

# FCC TEST REPORT

for

## **SANHO ELECTRONICS TECHNOLOGY CO., LTD**

Wireless Hard Drive Enclosure

Model Number: iUSBport HD, MC330

FCC ID: AXDMC330140217

Prepared for : SANHO ELECTRONICS TECHNOLOGY CO., LTD  
Address : 1/F, BLOCK 1, #1177 LINGYUN ROAD, NINGBO, CHINA

Prepared by : Keyway Testing Technology Co., Ltd.  
Address : Baishun Industrial Zone, Zhangmutou Town,  
Dongguan, Guangdong, China

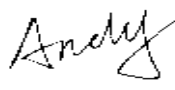
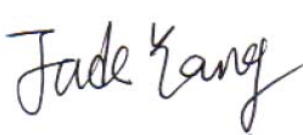
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Report No. : 14KWE021169F  
Date of Test : Feb. 11~17, 2014  
Date of Report : Feb. 18, 2014

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## Keyway Testing Technology Co., Ltd.

|                                                                                                                                                                                                              |                                                                                                                   |                                                                                                                     |                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|------------------|
| <b>Applicant:</b>                                                                                                                                                                                            | SANHO ELECTRONICS TECHNOLOGY CO., LTD                                                                             |                                                                                                                     |                  |
| <b>Address:</b>                                                                                                                                                                                              | 1/F, Block 1, #1177 Lingyun Road, Ningbo, China                                                                   |                                                                                                                     |                  |
| <b>Manufacturer:</b>                                                                                                                                                                                         | SANHO ELECTRONICS TECHNOLOGY CO., LTD                                                                             |                                                                                                                     |                  |
| <b>Address:</b>                                                                                                                                                                                              | 1/F, Block 1, #1177 Lingyun Road, Ningbo, China                                                                   |                                                                                                                     |                  |
| <b>E.U.T:</b>                                                                                                                                                                                                | Wireless Hard Drive Enclosure                                                                                     |                                                                                                                     |                  |
| <b>Model Number:</b>                                                                                                                                                                                         | iUSBport HD, MC330                                                                                                |                                                                                                                     |                  |
| <b>Trade Name:</b>                                                                                                                                                                                           | HYPER DRIVE                                                                                                       | <b>Serial No.:</b>                                                                                                  | -----            |
| <b>Date of Receipt:</b>                                                                                                                                                                                      | Feb. 10, 2014                                                                                                     | <b>Date of Test:</b>                                                                                                | Feb. 11~17, 2014 |
| <b>Test Specification:</b>                                                                                                                                                                                   | FCC Part 15, Subpart C: Oct. 1, 2013<br>ANSI C63.4:2003<br>KDB558074                                              |                                                                                                                     |                  |
| <b>Test Result:</b>                                                                                                                                                                                          | The equipment under test was found to be compliance with the requirements of the standards applied.               |                                                                                                                     |                  |
| <b>Issue Date: Feb. 18, 2014</b>                                                                                                                                                                             |                                                                                                                   |                                                                                                                     |                  |
| Tested by:                                                                                                                                                                                                   | Reviewed by:                                                                                                      | Approved by:                                                                                                        |                  |
| <br><hr style="width: 100%;"/>                                                                                            | <br><hr style="width: 100%;"/> | <br><hr style="width: 100%;"/> |                  |
| Andy Gao / Engineer                                                                                                                                                                                          | Jade Yang/ Supervisor                                                                                             | Chris Du / Manager                                                                                                  |                  |
| <b>Other Aspects:</b>                                                                                                                                                                                        |                                                                                                                   |                                                                                                                     |                  |
| None.                                                                                                                                                                                                        |                                                                                                                   |                                                                                                                     |                  |
| Abbreviations: OK/P=passed    fail/F=failed    n.a/N=not applicable    E.U.T=equipment under tested                                                                                                          |                                                                                                                   |                                                                                                                     |                  |
| This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Keyway Testing Technology Co., Ltd. |                                                                                                                   |                                                                                                                     |                  |

# 1. GENERAL PRODUCT INFORMATION

## 1.1. Product Function

Refer to Technical Construction Form and User Manual.

## 1.2. Description of Device (EUT)

|                                                  |                                                                                  |
|--------------------------------------------------|----------------------------------------------------------------------------------|
| Product Name:                                    | Wireless Hard Drive Enclosure                                                    |
| Model No.:                                       | iUSBport HD, MC330                                                               |
| Operation Frequency:                             | 2412MHz~2462MHz (802.11b/802.11g/802.11n(H20))<br>2422MHz~2452MHz (802.11n(H40)) |
| Channel numbers:                                 | 11 for 802.11b/802.11g/802.11n(H20) ,7 for 802.11n(H40)                          |
| Channel separation:                              | 5MHz                                                                             |
| Modulation technology:<br>(IEEE 802.11b)         | Direct Sequence Spread Spectrum (DSSS)                                           |
| Modulation technology:<br>(IEEE 802.11g/802.11n) | Orthogonal Frequency Division Multiplexing(OFDM)                                 |
| Data speed (IEEE 802.11b):                       | 1Mbps, 2Mbps, 5.5Mbps, 11Mbps                                                    |
| Data speed (IEEE 802.11g):                       | 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps,<br>36Mbps, 48Mbps,54Mbps                   |
| Data speed (IEEE 802.11n):                       | Up to 150Mbps                                                                    |
| Antenna Type:                                    | Integral                                                                         |
| Antenna gain:                                    | 3.8dBi (declare by Applicant)                                                    |
| Power supply:                                    | DC 5V from USB Port<br>DC 3.7V                                                   |

## 1.3. Independent Operation Modes

The basic operation modes are:

1.3.1. EUT work continues TX mode and frequency as below:

|                | Channel | Frequency |
|----------------|---------|-----------|
| 802.11b        | Low     | 2412MHz   |
|                | Middle  | 2437MHz   |
|                | High    | 2462MHz   |
| 802.11g        | Low     | 2412MHz   |
|                | Middle  | 2437MHz   |
|                | High    | 2462MHz   |
| 802.11n(HT20)  | Low     | 2412MHz   |
|                | Middle  | 2437MHz   |
|                | High    | 2462MHz   |
| 802.11 n(HT40) | Low     | 2422MHz   |
|                | Middle  | 2437MHz   |
|                | High    | 2452MHz   |

Remark: According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup” 1MHz for 802.11b,54MHz for 802.11g, 6.5Mbps for 802.11n(H20), 13Mbps for 802.11n(H40).

## 2. TEST SITES

### 2.1. Test Facilities

Lab Qualifications : 944 Shielded Room built by ETS-Lindgren, USA  
Date of completion: March 28, 2011

966 Chamber built by ETS-Lindgren, USA  
Date of completion: March 28, 2011

Certificated by TUV Rheinland, Germany.  
Registration No.: UA 50207153  
Date of registration: July 13, 2011

Certificated by UL, USA  
Registration No.: 100567-237  
Date of registration: September 1, 2011

Certificated by Intertek  
Registration No.: 2011-RTL-L1-31  
Date of registration: October 11, 2011

Certificated by Industry Canada  
Registration No.: 9868A  
Date of registration: December 8, 2011

Certificated by FCC, USA  
Registration No.: 370994  
Date of registration: February 21, 2012

Certificated by CNAS China  
Registration No.: CNAS L5783  
Date of registration: August 8, 2012

Name of Firm : Keyway Testing Technology Co., Ltd.

Site Location : Baishun Industrial Zone, Zhangmutou Town,  
Dongguan, Guangdong, China

## 2.2. List of Test and Measurement Instruments

### 2.2.1. For conducted emission at the mains terminals test

| Equipment                      | Manufacturer  | Model No. | Serial No. | Last Cal. | Next Cal. |
|--------------------------------|---------------|-----------|------------|-----------|-----------|
| EMI Test Receiver              | Rohde&Schwarz | ESCI      | 101156     | May 9,13  | May 9,14  |
| Artificial Mains Network       | Rohde&Schwarz | ENV216    | 101315     | May 9,13  | May 9,14  |
| Artificial Mains Network (AUX) | Rohde&Schwarz | ENV216    | 101314     | May 9,13  | May 9,14  |
| RF Cable                       | FUJIKURA      | 3D-2W     | 944 Cable  | May 9,13  | May 9,14  |

### 2.2.2. For radiated emission test (Below 1GHz)

| Equipment                | Manufacturer  | Model No. | Serial No.   | Last Cal. | Next Cal. |
|--------------------------|---------------|-----------|--------------|-----------|-----------|
| EMI Test Receiver        | Rohde&Schwarz | ESCI      | 101156       | May 9,13  | May 9,14  |
| Bilog Antenna            | ETS-LINDGREEN | 3142D     | 135452       | May 20,13 | May 20,14 |
| Spectrum Analyzer        | Agilent       | E4411B    | MY4511304    | May 9,13  | May 9,14  |
| 3m Semi-anechoic Chamber | ETS-LINDGREEN | 966       | KW01         | May 9,13  | May 9,14  |
| Signal Amplifier         | SONOMA        | 310       | 187016       | May 9,13  | May 9,14  |
| Signal Amplifier         | Agilent       | 8449B     | 3008A00251   | May 9,13  | May 9,14  |
| RF Cable                 | IMRO          | IMRO-400  | 966 Cable 1# | N/A       | N/A       |
| MULTI-DEVICE Controller  | ETS-LINDGREEN | 2090      | 126913       | N/A       | N/A       |

### 2.2.3. For above 1GHz radiated emission, output power,band edge, 6dB bandwidth test

| Equipment                | Manufacturer  | Model No. | Serial No.   | Last Cal.  | Next Cal.  |
|--------------------------|---------------|-----------|--------------|------------|------------|
| Horn Antenna             | DAZE          | ZN30701   | 11003        | May. 11,13 | May. 11,14 |
| Horn Antenna             | SCHWARZBECK   | BBHA9170  | 9170-068     | May. 11,13 | May. 11,14 |
| Spectrum Analyzer        | Agilent       | 8593E     | 3911A04271   | May. 9,13  | May. 9,14  |
| Spectrum Analyzer        | Agilent       | E4408B    | MY44211125   | May. 9,13  | May. 9,14  |
| Spectrum Analyzer        | Rohde&Schwarz | FSB 38    | 100427       | May. 9,13  | May. 9,14  |
| 3m Semi-anechoic Chamber | ETS-LINDGREN  | 966       | KW01         | May. 9,13  | May. 9,14  |
| Signal Amplifier         | DAZE          | ZN3380C   | 11001        | May. 9,13  | May. 9,14  |
| Signal Amplifier         | Agilent       | 8449B     | 3008A00251   | May. 9,13  | May. 9,14  |
| High Pass filter         | Micro         | HPM50111  | 324216       | May. 9,13  | May. 9,14  |
| RF Cable                 | IMRO          | IMRO-400  | 966 Cable 1# | May. 9,13  | May. 9,14  |
| MULTI-DEVICE Controller  | ETS-LINDGREN  | 2090      | 126913       | N/A        | N/A        |
| Antenna Holder           | ETS-LINDGREN  | 2070B     | 00109601     | N/A        | N/A        |

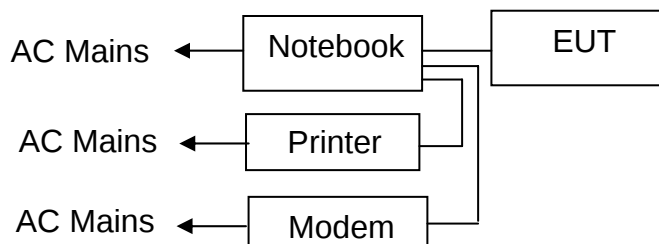
### 3. TEST SET-UP AND OPERATION MODES

#### 3.1. Principle of Configuration Selection

**Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

#### 3.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



*(EUT: Wireless Hard Drive Enclosure)*

#### 3.3. Test Operation Mode and Test Software

None.

#### 3.4. Special Accessories and Auxiliary Equipment

##### Notebook

Manufacturer: Lenovo  
M/N: Lenovo G475  
FCC Approver: FCC DOC

##### Printer

Manufacturer: Canon  
Model Number: LBP2900  
Power Cord: Unshielded, Detachable, 1.5m  
Data Cable: Unshielded, Detachable, 1.5m  
FCC Approver: FCC DOC

##### Modem

Manufacturer: Sanho  
Model Number: MS14  
Power Cord: Unshielded, Detachable, 1.2m  
Data Cable: Unshielded, Detachable, 1.0m  
FCC Approver: FCC DOC

#### 3.5. Countermeasures to Achieve EMC Compliance

None.

## 4. EMISSION TEST RESULTS

### 4.1. Conducted Emission at the Mains Terminals Test

#### 4.1.1. Limit 15.209 limits

| FREQUENCY OF EMISSION (MHz) | CONDUCTED LIMIT (dB $\mu$ V) |          |
|-----------------------------|------------------------------|----------|
|                             | Quasi-peak                   | Average  |
| 0.15-0.5                    | 66 to 56                     | 56 to 46 |
| 0.5-5                       | 56                           | 46       |
| 5-30                        | 60                           | 50       |

#### 4.1.2. Test Setup

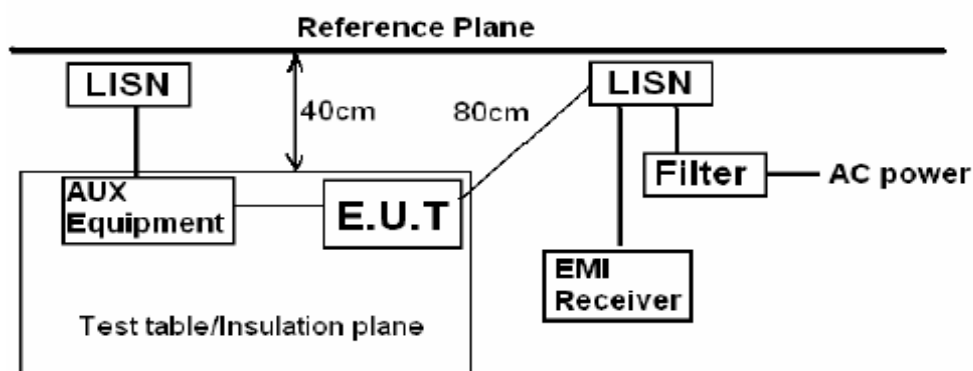
The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 0.8 m, the excess was folded back and forth parallel to the cable at the centre so as to form a bundle no longer than 0.4 m.

The EUT was kept 0.4 m from any other earthed conducting surface. Both sides of AC line were checked to find out the maximum conducted emission levels according to the test procedure during the conducted emission test.

The frequency range from 150 kHz to 30 MHz was investigated.

The bandwidth of the test receiver was set at 9 kHz.

Pretest for all mode, The test data of the worst case condition(s) was reported on the following page.



*Remark:*  
*E.U.T: Equipment Under Test*  
*LISN: Line Impedance Stabilization Network*  
*Test table height=0.8m*

#### 4.1.3. Test Mode

Set EUT in TX mode.

**Test Data****Line**

|    | Freq  | Level | Limit<br>Line | Over<br>Limit | Remark  |
|----|-------|-------|---------------|---------------|---------|
|    | MHz   | dBuV  | dBuV          | dB            |         |
| 1  | 0.180 | 41.28 | 54.50         | -13.22        | Average |
| 2  | 0.180 | 54.26 | 64.50         | -10.24        | QP      |
| 3  | 0.239 | 32.39 | 52.13         | -19.74        | Average |
| 4  | 0.239 | 45.64 | 62.13         | -16.49        | QP      |
| 5  | 0.315 | 28.65 | 49.84         | -21.19        | Average |
| 6  | 0.315 | 41.06 | 59.84         | -18.78        | QP      |
| 7  | 0.471 | 30.07 | 46.49         | -16.42        | Average |
| 8  | 0.471 | 42.15 | 56.49         | -14.34        | QP      |
| 9  | 0.647 | 28.28 | 46.00         | -17.72        | Average |
| 10 | 0.647 | 37.15 | 56.00         | -18.85        | QP      |
| 11 | 4.269 | 23.89 | 46.00         | -22.11        | Average |
| 12 | 4.269 | 36.26 | 56.00         | -19.74        | QP      |

**Neutral**

|    | Freq  | Level | Limit<br>Line | Over<br>Limit | Remark  |
|----|-------|-------|---------------|---------------|---------|
|    | MHz   | dBuV  | dBuV          | dB            |         |
| 1  | 0.173 | 42.16 | 54.81         | -12.65        | Average |
| 2  | 0.173 | 54.13 | 64.81         | -10.68        | QP      |
| 3  | 0.239 | 33.55 | 52.13         | -18.58        | Average |
| 4  | 0.239 | 46.12 | 62.13         | -16.01        | QP      |
| 5  | 0.365 | 29.83 | 48.61         | -18.78        | Average |
| 6  | 0.365 | 38.13 | 58.61         | -20.48        | QP      |
| 7  | 0.481 | 36.39 | 46.32         | -9.93         | Average |
| 8  | 0.481 | 44.20 | 56.32         | -12.12        | QP      |
| 9  | 1.242 | 26.57 | 46.00         | -19.43        | Average |
| 10 | 1.242 | 37.15 | 56.00         | -18.85        | QP      |
| 11 | 4.202 | 23.88 | 46.00         | -22.12        | Average |
| 12 | 4.202 | 36.15 | 56.00         | -19.85        | QP      |

## 4.2. Radiated Emission Test

### 4.2.1. Limit 15.209 limits

| FREQUENCY<br>MHz | DISTANCE<br>Meters | FIELD STRENGTHS LIMIT                                                                             |                                   |
|------------------|--------------------|---------------------------------------------------------------------------------------------------|-----------------------------------|
|                  |                    | $\mu\text{V}/\text{m}$                                                                            | $\text{dB}(\mu\text{V})/\text{m}$ |
| 30 ~ 88          | 3                  | 100                                                                                               | 40.0                              |
| 88 ~ 216         | 3                  | 150                                                                                               | 43.5                              |
| 216 ~ 960        | 3                  | 200                                                                                               | 46.0                              |
| 960 ~ 1000       | 3                  | 500                                                                                               | 54.0                              |
| Above 1000       | 3                  | 74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak)<br>54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average) |                                   |

### 4.2.2. Restricted bands of operation

| MHz                        | MHz                   | MHz             | GHz              |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110              | 16.42 - 16.423        | 399.9 - 410     | 4.5 - 5.15       |
| <sup>1</sup> 0.495 - 0.505 | 16.69475 - 16.69525   | 608 - 614       | 5.35 - 5.46      |
| 2.1735 - 2.1905            | 16.80425 - 16.80475   | 960 - 1240      | 7.25 - 7.75      |
| 4.125 - 4.128              | 25.5 - 25.67          | 1300 - 1427     | 8.025 - 8.5      |
| 4.17725 - 4.17775          | 37.5 - 38.25          | 1435 - 1626.5   | 9.0 - 9.2        |
| 4.20725 - 4.20775          | 73 - 74.6             | 1645.5 - 1646.5 | 9.3 - 9.5        |
| 6.215 - 6.218              | 74.8 - 75.2           | 1660 - 1710     | 10.6 - 12.7      |
| 6.26775 - 6.26825          | 108 - 121.94          | 1718.8 - 1722.2 | 13.25 - 13.4     |
| 6.31175 - 6.31225          | 123 - 138             | 2200 - 2300     | 14.47 - 14.5     |
| 8.291 - 8.294              | 149.9 - 150.05        | 2310 - 2390     | 15.35 - 16.2     |
| 8.362 - 8.366              | 156.52475 - 156.52525 | 2483.5 - 2500   | 17.7 - 21.4      |
| 8.37625 - 8.38675          | 156.7 - 156.9         | 2690 - 2900     | 22.01 - 23.12    |
| 8.41425 - 8.41475          | 162.0125 - 167.17     | 3260 - 3267     | 23.6 - 24.0      |
| 12.29 - 12.293             | 167.72 - 173.2        | 3332 - 3339     | 31.2 - 31.8      |
| 12.51975 - 12.52025        | 240 - 285             | 3345.8 - 3358   | 36.43 - 36.5     |
| 12.57675 - 12.57725        | 322 - 335.4           | 3600 - 4400     | ( <sup>2</sup> ) |

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

### 4.2.3. Test setup

The EUT was placed on a turn table which was 0.8 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz.

The frequency range from 30MHz to 10<sup>th</sup> harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

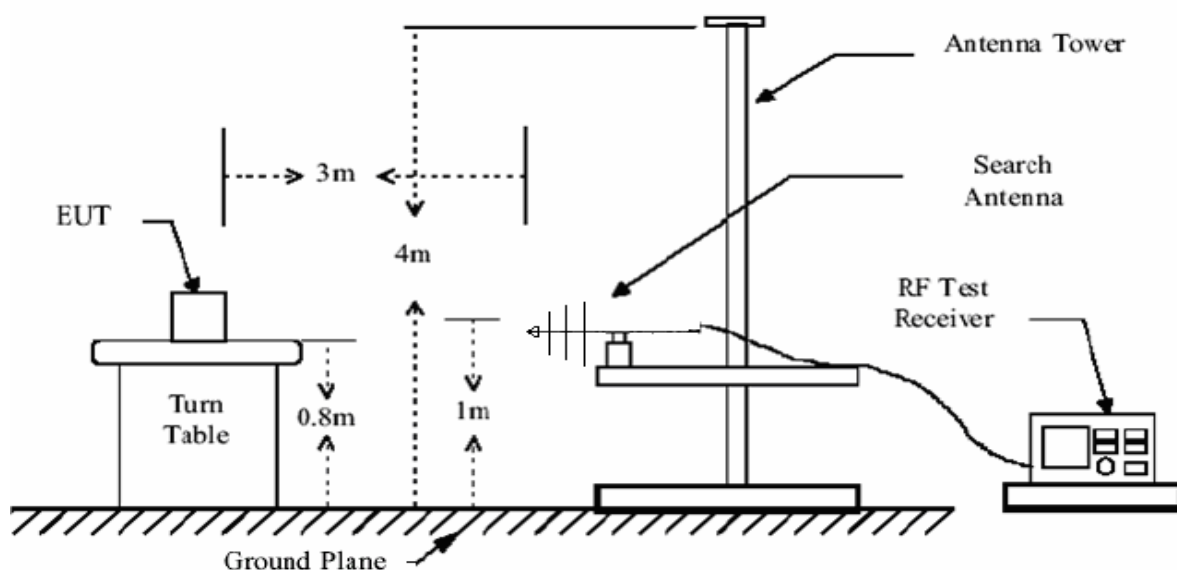
Notes: 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamp Factor.

2. Measurement Uncertainty:  $\pm 3.2$  dB at a level of confidence of 95%.

3. For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

4. For emissions below 1GHz, pretest for all mode, The test data of the worst case condition(s) was reported on the following pages.

5. For Both PK and AV value above 1GHz , PK detector is used .



## Test Data

Below 1GHz

WIFI Mode Horizontal polarizations

|   | Freq   | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss | Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|--------|------------------|---------------|----------------------|--------|--------|---------------|---------------|--------|
|   | MHz    | dB               | dBuV          | dB                   | dB/m   | dBuV/m | dBuV/m        | dB            |        |
| 1 | 44.55  | 31.40            | 38.20         | 0.56                 | 11.03  | 18.39  | 40.00         | -21.61        | QP     |
| 2 | 99.84  | 31.35            | 48.90         | 0.94                 | 9.59   | 28.08  | 43.50         | -15.42        | QP     |
| 3 | 165.80 | 31.21            | 44.51         | 1.30                 | 9.72   | 24.32  | 43.50         | -19.18        | QP     |
| 4 | 219.15 | 30.99            | 38.10         | 1.53                 | 11.92  | 20.56  | 46.00         | -25.44        | QP     |
| 5 | 335.55 | 30.74            | 47.10         | 2.10                 | 14.92  | 33.38  | 46.00         | -12.62        | QP     |
| 6 | 456.80 | 30.61            | 48.90         | 2.62                 | 17.79  | 38.70  | 46.00         | -7.30         | QP     |

WIFI Mode Vertical polarizations

|   | Freq   | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss | Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|--------|------------------|---------------|----------------------|--------|--------|---------------|---------------|--------|
|   | MHz    | dB               | dBuV          | dB                   | dB/m   | dBuV/m | dBuV/m        | dB            |        |
| 1 | 31.94  | 31.40            | 47.80         | 0.56                 | 17.66  | 34.62  | 40.00         | -5.38         | QP     |
| 2 | 44.55  | 31.40            | 51.50         | 0.56                 | 11.03  | 31.69  | 40.00         | -8.31         | QP     |
| 3 | 99.84  | 31.35            | 52.20         | 0.94                 | 9.59   | 31.38  | 43.50         | -12.12        | QP     |
| 4 | 136.70 | 31.20            | 52.10         | 1.12                 | 8.37   | 30.39  | 43.50         | -13.11        | QP     |
| 5 | 235.64 | 30.94            | 40.90         | 1.61                 | 12.50  | 24.07  | 46.00         | -21.93        | QP     |
| 6 | 587.75 | 30.71            | 42.10         | 3.29                 | 20.21  | 34.89  | 46.00         | -11.11        | QP     |

## Above 1GHz

## 802.11b 2412MHz Horizontal polarizations

|   | Freq     | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss | Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|----------------------|--------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB                   | dB/m   | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4824.00  | 27.50            | 31.47         | 12.01                | 32.99  | 48.97  | 74.00         | -25.03        | Peak   |
| 2 | 7236.00  | 27.95            | 22.13         | 16.61                | 37.30  | 48.09  | 74.00         | -25.91        | Peak   |
| 3 | 8701.00  | 28.31            | 20.32         | 16.81                | 37.04  | 45.86  | 74.00         | -28.14        | Peak   |
| 4 | 10197.00 | 28.82            | 22.52         | 17.00                | 38.72  | 49.42  | 74.00         | -24.58        | Peak   |
| 5 | 12407.00 | 29.08            | 16.88         | 17.71                | 39.48  | 44.99  | 74.00         | -29.01        | Peak   |
| 6 | 14583.00 | 29.49            | 15.98         | 19.73                | 40.25  | 46.47  | 74.00         | -27.53        | Peak   |

## 802.11b 2412MHz Vertical polarizations

|   | Freq     | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss | Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|----------------------|--------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB                   | dB/m   | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4824.00  | 27.50            | 31.41         | 12.01                | 32.99  | 48.91  | 74.00         | -25.09        | Peak   |
| 2 | 7236.00  | 27.95            | 21.63         | 16.61                | 37.30  | 47.59  | 74.00         | -26.41        | Peak   |
| 3 | 8599.00  | 28.28            | 24.11         | 16.79                | 36.92  | 49.54  | 74.00         | -24.46        | Peak   |
| 4 | 11608.00 | 28.96            | 19.24         | 17.29                | 39.80  | 47.37  | 74.00         | -26.63        | Peak   |
| 5 | 13189.00 | 29.24            | 17.66         | 18.42                | 41.57  | 48.41  | 74.00         | -25.59        | Peak   |
| 6 | 15603.00 | 29.64            | 19.02         | 20.39                | 38.79  | 48.56  | 74.00         | -25.44        | Peak   |

## 802.11b 2437MHz Horizontal polarizations

|   | Freq     | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss | Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|----------------------|--------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB                   | dB/m   | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4874.00  | 27.53            | 30.95         | 12.14                | 33.11  | 48.67  | 74.00         | -25.33        | Peak   |
| 2 | 7311.00  | 27.96            | 21.20         | 16.62                | 37.32  | 47.18  | 74.00         | -26.82        | Peak   |
| 3 | 9211.00  | 28.48            | 18.67         | 16.90                | 37.65  | 44.74  | 74.00         | -29.26        | Peak   |
| 4 | 10350.00 | 28.84            | 18.40         | 17.04                | 38.96  | 45.56  | 74.00         | -28.44        | Peak   |
| 5 | 12271.00 | 29.05            | 17.26         | 17.59                | 39.46  | 45.26  | 74.00         | -28.74        | Peak   |
| 6 | 15399.00 | 29.61            | 17.45         | 20.25                | 38.42  | 46.51  | 74.00         | -27.49        | Peak   |

**802.11b 2437MHz Vertical polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss Factor | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|-----------------------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB                          | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4874.00  | 27.53            | 31.06         | 12.14                       | 33.11             | 48.78  | 74.00         | -25.22        | Peak   |
| 2 | 7311.00  | 27.96            | 21.93         | 16.62                       | 37.32             | 47.91  | 74.00         | -26.09        | Peak   |
| 3 | 9517.00  | 28.61            | 20.65         | 16.92                       | 38.01             | 46.97  | 74.00         | -27.03        | Peak   |
| 4 | 12118.00 | 29.02            | 20.77         | 17.47                       | 39.42             | 48.64  | 74.00         | -25.36        | Peak   |
| 5 | 13869.00 | 29.37            | 15.97         | 19.20                       | 43.37             | 49.17  | 74.00         | -24.83        | Peak   |
| 6 | 16572.00 | 29.93            | 13.41         | 21.03                       | 43.57             | 48.08  | 74.00         | -25.92        | Peak   |

**802.11b 2462MHz Horizontal polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss Factor | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|-----------------------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB                          | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4924.00  | 27.56            | 31.10         | 12.28                       | 33.23             | 49.05  | 74.00         | -24.95        | Peak   |
| 2 | 7386.00  | 27.98            | 22.07         | 16.62                       | 37.36             | 48.07  | 74.00         | -25.93        | Peak   |
| 3 | 9211.00  | 28.48            | 20.39         | 16.90                       | 37.65             | 46.46  | 74.00         | -27.54        | Peak   |
| 4 | 11115.00 | 28.91            | 19.79         | 17.19                       | 39.59             | 47.66  | 74.00         | -26.34        | Peak   |
| 5 | 12645.00 | 29.13            | 19.08         | 17.91                       | 39.86             | 47.72  | 74.00         | -26.28        | Peak   |
| 6 | 14447.00 | 29.47            | 15.79         | 19.64                       | 40.90             | 46.86  | 74.00         | -27.14        | Peak   |

**802.11b 2462MHz Vertical polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss Factor | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|-----------------------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB                          | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4924.00  | 27.56            | 30.77         | 12.28                       | 33.23             | 48.72  | 74.00         | -25.28        | Peak   |
| 2 | 7386.00  | 27.98            | 22.14         | 16.62                       | 37.36             | 48.14  | 74.00         | -25.86        | Peak   |
| 3 | 9364.00  | 28.54            | 16.45         | 16.91                       | 37.83             | 42.65  | 74.00         | -31.35        | Peak   |
| 4 | 11115.00 | 28.91            | 16.79         | 17.19                       | 39.59             | 44.66  | 74.00         | -29.34        | Peak   |
| 5 | 13036.00 | 29.21            | 14.95         | 18.26                       | 40.86             | 44.86  | 74.00         | -29.14        | Peak   |
| 6 | 14226.00 | 29.43            | 13.31         | 19.51                       | 42.20             | 45.59  | 74.00         | -28.41        | Peak   |

**802.11g 2412MHz Horizontal polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss Factor | Antenna<br>Level | Limit<br>Line | Over<br>Limit | Remark      |
|---|----------|------------------|---------------|-----------------------------|------------------|---------------|---------------|-------------|
|   | MHz      | dB               | dBuV          | dB                          | dB/m             | dBuV/m        | dBuV/m        | dB          |
| 1 | 4824.00  | 27.50            | 30.69         | 12.01                       | 32.99            | 48.19         | 74.00         | -25.81 Peak |
| 2 | 7236.00  | 27.95            | 22.22         | 16.61                       | 37.30            | 48.18         | 74.00         | -25.82 Peak |
| 3 | 8242.00  | 28.17            | 21.41         | 16.71                       | 36.59            | 46.54         | 74.00         | -27.46 Peak |
| 4 | 10775.00 | 28.88            | 20.91         | 17.12                       | 39.37            | 48.52         | 74.00         | -25.48 Peak |
| 5 | 13529.00 | 29.31            | 13.80         | 18.81                       | 43.03            | 46.33         | 74.00         | -27.67 Peak |
| 6 | 15909.00 | 29.69            | 15.52         | 20.58                       | 39.97            | 46.38         | 74.00         | -27.62 Peak |

**802.11g 2412MHz Vertical polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss Factor | Antenna<br>Level | Limit<br>Line | Over<br>Limit | Remark      |
|---|----------|------------------|---------------|-----------------------------|------------------|---------------|---------------|-------------|
|   | MHz      | dB               | dBuV          | dB                          | dB/m             | dBuV/m        | dBuV/m        | dB          |
| 1 | 4824.00  | 27.50            | 30.84         | 12.01                       | 32.99            | 48.34         | 74.00         | -25.66 Peak |
| 2 | 7236.00  | 27.95            | 22.13         | 16.61                       | 37.30            | 48.09         | 74.00         | -25.91 Peak |
| 3 | 9211.00  | 28.48            | 20.99         | 16.90                       | 37.65            | 47.06         | 74.00         | -26.94 Peak |
| 4 | 10843.00 | 28.88            | 19.45         | 17.13                       | 39.41            | 47.11         | 74.00         | -26.89 Peak |
| 5 | 12730.00 | 29.15            | 18.87         | 17.99                       | 40.06            | 47.77         | 74.00         | -26.23 Peak |
| 6 | 14906.00 | 29.54            | 19.85         | 19.94                       | 38.92            | 49.17         | 74.00         | -24.83 Peak |

**802.11g 2437MHz Horizontal polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss Factor | Antenna<br>Level | Limit<br>Line | Over<br>Limit | Remark      |
|---|----------|------------------|---------------|-----------------------------|------------------|---------------|---------------|-------------|
|   | MHz      | dB               | dBuV          | dB                          | dB/m             | dBuV/m        | dBuV/m        | dB          |
| 1 | 4874.00  | 27.53            | 30.59         | 12.14                       | 33.11            | 48.31         | 74.00         | -25.69 Peak |
| 2 | 7311.00  | 27.96            | 22.07         | 16.62                       | 37.32            | 48.05         | 74.00         | -25.95 Peak |
| 3 | 9551.00  | 28.62            | 20.71         | 16.93                       | 38.04            | 47.06         | 74.00         | -26.94 Peak |
| 4 | 12373.00 | 29.07            | 19.42         | 17.68                       | 39.48            | 47.51         | 74.00         | -26.49 Peak |
| 5 | 13155.00 | 29.23            | 18.63         | 18.40                       | 41.41            | 49.21         | 74.00         | -24.79 Peak |
| 6 | 14719.00 | 29.51            | 18.21         | 19.83                       | 39.69            | 48.22         | 74.00         | -25.78 Peak |

**802.11g 2437MHz Vertical polarizations**

|   | Freq     | Preampl<br>Factor | Read<br>Level | CableAntenna<br>Loss Factor | Antenna<br>Level | Limit<br>Line | Over<br>Limit | Remark      |
|---|----------|-------------------|---------------|-----------------------------|------------------|---------------|---------------|-------------|
|   | MHz      | dB                | dBuV          | dB                          | dB/m             | dBuV/m        | dBuV/m        | dB          |
| 1 | 4874.00  | 27.53             | 29.56         | 12.14                       | 33.11            | 47.28         | 74.00         | -26.72 Peak |
| 2 | 7311.00  | 27.96             | 21.71         | 16.62                       | 37.32            | 47.69         | 74.00         | -26.31 Peak |
| 3 | 9704.00  | 28.68             | 20.32         | 16.94                       | 38.17            | 46.75         | 74.00         | -27.25 Peak |
| 4 | 11727.00 | 28.97             | 19.22         | 17.31                       | 39.68            | 47.24         | 74.00         | -26.76 Peak |
| 5 | 13325.00 | 29.26             | 15.27         | 18.59                       | 42.21            | 46.81         | 74.00         | -27.19 Peak |
| 6 | 14107.00 | 29.42             | 15.07         | 19.43                       | 42.90            | 47.98         | 74.00         | -26.02 Peak |

**802.11g 2462MHz Horizontal polarizations**

|   | Freq     | Preampl<br>Factor | Read<br>Level | CableAntenna<br>Loss Factor | Antenna<br>Level | Limit<br>Line | Over<br>Limit | Remark      |
|---|----------|-------------------|---------------|-----------------------------|------------------|---------------|---------------|-------------|
|   | MHz      | dB                | dBuV          | dB                          | dB/m             | dBuV/m        | dBuV/m        | dB          |
| 1 | 4924.00  | 27.56             | 29.72         | 12.28                       | 33.23            | 47.67         | 74.00         | -26.33 Peak |
| 2 | 7386.00  | 27.98             | 21.11         | 16.62                       | 37.36            | 47.11         | 74.00         | -26.89 Peak |
| 3 | 9534.00  | 28.61             | 22.59         | 16.92                       | 38.03            | 48.93         | 74.00         | -25.07 Peak |
| 4 | 10945.00 | 28.89             | 20.31         | 17.16                       | 39.47            | 48.05         | 74.00         | -25.95 Peak |
| 5 | 11914.00 | 28.99             | 21.22         | 17.35                       | 39.49            | 49.07         | 74.00         | -24.93 Peak |
| 6 | 14107.00 | 29.42             | 16.07         | 19.43                       | 42.90            | 48.98         | 74.00         | -25.02 Peak |

**802.11g 2462MHz Vertical polarizations**

|   | Freq     | Preampl<br>Factor | Read<br>Level | CableAntenna<br>Loss Factor | Antenna<br>Level | Limit<br>Line | Over<br>Limit | Remark      |
|---|----------|-------------------|---------------|-----------------------------|------------------|---------------|---------------|-------------|
|   | MHz      | dB                | dBuV          | dB                          | dB/m             | dBuV/m        | dBuV/m        | dB          |
| 1 | 4924.00  | 27.56             | 28.41         | 12.28                       | 33.23            | 46.36         | 74.00         | -27.64 Peak |
| 2 | 7386.00  | 27.98             | 20.81         | 16.62                       | 37.36            | 46.81         | 74.00         | -27.19 Peak |
| 3 | 8446.00  | 28.23             | 18.61         | 16.76                       | 36.76            | 43.90         | 74.00         | -30.10 Peak |
| 4 | 10469.00 | 28.85             | 17.00         | 17.06                       | 39.15            | 44.36         | 74.00         | -29.64 Peak |
| 5 | 13121.00 | 29.22             | 14.41         | 18.36                       | 41.26            | 44.81         | 74.00         | -29.19 Peak |
| 6 | 14413.00 | 29.46             | 15.03         | 19.63                       | 41.10            | 46.30         | 74.00         | -27.70 Peak |

**802.11n(HT20) 2412MHz Horizontal polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | Cable<br>Loss | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|---------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB            | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4824.00  | 27.50            | 27.58         | 12.01         | 32.99             | 45.08  | 74.00         | -28.92        | Peak   |
| 2 | 7236.00  | 27.95            | 19.15         | 16.61         | 37.30             | 45.11  | 74.00         | -28.89        | Peak   |
| 3 | 8684.00  | 28.30            | 21.34         | 16.81         | 37.02             | 46.87  | 74.00         | -27.13        | Peak   |
| 4 | 11353.00 | 28.94            | 19.08         | 17.24         | 39.78             | 47.16  | 74.00         | -26.84        | Peak   |
| 5 | 13512.00 | 29.30            | 14.98         | 18.79         | 43.02             | 47.49  | 74.00         | -26.51        | Peak   |
| 6 | 14413.00 | 29.46            | 16.03         | 19.63         | 41.10             | 47.30  | 74.00         | -26.70        | Peak   |

**802.11n(HT20) 2412MHz Vertical polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | Cable<br>Loss | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|---------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB            | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4824.00  | 27.50            | 28.34         | 12.01         | 32.99             | 45.84  | 74.00         | -28.16        | Peak   |
| 2 | 7236.00  | 27.95            | 20.12         | 16.61         | 37.30             | 46.08  | 74.00         | -27.92        | Peak   |
| 3 | 8293.00  | 28.19            | 21.10         | 16.72         | 36.63             | 46.26  | 74.00         | -27.74        | Peak   |
| 4 | 10316.00 | 28.83            | 19.57         | 17.03         | 38.91             | 46.68  | 74.00         | -27.32        | Peak   |
| 5 | 12917.00 | 29.18            | 16.43         | 18.14         | 40.50             | 45.89  | 74.00         | -28.11        | Peak   |
| 6 | 14787.00 | 29.52            | 16.98         | 19.86         | 39.41             | 46.73  | 74.00         | -27.27        | Peak   |

**802.11n(HT20) 2437MHz Horizontal polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | Cable<br>Loss | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|---------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB            | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4874.00  | 27.53            | 27.92         | 12.14         | 33.11             | 45.64  | 74.00         | -28.36        | Peak   |
| 2 | 7311.00  | 27.96            | 20.23         | 16.62         | 37.32             | 46.21  | 74.00         | -27.79        | Peak   |
| 3 | 9313.00  | 28.52            | 18.93         | 16.91         | 37.77             | 45.09  | 74.00         | -28.91        | Peak   |
| 4 | 11489.00 | 28.95            | 14.77         | 17.26         | 39.89             | 42.97  | 74.00         | -31.03        | Peak   |
| 5 | 15144.00 | 29.57            | 15.55         | 20.09         | 38.47             | 44.54  | 74.00         | -29.46        | Peak   |
| 6 | 16385.00 | 29.86            | 11.54         | 20.90         | 42.68             | 45.26  | 74.00         | -28.74        | Peak   |

**802.11n(HT20)2437MHz Vertical polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|----------------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB                   | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4874.00  | 27.53            | 27.45         | 12.14                | 33.11             | 45.17  | 74.00         | -28.83        | Peak   |
| 2 | 7311.00  | 27.96            | 20.22         | 16.62                | 37.32             | 46.20  | 74.00         | -27.80        | Peak   |
| 3 | 9160.00  | 28.46            | 16.98         | 16.89                | 37.59             | 43.00  | 74.00         | -31.00        | Peak   |
| 4 | 11591.00 | 28.96            | 16.06         | 17.29                | 39.81             | 44.20  | 74.00         | -29.80        | Peak   |
| 5 | 13121.00 | 29.22            | 14.40         | 18.36                | 41.26             | 44.80  | 74.00         | -29.20        | Peak   |
| 6 | 14617.00 | 29.49            | 14.04         | 19.76                | 40.11             | 44.42  | 74.00         | -29.58        | Peak   |

**802.11n(HT20) 2462MHz Horizontal polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|----------------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB                   | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4924.00  | 27.56            | 26.31         | 12.28                | 33.23             | 44.26  | 74.00         | -29.74        | Peak   |
| 2 | 7386.00  | 27.98            | 19.08         | 16.62                | 37.36             | 45.08  | 74.00         | -28.92        | Peak   |
| 3 | 8446.00  | 28.23            | 17.04         | 16.76                | 36.76             | 42.33  | 74.00         | -31.67        | Peak   |
| 4 | 10469.00 | 28.85            | 16.00         | 17.06                | 39.15             | 43.36  | 74.00         | -30.64        | Peak   |
| 5 | 13087.00 | 29.22            | 13.50         | 18.32                | 41.10             | 43.70  | 74.00         | -30.30        | Peak   |
| 6 | 14770.00 | 29.52            | 14.77         | 19.85                | 39.48             | 44.58  | 74.00         | -29.42        | Peak   |

**802.11n(HT20) 2462MHz Vertical polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | CableAntenna<br>Loss | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|----------------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB                   | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4924.00  | 27.56            | 26.36         | 12.28                | 33.23             | 44.31  | 74.00         | -29.69        | Peak   |
| 2 | 7386.00  | 27.98            | 19.21         | 16.62                | 37.36             | 45.21  | 74.00         | -28.79        | Peak   |
| 3 | 9024.00  | 28.41            | 15.14         | 16.88                | 37.42             | 41.03  | 74.00         | -32.97        | Peak   |
| 4 | 11353.00 | 28.94            | 15.27         | 17.24                | 39.78             | 43.35  | 74.00         | -30.65        | Peak   |
| 5 | 12900.00 | 29.18            | 13.22         | 18.12                | 40.46             | 42.62  | 74.00         | -31.38        | Peak   |
| 6 | 15076.00 | 29.56            | 14.26         | 20.04                | 38.49             | 43.23  | 74.00         | -30.77        | Peak   |

**802.11n(HT40) 2422MHz Horizontal polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | Cable&Antenna<br>Loss | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|-----------------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB                    | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4844.00  | 27.51            | 27.37         | 12.05                 | 33.03             | 44.94  | 74.00         | -29.06        | Peak   |
| 2 | 7266.00  | 27.95            | 19.20         | 16.61                 | 37.31             | 45.17  | 74.00         | -28.83        | Peak   |
| 3 | 8429.00  | 28.23            | 16.02         | 16.75                 | 36.74             | 41.28  | 74.00         | -32.72        | Peak   |
| 4 | 10044.00 | 28.81            | 15.79         | 16.98                 | 38.48             | 42.44  | 74.00         | -31.56        | Peak   |
| 5 | 12713.00 | 29.14            | 14.99         | 17.97                 | 40.02             | 43.84  | 74.00         | -30.16        | Peak   |
| 6 | 13478.00 | 29.29            | 12.02         | 18.75                 | 42.92             | 44.40  | 74.00         | -29.60        | Peak   |

**802.11n(HT40) 2422MHz Vertical polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | Cable&Antenna<br>Loss | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|-----------------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB                    | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4844.00  | 27.51            | 26.02         | 12.05                 | 33.03             | 43.59  | 74.00         | -30.41        | Peak   |
| 2 | 7266.00  | 27.95            | 18.84         | 16.61                 | 37.31             | 44.81  | 74.00         | -29.19        | Peak   |
| 3 | 9466.00  | 28.59            | 16.94         | 16.92                 | 37.96             | 43.23  | 74.00         | -30.77        | Peak   |
| 4 | 11472.00 | 28.95            | 13.60         | 17.26                 | 39.87             | 41.78  | 74.00         | -32.22        | Peak   |
| 5 | 12458.00 | 29.09            | 12.73         | 17.76                 | 39.49             | 40.89  | 74.00         | -33.11        | Peak   |
| 6 | 14736.00 | 29.51            | 12.17         | 19.83                 | 39.62             | 42.11  | 74.00         | -31.89        | Peak   |

**802.11n(HT40) 2437MHz Horizontal polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | Cable&Antenna<br>Loss | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|-----------------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB                    | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4874.00  | 27.53            | 26.89         | 12.14                 | 33.11             | 44.61  | 74.00         | -29.39        | Peak   |
| 2 | 7311.00  | 27.96            | 18.80         | 16.62                 | 37.32             | 44.78  | 74.00         | -29.22        | Peak   |
| 3 | 8752.00  | 28.32            | 16.64         | 16.83                 | 37.10             | 42.25  | 74.00         | -31.75        | Peak   |
| 4 | 10724.00 | 28.87            | 13.18         | 17.11                 | 39.33             | 40.75  | 74.00         | -33.25        | Peak   |
| 5 | 11506.00 | 28.95            | 12.40         | 17.27                 | 39.90             | 40.62  | 74.00         | -33.38        | Peak   |
| 6 | 13835.00 | 29.37            | 7.87          | 19.16                 | 43.33             | 40.99  | 74.00         | -33.01        | Peak   |

**802.11n(HT40)2437MHz Vertical polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | Cable<br>Loss | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|---------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB            | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4874.00  | 27.53            | 25.60         | 12.14         | 33.11             | 43.32  | 74.00         | -30.68        | Peak   |
| 2 | 7311.00  | 27.96            | 18.18         | 16.62         | 37.32             | 44.16  | 74.00         | -29.84        | Peak   |
| 3 | 9041.00  | 28.41            | 14.54         | 16.88         | 37.44             | 40.45  | 74.00         | -33.55        | Peak   |
| 4 | 11472.00 | 28.95            | 14.60         | 17.26         | 39.87             | 42.78  | 74.00         | -31.22        | Peak   |
| 5 | 13903.00 | 29.38            | 8.55          | 19.24         | 43.40             | 41.81  | 74.00         | -32.19        | Peak   |
| 6 | 14787.00 | 29.52            | 13.42         | 19.86         | 39.41             | 43.17  | 74.00         | -30.83        | Peak   |

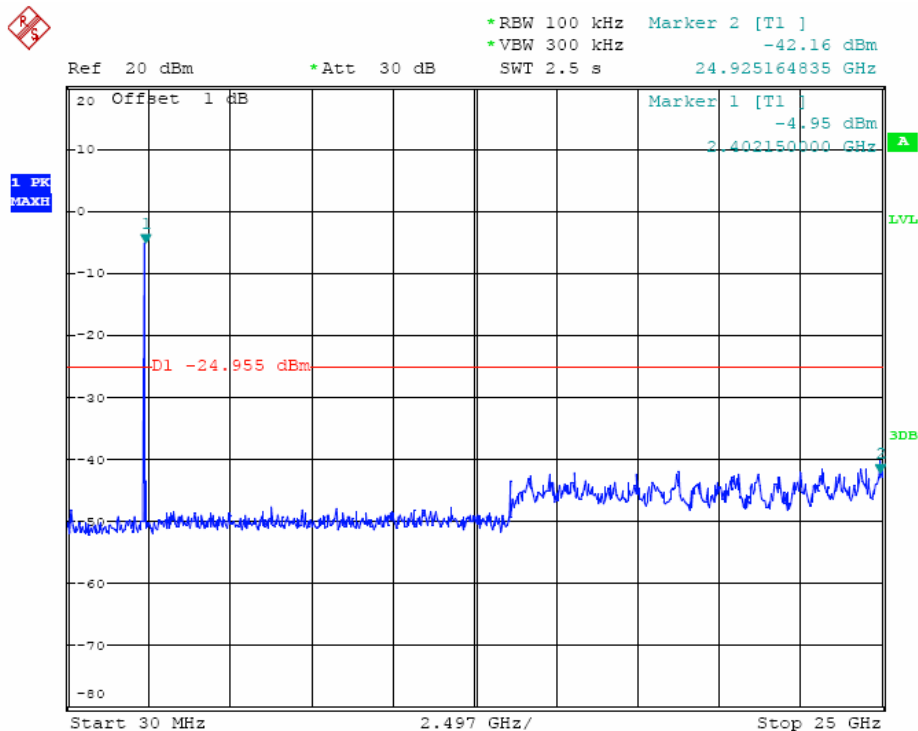
**802.11n(HT40) 2452MHz Horizontal polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | Cable<br>Loss | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|---------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB            | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4904.00  | 27.55            | 27.31         | 12.23         | 33.19             | 45.18  | 74.00         | -28.82        | Peak   |
| 2 | 7356.00  | 27.97            | 18.34         | 16.62         | 37.34             | 44.33  | 74.00         | -29.67        | Peak   |
| 3 | 9415.00  | 28.57            | 13.41         | 16.91         | 37.90             | 39.65  | 74.00         | -34.35        | Peak   |
| 4 | 13104.00 | 29.22            | 11.57         | 18.34         | 41.18             | 41.87  | 74.00         | -32.13        | Peak   |
| 5 | 15229.00 | 29.58            | 16.50         | 20.15         | 38.46             | 45.53  | 74.00         | -28.47        | Peak   |
| 6 | 16521.00 | 29.91            | 7.71          | 21.00         | 43.44             | 42.24  | 74.00         | -31.76        | Peak   |

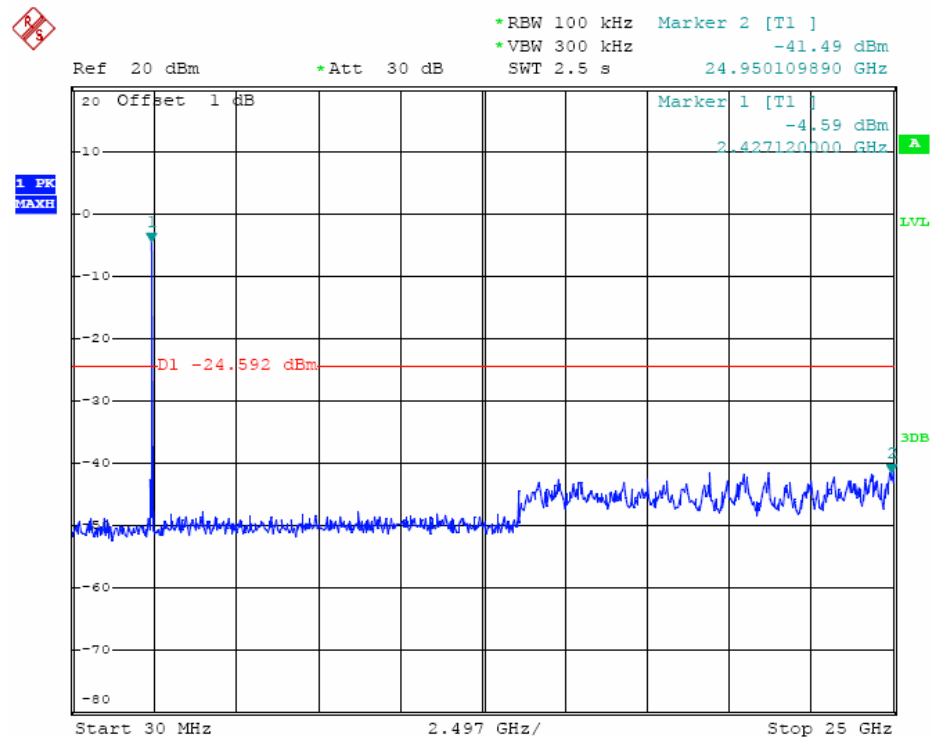
**802.11n(HT40) 2452MHz Vertical polarizations**

|   | Freq     | Preamp<br>Factor | Read<br>Level | Cable<br>Loss | Antenna<br>Factor | Level  | Limit<br>Line | Over<br>Limit | Remark |
|---|----------|------------------|---------------|---------------|-------------------|--------|---------------|---------------|--------|
|   | MHz      | dB               | dBuV          | dB            | dB/m              | dBuV/m | dBuV/m        | dB            |        |
| 1 | 4904.00  | 27.55            | 27.35         | 12.23         | 33.19             | 45.22  | 74.00         | -28.78        | Peak   |
| 2 | 7356.00  | 27.97            | 19.01         | 16.62         | 37.34             | 45.00  | 74.00         | -29.00        | Peak   |
| 3 | 8973.00  | 28.39            | 14.93         | 16.87         | 37.36             | 40.77  | 74.00         | -33.23        | Peak   |
| 4 | 11200.00 | 28.92            | 15.31         | 17.21         | 39.66             | 43.26  | 74.00         | -30.74        | Peak   |
| 5 | 13189.00 | 29.24            | 12.39         | 18.42         | 41.57             | 43.14  | 74.00         | -30.86        | Peak   |
| 6 | 14838.00 | 29.53            | 13.47         | 19.89         | 39.20             | 43.03  | 74.00         | -30.97        | Peak   |

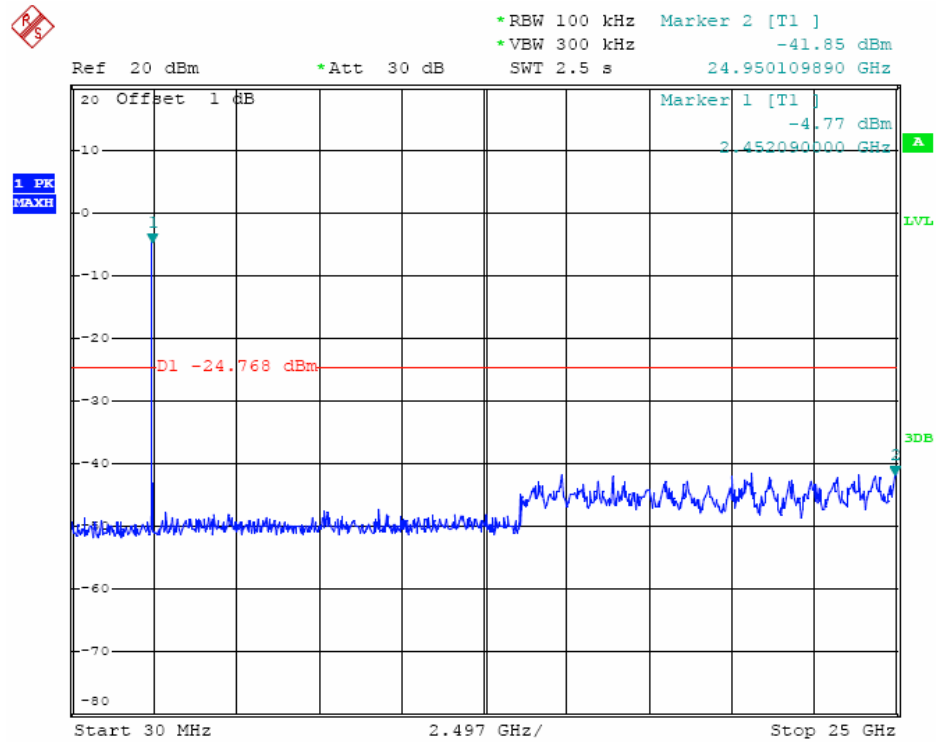
# For conducted test 802.11b 2412MHz



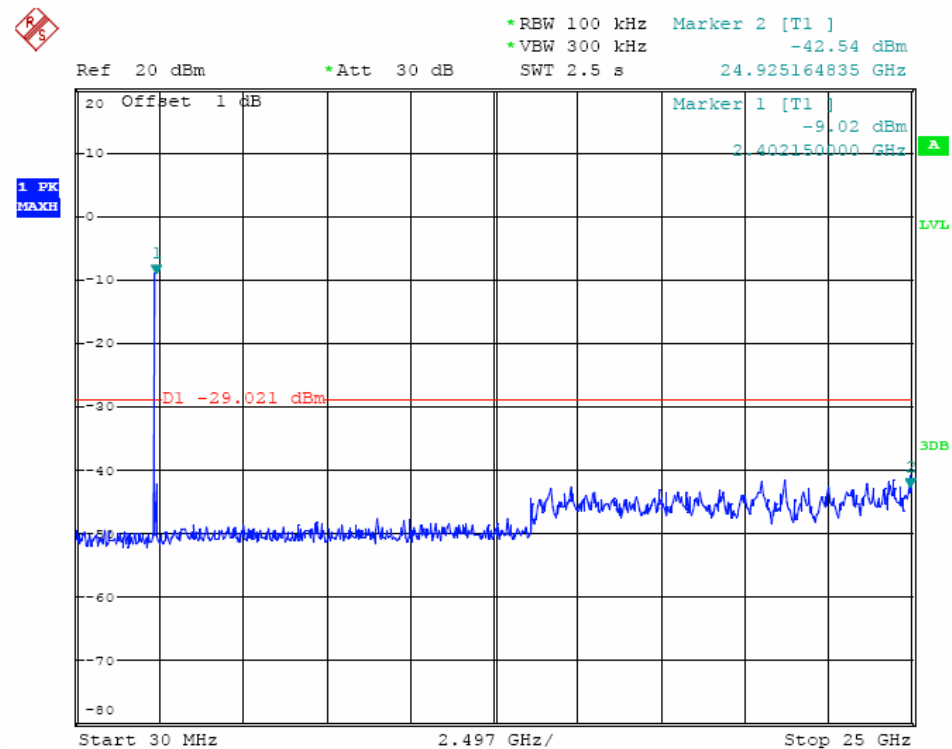
# 802.11b 2437MHz



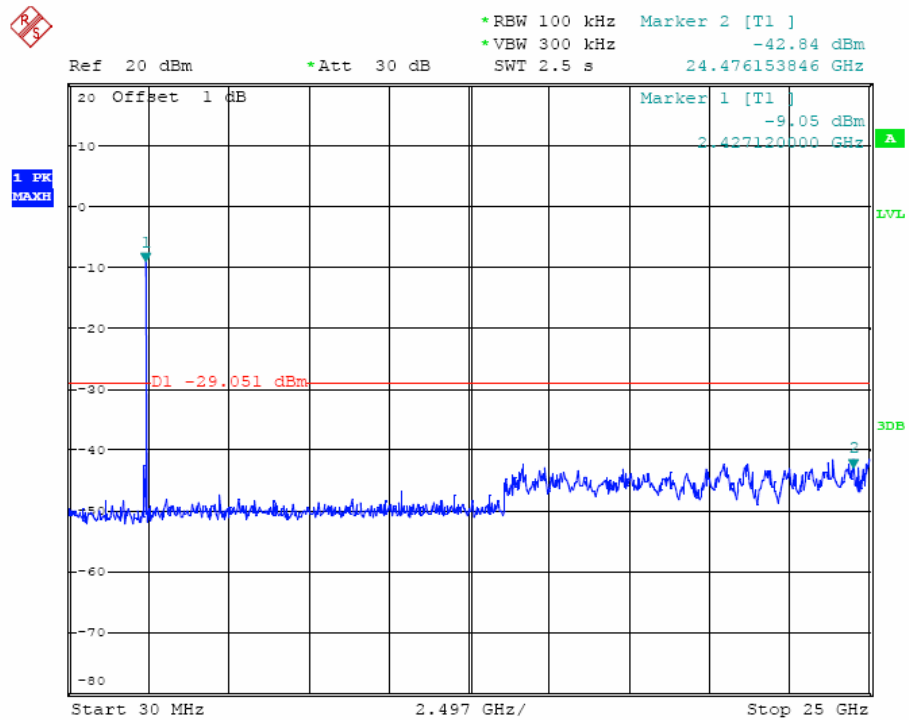
## 802.11b 2462MHz



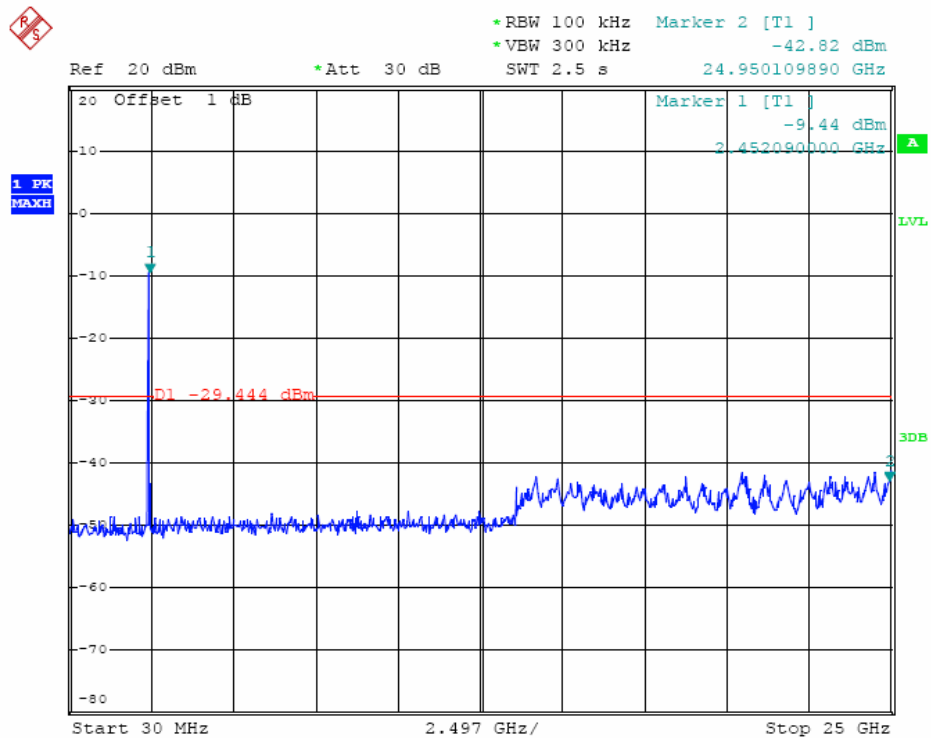
## 802.11g 2412MHz



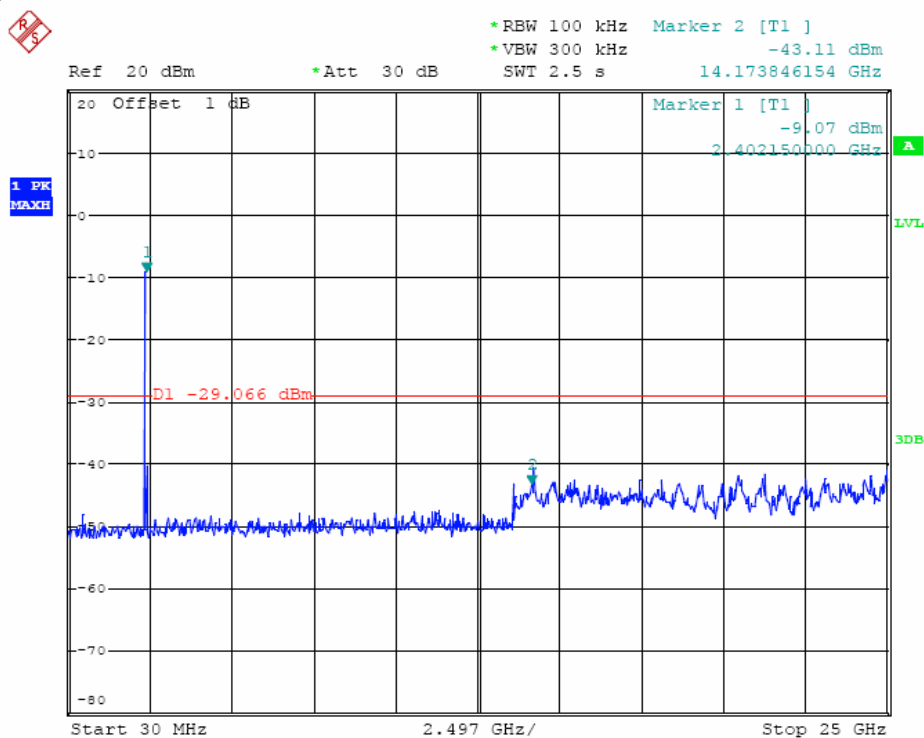
## 802.11g 2437MHz



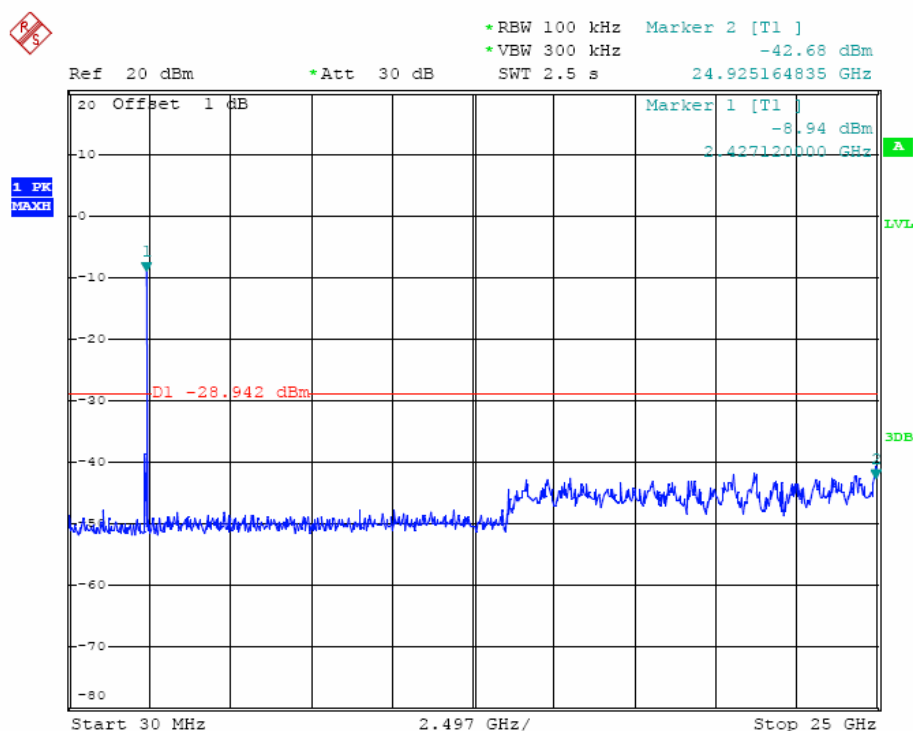
## 802.11g 2462MHz



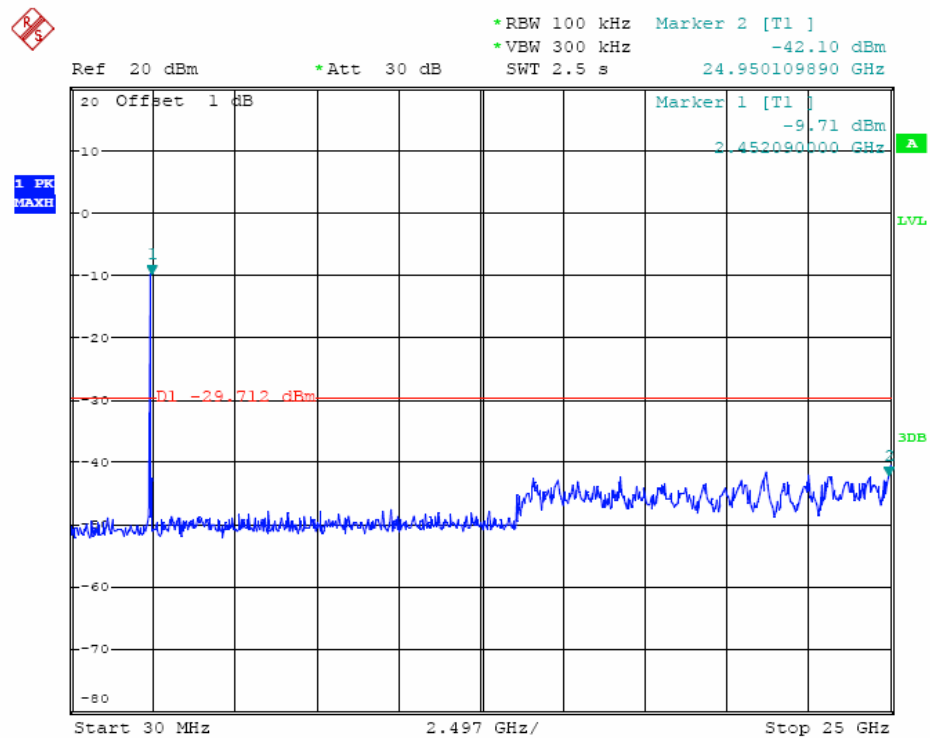
## 802.11n(HT20) 2412MHz



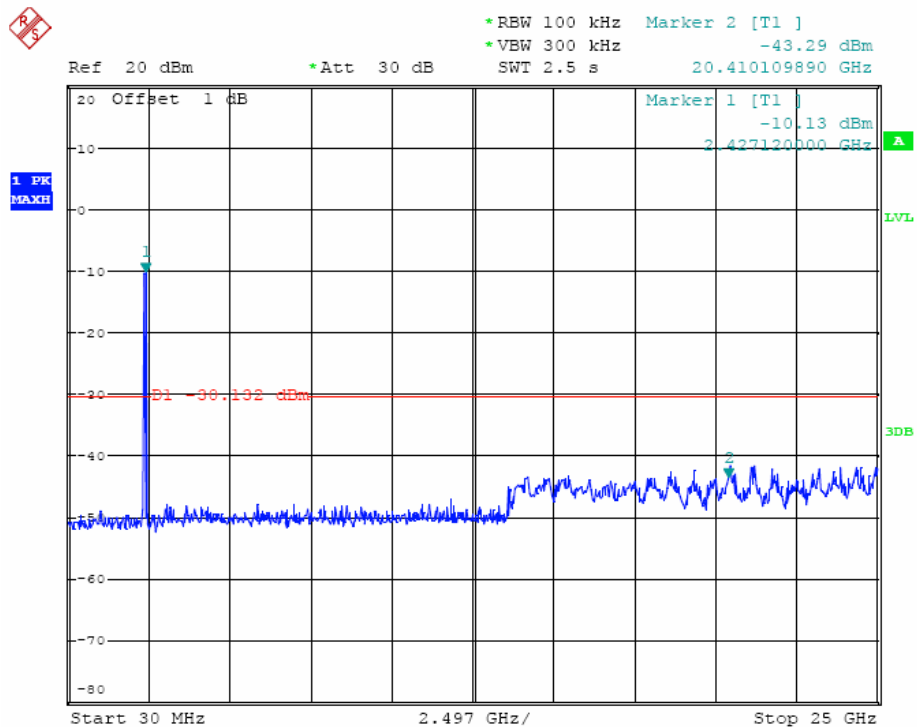
## 802.11n(HT20) 2437MHz



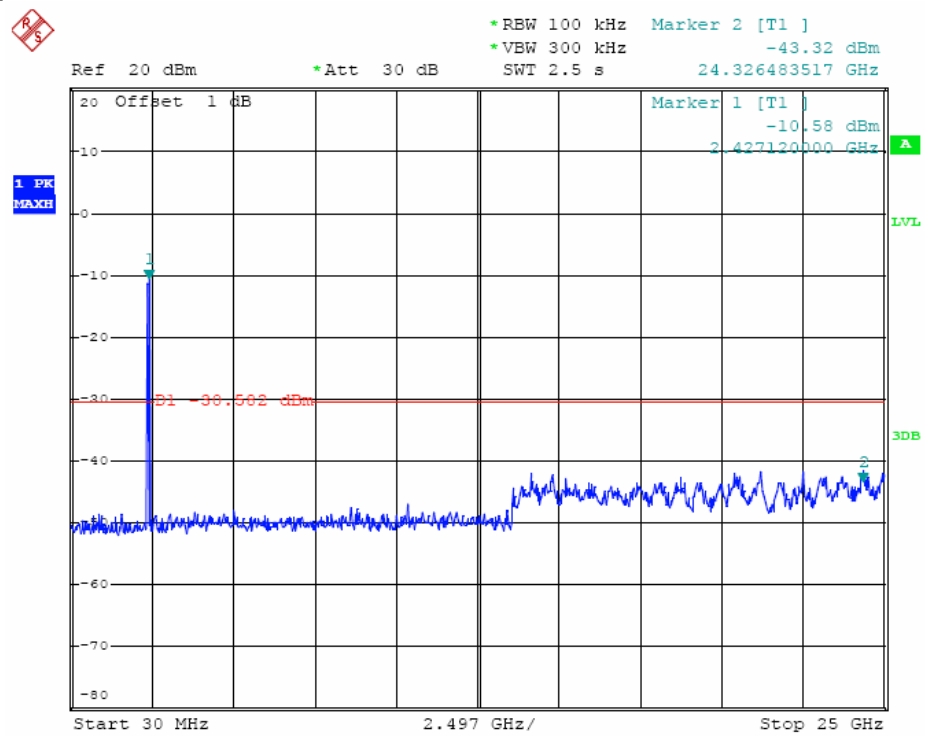
## 802.11n(HT20) 2462MHz



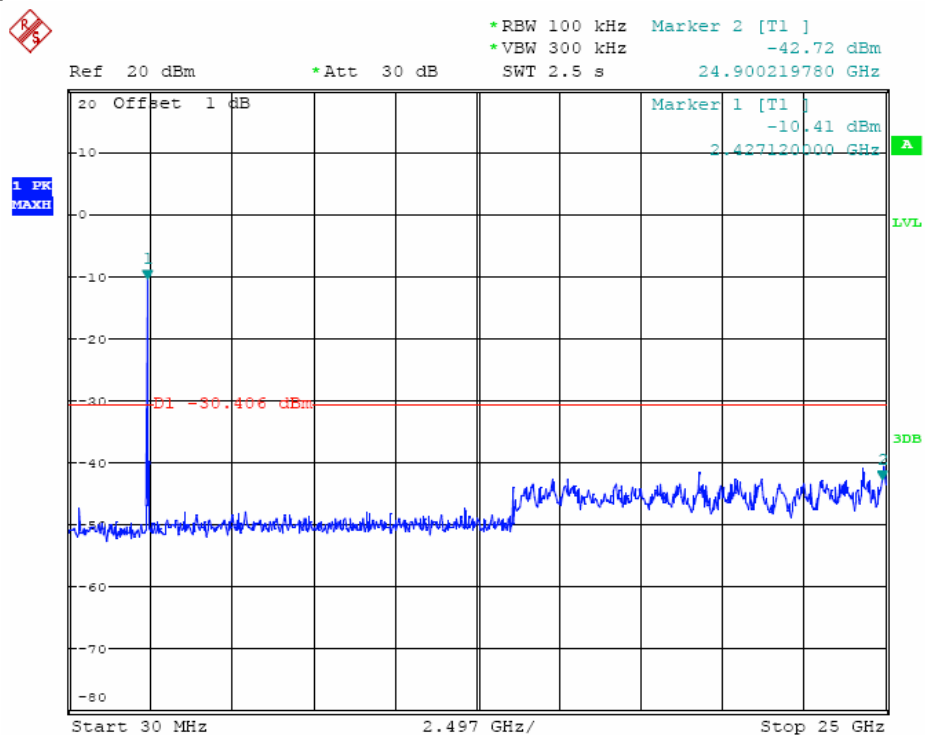
## 802.11n(HT40) 2422MHz



## 802.11n(HT40) 2437MHz



## 802.11n(HT40) 2452MHz



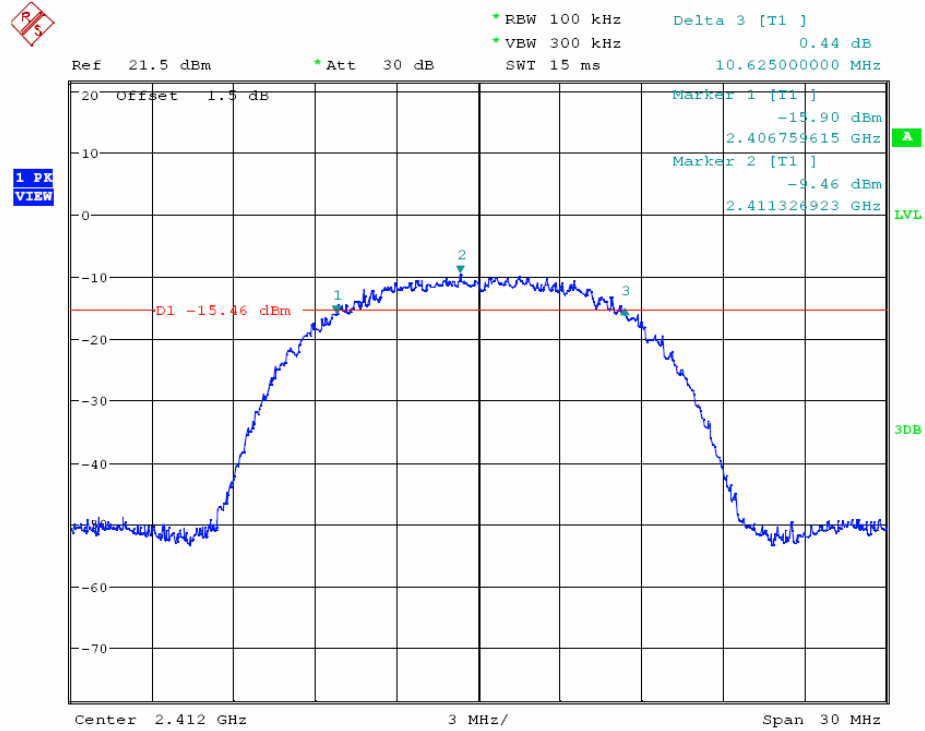
## 5. 6DB OCCUPY BANDWIDTH

### 5.1. Limits

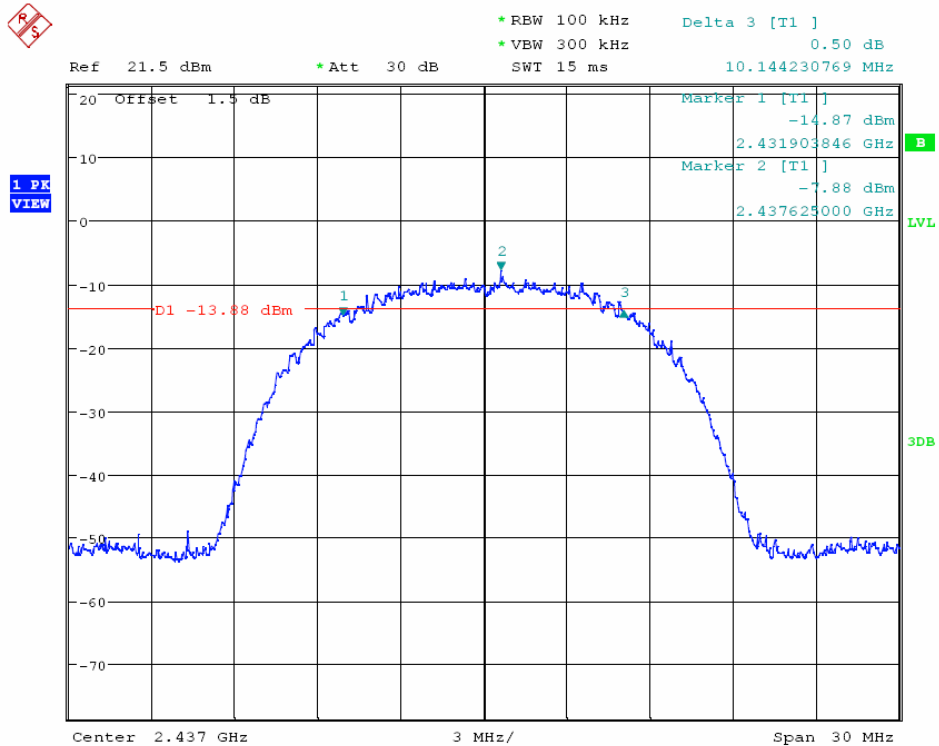
For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz  
Test data:

|               | Channel<br>Frequency (MHz) | 6dB Bandwidth<br>(MHz) | Limit<br>(MHz) | Result |
|---------------|----------------------------|------------------------|----------------|--------|
| 802.11b       | 2412                       | 10.63                  | >0.5           | Pass   |
|               | 2437                       | 10.14                  | >0.5           | Pass   |
|               | 2462                       | 10.10                  | >0.5           | Pass   |
| 802.11g       | 2412                       | 16.63                  | >0.5           | Pass   |
|               | 2437                       | 16.59                  | >0.5           | Pass   |
|               | 2462                       | 16.59                  | >0.5           | Pass   |
| 802.11n(HT20) | 2412                       | 17.84                  | >0.5           | Pass   |
|               | 2437                       | 17.88                  | >0.5           | Pass   |
|               | 2462                       | 17.79                  | >0.5           | Pass   |
| 802.11n(HT40) | 2422                       | 36.62                  | >0.5           | Pass   |
|               | 2437                       | 36.62                  | >0.5           | Pass   |
|               | 2452                       | 36.54                  | >0.5           | Pass   |

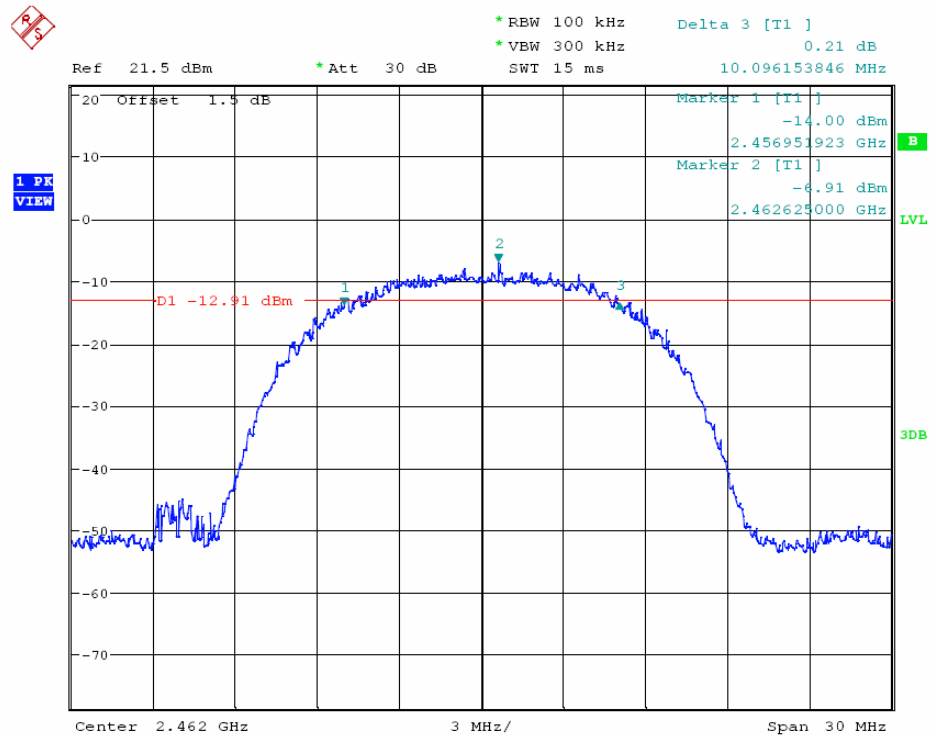
Test plot as follows:  
802.11b 2412MHz



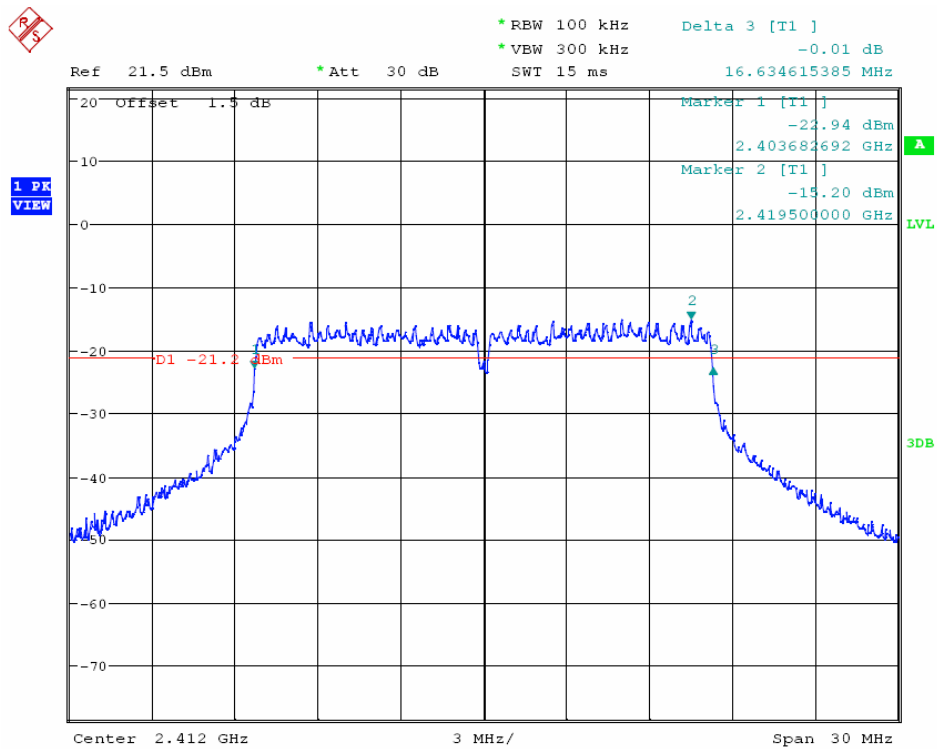
802.11b 2437MHz



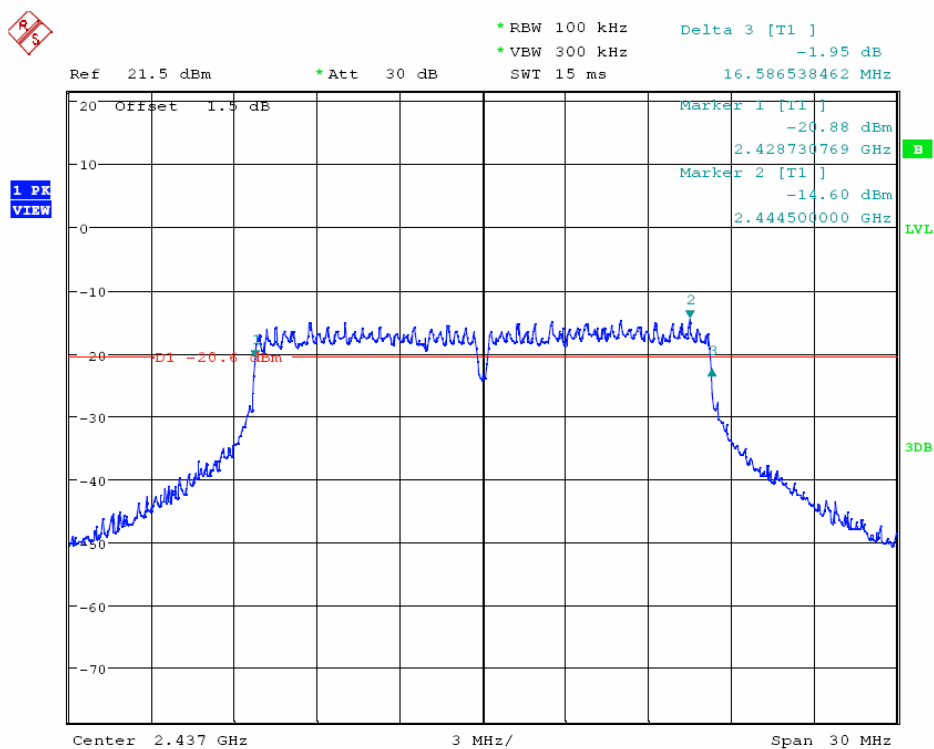
## 802.11b 2462MHz



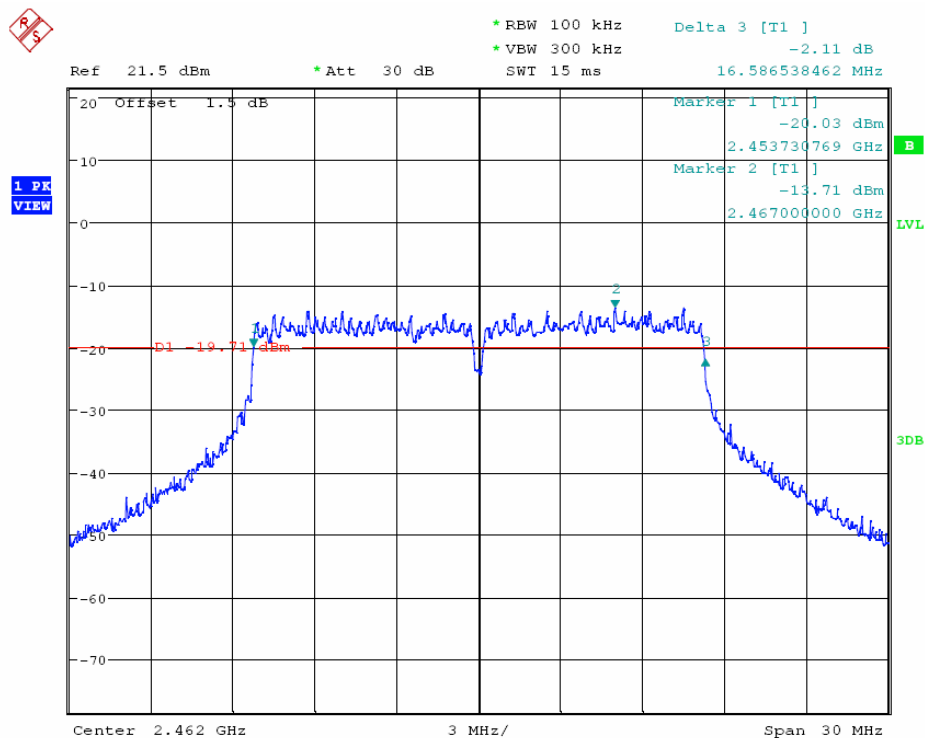
## 802.11g 2412MHz



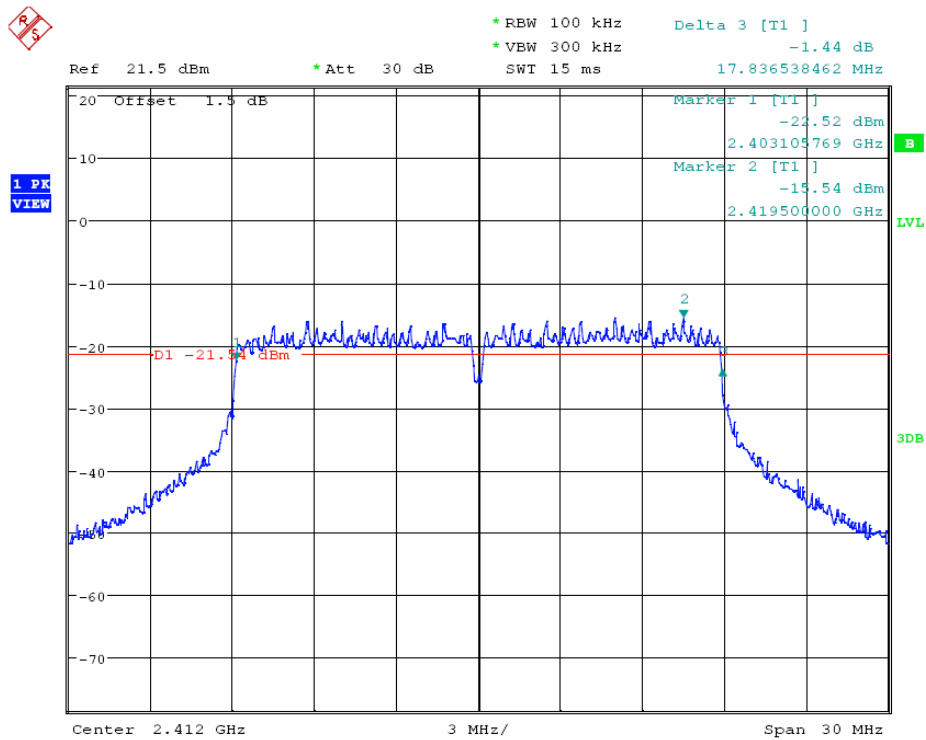
# 802.11g 2437MHz



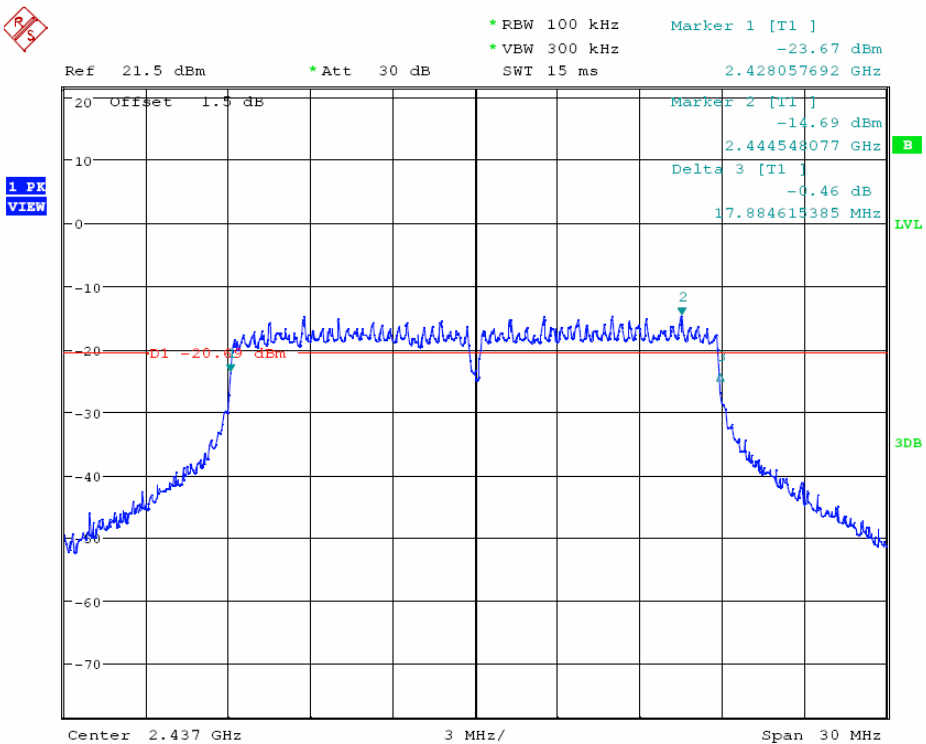
# 802.11g 2462MHz



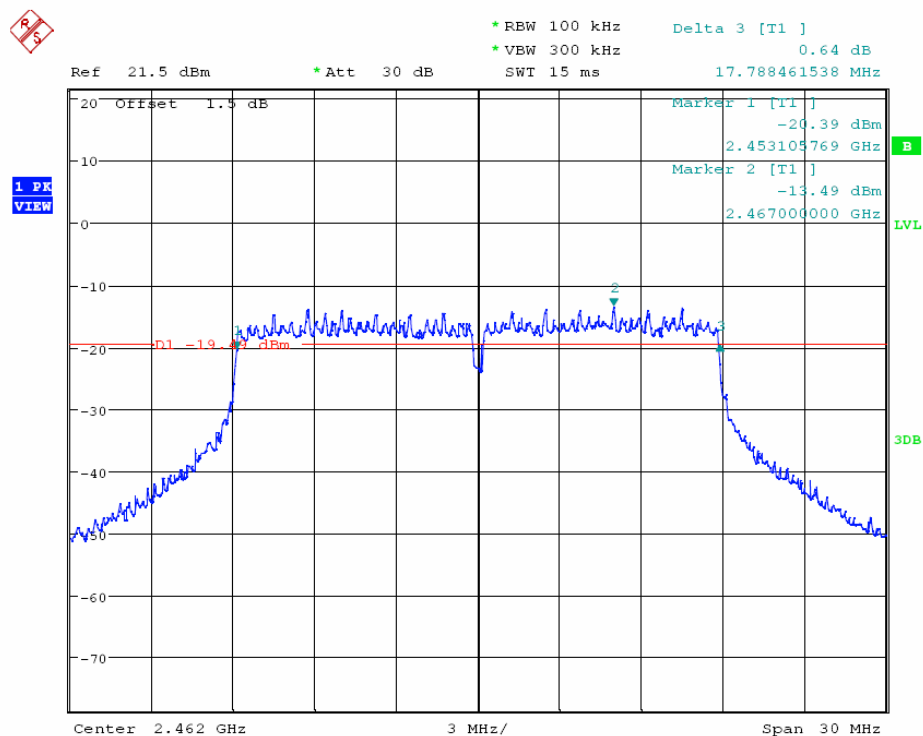
## 802.11n (HT20) 2412MHz



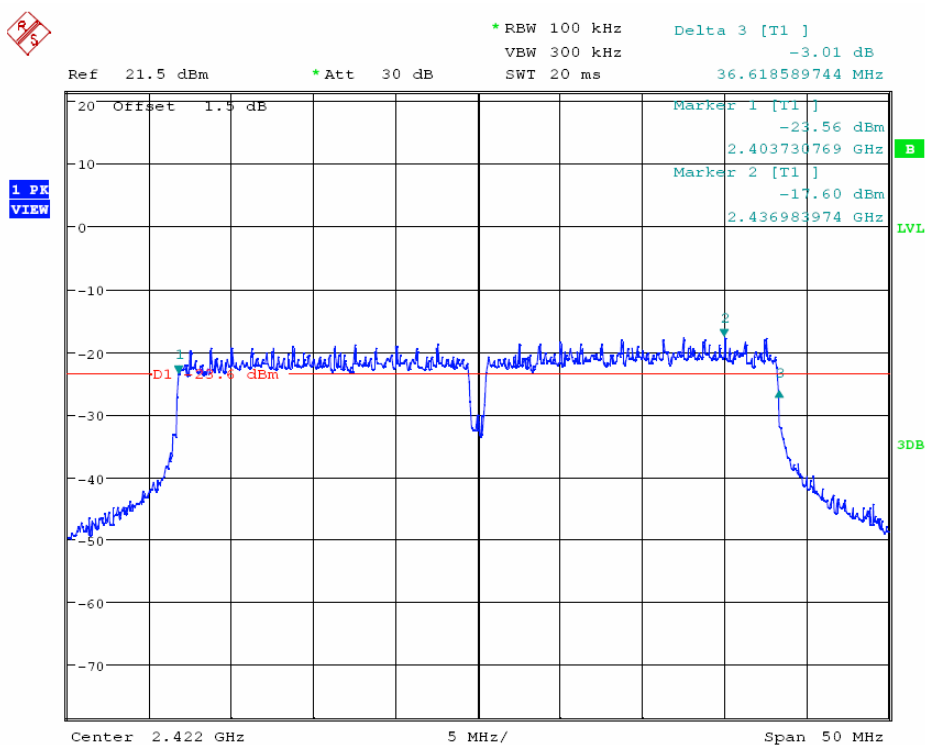
## 802.11n (HT20) 2437MHz



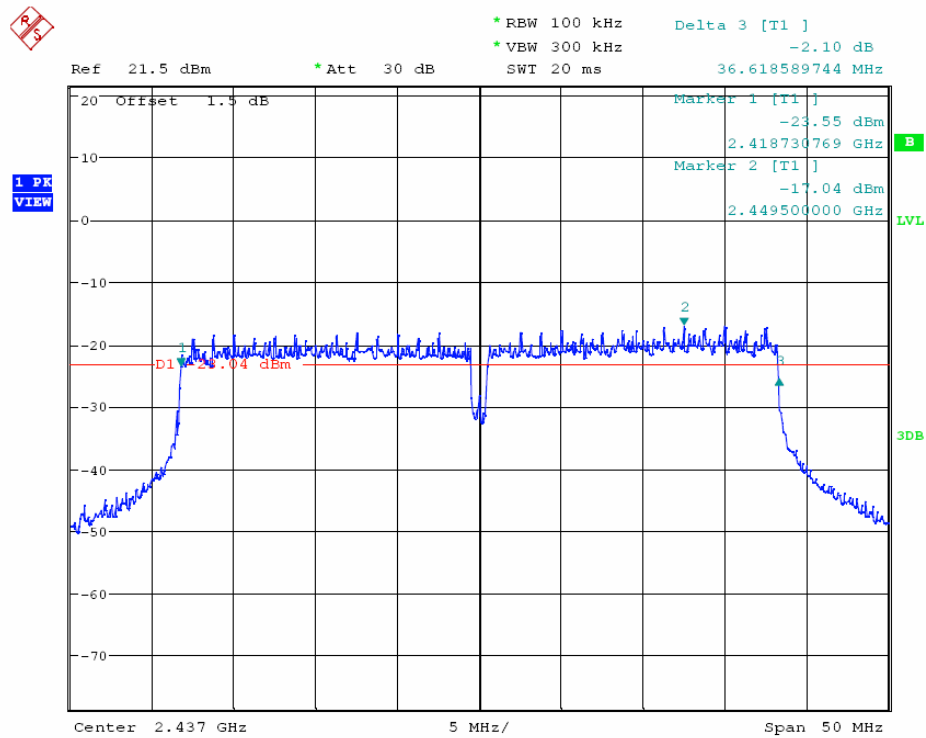
## 802.11n(HT20) 2462MHz



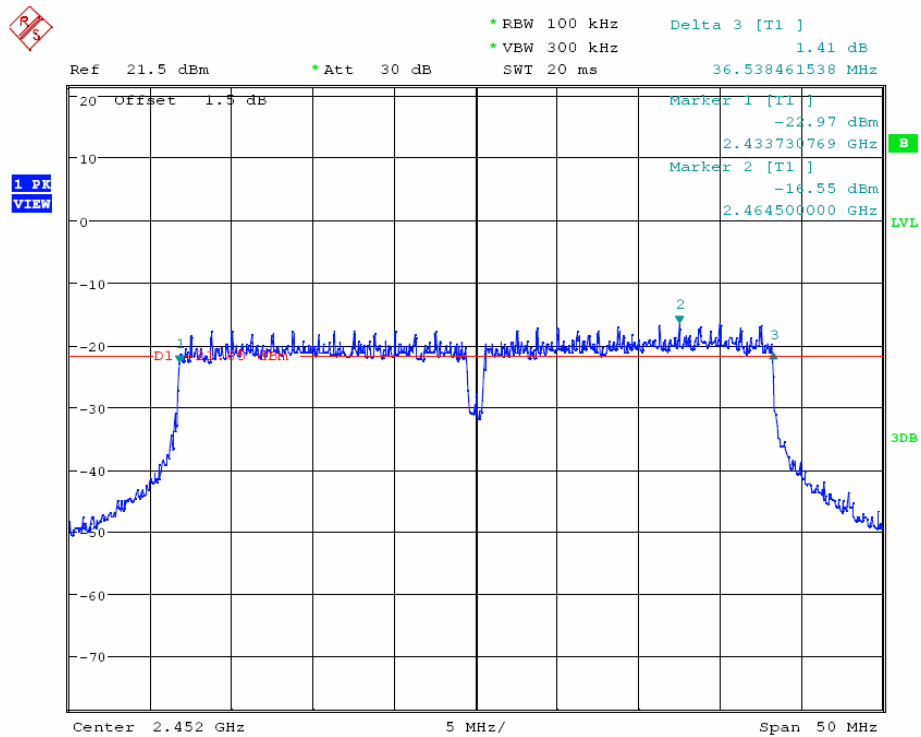
## 802.11n (HT40) 2422MHz



## 802.11n (HT40) 2437MHz



## 802.11n (HT40)2452MHz



## 6. BAND EDGE COMPLIANCE TEST

### 6.1. Limits

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

### 6.2. Test setup

The EUT was placed on a turn table which was 0.8 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure.

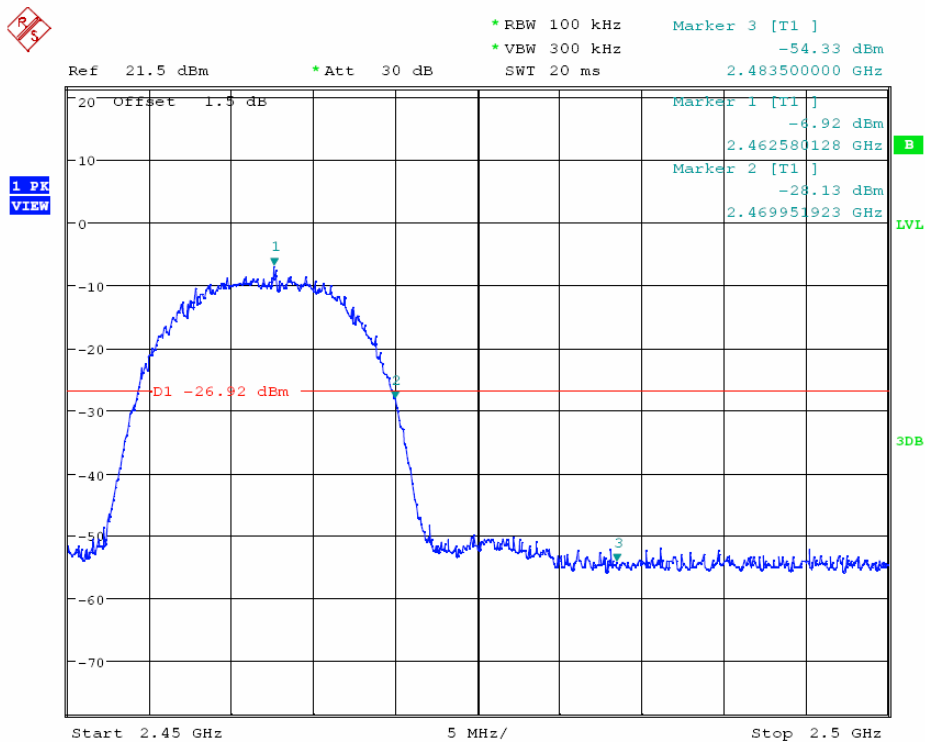
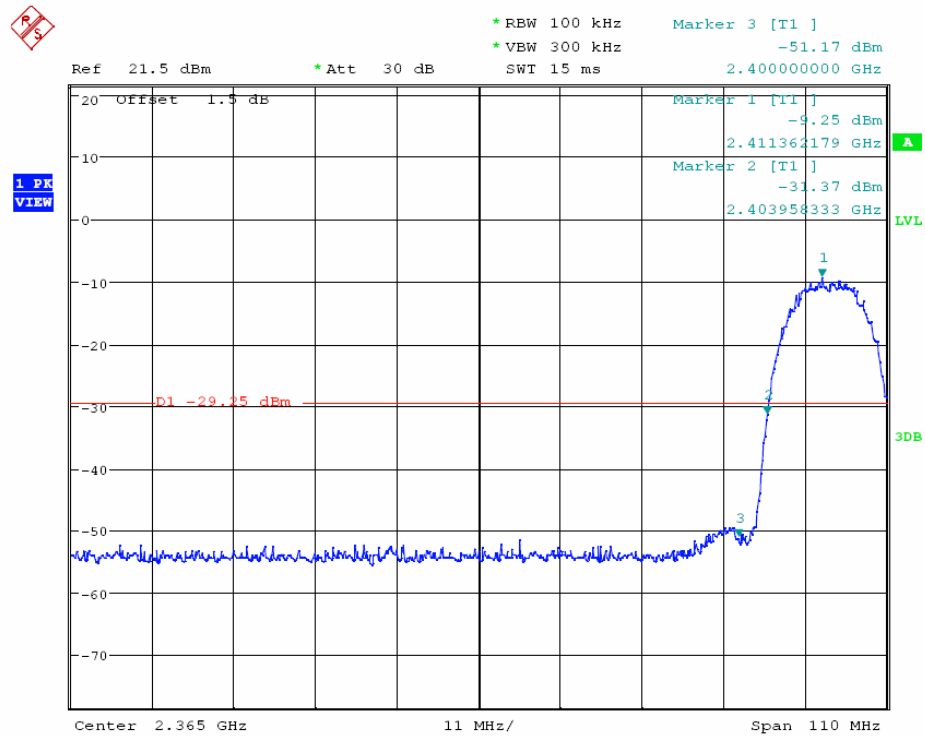
For conduct test, VBW is set at 300kHz and RBW is set at 100kHz for measurement.

Note: 1. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

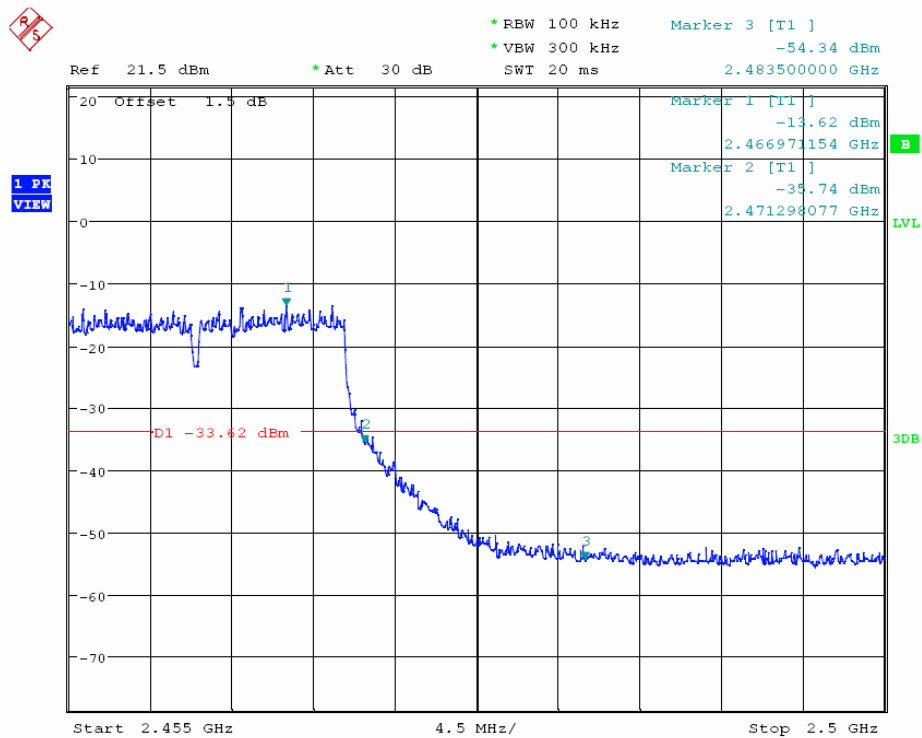
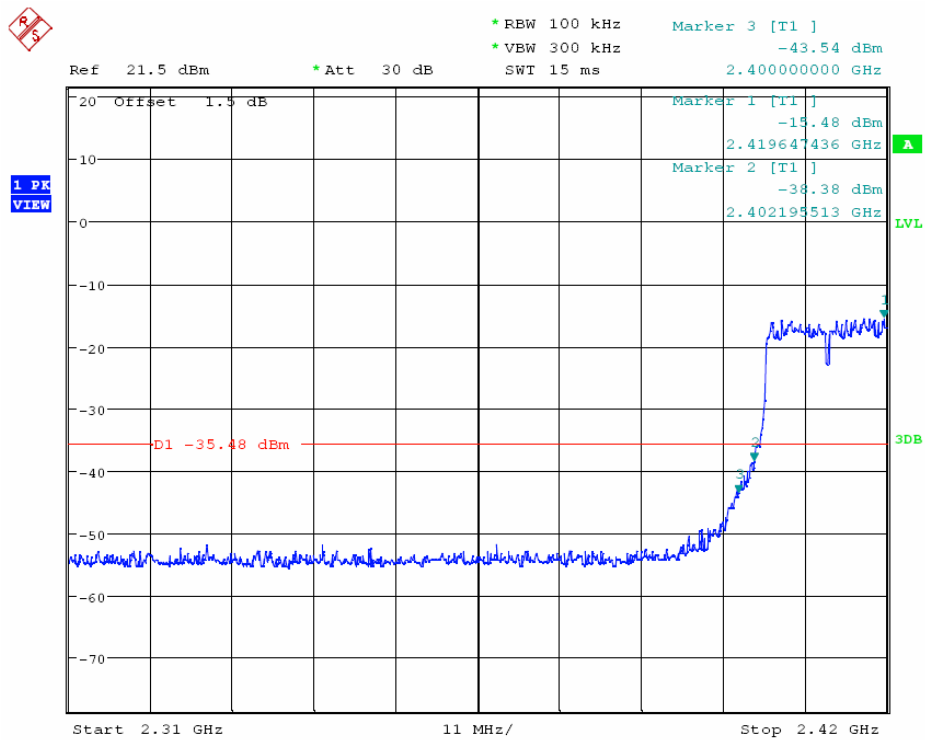
2. For Both PK and AV value above 1GHz, PK detector is used.

For radiated test as follows:

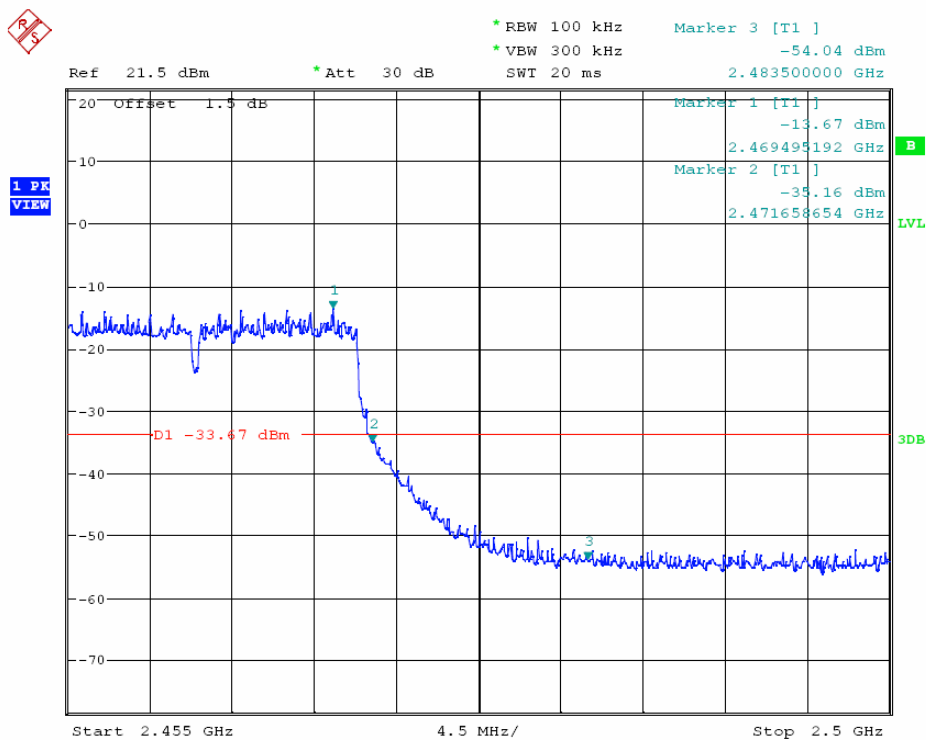
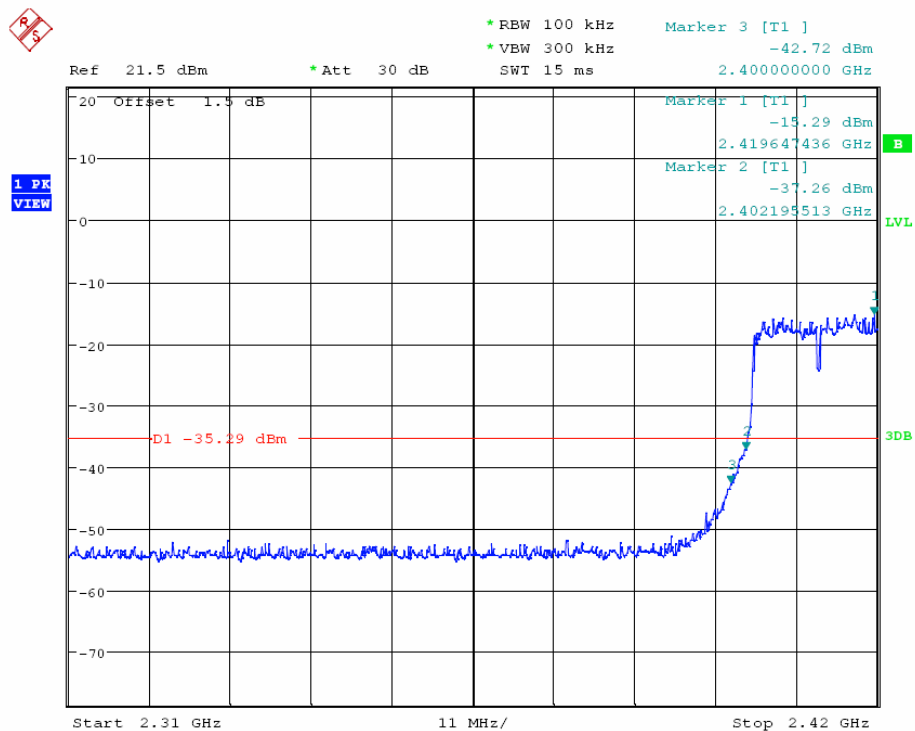
802.11b



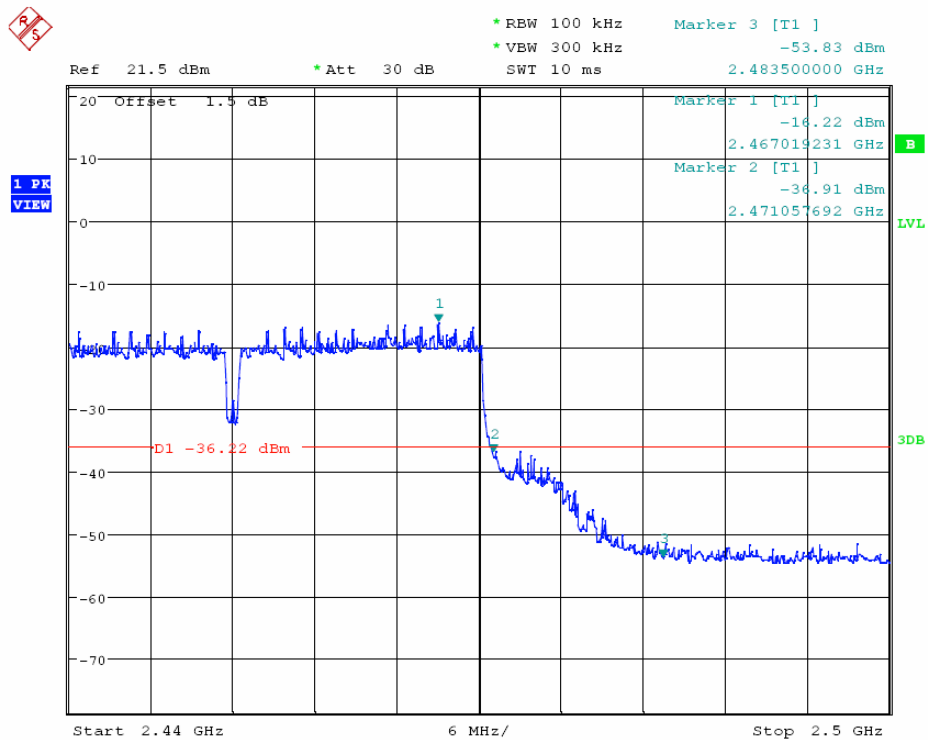
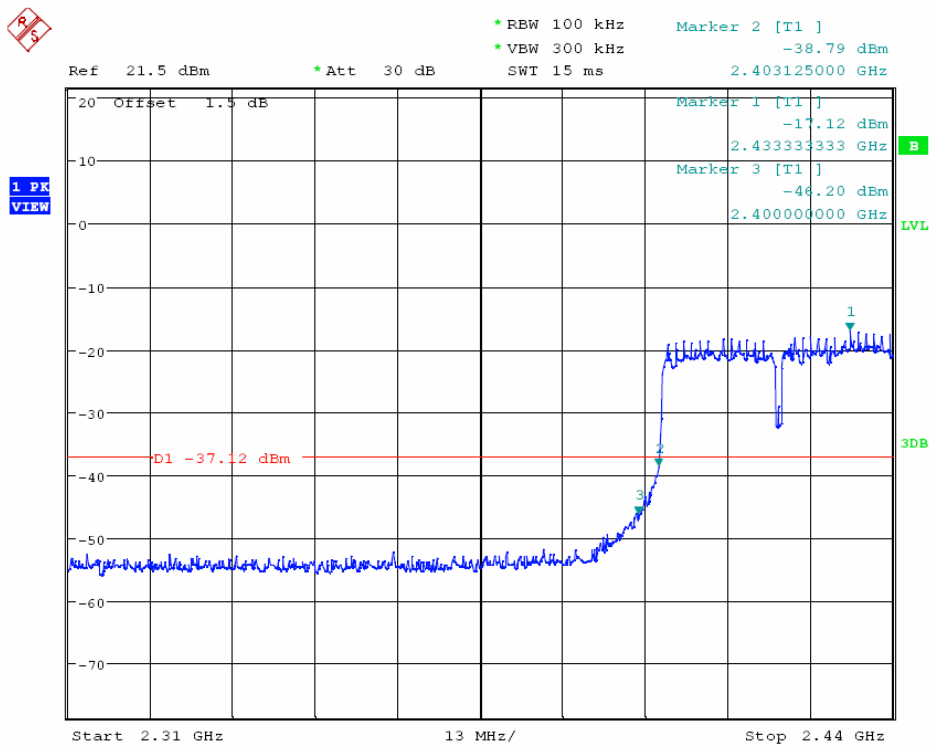
802.11g



## 802.11n(HT20)



802.11n(HT40)



For radiated test as follows:

|               | Frequency<br>(MHz) | Antenna<br>polarization<br>(H/V) | Emission<br>(dBuV/m) | Band edge Limit<br>(dBuV/m) |       | Result |
|---------------|--------------------|----------------------------------|----------------------|-----------------------------|-------|--------|
|               |                    |                                  | PK                   | PK                          | AV    |        |
| 802.11b       | <2400              | H                                | 45.34                | 74.00                       | 54.00 | Pass   |
|               | <2400              | V                                | 44.79                | 74.00                       | 54.00 | Pass   |
|               | >2483.5            | H                                | 44.92                | 74.00                       | 54.00 | Pass   |
|               | >2483.5            | V                                | 44.61                | 74.00                       | 54.00 | Pass   |
| 802.11g       | <2400              | H                                | 45.71                | 74.00                       | 54.00 | Pass   |
|               | <2400              | V                                | 43.97                | 74.00                       | 54.00 | Pass   |
|               | >2483.5            | H                                | 42.78                | 74.00                       | 54.00 | Pass   |
|               | >2483.5            | V                                | 43.04                | 74.00                       | 54.00 | Pass   |
| 802.11n(HT20) | <2400              | H                                | 44.61                | 74.00                       | 54.00 | Pass   |
|               | <2400              | V                                | 43.76                | 74.00                       | 54.00 | Pass   |
|               | >2483.5            | H                                | 44.08                | 74.00                       | 54.00 | Pass   |
|               | >2483.5            | V                                | 43.42                | 74.00                       | 54.00 | Pass   |
| 802.11n(HT40) | <2400              | H                                | 43.42                | 74.00                       | 54.00 | Pass   |
|               | <2400              | V                                | 42.89                | 74.00                       | 54.00 | Pass   |
|               | >2483.5            | H                                | 43.49                | 74.00                       | 54.00 | Pass   |
|               | >2483.5            | V                                | 44.18                | 74.00                       | 54.00 | Pass   |

Note:

1: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

2: All restricted frequency bands have been tested , include 2310MHz to 2390MHz and 2483.5MHz to 2500MHz, only worse result is reported as above.

## 7. OUTPUT POWER TEST

### 7.1. Limits

For systems using digital modulation in the 2400~2483.5MHz, The Peak out put Power shall not exceed 1W (30dBm)

### 7.2. Test setup

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW =1MHz.
4. Set the VBW  $\geq 3$  times RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

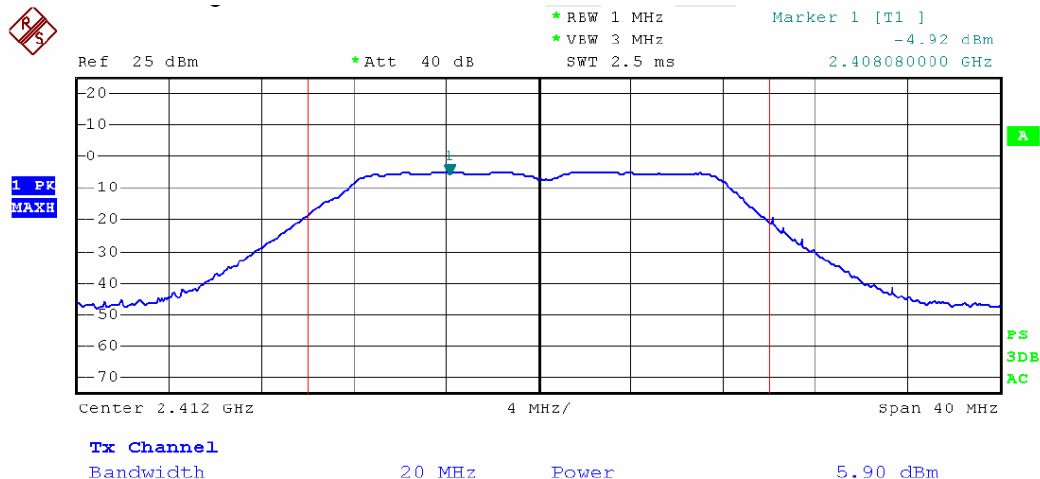
Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

### 7.3. Test result

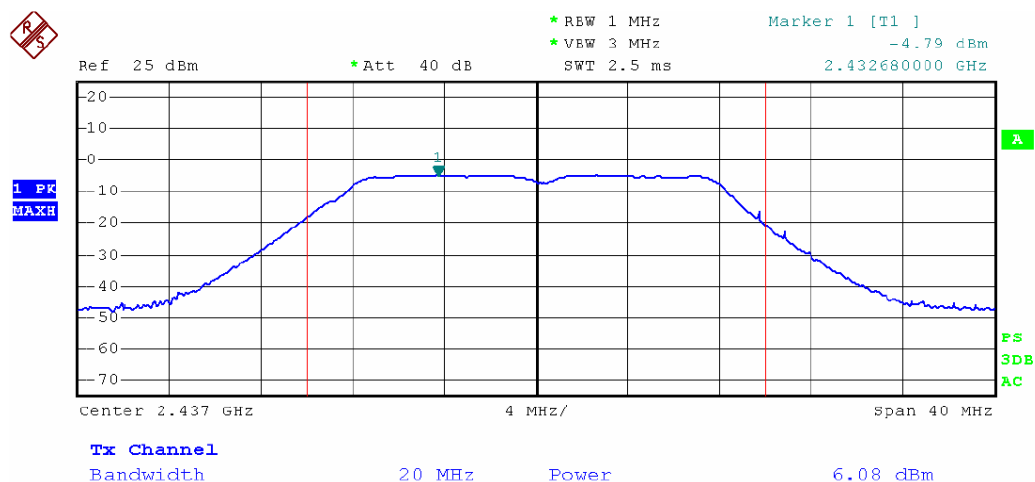
|               | Channel Frequency (MHz) | output Power(dBm) | Limit (dBm) | Result |
|---------------|-------------------------|-------------------|-------------|--------|
| 802.11b       | 2412                    | 7.05              | 30          | Pass   |
|               | 2437                    | 7.27              | 30          | Pass   |
|               | 2462                    | 7.20              | 30          | Pass   |
| 802.11g       | 2412                    | 5.90              | 30          | Pass   |
|               | 2437                    | 6.08              | 30          | Pass   |
|               | 2462                    | 6.09              | 30          | Pass   |
| 802.11n(HT20) | 2412                    | 6.13              | 30          | Pass   |
|               | 2437                    | 6.26              | 30          | Pass   |
|               | 2462                    | 6.29              | 30          | Pass   |
| 802.11n(HT40) | 2422                    | 6.03              | 30          | Pass   |
|               | 2437                    | 5.41              | 30          | Pass   |
|               | 2452                    | 5.50              | 30          | Pass   |



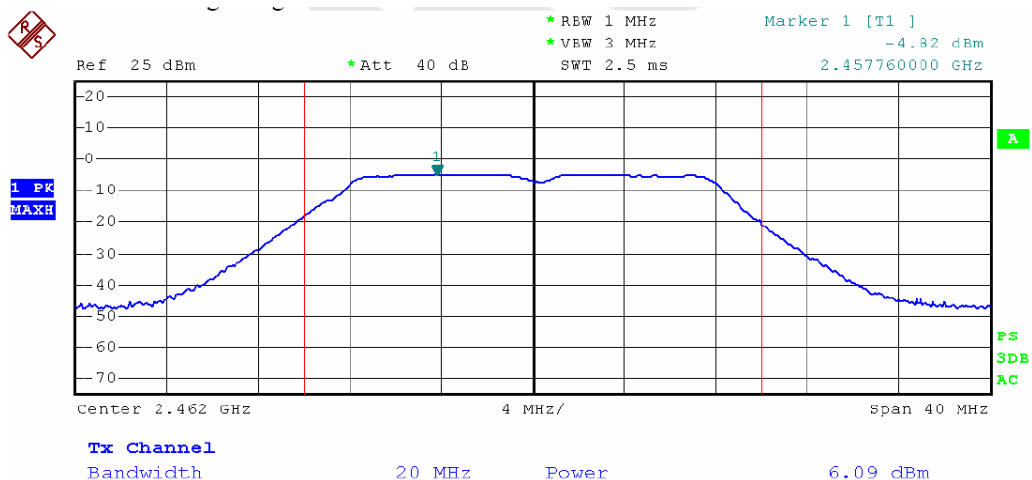
## 802.11g 2412MHz



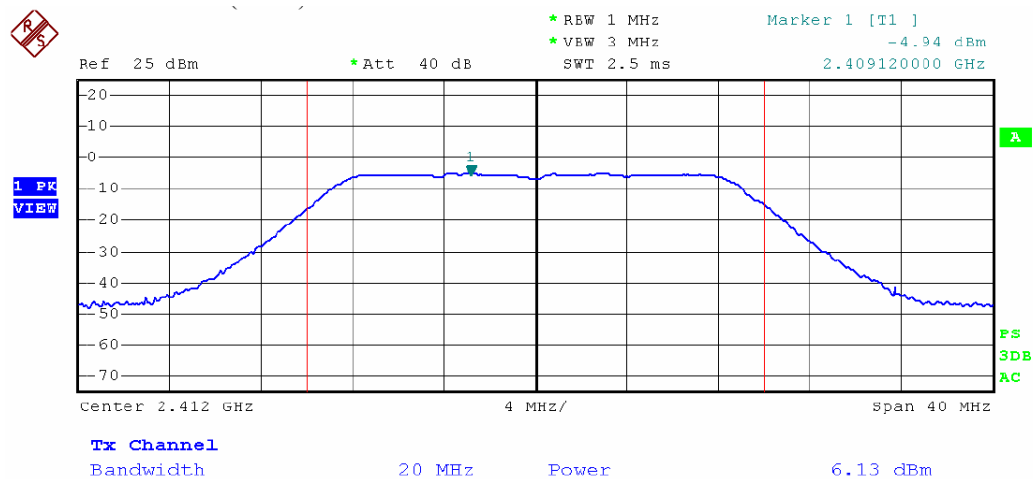
## 802.11g 2437MHz



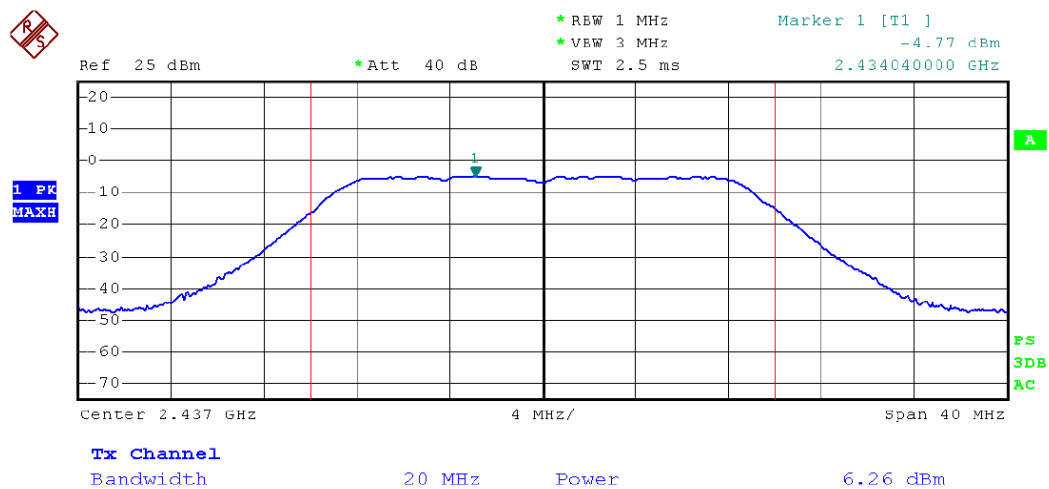
## 802.11g 2462MHz



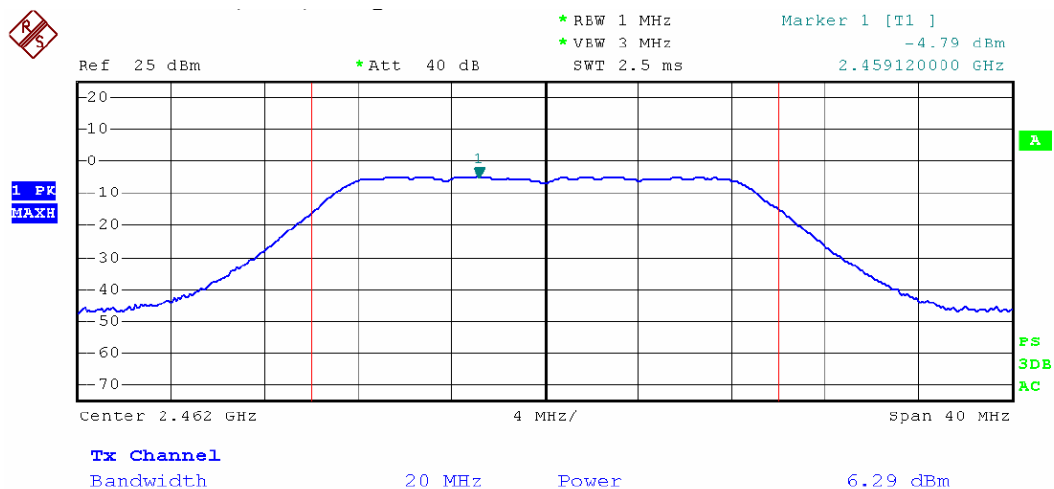
## 802.11n (HT20) 2412MHz



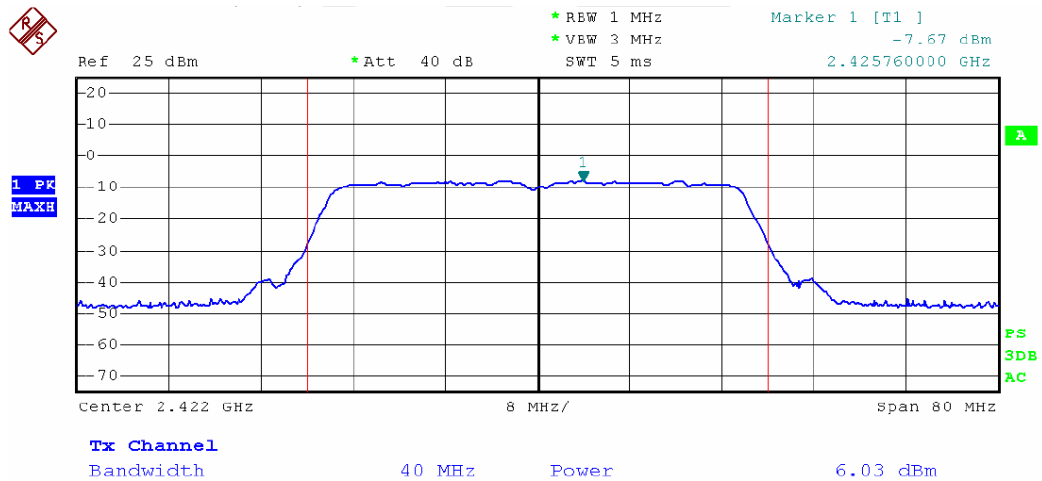
## 802.11n (HT20) 2437MHz



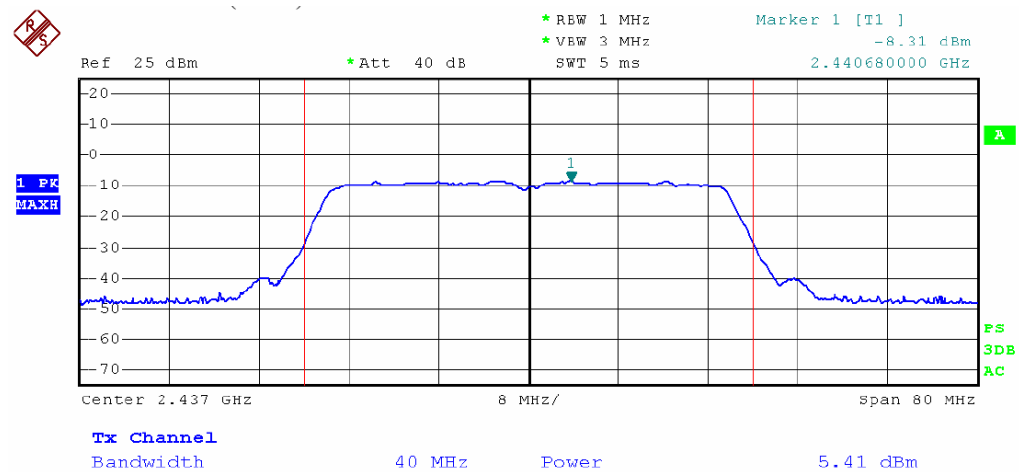
## 802.11n(HT20) 2462MHz



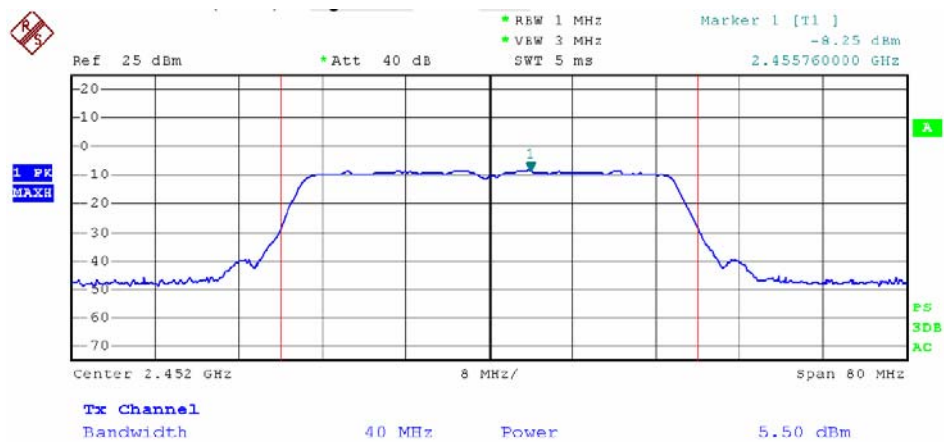
## 802.11n (HT40) 2422MHz



## 802.11n (HT40) 2437MHz



## 802.11n(HT40) 2452MHz



## 8. POWER SPECTRAL DENSITY TEST

### 8.1. Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

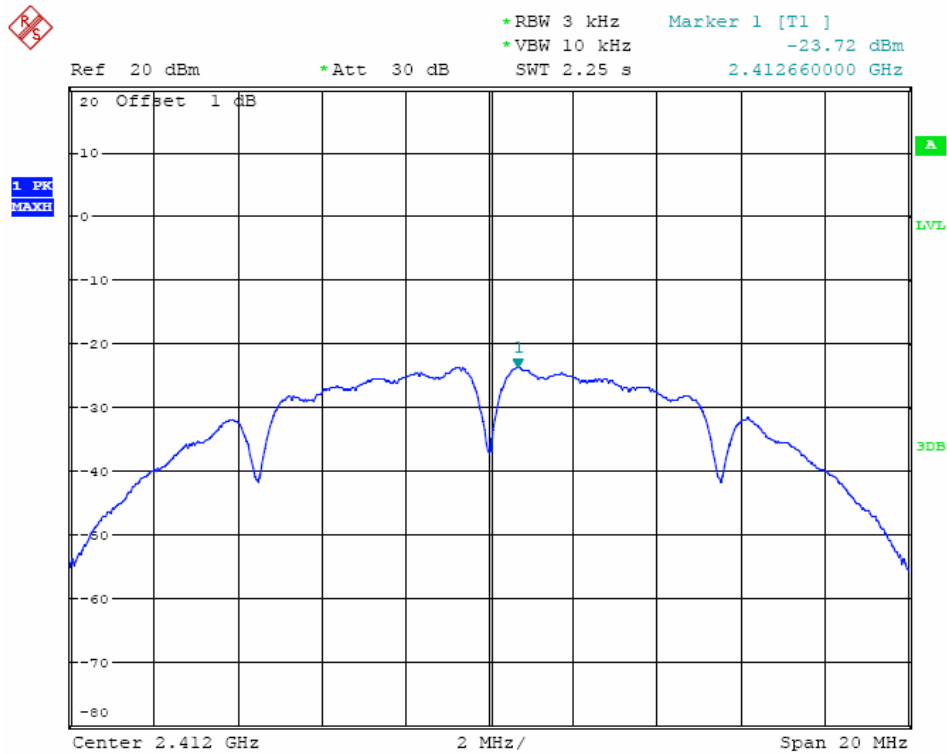
### 8.2. Test setup

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW =3kHz.
4. Set the VBW  $\geq 3$  times RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

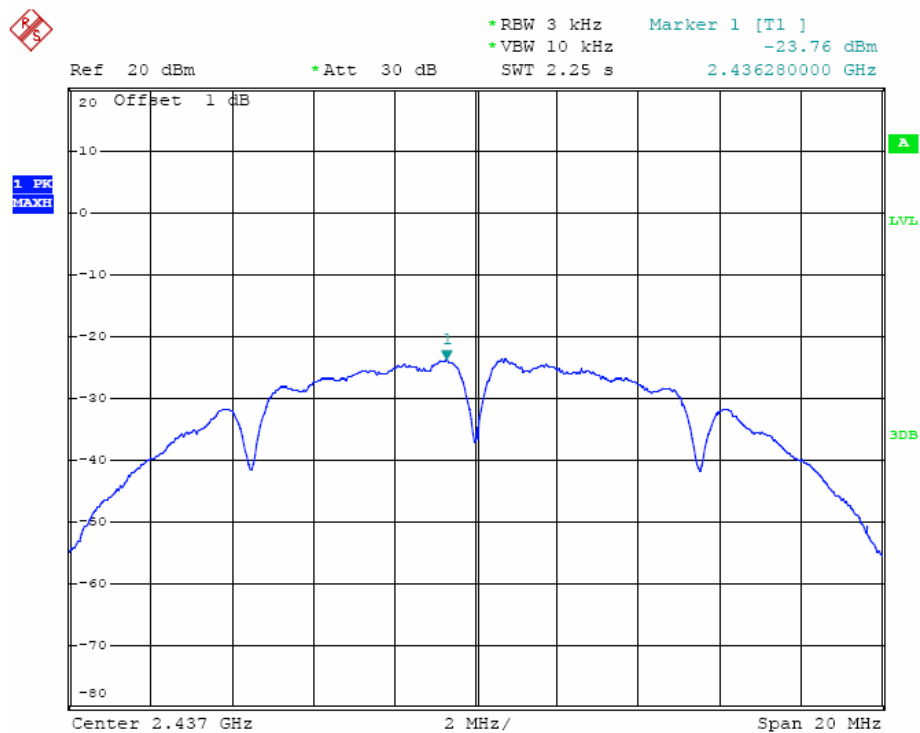
### 8.3. Test result

|                   | Channel<br>Frequency (MHz) | Power density<br>(dBm/3kHz) | Limit<br>(dBm/3kHz) | Result |
|-------------------|----------------------------|-----------------------------|---------------------|--------|
| 802.11b           | 2412                       | -23.72                      | 8                   | Pass   |
|                   | 2437                       | -23.76                      | 8                   | Pass   |
|                   | 2462                       | -23.94                      | 8                   | Pass   |
| 802.11g           | 2412                       | -22.72                      | 8                   | Pass   |
|                   | 2437                       | -22.65                      | 8                   | Pass   |
|                   | 2462                       | -23.00                      | 8                   | Pass   |
| 802.11n<br>(HT20) | 2412                       | -21.79                      | 8                   | Pass   |
|                   | 2437                       | -21.99                      | 8                   | Pass   |
|                   | 2462                       | -22.32                      | 8                   | Pass   |
| 802.11n<br>(HT40) | 2422                       | -22.40                      | 8                   | Pass   |
|                   | 2437                       | -22.09                      | 8                   | Pass   |
|                   | 2452                       | -19.96                      | 8                   | Pass   |
|                   |                            |                             |                     |        |

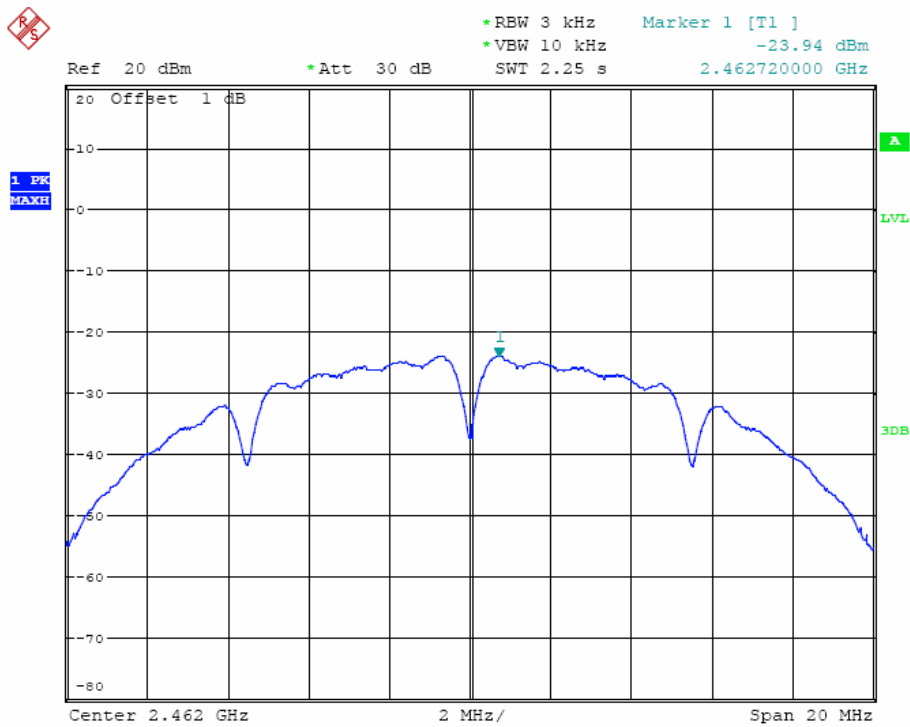
### 802.11b 2412MHz



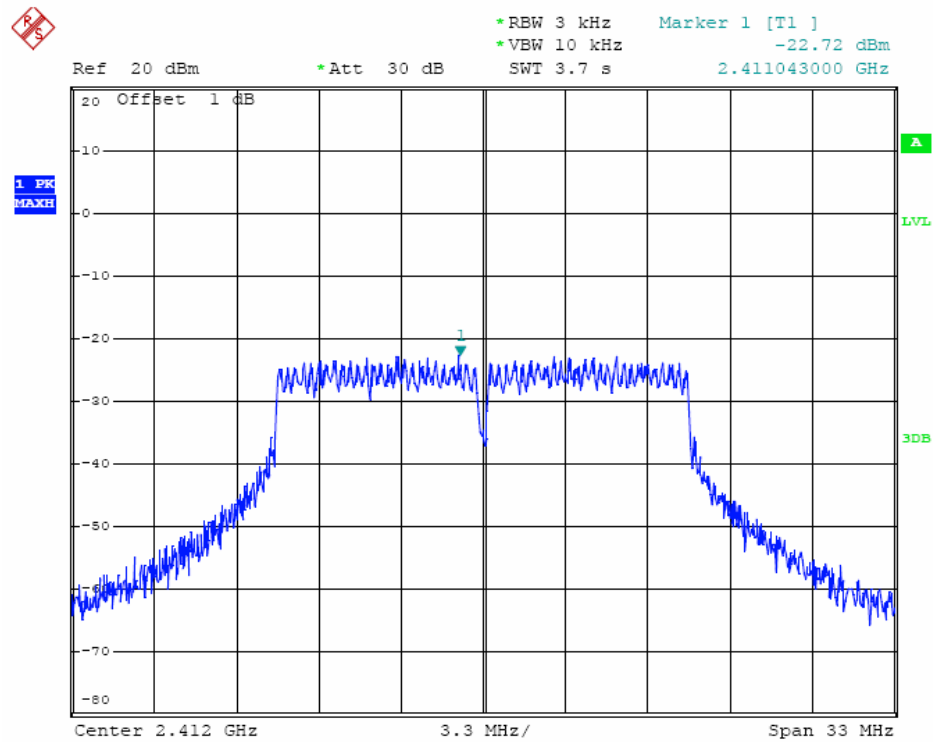
### 802.11b 2437MHz



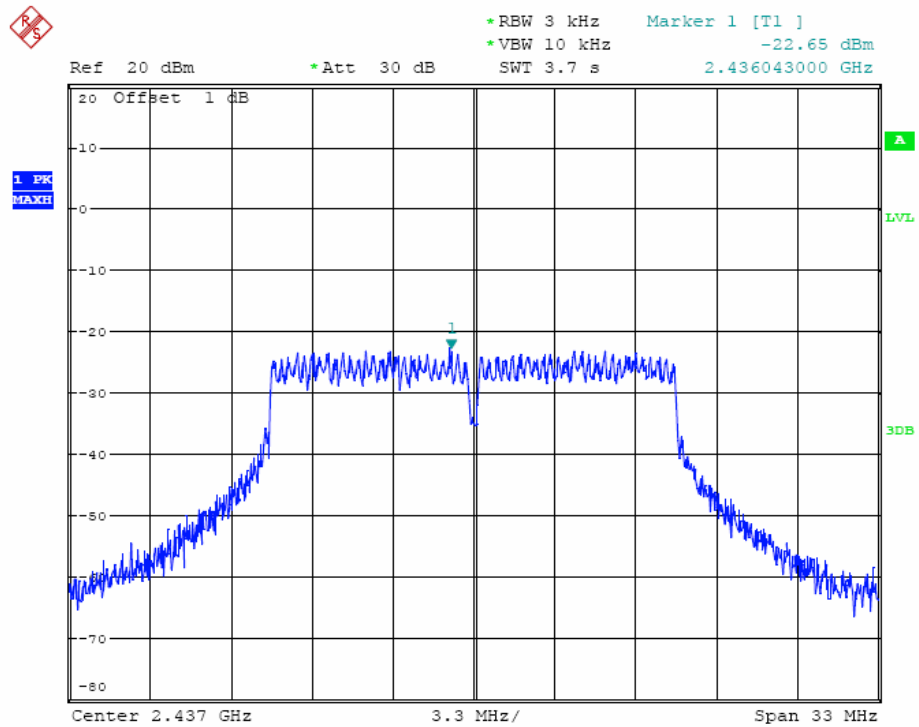
### 802.11b 2462MHz



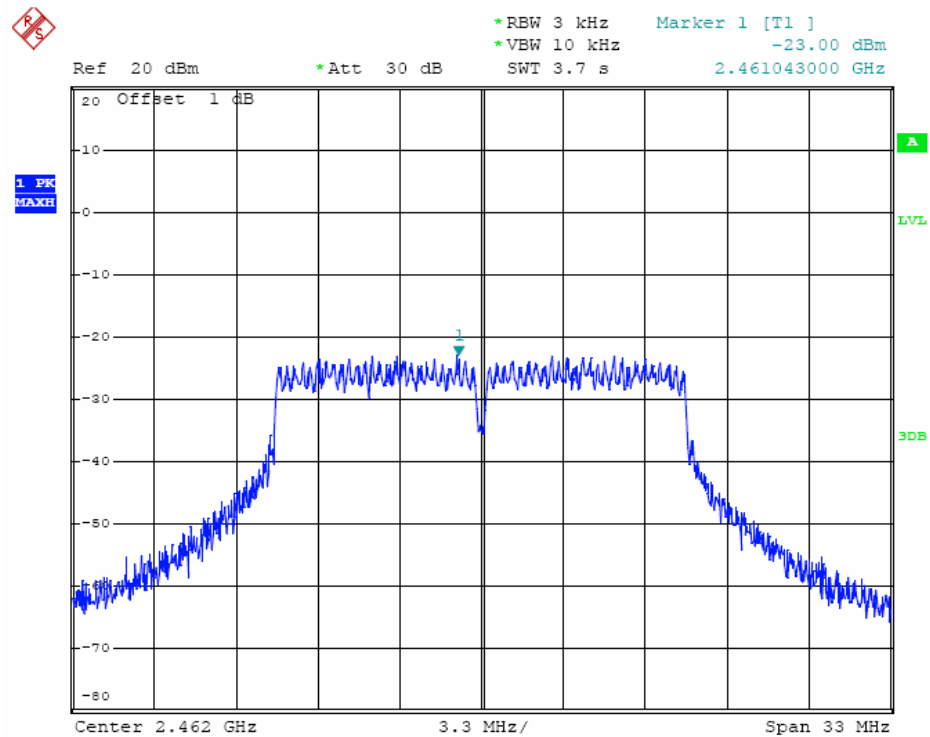
### 802.11g 2412MHz



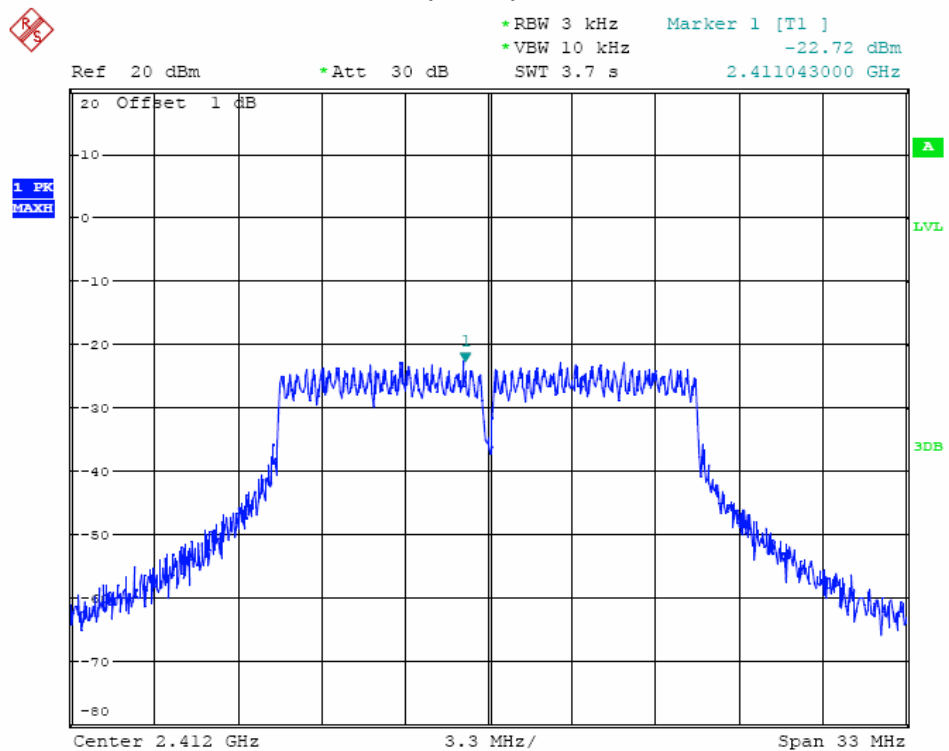
## 802.11g 2437MHz



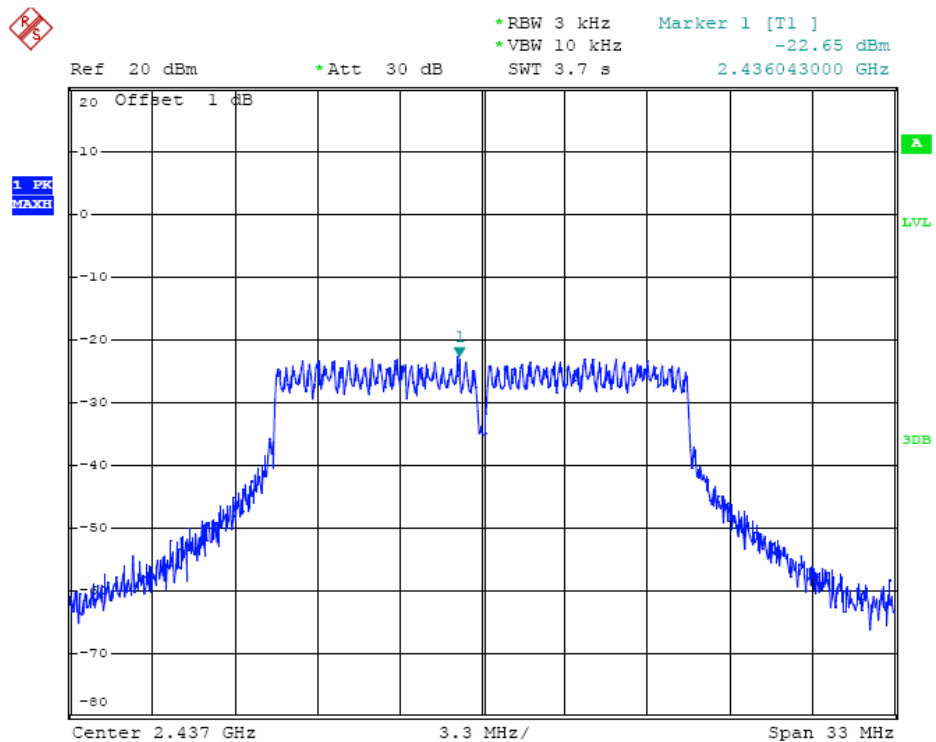
## 802.11g 2462MHz



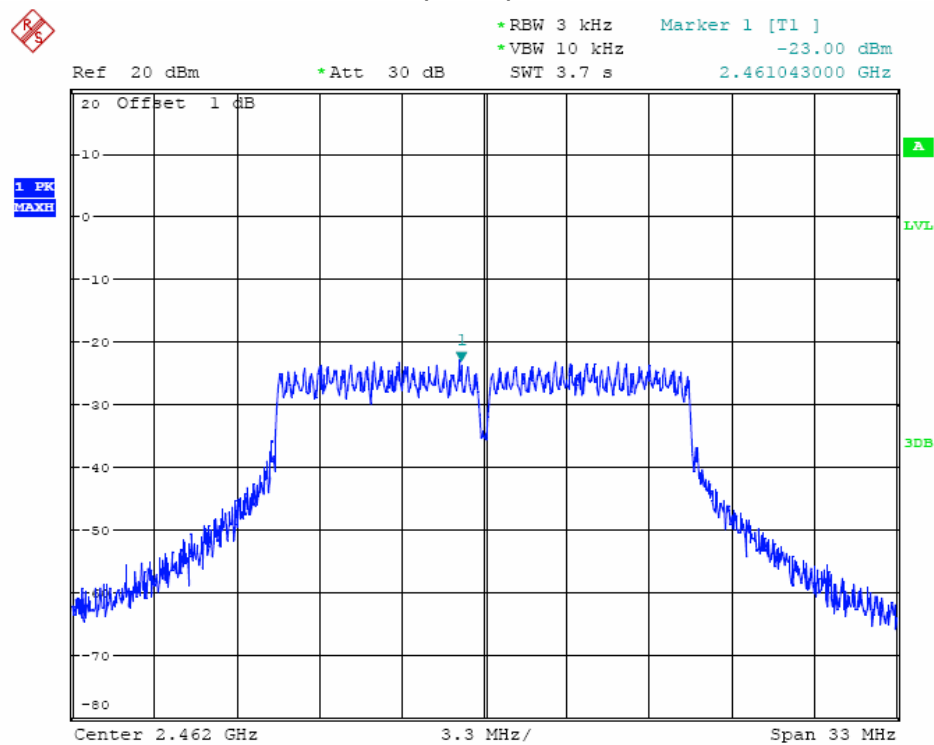
## 802.11n (HT20) 2412MHz



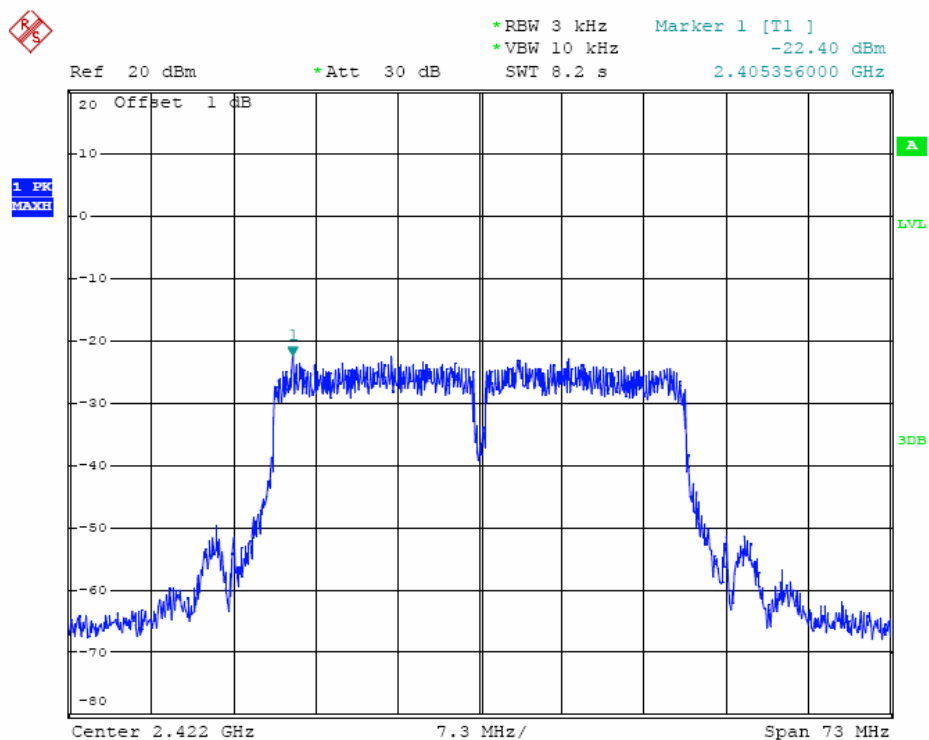
## 802.11n (HT20) 2437MHz



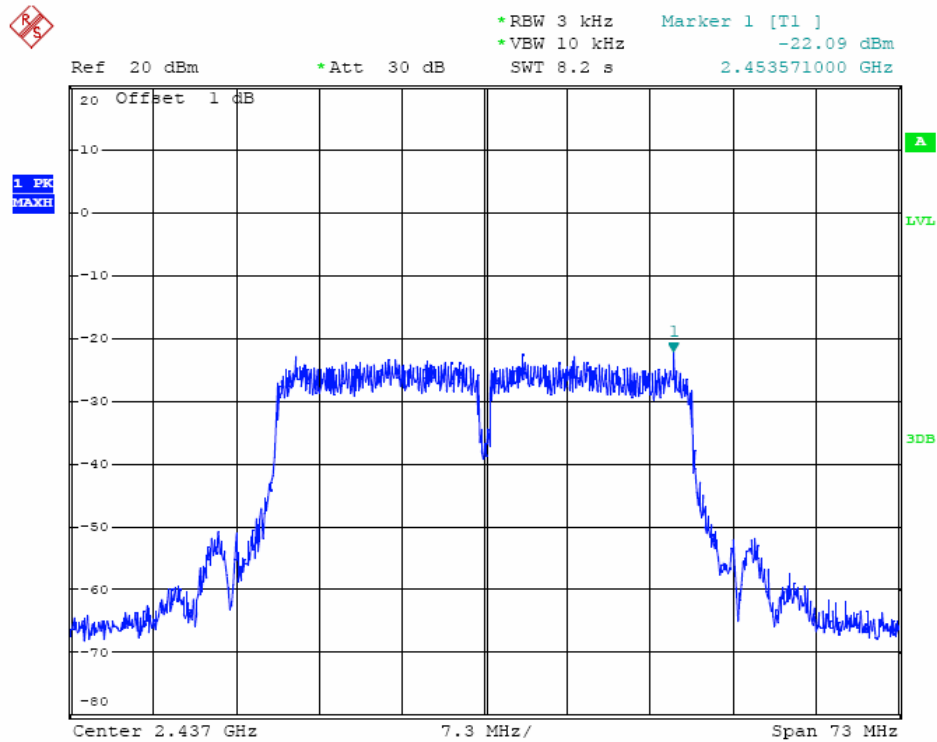
## 802.11n(HT20) 2462MHz



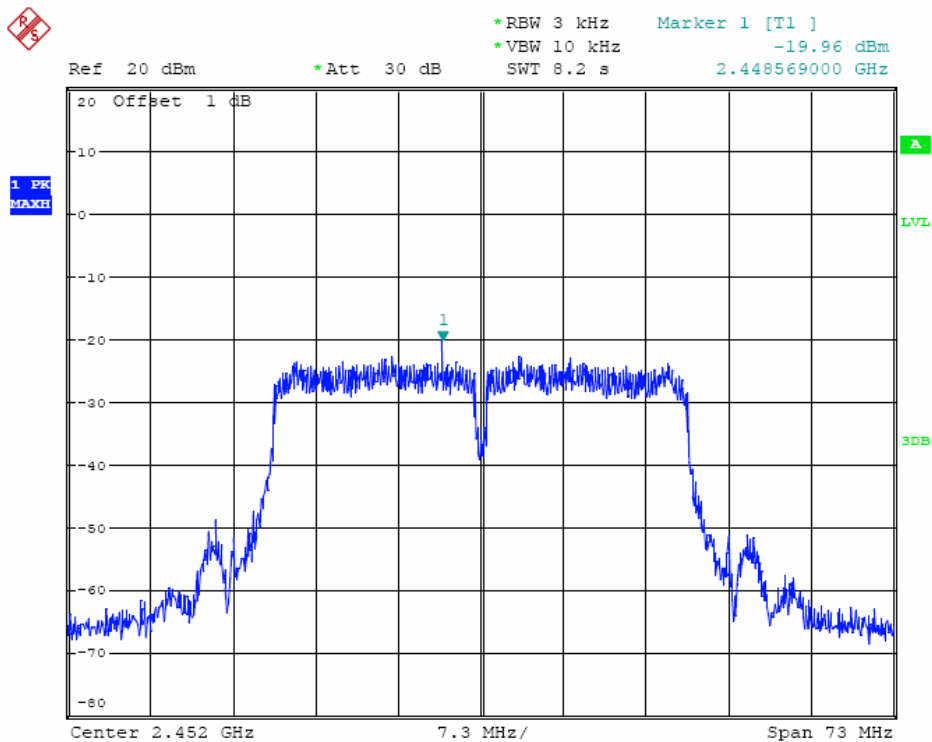
## 802.11 n (HT40) 2422MHz



# 802.11 n (HT40) 2437MHz



# 802.11 n (HT40)2452MHz



## 9. ANTENNA REQUIREMENTS

### 9.1. Limits

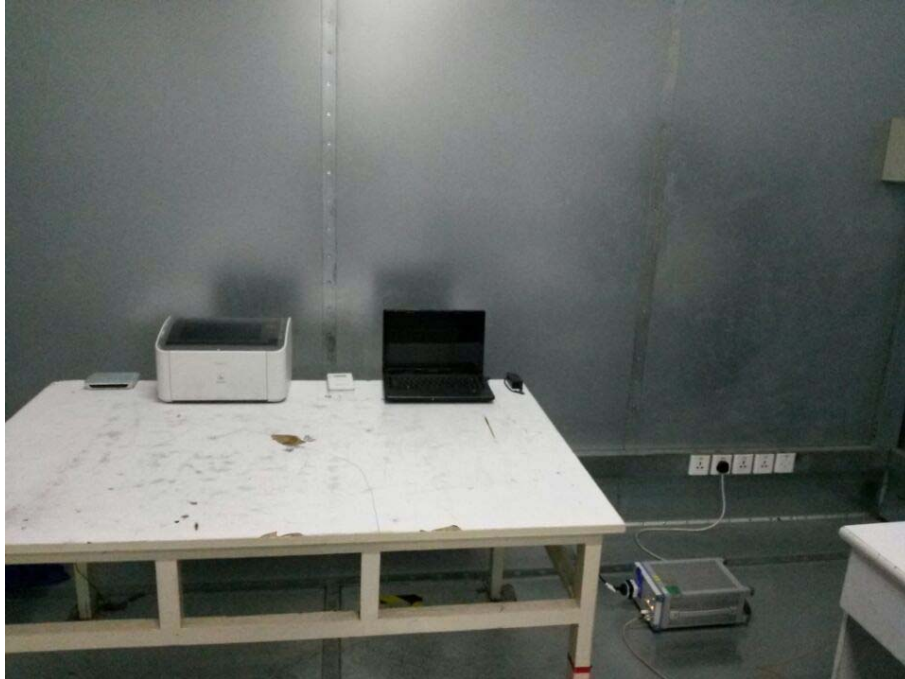
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional 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.

### 9.2. Result

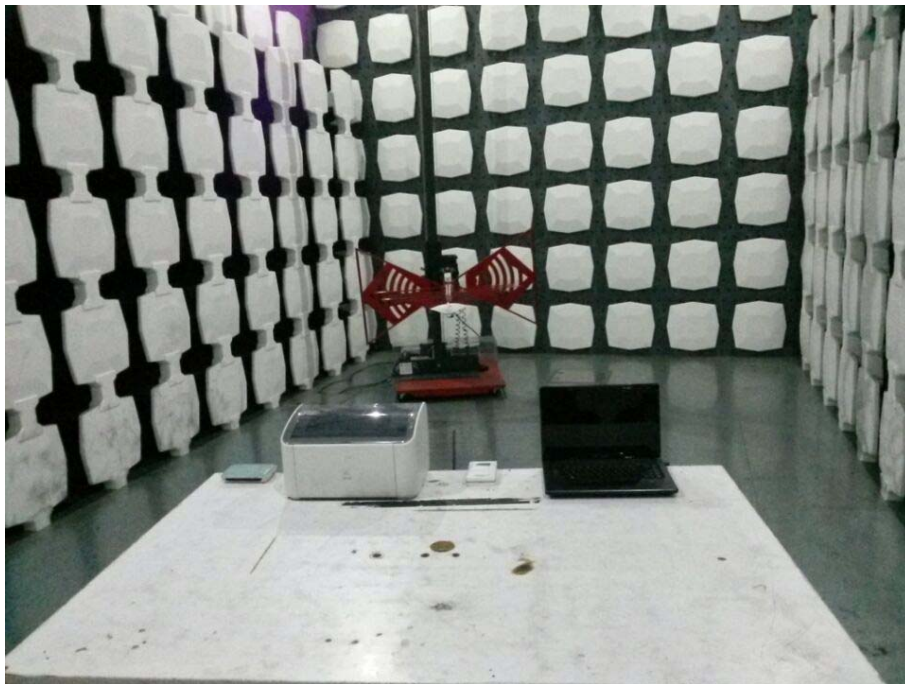
The antennas used for this product are integral Patch Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 3.8dBi.

## 10. PHOTOGRAPHS OF TEST SET-UP

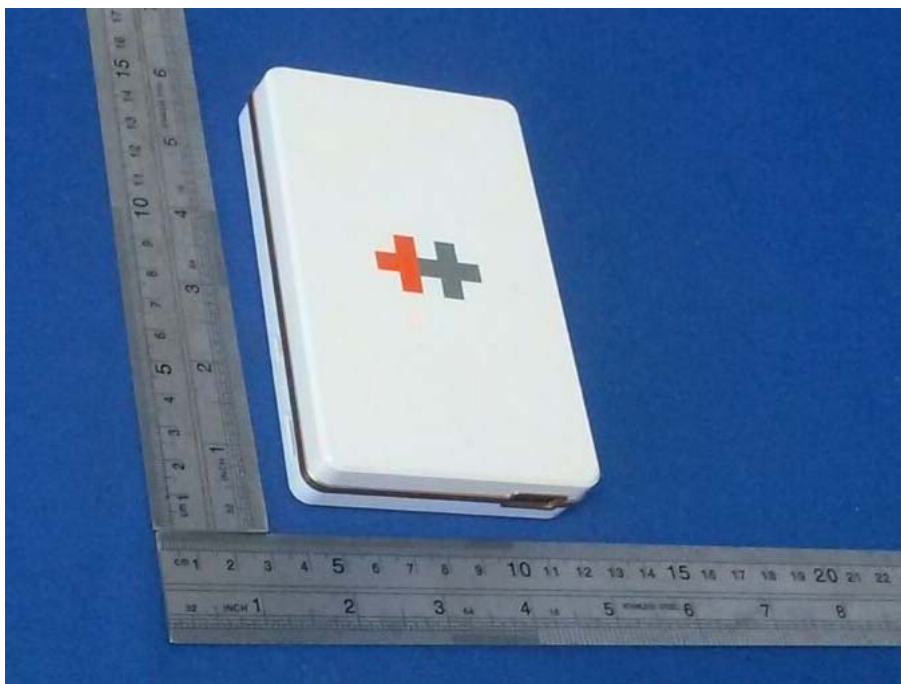
### 10.1. Set-up for Radiated Emission Test



## 10.2. Set-up for Radiated Emission Test



## 11. PHOTOGRAPHS OF THE EUT









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