



FCC TEST REPORT

FCC ID: 2AJZ2-LATCH5

On Behalf of

U-tec Group Inc.

Latch 5 Fingerprint Smart Lever Lock

Model No.: Latch 5 Fingerprint, Latch 5 XXX("X"=A-Z,0-9)

Prepared for : U-tec Group Inc.
Address : 32920 Alvarado-Niles Rd Ste 220, Union City, CA 94587

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 : A2209005-C01-R01
Date of Receipt : September 14, 2022
Date of Test : September 14, 2022–October 9, 2022
Date of Report : October 9, 2022
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TEST REPORT DECLARATION

Applicant : U-tec Group Inc.
Address : 32920 Alvarado-Niles Rd Ste 220, Union City, CA 94587
Manufacturer : U-tec Group Inc.
Address : 32920 Alvarado-Niles Rd Ste 220, Union City, CA 94587
EUT Description : Latch 5 Fingerprint Smart Lever Lock
(A) Model No. : Latch 5 Fingerprint, Latch 5 XXX("X"=A-Z,0-9)
(B) Trademark : 

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247

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



Approved by (name + signature).....: Jack Xu
Project Manager



Date of issue..... : October 9, 2022

Revision History

Revision	Issue Date	Revisions	Revised By
V0	October 9, 2022	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	Standards Paragraph	Result
Conducted Emission	FCC Part 15: 15.207	P
6dB Bandwidth	FCC PART 15:15.247(a)(2)	P
Output Power	FCC Part 15: 15.247(b)(3)	P
Radiated Spurious Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d)	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: 15.247(d)	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/PMN	: Latch 5 Fingerprint Smart Lever Lock
Model Number/HVIN(s) Diff.	: Latch 5 Fingerprint, Latch 5 XXX("X"=A-Z,0-9) : There is no difference except the name of the model. All tests are made with the Latch 5 Fingerprint model.
Trademark	: 
Test Voltage	: DC 6V from battery
Radio Technology	: GFSK for Bluetooth (BT LE)
Operation frequency	: 2402-2480MHz
Channel No.	: 40 channels for Bluetooth (BT LE)
Channel Separation	: 2MHz for Bluetooth (BT LE)
Modulation	: GFSK for Bluetooth (BT LE)
Data Rate	: 1Mbps, 2Mbps
Antenna Type	: Internal Antenna, Maximum Gain is 7.29dBi. (Antenna information is provided by applicant.)
Software Version	: V1.0
Hardware version/FVIN	: 94V-0

Remark:

1. The worst-case simultaneous transmission configuration was evaluated with no non-compliance found. Results in this report are only for Bluetooth BLE function, and there is no other transmitter involved.

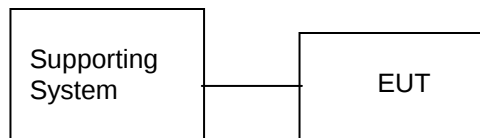
2.2. Accessories of Device (EUT)

Accessories1 : /
 Manufacturer : /
 Model : /
 INPUT : /
 OUTPUT : /

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDOC
1.	Notebook PC	Lenovo	ThinkPad E14	--	SDOC

2.4. Block Diagram of connection between EUT and simulators



2.5. Test Mode Description

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
GFSK	Low : CH0	2402
	Middle: CH19	2440
	High: CH39	2480

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

2.6. Test Conditions

Items	Required	Actual
Temperature range:	15-35°C	27°C
Humidity range:	25-75%	56%
Pressure range:	86-106kPa	98kPa

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
Designation Number: CN1236

July 15, 2019 Certificated by IC
Registration Number: CN0085

2.8. Measurement Uncertainty

(95% confidence levels, k=2)

Item	Uncertainty
Uncertainty for Power point Conducted Emissions Test	1.63dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	3.5dB
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.74dB(Polarize: V)
	3.76dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	3.77dB(Polarize: V)
	3.80dB(Polarize: H)
Uncertainty for radio frequency	5.06×10^{-8} GHz
Uncertainty for conducted RF Power	0.40dB
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	2022.08.22	1Year
Spectrum analyzer	Agilent	N9020A	A.14.16	MY499100060	2022.08.22	1Year
Receiver	ROHDE&SCHWARZ	ESR	2.28 SP1	1316.3003K03-10 2082-Wa	2022.08.22	1Year
Receiver	R&S	ESCI	4.42 SP1	101165	2022.08.22	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	/	VULB 9168#627	2021.08.30	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	/	2106	2021.08.30	2Year
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	/	00059	2021.08.30	2Year
RF Cable	Resenberger	Cable 1	/	RE1	2022.08.22	1Year
RF Cable	Resenberger	Cable 2	/	RE2	2022.08.22	1Year
RF Cable	Resenberger	Cable 3	/	CE1	2022.08.22	1Year
Pre-amplifier	HP	HP8347A	/	2834A00455	2022.08.22	1Year
Pre-amplifier	Agilent	8449B	/	3008A02664	2022.08.22	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	/	8126-466	2022.08.22	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	101043	2022.08.23	1 Year
Horn Antenna	SCHWARZBECK	BBHA9170	/	00946	2021.08.30	2 Year
Preamplifier	SKET	LNPA_1840 -50	/	SK2018101801	2022.08.22	1 Year
Power Meter	Agilent	E9300A	/	MY41496628	2022.08.22	1 Year
Power Sensor	DARE	RPR3006W	/	15100041SNO91	2022.08.22	1 Year
Temp. & Humid. Chamber	Weihuang	WHTH-1000 -40-880	/	100631	2022.08.22	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	/	20140927-6	2022.08.22	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	EZ	Alpha-3A1
CE	EZ-EMC	EZ	Alpha-3A1
RF-CE	MTS 8310	MW	V2.0.0.0

3. Spurious Emission

3.1. Test Limits

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

15.209 Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009-0.490	300	2400/F(KHz)	/
0.490-1.705	30	24000/F(KHz)	/
1.705-30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	
Note 1: The peak limit is 20 dB higher than the average limit			
Note 2: Peak limit applies (AVG limit + 20 dB) as well as RSS-247 Section 5.5			

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.

3.2. Test Procedure

The measuring distance of 3m shall be used for measurements at frequency up to 1GHz 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.

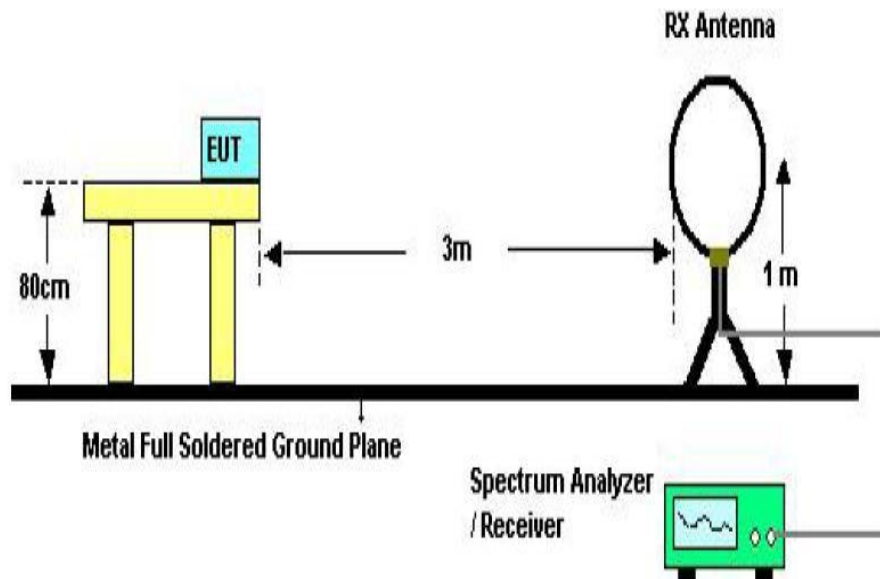
The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set of make measurement.

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

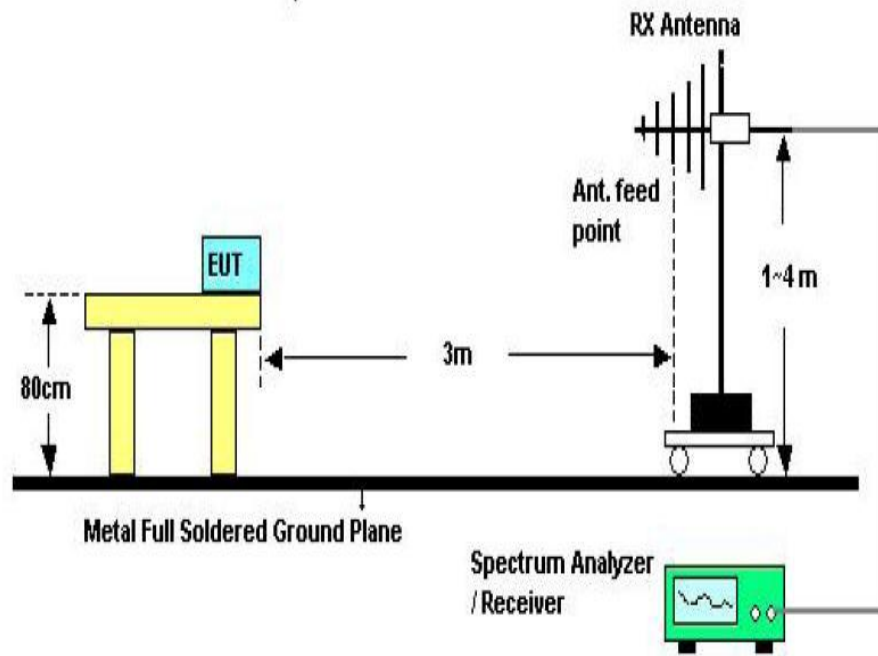
If Peak value comply with QP limit Below 1GHz, the EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.

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

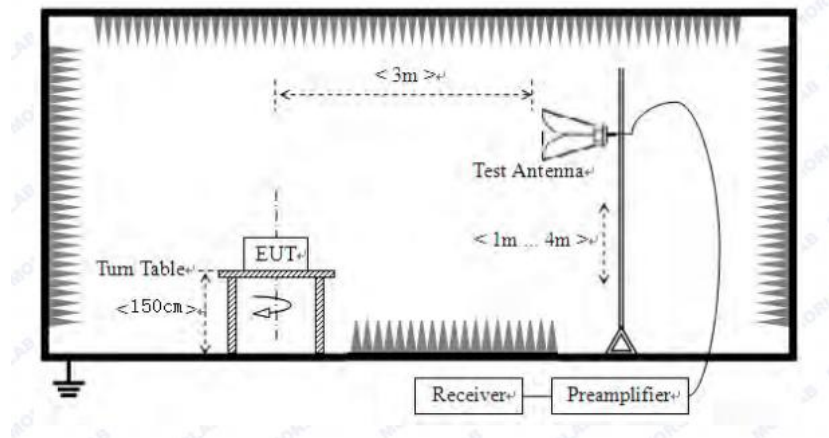
3.3. Test Setup



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 from 9 kHz to the 10th harmonic of the EUT.

Detailed information please see the following page.

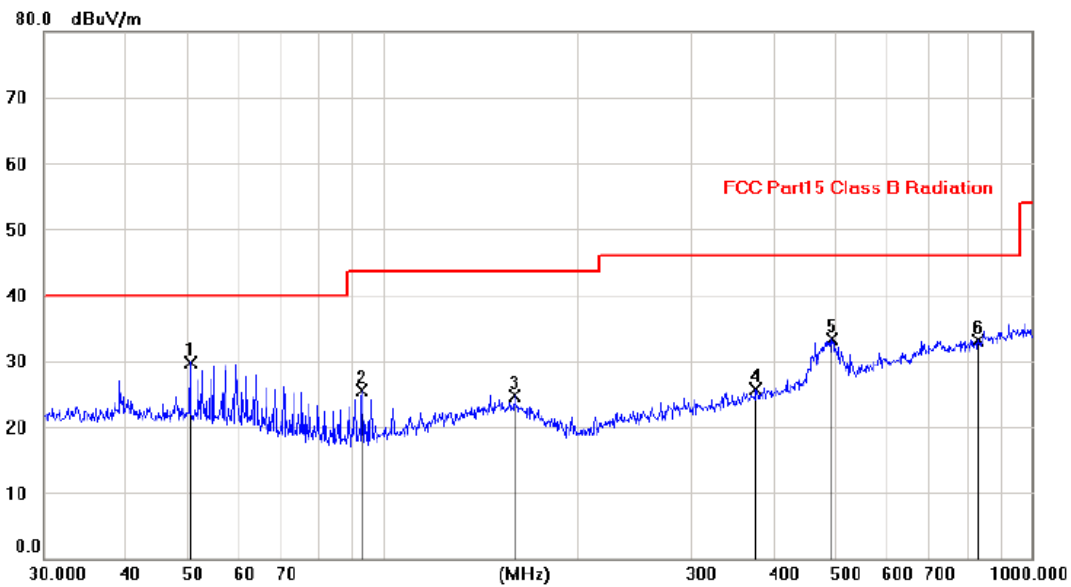
From 9KHz to 30MHz: Conclusion: PASS

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.

From 30MHz to 1000MHz: Conclusion: PASS

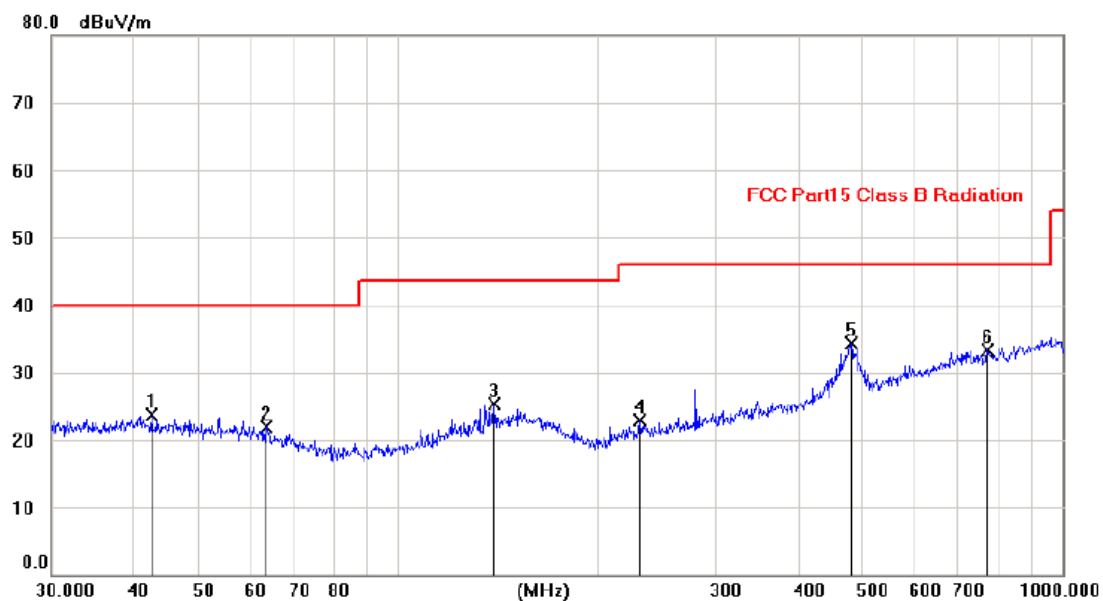
Vertical:



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
			dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	50.4856	15.84	13.96	29.80	40.00	-10.20	peak		
2		92.8198	15.16	10.32	25.48	43.50	-18.02	peak		
3		159.4113	9.74	15.04	24.78	43.50	-18.72	peak		
4		376.1583	9.88	15.81	25.69	46.00	-20.31	peak		
5		493.0445	15.22	18.12	33.34	46.00	-12.66	peak		
6		829.5271	9.88	23.20	33.08	46.00	-12.92	peak		

Note:1. *:Maximum data; x:Over limit; !:over margin.

2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Horizontal:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	Comment
			dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	
1		42.5651	9.40	14.28	23.68	40.00	-16.32	peak		
2		63.1432	9.46	12.51	21.97	40.00	-18.03	peak		
3		139.5732	11.05	14.28	25.33	43.50	-18.17	peak		
4		231.5825	10.61	12.35	22.96	46.00	-23.04	peak		
5	*	482.0465	16.31	17.98	34.29	46.00	-11.71	peak		
6		771.7191	10.56	22.71	33.27	46.00	-12.73	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 GFSK(1Mbps) TX 2402MHz.

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	45.04	V	33.95	10.18	34.26	54.91	74	-19.09	PK
4804	35.80	V	33.95	10.18	34.26	45.67	54	-8.33	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	43.45	H	33.95	10.18	34.26	53.32	74	-20.68	PK
4804	34.86	H	33.95	10.18	34.26	44.73	54	-9.27	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: TX Mid									
4880	44.38	V	33.93	10.2	34.29	54.22	74	-19.78	PK
4880	33.55	V	33.93	10.2	34.29	43.39	54	-10.61	AV
7320	/	/	/	/	/	/	/	/	/
9760	/	/	/	/	/	/	/	/	/
4880	45.45	H	33.93	10.2	34.29	55.29	74	-18.71	PK
4880	35.23	H	33.93	10.2	34.29	45.07	54	-8.93	AV
7320	/	/	/	/	/	/	/	/	/
9760	/	/	/	/	/	/	/	/	/
Test Mode: TX High									
4960	43.14	V	33.98	10.22	34.25	53.09	74	-20.91	PK
4960	34.03	V	33.98	10.22	34.25	43.98	54	-10.02	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	45.27	H	33.98	10.22	34.25	55.22	74	-18.78	PK
4960	32.05	H	33.98	10.22	34.25	42.00	54	-12.00	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/

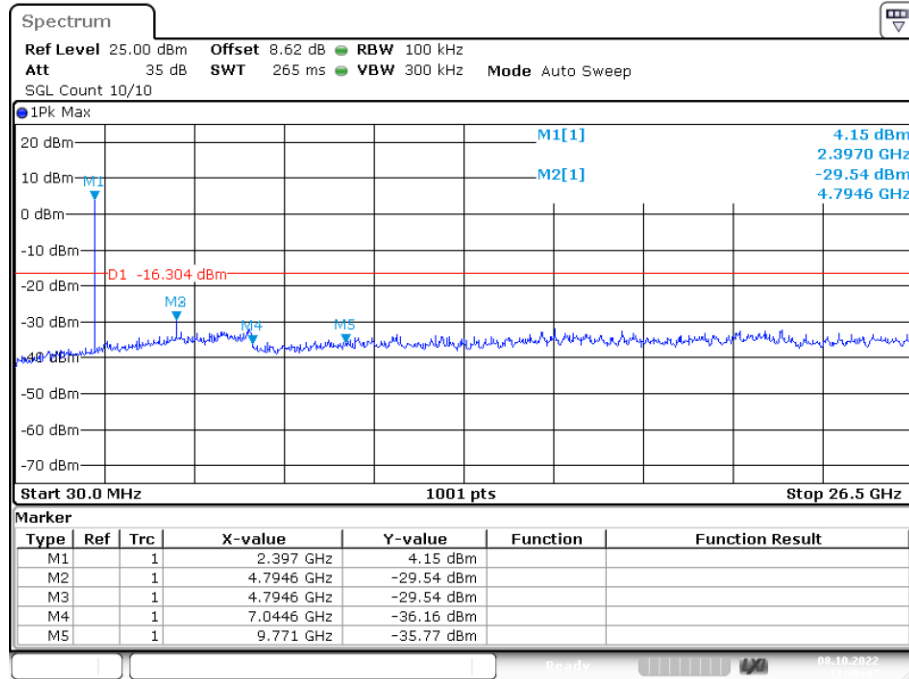
Note:
1, Result = Read level + Antenna factor + cable loss-Amp factor
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

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	44.01	V	33.95	10.18	34.26	53.88	74	-20.12	PK
4804	35.77	V	33.95	10.18	34.26	45.64	54	-8.36	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	45.51	H	33.95	10.18	34.26	55.38	74	-18.62	PK
4804	35.27	H	33.95	10.18	34.26	45.14	54	-8.86	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: TX Mid									
4880	44.31	V	33.93	10.2	34.29	54.15	74	-19.85	PK
4880	36.71	V	33.93	10.2	34.29	46.55	54	-7.45	AV
7320	/	/	/	/	/	/	/	/	/
9760	/	/	/	/	/	/	/	/	/
4880	43.00	H	33.93	10.2	34.29	52.84	74	-21.16	PK
4880	34.71	H	33.93	10.2	34.29	44.55	54	-9.45	AV
7320	/	/	/	/	/	/	/	/	/
9760	/	/	/	/	/	/	/	/	/
Test Mode: TX High									
4960	46.18	V	33.98	10.22	34.25	56.13	74	-17.87	PK
4960	34.81	V	33.98	10.22	34.25	44.76	54	-9.24	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	45.53	H	33.98	10.22	34.25	55.48	74	-18.52	PK
4960	34.12	H	33.98	10.22	34.25	44.07	54	-9.93	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.

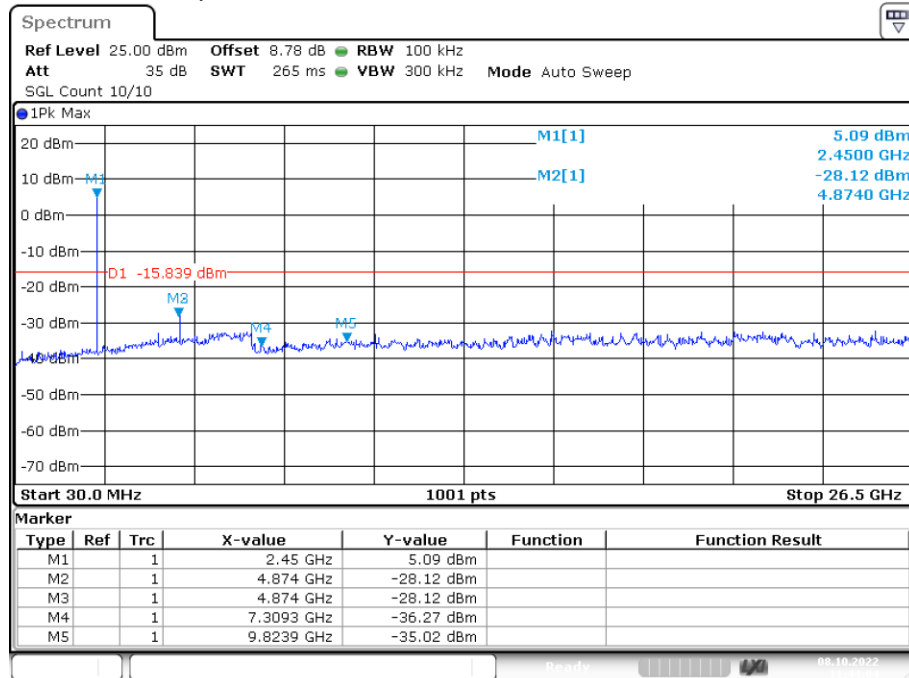
For 1Mbps
Conducted RF Spurious Emission

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



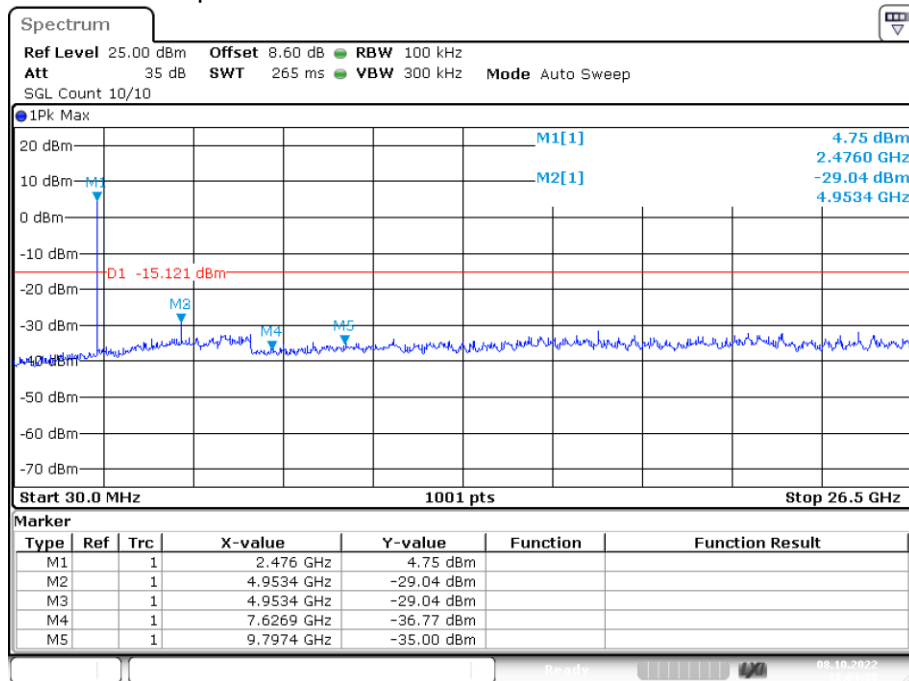
Date: 8.OCT.2022 11:46:46

Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission



Date: 8.OCT.2022 11:44:04

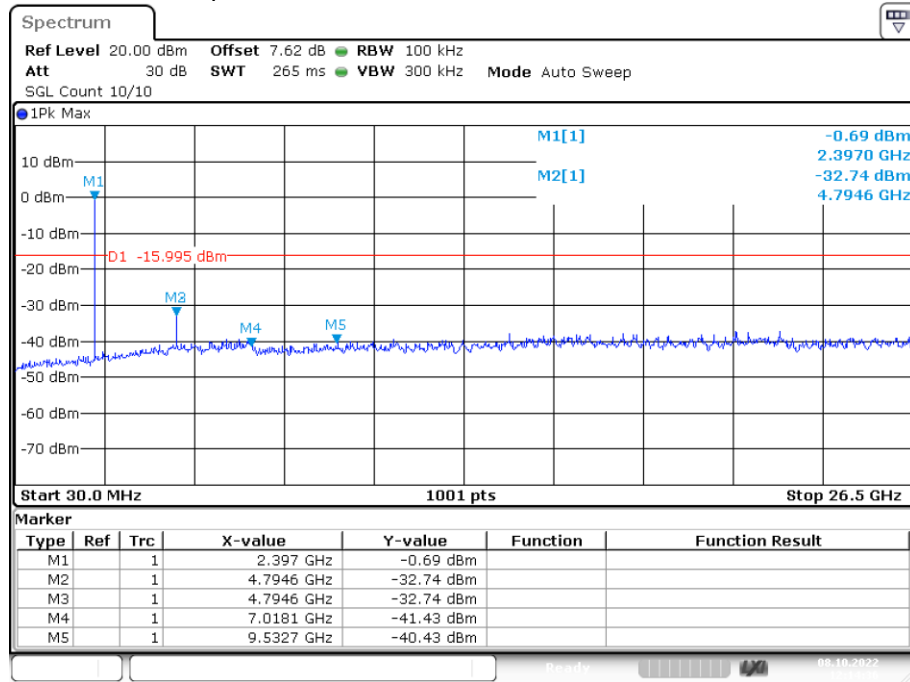
Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



Date: 8.OCT.2022 12:04:30

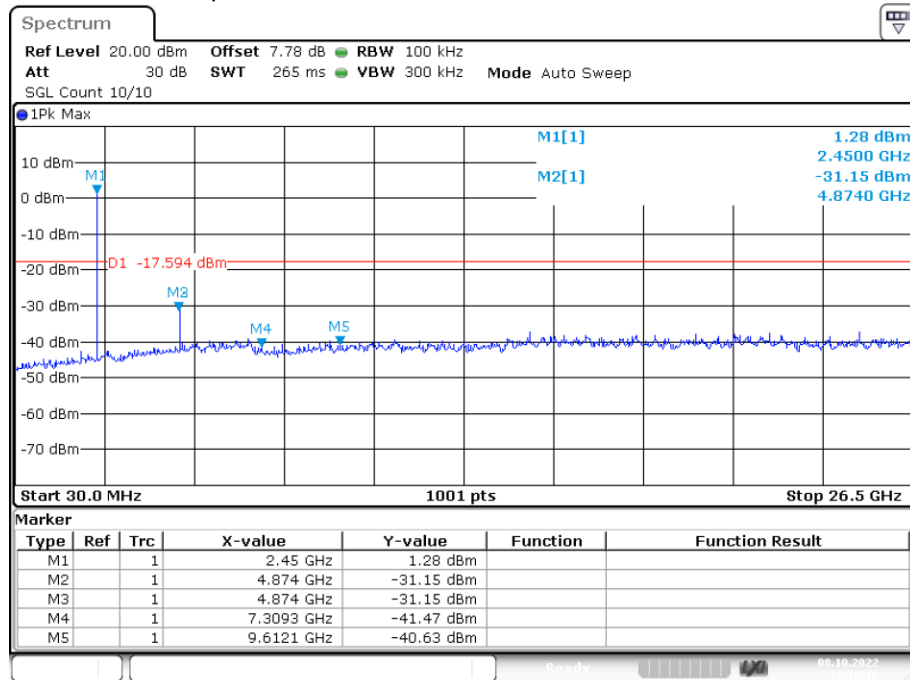
For 2Mbps
Conducted RF Spurious Emission

Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Emission



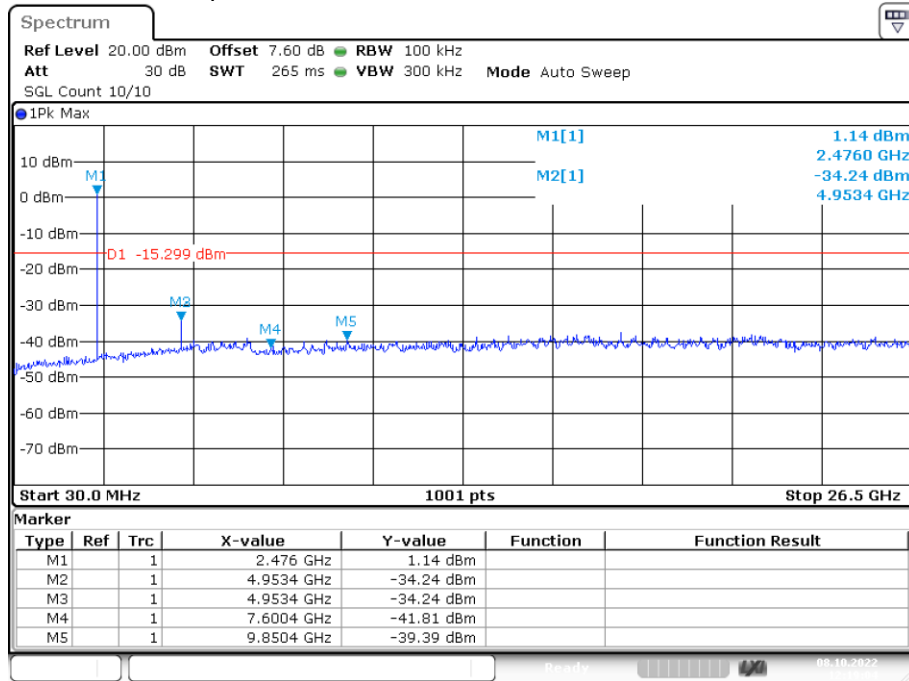
Date: 8.OCT.2022 12:14:35

Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Emission



Date: 8.OCT.2022 12:16:17

Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Emission



Date: 8.OCT.2022 12:19:03

4. Power Line Conducted Emission

4.1. Test Limits

Frequency MHz	Limits dB(μ V)	
	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.

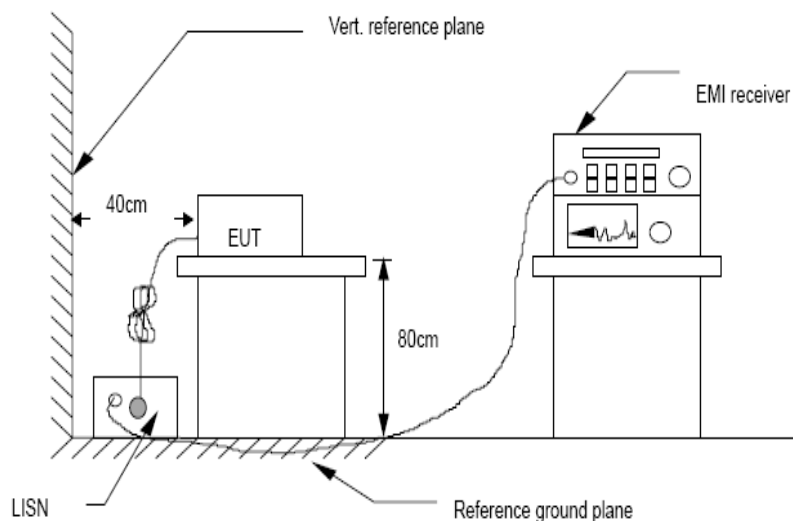
3. The limit decreases in line with the logarithm of the frequency in rang of 0.15 to 0.50 MHz.

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

Not applicable for equipment operated with PC, battery, or DC Power Supply.

5. Conducted Maximum Output Power

5.1. Test limits

Please refer section RSS-247 & 15.247.

5.2. Test Procedure

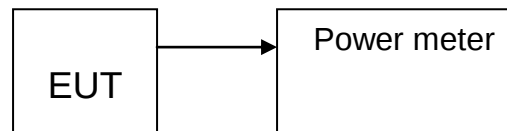
Details see the KDB558074 D01 Meas Guidance v05r02

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

Foe 1Mbps			
Channel	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)
CH1	2402	5.58	28.71
CH20	2440	5.497	28.71
CH40	2480	5.55	28.71
Conclusion: PASS			

Foe 2Mbps			
Channel	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)
CH1	2402	4.345	28.71
CH20	2440	4.49	28.71
CH40	2480	4.705	28.71
Conclusion: PASS			

Note: ANT gain=7.29dBi, so the Conducted Power Limit need to reduce 1.29.

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 KDB558074 D01 Meas Guidance v05r02

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

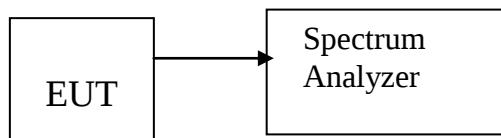
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Set the spectrum analyzer as RBW = 3kHz(Set the RBW to: $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$.), VBW = 10kHz(Set the $\text{VBW} \geq 3 \times \text{RBW}$), span $\geq 1.5 \times \text{DTS bandwidth}$., 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

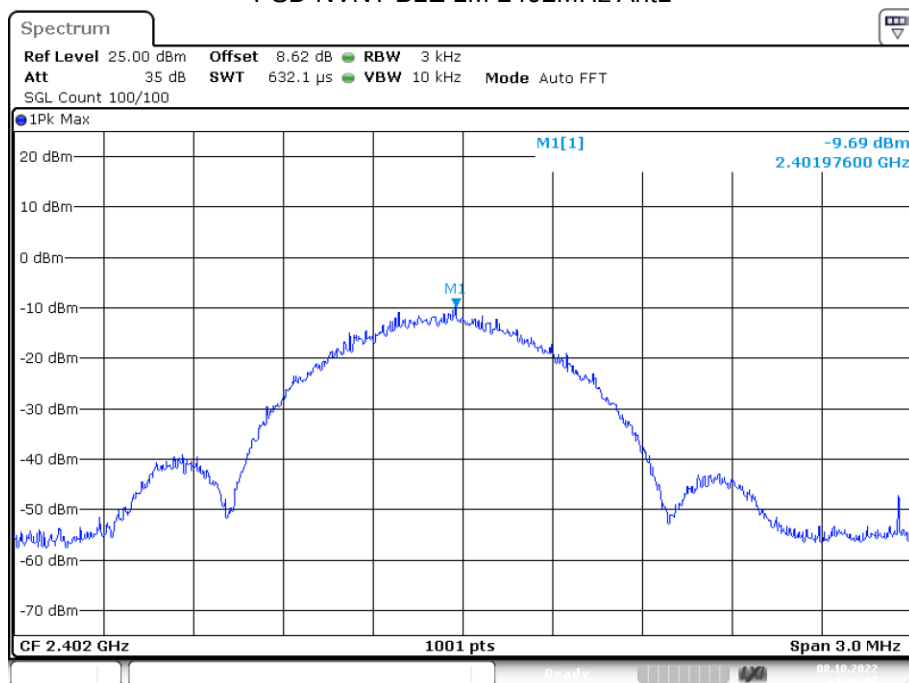


6.4. Test Results

For 1Mbps						
Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm/3K)	Limit (dBm/3K)	Verdict
NVNT	BLE 1M	2402	Ant1	-9.69	6.71	Pass
NVNT	BLE 1M	2440	Ant1	-8.039	6.71	Pass
NVNT	BLE 1M	2480	Ant1	-8.259	6.71	Pass

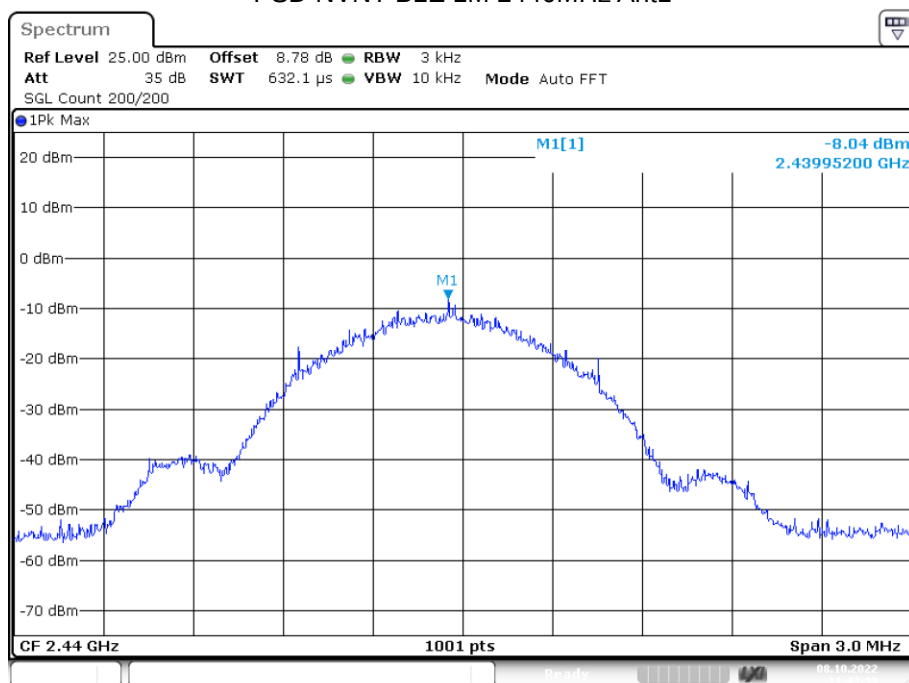
Note: ANT gain=7.29dBi, so the PSD Limit need to reduce 1.29.

PSD NVNT BLE 1M 2402MHz Ant1



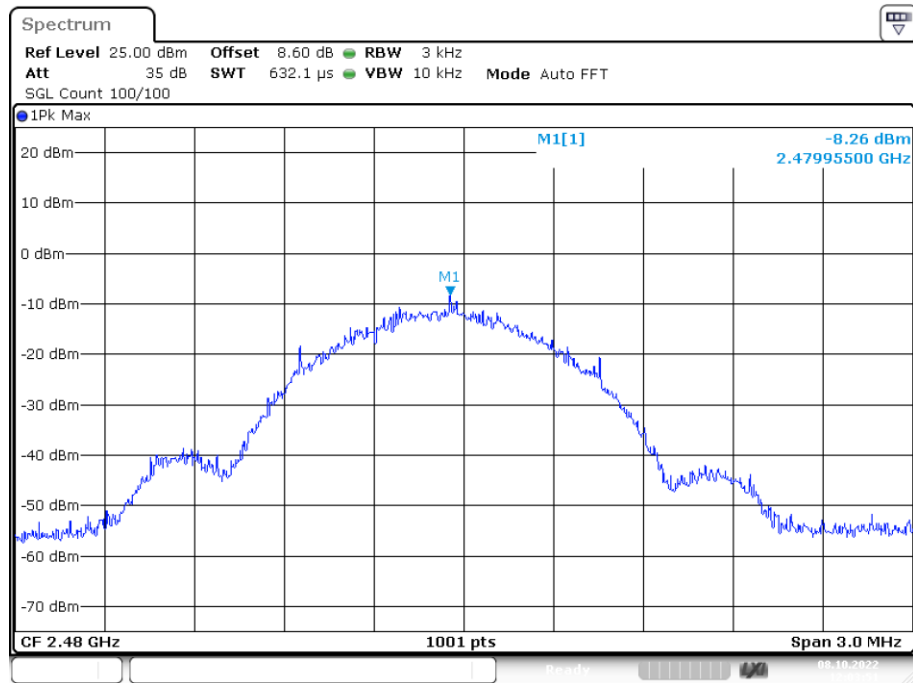
Date: 8.OCT.2022 11:46:07

PSD NVNT BLE 1M 2440MHz Ant1



Date: 8.OCT.2022 11:43:39

PSD NVNT BLE 1M 2480MHz Ant1

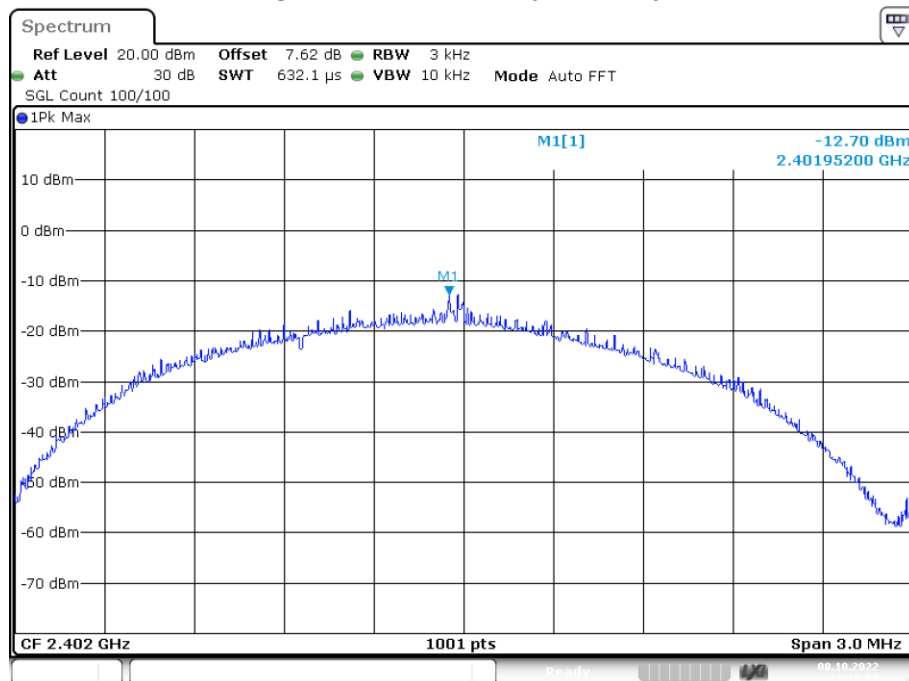


Date: 8.OCT.2022 12:03:51

For 2Mbps						
Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm/3K)	Limit (dBm/3K)	Verdict
NVNT	BLE 2M	2402	Ant1	-12.701	6.71	Pass
NVNT	BLE 2M	2440	Ant1	-12.054	6.71	Pass
NVNT	BLE 2M	2480	Ant1	-11.858	6.71	Pass

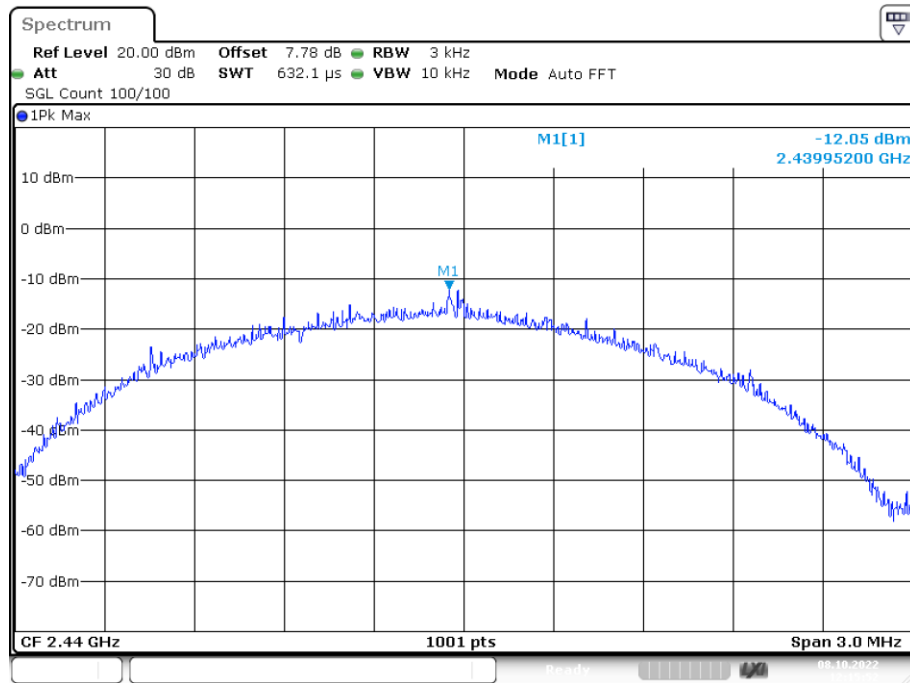
Note: ANT gain=7.29dBi, so the PSD Limit need to reduce 1.29.

PSD NVNT BLE 2M 2402MHz Ant1



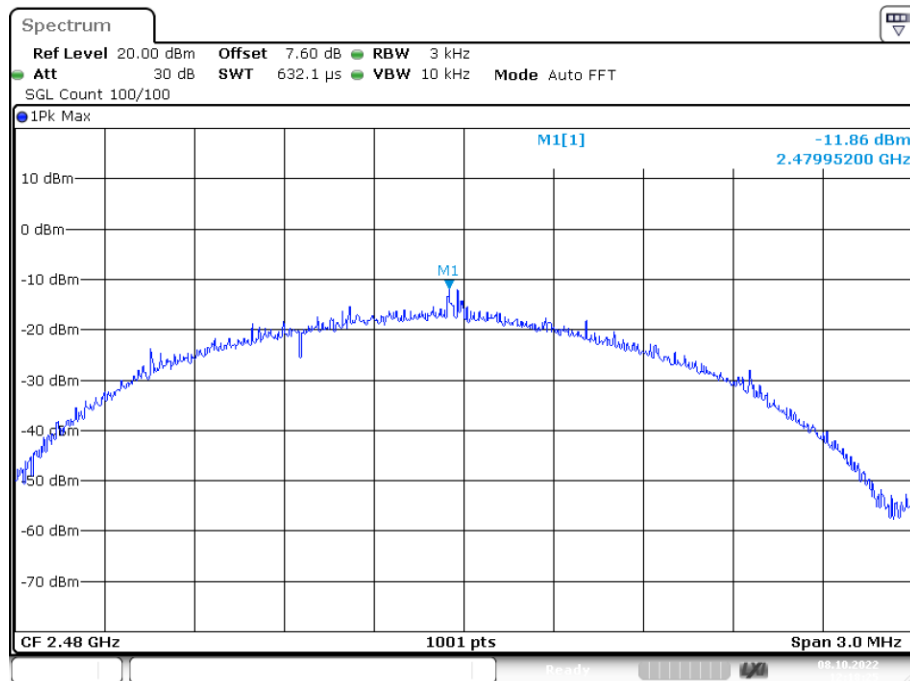
Date: 8.OCT.2022 12:13:59

PSD NVNT BLE 2M 2440MHz Ant1



Date: 8.OCT.2022 12:15:52

PSD NVNT BLE 2M 2480MHz Ant1



Date: 8.OCT.2022 12:18:25

7. Bandwidth

7.1. Test limits

Please refer section RSS-247 & 15.247

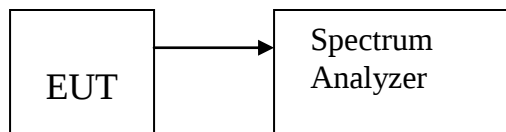
For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz.

7.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

- a) The bandwidth is measured at an amplitude level reduced 6dB 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 $RBW = 1-5\%BW$, $VBW \geq 3*RBW$, Sweep time set auto, detail see the test plot for 99% Bandwidth.
- c) The test receiver set $RBW = 100kHz$, $VBW \geq 3*RBW = 300kHz$, Sweep time set auto, detail see the test plot for 6dB Bandwidth.

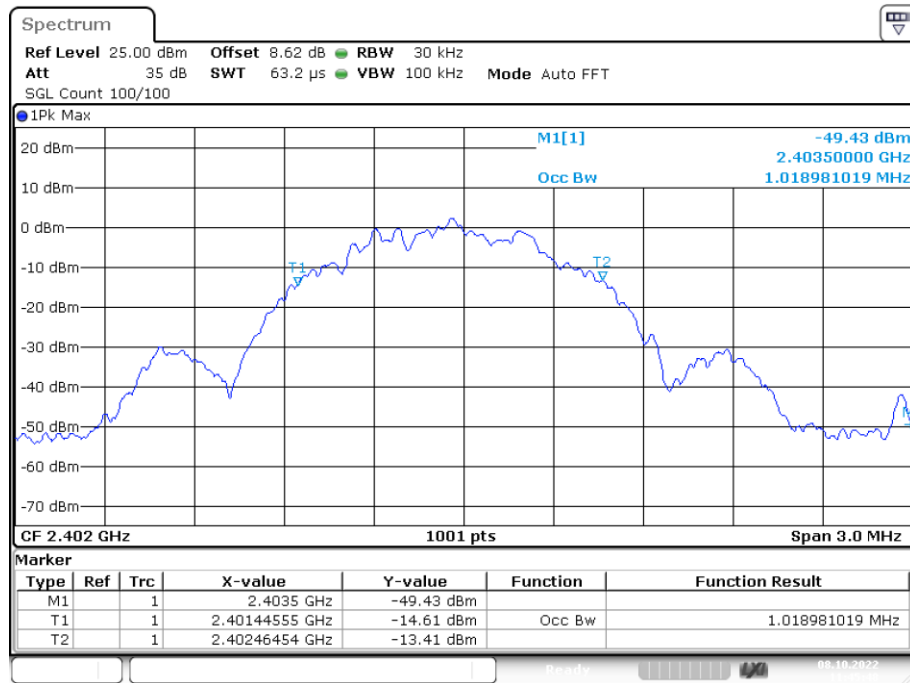
7.3. Test Setup



7.4. Test Results

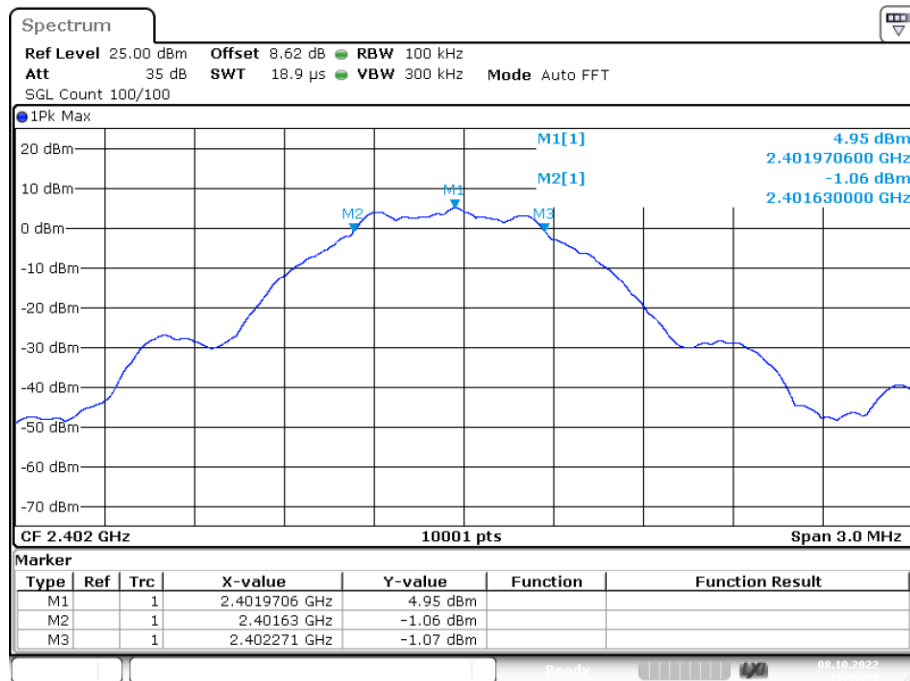
For 1Mbps							
Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant 1	1.019	0.64	0.5	Pass
NVNT	BLE 1M	2440	Ant 1	1.04	0.63	0.5	Pass
NVNT	BLE 1M	2480	Ant 1	1.04	0.624	0.5	Pass

OBW NVNT BLE 1M 2402MHz Ant1



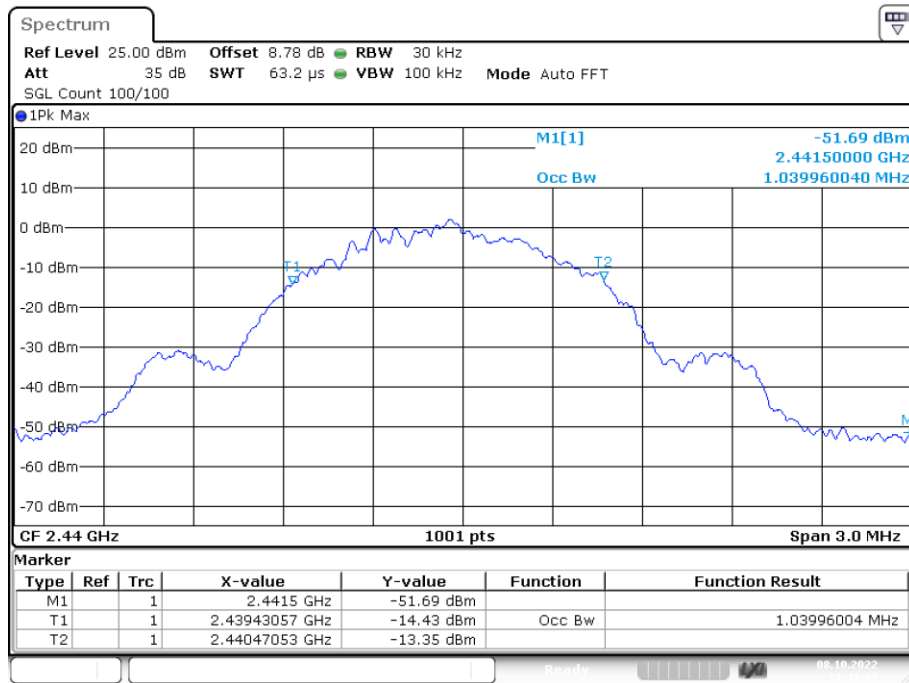
Date: 8.OCT.2022 11:45:48

-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



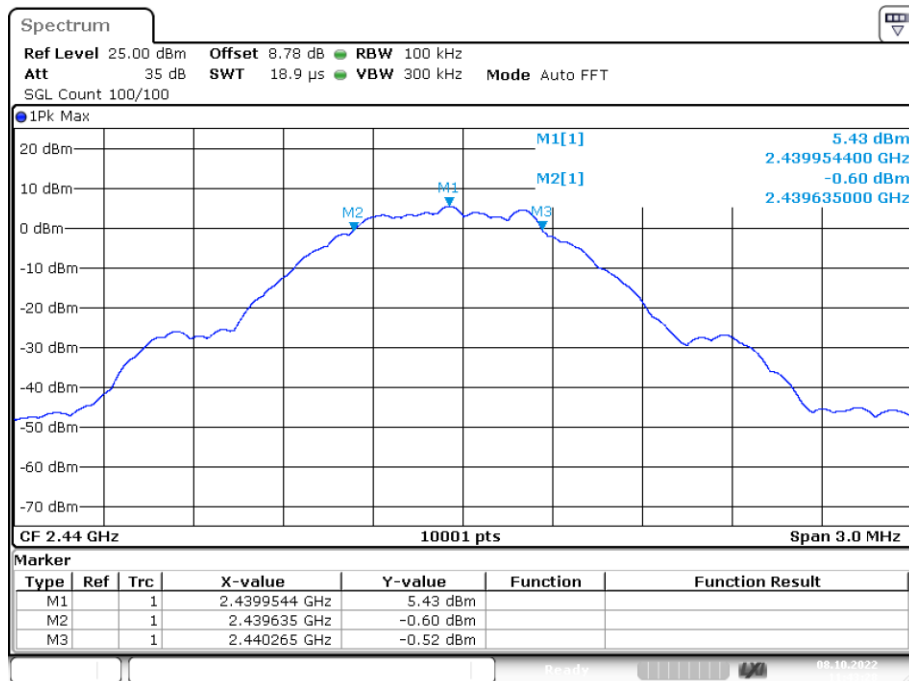
Date: 8.OCT.2022 11:45:58

OBW NVNT BLE 1M 2440MHz Ant1



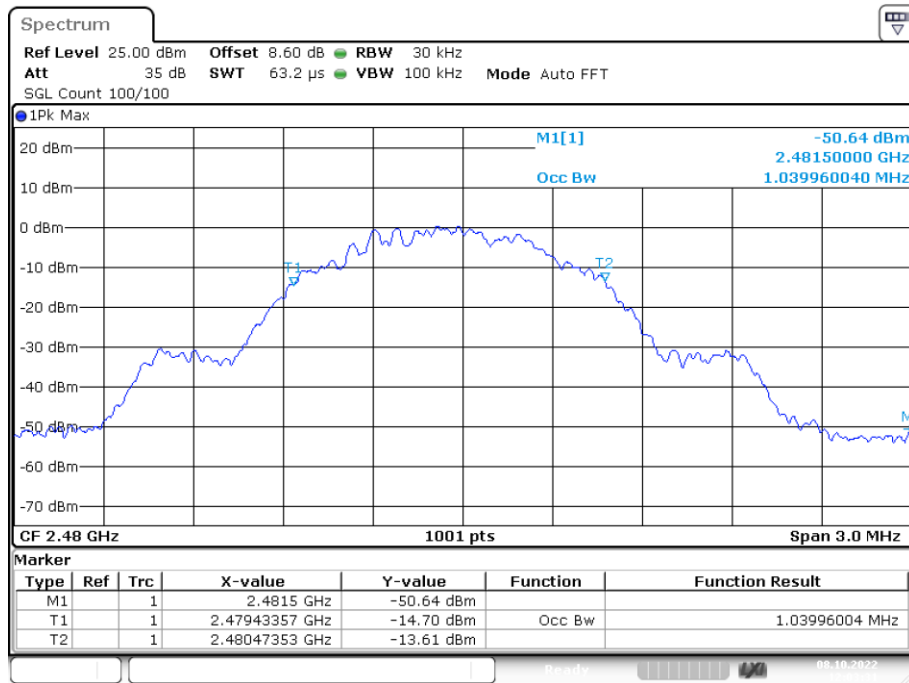
Date: 8.OCT.2022 11:43:17

-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



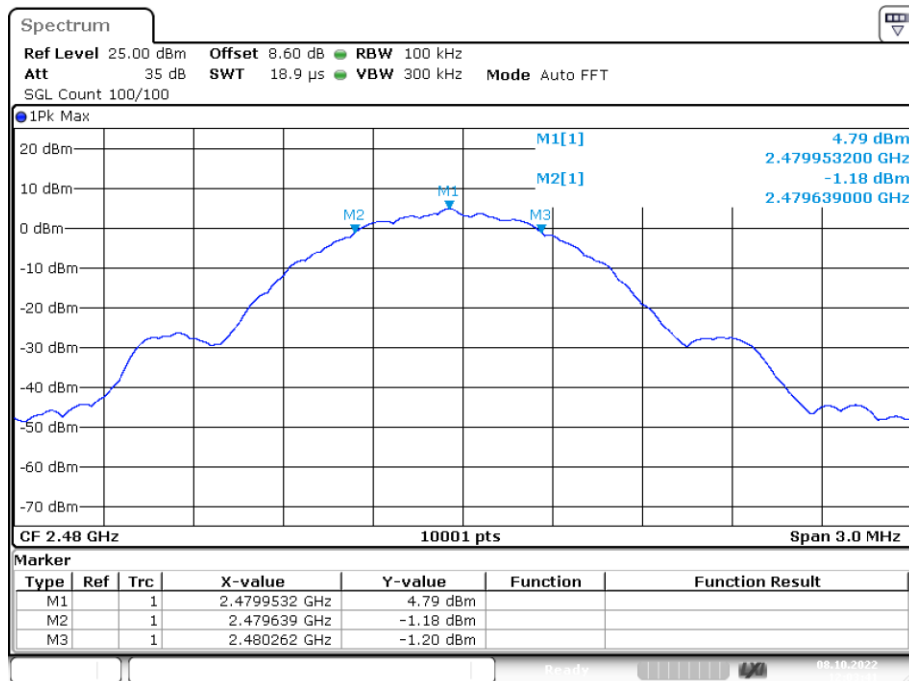
Date: 8.OCT.2022 11:43:27

OBW NVNT BLE 1M 2480MHz Ant1



Date: 8.OCT.2022 12:03:31

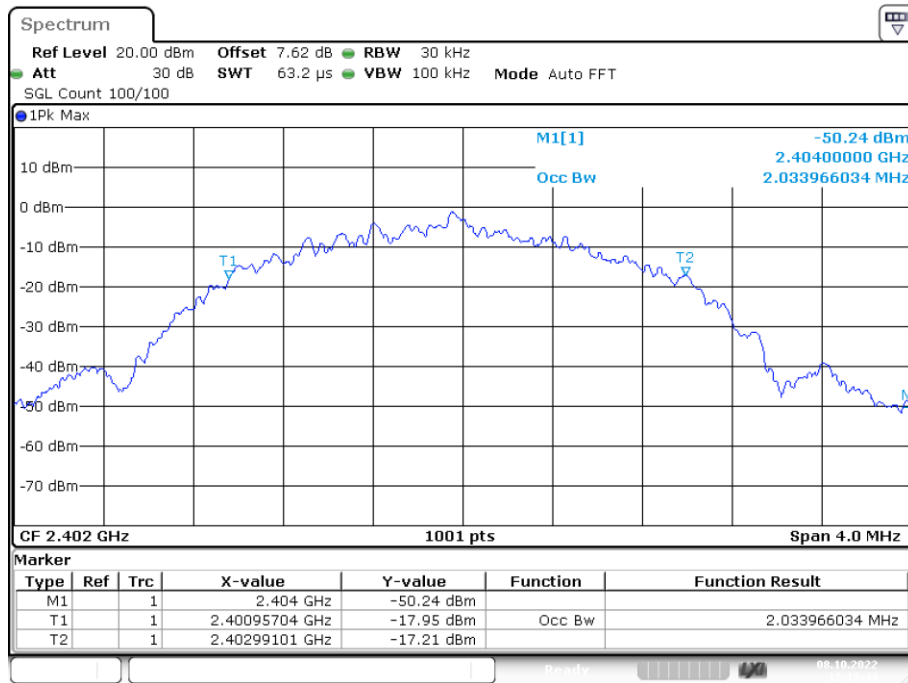
-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



Date: 8.OCT.2022 12:03:41

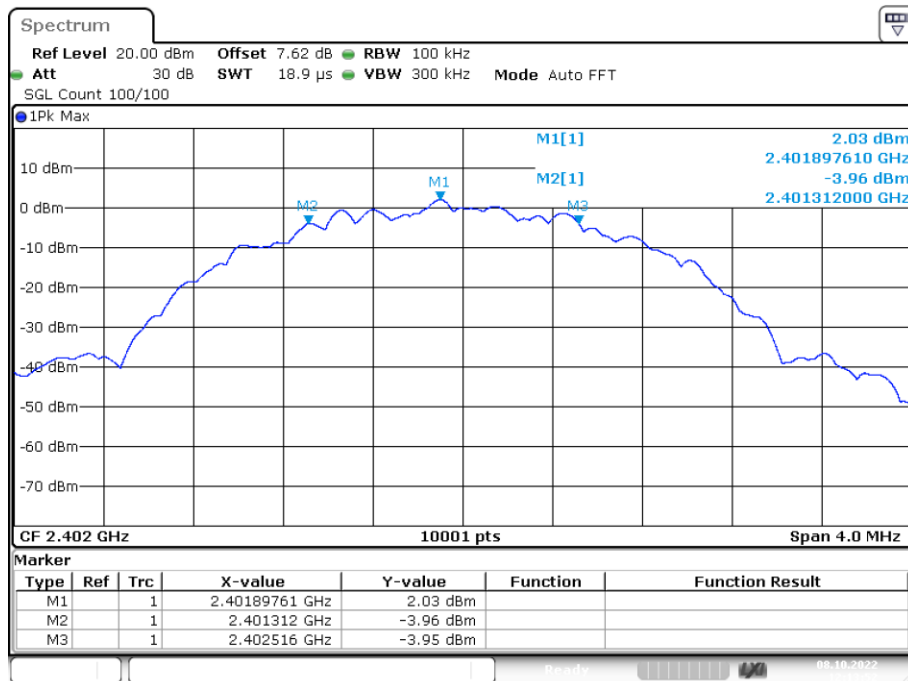
For 2Mbps							
Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 2M	2402	Ant 1	2.034	1.204	0.5	Pass
NVNT	BLE 2M	2440	Ant 1	2.026	1.083	0.5	Pass
NVNT	BLE 2M	2480	Ant 1	2.042	0.93	0.5	Pass

OBW NVNT BLE 2M 2402MHz Ant1



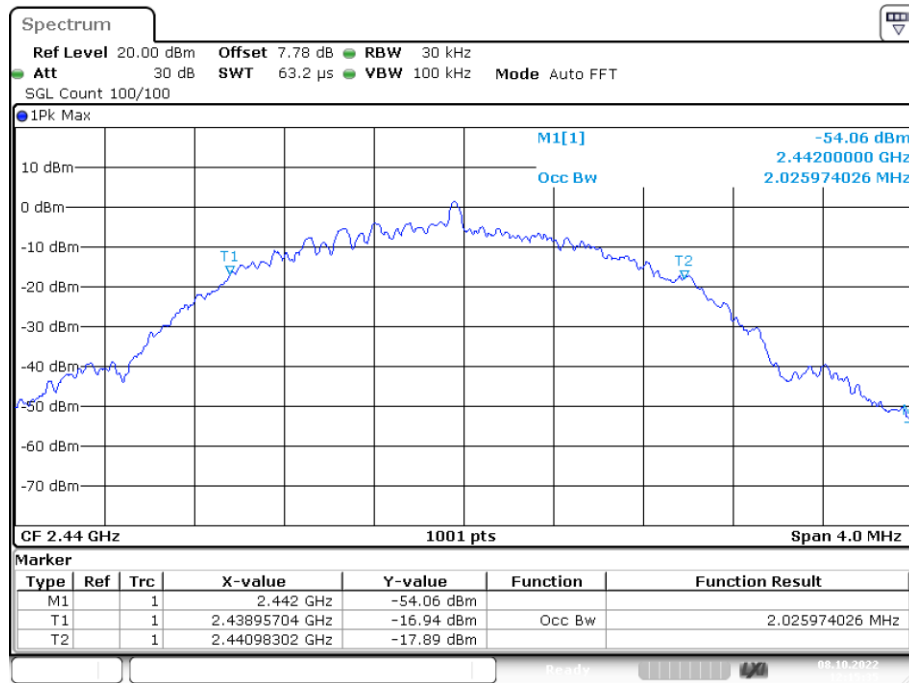
Date: 8.OCT.2022 12:13:43

-6dB Bandwidth NVNT BLE 2M 2402MHz Ant1



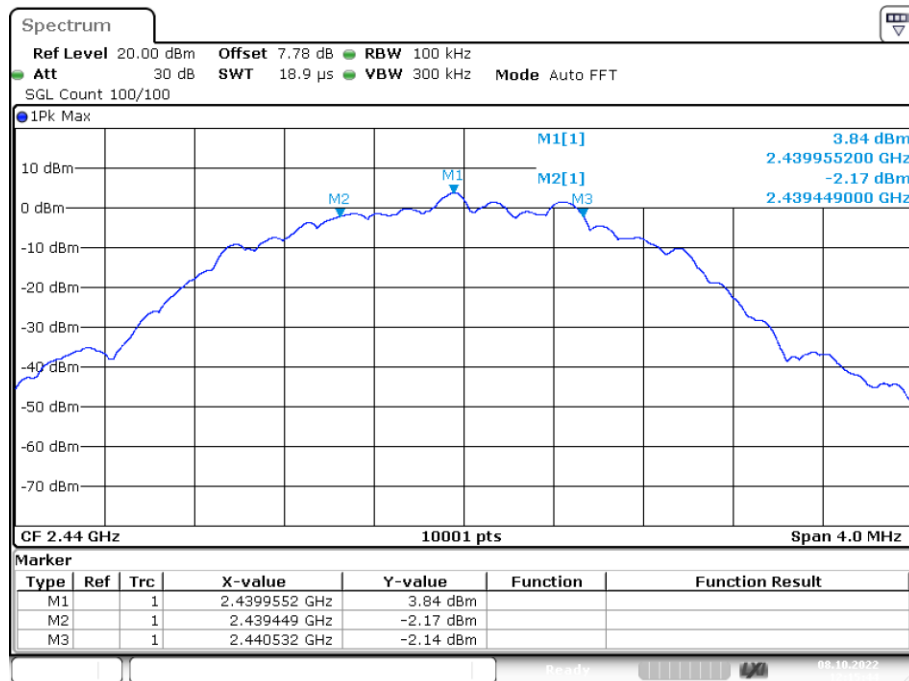
Date: 8.OCT.2022 12:13:52

OBW NVNT BLE 2M 2440MHz Ant1



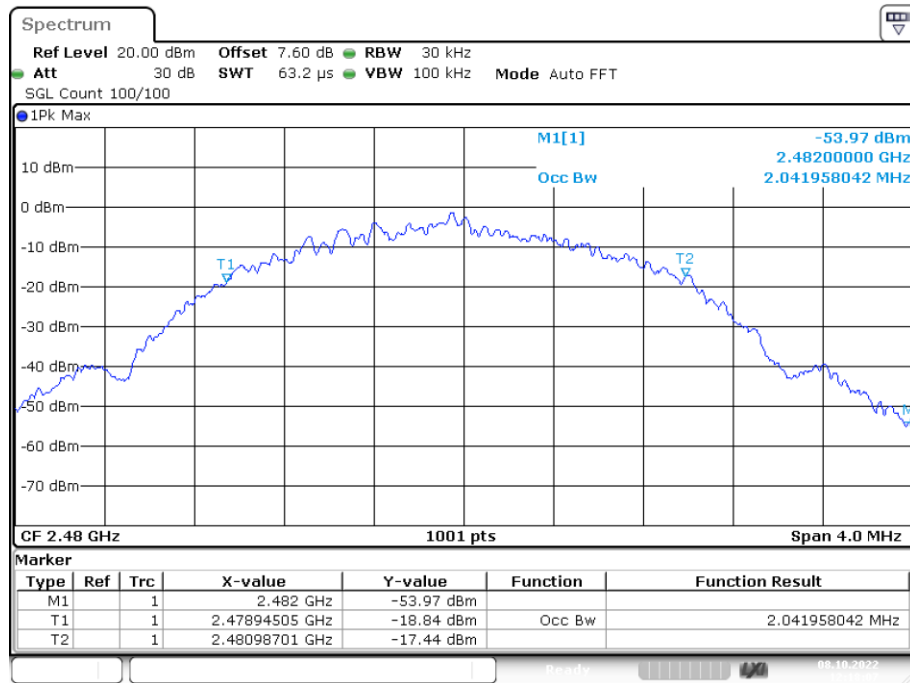
Date: 8.OCT.2022 12:15:35

-6dB Bandwidth NVNT BLE 2M 2440MHz Ant1



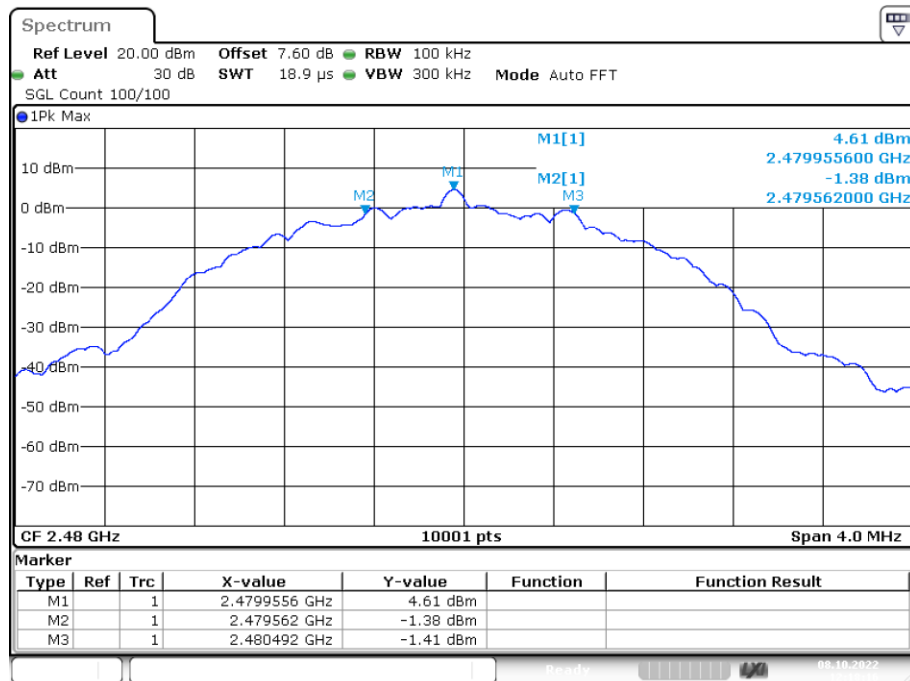
Date: 8.OCT.2022 12:15:44

OBW NVNT BLE 2M 2480MHz Ant1



Date: 8.OCT.2022 12:18:06

-6dB Bandwidth NVNT BLE 2M 2480MHz Ant1



Date: 8.OCT.2022 12:18:16

8. Band Edge Check

8.1. Test limits

Please refer section RSS-GEN&15.247.

8.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

8.2.1 Put the EUT on a 1.5m 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 3.3 above 1GHz.

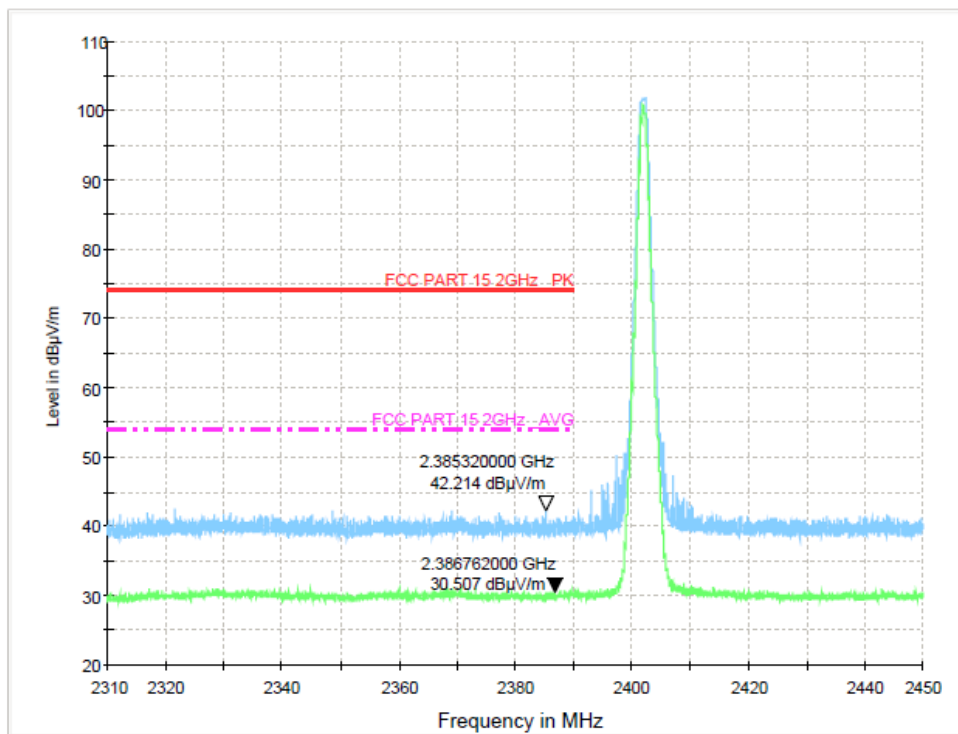
8.4. Test Results

Radiated Method:

Data Rate: 1Mbps

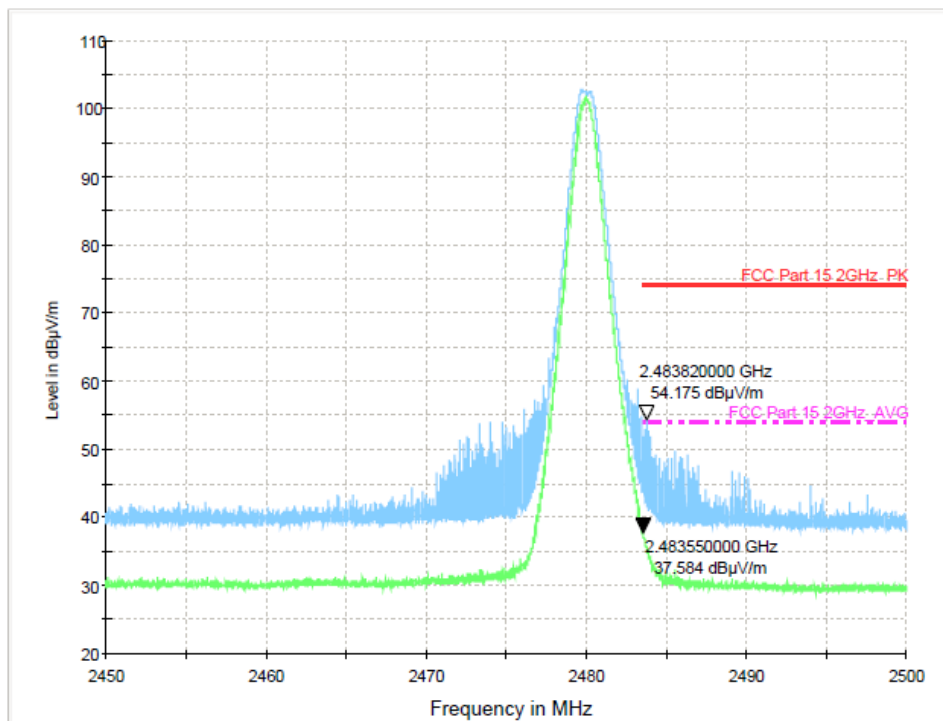
Test Mode:

GFSK-Low



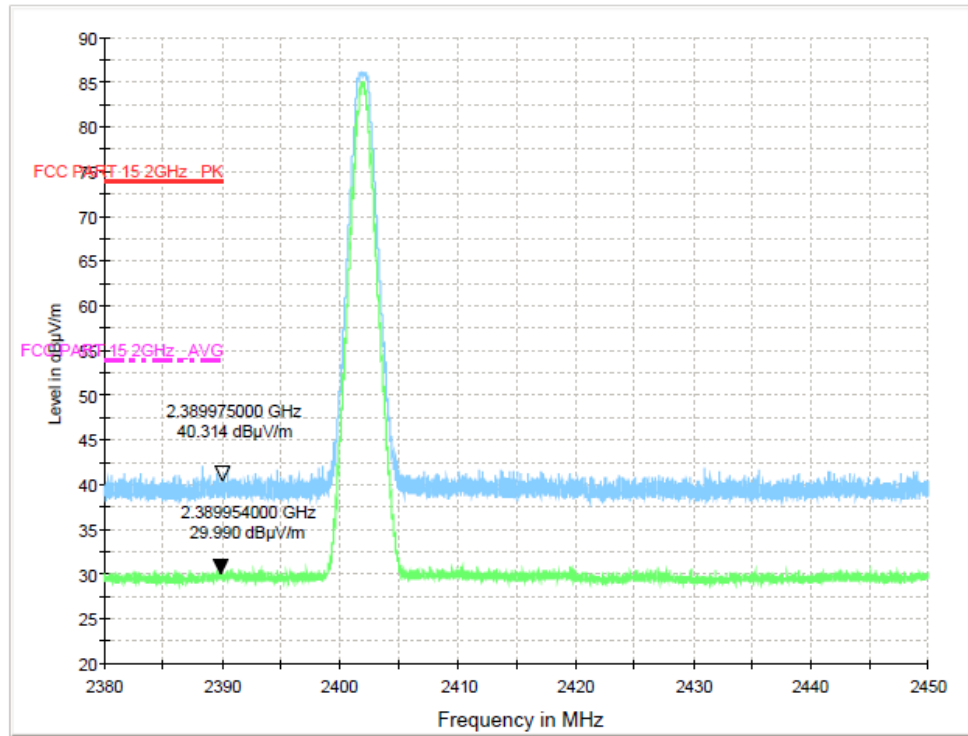
Test Mode:

GFSK-High

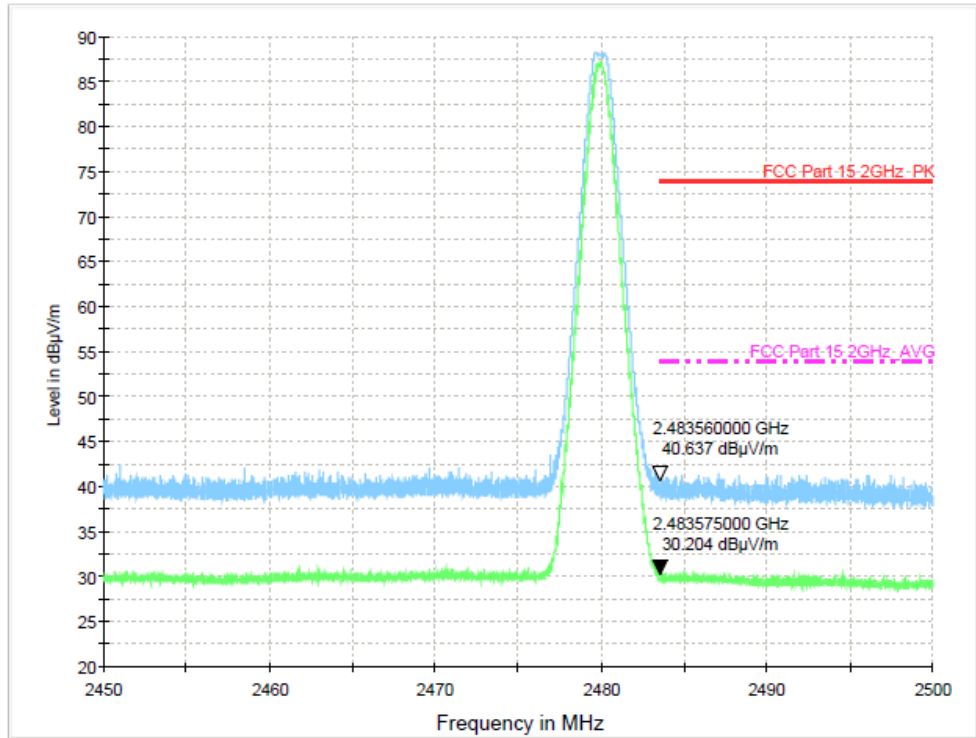


Data Rate: 2Mbps

Test Mode: GFSK-Low

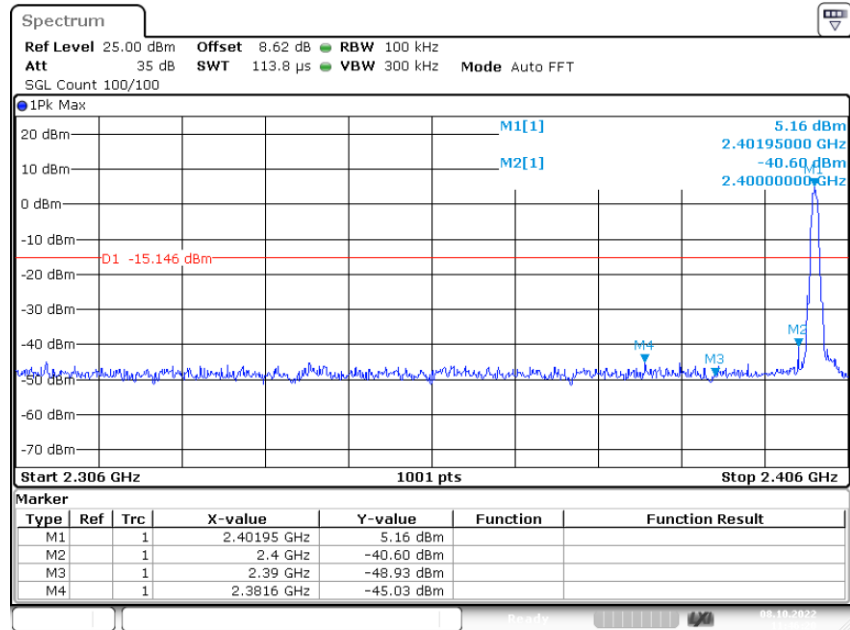


Test Mode: GFSK-High

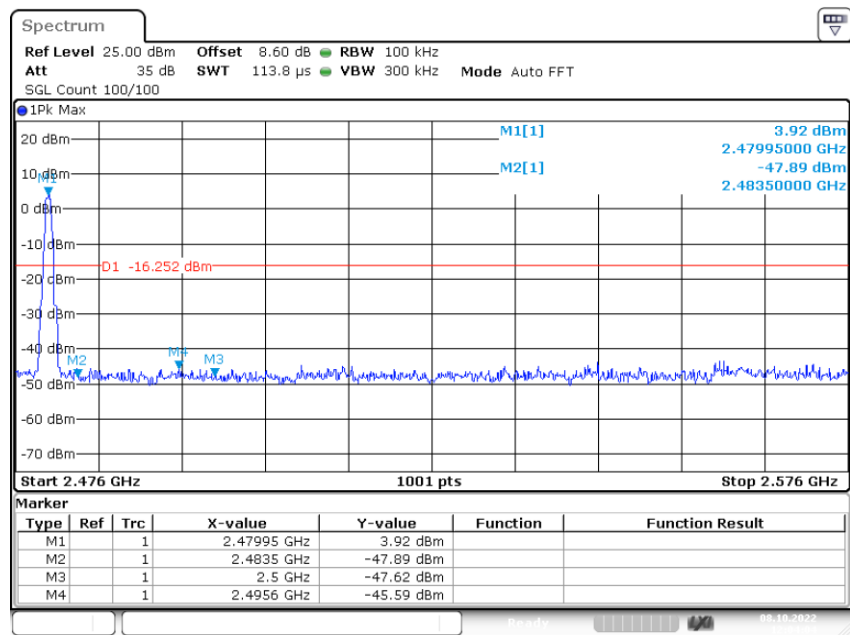


For 1Mbps
Conducted Method:
GFSK

Lowest channel

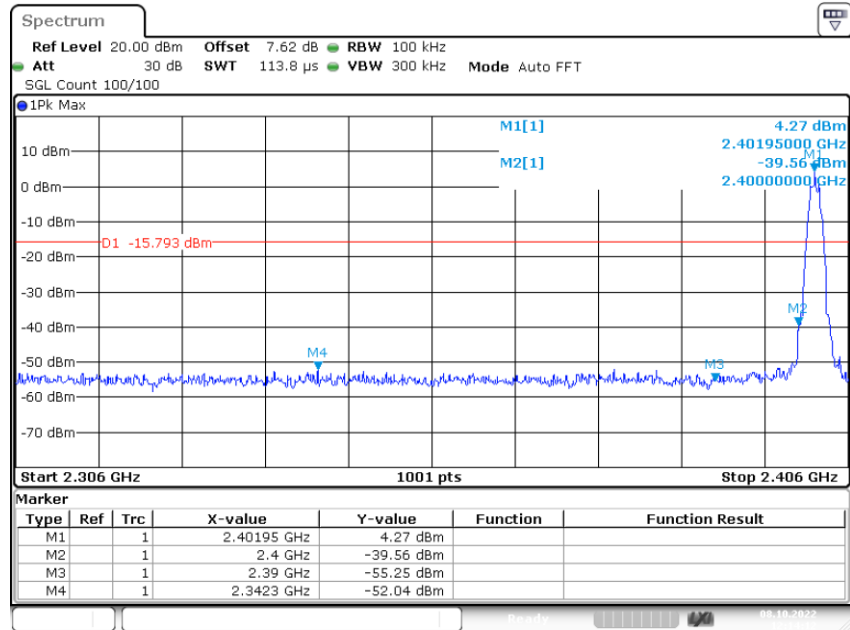


Highest channel

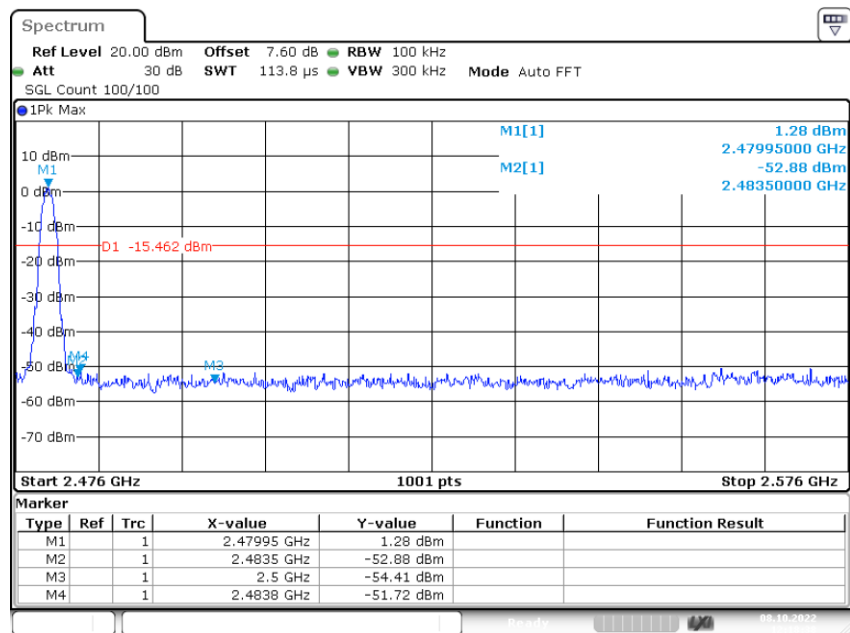


For 2Mbps
Conducted Method:
GFSK

Lowest channel



Highest channel



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

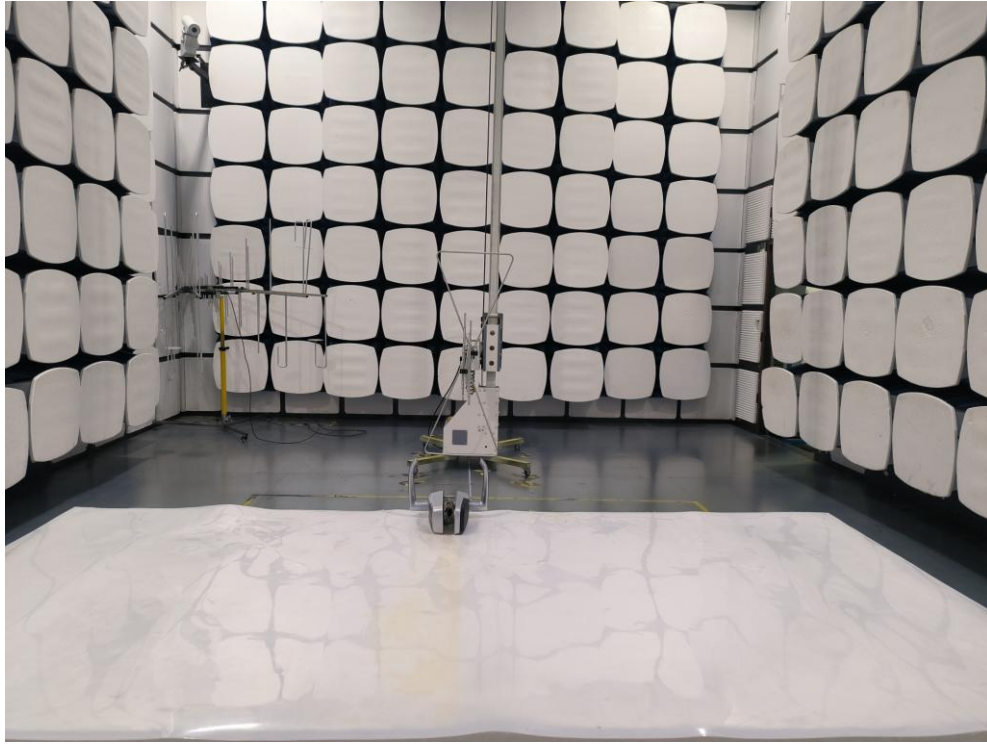
The antenna is Internal antenna and no consideration of replacement. Please see EUT photo for details.

9.3. Results

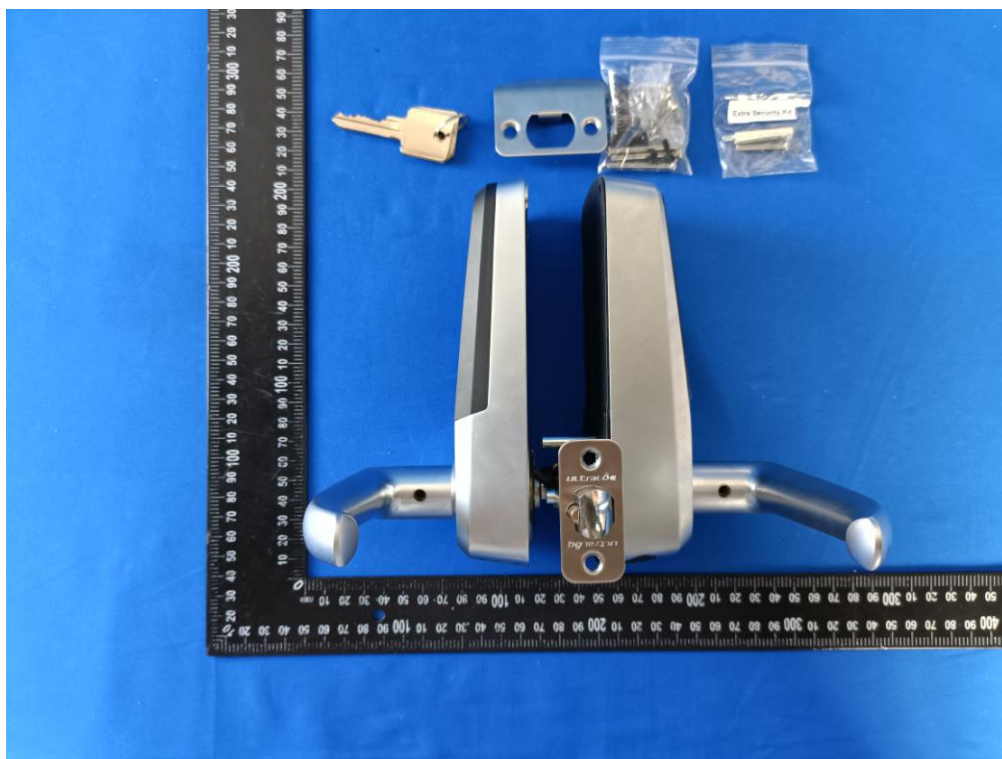
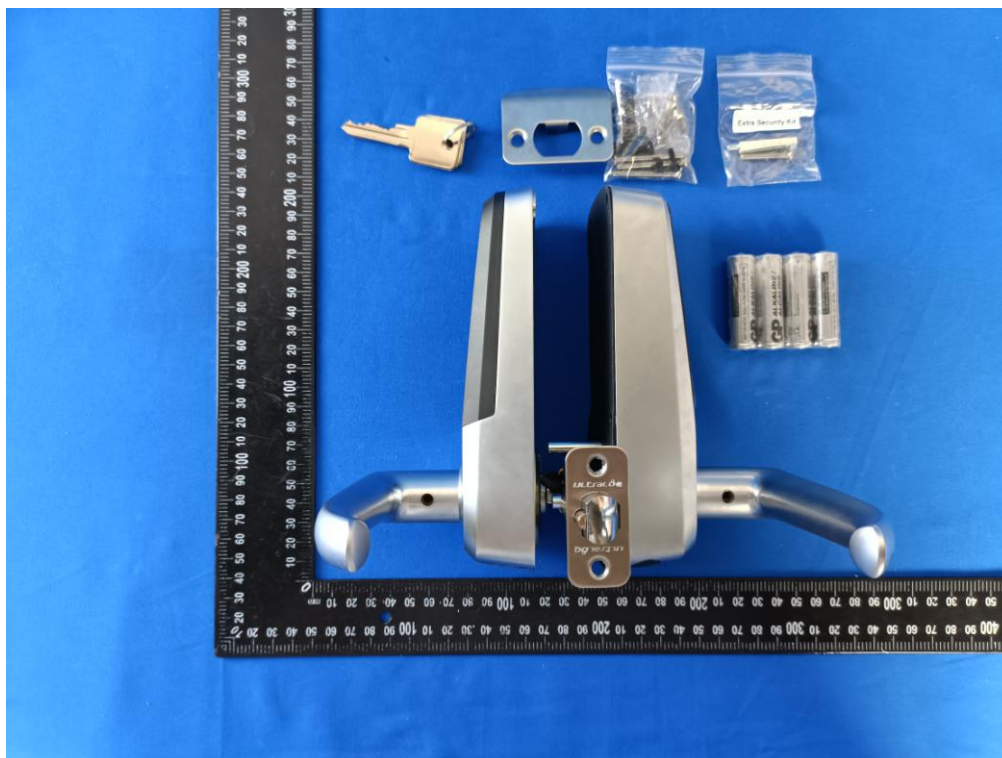
The EUT antenna is Internal Antenna. It comply with the standard requirement.

10. Test Setup Photo

10.1. Photos of Radiated emission

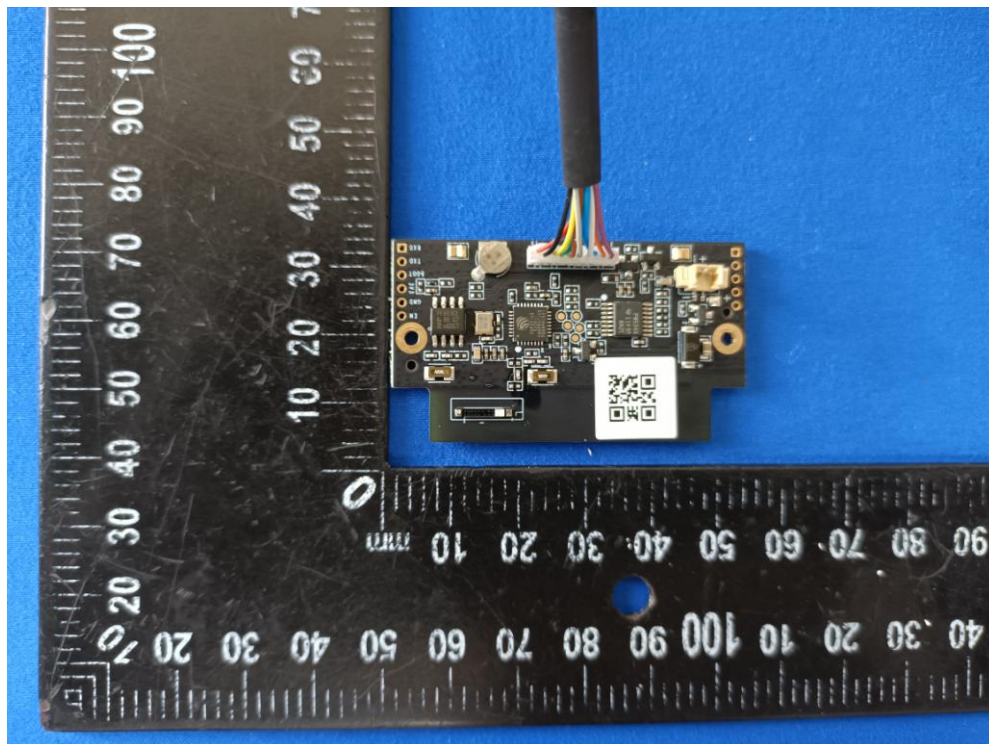


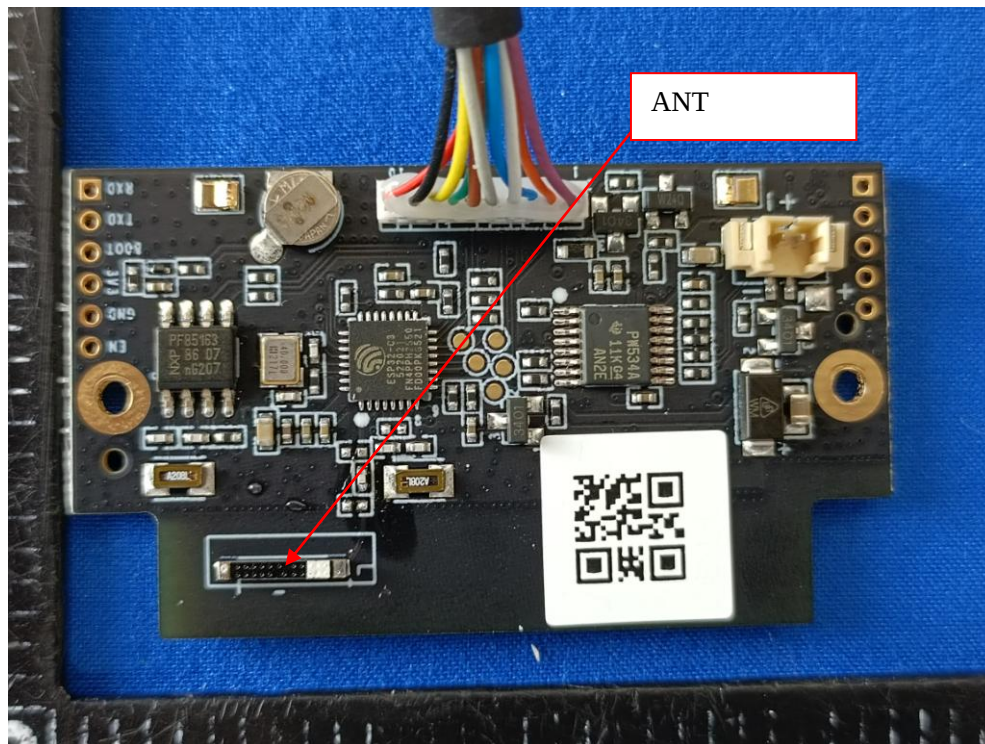
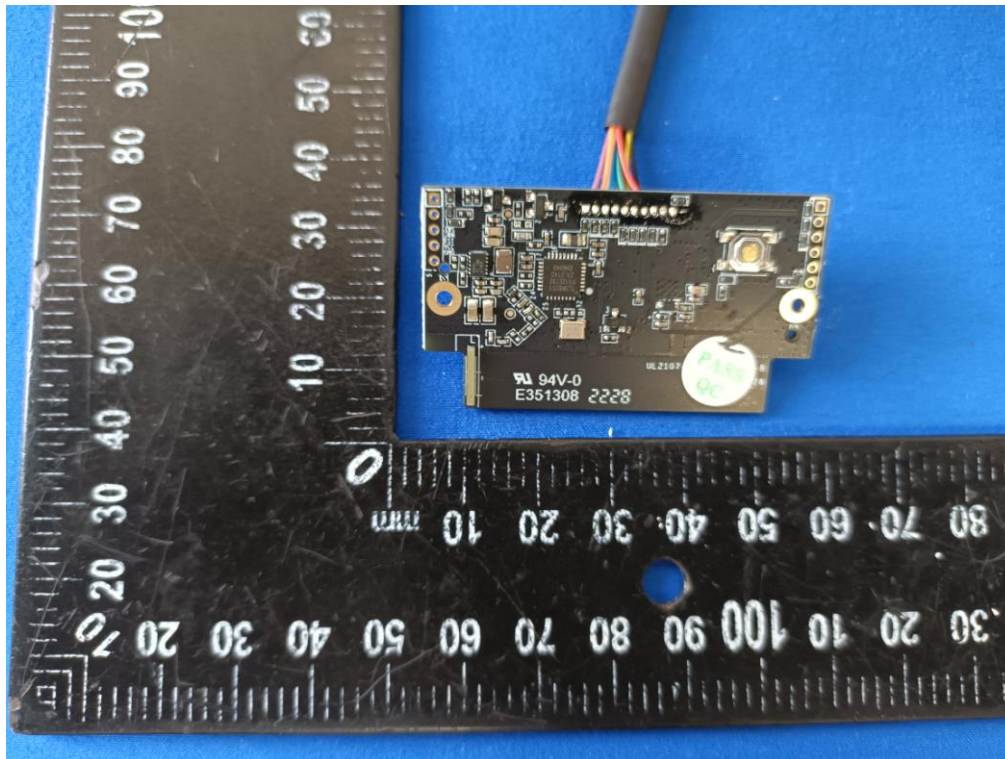
11. Photos of EUT

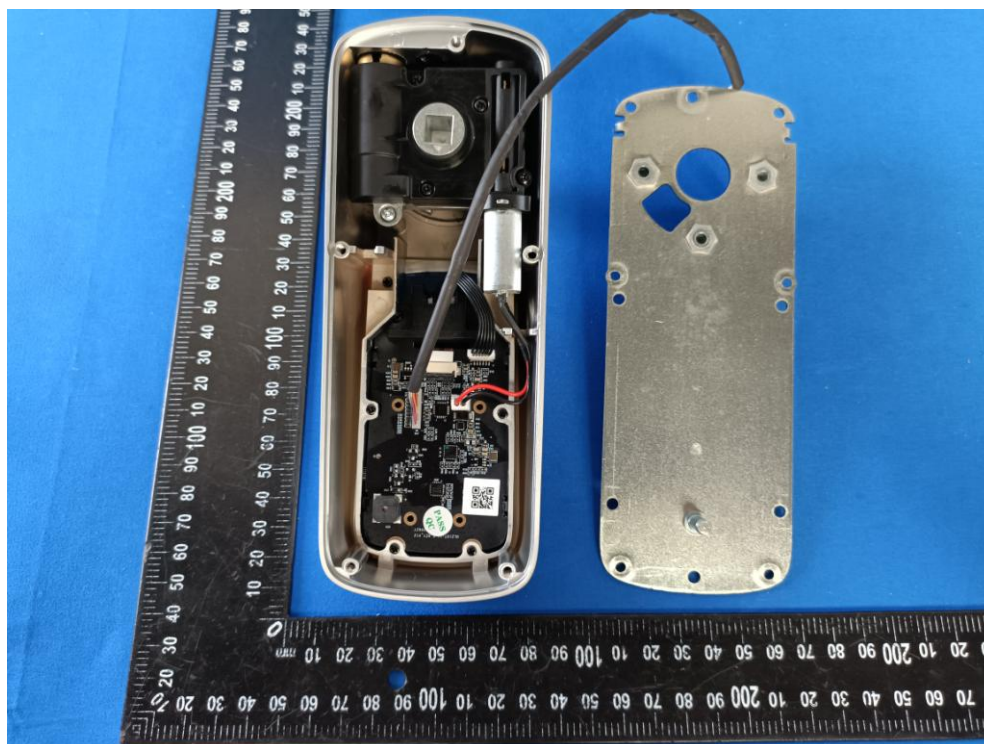


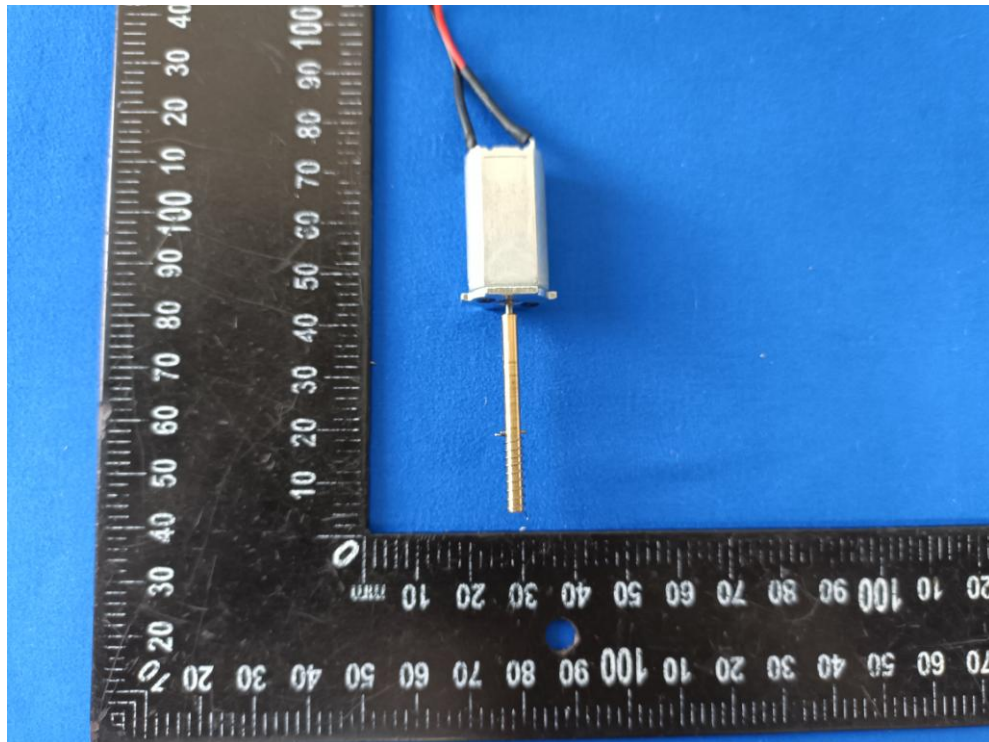
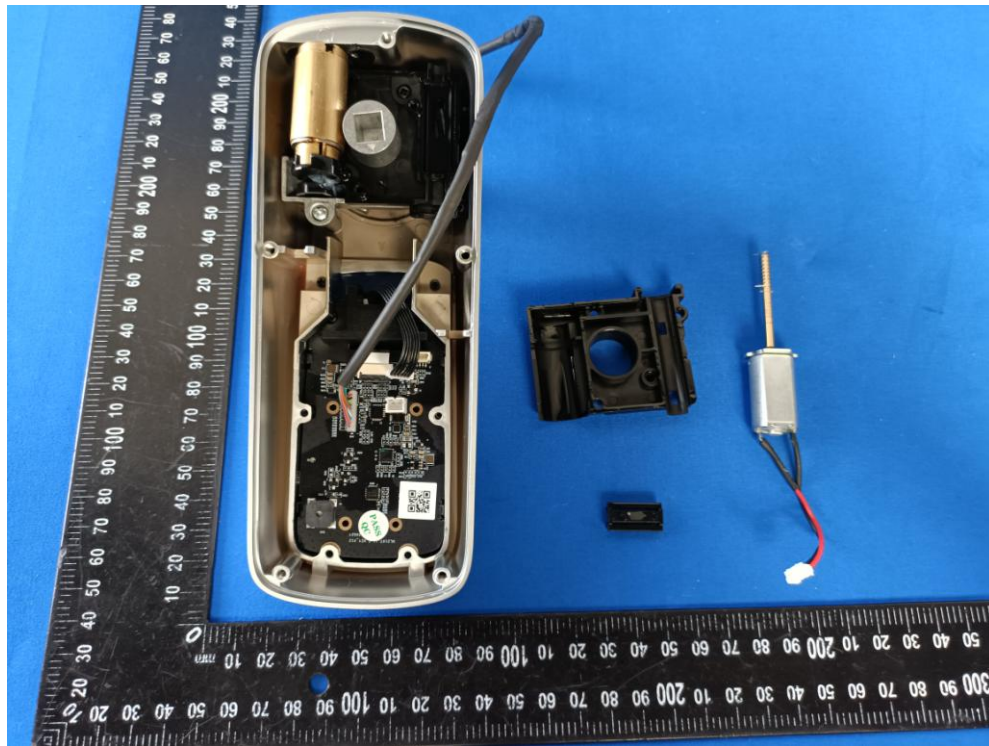


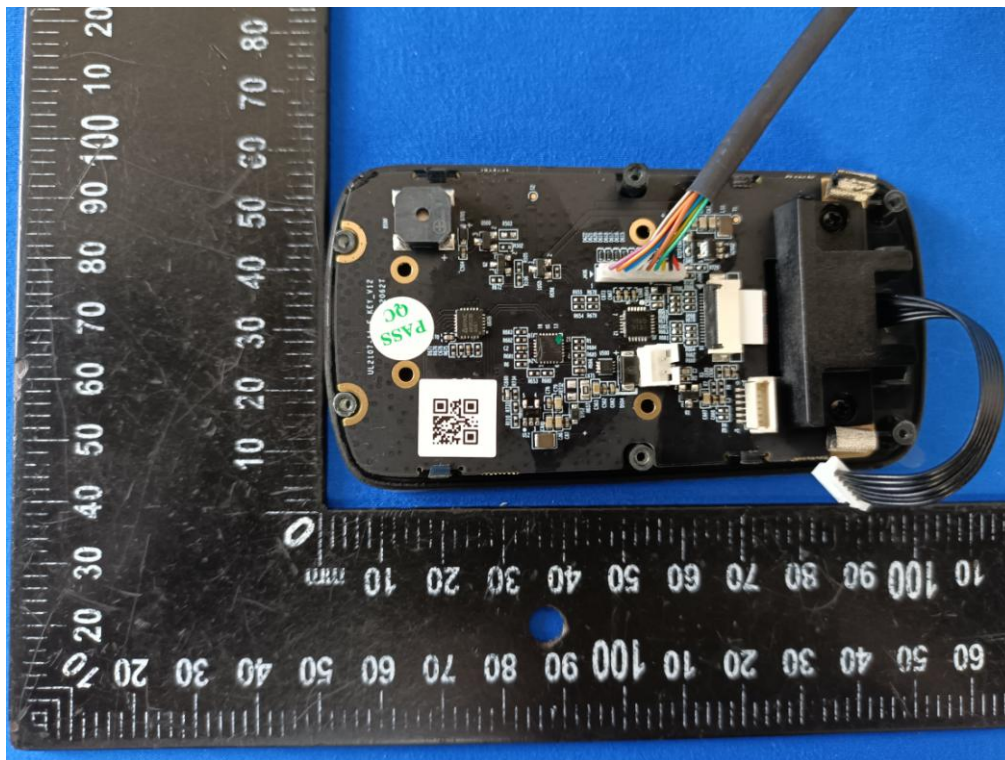
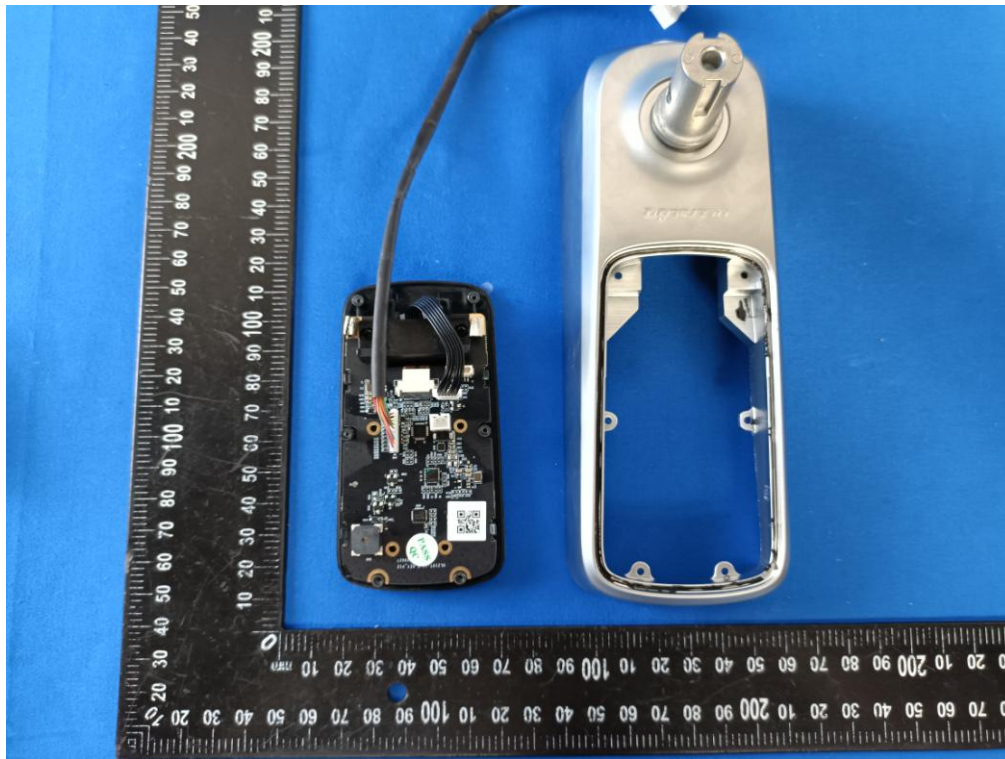


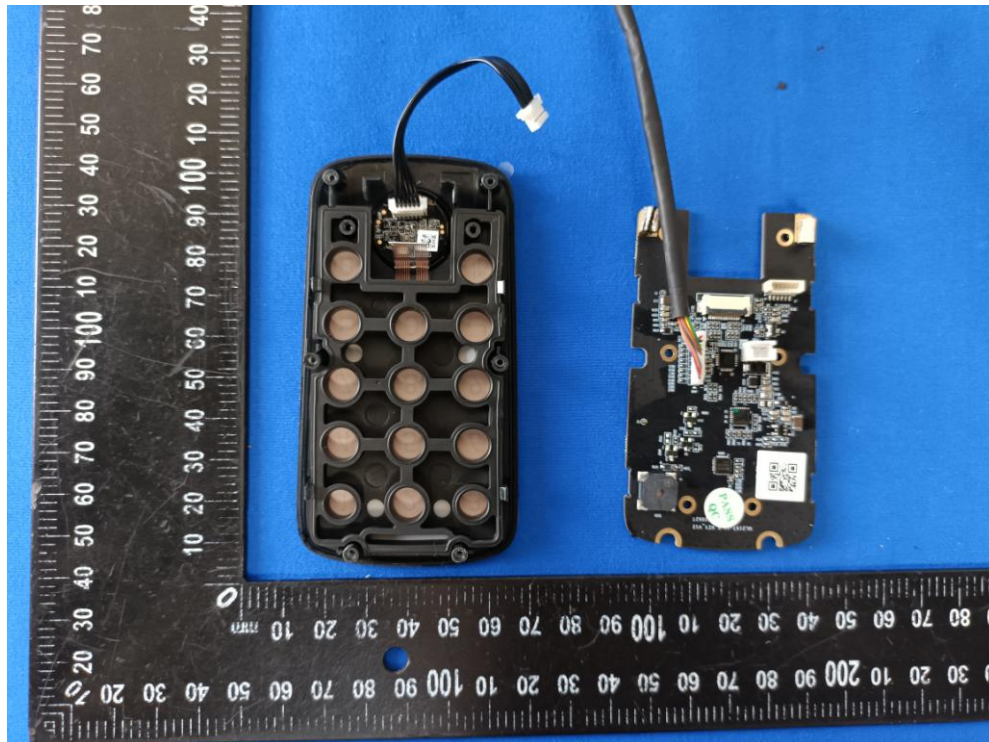
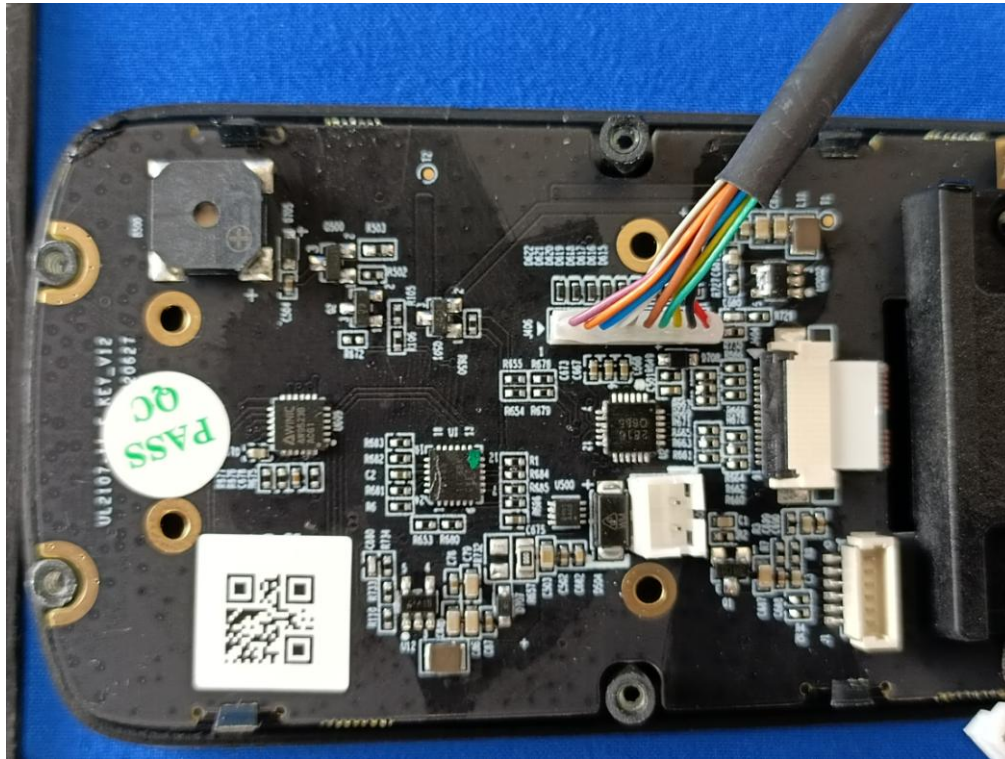


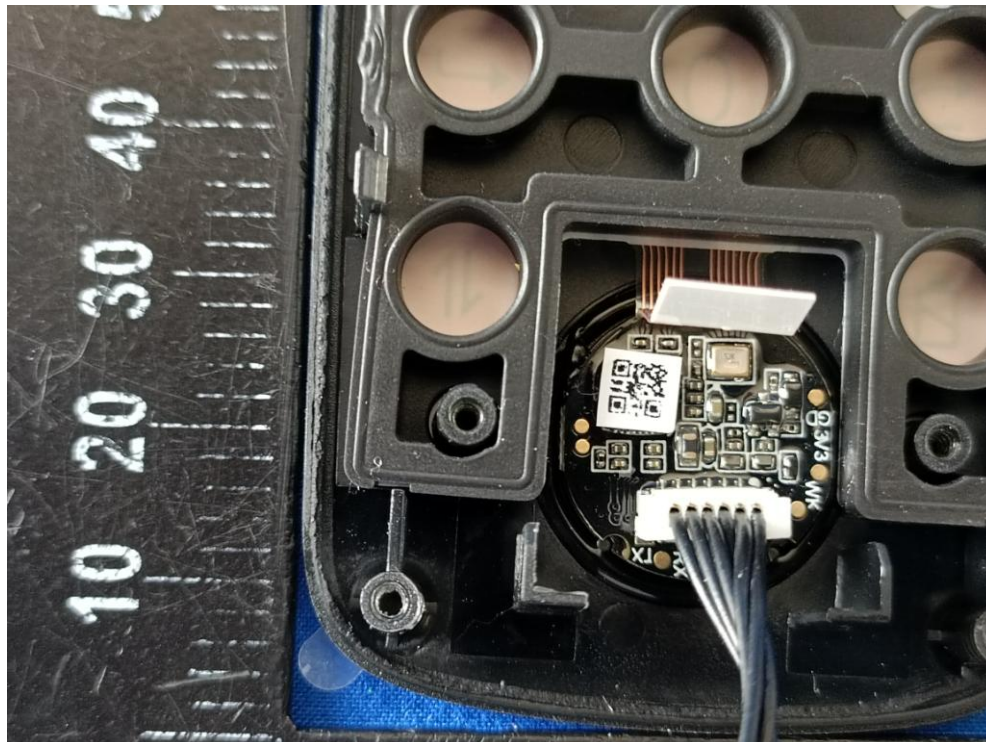
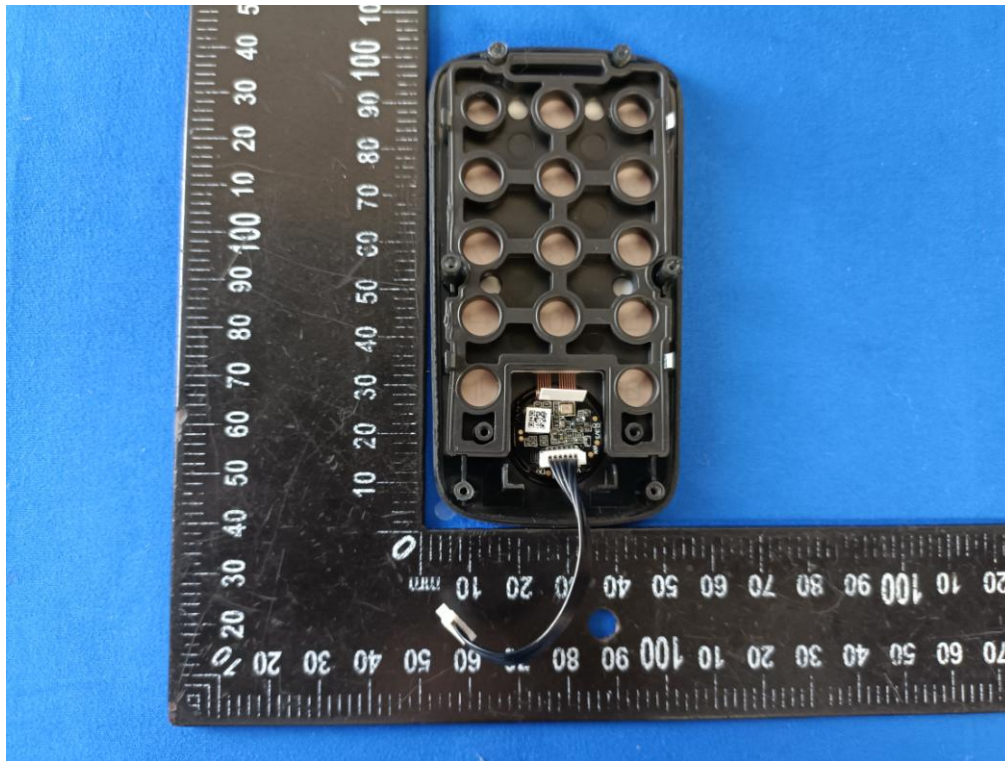


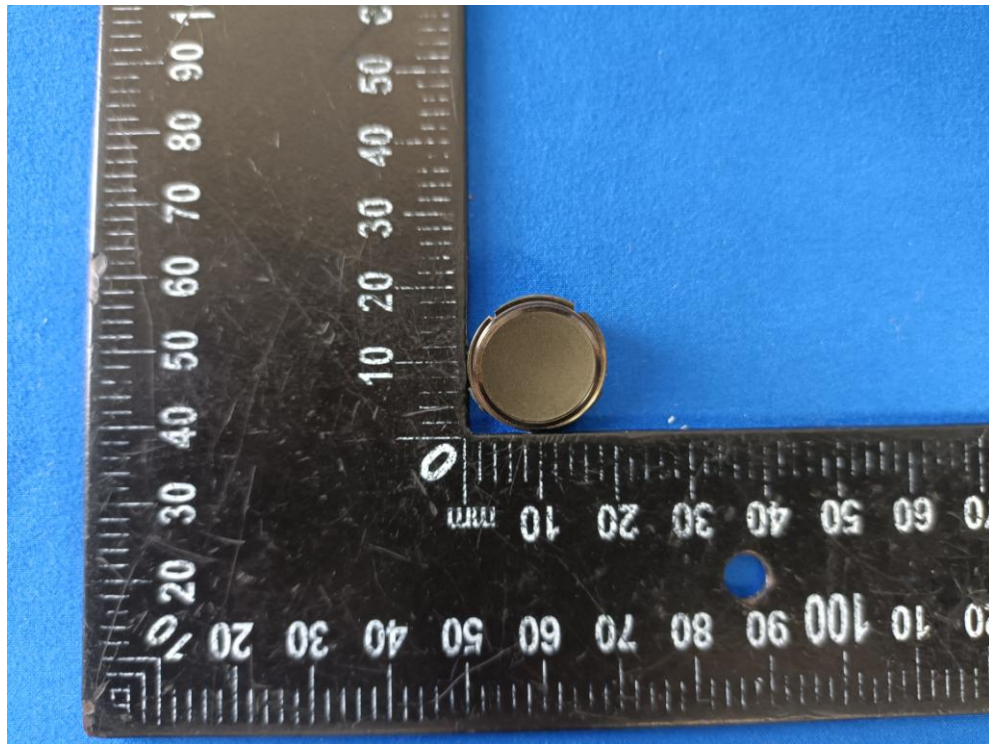
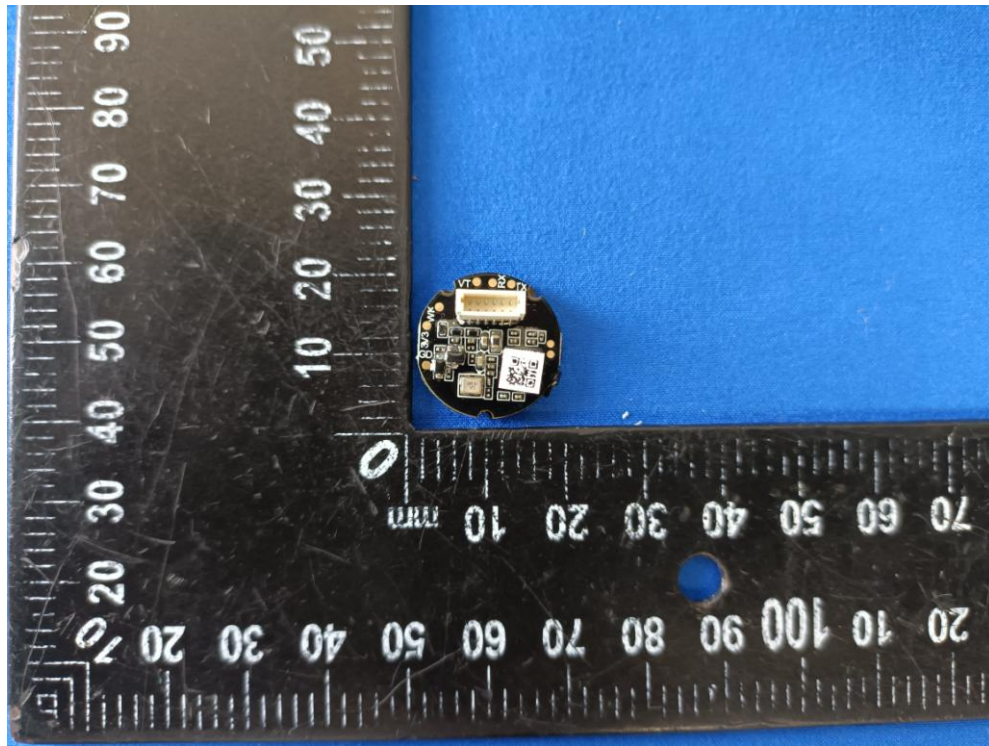


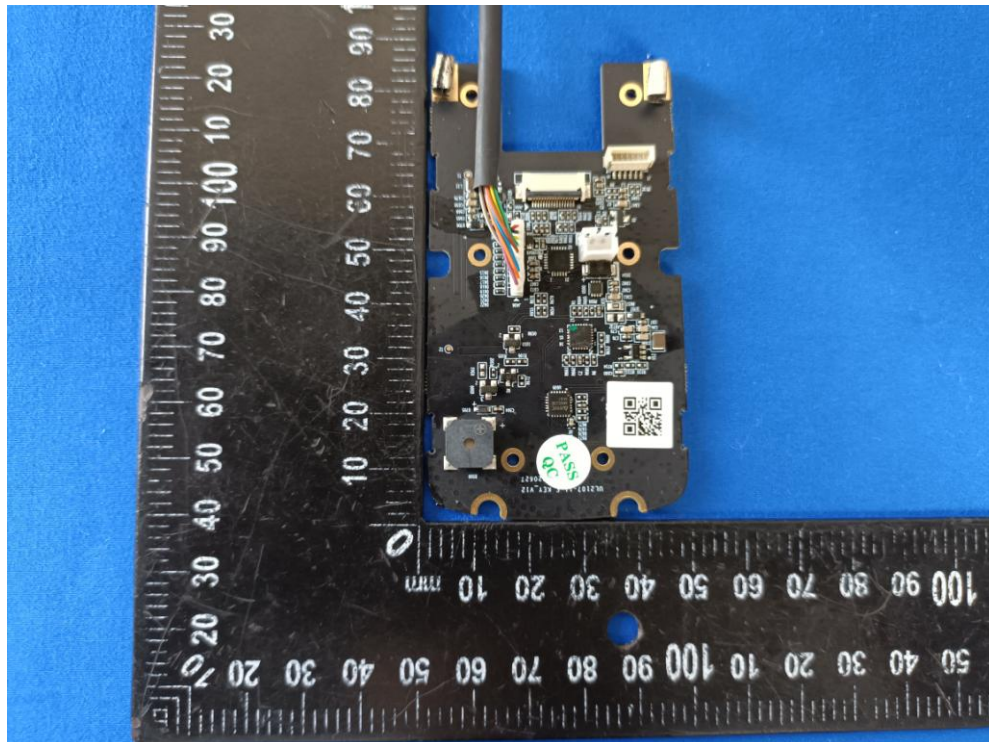
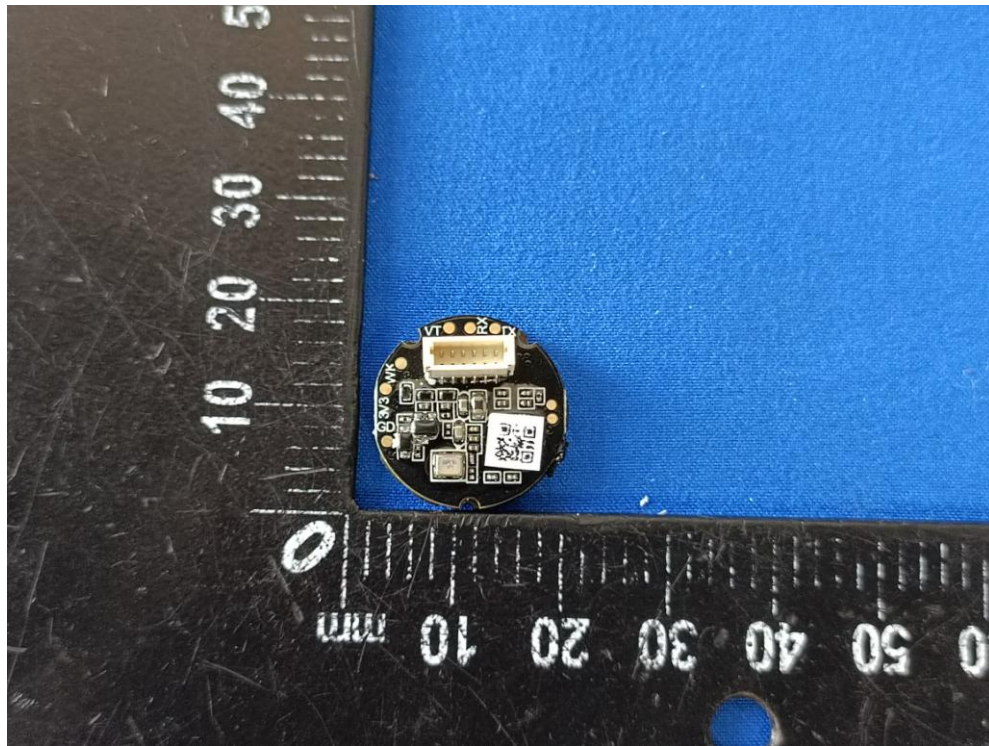


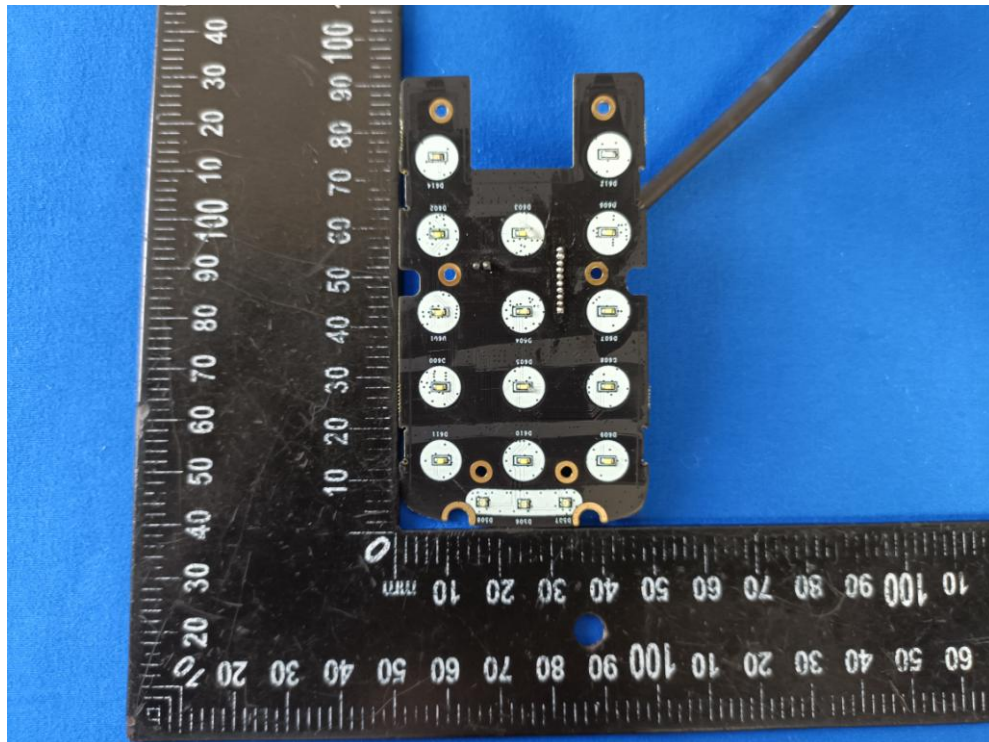
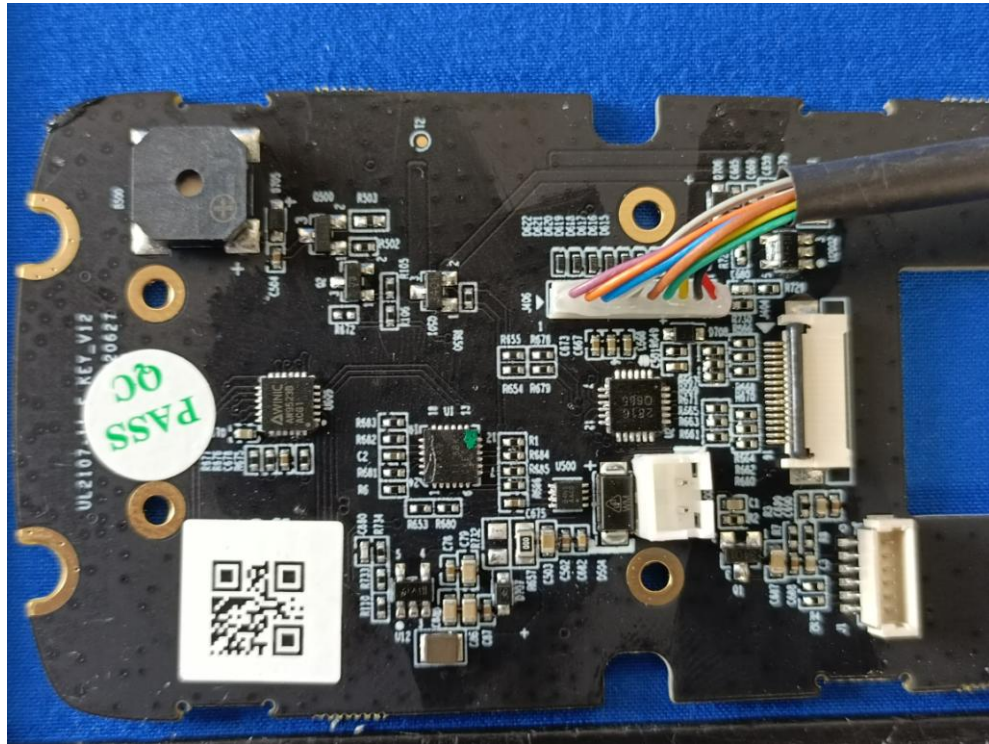












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