# FCC RF Test Report

| | | |
|---|---|---|
| APPLICANT | : | BLU Products, Inc. |
| EQUIPMENT | : | Mobile phone |
| BRAND NAME | : | BLU |
| MODEL NAME | : | ENERGY XL |
| MARKETING NAME | : | ENERGY XL |
| FCC ID | : | YHLBLUENERGYXL |
| STANDARD | : | FCC Part 15 Subpart C §15.247 |
| CLASSIFICATION | : | (DTS) Digital Transmission System |

**The product was received on Mar. 30, 2016 and testing was completed on Apr. 22, 2016. We, SPORTON INTERNATIONAL (SHENZHEN) 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 (SHENZHEN) INC., the test report shall not be reproduced except in full.**

**Prepared by: Ken Chen / Manager**

**Approved by: Jones Tsai / Manager**

Testing Laboratory
2353

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# REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FR633001C | Rev. 01 | Initial issue of report | Apr. 27, 2016 |
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# SUMMARY OF TEST RESULT

| Report Section | FCC Rule | IC Rule | Description | Limit | Result | Remark |
|---|---|---|---|---|---|---|
| 3.1 | 15.247(a)(2) | RSS-247 5.2(1) | 6dB Bandwidth | ≥ 0.5MHz | Pass | - |
| 3.1 | - | RSS-Gen 6.6 | 99% Bandwidth | - | Pass | - |
| 3.2 | 15.247(b) | RSS-247 A5.4(4) | Power Output Measurement | ≤ 30dBm | Pass | - |
| 3.3 | 15.247(e) | RSS-247 5.2(2) | Power Spectral Density | ≤ 8dBm/3kHz | Pass | - |
| 3.4 | 15.247(d) | RSS-247 5.5 | Conducted Band Edges | ≤ 20dBc | Pass | - |
| | | | Conducted Spurious Emission | | Pass | - |
| 3.5 | 15.247(d) | RSS-247 5.5 | Radiated Band Edges and Radiated Spurious Emission | 15.209(a) & 15.247(d) | Pass | Under limit 4.62 dB at 2389.650 MHz |
| 3.6 | 15.207 | RSS-GEN 8.8 | AC Conducted Emission | 15.207(a) | Pass | Under limit 12.72 dB at 0.450 MHz |
| 3.7 | 15.203 & 15.247(b) | N/A | Antenna Requirement | N/A | Pass | - |

# 1 General Description

## 1.1 Applicant

**BLU Products, Inc.**
10814 NW 33rd St # 100 Doral, FL 33172

## 1.2 Manufacturer

**BLU Products, Inc.**
10814 NW 33rd St # 100 Doral, FL 33172

## 1.3 Product Feature of Equipment Under Test

| Product Feature | |
|---|---|
| **Equipment** | Mobile phone |
| **Brand Name** | BLU |
| **Model Name** | ENERGY XL |
| **Marketing Name** | ENERGY XL |
| **FCC ID** | YHLBLUENERGYXL |
| **EUT supports Radios application** | GSM/GPRS/EGPRS/<br>WCDMA/HSPA/HSPA+/DC-HSDPA/LTE/<br>WLAN2.4GHz 802.11b/g/n HT20/HT40/<br>Bluetooth v3.0 + EDR/Bluetooth v4.0 LE |
| **IMEI Code** | Conducted: NA<br>Conduction: 354147042147943/354147043147942<br>Radiation:354147042147927/354147043147926 |
| **HW Version** | ENERGY XL_Mainboard_Q0 |
| **SW Version** | ENERGY XL_0102_V5128 |
| **EUT Stage** | Pre-Production |

**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** | 2412 MHz ~ 2462 MHz |
| **Maximum (Peak) Output Power to Antenna** | 802.11b : 19.39 dBm (0.0869 W)<br>802.11g : 24.25 dBm (0.2661 W)<br>802.11n HT20 : 23.74 dBm (0.2366 W)<br>802.11n HT40 : 23.67 dBm (0.2328 W) |
| **99% Occupied Bandwidth** | 802.11b : 12.65MHz<br>802.11g : 17.70MHz<br>802.11n HT20 : 18.35MHz<br>802.11n HT40 : 36.50MHz |
| **Antenna Type / Gain** | PIFA Antenna with gain 0.45 dBi |
| **Type of Modulation** | 802.11b : DSSS (DBPSK / DQPSK / CCK)<br>802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) |

## 1.5 Modification of EUT

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

## 1.6 Testing Location

| | | |
|---|---|---|
| **Test Site** | SPORTON INTERNATIONAL (SHENZHEN) INC. | |
| **Test Site Location** | 1F & 2F, Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China<br>TEL: +86-755-8637-9589<br>FAX: +86-755-8637-9595 | |
| **Test Site No.** | **Sporton Site No.** | |
| | TH01-SZ | CO01-SZ |

| | | |
|---|---|---|
| **Test Site** | SPORTON INTERNATIONAL (SHENZHEN) INC. | |
| **Test Site Location** | No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P. R. China<br>TEL: +86-755- 3320-2398 | |
| **Test Site No.** | **Sporton Site No.** | **FCC/IC Registration No.** |
| | 03CH02-SZ | 566869/4086F |

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

## 1.7 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
- 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.

# 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 (X plane) were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

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 2.3.

## 2.1 Carrier Frequency Channel

| Frequency Band | Channel | Freq. (MHz) | Channel | Freq. (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 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test shown in the following tables.

| 2.4GHz 802.11b RF Output Power (dBm) | | | | | | |
|---|---|---|---|---|---|---|
| Power vs. Channel | | | Power vs. Data Rate | | | |
| Channel | Frequency (MHz) | Data Rate 1Mbps | Channel | 2Mbps | 5.5Mbps | 11Mbps |
| CH 01 | 2412 | 18.85 | CH 06 | 19.30 | 19.16 | 19.35 |
| CH 06 | 2437 | **19.39** | | | | |
| CH 11 | 2462 | 18.77 | | | | |

| 2.4GHz 802.11g RF Output Power (dBm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Data Rate 6Mbps | Channel | 9Mbps | 12Mbps | 18Mbps | 24Mbps | 36Mbps | 48Mbps | 54Mbps |
| CH 01 | 2412 | 23.57 | CH 06 | 24.21 | 24.19 | 24.17 | 24.22 | 24.23 | 24.21 | 24.20 |
| CH 06 | 2437 | **24.25** | | | | | | | | |
| CH 11 | 2462 | 23.22 | | | | | | | | |

| 2.4GHz 802.11n HT20 RF Output Power (dBm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | Power vs. MCS Index | | | | | | | |
| Channel | Frequency (MHz) | MCS Index MCS0 | Channel | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| CH 01 | 2412 | 23.29 | CH 06 | 23.71 | 23.64 | 23.65 | 23.62 | 23.71 | 23.73 | 23.70 |
| CH 06 | 2437 | **23.74** | | | | | | | | |
| CH 11 | 2462 | 22.68 | | | | | | | | |

| 2.4GHz 802.11n HT40 RF Output Power (dBm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Power vs. Channel | | | Power vs. MCS Index | | | | | | | |
| Channel | Frequency (MHz) | MCS Index MCS0 | Channel | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| CH 03 | 2422 | 23.07 | CH 06 | 22.98 | 23.33 | 23.24 | 22.86 | 23.65 | 23.66 | 23.63 |
| CH 06 | 2437 | **23.67** | | | | | | | | |
| CH 09 | 2452 | 23.01 | | | | | | | | |

## 2.3 Test Mode

**Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.**

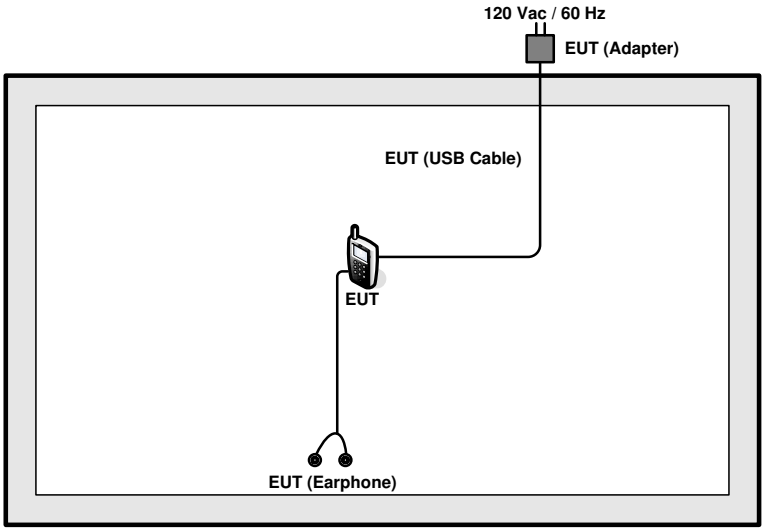
**<2.4GHz>**

| Modulation | Data Rate |
|---|---|
| 802.11b | 1 Mbps |
| 802.11g | 6 Mbps |
| 802.11n HT20 | MCS0 |
| 802.11n HT40 | MCS0 |

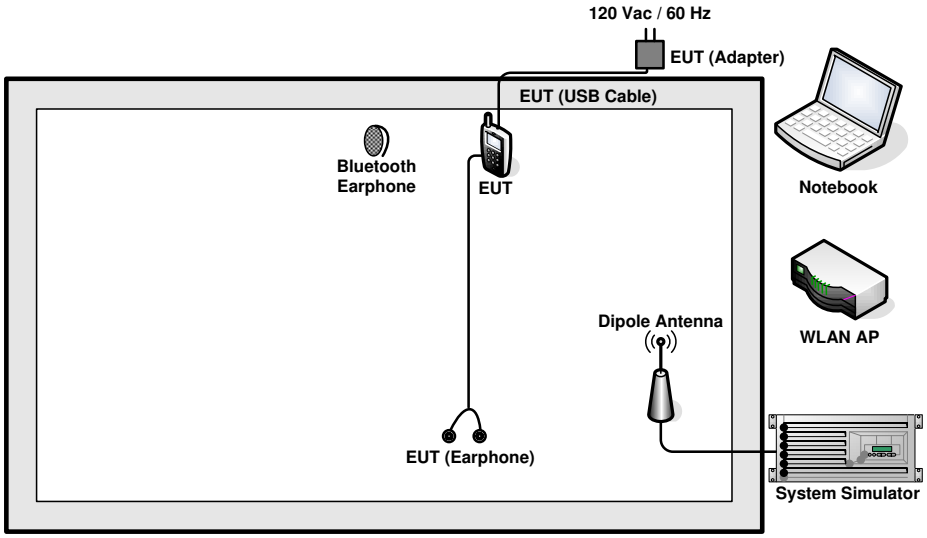
| Test Cases | |
|---|---|
| AC Conducted Emission | Mode 1 : GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone + SIM 1 |
| **Remark:** For radiated TCs, the tests were performed with adapter, battery, earphone and USB cable. | |

## 2.4 Connection Diagram of Test System

**<WLAN Tx Mode>**




**<AC Conducted Emission Mode>**



## 2.5 Support Unit used in test configuration and system

| Item | Equipment | Trade Name | Model Name | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | System Simulator | Anritsu | MT8820C | N/A | N/A | Unshielded, 1.8 m |
| 2. | WLAN AP | ASUS | RT-AC66U | MSQ-RTAC66U | N/A | Unshielded, 1.8 m |
| 3. | Notebook | Lenovo | E540 | FCC DoC | N/A | AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m |
| 4. | Bluetooth Earphone | Nokia | BH-108 | PYAHS-107W | N/A | N/A |

## 2.6 EUT Operation Test Setup

For WLAN function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

## 2.7 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 5 dB and 10dB attenuator.

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

= 5 + 10 = 15 (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.

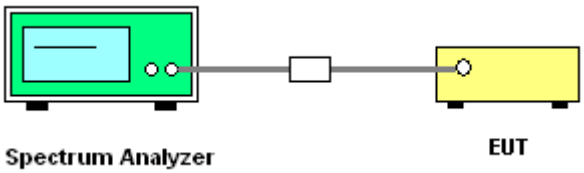
### 3.1.2 Measuring Instruments

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

### 3.1.3 Test Procedures

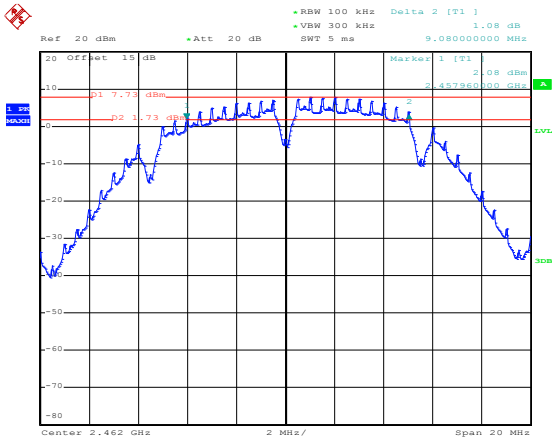
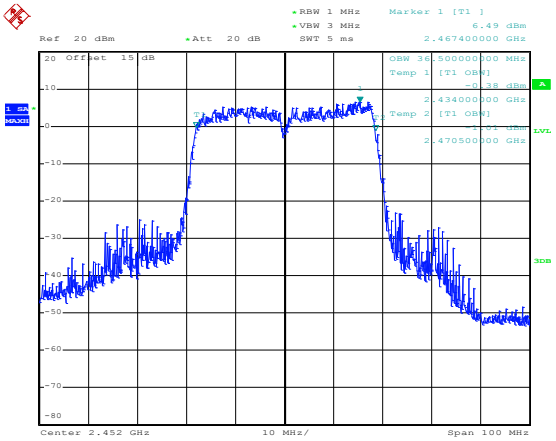
1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit 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 test report.

| Minimum 6dB Bandwidth | Maximum 99% Occupied Bandwidth |
|---|---|
|   Date: 1.APR.2016 00:48:55 |   Date: 6.APR.2016 16:14:22 |

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

## 3.2 Output Power Measurement

### 3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting Antenna of directional gain greater than 6dBi are 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.

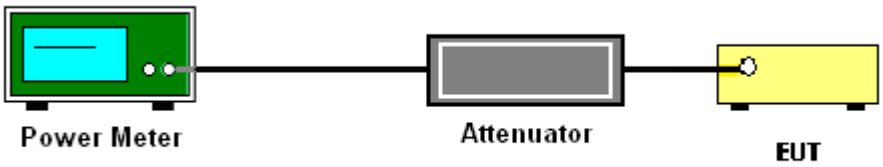
### 3.2.2 Measuring Instruments

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.

### 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.

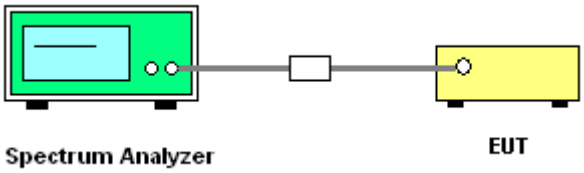
### 3.3.2 Measuring Instruments

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. 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. 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.
6. Measure and record the results in the test report.

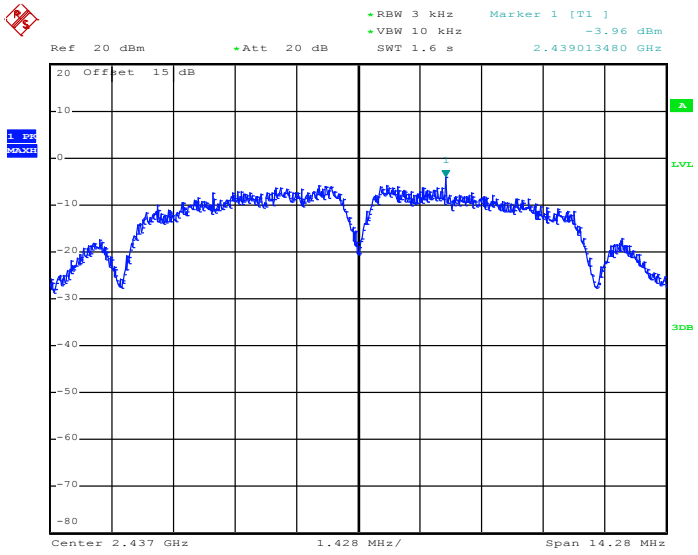
### 3.3.4 Test Setup



### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A of this test report.

**Worst Case Power Density (dBm/3kHz)**



## 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).

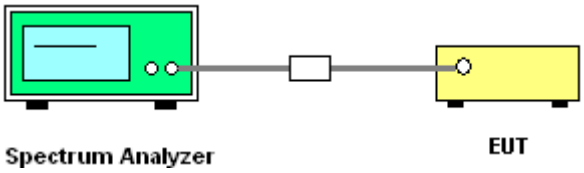
### 3.4.2 Measuring Instruments

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

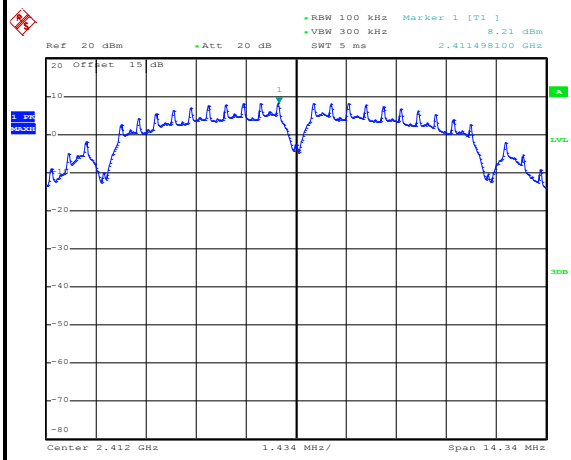


### 3.4.5 Test Result of Conducted Band Edges and Spurious Emission

| | | | |
|---|---|---|---|
| **Test Mode :** | 802.11b | **Temperature :** | 24~26℃ |
| **Test Band :** | 2.4GHz Low | **Relative Humidity :** | 50~53% |
| **Test Channel :** | 01 | **Test Engineer :** | Bruce Huang |

**WLAN 802.11b Channel 01**

**100kHz PSD reference Level**

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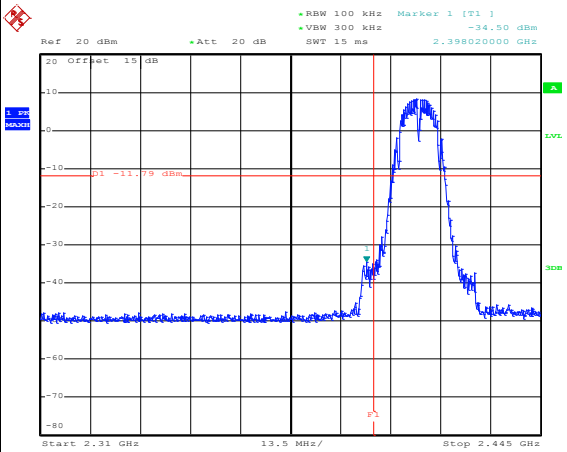
**Low Channel Plot**

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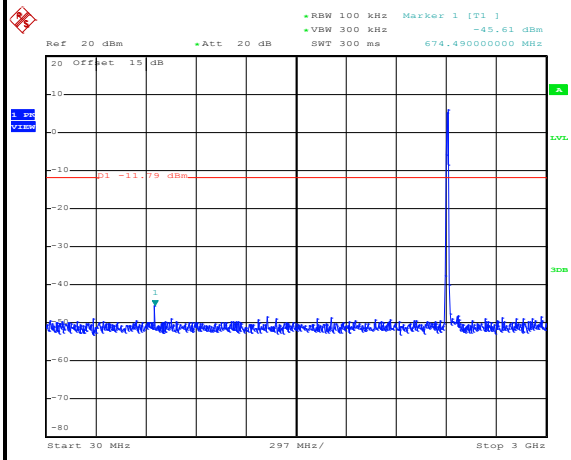
**Spurious Emission 30MHz~3GHz**

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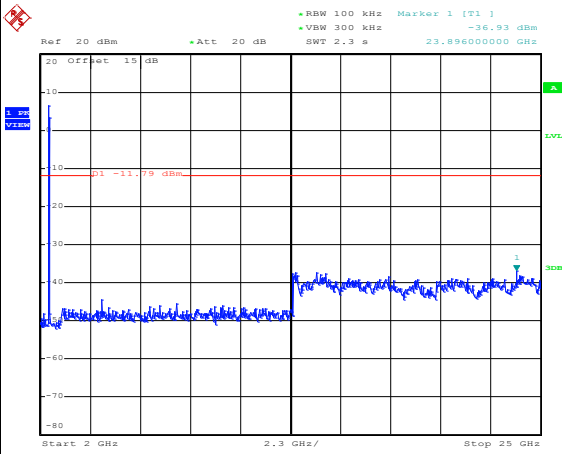
**Spurious Emission 2GHz~25GHz**

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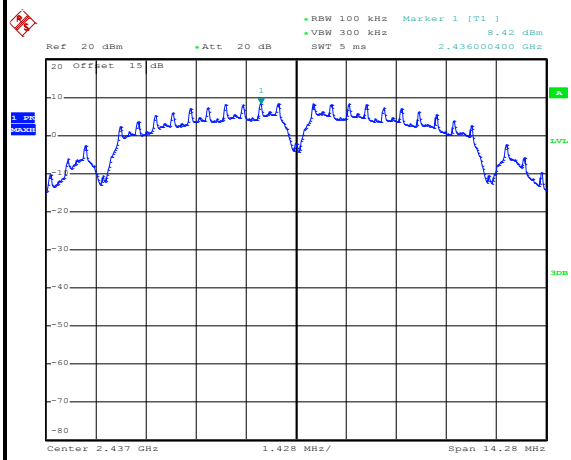
| | | | |
|---|---|---|---|
| **Test Mode :** | 802.11b | **Temperature :** | 24~26℃ |
| **Test Band :** | 2.4GHz Mid | **Relative Humidity :** | 50~53% |
| **Test Channel :** | 06 | **Test Engineer :** | Bruce Huang |

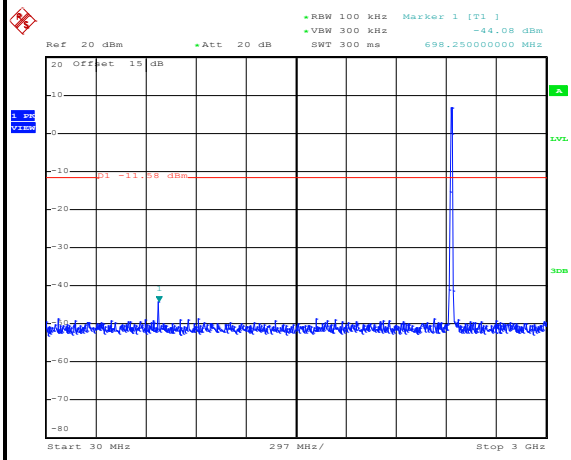
**WLAN 802.11b Channel 06**

**100kHz PSD reference Level**



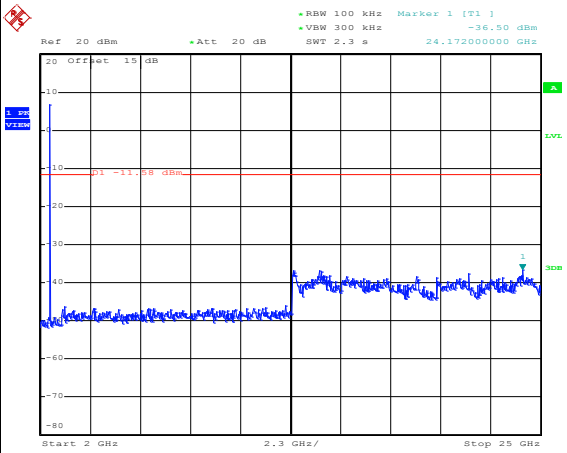

Date: 1.APR.2016 00:44:34

**Spurious Emission 30MHz~3GHz**




Date: 1.APR.2016 00:45:50

**Spurious Emission 2GHz~25GHz**

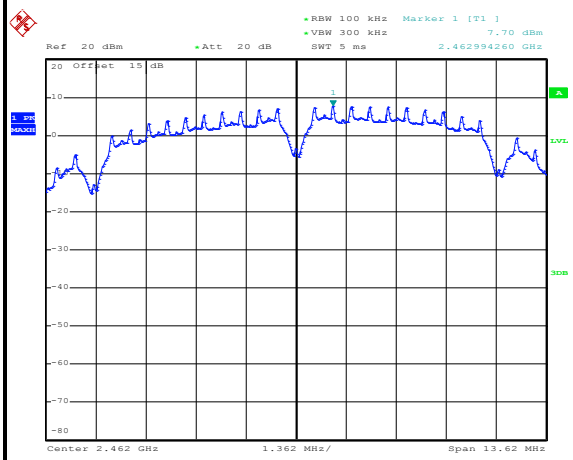



Date: 1.APR.2016 00:45:58

| | | | |
|---|---|---|---|
| **Test Mode :** | 802.11b | **Temperature :** | 24~26℃ |
| **Test Band :** | 2.4GHz High | **Relative Humidity :** | 50~53% |
| **Test Channel :** | 11 | **Test Engineer :** | Bruce Huang |

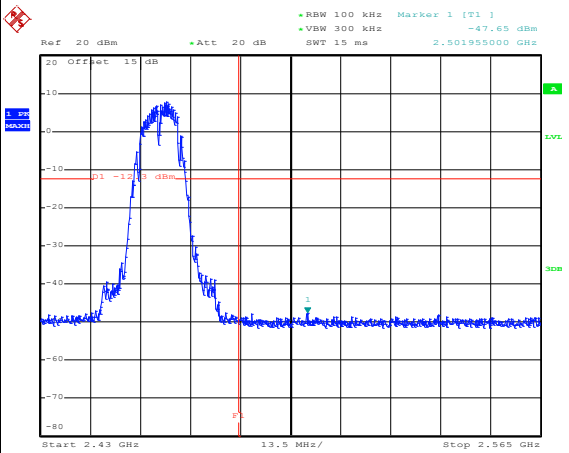
**WLAN 802.11b Channel 11**

**100kHz PSD reference Level**



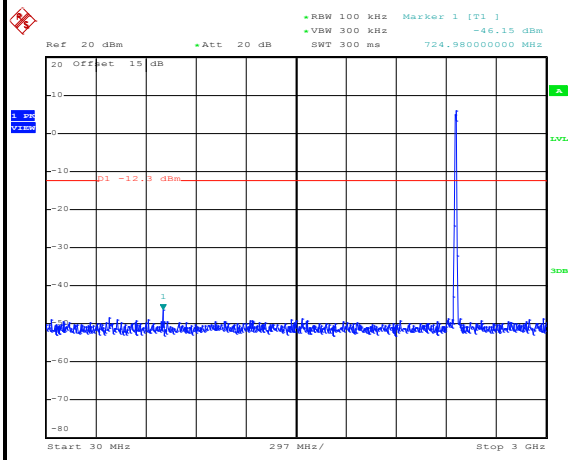

Date: 1.APR.2016 00:52:22

**High Channel Plot**



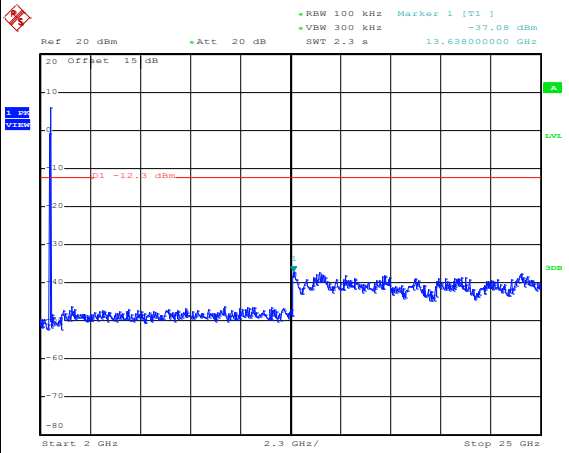

Date: 1.APR.2016 00:53:17

**Spurious Emission 30MHz~3GHz**




Date: 1.APR.2016 00:55:32

**Spurious Emission 2GHz~25GHz**

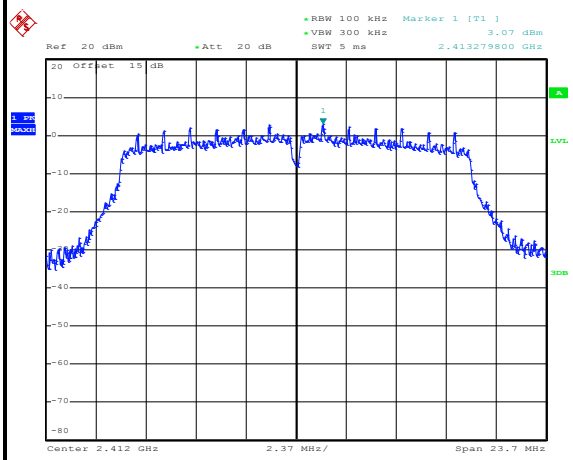



Date: 1.APR.2016 00:55:41

| | | | |
|---|---|---|---|
| **Test Mode :** | 802.11g | **Temperature :** | 24~26℃ |
| **Test Band :** | 2.4GHz Low | **Relative Humidity :** | 50~53% |
| **Test Channel :** | 01 | **Test Engineer :** | Bruce Huang |

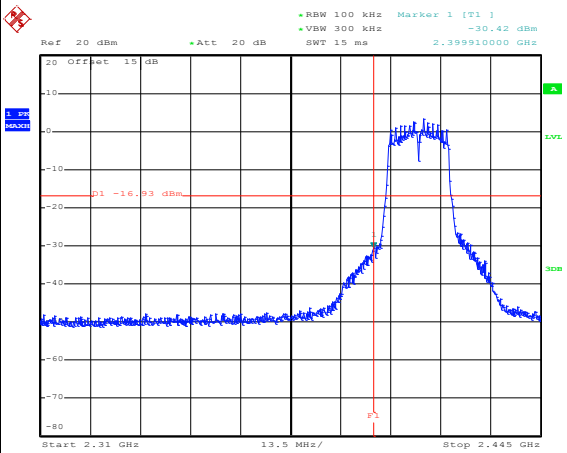
**WLAN 802.11g Channel 01**

**100kHz PSD reference Level**



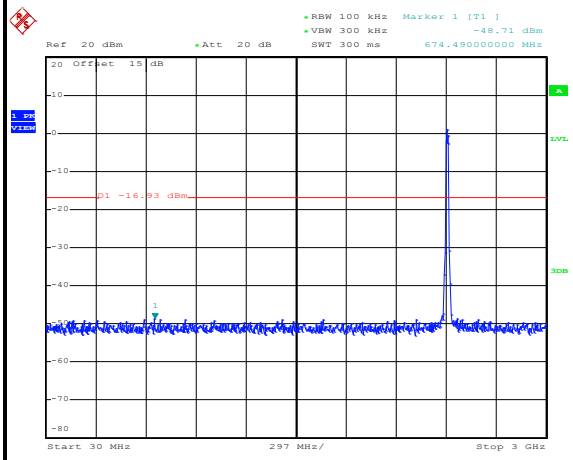

Date: 6.APR.2016 10:41:46

**Low Channel Plot**



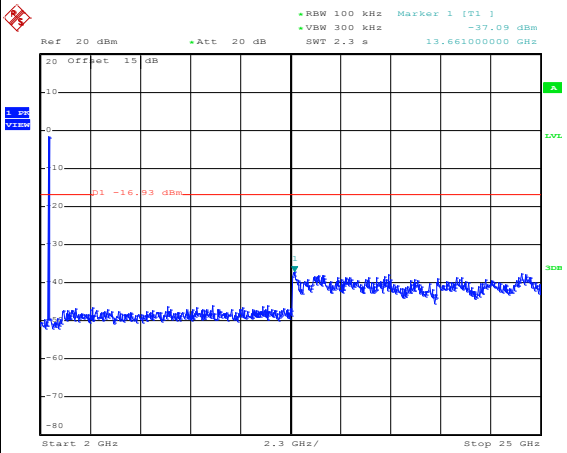

Date: 6.APR.2016 10:42:19

**Spurious Emission 30MHz~3GHz**




Date: 6.APR.2016 10:48:10

**Spurious Emission 2GHz~25GHz**

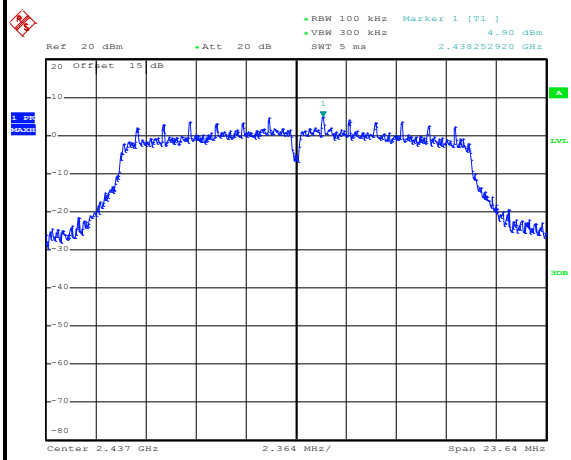



Date: 6.APR.2016 10:48:19

| | | | |
|---|---|---|---|
| **Test Mode :** | 802.11g | **Temperature :** | 24~26℃ |
| **Test Band :** | 2.4GHz Mid | **Relative Humidity :** | 50~53% |
| **Test Channel :** | 06 | **Test Engineer :** | Bruce Huang |

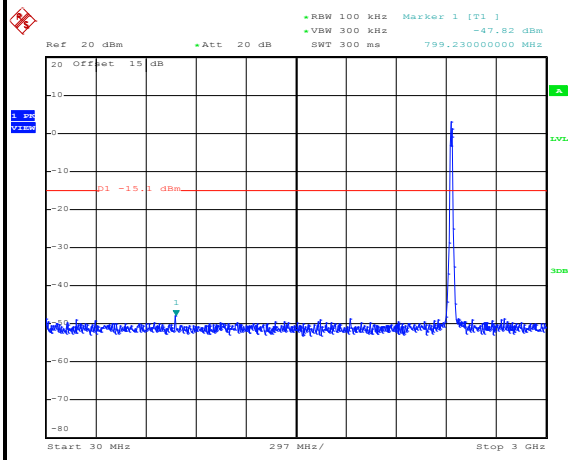
**WLAN 802.11g Channel 06**

**100kHz PSD reference Level**



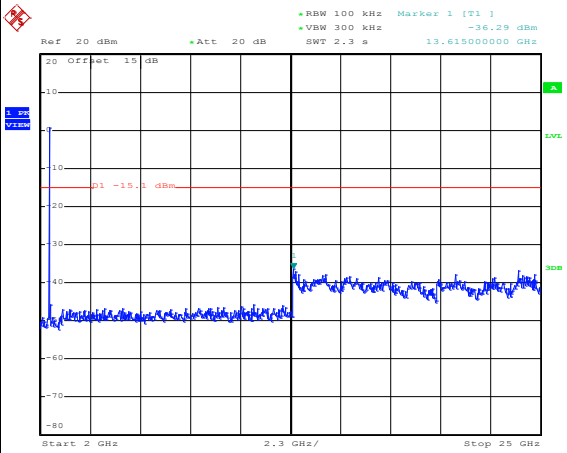

Date: 6.APR.2016 10:57:25

**Spurious Emission 30MHz~3GHz**




Date: 6.APR.2016 10:57:42

**Spurious Emission 2GHz~25GHz**

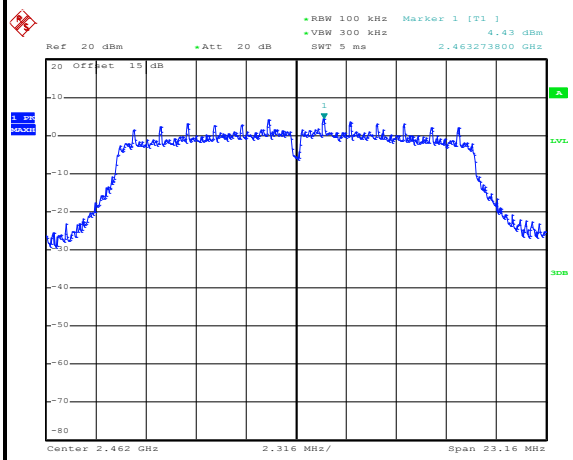



Date: 6.APR.2016 10:57:50

| | | | |
|---|---|---|---|
| **Test Mode :** | 802.11g | **Temperature :** | 24~26℃ |
| **Test Band :** | 2.4GHz High | **Relative Humidity :** | 50~53% |
| **Test Channel :** | 11 | **Test Engineer :** | Bruce Huang |

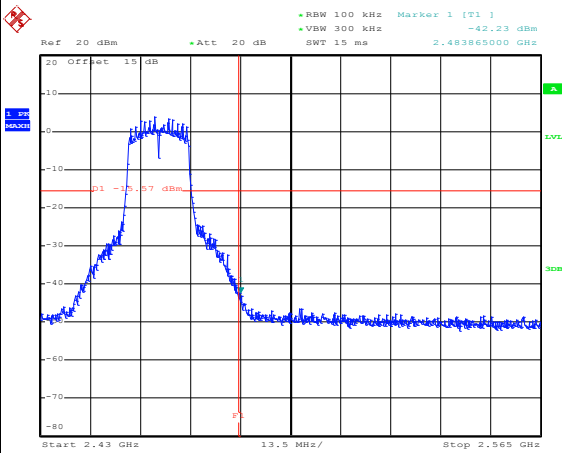
**WLAN 802.11g Channel 11**

**100kHz PSD reference Level**



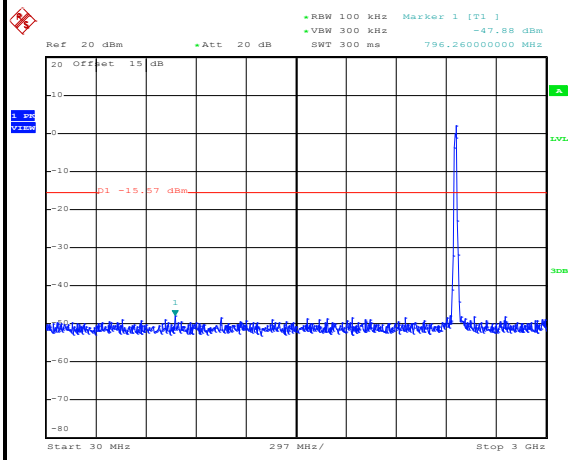

Date: 6.APR.2016 11:59:48

**High Channel Plot**



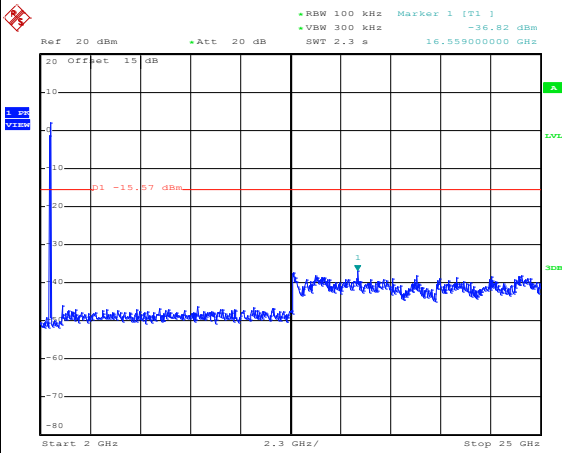

Date: 6.APR.2016 12:00:10

**Spurious Emission 30MHz~3GHz**




Date: 6.APR.2016 12:16:30

**Spurious Emission 2GHz~25GHz**

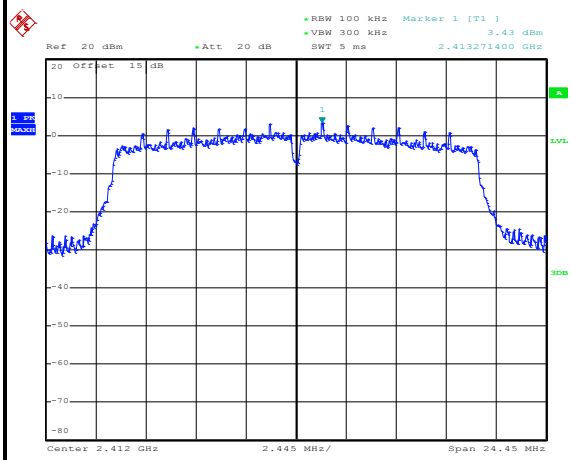



Date: 6.APR.2016 12:16:39

| | | | |
|---|---|---|---|
| **Test Mode :** | 802.11n HT20 | **Temperature :** | 24~26℃ |
| **Test Band :** | 2.4GHz Low | **Relative Humidity :** | 50~53% |
| **Test Channel :** | 01 | **Test Engineer :** | Bruce Huang |

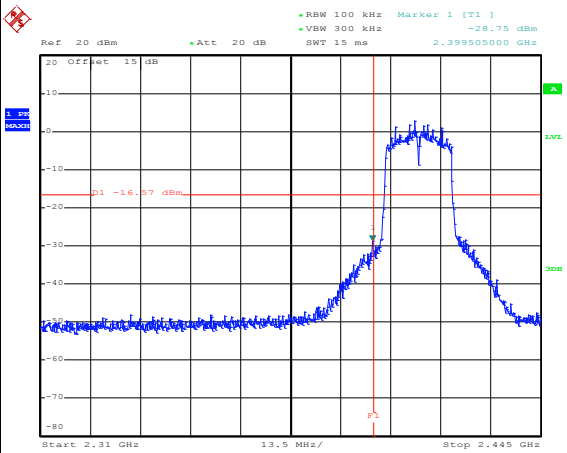
**WLAN 802.11n HT20 Channel 01**

**100kHz PSD reference Level**



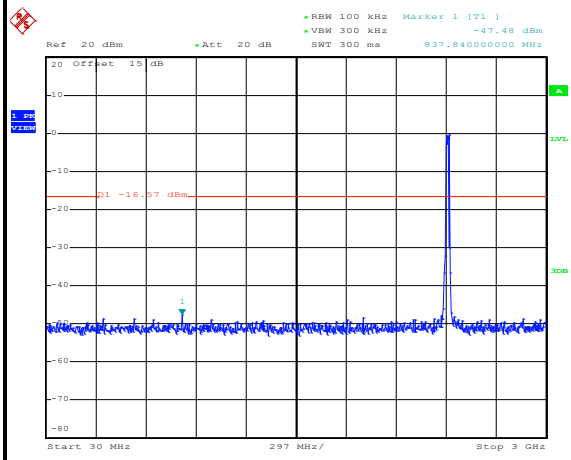

Date: 6.APR.2016 12:30:55

**Low Channel Plot**



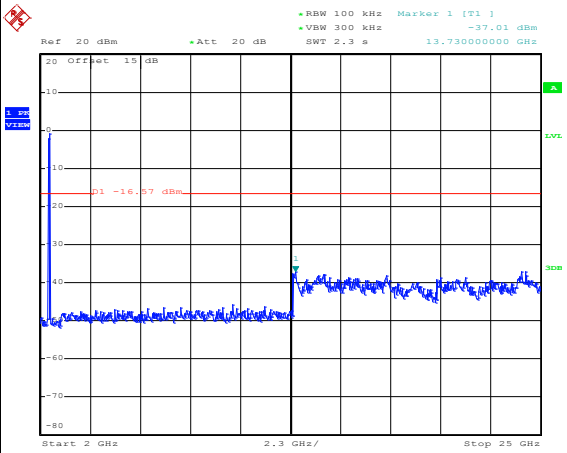

Date: 6.APR.2016 12:31:05

**Spurious Emission 30MHz~3GHz**




Date: 6.APR.2016 12:34:21

**Spurious Emission 2GHz~25GHz**

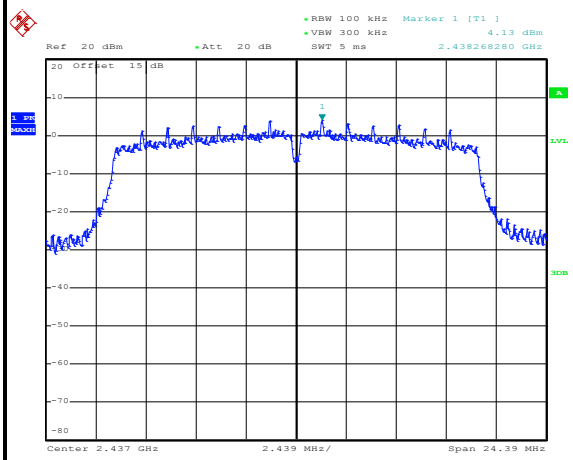



Date: 6.APR.2016 12:34:29

| | | | |
|---|---|---|---|
| **Test Mode :** | 802.11n HT20 | **Temperature :** | 24~26℃ |
| **Test Band :** | 2.4GHz Mid | **Relative Humidity :** | 50~53% |
| **Test Channel :** | 06 | **Test Engineer :** | Bruce Huang |

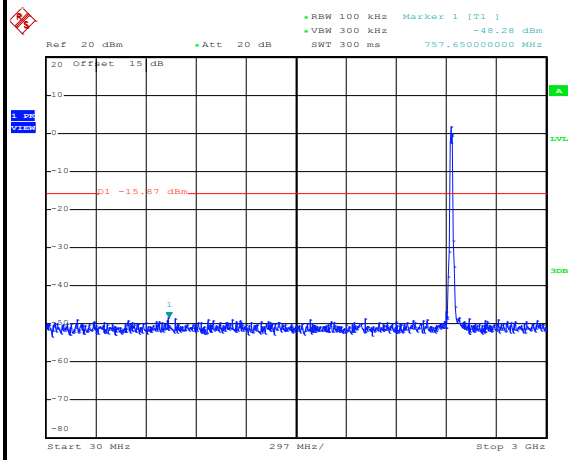
**WLAN 802.11n HT20 Channel 06**

**100kHz PSD reference Level**



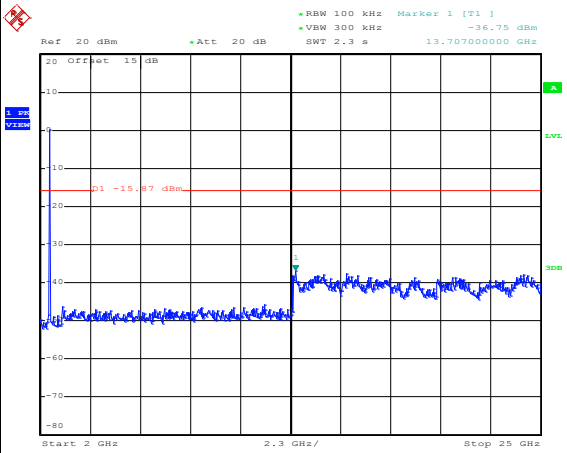

Date: 6.APR.2016 14:43:04

**Spurious Emission 30MHz~3GHz**




Date: 6.APR.2016 14:47:20

**Spurious Emission 2GHz~25GHz**

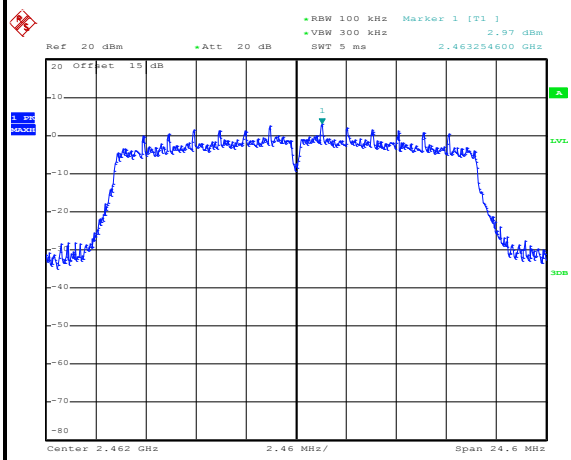



Date: 6.APR.2016 14:47:28

| | | | |
|---|---|---|---|
| **Test Mode :** | 802.11n HT20 | **Temperature :** | 24~26℃ |
| **Test Band :** | 2.4GHz High | **Relative Humidity :** | 50~53% |
| **Test Channel :** | 11 | **Test Engineer :** | Bruce Huang |

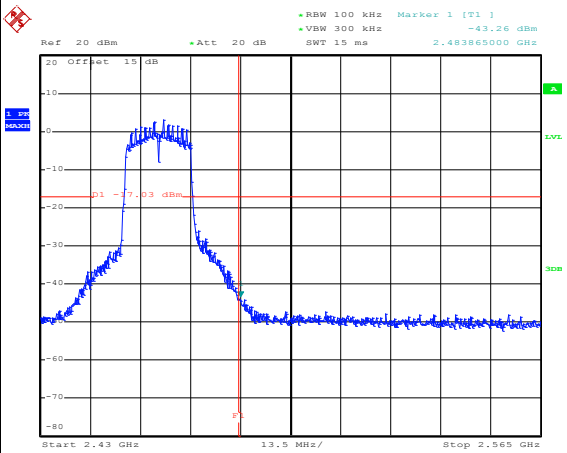
**WLAN 802.11n HT20 Channel 11**

**100kHz PSD reference Level**



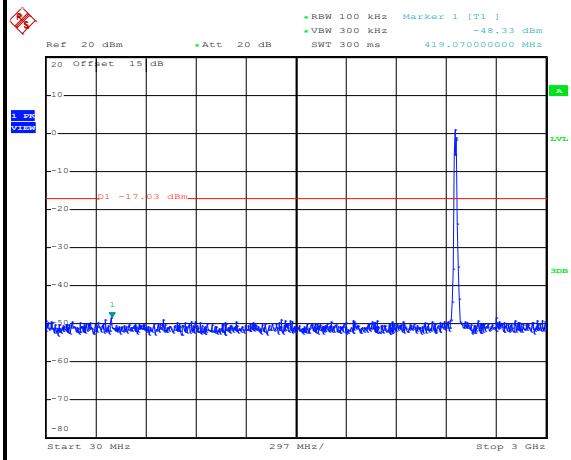

Date: 6.APR.2016 15:08:47

**High Channel Plot**



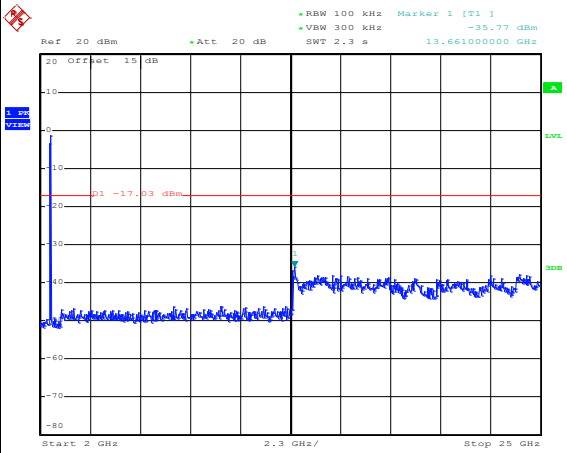

Date: 6.APR.2016 15:09:10

**Spurious Emission 30MHz~3GHz**




Date: 6.APR.2016 15:09:32

**Spurious Emission 2GHz~25GHz**

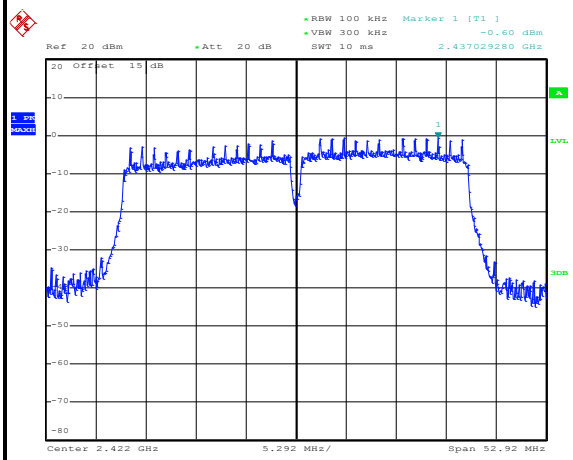



Date: 6.APR.2016 15:09:41

| | | | |
|---|---|---|---|
| **Test Mode :** | 802.11n HT40 | **Temperature :** | 24~26℃ |
| **Test Band :** | 2.4GHz Low | **Relative Humidity :** | 50~53% |
| **Test Channel :** | 03 | **Test Engineer :** | Bruce Huang |

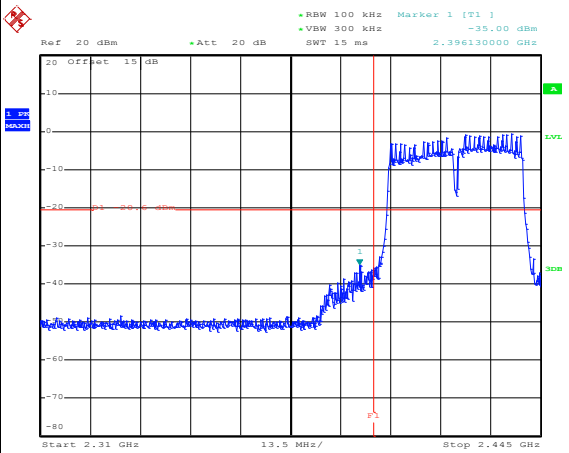
**WLAN 802.11n HT40 Channel 03**

**100kHz PSD reference Level**



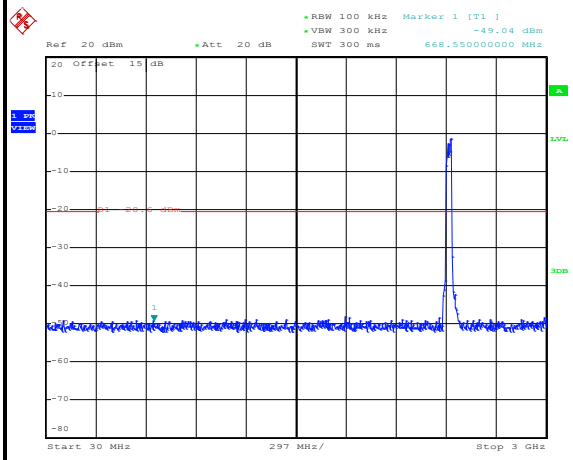

Date: 6.APR.2016 15:33:36

**Low Channel Plot**



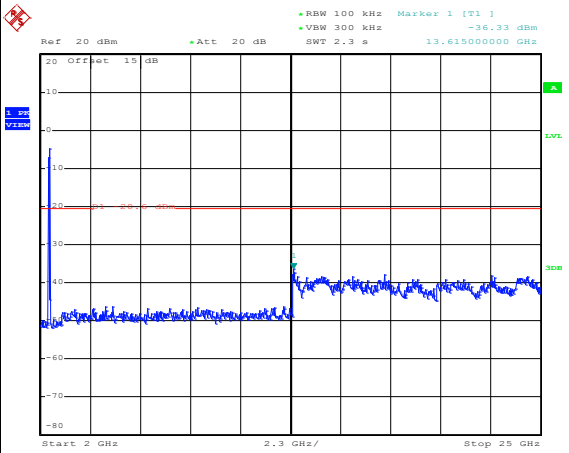

Date: 6.APR.2016 15:33:56

**Spurious Emission 30MHz~3GHz**




Date: 6.APR.2016 15:52:06

**Spurious Emission 2GHz~25GHz**

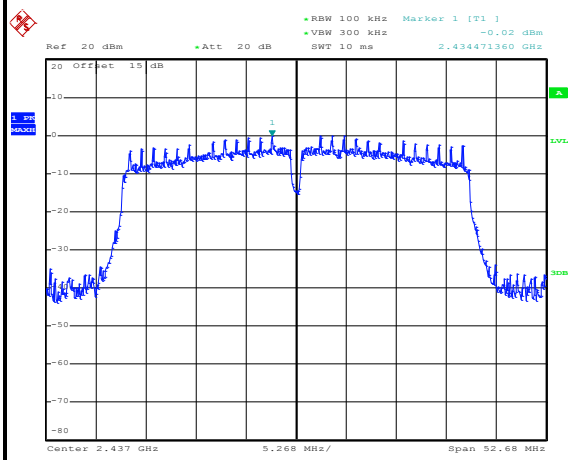



Date: 6.APR.2016 15:48:56

| | | | |
|---|---|---|---|
| **Test Mode :** | 802.11n HT40 | **Temperature :** | 24~26℃ |
| **Test Band :** | 2.4GHz Mid | **Relative Humidity :** | 50~53% |
| **Test Channel :** | 06 | **Test Engineer :** | Bruce Huang |

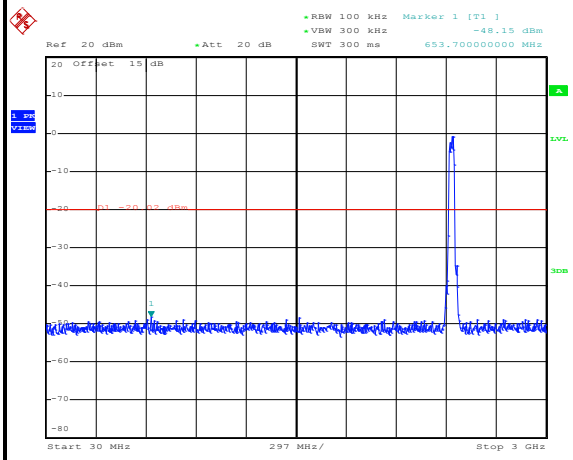
**WLAN 802.11n HT40 Channel 06**

**100kHz PSD reference Level**



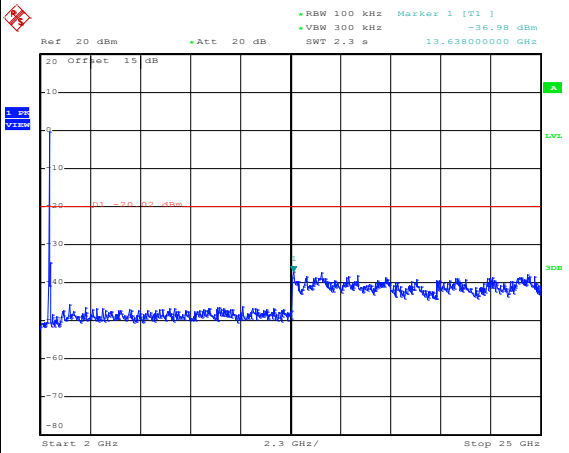

Date: 6.APR.2016 15:58:58

**Spurious Emission 30MHz~3GHz**




Date: 6.APR.2016 15:59:54

**Spurious Emission 2GHz~25GHz**

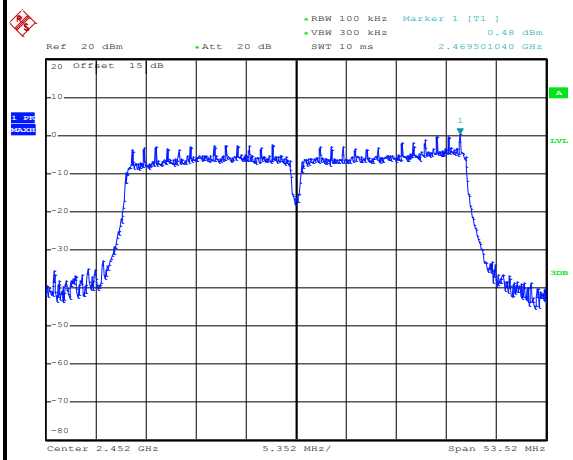



Date: 6.APR.2016 16:00:03

| | | | |
|---|---|---|---|
| **Test Mode :** | 802.11n HT40 | **Temperature :** | 24~26℃ |
| **Test Band :** | 2.4GHz High | **Relative Humidity :** | 50~53% |
| **Test Channel :** | 09 | **Test Engineer :** | Bruce Huang |

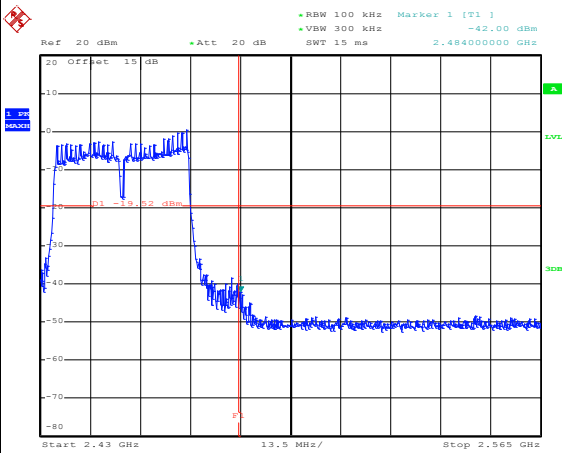
**WLAN 802.11n HT40 Channel 09**

**100kHz PSD reference Level**



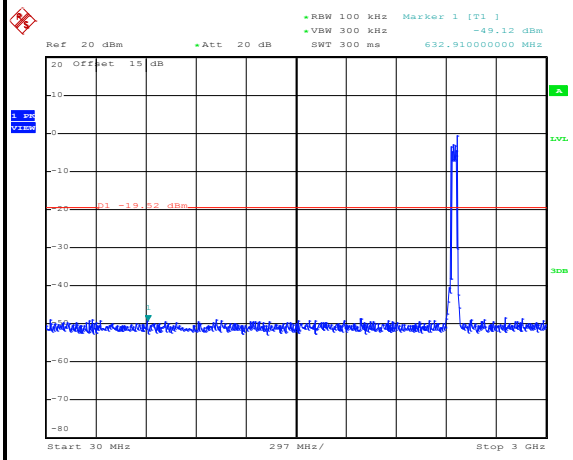

Date: 6.APR.2016 16:06:52

**High Channel Plot**



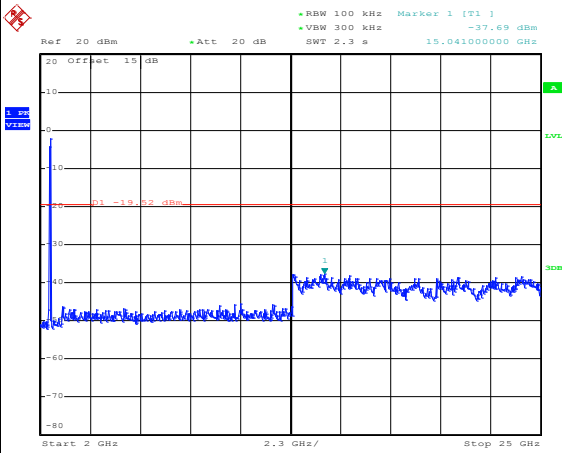

Date: 6.APR.2016 16:07:12

**Spurious Emission 30MHz~3GHz**




Date: 6.APR.2016 16:13:58

**Spurious Emission 2GHz~25GHz**




Date: 6.APR.2016 16:13:01

## 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.

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

### 3.5.2 Measuring Instruments

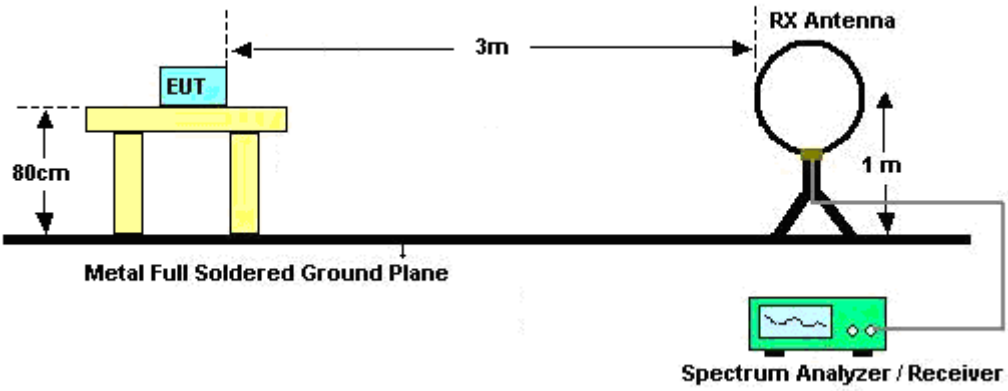
The measuring equipment is listed in the section 4 of this test report.

### 3.5.3 Test Procedures

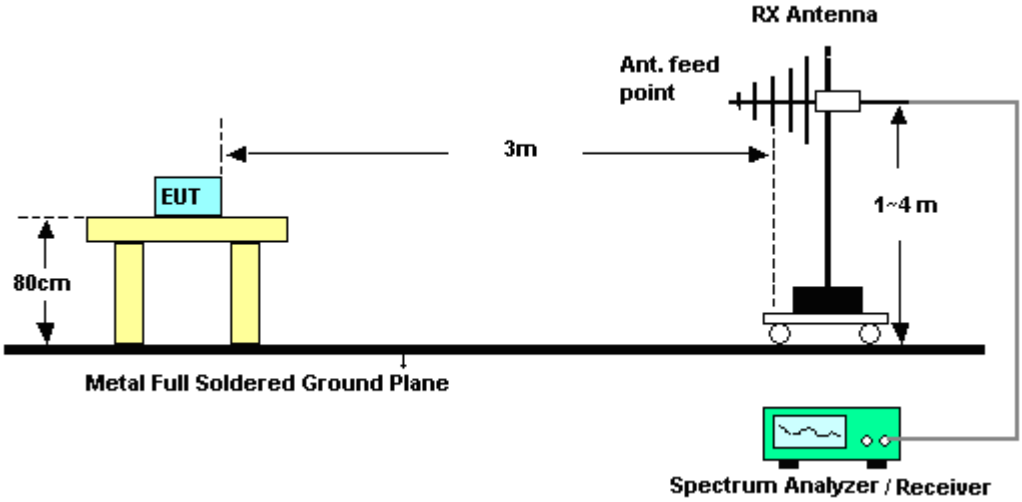
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the 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 ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 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

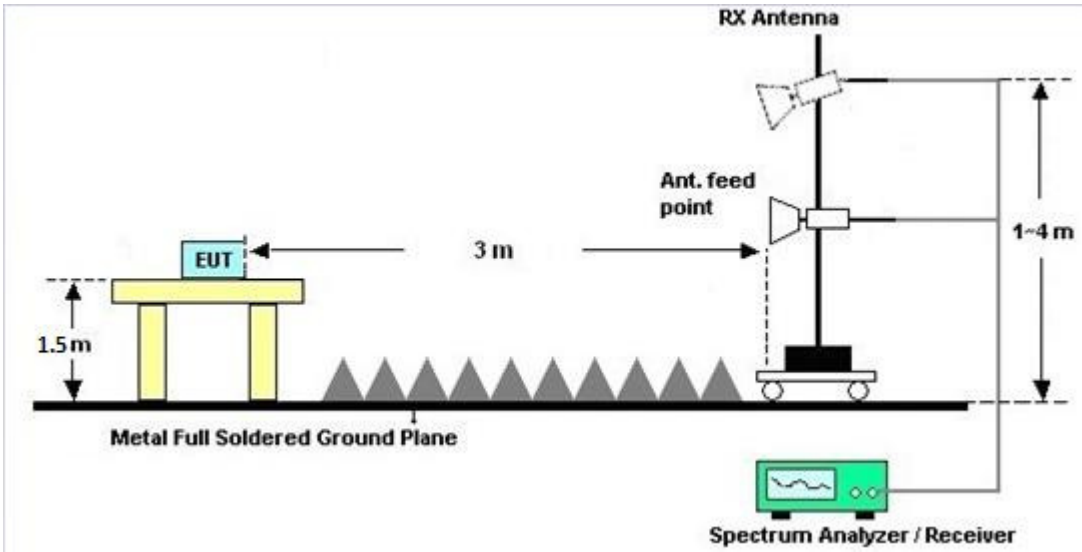
**For radiated emissions below 30MHz**




**For radiated emissions from 30MHz to 1GHz**



**For radiated emissions above 1GHz**



### 3.5.5 Test Results of Radiated Spurious 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.

### 3.5.7 Duty Cycle

Please refer to Appendix C.

### 3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10$^{th}$ Harmonic)

Please refer to Appendix B.

## 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 (MHz) | Conducted Limit (dBμV) | |
|---|---|---|
| | 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.

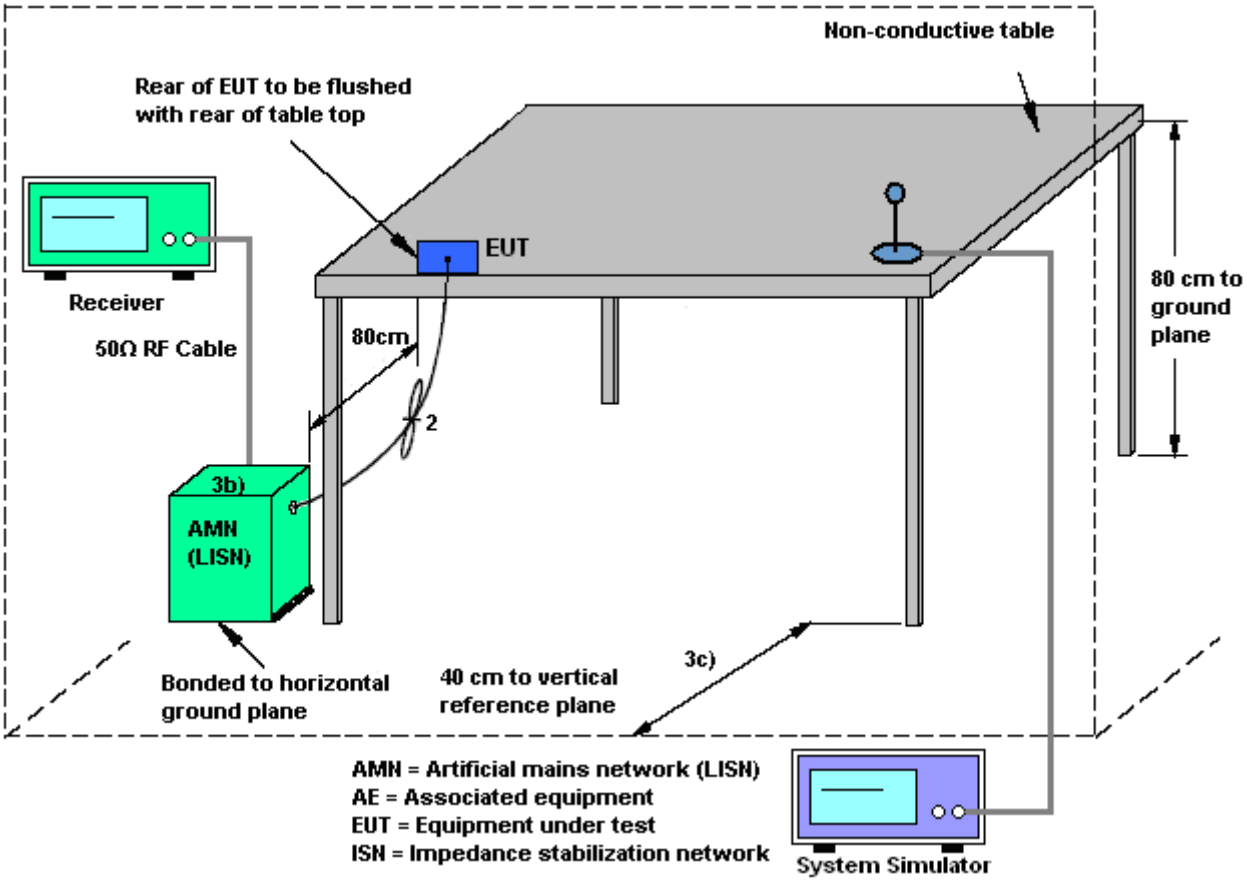
### 3.6.2 Measuring Instruments

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

### 3.6.3 Test Procedures

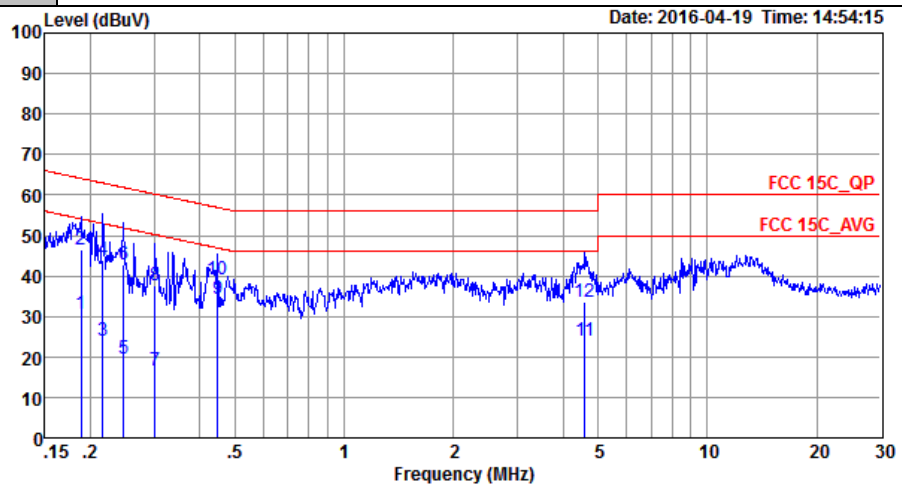
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other 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



### 3.6.5 Test Result of AC Conducted Emission

| | | | |
|---|---|---|---|
| **Test Mode :** | Mode 1 | **Temperature :** | 21~23℃ |
| **Test Engineer :** | Tao Cheng | **Relative Humidity :** | 41~43% |
| **Test Voltage :** | 120Vac / 60Hz | **Phase :** | Line |
| **Function Type :** | GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone + SIM 1 | | |

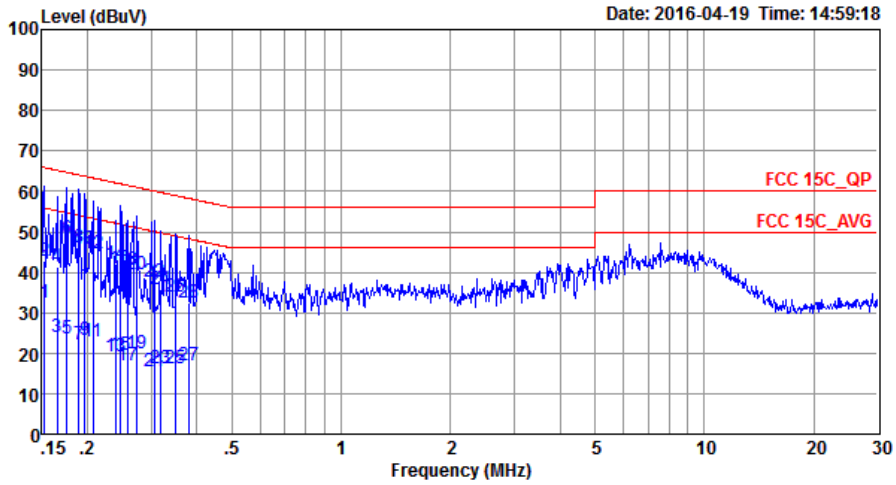



Site : CO01-SZ
Condition: FCC 15C_QP LISN_L_20160415 LINE

Mode : Mode 1
IMEI : 354147042147943/354147043147942

| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.19 | 30.81 | -23.30 | 54.11 | 20.00 | 0.50 | 10.31 | Average |
| 2 | 0.19 | 46.51 | -17.60 | 64.11 | 35.70 | 0.50 | 10.31 | QP |
| 3 | 0.22 | 24.01 | -28.95 | 52.96 | 13.20 | 0.53 | 10.28 | Average |
| 4 | 0.22 | 43.81 | -19.15 | 62.96 | 33.00 | 0.53 | 10.28 | QP |
| 5 | 0.25 | 19.39 | -32.47 | 51.86 | 8.59 | 0.55 | 10.25 | Average |
| 6 | 0.25 | 42.89 | -18.97 | 61.86 | 32.09 | 0.55 | 10.25 | QP |
| 7 | 0.30 | 16.77 | -33.42 | 50.19 | 6.00 | 0.57 | 10.20 | Average |
| 8 | 0.30 | 37.67 | -22.52 | 60.19 | 26.90 | 0.57 | 10.20 | QP |
| 9 * | 0.45 | 34.17 | -12.72 | 46.89 | 23.40 | 0.61 | 10.16 | Average |
| 10 | 0.45 | 39.27 | -17.62 | 56.89 | 28.50 | 0.61 | 10.16 | QP |
| 11 | 4.60 | 24.16 | -21.84 | 46.00 | 13.29 | 0.63 | 10.24 | Average |
| 12 | 4.60 | 33.76 | -22.24 | 56.00 | 22.89 | 0.63 | 10.24 | QP |

| | | | |
|---|---|---|---|
| **Test Mode :** | Mode 1 | **Temperature :** | 21~23℃ |
| **Test Engineer :** | Tao Cheng | **Relative Humidity :** | 41~43% |
| **Test Voltage :** | 120Vac / 60Hz | **Phase :** | Neutral |
| **Function Type :** | GSM850 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Earphone + SIM 1 | | |




Site : CO01-SZ
Condition: FCC 15C_QP LISN_N_20160415 NEUTRAL

Mode : Mode 1
IMEI : 354147042147943/354147043147942

| | | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | | 0.15 | 32.51 | -23.36 | 55.87 | 21.70 | 0.45 | 10.36 | Average |
| 2 | | 0.15 | 42.81 | -23.06 | 65.87 | 32.00 | 0.45 | 10.36 | QP |
| 3 | | 0.17 | 24.01 | -31.20 | 55.21 | 13.20 | 0.47 | 10.34 | Average |
| 4 | | 0.17 | 41.21 | -24.00 | 65.21 | 30.40 | 0.47 | 10.34 | QP |
| 5 | | 0.18 | 23.61 | -31.07 | 54.68 | 12.81 | 0.48 | 10.32 | Average |
| 6 | * | 0.18 | 48.51 | -16.17 | 64.68 | 37.71 | 0.48 | 10.32 | QP |
| 7 | | 0.19 | 22.01 | -32.05 | 54.06 | 11.20 | 0.50 | 10.31 | Average |
| 8 | | 0.19 | 46.01 | -18.05 | 64.06 | 35.20 | 0.50 | 10.31 | QP |
| 9 | | 0.20 | 23.20 | -30.56 | 53.76 | 12.39 | 0.51 | 10.30 | Average |
| 10 | | 0.20 | 45.90 | -17.86 | 63.76 | 35.09 | 0.51 | 10.30 | QP |
| 11 | | 0.21 | 23.00 | -30.32 | 53.32 | 12.19 | 0.52 | 10.29 | Average |
| 12 | | 0.21 | 44.80 | -18.52 | 63.32 | 33.99 | 0.52 | 10.29 | QP |
| 13 | | 0.24 | 19.10 | -33.03 | 52.13 | 8.30 | 0.55 | 10.25 | Average |
| 14 | | 0.24 | 42.10 | -20.03 | 62.13 | 31.30 | 0.55 | 10.25 | QP |
| 15 | | 0.25 | 19.40 | -32.46 | 51.86 | 8.60 | 0.55 | 10.25 | Average |
| 16 | | 0.25 | 41.10 | -20.76 | 61.86 | 30.30 | 0.55 | 10.25 | QP |
| 17 | | 0.26 | 16.80 | -34.67 | 51.47 | 6.01 | 0.56 | 10.23 | Average |
| 18 | | 0.26 | 40.70 | -20.77 | 61.47 | 29.91 | 0.56 | 10.23 | QP |
| 19 | | 0.27 | 19.79 | -31.19 | 50.98 | 9.00 | 0.57 | 10.22 | Average |
| 20 | | 0.27 | 39.39 | -21.59 | 60.98 | 28.60 | 0.57 | 10.22 | QP |
| 21 | | 0.31 | 15.49 | -34.61 | 50.10 | 4.70 | 0.59 | 10.20 | Average |
| 22 | | 0.31 | 37.69 | -22.41 | 60.10 | 26.90 | 0.59 | 10.20 | QP |
| 23 | | 0.32 | 16.08 | -33.67 | 49.75 | 5.31 | 0.58 | 10.19 | Average |
| 24 | | 0.32 | 35.78 | -23.97 | 59.75 | 25.01 | 0.58 | 10.19 | QP |
| 25 | | 0.35 | 16.05 | -32.91 | 48.96 | 5.30 | 0.57 | 10.18 | Average |
| 26 | | 0.35 | 33.95 | -25.01 | 58.96 | 23.20 | 0.57 | 10.18 | QP |
| 27 | | 0.38 | 16.83 | -31.47 | 48.30 | 6.09 | 0.56 | 10.18 | Average |
| 28 | | 0.38 | 32.53 | -25.77 | 58.30 | 21.79 | 0.56 | 10.18 | QP |

## 3.7 Antenna Requirements

### 3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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 FCC rule.

### 3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

### 3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

# 4 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSP30 | 101400 | 9kHz~40GHz | Jan. 12, 2016 | Apr. 01, 2016~ Apr. 06, 2016 | Jan. 11, 2017 | Conducted (TH01-SZ) |
| Pulse Power Senor | Anritsu | MA2411B | 1207253 | 30MHz~40GHz | Jan. 12, 2016 | Apr. 01, 2016~ Apr. 06, 2016 | Jan. 11, 2017 | Conducted (TH01-SZ) |
| Power Meter | Anritsu | ML2495A | 1218010 | 50MHz Bandwidth | Jan. 12, 2016 | Apr. 01, 2016~ Apr. 06, 2016 | Jan. 11, 2017 | Conducted (TH01-SZ) |
| EMI Test Receiver | R&S | ESR7 | 101404 | 9kHz~7GHz; Max 30dBm | Oct. 20, 2015 | Mar. 31, 2016~ Apr. 22, 2016 | Oct. 19, 2016 | Radiation (03CH02-SZ) |
| Spectrum Analyzer | R&S | FSV40 | 101041 | 10kHz~40GHz; Max 30dBm | Oct. 20, 2015 | Mar. 31, 2016~ Apr. 22, 2016 | Oct. 19, 2016 | Radiation (03CH02-SZ) |
| Loop Antenna | R&S | HFH2-Z2 | 100354 | 9kHz~30MHz | May 06, 2015 | Mar. 31, 2016~ Apr. 22, 2016 | May 05, 2016 | Radiation (03CH02-SZ) |
| Bilog Antenna | TeseQ | CBL6112D | 35407 | 30MHz~2GHz | May 06, 2015 | Mar. 31, 2016~ Apr. 22, 2016 | May 05, 2016 | Radiation (03CH02-SZ) |
| Double Ridge Horn Antenna | SCHWARZBECK | BBHA 9120D | 9120D-1285 | 1GHz~18GHz | Jan. 11, 2016 | Mar. 31, 2016~ Apr. 22, 2016 | Jan. 10, 2017 | Radiation (03CH02-SZ) |
| SHF-EHF Horn | com-power | AH-840 | 101071 | 18GHz~40GHz | Aug. 17, 2015 | Mar. 31, 2016~ Apr. 22, 2016 | Aug. 16, 2016 | Radiation (03CH02-SZ) |
| Amplifier | HP | 8447F | 3113A04622 | 9kHz~1300MHz / 30 dB | Aug. 07, 2015 | Mar. 31, 2016~ Apr. 22, 2016 | Aug. 06, 2016 | Radiation (03CH02-SZ) |
| Amplifier | Agilent | 8449B | 3008A01023 | 1GHz~26.5GHz | Oct. 20, 2015 | Mar. 31, 2016~ Apr. 22, 2016 | Oct. 19, 2016 | Radiation (03CH02-SZ) |
| HF Amplifier | MITEQ | TTA1840-35-HG | 1871923 | 18GHz~40GHz | Jul. 08, 2015 | Mar. 31, 2016~ Apr. 22, 2016 | Jul. 07, 2016 | Radiation (03CH02-SZ) |
| AC Power Source | Chroma | 61601 | 616010002470 | N/A | NCR | Mar. 31, 2016~ Apr. 22, 2016 | NCR | Radiation (03CH02-SZ) |
| Turn Table | Chaintek | T-200 | N/A | 0~360 degree | NCR | Mar. 31, 2016~ Apr. 22, 2016 | NCR | Radiation (03CH02-SZ) |
| Antenna Mast | Chaintek | MBS-400 | N/A | 1 m~4 m | NCR | Mar. 31, 2016~ Apr. 22, 2016 | NCR | Radiation (03CH02-SZ) |
| EMI Test Receiver | R&S | ESR7 | 101404 | 9kHz~7GHz; Max 30dBm | Oct. 20, 2015 | Mar. 31, 2016~ Apr. 19, 2016 | Oct. 19, 2016 | Conduction (CO01-SZ) |
| AC LISN | EMCO | 3816/2SH | 00103892 | 9kHz~30MHz | Jan.12, 2016 | Mar. 31, 2016~ Apr. 19, 2016 | Jan. 11, 2017 | Conduction (CO01-SZ) |
| AC LISN (for auxiliary equipment) | MessTec | 3816/2SH | 00103912 | 9kHz~30MHz | Jan. 12, 2016 | Mar. 31, 2016~ Apr. 19, 2016 | Jan. 11, 2017 | Conduction (CO01-SZ) |
| AC Power Source | Chroma | 61602 | 616020000891 | 100Vac~250Vac | Aug. 07, 2015 | Mar. 31, 2016~ Apr. 19, 2016 | Aug. 06, 2016 | Conduction (CO01-SZ) |
| Pulse Limiter | COM-POWER | LIT-153 Transient Limiter | 53139 | 150kHz~30MHz | Oct. 20, 2015 | Mar. 31, 2016~ Apr. 19, 2016 | Oct. 19, 2016 | Conduction (CO01-SZ) |

NCR: No Calibration Required

# 5 Uncertainty of Evaluation

**Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)**

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 2.3dB |

**Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

| | |
|---|---|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 5.0dB |

# Appendix A. Conducted Test Results

Report Number : FR633001C

## A1 - DTS Part

| | | | | |
|---|---|---|---|---|
| Test Engineer: | Bruce Huang | Temperature: | 24~26 | °C |
| Test Date: | 2016/4/1~2016/4/6 | Relative Humidity: | 50~53 | % |

## ***TEST RESULTS DATA***
## ***6dB and 99% Occupied Bandwidth***

| 2.4GHz Band | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | 99% Occupied BW (MHz) | 6dB BW (MHz) | 6dB BW Limit (MHz) | Pass/Fail |
| 11b | 1Mbps | 1 | 1 | 2412 | 12.65 | 9.56 | 0.50 | Pass |
| 11b | 1Mbps | 1 | 6 | 2437 | 12.35 | 9.52 | 0.50 | Pass |
| 11b | 1Mbps | 1 | 11 | 2462 | 12.65 | 9.08 | 0.50 | Pass |
| 11g | 6Mbps | 1 | 1 | 2412 | 17.30 | 15.80 | 0.50 | Pass |
| 11g | 6Mbps | 1 | 6 | 2437 | 17.50 | 15.76 | 0.50 | Pass |
| 11g | 6Mbps | 1 | 11 | 2462 | 17.70 | 15.44 | 0.50 | Pass |
| HT20 | MCS0 | 1 | 1 | 2412 | 18.30 | 16.30 | 0.50 | Pass |
| HT20 | MCS0 | 1 | 6 | 2437 | 18.35 | 16.26 | 0.50 | Pass |
| HT20 | MCS0 | 1 | 11 | 2462 | 18.30 | 16.40 | 0.50 | Pass |
| HT40 | MCS0 | 1 | 3 | 2422 | 36.30 | 35.28 | 0.50 | Pass |
| HT40 | MCS0 | 1 | 6 | 2437 | 36.00 | 35.12 | 0.50 | Pass |
| HT40 | MCS0 | 1 | 9 | 2452 | 36.50 | 35.68 | 0.50 | Pass |

## ***TEST RESULTS DATA***
## ***Peak Power Table***

| 2.4GHz Band | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Peak Conducted Power (dBm) | Conducted Power Limit (dBm) | DG (dBi) | EIRP Power (dBm) | EIRP Power Limit (dBm) | Pass /Fail |
| 11b | 1Mbps | 1 | 1 | 2412 | 18.85 | 30.00 | 0.45 | 19.30 | 36.00 | Pass |
| 11b | 1Mbps | 1 | 6 | 2437 | 19.39 | 30.00 | 0.45 | 19.84 | 36.00 | Pass |
| 11b | 1Mbps | 1 | 11 | 2462 | 18.77 | 30.00 | 0.45 | 19.22 | 36.00 | Pass |
| 11g | 6Mbps | 1 | 1 | 2412 | 23.57 | 30.00 | 0.45 | 24.02 | 36.00 | Pass |
| 11g | 6Mbps | 1 | 6 | 2437 | 24.25 | 30.00 | 0.45 | 24.70 | 36.00 | Pass |
| 11g | 6Mbps | 1 | 11 | 2462 | 23.22 | 30.00 | 0.45 | 23.67 | 36.00 | Pass |
| HT20 | MCS0 | 1 | 1 | 2412 | 23.29 | 30.00 | 0.45 | 23.74 | 36.00 | Pass |
| HT20 | MCS0 | 1 | 6 | 2437 | 23.74 | 30.00 | 0.45 | 24.19 | 36.00 | Pass |
| HT20 | MCS0 | 1 | 11 | 2462 | 22.68 | 30.00 | 0.45 | 23.13 | 36.00 | Pass |
| HT40 | MCS0 | 1 | 3 | 2422 | 23.07 | 30.00 | 0.45 | 23.52 | 36.00 | Pass |
| HT40 | MCS0 | 1 | 6 | 2437 | 23.67 | 30.00 | 0.45 | 24.12 | 36.00 | Pass |
| HT40 | MCS0 | 1 | 9 | 2452 | 23.01 | 30.00 | 0.45 | 23.46 | 36.00 | Pass |

***TEST RESULTS DATA***
***Average Power Table***
***(Reporting Only)***

| 2.4GHz Band | | | | | | |
|---|---|---|---|---|---|---|
| Mod. | Data Rate | $N_{TX}$ | CH. | Freq. (MHz) | Duty Factor (dB) | Average Conducted Power (dBm) |
| 11b | 1Mbps | 1 | 1 | 2412 | 0.08 | 15.80 |
| 11b | 1Mbps | 1 | 6 | 2437 | 0.08 | 16.41 |
| 11b | 1Mbps | 1 | 11 | 2462 | 0.08 | 15.70 |
| 11g | 6Mbps | 1 | 1 | 2412 | 0.50 | 14.96 |
| 11g | 6Mbps | 1 | 6 | 2437 | 0.50 | 15.47 |
| 11g | 6Mbps | 1 | 11 | 2462 | 0.50 | 14.50 |
| HT20 | MCS0 | 1 | 1 | 2412 | 0.54 | 13.85 |
| HT20 | MCS0 | 1 | 6 | 2437 | 0.54 | 14.36 |
| HT20 | MCS0 | 1 | 11 | 2462 | 0.54 | 13.56 |
| HT40 | MCS0 | 1 | 3 | 2422 | 1.03 | 13.17 |
| HT40 | MCS0 | 1 | 6 | 2437 | 1.03 | 13.40 |
| HT40 | MCS0 | 1 | 9 | 2452 | 1.03 | 12.66 |

## ***TEST RESULTS DATA***
## ***Peak Power Density***

| 2.4GHz Band | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Peak PSD (dBm /3kHz) | DG (dBi) | Peak PSD Limit (dBm /3kHz) | Pass/Fail |
| 11b | 1Mbps | 1 | 1 | 2412 | -5.69 | 0.45 | 8.00 | Pass |
| 11b | 1Mbps | 1 | 6 | 2437 | -3.96 | 0.45 | 8.00 | Pass |
| 11b | 1Mbps | 1 | 11 | 2462 | -7.03 | 0.45 | 8.00 | Pass |
| 11g | 6Mbps | 1 | 1 | 2412 | -10.06 | 0.45 | 8.00 | Pass |
| 11g | 6Mbps | 1 | 6 | 2437 | -8.77 | 0.45 | 8.00 | Pass |
| 11g | 6Mbps | 1 | 11 | 2462 | -7.91 | 0.45 | 8.00 | Pass |
| HT20 | MCS0 | 1 | 1 | 2412 | -9.95 | 0.45 | 8.00 | Pass |
| HT20 | MCS0 | 1 | 6 | 2437 | -10.70 | 0.45 | 8.00 | Pass |
| HT20 | MCS0 | 1 | 11 | 2462 | -11.80 | 0.45 | 8.00 | Pass |
| HT40 | MCS0 | 1 | 3 | 2422 | -14.07 | 0.45 | 8.00 | Pass |
| HT40 | MCS0 | 1 | 6 | 2437 | -14.28 | 0.45 | 8.00 | Pass |
| HT40 | MCS0 | 1 | 9 | 2452 | -15.45 | 0.45 | 8.00 | Pass |

# Appendix B. Radiated Spurious Emission

## 15C 2.4GHz 2400~2483.5MHz

## WIFI 802.11b (Band Edge @ 3m)

| WIFI | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | |
| 1 | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11b CH 01 2412MHz | | 2389.2 | 47.56 | -26.44 | 74 | 39.23 | 32.6 | 5.07 | 29.34 | 249 | 96 | P | H |
| | | 2389.92 | 36.96 | -17.04 | 54 | 28.67 | 32.6 | 5.07 | 29.38 | 249 | 96 | A | H |
| | * | 2412 | 103.87 | - | - | 95.52 | 32.61 | 5.12 | 29.38 | 249 | 96 | P | H |
| | * | 2412 | 101.67 | - | - | 93.32 | 32.61 | 5.12 | 29.38 | 249 | 96 | A | H |
| | | 2373.09 | 46.64 | -27.36 | 74 | 38.33 | 32.58 | 5.07 | 29.34 | 229 | 342 | P | V |
| | | 2368.68 | 34.5 | -19.5 | 54 | 26.19 | 32.58 | 5.07 | 29.34 | 229 | 342 | A | V |
| | * | 2412 | 94.71 | - | - | 86.36 | 32.61 | 5.12 | 29.38 | 229 | 342 | P | V |
| | * | 2412 | 92.51 | - | - | 84.16 | 32.61 | 5.12 | 29.38 | 229 | 342 | A | V |
| 802.11b CH 06 2437MHz | | 2389.83 | 47.38 | -26.62 | 74 | 39.09 | 32.6 | 5.07 | 29.38 | 217 | 109 | P | H |
| | | 2389.92 | 36.5 | -17.5 | 54 | 28.21 | 32.6 | 5.07 | 29.38 | 217 | 109 | A | H |
| | * | 2437 | 103.91 | - | - | 95.49 | 32.65 | 5.12 | 29.35 | 217 | 109 | P | H |
| | * | 2437 | 101.67 | - | - | 93.25 | 32.65 | 5.12 | 29.35 | 217 | 109 | A | H |
| | | 2484.4 | 48.49 | -25.51 | 74 | 39.96 | 32.68 | 5.16 | 29.31 | 217 | 109 | P | H |
| | | 2483.56 | 38.04 | -15.96 | 54 | 29.51 | 32.68 | 5.16 | 29.31 | 217 | 109 | A | H |
| | | 2379.03 | 46.45 | -27.55 | 74 | 38.14 | 32.58 | 5.07 | 29.34 | 233 | 35 | P | V |
| | | 2389.92 | 34.8 | -19.2 | 54 | 26.51 | 32.6 | 5.07 | 29.38 | 233 | 35 | A | V |
| | * | 2437 | 98.68 | - | - | 90.26 | 32.65 | 5.12 | 29.35 | 233 | 35 | P | V |
| | * | 2437 | 96.32 | - | - | 87.9 | 32.65 | 5.12 | 29.35 | 233 | 35 | A | V |
| | | 2495 | 46.4 | -27.6 | 74 | 37.77 | 32.7 | 5.21 | 29.28 | 233 | 35 | P | V |
| | | 2483.68 | 35.2 | -18.8 | 54 | 26.67 | 32.68 | 5.16 | 29.31 | 233 | 35 | A | V |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **802.11b CH 11 2462MHz** | * | 2462 | 103.15 | - | - | 94.65 | 32.67 | 5.16 | 29.33 | 206 | 249 | P | H |
| | * | 2462 | 100.84 | - | - | 92.34 | 32.67 | 5.16 | 29.33 | 206 | 249 | A | H |
| | | 2484.76 | 48.53 | -25.47 | 74 | 40 | 32.68 | 5.16 | 29.31 | 206 | 249 | P | H |
| | | 2483.92 | 37.95 | -16.05 | 54 | 29.42 | 32.68 | 5.16 | 29.31 | 206 | 249 | A | H |
| | * | 2462 | 96.21 | - | - | 87.71 | 32.67 | 5.16 | 29.33 | 208 | 39 | P | V |
| | * | 2462 | 94.05 | - | - | 85.55 | 32.67 | 5.16 | 29.33 | 208 | 39 | A | V |
| | | 2483.6 | 46.48 | -27.52 | 74 | 37.95 | 32.68 | 5.16 | 29.31 | 208 | 39 | P | V |
| | | 2483.8 | 35.71 | -18.29 | 54 | 27.18 | 32.68 | 5.16 | 29.31 | 208 | 39 | A | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## 15C 2.4GHz 2400~2483.5MHz

## WIFI 802.11b (Harmonic @ 3m)

| WIFI | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | |
| 1 | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11b CH 01 2412MHz | | 4824 | 43.72 | -30.28 | 74 | 60.25 | 34.4 | 7.46 | 58.39 | 185 | 255 | P | H |
| | | 4824 | 43.63 | -30.37 | 74 | 60.16 | 34.4 | 7.46 | 58.39 | 185 | 255 | P | V |
| 802.11b CH 06 2437MHz | | 4874 | 49.21 | -24.79 | 74 | 65.95 | 34.43 | 7.49 | 58.66 | 165 | 106 | P | H |
| | | 7311 | 45.96 | -28.04 | 74 | 58.66 | 36.22 | 9.7 | 58.62 | 174 | 100 | P | H |
| | | 4874 | 45.85 | -28.15 | 74 | 62.59 | 34.43 | 7.49 | 58.66 | 165 | 106 | P | V |
| | | 7311 | 45.84 | -28.16 | 74 | 58.54 | 36.22 | 9.7 | 58.62 | 174 | 100 | P | V |
| 802.11b CH 11 2462MHz | | 4924 | 48.7 | -25.3 | 74 | 65.23 | 34.46 | 7.53 | 58.52 | 150 | 285 | P | H |
| | | 7386 | 46.06 | -27.94 | 74 | 58.54 | 36.26 | 9.8 | 58.54 | 155 | 274 | P | H |
| | | 4924 | 45.25 | -28.75 | 74 | 61.78 | 34.46 | 7.53 | 58.52 | 150 | 285 | P | V |
| | | 7386 | 46.64 | -27.36 | 74 | 59.12 | 36.26 | 9.8 | 58.54 | 155 | 274 | P | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## 15C 2.4GHz 2400~2483.5MHz

## WIFI 802.11g (Band Edge @ 3m)

| WIFI | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | |
| 1 | | ( MHz ) | ( dBµV/m ) | ( dB ) | ( dBµV/m ) | ( dBµV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11g CH 01 2412MHz | | 2389.92 | 56.69 | -17.31 | 74 | 48.4 | 32.6 | 5.07 | 29.38 | 196 | 105 | P | H |
| | | 2389.92 | 44.01 | -9.99 | 54 | 35.72 | 32.6 | 5.07 | 29.38 | 196 | 105 | A | H |
| | * | 2412 | 106.96 | - | - | 98.61 | 32.61 | 5.12 | 29.38 | 196 | 105 | P | H |
| | * | 2412 | 99.28 | - | - | 90.93 | 32.61 | 5.12 | 29.38 | 196 | 105 | A | H |
| | | 2389.65 | 51.81 | -22.19 | 74 | 43.48 | 32.6 | 5.07 | 29.34 | 242 | 127 | P | V |
| | | 2389.83 | 38.27 | -15.73 | 54 | 29.98 | 32.6 | 5.07 | 29.38 | 242 | 127 | A | V |
| | * | 2412 | 100.13 | - | - | 91.78 | 32.61 | 5.12 | 29.38 | 242 | 127 | P | V |
| | * | 2412 | 92.61 | - | - | 84.26 | 32.61 | 5.12 | 29.38 | 242 | 127 | A | V |
| 802.11g CH 06 2437MHz | | 2389.92 | 52.76 | -21.24 | 74 | 44.47 | 32.6 | 5.07 | 29.38 | 241 | 104 | P | H |
| | | 2389.83 | 41.77 | -12.23 | 54 | 33.48 | 32.6 | 5.07 | 29.38 | 241 | 104 | A | H |
| | * | 2437 | 106.27 | - | - | 97.85 | 32.65 | 5.12 | 29.35 | 241 | 104 | P | H |
| | * | 2437 | 98.09 | - | - | 89.67 | 32.65 | 5.12 | 29.35 | 241 | 104 | A | H |
| | | 2483.64 | 52.05 | -21.95 | 74 | 43.52 | 32.68 | 5.16 | 29.31 | 241 | 104 | P | H |
| | | 2483.6 | 41.64 | -12.36 | 54 | 33.11 | 32.68 | 5.16 | 29.31 | 241 | 104 | A | H |
| | | 2389.92 | 48.18 | -25.82 | 74 | 39.89 | 32.6 | 5.07 | 29.38 | 245 | 130 | P | V |
| | | 2389.56 | 38.42 | -15.58 | 54 | 30.09 | 32.6 | 5.07 | 29.34 | 245 | 130 | A | V |
| | * | 2437 | 99.88 | - | - | 91.46 | 32.65 | 5.12 | 29.35 | 245 | 130 | P | V |
| | * | 2437 | 92.66 | - | - | 84.24 | 32.65 | 5.12 | 29.35 | 245 | 130 | A | V |
| | | 2483.88 | 48.79 | -25.21 | 74 | 40.26 | 32.68 | 5.16 | 29.31 | 245 | 130 | P | V |
| | | 2483.84 | 37.87 | -16.13 | 54 | 29.34 | 32.68 | 5.16 | 29.31 | 245 | 130 | A | V |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **802.11g CH 11 2462MHz** | * | 2462 | 105.64 | - | - | 97.14 | 32.67 | 5.16 | 29.33 | 167 | 104 | P | H |
| | * | 2462 | 97.34 | - | - | 88.84 | 32.67 | 5.16 | 29.33 | 167 | 104 | A | H |
| | | 2483.52 | 59.7 | -14.3 | 74 | 51.17 | 32.68 | 5.16 | 29.31 | 167 | 104 | P | H |
| | | 2483.68 | 44.64 | -9.36 | 54 | 36.11 | 32.68 | 5.16 | 29.31 | 167 | 104 | A | H |
| | * | 2462 | 99.49 | - | - | 90.99 | 32.67 | 5.16 | 29.33 | 238 | 132 | P | V |
| | * | 2462 | 92.11 | - | - | 83.61 | 32.67 | 5.16 | 29.33 | 238 | 132 | A | V |
| | | 2484.28 | 52.88 | -21.12 | 74 | 44.35 | 32.68 | 5.16 | 29.31 | 238 | 132 | P | V |
| | | 2483.6 | 39.04 | -14.96 | 54 | 30.51 | 32.68 | 5.16 | 29.31 | 238 | 132 | A | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## 15C 2.4GHz 2400~2483.5MHz

## WIFI 802.11g (Harmonic @ 3m)

| WIFI Ant. | Note | Frequency | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11g CH 01 2412MHz | | 4824 | 43.32 | -30.68 | 74 | 59.85 | 34.4 | 7.46 | 58.39 | 185 | 255 | P | H |
| | | 4824 | 44.2 | -29.8 | 74 | 60.73 | 34.4 | 7.46 | 58.39 | 185 | 255 | P | V |
| 802.11g CH 06 2437MHz | | 4874 | 46.45 | -27.55 | 74 | 63.19 | 34.43 | 7.49 | 58.66 | 165 | 106 | P | H |
| | | 7311 | 46.83 | -27.17 | 74 | 59.53 | 36.22 | 9.7 | 58.62 | 174 | 100 | P | H |
| | | 4874 | 44.3 | -29.7 | 74 | 61.04 | 34.43 | 7.49 | 58.66 | 165 | 106 | P | V |
| | | 7311 | 46.65 | -27.35 | 74 | 59.35 | 36.22 | 9.7 | 58.62 | 174 | 100 | P | V |
| 802.11g CH 11 2462MHz | | 4924 | 44.58 | -29.42 | 74 | 61.11 | 34.46 | 7.53 | 58.52 | 150 | 285 | P | H |
| | | 7386 | 45.72 | -28.28 | 74 | 58.2 | 36.26 | 9.8 | 58.54 | 155 | 274 | P | H |
| | | 4924 | 44.57 | -29.43 | 74 | 61.1 | 34.46 | 7.53 | 58.52 | 150 | 285 | P | V |
| | | 7386 | 45.99 | -28.01 | 74 | 58.47 | 36.26 | 9.8 | 58.54 | 155 | 274 | P | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## 15C 2.4GHz 2400~2483.5MHz
## WIFI 802.11n HT20 (Band Edge @ 3m)

| WIFI | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | |
| 1 | | ( MHz ) | ( dBµV/m ) | ( dB ) | ( dBµV/m ) | ( dBµV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11n HT20 CH 01 2412MHz | | 2389.47 | 58.96 | -15.04 | 74 | 50.63 | 32.6 | 5.07 | 29.34 | 196 | 107 | P | H |
| | | 2389.83 | 45.09 | -8.91 | 54 | 36.8 | 32.6 | 5.07 | 29.38 | 196 | 107 | A | H |
| | * | 2412 | 106.55 | - | - | 98.2 | 32.61 | 5.12 | 29.38 | 196 | 107 | P | H |
| | * | 2412 | 98.55 | - | - | 90.2 | 32.61 | 5.12 | 29.38 | 196 | 107 | A | H |
| | | 2389.92 | 51.23 | -22.77 | 74 | 42.94 | 32.6 | 5.07 | 29.38 | 242 | 127 | P | V |
| | | 2389.92 | 39.32 | -14.68 | 54 | 31.03 | 32.6 | 5.07 | 29.38 | 242 | 127 | A | V |
| | * | 2412 | 99.35 | - | - | 91 | 32.61 | 5.12 | 29.38 | 242 | 127 | P | V |
| | * | 2412 | 91.5 | - | - | 83.15 | 32.61 | 5.12 | 29.38 | 242 | 127 | A | V |
| 802.11n HT20 CH 06 2437MHz | | 2390 | 50.04 | -23.96 | 74 | 41.75 | 32.6 | 5.07 | 29.38 | 242 | 105 | P | H |
| | | 2389.92 | 40.74 | -13.26 | 54 | 32.45 | 32.6 | 5.07 | 29.38 | 242 | 105 | A | H |
| | * | 2437 | 105.9 | - | - | 97.48 | 32.65 | 5.12 | 29.35 | 242 | 105 | P | H |
| | * | 2437 | 97.11 | - | - | 88.69 | 32.65 | 5.12 | 29.35 | 242 | 105 | A | H |
| | | 2483.96 | 50.94 | -23.06 | 74 | 42.41 | 32.68 | 5.16 | 29.31 | 242 | 105 | P | H |
| | | 2483.96 | 40.59 | -13.41 | 54 | 32.06 | 32.68 | 5.16 | 29.31 | 242 | 105 | A | H |
| | | 2389.92 | 47.87 | -26.13 | 74 | 39.58 | 32.6 | 5.07 | 29.38 | 246 | 132 | P | V |
| | | 2389.83 | 37.49 | -16.51 | 54 | 29.2 | 32.6 | 5.07 | 29.38 | 246 | 132 | A | V |
| | * | 2437 | 98.06 | - | - | 89.64 | 32.65 | 5.12 | 29.35 | 246 | 132 | P | V |
| | * | 2437 | 91.14 | - | - | 82.72 | 32.65 | 5.12 | 29.35 | 246 | 132 | A | V |
| | | 2486.24 | 46.93 | -27.07 | 74 | 38.4 | 32.68 | 5.16 | 29.31 | 246 | 132 | P | V |
| | | 2483.76 | 37 | -17 | 54 | 28.47 | 32.68 | 5.16 | 29.31 | 246 | 132 | A | V |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11n HT20 CH 11 2462MHz | * | 2462 | 105.35 | - | - | 96.85 | 32.67 | 5.16 | 29.33 | 167 | 104 | P | H |
| | * | 2462 | 95.85 | - | - | 87.35 | 32.67 | 5.16 | 29.33 | 167 | 104 | A | H |
| | | 2483.68 | 58.84 | -15.16 | 74 | 50.31 | 32.68 | 5.16 | 29.31 | 167 | 104 | P | H |
| | | 2484 | 44.31 | -9.69 | 54 | 35.78 | 32.68 | 5.16 | 29.31 | 167 | 104 | A | H |
| | * | 2462 | 99.54 | - | - | 91.04 | 32.67 | 5.16 | 29.33 | 239 | 132 | P | V |
| | * | 2462 | 91.18 | - | - | 82.68 | 32.67 | 5.16 | 29.33 | 239 | 132 | A | V |
| | | 2483.92 | 54.35 | -19.65 | 74 | 45.82 | 32.68 | 5.16 | 29.31 | 239 | 132 | P | V |
| | | 2483.76 | 39.08 | -14.92 | 54 | 30.55 | 32.68 | 5.16 | 29.31 | 239 | 132 | A | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## 15C 2.4GHz 2400~2483.5MHz

## WIFI 802.11n HT20 (Harmonic @ 3m)

| WIFI | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | |
| 1 | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11n HT20 CH 01 2412MHz | | 4824 | 43.42 | -30.58 | 74 | 59.95 | 34.4 | 7.46 | 58.39 | 185 | 255 | P | H |
| | | 4824 | 43.98 | -30.02 | 74 | 60.51 | 34.4 | 7.46 | 58.39 | 185 | 255 | P | V |
| 802.11n HT20 CH 06 2437MHz | | 4874 | 44.7 | -29.3 | 74 | 61.44 | 34.43 | 7.49 | 58.66 | 165 | 106 | P | H |
| | | 7311 | 46.26 | -27.74 | 74 | 58.96 | 36.22 | 9.7 | 58.62 | 174 | 100 | P | H |
| | | 4874 | 44.69 | -29.31 | 74 | 61.43 | 34.43 | 7.49 | 58.66 | 165 | 106 | P | V |
| | | 7311 | 45.95 | -28.05 | 74 | 58.65 | 36.22 | 9.7 | 58.62 | 174 | 100 | P | V |
| 802.11n HT20 CH 11 2462MHz | | 4924 | 43.76 | -30.24 | 74 | 60.29 | 34.46 | 7.53 | 58.52 | 150 | 285 | P | H |
| | | 7386 | 46.78 | -27.22 | 74 | 59.26 | 36.26 | 9.8 | 58.54 | 155 | 274 | P | H |
| | | 4924 | 44.3 | -29.7 | 74 | 60.83 | 34.46 | 7.53 | 58.52 | 150 | 285 | P | V |
| | | 7386 | 46.11 | -27.89 | 74 | 58.59 | 36.26 | 9.8 | 58.54 | 155 | 274 | P | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## 15C 2.4GHz 2400~2483.5MHz
## WIFI 802.11n HT40 (Band Edge @ 3m)

| WIFI Ant. 1 | Note | Frequency ( MHz ) | Level ( dBμV/m ) | Over Limit ( dB ) | Limit Line ( dBμV/m ) | Read Level ( dBμV ) | Antenna Factor ( dB/m ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Peak Avg. (P/A) | Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11n HT40 CH 03 2422MHz | | 2389.74 | 66.04 | -7.96 | 74 | 57.71 | 32.6 | 5.07 | 29.34 | 196 | 109 | P | H |
| | | 2389.65 | 49.38 | -4.62 | 54 | 41.05 | 32.6 | 5.07 | 29.34 | 196 | 109 | A | H |
| | * | 2422 | 103.65 | - | - | 95.25 | 32.63 | 5.12 | 29.35 | 196 | 109 | P | H |
| | * | 2422 | 95.37 | - | - | 86.97 | 32.63 | 5.12 | 29.35 | 196 | 109 | A | H |
| | | 2484.04 | 49.39 | -24.61 | 74 | 40.86 | 32.68 | 5.16 | 29.31 | 196 | 109 | P | H |
| | | 2483.64 | 39.65 | -14.35 | 54 | 31.12 | 32.68 | 5.16 | 29.31 | 196 | 109 | A | H |
| | | 2389.74 | 59.27 | -14.73 | 74 | 50.94 | 32.6 | 5.07 | 29.34 | 243 | 132 | P | V |
| | | 2389.83 | 43.49 | -10.51 | 54 | 35.2 | 32.6 | 5.07 | 29.38 | 243 | 132 | A | V |
| | * | 2422 | 95.12 | - | - | 86.72 | 32.63 | 5.12 | 29.35 | 243 | 132 | P | V |
| | * | 2422 | 88.56 | - | - | 80.16 | 32.63 | 5.12 | 29.35 | 243 | 132 | A | V |
| | | 2484.44 | 46.44 | -27.56 | 74 | 37.91 | 32.68 | 5.16 | 29.31 | 243 | 132 | P | V |
| | | 2483.68 | 37.19 | -16.81 | 54 | 28.66 | 32.68 | 5.16 | 29.31 | 243 | 132 | A | V |
| 802.11n HT40 CH 06 2437MHz | | 2389.74 | 50.35 | -23.65 | 74 | 42.02 | 32.6 | 5.07 | 29.34 | 166 | 105 | P | H |
| | | 2389.74 | 40.17 | -13.83 | 54 | 31.84 | 32.6 | 5.07 | 29.34 | 166 | 105 | A | H |
| | * | 2437 | 103.1 | - | - | 94.68 | 32.65 | 5.12 | 29.35 | 166 | 105 | P | H |
| | * | 2437 | 95.22 | - | - | 86.8 | 32.65 | 5.12 | 29.35 | 166 | 105 | A | H |
| | | 2483.56 | 54.02 | -19.98 | 74 | 45.49 | 32.68 | 5.16 | 29.31 | 166 | 105 | P | H |
| | | 2484 | 43.26 | -10.74 | 54 | 34.73 | 32.68 | 5.16 | 29.31 | 166 | 105 | A | H |
| | | 2389.74 | 47.72 | -26.28 | 74 | 39.39 | 32.6 | 5.07 | 29.34 | 247 | 130 | P | V |
| | | 2389.74 | 38.86 | -15.14 | 54 | 30.53 | 32.6 | 5.07 | 29.34 | 247 | 130 | A | V |
| | * | 2437 | 96.84 | - | - | 88.42 | 32.65 | 5.12 | 29.35 | 247 | 130 | P | V |
| | * | 2437 | 88.62 | - | - | 80.2 | 32.65 | 5.12 | 29.35 | 247 | 130 | A | V |
| | | 2483.64 | 47.58 | -26.42 | 74 | 39.05 | 32.68 | 5.16 | 29.31 | 247 | 130 | P | V |
| | | 2483.68 | 37.93 | -16.07 | 54 | 29.4 | 32.68 | 5.16 | 29.31 | 247 | 130 | A | V |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11n HT40 CH 09 2452MHz | | 2389.83 | 47.49 | -26.51 | 74 | 39.2 | 32.6 | 5.07 | 29.38 | 166 | 105 | P | H |
| | | 2389.74 | 38.3 | -15.7 | 54 | 29.97 | 32.6 | 5.07 | 29.34 | 166 | 105 | A | H |
| | * | 2452 | 103.06 | - | - | 94.58 | 32.65 | 5.16 | 29.33 | 166 | 105 | P | H |
| | * | 2452 | 95.22 | - | - | 86.74 | 32.65 | 5.16 | 29.33 | 166 | 105 | A | H |
| | | 2483.68 | 63.96 | -10.04 | 74 | 55.43 | 32.68 | 5.16 | 29.31 | 166 | 105 | P | H |
| | | 2484 | 46.15 | -7.85 | 54 | 37.62 | 32.68 | 5.16 | 29.31 | 166 | 105 | A | H |
| | | 2389.01 | 46.52 | -27.48 | 74 | 38.19 | 32.6 | 5.07 | 29.34 | 247 | 130 | P | V |
| | | 2389.56 | 37.36 | -16.64 | 54 | 29.03 | 32.6 | 5.07 | 29.34 | 247 | 130 | A | V |
| | * | 2452 | 97.51 | - | - | 89.03 | 32.65 | 5.16 | 29.33 | 247 | 130 | P | V |
| | * | 2452 | 89.76 | - | - | 81.28 | 32.65 | 5.16 | 29.33 | 247 | 130 | A | V |
| | | 2484.36 | 56.09 | -17.91 | 74 | 47.56 | 32.68 | 5.16 | 29.31 | 247 | 130 | P | V |
| | | 2484.08 | 39.68 | -14.32 | 54 | 31.15 | 32.68 | 5.16 | 29.31 | 247 | 130 | A | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## 15C 2.4GHz 2400~2483.5MHz

## WIFI 802.11n HT40 (Harmonic @ 3m)

| WIFI Ant. | Note | Frequency | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11n HT40 CH 03 2422MHz | | 4844 | 44.13 | -29.87 | 74 | 60.74 | 34.41 | 7.46 | 58.48 | 150 | 350 | P | H |
| | | 7266 | 45.22 | -28.78 | 74 | 57.89 | 36.21 | 9.65 | 58.53 | 200 | 360 | P | H |
| | | 4844 | 44.48 | -29.52 | 74 | 61.09 | 34.41 | 7.46 | 58.48 | 150 | 350 | P | V |
| | | 7266 | 46.4 | -27.6 | 74 | 59.07 | 36.21 | 9.65 | 58.53 | 200 | 360 | P | V |
| 802.11n HT40 CH 06 2437MHz | | 4874 | 44.6 | -29.4 | 74 | 61.34 | 34.43 | 7.49 | 58.66 | 165 | 230 | P | H |
| | | 7311 | 45.99 | -28.01 | 74 | 58.69 | 36.22 | 9.7 | 58.62 | 186 | 323 | P | H |
| | | 4874 | 43.83 | -30.17 | 74 | 60.57 | 34.43 | 7.49 | 58.66 | 165 | 230 | P | V |
| | | 7311 | 47.12 | -26.88 | 74 | 59.82 | 36.22 | 9.7 | 58.62 | 186 | 323 | P | V |
| 802.11n HT40 CH 09 2452MHz | | 4904 | 43.54 | -30.46 | 74 | 60.2 | 34.45 | 7.53 | 58.64 | 150 | 360 | P | H |
| | | 7356 | 46.15 | -27.85 | 74 | 58.73 | 36.24 | 9.75 | 58.57 | 165 | 335 | P | H |
| | | 4904 | 43.76 | -30.24 | 74 | 60.42 | 34.45 | 7.53 | 58.64 | 150 | 360 | P | V |
| | | 7356 | 45.94 | -28.06 | 74 | 58.52 | 36.24 | 9.75 | 58.57 | 165 | 335 | P | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## 15C Emission below 1GHz

## 2.4GHz WIFI 802.11n HT40 (LF)

| WIFI | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | |
| 1 | | ( MHz ) | ( dBµV/m ) | ( dB ) | ( dBµV/m ) | (dBµV) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 2.4GHz 802.11n HT40 LF | | 95.96 | 25.83 | -17.67 | 43.5 | 38.97 | 11.22 | 1.44 | 25.8 | - | - | P | H |
| | | 191.99 | 34.02 | -9.48 | 43.5 | 45.67 | 11.56 | 2.08 | 25.29 | 100 | 0 | P | H |
| | | 277.35 | 31.86 | -14.14 | 46 | 41.08 | 13.33 | 2.54 | 25.09 | - | - | P | H |
| | | 500.45 | 26.84 | -19.16 | 46 | 30.13 | 19.4 | 3.65 | 26.34 | - | - | P | H |
| | | 812.79 | 29.84 | -16.16 | 46 | 28.54 | 22.39 | 5.04 | 26.13 | - | - | P | H |
| | | 896.21 | 34.04 | -11.96 | 46 | 32.91 | 21.63 | 5.38 | 25.88 | - | - | P | H |
| | | 53.28 | 35.06 | -4.94 | 40 | 50.52 | 9.48 | 1.03 | 25.97 | 100 | 0 | P | V |
| | | 80.44 | 29.54 | -10.46 | 40 | 43.88 | 10.2 | 1.32 | 25.86 | - | - | P | V |
| | | 169.68 | 28.24 | -15.26 | 43.5 | 39.82 | 11.88 | 1.95 | 25.41 | - | - | P | V |
| | | 280.26 | 25.48 | -20.52 | 46 | 34.58 | 13.43 | 2.55 | 25.08 | - | - | P | V |
| | | 793.39 | 29.85 | -16.15 | 46 | 28.73 | 22.35 | 4.95 | 26.18 | - | - | P | V |
| | | 981.57 | 29.97 | -24.03 | 54 | 28.3 | 21.27 | 5.65 | 25.25 | - | - | P | V |
| Remark | 1. No other spurious found.<br>2. All results are PASS against limit line. | | | | | | | | | | | | |

**Note symbol**

| | |
|---|---|
| * | **Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency per 15.209(c). |
| ! | Test result is **over limit** line. |
| P/A | **P**eak or **A**verage |
| H/V | **H**orizontal or **V**ertical |

## A calculation example for radiated spurious emission is shown as below:

| WIFI | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | |
| 1+2 | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11b CH 01 2412MHz | | 2390 | 55.45 | -18.55 | 74 | 54.51 | 32.22 | 4.58 | 35.86 | 103 | 308 | P | H |
| | | 2390 | 43.54 | -10.46 | 54 | 42.6 | 32.22 | 4.58 | 35.86 | 103 | 308 | A | H |

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

**For Peak Limit @ 2390MHz:**

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

**For Average Limit @ 2390MHz:**

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

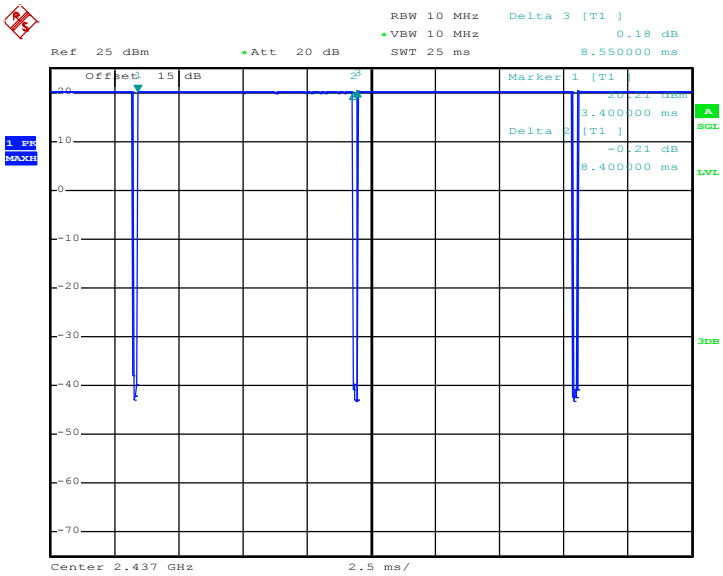
= -10.46(dB)

**Both peak and average measured complies with the limit line, so test result is “PASS”.**

# Appendix C. Duty Cycle Plots

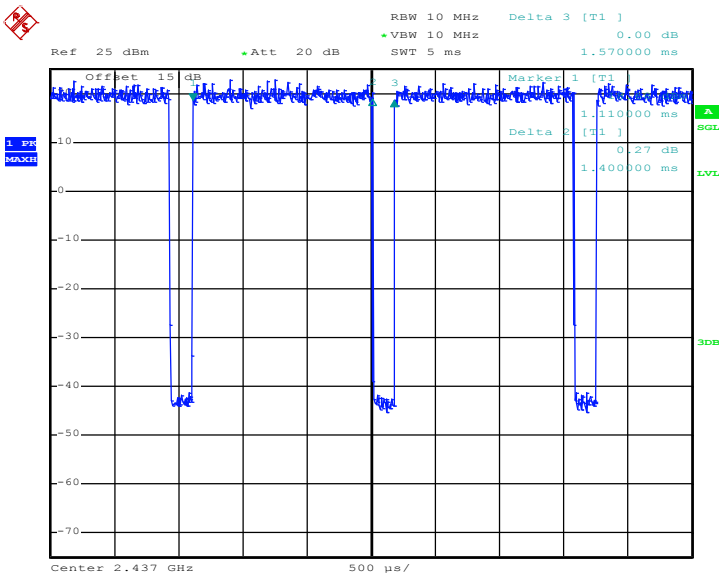
| Band | Duty Cycle(%) | T(ms) | 1/T(kHz) | VBW Setting |
|---|---|---|---|---|
| 802.11b | 98.25 | - | - | 10Hz |
| 802.11g | 89.17 | 1.40 | 0.71 | 1kHz |
| 2.4GHz 802.11n HT20 | 88.23 | 1.30 | 0.77 | 1kHz |
| 2.4GHz 802.11n HT40 | 78.95 | 0.65 | 1.54 | 3kHz |

**802.11b**




Date: 31.MAR.2016 21:50:24

## 802.11g

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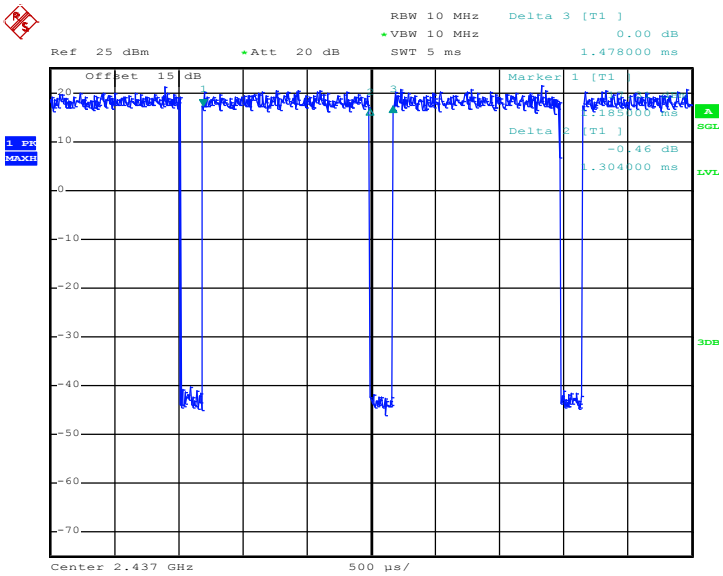
## 2.4GHz 802.11n HT20

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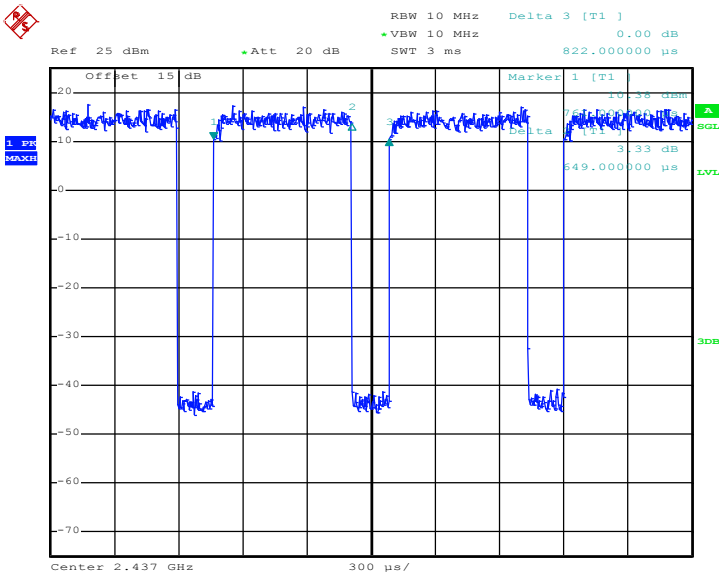
## 2.4GHz 802.11n HT40

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