

[TestMode: TX low channel]; [Polarity: Horizontal]

## Radiated Emission Measurement

Project No.: REH

Data :#3

2023/3/13

10:20:11



## Site

Polarization: *Horizontal*

Temperature: (C)

Limit: FCC Part15 (PK)

Power:

Humidity: %RH

EUT: Bluetooth module

M/N: TPL3936

Mode: BT TX-L

Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
			Level	Factor	ment		Detector	Comment
			MHz	dBuV	dB/m	dBuV/m	dB	
1		2386.500	43.16	-1.11	42.05	74.00	-31.95	peak
2		4804.000	38.80	4.05	42.85	74.00	-31.15	peak
3		7206.000	38.09	7.93	46.02	74.00	-27.98	peak
4		9608.000	37.46	10.90	48.36	74.00	-25.64	peak
5	*	11340.000	39.04	13.60	52.64	74.00	-21.36	peak
6		12609.000	38.65	13.87	52.52	74.00	-21.48	peak

\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only

## Test Result: Pass

[TestMode: TX low channel]; [Polarity: Vertical]

## Radiated Emission Measurement

Project No.: REH

Data :#4

2023/3/13

10:21:34



## Site

Polarization: **Vertical**

Temperature: (C)

Limit: FCC Part15 (PK)

Power:

Humidity: %RH

EUT: Bluetooth module

M/N: TPL3936

Mode: BT TX-L

Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
			Level	Factor	ment			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2386.500	42.32	-1.11	41.21	74.00	-32.79	peak
2		4804.000	39.52	4.05	43.57	74.00	-30.43	peak
3		7206.000	39.35	7.93	47.28	74.00	-26.72	peak
4		9608.000	38.10	10.90	49.00	74.00	-25.00	peak
5	*	11387.000	39.20	13.63	52.83	74.00	-21.17	peak
6		12538.500	38.64	13.87	52.51	74.00	-21.49	peak

\*:Maximum data x:Over limit !:over margin

⟨Reference Only

## Test Result: Pass

[TestMode: TX mid channel]; [Polarity: Vertical]

## Radiated Emission Measurement

Project No.: REH

Data :#12

2023/3/13

10:56:10



## Site

Polarization: **Vertical**

Temperature: (C)

Limit: FCC Part15 (PK)

Power:

Humidity: %RH

EUT: Bluetooth module

M/N: TPL3936

Mode: BT TX-M

Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
			Level	Factor	ment			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2468.750	44.31	-1.91	42.40	74.00	-31.60	peak
2		4884.000	39.82	4.37	44.19	74.00	-29.81	peak
3		7326.000	37.95	8.21	46.16	74.00	-27.84	peak
4		9768.000	37.19	11.31	48.50	74.00	-25.50	peak
5		11234.250	39.26	13.55	52.81	74.00	-21.19	peak
6 *		12409.250	39.72	13.88	53.60	74.00	-20.40	peak

\*:Maximum data x:Over limit !:over margin

⟨Reference Only

## Test Result: Pass

[TestMode: TX mid channel]; [Polarity: Horizontal]

## Radiated Emission Measurement

Project No.: REH

Data :#11

2023/3/13

10:51:29



## Site

Polarization: *Horizontal*

Temperature: (C)

Limit: FCC Part15 (PK)

## Power:

Humidity: %RH

EUT: Bluetooth module

M/N: TPL3936

Mode: BT TX-M

Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over		
			Level	Factor	ment				
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		2410.000	43.29	-1.26	42.03	74.00	-31.97	peak	
2		4877.500	44.17	4.35	48.52	74.00	-25.48	peak	
3		7326.000	37.95	8.21	46.16	74.00	-27.84	peak	
4		9768.000	37.87	11.31	49.18	74.00	-24.82	peak	
5		11351.750	39.13	13.61	52.74	74.00	-21.26	peak	
6	*	12456.250	39.45	13.88	53.33	74.00	-20.67	peak	

\*:Maximum data    x:Over limit    l:over margin

⟨Reference Only

## Test Result: Pass

[TestMode: TX high channel]; [Polarity: Horizontal]

## Radiated Emission Measurement

Project No.: REH

Data :#9

2023/3/13

10:36:59



## Site

Polarization: *Horizontal*

Temperature: (C)

Limit: FCC Part15 (PK)

Power:

Humidity: %RH

EUT: Bluetooth module

M/N: TPL3936

Mode: BT TX-H

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		2410.000	42.00	-1.26	40.74	74.00	-33.26	peak	
2		4960.000	39.17	5.42	44.59	74.00	-29.41	peak	
3		7440.000	38.21	8.48	46.69	74.00	-27.31	peak	
4		9920.000	36.98	11.69	48.67	74.00	-25.33	peak	
5		11316.500	38.96	13.59	52.55	74.00	-21.45	peak	
6	*	12550.250	39.57	13.87	53.44	74.00	-20.56	peak	

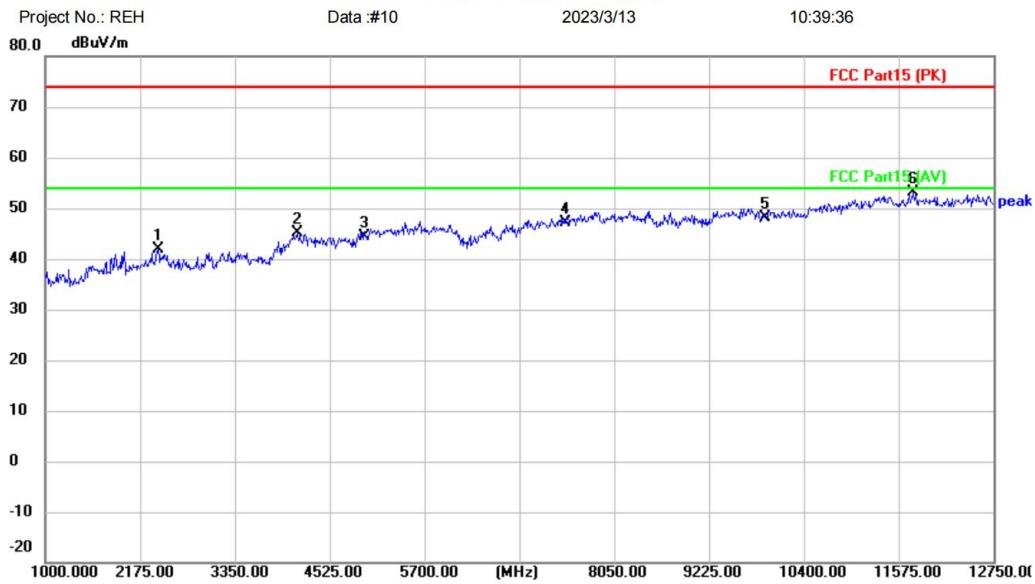
\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only

## Test Result: Pass

[TestMode: TX high channel]; [Polarity: Vertical]

## Radiated Emission Measurement



## Site

Polarization: **Vertical**

Temperature: (C)

Limit: FCC Part15 (PK)

Power:

Humidity: %RH

EUT: Bluetooth module

M/N: TPL3936

Mode: BT TX-H

Note:

No.	Mk.	Freq.	Reading	Correct	Measure	Limit	Over	Comment
			Level	Factor	ment			
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2398.250	43.11	-1.14	41.97	74.00	-32.03	peak
2		4125.500	41.85	3.34	45.19	74.00	-28.81	peak
3		4960.000	39.01	5.42	44.43	74.00	-29.57	peak
4		7440.000	38.76	8.48	47.24	74.00	-26.76	peak
5		9920.000	36.52	11.69	48.21	74.00	-25.79	peak
6	*	11751.250	39.22	13.79	53.01	74.00	-20.99	peak

\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only

## Test Result: Pass

Remark:

1. Final Level = Receiver Read level + Correct factor
2. Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

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## 19 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS

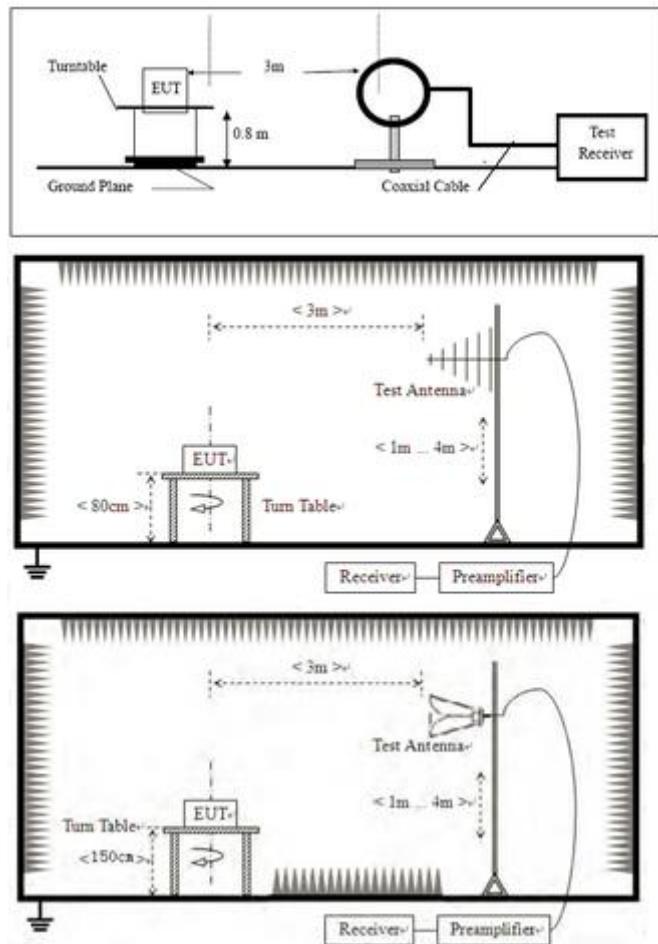
<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 6.10.5
<b>Test Mode (Pre-Scan)</b>	TX
<b>Test Mode (Final Test)</b>	TX
<b>Tester</b>	Jozu
<b>Temperature</b>	25 °C
<b>Humidity</b>	60%

### 19.1 LIMITS

<b>Frequency(MHz)</b>	<b>Field strength(microvolts/meter)</b>	<b>Measurement distance(meters)</b>
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

## 19.2 BLOCK DIAGRAM OF TEST SETUP



## 19.3 PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

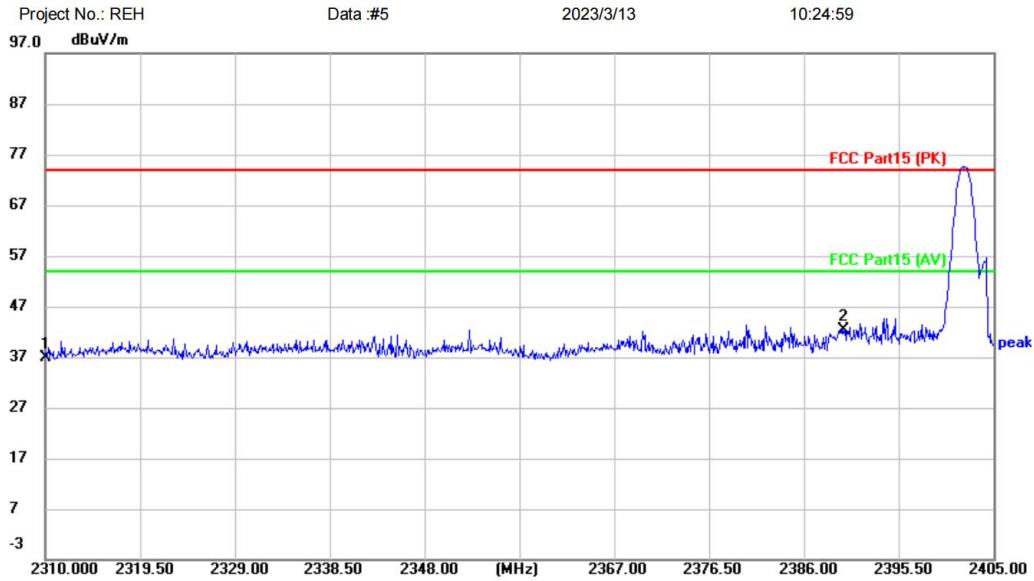
Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

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## 19.4 TEST DATA

[TestMode: TX low channel]; [Polarity: Horizontal]

### Radiated Emission Measurement



Site

Polarization: **Horizontal**

Temperature: (C)

Limit: FCC Part15 (PK)

Power:

Humidity: %RH

EUT: Bluetooth module

M/N: TPL3936

Mode: BT TX-L

Note:

No.	Mk.	Reading Freq. MHz	Correct Level dBuV	Measure- ment dB/m	Limit dBuV/m	Over dB	Detector	Comment
1		2310.000	41.25	-4.27	36.98	74.00	-37.02	peak
2	*	2390.000	46.25	-3.82	42.43	74.00	-31.57	peak

\*:Maximum data   x:Over limit   !:over margin

⟨Reference Only

**Test Result: Pass**

[TestMode: TX low channel]; [Polarity: Vertical]

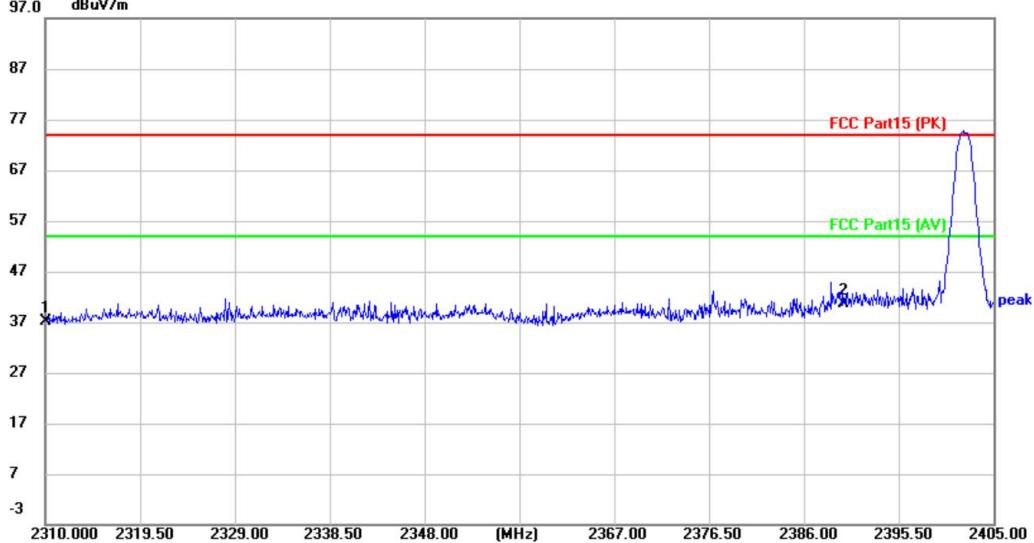
## Radiated Emission Measurement

Project No.: REH

Data :#6

2023/3/13

10:26:20



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## Site

Polarization: **Vertical**

Temperature: (C)

Limit: FCC Part15 (PK)

Power:

Humidity: %RH

EUT: Bluetooth module

M/N: TPL3936

Mode: BT TX-L

**Note:**

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over		
			Level	Factor	ment				
			MHz	dBuV	dB/m	dBuV/m	dB	Detector	Comment
1		2310.000	41.30	-4.27	37.03	74.00	-36.97	peak	
2	*	2390.000	44.45	-3.82	40.63	74.00	-33.37	peak	

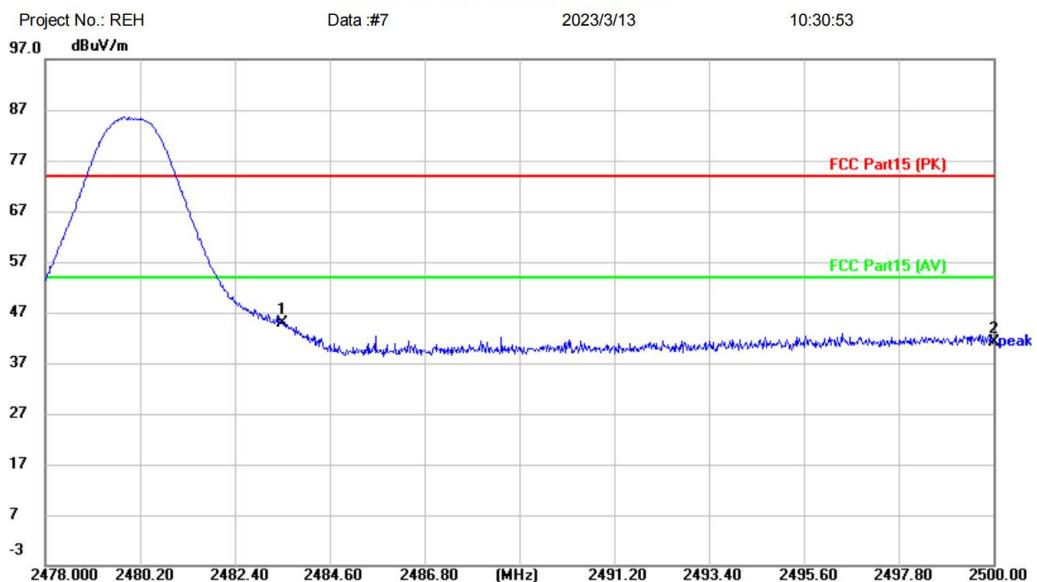
\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only

## Test Result: Pass

[TestMode: TX high channel]; [Polarity: Horizontal]

## Radiated Emission Measurement



## Site

Polarization: **Horizontal**

Temperature: (C)

Limit: FCC Part15 (PK)

Power:

Humidity: %RH

EUT: Bluetooth module

M/N: TPL3936

Mode: BT TX-H

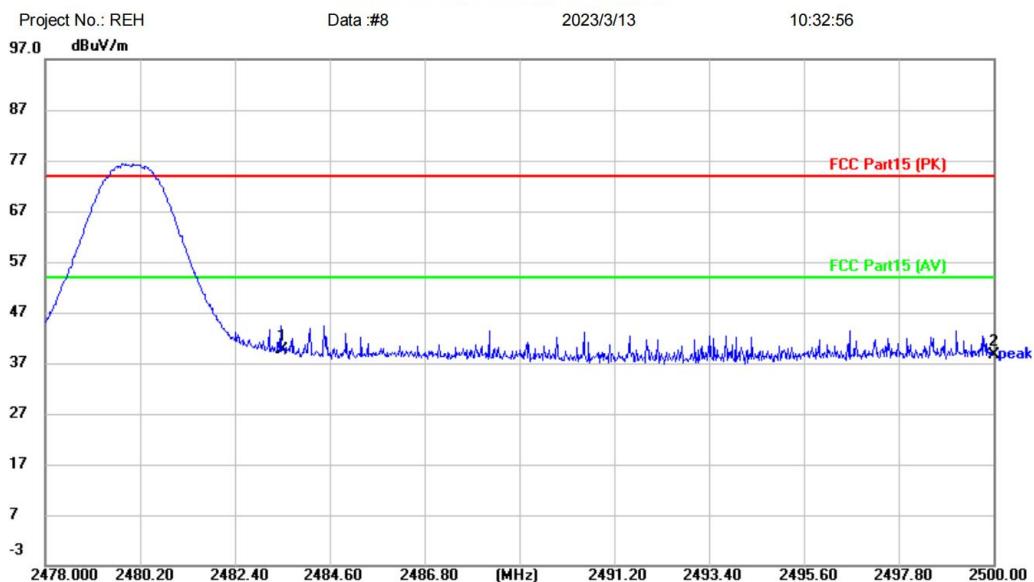
Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
			Level	Factor	ment			
1	*	2483.500	48.75	-3.96	44.79	74.00	-29.21	peak
2		2500.000	45.15	-4.00	41.15	74.00	-32.85	peak

\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only

## Test Result: Pass

**[TestMode: TX high channel]; [Polarity: Vertical]**
**Radiated Emission Measurement**


Site	Polarization: <b>Vertical</b>	Temperature: (C)
Limit: FCC Part15 (PK)	Power:	Humidity: %RH
EUT: Bluetooth module		
M/N: TPL3936		
Mode: BT TX-H		
Note:		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dB	Detector	Comment
1	*	2483.500	43.49	-3.96	39.53	74.00	-34.47	peak
2		2500.000	42.75	-4.00	38.75	74.00	-35.25	peak

\*:Maximum data   x:Over limit   !:over margin

⟨Reference Only⟩

**Test Result: Pass**

Remark:

1. Final Level = Receiver Read level + Correct factor
2. Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

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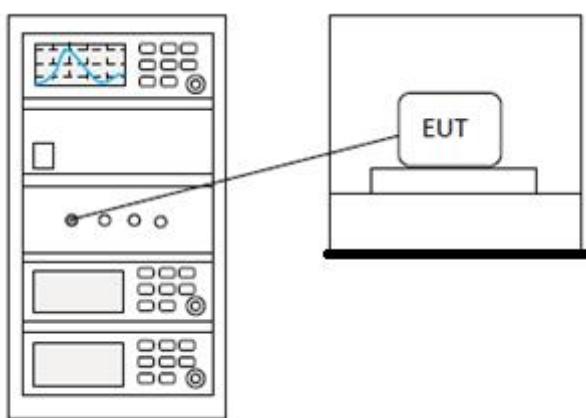
## 20 CONDUCTED BAND EDGES MEASUREMENT

<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2
<b>Test Mode (Pre-Scan)</b>	TX
<b>Test Mode (Final Test)</b>	TX
<b>Tester</b>	Jozu
<b>Temperature</b>	25 °C
<b>Humidity</b>	60%

### 20.1 LIMITS

<b>Limit:</b>	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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) (see §15.205(c)).
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### 20.2 BLOCK DIAGRAM OF TEST SETUP



### 20.3 TEST DATA

**Pass: Please Refer To Appendix: Appendix1 For Details**

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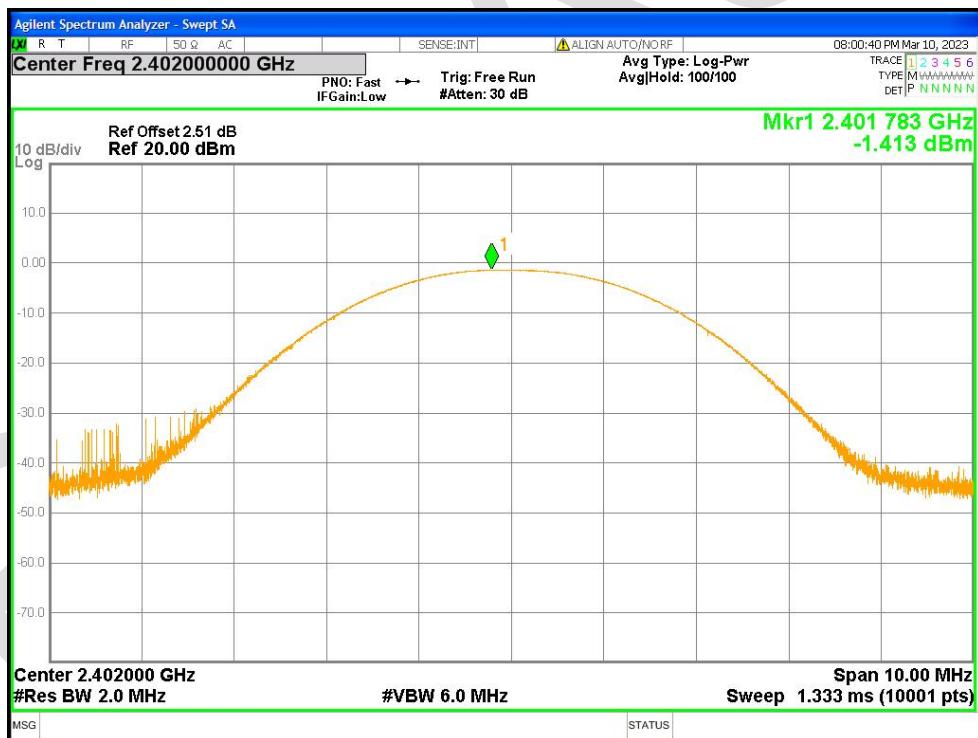
## 21 APPENDIX

### Appendix1

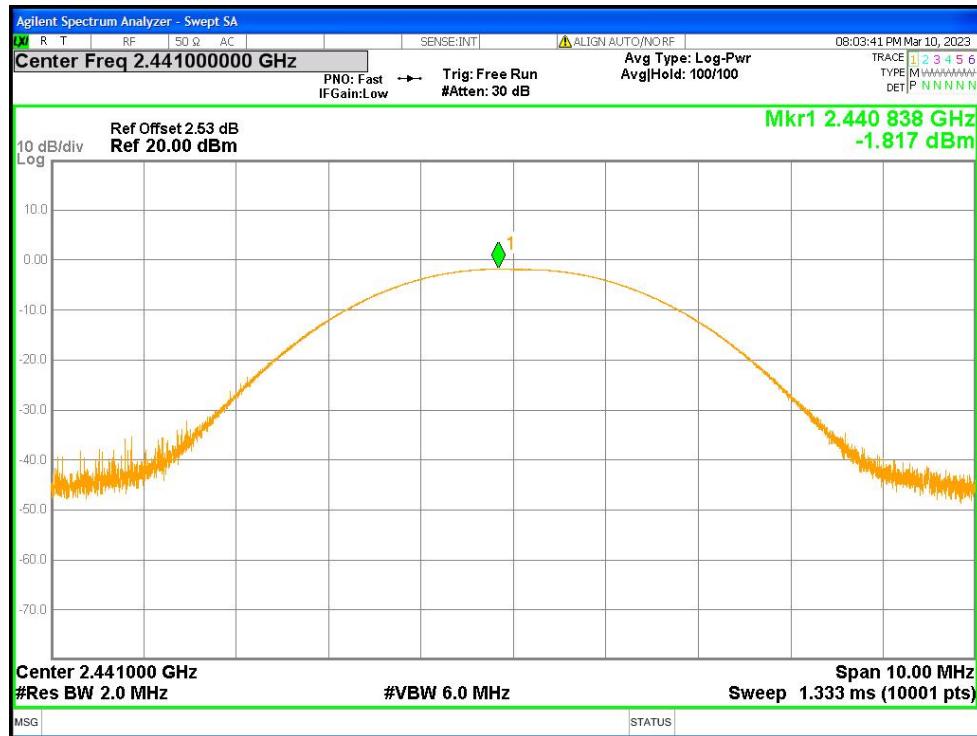
#### Maximum Conducted Output Power

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	1-DH1	2402	Ant1	-1.413	21	Pass
NVNT	1-DH1	2441	Ant1	-1.817	21	Pass
NVNT	1-DH1	2480	Ant1	-1.661	21	Pass
NVNT	2-DH1	2402	Ant1	-0.7	21	Pass
NVNT	2-DH1	2441	Ant1	-1.042	21	Pass
NVNT	2-DH1	2480	Ant1	-0.879	21	Pass
NVNT	3-DH1	2402	Ant1	-0.092	21	Pass
NVNT	3-DH1	2441	Ant1	-0.471	21	Pass
NVNT	3-DH1	2480	Ant1	-0.274	21	Pass

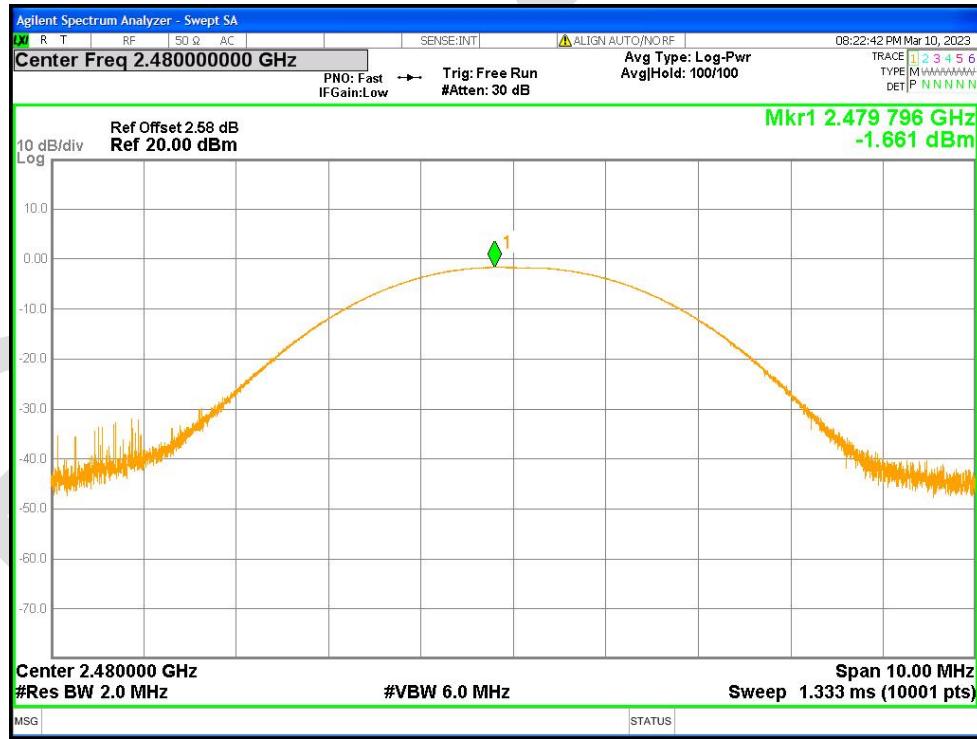
Power NVNT 1-DH1 2402MHz Ant1



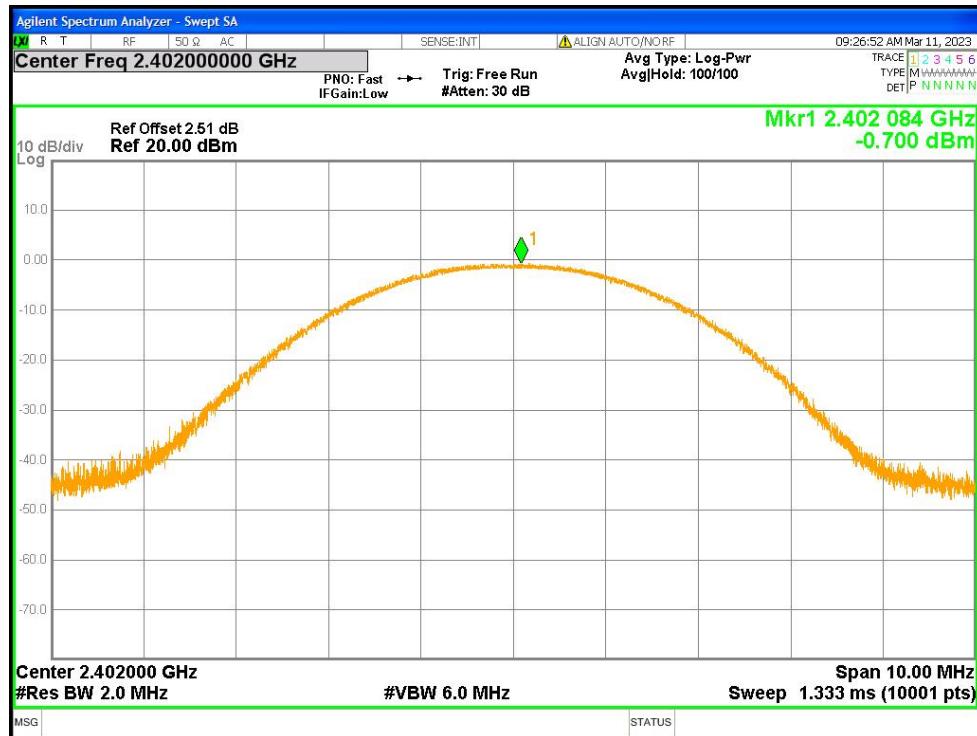
Power NVNT 1-DH1 2441MHz Ant1



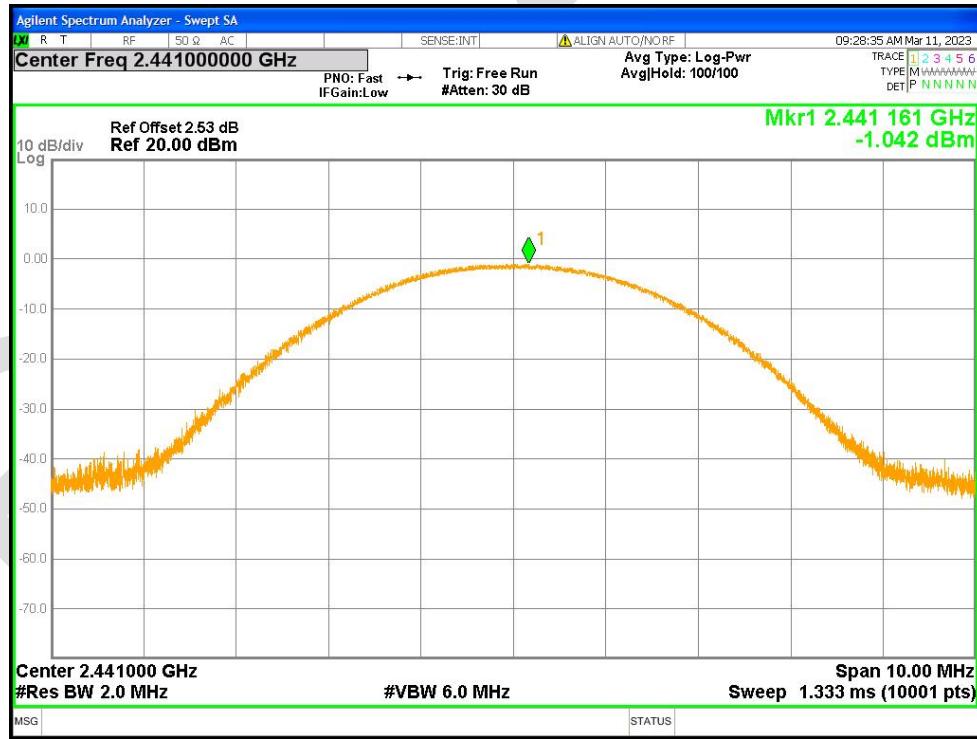
Power NVNT 1-DH1 2480MHz Ant1



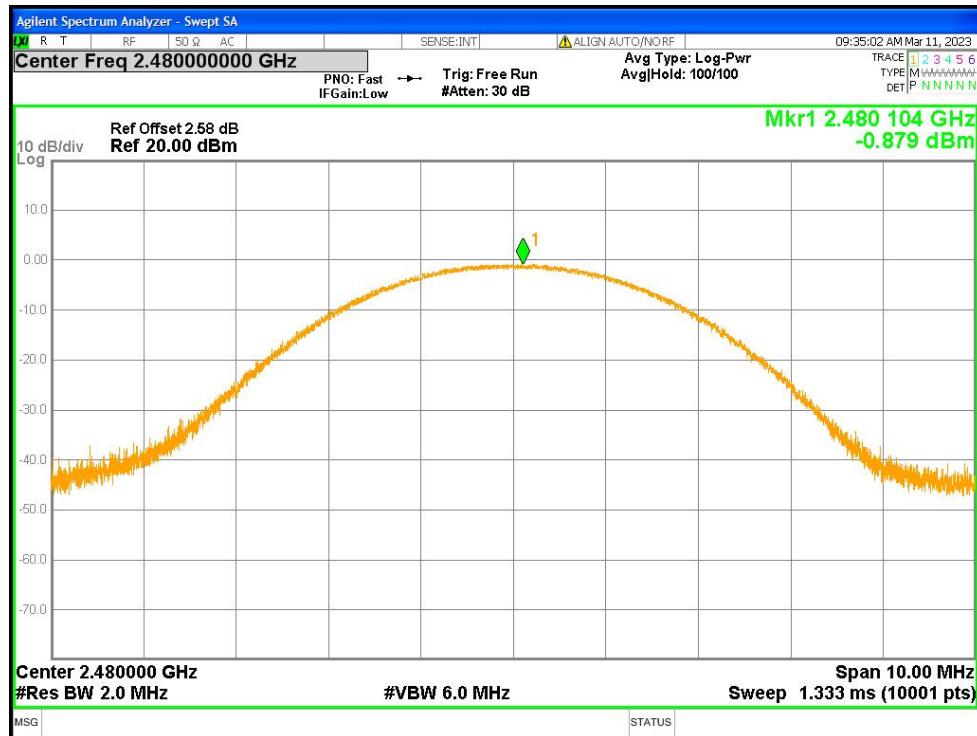
Power NVNT 2-DH1 2402MHz Ant1



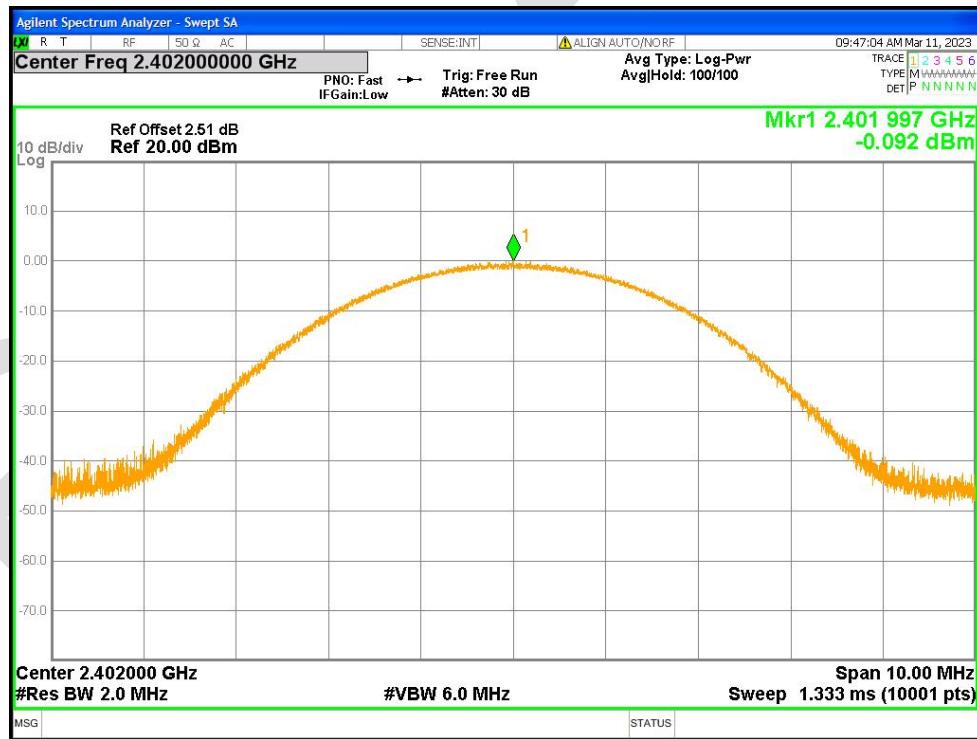
Power NVNT 2-DH1 2441MHz Ant1



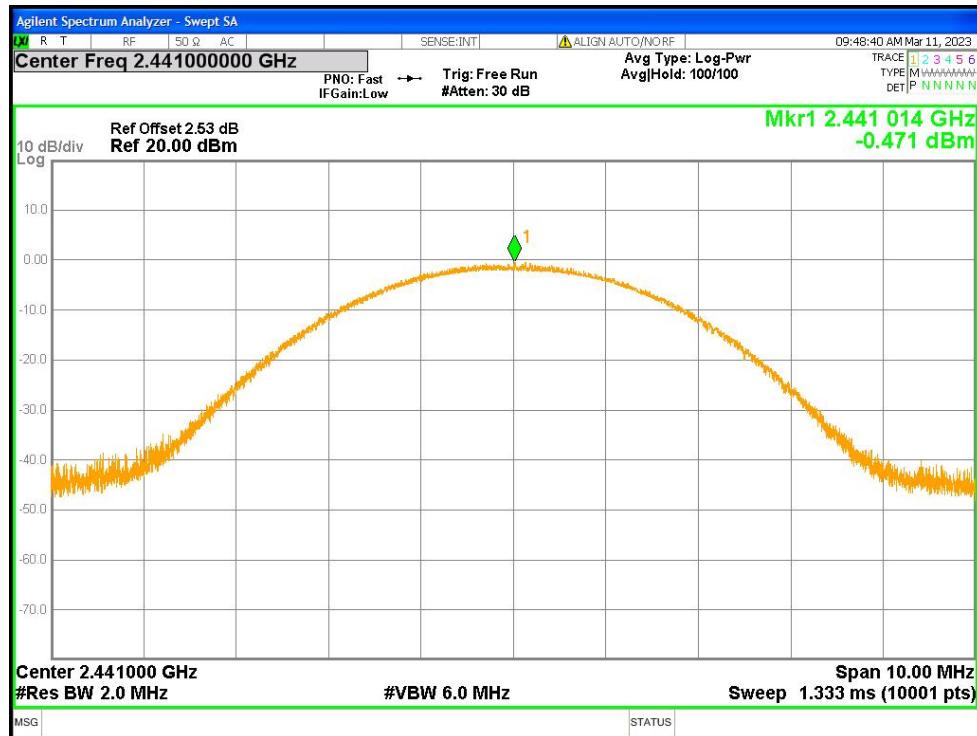
Power NVNT 2-DH1 2480MHz Ant1



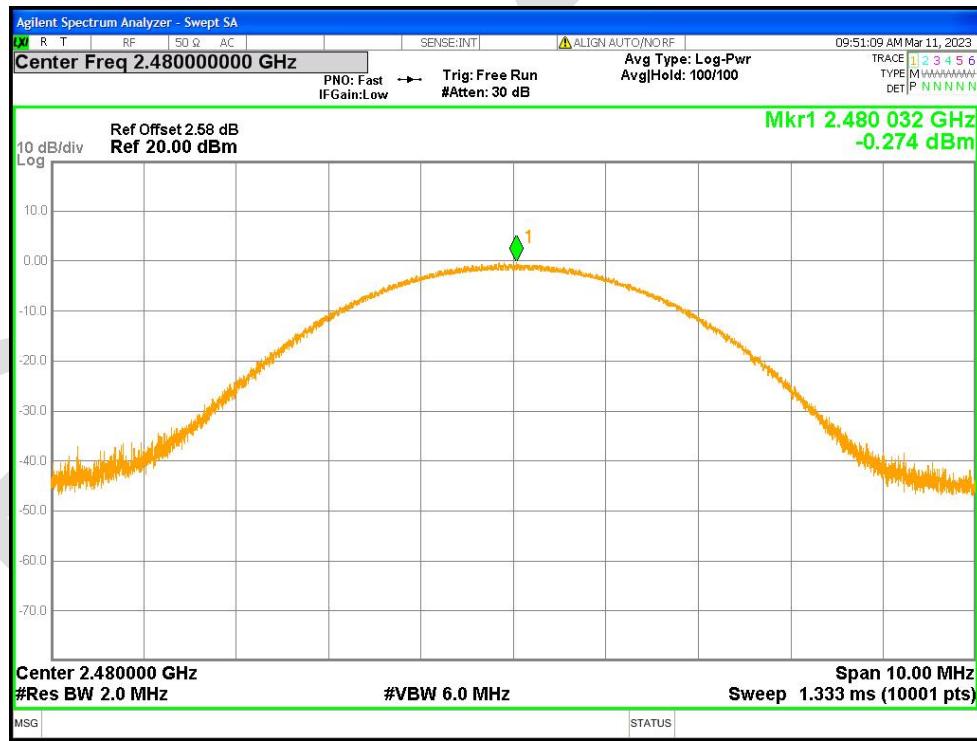
Power NVNT 3-DH1 2402MHz Ant1



Power NVNT 3-DH1 2441MHz Ant1

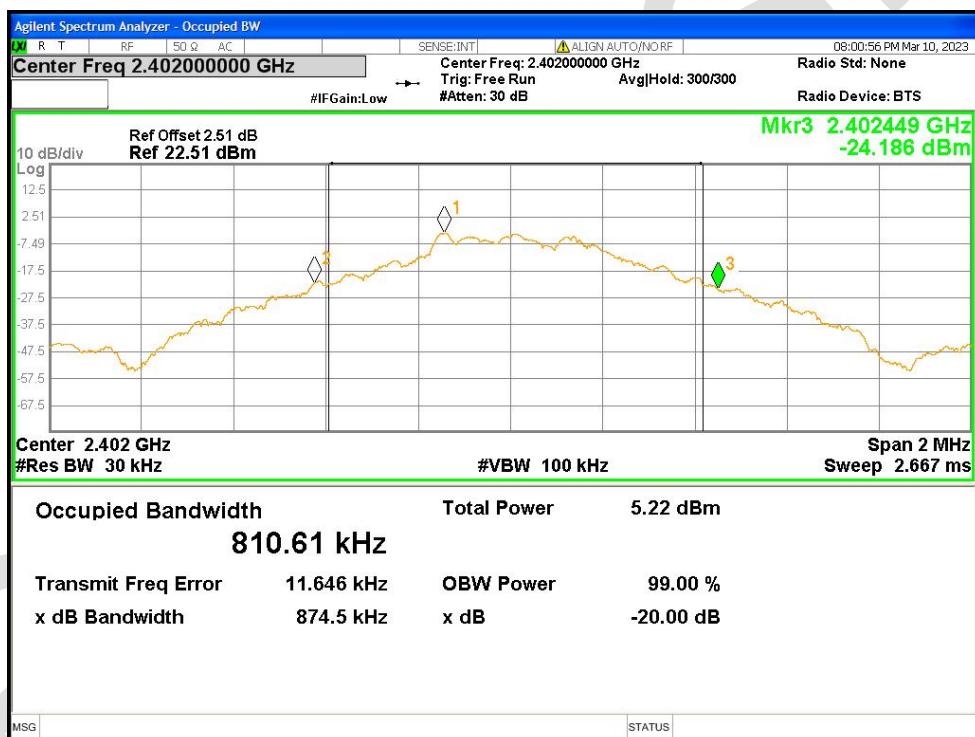


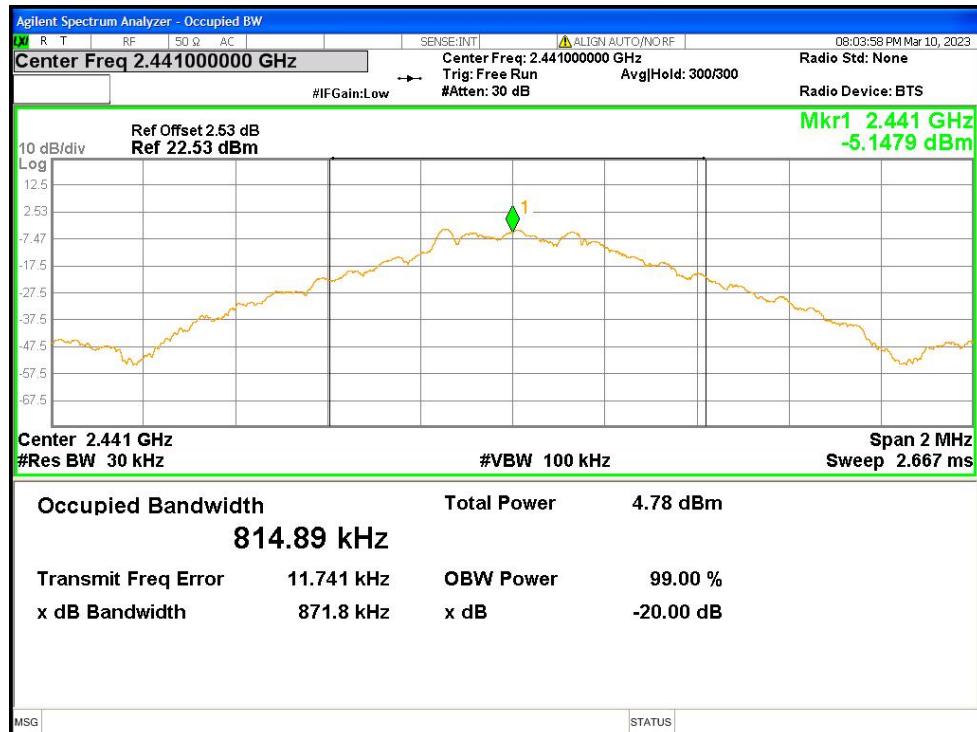
Power NVNT 3-DH1 2480MHz Ant1



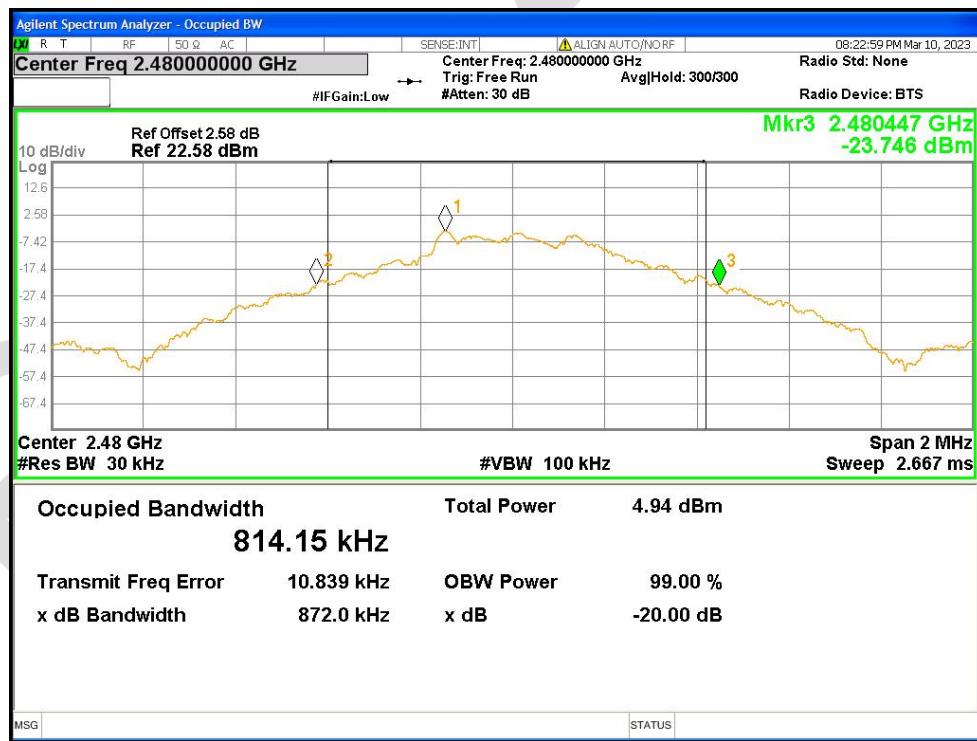
**-20dB Bandwidth**

Condition	Mode	Frequency (MHz)	Antenna	-20 dB Bandwidth (MHz)	Limit -20 dB Bandwidth (MHz)	Verdict
NVNT	1-DH1	2402	Ant1	0.874	0	Pass
NVNT	1-DH1	2441	Ant1	0.872	0	Pass
NVNT	1-DH1	2480	Ant1	0.872	0	Pass
NVNT	2-DH1	2402	Ant1	1.248	0	Pass
NVNT	2-DH1	2441	Ant1	1.25	0	Pass
NVNT	2-DH1	2480	Ant1	1.255	0	Pass
NVNT	3-DH1	2402	Ant1	1.217	0	Pass
NVNT	3-DH1	2441	Ant1	1.216	0	Pass
NVNT	3-DH1	2480	Ant1	1.242	0	Pass

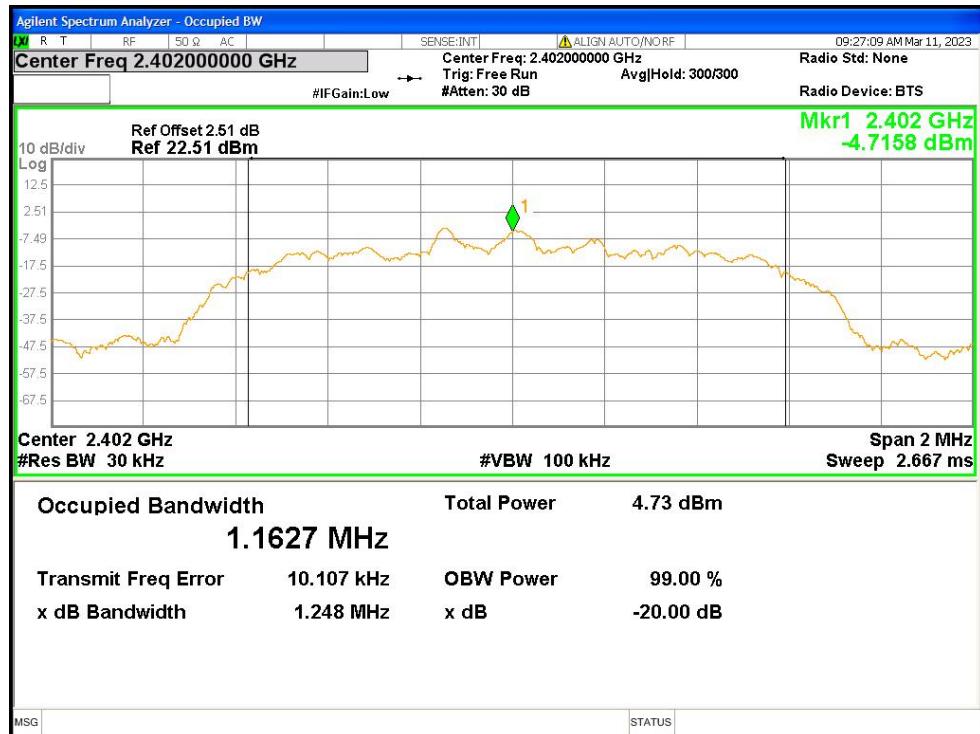
**-20dB Bandwidth NVNT 1-DH1 2402MHz Ant1**

**-20dB Bandwidth NVNT 1-DH1 2441MHz Ant1**



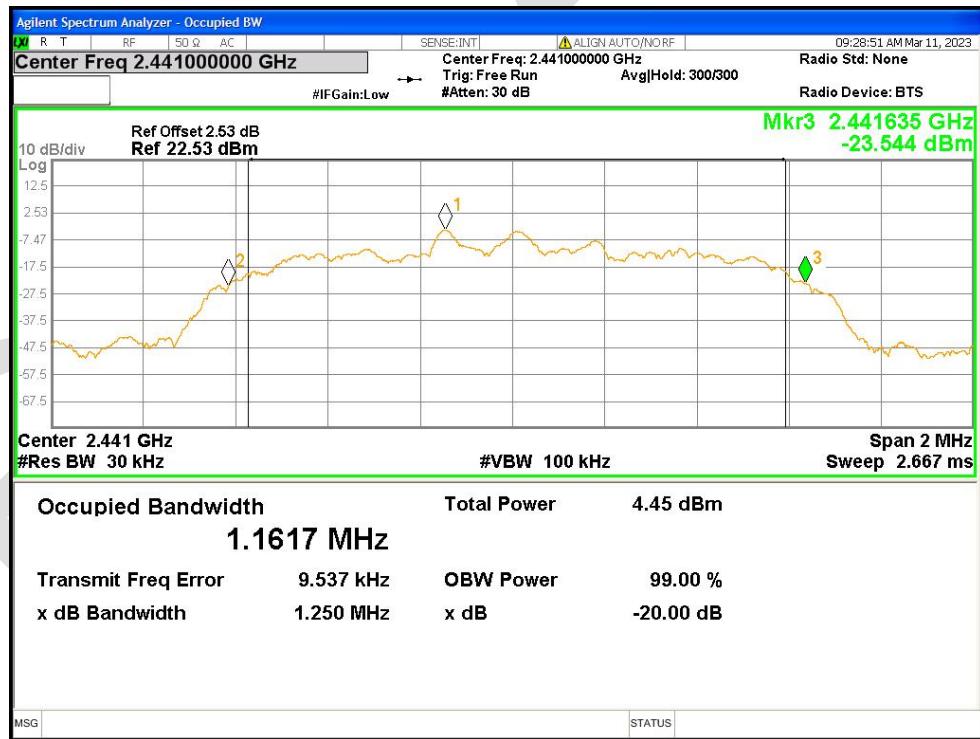
-20dB Bandwidth NVNT 1-DH1 2480MHz Ant1



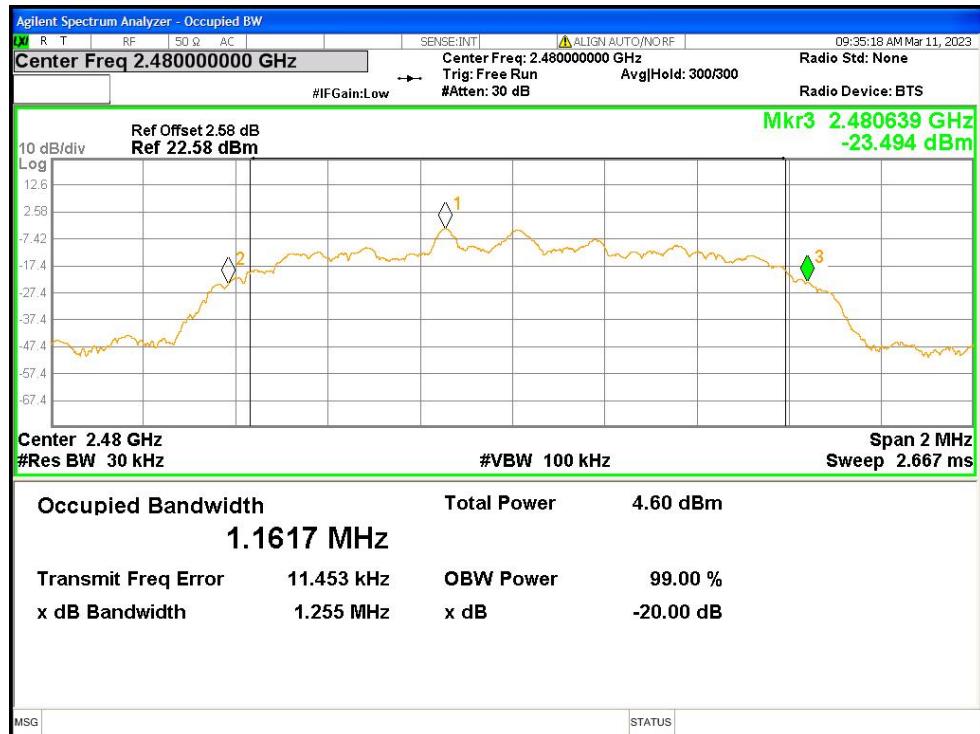
-20dB Bandwidth NVNT 2-DH1 2402MHz Ant1



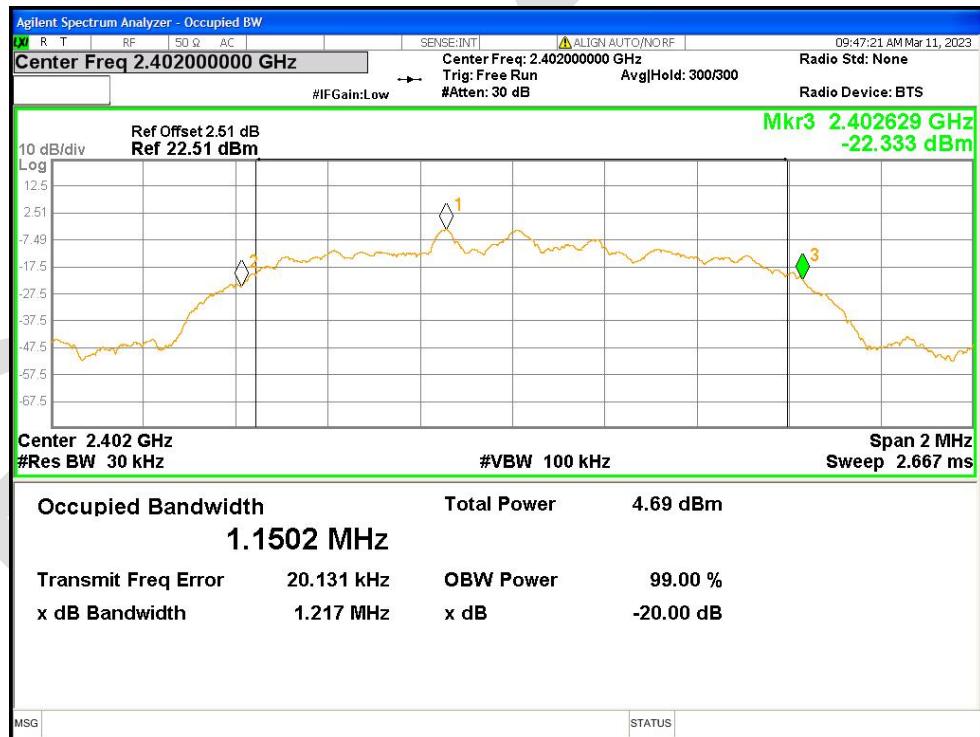
-20dB Bandwidth NVNT 2-DH1 2441MHz Ant1



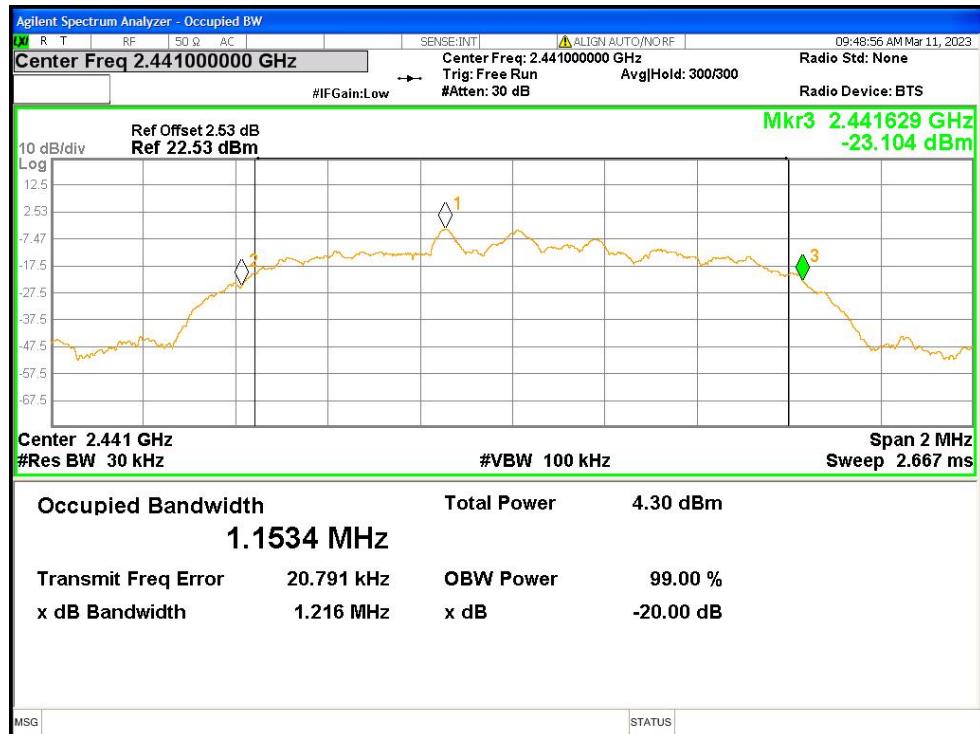
-20dB Bandwidth NVNT 2-DH1 2480MHz Ant1



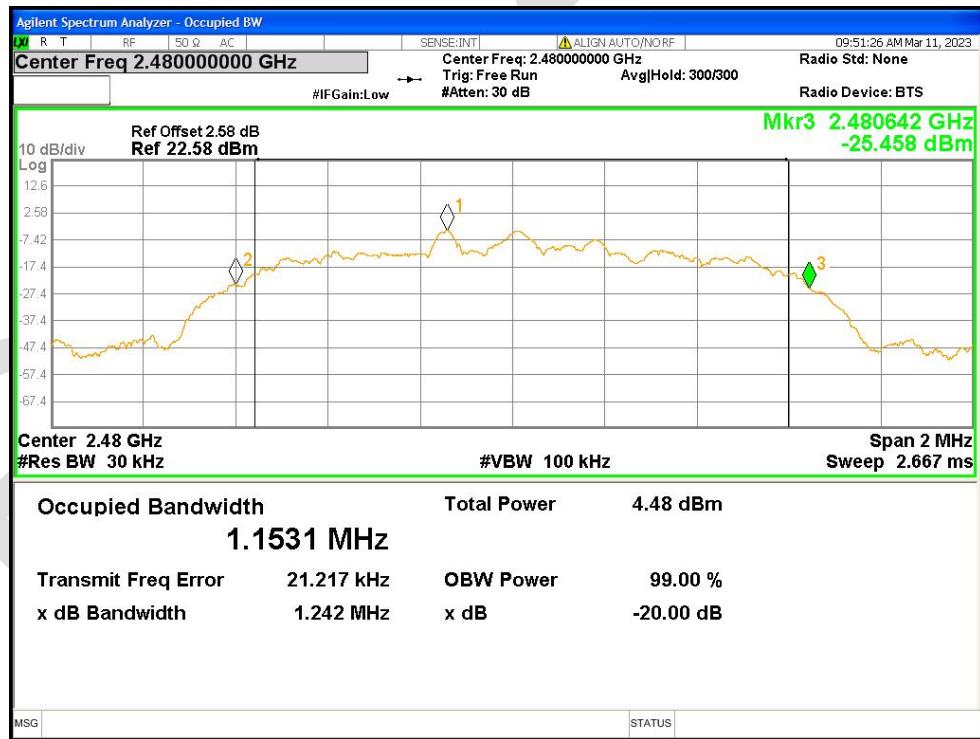
-20dB Bandwidth NVNT 3-DH1 2402MHz Ant1



-20dB Bandwidth NVNT 3-DH1 2441MHz Ant1

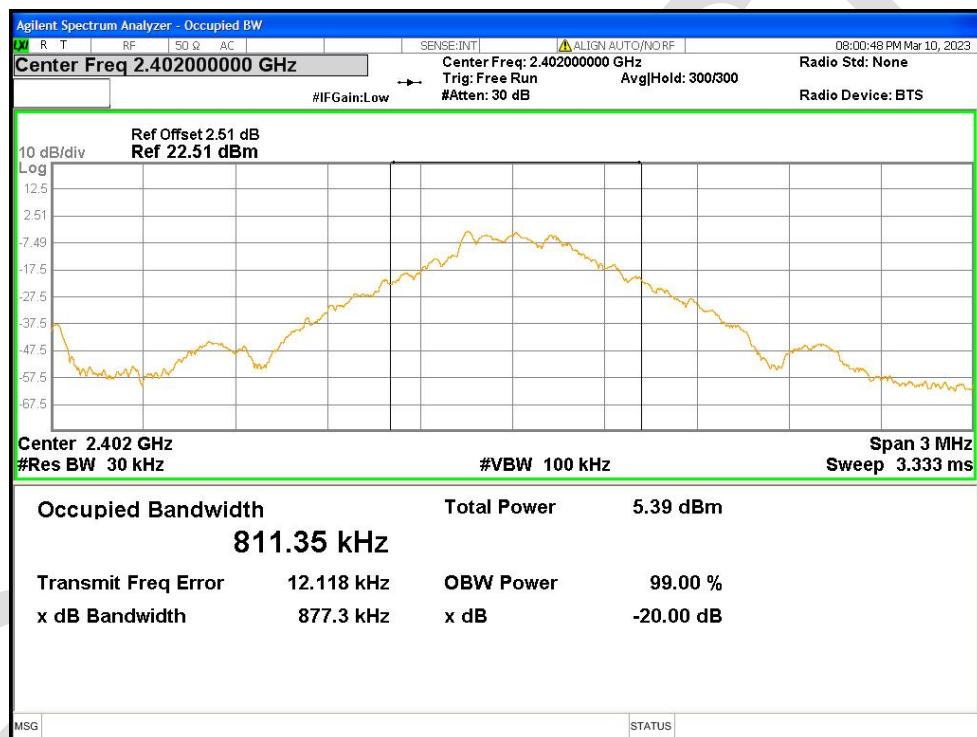


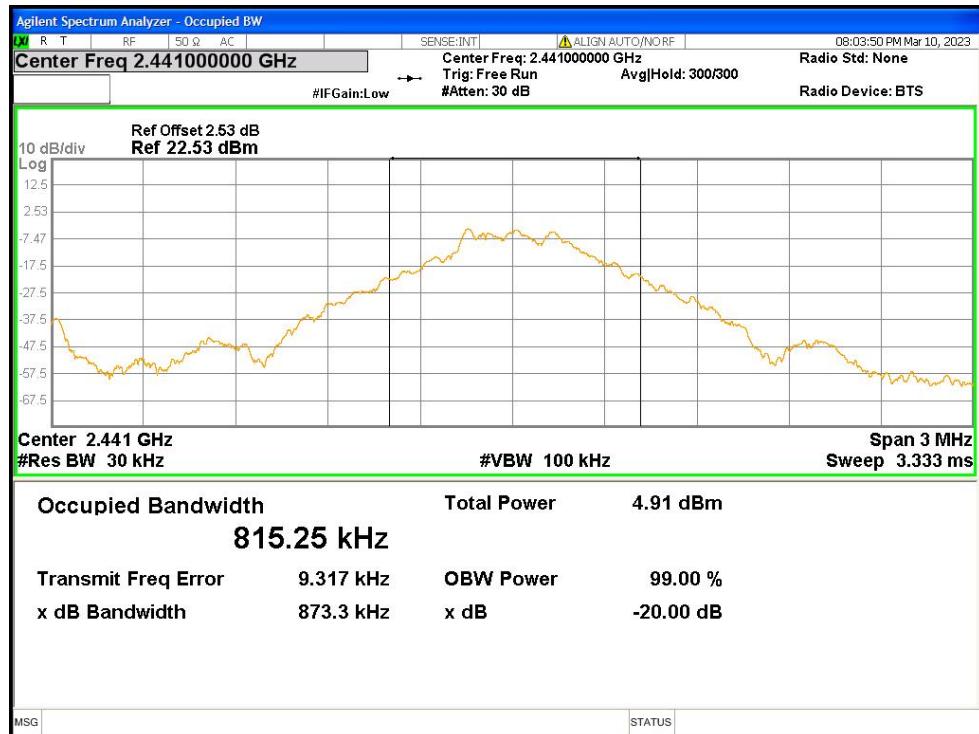
-20dB Bandwidth NVNT 3-DH1 2480MHz Ant1



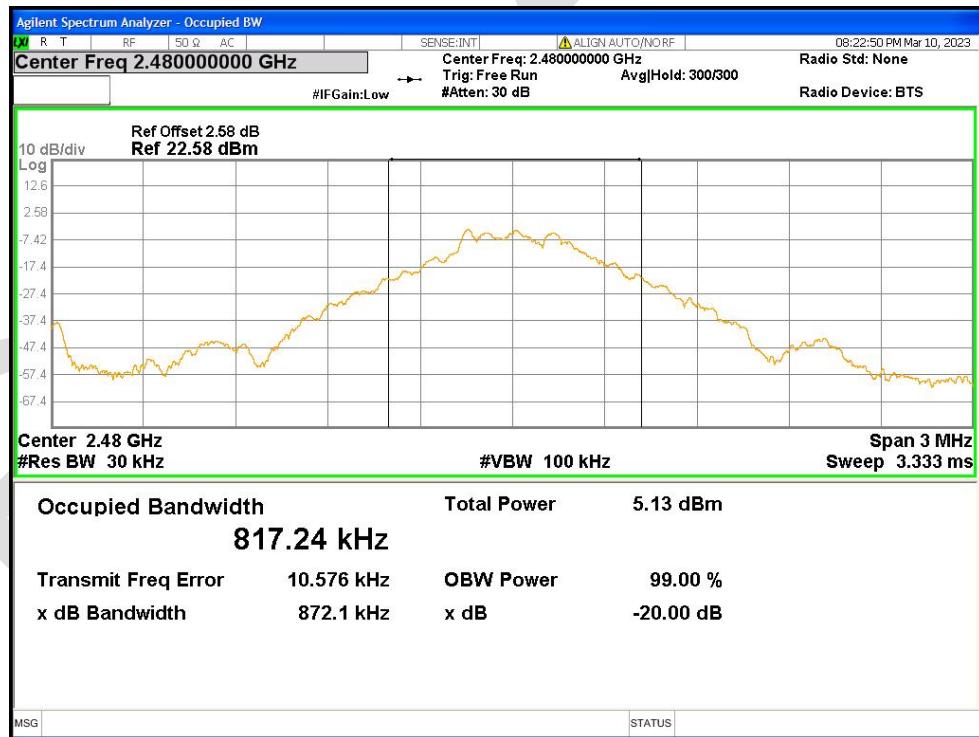
**Occupied Channel Bandwidth**

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	1-DH1	2402	Ant1	0.8113507862
NVNT	1-DH1	2441	Ant1	0.8152489212
NVNT	1-DH1	2480	Ant1	0.8172352059
NVNT	2-DH1	2402	Ant1	1.1648361
NVNT	2-DH1	2441	Ant1	1.165196517
NVNT	2-DH1	2480	Ant1	1.164166605
NVNT	3-DH1	2402	Ant1	1.154933775
NVNT	3-DH1	2441	Ant1	1.154582735
NVNT	3-DH1	2480	Ant1	1.153152548

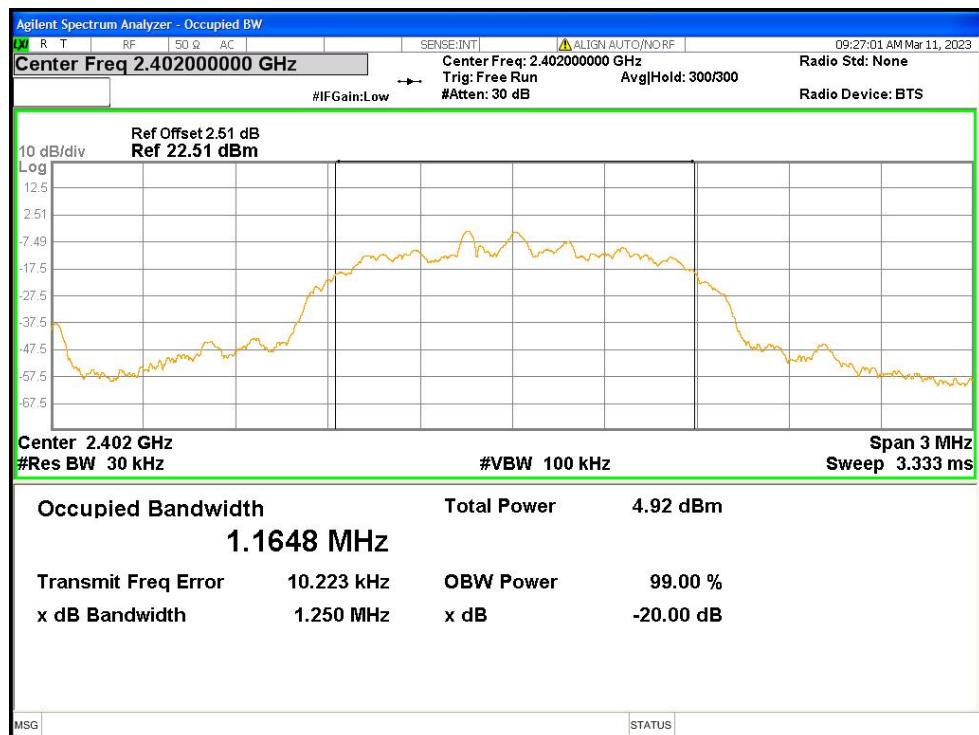
**OBW NVNT 1-DH1 2402MHz Ant1**

**OBW NVNT 1-DH1 2441MHz Ant1**



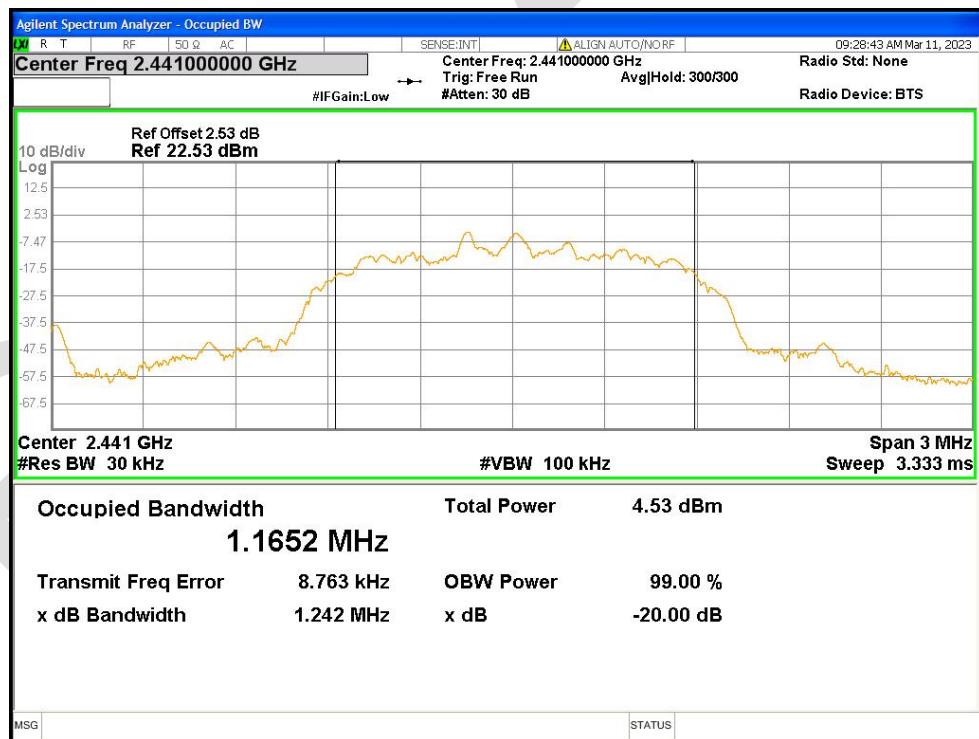
### OBW NVNT 1-DH1 2480MHz Ant1



### OBW NVNT 2-DH1 2402MHz Ant1



### OBW NVNT 2-DH1 2441MHz Ant1



### OBW NVNT 2-DH1 2480MHz Ant1