



# FCC RF Test Report

**APPLICANT** : Sony Mobile Communications Inc.  
**EQUIPMENT** : GSM/WCDMA/LTE Phone+Bluetooth, DTS/UNII  
a/b/g/n and NFC  
**BRAND NAME** : Sony  
**FCC ID** : PY7-84795R  
**STANDARD** : FCC Part 15 Subpart E §15.407  
**CLASSIFICATION** : (NII) Unlicensed National Information Infrastructure

This is a variant report which is only valid together with the original test report. The product was received on Sep. 22, 2016 and testing was completed on Nov. 28, 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.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



## SPORTON INTERNATIONAL INC.

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### REVISION HISTORY

| REPORT NO.   | VERSION | DESCRIPTION             | ISSUED DATE   |
|--------------|---------|-------------------------|---------------|
| FR692210-01E | Rev. 01 | Initial issue of report | Feb. 06, 2017 |
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### SUMMARY OF TEST RESULT

| Report Section | FCC Rule           | Description                            | Limit  | Result | Remark                                    |
|----------------|--------------------|--|--|--------|---|
| 3.1            | 15.407(a)          | Maximum Conducted Output Power         | FCC<br>≤ 24 dBm<br>(depend on band)          | Pass   | -   |
| 3.2            | 15.407(b)          | Unwanted Emissions                     | ≤ -17, -27 dBm<br>(depend on band)&15.209(a) | Pass   | Under limit<br>3.06 dB at<br>5725.240 MHz |
| 3.3            | 15.407(c)          | Automatically Discontinue Transmission | Discontinue Transmission                     | Pass   | -   |
| 3.4            | 15.203 & 15.407(a) | Antenna Requirement                    | N/A  | Pass   | -   |



# 1 General Description

## 1.1 Applicant

**Sony Mobile Communications Inc.**

4-12-3 Higashi-Shinagawa, Shinagawa-ku, Tokyo, 140-0002, Japan

## 1.2 Manufacturer

**Sony Mobile Communications Inc.**

4-12-3 Higashi-Shinagawa, Shinagawa-ku, Tokyo, 140-0002, Japan

## 1.3 Product Feature of Equipment Under Test

GSM/WCDMA/LTE, Bluetooth, DTS/UNII, a/b/g/n, GPS, and NFC

| Standards-related Product Specification |                                    |
|---|------------------------------------|
| Antenna Type                            | PIFA Antenna                       |
| Antenna Gain                            | <5150 MHz ~ 5250 MHz><br>-3.40 dBi |
|   | <5250 MHz ~ 5350 MHz><br>-2.70 dBi |
|   | <5470 MHz ~ 5725 MHz><br>-1.50 dBi |
|   |                                    |

**Remark:** This is a variant report. All the test cases were performed on original report which can be referred to Sporton Report Number FR692208-01E.

| EUT Information List |            |            |                            |
|----------------------|------------|------------|----------------------------|
| HW Version           | SW Version | S/N        | Performed Test Item        |
| A                    | 0.85       | RQ3002H1GK | RF conducted measurement   |
|                      |            | RQ3002H1FP | Radiated Spurious Emission |



| Accessory List |                       |
|----------------|-----------------------|
| AC Adapter 1   | Model No. : UCH20     |
|                | S/N : 1215W48600011   |
| Earphone 1     | Model No. : MH410c    |
|                | S/N : 1632A86300007A6 |
| USB Cable      | Model No. : UCB20     |
|                | S/N : 1625A912000332E |

**Note:**

1. Above EUT list and accessory list used are electrically identical per declared by manufacturer.
2. Above the accessories list are used to exercise the EUT during test.
3. For other wireless features of this EUT, test report will be issued separately.

### 1.4 Modification of EUT

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



### 1.5 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.

|                           |  |
|---------------------------|--|
| <b>Test Site</b>          | SPORTON INTERNATIONAL INC.   |
| <b>Test Site Location</b> | 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 |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b>  |
|                           | TH05-HY  |

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

|                           |  |
|---------------------------|--|
| <b>Test Site</b>          | SPORTON INTERNATIONAL INC.   |
| <b>Test Site Location</b> | No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist,<br>Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-0868<br>FAX: +886-3-327-0855 |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b>  |
|                           | 03CH12-HY  |

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

### 1.6 Applicable Standards

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

- ♦ FCC Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03
- ♦ 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: 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.

### 2.1 Carrier Frequency Channel

| Frequency Band                       | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|--------------------------------------|---------|-------------|---------|-------------|
| 5150-5250 MHz<br>Band 1<br>(U-NII-1) | 36      | 5180        | 44      | 5220        |
|                                      | 38*     | 5190        | 46*     | 5230        |
|                                      | 40      | 5200        | 48      | 5240        |
|                                      | -       | -           |         |             |

| Frequency Band                        | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---------------------------------------|---------|-------------|---------|-------------|
| 5250-5350 MHz<br>Band 2<br>(U-NII-2A) | 52      | 5260        | 60      | 5300        |
|                                       | 54*     | 5270        | 62*     | 5310        |
|                                       | 56      | 5280        | 64      | 5320        |
|                                       | -       | -           |         |             |

| Frequency Band                        | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---------------------------------------|---------|-------------|---------|-------------|
| 5470-5725 MHz<br>Band 3<br>(U-NII-2C) | 100     | 5500        | 112     | 5560        |
|                                       | 102*    | 5510        | 116     | 5580        |
|                                       | 104     | 5520        | 132     | 5660        |
|                                       | -       | -           | 134*    | 5670        |
|                                       | 108     | 5540        | 136     | 5680        |
|                                       | 110*    | 5550        | 140     | 5700        |

| Frequency Band   | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|------------------|---------|-------------|---------|-------------|
| Straddle Channel | -       | -           | 144     | 5720        |
|                  | 142*    | 5710        |         |             |

**Note:** The above Frequency and Channel in "\*" were 802.11n HT40.

## 2.2 Test Mode

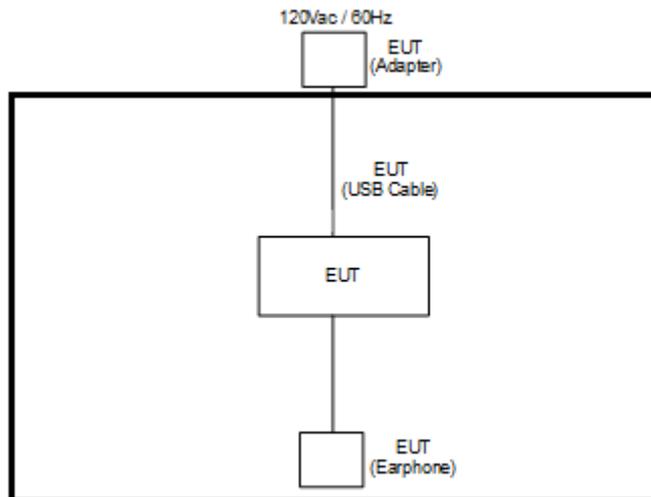
Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

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

| Ch. # |        | Band I : 5150-5250 MHz | Band II : 5250-5350 MHz | Band III : 5470-5725MHz |
|-------|--------|------------------------|-------------------------|-------------------------|
|       |        | 802.11n HT40           | 802.11n HT40            | 802.11n HT20            |
| L     | Low    | 38                     | -                       | -                       |
| M     | Middle | -                      | -                       | -                       |
| H     | High   | -                      | 62                      | 140                     |

## 2.3 Connection Diagram of Test System

<WLAN Tx Mode>



## 2.4 EUT Operation Test Setup

For RF test items, an engineering test program was provided and enabled to make EUT transmitting signals.



### 3 Test Result

#### 3.1 Maximum Conducted Output Power Measurement

##### 3.1.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW.

For the 5.25–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz.

For Straddle Channel, U-NII procedures and limits were applied for operations in the frequency band in accordance with FCC KDB 644545 D03.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

##### 3.1.2 Measuring Instruments

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

### 3.1.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03.

Method PM (Measurement using an RF average power meter):

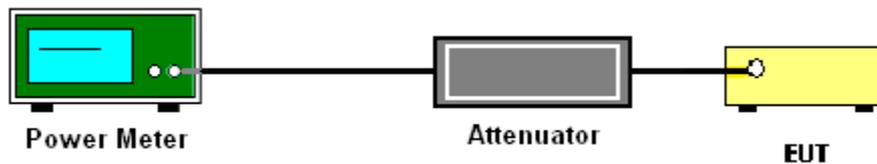
1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor,  $10 \log(1/x)$ , where  $x$  is the duty cycle.

For straddle channel, the testing follows Method SA-3 (RMS detection with max hold) of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03.

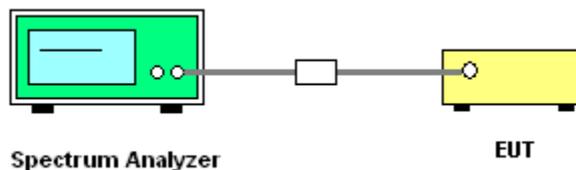
Compute power by integrating the spectrum across the 99% occupied bandwidth of the signal using the instrument's band power measurement function.

### 3.1.4 Test Setup

For normal channel:



For straddle channel:



### 3.1.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.



### 3.2 Unwanted Radiated Emission Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

#### 3.2.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27dBm/MHz.

For transmitters operating in the 5250-5350 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band must meet all applicable technical requirements for operation in the 5150-5250 MHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5150-5250 MHz band.

For transmitters operating in the 5470-5725MHz band: all emissions outside of the 5470-5725MHz band shall not exceed an EIRP of -27 dBm/MHz.

- (2) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,

| 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                             |

Note: The following formula is used to convert the EIRP to field strength.

$$E = \frac{1000000\sqrt{30P}}{3} \mu V/m, \text{ where } P \text{ is the eirp (Watts)}$$



| EIRP (dBm) | Field Strength at 3m (dBμV/m) |
|------------|-------------------------------|
| -17        | 78.3                          |
| - 27       | 68.3                          |

(3) KDB789033 D01 v01r03 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

### 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 FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03. Section G) Unwanted emissions measurement.

(1) Procedure for Unwanted Emissions Measurements Below 1000MHz

- RBW = 120 kHz
- VBW = 300 kHz
- Detector = Peak
- Trace mode = max hold

(2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

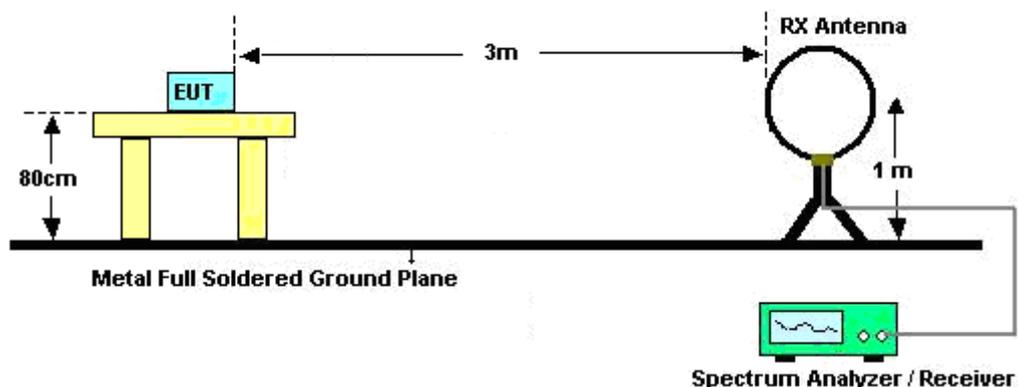
(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

- RBW = 1 MHz
- 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.

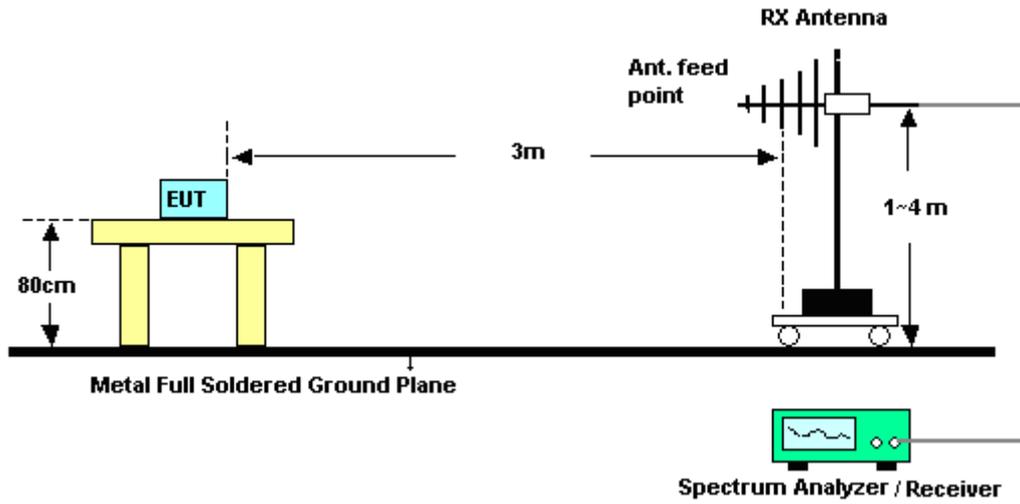
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

### 3.2.4 Test Setup

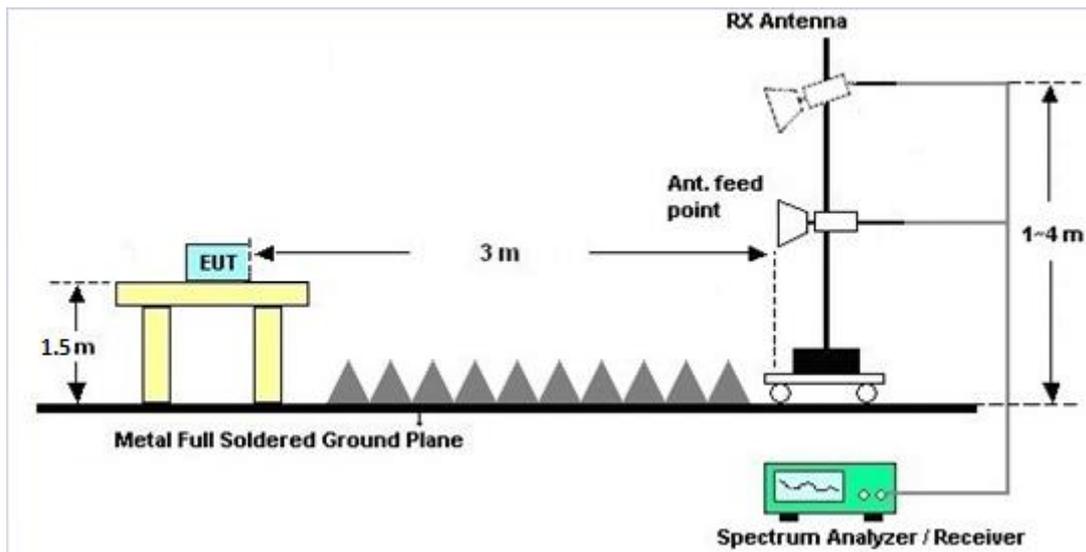
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz





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

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.

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

Please refer to Appendix B and C.

### **3.2.7 Duty Cycle**

Please refer to Appendix D.

### **3.2.8 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic)**

Please refer to Appendix B and C.



### **3.3 Automatically Discontinue Transmission**

#### **3.3.1 Limit of Automatically Discontinue Transmission**

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

#### **3.3.2 Measuring Instruments**

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

#### **3.3.3 Test Result of Automatically Discontinue Transmission**

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.



## **3.4 Antenna Requirements**

### **3.4.1 Standard Applicable**

According to FCC 47 CFR Section 15.407(a)(1)(2) ,if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **3.4.2 Antenna Anti-Replacement Construction**

An embedded-in antenna design is used.

### **3.4.3 Antenna Gain**

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



## 4 List of Measuring Equipments

| Instrument           | Manufacturer    | Model No.               | Serial No.      | Characteristics | Calibration Date | Test Date                     | Due Date      | Remark                |
|----------------------|-----------------|-------------------------|-----------------|-----------------|------------------|-------------------------------|---------------|-----------------------|
| Power Meter          | Anritsu         | ML2495A                 | 1240001         | 300MHz~40GHz    | Sep. 07, 2016    | Oct. 02, 2016 ~ Oct. 17, 2016 | Sep. 06, 2017 | Conducted (TH05-HY)   |
| Power Sensor         | Anritsu         | MA2411B                 | 1207349         | 300MHz~40GHz    | Sep. 07, 2016    | Oct. 02, 2016 ~ Oct. 17, 2016 | Sep. 06, 2017 | Conducted (TH05-HY)   |
| Hygrometer           | Testo           | 608-H2                  | 41410069        | N/A             | Aug. 28, 2016    | Oct. 02, 2016 ~ Oct. 17, 2016 | Aug. 27, 2017 | Conducted (TH05-HY)   |
| RF Cable             | HUBER + SUHNER  | SUCOFLEX 104            | MY84209521      | 1GHz~26GHz      | Dec. 03, 2015    | Oct. 02, 2016 ~ Oct. 17, 2016 | Dec. 02, 2016 | Conducted (TH05-HY)   |
| Loop Antenna         | Rohde & Schwarz | HFH2-Z2                 | 100315          | 9 kHz~30 MHz    | Sep. 02, 2015    | Oct. 15, 2016 ~ Nov. 28, 2016 | Sep. 01, 2017 | Radiation (03CH12-HY) |
| Amplifier            | SONOMA          | 310N                    | 187312          | 9kHz~1GHz       | Nov. 20, 2015    | Oct. 15, 2016 ~ Nov. 08, 2016 | Nov. 19, 2016 | Radiation (03CH12-HY) |
| Amplifier            | SONOMA          | 310N                    | 187312          | 9kHz~1GHz       | Nov. 10, 2016    | Nov. 22, 2016 ~ Nov. 28, 2016 | Nov. 09, 2017 | Radiation (03CH12-HY) |
| Bilog Antenna        | TESEQ           | CBL 6111D&N-6-06        | 35414&AT-N 0602 | 30MHz~1GHz      | Oct. 15, 2016    | Oct. 15, 2016 ~ Nov. 28, 2016 | Oct. 14, 2017 | Radiation (03CH12-HY) |
| Horn Antenna         | SCHWARZBECK     | BBHA 9120 D             | 9120D-1522      | 1G~18GHz        | Mar. 31, 2016    | Oct. 15, 2016 ~ Nov. 28, 2016 | Mar. 30, 2017 | Radiation (03CH12-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK     | BBHA 9170               | BBHA9170576     | 18GHz ~ 40GHz   | Apr. 15, 2016    | Oct. 15, 2016 ~ Nov. 28, 2016 | Apr. 14, 2017 | Radiation (03CH12-HY) |
| EMI Test Receiver    | Rohde & Schwarz | ESU26                   | 100390          | 20Hz~26.5GHz    | Dec. 21, 2015    | Oct. 15, 2016 ~ Nov. 28, 2016 | Dec. 20, 2016 | Radiation (03CH12-HY) |
| Spectrum Analyzer    | Agilent         | N9030A                  | MY52350276      | 3Hz~44GHz       | Mar. 21, 2016    | Oct. 15, 2016 ~ Nov. 28, 2016 | Mar. 20, 2017 | Radiation (03CH12-HY) |
| Preamplifier         | MITEQ           | TTA0204                 | 1872107         | 2GHz~40GHz      | Feb. 15, 2016    | Oct. 15, 2016 ~ Nov. 28, 2016 | Feb. 14, 2017 | Radiation (03CH12-HY) |
| Preamplifier         | MITEQ           | AMF-7D-0010 1800-30-10P | 1815698         | 1GHz~18GHz      | Dec. 14, 2015    | Oct. 15, 2016 ~ Nov. 28, 2016 | Dec. 13, 2016 | Radiation (03CH12-HY) |
| Preamplifier         | Keysight        | 83017A                  | MY53270148      | 1GHz~26.5GHz    | Jan. 30, 2016    | Oct. 15, 2016 ~ Nov. 28, 2016 | Jan. 29, 2017 | Radiation (03CH12-HY) |



| Instrument    | Manufacturer          | Model No.                            | Serial No.                             | Characteristics                  | Calibration Date | Test Date                        | Due Date      | Remark                   |
|---------------|-----------------------|--------------------------------------|--|----------------------------------|------------------|----------------------------------|---------------|--------------------------|
| Hygrometer    | TECPEL                | DTM-303B                             | TP140349                               | N/A                              | Nov. 17, 2015    | Oct. 15, 2016 ~<br>Nov. 08, 2016 | Nov. 16, 2016 | Radiation<br>(03CH12-HY) |
| Hygrometer    | TECPEL                | DTM-303B                             | TP140349                               | N/A                              | Nov. 14, 2016    | Nov. 22, 2016 ~<br>Nov. 28, 2016 | Nov. 13, 2017 | Radiation<br>(03CH12-HY) |
| RF Cable      | HUBER +<br>SUHNER     | SUCOFLEX<br>104                      | MY24958/4,<br>MY28653/4,<br>MY9839/4PE | 26GHz~40GHz                      | Jan. 12, 2016    | Oct. 15, 2016 ~<br>Nov. 28, 2016 | Jan. 11, 2017 | Radiation<br>(03CH12-HY) |
| RF Cable      | HUBER +<br>SUHNER     | SUCOFLEX<br>104                      | MY24958/4,<br>MY28653/4,<br>MY9839/4PE | 1GHz~26GHz                       | Jan. 12, 2016    | Oct. 15, 2016 ~<br>Nov. 28, 2016 | Jan. 11, 2017 | Radiation<br>(03CH12-HY) |
| RF Cable      | HUBER +<br>SUHNER     | SUCOFLEX<br>104                      | MY24958/4,<br>MY28653/4,<br>MY9839/4PE | 30MHz~1GHz                       | Jan. 12, 2016    | Oct. 15, 2016 ~<br>Nov. 28, 2016 | Jan. 11, 2017 | Radiation<br>(03CH12-HY) |
| RF Cable      | HUBER +<br>SUHNER     | SUCOFLEX<br>104                      | MY24958/4,<br>MY28653/4,<br>MY9839/4PE | 9K~30MHz                         | Jan. 12, 2016    | Oct. 15, 2016 ~<br>Nov. 28, 2016 | Jan. 11, 2017 | Radiation<br>(03CH12-HY) |
| Controller    | EMEC                  | EM1000                               | N/A                                    | Control Turn<br>table & Ant Mast | N/A              | Oct. 15, 2016 ~<br>Nov. 28, 2016 | N/A           | Radiation<br>(03CH12-HY) |
| Antenna Mast  | EMEC                  | AM-BS-4500-B                         | N/A                                    | 1m~4m                            | N/A              | Oct. 15, 2016 ~<br>Nov. 28, 2016 | N/A           | Radiation<br>(03CH12-HY) |
| Turn Table    | EMEC                  | TT2000                               | N/A                                    | 0~360 Degree                     | N/A              | Oct. 15, 2016 ~<br>Nov. 28, 2016 | N/A           | Radiation<br>(03CH12-HY) |
| Test Software | Audix                 | E3                                   | 6.2009-8-24                            | N/A                              | N/A              | Oct. 15, 2016 ~<br>Nov. 28, 2016 | N/A           | Radiation<br>(03CH12-HY) |
| Filter        | Wainwright            | WLKS4500-8S<br>S                     | SN19                                   | 4.5G Low Pass                    | Sep. 19, 2016    | Oct. 15, 2016 ~<br>Nov. 28, 2016 | Sep. 18, 2017 | Radiation<br>(03CH12-HY) |
| Filter        | Microwave<br>Circuits | WHKX8-5872.<br>5-6750-18000-<br>40ST | SN3                                    | 6.75 GHz<br>Highpass             | Sep. 19, 2016    | Oct. 15, 2016 ~<br>Nov. 28, 2016 | Sep. 18, 2017 | Radiation<br>(03CH12-HY) |



## 5 Uncertainty of Evaluation

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

|   |      |
|---|------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ ) | 5.10 |
|---|------|

### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

|   |      |
|---|------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ ) | 5.20 |
|---|------|

### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

|   |      |
|---|------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ ) | 4.70 |
|---|------|



## **Appendix A. Conducted Test Results**

|                |                         |                    |       |    |
|----------------|-------------------------|--------------------|-------|----|
| Test Engineer: | Luffy Lin / Tommy Lee   | Temperature:       | 21~25 | °C |
| Test Date:     | 2016/10/02 ~ 2016/10/17 | Relative Humidity: | 51~54 | %  |

**TEST RESULTS DATA**  
**Average Power Table**

| FCC Band I |           |     |     |             |                  |                               |                                 |          |  |           |
|------------|-----------|-----|-----|-------------|------------------|-------------------------------|---------------------------------|----------|--|-----------|
| Mod.       | Data Rate | NTX | CH. | Freq. (MHz) | Duty Factor (dB) | Average Conducted Power (dBm) | FCC Conducted Power Limit (dBm) | DG (dBi) |  | Pass/Fail |
| 11a        | 6Mbps     | 1   | 36  | 5180        | 0.12             | 14.96                         | 24.00                           | -3.40    |  | Pass      |
| 11a        | 6Mbps     | 1   | 44  | 5220        | 0.12             | 14.82                         | 24.00                           | -3.40    |  | Pass      |
| 11a        | 6Mbps     | 1   | 48  | 5240        | 0.12             | 14.92                         | 24.00                           | -3.40    |  | Pass      |
| HT20       | MCS0      | 1   | 36  | 5180        | 0.13             | 14.96                         | 24.00                           | -3.40    |  | Pass      |
| HT20       | MCS0      | 1   | 44  | 5220        | 0.13             | 14.93                         | 24.00                           | -3.40    |  | Pass      |
| HT20       | MCS0      | 1   | 48  | 5240        | 0.13             | 14.85                         | 24.00                           | -3.40    |  | Pass      |
| HT40       | MCS0      | 1   | 38  | 5190        | 0.28             | 12.31                         | 24.00                           | -3.40    |  | Pass      |
| HT40       | MCS0      | 1   | 46  | 5230        | 0.28             | 12.24                         | 24.00                           | -3.40    |  | Pass      |

**TEST RESULTS DATA**  
**Average Power Table**

| FCC Band II |           |     |     |             |                  |                               |                                 |          |                        |           |
|-------------|-----------|-----|-----|-------------|------------------|-------------------------------|---------------------------------|----------|------------------------|-----------|
| Mod.        | Data Rate | NTX | CH. | Freq. (MHz) | Duty Factor (dB) | Average Conducted Power (dBm) | FCC Conducted Power Limit (dBm) | DG (dBi) | EIRP Power Limit (dBm) | Pass/Fail |
| 11a         | 6M bps    | 1   | 52  | 5260        | 0.12             | 14.99                         | 23.98                           | -2.70    | 26.99                  | Pass      |
| 11a         | 6M bps    | 1   | 60  | 5300        | 0.12             | 14.97                         | 23.98                           | -2.70    | 26.99                  | Pass      |
| 11a         | 6M bps    | 1   | 64  | 5320        | 0.12             | 14.77                         | 23.98                           | -2.70    | 26.99                  | Pass      |
| HT20        | MCS 0     | 1   | 52  | 5260        | 0.13             | 14.97                         | 23.98                           | -2.70    | 26.99                  | Pass      |
| HT20        | MCS 0     | 1   | 60  | 5300        | 0.13             | 14.94                         | 23.98                           | -2.70    | 26.99                  | Pass      |
| HT20        | MCS 0     | 1   | 64  | 5320        | 0.13             | 14.95                         | 23.98                           | -2.70    | 26.99                  | Pass      |
| HT40        | MCS 0     | 1   | 54  | 5270        | 0.28             | 12.48                         | 23.98                           | -2.70    | 26.99                  | Pass      |
| HT40        | MCS 0     | 1   | 62  | 5310        | 0.28             | 12.41                         | 23.98                           | -2.70    | 26.99                  | Pass      |

**TEST RESULTS DATA**  
**Average Power Table**

| FCC Band III |           |     |     |             |                  |                               |                                 |          |                        |           |
|--------------|-----------|-----|-----|-------------|------------------|-------------------------------|---------------------------------|----------|------------------------|-----------|
| Mod.         | Data Rate | NTX | CH. | Freq. (MHz) | Duty Factor (dB) | Average Conducted Power (dBm) | FCC Conducted Power Limit (dBm) | DG (dBi) | EIRP Power Limit (dBm) | Pass/Fail |
| 11a          | 6M bps    | 1   | 100 | 5500        | 0.12             | 14.94                         | 23.98                           | -1.50    | 26.99                  | Pass      |
| 11a          | 6M bps    | 1   | 116 | 5580        | 0.12             | 14.82                         | 23.98                           | -1.50    | 26.99                  | Pass      |
| 11a          | 6M bps    | 1   | 140 | 5700        | 0.12             | 14.92                         | 23.98                           | -1.50    | 26.99                  | Pass      |
| HT20         | MCS 0     | 1   | 100 | 5500        | 0.13             | 14.98                         | 23.98                           | -1.50    | 26.99                  | Pass      |
| HT20         | MCS 0     | 1   | 116 | 5580        | 0.13             | 14.95                         | 23.98                           | -1.50    | 26.99                  | Pass      |
| HT20         | MCS 0     | 1   | 140 | 5700        | 0.13             | 14.97                         | 23.98                           | -1.50    | 26.99                  | Pass      |
| HT40         | MCS 0     | 1   | 102 | 5510        | 0.28             | 12.43                         | 23.98                           | -1.50    | 26.99                  | Pass      |
| HT40         | MCS 0     | 1   | 110 | 5550        | 0.28             | 12.31                         | 23.98                           | -1.50    | 26.99                  | Pass      |
| HT40         | MCS 0     | 1   | 134 | 5670        | 0.28             | 12.29                         | 23.98                           | -1.50    | 26.99                  | Pass      |

**TEST RESULTS DATA**  
**Average Power Table**

| FCC Straddle Channel |           |     |     |             |                  |                               |                                 |          |  |           |
|----------------------|-----------|-----|-----|-------------|------------------|-------------------------------|---------------------------------|----------|--|-----------|
| Mod.                 | Data Rate | NTX | CH. | Freq. (MHz) | Duty Factor (dB) | Average Conducted Power (dBm) | FCC Conducted Power Limit (dBm) | DG (dBi) |  | Pass/Fail |
| 11a                  | 6Mbps     | 1   | 144 | 5720        | 0.12             | 14.93                         | -                               | -1.50    |  | Pass      |
| HT20                 | MCS0      | 1   | 144 | 5720        | 0.13             | 14.82                         | -                               | -1.50    |  | Pass      |
| HT40                 | MCS0      | 1   | 142 | 5710        | 0.28             | 12.40                         | -                               | -1.50    |  | Pass      |



## Appendix B. Radiated Spurious Emission

|                 |                                   |                     |         |
|-----------------|-----------------------------------|---------------------|---------|
| Test Engineer : | Peter Chiu, Karl Hou, and Nick Yu | Temperature :       | 22~25°C |
|                 |                                   | Relative Humidity : | 53~56%  |

Band 1 5150~5250MHz

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 38 5190MHz |   | 5078.26           | 59.6             | -14.4             | 74                    | 47.7                | 31.58                   | 11.27             | 30.95                | 115            | 70                | P                 | H            |
|                            |   | 5149.76           | 49.54            | -4.46             | 54                    | 37.63               | 31.65                   | 11.21             | 30.95                | 115            | 70                | A                 | H            |
|                            | *   | 5190              | 97.83            | -                 | -                     | 85.92               | 31.68                   | 11.18             | 30.95                | 115            | 70                | P                 | H            |
|                            | *   | 5190              | 86.98            | -                 | -                     | 75.07               | 31.68                   | 11.18             | 30.95                | 115            | 70                | A                 | H            |
|                            |   | 5421.36           | 59.14            | -14.86            | 74                    | 46.53               | 31.92                   | 11.64             | 30.95                | 115            | 70                | P                 | H            |
|                            |   | 5436.24           | 48.8             | -5.2              | 54                    | 36.18               | 31.93                   | 11.64             | 30.95                | 115            | 70                | A                 | H            |
|                            |   | 5132.86           | 59.45            | -14.55            | 74                    | 47.53               | 31.63                   | 11.24             | 30.95                | 395            | 352               | P                 | V            |
|                            |   | 5150              | 48.85            | -5.15             | 54                    | 36.94               | 31.65                   | 11.21             | 30.95                | 395            | 352               | A                 | V            |
|                            | *   | 5188              | 98.52            | -                 | -                     | 86.61               | 31.68                   | 11.18             | 30.95                | 395            | 352               | P                 | V            |
|                            | *   | 5188              | 87.99            | -                 | -                     | 76.08               | 31.68                   | 11.18             | 30.95                | 395            | 352               | A                 | V            |
|                            |   | 5362.32           | 58.89            | -15.11            | 74                    | 46.45               | 31.87                   | 11.52             | 30.95                | 395            | 352               | P                 | V            |
|                            |   | 5428.08           | 48.81            | -5.19             | 54                    | 36.2                | 31.92                   | 11.64             | 30.95                | 395            | 352               | A                 | V            |
| Remark                     | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                   |                  |                   |                       |                     |                         |                   |                      |                |                   |                   |              |



**Band 1 5150~5250MHz**

**WIFI 802.11n HT40 (Harmonic @ 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 38 5190MHz |   | 10380             | 46.26            | -27.74            | 74                    | 46.95             | 39.61                   | 17.13             | 57.43                | 100            | 0                 | P               | H          |   |
|                            |   | 15570             | 46.39            | -27.61            | 74                    | 44.99             | 38.22                   | 21.64             | 58.46                | 100            | 0                 | P               | H          |   |
|                            |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 | H          |   |
|                            |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 | H          |   |
|                            |   |                   | 10380            | 46.35             | -27.65                | 74                | 47.04                   | 39.61             | 17.13                | 57.43          | 100               | 0               | P          | V |
|                            |   |                   | 15570            | 45.49             | -28.51                | 74                | 44.09                   | 38.22             | 21.64                | 58.46          | 100               | 0               | P          | V |
|                            |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 |            | V |
|                            |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 |            | V |
| <b>Remark</b>              | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 |            |   |



Band 2 5250~5350MHz

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 62 5310MHz |   | 5121.42           | 59.63            | -14.37            | 74                    | 46.86             | 32.48                   | 11.24             | 30.95                | 400            | 331               | P               | H          |
|                            |   | 5007.8            | 49.12            | -4.88             | 54                    | 36.23             | 32.5                    | 11.34             | 30.95                | 400            | 331               | A               | H          |
|                            | *   | 5310              | 101.56           | -                 | -                     | 88.64             | 32.44                   | 11.43             | 30.95                | 400            | 331               | P               | H          |
|                            | *   | 5310              | 91.1             | -                 | -                     | 78.18             | 32.44                   | 11.43             | 30.95                | 400            | 331               | A               | H          |
|                            |   | 5350.08           | 62.33            | -11.67            | 74                    | 49.33             | 32.43                   | 11.52             | 30.95                | 400            | 331               | P               | H          |
|                            |   | 5350.8            | 50.87            | -3.13             | 54                    | 37.87             | 32.43                   | 11.52             | 30.95                | 400            | 331               | A               | H          |
|                            |   | 5100.1            | 59.39            | -14.61            | 74                    | 46.62             | 32.48                   | 11.24             | 30.95                | 303            | 176               | P               | V          |
|                            |   | 5141.7            | 49.02            | -4.98             | 54                    | 36.29             | 32.47                   | 11.21             | 30.95                | 303            | 176               | A               | V          |
|                            | *   | 5310              | 98.18            | -                 | -                     | 85.26             | 32.44                   | 11.43             | 30.95                | 303            | 176               | P               | V          |
|                            | *   | 5310              | 87.71            | -                 | -                     | 74.79             | 32.44                   | 11.43             | 30.95                | 303            | 176               | A               | V          |
|                            |   | 5350.8            | 60.8             | -13.2             | 74                    | 47.8              | 32.43                   | 11.52             | 30.95                | 303            | 176               | P               | V          |
|                            |   | 5350.56           | 50.36            | -3.64             | 54                    | 37.36             | 32.43                   | 11.52             | 30.95                | 303            | 176               | A               | V          |
| Remark                     | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 |            |



**Band 2 5250~5350MHz**

**WIFI 802.11n HT40 (Harmonic @ 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 62 5310MHz |   | 10620             | 46.84            | -27.16            | 74                    | 46.57             | 40.05                   | 17.4              | 57.18                | 100            | 0                 | P               | H          |   |
|                            |   | 15930             | 45.41            | -28.59            | 74                    | 43.03             | 38.21                   | 21.91             | 57.74                | 100            | 0                 | P               | H          |   |
|                            |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 | H          |   |
|                            |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 | H          |   |
|                            |   |                   | 10620            | 47.23             | -26.77                | 74                | 46.96                   | 40.05             | 17.4                 | 57.18          | 100               | 0               | P          | V |
|                            |   |                   | 15930            | 47.72             | -26.28                | 74                | 45.34                   | 38.21             | 21.91                | 57.74          | 100               | 0               | P          | V |
|                            |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 |            | V |
|                            |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 | V          |   |
| <b>Remark</b>              | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 |            |   |



Band 3 - 5470~5725MHz

WIFI 802.11n HT20 (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 HT20 CH 140 5700MHz | *   | 5700              | 105.85           | -                 | -                     | 92.08             | 32.96                   | 11.82             | 31.01                | 239            | 333               | P               | H          |
|                             | *   | 5700              | 94.85            | -                 | -                     | 81.08             | 32.96                   | 11.82             | 31.01                | 239            | 333               | A               | H          |
|                             |   | 5725.08           | 65.57            | -8.43             | 74                    | 51.72             | 33.03                   | 11.84             | 31.02                | 239            | 333               | P               | H          |
|                             |   | 5725.24           | 50.94            | -3.06             | 54                    | 37.09             | 33.03                   | 11.84             | 31.02                | 239            | 333               | A               | H          |
|                             |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 | H          |
|                             |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 | H          |
|                             | *   | 5700              | 103.11           | -                 | -                     | 89.34             | 32.96                   | 11.82             | 31.01                | 117            | 162               | P               | V          |
|                             | *   | 5700              | 92.19            | -                 | -                     | 78.42             | 32.96                   | 11.82             | 31.01                | 117            | 162               | A               | V          |
|                             |   | 5725.08           | 62.14            | -11.86            | 74                    | 48.29             | 33.03                   | 11.84             | 31.02                | 117            | 162               | P               | V          |
|                             |   | 5725.32           | 50.02            | -3.98             | 54                    | 36.17             | 33.03                   | 11.84             | 31.02                | 117            | 162               | A               | V          |
|                             |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   | V               |            |
|                             |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   | V               |            |
| Remark                      | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 |            |



**Band 3 - 5470~5725MHz**

**WIFI 802.11n HT20 (Harmonic @ 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 HT20 CH 140 5700MHz |   | 11400             | 47.37            | -26.63            | 74                    | 46.52             | 40.2                    | 18.31             | 57.66                | 100            | 0                 | P               | H          |   |
|                             |   | 17100             | 54.35            | -19.65            | 74                    | 46.4              | 41.62                   | 22.99             | 56.66                | 209            | 21                | P               | H          |   |
|                             |   | 17100             | 40.55            | -13.45            | 54                    | 32.6              | 41.62                   | 22.99             | 56.66                | 209            | 21                | A               | H          |   |
|                             |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 | H          |   |
|                             |   |                   | 11400            | 47.17             | -26.83                | 74                | 46.32                   | 40.2              | 18.31                | 57.66          | 100               | 0               | P          | V |
|                             |   |                   | 17100            | 49.46             | -24.54                | 74                | 41.51                   | 41.62             | 22.99                | 56.66          | 100               | 0               | P          | V |
|                             |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 |            | V |
|                             |   |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 | V          |   |
| <b>Remark</b>               | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                   |                  |                   |                       |                   |                         |                   |                      |                |                   |                 |            |   |



Emission below 1GHz

WIFI 802.11n HT40 (LF @ 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<br>HT40<br>LF |  | 36.75     | 28.29      | -11.71 | 40         | 37.79    | 22.18    | 0.78   | 32.46  | 100    | 0       | P       | H       |   |
|                       |  | 66.72     | 26.75      | -13.25 | 40         | 45.72    | 12.42    | 1.06   | 32.45  |        |         | P       | H       |   |
|                       |  | 147.99    | 31.25      | -12.25 | 43.5       | 44.17    | 17.75    | 1.75   | 32.42  |        |         | P       | H       |   |
|                       |  | 465.2     | 24.75      | -21.25 | 46         | 30.55    | 23.51    | 3.08   | 32.39  |        |         | P       | H       |   |
|                       |  | 688.5     | 28.5       | -17.5  | 46         | 30.86    | 26.23    | 3.82   | 32.41  |        |         | P       | H       |   |
|                       |  | 798.4     | 31.18      | -14.82 | 46         | 31.36    | 27.88    | 4.14   | 32.2   |        |         | P       | H       |   |
|                       |  |           |            |        |            |          |          |        |        |        |         |         |         | H |
|                       |  |           |            |        |            |          |          |        |        |        |         |         |         | H |
|                       |  |           |            |        |            |          |          |        |        |        |         |         |         | H |
|                       |  |           |            |        |            |          |          |        |        |        |         |         |         | H |
|                       |  |           |            |        |            |          |          |        |        |        |         |         |         | H |
|                       |  |           |            |        |            |          |          |        |        |        |         |         |         | H |
|                       |  |           | 38.37      | 29.25  | -10.75     | 40       | 39.87    | 21.06  | 0.78   | 32.46  |         |         | P       | V |
|                       |  |           | 66.45      | 33.61  | -6.39      | 40       | 52.58    | 12.42  | 1.06   | 32.45  | 100     | 0       | P       | V |
|                       |  |           | 160.14     | 27.1   | -16.4      | 43.5     | 40.77    | 17     | 1.75   | 32.42  |         |         | P       | V |
|                       |  |           | 470.1      | 24.65  | -21.35     | 46       | 30.36    | 23.6   | 3.08   | 32.39  |         |         | P       | V |
|                       |  |           | 775.3      | 30.32  | -15.68     | 46       | 30.9     | 27.7   | 3.97   | 32.25  |         |         | P       | V |
|                       |  |           | 930.7      | 32.59  | -13.41     | 46       | 29.77    | 29.52  | 4.6    | 31.3   |         |         | P       | V |
|                       |  |           |            |        |            |          |          |        |        |        |         |         |         | V |
|                       |  |           |            |        |            |          |          |        |        |        |         |         |         | V |
|                       |  |           |            |        |            |          |          |        |        |        |         |         | V       |   |
|                       |  |           |            |        |            |          |          |        |        |        |         |         | V       |   |
|                       |  |           |            |        |            |          |          |        |        |        |         |         | V       |   |
|                       |  |           |            |        |            |          |          |        |        |        |         |         | V       |   |
| Remark                | 1. No other spurious found.<br>2. All results are PASS against limit line. |           |            |        |            |          |          |        |        |        |         |         |         |   |



**Note symbol**

|     |  |
|-----|--|
| *   | <b>Fundamental Frequency</b> which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency. |
| !   | Test result is <b>over limit</b> line.   |
| P/A | <b>Peak</b> or <b>Average</b>  |
| H/V | <b>Horizontal</b> or <b>Vertical</b>   |



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       |      | ( MHz )   | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | ( P/A ) | ( H/V ) |
| 802.11b |      | 2390      | 55.45      | -18.55 | 74         | 54.51    | 32.22    | 4.58   | 35.86  | 103    | 308     | P       | H       |
| CH 01   |      |           |            |        |            |          |          |        |        |        |         |         |         |
| 2412MHz |      | 2390      | 43.54      | -10.46 | 54         | 42.6     | 32.22    | 4.58   | 35.86  | 103    | 308     | A       | H       |

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

**For Peak Limit @ 2390MHz:**

- 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)
- Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 55.45(dBμV/m) – 74(dBμV/m)  
= -18.55(dB)

**For Average Limit @ 2390MHz:**

- 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)
- 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. Radiated Spurious Emission

|                 |                                   |                     |         |
|-----------------|-----------------------------------|---------------------|---------|
| Test Engineer : | Peter Chiu, Karl Hou, and Nick Yu | Temperature :       | 22~25°C |
|                 |                                   | Relative Humidity : | 53~56%  |

### Note symbol

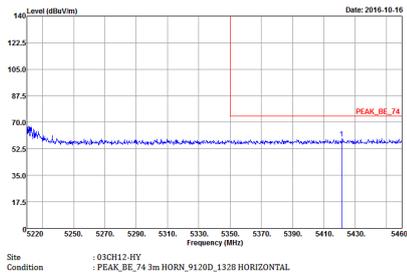
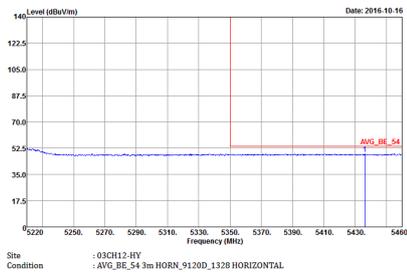
|    |                       |
|----|-----------------------|
| -L | Low channel location  |
| -R | High channel location |



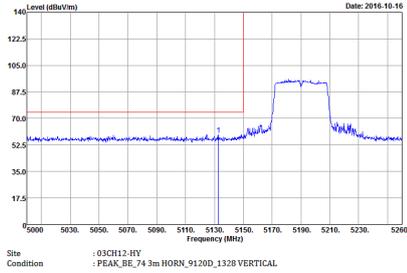
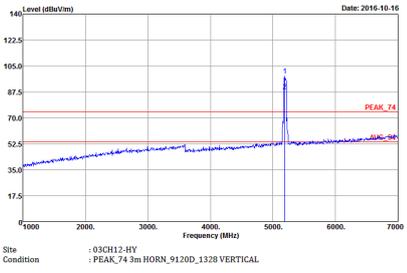
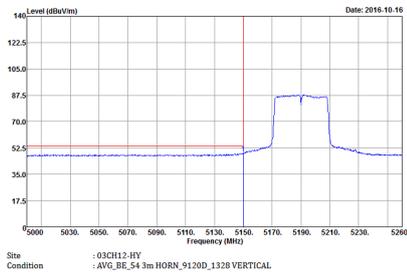
Band 1 5150~5250MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

Table with 2 columns (WIFI, ANT) and 2 rows (Peak, Avg.). The 'Peak' row shows 'Horizontal' and 'Fundamental' plots. The 'Avg.' row shows a 'Horizontal' plot and 'Left blank'.



| WIFI | Band 1 5150~5250MHz Band Edge @ 3m  |             |
|------|---|-------------|
| ANT  | 802.11n HT40 CH38 5190MHz - R   |             |
| 1    | Horizontal  | Fundamental |
| Peak |    | Left blank  |
| Avg. |  | Left blank  |



| WIFI        | Band 1 5150~5250MHz Band Edge @ 3m  |  |
|-------------|---|--|
| ANT         | 802.11n HT40 CH38 5190MHz - L   |  |
| 1           | <b>Vertical</b>   | <b>Fundamental</b>   |
| <b>Peak</b> |    |  |
| <b>Avg.</b> |  | <b>Left blank</b>  |



| WIFI | Band 1 5150~5250MHz Band Edge @ 3m   |             |
|------|--|-------------|
| ANT  | 802.11n HT40 CH38 5190MHz - R  |             |
| 1    | Vertical   | Fundamental |
| Peak | <p>Site Condition : 03CH12-HY<br/>: PEAK_BE_74 3m HORN_9120D_1328 VERTICAL</p> | Left blank  |
| Avg. | <p>Site Condition : 03CH12-HY<br/>: AVG_BE_54 3m HORN_9120D_1328 VERTICAL</p>  | Left blank  |

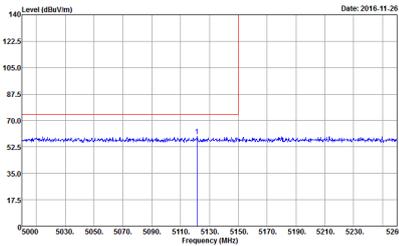
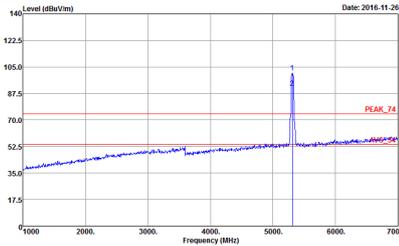
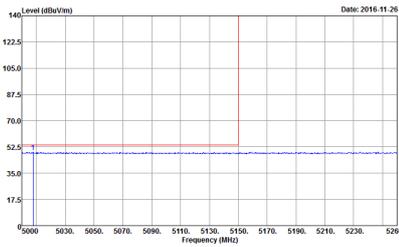


Band 1 5150~5250MHz  
WIFI 802.11n HT40 (Harmonic @ 3m)

| WIFI         | Band 1 5150~5250MHz Harmonic @ 3m   |   |
|--------------|---|---|
| ANT          | 802.11n HT40 CH38 5190MHz   |   |
| 1            | Horizontal  | Vertical  |
| Peak<br>Avg. | <p>Site Condition : 03CH12-HY<br/>: PEAK_74 3m HORN_9120D_1328 HORIZONTAL</p> | <p>Site Condition : 03CH12-HY<br/>: PEAK_74 3m HORN_9120D_1328 VERTICAL</p> |



**Band 2 5250~5350MHz  
WIFI 802.11n HT40 (Band Edge @ 3m)**

| WIFI | Band 2 5250~5350MHz Band Edge @ 3m  |  |
|------|---|--|
| ANT  | 802.11n HT40 CH62 5310 - L  |  |
| 1    | Horizontal  | Fundamental  |
| Peak |  <p>Site : 03CH12-HY<br/>Condition : PEAK_BE_74 3m HORN_9120D_1328 HORIZONTAL</p>  |  <p>Site : 03CH12-HY<br/>Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL</p> |
| Avg. |  <p>Site : 03CH12-HY<br/>Condition : AVG_BE_54 3m HORN_9120D_1328 HORIZONTAL</p> | Left blank   |



| WIFI | Band 2 5250~5350MHz Band Edge @ 3m   |             |
|------|--|-------------|
| ANT  | 802.11n HT40 CH62 5310 - R   |             |
| 1    | Horizontal   | Fundamental |
| Peak | <p>Site Condition : 03CH12-HY<br/>: PEAK_BE_74 3m HORN_9120D_1328 HORIZONTAL</p> | Left blank  |
| Avg. | <p>Site Condition : 03CH12-HY<br/>: AVG_BE_54 3m HORN_9120D_1328 HORIZONTAL</p>  | Left blank  |



| WIFI        | Band 2 5250~5350MHz Band Edge @ 3m   |   |
|-------------|--|---|
| ANT         | 802.11n HT40 CH62 5310 - L   |   |
| 1           | <b>Vertical</b>  | <b>Fundamental</b>  |
| <b>Peak</b> | <p>Site Condition : 03CH12-HY<br/>: PEAK_BE_74 3m HORN_9120D_1328 VERTICAL</p> | <p>Site Condition : 03CH12-HY<br/>: PEAK_74 3m HORN_9120D_1328 VERTICAL</p> |
| <b>Avg.</b> | <p>Site Condition : 03CH12-HY<br/>: AVG_BE_54 3m HORN_9120D_1328 VERTICAL</p>  | <b>Left blank</b>   |



| WIFI | Band 2 5250~5350MHz Band Edge @ 3m   |             |
|------|--|-------------|
| ANT  | 802.11n HT40 CH62 5310 - R   |             |
| 1    | Vertical   | Fundamental |
| Peak | <p>Site : 03CH12-HY<br/>Condition : PEAK_BE_24 3m HORN_9120D_1328 VERTICAL</p> | Left blank  |
| Avg. | <p>Site : 03CH12-HY<br/>Condition : AVG_BE_54 3m HORN_9120D_1328 VERTICAL</p>  | Left blank  |



Band 2 5250~5350MHz  
WIFI 802.11n HT40 (Harmonic @ 3m)

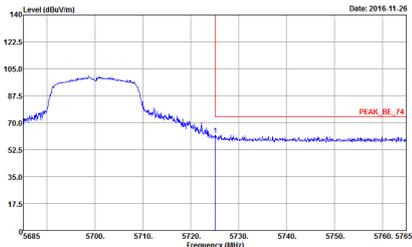
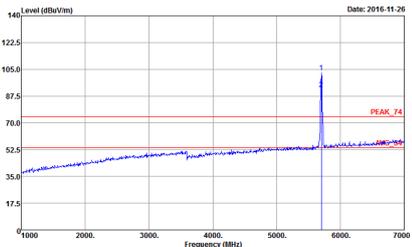
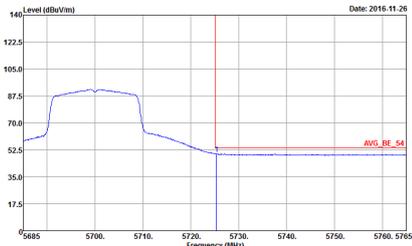
| WIFI         | Band 2 5250~5350MHz Harmonic @ 3m   |   |
|--------------|---|---|
| ANT          | 802.11n HT40 CH62 5310  |   |
| 1            | Horizontal  | Vertical  |
| Peak<br>Avg. | <p>Site Condition : 03CH12-FY<br/>: PEAK_74 3m HORN_9120D_1328 HORIZONTAL</p> | <p>Site Condition : 03CH12-FY<br/>: PEAK_74 3m HORN_9120D_1328 VERTICAL</p> |



**Band 3 5470~5725MHz  
WIFI 802.11n HT20 (Band Edge @ 3m)**

| WIFI               | Band 3 5470~5725MHz Band Edge @ 3m   |   |
|--------------------|--|---|
| ANT                | 802.11n HT20 CH140 5700MHz   |   |
| 1                  | Horizontal   | Fundamental   |
| <p><b>Peak</b></p> | <p>Site Condition : 03CH12-HY<br/>: PEAK_BE_74 3m HORN_9120D_1328 HORIZONTAL</p> | <p>Site Condition : 03CH12-HY<br/>: PEAK_74 3m HORN_9120D_1328 HORIZONTAL</p> |
| <p><b>Avg.</b></p> | <p>Site Condition : 03CH12-HY<br/>: AVG_BE_54 3m HORN_9120D_1328 HORIZONTAL</p>  | <p>Left blank</p>   |



| WIFI                | Band 3 5470~5725MHz Band Edge @ 3m  |  |
|---------------------|---|--|
| ANT                 | 802.11n HT20 CH140 5700MHz  |  |
| 1                   | Vertical  | Fundamental  |
| <p><b>Peak.</b></p> |  <p>Site Condition : 03CH12-HY<br/>: PEAK_BE_74 3m HORN_9120D_1328 VERTICAL</p>  |  <p>Site Condition : 03CH12-HY<br/>: PEAK_74 3m HORN_9120D_1328 VERTICAL</p> |
| <p><b>Avg.</b></p>  |  <p>Site Condition : 03CH12-HY<br/>: AVG_BE_54 3m HORN_9120D_1328 VERTICAL</p> | <p>Left blank</p>  |



Band 3 5470~5725MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

Table with 3 columns: WIFI, ANT, and measurement results for Horizontal and Vertical orientations. Includes sub-headers for Peak and Avg. and two frequency level graphs.



Band 3 5470~5725MHz

Emission below 1GHz

5GHz WIFI 802.11n HT40 (LF)

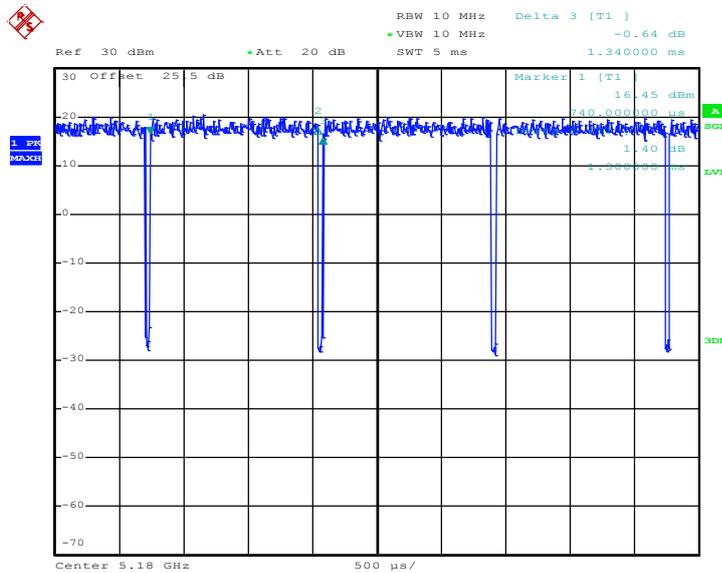
| WIFI         | 5GHz WIFI  |  |
|--------------|--|--|
| ANT          | 802.11n HT40 LF  |  |
| 1            | Horizontal   | Vertical   |
| QP /<br>Peak | <p>Site Condition : 03CH12-HY<br/>: QP 3m BILOG_6111D_37059 HORIZONTAL</p> | <p>Site Condition : 03CH12-HY<br/>: QP 3m BILOG_6111D_37059 VERTICAL</p> |



## Appendix D Duty Cycle Plots

| Band              | Duty Cycle(%) | T(us) | 1/T(kHz) | VBW Setting |
|-------------------|---------------|-------|----------|-------------|
| 5GHz 802.11n HT20 | 97.02         | 1300  | 0.77     | 1kHz        |
| 5GHz 802.11n HT40 | 93.86         | 642   | 1.56     | 3kHz        |

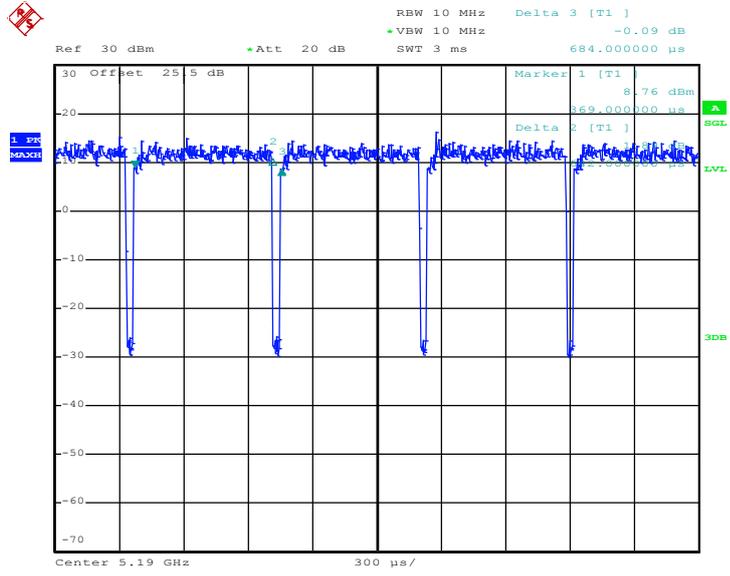
### 5GHz 802.11n HT20



Date: 2.OCT.2016 11:19:51



5GHz 802.11n HT40



Date: 2.OCT.2016 12:48:42



## **Appendix E. Original Report**

Please refer to Sporton report number FR692208-01E