

# TEST REPORT

of

## FCC Part 15 Subpart C

☒ New Application; ☐ Class I PC; ☐ Class II PC

**Product :** WIRELESS MOUSE  
**Brand:** GIGABYTE  
**Model:** GM-M7590W  
**Model Difference:** N/A  
**FCC ID:** JCKM7590WV10  
**FCC Rule Part:** §15.249  
**Applicant:** GIGA-BYTE Technology Co., Ltd.  
**Address:** No.6, Bao Chiang Road, Hsin-Tien Dist., New Taipei City 231, Taiwan

### Test Performed by:

#### International Standards Laboratory

<Lung-Tan LAB>

\*Site Registration No.

BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-3;

\*Address:

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Report No.: **ISL-16LR237FCDXX**

Issue Date : **2016/10/05**



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.

This report MUST not be used to claim product endorsement by TAF, NVLAP or any agency of the Government.

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**VERIFICATION OF COMPLIANCE**

**Applicant:** GIGA-BYTE Technology Co., Ltd.  
**Product Description:** WIRELESS MOUSE  
**Brand Name:** GIGABYTE  
**Model No.:** GM-M7590W  
**Model Difference:** N/A  
**FCC ID:** JCKM7590WV10  
**Date of test:** 2016/09/01 ~ 2016/10/04  
**Date of EUT Received:** 2016/09/01

**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.

**Test By:****Date:**

2016/10/05

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*Dino Chen / Engineer***Prepared By:****Date:**

2016/10/05

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*Gigi Yeh / Specialist***Approved By:****Date:**

2016/10/05

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*Vincent Su / Technical Manager*

## Version

| Version No. | Date       | Description                  |
|-------------|------------|------------------------------|
| 00          | 2016/10/05 | Initial creation of document |
|             |            |                              |

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## 1. GENERAL INFORMATION

### 1.1. Product Description

General:

|                  |                          |
|------------------|--------------------------|
| Product Name     | WIRELESS MOUSE           |
| Brand Name       | GIGABYTE                 |
| Model Name       | GM-M7590W                |
| Model Difference | N/A                      |
| Power Supply     | 3V dc form 2*AAA battery |

### 2.4GHz Transceiver 1TX / 1RX

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency Range(MHz) | 2408-2474MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Modulation type      | FSK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Channel Number       | CH01: (2408)MHz / CH02: (2410)MHz / CH03: (2412)MHz<br>CH04: (2414)MHz / CH05: (2416)MHz / CH06: (2418)MHz<br>CH07: (2420)MHz / CH08: (2422)MHz / CH09: (2424)MHz<br>CH10: (2426)MHz / CH11: (2428)MHz / CH12: (2430)MHz<br>CH13: (2432)MHz / CH14: (2434)MHz / CH15: (2436)MHz<br>CH16: (2438)MHz / CH17: (2440)MHz / CH18: (2442)MHz<br>CH19: (2444)MHz / CH20: (2446)MHz / CH21: (2448)MHz<br>CH22: (2450)MHz / CH23: (2452)MHz / CH24: (2454)MHz<br>CH25: (2456)MHz / CH26: (2458)MHz / CH27: (2460)MHz<br>CH28: (2462)MHz / CH29: (2464)MHz / CH30: (2466)MHz<br>CH31: (2468)MHz / CH32: (2470)MHz / CH33: (2472)MHz<br>CH34: (2474)MHz |
| Measured Power       | 85.94dBuV/m at 3 m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Antenna Designation: | PCB Antenna / 4.775 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

**1.2. Related Submittal(s) / Grant (s)**

This submittal(s) (test report) is intended for **FCC ID: JCKM7590WV10** filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

**1.3. Test Methodology**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10: 2013 and RSS-Gen issue 4: 2014. Radiated testing was performed at an antenna to EUT distance 3 meters.

**1.4. 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 ANSI C63.10: 2013. FCC Registration Number is: 872200; Designation Number is: TW1036, Canada Registration Number: 4067B-3.

**1.5. Special Accessories**

Not available for this EUT intended for grant.

**1.6. 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 Transmitter was operated in the engineering operating mode. the Tx frequency was fixed at 2408, 2440 and 2474MHz which were 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 and RSS-Gen issue 4: 2014. 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 maximum 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. Limitation

### (1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

| Frequency (MHz) | Conducted Limit (dBuV) |         |
|-----------------|------------------------|---------|
|                 | Quasi-Peak             | Average |
| 0.15 – 0.5      | 66 - 56                | 56 - 46 |
| 0.5 – 5         | 56                     | 46      |
| 5 - 30          | 60                     | 50      |

### (2) Radiated Emission 15.249(a)

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following.

| Frequency (MHz) | Field strength of Fundamental | Field strength of Harmonics | Distance (m) |
|-----------------|-------------------------------|-----------------------------|--------------|
| 902 - 928       | 50 mV/m<br>(94dBuV/m)         | 500 uV/m<br>(54dBuV/m)      | 3            |
| 2400 – 2483.5   | 50 mV/m<br>(94dBuV/m)         | 500 uV/m<br>(54dBuV/m)      | 3            |
| 5725 – 5875     | 50 mV/m<br>(94dBuV/m)         | 500 uV/m<br>(54dBuV/m)      | 3            |

**(3) Radiated Emission 15.249 (d)**

Emission Radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in Section 15.209 as below, whichever is the lesser attenuation.

| Frequency<br>(MHz) | Field strength<br>$\mu\text{V/m}$ | Distance (m) | Field strength at 3m<br>$\text{dB}\mu\text{V/m}$ |
|--------------------|-----------------------------------|--------------|--------------------------------------------------|
| 1.705-30           | 30                                | 30           | 69.54                                            |
| 30-88              | 100                               | 3            | 40                                               |
| 88-216             | 150                               | 3            | 43.5                                             |
| 216-960            | 200                               | 3            | 46                                               |
| Above 960          | 500                               | 3            | 54                                               |

**(4) Radiated Emission 15.249(e)**

For frequencies above 1000MHz, the above field strength limits are based on average limits. The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation.

- Remark:
1. Emission level in  $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$
  2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
  3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205
  4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of § 15.205, then the general radiated emission limits in § 15.209 apply.

## 2.5. Configuration of Tested System

Fig. 1 Configuration of Tested System

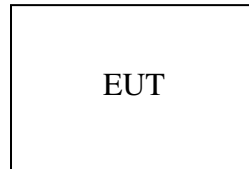


Table 1 Equipment Used in Tested System

| Item | Equipment | Mfr/Brand | Model/<br>Type No. | Series No. | Data Cable | Power Cord |
|------|-----------|-----------|--------------------|------------|------------|------------|
| 1    | N/A       |           |                    |            |            |            |

**Note:** All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

**Grounding:** Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

### 3. Summary of Test Results

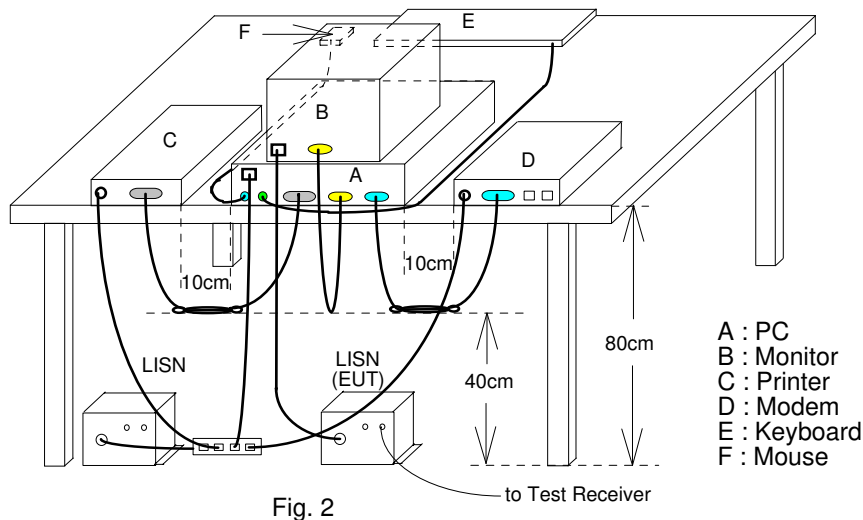
| FCC Rules | Description Of Test | Result |
|-----------|---------------------|--------|
|-----------|---------------------|--------|

## 4. Conducted Emissions Test

### 4.1 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.

### 4.2 Test SET-UP (Block Diagram of Configuration)



### 4.3 Measurement Equipment Used:

| Conducted Emission Test Site |                 |                    |                  |            |            |
|------------------------------|-----------------|--------------------|------------------|------------|------------|
| EQUIPMENT TYPE               | MFR             | MODEL NUMBER       | SERIAL NUMBER    | LAST CAL.  | CAL DUE.   |
| Conduction 04-3 Cable        | WOKEN           | CFD 300-NL         | Conduction 04 -3 | 07/27/2016 | 07/26/2017 |
| EMI Receiver 17              | Rohde & Schwarz | ESCI 7             | 100887           | 09/08/2016 | 09/07/2017 |
| LISN 18                      | ROHDE & SCHWARZ | ENV216             | 101424           | 02/11/2016 | 02/10/2017 |
| LISN 19                      | ROHDE & SCHWARZ | ENV216             | 101425           | 03/12/2016 | 03/11/2017 |
| Test Software                | Farad           | EZEMC Ver:ISL-03A2 | N/A              | N/A        | N/A        |

### 4.4 Measurement Result: N/A

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

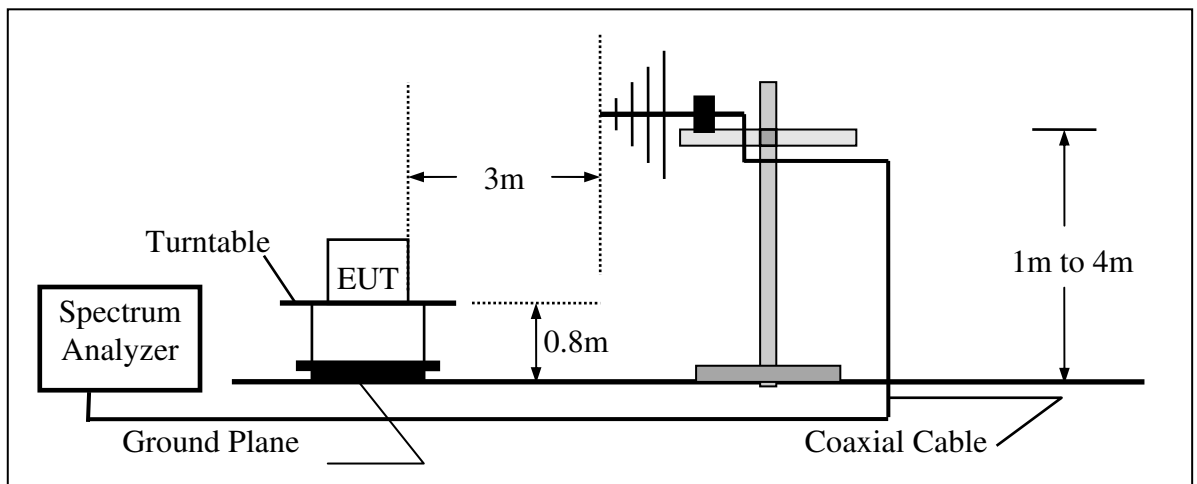
## 5. Radiated Emission Test

### 5.1 Measurement Procedure

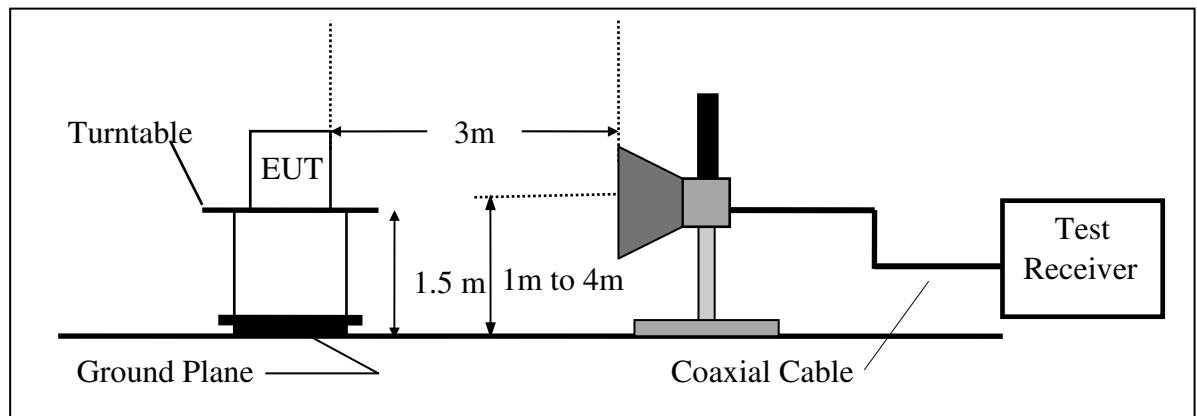
1. The EUT was placed on a turntable that is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

### 5.2 Test SET-UP (Block Diagram of Configuration)

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



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



### 5.3 Measurement Equipment Used:

| Chamber 14(966)                    |               |                       |                 |            |            |
|------------------------------------|---------------|-----------------------|-----------------|------------|------------|
| EQUIPMENT TYPE                     | MFR           | MODEL NUMBER          | SERIAL NUMBER   | LAST CAL.  | CAL DUE.   |
| 966 Chamber                        | Chance Most   | Chamber 19            | N/A             | 08/15/2016 | 08/14/2017 |
| Spectrum Analyzer<br>21(3Hz-44GHz) | Agilent       | N9030A                | MY51360021      | 10/02/2016 | 10/01/2017 |
| Loop Antenna (9K-30M)              | A.H.SYSTEM    | SAS-564               | 294             | 06/17/2015 | 06/16/2017 |
| 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            | 01/21/2015 | 01/20/2017 |
| Preamplifier (9k-1000M)            | HP            | 8447F                 | 3113A06362      | 11/13/2015 | 11/12/2016 |
| Preamplifier(1G-26G)               | Agilent       | 8449B                 | 3008A02471      | 08/25/2016 | 08/24/2017 |
| 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&37421/2 | 11/03/2015 | 11/02/2016 |
| 2.4G Filter                        | Micro-Tronics | Brm50702              | 76              | 12/26/2015 | 12/25/2016 |
| Test Software                      | Audix         | E3<br>Ver:6.12023     | N/A             | N/A        | N/A        |
| Test Software                      | Farad         | EZEMC<br>Ver:ISL-03A2 | N/A             | N/A        | N/A        |

## 5.4 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    |                                            |

## 5.5 Measurement Result

### Fundamental Emission Measurement Result

|                       |                               |           |              |
|-----------------------|-------------------------------|-----------|--------------|
| Operation Mode        | : TX mode                     | Test Date | : 2016/09/01 |
| Fundamental Frequency | : 2408 MHz, 2440 MHz, 2474MHz | Test By   | : Dino       |
| Temp                  | : 25                          |           |              |

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

Operation Mode TX CH Low  
Fundamental Frequency 2408 MHz  
Temperature 25

Test Date 2016/09/01  
Test By Dino

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

Operation Mode TX CH Mid  
Fundamental Frequency 2440 MHz  
Temperature 25

Test Date 2016/09/01  
Test By Dino

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

Operation Mode TX CH High  
Fundamental Frequency 2474 MHz  
Temperature 25

Test Date 2016/09/01  
Test By Dino

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

Operation Mode : TX CH Low  
Fundamental Frequency : 2408 MHz  
Temp : 25

Test Date : 2016/09/01  
Test By : Dino

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

Operation Mode : TX CH Mid  
Fundamental Frequency : 2440 MHz  
Temp : 25

Test Date : 2016/09/01  
Test By : Dino

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

Operation Mode : TX CH High  
Fundamental Frequency : 2474 MHz  
Temp : 25

Test Date : 2016/09/01  
Test By : Dino

## **Radiated Spurious Emission Measurement Result (Band Edge)**

|                |             |           |             |
|----------------|-------------|-----------|-------------|
| Operation Mode | : Band Edge | Test Date | :2016/09/01 |
| Temp./Hum.     | : 25        |           |             |

## **6. 20 dB Band Width Measurement**

### **6.1 Measurement Procedure**

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set ETU normal operating mode.
3. Set SPA Center Frequency = fundamental frequency, RBW = 100kHz, VBW = 300kHz, Span = 5MHz.
4. Set SPA Max hold. Mark peak, -20dB.

### **6.2 Test SET-UP (Block Diagram of Configuration)**

Same as 4.2 Radiated Emission Measurement.

### **6.3 Measurement Equipment Used:**

Same as 4.2 Radiated Emission Measurement.

### **6.4 Measurement Results:**

2408 Channel = 2.221MHz

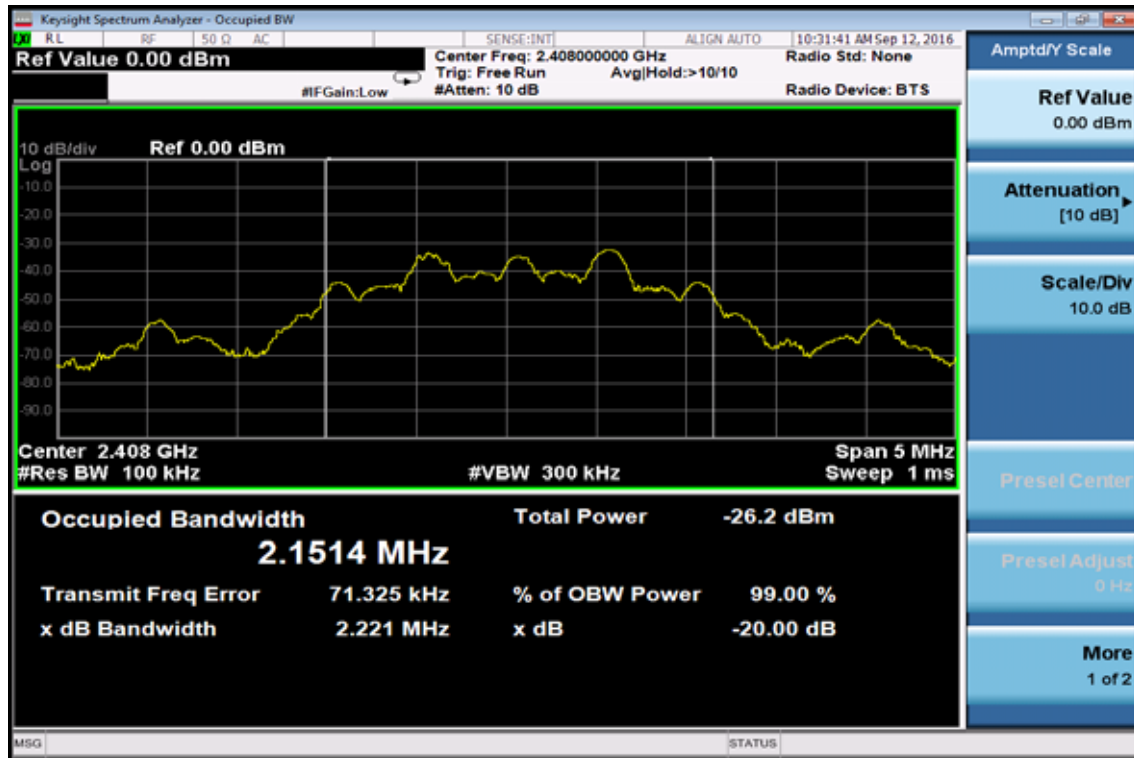
2440 Channel = 2.228MHz

2464 Channel = 2.228MHz

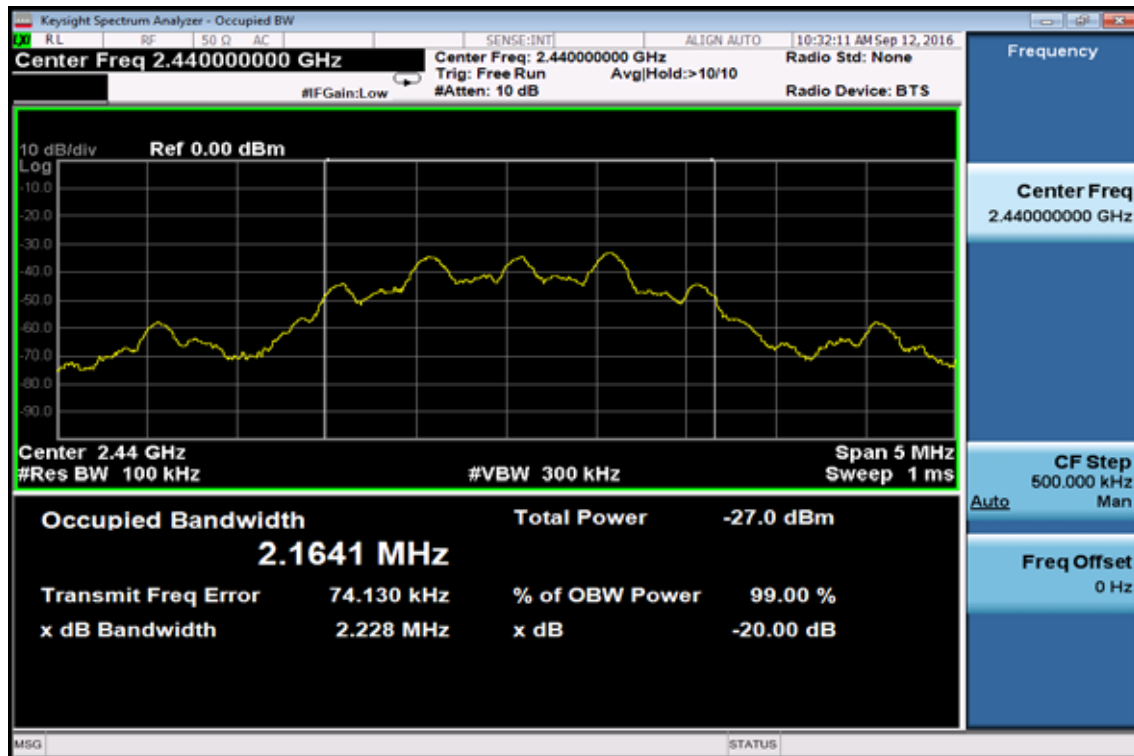
Refer to attached data chart.

## 20dB Band Width test Plot

### CH Low



### CH Mid



## CH High

