

# TEST REPORT

of

## FCC Part 15 Subpart C

New Application;  Class I PC;  Class II PC

**Product :** **Body Camera**

**Brand:** **Transcend**

**Model:** **DrivePro Body 30**

**Model Difference:** **N/A**

**FCC ID:** **A4Z-B001E**

**FCC Rule Part:** **§15.247, Cat: DTS**

**Applicant:** **Transcend Information Inc.**

**Address:** **No.70, Xing Zhong Rd., NeiHu Dist., Taipei,  
Taiwan**

**Test Performed by:**  
**International Standards Laboratory**

<Lung-Tan LAB>

\*Site Registration No.

BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-4;

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Report No.: **ISL-17LR138FC DTS**

Issue Date : **2017/07/04**

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

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## VERIFICATION OF COMPLIANCE

**Applicant:** Transcend Information Inc.  
**Product Description:** Body Camera  
**Brand Name:** Transcend  
**Model No.:** DrivePro Body 30  
**Model Difference:** N/A  
**FCC ID:** A4Z-B001E  
**Date of test:** 2017/06/03 ~ 2017/07/03  
**Date of EUT Received:** 2017/06/03

### We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

|                     |  |              |                     |
|---------------------|--|--------------|---------------------|
| <b>Test By:</b>     | <br>_____ | <b>Date:</b> | 2017/07/04<br>_____ |
|                     | <i>Dino Chen / Engineer</i>  |              |                     |
| <b>Prepared By:</b> | <br>_____ | <b>Date:</b> | 2017/07/04<br>_____ |
|                     | <i>Gigi Yeh / Engineer</i>   |              |                     |
| <b>Approved By:</b> | <br>_____ | <b>Date:</b> | 2017/07/04<br>_____ |
|                     | <i>Vincent Su / Technical Manager</i>  |              |                     |

## Version

| Version No. | Date       | Description                  |
|-------------|------------|------------------------------|
| 00          | 2017/07/04 | Initial creation of document |
|             |            |                              |
|             |            |                              |

## Uncertainty of Measurement

| Description Of Test                   | Uncertainty  |
|---------------------------------------|--|
| Conducted Emission<br>(AC power line) | 2.586 dB   |
| Field Strength of Spurious Radiation  | <=30MHz: 2.96dB<br>30-1GHz: 4.22 dB<br>1-40 GHz: 4.08 dB |
| Conducted Power                       | 2.412 GHz: 1.30 dB<br>5.805 GHz: 1.55 dB                 |
| Power Density                         | 2.412 GHz: 1.30 dB<br>5.805 GHz: 1.67 dB                 |
| Frequency                             | 0.0032%  |
| Time                                  | 0.01%  |
| DC Voltage                            | 1%   |

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|           |  |           |
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## 1 GENERAL INFORMATION

General:

|                  |  |                  |
|------------------|--|------------------|
| Product Name     | Body Camera                                    |                  |
| Brand Name       | Transcend                                      |                  |
| Model Name       | DrivePro Body 30                               |                  |
| Model Difference | N/A  |                  |
| Power Supply     | 5Vdc from AC/DC adapter or 3.6Vdc from Battery |                  |
|                  | Adapter:                                       | Model: WB-10G05R |
|                  | Battery  | Model: DPB30     |

2.4GHz WLAN: 1TX/1RX

| Wi-Fi                   | Frequency Range (MHz)    | Channels  | Peak / Average Power              | Modulation Technology |
|-------------------------|--------------------------|---|-----------------------------------|-----------------------|
| 802.11b                 | 2412 – 2462(DTS)         | 11  | 13.87dBm (PK)/<br>11.21 dBm (AV)  | DSSS                  |
| 802.11g                 | 2412 – 2462(DTS)         | 11  | 22.43dBm (PK) /<br>12.92 dBm (AV) | OFDM                  |
| 802.11n                 | HT20<br>2412 – 2462(DTS) | 11  | 21.98dBm (PK) /<br>12.31 dBm (AV) |                       |
| Modulation type         |                          | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM |                                   |                       |
| Antenna Designation     |                          | Chip antenna, 3.32dBi   |                                   |                       |
| Tune up power (Average) |                          | 12 dBm +/- 1 dBm  |                                   |                       |

Bluetooth: 1TX/1RX

|                      |                              |                             |
|----------------------|------------------------------|-----------------------------|
| Frequency Range:     | 2402 – 2480MHz               |                             |
| Bluetooth Version:   | V2.1 + EDR                   | V4.1                        |
| Channel number:      | 79 channels                  | 40 channels, 2MHz step      |
| Modulation type      | GFSK $+\pi$ / 4DQPSK + 8DPSK | Wide band Modulation (GFSK) |
| Transmit Power:      | 0.65 dBm Peak                | 0.83 dBm Peak               |
| Tune up power:       | 0 dBm +/- 1 dBm              | 0 dBm +/- 1 dBm             |
| Dwell Time:          | $\leq 0.4s$                  | N/A                         |
| Antenna Designation: | Chip antenna, 3.32dBi        |                             |

This report applies for 2.4GHz Wifi + BT BLE.

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



### 1.1 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: A4Z-B001E** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules

### 1.2 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at an antenna to EUT distance 3 meters.

KDB Document: 558074 D01 DTS Meas Guidance v0.4

### 1.3 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of International Standards Laboratory <Lung-Tan LAB> No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents . FCC Registration Number is: 872200; Designation Number is: TW1036, Canada Registration Number: 4067B-4.

### 1.4 Special Accessories

Not available for this EUT intended for grant.

### 1.5 Equipment Modifications

Not available for this EUT intended for grant.

## **2 SYSTEM TEST CONFIGURATION**

### **2.1 EUT Configuration**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### **2.2 EUT Exercise**

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

### **2.3 Test Procedure**

#### **2.3.1 Conducted Emissions**

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 6 of ANSI C63.10: 2013. Con-ducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR 16-1-1 Quasi-Peak and Average detector mode.

#### **2.3.2 Radiated Emissions**

The EUT is a placed on as turn table which is 0.8 m/1.5m (Frequency above 1GHz) above ground plane. The turn table shall rotate 360 degrees to determine the position of maxi-mum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 6 and 11 of ANSI C63.10: 2013.

## 2.4 Configuration of Tested System

**Fig. 2-1 Configuration of Tested System (Fixed channel)**



**Table 2-1 Equipment Used in Tested System**

| Item | Equipment | Mfr/Brand | Model/<br>Type No. | Series No. | Data Cable | Power Cord   |
|------|-----------|-----------|--------------------|------------|------------|--------------|
| 1    | Kit       | NA        | NA                 | NA         | NA         | Non-shielded |
| 2    | NB        | HP        | 440i               | NA         | NA         | Non-shielded |

### 3 SUMMARY OF TEST RESULTS

| FCC Rules          | Description Of Test                       | Result    |
|--------------------|---|-----------|
| §15.207(a)         | AC Power Line Conducted Emission          | Compliant |
| §15.247(b) (3),(4) | Peak Output Power/ EIRP                   | Compliant |
| §15.247(a)(2)      | 6dB Power Bandwidth                       | Compliant |
| §15.247(d)         | 100 KHz Bandwidth Of Frequency Band Edges | Compliant |
| §15.247(d)         | Spurious Emission                         | Compliant |
| §15.247(e)         | Peak Power Density                        | Compliant |
| §15.203            | Antenna Requirement                       | Compliant |

### 4 DESCRIPTION OF TEST MODES

The EUT has been tested under engineering operating condition.

Test program used to control the EUT for staying in continuous transmitting mode is programmed.

Wifi:

802.11 b mode: Channel low (2412MHz), mid (2437MHz), high (2462MHz) with 1Mbps lowest data rate are chosen for full testing.

802.11 g mode: Channel low (2412MHz), mid (2437MHz), high (2462MHz) with 6Mbps lowest data rate are chosen for full testing.

802.11 n \_20MHz: Channel low (2412MHz), mid (2437MHz), high (2462MHz) with 6.5Mbps lowest data rate are chosen for full testing.

BLE:

Channel low (2402MHz), mid (2442MHz) and high (2480MHz) with each modulation were chosen for full testing.

The worst case 802.11g mode was reported for Radiated Emission.

## 5 CONDUCTED EMISSION TEST

### 5.1 Standard Applicable:

According to §15.207, frequency range within 150KHz to 30MHz shall not exceed the Limit table as below.

| Frequency range<br>MHz | Limits<br>dB(uV) |          |
|------------------------|------------------|----------|
|                        | Quasi-peak       | Average  |
| 0.15 to 0.50           | 66 to 56         | 56 to 46 |
| 0.50 to 5              | 56               | 46       |
| 5 to 30                | 60               | 50       |

Note

- 1.The lower limit shall apply at the transition frequencies
- 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### 5.2 Measurement Equipment Used:

| Conducted Emission Test Site |                    |                       |                  |              |            |
|------------------------------|--------------------|-----------------------|------------------|--------------|------------|
| EQUIPMENT<br>TYPE            | MFR                | MODEL<br>NUMBER       | SERIAL<br>NUMBER | LAST<br>CAL. | CAL DUE.   |
| Conduction 04-3<br>Cable     | WOKEN              | CFD 300-NL            | Conduction 04 -3 | 09/12/2016   | 09/11/2017 |
| EMI Receiver 16              | Rohde &<br>Schwarz | ESCI                  | 101221           | 10/24/2016   | 10/23/2017 |
| LISN 18                      | ROHDE &<br>SCHWARZ | ENV216                | 101424           | 02/05/2017   | 02/04/2018 |
| LISN 19                      | ROHDE &<br>SCHWARZ | ENV216                | 101425           | 03/07/2017   | 03/06/2018 |
| Test Software                | Farad              | EZEMC<br>Ver:ISL-03A2 | N/A              | N/A          | N/A        |

### 5.3 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10: 20143.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

#### **5.4 Measurement Procedure:**

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

#### **5.5 Measurement Result:**

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Note: Refer to next page for measurement data and plots.



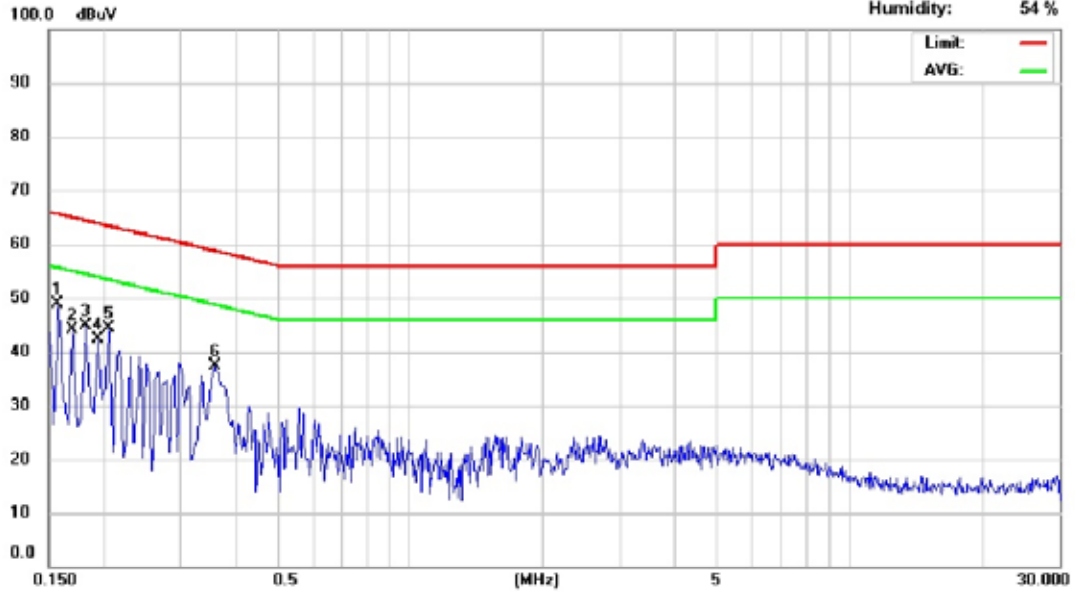
Conducted Emission Measurement

Date: 2017/6/29

operator: Shawn Li

Temperature: 26 °C

Humidity: 54 %



Site: Conduction 04

Phase: N

Limit: CISPR22 Class B Conduction(QP)

| No. | Frequency (MHz) | QP_R (dBuV) | AVG_R (dBuV) | Correct Factor (dB) | QP Emission (dBuV) | QP Limit (dBuV) | QP Margin (dB) | AVG Emission (dBuV) | AVG Limit (dBuV) | AVG Margin (dB) |
|-----|-----------------|-------------|--------------|---------------------|--------------------|-----------------|----------------|---------------------|------------------|-----------------|
| 1   | 0.158           | 36.51       | 22.02        | 9.64                | 46.15              | 65.57           | -19.42         | 31.66               | 55.57            | -23.91          |
| 2   | 0.170           | 32.62       | 17.73        | 9.64                | 42.26              | 64.96           | -22.70         | 27.37               | 54.96            | -27.59          |
| 3   | 0.182           | 32.74       | 19.37        | 9.65                | 42.39              | 64.39           | -22.00         | 29.02               | 54.39            | -25.37          |
| 4   | 0.194           | 31.44       | 17.47        | 9.65                | 41.09              | 63.86           | -22.77         | 27.12               | 53.86            | -26.74          |
| 5   | 0.206           | 30.42       | 16.41        | 9.65                | 40.07              | 63.37           | -23.30         | 26.06               | 53.37            | -27.31          |
| 6   | 0.358           | 28.68       | 23.47        | 9.67                | 38.35              | 58.77           | -20.42         | 33.14               | 48.77            | -15.63          |



## 6 PEAK OUTPUT POWER/ERIP MEASUREMENT

### 6.1 Standard Applicable:

According to §15.247(b)(3),(4)(b)

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(c) Operation with directional antenna gains greater than 6 dBi.

(1) Fixed point-to-point operation:

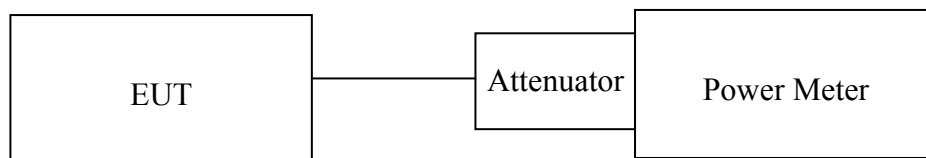
(i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

(ii) Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

## 6.2 Measurement Equipment Used:

| Conducted Emission Test Site |          |                             |                   |            |            |
|------------------------------|----------|-----------------------------|-------------------|------------|------------|
| EQUIPMENT TYPE               | MFR      | MODEL NUMBER                | SERIAL NUMBER     | LAST CAL.  | CAL DUE.   |
| Power Meter 05               | Anritsu  | ML2495A                     | 1116010           | 07/28/2016 | 07/27/2017 |
| Power Sensor 05              | Anritsu  | MA2411B                     | 34NKF50           | 07/28/2016 | 07/27/2017 |
| Power Sensor 06              | DARE     | RPR3006W                    | 13I00030SNO3<br>3 | 11/03/2016 | 11/02/2017 |
| Power Sensor 07              | DARE     | RPR3006W                    | 13I00030SNO3<br>4 | 11/03/2016 | 11/02/2017 |
| Temperature Chamber          | KSON     | THS-B4H100                  | 2287              | 06/28/2017 | 06/27/2018 |
| DC Power supply              | ABM      | 8185D                       | N/A               | 10/06/2016 | 10/05/2017 |
| AC Power supply              | EXTECH   | CFC105W                     | NA                | 12/25/2016 | 12/24/2017 |
| Attenuator                   | Woken    | Watt-65m3502                | 11051601          | NA         | NA         |
| Splitter                     | MCLI     | PS4-199                     | 12465             | 12/26/2015 | 12/25/2017 |
| Spectrum analyzer            | keysight | N9010A                      | MY56070257        | 05/31/2017 | 05/30/2018 |
| Spectrum analyzer            | R&S      | FSP40                       | 100143            | 08/07/2016 | 08/06/2017 |
| Test Software                | DARE     | Radimation<br>Ver:2013.1.23 | NA                | NA         | NA         |

## 6.3 Test Set-up:



## 6.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

**6.5 Measurement Result:**

802.11b

| Cable loss = 0 |             | Output Power |       | Limit<br>(dBm) |
|----------------|-------------|--------------|-------|----------------|
| CH             | Detector    |              |       |                |
|                | PK<br>(dBm) | AV<br>(dBm)  |       |                |
| Low            | 13.19       | 10.7         | 30.00 |                |
| Mid            | 13.43       | 10.94        |       |                |
| High           | 13.87       | 11.21        |       |                |

802.11g

| Cable loss = 0 |             | Output Power |       | Limit<br>(dBm) |
|----------------|-------------|--------------|-------|----------------|
| CH             | Detector    |              |       |                |
|                | PK<br>(dBm) | AV<br>(dBm)  |       |                |
| Low            | 21.52       | 11.97        | 30.00 |                |
| Mid            | 22.02       | 12.53        |       |                |
| High           | 22.43       | 12.92        |       |                |

802.11N HT20

| Cable loss = 0 |             | Output Power |       | Limit<br>(dBm) |
|----------------|-------------|--------------|-------|----------------|
| CH             | Detector    |              |       |                |
|                | PK<br>(dBm) | AV<br>(dBm)  |       |                |
| Low            | 21.01       | 11.37        | 30.00 |                |
| Mid            | 21.55       | 11.88        |       |                |
| High           | 21.98       | 12.31        |       |                |

**LE Mode 4.1**

| Frequency<br>(MHz) | Peak Reading<br>Power<br>(dBm) | Cable Loss | Output Power<br>(dBm) | Output Power<br>(W) | Limit<br>(W) |
|--------------------|--------------------------------|------------|-----------------------|---------------------|--------------|
| Low                | -0.08                          | 0.00       | -0.08                 | 0.00098             | 1            |
| Mid                | 0.19                           | 0.00       | 0.19                  | 0.00105             | 1            |
| High               | 0.83                           | 0.00       | 0.83                  | 0.00121             | 1            |

## 7 6dB Bandwidth

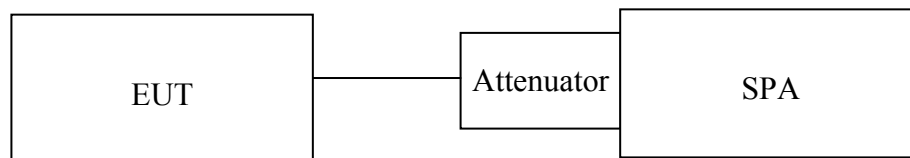
### 7.1 Standard Applicable:

According to §15.247(a)(2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500kHz.

### 7.2 Measurement Equipment Used:

Refer to section 6.2 for details.

### 7.3 Test Set-up:



### 7.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=100KHz, VBW = 3\*RBW, Span= cover the complete power envelope of the signal of the UUT Sweep=auto
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

## 7.5 Measurement Result:

### 802.11b

| Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (KHz) | Result |
|-----------------|---------------------|-------------|--------|
| Low             | 9.09                | > 500       | PASS   |
| Mid             | 8.57                | > 500       | PASS   |
| High            | 9.54                | > 500       | PASS   |

### 802.11g

| Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (KHz) | Result |
|-----------------|---------------------|-------------|--------|
| Low             | 14.48               | > 500       | PASS   |
| Mid             | 15.10               | > 500       | PASS   |
| High            | 14.47               | > 500       | PASS   |

### 802.11n HT20

| Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (KHz) | Result |
|-----------------|---------------------|-------------|--------|
| Low             | 13.93               | > 500       | PASS   |
| Mid             | 15.11               | > 500       | PASS   |
| High            | 15.65               | > 500       | PASS   |

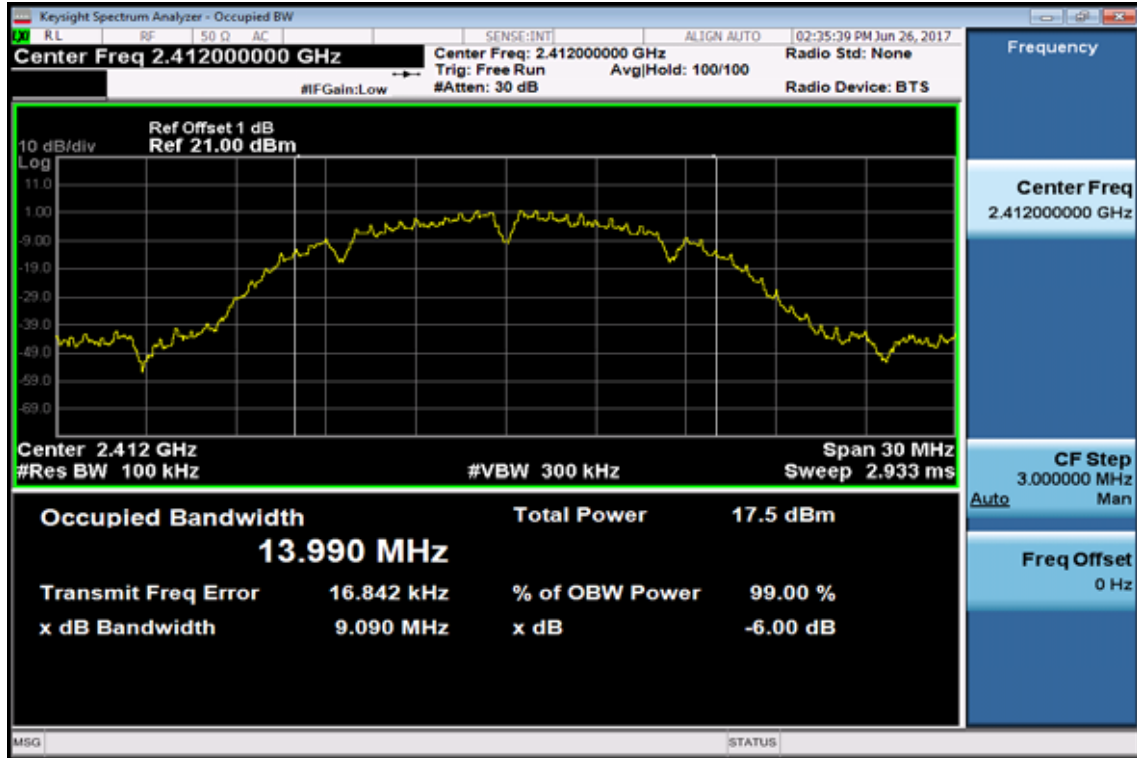
### BT LE

| Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (KHz) | Result |
|-----------------|---------------------|-------------|--------|
| Low             | 0.70                | > 500       | PASS   |
| Mid             | 0.70                | > 500       | PASS   |
| High            | 0.71                | > 500       | PASS   |

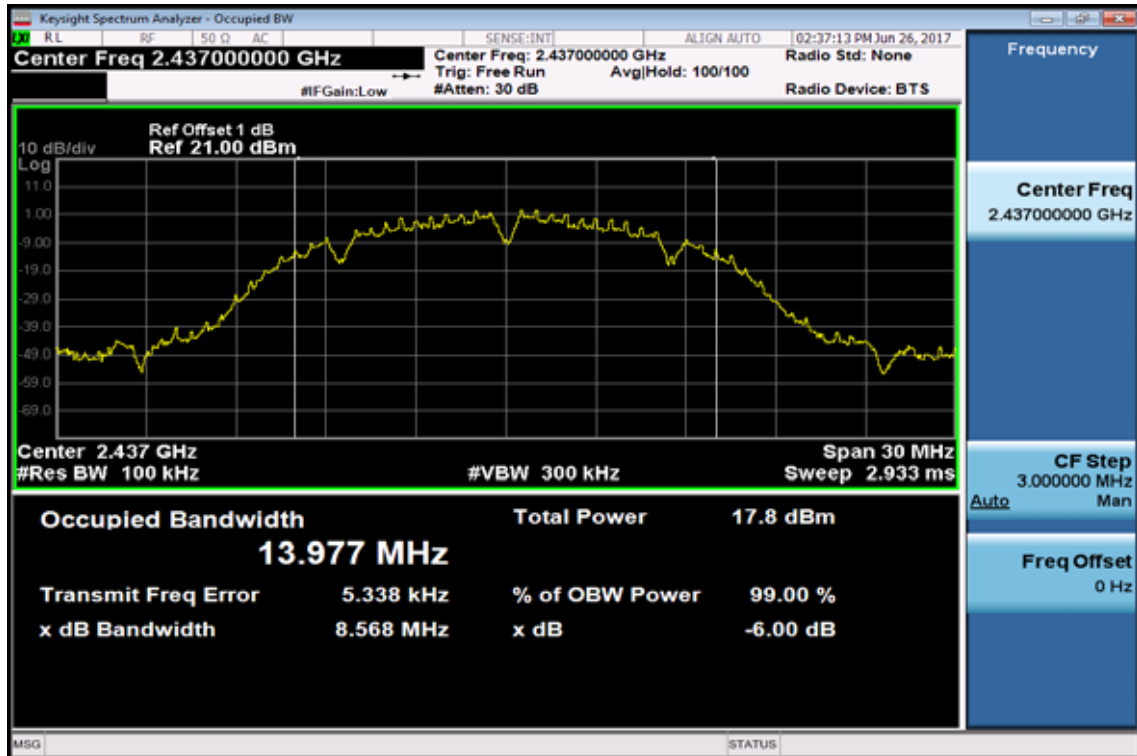
Note: Refer to next page for plots.

802.11b

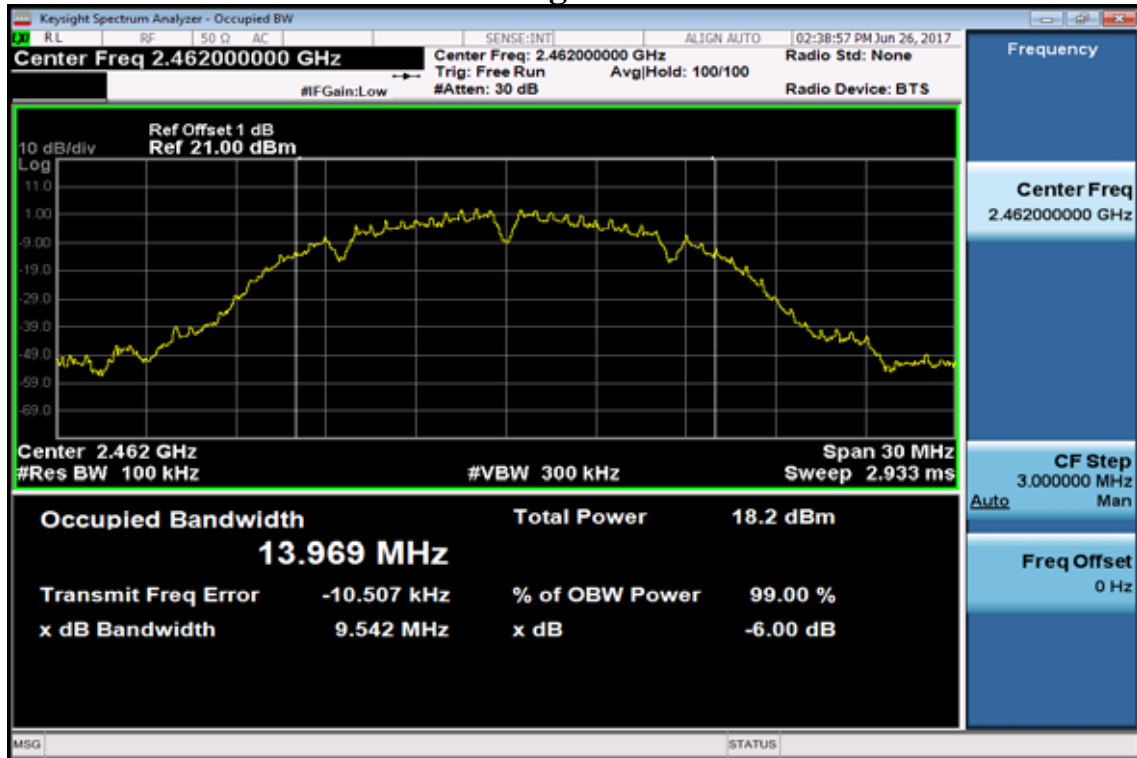
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

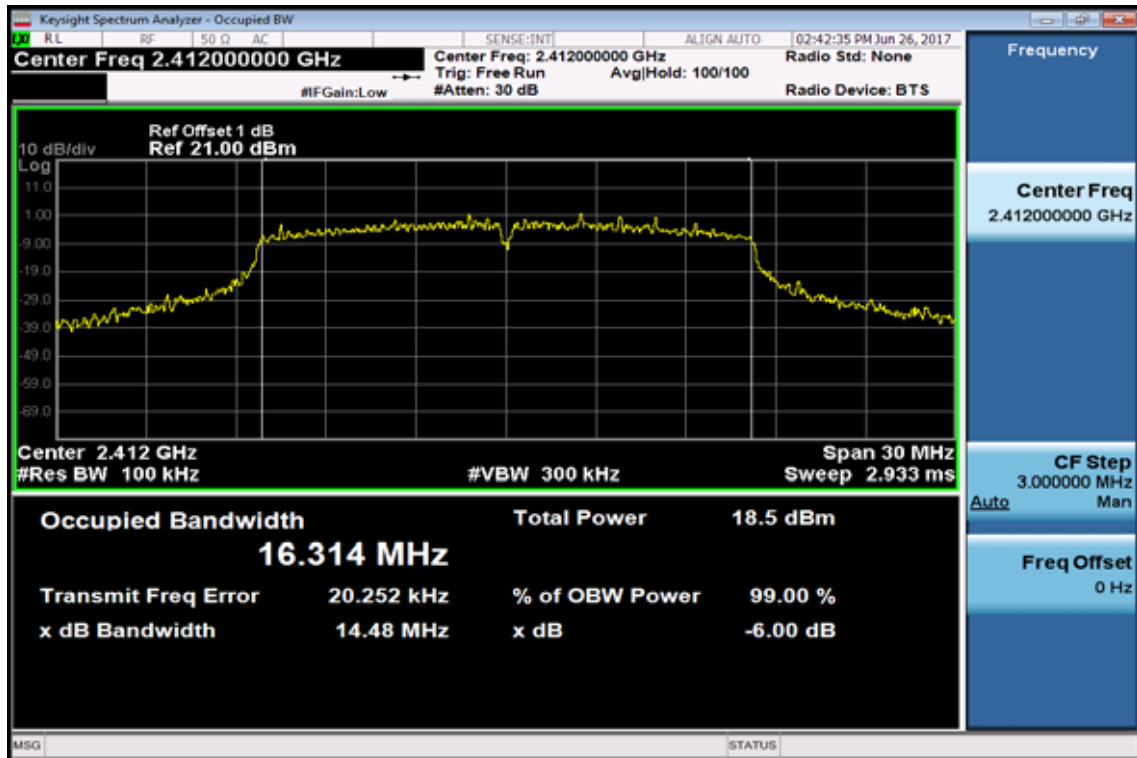


### 6dB Band Width Test Data CH-High

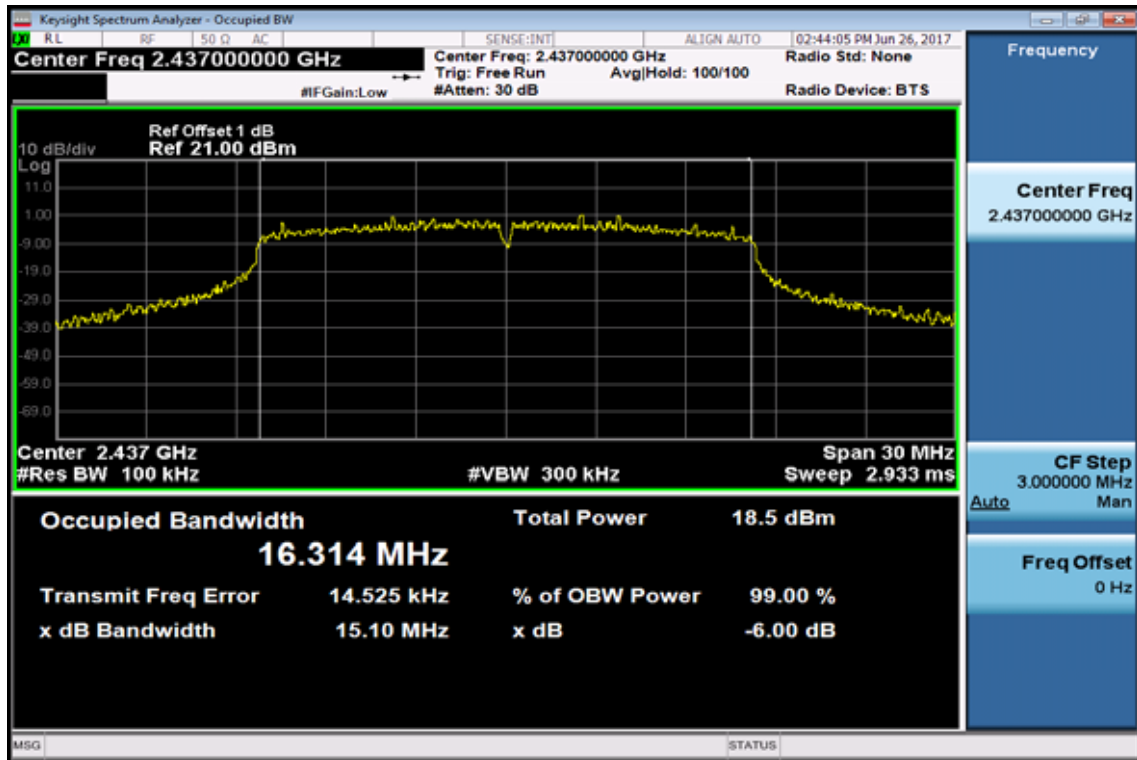


### 802.11g

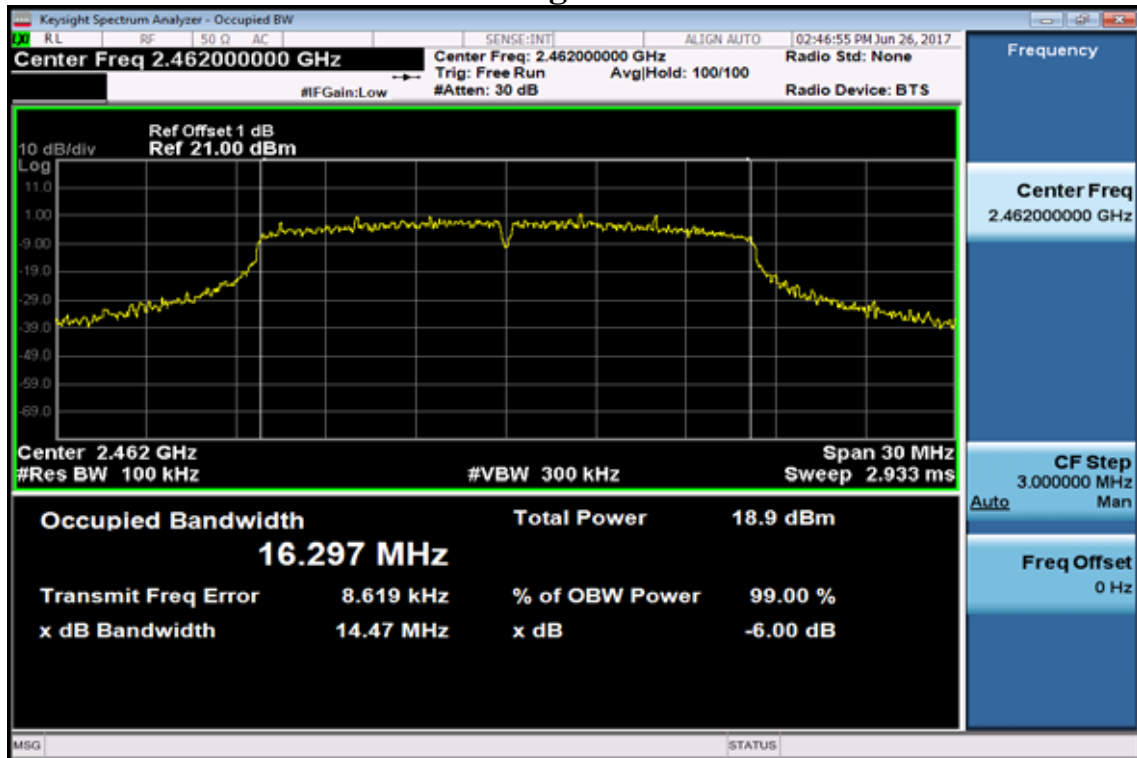
### 6dB Band Width Test Data CH-Low



### 6dB Band Width Test Data CH-Mid



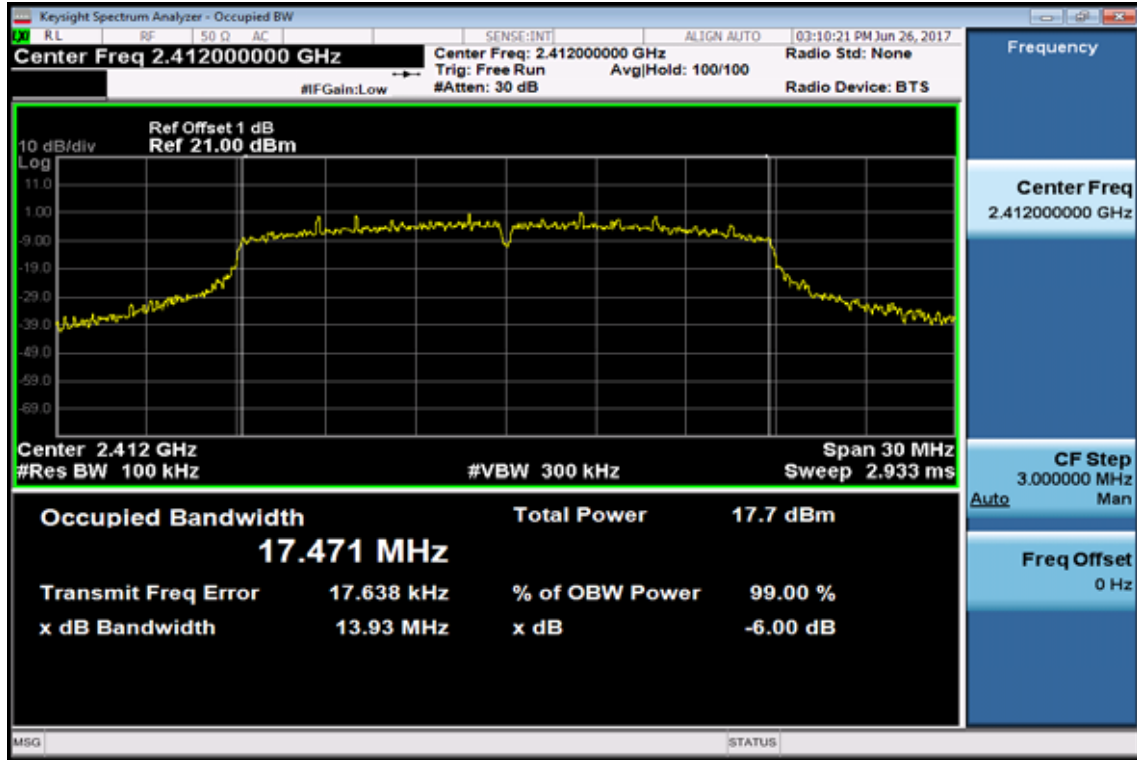
### 6dB Band Width Test Data CH-High



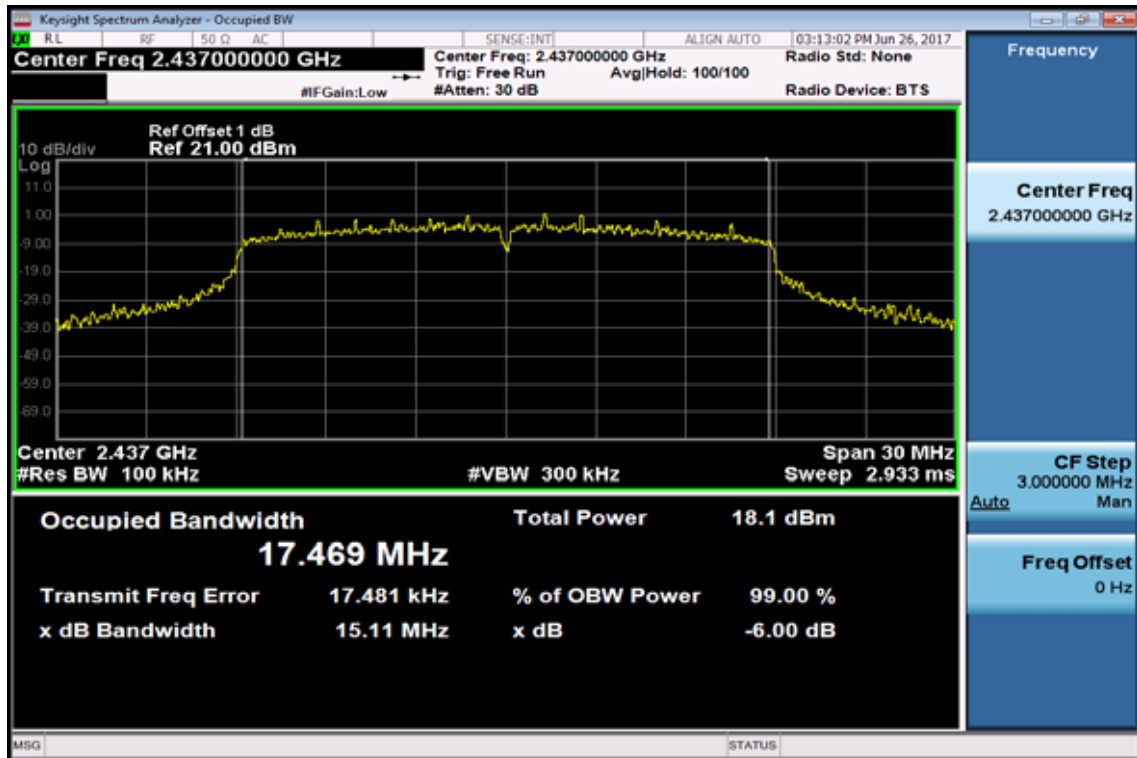


### 802.11n\_20M

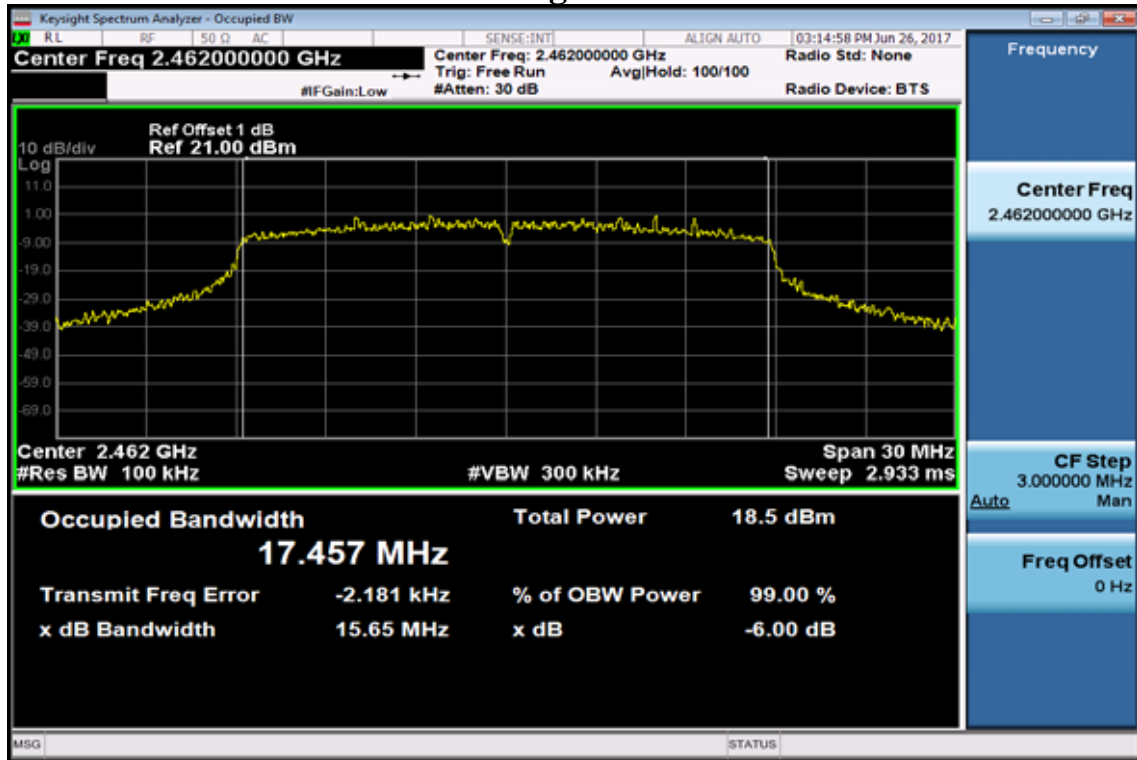
#### 6dB Band Width Test Data CH-Low



#### 6dB Band Width Test Data CH-Mid

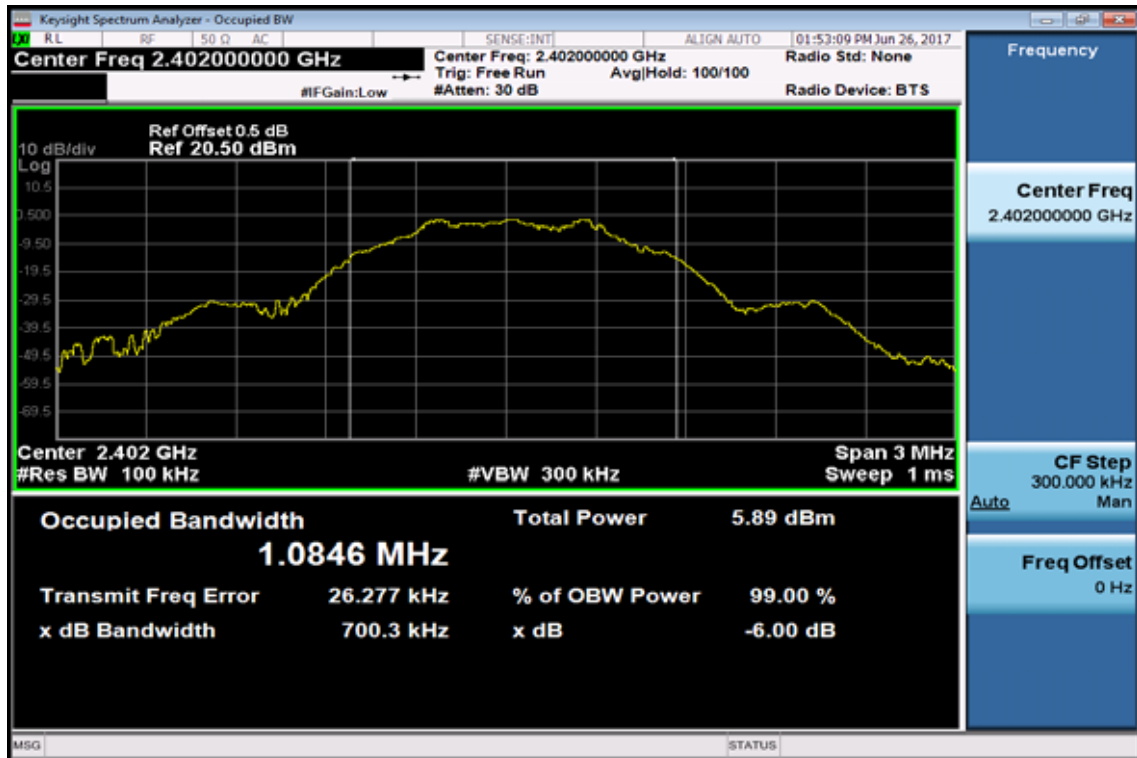


### 6dB Band Width Test Data CH-High

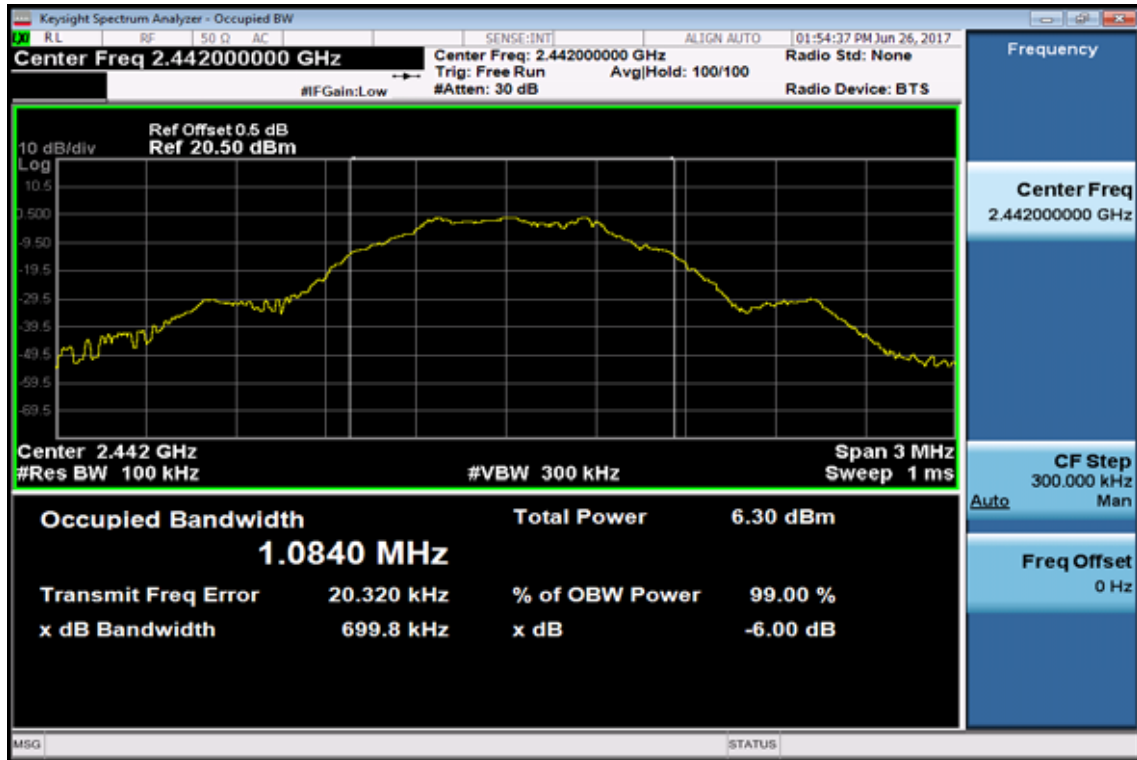


### BT LE

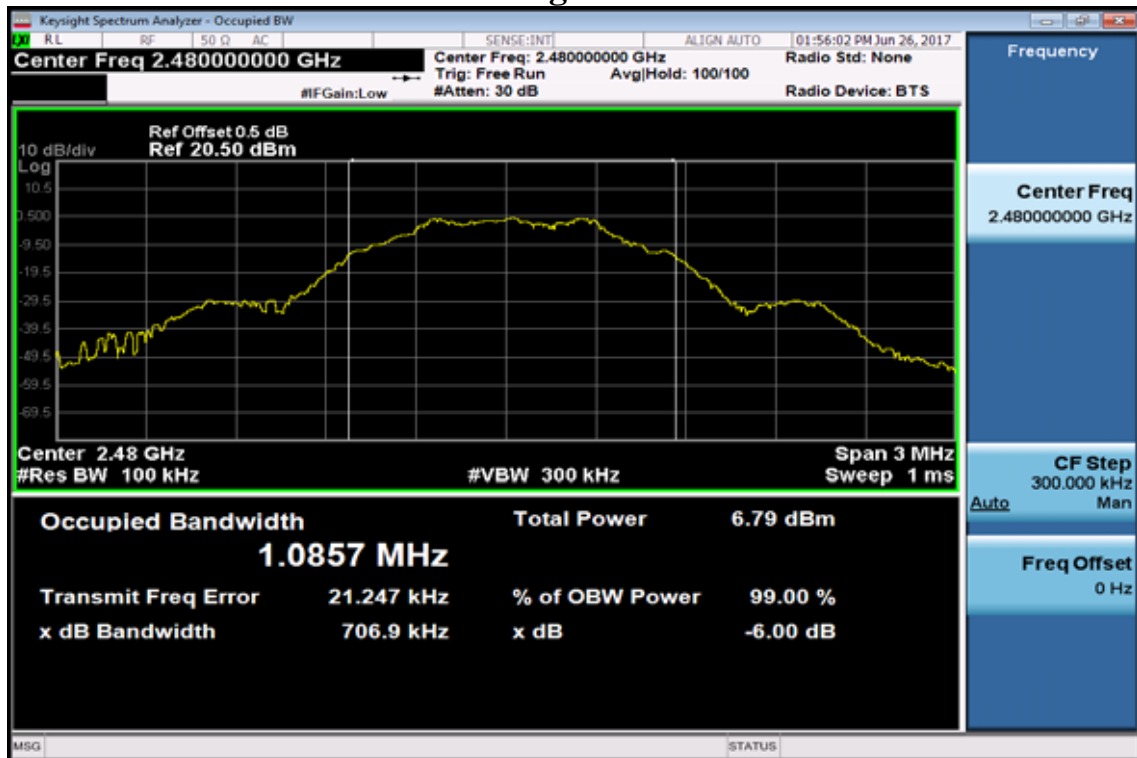
### 6dB Band Width Test Data CH-Low



### 6dB Band Width Test Data CH-Mid



### 6dB Band Width Test Data CH-High



## **8 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT**

### **8.1 Standard Applicable:**

According to §15.247(d), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

### **8.2 Measurement Equipment Used:**

#### **7.2.1. Conducted Emission at antenna port:**

Refer to section 6.2 for details.

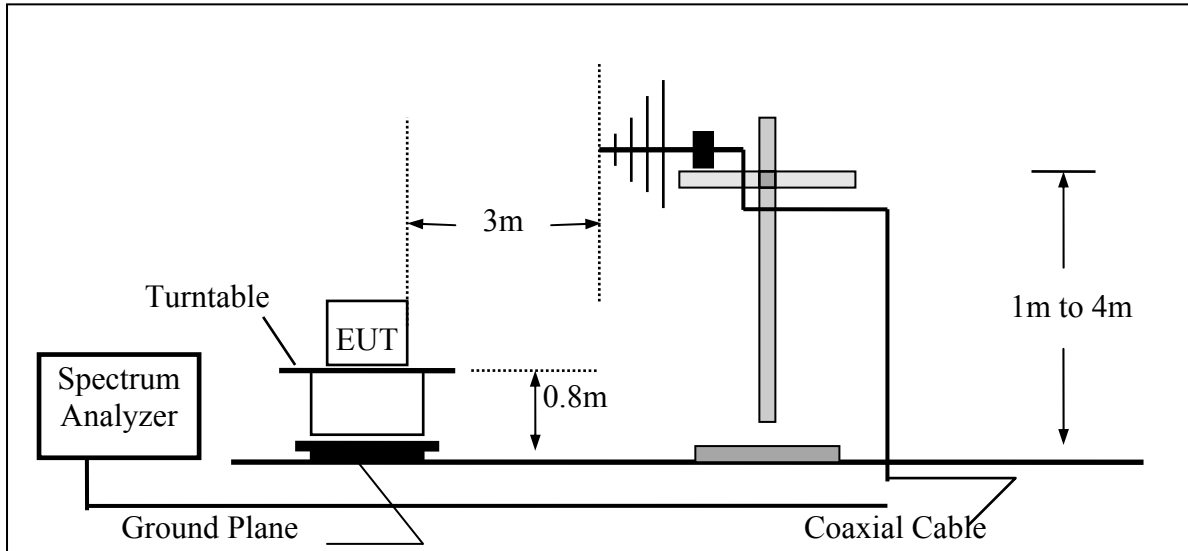
**7.2.2. Radiated emission:**

| <b>Chamber 14(966)</b>             |               |                        |                      |                  |                 |
|------------------------------------|---------------|------------------------|----------------------|------------------|-----------------|
| <b>EQUIPMENT TYPE</b>              | <b>MFR</b>    | <b>MODEL NUMBER</b>    | <b>SERIAL NUMBER</b> | <b>LAST CAL.</b> | <b>CAL DUE.</b> |
| 966 Chamber                        | Chance Most   | Chamber 19             | N/A                  | 08/15/2016       | 08/14/2017      |
| Spectrum Analyzer<br>21(3Hz-44GHz) | Agilent       | N9030A                 | MY51360021           | 11/14/2016       | 11/13/2017      |
| EMI Receiver                       | SCHWARZBECK   | FCVU1534               | 1534149              | 11/30/2016       | 11/29/2017      |
| Loop Antenna(9K-30M)               | EM            | EM-6879                | 271                  | 11/01/2016       | 10/31/2018      |
| Loop Antenna (9K-30M)              | A.H.SYSTEM    | SAS-564                | 294                  | 06/17/2017       | 06/16/2019      |
| Bilog Antenna (30M-1G)             | SCHWARZBECK   | VULB9168 w<br>5dB Att  | 736                  | 07/22/2016       | 07/21/2017      |
| Horn antenna (1G-18G)              | SCHWARZBECK   | 9120D                  | 9120D-1627           | 07/22/2016       | 07/21/2017      |
| Horn antenna (18G-26G)             | Com-power     | AH-826                 | 081001               | 07/24/2015       | 07/23/2017      |
| Horn antenna (26G-40G)             | Com-power     | AH-640                 | 100A                 | 02/22/2017       | 02/21/2019      |
| Preamplifier (9k-1000M)            | HP            | 8447F                  | 3113A06362           | 11/13/2016       | 11/12/2017      |
| Preamplifier(1G-26G)               | Agilent       | 8449B                  | 3008A02471           | 08/25/2016       | 08/24/2017      |
| Preamplifier (26G-40G)             | MITEQ         | JS4-26004000-<br>27-5A | 818471               | 07/23/2015       | 07/22/2017      |
| RF Cable (9k-18G)                  | HUBER SUHNER  | SUCOFLEX<br>104A       | MY1397/4A            | 08/25/2016       | 08/24/2017      |
| RF cable (18G~40G)                 | HUBER SUHNER  | Sucoflex 102           | 27963/2&3742<br>1/2  | 11/03/2015       | 11/02/2017      |
| Turn Table                         | MF            | Turn Table-19          | Turn Table-19        | N/A              | N/A             |
| Mast Tower                         | MF            | JSDES-15A              | 1308283              | N/A              | N/A             |
| Controller                         | MF            | MF-7802BS              | MF780208460          | N/A              | N/A             |
| AC power source                    | T-Power       | TFC-1005               | 40006471             | N/A              | N/A             |
| Signal Generator                   | R&S           | SMU200A                | 102330               | 03/15/2017       | 03/14/2018      |
| Signal Generator                   | Anritsu       | MG3692A                | 20311                | 11/04/2016       | 11/03/2017      |
| 2.4G Filter                        | Micro-Tronics | Brm50702               | 76                   | 12/25/2016       | 12/24/2017      |
| Test Software                      | Audix         | E3<br>Ver:6.12023      | N/A                  | N/A              | N/A             |

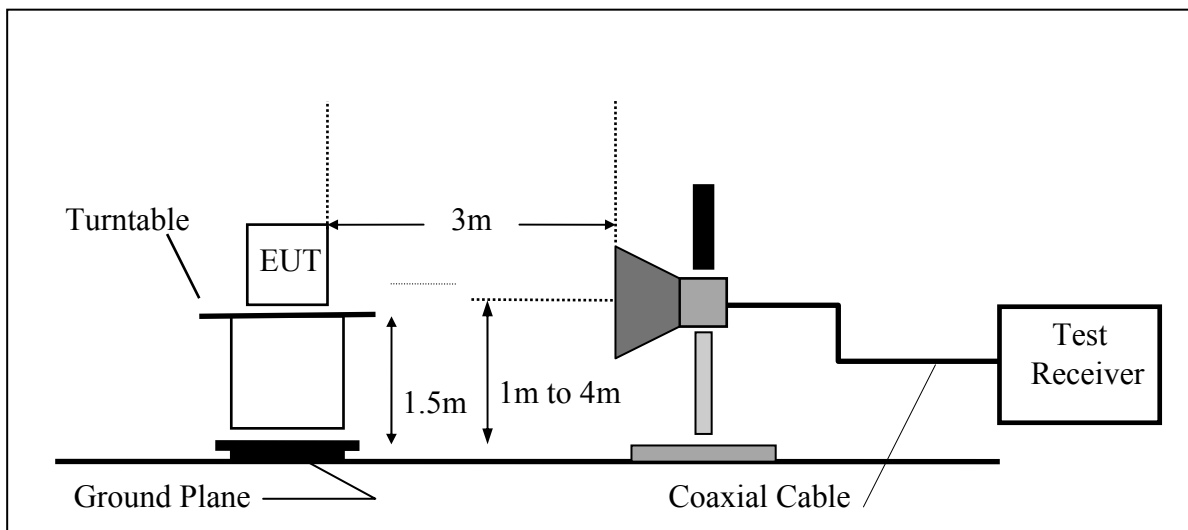
### 8.3 Test SET-UP:

The test item only performed radiated mode

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-Up Frequency Over 1 GHz



#### 8.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100KHz, Span=25MHz, Sweep = auto
5. Mark Peak, 2.390GHz and 2.4835GHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.

#### 8.5 Field Strength Calculation:

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

|       |                        |  |
|-------|------------------------|--|
| Where | FS = Field Strength    | CL = Cable Attenuation Factor (Cable Loss) |
|       | RA = Reading Amplitude | AG = Amplifier Gain                        |
|       | AF = Antenna Factor    |  |

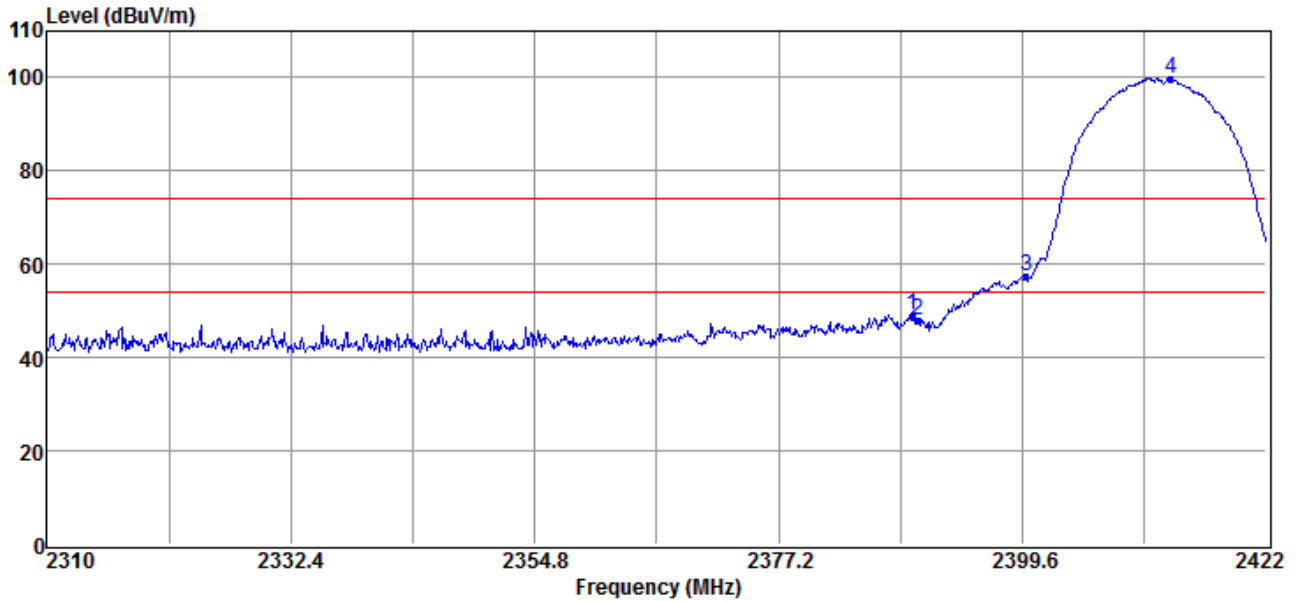
#### 8.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

**Radiated Emission: 802.11 b mode**

Operation Mode TX CH Low  
 Fundamental Frequency 2412 MHz  
 Temperature 25

Test Date 2017/06/29  
 Test By Dino  
 Humidity 60 %



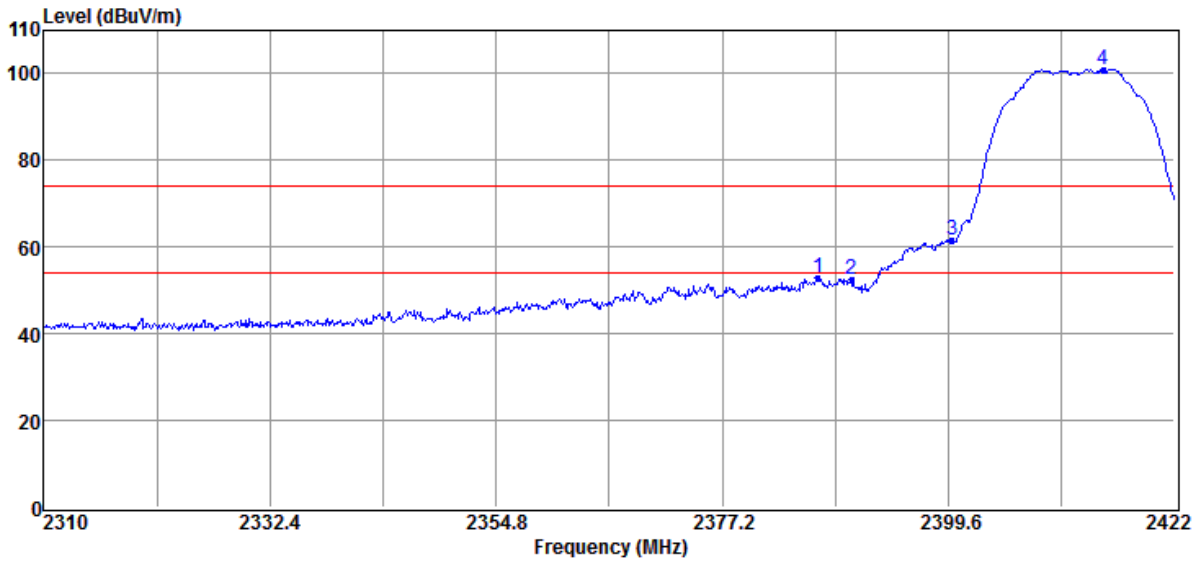
| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB/m | Level<br>dBuV/m | Limit<br>dBuV/m | Over Li<br>mit<br>dB | Remark  | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|---------|------------|
| 1  | 2389.52     | 52.45           | -3.15          | 49.30           | 74.00           | -24.70               | Average | VERTICAL   |
| 2  | 2390.00     | 51.06           | -3.15          | 47.91           | 74.00           | -26.09               | Peak    | VERTICAL   |
| 3  | 2400.00     | 60.63           | -3.16          | 57.47           | 79.82           | -22.35               | Peak    | VERTICAL   |
| 4  | 2413.26     | 102.98          | -3.16          | 99.82           | F               | --                   | Peak    | VERTICAL   |

**Remark:**

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**





| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB/m | Level<br>dBuV/m | Limit<br>dBuV/m | Over Li<br>mit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|--------|------------|
| 1  | 2386.72     | 56.00           | -3.15          | 52.85           | 74.00           | -21.15               | Peak   | HORIZONTAL |
| 2  | 2390.00     | 55.72           | -3.15          | 52.57           | 74.00           | -21.43               | Peak   | HORIZONTAL |
| 3  | 2400.00     | 64.71           | -3.16          | 61.55           | 80.93           | -19.38               | Peak   | HORIZONTAL |
| 4  | 2414.94     | 104.09          | -3.16          | 100.93          | F               | --                   | Peak   | HORIZONTAL |

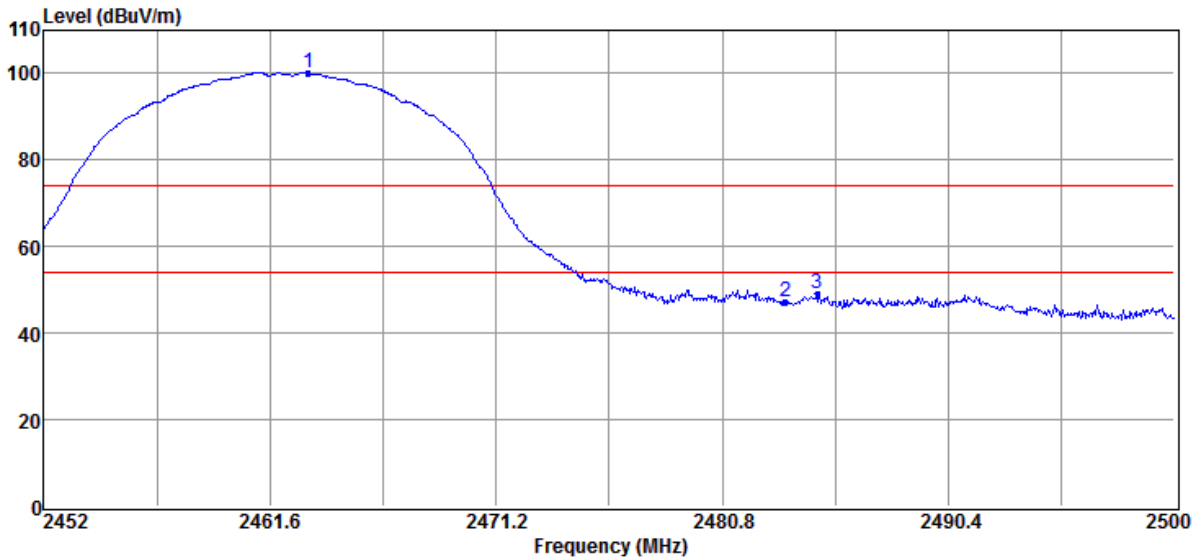
Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**

Operation Mode TX CH High  
 Fundamental Frequency 2462 MHz  
 Temperature 25

Test Date 2017/06/29  
 Test By Dino  
 Humidity 60 %

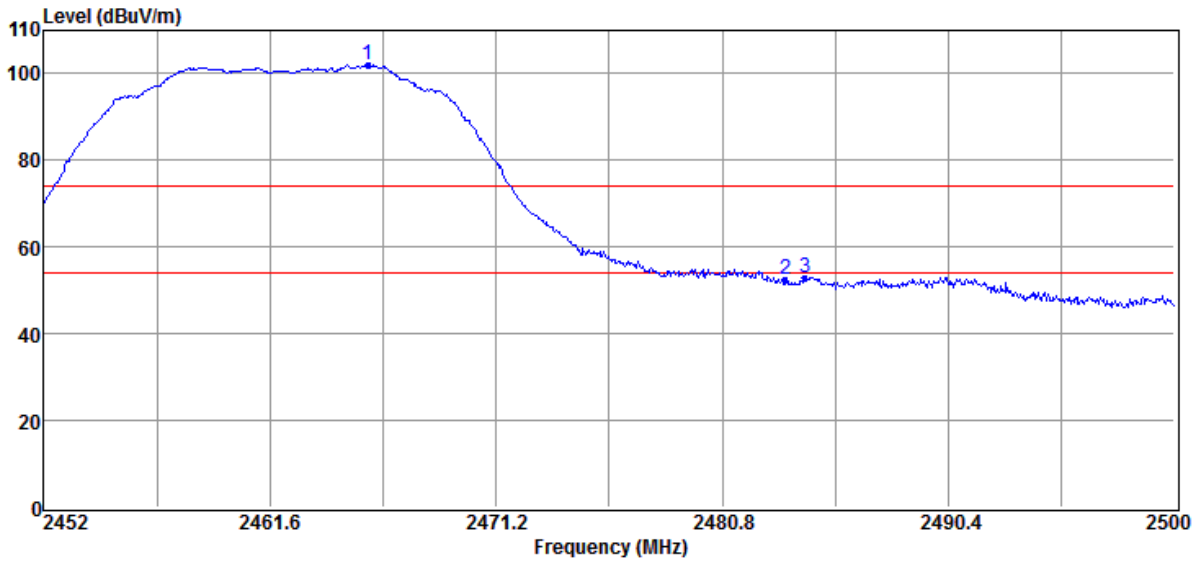


| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB/m | Level<br>dBuV/m | Limit<br>dBuV/m | Over Li<br>mit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|--------|------------|
| 1  | 2463.23     | 103.43          | -3.13          | 100.30          | F               | --                   | Peak   | VERTICAL   |
| 2  | 2483.50     | 50.41           | -3.11          | 47.30           | 74.00           | -26.70               | Peak   | VERTICAL   |
| 3  | 2484.83     | 52.11           | -3.10          | 49.01           | 74.00           | -24.99               | Peak   | VERTICAL   |

Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**



| No | Freq<br>MHz | Reading<br>dBUV | Factor<br>dB/m | Level<br>dBUV/m | Limit<br>dBUV/m | Over Li<br>mit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|--------|------------|
| 1  | 2465.78     | 105.10          | -3.12          | 101.98          | F               | --                   | Peak   | HORIZONTAL |
| 2  | 2483.50     | 55.69           | -3.11          | 52.58           | 74.00           | -21.42               | Peak   | HORIZONTAL |
| 3  | 2484.30     | 56.13           | -3.11          | 53.02           | 74.00           | -20.98               | Peak   | HORIZONTAL |

**Remark:**

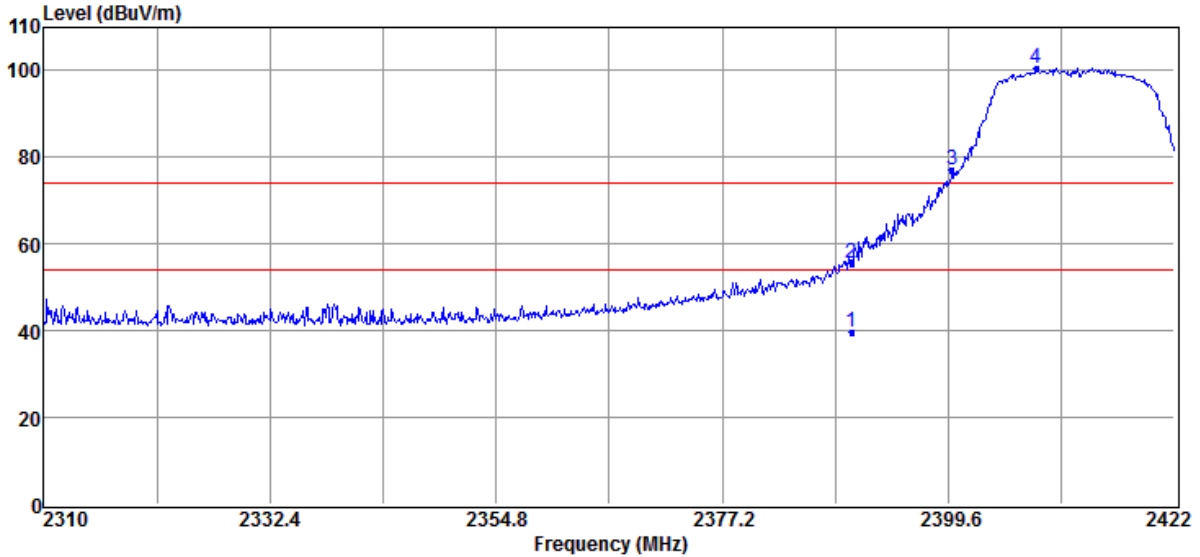
- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**

**Radiated Emission: 802.11 g mode**

Operation Mode TX CH Low  
 Fundamental Frequency 2412 MHz  
 Temperature 25

Test Date 2017/06/29  
 Test By Dino  
 Humidity 60 %

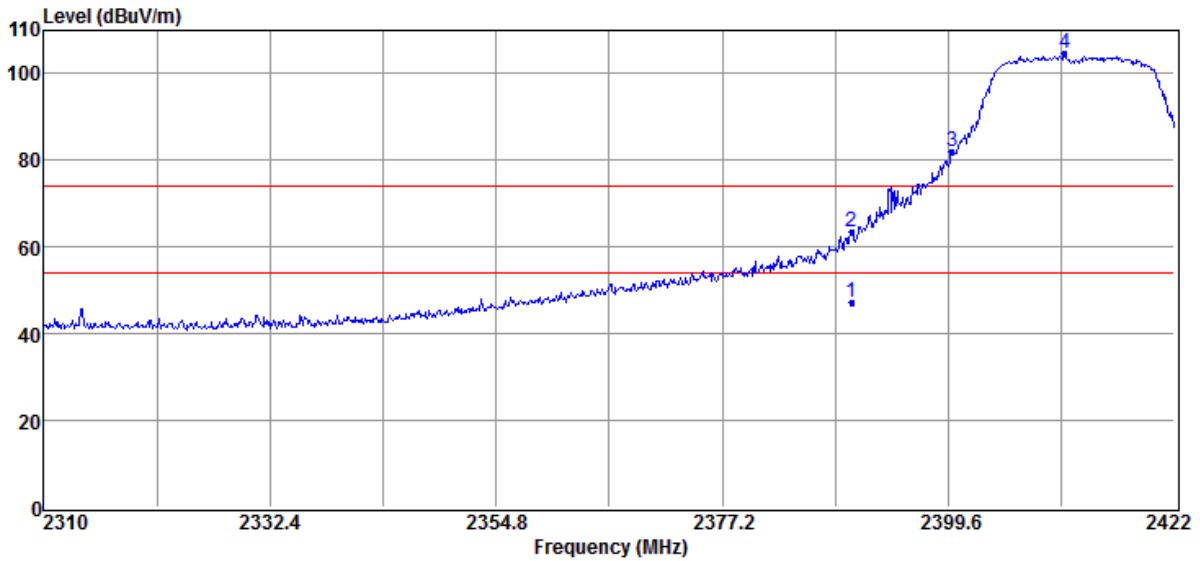


| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB/m | Level<br>dBuV/m | Limit<br>dBuV/m | Over Li<br>mit<br>dB | Remark  | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|---------|------------|
| 1  | 2390.00     | 42.87           | -3.15          | 39.72           | 54.00           | -14.28               | Average | VERTICAL   |
| 2  | 2390.00     | 58.90           | -3.15          | 55.75           | 74.00           | -18.25               | Peak    | VERTICAL   |
| 3  | 2400.00     | 80.45           | -3.16          | 77.29           | 80.48           | -3.19                | Peak    | VERTICAL   |
| 4  | 2408.34     | 103.63          | -3.15          | 100.48          | F               | --                   | Peak    | VERTICAL   |

**Remark:**

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**



| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB/m | Level<br>dBuV/m | Limit<br>dBuV/m | Over Li<br>mit<br>dB | Remark  | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|---------|------------|
| 1  | 2390.00     | 50.48           | -3.15          | 47.33           | 54.00           | -6.67                | Average | HORIZONTAL |
| 2  | 2390.00     | 66.80           | -3.15          | 63.65           | 74.00           | -10.35               | Peak    | HORIZONTAL |
| 3  | 2400.00     | 85.29           | -3.16          | 82.13           | 84.73           | -2.60                | Peak    | HORIZONTAL |
| 4  | 2411.14     | 107.88          | -3.15          | 104.73          | F               | --                   | Peak    | HORIZONTAL |

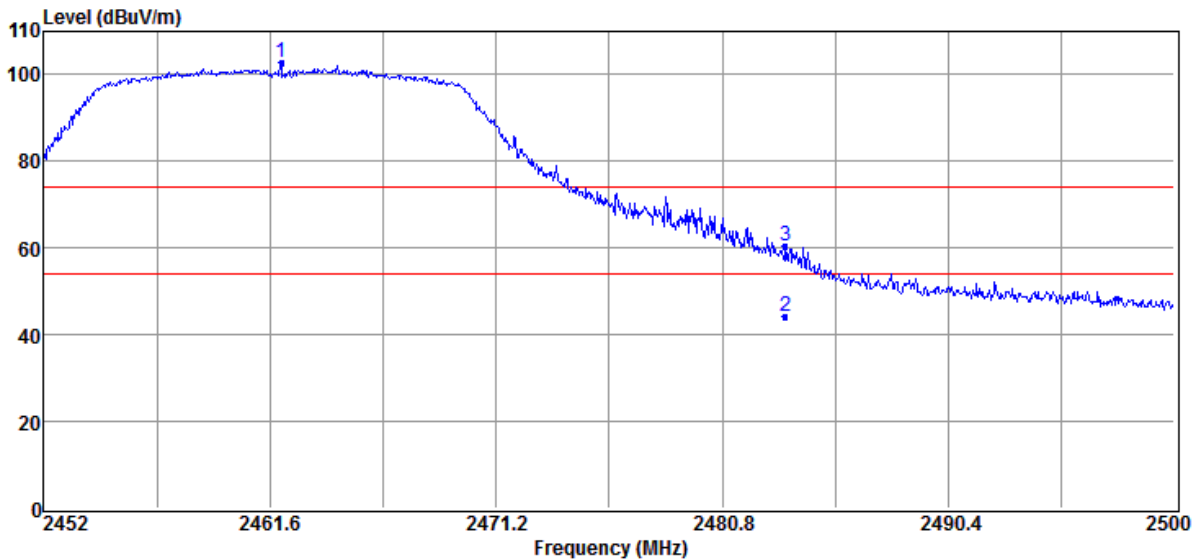
Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**

Operation Mode TX CH High  
 Fundamental Frequency 2462 MHz  
 Temperature 25

Test Date 2017/06/29  
 Test By Dino  
 Humidity 60 %

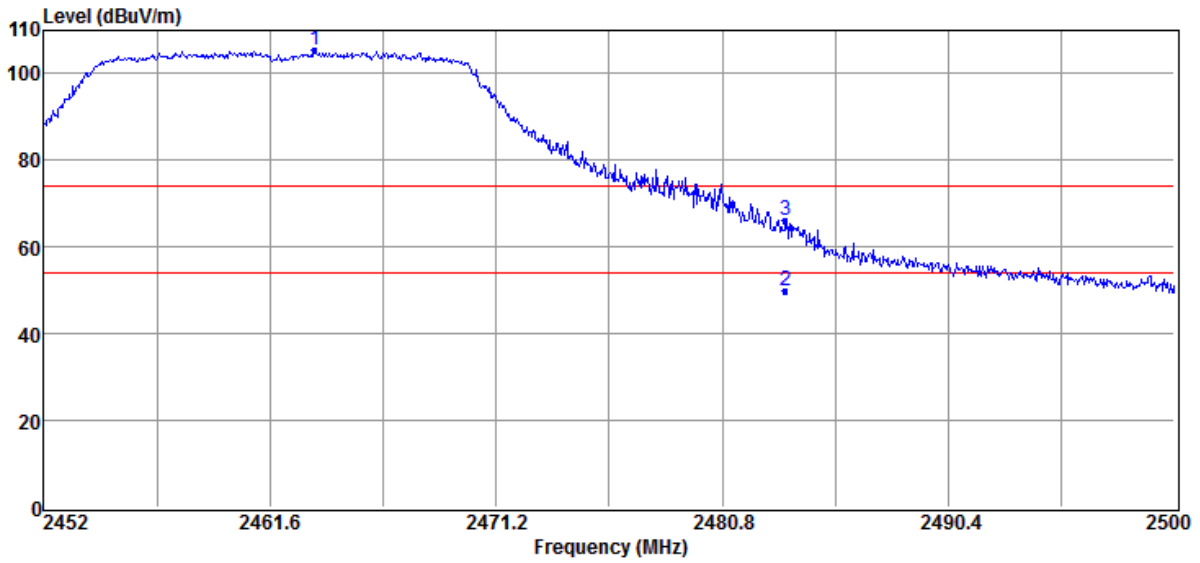


| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB/m | Level<br>dBuV/m | Limit<br>dBuV/m | Over Li<br>mit<br>dB | Remark  | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|---------|------------|
| 1  | 2462.08     | 105.78          | -3.12          | 102.66          | F               | --                   | Peak    | VERTICAL   |
| 2  | 2483.50     | 47.36           | -3.11          | 44.25           | 54.00           | -9.75                | Average | VERTICAL   |
| 3  | 2483.50     | 63.54           | -3.11          | 60.43           | 74.00           | -13.57               | Peak    | VERTICAL   |

Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**



| No | Freq<br>MHz | Reading<br>dBUV | Factor<br>dB/m | Level<br>dBUV/m | Limit<br>dBUV/m | Over Li<br>mit<br>dB | Remark  | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|---------|------------|
| 1  | 2463.52     | 108.59          | -3.13          | 105.46          | F               | --                   | Peak    | HORIZONTAL |
| 2  | 2483.50     | 53.09           | -3.11          | 49.98           | 54.00           | -4.02                | Average | HORIZONTAL |
| 3  | 2483.50     | 69.14           | -3.11          | 66.03           | 74.00           | -7.97                | Peak    | HORIZONTAL |

Remark:

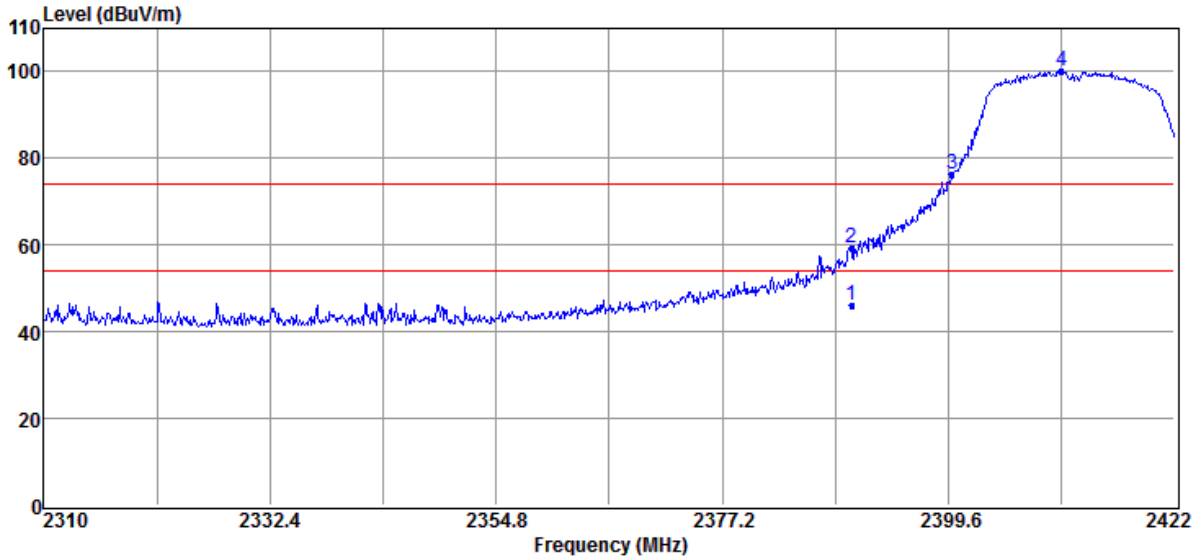
- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**

**Radiated Emission: 802.11 n\_20 mode**

Operation Mode TX CH Low  
 Fundamental Frequency 2412 MHz  
 Temperature 25

Test Date 2017/06/29  
 Test By Dino  
 Humidity 60 %



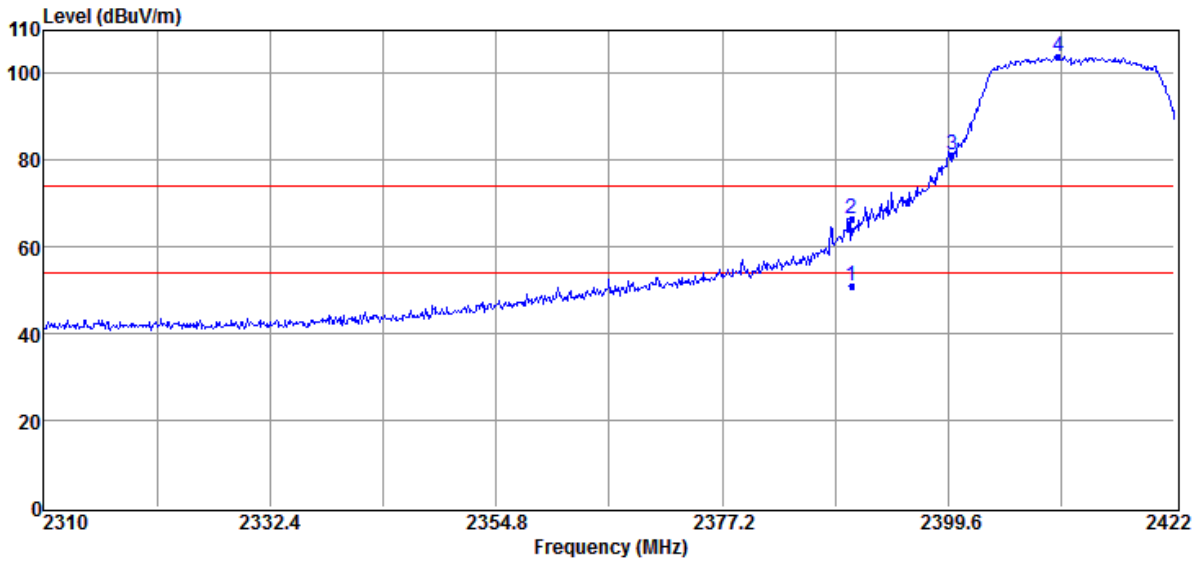
| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB/m | Level<br>dBuV/m | Limit<br>dBuV/m | Over Li<br>mit<br>dB | Remark  | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|---------|------------|
| 1  | 2390.00     | 49.08           | -3.15          | 45.93           | 54.00           | -8.07                | Average | VERTICAL   |
| 2  | 2390.00     | 62.32           | -3.15          | 59.17           | 74.00           | -14.83               | Peak    | VERTICAL   |
| 3  | 2400.00     | 79.62           | -3.16          | 76.46           | 80.27           | -3.81                | Peak    | VERTICAL   |
| 4  | 2410.80     | 103.42          | -3.15          | 100.27          | F               | --                   | Peak    | VERTICAL   |

**Remark:**

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**





| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB/m | Level<br>dBuV/m | Limit<br>dBuV/m | Over Li<br>mit<br>dB | Remark  | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|---------|------------|
| 1  | 2390.00     | 54.36           | -3.15          | 51.21           | 54.00           | -2.79                | Average | HORIZONTAL |
| 2  | 2390.00     | 69.82           | -3.15          | 66.67           | 74.00           | -7.33                | Peak    | HORIZONTAL |
| 3  | 2400.00     | 84.30           | -3.16          | 81.14           | 83.92           | -2.78                | Peak    | HORIZONTAL |
| 4  | 2410.46     | 107.07          | -3.15          | 103.92          | F               | --                   | Peak    | HORIZONTAL |

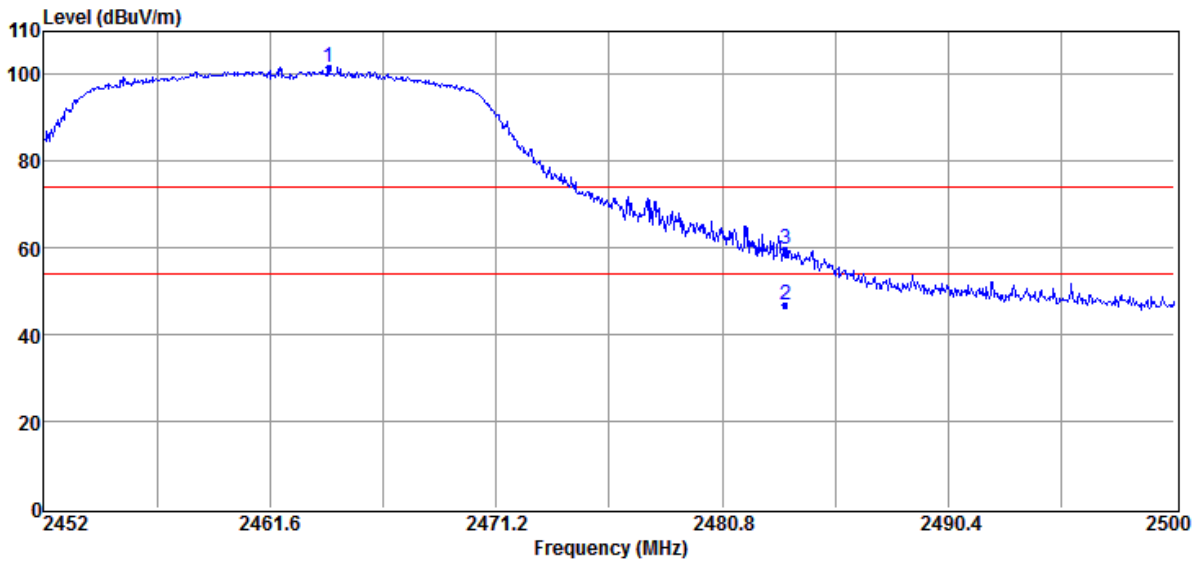
Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**

Operation Mode TX CH High  
 Fundamental Frequency 2462 MHz  
 Temperature 25

Test Date 2017/06/29  
 Test By Dino  
 Humidity 60 %

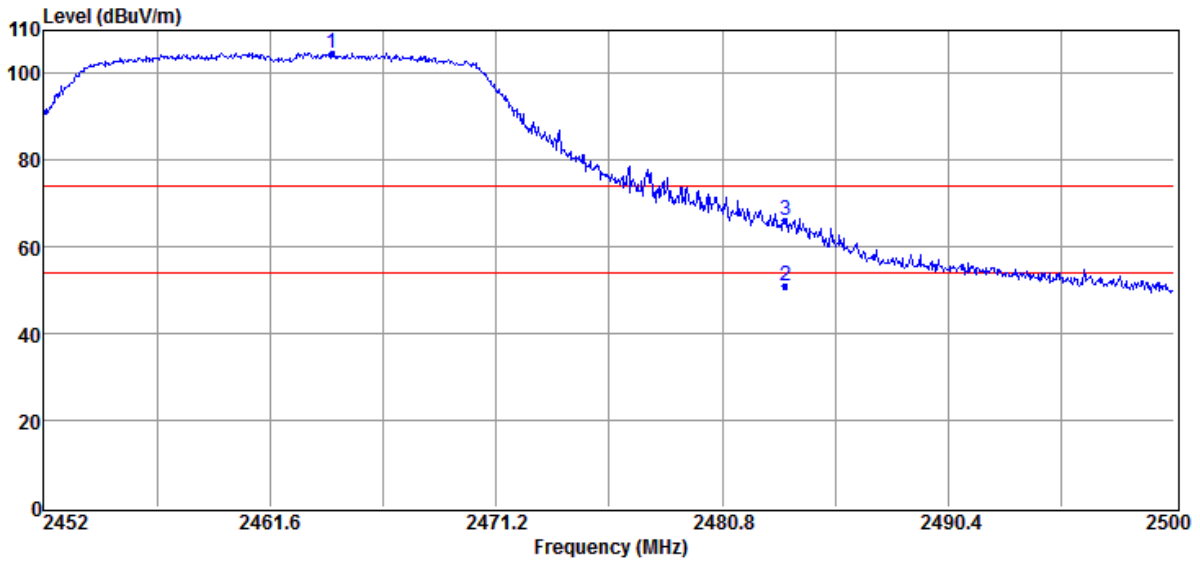


| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB/m | Level<br>dBuV/m | Limit<br>dBuV/m | Over Li<br>mit<br>dB | Remark  | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|---------|------------|
| 1  | 2464.10     | 104.93          | -3.13          | 101.80          | F               | --                   | Peak    | VERTICAL   |
| 2  | 2483.50     | 50.09           | -3.11          | 46.98           | 54.00           | -7.02                | Average | VERTICAL   |
| 3  | 2483.50     | 62.82           | -3.11          | 59.71           | 74.00           | -14.29               | Peak    | VERTICAL   |

Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**



| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB/m | Level<br>dBuV/m | Limit<br>dBuV/m | Over Li<br>mit<br>dB | Remark  | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|---------|------------|
| 1  | 2464.24     | 108.02          | -3.13          | 104.89          | F               | --                   | Peak    | HORIZONTAL |
| 2  | 2483.50     | 53.97           | -3.11          | 50.86           | 54.00           | -3.14                | Average | HORIZONTAL |
| 3  | 2483.50     | 69.22           | -3.11          | 66.11           | 74.00           | -7.89                | Peak    | HORIZONTAL |

Remark:

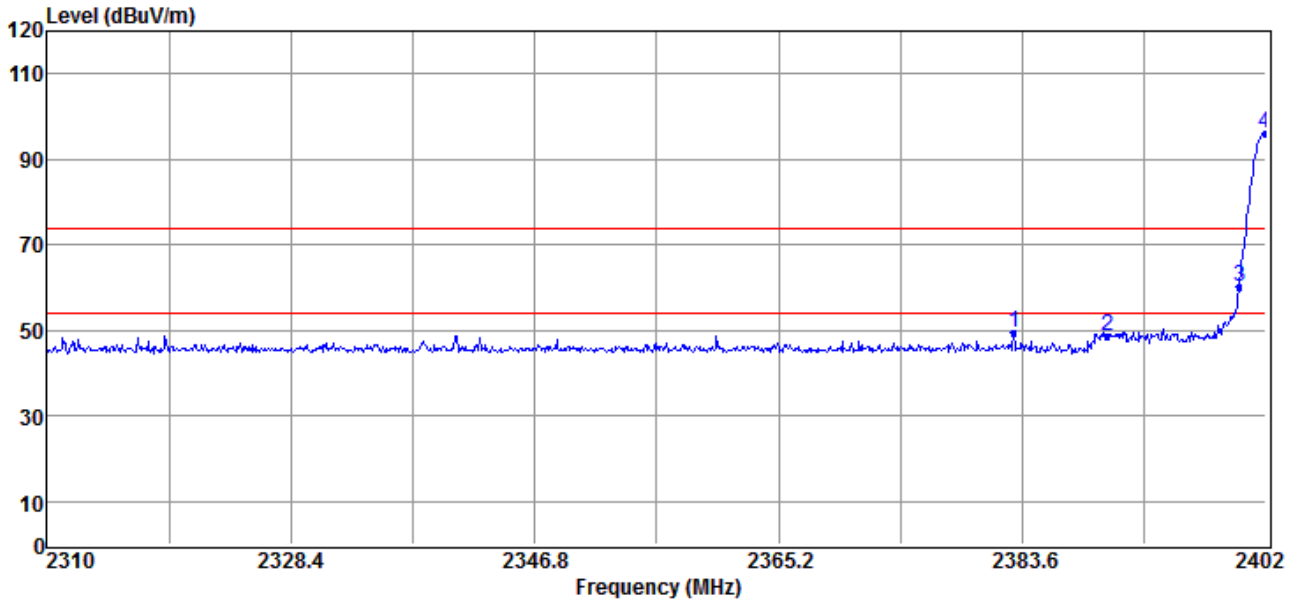
- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**

**Radiated Emission: BT LE mode**

Operation Mode TX CH Low  
 Fundamental Frequency 2402 MHz  
 Temperature 25

Test Date 2017/06/29  
 Test By Dino  
 Humidity 60 %

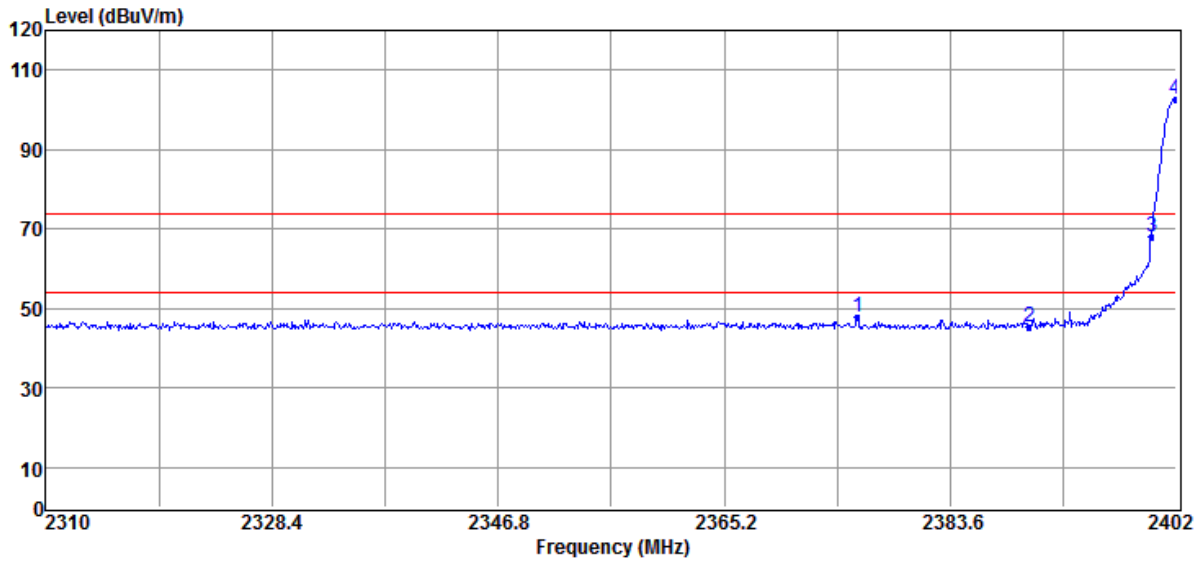


| No | Freq<br>MHz | Reading<br>dBUV | Factor<br>dB/m | Level<br>dBUV/m | Limit<br>dBUV/m | Over Li<br>mit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|--------|------------|
| 1  | 2382.96     | 52.79           | -3.15          | 49.64           | 74.00           | -24.36               | Peak   | VERTICAL   |
| 2  | 2390.00     | 51.96           | -3.15          | 48.81           | 74.00           | -25.19               | Peak   | VERTICAL   |
| 3  | 2400.00     | 63.23           | -3.16          | 60.07           | 76.04           | -15.97               | Peak   | VERTICAL   |
| 4  | 2401.91     | 99.20           | -3.16          | 96.04           | F               | --                   | Peak   | VERTICAL   |

**Remark:**

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**



| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB/m | Level<br>dBuV/m | Limit<br>dBuV/m | Over Li<br>mit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|--------|------------|
| 1  | 2376.06     | 50.82           | -3.15          | 47.67           | 74.00           | -26.33               | Peak   | HORIZONTAL |
| 2  | 2390.00     | 48.69           | -3.15          | 45.54           | 74.00           | -28.46               | Peak   | HORIZONTAL |
| 3  | 2400.00     | 71.28           | -3.16          | 68.12           | 82.67           | -14.55               | Peak   | HORIZONTAL |
| 4  | 2401.91     | 105.83          | -3.16          | 102.67          | F               | --                   | Peak   | HORIZONTAL |

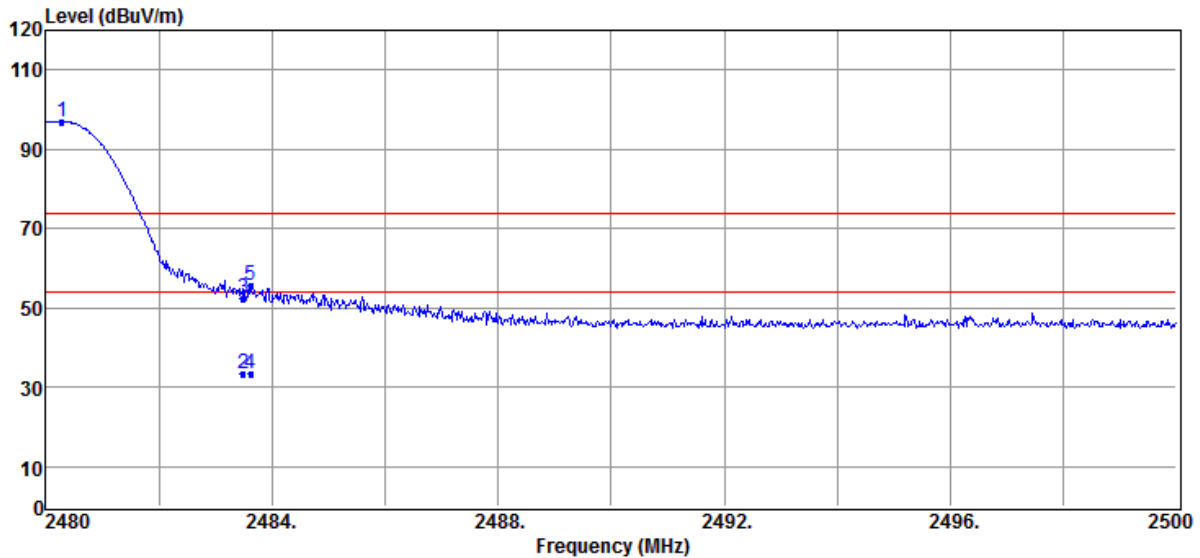
Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**

Operation Mode TX CH High  
Fundamental Frequency 2480 MHz  
Temperature 25

Test Date 2017/06/29  
Test By Dino  
Humidity 60 %

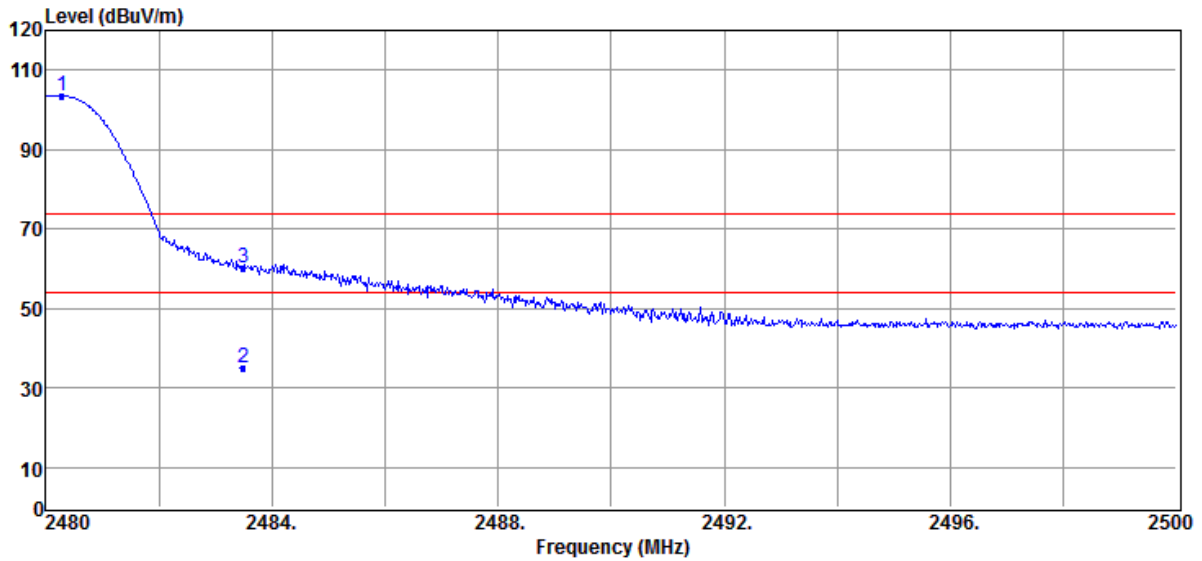


| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB/m | Level<br>dBuV/m | Limit<br>dBuV/m | Over Li<br>mit<br>dB | Remark  | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|---------|------------|
| 1  | 2480.28     | 100.13          | -3.11          | 97.02           | F               | --                   | Peak    | VERTICAL   |
| 2  | 2483.50     | 36.52           | -3.11          | 33.41           | 54.00           | -20.59               | Average | VERTICAL   |
| 3  | 2483.50     | 55.61           | -3.11          | 52.50           | 74.00           | -21.50               | Peak    | VERTICAL   |
| 4  | 2483.62     | 36.41           | -3.11          | 33.30           | 54.00           | -20.70               | Average | VERTICAL   |
| 5  | 2483.62     | 58.97           | -3.11          | 55.86           | 74.00           | -18.14               | Peak    | VERTICAL   |

Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency



| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB/m | Level<br>dBuV/m | Limit<br>dBuV/m | Over Li<br>mit<br>dB | Remark  | Pol<br>V/H |
|----|-------------|-----------------|----------------|-----------------|-----------------|----------------------|---------|------------|
| 1  | 2480.28     | 106.59          | -3.11          | 103.48          | F               | --                   | Peak    | HORIZONTAL |
| 2  | 2483.50     | 38.21           | -3.11          | 35.10           | 54.00           | -18.90               | Average | HORIZONTAL |
| 3  | 2483.50     | 63.27           | -3.11          | 60.16           | 74.00           | -13.84               | Peak    | HORIZONTAL |

9 Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Note: “F” denotes fundamental frequency**

## 9 SPURIOUS RADIATED EMISSION TEST

### 9.1 Standard Applicable

According to §15.247(d), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

### 9.2 Measurement Equipment Used:

#### 9.2.1 Conducted Emission at antenna port:

Refer to section 6.2 for details.

#### 9.2.2 Radiated emission:

Refer to section 8.2 for details.

### 9.3 Test SET-UP:

The test item only performed radiated mode

Refer to section 8.3 for details.

### 9.4 Measurement Procedure:

- 1 According 414788 section 2, Either OATS or chamber for radiated emission below 30MHz, the test was done at 966 chamber, the test site was evaluated with OATS and the Chamber has test signals level greater than OATS's .
- 2 The EUT was placed on a turn table which is 0.8m/1.5m above ground plane in 966 chamber.
- 3 The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 4 EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 5 When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
- 6 Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 7 And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 8 Repeat above procedures until all frequency measured were complete.



## 9.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

|       |                        |  |
|-------|------------------------|--|
| Where | FS = Field Strength    | CL = Cable Attenuation Factor (Cable Loss) |
|       | RA = Reading Amplitude | AG = Amplifier Gain                        |
|       | AF = Antenna Factor    |  |

## 9.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

**Radiated Spurious Emission Measurement Result (below 1GHz) (worst case: 802.11g mode)**

|                |         |           |            |
|----------------|---------|-----------|------------|
| Operation Mode | TX mode | Test Date | 2017/06/12 |
| Channel number | CH Low  | Test By   | Dino       |
| Temperature    | 25      | Pol       | Ver./Hor   |
| Humidity       | 60 %    |           |            |

| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1  | 54.25       | 33.27           | -5.36        | 27.91           | 40.00           | -12.09              | Peak   | VERTICAL   |
| 2  | 259.89      | 38.95           | -5.33        | 33.62           | 46.00           | -12.38              | Peak   | VERTICAL   |
| 3  | 668.26      | 31.05           | 2.23         | 33.28           | 46.00           | -12.72              | Peak   | VERTICAL   |
| 4  | 816.67      | 31.23           | 4.54         | 35.77           | 46.00           | -10.23              | Peak   | VERTICAL   |
| 5  | 890.39      | 30.45           | 5.77         | 36.22           | 46.00           | -9.78               | Peak   | VERTICAL   |
| 6  | 965.08      | 33.37           | 6.98         | 40.35           | 54.00           | -13.65              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 96.93       | 36.96           | -11.07       | 25.89           | 43.50           | -17.61              | Peak   | HORIZONTAL |
| 2  | 152.22      | 29.73           | -4.96        | 24.77           | 43.50           | -18.73              | Peak   | HORIZONTAL |
| 3  | 259.89      | 39.04           | -5.33        | 33.71           | 46.00           | -12.29              | Peak   | HORIZONTAL |
| 4  | 519.85      | 29.51           | -0.19        | 29.32           | 46.00           | -16.68              | Peak   | HORIZONTAL |
| 5  | 690.57      | 27.54           | 2.69         | 30.23           | 46.00           | -15.77              | Peak   | HORIZONTAL |
| 6  | 965.08      | 30.88           | 6.98         | 37.86           | 54.00           | -16.14              | Peak   | HORIZONTAL |

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

**Radiated Spurious Emission Measurement Result (below 1GHz) (worst case: 802.11g mode)**

|                |         |           |            |
|----------------|---------|-----------|------------|
| Operation Mode | TX mode | Test Date | 2017/06/12 |
| Channel number | CH Mid  | Test By   | Dino       |
| Temperature    | 25      | Pol       | Ver./Hor   |
| Humidity       | 60 %    |           |            |

| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1  | 52.31       | 32.17           | -5.24        | 26.93           | 40.00           | -13.07              | Peak   | VERTICAL   |
| 2  | 111.48      | 33.54           | -8.00        | 25.54           | 43.50           | -17.96              | Peak   | VERTICAL   |
| 3  | 259.89      | 39.79           | -5.33        | 34.46           | 46.00           | -11.54              | Peak   | VERTICAL   |
| 4  | 668.26      | 29.83           | 2.23         | 32.06           | 46.00           | -13.94              | Peak   | VERTICAL   |
| 5  | 816.67      | 31.17           | 4.54         | 35.71           | 46.00           | -10.29              | Peak   | VERTICAL   |
| 6  | 965.08      | 34.02           | 6.98         | 41.00           | 54.00           | -13.00              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 96.93       | 36.34           | -11.07       | 25.27           | 43.50           | -18.23              | Peak   | HORIZONTAL |
| 2  | 153.19      | 29.43           | -4.95        | 24.48           | 43.50           | -19.02              | Peak   | HORIZONTAL |
| 3  | 259.89      | 39.29           | -5.33        | 33.96           | 46.00           | -12.04              | Peak   | HORIZONTAL |
| 4  | 593.57      | 28.30           | 1.17         | 29.47           | 46.00           | -16.53              | Peak   | HORIZONTAL |
| 5  | 668.26      | 27.58           | 2.23         | 29.81           | 46.00           | -16.19              | Peak   | HORIZONTAL |
| 6  | 965.08      | 31.03           | 6.98         | 38.01           | 54.00           | -15.99              | Peak   | HORIZONTAL |

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

**Radiated Spurious Emission Measurement Result (below 1GHz) (worst case: 802.11g mode)**

|                |         |           |            |
|----------------|---------|-----------|------------|
| Operation Mode | TX mode | Test Date | 2017/06/12 |
| Channel number | CH High | Test By   | Dino       |
| Temperature    | 25      | Pol       | Ver./Hor   |
| Humidity       | 60 %    |           |            |

| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1  | 54.25       | 34.81           | -5.36        | 29.45           | 40.00           | -10.55              | Peak   | VERTICAL   |
| 2  | 111.48      | 35.91           | -8.00        | 27.91           | 43.50           | -15.59              | Peak   | VERTICAL   |
| 3  | 259.89      | 38.09           | -5.33        | 32.76           | 46.00           | -13.24              | Peak   | VERTICAL   |
| 4  | 668.26      | 30.66           | 2.23         | 32.89           | 46.00           | -13.11              | Peak   | VERTICAL   |
| 5  | 816.67      | 31.33           | 4.54         | 35.87           | 46.00           | -10.13              | Peak   | VERTICAL   |
| 6  | 965.08      | 34.54           | 6.98         | 41.52           | 54.00           | -12.48              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 96.93       | 36.64           | -11.07       | 25.57           | 43.50           | -17.93              | Peak   | HORIZONTAL |
| 2  | 151.25      | 29.54           | -5.01        | 24.53           | 43.50           | -18.97              | Peak   | HORIZONTAL |
| 3  | 259.89      | 41.96           | -5.33        | 36.63           | 46.00           | -9.37               | Peak   | HORIZONTAL |
| 4  | 519.85      | 29.48           | -0.19        | 29.29           | 46.00           | -16.71              | Peak   | HORIZONTAL |
| 5  | 593.57      | 28.15           | 1.17         | 29.32           | 46.00           | -16.68              | Peak   | HORIZONTAL |
| 6  | 965.08      | 31.30           | 6.98         | 38.28           | 54.00           | -15.72              | Peak   | HORIZONTAL |

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

**Radiated Spurious Emission Measurement Result (above 1GHz) (worst case: 802.11g mode)**

|                |         |           |            |
|----------------|---------|-----------|------------|
| Operation Mode | TX mode | Test Date | 2017/06/12 |
| Channel number | CH Low  | Test By   | Dino       |
| Temperature    | 25      | Pol       | Ver./Hor   |
| Humidity       | 60 %    |           |            |

| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1  | 2001.00     | 54.71           | -5.34        | 49.37           | 74.00           | -24.63              | Peak   | VERTICAL   |
| 2  | 4824.00     | 42.07           | 3.27         | 45.34           | 74.00           | -28.66              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 2001.00     | 49.83           | -5.34        | 44.49           | 74.00           | -29.51              | Peak   | HORIZONTAL |
| 2  | 4824.00     | 42.83           | 3.27         | 46.10           | 74.00           | -27.90              | Peak   | HORIZONTAL |

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Radiated Spurious Emission Measurement Result (above 1GHz) (worst case: 802.11g mode)**

|                |         |           |            |
|----------------|---------|-----------|------------|
| Operation Mode | TX mode | Test Date | 2017/06/12 |
| Channel number | CH Mid  | Test By   | Dino       |
| Temperature    | 25      | Pol       | Ver./Hor   |
| Humidity       | 60 %    |           |            |

| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1  | 1798.00     | 48.57           | -6.66        | 41.91           | 74.00           | -32.09              | Peak   | VERTICAL   |
| 2  | 4874.00     | 40.83           | 3.39         | 44.22           | 74.00           | -29.78              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 2176.00     | 43.55           | -3.37        | 40.18           | 74.00           | -33.82              | Peak   | HORIZONTAL |
| 2  | 4874.00     | 41.51           | 3.39         | 44.90           | 74.00           | -29.10              | Peak   | HORIZONTAL |

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Radiated Spurious Emission Measurement Result (above 1GHz) (worst case: 802.11g mode)**

|                |         |           |            |
|----------------|---------|-----------|------------|
| Operation Mode | TX mode | Test Date | 2017/06/12 |
| Channel number | CH High | Test By   | Dino       |
| Temperature    | 25      | Pol       | Ver./Hor   |
| Humidity       | 60 %    |           |            |

| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1  | 1266.00     | 49.58           | -8.13        | 41.45           | 74.00           | -32.55              | Peak   | VERTICAL   |
| 2  | 4924.00     | 40.02           | 3.51         | 43.53           | 74.00           | -30.47              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 1644.00     | 46.01           | -7.14        | 38.87           | 74.00           | -35.13              | Peak   | HORIZONTAL |
| 2  | 4924.00     | 40.36           | 3.51         | 43.87           | 74.00           | -30.13              | Peak   | HORIZONTAL |

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Radiated Spurious Emission Measurement Result (below 1GHz) BLE Mode**

|                |         |           |            |
|----------------|---------|-----------|------------|
| Operation Mode | TX mode | Test Date | 2017/06/12 |
| Channel number | CH Low  | Test By   | Dino       |
| Temperature    | 25      | Pol       | Ver./Hor   |
| Humidity       | 60 %    |           |            |

| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1  | 52.31       | 35.03           | -5.24        | 29.79           | 40.00           | -10.21              | Peak   | VERTICAL   |
| 2  | 91.11       | 39.36           | -11.87       | 27.49           | 43.50           | -16.01              | Peak   | VERTICAL   |
| 3  | 259.89      | 42.57           | -5.33        | 37.24           | 46.00           | -8.76               | Peak   | VERTICAL   |
| 4  | 519.85      | 29.51           | -0.19        | 29.32           | 46.00           | -16.68              | Peak   | VERTICAL   |
| 5  | 668.26      | 31.41           | 2.23         | 33.64           | 46.00           | -12.36              | Peak   | VERTICAL   |
| 6  | 965.08      | 34.10           | 6.98         | 41.08           | 54.00           | -12.92              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 96.93       | 37.27           | -11.07       | 26.20           | 43.50           | -17.30              | Peak   | HORIZONTAL |
| 2  | 154.16      | 30.41           | -4.93        | 25.48           | 43.50           | -18.02              | Peak   | HORIZONTAL |
| 3  | 259.89      | 39.36           | -5.33        | 34.03           | 46.00           | -11.97              | Peak   | HORIZONTAL |
| 4  | 519.85      | 29.64           | -0.19        | 29.45           | 46.00           | -16.55              | Peak   | HORIZONTAL |
| 5  | 668.26      | 29.72           | 2.23         | 31.95           | 46.00           | -14.05              | Peak   | HORIZONTAL |
| 6  | 965.08      | 32.02           | 6.98         | 39.00           | 54.00           | -15.00              | Peak   | HORIZONTAL |

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.



**Radiated Spurious Emission Measurement Result (below 1GHz) BLE Mode**

|                |         |           |            |
|----------------|---------|-----------|------------|
| Operation Mode | TX mode | Test Date | 2017/06/12 |
| Channel number | CH Mid  | Test By   | Dino       |
| Temperature    | 25      | Pol       | Ver./Hor   |
| Humidity       | 60 %    |           |            |

| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1  | 54.25       | 32.22           | -5.36        | 26.86           | 40.00           | -13.14              | Peak   | VERTICAL   |
| 2  | 111.48      | 32.75           | -8.00        | 24.75           | 43.50           | -18.75              | Peak   | VERTICAL   |
| 3  | 259.89      | 41.78           | -5.33        | 36.45           | 46.00           | -9.55               | Peak   | VERTICAL   |
| 4  | 668.26      | 30.57           | 2.23         | 32.80           | 46.00           | -13.20              | Peak   | VERTICAL   |
| 5  | 816.67      | 31.73           | 4.54         | 36.27           | 46.00           | -9.73               | Peak   | VERTICAL   |
| 6  | 965.08      | 33.93           | 6.98         | 40.91           | 54.00           | -13.09              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 96.93       | 38.05           | -11.07       | 26.98           | 43.50           | -16.52              | Peak   | HORIZONTAL |
| 2  | 153.19      | 32.01           | -4.95        | 27.06           | 43.50           | -16.44              | Peak   | HORIZONTAL |
| 3  | 259.89      | 41.84           | -5.33        | 36.51           | 46.00           | -9.49               | Peak   | HORIZONTAL |
| 4  | 593.57      | 29.64           | 1.17         | 30.81           | 46.00           | -15.19              | Peak   | HORIZONTAL |
| 5  | 676.99      | 28.31           | 2.31         | 30.62           | 46.00           | -15.38              | Peak   | HORIZONTAL |
| 6  | 965.08      | 32.62           | 6.98         | 39.60           | 54.00           | -14.40              | Peak   | HORIZONTAL |

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

**Radiated Spurious Emission Measurement Result (below 1GHz) BLE Mode**

|                |         |           |            |
|----------------|---------|-----------|------------|
| Operation Mode | TX mode | Test Date | 2017/06/12 |
| Channel number | CH High | Test By   | Dino       |
| Temperature    | 25      | Pol       | Ver./Hor   |
| Humidity       | 60 %    |           |            |

| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1  | 54.25       | 32.79           | -5.36        | 27.43           | 40.00           | -12.57              | Peak   | VERTICAL   |
| 2  | 111.48      | 32.71           | -8.00        | 24.71           | 43.50           | -18.79              | Peak   | VERTICAL   |
| 3  | 259.89      | 40.86           | -5.33        | 35.53           | 46.00           | -10.47              | Peak   | VERTICAL   |
| 4  | 445.16      | 28.48           | -1.28        | 27.20           | 46.00           | -18.80              | Peak   | VERTICAL   |
| 5  | 668.26      | 30.79           | 2.23         | 33.02           | 46.00           | -12.98              | Peak   | VERTICAL   |
| 6  | 965.08      | 33.99           | 6.98         | 40.97           | 54.00           | -13.03              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 96.93       | 37.87           | -11.07       | 26.80           | 43.50           | -16.70              | Peak   | HORIZONTAL |
| 2  | 152.22      | 32.16           | -4.96        | 27.20           | 43.50           | -16.30              | Peak   | HORIZONTAL |
| 3  | 259.89      | 39.90           | -5.33        | 34.57           | 46.00           | -11.43              | Peak   | HORIZONTAL |
| 4  | 593.57      | 28.82           | 1.17         | 29.99           | 46.00           | -16.01              | Peak   | HORIZONTAL |
| 5  | 668.26      | 29.06           | 2.23         | 31.29           | 46.00           | -14.71              | Peak   | HORIZONTAL |
| 6  | 965.08      | 31.05           | 6.98         | 38.03           | 54.00           | -15.97              | Peak   | HORIZONTAL |

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

**Radiated Spurious Emission Measurement Result (above 1GHz) BLE Mode**

|                |         |           |            |
|----------------|---------|-----------|------------|
| Operation Mode | TX mode | Test Date | 2017/06/12 |
| Channel number | CH Low  | Test By   | Dino       |
| Temperature    | 25      | Pol       | Ver./Hor   |
| Humidity       | 60 %    |           |            |

| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1  | 1994.00     | 56.18           | -5.39        | 50.79           | 74.00           | -23.21              | Peak   | VERTICAL   |
| 2  | 4804.00     | 43.69           | 3.23         | 46.92           | 74.00           | -27.08              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 1266.00     | 54.39           | -8.13        | 46.26           | 74.00           | -27.74              | Peak   | HORIZONTAL |
| 2  | 4804.00     | 43.21           | 3.23         | 46.44           | 74.00           | -27.56              | Peak   | HORIZONTAL |

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Radiated Spurious Emission Measurement Result (above 1GHz) BLE Mode**

|                |         |           |            |
|----------------|---------|-----------|------------|
| Operation Mode | TX mode | Test Date | 2017/06/12 |
| Channel number | CH Mid  | Test By   | Dino       |
| Temperature    | 25      | Pol       | Ver./Hor   |
| Humidity       | 60 %    |           |            |

| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1  | 1798.00     | 54.66           | -6.66        | 48.00           | 74.00           | -26.00              | Peak   | VERTICAL   |
| 2  | 4884.00     | 41.49           | 3.42         | 44.91           | 74.00           | -29.09              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 1266.00     | 54.61           | -8.13        | 46.48           | 74.00           | -27.52              | Peak   | HORIZONTAL |
| 2  | 4884.00     | 41.72           | 3.42         | 45.14           | 74.00           | -28.86              | Peak   | HORIZONTAL |

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

**Radiated Spurious Emission Measurement Result (above 1GHz) BLE Mode**

|                |         |           |            |
|----------------|---------|-----------|------------|
| Operation Mode | TX mode | Test Date | 2017/06/12 |
| Channel number | CH High | Test By   | Dino       |
| Temperature    | 25      | Pol       | Ver./Hor   |
| Humidity       | 60 %    |           |            |

| No | Freq<br>MHz | Reading<br>dBuV | Factor<br>dB | Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark | Pol<br>V/H |
|----|-------------|-----------------|--------------|-----------------|-----------------|---------------------|--------|------------|
| 1  | 2008.00     | 53.95           | -5.24        | 48.71           | 74.00           | -25.29              | Peak   | VERTICAL   |
| 2  | 4960.00     | 42.08           | 3.60         | 45.68           | 74.00           | -28.32              | Peak   | VERTICAL   |
|    |             |                 |              |                 |                 |                     |        |            |
| 1  | 1266.00     | 55.59           | -8.13        | 47.46           | 74.00           | -26.54              | Peak   | HORIZONTAL |
| 2  | 4960.00     | 41.55           | 3.60         | 45.15           | 74.00           | -28.85              | Peak   | HORIZONTAL |

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

## 10 Peak Power Spectral Density

### 10.1 Standard Applicable:

According to §15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### 10.2 Measurement Equipment Used:

Refer to section 6.2 for details.

### 10.3 Test Set-up:

Refer to section 6.3 for details.

### 10.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW =3KHz, VBW = 10KHz, Set the span to 1.5 DTS bandwidth., Sweep=Auto
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.

## 10.5 Measurement Result:

### 802.11b Mode

| CH   | Power Density Level dBm/3KHz | Maximum Limit (dBm) |
|------|------------------------------|---------------------|
| Low  | -11.90                       | 8                   |
| Mid  | -11.25                       | 8                   |
| High | -11.54                       | 8                   |

### 802.11g Mode

| CH   | Power Density Level dBm/3KHz | Maximum Limit (dBm) |
|------|------------------------------|---------------------|
| Low  | -12.31                       | 8                   |
| Mid  | -12.70                       | 8                   |
| High | -11.97                       | 8                   |

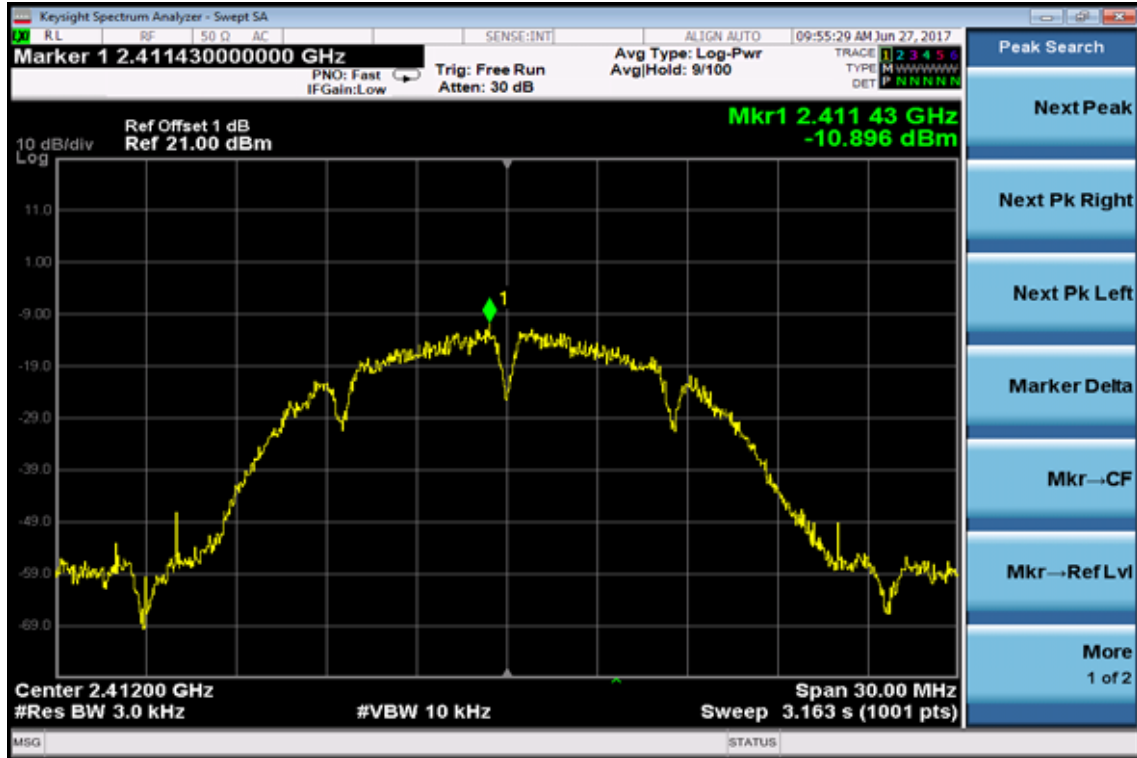
### 802.11n HT20

| CH   | Power Density Level dBm/3KHz | Maximum Limit (dBm) |
|------|------------------------------|---------------------|
| Low  | -12.79                       | 8                   |
| Mid  | -12.78                       | 8                   |
| High | -12.90                       | 8                   |

### BT LE mode

| CH   | Power Density Level dBm/3KHz | Maximum Limit (dBm) |
|------|------------------------------|---------------------|
| Low  | -14.09                       | 8                   |
| Mid  | -13.84                       | 8                   |
| High | -13.25                       | 8                   |

### 802.11b Power Spectral Density Test Plot (CH-Low)

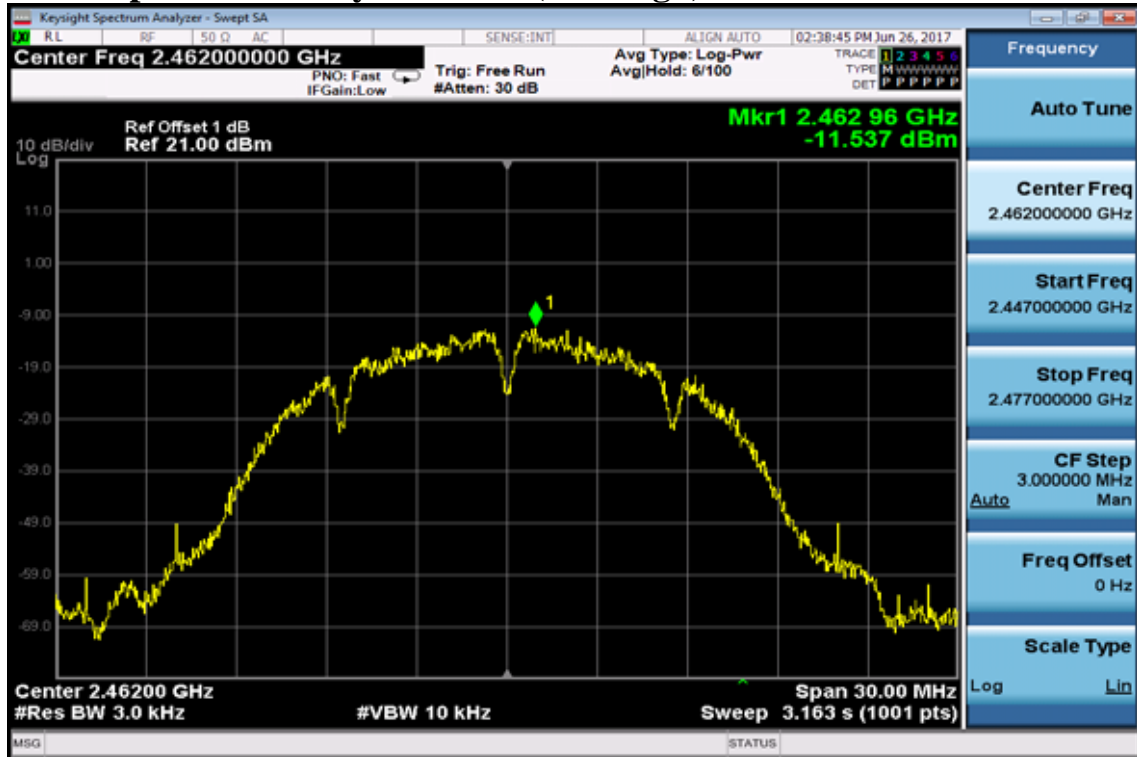


### Power Spectral Density Test Plot (CH-Mid)



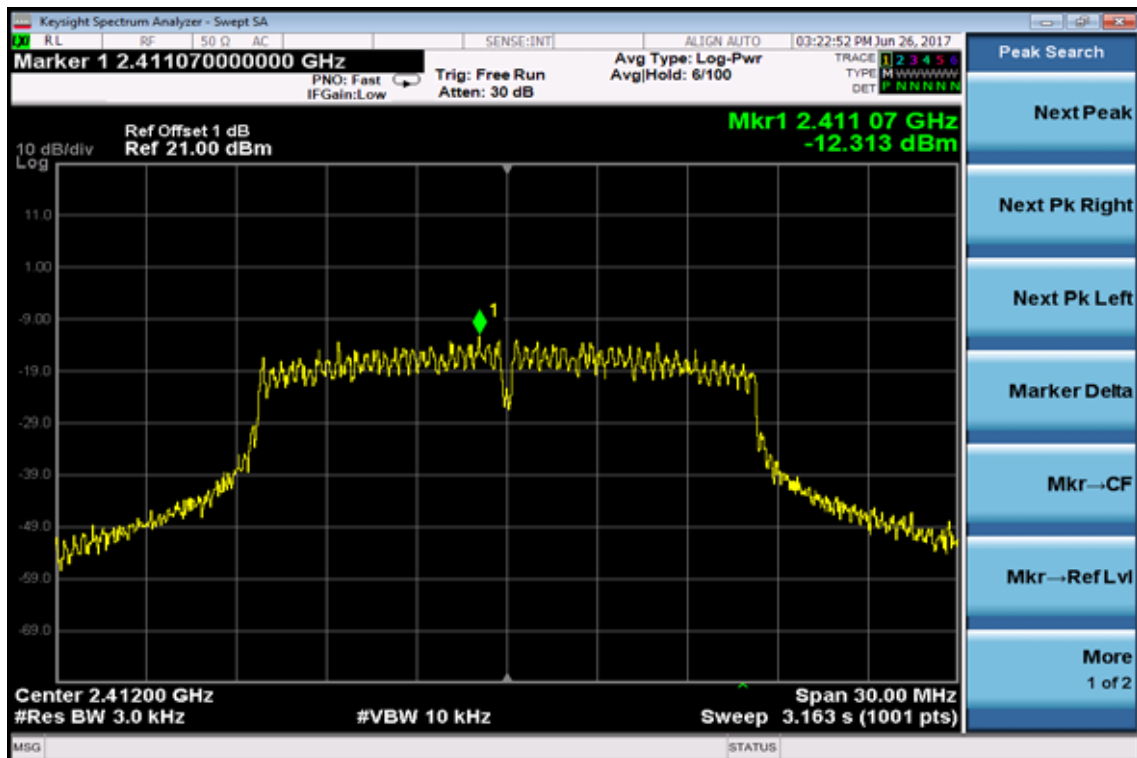


### Power Spectral Density Test Plot (CH-High)

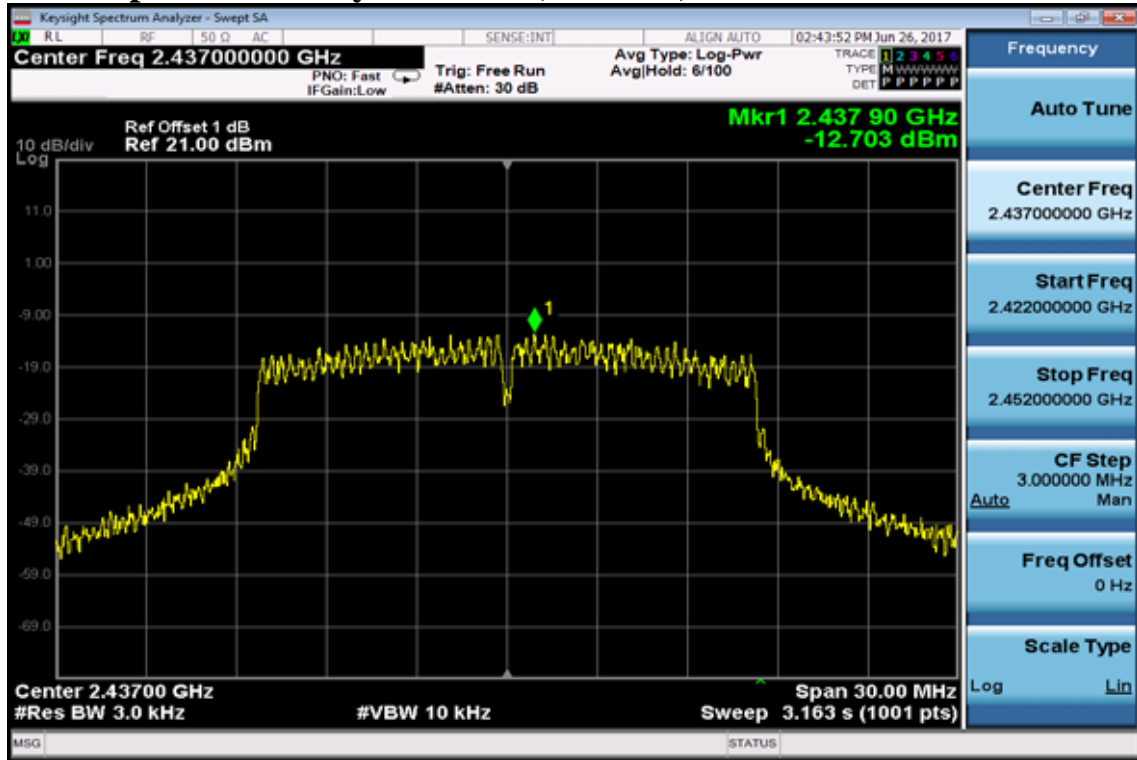


802.11g

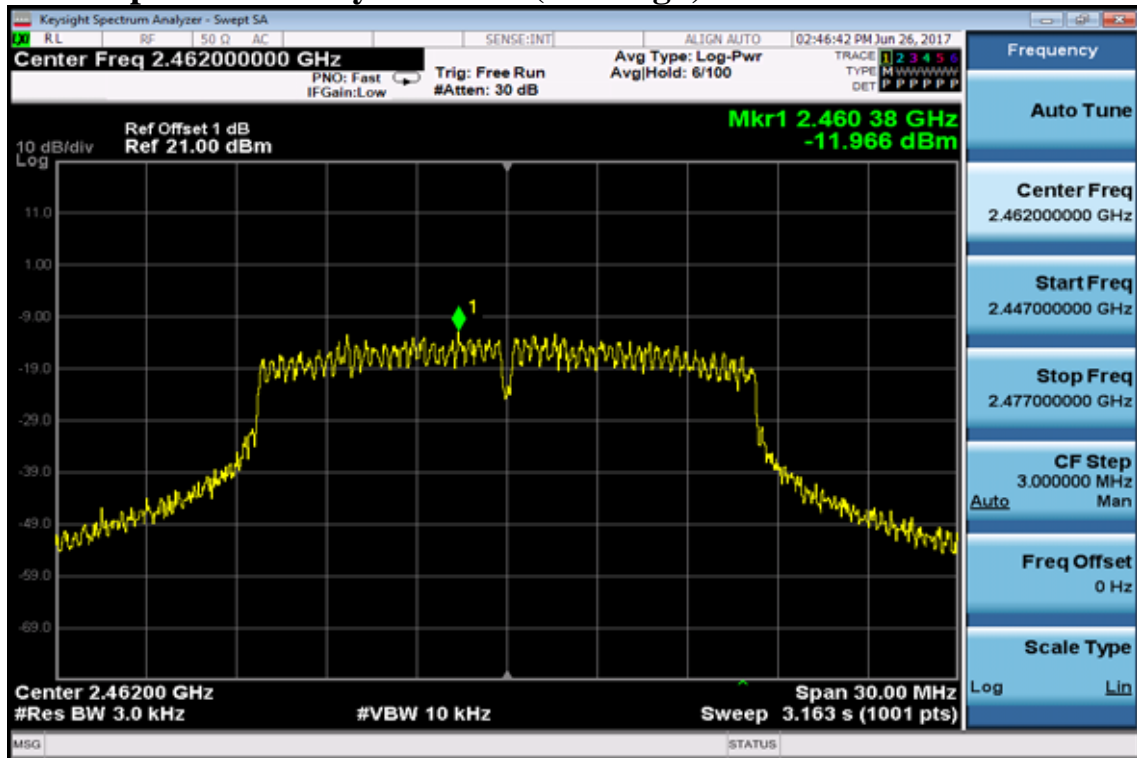
### Power Spectral Density Test Plot (CH-Low)



### Power Spectral Density Test Plot (CH-Mid)

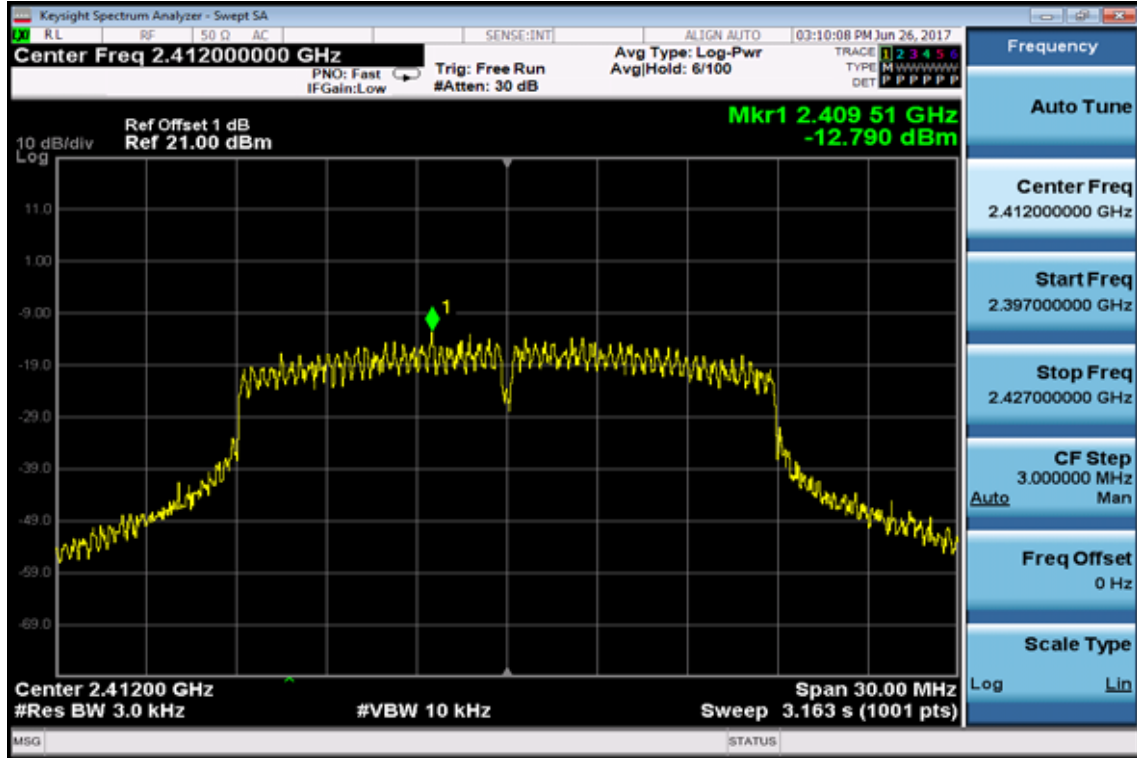


### Power Spectral Density Test Plot (CH-High)

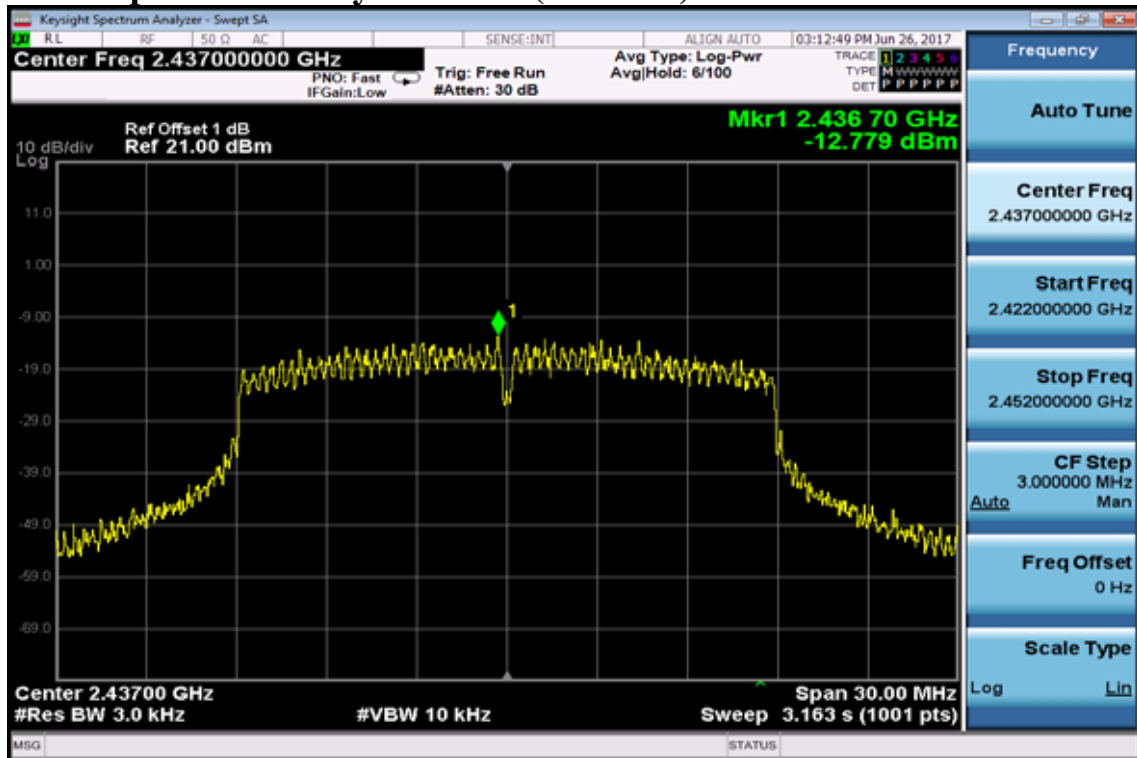


802.11n\_20M

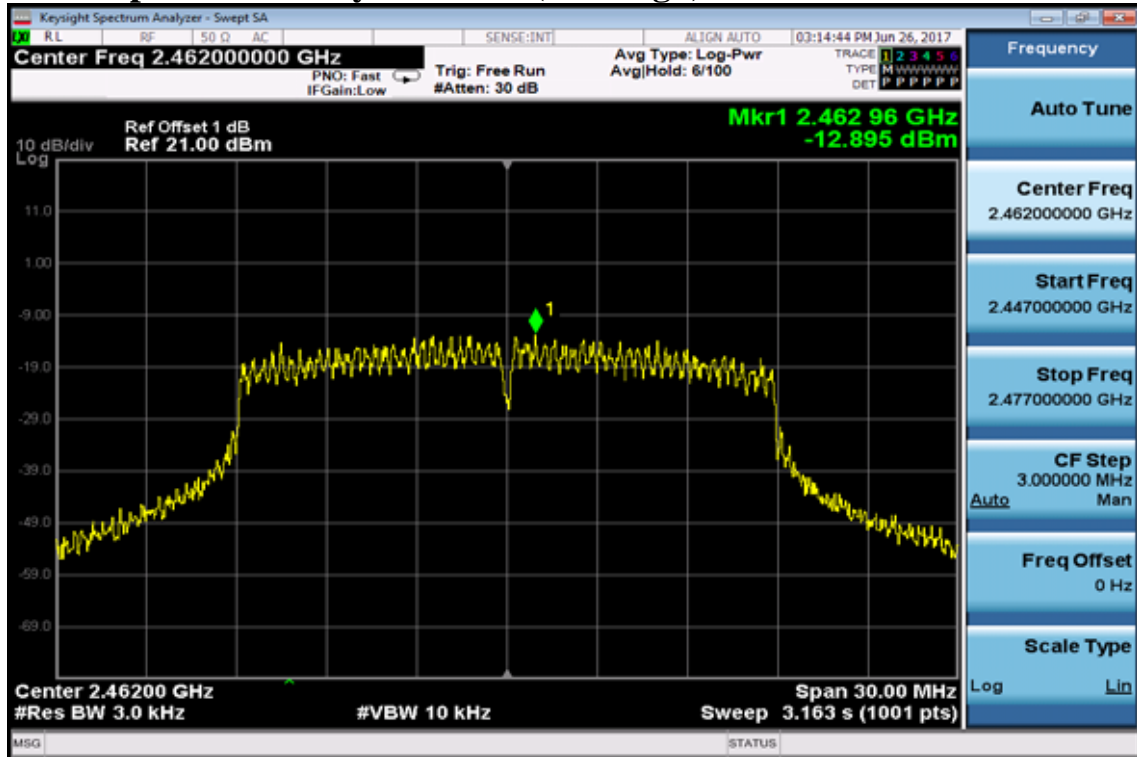
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

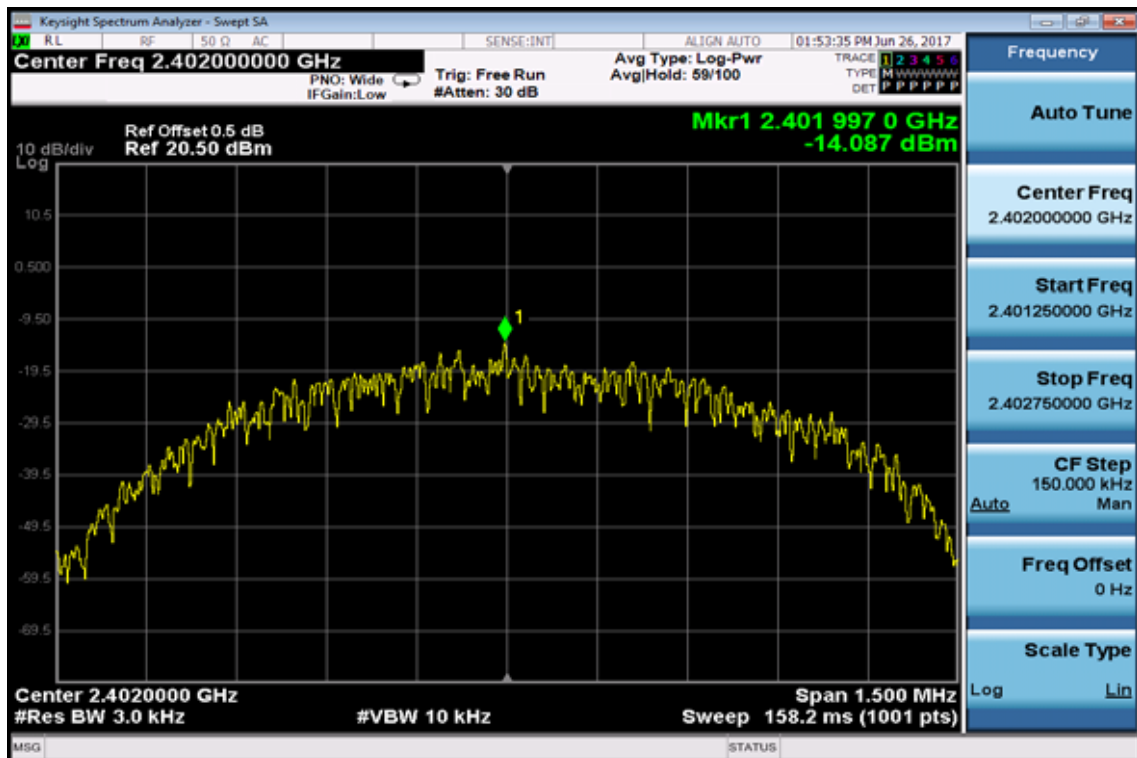


### Power Spectral Density Test Plot (CH-High)

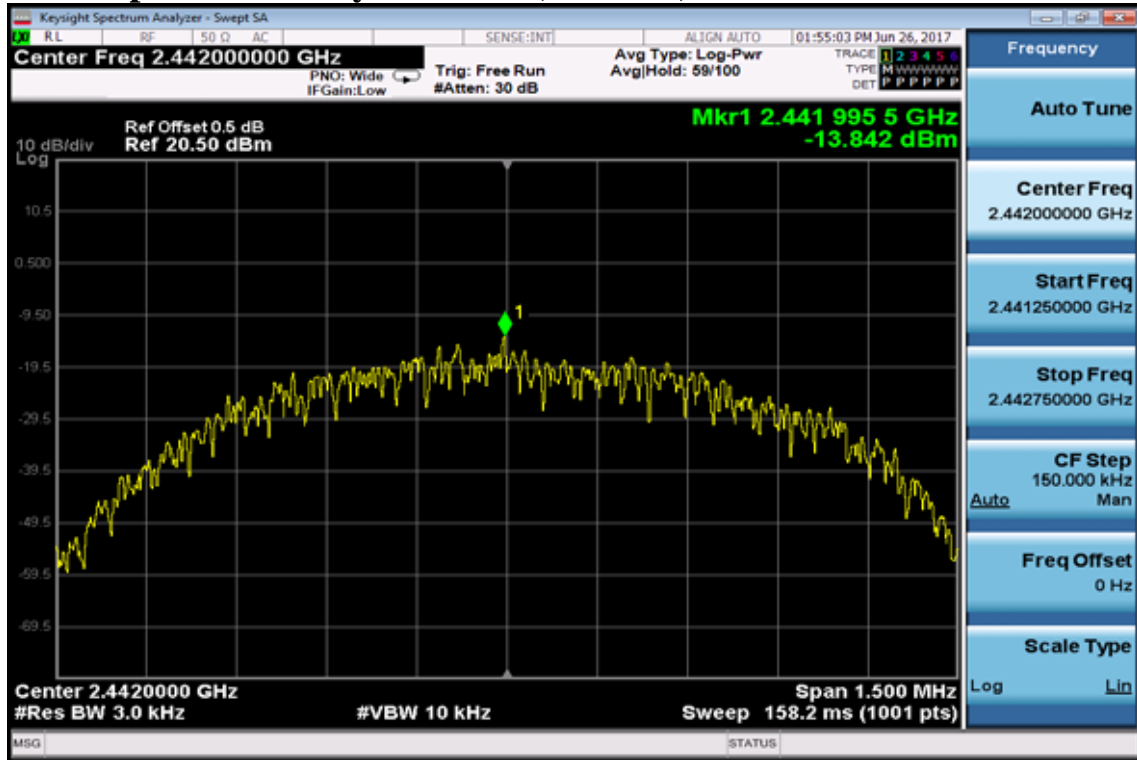


### BT LE

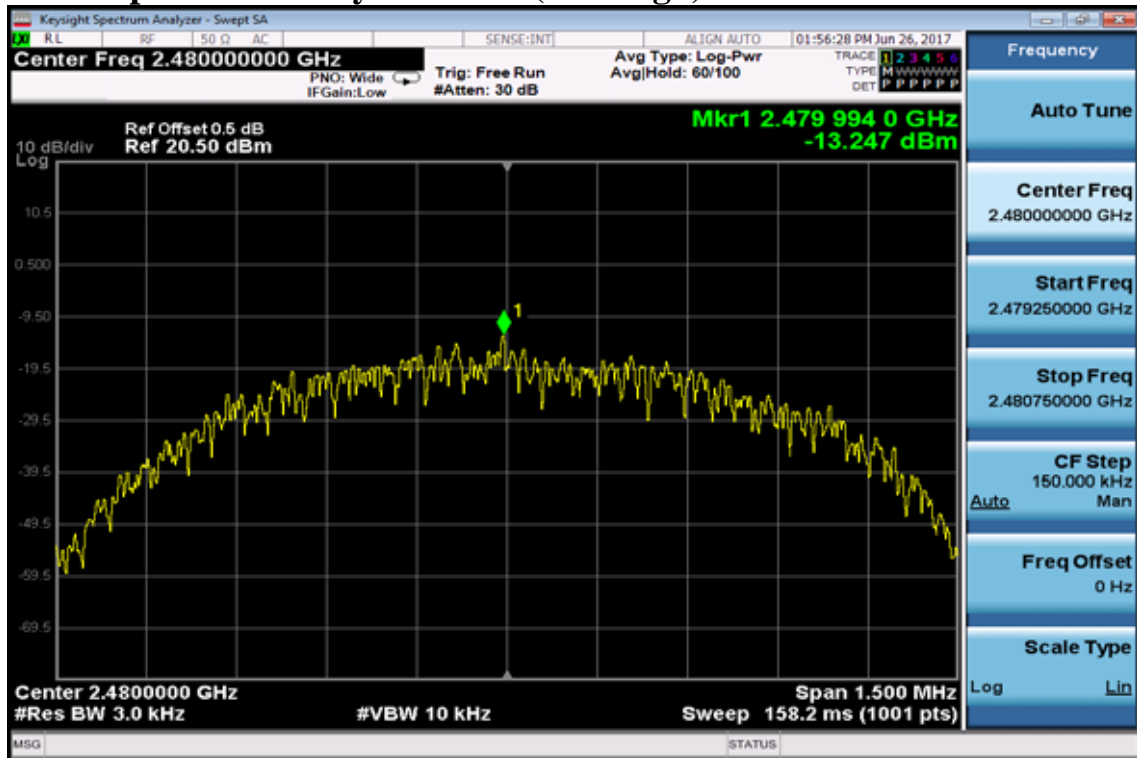
### Power Spectral Density Test Plot (CH-Low)



### Power Spectral Density Test Plot (CH-Mid)



### Power Spectral Density Test Plot (CH-High)



## 11 ANTENNA REQUIREMENT

### 11.1 Standard Applicable:

According to §15.203, Antenna requirement.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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 provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

### 11.2 Antenna Connected Construction:

The directional gains of antenna used for transmitting is 3.32dBi, which is Chip antenna and no consideration of replacement by user. Please see EUT photo and antenna spec. for details.

# **APPENDIX 1**

## **PHOTOGRAPHS OF SET UP**



**Radiated Emission Setup Photos (below 1G)**





### Radiated Emission Setup Photos (above 1G)





### Conducted Emission Setup Photos



## **APPENDIX 2**

# **PHOTOGRAPHS OF EUT**

**EUT 1**



**EUT 2**



***EUT 3***



***EUT 4***



***EUT 5***



***EUT 6***



**EUT 7**



**EUT 8**





**EUT 9**



**EUT 10**



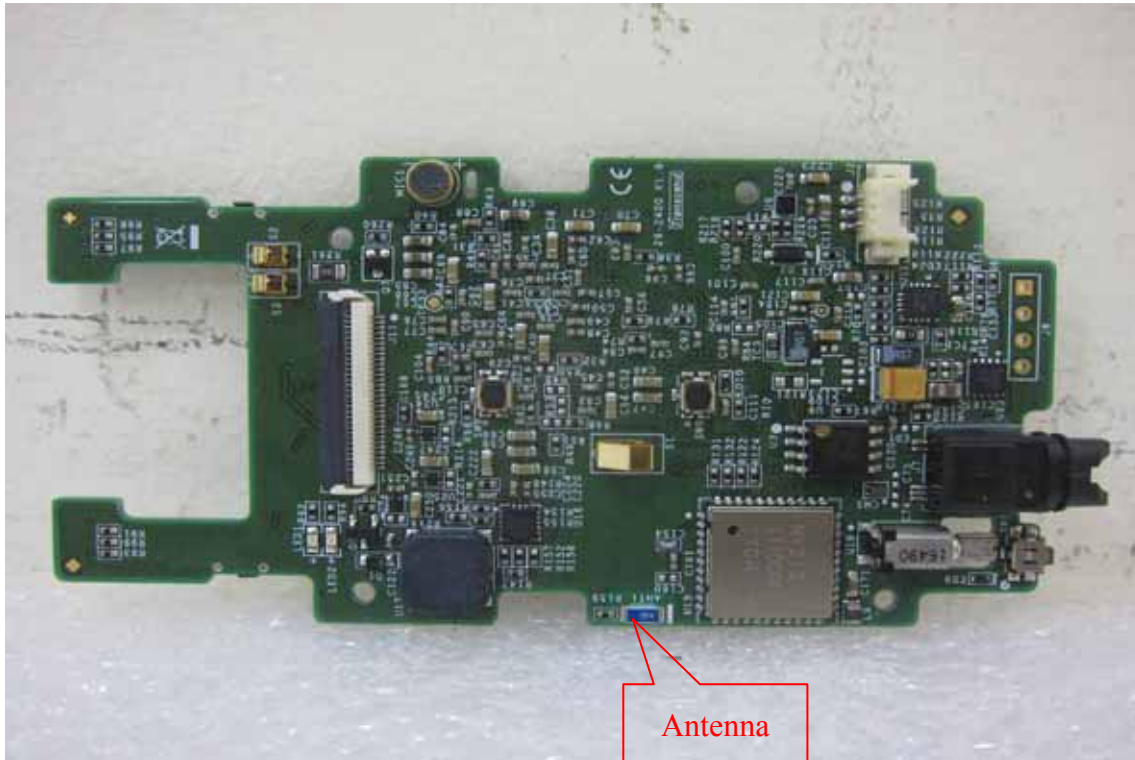
*EUT 11*



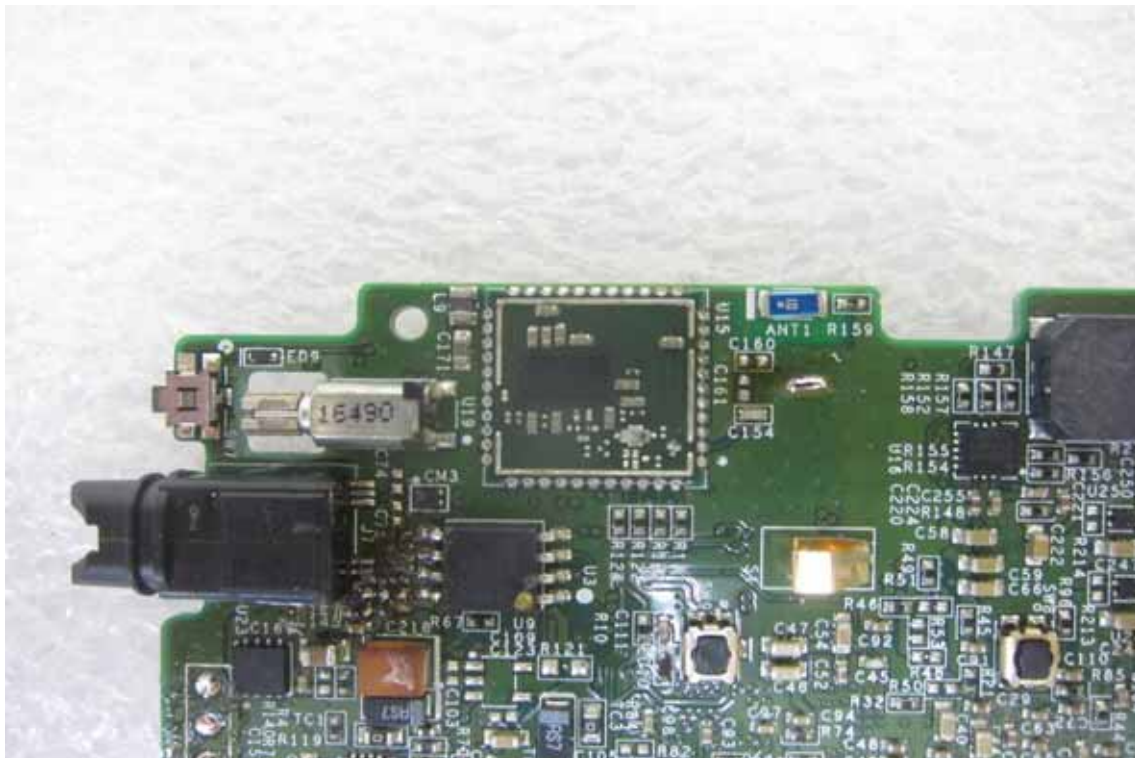
*EUT 12*



***EUT 13 RF Modular and antenna***



***EUT 14 Internal modular***



*~End of Report~*