



FCC Part 15E Test Report

FCC ID: 2AGZ3S00911

| | |
|------------------|--|
| Product Name: | Starry Launch |
| Trademark: | Starry |
| Model Name : | S00912 L36104CPWD |
| Prepared For : | Starry, Inc |
| Address : | 38 Chauncy St Ste 200, Boston, MA 02111 |
| Prepared By : | Shenzhen BCTC Testing Co., Ltd. |
| Address : | BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China |
| Test Date: | Oct. 18, 2019 – Oct. 22, 2019 |
| Date of Report : | Oct. 23, 2019 |
| Report No.: | BCTC-LH190901198-2E |



TEST RESULT CERTIFICATION

Applicant's name : Starry, Inc

Address : 38 Chauncy St Ste 200, Boston, MA 02111

Manufacture's Name : ShenZhen Spacetek Technology Co.,Ltd

Address : 3F, NO.2Huafeng first science&technology Park, SanWei,
Baoan District ShenZhen, China

Product description

Product name : Starry Launch

Trademark :
Starry

Model and/or type reference : S00912

L36104CPWD

Standards : FCC Part15 15.407

ANSI C63.10-2013

KDB 789033 D02 v02r01

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Prepared by(Engineer): Cai Fang Zhong

Cai Fang Zhong

Reviewer(Supervisor): Eric Yang

Eric Yang

Approved(Manager): Zero Zhou





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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

| FCC Part15 (15.407) , Subpart E | | | |
|---|---|----------|--------|
| Standard Section | Test Item | Judgment | Remark |
| 15.209(a), 15.407 (b)(1) 15.407 (b)(4) 15.407 (b)(6) | Spurious Radiated Emissions | PASS | |
| 2.1051, 15.407(b) | Spurious Emissions at Antenna Terminals | PASS | |

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report



1.1 TEST FACILITY

Shenzhen BCTC Testing Co., Ltd.

Add. : BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 712850

IC Registered No.: 23583

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

| No. | Item | Uncertainty |
|-----|--|-------------|
| 1 | 3m chamber Radiated spurious emission(30MHz-1GHz) | U=4.3dB |
| 2 | 3m chamber Radiated spurious emission(1GHz-18GHz) | U=4.5dB |
| 3 | 3m chamber Radiated spurious emission(18GHz-40GHz) | U=3.34dB |
| 4 | Conducted Adjacent channel power | U=1.38dB |
| 5 | Conducted output power uncertainty Above 1G | U=1.576dB |
| 6 | Conducted output power uncertainty below 1G | U=1.28dB |
| 7 | humidity uncertainty | U=5.3% |
| 8 | Temperature uncertainty | U=0.59℃ |



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

| | | |
|------------------------|--|---|
| Equipment | Starry Launch | |
| Trade Name | Starry | |
| Model Name | S00912 L36104CPWD | |
| Model Difference | All the model are the same circuit and RF module, except model names | |
| Product Description | IEEE 802.11 WLAN Mode Supported | <input checked="" type="checkbox"/> 802.11a/n(20MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11n(40MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11ac(80MHz channel bandwidth) |
| | Data Rate | 802.11a/n: 6,9,12,18,24,36,48,54Mbps; 802.11n(HT40/HT40):MCS0-MCS15; 802.11ac(HT80):NSS1, MCS0-MCS9 |
| | Modulation | OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11a/n/ac; |
| | Operating Frequency Range | <input checked="" type="checkbox"/> 5150-5250MHz for 802.11a/n(HT20)n(HT40)/ac80; <input checked="" type="checkbox"/> 5725-5850 MHz for 802.11a/n(HT20)/n(HT40)/ac80; |
| | Number of Channels | See Note 2. |
| | Antenna Type | External antenna |
| | Antenna Gain | 5dBi |
| | Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual. | |
| | Channel List | Please refer to the Note 2. |
| Ratings | DC 12V | |
| Adapter | Model: MKS-1201000S Input: 100-240V~50/60Hz 0.3A Output: 12.0V 1000mA | |
| Connecting I/O Port(s) | Please refer to the User's Manual | |

Note:

- For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- Frequency and Channel list for 802.11a/n/ac(20MHz) U-NII-1 (5150-5250MHz):

| 802.11a/n(20MHz) Carrier Frequency Channel | | | | | | | |
|---|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 36 | 5180 | 44 | 5220 | - | - | - | - |
| 40 | 5200 | 48 | 5240 | - | - | - | - |

| 802.11n(40MHz) Carrier Frequency Channel | | | | | | | |
|--|--|--|--|--|--|--|--|
|--|--|--|--|--|--|--|--|



| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| 38 | 5190 | - | - | - | - | - | - |
| 46 | 5230 | - | - | - | - | - | - |

| 802.11ac (80MHz) Carrier Frequency Channel | |
|--|-----------------|
| Channel | Frequency (MHz) |
| 42 | 5210 |

Frequency and Channel list for 802.11a/n/ac(20 MHz) U-NII-3 (5725-5850MHz):

| 802.11a/n(20 MHz) Carrier Frequency Channel | | | | | | | |
|--|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 149 | 5745 | 153 | 5765 | 157 | 5785 | 161 | 5805 |
| 165 | 5825 | - | - | - | - | - | - |

| 802.11n40MHz Carrier Frequency Channel | | | | | |
|--|-----------------|---------|-----------------|---------|-----------------|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 151 | 5755 | 159 | 5795 | - | - |

| 802.11ac 80MHz Carrier Frequency Channel | |
|--|-----------------|
| Channel | Frequency (MHz) |
| 155 | 5775 |

| Ant. | Antenna Type | Antenna Gain(dBi) |
|------|------------------|-------------------|
| A | External antenna | 5 |
| B | External antenna | 5 |



2.2 DESCRIPTION OF TEST MODES

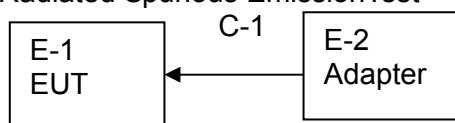
| For Radiated Emission | |
|-----------------------|---|
| Final Test Mode | Description |
| Mode 1 | 802.11a / n20 CH36/ CH40/ CH 48 802.11a /n 20 CH149/ CH157/ CH 165 |
| Mode 2 | 802.11n/40 CH38/ CH 46 802.11n40 CH 151 / CH 159 |
| Mode 3 | 802.11 ac80 CH 42/CH 155 |
| Mode 4 | 802.11a / n20 CH36/ CH40/ CH 48 802.11a /n20 CH149/ CH157/ CH 165 |

Note:

(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious EmissionTest



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| | Device Type | Brand | Model | Series No. | Data Cable |
|-----|---------------|--------|------------------|------------|------------|
| E-1 | Starry Launch | Starry | S00912 | N/A | EUT |
| E-2 | Adapter | N/A | MKS-12010 00S | N/A | EUT |

| Item | Shielded Type | Ferrite Core | Length | Note |
|------|---------------|--------------|--------|---------------------|
| C-1 | NO | NO | 1.2M | DC cable unshielded |

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.



2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

| Item | Equipment | Manufacturer | Type No. | Serial No. | Last calibration | Calibrated until |
|------|-------------------------------------|--------------|---------------|---------------|------------------|------------------|
| 1 | Spectrum Analyzer (9kHz-26.5GHz) | Agilent | E4407B | MY45109572 | Jun. 13, 2019 | Jun. 12, 2020 |
| 2 | Test Receiver (9kHz-7GHz) | R&S | ESR7 | 101154 | Jun. 13, 2019 | Jun. 12, 2020 |
| 3 | Bilog Antenna (30MHz-3GHz) | SCHWARZBECK | VULB9163 | VULB9163-942 | Jun. 22, 2019 | Jun. 21, 2020 |
| 4 | Horn Antenna (1GHz-18GHz) | SCHWARZBECK | BBHA9120D | 1541 | Jun. 22, 2019 | Jun. 21, 2020 |
| 5 | Horn Antenna (18GHz-40GHz) | SCHWARZBECK | BBHA9170 | 822 | Jun. 22, 2019 | Jun. 21, 2020 |
| 6 | Amplifier (9KHz-6GHz) | SCHWARZBECK | BBV9744 | 9744-0037 | Jun. 25, 2019 | Jun. 24, 2020 |
| 7 | Amplifier (0.5GHz-18GHz) | SCHWARZBECK | BBV9718 | 9718-309 | Jun. 25, 2019 | Jun. 24, 2020 |
| 8 | Amplifier (18GHz-40GHz) | MITEQ | TTA1840-35-HG | 2034381 | Jun. 17, 2019 | Jun. 16, 2020 |
| 9 | Loop Antenna (9KHz-30MHz) | SCHWARZBECK | FMZB1519B | 014 | Jul. 02, 2019 | Jul. 01, 2020 |
| 10 | RF cables1 (9kHz-30MHz) | Huber+Suhnar | 9kHz-30MHz | B1702988-0008 | Jun. 25, 2019 | Jun. 24, 2020 |
| 11 | RF cables2 (30MHz-1GHz) | Huber+Suhnar | 30MHz-1GHz | 1486150 | Jun. 25, 2019 | Jun. 24, 2020 |
| 12 | RF cables3 (1GHz-40GHz) | Huber+Suhnar | 1GHz-40GHz | 1607106 | Jun. 25, 2019 | Jun. 24, 2020 |
| 13 | Power Metter | Keysight | E4419 | \ | Jun. 17, 2019 | Jun. 16, 2020 |
| 14 | Power Sensor (AV) | Keysight | E9 300A | \ | Jun. 17, 2019 | Jun. 16, 2020 |
| 15 | Signal Analyzer 20kHz-26.5GHz | KEYSIGHT | N9020A | MY49100060 | Jun. 13, 2019 | Jun. 12, 2020 |
| 16 | Spectrum Analyzer 9kHz-40GHz | Aglient | FSP40 | 100363 | Jun. 13, 2019 | Jun. 12, 2020 |
| 17 | D.C. Power Supply | LongWei | TPR-6405D | \ | \ | \ |
| 18 | Software | Frad | EZ-EMC | FA-03A2 RE | \ | \ |



3. EMC EMISSION TEST

3.1 RADIATED EMISSION MEASUREMENT

3.2.1 APPLICABLE STANDARD

According to FCC Part 15.407(d) and 15.209

3.2.2 CONFORMANCE LIMIT

According to FCC Part 15.407(b)(7): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
According to FCC Part 15.205, Restricted bands

| 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 | 10.6-12.7 |
| 6.26775-6.26825 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2690-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293 | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | (2) |
| 13.36-13.41 | | | |

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Restricted Frequency(MHz) | Field Strength (μV/m) | Field Strength (dBμV/m) | Measurement Distance |
|---------------------------|-----------------------|-------------------------|----------------------|
| 0.009~0.490 | 2400/F(KHz) | 20 log (uV/m) | 300 |
| 0.490~1.705 | 2400/F(KHz) | 20 log (uV/m) | 30 |
| 1.705~30.0 | 30 | 29.5 | 30 |
| 30-88 | 100 | 40 | 3 |
| 88-216 | 150 | 43.5 | 3 |
| 216-960 | 200 | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

Limits of Radiated Emission Measurement(Above 1000MHz)

| Frequency(MHz) | Class B (dBuV/m) (at 3M) | |
|----------------|--------------------------|---------|
| | PEAK | AVERAGE |
| Above 1000 | 74 | 54 |

Remark : 1. Emission level in dBuV/m=20 log (uV/m)

2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

3. Distance extrapolation factor =40log(Specific distance/ test distance)(dB);

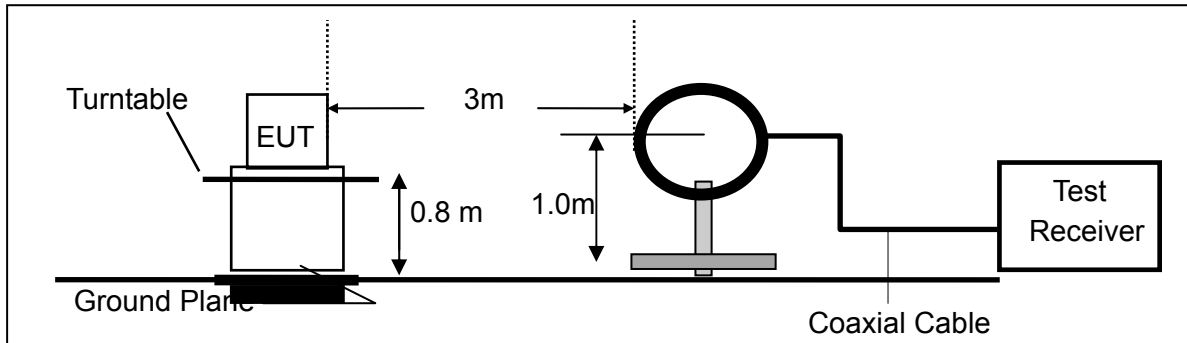
Limit line=Specific limits(dBuV) + distance extrapolation factor.

3.2.3 MEASURING INSTRUMENTS

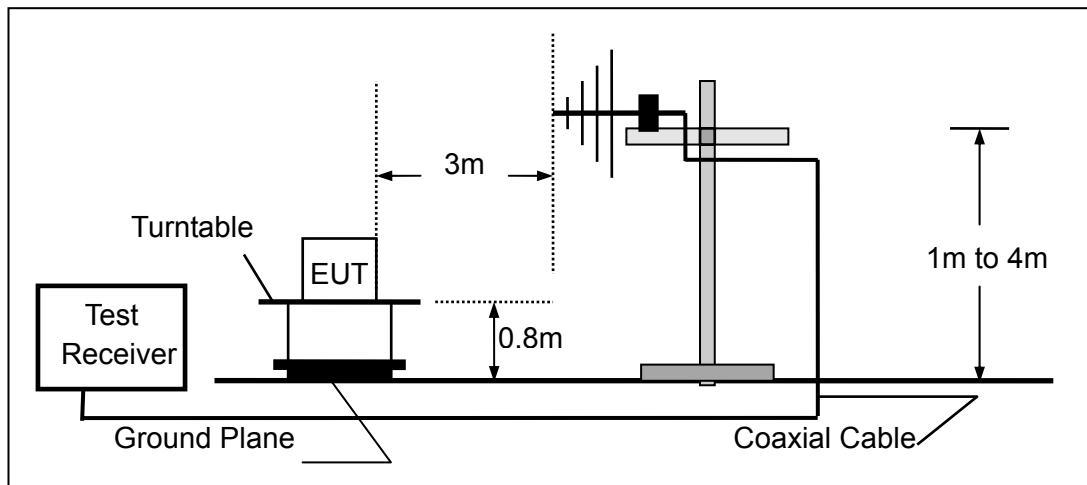
The Measuring equipment is listed in the section 6.3 of this test report.

3.2.4 TEST CONFIGURATION

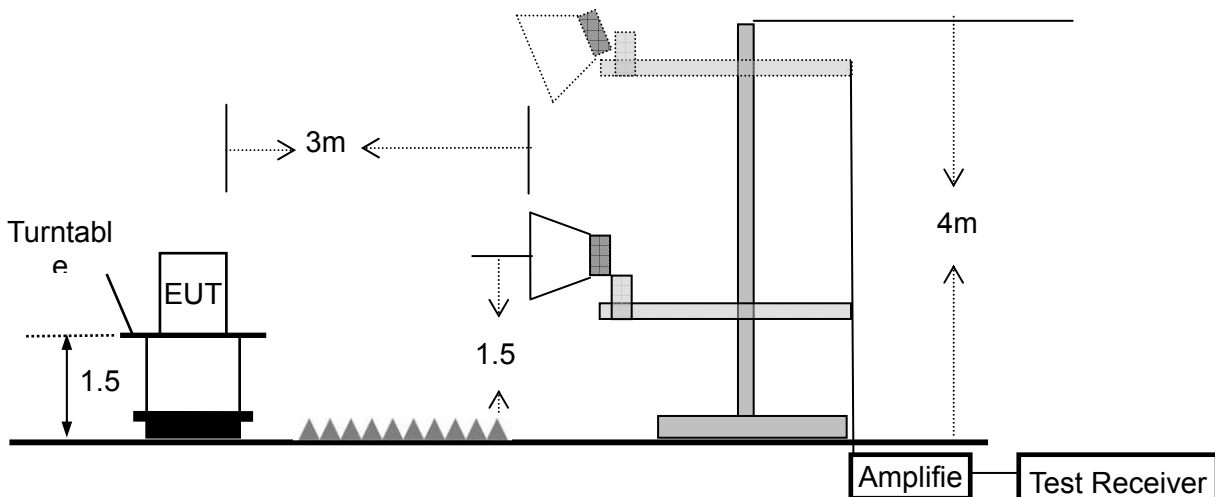
(a) For radiated emissions below 30MHz



(b) For radiated emissions from 30MHz to 1000MHz



(c) For radiated emissions above 1000MHz





3.2.5 TEST PROCEDURE

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10-2013. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT.

Use the following spectrum analyzer settings:

| Spectrum Parameter | Setting |
|---------------------------------------|--|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB (emission in restricted band) | 1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average |

| Receiver Parameter | Setting |
|------------------------|----------------------------------|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

- The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

| Frequency Band (MHz) | Function | Resolution bandwidth | Video Bandwidth |
|----------------------|----------|----------------------|-----------------|
| 30 to 1000 | QP | 120 kHz | 300 kHz |
| Above 1000 | Peak | 1 MHz | 1 MHz |
| | Average | 1 MHz | 10 Hz |

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where $RBWCF [dB] = 10 \cdot \lg(100 [kHz] / \text{narrower RBW} [kHz])$. , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.



3.2.6 TEST RESULTS (9KHZ – 30 MHZ)

| | | | |
|--------------|--------|--------------------|--------|
| Temperature: | 26℃ | Relative Humidity: | 54% |
| Pressure: | 101kPa | Test Voltage : | DC 12V |
| Test Mode : | Mode 5 | Polarization : | -- |

| Freq. | Reading | Limit | Margin | State |
|-------|----------|----------|--------|-------|
| (MHz) | (dBuV/m) | (dBuV/m) | (dB) | P/F |
| -- | -- | -- | -- | N/A |
| -- | -- | -- | -- | N/A |

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

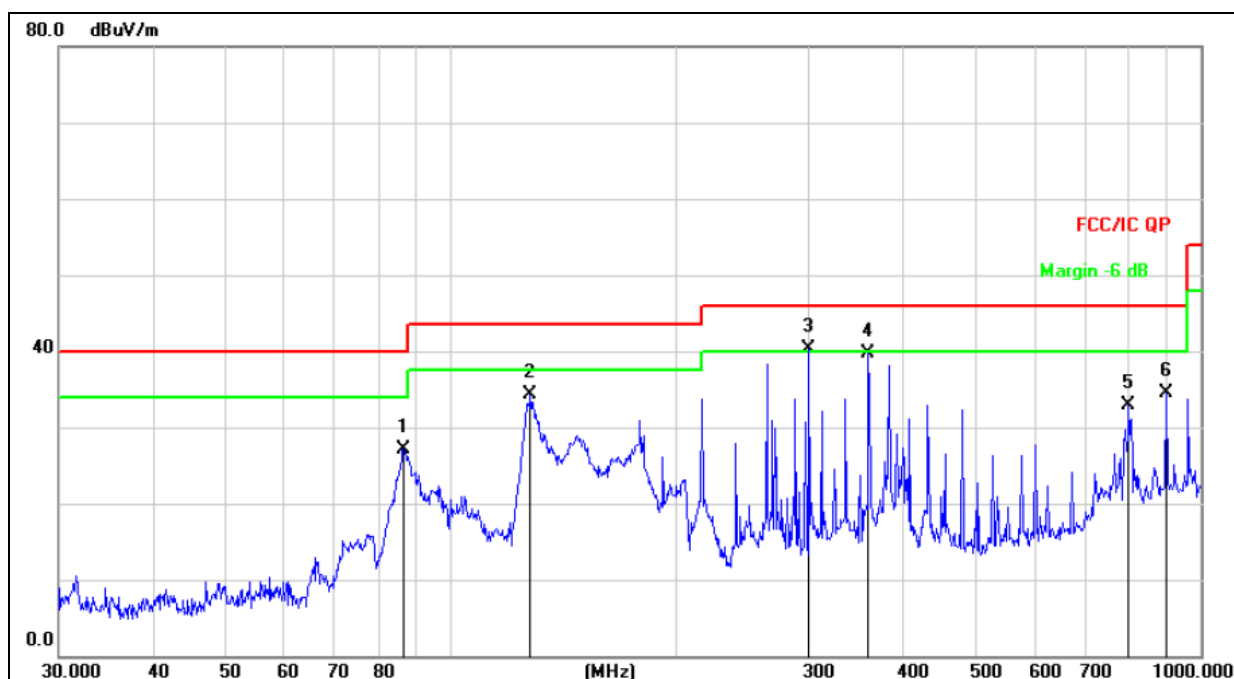
Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.



3.2.7 TEST RESULTS (30MHZ – 1GHZ)

| | | | |
|----------------|--------------|---------------------|------------|
| Temperature : | 26℃ | Relative Humidity : | 54% |
| Pressure : | 101 kPa | Polarization : | Horizontal |
| Test Voltage : | AC 120V/60Hz | | |
| Test Mode : | Mode 5 | | |



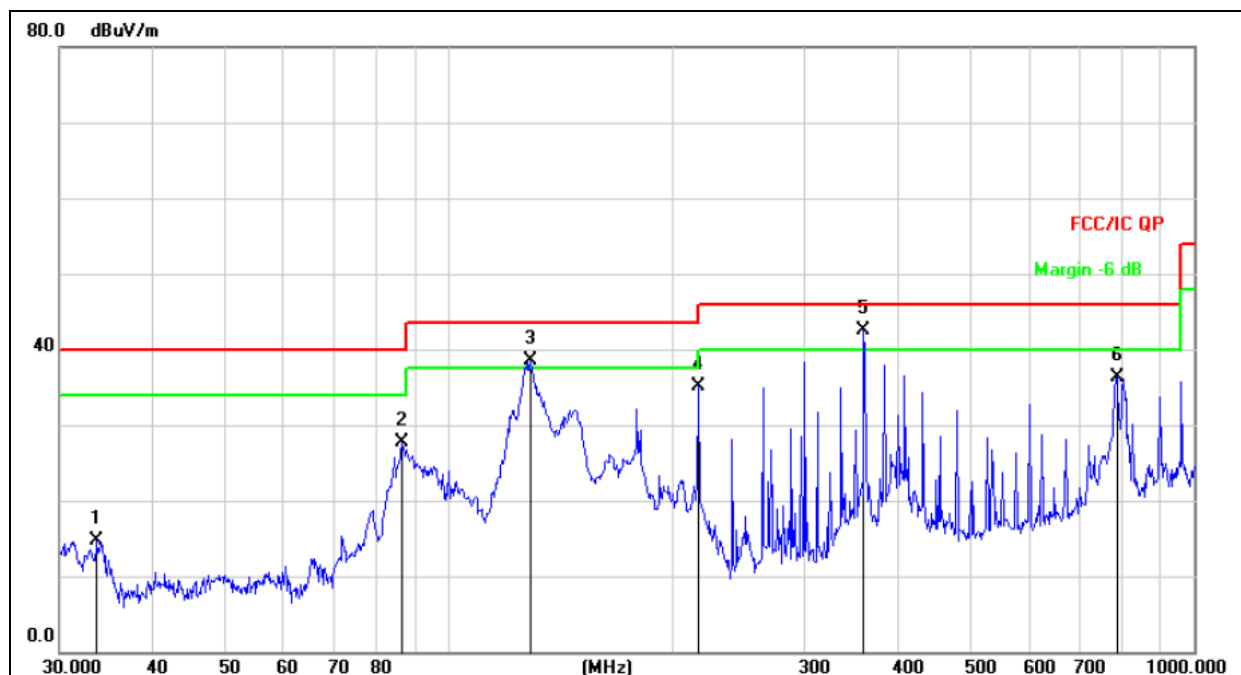
Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|-----|-----|----------|---------------|----------------|--------------|-------|--------|----------|
| | | MHz | dBuV | dB | dBuV/m | dB/m | dB | Detector |
| 1 | | 86.5029 | 45.99 | -18.91 | 27.08 | 40.00 | -12.92 | QP |
| 2 | | 127.6645 | 52.37 | -18.06 | 34.31 | 43.50 | -9.19 | QP |
| 3 | * | 300.3672 | 53.87 | -13.59 | 40.28 | 46.00 | -5.72 | QP |
| 4 | | 360.4476 | 51.78 | -11.99 | 39.79 | 46.00 | -6.21 | QP |
| 5 | | 801.7863 | 36.51 | -3.60 | 32.91 | 46.00 | -13.09 | QP |
| 6 | | 900.1474 | 36.01 | -1.50 | 34.51 | 46.00 | -11.49 | QP |



| | | | |
|----------------|--------------|---------------------|----------|
| Temperature : | 26℃ | Relative Humidity : | 54% |
| Pressure : | 101kPa | Polarization : | Vertical |
| Test Voltage : | AC 120V/60Hz | | |
| Test Mode : | Mode 5 | | |



Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dB/m | Over dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|---------------|------------|----------|
| 1 | | 33.6802 | 31.25 | -16.59 | 14.66 | 40.00 | -25.34 | QP |
| 2 | | 86.5029 | 46.52 | -18.91 | 27.61 | 40.00 | -12.39 | QP |
| 3 | ! | 128.5630 | 56.66 | -18.12 | 38.54 | 43.50 | -4.96 | QP |
| 4 | | 216.0240 | 51.07 | -15.93 | 35.14 | 46.00 | -10.86 | QP |
| 5 | * | 360.4476 | 54.55 | -11.99 | 42.56 | 46.00 | -3.44 | QP |
| 6 | | 787.8513 | 40.21 | -3.81 | 36.40 | 46.00 | -9.60 | QP |

Remark:

Test all the modes and only worst case was reported. The worst mode is U-NII-1 802.11a, Low Channel



3.2.8 TEST RESULTS (1GHz-40GHz)

| | |
|-------------|--------------------|
| Test Mode : | TX(5.2G) - 802.11a |
|-------------|--------------------|

| Polar | Frequency | Meter Reading | Cable loss | Antenna Factor | Preamp Factor | Emission Level | Limits | Margin | Detector Type |
|------------------------------------|-----------|---------------|------------|----------------|---------------|----------------|----------|--------|---------------|
| (H/V) | (MHz) | (dBuV) | (dB) | dB/m | (dB) | (dBuV/m) | (dBuV/m) | (dB) | |
| Low Channel (5180 MHz)-Above 1G | | | | | | | | | |
| Vertical | 4434.157 | 61.25 | 5.94 | 35.40 | 44.00 | 58.59 | 74.00 | -15.41 | Pk |
| Vertical | 4434.157 | 46.53 | 5.94 | 35.40 | 44.00 | 43.87 | 54.00 | -10.13 | AV |
| Vertical | 10370.362 | 59.24 | 8.46 | 39.75 | 44.50 | 62.95 | 74.00 | -11.05 | Pk |
| Vertical | 10370.362 | 42.92 | 8.46 | 39.75 | 44.50 | 46.63 | 54.00 | -7.37 | AV |
| Vertical | 15540.196 | 61.58 | 10.12 | 38.80 | 44.10 | 66.4 | 74.00 | -7.6 | Pk |
| Vertical | 15540.196 | 37.02 | 10.12 | 38.80 | 42.70 | 43.24 | 54.00 | -10.76 | AV |
| Horizontal | 4434.521 | 66.14 | 5.94 | 35.18 | 44.00 | 63.26 | 74.00 | -10.74 | Pk |
| Horizontal | 4434.521 | 44.23 | 5.94 | 35.18 | 44.00 | 41.35 | 54.00 | -12.65 | AV |
| Horizontal | 10370.623 | 58.74 | 8.46 | 38.71 | 44.50 | 61.41 | 74.00 | -12.59 | Pk |
| Horizontal | 10370.623 | 41.11 | 8.46 | 38.71 | 44.50 | 43.78 | 54.00 | -10.22 | AV |
| Horizontal | 10540.865 | 56.37 | 10.12 | 38.38 | 44.10 | 60.77 | 74.00 | -13.23 | Pk |
| Horizontal | 10540.865 | 38.58 | 10.12 | 38.38 | 44.10 | 42.98 | 54.00 | -11.02 | AV |
| middle Channel (5200 MHz)-Above 1G | | | | | | | | | |
| Vertical | 4592.093 | 60.55 | 6.48 | 36.35 | 44.05 | 59.33 | 74.00 | -14.67 | Pk |
| Vertical | 4592.093 | 41.96 | 6.48 | 36.35 | 44.05 | 40.74 | 54.00 | -13.26 | AV |
| Vertical | 10401.424 | 59.41 | 8.47 | 37.88 | 44.51 | 61.25 | 74.00 | -12.75 | Pk |
| Vertical | 10401.424 | 42.27 | 8.47 | 37.88 | 44.51 | 44.11 | 54.00 | -9.89 | AV |
| Vertical | 15600.218 | 56.51 | 10.12 | 38.8 | 44.10 | 61.33 | 74.00 | -12.67 | Pk |
| Vertical | 15600.218 | 36.65 | 10.12 | 38.8 | 42.70 | 42.87 | 54.00 | -11.13 | AV |
| Horizontal | 4592.691 | 59.23 | 6.48 | 36.37 | 44.05 | 58.03 | 74.00 | -15.97 | Pk |
| Horizontal | 4592.691 | 43.15 | 6.48 | 36.37 | 44.05 | 41.95 | 54.00 | -12.05 | AV |
| Horizontal | 10400.114 | 58.33 | 8.47 | 38.64 | 44.50 | 60.94 | 74.00 | -13.06 | Pk |
| Horizontal | 10400.114 | 42.12 | 8.47 | 38.64 | 44.50 | 44.73 | 54.00 | -9.27 | AV |
| Horizontal | 15600.187 | 59.63 | 10.12 | 38.38 | 44.10 | 64.03 | 74.00 | -9.97 | Pk |
| Horizontal | 15600.187 | 38.42 | 10.12 | 38.38 | 44.10 | 42.82 | 54.00 | -11.18 | AV |
| High Channel (5240 MHz)-Above 1G | | | | | | | | | |
| Vertical | 4739.246 | 60.25 | 7.10 | 37.24 | 43.50 | 61.09 | 74.00 | -12.91 | Pk |
| Vertical | 4739.246 | 44.69 | 7.10 | 37.24 | 43.50 | 45.53 | 54.00 | -8.47 | AV |
| Vertical | 10480.371 | 60.52 | 8.46 | 37.68 | 44.50 | 62.16 | 74.00 | -11.84 | Pk |
| Vertical | 10480.371 | 40.31 | 8.46 | 37.68 | 44.50 | 41.95 | 54.00 | -12.05 | AV |
| Vertical | 15720.359 | 61.23 | 10.12 | 38.8 | 44.10 | 66.05 | 74.00 | -7.95 | Pk |
| Vertical | 15720.359 | 39.41 | 10.12 | 38.8 | 42.70 | 45.63 | 54.00 | -8.37 | AV |
| Horizontal | 4739.352 | 59.33 | 7.10 | 37.24 | 43.50 | 60.17 | 74.00 | -13.83 | Pk |
| Horizontal | 4739.352 | 43.21 | 7.10 | 37.24 | 43.50 | 44.05 | 54.00 | -9.95 | AV |
| Horizontal | 10481.111 | 61.62 | 8.46 | 38.57 | 44.50 | 64.15 | 74.00 | -9.85 | Pk |
| Horizontal | 10481.111 | 43.45 | 8.46 | 38.57 | 44.50 | 45.98 | 54.00 | -8.02 | AV |
| Horizontal | 15720.357 | 60.18 | 10.12 | 38.38 | 44.10 | 64.58 | 74.00 | -9.42 | Pk |
| Horizontal | 15720.357 | 42.23 | 10.12 | 38.38 | 44.10 | 46.63 | 54.00 | -7.37 | AV |

Note:"802.11a(5G)" mode is the worst mode.

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



| | |
|-------------|----------------------|
| Test Mode : | TX (5.8G) -- 802.11a |
|-------------|----------------------|

| Polar | Frequency | Meter Reading | Cable loss | Antenna Factor | Preamplifier Factor | Emission Level | Limits | Margin | Detector Type |
|------------------------------------|-----------|---------------|------------|----------------|---------------------|----------------|----------|--------|---------------|
| (H/V) | (MHz) | (dBuV) | (dB) | dB/m | (dB) | (dBuV/m) | (dBuV/m) | (dB) | |
| Low Channel (5745 MHz)-Above 1G | | | | | | | | | |
| Vertical | 4679.195 | 59.88 | 5.94 | 35.40 | 44.00 | 57.22 | 74.00 | -16.78 | Pk |
| Vertical | 4679.195 | 39.45 | 5.94 | 35.40 | 44.00 | 36.79 | 54.00 | -17.21 | AV |
| Vertical | 11490.364 | 59.36 | 8.46 | 39.75 | 44.50 | 63.07 | 74.00 | -10.93 | Pk |
| Vertical | 11490.364 | 42.54 | 8.46 | 39.75 | 44.50 | 46.25 | 54.00 | -7.75 | AV |
| Vertical | 17235.101 | 55.36 | 10.12 | 38.80 | 44.10 | 60.18 | 74.00 | -13.82 | Pk |
| Vertical | 17235.101 | 38.35 | 10.12 | 38.80 | 42.70 | 44.57 | 54.00 | -9.43 | AV |
| Horizontal | 4679.332 | 57.64 | 5.94 | 35.18 | 44.00 | 54.76 | 74.00 | -19.24 | Pk |
| Horizontal | 4679.332 | 44.28 | 5.94 | 35.18 | 44.00 | 41.4 | 54.00 | -12.6 | AV |
| Horizontal | 11490.164 | 56.51 | 8.46 | 38.71 | 44.50 | 59.18 | 74.00 | -14.82 | Pk |
| Horizontal | 11490.164 | 40.19 | 8.46 | 38.71 | 44.50 | 42.86 | 54.00 | -11.14 | AV |
| Horizontal | 17235.196 | 58.52 | 10.12 | 38.38 | 44.10 | 62.92 | 74.00 | -11.08 | Pk |
| Horizontal | 17235.196 | 42.31 | 10.12 | 38.38 | 44.10 | 46.71 | 54.00 | -7.29 | AV |
| middle Channel (5785 MHz)-Above 1G | | | | | | | | | |
| Vertical | 4592.228 | 59.58 | 6.48 | 36.35 | 44.05 | 58.36 | 74.00 | -15.64 | Pk |
| Vertical | 4592.228 | 43.37 | 6.48 | 36.35 | 44.05 | 42.15 | 54.00 | -11.85 | AV |
| Vertical | 11570.203 | 61.05 | 8.47 | 37.88 | 44.51 | 62.89 | 74.00 | -11.11 | Pk |
| Vertical | 11570.203 | 43.66 | 8.47 | 37.88 | 44.51 | 45.5 | 54.00 | -8.5 | AV |
| Vertical | 17355.147 | 59.24 | 10.12 | 38.8 | 44.10 | 64.06 | 74.00 | -9.94 | Pk |
| Vertical | 17355.147 | 42.47 | 10.12 | 38.8 | 42.70 | 48.69 | 54.00 | -5.31 | AV |
| Horizontal | 4592.526 | 58.61 | 6.48 | 36.37 | 44.05 | 57.41 | 74.00 | -16.59 | Pk |
| Horizontal | 4592.526 | 43.27 | 6.48 | 36.37 | 44.05 | 42.07 | 54.00 | -11.93 | AV |
| Horizontal | 11570.123 | 60.18 | 8.47 | 38.64 | 44.50 | 62.79 | 74.00 | -11.21 | Pk |
| Horizontal | 11570.123 | 42.29 | 8.47 | 38.64 | 44.50 | 44.9 | 54.00 | -9.1 | AV |
| Horizontal | 17355.269 | 57.62 | 10.12 | 38.38 | 44.10 | 62.02 | 74.00 | -11.98 | Pk |
| Horizontal | 17355.269 | 42.34 | 10.12 | 38.38 | 44.10 | 46.74 | 54.00 | -7.26 | AV |
| High Channel (5825 MHz)-Above 1G | | | | | | | | | |
| Vertical | 6039.199 | 57.21 | 7.10 | 37.24 | 43.50 | 58.05 | 74.00 | -15.95 | Pk |
| Vertical | 6039.199 | 42.54 | 7.10 | 37.24 | 43.50 | 43.38 | 54.00 | -10.62 | AV |
| Vertical | 11652.562 | 58.35 | 8.46 | 37.68 | 44.50 | 59.99 | 74.00 | -14.01 | Pk |
| Vertical | 11652.562 | 41.19 | 8.46 | 37.68 | 44.50 | 42.83 | 54.00 | -11.17 | AV |
| Vertical | 17473.128 | 58.54 | 10.12 | 38.8 | 44.10 | 63.36 | 74.00 | -10.64 | Pk |
| Vertical | 17473.128 | 40.34 | 10.12 | 38.8 | 42.70 | 46.56 | 54.00 | -7.44 | AV |
| Horizontal | 6039.232 | 59.63 | 7.10 | 37.24 | 43.50 | 60.47 | 74.00 | -13.53 | Pk |
| Horizontal | 6039.232 | 43.38 | 7.10 | 37.24 | 43.50 | 44.22 | 54.00 | -9.78 | AV |
| Horizontal | 11652.319 | 52.23 | 8.46 | 38.57 | 44.50 | 54.76 | 74.00 | -19.24 | Pk |
| Horizontal | 11652.319 | 40.47 | 8.46 | 38.57 | 44.50 | 43 | 54.00 | -11 | AV |
| Horizontal | 17474.062 | 57.43 | 10.12 | 38.38 | 44.10 | 61.83 | 74.00 | -12.17 | Pk |
| Horizontal | 17474.062 | 40.15 | 10.12 | 38.38 | 44.10 | 44.55 | 54.00 | -9.45 | AV |

Note:"802.11a(5G)" mode is the worst mode. PK value is lower than the Average value limit, So average didn't record.

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value

has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

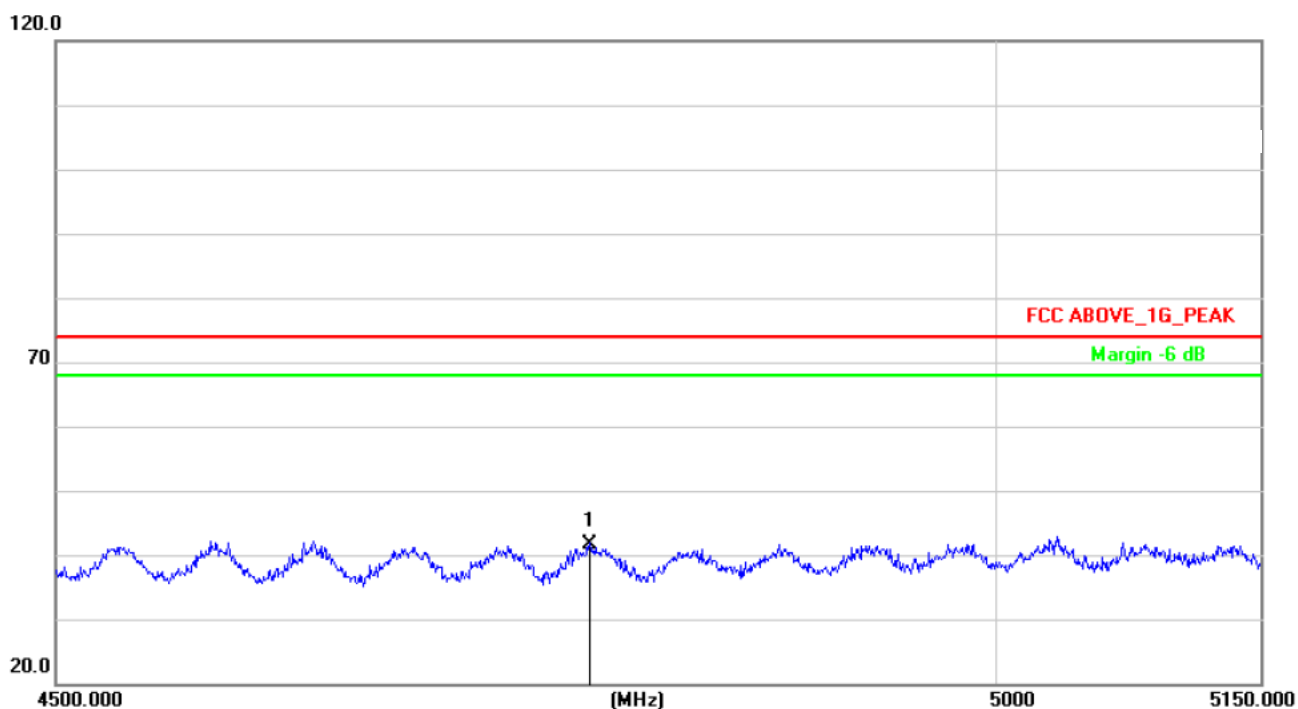
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamplifier Factor = Level.



Radiated bandedge

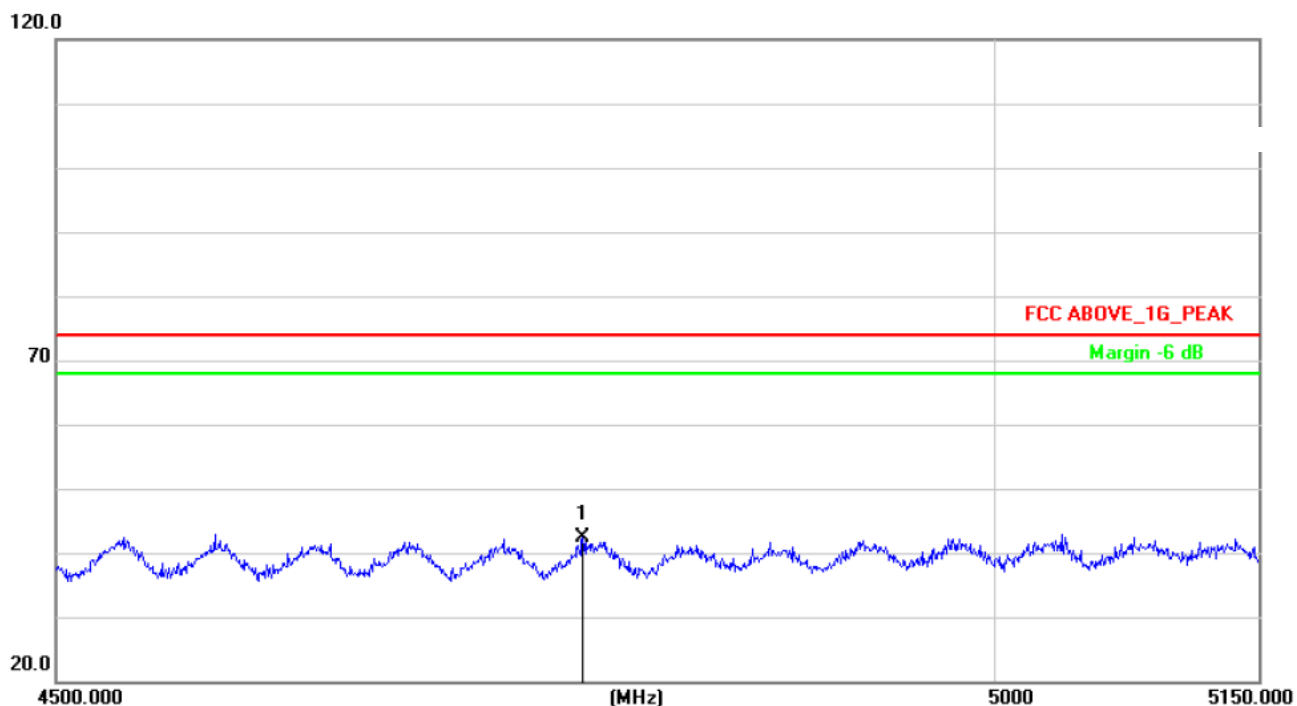
802.11 a

For the frequency band 5150-5250MHz

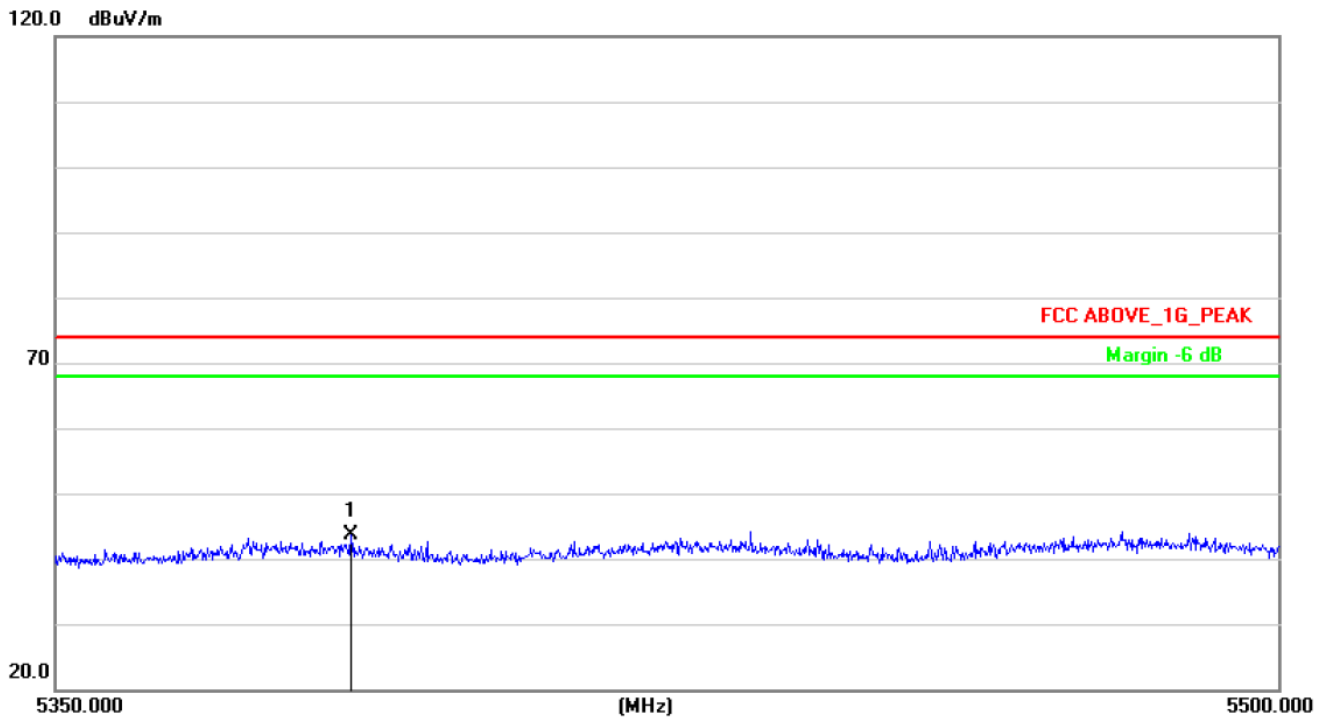


| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type | Polarization |
|-----------|---------------|--------|----------------|----------|--------|---------------|--------------|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | | |
| 4776.520 | 42.42 | -0.45 | 41.97 | 74.00 | -32.03 | PK | Horizontal |

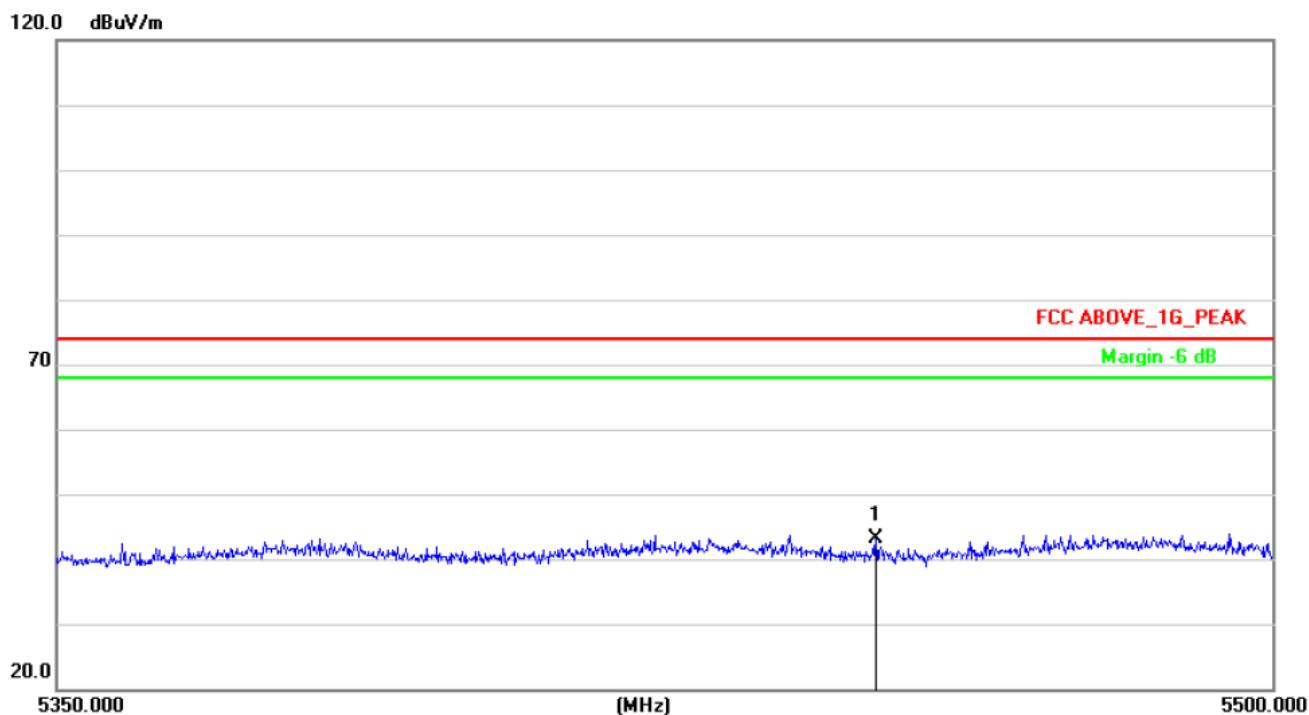
Remark:
Factor = Antenna Factor + Correct Factor. Correct Factor= Cable Loss – Pre-amplifier



| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type | Polarization |
|---|---------------|--------|----------------|----------|--------|---------------|--------------|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | | |
| 4775.500 | 42.86 | -0.45 | 42.41 | 74.00 | -31.59 | PK | Vertical |
| Remark: Factor = Antenna Factor + Correct Factor. Correct Factor= Cable Loss – Pre-amplifier | | | | | | | |



| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type | Polarization |
|---|---------------|--------|----------------|----------------|--------|---------------|--------------|
| (MHz) | (dB μ V) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | | |
| 5390.000 | 42.52 | 1.35 | 43.87 | 74.00 | -30.13 | PK | Horizontal |
| Remark: Factor = Antenna Factor + Correct Factor. Correct Factor= Cable Loss – Pre-amplifier | | | | | | | |



| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type | Polarization |
|---|---------------|--------|----------------|----------------|--------|---------------|--------------|
| (MHz) | (dB μ V) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | | |
| 5449.245 | 41.53 | 1.63 | 42.99 | 74.00 | -31.01 | PK | Vertical |
| Remark: Factor = Antenna Factor + Correct Factor. Correct Factor= Cable Loss – Pre-amplifier | | | | | | | |

Note:

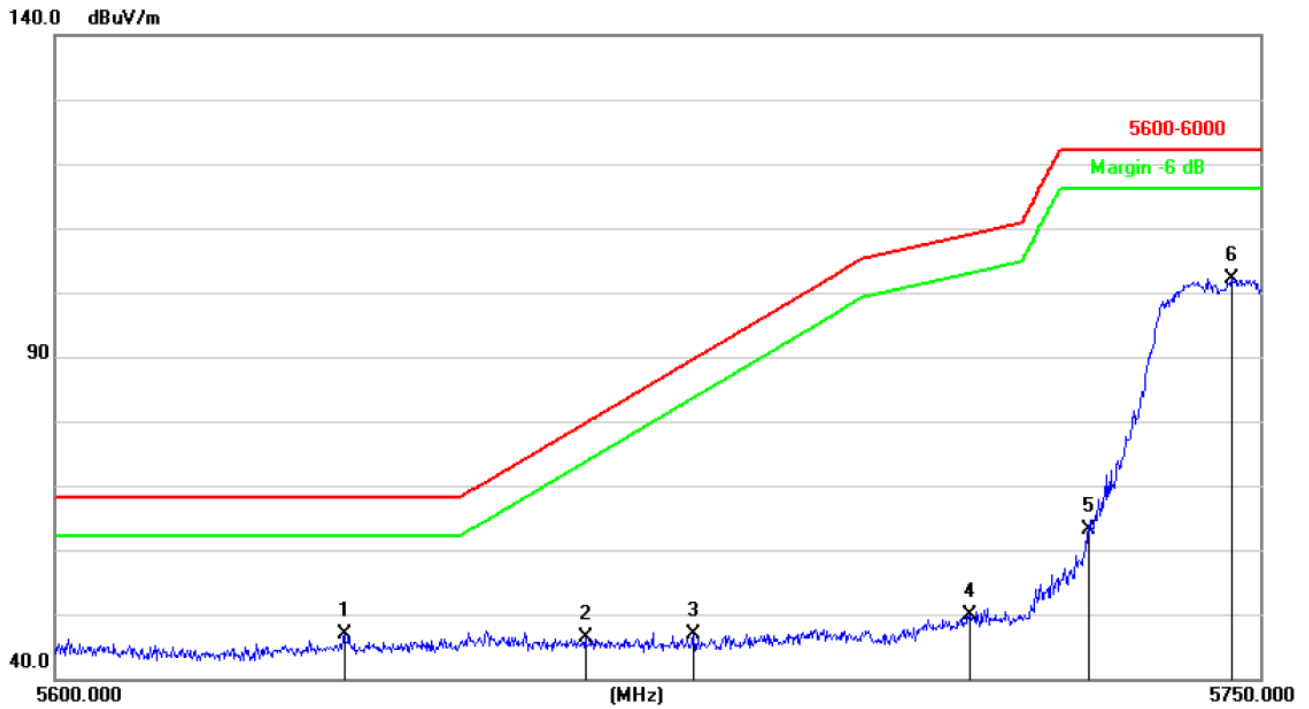
1. This EUT was tested in 802.11a/n(HT20), n(HT40), ac80 mode and 802.11a the worst case position data was reported.



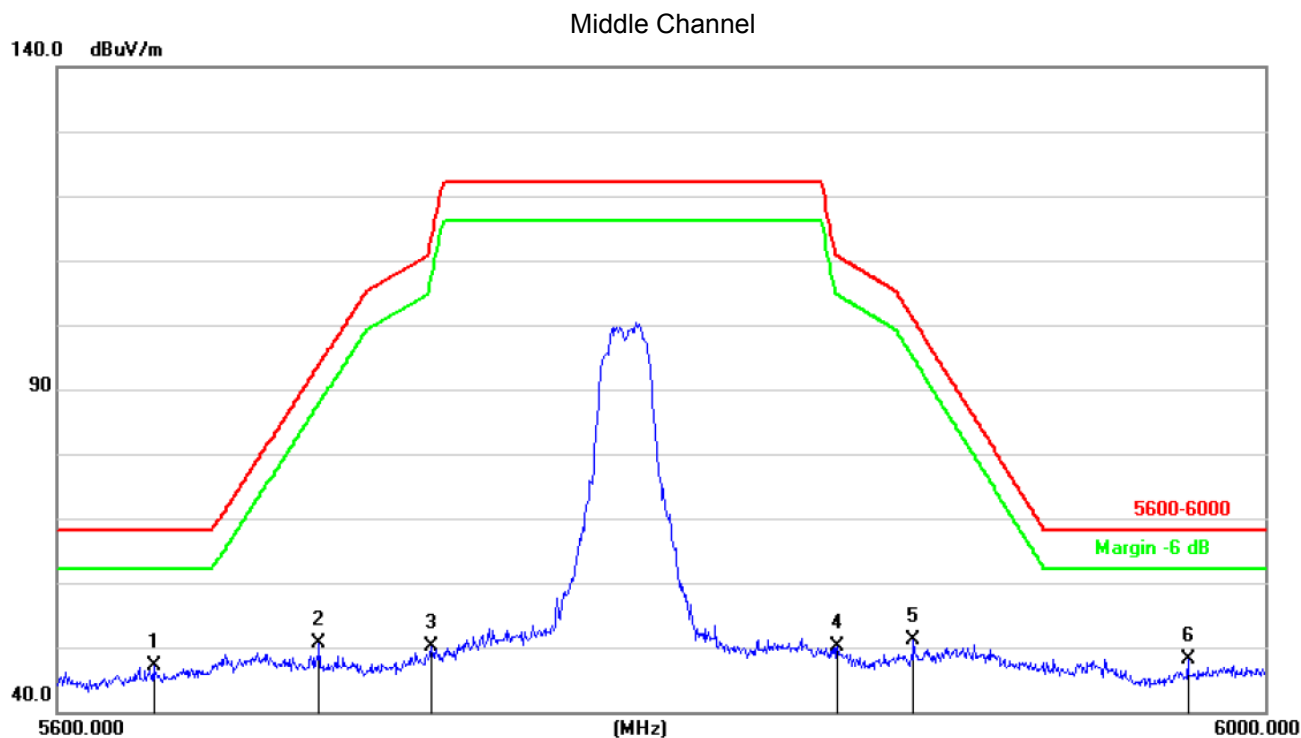
802.11n(HT20)

For the frequency band 5725-5850MHz

Low Channel



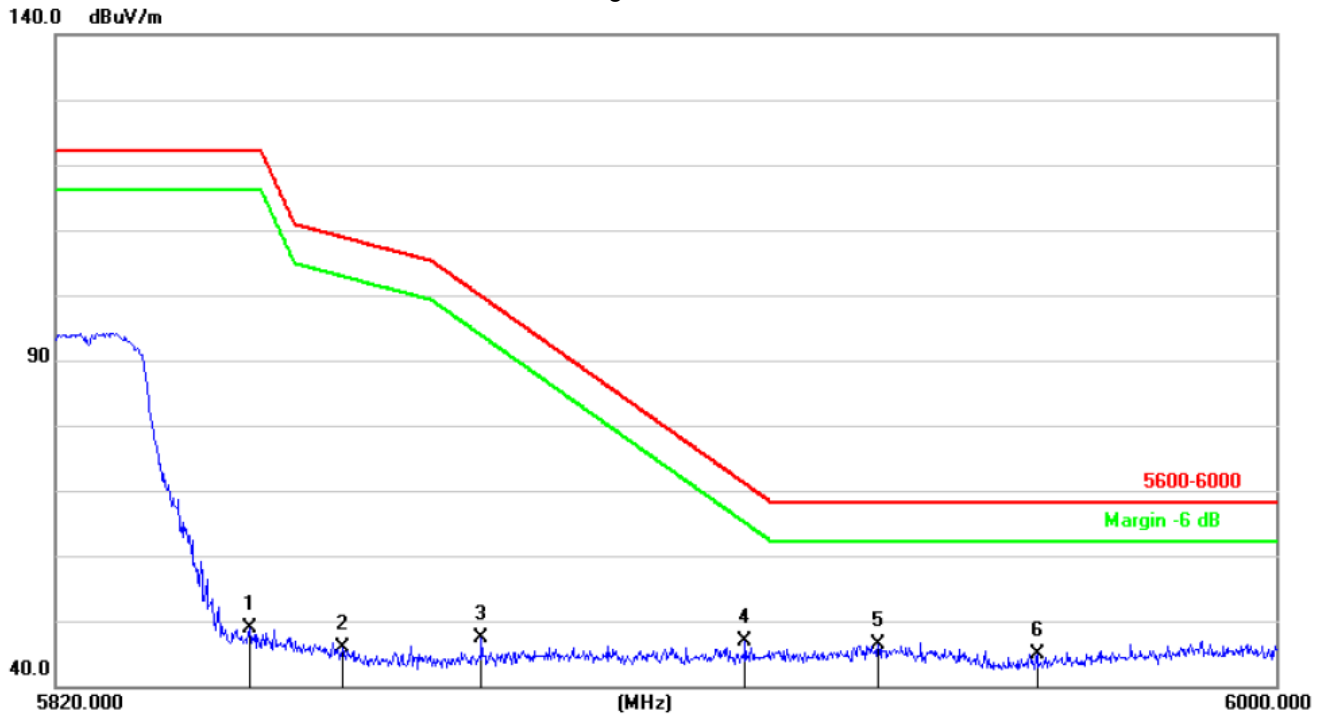
| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|-----|-----------|----------|--------------|----------|----------|--------|--------|
| | (MHz) | (dBuV/m) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 5635.700 | 44.55 | 2.41 | 46.96 | 68.20 | -21.24 | peak |
| 2 | 5665.550 | 43.83 | 2.54 | 46.37 | 79.74 | -33.37 | peak |
| 3 | 5679.050 | 44.38 | 2.60 | 46.98 | 89.74 | -42.76 | peak |
| 4 | 5713.550 | 47.14 | 2.74 | 49.88 | 109.00 | -59.12 | peak |
| 5 | 5728.550 | 60.29 | 2.81 | 63.10 | 122.20 | -59.10 | peak |
| 6 | 5746.400 | 99.15 | 2.88 | 102.03 | 122.20 | -20.17 | peak |



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1 | 5631.200 | 44.63 | 2.39 | 47.02 | 68.20 | -21.18 | peak |
| 2 | 5684.800 | 47.95 | 2.62 | 50.57 | 93.99 | -43.42 | peak |
| 3 | 5721.200 | 47.41 | 2.78 | 50.19 | 113.54 | -63.35 | peak |
| 4 | 5855.600 | 46.69 | 3.35 | 50.04 | 110.63 | -60.59 | peak |
| 5 | 5880.800 | 47.67 | 3.45 | 51.12 | 100.89 | -49.77 | peak |
| 6 | 5973.600 | 44.18 | 3.85 | 48.03 | 68.20 | -20.17 | peak |



High Channel



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-------------------------|--------------------|-------------------|----------------|--------|
| 1 | 5848.260 | 45.52 | 3.32 | 48.84 | 122.20 | -73.36 | peak |
| 2 | 5861.940 | 42.57 | 3.37 | 45.94 | 108.85 | -62.91 | peak |
| 3 | 5882.280 | 43.98 | 3.46 | 47.44 | 99.79 | -52.35 | peak |
| 4 | 5921.160 | 43.16 | 3.62 | 46.78 | 71.03 | -24.25 | peak |
| 5 | 5940.780 | 42.69 | 3.71 | 46.40 | 68.20 | -21.80 | peak |
| 6 | 5964.360 | 41.16 | 3.81 | 44.97 | 68.20 | -23.23 | peak |

Note:

1. This EUT was tested in 802.11a/n(HT20), n(HT40), ac(HT80) mode and 802.11n(HT20) the worst case position data was reported.



4.SPURIOUS RF CONDUCTED EMISSIONS

4.1CONFORMANCE LIMIT

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

4.2MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 6.3 of this test report.

4.3TEST SETUP

Please refer to Section 6.1 of this test report.

4.4TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBW= 300KHz to measure the peak field strength , and measure frequency range from 9KHz to 26.5GHz.

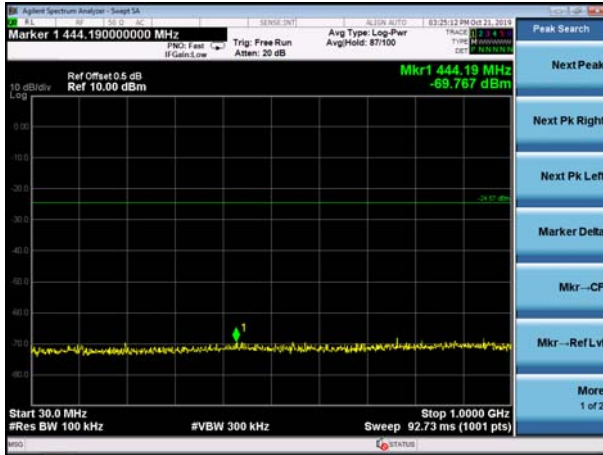
4.5TEST RESULTS



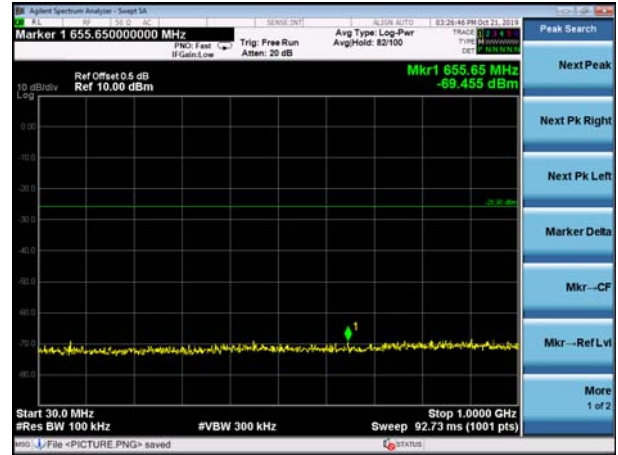
5.2G

Test Plot

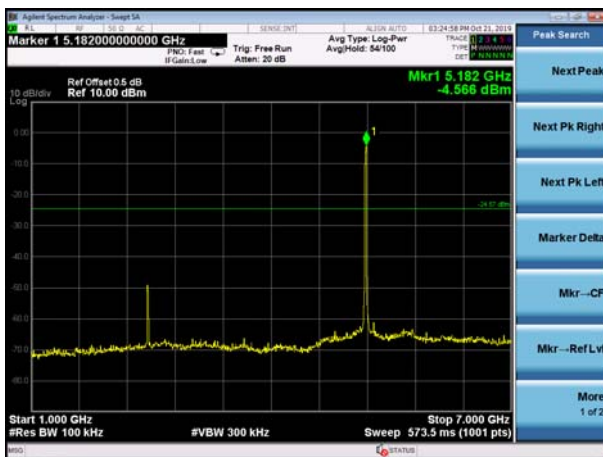
802.11a channel 36



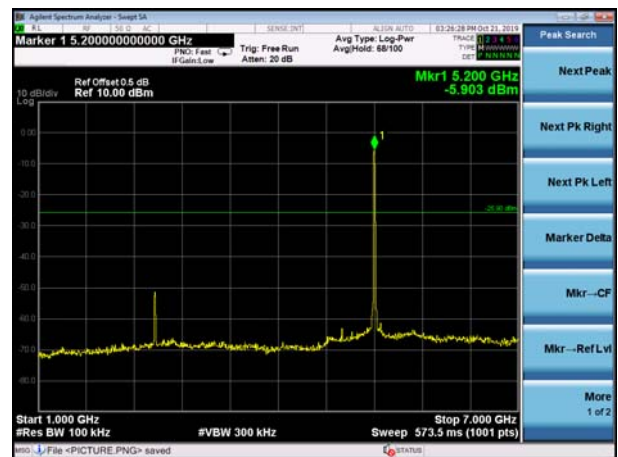
802.11a channel 40



802.11a channel 36



802.11a channel 40



802.11a channel 36



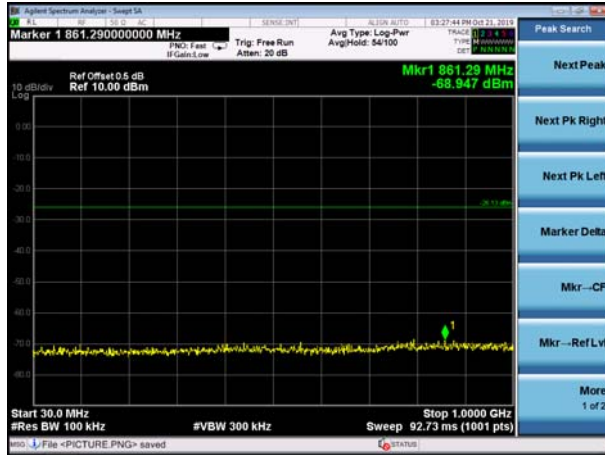
802.11a channel 40



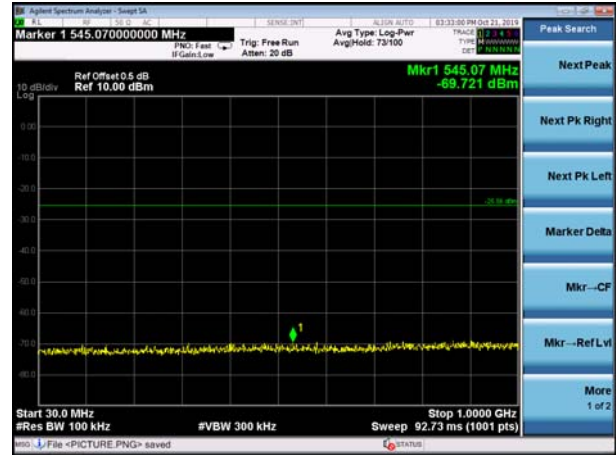


Test Plot

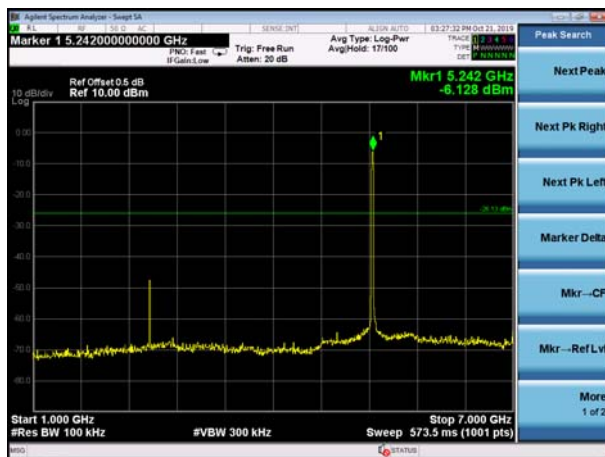
802.11a channel 48



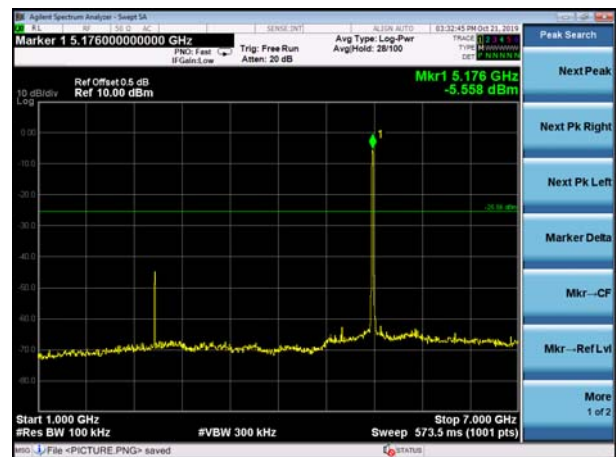
802.11n20 channel 36



802.11a channel 48



802.11n20 channel 36



802.11a channel 48



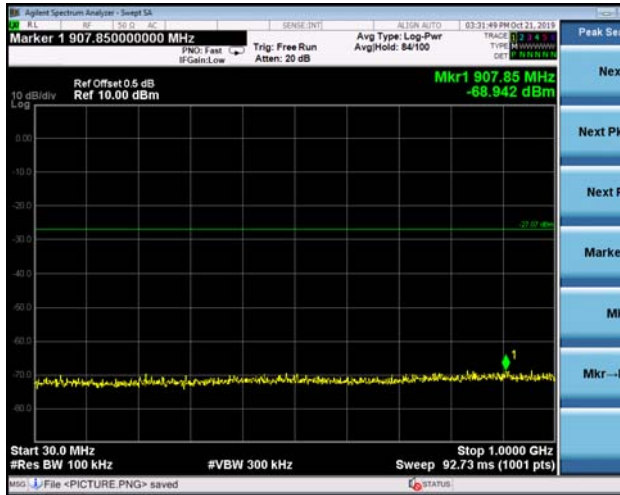
802.11n20 channel 36



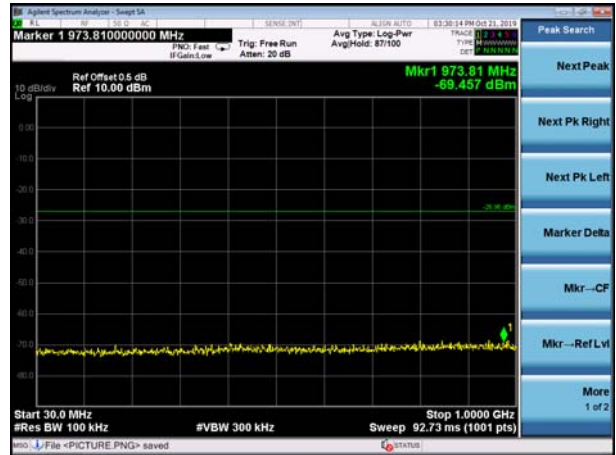


Test Plot

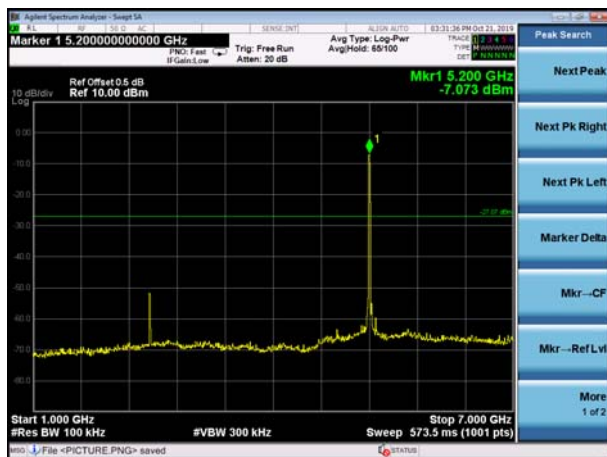
802.11n20 channel 40



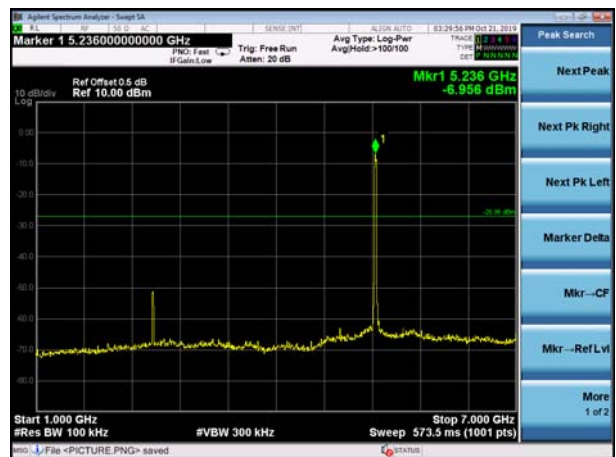
802.11n20 channel 48



802.11n20 channel 40



802.11n20 channel 48



802.11n20 channel 40



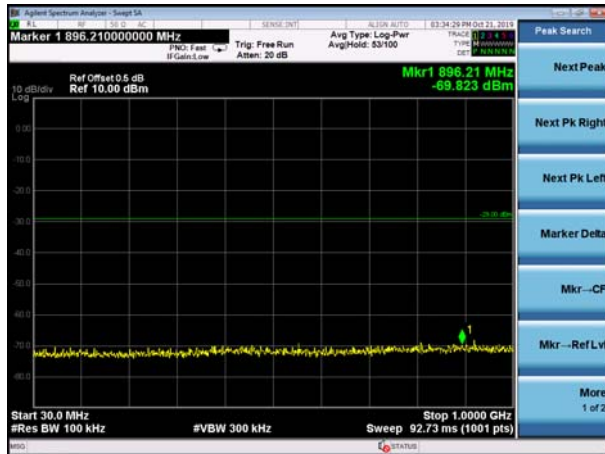
802.11n20 channel 48



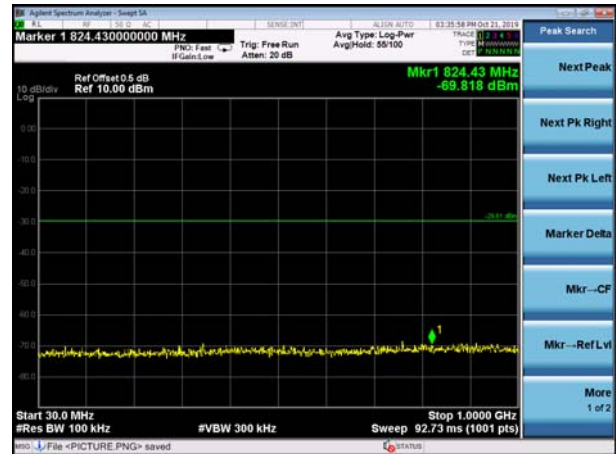


Test Plot

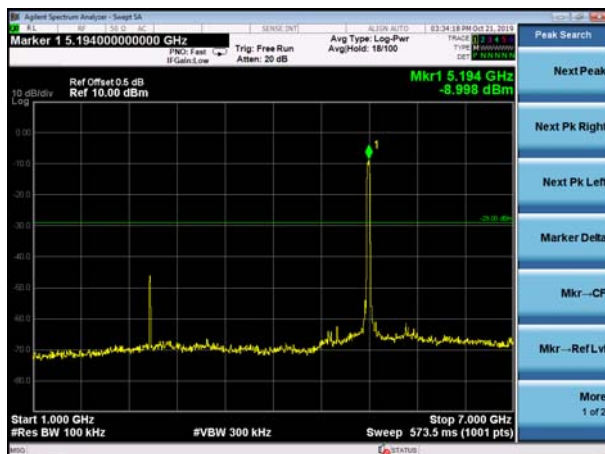
802.11n40 channel 38



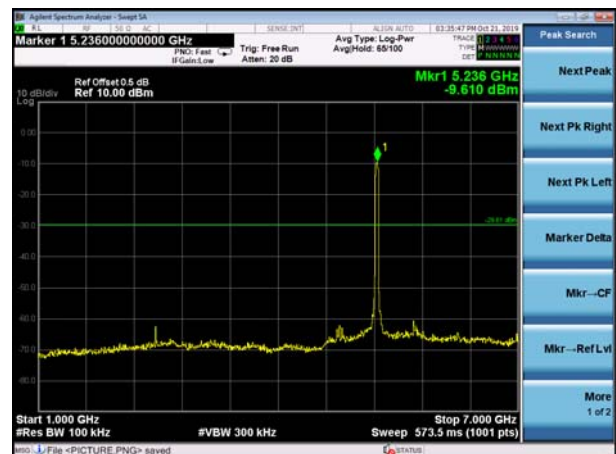
802.11n40 channel 46



802.11n40 channel 38



802.11n40 channel 46



802.11n40 channel 38



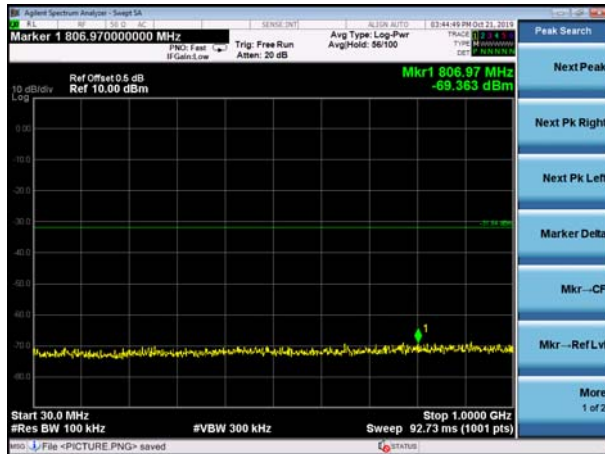
802.11n40 channel 46



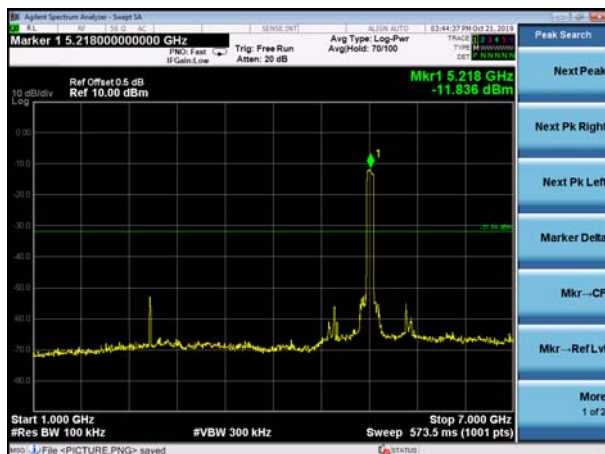


Test Plot

802.11ac80 on channel 42



802.11 ac80 on channel 42



802.11 ac80 on channel 42

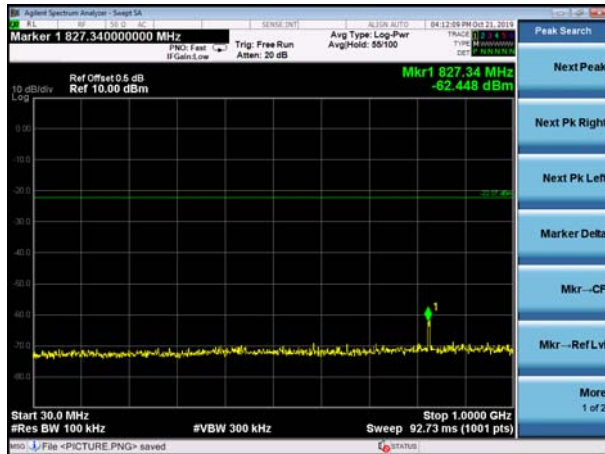




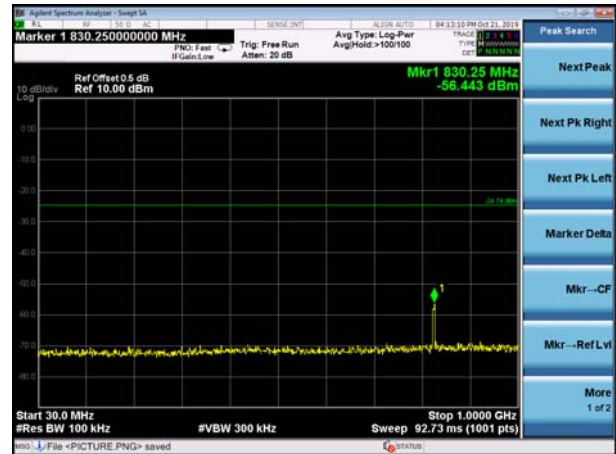
5.8G

Test Plot

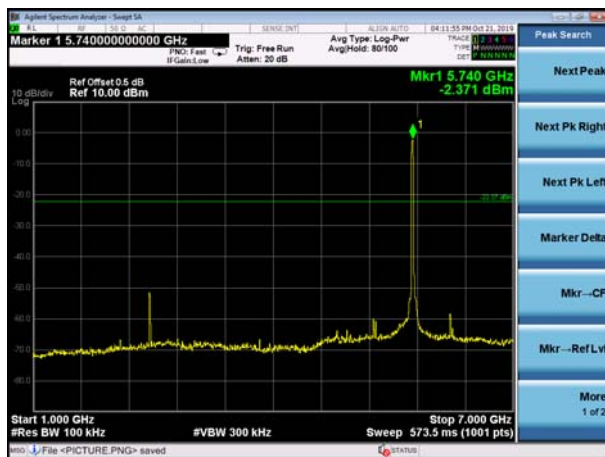
802.11a channel 149



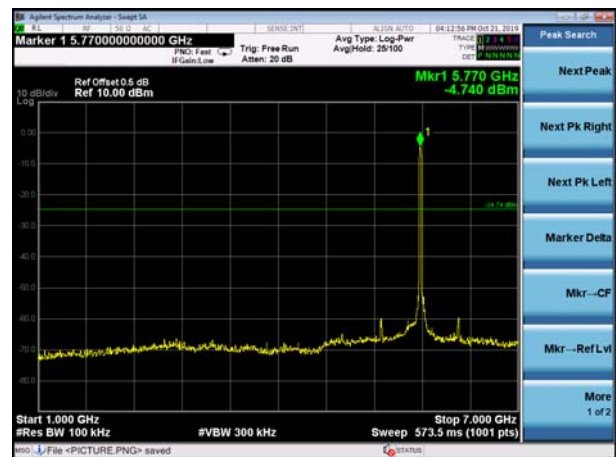
802.11a channel 157



802.11a channel 149



802.11a channel 157



802.11a channel 149



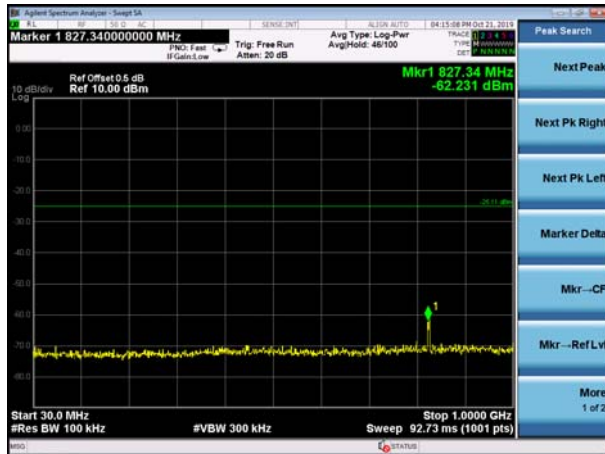
802.11a channel 157



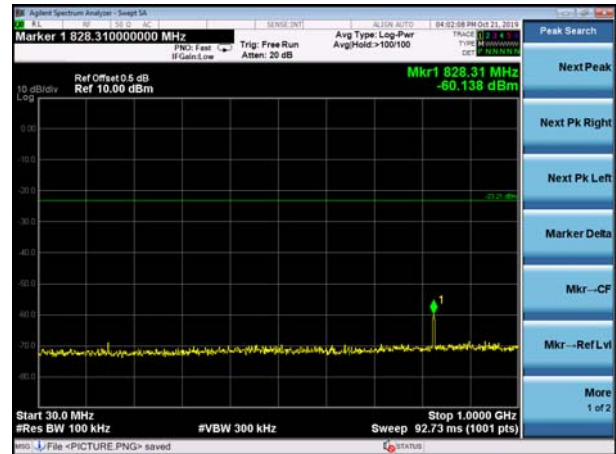


Test Plot

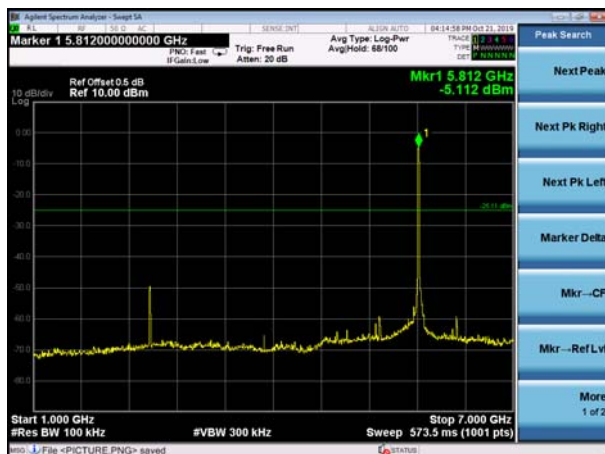
802.11a channel 165



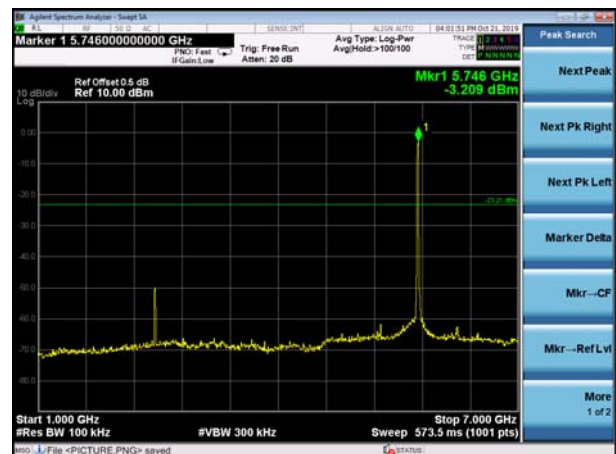
802.11n20 channel 149



802.11a channel 165



802.11n20 channel 149



802.11a channel 165



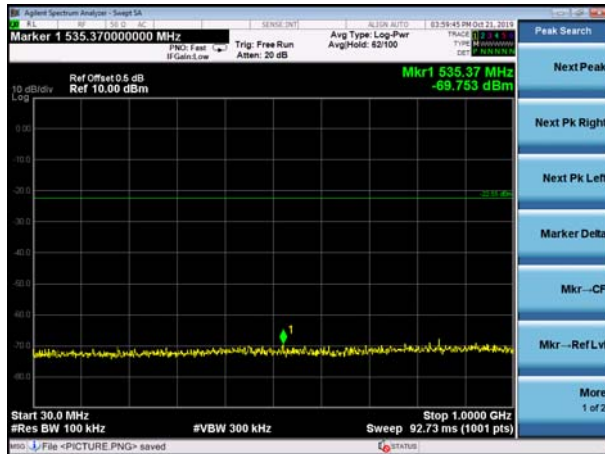
802.11n20 channel 149



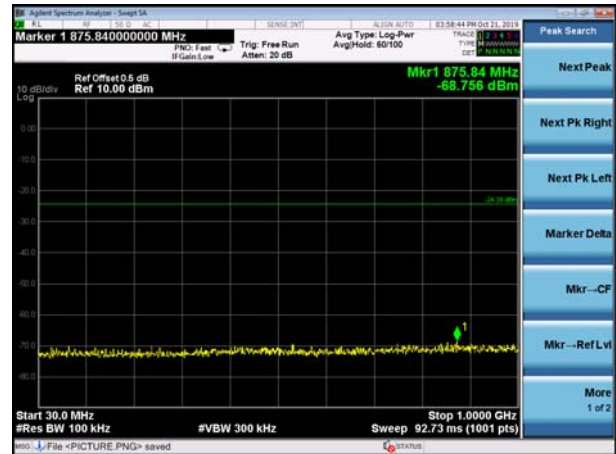


Test Plot

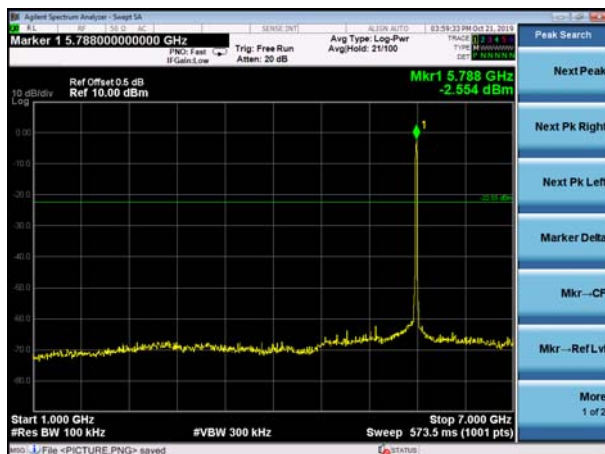
802.11n20 channel 157



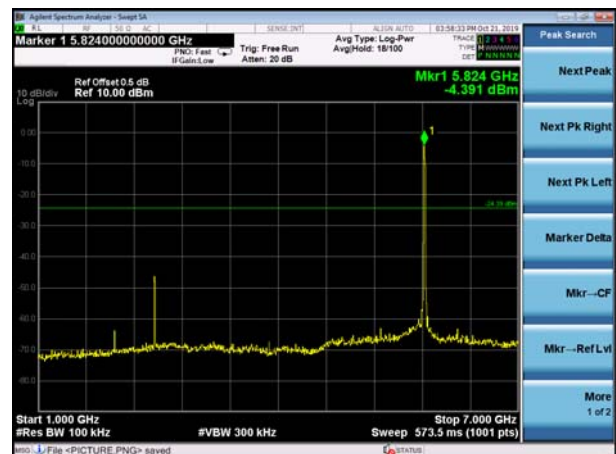
802.11n20 channel 165



802.11n20 channel 157



802.11n20 channel 165



802.11n20 channel 157



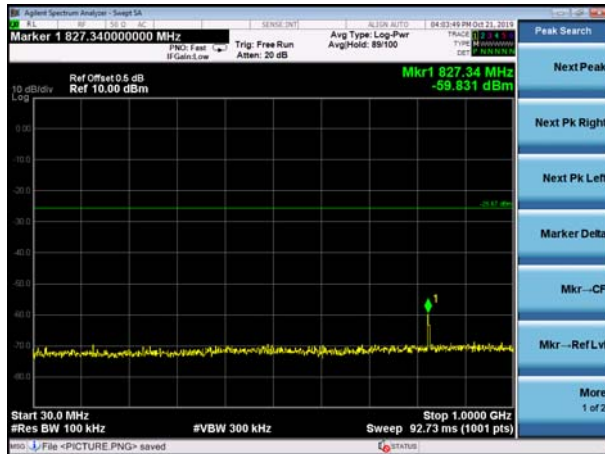
802.11n20 channel 165



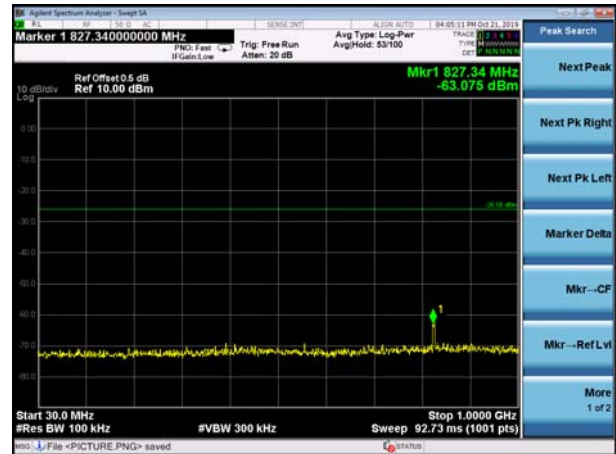


Test Plot

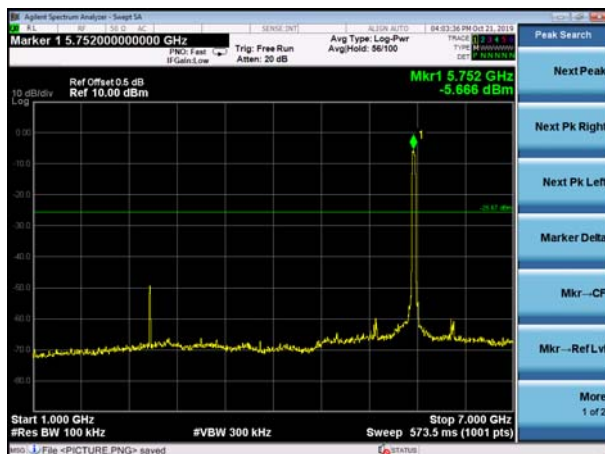
802.11n40 channel 151



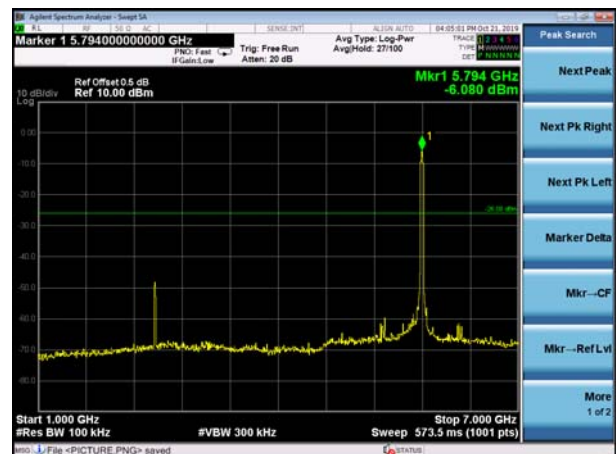
802.11n40 channel 159



802.11n40 channel 151



802.11n40 channel 159



802.11n40 channel 151



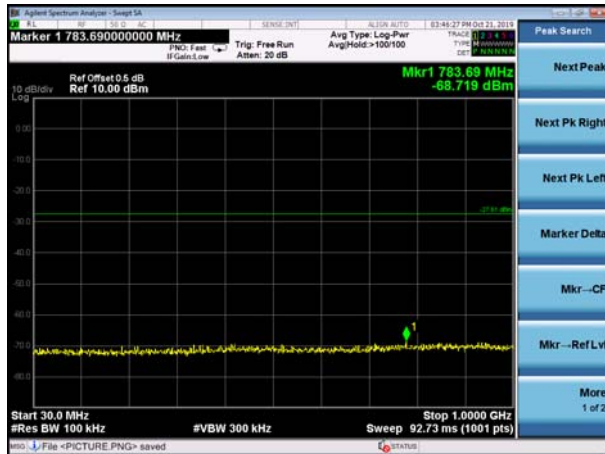
802.11n40 channel 159



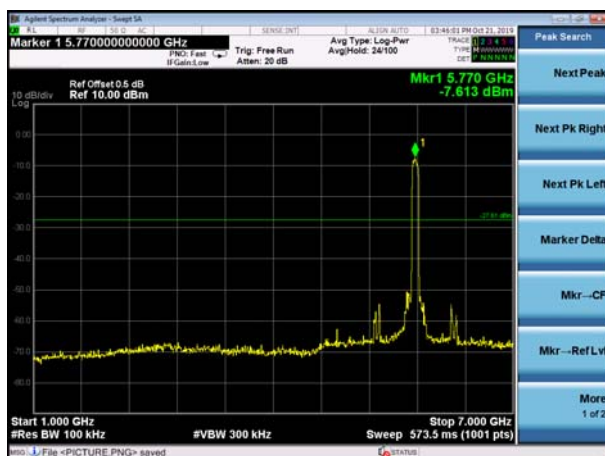


Test Plot

802.11ac80 on channel 155



802.11 ac80 on channel 155



802.11 ac80 on channel 155





5. EUT TEST PHOTO

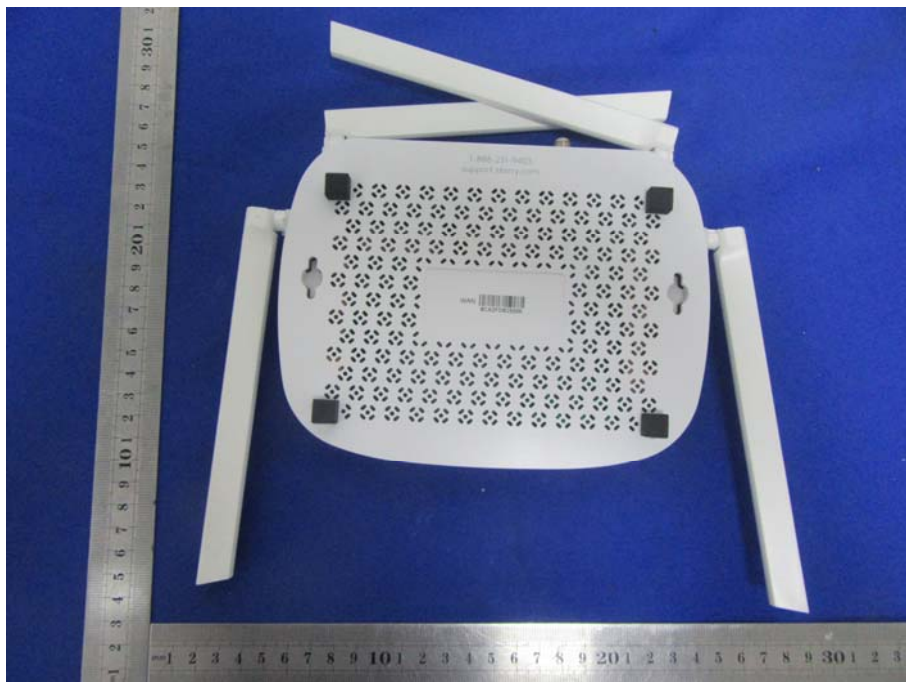
Radiated Measurement Photos







6. EUT PHOTO



***** END OF REPORT *****