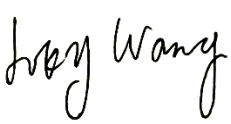
Product Name: BT remote	**Report No:ITEZA2-202400154RF**
Product Model: ZRC-BU-11	**Security Classification: Open**
Version: V1.0	**Total Page:60**

TIRT Testing Report

Prepared By:	**Checked By:**	**Approved By:**	
Aaron Long	Stone Tang	Joky Wang	
			

FCC Radio Test Report

FCC ID: 2BGV2ZRC-BU-11

According to

47 CFR FCC Part 15, Subpart C(Section 15.247)

ANSI C63.10:2013

Applicant:	Unify Data Technology LLC
Address:	1013 Centre Road, Suite 403S.2Wilmington, DE 19805, County of New Castle
Manufacturer:	Unify Data Technology LLC
Address:	1013 Centre Road, Suite 403S.2Wilmington, DE 19805, County of New Castle
Sample No:	1000035553
Product Name:	BT remote
Brand Name:	N/A
Model No.:	ZRC-BU-11
Test No.:	ZRC-BU-11

Date of Receipt:	2024/05/27
Date of Test:	2024/05/27~2024/06/11
Issued Date:	2024/06/14
Testing Lab:	TIRT

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REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
ITEZA2-202400154RF	V1.0	Original Report.	2024.06.14	Valid

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC CFR Title 47, Part 15, Subpart C				
Standard(s) Section	**Test Item**	**Test Result**	**Judgment**	**Remark**
15.207	AC Power Line Conducted Emissions	APPENDIX A	N/A	------
15.247(d) 15.205(a) 15.209(a)	Radiated Emissions	APPENDIX B APPENDIX C APPENDIX D	PASS	------
15.247(a)(2)	Bandwidth	APPENDIX E	PASS	------
15.247(b)(3)	Maximum Output Power	APPENDIX F	PASS	------
15.247(d)	Conducted Spurious Emission	APPENDIX G	PASS	------
15.247(e)	Power Spectral Density	APPENDIX H	PASS	------
15.203	Antenna Requirement	------	PASS	Note(2)

Note:

(1) “N/A” denotes test is not applicable to this device.

(2) The device what use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.

1.1 TEST FACILITY

Company:	Beijing TIRT Technology Service Co.,Ltd Shenzhen
Address:	104 Building C, Xinmingsheng Industrial Park No.132, Zhangge Old Village East Zone, Zhangge Community, Fucheng Street, Longhua District, Shenzhen, Guangdong, P. R. China
CNAS Registration Number:	CNAS L14158
A2LA Registration Number:	6049.01
FCC Accredited Lab.Designation Number:	CN1366
FCC Test Firm Registration Number:	820690
Telephone:	+86-0755-27087573

1.2 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))
The BTL measurement uncertainty as below table:

Uncertainty	
Parameter	Uncertainty
Occupied Channel Bandwidth	±142.12 KHz
RF power conducted	±0.74 dB
RF power radiated	±3.25dB
Spurious emissions, conducted	±1.78dB
Spurious emissions, radiated (30MHz～1GHz)	±4.6dB
Spurious emissions, radiated (1GHz ~ 18GHz)	±4.9dB
Conduction Emissions(150kHz~30MHz)	±3.1 dB
Humidity	±4.6%
Temprature	±0.7°C
Time	±1.25%

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
AC Power Line Conducted Emissions	N/A	N/A	N/A	N/A
Radiated Emissions-9 kHz to 30 MHz	24°C	50%	DC 3.0V from battery	Aaron Long
Radiated Emissions-30 MHz to 1000 MHz	24°C	53%	DC 3.0V from battery	Aaron Long
Radiated Emissions-Above 1000 MHz	26°C	53%	DC 3.0V from battery	Aaron Long
Bandwidth	25°C	56%	DC 3.0V from battery	Aaron Long
Maximum Output Power	24°C	54%	DC 3.0V from battery	Aaron Long
ConductedSpurious Emission	25°C	62%	DC 3.0V from battery	Aaron Long
Power Spectral Density	26°C	60%	DC 3.0V from battery	Aaron Long

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	BT remote
Brand Name	N/A
Test Model	ZRC-BU-11
Series Model	N/A
Model Difference(s)	N/A
Software Version	V1.0
Hardware Version	V1.0
Power Rating	DC 3.0V from battery（2*AAA battery）
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Type	GFSK
Bit Rate of Transmitter	1Mbps, 2Mbps
Max. Output Power	1Mbps: -2.72dBm (0.000535W)

Note:

1. For a more detailed features description, please refer to the manufacturer’s specifications or the user's manual.

2.2 DESCRIPTION OF TEST MODES

The test software was used to control EUT work in Continuous TX mode, and select test channel, wireless mode

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
GFSK (1M/2M)	Low :CH00	2402
	Middle: CH19	2440
	High: CH39	2480

Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

Table for Filed Antenna:

Ant.	Manufactured	Model Name	Antenna Type	Connector	Gain (dBi)
1	/	/	PCB Antenna	N/A	2.499

Note: Antenna information is provided by applicant.
The antenna is for testing purposes only.

2.3 PARAMETERS OF TEST SOFTWARE

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

Test Software Version	FCC_assist_1.0.2.2		
Frequency (MHz)	2402	2440	2480
1Mbps, 2 Mbps	default	default	default

2.4. ACCESSORIES OF DEVICE (EUT)

Accessories	/
Manufacturer	/
Model	/
Ratings	/
	/

2.5 BLOCKDIAGRAMSHOWINGTHECONFIGURATIONOFSYSTEMTESTED

EUT

2.6 SUPPORT UNITS

No.	Description	Manufacturer	Model	Note
1	N/A	N/A	N/A	N/A

3.AC POWER LINE CONDUCTED EMISSIONS

3.1LIMIT

Frequency of Emission (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15 -0.5	66 to 56*	56 to 46*
0.5-5.0	56	6
5.0 -30.0	60	50

Note:

(1) The tighter limit applies at the band edges.
(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

3.2TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipmentpowered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the groundplane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral 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.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

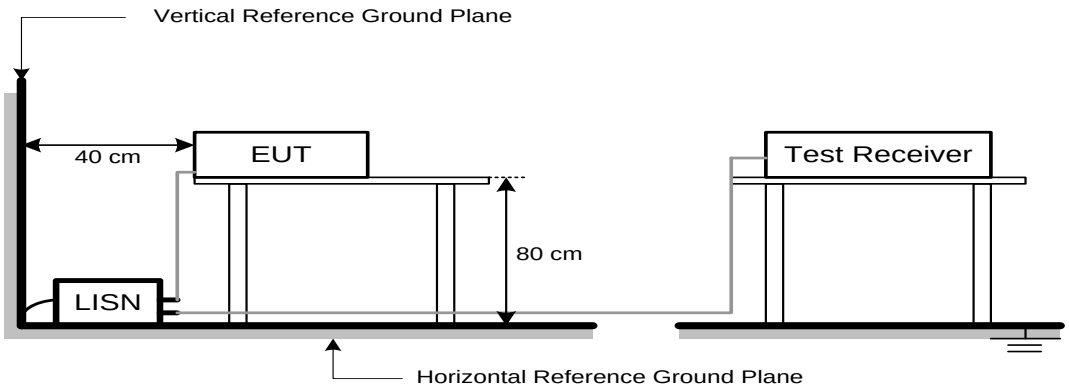
The following table is the setting of the receiver:

Receiver Parameters	Setting
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.3DEVIATIONFROMTESTSTANDARD

No deviation.

3.4TESTSETUP



The LISN edge is arranged parallel to the edge of the test table
The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT

3.5EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it).The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.6 TEST RESULTS

N/A
The EUT is supplied by Battery, so this item does not applicable.

4. RADIATED EMISSIONS

4.1LIMIT

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a)limit in the table below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (9 kHz-1000MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency (MHz)	(dBuV/m at 3 m)	
	Peak	Average
Above 1000	74	54

Note:

(1) The limit for radiated test was performed according to FCC CFR Title 47, Part 15, Subpart C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

4.2TEST PROCEDURE

a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
c. The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform. (below 1GHz)
h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn‘t perform. (above 1GHz)
i. For the actual test configuration, please refer to the related Item –EUT Test Photos.

The following table is the setting of the receiver:

Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~150 kHz for RBW 200 Hz
Start ~ Stop Frequency	0.15 MHz~30 MHz for RBW 9 kHz
Start ~ Stop Frequency	30 MHz~1000 MHz for RBW 100 kHz

Spectrum Parameters	Setting
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for PK value 1MHz / 1/THz for AVG value

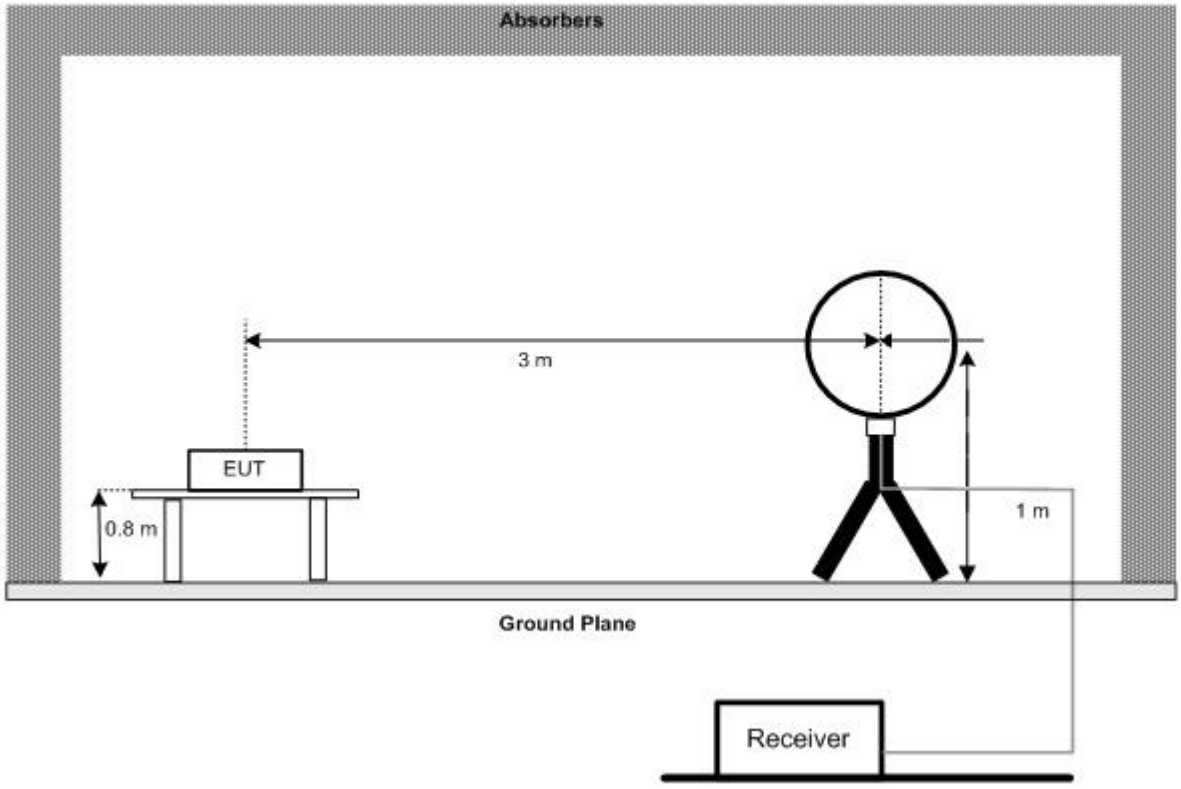
Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector
Start ~ Stop Frequency	1 GHz~26.5GHz for PK/AVG detector

4.3DEVIATIONFROMTESTSTANDARD

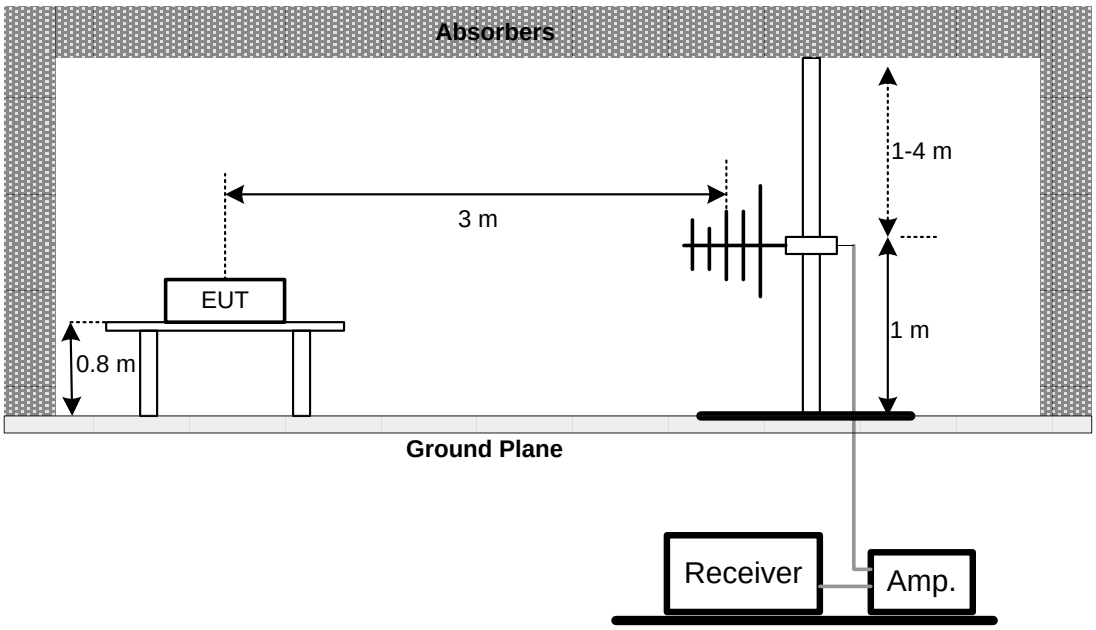
No deviation.

4.4TESTSETUP

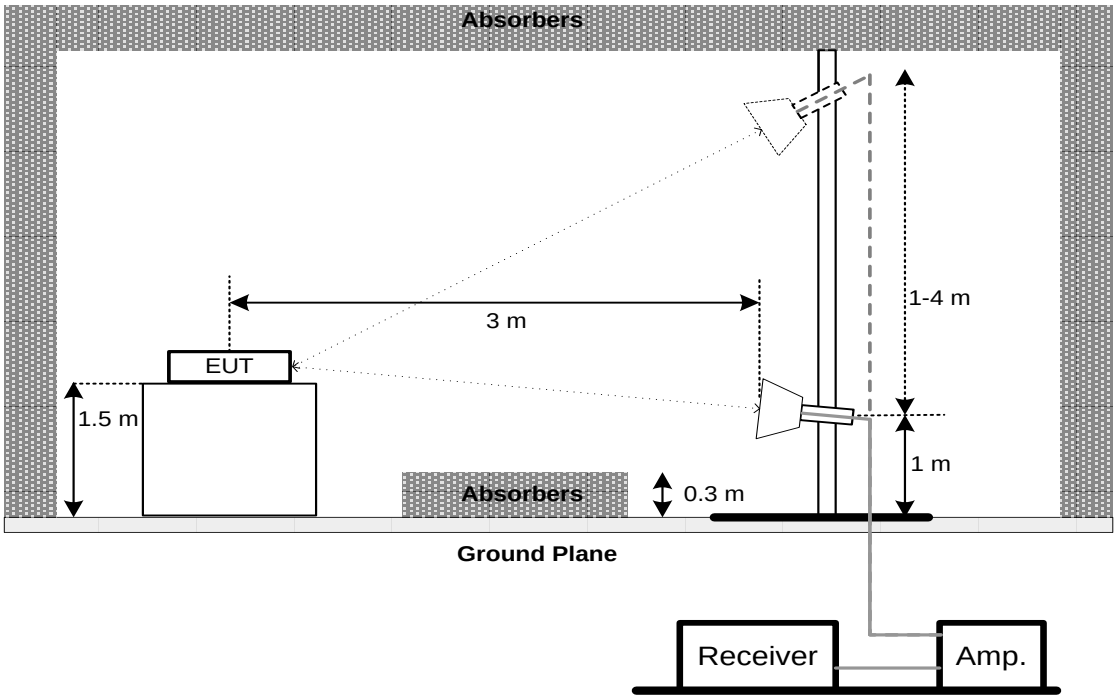
9 kHz to 30 MHz



30 MHz to 1 GHz



Above 1 GHz


Absorbers
3 m
1-4 m
EUT
1.5 m
1 m
Absorbers
0.3 m
Ground Plane
Receiver
Amp.

4.5EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.6 TEST RESULT- 9kHz TO 30MHz

Please refer to the APPENDIX-A

Remark:

(1) Distance extrapolation factor = 40 log (specific distance / test distance) (dB).
(2) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.7 TEST RESULT- 30MHz TO 1000MHz

Please refer to the APPENDIX-B

4.8 TEST RESULT- ABOVE 1000MHz

Please refer to the APPENDIX-C

Remark:

(1) No limit:This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

5.BANDWIDTH

5.1LIMIT

Section	Test Item	Limit
FCC 15.247(a)(2)	6dB Bandwidth	>= 500 kHz
	99% Emission Bandwidth	-

5.2TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. The following table is the setting of the spectrum analyzer:

For 6 dB Bandwidth:

Spectrum Parameters	Setting
Span Frequency	> Measurement Bandwidth
RBW	100 kHz
VBW	300kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

For 99% Emission Bandwidth:

Spectrum Parameters	Setting
Span Frequency	Between 1.5 times and 5.0 times the OBW
RBW	30 kHz
VBW	100kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.3DEVIATION FROM STANDARD

No deviation.

5.4TEST SETUP

5.5EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

5.6TESTRESULTS

Please refer to the APPENDIX-D

6.MAXIMUM OUTPUT POWER

6.1LIMIT

Section	Test Item	Limit
FCC 15.247(b)(3)	Maximum Output Power	1.0000 watt or 30.00dBm

6.2TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

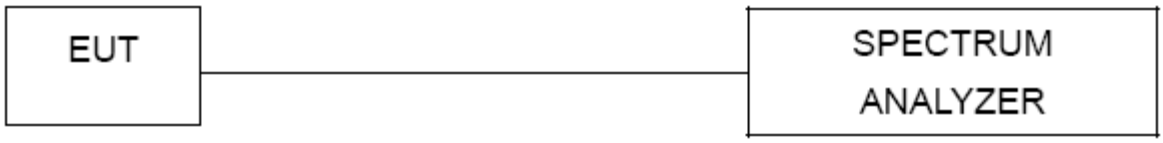
b. The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	≥ 3×RBW
RBW	3 MHz
VBW	3 MHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

6.3DEVIATION FROM STANDARD

No deviation.

6.4TEST SETUP



6.5EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

6.6TESTRESULTS

Please refer to the APPENDIX-E

7.CONDUCTED SPURIOUS EMISSION

7.1LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak Output Power limits. If the transmitter complies with the Output Power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

7.2TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Start Frequency	30 MHz
Stop Frequency	26.5 GHz
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

7.3DEVIATION FROM STANDARD

No deviation.

7.4TEST SETUP

7.5EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

7.6 TEST RESULTS

Please refer to the APPENDIX-F

8.POWER SPECTRAL DENSITY

8.1LIMIT

Section	Test Item	Limit
FCC 15.247(e)	Power Spectral Density	8 dBm (in any 3 kHz)

8.2TEST PROCEDURE

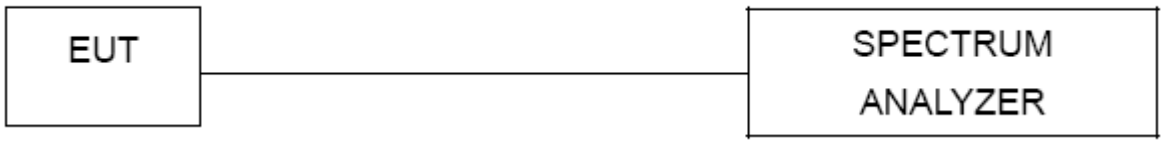
a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	2 MHz (1 Mbps) / 4 MHz (2 Mbps)
RBW	3 kHz
VBW	10 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

8.3DEVIATION FROM STANDARD

No deviation.

8.4TEST SETUP



8.5EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

8.6 TEST RESULTS

Please refer to the APPENDIX-G

9. ANTENNA REQUIREMENT

9.1STANDARD REQUIREMENT

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

9.2ANTENNA CONNECTED CONSTRUCTION

The antenna connector is unique antenna and no consideration of replacement. Please see EUT photo for details.

9.3RESULTS

The EUT antenna is PIFA antenna. It complies with the standard requirement.

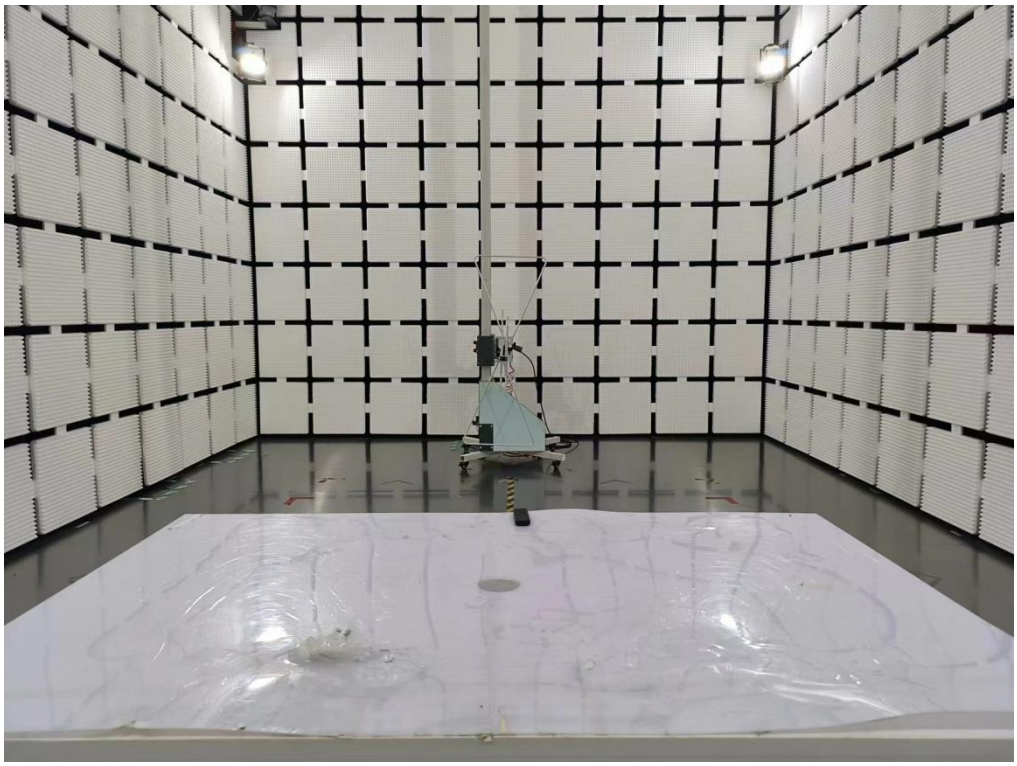
10. MEASUREMENT INSTRUMENTS LIST

Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Receiver	Rohde&Schwarz	ESIB 40	YH-TIRT-SAC-966-20220911	2024/01/05	2025/01/04
Integral Antenna	Schwarzbeck	VULB 9163	01314	2022.12.11	2024.12.10
Integral Antenna	Rohde&Schwarz	HF907	RSM2991424	2022.12.11	2024.12.10
Preamplifier	Emtrace	RP01A	'02017	2024/01/05	2025/01/04
Preamplifier	Schwarzbeck	BBV9744	00143	2024/01/05	2025/01/04
Loop Antenna	ZHINAN	ZN30900A	12024	2024/01/05	2025/01/04
Horn Antenna	Schwarzbeck	BBHA9170	00956	2024/01/05	2025/01/04
RF Cable	/	LMR400UF-NMNM-7.0M	/	2024/01/05	2025/01/04
RF Cable	/	SFT2050PUR-NMNM-7.0M	/	2024/01/05	2025/01/04
EMI Receiver	Rohde&Schwarz	ESR7	1316.3003K07-102611-mk	2023/11/02	2024/11/01
LISN	Rohde&Schwarz	ENV216	3560.655.12-102915-Bp	2023/11/02	2024/11/01
RF Cable	\	SFT2050PUR-NMNM-2.0M	\	2024/01/05	2025/01/04
Spectrum analyzer	ROHDE&SCHWARZ	FSU26	200732	2024/01/05	2025/01/04
Spectrum analyzer	ROHDE&SCHWARZ	FSV40-N	101722	2024/01/05	2025/01/04
Filter	HEWLETT PACKARD	JS0806-F	19K8060209	2024/01/05	2025/01/04

11. PHOTOS OF TEST SETUP

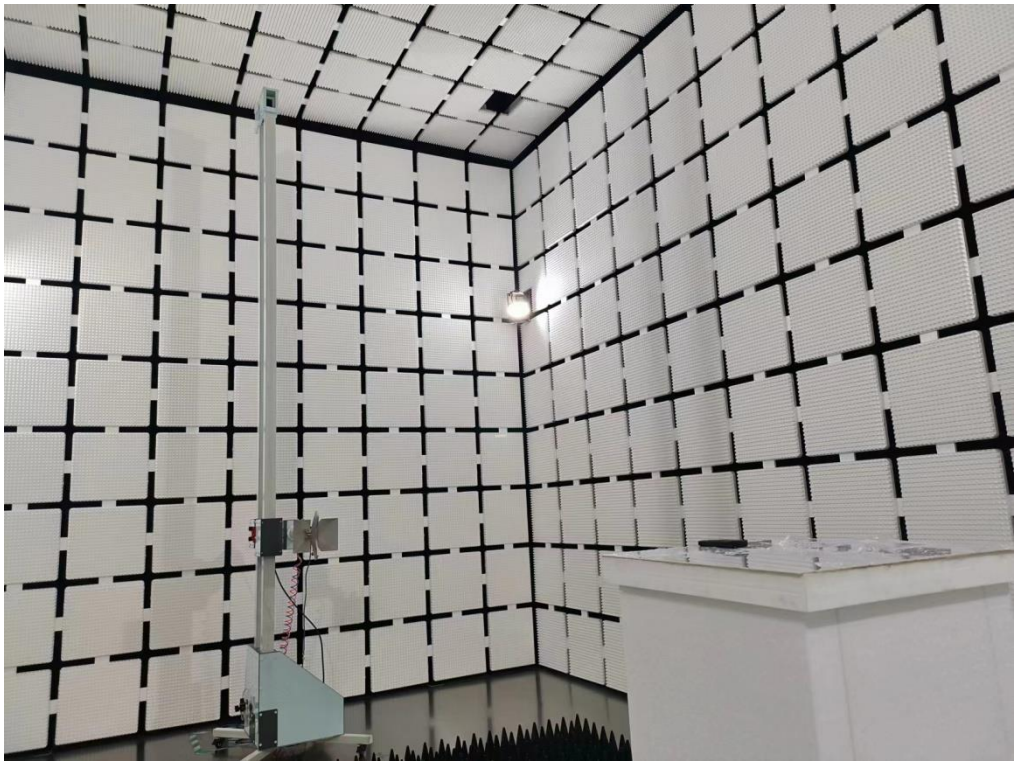
Radiated Emissions Test Photos

30 MHz to 1 GHz



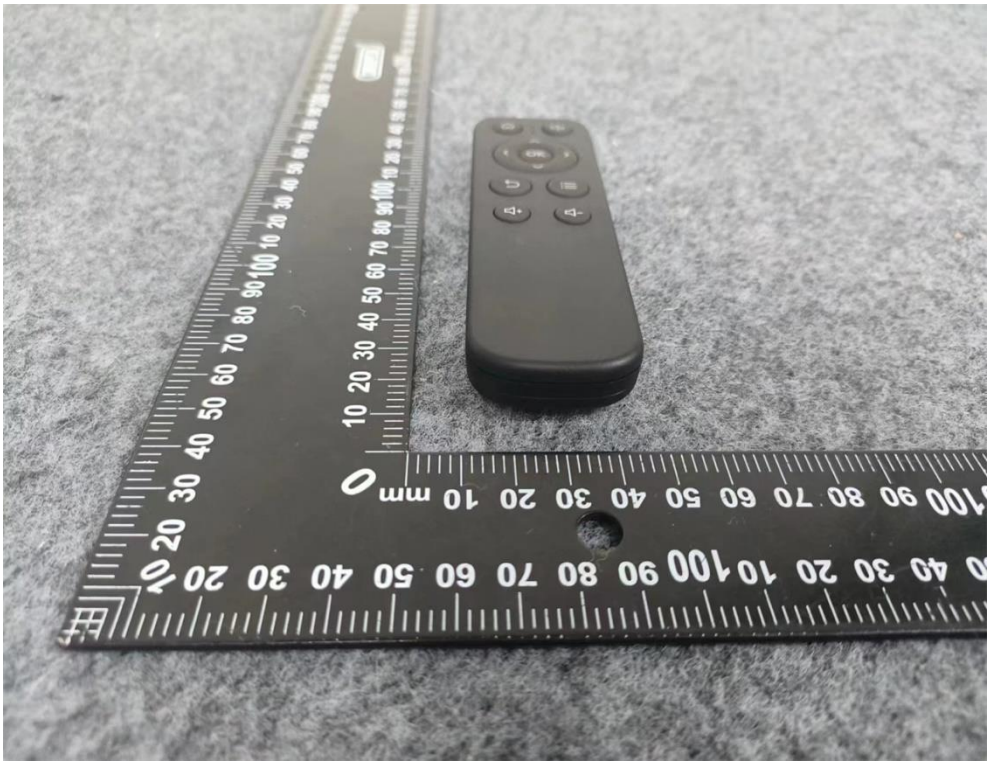
Radiated Emissions Test Photos

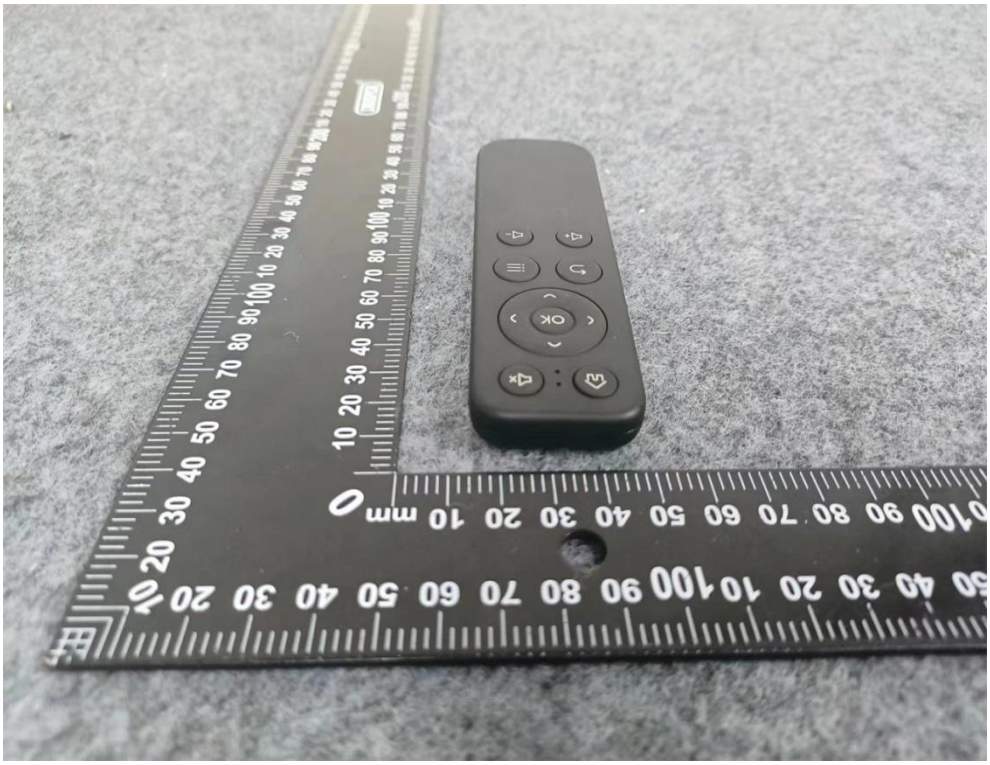
Above 1 GHz

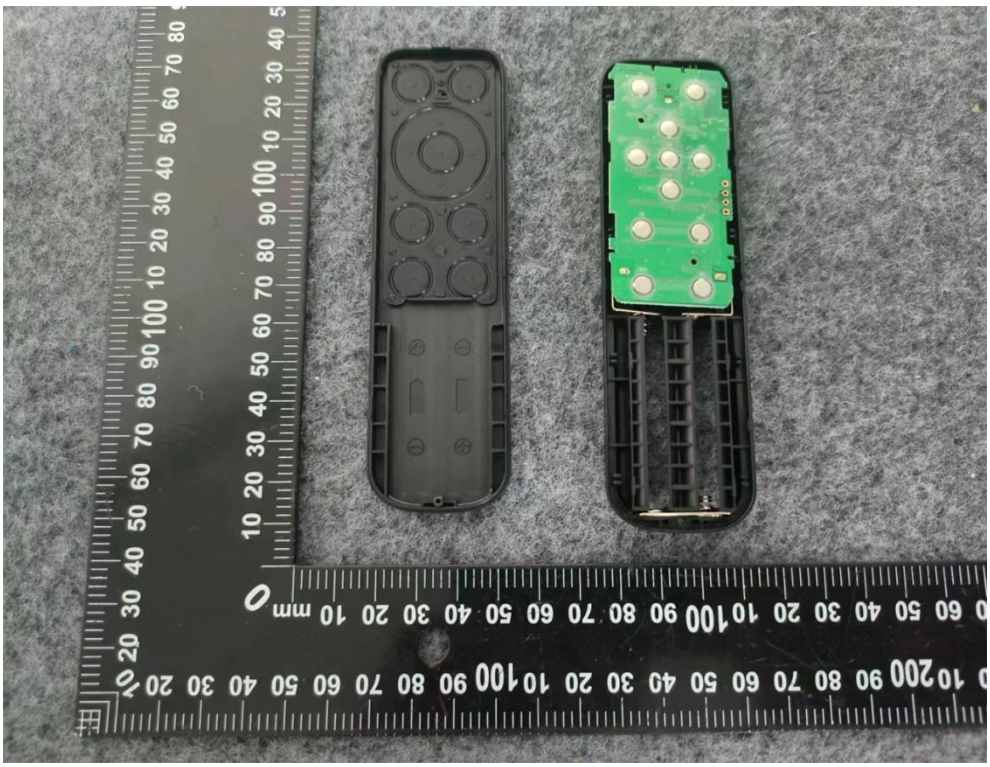


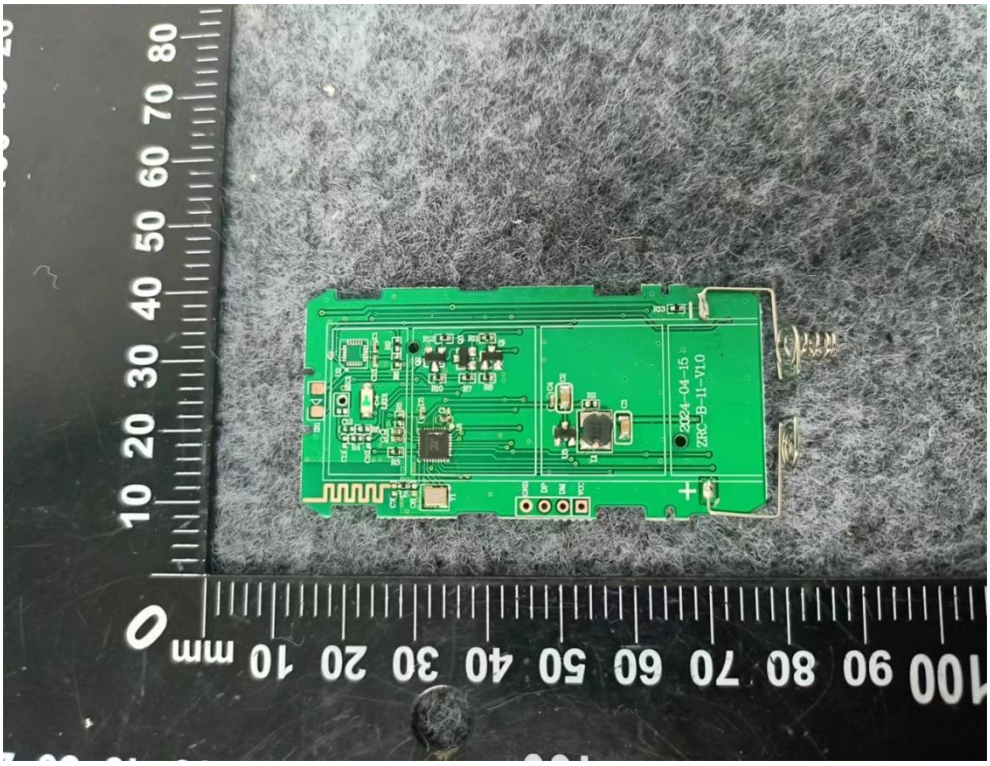
Conducted Test Photos

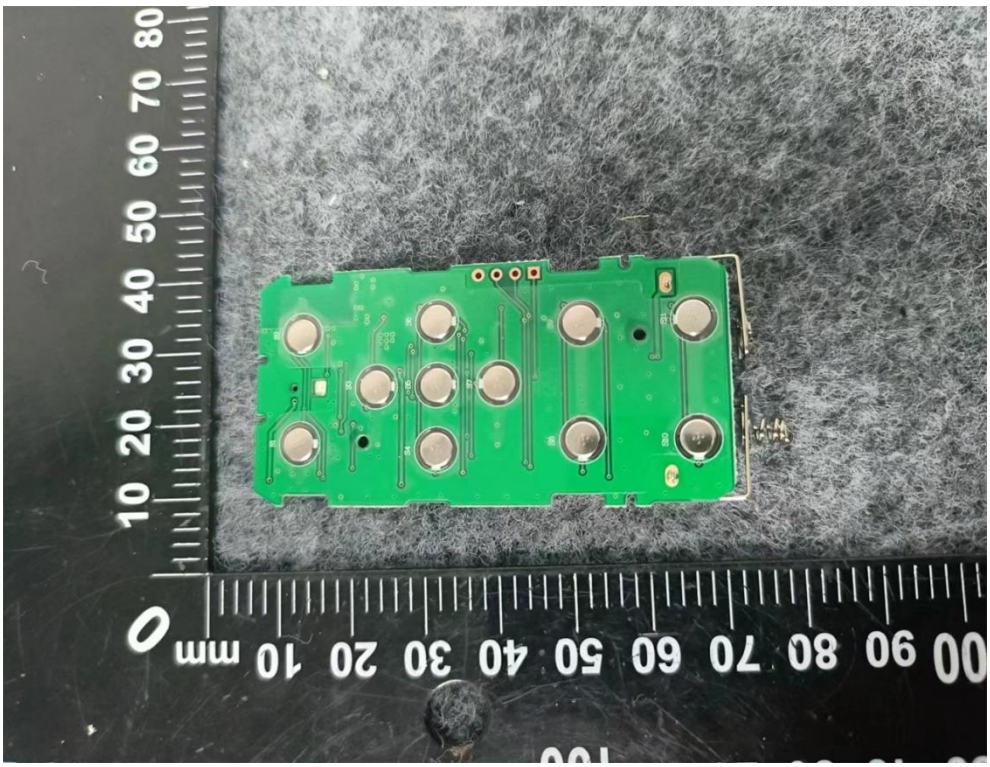
12. PHOTOS OF EUT










mm

APPENDIX A - RADIATED EMISSION -9 KHZ TO 30 MHZ

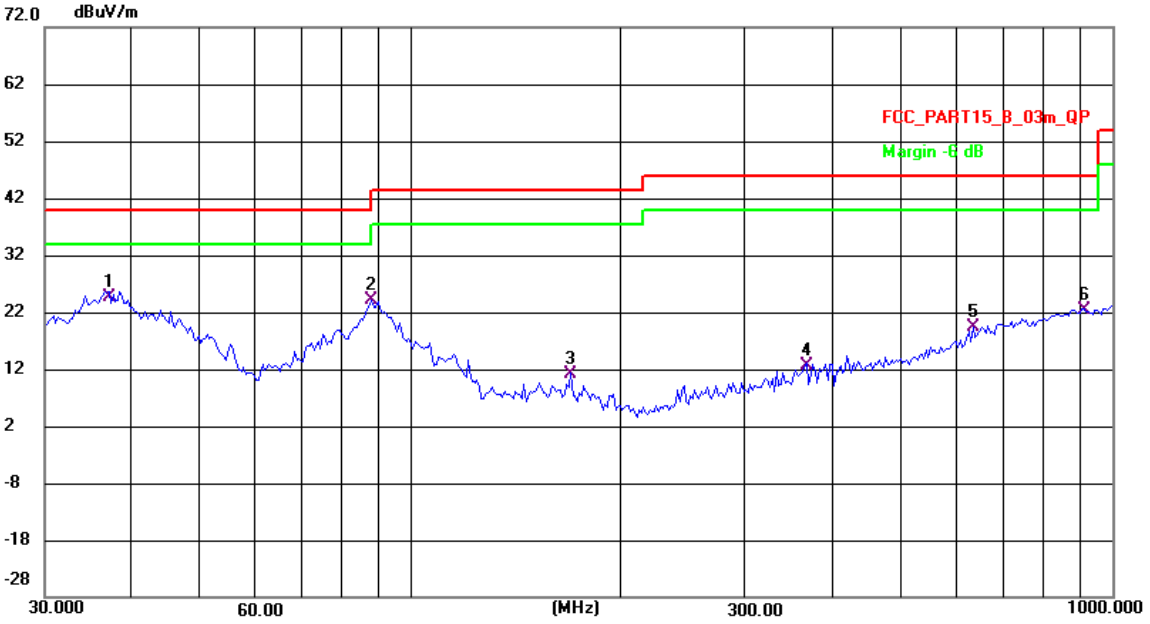
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

APPENDIX B - RADIATED EMISSION-30 MHZ TO 1000 MHZ

Only show the worst mode:

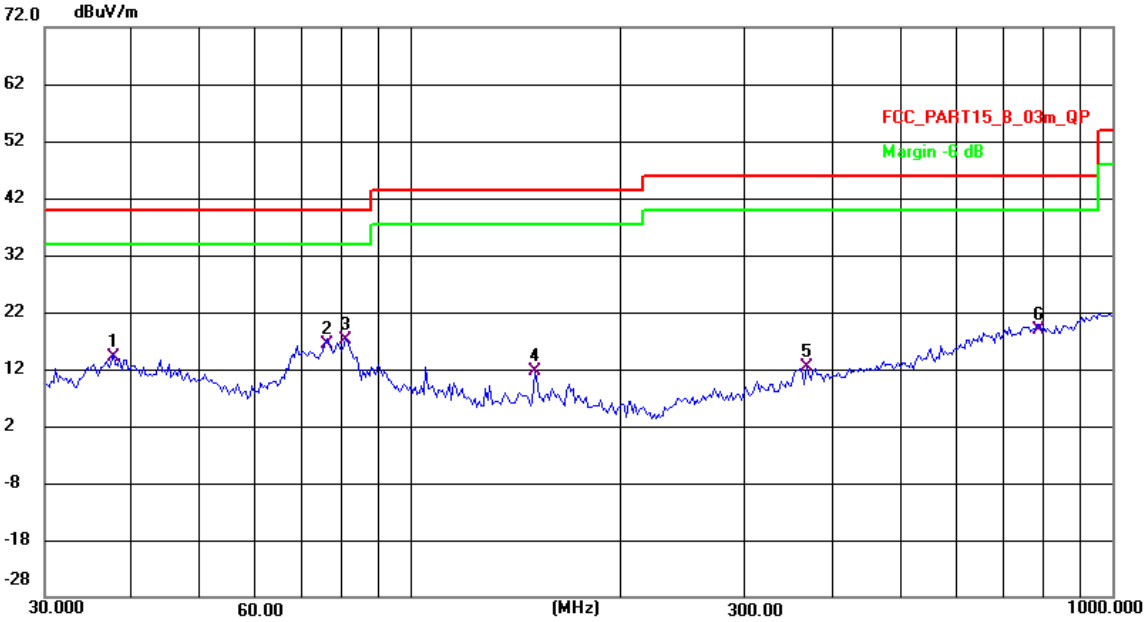
Test Mode	TX Mode_1Mbps Channel 00	Polarization	Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	37.0405	47.28	-22.59	24.69	40.00	-15.31	QP	200	0	P	
2	87.9136	49.77	-25.76	24.01	40.00	-15.99	QP	200	180	P	
3	168.9970	32.22	-20.97	11.25	43.50	-32.25	QP	200	360	P	
4	366.0866	32.71	-20.17	12.54	46.00	-33.46	QP	200	0	P	
5	633.3285	32.31	-13.00	19.31	46.00	-26.69	QP	200	0	P	
6	912.6953	30.67	-8.26	22.41	46.00	-23.59	QP	200	180	P	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX Mode_1Mbps Channel 00	Polarization	Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	37.5648	36.72	-22.49	14.23	40.00	-25.77	QP	100	0	P	
2	75.8520	41.42	-25.11	16.31	40.00	-23.69	QP	100	361	P	
3 *	80.8042	42.90	-25.88	17.02	40.00	-22.98	QP	100	327	P	
4	149.9676	32.38	-20.76	11.62	43.50	-31.88	QP	100	145	P	
5	366.0866	32.48	-20.17	12.31	46.00	-33.69	QP	100	90	P	
6	787.4749	29.02	-10.06	18.96	46.00	-27.04	QP	100	177	P	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX C - RADIATED EMISSION - ABOVE 1000 MHZ

Test Result of RADIATED EMISSION-1000MHz TO 25GHz

No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
Test Mode : GFSK TX Low								
1	4804	V	89.01	-27.15	61.86	74	-12.14	Peak
2	4804	V	68.05	-27.15	40.9	54	-13.10	Avg
3	7206	--	--	--	--	--	--	--
4	9608	--	--	--	--	--	--	--
5	4804	H	90.01	-27.15	62.86	74	-11.14	Peak
6	4804	H	68.95	-27.15	41.8	54	-12.20	Avg
7	7206	--	--	--	--	--	--	--
8	9608	--	--	--	--	--	--	--
Test Mode : GFSK TX Mid								
1	4880	V	89.69	-27.83	61.86	74	-12.14	Peak
2	4880	V	71.28	-27.83	43.45	54	-10.55	Avg
3	7320	--	--	--	--	--	--	--
4	9760	--	--	--	--	--	--	--
5	4880	H	90.32	-27.83	62.49	74	-11.51	Peak
6	4880	H	67.89	-27.83	40.06	54	-13.94	Avg
7	7320	--	--	--	--	--	--	--
8	9760	--	--	--	--	--	--	--
Test Mode : GFSK TX High								
1	4960	V	92.34	-28.45	63.89	74	-10.11	Peak
2	4960	V	75.01	-28.45	46.56	54	-7.44	Avg
3	7440	--	--	--	--	--	--	--
4	9920	--	--	--	--	--	--	--
5	4960	H	90.05	-28.45	61.6	74	-12.40	Peak
6	4960	H	69.91	-28.45	41.46	54	-12.54	Avg
7	7440	--	--	--	--	--	--	--
8	9920	--	--	--	--	--	--	--

Note :

1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.

2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.
Result=Reading + Correct Factor. Margin= Result-Limit.

Test Result of Radiated Spurious at Band edges

Test Results				PASS				
Frequency Range				2310MHz~2410MHz				
Test Mode				1Mbps: GFSK TX 2402MHz				
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	2390	H	75.01	-21.47	53.54	74.00	-20.46	Peak
2	2390	H	--	-21.47	--	54.00	--	Avg
3	2400	H	74.98	-26.12	48.86	74.00	-25.14	Peak
4	2400	H	--	-26.12	--	54.00	--	Avg
1	2390	V	75.05	-21.47	53.58	74.00	-20.42	Peak
2	2390	V	--	-21.47	--	54.00	--	Avg
3	2400	V	76.05	-26.12	49.93	74.00	-24.07	Peak
4	2400	V	--	-26.12	--	54.00	--	Avg
Test Results				PASS				
Frequency Range				2450MHz~2550MHz				
Test Mode				1Mbps: GFSK TX 2480MHz				
1	2483.5	H	78.01	-25.29	52.72	74.00	-21.28	Peak
2	2483.5	H	--	-25.29	--	54.00	--	Avg
1	2483.5	V	79.05	-25.29	53.76	74.00	-20.24	Peak
2	2483.5	V	--	-25.29	--	54.00	--	Avg

Note: 1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.

2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.

Result=Reading + Correct Factor.

Margin= Result-Limit.

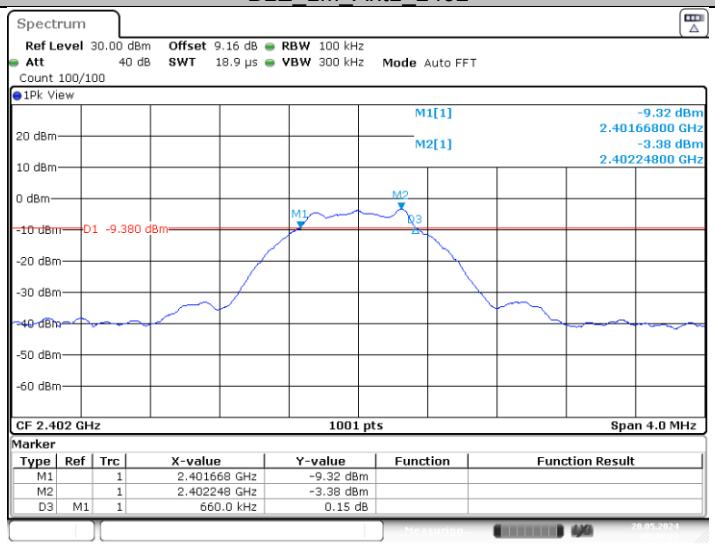
3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

APPENDIX D- BANDWIDTH

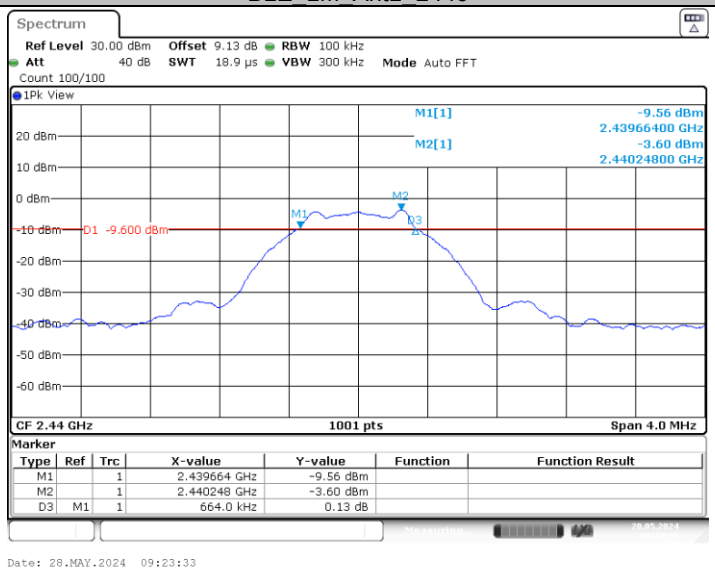
-6dB Bandwidth

TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.66	2401.67	2402.33	0.5	PASS
		2440	0.66	2439.66	2440.33	0.5	PASS
		2480	0.66	2479.67	2480.33	0.5	PASS
BLE_2M	Ant1	2402	1.15	2401.43	2402.58	0.5	PASS
		2440	1.15	2439.43	2440.58	0.5	PASS
		2480	1.16	2479.42	2480.58	0.5	PASS

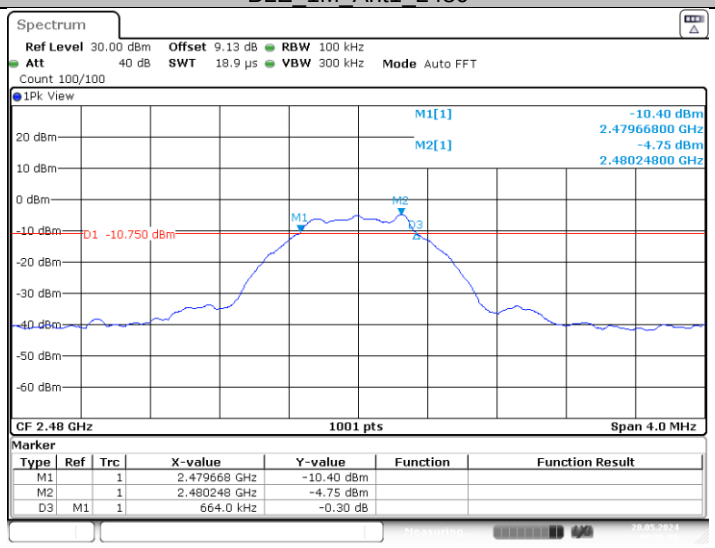
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



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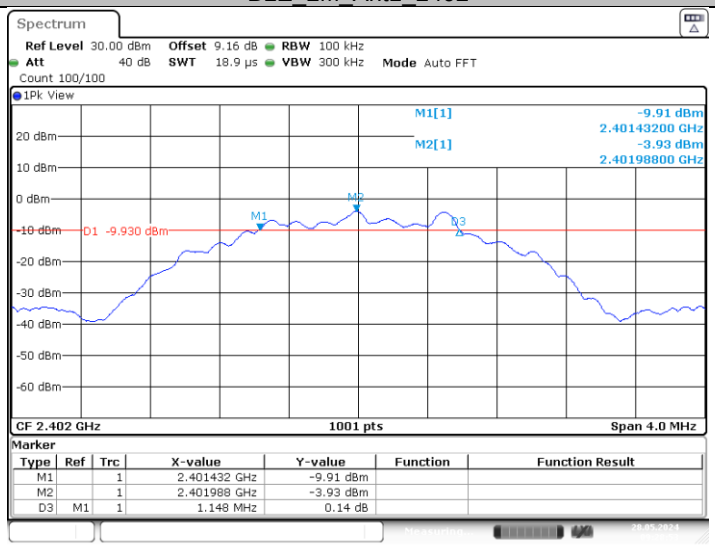
BLE_2M_Ant1_2402



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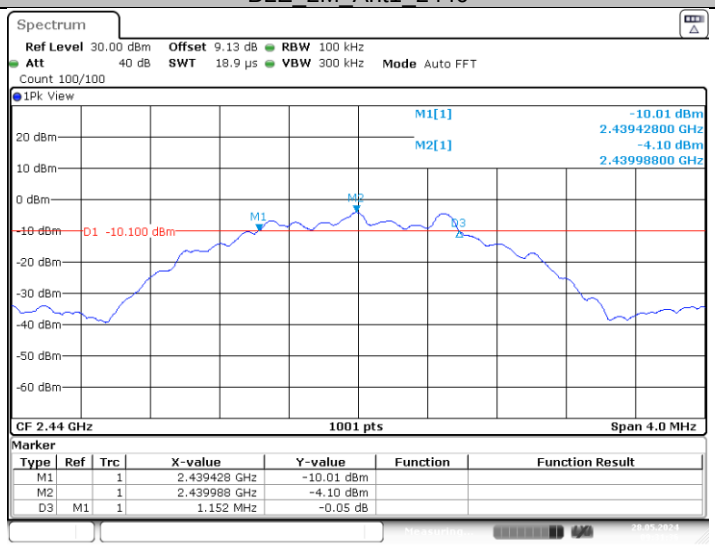
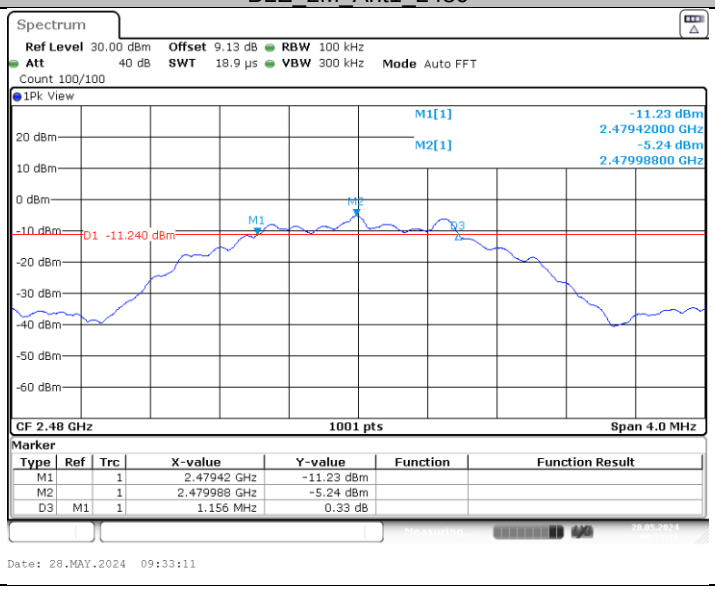
BLE_2M_Ant1_2440



Date: 28.MAY.2024 09:31:36

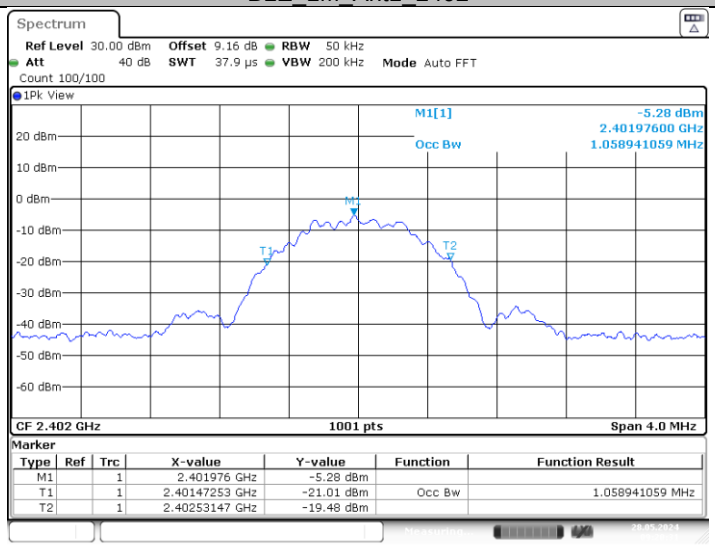
BLE_2M_Ant1_2480



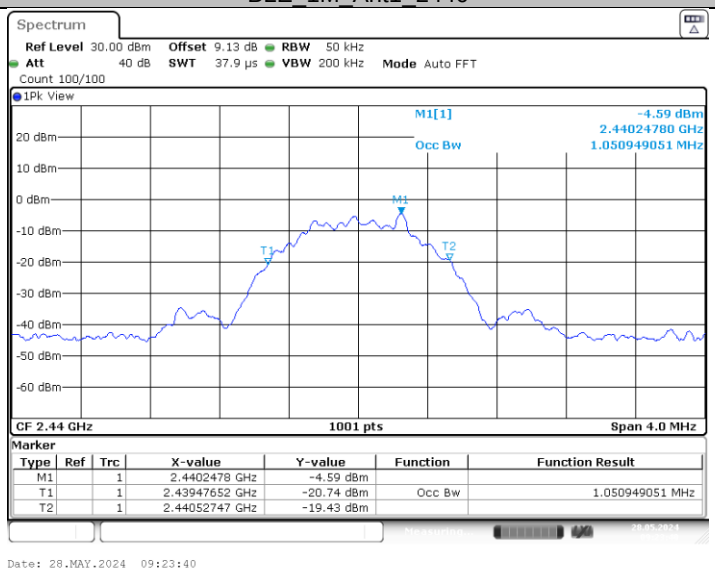
99% Occupied Bandwidth

TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.059	2401.4725	2402.5315	---	---
		2440	1.051	2439.4765	2440.5275	---	---
		2480	1.059	2479.4685	2480.5275	---	---
BLE_2M	Ant1	2402	2.086	2400.9730	2403.0589	---	---
		2440	2.086	2438.9650	2441.0509	---	---
		2480	2.09	2478.9650	2481.0549	---	---

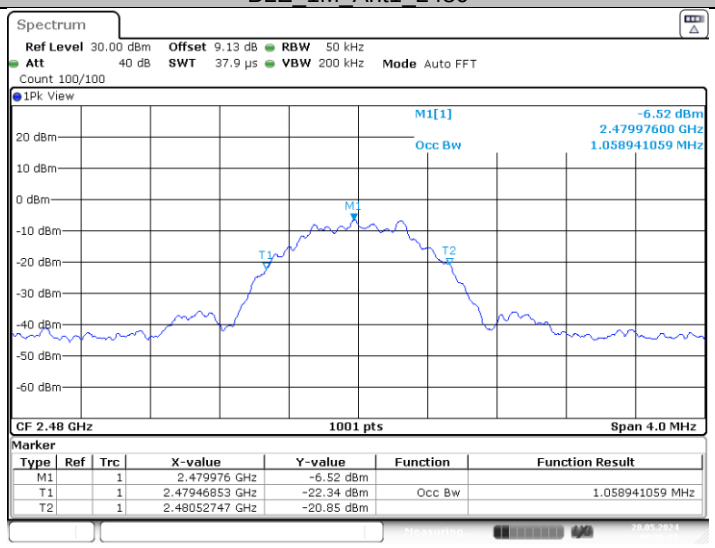
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



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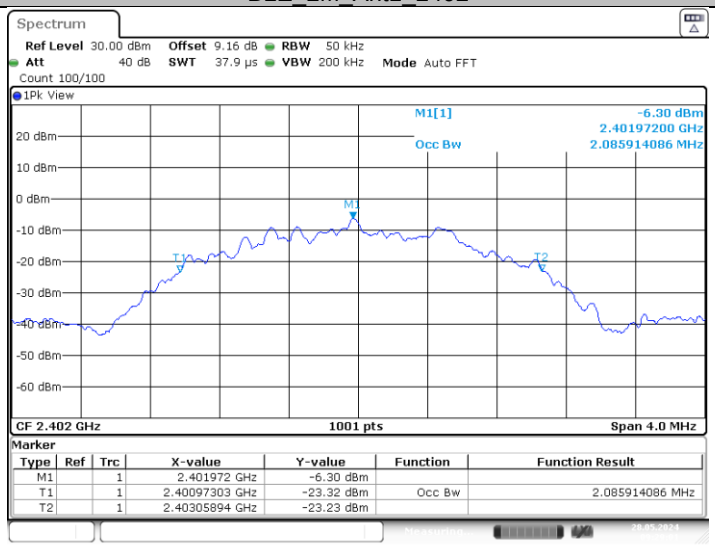
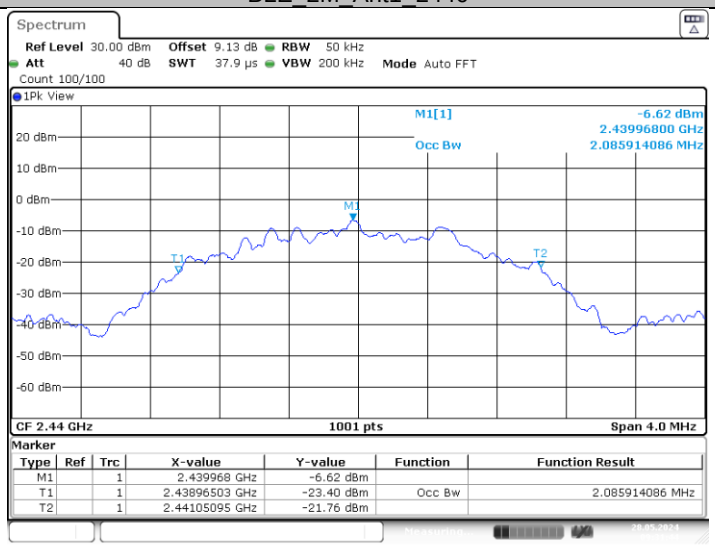
BLE_2M_Ant1_2402



Date: 28.MAY.2024 09:29:01

BLE_2M_Ant1_2440



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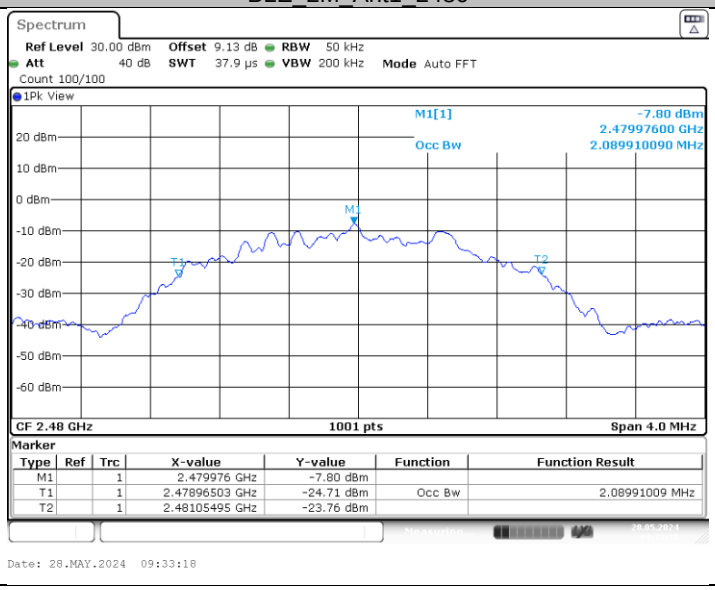
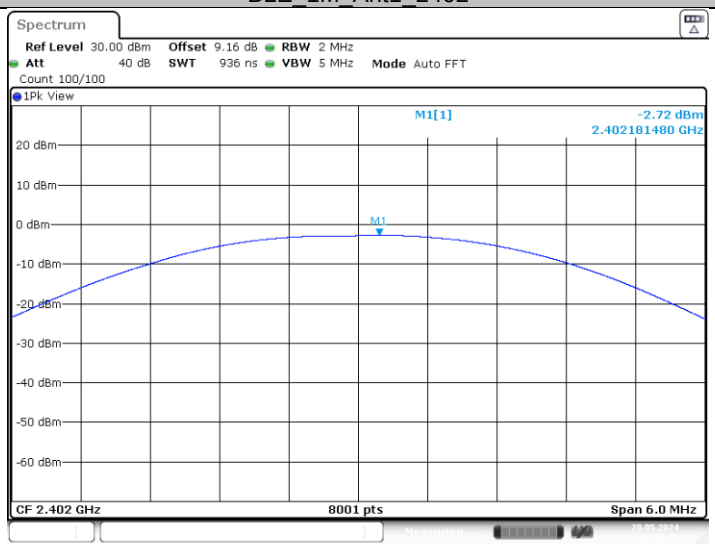
BLE_2M_Ant1_2480



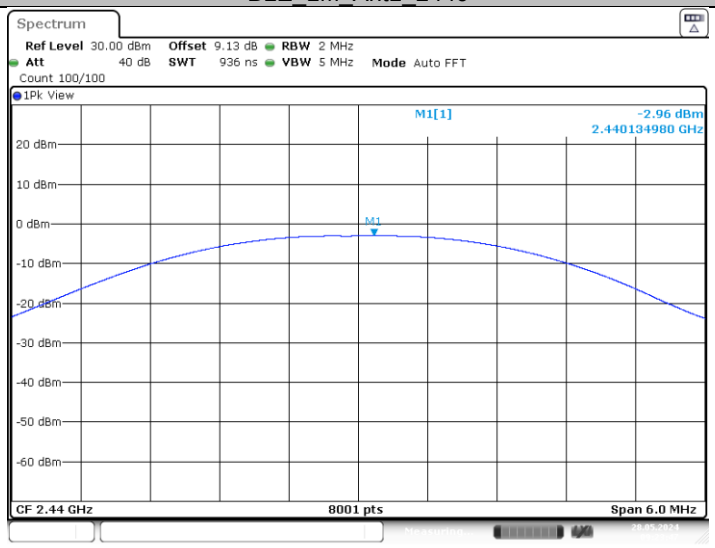
APPENDIX E - MAXIMUM OUTPUT POWER

TestMode	Antenna	Freq(MHz)	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	-2.72	≤30	PASS
		2440	-2.96	≤30	PASS
		2480	-4.11	≤30	PASS
BLE_2M	Ant1	2402	-2.81	≤30	PASS
		2440	-2.73	≤30	PASS
		2480	-4.01	≤30	PASS

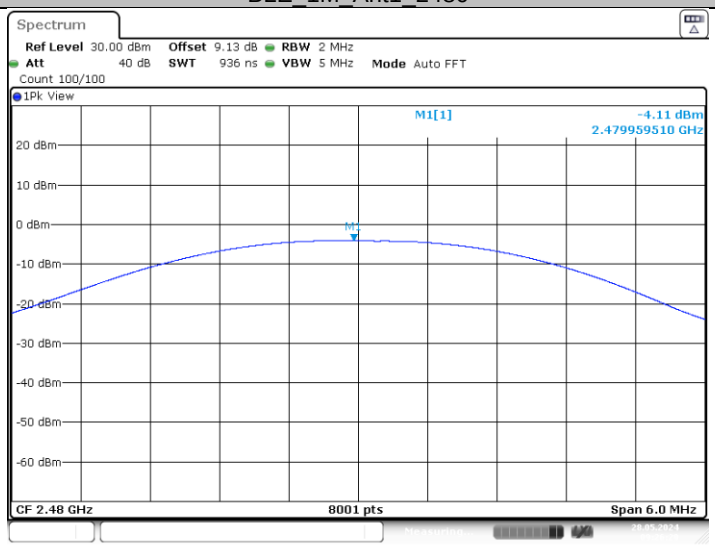
BLE_1M_Ant1_2402



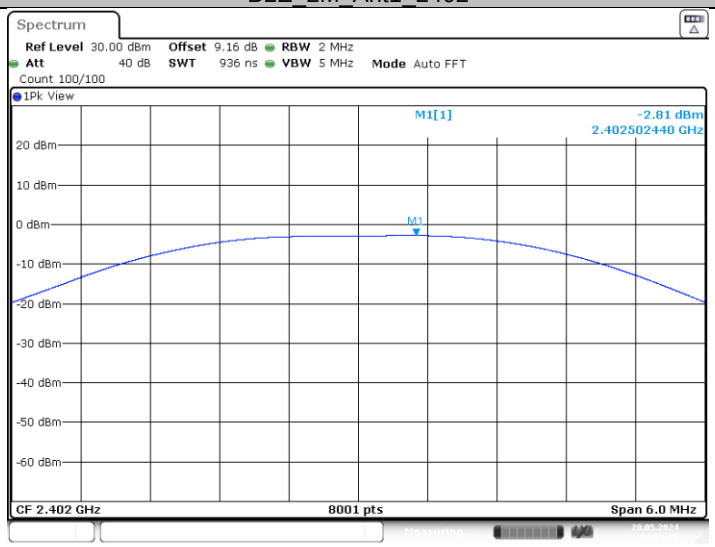
BLE_1M_Ant1_2440



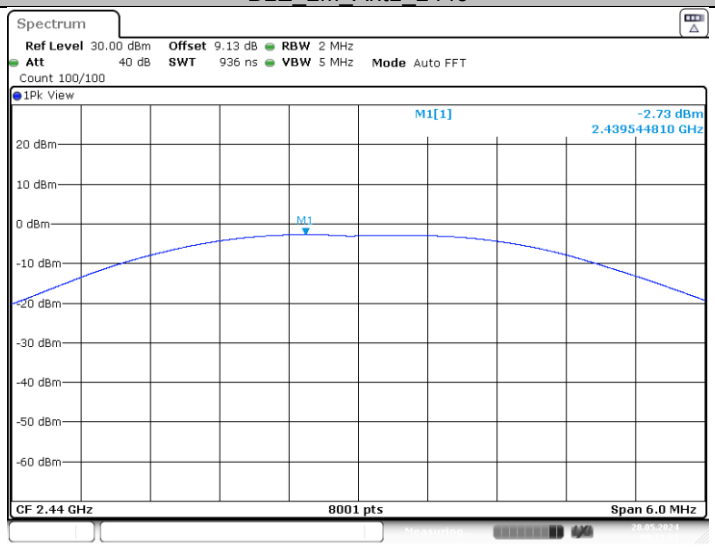
BLE_1M_Ant1_2480



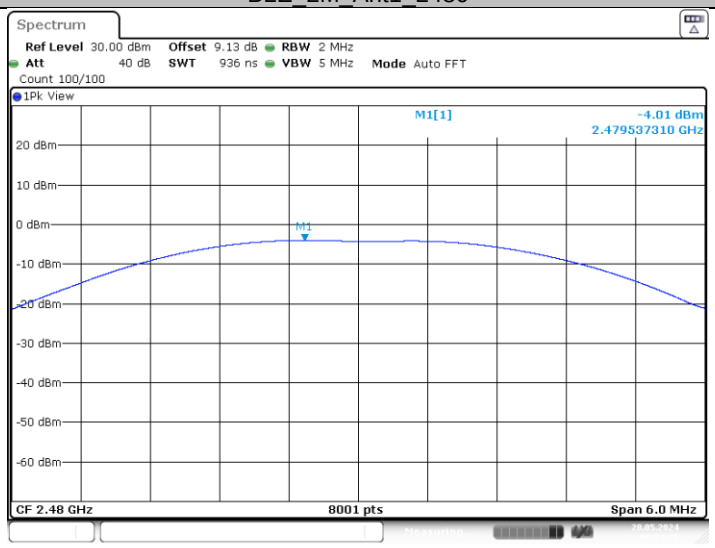
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480

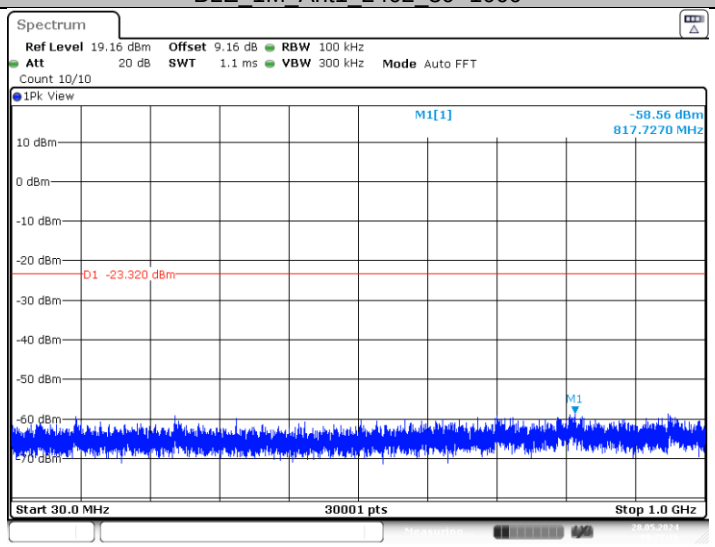


APPENDIX F - CONDUCTED SPURIOUS EMISSION

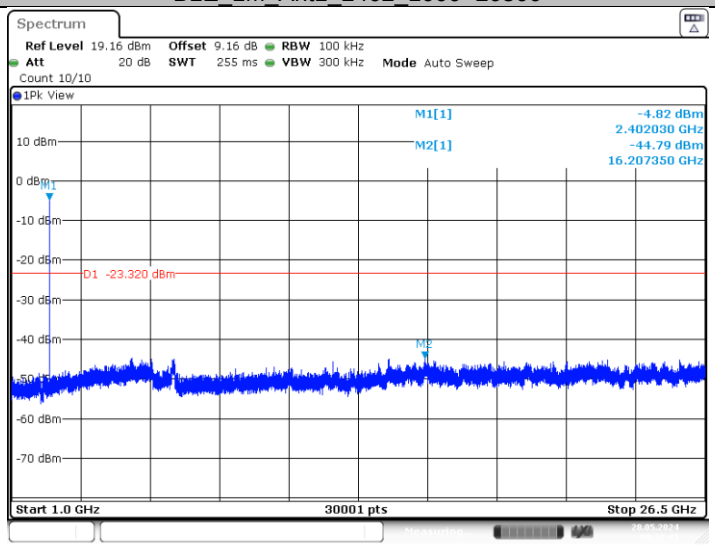
Spurious Emission

TestMode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	30~1000	-3.32	-58.56	≤-23.32	PASS
			1000~26500	-3.32	-44.79	≤-23.32	PASS
		2440	30~1000	-3.64	-57.72	≤-23.64	PASS
			1000~26500	-3.64	-44.03	≤-23.64	PASS
		2480	30~1000	-4.84	-57.54	≤-24.84	PASS
			1000~26500	-4.84	-43.98	≤-24.84	PASS
BLE_2M	Ant1	2402	30~1000	-3.92	-57.94	≤-23.92	PASS
			1000~26500	-3.92	-44.4	≤-23.92	PASS
		2440	30~1000	-4.15	-57.57	≤-24.15	PASS
			1000~26500	-4.15	-44.01	≤-24.15	PASS
		2480	30~1000	-5.49	-58.65	≤-25.49	PASS
			1000~26500	-5.49	-44.66	≤-25.49	PASS

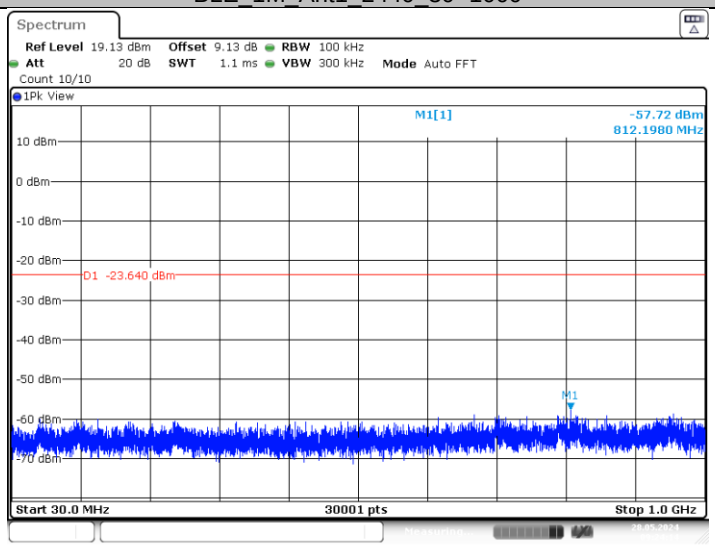
BLE_1M_Ant1_2402_30~1000



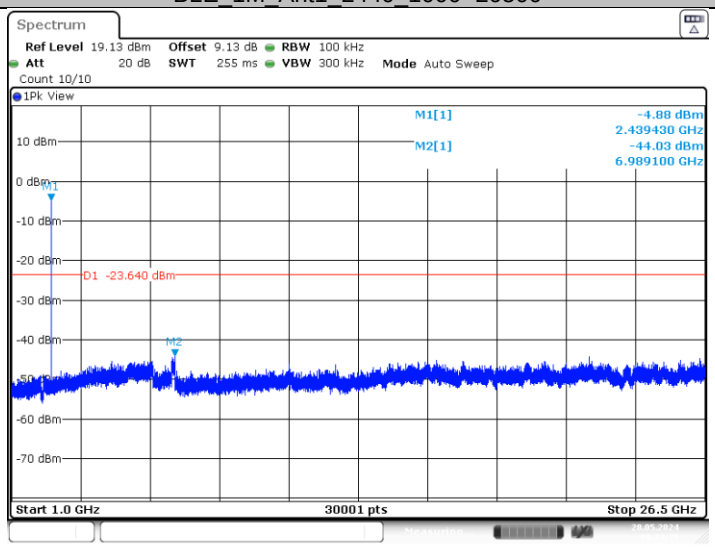
BLE_1M_Ant1_2402_1000~26500



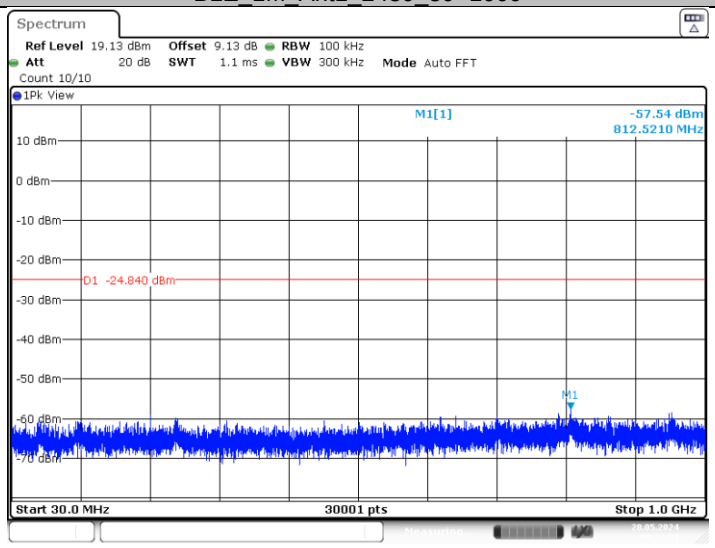
BLE_1M_Ant1_2440_30~1000



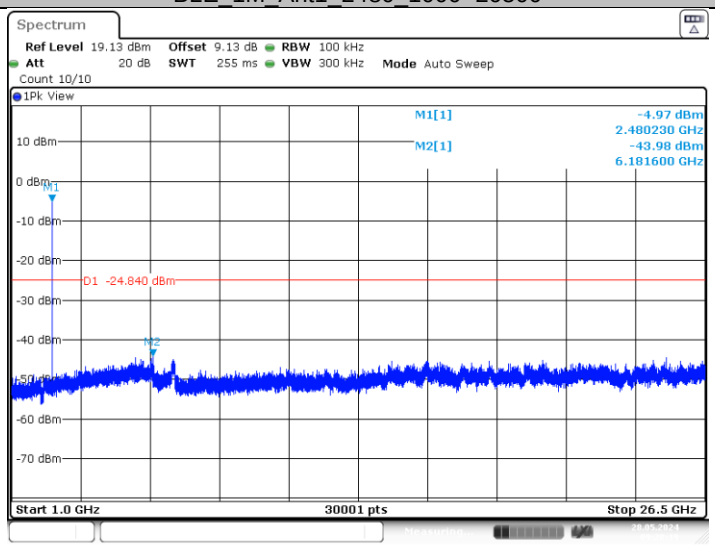
BLE_1M_Ant1_2440_1000~26500



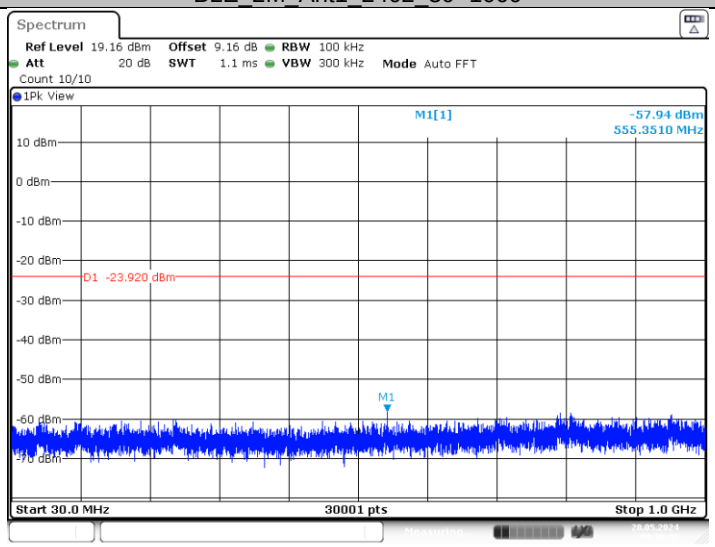
BLE_1M_Ant1_2480_30~1000



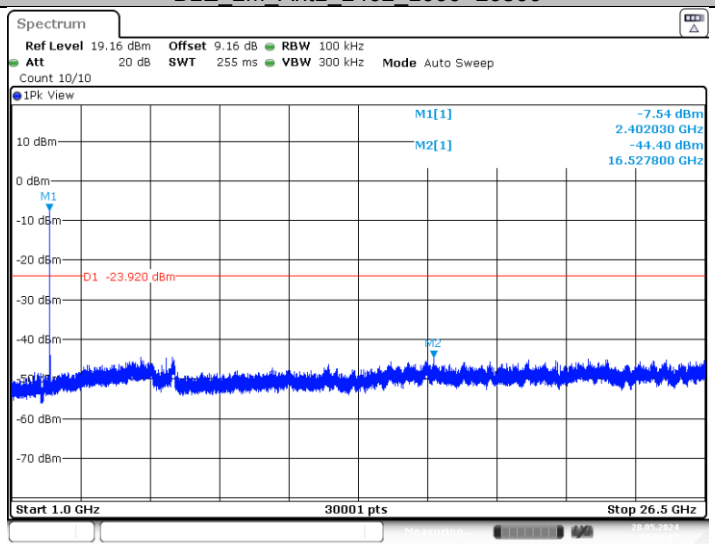
BLE_1M_Ant1_2480_1000~26500



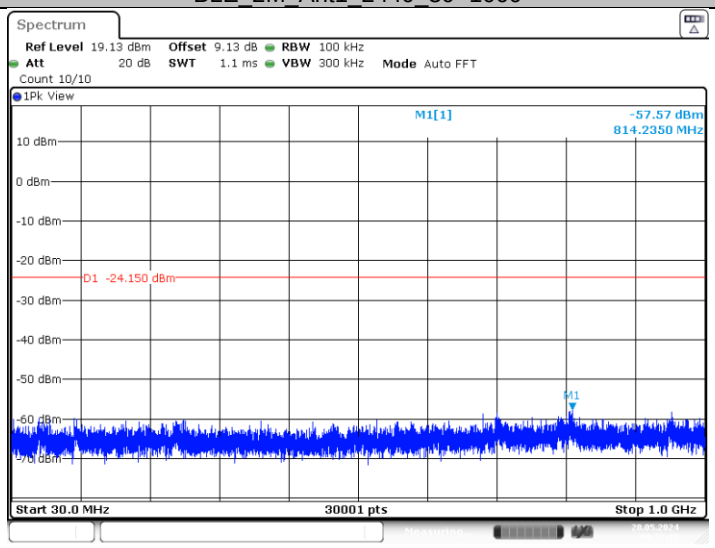
BLE_2M_Ant1_2402_30~1000



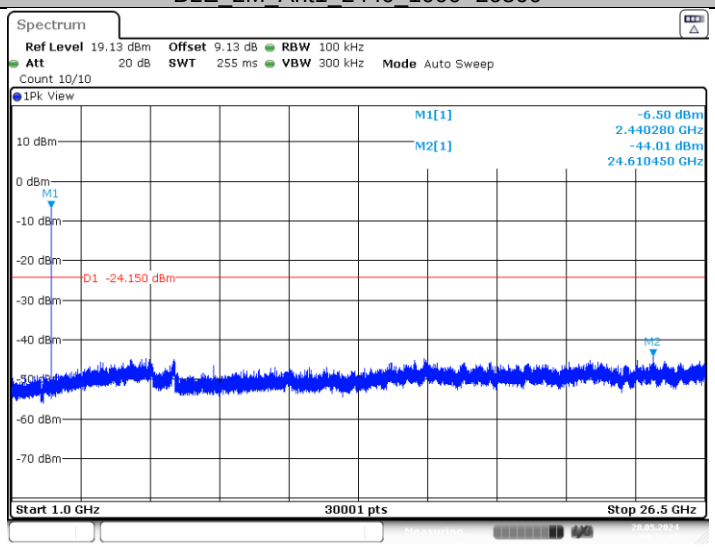
BLE_2M_Ant1_2402_1000~26500



BLE_2M_Ant1_2440_30~1000

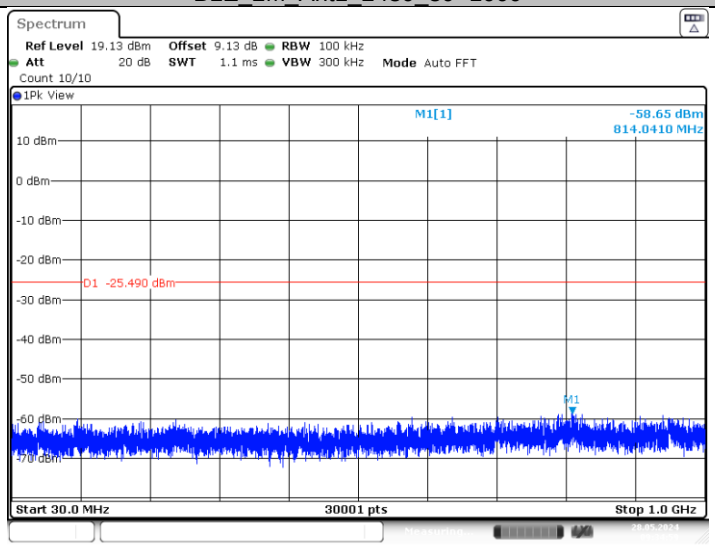


BLE_2M_Ant1_2440_1000~26500



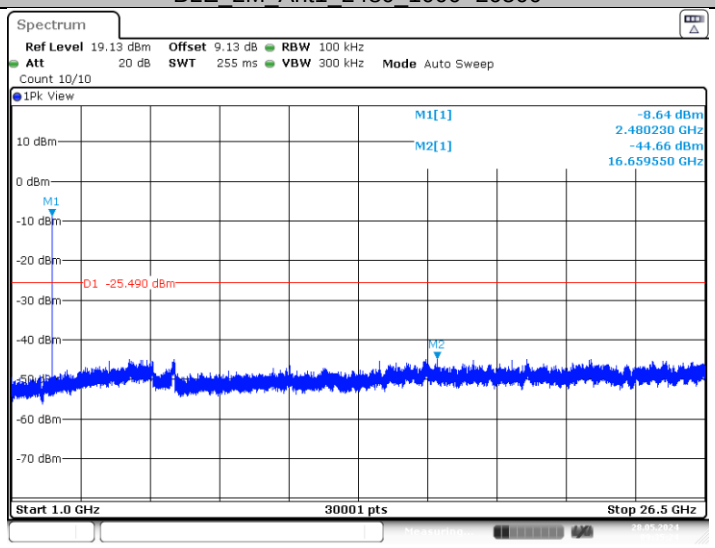
Date: 28.MAY.2024 09:32:42

BLE_2M_Ant1_2480_30~1000



Date: 28.MAY.2024 09:34:59

BLE_2M_Ant1_2480_1000~26500

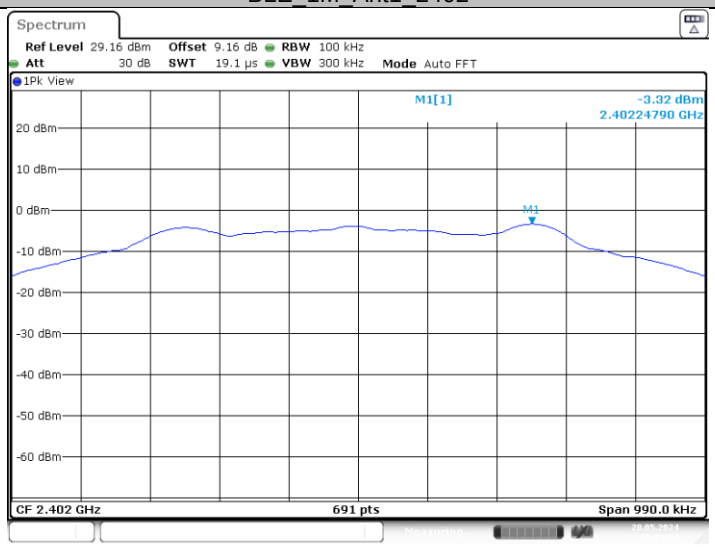


Date: 28.MAY.2024 09:35:24

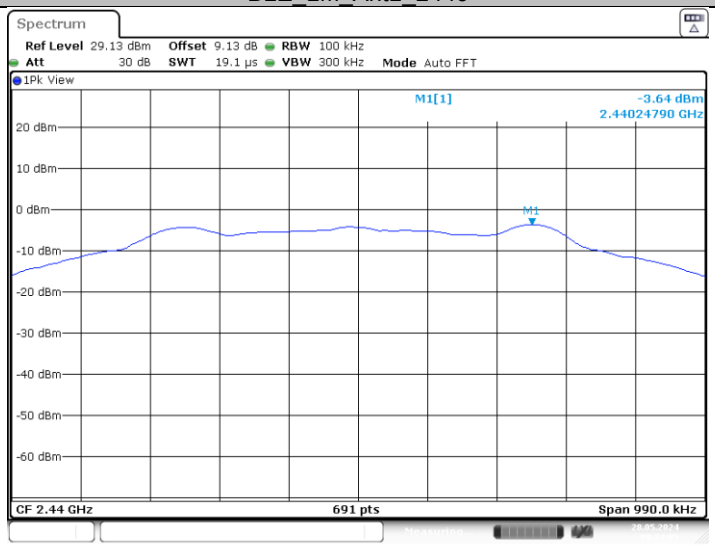
Reference level measurement

TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm]
BLE_1M	Ant1	2402	2402.25	-3.32
		2440	2440.25	-3.64
		2480	2480.25	-4.84
BLE_2M	Ant1	2402	2401.99	-3.92
		2440	2439.99	-4.15
		2480	2479.98	-5.49

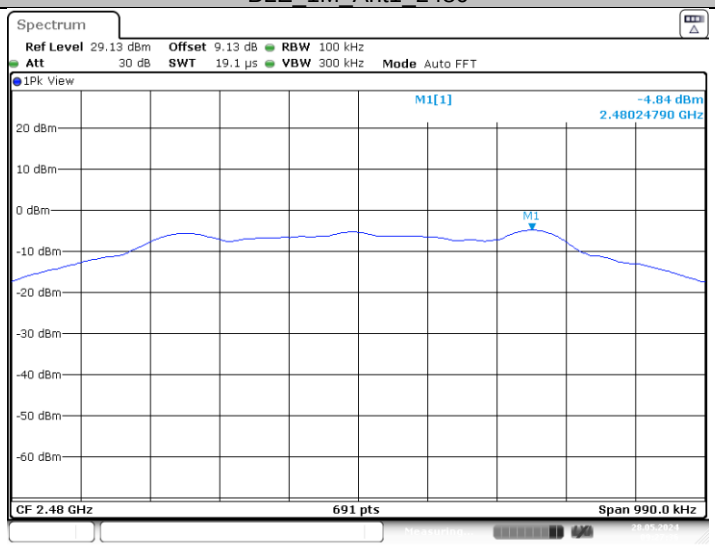
BLE_1M_Ant1_2402



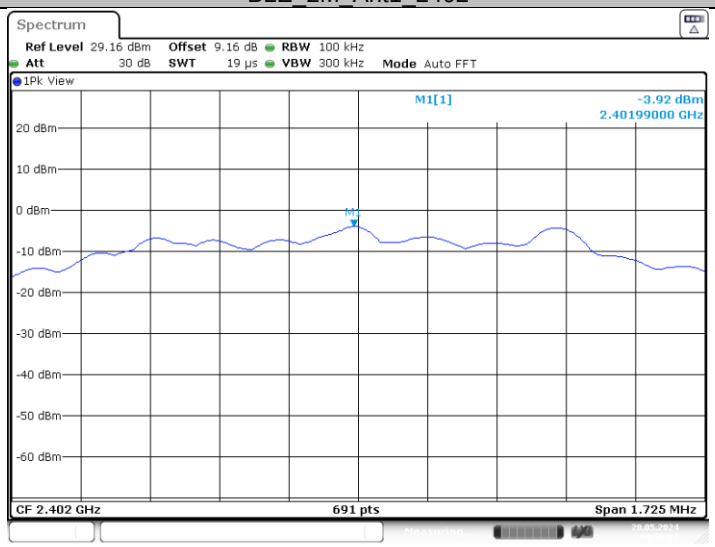
BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



BLE_2M_Ant1_2402



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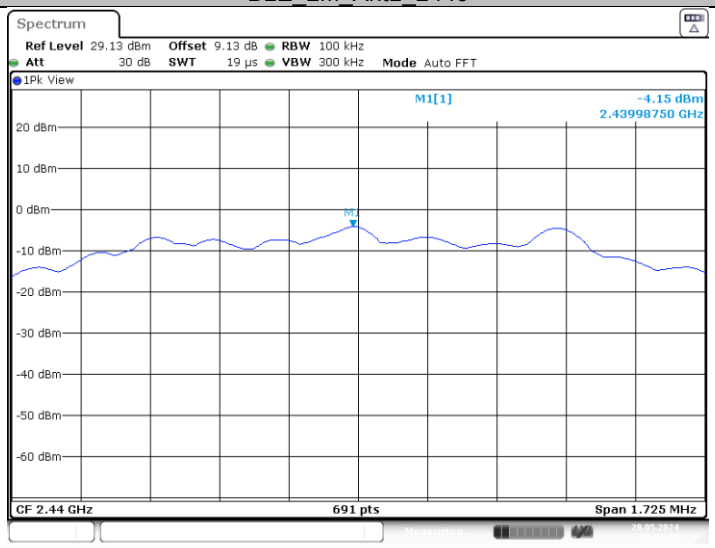

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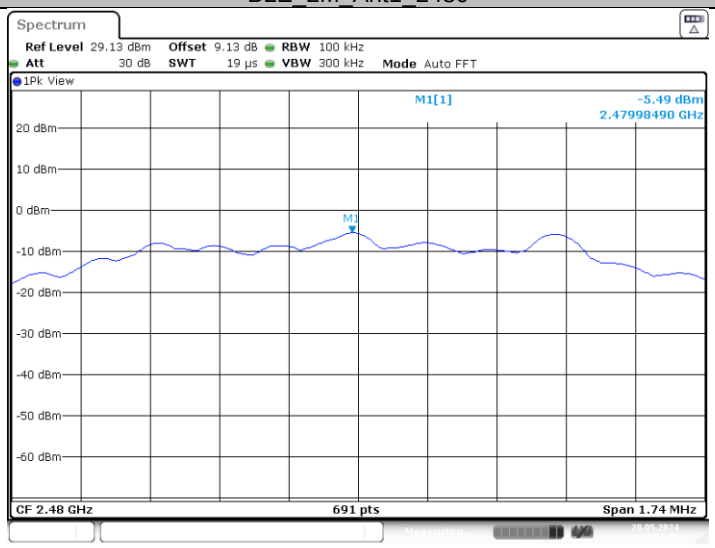
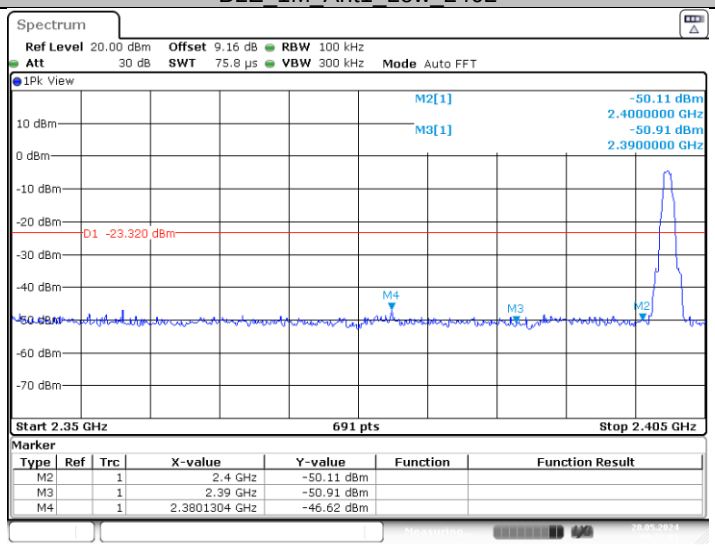


Band edge measurements

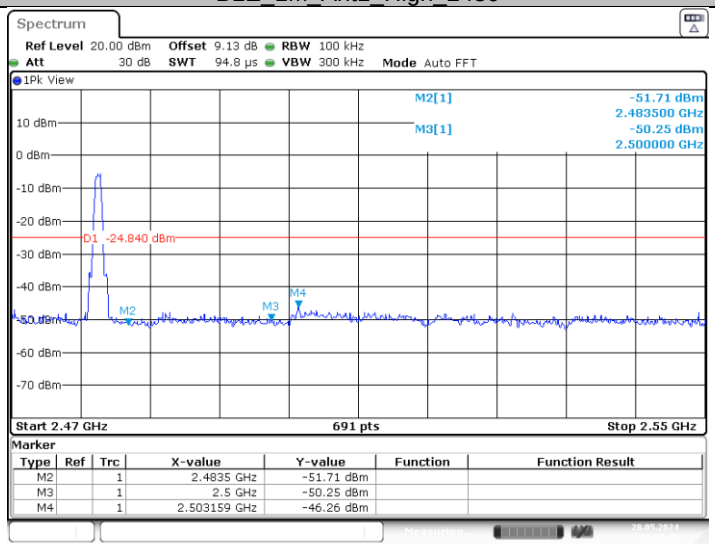
TestMode	Antenna	ChName	Freq(MHz)	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-3.32	-46.62	≤-23.32	PASS
		High	2480	-4.84	-46.26	≤-24.84	PASS
BLE_2M	Ant1	Low	2402	-3.92	-37.19	≤-23.92	PASS
		High	2480	-5.49	-47.09	≤-25.49	PASS

BLE_1M_Ant1_Low_2402



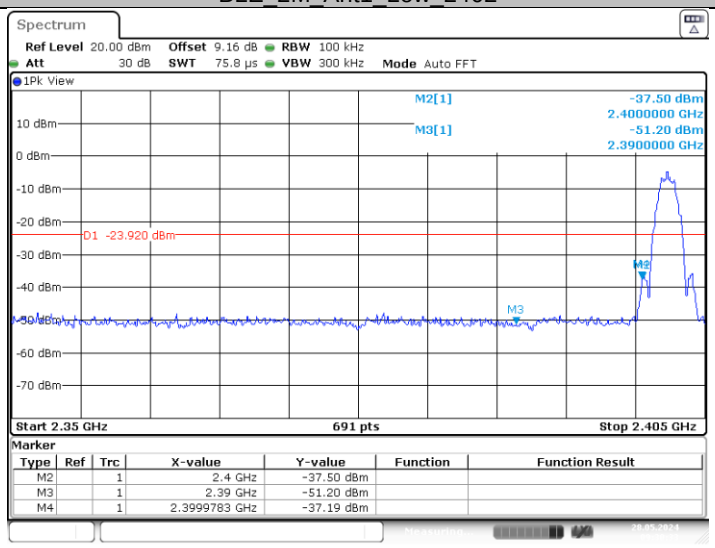
Date: 28.MAY.2024 09:22:03

BLE_1M_Ant1_High_2480



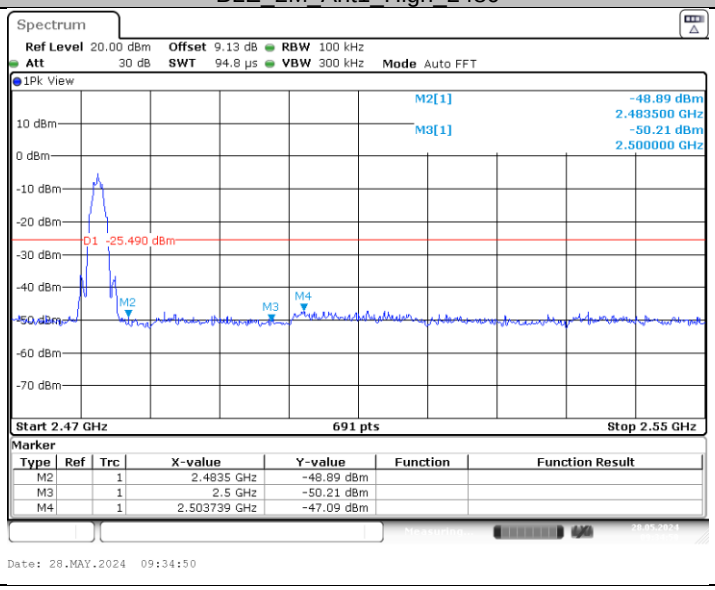
Date: 28.MAY.2024 09:27:45

BLE_2M_Ant1_Low_2402



Date: 28.MAY.2024 09:30:33

BLE_2M_Ant1_High_2480

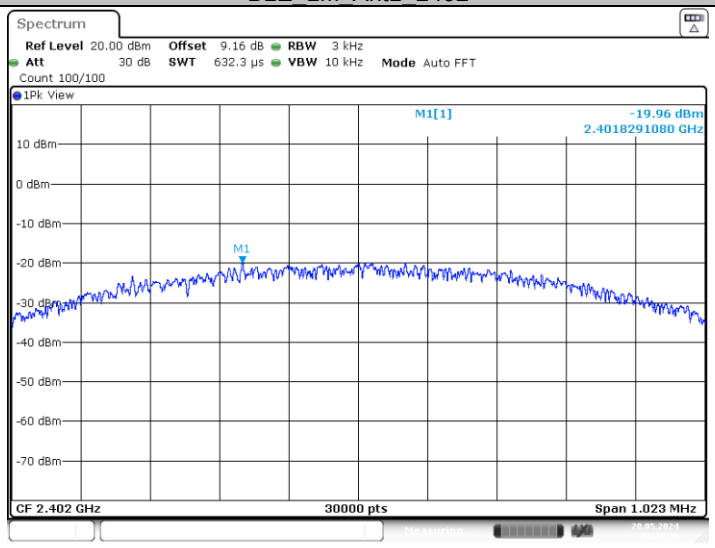


APPENDIX G- POWER SPECTRAL DENSITY

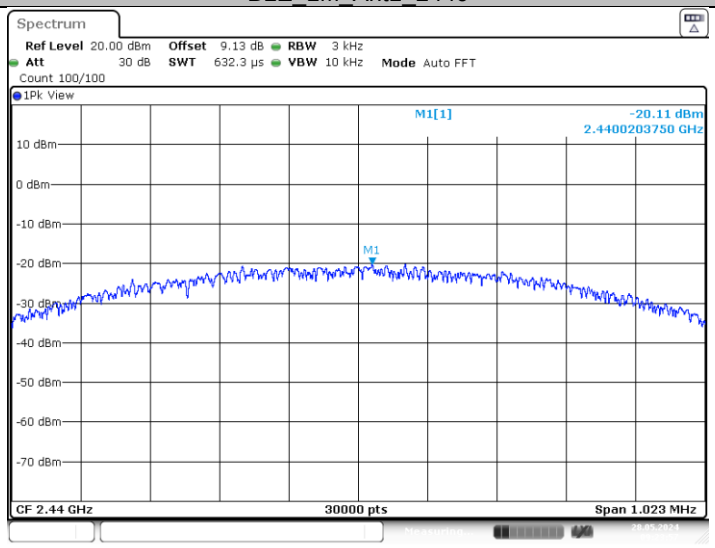
Power Spectral Density

TestMode	Antenna	Freq(MHz)	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-19.96	≤8.00	PASS
		2440	-20.11	≤8.00	PASS
		2480	-21.51	≤8.00	PASS
BLE_2M	Ant1	2402	-21.93	≤8.00	PASS
		2440	-22.11	≤8.00	PASS
		2480	-23.36	≤8.00	PASS

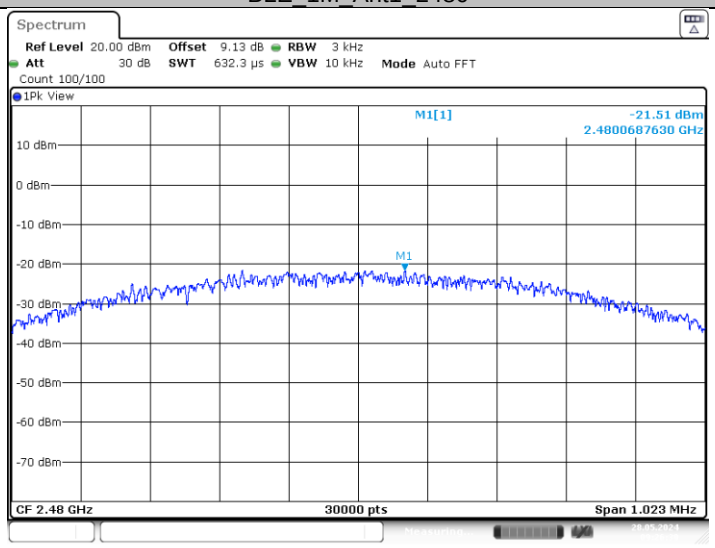
BLE_1M_Ant1_2402



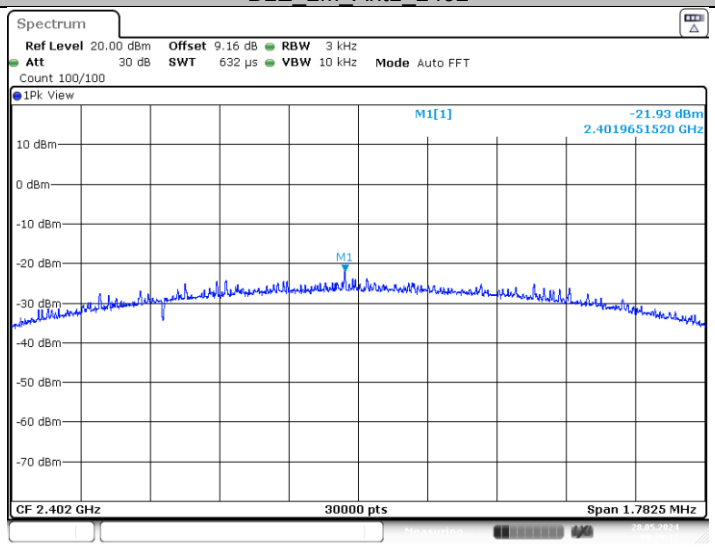
BLE_1M_Ant1_2440



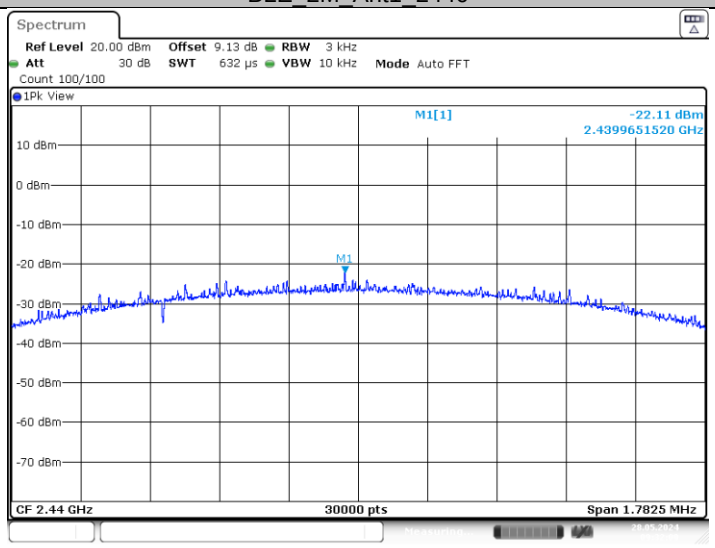
BLE_1M_Ant1_2480

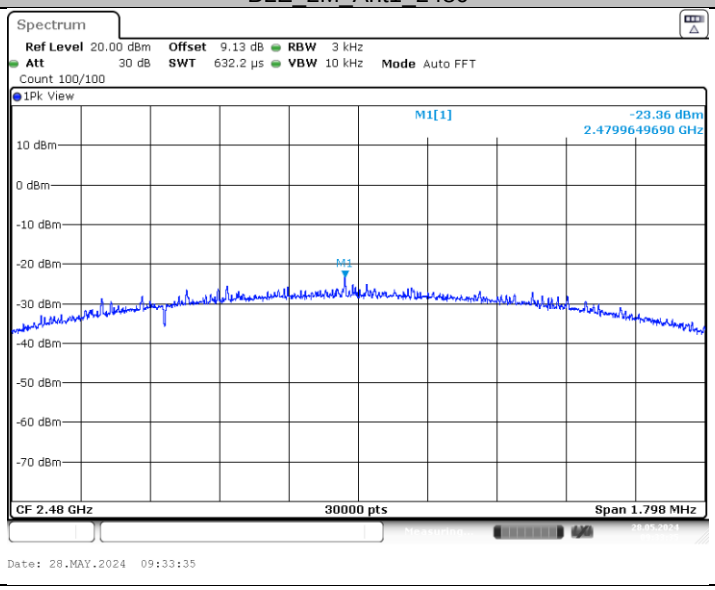


BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480


End of Test Report