



# RF TEST REPORT

**Report No.:** SET2013-07797

**Product Name:** GSM/WCDMA MOBILE PHONE

**FCC ID:** CLNSS1070

**Model No. :** M4 SS1070

**Applicant:** MFOURTEL MEXICO S.A. DE C.V.

**Address:** Homero 136 -101 Col. Chapultepec Morales, C.P. 11570,  
Delegacion Miguel Hidalgo

**Issued by:** CCIC-SET

**Lab Location:** Electronic Testing Building, Shahe Road, Xili, Nanshan District,  
Shenzhen, 518055, P. R. China

**Tel:** 86 755 26627338    **Fax:** 86 755 26627238

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### Test Report

**Product Name** ..... : GSM/WCDMA MOBILE PHONE

**Brand Name** ..... : N/A

**Trade Name** ..... : M4

**Applicant** ..... : MFOURTEL MEXICO S.A. DE C.V.

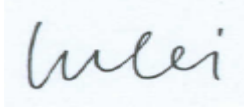
**Applicant Address** ..... : Homero 136 -101 Col. Chapultepec Morales, C.P. 11570, Delegacion Miguel Hidalgo

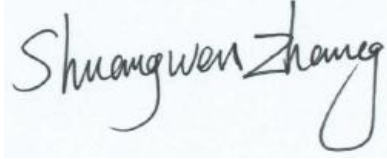
**Manufacturer**..... : CK Telecom Limited


**Manufacturer Address** ..... : Technology Road.High-Tech Development Zone. Heyuan, Guangdong,P.R.China.

**Test Standards**..... : 47 CFR Part 15 Subpart C: Radio Frequency Devices  
ANSI C63.10:2009: American National Standard for Testing Unlicensed Wireless Devices  
KDB558074 D01 DTS Meas Guidance v03r01

**Test Result** ..... : PASS

**Tested by** ..... :  2013-11-29  
\_\_\_\_\_  
Lu Lei, Test Engineer

**Reviewed by**..... :  2013-11-29  
\_\_\_\_\_  
Shuangwen Zhang, Senior EGINEER

**Product**..... :  2013-11-29  
\_\_\_\_\_  
Wu Li'an, Manager



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| Change History |              |                   |
|----------------|--------------|-------------------|
| Issue          | Date         | Reason for change |
| 1.0            | Nov 29, 2013 | First edition     |
|                |              |                   |
|                |              |                   |





## 1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Wi-Fi, 2.4GHz ISM band radiators) for the EUT FCC ID Certification:

| No. | Identity                         | Document Title  |
|-----|----------------------------------|---|
| 1   | 47 CFR Part 15<br>Subpart C 2012 | Radio Frequency Devices   |
| 2   | ANSI C63.102009                  | American National Standard for Testing<br>Unlicensed Wireless Devices |

Test detailed items/section required by FCC rules and results are as below:

| No. | Section           | Description                  | Result |
|-----|-------------------|------------------------------|--------|
| 1   | 15.203            | Antenna Requirement          | PASS   |
| 2   | 15.247(b)         | Peak Output Power            | PASS   |
| 3   | 15.247(a)         | Bandwidth                    | PASS   |
| 4   | 15.247(d)         | Conducted Spurious Emission  | PASS   |
| 5   | 15.247(d)         | Band Edge                    | PASS   |
| 6   | 15.207            | Conducted Emission           | PASS   |
| 7   | 15.209 ,15.247(c) | Radiated Emission            | PASS   |
| 8   | 15.247(e)         | Power spectral density (PSD) | PASS   |

The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.4 2009.

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item.

Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

| Test Items                           | Mode            | Data Rate | Channel |
|--------------------------------------|-----------------|-----------|---------|
| Peak Conducted Output Power          | 11b/DSSS        | 11 Mbps   | 1/6/11  |
| Power Spectral Density               | 11g/OFDM        | 54 Mbps   | 1/6/11  |
| 6dB Bandwidth                        | 11n(20MHz)/OFDM | 72Mbps    | 1/6/11  |
| Spurious RF conducted emission       | 11n(40MHz)/OFDM | 150 Mbps  | 3/6/9   |
| Radiated Emission 9kHz~1GHz&         |                 |           |         |
| Radiated Emission 1GHz~10th Harmonic | 11b/DSSS        | 11 Mbps   | 1/11    |
|                                      | 11g/OFDM        | 54 Mbps   | 1/11    |
| Band Edge                            | 11n(20MHz)/OFDM | 72Mbps    | 1/11    |
|                                      | 11n(40MHz)/OFDM | 150 Mbps  | 3/9     |



## 1.3 Facilities and Accreditations

### 1.3.1 Facilities

#### **CNAS-Lab Code: L1659**

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659. A 12.8\*6.8\*6.4 (m) fully anechoic chamber was used for the radiated spurious emissions test.

#### **FCC-Registration No.: 406086**

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 406086, Renewal date Nov. 19, 2011, valid time is until Nov. 18, 2014.

#### **IC-Registration No.: 11185A-1**

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on July. 15, 2013, valid time is until July. 15, 2016.

### 1.3.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

|                             |              |
|-----------------------------|--------------|
| Temperature ( °C):          | 15°C - 35°C  |
| Relative Humidity (%):      | 30% -60%     |
| Atmospheric Pressure (kPa): | 86KPa-106KPa |



## 2. 47 CFR PART 15C REQUIREMENTS

### 2.1 Antenna requirement

#### 2.1.1 Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

And according to FCC 47 CFR Section 15.247(c), 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.

#### 2.1.2 Antenna Information

**Antenna Category:** External antenna

An External antenna was soldered to the antenna port of EUT via an adaptor cable, can't be removed.

**Antenna General Information:**

| No. | EUT Model                 | Ant. Cat. | Ant. Type | Gain(dBi) |
|-----|---------------------------|-----------|-----------|-----------|
| 1   | GSM/WCDMA<br>MOBILE PHONE | External  | PIFA      | -1        |

#### 2.1.3 Result: comply



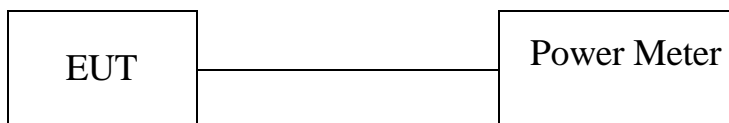


## 2.2 Peak Output Power

### 2.2.1 Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed 1 Watt.

### 2.2.2 Test Description



The measured output power was calculated by the reading of the spectrum analyzer and calibration.

#### A. Test Setup:

The EUT was directly connected to the power meter by 20dB Atten and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

#### B. Equipments List:

| Description       | Manufacturer | Model | Serial No.   | Cal.Due Date |
|-------------------|--------------|-------|--------------|--------------|
| Spectrum Analyzer | R&S          | FSP40 | 1164.4391.40 | 2014.06.10   |



### 2.2.3 Test Result

The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

#### 2.2.3.1 802.11b Test mode

##### A. Test Verdict:

| Channel | Frequency (MHz) | Measured Output Peak Power(dBm) | Refer to Plot | Limits (dBm) | Result |
|---------|-----------------|---------------------------------|---------------|--------------|--------|
| 1       | 2412            | 15.70                           | Plot 2.2 A    | 30           | PASS   |
| 6       | 2437            | 15.87                           | Plot 2.2 B    | 30           | PASS   |
| 11      | 2462            | 15.69                           | Plot 2.2 C    | 30           | PASS   |

Note: 1. For 802.11b mode at final test to get the worst-case emission at 11Mbps.  
2. The test results including the cable loss.

#### 2.2.3.2 802.11g Test mode

##### A. Test Verdict:

| Channel | Frequency (MHz) | Measured Output Peak Power (dBm) | Refer to Plot | Limits (dBm) | Result |
|---------|-----------------|----------------------------------|---------------|--------------|--------|
| 1       | 2412            | 15.01                            | Plot 2.2 D    | 30           | PASS   |
| 6       | 2437            | 15.02                            | Plot 2.2 E    | 30           | PASS   |
| 11      | 2462            | 15.03                            | Plot 2.2 F    | 30           | PASS   |

Note: 1. For 802.11g mode at final test to get the worst-case emission at 54Mbps.  
2. The test results including the cable loss.



**2.2.3.3 802.11n-20MHz Test mode**

**A. Test Verdict:**

| Channel | Frequency (MHz) | Measured Output Peak Power(dBm) | Refer to Plot | Limits (dBm) | Result |
|---------|-----------------|---------------------------------|---------------|--------------|--------|
| 1       | 2412            | 13.53                           | Plot 2.2 G    | 30           | PASS   |
| 6       | 2437            | 13.50                           | Plot 2.2 H    | 30           | PASS   |
| 11      | 2462            | 13.50                           | Plot 2.2 I    | 30           | PASS   |

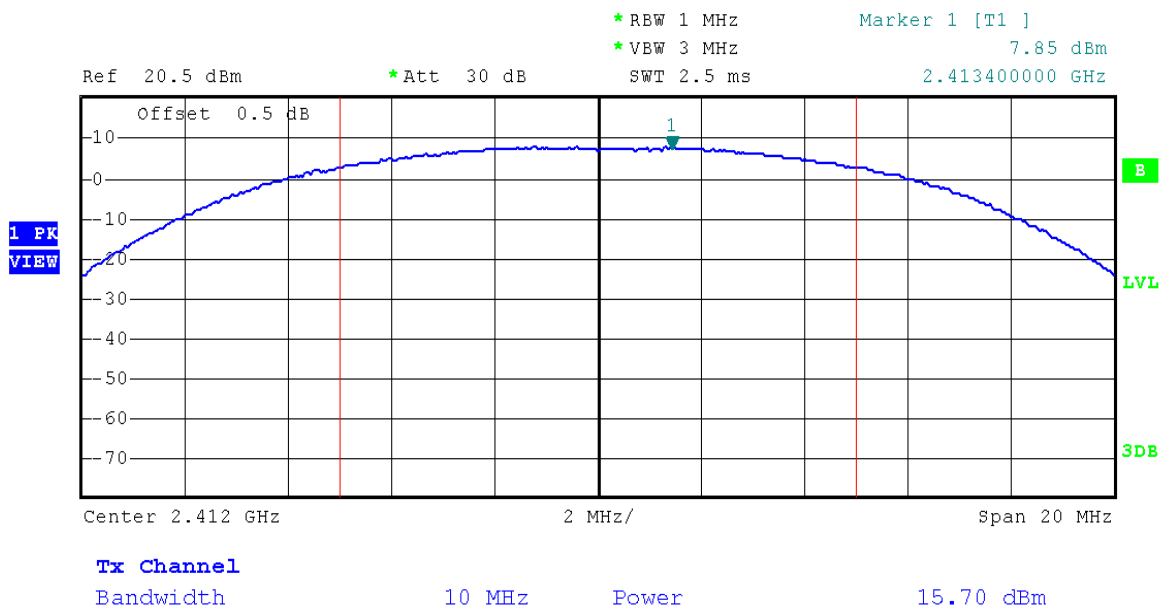
Note: 1. For 802.11n-20 mode at final test to get the worst-case emission at 72Mbps.  
 2. The test results including the cable lose.

**2.2.3.4 802.11n-40MHz Test mode**

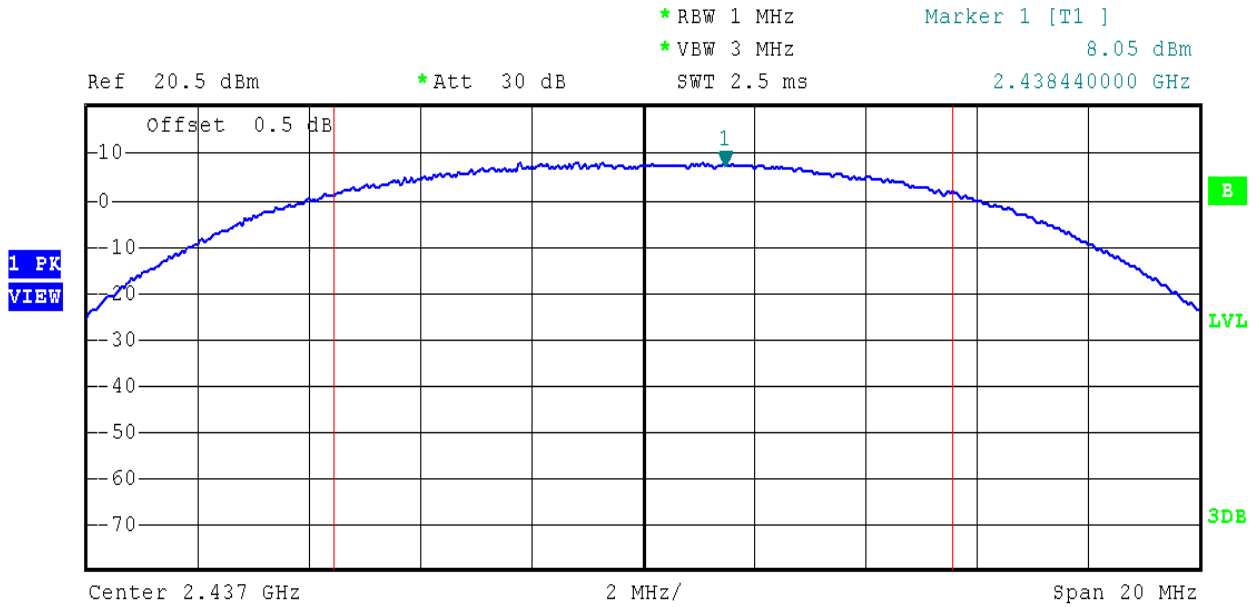
**A. Test Verdict:**

| Channel | Frequency (MHz) | Measured Output Peak Power(dBm) | Refer to Plot | Limits (dBm) | Result |
|---------|-----------------|---------------------------------|---------------|--------------|--------|
| 1       | 2412            | 12.52                           | Plot 2.2 J    | 30           | PASS   |
| 6       | 2437            | 12.53                           | Plot 2.2 K    | 30           | PASS   |
| 11      | 2462            | 12.48                           | Plot 2.2 L    | 30           | PASS   |

Note: 1. For 802.11n-40 mode at final test to get the worst-case emission at 72Mbps.  
 2. The test results including the cable lose.

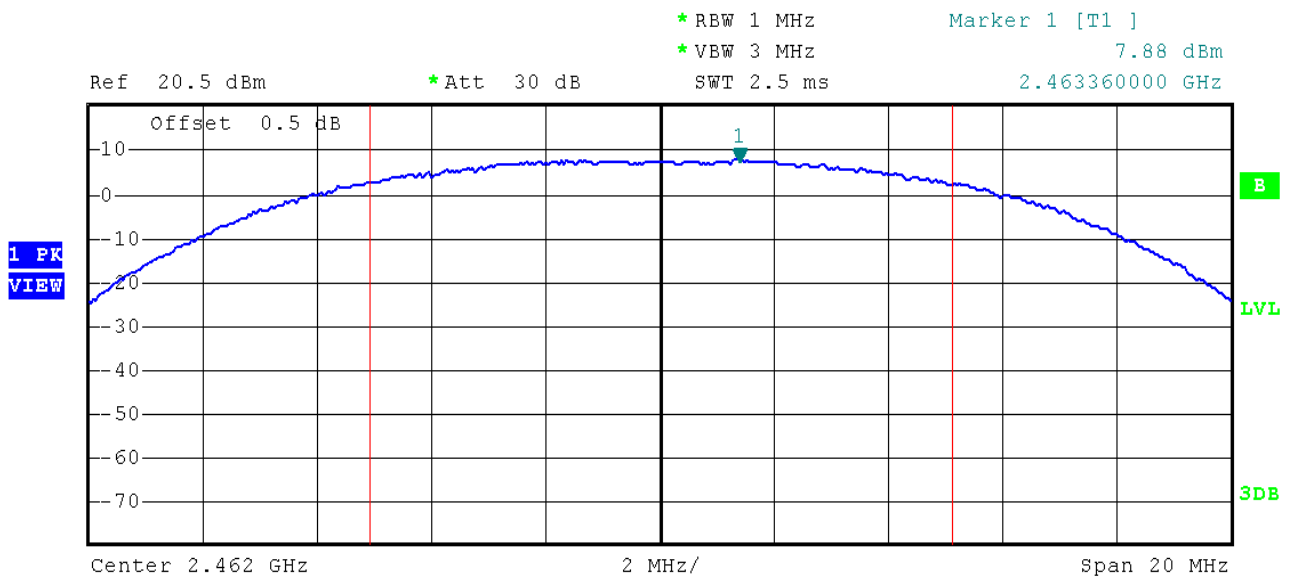


(Plot 2.2 A: Channel 1: 2412MHz @ 802.11b)



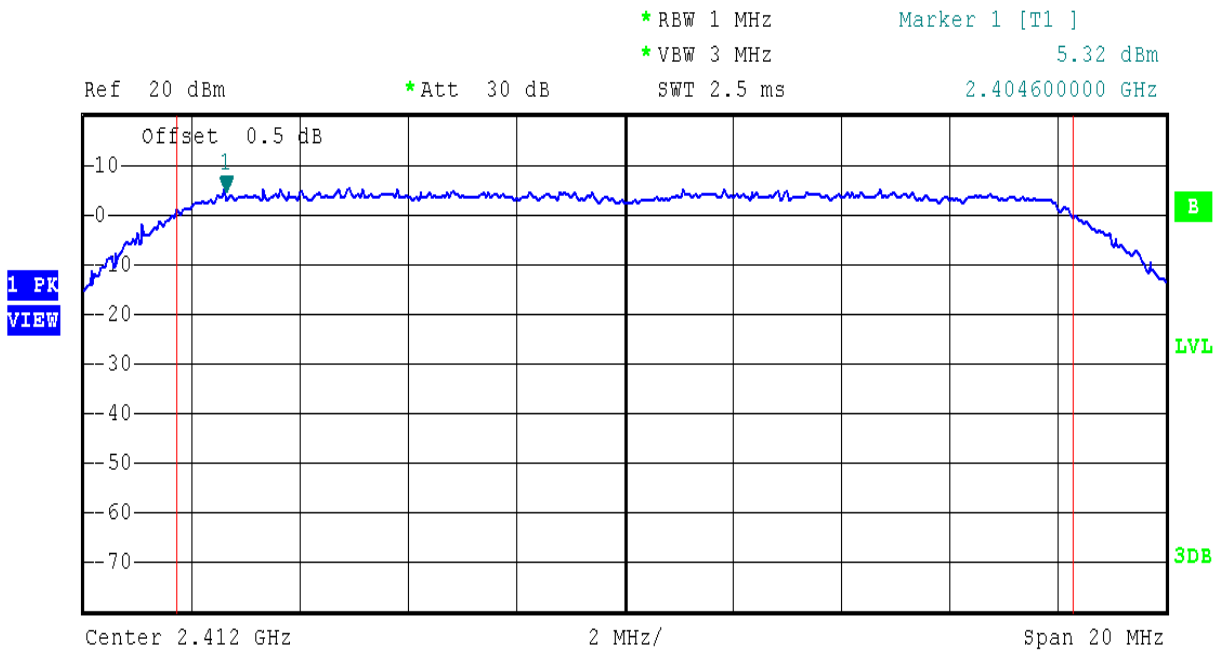
**Tx Channel**  
 Bandwidth                      11.12 MHz      Power                      15.87 dBm

(Plot 2.2 B: Channel 6: 2437MHz @ 802.11b)



**Tx Channel**  
 Bandwidth                      10.2 MHz      Power                      15.69 dBm

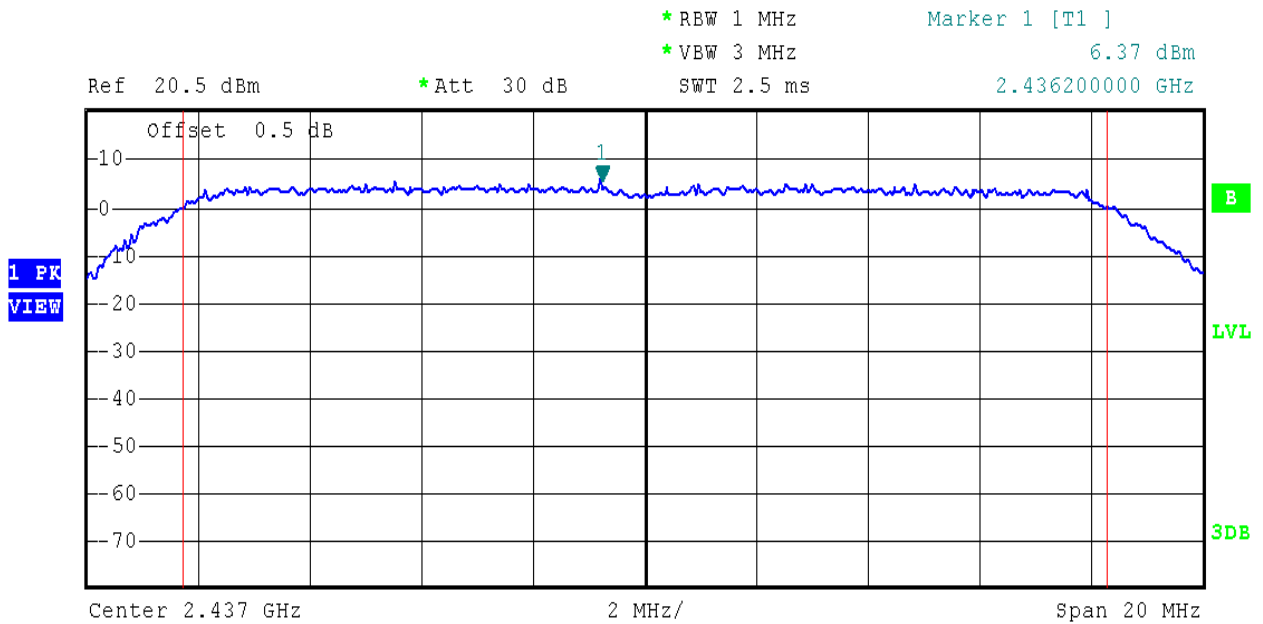
(Plot 2.2 C: Channel 11: 2462MHz @ 802.11b)



**Tx Channel**

Bandwidth 16.56 MHz Power 15.01 dBm

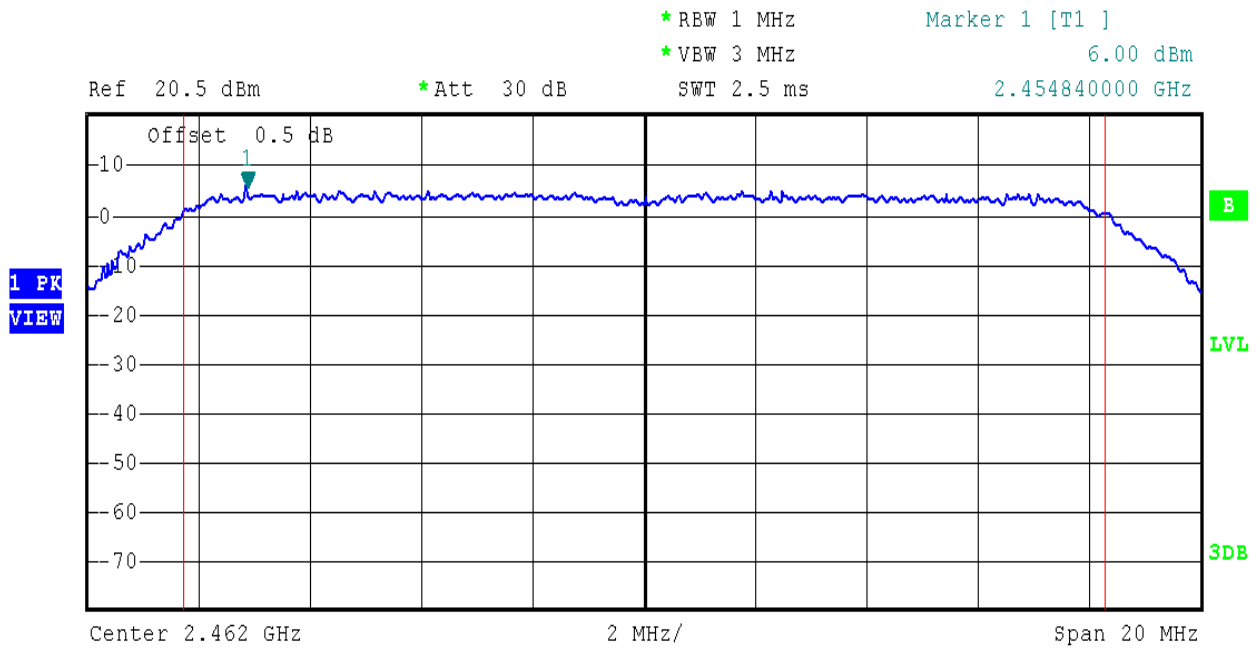
(Plot 2.2 D: Channel 1: 2412MHz @ 802.11g)



**Tx Channel**

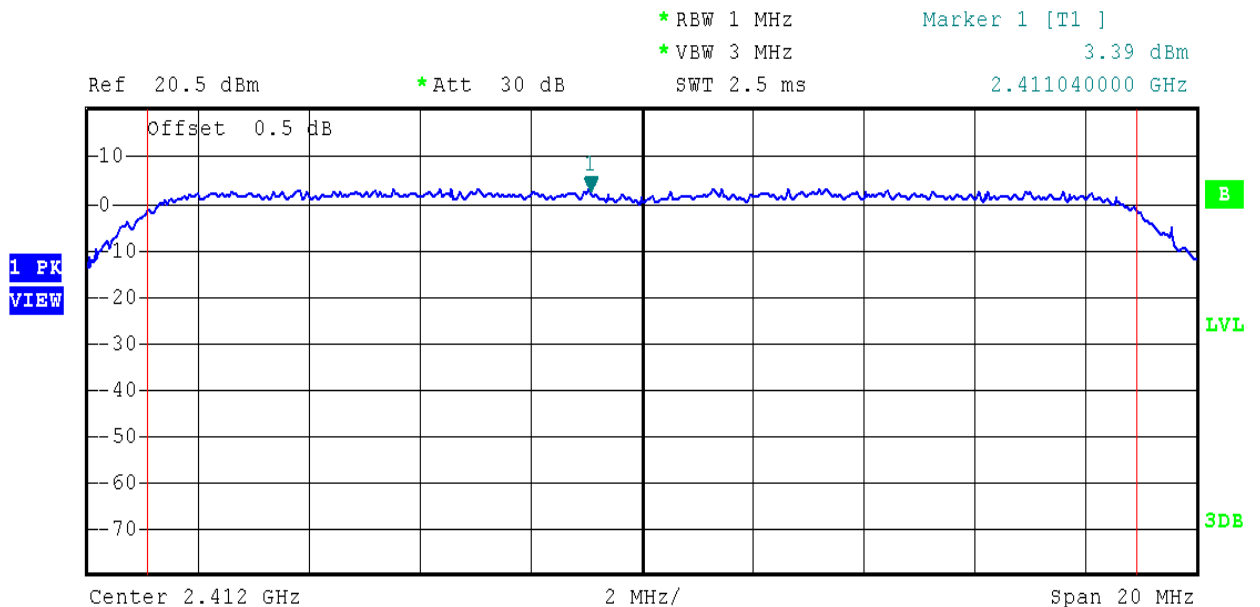
Bandwidth 16.56 MHz Power 15.02 dBm

(Plot 2.2 E: Channel 6: 2437MHz @ 802.11g)



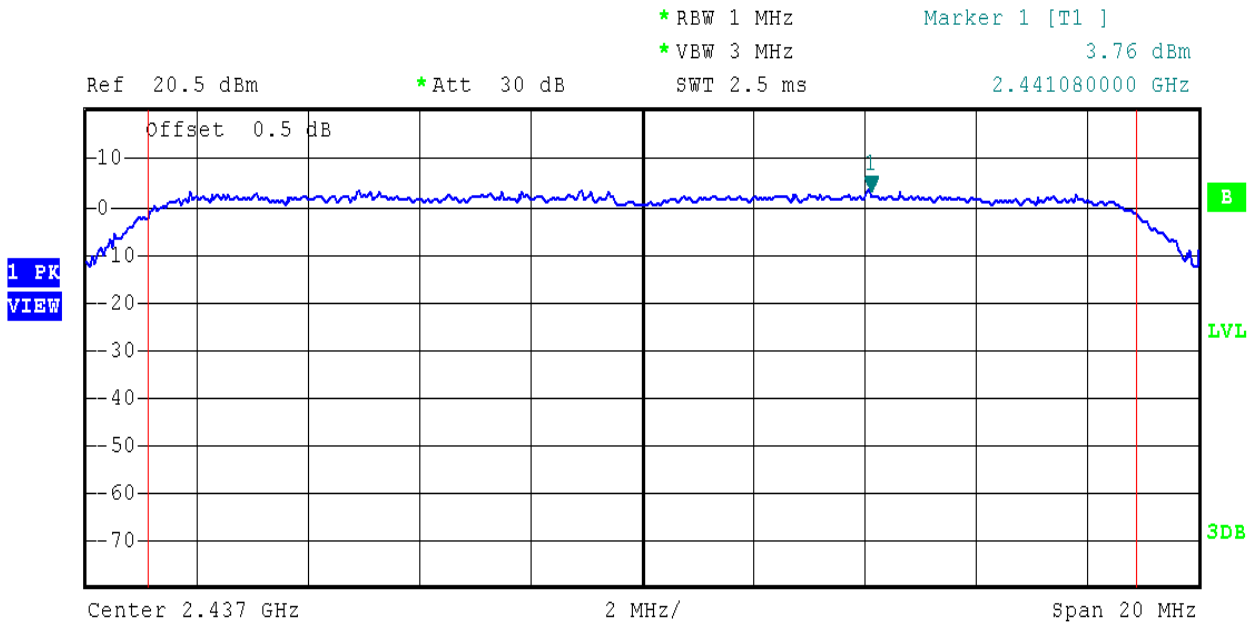
**Tx Channel**  
Bandwidth                      16.56 MHz      Power                      15.03 dBm

(Plot 2.2 F: Channel 11: 2462MHz @ 802.11g)



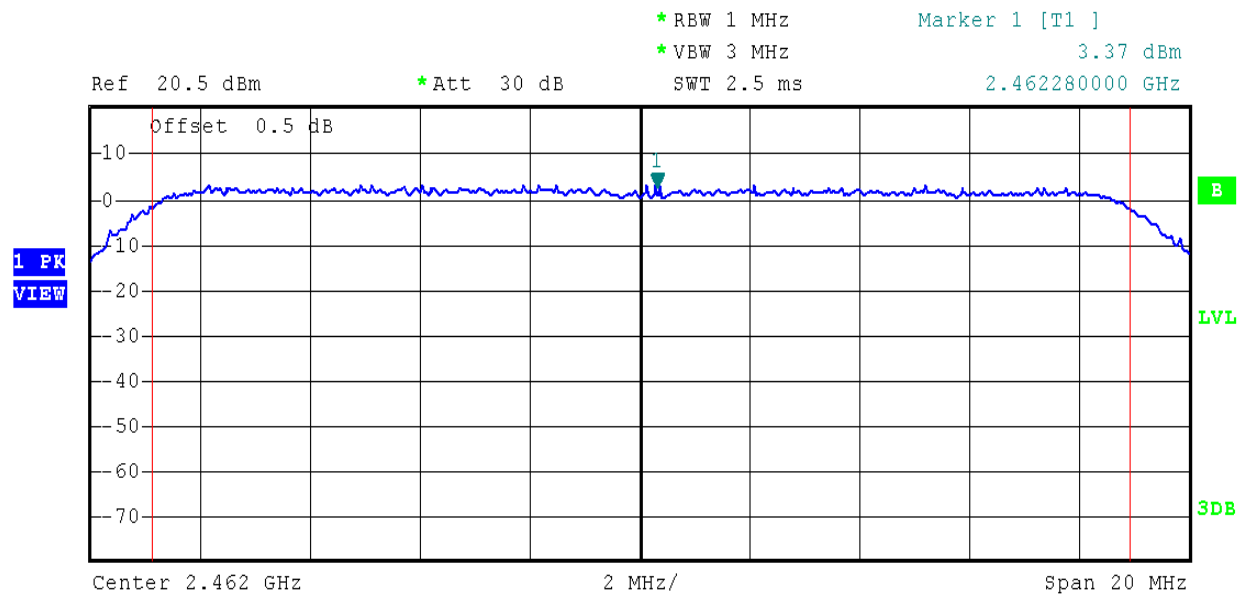
**Tx Channel**  
Bandwidth                      17.84 MHz      Power                      13.53 dBm

(Plot 2.2 G: Channel 1: 2412MHz @ 802.11n20)



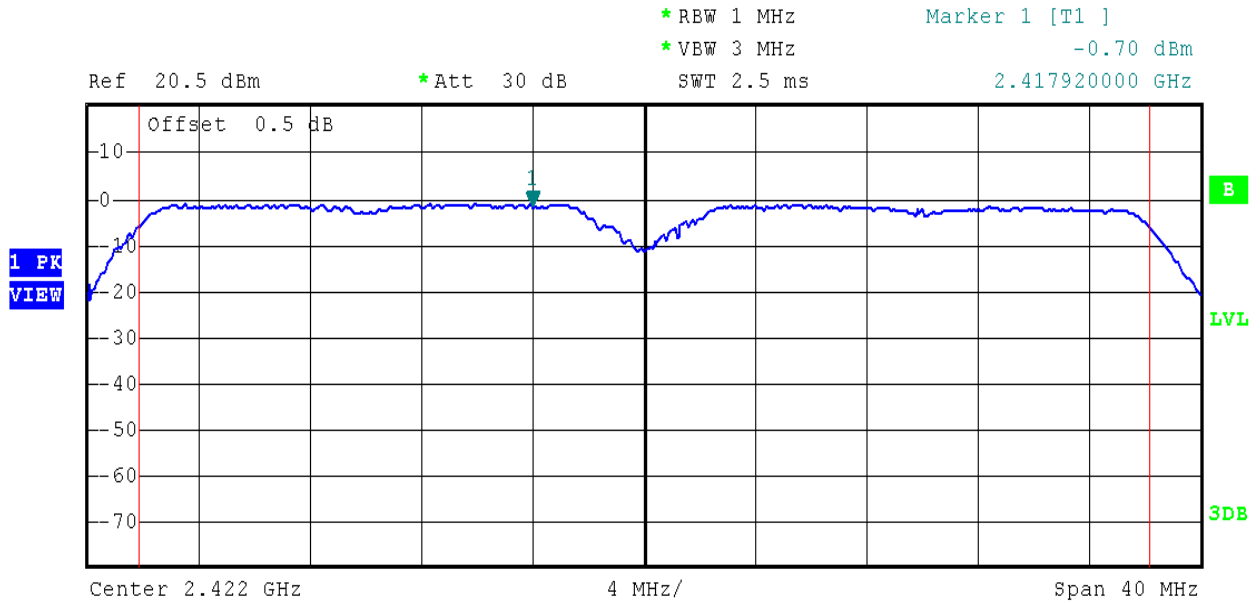
**Tx Channel**  
Bandwidth                      17.76 MHz      Power                      13.50 dBm

(Plot 2.2 H: Channel 6: 2437MHz @ 802.11n20)



**Tx Channel**  
Bandwidth                      17.8 MHz      Power                      13.50 dBm

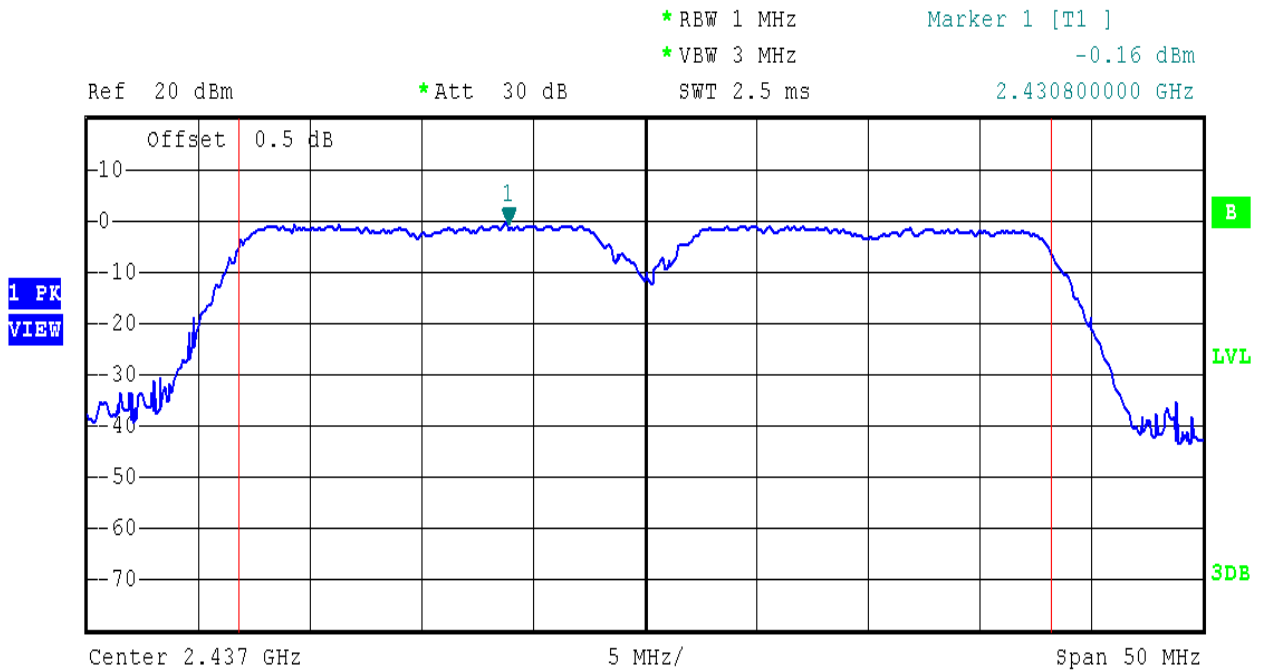
(Plot 2.2 I: Channel 11: 2462MHz @ 802.11n20)



**Tx Channel**

Bandwidth 36.32 MHz Power 12.52 dBm

(Plot 2.2 J: Channel 3: 2422MHz @ 802.11n40)

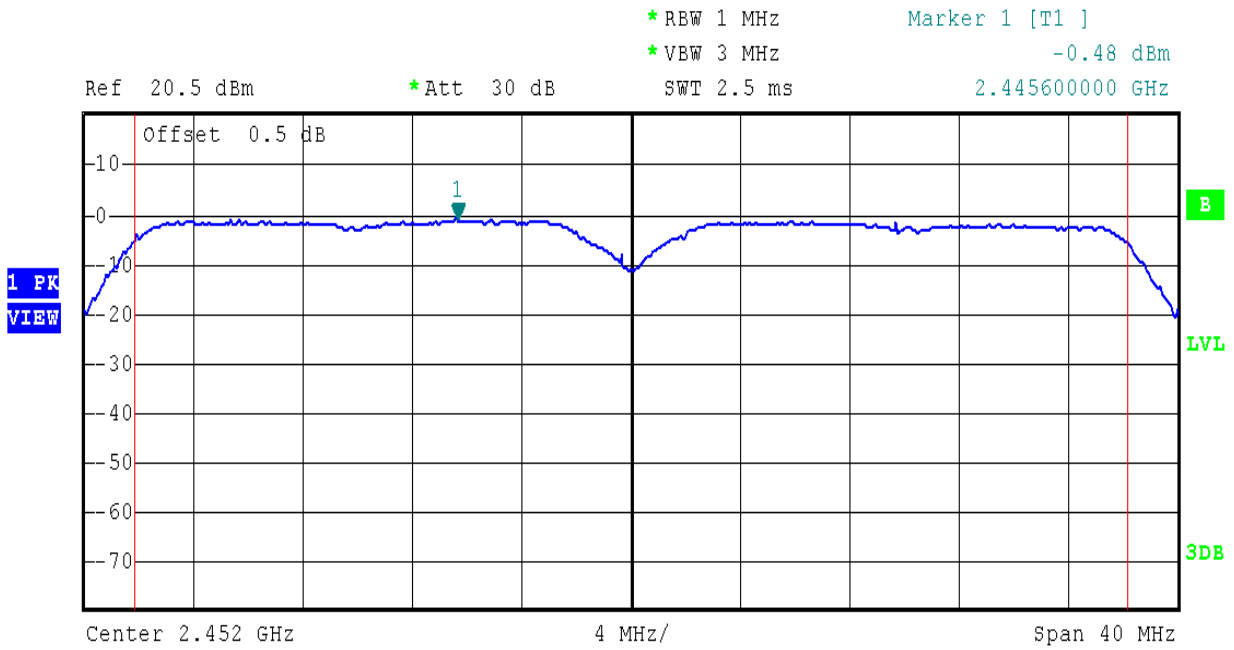


**Tx Channel**

Bandwidth 36.4 MHz Power 12.53 dBm

(Plot 2.2 K: Channel 6: 2437MHz @ 802.11n40)





**Tx Channel**  
Bandwidth                      36.32 MHz                      Power                      12.48 dBm

(Plot 2.2 L: Channel 9: 2452MHz @ 802.11n40)

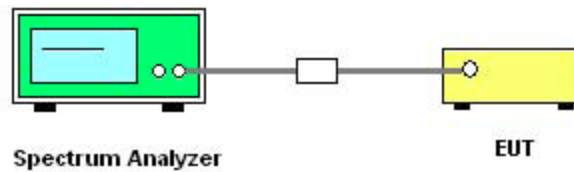
## 2.3 Bandwidth

### 2.3.1 Requirement

According to FCC section 15.247(a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 2.3.2 Test Description

#### A. Test Set:



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss and Atten as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

#### B. Equipments List:

| Description       | Manufacturer | Model | Serial No.   | Cal.Due Date |
|-------------------|--------------|-------|--------------|--------------|
| Spectrum Analyzer | R&S          | FSP40 | 1164.4391.40 | 2014.06.10   |

### 2.3.3 Test Result

The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

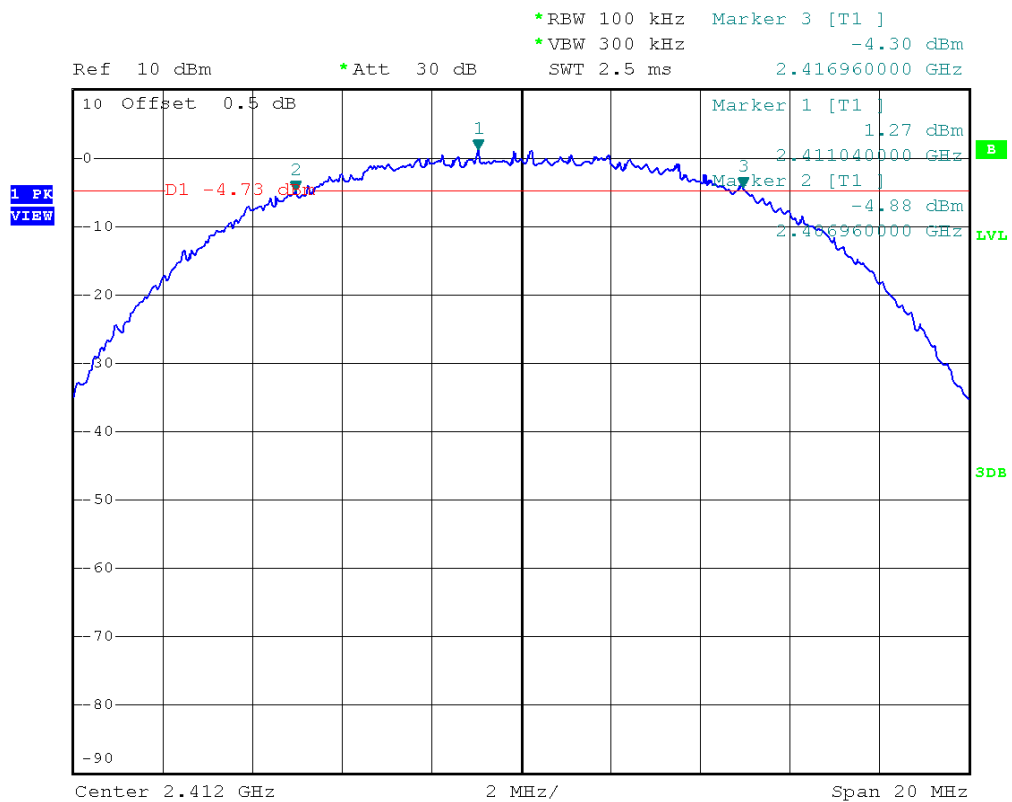


2.3.3.1 802.11b Test mode

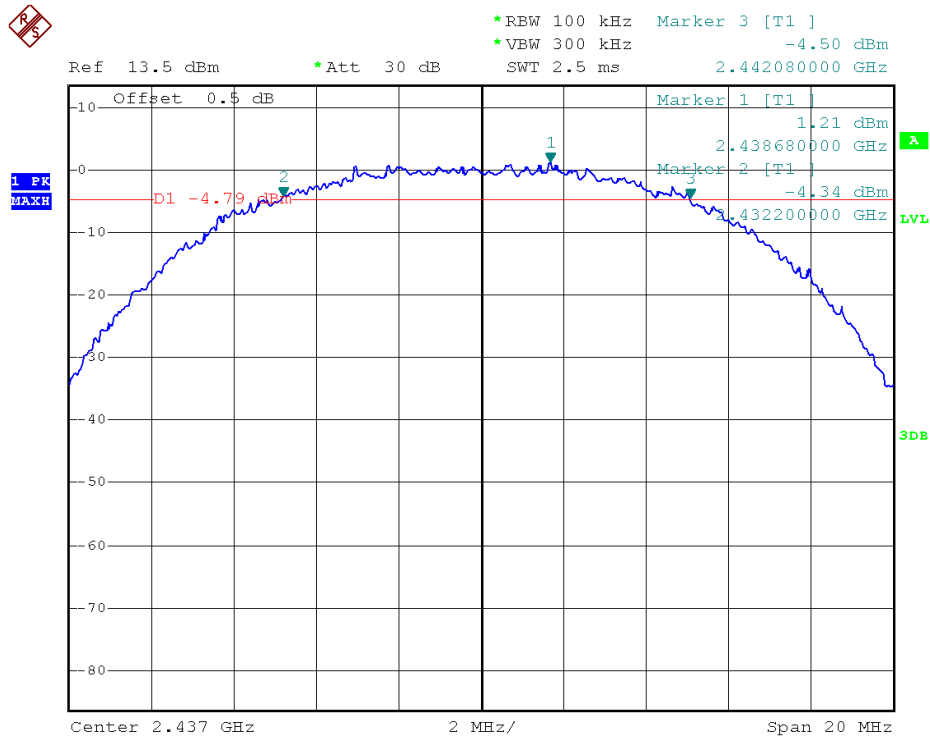
A. Test Verdict:

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Refer to Plot | Limits(kHz) | Result |
|---------|-----------------|----------------------|---------------|-------------|--------|
| 1       | 2412            | 10.00                | Plot 2.3 A    | ≥500        | PASS   |
| 6       | 2437            | 9.88                 | Plot 2.3 B    | ≥500        | PASS   |
| 11      | 2462            | 10.20                | Plot 2.3 C    | ≥500        | PASS   |

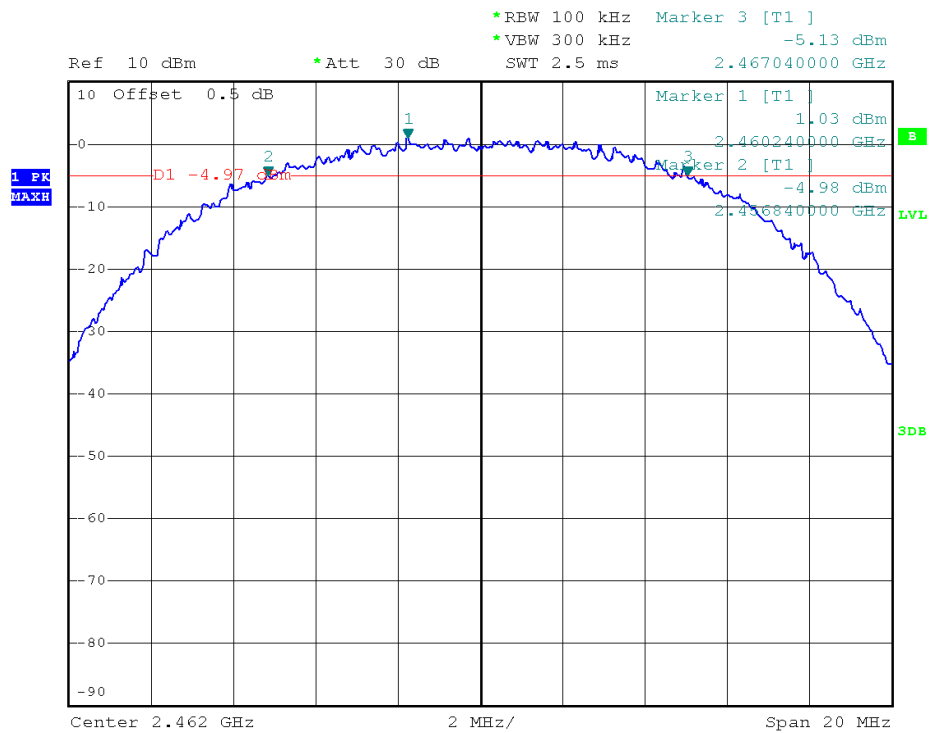
B. Test Plots:



(Plot 2.3 A: Channel 1: 2412MHz @ 802.11b)



(Plot 2.3 B: Channel 6: 2437 MHz @ 802.11b)



(Plot 2.3 C: Channel 11: 2462MHz @ 802.11b)

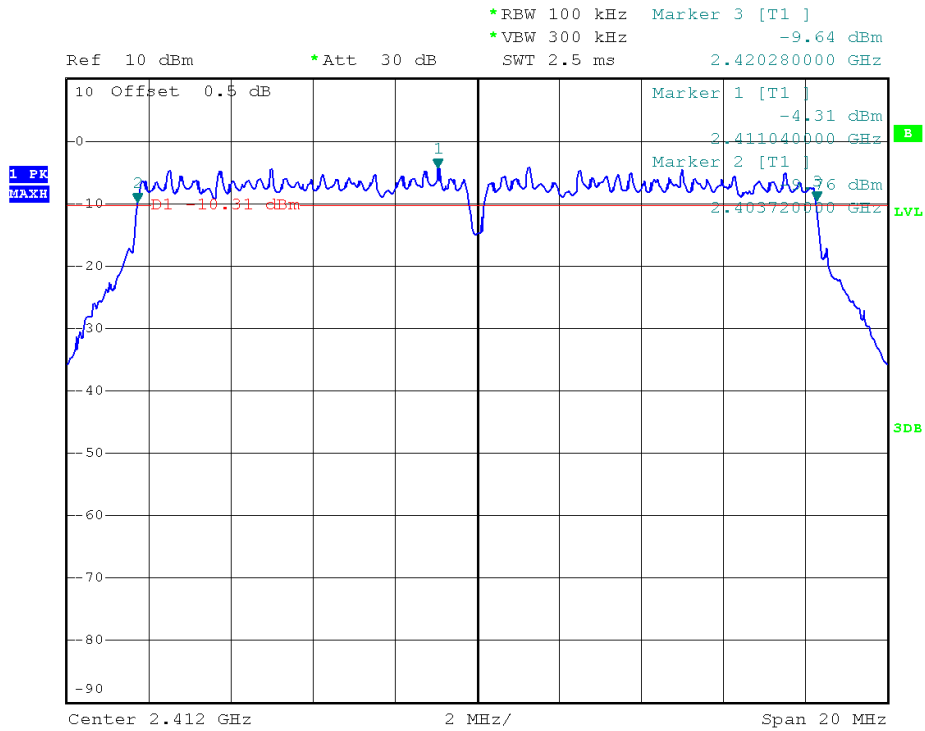


### 2.3.3.2 802.11g Test mode

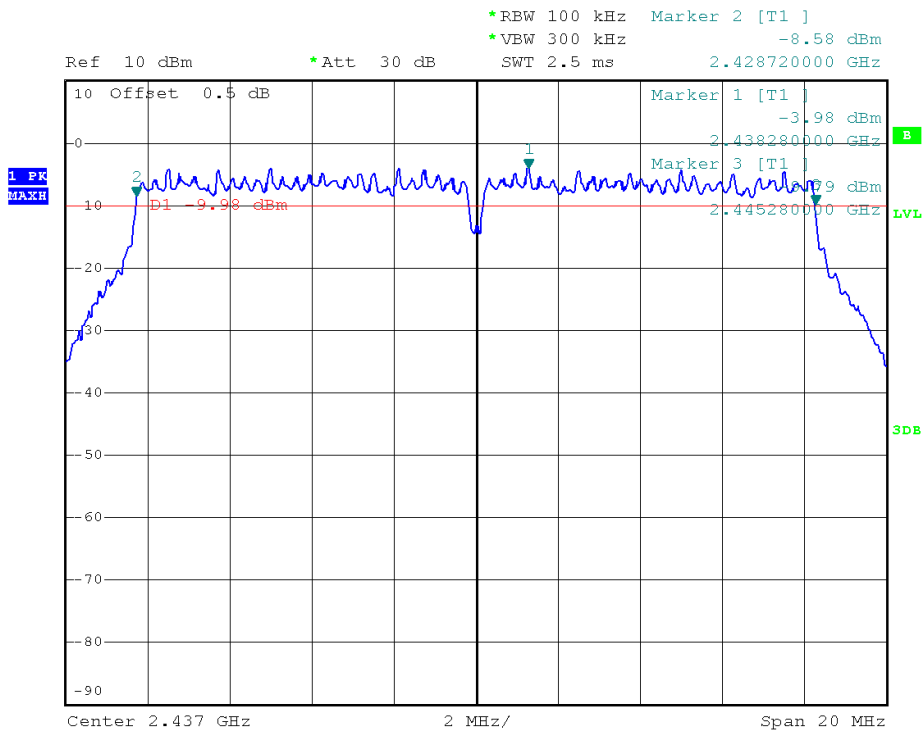
#### A. Test Verdict:

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Refer to Plot | Limits (kHz) | Result |
|---------|-----------------|----------------------|---------------|--------------|--------|
| 1       | 2412            | 16.56                | Plot 2.3 D    | ≥500         | PASS   |
| 6       | 2437            | 16.56                | Plot 2.3 E    | ≥500         | PASS   |
| 11      | 2462            | 16.56                | Plot 2.3 F    | ≥500         | PASS   |

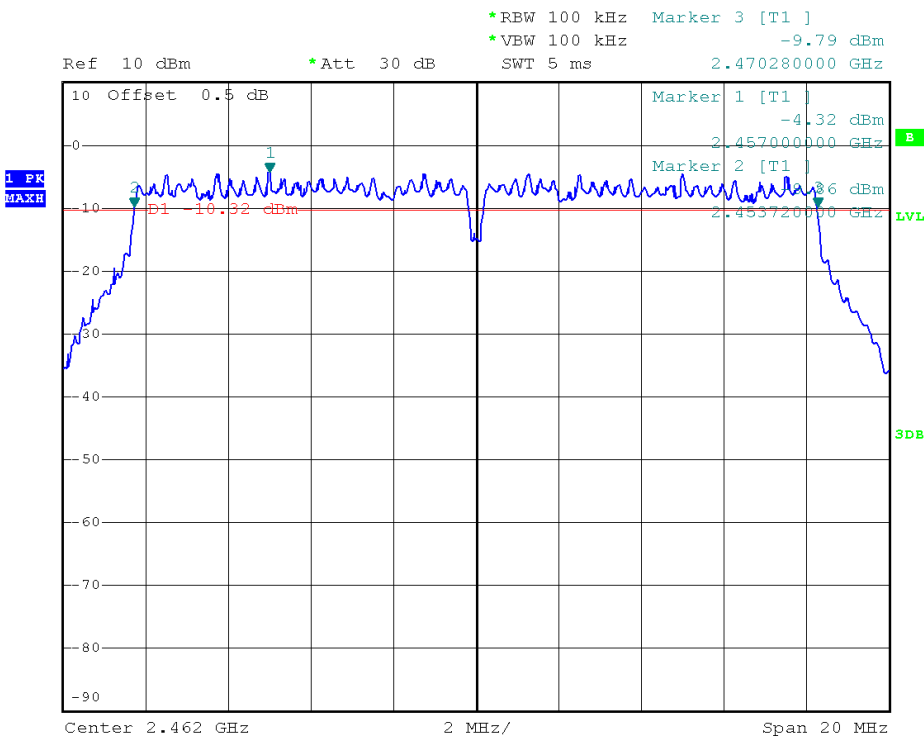
#### B. Test Plots:



(Plot 2.3 D: Channel 1: 2412MHz @ 802.11g)



(Plot 2.3 E: Channel 6: 2437MHz @ 802.11g)



(Plot 2.3 F: Channel 11: 2462MHz @ 802.11g)

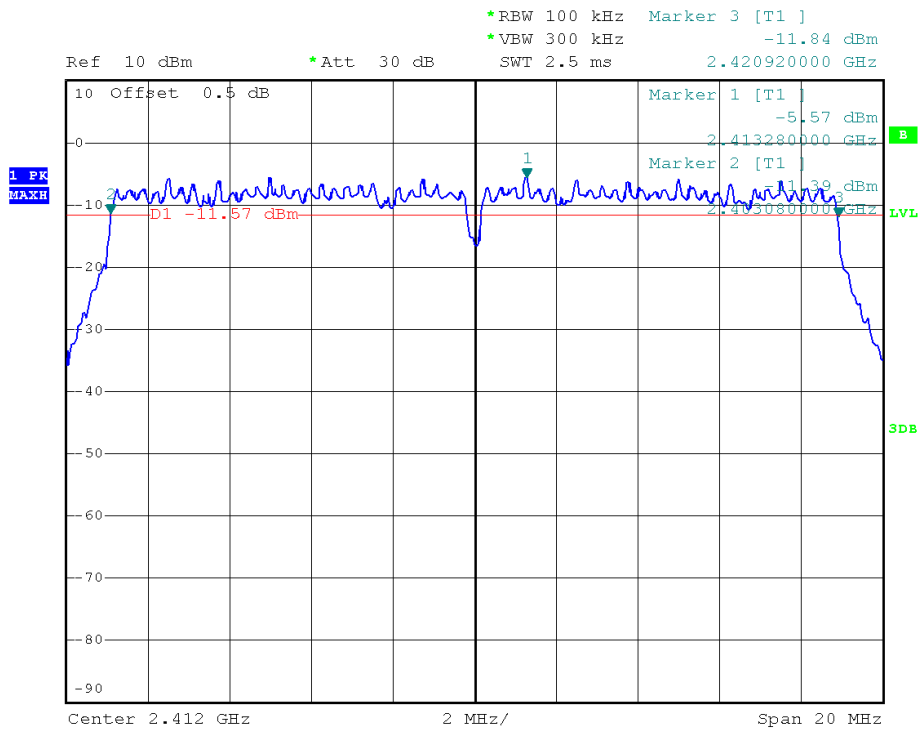


**2.3.3.3 802.11n-20 Test mode**

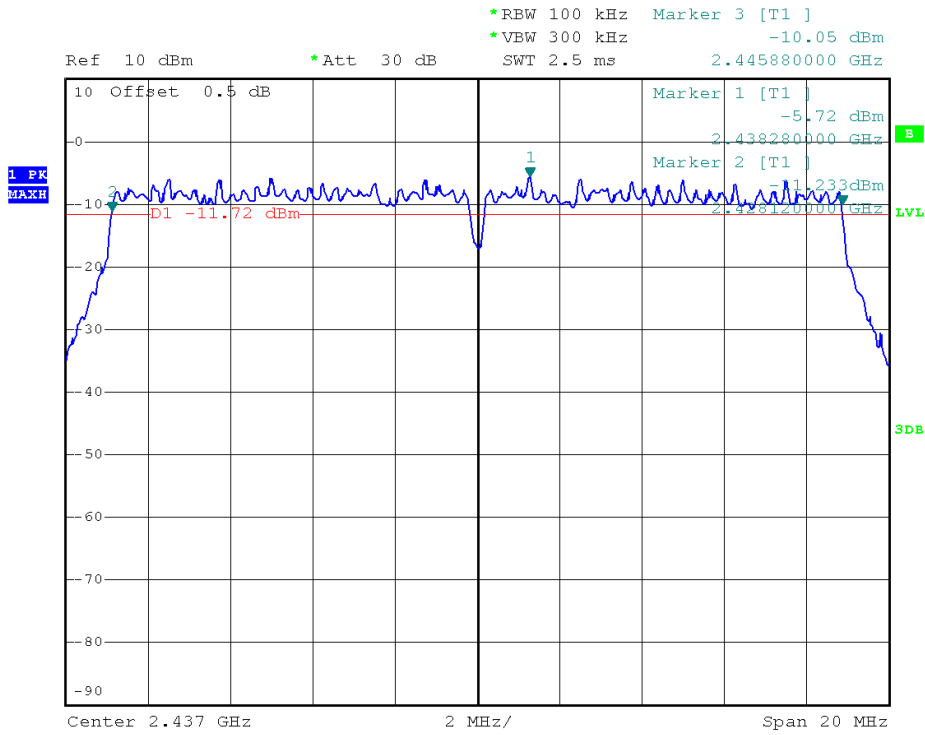
**A. Test Verdict:**

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Refer to Plot | Limits (kHz) | Result |
|---------|-----------------|----------------------|---------------|--------------|--------|
| 1       | 2412            | 17.84                | Plot 2.3 G    | ≥500         | PASS   |
| 6       | 2437            | 17.76                | Plot 2.3 H    | ≥500         | PASS   |
| 11      | 2462            | 17.80                | Plot 2.3 I    | ≥500         | PASS   |

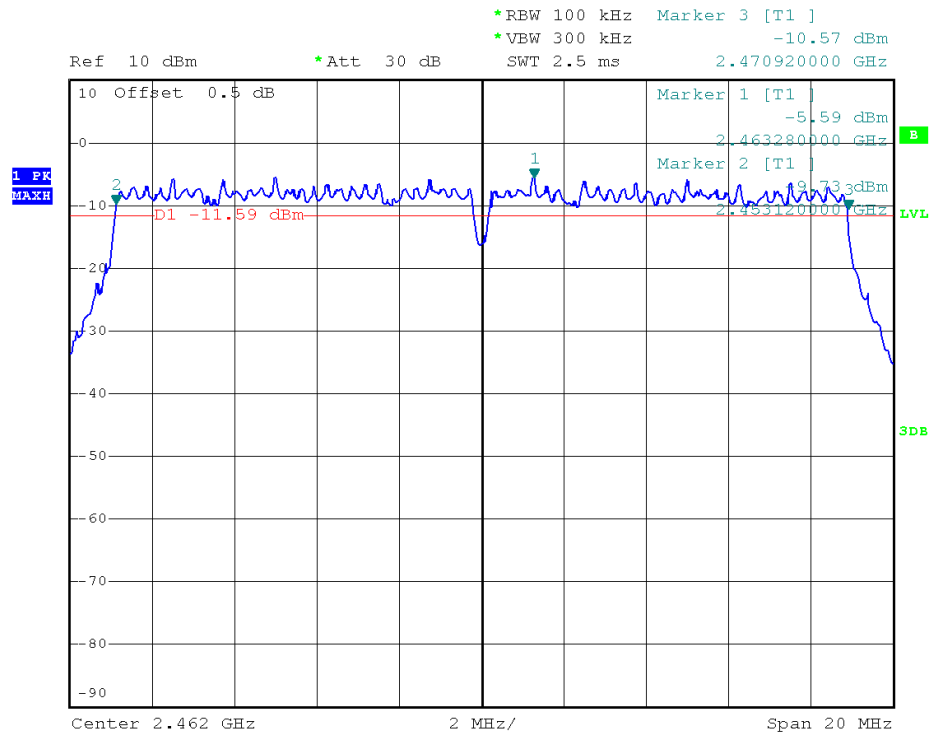
**B. Test Plots:**



(Plot 2.3 G: Channel 1: 2412MHz @ 802.11n-20)



(Plot 2.3 H: Channel 6: 2437MHz @ 802.11n-20)



(Plot 2.3 I: Channel 11: 2462MHz @ 802.11n-20)



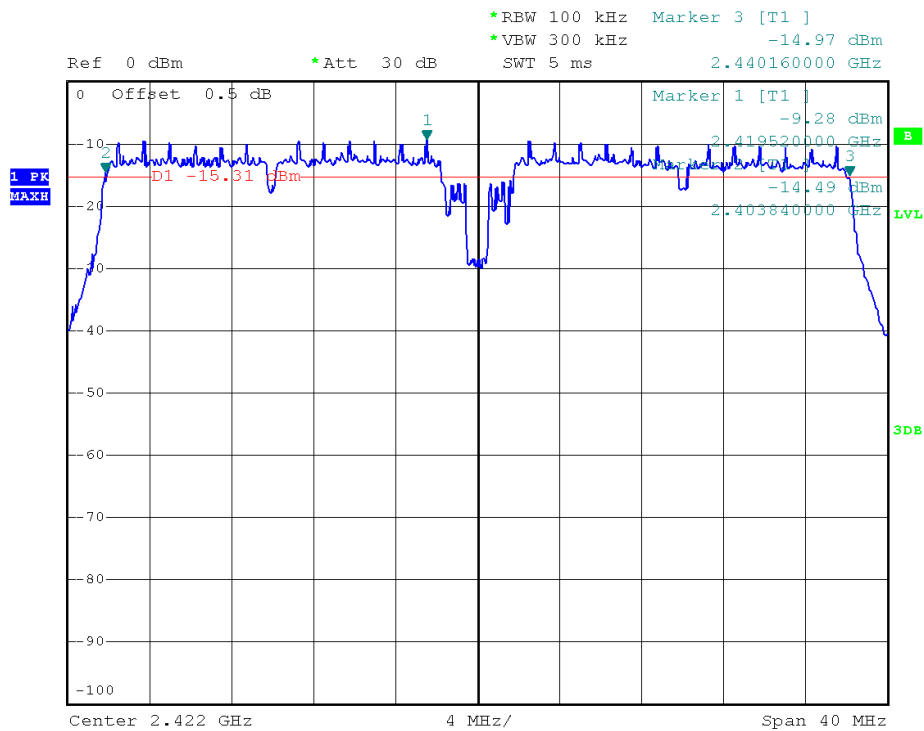


### 2.3.3.4 802.11n-40 Test mode

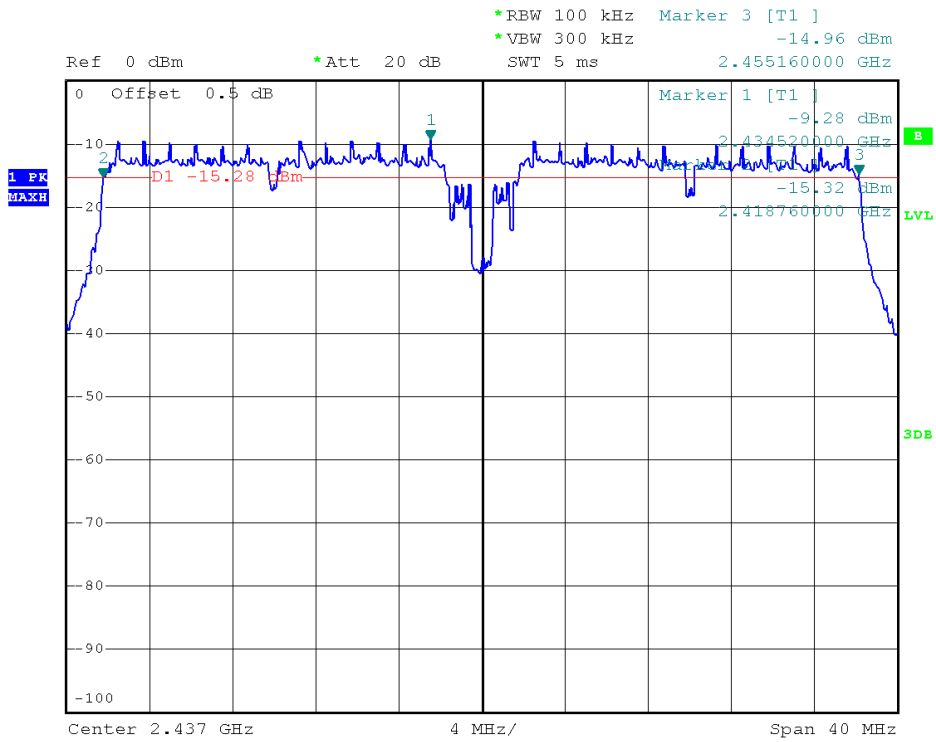
#### A. Test Verdict:

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Refer to Plot | Limits (kHz) | Result |
|---------|-----------------|----------------------|---------------|--------------|--------|
| 1       | 2412            | 36.32                | Plot 2.3 J    | ≥500         | PASS   |
| 6       | 2437            | 36.40                | Plot 2.3 K    | ≥500         | PASS   |
| 11      | 2462            | 36.32                | Plot 2.3 L    | ≥500         | PASS   |

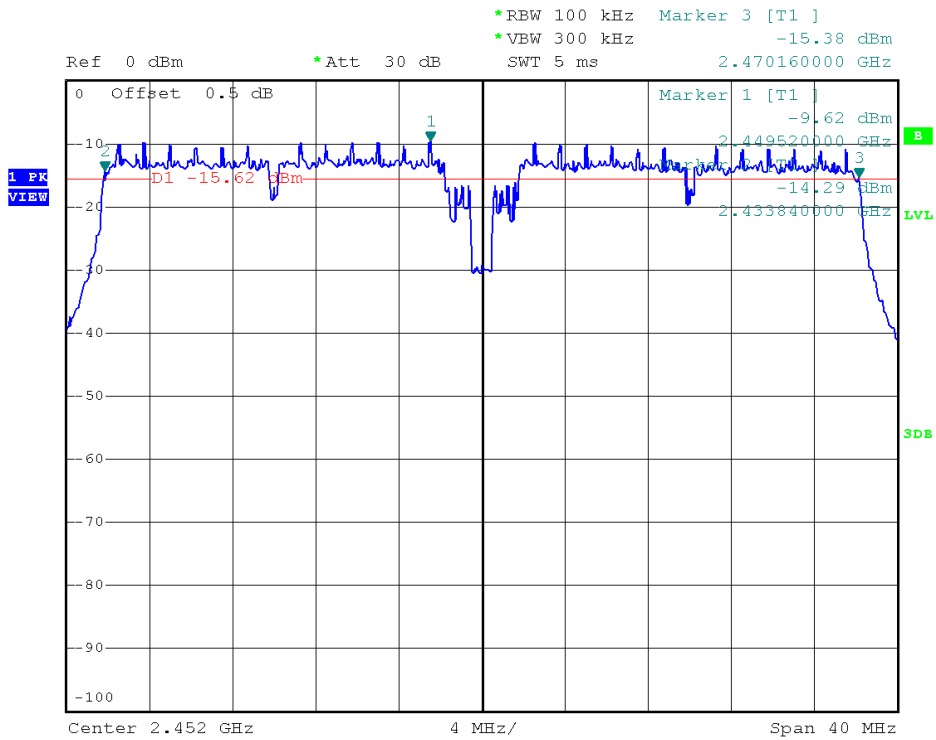
#### B. Test Plots:



(Plot 2.3 J: Channel 3: 2422MHz @ 802.11n-40)



(Plot 2.3 K: Channel 6: 2437MHz @ 802.11n-40)



(Plot 2.3 L: Channel 9: 2452MHz @ 802.11n-40)

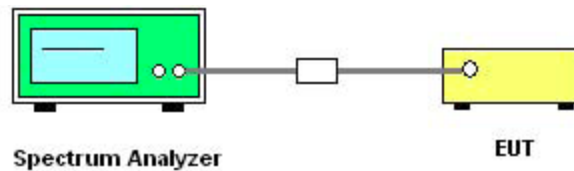
## 2.4 Conducted Spurious Emissions

### 2.4.1 Requirement

According to FCC section 15.247(c), 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.

### 2.4.2 Test Description

#### A. Test Set:



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss and Atten as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

#### B. Equipments List:

| Description       | Manufacturer | Model | Serial No.   | Cal.Due Date |
|-------------------|--------------|-------|--------------|--------------|
| Spectrum Analyzer | R&S          | FSP40 | 1164.4391.40 | 2014.06.10   |

### 2.4.3 Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

#### 2.4.3.1 802.11b Test mode

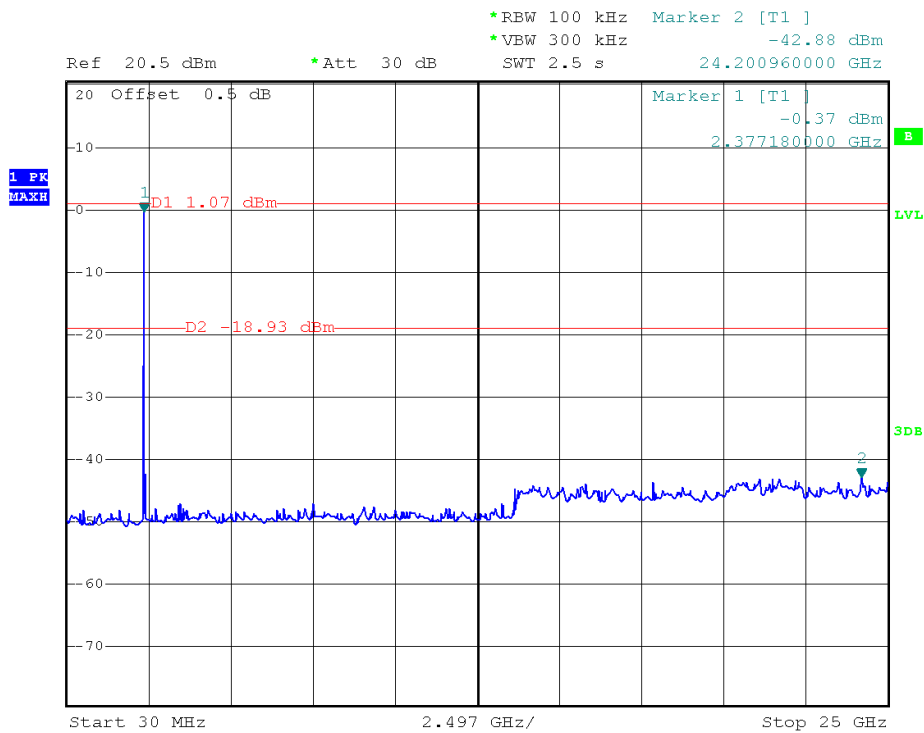
#### A. Test Verdict:



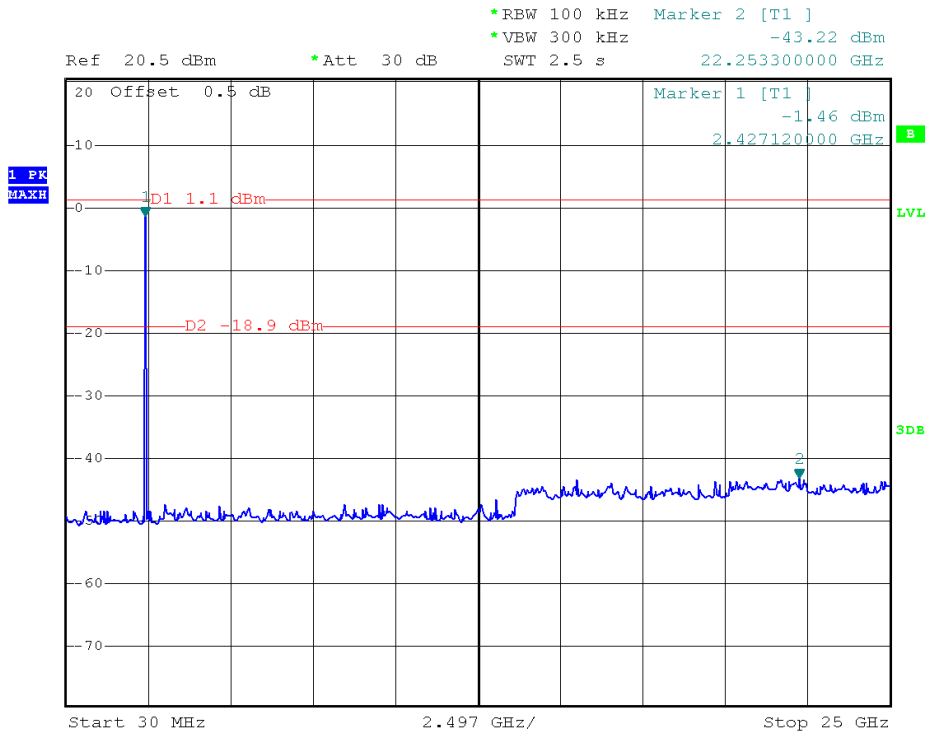
| Channel | Frequency (MHz) | Refer to Plot | Limit (dBc) | Verdict |
|---------|-----------------|---------------|-------------|---------|
| 1       | 2412            | Plot 2.4 A    | -20         | PASS    |
| 6       | 2437            | Plot 2.4 B    | -20         | PASS    |
| 11      | 2462            | Plot 2.4 C    | -20         | PASS    |

**B. Test Plots:**

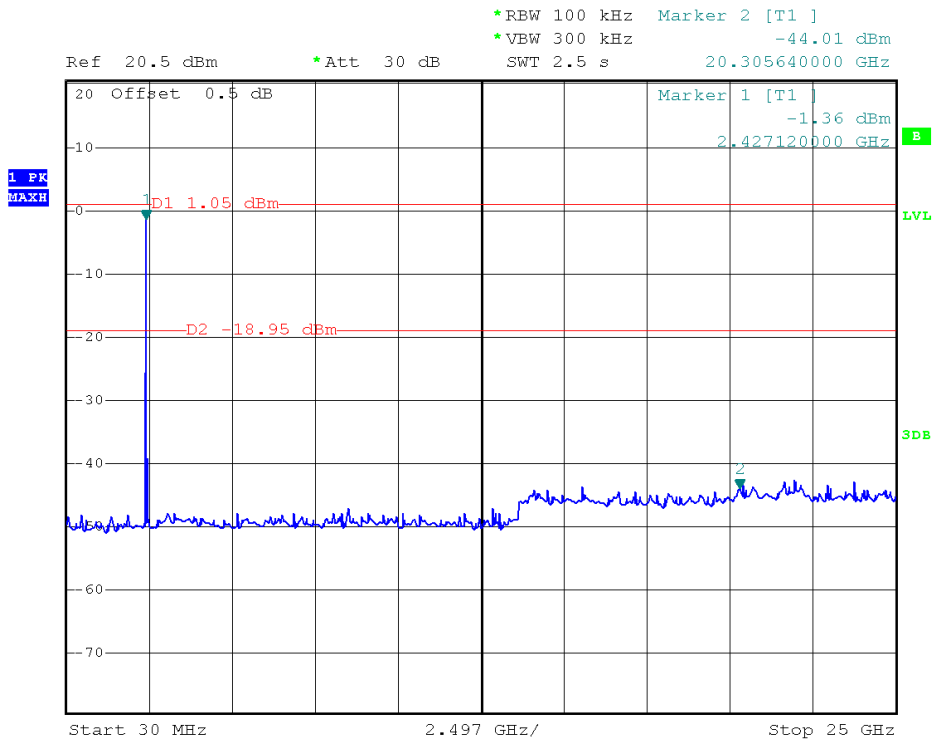
Note: the power of the Module transmitting frequency should be ignored.



(Plot 2.4 A: Channel = 1, 30MHz to 25GHz@ 802.11b)



(Plot 2.4 B: Channel = 6, 30MHz to 25GHz@ 802.11b)



(Plot 2.4 C: Channel = 11, 30MHz to 25GHz@ 802.11b)



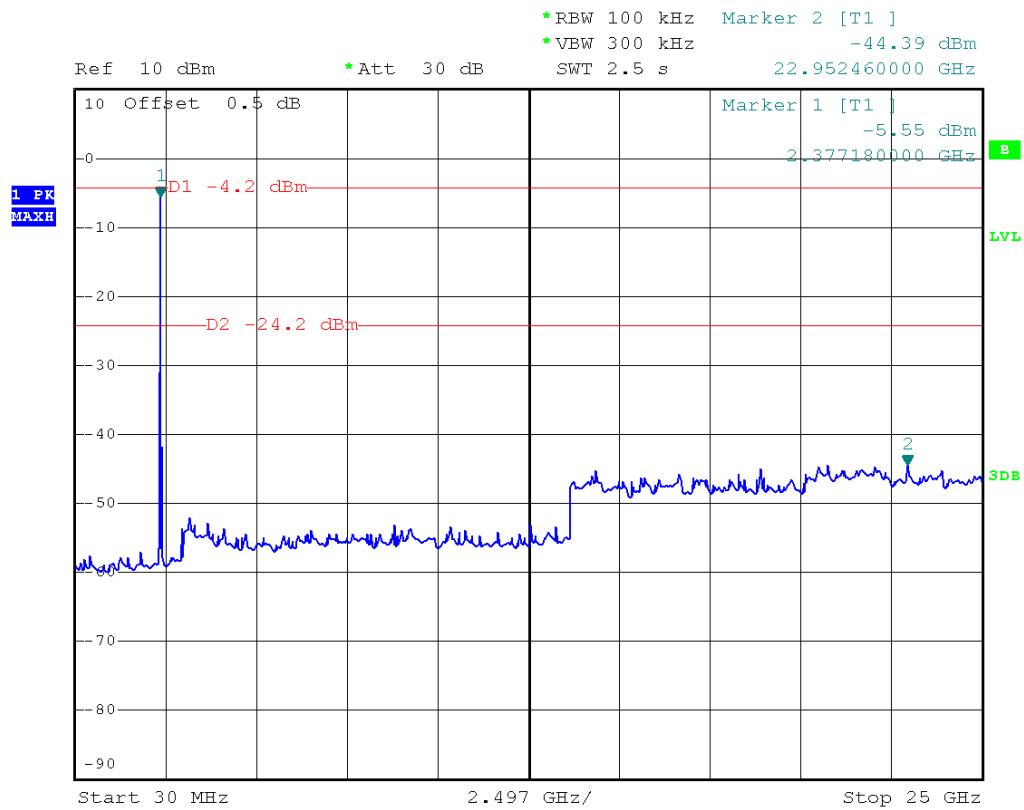
### 2.4.3.2 802.11g Test mode

#### A. Test Verdict:

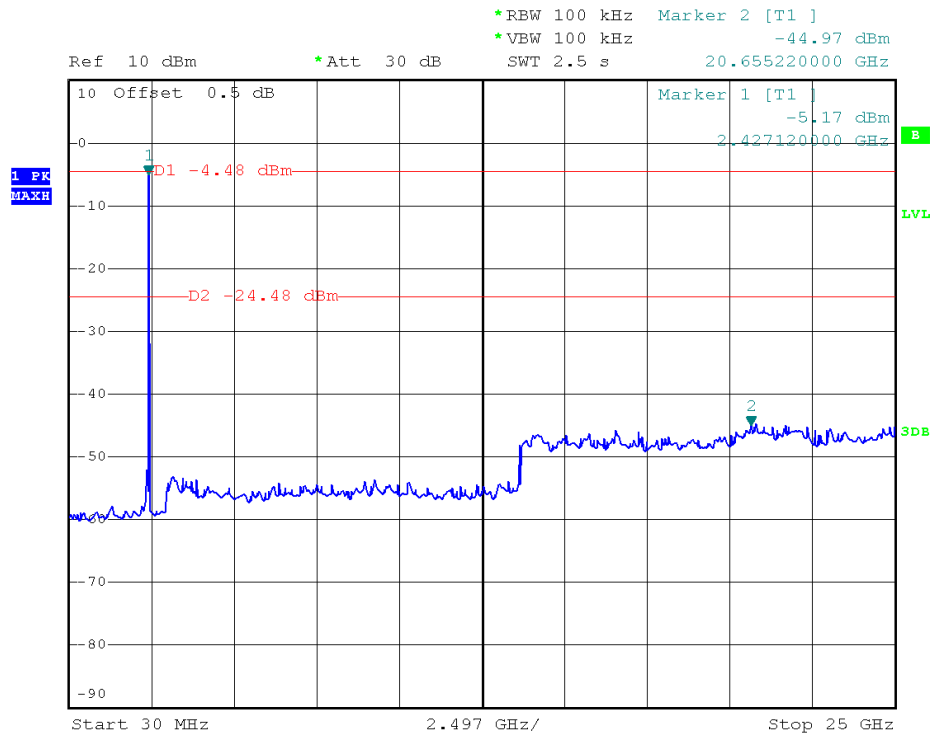
| Channel | Frequency (MHz) | Refer to Plot | Limit (dBc) | Verdict |
|---------|-----------------|---------------|-------------|---------|
| 1       | 2412            | Plot 2.4 D    | -20         | PASS    |
| 6       | 2437            | Plot 2.4 E    | -20         | PASS    |
| 11      | 2462            | Plot 2.4 F    | -20         | PASS    |

#### B. Test Plots:

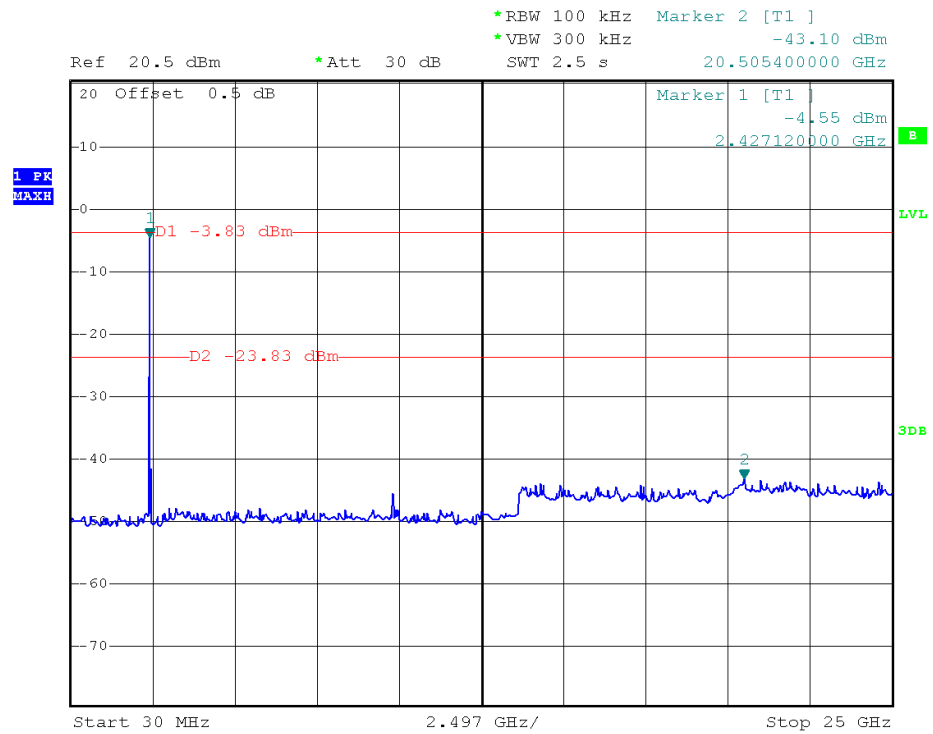
Note: the power of the Module transmitting frequency should be ignored.



(Plot 2.4 D: Channel = 1, 30MHz to 25GHz@ 802.11g)



(Plot 2.4 E: Channel = 6, 30MHz to 25GHz@ 802.11g)



(Plot 2.4 F: Channel = 11, 30MHz to 25GHz@ 802.11g)



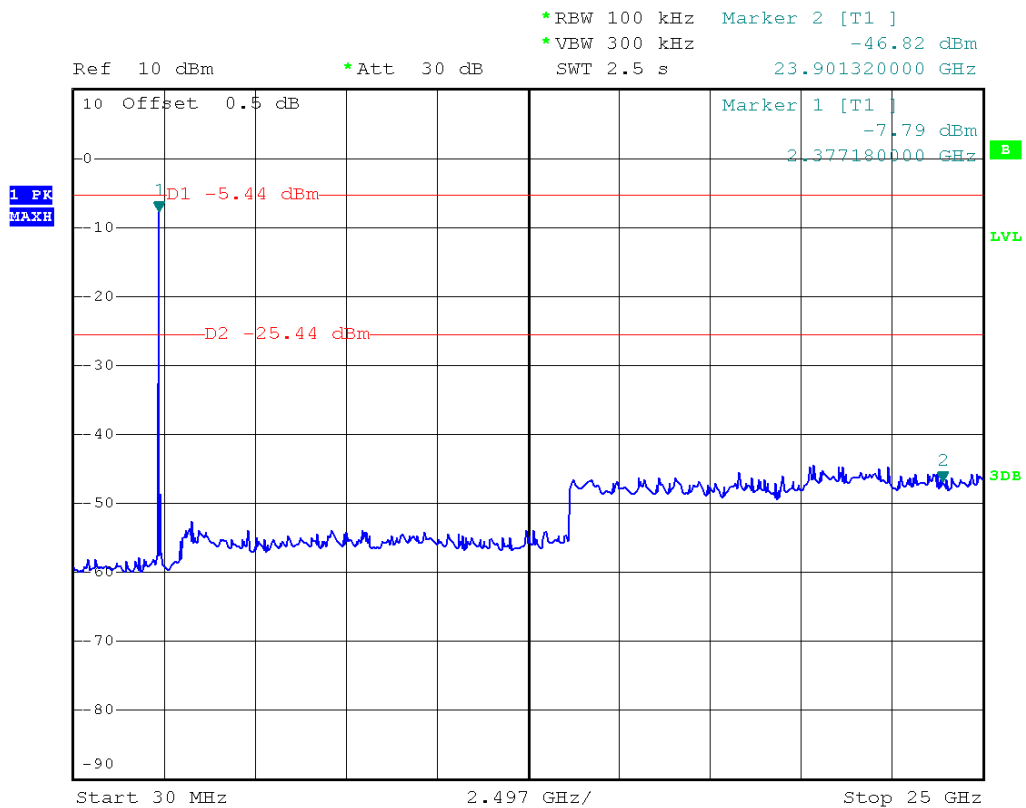
### 2.4.3.3 802.11n -20MHz Test mode

#### A. Test Verdict:

| Channel | Frequency (MHz) | Refer to Plot | Limit (dBc) | Verdict |
|---------|-----------------|---------------|-------------|---------|
| 1       | 2412            | Plot 2.4 G    | -20         | PASS    |
| 6       | 2437            | Plot 2.4 H    | -20         | PASS    |
| 11      | 2462            | Plot 2.4 I    | -20         | PASS    |

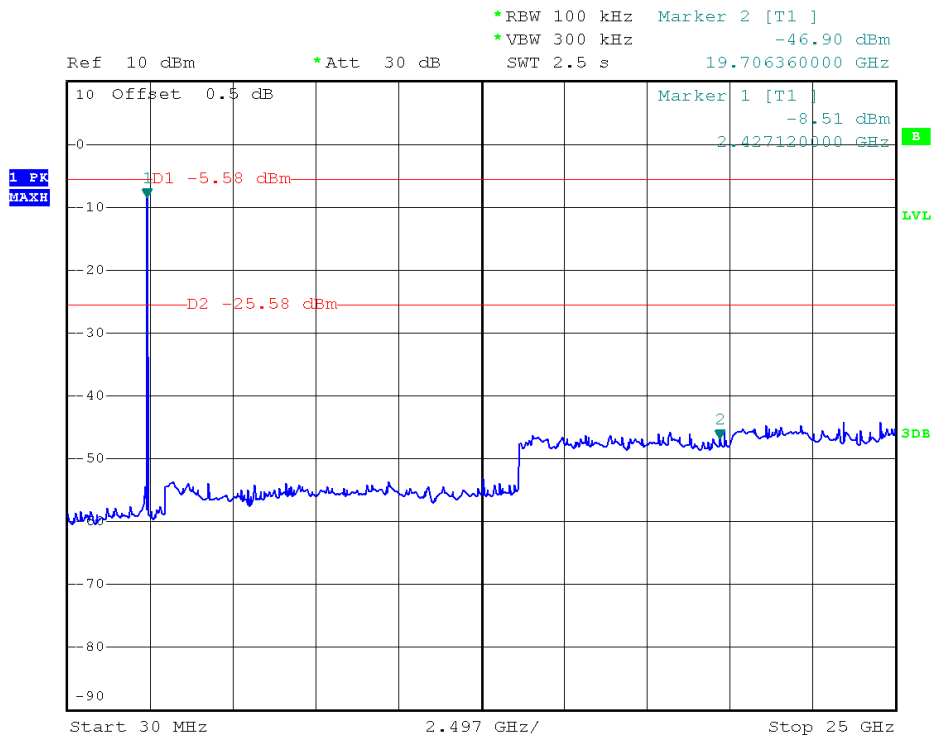
#### B. Test Plots:

Note: the power of the Module transmitting frequency should be ignored.

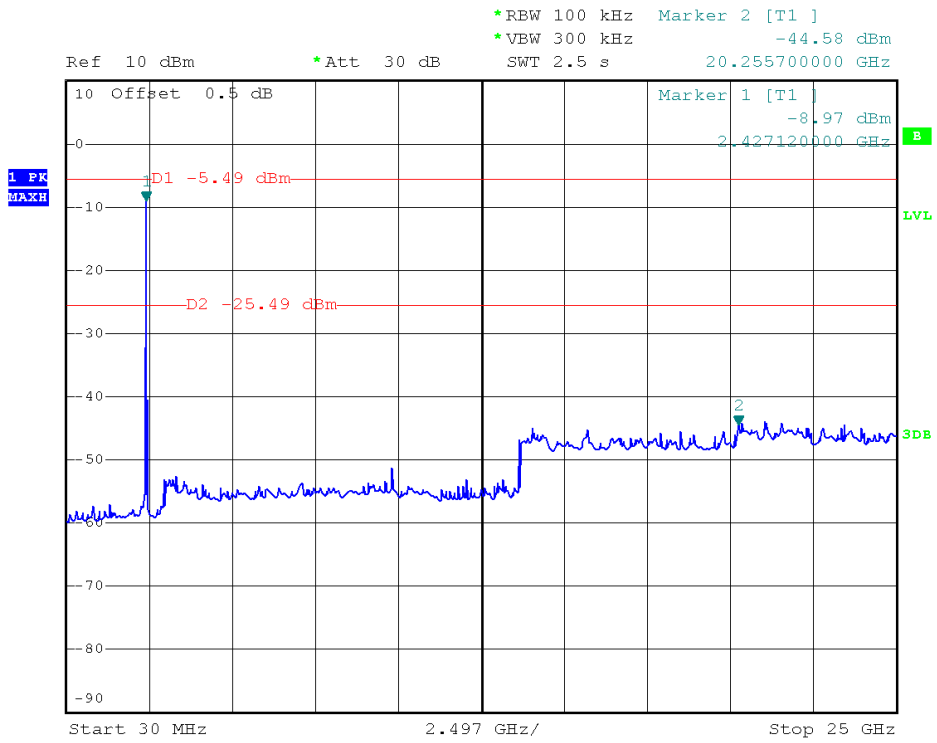


(Plot 2.4 G: Channel = 1, 30MHz to 25GHz@ 802.11n-20)





(Plot 2.4 H: Channel = 6, 30MHz to 25GHz@ 802.11n-20)



(Plot 2.4 I: Channel = 11, 30MHz to 25GHz@ 802.11n-20)



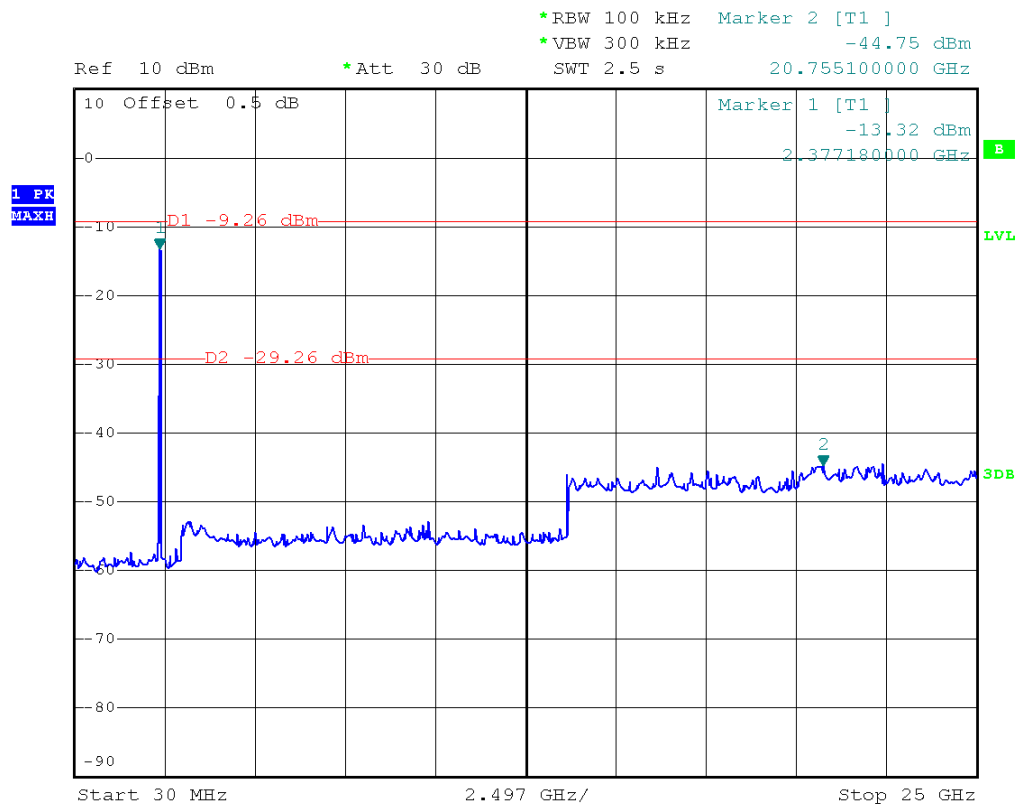
### 2.4.3.4 802.11n -40MHz Test mode

#### A. Test Verdict:

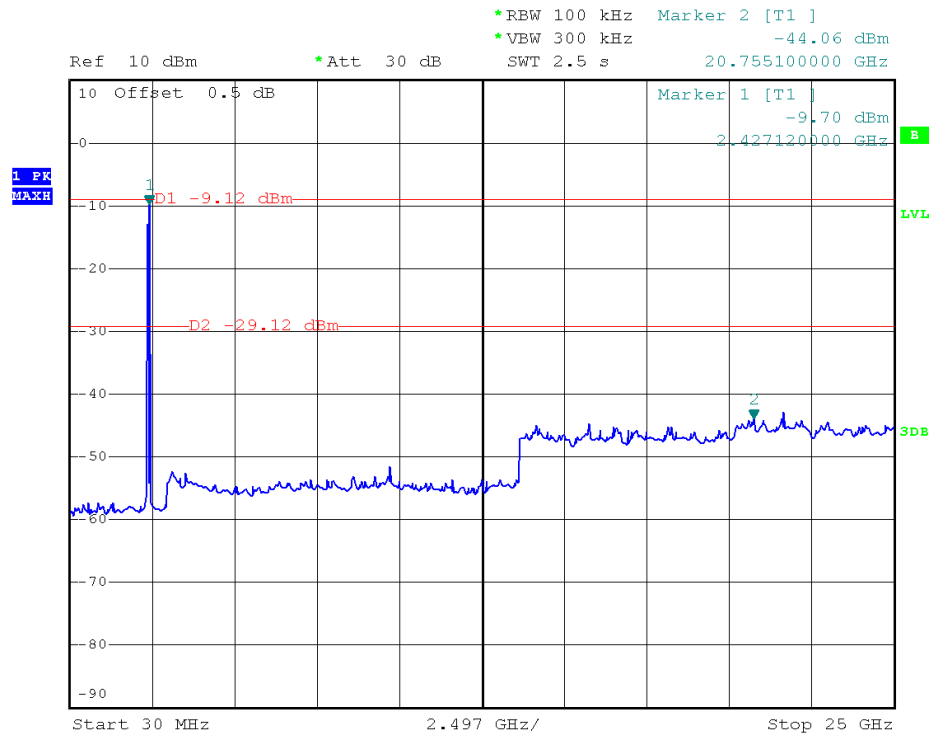
| Channel | Frequency (MHz) | Refer to Plot | Limit (dBc) | Verdict |
|---------|-----------------|---------------|-------------|---------|
| 3       | 2422            | Plot 2.4 J    | -20         | PASS    |
| 6       | 2437            | Plot 2.4 K    | -20         | PASS    |
| 9       | 2452            | Plot 2.4 L    | -20         | PASS    |

#### B. Test Plots:

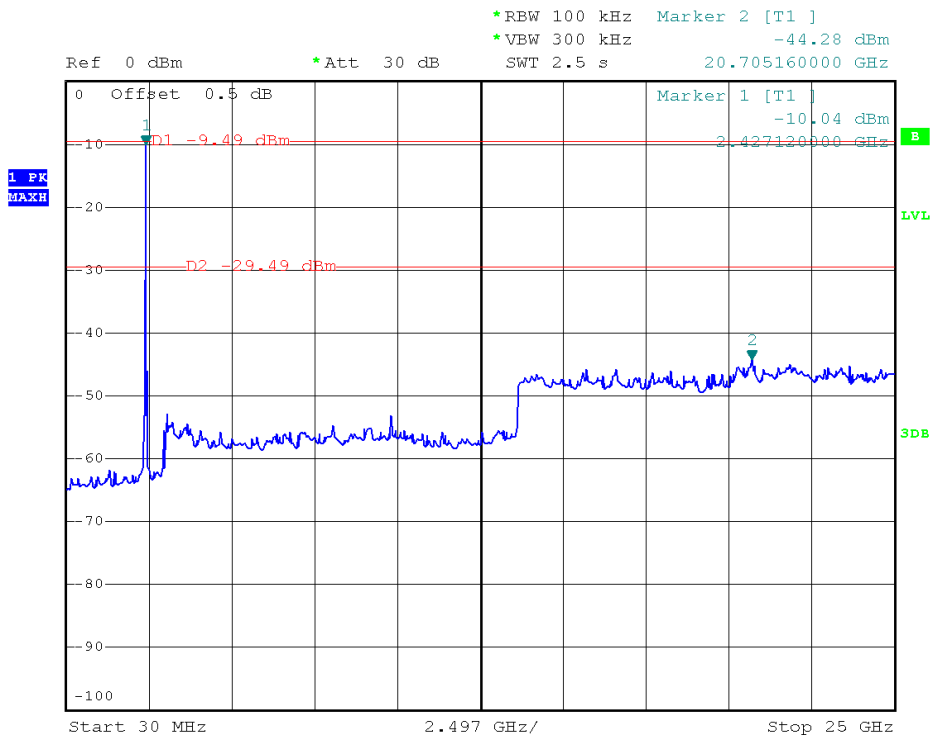
Note: the power of the Module transmitting frequency should be ignored.



(Plot 2.4 J: Channel = 3, 30MHz to 25GHz@ 802.11n-40)



(Plot 2.4 K: Channel = 6, 30MHz to 25GHz@ 802.11n-40)



(Plot 2.4 L: Channel = 9, 30MHz to 25GHz@ 802.11n-40)

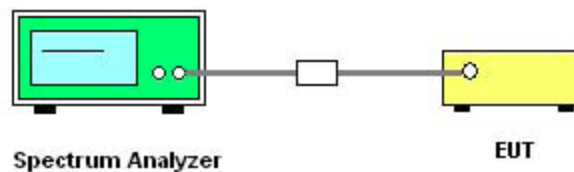
## 2.5 Power spectral density (PSD)

### 2.5.1 Requirement

According to FCC section 15.247(d), the same method of determining the conducted output power shall be used to determine the power spectral density. If a peak output power is measured, then a peak power spectral density measurement is required. If an average output power is measured, then an average power spectral density measurement should be used.

### 2.5.2 Test Description

#### A. Test Set:



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss and Atten as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

#### B. Test Procedure

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  $\geq$  3 kHz.
4. Set the VBW  $\geq$  3 x 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.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### C. Equipments List:

| Description       | Manufacturer | Model | Serial No.   | Cal.Due Date |
|-------------------|--------------|-------|--------------|--------------|
| Spectrum Analyzer | R&S          | FSP40 | 1164.4391.40 | 2014.06.10   |



### 2.5.3 Test Result

The lowest, middle and highest channels are tested to verify the band edge emissions.

#### 2.5.3.1 802.11b Test mode

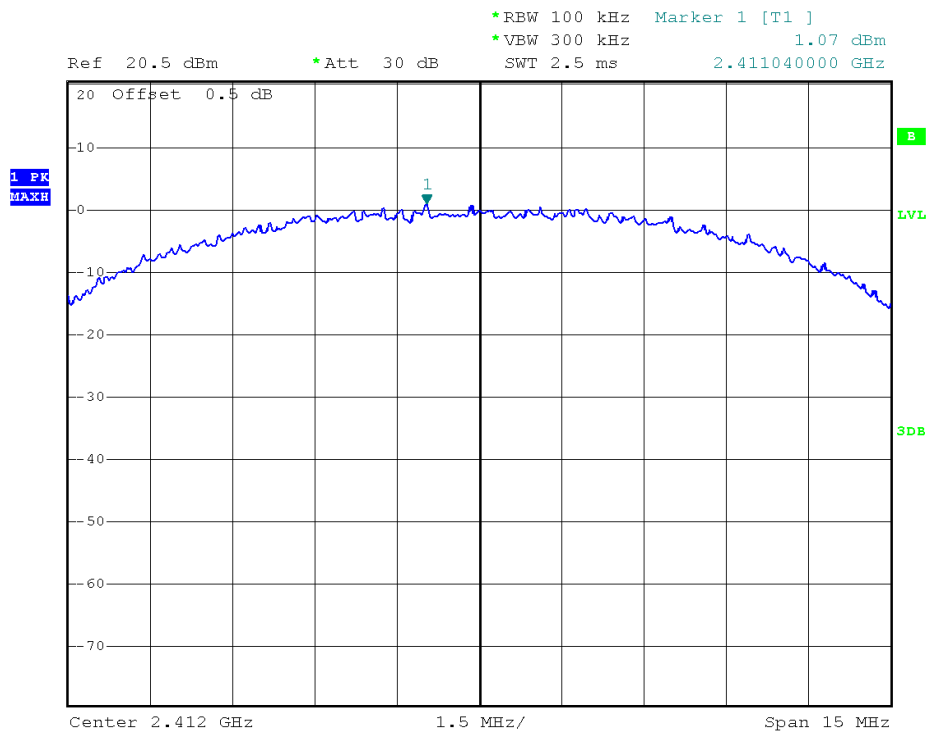
##### A. Test Verdict:

| Spectral power density (dBm/3kHz) |                 |                         |               |                  |         |
|-----------------------------------|-----------------|-------------------------|---------------|------------------|---------|
| Channel                           | Frequency (MHz) | Measured PSD (dBm/3kHz) | Refer to Plot | Limit (dBm/3kHz) | Verdict |
| 1                                 | 2412            | 1.07                    | Plot 2.5 A    | 8                | PASS    |
| 6                                 | 2437            | 1.10                    | Plot 2.5 B    | 8                | PASS    |
| 11                                | 2462            | 1.05                    | Plot 2.5 C    | 8                | PASS    |

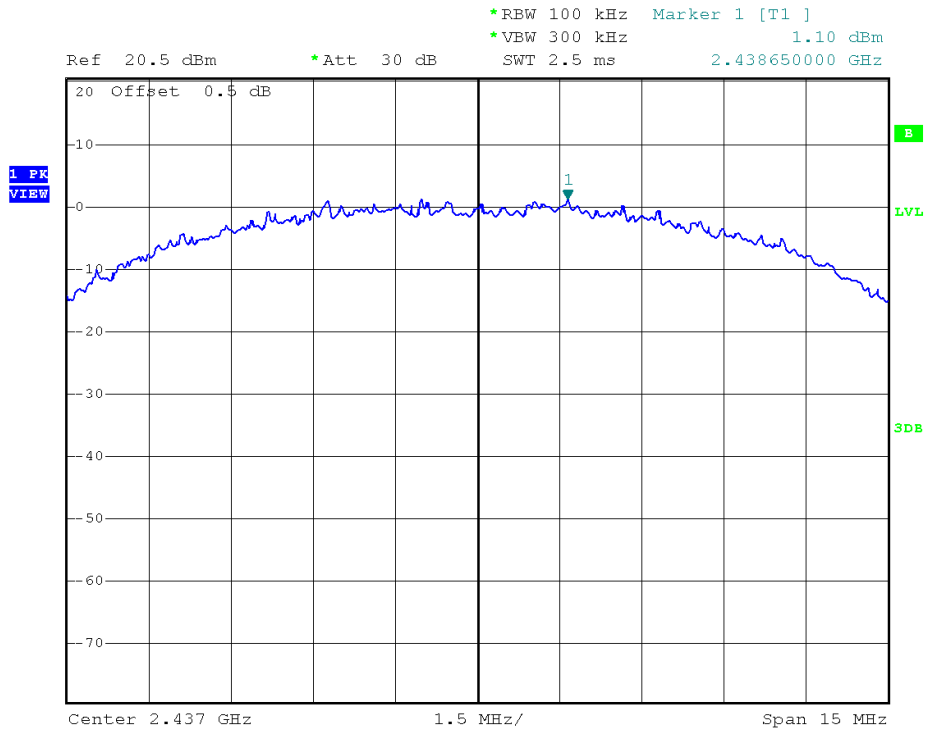
Measurement uncertainty:  $\pm 1.3$ dB

- Note: 1. For 802.11b mode at final test to get the worst-case emission at 11Mbps.  
 2. The test results including the cable loss.

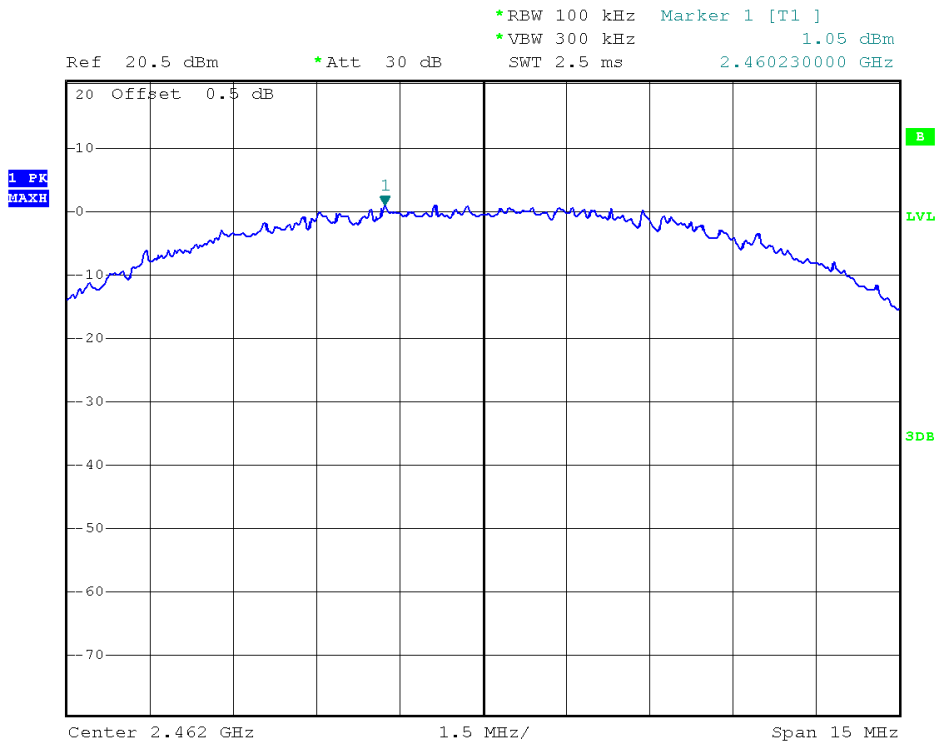
##### B. Test Plots:



(Plot 2.5 A: Channel = 1 @ 802.11b)



(Plot 2.5 B: Channel = 6 @ 802.11b)



(Plot 2.5 C: Channel = 11 @ 802.11b)



### 2.5.3.2 802.11g Test mode

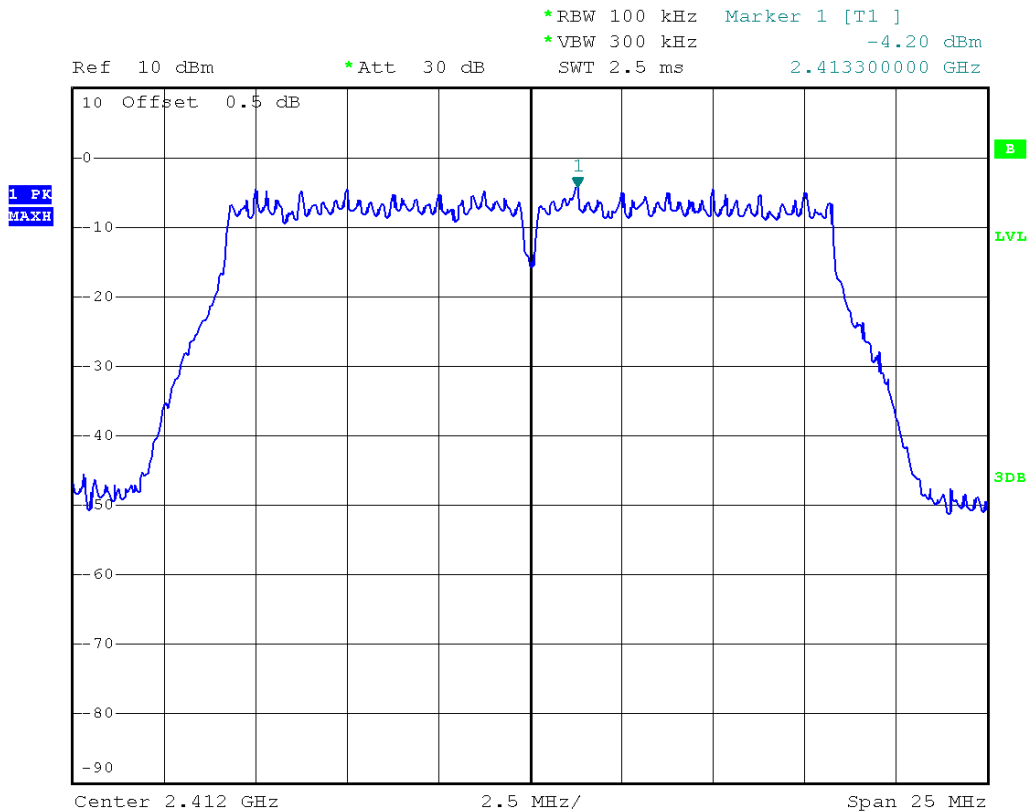
#### A. Test Verdict:

| Spectral power density (dBm/3kHz) |                 |                         |               |                  |         |
|-----------------------------------|-----------------|-------------------------|---------------|------------------|---------|
| Channel                           | Frequency (MHz) | Measured PSD (dBm/3kHz) | Refer to Plot | Limit (dBm/3kHz) | Verdict |
| 1                                 | 2412            | -4.20                   | Plot 2.5 D    | 8                | PASS    |
| 6                                 | 2437            | -4.48                   | Plot 2.5 E    | 8                | PASS    |
| 11                                | 2462            | -3.83                   | Plot 2.5 F    | 8                | PASS    |

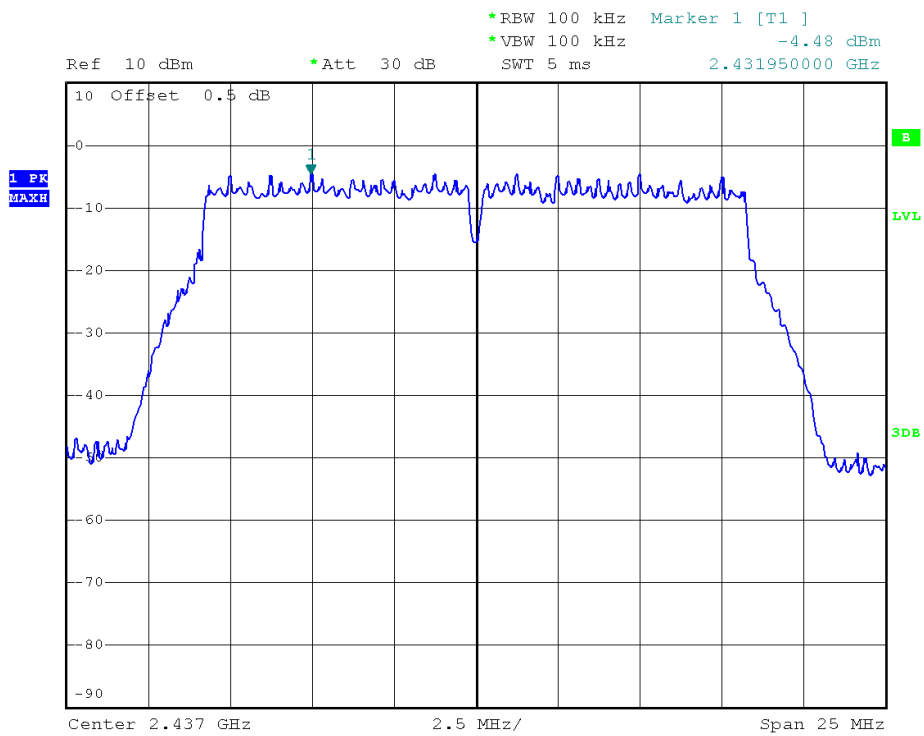
Measurement uncertainty:  $\pm 1.3$ dB

Note: 1. For 802.11g mode at final test to get the worst-case emission at 54 Mbps.  
 2. The test results including the cable lose.

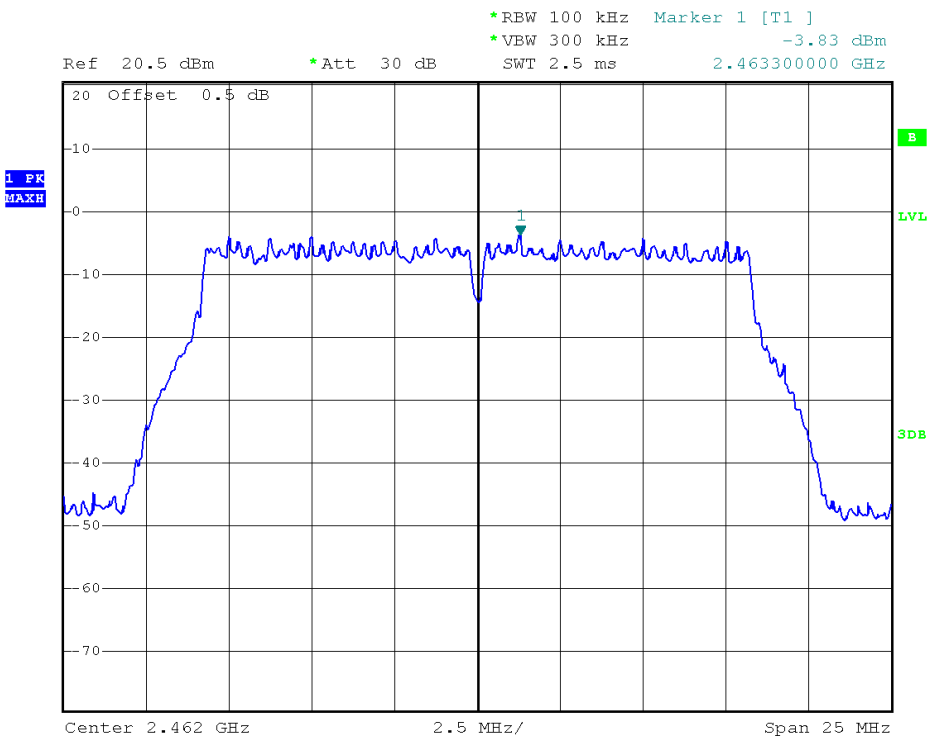
#### B. Test Plots:



(Plot 2.5 D: Channel = 1 @ 802.11g)



(Plot 2.5 E: Channel = 6 @ 802.11g)



(Plot 2.5 F: Channel = 11 @ 802.11g)





### 2.5.3.3 802.11n-20 Test mode

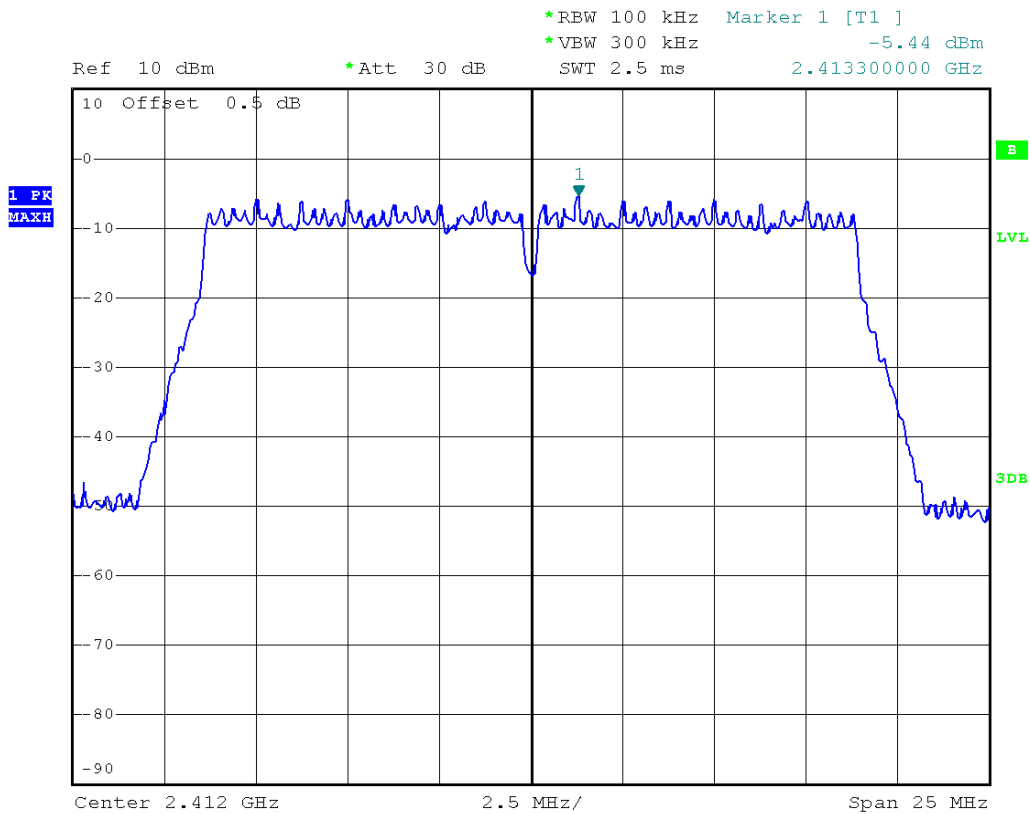
#### A. Test Verdict:

| Spectral power density (dBm/3kHz) |                 |                         |               |                  |         |
|-----------------------------------|-----------------|-------------------------|---------------|------------------|---------|
| Channel                           | Frequency (MHz) | Measured PSD (dBm/3kHz) | Refer to Plot | Limit (dBm/3kHz) | Verdict |
| 1                                 | 2412            | -5.44                   | Plot2.5 G     | 8                | PASS    |
| 6                                 | 2437            | -5.58                   | Plot2.5 H     | 8                | PASS    |
| 11                                | 2462            | -5.49                   | Plot2.5 I     | 8                | PASS    |

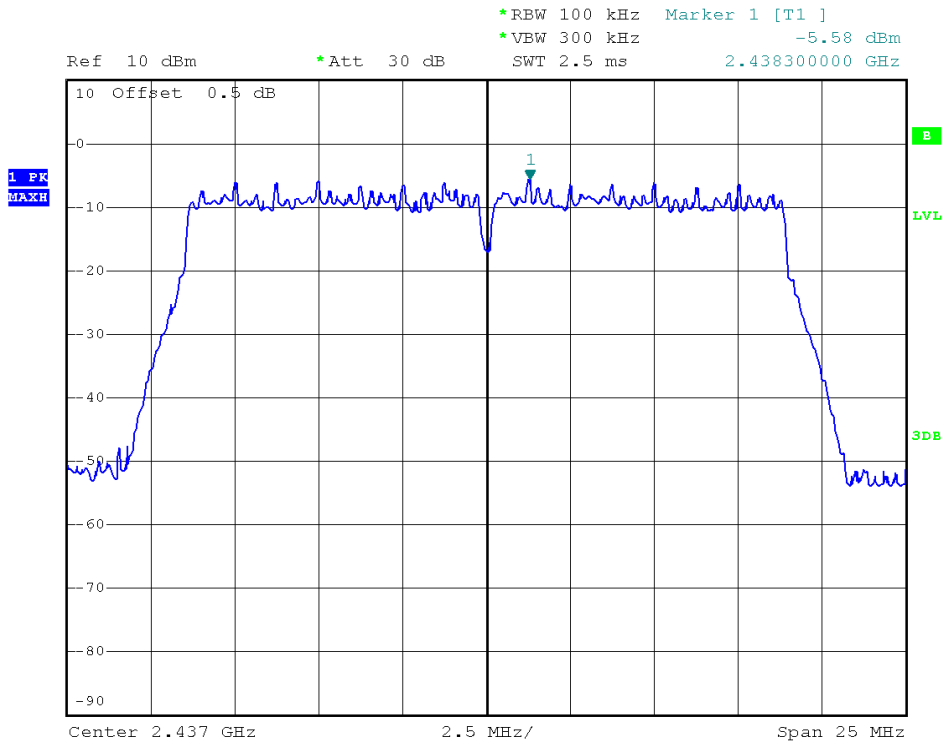
Measurement uncertainty:  $\pm 1.3\text{dB}$

- Note:
1. For 802.11n(20MHz) mode at final test to get the worst-case emission at 72 Mbps.
  2. The test results including the cable lose.

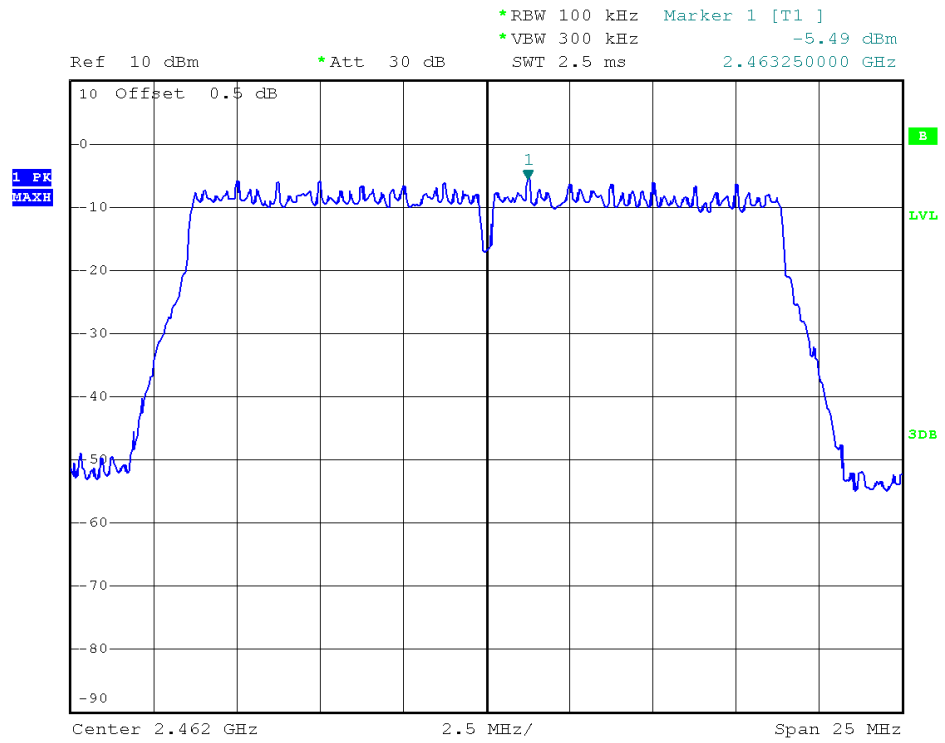
#### B. Test Plots:



(Plot 2.5 G: Channel = 1 @ 802.11n-20)



(Plot 2.5 H: Channel = 6 @ 802.11n-20)



(Plot 2.5 I: Channel = 11 @ 802.11n-20)



### 2.5.3.4 802.11n-40 Test mode

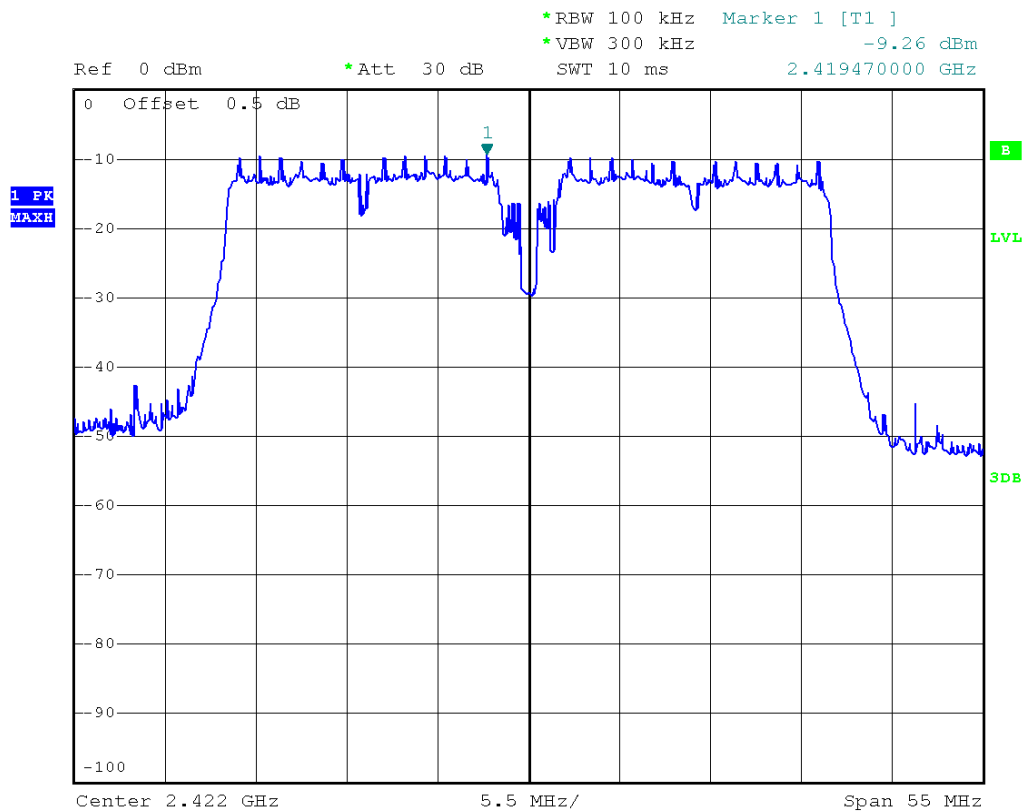
#### A. Test Verdict:

| Spectral power density (dBm/3kHz) |                 |                         |               |                  |         |
|-----------------------------------|-----------------|-------------------------|---------------|------------------|---------|
| Channel                           | Frequency (MHz) | Measured PSD (dBm/3kHz) | Refer to Plot | Limit (dBm/3kHz) | Verdict |
| 3                                 | 2422            | -9.26                   | Plot 2.5 J    | 8                | PASS    |
| 6                                 | 2437            | -9.12                   | Plot 2.5 K    | 8                | PASS    |
| 9                                 | 2452            | -9.49                   | Plot 2.5 L    | 8                | PASS    |

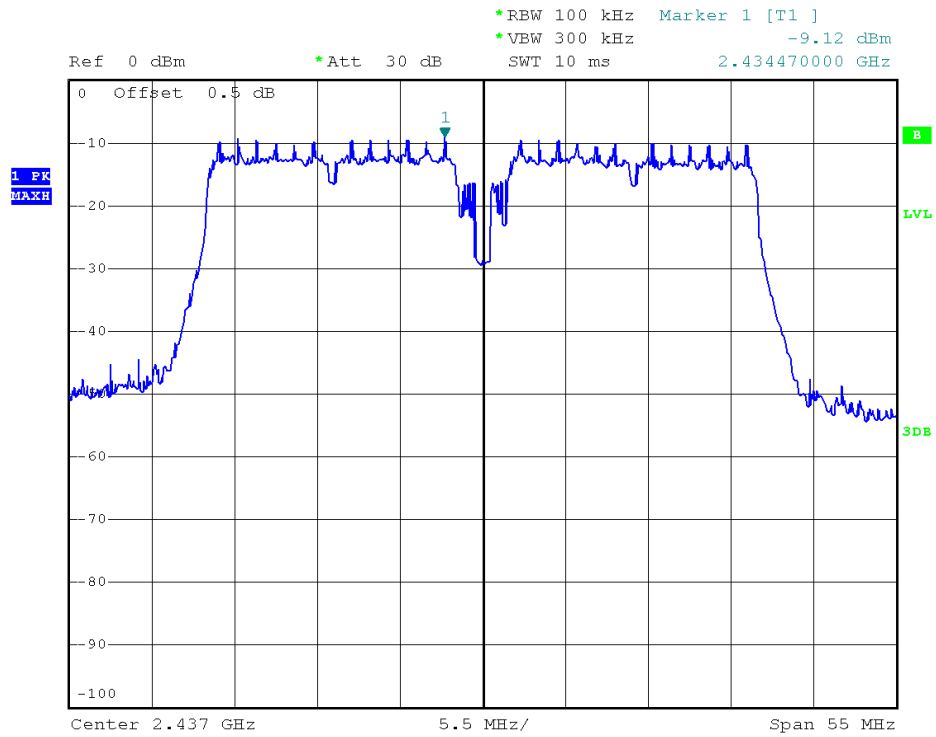
Measurement uncertainty:  $\pm 1.3\text{dB}$

- Note:
1. For 802.11n(40MHz) mode at final test to get the worst-case emission at 72 Mbps.
  2. The test results including the cable loss.

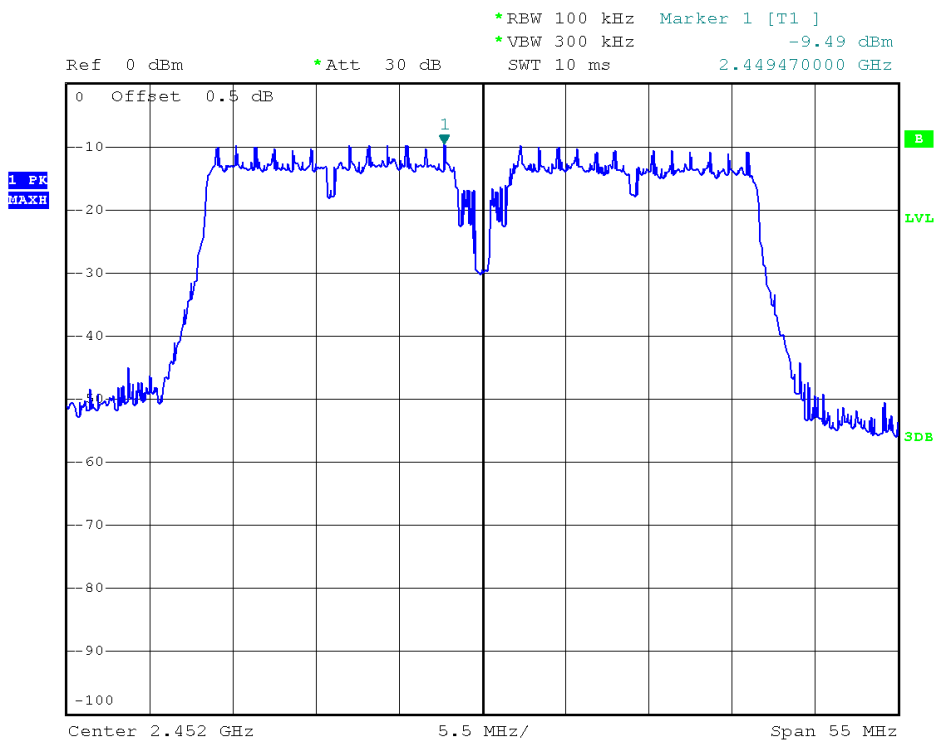
#### B. Test Plots:



(Plot 2.5 J: Channel = 3 @ 802.11n-40)



(Plot 2.5 K: Channel = 6 @ 802.11n-40)



(Plot 2.5 L: Channel = 9 @ 802.11n-40)

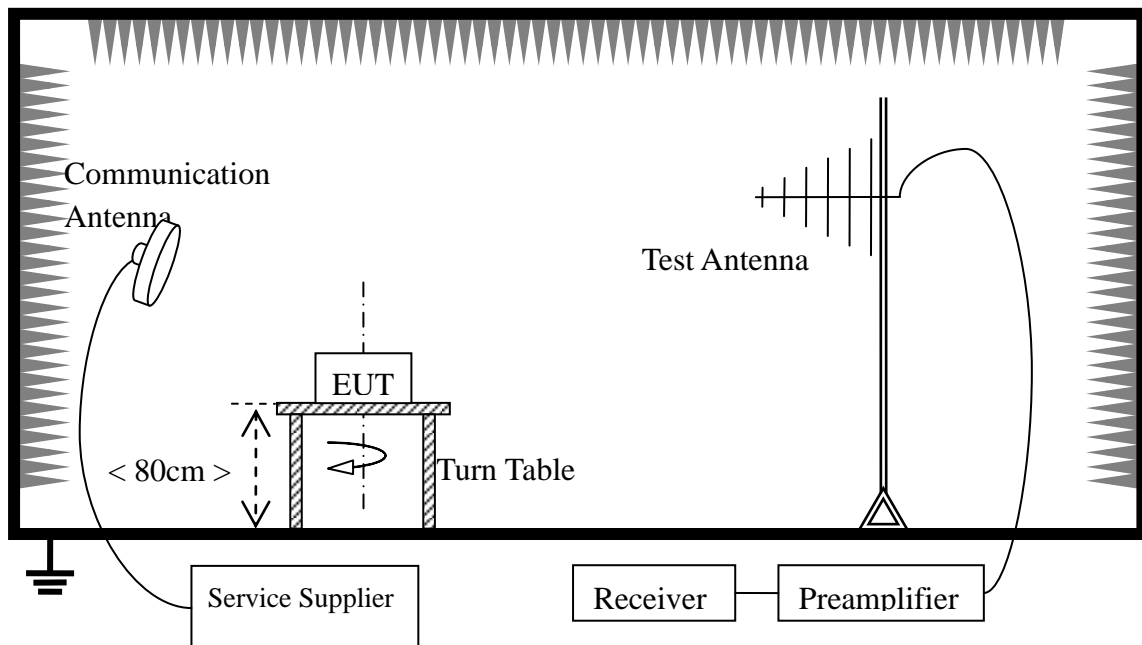
## 2.6 Band Edge

### 2.6.1 Requirement

According to FCC section 15.247(d), 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.

### 2.6.2 Test Description

#### A. Test Setup



The Module of the EUT is powered by the Battery charged with the AC Adapter. The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

**B. Equipments List:**

| Description               | Manufacturer | Model                   | Serial No. | Cal. Due Date |
|---------------------------|--------------|-------------------------|------------|---------------|
| Receiver                  | R&S          | ESIB26                  | A0304218   | 2014.06.07    |
| Full-Anechoic Chamber     | Albatross    | 12.8m*6.8m*6.4m         | A0412372   | 2014.06.07    |
| Double ridge horn antenna | R&S          | HF906                   | 100150     | 2014.06.10    |
| Ultra-wideband antenna    | R&S          | HL562                   | 100089     | 2014.06.10    |
| Ampilier 1G~18GHz         | R&S          | MITEQ<br>AFS42-00101800 | 25-S-42    | 2014.06.05    |

**2.6.3 Test Result**

Band edge were measurement for 802.11b,802.11g, 802.11n(20MHz) and 802.11n(40MHz) mode at difference date, recording worst case in test report.

**Radiated band edge Measurement:**

The lowest and highest channels are tested to verify the band edge emissions.

The measurement results are obtained as below:

$$E \text{ [dB}\mu \text{ V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

$A_T$ : Total correction Factor except Antenna

$U_R$ : Receiver Reading

$G_{\text{preamp}}$ : Preamplifier Gain

$A_{\text{Factor}}$ : Antenna Factor at 3m

NOTE 1: The red vertical lines “F1” in the following charts is to indicate the frequencies 2400MHz and 2483.5MHz respectively

NOTE 2: Both horizontal and vertical polarity direction of the test antenna has been performed, only the worst case recorded in this report.

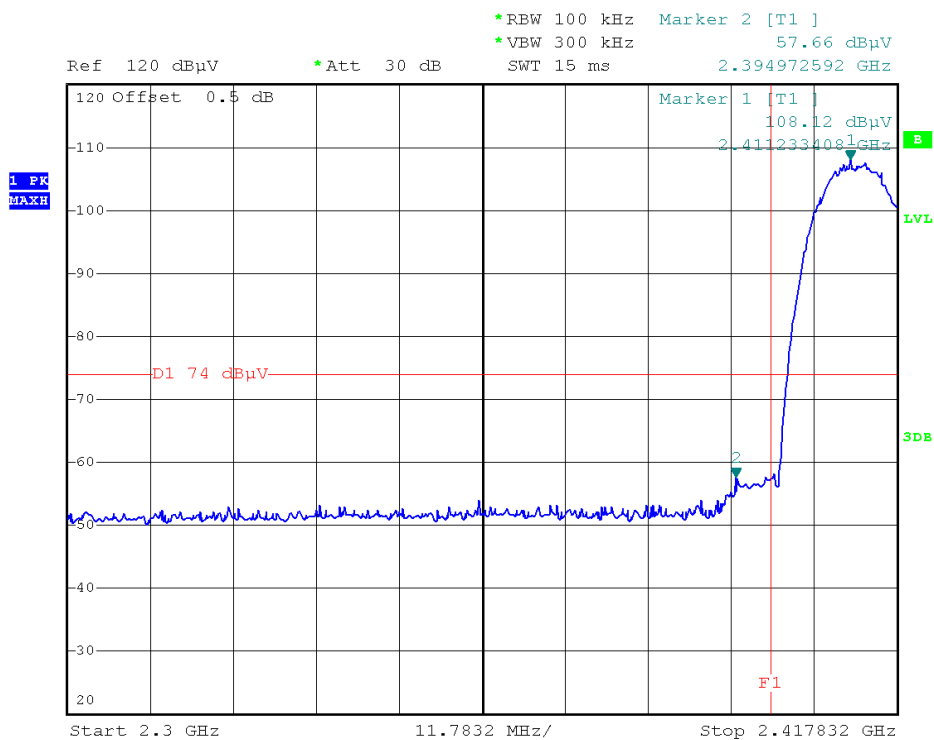


**802.11b**

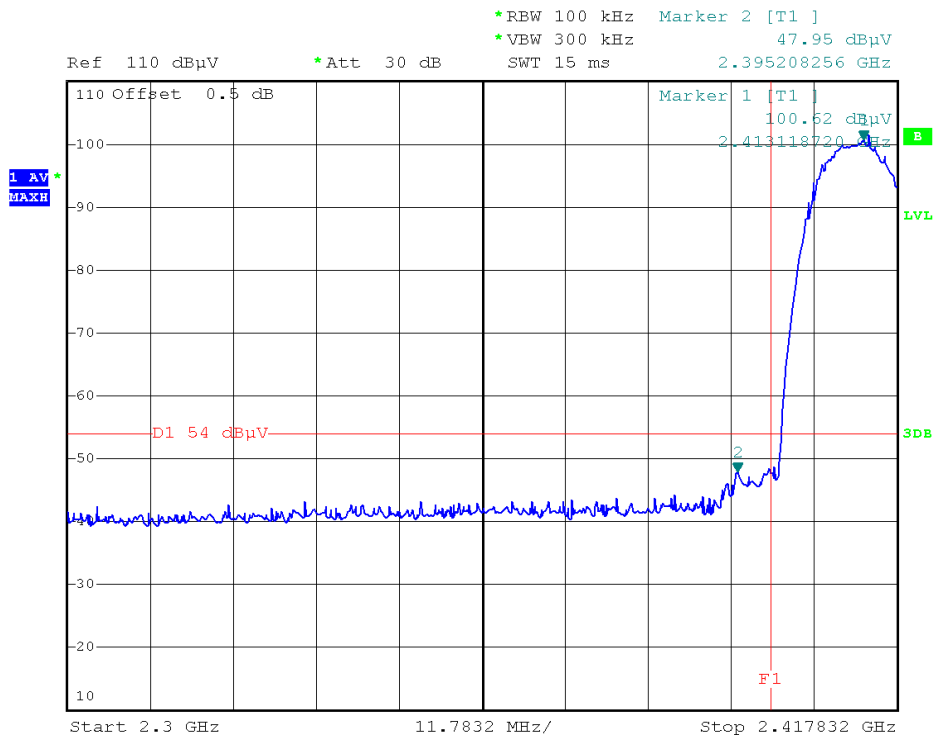
**A. Test Verdict:**

| Channel | Frequency (MHz) | Detector | Receiver Reading UR (dBuV) | AT (dB) | AFactor (dB@3m) | Max. Emission E (dB μV/m) | Limit (dB μV/m) | Verdict |
|---------|-----------------|----------|----------------------------|---------|-----------------|---------------------------|-----------------|---------|
|         |                 | PK/ AV   |                            |         |                 |                           |                 |         |
| 1       | 2394.973        | PK       | 57.66                      | -31.70  | 28.3            | 54.26                     | 74              | Pass    |
| 1       | 2395.208        | AV       | 47.95                      | -31.70  | 28.3            | 44.55                     | 54              | Pass    |
| 11      | 2490.191        | PK       | 50.78                      | -29.45  | 29.2            | 50.53                     | 74              | Pass    |
| 11      | 2489.111        | AV       | 45.82                      | -29.45  | 29.2            | 45.57                     | 54              | Pass    |

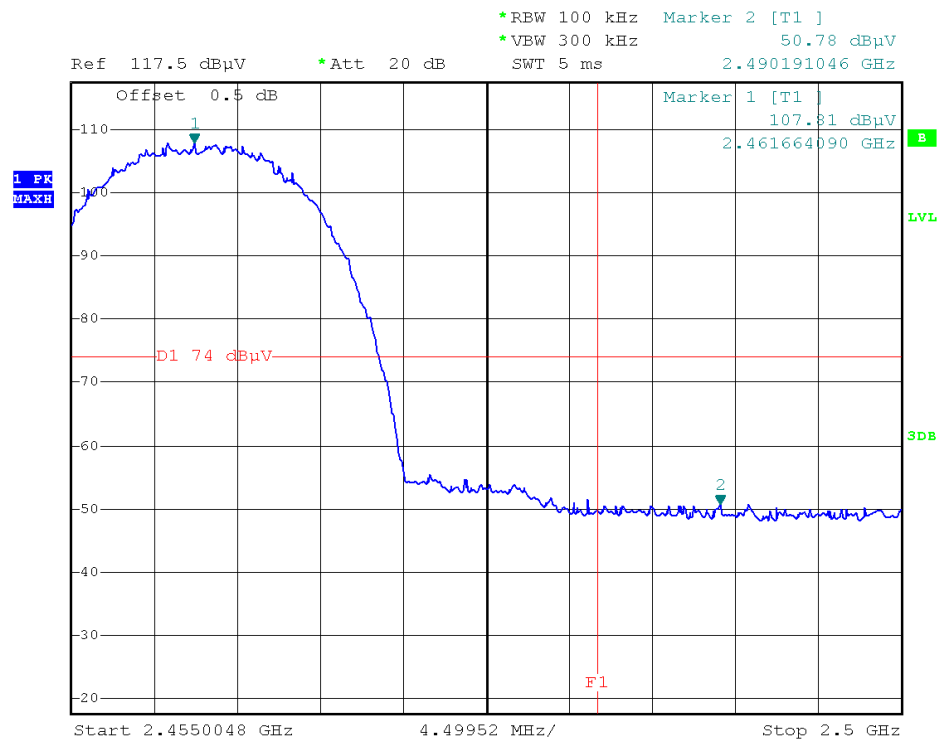
**B. Test Plots:**



(Plot 2.6 A1: Channel = 1 Peak @ 802.11b)

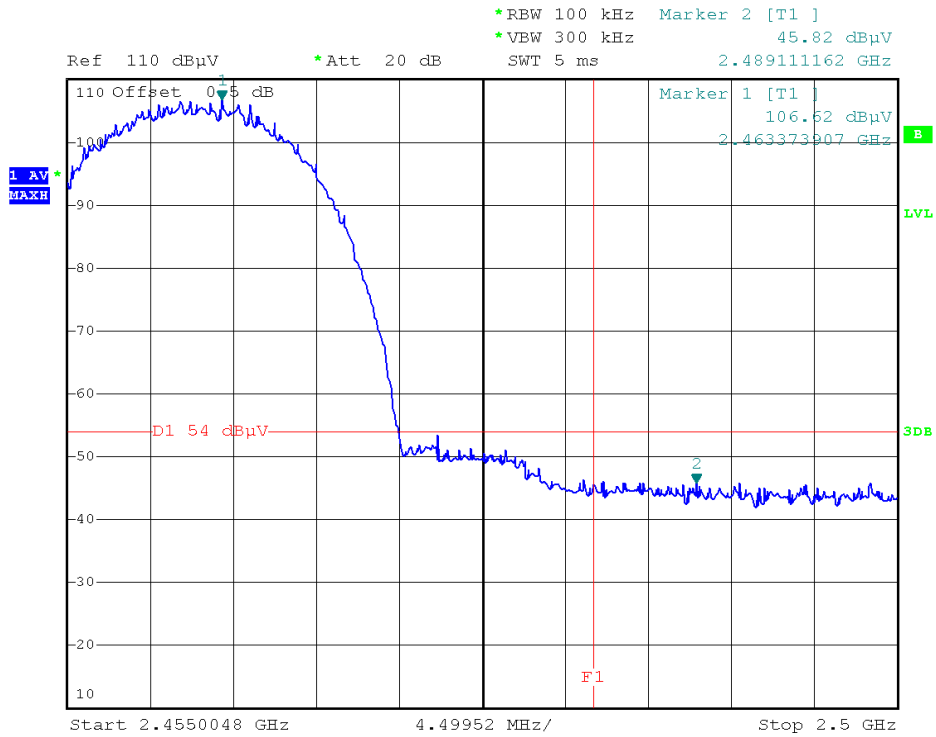


(Plot 2.6 A2: Channel = 1 AVG @ 802.11b)



(Plot 2.6 A3: Channel = 11 Peak @ 802.11b)





(Plot 2.6 A4: Channel = 11 AVG @ 802.11b)

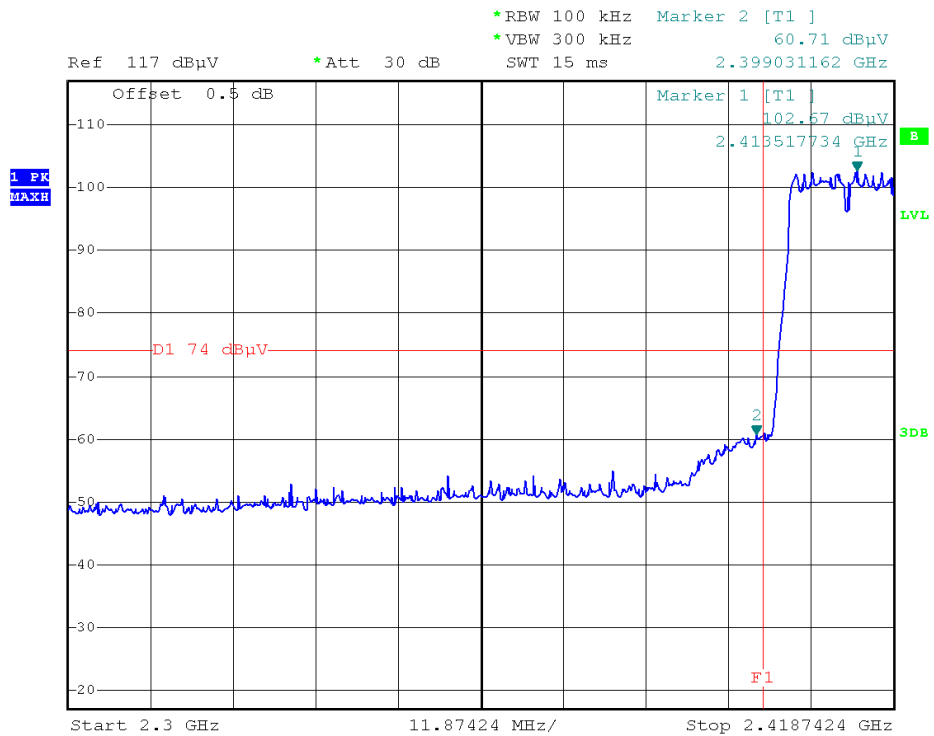
**802.11g**

**A. Test Verdict:**

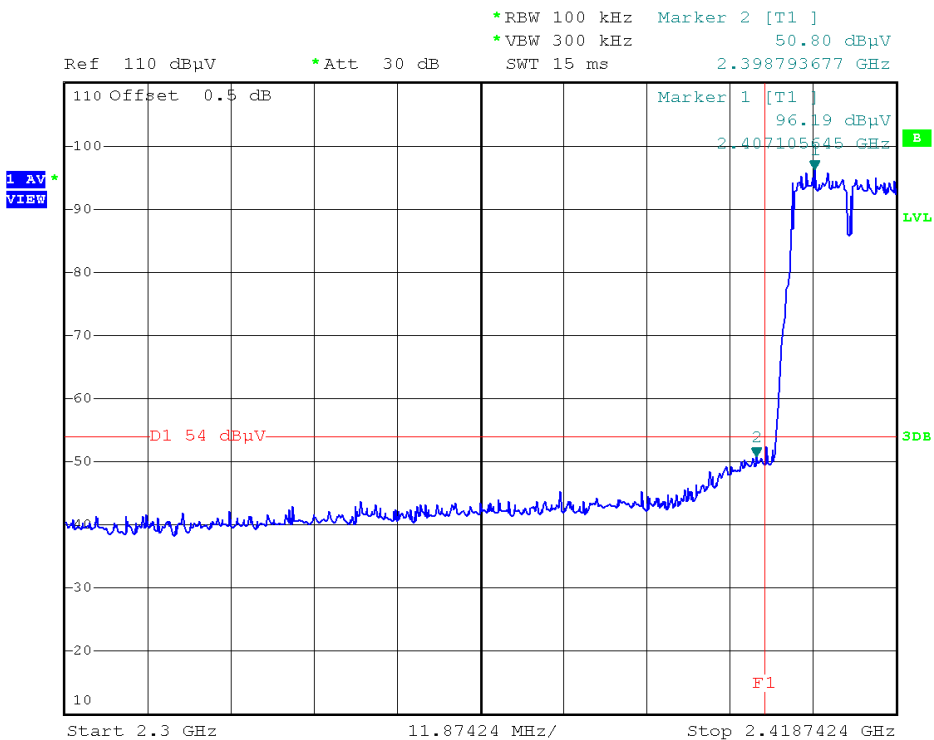
| Channel | Frequency (MHz) | Detector | Receiver Reading UR (dBuV) | AT (dB) | AFactor (dB@3m) | Max. Emission E (dB μV/m) | Limit (dB μV/m) | Verdict |
|---------|-----------------|----------|----------------------------|---------|-----------------|---------------------------|-----------------|---------|
|         |                 | PK/ AV   |                            |         |                 |                           |                 |         |
| 1       | 2399.031        | PK       | 60.71                      | -31.70  | 28.3            | 57.31                     | 74              | Pass    |
| 1       | 2398.794        | AV       | 50.80                      | -31.70  | 28.3            | 47.40                     | 54              | Pass    |
| 11      | 2497.076        | PK       | 54.71                      | -29.45  | 29.2            | 54.46                     | 74              | Pass    |
| 11      | 2492.017        | AV       | 47.41                      | -29.45  | 29.2            | 47.16                     | 54              | Pass    |



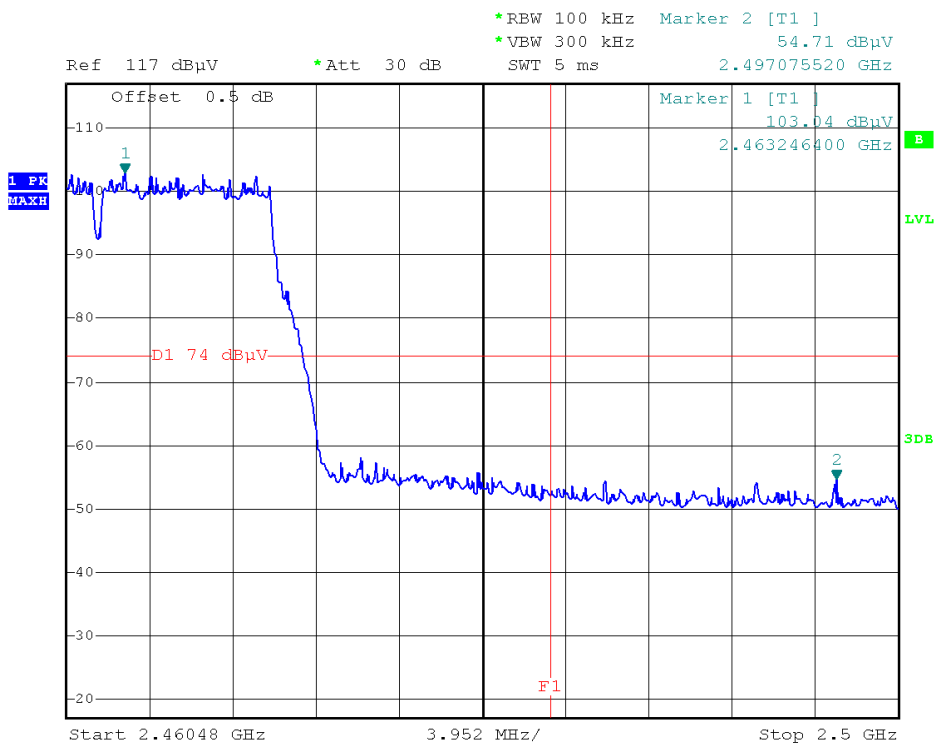
**B. Test Plots:**



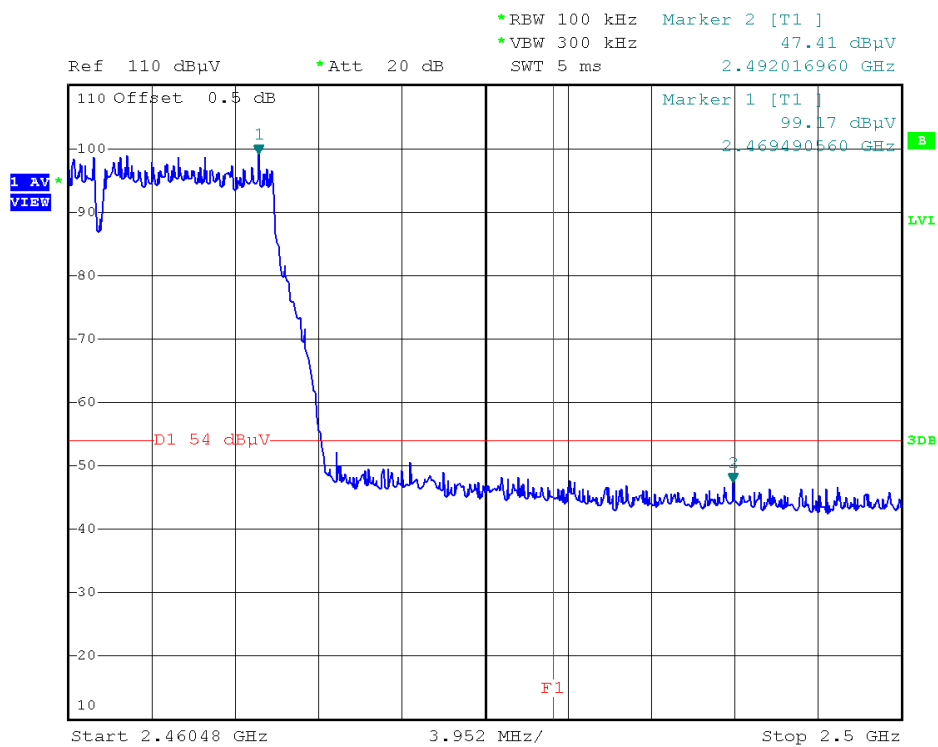
(Plot 2.6 B1: Channel = 1 Peak @ 802.11g)



(Plot 2.6 B2: Channel = 1 AVG @ 802.11g)



(Plot 2.6 B3: Channel = 11 Peak @ 802.11g)



(Plot 2.6 B4: Channel = 11 AVG @ 802.11g)

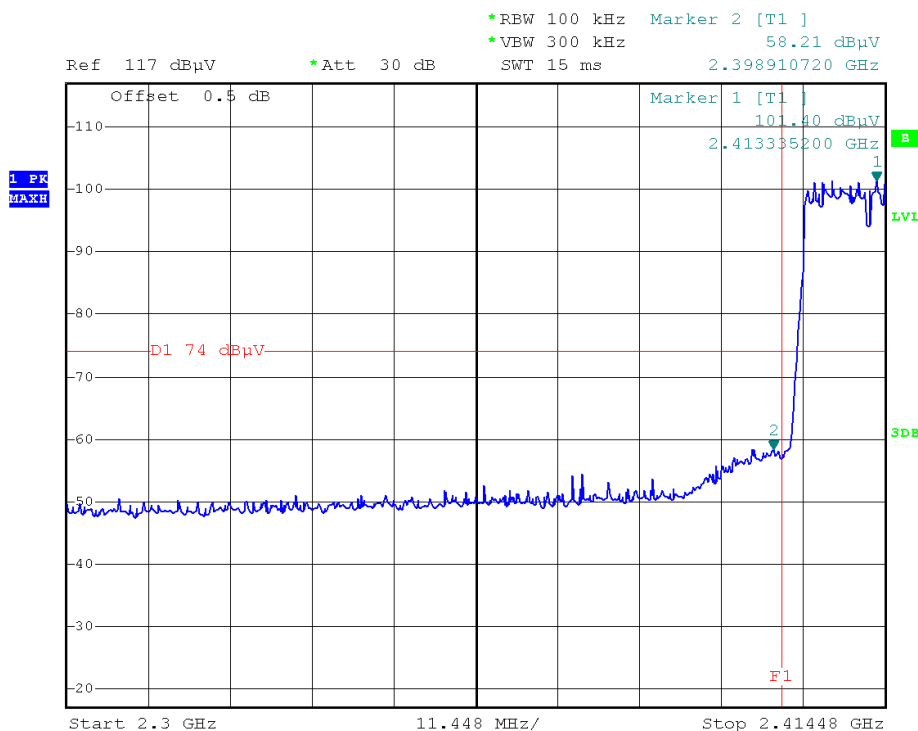


**802.11n-20**

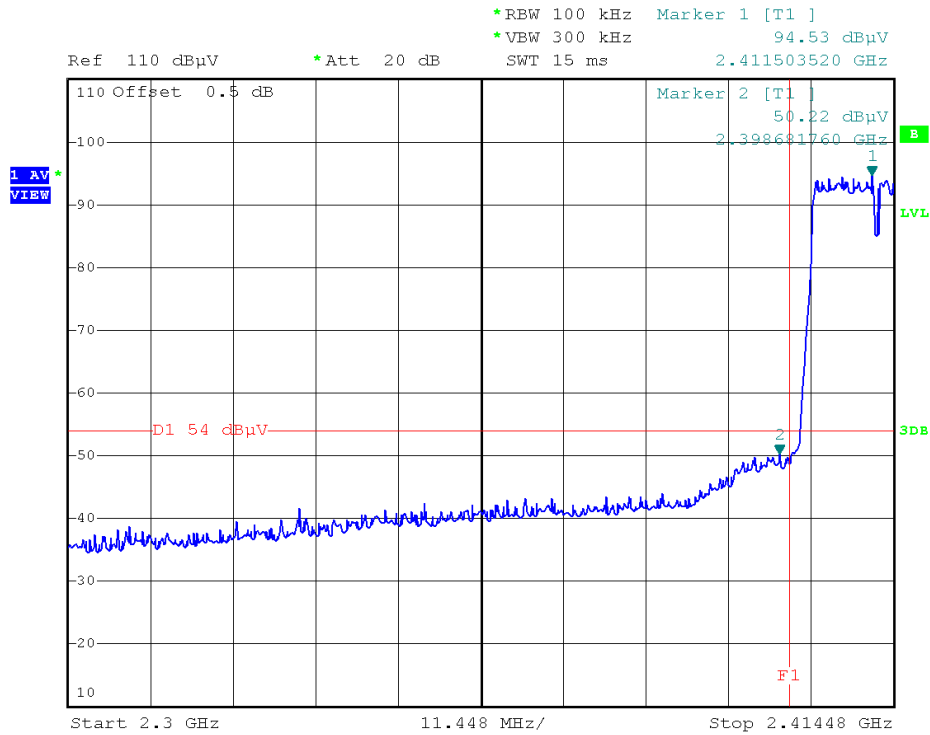
**A. Test Verdict:**

| Channel | Frequency (MHz) | Detector | Receiver Reading UR (dBuV) | AT (dB) | AFactor (dB@3m) | Max. Emission E (dB μV/m) | Limit (dB μV/m) | Verdict |
|---------|-----------------|----------|----------------------------|---------|-----------------|---------------------------|-----------------|---------|
|         |                 | PK/ AV   |                            |         |                 |                           |                 |         |
| 1       | 2398.911        | PK       | 58.21                      | -31.70  | 28.3            | 54.81                     | 74              | Pass    |
| 1       | 2398.682        | AV       | 50.22                      | -31.70  | 28.3            | 46.82                     | 54              | Pass    |
| 11      | 2495.710        | PK       | 52.61                      | -29.45  | 29.2            | 52.36                     | 74              | Pass    |
| 11      | 2495.788        | AV       | 48.93                      | -29.45  | 29.2            | 48.68                     | 54              | Pass    |

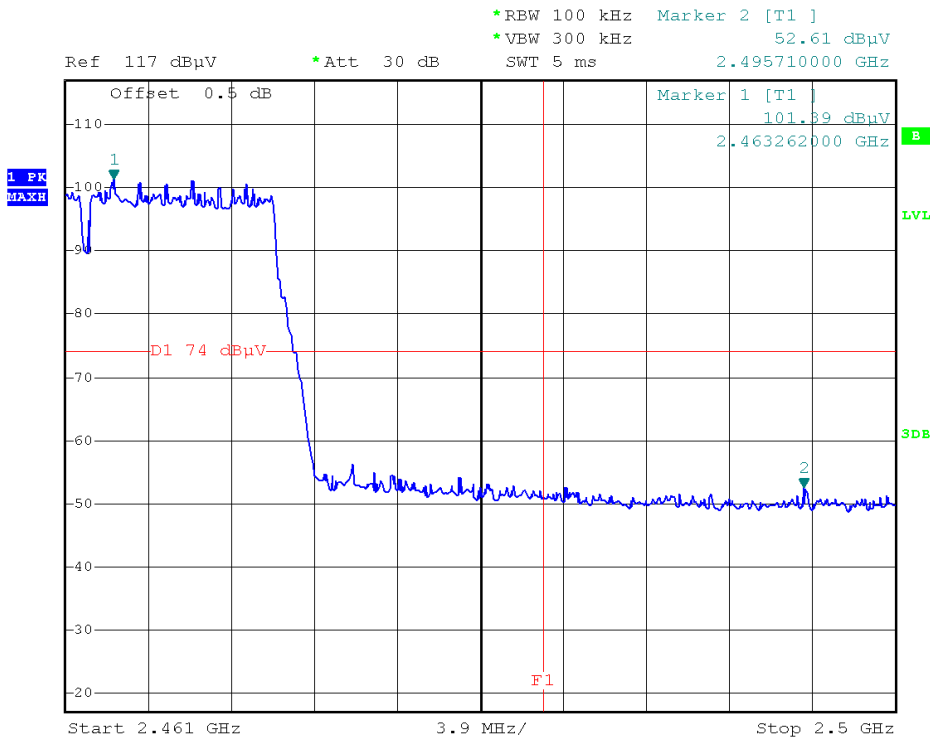
**B. Test Plots:**



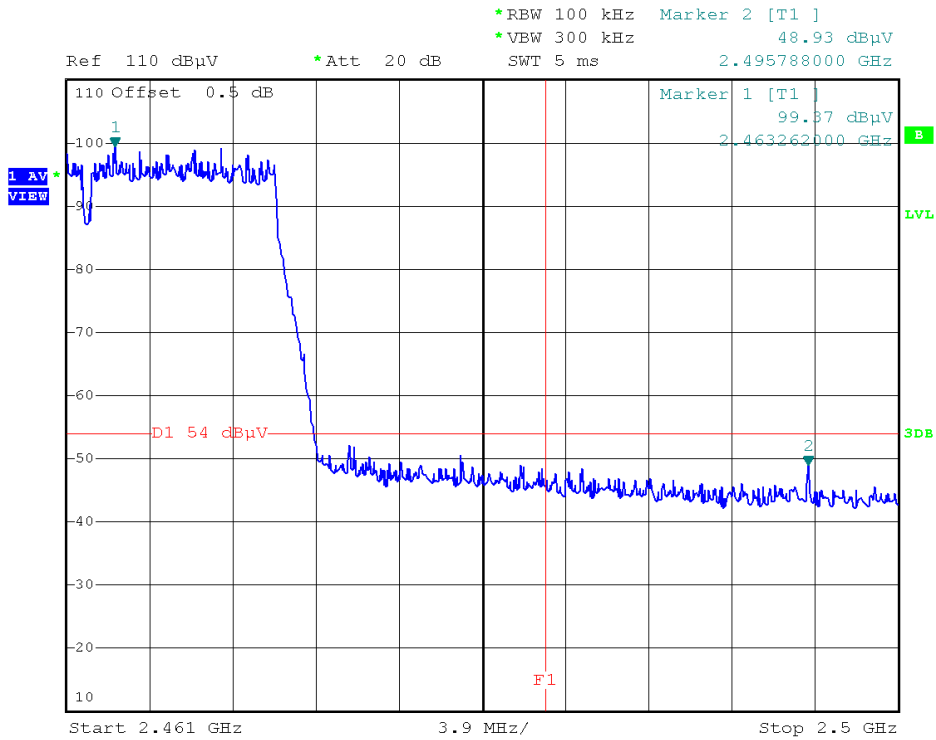
(Plot 2.6 C1: Channel = 1 Peak @ 802.11n-20)



(Plot 2.6 C2: Channel = 1 AVG @ 802.11n-20)



(Plot 2.6 C3: Channel = 11 Peak @ 802.11n-20)



(Plot 2.6 C4: Channel = 11 AVG @ 802.11n-20)

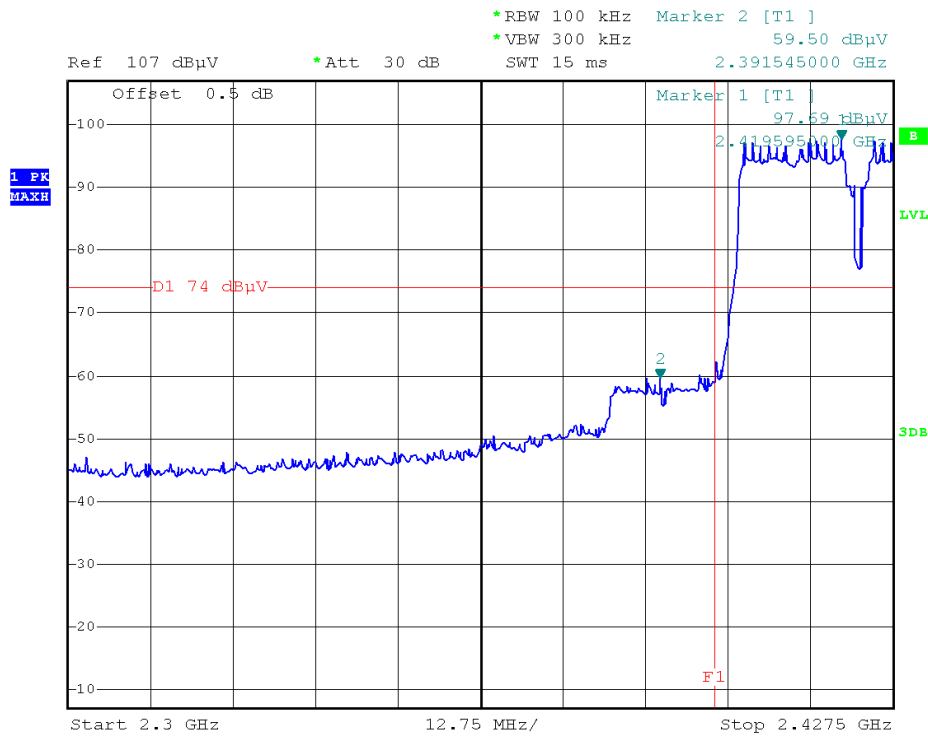
**802.11n-40**

**A. Test Verdict:**

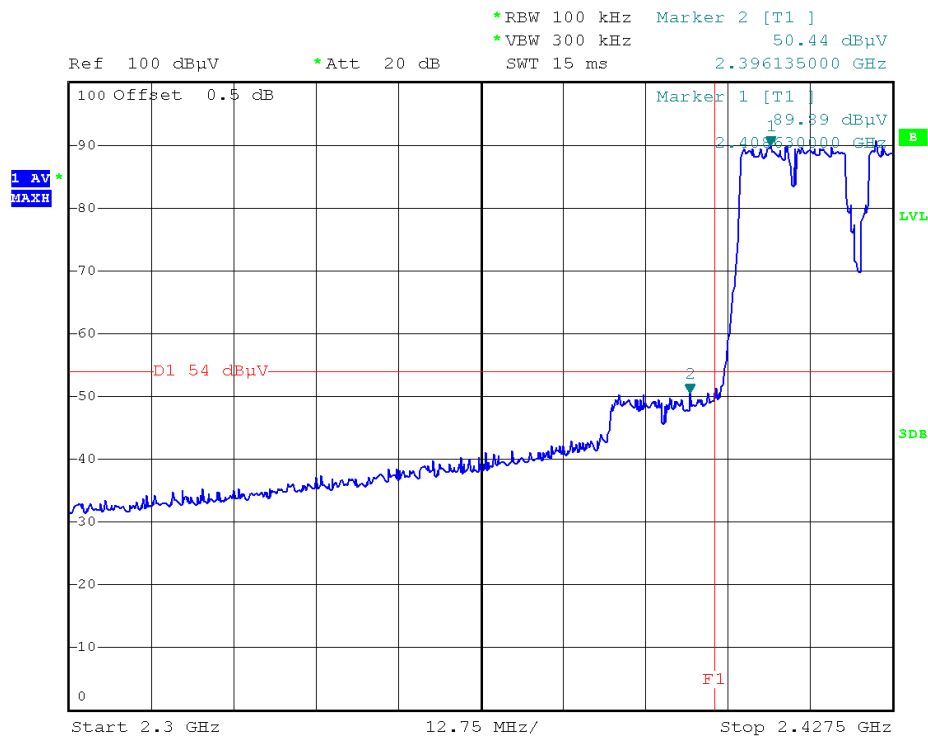
| Channel | Frequency (MHz) | Detector | Receiver Reading UR (dBuV) | AT (dB) | AFactor (dB@3m) | Max. Emission E (dB μV/m) | Limit (dB μV/m) | Verdict |
|---------|-----------------|----------|----------------------------|---------|-----------------|---------------------------|-----------------|---------|
|         |                 | PK/ AV   |                            |         |                 |                           |                 |         |
| 3       | 2391.545        | PK       | 59.50                      | -31.70  | 28.3            | 56.10                     | 74              | Pass    |
| 3       | 2396.135        | AV       | 50.44                      | -31.70  | 28.3            | 47.04                     | 54              | Pass    |
| 9       | 2484.556        | PK       | 54.61                      | -29.45  | 29.2            | 54.36                     | 74              | Pass    |
| 9       | 2488.660        | AV       | 48.18                      | -29.45  | 29.2            | 47.93                     | 54              | Pass    |



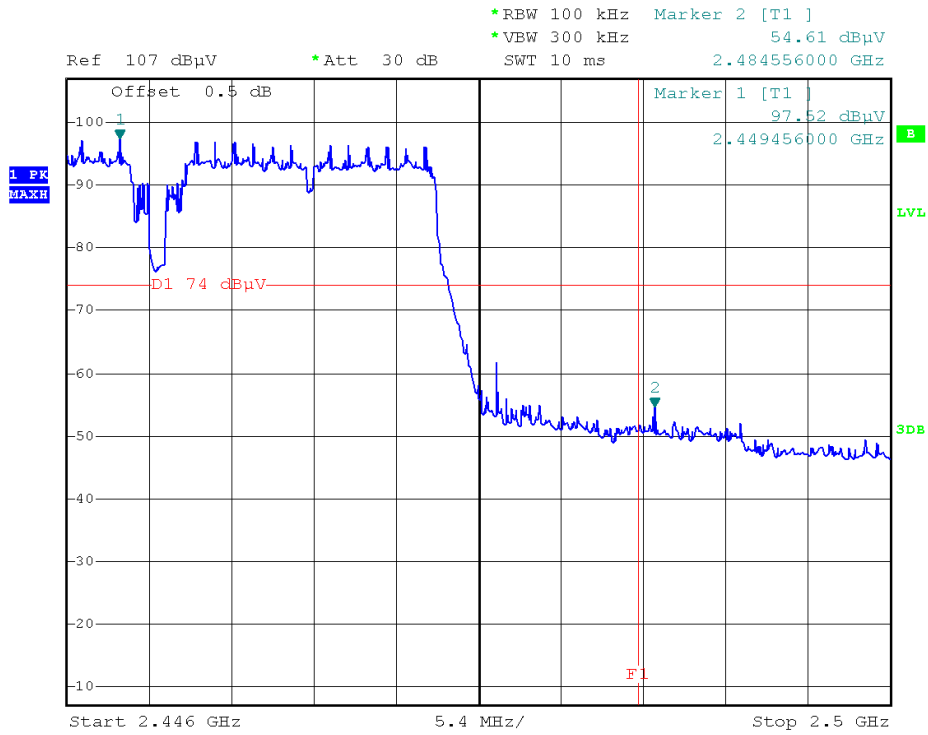
**B. Test Plots:**



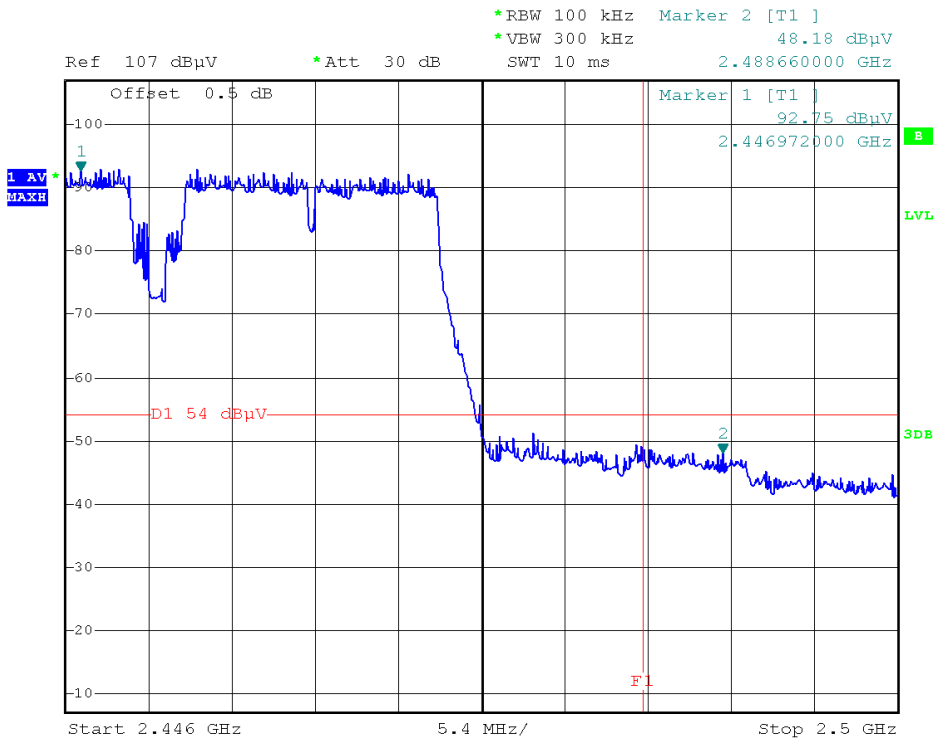
(Plot 2.6 D1: Channel = 3 Peak @ 802.11n-40)



(Plot 2.6 D2: Channel = 3 AVG @ 802.11n-40)



(Plot 2.6 D3: Channel = 9 Peak @ 802.11n-40)



(Plot 2.6 D4: Channel = 9 AVG @ 802.11n-40)





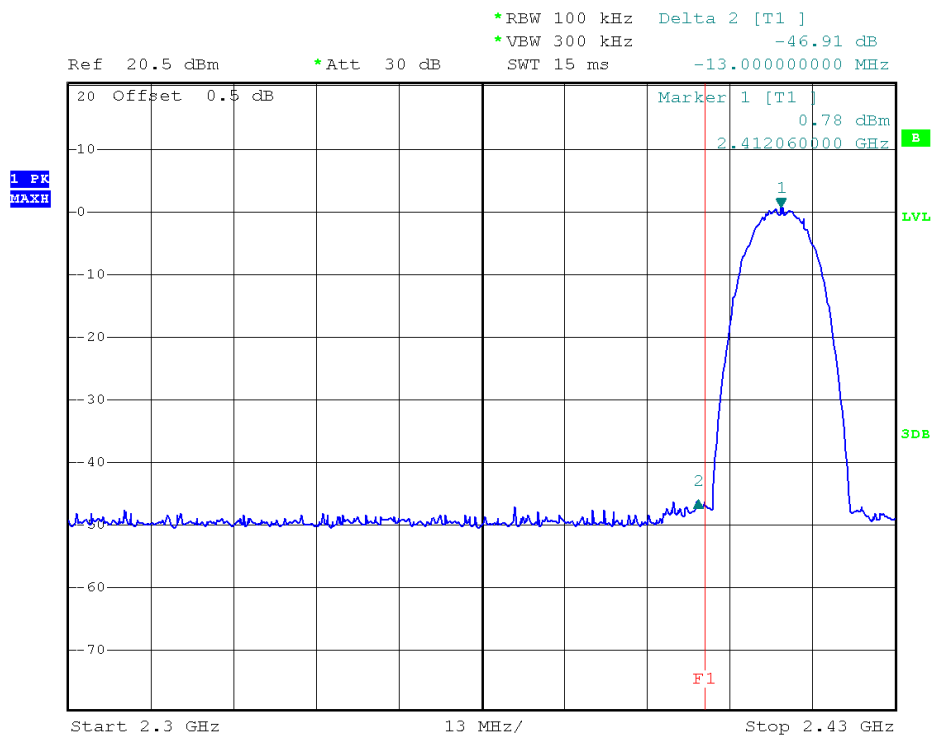
**Conducted Band Edge Measurement**

802.11b Test mode

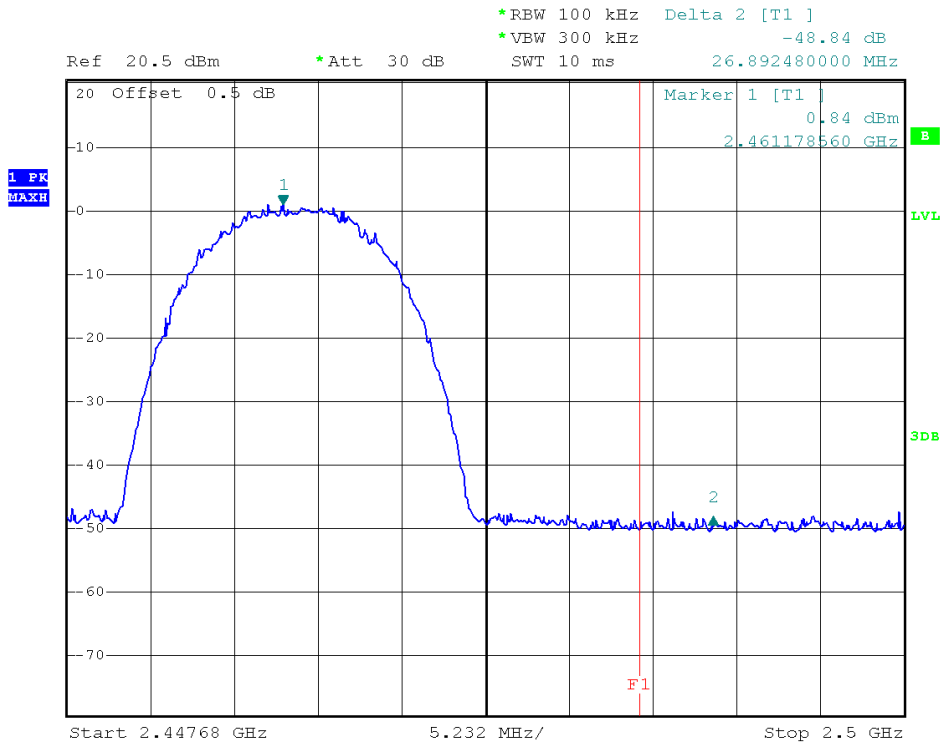
**A. Test Verdict:**

| Frequency (MHz)        | Delta Peak to Band emission (dBc) | Detector | Limit (dBc) | Refer to Plot | Verdict |
|------------------------|-----------------------------------|----------|-------------|---------------|---------|
| Out of left side band  |                                   |          |             |               |         |
| 2399.060               | -46.13                            | PK       | -20.00      | Plot 2.6 E1   | Pass    |
| Out of right side band |                                   |          |             |               |         |
| 2488.071               | -48.00                            | PK       | -20.00      | Plot 2.6 E2   | Pass    |

**B. Test Plots:**



(Plot 2.6 E1: Channel =1 2412MHz @ 802.11b)



(Plot 2.6 E2: Channel =11 2462MHz @ 802.11b)

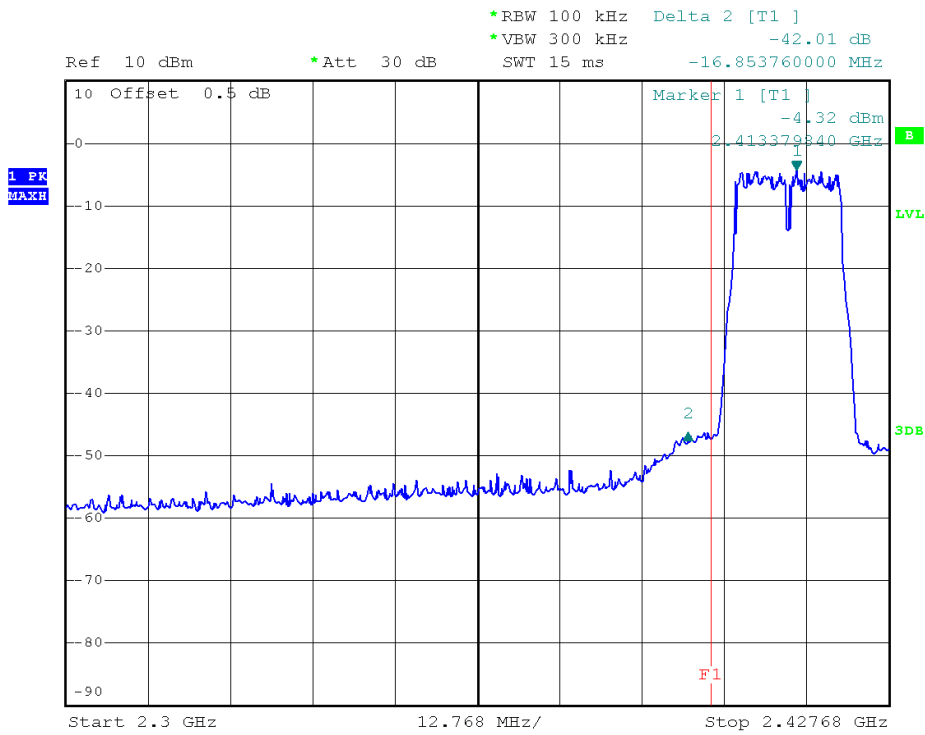
**802.11g Test mode**

The lowest and highest channels are tested to verify the band edge emissions.

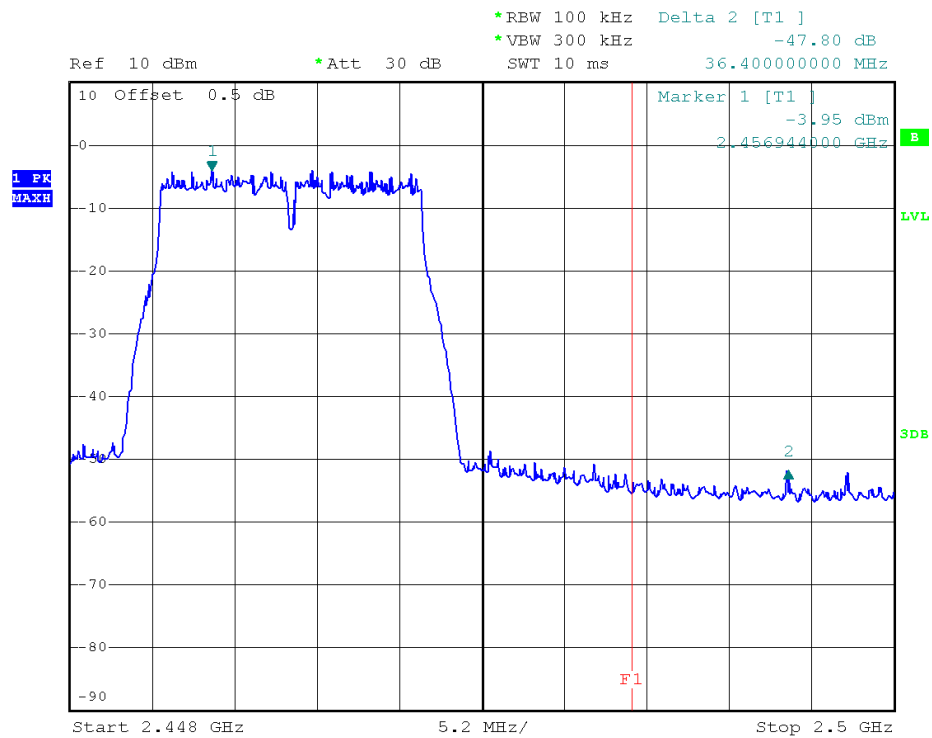
**A. Test Verdict:**

| Frequency (MHz)        | Delta Peak to Band emission (dBc) | Detector | Limit (dBc) | Refer to Plot | Verdict |
|------------------------|-----------------------------------|----------|-------------|---------------|---------|
| Out of left side band  |                                   |          |             |               |         |
| 2396.526               | -46.33                            | PK       | -20.00      | Plot 2.6 F1   | Pass    |
| Out of right side band |                                   |          |             |               |         |
| 2493.344               | -51.75                            | PK       | -20.00      | Plot 2.6 F2   | Pass    |

**B. Test Plots:**



(Plot 2.5.2 F1: Channel =1 2412MHz @ 802.11g)



(Plot 2.6 F2: Channel =11 2462MHz @ 802.11g)



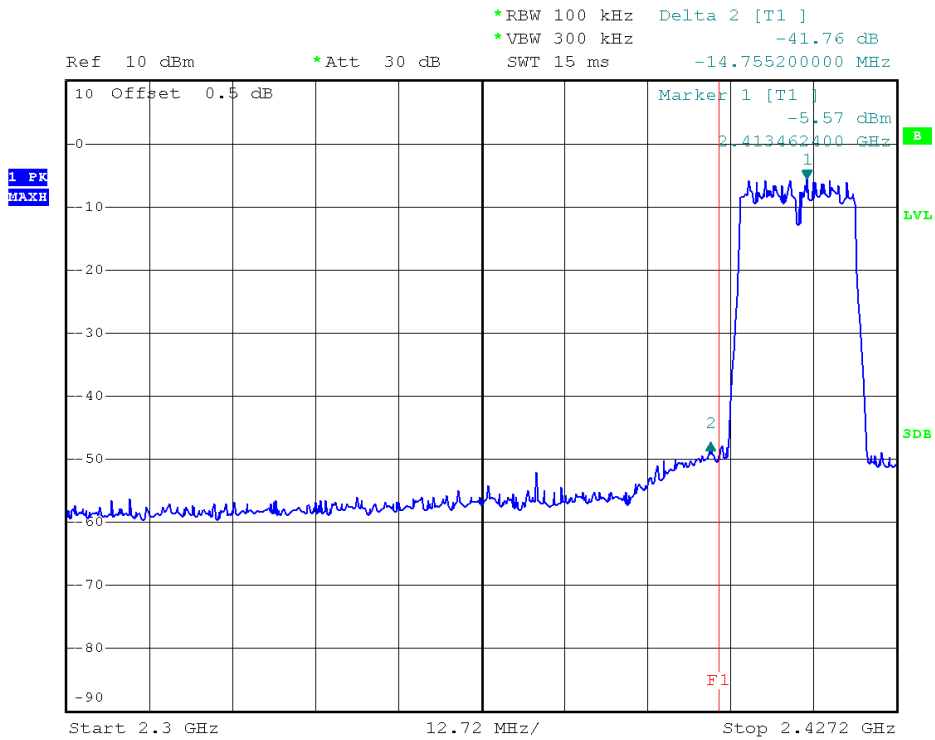
### 802.11n-20 Test mode

The lowest and highest channels are tested to verify the band edge emissions.

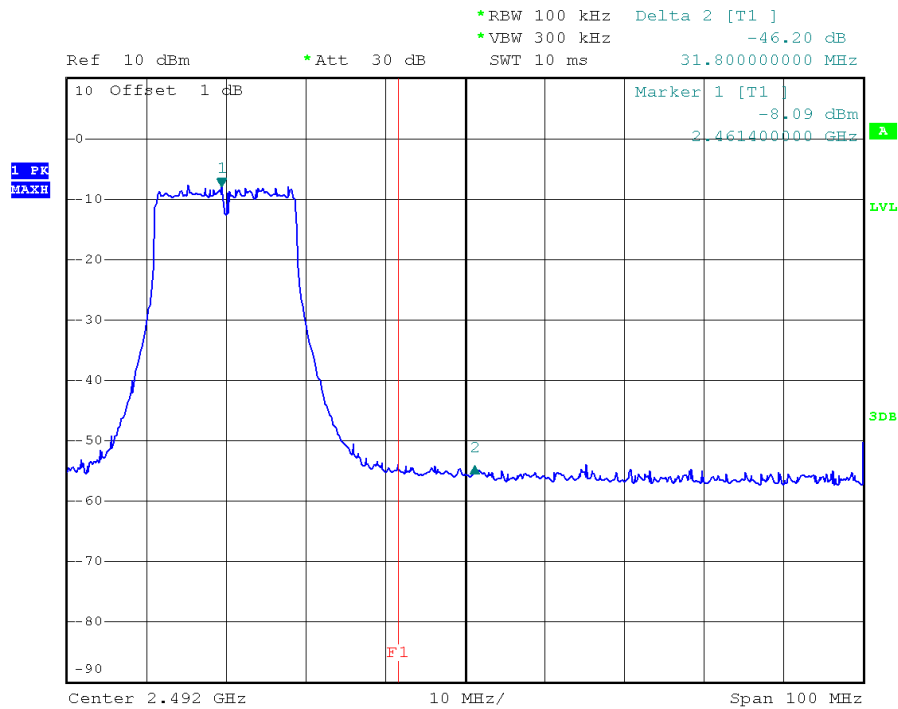
#### A. Test Verdict:

| Frequency (MHz)        | Delta Peak to Band emission (dBc) | Detector | Limit (dBc) | Refer to Plot | Verdict |
|------------------------|-----------------------------------|----------|-------------|---------------|---------|
| Out of left side band  |                                   |          |             |               |         |
| 2398.707               | -47.33                            | PK       | -20.00      | Plot 2.6 G1   | Pass    |
| Out of right side band |                                   |          |             |               |         |
| 2493.200               | -54.29                            | PK       | -20.00      | Plot 2.6 G2   | Pass    |

#### B. Test Plots:



(Plot 2.6 G1: Channel =1 2412MHz @ 802.11n-20)



(Plot 2.6 G2: Channel =11 2462MHz @ 802.11n-20)

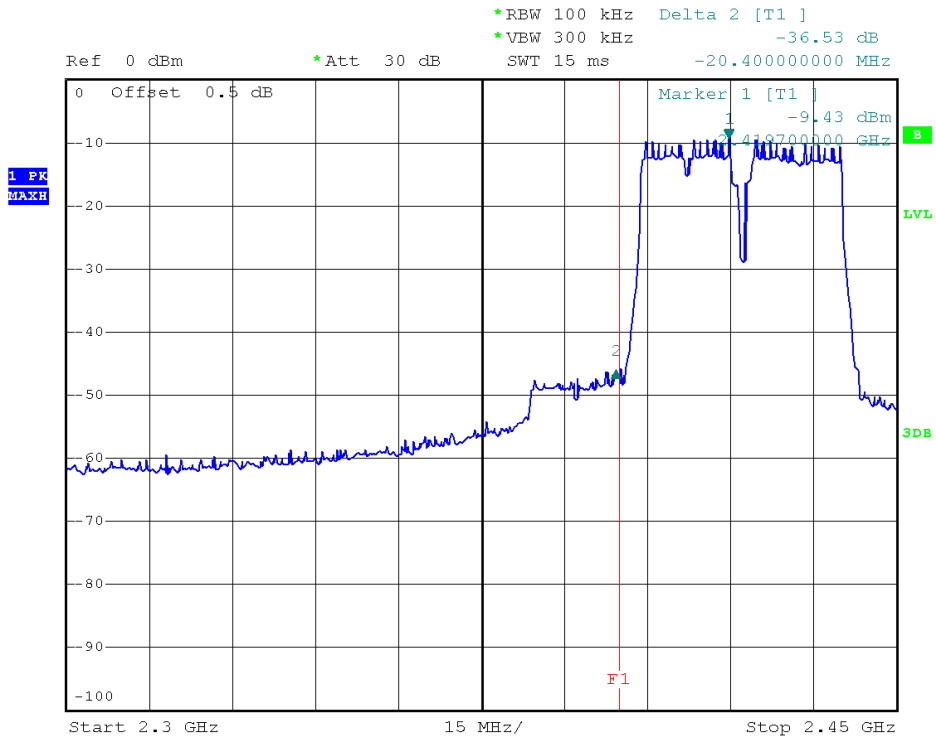
**802.11n-40 Test mode**

The lowest and highest channels are tested to verify the band edge emissions.

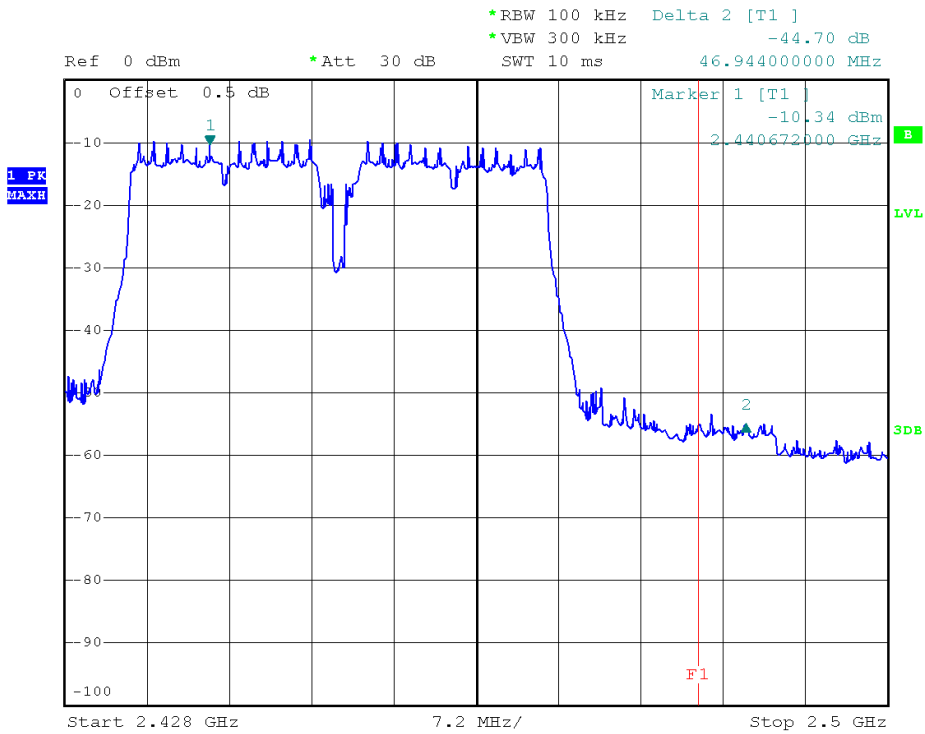
**A. Test Verdict:**

| Frequency (MHz)        | Delta Peak to Band emission (dBc) | Detector | Limit (dBc) | Refer to Plot | Verdict |
|------------------------|-----------------------------------|----------|-------------|---------------|---------|
| Out of left side band  |                                   |          |             |               |         |
| 2399.300               | -45.96                            | PK       | -20.00      | Plot 2.6 H1   | Pass    |
| Out of right side band |                                   |          |             |               |         |
| 2487.616               | -55.04                            | PK       | -20.00      | Plot 2.6 H2   | Pass    |

**B. Test Plots:**



(Plot 2.6 H1: Channel =3 2422MHz @ 802.11n-40)



(Plot 2.6 H2: Channel =9 2452MHz @ 802.11n-40)

## 2.7 Conducted Emission

### 2.7.1 Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 $\mu$ H/50 $\Omega$  line impedance stabilization network (LISN).

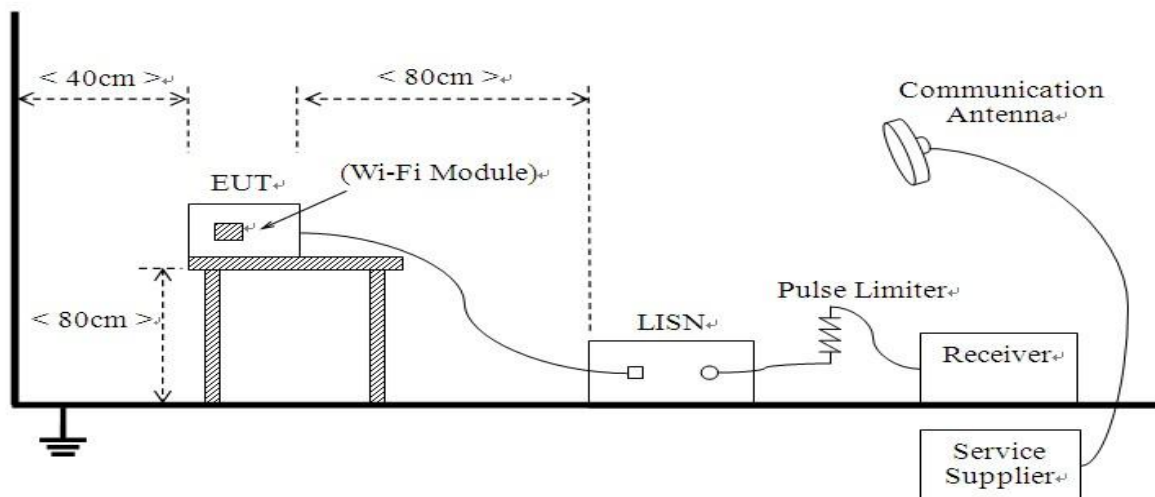
| Frequency range (MHz) | Conducted Limit (dB $\mu$ V) |          |
|-----------------------|------------------------------|----------|
|                       | Quai-peak                    | Average  |
| 0.15 - 0.50           | 66 to 56                     | 56 to 46 |
| 0.50 - 5              | 56                           | 46       |
| 5 - 30                | 60                           | 50       |

NOTE:

- The lower limit shall apply at the band edges.
- The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

### 2.7.2 Test Description

#### A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4:2009

The EUT is powered by a PC. The factors of the site are calibrated to correct the reading. During the measurement, the EUT is activated and controlled by the Wi-Fi Service Supplier (SS) via a Common Antenna.

**B. Equipments List:**

| Description   | Manufacturer  | Model   | Serial No. | Cal.Due Date |
|---------------|---------------|---------|------------|--------------|
| Test Receiver | ROHDE&SCHWARZ | ESCS30  | A0304260   | 2014.06.10   |
| LISN          | ROHDE&SCHWARZ | ESH2-Z5 | A0304221   | 2014.06.10   |

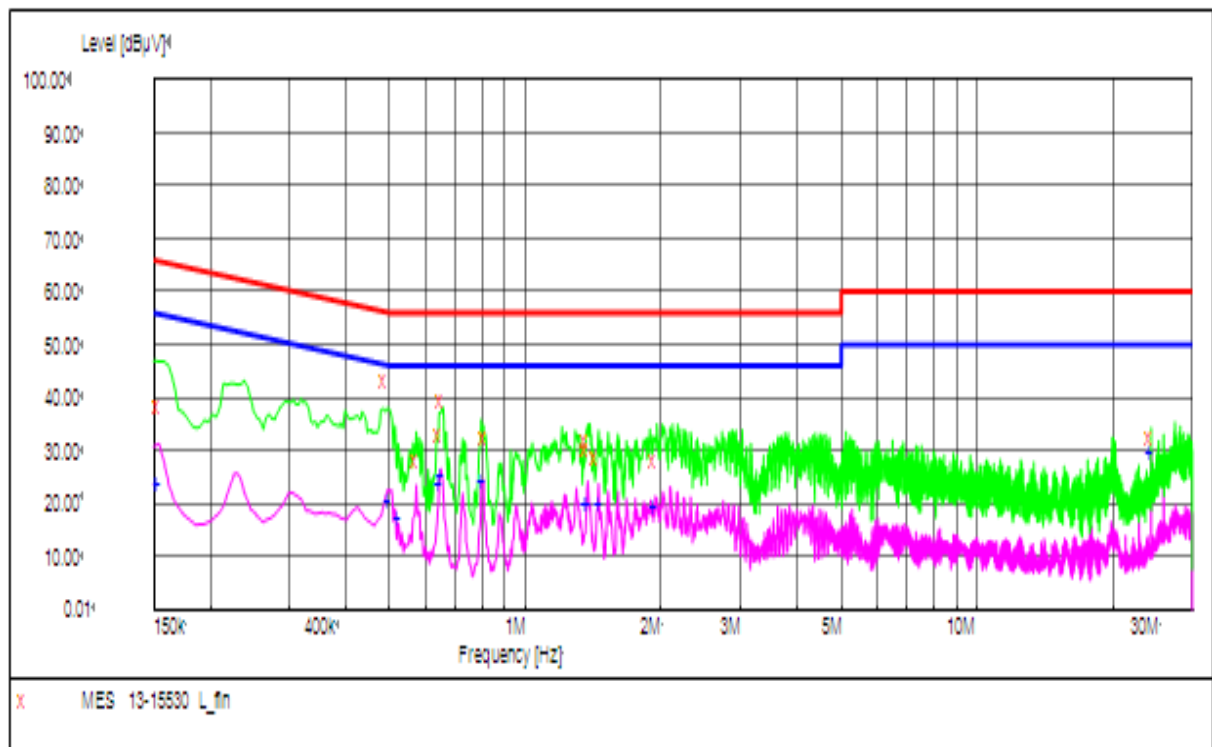
**2.7.3 Test Result**

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

**A. Test setup:**

The EUT configuration of the emission tests is EUT + PC.

**B. Test Plots:**



**Conducted Disturbance at Mains Terminals**

**L Test Data**

| QP              |               |                          |             | AV              |               |                          |             |
|-----------------|---------------|--------------------------|-------------|-----------------|---------------|--------------------------|-------------|
| Frequency (MHz) | Limits (dBµV) | Measurement Value (dBµV) | Margin (dB) | Frequency (MHz) | Limits (dBµV) | Measurement Value (dBµV) | Margin (dB) |
|                 |               |                          |             |                 |               |                          |             |

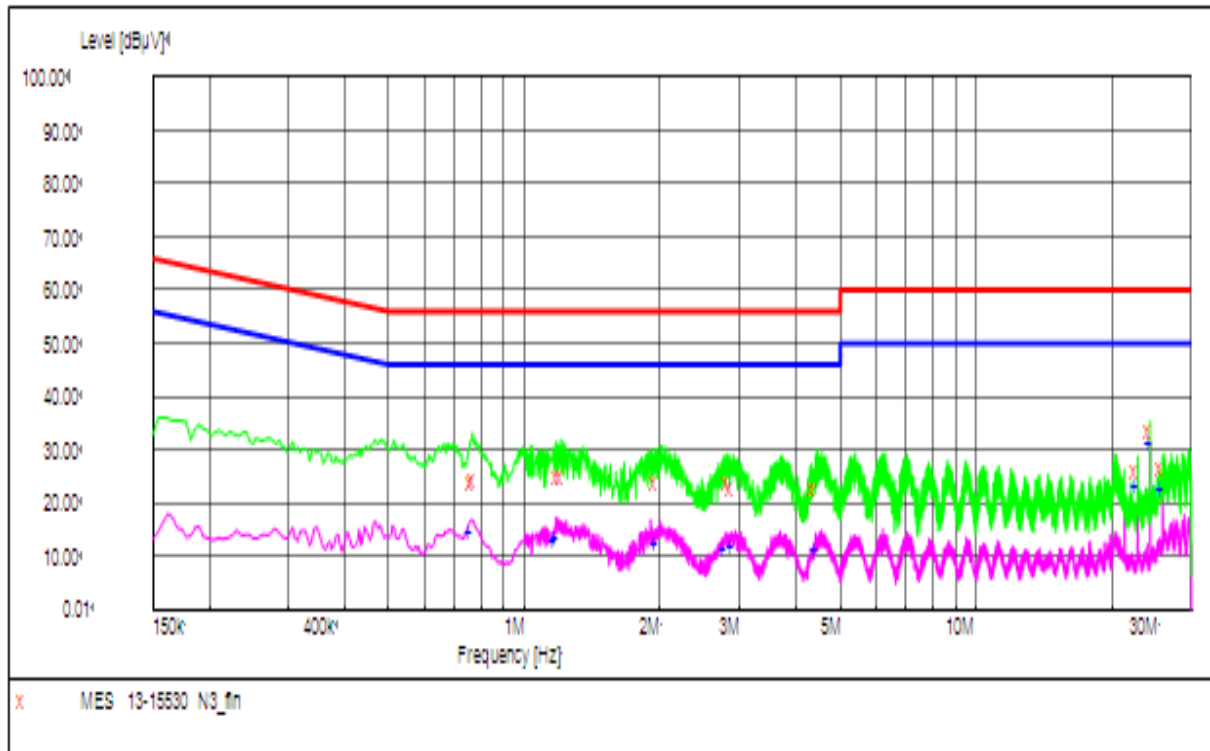




|         |      |       |       |         |      |       |       |
|---------|------|-------|-------|---------|------|-------|-------|
| 0.1540  | 65.8 | 38.80 | 27.00 | 0.1540  | 55.8 | 24.30 | 31.70 |
| 0.4900  | 56   | 43.60 | 12.40 | 0.6560  | 46   | 25.40 | 20.60 |
| 24.3520 | 60   | 32.60 | 27.40 | 24.3520 | 50   | 30.20 | 19.80 |

**L Test Curve**

**(Plot A: L Phase)**



**Conducted Disturbance at Mains Terminals**

**N Test Data**

| QP              |               |                          |             | AV              |               |                          |             |
|-----------------|---------------|--------------------------|-------------|-----------------|---------------|--------------------------|-------------|
| Frequency (MHz) | Limits (dBµV) | Measurement Value (dBµV) | Margin (dB) | Frequency (MHz) | Limits (dBµV) | Measurement Value (dBµV) | Margin (dB) |
| 0.7760          | 56            | 24.60                    | 31.40       | 0.7760          | 46            | 14.70                    | 31.30       |
| 1.1840          | 56            | 25.20                    | 30.80       | 1.1840          | 46            | 13.90                    | 32.10       |
| 24.3600         | 56            | 33.90                    | 22.10       | 24.3600         | 46            | 31.70                    | 14.30       |

**N Test Curve**

**(Plot B: N Phase)**

**Test Result: PASS**



## 2.8 Radiated Emission

### 2.8.1 Requirement

According to FCC section 15.247(c), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength ( $\mu\text{V}/\text{m}$ ) | Field Strength ( $\text{dB } \mu\text{V}/\text{m}$ ) | Measurement Distance (m) |
|-----------------|---|--|--------------------------|
| 0.009 - 0.490   | $2400/\text{F}(\text{kHz})$               | $20\log(2400/\text{F}(\text{kHz}))+80$               | 300                      |
| 0.490 - 1.705   | $24000/\text{F}(\text{kHz})$              | $20\log(24000/\text{F}(\text{kHz}))+40$              | 30                       |
| 1.705 - 30.0    | 30  | $20\log(30)+40$                                      | 30                       |
| 30 - 88         | 100                                       | 40.0   | 3                        |
| 88 - 216        | 150                                       | 43.5   | 3                        |
| 216 - 960       | 200                                       | 46.0   | 3                        |
| Above 960       | 500                                       | 54.0   | 3                        |

Note:

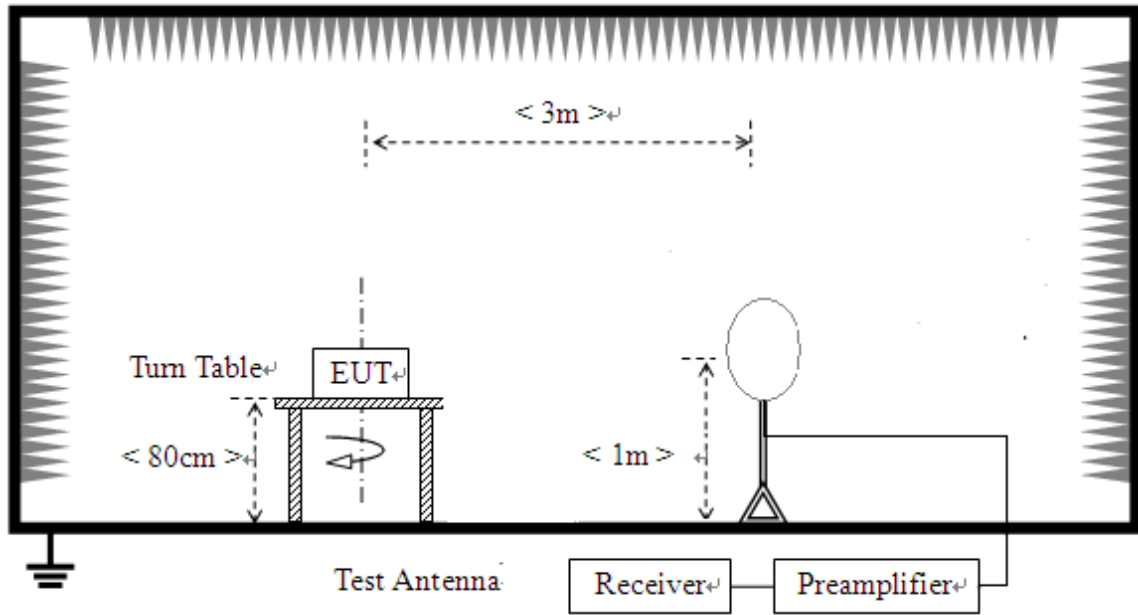
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

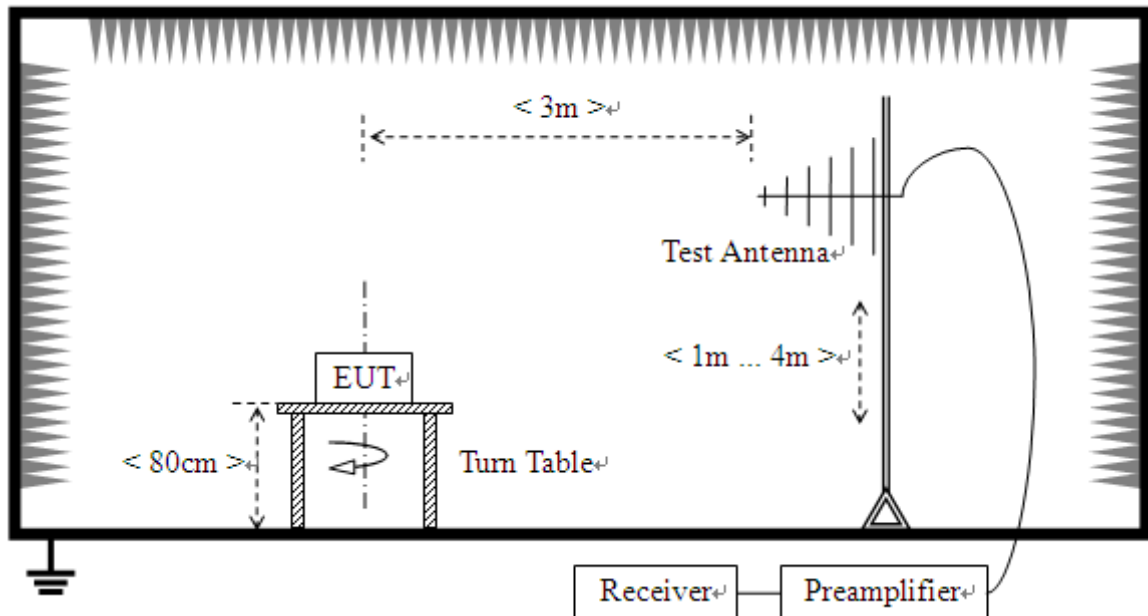
### 2.8.2 Test Description

#### A. Test Setup:

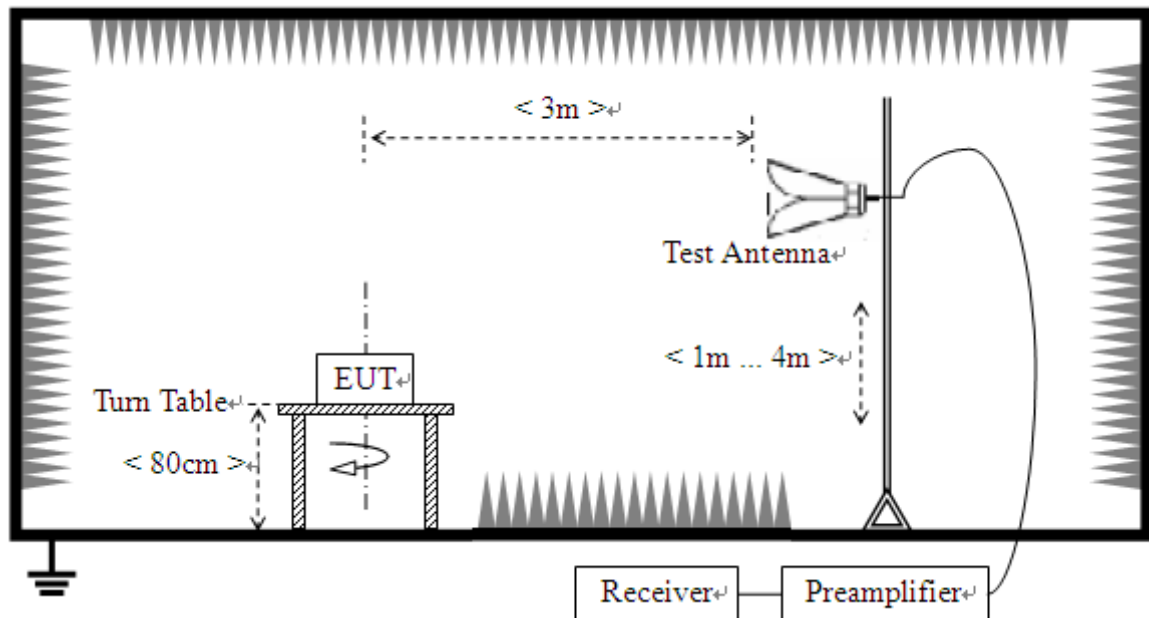
(1) For radiated emissions from 9kHz to 30MHz



(2) For radiated emissions from 30MHz to 1GHz



(3) For radiated emissions above 1GHz



The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2009). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4.

The EUT was powered by the PC. The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, the EUT is activated and controlled by the PC, set to operate under WIFI test mode.

For the Test Antenna:

- (a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- (b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

**B. Equipments List:**

| Description                       | Manufacturer | Model                   | Serial No.        | Cal.Due Date |
|-----------------------------------|--------------|-------------------------|-------------------|--------------|
| Receiver                          | R&S          | ESIB26                  | A0304218          | 2014.06.07   |
| Full-Anechoic Chamber             | Albatross    | 12.8m*6.8m*6.4m         | A0412372          | 2014.06.07   |
| Test Antenna - Bi-Log             | Schwarzbeck  | VULB 9163               | 9163-274          | 2014.06.09   |
| Test Antenna - Horn               | R&S          | BBHA 9120D              | 9120C-963         | 2014.06.09   |
| Test Antenna - Horn               | R&S          | HF960                   | 100150            | 2014.06.09   |
| Test Antenna – Horn<br>(18-25GHz) | ETS          | UG-596A/U               | A0902607          | 2014.06.05   |
| Test Antenna -Loop                | Schwarzbeck  | HFH2-Z2                 | 100047            | 2014.06.02   |
| Ampilier 1G~18GHz                 | R&S          | MITEQ<br>AFS42-00101800 | 25-S-42           | 2014.06.05   |
| Ampilier 18G~40GHz                | R&S          | JS42-18002600-28<br>-5A | 12111.0980.0<br>0 | 2014.06.05   |
| amplifier 20M~3GHz                | R&S          | PAP-0203H               | 22018             | 2014.06.10   |

**2.8.3 Test Result**

According to ANSI C63.4 selection 4.2.2, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{ V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

$A_T$ : Total correction Factor except Antenna

$U_R$ : Receiver Reading

$G_{\text{preamp}}$ : Preamplifier Gain

$A_{\text{Factor}}$ : Antenna Factor at 3m

$L_{\text{Cable loss}}$ : Cable loss

During the test, the total correction Factor  $A_T$  and  $A_{\text{Factor}}$  were built in test software.

Note: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

The minimum clock frequency was 24MHz, the radiated frequency range from 9KHz to 25GHz.

Note: 1. The radiated measurement are performed the each test mode (b/g/n) and channel (low/mid/high), the datum recorded below (802.11b mode, the middle channel) is the worst case for all the test mode and channel.

2. ULTRA-BROADBAND ANTENNA for the radiation emission test below 1G.

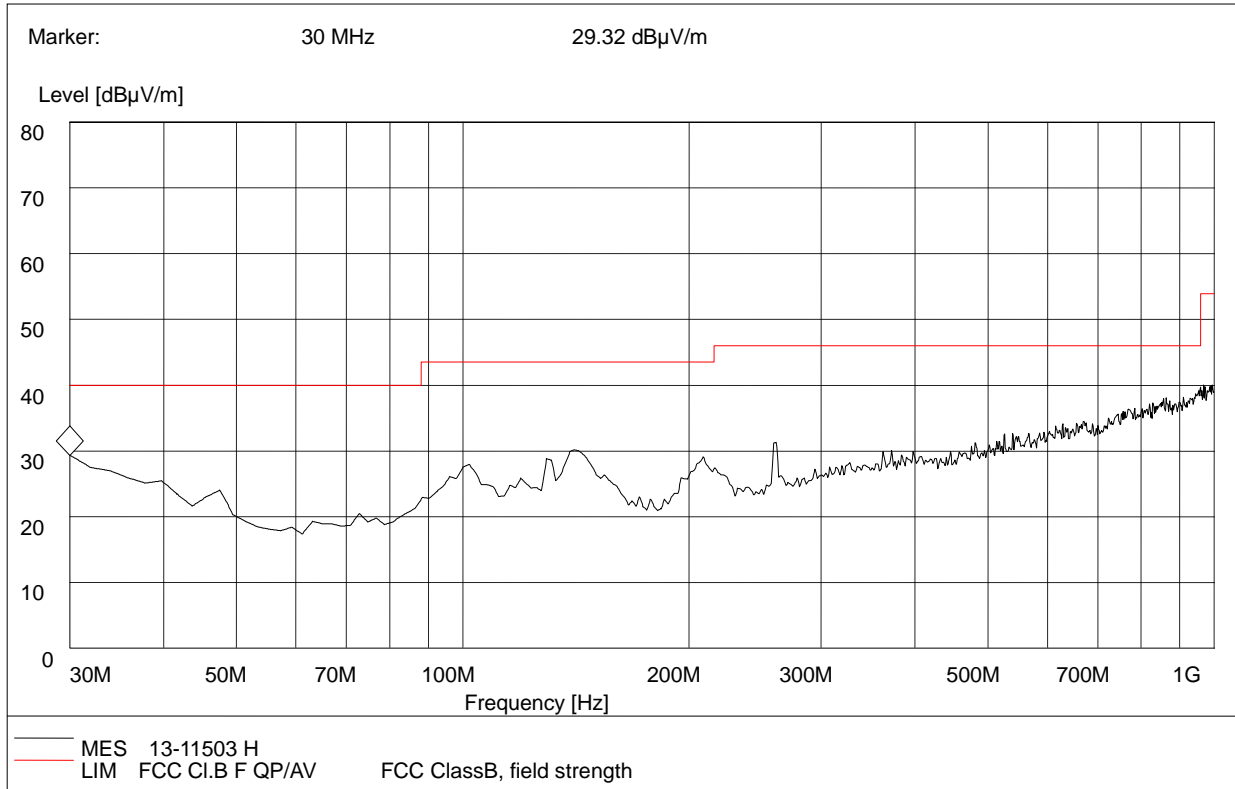
3. HORN ANTENNA for the radiation emission test above 1G.

**For 9KHz to 30MHz**

The test has been performed, and the Radiated Emission level is too low to the limit.

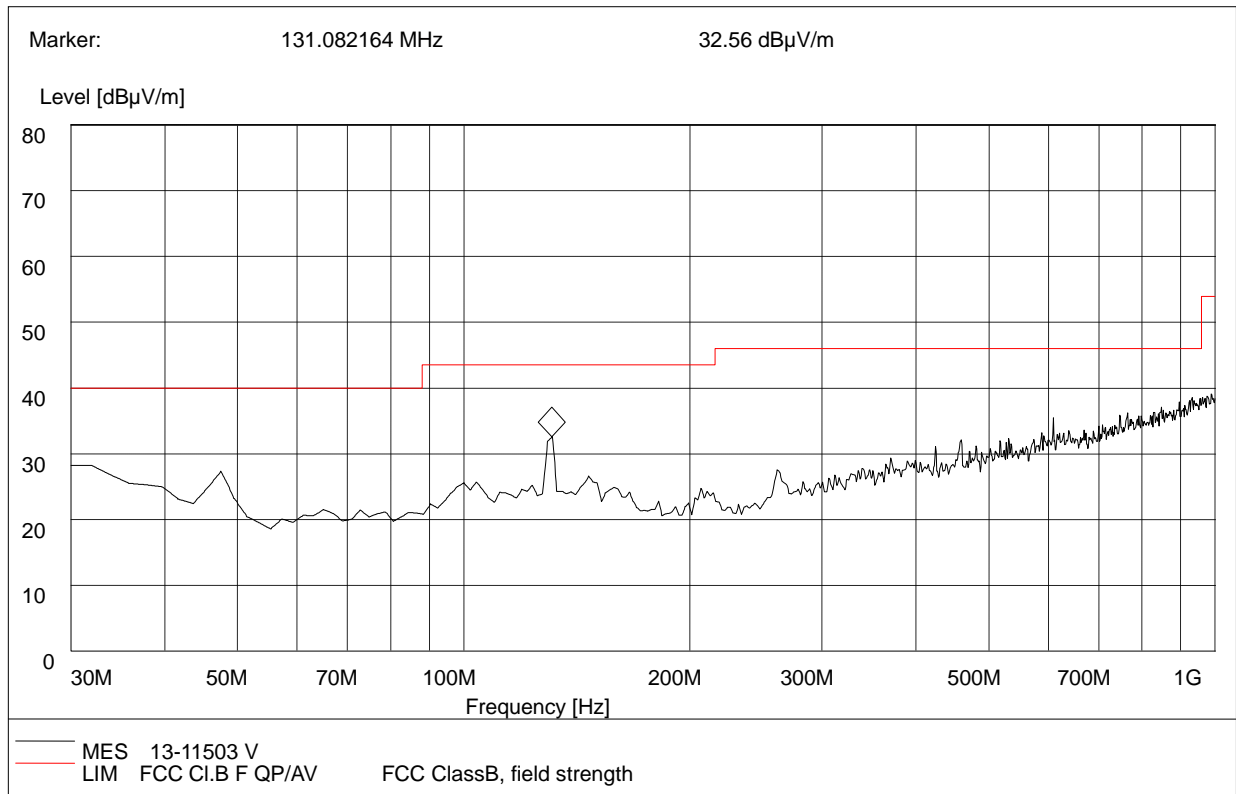


**For 30MHz to 1000 MHz**



| Fre. (MHz) | Pk    | QP  | AV  | Limit-PK | Limit-QP | Limit-AV | Degree | Antenna  | Verdict |
|------------|-------|-----|-----|----------|----------|----------|--------|----------|---------|
| 30         | 29.32 | N.A | N.A | N.A      | 40       | N.A      | 360    | Vertical | PASS    |

(Plot A: 30MHz to 1GHz, Antenna Horizontal)



| Fre. (MHz) | Pk    | QP  | AV  | Limit-PK | Limit-QP | Limit-AV | Degree | Antenna  | Verdict |
|------------|-------|-----|-----|----------|----------|----------|--------|----------|---------|
| 131.41     | 29.28 | N.A | N.A | N.A      | 43.5     | N.A      | 72     | Vertical | PASS    |

(Plot B: 30MHz to 1GHz, Antenna Vertical)

**For 1GHz to 25GHz**

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11b--2412MHz) |                 |               |    |                |             |                |             |           |                |              |               |
|--|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| No.  | Frequency (MHz) | Emssion Level |    | Limit (dBµV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
| 1  | *2412.00        | 109.22        | PK | /              | /           | 1.00 H         | 118         | 112.62    | 28.3           | 4.9          | -36.6         |
| 1  | *2412.00        | 98.59         | AV | /              | /           | 1.00 H         | 118         | 101.99    | 28.3           | 4.9          | -36.6         |
| 2  | 4824.00         | 52.21         | PK | 74.00          | 21.79       | 1.00 H         | 24          | 49.01     | 32.7           | 7.0          | -36.5         |
| 2  | 4824.00         | 46.77         | AV | 54.00          | 7.23        | 1.00 H         | 24          | 43.57     | 32.7           | 7.0          | -36.5         |
| 3  | 7236.00         | 51.18         | PK | 74.00          | 22.82       | 1.00 H         | 107         | 41.78     | 35.8           | 8.9          | -35.3         |
| 3  | 7236.00         | 43.99         | AV | 54.00          | 10.01       | 1.00 H         | 107         | 34.59     | 35.8           | 8.9          | -35.3         |
| 4  | 9648.00         | 50.78         | PK | 74.00          | 23.22       | 1.00 H         | 39          | 38.18     | 37.2           | 10.2         | -34.8         |
| 4  | 9648.00         | 45.16         | AV | 54.00          | 8.84        | 1.00 H         | 39          | 32.56     | 37.2           | 10.2         | -34.8         |



**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11b--2412MHz)**

| No. | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2412.00        | 109.75        | PK | /              | /           | 1.00 V         | 109         | 113.15    | 28.3           | 4.9          | -36.6         |
| 1   | *2412.00        | 99.68         | AV | /              | /           | 1.00 V         | 109         | 103.08    | 28.3           | 4.9          | -36.6         |
| 2   | 4824.00         | 52.66         | PK | 74.00          | 21.34       | 1.00 V         | 62          | 49.46     | 32.7           | 7.0          | -36.5         |
| 2   | 4824.00         | 46.13         | AV | 54.00          | 7.87        | 1.00 V         | 62          | 42.93     | 32.7           | 7.0          | -36.5         |
| 3   | 7236.00         | 51.55         | PK | 74.00          | 22.45       | 1.00 V         | 349         | 42.15     | 35.8           | 8.9          | -35.3         |
| 3   | 7236.00         | 44.2          | AV | 54.00          | 9.80        | 1.00 V         | 349         | 34.80     | 35.8           | 8.9          | -35.3         |
| 4   | 9648.00         | 55.15         | PK | 74.00          | 18.85       | 1.00 V         | 211         | 42.55     | 37.2           | 10.2         | -34.8         |
| 4   | 9648.00         | 46.5          | AV | 54.00          | 7.50        | 1.00 V         | 211         | 33.90     | 37.2           | 10.2         | -34.8         |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11b--2437MHz)**

| No. | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2437.00        | 107.59        | PK | /              | /           | 1.00 H         | 202         | 110.79    | 28.3           | 5.1          | -36.6         |
| 1   | *2437.00        | 99.81         | AV | /              | /           | 1.00 H         | 202         | 103.01    | 28.3           | 5.1          | -36.6         |
| 2   | 4874.00         | 53.53         | PK | 74.00          | 20.47       | 1.00 H         | 187         | 50.13     | 32.3           | 7.6          | -36.5         |
| 2   | 4874.00         | 48.03         | AV | 54.00          | 5.97        | 1.00 H         | 187         | 44.63     | 32.3           | 7.6          | -36.5         |
| 3   | 7311.00         | 54.61         | PK | 74.00          | 19.39       | 1.00 H         | 107         | 45.21     | 36.1           | 8.6          | -35.3         |
| 3   | 7311.00         | 48.62         | AV | 54.00          | 5.38        | 1.00 H         | 107         | 39.22     | 36.1           | 8.6          | -35.3         |
| 4   | 9748.00         | 50.31         | PK | 74.00          | 23.69       | 1.00 H         | 144         | 37.71     | 37.2           | 10.2         | -34.8         |
| 4   | 9748.00         | 43.41         | AV | 54.00          | 10.59       | 1.00 H         | 144         | 30.81     | 37.2           | 10.2         | -34.8         |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11b--2437MHz)**

| No. | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2437.00        | 108.68        | PK | /              | /           | 1.00 V         | 104         | 111.88    | 28.3           | 5.1          | -36.6         |
| 1   | *2437.00        | 97.88         | AV | /              | /           | 1.00 V         | 104         | 101.08    | 28.3           | 5.1          | -36.6         |
| 2   | 4874.00         | 51.82         | PK | 74.00          | 22.18       | 1.00 V         | 304         | 48.42     | 32.3           | 7.6          | -36.5         |
| 2   | 4874.00         | 47.98         | AV | 54.00          | 6.02        | 1.00 V         | 304         | 44.58     | 32.3           | 7.6          | -36.5         |
| 3   | 7311.00         | 49.82         | PK | 74.00          | 24.18       | 1.00 V         | 203         | 40.42     | 36.1           | 8.6          | -35.3         |
| 3   | 7311.00         | 47.30         | AV | 54.00          | 6.70        | 1.00 V         | 203         | 37.9      | 36.1           | 8.6          | -35.3         |
| 4   | 9748.00         | 49.45         | PK | 74.00          | 24.55       | 1.00 V         | 172         | 36.85     | 37.2           | 10.2         | -34.8         |
| 4   | 9748.00         | 44.56         | AV | 54.00          | 9.44        | 1.00 V         | 172         | 31.96     | 37.2           | 10.2         | -34.8         |





| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M (802.11b--2462MHz)</b> |                 |               |    |                |             |                |             |           |                |              |               |
|---|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| No.   | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
| 1   | *2462.00        | 111.57        | PK | /              | /           | 1.00 H         | 325         | 114.87    | 28.6           | 4.7          | -36.6         |
| 1   | *2462.00        | 100.29        | AV | /              | /           | 1.00 H         | 325         | 103.59    | 28.6           | 4.7          | -36.6         |
| 2   | 4924.00         | 52.57         | PK | 74.00          | 21.43       | 1.00 H         | 311         | 48.77     | 33             | 7.0          | -36.2         |
| 2   | 4924.00         | 47.61         | AV | 54.00          | 6.39        | 1.00 H         | 311         | 43.81     | 33             | 7.0          | -36.2         |
| 3   | 7386.00         | 50.57         | PK | 74.00          | 23.43       | 1.00 H         | 330         | 41.17     | 36.2           | 8.5          | -35.3         |
| 3   | 7386.00         | 47.17         | AV | 54.00          | 6.83        | 1.00 H         | 330         | 37.77     | 36.2           | 8.5          | -35.3         |
| 4   | 9848.00         | 52.1          | PK | 74.00          | 21.90       | 1.00 H         | 42          | 39.50     | 37.2           | 10.2         | -34.8         |
| 4   | 9848.00         | 49.17         | AV | 54.00          | 4.83        | 1.00 H         | 42          | 36.57     | 37.2           | 10.2         | -34.8         |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M (802.11b--2462MHz)</b> |                 |               |    |                |             |                |             |           |                |              |               |
|---|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| No.   | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
| 1   | *2462.00        | 112.81        | PK | /              | /           | 1.00 V         | 34          | 116.11    | 28.6           | 4.7          | -36.6         |
| 1   | *2462.00        | 100.16        | AV | /              | /           | 1.00 V         | 34          | 103.46    | 28.6           | 4.7          | -36.6         |
| 2   | 4924.00         | 51.09         | PK | 74.00          | 22.91       | 1.00 V         | 55          | 47.29     | 33             | 7.0          | -36.2         |
| 2   | 4924.00         | 44.18         | AV | 54.00          | 9.82        | 1.00 V         | 55          | 40.38     | 33             | 7.0          | -36.2         |
| 3   | 7386.00         | 51.47         | PK | 74.00          | 22.53       | 1.00 V         | 258         | 42.07     | 36.2           | 8.5          | -35.3         |
| 3   | 7386.00         | 48.32         | AV | 54.00          | 5.68        | 1.00 V         | 258         | 38.92     | 36.2           | 8.5          | -35.3         |
| 4   | 9848.00         | 50.94         | PK | 74.00          | 23.06       | 1.00 V         | 254         | 38.34     | 37.2           | 10.2         | -34.8         |
| 4   | 9848.00         | 48.59         | AV | 54.00          | 5.41        | 1.00 V         | 254         | 35.99     | 37.2           | 10.2         | -34.8         |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M (802.11g--2412MHz)</b> |                 |               |    |                |             |                |             |           |                |              |               |
|---|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| No.   | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
| 1   | *2412.00        | 109.83        | PK | /              | /           | 1.00 H         | 19          | 113.13    | 28.3           | 5.0          | -36.6         |
| 1   | *2412.00        | 100.09        | AV | /              | /           | 1.00 H         | 19          | 103.39    | 28.3           | 5.0          | -36.6         |
| 2   | 4824.00         | 52.91         | PK | 74.00          | 21.09       | 1.00 H         | 321         | 49.11     | 32.7           | 7.3          | -36.2         |
| 2   | 4824.00         | 47.76         | AV | 54.00          | 6.24        | 1.00 H         | 321         | 43.96     | 32.7           | 7.3          | -36.2         |
| 3   | 7236.00         | 51.69         | PK | 74.00          | 22.31       | 1.00 H         | 207         | 42.29     | 35.8           | 8.9          | -35.3         |
| 3   | 7236.00         | 48.53         | AV | 54.00          | 5.47        | 1.00 H         | 207         | 39.13     | 35.8           | 8.9          | -35.3         |
| 4   | 9648.00         | 50.60         | PK | 74.00          | 23.4        | 1.00 H         | 304         | 38        | 37.2           | 10.2         | -34.8         |
| 4   | 9648.00         | 44.89         | AV | 54.00          | 9.11        | 1.00 H         | 304         | 32.29     | 37.2           | 10.2         | -34.8         |



**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11g--2412MHz)**

| No. | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2412.00        | 107.2         | PK | /              | /           | 1.00 V         | 174         | 110.5     | 28.3           | 5.0          | -36.6         |
| 1   | *2412.00        | 96.52         | AV | /              | /           | 1.00 V         | 174         | 99.82     | 28.3           | 5.0          | -36.6         |
| 2   | 4824.00         | 53.92         | PK | 74.00          | 20.08       | 1.00 V         | 68          | 50.12     | 32.7           | 7.3          | -36.2         |
| 2   | 4824.00         | 47.98         | AV | 54.00          | 6.02        | 1.00 V         | 68          | 44.18     | 32.7           | 7.3          | -36.2         |
| 3   | 7236.00         | 52.57         | PK | 74.00          | 21.43       | 1.00 V         | 169         | 43.17     | 35.8           | 8.9          | -35.3         |
| 3   | 7236.00         | 48.03         | AV | 54.00          | 5.97        | 1.00 V         | 169         | 38.63     | 35.8           | 8.9          | -35.3         |
| 4   | 9648.00         | 50.67         | PK | 74.00          | 23.33       | 1.00 V         | 298         | 38.07     | 37.2           | 10.2         | -34.8         |
| 4   | 9648.00         | 47.41         | AV | 54.00          | 6.59        | 1.00 V         | 298         | 34.81     | 37.2           | 10.2         | -34.8         |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11g--2437MHz)**

| No. | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2437.00        | 108.51        | PK | /              | /           | 1.00 H         | 54          | 111.71    | 28.3           | 5.1          | -36.6         |
| 1   | *2437.00        | 97.96         | AV | /              | /           | 1.00 H         | 54          | 101.16    | 28.3           | 5.1          | -36.6         |
| 2   | 4874.00         | 51.63         | PK | 74.00          | 22.37       | 1.00 H         | 117         | 48.23     | 32.8           | 7.1          | -36.5         |
| 2   | 4874.00         | 47.40         | AV | 54.00          | 6.6         | 1.00 H         | 117         | 44.00     | 32.8           | 7.1          | -36.5         |
| 3   | 7311.00         | 50.06         | PK | 74.00          | 23.94       | 1.00 H         | 328         | 40.66     | 36.1           | 8.6          | -35.3         |
| 3   | 7311.00         | 45.31         | AV | 54.00          | 8.69        | 1.00 H         | 328         | 35.91     | 36.1           | 8.6          | -35.3         |
| 4   | 9748.00         | 51.54         | PK | 74.00          | 22.46       | 1.00 H         | 19          | 38.94     | 37.2           | 10.2         | -34.8         |
| 4   | 9748.00         | 45.48         | AV | 54.00          | 8.52        | 1.00 H         | 19          | 32.88     | 37.2           | 10.2         | -34.8         |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11g--2437MHz)**

| No. | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2437.00        | 108.74        | PK | /              | /           | 1.00 V         | 122         | 111.94    | 28.3           | 5.1          | -36.6         |
| 1   | *2437.00        | 98.30         | AV | /              | /           | 1.00 V         | 122         | 101.50    | 28.3           | 5.1          | -36.6         |
| 2   | 4874.00         | 52.08         | PK | 74.00          | 21.92       | 1.00 V         | 156         | 48.68     | 32.8           | 7.1          | -36.5         |
| 2   | 4874.00         | 47.47         | AV | 54.00          | 6.53        | 1.00 V         | 156         | 44.07     | 32.8           | 7.1          | -36.5         |
| 3   | 7311.00         | 50.50         | PK | 74.00          | 23.5        | 1.00 V         | 98          | 41.10     | 36.1           | 8.6          | -35.3         |
| 3   | 7311.00         | 46.55         | AV | 54.00          | 7.45        | 1.00 V         | 98          | 37.15     | 36.1           | 8.6          | -35.3         |
| 4   | 9748.00         | 50.06         | PK | 74.00          | 23.94       | 1.00 V         | 197         | 37.46     | 37.2           | 10.2         | -34.8         |
| 4   | 9748.00         | 45.39         | AV | 54.00          | 8.61        | 1.00 V         | 197         | 32.79     | 37.2           | 10.2         | -34.8         |



| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M (802.11g--2462MHz)</b> |                 |               |    |                |             |                |             |           |                |              |               |
|---|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| No.   | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
| 1   | *2462.00        | 107.37        | PK | /              | /           | 1.00 V         | 103         | 110.67    | 28.2           | 5.1          | -36.6         |
| 1   | *2462.00        | 100.19        | AV | /              | /           | 1.00 V         | 103         | 103.49    | 28.2           | 5.1          | -36.6         |
| 2   | 4924.00         | 51.85         | PK | 74.00          | 22.15       | 1.00 V         | 342         | 48.05     | 33             | 7.0          | -36.2         |
| 2   | 4924.00         | 45.02         | AV | 54.00          | 8.98        | 1.00 V         | 342         | 41.22     | 33             | 7.0          | -36.2         |
| 3   | 7386.00         | 51.28         | PK | 74.00          | 22.72       | 1.00 V         | 179         | 41.88     | 36.2           | 8.5          | -35.3         |
| 3   | 7386.00         | 46.48         | AV | 54.00          | 7.52        | 1.00 V         | 179         | 37.08     | 36.2           | 8.5          | -35.3         |
| 4   | 9848.00         | 50.76         | PK | 74.00          | 23.24       | 1.00 V         | 293         | 38.16     | 37.3           | 10.1         | -34.8         |
| 4   | 9848.00         | 46.36         | AV | 54.00          | 7.64        | 1.00 V         | 293         | 33.76     | 37.3           | 10.1         | -34.8         |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M (802.11g--2462MHz)</b> |                 |               |    |                |             |                |             |           |                |              |               |
|---|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| No.   | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
| 1   | *2462.00        | 108.06        | PK | /              | /           | 1.00 H         | 220         | 111.36    | 28.2           | 5.1          | -36.6         |
| 1   | *2462.00        | 98.58         | AV | /              | /           | 1.00 H         | 220         | 101.88    | 28.2           | 5.1          | -36.6         |
| 2   | 4924.00         | 52.37         | PK | 74.00          | 21.63       | 1.00 H         | 343         | 48.57     | 33             | 7.0          | -36.2         |
| 2   | 4924.00         | 47.51         | AV | 54.00          | 6.49        | 1.00 H         | 343         | 43.71     | 33             | 7.0          | -36.2         |
| 3   | 7386.00         | 50.89         | PK | 74.00          | 23.11       | 1.00 H         | 135         | 41.49     | 36.2           | 8.5          | -35.3         |
| 3   | 7386.00         | 47.12         | AV | 54.00          | 6.88        | 1.00 H         | 135         | 37.72     | 36.2           | 8.5          | -35.3         |
| 4   | 9848.00         | 49.47         | PK | 74.00          | 24.53       | 1.00 H         | 177         | 36.87     | 37.3           | 10.1         | -34.8         |
| 4   | 9848.00         | 44.48         | AV | 54.00          | 9.52        | 1.00 H         | 177         | 31.88     | 37.3           | 10.1         | -34.8         |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M (802.11n-20--2412MHz)</b> |                 |               |    |                |             |                |             |           |                |              |               |
|--|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| No.  | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
| 1  | *2412.00        | 107.04        | PK | /              | /           | 1.00 H         | 71          | 110.34    | 28.3           | 5.0          | -36.6         |
| 1  | *2412.00        | 97.11         | AV | /              | /           | 1.00 H         | 71          | 100.41    | 28.3           | 5.0          | -36.6         |
| 2  | 4824.00         | 51.9          | PK | 74.00          | 22.10       | 1.00 H         | 150         | 48.1      | 32.7           | 7.3          | -36.2         |
| 2  | 4824.00         | 46.17         | AV | 54.00          | 7.83        | 1.00 H         | 150         | 42.37     | 32.7           | 7.3          | -36.2         |
| 3  | 7236.00         | 51.29         | PK | 74.00          | 22.71       | 1.00 H         | 337         | 41.89     | 35.8           | 8.9          | -35.3         |
| 3  | 7236.00         | 47.02         | AV | 54.00          | 6.98        | 1.00 H         | 337         | 37.62     | 35.8           | 8.9          | -35.3         |
| 4  | 9648.00         | 50.57         | PK | 74.00          | 23.43       | 1.00 H         | 12          | 37.97     | 37.2           | 10.2         | -34.8         |
| 4  | 9648.00         | 45.26         | AV | 54.00          | 8.74        | 1.00 H         | 12          | 32.66     | 37.2           | 10.2         | -34.8         |



**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n-20--2412MHz)**

| No. | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2412.00        | 109.76        | PK | /              | /           | 1.00 V         | 189         | 113.06    | 28.3           | 5.0          | -36.6         |
| 1   | *2412.00        | 98.89         | AV | /              | /           | 1.00 V         | 189         | 102.19    | 28.3           | 5.0          | -36.6         |
| 2   | 4824.00         | 51.36         | PK | 74.00          | 22.64       | 1.00 V         | 96          | 47.56     | 32.7           | 7.3          | -36.2         |
| 2   | 4824.00         | 45.25         | AV | 54.00          | 8.75        | 1.00 V         | 96          | 41.45     | 32.7           | 7.3          | -36.2         |
| 3   | 7236.00         | 51.53         | PK | 74.00          | 22.47       | 1.00 V         | 233         | 42.13     | 35.8           | 8.9          | -35.3         |
| 3   | 7236.00         | 48.54         | AV | 54.00          | 5.46        | 1.00 V         | 233         | 39.14     | 35.8           | 8.9          | -35.3         |
| 4   | 9648.00         | 49.65         | PK | 74.00          | 24.35       | 1.00 V         | 304         | 37.05     | 37.2           | 10.2         | -34.8         |
| 4   | 9648.00         | 45.88         | AV | 54.00          | 8.12        | 1.00 V         | 304         | 33.28     | 37.2           | 10.2         | -34.8         |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n-20--2437MHz)**

| No. | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2437.00        | 108.62        | PK | /              | /           | 1.00 H         | 349         | 111.82    | 28.3           | 5.1          | -36.6         |
| 1   | *2437.00        | 100.00        | AV | /              | /           | 1.00 H         | 349         | 103.2     | 28.3           | 5.1          | -36.6         |
| 2   | 4874.00         | 52.77         | PK | 74.00          | 21.23       | 1.00 H         | 309         | 49.37     | 32.3           | 7.6          | -36.5         |
| 2   | 4874.00         | 48.85         | AV | 54.00          | 5.15        | 1.00 H         | 309         | 45.45     | 32.3           | 7.6          | -36.5         |
| 3   | 7311.00         | 51.96         | PK | 74.00          | 22.04       | 1.00 H         | 188         | 42.56     | 36.1           | 8.6          | -35.3         |
| 3   | 7311.00         | 49.37         | AV | 54.00          | 4.63        | 1.00 H         | 188         | 39.97     | 36.1           | 8.6          | -35.3         |
| 4   | 9748.00         | 51.06         | PK | 74.00          | 22.94       | 1.00 H         | 74          | 38.46     | 37.2           | 10.2         | -34.8         |
| 4   | 9748.00         | 46.72         | AV | 54.00          | 7.28        | 1.00 H         | 74          | 34.12     | 37.2           | 10.2         | -34.8         |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n-20--2437MHz)**

| No. | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2437.00        | 109.48        | PK | /              | /           | 1.00 V         | 205         | 112.68    | 28.3           | 5.1          | -36.6         |
| 1   | *2437.00        | 99.25         | AV | /              | /           | 1.00 V         | 205         | 102.45    | 28.3           | 5.1          | -36.6         |
| 2   | 4874.00         | 53.76         | PK | 74.00          | 20.24       | 1.00 V         | 262         | 50.36     | 32.3           | 7.6          | -36.5         |
| 2   | 4874.00         | 49.61         | AV | 54.00          | 4.39        | 1.00 V         | 262         | 46.21     | 32.3           | 7.6          | -36.5         |
| 3   | 7311.00         | 52.35         | PK | 74.00          | 21.65       | 1.00 V         | 338         | 42.95     | 36.1           | 8.6          | -35.3         |
| 3   | 7311.00         | 46.58         | AV | 54.00          | 7.42        | 1.00 V         | 338         | 37.18     | 36.1           | 8.6          | -35.3         |
| 4   | 9748.00         | 51.20         | PK | 74.00          | 22.80       | 1.00 V         | 152         | 38.6      | 37.2           | 10.2         | -34.8         |
| 4   | 9748.00         | 43.21         | AV | 54.00          | 10.79       | 1.00 V         | 152         | 30.61     | 37.2           | 10.2         | -34.8         |



**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n-20--2462MHz)**

| No. | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2462.00        | 109.44        | PK | /              | /           | 1.00 H         | 235         | 112.74    | 28.2           | 5.1          | -36.6         |
| 1   | *2462.00        | 100.23        | AV | /              | /           | 1.00 H         | 235         | 103.53    | 28.2           | 5.1          | -36.6         |
| 2   | 4924.00         | 52.65         | PK | 74.00          | 21.35       | 1.00 H         | 104         | 48.85     | 33             | 7.0          | -36.2         |
| 2   | 4924.00         | 46.98         | AV | 54.00          | 7.02        | 1.00 H         | 104         | 43.18     | 33             | 7.0          | -36.2         |
| 3   | 7386.00         | 51.87         | PK | 74.00          | 22.13       | 1.00 H         | 329         | 42.47     | 36.2           | 8.5          | -35.3         |
| 3   | 7386.00         | 46.87         | AV | 54.00          | 7.13        | 1.00 H         | 329         | 37.47     | 36.2           | 8.5          | -35.3         |
| 4   | 9848.00         | 52.97         | PK | 74.00          | 21.03       | 1.00 H         | 190         | 40.37     | 37.3           | 10.1         | -34.8         |
| 4   | 9848.00         | 47.31         | AV | 54.00          | 6.69        | 1.00 H         | 190         | 34.71     | 37.3           | 10.1         | -34.8         |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n-20--2462MHz)**

| No. | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2462.00        | 109.87        | PK | /              | /           | 1.00 V         | 176         | 113.17    | 28.2           | 5.1          | -36.6         |
| 1   | *2462.00        | 100.14        | AV | /              | /           | 1.00 V         | 176         | 103.44    | 28.2           | 5.1          | -36.6         |
| 2   | 4924.00         | 50.71         | PK | 74.00          | 23.29       | 1.00 V         | 117         | 46.91     | 33             | 7.0          | -36.2         |
| 2   | 4924.00         | 45.24         | AV | 54.00          | 8.76        | 1.00 V         | 117         | 41.44     | 33             | 7.0          | -36.2         |
| 3   | 7386.00         | 52.17         | PK | 74.00          | 21.83       | 1.00 V         | 294         | 42.77     | 36.2           | 8.5          | -35.3         |
| 3   | 7386.00         | 48.22         | AV | 54.00          | 5.78        | 1.00 V         | 294         | 38.82     | 36.2           | 8.5          | -35.3         |
| 4   | 9848.00         | 50.26         | PK | 74.00          | 23.74       | 1.00 V         | 84          | 37.66     | 37.3           | 10.1         | -34.8         |
| 4   | 9848.00         | 44.33         | AV | 54.00          | 9.67        | 1.00 V         | 84          | 31.73     | 37.3           | 10.1         | -34.8         |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n-40--2422MHz)**

| No. | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2422.00        | 106.81        | PK | /              | /           | 1.00 H         | 71          | 110.11    | 28.3           | 5.0          | -36.6         |
| 1   | *2422.00        | 96.86         | AV | /              | /           | 1.00 H         | 71          | 100.16    | 28.3           | 5.0          | -36.6         |
| 2   | 4844.00         | 51.64         | PK | 74             | 22.36       | 1.00 H         | 150         | 47.84     | 32.7           | 7.3          | -36.2         |
| 2   | 4844.00         | 45.93         | AV | 54             | 8.07        | 1.00 H         | 150         | 42.13     | 32.7           | 7.3          | -36.2         |
| 3   | 7266.00         | 51.03         | PK | 74             | 22.97       | 1.00 H         | 337         | 41.63     | 35.8           | 8.9          | -35.3         |
| 3   | 7266.00         | 46.79         | AV | 54             | 7.21        | 1.00 H         | 337         | 37.39     | 35.8           | 8.9          | -35.3         |
| 4   | 9688.00         | 50.32         | PK | 74             | 23.68       | 1.00 H         | 12          | 37.72     | 37.2           | 10.2         | -34.8         |
| 4   | 9688.00         | 45.01         | AV | 54             | 8.99        | 1.00 H         | 12          | 32.41     | 37.2           | 10.2         | -34.8         |



| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M (802.11n-40--2422MHz)</b> |                 |               |    |                |             |                |             |           |                |              |               |
|--|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| No.  | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
| 1  | *2422.00        | 109.53        | PK | /              | /           | 1.00 V         | 189         | 112.83    | 28.3           | 5            | -36.6         |
| 1  | *2422.00        | 98.64         | AV | /              | /           | 1.00 V         | 189         | 101.94    | 28.3           | 5            | -36.6         |
| 2  | 4844.00         | 51.1          | PK | 74             | 22.9        | 1.00 V         | 96          | 47.3      | 32.7           | 7.3          | -36.2         |
| 2  | 4844.00         | 45.01         | AV | 54             | 8.99        | 1.00 V         | 96          | 41.21     | 32.7           | 7.3          | -36.2         |
| 3  | 7266.00         | 51.27         | PK | 74             | 22.73       | 1.00 V         | 233         | 41.87     | 35.8           | 8.9          | -35.3         |
| 3  | 7266.00         | 48.31         | AV | 54             | 5.69        | 1.00 V         | 233         | 38.91     | 35.8           | 8.9          | -35.3         |
| 4  | 9688.00         | 49.4          | PK | 74             | 24.6        | 1.00 V         | 304         | 36.8      | 37.2           | 10.2         | -34.8         |
| 4  | 9688.00         | 45.63         | AV | 54             | 8.37        | 1.00 V         | 304         | 33.03     | 37.2           | 10.2         | -34.8         |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M (802.11n-40--2437MHz)</b> |                 |               |    |                |             |                |             |           |                |              |               |
|--|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| No.  | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
| 1  | *2437.00        | 108.39        | PK | /              | /           | 1.00 H         | 349         | 111.59    | 28.3           | 5.1          | -36.6         |
| 1  | *2437.00        | 99.75         | AV | /              | /           | 1.00 H         | 349         | 102.95    | 28.3           | 5.1          | -36.6         |
| 2  | 4874.00         | 52.51         | PK | 74             | 21.49       | 1.00 H         | 309         | 49.11     | 32.3           | 7.6          | -36.5         |
| 2  | 4874.00         | 48.61         | AV | 54             | 5.39        | 1.00 H         | 309         | 45.21     | 32.3           | 7.6          | -36.5         |
| 3  | 7311.00         | 51.7          | PK | 74             | 22.3        | 1.00 H         | 188         | 42.3      | 36.1           | 8.6          | -35.3         |
| 3  | 7311.00         | 49.14         | AV | 54             | 4.86        | 1.00 H         | 188         | 39.74     | 36.1           | 8.6          | -35.3         |
| 4  | 9748.00         | 50.81         | PK | 74             | 23.19       | 1.00 H         | 74          | 38.21     | 37.2           | 10.2         | -34.8         |
| 4  | 9748.00         | 46.47         | AV | 54             | 7.53        | 1.00 H         | 74          | 33.87     | 37.2           | 10.2         | -34.8         |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M (802.11n-40--2437MHz)</b> |                 |               |    |                |             |                |             |           |                |              |               |
|--|-----------------|---------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| No.  | Frequency (MHz) | Emssion Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
| 1  | *2437.00        | 109.25        | PK | /              | /           | 1.00 V         | 205         | 112.45    | 28.3           | 5.1          | -36.6         |
| 1  | *2437.00        | 99.00         | AV | /              | /           | 1.00 V         | 205         | 102.2     | 28.3           | 5.1          | -36.6         |
| 2  | 4874.00         | 53.50         | PK | 74             | 20.5        | 1.00 V         | 262         | 50.1      | 32.3           | 7.6          | -36.5         |
| 2  | 4874.00         | 49.37         | AV | 54             | 4.63        | 1.00 V         | 262         | 45.97     | 32.3           | 7.6          | -36.5         |
| 3  | 7311.00         | 52.09         | PK | 74             | 21.91       | 1.00 V         | 338         | 42.69     | 36.1           | 8.6          | -35.3         |
| 3  | 7311.00         | 46.35         | AV | 54             | 7.65        | 1.00 V         | 338         | 36.95     | 36.1           | 8.6          | -35.3         |
| 4  | 9748.00         | 50.95         | PK | 74             | 23.05       | 1.00 V         | 152         | 38.35     | 37.2           | 10.2         | -34.8         |
| 4  | 9748.00         | 42.96         | AV | 54             | 11.04       | 1.00 V         | 152         | 30.36     | 37.2           | 10.2         | -34.8         |



**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n-40--2452MHz)**

| No. | Frequency (MHz) | Emission Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|----------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2452.00        | 109.21         | PK | /              | /           | 1.00 H         | 235         | 112.51    | 28.2           | 5.1          | -36.6         |
| 1   | *2452.00        | 99.98          | AV | /              | /           | 1.00 H         | 235         | 103.28    | 28.2           | 5.1          | -36.6         |
| 2   | 4904.00         | 52.39          | PK | 74             | 21.61       | 1.00 H         | 104         | 48.59     | 33             | 7.0          | -36.2         |
| 2   | 4904.00         | 46.74          | AV | 54             | 7.26        | 1.00 H         | 104         | 42.94     | 33             | 7.0          | -36.2         |
| 3   | 7356.00         | 51.61          | PK | 74             | 22.39       | 1.00 H         | 329         | 42.21     | 36.2           | 8.5          | -35.3         |
| 3   | 7356.00         | 46.64          | AV | 54             | 7.36        | 1.00 H         | 329         | 37.24     | 36.2           | 8.5          | -35.3         |
| 4   | 9808.00         | 52.72          | PK | 74             | 21.28       | 1.00 H         | 190         | 40.12     | 37.3           | 10.1         | -34.8         |
| 4   | 9808.00         | 47.06          | AV | 54             | 6.94        | 1.00 H         | 190         | 34.46     | 37.3           | 10.1         | -34.8         |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n-40--2452MHz)**

| No. | Frequency (MHz) | Emission Level |    | Limit (dBuV/m) | Margin (dB) | Antenna Height | Table Angle | Raw Value | Antenna Factor | Cable Factor | Pre-amplifier |
|-----|-----------------|----------------|----|----------------|-------------|----------------|-------------|-----------|----------------|--------------|---------------|
| 1   | *2452.00        | 109.64         | PK | /              | /           | 1.00 V         | 176         | 112.94    | 28.2           | 5.1          | -36.6         |
| 1   | *2452.00        | 99.89          | AV | /              | /           | 1.00 V         | 176         | 103.19    | 28.2           | 5.1          | -36.6         |
| 2   | 4904.00         | 50.45          | PK | 74             | 23.55       | 1.00 V         | 117         | 46.65     | 33             | 7.0          | -36.2         |
| 2   | 4904.00         | 45             | AV | 54             | 9.00        | 1.00 V         | 117         | 41.2      | 33             | 7.0          | -36.2         |
| 3   | 7356.00         | 51.91          | PK | 74             | 22.09       | 1.00 V         | 294         | 42.51     | 36.2           | 8.5          | -35.3         |
| 3   | 7356.00         | 47.99          | AV | 54             | 6.01        | 1.00 V         | 294         | 38.59     | 36.2           | 8.5          | -35.3         |
| 4   | 9808.00         | 50.01          | PK | 74             | 23.99       | 1.00 V         | 84          | 37.41     | 37.3           | 10.1         | -34.8         |
| 4   | 9808.00         | 44.08          | AV | 54             | 9.92        | 1.00 V         | 84          | 31.48     | 37.3           | 10.1         | -34.8         |

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Antenna Factor (dB/m) + Cable Factor (dB) + Pre-amplifier Factor
  2. The other emission levels were very low against the limit.
  3. The other emission levels were very low against the limit.
  4. Margin value = Limit value - Emission level.
  5. The limit value is defined as per 15.247
  6. “ \* “ : Fundamental frequency



**Annex A      Accreditation Certificate**



**China National Accreditation Service for Conformity Assessment**

**LABORATORY ACCREDITATION CERTIFICATE**


**(Registration No. CNAS L1659 )**

**CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.**  
Building 28/29, Shigudong, Xili Industrial Area, Xili Street,  
Nanshan District, Shenzhen, Guangdong, China

*is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence of testing and calibration.*

*The scope of accreditation is detailed in the attached appendices bearing the same registration number as above. The appendices form an integral part of this certificate.*

Date of Issue: 2012-09-29  
Date of Expiry: 2015-09-28  
Date of Initial Accreditation: 1999-08-03  
Date of Update: 2012-09-29



Signed on behalf of China National Accreditation Service for Conformity Assessment

China National Accreditation Service for Conformity Assessment (CNAS) is authorized by Certification and Accreditation Administration of the People's Republic of China (CNCA) to operate the national accreditation schemes for conformity assessment. CNAS is the signatory to International Laboratory Accreditation Cooperation Multilateral Recognition Arrangement (ILAC MRA) and Asia Pacific Laboratory Accreditation Cooperation Multilateral Recognition Arrangement (APLAC MRA).

No.CNAS AL 2 0005210

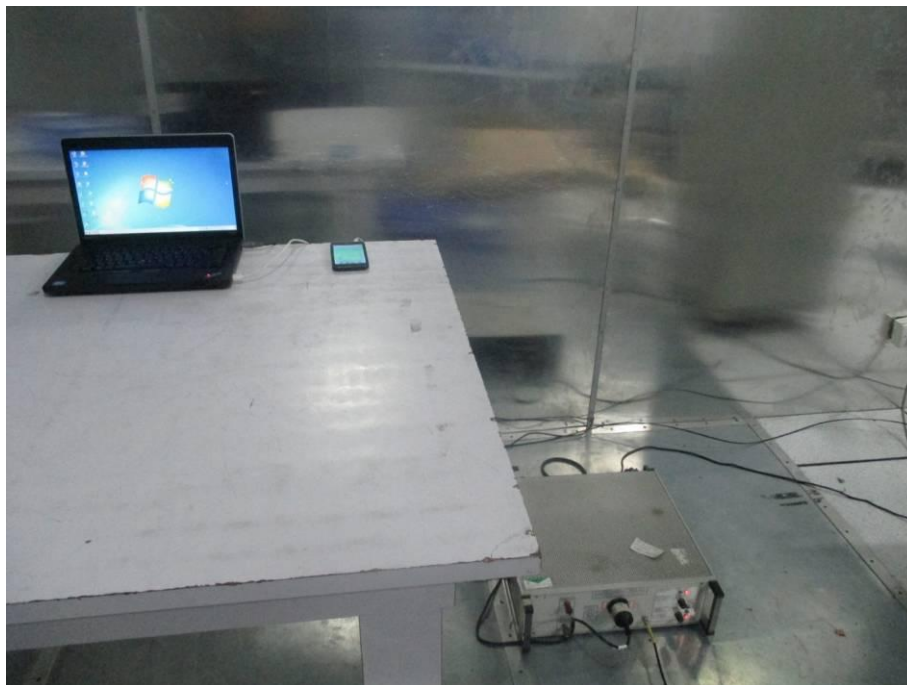


## Annex B PHOTOGRAPHS OF THE EUT



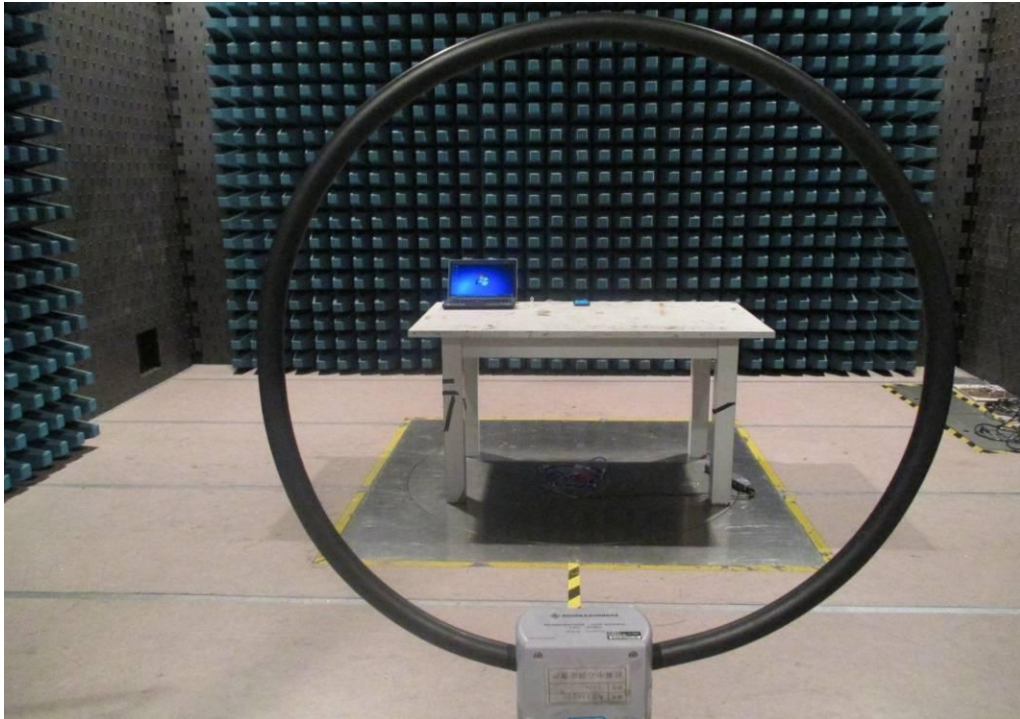
## Annex C PHOTOGRAPHS OF THE TEST SETUP

### 1. Conducted Measurement Setup

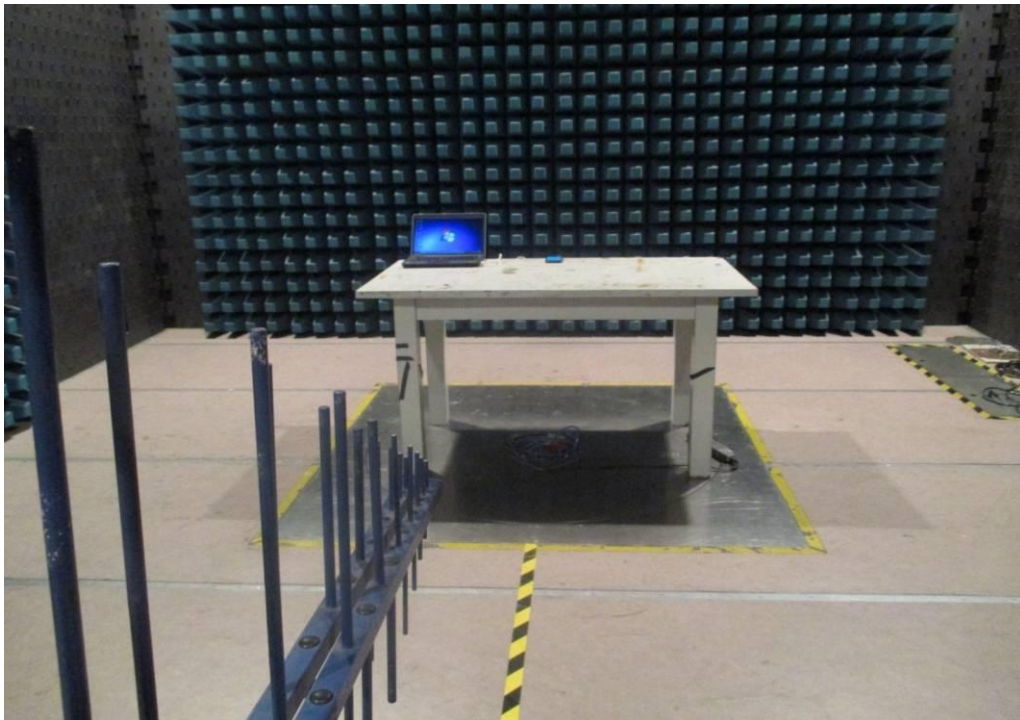


Conducted Emission

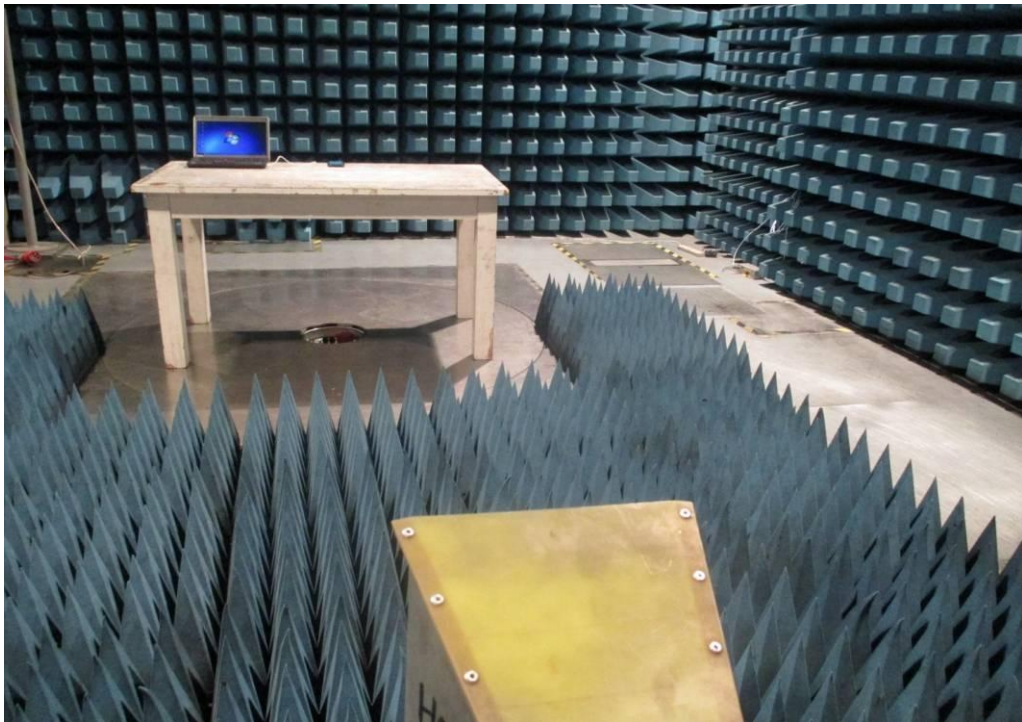
## 2. Radiated Measurement Setup



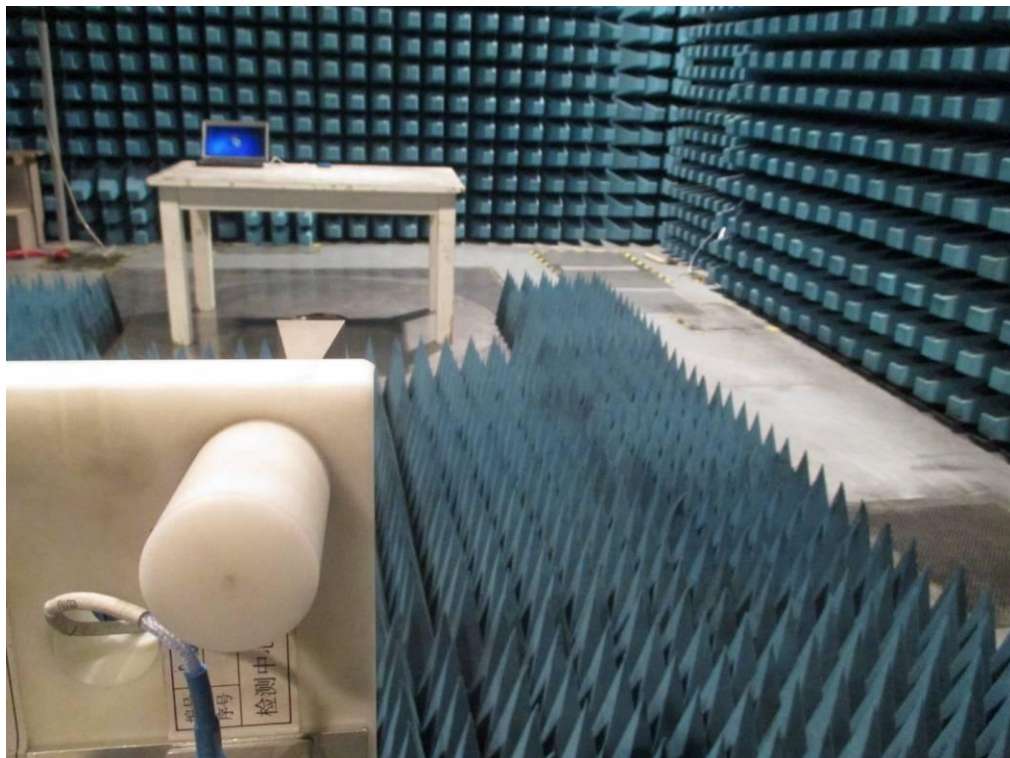
Radiated Emission of 9k-30M



Radiated Emission of 30M-1G



Radiated Emission of 1-18G



Radiated Emission of 18-26.5G

\*\* END OF REPORT \*\*