



# FCC RF Test Report

**APPLICANT** : HMD Global Oy  
**EQUIPMENT** : GSM/WCDMA/LTE Mobile Phone  
**BRAND NAME** : Nokia  
**MODEL NAME** : TA-1080  
**FCC ID** : 2AJOTTA-1080  
**STANDARD** : FCC Part 15 Subpart C §15.247  
**CLASSIFICATION** : (DSS) Spread Spectrum Transmitter

This is a data re-used report which is only valid together with the original test report. The product was received on Oct. 29, 2018 and testing was completed on Nov. 21, 2018. We, Sporton International (Kunshan) 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 (Kunshan) Inc., the test report shall not be reproduced except in full.



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Approved by: James Huang / Manager

***Sporton International (Kunshan) Inc.***  
***No. 1098, Pengxi North Road, Kunshan Economic Development Zone,***  
***Jiangsu Province 215335, China***



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## REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION             | ISSUED DATE   |
|------------|---------|-------------------------|---------------|
| FR8O2901C  | Rev. 01 | Initial issue of report | Dec. 11, 2018 |
|            |         |                         |               |
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## SUMMARY OF TEST RESULT

| Report Section                                                                                                         | FCC Rule           | Description                                        | Limit                          | Result | Remark                                   |
|------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------------------------|--------------------------------|--------|------------------------------------------|
| -                                                                                                                      | 15.247(a)(2)       | 6dB Bandwidth                                      | $\geq 0.5\text{MHz}$           | Pass   | 1                                        |
| -                                                                                                                      | -                  | 99% Bandwidth                                      | -                              | Pass   | 1                                        |
| -                                                                                                                      | 15.247(b)          | Power Output Measurement                           | $\leq 30\text{dBm}$            | Pass   | 1                                        |
| -                                                                                                                      | 15.247(e)          | Power Spectral Density                             | $\leq 8\text{dBm}/3\text{kHz}$ | Pass   | 1                                        |
| -                                                                                                                      | 15.247(d)          | Conducted Band Edges                               | $\leq 20\text{dBc}$            | Pass   | 1                                        |
|                                                                                                                        |                    | Conducted Spurious Emission                        |                                |        |                                          |
| 3.1                                                                                                                    | 15.247(d)          | Radiated Band Edges and Radiated Spurious Emission | 15.209(a) & 15.247(d)          | Pass   | Under limit<br>0.17 dB at<br>4926.00 MHz |
| 3.2                                                                                                                    | 15.207             | AC Conducted Emission                              | 15.207(a)                      | Pass   | Under limit<br>11.13 dB at<br>3.276 MHz  |
| 3.3                                                                                                                    | 15.203 & 15.247(b) | Antenna Requirement                                | N/A                            | Pass   | -                                        |
| <b>Remark 1:</b> Test items are performed on original report which can be referred to Sporton report number FR832104C. |                    |                                                    |                                |        |                                          |

# 1 General Description

## 1.1 Applicant

HMD Global Oy

Bertel Jungin aukio 9, 02600 Espoo, Finland

## 1.2 Manufacturer

HMD Global Oy

Bertel Jungin aukio 9, 02600 Espoo, Finland

## 1.3 Product Feature of Equipment Under Test

| Product Feature                 |                                                                                                                                              |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Equipment                       | GSM/WCDMA/LTE Mobile Phone                                                                                                                   |
| Brand Name                      | Nokia                                                                                                                                        |
| Model Name                      | TA-1080                                                                                                                                      |
| FCC ID                          | 2AJOTTA-1080                                                                                                                                 |
| EUT supports Radios application | GSM/GPRS/EGPRS/ WCDMA/HSPA/DC-HSDPA/<br>HSPA+(16QAM uplink is not supported)/LTE<br>WLAN 2.4GHz 802.11b/g/n HT20/HT40<br>Bluetooth BR/EDR/LE |
| IMEI Code                       | 864520040008403/864520040008411                                                                                                              |
| HW Version                      | HW0511                                                                                                                                       |
| SW Version                      | 000C_0_390                                                                                                                                   |
| EUT Stage                       | Identical Prototype                                                                                                                          |

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

## 1.4 Product Specification of Equipment Under Test

| Standards-related Product Specification |                                                                                        |
|-----------------------------------------|----------------------------------------------------------------------------------------|
| Tx/Rx Channel Frequency Range           | 2412 MHz ~ 2462 MHz                                                                    |
| Antenna Type / Gain                     | PIFA Antenna with gain -3.00 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 Re-use of Measured Data

### 1.6.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: TA-1080, FCC ID: 2AJOTTA-1080) is electrically identical to the reference device (Model: TA-1084, FCC ID: 2AJOTTA-1084) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 484596 D01.

### 1.6.2 Difference Section

For details concerning the similarity with respect to component placement, mechanical/electrical design etc., please refer to the Product Equality Declaration.

The re-used RF data includes the following bands provided in Appendix A (Sporton RF Report No. FR832104C for the reference device Model: TA-1084, FCC ID: 2AJOTTA-1084).

### 1.6.3 Reference detail Section:

| Equipment Class | Reference FCC ID | Folder Test            | Report Title/Section                                                                 |
|-----------------|------------------|------------------------|--------------------------------------------------------------------------------------|
| DSS (BR/EDR)    | 2AJOTTA-1084     | Part15C<br>(FR832104A) | All sections applicable except AC Conducted Emission and Radiated Spurious Emission. |
| DTS (BLE)       | 2AJOTTA-1084     | Part15C<br>(FR832104B) | All sections applicable except AC Conducted Emission and Radiated Spurious Emission. |
| DTS (WLAN)      | 2AJOTTA-1084     | Part15C<br>(FR832104C) | All sections applicable except AC Conducted Emission and Radiated Spurious Emission. |

**1.6.4 Spot Check Verification Data Section**

In order to confirm hardware similarity of the subject device with the reference device, spot check measurements were performed on the subject device for the following test items, the test result were consistent with FCC ID: 2AJOTTA-1084.

Assertions concerning the similarity of these devices are based on representations by the applicant. The applicant accepts full responsibility for the validity of the similarity claim, and for the determination that verification test data are sufficient to support it.

| Test Item                           | Mode       | 2AJOTTA-1084<br>Worst Result | 2AJOTTA-1080<br>Worst Result | Difference (dB) |
|-------------------------------------|------------|------------------------------|------------------------------|-----------------|
| Peak<br>Conducted<br>Power<br>(dBm) | 802.11b    | 18.18                        | 17.22                        | -0.96           |
|                                     | 802.11g    | 23.18                        | 22.85                        | -0.33           |
|                                     | 11n HT20   | 23.04                        | 21.81                        | -1.23           |
|                                     | 11n HT40   | 23.29                        | 22.72                        | -0.57           |
|                                     | BT (1Mbps) | 9.83                         | 9.69                         | -0.14           |
|                                     | BT (2Mbps) | 10.67                        | 10.49                        | -0.18           |
|                                     | BT (3Mbps) | 10.88                        | 10.88                        | 0               |
|                                     | BT LE      | 1.12                         | 1.14                         | 0.02            |



## 1.7 Testing Location

Sporton Lab is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0).

|                           |                                                                                                                                                     |                            |                                       |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------------------|
| <b>Test Site</b>          | Sporton International (Kunshan) Inc.                                                                                                                |                            |                                       |
| <b>Test Site Location</b> | No. 1098, Pengxi North Road, Kunshan Economic Development Zone,<br>Jiangsu Province 215335, China<br>TEL : 86-512-57900158<br>FAX : 86-512-57900958 |                            |                                       |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b>                                                                                                                             | <b>FCC designation No.</b> | <b>FCC Test Firm Registration No.</b> |
|                           | CO01-KS<br>03CH04-KS                                                                                                                                | CN5013                     | 630927                                |

## 1.8 Applicable Standards

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

- ♦ 47 CFR Part 15 Subpart C §15.247
- ♦ FCC KDB 558074 D01 15.247 Meas Guidance v05
- ♦ 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

- a. 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: conduction emission (150 kHz to 30 MHz), radiation 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.<br>(MHz) | Channel | Freq.<br>(MHz) |
|-----------------|---------|----------------|---------|----------------|
| 2400-2483.5 MHz | 1       | 2412           | 7       | 2442           |
|                 | 2       | 2417           | 8       | 2447           |
|                 | 3       | 2422           | 9       | 2452           |
|                 | 4       | 2427           | 10      | 2457           |
|                 | 5       | 2432           | 11      | 2462           |
|                 | 6       | 2437           |         |                |

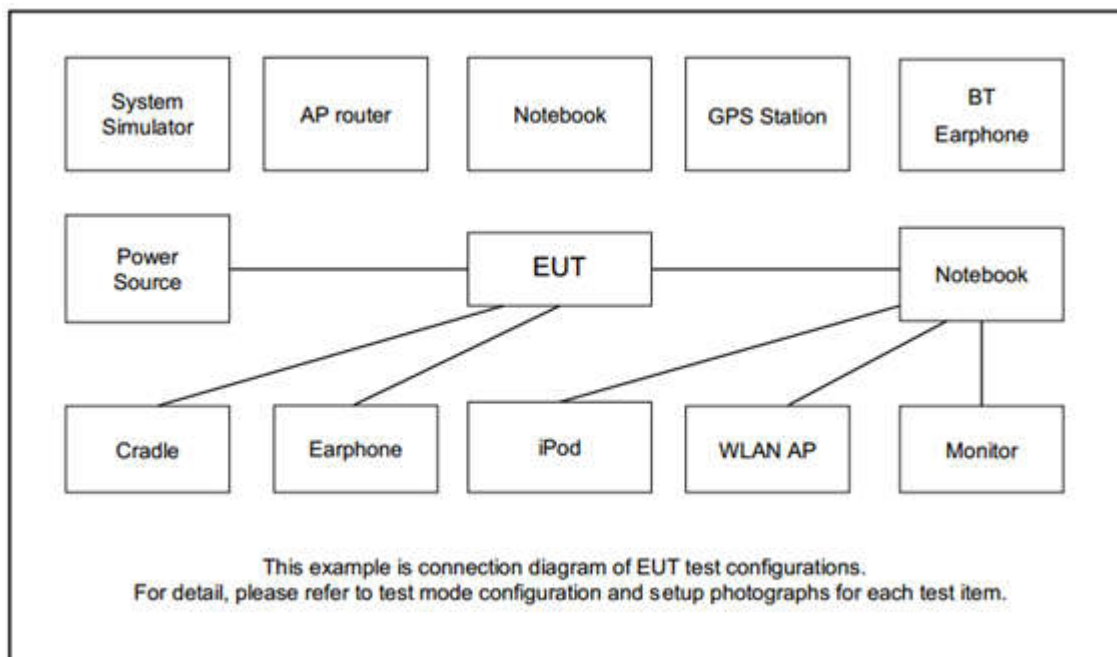
## 2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

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

| Test Cases                                                                                             |                                                                                                            |
|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| AC<br>Conducted<br>Emission                                                                            | Mode 1 : GSM850 Idle + Bluetooth Link + WLAN (2.4G) Link + Earphone + USB Cable<br>(Charging from Adapter) |
| <b>Remark:</b> For Radiated Test Cases, The tests were performed with Adapter, Earphone and USB Cable. |                                                                                                            |

## 2.3 Connection Diagram of Test System



## 2.4 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            | D-Link     | DIR-855    | KA2DIR855A2 | N/A        | Unshielded, 1.8 m                                          |
| 3.   | Bluetooth Earphone | Lenovo     | LBH308     | N/A         | N/A        | N/A                                                        |
| 4.   | Notebook           | Lenovo     | G480       | N/A         | N/A        | AC I/P:<br>Unshielded, 1.8 m<br>DC O/P:<br>Shielded, 1.8 m |

## 2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuously transmit/receive.

### 3 Test Result

#### 3.1 Radiated Band Edges and Spurious Emission Measurement

##### 3.1.1 Limit of Radiated Band Edges and Spurious Emission

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. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

| Frequency<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(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                                |

##### 3.1.2 Measuring Instruments

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

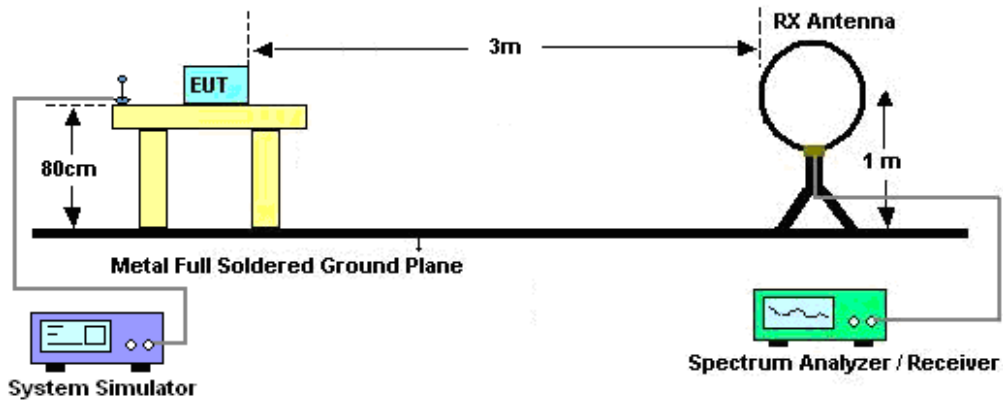


### 3.1.3 Test Procedures

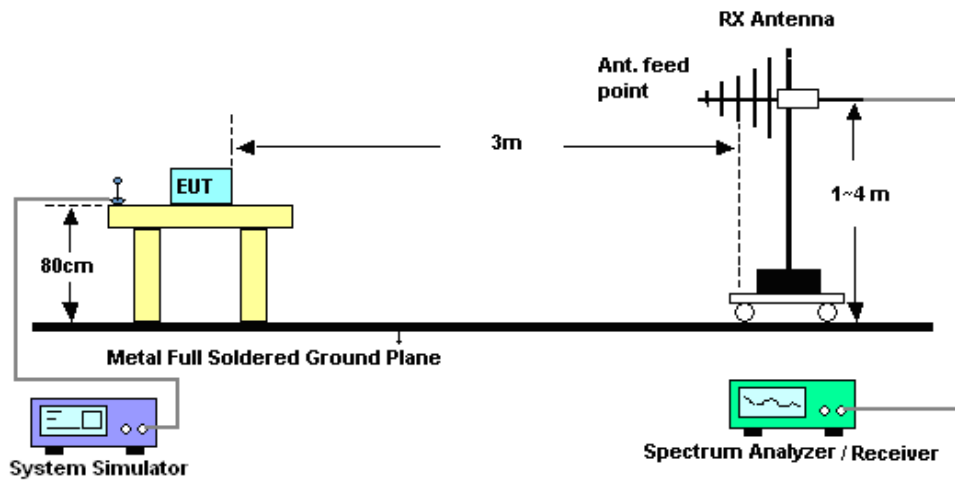
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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 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.
8. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for  $f < 1 \text{ GHz}$ ;  $\text{VBW} \geq \text{RBW}$ ; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW= 3MHz for  $f \geq 1 \text{ GHz}$  for peak measurement.  
For average measurement:
    - $\text{VBW} = 10 \text{ Hz}$ , when duty cycle is no less than 98 percent.
    - $\text{VBW} \geq 1/T$ , when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

### 3.1.4 Test Setup

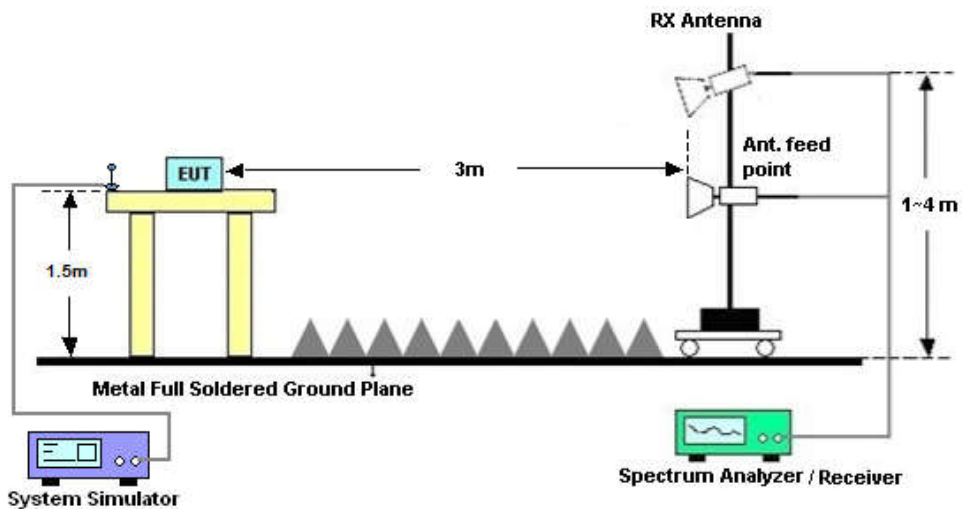
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz





### **3.1.5 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 was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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

Please refer to Appendix B.

### **3.1.7 Duty Cycle**

Please refer to Appendix C.

### **3.1.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)**

Please refer to Appendix B.

## 3.2 AC Conducted Emission Measurement

### 3.2.1 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 (dB $\mu$ V) |           |
|-----------------------------|------------------------------|-----------|
|                             | Quasi-peak                   | Average   |
| 0.15-0.5                    | 66 to 56*                    | 56 to 46* |
| 0.5-5                       | 56                           | 46        |
| 5-30                        | 60                           | 50        |

\*Decreases with the logarithm of the frequency.

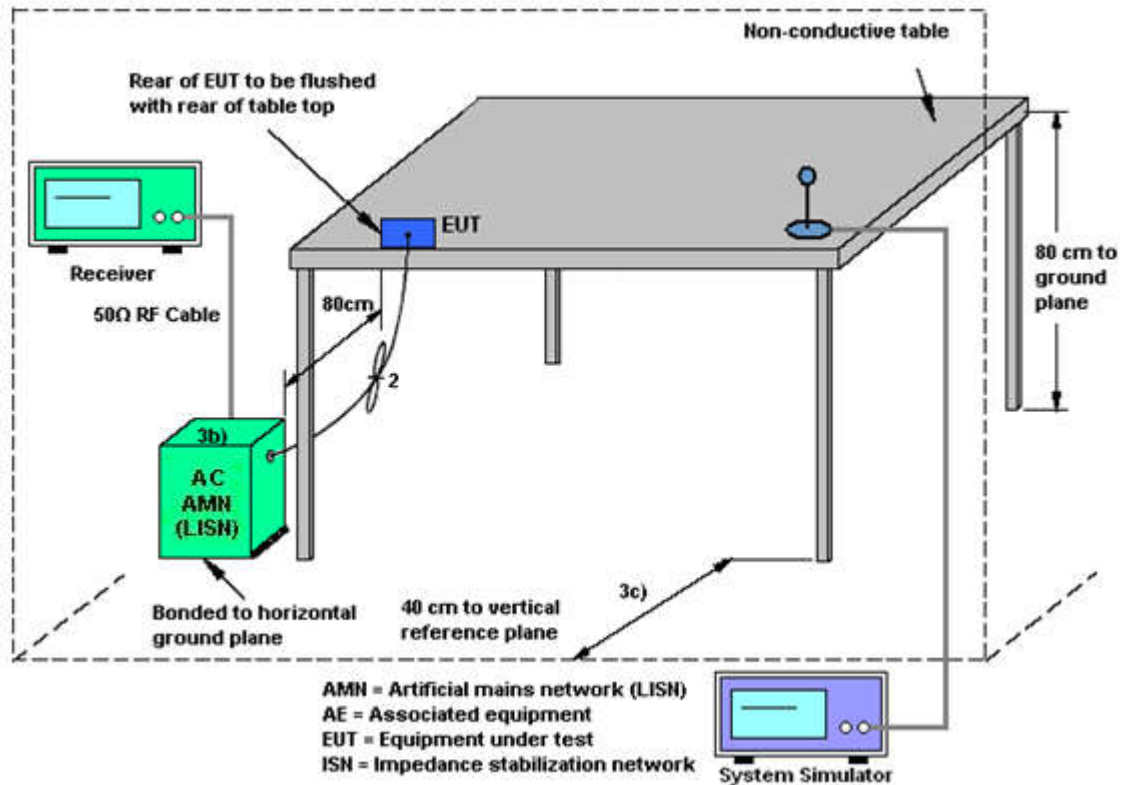
### 3.2.2 Measuring Instruments

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

### 3.2.3 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.

### 3.2.4 Test Setup



### 3.2.5 Test Result of AC Conducted Emission

Please refer to Appendix A.



### **3.3 Antenna Requirements**

#### **3.3.1 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. 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 rule.

#### **3.3.2 Antenna Anti-Replacement Construction**

An embedded-in antenna design is used.

#### **3.3.3 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                   |
|-----------------------------------------|--------------|----------------------------|------------------|----------------------------|------------------|---------------|---------------|--------------------------|
| EMI Test Receiver                       | R&S          | ESR7                       | 101403           | 9kHz~7GHz;Ma<br>x 30dBm    | Aug.06, 2018     | Nov. 16, 2018 | Aug.05, 2019  | Radiation<br>(03CH04-KS) |
| EXA Spectrum Analyzer                   | Keysight     | N9010A                     | MY551502<br>08   | 10Hz-44G,MAX<br>30dB       | Apr.17, 2018     | Nov. 16, 2018 | Apr. 16, 2019 | Radiation<br>(03CH04-KS) |
| Loop Antenna                            | R&S          | HFH2-Z2                    | 100321           | 9kHz~30MHz                 | Oct. 19, 2018    | Nov. 16, 2018 | Oct. 18, 2019 | Radiation<br>(03CH04-KS) |
| Bilog Antenna                           | TeseQ        | CBL6111D                   | 44483            | 30MHz-1GHz                 | Jan. 29, 2018    | Nov. 16, 2018 | Jan. 28, 2019 | Radiation<br>(03CH04-KS) |
| Horn Antenna                            | Schwarzbeck  | BBHA9120D                  | 1648             | 1GHz~18GHz                 | Dec. 16, 2017    | Nov. 16, 2018 | Dec. 15, 2018 | Radiation<br>(03CH04-KS) |
| SHF-EHF Horn                            | Schwarzbeck  | BBHA 9170                  | BBHA1702<br>49   | 15GHz~40GHz                | Feb. 07, 2018    | Nov. 16, 2018 | Feb. 06, 2019 | Radiation<br>(03CH04-KS) |
| Amplifier                               | Burgeon      | BPA-530                    | 102219           | 0.01MHz<br>~3000MHz        | Dec. 16, 2017    | Nov. 16, 2018 | Dec. 15, 2018 | Radiation<br>(03CH04-KS) |
| Amplifier                               | MITEQ        | TTA1840-35-<br>HG          | 2014749          | 18~40GHz                   | Feb. 8, 2018     | Nov. 16, 2018 | Feb. 07, 2019 | Radiation<br>(03CH04-KS) |
| high gain Amplifier                     | MITEQ        | AMF-7D-0010<br>1800-30-10P | 2025788          | 1Ghz-18Ghz                 | Apr. 17, 2018    | Nov. 16, 2018 | Apr. 16, 2019 | Radiation<br>(03CH04-KS) |
| Amplifier                               | Keysight     | 83017A                     | MY532702<br>03   | 500MHz~26.5G<br>Hz         | Dec. 16, 2017    | Nov. 16, 2018 | Dec. 15, 2018 | Radiation<br>(03CH04-KS) |
| AC Power Source                         | Chroma       | 61601                      | F1040900<br>04   | N/A                        | NCR              | Nov. 16, 2018 | NCR           | Radiation<br>(03CH04-KS) |
| Turn Table                              | ChamPro      | EM 1000-T                  | 060762-T         | 0~360 degree               | NCR              | Nov. 16, 2018 | NCR           | Radiation<br>(03CH04-KS) |
| Antenna Mast                            | ChamPro      | EM 1000-A                  | 060762-A         | 1 m~4 m                    | NCR              | Nov. 16, 2018 | NCR           | Radiation<br>(03CH04-KS) |
| EMI Receiver                            | R&S          | ESCI7                      | 100768           | 9kHz~7GHz;                 | Apr. 19, 2018    | Nov. 21, 2018 | Apr. 18, 2019 | Conduction<br>(CO01-KS)  |
| AC LISN                                 | MessTec      | AN3016                     | 060103           | 9kHz~30MHz                 | Oct. 12, 2018    | Nov. 21, 2018 | Oct. 11, 2019 | Conduction<br>(CO01-KS)  |
| AC LISN<br>(for auxiliary<br>equipment) | MessTec      | AN3016                     | 060105           | 9kHz~30MHz                 | Nov. 23, 2017    | Nov. 21, 2018 | Nov. 22, 2018 | Conduction<br>(CO01-KS)  |
| AC Power Source                         | Chroma       | 61602                      | ABP00000<br>0811 | AC 0V~300V,<br>45Hz~1000Hz | Oct. 12, 2018    | Nov. 21, 2018 | Oct. 11, 2019 | Conduction<br>(CO01-KS)  |

## 5 Uncertainty of Evaluation

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

|                                                                         |       |
|-------------------------------------------------------------------------|-------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ ) | 2.9dB |
|-------------------------------------------------------------------------|-------|

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

|                                                                         |       |
|-------------------------------------------------------------------------|-------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ ) | 4.9dB |
|-------------------------------------------------------------------------|-------|

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

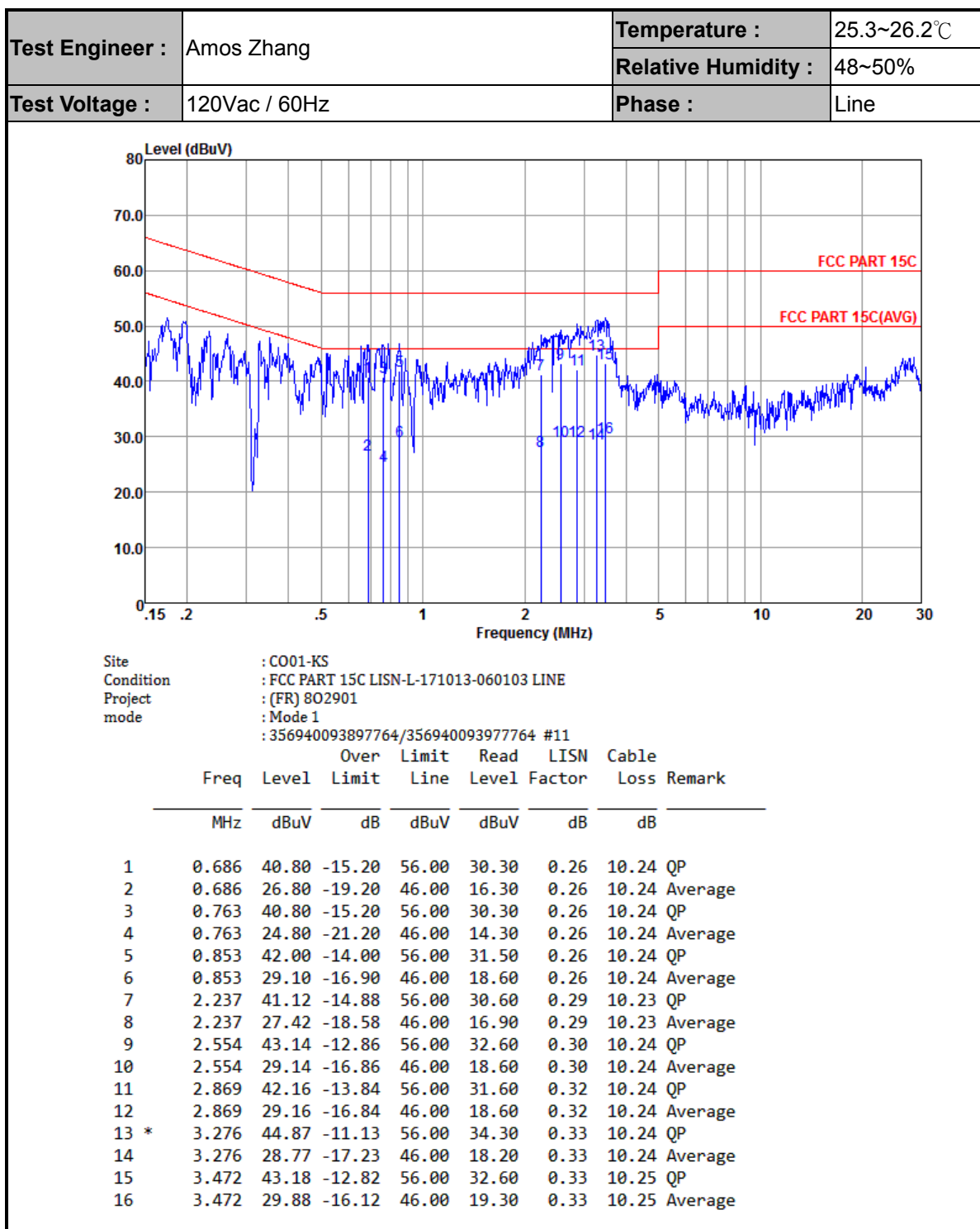
|                                                                         |       |
|-------------------------------------------------------------------------|-------|
| Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ ) | 5.0dB |
|-------------------------------------------------------------------------|-------|

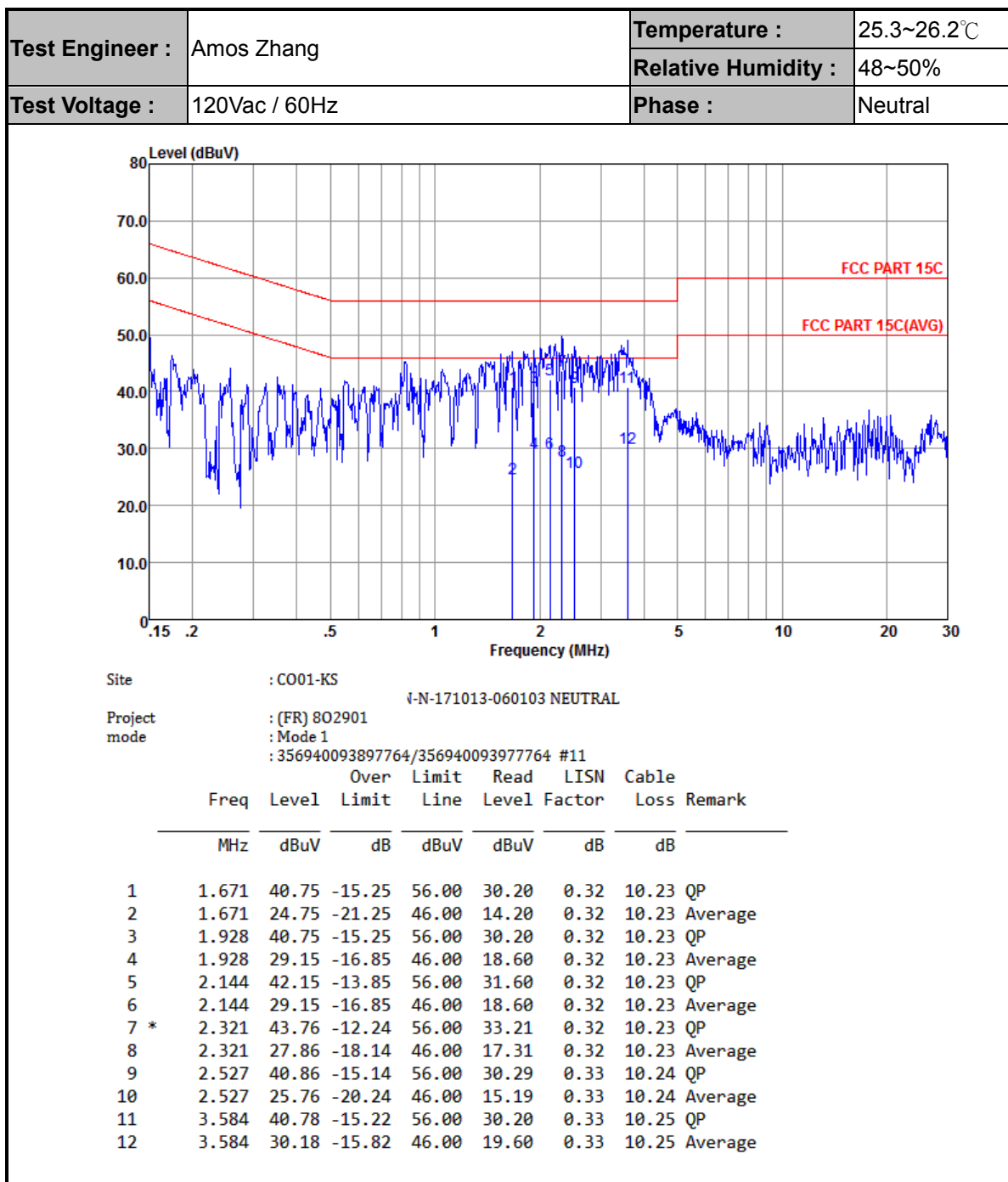
### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

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



## Appendix A. AC Conducted Emission Test Results







## Appendix B. Radiated Spurious Emission

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<br>CH 01<br>2412MHz |                                                              | 2347.44   | 53.93      | -20.07 | 74         | 48.2     | 32.1     | 5.43   | 31.8   | 105    | 89      | P     | H     |
|                             |                                                              | 2389.95   | 43.68      | -10.32 | 54         | 38       | 32       | 5.48   | 31.8   | 105    | 89      | A     | H     |
|                             | *                                                            | 2412      | 104.81     | -      | -          | 99       | 32.13    | 5.48   | 31.8   | 105    | 89      | P     | H     |
|                             | *                                                            | 2410      | 101.63     | -      | -          | 95.82    | 32.13    | 5.48   | 31.8   | 105    | 89      | A     | H     |
|                             |                                                              | 2380.85   | 53.75      | -20.25 | 74         | 48.09    | 32.03    | 5.43   | 31.8   | 385    | 114     | P     | V     |
|                             |                                                              | 2389.69   | 42.73      | -11.27 | 54         | 37.05    | 32       | 5.48   | 31.8   | 385    | 114     | A     | V     |
|                             | *                                                            | 2412      | 101.75     | -      | -          | 95.94    | 32.13    | 5.48   | 31.8   | 385    | 114     | P     | V     |
|                             | *                                                            | 2412      | 98.61      | -      | -          | 92.8     | 32.13    | 5.48   | 31.8   | 385    | 114     | A     | V     |
| 802.11b<br>CH 11<br>2462MHz | *                                                            | 2462      | 100.41     | -      | -          | 94.37    | 32.33    | 5.51   | 31.8   | 119    | 75      | P     | H     |
|                             | *                                                            | 2460      | 97.15      | -      | -          | 91.11    | 32.33    | 5.51   | 31.8   | 119    | 75      | A     | H     |
|                             |                                                              | 2498.56   | 53.42      | -20.58 | 74         | 47.47    | 32.2     | 5.55   | 31.8   | 119    | 75      | P     | H     |
|                             |                                                              | 2483.86   | 43.04      | -10.96 | 54         | 37.02    | 32.27    | 5.55   | 31.8   | 119    | 75      | A     | H     |
|                             | *                                                            | 2462      | 97.38      | -      | -          | 91.34    | 32.33    | 5.51   | 31.8   | 370    | 106     | P     | V     |
|                             | *                                                            | 2460      | 94.37      | -      | -          | 88.33    | 32.33    | 5.51   | 31.8   | 370    | 106     | A     | V     |
|                             |                                                              | 2488.6    | 53.8       | -20.2  | 74         | 47.85    | 32.2     | 5.55   | 31.8   | 370    | 106     | P     | V     |
|                             |                                                              | 2483.56   | 42.91      | -11.09 | 54         | 36.89    | 32.27    | 5.55   | 31.8   | 370    | 106     | A     | V     |
| Remark                      | 1. No other spurious found.                                  |           |            |        |            |          |          |        |        |        |         |       |       |
|                             | 2. All results are PASS against Peak and Average limit line. |           |            |        |            |          |          |        |        |        |         |       |       |



## 2.4GHz 2400~2483.5MHz

## WIFI 802.11b (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 ) |
|-------------|---------------------------------------------------------------------------------------------|-------------------|------------------|-------------------|-----------------------|---------------------|-------------------------|-------------------|----------------------|----------------|-------------------|-------------------|--------------|
| 802.11b     |                                                                                             | 4824              | 53.82            | -20.18            | 74                    | 73.64               | 34.2                    | 8.1               | 62.12                | 100            | 70                | P                 | H            |
| CH 01       |                                                                                             | 4824              | 53.6             | -0.4              | 54                    | 73.42               | 34.2                    | 8.1               | 62.12                | 100            | 70                | A                 | H            |
| 2412MHz     |                                                                                             | 4824              | 47.29            | -26.71            | 74                    | 67.11               | 34.2                    | 8.1               | 62.12                | 100            | 360               | P                 | V            |
| 802.11b     |                                                                                             | 4872              | 47.2             | -26.8             | 74                    | 67.09               | 34.13                   | 8.09              | 62.11                | 100            | 360               | P                 | H            |
| CH 06       |                                                                                             | 7308              | 43.02            | -30.98            | 74                    | 59.44               | 36.6                    | 9.75              | 62.77                | 100            | 360               | P                 | H            |
| 2437MHz     |                                                                                             | 4872              | 44.54            | -29.46            | 74                    | 64.43               | 34.13                   | 8.09              | 62.11                | 100            | 360               | P                 | V            |
|             |                                                                                             | 7308              | 42.78            | -31.22            | 74                    | 59.2                | 36.6                    | 9.75              | 62.77                | 100            | 360               | P                 | V            |
| 802.11b     |                                                                                             | 4926              | 54.11            | -19.89            | 74                    | 74.04               | 34.1                    | 8.06              | 62.09                | 108            | 293               | P                 | H            |
|             |                                                                                             | 4926              | 53.83            | -0.17             | 54                    | 73.76               | 34.1                    | 8.06              | 62.09                | 108            | 293               | A                 | H            |
| CH 11       |                                                                                             | 7386              | 42.05            | -31.95            | 74                    | 58.52               | 36.5                    | 9.81              | 62.78                | 108            | 293               | P                 | H            |
| 2462MHz     |                                                                                             | 4926              | 48.04            | -25.96            | 74                    | 67.97               | 34.1                    | 8.06              | 62.09                | 100            | 360               | P                 | V            |
|             |                                                                                             | 7386              | 42.6             | -31.4             | 74                    | 59.07               | 36.5                    | 9.81              | 62.78                | 100            | 360               | P                 | V            |
| Remark      | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                   |                  |                   |                       |                     |                         |                   |                      |                |                   |                   |              |



**2.4GHz 2400~2483.5MHz**  
**WIFI 802.11g (Band Edge @ 3m)**

| WIFI<br>Ant.<br>1                    | Note                                                                                        | Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>( dBμV ) | Antenna<br>Factor<br>( dB/m ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Peak<br>Avg.<br>( P/A ) | Pol.<br>( H/V ) |
|--------------------------------------|---------------------------------------------------------------------------------------------|----------------------|---------------------|-------------------------|-----------------------------|---------------------------|-------------------------------|-------------------------|----------------------------|----------------------|-------------------------|-------------------------|-----------------|
| <b>802.11g<br/>CH 01<br/>2412MHz</b> |                                                                                             | 2389.56              | 62.27               | -11.73                  | 74                          | 56.59                     | 32                            | 5.48                    | 31.8                       | 100                  | 250                     | P                       | H               |
|                                      |                                                                                             | 2389.95              | 47.6                | -6.4                    | 54                          | 41.92                     | 32                            | 5.48                    | 31.8                       | 100                  | 250                     | A                       | H               |
|                                      | *                                                                                           | 2408                 | 102.21              | -                       | -                           | 96.4                      | 32.13                         | 5.48                    | 31.8                       | 100                  | 250                     | P                       | H               |
|                                      | *                                                                                           | 2408                 | 94.6                | -                       | -                           | 88.79                     | 32.13                         | 5.48                    | 31.8                       | 100                  | 250                     | A                       | H               |
|                                      |                                                                                             | 2388.39              | 57.09               | -16.91                  | 74                          | 51.41                     | 32                            | 5.48                    | 31.8                       | 391                  | 287                     | P                       | V               |
|                                      |                                                                                             | 2389.95              | 44.34               | -9.66                   | 54                          | 38.66                     | 32                            | 5.48                    | 31.8                       | 391                  | 287                     | A                       | V               |
|                                      | *                                                                                           | 2416                 | 99.06               | -                       | -                           | 93.25                     | 32.13                         | 5.48                    | 31.8                       | 391                  | 287                     | P                       | V               |
|                                      | *                                                                                           | 2416                 | 91.36               | -                       | -                           | 85.55                     | 32.13                         | 5.48                    | 31.8                       | 391                  | 287                     | A                       | V               |
| <b>802.11g<br/>CH 11<br/>2462MHz</b> | *                                                                                           | 2456                 | 101.56              | -                       | -                           | 95.52                     | 32.33                         | 5.51                    | 31.8                       | 124                  | 73                      | P                       | H               |
|                                      | *                                                                                           | 2454                 | 93.86               | -                       | -                           | 87.82                     | 32.33                         | 5.51                    | 31.8                       | 124                  | 73                      | A                       | H               |
|                                      |                                                                                             | 2494.48              | 54.27               | -19.73                  | 74                          | 48.32                     | 32.2                          | 5.55                    | 31.8                       | 124                  | 73                      | P                       | H               |
|                                      |                                                                                             | 2483.5               | 43.79               | -10.21                  | 54                          | 37.77                     | 32.27                         | 5.55                    | 31.8                       | 124                  | 73                      | A                       | H               |
|                                      | *                                                                                           | 2456                 | 98.6                | -                       | -                           | 92.56                     | 32.33                         | 5.51                    | 31.8                       | 371                  | 121                     | P                       | V               |
|                                      | *                                                                                           | 2454                 | 89.91               | -                       | -                           | 83.87                     | 32.33                         | 5.51                    | 31.8                       | 371                  | 121                     | A                       | V               |
|                                      |                                                                                             | 2489.14              | 53.69               | -20.31                  | 74                          | 47.74                     | 32.2                          | 5.55                    | 31.8                       | 371                  | 121                     | P                       | V               |
|                                      |                                                                                             | 2483.56              | 43.6                | -10.4                   | 54                          | 37.58                     | 32.27                         | 5.55                    | 31.8                       | 371                  | 121                     | A                       | V               |
| <b>Remark</b>                        | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         |                 |



## 2.4GHz 2400~2483.5MHz

## WIFI 802.11g (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) |
|-----------------------------|---------------------------------------------------------------------------------------------|-------------------|------------------|-------------------|-----------------------|---------------------|-------------------------|-------------------|----------------------|----------------|-------------------|-----------------|------------|
| 802.11g<br>CH 01<br>2412MHz |                                                                                             | 4824              | 49.11            | -24.89            | 74                    | 68.93               | 34.2                    | 8.1               | 62.12                | 100            | 360               | P               | H          |
|                             |                                                                                             | 4824              | 44.33            | -29.67            | 74                    | 64.15               | 34.2                    | 8.1               | 62.12                | 100            | 360               | P               | V          |
| 802.11g<br>CH 06<br>2437MHz |                                                                                             | 4872              | 43.79            | -30.21            | 74                    | 63.68               | 34.13                   | 8.09              | 62.11                | 100            | 360               | P               | H          |
|                             |                                                                                             | 7308              | 42.28            | -31.72            | 74                    | 58.7                | 36.6                    | 9.75              | 62.77                | 100            | 360               | P               | H          |
|                             |                                                                                             | 4872              | 40.05            | -33.95            | 74                    | 59.94               | 34.13                   | 8.09              | 62.11                | 100            | 360               | P               | V          |
|                             |                                                                                             | 7308              | 43.22            | -30.78            | 74                    | 59.64               | 36.6                    | 9.75              | 62.77                | 100            | 360               | P               | V          |
| 802.11g<br>CH 11<br>2462MHz |                                                                                             | 4926              | 54.18            | -19.82            | 74                    | 74.11               | 34.1                    | 8.06              | 62.09                | 100            | 73                | P               | H          |
|                             |                                                                                             | 4926              | 42.76            | -11.24            | 54                    | 62.69               | 34.1                    | 8.06              | 62.09                | 100            | 73                | A               | H          |
|                             |                                                                                             | 7386              | 42.55            | -31.45            | 74                    | 59.02               | 36.5                    | 9.81              | 62.78                | 100            | 360               | P               | H          |
|                             |                                                                                             | 4926              | 44.33            | -29.67            | 74                    | 64.26               | 34.1                    | 8.06              | 62.09                | 100            | 360               | P               | V          |
|                             |                                                                                             | 7386              | 42.38            | -31.62            | 74                    | 58.85               | 36.5                    | 9.81              | 62.78                | 100            | 360               | P               | V          |
| Remark                      | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                   |                  |                   |                       |                     |                         |                   |                      |                |                   |                 |            |



## 2.4GHz 2400~2483.5MHz

## WIFI 802.11n HT20 (Band Edge @ 3m)

| WIFI<br>Ant.<br>1                   | Note                                                                                        | Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>( dBμV ) | Antenna<br>Factor<br>( dB/m ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Peak<br>Avg.<br>( P/A ) | Pol.<br>( H/V ) |
|-------------------------------------|---------------------------------------------------------------------------------------------|----------------------|---------------------|-------------------------|-----------------------------|---------------------------|-------------------------------|-------------------------|----------------------------|----------------------|-------------------------|-------------------------|-----------------|
| 802.11n<br>HT20<br>CH 01<br>2412MHz |                                                                                             | 2389.17              | 60.03               | -13.97                  | 74                          | 54.35                     | 32                            | 5.48                    | 31.8                       | 100                  | 90                      | P                       | H               |
|                                     |                                                                                             | 2389.95              | 46.72               | -7.28                   | 54                          | 41.04                     | 32                            | 5.48                    | 31.8                       | 100                  | 90                      | A                       | H               |
|                                     | *                                                                                           | 2408                 | 101.29              | -                       | -                           | 95.48                     | 32.13                         | 5.48                    | 31.8                       | 100                  | 90                      | P                       | H               |
|                                     | *                                                                                           | 2408                 | 93.51               | -                       | -                           | 87.7                      | 32.13                         | 5.48                    | 31.8                       | 100                  | 90                      | A                       | H               |
|                                     |                                                                                             | 2389.69              | 57.62               | -16.38                  | 74                          | 51.94                     | 32                            | 5.48                    | 31.8                       | 385                  | 115                     | P                       | V               |
|                                     |                                                                                             | 2389.95              | 45.83               | -8.17                   | 54                          | 40.15                     | 32                            | 5.48                    | 31.8                       | 385                  | 115                     | A                       | V               |
|                                     | *                                                                                           | 2416                 | 99.71               | -                       | -                           | 93.9                      | 32.13                         | 5.48                    | 31.8                       | 385                  | 115                     | P                       | V               |
|                                     | *                                                                                           | 2416                 | 91.96               | -                       | -                           | 86.15                     | 32.13                         | 5.48                    | 31.8                       | 385                  | 115                     | A                       | V               |
| 802.11n<br>HT20<br>CH 11<br>2462MHz | *                                                                                           | 2456                 | 103.75              | -                       | -                           | 97.71                     | 32.33                         | 5.51                    | 31.8                       | 124                  | 251                     | P                       | H               |
|                                     | *                                                                                           | 2454                 | 96.03               | -                       | -                           | 89.99                     | 32.33                         | 5.51                    | 31.8                       | 124                  | 251                     | A                       | H               |
|                                     |                                                                                             | 2483.5               | 58.11               | -15.89                  | 74                          | 52.09                     | 32.27                         | 5.55                    | 31.8                       | 124                  | 251                     | P                       | H               |
|                                     |                                                                                             | 2483.5               | 45.36               | -8.64                   | 54                          | 39.34                     | 32.27                         | 5.55                    | 31.8                       | 124                  | 251                     | A                       | H               |
|                                     | *                                                                                           | 2454                 | 97.42               | -                       | -                           | 91.38                     | 32.33                         | 5.51                    | 31.8                       | 288                  | 123                     | P                       | V               |
|                                     | *                                                                                           | 2454                 | 89.86               | -                       | -                           | 83.82                     | 32.33                         | 5.51                    | 31.8                       | 288                  | 123                     | A                       | V               |
|                                     |                                                                                             | 2484.52              | 54.14               | -19.86                  | 74                          | 48.12                     | 32.27                         | 5.55                    | 31.8                       | 288                  | 123                     | P                       | V               |
|                                     |                                                                                             | 2484.34              | 43.65               | -10.35                  | 54                          | 37.63                     | 32.27                         | 5.55                    | 31.8                       | 288                  | 123                     | A                       | V               |
| Remark                              | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         |                 |



**2.4GHz 2400~2483.5MHz**  
**WIFI 802.11n HT20 (Harmonic @ 3m)**

| WIFI<br>Ant.<br>1                   | Note                                                                                        | Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>( dBμV ) | Antenna<br>Factor<br>( dB/m ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Peak<br>Avg.<br>(P/A) | Pol.<br>(H/V) |
|-------------------------------------|---------------------------------------------------------------------------------------------|----------------------|---------------------|-------------------------|-----------------------------|---------------------------|-------------------------------|-------------------------|----------------------------|----------------------|-------------------------|-----------------------|---------------|
| 802.11n<br>HT20<br>CH 01<br>2412MHz |                                                                                             | 4824                 | 46.26               | -27.74                  | 74                          | 66.08                     | 34.2                          | 8.1                     | 62.12                      | 100                  | 360                     | P                     | H             |
|                                     |                                                                                             | 4824                 | 41.61               | -32.39                  | 74                          | 61.43                     | 34.2                          | 8.1                     | 62.12                      | 100                  | 360                     | P                     | V             |
| 802.11n<br>HT20<br>CH 06<br>2437MHz |                                                                                             | 4872                 | 43.44               | -30.56                  | 74                          | 63.33                     | 34.13                         | 8.09                    | 62.11                      | 100                  | 360                     | P                     | H             |
|                                     |                                                                                             | 7308                 | 42.92               | -31.08                  | 74                          | 59.34                     | 36.6                          | 9.75                    | 62.77                      | 100                  | 360                     | P                     | H             |
|                                     |                                                                                             | 4872                 | 39.34               | -34.66                  | 74                          | 59.23                     | 34.13                         | 8.09                    | 62.11                      | 100                  | 360                     | P                     | V             |
|                                     |                                                                                             | 7308                 | 42.83               | -31.17                  | 74                          | 59.25                     | 36.6                          | 9.75                    | 62.77                      | 100                  | 360                     | P                     | V             |
| 802.11n<br>HT20<br>CH 11<br>2462MHz |                                                                                             | 4926                 | 54.63               | -19.37                  | 74                          | 74.56                     | 34.1                          | 8.06                    | 62.09                      | 100                  | 74                      | P                     | H             |
|                                     |                                                                                             | 4926                 | 42.96               | -11.04                  | 54                          | 62.89                     | 34.1                          | 8.06                    | 62.09                      | 100                  | 74                      | A                     | H             |
|                                     |                                                                                             | 7386                 | 42.25               | -31.75                  | 74                          | 58.72                     | 36.5                          | 9.81                    | 62.78                      | 100                  | 360                     | P                     | H             |
|                                     |                                                                                             | 4926                 | 42.7                | -31.3                   | 74                          | 62.63                     | 34.1                          | 8.06                    | 62.09                      | 100                  | 360                     | P                     | V             |
|                                     |                                                                                             | 7386                 | 42.24               | -31.76                  | 74                          | 58.71                     | 36.5                          | 9.81                    | 62.78                      | 100                  | 360                     | P                     | V             |
| Remark                              | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                       |               |



## 2.4GHz 2400~2483.5MHz

## WIFI 802.11n HT40 (Band Edge @ 3m)

| WIFI<br>Ant.<br>1                   | Note                                                                                        | Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>( dBμV ) | Antenna<br>Factor<br>( dB/m ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Peak<br>Avg.<br>( P/A ) | Pol.<br>( H/V ) |
|-------------------------------------|---------------------------------------------------------------------------------------------|----------------------|---------------------|-------------------------|-----------------------------|---------------------------|-------------------------------|-------------------------|----------------------------|----------------------|-------------------------|-------------------------|-----------------|
| 802.11n<br>HT40<br>CH 03<br>2422MHz |                                                                                             | 2389.04              | 60.81               | -13.19                  | 74                          | 55.13                     | 32                            | 5.48                    | 31.8                       | 209                  | 255                     | P                       | H               |
|                                     |                                                                                             | 2389.69              | 48.86               | -5.14                   | 54                          | 43.18                     | 32                            | 5.48                    | 31.8                       | 209                  | 255                     | A                       | H               |
|                                     | *                                                                                           | 2412                 | 97.96               | -                       | -                           | 92.15                     | 32.13                         | 5.48                    | 31.8                       | 209                  | 255                     | P                       | H               |
|                                     | *                                                                                           | 2412                 | 90.21               | -                       | -                           | 84.4                      | 32.13                         | 5.48                    | 31.8                       | 209                  | 255                     | A                       | H               |
|                                     |                                                                                             | 2484.04              | 53.56               | -20.44                  | 74                          | 47.54                     | 32.27                         | 5.55                    | 31.8                       | 209                  | 255                     | P                       | H               |
|                                     |                                                                                             | 2485.48              | 43.01               | -10.99                  | 54                          | 36.99                     | 32.27                         | 5.55                    | 31.8                       | 209                  | 255                     | A                       | H               |
|                                     |                                                                                             | 2389.82              | 60.67               | -13.33                  | 74                          | 54.99                     | 32                            | 5.48                    | 31.8                       | 385                  | 106                     | P                       | V               |
|                                     |                                                                                             | 2389.95              | 47.61               | -6.39                   | 54                          | 41.93                     | 32                            | 5.48                    | 31.8                       | 385                  | 106                     | A                       | V               |
|                                     | *                                                                                           | 2412                 | 96.36               | -                       | -                           | 90.55                     | 32.13                         | 5.48                    | 31.8                       | 385                  | 106                     | P                       | V               |
|                                     | *                                                                                           | 2412                 | 88.5                | -                       | -                           | 82.69                     | 32.13                         | 5.48                    | 31.8                       | 385                  | 106                     | A                       | V               |
|                                     |                                                                                             | 2484.4               | 53.52               | -20.48                  | 74                          | 47.5                      | 32.27                         | 5.55                    | 31.8                       | 385                  | 106                     | P                       | V               |
|                                     |                                                                                             | 2483.68              | 43.35               | -10.65                  | 54                          | 37.33                     | 32.27                         | 5.55                    | 31.8                       | 385                  | 106                     | A                       | V               |
| 802.11n<br>HT40<br>CH 09<br>2452MHz |                                                                                             | 2388                 | 53.91               | -20.09                  | 74                          | 48.23                     | 32                            | 5.48                    | 31.8                       | 100                  | 65                      | P                       | H               |
|                                     |                                                                                             | 2389.17              | 43.82               | -10.18                  | 54                          | 38.14                     | 32                            | 5.48                    | 31.8                       | 100                  | 65                      | A                       | H               |
|                                     | *                                                                                           | 2446                 | 97.38               | -                       | -                           | 91.27                     | 32.4                          | 5.51                    | 31.8                       | 100                  | 65                      | P                       | H               |
|                                     | *                                                                                           | 2448                 | 89.08               | -                       | -                           | 82.97                     | 32.4                          | 5.51                    | 31.8                       | 100                  | 65                      | A                       | H               |
|                                     |                                                                                             | 2485.36              | 58.67               | -15.33                  | 74                          | 52.65                     | 32.27                         | 5.55                    | 31.8                       | 100                  | 65                      | P                       | H               |
|                                     |                                                                                             | 2483.56              | 44.32               | -9.68                   | 54                          | 38.3                      | 32.27                         | 5.55                    | 31.8                       | 100                  | 65                      | A                       | H               |
|                                     |                                                                                             | 2357.19              | 54.54               | -19.46                  | 74                          | 48.84                     | 32.07                         | 5.43                    | 31.8                       | 295                  | 124                     | P                       | V               |
|                                     |                                                                                             | 2389.56              | 42.97               | -11.03                  | 54                          | 37.29                     | 32                            | 5.48                    | 31.8                       | 295                  | 124                     | A                       | V               |
|                                     | *                                                                                           | 2448                 | 92.95               | -                       | -                           | 86.84                     | 32.4                          | 5.51                    | 31.8                       | 295                  | 124                     | P                       | V               |
|                                     | *                                                                                           | 2448                 | 84.46               | -                       | -                           | 78.35                     | 32.4                          | 5.51                    | 31.8                       | 295                  | 124                     | A                       | V               |
|                                     |                                                                                             | 2485.3               | 53.87               | -20.13                  | 74                          | 47.85                     | 32.27                         | 5.55                    | 31.8                       | 295                  | 124                     | P                       | V               |
|                                     |                                                                                             | 2485.36              | 43.59               | -10.41                  | 54                          | 37.57                     | 32.27                         | 5.55                    | 31.8                       | 295                  | 124                     | A                       | V               |
| Remark                              | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         |                 |



**2.4GHz 2400~2483.5MHz**  
**WIFI 802.11n HT40 (Harmonic @ 3m)**

| WIFI<br>Ant.<br>1                   | Note                                                                                        | Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>( dBμV ) | Antenna<br>Factor<br>( dB/m ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Peak<br>Avg.<br>( P/A ) | Pol.<br>( H/V ) |
|-------------------------------------|---------------------------------------------------------------------------------------------|----------------------|---------------------|-------------------------|-----------------------------|---------------------------|-------------------------------|-------------------------|----------------------------|----------------------|-------------------------|-------------------------|-----------------|
| 802.11n<br>HT40<br>CH 03<br>2422MHz |                                                                                             | 4842                 | 44.44               | -29.56                  | 74                          | 64.27                     | 34.2                          | 8.09                    | 62.12                      | 100                  | 360                     | P                       | H               |
|                                     |                                                                                             | 7266                 | 42.88               | -31.12                  | 74                          | 59.4                      | 36.53                         | 9.72                    | 62.77                      | 100                  | 360                     | P                       | H               |
|                                     |                                                                                             | 4842                 | 41.48               | -32.52                  | 74                          | 61.31                     | 34.2                          | 8.09                    | 62.12                      | 100                  | 360                     | P                       | V               |
|                                     |                                                                                             | 7266                 | 42.42               | -31.58                  | 74                          | 58.94                     | 36.53                         | 9.72                    | 62.77                      | 100                  | 360                     | P                       | V               |
| 802.11n<br>HT40<br>CH 06<br>2437MHz |                                                                                             | 4872                 | 41.6                | -32.4                   | 74                          | 61.49                     | 34.13                         | 8.09                    | 62.11                      | 100                  | 360                     | P                       | H               |
|                                     |                                                                                             | 7308                 | 42.71               | -31.29                  | 74                          | 59.13                     | 36.6                          | 9.75                    | 62.77                      | 100                  | 360                     | P                       | H               |
|                                     |                                                                                             | 4872                 | 38.74               | -35.26                  | 74                          | 58.63                     | 34.13                         | 8.09                    | 62.11                      | 100                  | 360                     | P                       | V               |
|                                     |                                                                                             | 7308                 | 42.75               | -31.25                  | 74                          | 59.17                     | 36.6                          | 9.75                    | 62.77                      | 100                  | 360                     | P                       | V               |
| 802.11n<br>HT40<br>CH 09<br>2452MHz |                                                                                             | 4902                 | 42.13               | -31.87                  | 74                          | 62.05                     | 34.1                          | 8.07                    | 62.09                      | 100                  | 360                     | P                       | H               |
|                                     |                                                                                             | 7356                 | 42.7                | -31.3                   | 74                          | 59.1                      | 36.6                          | 9.78                    | 62.78                      | 100                  | 360                     | P                       | H               |
|                                     |                                                                                             | 4902                 | 40.78               | -33.22                  | 74                          | 60.7                      | 34.1                          | 8.07                    | 62.09                      | 100                  | 360                     | P                       | V               |
|                                     |                                                                                             | 7356                 | 42.27               | -31.73                  | 74                          | 58.67                     | 36.6                          | 9.78                    | 62.78                      | 100                  | 360                     | P                       | V               |
| Remark                              | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                      |                     |                         |                             |                           |                               |                         |                            |                      |                         |                         |                 |



## 2.4GHz 2400~2483.5MHz

## Emission below 1GHz

## 2.4GHz WIFI 802.11b (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<br>802.11b<br>LF |                                                                            | 30        | 23.56      | -16.44 | 40         | 30.43  | 24.5     | 0.61   | 31.98  | -      | -       | P     | H     |
|                         |                                                                            | 62.01     | 22.79      | -17.21 | 40         | 41.45  | 12.44    | 0.82   | 31.92  | -      | -       | P     | H     |
|                         |                                                                            | 127       | 27.4       | -16.1  | 43.5       | 40.42  | 17.78    | 1.14   | 31.94  | -      | -       | P     | H     |
|                         |                                                                            | 193.93    | 26.7       | -16.8  | 43.5       | 41.91  | 15.27    | 1.42   | 31.9   | -      | -       | P     | H     |
|                         |                                                                            | 287.05    | 33.1       | -12.9  | 46         | 44.54  | 18.81    | 1.8    | 32.05  | 100    | 36      | P     | H     |
|                         |                                                                            | 373.38    | 28.45      | -17.55 | 46         | 37.66  | 20.92    | 1.96   | 32.09  | -      | -       | P     | H     |
|                         |                                                                            | 30        | 26.82      | -13.18 | 40         | 33.69  | 24.5     | 0.61   | 31.98  | -      | -       | P     | V     |
|                         |                                                                            | 61.04     | 26.04      | -13.96 | 40         | 44.73  | 12.42    | 0.81   | 31.92  | -      | -       | P     | V     |
|                         |                                                                            | 127       | 32.19      | -11.31 | 43.5       | 45.21  | 17.78    | 1.14   | 31.94  | 132    | 14      | P     | V     |
|                         |                                                                            | 191.02    | 24.46      | -19.04 | 43.5       | 39.7   | 15.26    | 1.41   | 31.91  | -      | -       | P     | V     |
|                         |                                                                            | 252.13    | 22.51      | -23.49 | 46         | 34.19  | 18.54    | 1.74   | 31.96  | -      | -       | P     | V     |
|                         |                                                                            | 289.96    | 21.94      | -24.06 | 46         | 33.34  | 18.85    | 1.81   | 32.06  | -      | -       | P     | 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>P</b> eak or <b>A</b> verage                                                                                                                          |
| H/V | <b>H</b> orizontal or <b>V</b> 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.    |         |
| 2       |      | ( 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       |

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”.**



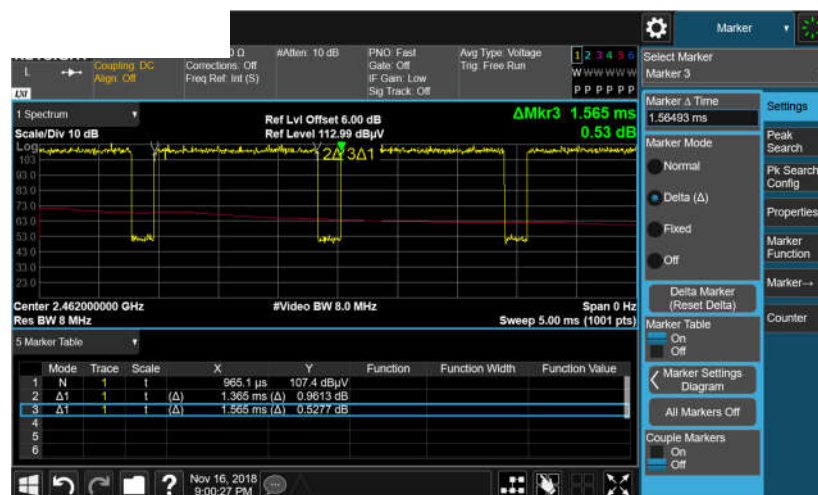
## Appendix C. Duty Cycle Plots

| Band         | Duty Cycle(%) | T(ms) | 1/T(kHz) | VBW Setting |
|--------------|---------------|-------|----------|-------------|
| 802.11b      | 97.62         | 8.220 | 0.122    | 0.13KHz     |
| 802.11g      | 87.22         | 1.365 | 0.733    | 0.75KHz     |
| 802.11n HT20 | 86.44         | 1.275 | 0.784    | 0.82KHz     |
| 802.11n HT40 | 85.97         | 1.226 | 0.816    | 0.82KHz     |

## 802.11b

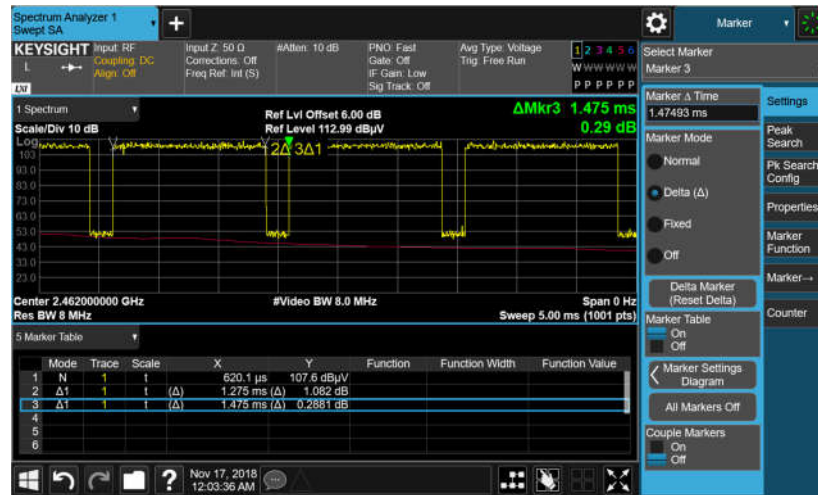


## 802.11g

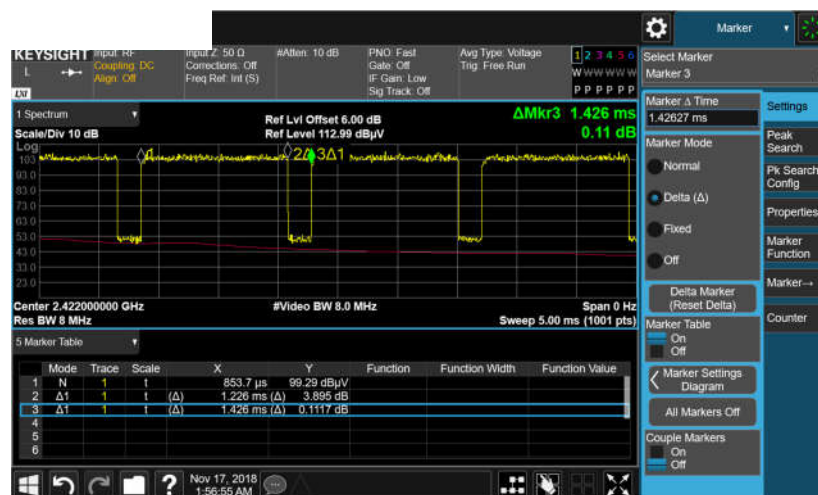




802.11n HT20



802.11n HT40





## **Appendix E. Reference Report**

Please refer to Sporton report number FR832104C which is issued separately.