

TEST REPORT

Product Name : Car Diagnostic Tool
Brand Mark : YMIOT
Model No. : B02
FCC ID : 2A2KR-YMIOT-B
Report Number : BLA-EMC-202105-A10802
Date of Sample Receipt : 2021/5/27
Date of Test : 2021/5/27 to 2021/7/8
Date of Issue : 2021/7/8
Test Standard : 47 CFR Part 15, Subpart C 15.247
Test Result : Pass

Prepared for:

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2021/7/8



REPORT REVISE RECORD

| Version No. | Date | Description |
|-------------|----------|-------------|
| 00 | 2021/7/8 | Original |

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1 TEST SUMMARY

| Test item | Test Requirement | Test Method | Class/Severity | Result |
|---|----------------------------------|--|--|--------|
| Conducted Band Edges Measurement | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2 | 47 CFR Part 15, Subpart C 15.247(d) | Pass |
| Conducted Peak Output Power | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 7.8.5 | 47 CFR Part 15, Subpart C 15.247(b)(3) | Pass |
| Minimum 6dB Bandwidth | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 11.8.1 | 47 CFR Part 15, Subpart C 15.247a(2) | Pass |
| Antenna Requirement | 47 CFR Part 15, Subpart C 15.247 | N/A | 47 CFR Part 15, Subpart C 15.203 & 15.247(c) | Pass |
| Radiated Spurious Emissions | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 6.4,6.5,6.6 | 47 CFR Part 15, Subpart C 15.209 & 15.247(d) | Pass |
| Radiated Emissions which fall in the restricted bands | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 6.10.5 | 47 CFR Part 15, Subpart C 15.209 & 15.247(d) | Pass |
| Conducted Spurious Emissions | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 7.8.6 & Section 11.11 | 47 CFR Part 15, Subpart C 15.247(d) | Pass |
| Power Spectrum Density | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 11.10.2 | 47 CFR Part 15, Subpart C 15.247(e) | Pass |

2 GENERAL INFORMATION

| | |
|-----------------------|--|
| Applicant | Shenzhen Yuming Electronics Co., Ltd. |
| Address | 2nd floor, Building 17, Hualian Industrial Zone, Xinshi Community, Dalang Street, Longhua District, Shenzhen |
| Manufacturer | Shenzhen Yuming Electronics Co., Ltd. |
| Address | 2nd floor, Building 17, Hualian Industrial Zone, Xinshi Community, Dalang Street, Longhua District, Shenzhen |
| Factory | Shenzhen Yuming Electronics Co., Ltd. |
| Address | 2nd floor, Building 17, Hualian Industrial Zone, Xinshi Community, Dalang Street, Longhua District, Shenzhen |
| Product Name | Car Diagnostic Tool |
| Test Model No. | B02 |

3 GENERAL DESCRIPTION OF E.U.T.

| | |
|-----------------------------|------------------------------------|
| Hardware Version | 1.0. |
| Software Version | 1.0. |
| Operation Frequency: | 2402MHz-2480MHz |
| Modulation Type: | GFSK |
| Channel Spacing: | 2MHz |
| Number of Channels: | 40 |
| Antenna Type: | PCB Antenna |
| Antenna Gain: | 1.8 dBi(Provided by the applicant) |

4 TEST ENVIRONMENT

| Environment | Temperature | Voltage |
|-------------|-------------|---------|
| Normal | 25°C | DC12V |

5 TEST MODE

| TEST MODE | TEST MODE DESCRIPTION |
|-----------|---|
| TX | Keep the EUT in transmitting mode with modulation |

Remark: Only the data of the worst mode would be recorded in this report.

6 MEASUREMENT UNCERTAINTY

| Parameter | Expanded Uncertainty (Confidence of 95%) |
|--|--|
| Radiated Emission(9kHz-30MHz) | ±4.34dB |
| Radiated Emission(30Mz-1000MHz) | ±4.24dB |
| Radiated Emission(1GHz-18GHz) | ±4.68dB |
| AC Power Line Conducted Emission(150kHz-30MHz) | ±3.45dB |

7 DESCRIPTION OF SUPPORT UNIT

| Device Type | Manufacturer | Model Name | Serial No. | Remark |
|-------------|--------------|------------|------------|--------|
| PC | HASEE | K610D | N/A | N/A |

Note:

“--” means no any support device during testing.

8 LABORATORY LOCATION

All tests were performed at:

BlueAsia of Technical Services(Shenzhen) Co., Ltd.

Building C, No. 107, Shihuan Road, Shiyuan Sub-District, Baoan District, Shenzhen, Guangdong Province, China

Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673

No tests were sub-contracted.

9 TEST INSTRUMENTS LIST

| Test Equipment Of Conducted Band Edges Measurement | | | | | |
|--|--------------|--------|------------|------------|------------|
| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
| Spectrum | R&S | FSP40 | 100817 | 2020/10/12 | 2021/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2020/10/12 | 2021/10/11 |
| Signal Generator | Agilent | N5182A | MY49060650 | 2020/10/12 | 2021/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2020/10/12 | 2021/10/11 |

| Test Equipment Of Conducted Peak Output Power | | | | | |
|---|--------------|--------|------------|------------|------------|
| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
| Spectrum | R&S | FSP40 | 100817 | 2020/10/12 | 2021/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2020/10/12 | 2021/10/11 |
| Signal Generator | Agilent | N5182A | MY49060650 | 2020/10/12 | 2021/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2020/10/12 | 2021/10/11 |

| Test Equipment Of Minimum 6dB Bandwidth | | | | | |
|---|--------------|--------|------------|------------|------------|
| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
| Spectrum | R&S | FSP40 | 100817 | 2020/10/12 | 2021/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2020/10/12 | 2021/10/11 |
| Signal Generator | Agilent | N5182A | MY49060650 | 2020/10/12 | 2021/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2020/10/12 | 2021/10/11 |

| Test Equipment Of Radiated Spurious Emissions | | | | | |
|---|--------------|-------|-----|----------|---------|
| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |

| | | | | | |
|-------------------|-------------|---------------|------------------|------------|------------|
| Chamber | SKET | 966 | N/A | 2020/11/10 | 2023/11/9 |
| Spectrum | R&S | FSP40 | 100817 | 2020/10/12 | 2021/10/11 |
| Receiver | R&S | ESR7 | 101199 | 2020/10/12 | 2021/10/11 |
| broadband Antenna | Schwarzbeck | VULB9168 | 00836 P:00227 | 2020/9/26 | 2022/9/25 |
| Horn Antenna | Schwarzbeck | 9120D | 01892 P:00331 | 2020/9/26 | 2022/9/25 |
| Amplifier | SKET | PA-000318G-45 | N/A | 2020/10/16 | 2021/10/15 |
| EMI software | EZ | EZ-EMC | EEMC-3A1 | N/A | N/A |
| Loop antenna | SCHNARZBECK | FMZB1519B | 00102 | 2020/9/26 | 2022/9/25 |
| Controller | SKET | N/A | N/A | N/A | N/A |
| Coaxial Cable | BlueAsia | BLA-XC-02 | N/A | N/A | N/A |
| Coaxial Cable | BlueAsia | BLA-XC-03 | N/A | N/A | N/A |
| Coaxial Cable | BlueAsia | BLA-XC-01 | N/A | N/A | N/A |

Test Equipment Of Radiated Emissions which fall in the restricted bands

| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
|-------------------|--------------|---------------|------------------|------------|------------|
| Chamber | SKET | 966 | N/A | 2020/11/10 | 2023/11/9 |
| Spectrum | R&S | FSP40 | 100817 | 2020/10/12 | 2021/10/11 |
| Receiver | R&S | ESR7 | 101199 | 2020/10/12 | 2021/10/11 |
| broadband Antenna | Schwarzbeck | VULB9168 | 00836 P:00227 | 2020/9/26 | 2022/9/25 |
| Horn Antenna | Schwarzbeck | 9120D | 01892 P:00331 | 2020/9/26 | 2022/9/25 |
| Amplifier | SKET | PA-000318G-45 | N/A | 2020/10/16 | 2021/10/15 |
| EMI software | EZ | EZ-EMC | EEMC-3A1 | N/A | N/A |
| Loop antenna | SCHNARZBECK | FMZB1519B | 00102 | 2020/9/26 | 2022/9/25 |

| | | | | | |
|---------------|----------|-----------|-----|-----|-----|
| Controller | SKET | N/A | N/A | N/A | N/A |
| Coaxial Cable | BlueAsia | BLA-XC-02 | N/A | N/A | N/A |
| Coaxial Cable | BlueAsia | BLA-XC-03 | N/A | N/A | N/A |
| Coaxial Cable | BlueAsia | BLA-XC-01 | N/A | N/A | N/A |

Test Equipment Of Conducted Spurious Emissions

| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum | R&S | FSP40 | 100817 | 2020/10/12 | 2021/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2020/10/12 | 2021/10/11 |
| Signal Generator | Agilent | N5182A | MY49060650 | 2020/10/12 | 2021/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2020/10/12 | 2021/10/11 |

Test Equipment Of Power Spectrum Density

| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum | R&S | FSP40 | 100817 | 2020/10/12 | 2021/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2020/10/12 | 2021/10/11 |
| Signal Generator | Agilent | N5182A | MY49060650 | 2020/10/12 | 2021/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2020/10/12 | 2021/10/11 |

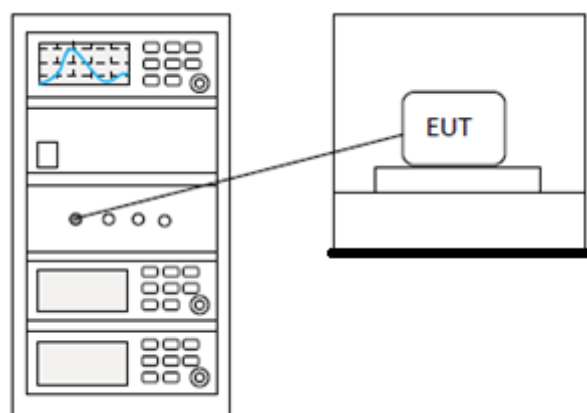
10 CONDUCTED BAND EDGES MEASUREMENT

| | |
|-------------------------------|--|
| Test Standard | 47 CFR Part 15, Subpart C 15.247 |
| Test Method | ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2 |
| Test Mode (Pre-Scan) | TX |
| Test Mode (Final Test) | TX |
| Tester | Sven |
| Temperature | 25°C |
| Humidity | 52% |

10.1 LIMITS

| | |
|---------------|--|
| Limit: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). |
|---------------|--|

10.2 BLOCK DIAGRAM OF TEST SETUP



10.3 TEST DATA

| |
|--|
| Pass: Please Refer To Appendix: For Details |
|--|

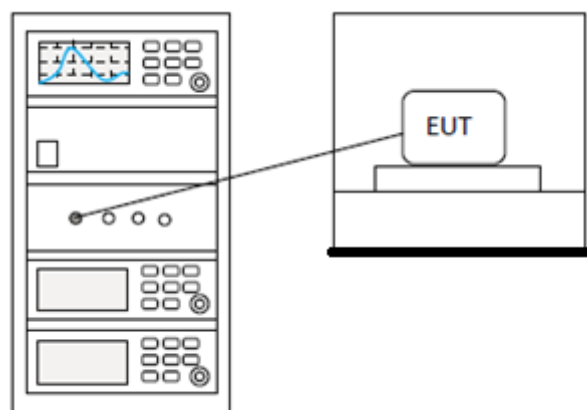
11 CONDUCTED PEAK OUTPUT POWER

| | |
|-------------------------------|----------------------------------|
| Test Standard | 47 CFR Part 15, Subpart C 15.247 |
| Test Method | ANSI C63.10 (2013) Section 7.8.5 |
| Test Mode (Pre-Scan) | TX |
| Test Mode (Final Test) | TX |
| Tester | Sven |
| Temperature | 25°C |
| Humidity | 52% |

11.1 LIMITS

| Frequency range(MHz) | Output power of the intentional radiator(watt) |
|-----------------------------|--|
| 902-928 | 1 for ≥ 50 hopping channels |
| | 0.25 for $25 \leq \text{hopping channels} < 50$ |
| | 1 for digital modulation |
| 2400-2483.5 | 1 for ≥ 75 non-overlapping hopping channels |
| | 0.125 for all other frequency hopping systems |
| | 1 for digital modulation |
| 5725-5850 | 1 for frequency hopping systems and digital modulation |

11.2 BLOCK DIAGRAM OF TEST SETUP



11.3 TEST DATA

Pass: Please Refer To Appendix: For Details

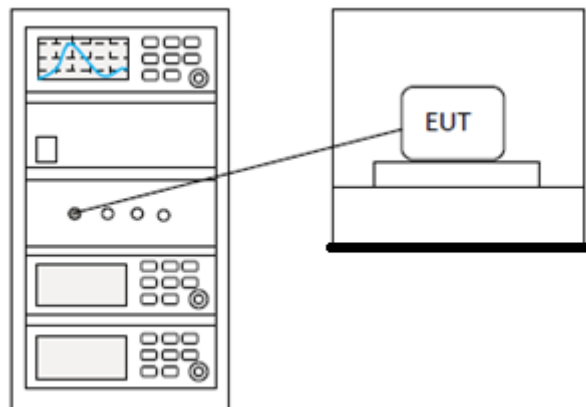
12 MINIMUM 6DB BANDWIDTH

| | |
|------------------------|-----------------------------------|
| Test Standard | 47 CFR Part 15, Subpart C 15.247 |
| Test Method | ANSI C63.10 (2013) Section 11.8.1 |
| Test Mode (Pre-Scan) | TX |
| Test Mode (Final Test) | TX |
| Tester | Sven |
| Temperature | 25°C |
| Humidity | 52% |

12.1 LIMITS

| | |
|---------------|----------------|
| Limit: | ≥ 500 kHz |
|---------------|----------------|

12.2 BLOCK DIAGRAM OF TEST SETUP



12.3 TEST DATA

Pass: Please Refer To Appendix: For Details

13 ANTENNA REQUIREMENT

| | |
|---------------|----------------------------------|
| Test Standard | 47 CFR Part 15, Subpart C 15.247 |
| Test Method | N/A |

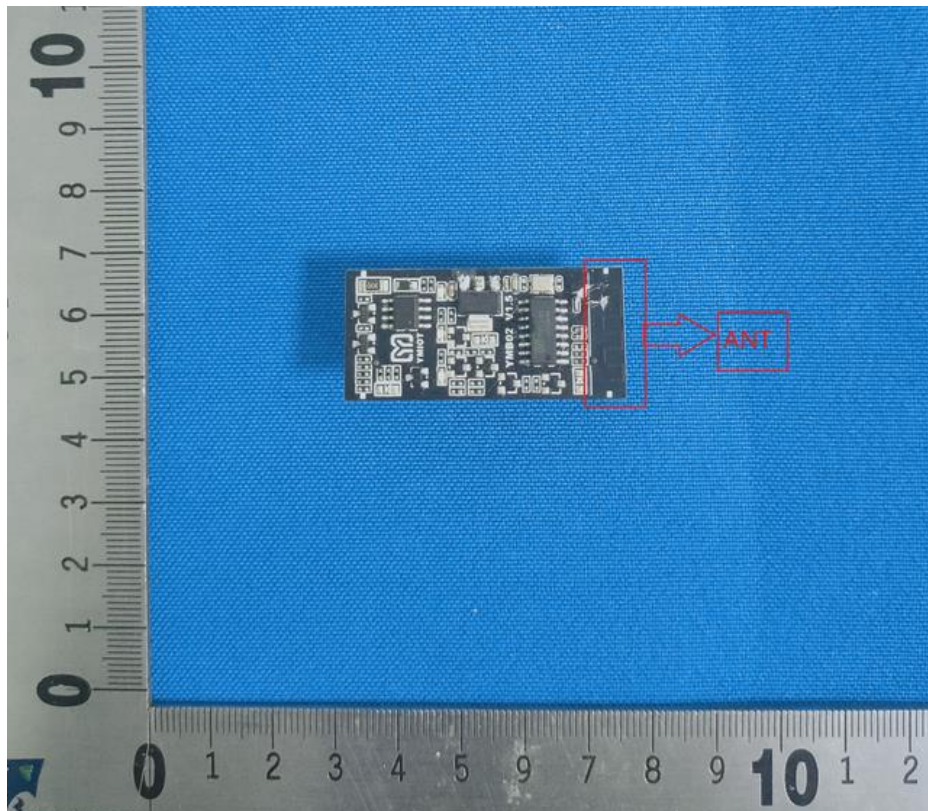
13.1 CONCLUSION

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 an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 1.8 dBi.



14 RADIATED SPURIOUS EMISSIONS

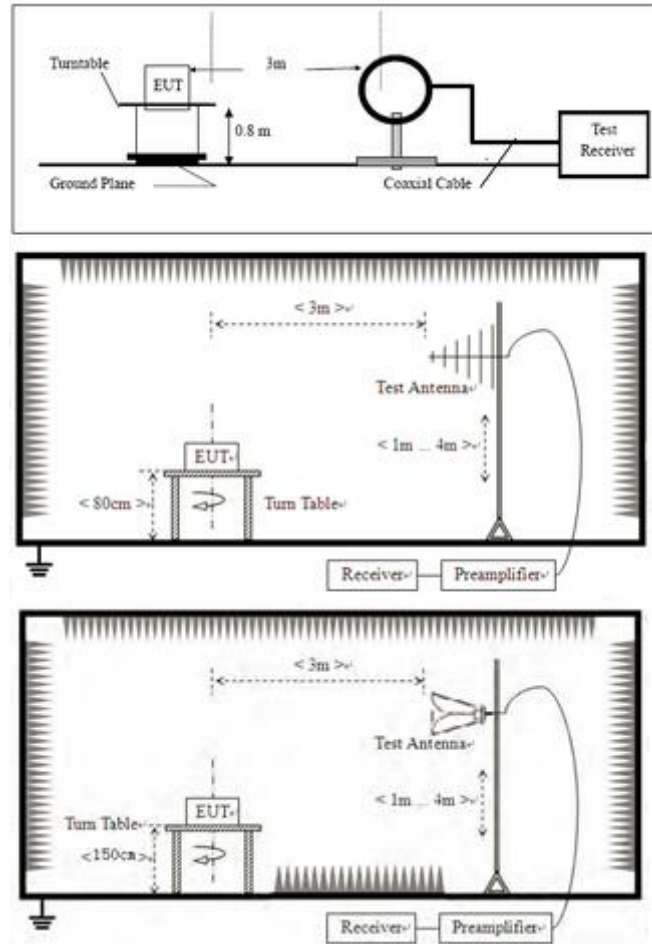
| | |
|-------------------------------|---|
| Test Standard | 47 CFR Part 15, Subpart C 15.247 |
| Test Method | ANSI C63.10 (2013) Section 6.4,6.5,6.6 |
| Test Mode (Pre-Scan) | TX;TX Low channel;TX middle channel;TX high channel |
| Test Mode (Final Test) | TX;TX Low channel;TX middle channel;TX high channel |
| Tester | Sven |
| Temperature | 25℃ |
| Humidity | 52% |

14.1 LIMITS

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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

14.2 BLOCK DIAGRAM OF TEST SETUP



14.3 PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

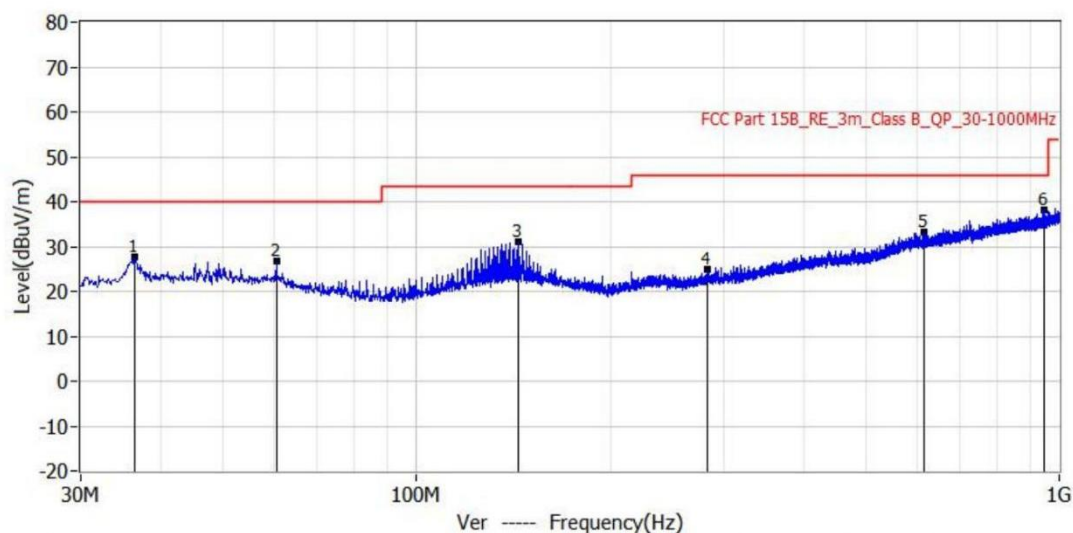
Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. fundamental frequency is blocked by filter, and only spurious emission is shown.
- 4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

14.4 TEST DATA

[TestMode: TX]; [Polarity: Vertical]

| | |
|------------------------------------|--------------------------------|
| Test Lab: BlueAsia EMC Lab (RE #1) | Project: BLA-EMC-202106-A108 |
| EUT: Car Diagnostic Tool | Test Engineer: |
| M/N: B02 | Temperature: |
| S/N: | Humidity: 45%RH |
| Test Mode: TX mode | Test Voltage: |
| Note: | Test Data: 2021-07-07 10:19:23 |

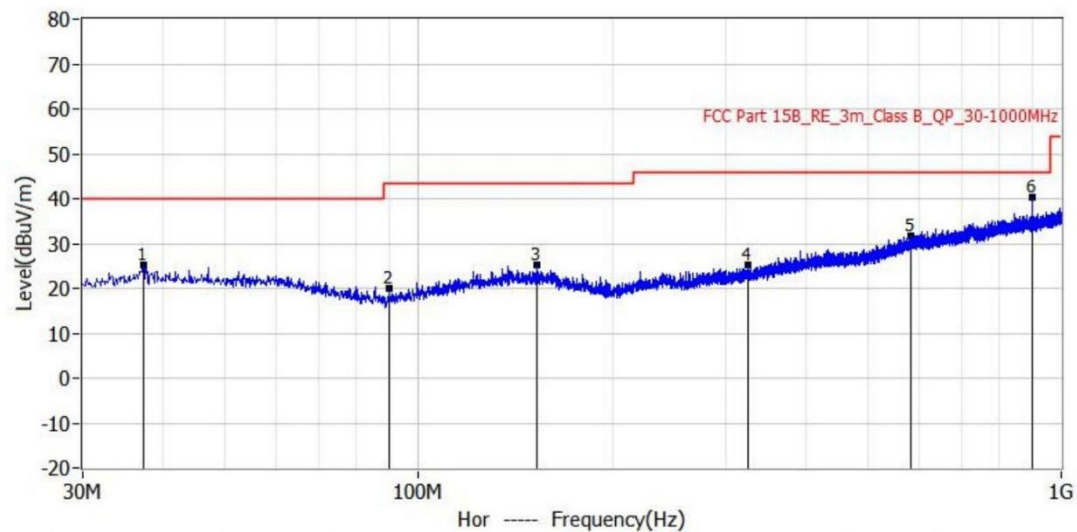


| No. | Frequency | Limit dBuV/m | Level dBuV/m | Delta dB | Reading dBuV | Factor dB/m | Detector | Polar | Height cm | Angle deg |
|-----|------------|-----------------|-----------------|-------------|-----------------|----------------|----------|-------|--------------|--------------|
| 1* | 36.305MHz | 40.0 | 27.6 | -12.4 | 3.9 | 23.7 | QP | Ver | | |
| 2* | 60.434MHz | 40.0 | 26.7 | -13.3 | 3.3 | 23.4 | QP | Ver | | |
| 3* | 143.854MHz | 43.5 | 31.0 | -12.5 | 7.4 | 23.6 | QP | Ver | | |
| 4* | 283.898MHz | 46.0 | 24.8 | -21.2 | 1.1 | 23.7 | QP | Ver | | |
| 5* | 616.486MHz | 46.0 | 33.1 | -12.9 | 1.7 | 31.4 | QP | Ver | | |
| 6* | 945.559MHz | 46.0 | 38.2 | -7.8 | 2.7 | 35.5 | QP | Ver | | |

Test Result: Pass

[TestMode: TX]; [Polarity: Horizontal]

| | |
|------------------------------------|--------------------------------|
| Test Lab: BlueAsia EMC Lab (RE #1) | Project: BLA-EMC-202106-A108 |
| EUT: Car Diagnostic Tool | Test Engineer: |
| M/N: B02 | Temperature: |
| S/N: | Humidity: 45%RH |
| Test Mode: TX mode | Test Voltage: |
| Note: | Test Data: 2021-07-07 10:23:52 |

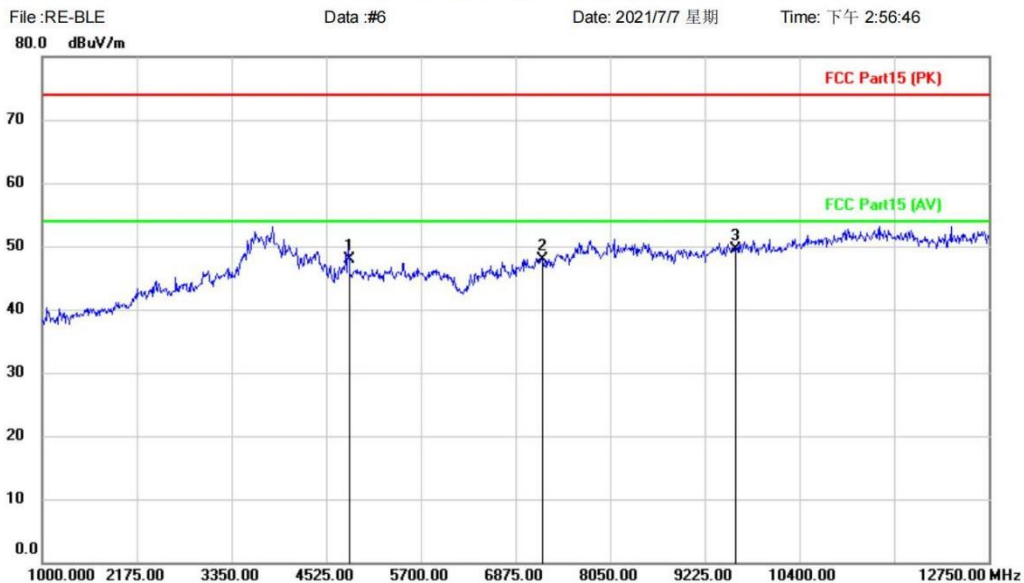


| No. | Frequency | Limit dBuV/m | Level dBuV/m | Delta dB | Reading dBuV | Factor dB/m | Detector | Polar | Height cm | Angle deg |
|-----|------------|--------------|--------------|----------|--------------|-------------|----------|-------|-----------|-----------|
| 1* | 37.275MHz | 40.0 | 25.1 | -14.9 | 1.3 | 23.8 | QP | Hor | | |
| 2* | 90.019MHz | 43.5 | 19.9 | -23.6 | 0.6 | 19.3 | QP | Hor | | |
| 3* | 152.948MHz | 43.5 | 25.2 | -18.3 | 1.8 | 23.4 | QP | Hor | | |
| 4* | 324.759MHz | 46.0 | 25.3 | -20.7 | 0.4 | 24.9 | QP | Hor | | |
| 5* | 583.143MHz | 46.0 | 31.7 | -14.3 | 0.9 | 30.8 | QP | Hor | | |
| 6* | 901.424MHz | 46.0 | 40.4 | -5.6 | 5.4 | 35.0 | QP | Hor | | |

Test Result: Pass

[TestMode: TX Low channel]; [Polarity: Vertical]

Radiated Emission Measurement



Site: Polarization: **Vertical** Temperature:
Limit: FCC Part15 (PK) Power: Humidity: %
EUT: Car Diagnostic Tool Distance:
M/N: B02
Mode: TX-L
Note:

| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Antenna Height cm | Table Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1 | | 4804.000 | 44.29 | 3.71 | 48.00 | 74.00 | -26.00 | peak | | |
| 2 | | 7206.000 | 42.02 | 5.96 | 47.98 | 74.00 | -26.02 | peak | | |
| 3 | * | 9608.000 | 40.17 | 9.29 | 49.46 | 74.00 | -24.54 | peak | | |

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

<Reference Only

Test Result: Pass

[TestMode: TX Low channel]; [Polarity: Horizontal]

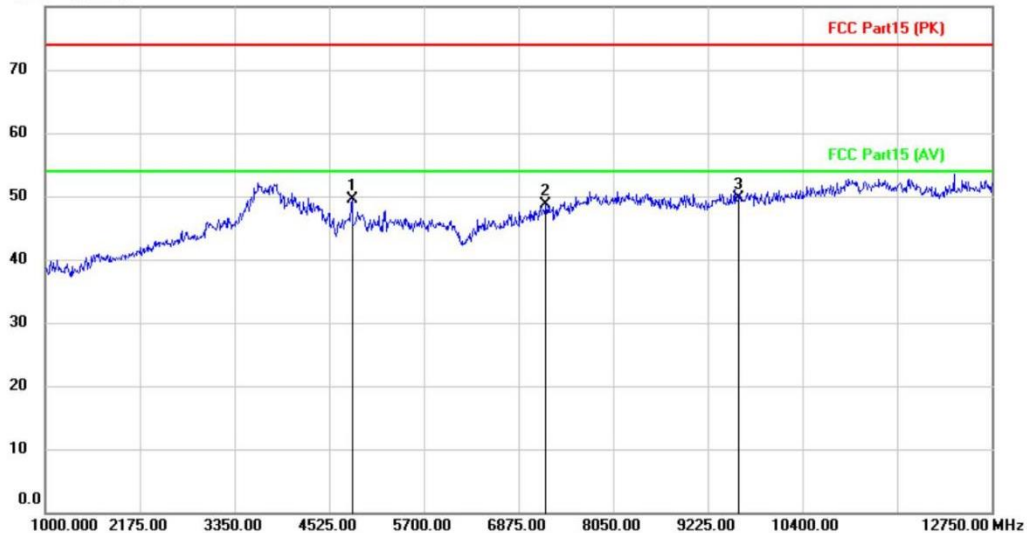
Radiated Emission Measurement

File: RE-BLE
80.0 dBuV/m

Data: #5

Date: 2021/7/7 星期

Time: 下午 2:55:01



Site

Polarization: **Horizontal**

Temperature:

Limit: FCC Part15 (PK)

Power:

Humidity: %

EUT: Car Diagnostic Tool

Distance:

M/N: B02

Mode: TX-L

Note:

| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Antenna Height cm | Table Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1 | | 4804.000 | 45.81 | 3.71 | 49.52 | 74.00 | -24.48 | peak | | |
| 2 | | 7206.000 | 42.67 | 5.96 | 48.63 | 74.00 | -25.37 | peak | | |
| 3 | * | 9608.000 | 40.42 | 9.29 | 49.71 | 74.00 | -24.29 | peak | | |

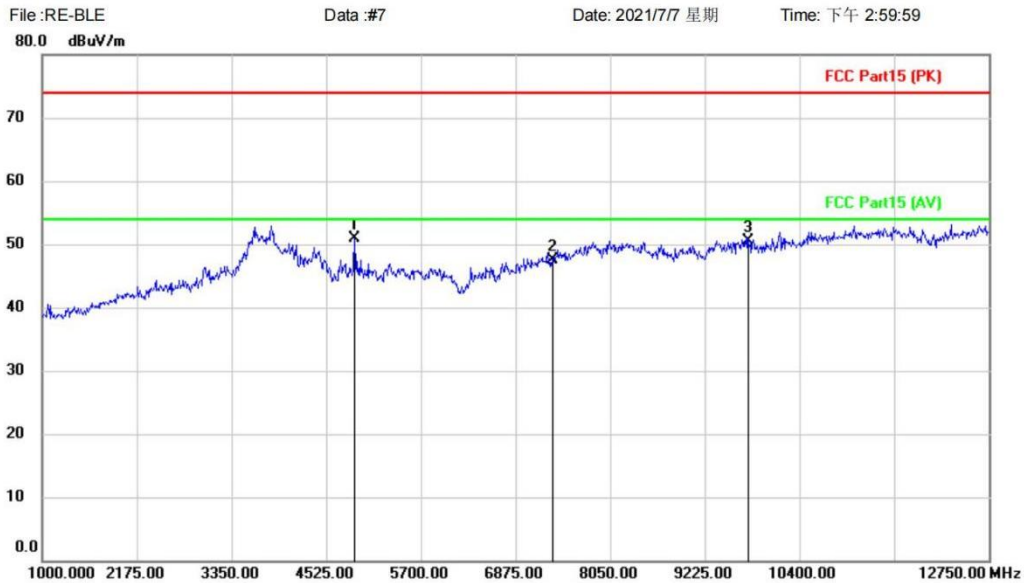
*:Maximum data x:Over limit !:over margin

<Reference Only

Test Result: Pass

[TestMode: TX middle channel]; [Polarity: Vertical]

Radiated Emission Measurement



Site Limit: FCC Part15 (PK) Polarization: **Vertical** Temperature:
EUT: Car Diagnostic Tool Power: Humidity: %
M/N: B02 Distance:
Mode: TX-M
Note:

| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Antenna Height cm | Table Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1 | * | 4877.500 | 47.53 | 3.37 | 50.90 | 74.00 | -23.10 | peak | | |
| 2 | | 7323.000 | 41.09 | 6.43 | 47.52 | 74.00 | -26.48 | peak | | |
| 3 | | 9764.000 | 40.81 | 9.63 | 50.44 | 74.00 | -23.56 | peak | | |

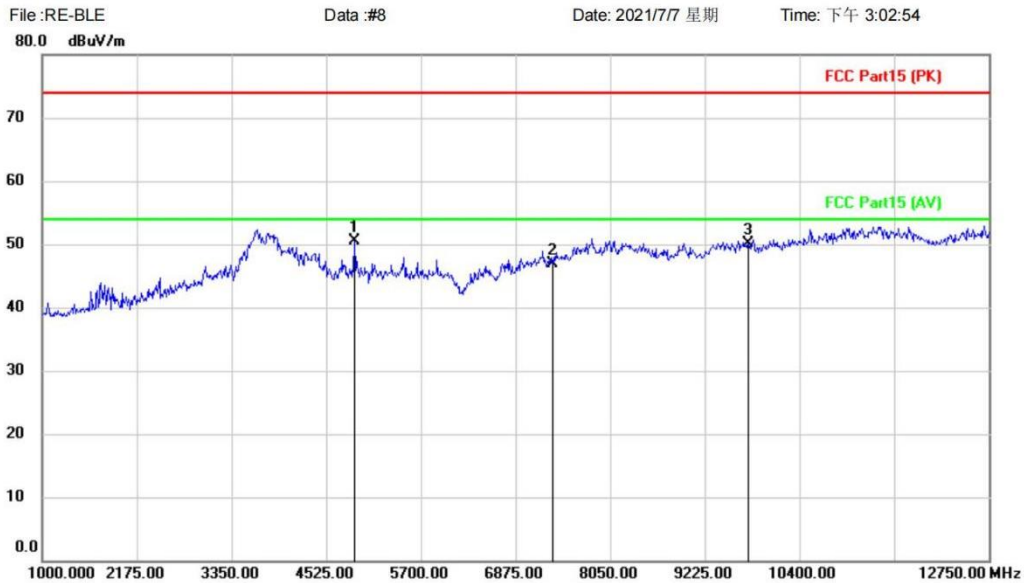
*:Maximum data x:Over limit !:over margin

<Reference Only

Test Result: Pass

[TestMode: TX middle channel]; [Polarity: Horizontal]

Radiated Emission Measurement



Site Limit: FCC Part15 (PK) Polarization: **Horizontal** Temperature:
EUT: Car Diagnostic Tool Power: Humidity: %
M/N: B02 Distance:
Mode: TX-M
Note:

| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Antenna Height cm | Table Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1 | * | 4877.500 | 47.19 | 3.37 | 50.56 | 74.00 | -23.44 | peak | | |
| 2 | | 7323.000 | 40.40 | 6.43 | 46.83 | 74.00 | -27.17 | peak | | |
| 3 | | 9764.000 | 40.48 | 9.63 | 50.11 | 74.00 | -23.89 | peak | | |

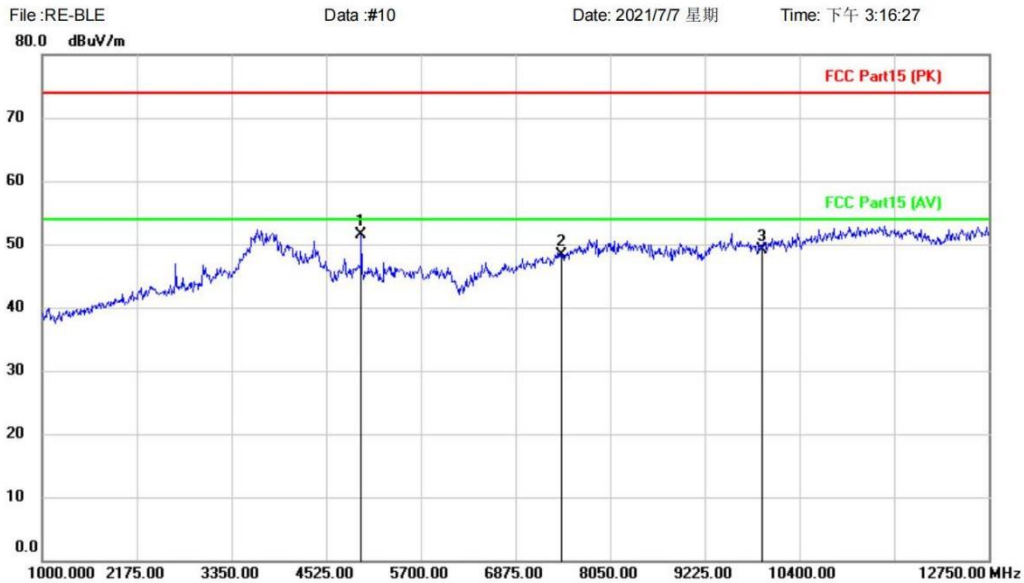
*:Maximum data x:Over limit !:over margin

<Reference Only

Test Result: Pass

[TestMode: TX high channel]; [Polarity: Vertical]

Radiated Emission Measurement



Site Limit: FCC Part15 (PK) Polarization: **Vertical** Temperature:
EUT: Car Diagnostic Tool Power: Humidity: %
M/N: B02 Distance:
Mode: TX-H
Note:

| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Antenna Height cm | Table Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1 | * | 4959.750 | 47.76 | 3.75 | 51.51 | 74.00 | -22.49 | peak | | |
| 2 | | 7440.000 | 41.36 | 6.86 | 48.22 | 74.00 | -25.78 | peak | | |
| 3 | | 9920.000 | 38.90 | 10.16 | 49.06 | 74.00 | -24.94 | peak | | |

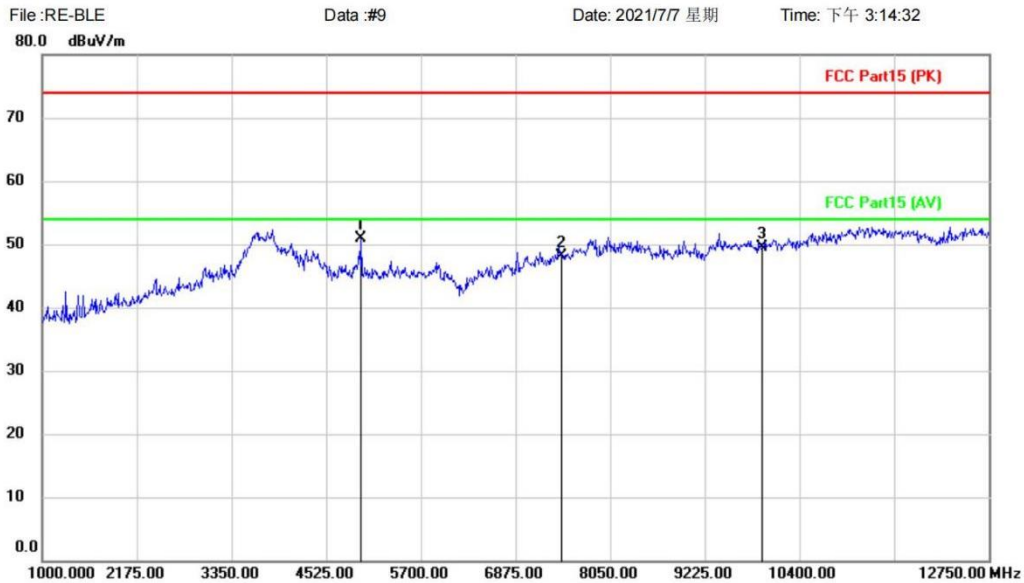
*:Maximum data x:Over limit !:over margin

〈Reference Only

Test Result: Pass

[TestMode: TX high channel]; [Polarity: Horizontal]

Radiated Emission Measurement



Site Limit: FCC Part15 (PK) Polarization: **Horizontal** Temperature:
EUT: Car Diagnostic Tool Power: Humidity: %
M/N: B02 Distance:
Mode: TX-H
Note:

| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Antenna Height cm | Table Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1 | * | 4959.750 | 47.23 | 3.75 | 50.98 | 74.00 | -23.02 | peak | | |
| 2 | | 7440.000 | 41.16 | 6.86 | 48.02 | 74.00 | -25.98 | peak | | |
| 3 | | 9920.000 | 39.30 | 10.16 | 49.46 | 74.00 | -24.54 | peak | | |

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

<Reference Only

Test Result: Pass

15 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS

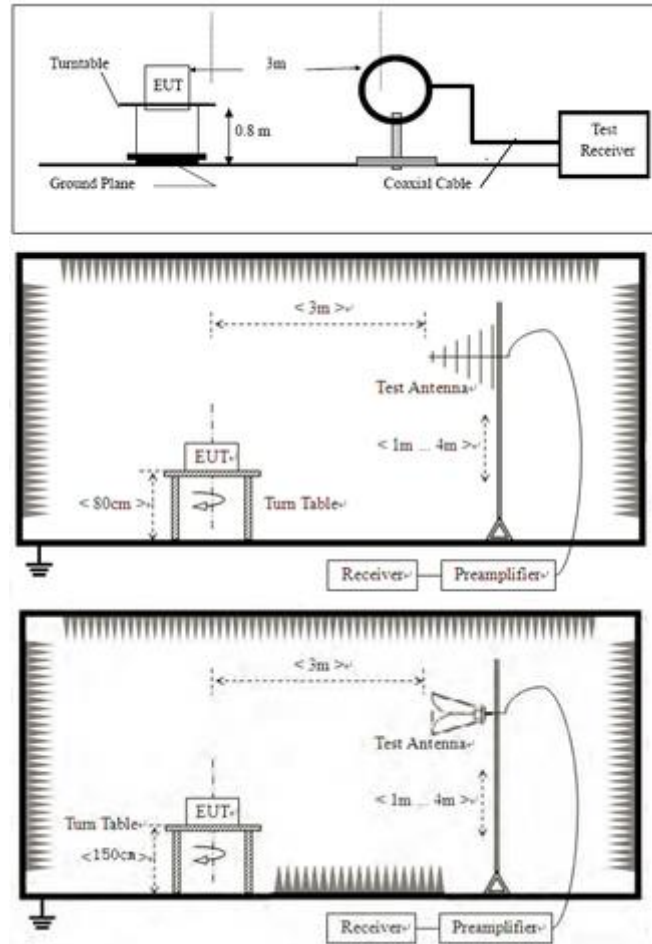
| | |
|-------------------------------|-----------------------------------|
| Test Standard | 47 CFR Part 15, Subpart C 15.247 |
| Test Method | ANSI C63.10 (2013) Section 6.10.5 |
| Test Mode (Pre-Scan) | TX Low channel;TX high channel |
| Test Mode (Final Test) | TX Low channel;TX high channel |
| Tester | Sven |
| Temperature | 25℃ |
| Humidity | 52% |

15.1 LIMITS

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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

15.2 BLOCK DIAGRAM OF TEST SETUP



15.3 PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

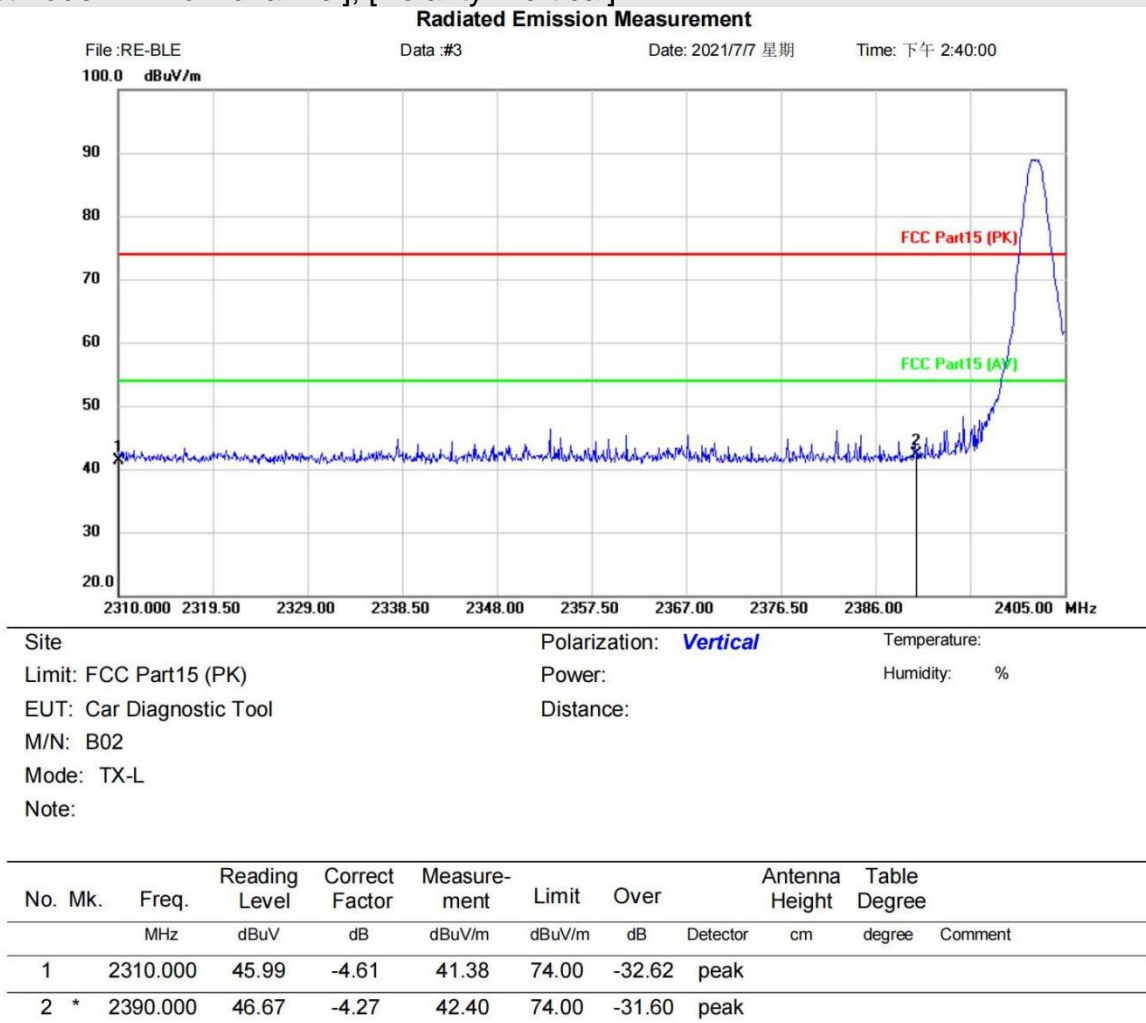
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: $\text{Level} = \text{Read Level} + \text{Cable Loss} + \text{Antenna Factor} - \text{Preamp Factor}$

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

15.4 TEST DATA

[TestMode: TX Low channel]; [Polarity: Vertical]



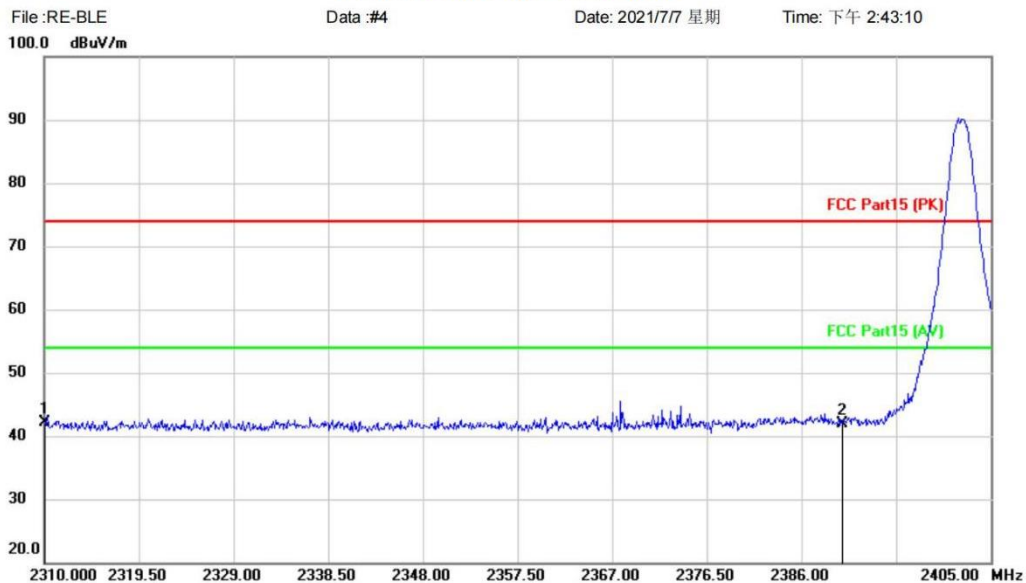
*:Maximum data x:Over limit !:over margin

<Reference Only

Test Result: Pass

[TestMode: TX Low channel]; [Polarity: Horizontal]

Radiated Emission Measurement



Site Polarization: **Horizontal** Temperature:
Limit: FCC Part15 (PK) Power: Humidity: %
EUT: Car Diagnostic Tool Distance:
M/N: B02
Mode: TX-L
Note:

| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Antenna Height cm | Table Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1 | * | 2310.000 | 46.71 | -4.61 | 42.10 | 74.00 | -31.90 | peak | | |
| 2 | | 2390.000 | 46.26 | -4.27 | 41.99 | 74.00 | -32.01 | peak | | |

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

<Reference Only

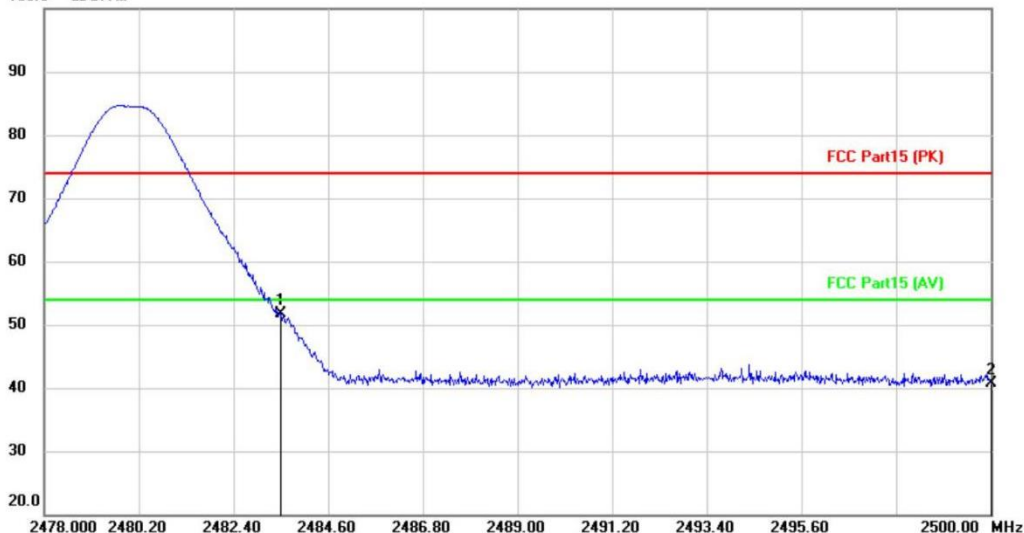
Test Result: Pass

[TestMode: TX high channel]; [Polarity: Vertical]

Radiated Emission Measurement

File :RE-BLE Data :#11 Date: 2021/7/7 星期 Time: 下午 3:19:29

100.0 dBuV/m



Site

Limit: FCC Part15 (PK)

EUT: Car Diagnostic Tool

M/N: B02

Mode: TX-H

Note:

Polarization: **Vertical**

Temperature:

Power:

Humidity: %

Distance:

| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Antenna Height cm | Table Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1 | * | 2483.500 | 55.59 | -3.84 | 51.75 | 74.00 | -22.25 | peak | | |
| 2 | | 2500.000 | 44.44 | -3.78 | 40.66 | 74.00 | -33.34 | peak | | |

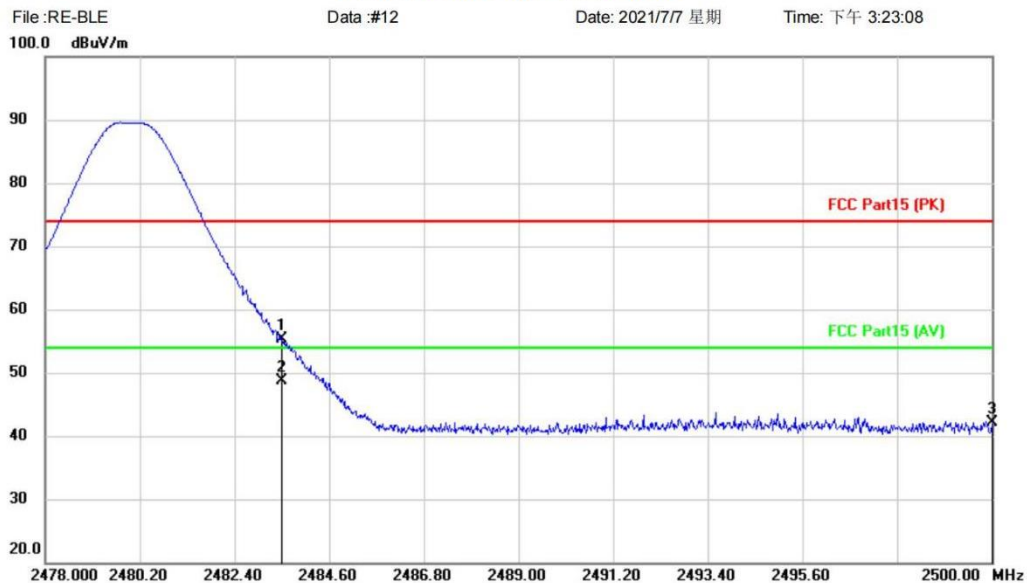
*:Maximum data x:Over limit !:over margin

<Reference Only

Test Result: Pass

[TestMode: TX high channel]; [Polarity: Horizontal]

Radiated Emission Measurement



Site: Limit: FCC Part15 (PK) EUT: Car Diagnostic Tool M/N: B02 Mode: TX-H Note:

Polarization: **Horizontal** Temperature: Power: Humidity: % Distance:

| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Antenna Height cm | Table Degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|-----------------|---------|
| 1 | | 2483.500 | 59.07 | -3.84 | 55.23 | 74.00 | -18.77 | peak | | |
| 2 | * | 2483.500 | 52.45 | -3.84 | 48.61 | 54.00 | -5.39 | AVG | | |
| 3 | | 2500.000 | 45.81 | -3.78 | 42.03 | 74.00 | -31.97 | peak | | |

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

<Reference Only

Test Result: Pass

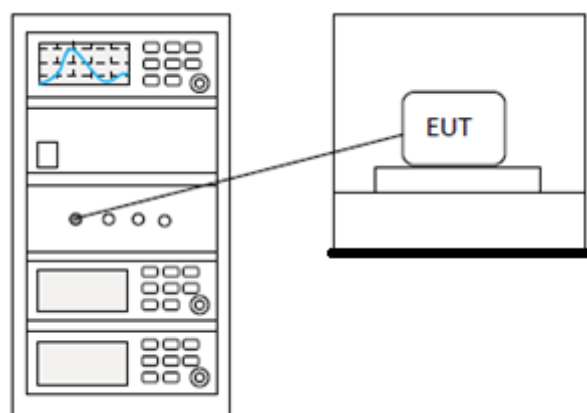
16 CONDUCTED SPURIOUS EMISSIONS

| | |
|-------------------------------|--|
| Test Standard | 47 CFR Part 15, Subpart C 15.247 |
| Test Method | ANSI C63.10 (2013) Section 7.8.6 & Section 11.11 |
| Test Mode (Pre-Scan) | TX |
| Test Mode (Final Test) | TX |
| Tester | Sven |
| Temperature | 25°C |
| Humidity | 52% |

16.1 LIMITS

| | |
|---------------|--|
| Limit: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). |
|---------------|--|

16.2 BLOCK DIAGRAM OF TEST SETUP



16.3 TEST DATA**Pass: Please Refer To Appendix: For Details**

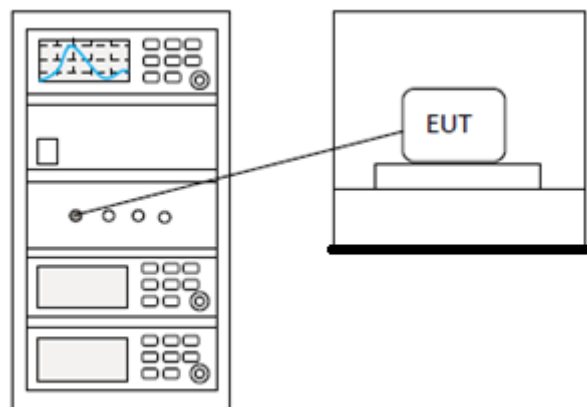
17 POWER SPECTRUM DENSITY

| | |
|------------------------|------------------------------------|
| Test Standard | 47 CFR Part 15, Subpart C 15.247 |
| Test Method | ANSI C63.10 (2013) Section 11.10.2 |
| Test Mode (Pre-Scan) | TX |
| Test Mode (Final Test) | TX |
| Tester | Sven |
| Temperature | 25°C |
| Humidity | 52% |

17.1 LIMITS

| | |
|---------------|--|
| Limit: | $\leq 8\text{dBm}$ in any 3 kHz band during any time interval of continuous transmission |
|---------------|--|

17.2 BLOCK DIAGRAM OF TEST SETUP



17.3 TEST DATA

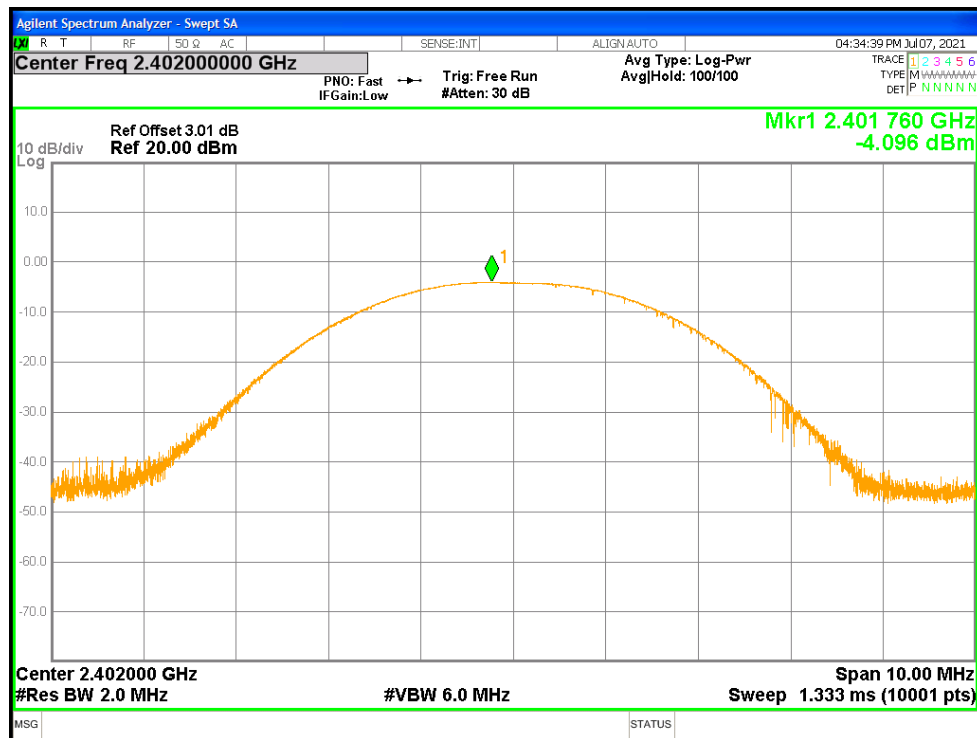
| |
|--|
| Pass: Please Refer To Appendix: For Details |
|--|

18 APPENDIX

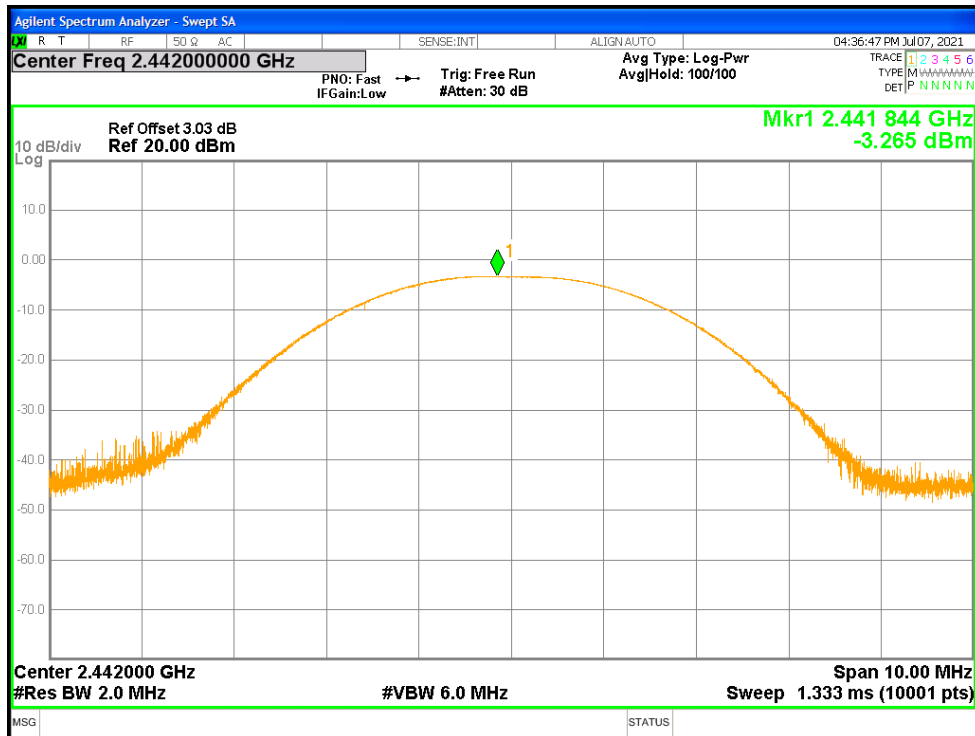
18.1 MAXIMUM CONDUCTED OUTPUT POWER

| Condition | Mode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Total Power (dBm) | Limit (dBm) | Verdict |
|-----------|--------|-----------------|---------|-----------------------|-------------------|-------------|---------|
| NVNT | BLE 1M | 2402 | Ant1 | -4.096 | -4.096 | 30 | Pass |
| NVNT | BLE 1M | 2442 | Ant1 | -3.265 | -3.265 | 30 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | -2.272 | -2.272 | 30 | Pass |

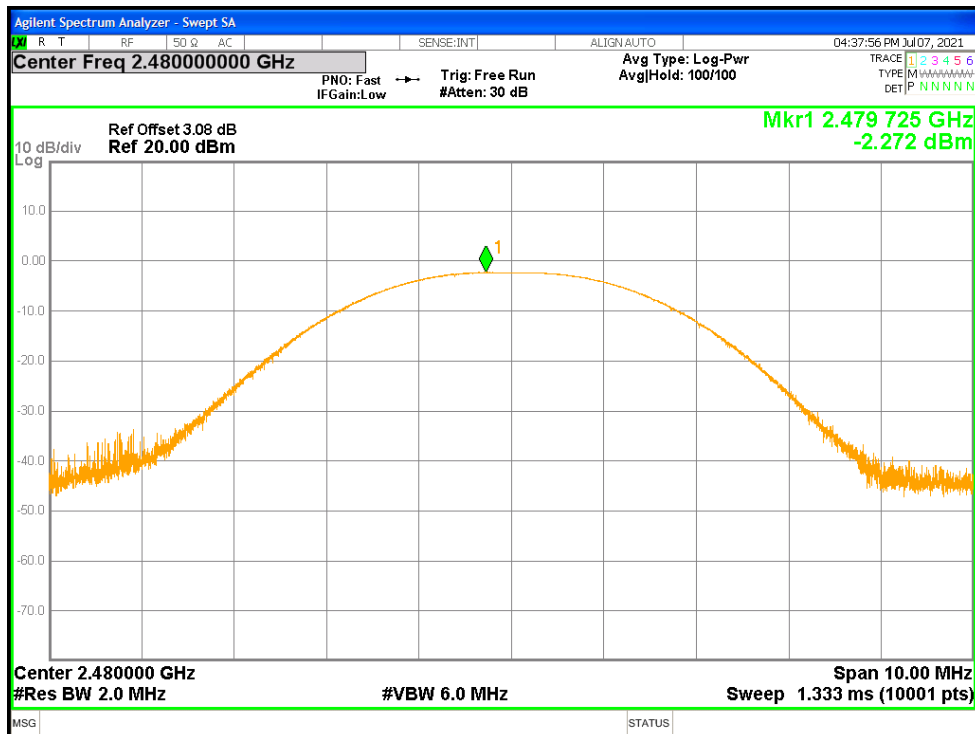
Power NVNT BLE 1M 2402MHz Ant1



Power NVNT BLE 1M 2442MHz Ant1



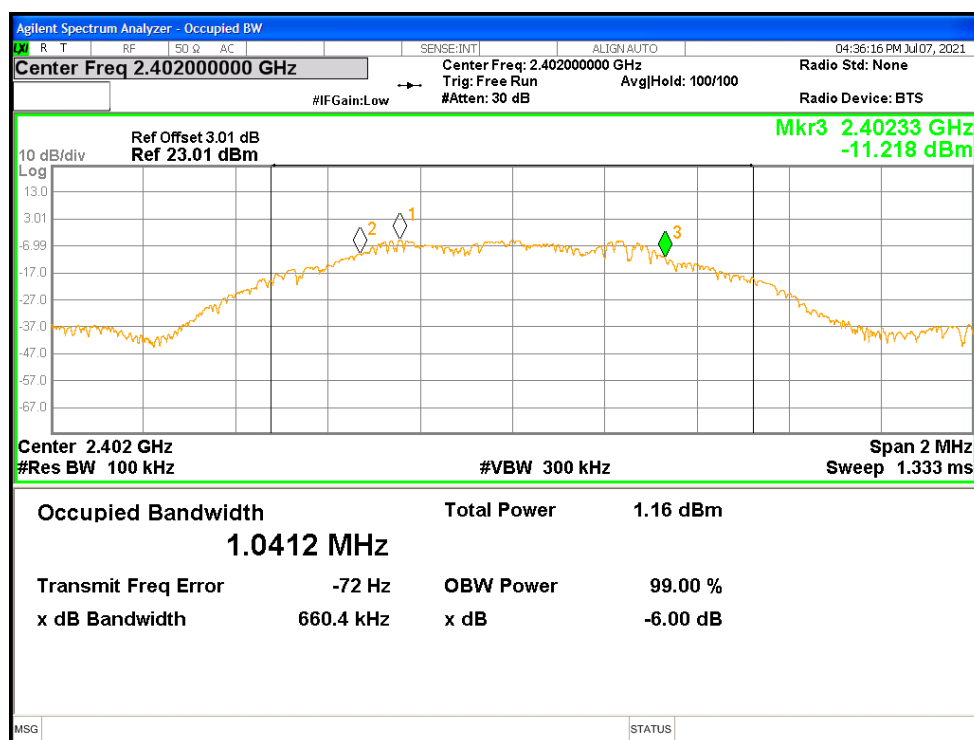
Power NVNT BLE 1M 2480MHz Ant1



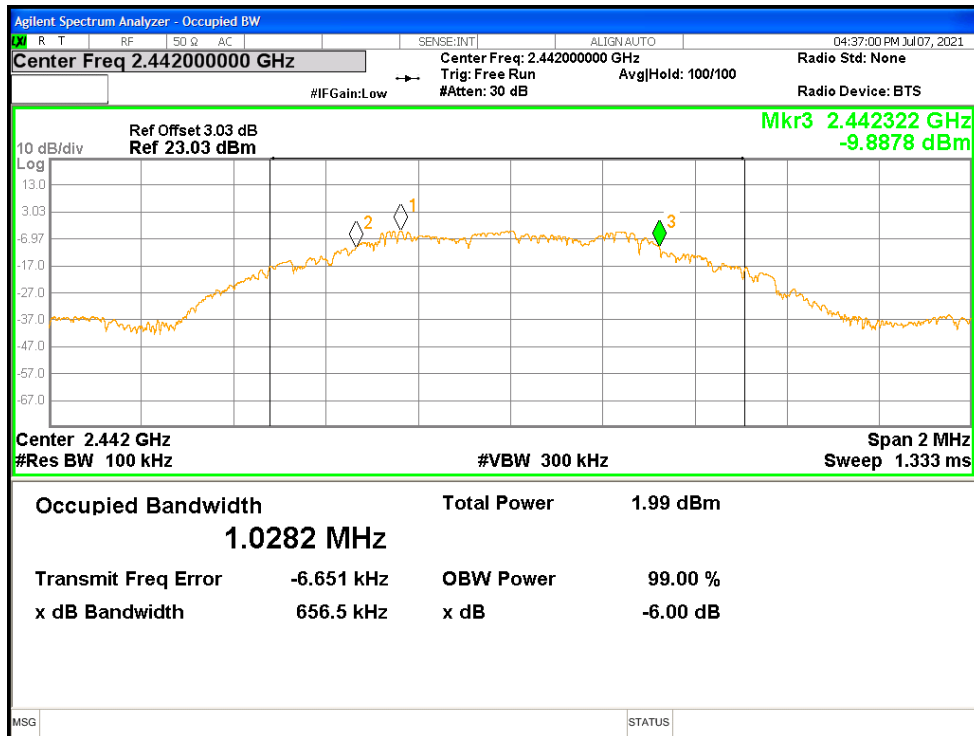
18.2 -6DB BANDWIDTH

| Condition | Mode | Frequency (MHz) | Antenna | -6 dB Bandwidth (MHz) | Limit -6 dB Bandwidth (MHz) | Verdict |
|-----------|--------|-----------------|---------|-----------------------|-----------------------------|---------|
| NVNT | BLE 1M | 2402 | Ant1 | 0.66 | 0.5 | Pass |
| NVNT | BLE 1M | 2442 | Ant1 | 0.657 | 0.5 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | 0.667 | 0.5 | Pass |

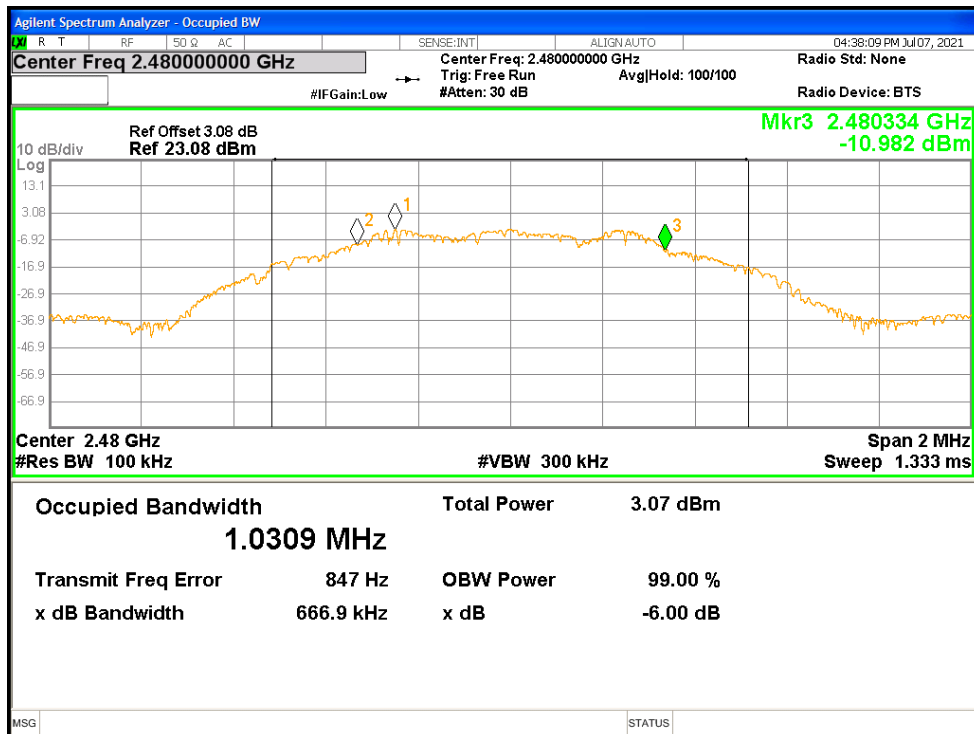
-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2442MHz Ant1



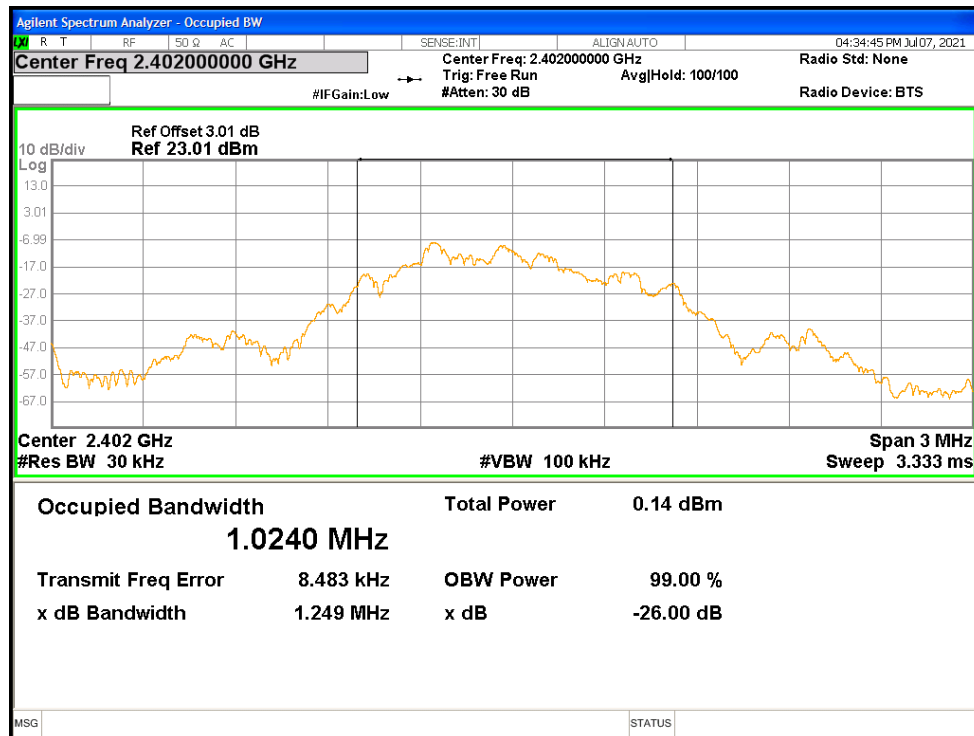
-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



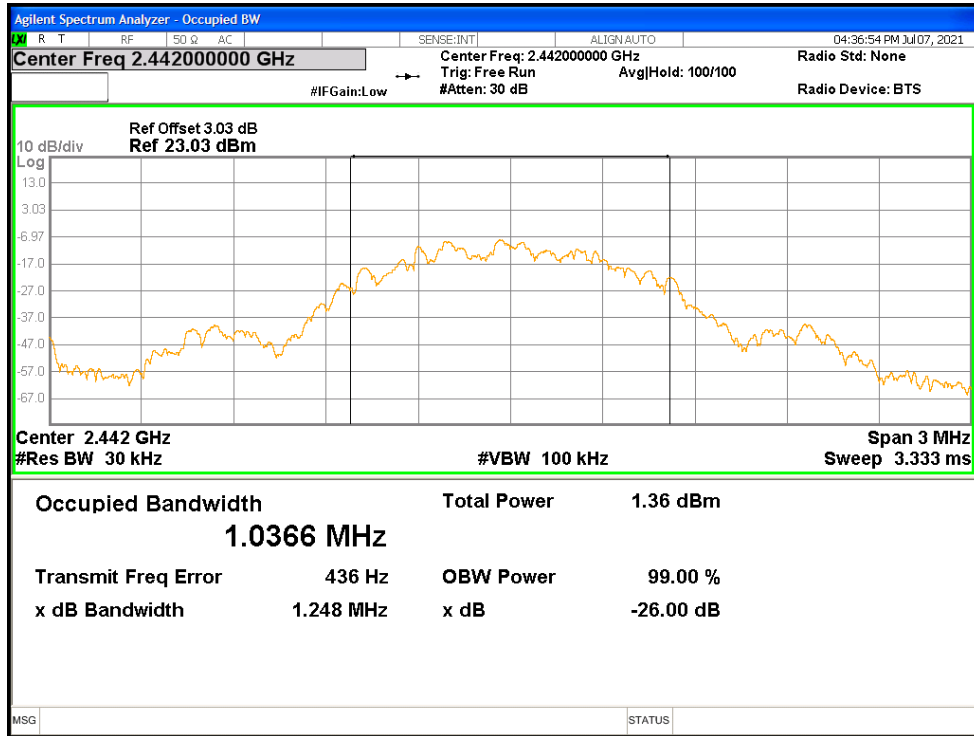
18.3 OCCUPIED CHANNEL BANDWIDTH

| Condition | Mode | Frequency (MHz) | Antenna | 99% OBW (MHz) |
|-----------|--------|-----------------|---------|---------------|
| NVNT | BLE 1M | 2402 | Ant1 | 1.024037066 |
| NVNT | BLE 1M | 2442 | Ant1 | 1.036600352 |
| NVNT | BLE 1M | 2480 | Ant1 | 1.032017016 |

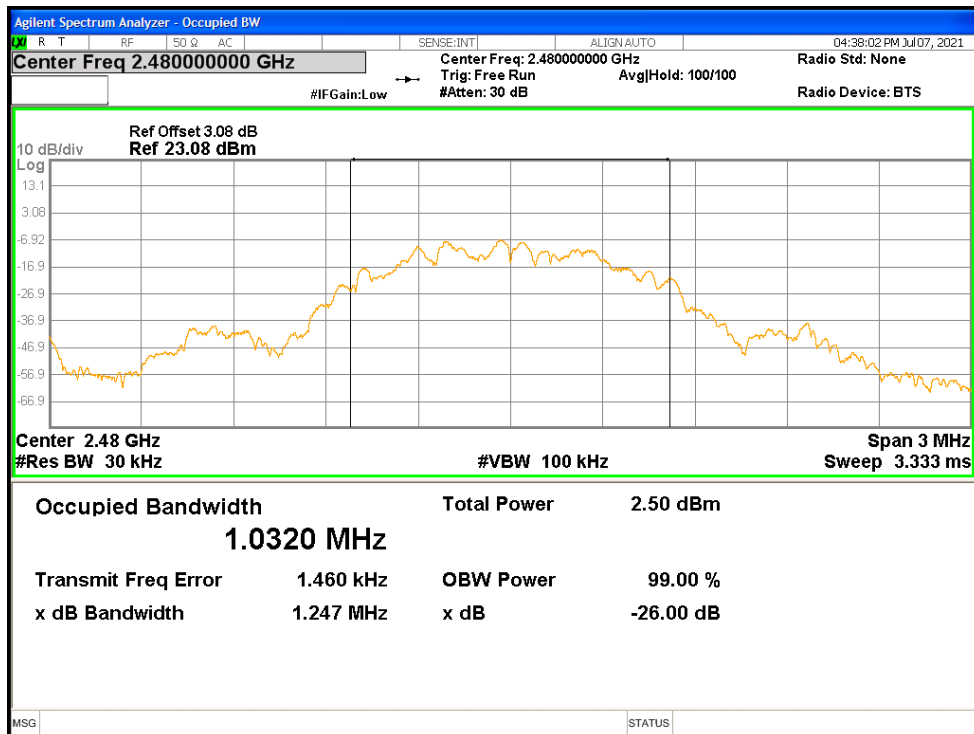
OBW NVNT BLE 1M 2402MHz Ant1



OBW NVNT BLE 1M 2442MHz Ant1



OBW NVNT BLE 1M 2480MHz Ant1



18.4 MAXIMUM POWER SPECTRAL DENSITY LEVEL

| Condition | Mode | Frequency (MHz) | Antenna | Max PSD (dBm) | Limit (dBm) | Verdict |
|-----------|--------|-----------------|---------|---------------|-------------|---------|
| NVNT | BLE 1M | 2402 | Ant1 | -15.178 | 8 | Pass |
| NVNT | BLE 1M | 2442 | Ant1 | -13.596 | 8 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | -12.746 | 8 | Pass |

PSD NVNT BLE 1M 2402MHz Ant1



PSD NVNT BLE 1M 2442MHz Ant1



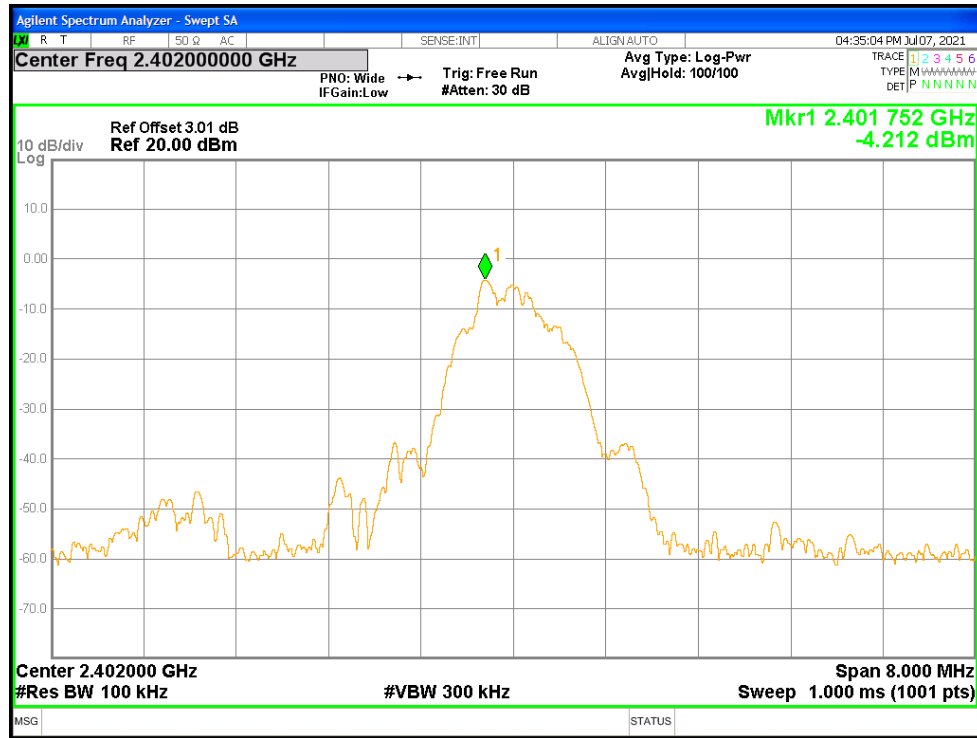
PSD NVNT BLE 1M 2480MHz Ant1



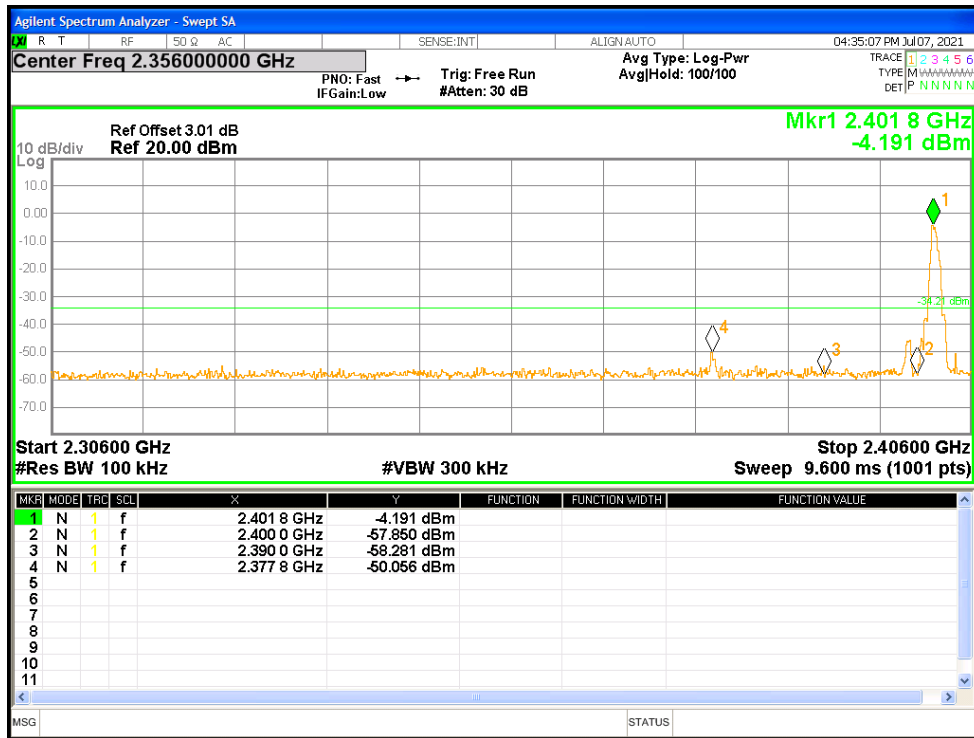
18.5 BAND EDGE

| Condition | Mode | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|--------|-----------------|---------|-----------------|-------------|---------|
| NVNT | BLE 1M | 2402 | Ant1 | -45.84 | -30 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | -48.3 | -30 | Pass |

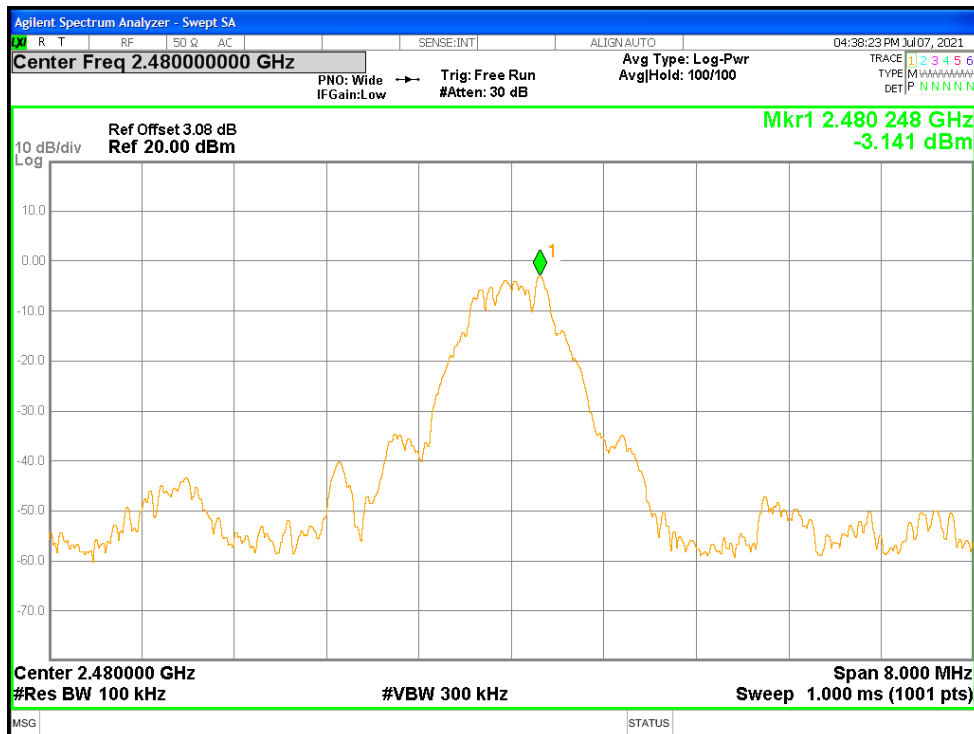
Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



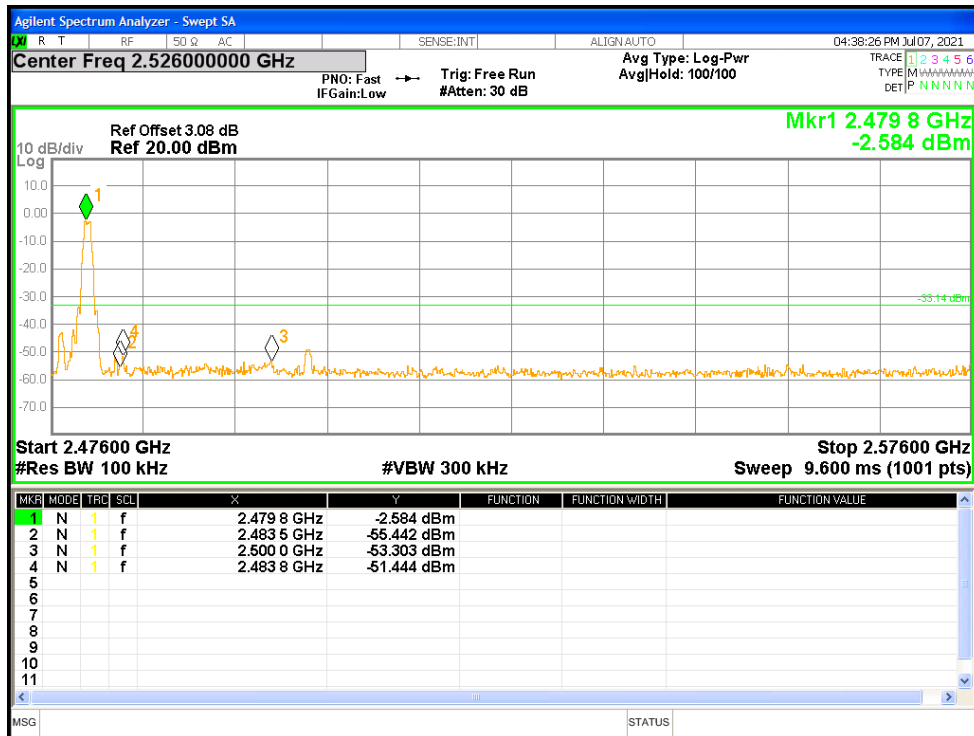
Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



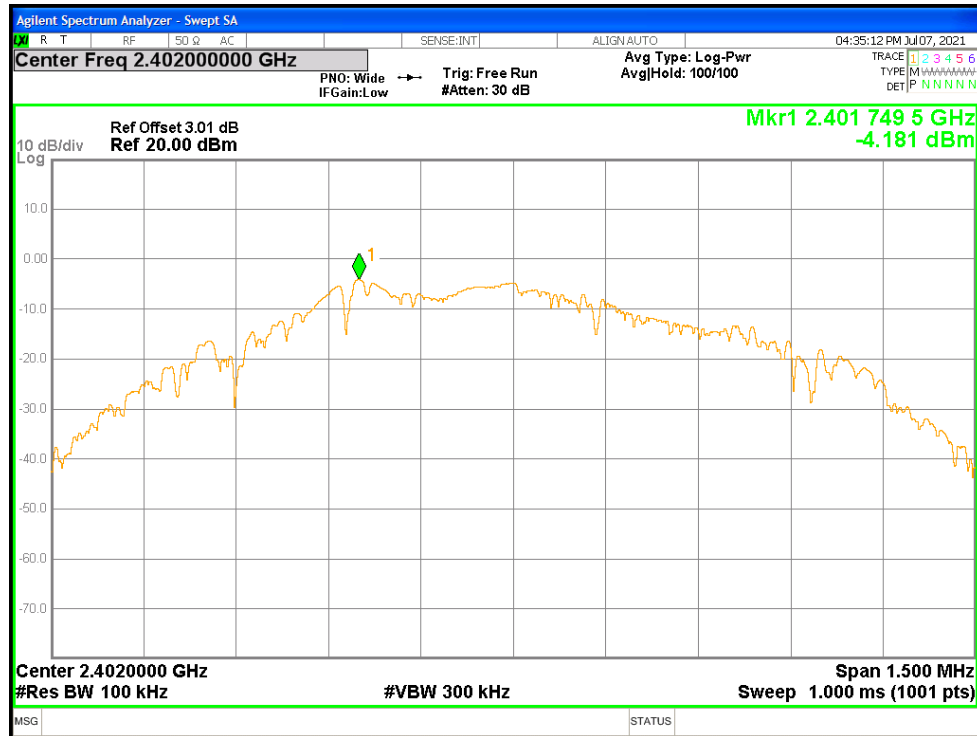
Band Edge NVNT BLE 1M 2480MHz Ant1 Emission



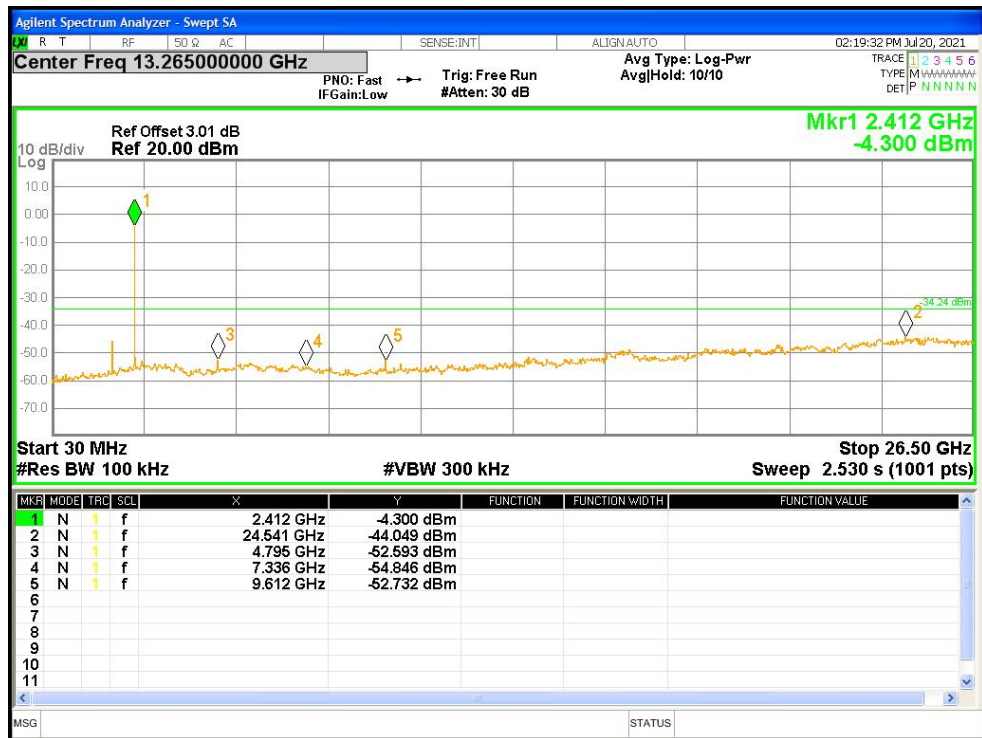
18.6 CONDUCTED RF SPURIOUS EMISSION

| Condition | Mode | Frequency (MHz) | Antenna | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|--------|-----------------|---------|-----------------|-------------|---------|
| NVNT | BLE 1M | 2402 | Ant1 | -39.72 | -30 | Pass |
| NVNT | BLE 1M | 2442 | Ant1 | -40.91 | -30 | Pass |
| NVNT | BLE 1M | 2480 | Ant1 | -41.09 | -30 | Pass |

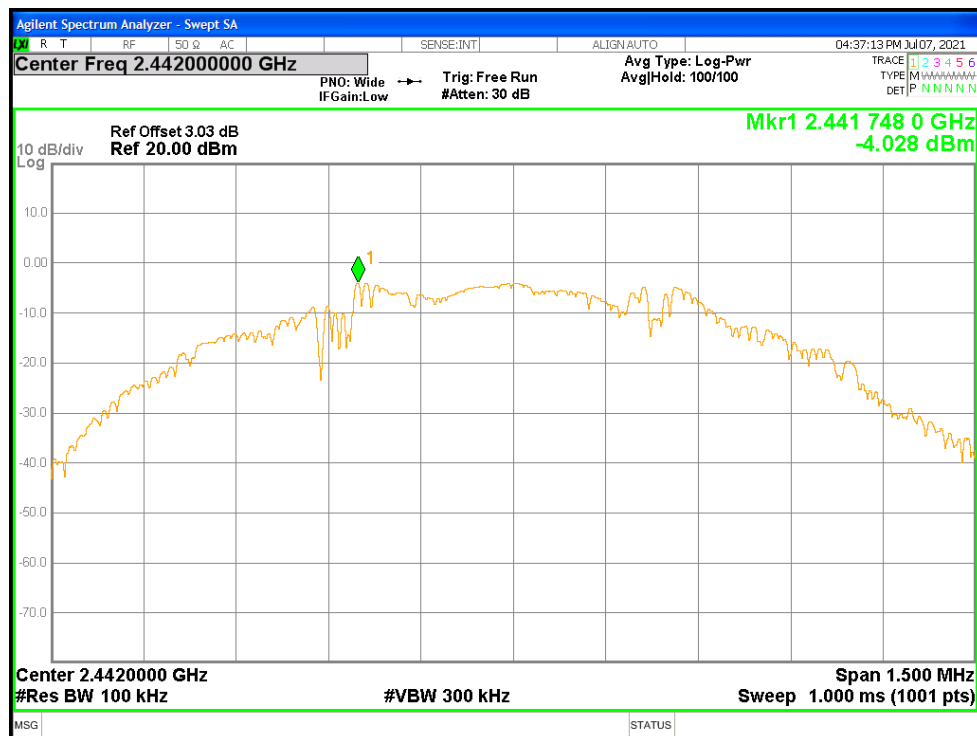
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



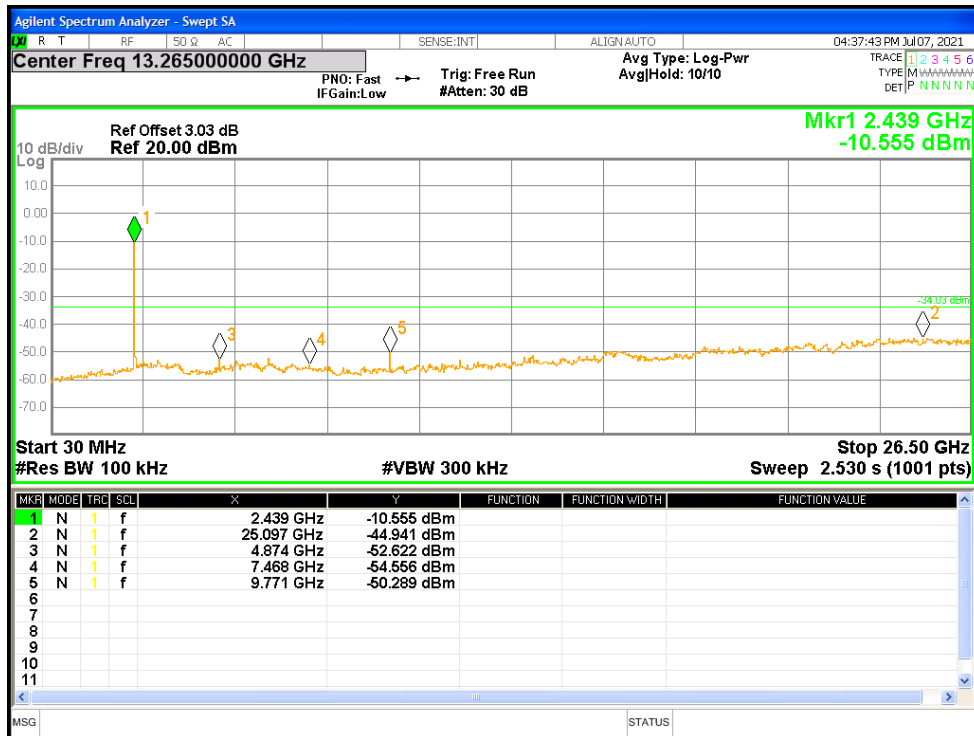
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



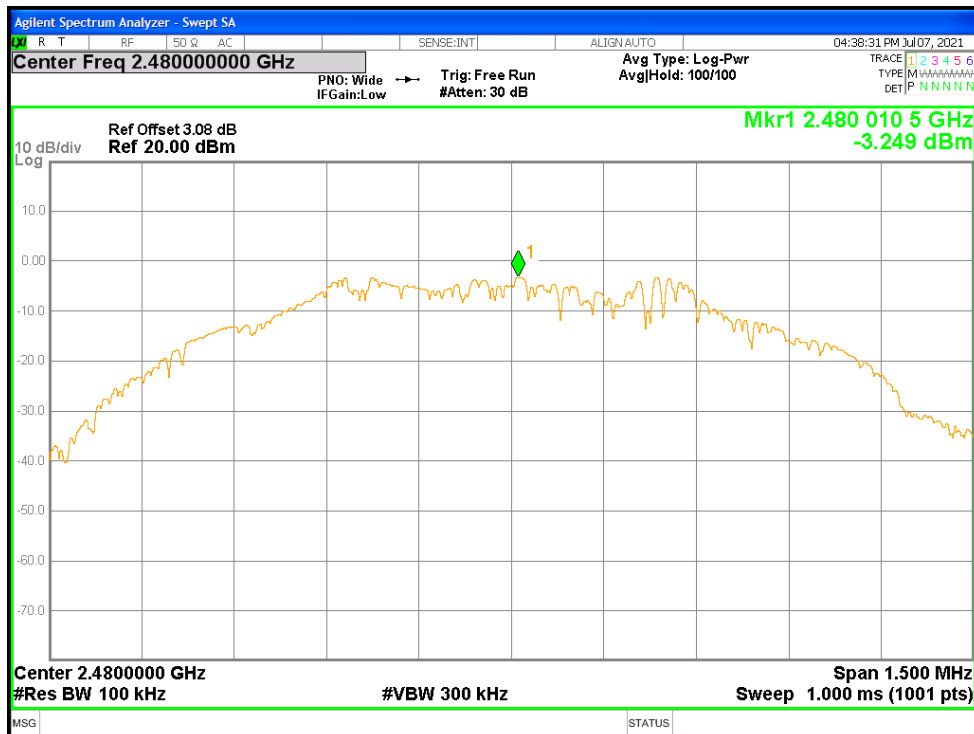
Tx. Spurious NVNT BLE 1M 2442MHz Ant1 Ref



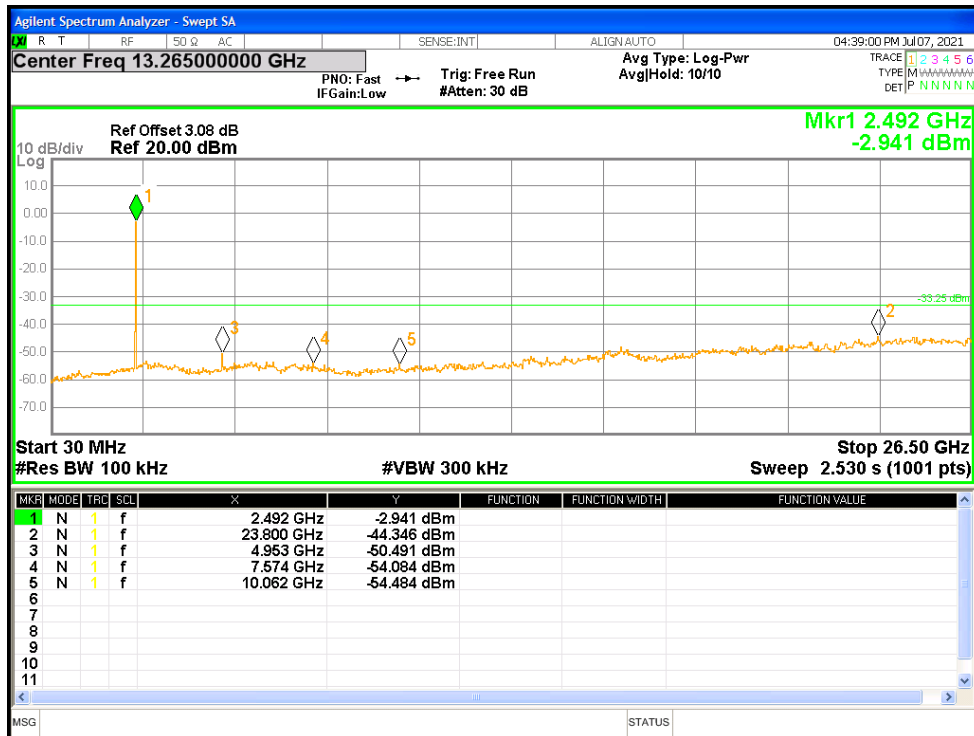
Tx. Spurious NVNT BLE 1M 2442MHz Ant1 Emission



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref

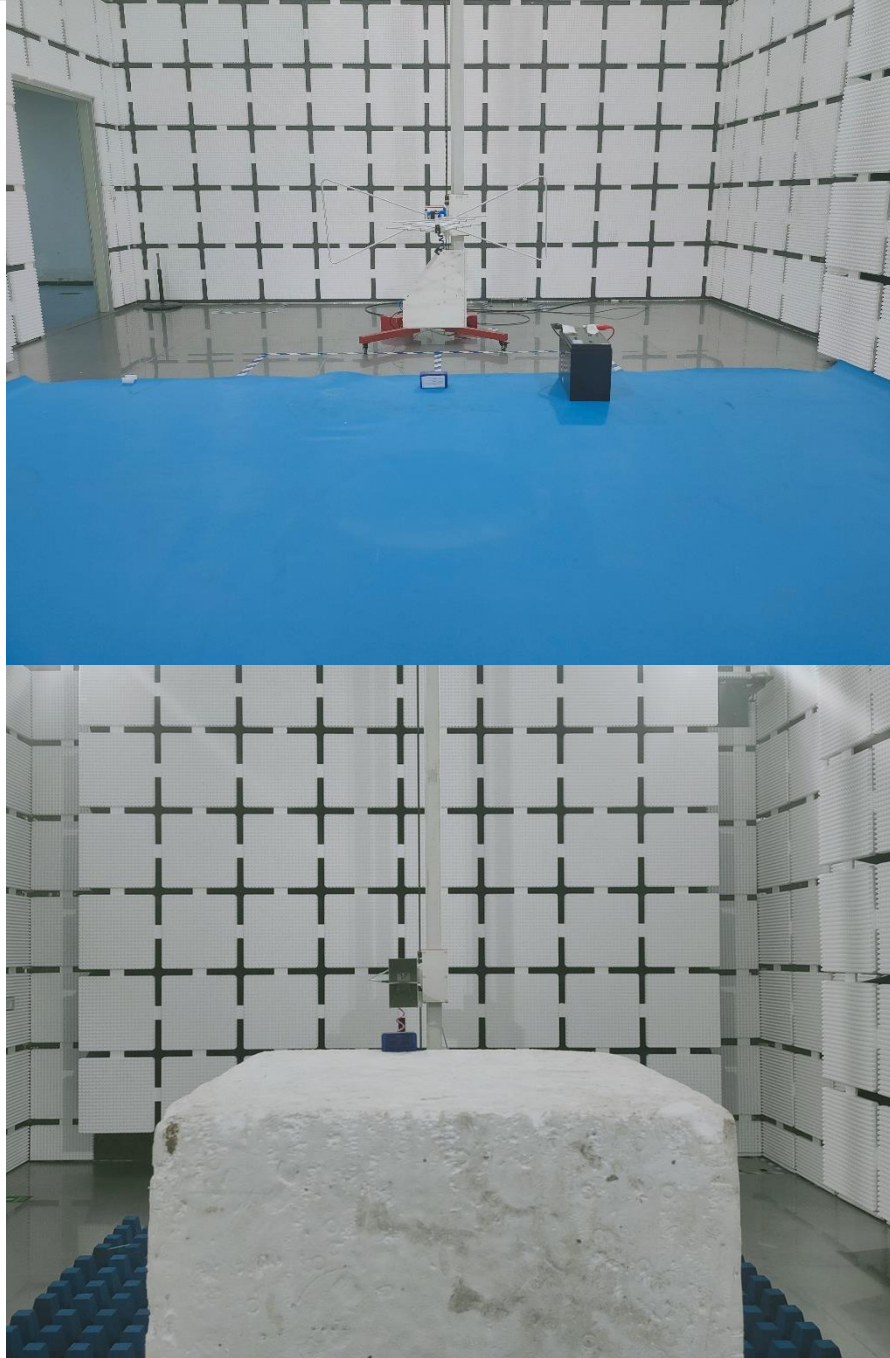


Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



APPENDIX A: PHOTOGRAPHS OF TEST SETUP

Radiated Spurious Emissions



APPENDIX B: PHOTOGRAPHS OF EUT

(Reference to the report NO.BLA-EMC-202105-A10801)

----END OF REPORT----

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