

# FCC PART 15.407

## TEST REPORT

For

### ZIONCOM ELECTRONICS (SHENZHEN) LTD.

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Shajing Street, Baoan District, Shenzhen, China

**FCC ID: X7DIP04336**

|                                        |                                                                                                                                                                                                                                                       |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report | <b>Product Name:</b><br>1200Mbps Smart Home Wi-Fi Router                                                                                                                                                                                              |
| <b>Report Number:</b> RDG171206017-00B |                                                                                                                                                                                                                                                       |
| <b>Report Date:</b> 2017-12-18         |                                                                                                                                                                                                                                                       |
| <b>Reviewed By:</b>                    | Jerry Zhang<br>EMC Manager                                                                                                                                                                                                                            |
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**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

|                                    |                    |                                           |
|------------------------------------|--------------------|-------------------------------------------|
| <b>EUT Name:</b>                   |                    | 1200Mbps Smart Home Wi-Fi Router          |
| <b>EUT Model:</b>                  |                    | T10                                       |
| <b>Multiple Models:</b>            |                    | IP04336                                   |
| <b>FCC ID:</b>                     |                    | X7DIP04336                                |
| <b>Rated Input Voltage:</b>        |                    | DC 12V from Adapter                       |
| <b>Nominal Adapter Information</b> | <b>Model Name:</b> | DCP014E121000U                            |
|                                    | <b>Input:</b>      | 100-240V ~ 50/60Hz 0.5A Max               |
|                                    | <b>Output:</b>     | DC 12V, 1A                                |
| <b>External Dimension:</b>         |                    | Length (8.9cm)*Width (8.9cm)*High (6.8cm) |
| <b>Serial Number:</b>              |                    | 170912023                                 |
| <b>EUT Received Date:</b>          |                    | 2017. 09.12                               |

*Note: The series product, models T10, IP04336 are electrically identical, the differences between them just the model name for marketing purpose, we selected T10 for full test , and please refer to the declaration letter for details.*

### Objective

This type approval report is prepared on behalf of **ZIONCOM ELECTRONICS (SHENZHEN) LTD.** in accordance with Part 2-Subpart J, Part 15-Subparts A, and E of the Federal Communications Commission's rules.

The tests were performed in order to determine compliance with FCC Rules Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

### Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: X7DIP04336.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. And KDB 789033 D02 General U-NII Test Procedures New Rules v01r04

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

**Measurement Uncertainty**

| Parameter                         | Measurement Uncertainty                                                                                                                                    |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Occupied Channel Bandwidth        | ±5 %                                                                                                                                                       |
| RF output power, conducted        | ±0.61dB                                                                                                                                                    |
| Power Spectral Density, conducted | ±0.61 dB                                                                                                                                                   |
| Unwanted Emissions, radiated      | 30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical<br>200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical<br>1G~6GHz: 4.45 dB, 6G~40GHz: 5.23 dB |
| Unwanted Emissions,conducted      | ±1.5 dB                                                                                                                                                    |
| Temperature                       | ±1 °C                                                                                                                                                      |
| Humidity                          | ±5%                                                                                                                                                        |
| DC and low frequency voltages     | ±0.4%                                                                                                                                                      |
| Duty Cycle                        | 1%                                                                                                                                                         |
| AC Power Lines Conducted Emission | 3.12 dB (150 kHz to 30 MHz)                                                                                                                                |

**Test Facility**

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China

Bay Area Compliance Laboratories Corp. (Dongguan) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L5662). And accredited to ISO/IEC 17025 by NVLAP(Test Laboratory Accreditation Certificate Number 500069-0), the FCC Designation No. CN5002 under the KDB 974614 D01.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Bay Area Compliance Laboratories Corp. (Dongguan) was registered with ISED Canada under ISED Canada Registration Number 3062D.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

The system support 802.11a/n ht20/n ht40/ac vht20/ac vht40/ac vht80, the vh20/vht40 were reduced since the identical parameters with 802.11n ht20 and ht40.

For 5150~5250 MHz band, 7 channels are provided to testing:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 36      | 5180            | 44      | 5220            |
| 38      | 5190            | 46      | 5230            |
| 40      | 5200            | 48      | 5240            |
| 42      | 5210            | /       | /               |

802.11a, 802.11n ht20 were tested with Channel 36, 40 and 48,  
802.11n ht40 were tested with Channel 38 and 46.  
802.11ac80 mode was tested with channel 42

For 5725~5850MHz band, 8 channels are provided to testing:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 149     | 5745            | 157     | 5785            |
| 151     | 5755            | 159     | 5795            |
| 153     | 5765            | 161     | 5805            |
| 155     | 5775            | 165     | 5825            |

802.11a, 802.11n ht20 were tested with Channel 149, 157 and 165,  
802.11n ht40 were tested with Channel 151 and 159.  
802.11ac80 mode was tested with channel 155.

The device supports SISO and MIMO at 802.11n ht20/n ht40/AC80 mode, per pre-test, MIMO mode was the worst and reported.

### EUT Exercise Software

The software “MP\_TEST.exe” was used for testing, which was provided by manufacturer. The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations. The maximum power was configured as below table, that provided by the manufacturer:

**5150-5250MHz:**

| Chain 0/ Chain 1    |                       |             |         |         |
|---------------------|-----------------------|-------------|---------|---------|
| Test Mode           | Test Software Version | MP_TEST.exe |         |         |
| <b>802.11a</b>      | Test Frequency        | 5180MHz     | 5200MHz | 5240MHz |
|                     | Data Rate             | OFDM 6M     | OFDM 6M | OFDM 6M |
|                     | Power Level Setting   | 33/29       | 37/34   | 37/34   |
| <b>802.11n ht20</b> | Test Frequency        | 5180MHz     | 5200MHz | 5240MHz |
|                     | Data Rate             | MCS0        | MCS0    | MCS0    |
|                     | Power Level Setting   | 33/30       | 33/32   | 33/32   |
| <b>802.11n ht40</b> | Test Frequency        | 5190MHz     | /       | 5230MHz |
|                     | Data Rate             | MCS0        | /       | MCS0    |
|                     | Power Level Setting   | 29/33       | /       | 35/32   |
| <b>802.11ac80</b>   | Test Frequency        | /           | 5210MHz | /       |
|                     | Data Rate             | /           | MCS0    | /       |
|                     | Power Level Setting   | /           | 29/33   | /       |

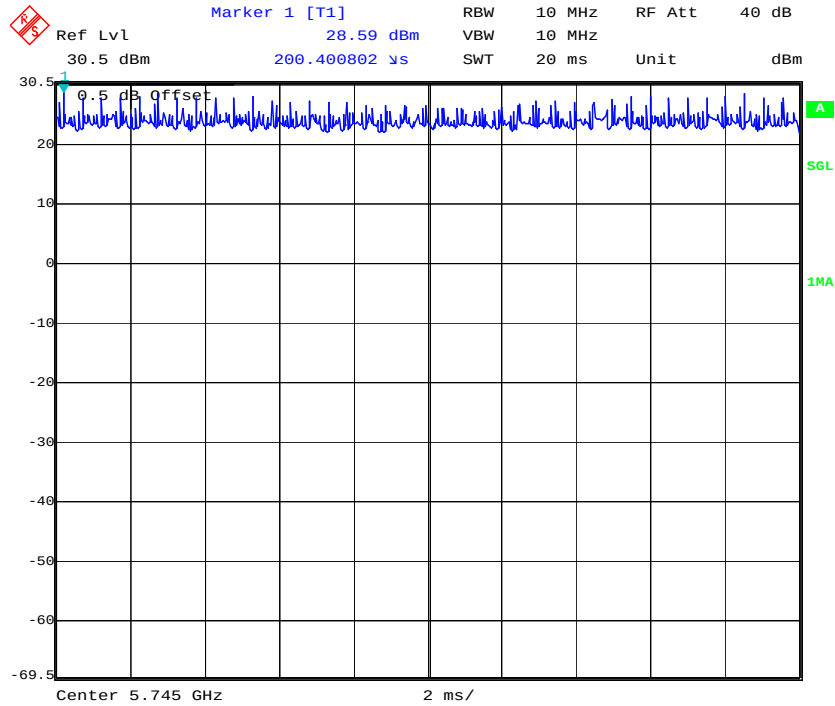
**5725-5850MHz:**

| Chain 0/ Chain 1    |                       |             |         |         |
|---------------------|-----------------------|-------------|---------|---------|
| Test Mode           | Test Software Version | MP_TEST.exe |         |         |
| <b>802.11a</b>      | Test Frequency        | 5745MHz     | 5785MHz | 5825MHz |
|                     | Data Rate             | OFDM 6M     | OFDM 6M | OFDM 6M |
|                     | Power Level Setting   | 39/33       | 39/41   | 39/41   |
| <b>802.11n ht20</b> | Test Frequency        | 5745MHz     | 5785MHz | 5825MHz |
|                     | Data Rate             | MCS0        | MCS0    | MCS0    |
|                     | Power Level Setting   | 37/33       | 37/40   | 37/33   |
| <b>802.11n ht40</b> | Test Frequency        | 5755MHz     | /       | 5795MHz |
|                     | Data Rate             | MCS0        | /       | MCS0    |
|                     | Power Level Setting   | 39/33       | /       | 39/33   |
| <b>802.11ac80</b>   | Test Frequency        | /           | 5775MHz | /       |
|                     | Data Rate             | /           | MCS0    | /       |
|                     | Power Level Setting   | /           | 39/33   | /       |

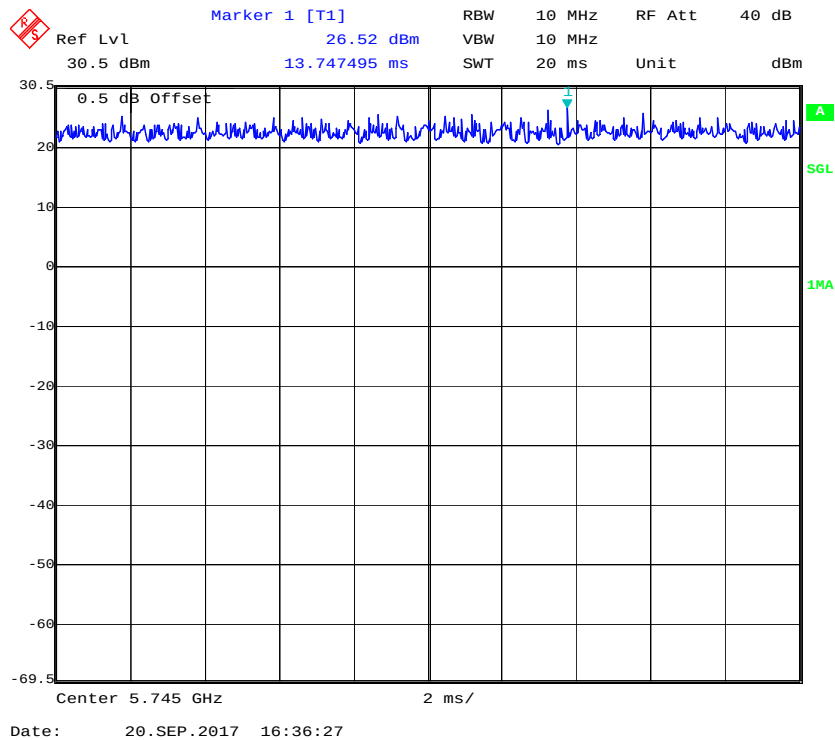
The duty cycle as below:

| Mode         | T <sub>on</sub><br>(ms) | T <sub>on+off</sub><br>(ms) | Duty Cycle<br>(%) |
|--------------|-------------------------|-----------------------------|-------------------|
| 802.11a      | 20                      | 20                          | 100               |
| 802.11n ht20 | 20                      | 20                          | 100               |
| 802.11n ht40 | 20                      | 20                          | 100               |
| 802.11ac80   | 20                      | 20                          | 100               |

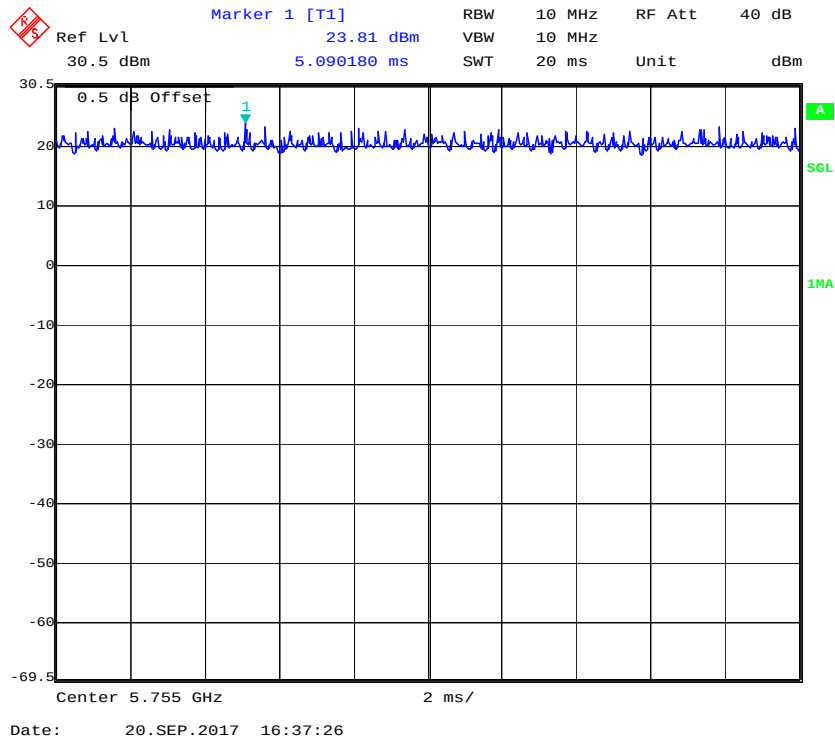
### 802.11a mode



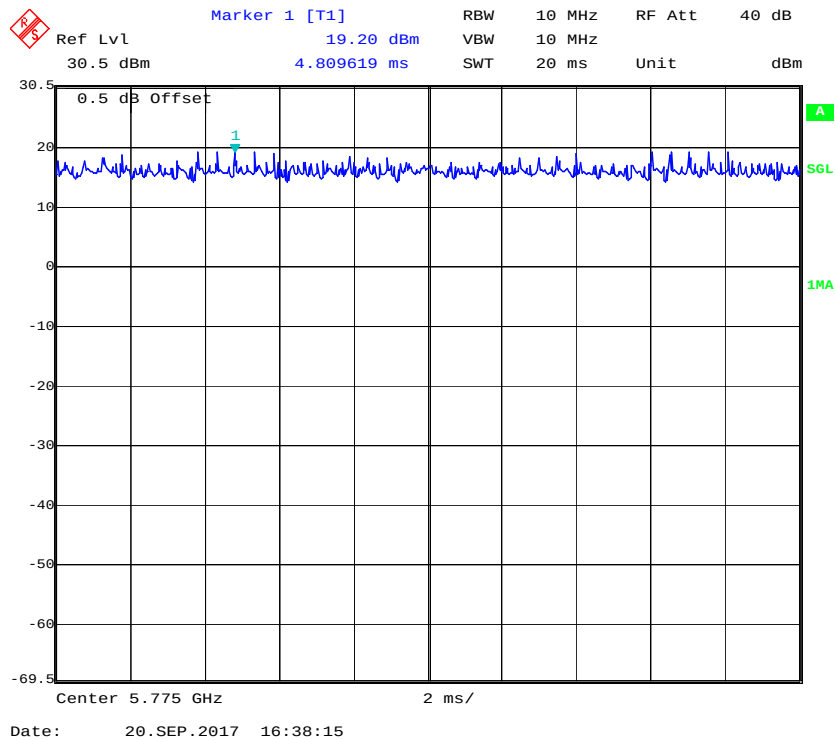
### 802.11n ht20 mode



### 802.11n ht40 mode



### 802.11ac80 mode



## Equipment Modifications

No modification was made to the EUT.

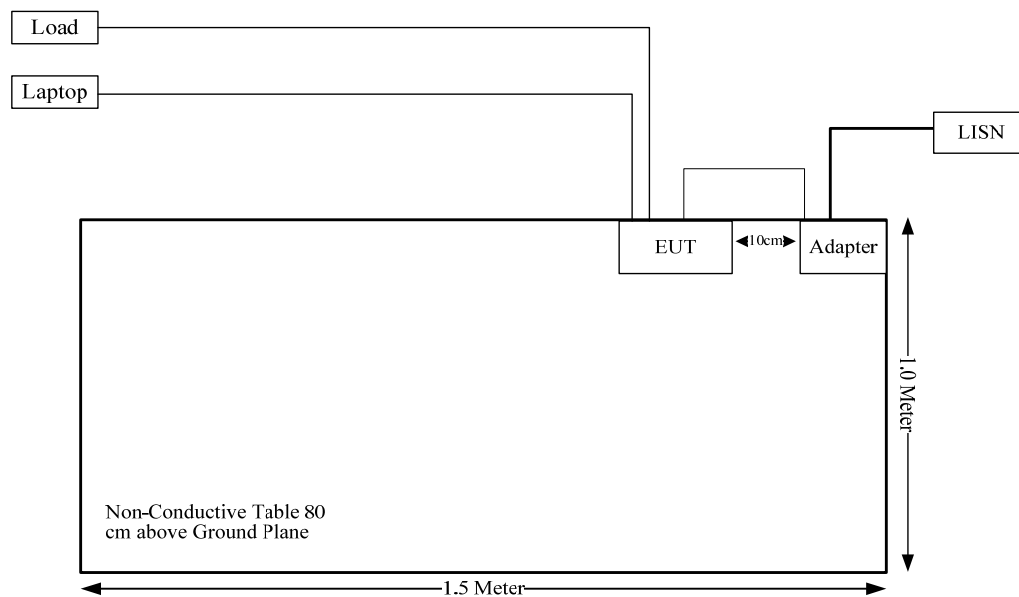
## Local Support Equipment List and Details

| Manufacturer | Description | Model | Serial Number |
|--------------|-------------|-------|---------------|
| DELL         | Laptop      | PP11L | QDS-BRCM1017  |

## Support Cable List and Details

| Cable Description | Shielding Type | Ferrite Core | Length (m) | From Port           | To   |
|-------------------|----------------|--------------|------------|---------------------|------|
| RJ45 Cable        | yes            | No           | 10         | RJ45 Port of Laptop | EUT  |
| RJ45 Cable*2      | yes            | No           | 10         | EUT                 | Load |
| Adapter Cable     | No             | No           | 1.36       | Adapter             | EUT  |

## Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

| <b>FCC Rules</b>                    | <b>Description of Test</b>             | <b>Result</b> |
|-------------------------------------|----------------------------------------|---------------|
| FCC §15.407 (f) & §1.1310 & §2.1091 | Maximum Permissible Exposure (MPE)     | Compliance    |
| §15.203                             | Antenna Requirement                    | Compliance    |
| §15.407(b)(6)& §15.207(a)           | Conducted Emissions                    | Compliance    |
| §15.205& §15.209 & §15.407(b)       | Undesirable Emission& Restricted Bands | Compliance    |
| §15.407(b)                          | Out Of Band Emissions                  | Compliance    |
| §15.407(a) (e)                      | Emission Bandwidth                     | Compliance    |
| §15.407(g)                          | Frequency Stability                    | Compliance    |
| §15.407(a)                          | Conducted Transmitter Output Power     | Compliance    |
| §15.407 (a)                         | Power Spectral Density                 | Compliance    |

## FCC §15.407 (f) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### Applicable Standard

According to subpart 15.407(f) and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

| (B) Limits for General Population/Uncontrolled Exposure |                               |                               |                                     |                          |
|---------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| Frequency Range (MHz)                                   | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (minutes) |
| 0.3–1.34                                                | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34–30                                                 | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 30                       |
| 30–300                                                  | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300–1500                                                | /                             | /                             | f/1500                              | 30                       |
| 1500–100,000                                            | /                             | /                             | 1.0                                 | 30                       |

f = frequency in MHz; \* = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

### Calculation formula:

Prediction of power density at the distance of the applicable MPE limit

$S = PG/4\pi R^2$  = power density (in appropriate units, e.g. mW/cm<sup>2</sup>);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

**Calculated Data:**

| Frequency Band | Antenna Gain |           | Output Power including Turn-Up tolerance |        | Evaluation Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) |
|----------------|--------------|-----------|------------------------------------------|--------|--------------------------|-------------------------------------|---------------------------------|
|                | (dBi)        | (numeric) | (dBm)                                    | (mW)   |                          |                                     |                                 |
| 2.4GHz         | 2            | 1.58      | 29                                       | 794.33 | 20.00                    | 0.25                                | 1.0                             |
| 5GHz           | 2            | 1.58      | 21                                       | 125.89 | 20.00                    | 0.04                                | 1.0                             |

The 2.4GHz and 5GHz band can transmit simultaneously:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$$=S_{2.4}/S_{limit-2.4} + S_5/S_{limit-5}$$

$$=0.25/1+0.04/1$$

$$=0.29$$

$$< 1.0$$

**Result:** The device meet FCC MPE at 20 cm distance

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## **FCC §15.203 – ANTENNA REQUIREMENT**

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### **Applicable Standard**

According to § 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. 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.

And according to FCC 47 CFR section 15.407 (a)(1), if transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **Antenna Connector Construction**

The EUT have 2 internal antennas for 2.4G Band and 5G band, both antenna gains are 2dBi in 2.4G and 5G band. Please refer to the EUT photo.

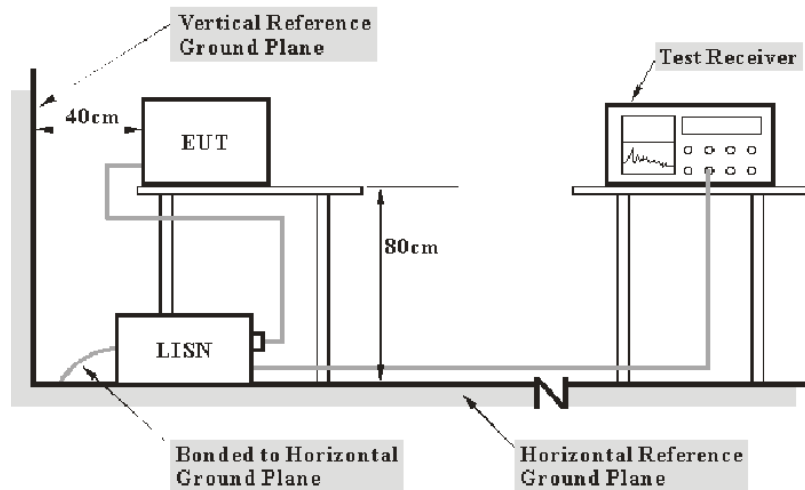
**Result:** Compliance.

## FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

### Applicable Standard

FCC §15.207(a), §15.407(b) (6).

### EUT Setup



Note: 1. Support units were connected to second LISN.  
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to the main lisn with a 120 V/60 Hz AC power source.

### EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

| Frequency Range  | IF B/W |
|------------------|--------|
| 150 kHz – 30 MHz | 9 kHz  |

## Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

$V_C$  (cord. Reading): corrected voltage amplitude

$V_R$ : reading voltage amplitude

$A_C$ : attenuation caused by cable loss

VDF: voltage division factor of AMN

$C_f$ : Correction Factor

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Equipment List and Details

| Manufacturer | Description        | Model   | Serial Number | Calibration Date | Calibration Due Date |
|--------------|--------------------|---------|---------------|------------------|----------------------|
| R&S          | EMI Test Receiver  | ESCS 30 | 830245/006    | 2016-12-08       | 2017-12-08           |
| R&S          | L.I.S.N            | ESH2-Z5 | 892107/021    | 2017-09-25       | 2018-09-25           |
| R&S          | Two-line V-network | ENV 216 | 3560.6550.12  | 2016-12-08       | 2017-12-08           |
| R&S          | Test Software      | EMC32   | Version8.53.0 | N/A              | N/A                  |
| N/A          | Coaxial Cable      | 2m      | C0200/01      | 2017-09-05       | 2018-09-05           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Procedure

During the conducted emission test, the adapter was connected to the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

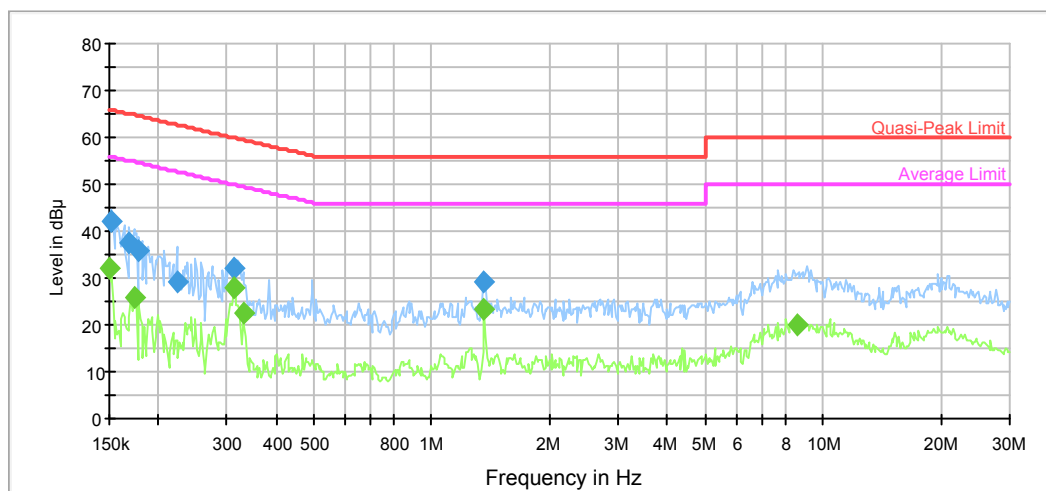
**Test Data****Environmental Conditions**

|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 27.3°C   |
| <b>Relative Humidity:</b> | 46 %     |
| <b>ATM Pressure:</b>      | 100.4kPa |

The testing was performed by Gaochao Gong on 2017-09-25.

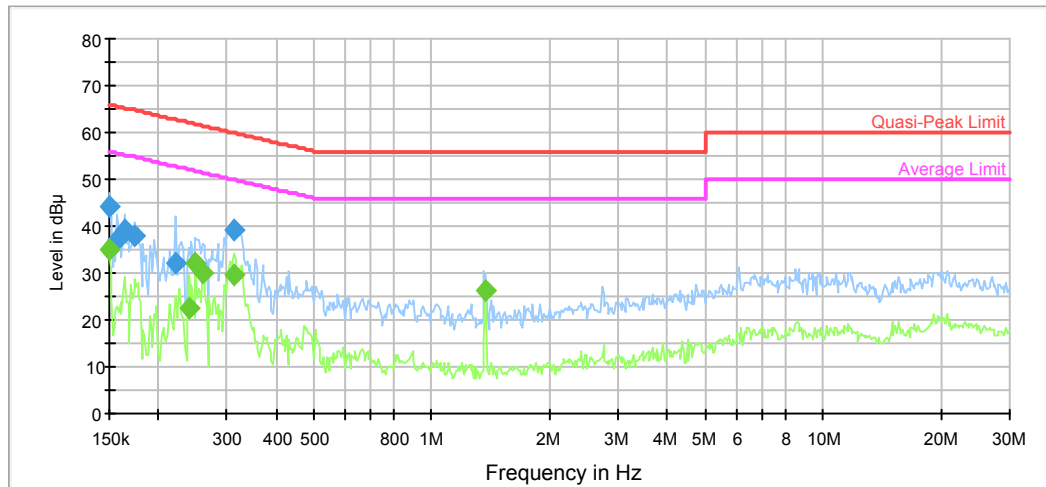
Test Mode: Transmitting

AC120 V, 60 Hz, Line:



| Frequency (MHz) | QuasiPeak (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment    |
|-----------------|------------------|-----------------|------|------------|-------------|--------------|------------|
| 0.152410        | 42.0             | 9.000           | L1   | 11.2       | 23.9        | 65.9         | Compliance |
| 0.169044        | 37.7             | 9.000           | L1   | 10.9       | 27.3        | 65.0         | Compliance |
| 0.178741        | 35.9             | 9.000           | L1   | 10.8       | 28.6        | 64.5         | Compliance |
| 0.223418        | 29.1             | 9.000           | L1   | 10.5       | 33.6        | 62.7         | Compliance |
| 0.312220        | 32.1             | 9.000           | L1   | 10.1       | 27.8        | 59.9         | Compliance |
| 1.363512        | 29.2             | 9.000           | L1   | 9.7        | 26.8        | 56.0         | Compliance |

| Frequency (MHz) | Average (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment    |
|-----------------|----------------|-----------------|------|------------|-------------|--------------|------------|
| 0.150000        | 32.3           | 9.000           | L1   | 11.2       | 23.7        | 56.0         | Compliance |
| 0.173134        | 25.9           | 9.000           | L1   | 10.9       | 28.9        | 54.8         | Compliance |
| 0.312220        | 27.8           | 9.000           | L1   | 10.1       | 22.1        | 49.9         | Compliance |
| 0.330129        | 22.6           | 9.000           | L1   | 10.1       | 26.8        | 49.4         | Compliance |
| 1.363512        | 23.2           | 9.000           | L1   | 9.7        | 22.8        | 46.0         | Compliance |
| 8.590963        | 19.8           | 9.000           | L1   | 9.9        | 30.2        | 50.0         | Compliance |

**AC120 V, 60 Hz, Neutral:**

| frequency (MHz) | QuasiPeak (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment    |
|-----------------|------------------|-----------------|------|------------|-------------|--------------|------------|
| 0.150000        | 44.2             | 9.000           | N    | 11.2       | 21.8        | 66.0         | Compliance |
| 0.157346        | 37.2             | 9.000           | N    | 11.1       | 28.4        | 65.6         | Compliance |
| 0.163741        | 39.0             | 9.000           | N    | 11.0       | 26.3        | 65.3         | Compliance |
| 0.174519        | 37.9             | 9.000           | N    | 10.9       | 26.8        | 64.7         | Compliance |
| 0.221645        | 32.3             | 9.000           | N    | 10.5       | 30.5        | 62.8         | Compliance |
| 0.312220        | 39.1             | 9.000           | N    | 10.1       | 20.8        | 59.9         | Compliance |

| Frequency (MHz) | Average (dBμV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment    |
|-----------------|----------------|-----------------|------|------------|-------------|--------------|------------|
| 0.150000        | 35.1           | 9.000           | N    | 11.2       | 20.9        | 56.0         | Compliance |
| 0.240029        | 22.5           | 9.000           | N    | 10.4       | 29.6        | 52.1         | Compliance |
| 0.249785        | 32.1           | 9.000           | N    | 10.3       | 19.7        | 51.8         | Compliance |
| 0.259937        | 29.9           | 9.000           | N    | 10.3       | 21.5        | 51.4         | Compliance |
| 0.312220        | 29.4           | 9.000           | N    | 10.1       | 20.5        | 49.9         | Compliance |
| 1.374420        | 26.1           | 9.000           | N    | 9.7        | 19.9        | 46.0         | Compliance |

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**FCC §15.209, §15.205 & §15.407(b) –UNWANTED EMISSION**

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**Applicable Standard**

FCC §15.407; §15.209; §15.205;

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

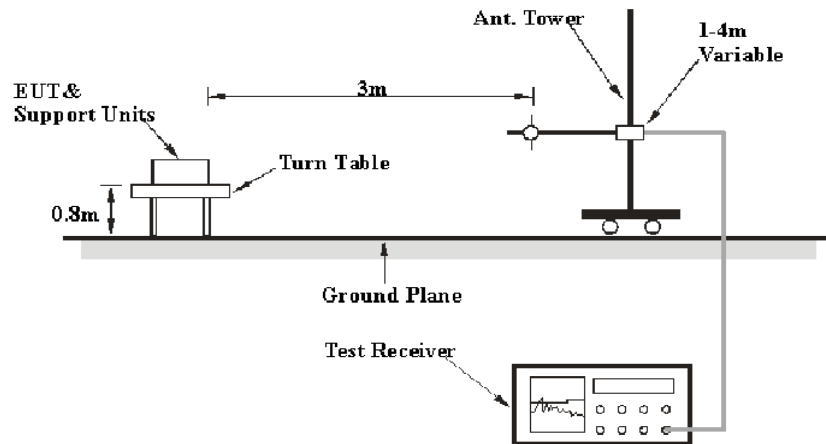
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

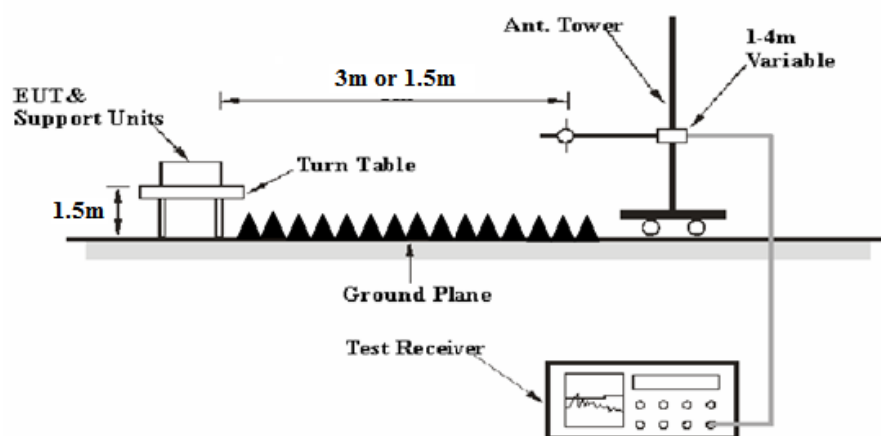
(7) The provisions of §15.205 apply to intentional radiators operating under this section.

## EUT Setup

### Below 1 GHz:



### Above 1 GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

## EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

30-1000MHz:

| Measurement | RBW     | Video B/W | IF B/W |
|-------------|---------|-----------|--------|
| QP          | 120 kHz | 300 kHz   | 120kHz |

1GHz- 40GHz:

| Measurement | Duty cycle | RBW  | Video B/W |
|-------------|------------|------|-----------|
| PK          | Any        | 1MHz | 3 MHz     |
| Ave.        | >98%       | 1MHz | 10 Hz     |
|             | <98%       | 1MHz | 1/T       |

## Test Procedure

During the radiated emission test, the adapter was connected to the first AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

According to KDB 789033 D02 General UNII Test Procedures New Rules v01r04, emission shall be computed as:  $E [dB\mu V/m] = EIRP[dBm] + 95.2$ , for  $d = 3$  meters.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Extrapolation result} - \text{Limit}$$

**Test Equipment List and Details**

| Manufacturer          | Description         | Model                  | Serial Number      | Calibration Date | Calibration Due Date |
|-----------------------|---------------------|------------------------|--------------------|------------------|----------------------|
| R&S                   | EMI Test Receiver   | ESCI                   | 100224             | 2017-09-01       | 2018-09-01           |
| Sunol Sciences        | Antenna             | JB3                    | A060611-2          | 2017-08-25       | 2020-08-25           |
| HP                    | Amplifier           | 8447D                  | 2727A05902         | 2017-09-05       | 2018-09-05           |
| N/A                   | Coaxial Cable       | C-NJNJ-50              | C-0400-01          | 2017-09-05       | 2018-09-05           |
| N/A                   | Coaxial Cable       | C-NJNJ-50              | C-0075-01          | 2017-09-05       | 2018-09-05           |
| N/A                   | Coaxial Cable       | C-NJNJ-50              | C-1000-01          | 2017-09-05       | 2018-09-05           |
| Agilent               | Spectrum Analyzer   | E4440A                 | SG43360054         | 2016-12-08       | 2017-12-08           |
| ETS-Lindgren          | Horn Antenna        | 3115                   | 000 527 35         | 2016-01-05       | 2019-01-05           |
| MITEQ                 | Amplifier           | AFS42-00101800-25-S-42 | 2001271            | 2017-09-05       | 2018-09-05           |
| Ducommun Technologies | Horn Antenna        | ARH-4223-02            | 1007726-02<br>1304 | 2016-11-18       | 2019-11-18           |
| Ducommun Technologies | Horn Antenna        | ARH-2823-02            | 1007726-01<br>1302 | 2016-11-18       | 2019-11-18           |
| Quinstar              | Amplifier           | QLW-18405536-JO        | 15964001001        | 2017-06-27       | 2018-06-27           |
| N/A                   | Coaxial Cable       | C-SJSJ-50              | C-0800-01          | 2017-09-05       | 2018-09-05           |
| R&S                   | Spectrum Analyzer   | FSP 38                 | 100478             | 2016-12-08       | 2017-12-08           |
| Chengdu OuLi          | Bandrejector Filter | 5725-5850              | 005                | 2017-09-05       | 2018-09-05           |
| Farad                 | Test Software       | EZ-EMC                 | V1.1.4.2           | N/A              | N/A                  |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

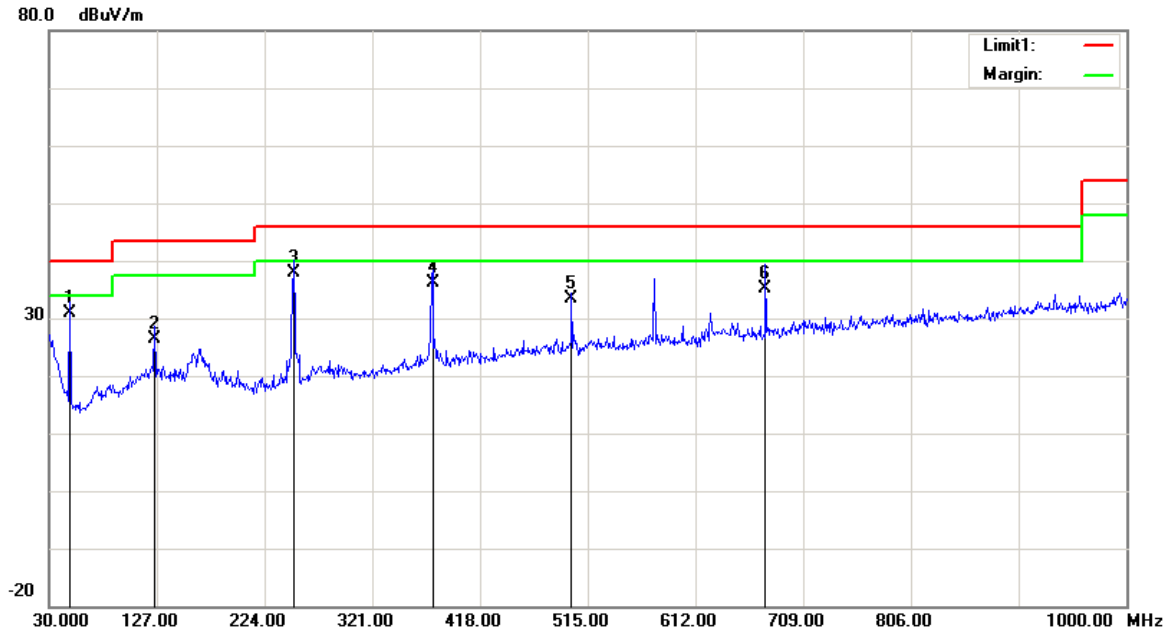
|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 29.1 °C   |
| <b>Relative Humidity:</b> | 48 %      |
| <b>ATM Pressure:</b>      | 100.4 kPa |

\* The testing was performed by Steven Zuo 2017-09-18.

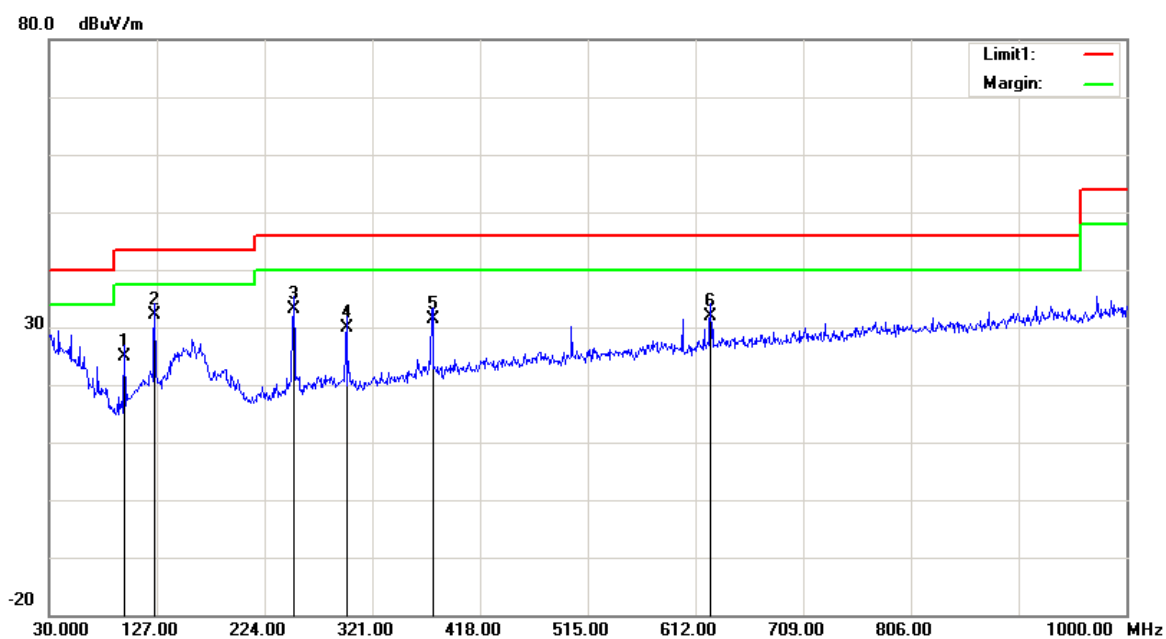
Test Mode: Transmitting

1) Below 1GHz(802.11n ht20 5785 MHz was the worst):

### Horizontal



| Frequency (MHz) | Receiver Reading (dBμV) | Detector | Correction Factor (dB/m) | Cord. Amp. (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|-------------------------|----------|--------------------------|---------------------|----------------|-------------|
| 48.4300         | 41.89                   | QP       | -11.09                   | 30.80               | 40.00          | 9.20        |
| 125.0600        | 31.33                   | QP       | -4.83                    | 26.50               | 43.50          | 17.00       |
| 250.1900        | 44.42                   | QP       | -6.42                    | 38.00               | 46.00          | 8.00        |
| 375.3200        | 38.97                   | QP       | -2.77                    | 36.20               | 46.00          | 9.80        |
| 500.4500        | 34.37                   | QP       | -1.07                    | 33.30               | 46.00          | 12.70       |
| 675.0500        | 33.39                   | QP       | 1.81                     | 35.20               | 46.00          | 10.80       |

**Vertical**

| Frequency (MHz) | Receiver Reading (dBμV) | Detector | Correction Factor (dB/m) | Cord. Amp. (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|-------------------------|----------|--------------------------|---------------------|----------------|-------------|
| 97.9000         | 33.92                   | QP       | -9.02                    | 24.90               | 43.50          | 18.60       |
| 125.0600        | 37.03                   | QP       | -4.83                    | 32.20               | 43.50          | 11.30       |
| 250.1900        | 39.62                   | QP       | -6.42                    | 33.20               | 46.00          | 12.80       |
| 297.7200        | 34.15                   | QP       | -4.35                    | 29.80               | 46.00          | 16.20       |
| 375.3200        | 34.07                   | QP       | -2.77                    | 31.30               | 46.00          | 14.70       |
| 625.5800        | 30.94                   | QP       | 1.06                     | 32.00               | 46.00          | 14.00       |

**2) 1GHz-40GHz:****5150-5250MHz****802.11a(Chain 0 was the worst)**

| Frequency<br>(MHz)       | Receiver          |                        | Rx Antenna     |                | Cable<br>loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|--------------------------|-------------------|------------------------|----------------|----------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
|                          | Reading<br>(dBμV) | Detector<br>(PK/QP/AV) | Polar<br>(H/V) | Factor<br>(dB) |                       |                           |                                    |                   |                |
| Low Channel: 5180 MHz    |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5180.00                  | 73.48             | PK                     | H              | 33.59          | 3.58                  | 0.00                      | 104.63                             | N/A               | N/A            |
| 5180.00                  | 65.75             | AV                     | H              | 33.59          | 3.58                  | 0.00                      | 96.90                              | N/A               | N/A            |
| 5180.00                  | 85.15             | PK                     | V              | 33.59          | 3.58                  | 0.00                      | 116.30                             | N/A               | N/A            |
| 5180.00                  | 77.63             | AV                     | V              | 33.59          | 3.58                  | 0.00                      | 108.78                             | N/A               | N/A            |
| 5150.00                  | 35.66             | PK                     | V              | 33.54          | 3.56                  | 0.00                      | 66.74                              | 74.00             | 7.26           |
| 5150.00                  | 18.29             | AV                     | V              | 33.54          | 3.56                  | 0.00                      | 49.37                              | 54.00             | 4.63           |
| 10360.00                 | 48.64             | PK                     | V              | 38.17          | 6.29                  | 36.85                     | 50.23                              | 74.00             | 23.77          |
| 10360.00                 | 34.52             | AV                     | V              | 38.17          | 6.29                  | 36.85                     | 36.11                              | 54.00             | 17.89          |
| 15540.00                 | 47.48             | PK                     | V              | 38.06          | 8.85                  | 39.04                     | 49.33                              | 74.00             | 24.67          |
| 15540.00                 | 33.16             | AV                     | V              | 38.06          | 8.85                  | 39.04                     | 35.01                              | 54.00             | 18.99          |
| 6908.50                  | 54.61             | PK                     | V              | 35.02          | 5.10                  | 36.99                     | 51.72                              | 74.00             | 22.28          |
| 6908.50                  | 44.21             | AV                     | V              | 35.02          | 5.10                  | 36.99                     | 41.32                              | 54.00             | 12.68          |
| Middle Channel: 5200 MHz |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5200.00                  | 73.55             | PK                     | H              | 33.62          | 3.60                  | 0.00                      | 104.75                             | N/A               | N/A            |
| 5200.00                  | 66.84             | AV                     | H              | 33.62          | 3.60                  | 0.00                      | 98.04                              | N/A               | N/A            |
| 5200.00                  | 83.36             | PK                     | V              | 33.62          | 3.60                  | 0.00                      | 114.56                             | N/A               | N/A            |
| 5200.00                  | 77.15             | AV                     | V              | 33.62          | 3.60                  | 0.00                      | 108.35                             | N/A               | N/A            |
| 10400.00                 | 48.71             | PK                     | V              | 38.18          | 6.32                  | 36.86                     | 50.33                              | 74.00             | 23.67          |
| 10400.00                 | 34.62             | AV                     | V              | 38.18          | 6.32                  | 36.86                     | 36.24                              | 54.00             | 17.76          |
| 15600.00                 | 47.68             | PK                     | V              | 38.00          | 8.83                  | 39.09                     | 49.40                              | 74.00             | 24.6           |
| 15600.00                 | 33.32             | AV                     | V              | 38.00          | 8.83                  | 39.09                     | 35.04                              | 54.00             | 18.96          |
| 8995.00                  | 46.45             | PK                     | V              | 37.70          | 5.49                  | 36.93                     | 46.69                              | 74.00             | 27.31          |
| 8995.00                  | 33.16             | AV                     | V              | 37.70          | 5.49                  | 36.93                     | 33.40                              | 54.00             | 20.6           |
| 6935.50                  | 54.31             | PK                     | V              | 35.07          | 5.12                  | 36.98                     | 51.50                              | 74.00             | 22.5           |
| 6935.50                  | 42.13             | AV                     | V              | 35.07          | 5.12                  | 36.98                     | 39.32                              | 54.00             | 14.68          |
| High Channel: 5240 MHz   |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5240.00                  | 73.55             | PK                     | H              | 33.68          | 3.52                  | 0.00                      | 104.73                             | N/A               | N/A            |
| 5240.00                  | 66.57             | AV                     | H              | 33.68          | 3.52                  | 0.00                      | 97.75                              | N/A               | N/A            |
| 5240.00                  | 83.49             | PK                     | V              | 33.68          | 3.52                  | 0.00                      | 114.67                             | N/A               | N/A            |
| 5240.00                  | 76.42             | AV                     | V              | 33.68          | 3.52                  | 0.00                      | 107.60                             | N/A               | N/A            |
| 5350.00                  | 27.15             | PK                     | V              | 33.86          | 3.52                  | 0.00                      | 58.51                              | 74.00             | 15.49          |
| 5350.00                  | 14.23             | AV                     | V              | 33.86          | 3.52                  | 0.00                      | 45.59                              | 54.00             | 8.41           |
| 10480.00                 | 48.77             | PK                     | V              | 38.20          | 6.37                  | 36.88                     | 50.44                              | 74.00             | 23.56          |
| 10480.00                 | 34.40             | AV                     | V              | 38.20          | 6.37                  | 36.88                     | 36.07                              | 54.00             | 17.93          |
| 15720.00                 | 47.35             | PK                     | V              | 37.88          | 8.79                  | 39.18                     | 48.82                              | 74.00             | 25.18          |
| 15720.00                 | 33.31             | AV                     | V              | 37.88          | 8.79                  | 39.18                     | 34.78                              | 54.00             | 19.22          |
| 6985.00                  | 54.44             | PK                     | V              | 35.17          | 5.17                  | 36.97                     | 51.79                              | 74.00             | 22.21          |
| 6985.00                  | 43.96             | AV                     | V              | 35.17          | 5.17                  | 36.97                     | 41.31                              | 54.00             | 12.69          |

**802.11n ht20(2Tx was the worst)**

| Frequency<br>(MHz)       | Receiver          |                        | Rx Antenna     |                | Cable<br>loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|--------------------------|-------------------|------------------------|----------------|----------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
|                          | Reading<br>(dBμV) | Detector<br>(PK/QP/AV) | Polar<br>(H/V) | Factor<br>(dB) |                       |                           |                                    |                   |                |
| Low Channel: 5180 MHz    |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5180.00                  | 77.53             | PK                     | H              | 33.59          | 3.58                  | 0.00                      | 108.68                             | N/A               | N/A            |
| 5180.00                  | 67.25             | AV                     | H              | 33.59          | 3.58                  | 0.00                      | 98.40                              | N/A               | N/A            |
| 5180.00                  | 87.26             | PK                     | V              | 33.59          | 3.58                  | 0.00                      | 118.41                             | N/A               | N/A            |
| 5180.00                  | 79.35             | AV                     | V              | 33.59          | 3.58                  | 0.00                      | 110.50                             | N/A               | N/A            |
| 5150.00                  | 39.58             | PK                     | V              | 33.54          | 3.56                  | 0.00                      | 70.66                              | 74.00             | 3.34           |
| 5150.00                  | 18.25             | AV                     | V              | 33.54          | 3.56                  | 0.00                      | 49.33                              | 54.00             | 4.67           |
| 10360.00                 | 48.76             | PK                     | V              | 38.17          | 6.29                  | 36.85                     | 50.35                              | 74.00             | 23.65          |
| 10360.00                 | 34.72             | AV                     | V              | 38.17          | 6.29                  | 36.85                     | 36.31                              | 54.00             | 17.69          |
| 15540.00                 | 47.43             | PK                     | V              | 38.06          | 8.85                  | 39.04                     | 49.28                              | 74.00             | 24.72          |
| 15540.00                 | 33.12             | AV                     | V              | 38.06          | 8.85                  | 39.04                     | 34.97                              | 54.00             | 19.03          |
| 6908.50                  | 53.09             | PK                     | V              | 35.02          | 5.10                  | 36.99                     | 50.20                              | 74.00             | 23.80          |
| 6908.50                  | 42.66             | AV                     | V              | 35.02          | 5.10                  | 36.99                     | 39.77                              | 54.00             | 14.23          |
| Middle Channel: 5200 MHz |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5200.00                  | 77.75             | PK                     | H              | 33.62          | 3.60                  | 0.00                      | 108.95                             | N/A               | N/A            |
| 5200.00                  | 69.58             | AV                     | H              | 33.62          | 3.60                  | 0.00                      | 100.78                             | N/A               | N/A            |
| 5200.00                  | 87.39             | PK                     | V              | 33.62          | 3.60                  | 0.00                      | 118.59                             | N/A               | N/A            |
| 5200.00                  | 79.83             | AV                     | V              | 33.62          | 3.60                  | 0.00                      | 111.03                             | N/A               | N/A            |
| 10400.00                 | 48.70             | PK                     | V              | 38.18          | 6.32                  | 36.86                     | 50.32                              | 74.00             | 23.68          |
| 10400.00                 | 34.52             | AV                     | V              | 38.18          | 6.32                  | 36.86                     | 36.14                              | 54.00             | 17.86          |
| 15600.00                 | 47.65             | PK                     | V              | 38.00          | 8.83                  | 39.09                     | 49.37                              | 74.00             | 24.63          |
| 15600.00                 | 33.03             | AV                     | V              | 38.00          | 8.83                  | 39.09                     | 34.75                              | 54.00             | 19.25          |
| 8995.00                  | 46.25             | PK                     | V              | 37.70          | 5.49                  | 36.93                     | 46.49                              | 74.00             | 27.51          |
| 8995.00                  | 33.24             | AV                     | V              | 37.70          | 5.49                  | 36.93                     | 33.48                              | 54.00             | 20.52          |
| 6935.50                  | 54.82             | PK                     | V              | 35.07          | 5.12                  | 36.98                     | 52.01                              | 74.00             | 21.99          |
| 6935.50                  | 43.67             | AV                     | V              | 35.07          | 5.12                  | 36.98                     | 40.86                              | 54.00             | 13.14          |
| High Channel: 5240 MHz   |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5240.00                  | 73.63             | PK                     | H              | 33.68          | 3.52                  | 0.00                      | 104.81                             | N/A               | N/A            |
| 5240.00                  | 67.25             | AV                     | H              | 33.68          | 3.52                  | 0.00                      | 98.43                              | N/A               | N/A            |
| 5240.00                  | 86.58             | PK                     | V              | 33.68          | 3.52                  | 0.00                      | 117.76                             | N/A               | N/A            |
| 5240.00                  | 79.36             | AV                     | V              | 33.68          | 3.52                  | 0.00                      | 110.54                             | N/A               | N/A            |
| 5350.00                  | 26.57             | PK                     | V              | 33.86          | 3.52                  | 0.00                      | 57.93                              | 74.00             | 16.07          |
| 5350.00                  | 14.29             | AV                     | V              | 33.86          | 3.52                  | 0.00                      | 45.65                              | 54.00             | 8.35           |
| 10480.00                 | 48.59             | PK                     | V              | 38.20          | 6.37                  | 36.88                     | 50.26                              | 74.00             | 23.74          |
| 10480.00                 | 34.53             | AV                     | V              | 38.20          | 6.37                  | 36.88                     | 36.20                              | 54.00             | 17.80          |
| 15720.00                 | 47.59             | PK                     | V              | 37.88          | 8.79                  | 39.18                     | 49.06                              | 74.00             | 24.94          |
| 15720.00                 | 33.18             | AV                     | V              | 37.88          | 8.79                  | 39.18                     | 34.65                              | 54.00             | 19.35          |
| 6985.00                  | 53.24             | PK                     | V              | 35.17          | 5.17                  | 36.97                     | 50.59                              | 74.00             | 23.41          |
| 6985.00                  | 43.26             | AV                     | V              | 35.17          | 5.17                  | 36.97                     | 40.61                              | 54.00             | 13.39          |

**802.11n ht40(2Tx was the worst)**

| Frequency<br>(MHz)     | Receiver          |                        | Rx Antenna     |                | Cable<br>loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|------------------------|-------------------|------------------------|----------------|----------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
|                        | Reading<br>(dBμV) | Detector<br>(PK/QP/AV) | Polar<br>(H/V) | Factor<br>(dB) |                       |                           |                                    |                   |                |
| Low Channel: 5190 MHz  |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5190.00                | 73.34             | PK                     | H              | 33.60          | 3.59                  | 0.00                      | 104.51                             | N/A               | N/A            |
| 5190.00                | 67.45             | AV                     | H              | 33.60          | 3.59                  | 0.00                      | 98.62                              | N/A               | N/A            |
| 5190.00                | 81.39             | PK                     | V              | 33.60          | 3.59                  | 0.00                      | 112.56                             | N/A               | N/A            |
| 5190.00                | 76.36             | AV                     | V              | 33.60          | 3.59                  | 0.00                      | 107.53                             | N/A               | N/A            |
| 5150.00                | 28.69             | PK                     | V              | 33.54          | 3.56                  | 0.00                      | 59.77                              | 74.00             | 14.23          |
| 5150.00                | 17.27             | AV                     | V              | 33.54          | 3.56                  | 0.00                      | 48.35                              | 54.00             | 5.65           |
| 10380.00               | 48.55             | PK                     | V              | 38.18          | 6.31                  | 36.85                     | 50.17                              | 74.00             | 23.83          |
| 10380.00               | 34.64             | AV                     | V              | 38.18          | 6.31                  | 36.85                     | 36.26                              | 54.00             | 17.74          |
| 15570.00               | 47.54             | PK                     | V              | 38.03          | 8.84                  | 39.06                     | 49.33                              | 74.00             | 24.67          |
| 15570.00               | 33.31             | AV                     | V              | 38.03          | 8.84                  | 39.06                     | 35.10                              | 54.00             | 18.90          |
| 6922.00                | 54.54             | PK                     | V              | 35.04          | 5.11                  | 36.99                     | 51.68                              | 74.00             | 22.32          |
| 6922.00                | 43.65             | AV                     | V              | 35.04          | 5.11                  | 36.99                     | 40.79                              | 54.00             | 13.21          |
| High Channel: 5230 MHz |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5230.00                | 61.54             | PK                     | H              | 33.67          | 3.54                  | 0.00                      | 92.73                              | N/A               | N/A            |
| 5230.00                | 56.34             | AV                     | H              | 33.67          | 3.54                  | 0.00                      | 87.53                              | N/A               | N/A            |
| 5230.00                | 79.55             | PK                     | V              | 33.67          | 3.54                  | 0.00                      | 110.74                             | N/A               | N/A            |
| 5230.00                | 72.35             | AV                     | V              | 33.67          | 3.54                  | 0.00                      | 103.54                             | N/A               | N/A            |
| 5350.00                | 26.49             | PK                     | V              | 33.86          | 3.52                  | 0.00                      | 57.85                              | 74.00             | 16.15          |
| 5350.00                | 14.98             | AV                     | V              | 33.86          | 3.52                  | 0.00                      | 46.34                              | 54.00             | 7.66           |
| 10460.00               | 48.52             | PK                     | V              | 38.19          | 6.36                  | 36.87                     | 50.18                              | 74.00             | 23.82          |
| 10460.00               | 34.45             | AV                     | V              | 38.19          | 6.36                  | 36.87                     | 36.11                              | 54.00             | 17.89          |
| 15690.00               | 47.41             | PK                     | V              | 37.91          | 8.80                  | 39.15                     | 48.95                              | 74.00             | 25.05          |
| 15690.00               | 33.19             | AV                     | V              | 37.91          | 8.80                  | 39.15                     | 34.73                              | 54.00             | 19.27          |
| 6971.50                | 54.13             | PK                     | V              | 35.14          | 5.16                  | 36.98                     | 51.43                              | 74.00             | 22.57          |
| 6971.50                | 44.28             | AV                     | V              | 35.14          | 5.16                  | 36.98                     | 41.58                              | 54.00             | 12.42          |

**802.11 ac80(2Tx was the worst)**

| Frequency<br>(MHz)       | Receiver          |                        | Rx Antenna     |                | Cable<br>loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|--------------------------|-------------------|------------------------|----------------|----------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
|                          | Reading<br>(dBμV) | Detector<br>(PK/QP/AV) | Polar<br>(H/V) | Factor<br>(dB) |                       |                           |                                    |                   |                |
| Middle Channel: 5210 MHz |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5210.00                  | 63.76             | PK                     | H              | 33.64          | 3.58                  | 0.00                      | 94.96                              | N/A               | N/A            |
| 5210.00                  | 57.48             | AV                     | H              | 33.64          | 3.58                  | 0.00                      | 88.68                              | N/A               | N/A            |
| 5210.00                  | 76.55             | PK                     | V              | 33.64          | 3.58                  | 0.00                      | 107.75                             | N/A               | N/A            |
| 5210.00                  | 68.59             | AV                     | V              | 33.64          | 3.58                  | 0.00                      | 99.79                              | N/A               | N/A            |
| 5150.00                  | 36.51             | PK                     | V              | 33.54          | 3.56                  | 0.00                      | 67.59                              | 74.00             | 6.41           |
| 5150.00                  | 14.26             | AV                     | V              | 33.54          | 3.56                  | 0.00                      | 45.34                              | 54.00             | 8.66           |
| 5350.00                  | 26.22             | PK                     | V              | 33.86          | 3.52                  | 0.00                      | 57.58                              | 74.00             | 16.42          |
| 5350.00                  | 13.65             | AV                     | V              | 33.86          | 3.52                  | 0.00                      | 45.01                              | 54.00             | 8.99           |
| 10420.00                 | 48.47             | PK                     | V              | 38.18          | 6.33                  | 36.86                     | 50.10                              | 74.00             | 23.90          |
| 10420.00                 | 34.49             | AV                     | V              | 38.18          | 6.33                  | 36.86                     | 36.12                              | 54.00             | 17.88          |
| 15630.00                 | 47.62             | PK                     | V              | 37.97          | 8.82                  | 39.11                     | 49.28                              | 74.00             | 24.72          |
| 15630.00                 | 33.43             | AV                     | V              | 37.97          | 8.82                  | 39.11                     | 35.09                              | 54.00             | 18.91          |
| 6944.50                  | 54.44             | PK                     | V              | 35.09          | 5.13                  | 36.98                     | 51.66                              | 74.00             | 22.34          |
| 6944.50                  | 44.18             | AV                     | V              | 35.09          | 5.13                  | 36.98                     | 41.40                              | 54.00             | 12.60          |

**5725-5850MHz:****802.11a(Chain 0 was the worst)**

| Frequency<br>(MHz)       | Receiver          |                        | Rx Antenna     |                | Cable<br>loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|--------------------------|-------------------|------------------------|----------------|----------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
|                          | Reading<br>(dBμV) | Detector<br>(PK/QP/AV) | Polar<br>(H/V) | Factor<br>(dB) |                       |                           |                                    |                   |                |
| Low Channel: 5745MHz     |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5745.00                  | 73.24             | PK                     | H              | 34.20          | 3.69                  | 0.00                      | 105.11                             | N/A               | N/A            |
| 5745.00                  | 63.59             | AV                     | H              | 34.20          | 3.69                  | 0.00                      | 95.46                              | N/A               | N/A            |
| 5745.00                  | 77.87             | PK                     | V              | 34.20          | 3.69                  | 0.00                      | 109.74                             | N/A               | N/A            |
| 5745.00                  | 67.89             | AV                     | V              | 34.20          | 3.69                  | 0.00                      | 99.76                              | N/A               | N/A            |
| 5725.00                  | 53.17             | PK                     | V              | 34.19          | 3.69                  | 0.00                      | 85.03                              | 122.20            | 37.17          |
| 5720.00                  | 43.73             | PK                     | V              | 34.19          | 3.69                  | 0.00                      | 75.59                              | 110.80            | 35.21          |
| 5700.00                  | 35.42             | PK                     | V              | 34.18          | 3.68                  | 0.00                      | 67.26                              | 105.20            | 37.94          |
| 5650.00                  | 26.44             | PK                     | V              | 34.16          | 3.63                  | 0.00                      | 58.21                              | 68.20             | 9.99           |
| 11490.00                 | 48.67             | PK                     | V              | 38.99          | 6.59                  | 37.35                     | 50.88                              | 74.00             | 23.12          |
| 11490.00                 | 33.58             | AV                     | V              | 38.99          | 6.59                  | 37.35                     | 35.79                              | 54.00             | 18.21          |
| 17235.00                 | 47.59             | PK                     | V              | 41.56          | 8.78                  | 38.61                     | 53.30                              | 74.00             | 20.70          |
| 17235.00                 | 32.63             | AV                     | V              | 41.56          | 8.78                  | 38.61                     | 38.34                              | 54.00             | 15.66          |
| 7660.00                  | 62.57             | PK                     | V              | 36.60          | 4.45                  | 37.32                     | 60.28                              | 74.00             | 13.72          |
| 7660.00                  | 48.35             | AV                     | V              | 36.60          | 4.45                  | 37.32                     | 46.06                              | 54.00             | 7.94           |
| Middle Channel: 5785 MHz |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5785.00                  | 68.57             | PK                     | H              | 34.21          | 3.71                  | 0.00                      | 100.47                             | N/A               | N/A            |
| 5785.00                  | 58.59             | AV                     | H              | 34.21          | 3.71                  | 0.00                      | 90.49                              | N/A               | N/A            |
| 5785.00                  | 79.87             | PK                     | V              | 34.21          | 3.71                  | 0.00                      | 111.77                             | N/A               | N/A            |
| 5785.00                  | 69.58             | AV                     | V              | 34.21          | 3.71                  | 0.00                      | 101.48                             | N/A               | N/A            |
| 11570.00                 | 48.46             | PK                     | V              | 39.00          | 6.61                  | 37.44                     | 50.61                              | 74.00             | 23.39          |
| 11570.00                 | 33.53             | AV                     | V              | 39.00          | 6.61                  | 37.44                     | 35.68                              | 54.00             | 18.32          |
| 17355.00                 | 47.41             | PK                     | V              | 42.26          | 8.81                  | 38.52                     | 53.94                              | 74.00             | 20.06          |
| 17355.00                 | 32.64             | AV                     | V              | 42.26          | 8.81                  | 38.52                     | 39.17                              | 54.00             | 14.83          |
| 9855.00                  | 46.74             | PK                     | V              | 38.04          | 5.97                  | 36.72                     | 48.01                              | 74.00             | 25.99          |
| 9855.00                  | 32.63             | AV                     | V              | 38.04          | 5.97                  | 36.72                     | 33.90                              | 54.00             | 20.10          |
| 7710.00                  | 59.49             | PK                     | V              | 36.63          | 4.50                  | 37.23                     | 57.37                              | 74.00             | 16.63          |
| 7710.00                  | 49.55             | AV                     | V              | 36.63          | 4.50                  | 37.23                     | 47.43                              | 54.00             | 6.57           |
| High Channel: 5825 MHz   |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5825.00                  | 70.38             | PK                     | H              | 34.23          | 3.73                  | 0.00                      | 102.32                             | N/A               | N/A            |
| 5825.00                  | 60.29             | AV                     | H              | 34.23          | 3.73                  | 0.00                      | 92.23                              | N/A               | N/A            |
| 5825.00                  | 75.28             | PK                     | V              | 34.23          | 3.73                  | 0.00                      | 107.22                             | N/A               | N/A            |
| 5825.00                  | 65.47             | AV                     | V              | 34.23          | 3.73                  | 0.00                      | 97.41                              | N/A               | N/A            |
| 5850.00                  | 41.05             | PK                     | V              | 34.24          | 3.75                  | 0.00                      | 73.02                              | 122.20            | 49.18          |
| 5855.00                  | 38.08             | PK                     | V              | 34.24          | 3.75                  | 0.00                      | 70.05                              | 110.80            | 40.75          |
| 5875.00                  | 29.18             | PK                     | V              | 34.25          | 3.77                  | 0.00                      | 61.18                              | 105.20            | 44.02          |
| 5925.00                  | 27.55             | PK                     | V              | 34.27          | 3.80                  | 0.00                      | 59.60                              | 68.20             | 8.60           |
| 11650.00                 | 48.79             | PK                     | V              | 39.00          | 6.64                  | 37.53                     | 50.88                              | 74.00             | 23.12          |
| 11650.00                 | 33.86             | AV                     | V              | 39.00          | 6.64                  | 37.53                     | 35.95                              | 54.00             | 18.05          |
| 17475.00                 | 47.6              | PK                     | V              | 42.96          | 8.84                  | 38.44                     | 54.94                              | 74.00             | 19.06          |
| 17475.00                 | 32.43             | AV                     | V              | 42.96          | 8.84                  | 38.44                     | 39.77                              | 54.00             | 14.23          |
| 7768.00                  | 53.38             | PK                     | V              | 36.66          | 4.55                  | 37.13                     | 51.44                              | 74.00             | 22.56          |
| 7768.00                  | 43.26             | AV                     | V              | 36.66          | 4.55                  | 37.13                     | 41.32                              | 54.00             | 12.68          |

**802.11n ht20(2Tx was the worst)**

| Frequency<br>(MHz)       | Receiver          |                        | Rx Antenna     |                | Cable<br>loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|--------------------------|-------------------|------------------------|----------------|----------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
|                          | Reading<br>(dBμV) | Detector<br>(PK/QP/AV) | Polar<br>(H/V) | Factor<br>(dB) |                       |                           |                                    |                   |                |
| Low Channel: 5745MHz     |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5745.00                  | 70.97             | PK                     | H              | 34.20          | 3.69                  | 0.00                      | 102.84                             | N/A               | N/A            |
| 5745.00                  | 60.23             | AV                     | H              | 34.20          | 3.69                  | 0.00                      | 92.10                              | N/A               | N/A            |
| 5745.00                  | 77.42             | PK                     | V              | 34.20          | 3.69                  | 0.00                      | 109.29                             | N/A               | N/A            |
| 5745.00                  | 67.15             | AV                     | V              | 34.20          | 3.69                  | 0.00                      | 99.02                              | N/A               | N/A            |
| 5725.00                  | 53.57             | PK                     | V              | 34.19          | 3.69                  | 0.00                      | 85.43                              | 122.20            | 36.77          |
| 5720.00                  | 43.26             | PK                     | V              | 34.19          | 3.69                  | 0.00                      | 75.12                              | 110.80            | 35.68          |
| 5700.00                  | 35.29             | PK                     | V              | 34.18          | 3.68                  | 0.00                      | 67.13                              | 105.20            | 38.07          |
| 5650.00                  | 26.81             | PK                     | V              | 34.16          | 3.63                  | 0.00                      | 58.58                              | 68.20             | 9.62           |
| 11490.00                 | 48.71             | PK                     | V              | 38.99          | 6.59                  | 37.35                     | 50.92                              | 74.00             | 23.08          |
| 11490.00                 | 33.76             | AV                     | V              | 38.99          | 6.59                  | 37.35                     | 35.97                              | 54.00             | 18.03          |
| 17235.00                 | 47.87             | PK                     | V              | 41.56          | 8.78                  | 38.61                     | 53.58                              | 74.00             | 20.42          |
| 17235.00                 | 32.61             | AV                     | V              | 41.56          | 8.78                  | 38.61                     | 38.32                              | 54.00             | 15.68          |
| 7660.00                  | 59.83             | PK                     | V              | 36.60          | 4.45                  | 37.32                     | 57.54                              | 74.00             | 16.46          |
| 7660.00                  | 48.65             | AV                     | V              | 36.60          | 4.45                  | 37.32                     | 46.36                              | 54.00             | 7.64           |
| Middle Channel: 5785 MHz |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5785.00                  | 68.76             | PK                     | H              | 34.21          | 3.71                  | 0.00                      | 100.66                             | N/A               | N/A            |
| 5785.00                  | 58.59             | AV                     | H              | 34.21          | 3.71                  | 0.00                      | 90.49                              | N/A               | N/A            |
| 5785.00                  | 76.48             | PK                     | V              | 34.21          | 3.71                  | 0.00                      | 108.38                             | N/A               | N/A            |
| 5785.00                  | 66.59             | AV                     | V              | 34.21          | 3.71                  | 0.00                      | 98.49                              | N/A               | N/A            |
| 11570.00                 | 48.37             | PK                     | V              | 39.00          | 6.61                  | 37.44                     | 50.52                              | 74.00             | 23.48          |
| 11570.00                 | 33.31             | AV                     | V              | 39.00          | 6.61                  | 37.44                     | 35.46                              | 54.00             | 18.54          |
| 17355.00                 | 47.28             | PK                     | V              | 42.26          | 8.81                  | 38.52                     | 53.81                              | 74.00             | 20.19          |
| 17355.00                 | 32.36             | AV                     | V              | 42.26          | 8.81                  | 38.52                     | 38.89                              | 54.00             | 15.11          |
| 9855.00                  | 46.62             | PK                     | V              | 38.04          | 5.97                  | 36.72                     | 47.89                              | 74.00             | 26.11          |
| 9855.00                  | 32.59             | AV                     | V              | 38.04          | 5.97                  | 36.72                     | 33.86                              | 54.00             | 20.14          |
| 7710.00                  | 58.14             | PK                     | V              | 36.63          | 4.50                  | 37.23                     | 56.02                              | 74.00             | 17.98          |
| 7710.00                  | 48.27             | AV                     | V              | 36.63          | 4.50                  | 37.23                     | 46.15                              | 54.00             | 7.85           |
| High Channel: 5825 MHz   |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5825.00                  | 65.09             | PK                     | H              | 34.23          | 3.73                  | 0.00                      | 97.03                              | N/A               | N/A            |
| 5825.00                  | 55.59             | AV                     | H              | 34.23          | 3.73                  | 0.00                      | 87.53                              | N/A               | N/A            |
| 5825.00                  | 77.18             | PK                     | V              | 34.23          | 3.73                  | 0.00                      | 109.12                             | N/A               | N/A            |
| 5825.00                  | 67.52             | AV                     | V              | 34.23          | 3.73                  | 0.00                      | 99.46                              | N/A               | N/A            |
| 5850.00                  | 32.46             | PK                     | V              | 34.24          | 3.75                  | 0.00                      | 64.43                              | 122.20            | 57.77          |
| 5855.00                  | 31.57             | PK                     | V              | 34.24          | 3.75                  | 0.00                      | 63.54                              | 110.80            | 47.26          |
| 5875.00                  | 26.21             | PK                     | V              | 34.25          | 3.77                  | 0.00                      | 58.21                              | 105.20            | 46.99          |
| 5925.00                  | 25.96             | PK                     | V              | 34.27          | 3.80                  | 0.00                      | 58.01                              | 68.20             | 10.19          |
| 11650.00                 | 48.78             | PK                     | V              | 39.00          | 6.64                  | 37.53                     | 50.87                              | 74.00             | 23.13          |
| 11650.00                 | 33.38             | AV                     | V              | 39.00          | 6.64                  | 37.53                     | 35.47                              | 54.00             | 18.53          |
| 17475.00                 | 47.74             | PK                     | V              | 42.96          | 8.84                  | 38.44                     | 55.08                              | 74.00             | 18.92          |
| 17475.00                 | 32.84             | AV                     | V              | 42.96          | 8.84                  | 38.44                     | 40.18                              | 54.00             | 13.82          |
| 7768.00                  | 57.91             | PK                     | V              | 36.66          | 4.55                  | 37.13                     | 55.97                              | 74.00             | 18.03          |
| 7768.00                  | 47.44             | AV                     | V              | 36.66          | 4.55                  | 37.13                     | 45.50                              | 54.00             | 8.50           |

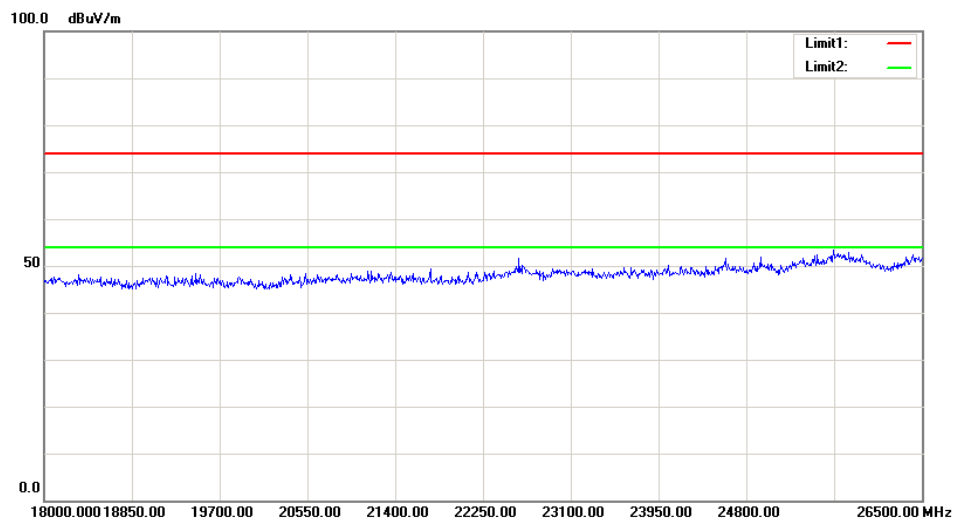
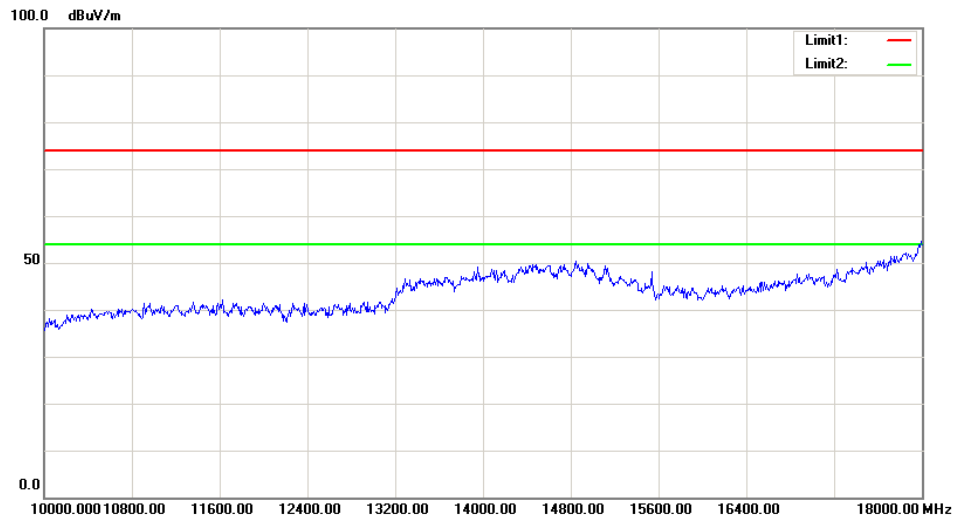
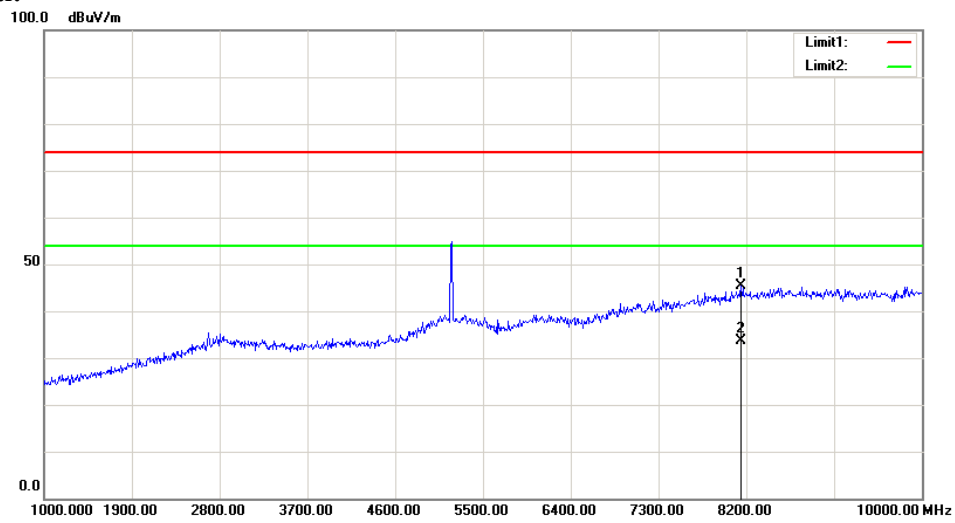
**802.11n ht40(2Tx was the worst)**

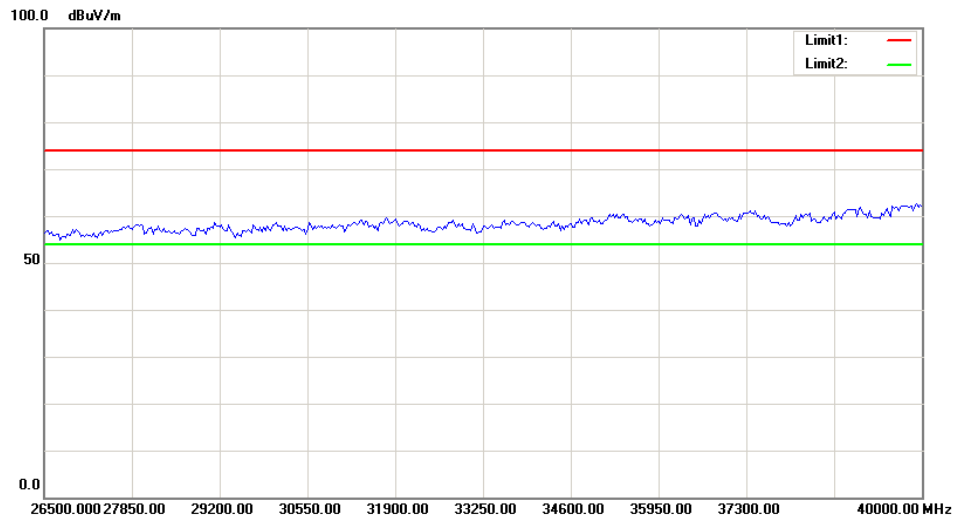
| Frequency<br>(MHz)     | Receiver          |                        | Rx Antenna     |                | Cable<br>loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|------------------------|-------------------|------------------------|----------------|----------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
|                        | Reading<br>(dBμV) | Detector<br>(PK/QP/AV) | Polar<br>(H/V) | Factor<br>(dB) |                       |                           |                                    |                   |                |
| Low Channel: 5755MHz   |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5755.00                | 65.97             | PK                     | H              | 34.20          | 3.70                  | 0.00                      | 97.85                              | N/A               | N/A            |
| 5755.00                | 55.48             | AV                     | H              | 34.20          | 3.70                  | 0.00                      | 87.36                              | N/A               | N/A            |
| 5755.00                | 73.19             | PK                     | V              | 34.20          | 3.70                  | 0.00                      | 105.07                             | N/A               | N/A            |
| 5755.00                | 63.25             | AV                     | V              | 34.20          | 3.70                  | 0.00                      | 95.13                              | N/A               | N/A            |
| 5725.00                | 48.22             | PK                     | V              | 34.19          | 3.69                  | 0.00                      | 80.08                              | 122.20            | 42.12          |
| 5720.00                | 46.05             | PK                     | V              | 34.19          | 3.69                  | 0.00                      | 77.91                              | 110.80            | 32.89          |
| 5700.00                | 35.43             | PK                     | V              | 34.18          | 3.68                  | 0.00                      | 67.27                              | 105.20            | 37.93          |
| 5650.00                | 26.92             | PK                     | V              | 34.16          | 3.63                  | 0.00                      | 58.69                              | 68.20             | 9.51           |
| 11510.00               | 48.81             | PK                     | V              | 39.00          | 6.59                  | 37.37                     | 51.01                              | 74.00             | 22.99          |
| 11510.00               | 33.68             | AV                     | V              | 39.00          | 6.59                  | 37.37                     | 35.88                              | 54.00             | 18.12          |
| 17265.00               | 47.46             | PK                     | V              | 41.74          | 8.79                  | 38.58                     | 53.39                              | 74.00             | 20.61          |
| 17265.00               | 32.33             | AV                     | V              | 41.74          | 8.79                  | 38.58                     | 38.26                              | 54.00             | 15.74          |
| 7673.50                | 59.52             | PK                     | V              | 36.60          | 4.47                  | 37.29                     | 57.28                              | 74.00             | 16.72          |
| 7673.50                | 49.66             | AV                     | V              | 36.60          | 4.47                  | 37.29                     | 47.42                              | 54.00             | 6.58           |
| High Channel: 5795 MHz |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5795.00                | 67.31             | PK                     | H              | 34.22          | 3.71                  | 0.00                      | 99.22                              | N/A               | N/A            |
| 5795.00                | 57.48             | AV                     | H              | 34.22          | 3.71                  | 0.00                      | 89.39                              | N/A               | N/A            |
| 5795.00                | 74.98             | PK                     | V              | 34.22          | 3.71                  | 0.00                      | 106.89                             | N/A               | N/A            |
| 5795.00                | 64.12             | AV                     | V              | 34.22          | 3.71                  | 0.00                      | 96.03                              | N/A               | N/A            |
| 5850.00                | 36.16             | PK                     | V              | 34.24          | 3.75                  | 0.00                      | 68.13                              | 122.20            | 54.07          |
| 5855.00                | 35.18             | PK                     | V              | 34.24          | 3.75                  | 0.00                      | 67.15                              | 110.80            | 43.65          |
| 5875.00                | 29.22             | PK                     | V              | 34.25          | 3.77                  | 0.00                      | 61.22                              | 105.20            | 43.98          |
| 5925.00                | 26.14             | PK                     | V              | 34.27          | 3.80                  | 0.00                      | 58.19                              | 68.20             | 10.01          |
| 11590.00               | 48.52             | PK                     | V              | 39.00          | 6.62                  | 37.46                     | 50.66                              | 74.00             | 23.34          |
| 11590.00               | 33.86             | AV                     | V              | 39.00          | 6.62                  | 37.46                     | 36.00                              | 54.00             | 18.00          |
| 17385.00               | 47.85             | PK                     | V              | 42.43          | 8.82                  | 38.50                     | 54.58                              | 74.00             | 19.42          |
| 17385.00               | 32.92             | AV                     | V              | 42.43          | 8.82                  | 38.50                     | 39.65                              | 54.00             | 14.35          |
| 7727.50                | 51.59             | PK                     | V              | 36.64          | 4.51                  | 37.20                     | 49.52                              | 74.00             | 24.48          |
| 7727.50                | 40.21             | AV                     | V              | 36.64          | 4.51                  | 37.20                     | 38.14                              | 54.00             | 15.86          |

**802.11 ac80(2Tx was the worst)**

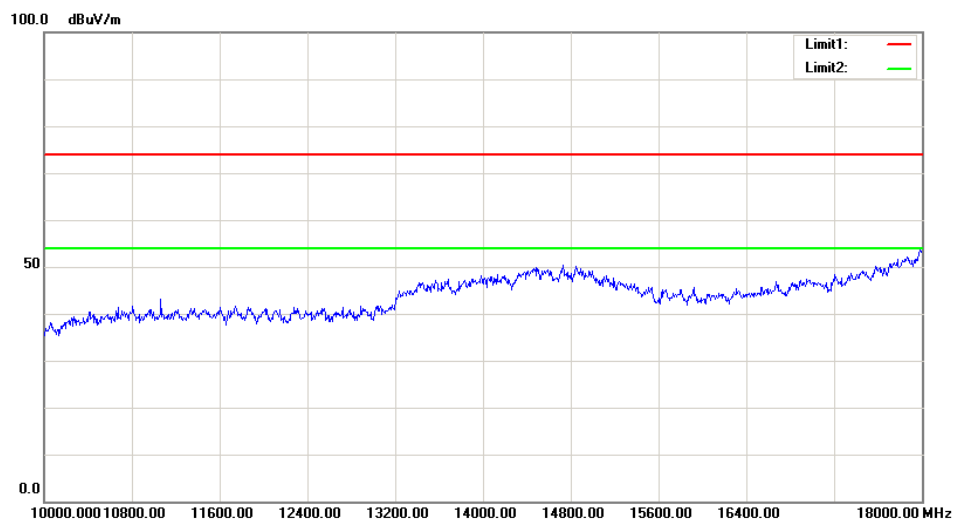
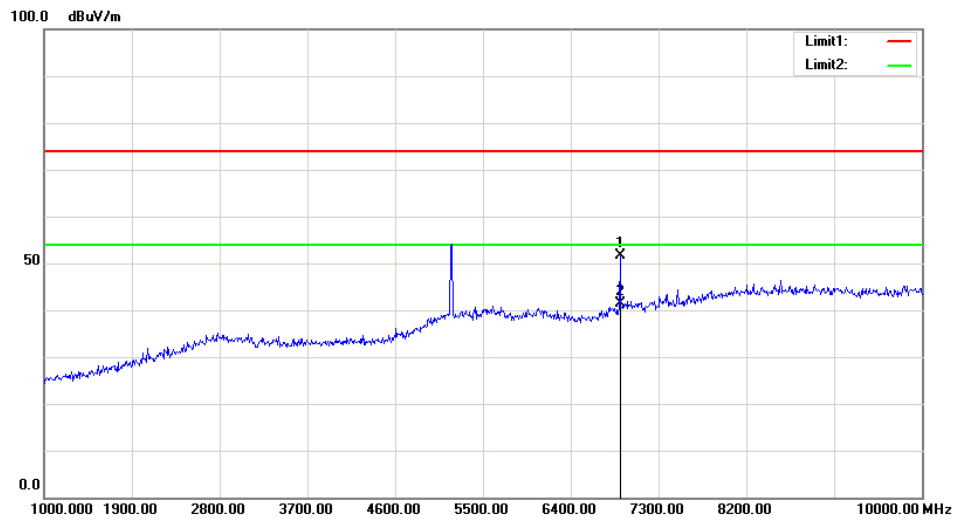
| Frequency<br>(MHz)       | Receiver          |                        | Rx Antenna     |                | Cable<br>loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|--------------------------|-------------------|------------------------|----------------|----------------|-----------------------|---------------------------|------------------------------------|-------------------|----------------|
|                          | Reading<br>(dBμV) | Detector<br>(PK/QP/AV) | Polar<br>(H/V) | Factor<br>(dB) |                       |                           |                                    |                   |                |
| Middle Channel: 5775 MHz |                   |                        |                |                |                       |                           |                                    |                   |                |
| 5775.00                  | 68.46             | PK                     | H              | 34.21          | 3.70                  | 0.00                      | 100.35                             | N/A               | N/A            |
| 5775.00                  | 58.25             | AV                     | H              | 34.21          | 3.70                  | 0.00                      | 90.14                              | N/A               | N/A            |
| 5775.00                  | 78.75             | PK                     | V              | 34.21          | 3.70                  | 0.00                      | 110.64                             | N/A               | N/A            |
| 5775.00                  | 68.52             | AV                     | V              | 34.21          | 3.70                  | 0.00                      | 100.41                             | N/A               | N/A            |
| 5725.00                  | 53.08             | PK                     | V              | 34.19          | 3.69                  | 0.00                      | 84.94                              | 122.20            | 37.26          |
| 5720.00                  | 48.18             | PK                     | V              | 34.19          | 3.69                  | 0.00                      | 80.04                              | 110.80            | 30.76          |
| 5700.00                  | 47.11             | PK                     | V              | 34.18          | 3.68                  | 0.00                      | 78.95                              | 105.20            | 26.25          |
| 5650.00                  | 32.26             | PK                     | V              | 34.16          | 3.63                  | 0.00                      | 64.03                              | 68.20             | 4.17           |
| 5850.00                  | 52.64             | PK                     | V              | 34.24          | 3.75                  | 0.00                      | 84.61                              | 122.20            | 37.59          |
| 5855.00                  | 48.26             | PK                     | V              | 34.24          | 3.75                  | 0.00                      | 80.23                              | 110.80            | 30.57          |
| 5875.00                  | 37.84             | PK                     | V              | 34.25          | 3.77                  | 0.00                      | 69.84                              | 105.20            | 35.36          |
| 5925.00                  | 29.46             | PK                     | V              | 34.27          | 3.80                  | 0.00                      | 61.51                              | 68.20             | 6.69           |
| 11550.00                 | 48.82             | PK                     | V              | 39.00          | 6.61                  | 37.42                     | 50.99                              | 74.00             | 23.01          |
| 11550.00                 | 33.46             | AV                     | V              | 39.00          | 6.61                  | 37.42                     | 35.63                              | 54.00             | 18.37          |
| 17325.00                 | 47.56             | PK                     | V              | 42.09          | 8.80                  | 38.54                     | 53.89                              | 74.00             | 20.11          |
| 17325.00                 | 32.85             | AV                     | V              | 42.09          | 8.80                  | 38.54                     | 39.18                              | 54.00             | 14.82          |
| 7700.50                  | 60.46             | PK                     | V              | 36.62          | 4.49                  | 37.25                     | 58.30                              | 74.00             | 15.70          |
| 7700.50                  | 50.13             | AV                     | V              | 36.62          | 4.49                  | 37.25                     | 47.97                              | 54.00             | 6.03           |

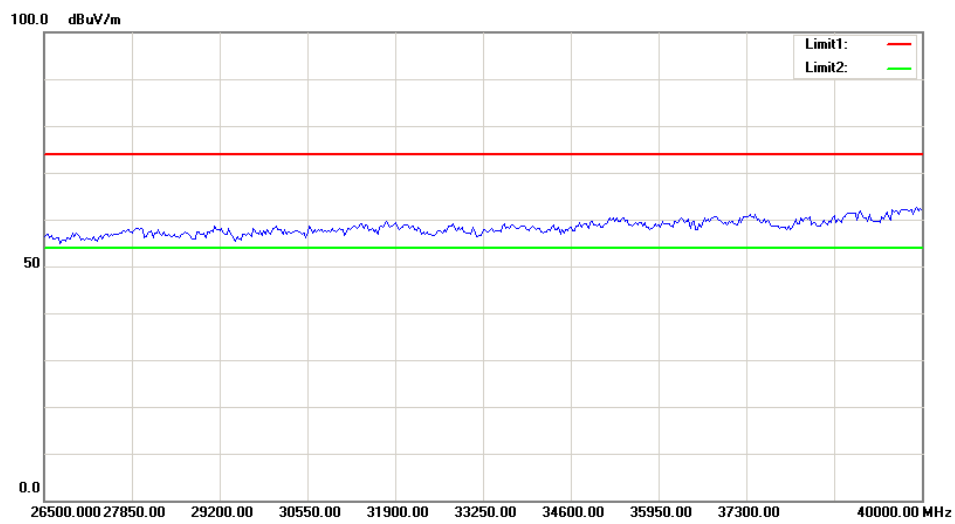
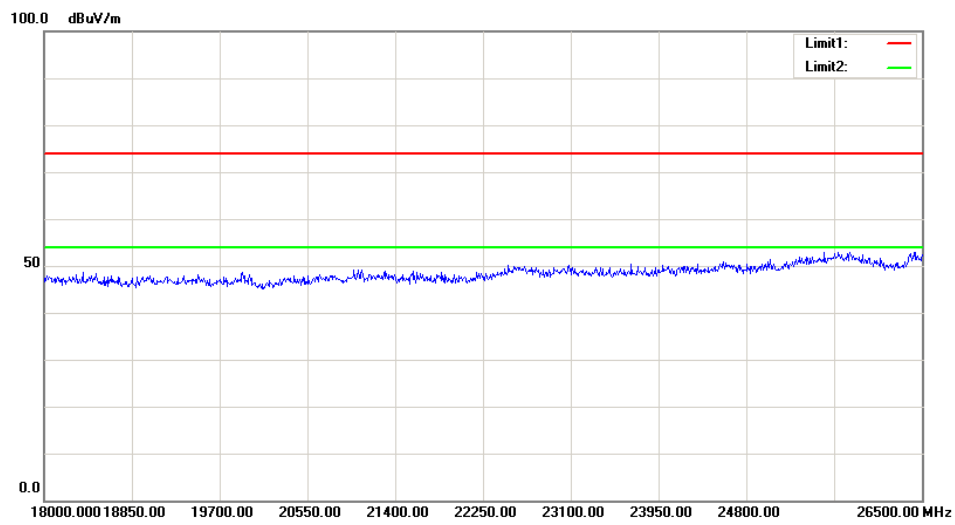
**Test Plots(For worst mode 802.11n ht20 2Tx 5200MHz)**  
**Horizontal:**





Vertical:





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**FCC §15.407(b)–OUT- OF-BAND EMISSIONS**

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**Applicable Standard**

FCC §15.407

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of –27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of –27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of –27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of –27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

**Test Procedure**

According to KDB 789033 D02 General UNII Test Procedures New Rules v01r04

**Test Equipment List and Details**

| Manufacturer | Description       | Model       | Serial Number | Calibration Date | Calibration Due Date |
|--------------|-------------------|-------------|---------------|------------------|----------------------|
| R&S          | Spectrum Analyzer | FSIQ 26     | 831929/005    | 2017-08-31       | 2018-08-31           |
| N/A          | Coaxial Cable     | C-SJ00-0010 | C0010/04      | Each Time        | /                    |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

|                           |                 |
|---------------------------|-----------------|
| <b>Temperature:</b>       | 27.6~29.3°C     |
| <b>Relative Humidity:</b> | 39~63 %         |
| <b>ATM Pressure:</b>      | 100.3 ~100.4kPa |

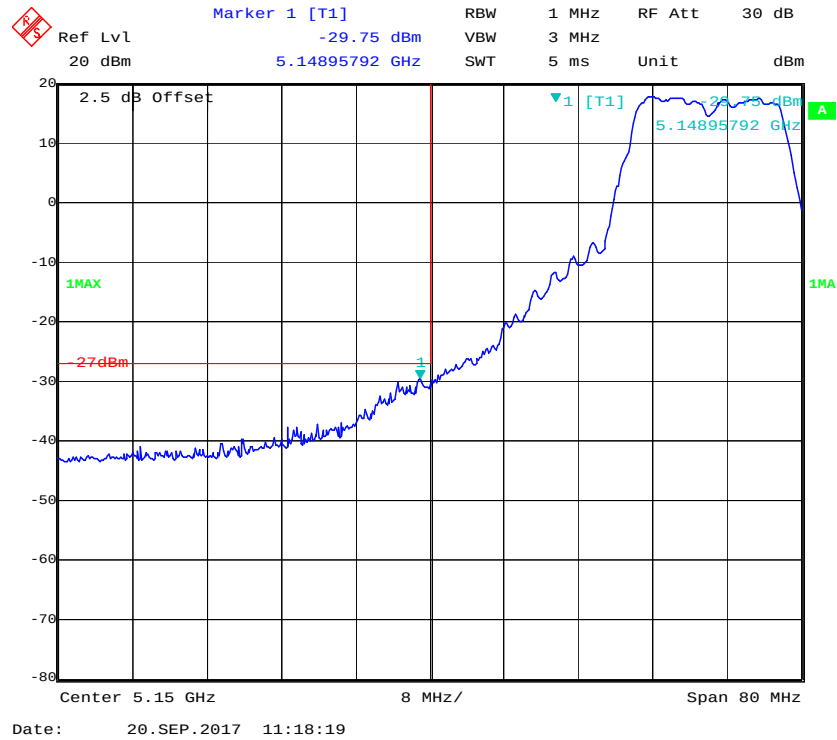
*The testing was performed by Rick Chen from 2017-09-20 to 2017-12-18.*

**Test Result:** Pass.

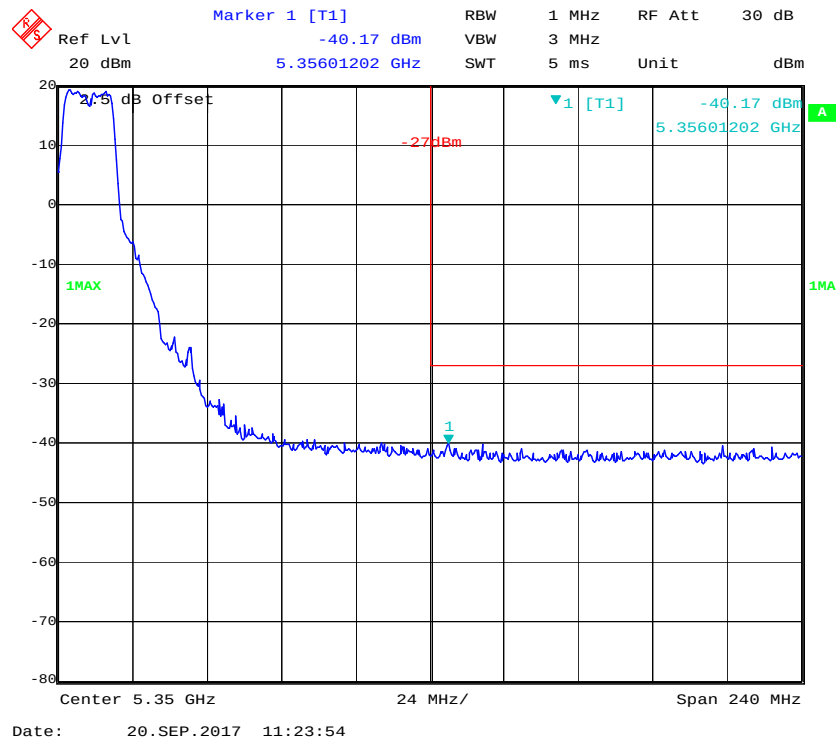
Please refer to the following plots.

**5150-5250MHz**(the antenna gain was offset in the display, all emission under limit more than 3dBc for 802.11n and ac modes, so 2TX mode also compliance the requirement)  
Chain 0:

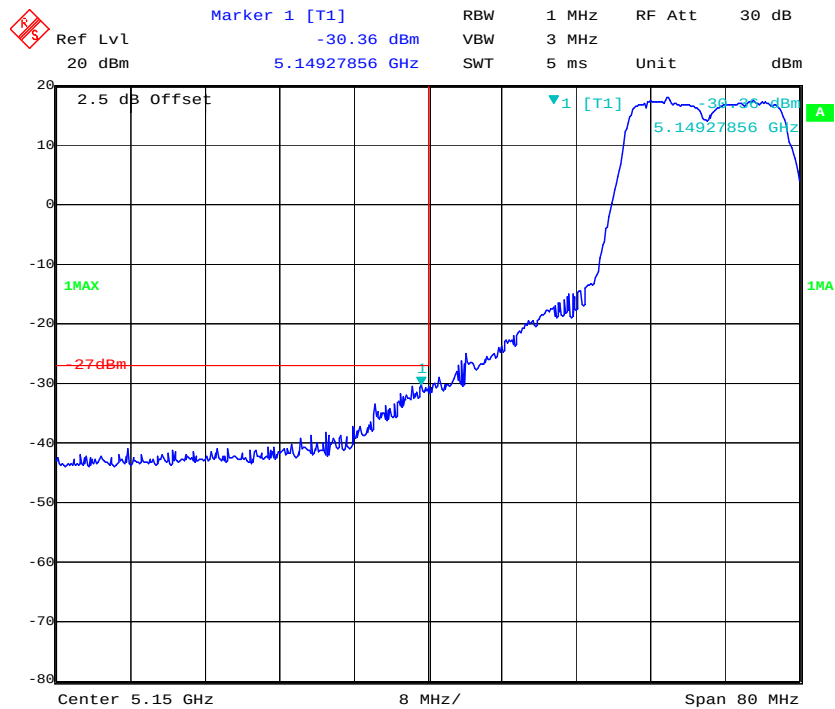
### 802.11a Low Channel



### 802.11a High Channel

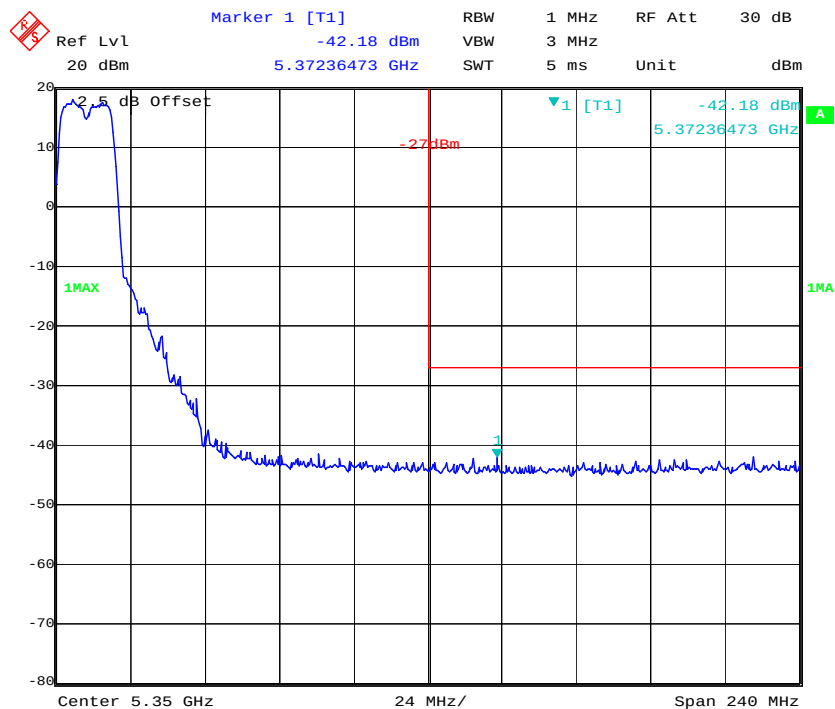


## 802.11n ht20 Low Channel



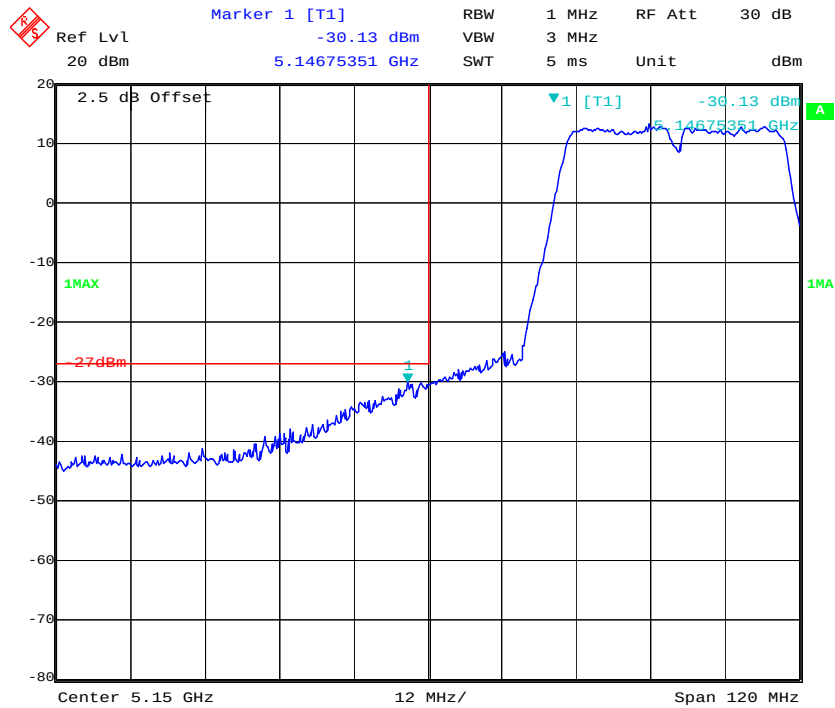
Date: 20.SEP.2017 11:30:44

## 802.11n ht20 High Channel



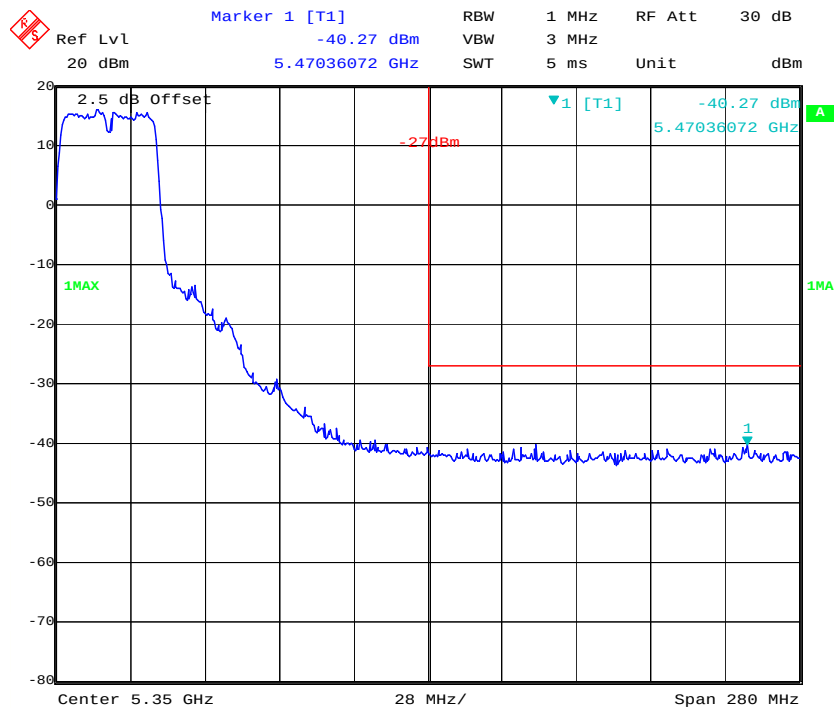
Date: 20.SEP.2017 11:26:27

## 802.11n ht40 Low Channel



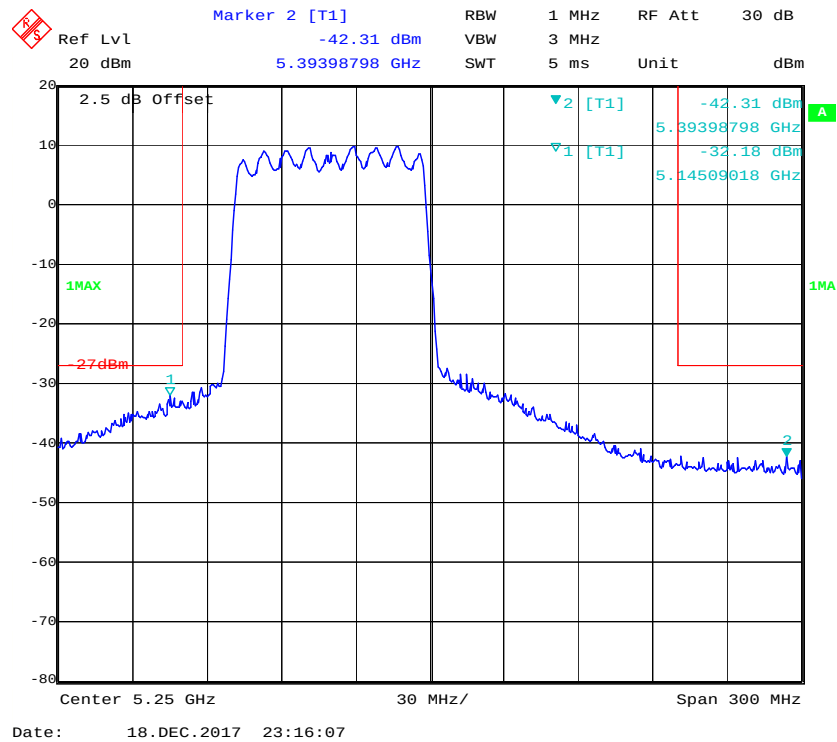
Date: 20.SEP.2017 11:36:45

## 802.11n ht40 High Channel

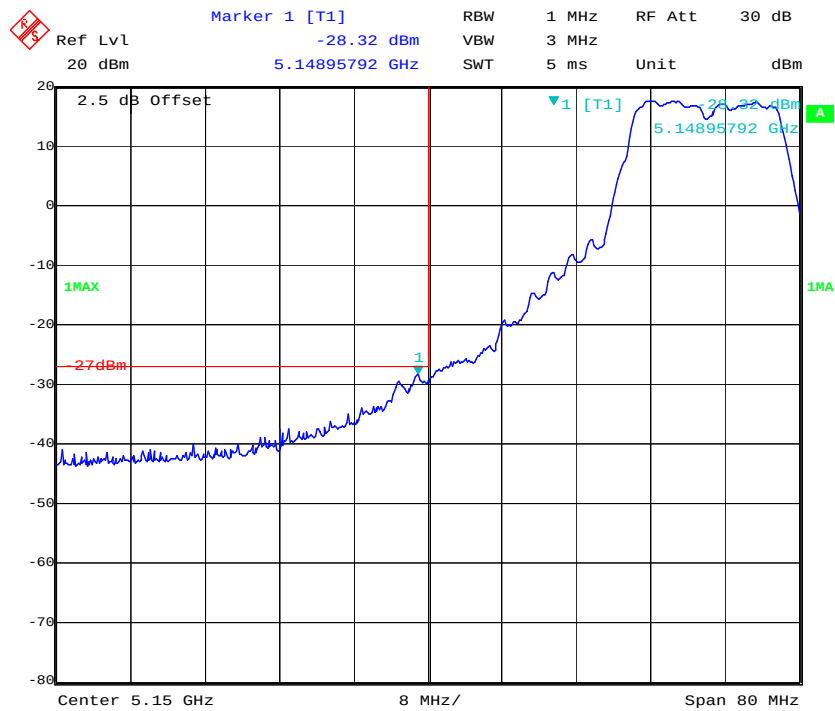


Date: 20.SEP.2017 11:38:57

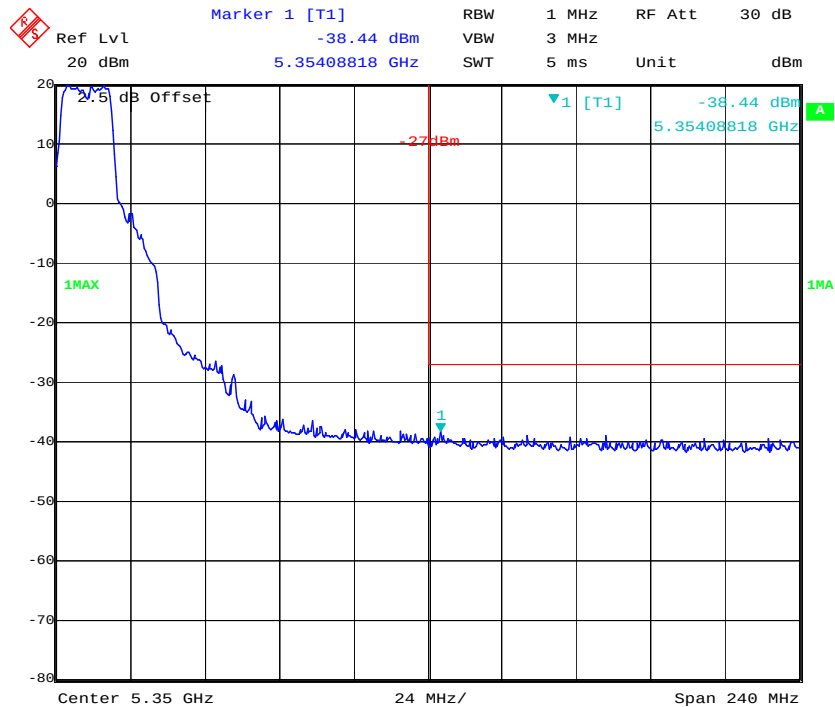
## 802.11n ac80 Middle Channel



Chain 1:

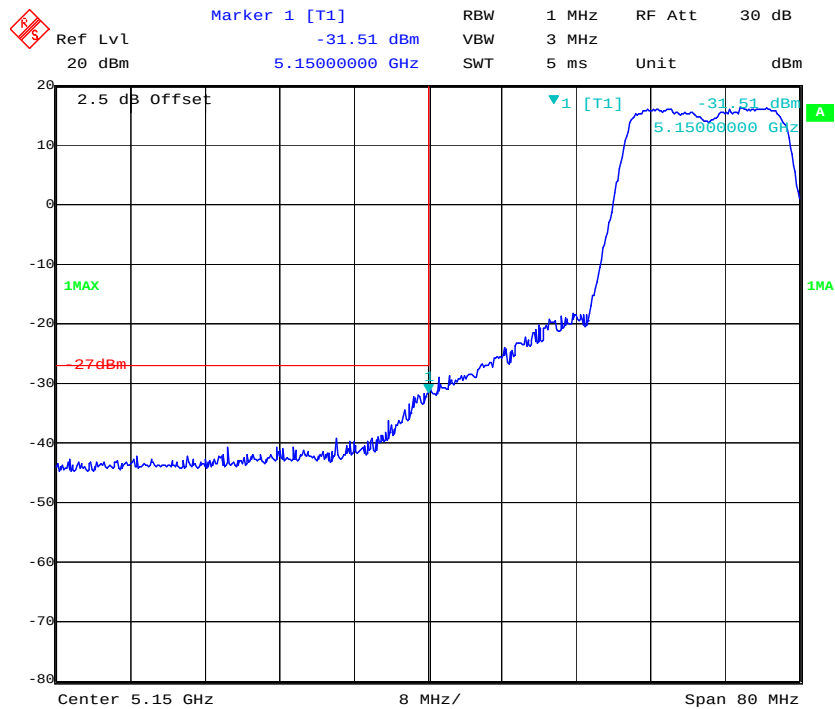
**802.11a Low Channel**

Date: 20.SEP.2017 13:29:35

**802.11a High Channel**

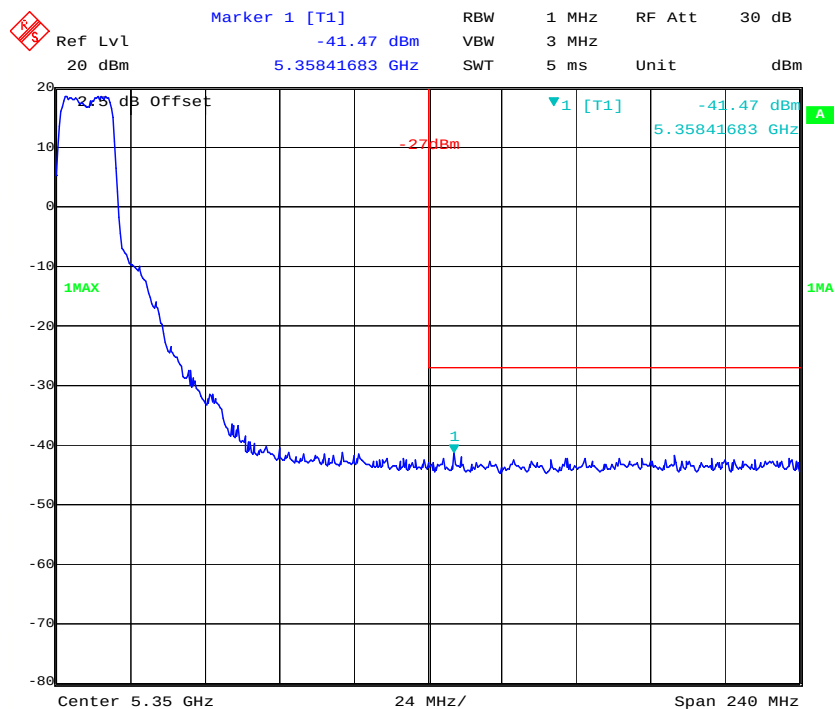
Date: 20.SEP.2017 13:35:36

## 802.11n ht20 Low Channel



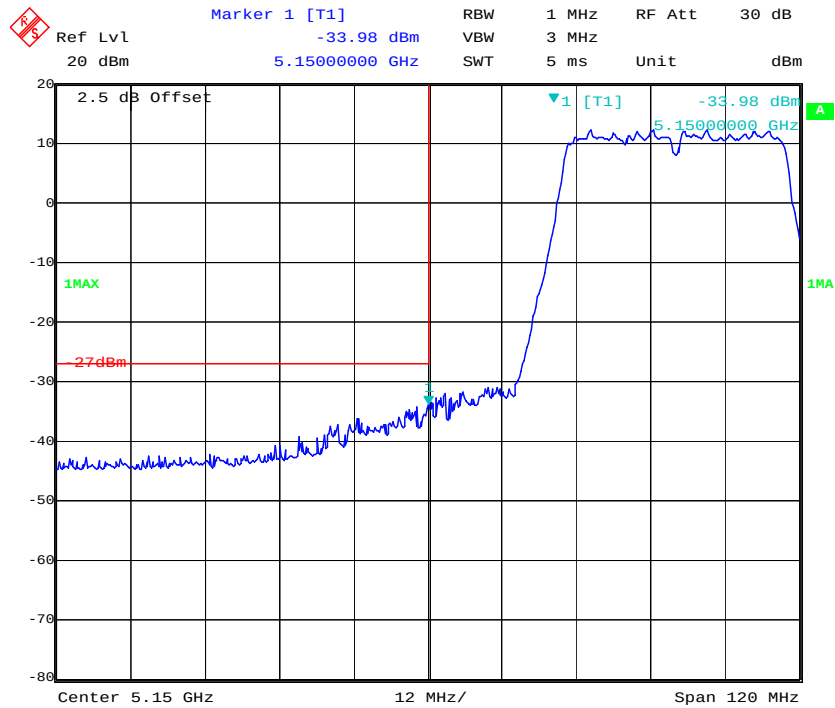
Date: 20.SEP.2017 13:46:37

## 802.11n ht20 High Channel

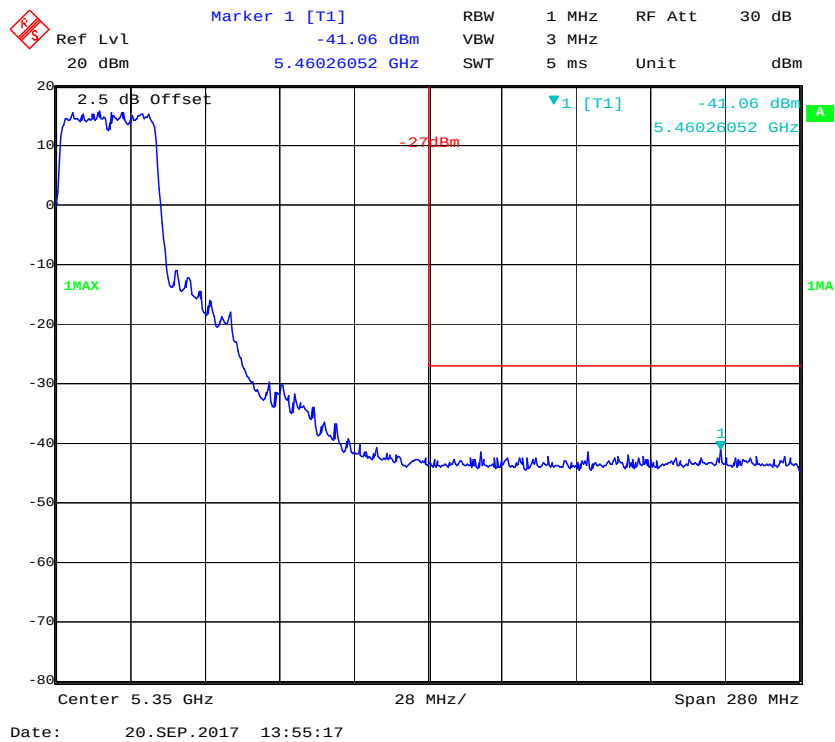


Date: 20.SEP.2017 13:38:11

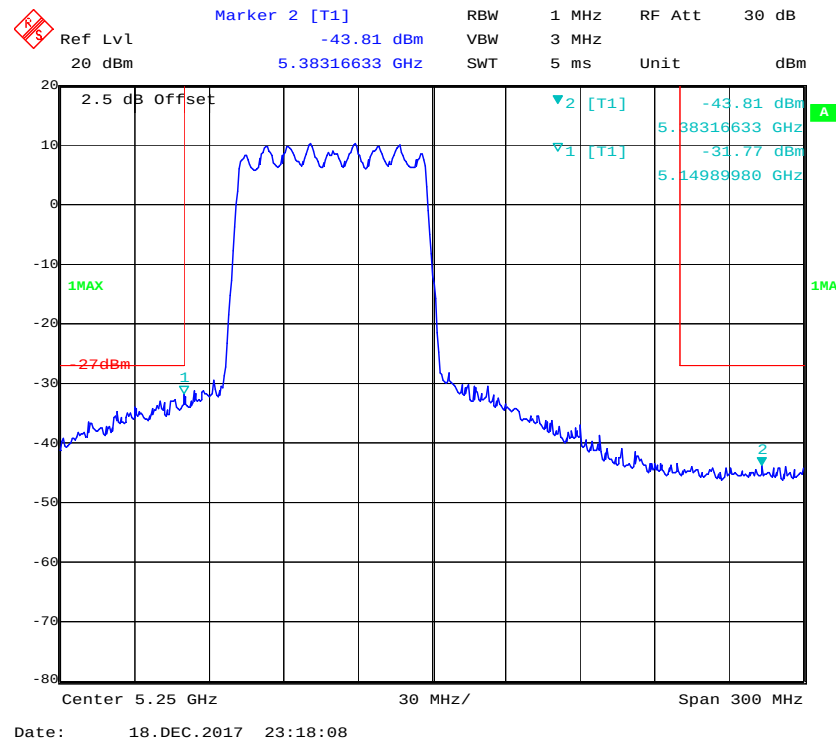
## 802.11n ht40 Low Channel



## 802.11n ht40 High Channel



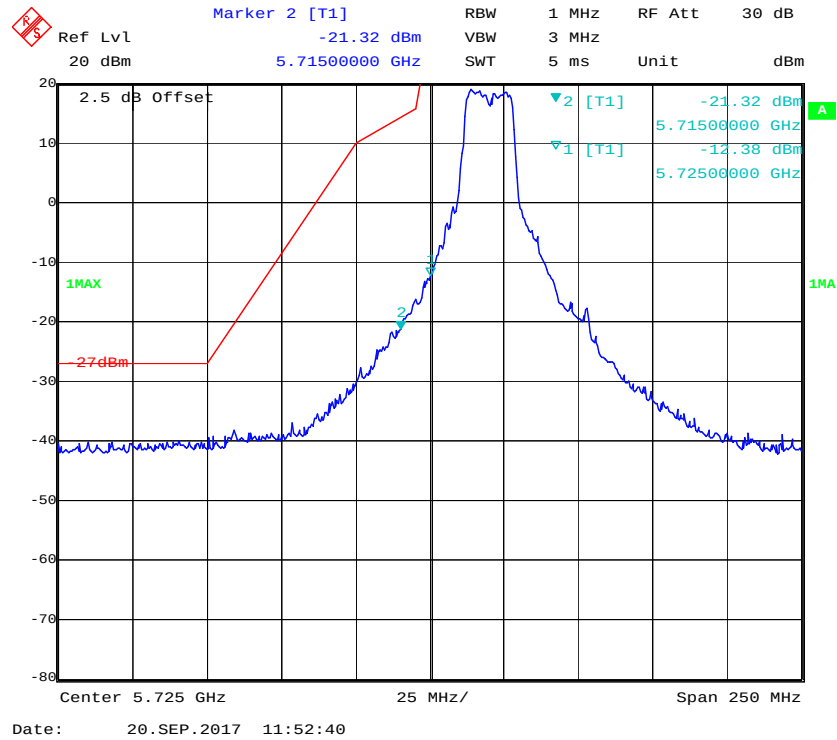
## 802.11n ac80 Middle Channel



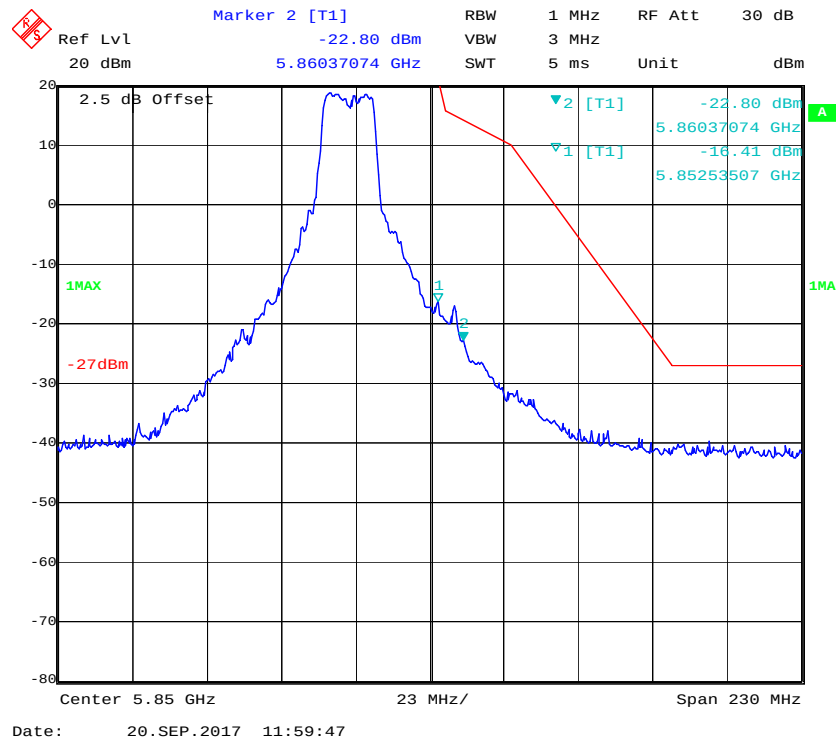
**5725-5850MHz**(the antenna gain was offset in the display, all emission under limit more than 3dBc, so 2TX mode also compliance the requirement)

Chain 0:

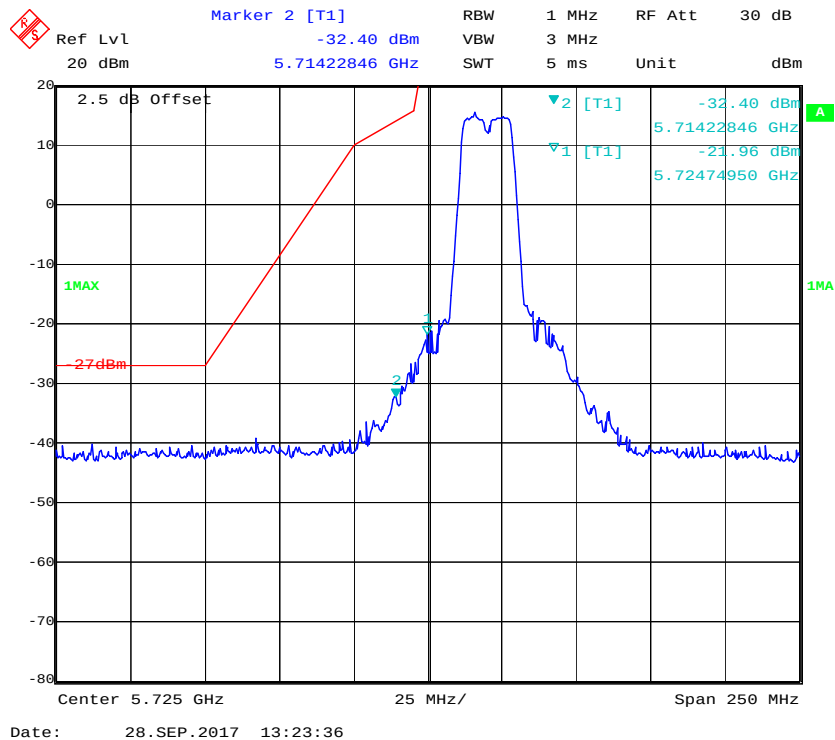
### 802.11a Low Channel



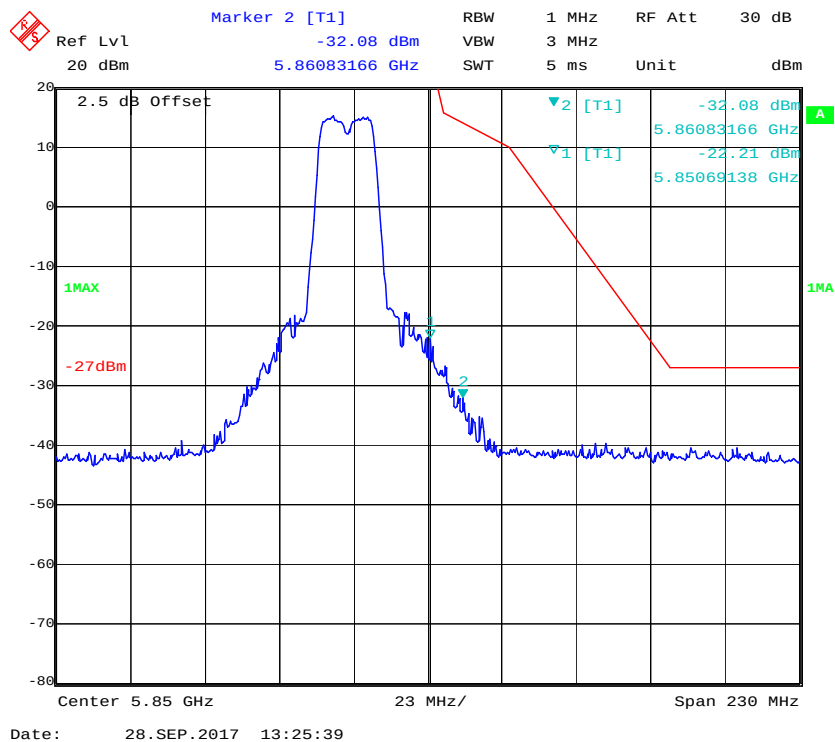
### 802.11a High Channel



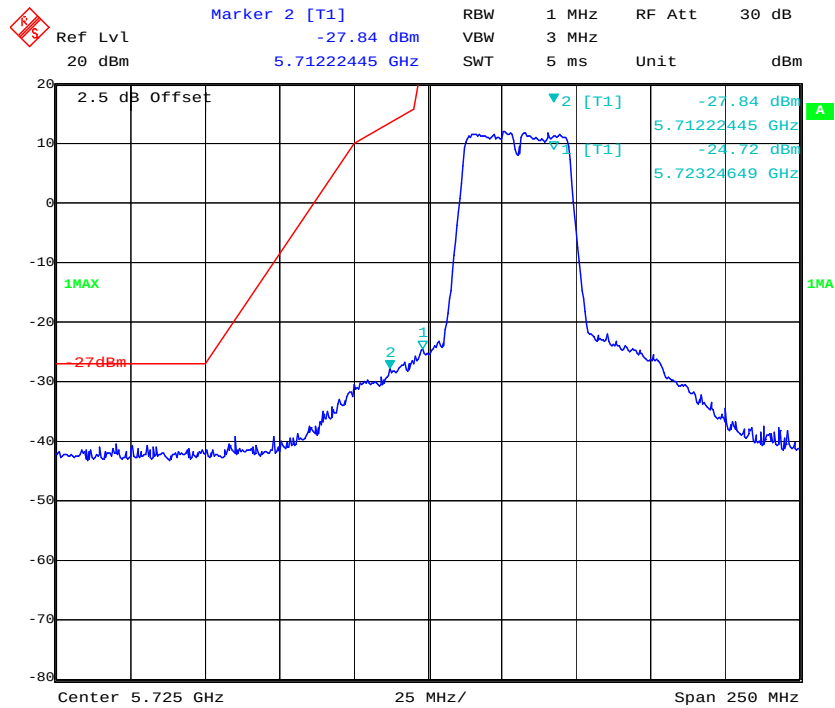
## 802.11n ht20 Low Channel



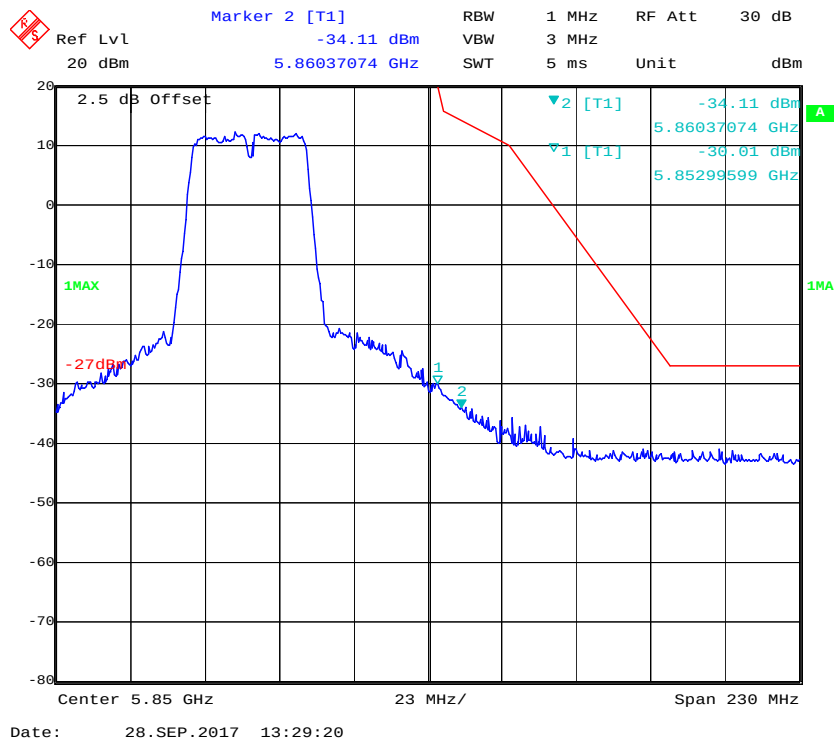
## 802.11n ht20 High Channel



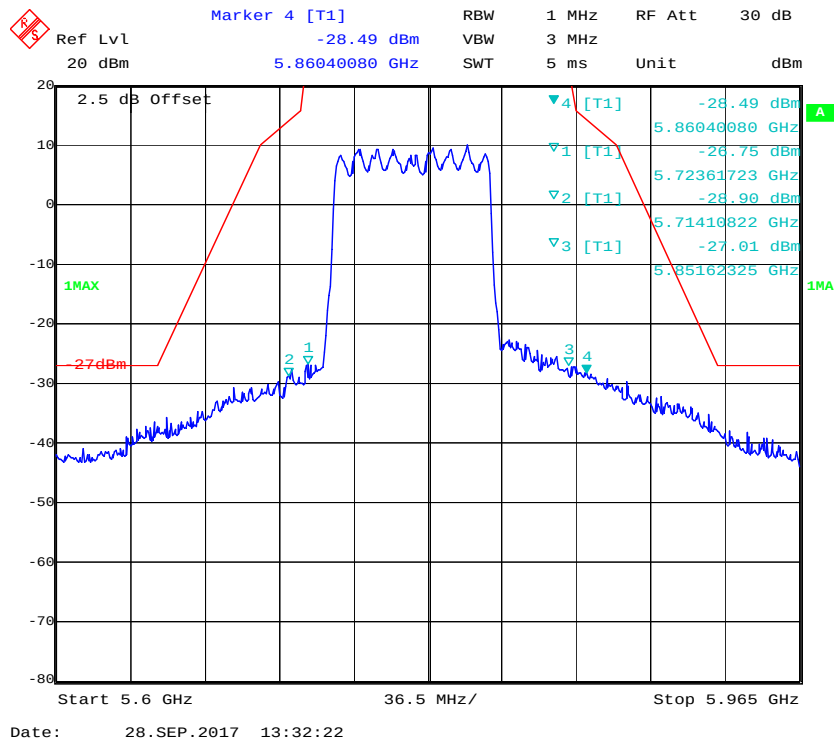
## 802.11n ht40 Low Channel



## 802.11n ht40 High Channel

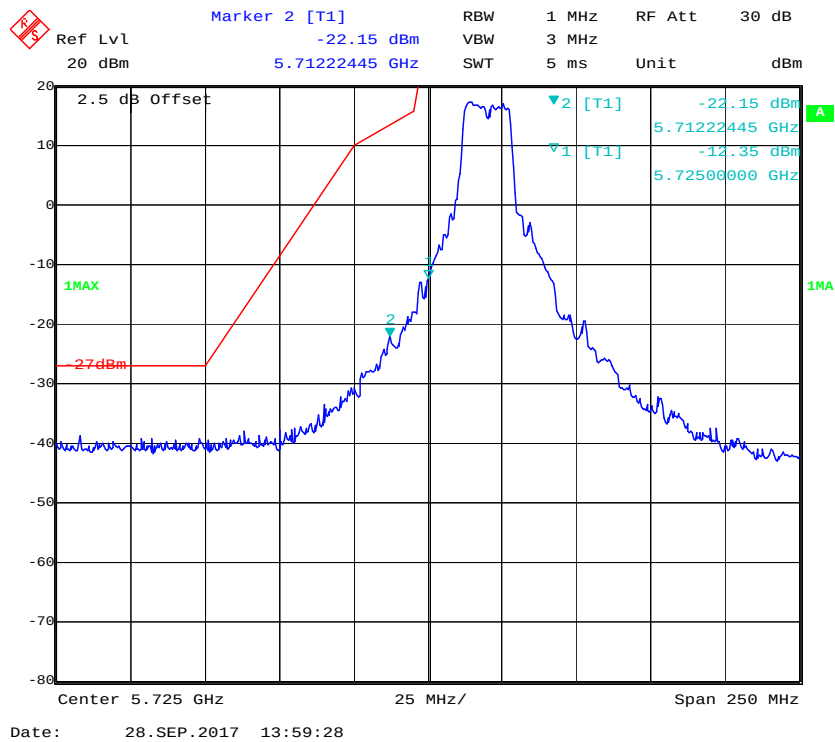


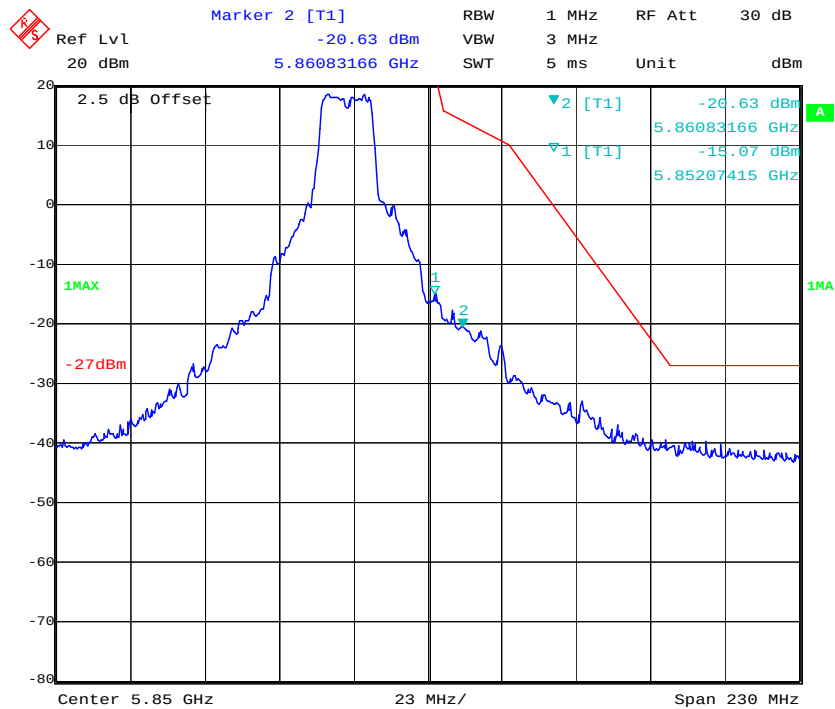
## 802.11n ac80 Middle Channel



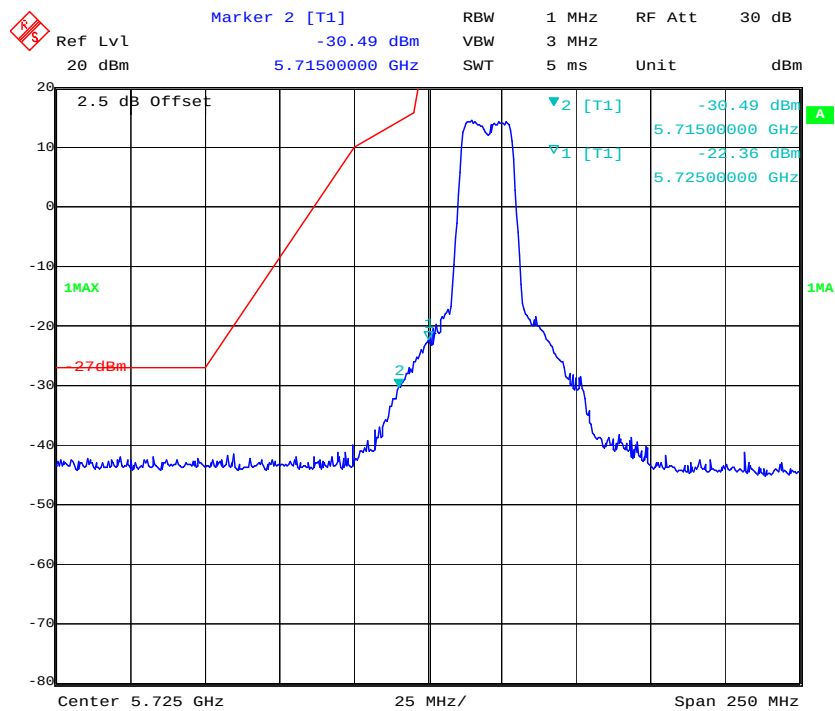
Chain 1:

## 802.11a Low Channel



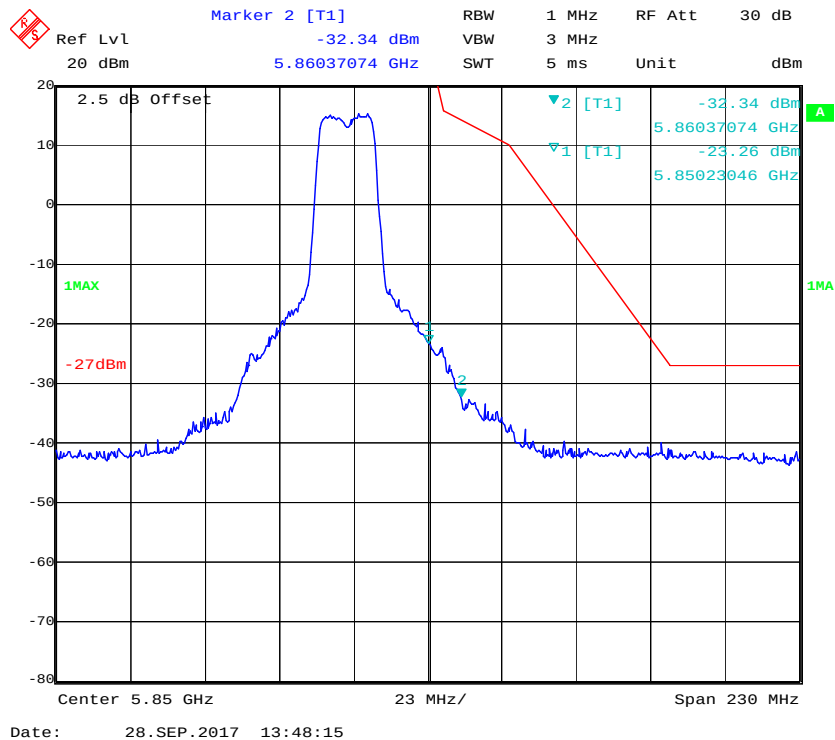
**802.11a High Channel**

Date: 20.SEP.2017 14:24:13

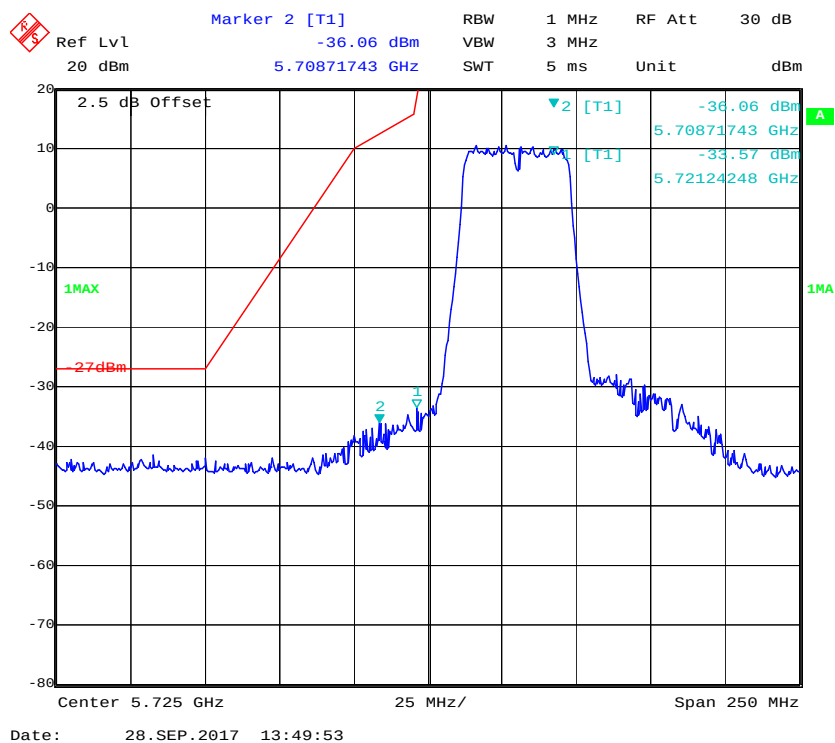
**802.11n ht20 Low Channel**

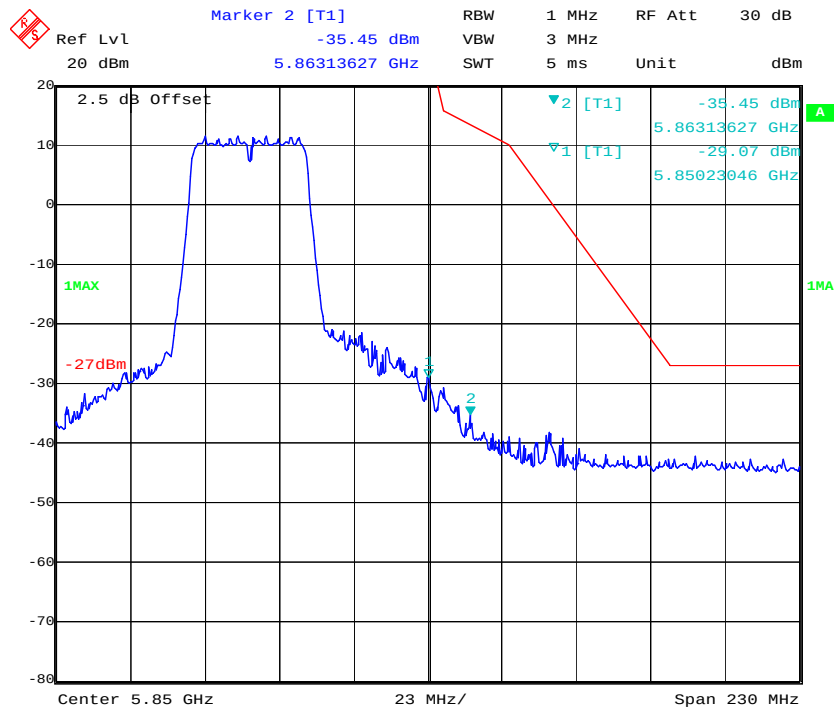
Date: 28.SEP.2017 13:55:27

## 802.11n ht20 High Channel

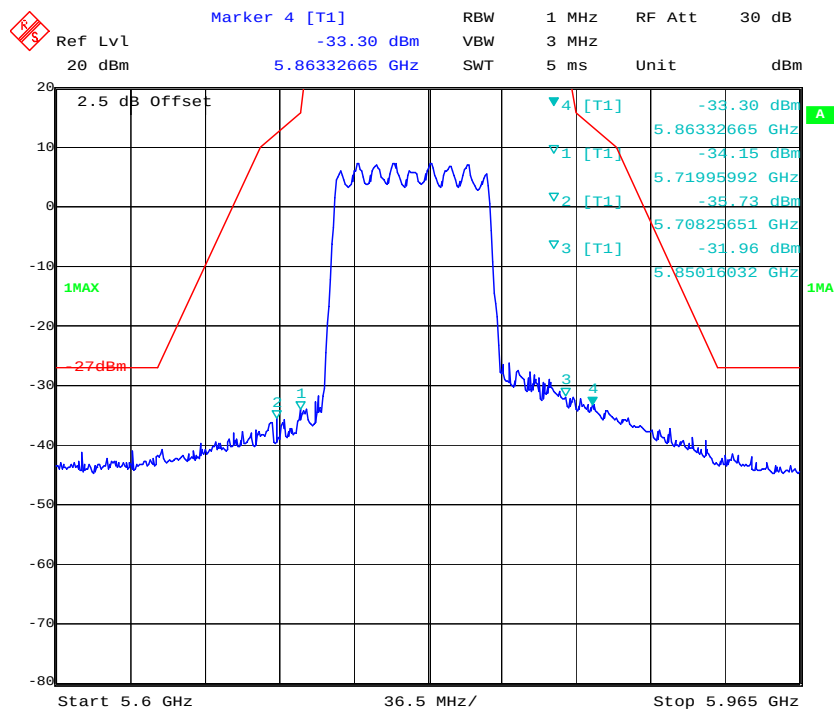


## 802.11n ht40 Low Channel



**802.11n ht40 High Channel**

Date: 28.SEP.2017 13:52:09

**802.11n ac80 Middle Channel**

Date: 28.SEP.2017 13:53:22

**FCC §15.407(a)(e) –EMISSION BANDWIDTH AND OCCUPIED BANDWIDTH****Applicable Standard**

15.407(a) (e)

**Test Equipment List and Details**

| Manufacturer | Description       | Model       | Serial Number | Calibration Date | Calibration Due Date |
|--------------|-------------------|-------------|---------------|------------------|----------------------|
| R&S          | Spectrum Analyzer | FSIQ 26     | 831929/005    | 2017-08-31       | 2018-08-31           |
| N/A          | Coaxial Cable     | C-SJ00-0010 | C0010/04      | Each Time        | /                    |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

**Test Procedure**

According to KDB 789033 D02 General UNII Test Procedures New Rules v01r04

**Test Data****Environmental Conditions**

|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 27.6°C   |
| <b>Relative Humidity:</b> | 39%      |
| <b>ATM Pressure:</b>      | 100.4kPa |

*The testing was performed by Rick Chen on 2017-09-20.*

**Test Result:** Pass.

Please refer to the following tables and plots.

Test mode: Transmitting(Test performed at chain 0)

**5150-5250MHz:**

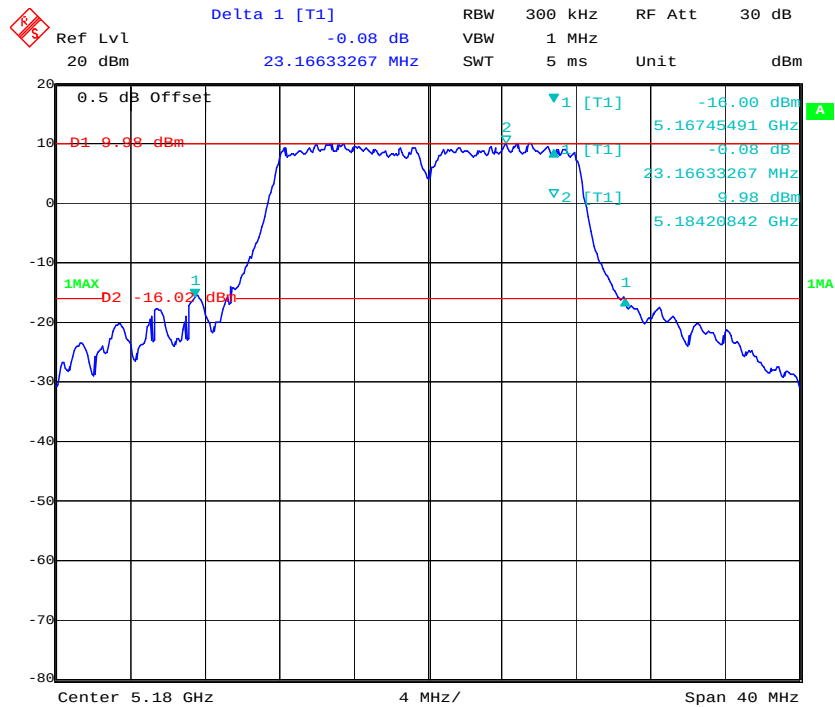
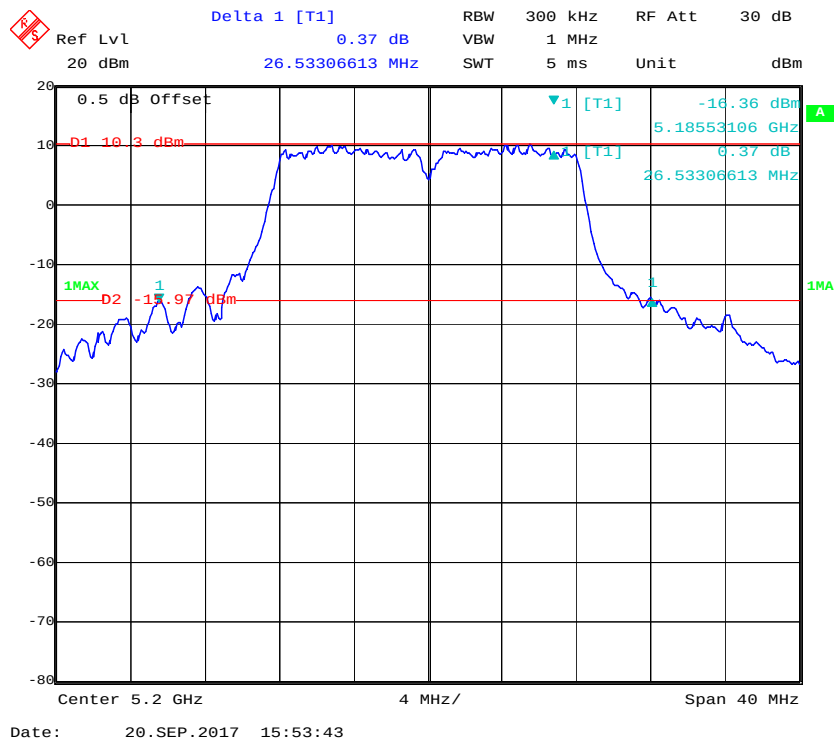
| Mode         | Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|--------------|---------|-----------------|--------------------------------|------------------------------|
| 802.11 a     | Low     | 5180            | 23.17                          | 16.83                        |
|              | Middle  | 5200            | 26.53                          | 16.99                        |
|              | High    | 5240            | 26.85                          | 16.99                        |
| 802.11n ht20 | Low     | 5180            | 21.4                           | 17.8                         |
|              | Middle  | 5200            | 21.32                          | 17.8                         |
|              | High    | 5240            | 21.32                          | 17.8                         |
| 802.11n ht40 | Low     | 5190            | 41.84                          | 36.87                        |
|              | High    | 5230            | 41.84                          | 37.03                        |
| 802.11ac80   | Middle  | 5210            | 82.08                          | 75.99                        |

Note: the 99% Occupied Bandwidth have not fall into the band 5250-5350MHz, please refer to the test plots of 99% Occupied Bandwidth.

**5725-5850MHz:**

| Mode         | Channel | Frequency (MHz) | 6 dB Emission Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|--------------|---------|-----------------|-------------------------------|------------------------------|
| 802.11 a     | Low     | 5745            | 16.59                         | 17.23                        |
|              | Middle  | 5785            | 16.59                         | 17.15                        |
|              | High    | 5825            | 16.59                         | 17.15                        |
| 802.11n ht20 | Low     | 5745            | 17.72                         | 17.8                         |
|              | Middle  | 5785            | 17.8                          | 17.8                         |
|              | High    | 5825            | 17.8                          | 17.8                         |
| 802.11n ht40 | Low     | 5755            | 36.71                         | 37.03                        |
|              | High    | 5795            | 36.71                         | 37.19                        |
| 802.11ac80   | Middle  | 5775            | 76.63                         | 75.99                        |

Note: For 5725-5850MHz band, the 99% Occupied Bandwidth have not fall into the band 5470-5725MHz.

**5150-5250MHz: 26dB Emission Bandwidth:****802.11a Low Channel****802.11a Middle Channel**

Delta 1 [T1]

Ref Lvl 1.38 dB

20 dBm 26.85370741 MHz

RBW 300 kHz RF Att 30 dB

VBW 1 MHz

SWT 5 ms Unit dBm

0.5 dB Offset

D1 10.32 dBm

1MAX -16.34 dBm

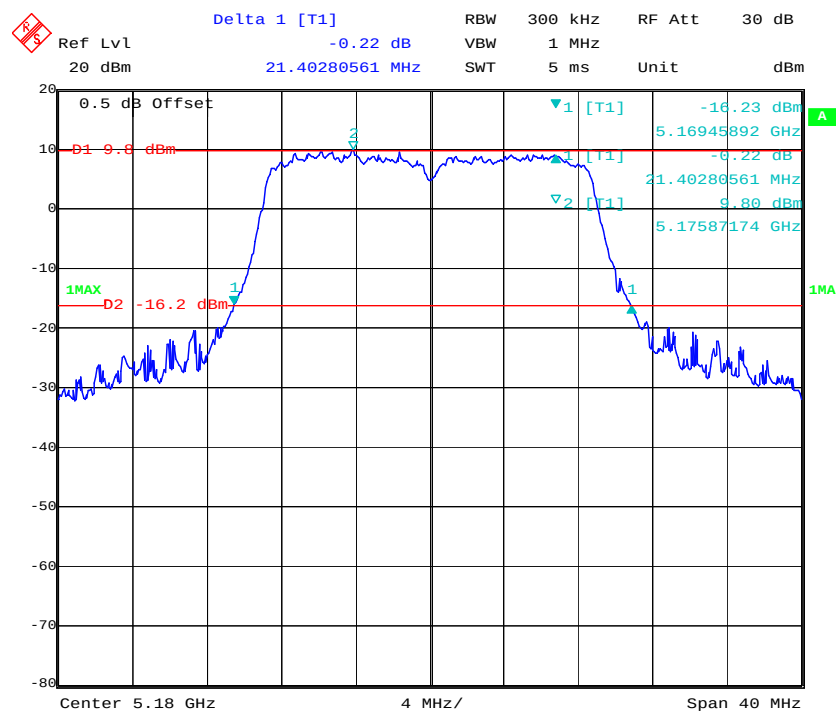
D2 -16.34 dBm

1 5.22529058 GHz

1 26.85370741 MHz

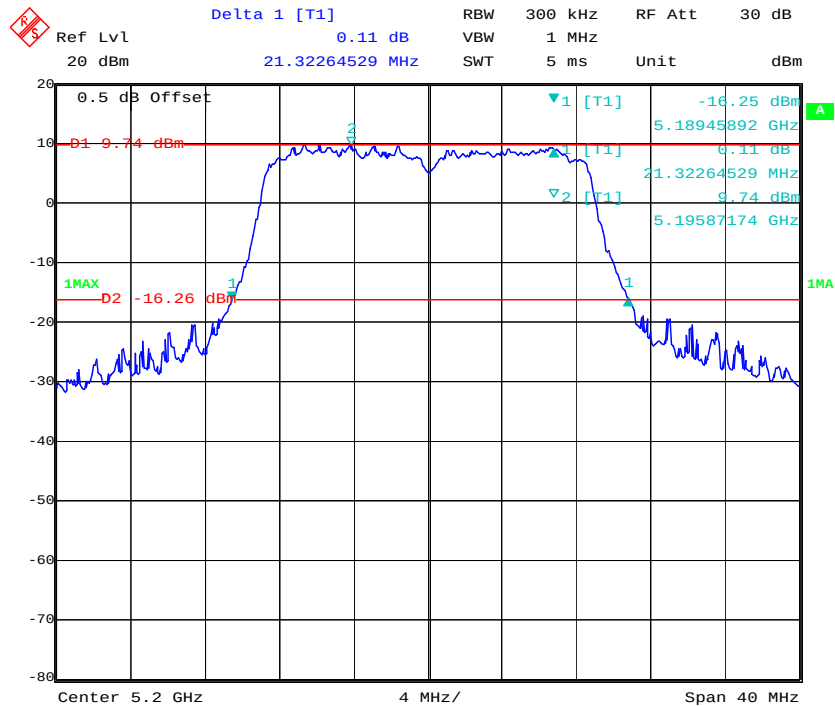
Center 5.24 GHz 4 MHz/ Span 40 MHz

### 802.11n ht20 Low Channel



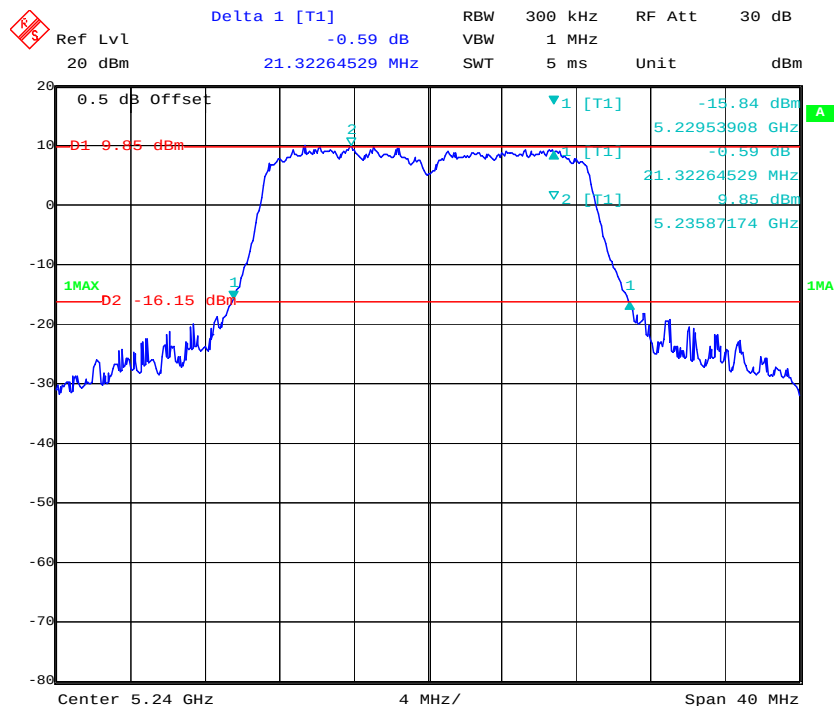
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## 802.11n ht20 Middle Channel



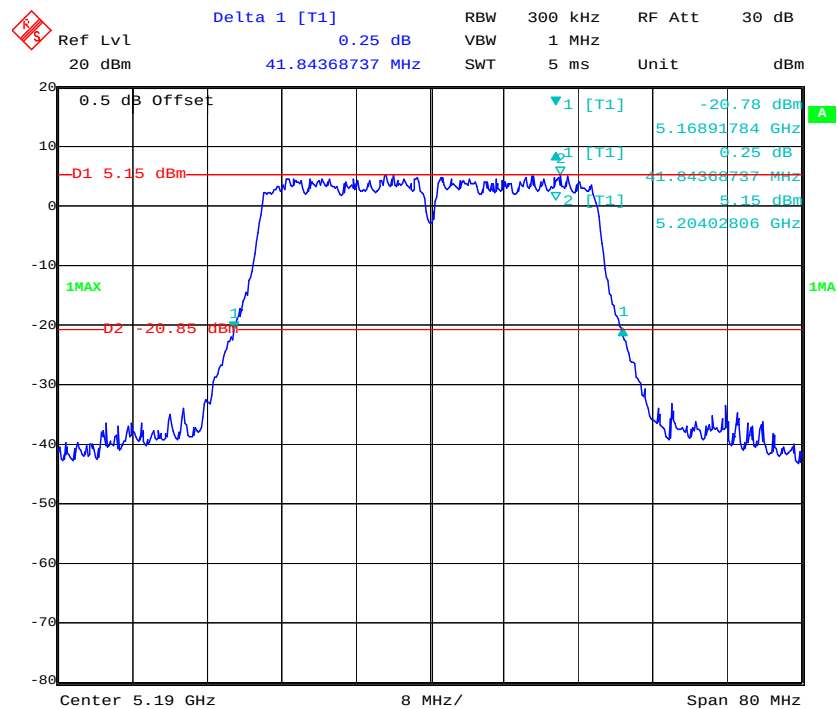
Date: 20.SEP.2017 11:27:02

## 802.11n ht20 High Channel



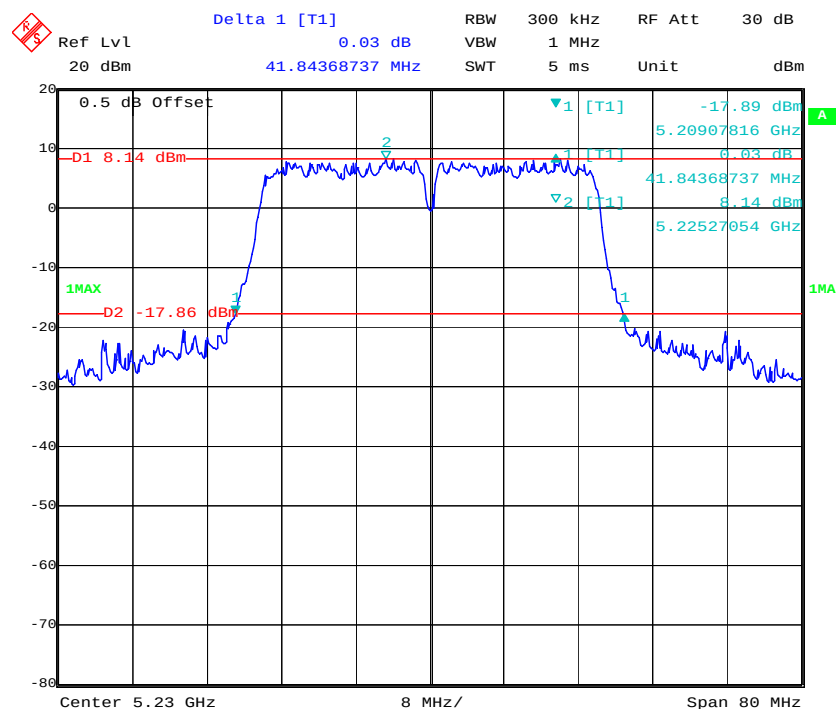
Date: 20.SEP.2017 11:25:00

## 802.11n ht40 Low Channel



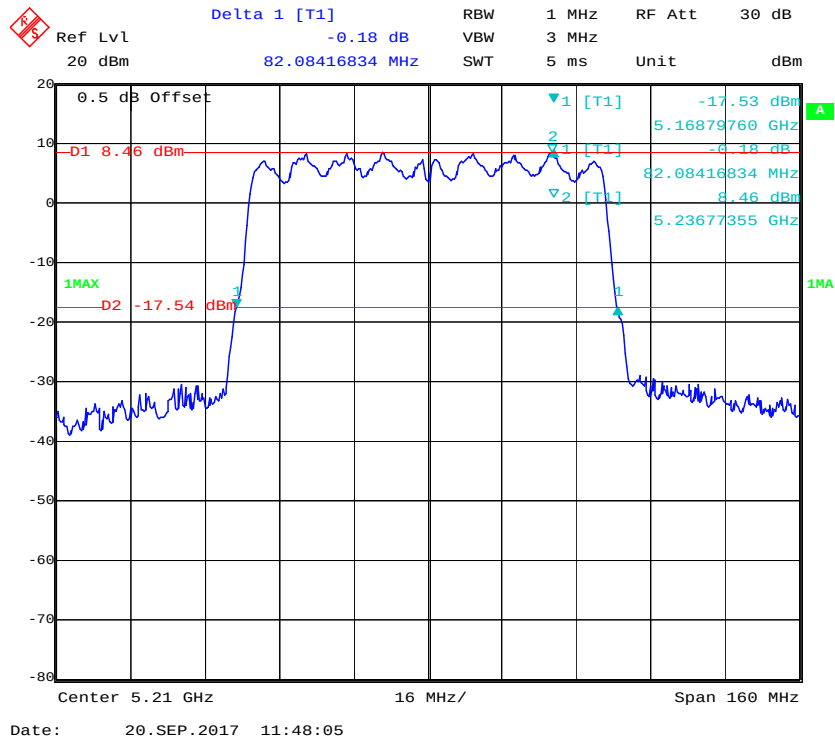
Date: 20.SEP.2017 11:35:18

## 802.11n ht40 High Channel



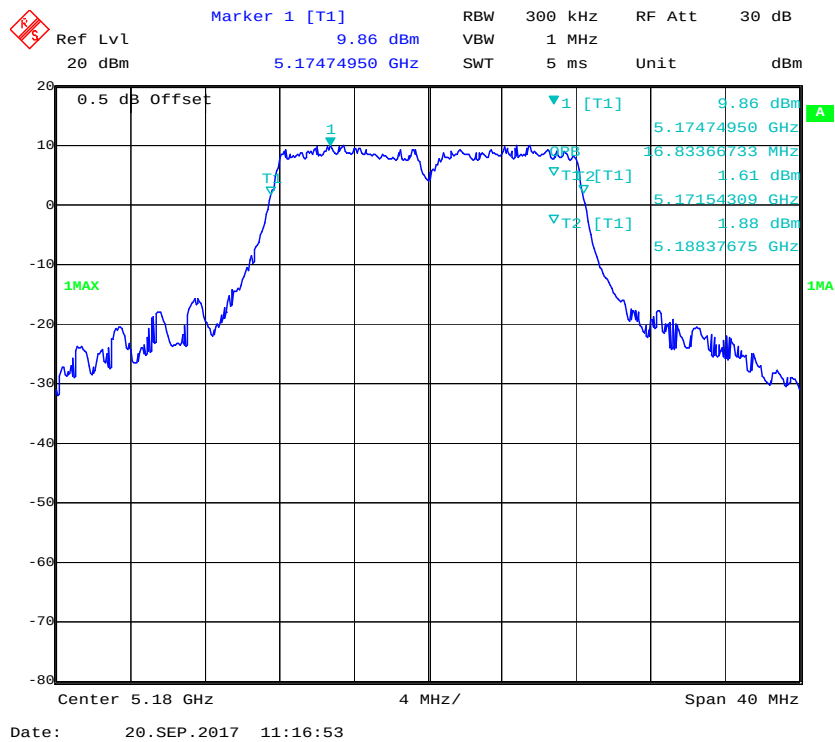
Date: 20.SEP.2017 11:37:36

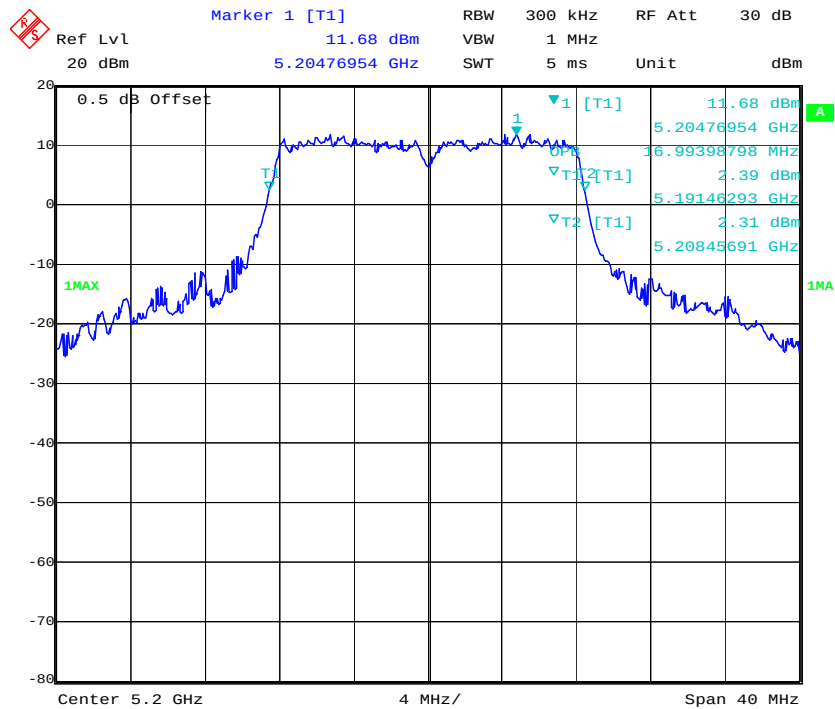
## 802.11ac80 Middle Channel



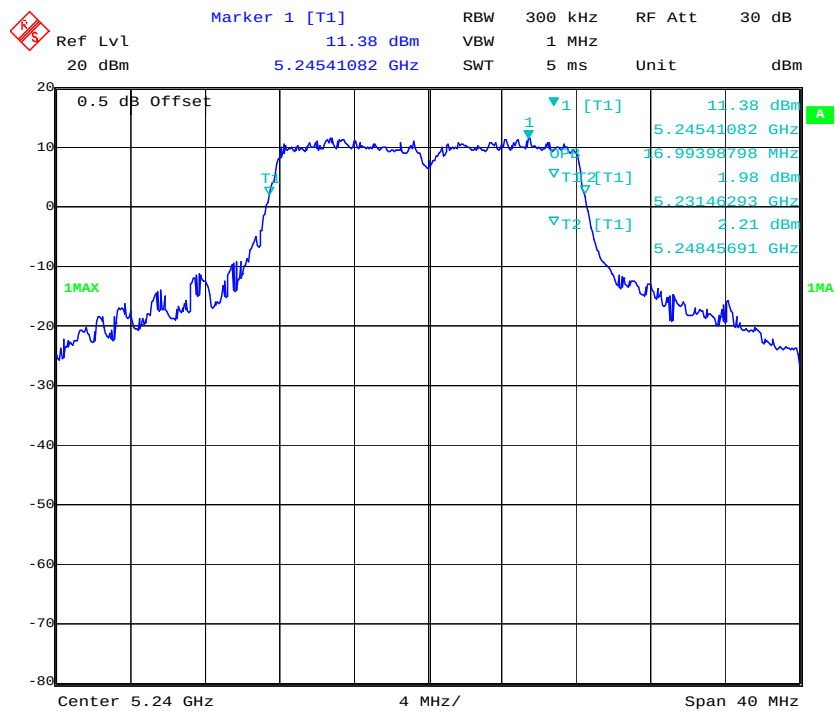
## 99% Occupied Bandwidth

## 802.11a Low Channel



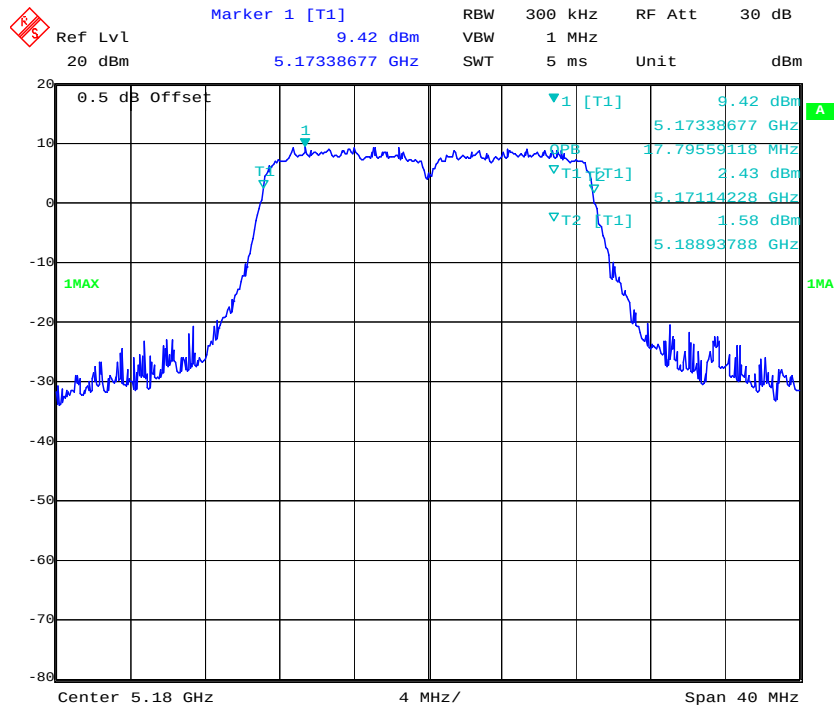
**802.11a Middle Channel**

Date: 20.SEP.2017 11:19:19

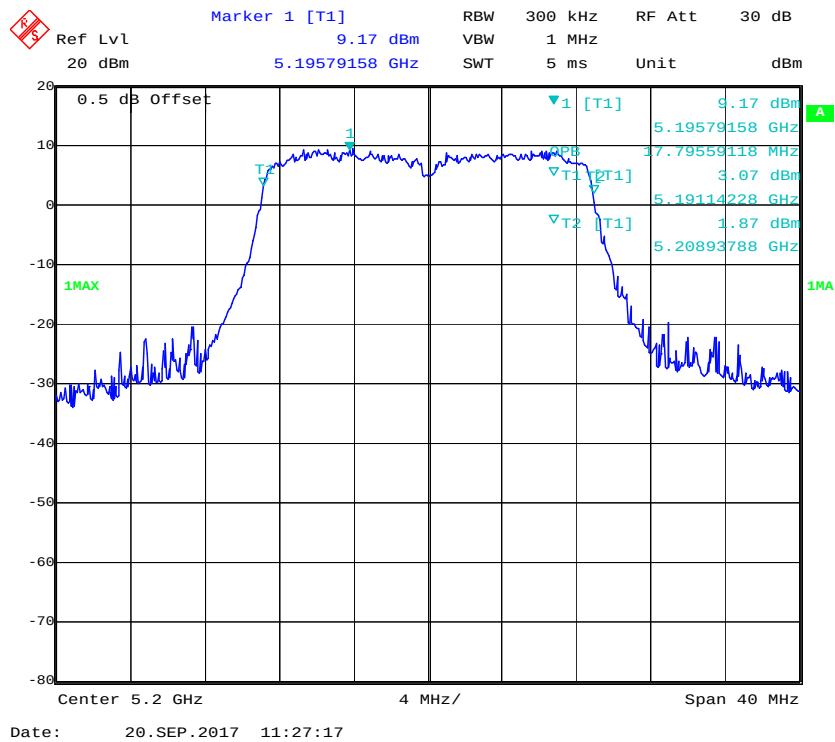
**802.11a High Channel**

Date: 20.SEP.2017 11:22:42

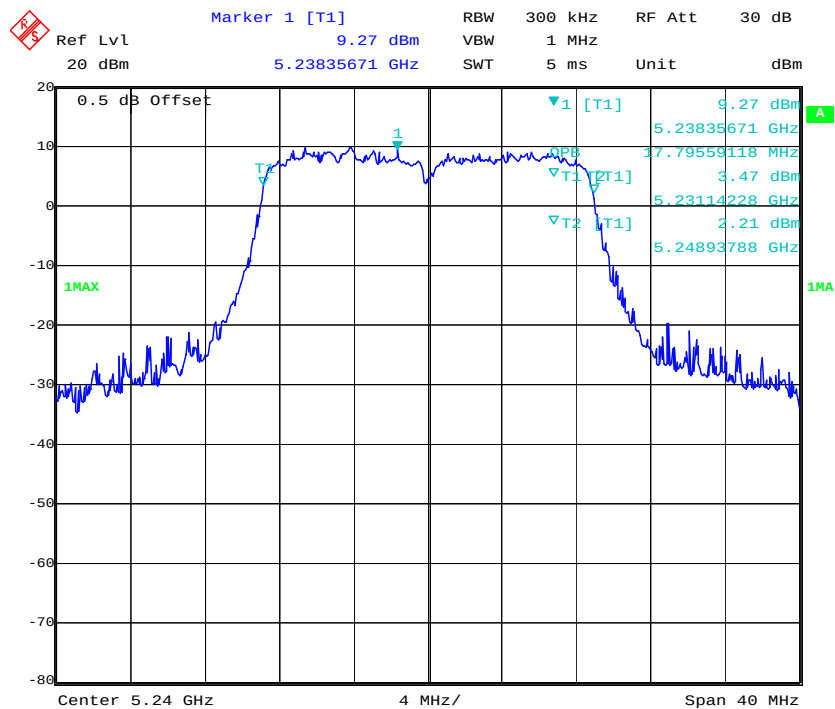
## 802.11n ht20 Low Channel



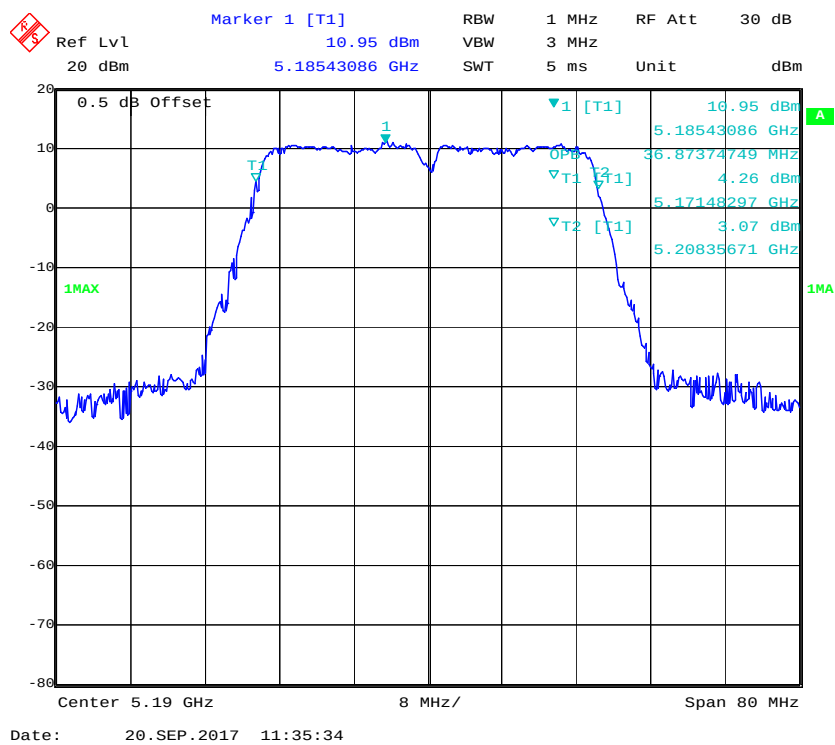
## 802.11n ht20 Middle Channel

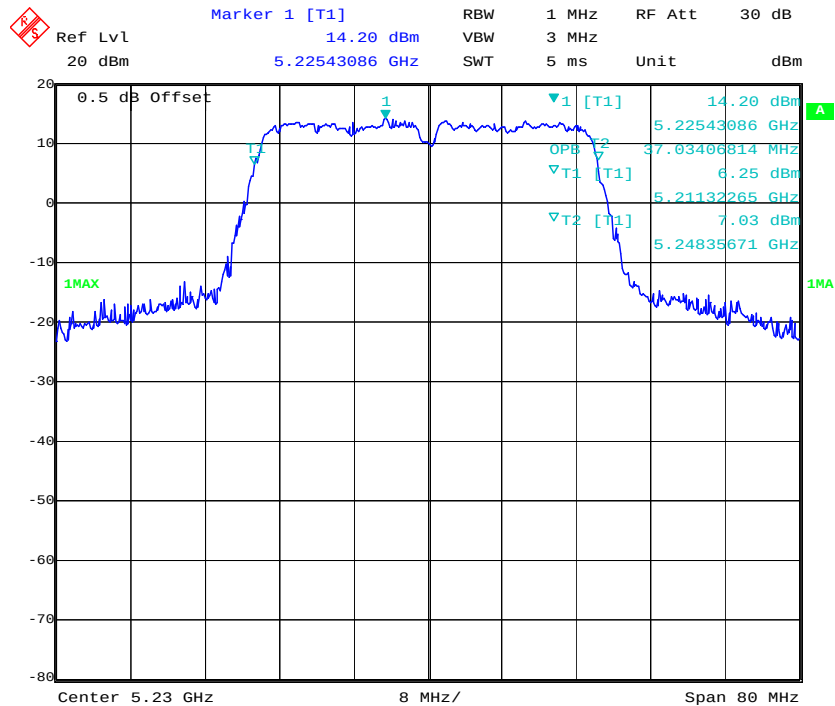
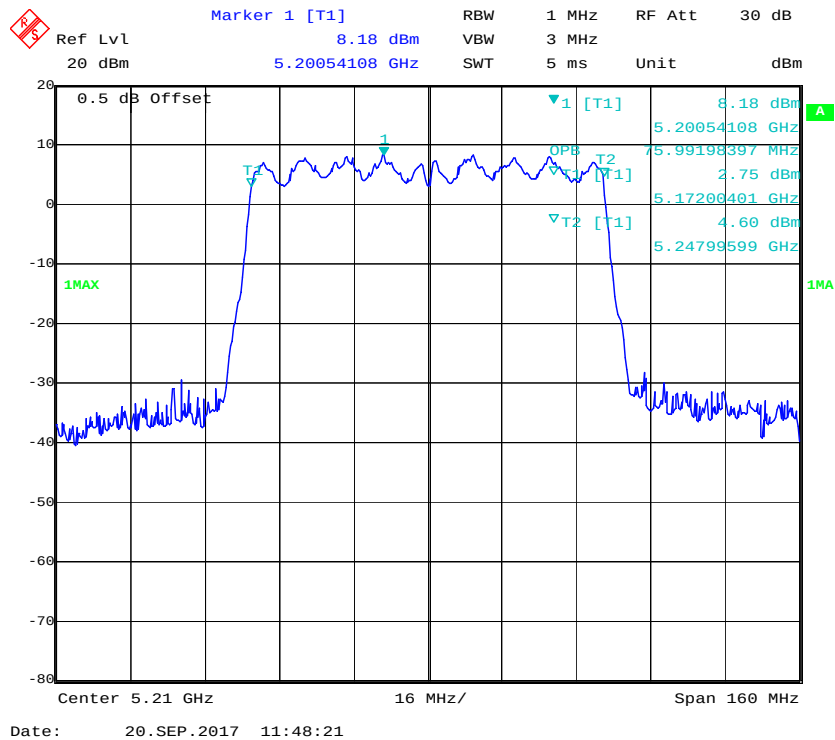


## 802.11n ht20 High Channel



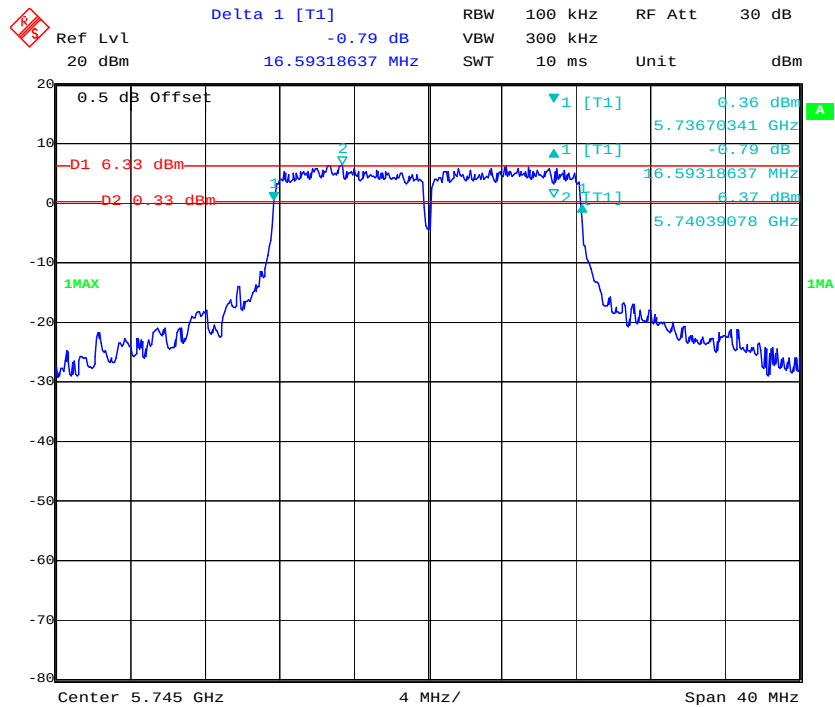
## 802.11n ht40 Low Channel



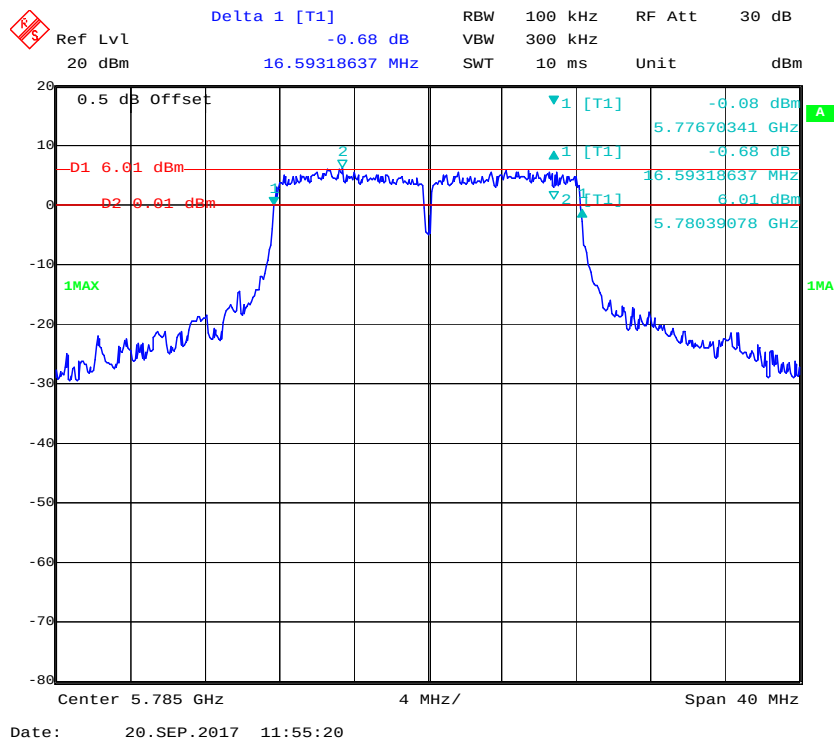
**802.11n ht40 High Channel****802.11ac80 Middle Channel**

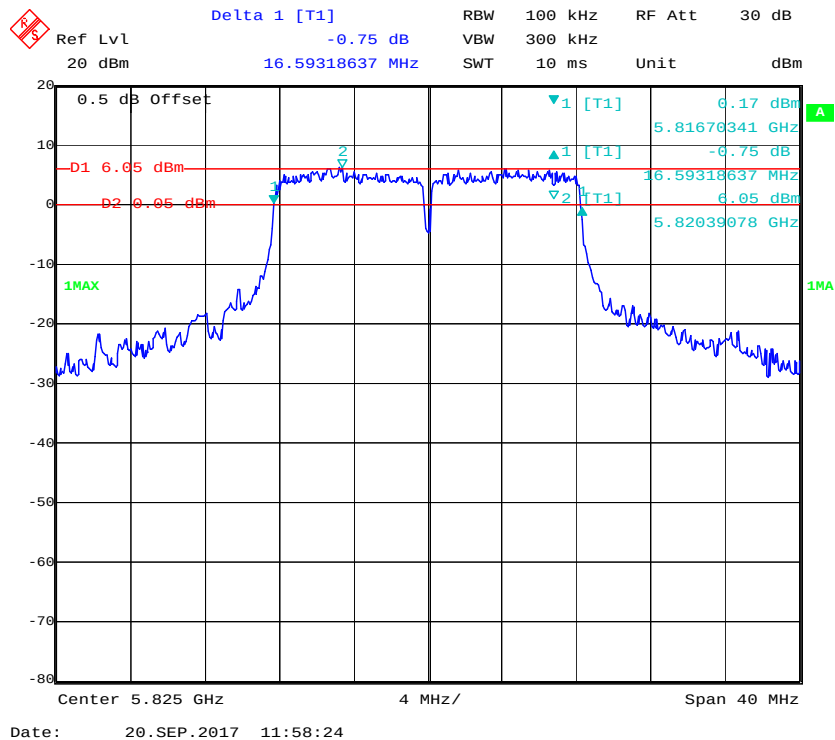
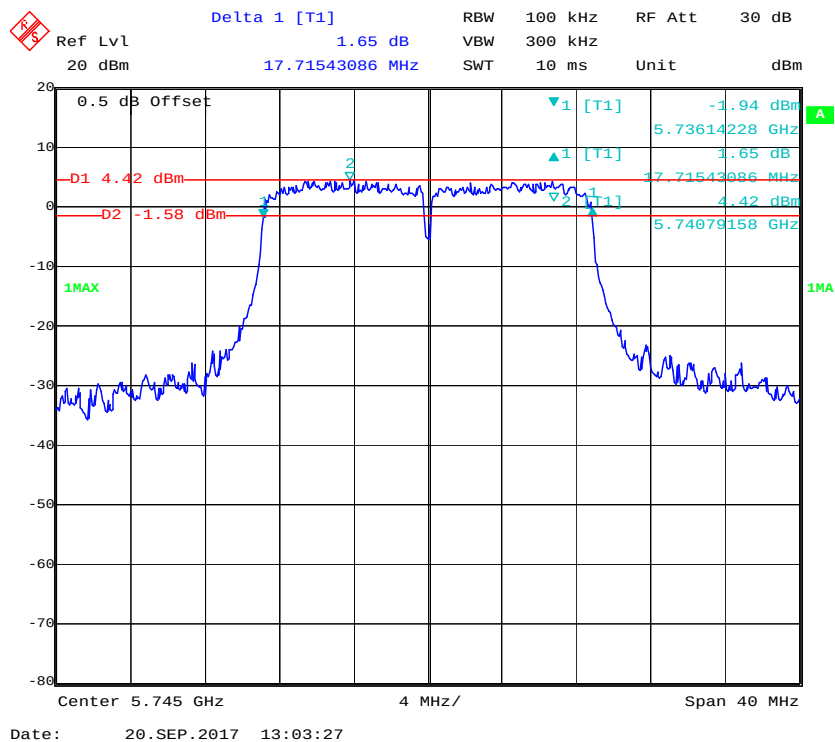
5725-5850MHz:  
6dB Bandwidth:

### 802.11a Low Channel

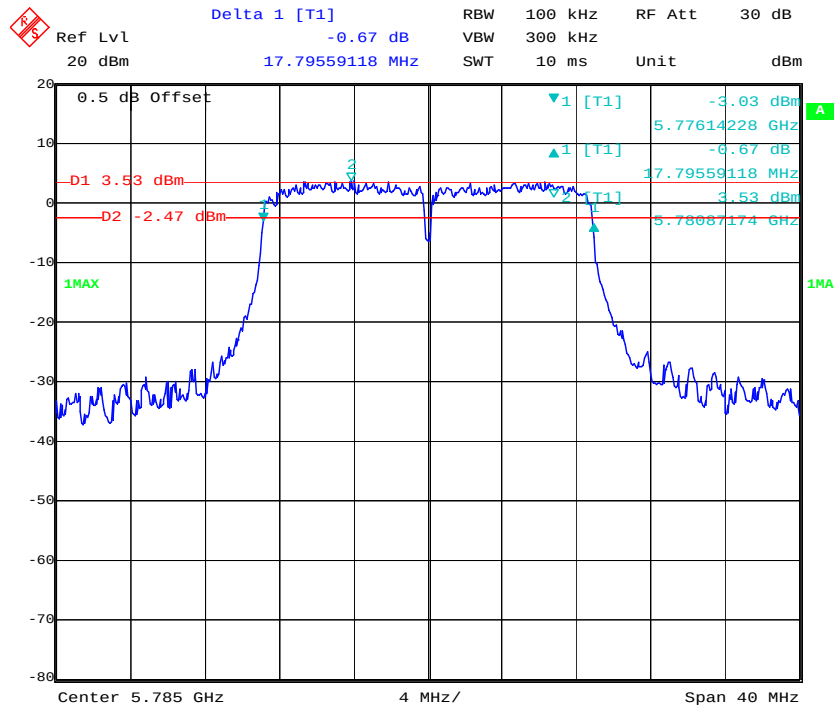


### 802.11a Middle Channel

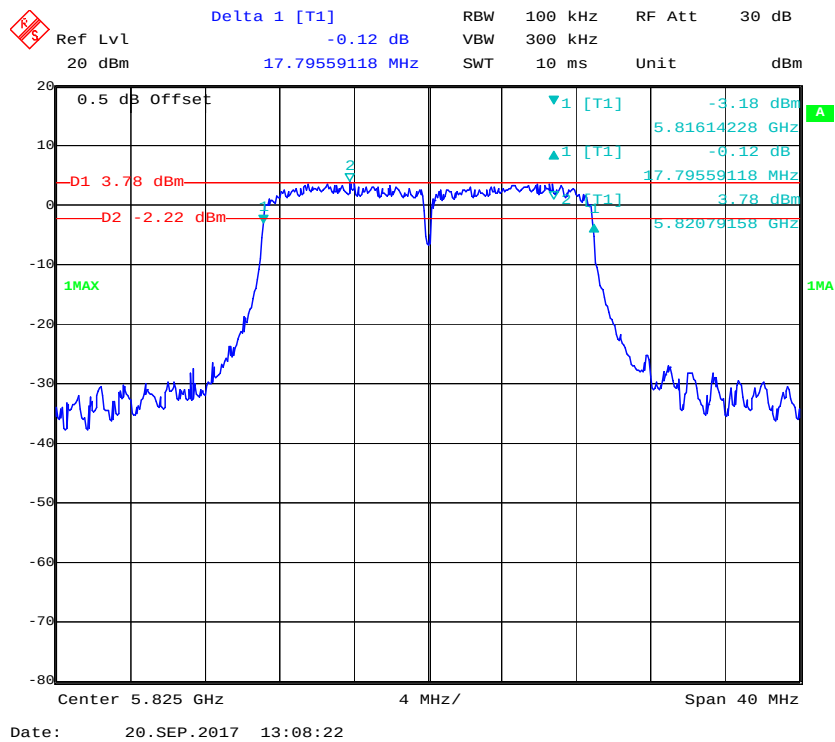


**802.11a High Channel****802.11ht20 Low Channel**

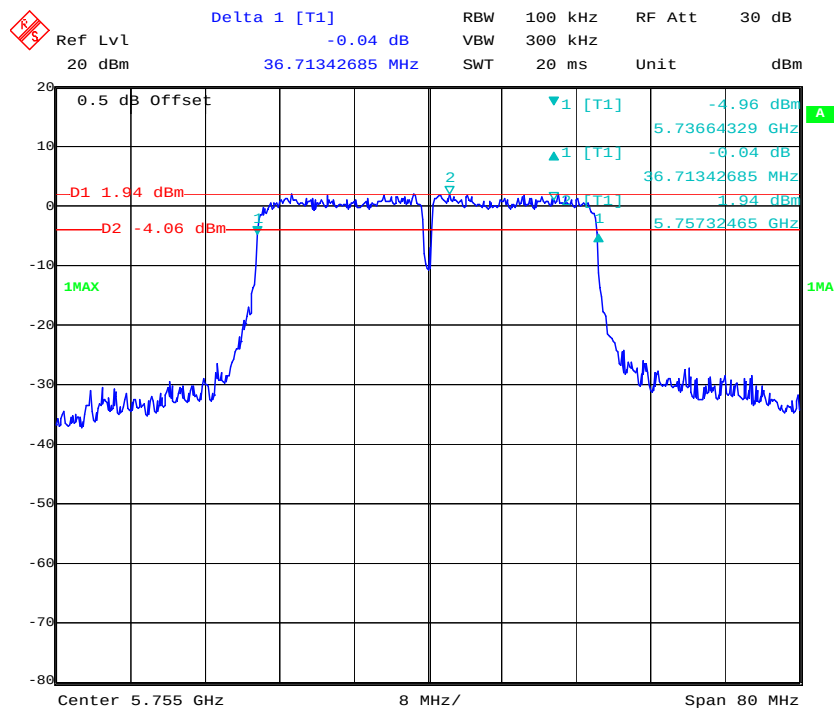
## 802.11ht20 Middle Channel



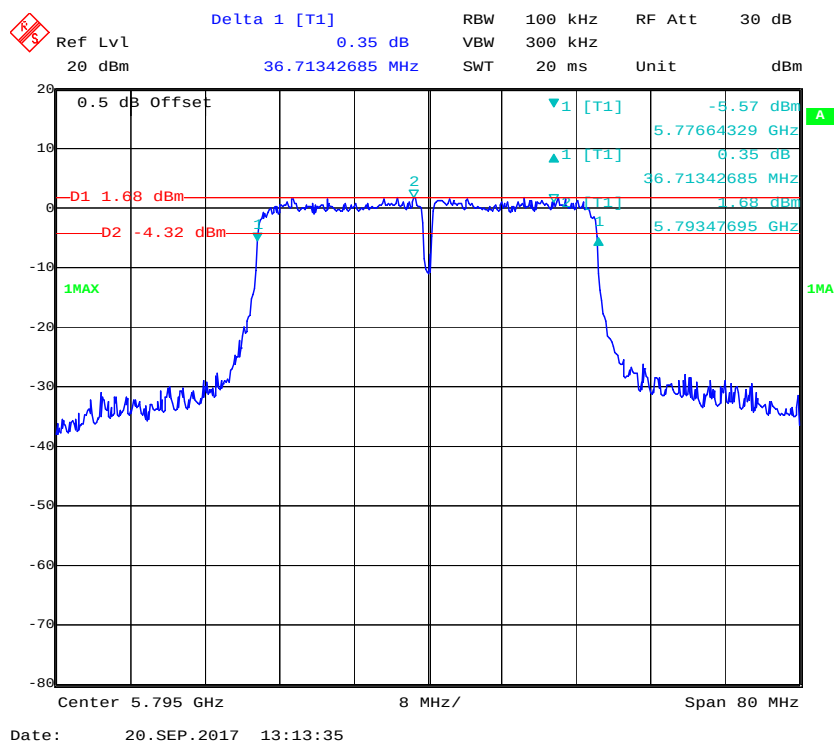
## 802.11ht20 High Channel



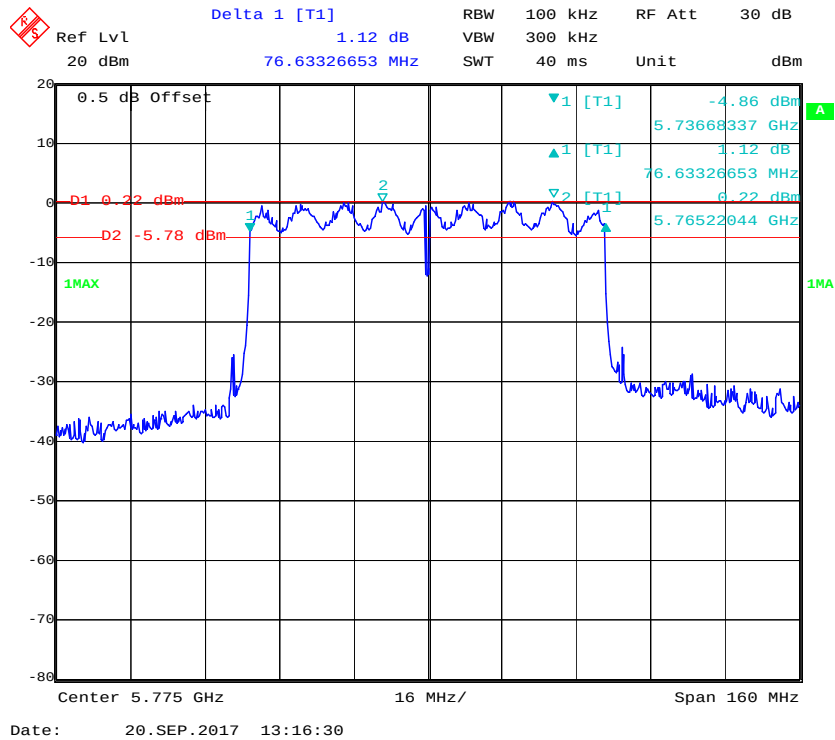
## 802.11ht40 Low Channel



## 802.11ht40 High Channel

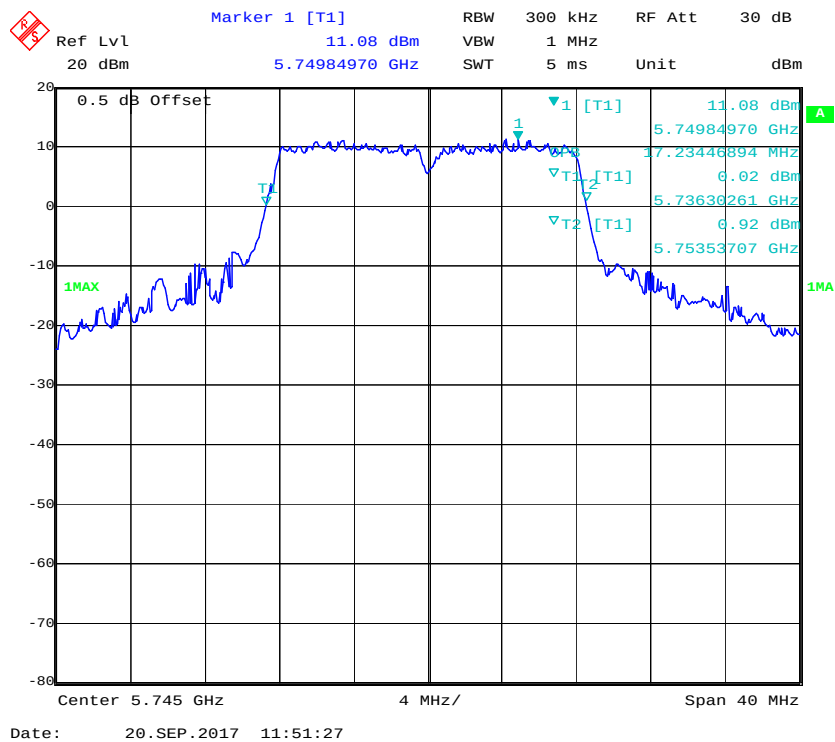


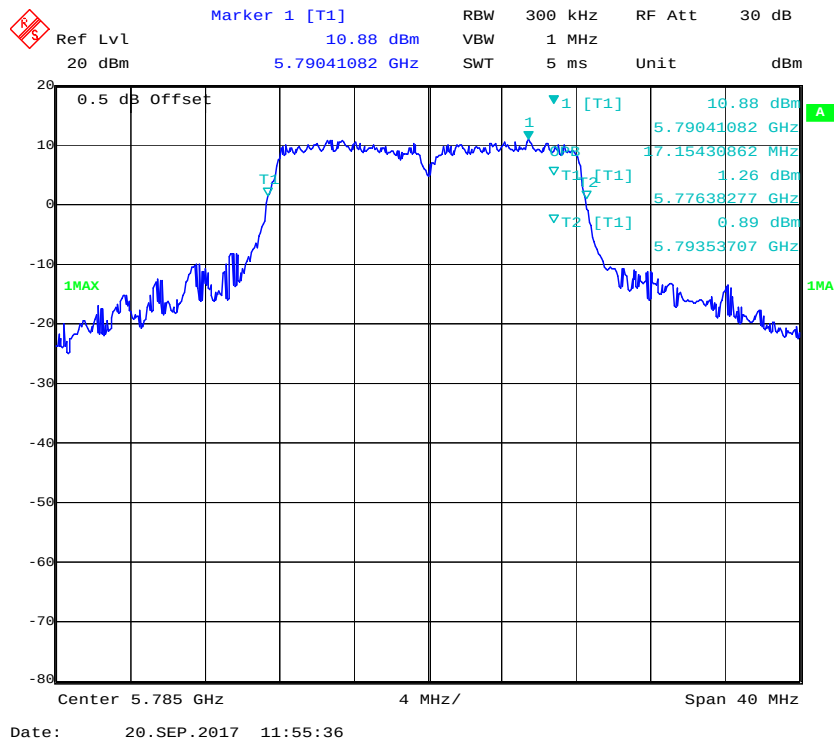
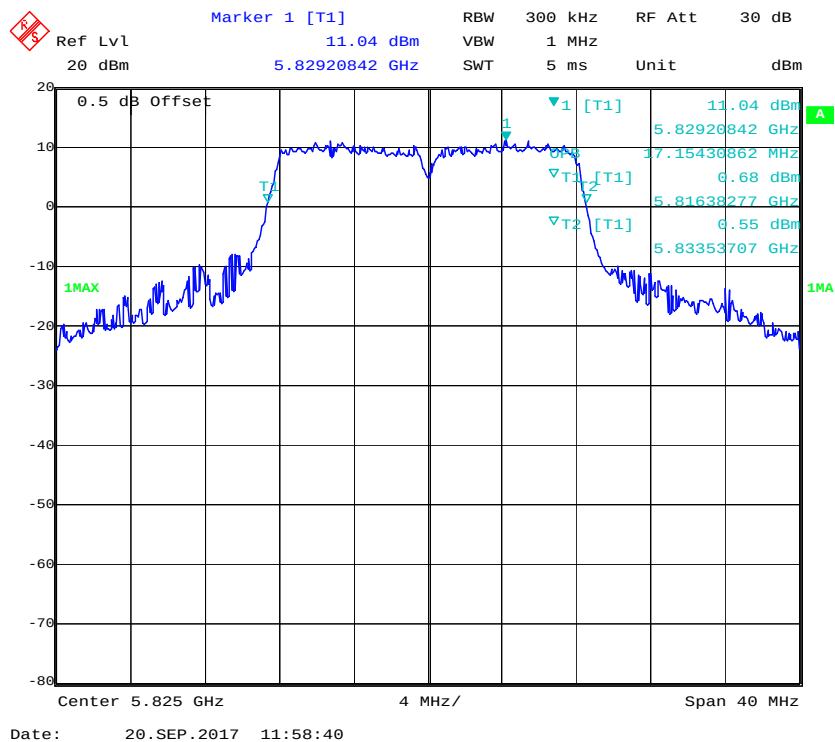
## 802.11ac80 Middle Channel



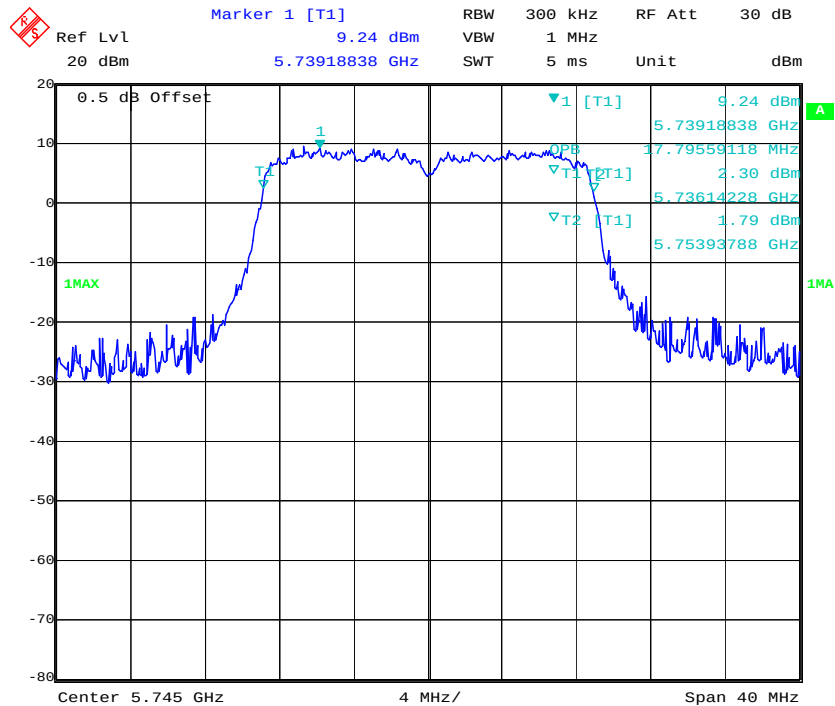
99% Occupied Bandwidth:

## 802.11a Low Channel

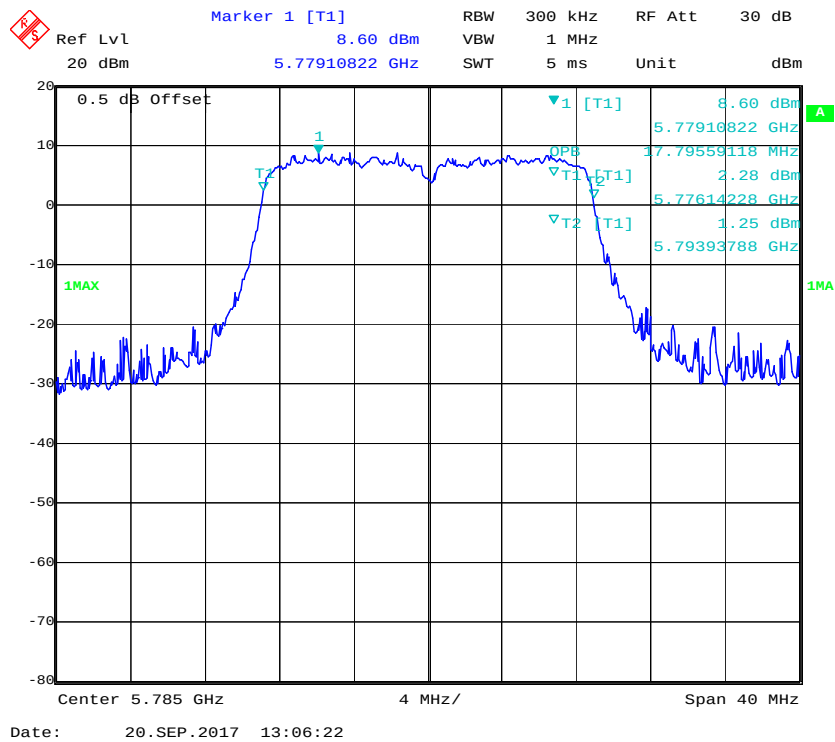


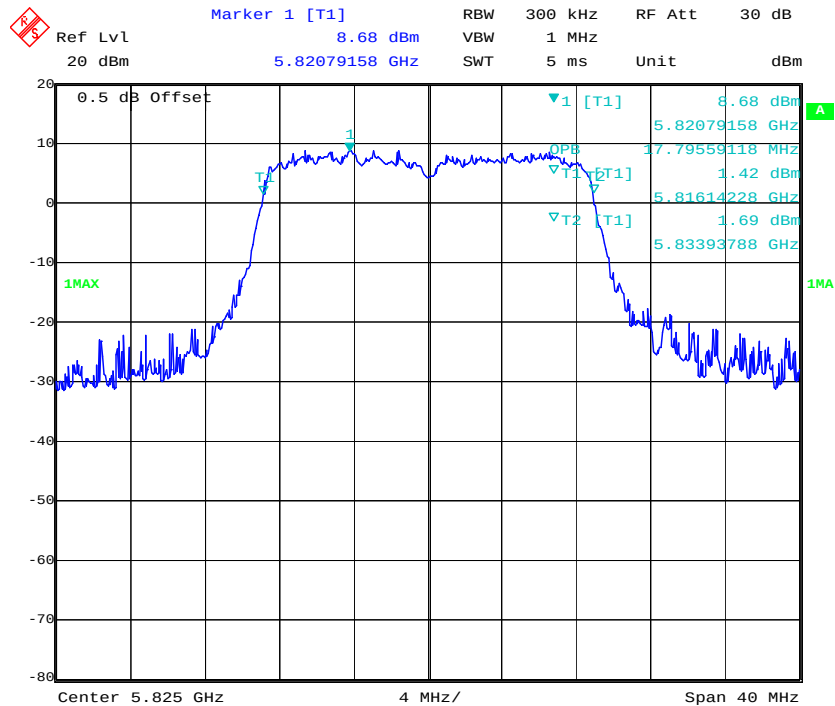
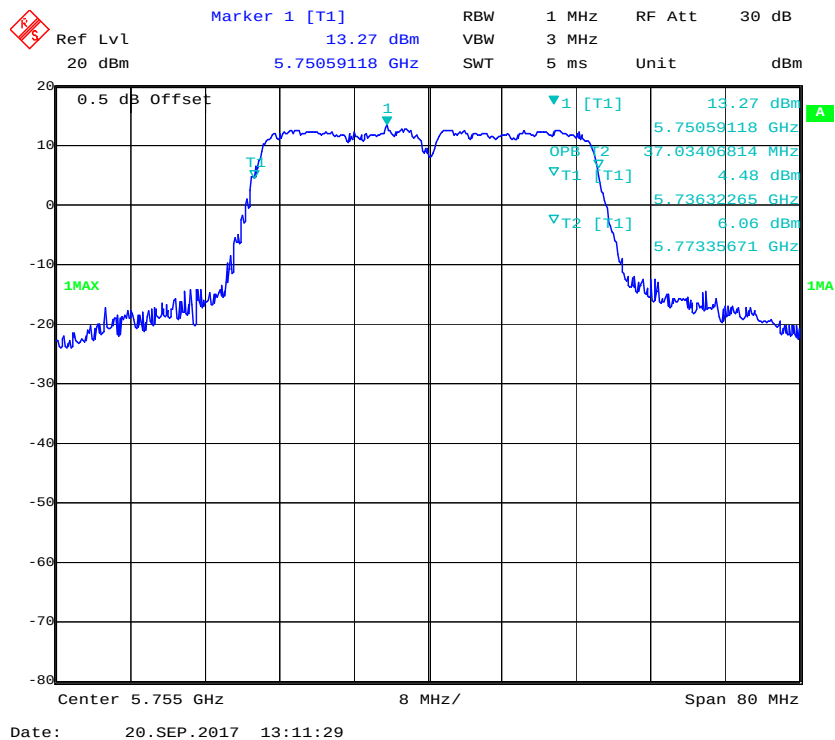
**802.11a Middle Channel****802.11a High Channel**

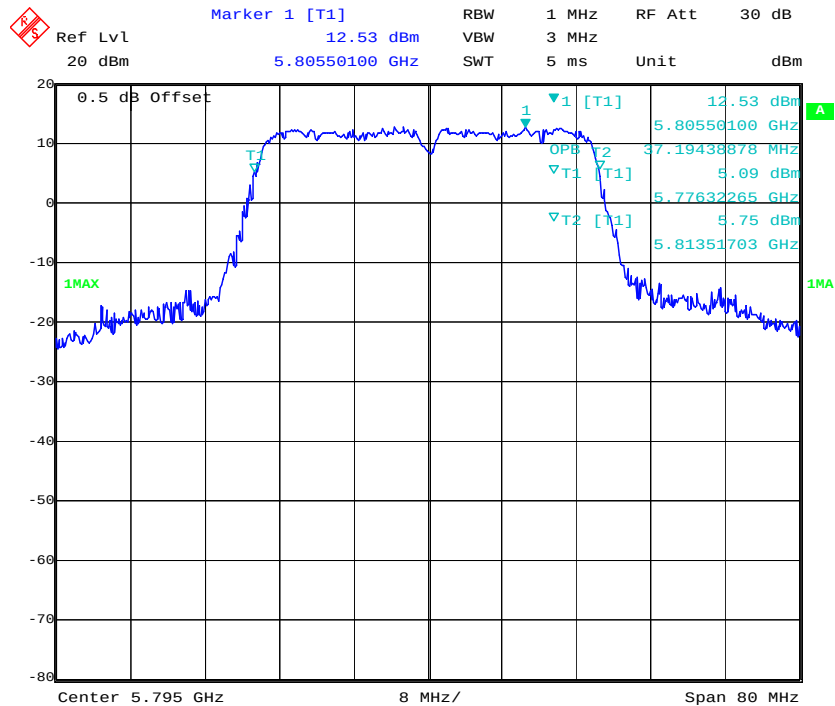
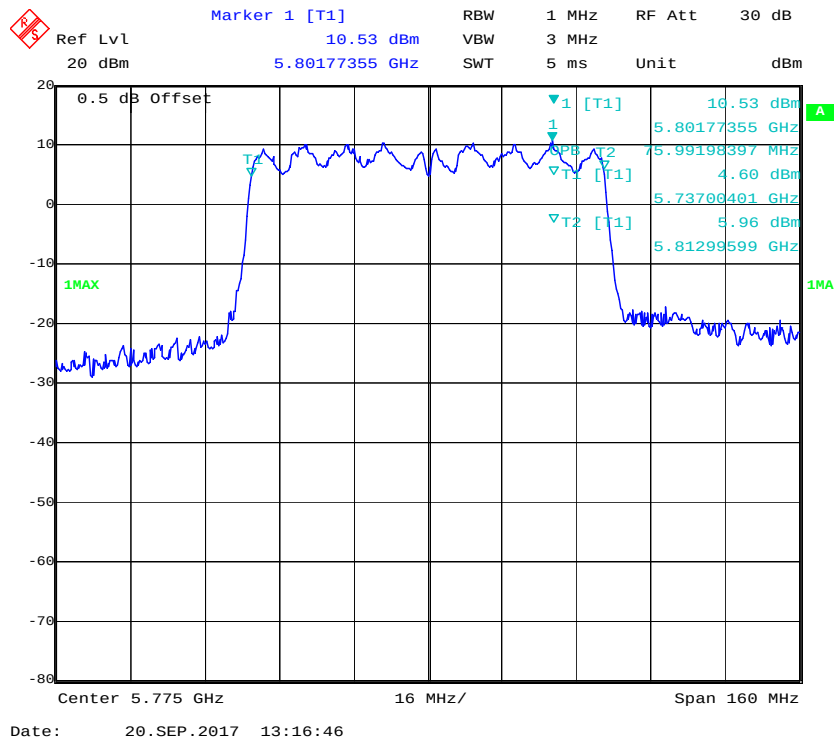
### 802.11ht20 Low Channel



### 802.11ht20 Middle Channel



**802.11ht20 High Channel****802.11ht40 Low Channel**

**802.11ht40 High Channel****802.11ac80 Middle Channel**

**FCC §15.407(g)–FREQUENCY STABILITY****Applicable Standard**

FCC §15.407(g)

(g) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

**Test Procedure**

According to ANSI C63.10-2013 “American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices”.

**Test Equipment List and Details**

| Manufacturer | Description                   | Model       | Serial Number | Calibration Date | Calibration Due Date |
|--------------|-------------------------------|-------------|---------------|------------------|----------------------|
| R&S          | Spectrum Analyzer             | FSIQ 26     | 831929/005    | 2017-08-31       | 2018-08-31           |
| N/A          | Coaxial Cable                 | C-SJ00-0010 | C0010/04      | Each Time        | /                    |
| UNI-T        | Multimeter                    | UT39A       | M130199938    | 2017-05-09       | 2018-05-09           |
| Dongzhixu    | High Temperature Test Chamber | DP1000      | 201105083-4   | 2017-09-10       | 2018-09-09           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

|                    |          |
|--------------------|----------|
| Temperature:       | 27.6°C   |
| Relative Humidity: | 39%      |
| ATM Pressure:      | 100.4kPa |

*The testing was performed by Rick Chen on 2017-09-20.*

**Test Mode: Transmitting**(Test was performed at Chain 0)

**Test Result:** Pass.

**5150-5250MHz:**

802.11a

| Temperature | Voltage         | f <sub>L</sub> at Low Test Channel | F <sub>H</sub> at High Test Channel | Limit                                                       |
|-------------|-----------------|------------------------------------|-------------------------------------|-------------------------------------------------------------|
| °C          | V <sub>AC</sub> | MHz                                | MHz                                 |                                                             |
| 0           | 120             | 5171.5431                          | 5248.4569                           | f <sub>L</sub> and f <sub>H</sub> Within 5150~5250MHz range |
| 10          |                 | 5171.5338                          | 5248.4549                           |                                                             |
| 20          |                 | 5171.5372                          | 5248.4556                           |                                                             |
| 30          |                 | 5171.5424                          | 5248.4472                           |                                                             |
| 40          |                 | 5171.5362                          | 5248.4548                           |                                                             |
| 25          | 102             | 5171.5399                          | 5248.4526                           |                                                             |
| 25          | 138             | 5171.5332                          | 5248.4493                           |                                                             |

802.11n ht20:

| Temperature | Voltage         | f <sub>L</sub> at Low Test Channel | F <sub>H</sub> at High Test Channel | Limit                                                       |
|-------------|-----------------|------------------------------------|-------------------------------------|-------------------------------------------------------------|
| °C          | V <sub>AC</sub> | MHz                                | MHz                                 |                                                             |
| 0           | 120             | 5171.1423                          | 5248.9379                           | f <sub>L</sub> and f <sub>H</sub> Within 5150~5250MHz range |
| 10          |                 | 5171.139                           | 5248.9298                           |                                                             |
| 20          |                 | 5171.1397                          | 5248.9436                           |                                                             |
| 30          |                 | 5171.1412                          | 5248.941                            |                                                             |
| 40          |                 | 5171.1503                          | 5248.9425                           |                                                             |
| 25          | 102             | 5171.1516                          | 5248.9369                           |                                                             |
| 25          | 138             | 5171.1334                          | 5248.9456                           |                                                             |

802.11n ht40:

| Temperature | Voltage         | f <sub>L</sub> at Low Test Channel | F <sub>H</sub> at High Test Channel | Limit                                                       |
|-------------|-----------------|------------------------------------|-------------------------------------|-------------------------------------------------------------|
| °C          | V <sub>AC</sub> | MHz                                | MHz                                 |                                                             |
| 0           | 120             | 5171.483                           | 5248.3567                           | f <sub>L</sub> and f <sub>H</sub> Within 5150~5250MHz range |
| 10          |                 | 5171.473                           | 5248.3571                           |                                                             |
| 20          |                 | 5171.4875                          | 5248.3646                           |                                                             |
| 30          |                 | 5171.4771                          | 5248.3599                           |                                                             |
| 40          |                 | 5171.4767                          | 5248.3634                           |                                                             |
| 25          | 102             | 5171.4854                          | 5248.3636                           |                                                             |
| 25          | 138             | 5171.482                           | 5248.3541                           |                                                             |

802.11ac80:

| Temperature | Voltage         | f <sub>L</sub> at Low Test Channel | F <sub>H</sub> at High Test Channel | Limit                                                       |
|-------------|-----------------|------------------------------------|-------------------------------------|-------------------------------------------------------------|
| °C          | V <sub>AC</sub> | MHz                                | MHz                                 |                                                             |
| 0           | 120             | 5172.004                           | 5247.996                            | f <sub>L</sub> and f <sub>H</sub> Within 5150~5250MHz range |
| 10          |                 | 5172.0116                          | 5248.0018                           |                                                             |
| 20          |                 | 5171.9942                          | 5248.9974                           |                                                             |
| 30          |                 | 5172.0027                          | 5247.99                             |                                                             |
| 40          |                 | 5171.9992                          | 5247.9933                           |                                                             |
| 25          | 102             | 5172.0057                          | 5247.0032                           |                                                             |
| 25          | 138             | 5172.009                           | 5247.9954                           |                                                             |

Note: the f<sub>L</sub> and f<sub>H</sub> determined by 99% Occupied bandwidth low edge at Low test channel and High edge at High test channel.

**5725-5850MHz:**

802.11a

| Temperature | Voltage         | f <sub>L</sub> at Low Test Channel | F <sub>H</sub> at High Test Channel | Limit                                                       |
|-------------|-----------------|------------------------------------|-------------------------------------|-------------------------------------------------------------|
| °C          | V <sub>AC</sub> | MHz                                | MHz                                 |                                                             |
| 0           | 120             | 5736.3026                          | 5833.5371                           | f <sub>L</sub> and f <sub>H</sub> Within 5725~5850MHz range |
| 10          |                 | 5736.2998                          | 5833.5384                           |                                                             |
| 20          |                 | 5736.3105                          | 5833.5463                           |                                                             |
| 30          |                 | 5736.3113                          | 5833.5382                           |                                                             |
| 40          |                 | 5736.3105                          | 5833.5339                           |                                                             |
| 25          | 102             | 5736.2999                          | 5833.5388                           |                                                             |
| 25          | 138             | 5736.3031                          | 5833.5379                           |                                                             |

802.11n ht20:

| Temperature | Voltage         | f <sub>L</sub> at Low Test Channel | F <sub>H</sub> at High Test Channel | Limit                                                       |
|-------------|-----------------|------------------------------------|-------------------------------------|-------------------------------------------------------------|
| °C          | V <sub>AC</sub> | MHz                                | MHz                                 |                                                             |
| 0           | 120             | 5736.1423                          | 5833.9379                           | f <sub>L</sub> and f <sub>H</sub> Within 5725~5850MHz range |
| 10          |                 | 5736.1419                          | 5833.9355                           |                                                             |
| 20          |                 | 5736.1442                          | 5833.9338                           |                                                             |
| 30          |                 | 5736.1346                          | 5833.9302                           |                                                             |
| 40          |                 | 5736.1522                          | 5833.9432                           |                                                             |
| 25          | 102             | 5736.1514                          | 5833.9449                           |                                                             |
| 25          | 138             | 5736.1453                          | 5833.9472                           |                                                             |

802.11n ht40:

| Temperature | Voltage         | f <sub>L</sub> at Low Test Channel | F <sub>H</sub> at High Test Channel | Limit                                                       |
|-------------|-----------------|------------------------------------|-------------------------------------|-------------------------------------------------------------|
| °C          | V <sub>AC</sub> | MHz                                | MHz                                 |                                                             |
| 0           | 120             | 5736.3227                          | 5813.517                            | f <sub>L</sub> and f <sub>H</sub> Within 5725~5850MHz range |
| 10          |                 | 5736.3156                          | 5813.5173                           |                                                             |
| 20          |                 | 5736.3309                          | 5813.5208                           |                                                             |
| 30          |                 | 5736.315                           | 5813.5256                           |                                                             |
| 40          |                 | 5736.3141                          | 5813.5103                           |                                                             |
| 25          | 102             | 5736.3274                          | 5813.5234                           |                                                             |
| 25          | 138             | 5736.324                           | 5813.5203                           |                                                             |

802.11ac80:

| Temperature | Voltage         | f <sub>L</sub> at Low Test Channel | F <sub>H</sub> at High Test Channel | Limit                                                       |
|-------------|-----------------|------------------------------------|-------------------------------------|-------------------------------------------------------------|
| °C          | V <sub>AC</sub> | MHz                                | MHz                                 |                                                             |
| 0           | 120             | 5737.004                           | 5813.3166                           | f <sub>L</sub> and f <sub>H</sub> Within 5725~5850MHz range |
| 10          |                 | 5737.0026                          | 5813.3097                           |                                                             |
| 20          |                 | 5736.9976                          | 5813.3088                           |                                                             |
| 30          |                 | 5737.0059                          | 5813.3203                           |                                                             |
| 40          |                 | 5737.0121                          | 5813.3187                           |                                                             |
| 25          | 102             | 5737.0109                          | 5813.3198                           |                                                             |
| 25          | 138             | 5737.009                           | 5813.3262                           |                                                             |

Note: the f<sub>L</sub> and f<sub>H</sub> determined by 99% Occupied bandwidth low edge at Low test channel and High edge at High test channel.

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**FCC §15.407(a) –MAXIMUM CONDUCTED OUTPUT POWER**

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**Applicable Standard**

## (a) Power limits:

## (1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm  $10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(4) The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

### Test Equipment List and Details

| Manufacturer | Description           | Model       | Serial Number | Calibration Date | Calibration Due Date |
|--------------|-----------------------|-------------|---------------|------------------|----------------------|
| Agilent      | Wideband Power Sensor | N1921A      | MY54210016    | 2016-11-03       | 2017-11-03           |
| Agilent      | Wideband Power Sensor | N1921A      | MY54170013    | 2016-11-03       | 2017-11-03           |
| Agilent      | P-Series Power Meter  | N1912A      | MY5000448     | 2016-11-03       | 2017-11-03           |
| N/A          | Coaxial Cable         | C-SJ00-0010 | C0010/04      | Each Time        | /                    |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01r04

### Test Data

#### Environmental Conditions

|                    |          |
|--------------------|----------|
| Temperature:       | 27.6°C   |
| Relative Humidity: | 39 %     |
| ATM Pressure:      | 100.4kPa |

*The testing was performed by Rick Chen on 2017-09-20.*

Test Mode: Transmitting

| UNII Band     | Mode        | Frequency (MHz) | Conducted Average Output Power (dBm) |         |       | Limit (dBm) | Result |
|---------------|-------------|-----------------|--------------------------------------|---------|-------|-------------|--------|
|               |             |                 | Chain 0                              | Chain 1 | Total |             |        |
| 5150-5250 MHz | 802.11 a    | 5180            | 17.2                                 | 17.68   | /     | 30          | PASS   |
|               |             | 5200            | 18.18                                | 17.95   | /     | 30          | PASS   |
|               |             | 5240            | 17.85                                | 18.2    | /     | 30          | PASS   |
|               | 802.11ht20  | 5180            | 17.19                                | 16.6    | 19.92 | 30          | PASS   |
|               |             | 5200            | 17.01                                | 17.25   | 20.14 | 30          | PASS   |
|               |             | 5240            | 16.81                                | 17.22   | 20.03 | 30          | PASS   |
|               | 802.11ht40  | 5190            | 17.54                                | 16.93   | 20.26 | 30          | PASS   |
|               |             | 5230            | 16.76                                | 17.46   | 20.13 | 30          | PASS   |
|               | 802.11 ac80 | 5210            | 13.89                                | 16.55   | 18.43 | 30          | PASS   |
|               |             |                 |                                      |         |       |             |        |
| 5725-5850 MHz | 802.11 a    | 5745            | 17.96                                | 17.47   | /     | 30          | PASS   |
|               |             | 5785            | 18.1                                 | 17.23   | /     | 30          | PASS   |
|               |             | 5825            | 18.26                                | 17.03   | /     | 30          | PASS   |
|               | 802.11ht20  | 5745            | 17.21                                | 17.39   | 20.31 | 30          | PASS   |
|               |             | 5785            | 17.04                                | 17.04   | 20.05 | 30          | PASS   |
|               |             | 5825            | 16.93                                | 16.77   | 19.86 | 30          | PASS   |
|               | 802.11ht40  | 5755            | 17.13                                | 17.24   | 20.20 | 30          | PASS   |
|               |             | 5795            | 17.08                                | 17.1    | 20.10 | 30          | PASS   |
|               | 802.11 ac80 | 5775            | 16.33                                | 16.3    | 19.33 | 30          | PASS   |
|               |             |                 |                                      |         |       |             |        |

Note: The maximum antenna gain is 2.0dBi in 5GHz band. The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:

Array Gain = 0 dB (i.e., no array gain) for  $N_{ANT} \leq 4$ ;

So:

Directional gain =  $G_{ANT} + \text{Array Gain} = 2.0\text{dBi} < 6\text{dBi}$

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**FCC §15.407(a) - POWER SPECTRAL DENSITY**

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**Applicable Standard**

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm  $10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output

power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

## Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01r04

## Test Equipment List and Details

| Manufacturer | Description       | Model       | Serial Number | Calibration Date | Calibration Due Date |
|--------------|-------------------|-------------|---------------|------------------|----------------------|
| R&S          | Spectrum Analyzer | FSIQ 26     | 831929/005    | 2017-08-31       | 2018-08-31           |
| N/A          | Coaxial Cable     | C-SJ00-0010 | C0010/04      | Each Time        | /                    |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

|                    |          |
|--------------------|----------|
| Temperature:       | 27.6°C   |
| Relative Humidity: | 39 %     |
| ATM Pressure:      | 100.4kPa |

*The testing was performed by Rick Chen on 2017-09-20.*

*Test Mode: Transmitting*

*Test Result: Compliance. Please refer to the following table and plot.*

**5150-5250MHz**

| Mode        | Frequency (MHz) | Power Spectral Density (dBm/MHz) |         |       |        |
|-------------|-----------------|----------------------------------|---------|-------|--------|
|             |                 | Chain 0                          | Chain 1 | Total | Limits |
| 802.11 a    | 5180            | 8.71                             | 8.33    | /     | 17     |
|             | 5200            | 10.2                             | 10.72   | /     | 17     |
|             | 5240            | 10.09                            | 10.97   | /     | 17     |
| 802.11 ht20 | 5180            | 8.14                             | 7.34    | 10.77 | 17     |
|             | 5200            | 8.21                             | 9.3     | 11.8  | 17     |
|             | 5240            | 8.34                             | 10.26   | 12.42 | 17     |
| 802.11 ht40 | 5190            | 3.45                             | 4.56    | 7.05  | 17     |
|             | 5230            | 6.35                             | 6.4     | 9.39  | 17     |
| 802.11 ac80 | 5210            | 1.54                             | 1.23    | 4.4   | 17     |

**5725-5850MHz**

| Mode        | Frequency (MHz) | Reading (dBm/300kHz) |         | Power Spectral Density (dBm/500kHz) |         |       |       |
|-------------|-----------------|----------------------|---------|-------------------------------------|---------|-------|-------|
|             |                 | Chain 0              | Chain 1 | Chain 0                             | Chain 1 | Total | Limit |
| 802.11 a    | 5745            | 5.97                 | 6.04    | 8.19                                | 8.26    | /     | 30    |
|             | 5785            | 5.93                 | 5.84    | 8.15                                | 8.06    | /     | 30    |
|             | 5825            | 5.79                 | 5.62    | 8.01                                | 7.84    | /     | 30    |
| 802.11 ht20 | 5745            | 4.11                 | 6.19    | 6.33                                | 8.41    | 10.50 | 30    |
|             | 5785            | 3.79                 | 5.69    | 6.01                                | 7.91    | 10.07 | 30    |
|             | 5825            | 3.82                 | 6.15    | 6.04                                | 8.37    | 10.37 | 30    |
| 802.11 ht40 | 5755            | 1.6                  | 3.32    | 3.82                                | 5.54    | 7.77  | 30    |
|             | 5795            | 1.57                 | 2.19    | 3.79                                | 4.41    | 7.12  | 30    |
| 802.11 ac80 | 5775            | -0.25                | -0.2    | 1.97                                | 2.02    | 5.00  | 30    |

Note 1: The maximum antenna gain is 2.0dBi in 5GHz band. The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:

$$\text{Array Gain} = 10 \log(N_{\text{ANT}}/N_{\text{SS}}) \text{ dB.}$$

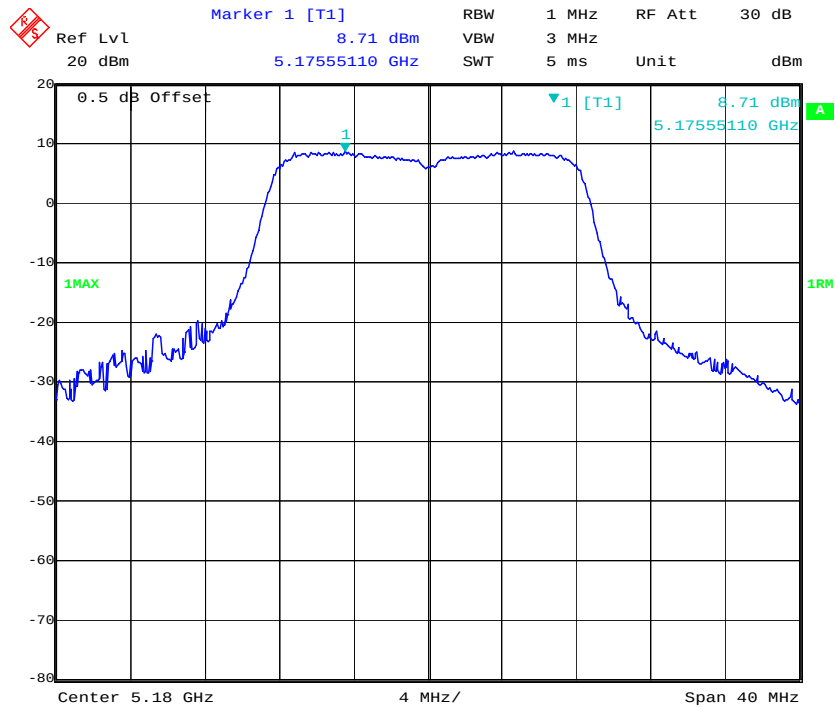
So:

$$\text{Directional gain} = G_{\text{ANT}} + \text{Array Gain} = 2.0\text{dBi} + 10 \cdot \log(2) = 5.0\text{dBi}$$

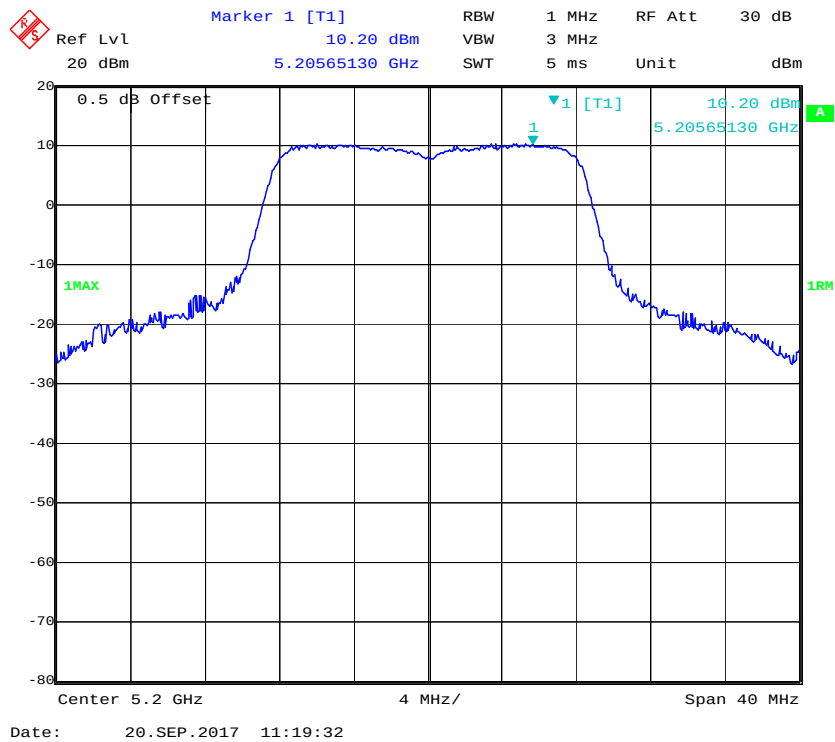
Note 2: For 5.8GHz band, If measurement bandwidth of Maximum PSD is specified in 500 kHz, add  $10\log(500\text{kHz}/\text{RBW})$  to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

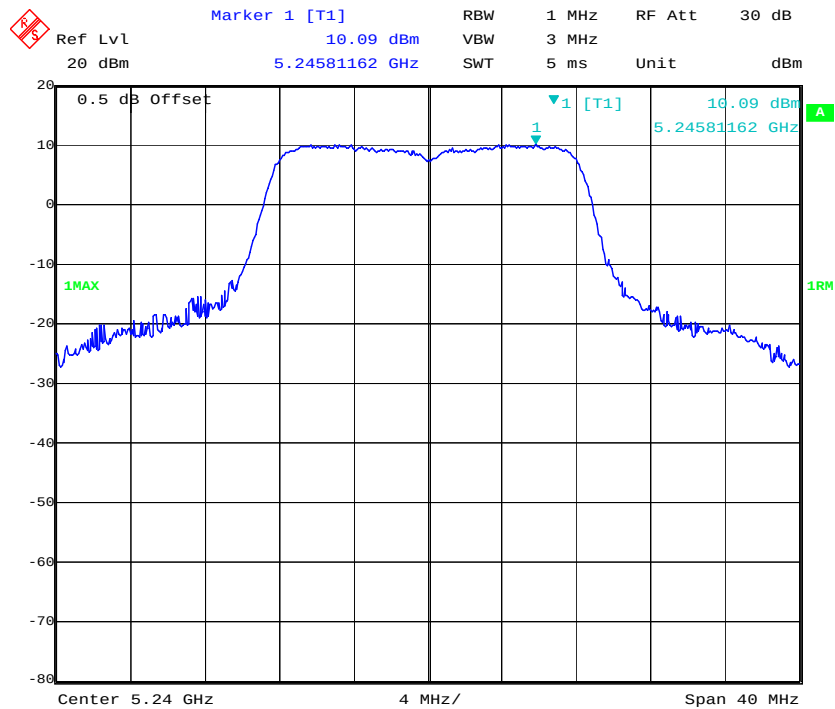
5150-5250MHz  
Chain 0:

### 802.11a Low Channel

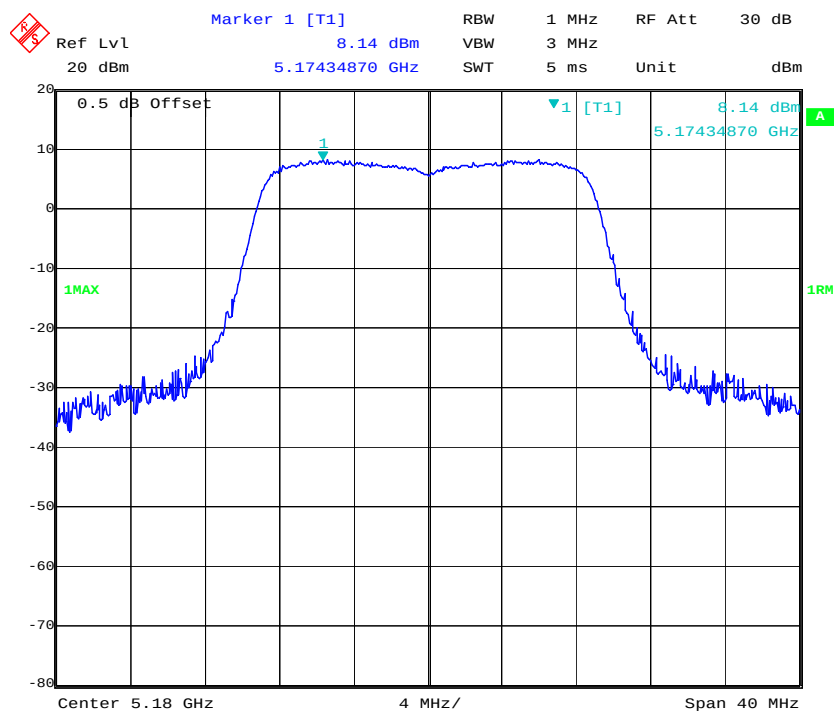


### 802.11a Middle Channel



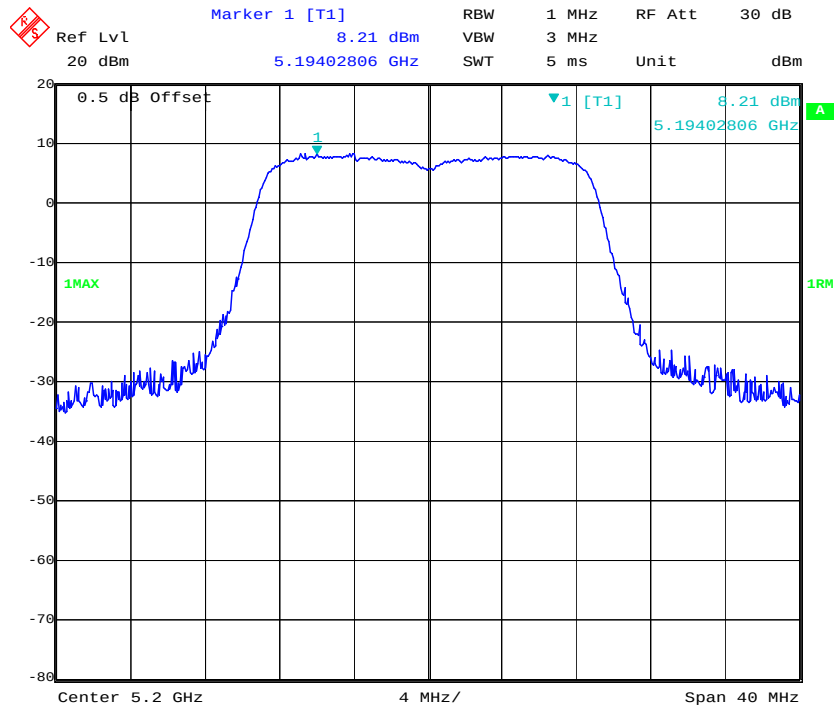
**802.11a High Channel**

Date: 20.SEP.2017 11:22:55

**802.11n ht20 Low Channel**

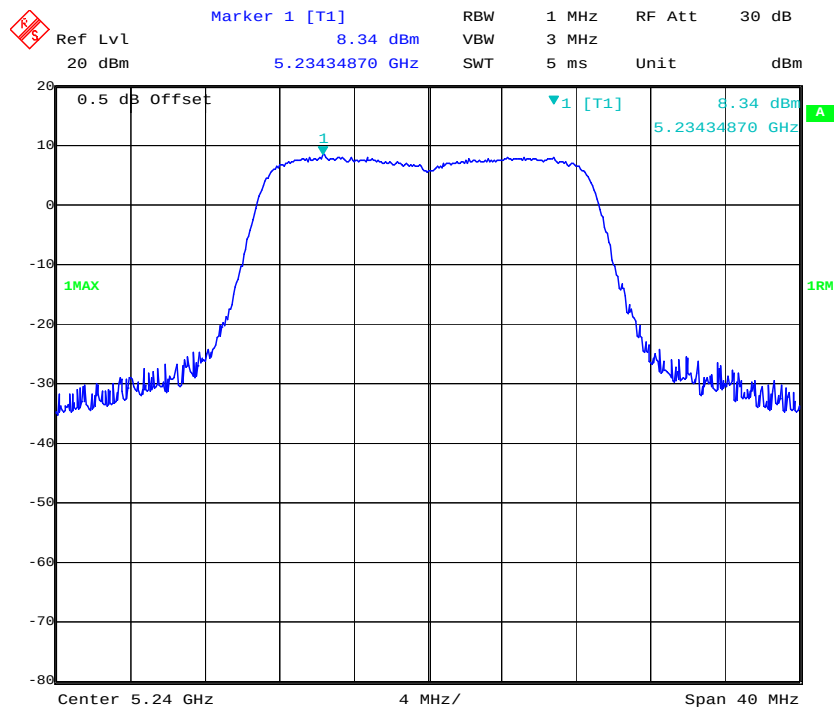
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### 802.11n ht20 Middle Channel



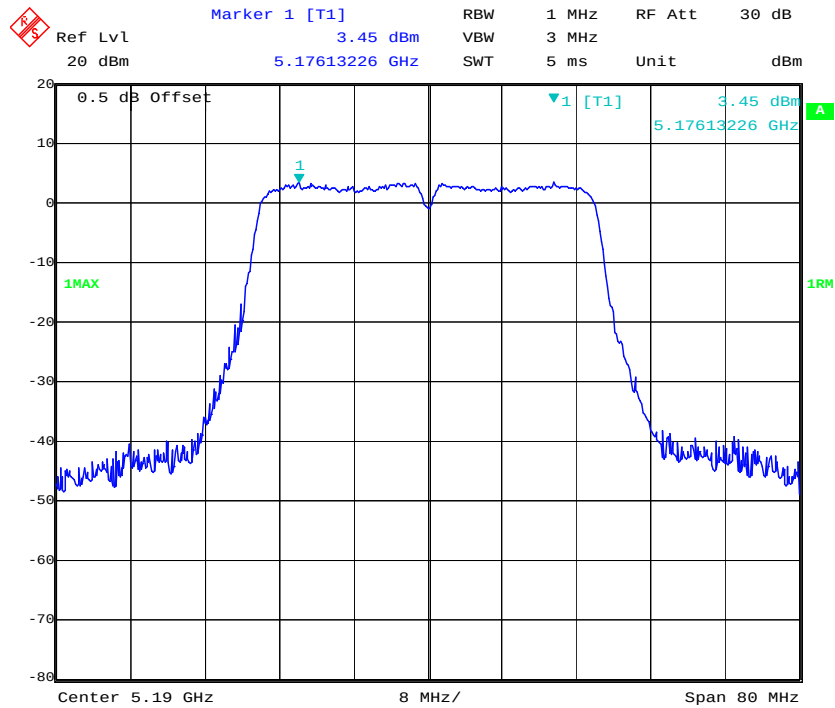
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### 802.11n ht20 High Channel

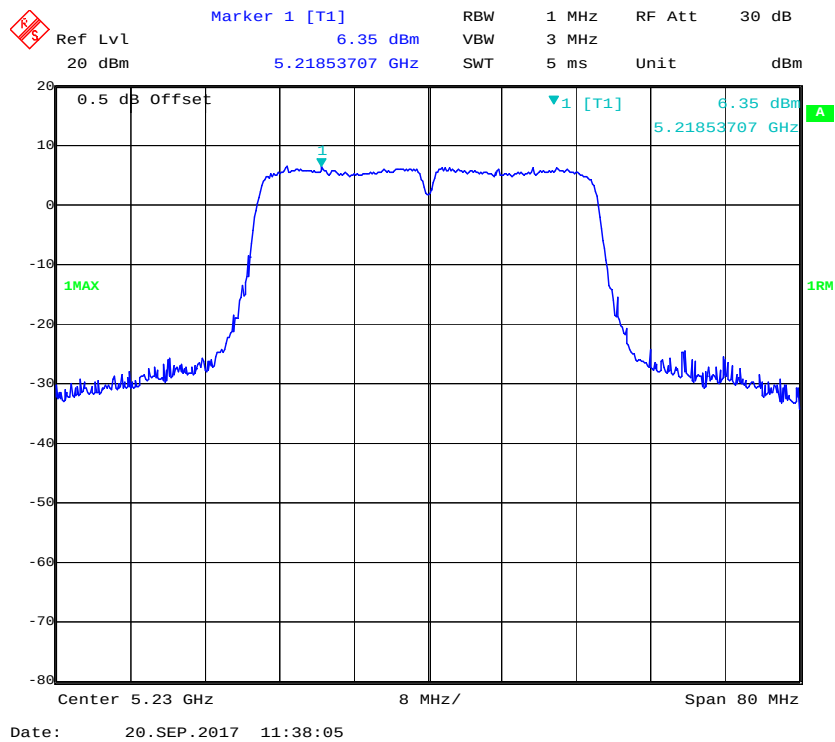


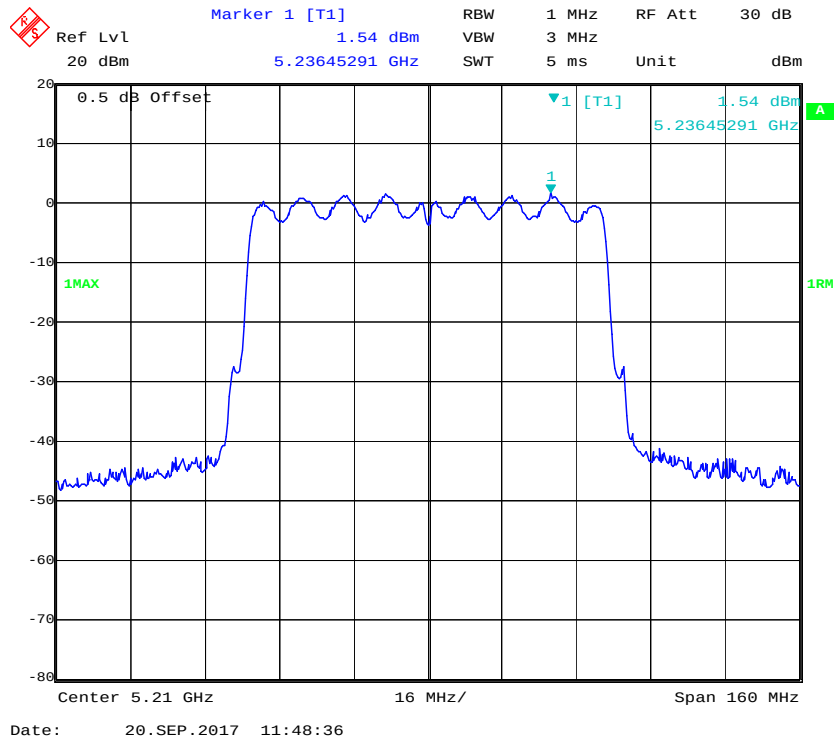
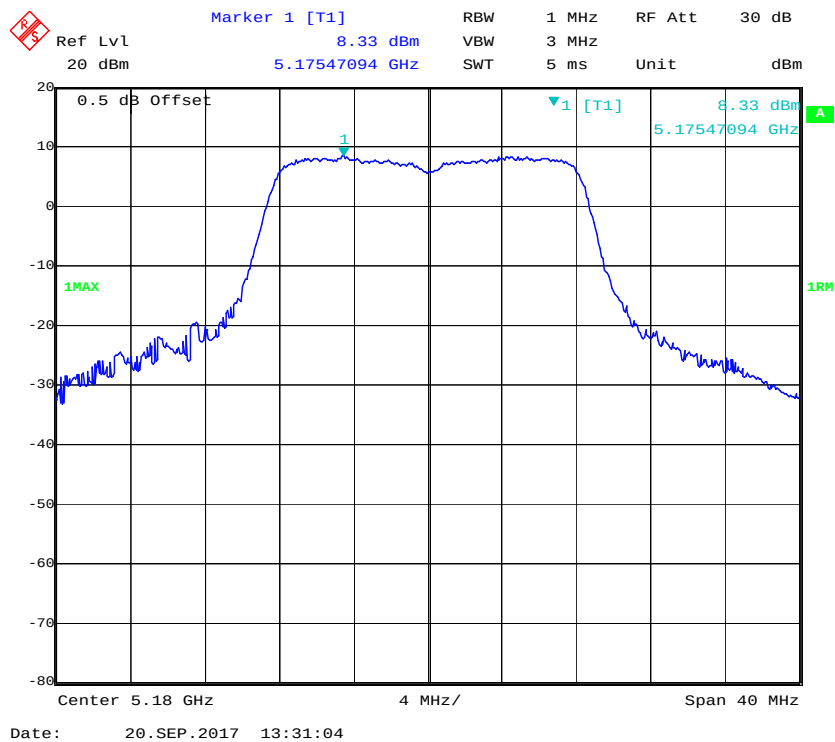
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## 802.11n ht40 Low Channel

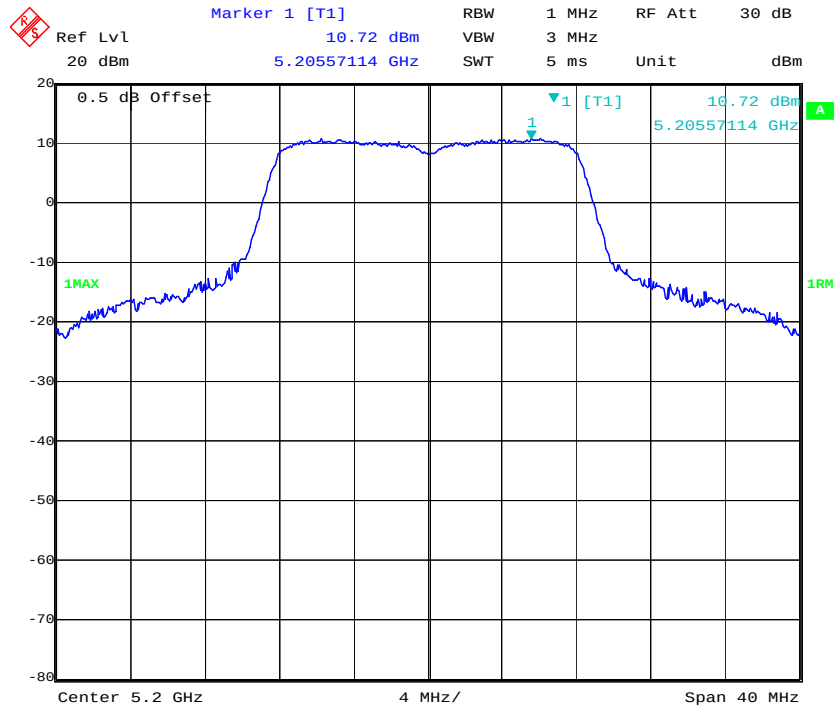


## 802.11n ht40 High Channel



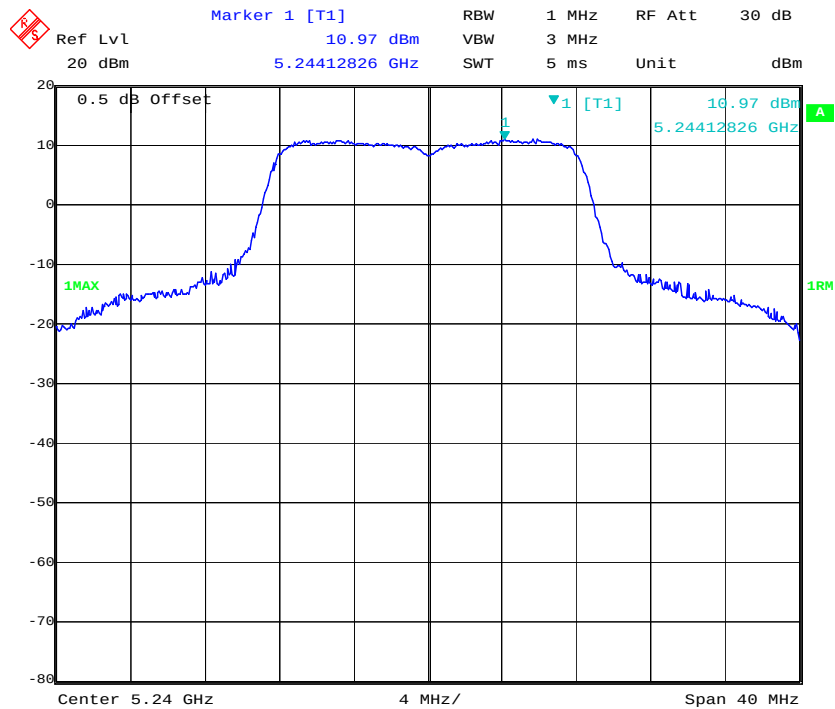
**802.11ac80 Middle Channel****Chain 1:****802.11a Low Channel**

### 802.11a Middle Channel



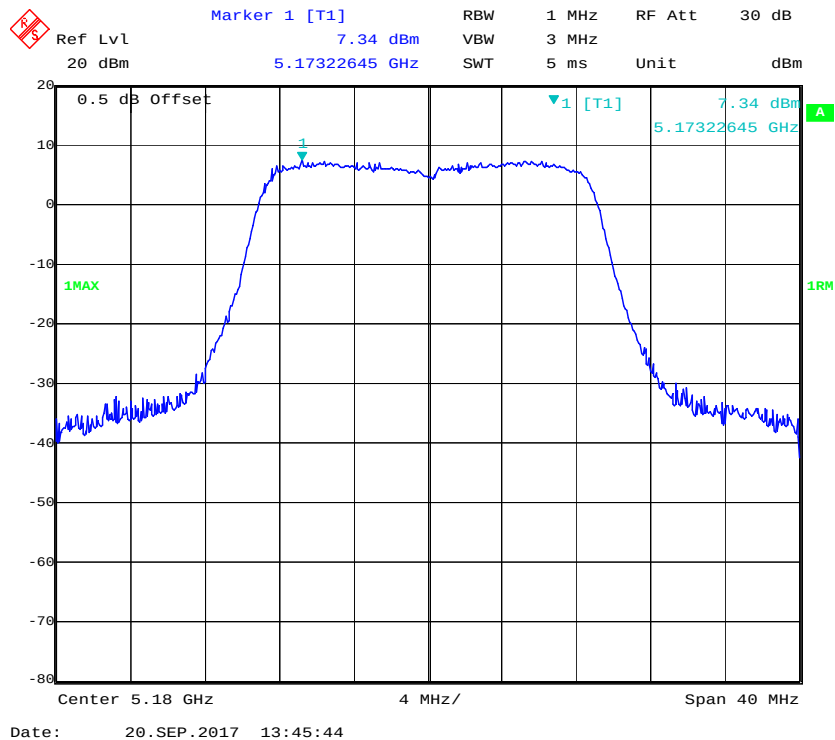
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### 802.11a High Channel

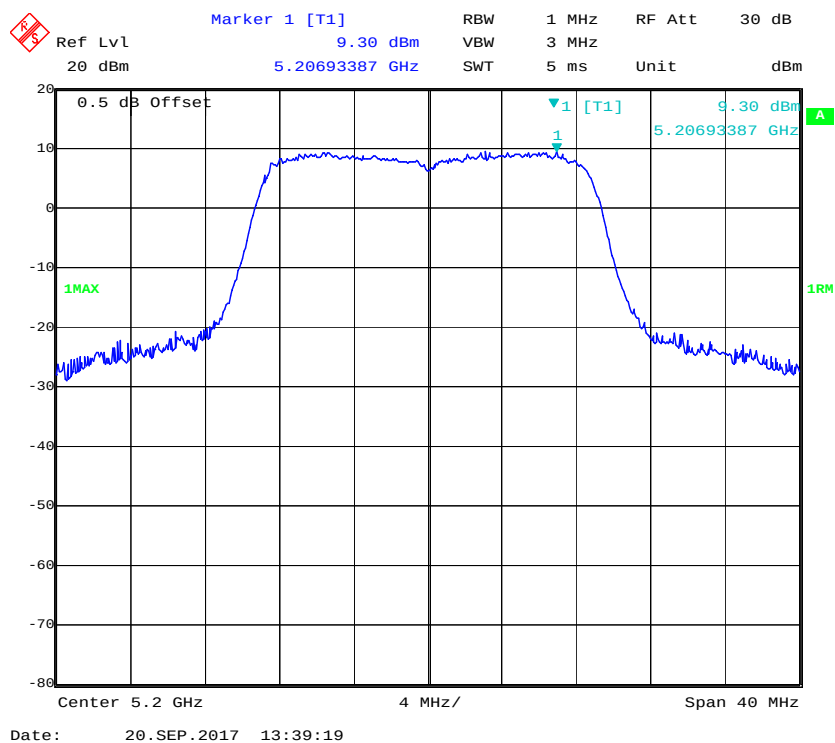


Date: 20.SEP.2017 13:34:44

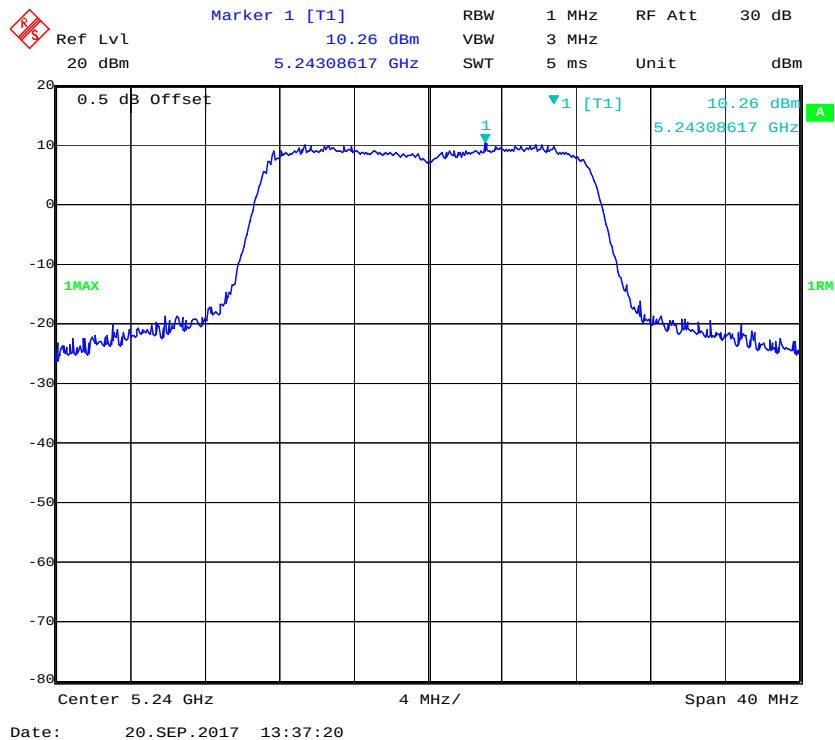
## 802.11n ht20 Low Channel



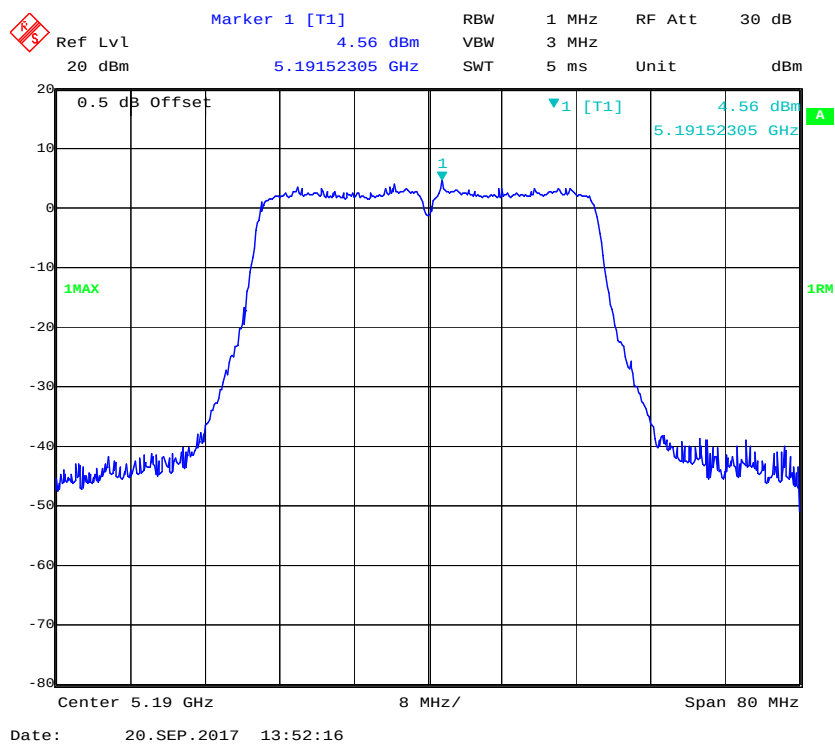
## 802.11n ht20 Middle Channel

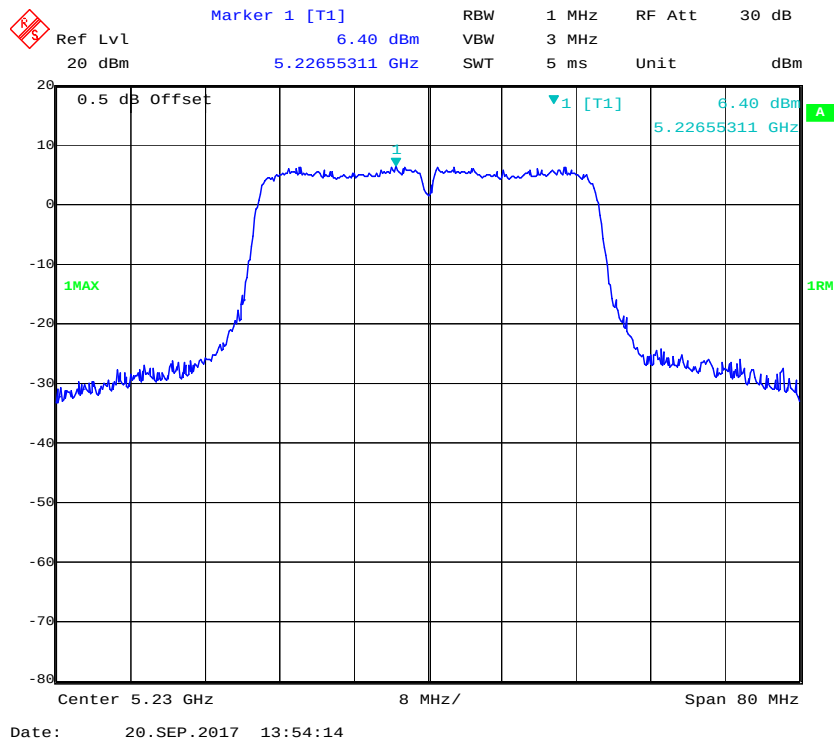
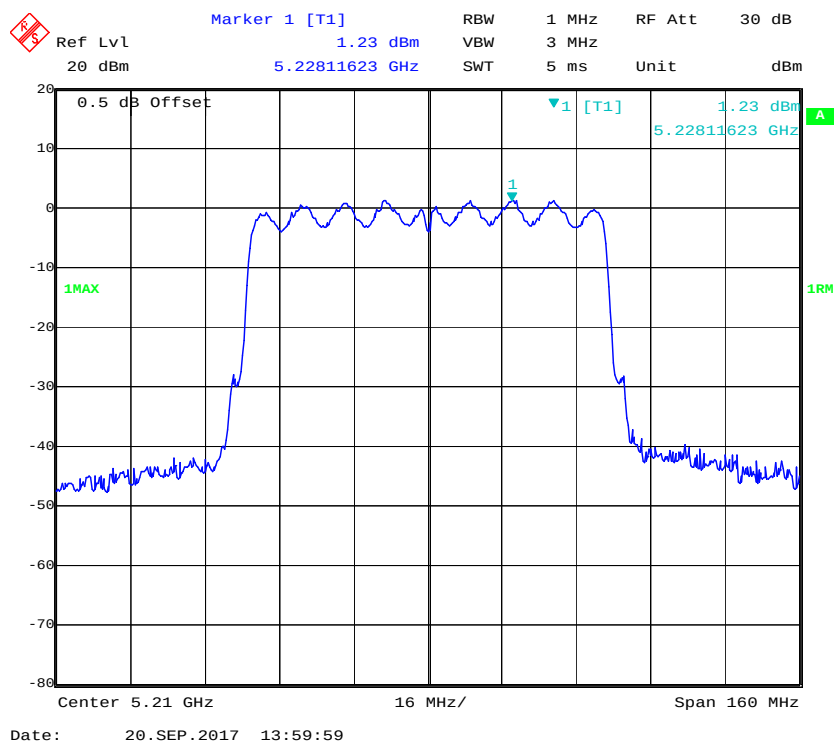


### 802.11n ht20 High Channel



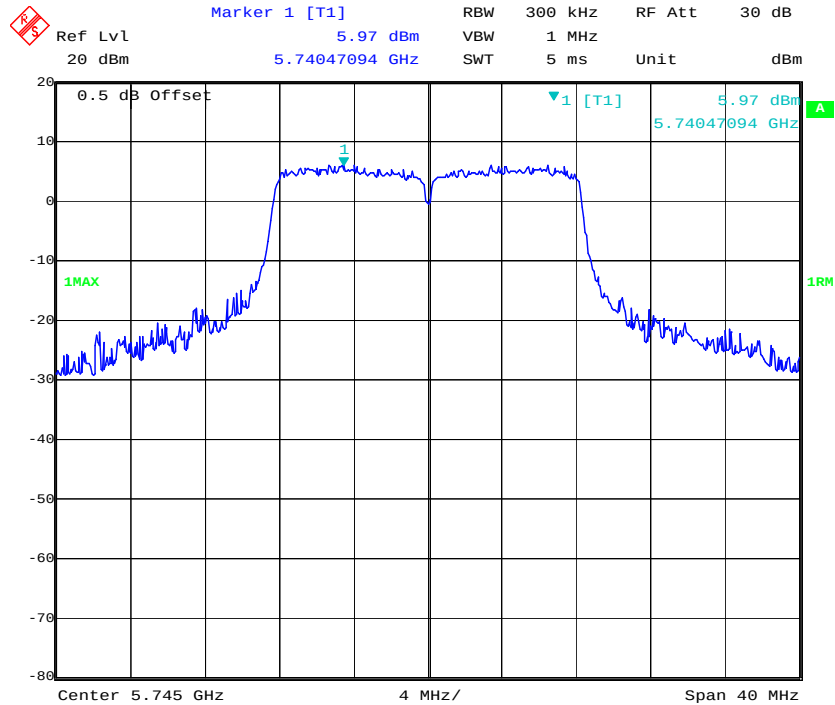
### 802.11n ht40 Low Channel



**802.11n ht40 High Channel****802.11ac80 Middle Channel**

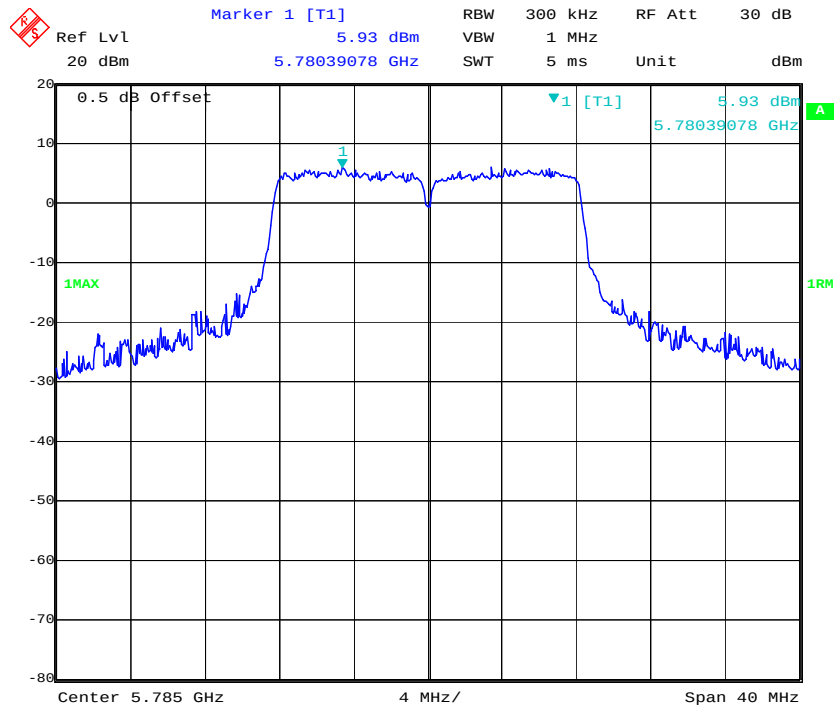
**5725-5850MHz**  
**Chain 0:**

**802.11a Low Channel**

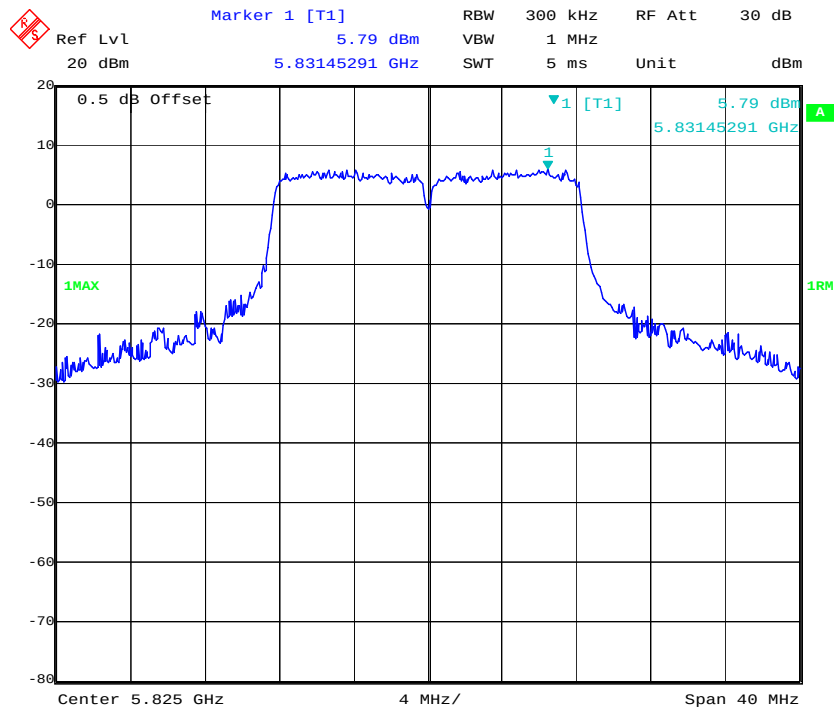


Date: 20.SEP.2017 11:51:40

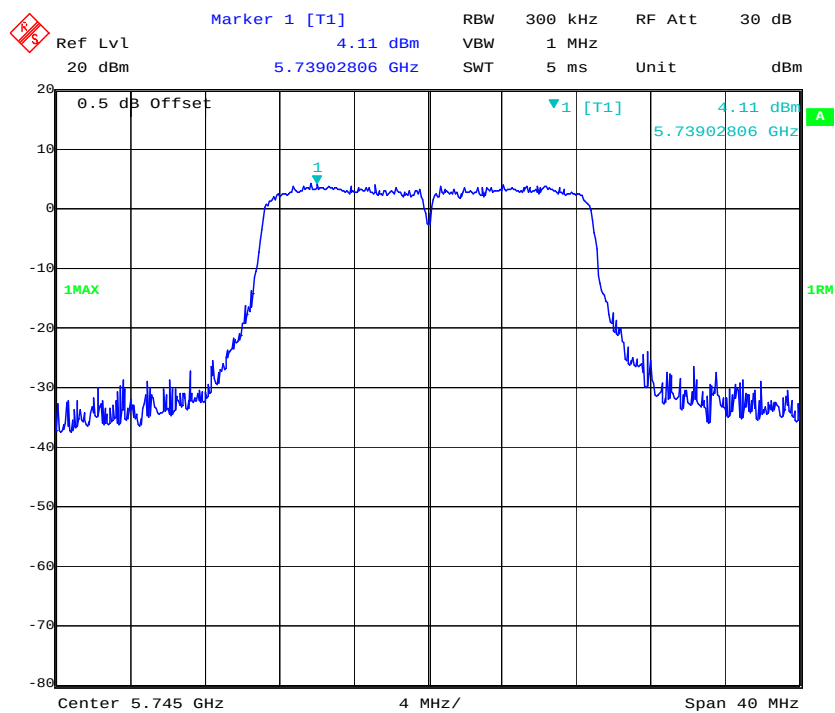
**802.11a Middle Channel**



Date: 20.SEP.2017 11:55:50

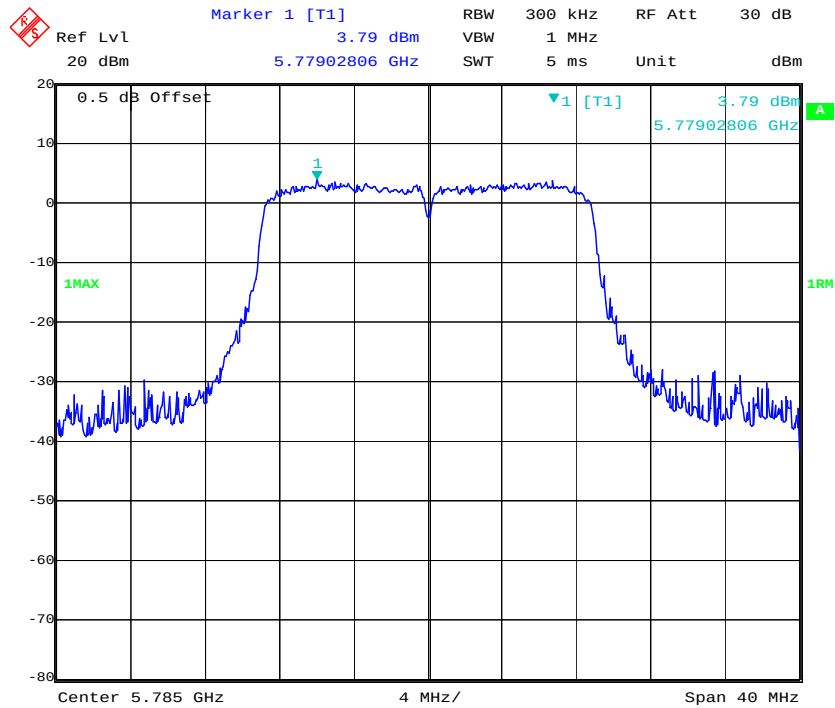
**802.11a High Channel**

Date: 20.SEP.2017 11:58:54

**802.11n ht20 Low Channel**

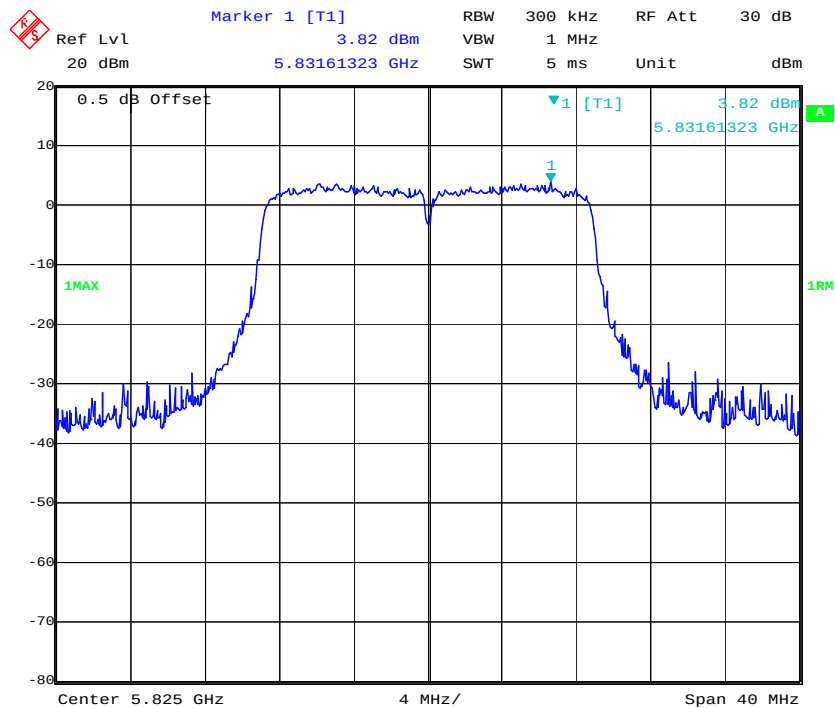
Date: 20.SEP.2017 13:04:04

### 802.11n ht20 Middle Channel



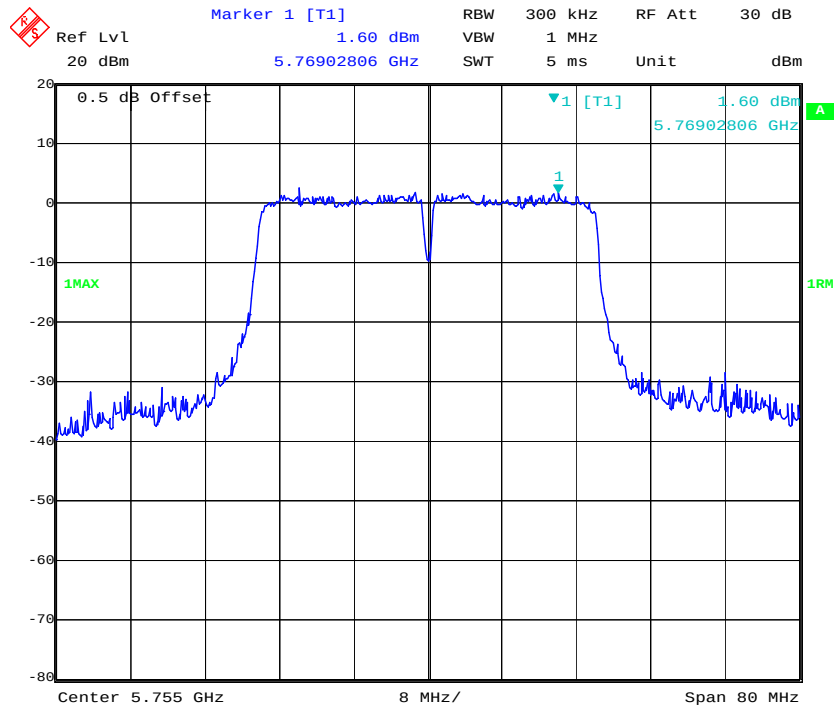
Date: 20.SEP.2017 13:06:36

### 802.11n ht20 High Channel



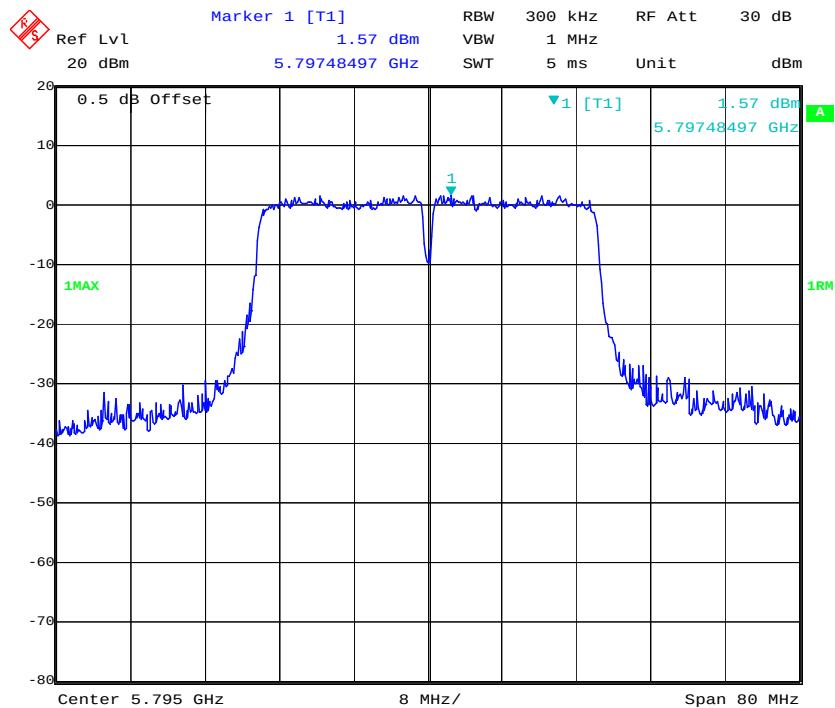
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### 802.11n ht40 Low Channel



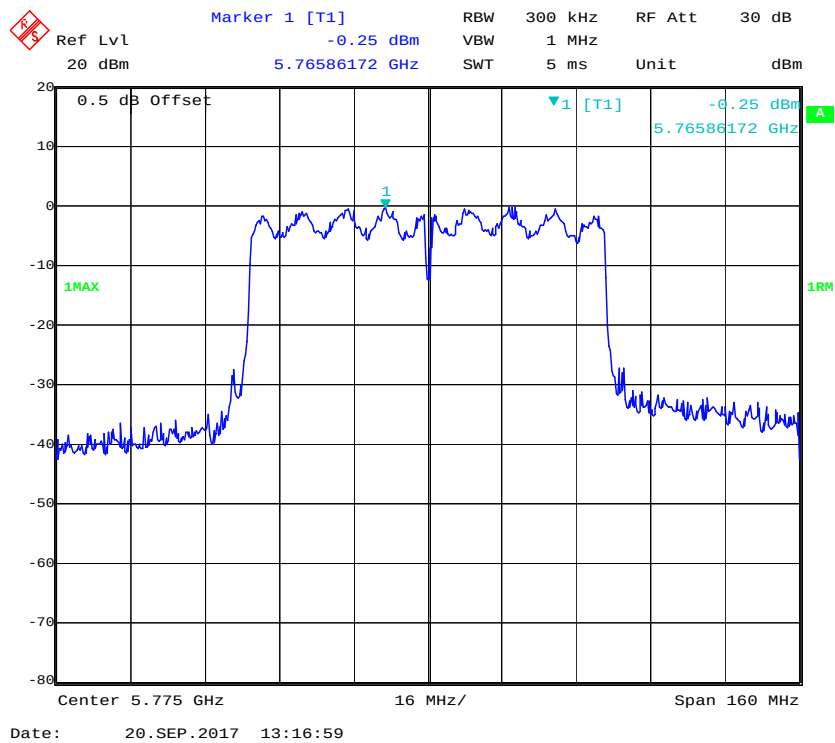
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### 802.11n ht40 High Channel



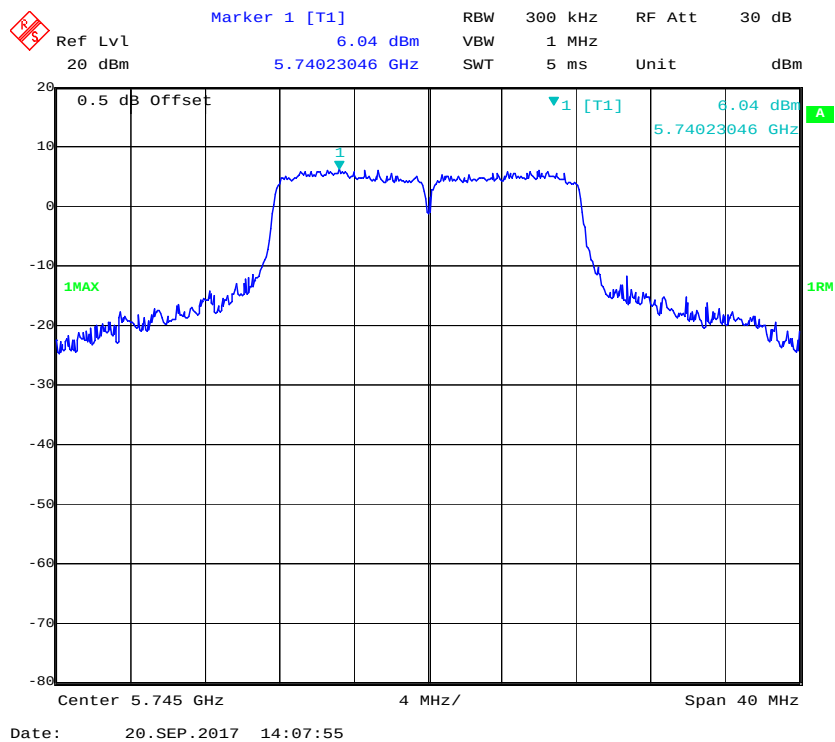
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## 802.11ac80 Middle Channel

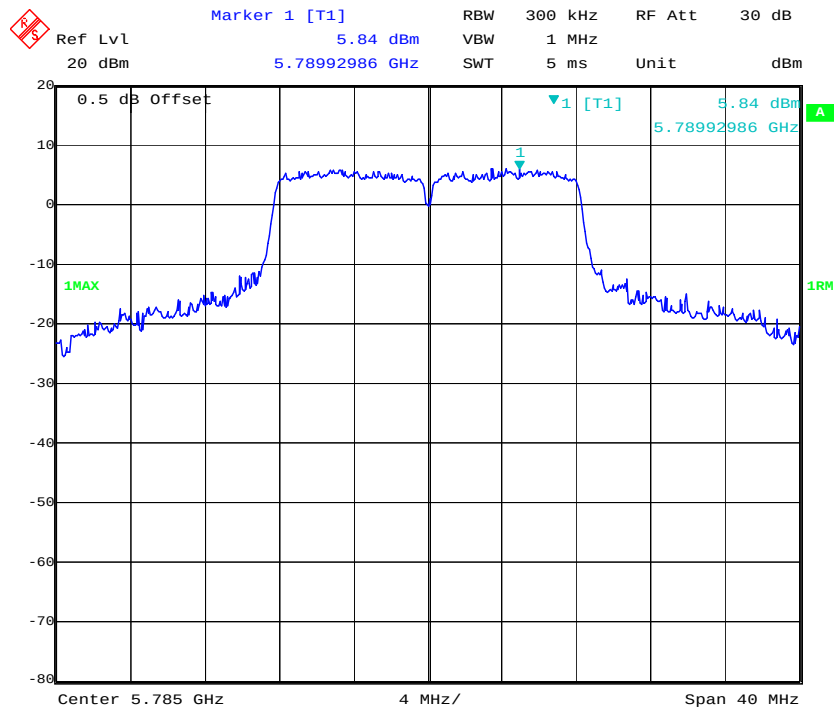


## Chain 1:

## 802.11a Low Channel

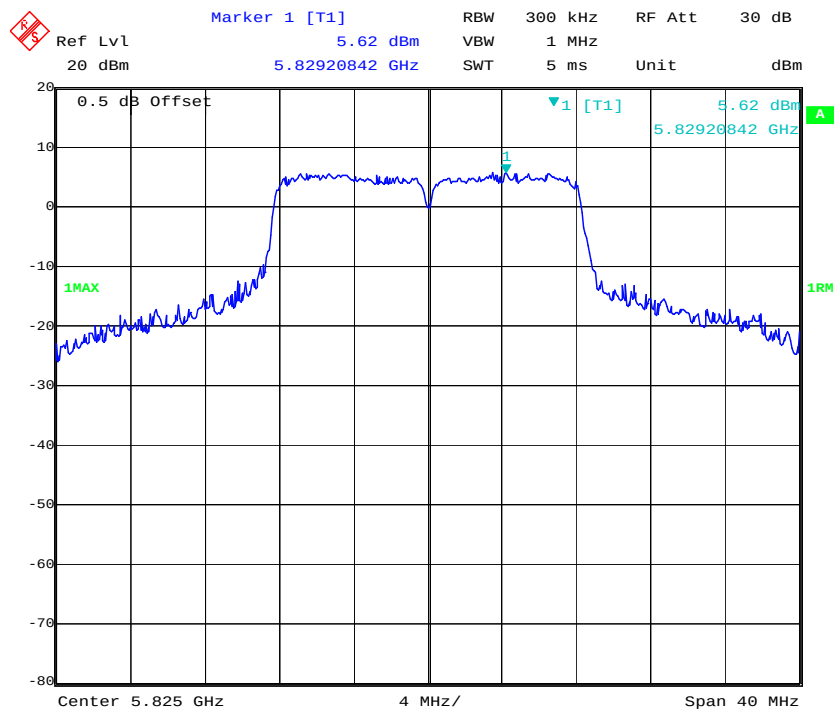


### 802.11a Middle Channel



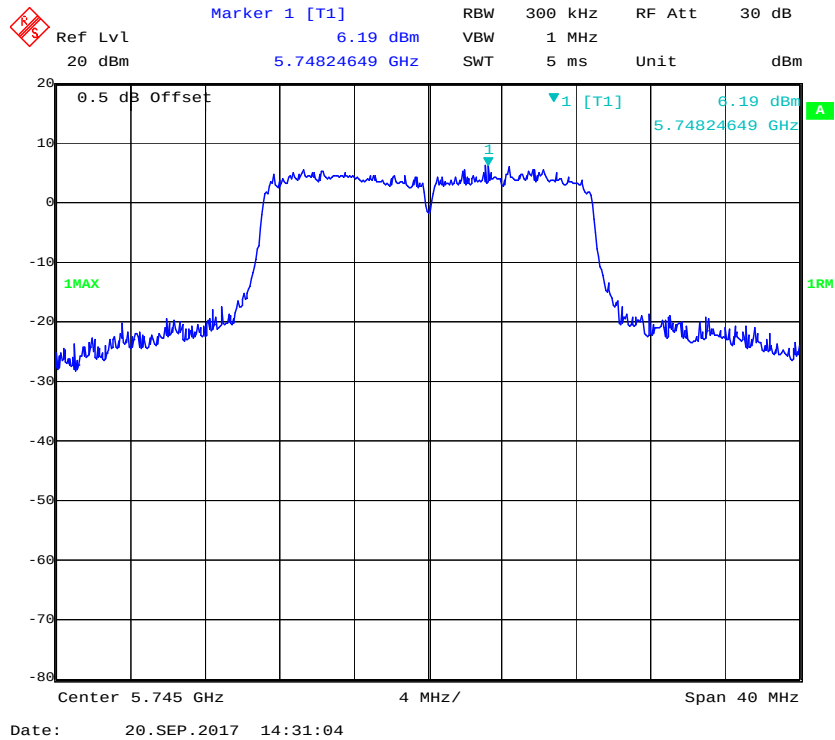
Date: 20.SEP.2017 14:12:34

### 802.11a High Channel

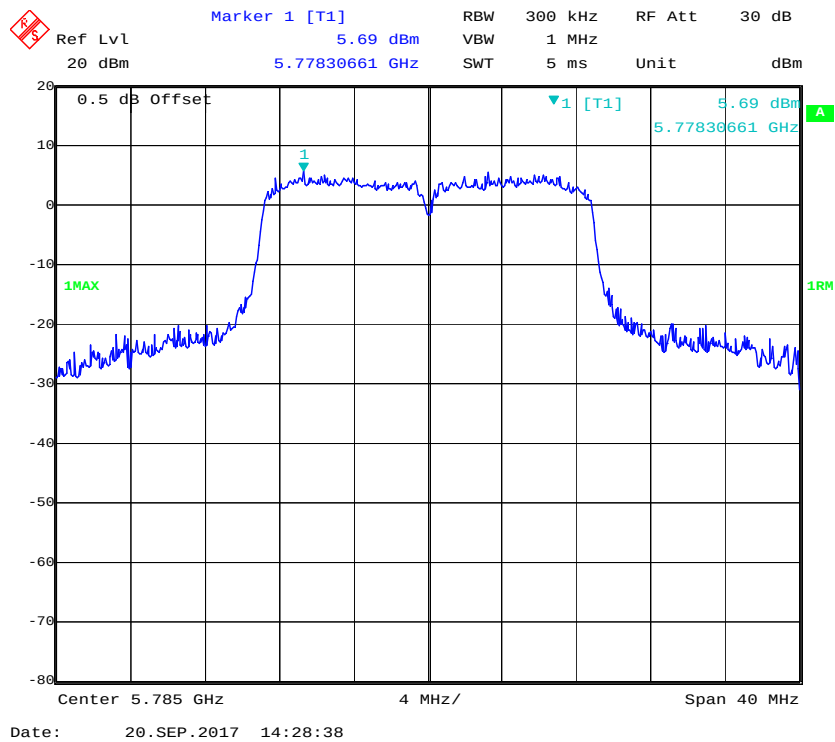


Date: 20.SEP.2017 14:23:13

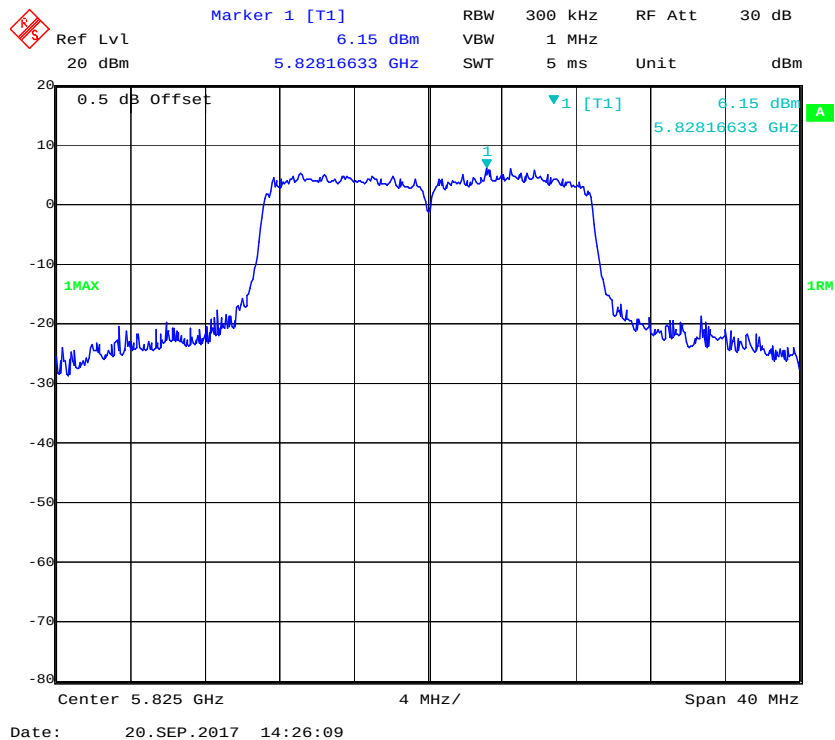
### 802.11n ht20 Low Channel



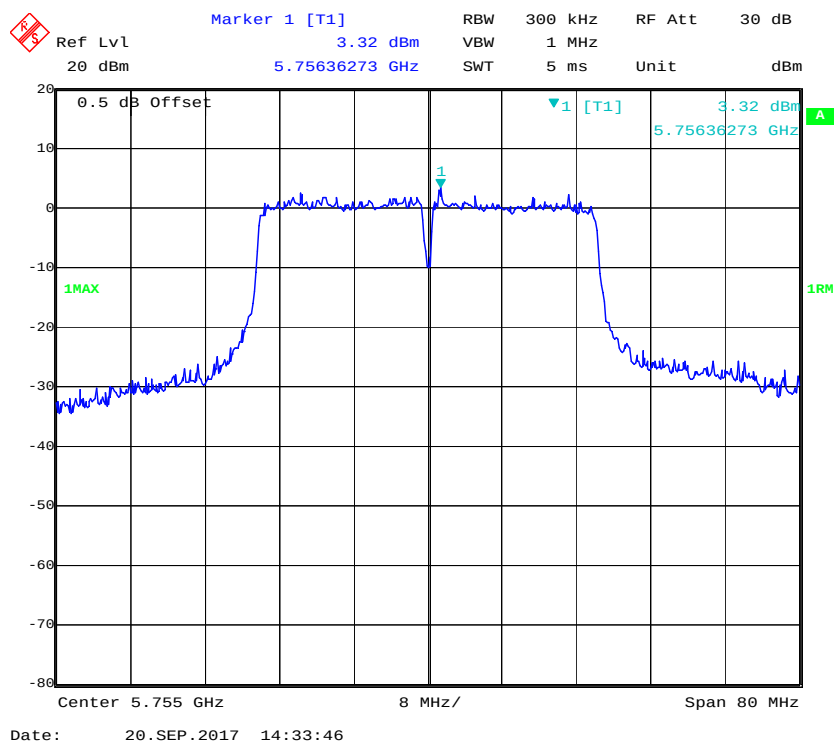
### 802.11n ht20 Middle Channel

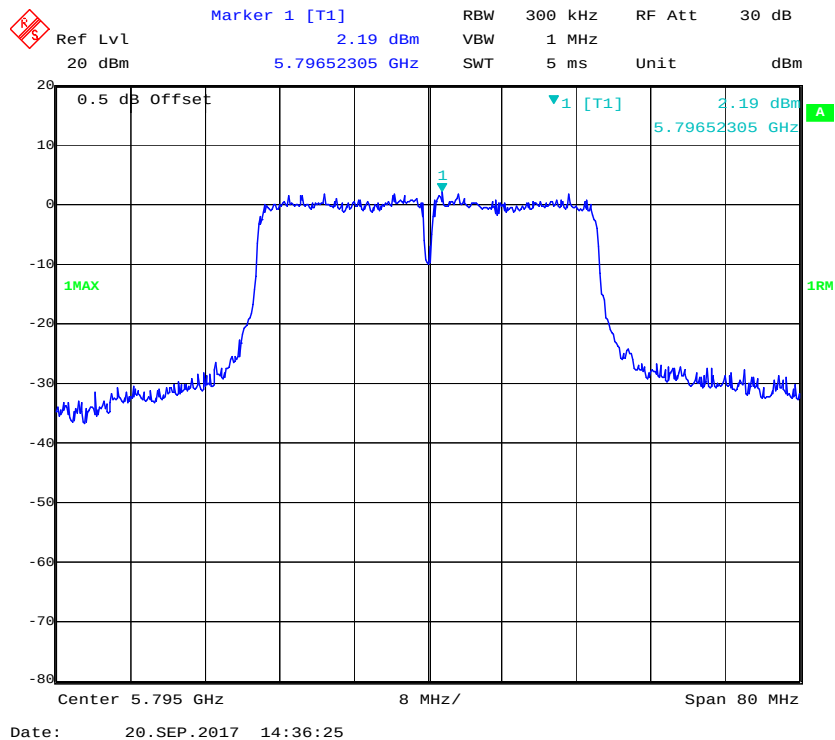
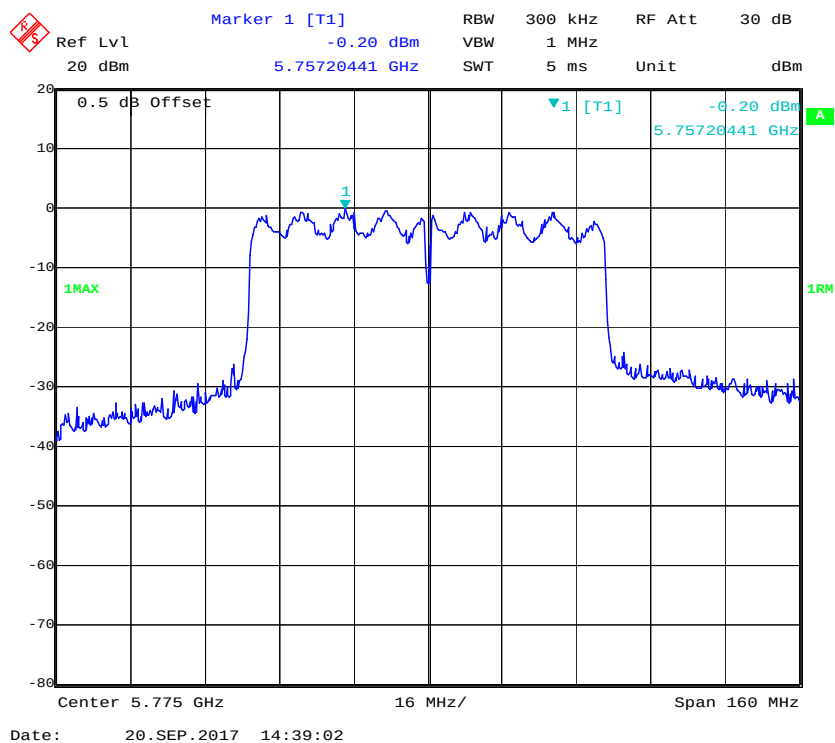


### 802.11 n ht20 High Channel



### 802.11n ht40 Low Channel



**802.11n ht40 High Channel****802.11ac80 Middle Channel**

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