



# FCC RF Test Report

**APPLICANT** : Hewlett Packard Enterprise Company  
**EQUIPMENT** : Wireless Access Point  
**BRAND NAME** : aruba  
**MODEL NAME** : APIN0207  
**FCC ID** : Q9DAPIN0207  
**STANDARD** : FCC Part 15 Subpart C §15.247  
**CLASSIFICATION** : (DTS) Digital Transmission System

The product was received on Apr. 27, 2016 and testing was completed on Jul. 19, 2016. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

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Reviewed by: Joseph Lin / Supervisor

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Approved by: Jones Tsai / Manager



**SPORTON INTERNATIONAL INC.**

**No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.**



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## REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION                                        | ISSUED DATE   |
|------------|---------|----------------------------------------------------|---------------|
| FR671301B  | Rev. 01 | Initial issue of report                            | Sep. 07, 2016 |
| FR671301B  | Rev. 02 | Revising the Normal Voltage for POE in Section 1.9 | Sep. 23, 2016 |
|            |         |                                                    |               |
|            |         |                                                    |               |
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|            |         |                                                    |               |
|            |         |                                                    |               |

## SUMMARY OF TEST RESULT

| Report Section | FCC Rule           | Description                                        | Limit                          | Result | Remark                              |
|----------------|--------------------|----------------------------------------------------|--------------------------------|--------|-------------------------------------|
| 3.1            | 15.247(a)(2)       | 6dB Bandwidth                                      | $\geq 0.5\text{MHz}$           | Pass   | -                                   |
| 3.1            | -                  | 99% Bandwidth                                      | -                              | Pass   | -                                   |
| 3.2            | 15.247(b)          | Power Output Measurement                           | $\leq 30\text{dBm}$            | Pass   | -                                   |
| 3.3            | 15.247(e)          | Power Spectral Density                             | $\leq 8\text{dBm}/3\text{kHz}$ | Pass   | -                                   |
| 3.4            | 15.247(d)          | Conducted Band Edges                               | $\leq 20\text{dBc}$            | Pass   | -                                   |
|                |                    | Conducted Spurious Emission                        |                                | Pass   | -                                   |
| 3.5            | 15.247(d)          | Radiated Band Edges and Radiated Spurious Emission | 15.209(a) & 15.247(d)          | Pass   | Under limit 0.10 dB at 2843.640 MHz |
| 3.6            | 15.207             | AC Conducted Emission                              | 15.207(a)                      | Pass   | Under limit 13.10 dB at 0.166 MHz   |
| 3.7            | 15.203 & 15.247(b) | Antenna Requirement                                | N/A                            | Pass   | -                                   |



# 1 General Description

## 1.1 Applicant

**Hewlett Packard Enterprise Company**  
3000 Hanover Street, Palo Alto, CA 94304

## 1.2 Manufacturer

**Hewlett Packard Enterprise Company**  
3000 Hanover Street, Palo Alto, CA 94304

## 1.3 Product Feature of Equipment Under Test

| Product Feature                 |                                                                              |
|---------------------------------|------------------------------------------------------------------------------|
| Equipment                       | Wireless Access Point                                                        |
| Brand Name                      | aruba                                                                        |
| Model Name                      | APIN0207                                                                     |
| FCC ID                          | Q9DAPIN0207                                                                  |
| S/N                             | DX0000039 (for RF Conducted and Radiation)<br>DX0000061 (for Conduction)     |
| EUT supports Radios application | WLAN 11a/b/g/n HT20/HT40<br>WLAN 11ac VHT20/VHT40/VHT80<br>Bluetooth v4.0 LE |
| SW Version                      | 6.5.1.0 build 55812                                                          |
| EUT Stage                       | Identical Prototype                                                          |

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4 Product Specification of Equipment Under Test

| Standards-related Product Specification              |                                                                                                                                                |             |             |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|
| Tx/Rx Channel Frequency Range                        | 802.11b/g/n : 2412 MHz ~ 2462 MHz                                                                                                              |             |             |
| Maximum Output Power to antenna<br>< Non-TXBF Modes> | 802.11b : 24.40 dBm (0.2754 W)<br>802.11g : 27.49 dBm (0.5610 W)<br>802.11n HT20 : 27.90 dBm (0.6166 W)<br>802.11n HT40 : 26.76 dBm (0.4742 W) |             |             |
| Maximum Output Power to antenna<br><TXBF Modes>      | 802.11n HT20 : 28.32 dBm (0.6792 W)<br>802.11n HT40 : 26.75 dBm (0.4732 W)                                                                     |             |             |
| 99% Occupied Bandwidth<br>< Non-TXBF Modes>          | 802.11b : 11.90MHz<br>802.11g : 18.45MHz<br>802.11n HT20 : 19.15MHz<br>802.11n HT40 : 36.80MHz                                                 |             |             |
| 99% Occupied Bandwidth<br><TXBF Modes>               | 802.11n HT20 : 19.05MHz<br>802.11n HT40 : 36.50MHz                                                                                             |             |             |
| Antenna Type                                         | <Ant 1><br>802.11b/g/n : PIFA Antenna type with gain 2.20 dBi<br><Ant 2><br>802.11b/g/n : PIFA Antenna type with gain 2.20 dBi                 |             |             |
| Type of Modulation                                   | 802.11b : DSSS (DBPSK / DQPSK / CCK)<br>802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)                                                         |             |             |
| Antenna Function for Transmitter                     |                                                                                                                                                |             |             |
|                                                      | 802.11 b/g/n<br>MIMO                                                                                                                           | Ant. 1<br>√ | Ant. 2<br>√ |

## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.6 Specification of Accessory

| Specification of Accessory                    |                     |                                           |                   |             |
|-----------------------------------------------|---------------------|-------------------------------------------|-------------------|-------------|
| <b>AC Adapter</b>                             | <b>Brand Name</b>   | CUI INC                                   | <b>Model Name</b> | EMSA120300  |
|                                               | <b>Power Rating</b> | I/P: 100-240Vac, 1A, O/P: 12Vdc, 1.5A     |                   |             |
| <b>Power over Ethernet<br/>(POE) DC Power</b> | <b>Brand Name</b>   | PowerDsine                                | <b>Model Name</b> | PD-3501G/AC |
|                                               | <b>Power Rating</b> | I/P: 100-240Vac, 0.43A, O/P: 57Vdc, 600mA |                   |             |

## 1.7 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

|                    |                                                                                                                                                                  |         |           |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------|
| Test Site          | SPORTON INTERNATIONAL INC.                                                                                                                                       |         |           |
| Test Site Location | No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park,<br>Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |         |           |
| Test Site No.      | Sporton Site No.                                                                                                                                                 |         |           |
|                    | TH05-HY                                                                                                                                                          | CO05-HY | 03CH06-HY |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

## 1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ ANSI C63.10-2013

### Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

## 1.9 Test Condition

|                     |                                      |
|---------------------|--------------------------------------|
| Normal Voltage      | DC 12V for Adapter<br>DC 57V for POE |
| Normal Temperature  | 25°C                                 |
| Extreme Temperature | 0°C and 50°C                         |

**Note:** The test temperature was between 0°C ~ 50°C by manufacturer requested.



## 2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.2.

### 2.1 Carrier Frequency and Channel

| Frequency Band  | Channel | Freq.<br>(MHz) | Channel | Freq.<br>(MHz) |
|-----------------|---------|----------------|---------|----------------|
| 2400-2483.5 MHz | 1       | 2412           | 7       | 2442           |
|                 | 2       | 2417           | 8       | 2447           |
|                 | 3       | 2422           | 9       | 2452           |
|                 | 4       | 2427           | 10      | 2457           |
|                 | 5       | 2432           | 11      | 2462           |
|                 | 6       | 2437           |         |                |



## 2.2 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

### < Non-TXBF Modes>

| Modulation   | Data Rate |
|--------------|-----------|
| 802.11b      | 1 Mbps    |
| 802.11g      | 6 Mbps    |
| 802.11n HT20 | MCS8      |
| 802.11n HT40 | MCS8      |

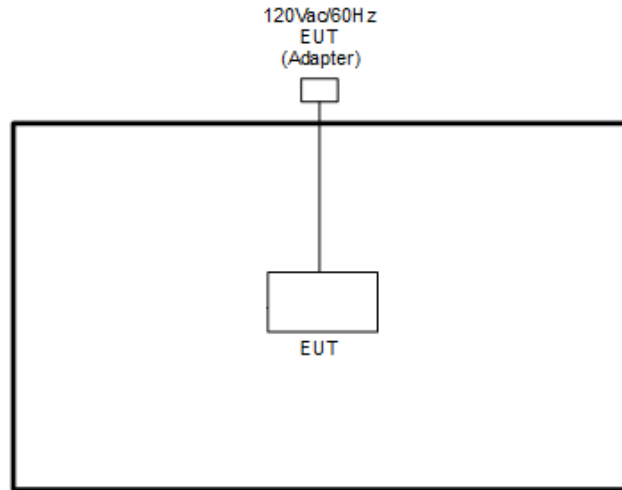
### <TXBF Modes>

| Modulation   | Data Rate |
|--------------|-----------|
| 802.11n HT20 | MCS0      |
| 802.11n HT40 | MCS0      |

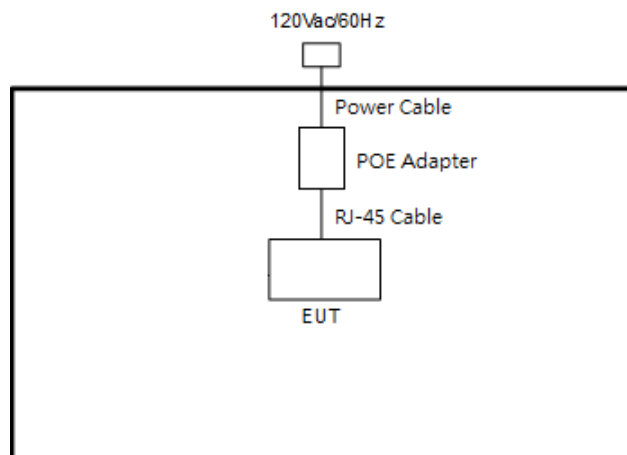
| Test Cases                                                                                            |                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| AC<br>Conducted<br>Emission                                                                           | Mode 1 :Bluetooth Link + LAN Link + WLAN (2.4GHz) Link + Adapter<br>Mode 2 Bluetooth Link + LAN Link + WLAN (2.4GHz) Link + POE Adapter |
| <b>Remark:</b> The worst case of conducted emission is mode 1; only the test data of it was reported. |                                                                                                                                         |

## 2.3 Connection Diagram of Test System

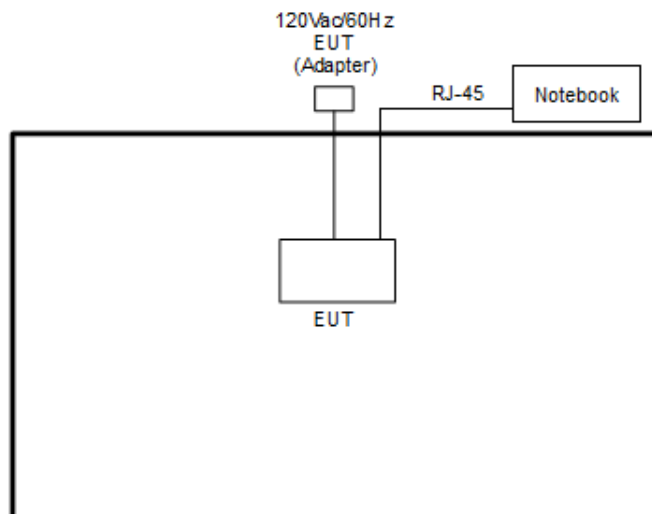
### <WLAN Tx Non-TXBF Mode with AC Adapter>



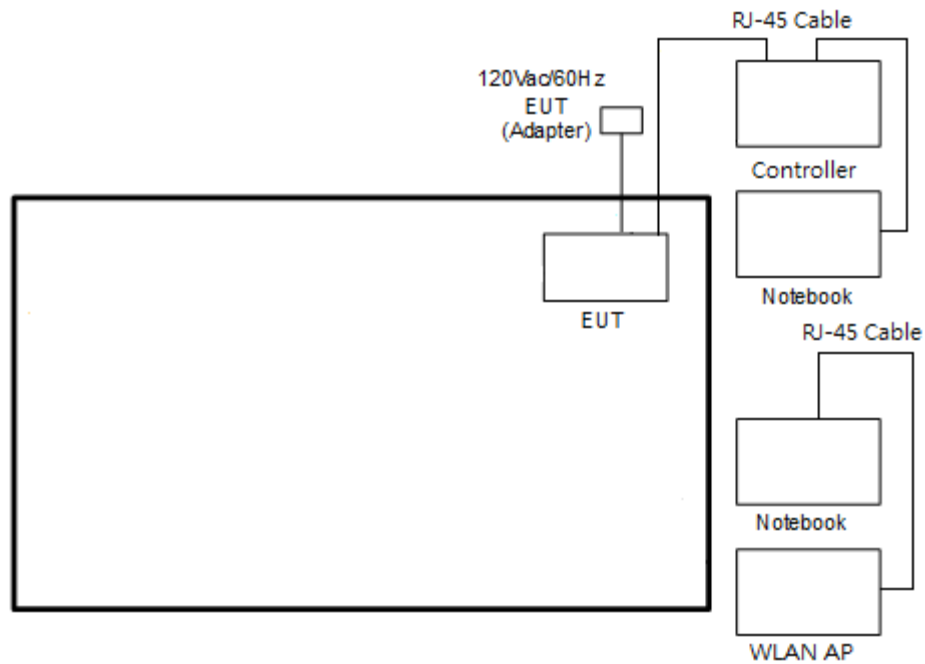
### <WLAN Tx Non-TXBF Mode with PoE Adapter>



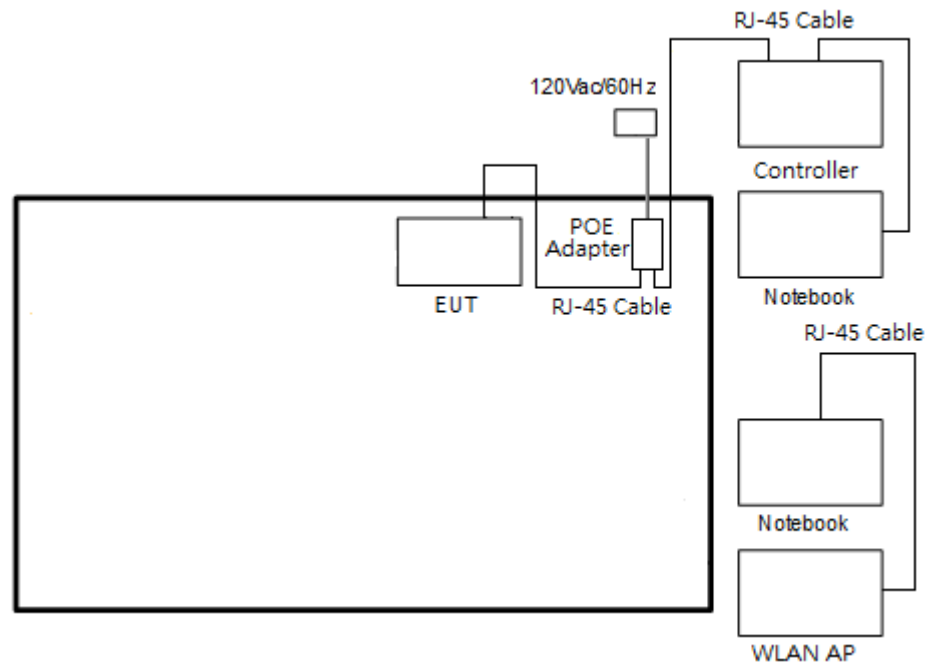
### <WLAN Tx TXBF Mode>



**<AC Conducted Emission with AC Adapter Mode>**



**<AC Conducted Emission with PoE Adapter Mode>**



## 2.4 Support Unit used in test configuration and system

| Item | Equipment  | Trade Name | Model Name        | FCC ID                                       | Data Cable | Power Cord                                                 |
|------|------------|------------|-------------------|----------------------------------------------|------------|------------------------------------------------------------|
| 1.   | Notebook   | DELL       | P20G              | FCC DoC/<br>Contains FCC ID:<br>QDS-BRCM1051 | N/A        | AC I/P:<br>Unshielded, 1.2 m<br>DC O/P:<br>Shielded, 1.8 m |
| 2.   | Notebook   | DELL       | Latitude<br>E6320 | FCC DoC/<br>Contains FCC ID:<br>QDS-BRCM1054 | N/A        | AC I/P:<br>Unshielded, 1.2 m<br>DC O/P:<br>Shielded, 1.8 m |
| 3.   | Notebook   | Lenovo     | 80Q7              | PPD-QCNFA435                                 | N/A        | AC I/P:<br>Unshielded, 1.2 m<br>DC O/P:<br>Shielded, 1.8 m |
| 4.   | PoE        | Microsemi  | PD-3501G          | FCC DoC                                      | N/A        | Unshielded, 1.2 m                                          |
| 5.   | Controller | ARUBA      | ARCN7030          | Verification                                 | N/A        | Unshielded, 1.2 m                                          |
| 6.   | WLAN AP    | ARUBA      | RFQ-207           | N/A                                          | N/A        | Unshielded, 1.6 m                                          |

## 2.5 EUT Operation Test Setup

For Non-TXBF modes programmed RF utility “MTool(Version: 2.0.3.2)”, installed in the notebook make the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.

For WLAN MIMO TXBF modes, the EUT was tested under normal operation and link to another EUT with power, modulation modes and data rates controlled by engineer mode command lines. The iperf software tool was used to make EUT continuous transmitting signals.

## 2.6 Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

*Offset(dB) = RF cable loss(dB) + attenuator factor(dB).*

*= 4.2 + 10 = 14.2 (dB)*

### 3 Test Result

#### 3.1 6dB and 99% Bandwidth Measurement

##### 3.1.1 Limit of 6dB and 99% Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

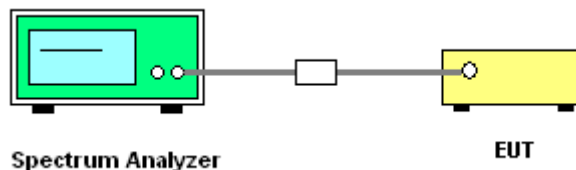
##### 3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

##### 3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

##### 3.1.4 Test Setup

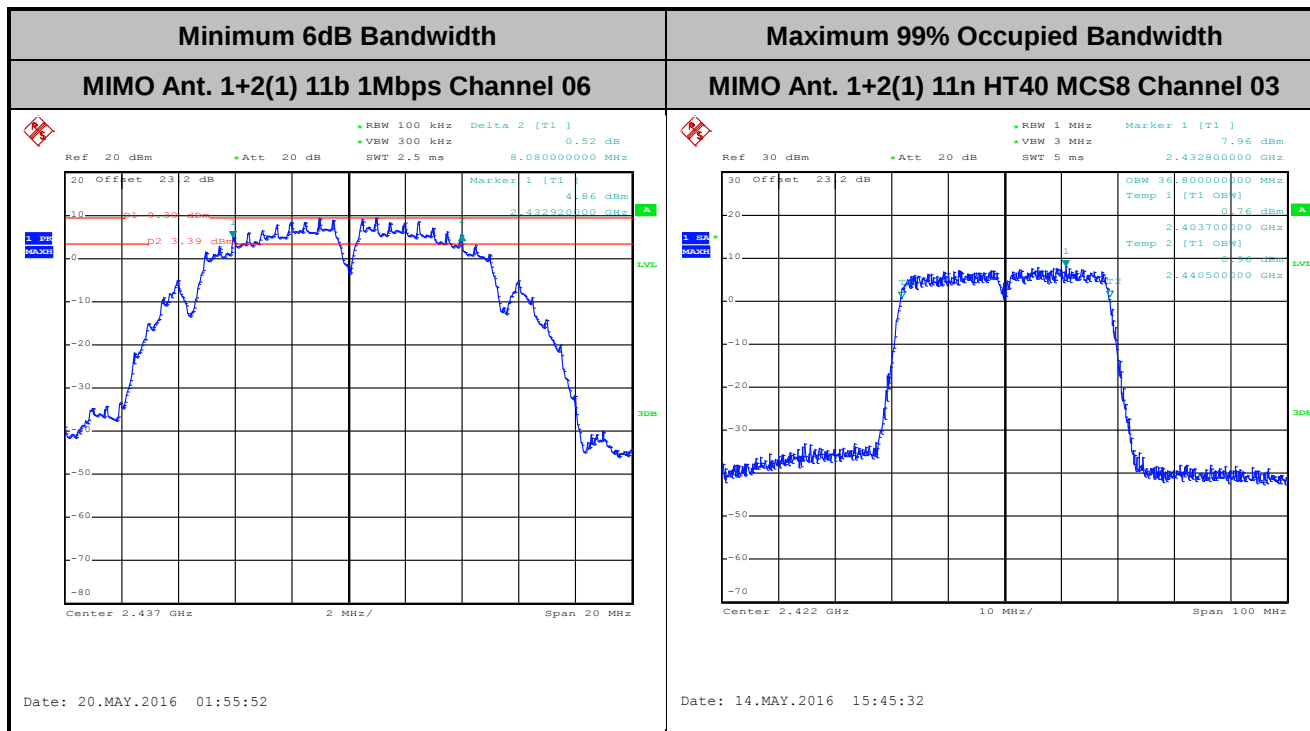




### 3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A of this report.

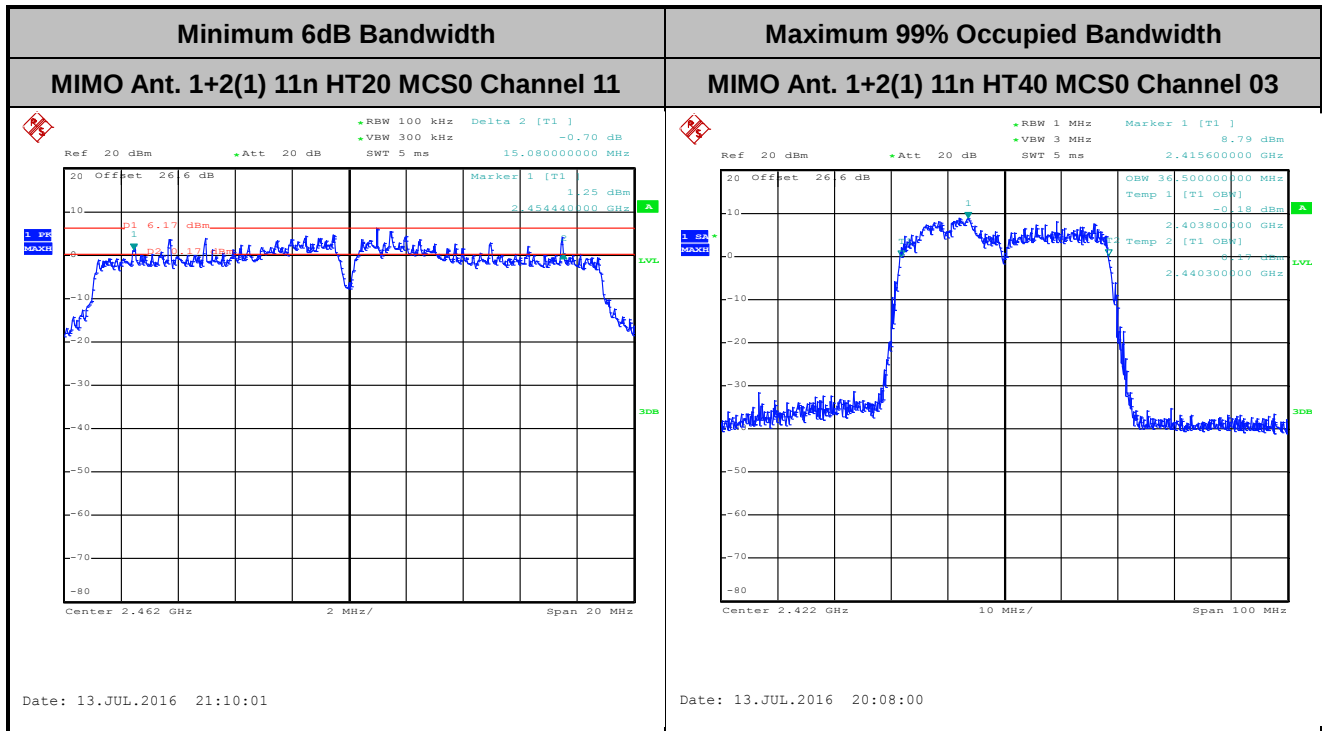
< Non-TXBF Modes >



**Note :** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



## &lt;TXBF Modes&gt;



**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

## 3.2 Peak Output Power Measurement

### 3.2.1 Limit of Peak Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

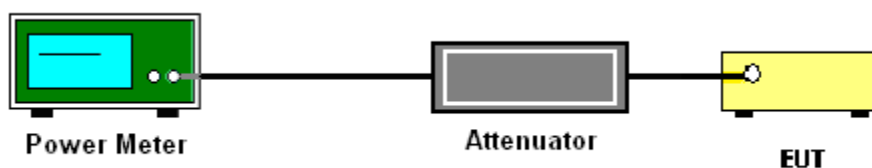
### 3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r05 section 9.1.2 PKPM1 Peak power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

### 3.2.4 Test Setup



### 3.2.5 Test Result of Peak Output Power

Please refer to Appendix A of this test report.

### 3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A of this test report.

### **3.3 Power Spectral Density Measurement**

#### **3.3.1 Limit of Power Spectral Density**

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

#### **3.3.2 Measuring Instruments**

The measuring equipment is listed in the section 4 of this test report.

#### **3.3.3 Test Procedures**

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. For non-TXBF mode, make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. For TXBF mode, make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 10 kHz. Video bandwidth VBW = 30 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
6. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
7. Measure and record the results in the test report.
8. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

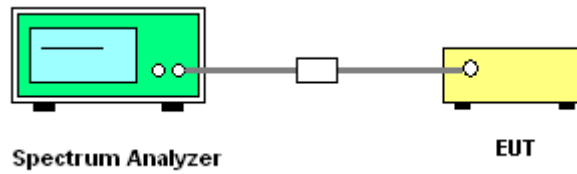
If measurements performed using method (2) plus  $10 \log(N)$  exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

Method (1): Measure and sum the spectra across the outputs.

The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

Method (2): Measure and add  $10 \log(N)$  dB, where N is the number of outputs. (N=2)

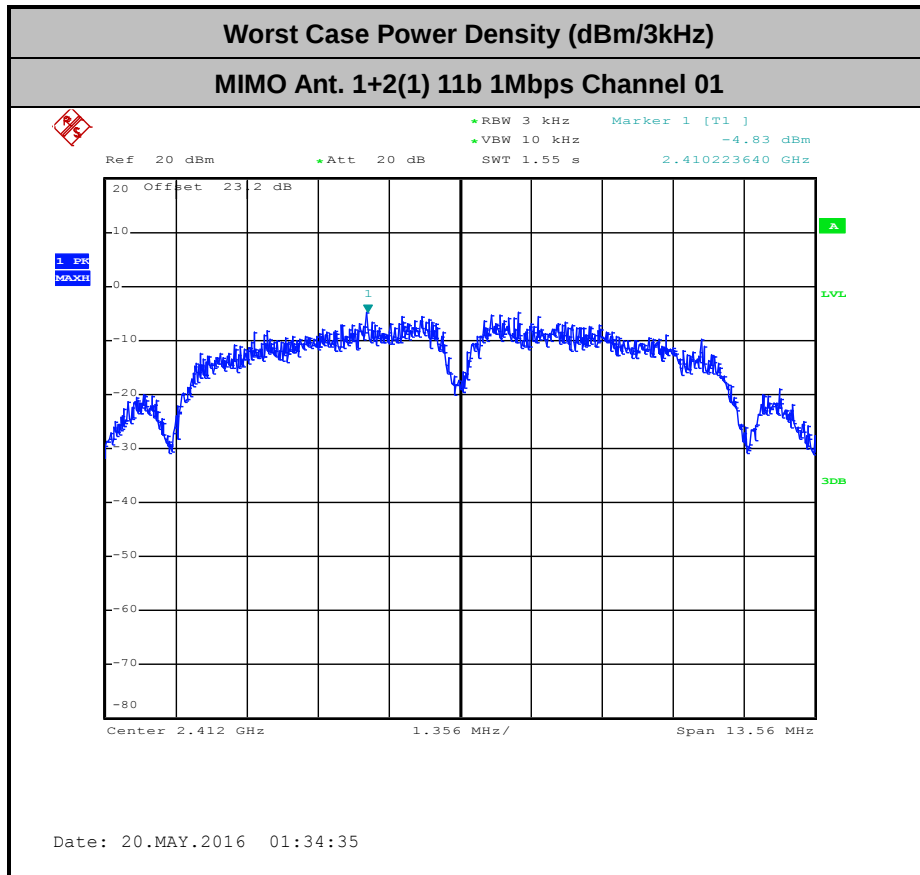
### 3.3.4 Test Setup

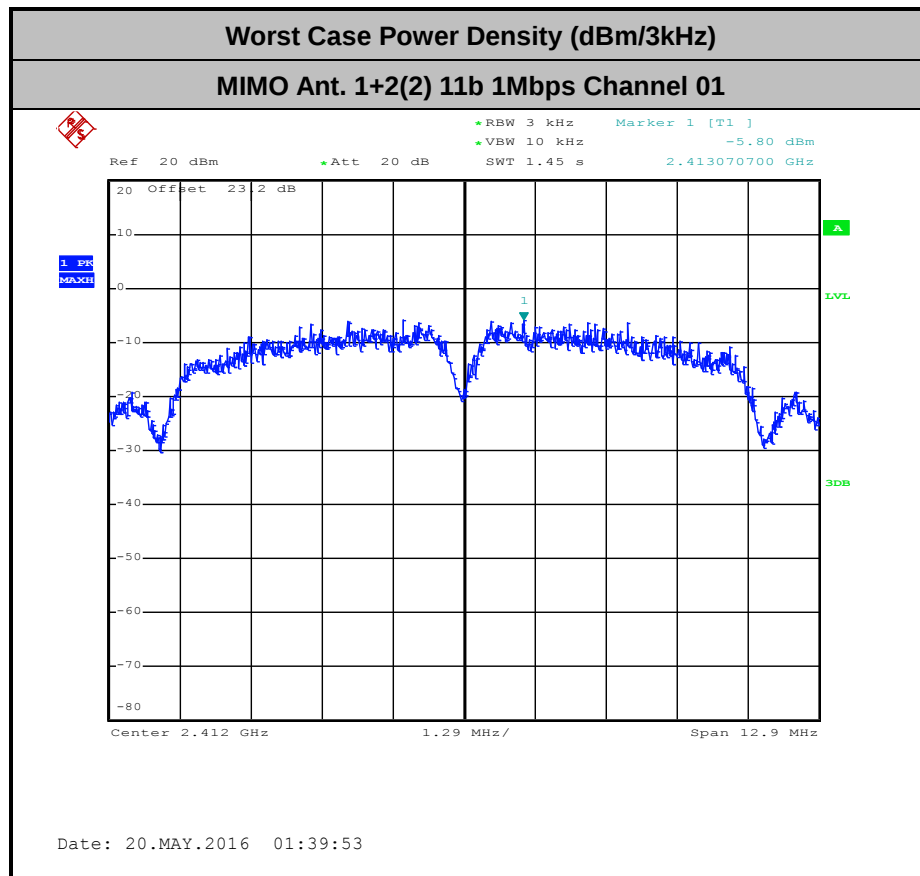


### 3.3.5 Test Result of Power Spectral Density

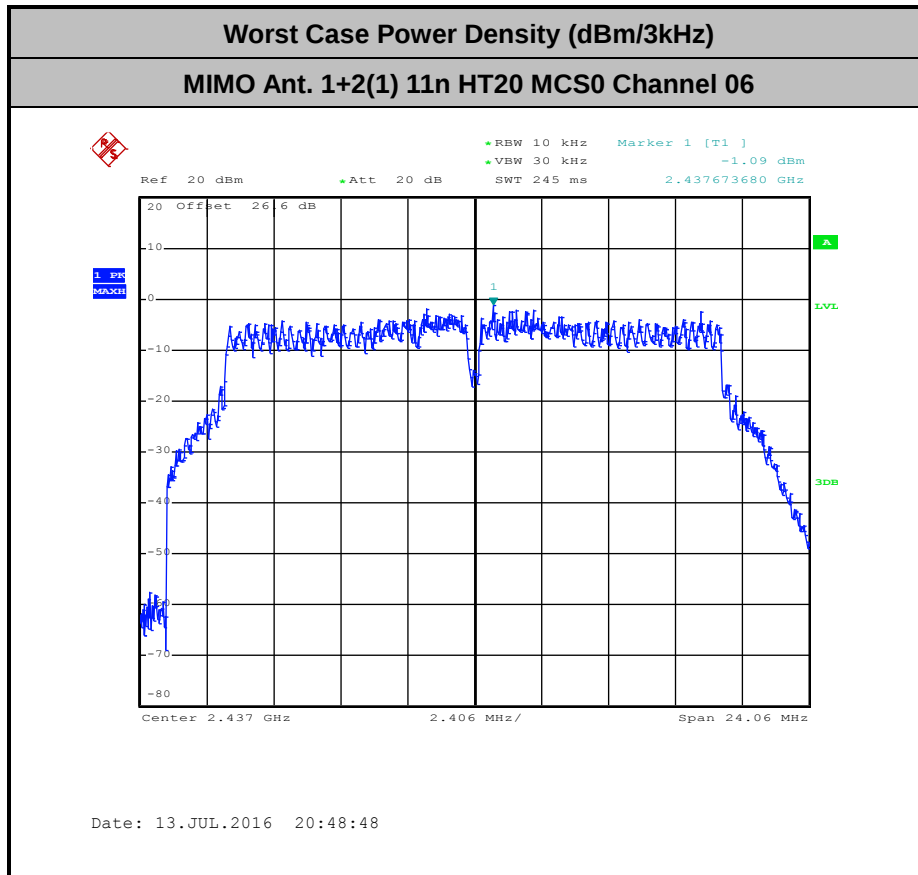
Please refer to Appendix A of this report.

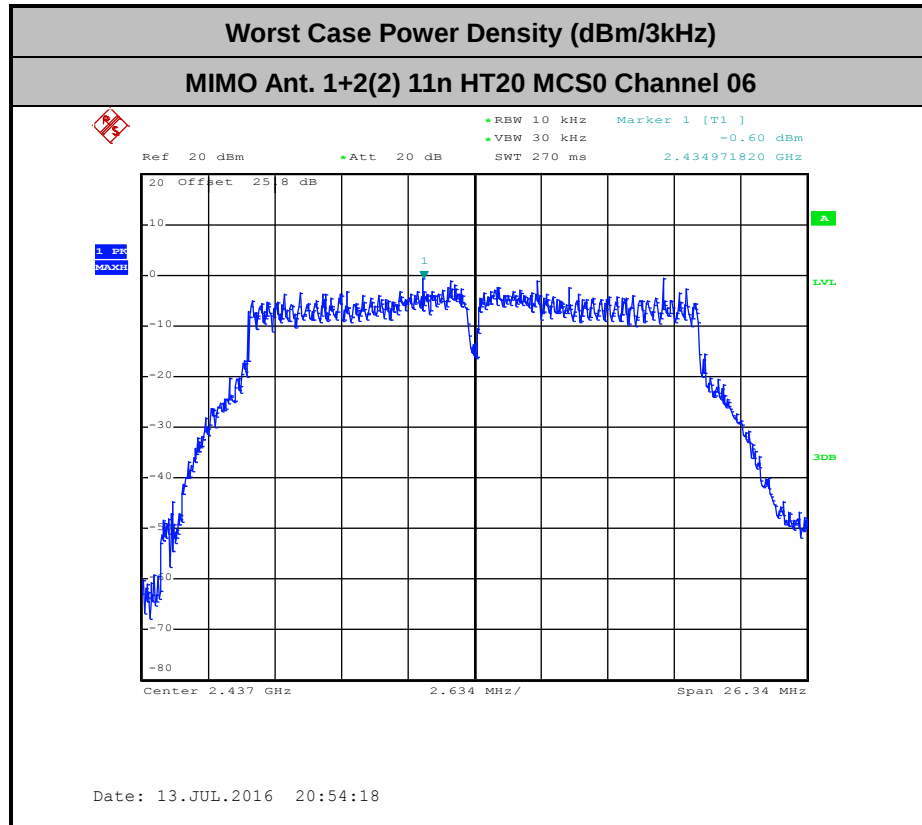
### < Non-TXBF Modes>





## <TXBF Modes>





### **3.4 Conducted Band Edges and Spurious Emission Measurement**

#### **3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement**

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

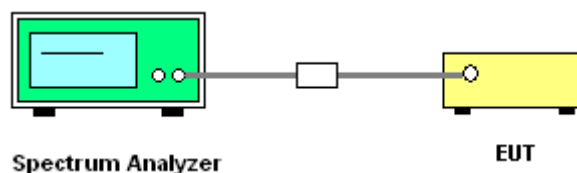
#### **3.4.2 Measuring Instruments**

The measuring equipment is listed in the section 4 of this test report.

#### **3.4.3 Test Procedures**

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

#### **3.4.4 Test Setup**



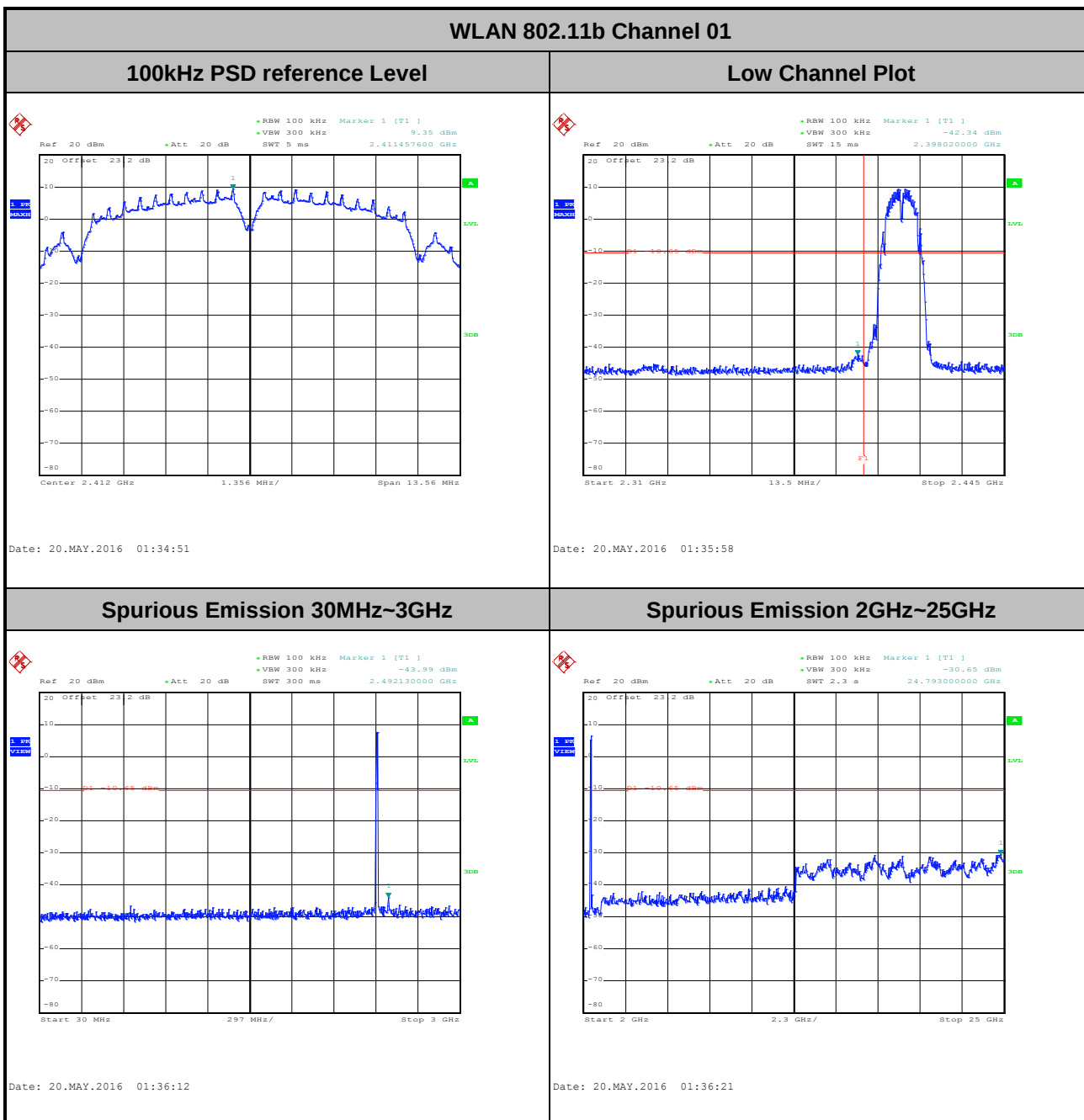


### 3.4.5 Test Result of Conducted Band Edges and Spurious Emission

#### < Non-TXBF Modes >

Number of TX = 2, Ant. 1 (Measured)

|                |            |                     |          |
|----------------|------------|---------------------|----------|
| Number of TX   | 2          | Ant. :              | 1        |
| Test Mode :    | 802.11b    | Temperature :       | 21~25℃   |
| Test Band :    | 2.4GHz Low | Relative Humidity : | 51~54%   |
| Test Channel : | 01         | Test Engineer :     | Bill Kuo |



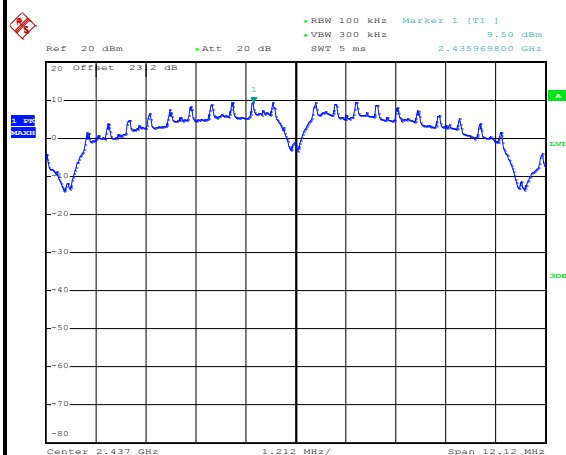


|                |            |                     |          |
|----------------|------------|---------------------|----------|
| Number of TX : | 2          | Ant. :              | 1        |
| Test Mode :    | 802.11b    | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Mid | Relative Humidity : | 51~54%   |
| Test Channel : | 06         | Test Engineer :     | Bill Kuo |

## WLAN 802.11b Channel 06

## 100kHz PSD reference Level

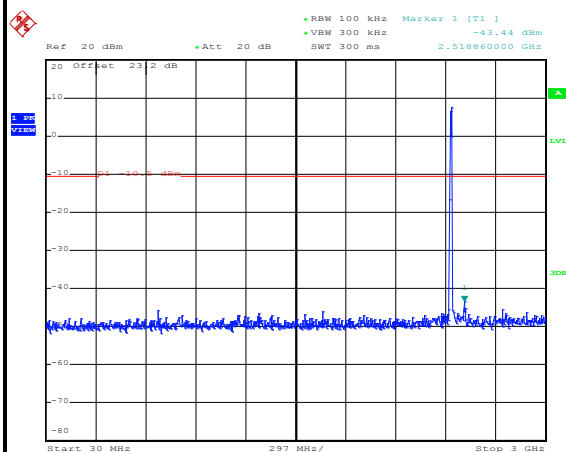
## Mid Channel Plot



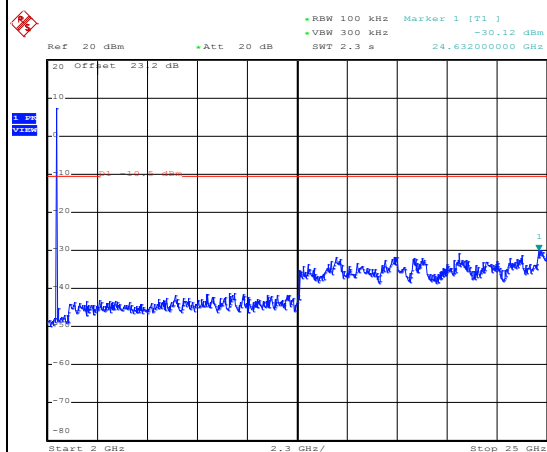
Date: 20.MAY.2016 01:57:10

## Spurious Emission 30MHz~3GHz

## Spurious Emission 2GHz~25GHz



Date: 20.MAY.2016 01:57:24



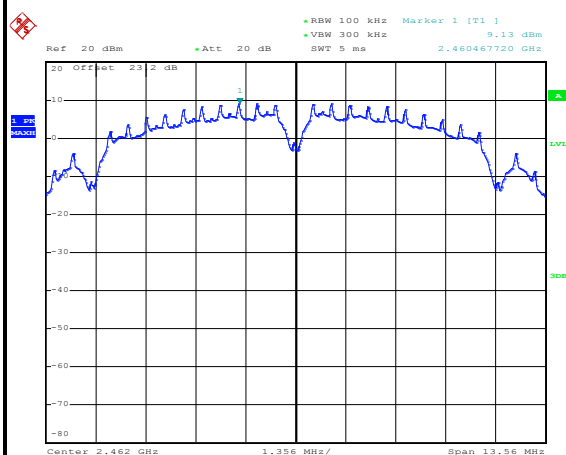
Date: 20.MAY.2016 01:57:32



|                |             |                     |          |
|----------------|-------------|---------------------|----------|
| Number of TX : | 2           | Ant. :              | 1        |
| Test Mode :    | 802.11b     | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz High | Relative Humidity : | 51~54%   |
| Test Channel : | 11          | Test Engineer :     | Bill Kuo |

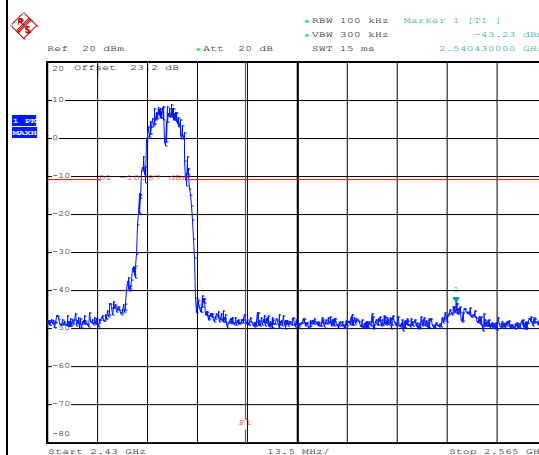
## WLAN 802.11b Channel 11

## 100kHz PSD reference Level



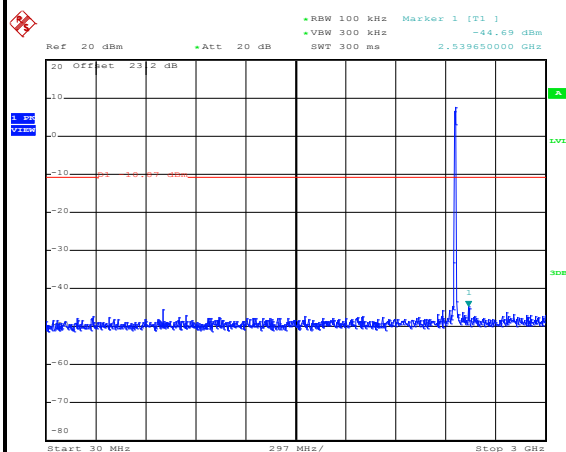
Date: 20.MAY.2016 02:08:14

## High Channel Plot



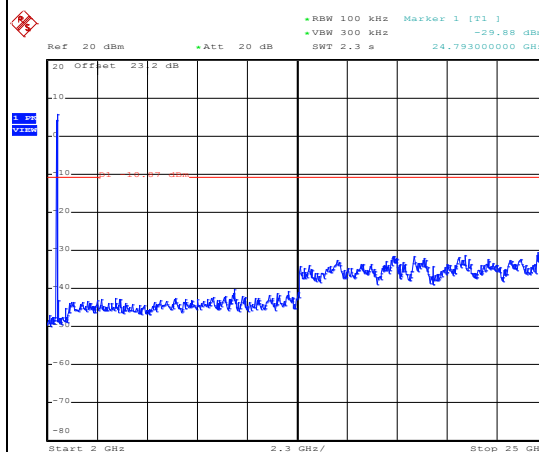
Date: 20.MAY.2016 02:08:42

## Spurious Emission 30MHz~3GHz



Date: 20.MAY.2016 02:08:59

## Spurious Emission 2GHz~25GHz



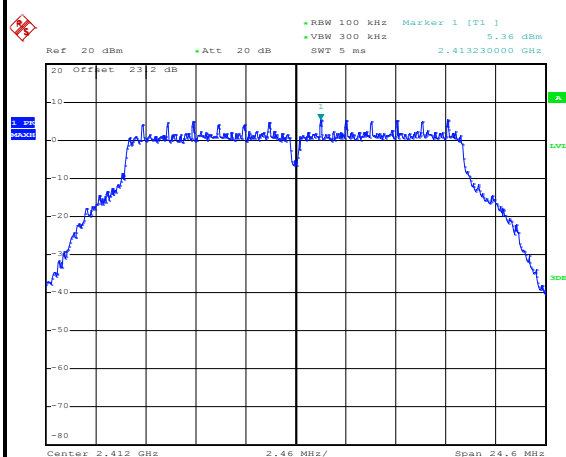
Date: 20.MAY.2016 02:09:08



|                |            |                     |          |
|----------------|------------|---------------------|----------|
| Number of TX : | 2          | Ant. :              | 1        |
| Test Mode :    | 802.11g    | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Low | Relative Humidity : | 51~54%   |
| Test Channel : | 01         | Test Engineer :     | Bill Kuo |

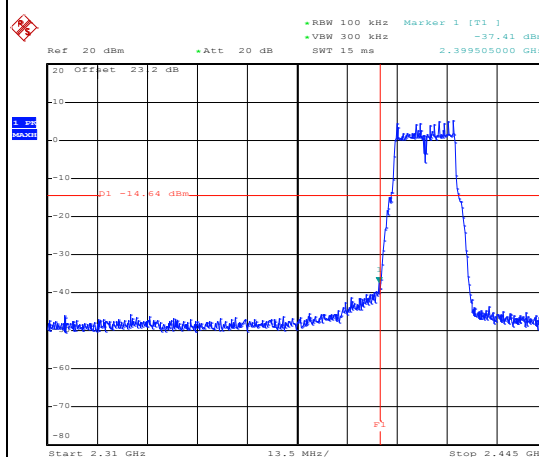
## WLAN 802.11g Channel 01

## 100kHz PSD reference Level



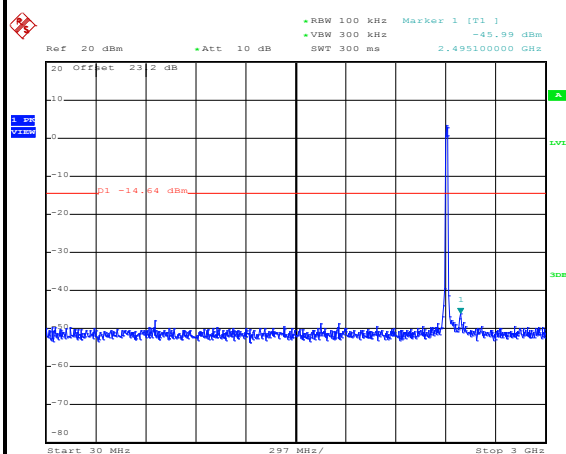
Date: 14.MAY.2016 14:59:45

## Low Channel Plot



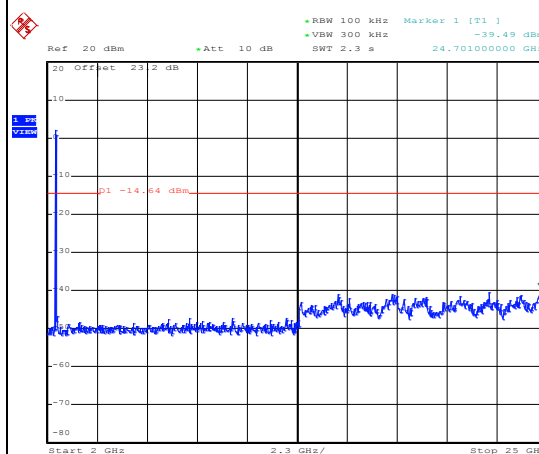
Date: 14.MAY.2016 14:59:58

## Spurious Emission 30MHz~3GHz



Date: 14.MAY.2016 15:00:09

## Spurious Emission 2GHz~25GHz



Date: 14.MAY.2016 15:00:17

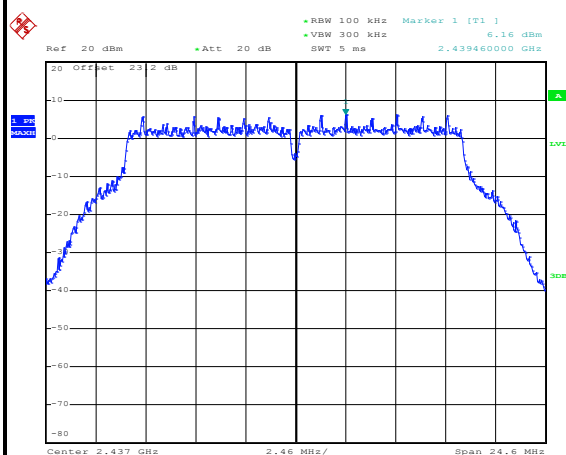


|                |            |                     |          |
|----------------|------------|---------------------|----------|
| Number of TX : | 2          | Ant. :              | 1        |
| Test Mode :    | 802.11g    | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Mid | Relative Humidity : | 51~54%   |
| Test Channel : | 06         | Test Engineer :     | Bill Kuo |

## WLAN 802.11g Channel 06

## 100kHz PSD reference Level

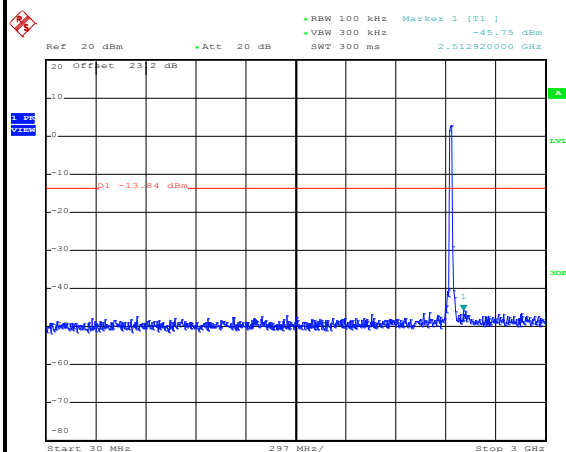
## Mid Channel Plot



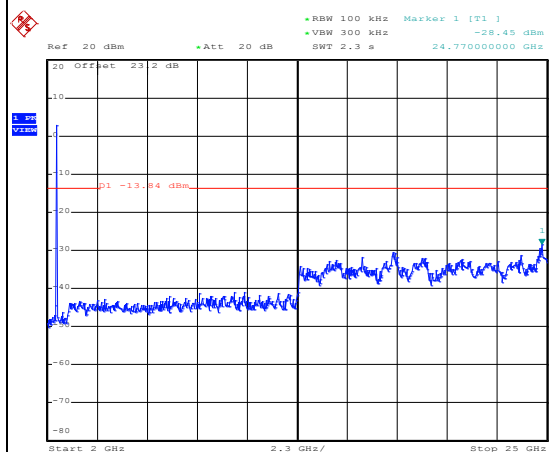
Date: 20.MAY.2016 02:19:55

## Spurious Emission 30MHz~3GHz

## Spurious Emission 2GHz~25GHz



Date: 20.MAY.2016 02:20:36



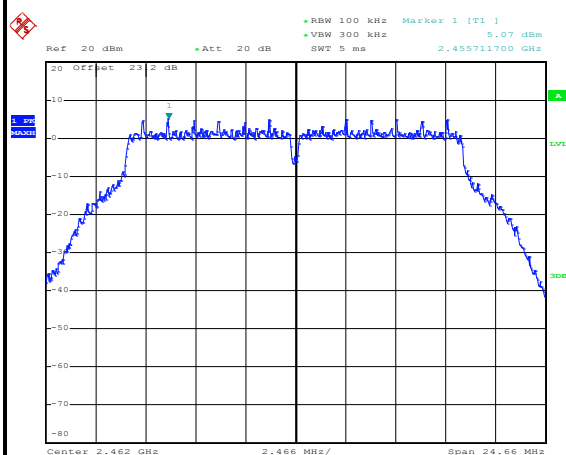
Date: 20.MAY.2016 02:20:44



|                |             |                     |          |
|----------------|-------------|---------------------|----------|
| Number of TX : | 2           | Ant. :              | 1        |
| Test Mode :    | 802.11g     | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz High | Relative Humidity : | 51~54%   |
| Test Channel : | 11          | Test Engineer :     | Bill Kuo |

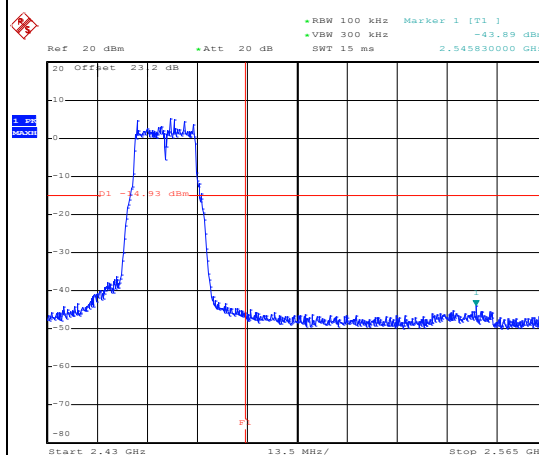
## WLAN 802.11g Channel 11

## 100kHz PSD reference Level



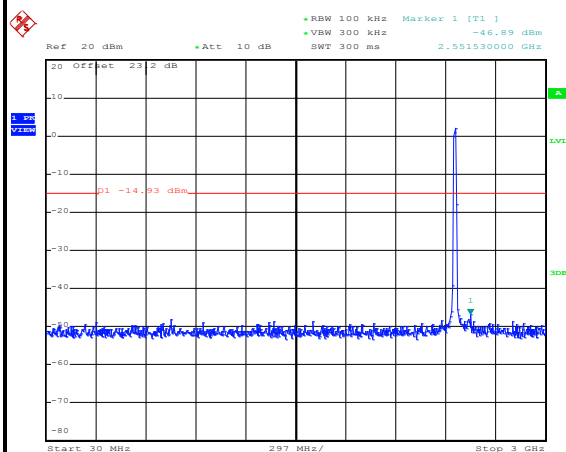
Date: 14.MAY.2016 15:16:32

## High Channel Plot



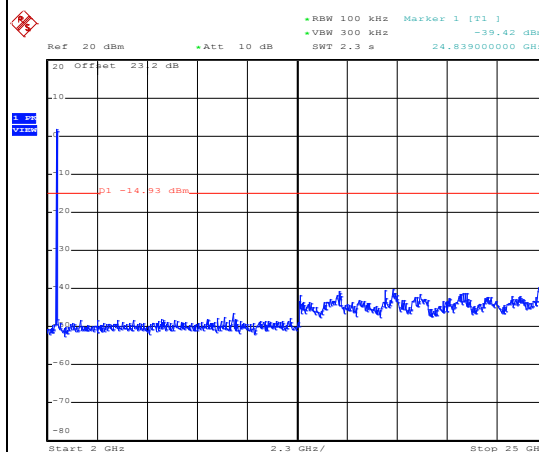
Date: 14.MAY.2016 15:16:59

## Spurious Emission 30MHz~3GHz



Date: 14.MAY.2016 15:17:10

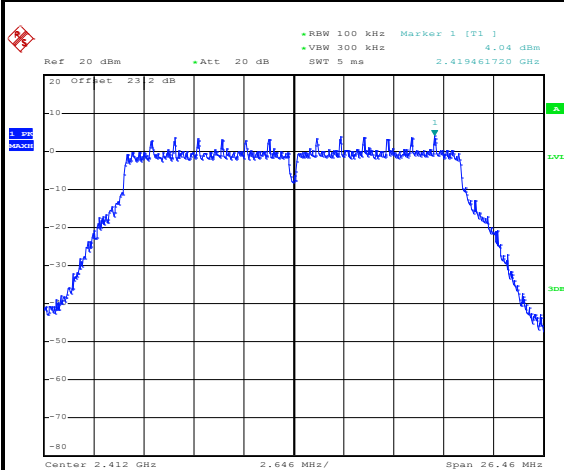
## Spurious Emission 2GHz~25GHz



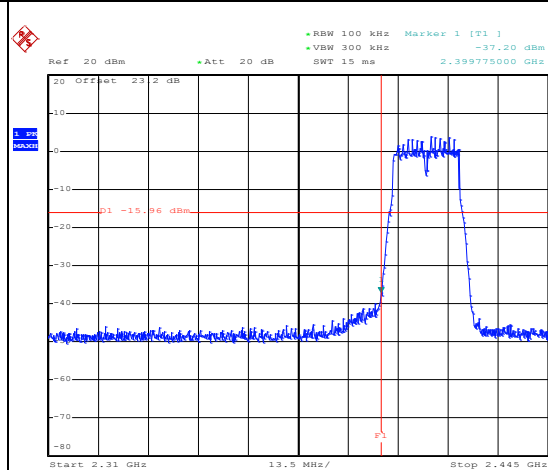
Date: 14.MAY.2016 15:17:19



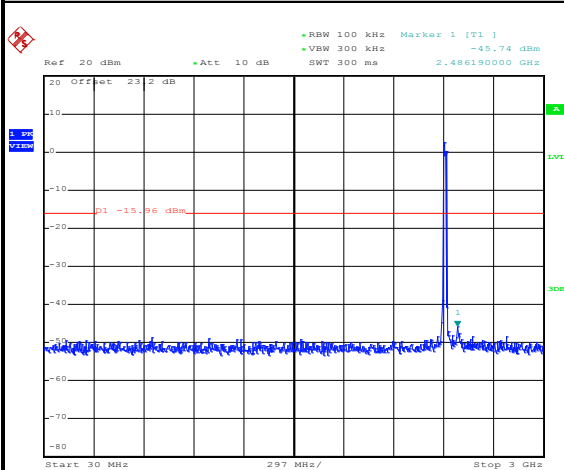
|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 1        |
| Test Mode :    | 802.11n HT20 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Low   | Relative Humidity : | 51~54%   |
| Test Channel : | 01           | Test Engineer :     | Bill Kuo |

**WLAN 802.11n HT20 Channel 01****100kHz PSD reference Level**

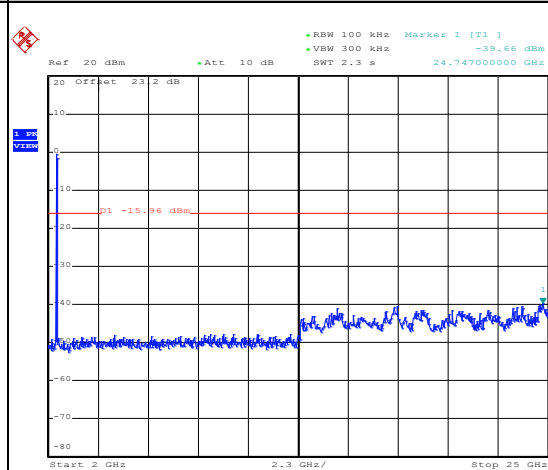
Date: 14.MAY.2016 15:25:19

**Low Channel Plot**

Date: 14.MAY.2016 15:25:45

**Spurious Emission 30MHz~3GHz**

Date: 14.MAY.2016 15:25:57

**Spurious Emission 2GHz~25GHz**

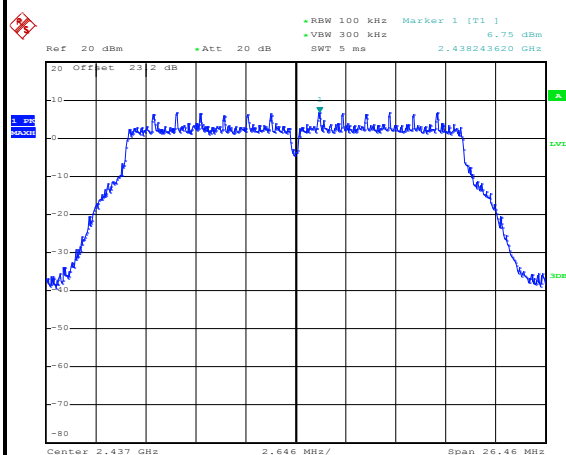
Date: 14.MAY.2016 15:26:05



|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 1        |
| Test Mode :    | 802.11n HT20 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Mid   | Relative Humidity : | 51~54%   |
| Test Channel : | 06           | Test Engineer :     | Bill Kuo |

## WLAN 802.11n HT20 Channel 06

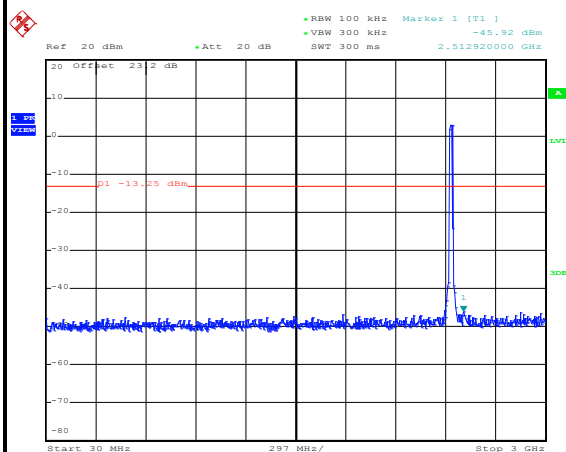
## 100kHz PSD reference Level



Date: 20.MAY.2016 02:29:23

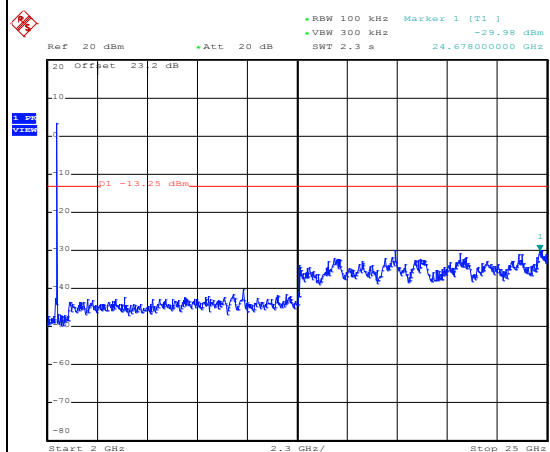
## Mid Channel Plot

## Spurious Emission 30MHz~3GHz



Date: 20.MAY.2016 02:30:19

## Spurious Emission 2GHz~25GHz



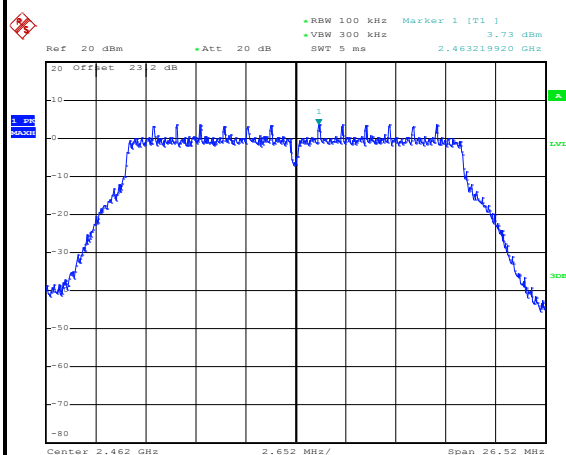
Date: 20.MAY.2016 02:30:27



|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 1        |
| Test Mode :    | 802.11n HT20 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz High  | Relative Humidity : | 51~54%   |
| Test Channel : | 11           | Test Engineer :     | Bill Kuo |

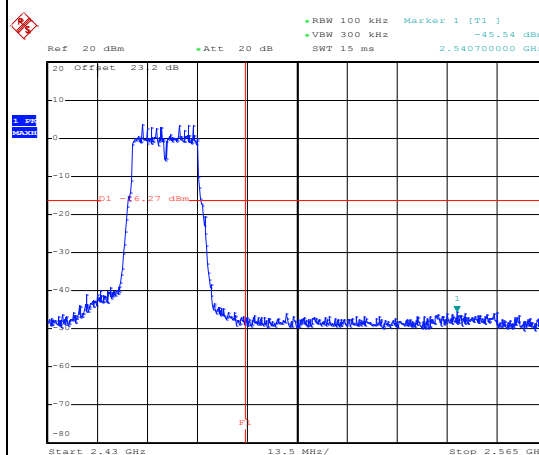
## WLAN 802.11n HT20 Channel 11

## 100kHz PSD reference Level



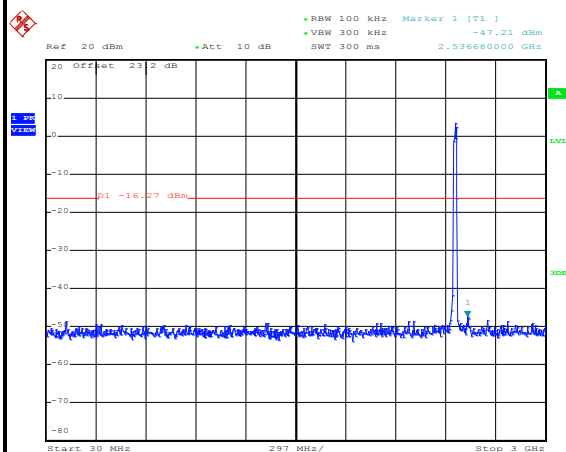
Date: 14.MAY.2016 15:34:25

## High Channel Plot



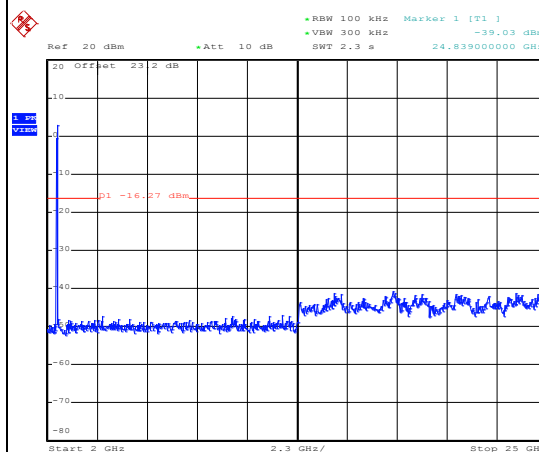
Date: 14.MAY.2016 15:34:39

## Spurious Emission 30MHz~3GHz



Date: 14.MAY.2016 15:34:50

## Spurious Emission 2GHz~25GHz



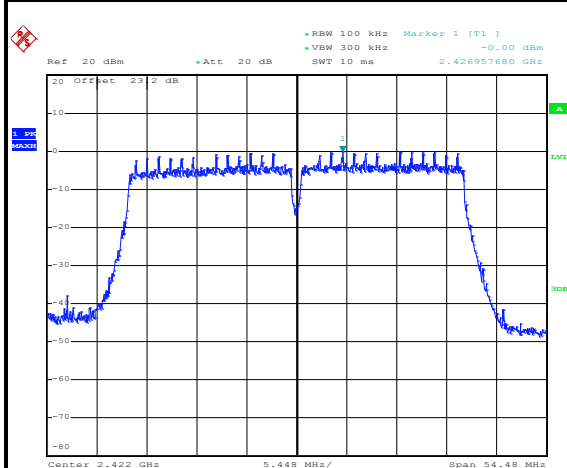
Date: 14.MAY.2016 15:34:59



|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 1        |
| Test Mode :    | 802.11n HT40 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Low   | Relative Humidity : | 51~54%   |
| Test Channel : | 03           | Test Engineer :     | Bill Kuo |

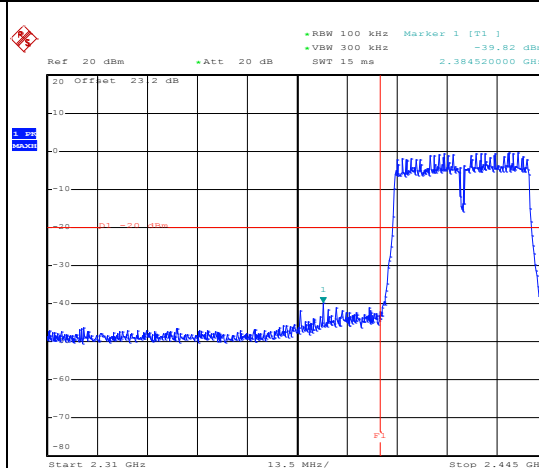
## WLAN 802.11n HT40 Channel 03

## 100kHz PSD reference Level



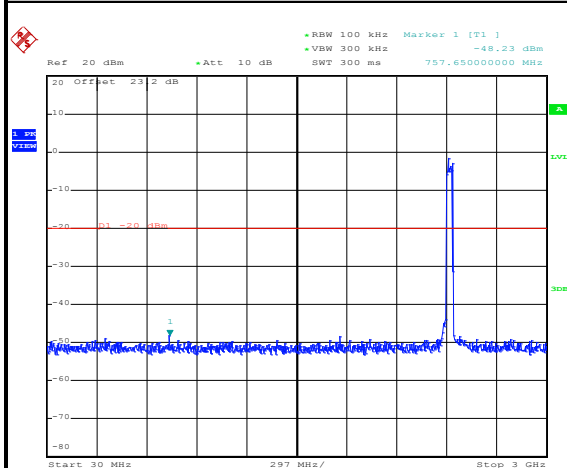
Date: 14.MAY.2016 15:44:22

## Low Channel Plot



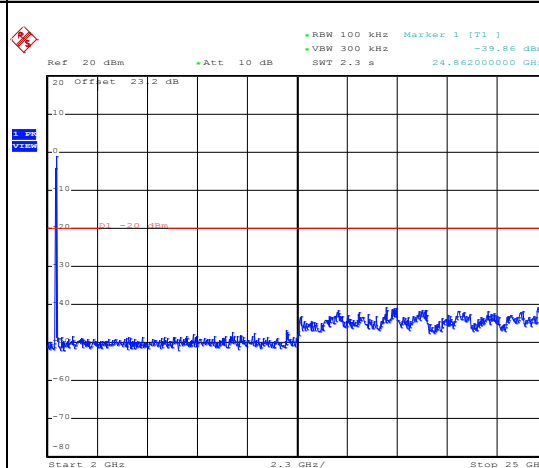
Date: 14.MAY.2016 15:44:35

## Spurious Emission 30MHz~3GHz



Date: 14.MAY.2016 15:45:06

## Spurious Emission 2GHz~25GHz



Date: 14.MAY.2016 15:45:15

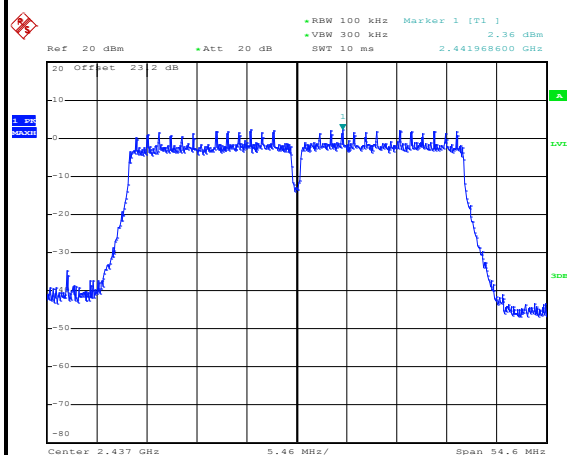


|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 1        |
| Test Mode :    | 802.11n HT40 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Mid   | Relative Humidity : | 51~54%   |
| Test Channel : | 06           | Test Engineer :     | Bill Kuo |

## WLAN 802.11n HT40 Channel 06

## 100kHz PSD reference Level

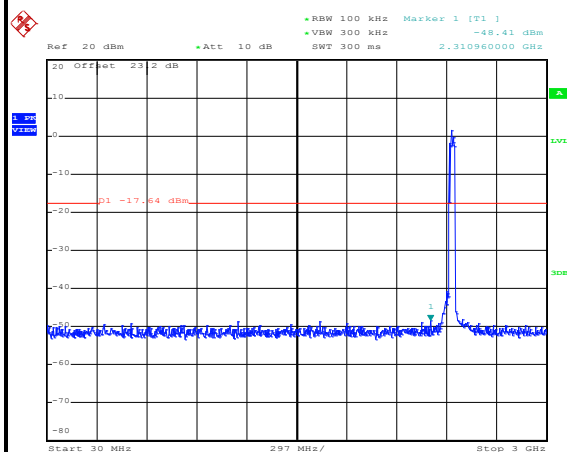
## Mid Channel Plot



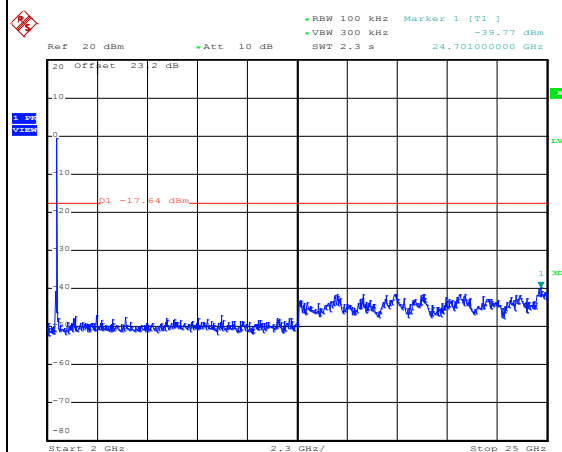
Date: 14.MAY.2016 15:47:53

## Spurious Emission 30MHz~3GHz

## Spurious Emission 2GHz~25GHz



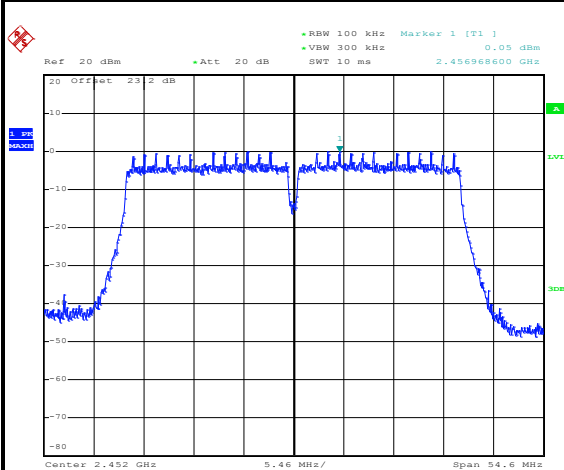
Date: 14.MAY.2016 15:52:13



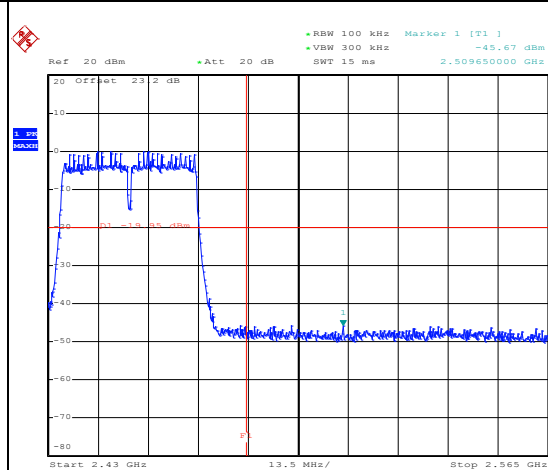
Date: 14.MAY.2016 15:52:21



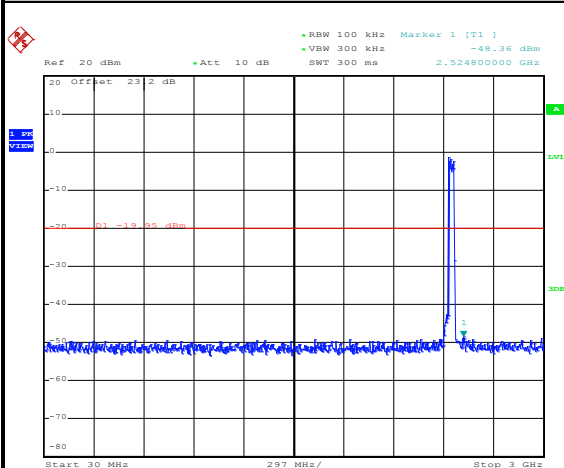
|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 1        |
| Test Mode :    | 802.11n HT40 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz High  | Relative Humidity : | 51~54%   |
| Test Channel : | 09           | Test Engineer :     | Bill Kuo |

**WLAN 802.11n HT40 Channel 09****100kHz PSD reference Level**

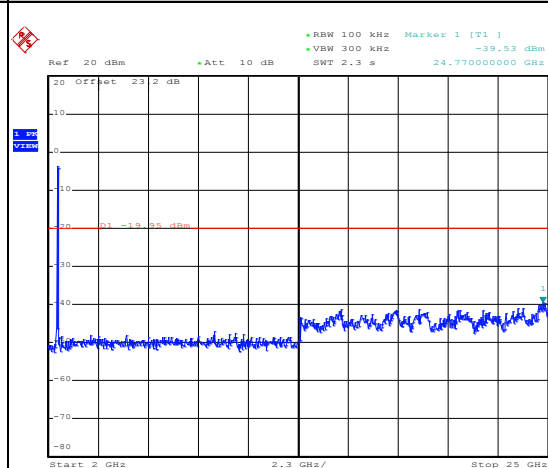
Date: 14.MAY.2016 16:00:18

**High Channel Plot**

Date: 14.MAY.2016 16:00:32

**Spurious Emission 30MHz~3GHz**

Date: 14.MAY.2016 16:01:02

**Spurious Emission 2GHz~25GHz**

Date: 14.MAY.2016 16:01:10

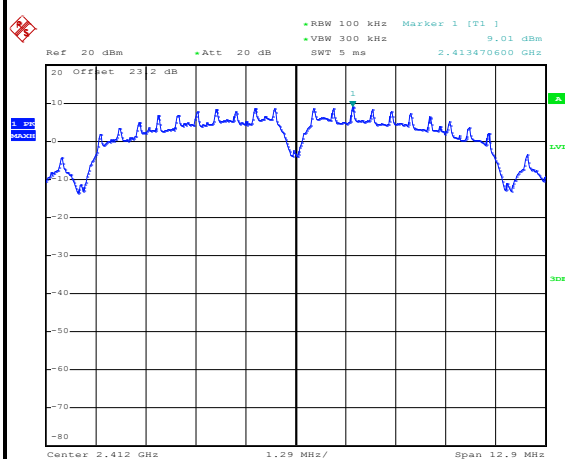


Number of TX = 2, Ant. 2 (Measured)

|                |            |                     |          |
|----------------|------------|---------------------|----------|
| Number of TX : | 2          | Ant. :              | 2        |
| Test Mode :    | 802.11b    | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Low | Relative Humidity : | 51~54%   |
| Test Channel : | 01         | Test Engineer :     | Bill Kuo |

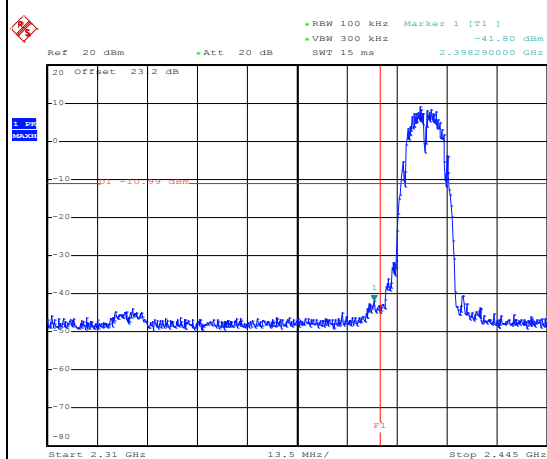
## WLAN 802.11b Channel 01

## 100kHz PSD reference Level



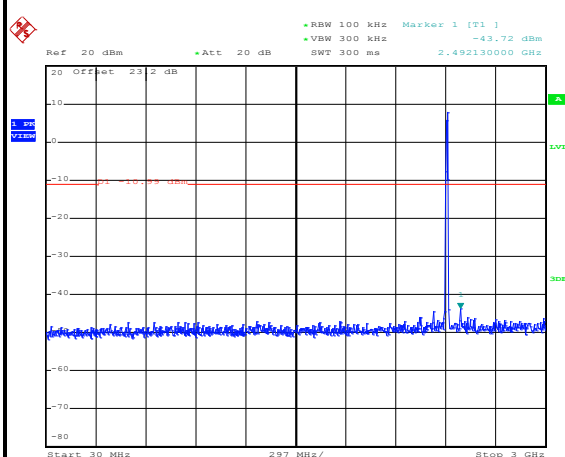
Date: 20.MAY.2016 01:40:14

## Low Channel Plot



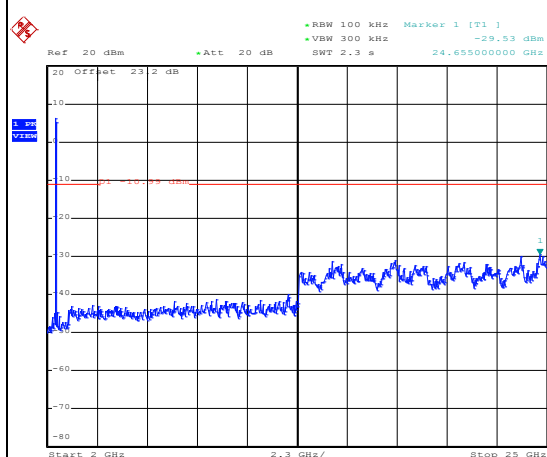
Date: 20.MAY.2016 01:40:35

## Spurious Emission 30MHz~3GHz



Date: 20.MAY.2016 01:40:48

## Spurious Emission 2GHz~25GHz



Date: 20.MAY.2016 01:40:56

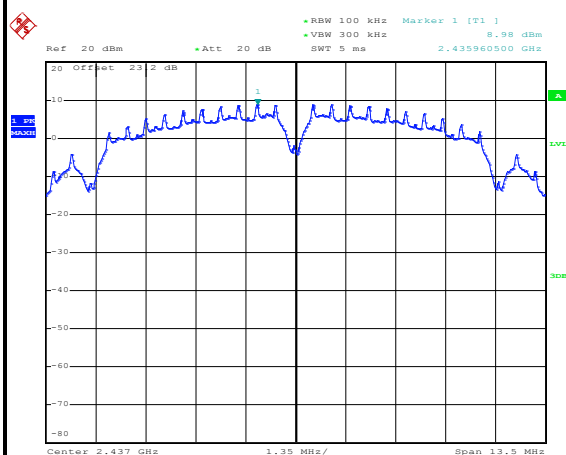


|                |            |                     |          |
|----------------|------------|---------------------|----------|
| Number of TX : | 2          | Ant. :              | 2        |
| Test Mode :    | 802.11b    | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Mid | Relative Humidity : | 51~54%   |
| Test Channel : | 06         | Test Engineer :     | Bill Kuo |

## WLAN 802.11b Channel 06

## 100kHz PSD reference Level

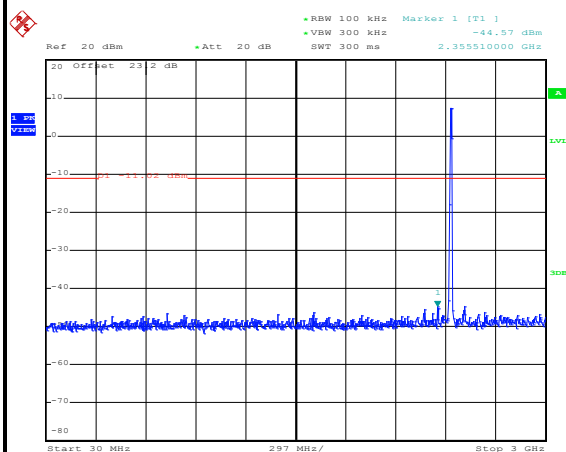
## Mid Channel Plot



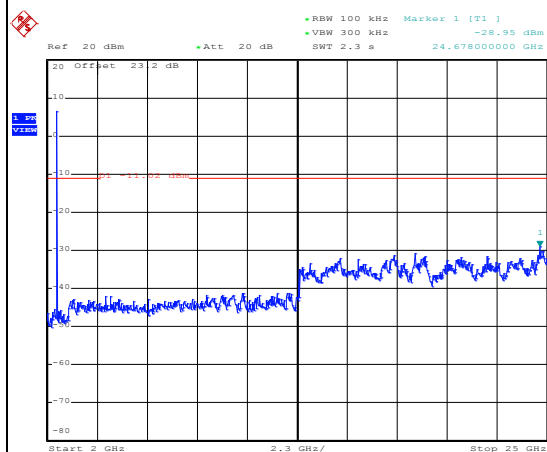
Date: 20.MAY.2016 02:01:16

## Spurious Emission 30MHz~3GHz

## Spurious Emission 2GHz~25GHz



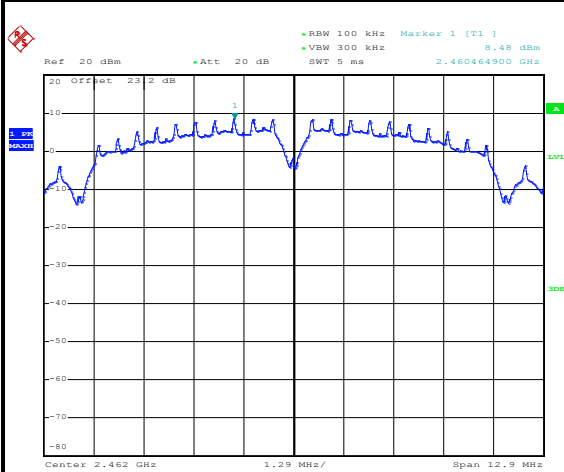
Date: 20.MAY.2016 02:01:33



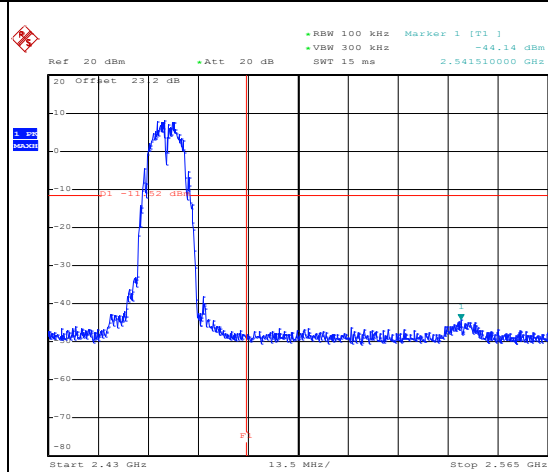
Date: 20.MAY.2016 02:01:41



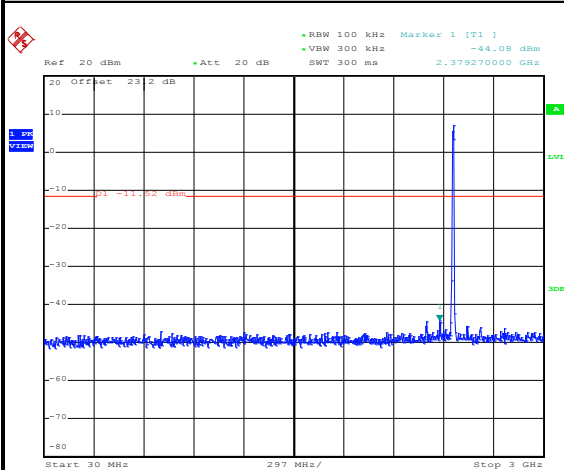
|                |             |                     |          |
|----------------|-------------|---------------------|----------|
| Number of TX : | 2           | Ant. :              | 2        |
| Test Mode :    | 802.11b     | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz High | Relative Humidity : | 51~54%   |
| Test Channel : | 11          | Test Engineer :     | Bill Kuo |

**WLAN 802.11b Channel 11****100kHz PSD reference Level**

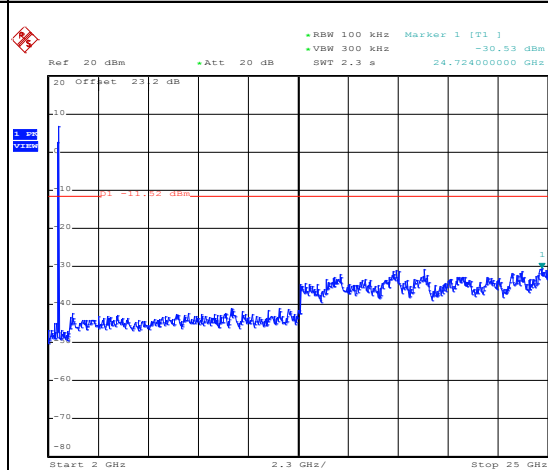
Date: 20.MAY.2016 02:12:37

**High Channel Plot**

Date: 20.MAY.2016 02:12:50

**Spurious Emission 30MHz~3GHz**

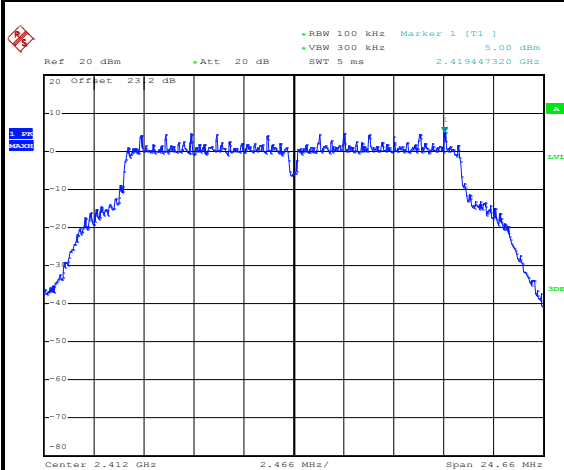
Date: 20.MAY.2016 02:13:03

**Spurious Emission 2GHz~25GHz**

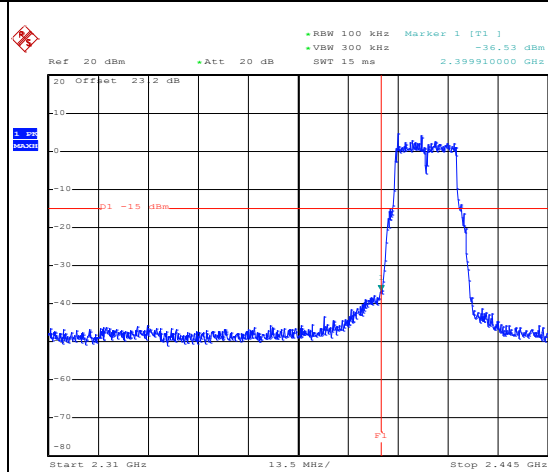
Date: 20.MAY.2016 02:13:11



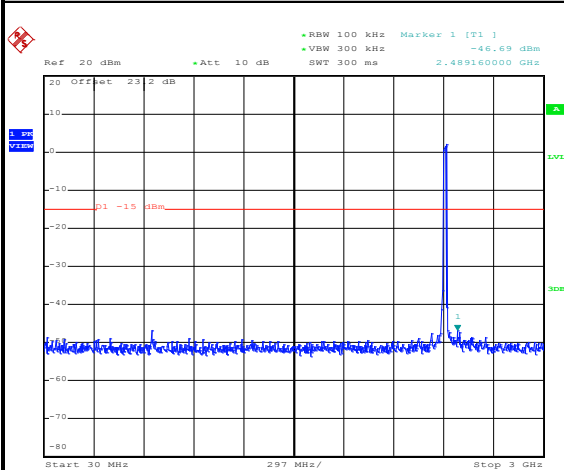
|                |            |                     |          |
|----------------|------------|---------------------|----------|
| Number of TX : | 2          | Ant. :              | 2        |
| Test Mode :    | 802.11g    | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Low | Relative Humidity : | 51~54%   |
| Test Channel : | 01         | Test Engineer :     | Bill Kuo |

**WLAN 802.11g Channel 01****100kHz PSD reference Level**

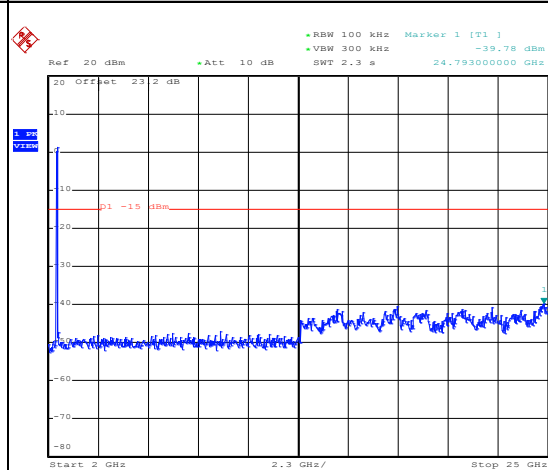
Date: 14.MAY.2016 15:02:24

**Low Channel Plot**

Date: 14.MAY.2016 15:02:34

**Spurious Emission 30MHz~3GHz**

Date: 14.MAY.2016 15:02:46

**Spurious Emission 2GHz~25GHz**

Date: 14.MAY.2016 15:02:54

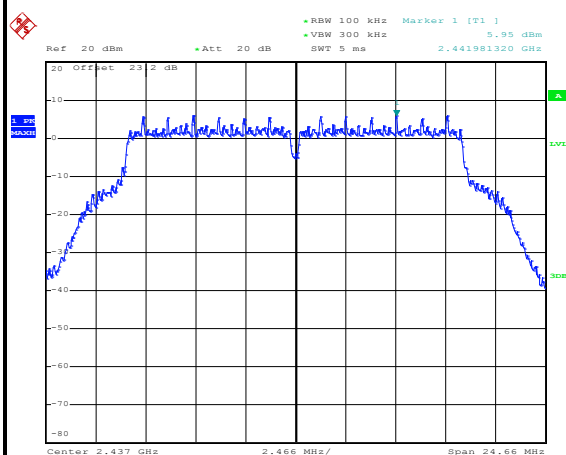


|                |            |                     |          |
|----------------|------------|---------------------|----------|
| Number of TX : | 2          | Ant. :              | 2        |
| Test Mode :    | 802.11g    | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Mid | Relative Humidity : | 51~54%   |
| Test Channel : | 06         | Test Engineer :     | Bill Kuo |

## WLAN 802.11g Channel 06

## 100kHz PSD reference Level

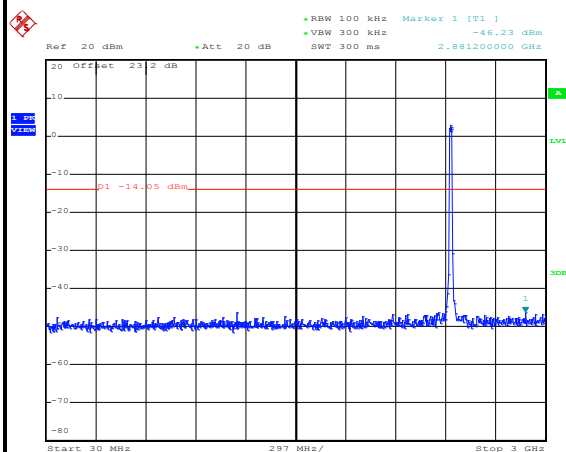
## Mid Channel Plot



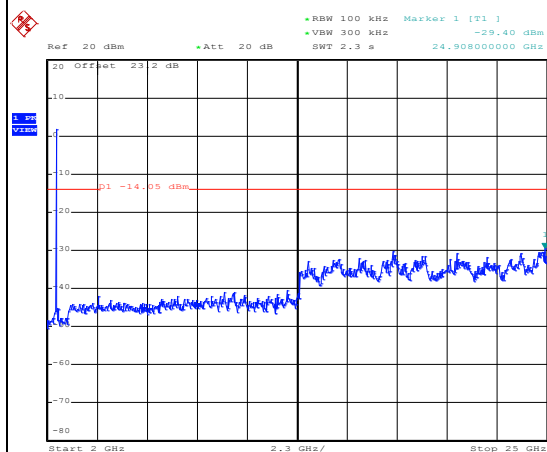
Date: 20.MAY.2016 02:23:27

## Spurious Emission 30MHz~3GHz

## Spurious Emission 2GHz~25GHz



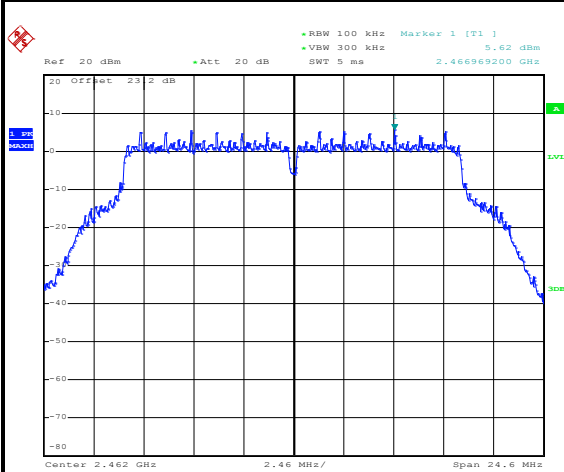
Date: 20.MAY.2016 02:23:52



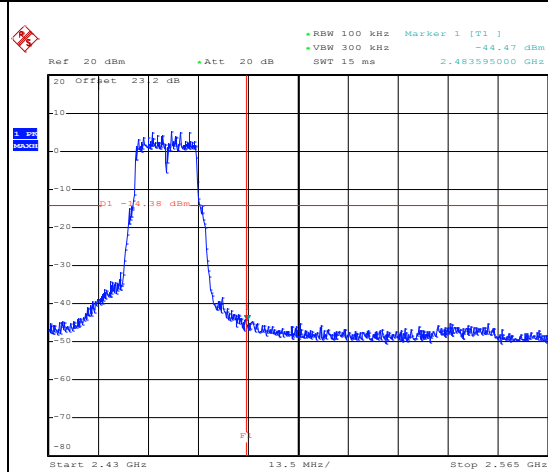
Date: 20.MAY.2016 02:24:00



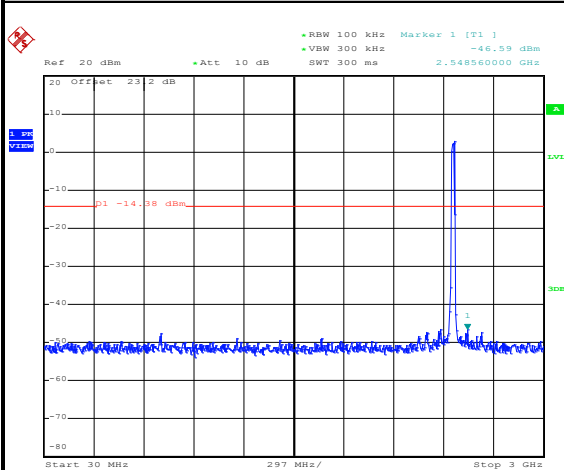
|                |             |                     |          |
|----------------|-------------|---------------------|----------|
| Number of TX : | 2           | Ant. :              | 2        |
| Test Mode :    | 802.11g     | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz High | Relative Humidity : | 51~54%   |
| Test Channel : | 11          | Test Engineer :     | Bill Kuo |

**WLAN 802.11g Channel 11****100kHz PSD reference Level**

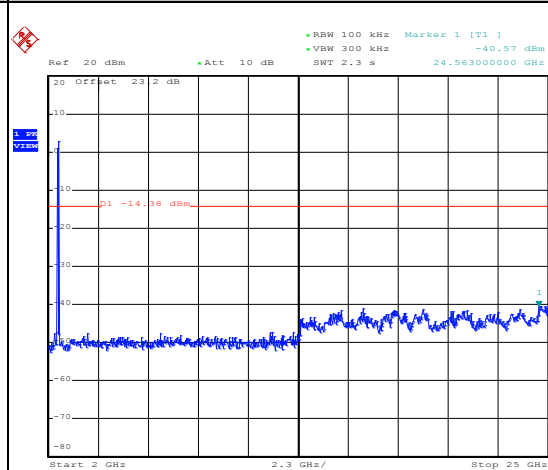
Date: 14.MAY.2016 15:14:06

**High Channel Plot**

Date: 14.MAY.2016 15:14:18

**Spurious Emission 30MHz~3GHz**

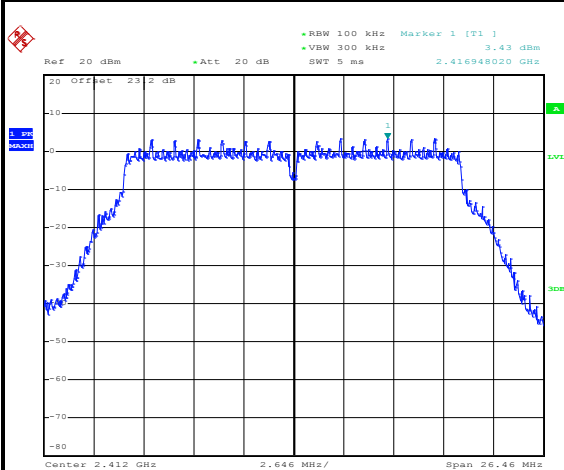
Date: 14.MAY.2016 15:14:29

**Spurious Emission 2GHz~25GHz**

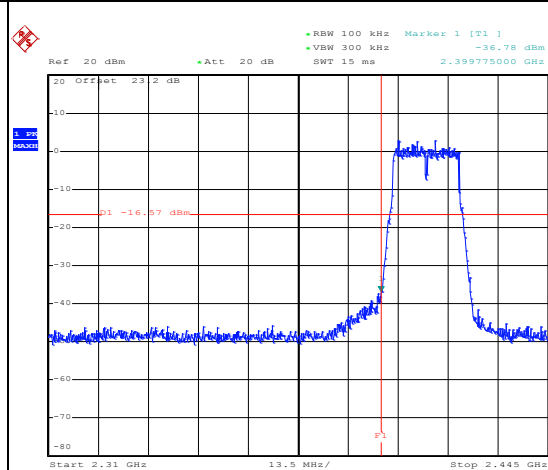
Date: 14.MAY.2016 15:14:37



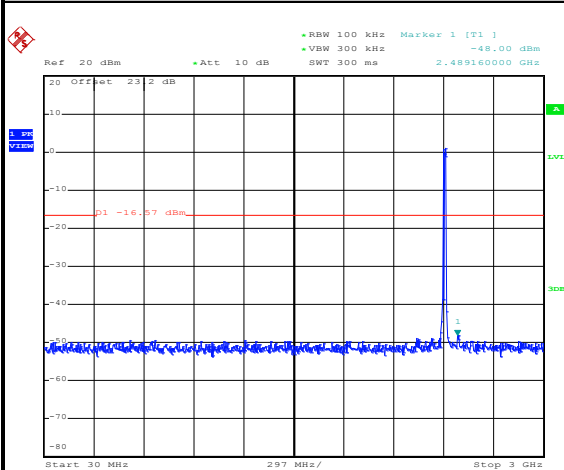
|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 2        |
| Test Mode :    | 802.11n HT20 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Low   | Relative Humidity : | 51~54%   |
| Test Channel : | 01           | Test Engineer :     | Bill Kuo |

**WLAN 802.11n HT20 Channel 01****100kHz PSD reference Level**

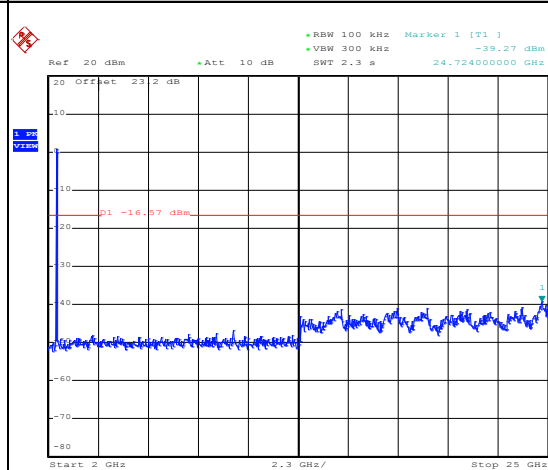
Date: 14.MAY.2016 15:27:33

**Low Channel Plot**

Date: 14.MAY.2016 15:27:44

**Spurious Emission 30MHz~3GHz**

Date: 14.MAY.2016 15:27:55

**Spurious Emission 2GHz~25GHz**

Date: 14.MAY.2016 15:28:03

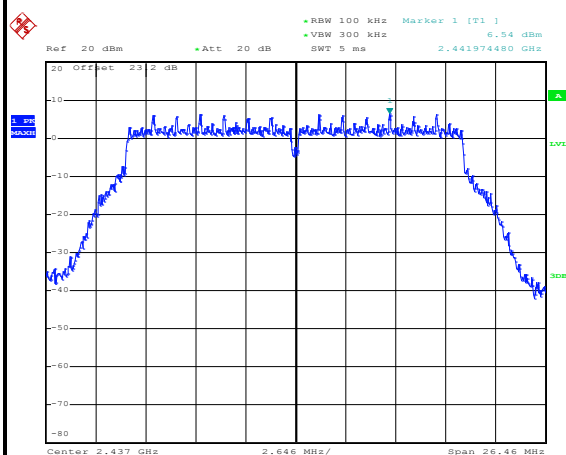


|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 2        |
| Test Mode :    | 802.11n HT20 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Mid   | Relative Humidity : | 51~54%   |
| Test Channel : | 06           | Test Engineer :     | Bill Kuo |

## WLAN 802.11n HT20 Channel 06

## 100kHz PSD reference Level

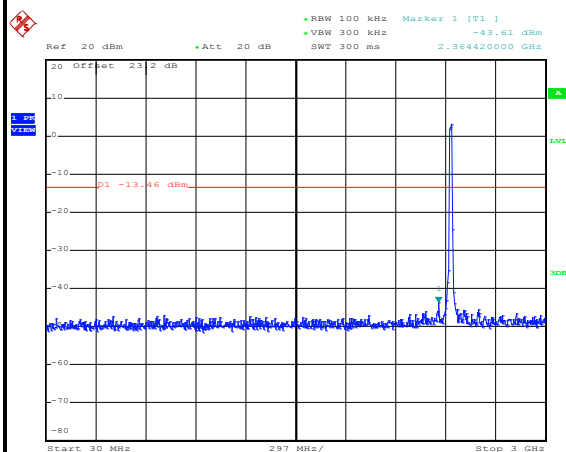
## Mid Channel Plot



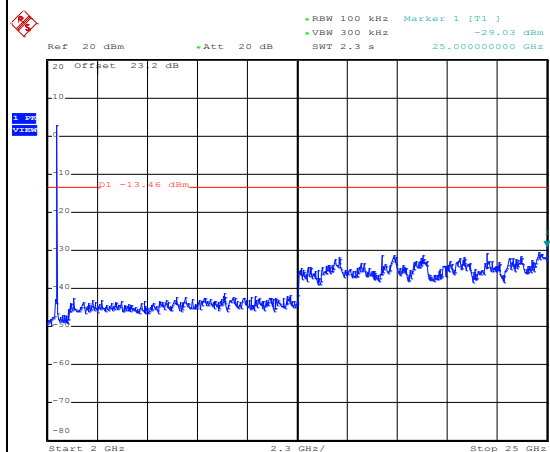
Date: 20.MAY.2016 02:34:24

## Spurious Emission 30MHz~3GHz

## Spurious Emission 2GHz~25GHz



Date: 20.MAY.2016 02:34:46



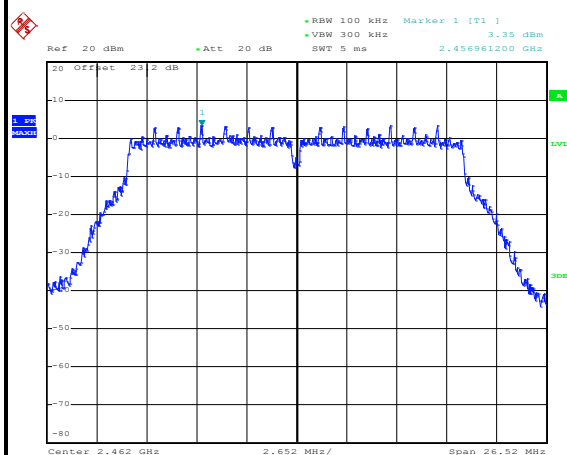
Date: 20.MAY.2016 02:34:55



|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 2        |
| Test Mode :    | 802.11n HT20 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz High  | Relative Humidity : | 51~54%   |
| Test Channel : | 11           | Test Engineer :     | Bill Kuo |

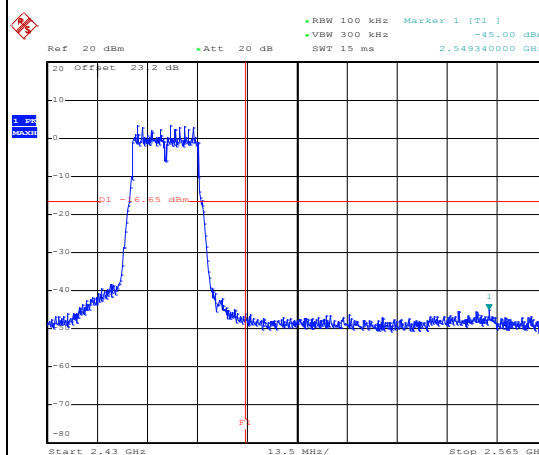
## WLAN 802.11n HT20 Channel 11

## 100kHz PSD reference Level



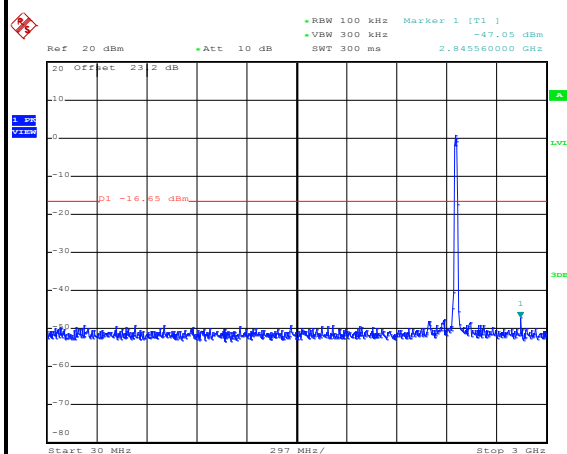
Date: 14.MAY.2016 15:36:30

## High Channel Plot



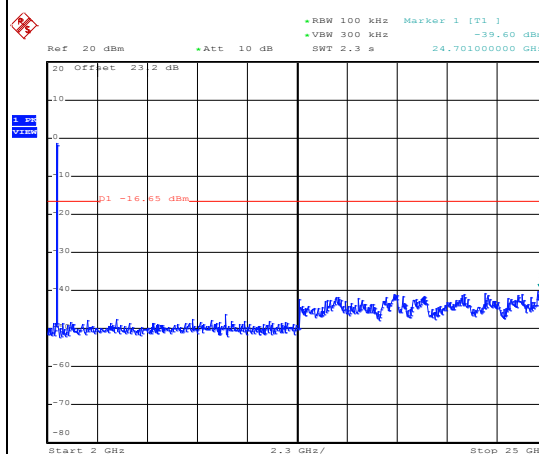
Date: 14.MAY.2016 15:36:42

## Spurious Emission 30MHz~3GHz



Date: 14.MAY.2016 15:36:55

## Spurious Emission 2GHz~25GHz



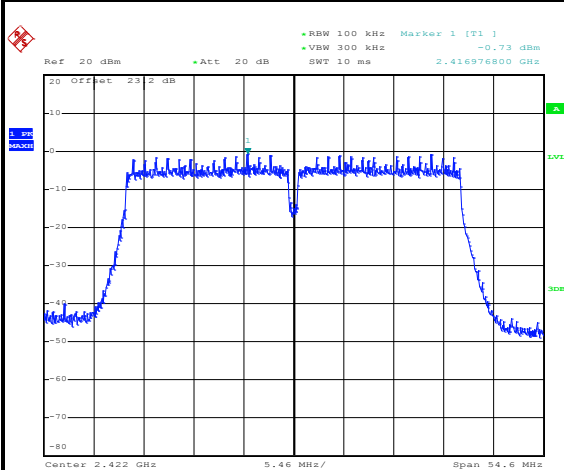
Date: 14.MAY.2016 15:37:03



|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 2        |
| Test Mode :    | 802.11n HT40 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Low   | Relative Humidity : | 51~54%   |
| Test Channel : | 03           | Test Engineer :     | Bill Kuo |

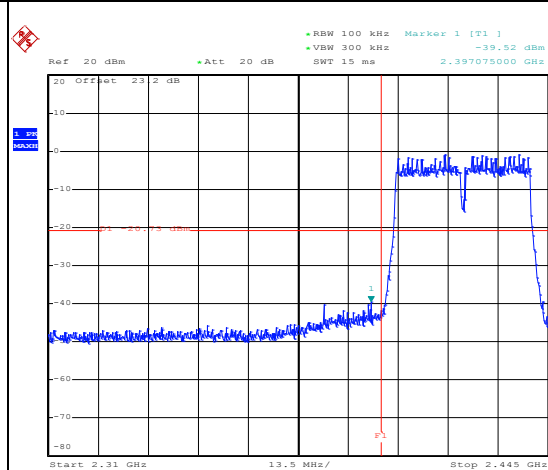
## WLAN 802.11n HT40 Channel 03

## 100kHz PSD reference Level



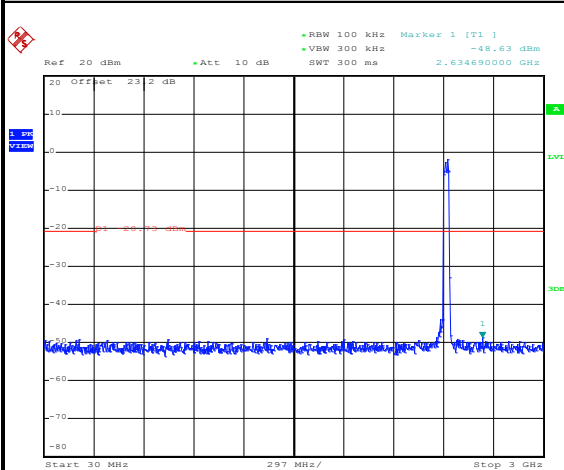
Date: 14.MAY.2016 15:39:38

## Low Channel Plot



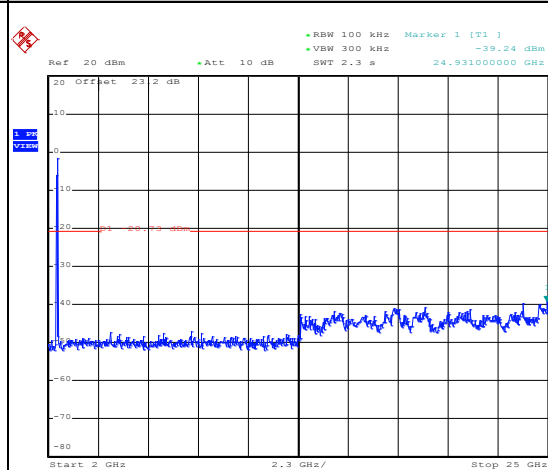
Date: 14.MAY.2016 15:39:50

## Spurious Emission 30MHz~3GHz



Date: 14.MAY.2016 15:41:41

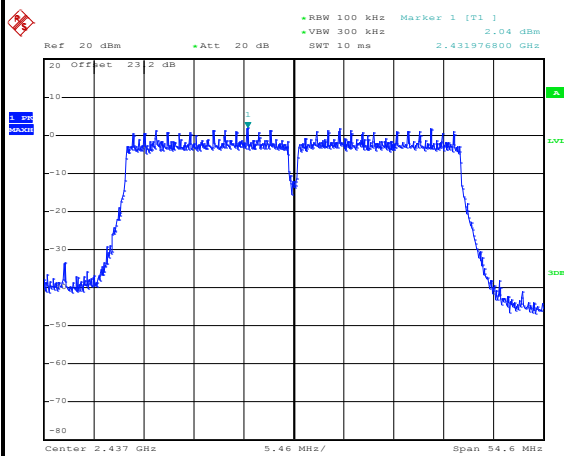
## Spurious Emission 2GHz~25GHz



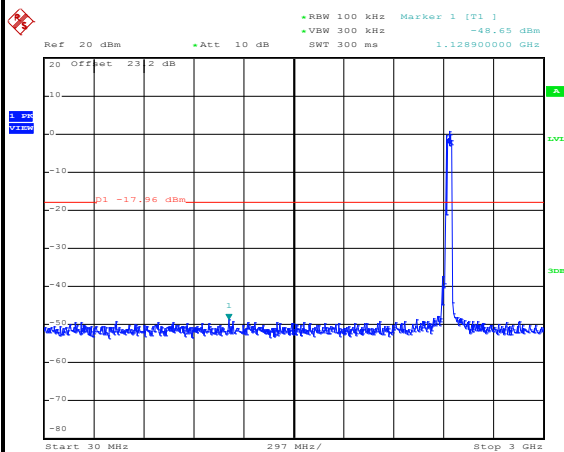
Date: 14.MAY.2016 15:41:50



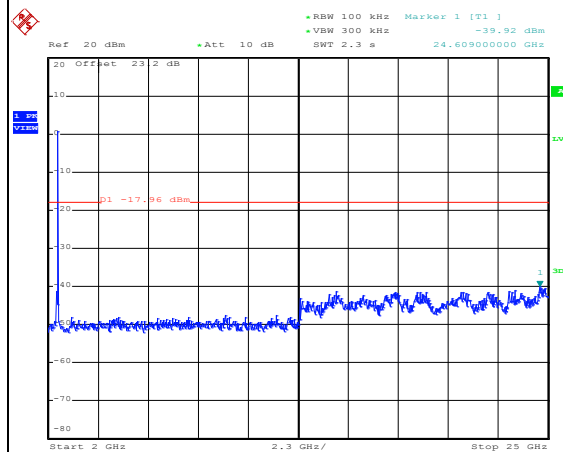
|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 2        |
| Test Mode :    | 802.11n HT40 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Mid   | Relative Humidity : | 51~54%   |
| Test Channel : | 06           | Test Engineer :     | Bill Kuo |

**WLAN 802.11n HT40 Channel 06****100kHz PSD reference Level****Mid Channel Plot**

Date: 14.MAY.2016 15:54:22

**Spurious Emission 30MHz~3GHz****Spurious Emission 2GHz~25GHz**

Date: 14.MAY.2016 15:54:33



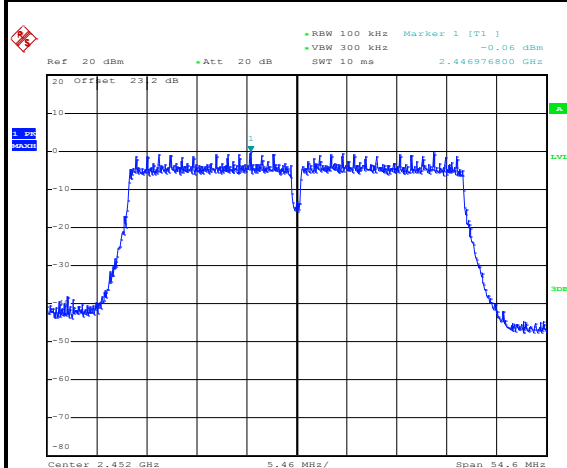
Date: 14.MAY.2016 15:54:42



|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 2        |
| Test Mode :    | 802.11n HT40 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz High  | Relative Humidity : | 51~54%   |
| Test Channel : | 09           | Test Engineer :     | Bill Kuo |

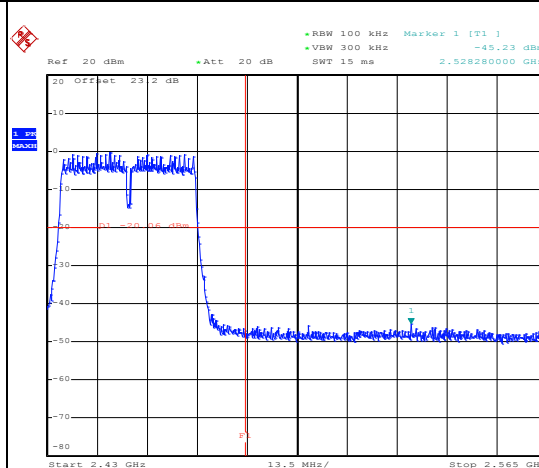
## WLAN 802.11n HT40 Channel 09

## 100kHz PSD reference Level



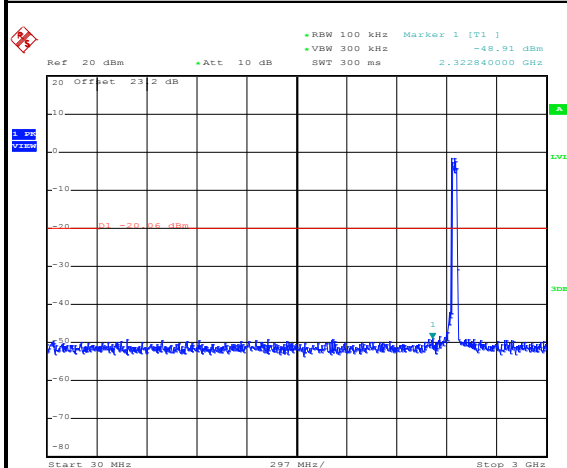
Date: 14.MAY.2016 15:57:16

## High Channel Plot



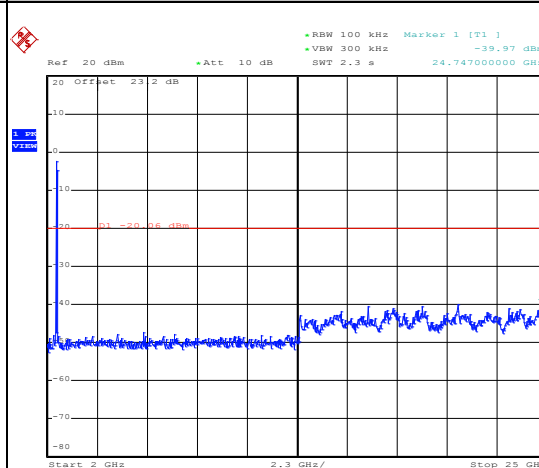
Date: 14.MAY.2016 15:57:30

## Spurious Emission 30MHz~3GHz



Date: 14.MAY.2016 15:58:28

## Spurious Emission 2GHz~25GHz



Date: 14.MAY.2016 15:58:36



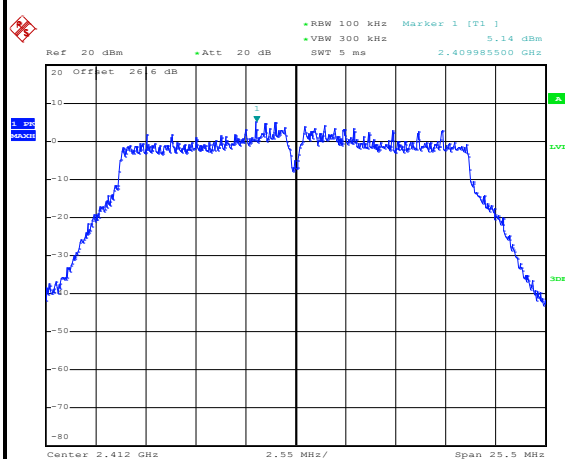
## &lt;TXBF Modes&gt;

Number of TX = 2, Ant. 1 (Measured)

|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 1        |
| Test Mode :    | 802.11n HT20 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Low   | Relative Humidity : | 51~54%   |
| Test Channel : | 01           | Test Engineer :     | Bill Kuo |

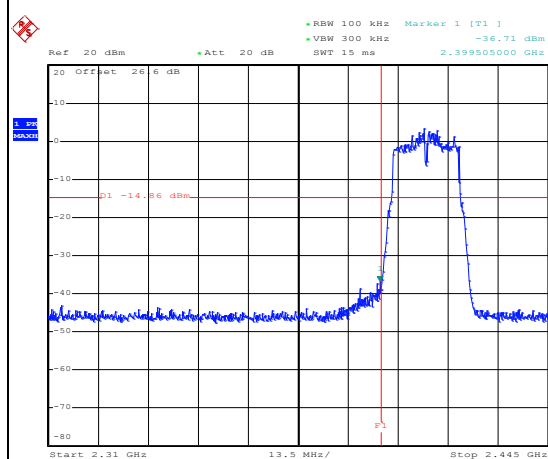
## WLAN 802.11n HT20 Channel 01

## 100kHz PSD reference Level



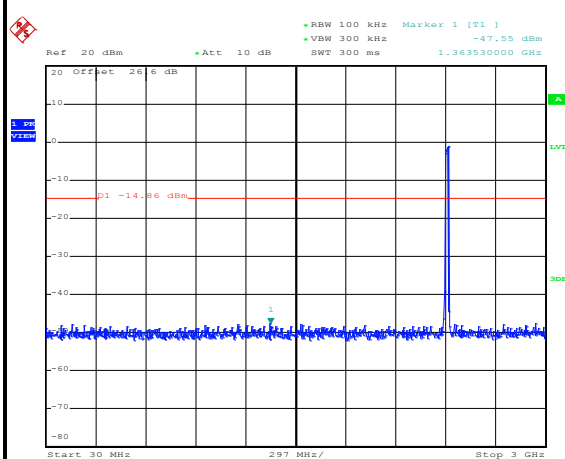
Date: 13.JUL.2016 20:43:59

## Low Channel Plot



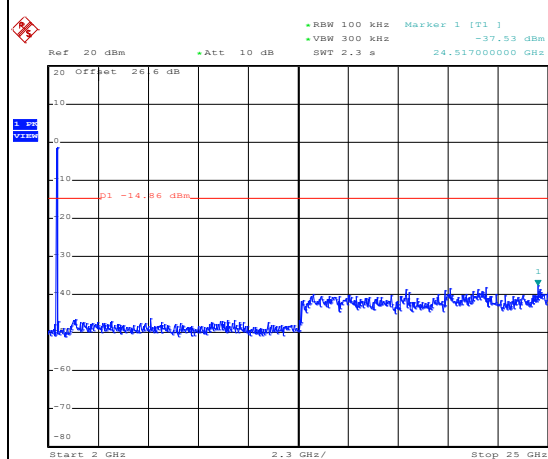
Date: 13.JUL.2016 20:44:36

## Spurious Emission 30MHz~3GHz



Date: 13.JUL.2016 20:44:48

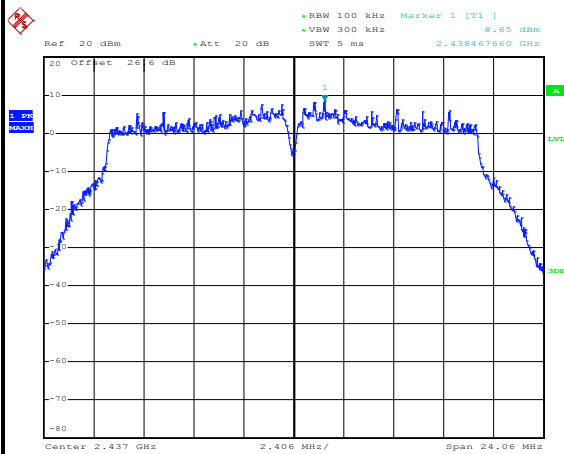
## Spurious Emission 2GHz~25GHz



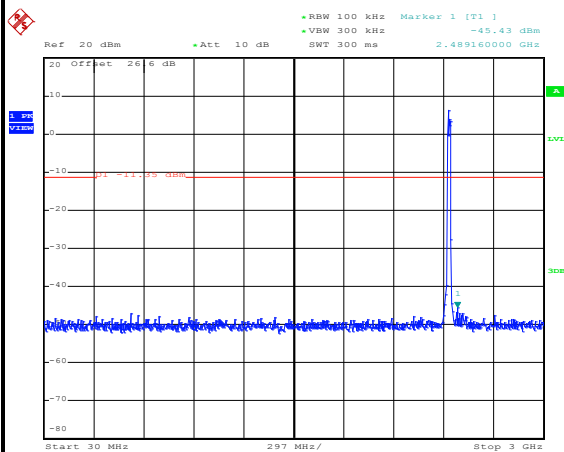
Date: 13.JUL.2016 20:45:11



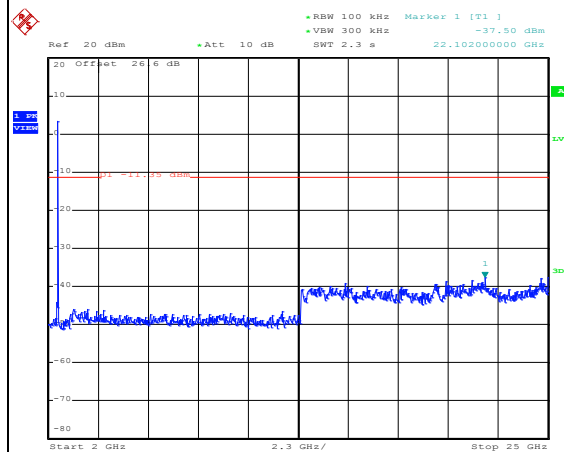
|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 1        |
| Test Mode :    | 802.11n HT20 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Mid   | Relative Humidity : | 51~54%   |
| Test Channel : | 06           | Test Engineer :     | Bill Kuo |

**WLAN 802.11n HT20 Channel 06****100kHz PSD reference Level****Mid Channel Plot**

Date: 13.JUL.2016 20:49:22

**Spurious Emission 30MHz~3GHz****Spurious Emission 2GHz~25GHz**

Date: 13.JUL.2016 20:49:33



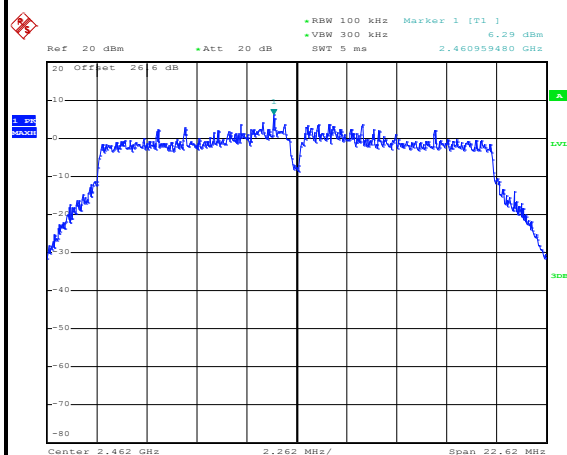
Date: 13.JUL.2016 20:49:41



|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 1        |
| Test Mode :    | 802.11n HT20 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz High  | Relative Humidity : | 51~54%   |
| Test Channel : | 11           | Test Engineer :     | Bill Kuo |

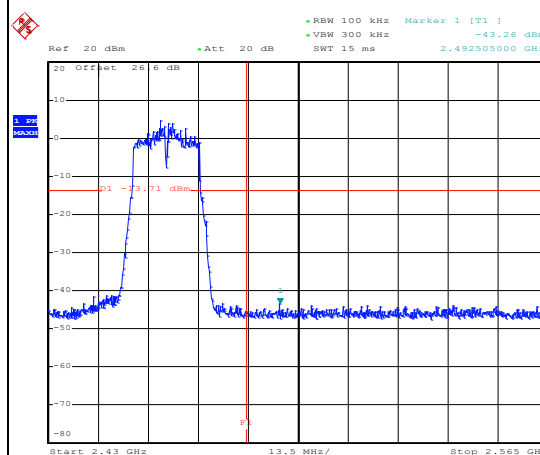
## WLAN 802.11n HT20 Channel 11

## 100kHz PSD reference Level



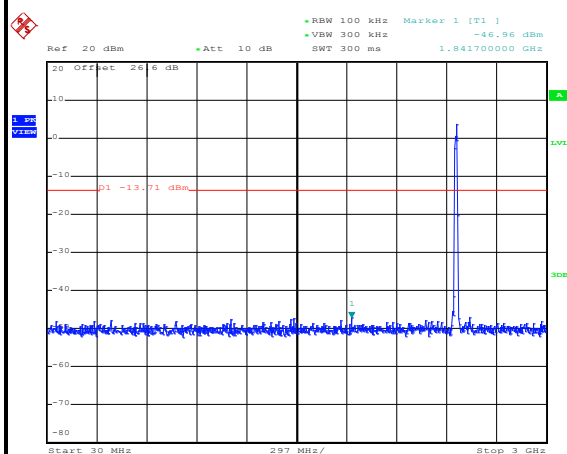
Date: 13.JUL.2016 21:12:29

## High Channel Plot



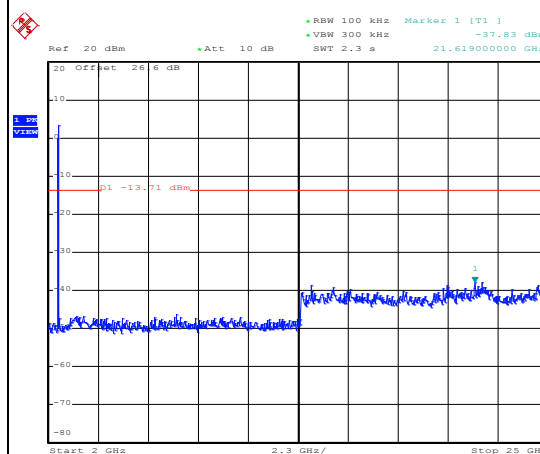
Date: 13.JUL.2016 21:12:58

## Spurious Emission 30MHz~3GHz



Date: 13.JUL.2016 21:13:13

## Spurious Emission 2GHz~25GHz



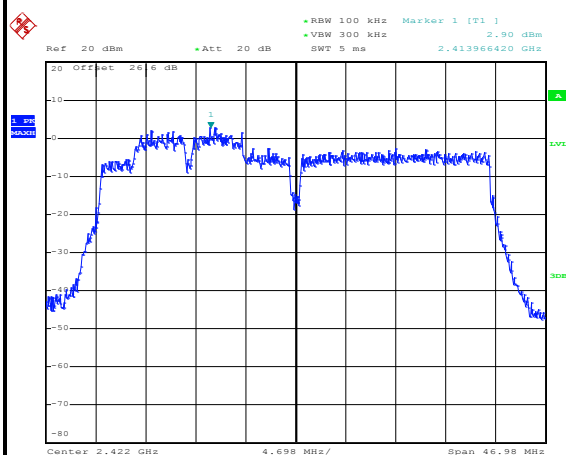
Date: 13.JUL.2016 21:13:36



|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 1        |
| Test Mode :    | 802.11n HT40 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Low   | Relative Humidity : | 51~54%   |
| Test Channel : | 03           | Test Engineer :     | Bill Kuo |

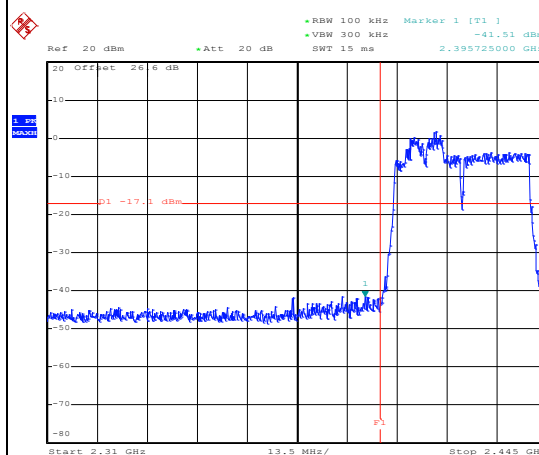
## WLAN 802.11n HT40 Channel 03

## 100kHz PSD reference Level



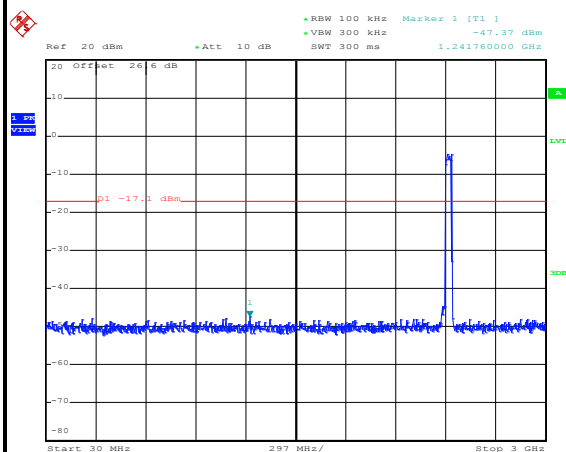
Date: 13.JUL.2016 20:06:34

## Low Channel Plot



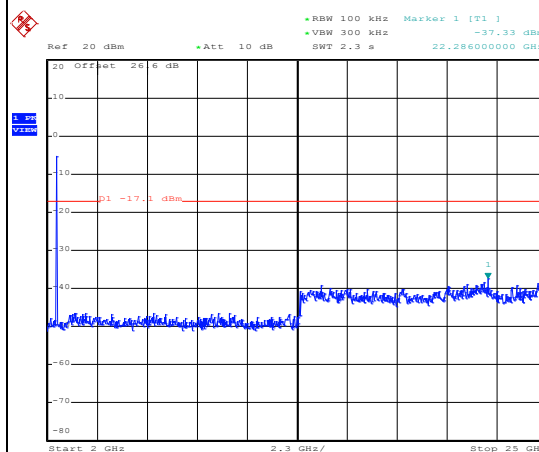
Date: 13.JUL.2016 20:06:49

## Spurious Emission 30MHz~3GHz



Date: 13.JUL.2016 20:07:04

## Spurious Emission 2GHz~25GHz



Date: 13.JUL.2016 20:07:13

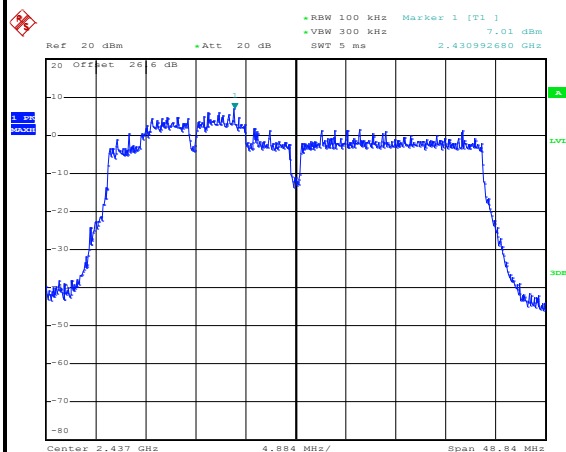


|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 1        |
| Test Mode :    | 802.11n HT40 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Mid   | Relative Humidity : | 51~54%   |
| Test Channel : | 06           | Test Engineer :     | Bill Kuo |

## WLAN 802.11n HT40 Channel 06

## 100kHz PSD reference Level

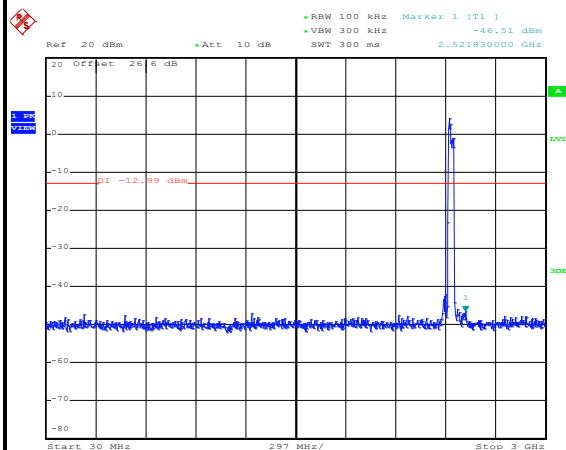
## Mid Channel Plot



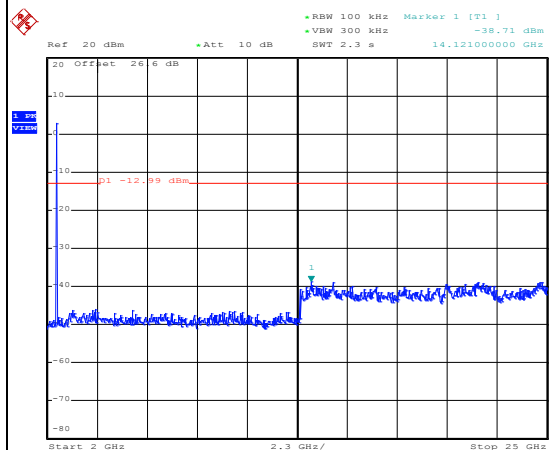
Date: 13.JUL.2016 20:24:03

## Spurious Emission 30MHz~3GHz

## Spurious Emission 2GHz~25GHz



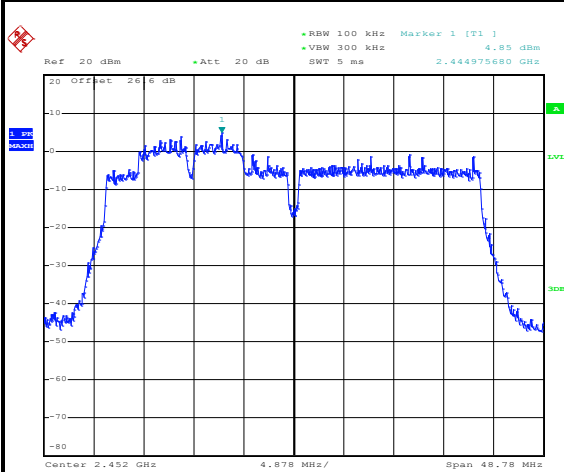
Date: 13.JUL.2016 20:25:09



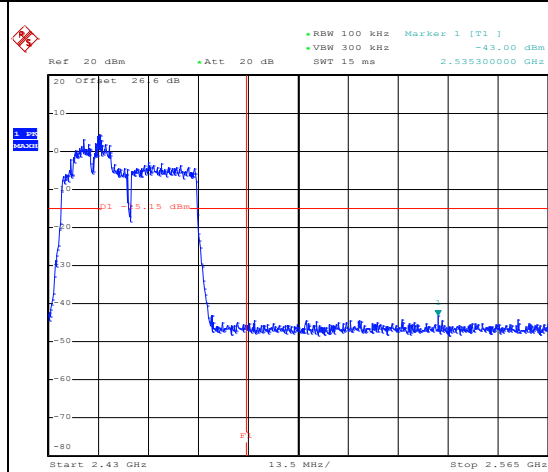
Date: 13.JUL.2016 20:24:35



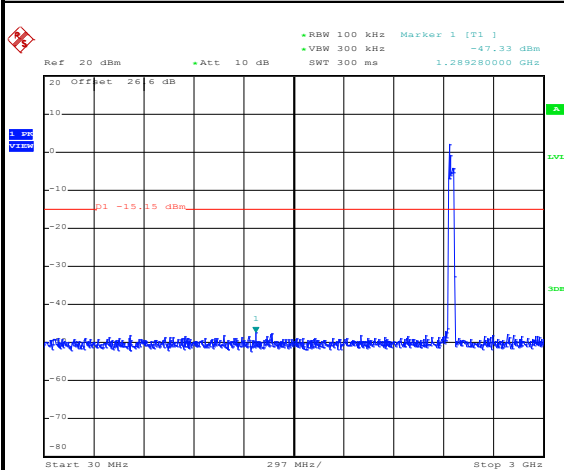
|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 1        |
| Test Mode :    | 802.11n HT40 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz High  | Relative Humidity : | 51~54%   |
| Test Channel : | 09           | Test Engineer :     | Bill Kuo |

**WLAN 802.11n HT40 Channel 09****100kHz PSD reference Level**

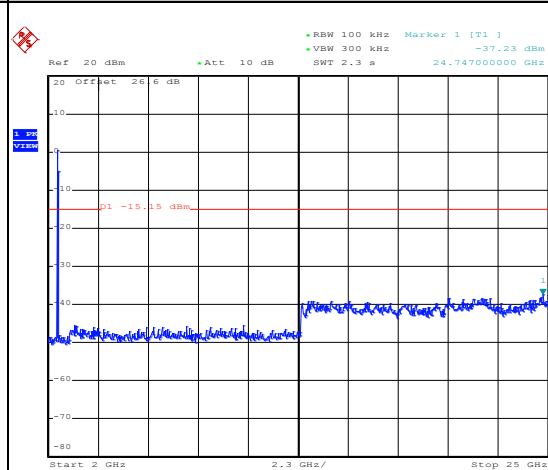
Date: 13.JUL.2016 20:29:00

**High Channel Plot**

Date: 13.JUL.2016 20:29:23

**Spurious Emission 30MHz~3GHz**

Date: 13.JUL.2016 20:29:37

**Spurious Emission 2GHz~25GHz**

Date: 13.JUL.2016 20:30:30

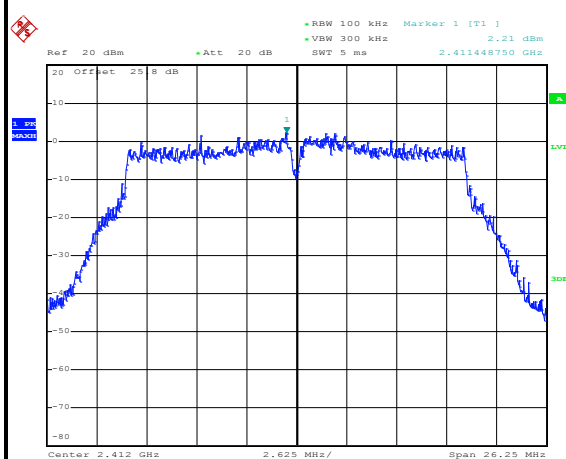


Number of TX = 2, Ant. 2 (Measured)

|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 2        |
| Test Mode :    | 802.11n HT20 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Low   | Relative Humidity : | 51~54%   |
| Test Channel : | 01           | Test Engineer :     | Bill Kuo |

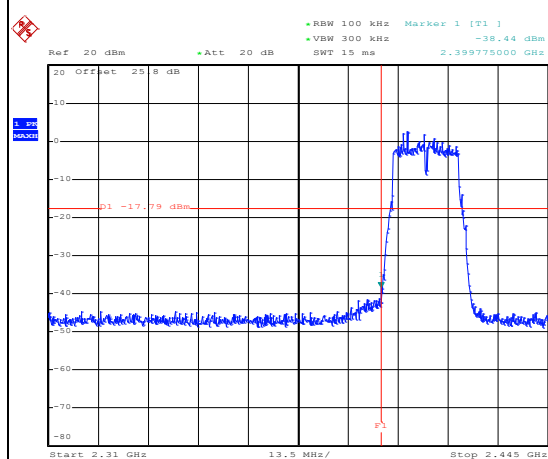
## WLAN 802.11n HT20 Channel 01

## 100kHz PSD reference Level



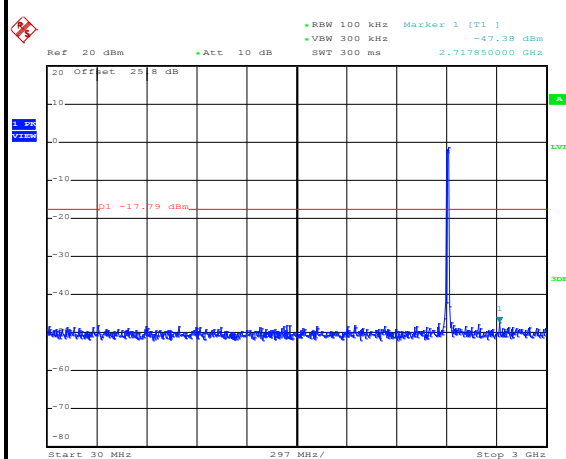
Date: 13.JUL.2016 20:38:51

## Low Channel Plot



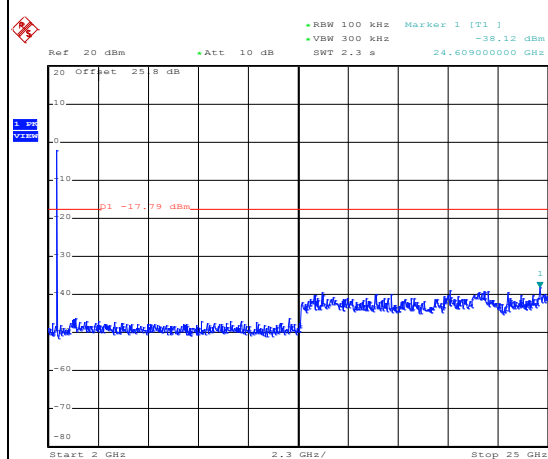
Date: 13.JUL.2016 20:39:06

## Spurious Emission 30MHz~3GHz



Date: 13.JUL.2016 20:39:19

## Spurious Emission 2GHz~25GHz



Date: 13.JUL.2016 20:39:27

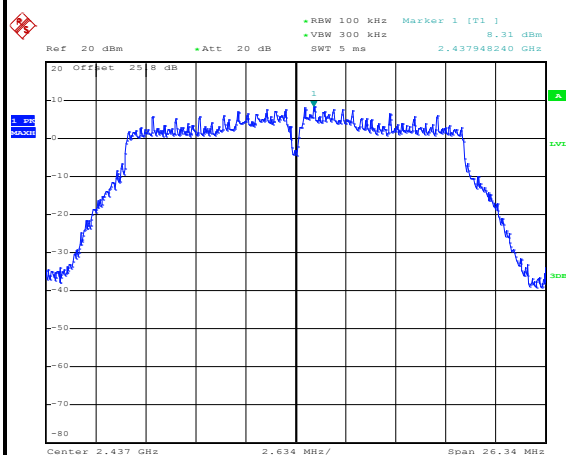


|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 2        |
| Test Mode :    | 802.11n HT20 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Mid   | Relative Humidity : | 51~54%   |
| Test Channel : | 06           | Test Engineer :     | Bill Kuo |

## WLAN 802.11n HT20 Channel 06

## 100kHz PSD reference Level

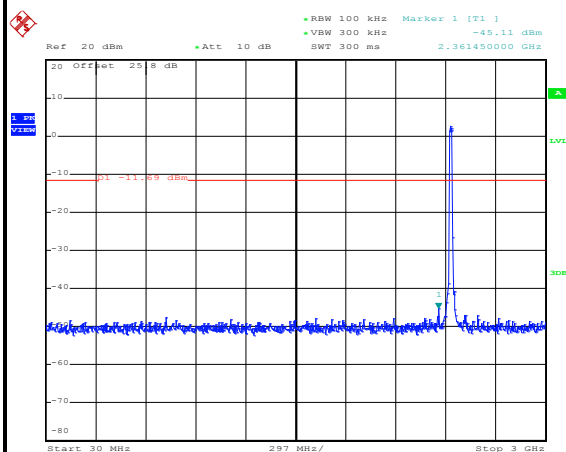
## Mid Channel Plot



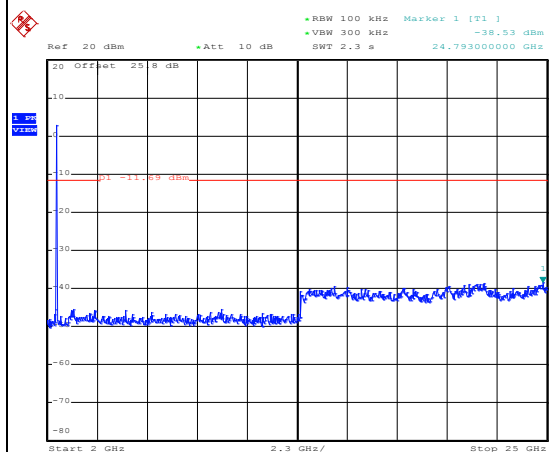
Date: 13.JUL.2016 20:58:08

## Spurious Emission 30MHz~3GHz

## Spurious Emission 2GHz~25GHz



Date: 13.JUL.2016 20:58:36



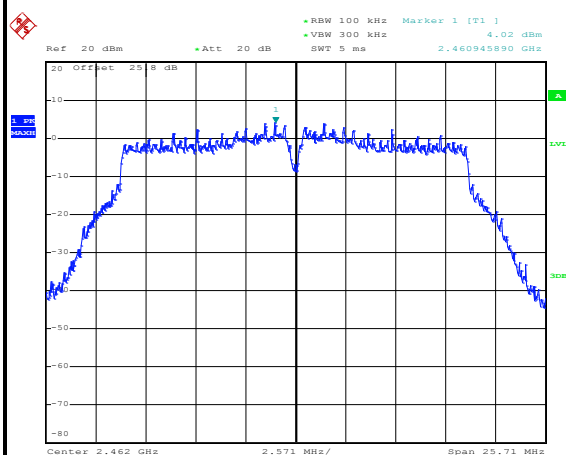
Date: 13.JUL.2016 21:00:02



|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 2        |
| Test Mode :    | 802.11n HT20 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz High  | Relative Humidity : | 51~54%   |
| Test Channel : | 11           | Test Engineer :     | Bill Kuo |

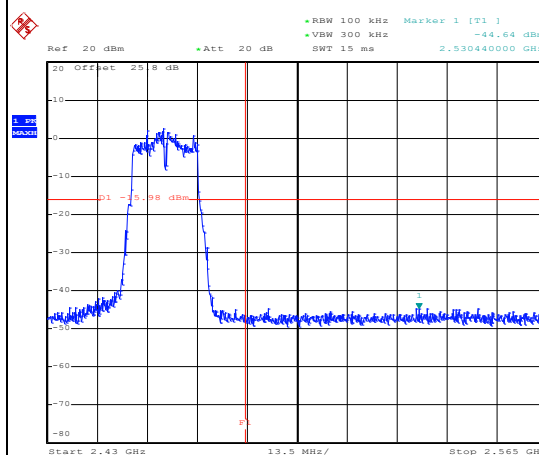
## WLAN 802.11n HT20 Channel 11

## 100kHz PSD reference Level



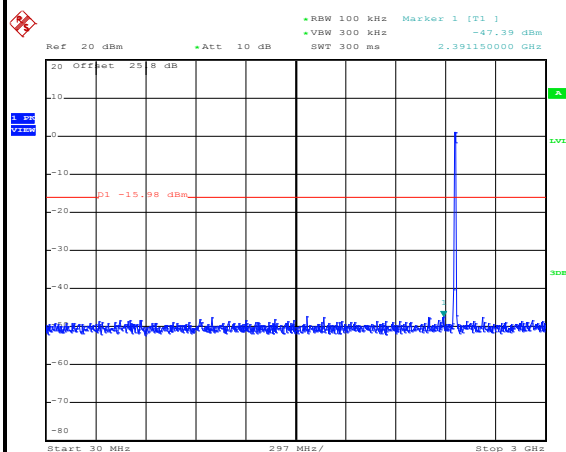
Date: 13.JUL.2016 21:05:00

## High Channel Plot



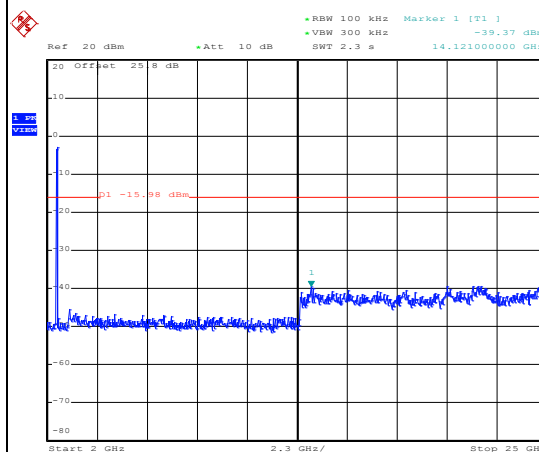
Date: 13.JUL.2016 21:06:26

## Spurious Emission 30MHz~3GHz



Date: 13.JUL.2016 21:06:38

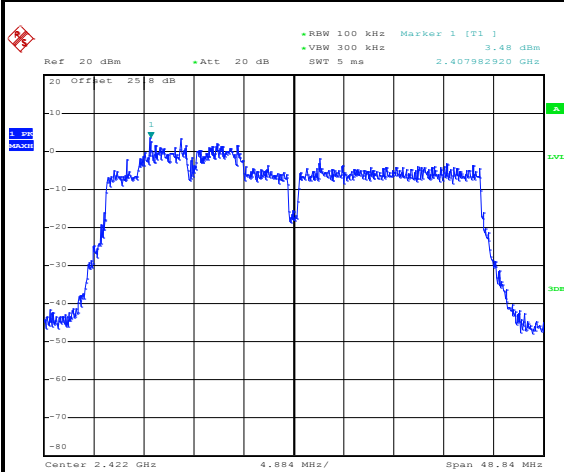
## Spurious Emission 2GHz~25GHz



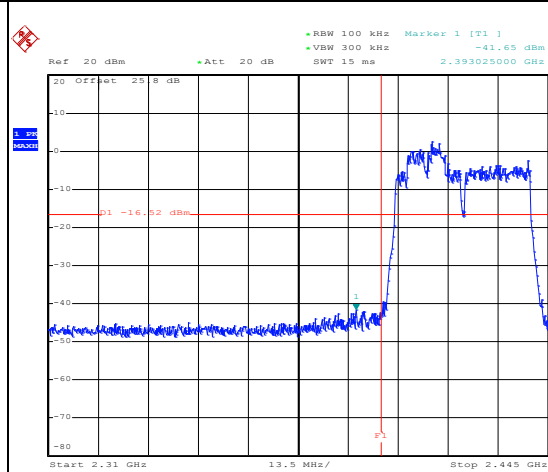
Date: 13.JUL.2016 21:06:47



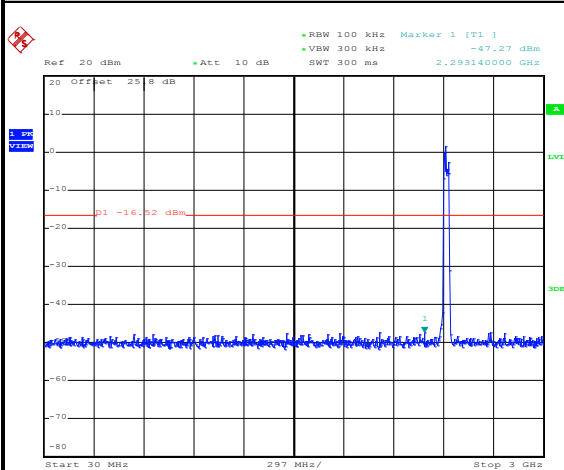
|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 2        |
| Test Mode :    | 802.11n HT40 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Low   | Relative Humidity : | 51~54%   |
| Test Channel : | 03           | Test Engineer :     | Bill Kuo |

**WLAN 802.11n HT40 Channel 03****100kHz PSD reference Level**

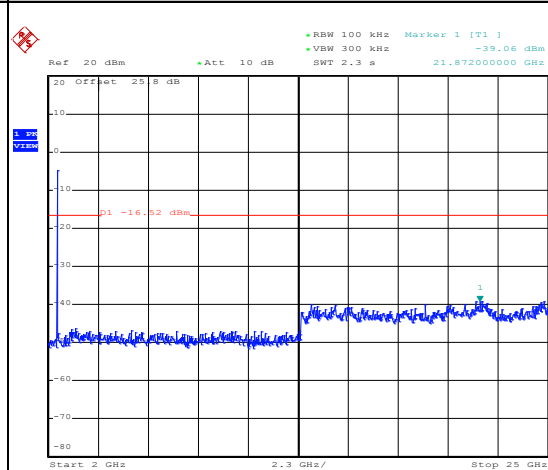
Date: 13.JUL.2016 20:12:04

**Low Channel Plot**

Date: 13.JUL.2016 20:12:21

**Spurious Emission 30MHz~3GHz**

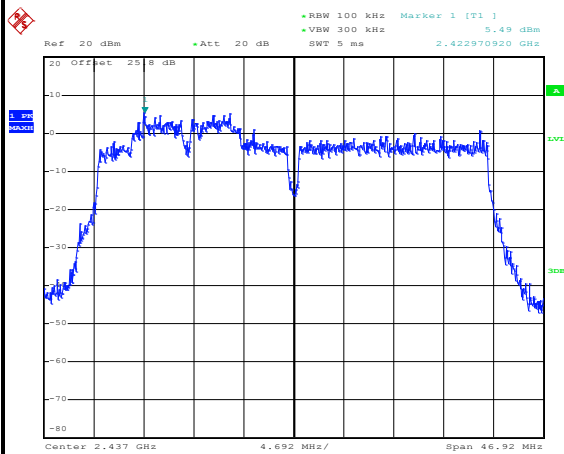
Date: 13.JUL.2016 20:13:31

**Spurious Emission 2GHz~25GHz**

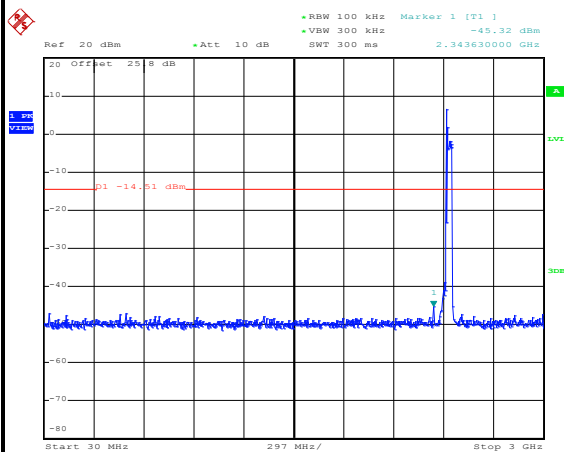
Date: 13.JUL.2016 20:13:02



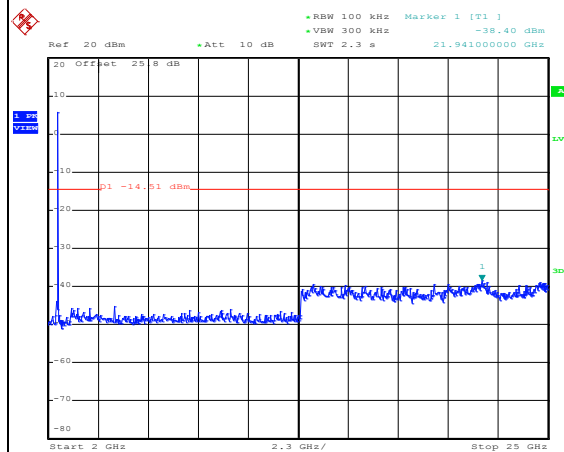
|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 2        |
| Test Mode :    | 802.11n HT40 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz Mid   | Relative Humidity : | 51~54%   |
| Test Channel : | 06           | Test Engineer :     | Bill Kuo |

**WLAN 802.11n HT40 Channel 06****100kHz PSD reference Level****Mid Channel Plot**

Date: 13.JUL.2016 20:17:45

**Spurious Emission 30MHz~3GHz****Spurious Emission 2GHz~25GHz**

Date: 13.JUL.2016 20:19:32



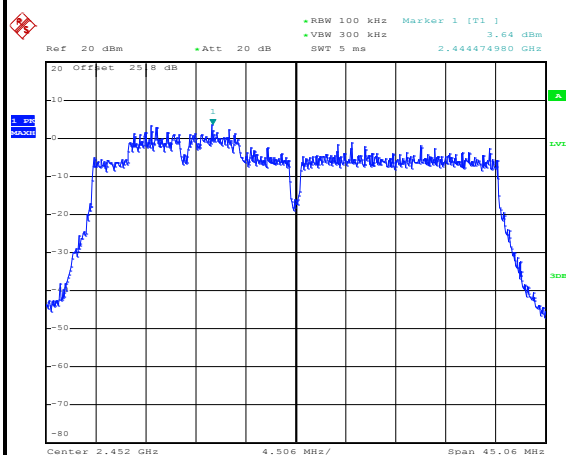
Date: 13.JUL.2016 20:18:43



|                |              |                     |          |
|----------------|--------------|---------------------|----------|
| Number of TX : | 2            | Ant. :              | 2        |
| Test Mode :    | 802.11n HT40 | Temperature :       | 21~25°C  |
| Test Band :    | 2.4GHz High  | Relative Humidity : | 51~54%   |
| Test Channel : | 09           | Test Engineer :     | Bill Kuo |

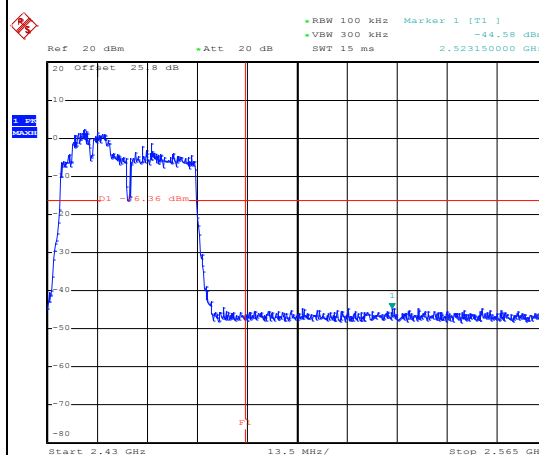
## WLAN 802.11n HT40 Channel 09

## 100kHz PSD reference Level



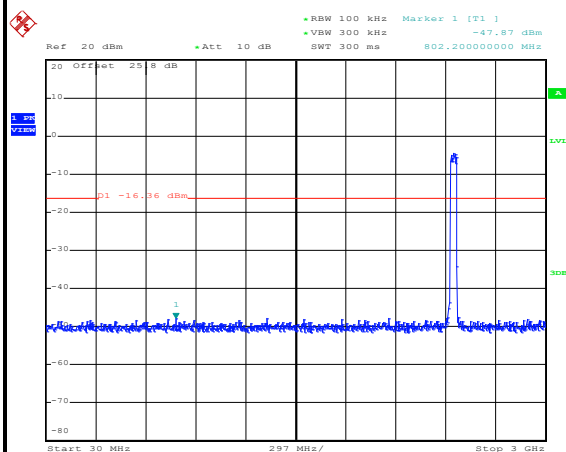
Date: 13.JUL.2016 20:34:13

## High Channel Plot



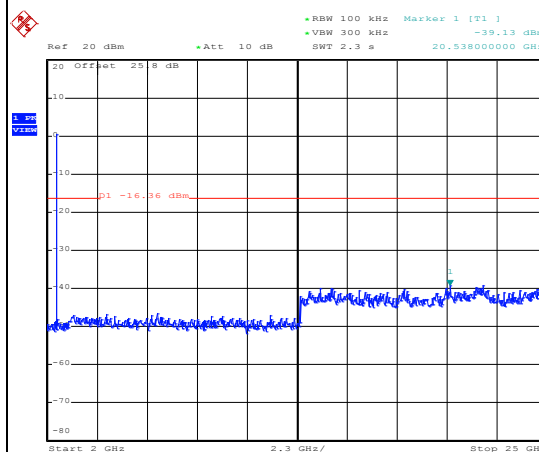
Date: 13.JUL.2016 20:34:38

## Spurious Emission 30MHz~3GHz



Date: 13.JUL.2016 20:35:30

## Spurious Emission 2GHz~25GHz



Date: 13.JUL.2016 20:35:00



### **3.5 Radiated Band Edges and Spurious Emission Measurement**

#### **3.5.1 Limit of Radiated band edge and Spurious Emission Measurement**

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

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

#### **3.5.2 Measuring Instruments**

The measuring equipment is listed in the section 4 of this test report.



### 3.5.3 Test Procedure

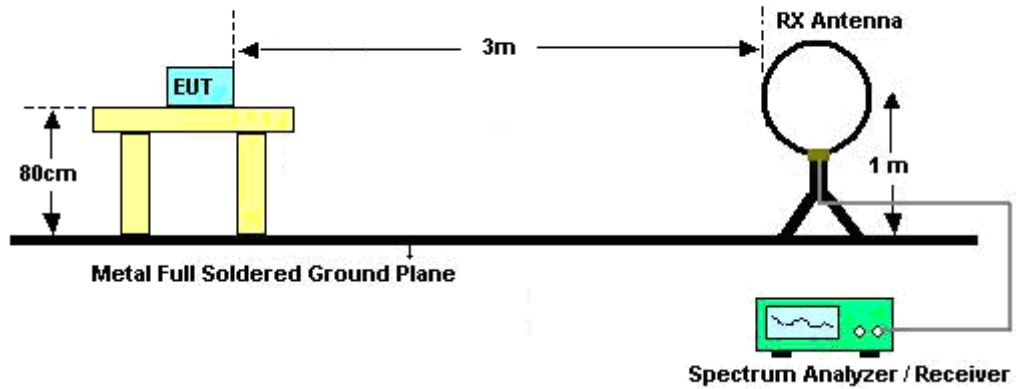
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for  $f < 1$  GHz; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW= 3MHz for  $f \geq 1$  GHz for peak measurement.

For average measurement:

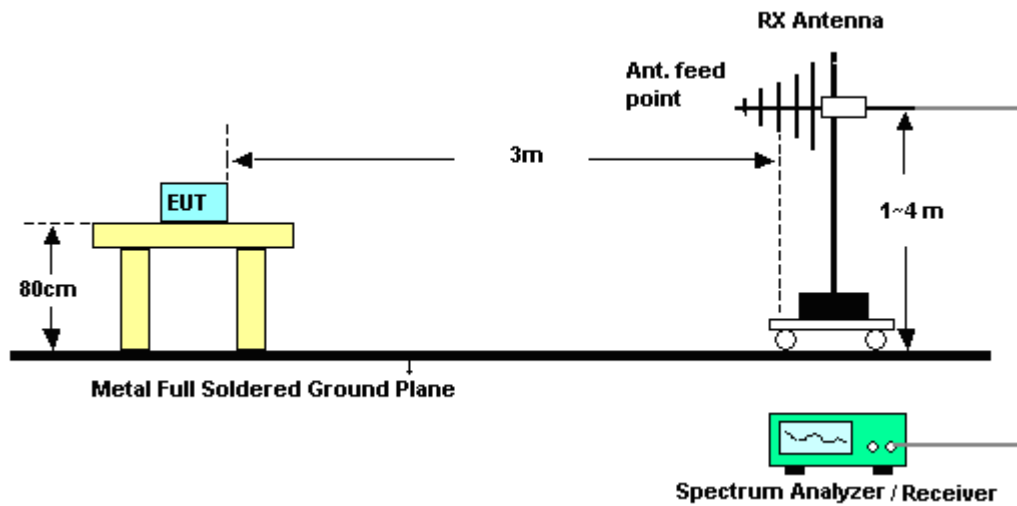
    - VBW = 10 Hz, when duty cycle is no less than 98 percent.
    - VBW  $\geq 1/T$ , when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

### 3.5.4 Test Setup

For radiated emissions below 30MHz

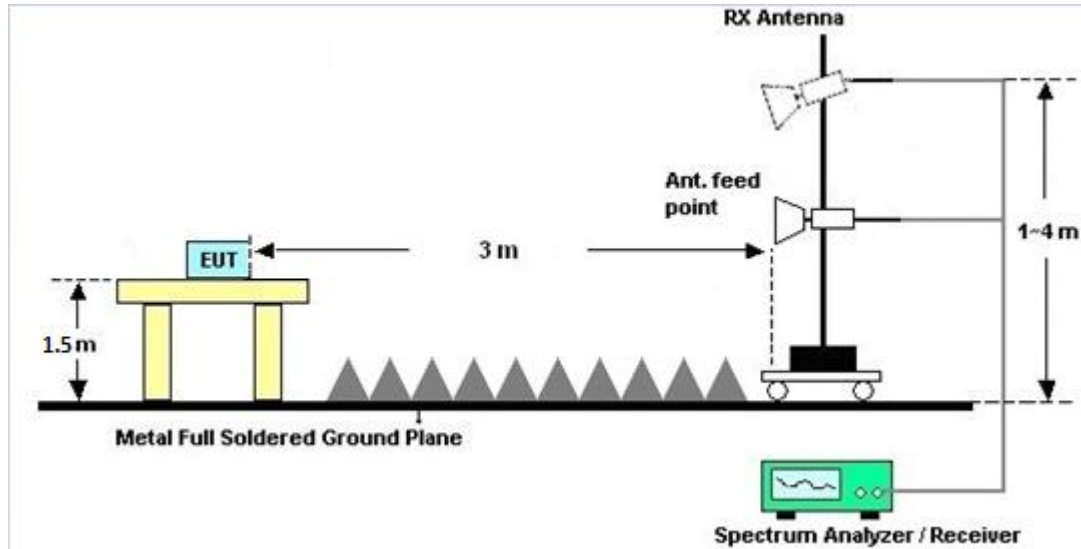


For radiated emissions from 30MHz to 1GHz

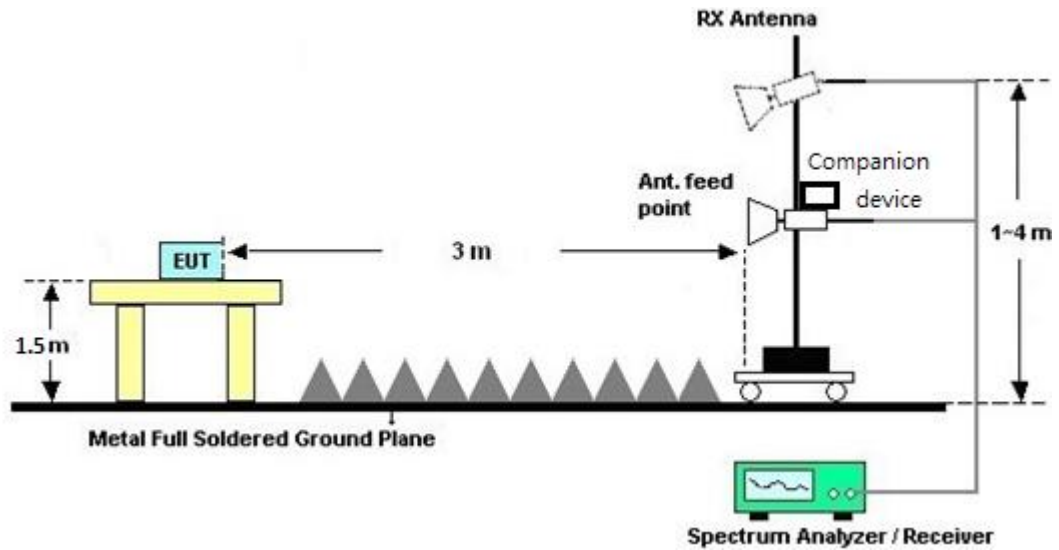


For radiated emissions above 1GHz

Non-TXBF mode



TXBF mode





### **3.5.5 Test Results of Radiated Emissions (9kHz ~ 30MHz)**

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

### **3.5.6 Test Result of Radiated Spurious at Band Edges**

Please refer to Appendix B and C of this test report.

### **3.5.7 Duty Cycle**

Please refer to Appendix D.

### **3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10<sup>th</sup> Harmonic)**

Please refer to Appendix and C of this test report.

## **3.6 AC Conducted Emission Measurement**

### **3.6.1 Limit of AC Conducted Emission**

For equipment 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 or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

| Frequency of Emission<br>(MHz) | Conducted Limit (dB $\mu$ V) |           |
|--------------------------------|------------------------------|-----------|
|                                | Quasi-Peak                   | Average   |
| 0.15-0.5                       | 66 to 56*                    | 56 to 46* |
| 0.5-5                          | 56                           | 46        |
| 5-30                           | 60                           | 50        |

\*Decreases with the logarithm of the frequency.

### **3.6.2 Measuring Instruments**

The measuring equipment is listed in the section 4 of this test report.

### **3.6.3 Test Procedures**

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

### 3.6.4 Test Setup

