



# FCC RADIO TEST REPORT

FCC ID : QYL9260NG  
Equipment : WLAN module  
Brand Name : Getac  
Model Name : 9260NGW  
Applicant : Getac Technology Corporation.  
5F., Building A, No. 209, Sec. 1, Nangang Rd.,  
Nangang Dist., Taipei City 11568, Taiwan, R.O.C.  
Standard : FCC Part 15 Subpart C §15.247

The product was received on Apr. 09, 2019 and testing was started from Apr. 19, 2019 and completed on May 06, 2019. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, 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 report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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

Approved by: Jones Tsai

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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## History of this test report

| Report No.   | Version | Description             | Issued Date  |
|--------------|---------|-------------------------|--------------|
| FR391803-53B | 01      | Initial issue of report | May 29, 2019 |
|              |         |                         |              |
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|              |         |                         |              |

## Summary of Test Result

| Report Clause | Ref Std. Clause    | Test Items                                | Result (PASS/FAIL) |
|---------------|--------------------|-------------------------------------------|--------------------|
| 3.1           | 15.247(b)(3)       | Output Power                              | Pass               |
| 3.2           | 15.247(d)          | Radiated Band Edges and Spurious Emission | Pass               |
| 3.3           | 15.203 & 15.247(b) | Antenna Requirement                       | Pass               |

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

**Reviewed by:** Wii Chang

**Report Producer:** Ann Lee



# 1 General Description

## 1.1 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, and Wi-Fi 5GHz 802.11a/n/ac

| Product Specification subjective to this standard |                                               |
|---------------------------------------------------|-----------------------------------------------|
| Antenna Type                                      | WLAN: PIFA Antenna<br>Bluetooth: PIFA Antenna |

The product was installed into Tablet (Brand Name: Getac, HVIN: F110, F110\_G5, F110-Ex) during test, which can be referred the following information:

| Report Sample                          | Sample 1                                                 | Sample 2                         | Sample 3                 | Sample 4                 | Sample 5                         |
|----------------------------------------|----------------------------------------------------------|----------------------------------|--------------------------|--------------------------|----------------------------------|
| F110 SKU                               | SKU D                                                    | SKU E                            | SKU F                    | SKU G                    | SKU F                            |
| CPU                                    | I5-8265U                                                 | i7-8565U                         | i7-8565U                 | I5-8365U                 | i7-8565U                         |
| DDR                                    | 4G                                                       | 8G                               | 16G                      | 16G                      | 16G                              |
| SSD                                    | 128GB                                                    | 256GB                            | 512GB                    | 1TB                      | 512GB                            |
| Panel                                  | AUO<br>HD B116XAN05                                      | FHD,KD116N11-30<br>NP-A9         | FHD,KD116N11-30<br>NP-A9 | FHD,KD116N11-30<br>NP-A9 | FHD,KD116N11-30<br>NP-A9         |
| Digitizer                              | Getac                                                    | Getac                            | Getac                    | not Support              | Getac                            |
| Option Bay                             | RS232+LAN                                                | LAN                              | BCR                      | LAN                      | BCR                              |
| Expansion Bay                          | SMART CARD or<br>SSD Easily<br>removable + Smart<br>Card | HID RFID                         | Finger print             | not Support              | HID RFID                         |
| WLAN/BT                                | Support(9260NGW)                                         | Support(9260NGW)                 | Support(9260NGW)         | Support(9260NGW)         | Support(9260NGW)                 |
| WWAN                                   | not Support                                              | Support(EM7455)                  | Support(EM7511)          | not Support              | Support(EM7455)                  |
| GPS                                    | GPS(MC-1010)                                             | GPS(MC-1010)                     | GPS(MC-1010)             | GPS(MC-1010)             | GPS(MC-1010)                     |
| Webcam FHD                             | Support                                                  | not Support                      | not Support              | Support                  | not Support                      |
| Rear 8M Camera                         | Support                                                  | Support                          | Support                  | Support                  | Support                          |
| IR Webcam                              | not Support                                              | Support                          | Support                  | not Support              | Support                          |
| RFID                                   | not Support                                              | Support(OMNIKEY<br>5127 CK MINI) | not Support              | not Support              | Support(OMNIKEY<br>5127 CK MINI) |
| Default IO<br>(USB 3.0 port)           | Support                                                  | Support                          | Support                  | Support                  | Support                          |
| Default IO<br>(HDMI)                   | Support                                                  | Support                          | Support                  | not Support              | Support                          |
| Default IO<br>(Audio)                  | Support                                                  | Support                          | Support                  | Support                  | Support                          |
| Default IO<br>(USB3.1 Type-C<br>Gen 1) | not Support                                              | not Support                      | not Support              | Support                  | not Support                      |
| Explosion-proof<br>cover               | not Support                                              | not Support                      | not Support              | not Support              | Support                          |

## 1.2 Modification of EUT

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

### 1.3 Testing Location

|                    |                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------|
| Test Site          | SPORTON INTERNATIONAL INC.                                                                                            |
| Test Site Location | No.52, Huaya 1st Rd., Guishan Dist.,<br>Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |
| Test Site No.      | Sporton Site No.                                                                                                      |
|                    | TH05-HY                                                                                                               |

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

|                    |                                                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Test Site          | SPORTON INTERNATIONAL INC.                                                                                                                |
| Test Site Location | No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist.,<br>Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-0868<br>FAX: +886-3-327-0855 |
| Test Site No.      | Sporton Site No.                                                                                                                          |
|                    | 03CH15-HY                                                                                                                                 |

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

FCC designation No.: TW1190 and TW0007

### 1.4 Applicable Standards

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

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ 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

### 2.1 Carrier Frequency Channel

| Frequency Band  | Channel | Freq.<br>(MHz) | Channel | Freq.<br>(MHz) |
|-----------------|---------|----------------|---------|----------------|
| 2400-2483.5 MHz | 0       | 2402           | 21      | 2444           |
|                 | 1       | 2404           | 22      | 2446           |
|                 | 2       | 2406           | 23      | 2448           |
|                 | 3       | 2408           | 24      | 2450           |
|                 | 4       | 2410           | 25      | 2452           |
|                 | 5       | 2412           | 26      | 2454           |
|                 | 6       | 2414           | 27      | 2456           |
|                 | 7       | 2416           | 28      | 2458           |
|                 | 8       | 2418           | 29      | 2460           |
|                 | 9       | 2420           | 30      | 2462           |
|                 | 10      | 2422           | 31      | 2464           |
|                 | 11      | 2424           | 32      | 2466           |
|                 | 12      | 2426           | 33      | 2468           |
|                 | 13      | 2428           | 34      | 2470           |
|                 | 14      | 2430           | 35      | 2472           |
|                 | 15      | 2432           | 36      | 2474           |
|                 | 16      | 2434           | 37      | 2476           |
|                 | 17      | 2436           | 38      | 2478           |
|                 | 18      | 2438           | 39      | 2480           |
|                 | 19      | 2440           | -       | -              |
|                 | 20      | 2442           | -       | -              |

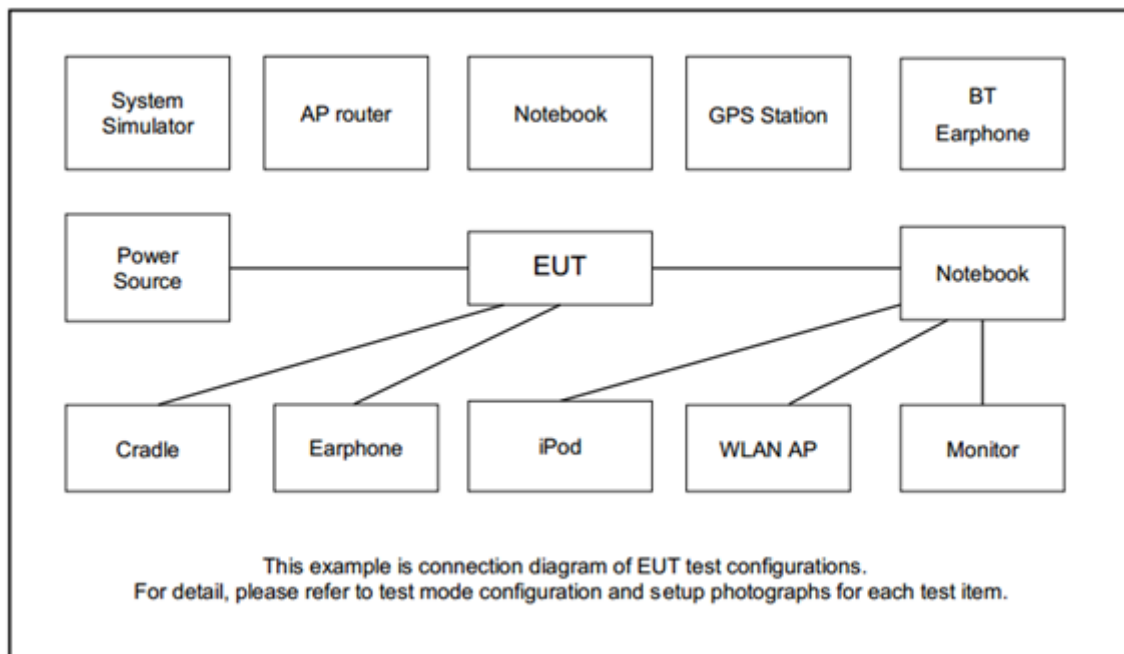
## 2.2 Test Mode

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: 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.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

| Summary table of Test Cases                                                                                                                                                                                                               |                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Test Item                                                                                                                                                                                                                                 | Data Rate / Modulation                   |
|                                                                                                                                                                                                                                           | Bluetooth – LE / GFSK                    |
| <b>Radiated Test Cases</b>                                                                                                                                                                                                                | Mode 1: Bluetooth Tx CH19_2440 MHz_1Mbps |
| <b>Remark:</b> <ol style="list-style-type: none"> <li>For Radiated Test Cases, the tests were performed with Sample 3.</li> <li>The tests were performed with Battery (Model: BP3S1P2290 A) and Adapter (Model: FSP065-RBBN3).</li> </ol> |                                          |

## 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.   | iPod Earphone | Apple      | N/A        | Verification | Unshielded, 1.0 m | N/A        |

## 2.5 EUT Operation Test Setup

The RF test items, utility “DRTU” was installed in Tablet which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

### 3 Test Result

#### 3.1 Output Power Measurement

##### 3.1.1 Limit of Output Power

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

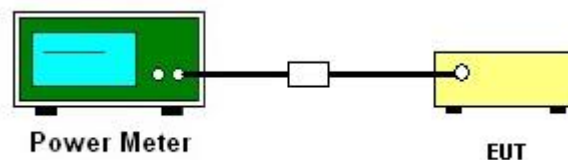
##### 3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

##### 3.1.3 Test Procedures

1. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
2. The RF output of EUT was connected to the power meter by RF cable and attenuator.
3. The path loss was compensated to the results for each measurement.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Measure the conducted output power and record the results in the test report.

##### 3.1.4 Test Setup



##### 3.1.5 Test Result of Average Output Power

Please refer to Appendix A.

## 3.2 Radiated Band Edges and Spurious Emission Measurement

### 3.2.1 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. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the 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                                |

### 3.2.2 Measuring Instruments

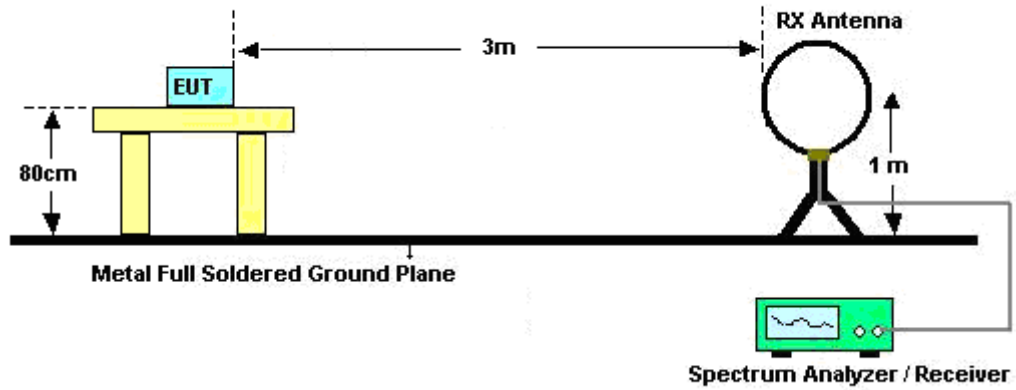
See list of measuring equipment of this test report.

### 3.2.3 Test Procedures

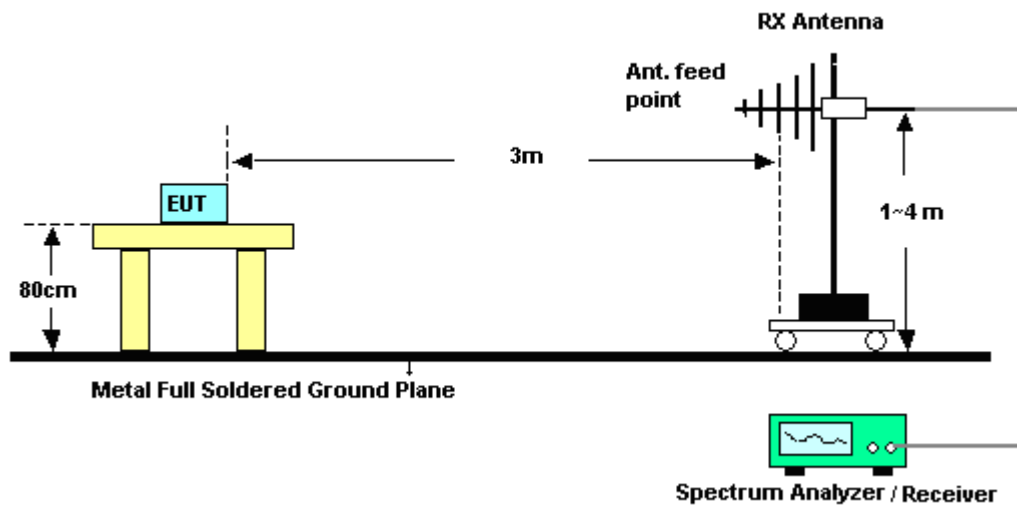
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the 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  $f < 1$  GHz;  $VBW \geq RBW$ ; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW= 3MHz for  $f \geq 1$  GHz for peak measurement.  
For average measurement:
    - $VBW = 10$  Hz, when duty cycle is no less than 98 percent.
    - $VBW \geq 1/T$ , when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

### 3.2.4 Test Setup

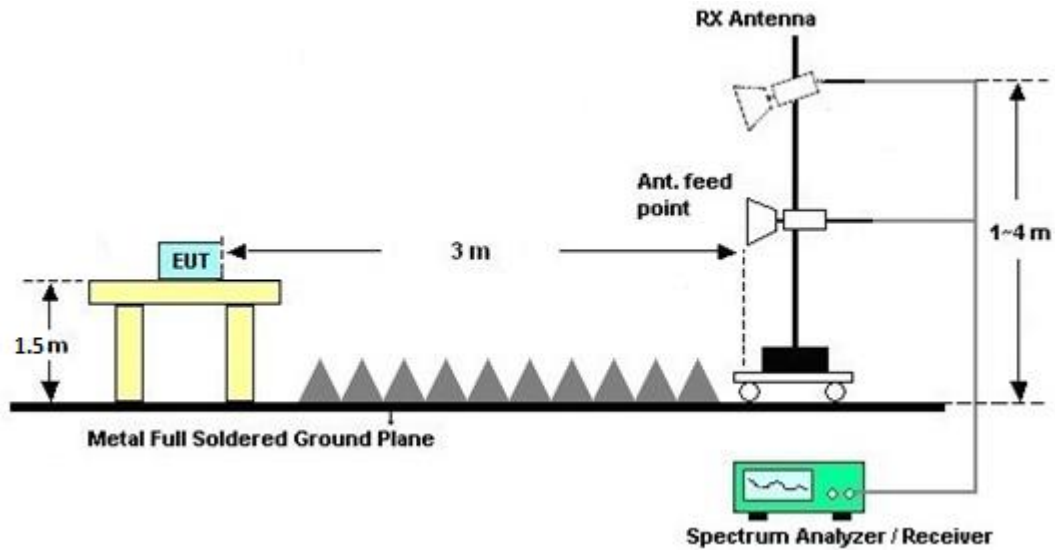
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

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

Please refer to Appendix B and C.

### 3.2.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix B and C.



### **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                |
|-----------------------|-----------------|-----------------------------|------------------------|-----------------|------------------|-------------------------------|---------------|-----------------------|
| Power Sensor          | DARE            | RadiPower                   | 15I00041SNO09          | 10MHz~6GHz      | May 07, 2018     | Apr. 19, 2019                 | May 06, 2019  | Conducted (TH05-HY)   |
| Spectrum Analyzer     | Rohde & Schwarz | FSV 30                      | 100895                 | 9kHz~30GHz      | Apr. 20, 2018    | Apr. 19, 2019                 | Apr. 19, 2019 | Conducted (TH05-HY)   |
| Switch Box & RF Cable | EM              | EMSW18                      | EC1208382              | N/A             | Mar. 27, 2019    | Apr. 19, 2019                 | Mar. 26, 2020 | Conducted (TH05-HY)   |
| Loop Antenna          | Rohde & Schwarz | HFH2-Z2                     | 100488                 | 9 kHz~30 MHz    | Jan. 07, 2019    | May 04, 2019~<br>May 06, 2019 | Jan. 06, 2020 | Radiation (03CH15-HY) |
| Preamplifier          | EMEC            | EM18G40G                    | 060715                 | 18GHz ~ 40GHz   | Dec. 06, 2018    | May 04, 2019~<br>May 06, 2019 | Dec. 05, 2019 | Radiation (03CH15-HY) |
| Bilog Antenna         | TESEQ           | CBL6111D&00802N1D01N-06     | 47020&06               | 30MHz to 1GHz   | Oct. 13, 2018    | May 04, 2019~<br>May 06, 2019 | Oct. 12, 2019 | Radiation (03CH15-HY) |
| Horn Antenna          | SCHWARZBECK     | BBHA 9120D                  | 9120D-1620             | 1G~18GHz        | Oct. 17, 2018    | May 04, 2019~<br>May 06, 2019 | Oct. 16, 2019 | Radiation (03CH15-HY) |
| SHF-EHF Horn Antenna  | SCHWARZBECK     | BBHA 9170                   | BBHA9170576            | 18GHz ~ 40GHz   | May 08, 2018     | May 04, 2019~<br>May 06, 2019 | May 07, 2019  | Radiation (03CH15-HY) |
| Amplifier             | SONOMA          | 310N                        | 363440                 | 9kHz~1GHz       | Dec. 28, 2018    | May 04, 2019~<br>May 06, 2019 | Dec. 27, 2019 | Radiation (03CH15-HY) |
| Preamplifier          | Jet-Power       | JAP00101800-30-10P          | 160118550004           | 1GHz~18GHz      | Apr. 25, 2019    | May 04, 2019~<br>May 06, 2019 | Apr. 24, 2020 | Radiation (03CH15-HY) |
| Preamplifier          | Keysight        | 83017A                      | MY53270195             | 1GHz~26.5GHz    | Aug. 23, 2018    | May 04, 2019~<br>May 06, 2019 | Aug. 22, 2019 | Radiation (03CH15-HY) |
| Spectrum Analyzer     | Agilent         | N9010A                      | MY53470118             | 10Hz~44GHz      | Apr. 18, 2019    | May 04, 2019~<br>May 06, 2019 | Apr. 17, 2020 | Radiation (03CH15-HY) |
| Antenna Mast          | ChainTek        | MBS-520-1                   | N/A                    | 1m~4m           | N/A              | May 04, 2019~<br>May 06, 2019 | N/A           | Radiation (03CH15-HY) |
| Turn Table            | ChainTek        | T-200-S-1                   | N/A                    | 0~360 Degree    | N/A              | May 04, 2019~<br>May 06, 2019 | N/A           | Radiation (03CH15-HY) |
| Software              | Audix           | E3 6.2009-8-24              | RK-000451              | N/A             | N/A              | May 04, 2019~<br>May 06, 2019 | N/A           | Radiation (03CH15-HY) |
| RF Cable              | HUBER + SUHNER  | SUCOFLEX 104                | MY36980/4              | 30M-18G         | Apr. 15, 2019    | May 04, 2019~<br>May 06, 2019 | Apr. 14, 2020 | Radiation (03CH15-HY) |
| RF Cable              | HUBER + SUHNER  | SUCOFLEX 104                | MY9838/4               | 30M-18G         | Apr. 15, 2019    | May 04, 2019~<br>May 06, 2019 | Apr. 14, 2020 | Radiation (03CH15-HY) |
| RF Cable              | HUBER + SUHNER  | MTJ                         | 000000-MT18 A-100D3210 | 30M-18G         | Apr. 15, 2019    | May 04, 2019~<br>May 06, 2019 | Apr. 14, 2020 | Radiation (03CH15-HY) |
| RF Cable              | HUBER + SUHNER  | SUCOFLEX 102                | MY2859/2               | 30MHz-40GHz     | Mar. 13, 2019    | May 04, 2019~<br>May 06, 2019 | Mar. 12, 2020 | Radiation (03CH15-HY) |
| RF Cable              | HUBER + SUHNER  | SUCOFLEX 102                | MY4274/2               | 30MHz-40GHz     | Mar. 13, 2019    | May 04, 2019~<br>May 06, 2019 | Mar. 12, 2020 | Radiation (03CH15-HY) |
| Filter                | Wainwright      | WLK4-1000-1530-8000-40S     | SN11                   | 1G Low Pass     | Sep. 16, 2018    | May 04, 2019~<br>May 06, 2019 | Sep. 15, 2019 | Radiation (03CH15-HY) |
| Filter                | Wainwright      | WHKX12-2700-3000-18000-60ST | SN1                    | 3 GHz Highpass  | Sep. 16, 2018    | May 04, 2019~<br>May 06, 2019 | Sep. 15, 2019 | Radiation (03CH15-HY) |

## 5 Uncertainty of Evaluation

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

|                                                                            |     |
|----------------------------------------------------------------------------|-----|
| Measuring Uncertainty for a Level of Confidence<br>of 95% ( $U = 2Uc(y)$ ) | 5.2 |
|----------------------------------------------------------------------------|-----|

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

|                                                                            |     |
|----------------------------------------------------------------------------|-----|
| Measuring Uncertainty for a Level of Confidence<br>of 95% ( $U = 2Uc(y)$ ) | 5.5 |
|----------------------------------------------------------------------------|-----|

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

|                                                                            |     |
|----------------------------------------------------------------------------|-----|
| Measuring Uncertainty for a Level of Confidence<br>of 95% ( $U = 2Uc(y)$ ) | 5.2 |
|----------------------------------------------------------------------------|-----|

**Appendix A. Test Result of Conducted Test Items**

|                |             |                    |       |    |
|----------------|-------------|--------------------|-------|----|
| Test Engineer: | Richard Qiu | Temperature:       | 21~25 | °C |
| Test Date:     | 2019/4/19   | Relative Humidity: | 51~54 | %  |

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

| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Average Conducted Power (dBm) | Conducted Power Limit (dBm) | DG (dBi) | EIRP Power (dBm) | EIRP Power Limit (dBm) | Pass /Fail |
|------|-----------|-----|-----|-------------|-------------------------------|-----------------------------|----------|------------------|------------------------|------------|
| BLE  | 1Mbps     | 1   | 0   | 2402        | 7.80                          | 30.00                       | 1.83     | 9.63             | 36.00                  | Pass       |
| BLE  | 1Mbps     | 1   | 19  | 2440        | 7.90                          | 30.00                       | 1.83     | 9.73             | 36.00                  | Pass       |
| BLE  | 1Mbps     | 1   | 39  | 2480        | 8.20                          | 30.00                       | 1.83     | 10.03            | 36.00                  | Pass       |



## Appendix B. Radiated Spurious Emission

|                 |            |                     |         |
|-----------------|------------|---------------------|---------|
| Test Engineer : | Watt Tseng | Temperature :       | 23~26°C |
|                 |            | Relative Humidity : | 50~57%  |

### 2.4GHz 2400~2483.5MHz

#### BLE (Band Edge @ 3m)

| BLE                     | Note                                                                                        | Frequency | Level      | Over Limit | Limit Line | Read Level | Antenna Factor | Path Loss | Preampl Factor | Ant Pos | Table Pos | Peak Avg. | Pol.    |
|-------------------------|---------------------------------------------------------------------------------------------|-----------|------------|------------|------------|------------|----------------|-----------|----------------|---------|-----------|-----------|---------|
|                         |                                                                                             | ( MHz )   | ( dBμV/m ) | ( dB )     | ( dBμV/m ) | ( dBμV )   | ( dB/m )       | ( dB )    | ( dB )         | ( cm )  | ( deg )   | ( P/A )   | ( H/V ) |
| BLE<br>CH 19<br>2440MHz |                                                                                             | 2346.4    | 53.66      | -20.34     | 74         | 40.58      | 27.7           | 16.26     | 30.88          | 100     | 106       | P         | H       |
|                         |                                                                                             | 2363.2    | 44.61      | -9.39      | 54         | 31.53      | 27.67          | 16.29     | 30.88          | 100     | 106       | A         | H       |
|                         | *                                                                                           | 2440      | 99.07      | -          | -          | 85.93      | 27.6           | 16.38     | 30.84          | 100     | 106       | P         | H       |
|                         | *                                                                                           | 2440      | 98.59      | -          | -          | 85.45      | 27.6           | 16.38     | 30.84          | 100     | 106       | A         | H       |
|                         |                                                                                             | 2499.09   | 52.92      | -21.08     | 74         | 39.9       | 27.4           | 16.43     | 30.81          | 100     | 106       | P         | H       |
|                         |                                                                                             | 2499.93   | 44.16      | -9.84      | 54         | 31.14      | 27.4           | 16.43     | 30.81          | 100     | 106       | A         | H       |
|                         |                                                                                             | 2354.1    | 53.17      | -20.83     | 74         | 40.11      | 27.67          | 16.27     | 30.88          | 297     | 85        | P         | V       |
|                         |                                                                                             | 2337.16   | 44.6       | -9.4       | 54         | 31.54      | 27.7           | 16.25     | 30.89          | 297     | 85        | A         | V       |
|                         | *                                                                                           | 2440      | 99.04      | -          | -          | 85.9       | 27.6           | 16.38     | 30.84          | 297     | 85        | P         | V       |
|                         | *                                                                                           | 2440      | 98.53      | -          | -          | 85.39      | 27.6           | 16.38     | 30.84          | 297     | 85        | A         | V       |
|                         |                                                                                             | 2486      | 53.43      | -20.57     | 74         | 40.36      | 27.47          | 16.42     | 30.82          | 297     | 85        | P         | V       |
|                         |                                                                                             | 2486.42   | 44.4       | -9.6       | 54         | 31.33      | 27.47          | 16.42     | 30.82          | 297     | 85        | 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****BLE (Harmonic @ 3m)**

| BLE                     | 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 ) | Path<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 ) |
|-------------------------|---------------------------------------------------------------------------------------------|----------------------|---------------------|-------------------------|-----------------------------|---------------------------|-------------------------------|------------------------|----------------------------|----------------------|-------------------------|-------------------------|-----------------|
| BLE<br>CH 19<br>2440MHz |                                                                                             | 4880                 | 39.1                | -34.9                   | 74                          | 60.19                     | 31.3                          | 9.72                   | 62.11                      | 100                  | 0                       | P                       | H               |
|                         |                                                                                             | 7320                 | 44.82               | -29.18                  | 74                          | 59.84                     | 36.23                         | 11.79                  | 63.04                      | 100                  | 0                       | P                       | H               |
|                         |                                                                                             |                      |                     |                         |                             |                           |                               |                        |                            |                      |                         |                         | H               |
|                         |                                                                                             |                      |                     |                         |                             |                           |                               |                        |                            |                      |                         |                         | H               |
|                         |                                                                                             | 4880                 | 39.53               | -34.47                  | 74                          | 60.62                     | 31.3                          | 9.72                   | 62.11                      | 100                  | 0                       | P                       | V               |
|                         |                                                                                             | 7320                 | 45.06               | -28.94                  | 74                          | 60.08                     | 36.23                         | 11.79                  | 63.04                      | 100                  | 0                       | P                       | V               |
|                         |                                                                                             |                      |                     |                         |                             |                           |                               |                        |                            |                      |                         |                         | V               |
|                         |                                                                                             |                      |                     |                         |                             |                           |                               |                        |                            |                      |                         |                         | V               |
| Remark                  | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. |                      |                     |                         |                             |                           |                               |                        |                            |                      |                         |                         |                 |

## Emission below 1GHz

## 2.4GHz BLE (LF)

[illegible]



**Note symbol**

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

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

| BLE                     | Note | Frequency | Level      | Over   | Limit      | Read     | Antenna  | Path   | Preamp | Ant    | Table   | Peak    | Pol.    |
|-------------------------|------|-----------|------------|--------|------------|----------|----------|--------|--------|--------|---------|---------|---------|
|                         |      |           |            | Limit  | Line       | Level    | Factor   | Loss   | Factor | Pos    | Pos     | Avg.    |         |
|                         |      | ( MHz )   | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | ( P/A ) | ( H/V ) |
| BLE<br>CH 00<br>2402MHz |      | 2390      | 55.45      | -18.55 | 74         | 54.51    | 32.22    | 4.58   | 35.86  | 103    | 308     | P       | H       |
|                         |      | 2390      | 43.54      | -10.46 | 54         | 42.6     | 32.22    | 4.58   | 35.86  | 103    | 308     | A       | H       |

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =  
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

**For Peak Limit @ 2390MHz:**

1. Level(dBμV/m)  
= Antenna Factor(dB/m) + Path 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) + Path 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. Radiated Spurious Emission Plots

|                 |            |                     |         |
|-----------------|------------|---------------------|---------|
| Test Engineer : | Watt Tseng | Temperature :       | 23~26°C |
|                 |            | Relative Humidity : | 50~57%  |

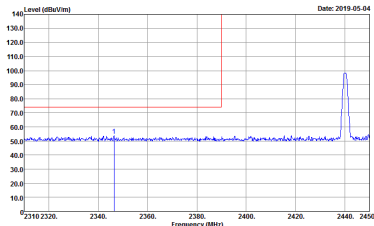
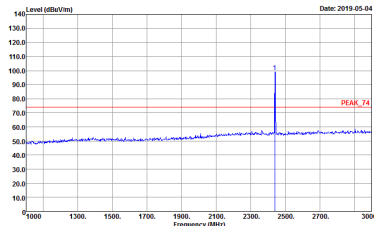
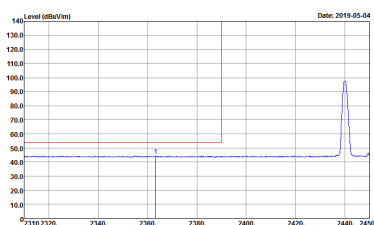
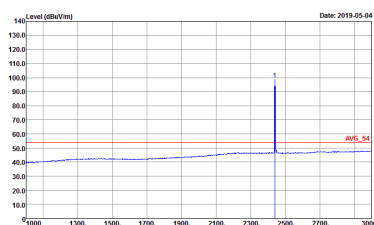
### Note symbol

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

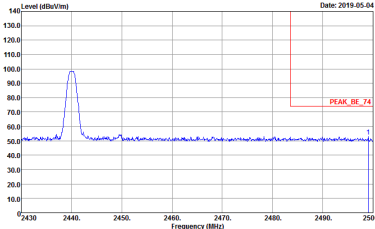
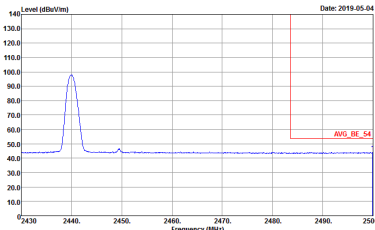


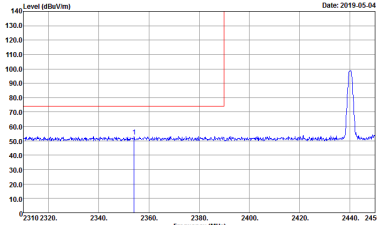
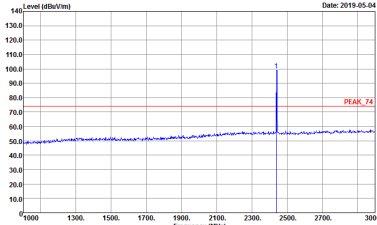
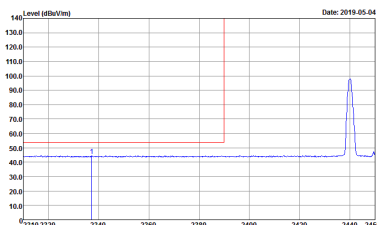
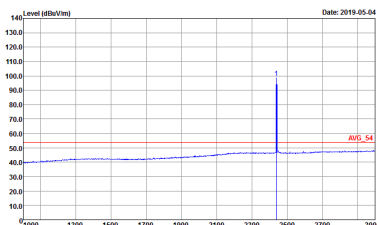
## 2.4GHz 2400~2483.5MHz

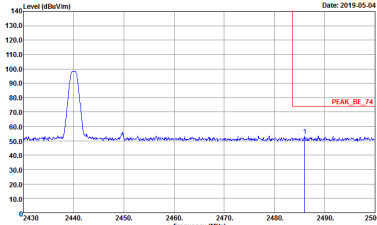
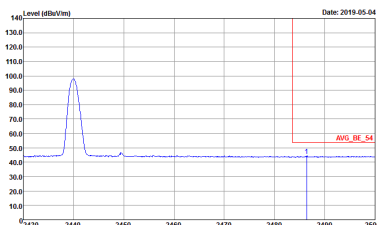
## BLE (Band Edge @ 3m)

| BLE  | 2.4GHz 2400~2483.5MHz Band Edge @ 3m                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                 |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | BLE CH19 2440MHz - L                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                 |
|      | Horizontal                                                                                                                                                                                                                                                                        | Fundamental                                                                                                                                                                                                                                                                     |
| Peak |  <p>Site : 03CH15-HY<br/>Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL<br/>Detector : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto<br/>Detector : Peak<br/>Project : 391803-53<br/>Mode : 3</p> |  <p>Site : 03CH15-HY<br/>Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL<br/>Detector : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto<br/>Detector : Peak<br/>Project : 391803-53<br/>Mode : 3</p> |
| Avg. |  <p>Site : 03CH15-HY<br/>Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL<br/>Detector : RBW:1000.000kHz VBW:3.000kHz SWT:Auto<br/>Detector : Peak<br/>Project : 391803-53<br/>Mode : 3</p>   |  <p>Site : 03CH15-HY<br/>Condition : AVG_54 3m 91200_15_1620 HORIZONTAL<br/>Detector : RBW:1000.000kHz VBW:3.000kHz SWT:Auto<br/>Detector : Peak<br/>Project : 391803-53<br/>Mode : 3</p>   |



| BLE  | 2.4GHz 2400~2483.5MHz Band Edge @ 3m                                                                                                                                                                                                 |             |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
|      | BLE CH19 2440MHz - R                                                                                                                                                                                                                 |             |
|      | Horizontal                                                                                                                                                                                                                           | Fundamental |
| Peak | <div><p>Site : 03CH15-HY<br/>Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL<br/>Detector : Peak<br/>Project : 391803-53<br/>Mode : 3</p></div>  | Left blank  |
| Avg. | <div><p>Site : 03CH15-HY<br/>Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL<br/>Detector : Peak<br/>Project : 391803-53<br/>Mode : 3</p></div> | Left blank  |

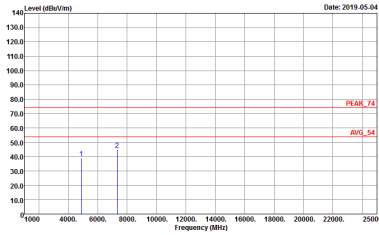
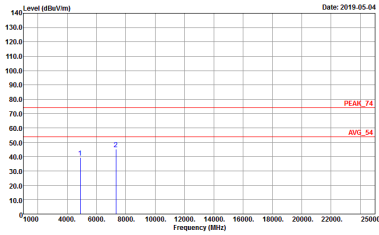
| BLE  | 2.4GHz 2400~2483.5MHz Band Edge @ 3m                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                        |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | BLE CH19 2440MHz - L                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                        |
|      | Vertical                                                                                                                                                                                                                                                                                 | Fundamental                                                                                                                                                                                                                                                                            |
| Peak |  <p>           Site : 03CH15-HY<br/>           Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL<br/>           Detector : Peak<br/>           Project : 391803-53<br/>           Mode : 3         </p>  |  <p>           Site : 03CH15-HY<br/>           Condition : PEAK_74 3m 91200_15_1620 VERTICAL<br/>           Detector : Peak<br/>           Project : 391803-53<br/>           Mode : 3         </p>  |
| Avg. |  <p>           Site : 03CH15-HY<br/>           Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL<br/>           Detector : Peak<br/>           Project : 391803-53<br/>           Mode : 3         </p> |  <p>           Site : 03CH15-HY<br/>           Condition : AVG_54 3m 91200_15_1620 VERTICAL<br/>           Detector : Peak<br/>           Project : 391803-53<br/>           Mode : 3         </p> |

| BLE  | 2.4GHz 2400~2483.5MHz Band Edge @ 3m                                                                                                                                                                                                                                                     |             |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
|      | BLE CH19 2440MHz - R                                                                                                                                                                                                                                                                     |             |
|      | Vertical                                                                                                                                                                                                                                                                                 | Fundamental |
| Peak |  <p>           Site : 03CH15-HY<br/>           Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL<br/>           Detector : Peak<br/>           Project : 391803-53<br/>           Mode : 3         </p>  | Left blank  |
| Avg. |  <p>           Site : 03CH15-HY<br/>           Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL<br/>           Detector : Peak<br/>           Project : 391803-53<br/>           Mode : 3         </p> | Left blank  |

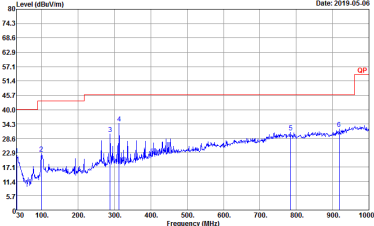
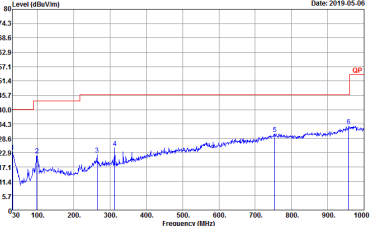


## 2.4GHz 2400~2483.5MHz

## BLE (Harmonic @ 3m)

| BLE          | 2.4GHz 2400~2483.5MHz Harmonic @ 3m                                                                                                                                                                                    |                                                                                                                                                                                                                       |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | BLE CH19 2440MHz                                                                                                                                                                                                       |                                                                                                                                                                                                                       |
|              | Horizontal                                                                                                                                                                                                             | Vertical                                                                                                                                                                                                              |
| Peak<br>Avg. |  <p>Site : 03CH15-4Y<br/>Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL<br/>Detector : Peak<br/>Project : 391803-53<br/>Mode : 3</p> |  <p>Site : 03CH15-4Y<br/>Condition : PEAK_74 3m 91200_15_1620 VERTICAL<br/>Detector : Peak<br/>Project : 391803-53<br/>Mode : 3</p> |

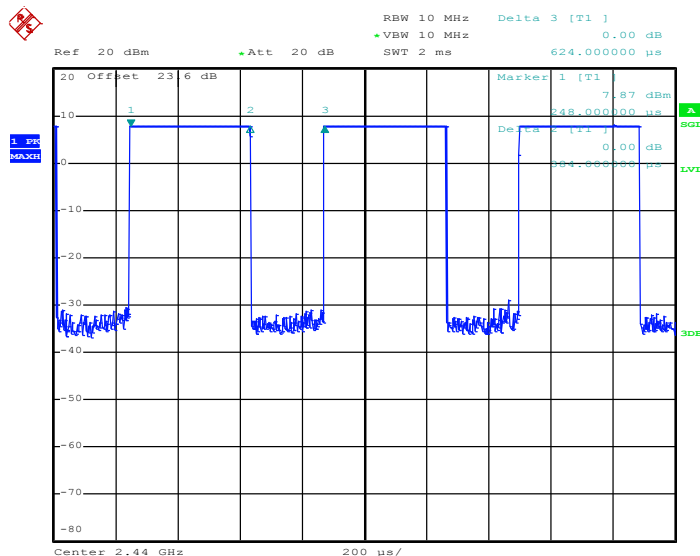
**Emission below 1GHz**
**2.4GHz BLE (LF)**

| BLE          | 2.4GHz 2400~2483.5MHz                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                   |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | BLE LF                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                   |
|              | Horizontal                                                                                                                                                                                                                                                                         | Vertical                                                                                                                                                                                                                                                                          |
| QP /<br>Peak |  <p>           Site : 03CH15-HY<br/>           Condition : QP 3m BTL06_15_41912 HORIZONTAL<br/>           Detector : Peak<br/>           Project : 391803-53<br/>           Mode : 4         </p> |  <p>           Site : 03CH15-HY<br/>           Condition : QP 3m BTL06_15_41912 VERTICAL<br/>           Detector : Peak<br/>           Project : 391803-53<br/>           Mode : 4         </p> |
|              |                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                   |

## Appendix D. Duty Cycle Plots

| Band          | Duty Cycle (%) | T(us)  | 1/T(kHz) | VBW Setting | Duty Factor (dB) |
|---------------|----------------|--------|----------|-------------|------------------|
| Bluetooth -LE | 61.54          | 384.00 | 2.60     | 3kHz        | 2.11             |

### Bluetooth -LE



Date: 19.APR.2019 17:33:24