

Report No.: ZR/2021/3002203

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FCC TEST REPORT

Application No.: ZR/2021/30022 Applicant: HMD Global Oy

Address of Applicant Bertel Jungin aukio 9, 02600 Espoo, Finland

Manufacturer: HMD Global Oy

Address of Manufacturer Bertel Jungin aukio 9, 02600 Espoo, Finland

EUT Description: Smart Phone Model No.: TA-1371 Trade Mark: **NOKIA**

FCC ID: 2AJOTTA-1371

47 CFR FCC Part 2, Subpart J Standards:

47 CFR Part 15, Subpart C

Date of Receipt:

Date of Test: 2021/4/2 to 2021/5/14

Date of Issue: 2021/5/14 Test Result: PASS *

In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Derek Yang Wireless Laboratory Manager





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Version 1

| Revision Record | | | | | | |
|-----------------|---------|------------|----------|----------|--|--|
| Version | Chapter | Date | Modifier | Remark | | |
| 01 | | 2021-05-14 | | Original | | |
| | | | | | | |
| | | | | | | |

| Authorized for issue by: | |
|--------------------------|------------------------|
| Prepared By | Dee.Zheng |
| | (Dee Zheng) / Engineer |
| Checked By | Jun Hong |
| | (Jim Huang) / Reviewer |





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2 **Test Summary**

| Test Item | Test Requirement | Test Method | Test Result | Result | Test Lab* |
|---|------------------|------------------|----------------|--------|--------------|
| AC Power Line Conducted Emission | 15.207 | ANSI C63.10 2013 | Clause 4.2 | PASS | В |
| Conducted Output Power | 15.247 (b)(3) | ANSI C63.10 2013 | Clause 4.3 | PASS | Α |
| DTS (6 dB) Bandwidth | 15.247 (a)(2) | ANSI C63.10 2013 | Clause 4.4 | PASS | Α |
| Power Spectral Density | 15.247 (e) | ANSI C63.10 2013 | Clause 4.5 | PASS | Α |
| Band-edge for RF Conducted Emissions | 15.247(d) | ANSI C63.10 2013 | Clause 4.6 | PASS | Α |
| RF Conducted Spurious Emissions | 15.247(d) | ANSI C63.10 2013 | Clause 4.7 | PASS | Α |
| Radiated Spurious Emissions | 15.205/15.209 | ANSI C63.10 2013 | Clause 4.8 | PASS | В |
| Restricted bands around fundamental frequency (Radiated Emission) | 15.205/15.209 | ANSI C63.10 2013 | Clause 4.9 | PASS | В |

Remark: All test were performed by Lab A and B.

Lab A SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch Lab B SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD.





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General Information 3

3.1 Details of Client

| Applicant: | HMD Global Oy |
|-------------------------|---|
| Address of Applicant | Bertel Jungin aukio 9, 02600 Espoo, Finland |
| Manufacturer: | HMD Global Oy |
| Address of Manufacturer | Bertel Jungin aukio 9, 02600 Espoo, Finland |

3.2 Test Location

Lab A:

| Company: | SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch | |
|--|---|--|
| Address: No. 1 Workshop, M-10, Middle section, Science & Technology Park Shenzhen, Guangdong, China | | |
| Post code: | 518057 | |
| Test engineer: | Dee Zheng,Swing Hu,Habit Zeng | |

I ab B:

| Company: | SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD. |
|----------------|--|
| Address: | 1/F, Unit D, Building 1, Kanghong Orange Technology Park, No.137, Keyuan 3rd Road, Fengdong New City, Xi'an, Shaanxi China |
| Post code: | 710086 |
| Test engineer: | Leah Chen,Ken Liu,Andy Yao |





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3.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

Lab A:

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC -Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

Lab B:

A2LA (Certificate No. 4854.01)

SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4854.01.

FCC-Designation Number: CN1271.





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3.4 General Description of EUT

| EUT Description: | Smart Phone | |
|----------------------|---|--|
| Model No.: | TA-1371 | |
| Trade Mark: | NOKIA | |
| Hardware Version: | V1.00 | |
| Software Version: | 00WW_1_01A | |
| Operation Frequency: | 2400MHz~2483.5MHz fc = 2402 MHz + N * 2 MHz, where: -fc = "Operating Frequency" in MHz, -N = "Channel Number" with the range from 0 to 39. | |
| Bluetooth version: | Bluetooth V5.1 | |
| Modulation Type: | GFSK | |
| Number of Channel: | 40 | |
| Sample Type: | □ Portable Device, □ Module | |
| Antenna Type: | ☐ External, ☑ Integrated | |
| Antenna Gain: | -0.5dBi(ANT4) | |

| Operation Frequency of each channel | | | | | | | |
|-------------------------------------|-----------|---------|-----------|---------|-----------|---------|-----------|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 0 | 2402MHz | 10 | 2422MHz | 20 | 2442MHz | 30 | 2462MHz |
| 1 | 2404MHz | 11 | 2424MHz | 21 | 2444MHz | 31 | 2464MHz |
| 2 | 2406MHz | 12 | 2426MHz | 22 | 2446MHz | 32 | 2466MHz |
| 3 | 2408MHz | 13 | 2428MHz | 23 | 2448MHz | 33 | 2468MHz |
| 4 | 2410MHz | 14 | 2430MHz | 24 | 2450MHz | 34 | 2470MHz |
| 5 | 2412MHz | 15 | 2432MHz | 25 | 2452MHz | 35 | 2472MHz |
| 6 | 2414MHz | 16 | 2434MHz | 26 | 2454MHz | 36 | 2474MHz |
| 7 | 2416MHz | 17 | 2436MHz | 27 | 2456MHz | 37 | 2476MHz |
| 8 | 2418MHz | 18 | 2438MHz | 28 | 2458MHz | 38 | 2478MHz |
| 9 | 2420MHz | 19 | 2440MHz | 29 | 2460MHz | 39 | 2480MHz |



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Remark:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Channel | Frequency |
|---------------------------|-----------|
| The Lowest channel(CH0) | 2402MHz |
| The Middle channel(CH19) | 2440MHz |
| The Highest channel(CH39) | 2480MHz |

3.5 Test Environment

| Operating Environment: | | |
|------------------------|------------|--|
| Temperature: | 25.0 °C | |
| Humidity: | 50 % RH | |
| Atmospheric Pressure: | 101.30 KPa | |

3.6 Description of Support Units

The EUT has been tested independent unit.





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Test results and Measurement Data 4

4.1 Antenna Requirement

Standard requirement: 47 CFR Part 15C Section 15.203 /247(c)

15.203 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, 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.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -0.5dBi.





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4.2 AC Power Line Conducted Emissions

| Test Requirement: | 47 CFR Part 15C Section 15.207 | | | |
|-----------------------|--|------------------------------|-------------------------|--|
| Test Method: | ANSI C63.10: 2013 | | | |
| Test Frequency Range: | 150kHz to 30MHz | | | |
| Limit: | Fraguency range (MUz) | Limit (dBuV) | | |
| | Frequency range (MHz) | Quasi-peak | Average | |
| | 0.15-0.5 | 66 to 56* | 56 to 46* | |
| | 0.5-5 | 56 | 46 | |
| | 5-30 | 60 | 50 | |
| | * Decreases with the log | arithm of the frequency. | | |
| Test Procedure: | The mains terminal droom. | listurbance voltage test was | conducted in a shielded | |
| | room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane. 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to | | | |



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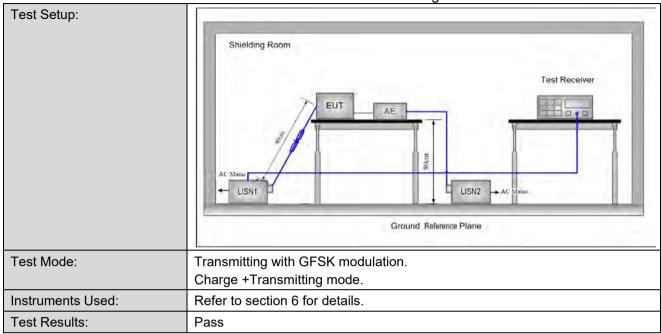
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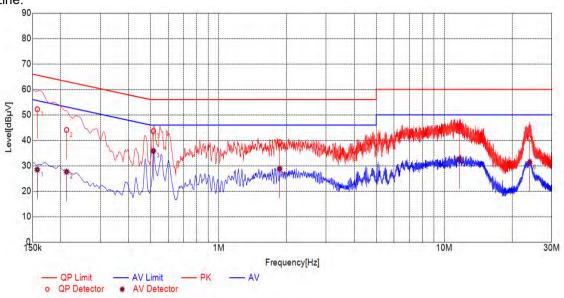
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Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live Line:



Test Graph

| Final Data List | | | | | | | | |
|-----------------|----------------|----------------|-----------------------|-----------------------|----------------------|-----------------------|-----------------------|----------------------|
| NO. | Freq. [MHz] | Factor [dB] | QP Value [dBµV] | QP Limit [dBµV] | QP Margin [dB] | AV Value [dBµV] | AV Limit [dBµV] | AV Margin [dB] |
| 1 | 0.1573 | 10.10 | 52.21 | 65.61 | 13.40 | 28.48 | 55.61 | 27.13 |
| 2 | 0.2121 | 10.10 | 44.07 | 63.12 | 19.05 | 27.61 | 53.12 | 25.51 |
| 3 | 0.5143 | 10.10 | 43.60 | 56.00 | 12.40 | 35.86 | 46.00 | 10.14 |
| 4 | 1.8667 | 10.10 | 39.24 | 56.00 | 16.76 | 28.79 | 46.00 | 17.21 |
| 5 | 11.6875 | 10.10 | 43.61 | 60.00 | 16.39 | 32.66 | 50.00 | 17.34 |
| 6 | 23.9382 | 10.11 | 40.75 | 60.00 | 19.25 | 31.36 | 50.00 | 18.64 |



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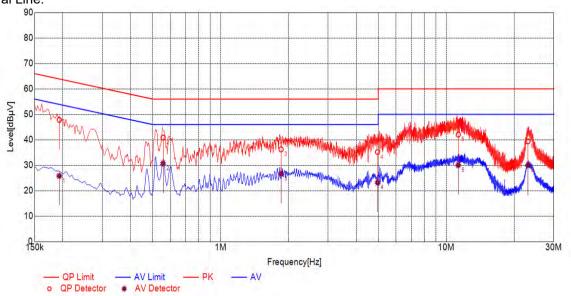
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Test Graph

| Final Data List | | | | | | | | |
|-----------------|----------------|----------------|-----------------------|-----------------------|----------------------|-----------------------|-----------------------|----------------------|
| NO. | Freq. [MHz] | Factor [dB] | QP Value [dBµV] | QP Limit [dBµV] | QP Margin [dB] | AV Value [dBµV] | AV Limit [dBµV] | AV Margin [dB] |
| 1 | 0.1929 | 10.10 | 47.80 | 63.91 | 16.11 | 25.79 | 53.91 | 28.12 |
| 2 | 0.5567 | 10.10 | 40.88 | 56.00 | 15.12 | 30.67 | 46.00 | 15.33 |
| 3 | 1.8553 | 10.10 | 36.25 | 56.00 | 19.75 | 26.70 | 46.00 | 19.30 |
| 4 | 4.9652 | 10.10 | 35.19 | 56.00 | 20.81 | 23.18 | 46.00 | 22.82 |
| 5 | 11.3086 | 10.10 | 42.03 | 60.00 | 17.97 | 30.03 | 50.00 | 19.97 |
| 6 | 23.0368 | 10.11 | 39.38 | 60.00 | 20.62 | 29.95 | 50.00 | 20.05 |

Remark:

- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.



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4.3 Duty Cycle

The detailed test data see: Appendix

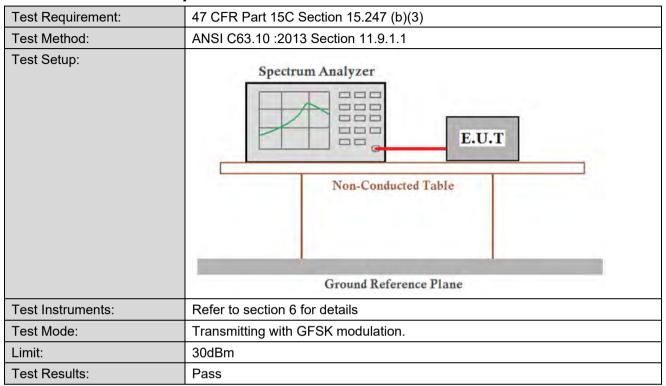




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4.4 Conducted Output Power



The detailed test data see: Appendix

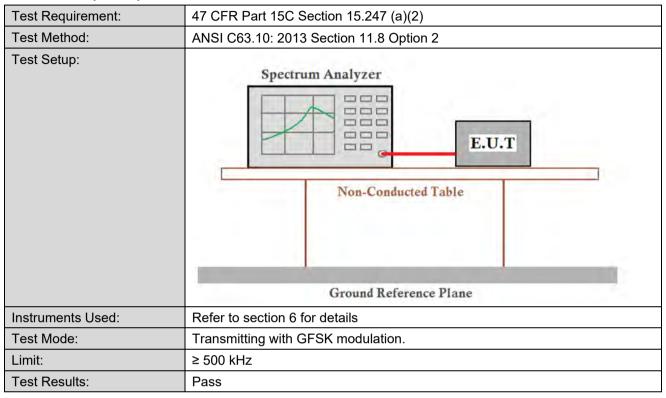




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4.5 DTS (6 dB) Bandwidth



The detailed test data see: Appendix

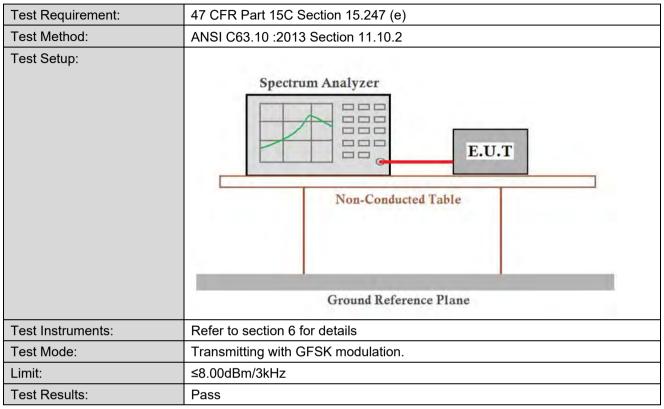




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4.6 Power Spectral Density



The detailed test data see: Appendix





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4.7 Band-edge for RF Conducted Emissions

| Test Requirement: | 47 CFR Part 15C Section 15.247 (d) | | | |
|-------------------|---|--|--|--|
| Test Method: | ANSI C63.10: 2013 Section 11.13 | | | |
| Test Setup: | Spectrum Analyzer E.U.T Non-Conducted Table | | | |
| | Ground Reference Plane | | | |
| Instruments Used: | Refer to section 6 for details | | | |
| Test Mode: | Transmitting with GFSK modulation. | | | |
| Limit: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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. | | | |
| Test Results: | Pass | | | |

The detailed test data see: Appendix

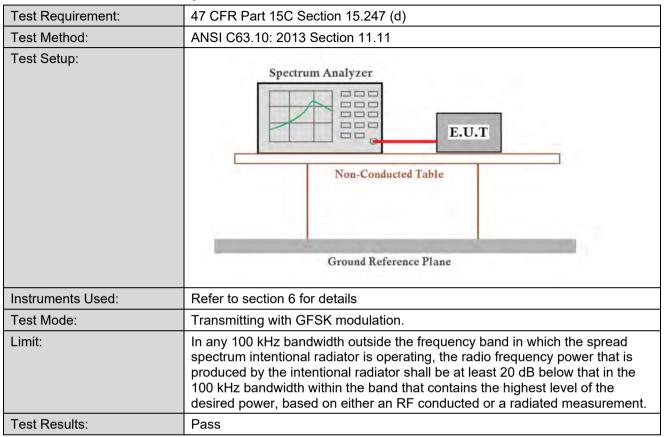




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4.8 RF Conducted Spurious Emissions



The detailed test data see: Appendix





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4.9 Radiated Spurious Emissions

| Test Requirement: | 47 CFR Part 15C Section 15.209 and 15.205 | | | | | | |
|-------------------|--|----------------------------------|-------------------|------------|--------------------------|--|--|
| Test Method: | ANSI C63.10 :2013 Section 11.12 | | | | | | |
| Test Site: | Measurement Distance: 3m (Semi-Anechoic Chamber) | | | | | | |
| Receiver Setup: | Frequency | Detector | RBW | VBW | Remark | | |
| | 0.009MHz-0.090MHz | Peak | 10kHz | 30kHz | Peak | | |
| | 0.009MHz-0.090MHz | Average | 10kHz | 30kHz | Average | | |
| | 0.090MHz-0.110MHz | Quasi-peak | 10kHz | 30kHz | Quasi-peak | | |
| | 0.110MHz-0.490MHz | Peak | 10kHz | 30kHz | Peak | | |
| | 0.110MHz-0.490MHz | Average | 10kHz | 30kHz | Average | | |
| | 0.490MHz -30MHz | Quasi-peak | 10kHz | 30kHz | Quasi-peak | | |
| | 30MHz-1GHz | Quasi-peak | 120kHz | 300kHz | Quasi-peak | | |
| | Above 1GHz | Peak | 1MHz | 3MHz | Peak | | |
| | Above 1G112 | Peak | 1MHz | 10Hz | Average | | |
| Limit: | Frequency | Field strength (microvolt/meter) | Limit (dBuV/m) | Remark | Measurement distance (m) | | |
| | 0.009MHz-0.490MHz | 2400/F(kHz) | - | - | 300 | | |
| | 0.490MHz-1.705MHz | 24000/F(kHz) | - | - | 30 | | |
| | 1.705MHz-30MHz | 30 | - | - | 30 | | |
| | 30MHz-88MHz | 100 | 40.0 | Quasi-peak | 3 | | |
| | 88MHz-216MHz | 150 | 43.5 | Quasi-peak | 3 | | |
| | 216MHz-960MHz | 200 | 46.0 | Quasi-peak | 3 | | |
| | 960MHz-1GHz | 500 | 54.0 | Quasi-peak | 3 | | |
| | Above 1GHz | 500 | 54.0 | Average | 3 | | |
| | Remark: 15.35(b),Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device. | | | | | | |



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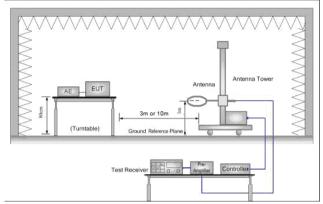
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Test Setup:



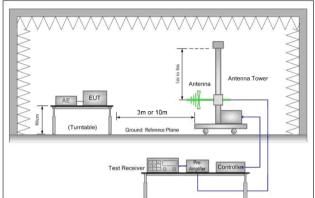


Figure 1. Below 30MHz

Figure 2. 30MHz to 1GHz

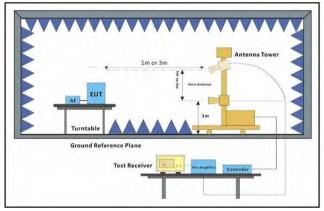


Figure 3. Above 1 GHz

Test 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 camber. 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 semi-anechoic camber. 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.
- e. Use the following spectrum analyzer settings:
 - Span shall wide enough to fully capture the emission being (1) measured;
 - Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz; (2)VBW ≥ RBW; Sweep = auto;
 - Detector function = peak; Trace = max hold for peak
 - For average measurement: use duty cycle correction factor method per 15.35(c).

Duty cycle = On time/100 milliseconds



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| On time = N 1 *L 1 +N 2 *L 2 ++N n-1 *LN n-1 +N n *L n Where N 1 is number of type 1 pulses, L 1 is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + 20*log(Duty cycle) f. For each suspected emission, the EUT was arranged to its worst cathen the antenna was tuned to heights from 1 meter to 4 meters(for frequency of below 30MHz, the antenna was tuned to heights 1 meters the rotatable table was turned from 0 degrees to 360 degrees to maximum reading. g. The test-receiver system was set to Peak Detect Function and Spandwidth with Maximum Hold Mode. h. If the emission level of the EUT in peak mode was 10dB lower than the specified, then testing could be stopped and the peak values of the would be reported. Otherwise the emissions that did not have 10dB would be re-tested one by one using peak, quasi-peak or average mes specified and then reported in a data sheet. i. Test the EUT in the lowest channel, the middle channel, the Highest channel is the stopped and the peak values of the content of the testing could be stopped and the peak values of the would be reported. Otherwise the emissions that did not have 10dB would be re-tested one by one using peak, quasi-peak or average mes specified and then reported in a data sheet. | | | | |
|---|---------------------|--|--|--|
| Average Emission Level = Peak Emission Level + 20*log(Duty cycle) f. For each suspected emission, the EUT was arranged to its worst cathen the antenna was tuned to heights from 1 meter to 4 meters(for frequency of below 30MHz, the antenna was tuned to heights 1 meters the rotatable table was turned from 0 degrees to 360 degrees to maximum reading. g. The test-receiver system was set to Peak Detect Function and Spandwidth with Maximum Hold Mode. h. If the emission level of the EUT in peak mode was 10dB lower than to specified, then testing could be stopped and the peak values of the would be reported. Otherwise the emissions that did not have 10dB would be re-tested one by one using peak, quasi-peak or average me specified and then reported in a data sheet. | | | | |
| f. For each suspected emission, the EUT was arranged to its worst cathen the antenna was tuned to heights from 1 meter to 4 meters(for frequency of below 30MHz, the antenna was tuned to heights 1 meters the rotatable table was turned from 0 degrees to 360 degrees to maximum reading. g. The test-receiver system was set to Peak Detect Function and Spandwidth with Maximum Hold Mode. h. If the emission level of the EUT in peak mode was 10dB lower than to specified, then testing could be stopped and the peak values of the would be reported. Otherwise the emissions that did not have 10dB would be re-tested one by one using peak, quasi-peak or average me specified and then reported in a data sheet. | | | | |
| then the antenna was tuned to heights from 1 meter to 4 meters(for frequency of below 30MHz, the antenna was tuned to heights 1 meters the rotatable table was turned from 0 degrees to 360 degrees to maximum reading. g. The test-receiver system was set to Peak Detect Function and Spandwidth with Maximum Hold Mode. h. If the emission level of the EUT in peak mode was 10dB lower than to specified, then testing could be stopped and the peak values of the would be reported. Otherwise the emissions that did not have 10dB would be re-tested one by one using peak, quasi-peak or average me specified and then reported in a data sheet. | | | | |
| Bandwidth with Maximum Hold Mode. h. If the emission level of the EUT in peak mode was 10dB lower than to specified, then testing could be stopped and the peak values of the would be reported. Otherwise the emissions that did not have 10dB would be re-tested one by one using peak, quasi-peak or average me specified and then reported in a data sheet. | the test er) and | | | |
| specified, then testing could be stopped and the peak values of the would be reported. Otherwise the emissions that did not have 10dB would be re-tested one by one using peak, quasi-peak or average me specified and then reported in a data sheet. | pecified | | | |
| i. Test the EUT in the lowest channel, the middle channel ,the Highest ch | ne EUT margin | | | |
| · · · · · · · · · · · · · · · · · · · | nannel. | | | |
| j. The radiation measurements are performed in X, Y, Z axis position Transmitting mode, And found the X axis positioning which it is worse | | | | |
| k. Repeat above procedures until all frequencies measured was complete | · | | | |
| | | | | |
| Exploratory Test Mode: Transmitting with GFSK modulation. | | | | |
| Charge + Transmitting mode. | | | | |
| Final Test Mode: Transmitting with GFSK modulation. | | | | |
| Pretest the EUT at Charge + Transmitting mode, | | | | |
| For below 1GHz part, through pre-scan, the worst case is the lowest conclusion. Only the worst case is recorded in the report. | hannel. | | | |
| Instruments Used: Refer to section 6 for details | | | | |
| Test Results: Pass | | | | |

The detailed test data see: Appendix



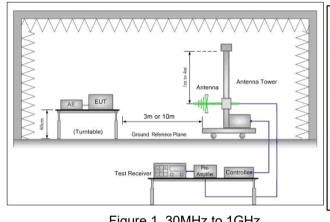


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4.10Restricted bands around fundamental frequency

| Test Requirement: | 47 CFR Part 15C Section | 47 CFR Part 15C Section 15.209 and 15.205 | | | | | | |
|-------------------|---------------------------|--|---------------|--|--|--|--|--|
| Test Method: | ANSI C63.10: 2013 Section | ANSI C63.10: 2013 Section 11.12 | | | | | | |
| Test Site: | Measurement Distance: 3r | Measurement Distance: 3m (Semi-Anechoic Chamber) | | | | | | |
| Limit: | Frequency | Limit (dBuV/m) | Remark | | | | | |
| | 30MHz-88MHz | 40.0 | Quasi-peak | | | | | |
| | 88MHz-216MHz | 43.5 | Quasi-peak | | | | | |
| | 216MHz-960MHz | 46.0 | Quasi-peak | | | | | |
| | 960MHz-1GHz | 54.0 | Quasi-peak | | | | | |
| | Al- 21/2 4 O L I- | 54.0 | Average Value | | | | | |
| | Above 1GHz | 74.0 | Peak Value | | | | | |
| Test Setup: | | <u>.</u> | | | | | | |



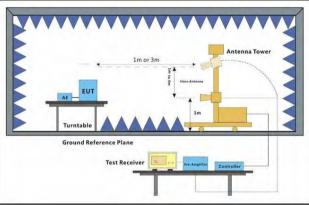


Figure 1. 30MHz to 1GHz

Figure 2. Above 1 GHz



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| | 1 ago. 21 01 01 |
|------------------------|---|
| Test Procedure: | a. 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 camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. c. 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. d. 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. e. 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. g. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel h. Test the EUT in the lowest 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 worse case. j. Repeat above procedures until all frequencies measured was complete. |
| Evaloratory Toot Mada: | Transmitting with CESK modulation |
| Exploratory Test Mode: | Transmitting with GFSK modulation. Charge + Transmitting mode. |
| Final Test Mode: | Transmitting with GFSK modulation. |
| | Pretest the EUT at Charge + Transmitting mode. |
| | Only the worst case is recorded in the report. |
| Instruments Used: | Refer to section 6 for details |
| Test Results: | Pass |

The detailed test data see: Appendix





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Measurement Uncertainty (95% confidence levels, k=2)

Lab A:

| No. | Item | Measurement Uncertainty | | |
|-----|-------------------------------|--------------------------|--|--|
| 1 | Total RF power, conducted | ±0.41dB | | |
| 2 | RF power density, conducted | ±1.96dB | | |
| 3 | Spurious emissions, conducted | ±0.41dB | | |
| 4 | Radio Frequency | ±7.10 x 10 ⁻⁸ | | |
| 5 | Duty Cycle | ±0.49% | | |
| 6 | Occupied Bandwidth | ±0.2% | | |

Lab B:

| No. | ltem | Measurement Uncertainty | | |
|-----|---------------------|---------------------------|--|--|
| 1 | Conduction Emission | ± 3.0dB (150kHz to 30MHz) | | |
| | | ± 4.8dB (Below 1GHz) | | |
| 2 | Dedicted Envisors | ± 4.8dB (1GHz to 6GHz) | | |
| 2 | Radiated Emission | ± 4.5dB (6GHz to 18GHz) | | |
| | | ± 5.02dB (Above 18GHz) | | |





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Equipment List

| | | RF conducted | | | |
|-----------------------|------------------------------------|--------------|---------------|------------------------|----------------------------|
| Test Equipment | Manufacturer | Model No. | Inventory No. | Cal. Date (yyyy-mm-dd) | Cal. Due date (yyyy-mm-dd) |
| Signal Analyzer | Rohde & Schwarz | FSV | W025-05 | 2020/4/16 | 2021/4/15 |
| | | | | 2021/4/14 | 2022/4/13 |
| DC Power Supply | Rohde & Schwarz | HMP2020 | W009-08 | 2020/7/15 | 2021/7/15 |
| Power Meter | Rohde & Schwarz | NRVS | SEM014-02 | 2020/7/14 | 2021/7/13 |
| Humidity/ Temperature | Shanghai | | | 2020/4/21 | 2021/4/20 |
| Indicator | Meteorological Industry Factory | HTC-1 | W006-17 | 2021/4/14 | 2022/4/13 |

| CE Test System | | | | | | | | |
|--------------------------------|---------------|-------------|---------------|------------|-----------------|--|--|--|
| Equipment | Manufacturer | Model No. | Inventory No. | Cal Date | Cal Due Date | | | |
| Shielding Room | Brilliant-emc | N/A | XAW03-35-01 | 2019-09-11 | 2022-09-10 | | | |
| Test receiver | ROHDE&SCHWARZ | ESR | XAW01-08-01 | 2020-09-11 | 2021-09-10 | | | |
| Artificial network | ROHDE&SCHWARZ | ENV216 | XAW01-04-01 | 2020-08-04 | 2021-08-03 | | | |
| Temperature and humidity meter | MingGao | TH101B | XAW01-01-01 | 2020-11-06 | 2021-11-05 | | | |
| Measurement Software | Tonscend | TS+ CE V2.5 | XAW02-05-02 | NCR | NCR | | | |





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| | | RSE Test Syste | em | _ | |
|---------------------------------------|----------------|---------------------|---------------|------------|--------------|
| Equipment | Manufacturer | Model No. | Inventory No. | Cal Date | Cal Due Date |
| Semi-Anechoic Chamber | Brilliant-emc | N/A | XAW03-35-01 | 2019-09-11 | 2022-09-10 |
| MXA signal analyzer | Keysight | N9020A | XAW01-06-01 | 2021-04-01 | 2022-03-31 |
| Test receiver | ROHDE&SCHWARZ | ESR | XAW01-08-01 | 2020-09-11 | 2021-09-10 |
| Receiving antenna (30MHz-3GHz) | Schwarzbeck | VULB 9163 | XAW01-09-01 | 2019-10-13 | 2021-10-12 |
| Receiving antenna (1GHz~18GHz) | Schwarzbeck | BBHA 9120D | XAW01-09-02 | 2019-10-13 | 2021-10-12 |
| Receiving antenna (15GHz~40GHz) | Schwarzbeck | BBHA 9170 | XAW01-09-03 | 2019-10-13 | 2021-10-12 |
| Directional antenna rack controller | Max-Full | MF-7802BS | XAW03-03-01 | NCR | NCR |
| High-speed antenna rack controller | Max-Full | MF-7802 | XAW03-04-01 | NCR | NCR |
| Filter bank | Tonscend | JS0806-F | XAW03-05-01 | NCR | NCR |
| Filter bank | Tonscend | JS0806s | XAW03-05-02 | NCR | NCR |
| Amplifier | Tonscend | TAP00903040 | XAW01-41-01 | 2020-10-26 | 2021-10-25 |
| Amplifier | Tonscend | TAP01018048 | XAW01-41-02 | 2020-10-26 | 2021-10-25 |
| Amplifier | Tonscend | TAP18040048 | XAW01-41-03 | 2020-10-27 | 2021-10-26 |
| Amplifier | Shanghai Steed | YX28980930 | XAW01-41-06 | 2020-10-26 | 2021-10-25 |
| Temperature and humidity meter | MingGao | TH101B | XAW01-01-01 | 2020-11-06 | 2021-11-05 |
| Measurement Software | Tonscend | TS+ RSE V3.0.0.2 | XAW02-05-01 | NCR | NCR |



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7 **Photographs - EUT Constructional Details**

Refer to Appendix A Setup Photos.





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Appendix





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DTS Bandwidth

Test Result

| TestMode | Antenna | Channel | DTS BW [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|----------|---------|---------|--------------|----------|----------|------------|---------|
| BLE_1M | Ant4 | 2402 | 0.666 | 2401.661 | 2402.327 | 0.5 | PASS |
| | | 2440 | 0.669 | 2439.658 | 2440.327 | 0.5 | PASS |
| | | 2480 | 0.669 | 2479.658 | 2480.327 | 0.5 | PASS |
| BLE_2M | Ant4 | 2402 | 1.155 | 2401.425 | 2402.580 | 0.5 | PASS |
| | | 2440 | 1.165 | 2439.415 | 2440.580 | 0.5 | PASS |
| | | 2480 | 1.160 | 2479.415 | 2480.575 | 0.5 | PASS |

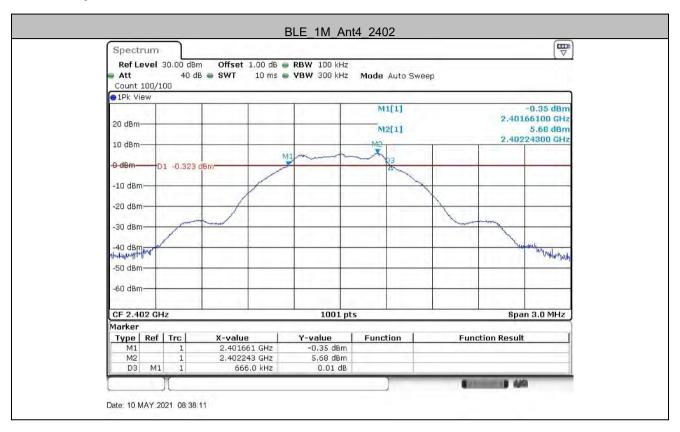




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Test Graphs







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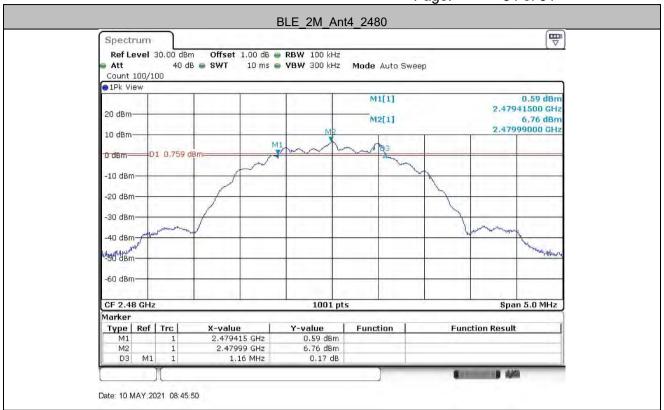
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Occupied Channel Bandwidth Test Result

| TestMode | Antenna | Channel | OCB [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|----------|---------|---------|-----------|----------|----------|------------|---------|
| BLE_1M | Ant4 | 2402 | 1.016 | 2401.494 | 2402.509 | | PASS |
| | | 2440 | 1.013 | 2439.494 | 2440.506 | | PASS |
| | | 2480 | 1.016 | 2479.491 | 2480.506 | | PASS |
| BLE_2M | Ant4 | 2402 | 2.018 | 2400.991 | 2403.009 | | PASS |
| | | 2440 | 2.013 | 2438.991 | 2441.004 | | PASS |
| | | 2480 | 2.018 | 2478.986 | 2481.004 | | PASS |

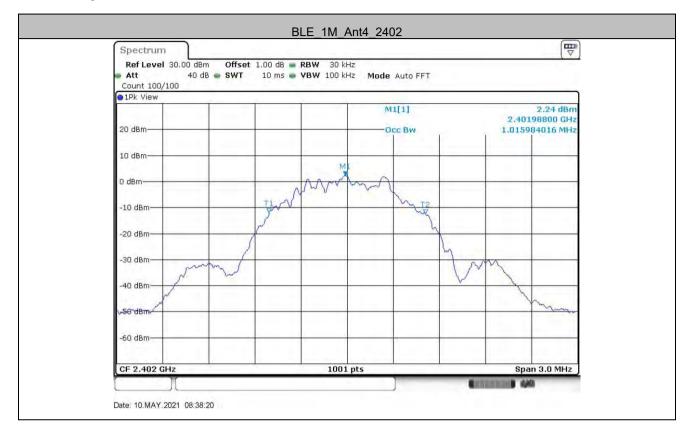




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Test Graphs

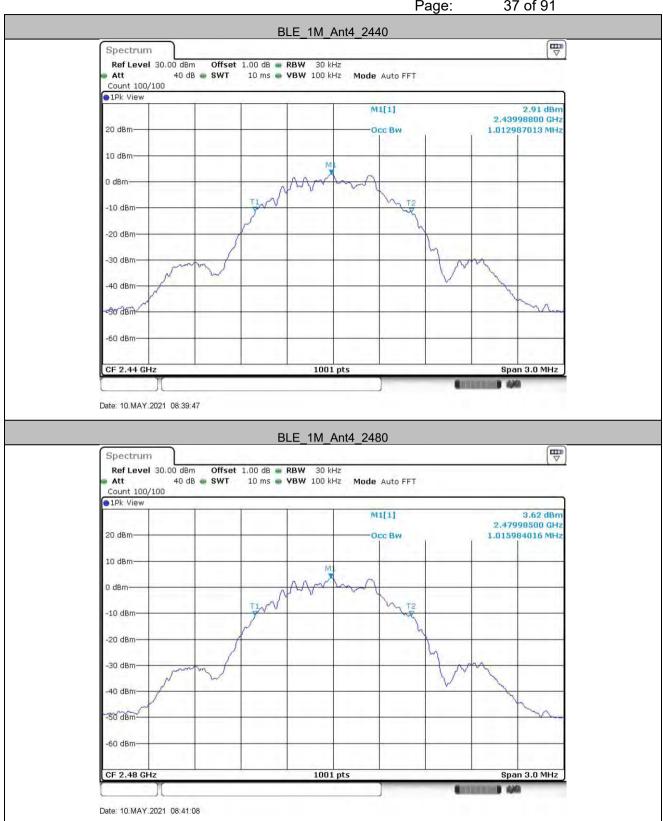






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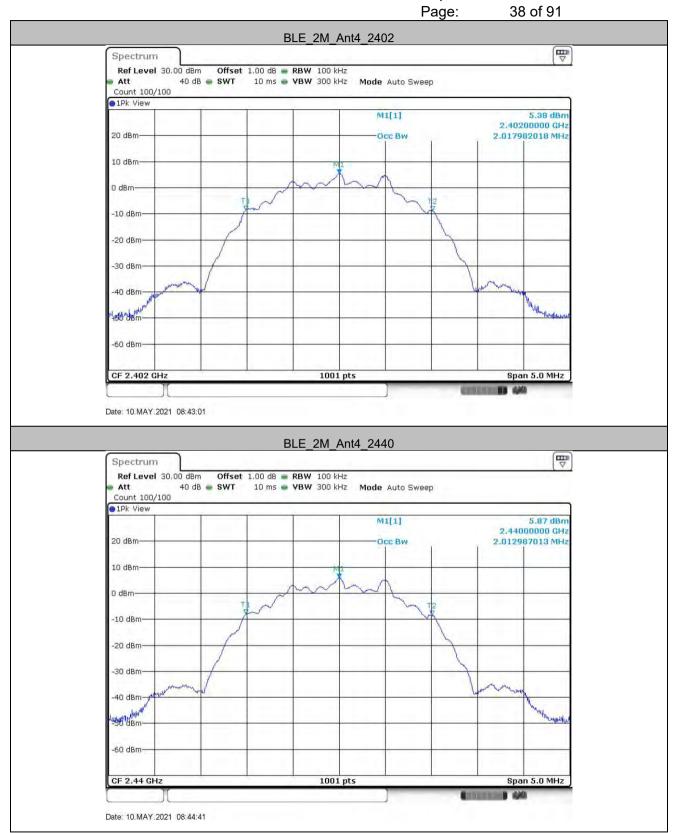
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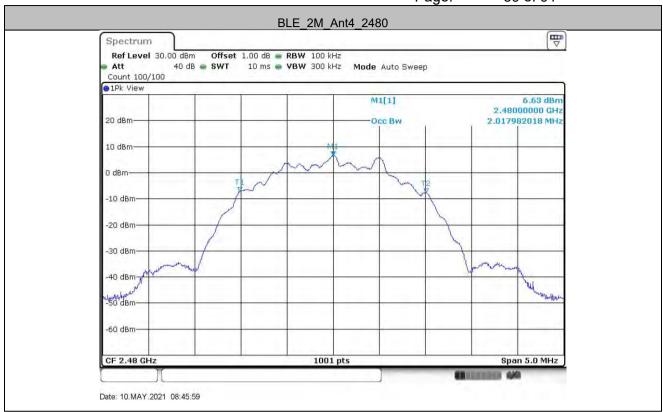
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Maximum conducted output power **Test Result**

| TestMode | Antenna | Channel | Result[dBm] | Limit[dBm] | Verdict |
|----------|---------|---------|-------------|------------|---------|
| | | 2402 | 6.14 | <=30 | PASS |
| BLE_1M | Ant4 | 2440 | 6.77 | <=30 | PASS |
| | | 2480 | 7.51 | <=30 | PASS |
| | | 2402 | 6.24 | <=30 | PASS |
| BLE_2M | Ant4 | 2440 | 6.84 | <=30 | PASS |
| | | 2480 | 7.62 | <=30 | PASS |

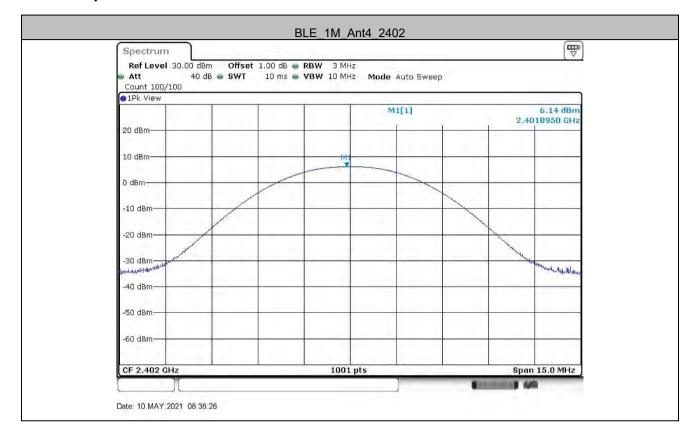




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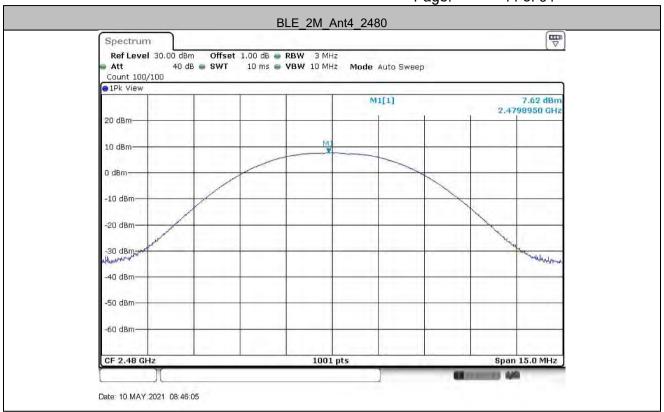
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Maximum power spectral density **Test Result**

| TestMode | Antenna | Channel | Result[dBm/3-100kHz] | Limit[dBm/3kHz] | Verdict |
|----------|---------|---------|----------------------|-----------------|---------|
| | | 2402 | -10.8 | <=8 | PASS |
| BLE_1M | Ant4 | 2440 | -10.14 | <=8 | PASS |
| | | 2480 | -9.4 | <=8 | PASS |
| | | 2402 | -13.1 | <=8 | PASS |
| BLE_2M | Ant4 | 2440 | -12.41 | <=8 | PASS |
| | | 2480 | -11.73 | <=8 | PASS |

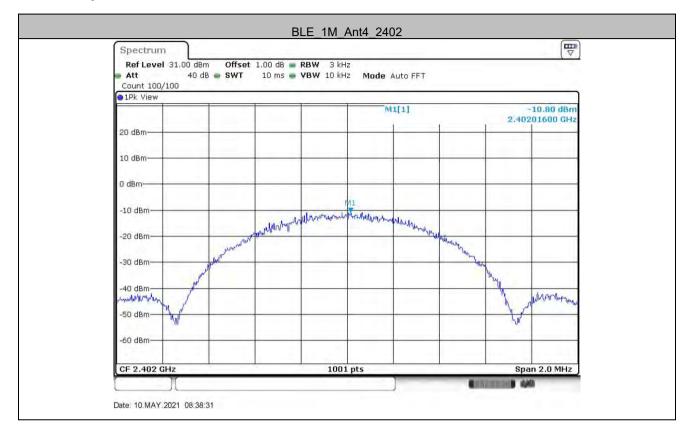




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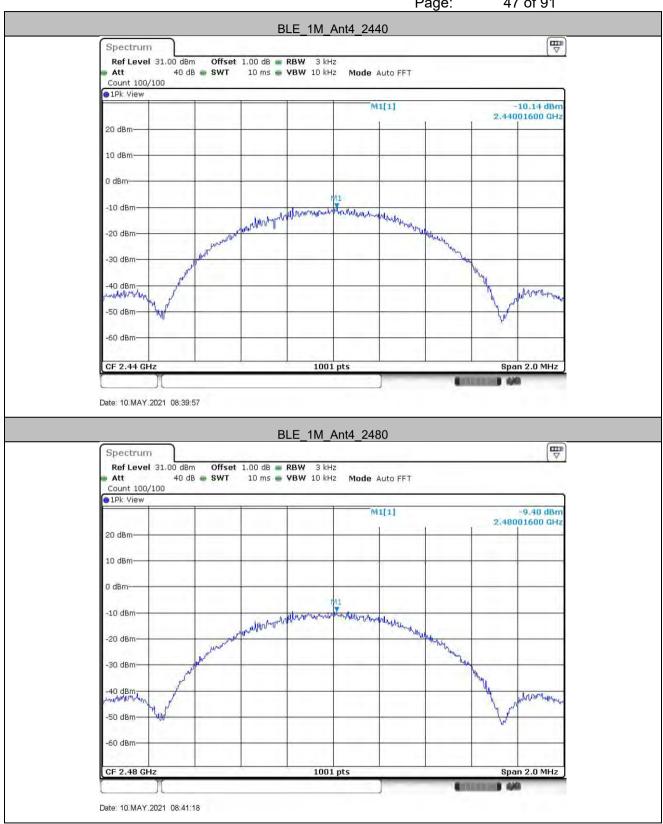






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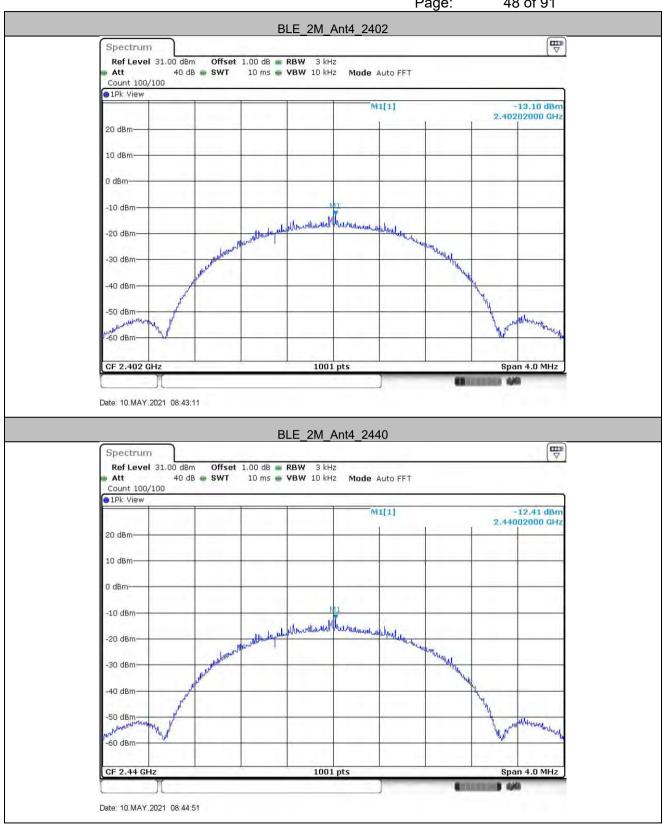
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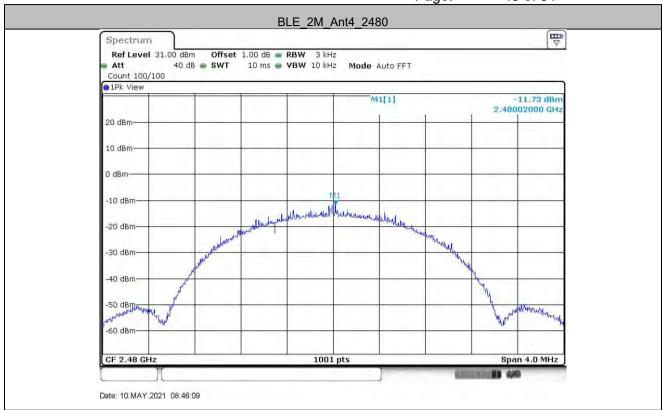
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Band edge measurements

Test Result

| TestMode | Antenna | ChName | Channel | RefLevel[dBm] | Result[dBm] | Limit[dBm] | Verdict |
|-------------|---------|--------|---------|---------------|-------------|------------|---------|
| 5.5 | | Low | 2402 | 5.60 | -51.42 | <=-14.4 | PASS |
| BLE_1M Ant4 | Ant4 | High | 2480 | 6.83 | -56.78 | <=-13.17 | PASS |
| | | Low | 2402 | 5.39 | -42.74 | <=-14.61 | PASS |
| BLE_2M | Ant4 | High | 2480 | 6.68 | -56.16 | <=-13.32 | PASS |

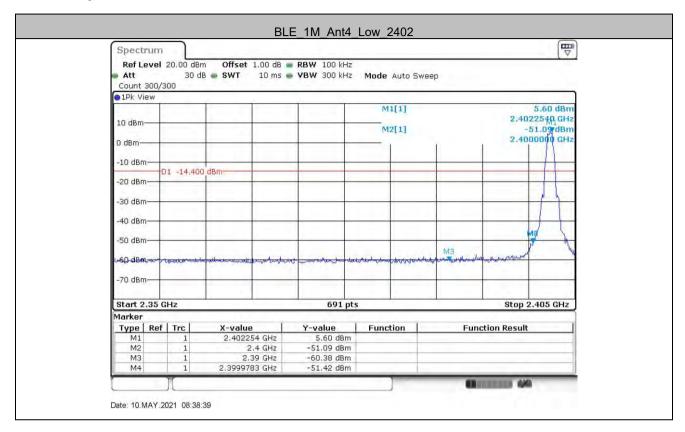




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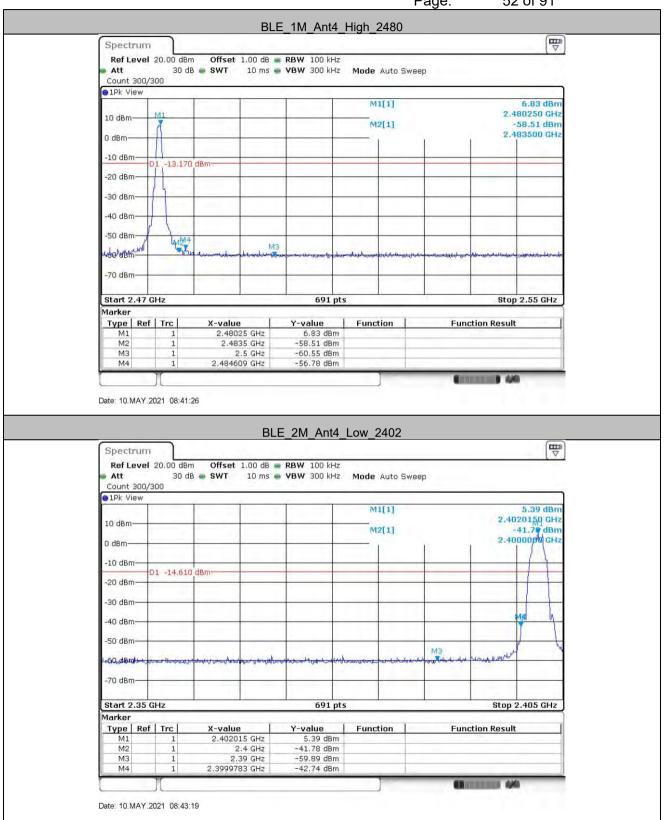






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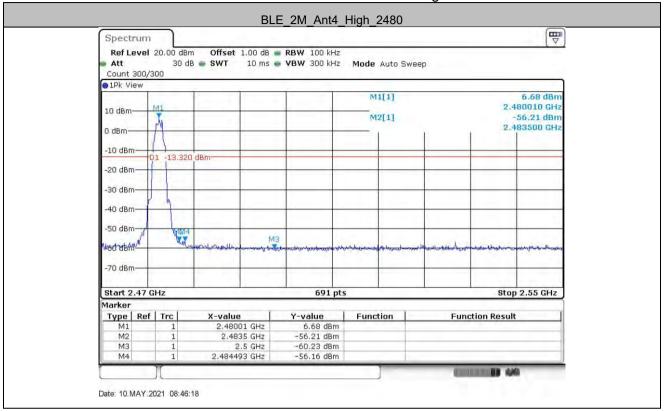
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Conducted Spurious Emission Test Result

| TestMode | Antenna | Channel | FreqRange [MHz] | RefLevel | Result[dBm] | Limit[dBm] | Verdict |
|----------|---------|---------|--------------------|----------|-------------|------------|---------|
| | | | Reference | 5.94 | 5.94 | | PASS |
| | | 2402 | 30~1000 | 5.94 | -46.48 | <=-14.06 | PASS |
| | | | 1000~26500 | 5.94 | -31.79 | <=-14.06 | PASS |
| | | | Reference | 6.26 | 6.26 | | PASS |
| BLE_1M | Ant4 | 2440 | 30~1000 | 6.26 | -45.81 | <=-13.74 | PASS |
| | | | 1000~26500 | 6.26 | -31.94 | <=-13.74 | PASS |
| | | 2480 | Reference | 7.19 | 7.19 | | PASS |
| | | | 30~1000 | 7.19 | -45.99 | <=-12.81 | PASS |
| | | | 1000~26500 | 7.19 | -31.54 | <=-12.81 | PASS |
| | | 2402 | Reference | 5.54 | 5.54 | | PASS |
| | | | 30~1000 | 5.54 | -46.51 | <=-14.46 | PASS |
| | | | 1000~26500 | 5.54 | -31.81 | <=-14.46 | PASS |
| | | 2440 | Reference | 6.23 | 6.23 | | PASS |
| BLE_2M | Ant4 | | 30~1000 | 6.23 | -46.22 | <=-13.77 | PASS |
| | | | 1000~26500 | 6.23 | -31.72 | <=-13.77 | PASS |
| | | 2480 | Reference | 6.97 | 6.97 | | PASS |
| | | | 30~1000 | 6.97 | -44.25 | <=-13.03 | PASS |
| | | | 1000~26500 | 6.97 | -31.81 | <=-13.03 | PASS |





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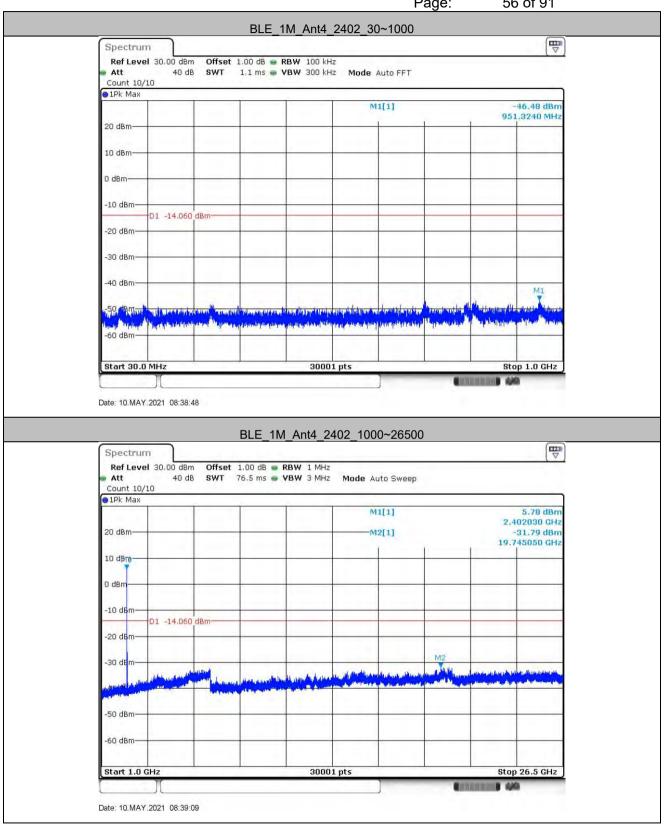






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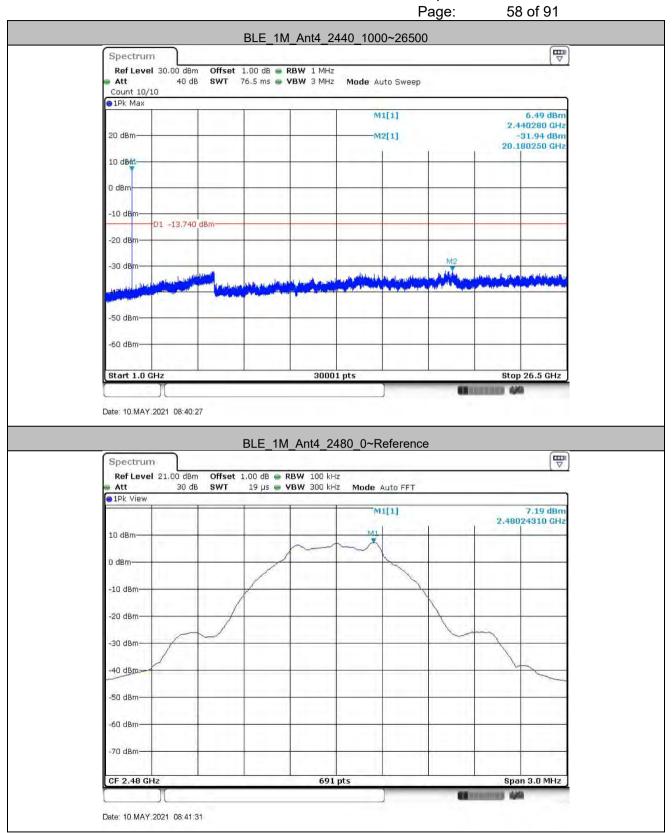
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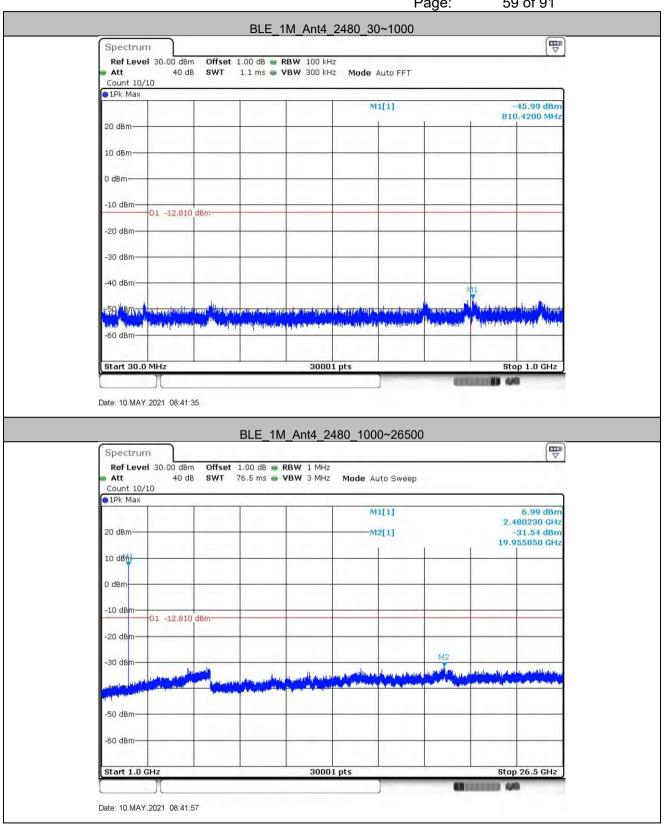
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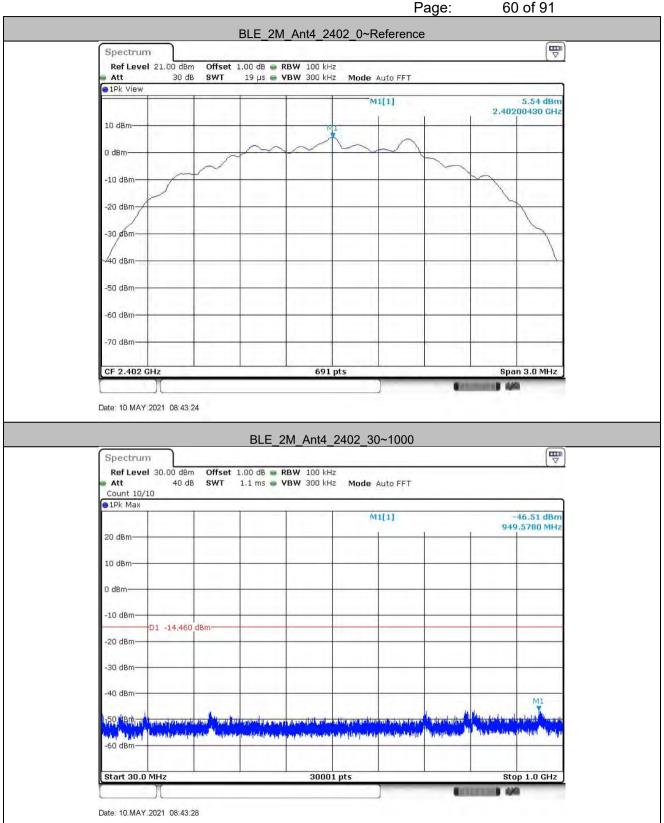
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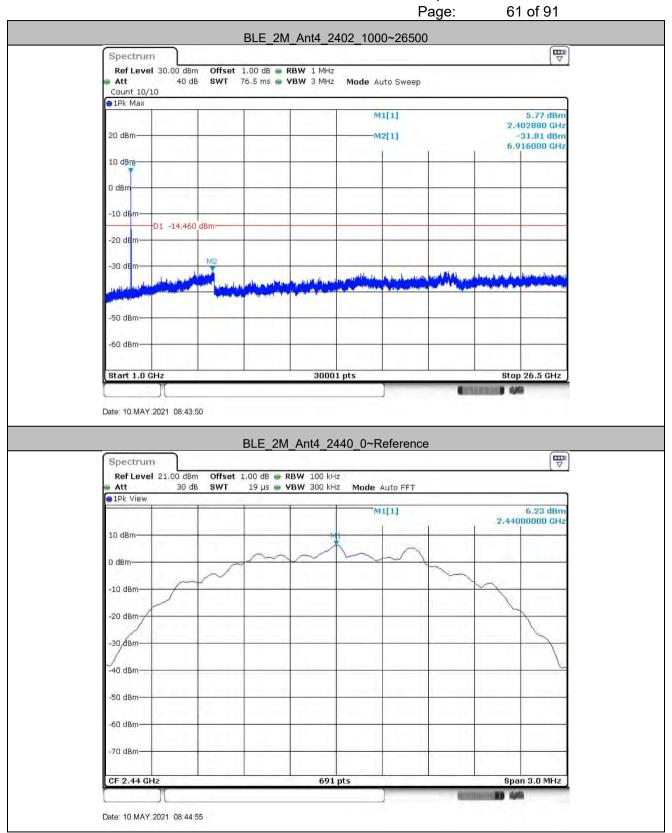
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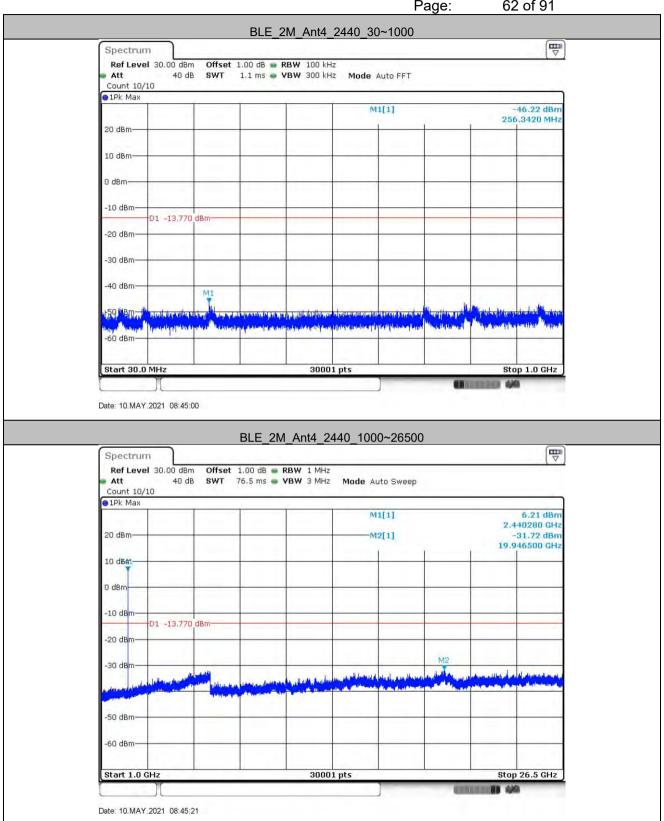
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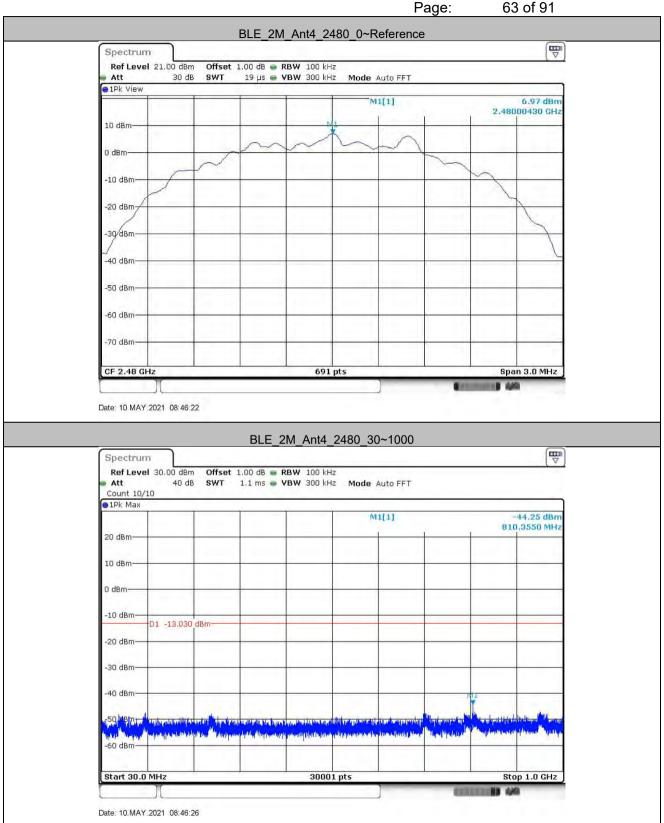
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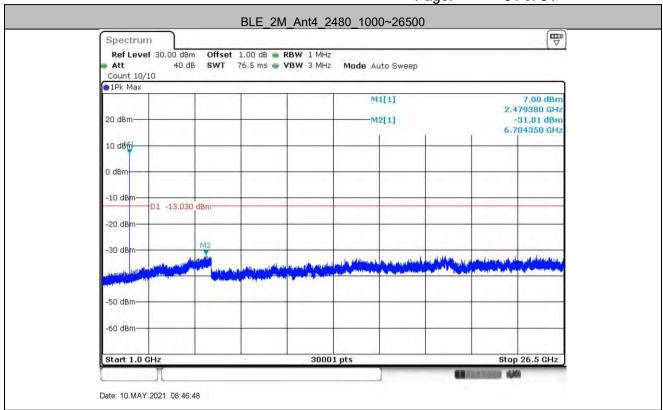
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Duty Cycle Test Result

| TestMode | Antenna | Channel | Transmission Duration [ms] | Transmission Period [ms] | Duty Cycle [%] | Limit | Verdict |
|----------|---------|---------|-----------------------------|--------------------------|-------------------|-------|---------|
| | | 2402 | 2.13 | 2.47 | 86.23 | | PASS |
| BLE_1M | Ant4 | 2440 | 2.13 | 2.47 | 86.23 | | PASS |
| | | 2480 | 2.13 | 2.47 | 86.23 | | PASS |
| | | 2402 | 1.09 | 1.85 | 58.92 | | PASS |
| BLE_2M | Ant4 | 2440 | 1.09 | 1.85 | 58.92 | | PASS |
| | | 2480 | 1.09 | 1.85 | 58.92 | | PASS |

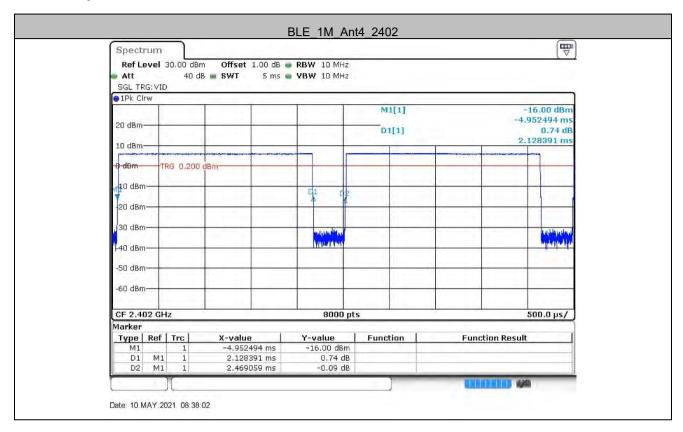




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Test Graphs

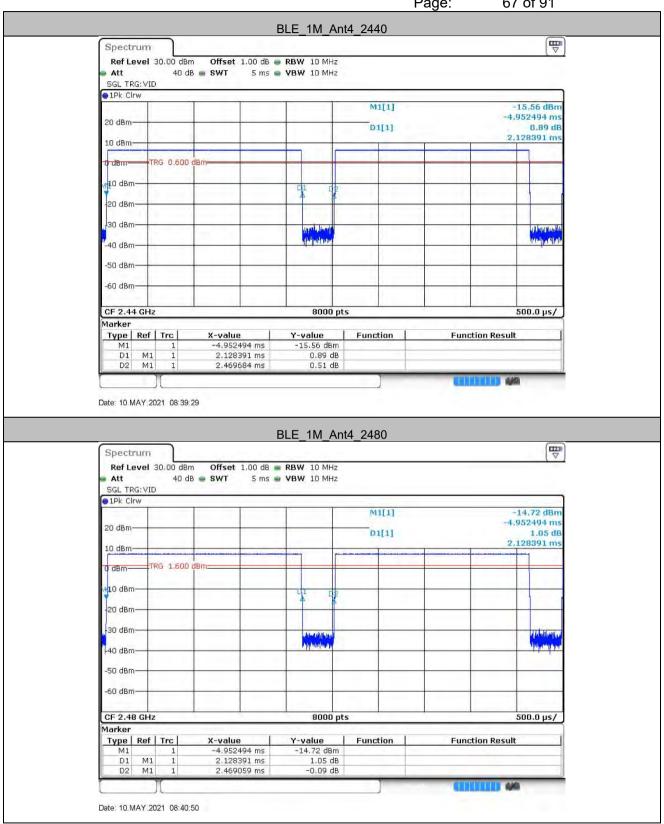






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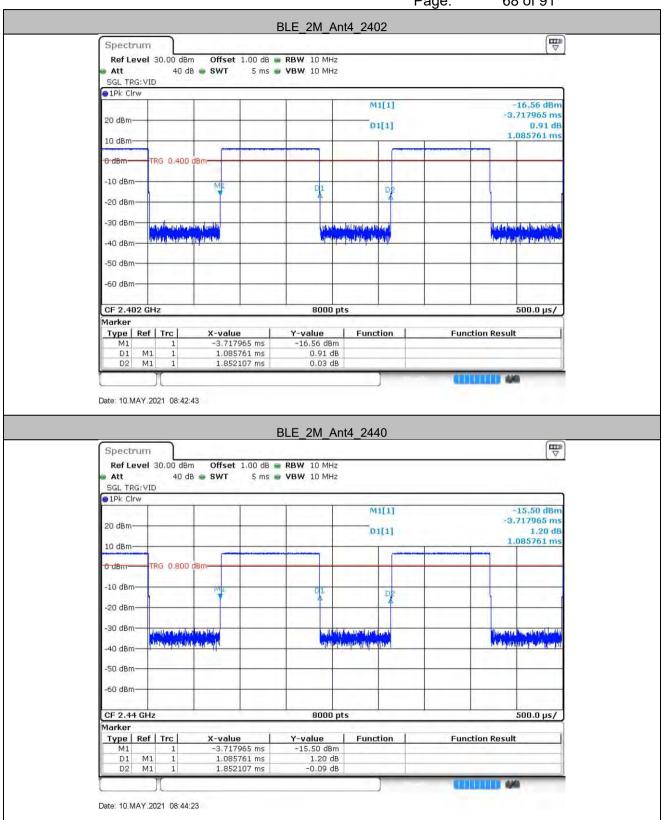
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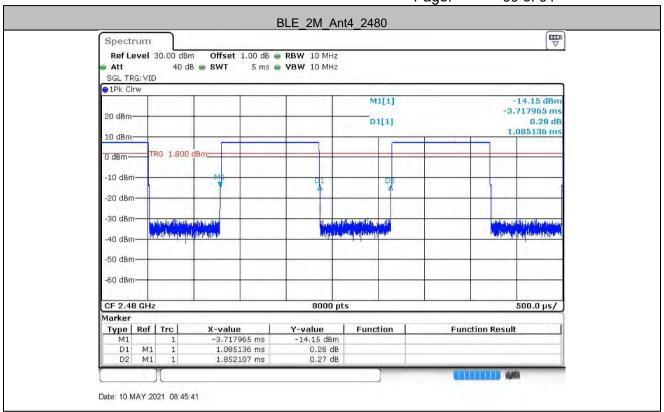
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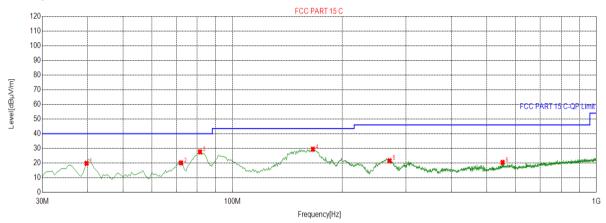
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Radiated Spurious Emission

Radiated Emission below 1GHz **Charge + Transmitting BLE 1M**

Test Graph



- QP Limit - Horizontal PK

Suspected List

| Suspe | Suspected List | | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 39.7049 | 19.79 | -22.44 | 40.00 | 20.21 | 189 | 95 | Horizontal | | | |
| 2 | 72.2161 | 20.10 | -25.50 | 40.00 | 19.90 | 213 | 236 | Horizontal | | | |
| 3 | 81.4357 | 27.58 | -26.90 | 40.00 | 12.42 | 226 | 264 | Horizontal | | | |
| 4 | 166.353 | 29.43 | -25.30 | 43.50 | 14.07 | 200 | 101 | Horizontal | | | |
| 5 | 270.195 | 21.57 | -20.11 | 46.00 | 24.43 | 187 | 56 | Horizontal | | | |
| 6 | 552.606 | 20.41 | -13.05 | 46.00 | 25.59 | 165 | 142 | Horizontal | | | |

Final Data List

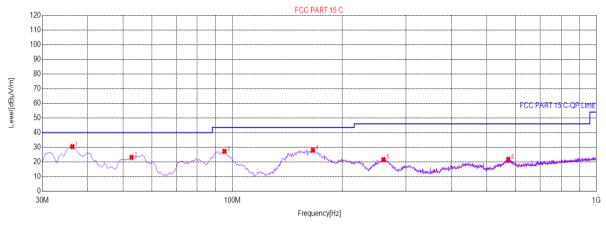




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Test Graph



Vertical PK QP Detector

Suspected List

| <u> </u> | Juopootou Elot | | | | | | | | | | |
|----------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| Susp | Suspected List | | | | | | | | | | |
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 36.3082 | 30.46 | -23.53 | 40.00 | 9.54 | 187 | 291 | Vertical | | | |
| 2 | 52.8064 | 23.15 | -21.78 | 40.00 | 16.85 | 165 | 348 | Vertical | | | |
| 3 | 95.0225 | 27.24 | -23.69 | 43.50 | 16.26 | 189 | 113 | Vertical | | | |
| 4 | 166.353 | 27.97 | -25.30 | 43.50 | 15.53 | 178 | 2 | Vertical | | | |
| 5 | 260.005 | 21.62 | -20.40 | 46.00 | 24.38 | 169 | 21 | Vertical | | | |
| 6 | 572.986 | 21.80 | -12.74 | 46.00 | 24.20 | 185 | 360 | Vertical | | | |

Final Data List



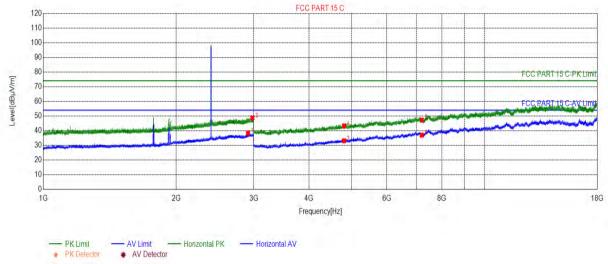


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Transmitter Emission above 1GHz BLE 1M_Channel 0

Test Graph



Suspected List

| - | tou Liot | | | | | | | | | | |
|---------------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| Suspe | Suspected List | | | | | | | | | | |
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2909.49 | 38.33 | 10.23 | 54.00 | 15.67 | 136 | 351 | Horizontal | | | |
| 2 | 2976.99 | 48.71 | 10.48 | 74.00 | 25.29 | 203 | 255 | Horizontal | | | |
| 3 | 4804.00 | 33.13 | -15.41 | 54.00 | 20.87 | 213 | 165 | Horizontal | | | |
| 4 | 4804.00 | 43.34 | -15.41 | 74.00 | 30.66 | 224 | 216 | Horizontal | | | |
| 5 | 7206.00 | 47.25 | -8.59 | 74.00 | 26.75 | 236 | 18 | Horizontal | | | |
| 6 | 7206.00 | 36.98 | -8.59 | 54.00 | 17.02 | 189 | 44 | Horizontal | | | |

Final Data List



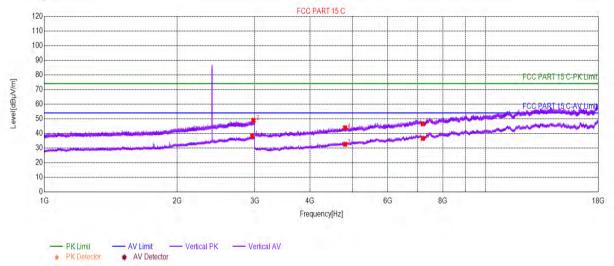


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BLE 1M Channel 0

Test Graph



Suspected List

| Juopoo | dopeoted Eist | | | | | | | | | | |
|-------------------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| Susp | Suspected List | | | | | | | | | | |
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2957.99 | 38.29 | 10.53 | 54.00 | 15.71 | 214 | 172 | Vertical | | | |
| 2 | 2978.69 | 48.88 | 10.52 | 74.00 | 25.12 | 156 | 210 | Vertical | | | |
| 3 | 4804.00 | 32.58 | -15.41 | 54.00 | 21.42 | 222 | 104 | Vertical | | | |
| 4 | 4804.00 | 43.80 | -15.41 | 74.00 | 30.20 | 203 | 352 | Vertical | | | |
| 5 | 7206.00 | 46.54 | -8.59 | 74.00 | 27.46 | 147 | 163 | Vertical | | | |
| 6 | 7206.00 | 36.61 | -8.59 | 54.00 | 17.39 | 136 | 18 | Vertical | | | |

Final Data List



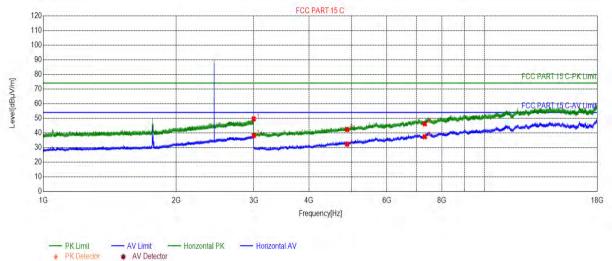


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BLE 1M Channel 19

Test Graph



Suspected List

| Suspe | Suspected List | | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2997.99 | 49.55 | 10.75 | 74.00 | 24.45 | 165 | 300 | Horizontal | | | |
| 2 | 2999.20 | 38.24 | 10.78 | 54.00 | 15.76 | 136 | 358 | Horizontal | | | |
| 3 | 4880.00 | 42.31 | -15.07 | 74.00 | 31.69 | 145 | 61 | Horizontal | | | |
| 4 | 4880.00 | 32.27 | -15.07 | 54.00 | 21.73 | 189 | 275 | Horizontal | | | |
| 5 | 7320.00 | 37.43 | -8.63 | 54.00 | 16.57 | 160 | 257 | Horizontal | | | |
| 6 | 7320.00 | 46.20 | -8.63 | 74.00 | 27.80 | 113 | 352 | Horizontal | | | |

Final Data List



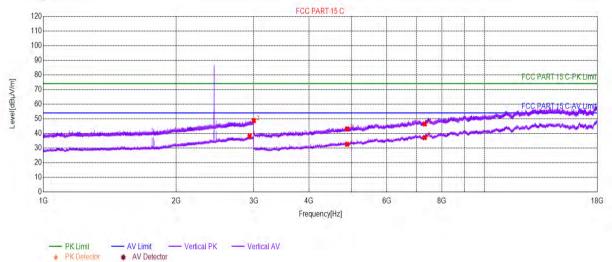


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BLE 1M Channel 19

Test Graph



Suspected List

| Suspe | Suspected List | | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2933.49 | 38.09 | 10.54 | 54.00 | 15.91 | 296 | 167 | Vertical | | | |
| 2 | 2998.09 | 48.73 | 10.75 | 74.00 | 25.27 | 236 | 197 | Vertical | | | |
| 3 | 4880.00 | 43.11 | -15.07 | 74.00 | 30.89 | 215 | 187 | Vertical | | | |
| 4 | 4880.00 | 32.58 | -15.07 | 54.00 | 21.42 | 241 | 90 | Vertical | | | |
| 5 | 7320.00 | 37.19 | -8.63 | 54.00 | 16.81 | 203 | 214 | Vertical | | | |
| 6 | 7320.00 | 46.49 | -8.63 | 74.00 | 27.51 | 225 | 82 | Vertical | | | |

Final Data List



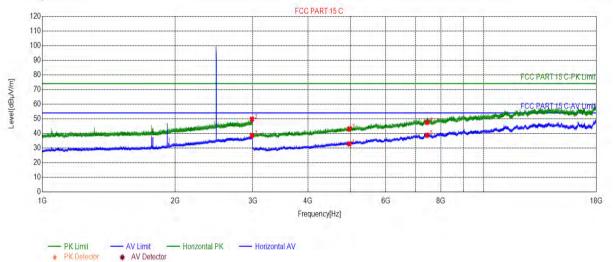


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BLE 1M Channel 39

Test Graph



Suspected List

| dopeoted Eist | | | | | | | | | | | |
|---------------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| Susp | Suspected List | | | | | | | | | | |
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2984.69 | 38.65 | 10.52 | 54.00 | 15.35 | 169 | 314 | Horizontal | | | |
| 2 | 2986.09 | 49.72 | 10.51 | 74.00 | 24.28 | 165 | 358 | Horizontal | | | |
| 3 | 4960.00 | 43.04 | -14.40 | 74.00 | 30.96 | 172 | 90 | Horizontal | | | |
| 4 | 4960.00 | 32.82 | -14.40 | 54.00 | 21.18 | 188 | 214 | Horizontal | | | |
| 5 | 7440.00 | 38.69 | -7.31 | 54.00 | 15.31 | 162 | 359 | Horizontal | | | |
| 6 | 7440.00 | 47.48 | -7.31 | 74.00 | 26.52 | 131 | 104 | Horizontal | | | |

Final Data List



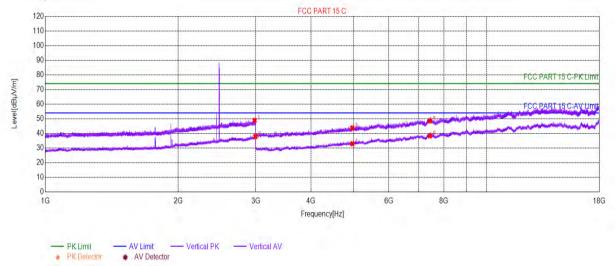


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BLE 1M Channel 39

Test Graph



Suspected List

| Juopoo | dopeoted Eist | | | | | | | | | | |
|-------------------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| Susp | Suspected List | | | | | | | | | | |
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2981.59 | 48.96 | 10.54 | 74.00 | 25.04 | 269 | 135 | Vertical | | | |
| 2 | 2993.19 | 37.90 | 10.59 | 54.00 | 16.10 | 213 | 143 | Vertical | | | |
| 3 | 4960.00 | 43.71 | -14.40 | 74.00 | 30.29 | 211 | 190 | Vertical | | | |
| 4 | 4960.00 | 32.92 | -14.40 | 54.00 | 21.08 | 265 | 327 | Vertical | | | |
| 5 | 7440.00 | 48.51 | -7.31 | 74.00 | 25.49 | 203 | 2 | Vertical | | | |
| 6 | 7440.00 | 38.33 | -7.31 | 54.00 | 15.67 | 233 | 122 | Vertical | | | |

Final Data List



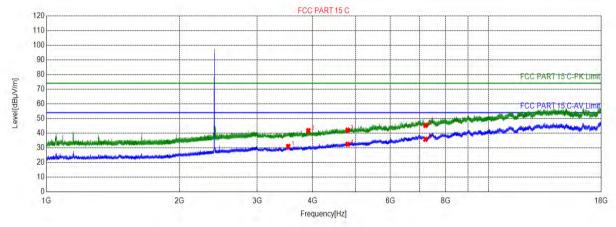


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BLE 2M Channel 0

Test Graph



PK Detector

* AV Detector

Suspected List

| <u>ouspec</u> | dispected List | | | | | | | | | | |
|---------------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| Susp | Suspected List | | | | | | | | | | |
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 3523.82 | 30.99 | -19.83 | 54.00 | 23.01 | 174 | 218 | Horizontal | | | |
| 2 | 3914.43 | 41.75 | -18.59 | 74.00 | 32.25 | 185 | 137 | Horizontal | | | |
| 3 | 4804.00 | 42.00 | -15.41 | 74.00 | 32.00 | 194 | 76 | Horizontal | | | |
| 4 | 4804.00 | 32.43 | -15.41 | 54.00 | 21.57 | 204 | 154 | Horizontal | | | |
| 5 | 7206.00 | 35.83 | -8.59 | 54.00 | 18.17 | 234 | 120 | Horizontal | | | |
| 6 | 7206.00 | 45.27 | -8.59 | 74.00 | 28.73 | 212 | 188 | Horizontal | | | |

Final Data List



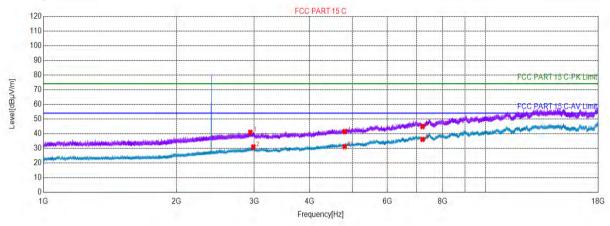


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BLE 2M Channel 0

Test Graph



 PK Detector * AV Detector

Suspected List

| Suspe | Suspected List | | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2939.89 | 40.98 | 10.50 | 74.00 | 33.02 | 158 | 254 | Vertical | | | |
| 2 | 2984.89 | 30.98 | 10.52 | 54.00 | 23.02 | 269 | 46 | Vertical | | | |
| 3 | 4804.00 | 31.19 | -15.41 | 54.00 | 22.81 | 246 | 246 | Vertical | | | |
| 4 | 4804.00 | 41.43 | -15.41 | 74.00 | 32.57 | 273 | 332 | Vertical | | | |
| 5 | 7206.00 | 44.80 | -8.59 | 74.00 | 29.20 | 213 | 260 | Vertical | | | |
| 6 | 7206.00 | 36.09 | -8.59 | 54.00 | 17.91 | 216 | 27 | Vertical | | | |

Final Data List

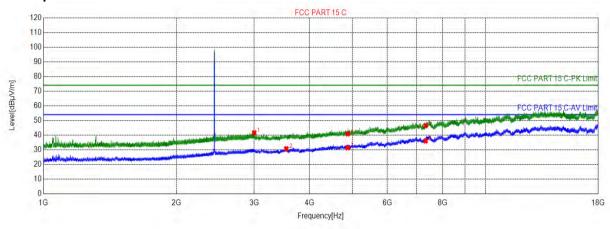




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BLE 2M Channel 19 Test Graph



 PK Detector * AV Detector

Suspected List

| Suspe | Suspected List | | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2998.89 | 41.54 | 10.77 | 74.00 | 32.46 | 157 | 359 | Horizontal | | | |
| 2 | 3545.42 | 30.70 | -20.06 | 54.00 | 23.30 | 195 | 14 | Horizontal | | | |
| 3 | 4880.00 | 31.44 | -15.07 | 54.00 | 22.56 | 203 | 358 | Horizontal | | | |
| 4 | 4880.00 | 40.89 | -15.07 | 74.00 | 33.11 | 219 | 275 | Horizontal | | | |
| 5 | 7320.00 | 46.55 | -8.63 | 74.00 | 27.45 | 223 | 159 | Horizontal | | | |
| 6 | 7320.00 | 36.05 | -8.63 | 54.00 | 17.95 | 238 | 29 | Horizontal | | | |

Final Data List



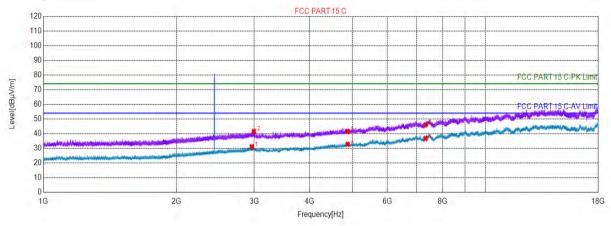


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BLE 2M Channel 19

Test Graph



 PK Detector * AV Detector

Suspected List

| Suspe | Suspected List | | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2961.69 | 31.11 | 10.48 | 54.00 | 22.89 | 159 | 23 | Vertical | | | |
| 2 | 2993.69 | 41.57 | 10.61 | 74.00 | 32.43 | 185 | 170 | Vertical | | | |
| 3 | 4880.00 | 41.47 | -15.07 | 74.00 | 32.53 | 196 | 2 | Vertical | | | |
| 4 | 4880.00 | 32.77 | -15.07 | 54.00 | 21.23 | 204 | 289 | Vertical | | | |
| 5 | 7320.00 | 46.15 | -8.63 | 74.00 | 27.85 | 219 | 186 | Vertical | | | |
| 6 | 7320.00 | 36.76 | -8.63 | 54.00 | 17.24 | 223 | 259 | Vertical | | | |

Final Data List



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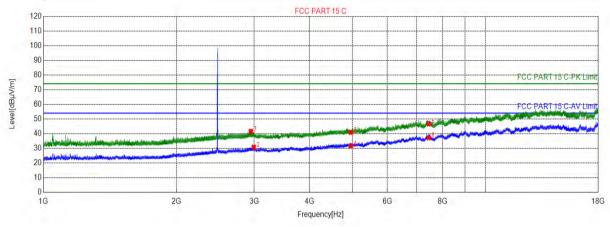


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BLE 2M Channel 39

Test Graph



 PK Detector * AV Detector

Suspected List

| Suspe | Suspected List | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | |
| 1 | 2946.99 | 41.54 | 10.55 | 74.00 | 32.46 | 159 | 150 | Horizontal | | |
| 2 | 2991.79 | 30.76 | 10.55 | 54.00 | 23.24 | 169 | 251 | Horizontal | | |
| 3 | 4960.00 | 40.96 | -14.40 | 74.00 | 33.04 | 241 | 290 | Horizontal | | |
| 4 | 4960.00 | 31.59 | -14.40 | 54.00 | 22.41 | 231 | 0 | Horizontal | | |
| 5 | 7440.00 | 46.68 | -7.31 | 74.00 | 27.32 | 266 | 185 | Horizontal | | |
| 6 | 7440.00 | 37.20 | -7.31 | 54.00 | 16.80 | 213 | 0 | Horizontal | | |

Final Data List

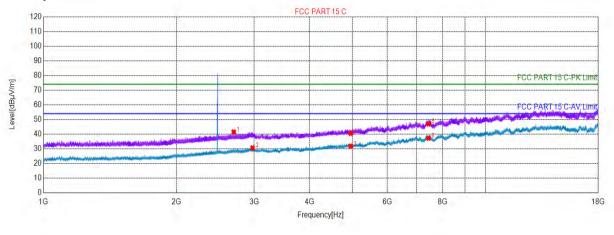




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BLE 2M Channel 39 Test Graph



 PK Detector * AV Detector

Suspected List

| Suspe | Suspected List | | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2695.98 | 41.45 | 9.45 | 74.00 | 32.55 | 187 | 73 | Vertical | | | |
| 2 | 2973.59 | 30.61 | 10.41 | 54.00 | 23.39 | 169 | 22 | Vertical | | | |
| 3 | 4960.00 | 31.83 | -14.40 | 54.00 | 22.17 | 188 | 348 | Vertical | | | |
| 4 | 4960.00 | 40.51 | -14.40 | 74.00 | 33.49 | 194 | 197 | Vertical | | | |
| 5 | 7440.00 | 46.89 | -7.31 | 74.00 | 27.11 | 182 | 139 | Vertical | | | |
| 6 | 7440.00 | 37.22 | -7.31 | 54.00 | 16.78 | 199 | 319 | Vertical | | | |

Final Data List

Remark:

- 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
- 2) Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3) As shown in this section, 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. So, only the peak measurements were shown in the report.
- 4) All Modes have been tested, but only the worst case data displayed in this report.



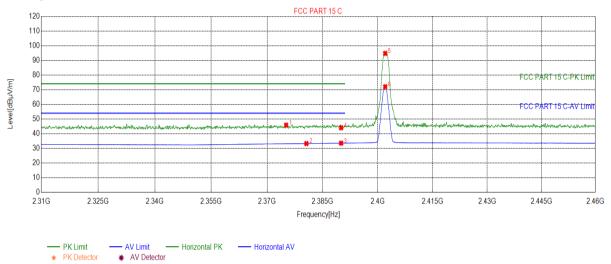


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Restricted bands around fundamental frequency **Test plots** BLE 1M_Channel 0

Test Graph



Suspected List

| Suspe | Suspected List | | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2375.13 | 45.83 | 9.20 | 74.00 | 28.17 | 218 | 58 | Horizontal | | | |
| 2 | 2380.61 | 33.27 | 9.35 | 54.00 | 20.73 | 308 | 136 | Horizontal | | | |
| 3 | 2390.00 | 33.53 | 9.60 | 54.00 | 20.47 | 205 | 241 | Horizontal | | | |
| 4 | 2390.00 | 44.03 | 9.60 | 74.00 | 29.97 | 237 | 69 | Horizontal | | | |
| 5 | 2402.00 | 94.75 | 9.87 | 0.00 | -94.75 | 367 | 125 | Horizontal | | | |
| 6 | 2402.00 | 71.99 | 9.87 | 0.00 | -71.99 | 184 | 245 | Horizontal | | | |

Final Data List



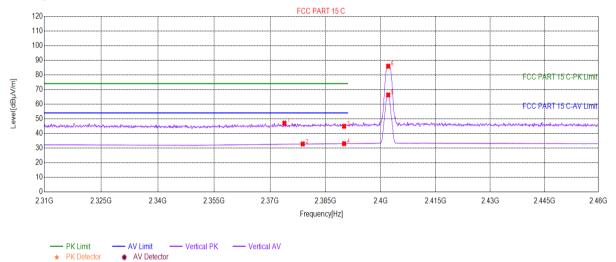


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BLE 1M Channel 0

Test Graph



Suspected List

| dopeoted Eist | | | | | | | | | | |
|----------------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|
| Suspected List | | | | | | | | | | |
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | |
| 1 | 2373.85 | 47.02 | 9.17 | 74.00 | 26.98 | 256 | 145 | Vertical | | |
| 2 | 2378.80 | 32.79 | 9.30 | 54.00 | 21.21 | 241 | 158 | Vertical | | |
| 3 | 2390.00 | 44.88 | 9.60 | 74.00 | 29.12 | 278 | 214 | Vertical | | |
| 4 | 2390.00 | 33.00 | 9.60 | 54.00 | 21.00 | 256 | 23 | Vertical | | |
| 5 | 2402.00 | 66.26 | 9.87 | 0.00 | -66.26 | 236 | 158 | Vertical | | |
| 6 | 2402.00 | 85.92 | 9.87 | 0.00 | -85.92 | 247 | 174 | Vertical | | |

Final Data List



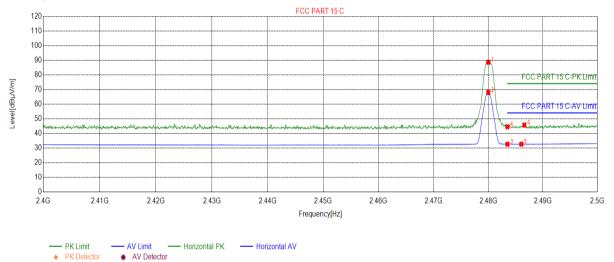


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BLE 1M Channel 39

Test Graph



Suspected List

| Suspe | Suspected List | | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2480.00 | 88.57 | 8.47 | 0.00 | -88.57 | 246 | 23 | Horizontal | | | |
| 2 | 2480.00 | 68.01 | 8.47 | 0.00 | -68.01 | 274 | 187 | Horizontal | | | |
| 3 | 2483.50 | 32.63 | 8.48 | 54.00 | 21.37 | 285 | 198 | Horizontal | | | |
| 4 | 2483.50 | 44.57 | 8.48 | 74.00 | 29.43 | 263 | 210 | Horizontal | | | |
| 5 | 2486.04 | 32.68 | 8.49 | 54.00 | 21.32 | 250 | 198 | Horizontal | | | |
| 6 | 2486.59 | 45.72 | 8.49 | 74.00 | 28.28 | 236 | 165 | Horizontal | | | |

Final Data List



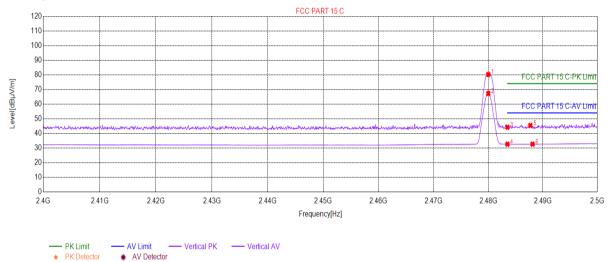


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BLE 1M Channel 39

Test Graph



Suspected List

| <u>ouspec</u> | dispected List | | | | | | | | | |
|----------------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|
| Suspected List | | | | | | | | | | |
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | |
| 1 | 2480.00 | 80.24 | 8.47 | 0.00 | -80.24 | 254 | 85 | Vertical | | |
| 2 | 2480.00 | 67.28 | 8.47 | 0.00 | -67.28 | 250 | 52 | Vertical | | |
| 3 | 2483.50 | 44.21 | 8.48 | 74.00 | 29.79 | 263 | 136 | Vertical | | |
| 4 | 2483.50 | 32.63 | 8.48 | 54.00 | 21.37 | 278 | 36 | Vertical | | |
| 5 | 2487.69 | 45.46 | 8.50 | 74.00 | 28.54 | 255 | 213 | Vertical | | |
| 6 | 2488.09 | 32.67 | 8.50 | 54.00 | 21.33 | 213 | 198 | Vertical | | |

Final Data List



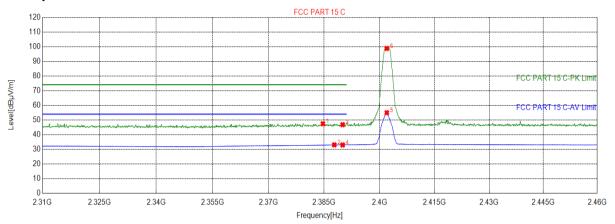


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BLE 2M Channel 0

Test Graph



★ PK Detector * AV Detector

Suspected List

| Suspe | Suspected List | | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2384.66 | 47.43 | 9.46 | 74.00 | 26.57 | 234 | 123 | Horizontal | | | |
| 2 | 2387.73 | 33.05 | 9.54 | 54.00 | 20.95 | 259 | 321 | Horizontal | | | |
| 3 | 2390.00 | 46.79 | 9.60 | 74.00 | 27.21 | 275 | 258 | Horizontal | | | |
| 4 | 2390.00 | 32.98 | 9.60 | 54.00 | 21.02 | 159 | 169 | Horizontal | | | |
| 5 | 2402.00 | 54.95 | 9.87 | 0.00 | -54.95 | 210 | 147 | Horizontal | | | |
| 6 | 2402.00 | 98.77 | 9.87 | 0.00 | -98.77 | 223 | 191 | Horizontal | | | |

Final Data List



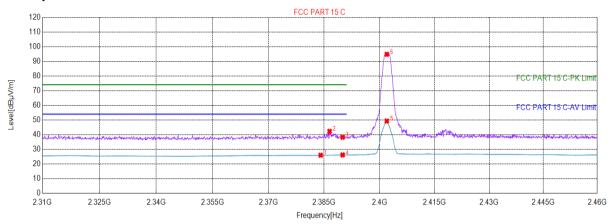


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BLE 2M Channel 0

Test Graph



★ PK Detector * AV Detector

Suspected List

| Suspe | Suspected List | | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2384.06 | 25.99 | 9.44 | 54.00 | 28.01 | 159 | 159 | Vertical | | | |
| 2 | 2386.46 | 42.24 | 9.51 | 74.00 | 31.76 | 242 | 138 | Vertical | | | |
| 3 | 2390.00 | 38.26 | 9.60 | 74.00 | 35.74 | 234 | 29 | Vertical | | | |
| 4 | 2390.00 | 26.18 | 9.60 | 54.00 | 27.82 | 205 | 96 | Vertical | | | |
| 5 | 2402.00 | 49.26 | 9.87 | 0.00 | -49.26 | 211 | 37 | Vertical | | | |
| 6 | 2402.00 | 94.77 | 9.87 | 0.00 | -94.77 | 239 | 214 | Vertical | | | |

Final Data List



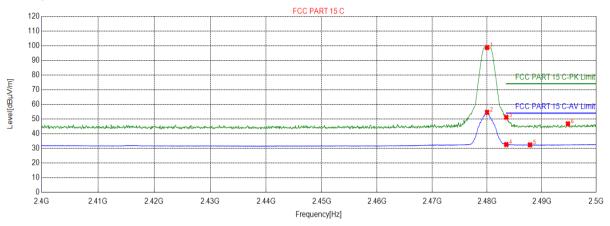


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BLE 2M Channel 39

Test Graph



★ PK Detector * AV Detector

Suspected List

| Suspe | Suspected List | | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2480.00 | 98.72 | 8.47 | 0.00 | -98.72 | 158 | 147 | Horizontal | | | |
| 2 | 2480.00 | 54.55 | 8.47 | 0.00 | -54.55 | 164 | 158 | Horizontal | | | |
| 3 | 2483.50 | 51.14 | 8.48 | 74.00 | 22.86 | 173 | 169 | Horizontal | | | |
| 4 | 2483.50 | 32.58 | 8.48 | 54.00 | 21.42 | 210 | 91 | Horizontal | | | |
| 5 | 2487.84 | 32.36 | 8.50 | 54.00 | 21.64 | 206 | 85 | Horizontal | | | |
| 6 | 2494.79 | 46.71 | 8.61 | 74.00 | 27.29 | 234 | 219 | Horizontal | | | |

Final Data List



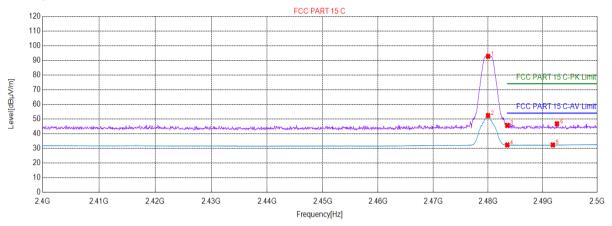


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BLE 2M Channel 39

Test Graph



★ PK Detector * AV Detector

Suspected List

| Suspe | Suspected List | | | | | | | | | | |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity | | | |
| 1 | 2480.00 | 92.70 | 8.47 | 0.00 | -92.70 | 158 | 147 | Vertical | | | |
| 2 | 2480.00 | 52.34 | 8.47 | 0.00 | -52.34 | 259 | 29 | Vertical | | | |
| 3 | 2483.50 | 45.59 | 8.48 | 74.00 | 28.41 | 157 | 95 | Vertical | | | |
| 4 | 2483.50 | 32.29 | 8.48 | 54.00 | 21.71 | 196 | 81 | Vertical | | | |
| 5 | 2491.84 | 32.32 | 8.54 | 54.00 | 21.68 | 247 | 159 | Vertical | | | |
| 6 | 2492.59 | 46.76 | 8.56 | 74.00 | 27.24 | 174 | 231 | Vertical | | | |

Final Data List

Remark:

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 All Modes have been tested, but only the worst case data displayed in this report.

The End



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