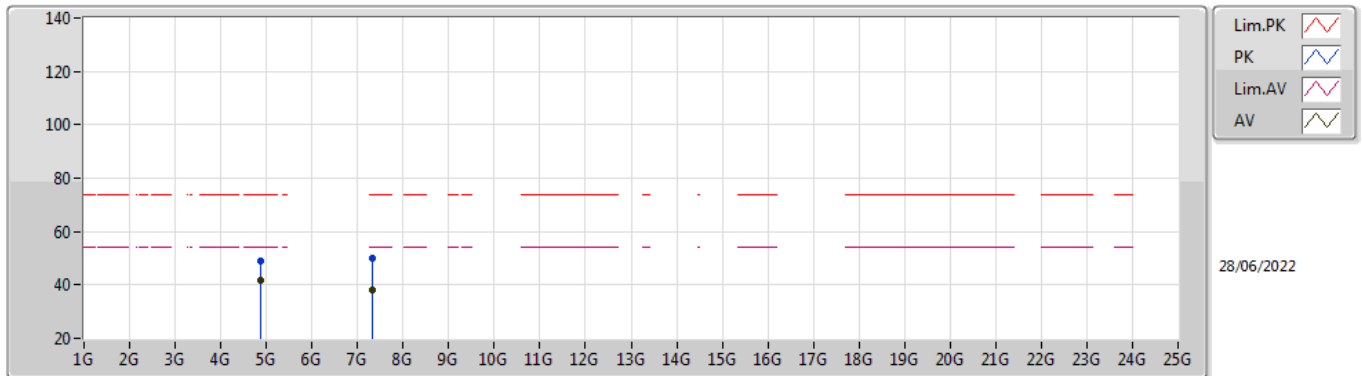
2440MHz_TX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.3456G	47.14	54.00	-6.86	31.60	3	Horizontal	280	1.25	-	15.54	27.28	4.32	-
AV	2.44G	87.03	Inf	-Inf	32.00	3	Horizontal	280	1.25	-	55.03	27.56	4.44	-
AV	2.4936G	48.00	54.00	-6.00	32.38	3	Horizontal	280	1.25	-	15.62	27.86	4.52	-
PK	2.3668G	57.84	74.00	-16.16	31.68	3	Horizontal	280	1.25	-	26.16	27.33	4.35	-
PK	2.4396G	88.05	Inf	-Inf	32.00	3	Horizontal	280	1.25	-	56.05	27.56	4.44	-
PK	2.4988G	58.90	74.00	-15.10	32.41	3	Horizontal	280	1.25	-	26.49	27.89	4.52	-

BT-LE(1Mbps)

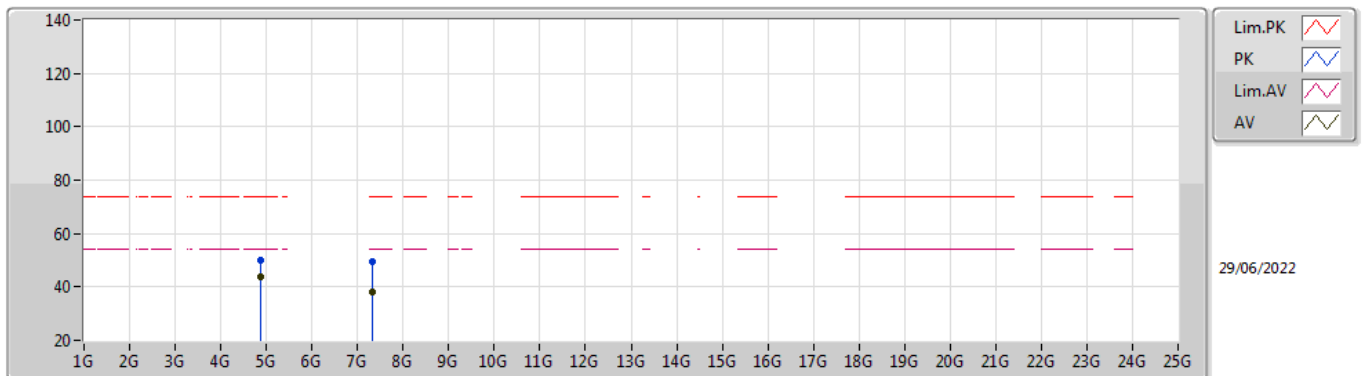
2440MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.8799G	41.82	54.00	-12.18	4.63	3	Vertical	335	1.39	-	37.19	32.76	6.31	34.44
AV	7.3196G	38.10	54.00	-15.90	10.11	3	Vertical	23	2.31	-	27.99	36.78	8.14	34.81
PK	4.88003G	49.12	74.00	-24.88	4.63	3	Vertical	335	1.39	-	44.49	32.76	6.31	34.44
PK	7.32045G	49.86	74.00	-24.14	10.11	3	Vertical	23	2.31	-	39.75	36.78	8.14	34.81

BT-LE(1Mbps)

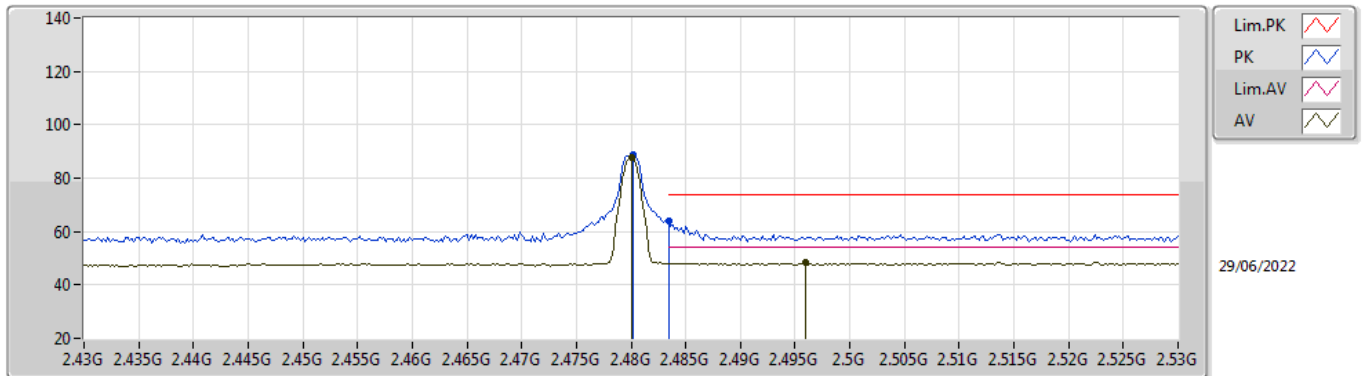
2440MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.8797G	43.64	54.00	-10.36	4.63	3	Horizontal	337	1.27	-	39.01	32.76	6.31	34.44
AV	7.3202G	38.10	54.00	-15.90	10.11	3	Horizontal	108	1.82	-	27.99	36.78	8.14	34.81
PK	4.88042G	49.86	74.00	-24.14	4.63	3	Horizontal	337	1.27	-	45.23	32.76	6.31	34.44
PK	7.3201G	49.24	74.00	-24.76	10.11	3	Horizontal	108	1.82	-	39.13	36.78	8.14	34.81

BT-LE(1Mbps)

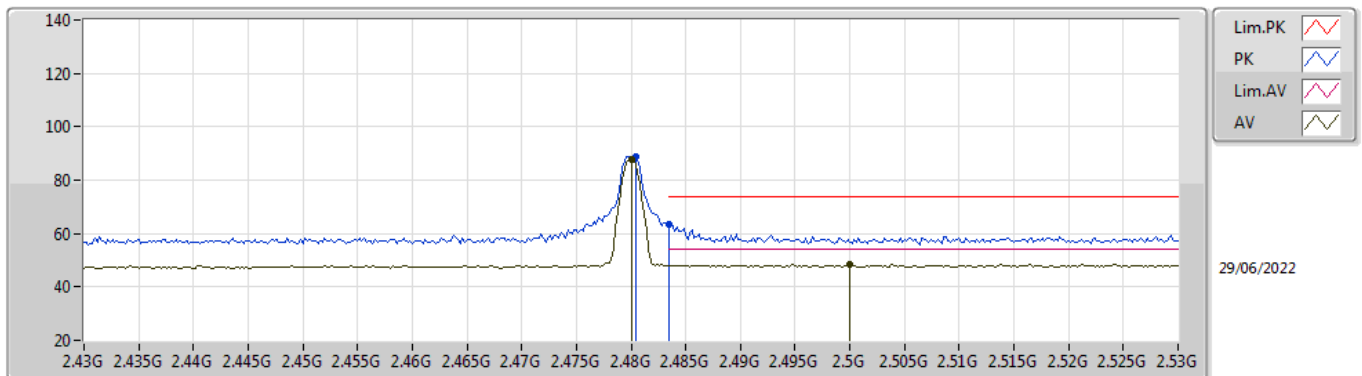
2480MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.48G	87.57	Inf	-Inf	32.28	3	Vertical	280	1.55	-	55.29	27.78	4.50	-
AV	2.496G	48.25	54.00	-5.75	32.40	3	Vertical	280	1.55	-	15.85	27.88	4.52	-
PK	2.4802G	88.54	Inf	-Inf	32.28	3	Vertical	280	1.55	-	56.26	27.78	4.50	-
PK	2.4835G	64.08	74.00	-9.92	32.30	3	Vertical	280	1.55	-	31.78	27.80	4.50	-

BT-LE(1Mbps)

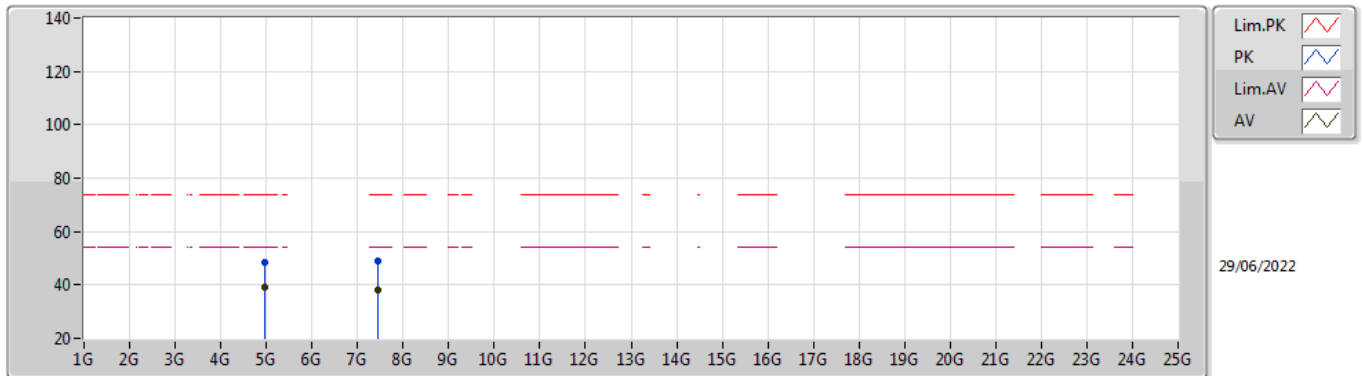
2480MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.48G	87.98	Inf	-Inf	32.28	3	Horizontal	277	1.25	-	55.70	27.78	4.50	-
AV	2.5G	48.27	54.00	-5.73	32.43	3	Horizontal	277	1.25	-	15.84	27.90	4.53	-
PK	2.4804G	89.02	Inf	-Inf	32.28	3	Horizontal	277	1.25	-	56.74	27.78	4.50	-
PK	2.4835G	63.67	74.00	-10.33	32.30	3	Horizontal	277	1.25	-	31.37	27.80	4.50	-

BT-LE(1Mbps)

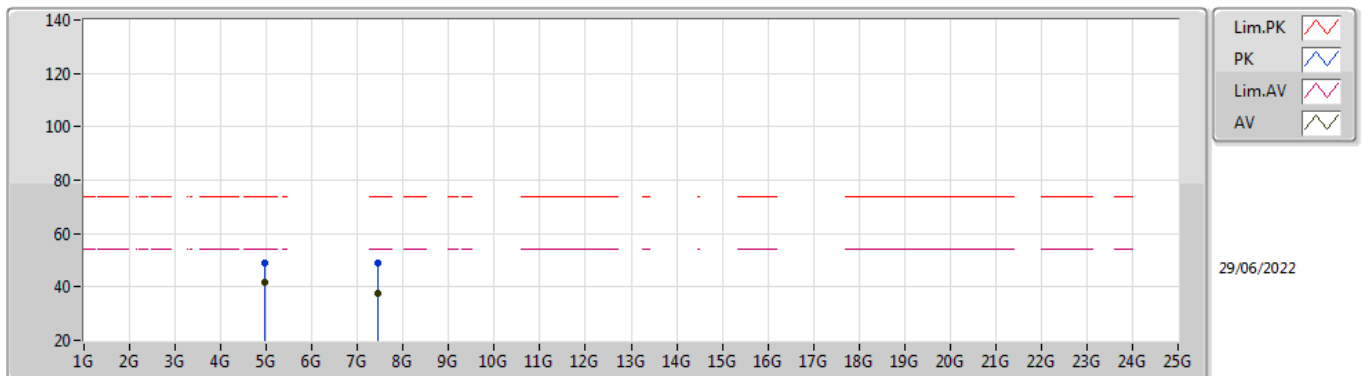
2480MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.95957G	39.35	54.00	-14.65	5.07	3	Vertical	290	1.80	-	34.28	33.14	6.36	34.43
AV	7.43996G	37.89	54.00	-16.11	9.92	3	Vertical	177	1.24	-	27.97	36.60	8.17	34.85
PK	4.96031G	48.30	74.00	-25.70	5.07	3	Vertical	290	1.80	-	43.23	33.14	6.36	34.43
PK	7.43957G	48.87	74.00	-25.13	9.92	3	Vertical	177	1.24	-	38.95	36.60	8.17	34.85

BT-LE(1Mbps)

2480MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.9596G	41.96	54.00	-12.04	5.07	3	Horizontal	278	1.38	-	36.89	33.14	6.36	34.43
AV	7.44027G	37.81	54.00	-16.19	9.92	3	Horizontal	151	2.23	-	27.89	36.60	8.17	34.85
PK	4.96031G	49.22	74.00	-24.78	5.07	3	Horizontal	278	1.38	-	44.15	33.14	6.36	34.43
PK	7.4401G	49.21	74.00	-24.79	9.92	3	Horizontal	151	2.23	-	39.29	36.60	8.17	34.85