

# TEST REPORT

of

## FCC Part 15 Subpart C and CANADA RSS-210

New Application;  Class I PC;  Class II PC

**Product :** Evoluent VerticalMouse D Large Wireless  
**Brand:** Evoluent  
**Model:** VMDLW  
**Model Difference:** N/A  
**FCC ID:** R6Y-VMDLW  
**IC:** 10500A-VMDLW  
**FCC Rule Part:** §15.249  
**IC Rule Part:** RSS-210 issue 9:2017; RSS-Gen issue 5: 2018  
**Applicant:** Evoluent  
**Address:** 925 Linden Ave., Unit C, South San Francisco,  
CA 94080 USA

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

<LT Lab.>

\*Site Registration No.

BSMI: SL2-IN-E-0013; MRA TW0997; TAF: 0997; IC: IC4067B-4 ;

\*Address:

No. 120, Lane 180, Hsin Ho Rd.

Lung-Tan Dist., Tao Yuan City 325, Taiwan

\*Tel : 886-3-407-1718; Fax: 886-3-407-1738

**Report No.: ISL-19LR123FC-MA**

**Issue Date : 2020/01/06**

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 or any agency of the Government.

This test report shall not be reproduced except in full, without the written approval of International Standards Laboratory Corp.



## VERIFICATION OF COMPLIANCE

**Applicant:** Evoluent  
**Product Description:** Evoluent VerticalMouse D Large Wireless  
**Brand Name:** Evoluent  
**Model No.:** VMDLW  
**Model Difference:** N/A  
**FCC ID:** R6Y-VMDLW  
**IC:** 10500A-VMDLW  
**Date of test:** 2019/06/03 ~ 2019/06/09  
**Date of EUT Received:** 2019/06/01

### 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 Corp.

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:**                     Weitin Chen                     **Date:**                     2020/01/06                      
*Weitin Chen / Senior Engineer*

**Prepared By:**                     Elisa Chen                     **Date:**                     2020/01/06                      
*Elisa Chen / Senior Engineer*

**Approved By:**                     Jerry Liu                     **Date:**                     2020/01/06                      
*Jerry Liu / Technical Manager*

## Version

Version No.	Date	Description
00	2020/01/06	Initial creation of document

## Uncertainty of Measurement

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

## Table of Contents

<b>1.</b>	<b>GENERAL INFORMATION .....</b>	<b>5</b>
1.1.	PRODUCT DESCRIPTION .....	5
1.2.	RELATED SUBMITTAL(S) / GRANT (S) .....	7
1.3.	TEST METHODOLOGY.....	7
1.4.	TEST FACILITY .....	7
1.5.	SPECIAL ACCESSORIES.....	7
1.6.	EQUIPMENT MODIFICATIONS .....	7
<b>2.</b>	<b>SYSTEM TEST CONFIGURATION .....</b>	<b>8</b>
2.1.	EUT CONFIGURATION.....	8
2.2.	EUT EXERCISE .....	8
2.3.	TEST PROCEDURE.....	8
2.4.	LIMITATION.....	9
2.5.	CONFIGURATION OF TESTED SYSTEM.....	11
<b>3.</b>	<b>SUMMARY OF TEST RESULTS .....</b>	<b>12</b>
<b>4.</b>	<b>CONDUCTED EMISSIONS TEST .....</b>	<b>13</b>
4.1	MEASUREMENT PROCEDURE: .....	13
4.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	13
4.3	MEASUREMENT EQUIPMENT USED: .....	13
4.4	MEASUREMENT RESULT: .....	13
<b>5.</b>	<b>RADIATED EMISSION TEST .....</b>	<b>14</b>
5.1	MEASUREMENT PROCEDURE.....	14
5.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	14
5.3	MEASUREMENT EQUIPMENT USED: .....	15
5.4	FIELD STRENGTH CALCULATION .....	16
5.5	MEASUREMENT RESULT .....	17
<b>6.</b>	<b>20 DB BAND WIDTH MEASUREMENT.....</b>	<b>25</b>
6.1	MEASUREMENT PROCEDURE.....	25
6.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	25
6.3	MEASUREMENT EQUIPMENT USED: .....	25
6.4	MEASUREMENT RESULTS:.....	25
<b>7.</b>	<b>99% BAND WIDTH MEASUREMENT .....</b>	<b>28</b>
7.1	MEASUREMENT PROCEDURE.....	28
7.2	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	28
7.3	MEASUREMENT EQUIPMENT USED: .....	28
7.4	MEASUREMENT RESULTS:.....	28

## 1. General Information

### 1.1. Product Description

General:

Product Name	Evoluent VerticalMouse D Large Wireless
Brand Name	Evoluent
Model Name	VMDLW
Model Difference	N/A
Power Supply	1.5Vdc from AA battery

IC RSS-Gen:

Product SW/HW version	REV_0110 / KS-1911-M01
Radio SW/HW version	REV_0110 / KS-1911-M01
PMN (Product Marketing Name)	VMDLW
HVIN (Hardware Version Identification Number)	VMDLW
FVIN (Firmware Version Identification Number)	N/A
Test SoftWare Version	HCITester 2.1.00
RF power setting:	0

2.4GHz

Frequency Range(MHz)	2405MHz-2475MHz
Modulation type	GFSK
Channel Number	15
Measured Power	93.43dBuV/m at 3 m
Antenna Designation:	PCB Antenna / -1.65 dBi

Channel list

Channel	Freq.(MHz)	Channel	Freq.(MHz)
1	2405	9	2445
2	2410	10	2450
3	2415	11	2455
4	2420	12	2460
5	2425	13	2465
6	2430	14	2470
7	2435	15	2475
8	2440	---	---

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

This submittal(s) (test report) is intended for **FCC ID: R6Y-VMDLW** filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules and **IC: 10500A-VMDLW** filing to comply with Industry Canada RSS-210 issue 2: 2017.

**1.3. Test Methodology**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10: 2013 and RSS-Gen issue5: 2018. 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 Corp.** <LT 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: 487532; Designation Number is: TW0997, Canada Registration Number: 4067B-4.

**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 2457MHz 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 issue5: 2018. 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 §15.207 and RSS-Gen §7.2.4, frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits 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.

### (2) Radiated Emission 15.249(a) and RSS-210 issue 9,§B.10(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 (94dBuV/m)	500 uV/m (54dBuV/m)	3
2400 – 2483.5	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
5725 – 5875	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3

**(3) Radiated Emission 15.249 (d) and RSS-210 issue 9, §B.10(b)**

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 and RSS-Gen as below, whichever is the lesser attenuation.

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance (m)	Field strength at 3m $\text{dB}\mu\text{V/m}$
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) and RSS-Gen**

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

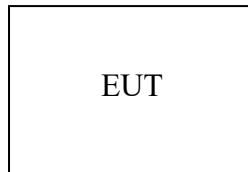


Table 1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
	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
§15.207/ RSS-Gen §7.2.2	Conducted Emission	N/A
§15.249(a)(d)(e) RSS-210 issue 9,§B.10(a)(b)	Field Strength Measurement	Compliant
§15.215(c)	20dB band width Measurement	Compliant
RSS-Gen §4.6.1	99% Power Bandwidth	Compliant

#### Description of test modes

The EUT has been tested under operating condition.

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

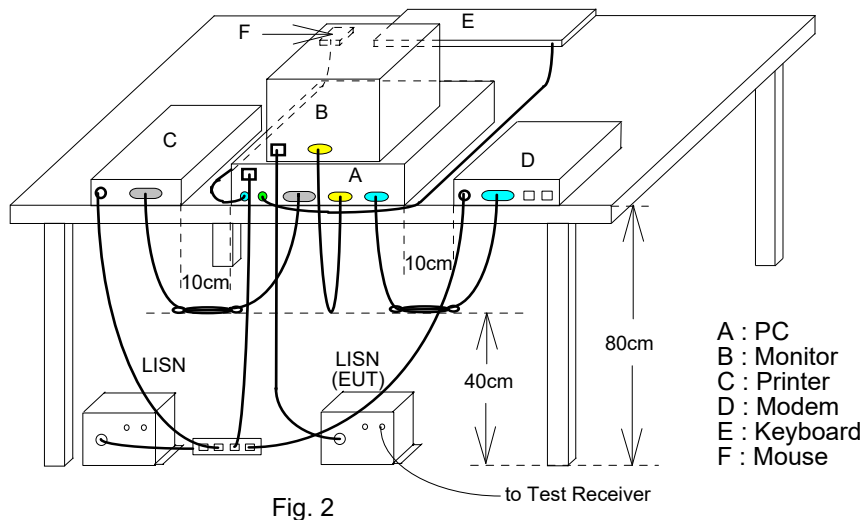
Channel Low (2405MHz), Channel Mid (2440MHz), and Channel High (2475MHz) with highest data rate are chosen for full testing.

## 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.
Chamber05 -1 Cable	WOKEN	CFD 300-NL	Chamber05 -1 Cable	08/29/2019	08/29/2020
EMI Receiver 13	ROHDE & SCHWARZ	ESCI	101015	07/25/2019	07/25/2020
LISN 15	ROHDE & SCHWARZ	ENV216	101335	11/22/2018	11/22/2019
LISN 22	ROHDE & SCHWARZ	ENV216	101478	08/13/2019	08/13/2020
Test Software	Farad	EZEMC Ver:ISL-03A2	N/A	N/A	N/A

### 4.4 Measurement Result:

N/A

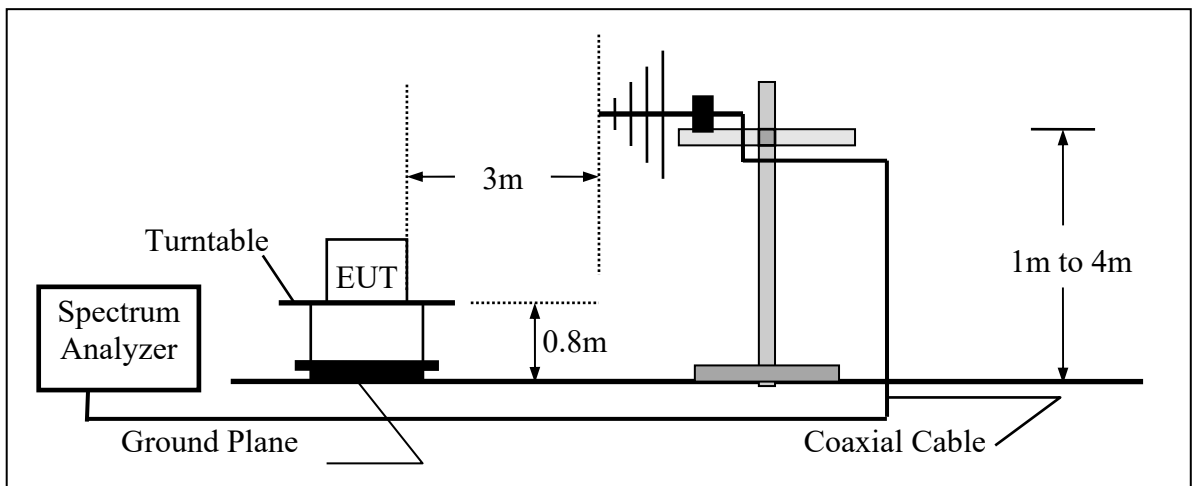
## 5. Radiated Emission Test

### 5.1 Measurement Procedure

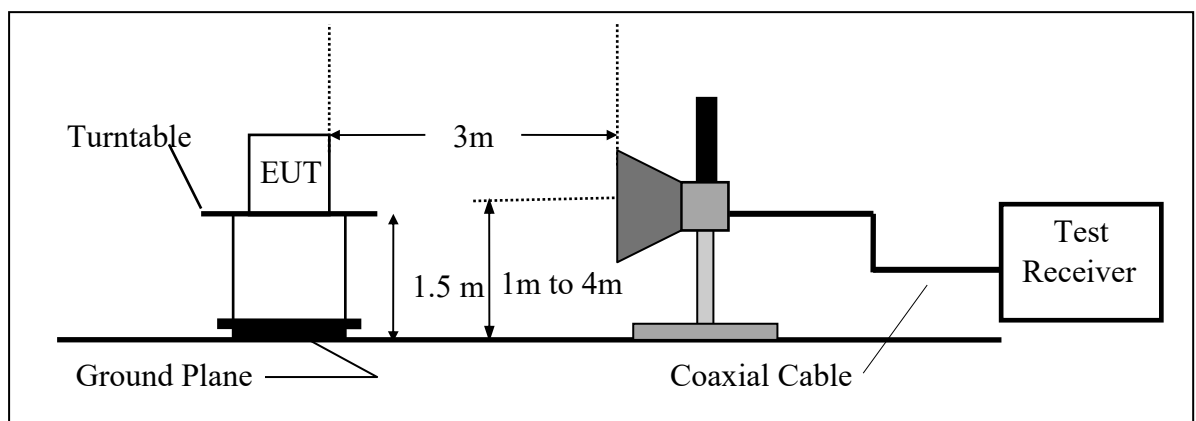
1. The EUT was placed on a turntable that is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above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

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Chamber 19	Spectrum analyzer	R&S	FSP40	100116	01/10/2019	01/10/2020
Chamber 19	EMI Receiver	R&S	ESR3	102461	08/08/2018	08/08/2020
Chamber 19	Loop Antenna	EM	EM-6879	271	05/31/2019	05/31/2020
Chamber 19	Bilog Antenna (30MHz-1GHz)	Schwarzbeck	VULB9168 w 5dB Att.	736	01/29/2019	01/29/2020
Chamber 19	Horn antenna (1GHz-18GHz)	Schwarzbeck	9120D	9120D-1627	06/17/2019	06/17/2020
Chamber 19	Horn antenna (18GHz-26GHz)	Com-power	AH-826	081001	11/25/2019	11/25/2020
Chamber 19	Horn antenna (26GHz-40GHz)	Com-power	AH-640	100A	03/29/2019	03/29/2021
Chamber 19	Preamplifier (9kHz-1GHz)	HP	8447F	3113A06362	01/14/2019	01/14/2020
Chamber 19	Preamplifier (1GHz-26GHz)	Agilent	8449B	3008A02471	10/05/2019	10/05/2020
Chamber 19	Preamplifier (26GHz-40GHz)	MITEQ	JS4-26004000-27-5A	818471	05/06/2019	05/06/2020
Chamber 19	RF Cable (9kHz-18GHz)	HUBER SUHNER	Sucoflex 104A	MY1397/4A	01/17/2019	01/17/2020
Chamber 19	RF Cable (18GHz-40GHz)	HUBER SUHNER	Sucoflex 102	27963/2&374 21/2	11/21/2019	11/21/2020
Chamber 19	Signal Generator	Anritsu	MG3692A	20311	01/09/2019	01/09/2020
Chamber 19	Test Software	Audix	E3 Ver:6.12023	N/A	N/A	N/A
Chamber 19	Magnetic Field Meter	Combinova	MFM-10	645	10/16/2019	10/16/2020
Chamber 19	Magnetic Field Meter	Combinova	MFM-1000	619	12/06/2018	12/06/2019
Chamber 19	Electric Field Meter	Combinova	EFM-200	402	10/16/2019	10/16/2020
Chamber 19	E-field probe	Narda / Wandel & Goltermann	EF-0691 + NBM-520	D-0135 + D-0526	03/02/2019	03/02/2020

#### 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	: 2019/06/05
Fundamental Frequency	: 2457 MHz	Test By	: Weitin
Temp	: 25 °C	Hum.	: 60%

#### CH Low:

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2404.90	107.16	-15.73	91.43	114.00	-22.57	Peak	VERTICAL
1	2405.03	108.72	-15.73	92.99	114.00	-21.01	Peak	HORIZONTAL

#### CH Mid:

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2440.23	105.96	-15.72	90.24	114.00	-23.76	Peak	VERTICAL
1	2439.87	109.03	-15.72	93.31	114.00	-20.69	Peak	HORIZONTAL

#### CH High:

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2475.00	109.15	-15.72	93.43	114.00	-20.57	Peak	VERTICAL
1	2475.16	109.11	-15.72	93.39	114.00	-20.61	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 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, Sweep time= 200 ms., the VBW setting was 10KHz.

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

Operation Mode : TX CH Low Test Date : 2019/06/05  
Temp./ Hum. : 25 °C/60% Test By : Weitin

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	154.16	26.77	-5.93	20.84	43.50	-22.66	Peak	VERTICAL
2	265.71	32.36	-6.01	26.35	46.00	-19.65	Peak	VERTICAL
3	483.96	27.34	-1.79	25.55	46.00	-20.45	Peak	VERTICAL
4	575.14	29.03	-0.20	28.83	46.00	-17.17	Peak	VERTICAL
5	703.18	28.17	1.96	30.13	46.00	-15.87	Peak	VERTICAL
6	857.41	28.38	4.50	32.88	46.00	-13.12	Peak	VERTICAL
1	160.95	26.54	-5.92	20.62	43.50	-22.88	Peak	HORIZONTAL
2	259.89	30.78	-6.33	24.45	46.00	-21.55	Peak	HORIZONTAL
3	442.25	26.87	-2.21	24.66	46.00	-21.34	Peak	HORIZONTAL
4	577.08	28.37	-0.14	28.23	46.00	-17.77	Peak	HORIZONTAL
5	777.87	26.59	3.37	29.96	46.00	-16.04	Peak	HORIZONTAL
6	838.98	28.42	4.19	32.61	46.00	-13.39	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 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 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.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Operation Mode : TX CH Mid  
Temp./ Hum. : 25 °C/60%

Test Date : 2019/06/05  
Test By : Weitin

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	145.43	27.48	-6.19	21.29	43.50	-22.21	Peak	VERTICAL
2	271.53	28.39	-5.71	22.68	46.00	-23.32	Peak	VERTICAL
3	463.59	28.65	-1.96	26.69	46.00	-19.31	Peak	VERTICAL
4	611.03	28.04	0.55	28.59	46.00	-17.41	Peak	VERTICAL
5	752.65	26.31	3.12	29.43	46.00	-16.57	Peak	VERTICAL
6	862.26	27.80	4.59	32.39	46.00	-13.61	Peak	VERTICAL
1	172.59	27.65	-6.56	21.09	43.50	-22.41	Peak	HORIZONTAL
2	342.34	26.51	-4.15	22.36	46.00	-23.64	Peak	HORIZONTAL
3	553.80	27.34	-0.72	26.62	46.00	-19.38	Peak	HORIZONTAL
4	685.72	27.76	1.63	29.39	46.00	-16.61	Peak	HORIZONTAL
5	799.21	27.44	3.59	31.03	46.00	-14.97	Peak	HORIZONTAL
6	948.59	26.30	6.28	32.58	46.00	-13.42	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 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 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.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Operation Mode : TX CH High  
Temp./ Hum. : 25 °C/60%

Test Date : 2019/06/05  
Test By : Weitin

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	106.63	30.91	-10.07	20.84	43.50	-22.66	Peak	VERTICAL
2	265.71	27.73	-6.01	21.72	46.00	-24.28	Peak	VERTICAL
3	466.50	26.75	-1.93	24.82	46.00	-21.18	Peak	VERTICAL
4	584.84	27.86	0.05	27.91	46.00	-18.09	Peak	VERTICAL
5	831.22	28.53	4.07	32.60	46.00	-13.40	Peak	VERTICAL
6	965.08	26.83	6.49	33.32	54.00	-20.68	Peak	VERTICAL
1	155.13	26.52	-5.93	20.59	43.50	-22.91	Peak	HORIZONTAL
2	258.92	31.86	-6.37	25.49	46.00	-20.51	Peak	HORIZONTAL
3	413.15	27.24	-2.74	24.50	46.00	-21.50	Peak	HORIZONTAL
4	588.72	28.17	0.14	28.31	46.00	-17.69	Peak	HORIZONTAL
5	755.56	26.60	3.14	29.74	46.00	-16.26	Peak	HORIZONTAL
6	834.13	28.50	4.11	32.61	46.00	-13.39	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 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 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.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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

Operation Mode : TX CH Low Test Date : 2019/06/05  
Temp./ Hum. : 25 °C/60% Test By : Weitin

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4810.00	44.34	-9.27	35.07	74.00	-38.93	Peak	VERTICAL
2	6243.00	46.65	-5.08	41.57	74.00	-32.43	Peak	VERTICAL
1	4810.00	44.06	-9.27	34.79	74.00	-39.21	Peak	HORIZONTAL
2	6474.00	45.39	-4.15	41.24	74.00	-32.76	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 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 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.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Operation Mode : TX CH Mid  
Temp./ Hum. : 25 °C/60%

Test Date : 2019/06/05  
Test By : Weitin

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4880.00	45.38	-9.07	36.31	74.00	-37.69	Peak	VERTICAL
2	6145.00	46.24	-5.44	40.80	74.00	-33.20	Peak	VERTICAL
1	4880.00	45.66	-9.07	36.59	74.00	-37.41	Peak	HORIZONTAL
2	6152.00	46.22	-5.41	40.81	74.00	-33.19	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 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 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.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Operation Mode : TX CH High  
Temp./ Hum. : 25 °C/60%

Test Date : 2019/06/05  
Test By : Weitin

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4950.00	44.29	-8.89	35.40	74.00	-38.60	Peak	VERTICAL
2	6166.00	46.18	-5.37	40.81	74.00	-33.19	Peak	VERTICAL
1	4950.00	44.03	-8.89	35.14	74.00	-38.86	Peak	HORIZONTAL
2	6201.00	46.14	-5.27	40.87	74.00	-33.13	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 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 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.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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

Operation Mode : Band Edge Test Date : 2019/06/05  
Temp./Hum. : 25 °C / : 60% Test By : Weitin

#### CH Low

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2400.00	53.04	-15.73	37.31	54.00	-16.69	Average	VERTICAL
2	2400.00	73.42	-15.73	57.69	74.00	-16.31	Peak	VERTICAL
1	2400.00	57.43	-15.73	41.70	54.00	-12.30	Average	HORIZONTAL
2	2400.00	77.49	-15.73	61.76	74.00	-12.24	Peak	HORIZONTAL

#### CH High

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2483.50	64.51	-15.71	48.80	74.00	-25.20	Peak	VERTICAL
1	2483.50	53.31	-15.71	37.60	54.00	-16.40	Average	HORIZONTAL
2	2483.50	73.31	-15.71	57.60	74.00	-16.40	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, Sweep time= 200 ms., the VBW setting was 10MHz.



## **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:**

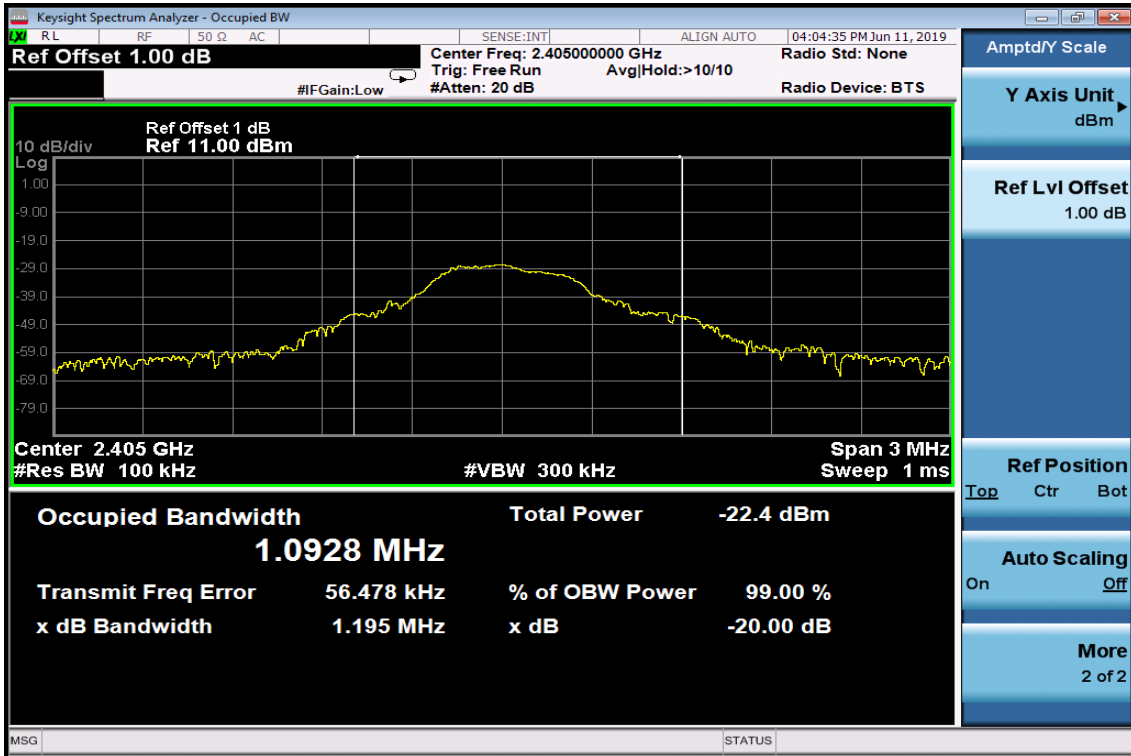
CH Low 20dB BW = 1.195MHz

CH Mid 20dB BW = 1.427MHz

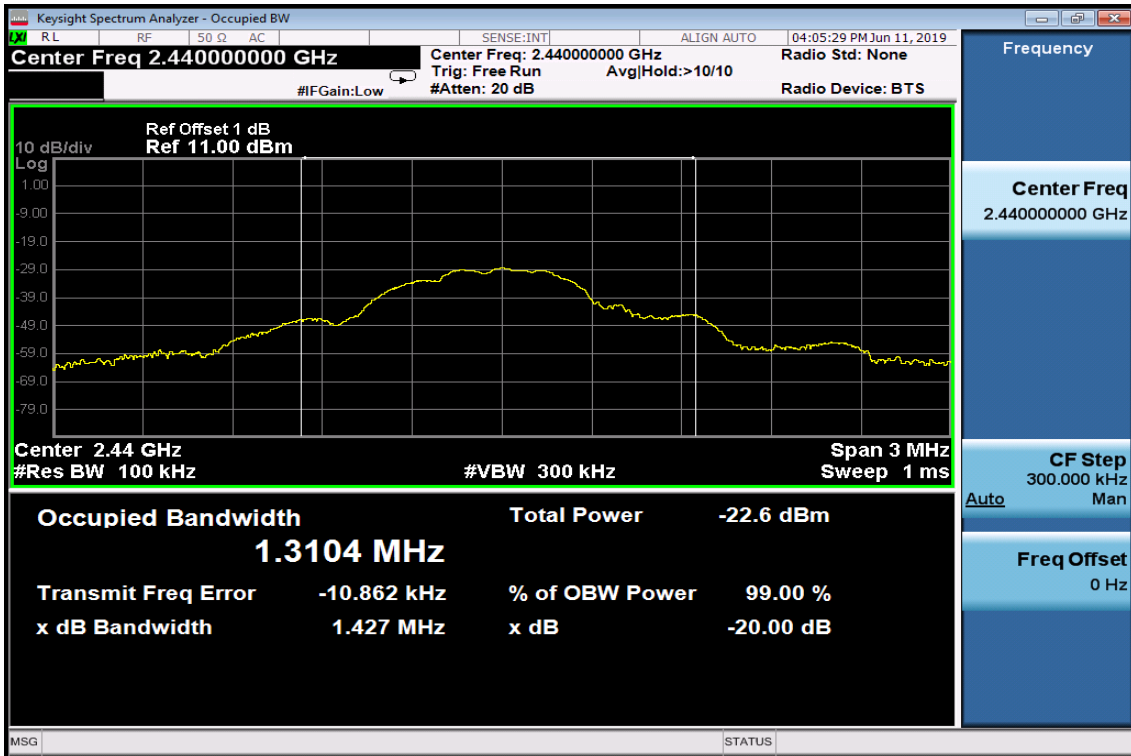
CH High 20dB BW = 2.033MHz

Refer to attached data chart.

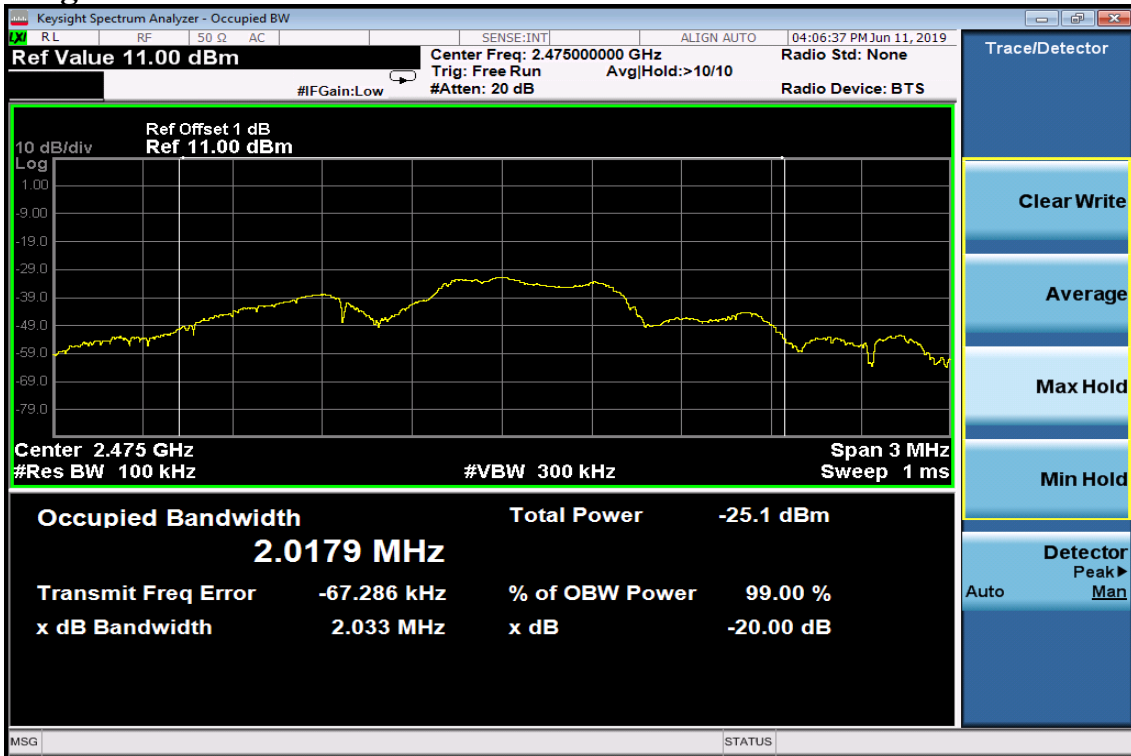
## 20dB Band Width test Plot CH Low



## CH Mid



### CH High



## 7. 99% Band Width Measurement

### 7.1 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=1% of the approximate emission bandwidth, VBW = 3 times RBW, Span= approximately 20dB below the peak level. Sweep=auto
- 4 Turn on the 99% bandwidth function, max reading.
- 5 Repeat above procedures until all frequency measured were complete.

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

Same as 4.2 Radiated Emission Measurement.

### 7.3 Measurement Equipment Used:

Same as 4.2 Radiated Emission Measurement.

### 7.4 Measurement Results:

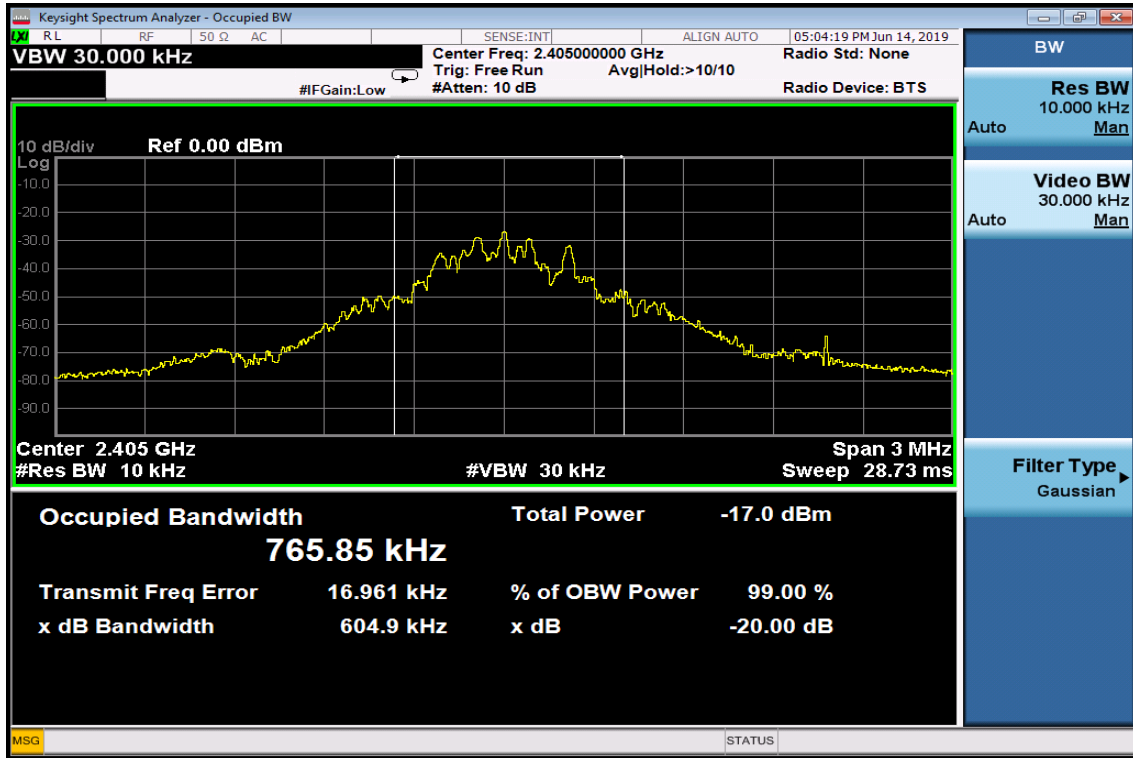
CH Low 99% OBW = 765.85kHz

CH Mid 99% OBW = 808.03kHz

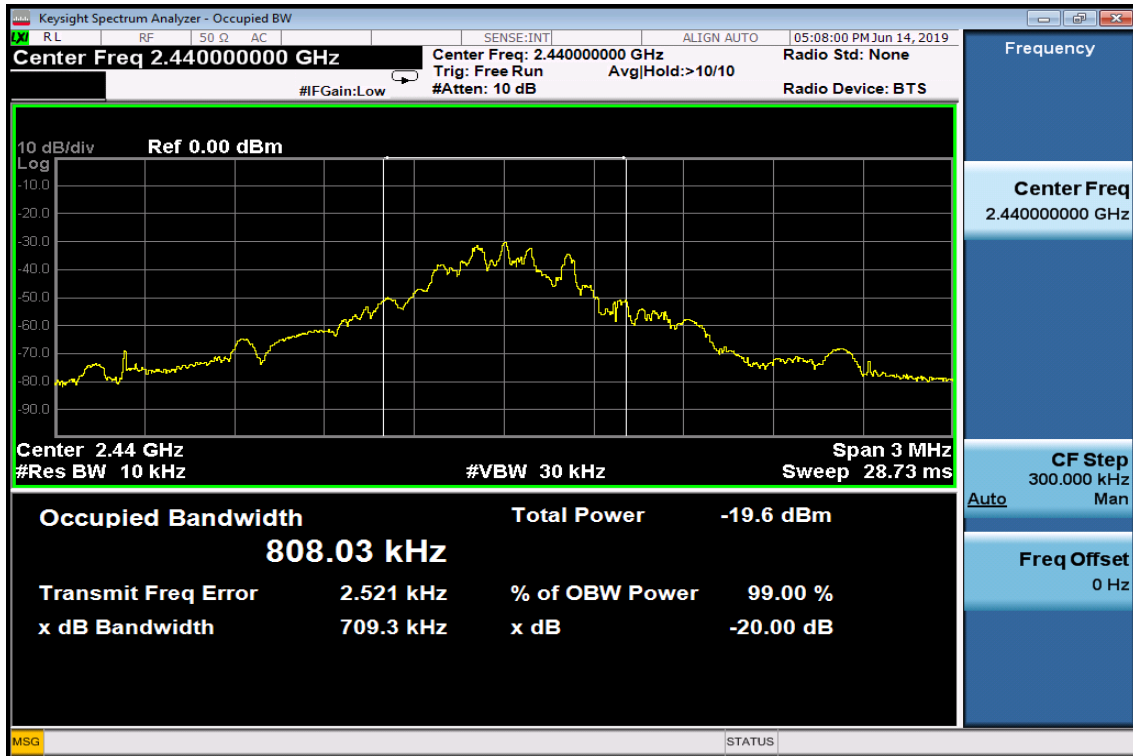
CH High 99% OBW = 1.2623MHz

Refer to attached data chart.

## 99% Band Width test Plot CH Low



## CH Mid



CH High

