

FCC Radio Test Report

FCC ID : XPYANNAB1
Equipment : Stand-alone Bluetooth LE module
Brand Name : u-blox
Model Name : ANNA-B112
Applicant : u-blox AG
Zürcherstrasse 68, Thalwil, Ch-8800, Switzerland
Manufacturer : u-blox AG
Zürcherstrasse 68, Thalwil, Ch-8800, Switzerland
Standard : 47 CFR FCC Part 15.247
Blockchain :



The product was received on Jan. 12, 2024, and testing was started from Jan. 16, 2024 and completed on Jan. 30, 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 variant 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



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	15.247(b)	Maximum Conducted Output Power	PASS	-
3.2	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

Note: This is a variant test report for adding new type of antenna.

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: Amber Chiu



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.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	YAGEO	ANT3216LL00R2400A	Chip Antenna	N/A	5.05

Note 1: The EUT has one antenna.

For BT function:

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

Ant. 1 can be used as transmitting/receiving.

1.1.3 EUT Information

Operational Condition	
EUT Power Type	From DC Power supply
Type of EUT	
<input type="checkbox"/>	Stand-alone
<input type="checkbox"/>	Combined (EUT where the radio part is fully integrated within another device)
	Combined Equipment - Brand Name / Model No.:
<input checked="" type="checkbox"/>	Plug-in radio (EUT intended for a variety of host systems)
	Host System - Brand Name / Model No.: Wacker Neuson / DPU55/65
<input type="checkbox"/>	Other:

1.1.4 Mode Test Duty Cycle

Mode	DC	DCF (dB)	T (s)	VBW (Hz) $\geq 1/T$
BT-LE(1Mbps)	0.633	1.99	395.625u	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				
<input checked="" type="checkbox"/>	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	TH07-HY	Xun Hsieh	23.1~24.0°C / 52~58%	16/Jan/2024
Radiated	03CH03-HY	Lego Lin	23.5~24.7°C / 46~53%	17/Jan/2024~30/Jan/2024
<input type="checkbox"/>	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	

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
Maximum Conducted Output Power	2 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	nrfgo
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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	Maximum Conducted Output Power
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	DC power supply		
Operating Mode > 1GHz	CTX		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT		V	

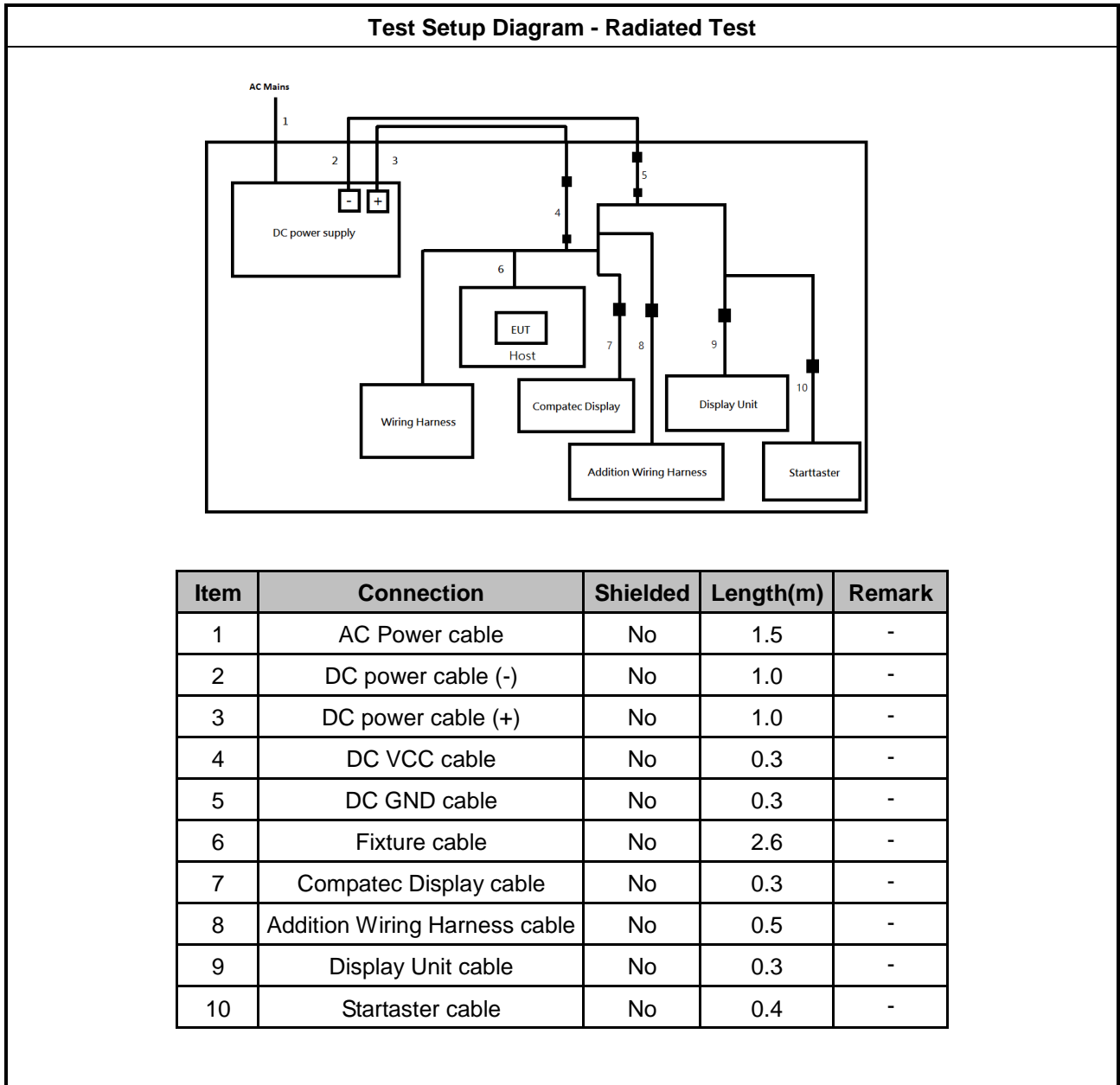


2.3 Support Equipment

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

Support Equipment – Radiated					
No.	Equipment	Brand Name	Model Name	FCC ID	Remark
1	DC Power Supply	Chroma	62024P-100-50	-	-
2	AC power cable	PowerSync	TPCMRN0018	-	-
3	DC power cable * 2	N/A	N/A	-	-
4	Wiring Harness(For Main Model (Worst Case))	N/A	N/A	-	-
5	Wiring Harness(For Variant Model (2nd Variant))	N/A	N/A	-	-
6	Additional Wiring Harness	N/A	N/A	-	-
7	Console Cable	N/A	N/A	-	-
8	X5: Starttaster	N/A	N/A	-	-
9	X16: Compatec Display	N/A	N/A	-	-
10	X4: Display Unit	N/A	N/A	-	-
11	DC VCC	N/A	N/A	-	-
12	DC GND	N/A	N/A	-	-

2.4 Test Setup Diagram



3 Transmitter Test Result

3.1 Maximum Conducted Output Power

3.1.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit	
	<ul style="list-style-type: none"> ▪ If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)
	<ul style="list-style-type: none"> ▪ Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm
	<ul style="list-style-type: none"> ▪ Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<ul style="list-style-type: none"> ▪ Smart antenna system (SAS):
	<ul style="list-style-type: none"> - Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<ul style="list-style-type: none"> - Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<ul style="list-style-type: none"> - Aggregate power on all beams: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3 + 8$ dBm
e.i.r.p. Power Limit:	
	<ul style="list-style-type: none"> ▪ 2400-2483.5 MHz Band
	<ul style="list-style-type: none"> ▪ Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)
	<ul style="list-style-type: none"> ▪ Point-to-point systems (P2P): $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX}])$ dBm
	<ul style="list-style-type: none"> ▪ Smart antenna system (SAS)
	<ul style="list-style-type: none"> - Single beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	<ul style="list-style-type: none"> - Overlap beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	<ul style="list-style-type: none"> - 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.	

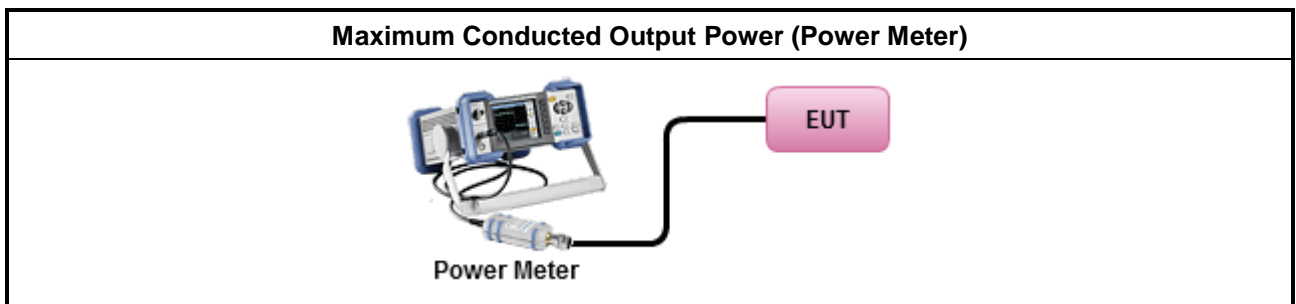
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

Test Method	
<ul style="list-style-type: none"> ▪ Maximum Peak Conducted Output Power 	
<input type="checkbox"/>	Refer as KDB 558074, clause 8.3.1.1 (11.9.1.1 of ANSI C63.10) RBW ≥ EBW method.
<input type="checkbox"/>	Refer as KDB 558074, clause 8.3.1.2 (11.9.1.2 of ANSI C63.10) integrated band power method.
<input type="checkbox"/>	Refer as KDB 558074, clause 8.3.1.3 (11.9.1.3 of ANSI C63.10) peak power meter.
<ul style="list-style-type: none"> ▪ Maximum Average Conducted Output Power 	
<input type="checkbox"/>	Refer as KDB 558074, clause 8.3.2.2 (11.9.2.2 of ANSI C63.10) using a spectrum analyzer.
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 8.3.2.3 (11.9.2.3 of ANSI C63.10) using a power meter.
<ul style="list-style-type: none"> ▪ For conducted measurement. 	
<ul style="list-style-type: none"> ▪ 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. 	
<ul style="list-style-type: none"> ▪ 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]) $EIRP_{total} = P_{total} + DG$ 	

3.1.4 Test Setup



3.1.5 Test Result of Maximum Conducted Output Power

Refer as Appendix A



3.2 Emissions in Restricted Frequency Bands

3.2.1 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.

3.2.2 Measuring Instruments

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



3.2.3 Test Procedures

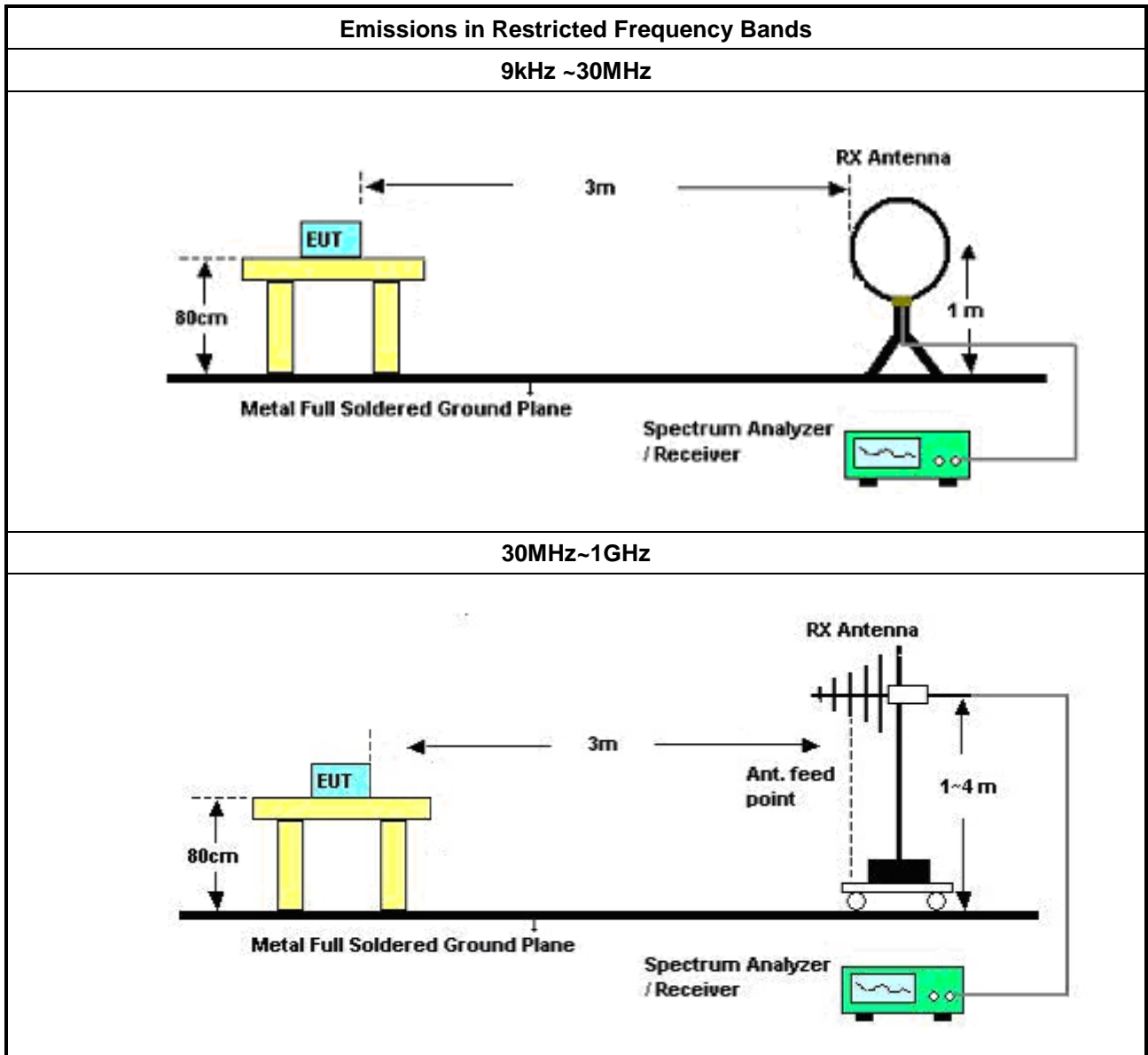
Test Method	
	<ul style="list-style-type: none"> The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].
	<ul style="list-style-type: none"> Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
	<ul style="list-style-type: none"> For the transmitter unwanted emissions shall be measured using following options below: <ul style="list-style-type: none"> Refer as KDB 558074, clause 8.6 (11.12 of ANSI C63.10) for restricted frequency bands.
	<ul style="list-style-type: none"> For the transmitter band-edge emissions shall be measured using following options below: <ul style="list-style-type: none"> 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.
	<ul style="list-style-type: none"> Use the following spectrum analyzer settings: <ul style="list-style-type: none"> 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.
	<ul style="list-style-type: none"> KDB 414788 Open-Field Test Sites and Chamber Correlation Justification. <ul style="list-style-type: none"> 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.

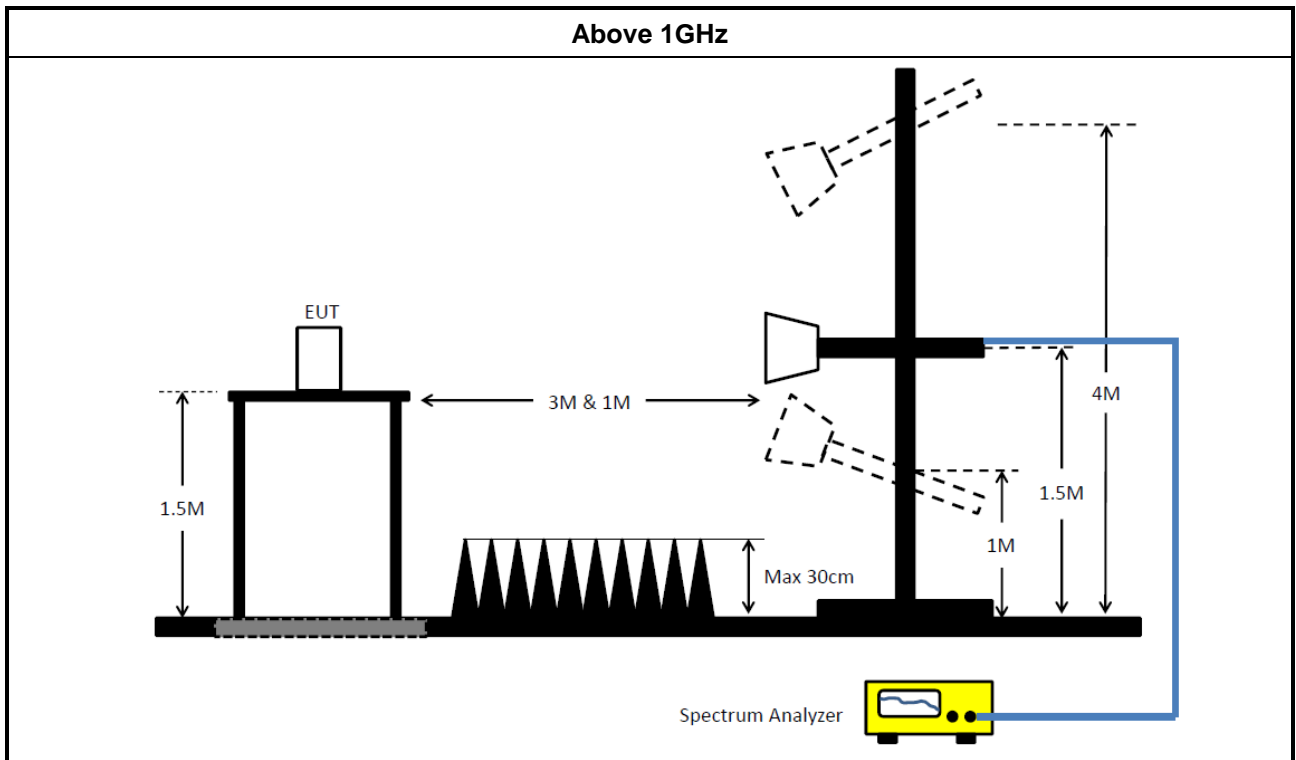
3.2.4 Measurement Results Calculation

The measured Level is calculated using:

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

3.2.5 Test Setup





3.2.6 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.

3.2.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix B

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	101515	9kHz~40GHz	14/Feb/2023	13/Feb/2024
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	V5.11.15	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+6m	HUBER+SUHNE R	SUOFLEX 104	03CH03-cable-01	1GHz~40GHz	29/Jun/2023	28/Jun/2024
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	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	-0.43	0.00091



Result

Mode	Result	DG (dBi)	Total Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	5.05	-0.70	30.00
2440MHz	Pass	5.05	-0.58	30.00
2480MHz	Pass	5.05	-0.43	30.00

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



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	QP	190.37M	40.17	43.50	-3.33	3	Horizontal	197	1.57

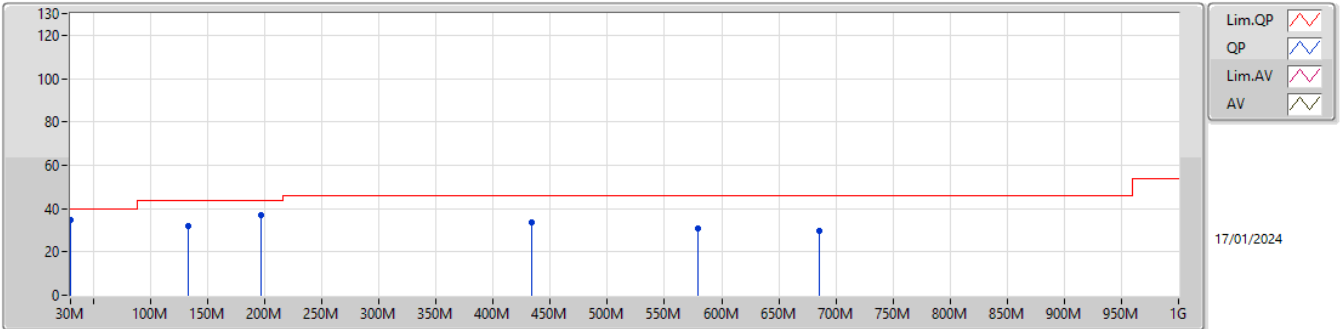


Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-
2480MHz	Pass	PK	132.82M	32.12	43.50	-11.38	3	Vertical	0	1.00
2480MHz	Pass	PK	196.84M	37.24	43.50	-6.26	3	Vertical	0	1.00
2480MHz	Pass	PK	433.52M	33.74	46.00	-12.26	3	Vertical	0	1.00
2480MHz	Pass	PK	579.02M	30.66	46.00	-15.34	3	Vertical	0	1.00
2480MHz	Pass	PK	685.72M	29.45	46.00	-16.55	3	Vertical	0	1.00
2480MHz	Pass	QP	30M	34.87	40.00	-5.13	3	Vertical	78	1.00
2480MHz	Pass	PK	30M	30.65	40.00	-9.35	3	Horizontal	0	1.00
2480MHz	Pass	PK	132.82M	34.26	43.50	-9.24	3	Horizontal	0	1.00
2480MHz	Pass	PK	222.06M	41.78	46.00	-4.22	3	Horizontal	0	1.00
2480MHz	Pass	PK	253.1M	35.80	46.00	-10.20	3	Horizontal	0	1.00
2480MHz	Pass	PK	433.52M	35.54	46.00	-10.46	3	Horizontal	0	1.00
2480MHz	Pass	QP	190.37M	40.17	43.50	-3.33	3	Horizontal	197	1.57

2.4-2.4835GHz_BT-LE(1Mbps)

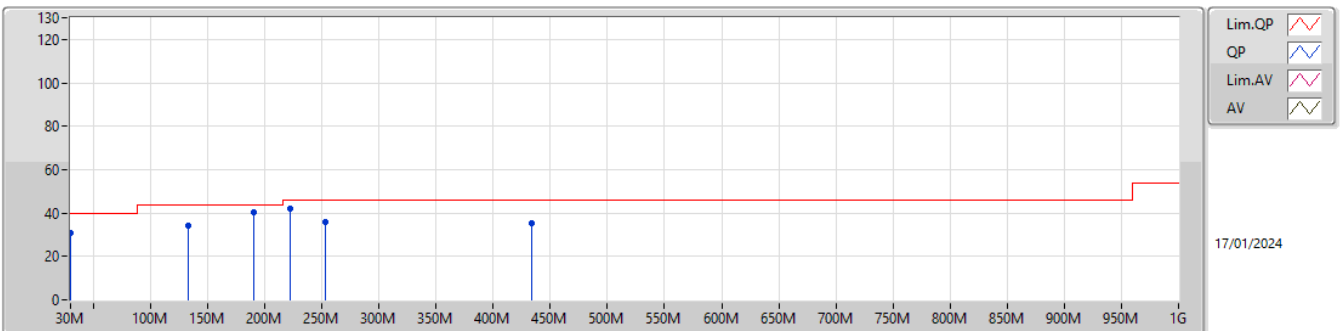
2480MHz_DC power supply



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	132.82M	32.12	43.50	-11.38	-8.43	3	Vertical	0	1.00	40.55	16.99	1.90	27.32
PK	196.84M	37.24	43.50	-6.26	-10.38	3	Vertical	0	1.00	47.62	14.39	2.34	27.11
PK	433.52M	33.74	46.00	-12.26	-2.09	3	Vertical	0	1.00	35.83	22.04	3.54	27.67
PK	579.02M	30.66	46.00	-15.34	0.19	3	Vertical	0	1.00	30.47	24.17	4.21	28.19
PK	685.72M	29.45	46.00	-16.55	0.68	3	Vertical	0	1.00	28.77	24.29	4.55	28.16
QP	30M	34.87	40.00	-5.13	-3.18	3	Vertical	78	1.00	38.05	23.49	0.92	27.59

2.4-2.4835GHz_BT-LE(1Mbps)

2480MHz_DC power supply



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	30M	30.65	40.00	-9.35	-3.18	3	Horizontal	0	1.00	33.83	23.49	0.92	27.59
PK	132.82M	34.26	43.50	-9.24	-8.43	3	Horizontal	0	1.00	42.69	16.99	1.90	27.32
PK	222.06M	41.78	46.00	-4.22	-10.06	3	Horizontal	0	1.00	51.84	14.54	2.48	27.08
PK	253.11M	35.80	46.00	-10.20	-6.47	3	Horizontal	0	1.00	42.27	17.92	2.65	27.04
PK	433.52M	35.54	46.00	-10.46	-2.09	3	Horizontal	0	1.00	37.63	22.04	3.54	27.67
QP	190.37M	40.17	43.50	-3.33	-10.58	3	Horizontal	197	1.57	50.75	14.25	2.29	27.12



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	4.95999G	53.89	54.00	-0.11	3	Vertical	61	1.70

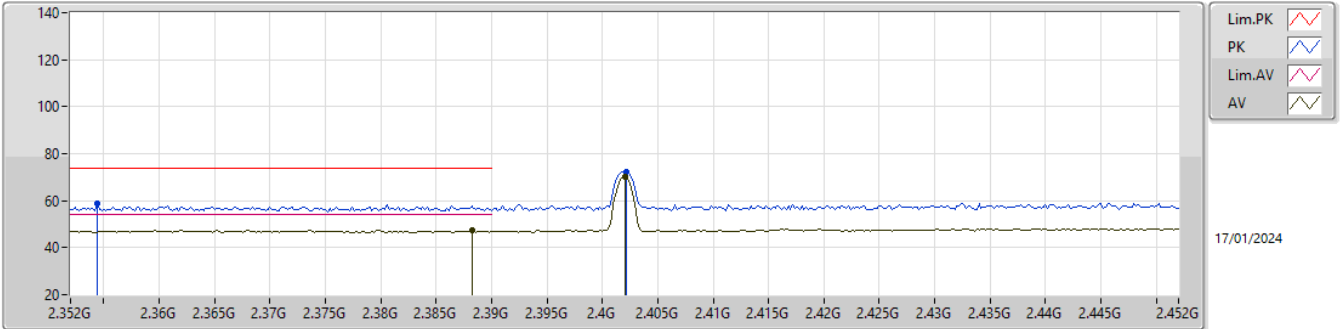


Result

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	2.3882G	47.41	54.00	-6.59	3	Vertical	340	1.72
2402MHz	Pass	AV	2.402G	70.19	Inf	-Inf	3	Vertical	340	1.72
2402MHz	Pass	PK	2.3544G	58.78	74.00	-15.22	3	Vertical	340	1.72
2402MHz	Pass	PK	2.4022G	72.32	Inf	-Inf	3	Vertical	340	1.72
2402MHz	Pass	AV	2.3712G	47.38	54.00	-6.62	3	Horizontal	172	1.81
2402MHz	Pass	AV	2.402G	68.53	Inf	-Inf	3	Horizontal	172	1.81
2402MHz	Pass	PK	2.3614G	58.26	74.00	-15.74	3	Horizontal	172	1.81
2402MHz	Pass	PK	2.4022G	70.78	Inf	-Inf	3	Horizontal	172	1.81
2402MHz	Pass	AV	4.80394G	50.92	54.00	-3.08	3	Vertical	44	2.61
2402MHz	Pass	PK	4.80439G	54.90	74.00	-19.10	3	Vertical	44	2.61
2402MHz	Pass	AV	4.80402G	51.98	54.00	-2.02	3	Horizontal	149	2.53
2402MHz	Pass	PK	4.804G	55.40	74.00	-18.60	3	Horizontal	149	2.53
2440MHz	Pass	AV	2.3608G	47.16	54.00	-6.84	3	Vertical	342	1.40
2440MHz	Pass	AV	2.44G	71.11	Inf	-Inf	3	Vertical	342	1.40
2440MHz	Pass	AV	2.492G	48.38	54.00	-5.62	3	Vertical	342	1.40
2440MHz	Pass	PK	2.3712G	58.13	74.00	-15.87	3	Vertical	342	1.40
2440MHz	Pass	PK	2.44G	73.13	Inf	-Inf	3	Vertical	342	1.40
2440MHz	Pass	PK	2.4964G	58.87	74.00	-15.13	3	Vertical	342	1.40
2440MHz	Pass	AV	2.3892G	47.20	54.00	-6.80	3	Horizontal	171	2.76
2440MHz	Pass	AV	2.44G	68.47	Inf	-Inf	3	Horizontal	171	2.76
2440MHz	Pass	AV	2.4892G	48.14	54.00	-5.86	3	Horizontal	171	2.76
2440MHz	Pass	PK	2.3808G	57.86	74.00	-16.14	3	Horizontal	171	2.76
2440MHz	Pass	PK	2.4396G	70.64	Inf	-Inf	3	Horizontal	171	2.76
2440MHz	Pass	PK	2.492G	58.89	74.00	-15.11	3	Horizontal	171	2.76
2440MHz	Pass	AV	4.87996G	53.14	54.00	-0.86	3	Vertical	100	2.42
2440MHz	Pass	AV	7.3192G	46.19	54.00	-7.81	3	Vertical	112	1.71
2440MHz	Pass	PK	4.88008G	56.40	74.00	-17.60	3	Vertical	100	2.42
2440MHz	Pass	PK	7.32092G	54.08	74.00	-19.92	3	Vertical	112	1.71
2440MHz	Pass	AV	4.87995G	53.36	54.00	-0.64	3	Horizontal	77	1.71
2440MHz	Pass	AV	7.31927G	43.52	54.00	-10.48	3	Horizontal	134	1.52
2440MHz	Pass	PK	4.87996G	56.30	74.00	-17.70	3	Horizontal	77	1.71
2440MHz	Pass	PK	7.32053G	52.88	74.00	-21.12	3	Horizontal	134	1.52
2480MHz	Pass	AV	2.48G	72.05	Inf	-Inf	3	Vertical	342	1.35
2480MHz	Pass	AV	2.4898G	48.38	54.00	-5.62	3	Vertical	342	1.35
2480MHz	Pass	PK	2.4798G	73.93	Inf	-Inf	3	Vertical	342	1.35
2480MHz	Pass	PK	2.4926G	59.41	74.00	-14.59	3	Vertical	342	1.35
2480MHz	Pass	AV	2.48G	70.72	Inf	-Inf	3	Horizontal	355	2.17
2480MHz	Pass	AV	2.4886G	48.37	54.00	-5.63	3	Horizontal	355	2.17
2480MHz	Pass	PK	2.48G	72.65	Inf	-Inf	3	Horizontal	355	2.17
2480MHz	Pass	PK	2.4864G	59.33	74.00	-14.67	3	Horizontal	355	2.17
2480MHz	Pass	AV	4.95999G	53.89	54.00	-0.11	3	Vertical	61	1.70
2480MHz	Pass	AV	7.43922G	47.69	54.00	-6.31	3	Vertical	154	1.51
2480MHz	Pass	PK	4.95941G	57.13	74.00	-16.87	3	Vertical	61	1.70
2480MHz	Pass	PK	7.43913G	55.84	74.00	-18.16	3	Vertical	154	1.51
2480MHz	Pass	AV	4.95996G	52.87	54.00	-1.13	3	Horizontal	30	1.54
2480MHz	Pass	AV	7.43922G	45.06	54.00	-8.94	3	Horizontal	131	1.64
2480MHz	Pass	PK	4.96001G	55.94	74.00	-18.06	3	Horizontal	30	1.54
2480MHz	Pass	PK	7.43932G	53.38	74.00	-20.62	3	Horizontal	131	1.64

2.4-2.4835GHz_BT-LE(1Mbps)

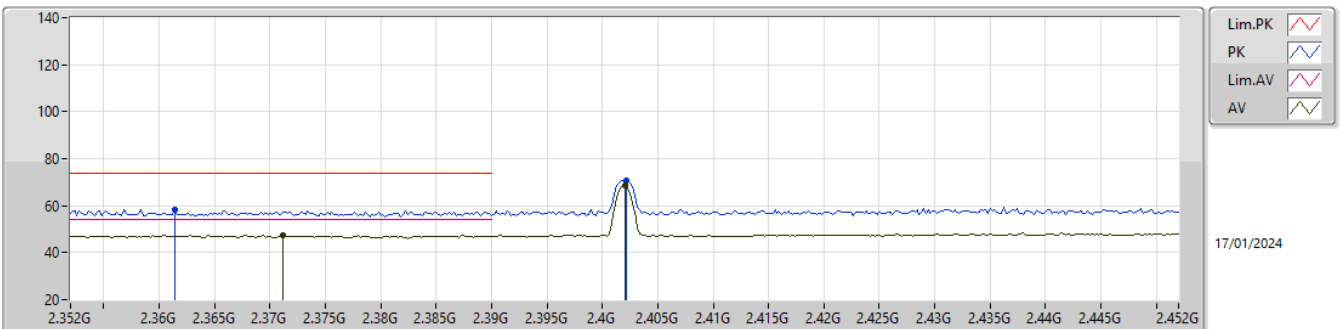
2402MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.3882G	47.41	54.00	-6.59	31.83	3	Vertical	340	1.72	15.58	27.18	4.65	-
AV	2.402G	70.19	Inf	-Inf	32.06	3	Vertical	340	1.72	38.13	27.40	4.66	-
PK	2.3544G	58.78	74.00	-15.22	31.75	3	Vertical	340	1.72	27.03	27.14	4.61	-
PK	2.4022G	72.32	Inf	-Inf	32.06	3	Vertical	340	1.72	40.26	27.40	4.66	-

2.4-2.4835GHz_BT-LE(1Mbps)

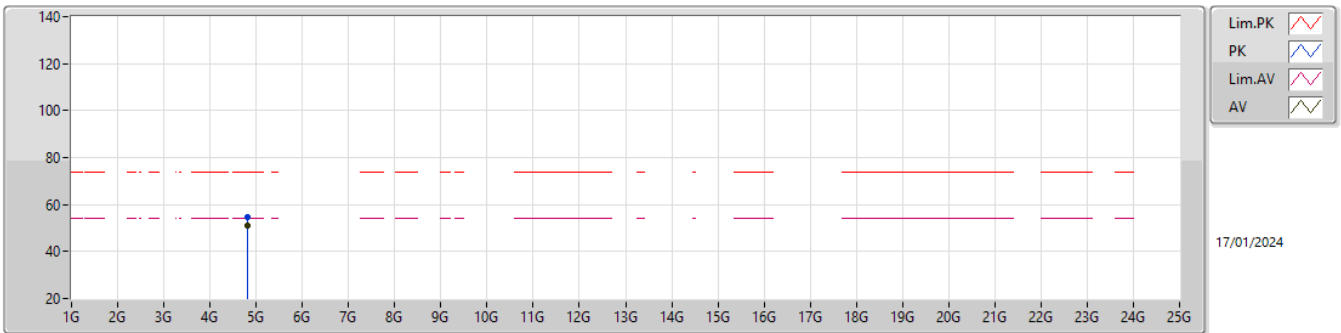
2402MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.3712G	47.38	54.00	-6.62	31.82	3	Horizontal	172	1.81	15.56	27.19	4.63	-
AV	2.402G	68.53	Inf	-Inf	32.06	3	Horizontal	172	1.81	36.47	27.40	4.66	-
PK	2.3614G	58.26	74.00	-15.74	31.81	3	Horizontal	172	1.81	26.45	27.20	4.61	-
PK	2.4022G	70.78	Inf	-Inf	32.06	3	Horizontal	172	1.81	38.72	27.40	4.66	-

2.4-2.4835GHz_BT-LE(1Mbps)

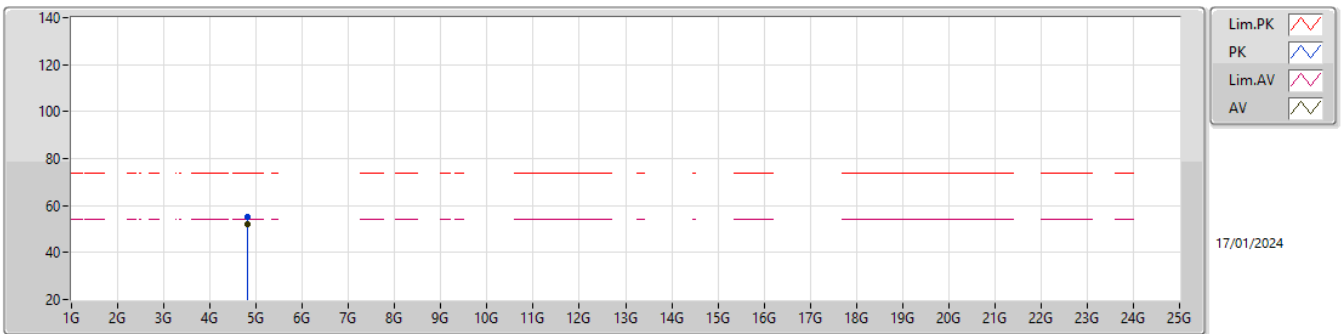
2402MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.80394G	50.92	54.00	-3.08	4.80	3	Vertical	44	2.61	46.12	32.02	6.79	34.01
PK	4.80439G	54.90	74.00	-19.10	4.81	3	Vertical	44	2.61	50.09	32.03	6.79	34.01

2.4-2.4835GHz_BT-LE(1Mbps)

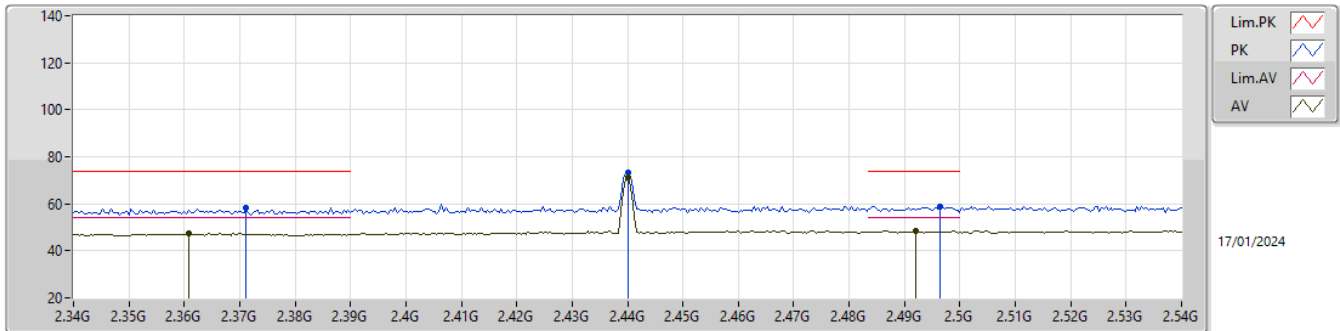
2402MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.80402G	51.98	54.00	-2.02	4.80	3	Horizontal	149	2.53	47.18	32.02	6.79	34.01
PK	4.804G	55.40	74.00	-18.60	4.80	3	Horizontal	149	2.53	50.60	32.02	6.79	34.01

2.4-2.4835GHz_BT-LE(1Mbps)

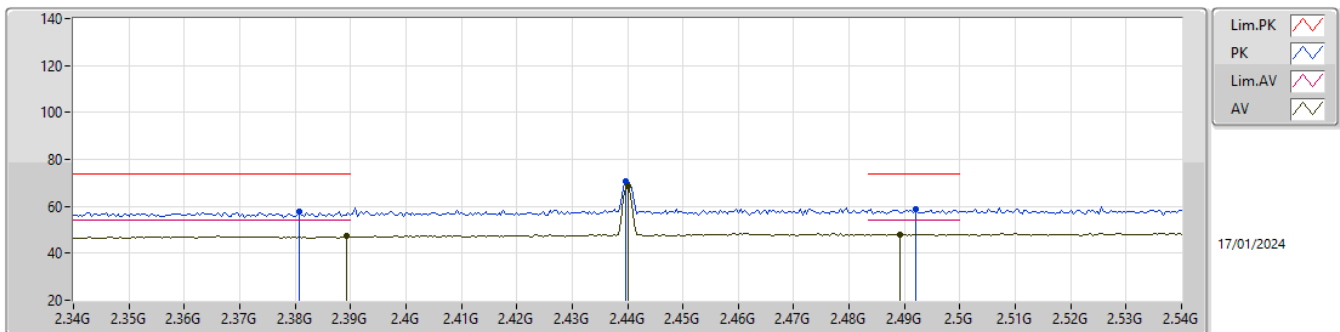
2440MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.3608G	47.16	54.00	-6.84	31.81	3	Vertical	342	1.40	15.35	27.20	4.61	-
AV	2.44G	71.11	Inf	-Inf	32.33	3	Vertical	342	1.40	38.78	27.60	4.73	-
AV	2.492G	48.38	54.00	-5.62	32.62	3	Vertical	342	1.40	15.76	27.80	4.82	-
PK	2.3712G	58.13	74.00	-15.87	31.82	3	Vertical	342	1.40	26.31	27.19	4.63	-
PK	2.44G	73.13	Inf	-Inf	32.33	3	Vertical	342	1.40	40.80	27.60	4.73	-
PK	2.4964G	58.87	74.00	-15.13	32.62	3	Vertical	342	1.40	26.25	27.80	4.82	-

2.4-2.4835GHz_BT-LE(1Mbps)

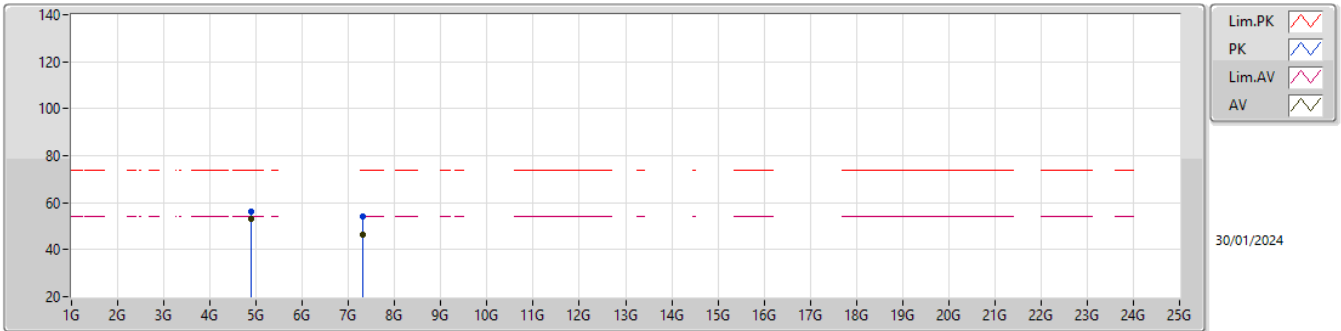
2440MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.3892G	47.20	54.00	-6.80	31.84	3	Horizontal	171	2.76	15.36	27.19	4.65	-
AV	2.44G	68.47	Inf	-Inf	32.33	3	Horizontal	171	2.76	36.14	27.60	4.73	-
AV	2.4892G	48.14	54.00	-5.86	32.60	3	Horizontal	171	2.76	15.54	27.79	4.81	-
PK	2.3808G	57.86	74.00	-16.14	31.75	3	Horizontal	171	2.76	26.11	27.11	4.64	-
PK	2.4396G	70.64	Inf	-Inf	32.33	3	Horizontal	171	2.76	38.31	27.60	4.73	-
PK	2.492G	58.89	74.00	-15.11	32.62	3	Horizontal	171	2.76	26.27	27.80	4.82	-

2.4-2.4835GHz_BT-LE(1Mbps)

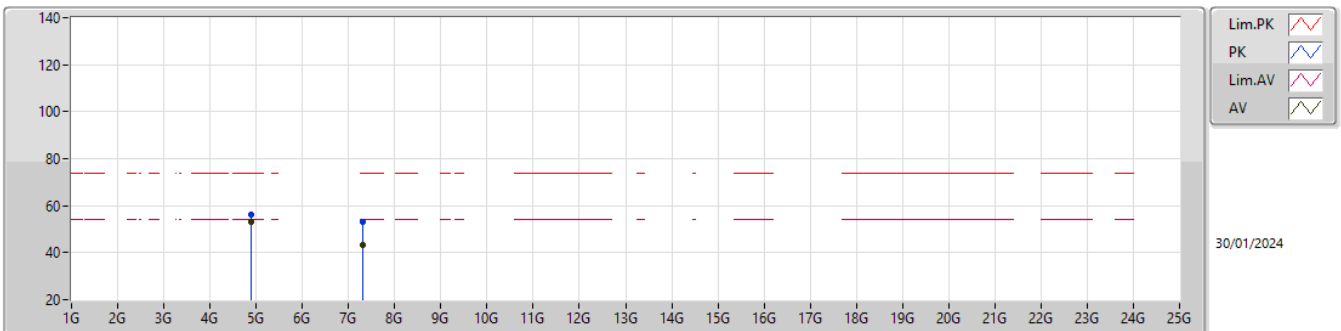
2440MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.87996G	53.14	54.00	-0.86	5.30	3	Vertical	100	2.42	47.84	32.48	6.82	34.00
AV	7.3192G	46.19	54.00	-7.81	10.92	3	Vertical	112	1.71	35.27	36.66	8.60	34.34
PK	4.88008G	56.40	74.00	-17.60	5.30	3	Vertical	100	2.42	51.10	32.48	6.82	34.00
PK	7.32092G	54.08	74.00	-19.92	10.93	3	Vertical	112	1.71	43.15	36.66	8.61	34.34

2.4-2.4835GHz_BT-LE(1Mbps)

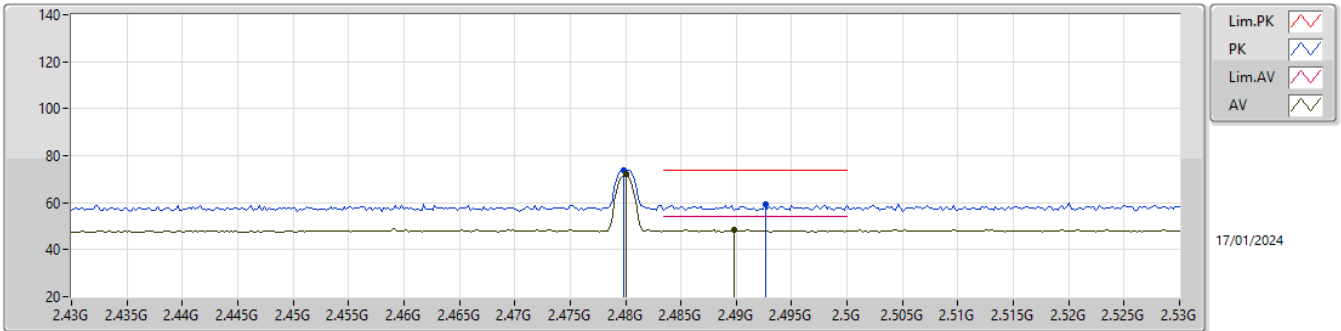
2440MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.87995G	53.36	54.00	-0.64	5.30	3	Horizontal	77	1.71	48.06	32.48	6.82	34.00
AV	7.31927G	43.52	54.00	-10.48	10.92	3	Horizontal	134	1.52	32.60	36.66	8.60	34.34
PK	4.87996G	56.30	74.00	-17.70	5.30	3	Horizontal	77	1.71	51.00	32.48	6.82	34.00
PK	7.32053G	52.88	74.00	-21.12	10.92	3	Horizontal	134	1.52	41.96	36.66	8.60	34.34

2.4-2.4835GHz_BT-LE(1Mbps)

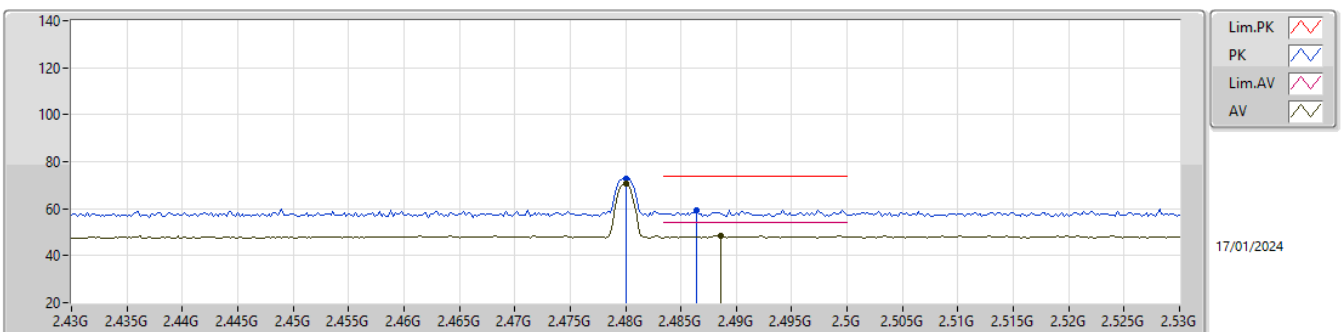
2480MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.48G	72.05	Inf	-Inf	32.50	3	Vertical	342	1.35	39.55	27.70	4.80	-
AV	2.4898G	48.38	54.00	-5.62	32.61	3	Vertical	342	1.35	15.77	27.80	4.81	-
PK	2.4798G	73.93	Inf	-Inf	32.50	3	Vertical	342	1.35	41.43	27.70	4.80	-
PK	2.4926G	59.41	74.00	-14.59	32.62	3	Vertical	342	1.35	26.79	27.80	4.82	-

2.4-2.4835GHz_BT-LE(1Mbps)

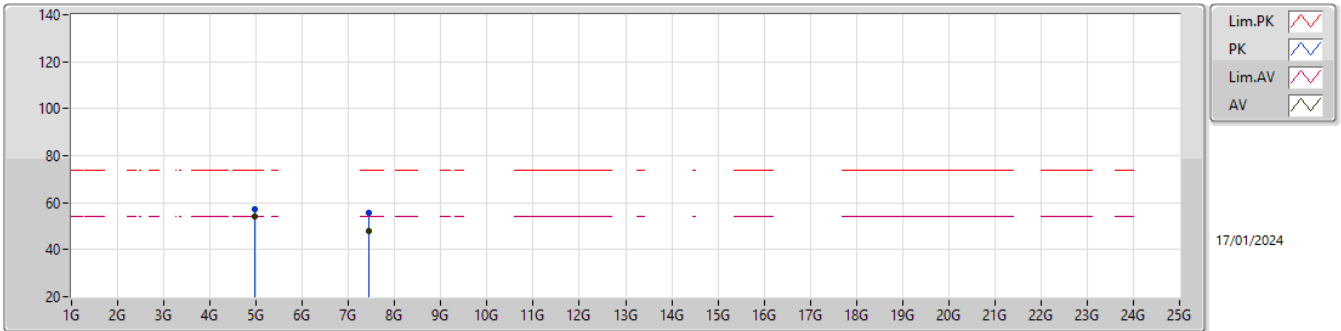
2480MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.48G	70.72	Inf	-Inf	32.50	3	Horizontal	355	2.17	38.22	27.70	4.80	-
AV	2.4886G	48.37	54.00	-5.63	32.60	3	Horizontal	355	2.17	15.77	27.79	4.81	-
PK	2.48G	72.65	Inf	-Inf	32.50	3	Horizontal	355	2.17	40.15	27.70	4.80	-
PK	2.4864G	59.33	74.00	-14.67	32.57	3	Horizontal	355	2.17	26.76	27.76	4.81	-

2.4-2.4835GHz_BT-LE(1Mbps)

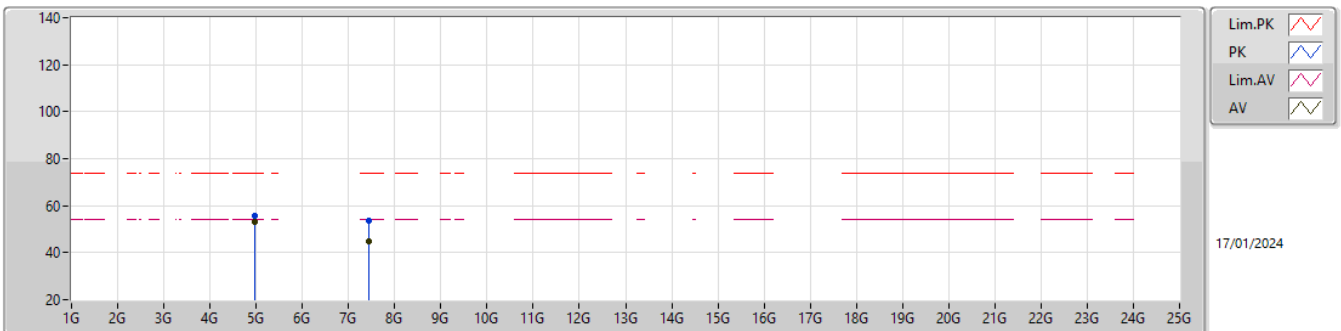
2480MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.95999G	53.89	54.00	-0.11	5.72	3	Vertical	61	1.70	48.17	32.86	6.85	33.99
AV	7.43922G	47.69	54.00	-6.31	10.63	3	Vertical	154	1.51	37.06	36.32	8.66	34.35
PK	4.95941G	57.13	74.00	-16.87	5.72	3	Vertical	61	1.70	51.41	32.86	6.85	33.99
PK	7.43913G	55.84	74.00	-18.16	10.63	3	Vertical	154	1.51	45.21	36.32	8.66	34.35

2.4-2.4835GHz_BT-LE(1Mbps)

2480MHz_TX

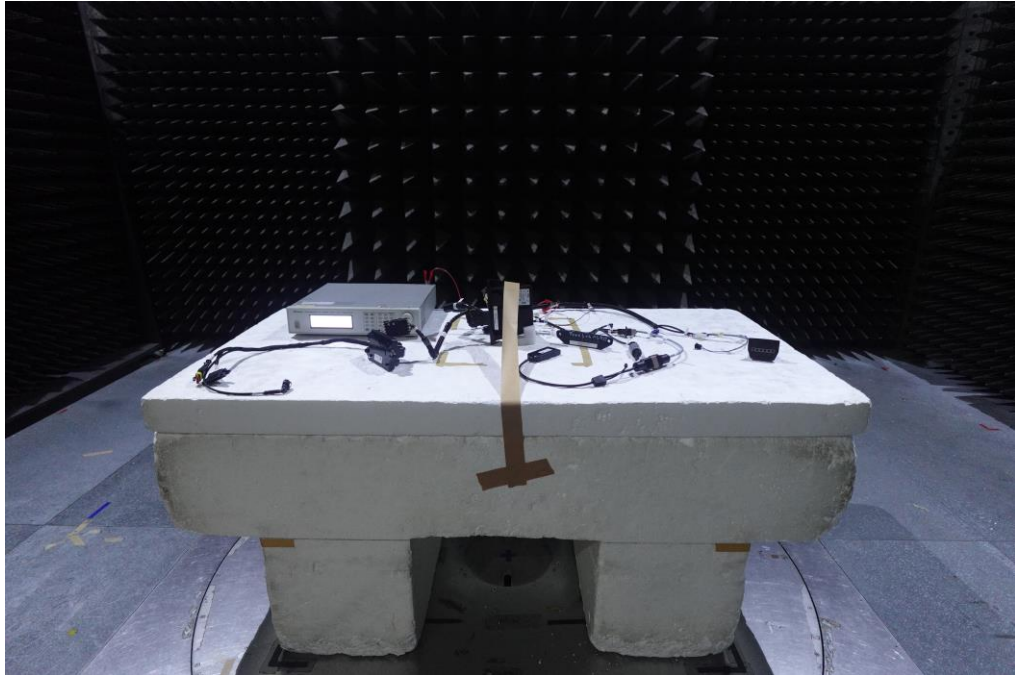


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.95996G	52.87	54.00	-1.13	5.72	3	Horizontal	30	1.54	47.15	32.86	6.85	33.99
AV	7.43922G	45.06	54.00	-8.94	10.63	3	Horizontal	131	1.64	34.43	36.32	8.66	34.35
PK	4.96001G	55.94	74.00	-18.06	5.72	3	Horizontal	30	1.54	50.22	32.86	6.85	33.99
PK	7.43932G	53.38	74.00	-20.62	10.63	3	Horizontal	131	1.64	42.75	36.32	8.66	34.35

1. Photographs of Radiated Emissions Test Configuration

For radiated emissions 30MHz~1GHz

Front view

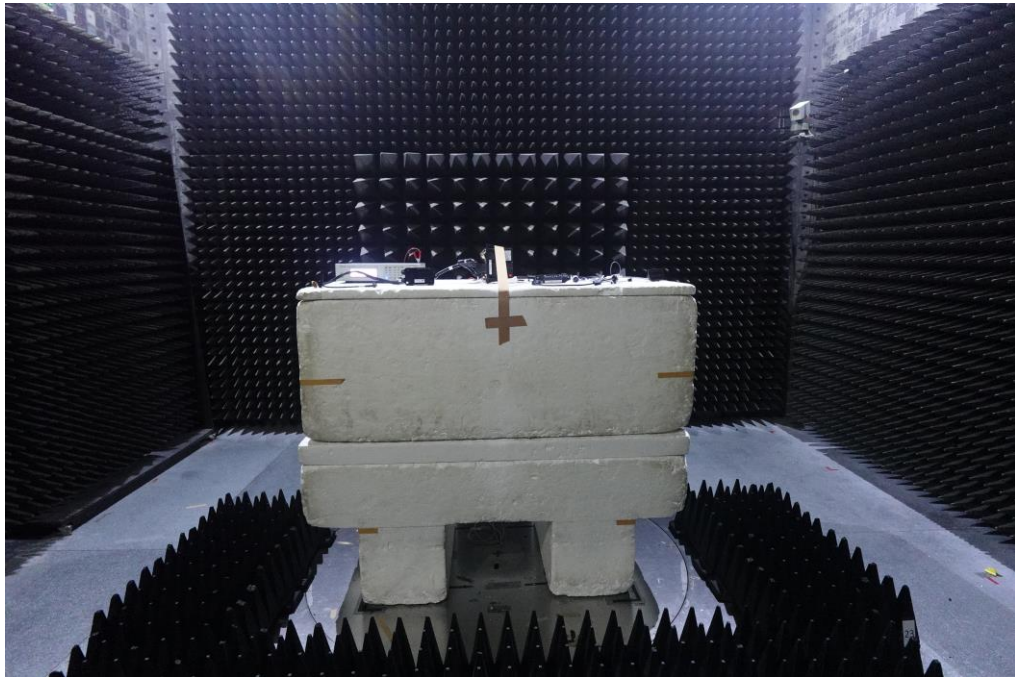


Rear view



For radiated emissions above 1GHz

Front view



Rear view



————THE END————