



# FCC TEST REPORT

According to

## FCC Rules and Regulations Part 15 Subpart C

|            |                                                                              |
|------------|------------------------------------------------------------------------------|
| Applicant  | : Olive Media Inc.                                                           |
| Address    | : One Letterman Drive, Building D Promenade,<br>San Francisco, CA 94129, USA |
| Equipment  | : Digital Audio Player                                                       |
| Model No.  | : O1-S, O1-1S, O1-2S                                                         |
| Trade Name | : Olive                                                                      |
| FCC ID     | : 2AB8O-O1-001                                                               |

- The test result refers exclusively to the test presented test model / sample.,
- Without written approval of **CerpPASS Technology Corp.**, the test report shall not be reproduced except in full.

Laboratory Accreditation





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## History of this test report

■ ORIGINAL.

☐ Additional attachment as following record:

| Attachment No. | Issue Date    | Description |
|----------------|---------------|-------------|
| TEF11308027    | Mar. 14, 2014 | Original.   |
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# CERTIFICATE OF COMPLIANCE

According to

## FCC Rules and Regulations Part 15 Subpart C

|           |                                                                              |
|-----------|------------------------------------------------------------------------------|
| Applicant | : Olive Media Inc.                                                           |
| Address   | : One Letterman Drive, Building D Promenade,<br>San Francisco, CA 94129, USA |
| Equipment | : Digital Audio Player                                                       |
| Model No. | : O1-S, O1-1S, O1-2S                                                         |
| FCC ID    | : 2AB8O-O1-001                                                               |

### I HEREBY CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 2009, KDB558074 & KDB662911**. The equipment was **passed** the test performed according to **FCC Rules and Regulations Part 15 Subpart C (2010)**.

The sample was received on Jun. 25, 2014 and the testing was carried out on Aug. 25, 2014 at CerpPASS Technology Corp.

Approved by:

Tested by:

Hill Chen  
EMC/RF B.U. Assistant Manager

Aiden Lu  
Engineer



## 1. Report of Measurements and Examinations

### 1.1 List of Measurements and Examinations

| FCC Rule                             | Description of Test                      | Result |
|--------------------------------------|------------------------------------------|--------|
| 15.203                               | Antenna Requirement                      | Pass   |
| 15.207                               | Conducted Emission                       | Pass   |
| 15.209<br>15.247(d)                  | Radiated Emission                        | Pass   |
| 15.247(a)(2)                         | 6dB Bandwidth                            | Pass   |
| 15.247(b)                            | Maximum Peak Output Power                | Pass   |
| 15.247(d)                            | 100kHz Bandwidth of Frequency Band Edges | Pass   |
| 15.247(e)                            | Power Spectral Density                   | Pass   |
| 1.1307<br>1.1310<br>2.1091<br>2.1093 | RF Exposure Compliance                   | Pass   |



## 2. Test Configuration of Equipment under Test

### 2.1 Feature of Equipment under Test

|                     |                                                                                                                                                                                                                                       |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency range     | 802.11b/g/n: 2.412-2.462GHz<br>Bluetooth: 2.402-2.480GHz                                                                                                                                                                              |
| Channel spacing     | 802.11b/g/n: 5MHz<br>Bluetooth: 1MHz                                                                                                                                                                                                  |
| Channel List        | 802.11b/g/n: 1-11 channels<br>Bluetooth: 0-78 channels                                                                                                                                                                                |
| Modulation type     | 802.11b/g/n: DSSS, OFDM<br>Bluetooth: FHSS                                                                                                                                                                                            |
| Data Rate           | 802.11b/g/n:<br>802.11b: 1, 2, 5.5, 11Mbps<br>802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps<br>802.11n: MCS8, MCS9, MCS10, MCS11, MCS12, MCS13,<br>MCS14, MCS15 Mbps<br>Bluetooth:<br>GFSK: 1Mbps<br>$\pi/4$ -QPSK: 2Mbps<br>8DPSK: 3Mbps |
| Antenna type & gain | WIFI:<br>Antenna 1: Dipole/ 3 dBi<br>Antenna 2: PIFA/ 1.65dBi<br>BT:<br>Printed/ 1.87dBi                                                                                                                                              |

### 2.2 Carrier Frequency of Channels

802.11b, 802.11g, 802.11n HT 20

| Channel | Frequency(MHz) | Channel | Frequency(MHz) |
|---------|----------------|---------|----------------|
| 01      | 2412           | 07      | 2442           |
| 02      | 2417           | 08      | 2447           |
| 03      | 2422           | 09      | 2452           |
| 04      | 2427           | 10      | 2457           |
| 05      | 2432           | 11      | 2462           |
| 06      | 2437           | ---     | ---            |



## 2.3 Test Mode and Test Software

- During testing, the interface cables and equipment positions were varied according to ANSI C63.4.
  - The complete test system included Notebook and EUT for RF test.
  - An executive program "WI command" under XP was executed to keep transmitting and receiving data via Wireless.
  - The following test modes were performed for test:
    - 802.11b/g/n HT20: CH01: 2412MHz, CH06: 2437MHz, CH11: 2462MHz
- \* Power output of data rate:

| mode            | antenna TX1 |       |         |       |         |       |         |       |         |
|-----------------|-------------|-------|---------|-------|---------|-------|---------|-------|---------|
|                 | rate        | 1M    |         | 2M    |         | 5.5M  |         | 11M   |         |
| 802.11b         | Channel     | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
|                 | 1           | 18.18 | 14.47   | 18.55 | 14.83   | 18.52 | 14.80   | 18.57 | 14.56   |
|                 | 6           | 18.17 | 14.43   | 18.58 | 14.86   | 18.57 | 14.86   | 18.60 | 14.57   |
|                 | 11          | 18.21 | 14.47   | 18.63 | 14.92   | 18.65 | 14.93   | 18.54 | 14.40   |
| mode            | rate        | 6M    |         | 9M    |         | 12M   |         | 18M   |         |
| 802.11g         | Channel     | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
|                 | 1           | 22.19 | 12.26   | 22.25 | 12.37   | 22.15 | 12.35   | 22.02 | 11.86   |
|                 | 6           | 22.25 | 12.34   | 22.15 | 12.25   | 22.06 | 12.17   | 22.08 | 11.97   |
|                 | 11          | 22.22 | 12.38   | 22.15 | 12.20   | 22.12 | 12.25   | 22.12 | 12.14   |
| mode            | rate        | 24M   |         | 36M   |         | 48M   |         | 54M   |         |
| 802.11g         | Channel     | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
|                 | 1           | 22.07 | 12.10   | 22.21 | 11.82   | 22.06 | 11.20   | 21.98 | 11.10   |
|                 | 6           | 22.03 | 11.96   | 22.05 | 11.67   | 22.12 | 11.45   | 22.15 | 11.37   |
|                 | 11          | 22.01 | 11.98   | 22.06 | 11.75   | 22.15 | 11.52   | 22.21 | 11.43   |
| mode            | rate        | MCS8  |         | MCS9  |         | MCS10 |         | MCS11 |         |
| 802.11n<br>HT20 | Channel     | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
|                 | 1           | 22.02 | 11.86   | 21.97 | 11.80   | 22.14 | 11.27   | 21.95 | 11.12   |
|                 | 6           | 22.12 | 11.92   | 22.05 | 11.87   | 22.23 | 11.45   | 22.01 | 11.18   |
|                 | 11          | 21.96 | 11.83   | 22.01 | 11.75   | 22.24 | 11.49   | 22.02 | 11.21   |
| mode            | rate        | MCS12 |         | MCS13 |         | MCS14 |         | MCS15 |         |
| 802.11n<br>HT20 | Channel     | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
|                 | 1           | 21.95 | 10.82   | 22.02 | 10.56   | 22.05 | 10.40   | 22.03 | 10.26   |
|                 | 6           | 22.05 | 10.90   | 22.06 | 10.68   | 22.01 | 10.15   | 22.01 | 10.08   |
|                 | 11          | 22.10 | 10.96   | 22.11 | 10.74   | 22.02 | 10.22   | 21.97 | 10.05   |



| antenna TX2 |       |         |       |         |       |         |       |         |
|-------------|-------|---------|-------|---------|-------|---------|-------|---------|
| rate        | 1M    |         | 2M    |         | 5.5M  |         | 11M   |         |
| Channel     | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
| 1           | 18.62 | 14.75   | 18.75 | 14.92   | 18.91 | 15.09   | 18.83 | 14.68   |
| 6           | 18.50 | 14.66   | 18.89 | 15.03   | 18.85 | 14.96   | 18.82 | 14.67   |
| 11          | 18.49 | 14.63   | 18.82 | 14.97   | 18.82 | 14.90   | 18.81 | 14.66   |
| rate        | 6M    |         | 9M    |         | 12M   |         | 18M   |         |
| Channel     | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
| 1           | 22.76 | 12.57   | 22.63 | 12.45   | 22.45 | 12.35   | 22.35 | 12.28   |
| 6           | 22.66 | 12.50   | 22.71 | 12.51   | 22.41 | 12.30   | 22.31 | 12.14   |
| 11          | 22.51 | 12.44   | 22.56 | 12.39   | 22.37 | 12.28   | 22.57 | 12.57   |
| rate        | 24M   |         | 36M   |         | 48M   |         | 54M   |         |
| Channel     | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
| 1           | 22.45 | 12.30   | 22.43 | 11.94   | 22.43 | 11.73   | 22.38 | 11.63   |
| 6           | 22.35 | 12.25   | 22.51 | 12.05   | 22.50 | 11.78   | 22.35 | 11.57   |
| 11          | 22.41 | 12.27   | 22.47 | 11.91   | 22.32 | 11.71   | 22.36 | 11.60   |
| rate        | MCS8  |         | MCS9  |         | MCS10 |         | MCS11 |         |
| Channel     | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
| 1           | 22.47 | 12.33   | 22.05 | 11.86   | 22.42 | 11.77   | 22.35 | 11.53   |
| 6           | 22.42 | 12.37   | 22.25 | 12.05   | 22.41 | 11.75   | 22.25 | 11.40   |
| 11          | 22.33 | 12.28   | 22.25 | 12.07   | 22.29 | 11.73   | 22.30 | 11.50   |
| rate        | MCS12 |         | MCS13 |         | MCS14 |         | MCS15 |         |
| Channel     | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
| 1           | 22.03 | 11.21   | 22.00 | 10.80   | 22.03 | 10.71   | 22.12 | 10.63   |
| 6           | 22.01 | 11.16   | 22.06 | 10.85   | 22.10 | 10.75   | 22.10 | 10.58   |
| 11          | 22.00 | 11.14   | 21.97 | 10.72   | 22.00 | 10.62   | 22.05 | 10.55   |

| TX1+TX2 |       |         |       |         |       |         |       |         |
|---------|-------|---------|-------|---------|-------|---------|-------|---------|
| rate    | 1M    |         | 2M    |         | 5.5M  |         | 11M   |         |
| Channel | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
| 1       | 21.42 | 17.62   | 21.66 | 17.89   | 21.73 | 17.96   | 21.71 | 17.63   |
| 6       | 21.35 | 17.56   | 21.75 | 17.96   | 21.72 | 17.92   | 21.72 | 17.63   |
| 11      | 21.36 | 17.56   | 21.74 | 17.96   | 21.75 | 17.93   | 21.69 | 17.54   |
| rate    | 6M    |         | 9M    |         | 12M   |         | 18M   |         |
| Channel | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
| 1       | 25.49 | 15.43   | 25.45 | 15.42   | 25.31 | 15.36   | 25.20 | 15.09   |
| 6       | 25.47 | 15.43   | 25.45 | 15.39   | 25.25 | 15.25   | 25.21 | 15.07   |
| 11      | 25.38 | 15.42   | 25.37 | 15.31   | 22.56 | 15.28   | 25.36 | 15.37   |
| rate    | 24M   |         | 36M   |         | 48M   |         | 54M   |         |
| Channel | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
| 1       | 25.27 | 15.21   | 25.33 | 14.89   | 25.26 | 14.48   | 25.19 | 14.38   |
| 6       | 25.20 | 15.12   | 25.30 | 14.87   | 25.32 | 14.63   | 25.26 | 14.48   |
| 11      | 25.22 | 15.14   | 25.28 | 14.84   | 25.25 | 14.63   | 25.30 | 14.53   |
| rate    | MCS8  |         | MCS9  |         | MCS10 |         | MCS11 |         |
| Channel | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
| 1       | 25.26 | 15.11   | 25.02 | 14.84   | 25.29 | 14.54   | 25.16 | 14.34   |
| 6       | 25.28 | 15.16   | 25.16 | 14.97   | 25.33 | 14.61   | 25.14 | 14.30   |
| 11      | 25.16 | 15.07   | 25.14 | 14.92   | 25.28 | 14.62   | 25.17 | 14.37   |
| rate    | MCS12 |         | MCS13 |         | MCS14 |         | MCS15 |         |
| Channel | Peak  | Average | Peak  | Average | Peak  | Average | Peak  | Average |
| 1       | 25.00 | 14.03   | 25.02 | 13.69   | 25.05 | 13.57   | 25.09 | 13.46   |
| 6       | 25.04 | 14.04   | 25.07 | 13.78   | 25.07 | 13.47   | 25.07 | 13.35   |
| 11      | 25.06 | 14.06   | 25.05 | 13.74   | 25.02 | 13.43   | 25.02 | 13.32   |



## 2.4 Description of Test System

| Device   | Manufacturer | Model No. | Description                   |
|----------|--------------|-----------|-------------------------------|
| Notebook | ASUS         | A8J       | Power Cable, Unshielding 1.8m |

Used cable

| Cable | Quantity | Description       |
|-------|----------|-------------------|
| USB   | 1        | Unshielding, 1.8m |

## 2.5 General Information of Test

|                               |                                                                                                                                                          |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Site :                   | Cerpass Technology Corporation Test Laboratory<br>No.10, Lane 2, Lianfu Street, Luzhu Township, Taoyuan<br>County 33848, Taiwan(R.O.C.)                  |
| Test Site Location :          | 2F-11, No. 3, Yuan Qu St., (Nankang Software Park),<br>Taipei, Taiwan 115, R.O.C.                                                                        |
| Test Site Location :          | No.68-1, Shihbachongsi, Shihding Township,<br>Taipei City 223, Taiwan, R.O.C.                                                                            |
| FCC Registration Number :     | TW1049, TW1061, 488071, 390316                                                                                                                           |
| IC Registration Number :      | 4934B-1, 4934D-1, 4934E-1, 4934E-2                                                                                                                       |
| VCCI Registration Number :    | T-1173 for Telecommunication Test<br>C-4139 for Conducted emission test<br>R-3428 for Radiated emission test<br>G-97 for radiated disturbance above 1GHz |
| Frequency Range Investigated: | Conducted: from 150kHz to 30MHz<br>Radiation: from 30MHz to 40,000MHz                                                                                    |
| Test Distance:                | The test distance of radiated emission from antenna to<br>EUT is 3 M.                                                                                    |

## 2.6 Measurement Uncertainty

| Measurement Item             | Uncertainty         |
|------------------------------|---------------------|
| Radiated emission            | $\pm 4.11\text{dB}$ |
| Peak Output Power(conducted) | $\pm 1.38\text{dB}$ |
| Peak Output Power(Radiated)  | $\pm 1.70\text{dB}$ |
| Power Spectral Density       | $\pm 1.39\text{dB}$ |
| Radiated emission(3m)        | $\pm 4.11\text{dB}$ |
| Radiated emission(10m)       | $\pm 3.89\text{dB}$ |



### 3. Antenna Requirements

#### 3.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

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

#### 3.2 Antenna Construction and Directional Gain

Antenna 1

Antenna Type: Dipole Antenna

Antenna Gain: 3 dBi

Antenna 2

Antenna Type: PIFA Antenna

Antenna Gain: 1.65 dBi

Directional gain =  $10 \log(10^{\text{gain1}/20} + 10^{\text{gain2}/20})$  dBi =  $10 \log(0.444)$  = 4.44 (dBi)



## 4. Test of Conducted Emission

### 4.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-2009 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

| Frequency<br>(MHz) | Quasi Peak<br>(dB $\mu$ V) | Average<br>(dB $\mu$ V) |
|--------------------|----------------------------|-------------------------|
| 0.15 – 0.5         | 66-56*                     | 56-46*                  |
| 0.5 – 5.0          | 56                         | 46                      |
| 5.0 – 30.0         | 60                         | 50                      |

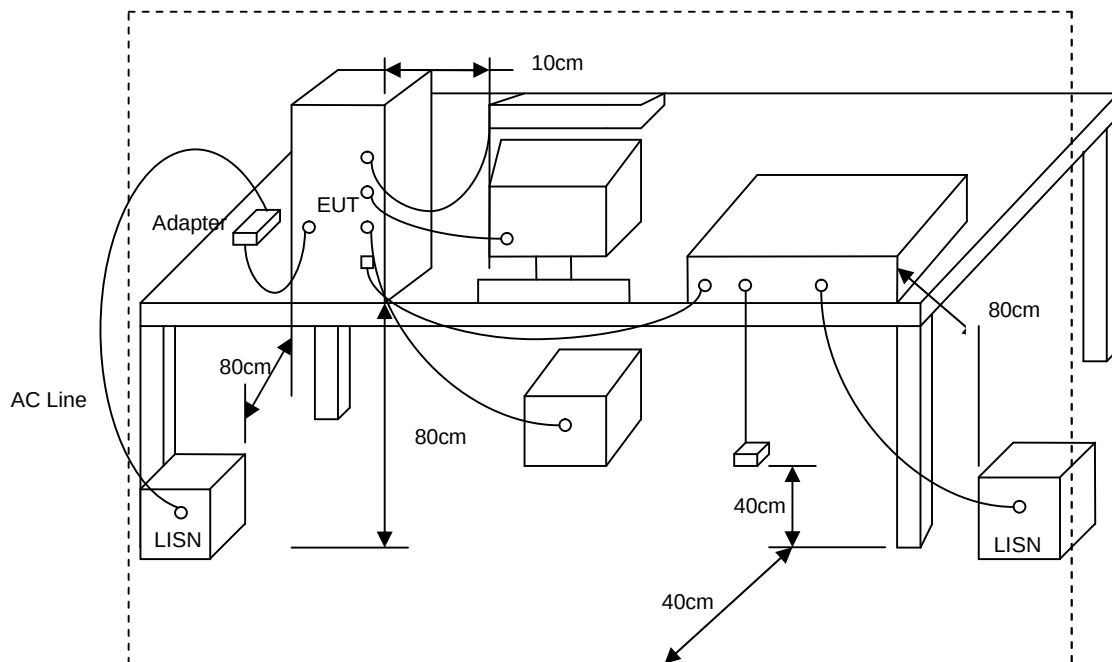
\*Decreases with the logarithm of the frequency.

### 4.2 Test Procedures

- The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- Connect EUT to the power mains through a line impedance stabilization network (LISN).
- All the support units are connecting to the other LISN.
- The LISN provides 50 ohm coupling impedance for the measuring instrument.
- The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
- Both sides of AC line were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched.
- Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.



### 4.3 Typical Test Setup



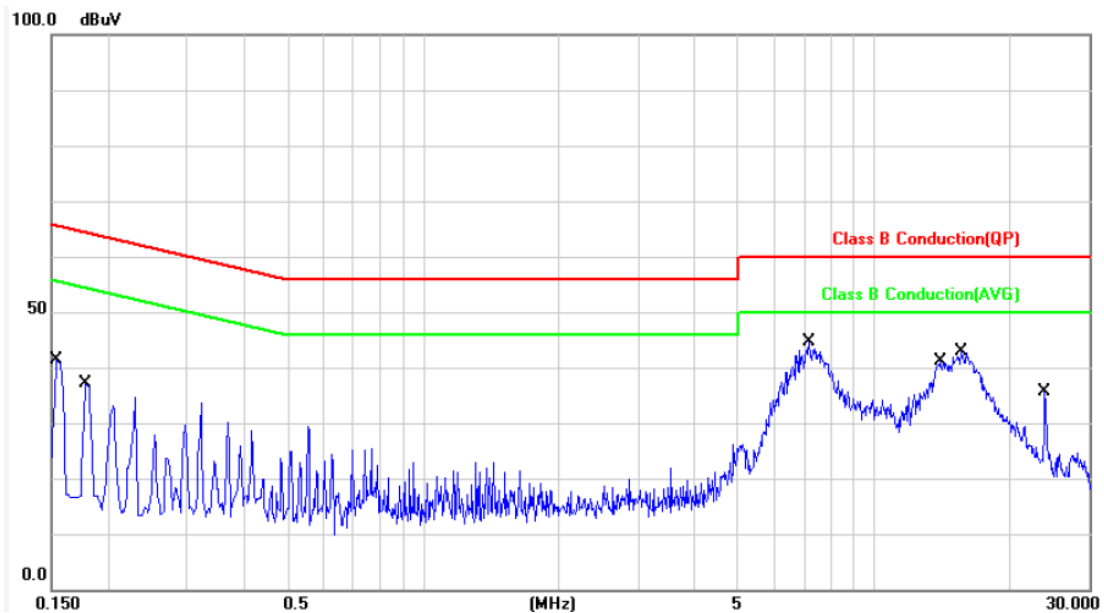
#### 4.4 Measurement Equipment

| Instrument   | Manufacturer | Model No. | Serial No. | Calibration Date | Valid Date |
|--------------|--------------|-----------|------------|------------------|------------|
| EMI Receiver | R&S          | ESCI      | 100821     | 2013/09/18       | 2014/09/17 |
| LISN         | Schwarzbeck  | NSLK 8127 | 8127-740   | 2014/08/14       | 2015/08/13 |
| LISN         | Schwarzbeck  | NSLK 8127 | 8127-516   | 2014/03/10       | 2015/03/09 |
| Software     | Farad        | Ez-EMC    | ver.ct3a1  | N/A              | N/A        |



#### 4.5 Test Result and Data

|           |                 |                      |            |
|-----------|-----------------|----------------------|------------|
| Power     | : AC 120V       | Pol/Phase            | : LINE     |
| Test Mode | : 802.11g, CH1  | Temperature          | : 23 °C    |
|           |                 | Humidity             | : 53 %     |
| Test Date | : Aug. 25, 2014 | Atmospheric Pressure | : 1014 hpa |



| No. | Frequency (MHz) | Factor (dB) | Reading (dBuV) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F |
|-----|-----------------|-------------|----------------|--------------|--------------|-------------|----------|-----|
| 1   | 0.1539          | 9.92        | 23.94          | 33.86        | 65.78        | -31.92      | QP       | P   |
| 2   | 0.1539          | 9.92        | 4.74           | 14.66        | 55.78        | -41.12      | AVG      | P   |
| 3   | 0.1780          | 9.92        | 20.66          | 30.58        | 64.57        | -33.99      | QP       | P   |
| 4   | 0.1780          | 9.92        | 3.24           | 13.16        | 54.57        | -41.41      | AVG      | P   |
| 5   | 7.2059          | 10.18       | 28.31          | 38.49        | 60.00        | -21.51      | QP       | P   |
| 6   | 7.2059          | 10.18       | 19.55          | 29.73        | 50.00        | -20.27      | AVG      | P   |
| 7   | 14.0299         | 10.35       | 23.23          | 33.58        | 60.00        | -26.42      | QP       | P   |
| 8   | 14.0299         | 10.35       | 15.47          | 25.82        | 50.00        | -24.18      | AVG      | P   |
| 9   | 15.5859         | 10.39       | 27.13          | 37.52        | 60.00        | -22.48      | QP       | P   |
| 10  | 15.5859         | 10.39       | 16.07          | 26.46        | 50.00        | -23.54      | AVG      | P   |
| 11  | 24.0140         | 10.52       | 23.58          | 34.10        | 60.00        | -25.90      | QP       | P   |
| 12  | 24.0140         | 10.52       | 23.15          | 33.67        | 50.00        | -16.33      | AVG      | P   |

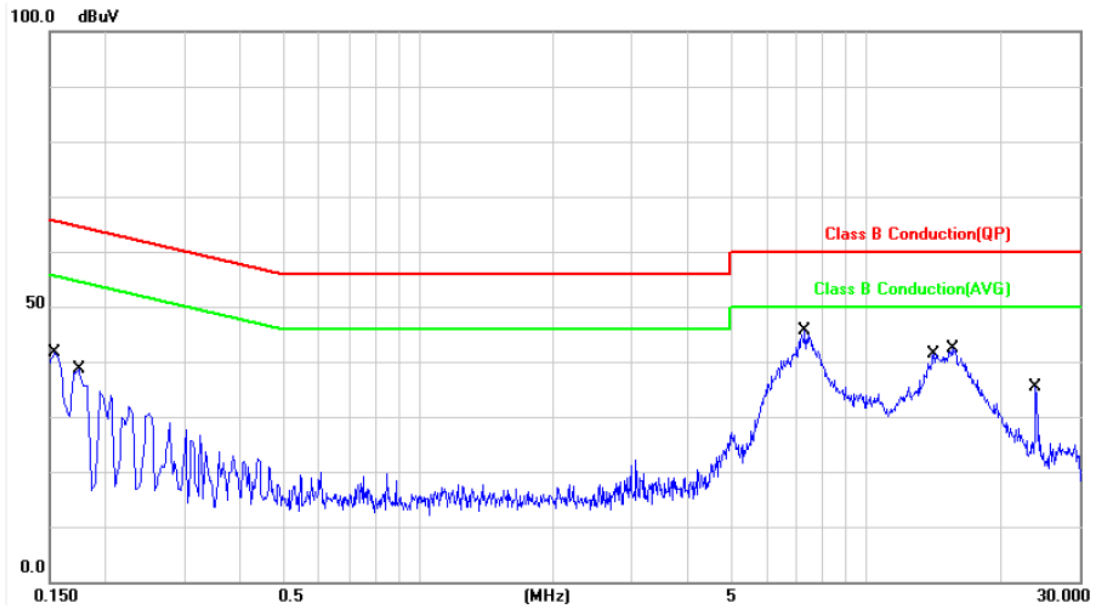
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= (LISN or ISN or PLC or Current Probe) Factor + Cable Loss + Attenuator



|           |                 |                      |            |
|-----------|-----------------|----------------------|------------|
| Power     | : AC 120V       | Pol/Phase            | : NEUTRAL  |
| Test Mode | : 802.11g, CH1  | Temperature          | : 23 °C    |
|           |                 | Humidity             | : 53 %     |
| Test Date | : Aug. 25, 2014 | Atmospheric Pressure | : 1014 hpa |



| No. | Frequency (MHz) | Factor (dB) | Reading (dBuV) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F |
|-----|-----------------|-------------|----------------|--------------|--------------|-------------|----------|-----|
| 1   | 0.1539          | 9.92        | 33.46          | 43.38        | 65.78        | -22.40      | QP       | P   |
| 2   | 0.1539          | 9.92        | 9.05           | 18.97        | 55.78        | -36.81      | AVG      | P   |
| 3   | 0.1740          | 9.92        | 21.52          | 31.44        | 64.76        | -33.32      | QP       | P   |
| 4   | 0.1740          | 9.92        | 3.16           | 13.08        | 54.76        | -41.68      | AVG      | P   |
| 5   | 7.3060          | 10.18       | 28.85          | 39.03        | 60.00        | -20.97      | QP       | P   |
| 6   | 7.3060          | 10.18       | 20.25          | 30.43        | 50.00        | -19.57      | AVG      | P   |
| 7   | 14.1740         | 10.33       | 24.20          | 34.53        | 60.00        | -25.47      | QP       | P   |
| 8   | 14.1740         | 10.33       | 16.77          | 27.10        | 50.00        | -22.90      | AVG      | P   |
| 9   | 15.5900         | 10.36       | 27.15          | 37.51        | 60.00        | -22.49      | QP       | P   |
| 10  | 15.5900         | 10.36       | 17.56          | 27.92        | 50.00        | -22.08      | AVG      | P   |
| 11  | 24.0140         | 10.50       | 23.35          | 33.85        | 60.00        | -26.15      | QP       | P   |
| 12  | 24.0140         | 10.50       | 22.94          | 33.44        | 50.00        | -16.56      | AVG      | P   |

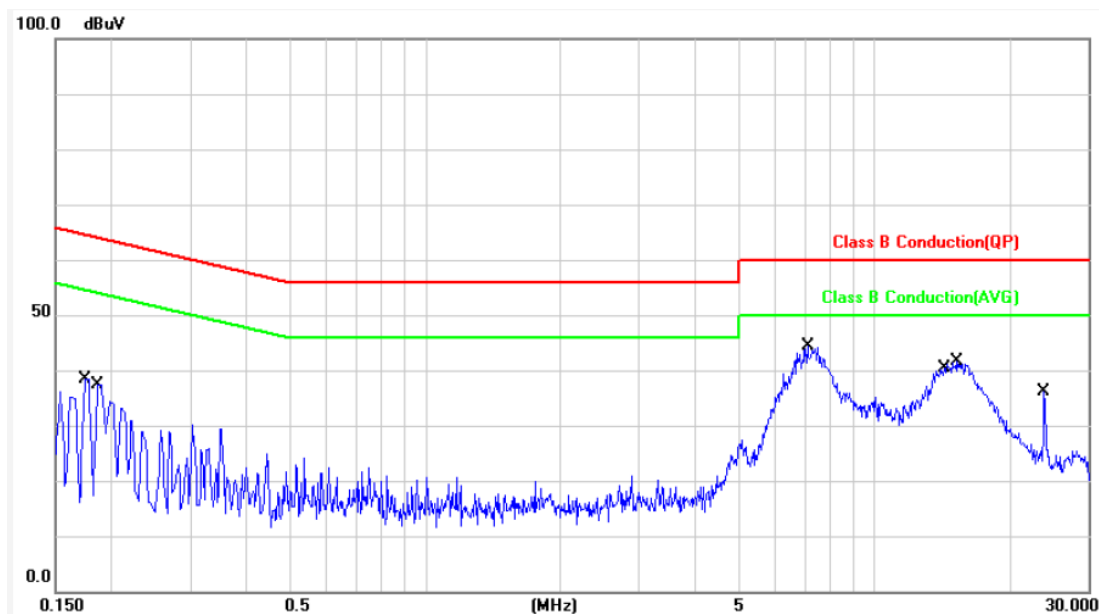
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= (LISN or ISN or PLC or Current Probe) Factor + Cable Loss + Attenuator



|           |                     |                      |            |
|-----------|---------------------|----------------------|------------|
| Power     | : AC 120V           | Pol/Phase            | : LINE     |
| Test Mode | : 802.11n HT20, CH1 | Temperature          | : 23 °C    |
|           |                     | Humidity             | : 53 %     |
| Test Date | : Aug. 25, 2014     | Atmospheric Pressure | : 1014 hpa |



| No. | Frequency (MHz) | Factor (dB) | Reading (dBuV) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F |
|-----|-----------------|-------------|----------------|--------------|--------------|-------------|----------|-----|
| 1   | 0.1740          | 9.92        | 20.79          | 30.71        | 64.76        | -34.05      | QP       | P   |
| 2   | 0.1740          | 9.92        | 2.41           | 12.33        | 54.76        | -42.43      | AVG      | P   |
| 3   | 0.1860          | 9.92        | 19.29          | 29.21        | 64.21        | -35.00      | QP       | P   |
| 4   | 0.1860          | 9.92        | 1.64           | 11.56        | 54.21        | -42.65      | AVG      | P   |
| 5   | 7.1100          | 10.18       | 28.21          | 38.39        | 60.00        | -21.61      | QP       | P   |
| 6   | 7.1100          | 10.18       | 19.07          | 29.25        | 50.00        | -20.75      | AVG      | P   |
| 7   | 14.0740         | 10.35       | 24.61          | 34.96        | 60.00        | -25.04      | QP       | P   |
| 8   | 14.0740         | 10.35       | 17.12          | 27.47        | 50.00        | -22.53      | AVG      | P   |
| 9   | 15.2980         | 10.38       | 27.03          | 37.41        | 60.00        | -22.59      | QP       | P   |
| 10  | 15.2980         | 10.38       | 16.87          | 27.25        | 50.00        | -22.75      | AVG      | P   |
| 11  | 24.0140         | 10.52       | 23.60          | 34.12        | 60.00        | -25.88      | QP       | P   |
| 12  | 24.0140         | 10.52       | 23.15          | 33.67        | 50.00        | -16.33      | AVG      | P   |

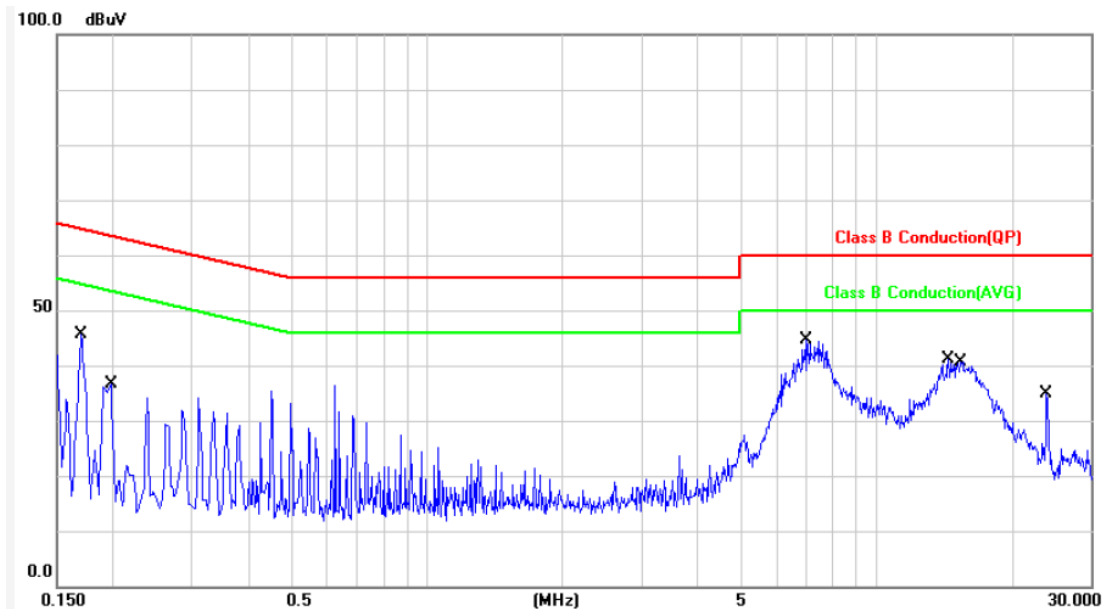
Note: Level = Reading + Factor

Margin = Level – Limit

Factor= (LISN or ISN or PLC or Current Probe) Factor + Cable Loss + Attenuator



|           |                     |                      |            |
|-----------|---------------------|----------------------|------------|
| Power     | : AC 120V           | Pol/Phase            | : NEUTRAL  |
| Test Mode | : 802.11n HT20, CH1 | Temperature          | : 23 °C    |
|           |                     | Humidity             | : 53 %     |
| Test Date | : Aug. 25, 2014     | Atmospheric Pressure | : 1014 hpa |



| No. | Frequency (MHz) | Factor (dB) | Reading (dBuV) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F |
|-----|-----------------|-------------|----------------|--------------|--------------|-------------|----------|-----|
| 1   | 0.1700          | 9.92        | 23.42          | 33.34        | 64.96        | -31.62      | QP       | P   |
| 2   | 0.1700          | 9.92        | 3.14           | 13.06        | 54.96        | -41.90      | AVG      | P   |
| 3   | 0.1980          | 9.91        | 17.91          | 27.82        | 63.69        | -35.87      | QP       | P   |
| 4   | 0.1980          | 9.91        | 1.09           | 11.00        | 53.69        | -42.69      | AVG      | P   |
| 5   | 7.0179          | 10.18       | 27.71          | 37.89        | 60.00        | -22.11      | QP       | P   |
| 6   | 7.0179          | 10.18       | 18.53          | 28.71        | 50.00        | -21.29      | AVG      | P   |
| 7   | 14.4539         | 10.36       | 25.91          | 36.27        | 60.00        | -23.73      | QP       | P   |
| 8   | 14.4539         | 10.36       | 16.81          | 27.17        | 50.00        | -22.83      | AVG      | P   |
| 9   | 15.4259         | 10.36       | 26.78          | 37.14        | 60.00        | -22.86      | QP       | P   |
| 10  | 15.4259         | 10.36       | 16.35          | 26.71        | 50.00        | -23.29      | AVG      | P   |
| 11  | 24.0140         | 10.50       | 23.34          | 33.84        | 60.00        | -26.16      | QP       | P   |
| 12  | 24.0140         | 10.50       | 22.93          | 33.43        | 50.00        | -16.57      | AVG      | P   |

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= (LISN or ISN or PLC or Current Probe) Factor + Cable Loss + Attenuator



## 5. Test of Radiated Emission

### 5.1 Test Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

| Frequency (MHz) | Field Strength (microvolt/meter) | Measurement Distance (meters) |
|-----------------|----------------------------------|-------------------------------|
| 0.009 ~ 0.490   | 2400/F(kHz)                      | 300                           |
| 0.490 ~ 1.705   | 24000/F(kHz)                     | 30                            |
| 1.705 ~ 30.0    | 30                               | 30                            |
| 30 ~ 88         | 100                              | 3                             |
| 88 ~ 216        | 150                              | 3                             |
| 216 ~ 960       | 200                              | 3                             |
| Above 960       | 500                              | 3                             |

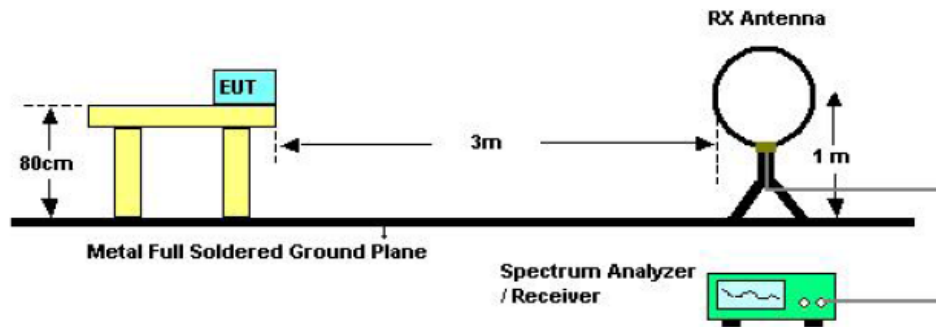
### 5.2 Test Procedures

- The EUT was placed on a rotatable table top 0.8 meter above ground.
- The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- The table was rotated 360 degrees to determine the position of the highest radiation.
- The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
- For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- "Cone of radiation" has been considered to be 3dB bandwidth of the measurement antenna.

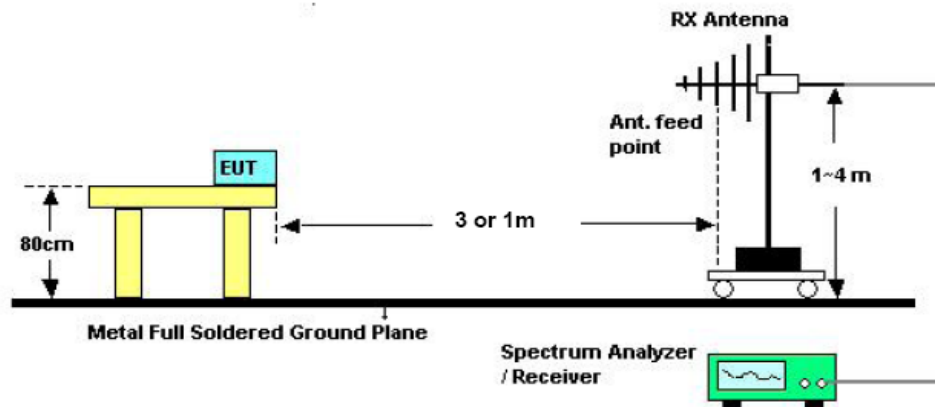


### 5.3 Typical Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.

Distance extrapolation factor =  $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

### 5.4 Measurement Equipment

| Instrument/Ancillary | Manufacturer | Model No. | Serial No. | Calibration Date | Valid Date |
|----------------------|--------------|-----------|------------|------------------|------------|
| EMI Receiver         | R&S          | ESCI      | 100443     | 2014/04/09       | 2015/04/08 |
| Bilog Antenna        | Schwarzbeck  | VULB 9168 | 275        | 2013/10/01       | 2014/09/30 |
| Amplifier            | QuieTek      | AP/0100A  | CHM0906075 | 2013/09/30       | 2014/09/29 |
| SPECTRUM ANALYZER    | R&S          | FSP40     | 100219     | 2013/09/14       | 2014/09/13 |
| HORN ANTENNA         | EMCO         | 3115      | 31601      | 2013/09/18       | 2014/09/17 |
| PREAMPLIFIER         | AGILENT      | 8449B     | 3008A01954 | 2014/03/28       | 2015/03/27 |

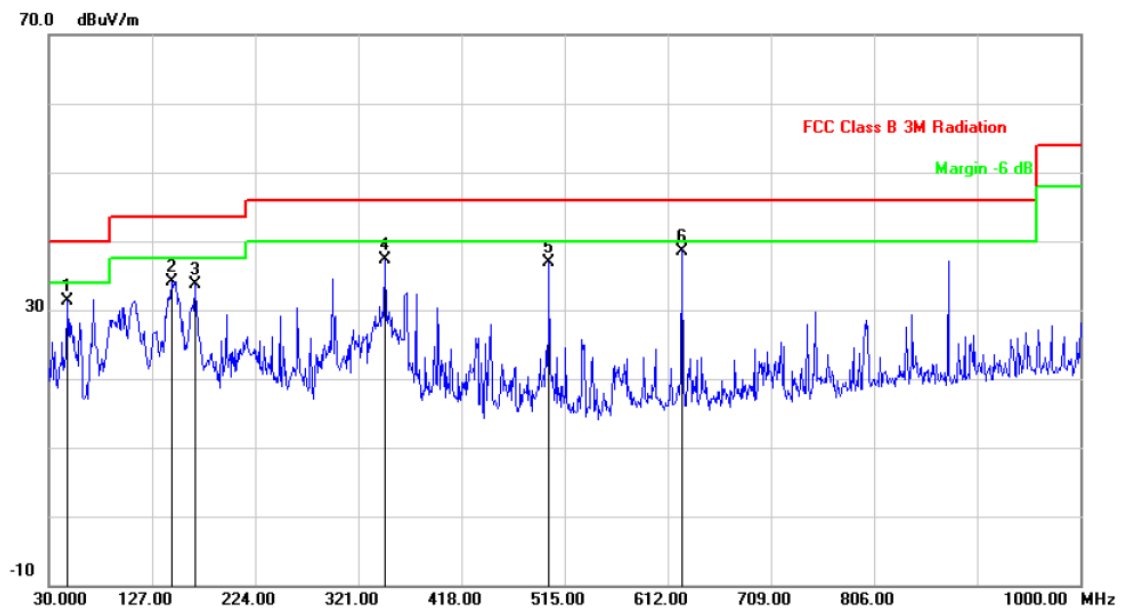


## 5.5 Test Result and Data (9kHz ~ 30MHz)

The 9kHz - 30MHz spurious emission is under limit 20dB more.

## 5.6 Test Result and Data (30MHz ~ 1GHz)

|           |                 |                      |            |
|-----------|-----------------|----------------------|------------|
| Power     | : AC 120V       | Pol/Phase            | : VERTICAL |
| Test Mode | : 802.11g, CH1  | Temperature          | : 25 °C    |
|           |                 | Humidity             | : 54 %     |
| Test Date | : Jun. 27, 2014 | Atmospheric Pressure | : 1100 hpa |



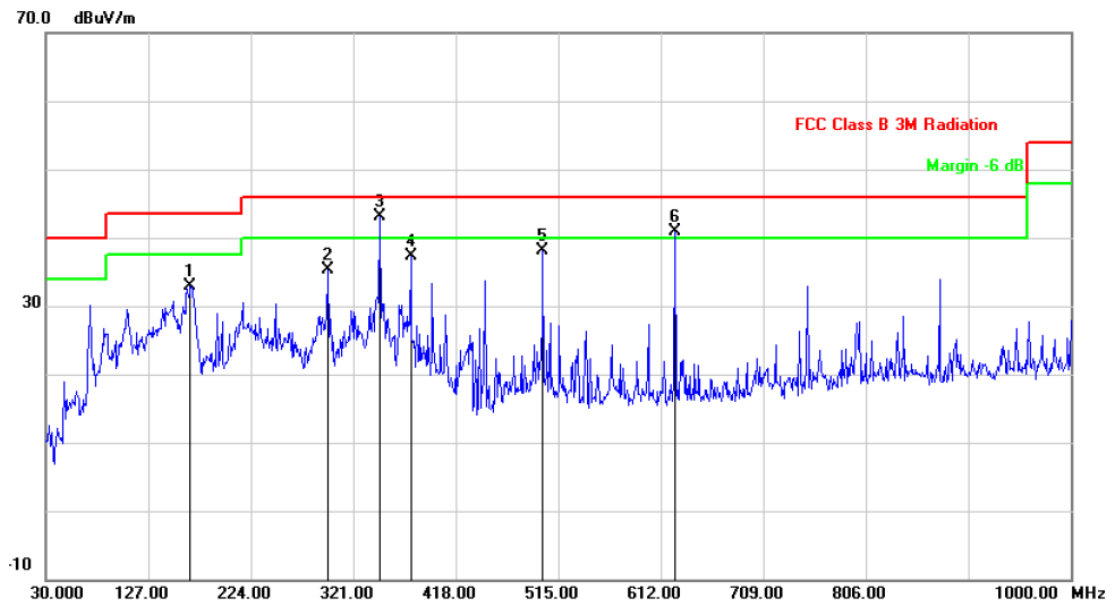
| No. | Frequency (MHz) | Factor (dB/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. | Height (cm) | Azimuth (deg) |
|-----|-----------------|---------------|----------------|----------------|----------------|-------------|------|-------------|---------------|
| 1   | 47.4600         | -18.06        | 49.32          | 31.26          | 40.00          | -8.74       | peak | 100         | 192           |
| 2   | 145.4300        | -18.91        | 53.05          | 34.14          | 43.50          | -9.36       | peak | 100         | 192           |
| 3   | 167.7400        | -18.94        | 52.72          | 33.78          | 43.50          | -9.72       | peak | 100         | 192           |
| 4   | 346.2200        | -16.57        | 53.94          | 37.37          | 46.00          | -8.63       | peak | 100         | 192           |
| 5   | 500.4500        | -12.74        | 49.64          | 36.90          | 46.00          | -9.10       | peak | 100         | 192           |
| 6   | 625.5800        | -10.01        | 48.61          | 38.60          | 46.00          | -7.40       | peak | 100         | 192           |

Note: Level = Reading + Factor

Margin = Level – Limit



|           |                 |                      |              |
|-----------|-----------------|----------------------|--------------|
| Power     | : AC 120V       | Pol/Phase            | : HORIZONTAL |
| Test Mode | : 802.11g, CH1  | Temperature          | : 25 °C      |
|           |                 | Humidity             | : 54 %       |
| Test Date | : Jun. 27, 2014 | Atmospheric Pressure | : 1100 hpa   |



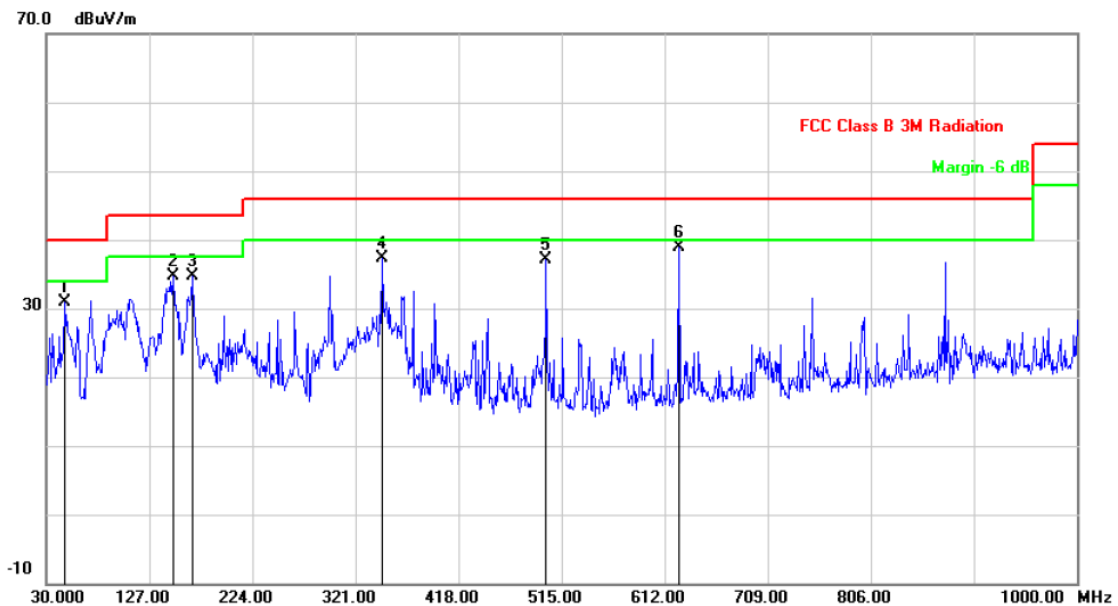
| No. | Frequency (MHz) | Factor (dB/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. | Height (cm) | Azimuth (deg) |
|-----|-----------------|---------------|----------------|----------------|----------------|-------------|------|-------------|---------------|
| 1   | 166.7700        | -18.90        | 51.89          | 32.99          | 43.50          | -10.51      | peak | 100         | 190           |
| 2   | 296.7500        | -17.89        | 53.22          | 35.33          | 46.00          | -10.67      | peak | 100         | 190           |
| 3   | 346.2200        | -16.57        | 59.62          | 43.05          | 46.00          | -2.95       | peak | 100         | 190           |
| 4   | 375.3200        | -15.71        | 53.01          | 37.30          | 46.00          | -8.70       | peak | 100         | 190           |
| 5   | 500.4500        | -12.74        | 50.80          | 38.06          | 46.00          | -7.94       | peak | 100         | 190           |
| 6   | 625.5800        | -10.01        | 50.98          | 40.97          | 46.00          | -5.03       | peak | 100         | 190           |

Note: Level = Reading + Factor

Margin = Level – Limit



|           |                     |                      |            |
|-----------|---------------------|----------------------|------------|
| Power     | : AC 120V           | Pol/Phase            | : VERTICAL |
| Test Mode | : 802.11n HT20, CH1 | Temperature          | : 25 °C    |
|           |                     | Humidity             | : 54 %     |
| Test Date | : Jun. 27, 2014     | Atmospheric Pressure | : 1100 hpa |



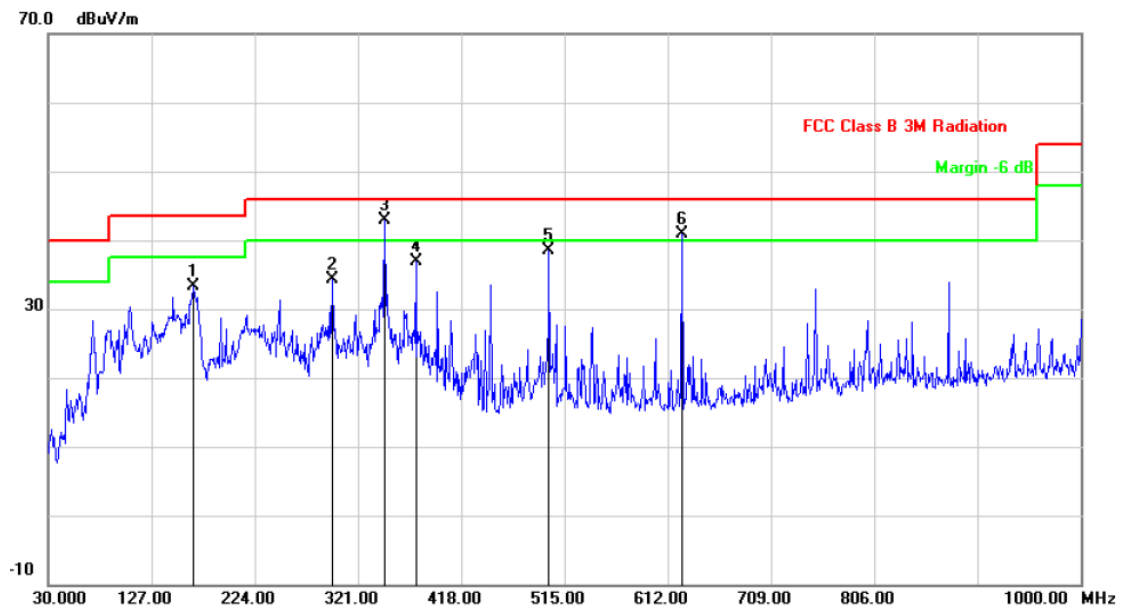
| No. | Frequency (MHz) | Factor (dB/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. | Height (cm) | Azimuth (deg) |
|-----|-----------------|---------------|----------------|----------------|----------------|-------------|------|-------------|---------------|
| 1   | 47.4600         | -18.06        | 48.99          | 30.93          | 40.00          | -9.07       | peak | 100         | 195           |
| 2   | 149.3100        | -18.75        | 53.51          | 34.76          | 43.50          | -8.74       | peak | 100         | 195           |
| 3   | 167.7400        | -18.94        | 53.73          | 34.79          | 43.50          | -8.71       | peak | 100         | 195           |
| 4   | 346.2200        | -16.57        | 53.90          | 37.33          | 46.00          | -8.67       | peak | 100         | 195           |
| 5   | 500.4500        | -12.74        | 49.80          | 37.06          | 46.00          | -8.94       | peak | 100         | 195           |
| 6   | 625.5800        | -10.01        | 48.95          | 38.94          | 46.00          | -7.06       | peak | 100         | 195           |

Note: Level = Reading + Factor

Margin = Level – Limit



|           |                     |                      |              |
|-----------|---------------------|----------------------|--------------|
| Power     | : AC 120V           | Pol/Phase            | : HORIZONTAL |
| Test Mode | : 802.11n HT20, CH1 | Temperature          | : 25 °C      |
|           |                     | Humidity             | : 54 %       |
| Test Date | : Jun. 27, 2014     | Atmospheric Pressure | : 1100 hpa   |



| No. | Frequency (MHz) | Factor (dB/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. | Height (cm) | Azimuth (deg) |
|-----|-----------------|---------------|----------------|----------------|----------------|-------------|------|-------------|---------------|
| 1   | 166.7700        | -18.90        | 52.13          | 33.23          | 43.50          | -10.27      | peak | 100         | 188           |
| 2   | 296.7500        | -17.89        | 52.13          | 34.24          | 46.00          | -11.76      | peak | 100         | 188           |
| 3   | 346.2200        | -16.57        | 59.41          | 42.84          | 46.00          | -3.16       | peak | 100         | 188           |
| 4   | 375.3200        | -15.71        | 52.66          | 36.95          | 46.00          | -9.05       | peak | 100         | 188           |
| 5   | 500.4500        | -12.74        | 51.27          | 38.53          | 46.00          | -7.47       | peak | 100         | 188           |
| 6   | 625.5800        | -10.01        | 50.97          | 40.96          | 46.00          | -5.04       | peak | 100         | 188           |

Note: Level = Reading + Factor

Margin = Level – Limit



## **5.7 Test Result and Data (Above 1GHz)**

The 9kHz-30MHz spurious emission is under limit 20dB more.



## 6. 6dB Bandwidth Measurement Data

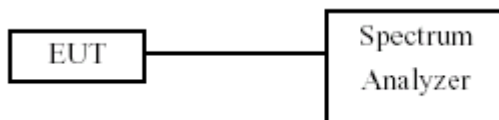
### 6.1 Test Limit

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

### 6.2 Test Procedures

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 1~5% of the emission bandwidth and VBW  $\geq 3 \times$  RBW.
- The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.
- The 6dB Bandwidth was measured and recorded.

### 6.3 Test Setup Layout



### 6.4 Measurement Equipment

| Instrument/Ancillary | Manufacturer | Model No. | Serial No. | Calibration Date | Valid Date |
|----------------------|--------------|-----------|------------|------------------|------------|
| Spectrum Analyzer    | R&S          | FSP40     | 100047     | 2014/03/27       | 2015/03/26 |



## 6.5 Test Result and Data

Test Date: Jun. 25, 2014

Temperature: 24°C

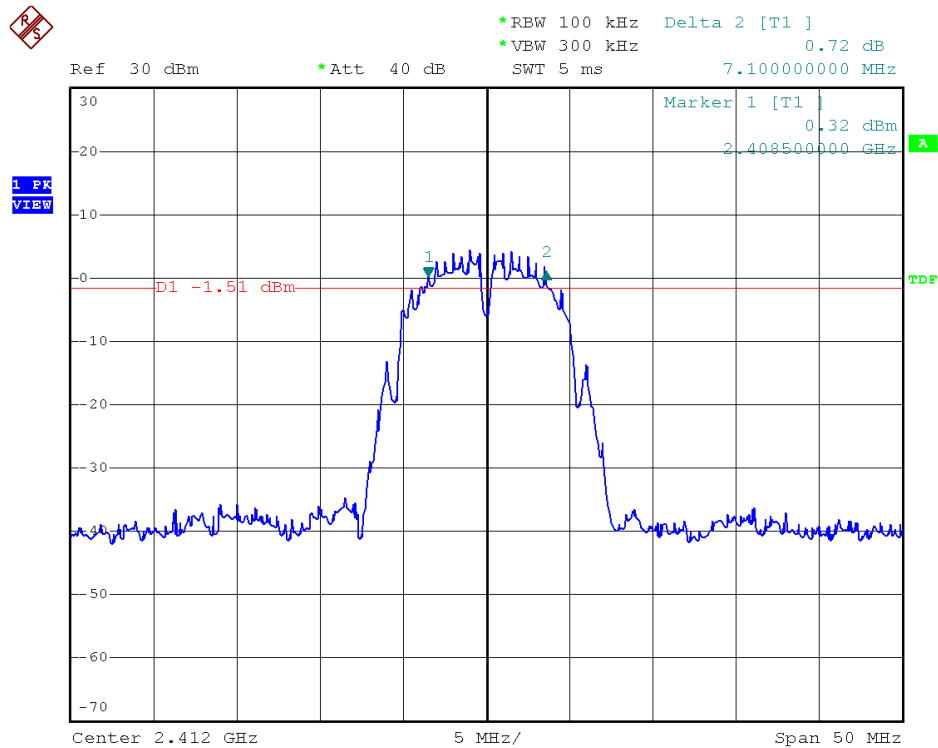
Atmospheric pressure: 1040 hPa

Humidity: 53%

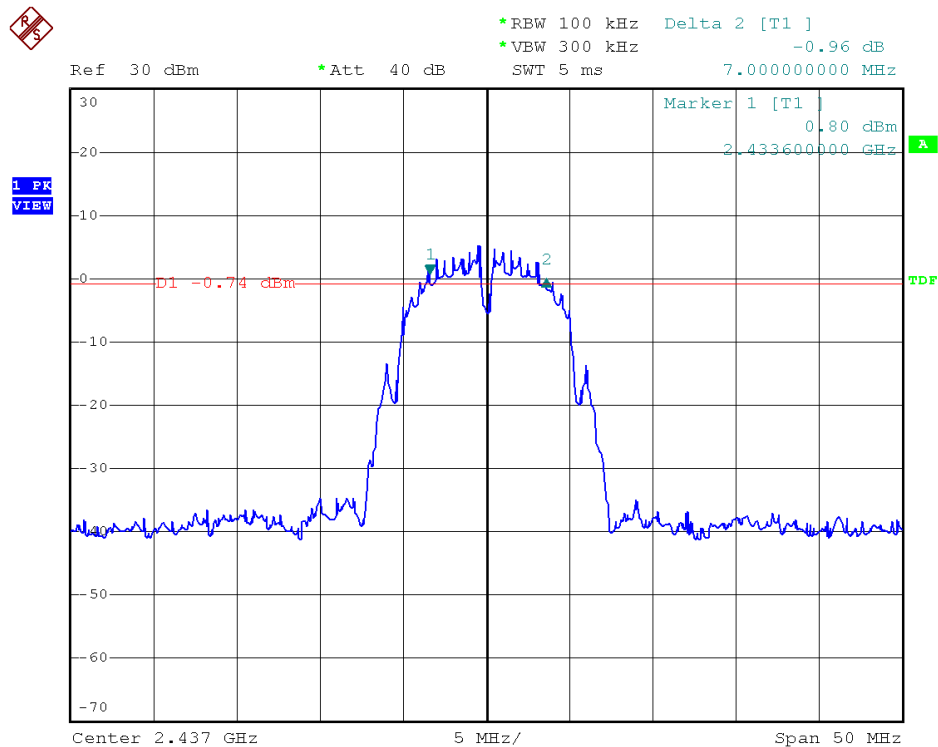
| Modulation Standard        | Channel | Frequency (MHz) | 6dB Bandwidth (MHz) |       |
|----------------------------|---------|-----------------|---------------------|-------|
|                            |         |                 | ANT 1               | ANT 2 |
| 802.11b<br>(5.5Mbps)       | 01      | 2412            | 7.1                 | 8.0   |
|                            | 06      | 2437            | 7.0                 | 8.0   |
|                            | 11      | 2462            | 8.2                 | 8.1   |
| 802.11g<br>(6Mbps)         | 01      | 2412            | 13.3                | 15.4  |
|                            | 06      | 2437            | 13.9                | 15.4  |
|                            | 11      | 2462            | 13.5                | 15.4  |
| 802.11n HT20<br>(MCS8Mbps) | 01      | 2412            | 15.0                | 15.4  |
|                            | 06      | 2437            | 15.1                | 15.4  |
|                            | 11      | 2462            | 15.1                | 15.0  |



Modulation Standard: 802.11b (5.5Mbps), Antenna 1  
Channel: 01

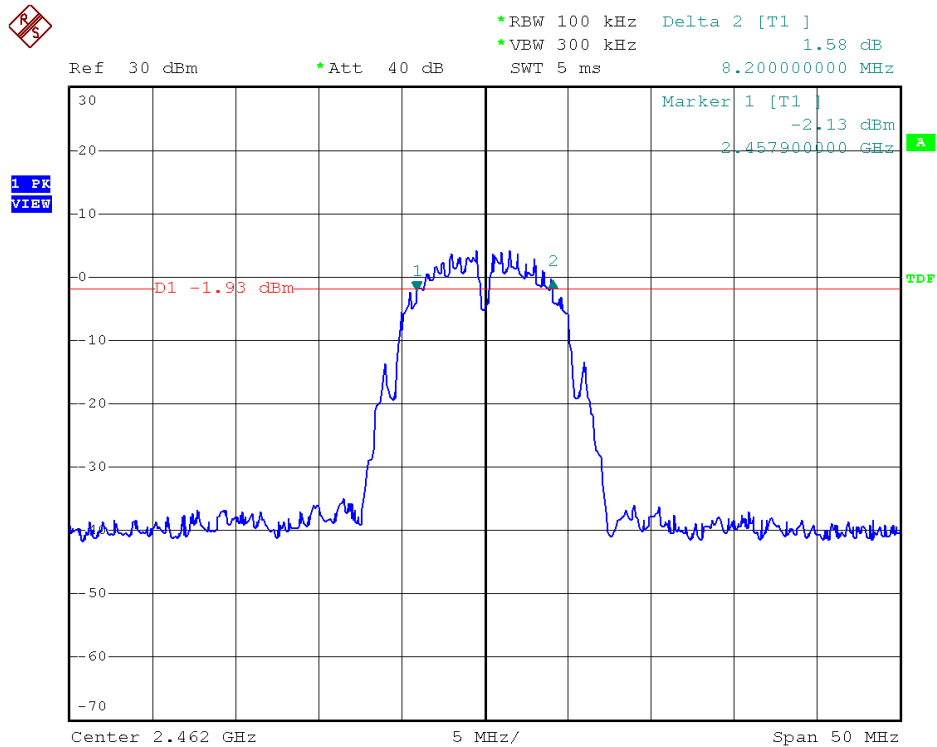


Modulation Standard: 802.11b (5.5Mbps), Antenna 1  
Channel: 06

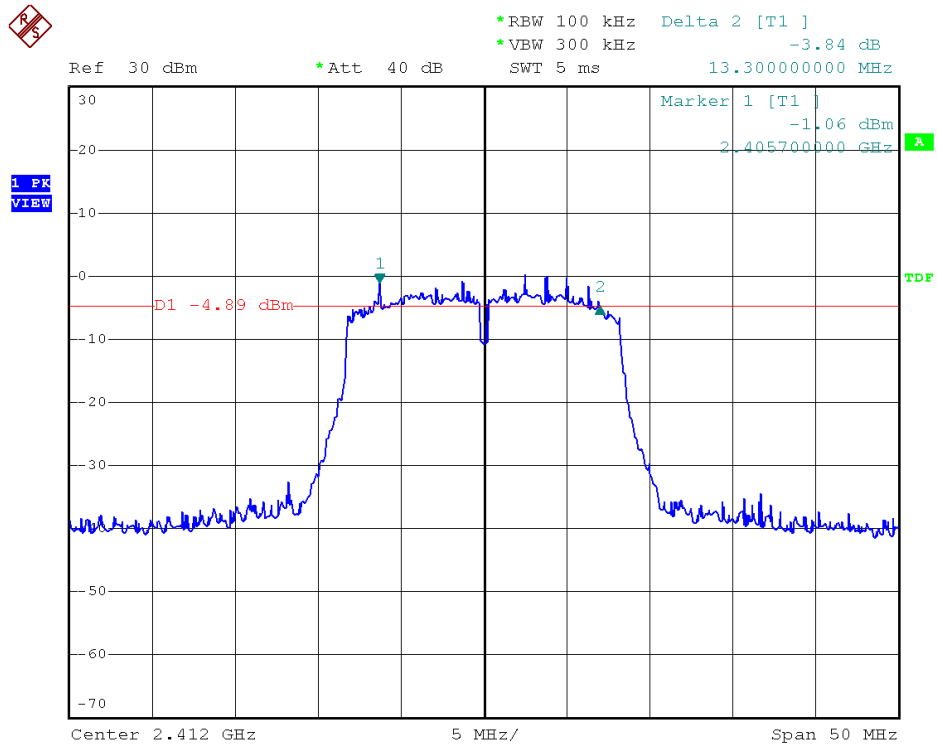




Modulation Standard: 802.11b (5.5Mbps), Antenna 1  
Channel: 11

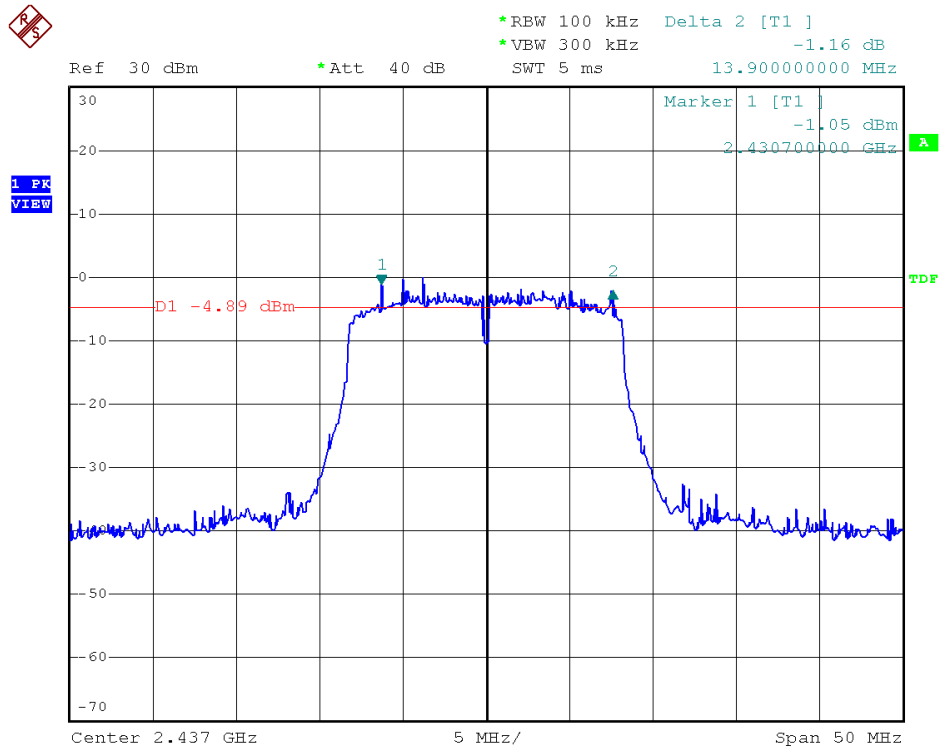


Modulation Standard: 802.11g (6Mbps), Antenna 1  
Channel: 01

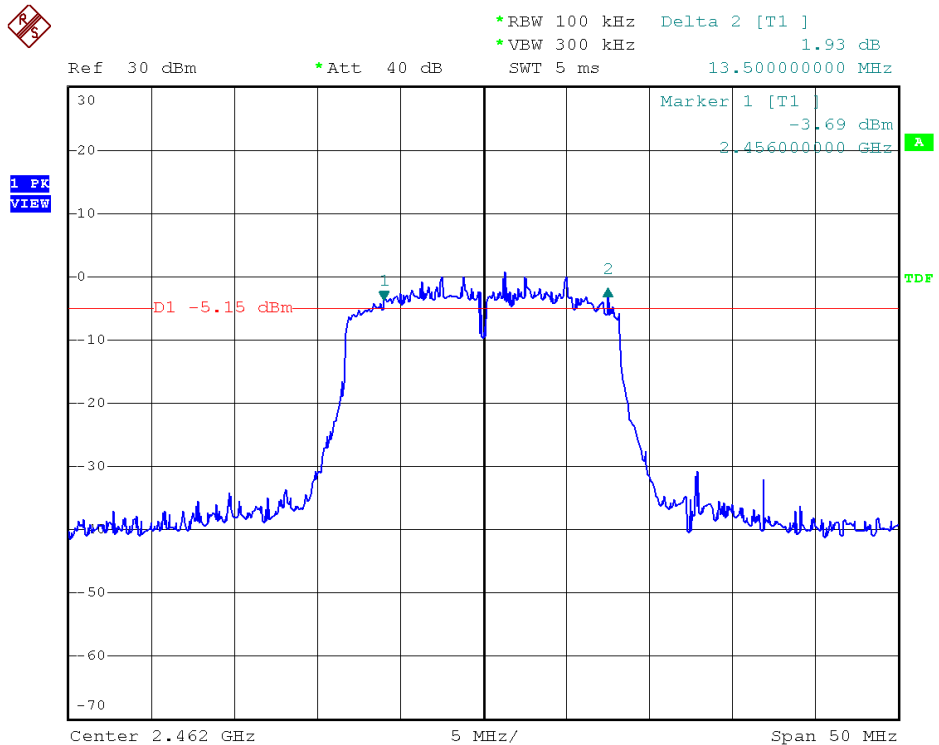




Modulation Standard: 802.11g (6Mbps), Antenna 1  
Channel: 06

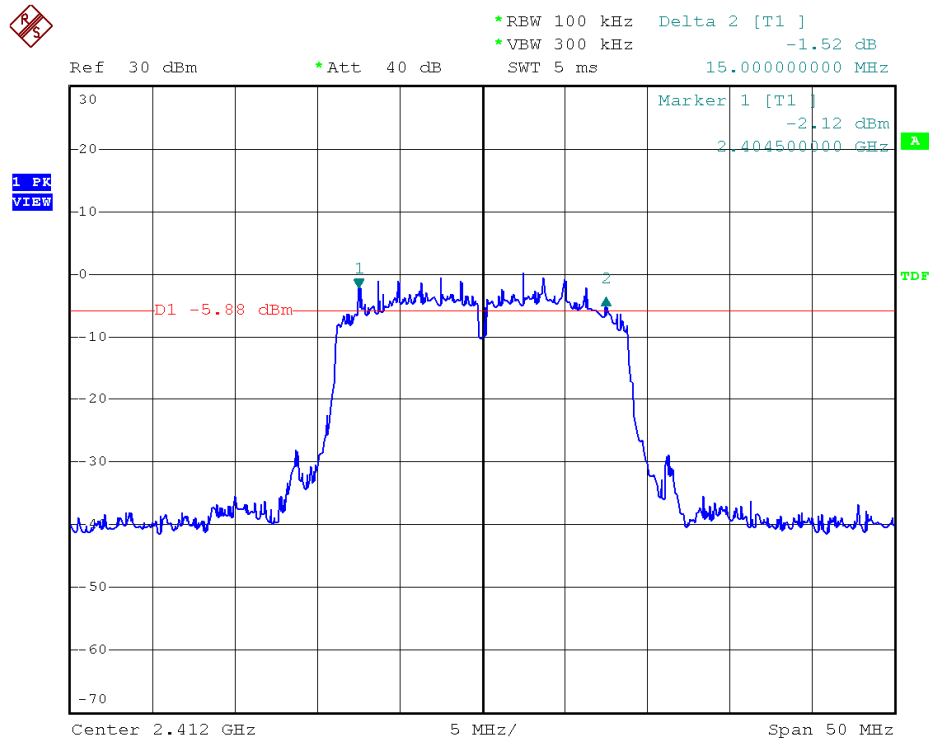


Modulation Standard: 802.11g (6Mbps), Antenna 1  
Channel: 11

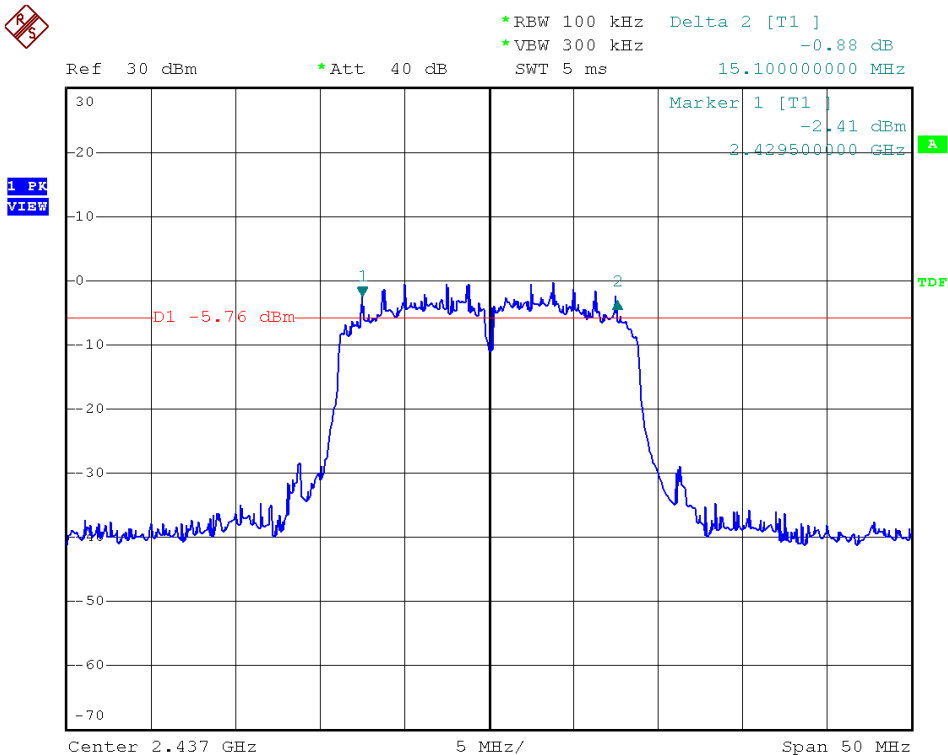




Modulation Standard: 802.11n HT20 (MCS8Mbps), Antenna 1  
Channel: 01

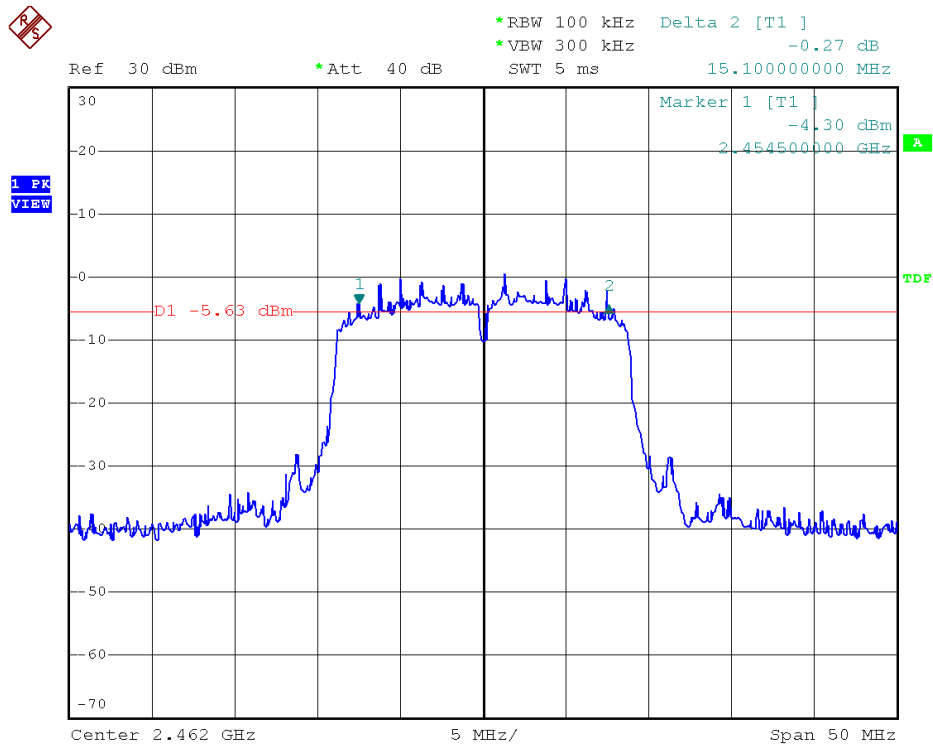


Modulation Standard: 802.11n HT20 (MCS8Mbps), Antenna 1  
Channel: 06

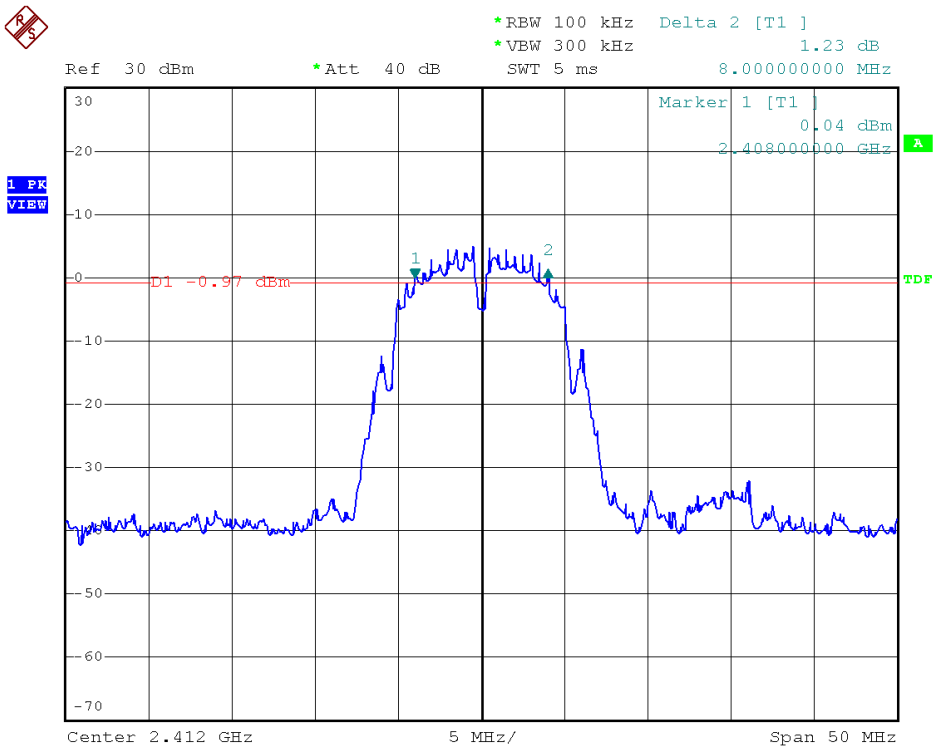




Modulation Standard: 802.11n HT20 (MCS8Mbps), Antenna 1  
Channel: 11

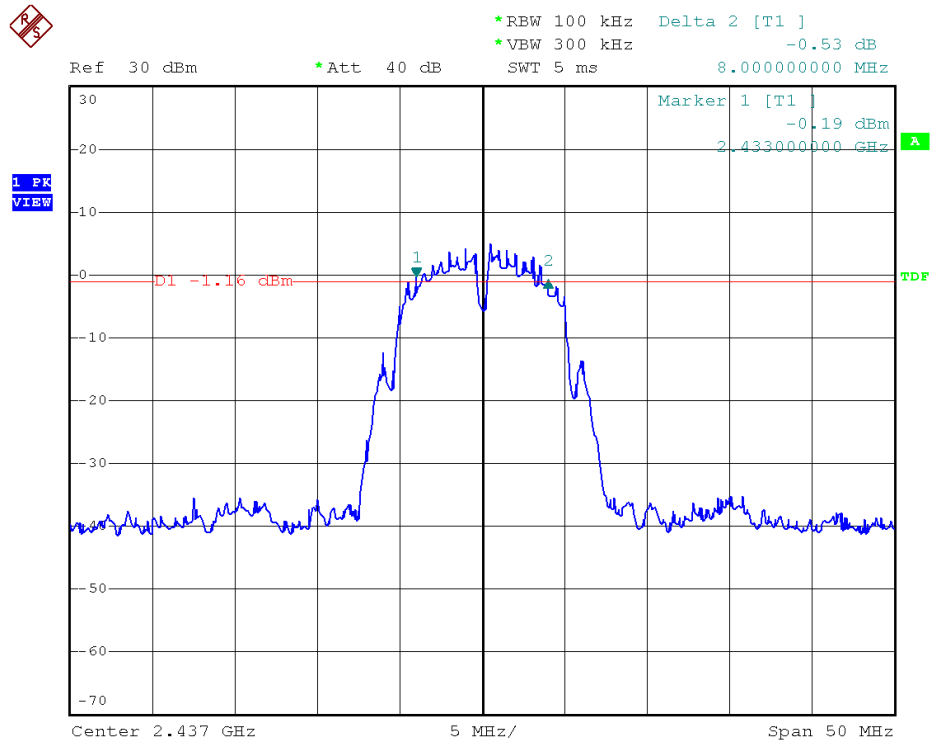


Modulation Standard: 802.11b (5.5Mbps), Antenna 2  
Channel: 01

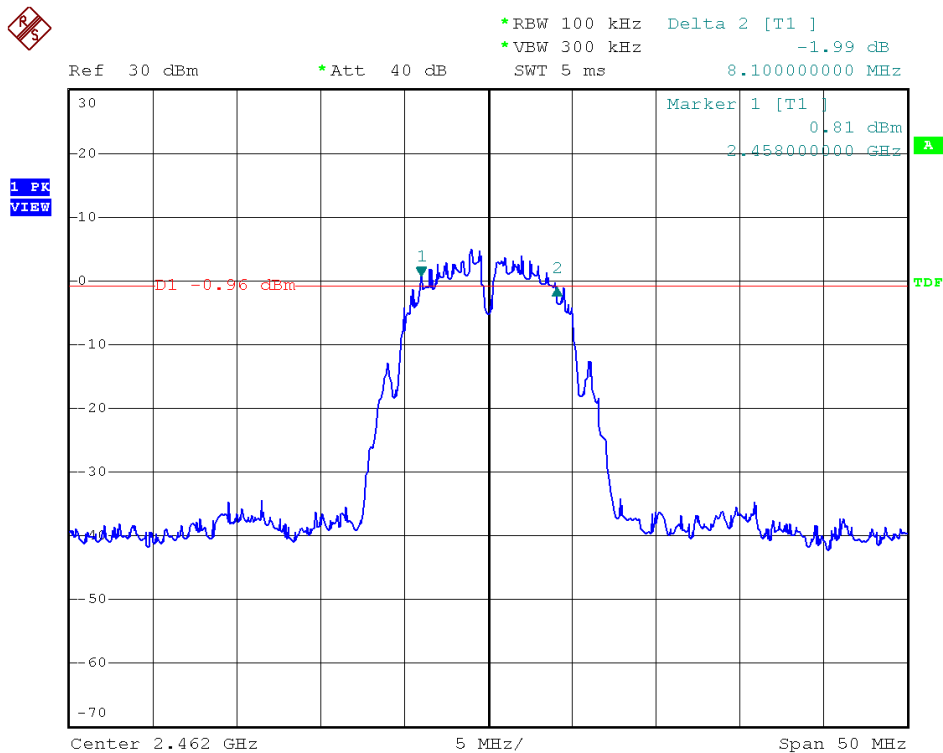




Modulation Standard: 802.11b (5.5Mbps), Antenna 2  
Channel: 06

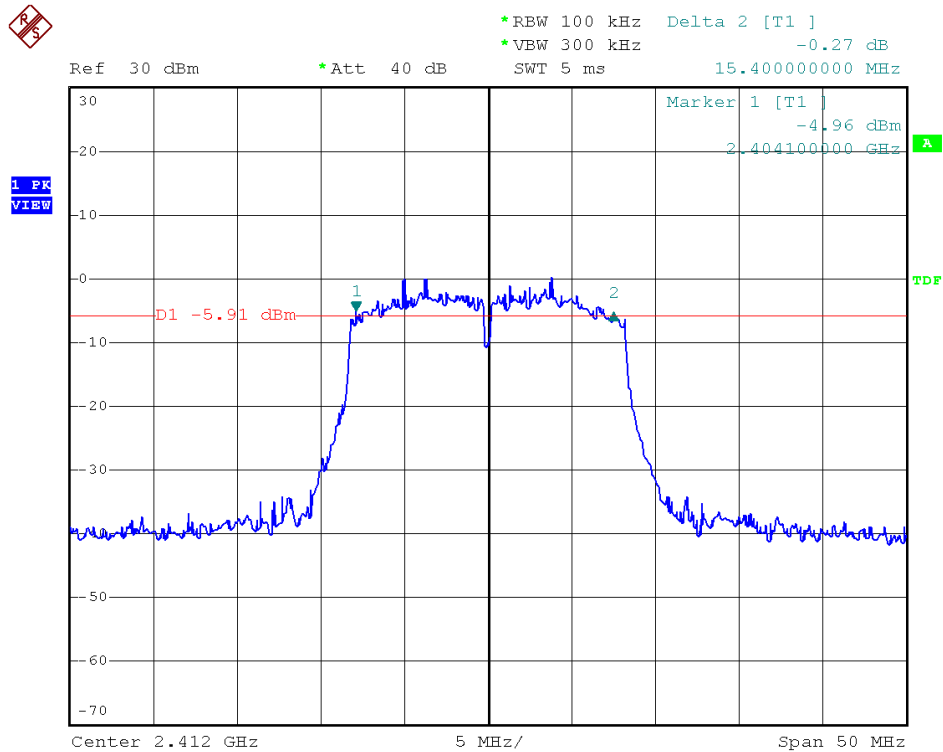


Modulation Standard: 802.11b (5.5Mbps), Antenna 2  
Channel: 11

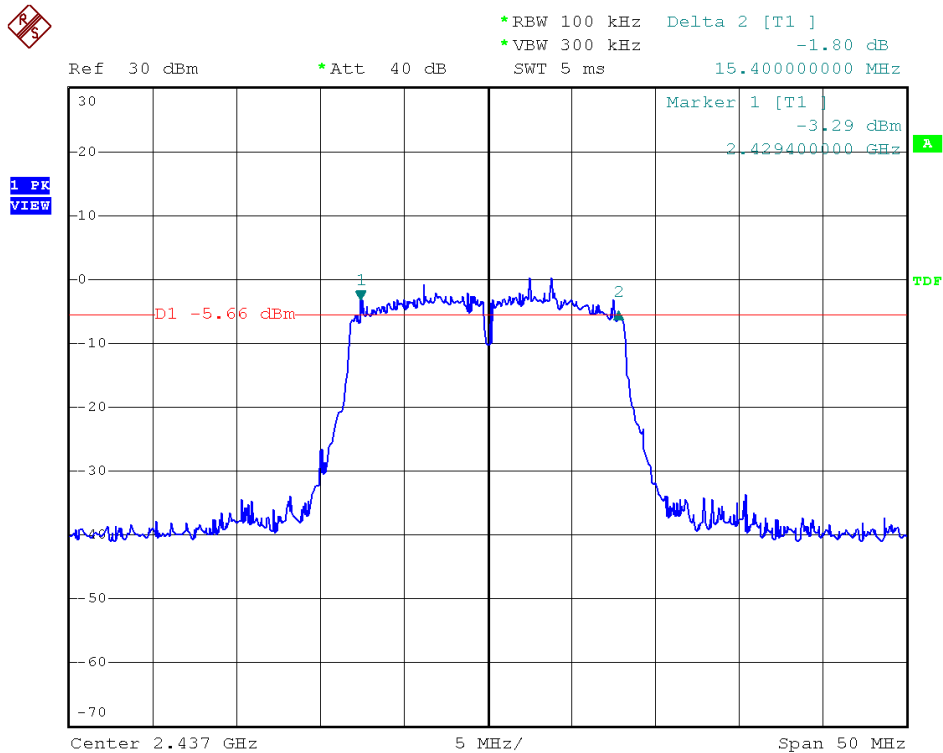




Modulation Standard: 802.11g (6Mbps), Antenna 2  
Channel: 01

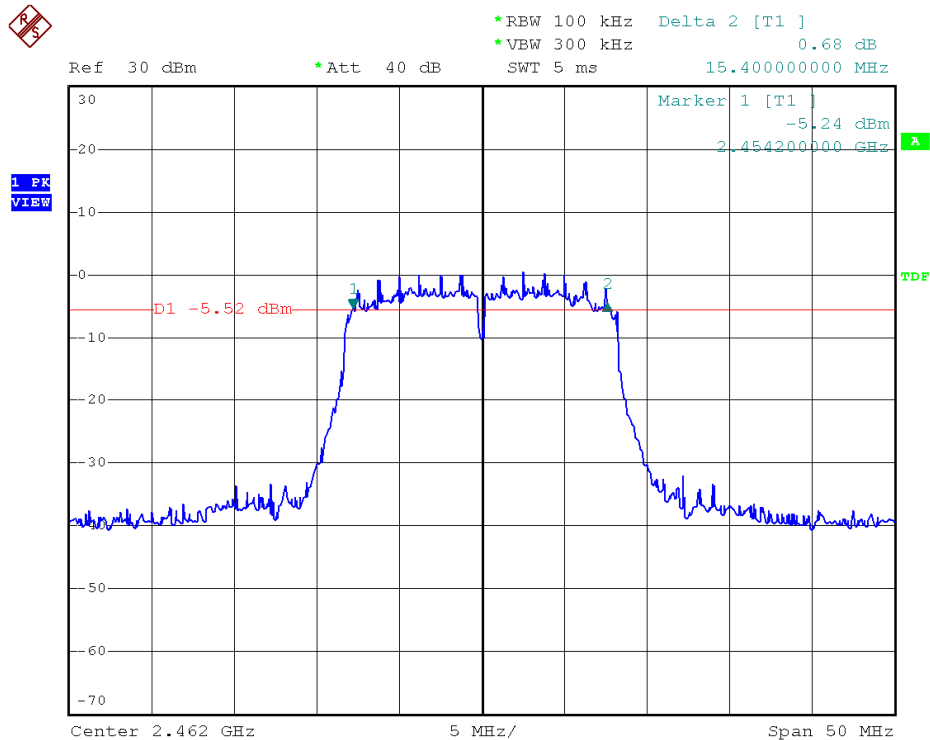


Modulation Standard: 802.11g (6Mbps), Antenna 2  
Channel: 06

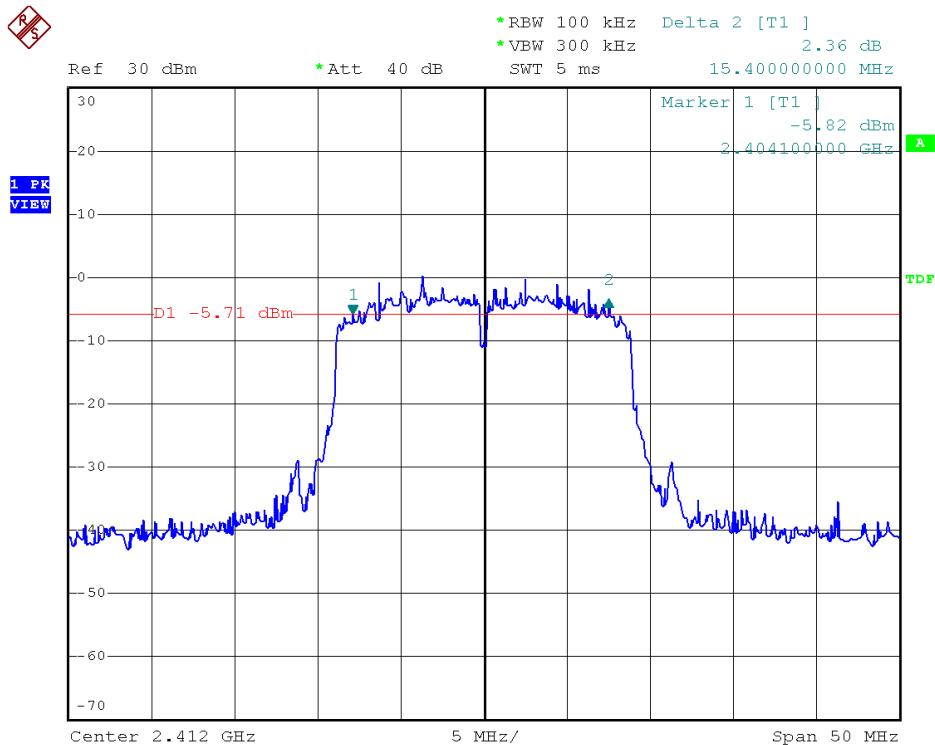




Modulation Standard: 802.11g (6Mbps), Antenna 2  
Channel: 11

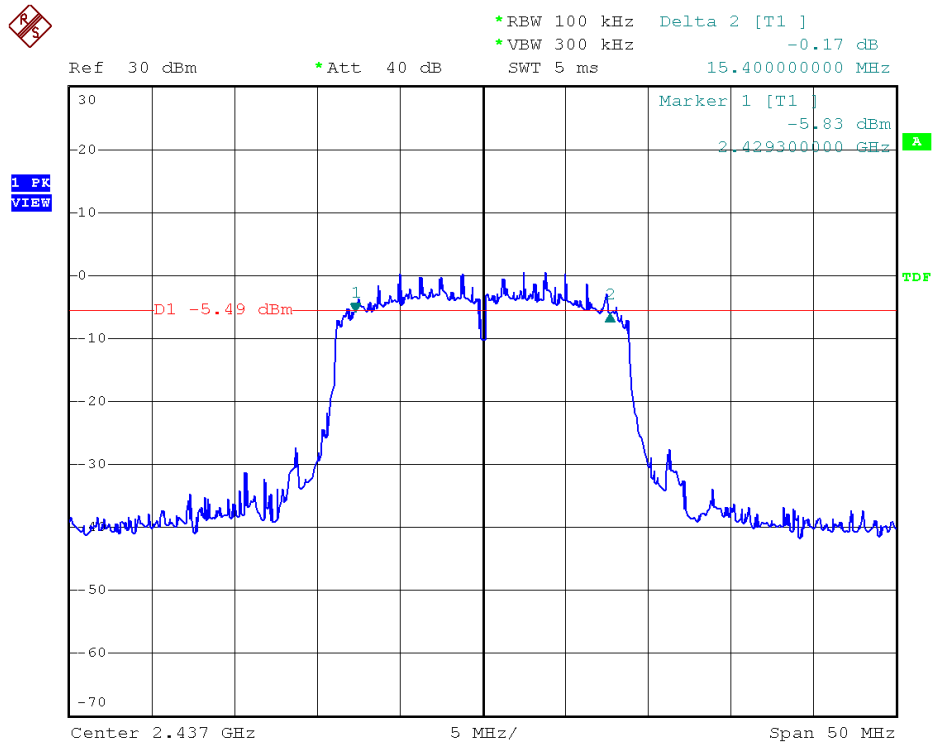


Modulation Standard: 802.11n HT20 (MCS8Mbps), Antenna 2  
Channel: 01

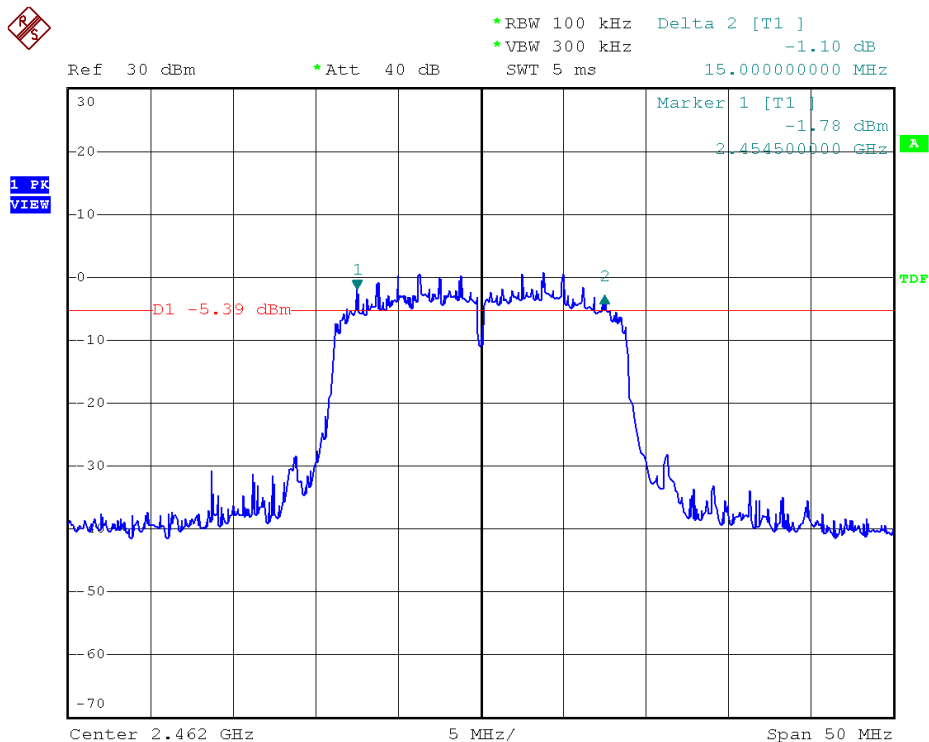




Modulation Standard: 802.11n HT20 (MCS8Mbps), Antenna 2  
Channel: 06



Modulation Standard: 802.11n HT20 (MCS8Mbps), Antenna 2  
Channel: 11





## 7. Maximum Peak and Average Output Power

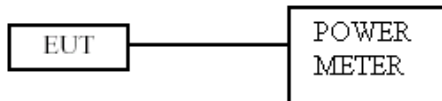
### 7.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

### 7.2 Test Procedures

The antenna port (RF output) of the EUT was connected to the input (RF input) of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

### 7.3 Test Setup Layout



### 7.4 Measurement Equipment

| Instrument/Ancillary | Manufacturer | Model No. | Serial No. | Calibration Date | Valid Date |
|----------------------|--------------|-----------|------------|------------------|------------|
| Spectrum Analyzer    | R&S          | FSP40     | 100047     | 2014/03/27       | 2015/03/26 |
| SERIES POWER METER   | ANRITSU      | ML2495A   | 1224005    | 2014/03/27       | 2015/03/26 |
| POWER SENSOR         | ANRITSU      | MA2411B   | 1207295    | 2014/03/27       | 2015/03/26 |



## 7.5 Test Result and Data

Test Date: Jun. 25, 2014

Temperature: 24°C

Atmospheric pressure: 1040 hPa

Humidity: 53%

| Modulation Standard           | Channel | Frequency (MHz) | Peak Power Output (dBm) |       |         |
|-------------------------------|---------|-----------------|-------------------------|-------|---------|
|                               |         |                 | ANT 1                   | ANT 2 | ANT 1+2 |
| 802.11b<br>(5.5Mbps)          | 01      | 2412            | 18.52                   | 18.91 | 21.73   |
|                               | 06      | 2437            | 18.57                   | 18.85 | 21.72   |
|                               | 11      | 2462            | 18.65                   | 18.82 | 21.75   |
| 802.11g<br>(6Mbps)            | 01      | 2412            | 22.19                   | 22.76 | 25.49   |
|                               | 06      | 2437            | 22.25                   | 22.66 | 25.47   |
|                               | 11      | 2462            | 22.22                   | 22.51 | 25.38   |
| 802.11n<br>HT20<br>(MCS8Mbps) | 01      | 2412            | 22.02                   | 22.47 | 25.26   |
|                               | 06      | 2437            | 22.12                   | 22.42 | 25.28   |
|                               | 11      | 2462            | 21.96                   | 22.33 | 25.16   |

| Modulation Standard           | Channel | Frequency (MHz) | Peak Power Output (mW) |        |         |
|-------------------------------|---------|-----------------|------------------------|--------|---------|
|                               |         |                 | ANT 1                  | ANT 2  | ANT 1+2 |
| 802.11b<br>(5.5Mbps)          | 01      | 2412            | 71.12                  | 77.80  | 148.93  |
|                               | 06      | 2437            | 71.94                  | 76.74  | 148.68  |
|                               | 11      | 2462            | 73.28                  | 76.21  | 149.49  |
| 802.11g<br>(6Mbps)            | 01      | 2412            | 165.58                 | 188.80 | 354.38  |
|                               | 06      | 2437            | 167.88                 | 184.50 | 352.38  |
|                               | 11      | 2462            | 166.72                 | 178.24 | 344.96  |
| 802.11n<br>HT20<br>(MCS8Mbps) | 01      | 2412            | 159.22                 | 176.60 | 335.82  |
|                               | 06      | 2437            | 162.93                 | 174.58 | 337.51  |
|                               | 11      | 2462            | 157.04                 | 171.00 | 328.04  |



## 8. Power Spectral Density

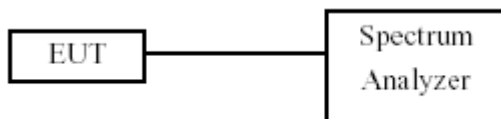
### 8.1 Test Limit

The Maximum of Power Spectral Density Measurement is 8dBm.

### 8.2 Test Procedures

- The transmitter output was connected to spectrum analyzer.
- The spectrum analyzer's resolution bandwidth were set at 3KHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=auto couple.
- The power spectral density was measured and recorded.

### 8.3 Test Setup Layout



### 8.4 Measurement Equipment

| Instrument/Ancillary | Manufacturer | Model No. | Serial No. | Calibration Date | Valid Date |
|----------------------|--------------|-----------|------------|------------------|------------|
| Spectrum Analyzer    | R&S          | FSP40     | 100047     | 2014/03/27       | 2015/03/26 |

### 8.5 Test Result and Data

Test Date: Jun. 25, 2014

Temperature: 24°C

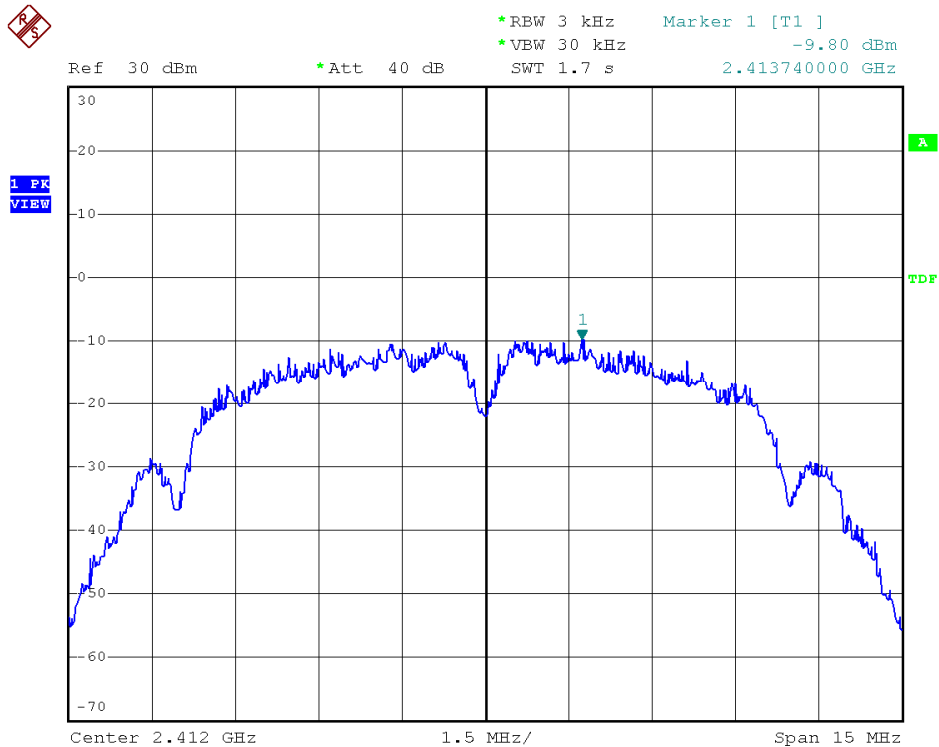
Atmospheric pressure: 1040 hPa

Humidity: 53%

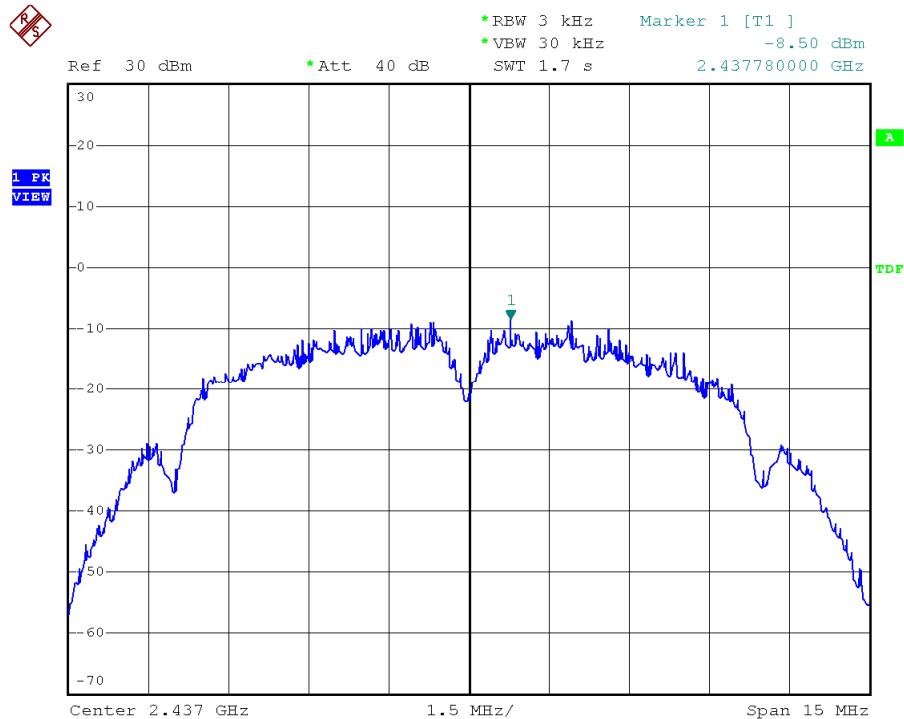
| Modulation Standard      | Channel | Frequency (MHz) | Maximum Power Density of 3 kHz Bandwidth (dBm) |        |         |
|--------------------------|---------|-----------------|------------------------------------------------|--------|---------|
|                          |         |                 | ANT 1                                          | ANT 2  | ANT 1+2 |
| 802.11b (5.5Mbps)        | 01      | 2412            | -9.80                                          | -8.74  | -6.23   |
|                          | 06      | 2437            | -8.50                                          | -9.83  | -6.10   |
|                          | 11      | 2462            | -8.03                                          | -8.30  | -5.15   |
| 802.11g (6Mbps)          | 01      | 2412            | -13.21                                         | -13.42 | -10.30  |
|                          | 06      | 2437            | -14.28                                         | -13.24 | -10.72  |
|                          | 11      | 2462            | -12.83                                         | -13.23 | -10.02  |
| 802.11n HT20 (MCS8 Mbps) | 01      | 2412            | -11.82                                         | -12.88 | -9.31   |
|                          | 06      | 2437            | -13.09                                         | -13.26 | -10.16  |
|                          | 11      | 2462            | -13.49                                         | -13.95 | -10.70  |



Modulation Standard: 802.11b (5.5Mbps), Antenna 1  
Channel: 01

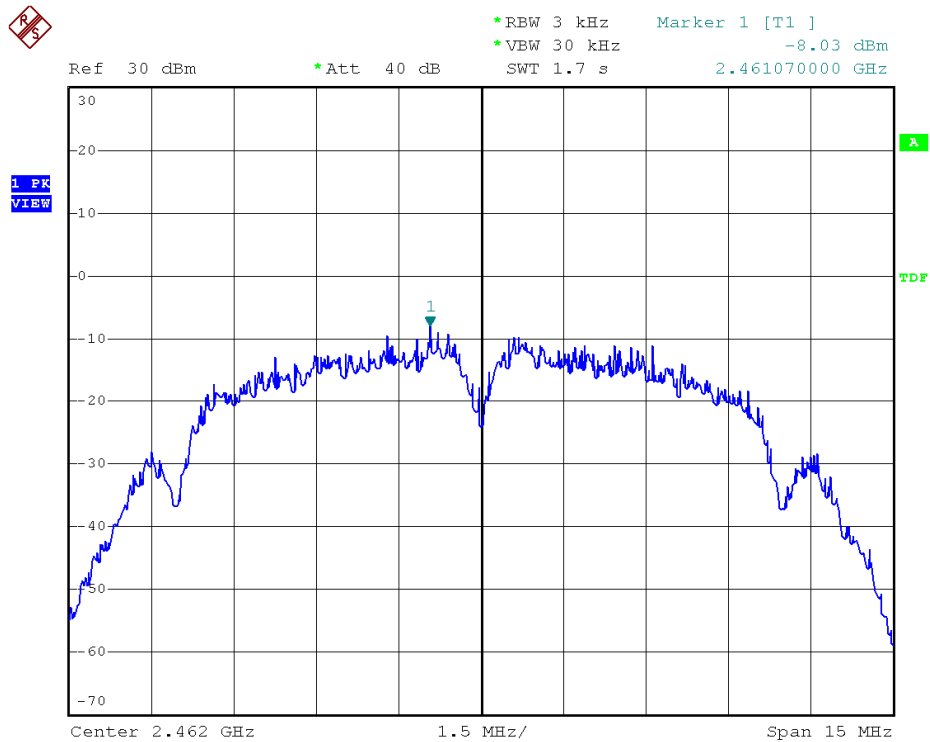


Modulation Standard: 802.11b (5.5Mbps), Antenna 1  
Channel: 06

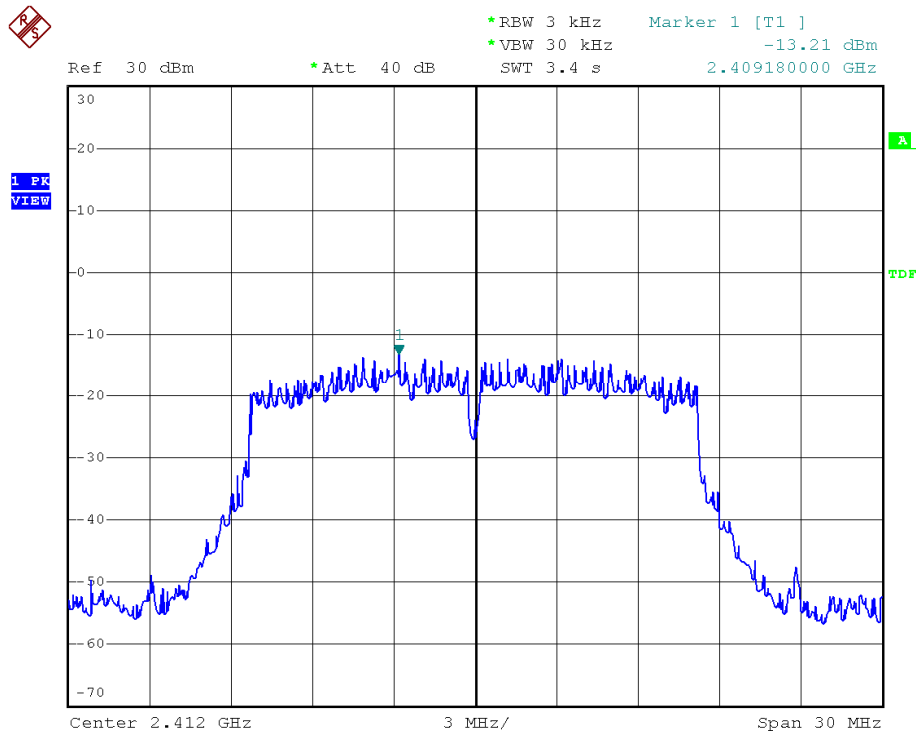




Modulation Standard: 802.11b (5.5Mbps), Antenna 1  
Channel: 11

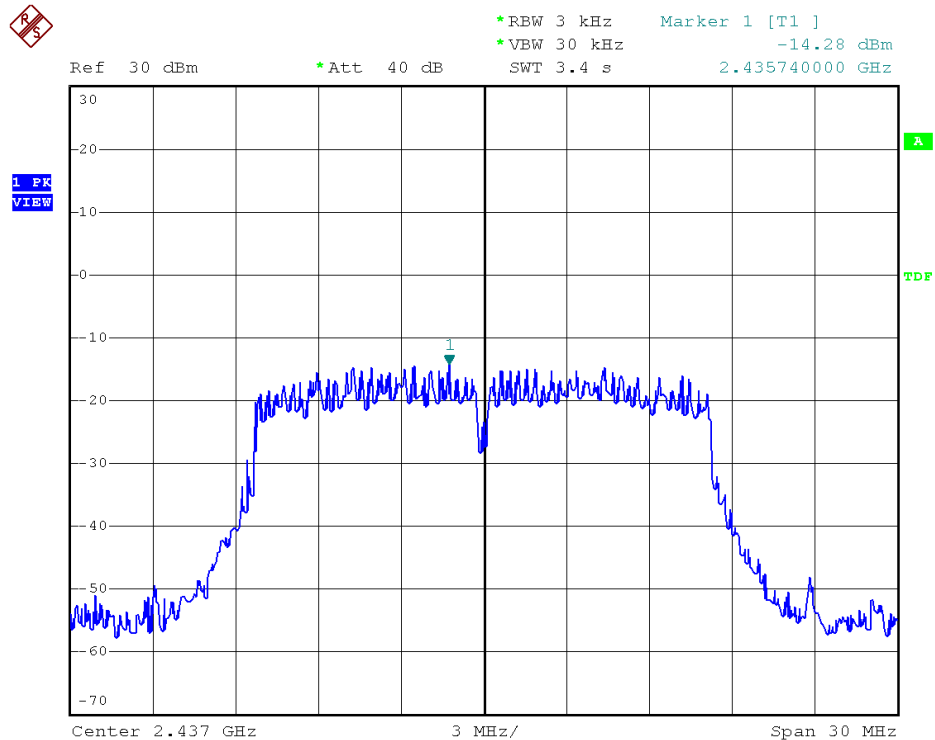


Modulation Standard: 802.11g (6Mbps), Antenna 1  
Channel: 01

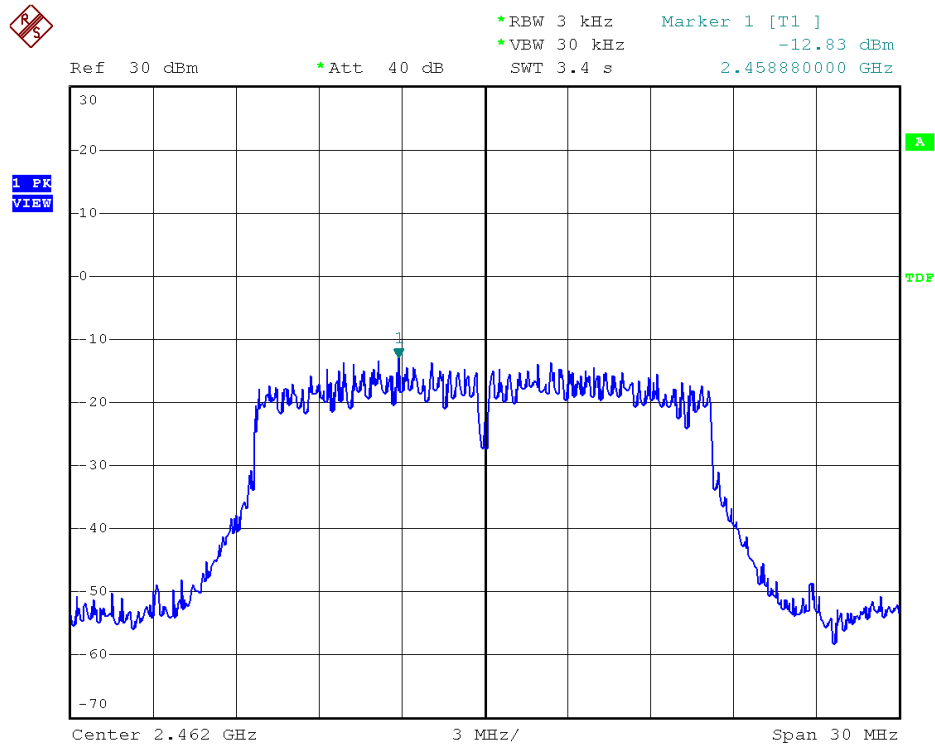




Modulation Standard: 802.11g (6Mbps), Antenna 1  
Channel: 06

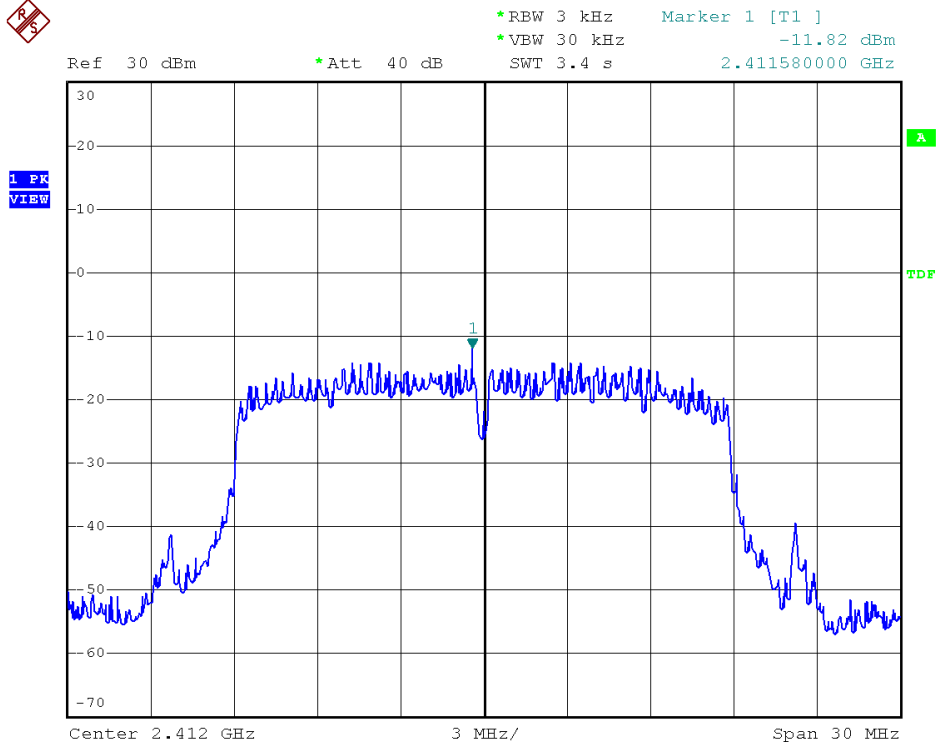


Modulation Standard: 802.11g (6Mbps), Antenna 1  
Channel: 11

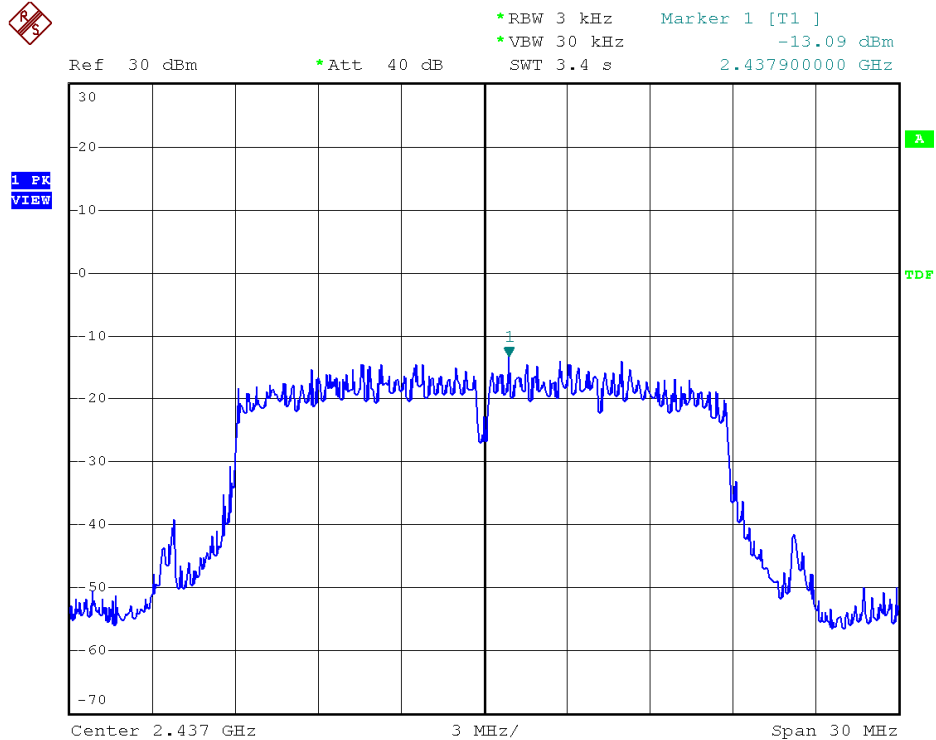




Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 1  
Channel: 01

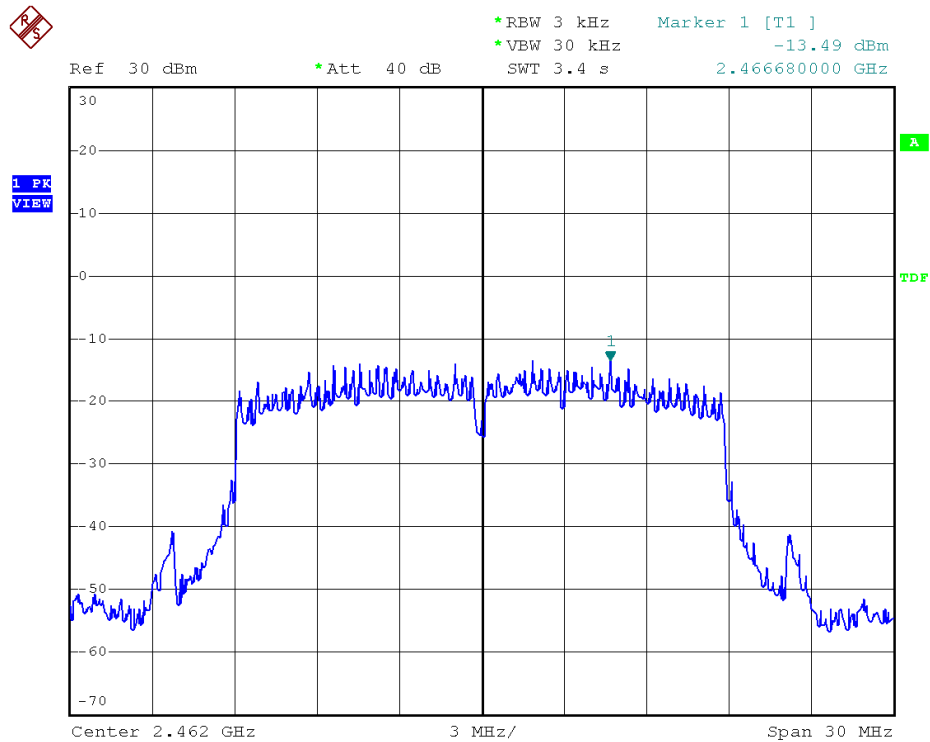


Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 1  
Channel: 06

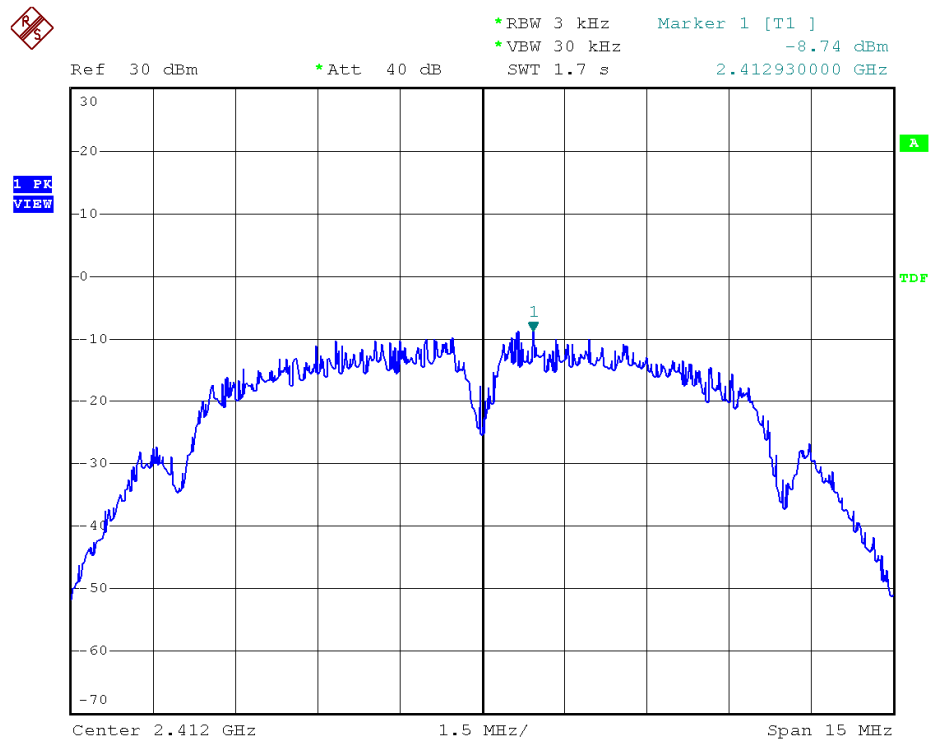




Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 1  
Channel: 11

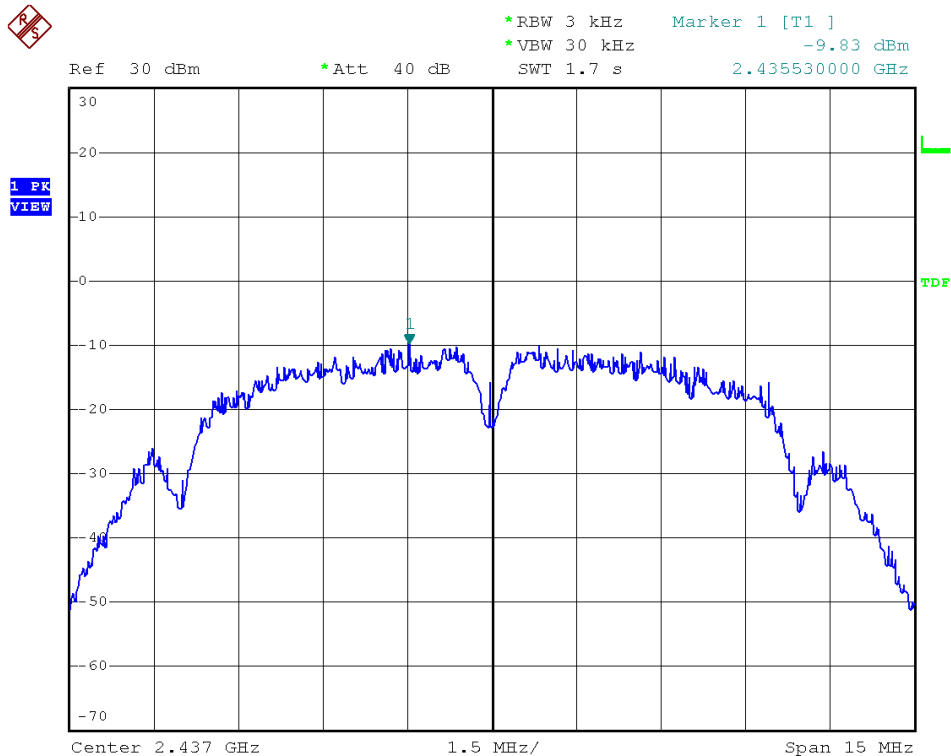


Modulation Standard: 802.11b (5.5Mbps), Antenna 2  
Channel: 01

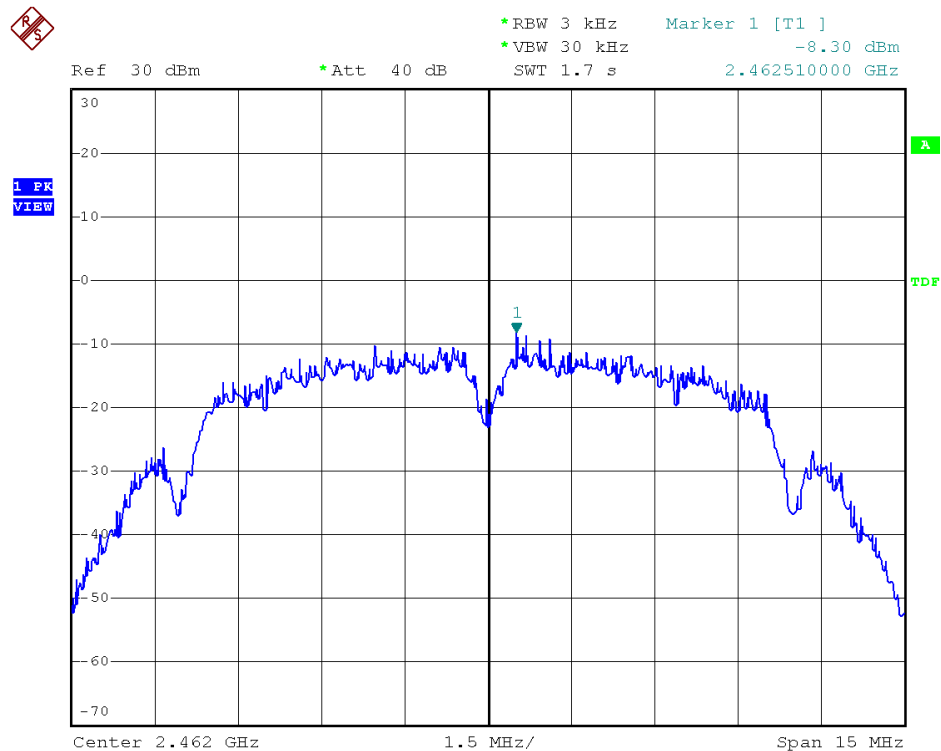




Modulation Standard: 802.11b (5.5Mbps), Antenna 2  
Channel: 06

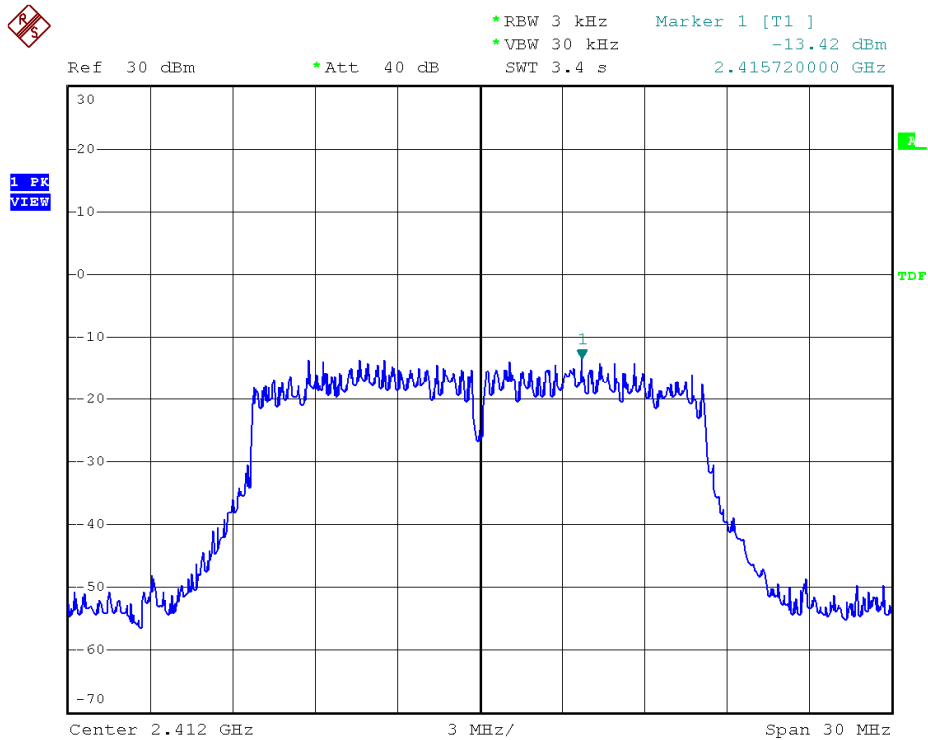


Modulation Standard: 802.11b (5.5Mbps), Antenna 2  
Channel: 11

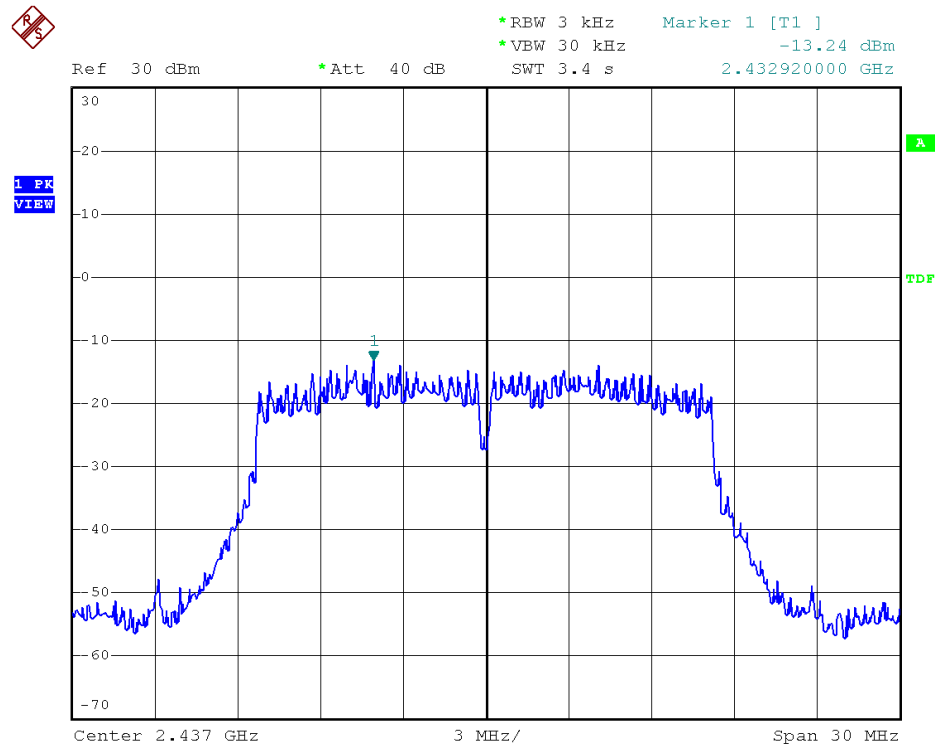




Modulation Standard: 802.11g (6Mbps), Antenna 2  
Channel: 01

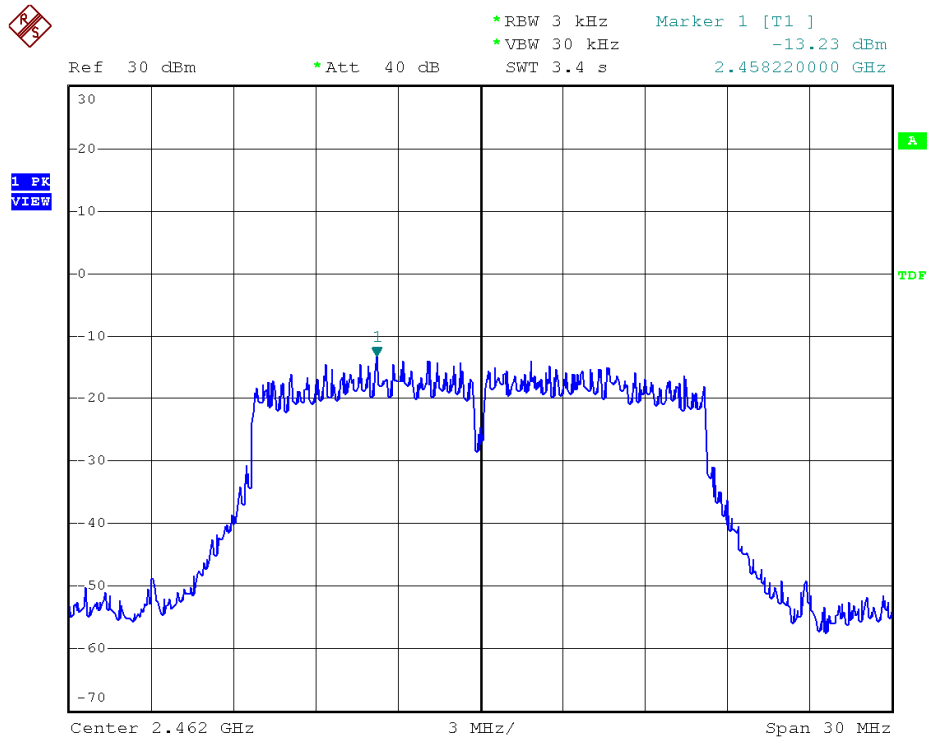


Modulation Standard: 802.11g (6Mbps), Antenna 2  
Channel: 06

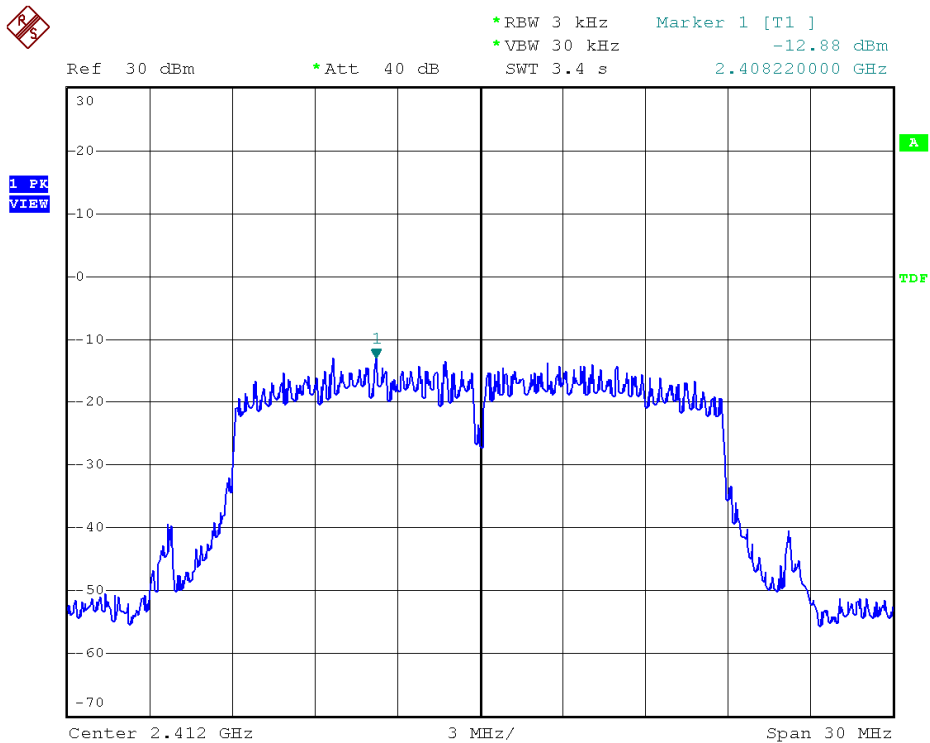




Modulation Standard: 802.11g (6Mbps), Antenna 2  
Channel: 11

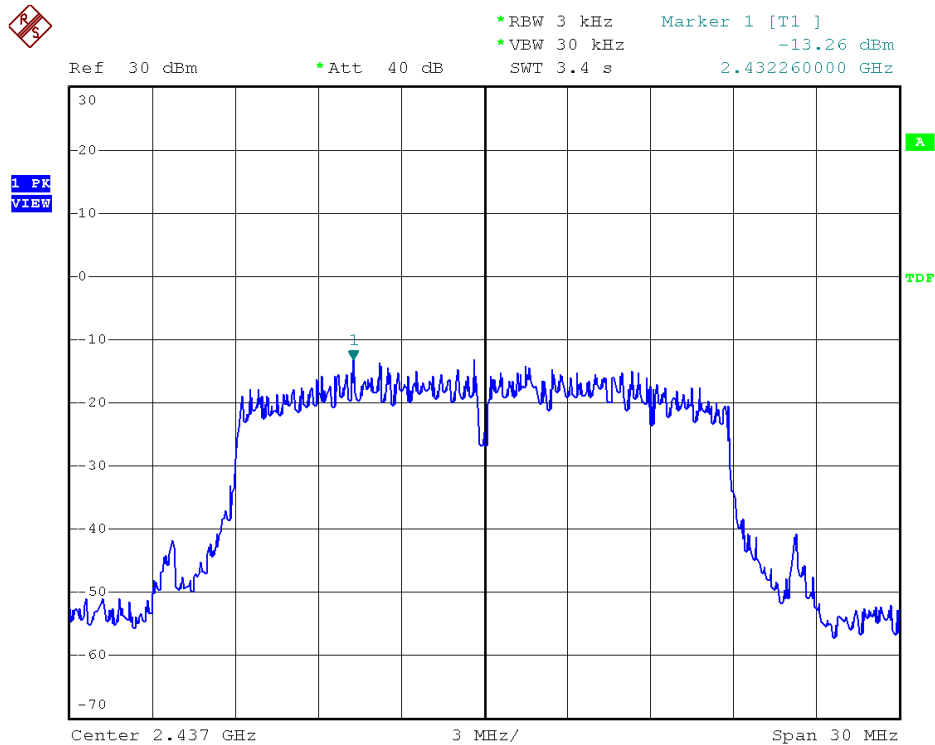


Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 2  
Channel: 01

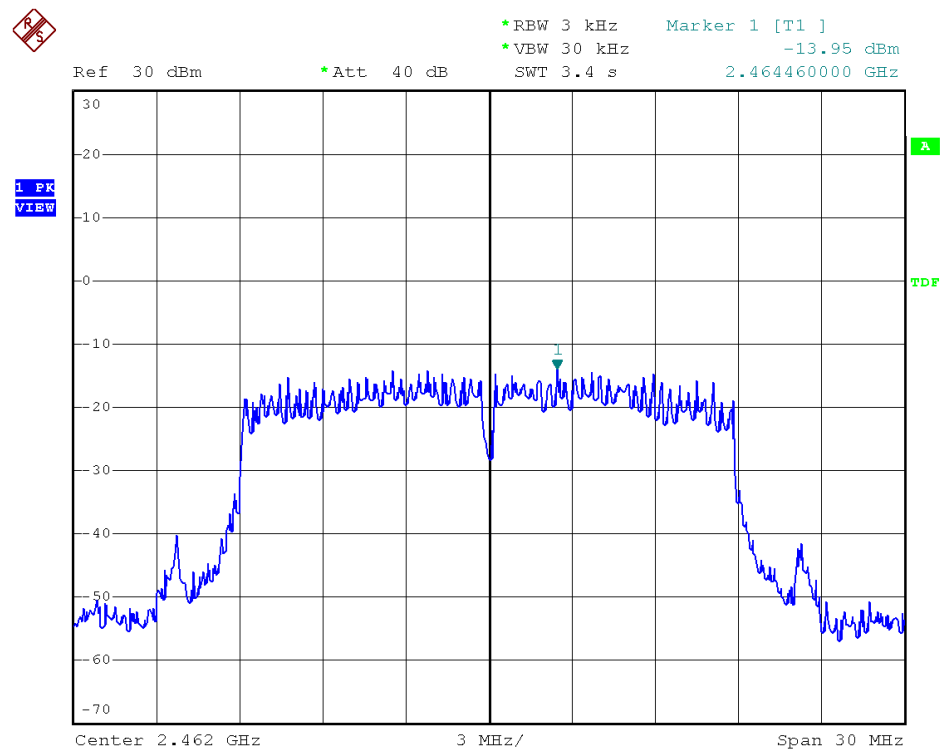




Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 2  
Channel: 06



Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 2  
Channel: 11





## 9. Band Edges Measurement

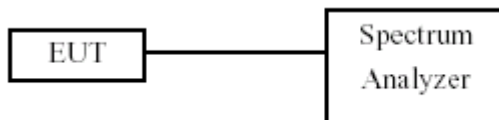
### 9.1 Test Limit

Below -20dB of the highest emission level of operating band (In 100 kHz Resolution Bandwidth)

### 9.2 Test Procedure

- The transmitter output was connected to the spectrum analyzer via a low lose cable.
- Set RBW of spectrum analyzer to 100 KHz and VBW of spectrum analyzer to 300 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
- Peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20dB relative to the maximum measured in-band peak PSD level.
- The band edges was measured and recorded.

### 9.3 Test Setup Layout



### 9.4 Measurement Equipment

| Instrument/Ancillary | Manufacturer | Model No. | Serial No. | Calibration Date | Valid Date |
|----------------------|--------------|-----------|------------|------------------|------------|
| Spectrum Analyzer    | R&S          | FSP40     | 100047     | 2014/03/27       | 2015/03/26 |

### 9.5 Test Result and Data

Test Date: Jun. 25, 2014

Temperature: 24°C

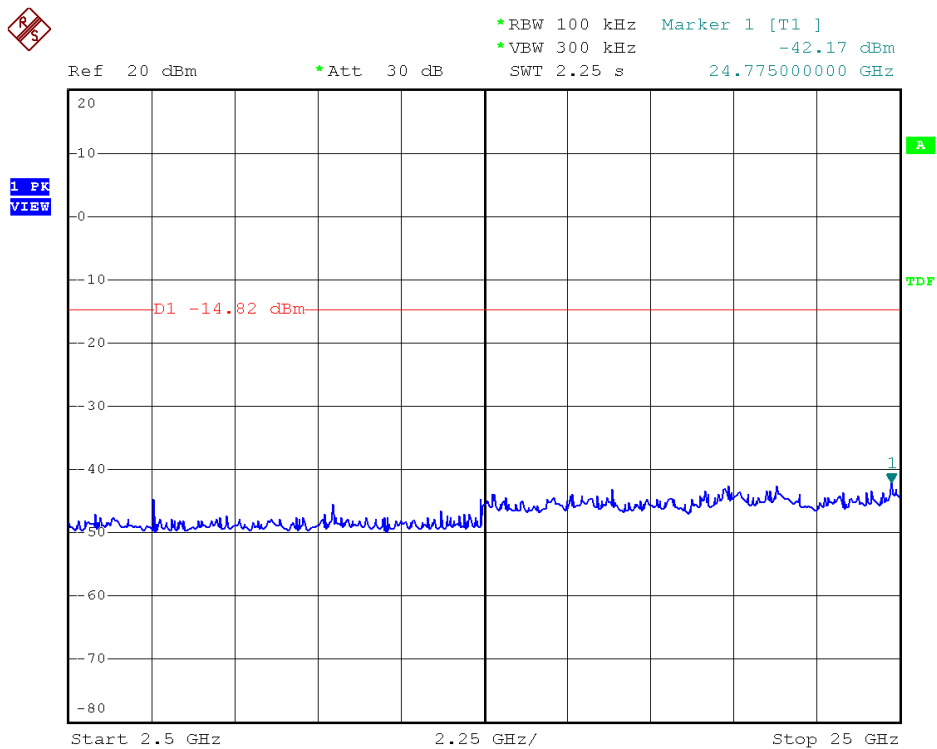
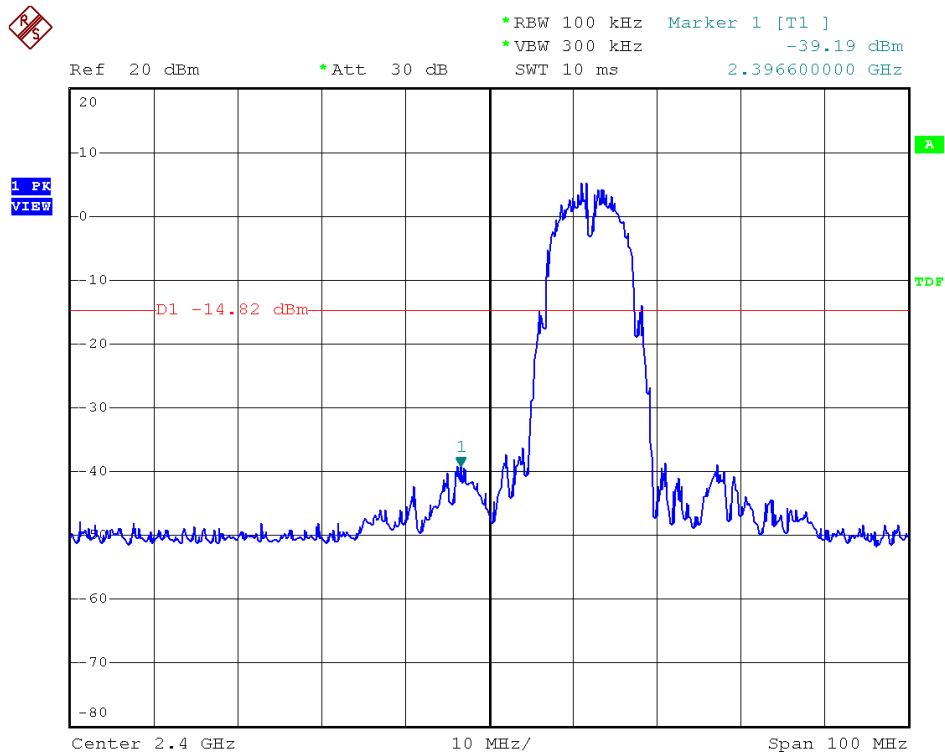
Atmospheric pressure: 1040 hPa

Humidity: 53%

| Modulation Standard      | Channel | Frequency (MHz) | maximum value in frequency(MHz) |         | maximum value (dBm) |        | Limit (dBm) |
|--------------------------|---------|-----------------|---------------------------------|---------|---------------------|--------|-------------|
|                          |         |                 | ANT 1                           | ANT 2   | ANT 1               | ANT 2  |             |
| 802.11b (5.5Mbps)        | 01      | 2412            | 2396.6                          | 2396.0  | -39.19              | -39.88 | -24.69      |
|                          | 11      | 2462            | 20320.0                         | 2014.0  | -40.84              | -42.42 | -17.38      |
| 802.11g (6Mbps)          | 01      | 2412            | 2397.2                          | 2399.0  | -37.13              | -36.45 | -32.11      |
|                          | 11      | 2462            | 2484.9                          | 2185.0  | -41.54              | -42.08 | -21.49      |
| 802.11n HT20 (MCS8 Mbps) | 01      | 2412            | 2397.0                          | 2399.6  | -36.53              | -35.72 | -30.95      |
|                          | 11      | 2462            | 20230.0                         | 20230.0 | -42.51              | -42.43 | -21.54      |

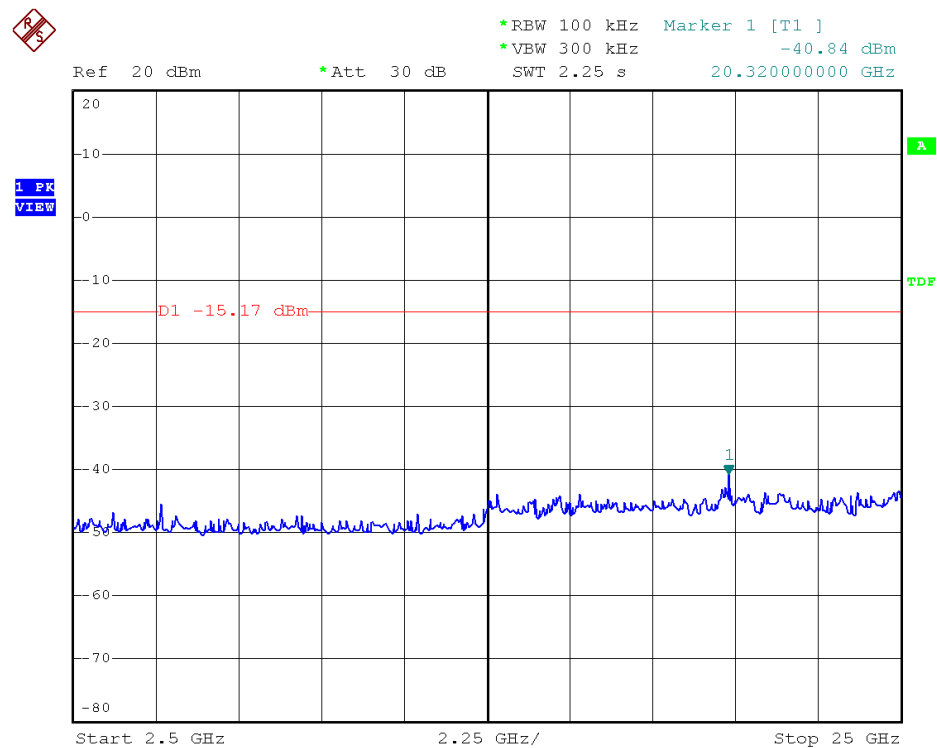
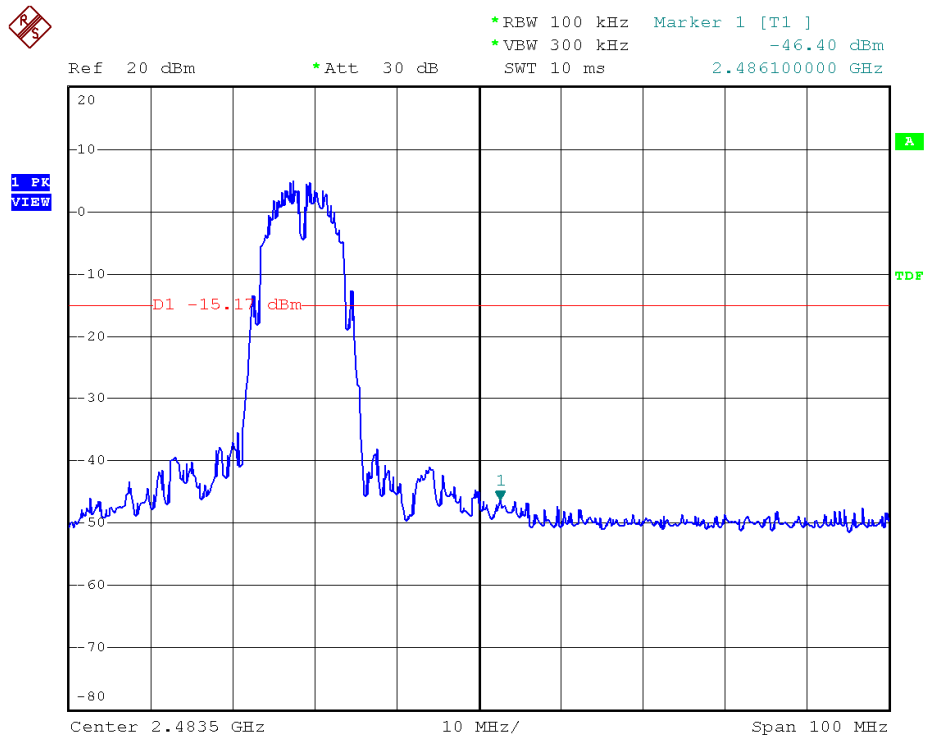


Modulation Standard: 802.11b (5.5Mbps), Antenna 1  
Channel: 01



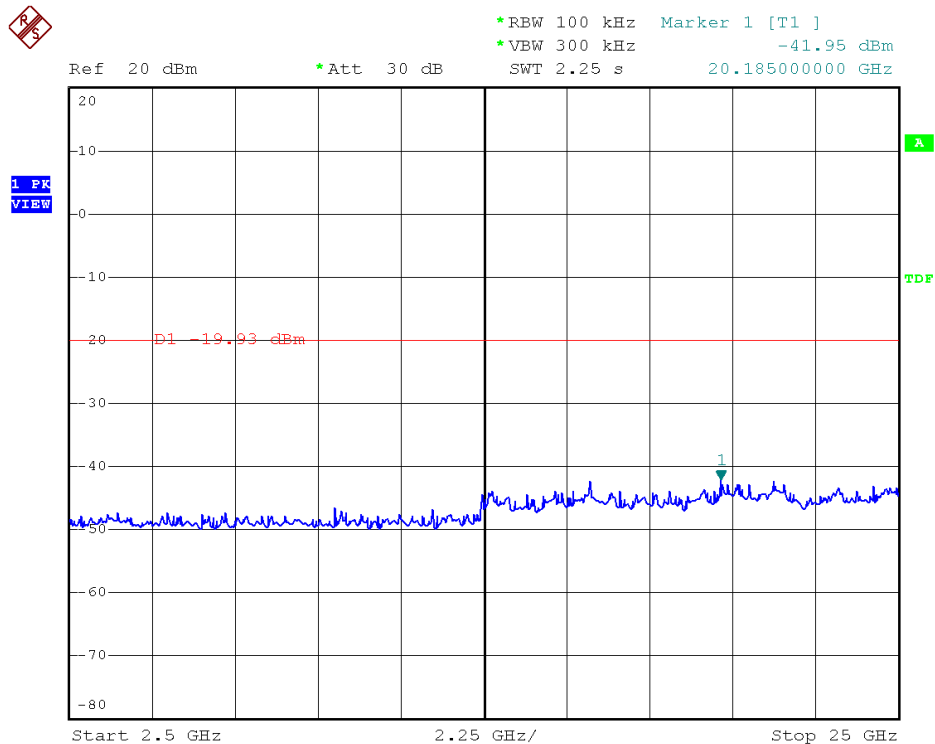
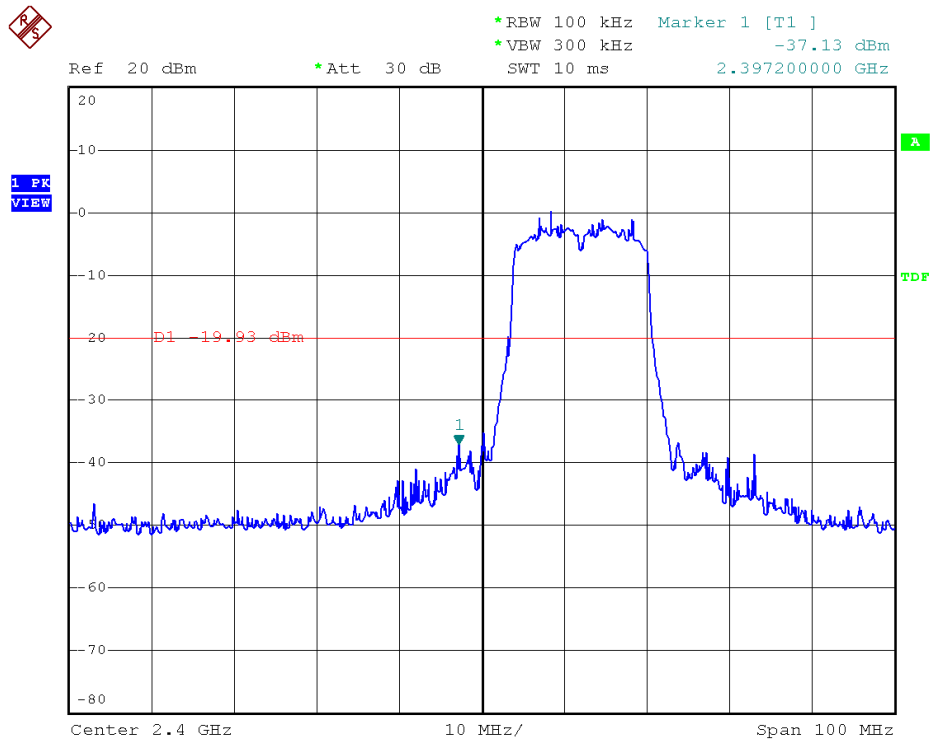


Modulation Standard: 802.11b (5.5Mbps), Antenna 1  
Channel: 11



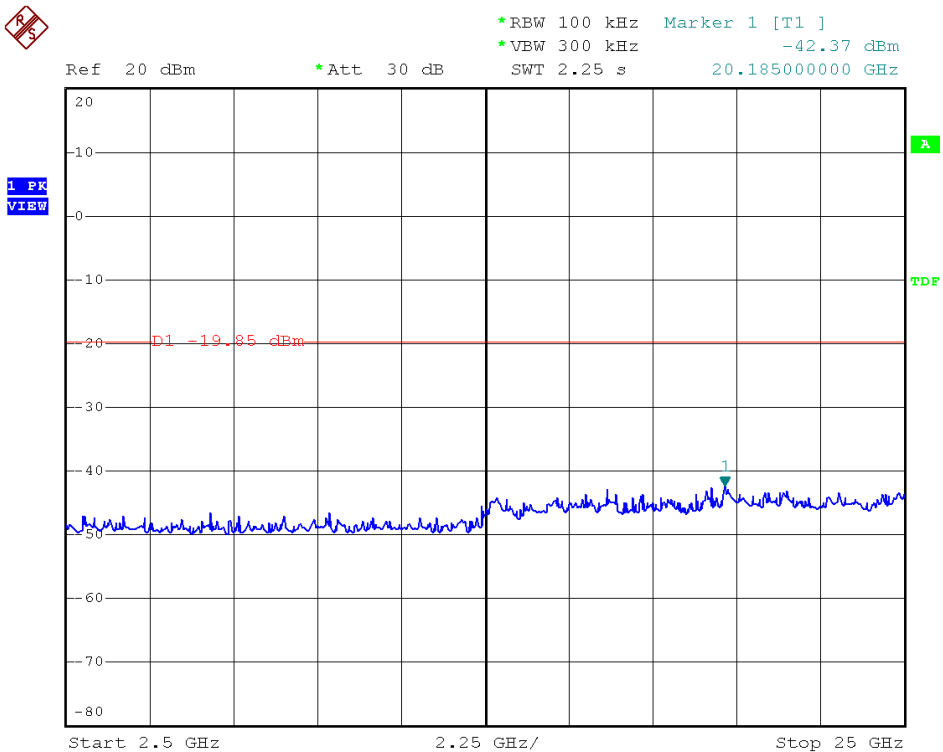
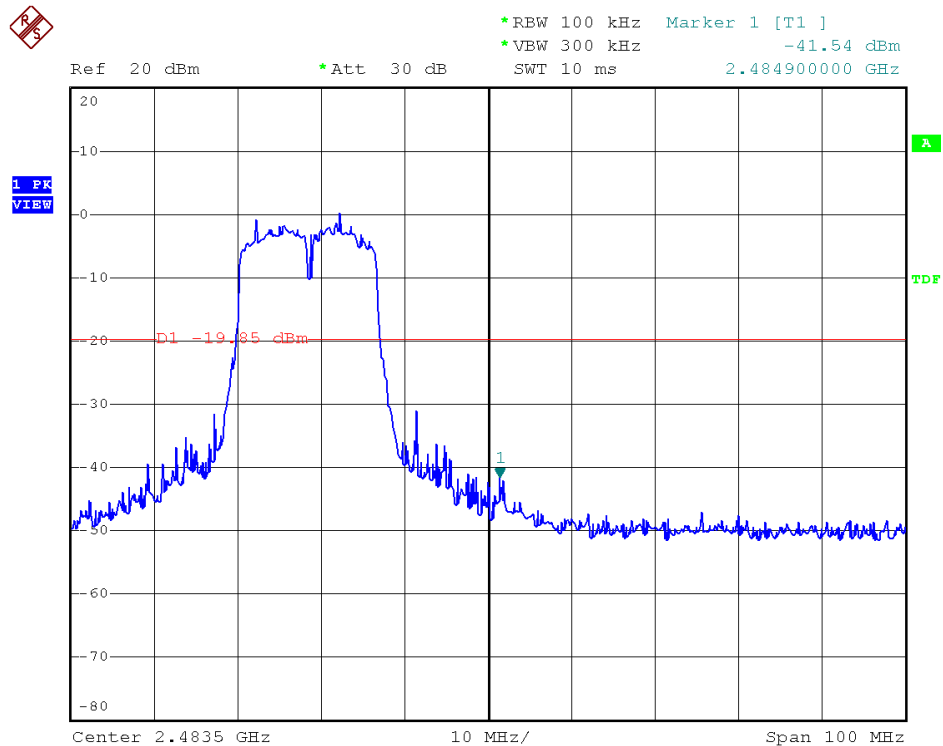


Modulation Standard: 802.11g (6Mbps), Antenna 1  
Channel: 01



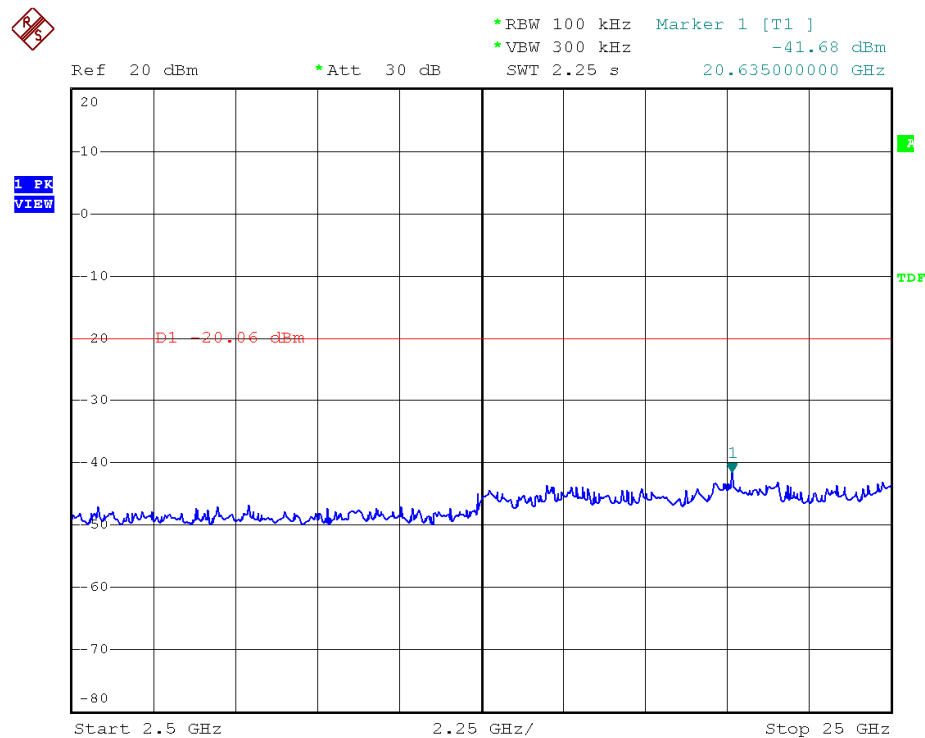
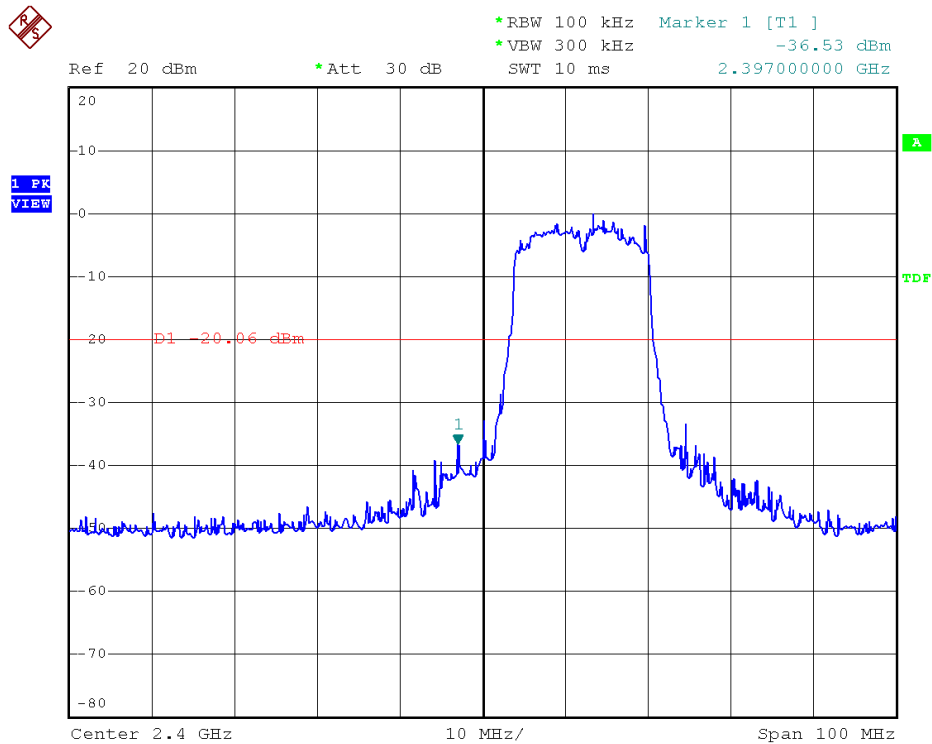


Modulation Standard: 802.11g (6Mbps), Antenna 1  
Channel: 11



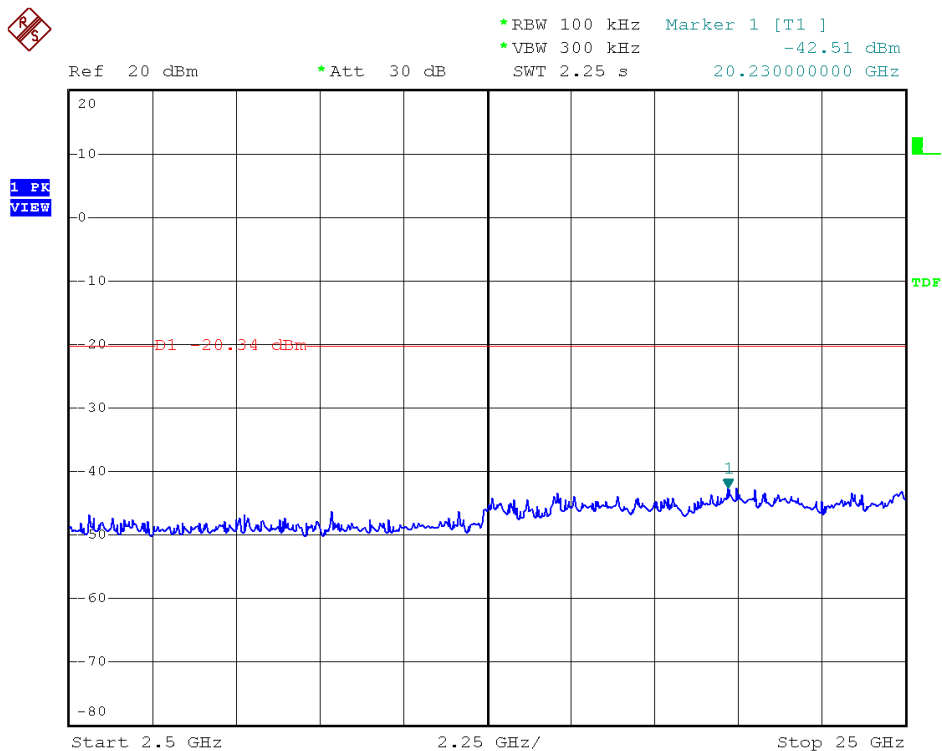
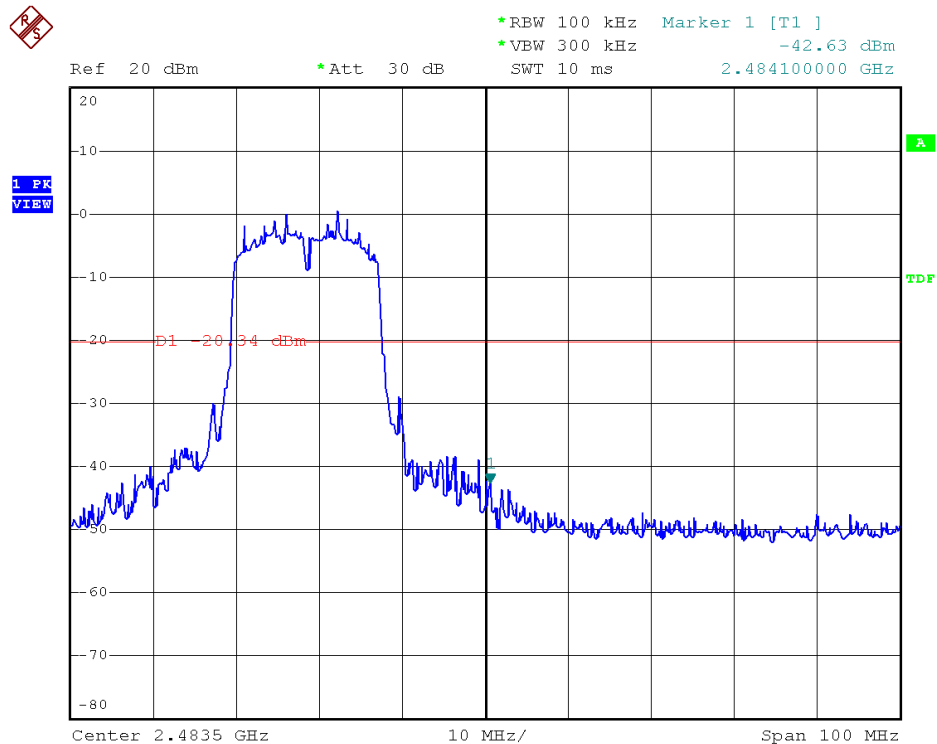


Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 1  
Channel: 01



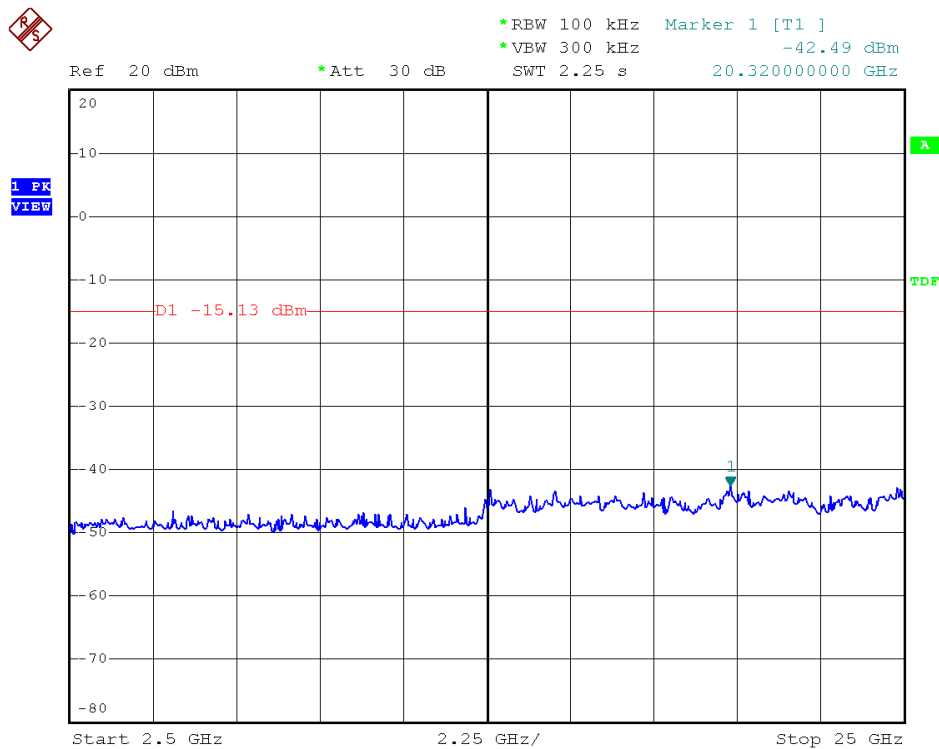
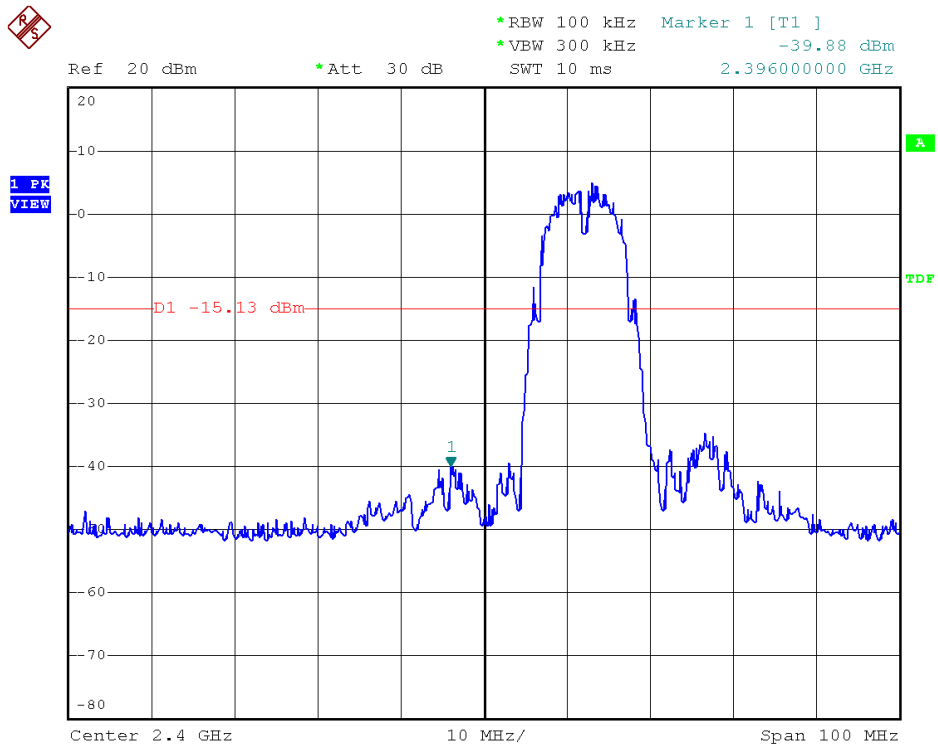


Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 1  
Channel: 11



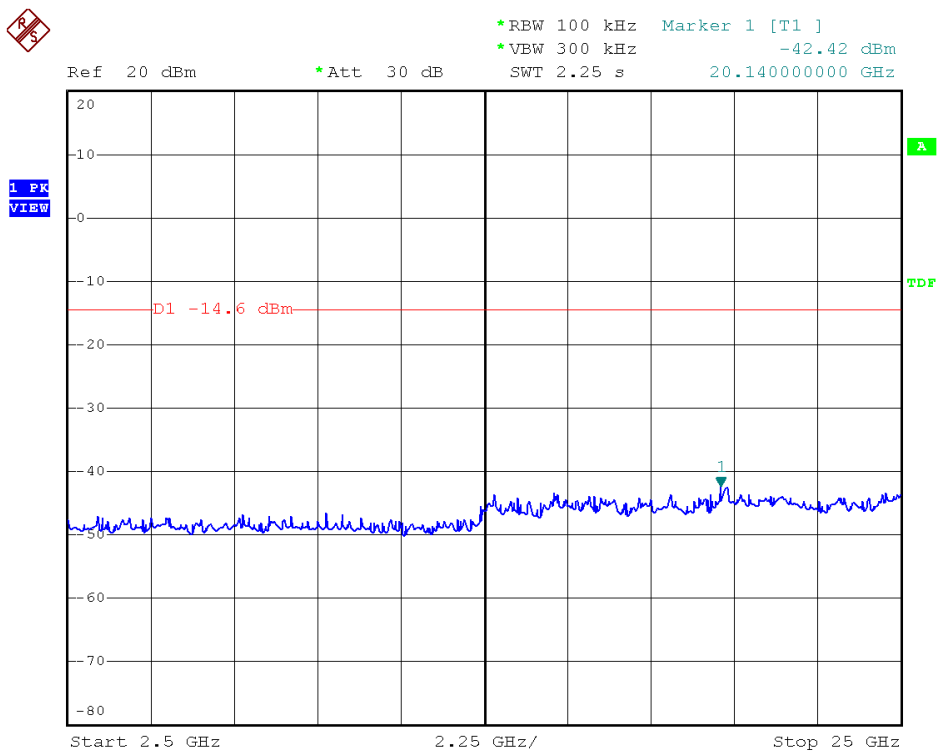
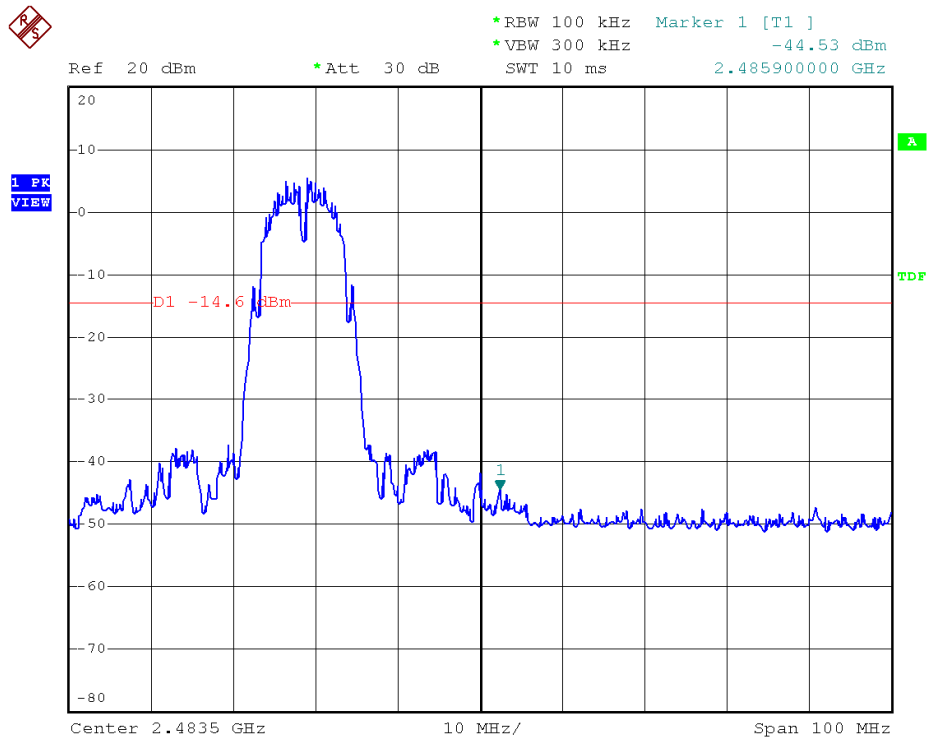


Modulation Standard: 802.11b (5.5Mbps), Antenna 2  
Channel: 01



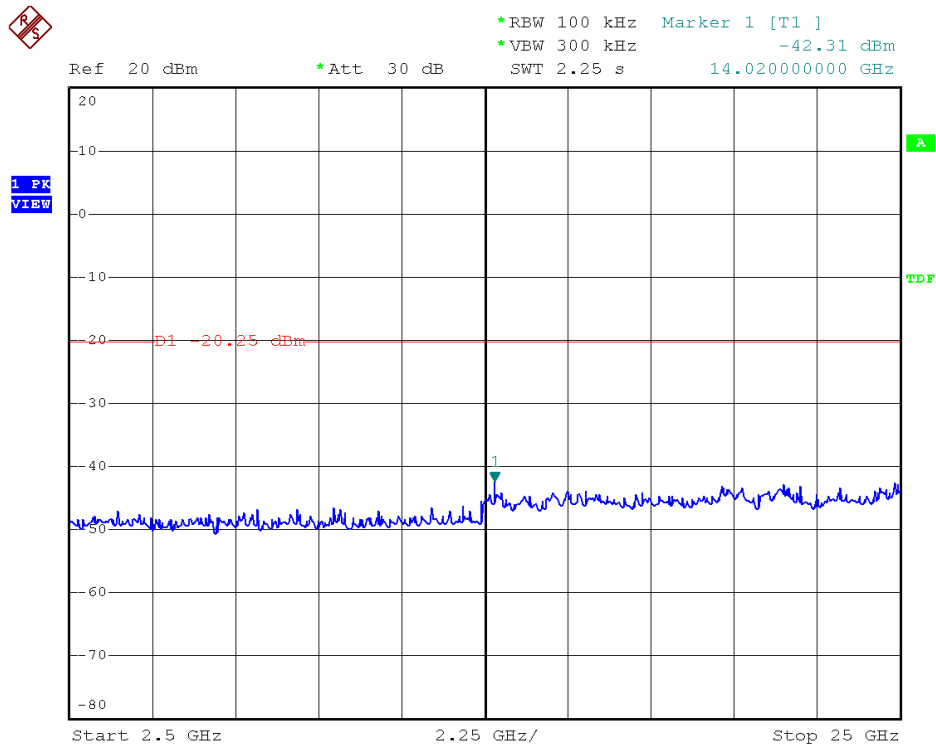
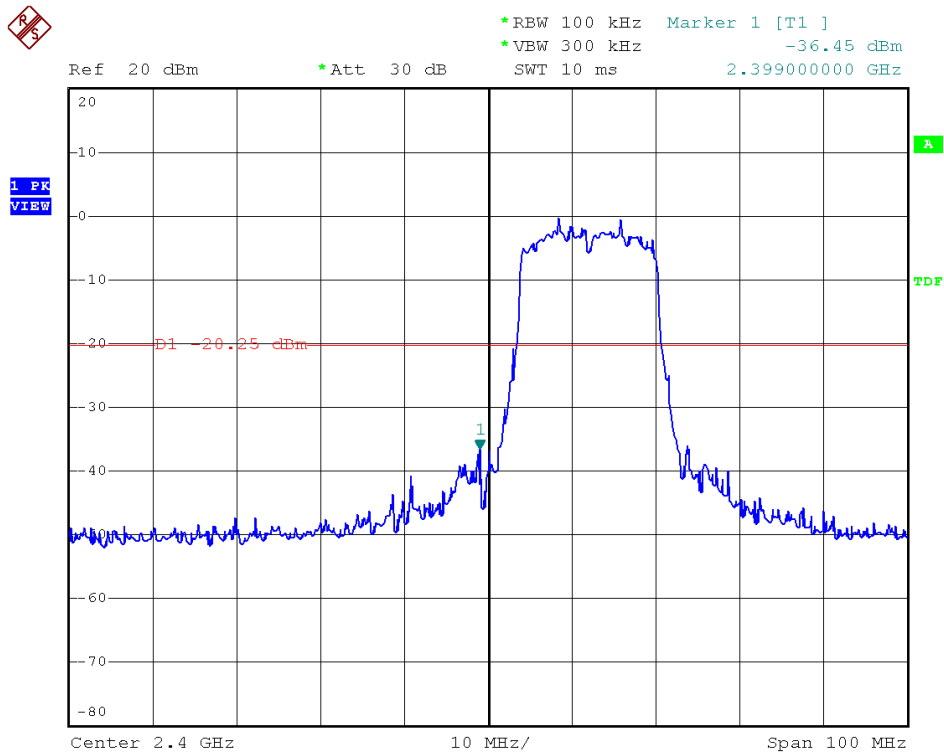


Modulation Standard: 802.11b (5.5Mbps), Antenna 2  
Channel: 11



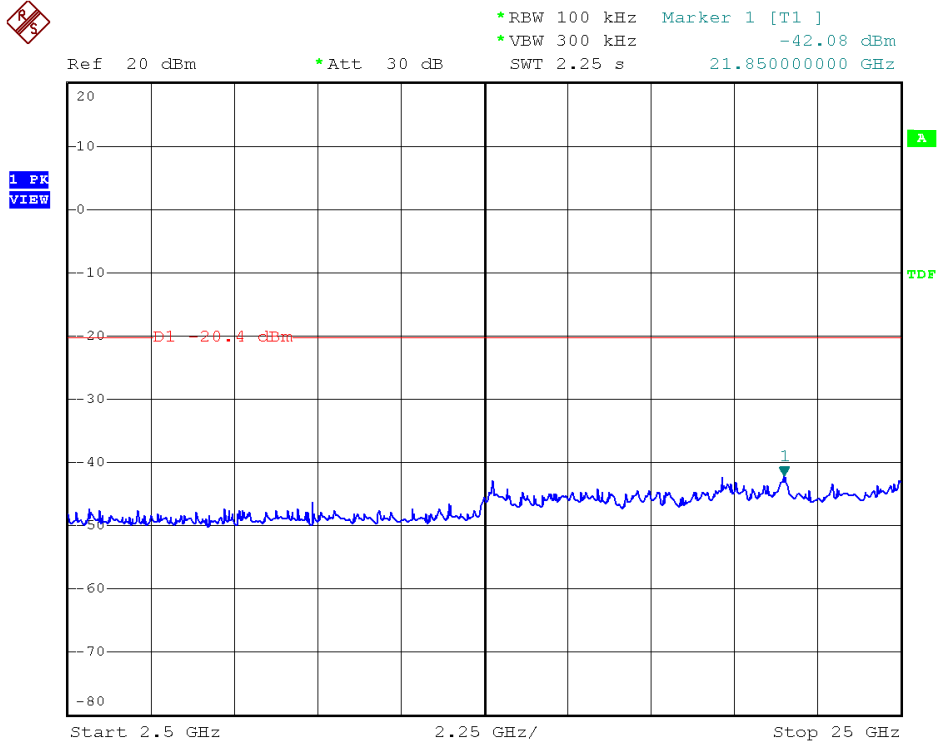
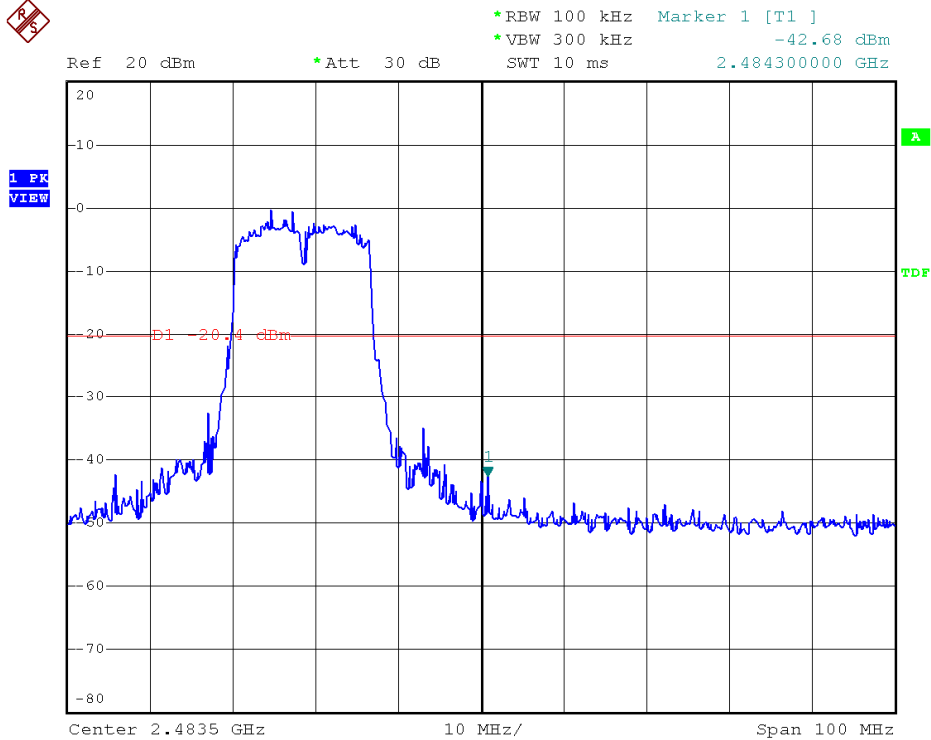


Modulation Standard: 802.11g (6Mbps), Antenna 2  
Channel: 01



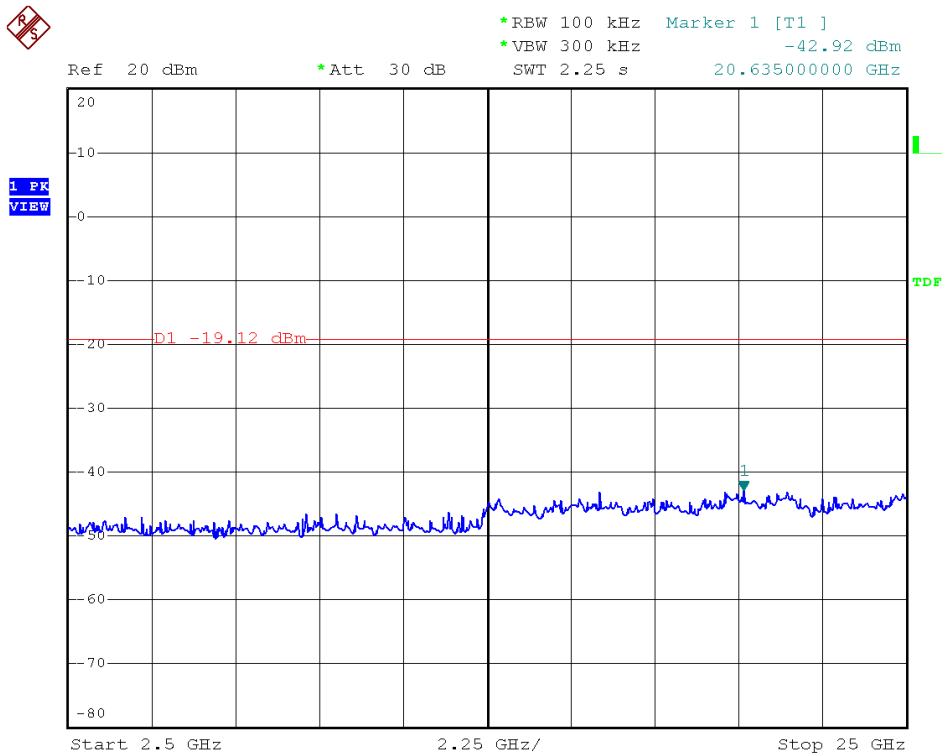
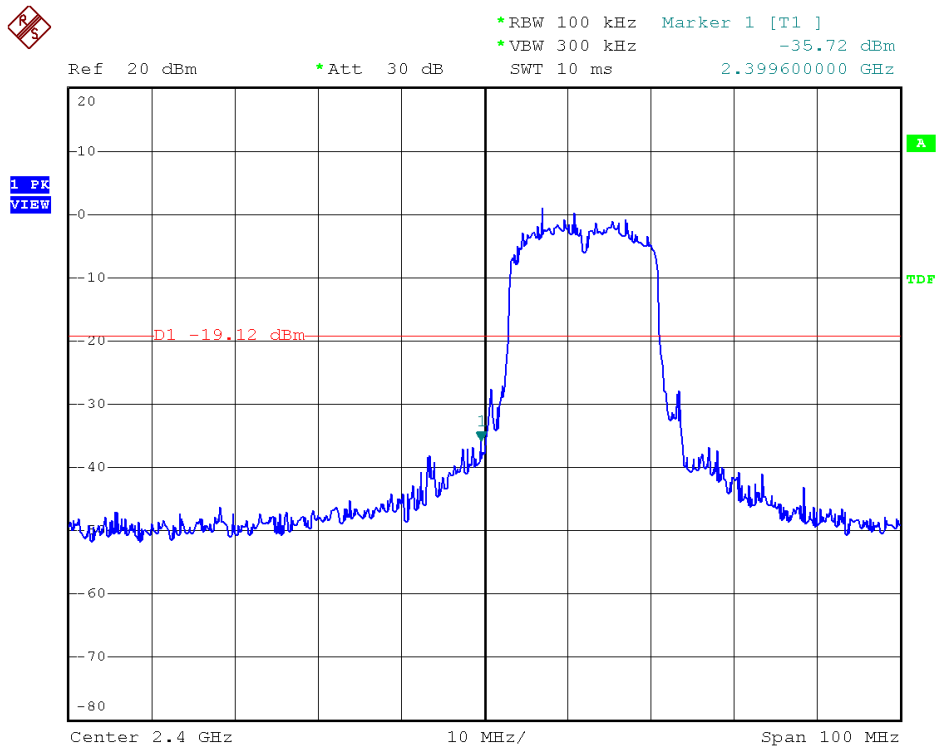


Modulation Standard: 802.11g (6Mbps), Antenna 2  
Channel: 11



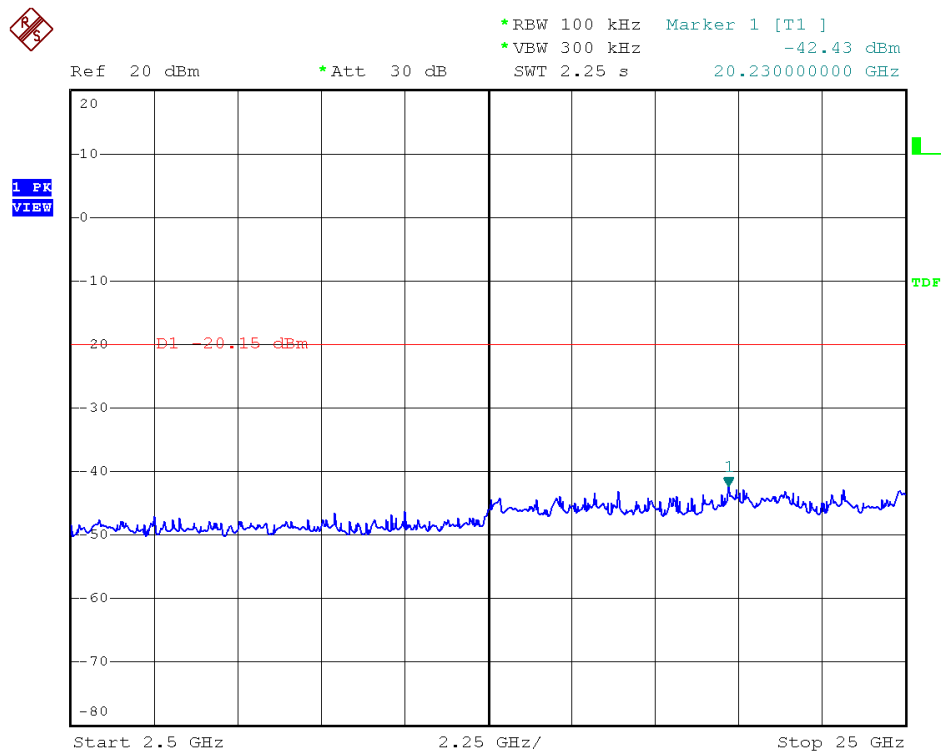
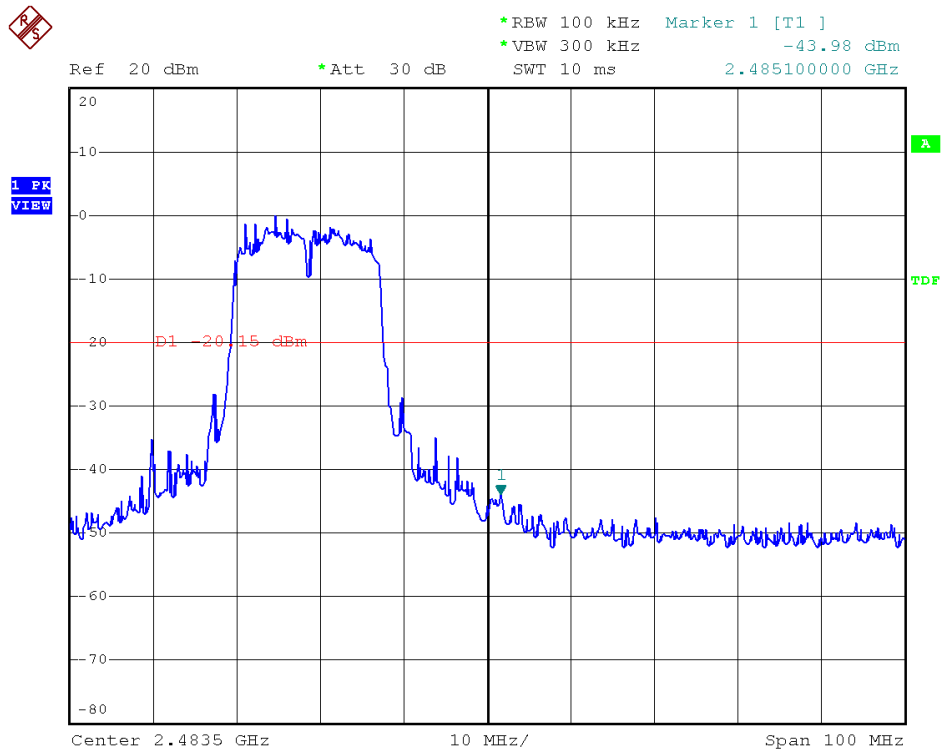


Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 2  
Channel: 01





Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 2  
Channel: 11





## 9.6 Restrict Band Emission Measurement Data

Test Date: Jun. 27, 2014

Temperature: 25 °C

Atmospheric pressure: 1100 hPa

Humidity: 54 %

Modulation Standard: IEEE 802.11b (5.5Mbps)

| Channel 1       |             |                      |                       |                 |        | Fundamental Frequency: 2412 MHz |     |             |            |              |
|-----------------|-------------|----------------------|-----------------------|-----------------|--------|---------------------------------|-----|-------------|------------|--------------|
| Frequency (MHz) | Ant-Pol H/V | Meter Reading (dBuV) | Corrected Factor (dB) | Result (dBuV/m) | Remark | Limit (dBuV/m)                  |     | Margin (dB) | Table Deg. | Ant High (m) |
|                 |             |                      |                       |                 |        | Peak                            | Ave |             |            |              |
| 2389.660        | V           | 53.33                | 6.50                  | 59.83           | Peak   | 74                              | 54  | -14.17      | 177        | 1.00         |
| 2389.660        | V           | 42.83                | 6.50                  | 49.33           | Ave    | 74                              | 54  | -4.67       | 177        | 1.00         |
| 2389.866        | H           | 54.06                | 6.50                  | 60.56           | Peak   | 74                              | 54  | -13.44      | 182        | 1.00         |
| 2389.866        | H           | 43.68                | 6.50                  | 50.18           | Ave    | 74                              | 54  | -3.82       | 182        | 1.00         |
| Channel 11      |             |                      |                       |                 |        | Fundamental Frequency: 2462 MHz |     |             |            |              |
| Frequency (MHz) | Ant-Pol H/V | Meter Reading (dBuV) | Corrected Factor (dB) | Result (dBuV/m) | Remark | Limit (dBuV/m)                  |     | Margin (dB) | Table Deg. | Ant High (m) |
|                 |             |                      |                       |                 |        | Peak                            | Ave |             |            |              |
| 2484.194        | V           | 53.66                | 6.64                  | 60.30           | Peak   | 74                              | 54  | -13.70      | 178        | 1.00         |
| 2484.194        | V           | 42.10                | 6.64                  | 48.74           | Ave    | 74                              | 54  | -5.26       | 178        | 1.00         |
| 2484.192        | H           | 53.46                | 6.64                  | 60.10           | Peak   | 74                              | 54  | -13.90      | 182        | 1.00         |
| 2484.192        | H           | 35.54                | 6.64                  | 42.18           | Ave    | 74                              | 54  | -11.82      | 182        | 1.00         |

Modulation Standard: IEEE 802.11g (6Mbps)

| Channel 1       |             |                      |                       |                 |        | Fundamental Frequency: 2412 MHz |     |             |            |              |
|-----------------|-------------|----------------------|-----------------------|-----------------|--------|---------------------------------|-----|-------------|------------|--------------|
| Frequency (MHz) | Ant-Pol H/V | Meter Reading (dBuV) | Corrected Factor (dB) | Result (dBuV/m) | Remark | Limit (dBuV/m)                  |     | Margin (dB) | Table Deg. | Ant High (m) |
|                 |             |                      |                       |                 |        | Peak                            | Ave |             |            |              |
| 2389.560        | V           | 64.52                | 6.50                  | 71.02           | Peak   | 74                              | 54  | -2.98       | 177        | 1.00         |
| 2389.560        | V           | 42.02                | 6.50                  | 48.52           | Ave    | 74                              | 54  | -5.48       | 177        | 1.00         |
| 2389.968        | H           | 64.47                | 6.50                  | 70.97           | Peak   | 74                              | 54  | -3.03       | 182        | 1.00         |
| 2389.968        | H           | 41.55                | 6.50                  | 48.05           | Ave    | 74                              | 54  | -5.95       | 182        | 1.00         |
| Channel 11      |             |                      |                       |                 |        | Fundamental Frequency: 2462 MHz |     |             |            |              |
| Frequency (MHz) | Ant-Pol H/V | Meter Reading (dBuV) | Corrected Factor (dB) | Result (dBuV/m) | Remark | Limit (dBuV/m)                  |     | Margin (dB) | Table Deg. | Ant High (m) |
|                 |             |                      |                       |                 |        | Peak                            | Ave |             |            |              |
| 2486.130        | V           | 65.00                | 6.64                  | 71.64           | Peak   | 74                              | 54  | -2.36       | 175        | 1.00         |
| 2486.130        | V           | 35.54                | 6.64                  | 42.18           | Ave    | 74                              | 54  | -11.82      | 175        | 1.00         |
| 2484.002        | H           | 64.40                | 6.64                  | 71.04           | Peak   | 74                              | 54  | -2.96       | 185        | 1.00         |
| 2484.002        | H           | 40.24                | 6.64                  | 46.88           | Ave    | 74                              | 54  | -7.12       | 185        | 1.00         |



Modulation Standard: IEEE 802.11n HT20 (MCS8 Mbps)

| Channel 1       |             |                      |                       |                 |        | Fundamental Frequency: 2412 MHz |     |             |            |              |
|-----------------|-------------|----------------------|-----------------------|-----------------|--------|---------------------------------|-----|-------------|------------|--------------|
| Frequency (MHz) | Ant-Pol H/V | Meter Reading (dBuV) | Corrected Factor (dB) | Result (dBuV/m) | Remark | Limit (dBuV/m)                  |     | Margin (dB) | Table Deg. | Ant High (m) |
|                 |             |                      |                       |                 |        | Peak                            | Ave |             |            |              |
| 2389.458        | V           | 51.23                | 6.50                  | 57.73           | Peak   | 74                              | 54  | -16.27      | 195        | 1.00         |
| 2389.458        | V           | 35.94                | 6.50                  | 42.44           | Ave    | 74                              | 54  | -11.56      | 195        | 1.00         |
| 2337.742        | H           | 50.61                | 6.50                  | 57.04           | Peak   | 74                              | 54  | -16.96      | 186        | 1.00         |
| 2337.744        | H           | 35.82                | 6.50                  | 42.25           | Ave    | 74                              | 54  | -11.75      | 186        | 1.00         |
| Channel 11      |             |                      |                       |                 |        | Fundamental Frequency: 2462 MHz |     |             |            |              |
| Frequency (MHz) | Ant-Pol H/V | Meter Reading (dBuV) | Corrected Factor (dB) | Result (dBuV/m) | Remark | Limit (dBuV/m)                  |     | Margin (dB) | Table Deg. | Ant High (m) |
|                 |             |                      |                       |                 |        | Peak                            | Ave |             |            |              |
| 2484.382        | V           | 63.67                | 6.64                  | 70.31           | Peak   | 74                              | 54  | -3.69       | 182        | 1.00         |
| 2484.382        | V           | 35.51                | 6.64                  | 42.15           | Ave    | 74                              | 54  | -11.85      | 182        | 1.00         |
| 2483.584        | H           | 54.86                | 6.64                  | 61.50           | Peak   | 74                              | 54  | -12.50      | 177        | 1.00         |
| 2483.584        | H           | 35.41                | 6.64                  | 42.05           | Ave    | 74                              | 54  | -11.95      | 177        | 1.00         |

## Notes:

1. Result = Meter Reading + Factor
2. Factor = Antenna Factor + Cable Loss – Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz (detector peak mode) for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz (detector sample mode) for Average detection at frequency above 1GHz.



## 10. Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

| MHz                 | MHz                   | MHz             | GHz             |
|---------------------|-----------------------|-----------------|-----------------|
| 0.09000 – 0.11000   | 16.42000 – 16.42300   | 399.9 – 410.0   | 4.500 – 5.250   |
| 0.49500 – 0.505**   | 16.69475 – 16.69525   | 608.0 – 614.0   | 5.350 – 5.460   |
| 2.17350 – 2.19050   | 16.80425 – 16.80475   | 960.0 – 1240.0  | 7.250 – 7.750   |
| 4.12500 – 4.12800   | 25.50000 – 25.67000   | 1300.0 – 1427.0 | 8.025 – 8.500   |
| 4.17725 – 4.17775   | 37.50000 – 38.25000   | 1435.0 – 1626.5 | 9.000 – 9.200   |
| 4.20725 – 4.20775   | 73.00000 – 74.60000   | 1645.5 – 1646.5 | 9.300 – 9.500   |
| 6.21500 – 6.21800   | 74.80000 – 75.20000   | 1660.0 – 1710.0 | 10.600 – 12.700 |
| 6.26775 – 6.26825   | 108.00000 – 121.94000 | 1718.8 – 1722.2 | 13.250 – 13.400 |
| 6.31175 – 6.31225   | 123.00000 – 138.00000 | 2200.0 – 2300.0 | 14.470 – 14.500 |
| 8.29100 – 8.29400   | 149.90000 – 150.05000 | 2310.0 – 2390.0 | 15.350 – 16.200 |
| 8.36200 – 8.36600   | 156.52475 – 156.52525 | 2483.5 – 2500.0 | 17.700 – 21.400 |
| 8.37625 – 8.38675   | 156.70000 – 156.90000 | 2655.0 – 2900.0 | 22.010 – 23.120 |
| 8.41425 – 8.41475   | 162.01250 – 167.17000 | 3260.0 – 3267.0 | 23.600 – 24.000 |
| 12.29000 – 12.29300 | 167.72000 – 173.20000 | 3332.0 – 3339.0 | 31.200 – 31.800 |
| 12.51975 – 12.52025 | 240.00000 – 285.00000 | 3345.8 – 3358.0 | 36.430 – 36.500 |
| 12.57675 – 12.57725 | 322.00000 – 335.40000 | 3600.0 – 4400.0 | Above 38.6      |
| 13.36000 – 13.41000 |                       |                 |                 |

\*\* : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

### 10.1 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.