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No. 1 Workshop, M-10, Middle section, Science & Technology Park, Report No.: SZEM170800932403

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TEST REPORT

Application No.: SZEM1708009324CR (SHEM1708005549CR)

Applicant: Shanghai PartnerX Robotics Co., Ltd

Address of Applicant: 8th Floor, Building 90, No. 1122 North Qinzhou Rd. Shanghai, China 200233

Manufacturer: Shanghai PartnerX Robotics Co., Ltd

Address of Manufacturer: 8th Floor, Building 90, No. 1122 North Qinzhou Rd. Shanghai, China 200233

Factory: PartnerX(Changzhou) Robotics Co., Ltd.

Address of Factory: Factory 23, Innovative Industrial Park, No.377 South Wuyi Rd., Wujin High-

tech Industrial Zone, China

FCC ID: 2AJ5L-M1 **IC**: 22130-M1

Equipment Under Test (EUT):

EUT Name: Abilix Educational Robot Mobile Series

Model No.: Oculus 2, Oculus 1¤

Please refer to section 2 of this report which indicates which model was

actually tested and which were electrically identical.

Trade mark: Abilix

Standards: 47 CFR Part 15, Subpart C 15.247

RSS-247 Issue 2 February 2017, RSS-Gen Issue-4 November 2014

Date of Receipt: 2017-08-22

Date of Test: 2017-09-04 to 2017-09-18

Date of Issue: 2017-09-19

Test Result : Pass*



Jack Zhang EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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^{*} In the configuration tested, the EUT complied with the standards specified above.



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| | Revision Record | | | | | |
|---------|-----------------|------------|----------|----------|--|--|
| Version | Chapter | Date | Modifier | Remark | | |
| 00 | 1 | 2017-09-19 | / | Original | | |
| | | | | | | |
| | | | | | | |

| Authorized for issue by: | | |
|--------------------------|------------------------------|------------|
| Engineer | Forychon | 2017-09-19 |
| | Foray Chen /Project Engineer | Date |
| Reviewer | Eric Fu | 2017-09-19 |
| | Eric Fu /Reviewer | Date |



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2 Test Summary

| Radio Spectrum Technical Requirement | | | | |
|--------------------------------------|-------------------------------------|--------|----------------------------------------------------|--------|
| Item | Standard | Method | Requirement | Result |
| Antenna Requirement | 47 CFR Part 15, Subpart C 15.247 | N/A | 47 CFR Part 15, Subpart C 15.203 & 15.247(c) | Pass |

| Radio Spectrum Matter Part | | | | |
|-------------------------------------------------------------|-------------------------------------|-----------------------------------------|----------------------------------------------------|--------|
| Item | Standard | Method | Requirement | Result |
| Conducted Emissions at AC Power Line (150kHz-30MHz) | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 6.2 | 47 CFR Part 15, Subpart C 15.207 | 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 |
| Conducted Peak Output Power | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 11.9.1 | 47 CFR Part 15, Subpart C 15.247(b)(3) | 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 |
| Conducted Band Edges Measurement | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 11.13.3.2 | 47 CFR Part 15, Subpart C 15.247(d) | Pass |
| Conducted Spurious Emissions | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 11.11 | 47 CFR Part 15, Subpart C 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 |
| Radiated Spurious Emissions | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 6.10.4 | 47 CFR Part 15, Subpart C 15.209 & 15.247(d) | Pass |
| 99% Occupied bandwidth | | RSS-Gen Clause 6.6 | RSS-Gen Issue 4 section 6.6 | PASS |

Declaration of EUT Family Grouping:

Note: There are series models mentioned in this report, and they are the identical in electrical and electronic characters. Only the model Oculus 2 was tested since their differences were the model number and appearance.



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4 General Information

4.1 Details of E.U.T.

| Power supply: | Adapter manufacturer: Xinsu Global Electronic Co., Limited Model: XSG0841000US Input: AC 100-240V, 50/60Hz 0.6A Max Output: 8.4V 1.0A |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Test voltage: | AC 120V, 60Hz |
| Cable: | AC cable: 0cm DC cable: 120cm |
| Operation Frequency:: | 2412MHz-2462MHz |
| Modulation technique: | 802.11 b DSSS(CCK, DQPSK, DBPSK) 802.11 g/n(HT20) OFDM(64QAM, 16QAM, QPSK, BPSK) |
| Data Rate: Antenna type: | 802.11b: 1/2/5.5/11Mbps, 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n(HT20): MCS0-MCS7 PCB Antenna |
| Antenna gain: | 2 dbi |
| Number of channels: | 11 |

4.2 Description of Support Units

The EUT has been tested as an independent unit.

| Description | Manufacturer | Model No. | Serial No. |
|---------------------------------|--------------|----------------|------------|
| Laptop | Lenovo | ThinkPad X100e | SGS |
| USB to TTL Bridge Controller | / | FT232 | SGS |
| Serial debugging tools | / | Ver 1.3 | Client |



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4.3 Measurement Uncertainty

| No. | Item | Measurement Uncertainty |
|-----|---------------------------------|-------------------------|
| 1 | Radio Frequency | 7.25 x 10-8 |
| 2 | Timeout | 2s |
| 3 | Duty cycle | 0.37% |
| 4 | Occupied Bandwidth | 3% |
| 5 | RF conducted power | 0.75dB |
| 6 | RF power density | 2.84dB |
| 7 | Conducted Spurious emissions | 0.75dB |
| 8 | DE Dadiated newer | 4.5dB (below 1GHz) |
| 0 | RF Radiated power | 4.8dB (above 1GHz) |
| 9 | Dadiated Churique emission test | 4.5dB (30MHz-1GHz) |
| 9 | Radiated Spurious emission test | 4.8dB (1GHz-18GHz) |
| 10 | Temperature test | 1℃ |
| 11 | Humidity test | 3% |
| 12 | Supply voltages | 1.5% |
| 13 | Time | 3% |



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4.4 Standards Applicable for Testing

Table 1: Tests Carried Out Under 47 CFR Part 15, Subpart C 15.247

| Item | Status |
|------------------------------------------------------------------------------|----------|
| Antenna Requirement | √ |
| Conducted Emissions at AC Power Line (150kHz-30MHz) | √ |
| Minimum 6dB Bandwidth | √ |
| Conducted Peak Output Power | √ |
| 20dB Bandwidth | × |
| Carrier Frequencies Separation | × |
| Hopping Channel Number | × |
| Dwell Time | × |
| Power Spectrum Density | √ |
| Conducted Band Edges Measurement | √ |
| Conducted Spurious Emissions | √ |
| Radiated Emissions which fall in the restricted bands | √ |
| Radiated Spurious Emissions | √ |
| Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence | × |
| 99% Occupied bandwidth | √ |

- x Indicates that the test is not applicable
- $\sqrt{}$ Indicates that the test is applicable



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4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.6 Test Facility

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

· CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

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 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 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.

Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None



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5 Equipment List

| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
|---------------------------|--------------|--------------------|------------------------|------------|----------------|
| Conducted Emission at AC | | | in to the state of the | | 0.11 2.00 2.00 |
| EMI test receiver | R&S | ESR7 | SHEM162-1 | 2016-12-29 | 2017-12-28 |
| LISN | Schwarzbeck | NSLK8127 | SHEM061-1 | 2016-12-29 | 2017-12-28 |
| LISN | EMCO | 3816/2 | SHEM019-1 | 2016-12-29 | 2017-12-28 |
| Pulse limiter | R&S | ESH3-Z2 | SHEM029-1 | 2017-08-12 | 2018-08-11 |
| CE test Cable | / | CE01 | / | 2016-12-29 | 2017-12-28 |
| Conducted Test | <u>'</u> | <u> </u> | <u> </u> | | |
| Spectrum Analyzer | R&S | FSP-30 | SHEM002-1 | 2017-04-24 | 2018-04-23 |
| Spectrum Analyzer | Agilent | N9020A | SHEM181-1 | 2017-07-03 | 2018-07-02 |
| Power meter | R&S | NRP | SHEM057-1 | 2016-12-29 | 2017-12-28 |
| Power Sensor | R&S | NRP-Z22 | SHEM136-1 | 2017-07-22 | 2018-07-21 |
| Power Sensor | R&S | NRP-Z91 | SHEM057-2 | 2016-12-29 | 2017-12-28 |
| Signal Generator | R&S | SMR40 | SHEM058-1 | 2017-07-03 | 2018-07-02 |
| Signal Generator | Agilent | N5182A | SHEM182-1 | 2017-07-03 | 2018-07-02 |
| Communication Tester | R&S | CMW500 | SHEM183-1 | 2017-07-03 | 2018-07-02 |
| Switcher | Tonscend | JS0806 | SHEM184-1 | / | / |
| Splitter | Anritsu | MA1612A | SHEM185-1 | / | / |
| Coupler | e-meca | 803-S-1 | SHEM186-1 | / | / |
| High-low Temp Cabinet | Suzhou Zhihe | TL-40 | SHEM087-1 | 2017-09-13 | 2018-09-12 |
| AC Power Stabilizer | WOCEN | 6100 | SHEM045-1 | 2017-01-14 | 2018-01-13 |
| DC Power Supply | QJE | QJ30003SII | SHEM046-1 | 2017-01-14 | 2018-01-13 |
| Radiated Test | | | | | |
| EMI test receiver | R&S | ESU40 | SHEM051-1 | 2017-09-26 | 2018-09-25 |
| Spectrum Analyzer | R&S | FSP-30 | SHEM002-1 | 2017-04-24 | 2018-04-23 |
| Loop Antenna (9kHz-30MHz) | Schwarzbeck | FMZB1519 | SHEM135-1 | 2017-04-10 | 2018-04-09 |
| Antenna (25MHz-2GHz) | Schwarzbeck | VULB9168 | SHEM048-1 | 2017-02-28 | 2018-02-27 |
| Antenna (25MHz-3GHz) | Schwarzbeck | HL562 | SHEM010-1 | 2017-02-28 | 2018-02-27 |
| Horn Antenna (1-8GHz) | Schwarzbeck | HF906 | SHEM009-1 | 2016-09-24 | 2018-09-23 |
| Horn Antenna (1-18GHz) | Schwarzbeck | BBHA9120D | SHEM050-1 | 2017-01-14 | 2018-01-13 |
| Horn Antenna (14-40GHz) | Schwarzbeck | BBHA 9170 | SHEM049-1 | 2017-02-13 | 2018-01-15 |
| Pre-amplifier (9KHz-2GHz) | CLAVIIO | BDLNA-0001-412010 | SHEM164-1 | 2017-08-22 | 2018-08-21 |
| Pre-amplifier (1-26.5GHz) | CLAVIIO | BDLNA-0118-352810 | SHEM050-2 | 2017-08-22 | 2018-08-21 |
| Band filter | LORCH | 9BRX-875/X150-SR | SHEM156-1 | / | / |
| Band filter | LORCH | 13BRX-1950/X500-SR | SHEM083-2 | / | / |
| Band filter | LORCH | 5BRX-2400/X200-SR | SHEM155-1 | / | / |
| Band filter | LORCH | 5BRX-5500/X1000-SR | SHEM157-2 | / | / |
| High pass Filter | Wainwright | WHK3.0/18G-100SS | SHEM157-1 | / | / |
| High pass Filter | Wainwright | WHKS1700-3SS | SHEM157-3 | / | / |
| Semi/Fully Anechoic | ST | 11*6*6M | SHEM078-2 | 2017-07-22 | 2018-07-21 |
| RE test Cable | / | RE01, RE02, RE06 | / | 2016-12-29 | 2017-12-28 |



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247

6.1.2 Conclusion

Standard Requirment:

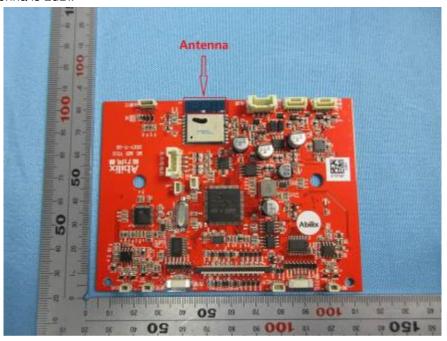
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2dBi.





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7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement: 47 CFR Part 15, Subpart C 15.247
Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

| | Conducte | ed limit(dBµV) | |
|-------------------------------------------------|------------|----------------|--|
| Frequency of emission(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 logarithm of the frequency. | | | |

7.1.1 E.U.T. Operation

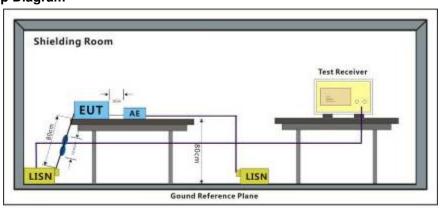
Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode c: Engineering Mode: Using test software to control EUT working in continuous

transmitting and receiving, and select channel and modulation type

7.1.2 Test Setup Diagram





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7.1.3 Measurement Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

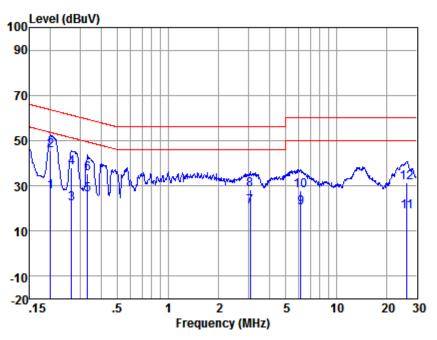
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50 \text{ohm}/50 \mu\text{H} + 5 \text{ohm}$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference 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 ANSI C63.10 on conducted measurement.



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AC Live Line



Site : chamber Condition : LISN-L-2017

Project No: 5549CR

Test mode : a

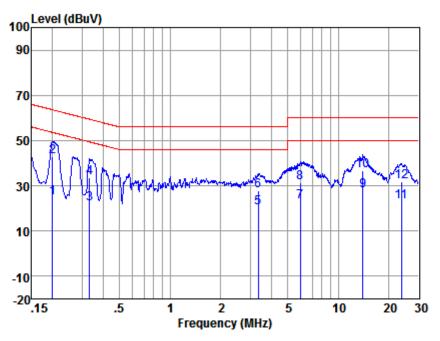
| | Freq | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|----|--------|---------------|----------------|---------------|-------|---------------|---------------|---------|
| | MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.200 | 17.52 | 0.11 | 9.81 | 27.44 | 53.62 | -26.18 | Average |
| 2 | 0.200 | 35.62 | 0.11 | 9.81 | 45.54 | 63.62 | -18.08 | QP |
| 3 | 0.267 | 12.29 | 0.11 | 9.81 | 22.21 | 51.20 | -28.99 | Average |
| 4 | 0.267 | 28.08 | 0.11 | 9.81 | 38.00 | 61.20 | -23.20 | QP |
| 5 | 0.332 | 15.92 | 0.11 | 9.81 | 25.84 | 49.40 | -23.56 | Average |
| 6 | 0.332 | 25.59 | 0.11 | 9.81 | 35.51 | 59.40 | -23.89 | QP |
| 7 | 3.074 | 10.96 | 0.12 | 9.85 | 20.93 | 46.00 | -25.07 | Average |
| 8 | 3.074 | 18.29 | 0.12 | 9.85 | 28.26 | 56.00 | -27.74 | QP |
| 9 | 6.153 | 10.48 | 0.11 | 9.86 | 20.45 | 50.00 | -29.55 | Average |
| 10 | 6.153 | 17.87 | 0.11 | 9.86 | 27.84 | 60.00 | -32.16 | QP |
| 11 | 26.418 | 8.09 | 0.21 | 10.05 | 18.35 | 50.00 | -31.65 | Average |
| 12 | 26.418 | 21.17 | 0.21 | 10.05 | 31.43 | 60.00 | -28.57 | QP |



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AC Neutral Line



Site : chamber Condition : LISN-N-2017

Project No: 5549CR

Test mode : a

| | Freq | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|----|--------|---------------|----------------|---------------|-------|---------------|---------------|---------|
| | MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.200 | 14.79 | 0.12 | 9.81 | 24.72 | 53.62 | -28.90 | Average |
| 2 | 0.200 | 32.99 | 0.12 | 9.81 | 42.92 | 63.62 | -20.70 | QP |
| 3 | 0.332 | 12.31 | 0.11 | 9.81 | 22.23 | 49.40 | -27.17 | Average |
| 4 | 0.332 | 23.88 | 0.11 | 9.81 | 33.80 | 59.40 | -25.60 | QP |
| 5 | 3.346 | 10.49 | 0.13 | 9.85 | 20.47 | 46.00 | -25.53 | Average |
| 6 | 3.346 | 17.81 | 0.13 | 9.85 | 27.79 | 56.00 | -28.21 | QP |
| 7 | 5.961 | 13.15 | 0.13 | 9.86 | 23.14 | 50.00 | -26.86 | Average |
| 8 | 5.961 | 21.33 | 0.13 | 9.86 | 31.32 | 60.00 | -28.68 | QP |
| 9 | 14.063 | 17.50 | 0.16 | 10.00 | 27.66 | 50.00 | -22.34 | Average |
| 10 | 14.063 | 26.34 | 0.16 | 10.00 | 36.50 | 60.00 | -23.50 | QP |
| 11 | 23.762 | 12.57 | 0.22 | 10.04 | 22.83 | 50.00 | -27.17 | Average |
| 12 | 23.762 | 21.67 | 0.22 | 10.04 | 31.93 | 60.00 | -28.07 | QP |



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7.2 Minimum 6dB Bandwidth

Test Requirement: 47 CFR Part 15, Subpart C 15.247
Test Method: ANSI C63.10 (2013) Section 11.8.1

Measurement Distance: 3m

Limit: ≥500 kHz

7.2.1 E.U.T. Operation

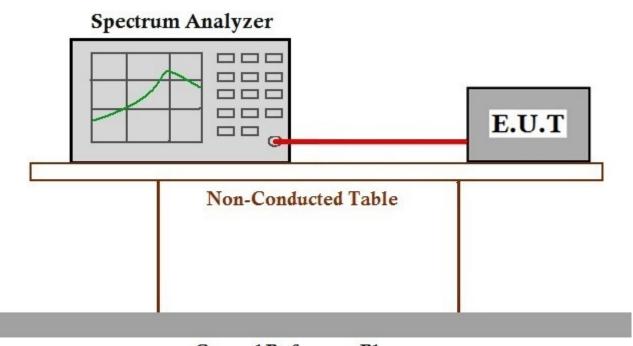
Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode c: Engineering Mode: Using test software to control EUT working in continuous

transmitting and receiving, and select channel and modulation type

7.2.2 Test Setup Diagram



Ground Reference Plane

7.2.3 Measurement Data

The detailed test data see: Appendix 15.247



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7.3 Conducted Peak Output Power

Test Requirement: 47 CFR Part 15, Subpart C 15.247
Test Method: ANSI C63.10 (2013) Section 11.9.1

Measurement Distance: 3m

Limit:

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

7.3.1 E.U.T. Operation

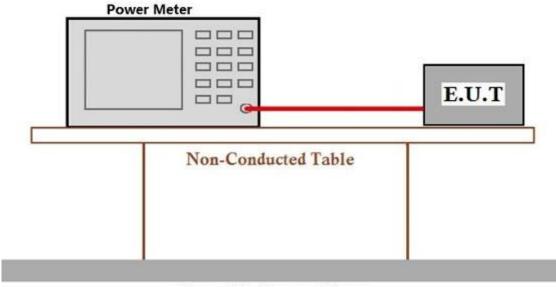
Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode c: Engineering Mode: Using test software to control EUT working in continuous

transmitting and receiving, and select channel and modulation type

7.3.2 Test Setup Diagram



Ground Reference Plane

7.3.3 Measurement Data

The detailed test data see: Appendix 15.247

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7.4 Power Spectrum Density

Test Requirement: 47 CFR Part 15, Subpart C 15.247
Test Method: ANSI C63.10 (2013) Section 11.10.2

Measurement Distance: 3m

Limit: ≤8dBm in any 3 kHz band during any time interval of continuous

transmission

7.4.1 E.U.T. Operation

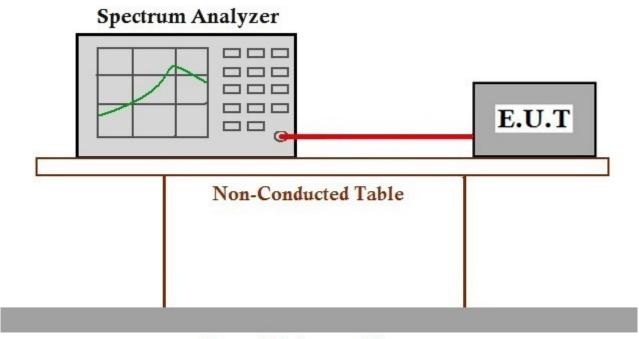
Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode c: Engineering Mode: Using test software to control EUT working in continuous

transmitting and receiving, and select channel and modulation type

7.4.2 Test Setup Diagram



Ground Reference Plane

7.4.3 Measurement Data

The detailed test data see: Appendix 15.247



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7.5 Conducted Band Edges Measurement

Test Requirement: 47 CFR Part 15, Subpart C 15.247
Test Method: ANSI C63.10 (2013) Section 11.13.3.2

Measurement Distance: 3m

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

transmi

7.5.1 E.U.T. Operation

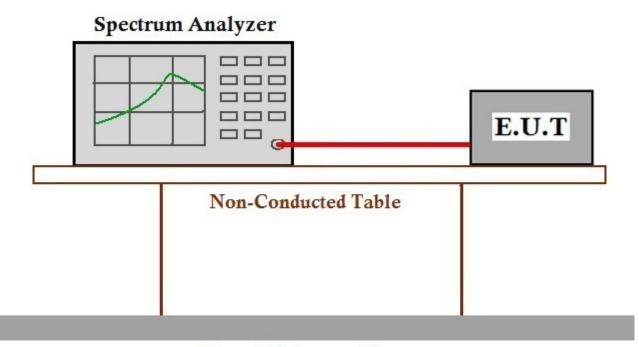
Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode c: Engineering Mode: Using test software to control EUT working in continuous

transmitting and receiving, and select channel and modulation type

7.5.2 Test Setup Diagram



Ground Reference Plane

7.5.3 Measurement Data

The detailed test data see: Appendix 15.247

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7.6 Conducted Spurious Emissions

Test Requirement: 47 CFR Part 15, Subpart C 15.247
Test Method: ANSI C63.10 (2013) Section 11.11

Measurement Distance: 3m

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

transmi

7.6.1 E.U.T. Operation

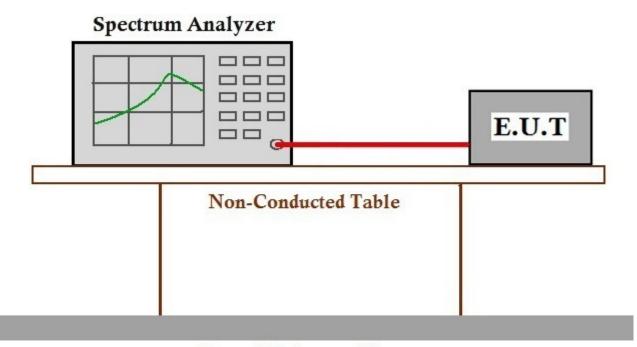
Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode c: Engineering Mode: Using test software to control EUT working in continuous

transmitting and receiving, and select channel and modulation type

7.6.2 Test Setup Diagram



Ground Reference Plane

7.6.3 Measurement Data

The detailed test data see: Appendix 15.247

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7.7 Radiated Emissions which fall in the restricted bands

Test Requirement: 47 CFR Part 15, Subpart C 15.247
Test Method: ANSI C63.10 (2013) Section 6.10.5

Measurement Distance: 3m

Limit:

| 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.

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode c: Engineering Mode: Using test software to control EUT working in continuous

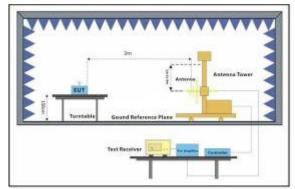
transmitting and receiving, and select channel and modulation type

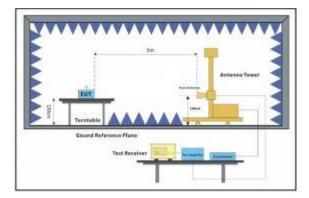


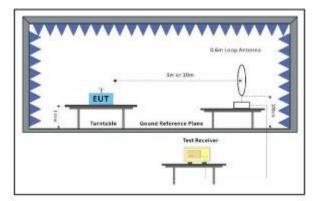
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7.7.2 Test Setup Diagram









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7.7.3 Measurement Data

- 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 chamber. 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 fully-anechoic chamber. 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 (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.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. 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.



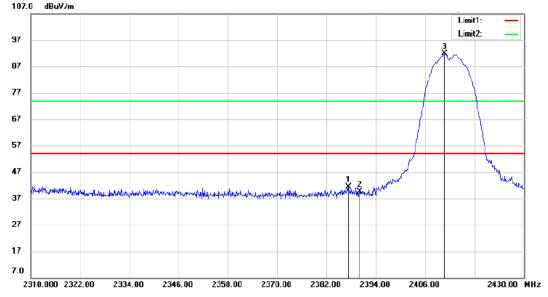
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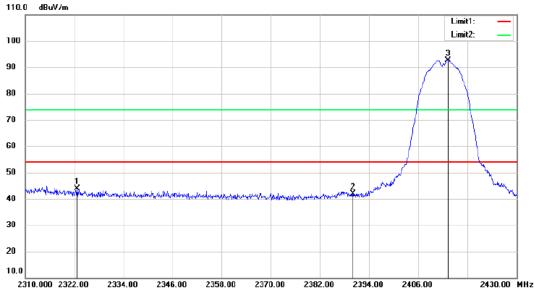
Test Mode: 802.11b Channel: 2412

| MK | Frequency (MHz) | Reading (dBuV/m) | Corrected factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|----|--------------------|------------------|----------------------|--------------------|-------------------|--------------------|----------|--------------|
| 1 | 2387.4 | 45.21 | -3.87 | 41.34 | 54 | -12.66 | Peak | Horizontal |
| 2 | 2390 | 43.57 | -3.89 | 39.68 | 54 | -14.32 | Peak | Horizontal |
| 3 | 2410.68 | 95.79 | -3.93 | 91.86 | 54 | 37.86 | Peak | Horizontal |
| 1 | 2322.72 | 47.66 | -3.69 | 43.97 | 54 | -10.03 | Peak | Vertical |
| 2 | 2390 | 45.73 | -3.89 | 41.84 | 54 | -12.16 | Peak | Vertical |
| 3 | 2413.2 | 96.57 | -3.92 | 92.65 | 54 | 38.65 | Peak | Vertical |

Horizontal



Vertical





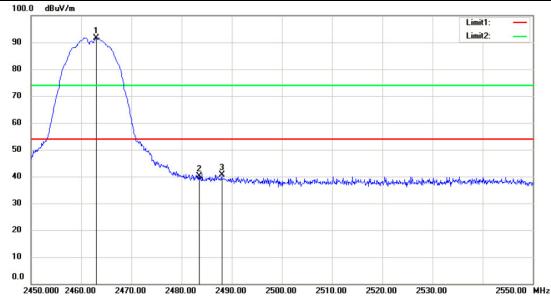
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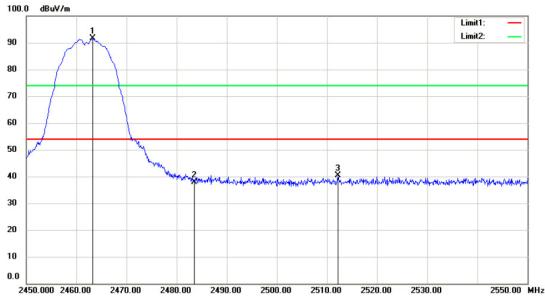
Test Mode: 802.11b Channel: 2462

| MK | Frequency (MHz) | Reading (dBuV/m) | Corrected factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|----|--------------------|------------------|----------------------|--------------------|-------------------|--------------------|----------|--------------|
| 1 | 2463 | 95.68 | -3.99 | 91.69 | 54 | 37.69 | Peak | Horizontal |
| 2 | 2483.5 | 44.08 | -4.01 | 40.07 | 54 | -13.93 | Peak | Horizontal |
| 3 | 2488 | 44.63 | -4.01 | 40.62 | 54 | -13.38 | Peak | Horizontal |
| 1 | 2463.3 | 95.49 | -3.98 | 91.51 | 54 | 37.51 | Peak | Vertical |
| 2 | 2483.5 | 41.91 | -4.01 | 37.9 | 54 | -16.1 | Peak | Vertical |
| 3 | 2512.2 | 44.25 | -3.89 | 40.36 | 54 | -13.64 | Peak | Vertical |





Vertical





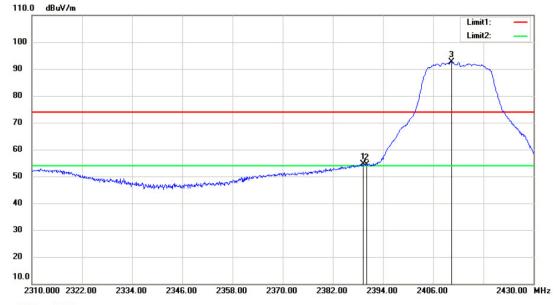
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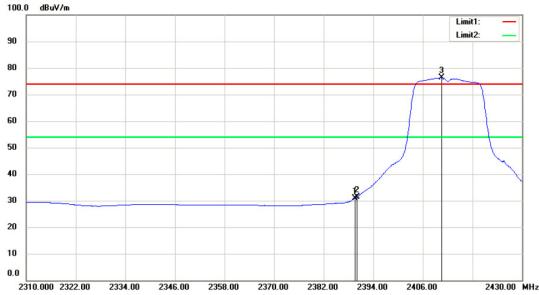
Test Mode: 802.11g Channel: 2412

| MK | Frequency (MHz) | Reading (dBuV/m) | Corrected factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization | | | |
|----|--------------------|------------------|----------------------|--------------------|-------------------|--------------------|----------|--------------|--|--|--|
| 1 | 2389.2 | 58.47 | -3.89 | 54.58 | 74 | -19.42 | Peak | Horizontal | | | |
| 2 | 2390 | 58.18 | -3.89 | 54.29 | 74 | -19.71 | Peak | Horizontal | | | |
| 3 | 2410.32 | 96.52 | -3.93 | 92.59 | 74 | 18.59 | Peak | Horizontal | | | |
| 1 | 2389.56 | 34.81 | -3.88 | 30.93 | 54 | -23.07 | Average | Horizontal | | | |
| 2 | 2390 | 35.32 | -3.89 | 31.43 | 54 | -22.57 | Average | Horizontal | | | |
| 3 | 2410.56 | 80.25 | -3.93 | 76.32 | 54 | 22.32 | Average | Horizontal | | | |





Average



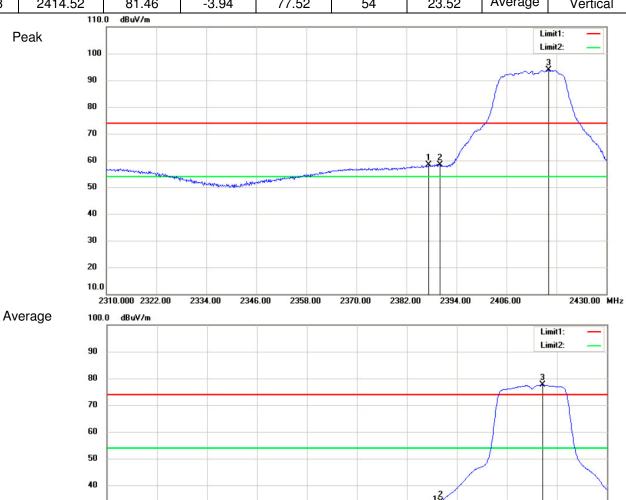


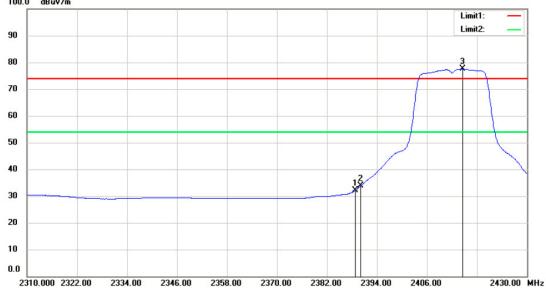
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Test Mode: 802.11g Channel: 2412

| MK | Frequency (MHz) | Reading (dBuV/m) | Corrected factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|----|--------------------|---------------------|----------------------|--------------------|-------------------|--------------------|----------|--------------|
| 1 | 2387.4 | 62.24 | -3.87 | 58.37 | 74 | -15.63 | Peak | Vertical |
| 2 | 2390 | 62.27 | -3.89 | 58.38 | 74 | -15.62 | Peak | Vertical |
| 3 | 2416.08 | 97.7 | -3.93 | 93.77 | 74 | 19.77 | Peak | Vertical |
| 1 | 2388.84 | 36.08 | -3.89 | 32.19 | 54 | -21.81 | Average | Vertical |
| 2 | 2390 | 37.69 | -3.89 | 33.8 | 54 | -20.2 | Average | Vertical |
| 3 | 2414.52 | 81.46 | -3.94 | 77.52 | 54 | 23.52 | Average | Vertical |







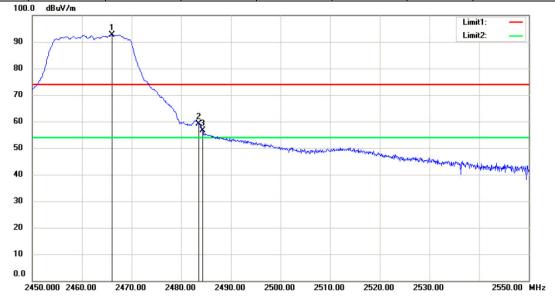
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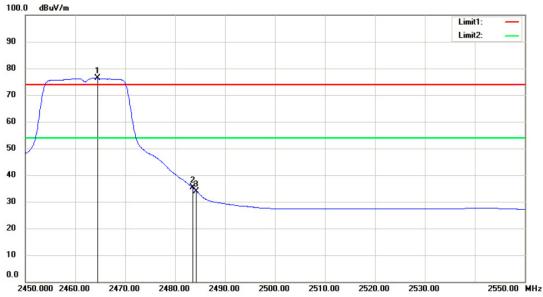
Test Mode: 802.11g Channel: 2462

| MK | Frequency (MHz) | Reading (dBuV/m) | Corrected factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization | | |
|----|--------------------|------------------|----------------------|--------------------|-------------------|--------------------|----------|--------------|--|--|
| 1 | 2466 | 96.55 | -3.99 | 92.56 | 74 | 18.56 | Peak | Horizontal | | |
| 2 | 2483.5 | 63.26 | -4.01 | 59.25 | 74 | -14.75 | Peak | Horizontal | | |
| 3 | 2484.3 | 60.76 | -4.02 | 56.74 | 74 | -17.26 | Peak | Horizontal | | |
| 1 | 2464.5 | 80.32 | -3.99 | 76.33 | 54 | 22.33 | Average | Horizontal | | |
| 2 | 2483.5 | 39.33 | -4.01 | 35.32 | 54 | -18.68 | Average | Horizontal | | |
| 3 | 2484.2 | 38.01 | -4.02 | 33.99 | 54 | -20.01 | Average | Horizontal | | |





Average





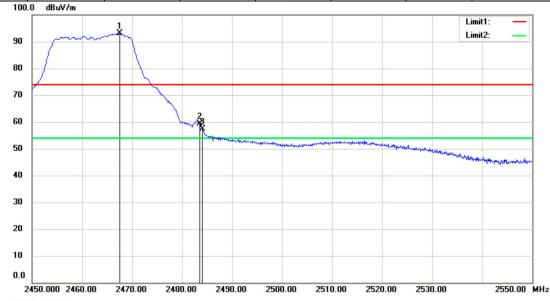
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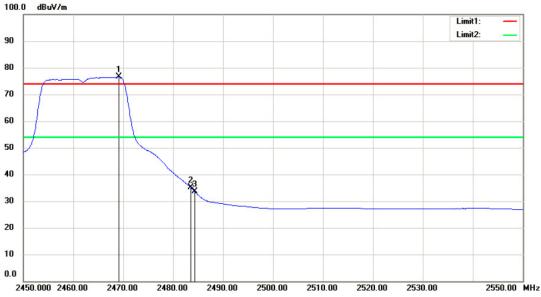
Test Mode: 802.11g Channel: 2462

| MK | Frequency (MHz) | Reading (dBuV/m) | Corrected factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization | | | |
|----|--------------------|---------------------|----------------------|--------------------|-------------------|--------------------|----------|--------------|--|--|--|
| 1 | 2467.5 | 97.02 | -4 | 93.02 | 74 | 19.02 | Peak | Vertical | | | |
| 2 | 2483.5 | 63.3 | -4.01 | 59.29 | 74 | -14.71 | Peak | Vertical | | | |
| 3 | 2484.1 | 61.34 | -4.02 | 57.32 | 74 | -16.68 | Peak | Vertical | | | |
| 1 | 2469.1 | 80.52 | -3.99 | 76.53 | 54 | 22.53 | Average | Vertical | | | |
| 2 | 2483.5 | 39.11 | -4.01 | 35.1 | 54 | -18.9 | Average | Vertical | | | |
| 3 | 2484.3 | 37.58 | -4.02 | 33.56 | 54 | -20.44 | Average | Vertical | | | |





Average



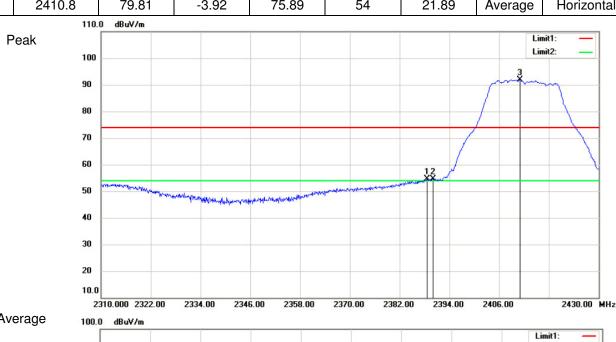


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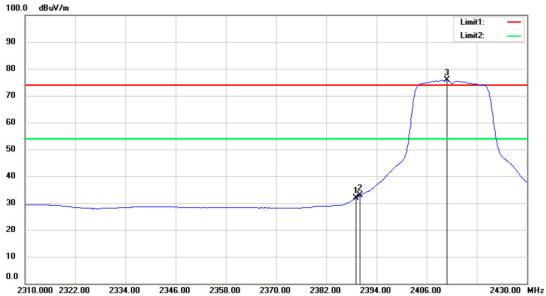
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Test Mode: 802.11 n(HT20) Channel: 2412

| MK | Frequency (MHz) | Reading (dBuV/m) | Corrected factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|----|--------------------|---------------------|----------------------|--------------------|-------------------|--------------------|----------|--------------|
| 1 | 2388.6 | 58.43 | -3.88 | 54.55 | 74 | -19.45 | Peak | Horizontal |
| 2 | 2390 | 58.45 | -3.89 | 54.56 | 74 | -19.44 | Peak | Horizontal |
| 3 | 2411.04 | 95.86 | -3.93 | 91.93 | 74 | 17.93 | Peak | Horizontal |
| 1 | 2389.08 | 35.8 | -3.89 | 31.91 | 54 | -22.09 | Average | Horizontal |
| 2 | 2390 | 36.66 | -3.89 | 32.77 | 54 | -21.23 | Average | Horizontal |
| 3 | 2410.8 | 79.81 | -3.92 | 75.89 | 54 | 21.89 | Average | Horizontal |







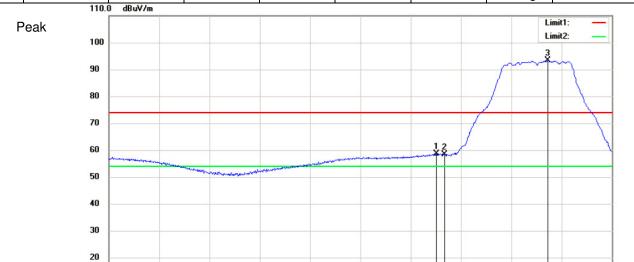


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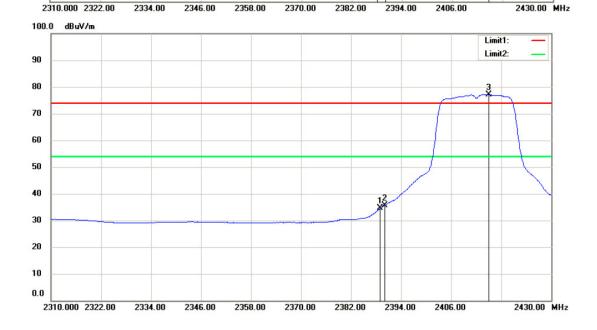
Test Mode: 802.11 n(HT20) Channel: 2412

| MK | Frequency (MHz) | Reading (dBuV/m) | Corrected factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization | | | |
|----|--------------------|------------------|----------------------|--------------------|-------------------|--------------------|----------|--------------|--|--|--|
| 1 | 2388.12 | 62.49 | -3.88 | 58.61 | 74 | -15.39 | Peak | Vertical | | | |
| 2 | 2390 | 62.39 | -3.89 | 58.5 | 74 | -15.5 | Peak | Vertical | | | |
| 3 | 2414.76 | 97.44 | -3.94 | 93.5 | 74 | 19.5 | Peak | Vertical | | | |
| 1 | 2388.96 | 38.45 | -3.89 | 34.56 | 54 | -19.44 | Average | Vertical | | | |
| 2 | 2390 | 39.57 | -3.89 | 35.68 | 54 | -18.32 | Average | Vertical | | | |
| 3 | 2415 | 81.12 | -3.94 | 77.18 | 54 | 23.18 | Average | Vertical | | | |



Average

10.0





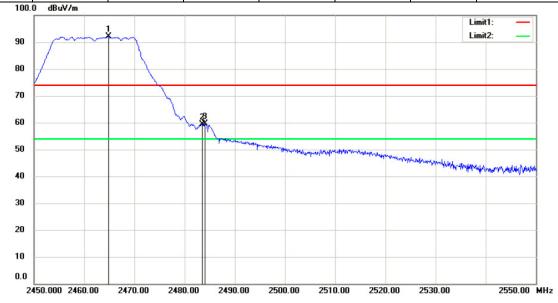
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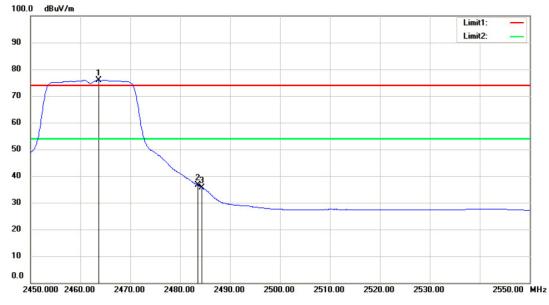
Test Mode: 802.11 n(HT20) Channel: 2462

| MK | Frequency (MHz) | Reading (dBuV/m) | Corrected factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|----|--------------------|---------------------|----------------------|--------------------|-------------------|--------------------|----------|--------------|
| 1 | 2464.8 | 96.05 | -4 | 92.05 | 74 | 18.05 | Peak | Horizontal |
| 2 | 2483.5 | 63.33 | -4.01 | 59.32 | 74 | -14.68 | Peak | Horizontal |
| 3 | 2484 | 63.54 | -4.02 | 59.52 | 74 | -14.48 | Peak | Horizontal |
| 1 | 2463.6 | 79.85 | -3.98 | 75.87 | 54 | 21.87 | Average | Horizontal |
| 2 | 2483.5 | 40.57 | -4.01 | 36.56 | 54 | -17.44 | Average | Horizontal |
| 3 | 2484.3 | 39.74 | -4.02 | 35.72 | 54 | -18.28 | Average | Horizontal |





Average





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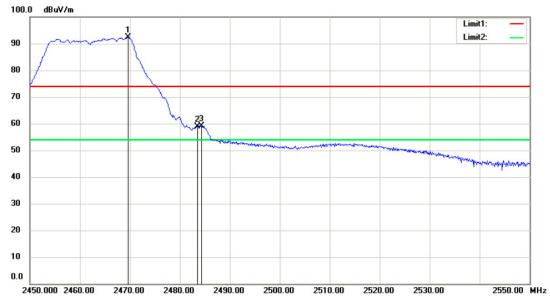
Channel: 2462

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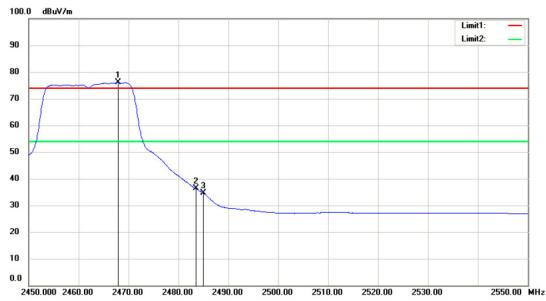
Test Mode: 802.11 n(HT20)

| MK | Frequency (MHz) | Reading (dBuV/m) | Corrected factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|----|--------------------|---------------------|----------------------|--------------------|-------------------|--------------------|----------|--------------|
| 1 | 2469.6 | 96.38 | -4 | 92.38 | 74 | 18.38 | Peak | Vertical |
| 2 | 2483.5 | 62.96 | -4.01 | 58.95 | 74 | -15.05 | Peak | Vertical |
| 3 | 2484.3 | 63.08 | -4.02 | 59.06 | 74 | -14.94 | Peak | Vertical |
| 1 | 2467.9 | 80.04 | -3.99 | 76.05 | 54 | 22.05 | Average | Vertical |
| 2 | 2483.5 | 40.27 | -4.01 | 36.26 | 54 | -17.74 | Average | Vertical |
| 3 | 2485 | 38.62 | -4.01 | 34.61 | 54 | -19.39 | Average | Vertical |





Average





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Remark: 1). Test Level = Receiver Reading + Antenna Factor + Cable Loss- Preamplifier Factor 2). If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

All frequencies within the "Restricted bands" have been evaluated to compliance. Except as shown in paragraph of this section, only spurious emissions are permitted in any of the frequency bands listed below:

a. FCC Part 15, Subpart C Section 15.205 Restricted bands of operation.

| MHz | MHz | MHz | GHz |
|---------------------|-----------------------|-----------------|---------------|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| 10.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.5 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - 156.52525 | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.7 - 156.9 | 2655 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 162.0125 - 167.17 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 167.72 - 173.2 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 240 - 285 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 322 - 335.4 | 3600 - 4400 | |
| 13.36 - 13.41 | | | |



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b. RSS-Gen section 7.2.2 Restricted bands of operation

| MHz | MHz | GHz |
|---------------------|---------------|-------------|
| 0.090-0.110 | 240-285 | 9.0-9.2 |
| 2.1735-2.1905 | 322-335.4 | 9.3-9.5 |
| 3.020-3.026 | 399.9-410 | 10.6-12.7 |
| 4.125-4.128 | 608-614 | 13.25-13.4 |
| 4.17725-4.17775 | 960-1427 | 14.47-14.5 |
| 4.20725-4.20775 | 1435-1626.5 | 15.35-16.2 |
| 5.677-5.683 | 1645.5-1646.5 | 17.7-21.4 |
| 6.215-6.218 | 1660-1710 | 22.01-23.12 |
| 6.26775-6.26825 | 1718.8-1722.2 | 23.6-24.0 |
| 6.31175-6.31225 | 2200-2300 | 31.2-31.8 |
| 8.291-8.294 | 2310-2390 | 36.43-36.5 |
| 8.362-8.366 | 2655-2900 | Above 38.6 |
| 8.37625-8.38675 | 3260-3267 | |
| 8.41425-8.41475 | 3332-3339 | |
| 12.29-12.293 | 3345.8-3358 | |
| 12.51975-12.52025 | 3500-4400 | |
| 12.57675-12.57725 | 4500-5150 | |
| 13.36-13.41 | 5350-5460 | |
| 16.42-16.423 | 7250-7750 | |
| 16.69475-16.69525 | 8025-8500 | |
| 16.80425-16.80475 | | |
| 25.5-25.67 | | |
| 37.5-38.25 | | |
| 73-74.6 | | |
| 74.8-75.2 | | |
| 108-138 | | |
| 156.52475-156.52525 | | |
| 156.7-156.9 | | |



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7.8 Radiated Spurious Emissions

Test Requirement: 47 CFR Part 15, Subpart C 15.247
Test Method: ANSI C63.10 (2013) Section 6.10.4

Measurement Distance: 3m

Limit:

| 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.

7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode c: Engineering Mode: Using test software to control EUT working in continuous

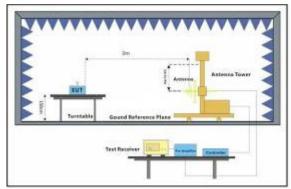
transmitting and receiving, and select channel and modulation type

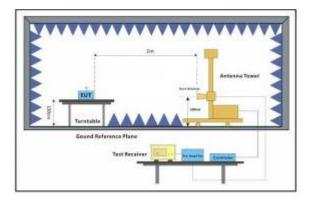


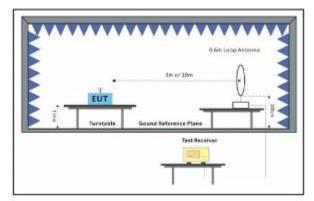
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7.8.2 Test Setup Diagram









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7.8.3 Measurement Data

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 chamber. 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 fully-anechoic chamber. 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 (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.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. 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.



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30MHz-1GHz:

| Item | Freq. | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Result Level | Limit Line | Over Limit | Detector | Polarization |
|--------|--------|---------------|-------------------|------------------|---------------|-----------------|---------------|---------------|----------|--------------|
| (Mark) | (MHz) | (dBµV) | (dB/m) | (dB) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | | |
| 1 | 31.18 | 48.28 | 15.43 | 42.60 | 0.19 | 21.30 | 40.00 | -18.70 | QP | Horizontal |
| 2 | 72.34 | 52.05 | 10.59 | 42.67 | 0.35 | 20.32 | 40.00 | -19.68 | QP | Horizontal |
| 3 | 107.89 | 60.01 | 9.58 | 42.70 | 0.49 | 27.38 | 43.50 | -16.12 | QP | Horizontal |
| 4 | 163.76 | 62.09 | 12.52 | 42.58 | 0.64 | 32.67 | 43.50 | -10.83 | QP | Horizontal |
| 5 | 176.27 | 60.87 | 11.79 | 42.56 | 0.66 | 30.76 | 43.50 | -12.74 | QP | Horizontal |
| 6 | 236.65 | 55.03 | 10.97 | 42.47 | 0.75 | 24.28 | 46.00 | -21.72 | QP | Horizontal |
| 1 | 31.18 | 62.25 | 15.43 | 42.60 | 0.19 | 35.27 | 40.00 | -4.73 | QP | Vertical |
| 2 | 56.20 | 58.42 | 11.87 | 42.65 | 0.28 | 27.92 | 40.00 | -12.08 | QP | Vertical |
| 3 | 97.80 | 65.09 | 9.22 | 42.69 | 0.45 | 32.07 | 43.50 | -11.43 | QP | Vertical |
| 4 | 108.65 | 71.53 | 9.59 | 42.70 | 0.49 | 38.91 | 43.50 | -4.59 | QP | Vertical |
| 5 | 131.30 | 60.76 | 12.59 | 42.65 | 0.58 | 31.28 | 43.50 | -12.22 | QP | Vertical |
| 6 | 175.04 | 68.56 | 11.75 | 42.56 | 0.66 | 38.41 | 43.50 | -5.09 | QP | Vertical |

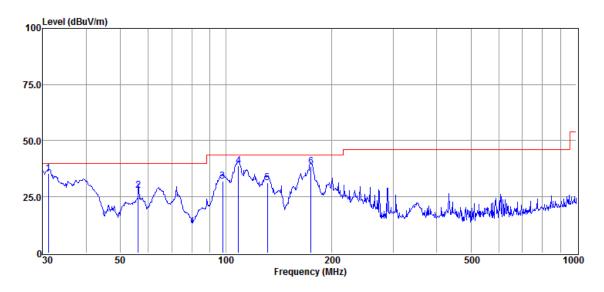
Result Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



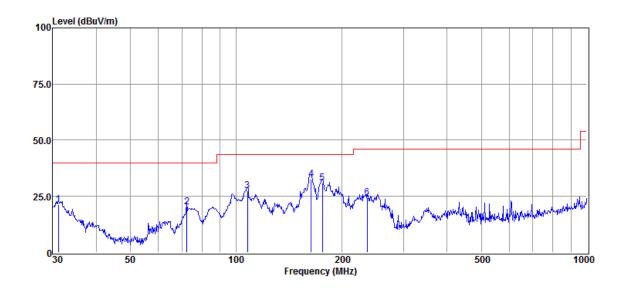
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Test plot as below: Vertical:



Horizontal:





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Above 1GHz:

Test mode: 802.11b Channel: 2412

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|------|--------------------|-------------------|----------------|-------------------|-------------------|--------------------|----------|--------------|
| 1 | 4824 | 42.76 | 6.4 | 49.16 | 54 | -4.84 | peak | Horizontal |
| 2 | 7236 | 37.55 | 10.76 | 48.31 | 54 | -5.69 | peak | Horizontal |
| 3 | 9648 | 36.21 | 14.37 | 50.58 | 54 | -3.42 | peak | Horizontal |
| 4 | 4824 | 41.09 | 6.4 | 47.49 | 54 | -6.51 | peak | Vertical |
| 5 | 7236 | 38.43 | 10.76 | 49.19 | 54 | -4.81 | peak | Vertical |
| 6 | 9648 | 34.65 | 14.37 | 49.02 | 54 | -4.98 | peak | Vertical |

Test mode: 802.11b Channel: 2437

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|------|--------------------|-------------------|----------------|-------------------|-------------------|--------------------|----------|--------------|
| 1 | 4874 | 41.04 | 6.92 | 47.96 | 54 | -6.04 | peak | Horizontal |
| 2 | 7311 | 39.88 | 11.08 | 50.96 | 54 | -3.04 | peak | Horizontal |
| 3 | 9748 | 34.37 | 14.36 | 48.73 | 54 | -5.27 | peak | Horizontal |
| 4 | 4874 | 40.97 | 6.92 | 47.89 | 54 | -6.11 | peak | Vertical |
| 5 | 7311 | 36.78 | 11.08 | 47.86 | 54 | -6.14 | peak | Vertical |
| 6 | 9748 | 32.22 | 14.36 | 46.58 | 54 | -7.42 | peak | Vertical |

Test mode: 802.11b Channel: 2462

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|------|--------------------|-------------------|----------------|-------------------|-------------------|--------------------|----------|--------------|
| 1 | 4924 | 41.75 | 7.31 | 49.06 | 54 | -4.94 | peak | Horizontal |
| 2 | 7386 | 38.12 | 11.41 | 49.53 | 54 | -4.47 | peak | Horizontal |
| 3 | 9848 | 35.02 | 14.38 | 49.4 | 54 | -4.6 | peak | Horizontal |
| 4 | 4924 | 40.03 | 7.31 | 47.34 | 54 | -6.66 | peak | Vertical |
| 5 | 7386 | 38.04 | 11.41 | 49.45 | 54 | -4.55 | peak | Vertical |
| 6 | 9848 | 33.2 | 14.38 | 47.58 | 54 | -6.42 | peak | Vertical |



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Test mode: 802.11g Channel: 2412

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|------|--------------------|-------------------|----------------|-------------------|-------------------|--------------------|----------|--------------|
| 1 | 4824 | 41.04 | 6.4 | 47.44 | 54 | -6.56 | peak | Horizontal |
| 2 | 7236 | 38 | 10.76 | 48.76 | 54 | -5.24 | peak | Horizontal |
| 3 | 9648 | 35.15 | 14.37 | 49.52 | 54 | -4.48 | peak | Horizontal |
| 4 | 4824 | 42.26 | 6.4 | 48.66 | 54 | -5.34 | peak | Vertical |
| 5 | 7236 | 38.34 | 10.76 | 49.1 | 54 | -4.9 | peak | Vertical |
| 6 | 9648 | 30.41 | 14.37 | 44.78 | 54 | -9.22 | peak | Vertical |

Test mode: 802.11g Channel: 2437

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|------|--------------------|-------------------|----------------|-------------------|-------------------|--------------------|----------|--------------|
| 1 | 4874 | 40.02 | 6.92 | 46.94 | 54 | -7.06 | peak | Horizontal |
| 2 | 7311 | 36.94 | 11.08 | 48.02 | 54 | -5.98 | peak | Horizontal |
| 3 | 9748 | 35.78 | 14.36 | 50.14 | 54 | -3.86 | peak | Horizontal |
| 4 | 4874 | 42.92 | 6.92 | 49.84 | 54 | -4.16 | peak | Vertical |
| 5 | 7311 | 37.11 | 11.08 | 48.19 | 54 | -5.81 | peak | Vertical |
| 6 | 9748 | 34.12 | 14.36 | 48.48 | 54 | -5.52 | peak | Vertical |

Test mode: 802.11g Channel: 2462

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|------|--------------------|-------------------|----------------|-------------------|-------------------|--------------------|----------|--------------|
| 1 | 4924 | 42.18 | 7.31 | 49.49 | 54 | -4.51 | peak | Horizontal |
| 2 | 7386 | 39.71 | 11.41 | 51.12 | 54 | -2.88 | peak | Horizontal |
| 3 | 9848 | 36.34 | 14.38 | 50.72 | 54 | -3.28 | peak | Horizontal |
| 4 | 4924 | 39.29 | 7.31 | 46.6 | 54 | -7.4 | peak | Vertical |
| 5 | 7386 | 37.44 | 11.41 | 48.85 | 54 | -5.15 | peak | Vertical |
| 6 | 9848 | 32.58 | 14.38 | 46.96 | 54 | -7.04 | peak | Vertical |



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Test mode: 802.11 n(HT20) Channel: 2412

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|------|--------------------|-------------------|----------------|-------------------|-------------------|--------------------|----------|--------------|
| 1 | 4824 | 40.3 | 6.4 | 46.7 | 54 | -7.3 | peak | Horizontal |
| 2 | 7236 | 36.09 | 10.76 | 46.85 | 54 | -7.15 | peak | Horizontal |
| 3 | 9648 | 35.34 | 14.37 | 49.71 | 54 | -4.29 | peak | Horizontal |
| 4 | 4824 | 40.56 | 6.4 | 46.96 | 54 | -7.04 | peak | Vertical |
| 5 | 7236 | 37.74 | 10.76 | 48.5 | 54 | -5.5 | peak | Vertical |
| 6 | 9648 | 37.61 | 14.37 | 51.98 | 54 | -2.02 | peak | Vertical |

Test mode: 802.11 n(HT20) Channel: 2437

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|------|--------------------|-------------------|-------------|-------------------|-------------------|--------------------|----------|--------------|
| 1 | 4874 | 41.01 | 6.92 | 47.93 | 54 | -6.07 | peak | Horizontal |
| 2 | 7311 | 37.23 | 11.08 | 48.31 | 54 | -5.69 | peak | Horizontal |
| 3 | 9748 | 32.43 | 14.36 | 46.79 | 54 | -7.21 | peak | Horizontal |
| 4 | 4874 | 41.58 | 6.92 | 48.5 | 54 | -5.5 | peak | Vertical |
| 5 | 7311 | 34.89 | 11.08 | 45.97 | 54 | -8.03 | peak | Vertical |
| 6 | 9748 | 33.42 | 14.36 | 47.78 | 54 | -6.22 | peak | Vertical |

Test mode: 802.11 n(HT20) Channel: 2462

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|------|--------------------|-------------------|----------------|-------------------|-------------------|--------------------|----------|--------------|
| 1 | 4924 | 38.28 | 7.31 | 45.59 | 54 | -8.41 | peak | Horizontal |
| 2 | 7386 | 36.75 | 11.41 | 48.16 | 54 | -5.84 | peak | Horizontal |
| 3 | 9848 | 31.12 | 14.38 | 45.5 | 54 | -8.5 | peak | Horizontal |
| 4 | 4924 | 41.65 | 7.31 | 48.96 | 54 | -5.04 | peak | Vertical |
| 5 | 7386 | 34.49 | 11.41 | 45.9 | 54 | -8.1 | peak | Vertical |
| 6 | 9848 | 33.83 | 14.38 | 48.21 | 54 | -5.79 | peak | Vertical |

Remark:1) Emission = Receiver Reading + Factor

- 2) Factor = Antenna Factor + Cable Loss + Pre-amplifier Factor.
- 3) If the Peak value below the AV Limit, the AV test doesn't perform for this submission.
- 4) No spurious emissions were detected within 20dB of limit below 30MHz

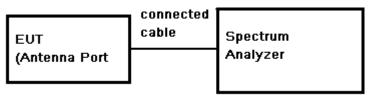


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7.9 99% Occupied Bandwidth

Test Configuration:



Test Procedure:

- 1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
- 2. Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centred on the hopping channel;
- 3. Set the spectrum analyzer: RBW >= 1% of the 20dB bandwidth (set 1MHz). VBW >= RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
- 4. Mark the peak frequency and -20dB points.

Test Date:

The detailed test data see: Appendix 15.247



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8 Equipment Under Test Pictures

Refer to the < Test Setup Photos>

9 EUT Constructional Details

Refer to the < External Photos > & < Internal Photos>.

-- End of the Report--