FCC TEST REPORT

FCC ID: 2BE8V-AP200

On Behalf of

ShenZhen KaiFuTe Technology Co., Ltd.

Smart Car Kit

Model No.: AP200

Prepared for	:	ShenZhen KaiFuTe Technology Co., Ltd.
Address	:	NO.201, Second Floor Hedi Maker Mashion, No. 28 Qingshui Road, Longxi Community Longgan District, Shenzhen City, China

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

Report Number	:	A2403093-C01-R01
Date of Receipt	:	March 11, 2024
Date of Test	:	March 11, 2024 - March 25, 2024
Date of Report	:	March 25, 2024
Version Number	:	V0
Result		**Pass**

TABLE OF CONTENTS

TEST REPORT DECLARATION

Applicant	:	ShenZhen KaiFuTe Technology Co., Ltd.
Address	:	NO.201, Second Floor Hedi Maker Mashion, No. 28 Qingshui Road, Longxi Community Longgan District, Shenzhen City, China
Manufacturer	:	ShenZhen KaiFuTe Technology Co., Ltd.
Address	:	NO.201, Second Floor Hedi Maker Mashion, No. 28 Qingshui Road, Longxi Community Longgan District, Shenzhen City, China
EUT Description	:	Smart Car Kit
		(A) Model No. AP200
		(B) Trademark

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247

ANSI C63.10-2013

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....:	Yannis Wen Project Engineer	Yannis Wen
Approved by (name + signature).....:	Reak Yang Project Manager	Reak.Yang
Date of issue.....:	March 25, 2024	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	March 25, 2024	Initial released Issue	Yannis Wen

1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Test Item	Test Requirement	Standards Paragraph	Result
Conducted Emission	FCC PART 15	15.207	P
6dB Bandwidth	FCC PART 15	15.247 (a)(2)	P
Conducted Maximum Peak Output Power	FCC PART 15	15.247 (b)(3)	P
Radiated Spurious Emission	FCC PART 15	15.247 (c)	P
Conducted Spurious & Band Edge Emission	FCC PART 15	15.247 (d)	P
Power Spectral Density	FCC PART 15	15.247 (e)	P
Radiated Band Edge Emission	FCC PART 15	15.205	P
Antenna Requirement	FCC PART 15	15.203	P

Note: 1. P is an abbreviation for Pass.
2. F is an abbreviation for Fail.
3. N/A is an abbreviation for Not Applicable.
4. The conclusion of this test report is judged by actual test data without considering measurement uncertainty.

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Description	:	Smart Car Kit
Model Number	:	AP200
Diff	:	N/A
Power supply	:	DC 12V/24V from DC power.
Radio Technology	:	Bluetooth BLE
Operation frequency	:	2402-2480MHz
Channel No.	:	40 Channels
Channel spacing	:	2MHz
Rate	:	1Mbps, 2Mbps
Modulation type	:	GFSK
Antenna Type Coaxial cable loss	:	Internal antenna, Maximum Gain is -1.3dBi. (Antenna information is provided by applicant.) Max coaxial cable loss:0.5dB (Cable lossvalue is provided by applicant.)
Software version	:	V1.0
Hardware version	:	V1.0
Connector cable loss	:	N/A
Intend use environment	:	Residential, commercial and light industrial environment

2.2. Accessories of Device (EUT)

Accessories : /

Manufacturer : /

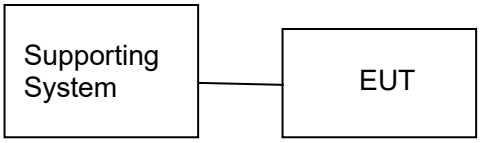
Model : /

Ratings : /

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDoC
1.	Notebook PC	Lenovo	ThinkPad E14	/	/

2.4. Block Diagram of connection between EUT and simulators



2.5. Test Mode Description

Tested mode, channel, and data rate information		
Duty cycle :100%		
Mode	**Channel**	**Frequency (MHz)**
GFSK (1M/2Mbps)	Low :CH1	2402
	Middle: CH20	2440
	High: CH40	2480

2.6. Test Conditions

Items	Required	Actual
Temperature range:	15-35℃	24℃
Humidity range:	25-75%	56%
Pressure range:	86-106kPa	980kPa

2.7. Test Facility

Shenzhen Alpha Product Testing Co., Ltd
Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103,
Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission
Registration Number: 293961

July 25, 2017 Certificated by IC
Registration Number: 12135A

2.8. Measurement Uncertainty

(95% confidence levels, k=2)

Item	**Uncertainty**
Uncertainty for Power point Conducted Emissions Test	2.74dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB(Polarize: V)
	2.57dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.77dB(Polarize: V)
	3.80dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.13dB(Polarize: H)
	4.16dB(Polarize: V)
Uncertainty for radio frequency	5.4×10-8
Uncertainty for conducted RF Power	0.37dB
Uncertainty for temperature	0.2℃
Uncertainty for humidity	1%
Uncertainty for DC and low frequency voltages	0.06%

2.9. Test Equipment List

Equipment	Manufacture	Model No.	Firmware version	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	CHENYU	9*6*6	/	N/A	2022.05.17	3Year
Spectrum analyzer	ROHDE&SCHWARZ	FSV40-N	2.3	102137	2023.08.16	1Year
Spectrum analyzer	Agilent	N9020A	A.14.16	MY499100060	2023.08.16	1Year
Receiver	ROHDE&SCHWARZ	ESR	2.28 SP1	1316.3003K03-102082-Wa	2023.08.16	1Year
Receiver	R&S	ESCI	4.42 SP1	101165	2023.08.16	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	/	VULB 9168#627	2023.08.28	1Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	/	2106	2023.08.19	1Year
Loop Antenna	SCHWARZBECK	FMZB 1519B	/	00128	2023.08.19	1Year
RF Cable	Resenberger	Cable 1	/	RE1	2023.08.16	1Year
RF Cable	Resenberger	Cable 2	/	RE2	2023.08.16	1Year
RF Cable	Resenberger	Cable 3	/	CE1	2023.08.16	1Year
Pre-amplifier	HP	HP8347A	/	2834A00455	2023.08.16	1Year
Pre-amplifier	Agilent	8449B	/	3008A02664	2023.08.16	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	/	8126-466	2023.08.16	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	101043	2023.08.16	1Year
Horn Antenna	SCHWARZBECK	BBHA 9170	/	00946	2023.08.19	1Year
Preamplifier	SKET	LNPA_1840-50	/	SK2018101801	2023.08.16	1 Year
Power Meter	Agilent	E9300A	/	MY41496628	2023.08.16	1 Year
Power Sensor	DARE	RPR3006W	/	15100041SNO91	2023.08.16	1 Year
Temp. & Humid. Chamber	Teelong	TL-HW408S	/	TL-20191205-01	2023.07.25	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	/	20140927-6	2023.08.16	1 Year
Adjustable attenuator	MWRFtest	N/A	/	N/A	N/A	N/A
10dB Attenuator	Mini-Circuits	DC-6G	/	N/A	N/A	N/A

Software Information			
Test Item	Software Name	Manufacturer	Version
RE	EZ-EMC	Farad	Alpha-3A1
CE	EZ-EMC	Farad	Alpha-3A1
RF-CE	MTS 8310	MWRFtest	V2.0.0.0

3. SPURIOUS EMISSION

3.1. Test Limits

Frequencies (MHz)	Field Strength (micorvolts/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

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

NOTE:

a) The tighter limit applies at the band edges.
b) Emission Level(dB uV/m)=20log Emission Level(uv/m)

3.2. Test Procedure

The measuring distance of 3m shall be used for measurements at frequency up to 1GH and above 1GHz, The EUT was placed on a rotating 0.8 m high above ground for below 1GHz and 1.5m high for above1GHz testing, The table was rotated 360 degrees to determine the position of the highest radiation

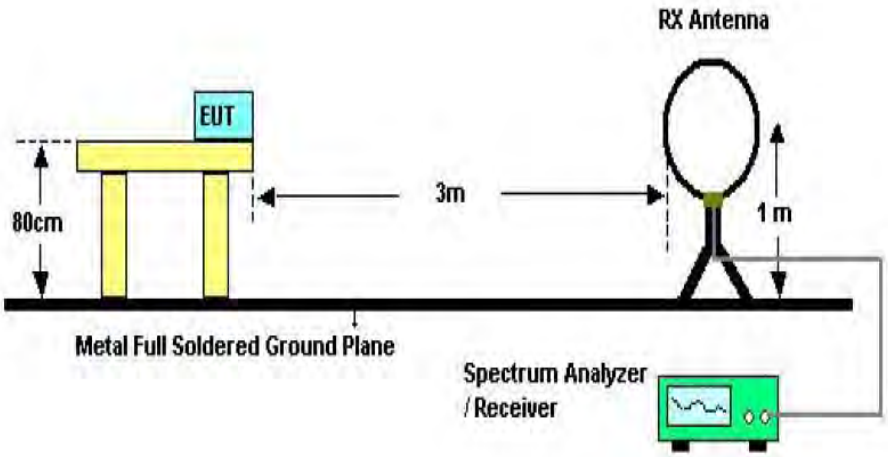
The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set of make measurement.

The initial step in collecting conducted emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significant Peaks are then marked. and then Qusia Peak Detector mode premeasured

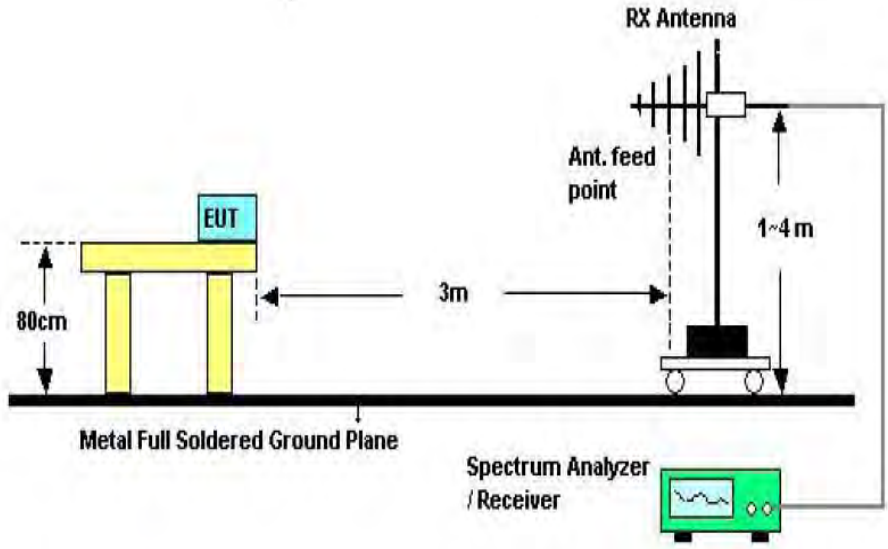
If Peak value comply with QP limit Below 1GHz.The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.

For the actual test configuration, please see the test setup photo.

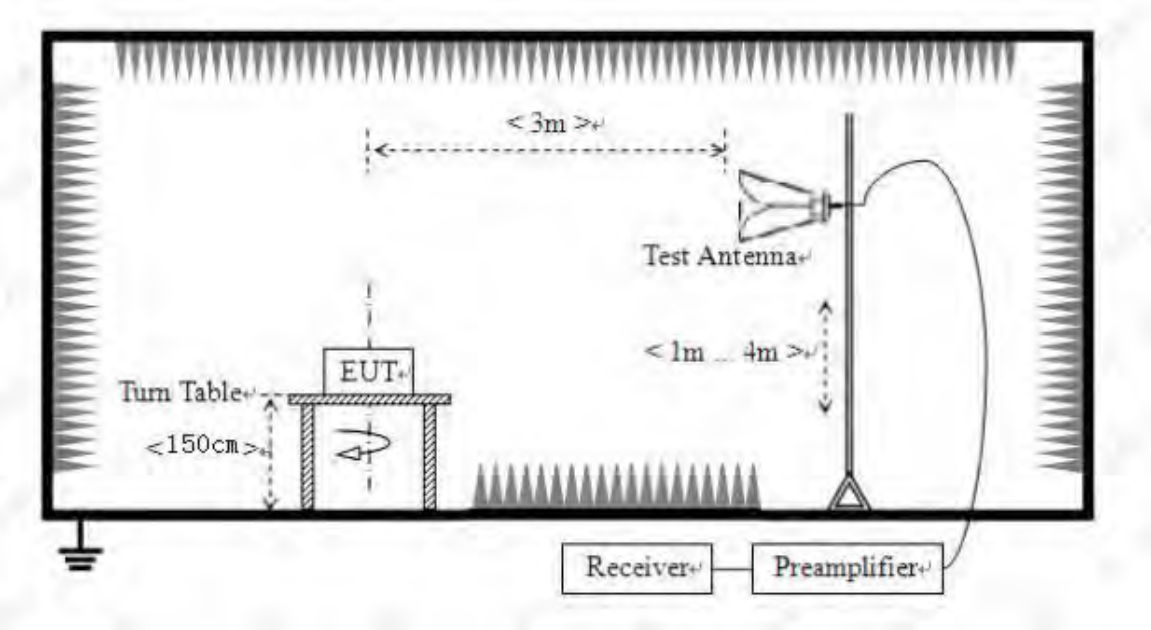
3.3. Test Setup



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

3.4. Test Results

Test Condition

Continual Transmitting in maximum power.

9KHz~150KHz	RBW200Hz	VBW1KHz
150KHz~30MHz	RBW9KHz	VBW 30KHz
30MHZ~1GHz	RBW120KHz	VBW 300KHz
Above1GHz	RBW1MHz	VBW 3MHz

We have scanned the 10th harmonic from 9 kHz to the EUT.

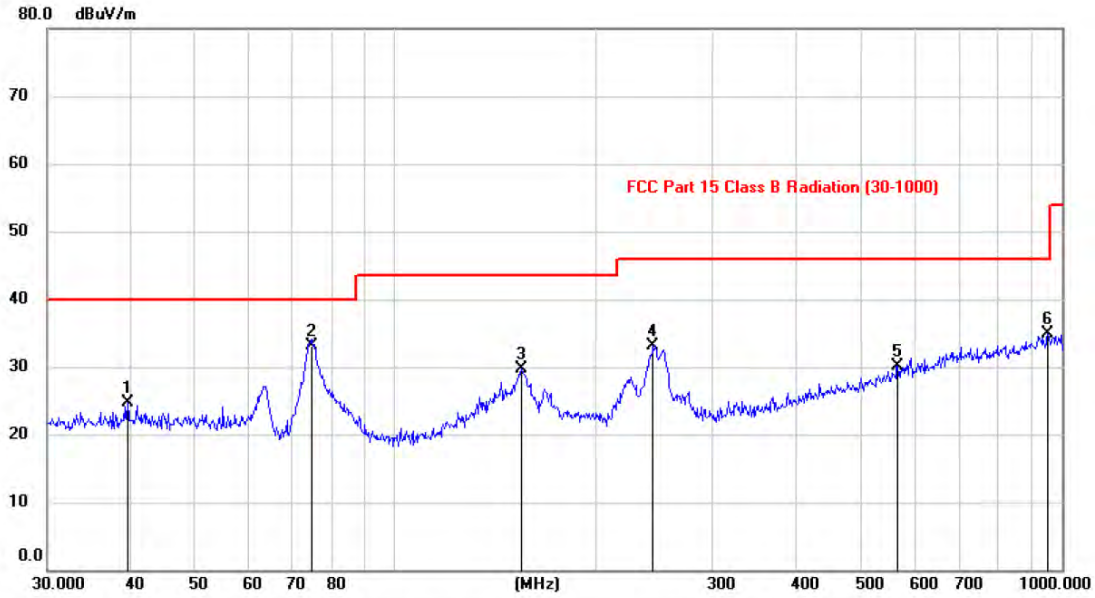
Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

Note: 1.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

2. Only show the test data of the worst Channel in this report.

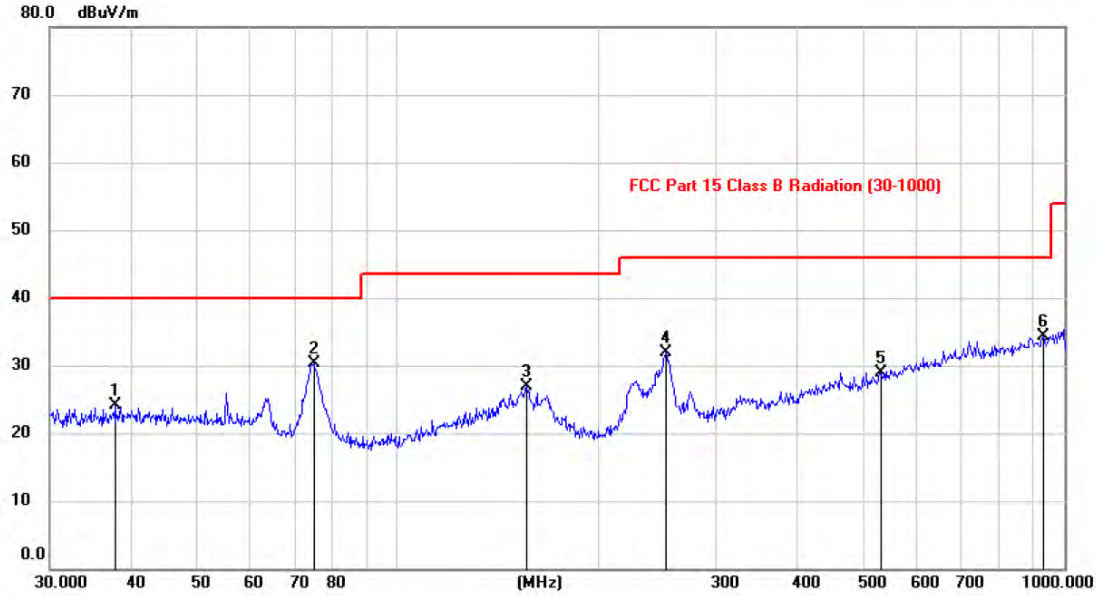
Antenna polarity: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		39.6822	10.25	14.39	24.64	40.00	-15.36	peak			
2	*	74.8054	22.77	10.43	33.20	40.00	-6.80	QP			
3		154.7481	14.95	14.76	29.71	43.50	-13.79	peak			
4		244.1750	20.93	12.25	33.18	46.00	-12.82	peak			
5		568.3469	10.84	19.24	30.08	46.00	-15.92	peak			
6		954.5452	10.78	24.20	34.98	46.00	-11.02	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Antenna polarity: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		37.6490	10.07	14.04	24.11	40.00	-15.89	peak			
2	*	74.8316	19.92	10.42	30.34	40.00	-9.66	peak			
3		156.2567	12.11	14.76	26.87	43.50	-16.63	peak			
4		252.2101	19.55	12.37	31.92	46.00	-14.08	peak			
5		530.9074	10.37	18.54	28.91	46.00	-17.09	peak			
6		931.9447	10.18	24.04	34.22	46.00	-11.78	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Notes: Above is below 1GHz test data. This report only shall the worst case mode for TX 1M 2402MHz.

1Mbps:
From 1G-25GHz

Test Mode: TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4804	45.33	V	33.95	10.18	34.26	55.20	74	-18.80	PK
4804	35.99	V	33.95	10.18	34.26	45.86	54	-8.14	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	43.45	H	33.95	10.18	34.26	53.32	74	-20.68	PK
4804	35.34	H	33.95	10.18	34.26	45.21	54	-8.79	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: TX Mid									
4880	44.38	V	33.93	10.2	34.29	54.22	74	-19.78	PK
4880	34.62	V	33.93	10.2	34.29	44.46	54	-9.54	AV
7320	/	/	/	/	/	/	/	/	/
9760	/	/	/	/	/	/	/	/	/
4880	44.31	H	33.93	10.2	34.29	54.15	74	-19.85	PK
4880	34.33	H	33.93	10.2	34.29	44.17	54	-9.83	AV
7320	/	/	/	/	/	/	/	/	/
9760	/	/	/	/	/	/	/	/	/
Test Mode: TX High									
4960	44.30	V	33.98	10.22	34.25	54.25	74	-19.75	PK
4960	35.32	V	33.98	10.22	34.25	45.27	54	-8.73	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	45.42	H	33.98	10.22	34.25	55.37	74	-18.63	PK
4960	33.28	H	33.98	10.22	34.25	43.23	54	-10.77	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/

Note:
1, Result = Read level + Antenna factor + cable loss-Amp factor
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

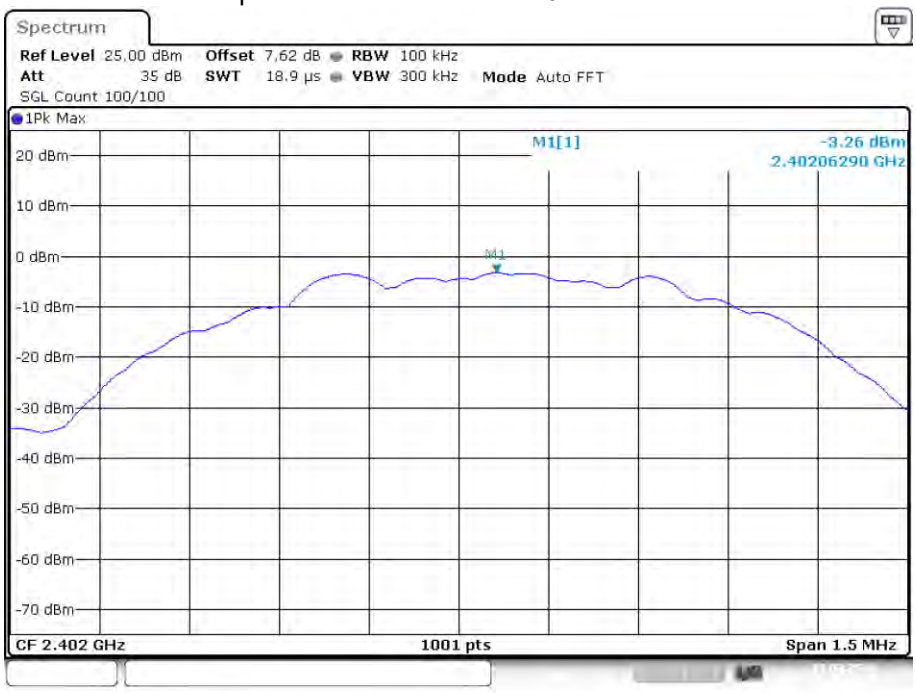
2Mbps:
From 1G-25GHz

Test Mode: TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4804	44.41	V	33.95	10.18	34.26	54.28	74	-19.72	PK
4804	38.21	V	33.95	10.18	34.26	48.08	54	-5.92	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	42.97	H	33.95	10.18	34.26	52.84	74	-21.16	PK
4804	36.46	H	33.95	10.18	34.26	46.33	54	-7.67	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: TX Mid									
4880	42.24	V	33.93	10.2	34.29	52.08	74	-21.92	PK
4880	33.56	V	33.93	10.2	34.29	43.40	54	-10.60	AV
7320	/	/	/	/	/	/	/	/	/
9760	/	/	/	/	/	/	/	/	/
4880	46.54	H	33.93	10.2	34.29	56.38	74	-17.62	PK
4880	33.89	H	33.93	10.2	34.29	43.73	54	-10.27	AV
7320	/	/	/	/	/	/	/	/	/
9760	/	/	/	/	/	/	/	/	/
Test Mode: TX High									
4960	45.47	V	33.98	10.22	34.25	55.42	74	-18.58	PK
4960	35.72	V	33.98	10.22	34.25	45.67	54	-8.33	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	44.91	H	33.98	10.22	34.25	54.86	74	-19.14	PK
4960	33.50	H	33.98	10.22	34.25	43.45	54	-10.55	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/

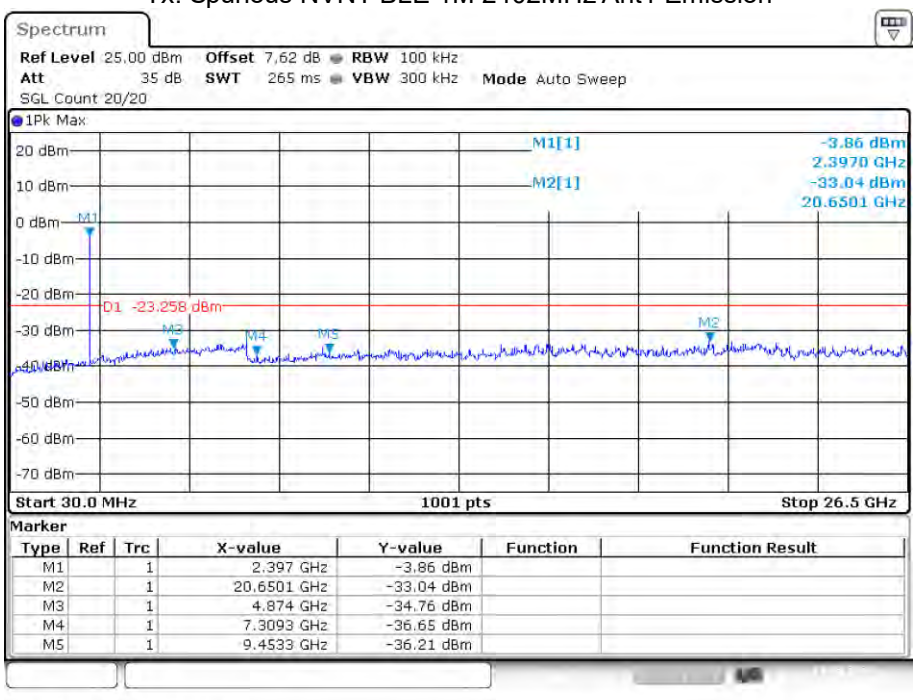
Note:
1, Result = Read level + Antenna factor + cable loss-Amp factor
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Conducted RF Spurious Emission

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



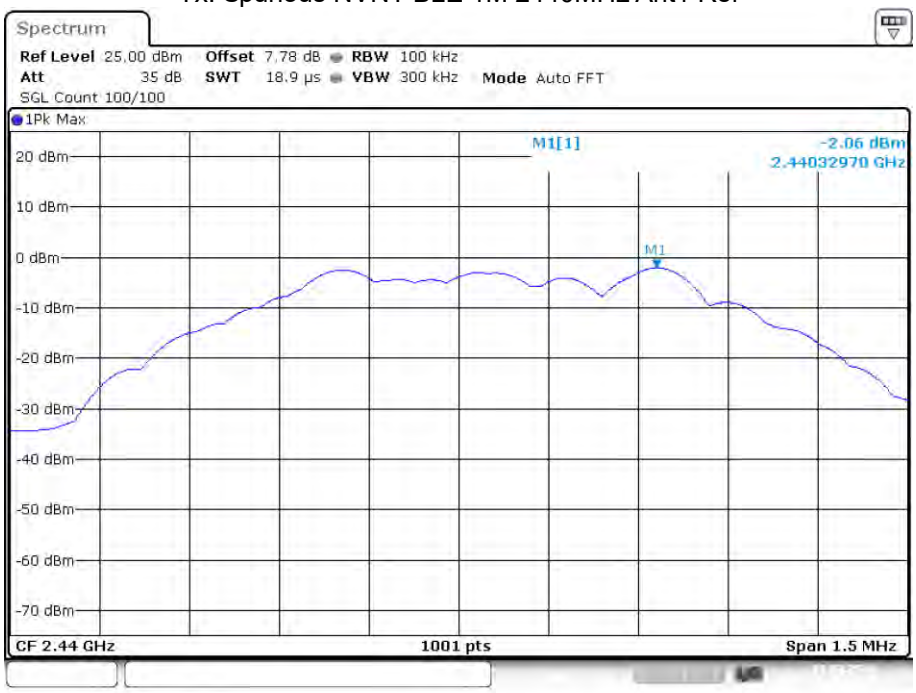
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



Marker

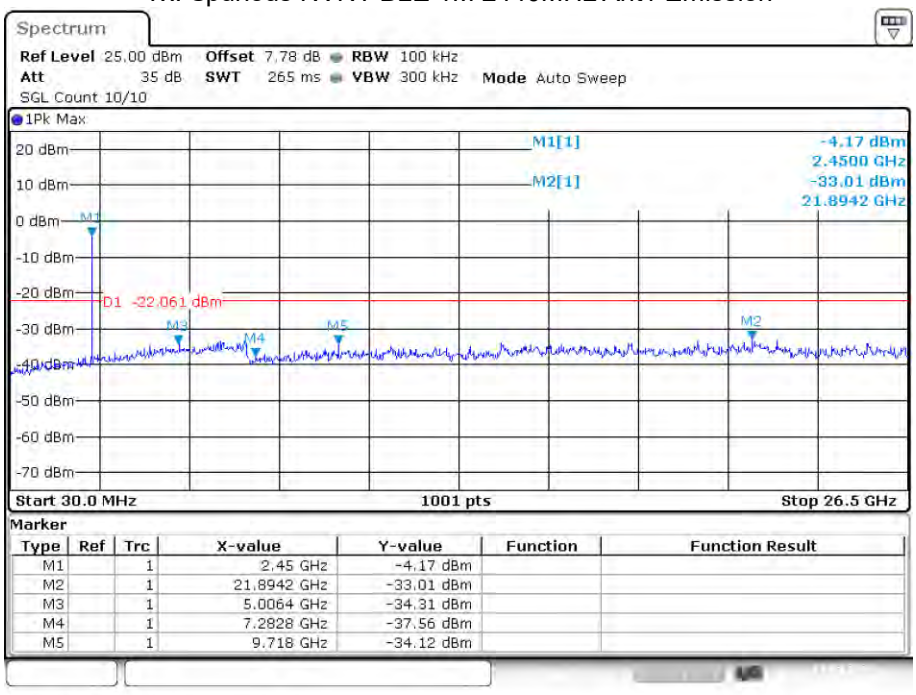
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.397 GHz	-3.86 dBm		
M2		1	20.6501 GHz	-33.04 dBm		
M3		1	4.874 GHz	-34.76 dBm		
M4		1	7.3093 GHz	-36.65 dBm		
M5		1	9.4533 GHz	-36.21 dBm		

Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref



Date: 18.MAR.2024 14:19:57

Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission

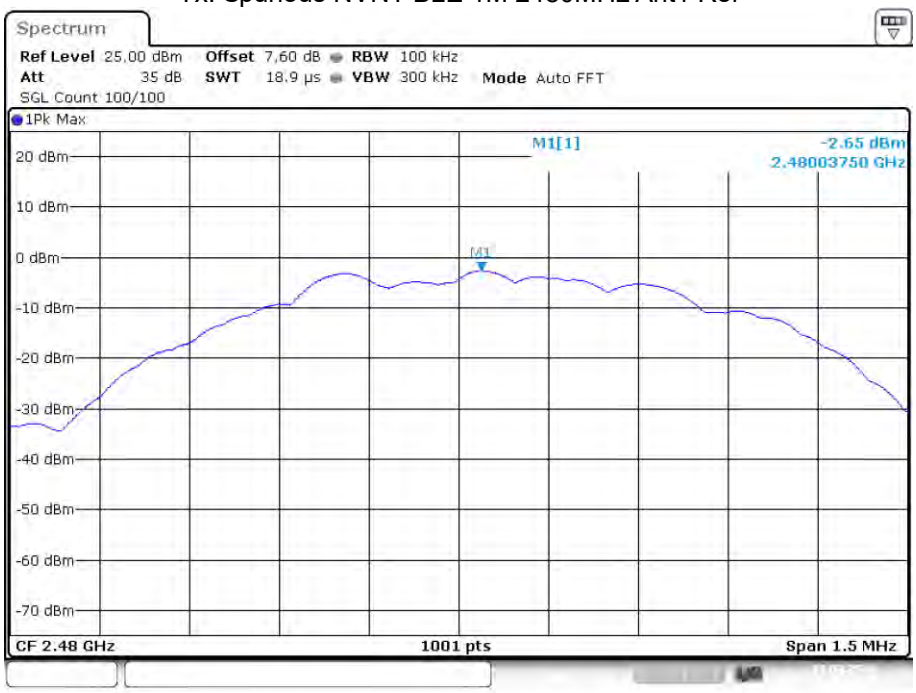


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	-4.17 dBm		
M2		1	21.8942 GHz	-33.01 dBm		
M3		1	5.0064 GHz	-34.31 dBm		
M4		1	7.2828 GHz	-37.56 dBm		
M5		1	9.718 GHz	-34.12 dBm		

Date: 18.MAR.2024 14:20:15

Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



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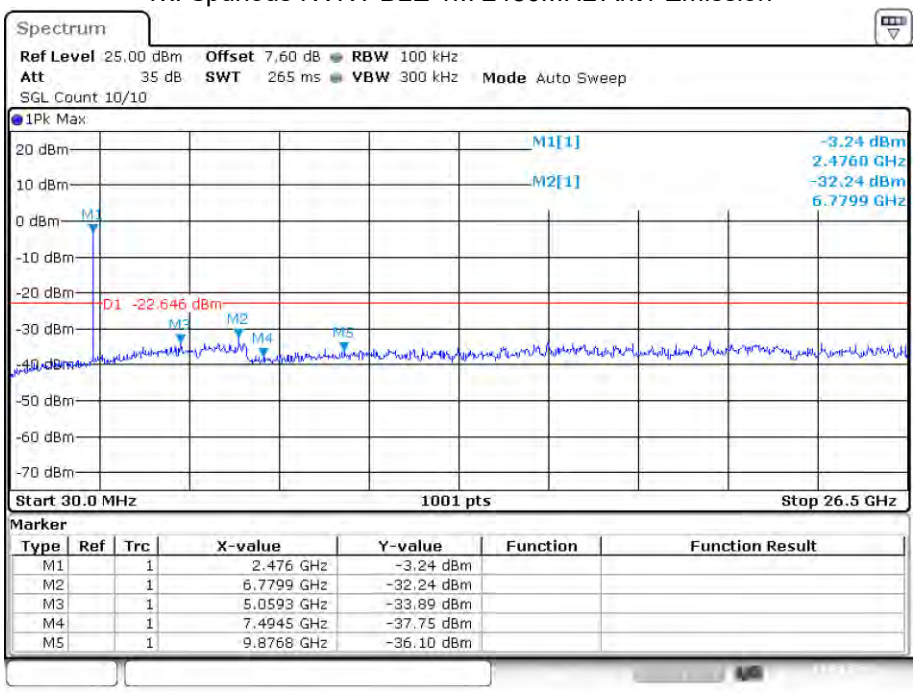
Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



Marker

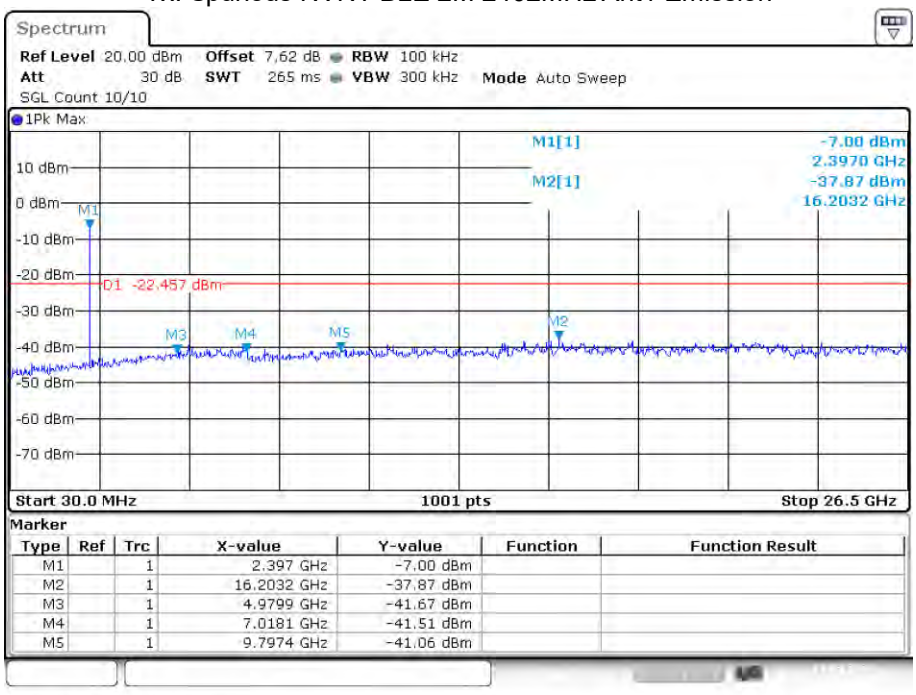
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.476 GHz	-3.24 dBm		
M2		1	6.7799 GHz	-32.24 dBm		
M3		1	5.0593 GHz	-33.89 dBm		
M4		1	7.4945 GHz	-37.75 dBm		
M5		1	9.8768 GHz	-36.10 dBm		

Date: 18.MAR.2024 14:21:55

Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Ref

Date: 18.MAR.2024 14:56:10

Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Emission



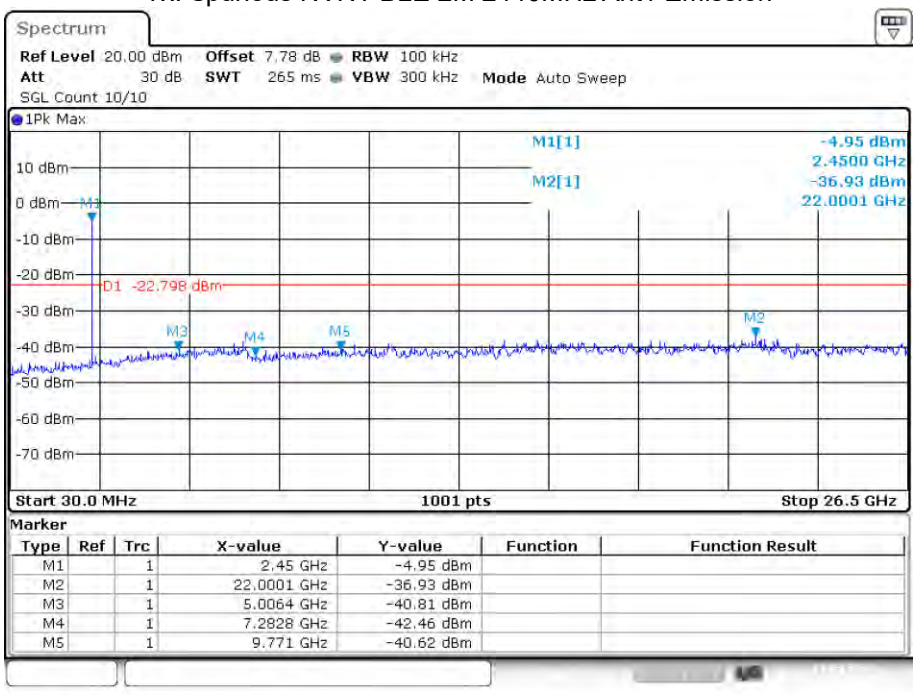
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.397 GHz	-7.00 dBm		
M2		1	16.2032 GHz	-37.87 dBm		
M3		1	4.9799 GHz	-41.67 dBm		
M4		1	7.0181 GHz	-41.51 dBm		
M5		1	9.7974 GHz	-41.06 dBm		

Date: 18.MAR.2024 14:56:28

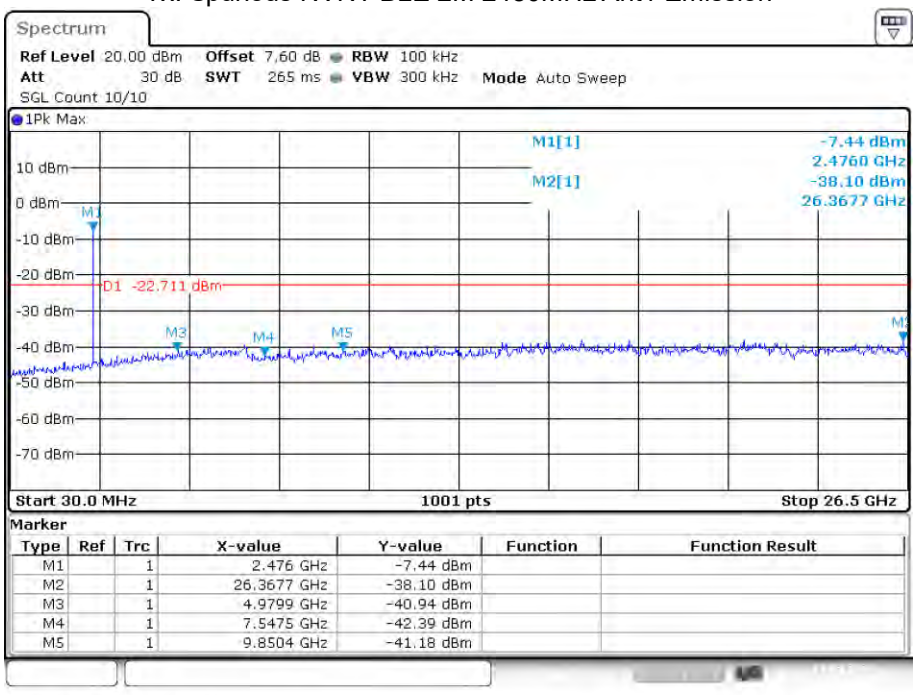
Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Ref

Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Emission



Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Ref

Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.476 GHz	-7.44 dBm		
M2		1	26.3677 GHz	-38.10 dBm		
M3		1	4.9799 GHz	-40.94 dBm		
M4		1	7.5475 GHz	-42.39 dBm		
M5		1	9.8504 GHz	-41.18 dBm		

4. POWER LINE CONDUCTED EMISSION

4.1. Test Limits

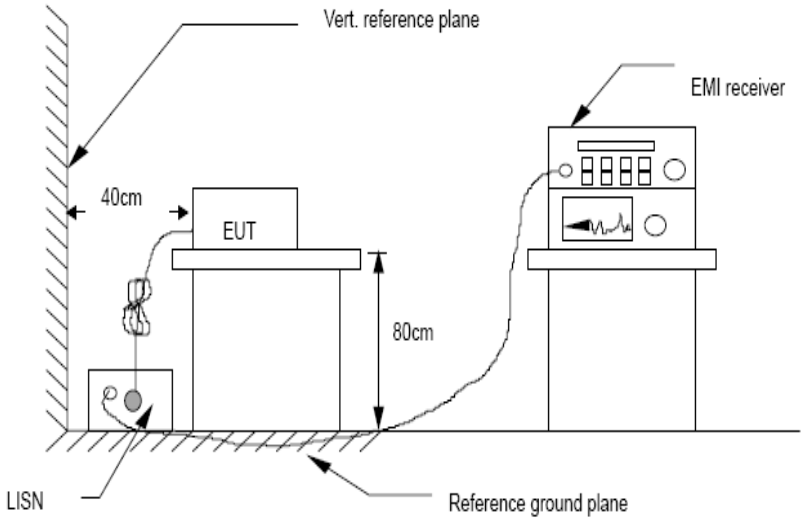
Frequency	Limits dB(μV)	
MHz	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.
3. The limit decreases in line with the logarithm of the frequency in rang of 0.15 to 0.50 MHz.

4.2. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10:2013 on Conducted Emission Measurement.
The bandwidth of test receiver is set at 9 kHz.

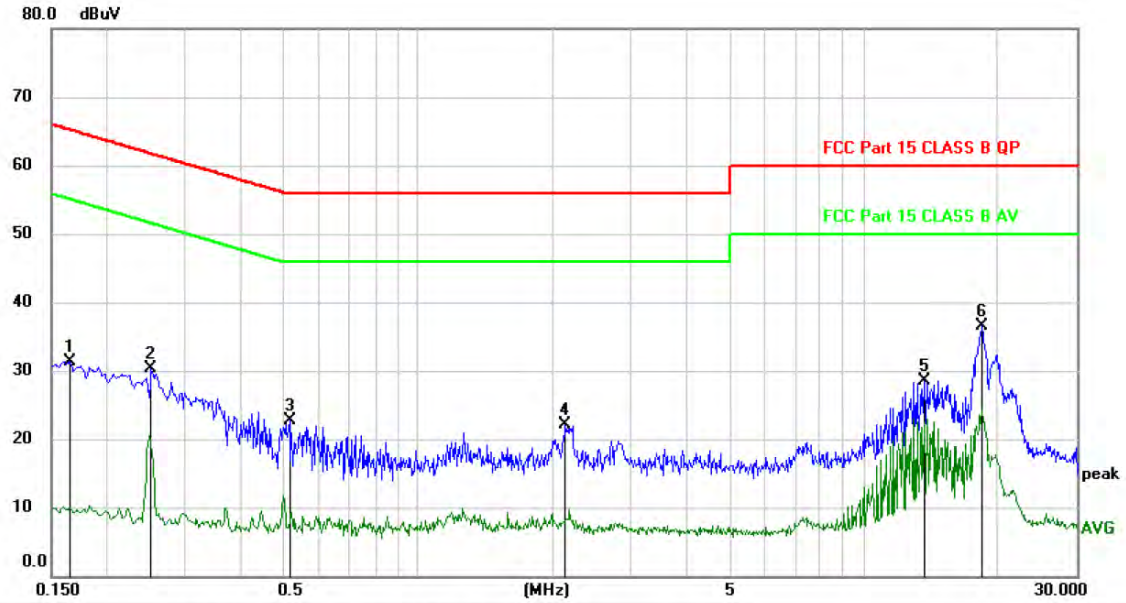
4.3. Test Setup



4.4. Test Results

Pass

Polarity: L

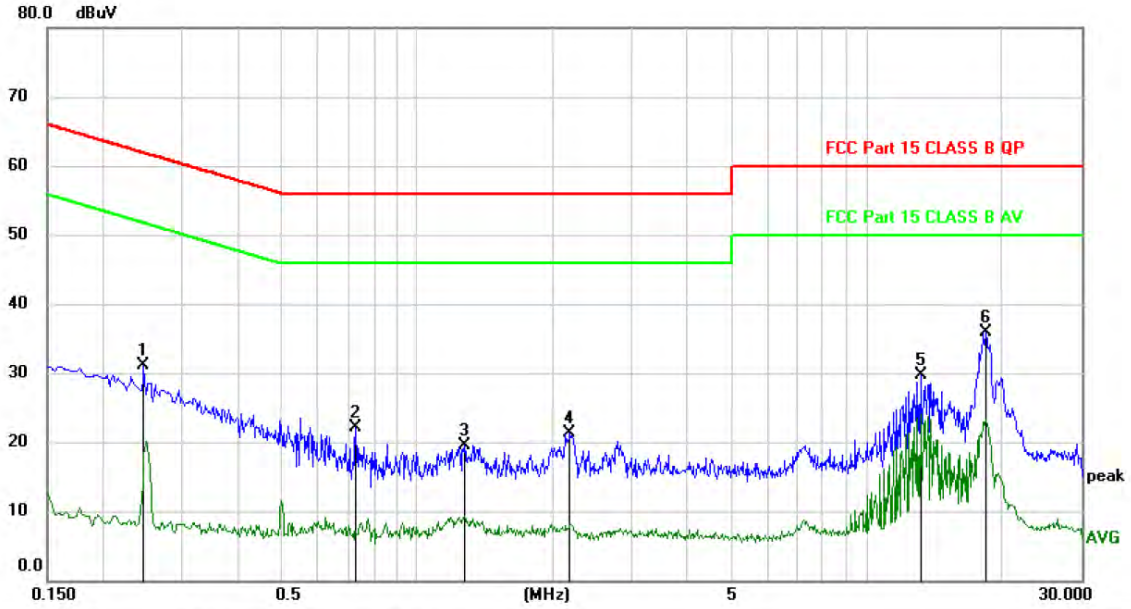


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1650	21.35	10.05	31.40	65.21	-33.81	peak	
2		0.2519	20.14	10.11	30.25	61.69	-31.44	peak	
3		0.5130	12.43	10.27	22.70	56.00	-33.30	peak	
4		2.1390	11.74	10.42	22.16	56.00	-33.84	peak	
5		13.6800	17.66	10.92	28.58	60.00	-31.42	peak	
6	*	18.3570	25.53	11.02	36.55	60.00	-23.45	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Polarity: N



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2460	21.06	10.11	31.17	61.89	-30.72	peak	
2		0.7290	11.85	10.33	22.18	56.00	-33.82	peak	
3		1.2750	9.08	10.42	19.50	56.00	-36.50	peak	
4		2.1840	10.78	10.43	21.21	56.00	-34.79	peak	
5		13.1550	18.71	10.90	29.61	60.00	-30.39	peak	
6	*	18.3660	24.85	11.02	35.87	60.00	-24.13	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Remark: All modes have been tested, and only worst data of GFSK 1M mode, Channel 2402MHz was listed in this report.

5. CONDUCTED MAXIMUM PEAK OUTPUT POWER

5.1. Test limits

Please refer section RSS-247 & 15.247.

5.2. Test Procedure

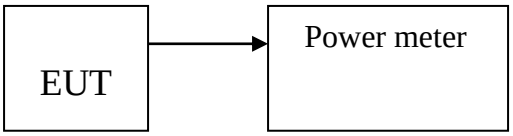
Details see the KDB 558074 D01 15.247 Meas Guidance v05r02

5.2.1 Place the EUT on the table and set it in transmitting mode.

5.2.2 Measure out each mode and each bands peak output power of EUT.

Note: The cable loss and attenuator loss were offset into measure device as amplitude offset.

5.3. Test Setup



5.4. Test Results

GFSK (1M)

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	EIRP (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	-0.955	-2.255	30	Pass
NVNT	BLE 1M	2440	Ant1	-0.204	-1.504	30	Pass
NVNT	BLE 1M	2480	Ant1	-0.969	-2.269	30	Pass

GFSK (2M)

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	EIRP (dBm)	Limit (dBm)	Verdict
NVNT	BLE 2M	2402	Ant1	-0.715	-2.015	30	Pass
NVNT	BLE 2M	2440	Ant1	-1.109	-2.409	30	Pass
NVNT	BLE 2M	2480	Ant1	-1.387	-2.687	30	Pass

6. PEAK POWER SPECTRAL DENSITY

6.1. Test limits

6.1.1 Please refer section RSS-247 & 15.247.
6.1.2 For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.
6.1.3 The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

6.2. Test Procedure

Details see the KDB 558074 D01 15.247 Meas Guidance v05r02

6.2.1 Place the EUT on the table and set it in transmitting mode.

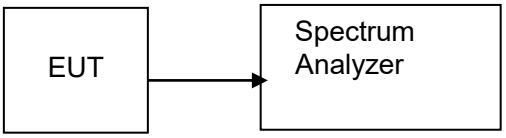
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Set the spectrum analyzer as RBW = 3kHz(Set the RBW to: 3 kHz≤RBW≤100 kHz.), VBW = 10kHz(Set the VBW≥3×RBW), span=1.5×DTS bandwidth., detail see the test plot.

6.2.4 Record the max reading.

6.2.5 Repeat the above procedure until the measurements for all frequencies are completed.

6.3. Test Setup



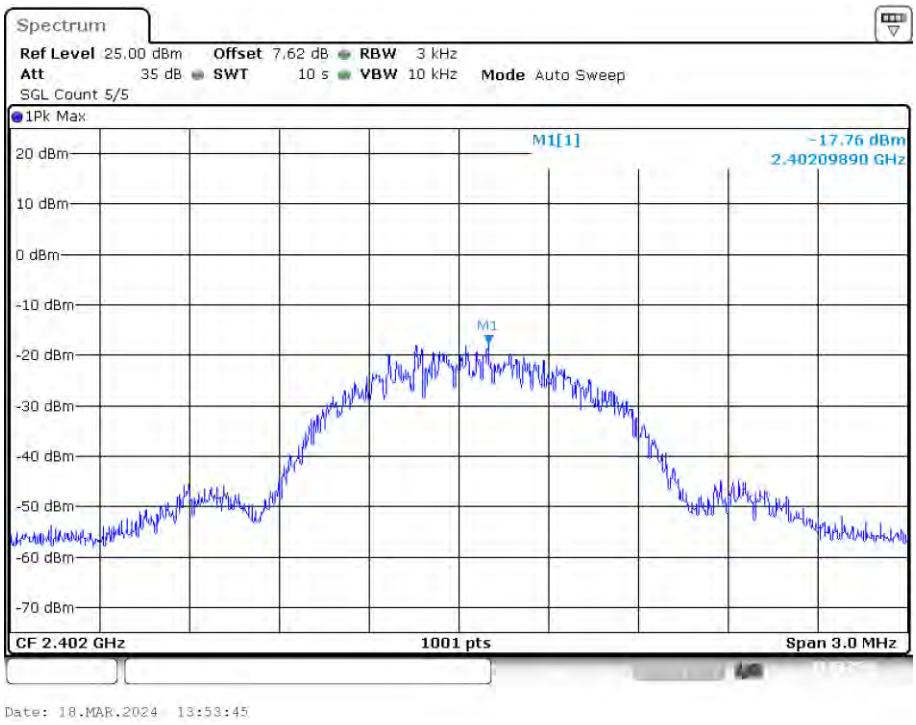
6.4. Test Results

Pass
The test results are listed in next pages.

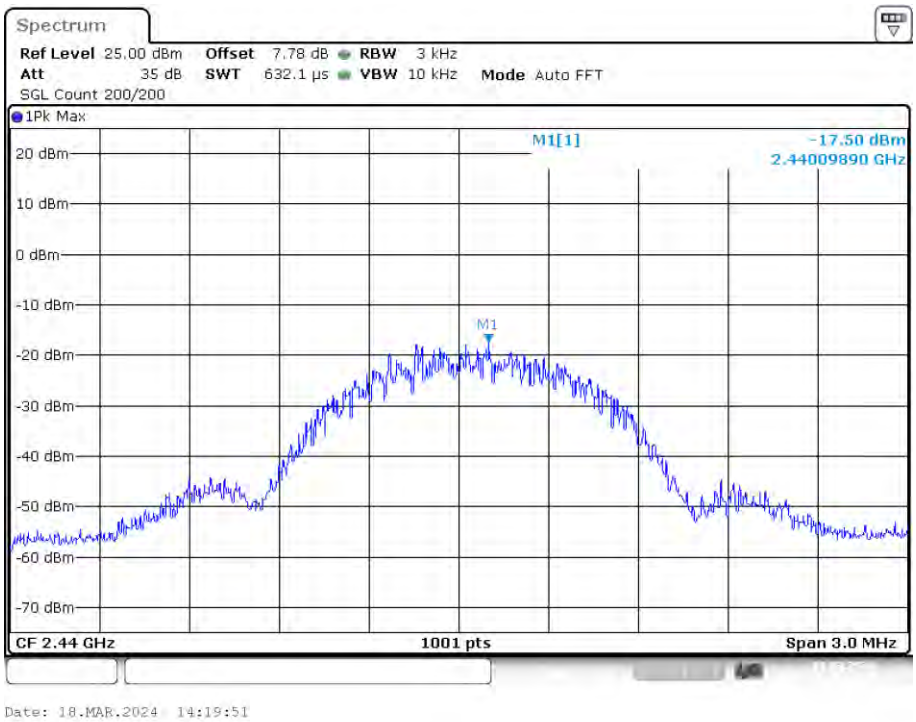
GFSK (1M)

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	-17.759	8	Pass
NVNT	BLE 1M	2440	Ant1	-17.499	8	Pass
NVNT	BLE 1M	2480	Ant1	-18.508	8	Pass

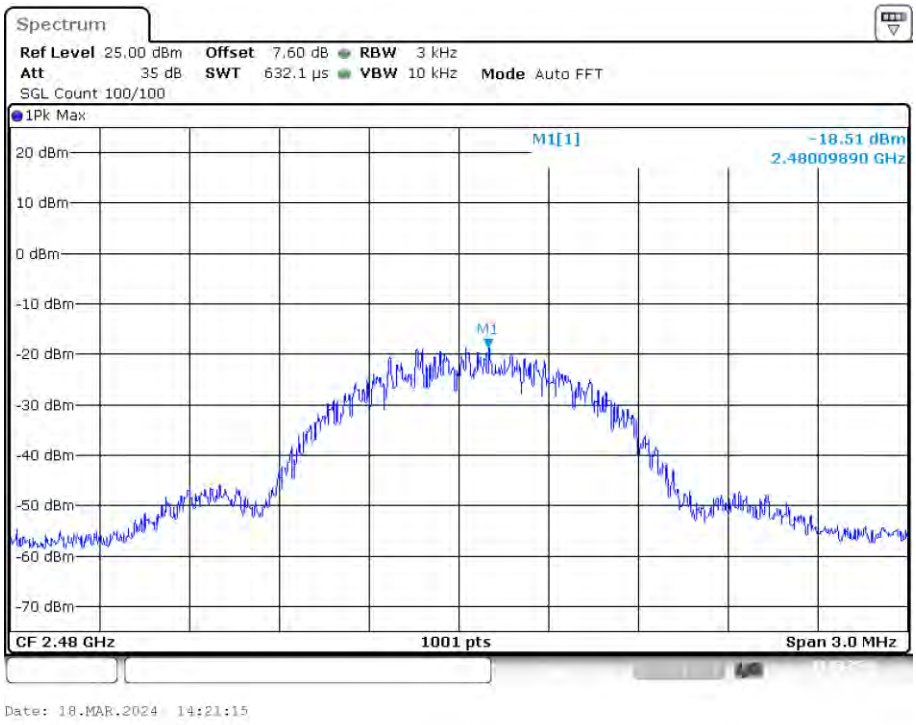
PSD NVNT BLE 1M 2402MHz Ant1



PSD NVNT BLE 1M 2440MHz Ant1



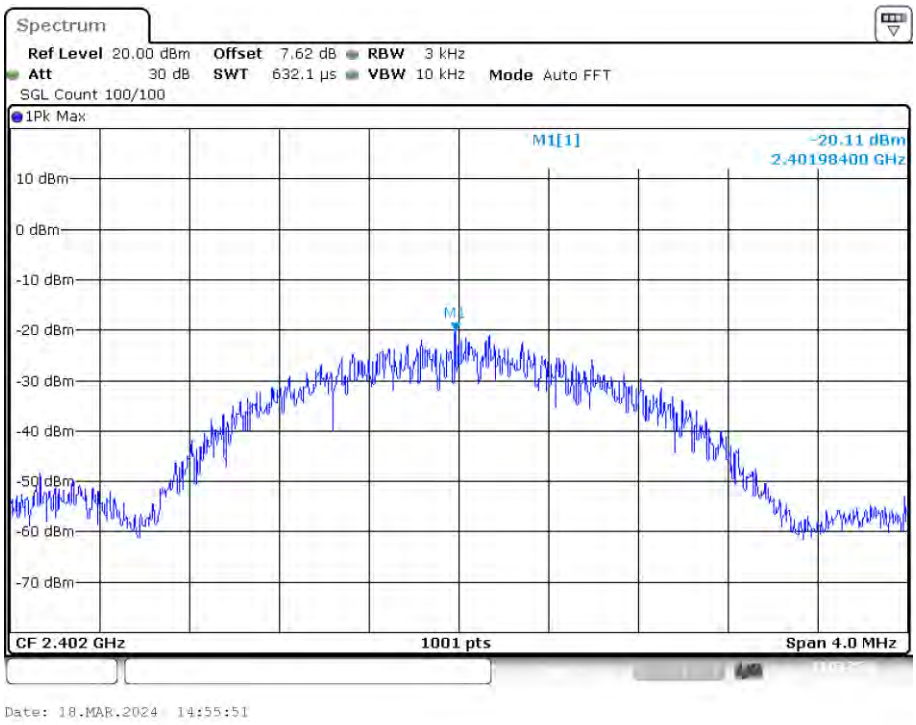
PSD NVNT BLE 1M 2480MHz Ant1



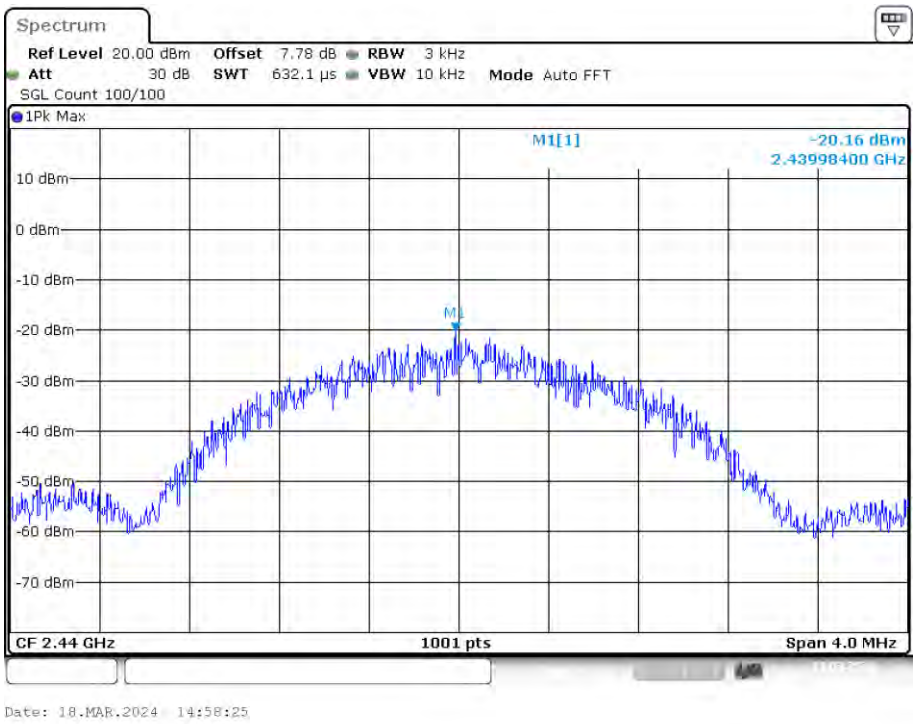
GFSK (2M)

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	BLE 2M	2402	Ant1	-20.108	8	Pass
NVNT	BLE 2M	2440	Ant1	-20.164	8	Pass
NVNT	BLE 2M	2480	Ant1	-20.407	8	Pass

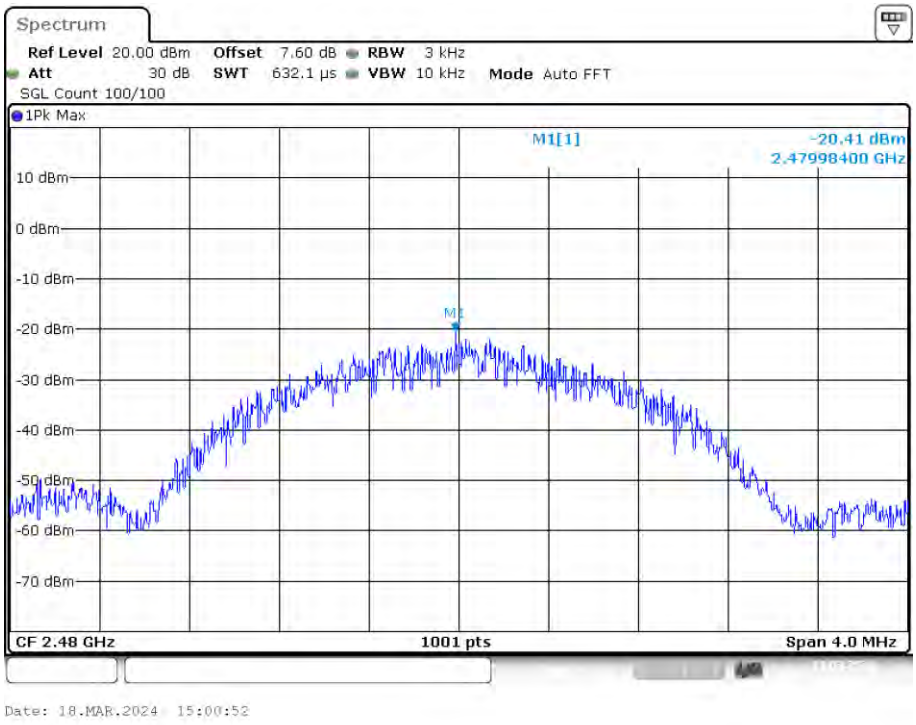
PSD NVNT BLE 2M 2402MHz Ant1



PSD NVNT BLE 2M 2440MHz Ant1



PSD NVNT BLE 2M 2480MHz Ant1



7. BANDWIDTH

7.1. Test limits

Please refer section RSS-247 & 15.247

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz.

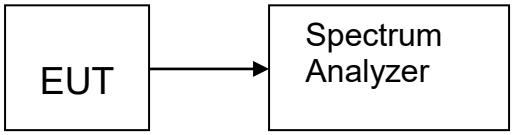
7.2. Test Procedure

Details see the KDB 558074 D01 15.247 Meas Guidance v05r02

a) The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

b) The test receiver set RBW = 100kHz, VBW≥3*RBW =300kHz, sweep time set auto, detail see the test plot.

7.3. Test Setup

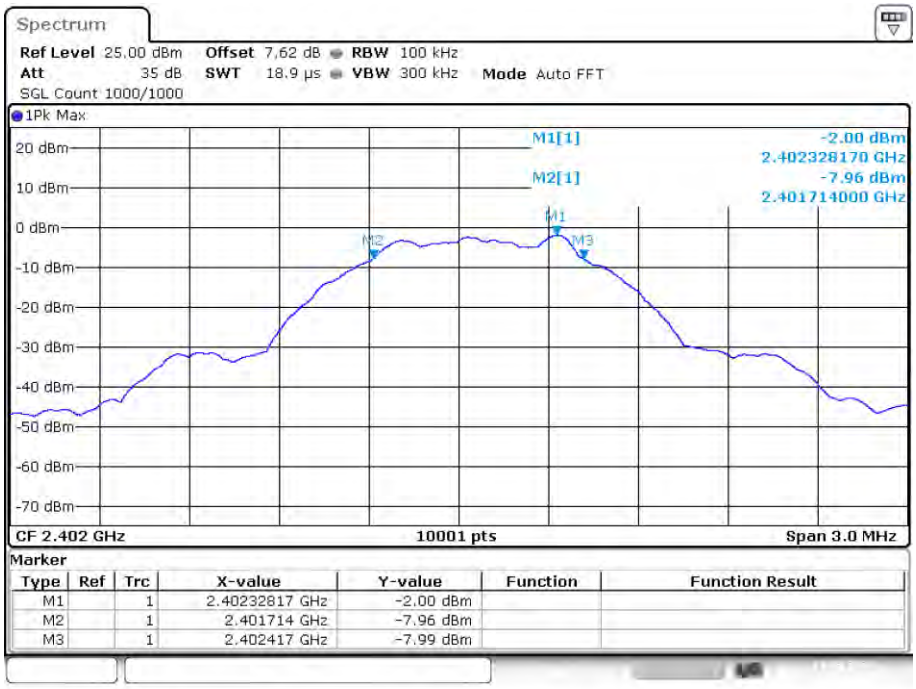


7.4. Test Results

GFSK(1M)

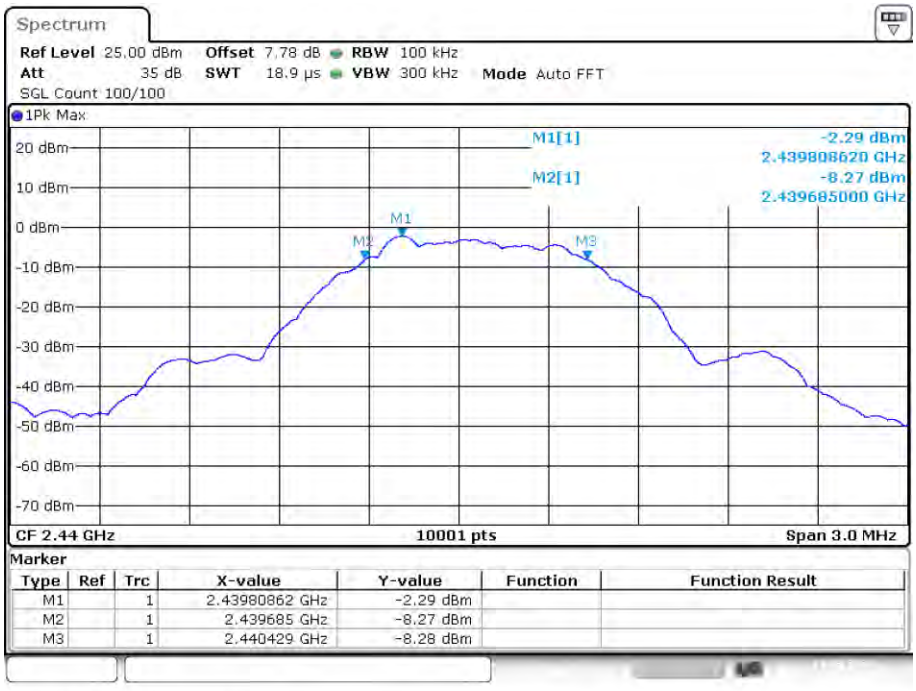
Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE	2402	Ant 1	1.046	0.704	0.5	Pass
NVNT	BLE	2440	Ant 1	1.055	0.744	0.5	Pass
NVNT	BLE	2480	Ant 1	1.046	0.673	0.5	Pass

-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



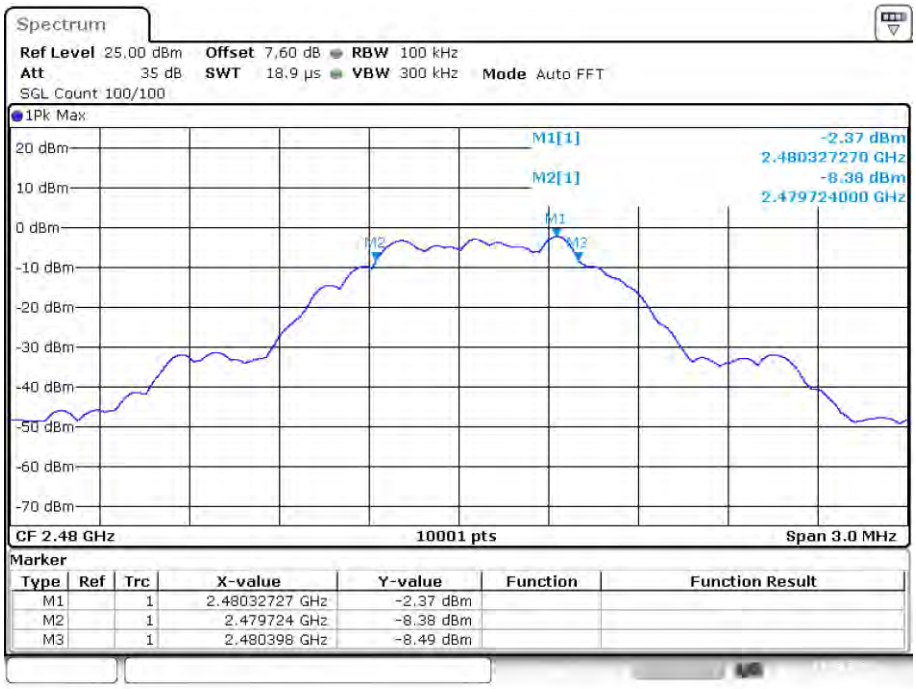
Date: 18.MAR.2024 13:52:48

-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



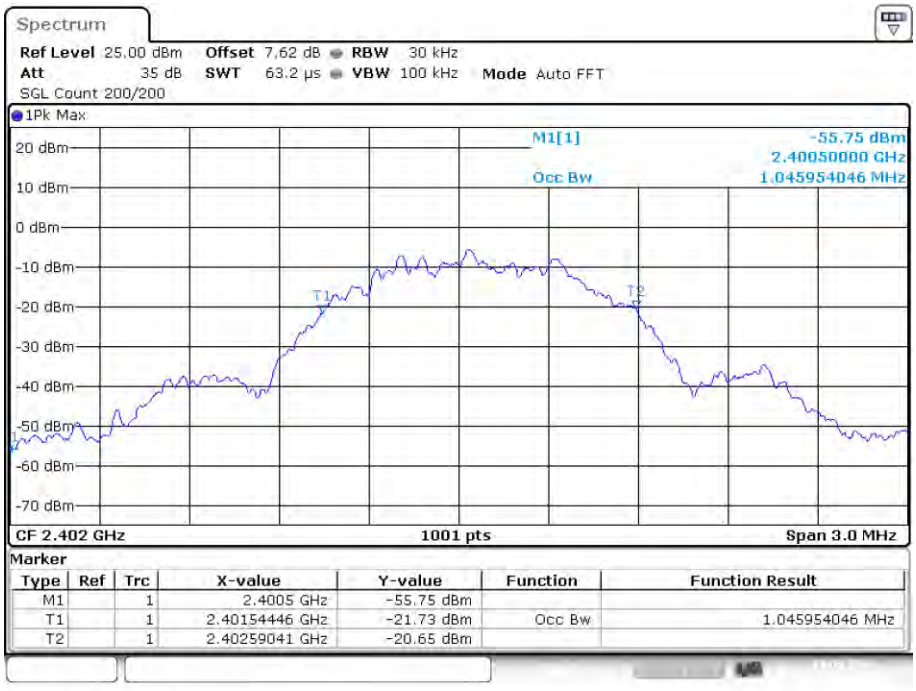
Date: 18.MAR.2024 14:19:42

-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



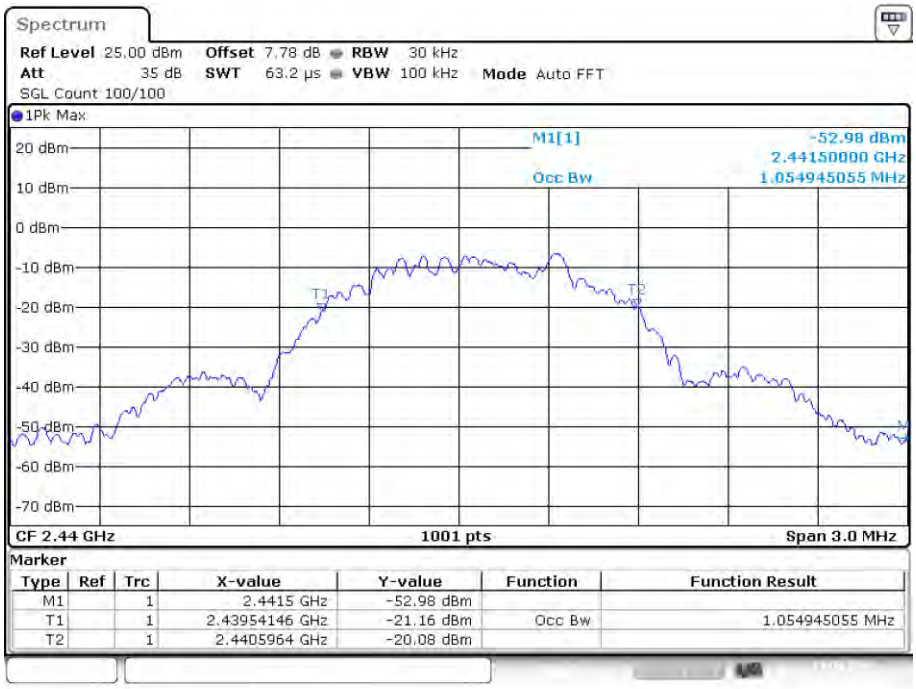
Date: 18.MAR.2024 14:21:05

OBW NVNT BLE 1M 2402MHz Ant1

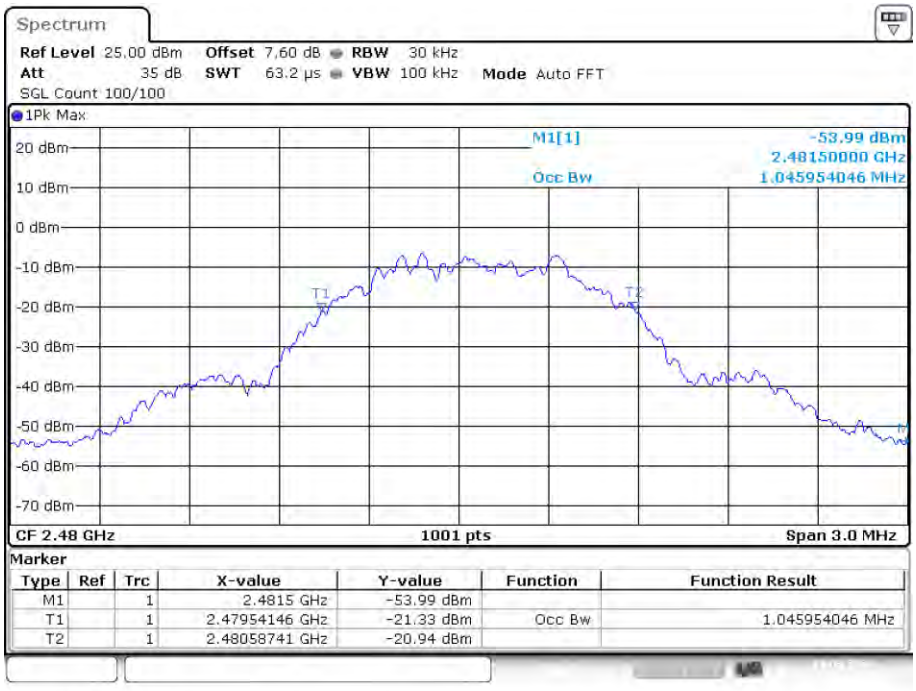


Date: 18.MAR.2024 13:52:32

OBW NVNT BLE 1M 2440MHz Ant1



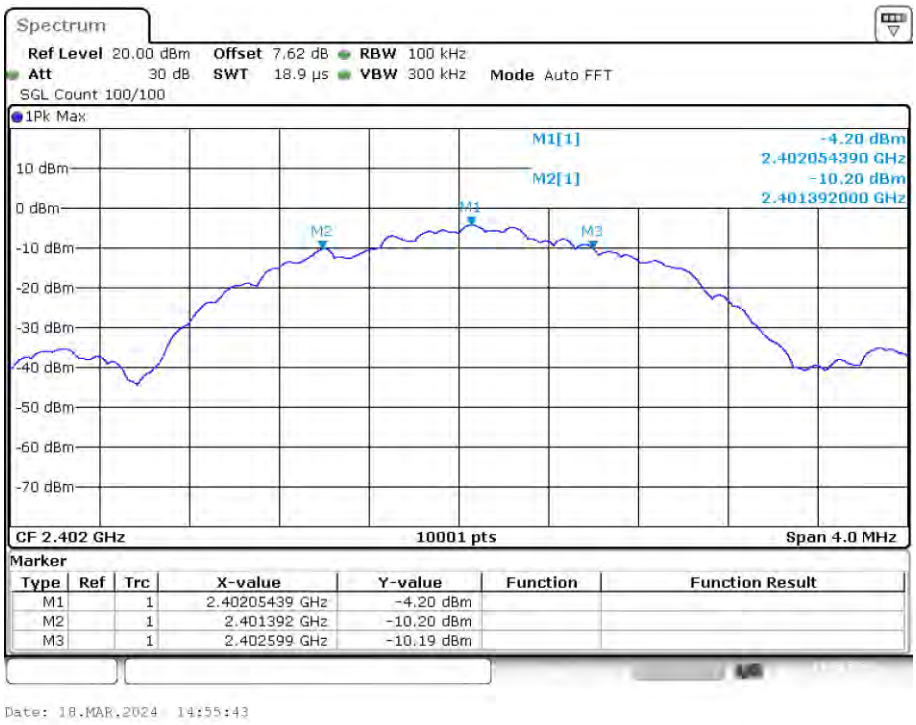
OBW NVNT BLE 1M 2480MHz Ant1



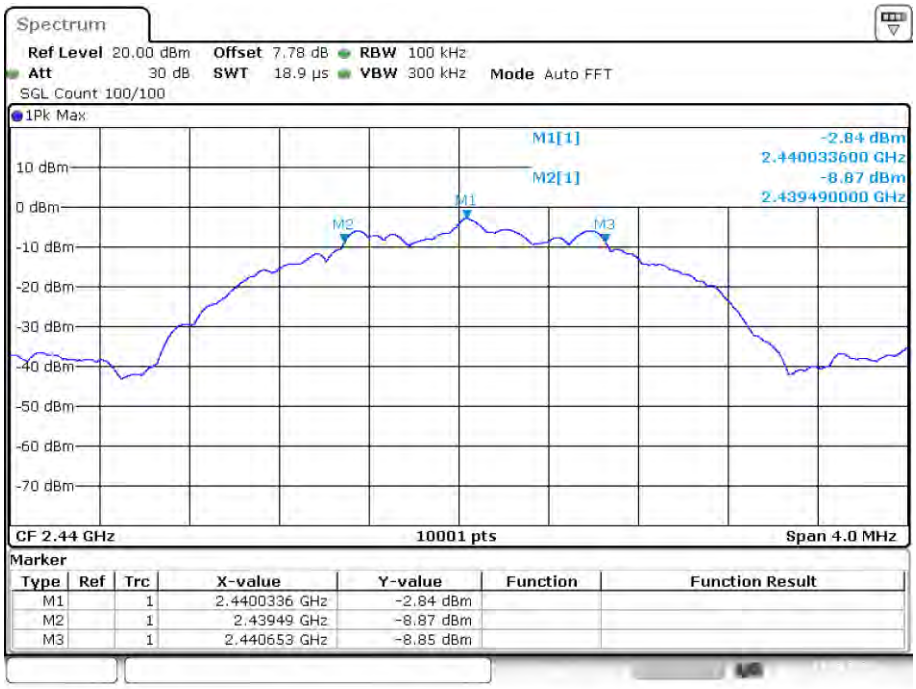
GFSK(2M)

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE	2402	Ant 1	2.038	1.207	0.5	Pass
NVNT	BLE	2440	Ant 1	2.046	1.162	0.5	Pass
NVNT	BLE	2480	Ant 1	2.062	0.958	0.5	Pass

-6dB Bandwidth NVNT BLE 2M 2402MHz Ant1

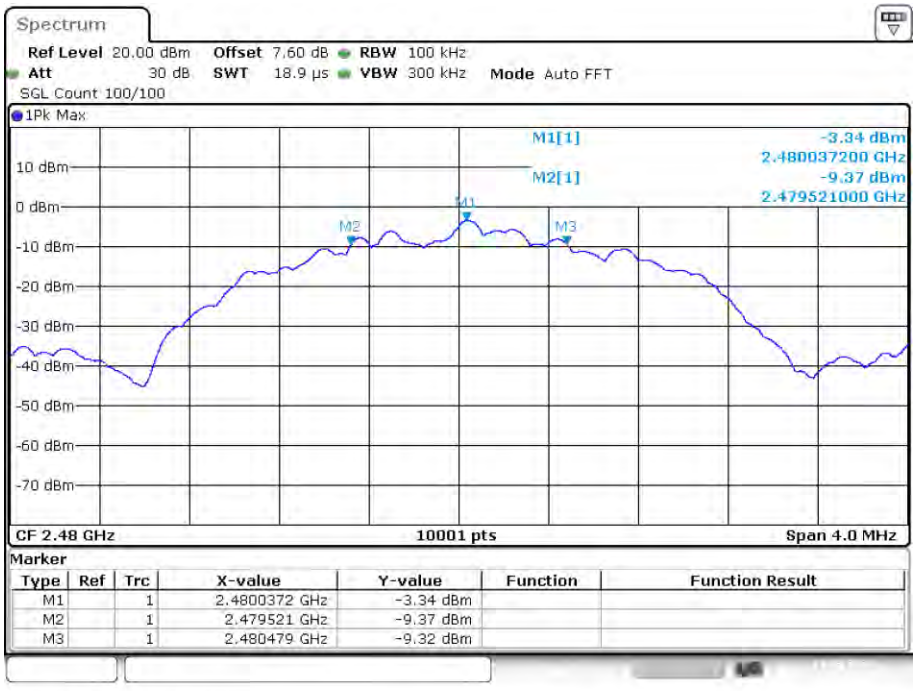


-6dB Bandwidth NVNT BLE 2M 2440MHz Ant1



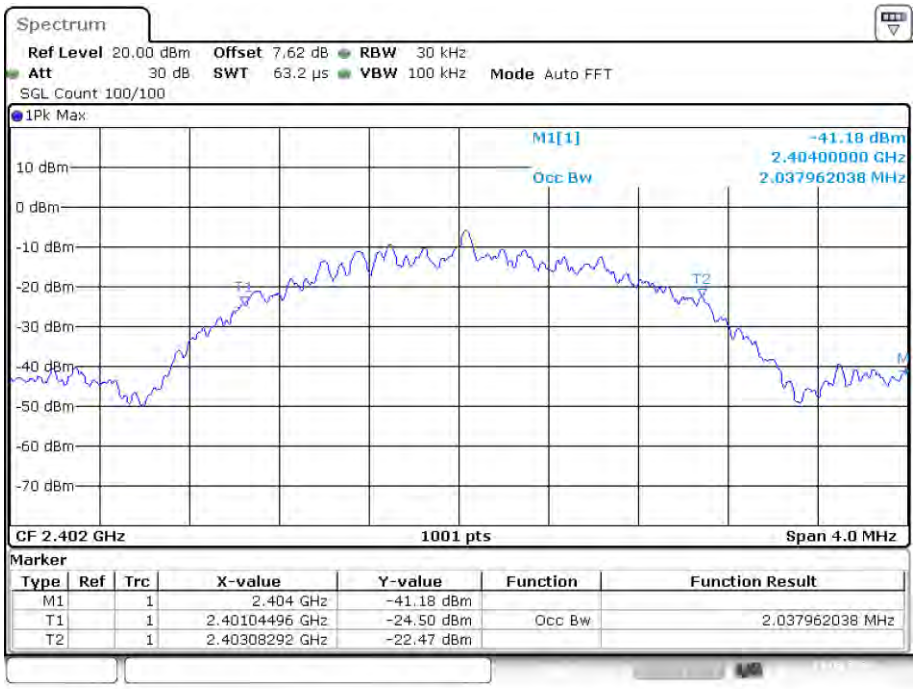
Date: 18.MAR.2024 14:58:17

-6dB Bandwidth NVNT BLE 2M 2480MHz Ant1



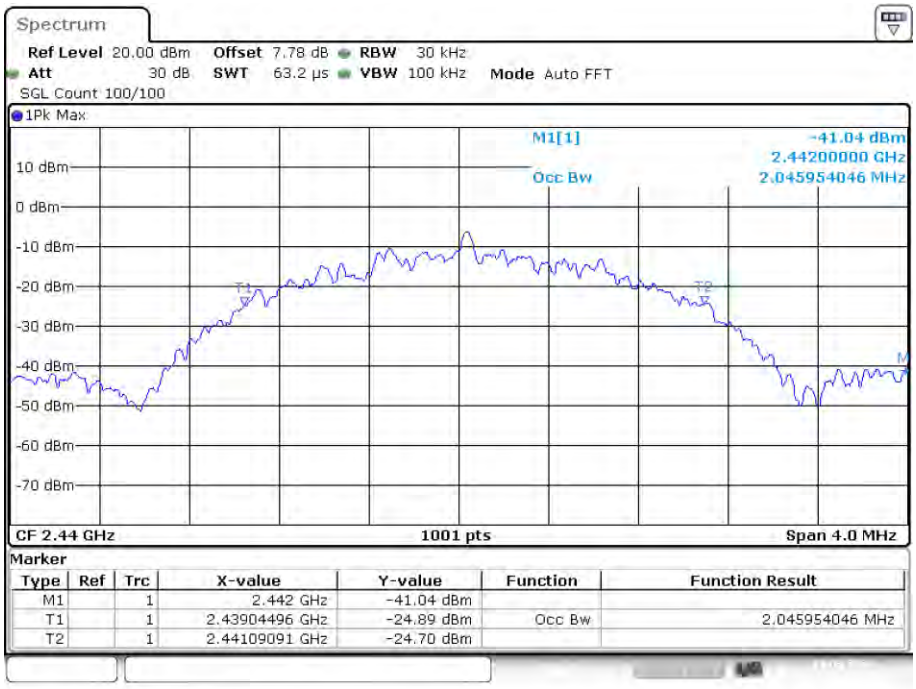
Date: 18.MAR.2024 15:00:42

OBW NVNT BLE 2M 2402MHz Ant1



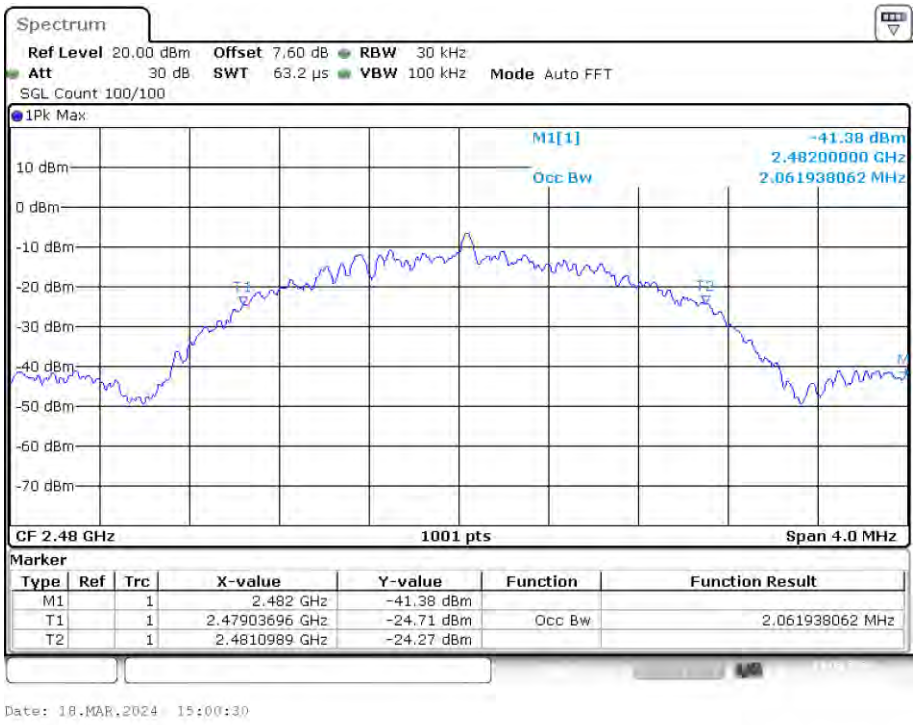
Date: 18.MAR.2024 14:55:34

OBW NVNT BLE 2M 2440MHz Ant1



Date: 18.MAR.2024 14:58:08

OBW NVNT BLE 2M 2480MHz Ant1



8. BAND EDGE CHECK

8.1. Test limits

Please refer section RSS-GEN&15.247.

8.2. Test Procedure

Details see the KDB 558074 D01 15.247 Meas Guidance v05r02

8.2.1 Put the EUT on a 0.8m high table, power on the EUT. Emissions were scanned and measured rotating the EUT to 360 degrees, Find the maximum Emission

8.2.2 Check the spurious emissions out of band.

8.2.3 RBW 1MHz, VBW 3MHz, peak detector for peak value, RBW 1MHz, VBW 3MHz, RMS detector for AV value.

8.3. Test Setup

Same as 5.2.2.

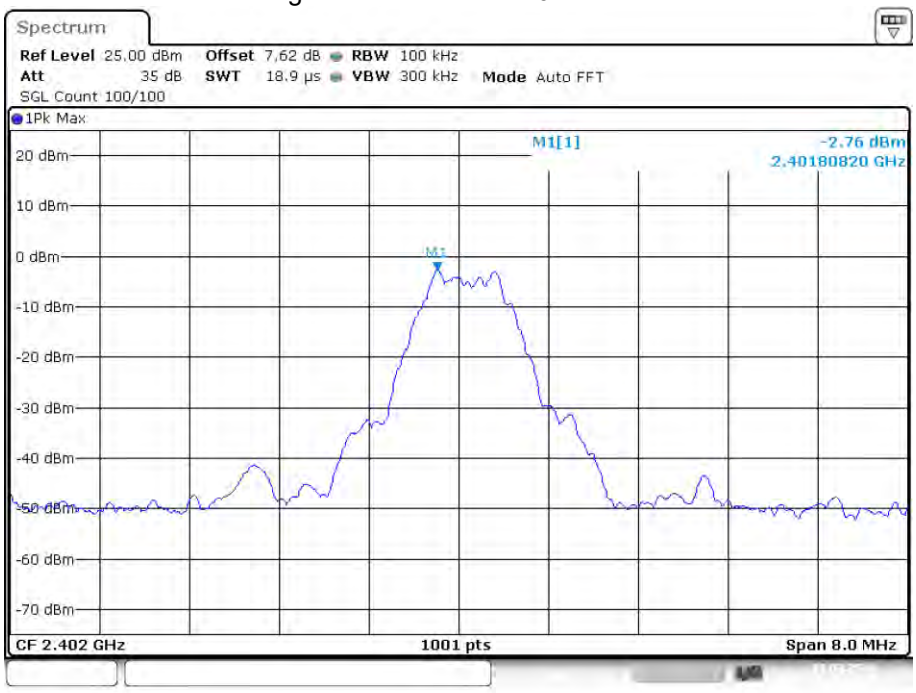
8.4. Test Results

Pass

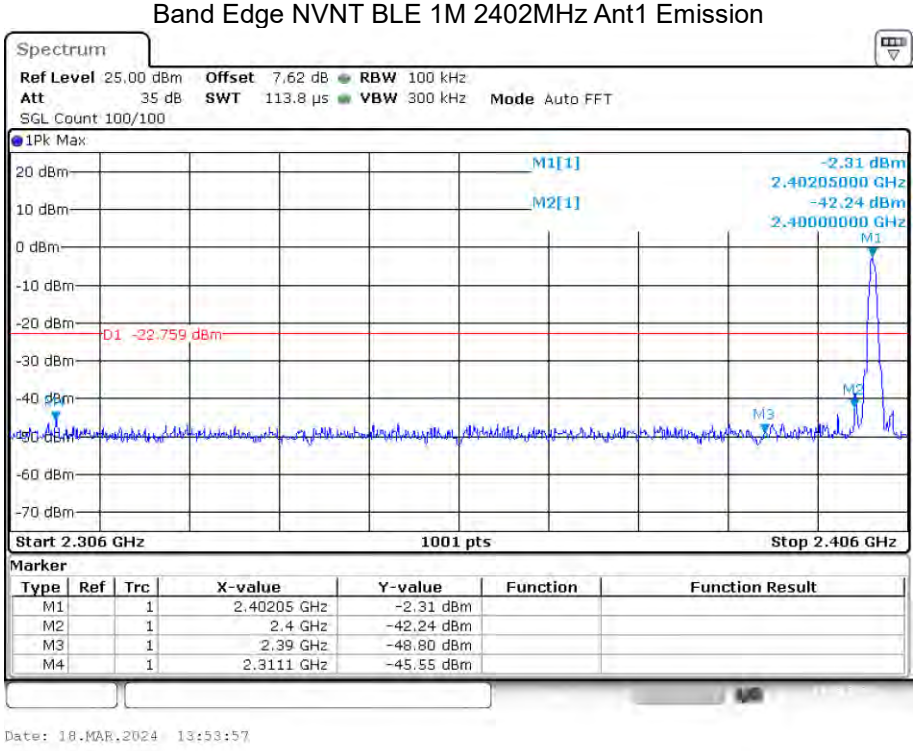
The test results are listed in next pages.

GFSK (1M)

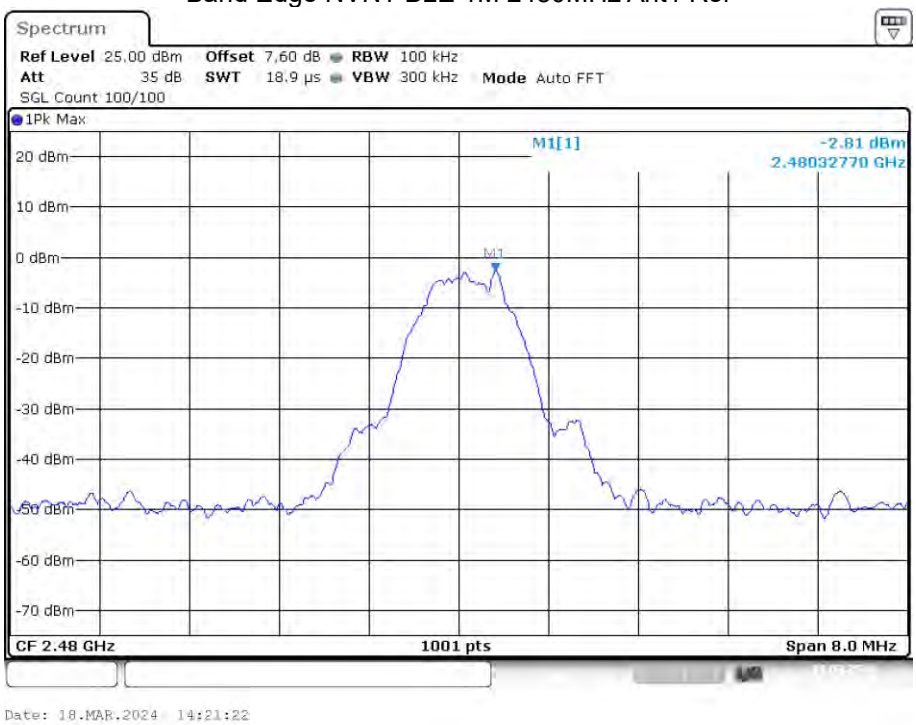
Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



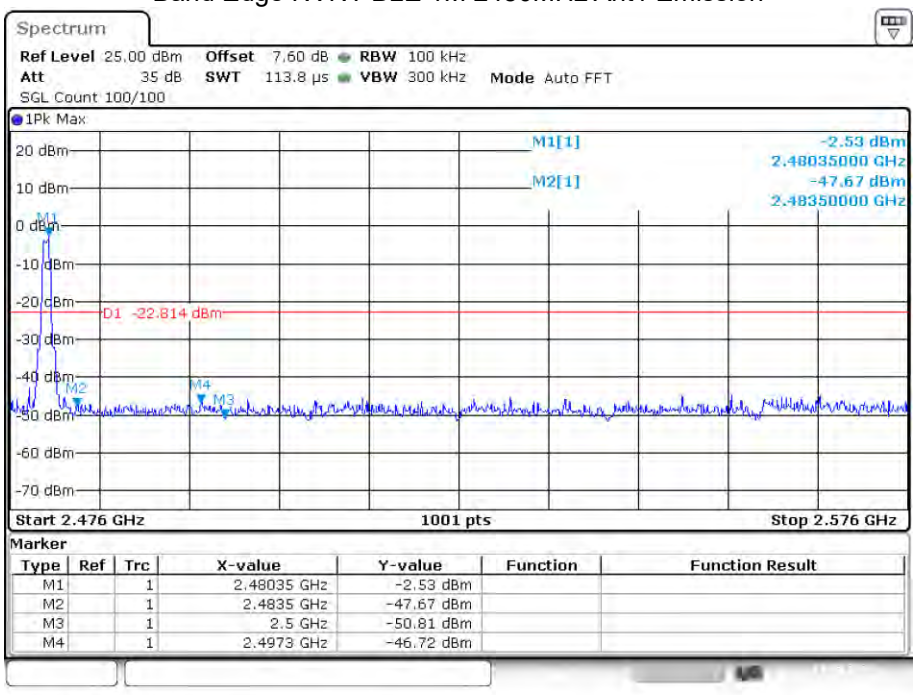
Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



Band Edge NVNT BLE 1M 2480MHz Ant1 Ref

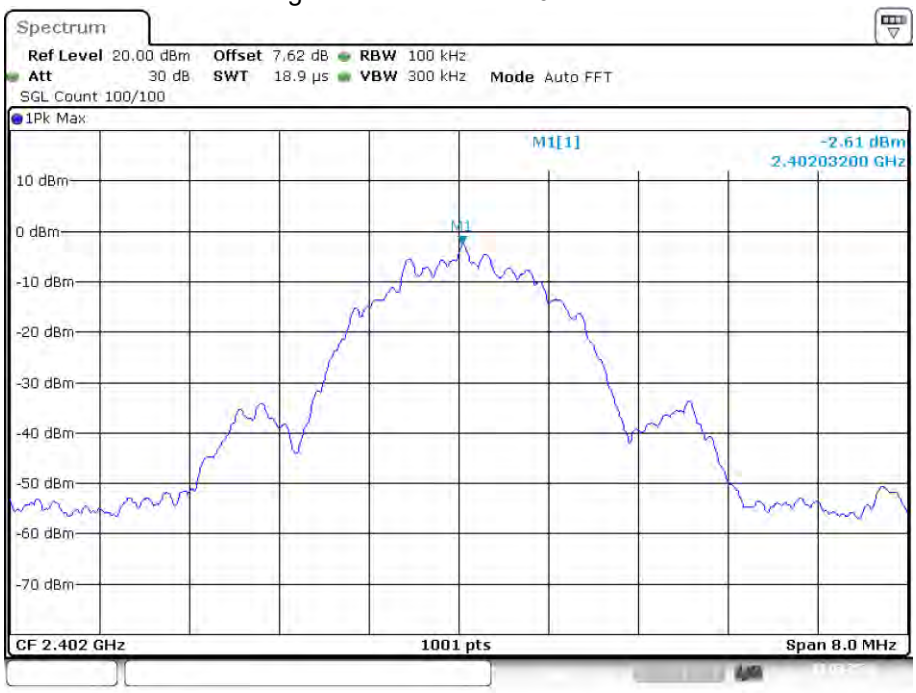


Band Edge NVNT BLE 1M 2480MHz Ant1 Emission



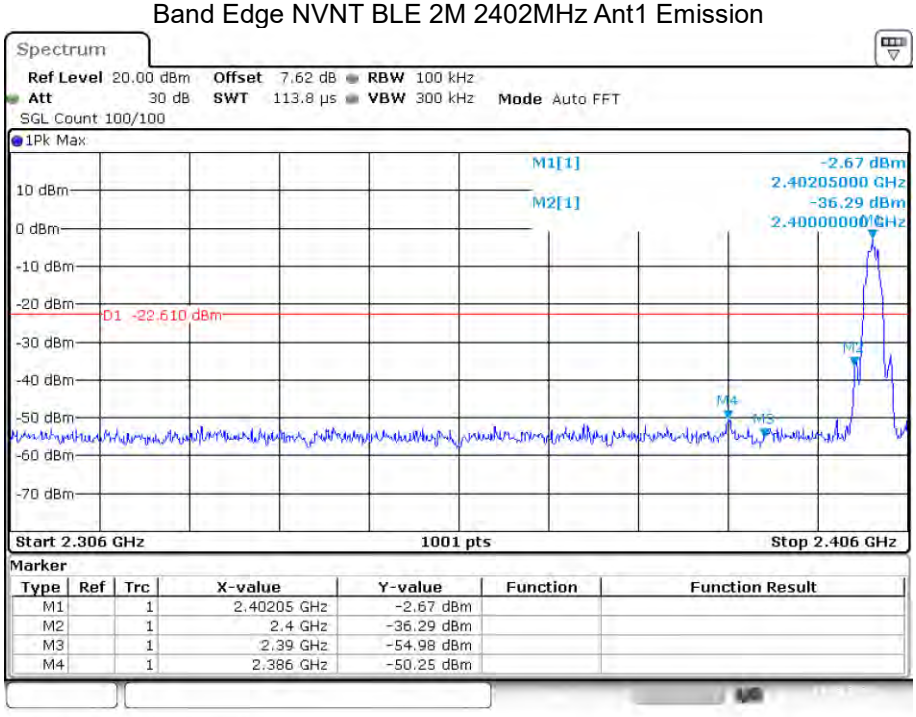
GFSK (2M)

Band Edge NVNT BLE 2M 2402MHz Ant1 Ref



Date: 18.MAR.2024 14:55:57

Band Edge NVNT BLE 2M 2402MHz Ant1 Emission



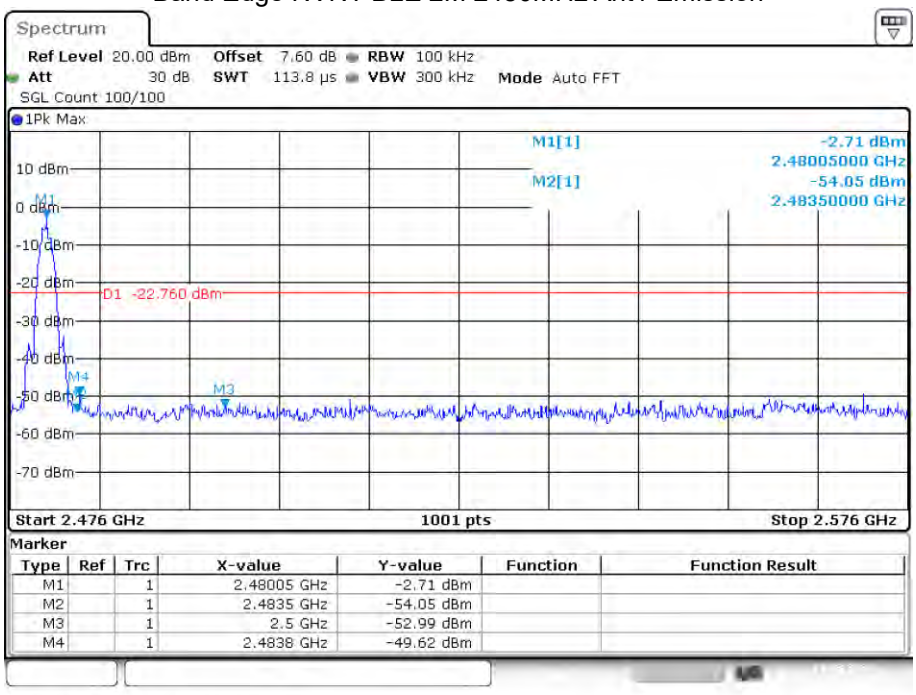
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40205 GHz	-2.67 dBm		
M2		1	2.4 GHz	-36.29 dBm		
M3		1	2.39 GHz	-54.98 dBm		
M4		1	2.386 GHz	-50.25 dBm		

Date: 18.MAR.2024 14:56:03

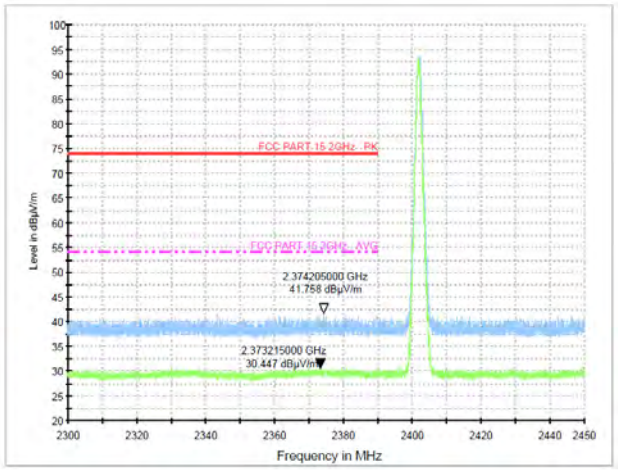
Band Edge NVNT BLE 2M 2480MHz Ant1 Ref

Band Edge NVNT BLE 2M 2480MHz Ant1 Emission

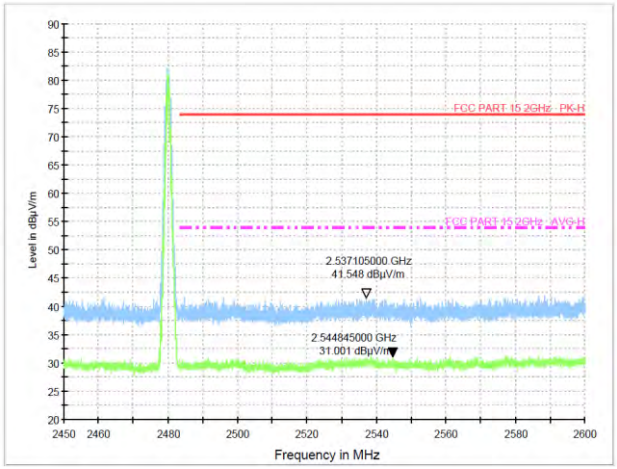


Radiated Method: GFSK(1M)

Test Mode: CH-L

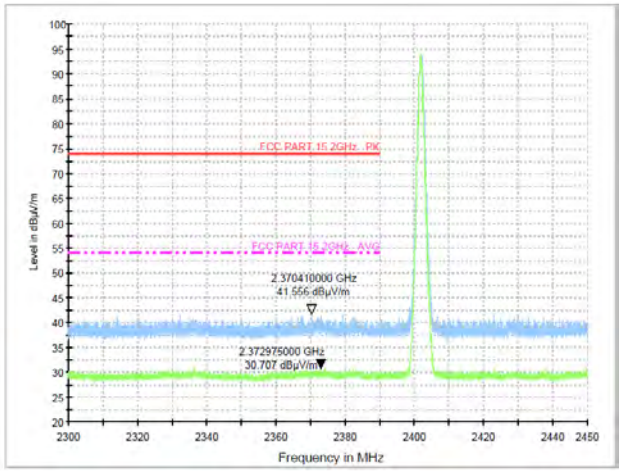


Test Mode: CH-H

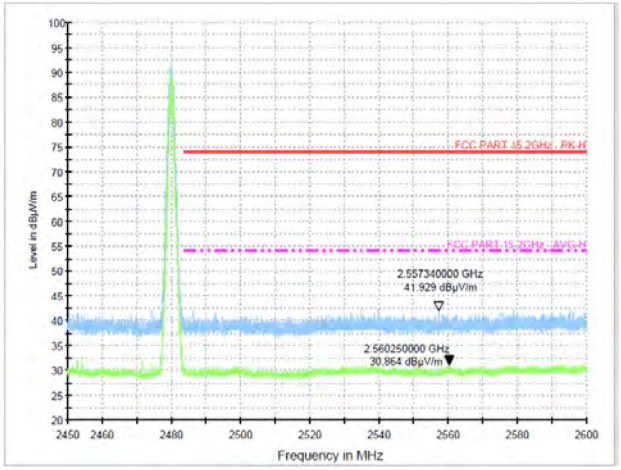


Radiated Method: GFSK(2M)

Test Mode: CH-L



Test Mode: CH-H



9. ANTENNA REQUIREMENT

9.1. Standard 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.

9.2. Antenna Connected Construction

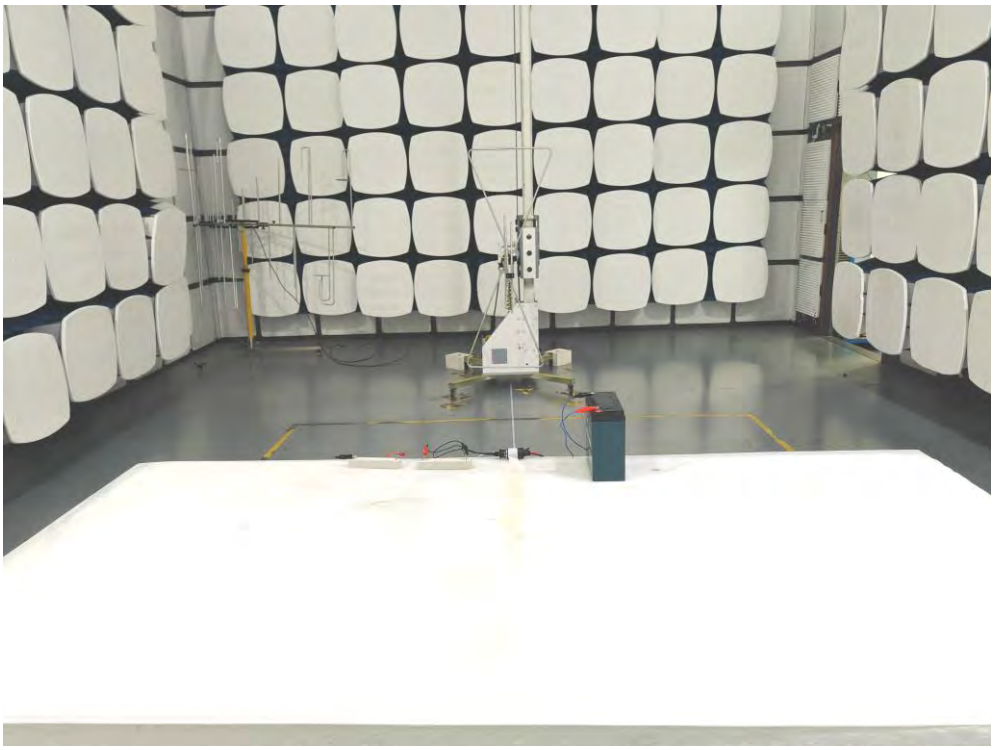
The antenna is internal antenna and no consideration of replacement. Please see EUT photo for details.

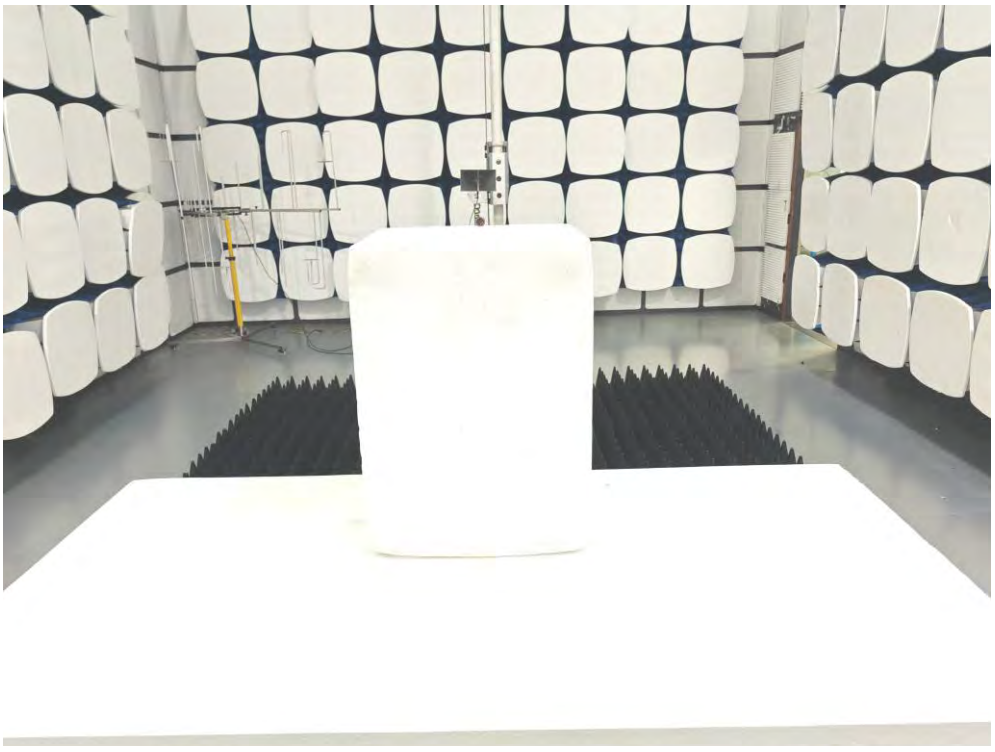
9.3. Results

The EUT antenna is Internal Antenna. It complies with the standard requirement.

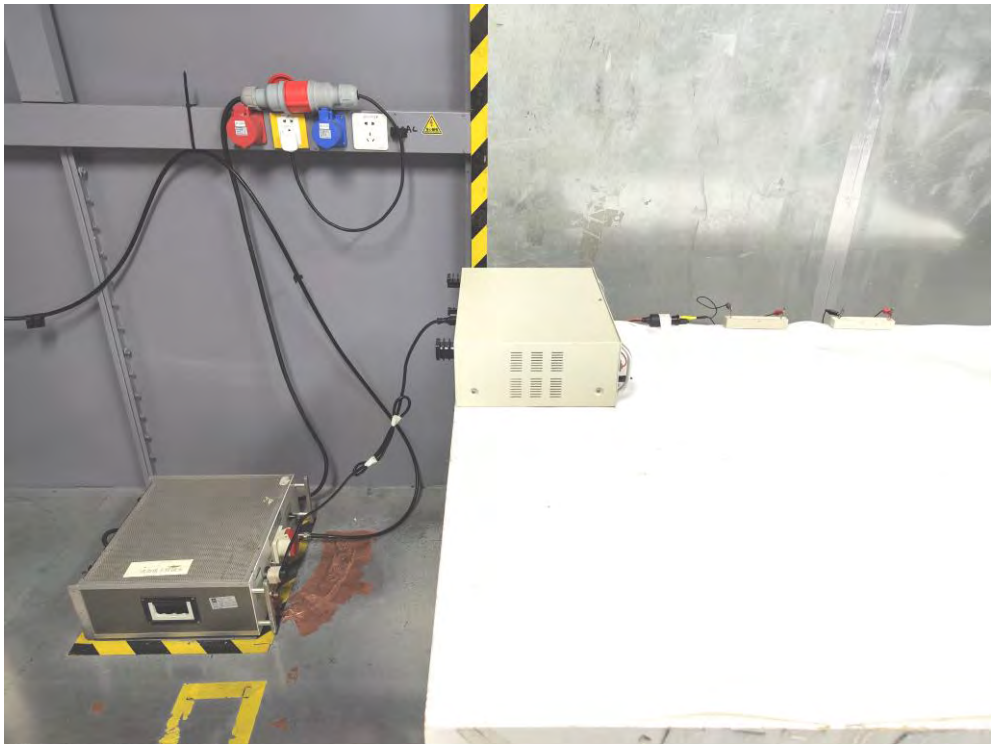
10. TEST SETUP PHOTO

10.1.Photo of Radiated Emission test

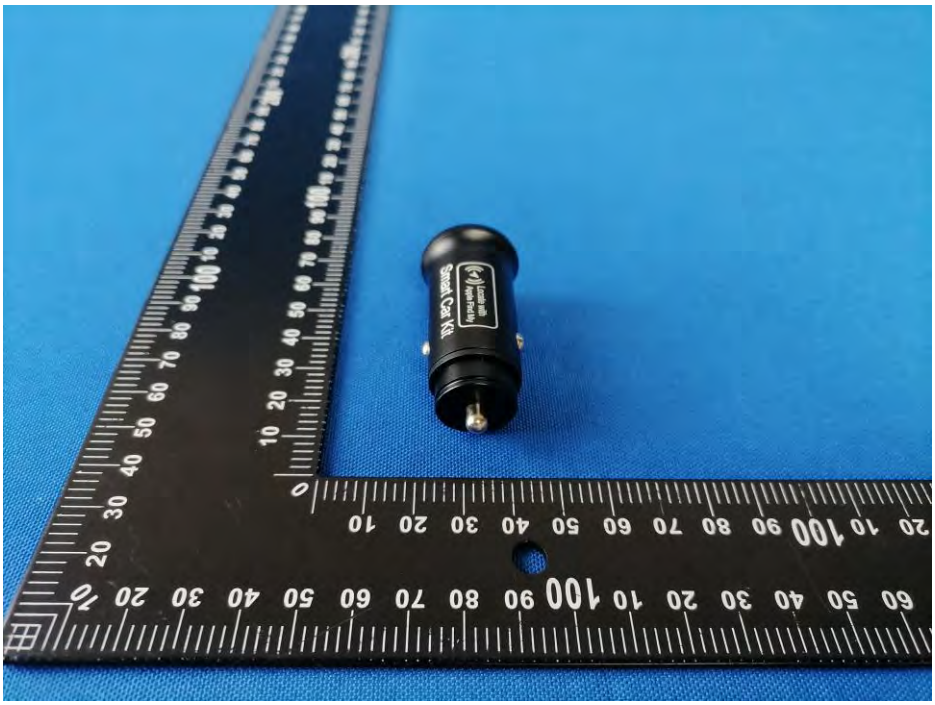


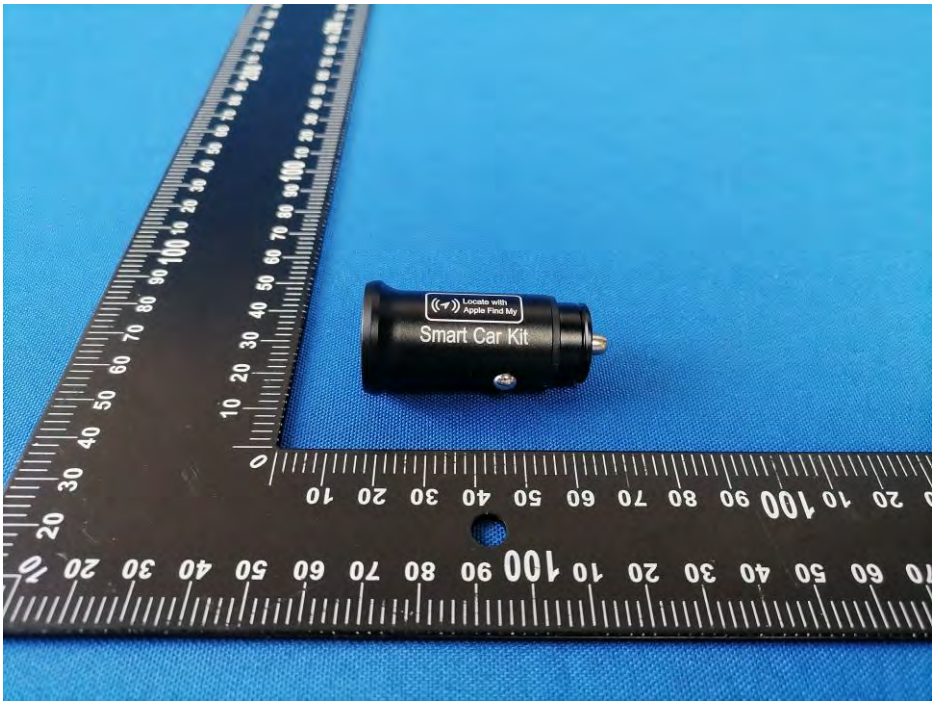


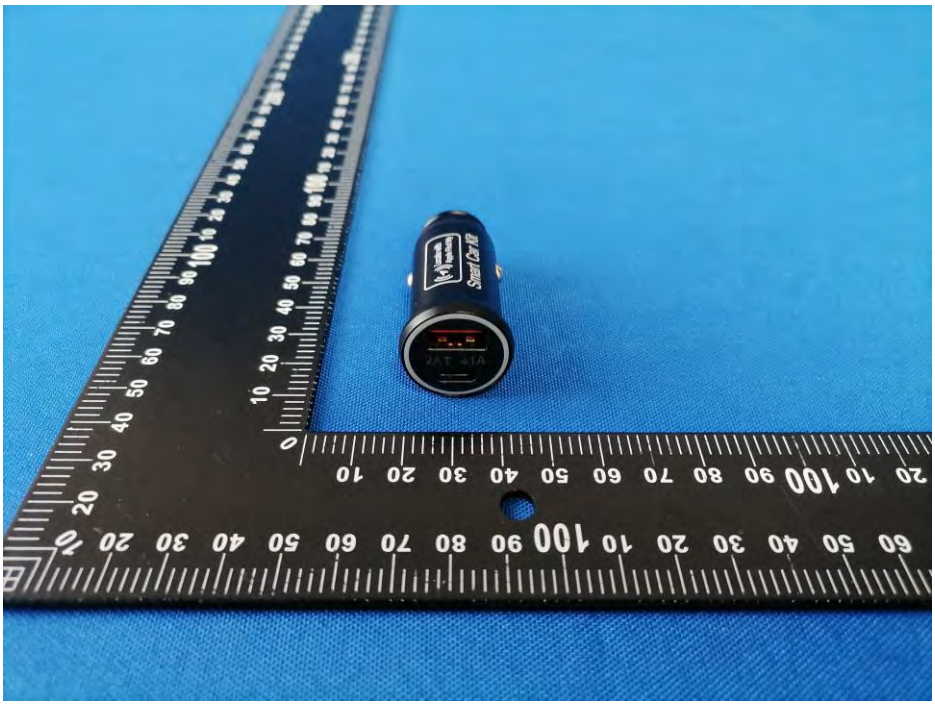
10.2.Photo of Conducted Emission test

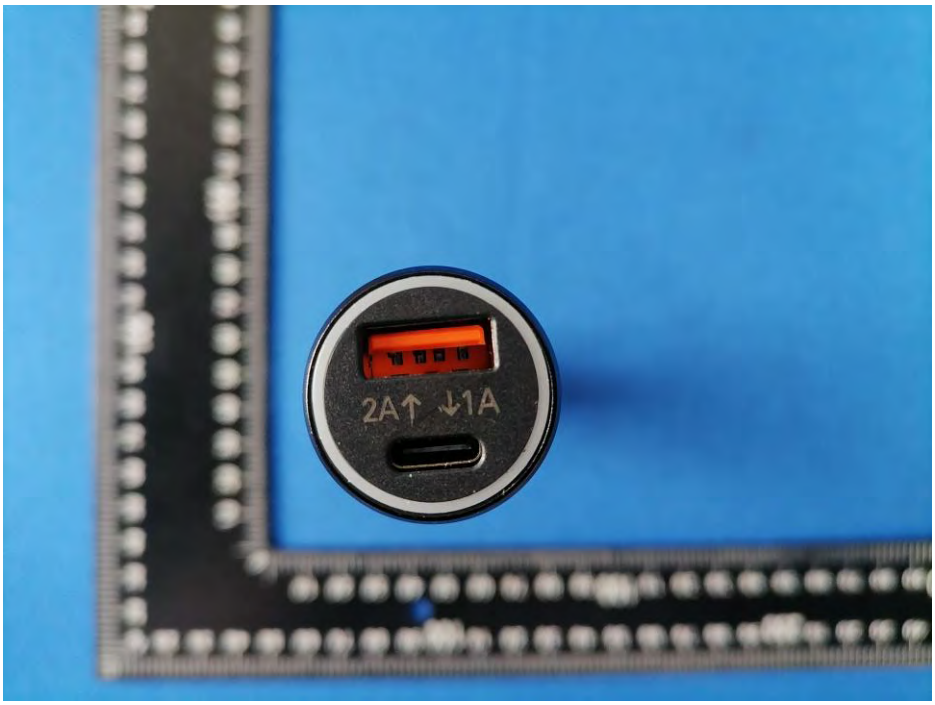


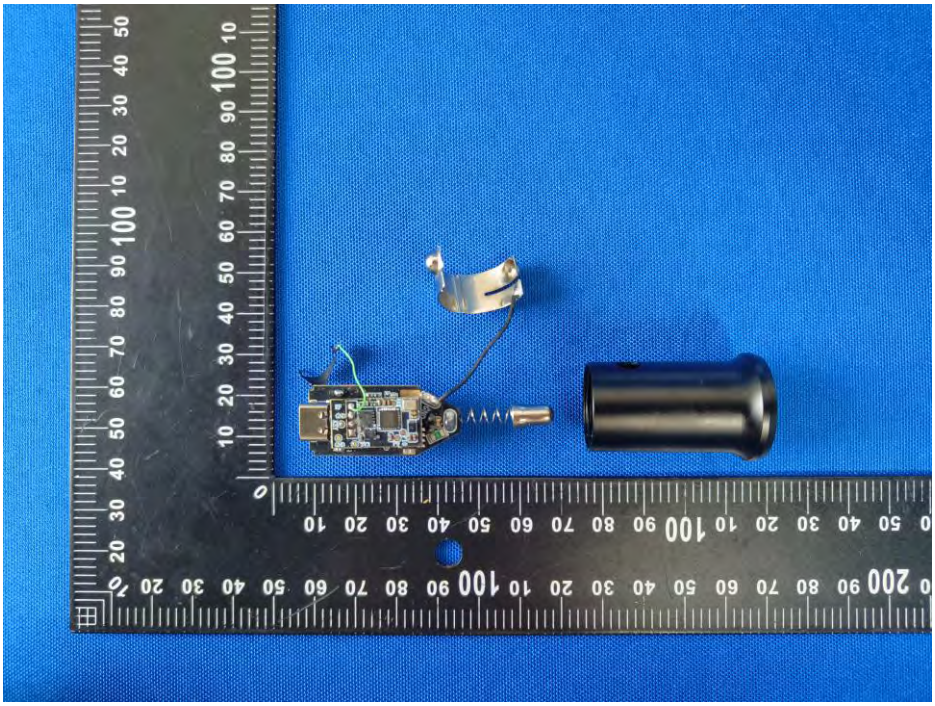
11. PHOTOS OF EUT

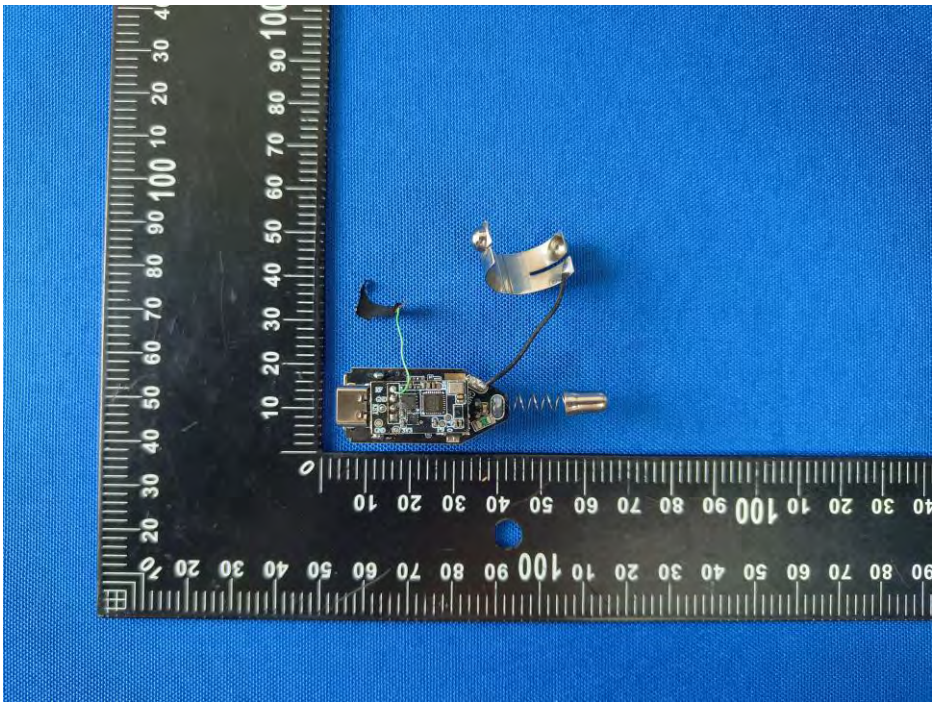


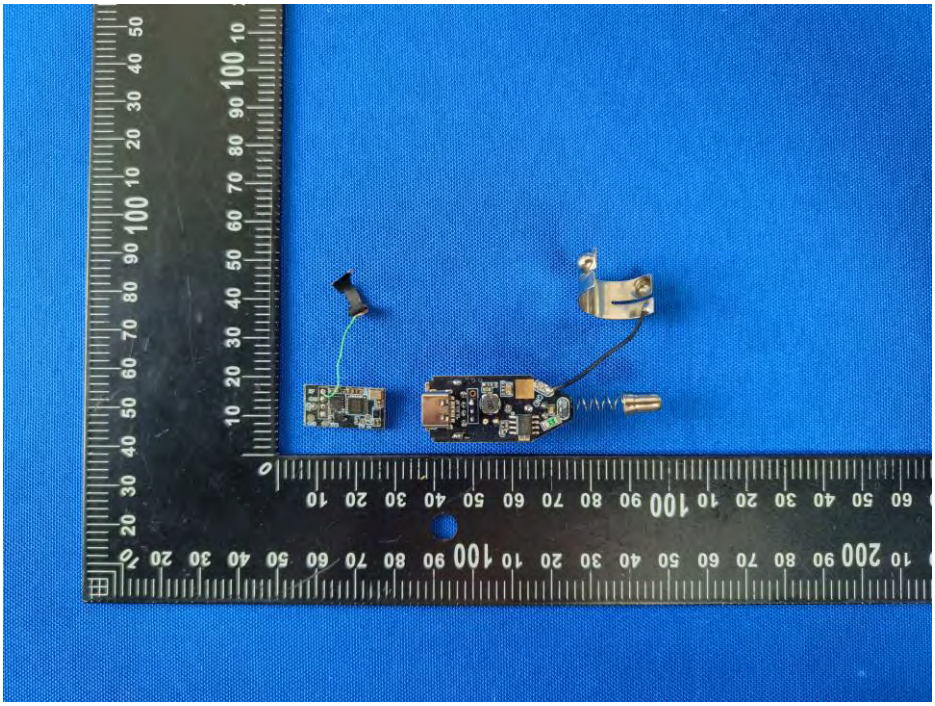

Locate with
Apple Find My
Smart Car Kit

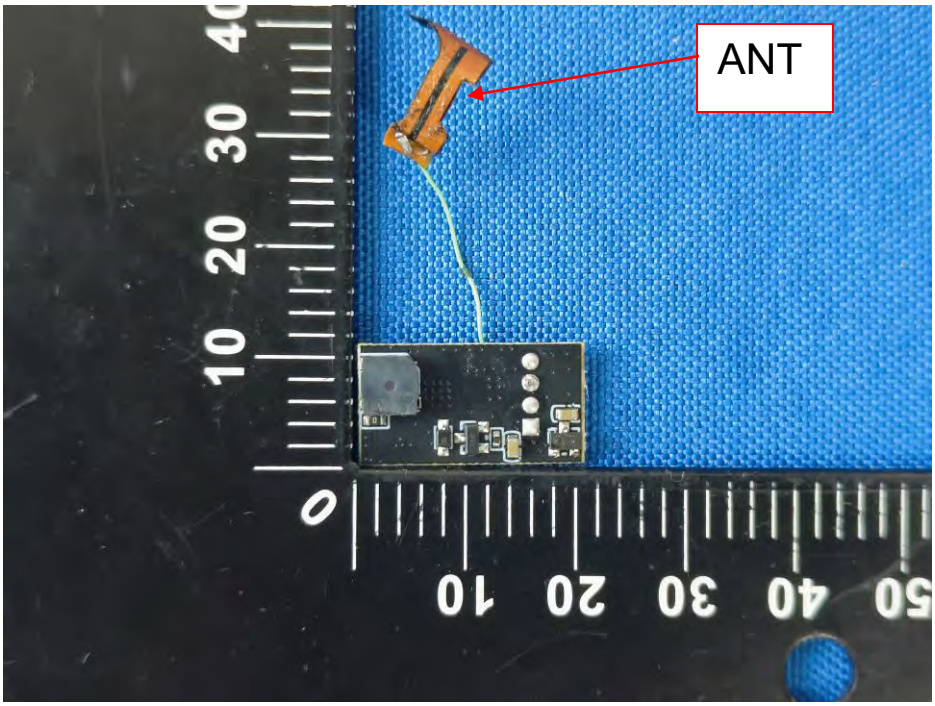



2A↑ ↓1A





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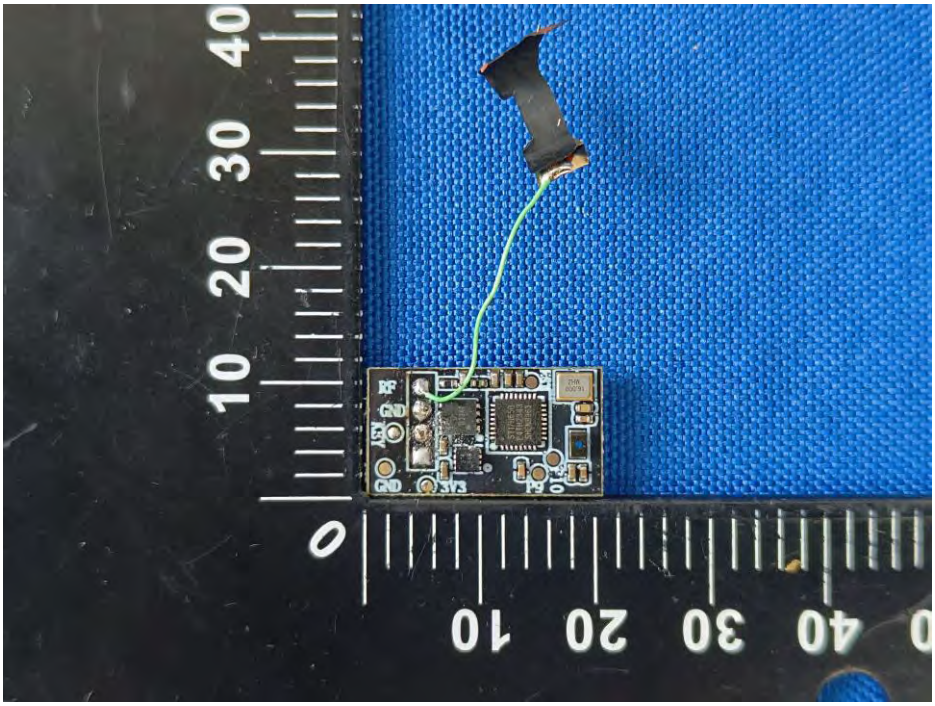
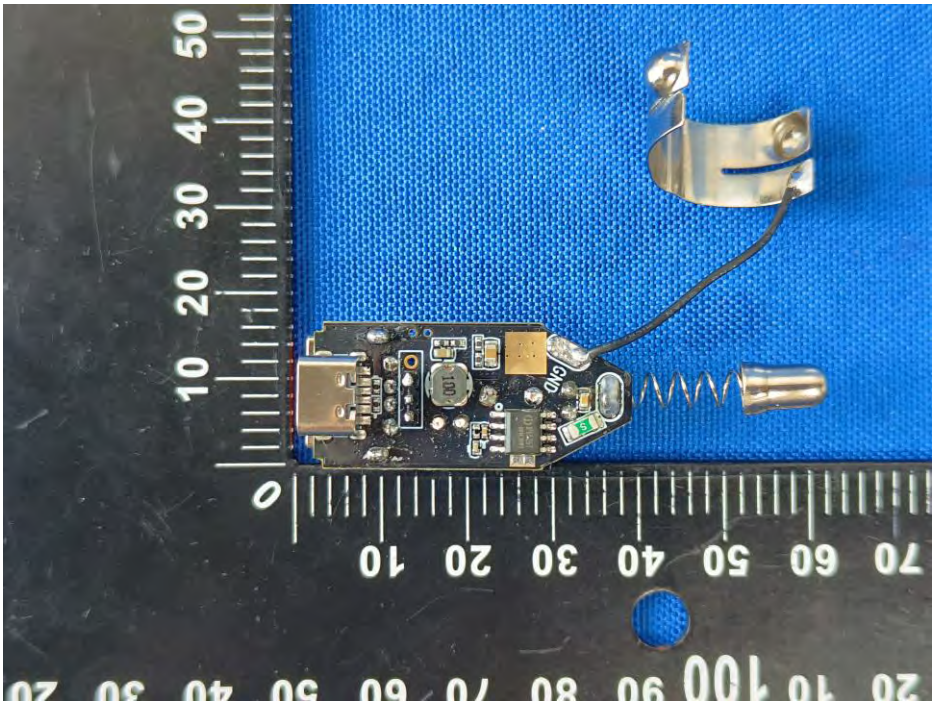
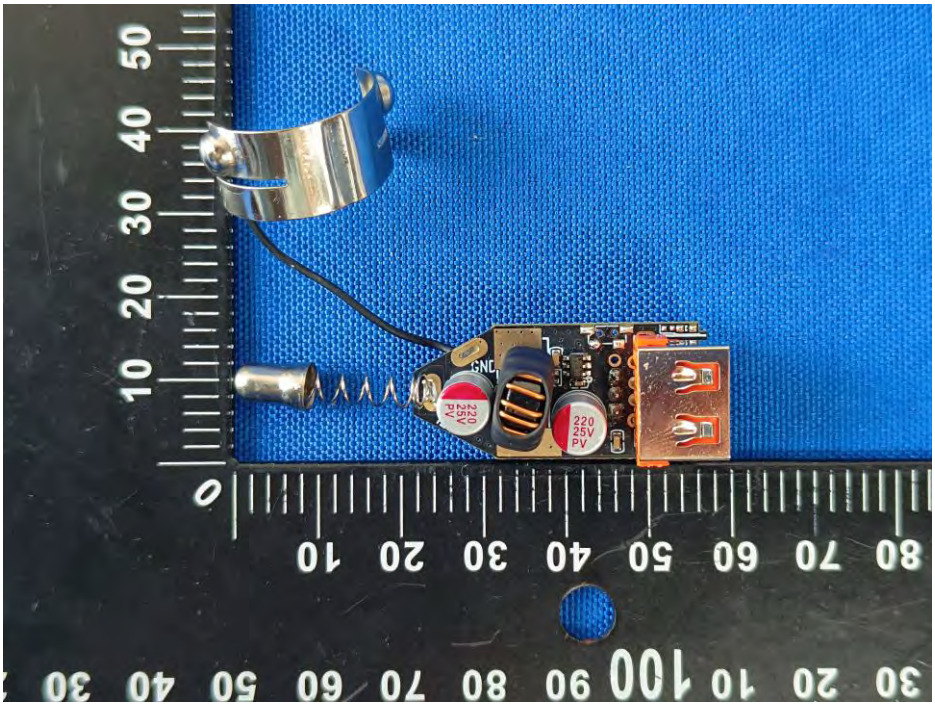

RF
GND
RST
GND
3V3
P4


GND



------END OF REPORT-------