# FCC TEST REPORT

# FCC ID: 2AOQVC300

| | | |
|---|---|---|
| Product | : | WIFI Smart Socket |
| Model Name | : | C300, C301, C302, C303, C304, C305, C306, C307, C308, C309, C310, C311, C312, C313, C314, C315, C316, C317, C318, C319 |
| Brand | : | N/A |
| Report No. | : | PTCDQ03171260601E-FC01 |

**Prepared for**

Shenzhen Xinyixin Technology Co.,Ltd

Building A17, Fuqiao 3rd Industrial Zone, Qiaotou, Fuyong, Baoan, Shenzhen, China

**Prepared by**

Dongguan Precise Testing & Certification Corp., Ltd.

Building D, Baoding Technology Park, Guangming Road 2, Guangming Community, Dongcheng District, Dongguan, Guangdong, China

# 1 TEST RESULT CERTIFICATION

| | | |
|---|---|---|
| Applicant's name | : | Shenzhen Xinyixin Technology Co.,Ltd |
| Address | : | Building A17, Fuqiao 3rd Industrial Zone, Qiaotou, Fuyong, Baoan, Shenzhen, China |
| Manufacture's name | : | Shenzhen Xinyixin Technology Co.,Ltd |
| Address | : | Building A17, Fuqiao 3rd Industrial Zone, Qiaotou, Fuyong, Baoan, Shenzhen, China |
| Product name | : | WIFI Smart Socket |
| Model name | : | C300, C301, C302, C303, C304, C305, C306, C307, C308, C309, C310, C311, C312, C313, C314, C315, C316, C317, C318, C319 |
| Standards | : | FCC CFR47 Part 15 Section 15.247: 2017 |
| Test procedure | : | ANSI C63.10:2013 |
| Test Date | : | December 22, 2017 to January 03, 2018 |
| Date of Issue | : | January 04, 2018 |
| Test Result | : | Pass |

This device described above has been tested by PTC, 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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Test Engineer:

Leo Yang

Leo Yang / Engineer

Technical Manager:

Chris Du / Manager

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## 2 Test Summary

| Test Items | Test Requirement | Result |
|---|---|---|
| Conduct Emission | 15.207 | PASS |
| Radiated Spurious Emissions | 15.205(a)<br>15.209<br>15.247(d) | PASS |
| Conducted Spurious Emission | 15.247(d) | PASS |
| Band edge | 15.247(d)<br>15.205(a) | PASS |
| 6dB Bandwidth | 15.247(a)(2) | PASS |
| Maximum Peak Output Power | 15.247(b)(1) | PASS |
| Power Spectral Density | 15.247(e) | PASS |
| Antenna Requirement | 15.203 | PASS |
| Remark:<br>N/A: Not Applicable | | |

# 3 General Information

## 3.1 General Description of E.U.T.

| | | |
|---|---|---|
| Product Name | : | WIFI Smart Socket |
| Model Name | : | C300, C301, C302, C303, C304, C305, C306, C307, C308, C309, C310, C311, C312, C313, C314, C315, C316, C317, C318, C319 |
| Specification | : | 802.11b/g/n HT20 |
| Operation Frequency | : | 2412-2462MHz |
| Number of Channel | : | 11 |
| Type of Modulation | : | DSSS with DBPSK/DQPSK/CCK for 802.11b;<br>OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n; |
| Antenna installation | : | Printed PCB Antenna |
| Antenna Gain | : | 3 dBi |
| Power supply | : | AC 125V/60Hz |

## 3.2 Channel List

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (802.11b: 1 Mbps; 802.11g: 6 Mbps; 802.11n (HT20): MCS0) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for 802.11 b/g/n (HT20):

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|
| 1 | 2412 | 5 | 2432 | 9 | 2452 |
| 2 | 2417 | 6 | 2437 | 10 | 2457 |
| 3 | 2422 | 7 | 2442 | 11 | 2462 |
| 4 | 2427 | 8 | 2447 | | |

Test Frequency and Channel for 802.11 b/g/n (HT20):

| Lowest Frequency | | Middle Frequency | | Highest Frequency | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 1 | 2412 | 6 | 2437 | 11 | 2462 |

## 3.3 Test Site

Dongguan Precise Testing & Certification Corp., Ltd.

Address: Building D, Baoding Technology Park, Guangming Road2, Dongcheng District, Dongguan, Guangdong, China

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A-1

Test Lab: 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

FCC Registered No.: 712850

Test items: Radiated Spurious Emission(18GHz to 25GHz)

# 4 Equipment During Test

## 4.1 Equipments List

RF Conducted Test

| Name of Equipment | Manufacturer | Model | Serial No. | Characteristics | Calibration Due |
|---|---|---|---|---|---|
| MXG Signal Analyzer | Agilent | N9020A | MY56070279 | 10Hz-30GHz | Apr 07, 2018 |
| Coaxial Cable | CDS | 79254 | 46107086 | 10Hz-30GHz | Oct 09, 2018 |

Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

Radiated Emissions(Test Frequency from 9KHz-18GHz)

| Name of Equipment | Manufacturer | Model | Serial No. | Characteristics | Calibration Due |
|---|---|---|---|---|---|
| EMI Test Receiver | Rohde&Schwarz | ESCI | 101417 | 9KHz-3GHz | Sep. 03, 2018 |
| Loop Antenna | Schwarzbeck | FMZB 1519 | 012 | 9 KHz -30MHz | Aug 31, 2018 |
| Bilog Antenna | SCHWARZBECK | VULB9160 | 9160-3355 | 25MHz-2GHz | Aug 31, 2018 |
| Preamplifier (low frequency) | SCHWARZBECK | BBV 9475 | 9745-0013 | 1MHz-1GHz | Sep. 03, 2018 |
| Cable | Schwarzbeck | PLF-100 | 549489 | 9KHz-3GHz | Sep. 03, 2018 |
| Spectrum Analyzer | Agilent | E4407B | MY45109572 | 9KHz-40GHz | Oct. 13, 2018 |
| Horn Antenna | SCHWARZBECK | 9120D | 9120D-1246 | 1GHz-18GHz | Aug. 31, 2018 |
| Power Amplifier | LUNAR EM | LNA1G18-40 | J10100000081 | 1GHz-26.5GHz | Aug. 31, 2018 |
| Cable | H+S | CBL-26 | N/A | 1GHz-26.5GHz | Sep. 03, 2018 |

Radiated Emission (Test Frequency from 18GHz-25GHz)

| Name of Equipment | Manufacturer | Model | Serial No. | Characteristics | Calibration Due |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4407B | MY45109572 | 9KHz-26.5GHz | 2018.08.26 |
| Test Receiver | R&S | ESPI | 101396 | 9KHz-7GHz | 2018.08.26 |
| Horn Antenna | SCHWARZBECK | BBHA 9170 | 9170-181 | 14GHz-40GHz | 2018.09.02 |
| Amplifier | SCHWARZBECK | BBV 9721 | 9721-205 | 18GHz-40GHz | 2018.08.26 |
| RF Cable | R&S | R204 | R21X | 1GHz-40GHz | 2018.08.26 |
| Antenna Connector | Florida RF Labs | N/A | RF01# | N/A | 2018.08.26 |

Conducted Emissions

| Name of Equipment | Manufacturer | Model | Serial No. | Characteristics | Calibration Due |
|---|---|---|---|---|---|
| EMI Test Receiver | Rohde&Schwarz | ESCI | 101417 | 9KHz-3GHz | Sep. 03, 2018 |
| Artificial Mains Network | Rohde&Schwarz | L2-16B | 000WX31025 | 9KHz-300MHz | Sep. 03, 2018 |
| Artificial Mains Network | Rohde&Schwarz | ENV216 | 101342 | 9KHz-300MHz | Sep. 03, 2018 |

## 4.2 Measurement Uncertainty

| Parameter | Uncertainty |
|---|---|
| RF output power, conducted | ±1.0dB |
| Power Spectral Density, conducted | ±2.2dB |
| Radio Frequency | ± 1 x $10^{-6}$ |
| Bandwidth | ± 1.5 x $10^{-6}$ |
| Time | ±2% |
| Duty Cycle | ±2% |
| Temperature | ±1°C |
| Humidity | ±5% |
| DC and low frequency voltages | ±3% |
| Conducted Emissions (150kHz~30MHz) | ±3.64dB |
| Radiated Emission(30MHz~1GHz) | ±5.03dB |
| Radiated Emission(1GHz~25GHz) | ±4.74dB |

## 4.3 Description of Support Units

| Equipment | Model No. | Series No. |
|---|---|---|
| N/A | N/A | N/A |

# 5 Conducted Emission

| | | |
|---|---|---|
| Test Requirement: | : | FCC CFR 47 Part 15 Section 15.207 |
| Test Method: | : | ANSI C63.10: 2013 |
| Test Result: | : | PASS |
| Frequency Range: | : | 150kHz to 30MHz |
| Class/Severity: | : | Class B |

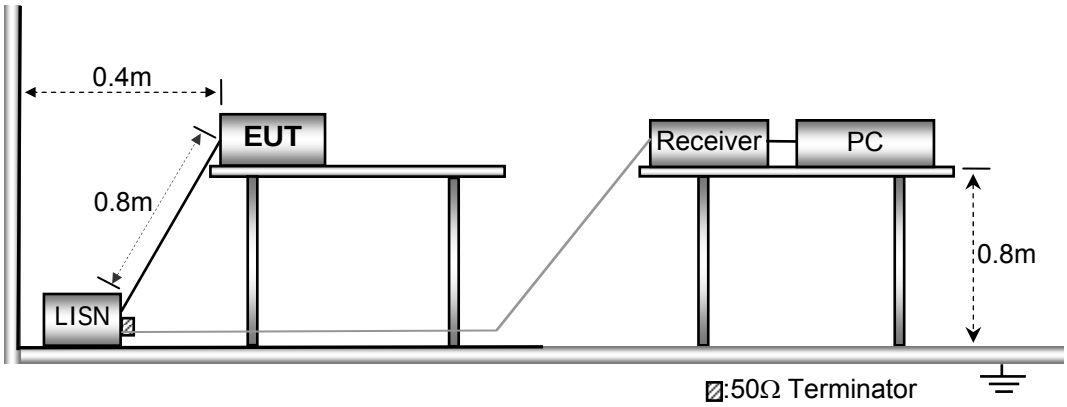
## 5.1 E.U.T. Operation

Operating Environment **:**

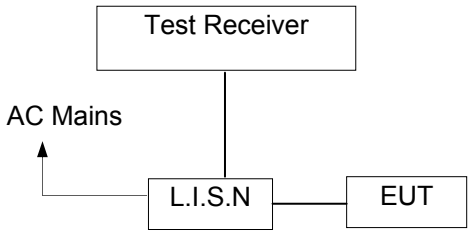
| | | |
|---|---|---|
| Temperature: | : | 25.5 °C |
| Humidity: | : | 51 % RH |
| Atmospheric Pressure: | : | 101.2kPa |

## 5.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



## 5.3 Test SET-UP (Block Diagram of Configuration)




## 5.4 Measurement Procedure

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

## 5.5 Conducted Emission Limit

**Conducted Emission**

| Frequency(MHz) | Quasi-peak | Average |
|---|---|---|
| 0.15-0.5 | 66-56 | 56-46 |
| 0.5-5.0 | 56 | 46 |
| 5.0-30.0 | 60 | 50 |

**Note:**
1. The lower limit shall apply at the transition frequencies
2.The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

## 5.6 Measurement Description

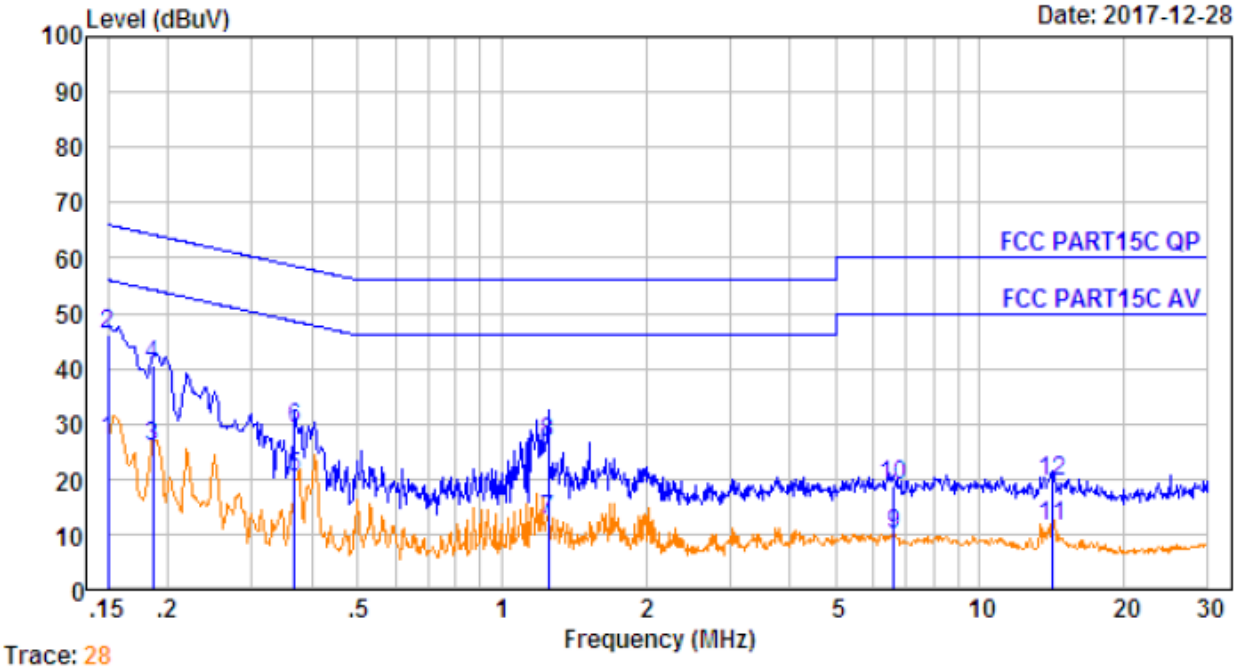
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

## 5.7 Conducted Emission Test Result

Pass.

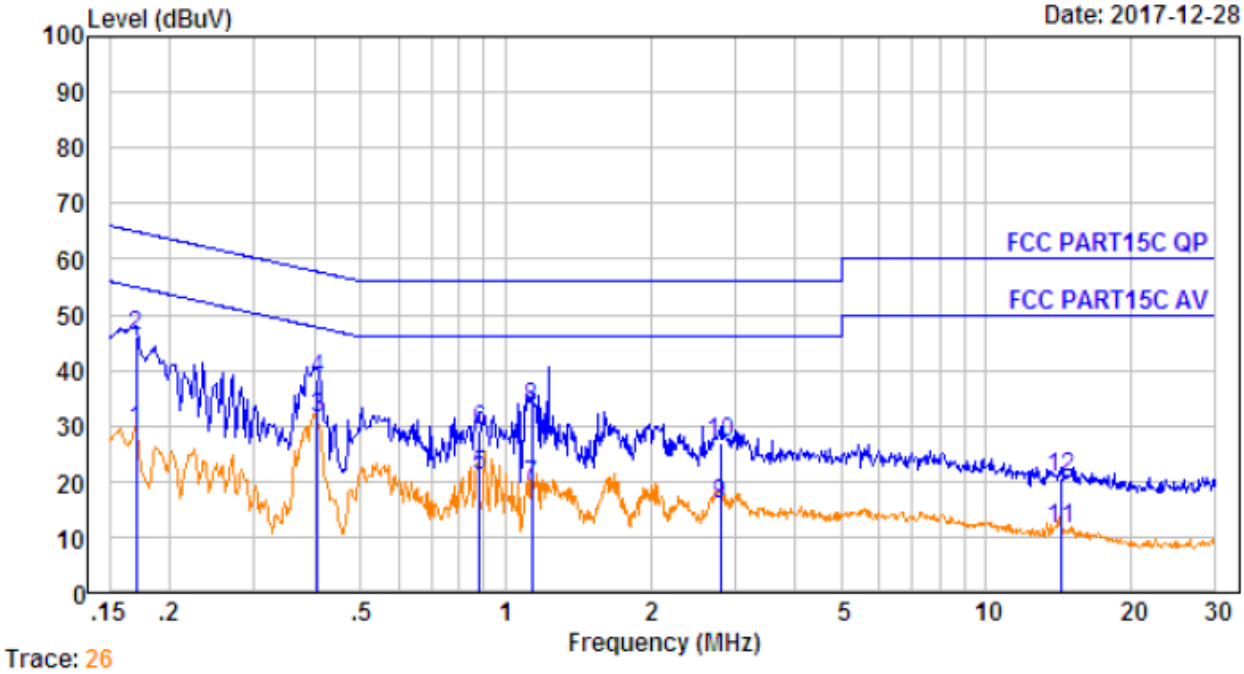
Please refer to the following pages.

Line-AC 120V/60Hz




| No. | Freq MHz | Cable Loss dB | AMN Factor dB | Receiver Reading dBuV | Emission Level dBuV | Limit dBuV | Over Limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 1. | 0.150 | 0.21 | 9.50 | 17.25 | 26.96 | 56.00 | -29.04 | Average |
| 2. | 0.150 | 0.21 | 9.50 | 36.25 | 45.96 | 66.00 | -20.04 | QP |
| 3. | 0.186 | 0.26 | 9.57 | 15.88 | 25.71 | 54.20 | -28.49 | Average |
| 4. | 0.186 | 0.26 | 9.57 | 30.88 | 40.71 | 64.20 | -23.49 | QP |
| 5. | 0.369 | 0.39 | 9.72 | 10.10 | 20.21 | 48.52 | -28.31 | Average |
| 6. | 0.369 | 0.39 | 9.72 | 19.10 | 29.21 | 58.52 | -29.31 | QP |
| 7. | 1.249 | 0.46 | 9.83 | 2.35 | 12.64 | 46.00 | -33.36 | Average |
| 8. | 1.249 | 0.46 | 9.83 | 16.35 | 26.64 | 56.00 | -29.36 | QP |
| 9. | 6.627 | 0.54 | 9.98 | -0.74 | 9.78 | 50.00 | -40.22 | Average |
| 10. | 6.627 | 0.54 | 9.98 | 8.26 | 18.78 | 60.00 | -41.22 | QP |
| 11. | 14.138 | 0.56 | 10.00 | 0.85 | 11.41 | 50.00 | -38.59 | Average |
| 12. | 14.138 | 0.56 | 10.00 | 8.85 | 19.41 | 60.00 | -40.59 | QP |

Neutral-AC 120V/60Hz




| No. | Freq MHz | Cable Loss dB | AMN Factor dB | Receiver Reading dBuV | Emission Level dBuV | Limit dBuV | Over Limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 1. | 0.170 | 0.24 | 9.57 | 19.25 | 29.06 | 54.94 | -25.88 | Average |
| 2. | 0.170 | 0.24 | 9.57 | 36.25 | 46.06 | 64.94 | -18.88 | QP |
| 3. | 0.406 | 0.41 | 9.77 | 21.27 | 31.45 | 47.73 | -16.28 | Average |
| 4. | 0.406 | 0.41 | 9.77 | 28.27 | 38.45 | 57.73 | -19.28 | QP |
| 5. | 0.885 | 0.45 | 9.84 | 10.76 | 21.05 | 46.00 | -24.95 | Average |
| 6. | 0.885 | 0.45 | 9.84 | 18.76 | 29.05 | 56.00 | -26.95 | QP |
| 7. | 1.135 | 0.46 | 9.86 | 8.75 | 19.07 | 46.00 | -26.93 | Average |
| 8. | 1.135 | 0.46 | 9.86 | 22.75 | 33.07 | 56.00 | -22.93 | QP |
| 9. | 2.794 | 0.47 | 9.91 | 5.56 | 15.94 | 46.00 | -30.06 | Average |
| 10. | 2.794 | 0.47 | 9.91 | 16.56 | 26.94 | 56.00 | -29.06 | QP |
| 11. | 14.288 | 0.56 | 10.07 | 0.95 | 11.58 | 50.00 | -38.42 | Average |
| 12. | 14.288 | 0.56 | 10.07 | 9.95 | 20.58 | 60.00 | -39.42 | QP |

# 6 Radiated Spurious Emissions

Test Requirement: : FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: : ANSI C63.10:2013

Test Result: : PASS

Measurement Distance: : 3m

Limit: : See the follow table

| Frequency (MHz) | Field Strength | | Field Strength Limit at 3m Measurement Dist | |
|---|---|---|---|---|
| | uV/m | Distance (m) | uV/m | dBuV/m |
| 0.009 ~ 0.490 | 2400/F(kHz) | 300 | 10000 * 2400/F(kHz) | $20\log^{(2400/F(kHz))} + 80$ |
| 0.490 ~ 1.705 | 24000/F(kHz) | 30 | 100 * 24000/F(kHz) | $20\log^{(24000/F(kHz))} + 40$ |
| 1.705 ~ 30 | 30 | 30 | 100 * 30 | $20\log^{(30)} + 40$ |
| 30 ~ 88 | 100 | 3 | 100 | $20\log^{(100)}$ |
| 88 ~ 216 | 150 | 3 | 150 | $20\log^{(150)}$ |
| 216 ~ 960 | 200 | 3 | 200 | $20\log^{(200)}$ |
| Above 960 | 500 | 3 | 500 | $20\log^{(500)}$ |

## 6.1 EUT Operation

Operating Environment :

Temperature: : 23.5 °C

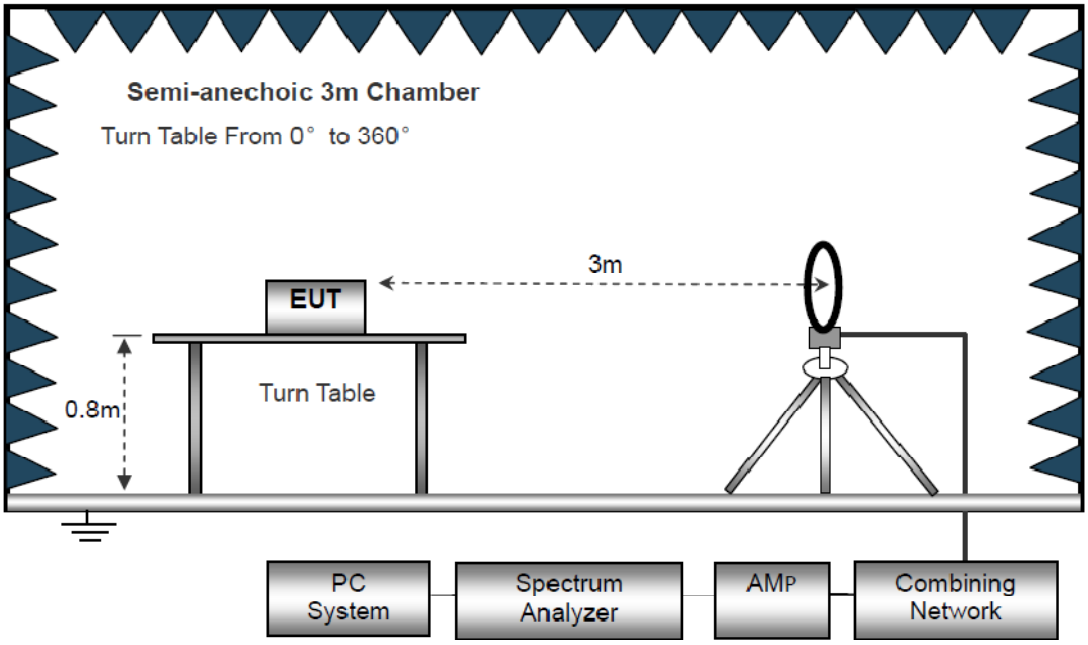
Humidity: : 51.1 % RH

Atmospheric Pressure: : 101.2kPa

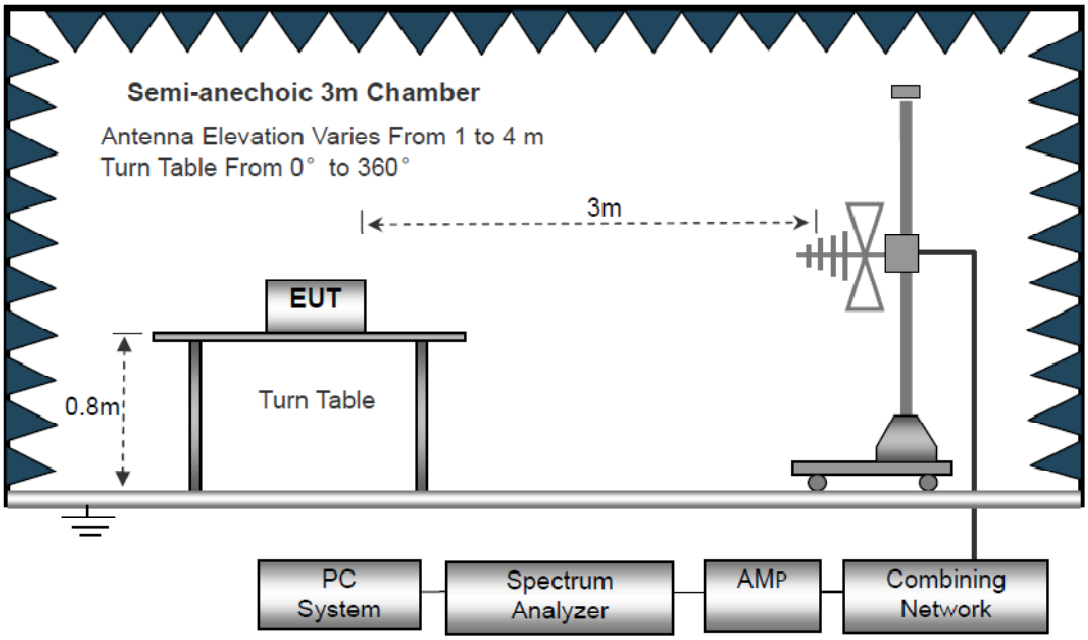
## 6.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

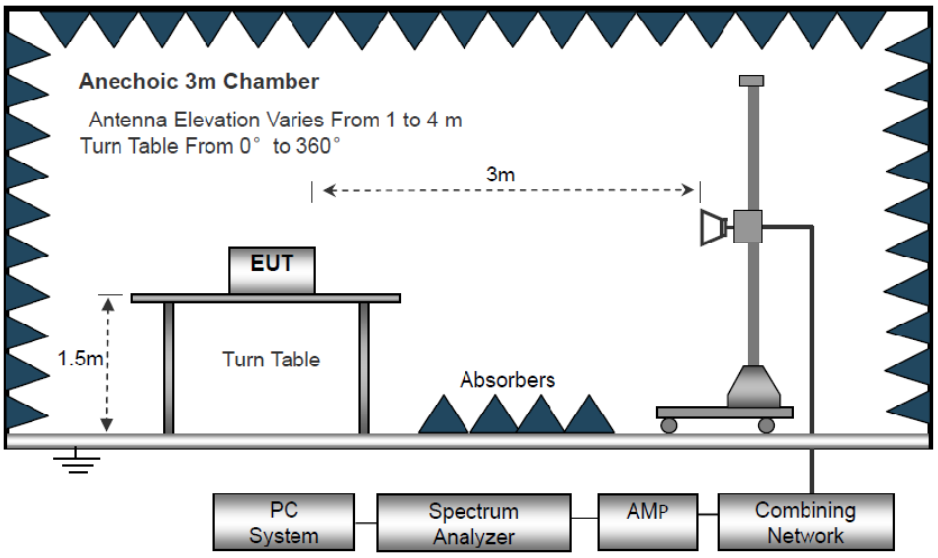
The test setup for emission measurement below 30MHz




The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz




## 6.3 Spectrum Analyzer Setup

| | | | |
|---|---|---|---|
| Below 30MHz | | | |
| IF Bandwidth | : | 10kHz | |
| Resolution Bandwidth | : | 10kHz | |
| Video Bandwidth | : | 10kHz | |
| 30MHz ~ 1GHz | | | |
| Detector | : | PK | QP |
| Resolution Bandwidth | : | 100kHz | 120kHz |
| Video Bandwidth | : | 300kHz | 300kHz |
| Above 1GHz | | | |
| Detector | : | PK | AV |
| Resolution Bandwidth | : | 1MHz | 1MHz |
| Video Bandwidth | : | 3MHz | 10Hz |

## 6.4 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2013.

2. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.

3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.

5. Set to the maximum power setting and enable the EUT transmit continuously.

6. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.

7. Test Procedure of measurement (For Above 1GHz):

1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).

2) Change the antenna polarization and repeat 1) with vertical polarization.

3) Make a hardcopy of the spectrum.

4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.

5) Change the analyser mode to Clear/ Write and found the cone of emission.

6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.

7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.

8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

8. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

## 6.5 Summary of Test Results

**Test Frequency: 9KHz-30MHz**

| Freq. (MHz) | Ant.Pol. H/V | Emission Level (dBuV/m) | Limit 3m (dBuV/m) | Over (dB) |
|---|---|---|---|---|
| -- | -- | -- | -- | >20 |

Note:

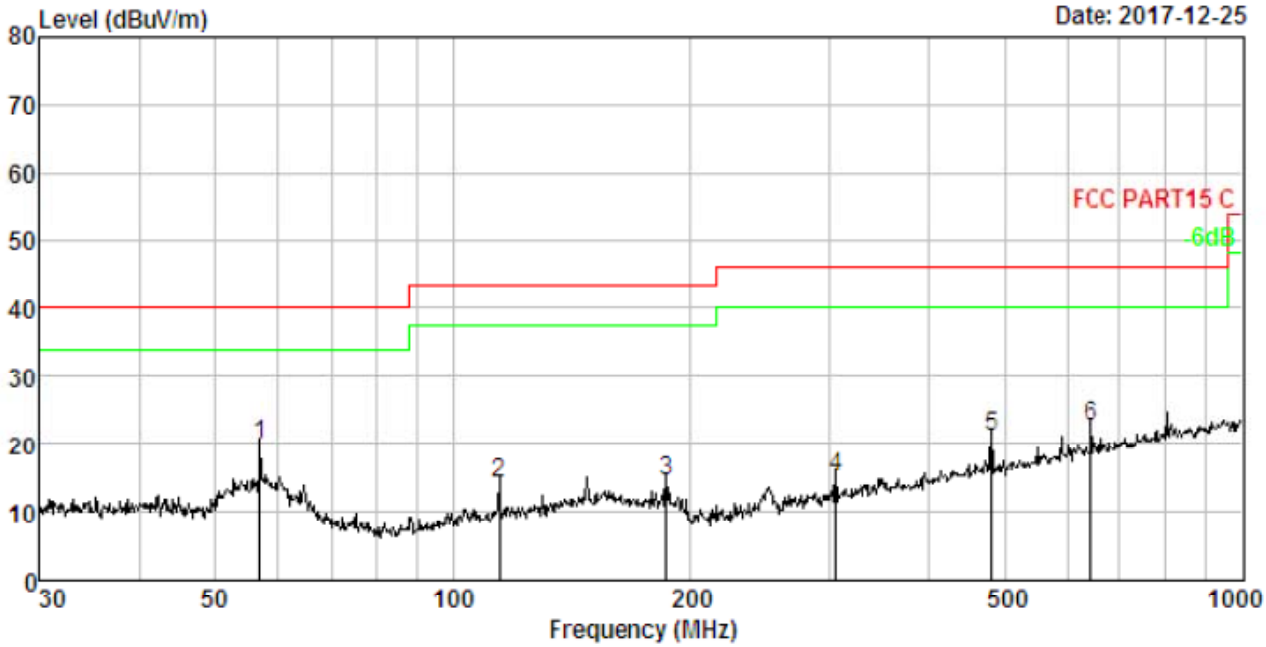
The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor =40log(Specific distance/ test distance)( dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

**Test Frequency: 30MHz ~ 1GHz**

Please refer to the following test plots:

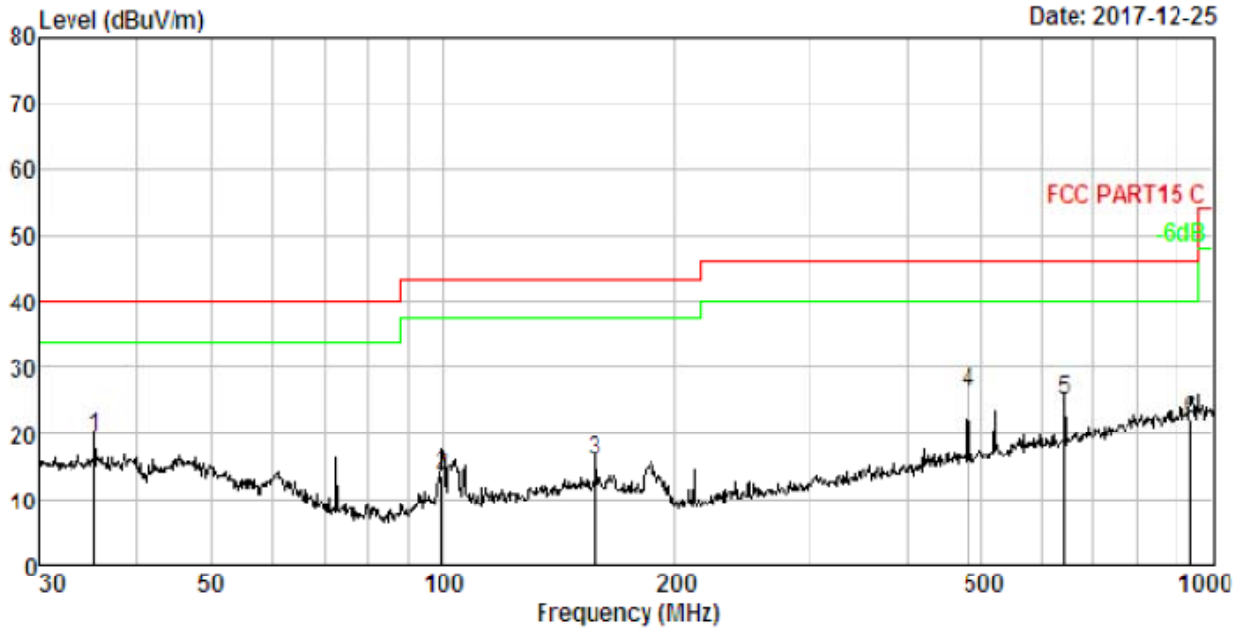
Antenna Polarization: Horizontal




| No. | Freq MHz | Cable Loss dB | ANT Factor dB/m | Receiver Reading dBuV | Preamp Factor dB | Emission Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 56.991 | 1.64 | 12.01 | 36.59 | 30.19 | 20.05 | 40.00 | -19.95 | QP |
| 2. | 114.515 | 2.27 | 11.51 | 30.72 | 30.44 | 14.06 | 43.50 | -29.44 | QP |
| 3. | 186.441 | 2.71 | 11.57 | 30.67 | 30.61 | 14.34 | 43.50 | -29.16 | QP |
| 4. | 304.610 | 3.15 | 13.30 | 29.47 | 30.78 | 15.14 | 46.00 | -30.86 | QP |
| 5. | 480.528 | 3.57 | 16.89 | 31.87 | 30.94 | 21.39 | 46.00 | -24.61 | QP |
| 6. | 640.611 | 3.83 | 19.45 | 30.51 | 31.04 | 22.75 | 46.00 | -23.25 | QP |

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP Factor

Antenna Polarization: Vertical




| No. | Freq MHz | Cable Loss dB | ANT Factor dB/m | Receiver Reading dBuV | Preamp Factor dB | Emission Level dBuV/m | Limit dBuV/m | Over Limit dB | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 35.251 | 1.20 | 13.41 | 34.89 | 30.03 | 19.47 | 40.00 | -20.53 | QP |
| 2. | 99.878 | 2.14 | 10.23 | 31.63 | 30.39 | 13.61 | 43.50 | -29.89 | QP |
| 3. | 157.559 | 2.56 | 13.88 | 30.19 | 30.55 | 16.08 | 43.50 | -27.42 | QP |
| 4. | 480.528 | 3.57 | 16.89 | 36.66 | 30.94 | 26.18 | 46.00 | -19.82 | QP |
| 5. | 640.611 | 3.83 | 19.45 | 32.82 | 31.04 | 25.06 | 46.00 | -20.94 | QP |
| 6. | 935.546 | 4.17 | 23.15 | 25.94 | 31.17 | 22.09 | 46.00 | -23.91 | QP |

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP Factor

## Test Frequency 1GHz-18GHz:

Low Channel (2412MHz) Worst case 802.11b

| Frequency (MHz) | S.A Reading (dBuV) | Detector (PK/AV) | Polarity (H/V) | Ant. Factor (dB/m) | Cable Loss (dB) | Pre-Amp. Gain (dB) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 4824 | 30.15 | AV | V | 29.89 | 9.04 | 21.43 | 47.65 | 54 | -6.35 |
| 4824 | 29.42 | AV | H | 29.89 | 9.04 | 21.43 | 46.92 | 54 | -7.08 |
| 4824 | 28.35 | PK | V | 29.89 | 9.04 | 21.43 | 45.85 | 74 | -28.15 |
| 4824 | 30.05 | PK | H | 29.89 | 9.04 | 21.43 | 47.55 | 74 | -26.45 |
| 17026 | 31.49 | AV | V | 30.14 | 8.72 | 25.83 | 44.52 | 54 | -9.48 |
| 17026 | 32.06 | AV | H | 30.14 | 8.72 | 25.83 | 45.09 | 54 | -8.91 |
| 17026 | 29.46 | PK | V | 30.14 | 8.72 | 25.83 | 42.49 | 74 | -31.51 |
| 17026 | 30.56 | PK | H | 30.14 | 8.72 | 25.83 | 43.59 | 74 | -30.41 |

Middle Channel (2437MHz) Worst case 802.11n (HT20)

| Frequency (MHz) | S.A Reading (dBuV) | Detector (PK/AV) | Polarity (H/V) | Ant. Factor (dB/m) | Cable Loss (dB) | Pre-Amp. Gain (dB) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 4874 | 23.05 | AV | V | 30.12 | 10.48 | 19.34 | 44.31 | 54 | -9.69 |
| 4874 | 24.62 | AV | H | 30.12 | 10.48 | 19.34 | 45.88 | 54 | -8.12 |
| 4874 | 25.12 | PK | V | 30.12 | 10.48 | 19.34 | 46.38 | 74 | -27.62 |
| 4874 | 24.85 | PK | H | 30.12 | 10.48 | 19.34 | 46.11 | 74 | -27.89 |
| 16358 | 29.35 | AV | V | 29.43 | 9.58 | 21.45 | 46.91 | 54 | -7.09 |
| 16358 | 28.42 | AV | H | 29.43 | 9.58 | 21.45 | 45.98 | 54 | -8.02 |
| 16358 | 27.01 | PK | V | 29.43 | 9.58 | 21.45 | 44.57 | 74 | -29.43 |
| 16358 | 26.68 | PK | H | 29.43 | 9.58 | 21.45 | 44.24 | 74 | -29.76 |

High Channel (2462MHz) Worst case 802.11b

| Frequency (MHz) | S.A Reading (dBuV) | Detector (PK/AV) | Polarity (H/V) | Ant. Factor (dB/m) | Cable Loss (dB) | Pre-Amp. Gain (dB) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 4924 | 26.35 | AV | V | 20.45 | 8.43 | 19.48 | 35.75 | 54 | -18.25 |
| 4924 | 25.47 | AV | H | 20.45 | 8.43 | 19.48 | 34.87 | 54 | -19.13 |
| 4924 | 24.12 | PK | V | 20.45 | 8.43 | 19.48 | 33.52 | 74 | -40.48 |
| 4924 | 22.08 | PK | H | 20.45 | 8.43 | 19.48 | 31.48 | 74 | -42.52 |
| 17265 | 23.65 | AV | V | 22.35 | 10.29 | 20.75 | 35.54 | 54 | -18.46 |
| 17265 | 25.18 | AV | H | 22.35 | 10.29 | 20.75 | 37.07 | 54 | -16.93 |
| 17265 | 26.23 | PK | V | 22.35 | 10.29 | 20.75 | 38.12 | 74 | -35.88 |
| 17265 | 27.08 | PK | H | 22.35 | 10.29 | 20.75 | 38.97 | 74 | -35.03 |

Note:

1. The testing has been conformed to 10*2462MHz=24620MHz.
2. All other emissions more than 30dB below the limit.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
   Emission Level = Reading + Factor
   Margin=Emission Level-Limit
4. X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

## Test Frequency: From 18GHz to 25GHz

The measurements were more than 20dB below the limit and not reported.

# 7 Conducted Spurious Emission

| | | |
|---|---|---|
| Test Requirement | : | FCC CFR47 Part 15 Section 15.247 |
| Test Method | : | ANSI C63.10:2013 |
| Test Limit | : | Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). |

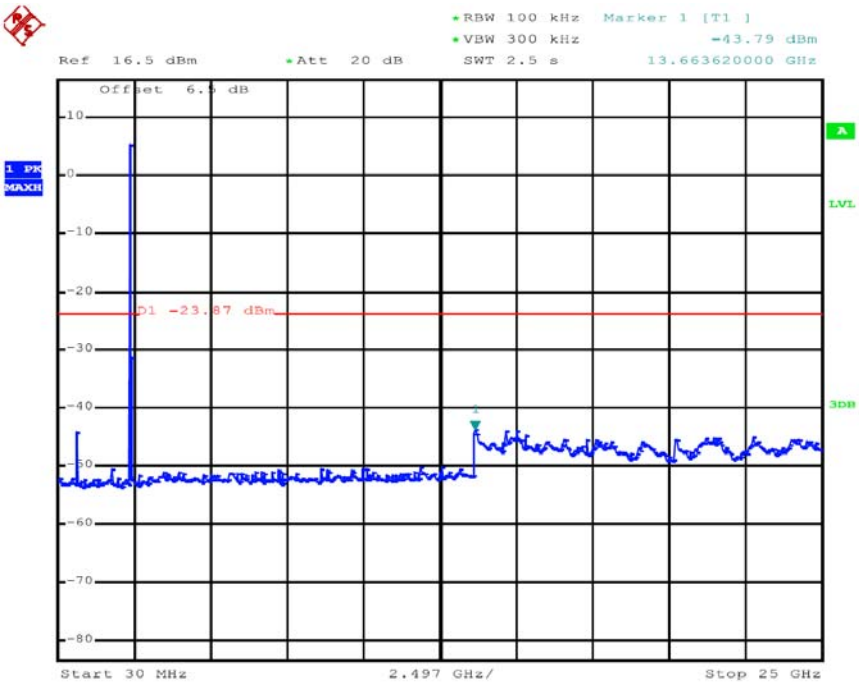
## 7.1 Test Procedure

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: RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold

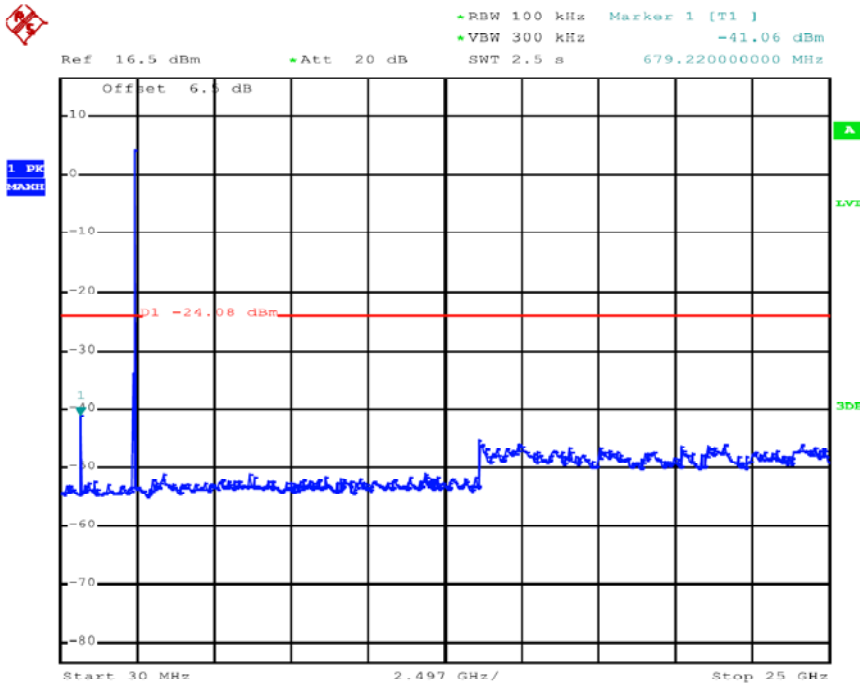
## 7.2 Test Result

802.11 b

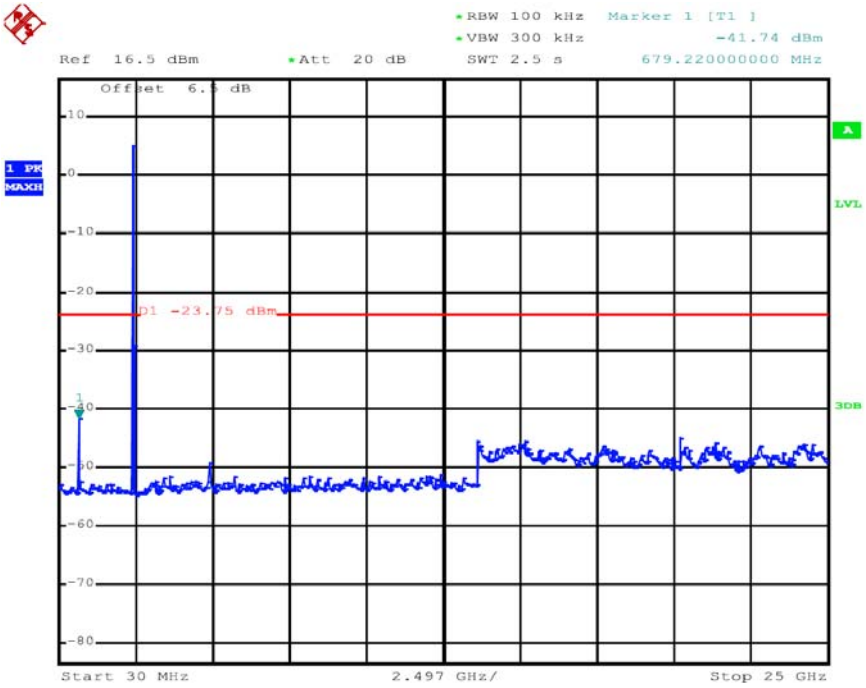
Low Channel




Middle Channel

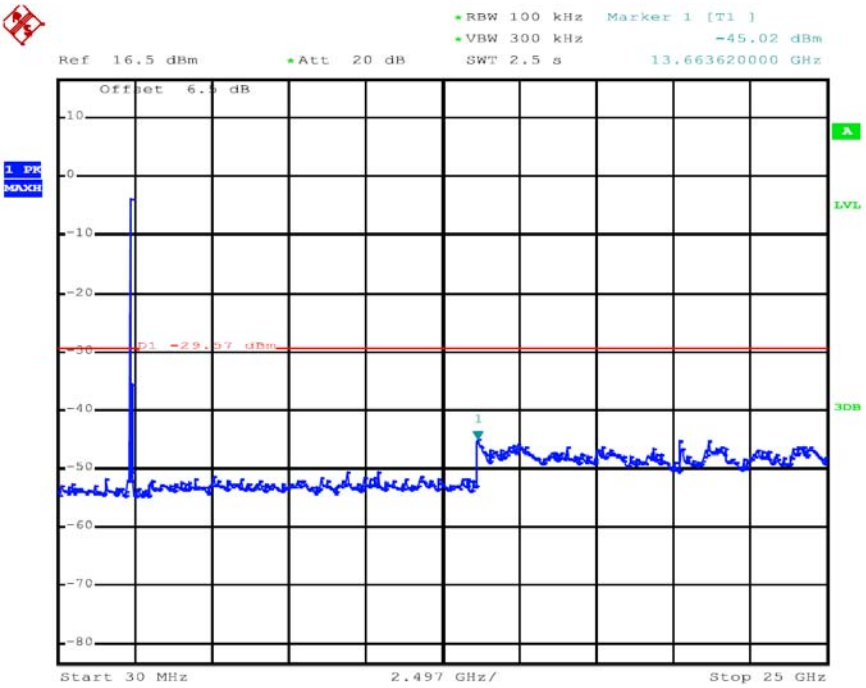


High Channel

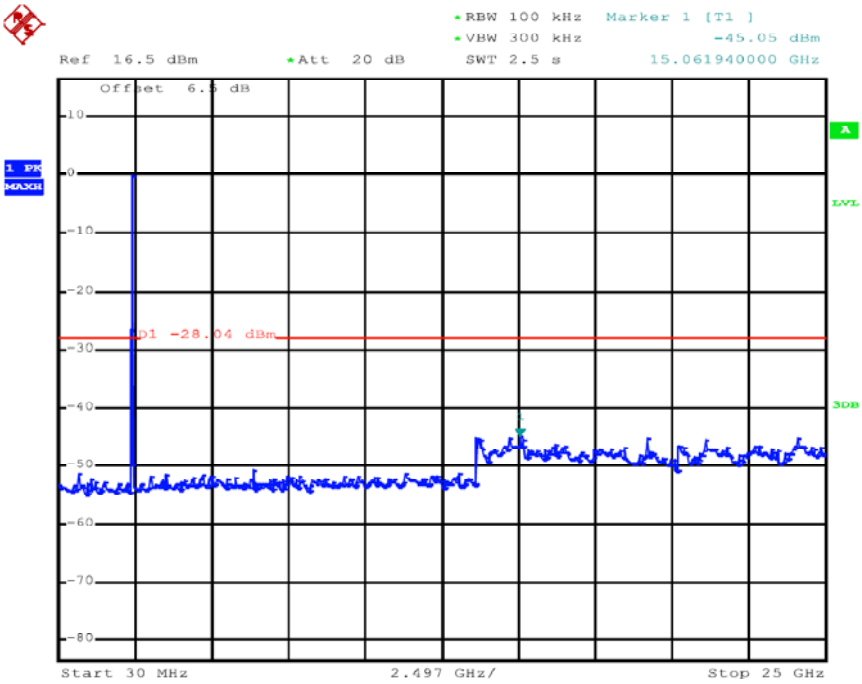



802.11g

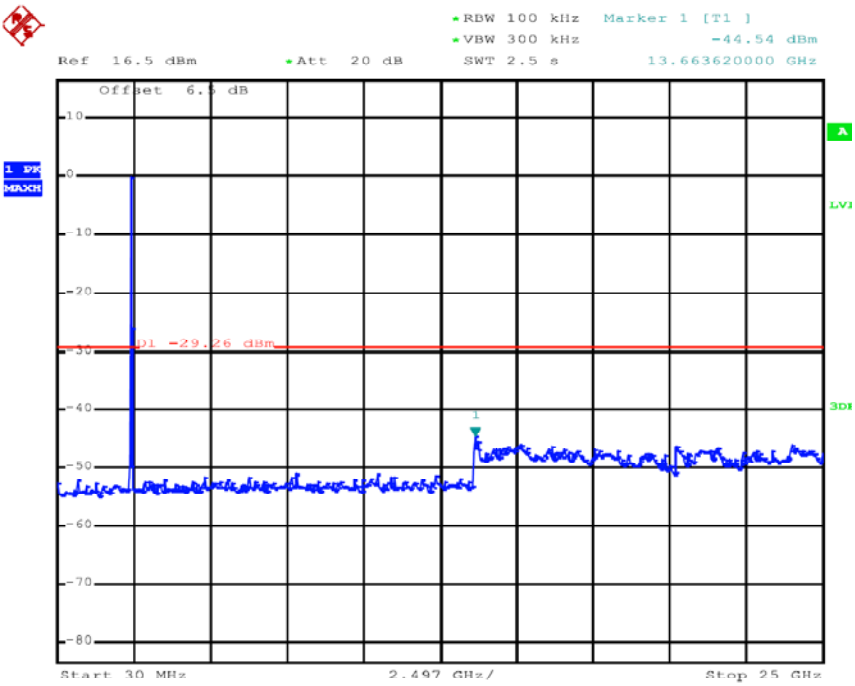
Low Channel



Middle Channel

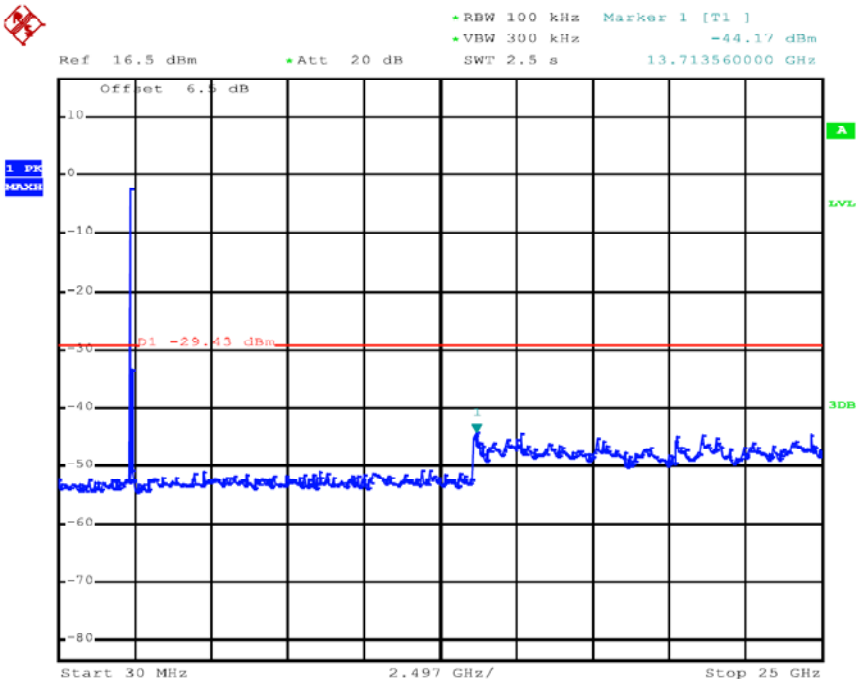



High Channel

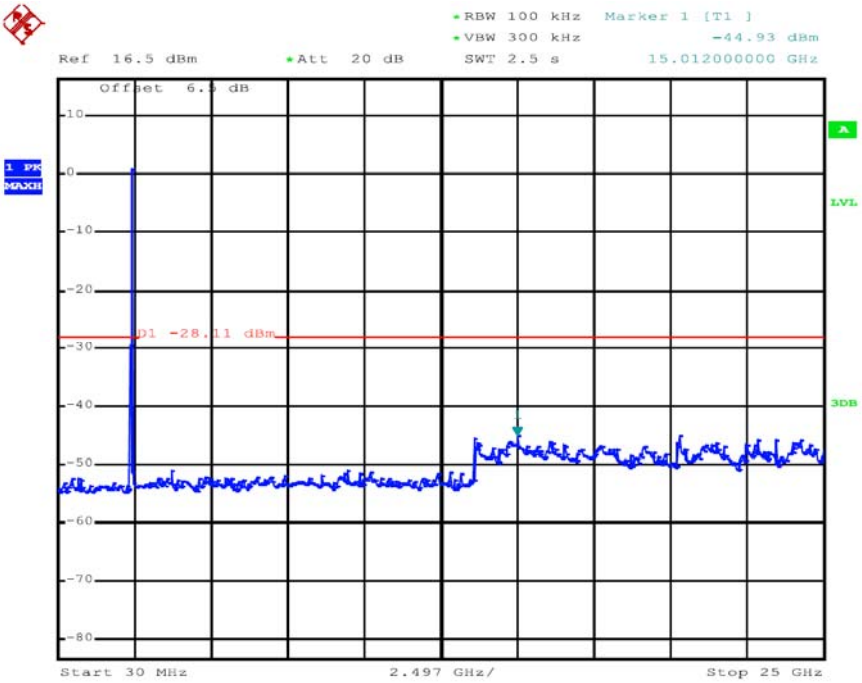


802.11n-HT20

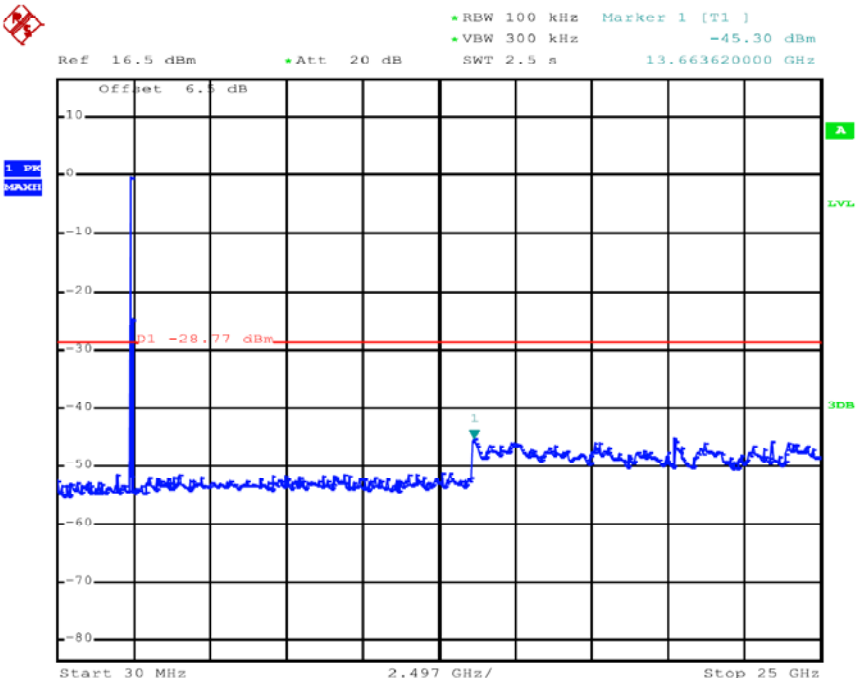
Low Channel




Middle Channel



High Channel



# 8 Band Edge Measurement

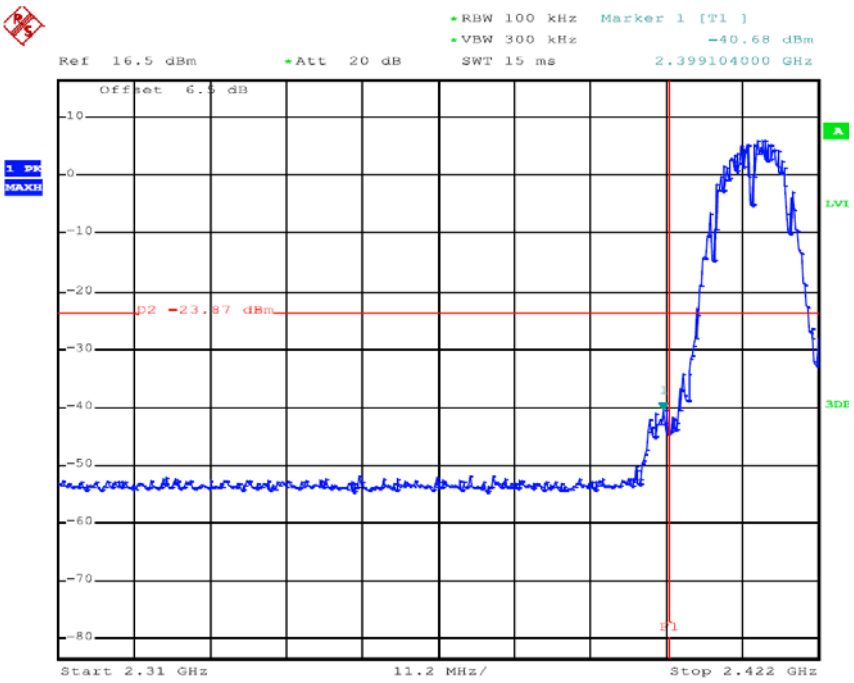
| | | |
|---|---|---|
| Test Requirement | : | Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)). |
| Test Method | : | ANSI C63.10:2013, KDB 558074 D01 DTS MEAS GUIDANCE V03R03 |
| Test Limit | : | Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). |

## 8.1 Test Procedure

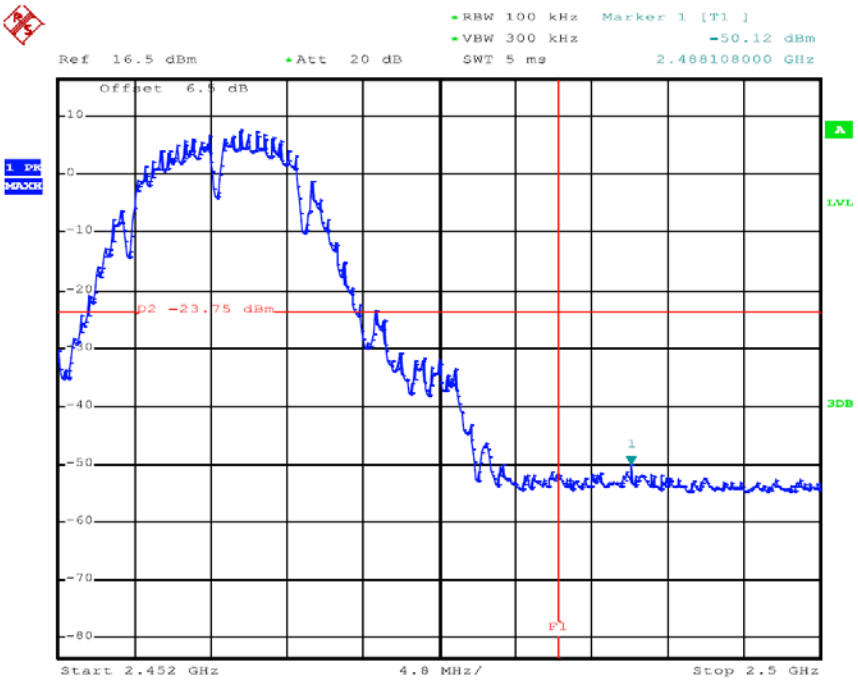
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold

## 8.2 Test Result

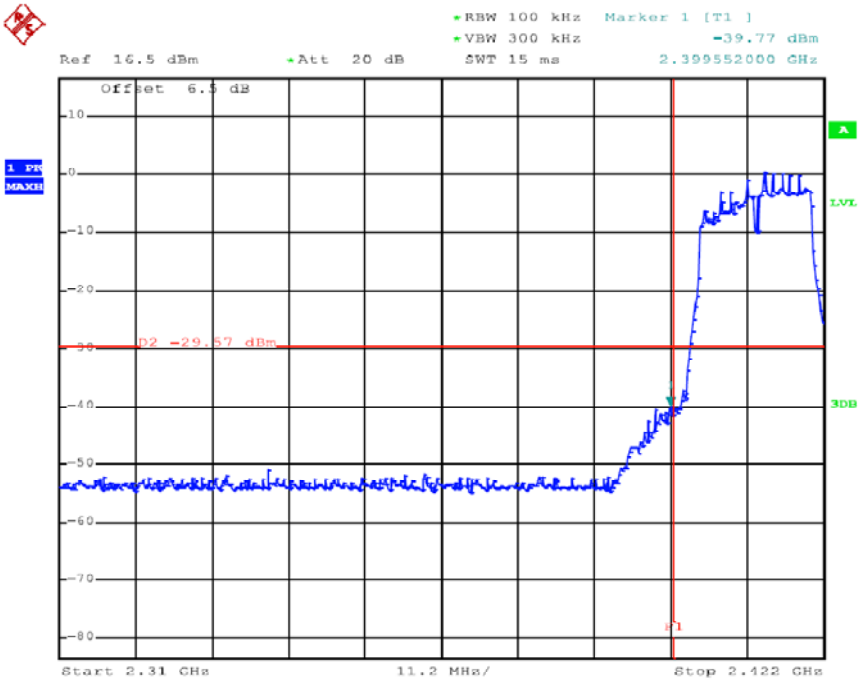
802.11b



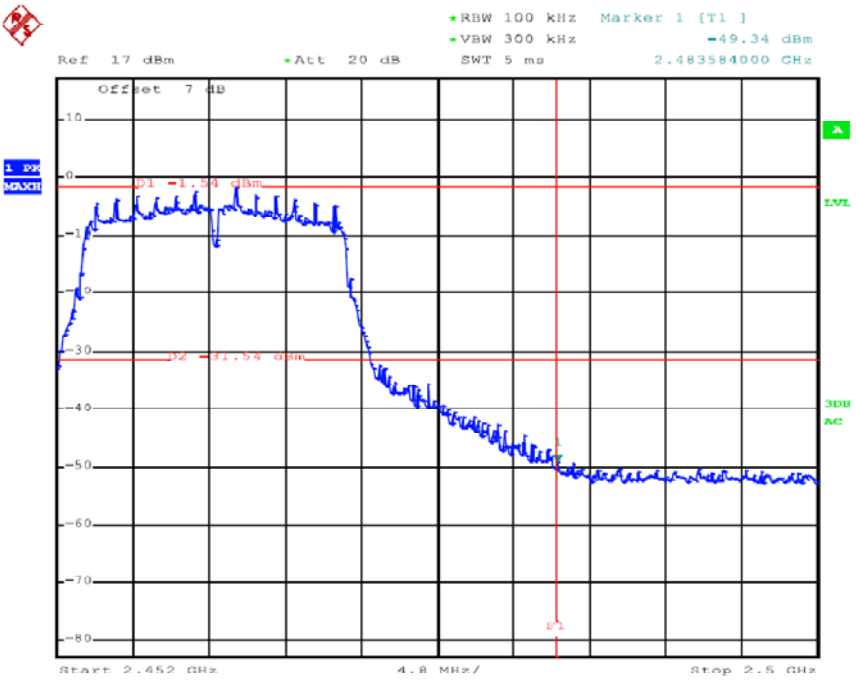

802.11b



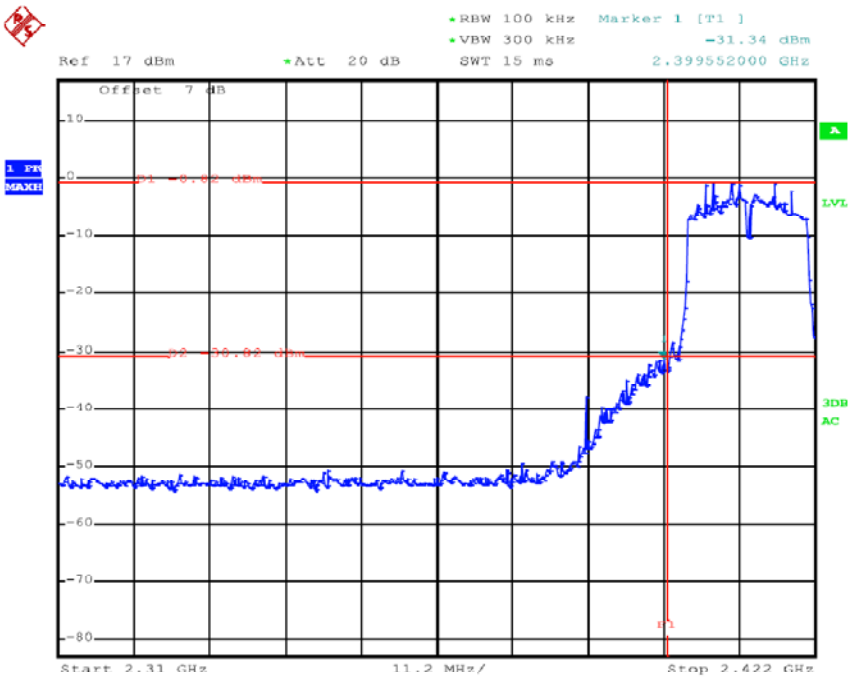
802.11g



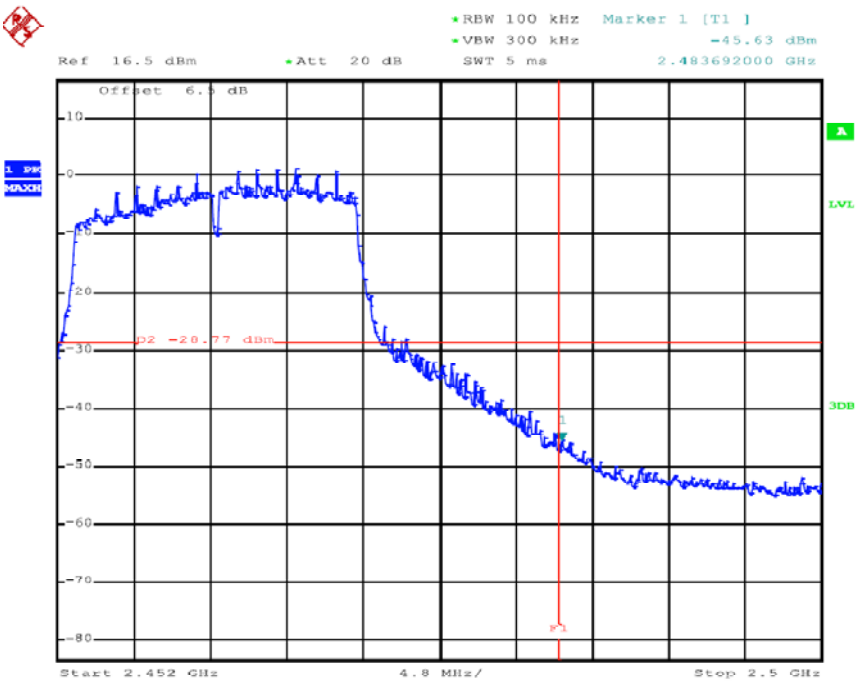

802.11g



802.11n-HT20




802.11n-HT20



# 9 6dB Bandwidth Measurement

| | | |
|---|---|---|
| Test Requirement | : | FCC CFR47 Part 15 Section 15.247 |
| Test Method | : | ANSI C63.10:2013 |
| Test Limit | | Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz. |

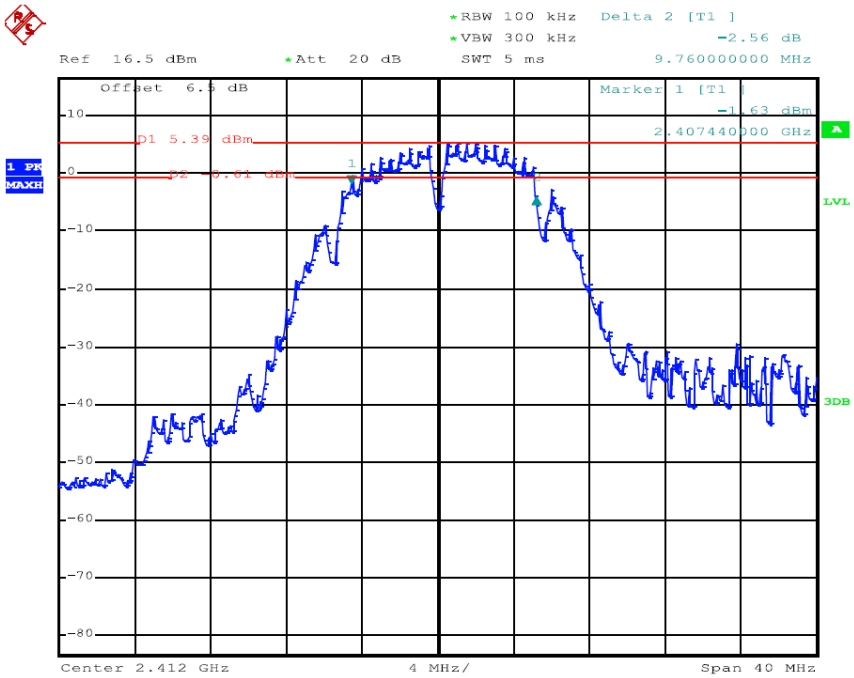
## 9.1 Test Procedure

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: RBW = 100kHz, VBW = 300kHz,

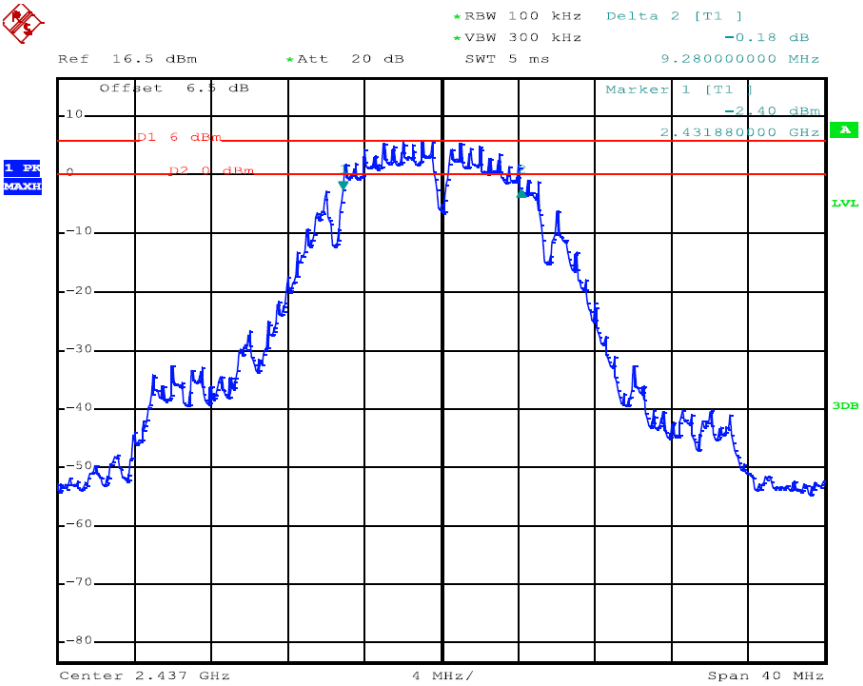
## 9.2 Test Result

| Modulation | Bandwidth(MHz) | | | Limit |
|---|---|---|---|---|
| | Low Channel | Middle Channel | High Channel | |
| 802.11b | 9.76 | 9.28 | 9.68 | ≥500kHz |
| 802.11g | 15.92 | 15.84 | 15.84 | ≥500kHz |
| 802.11n-HT20 | 16.48 | 16.48 | 16.48 | ≥500kHz |

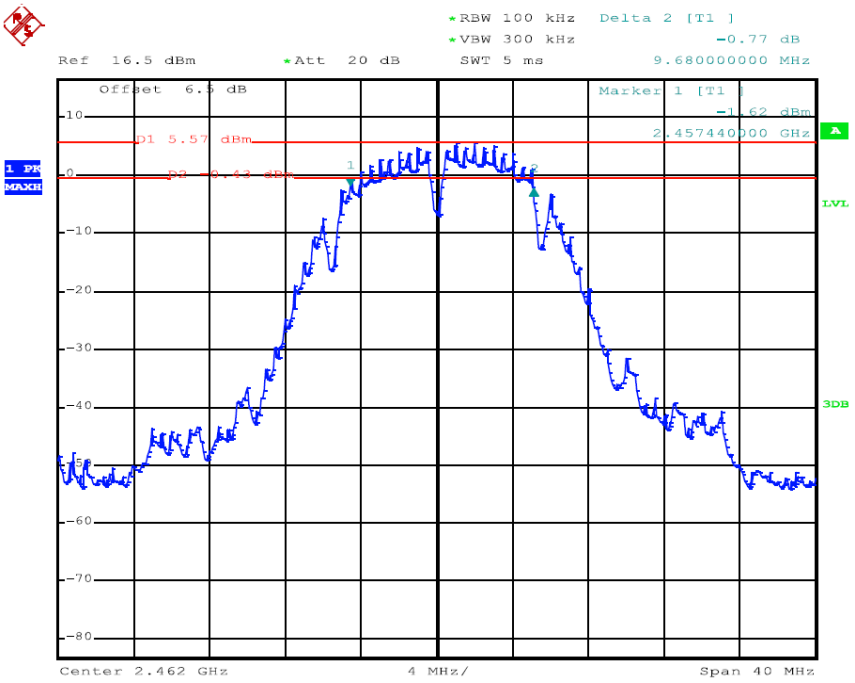
802.11b Low Channel



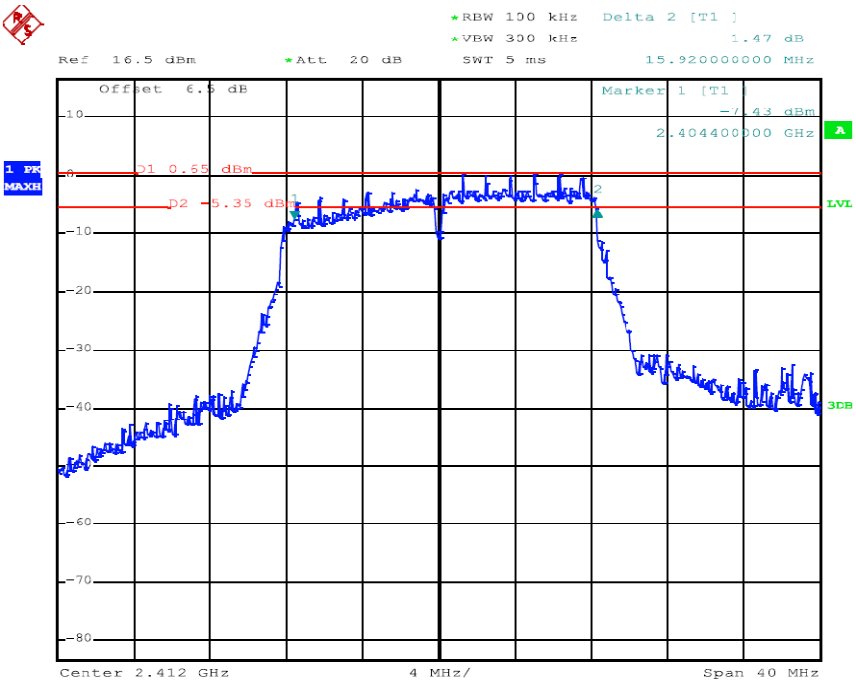

802.11b Middle Channel



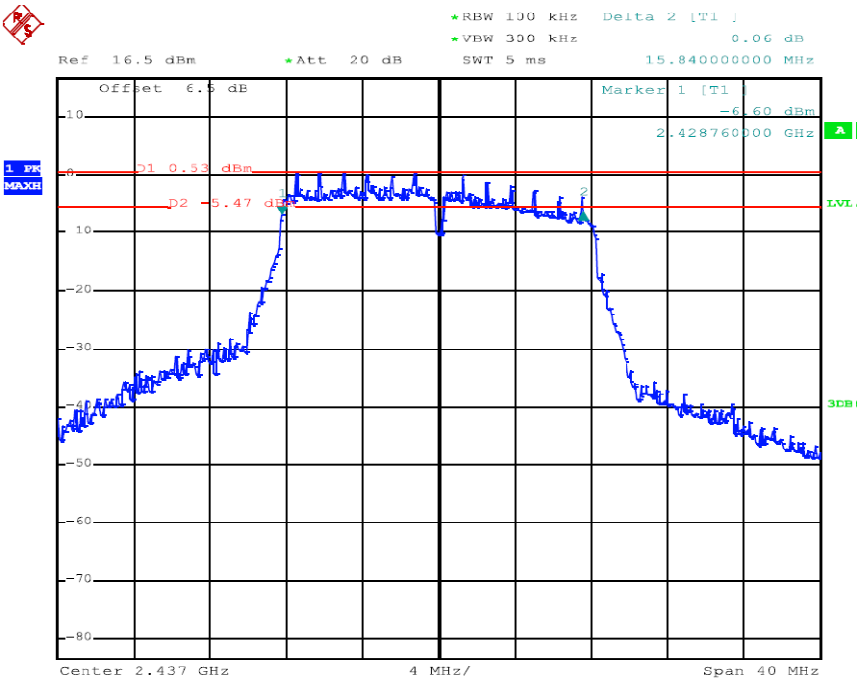
802.11b High Channel



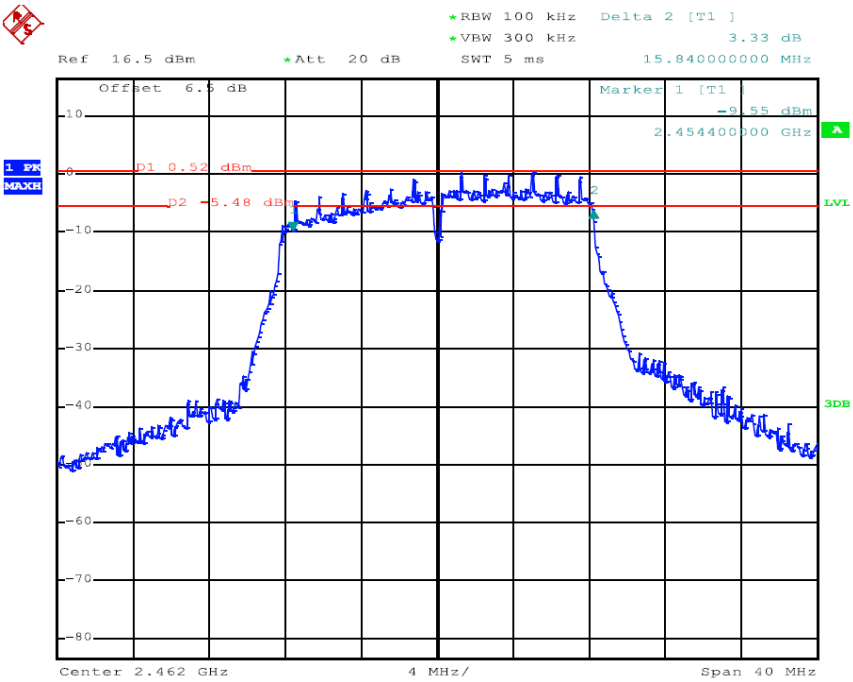

802.11g Low Channel



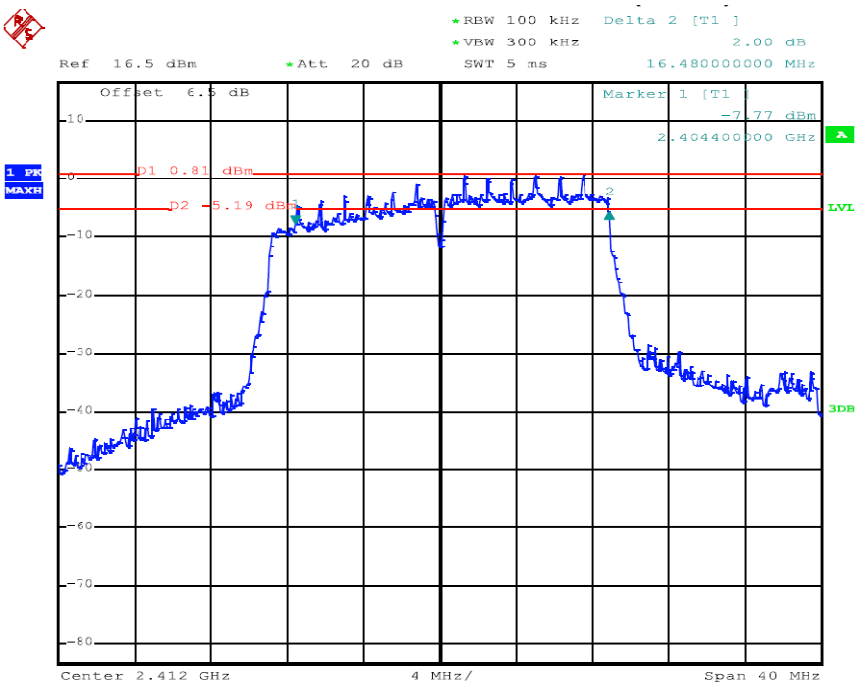
802.11g Middle Channel



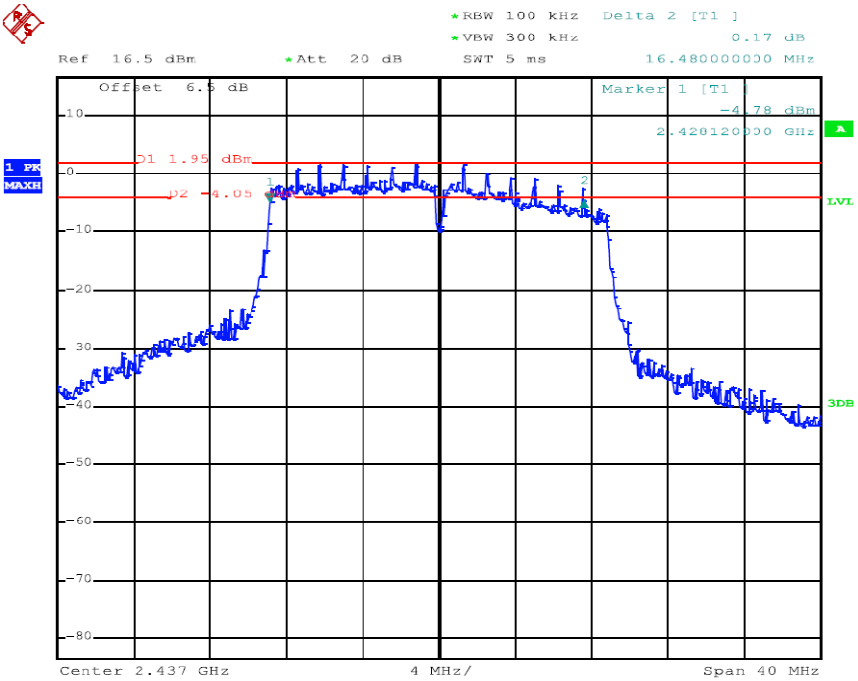

802.11g High Channel



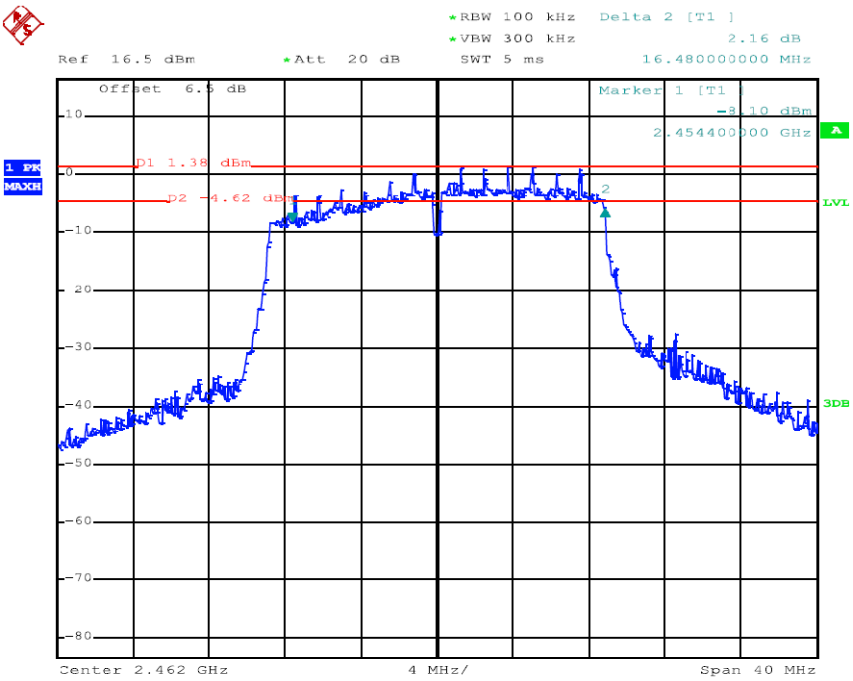
802.11n-HT20 Low Channel




802.11n-HT20 Middle Channel



802.11n-HT20 High Channel



# 10 Maximum Peak Output Power

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : ANSI C63.10:2013

Test Limit : Regulation 15.247 (b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

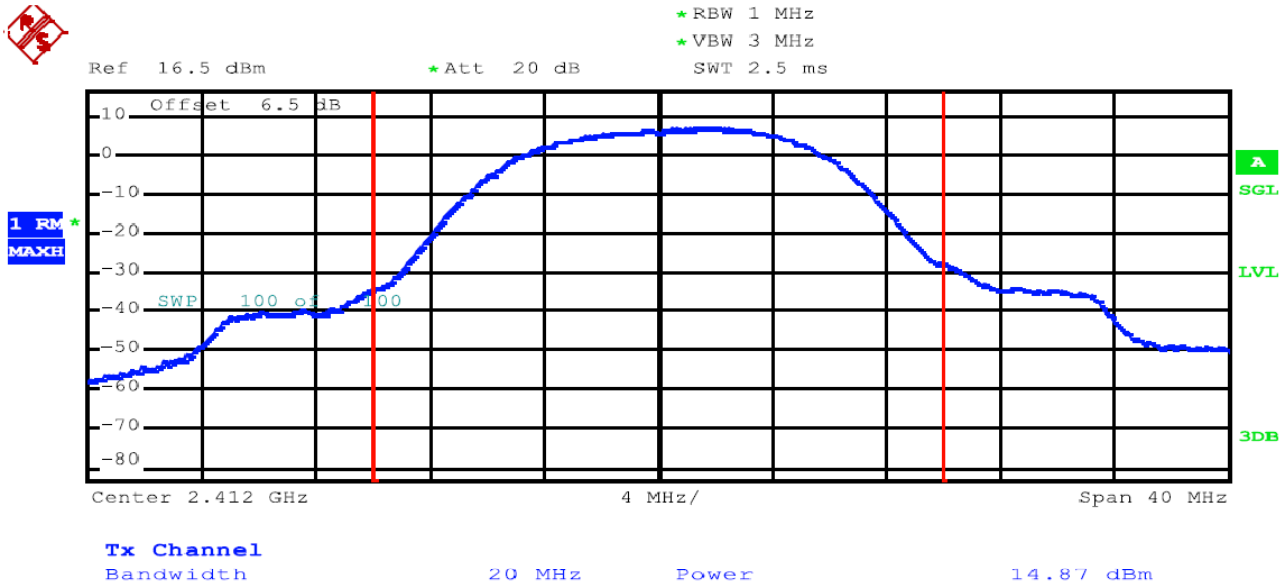
## 10.1 Test Procedure

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

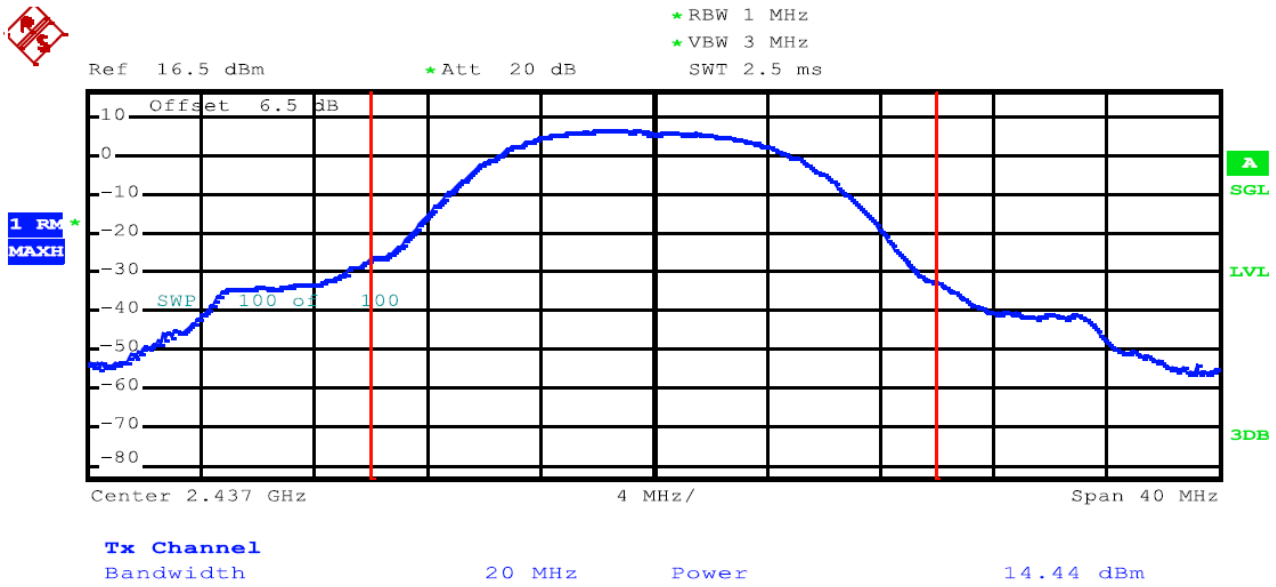
## 10.2 Test Result

| Modulation | Maximum Peak Output Power (dBm) | | | Limit |
|---|---|---|---|---|
| | Low Channel | Middle Channel | High Channel | |
| 802.11b | 14.87 | 14.44 | 14.06 | 1W(30dBm) |
| 802.11g | 12.15 | 12.65 | 13.02 | 1W(30dBm) |
| 802.11n-HT20 | 12.23 | 12.43 | 13.30 | 1W(30dBm) |

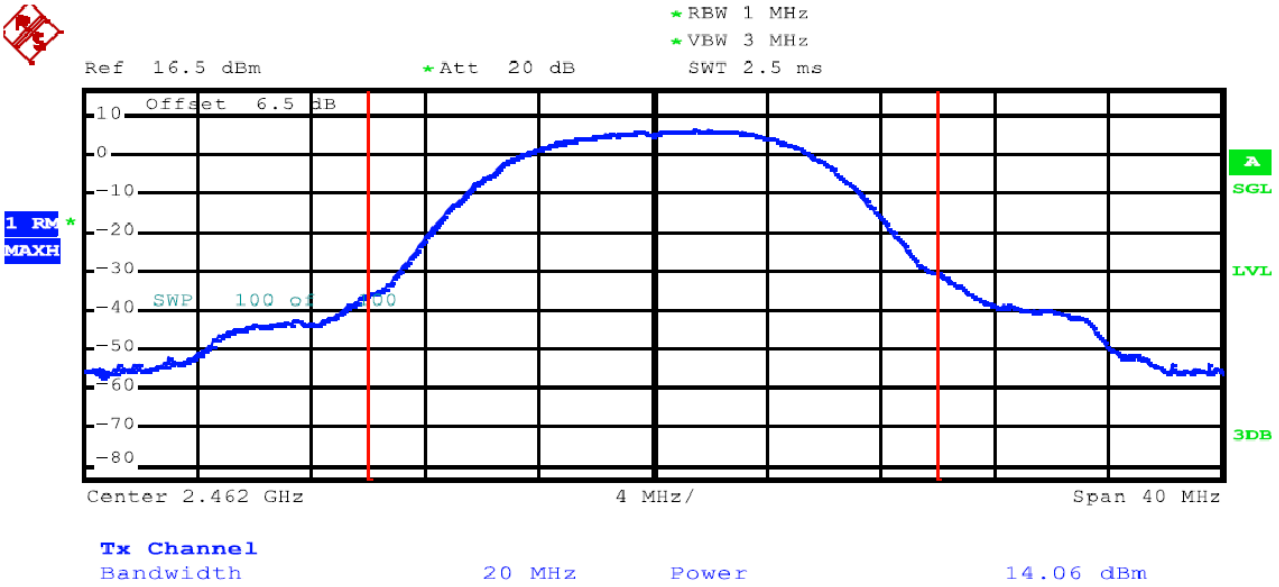
802.11b Low Channel



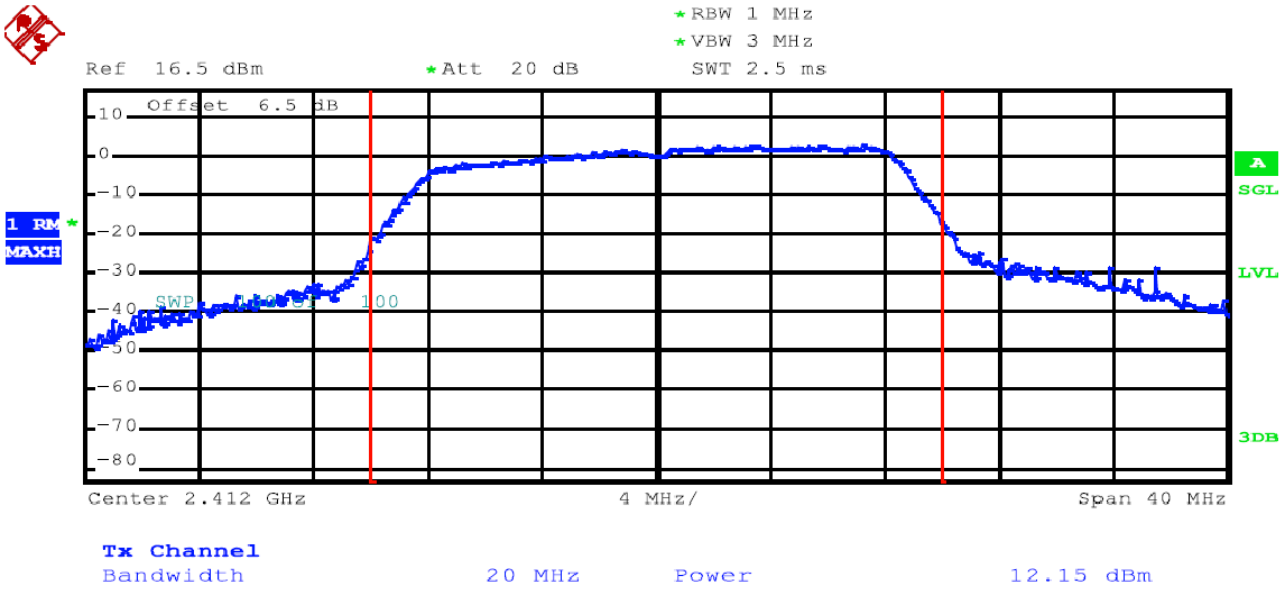

802.11b Middle Channel



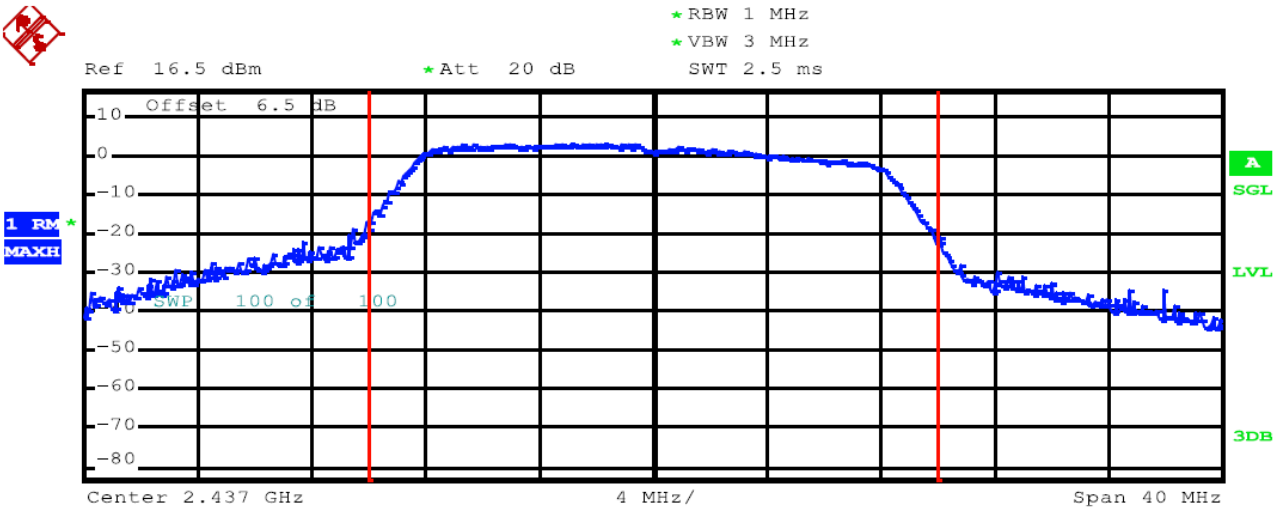
802.11b High Channel




802.11g Low Channel

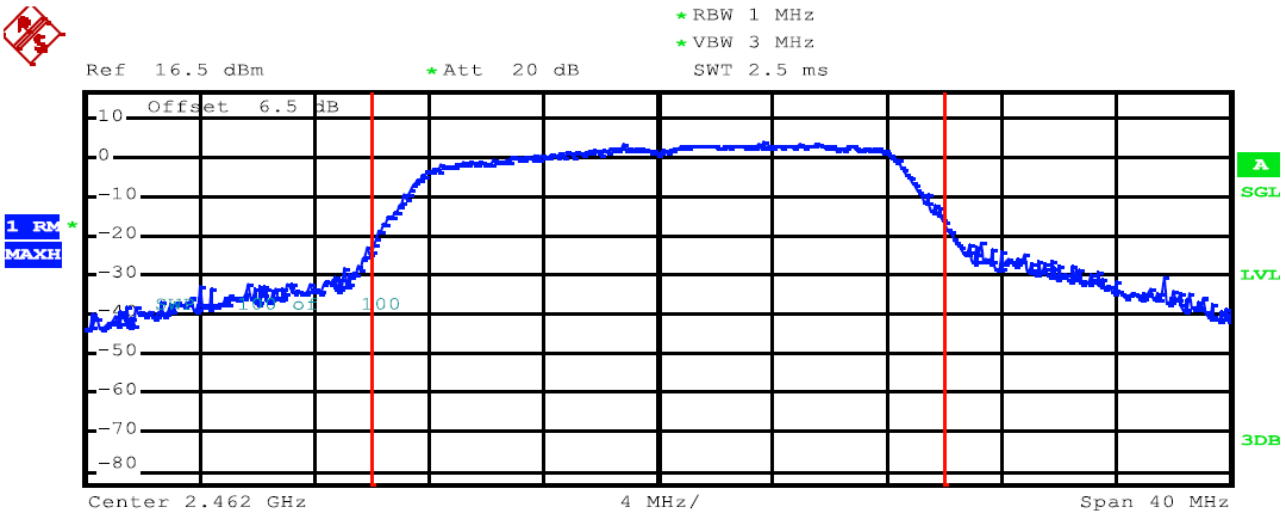


802.11g Middle Channel



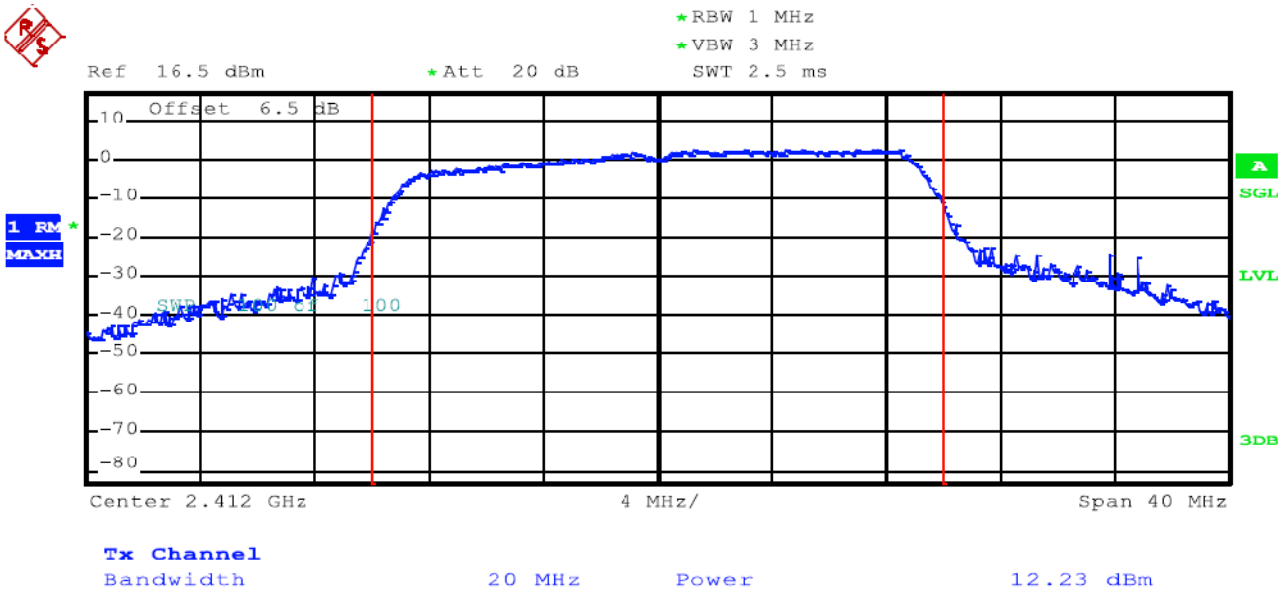

Tx Channel
Bandwidth 20 MHz Power 12.65 dBm

802.11g High Channel

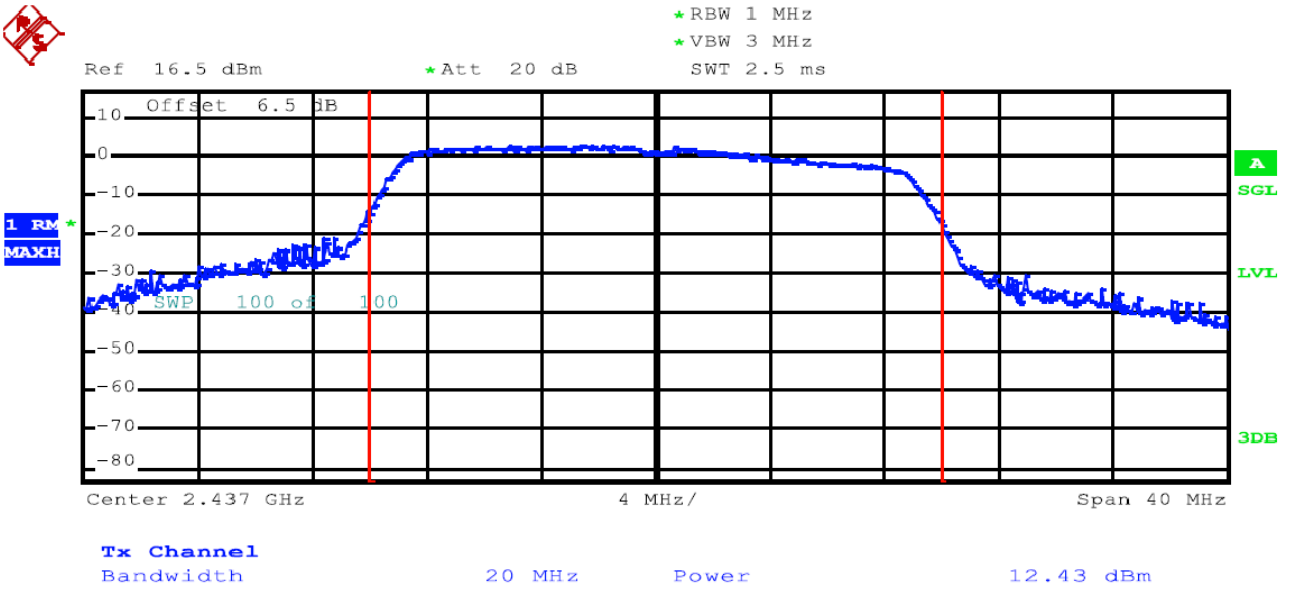



Tx Channel
Bandwidth 20 MHz Power 13.02 dBm

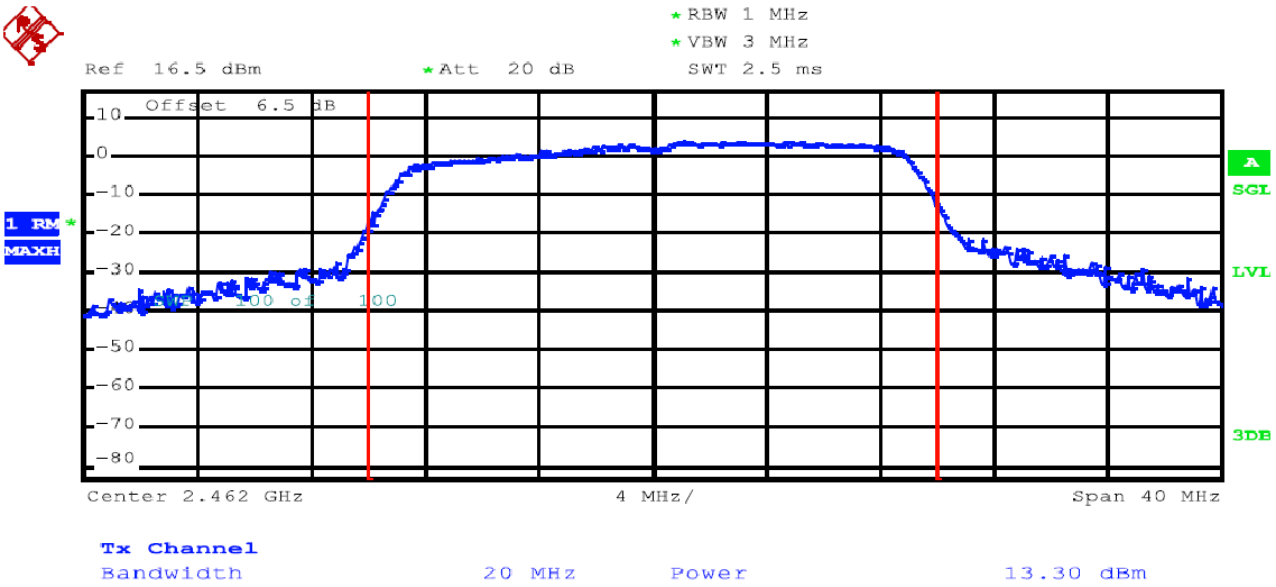
802.11n-HT20 Low Channel




802.11n-HT20 Middle Channel



802.11n-HT20 High Channel



# 11 Power Spectral density

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : ANSI C63.10:2013

Test Limit : Regulation 15.247(f) The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

## 11.1 Test Procedure

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

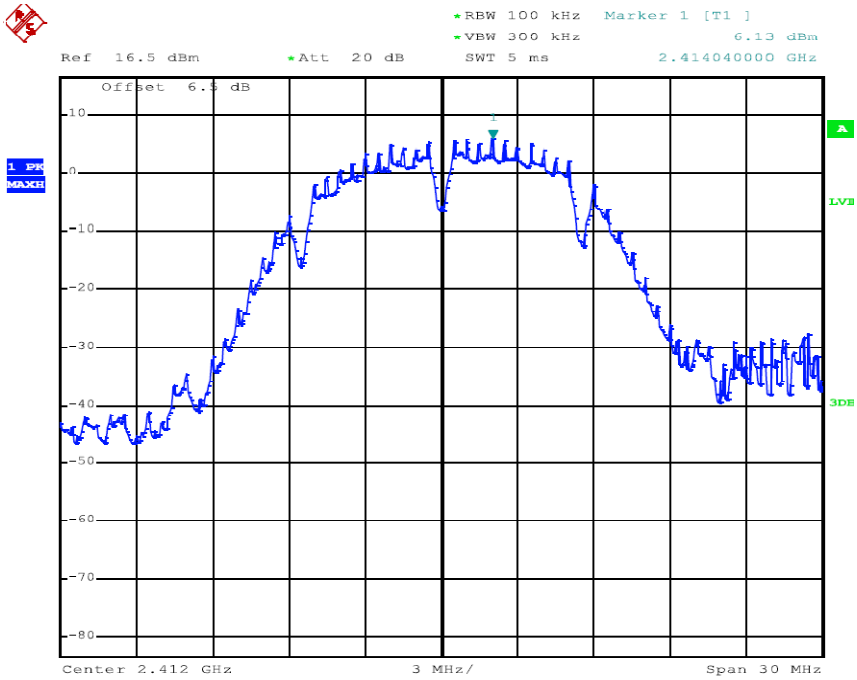
2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

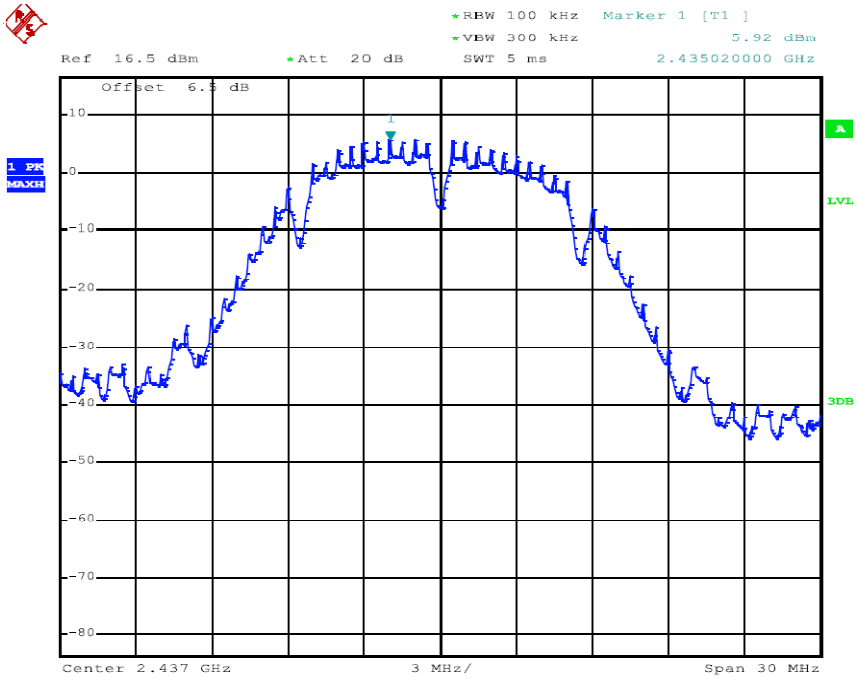
## 11.2 Test Result

| Modulation | Power Spectral density ( dBm/3kHz ) | | | Limit |
|---|---|---|---|---|
| | Low Channel | Middle Channel | High Channel | |
| 802.11b | 6.13 | 5.92 | 6.25 | 8dBm/3kHz |
| 802.11g | 0.43 | 1.96 | 0.74 | 8dBm/3kHz |
| 802.11n-HT20 | 0.57 | 1.89 | 1.23 | 8dBm/3kHz |

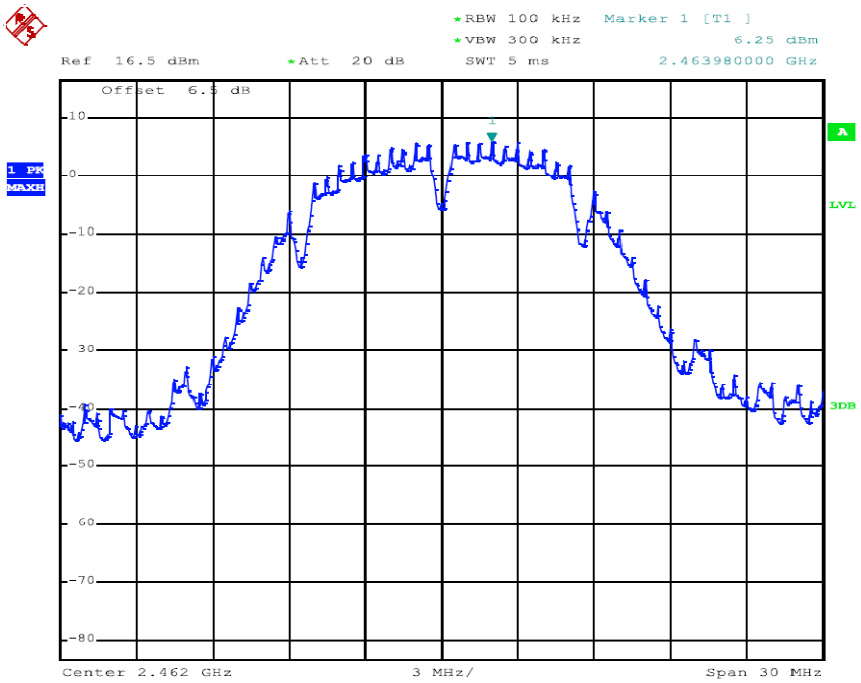
802.11b Low Channel



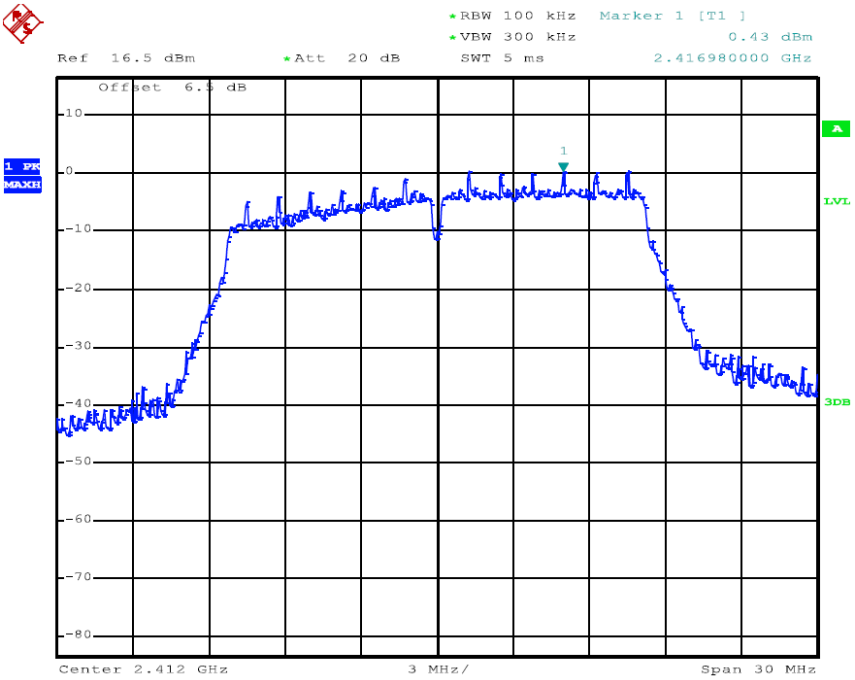

802.11b Middle Channel



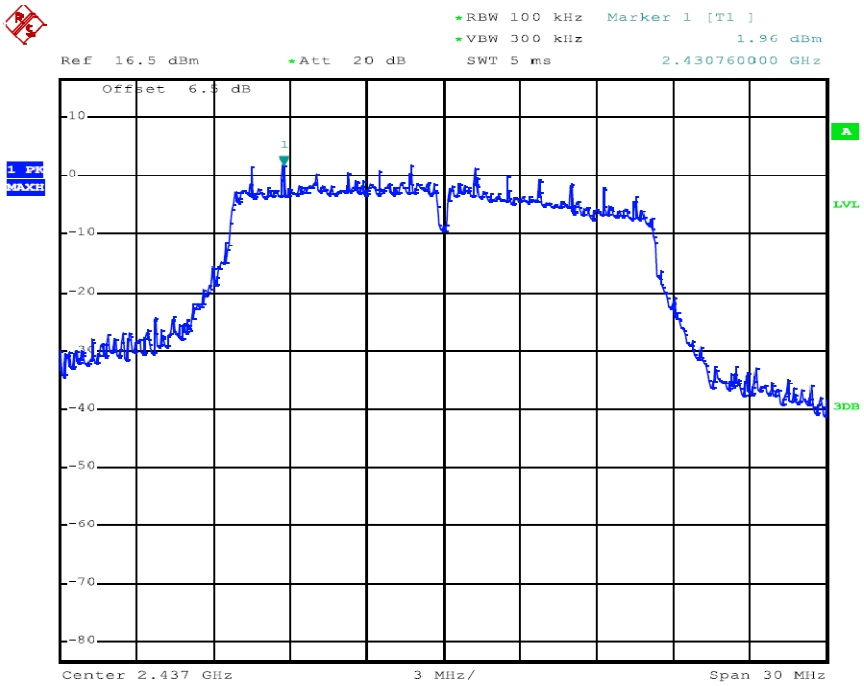
802.11b High Channel



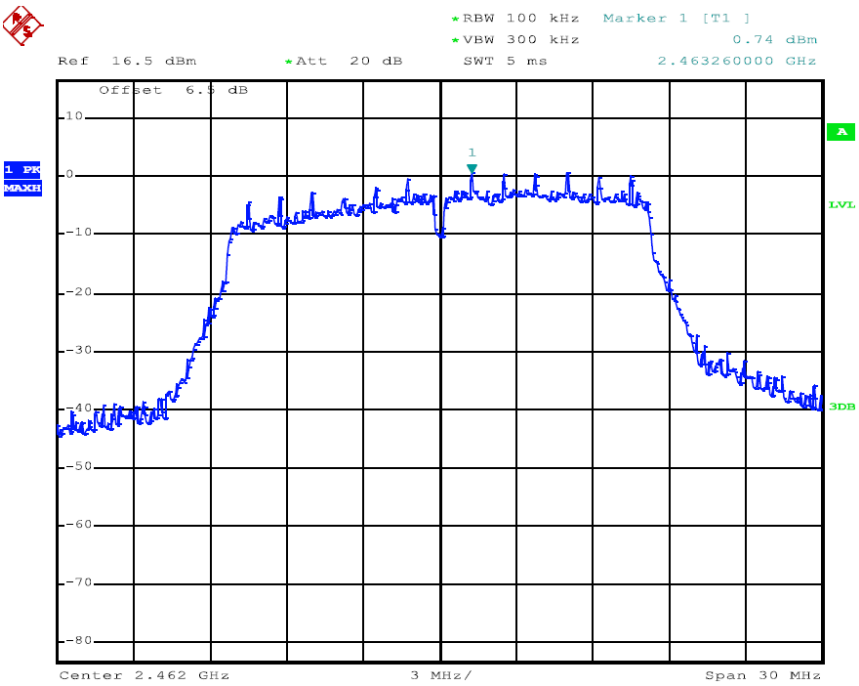

802.11g Low Channel



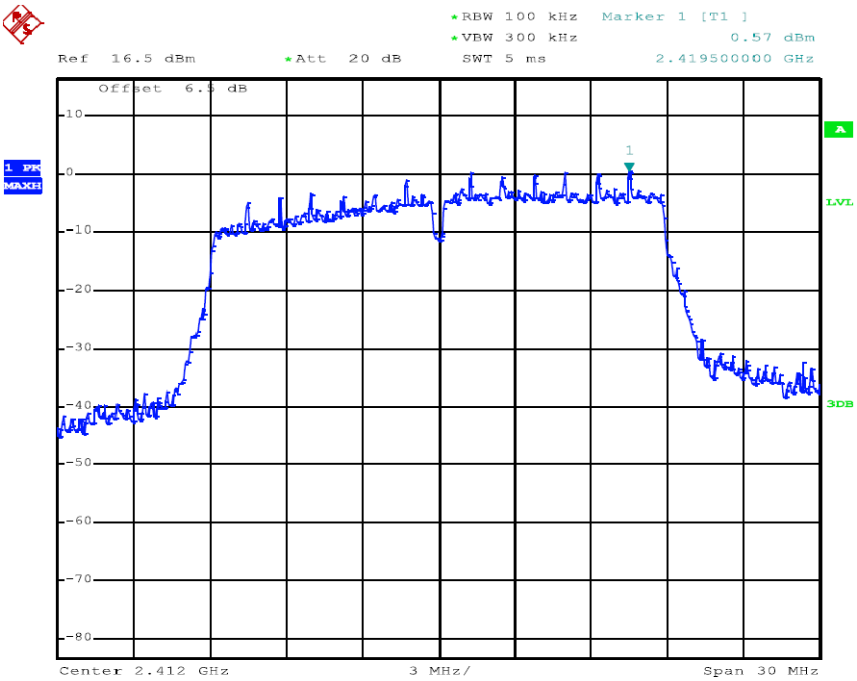
802.11g Middle Channel



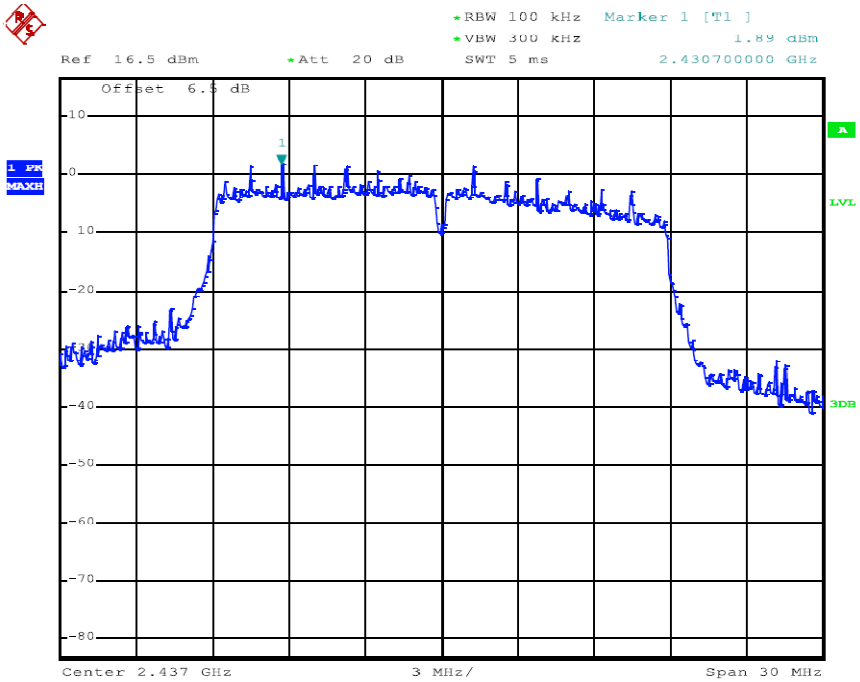

802.11g High Channel



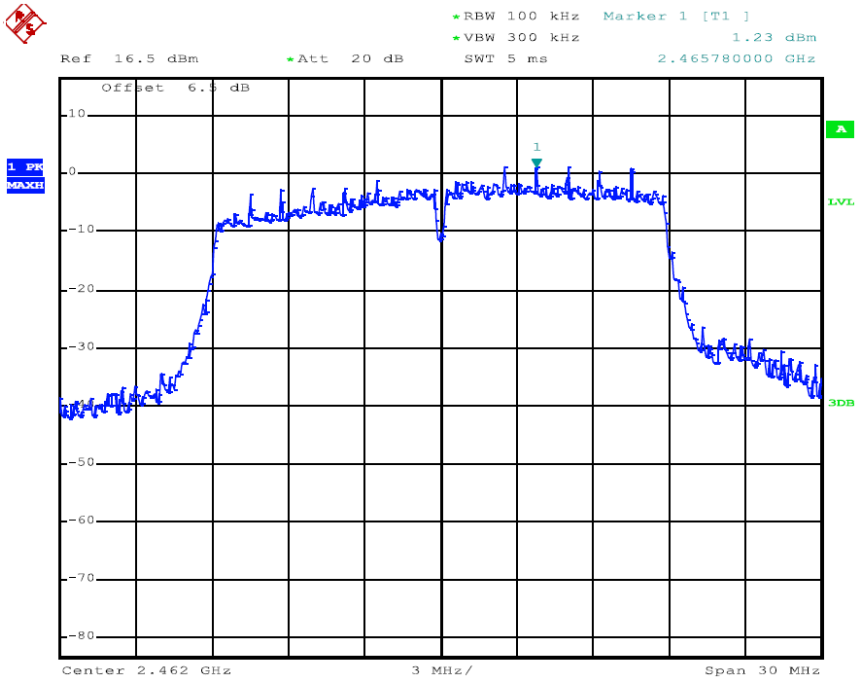
802.11n-HT20 Low Channel




802.11n-HT20 Middle Channel



802.11n-HT20 High Channel



# 12 Antenna Application

## 12.1 Antenna Requirement

For intentional device, according to FCC 47 CFR Section 15.203, 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

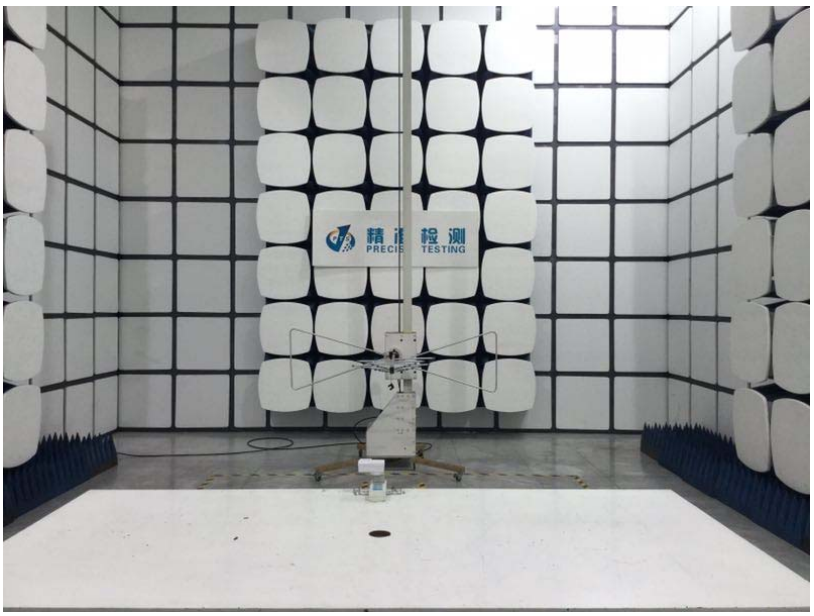
## 12.2 Result

The EUT'S antenna, permanent attached antenna, is internal antenna. The antenna's gain is 3dBi and meets the requirement.

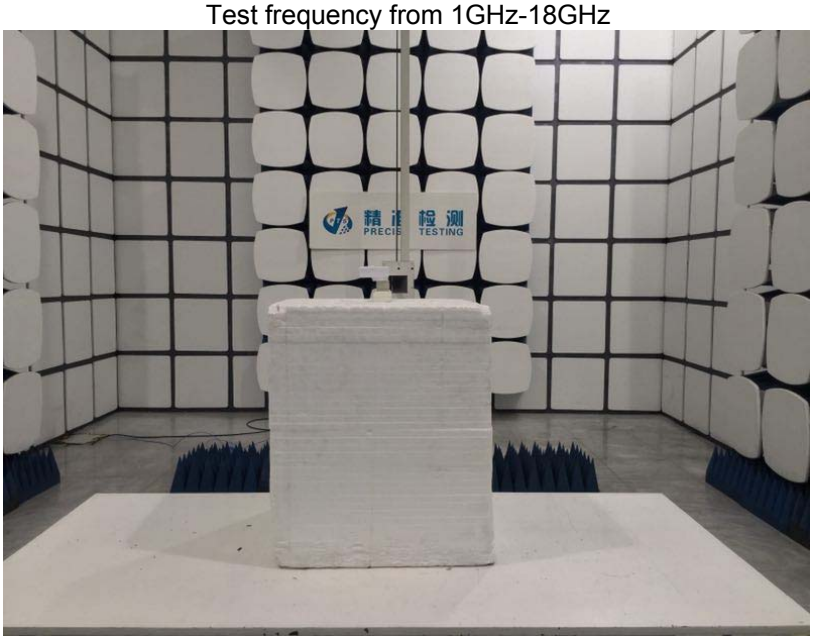
# 13 Test Setup

Conducted Emissions

Radiated Spurious Emissions
From 30MHz-1000MHz

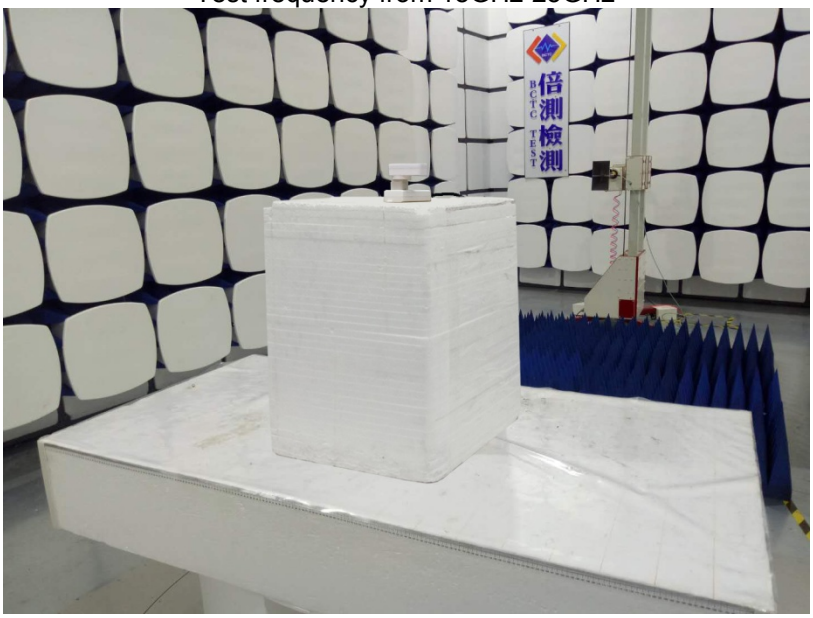


Test frequency from 1GHz-18GHz

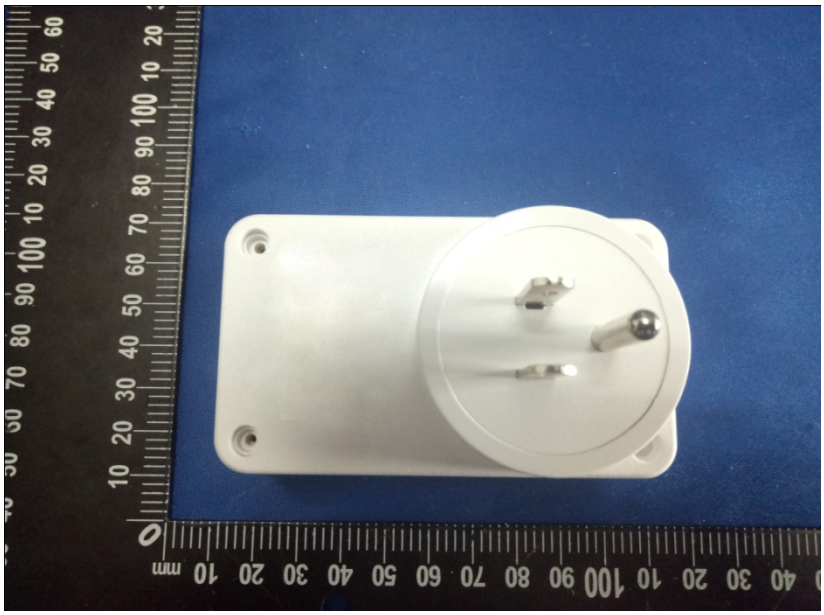


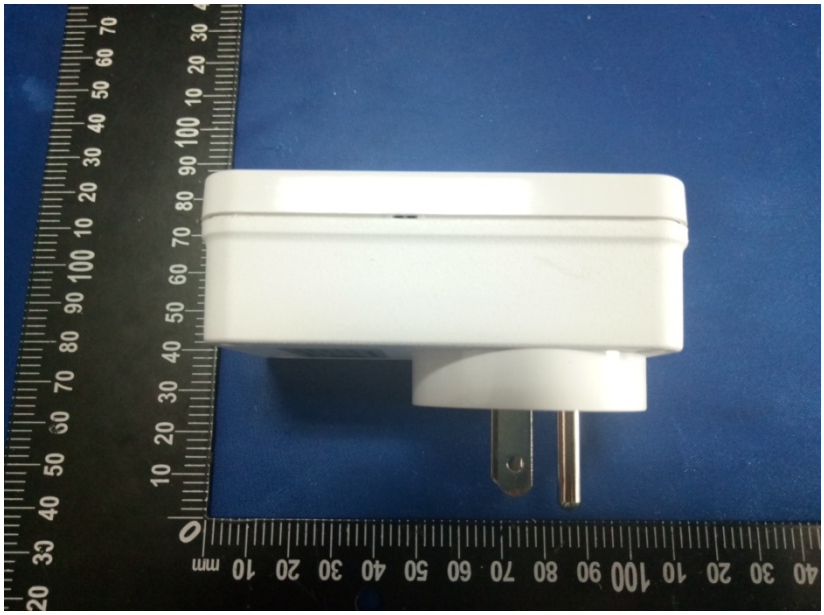

Radiated Spurious Emissions

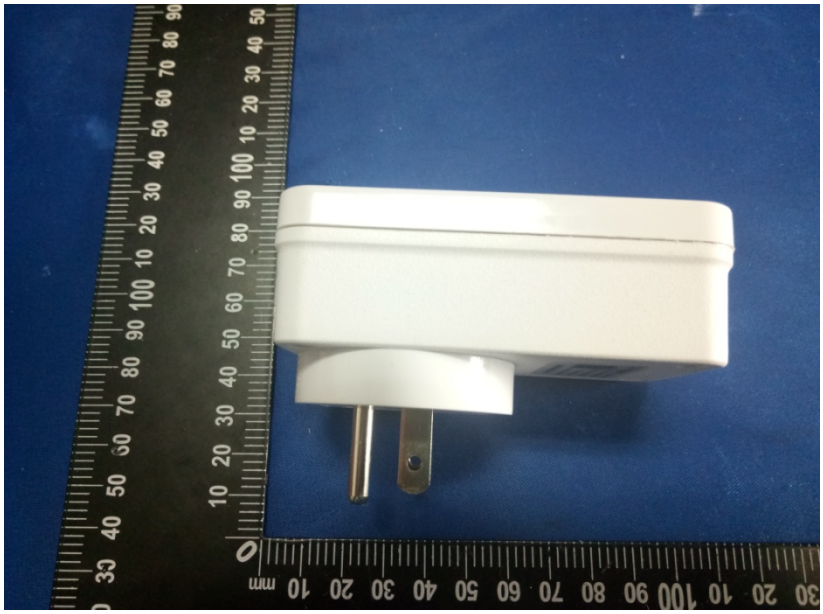
Test frequency from 18GHz-25GHz

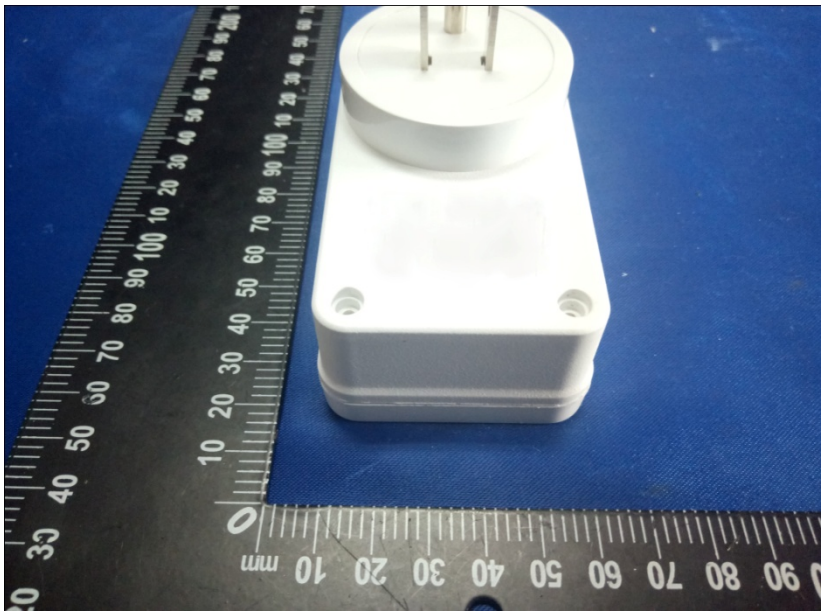


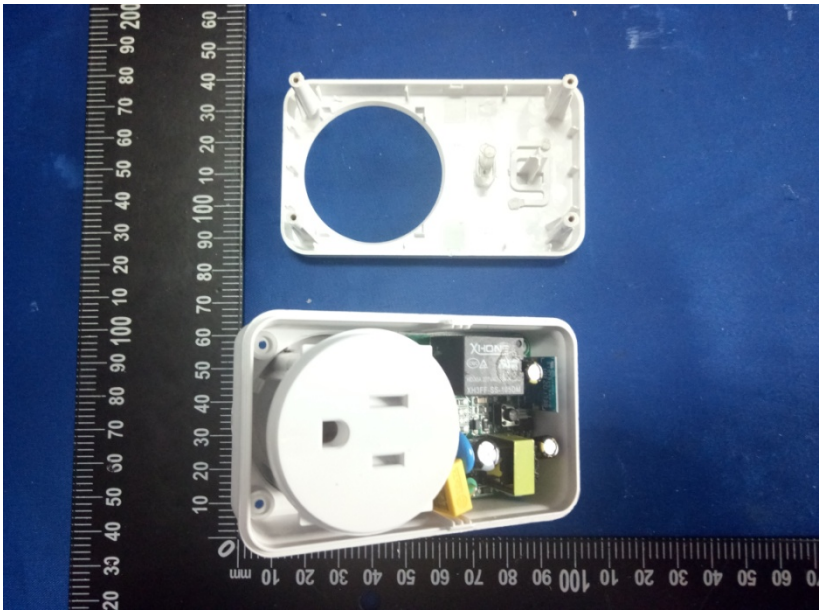
# 14 EUT Photos

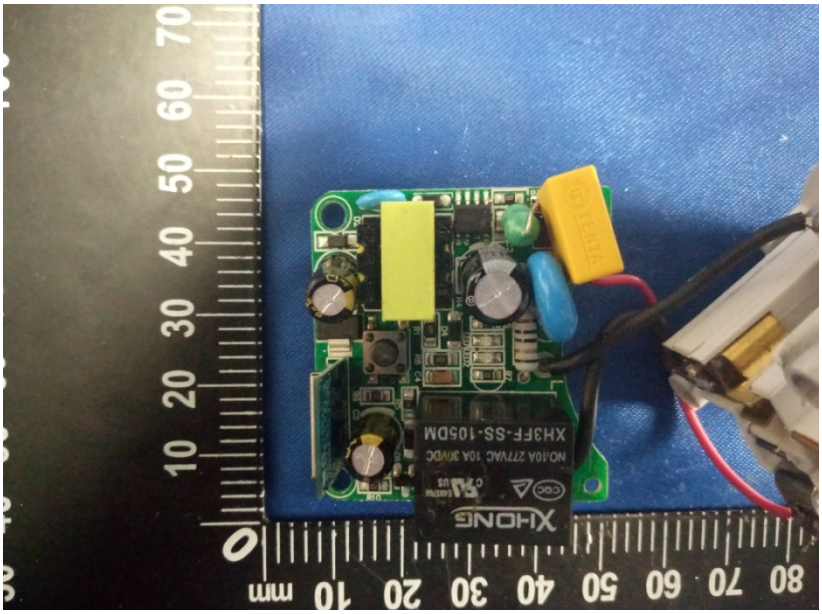











XHONG
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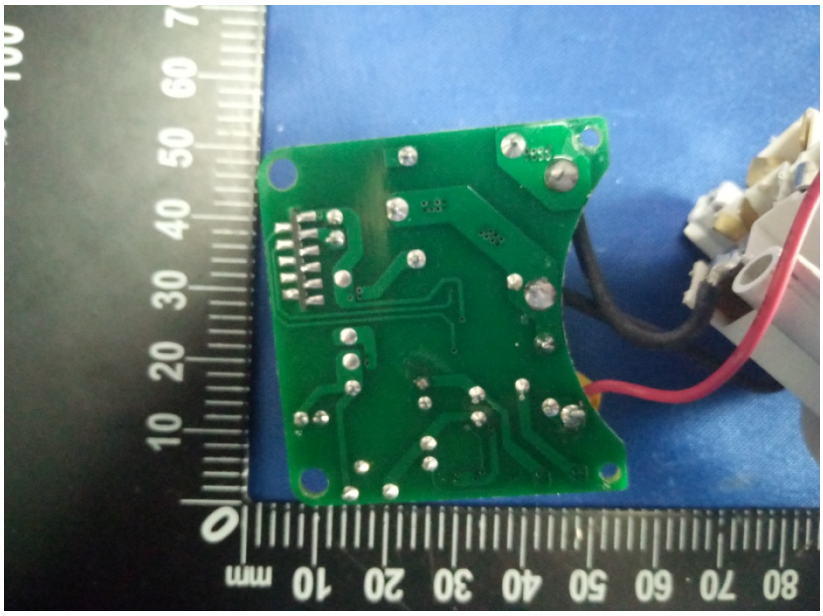
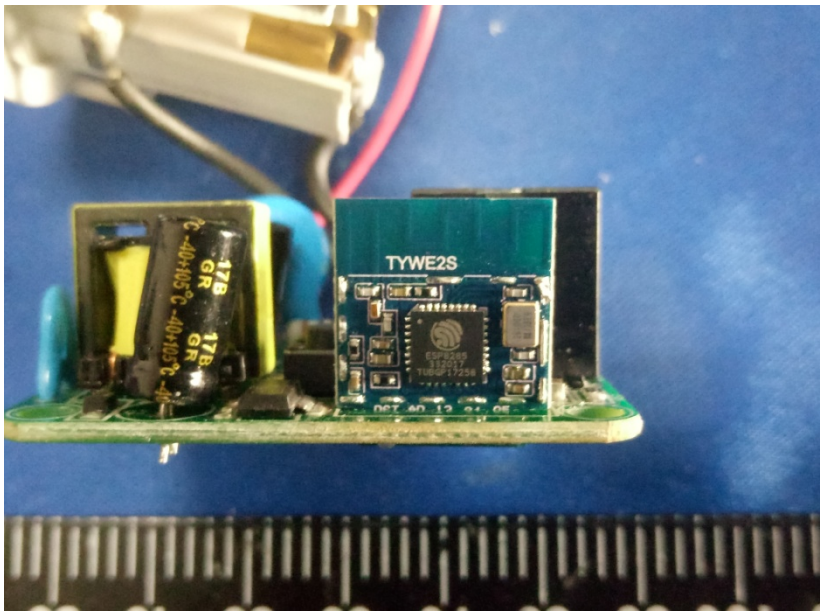
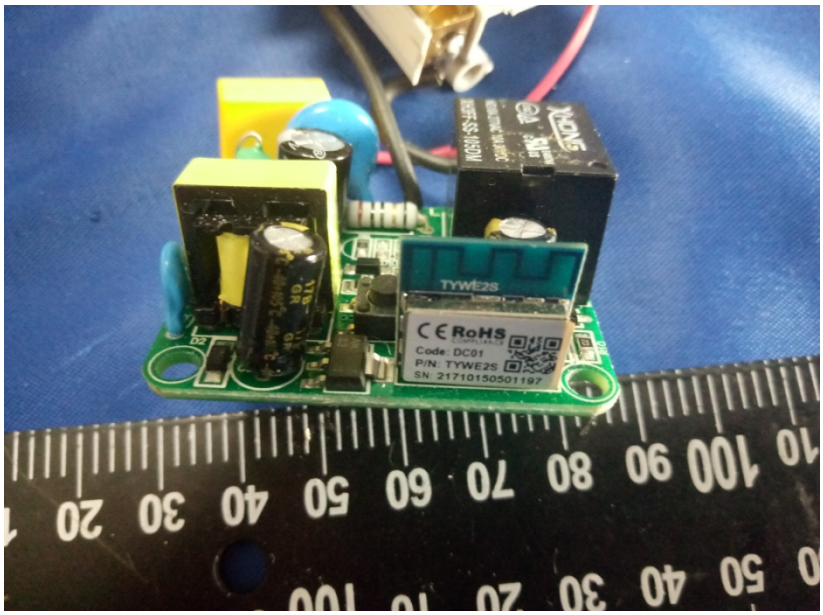
XH3FF-SS-105DM




TYWE2S




********THE END REPORT********