



FCC TEST REPORT

FCC ID: 2ATQZ-TDL4

On Behalf of

Shenzhen Mooer Audio Co.,Ltd

Guitar Stomp Box

Model No.: TDL4 (Ocean Machine II)

Prepared for : Shenzhen Mooer Audio Co.,Ltd
Address : 6F, Unit D, Jinghang Building, Liuxian 3rd Road, Baoan 71 District,
Shenzhen, 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 : A2308014-C02-R01
Date of Receipt : October 16, 2023
Date of Test : October 16, 2023–December 15, 2023
Date of Report : December 15, 2023
Version Number : V0
Test Result : Pass

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TEST REPORT DECLARATION

Applicant : Shenzhen Mooer Audio Co.,Ltd
 Address : 6F, Unit D, Jinghang Building, Liuxian 3rd Road, Baoan 71 District, Shenzhen, China
 Manufacturer : Shenzhen Mooer Audio Co.,Ltd
 Address : 6F, Unit D, Jinghang Building, Liuxian 3rd Road, Baoan 71 District, Shenzhen, China
 EUT Description : Guitar Stomp Box
 (A) Model No. : TDL4 (Ocean Machine II)
 (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



Approved by (name + signature).....: Reak Yang
Project Manager



Date of issue.....: December 15, 2023

Revision History

| Revision | Issue Date | Revisions | Revised By |
|----------|-------------------|------------------------|------------|
| V0 | December 15, 2023 | 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 |
| 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/PMN : Guitar Stomp Box

Model
Number/HVIN(s) : TDL4 (Ocean Machine II)
Diff. : N/A

Trademark : 

Test Voltage : DC 9V from DC Power

Radio Technology : 2.4g Technology

Operation
frequency : 2415-2455MHz

Channel No. : 3 Channels

Modulation type : GFSK

Antenna Type : PCB antenna, Maximum Gain is -0.58dBi.
(Antenna information is provided by applicant.)

Software Version : V1.0

Hardware version : V04

Remark: EUT has two RF antennas, only using PCB antenna, with a maximum gain of -0.58dBi, not suitable for chip antenna.

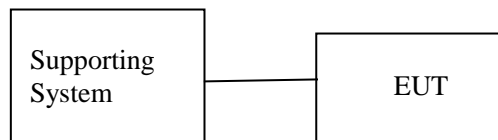
2.2. Accessories of Device (EUT)

Accessories1 : /
 Manufacturer : /
 Model : /
 Ratings : /

2.3. Tested Supporting System Details

| No. | Description | Manufacturer | Model | Serial Number | Certification |
|-----|-------------|--------------|--------------|---------------|---------------|
| 1. | Notebook | Lenovo | ThinkPad E14 | N/A | N/A |

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 :CH1 | 2415 |
| | Middle: CH2 | 2435 |
| | High: CH3 | 2455 |

2.6. Test Conditions

| Items | Required | Actual |
|--------------------|-----------|--------|
| Temperature range: | 15-35°C | 24°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

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 | 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 |

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 | 1316.3003K03-10 2082-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 | 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

| 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

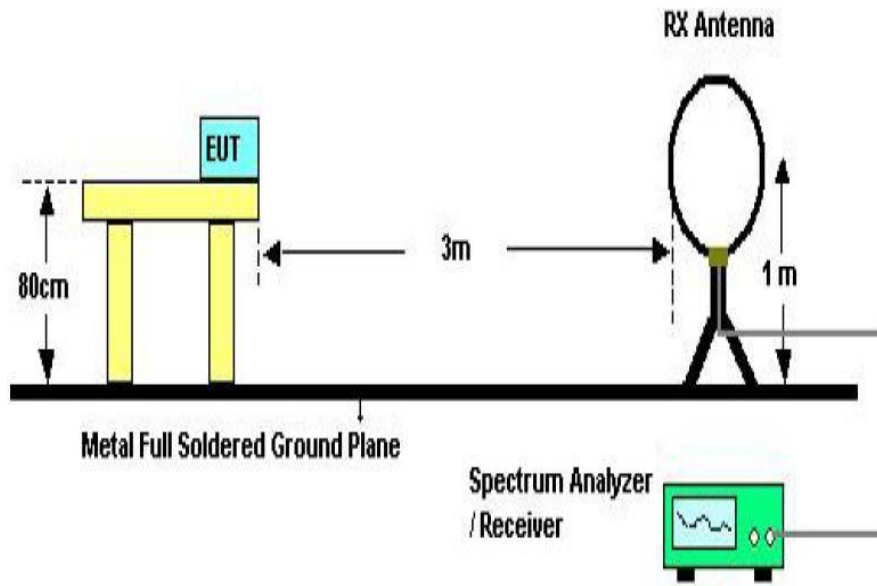
The measuring distance of 3m shall be used for measurements at frequency up to 1GH and above 1GHz, The EUT was placed on a rotating 0.8 m high above ground for below 1GHz and 1.5m high for above1GHz testing, The table was rotated 360 degrees to determine the position of the highest radiation The Test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

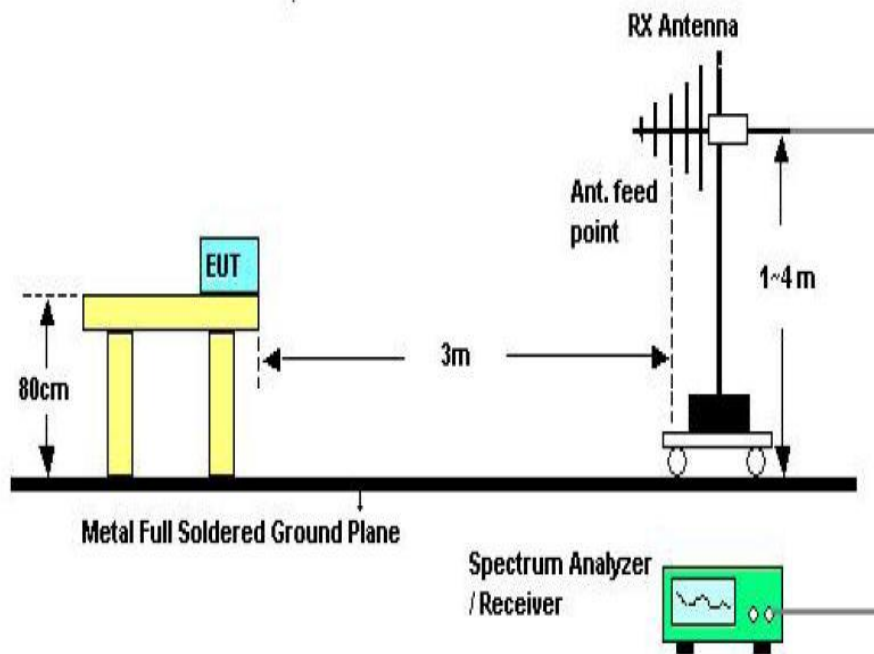
If Peak value comply with QP limit Below 1GHz.The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.

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

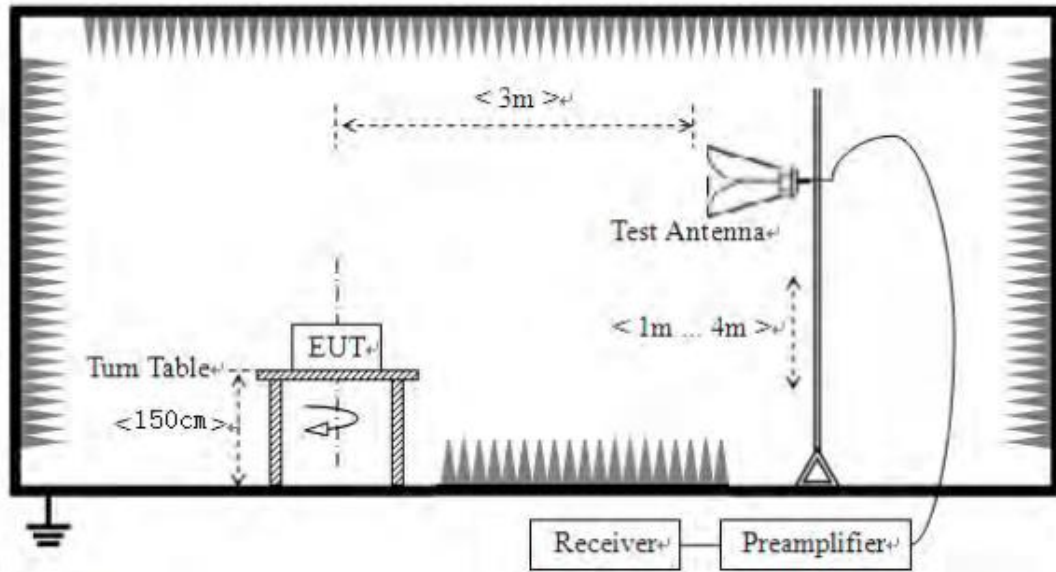
3.3. Test Setup



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.

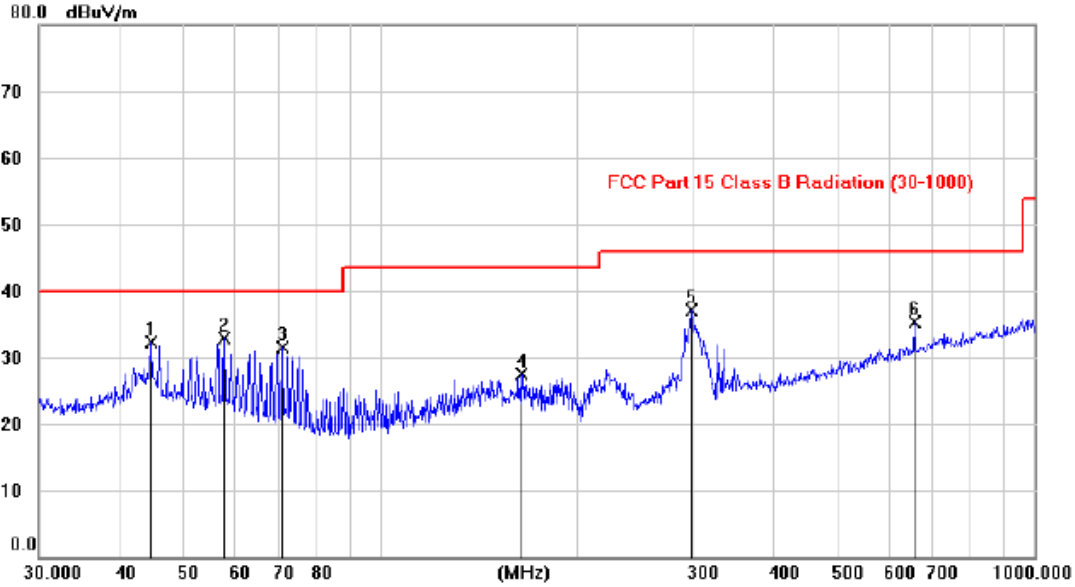
Detailed information please see the following page.

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.

| | | | |
|---|---------------------|------------------|-------------------------|
| From 30MHz to 1000MHz: Conclusion: PASS | | | |
| EUT Description | Guitar Stomp Box | Model No. | TDL4 (Ocean Machine II) |
| Temperature | 24.8°C | Humidity | 71% |
| Pol | Vertical | Test date | 2023/11/16 |
| Test Voltage | DC 9V from DC Power | Test mode | GFSK (2415MHz) |

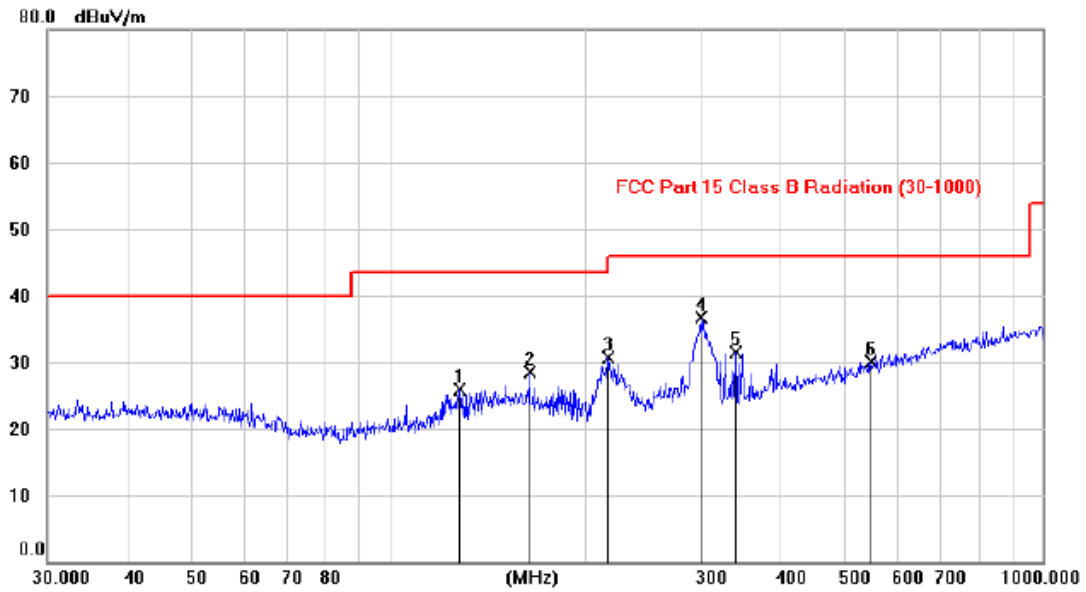


| No. | Mk. | Freq. | Reading Level | Correct Factor | Measurement | Limit | Margin | Antenna Height | Table Degree | |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | cm | degree | Comment |
| 1 | | 44.5556 | 18.11 | 14.16 | 32.27 | 40.00 | -7.73 | | | peak |
| 2 | * | 57.6748 | 19.56 | 13.41 | 32.97 | 40.00 | -7.03 | | | peak |
| 3 | | 70.8150 | 20.38 | 11.17 | 31.55 | 40.00 | -8.45 | | | peak |
| 4 | | 163.8699 | 12.91 | 14.67 | 27.58 | 43.50 | -15.92 | | | peak |
| 5 | | 298.6868 | 23.08 | 14.07 | 37.15 | 46.00 | -8.85 | | | peak |
| 6 | | 655.4565 | 14.10 | 21.16 | 35.26 | 46.00 | -10.74 | | | peak |

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

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

| | |
|------------|------------|
| Pol | Horizontal |
|------------|------------|



| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Margin dB | Detector | Antenna Height cm | Table Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|--------------|----------|-------------------------|-----------------|---------|
| 1 | | 128.5179 | 12.41 | 13.51 | 25.92 | 43.50 | -17.58 | peak | | | |
| 2 | | 163.8890 | 13.78 | 14.67 | 28.45 | 43.50 | -15.05 | peak | | | |
| 3 | | 216.2766 | 19.21 | 11.49 | 30.70 | 46.00 | -15.30 | peak | | | |
| 4 | * | 300.0164 | 22.51 | 14.10 | 36.61 | 46.00 | -9.39 | peak | | | |
| 5 | | 338.9939 | 16.52 | 15.05 | 31.57 | 46.00 | -14.43 | peak | | | |
| 6 | | 546.0755 | 10.97 | 19.12 | 30.09 | 46.00 | -15.91 | peak | | | |

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

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

*:Maximum data x:Over limit !:over margin

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

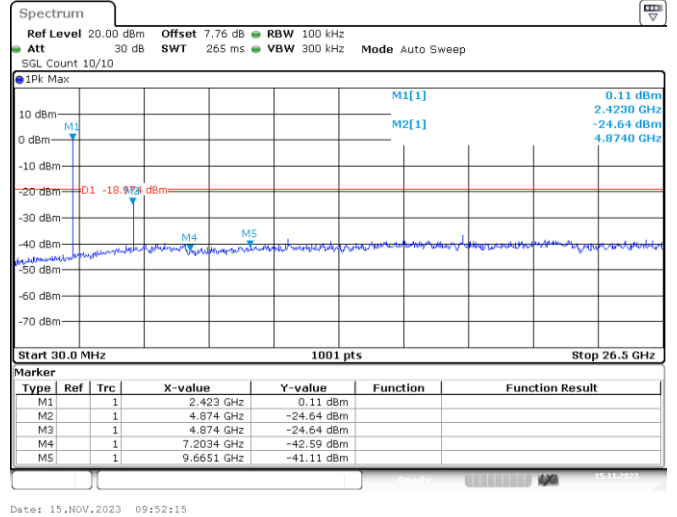
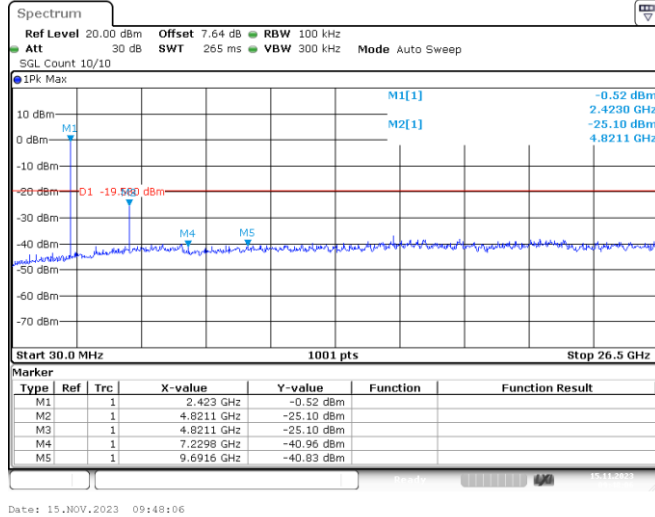
Remark: All modes have been tested, and only worst data of GFSK (2415MHz) was listed in this report.

From 1G-25GHz

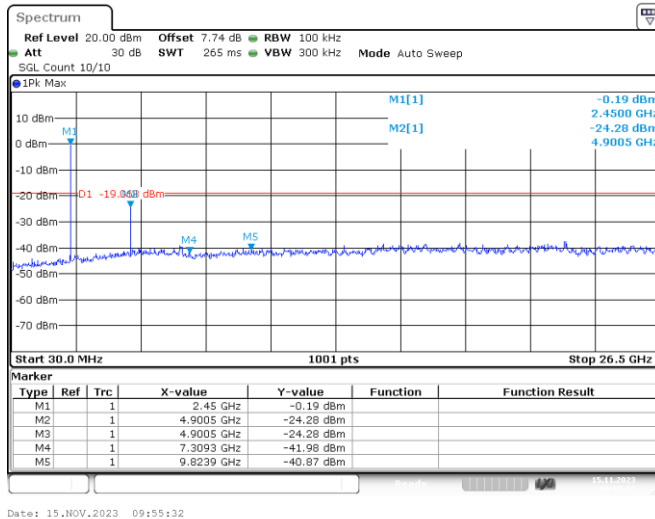
| Test Mode: TX Low | | | | | | | | | |
|---|---------------------|-------------|-----------------------|----------------|-----------------|-----------------|----------------|-------------|--------|
| Freq (MHz) | Read Level (dBuV/m) | Polar (H/V) | Antenna Factor (dB/m) | Cable loss(dB) | Amp Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
| 4830 | 43.40 | V | 33.95 | 10.18 | 34.26 | 53.27 | 74 | -20.73 | PK |
| 4830 | 38.66 | V | 33.95 | 10.18 | 34.26 | 48.53 | 54 | -5.47 | AV |
| 7245 | / | / | / | / | / | / | / | / | / |
| 9660 | / | / | / | / | / | / | / | / | / |
| 4830 | 45.89 | H | 33.95 | 10.18 | 34.26 | 55.76 | 74 | -18.24 | PK |
| 4830 | 34.37 | H | 33.95 | 10.18 | 34.26 | 44.24 | 54 | -9.76 | AV |
| 7245 | / | / | / | / | / | / | / | / | / |
| 9660 | / | / | / | / | / | / | / | / | / |
| Test Mode: TX Mid | | | | | | | | | |
| 4870 | 44.81 | V | 33.93 | 10.2 | 34.29 | 54.65 | 74 | -19.35 | PK |
| 4870 | 36.81 | V | 33.93 | 10.2 | 34.29 | 46.65 | 54 | -7.35 | AV |
| 7305 | / | / | / | / | / | / | / | / | / |
| 9740 | / | / | / | / | / | / | / | / | / |
| 4870 | 44.75 | H | 33.93 | 10.2 | 34.29 | 54.59 | 74 | -19.41 | PK |
| 4870 | 34.11 | H | 33.93 | 10.2 | 34.29 | 43.95 | 54 | -10.05 | AV |
| 7305 | / | / | / | / | / | / | / | / | / |
| 9740 | / | / | / | / | / | / | / | / | / |
| Test Mode: TX High | | | | | | | | | |
| 4910 | 44.38 | V | 33.98 | 10.22 | 34.25 | 54.33 | 74 | -19.67 | PK |
| 4910 | 33.90 | V | 33.98 | 10.22 | 34.25 | 43.85 | 54 | -10.15 | AV |
| 7365 | / | / | / | / | / | / | / | / | / |
| 9820 | / | / | / | / | / | / | / | / | / |
| 4910 | 43.83 | H | 33.98 | 10.22 | 34.25 | 53.78 | 74 | -20.22 | PK |
| 4910 | 34.28 | H | 33.98 | 10.22 | 34.25 | 44.23 | 54 | -9.77 | AV |
| 7365 | / | / | / | / | / | / | / | / | / |
| 9820 | / | / | / | / | / | / | / | / | / |
| 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 method:

| | | | |
|------------------------|------------------|------------------|-------------------------|
| EUT Description | Guitar Stomp Box | Model No. | TDL4 (Ocean Machine II) |
| Temperature | 24°C | Humidity | 56% |
| Test mode | GFSK (2415MHz) | Test mode | GFSK (2435MHz) |



Test mode GFSK (2455MHz)



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.

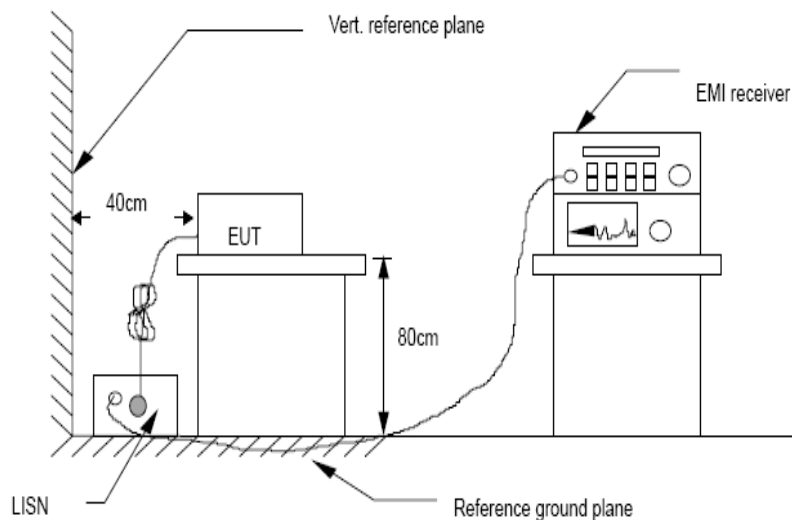
3. The limit decreases in line with the logarithm of the frequency in rang of 0.15 to 0.50 MHz.

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.

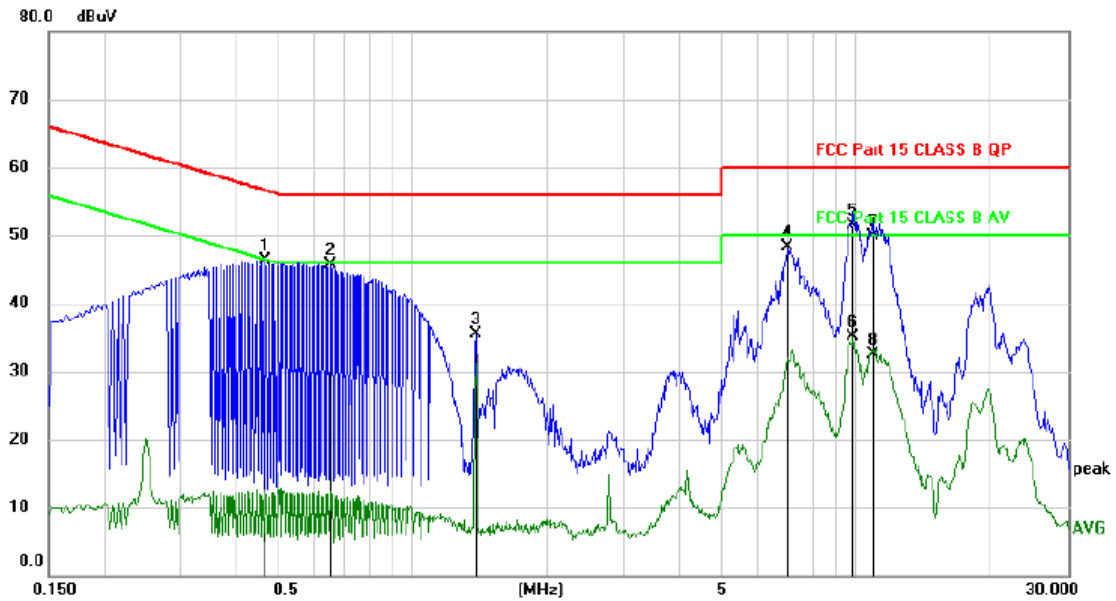
The bandwidth of test receiver is set at 9 kHz.

4.3. Test Setup



4.4. Test Results

| | | | |
|------------------------|---------------------|------------------|-------------------------|
| EUT Description | Guitar Stomp Box | Model No. | TDL4 (Ocean Machine II) |
| Temperature | 24.5°C | Humidity | 51% |
| Pol | Line | Test date | 2023/11/24 |
| Test Voltage | DC 9V from DC Power | Test mode | GFSK (2415MHz) |



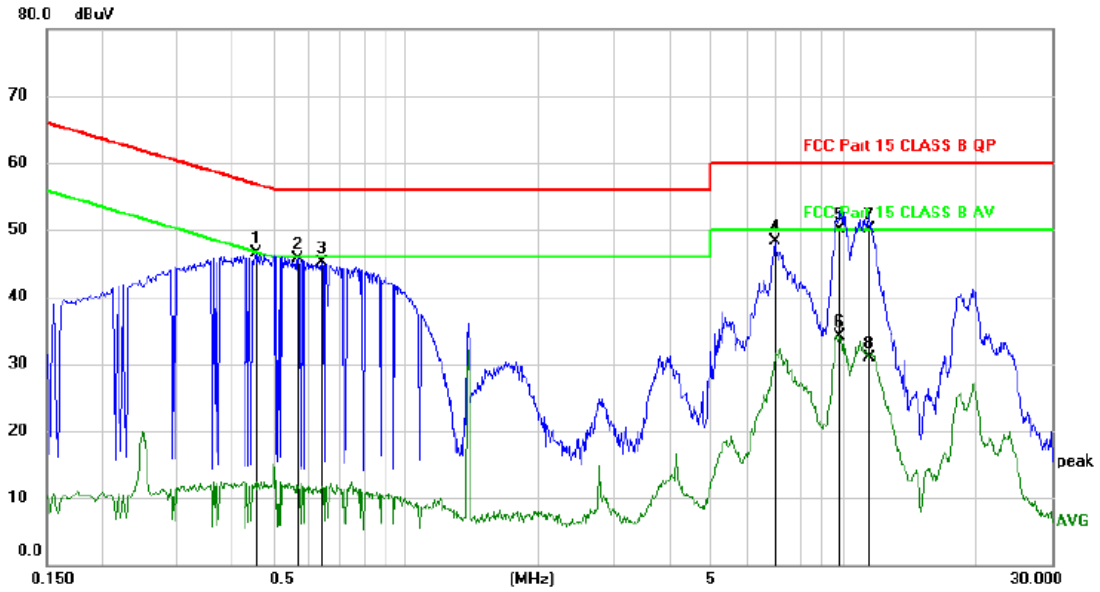
| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV | Limit dBuV | Margin dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|--------------|----------|---------|
| 1 | | 0.4620 | 36.45 | 9.95 | 46.40 | 56.66 | -10.26 | peak | |
| 2 | | 0.6480 | 35.85 | 9.92 | 45.77 | 56.00 | -10.23 | peak | |
| 3 | | 1.3860 | 25.64 | 9.89 | 35.53 | 56.00 | -20.47 | peak | |
| 4 | | 7.0080 | 38.17 | 10.12 | 48.29 | 60.00 | -11.71 | peak | |
| 5 | * | 9.8520 | 41.34 | 10.21 | 51.55 | 60.00 | -8.45 | QP | |
| 6 | | 9.8520 | 24.80 | 10.21 | 35.01 | 50.00 | -14.99 | AVG | |
| 7 | | 10.8720 | 39.65 | 10.23 | 49.88 | 60.00 | -10.12 | QP | |
| 8 | | 10.8720 | 22.32 | 10.23 | 32.55 | 50.00 | -17.45 | AVG | |

*: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

| | |
|------------|---------|
| Pol | Neutral |
|------------|---------|



| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV | Limit dBuV | Margin dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|--------------|----------|---------|
| 1 | | 0.4560 | 36.47 | 9.95 | 46.42 | 56.77 | -10.35 | peak | |
| 2 | | 0.5670 | 35.80 | 9.93 | 45.73 | 56.00 | -10.27 | peak | |
| 3 | | 0.6419 | 35.24 | 9.92 | 45.16 | 56.00 | -10.84 | peak | |
| 4 | | 6.9720 | 38.11 | 10.12 | 48.23 | 60.00 | -11.77 | peak | |
| 5 | * | 9.8490 | 39.90 | 10.21 | 50.11 | 60.00 | -9.89 | QP | |
| 6 | | 9.8490 | 23.85 | 10.21 | 34.06 | 50.00 | -15.94 | AVG | |
| 7 | | 11.4840 | 39.86 | 10.25 | 50.11 | 60.00 | -9.89 | QP | |
| 8 | | 11.4840 | 20.60 | 10.25 | 30.85 | 50.00 | -19.15 | AVG | |

*: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

*:Maximum data x:Over limit !:over margin

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 (2415MHz) was listed in this report.

5. Conducted Maximum Output Power

5.1. Test limits

Please refer section RSS-247 & 15.247.

5.2. Test Procedure

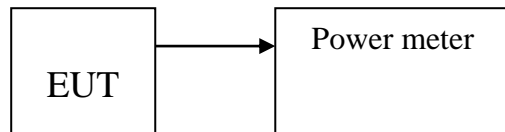
Details see the KDB558074 D01 Meas Guidance V05

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 AVG 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

| Condition | Mode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Duty Factor (dB) | E.I.R.P (dBm) | Limit (dBm) | Verdict |
|-----------|------|-----------------|---------|-----------------------|------------------|---------------|-------------|---------|
| NVNT | 2.4G | 2415 | Ant1 | -1.34 | 0 | 0.16 | 30 | Pass |
| NVNT | 2.4G | 2435 | Ant1 | -0.577 | 0 | 0.923 | 30 | Pass |
| NVNT | 2.4G | 2455 | Ant1 | -0.852 | 0 | 0.648 | 30 | Pass |

6. 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 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 V05

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

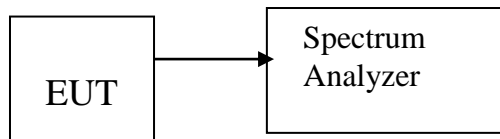
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Detector = RMS. 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=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.

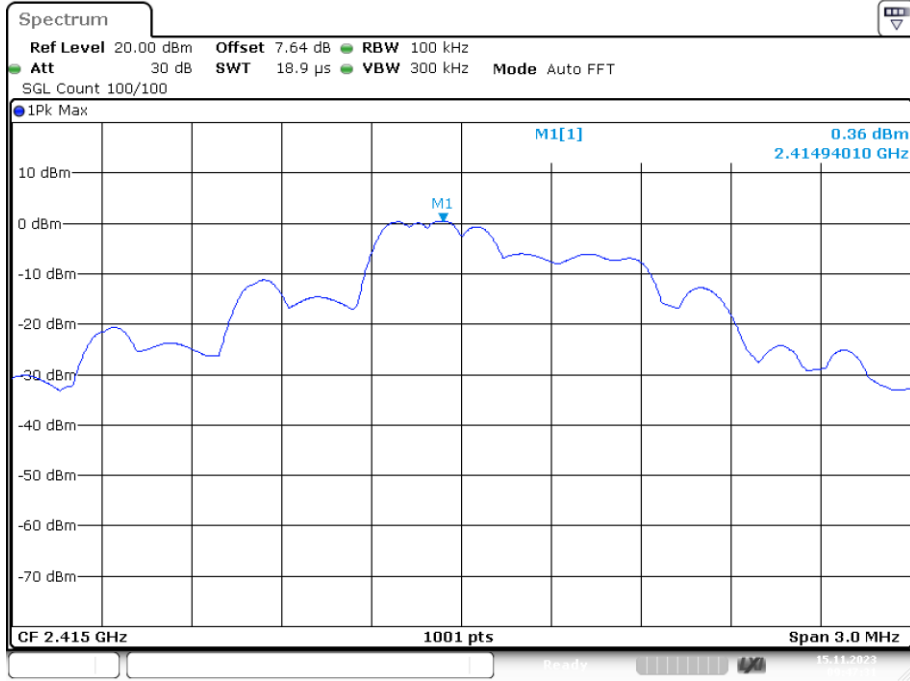
6.3. Test Setup



6.4. Test Results

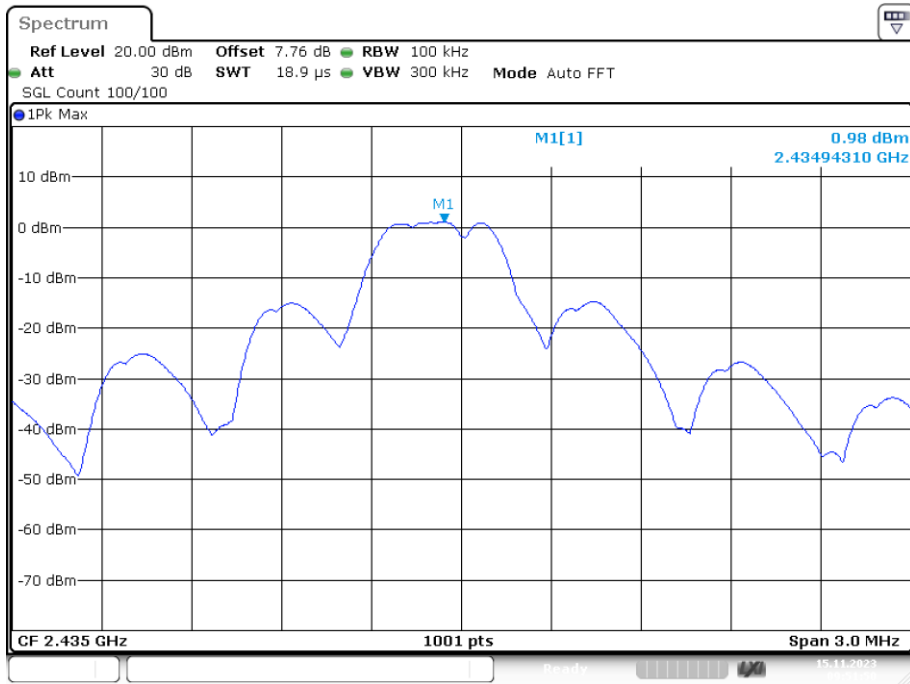
| Condition | Mode | Frequency (MHz) | Antenna | Max PSD (dBm) | Limit (dBm) | Verdict |
|-----------|------|-----------------|---------|---------------|-------------|---------|
| NVNT | 2.4G | 2415 | Ant1 | 0.357 | 8 | Pass |
| NVNT | 2.4G | 2435 | Ant1 | 0.984 | 8 | Pass |
| NVNT | 2.4G | 2455 | Ant1 | 0.849 | 8 | Pass |

PSD NVNT 2.4G 2415MHz Ant1



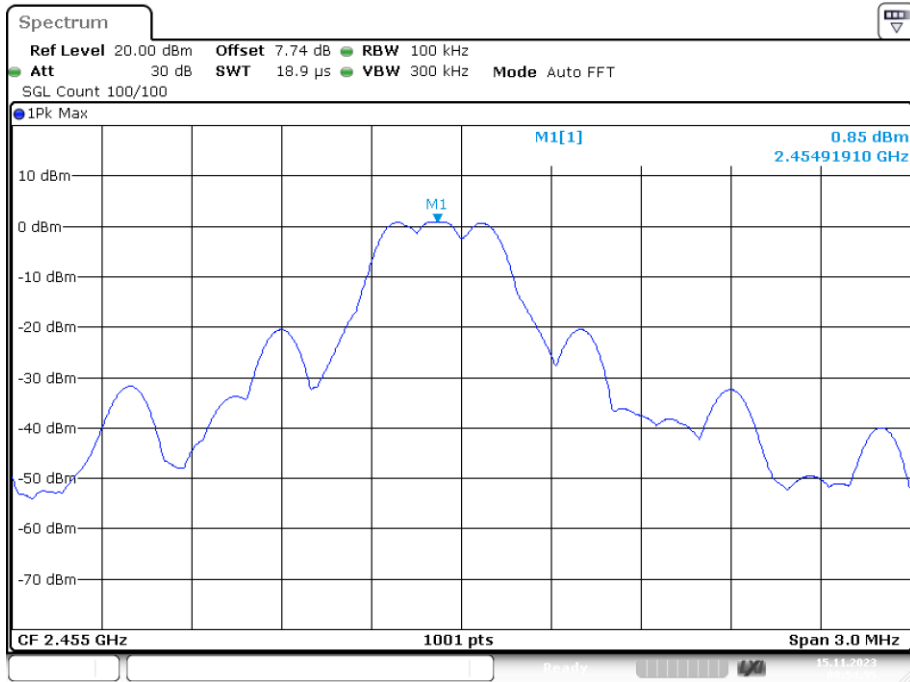
Date: 15.NOV.2023 09:47:31

PSD NVNT 2.4G 2435MHz Ant1



Date: 15.NOV.2023 09:51:51

PSD NVNT 2.4G 2455MHz Ant1



Date: 15.NOV.2023 09:54:54

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.

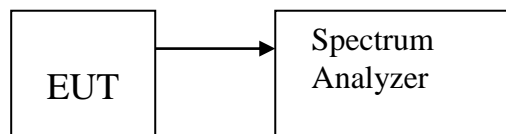
7.2. Test Procedure

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 = 100kHz, VBW $\geq 3 \times$ RBW = 300kHz,, Sweep time set auto, detail see the test plot.

7.3. Test Setup

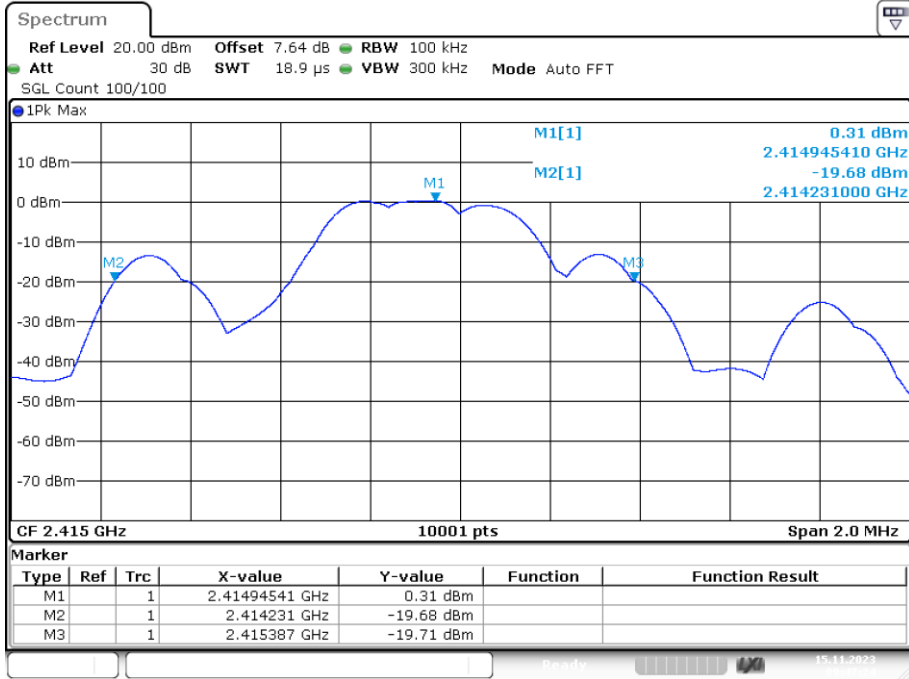


7.4. Test Results

-6dB Bandwidth

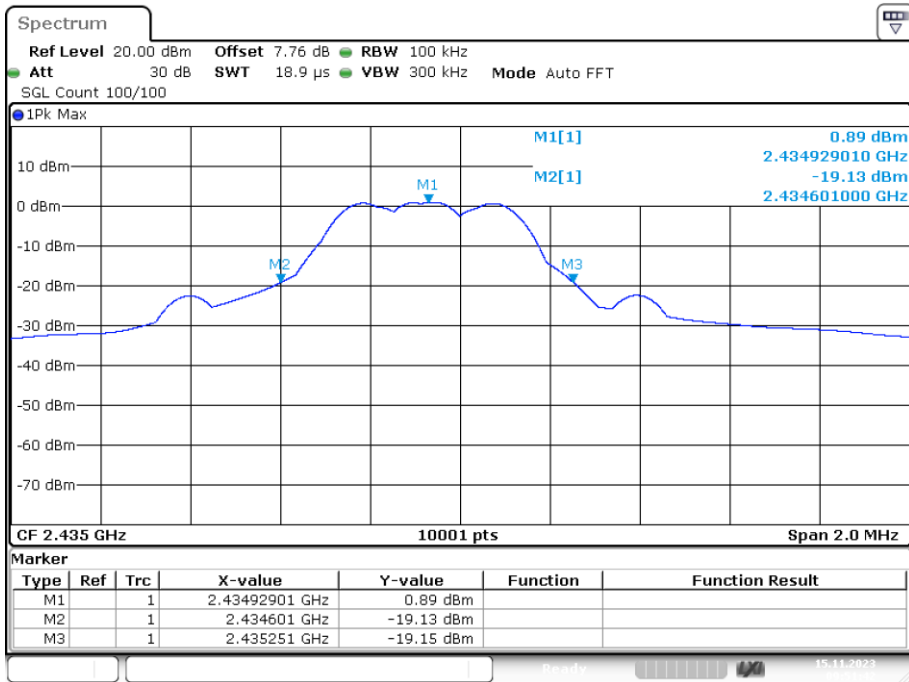
| Condition | Mode | Frequency (MHz) | Antenna | -6 dB Bandwidth (MHz) | Limit -6 dB Bandwidth (MHz) | Verdict |
|-----------|------|-----------------|---------|-----------------------|-----------------------------|---------|
| NVNT | 2.4G | 2415 | Ant1 | 1.156 | / | Pass |
| NVNT | 2.4G | 2435 | Ant1 | 0.649 | / | Pass |
| NVNT | 2.4G | 2455 | Ant1 | 0.608 | / | Pass |

-6dB Bandwidth NVNT 2.4G 2415MHz Ant1



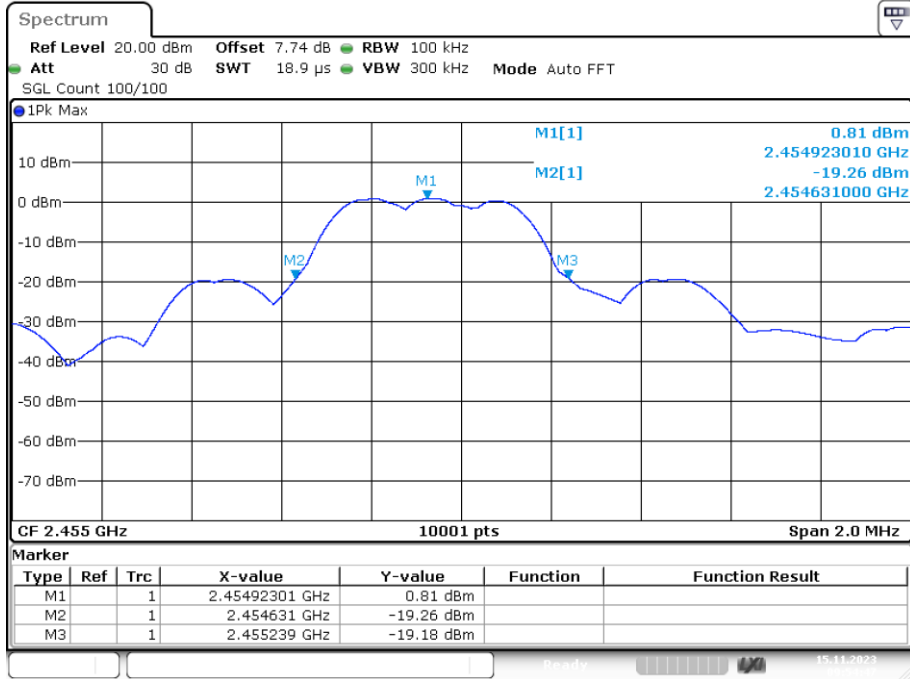
Date: 15.NOV.2023 09:47:24

-6dB Bandwidth NVNT 2.4G 2435MHz Ant1



Date: 15.NOV.2023 09:51:42

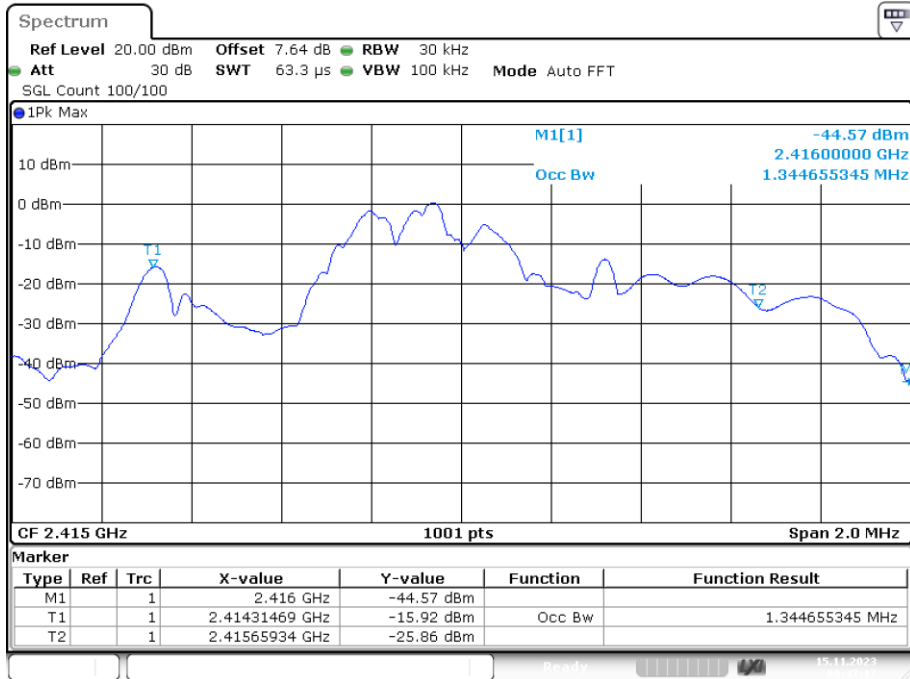
-6dB Bandwidth NVNT 2.4G 2455MHz Ant1



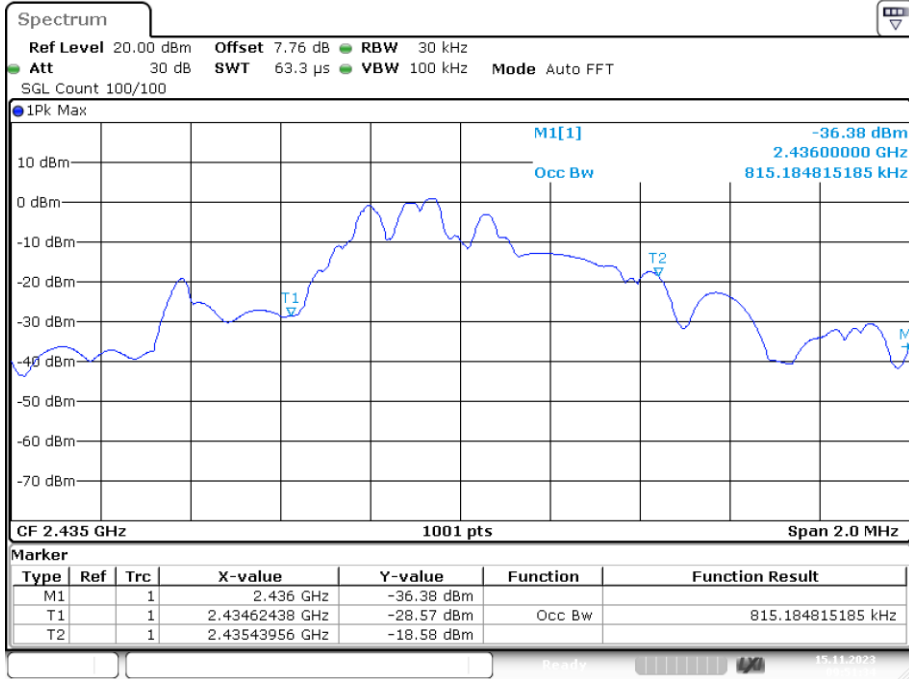
Occupied Channel Bandwidth

| Condition | Mode | Frequency (MHz) | Antenna | 99% OBW (MHz) |
|-----------|------|-----------------|---------|---------------|
| NVNT | 2.4G | 2415 | Ant1 | 1.345 |
| NVNT | 2.4G | 2435 | Ant1 | 0.815 |
| NVNT | 2.4G | 2455 | Ant1 | 0.47 |

OBW NVNT 2.4G 2415MHz Ant1

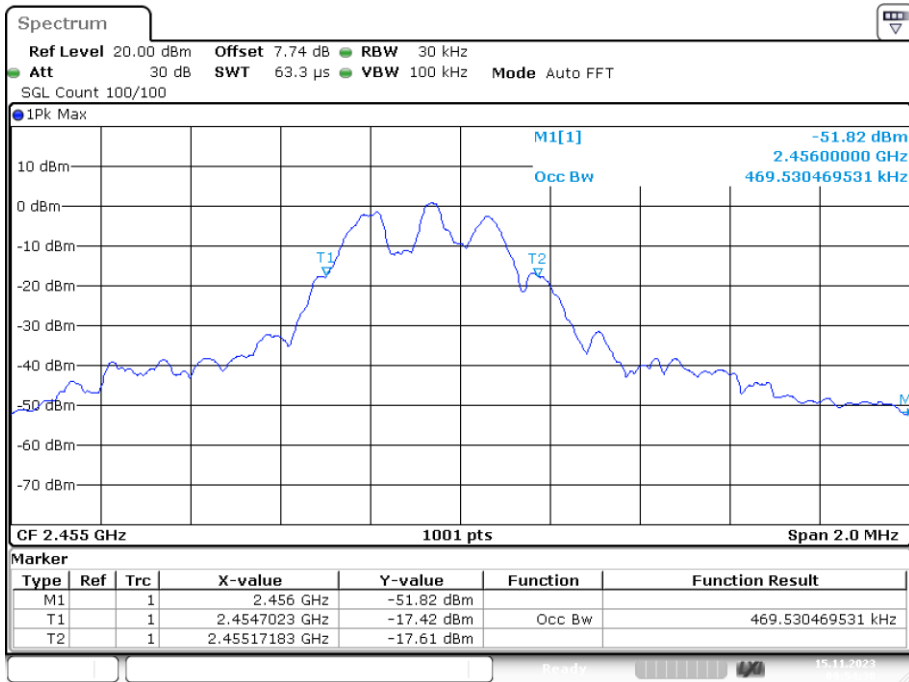


OBW NVNT 2.4G 2435MHz Ant1



Date: 15.NOV.2023 09:51:34

OBW NVNT 2.4G 2455MHz Ant1



Date: 15.NOV.2023 09:54:37

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 V05

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.

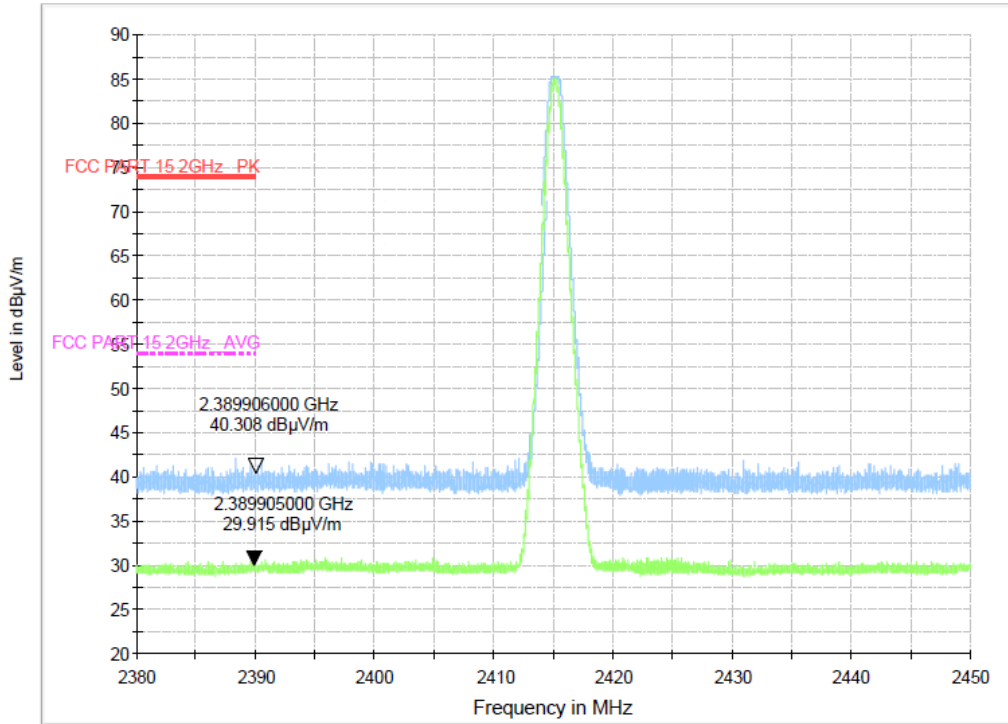
8.2.3 RBW 1MHz ,VBW 3MHz ,peak detector for peak value , RBW 1MHz ,VBW 3MHz ,RMS detector for AV value.

8.3. Test Setup

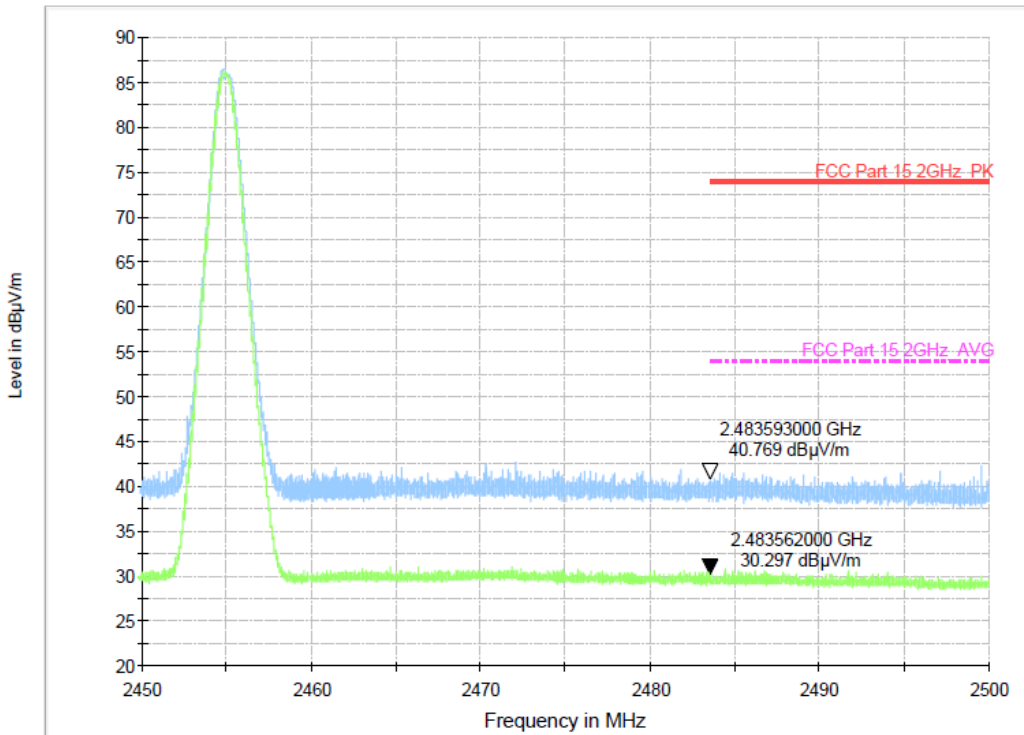
Same as 5.2.2.

8.4. Test Results

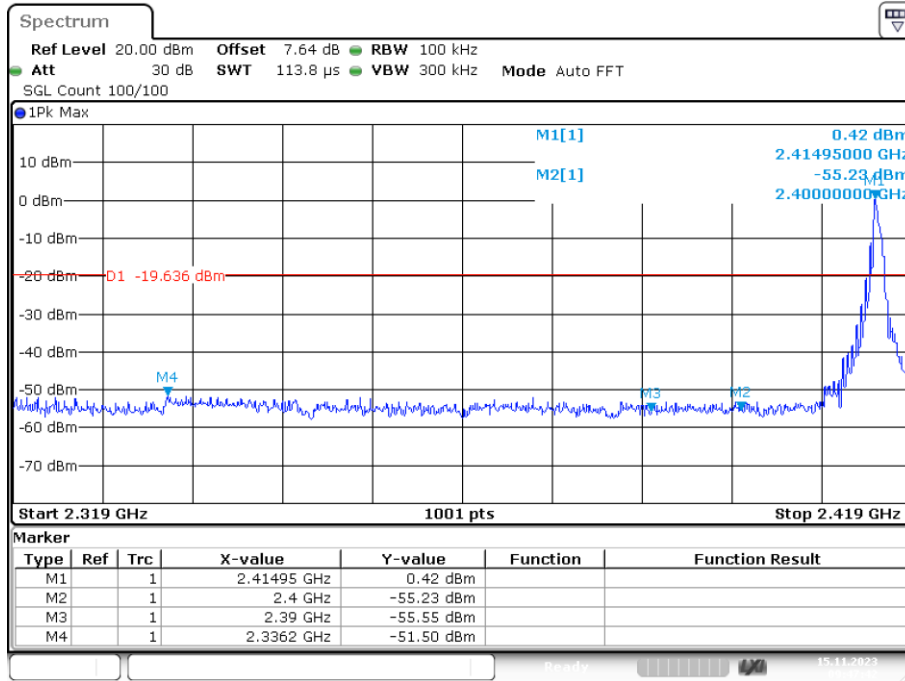
Radiated Method:
Test Mode: Low



Test Mode: High

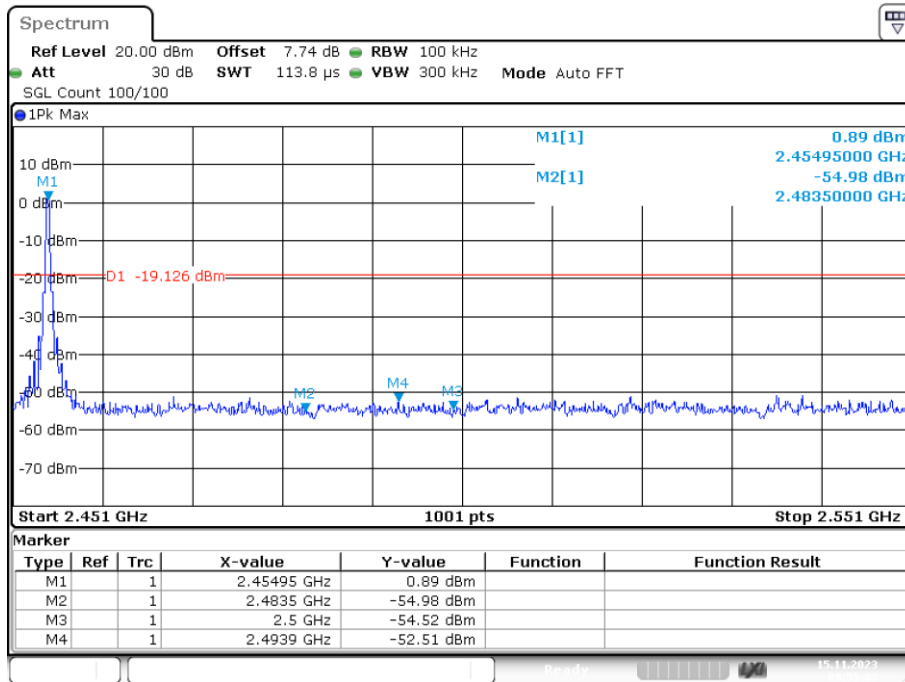


Conducted Method:



Date: 15.NOV.2023 09:47:42

Lowest channel



Date: 15.NOV.2023 09:55:07

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 2.4G, but the use of a standard antenna jack or electrical connector is prohibited.

9.2. Antenna Connected Construction

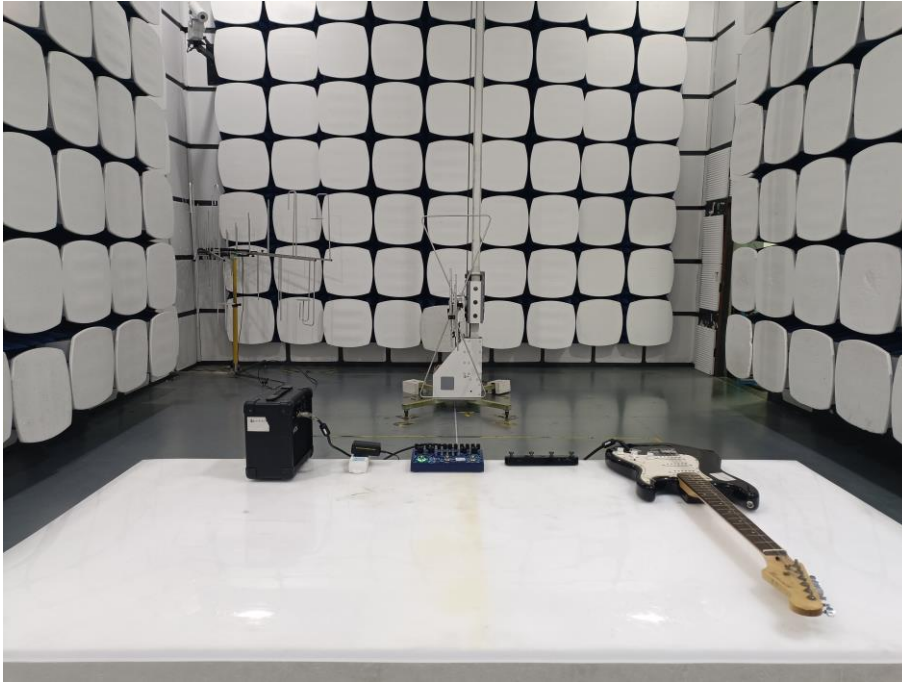
The antenna is PCB antenna and no consideration of replacement. Please see EUT photo for details.

9.3. Results

The EUT antenna 1 is Internal antenna. It complies with the standard requirement.

10. Test Setup Photo

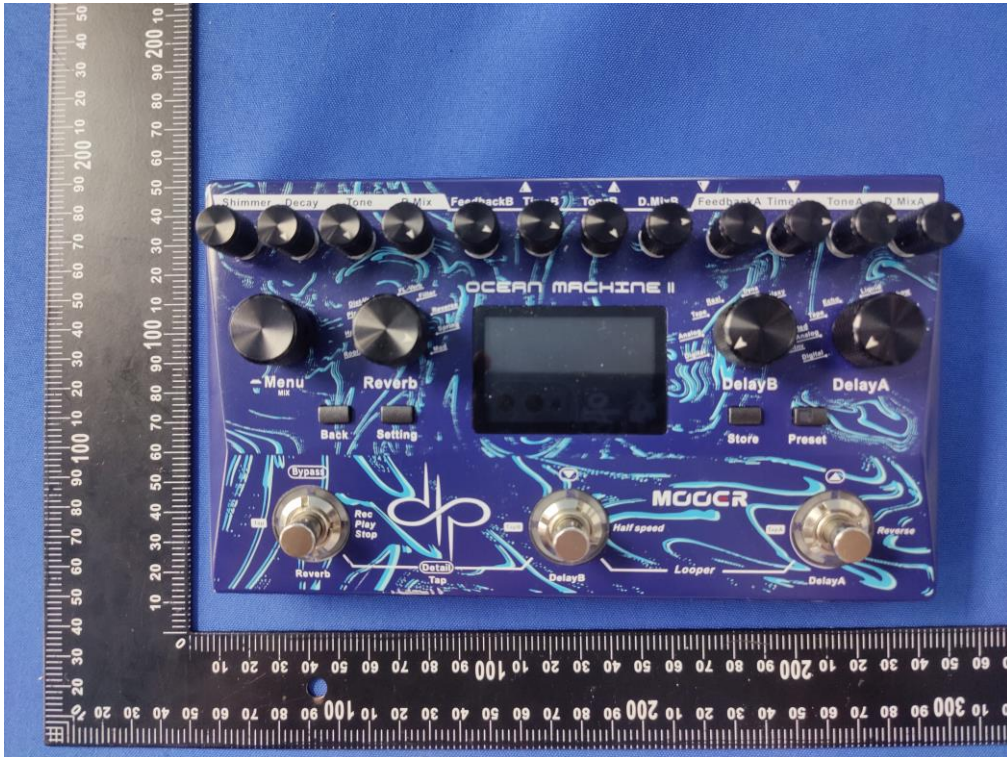
10.1. Photos of Radiated emission

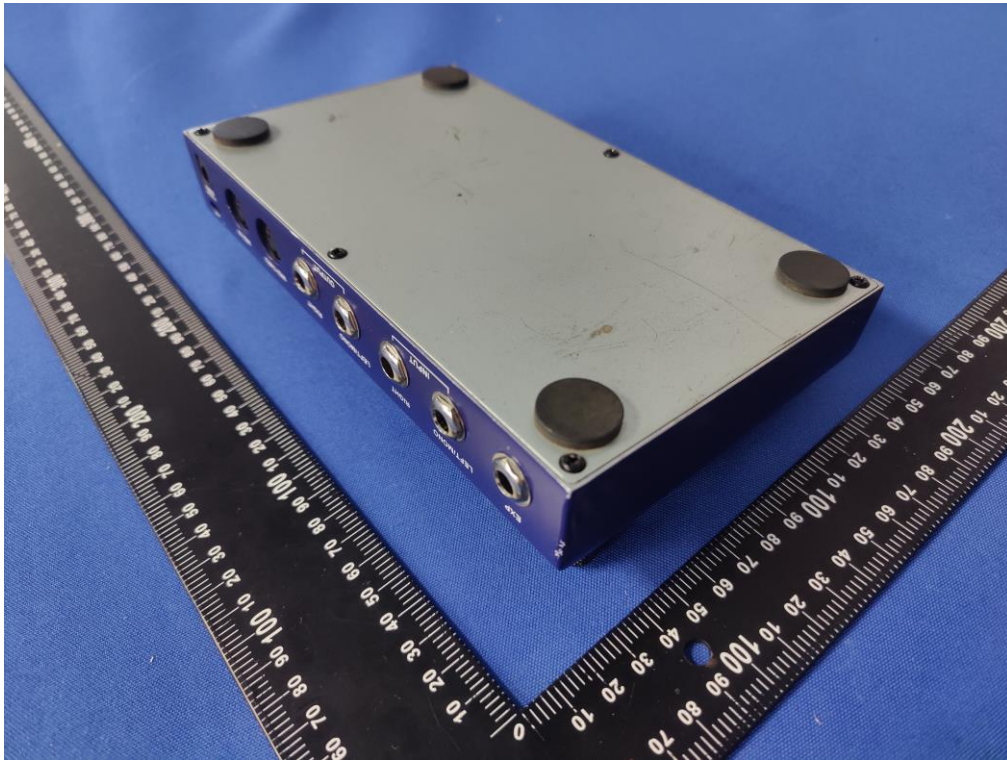


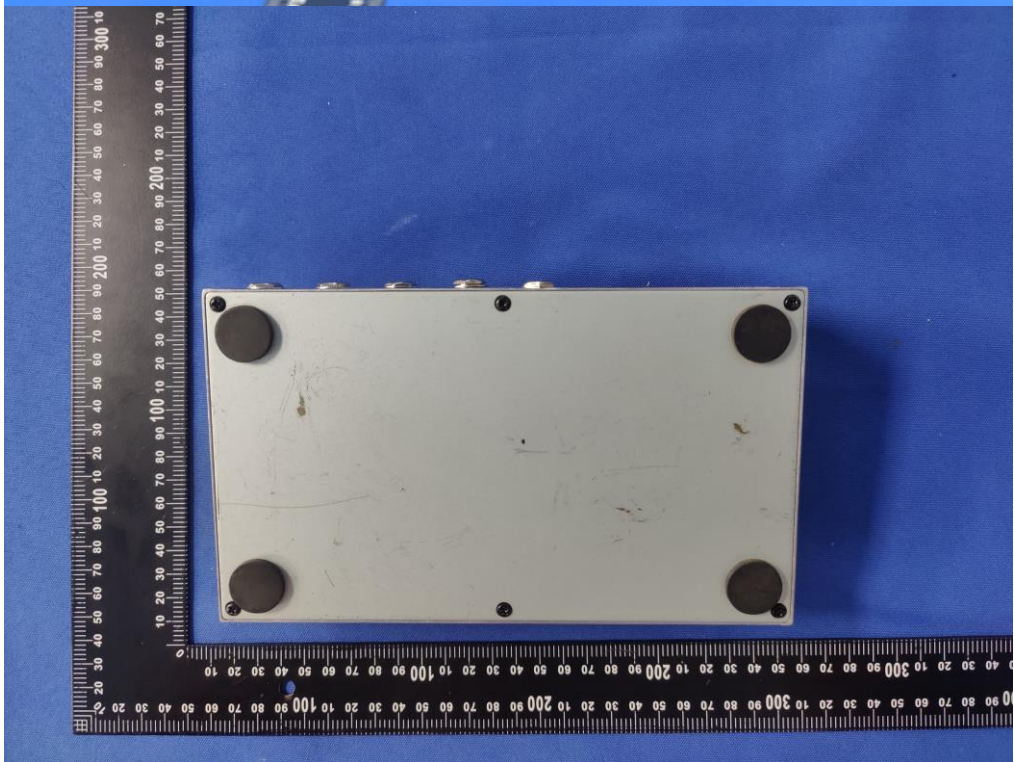
10.2.Photos of Conducted Emission test

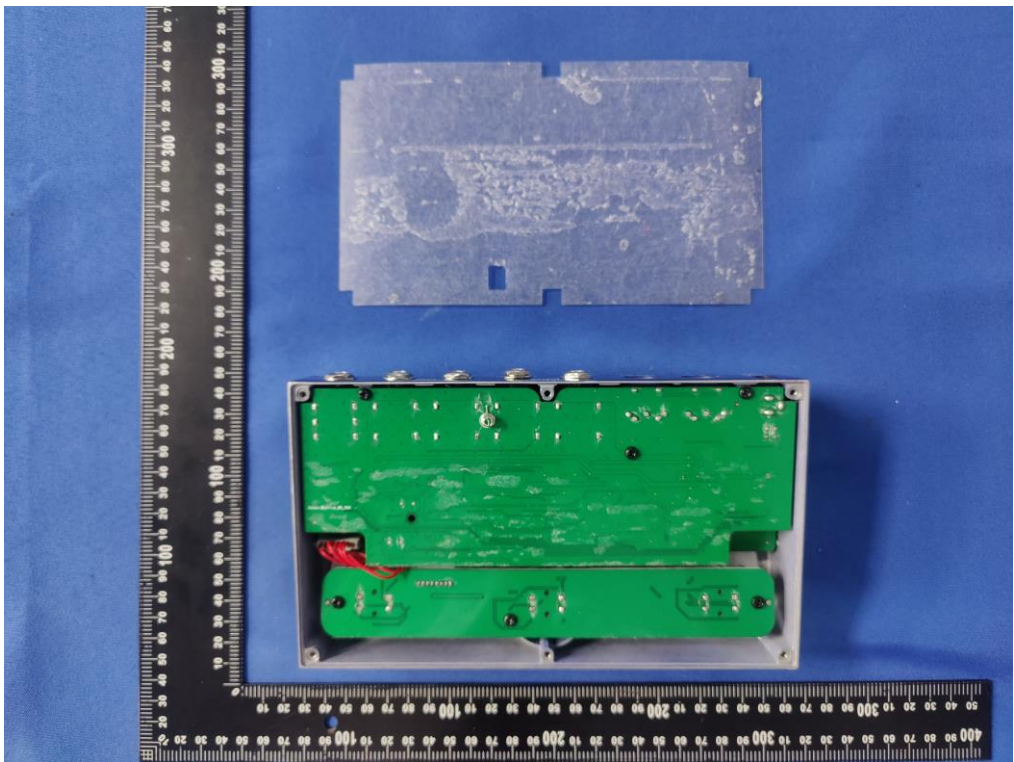
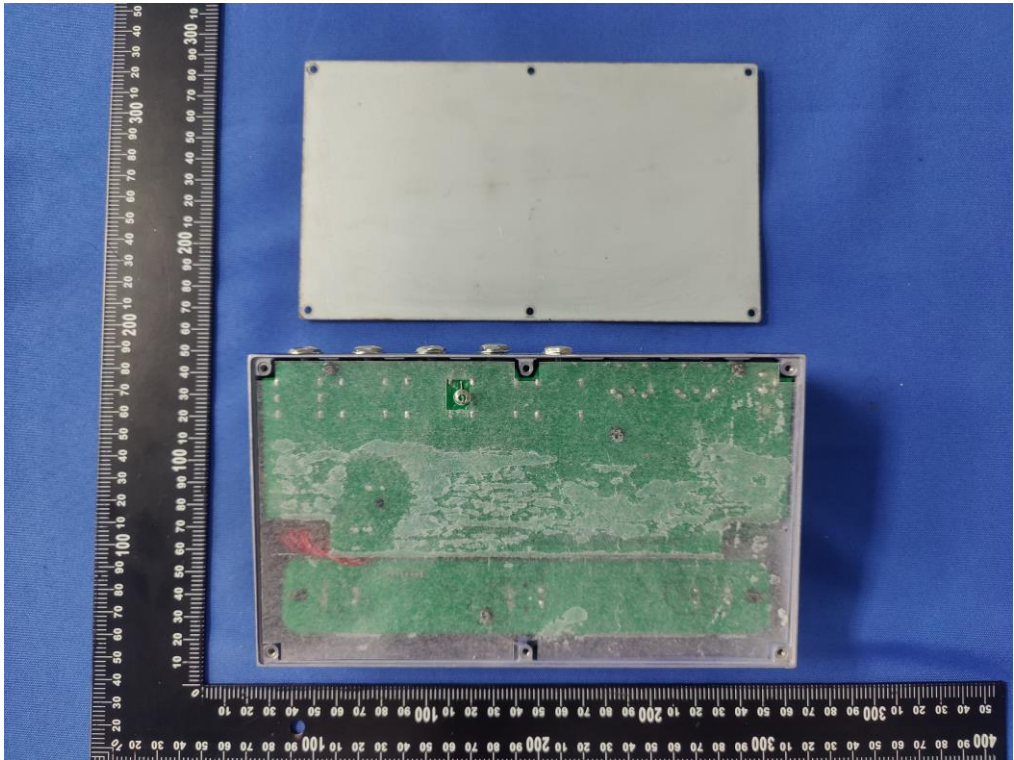


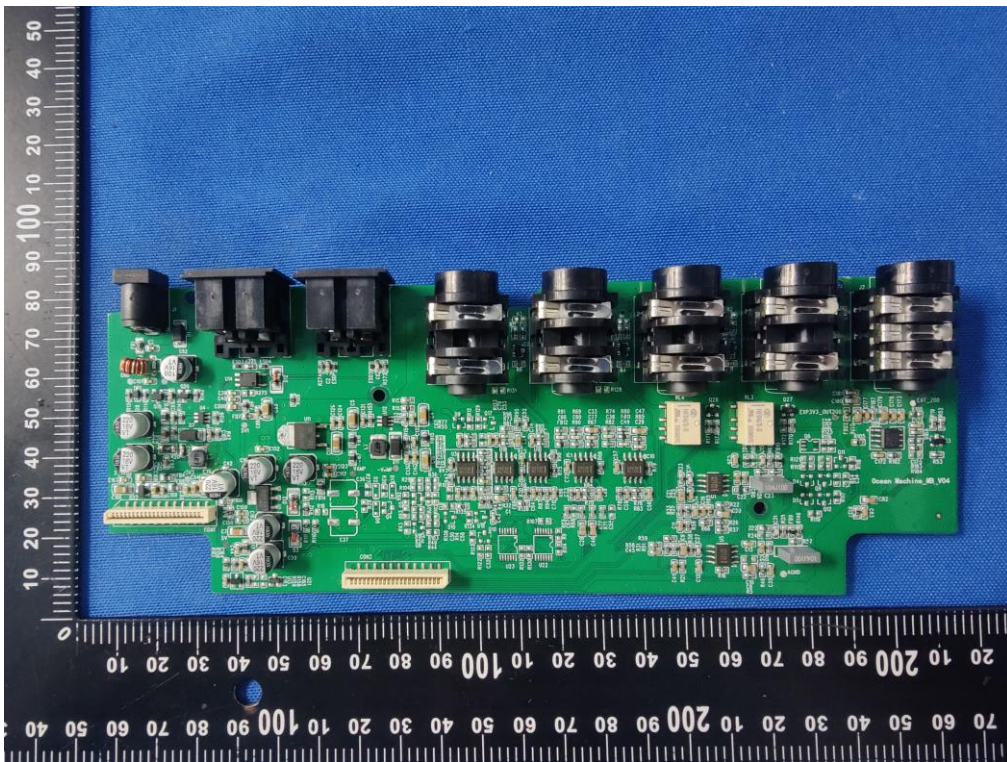
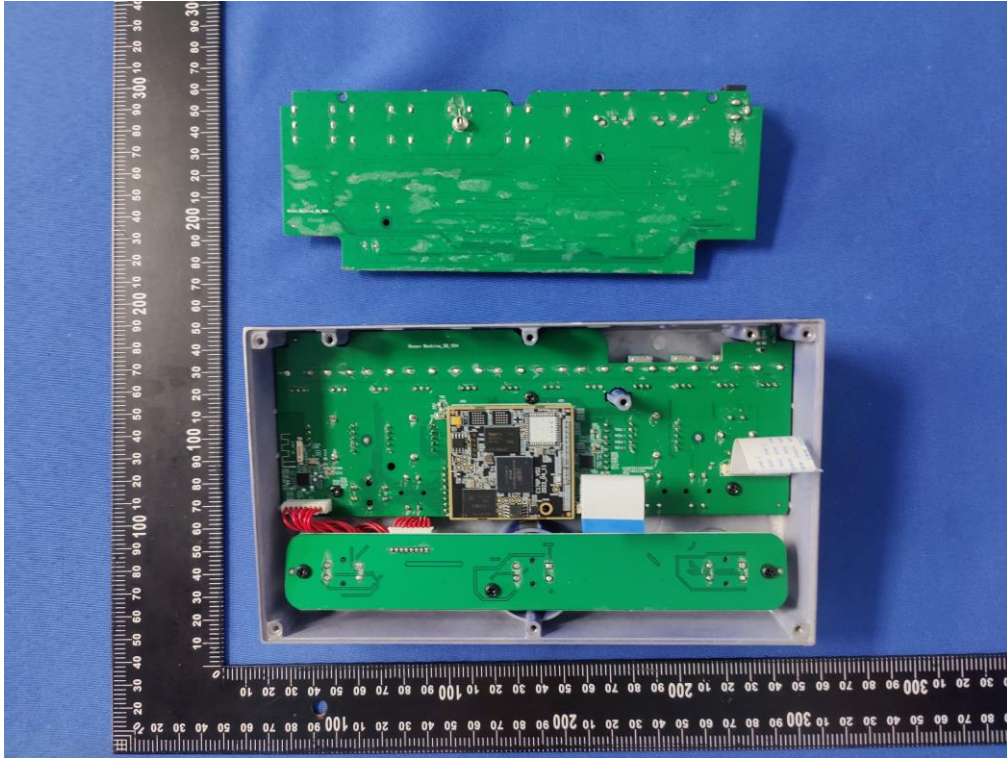
11. EUT Photo

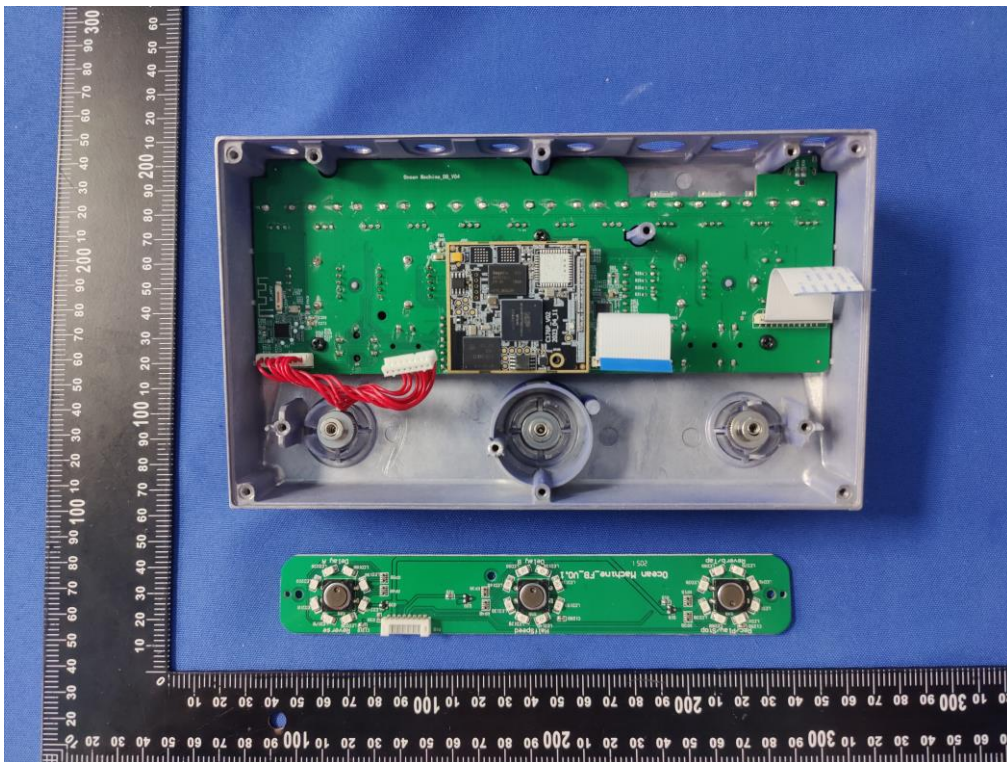
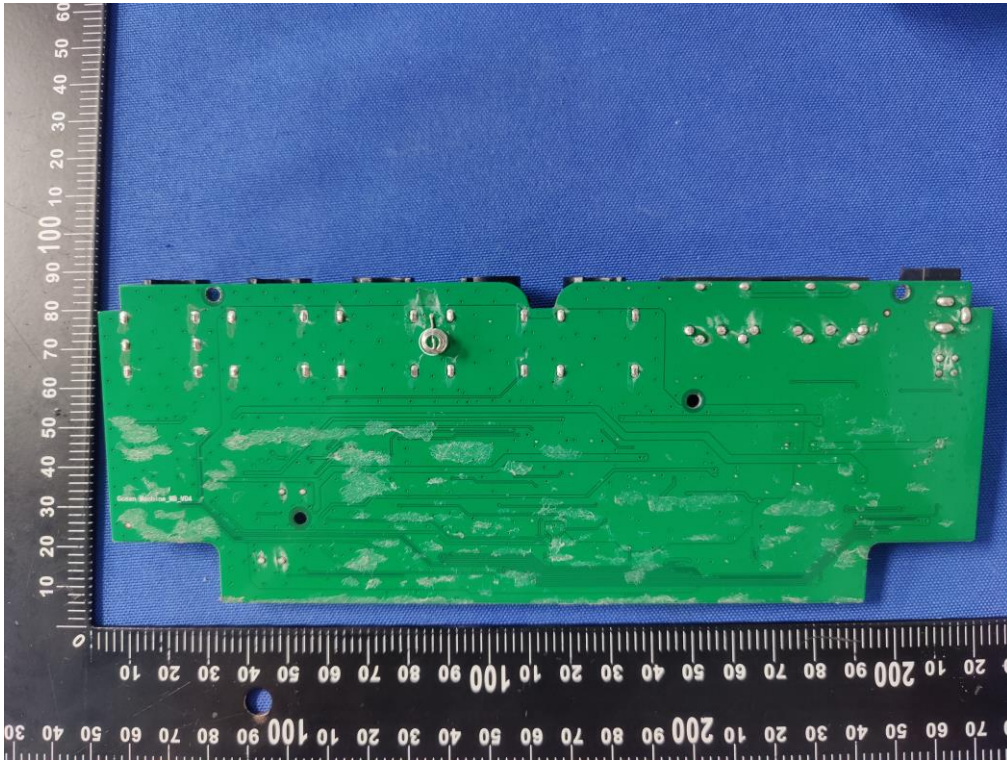


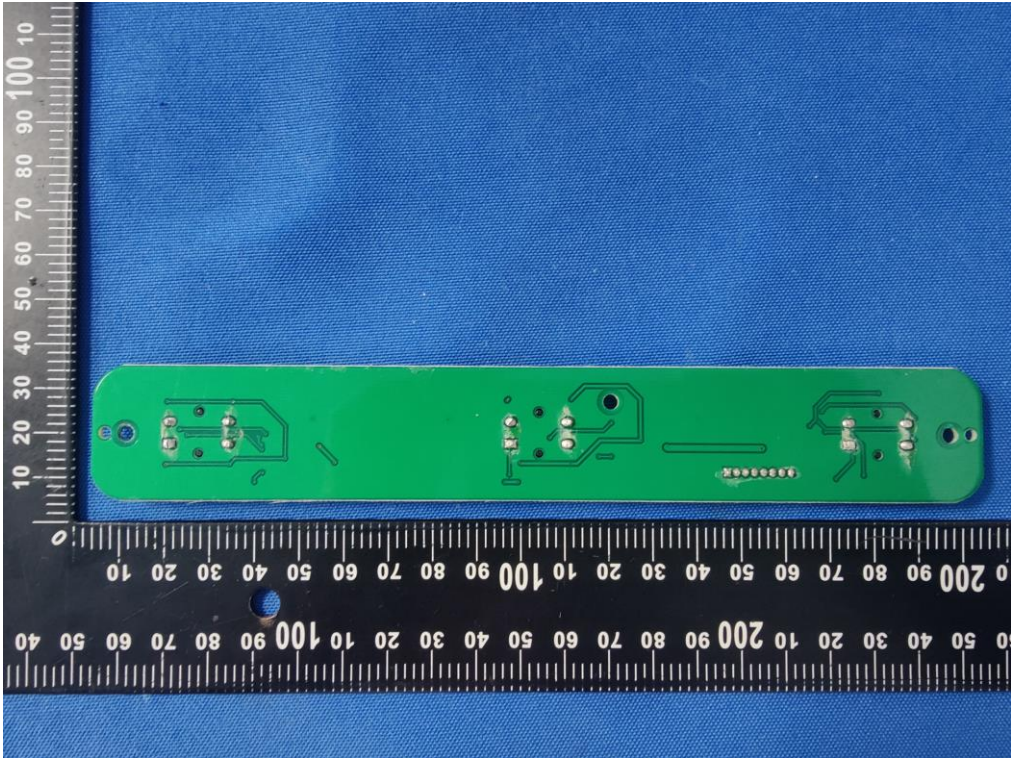
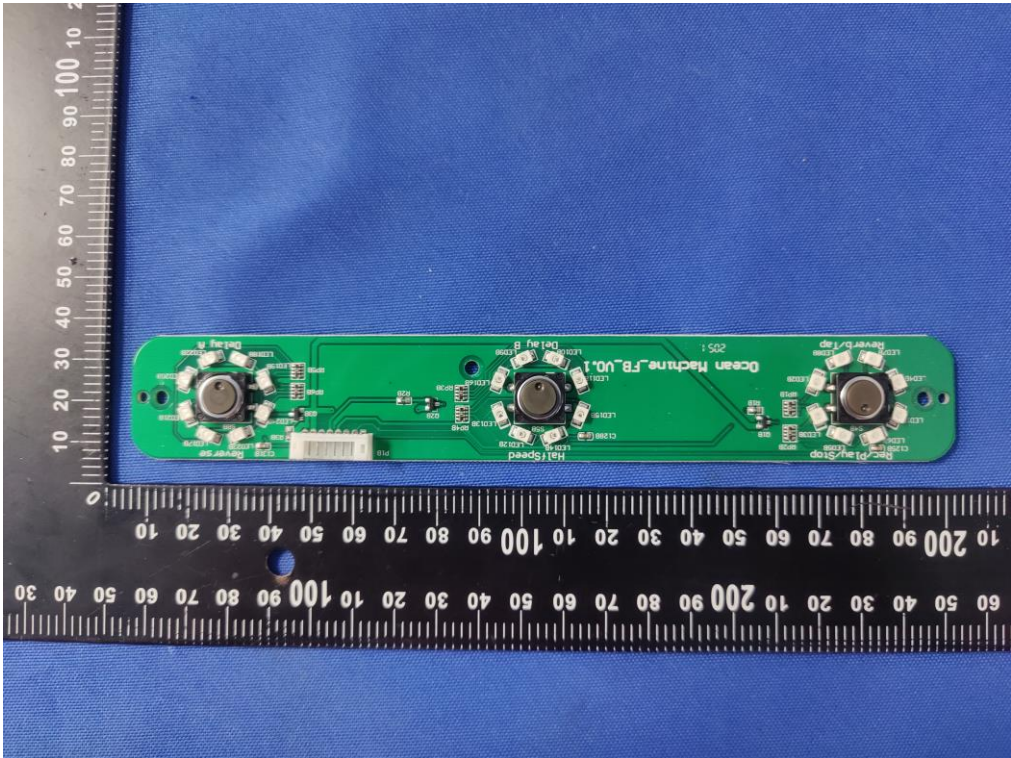


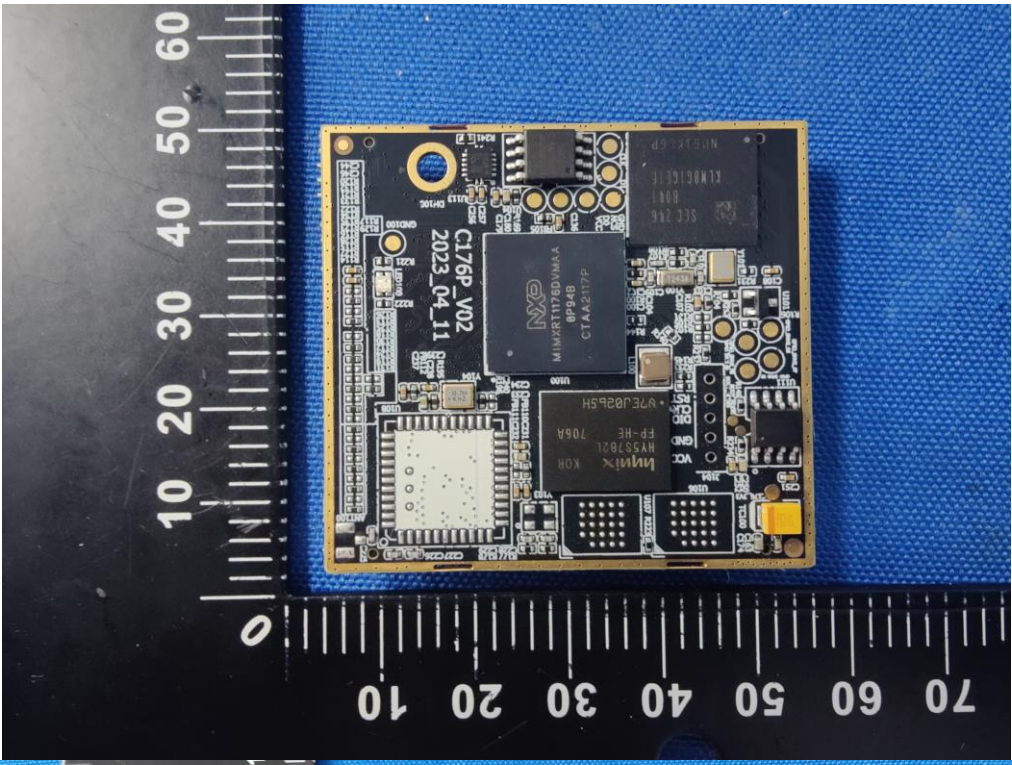
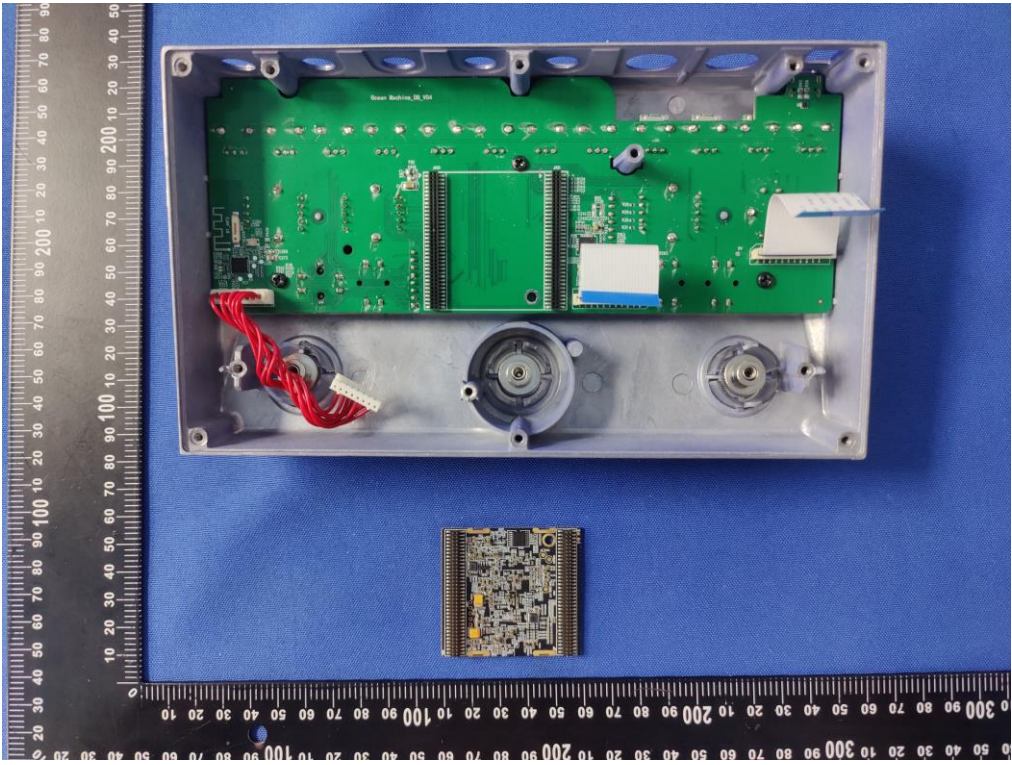


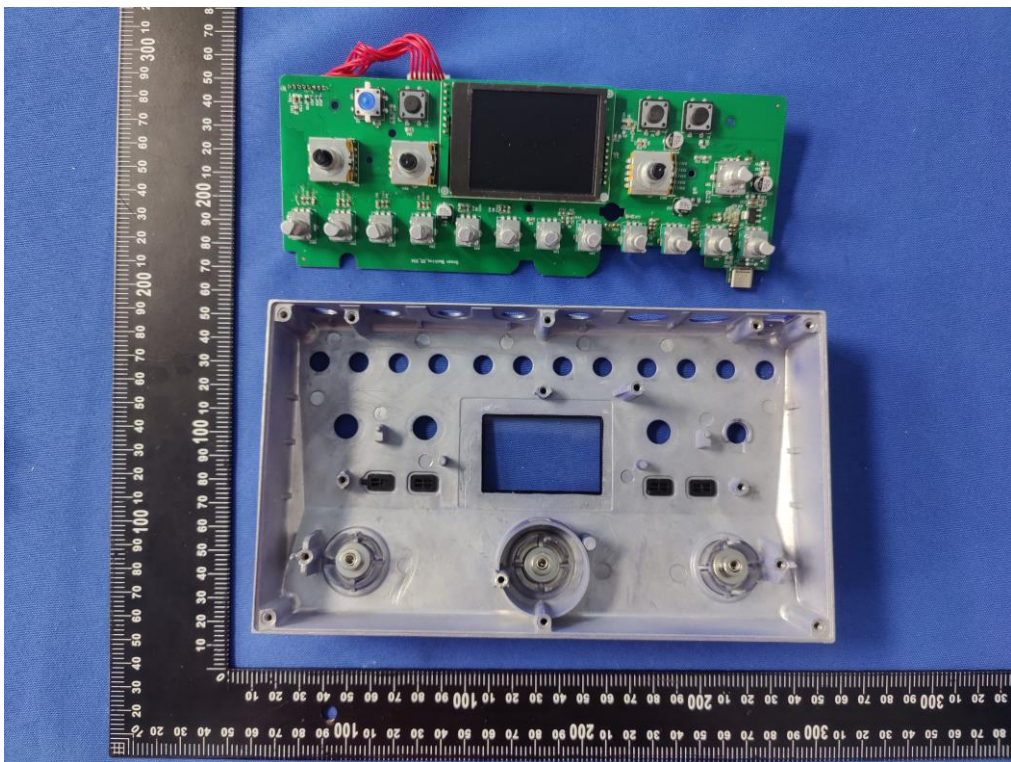
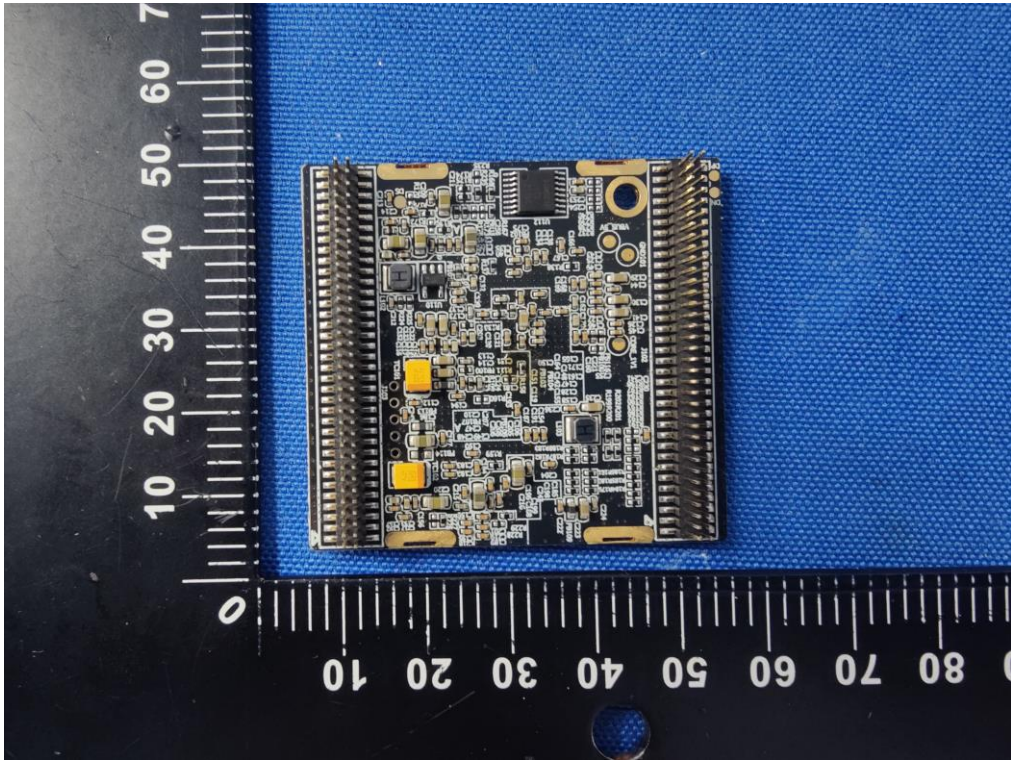


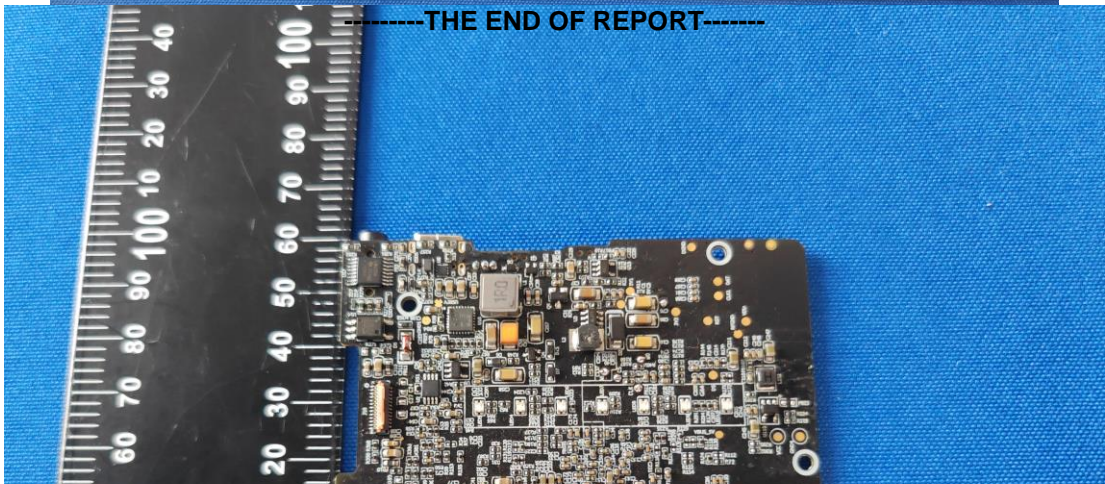
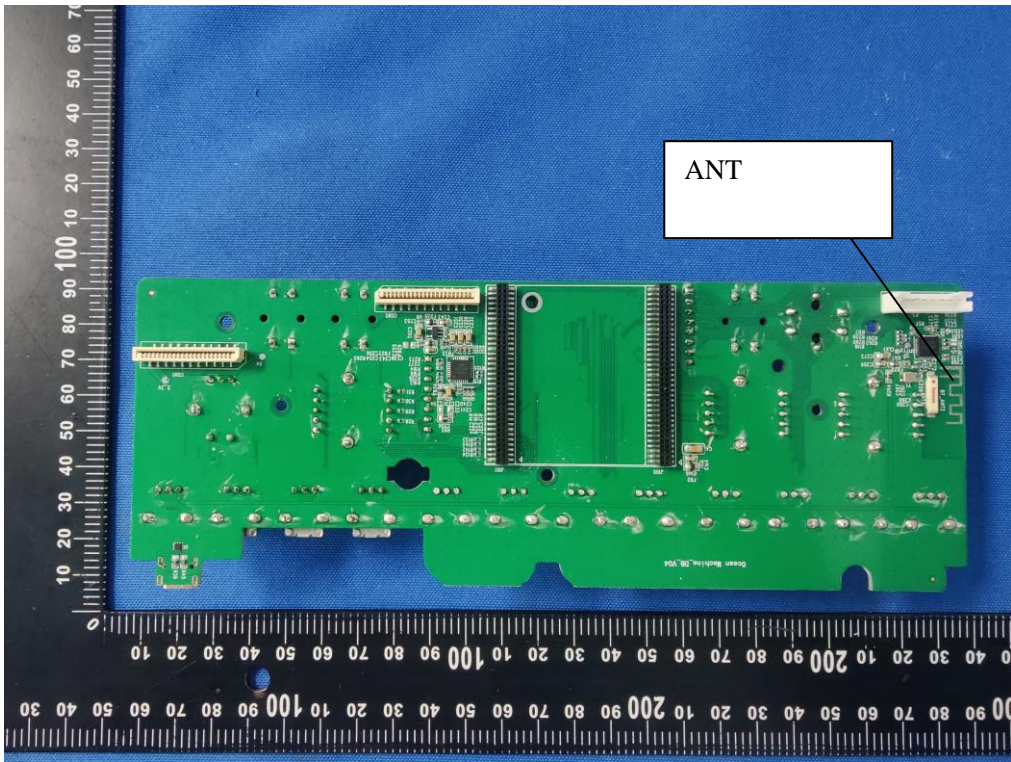
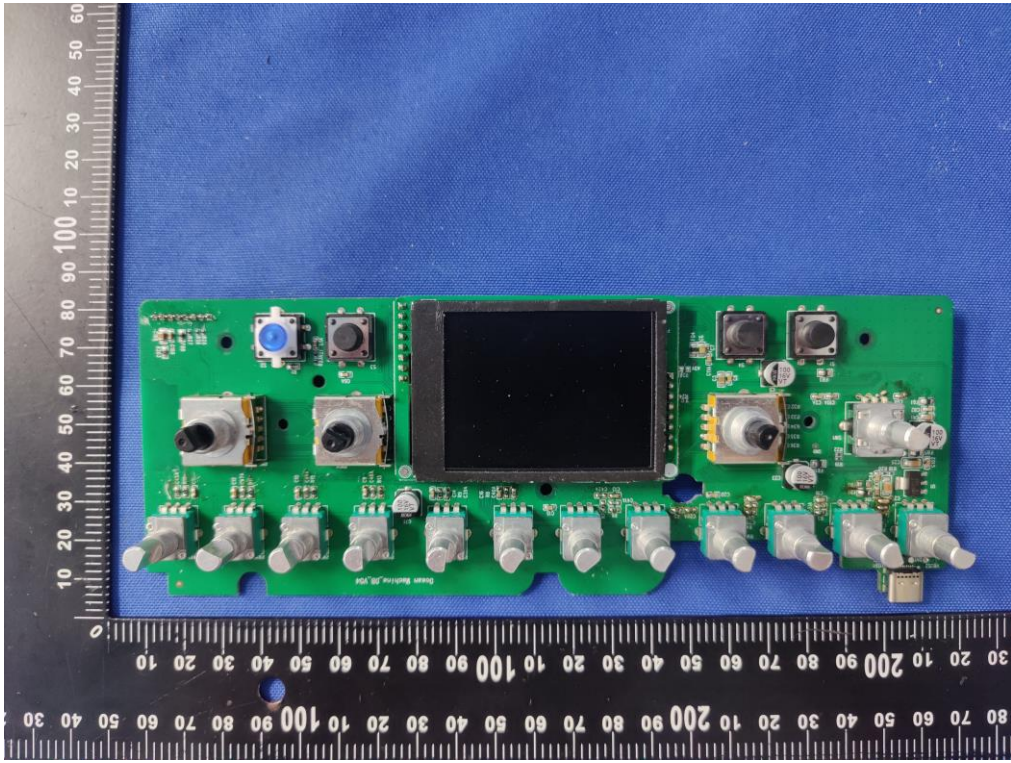












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