



6. AVERAGE TIME OF OCCUPANCY

6.1 LIMIT

FCC Part 15.247, Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

6.2 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyzer.
- Set RBW = 1MHz/VBW = 3MHz.
- Use a video trigger with the trigger level set to enable triggering only on full pulses.
- Sweep Time is more than once pulse time.
Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- Measure the maximum time duration of one single pulse.
- Set the EUT for DH5, DH3 and DH1 packet transmitting.
- Measure the maximum time duration of one single pulse.
- DH5 Packet permit maximum $1600 / 79 / 6 = 3.37$ hops per second in each channel (5 time slots RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is $3.37 \times 31.6 = 106.6$.
- DH3 Packet permit maximum $1600 / 79 / 4 = 5.06$ hops per second in each channel (3 time slots RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is $5.06 \times 31.6 = 160$.
- DH1 Packet permit maximum $1600 / 79 / 2 = 10.12$ hops per second in each channel (1 time slot RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is $10.12 \times 31.6 = 320$.

6.3 TEST SETUP



6.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.



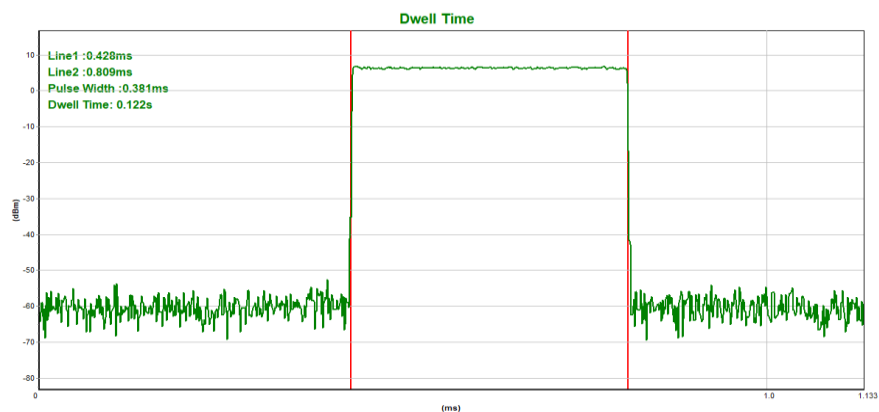
6.5 TEST RESULTS

Temperature:	25°C	Relative Humidity:	50%
Test Mode:	GFSK/ $\pi/4$ -DQPSK/ 8DPSK	Test Voltage:	DC 3.85V

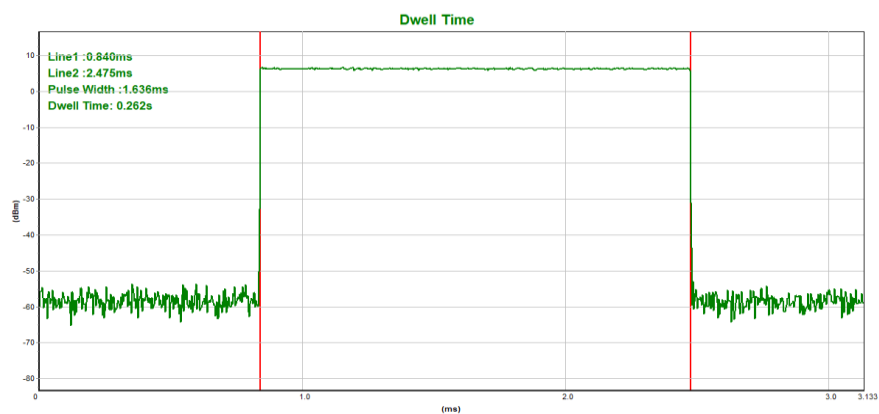
Modulation	Pocket Type	Frequency (MHz)	Single Pulse Time (ms)	Dwell Time (s)	Limit (s)	Result
GFSK	DH1	2441	0.381	0.122	0.4	Pass
	DH3	2441	1.636	0.262	0.4	Pass
	DH5	2441	2.886	0.308	0.4	Pass
$\pi/4$ DQPSK	2DH1	2441	0.390	0.125	0.4	Pass
	2DH3	2441	1.646	0.263	0.4	Pass
	2DH5	2441	2.888	0.308	0.4	Pass
8DPSK	3DH1	2441	0.391	0.125	0.4	Pass
	3DH3	2441	1.640	0.262	0.4	Pass
	3DH5	2441	2.896	0.309	0.4	Pass



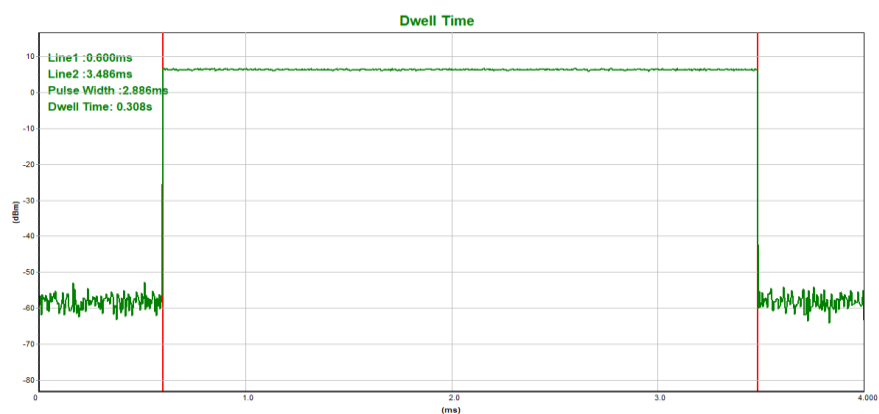
CH39-DH1



CH39-DH3

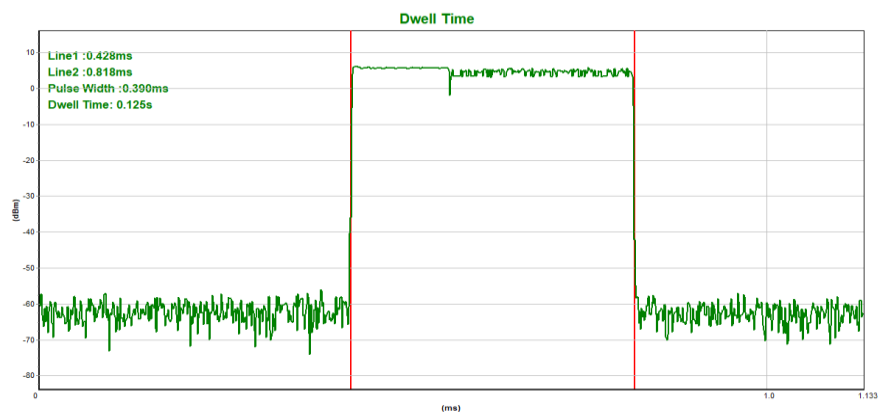


CH39-DH5

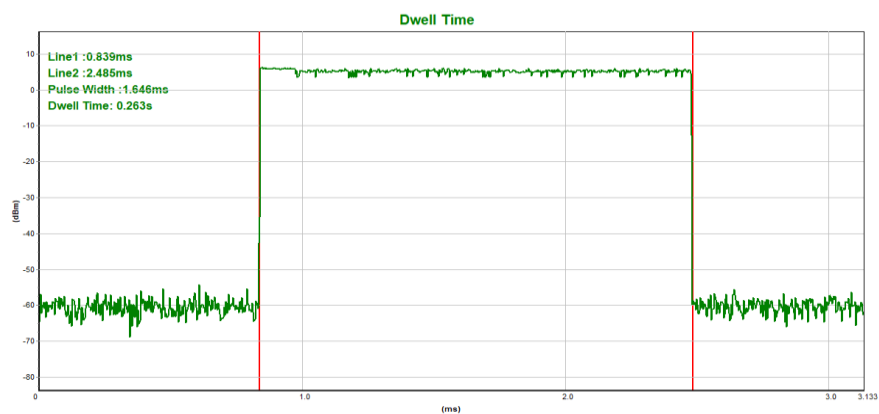




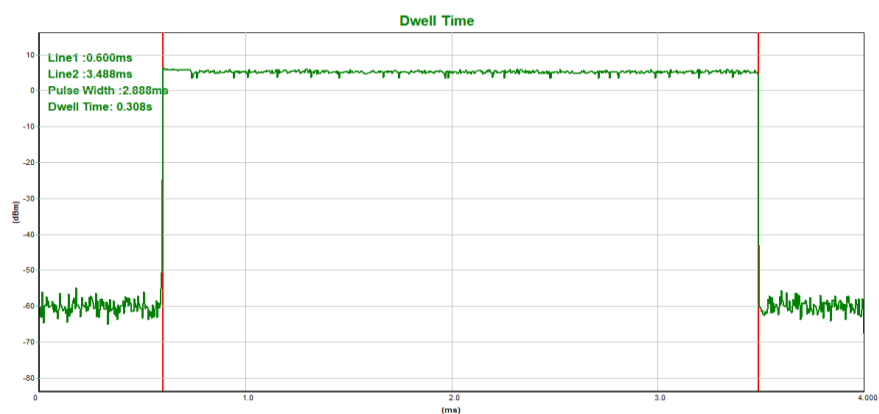
CH39-2DH1



CH39-2DH3



CH39-2DH5

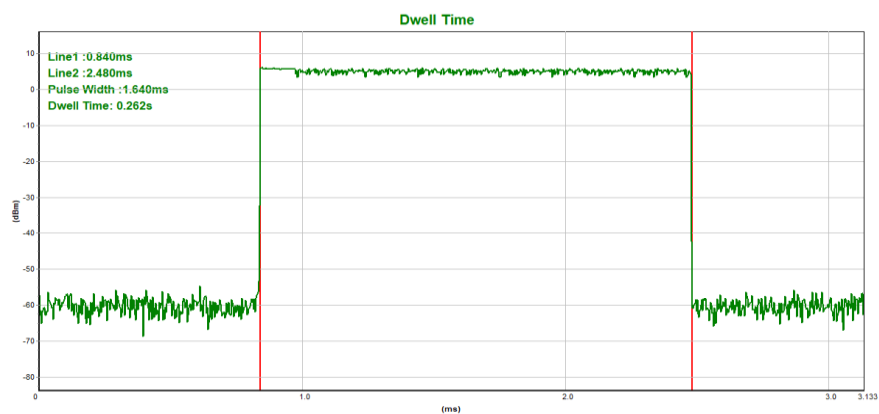




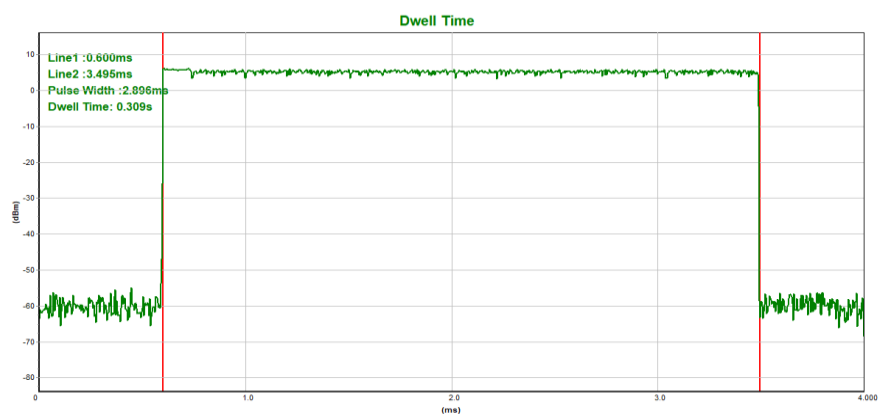
CH39-3DH1



CH39-3DH3



CH39-3DH5



7. HOPPING CHANNEL SEPARATION MEASUREMENT

7.1 LIMIT

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> 20 dB Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

7.2 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
- The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.

7.3 TEST SETUP



7.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.



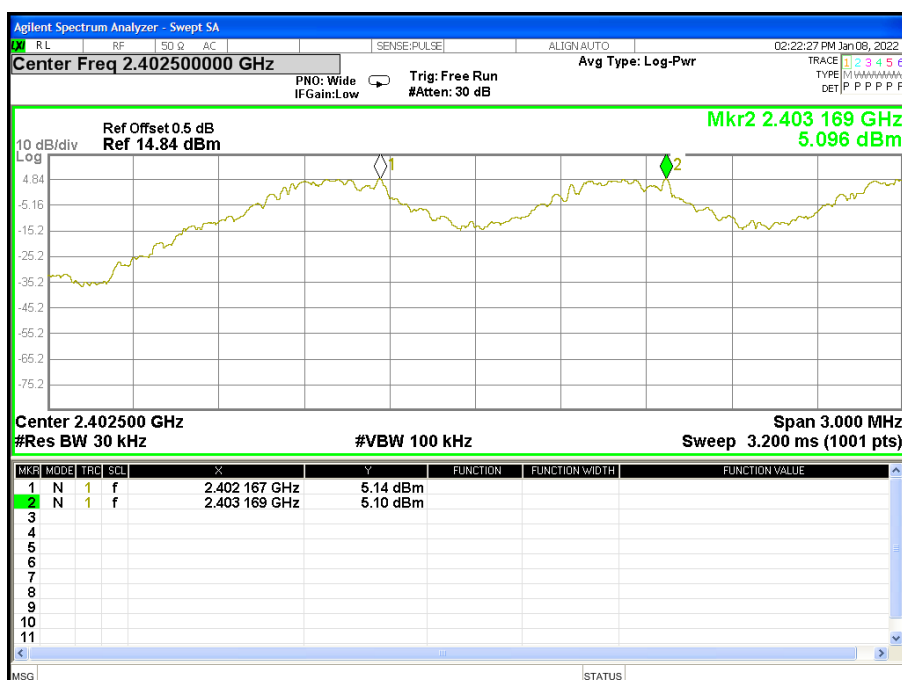
7.5 TEST RESULTS

Temperature:	25°C	Relative Humidity:	50%
Test Mode:	GFSK/ π /4-DQPSK/8DPSK	Test Voltage:	DC 3.85V

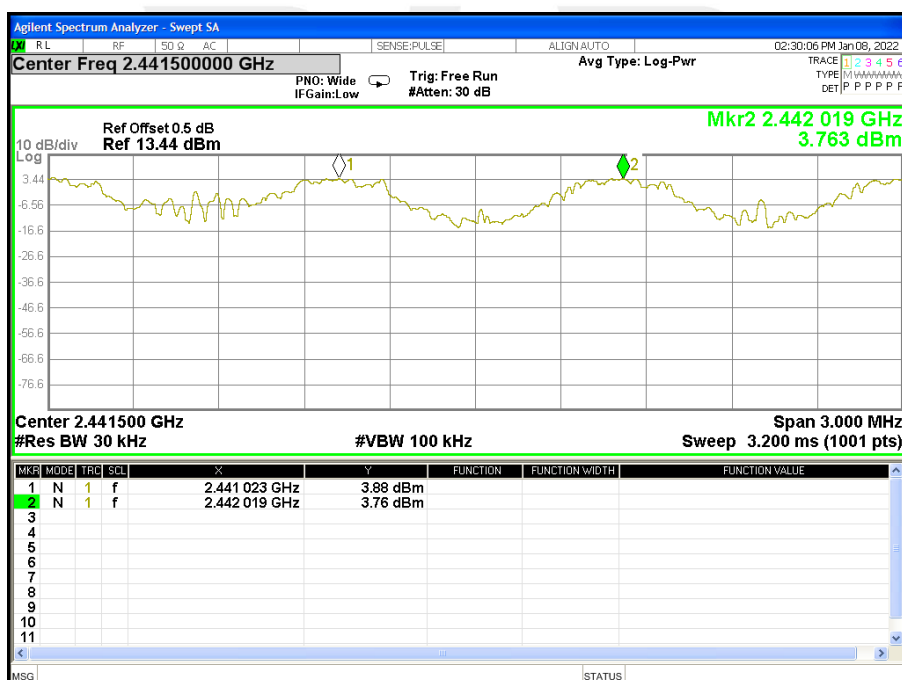
Modulation	Frequency (MHz)	Mark1 Frequency (MHz)	Mark2 Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
GFSK	2402	2402.167	2403.169	1.002	0.703	Pass
	2441	2441.023	2442.019	0.996	0.703	Pass
	2480	2479.023	2480.019	0.996	0.692	Pass
π /4DQPSK	2402	2401.834	2403.166	1.332	0.879	Pass
	2441	2441.014	2442.019	1.005	0.877	Pass
	2480	2479.023	2480.166	1.143	0.870	Pass
8DPSK	2402	2402.173	2403.163	0.990	0.869	Pass
	2441	2441.170	2442.172	1.002	0.866	Pass
	2480	2479.164	2480.160	0.996	0.862	Pass



CH00 -1Mbps

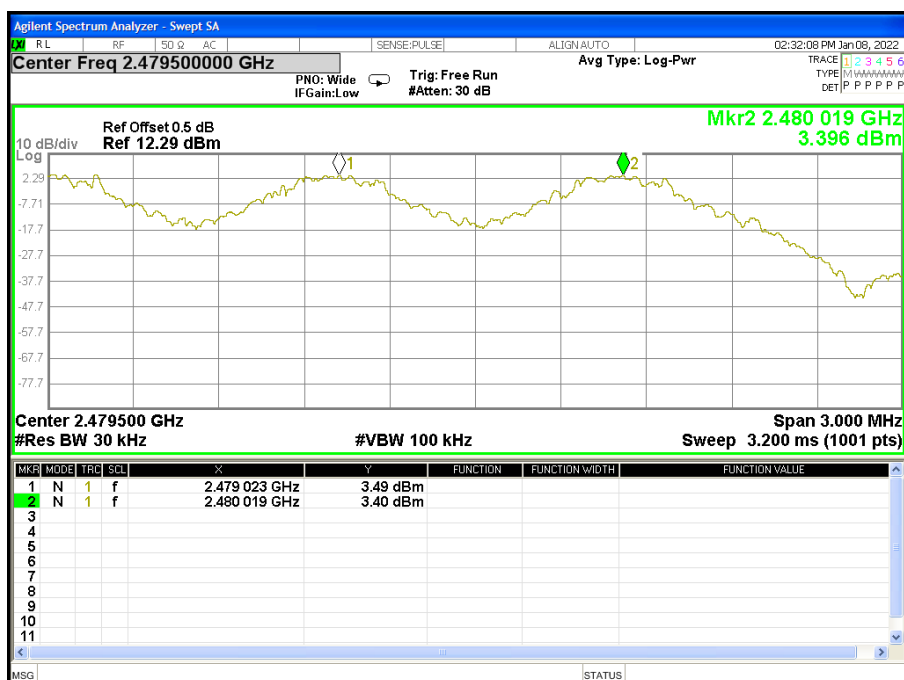


CH39 -1Mbps

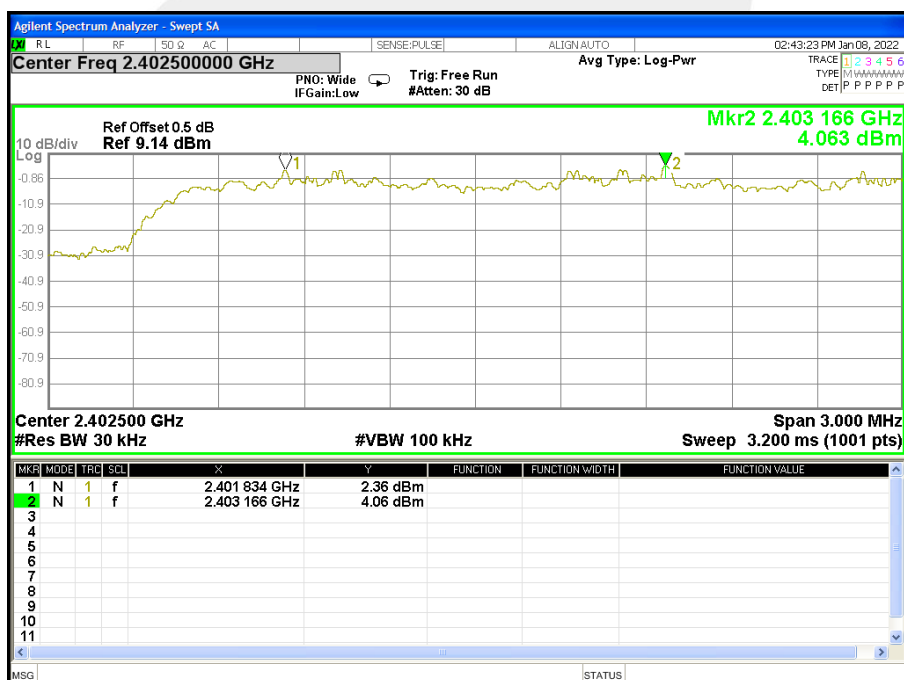




CH78 -1Mbps

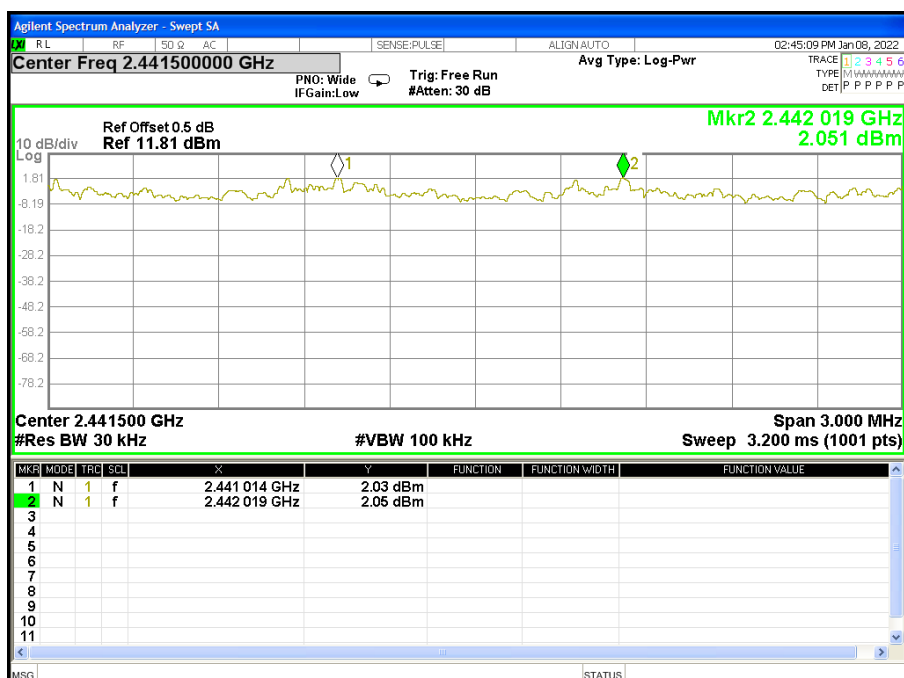


CH00 -2Mbps

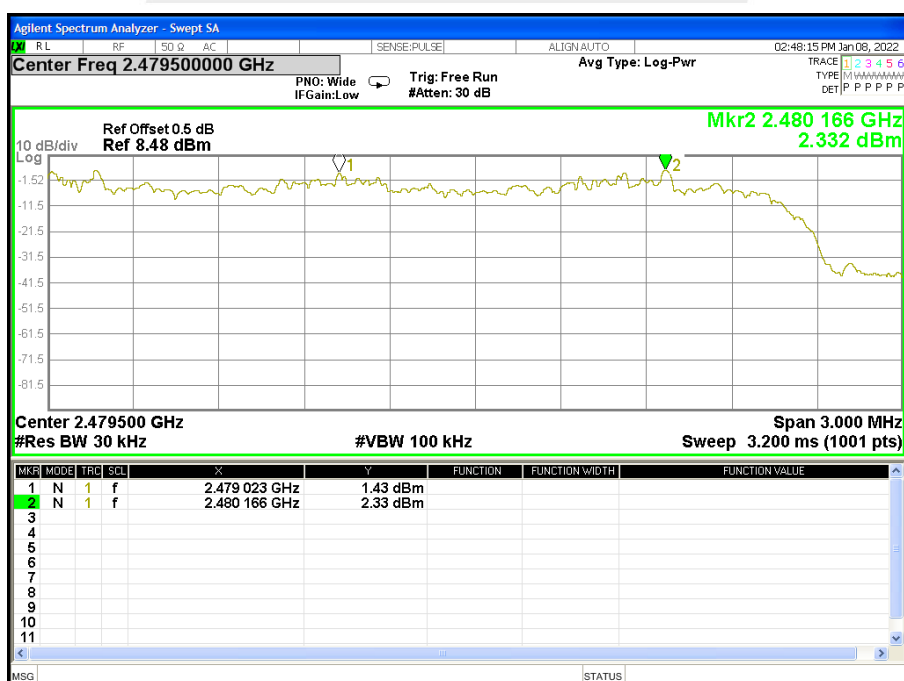




CH39 -2Mbps

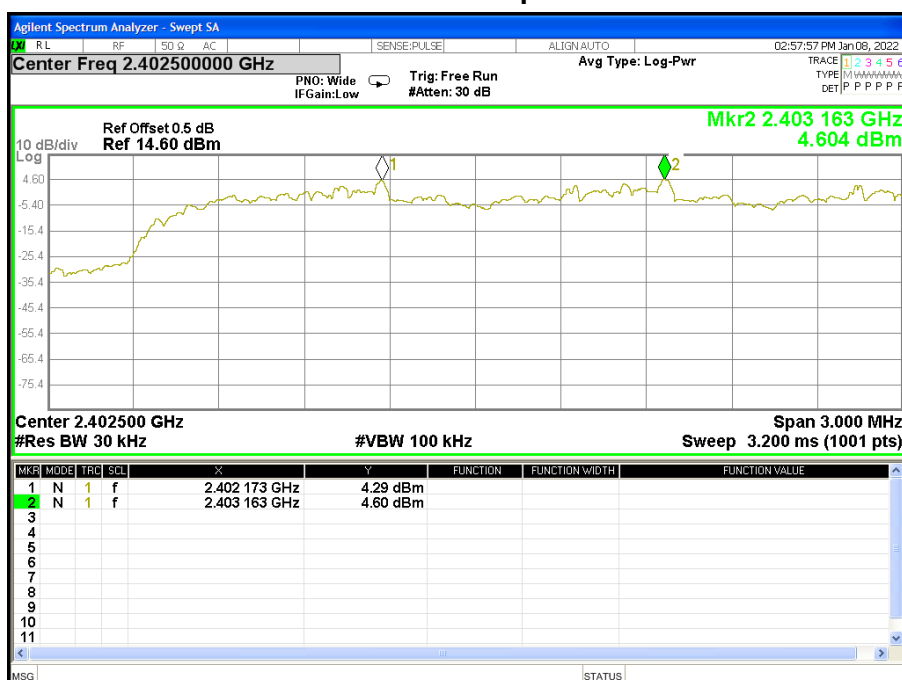


CH78 -2Mbps

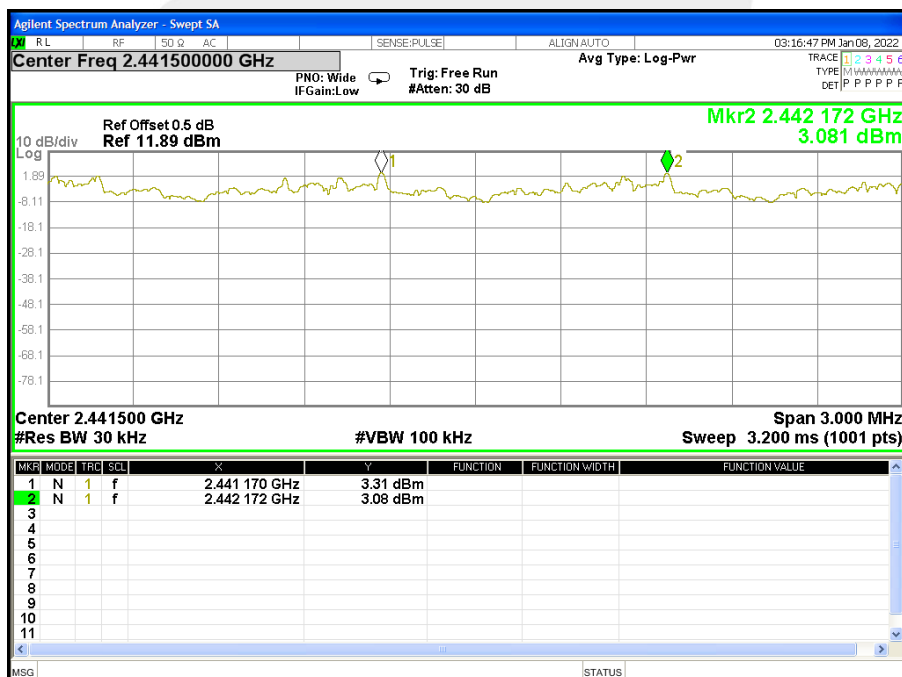




CH00 -3Mbps

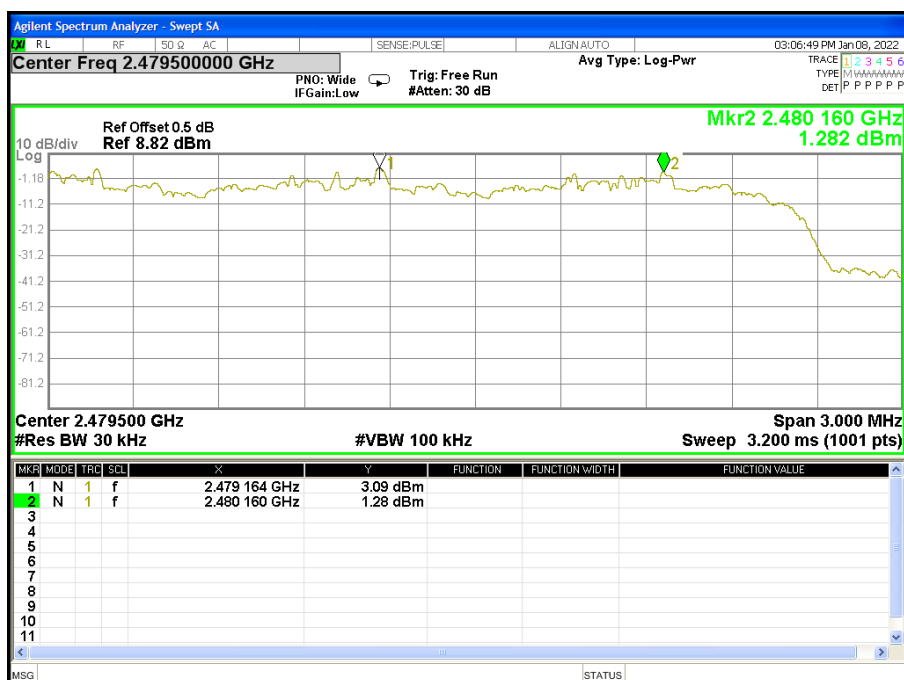


CH39 -3Mbps





CH78 -3Mbps





8. BANDWIDTH TEST

8.1 LIMIT

FCC Part15 15.247,Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)	Bandwidth	N/A	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

8.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- Spectrum Setting: RBW= 30KHz, VBW=100KHz, Sweep time = Auto.

8.3 TEST SETUP



8.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.



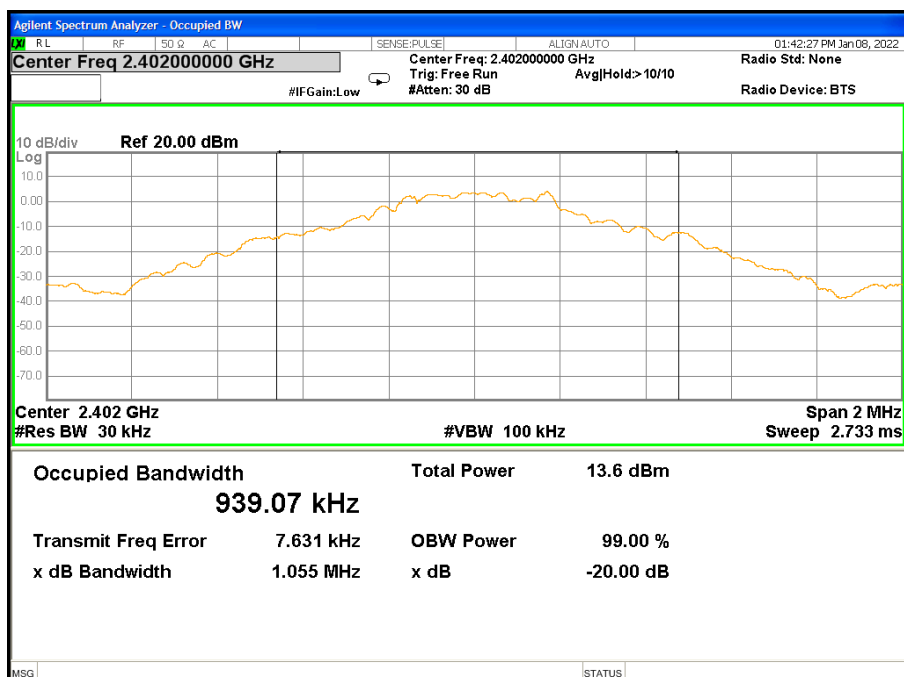
8.5 TEST RESULTS

Temperature:	25°C	Relative Humidity:	50%
Test Mode:	GFSK/ π /4-DQPSK/8DPSK	Test Voltage:	DC 3.85V

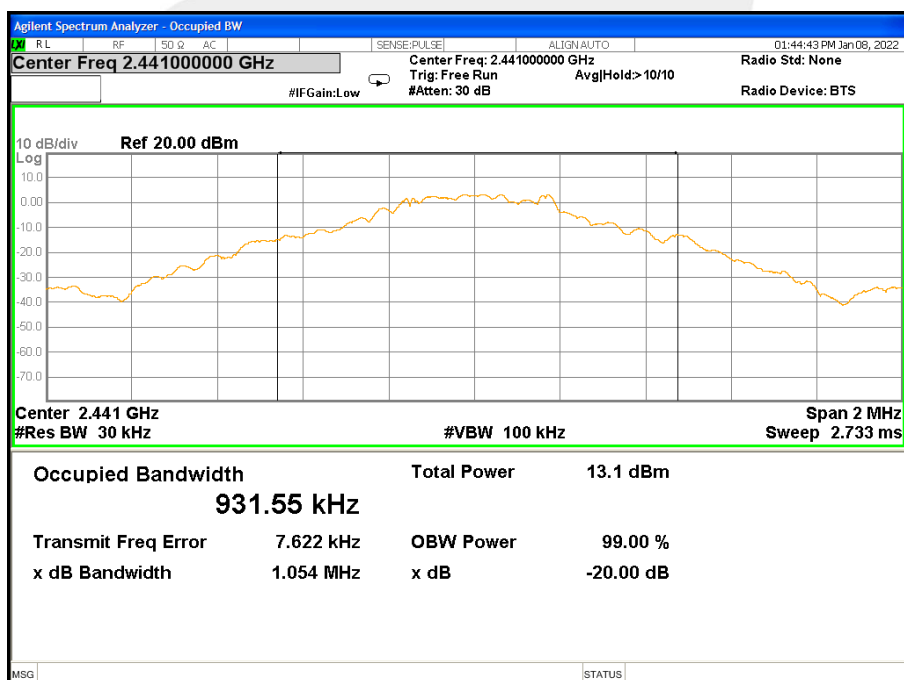
Modulation	Frequency (MHz)	-20 dB Bandwidth (MHz)	Result
GFSK	2402	1.0550	Pass
	2441	1.0540	Pass
	2480	1.0380	Pass
π /4DQPSK	2402	1.319	Pass
	2441	1.315	Pass
	2480	1.305	Pass
8DPSK	2402	1.304	Pass
	2441	1.299	Pass
	2480	1.293	Pass



CH00 -1Mbps

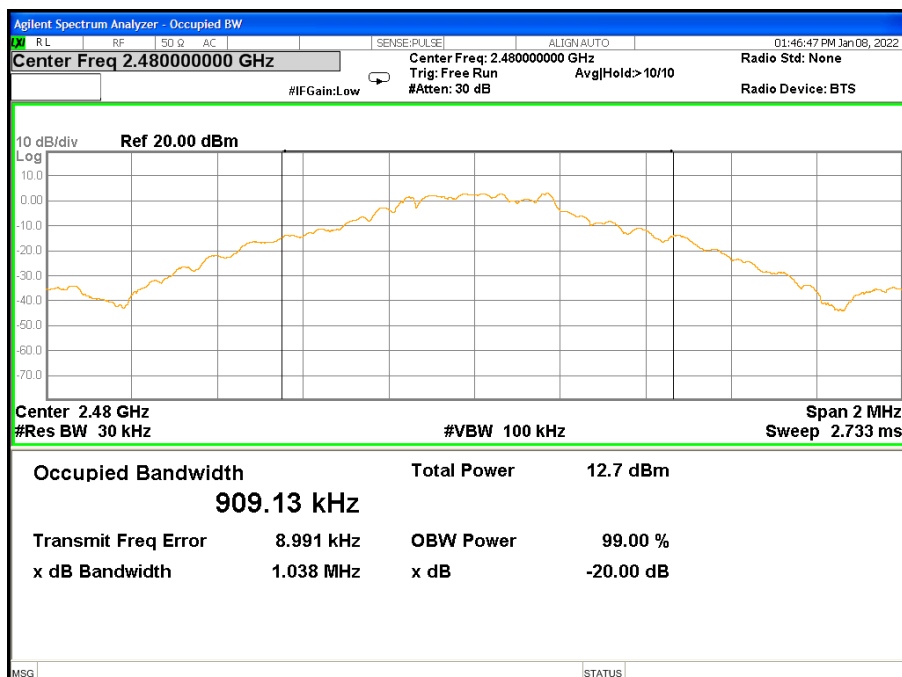


CH39 -1Mbps

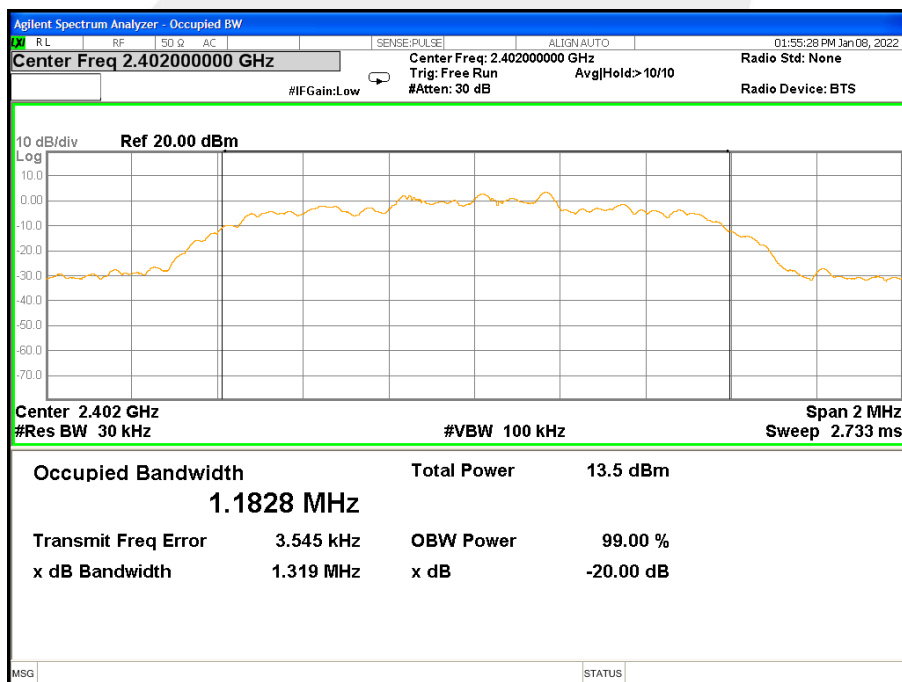




CH78 -1Mbps

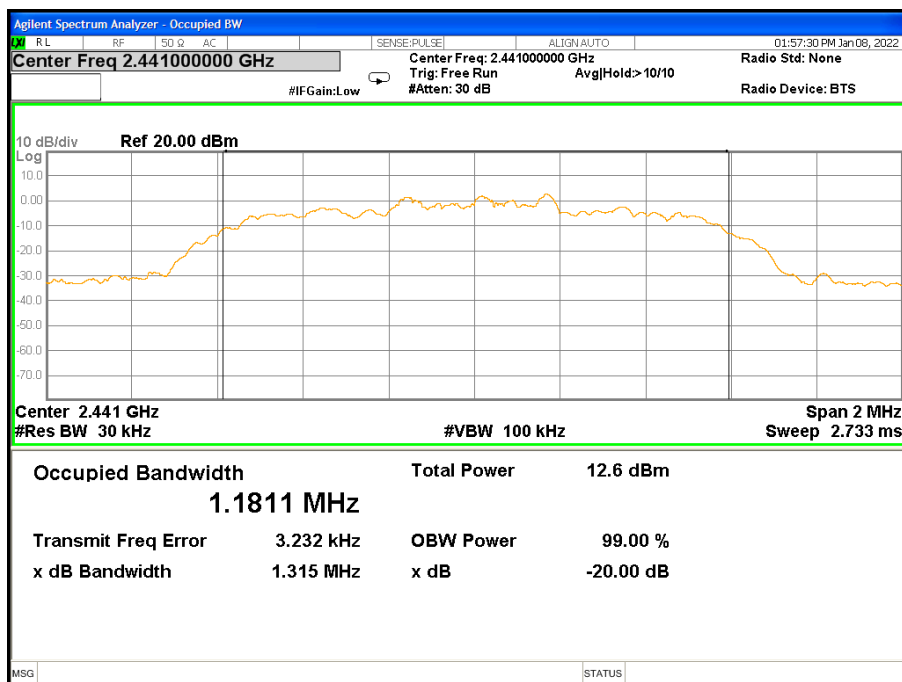


CH00 -2Mbps

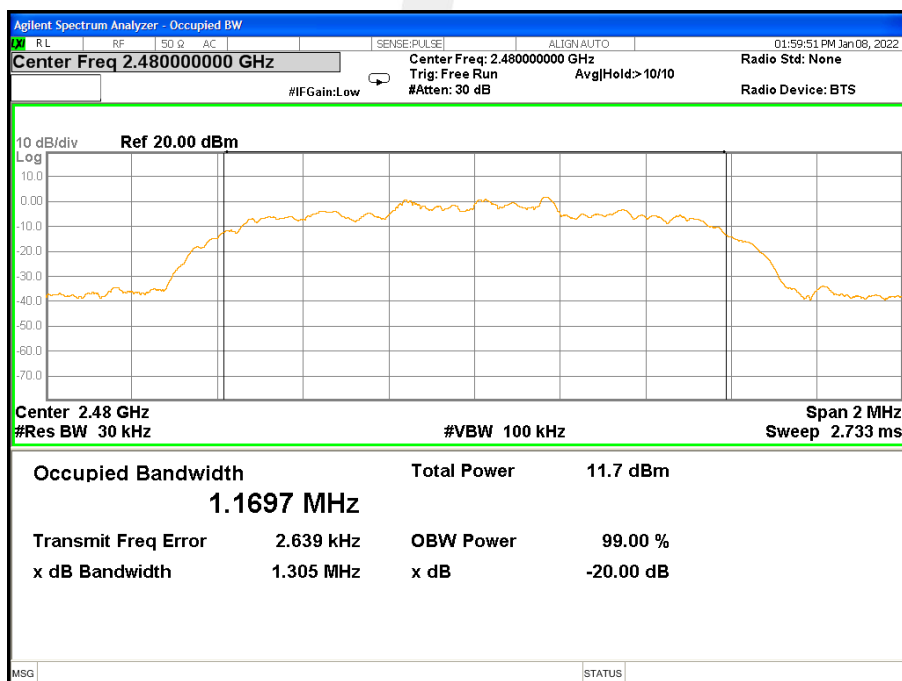




CH39 -2Mbps

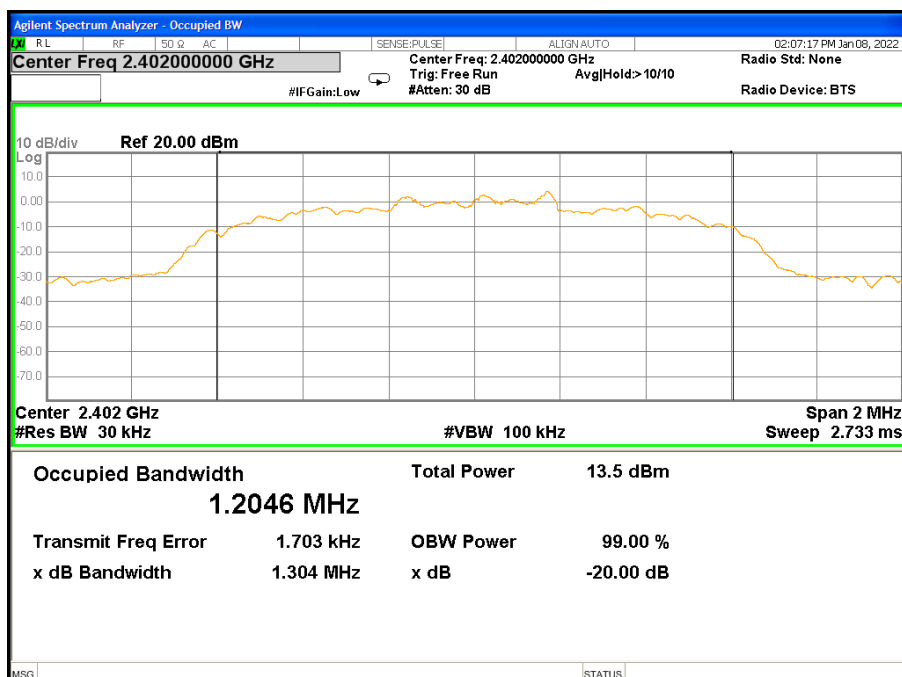


CH78 -2Mbps

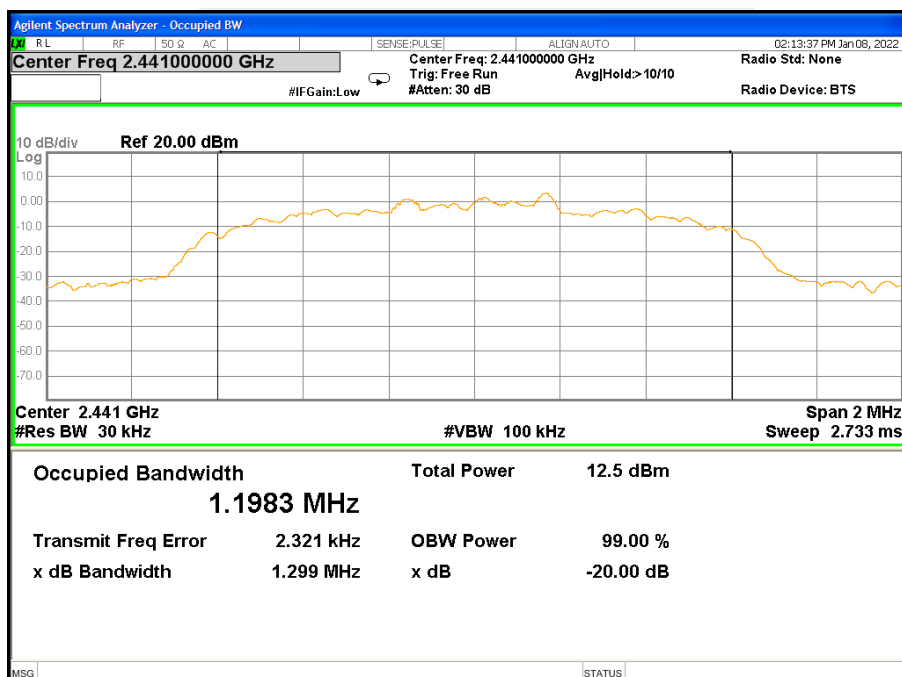




CH00 -3Mbps

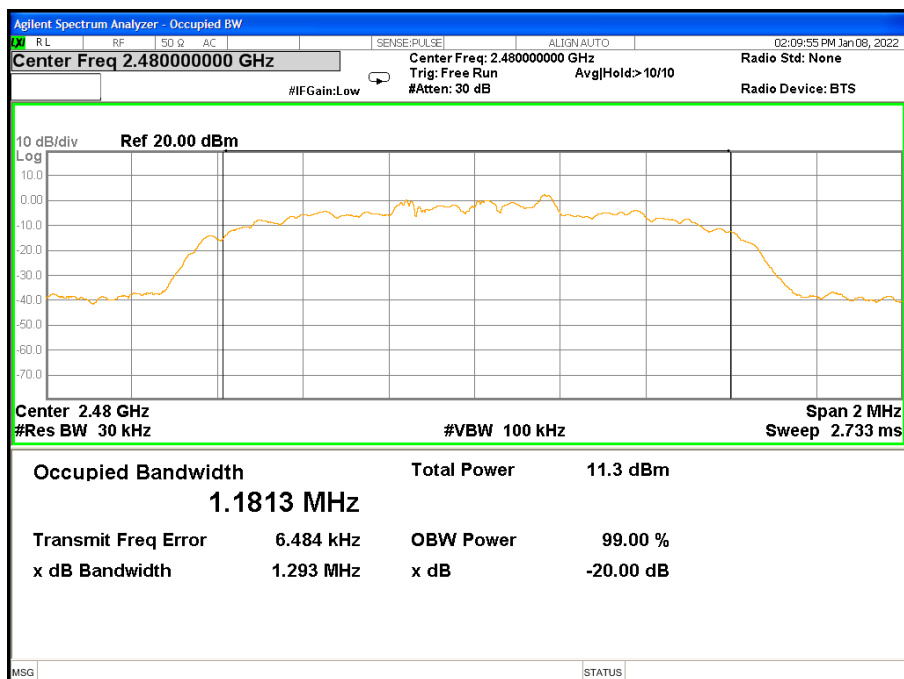


CH39 -3Mbps





CH78 -3Mbps





9. OUTPUT POWER TEST

9.1 LIMIT

FCC Part 15.247, Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)&(b)(1)	Output Power	1 W or 0.125W	2400-2483.5	PASS
		if channel separation > 2/3 bandwidth provided the systems operate with an output power no greater than 125 mW (20.97 dBm)		

9.2 TEST PROCEDURE

This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:

a) Use the following spectrum analyzer settings:

1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.

2) RBW > 20 dB bandwidth of the emission being measured.

3) VBW ≥ RBW.

4) Sweep: Auto.

5) Detector function: Peak.

6) Trace: Max hold.

b) Allow trace to stabilize.

c) Use the marker-to-peak function to set the marker to the peak of the emission.

d) The indicated level is the peak output power, after any corrections for external attenuators and cables.

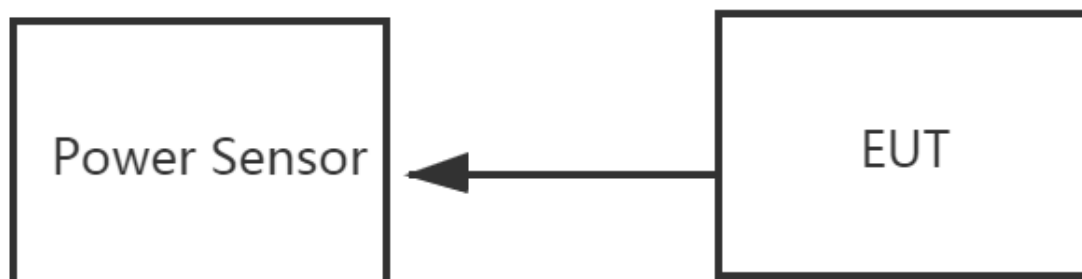
e) A plot of the test results and setup description shall be included in the test report.

NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

PKPM1 Peak power meter method:

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DSS bandwidth and shall use a fast-responding diode detector.

9.3 TEST SETUP



9.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.



9.5 TEST RESULTS

Temperature:	25°C	Relative Humidity:	60%
Test Voltage:	DC 3.85V		

Modulation	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	Limit (dBm)
GFSK (1M)	2402	7.48	5.67	20.97
	2441	6.34	4.58	20.97
	2480	5.92	4.22	20.97
$\pi/4$ -DQPSK (2M)	2402	7.25	3.93	20.97
	2441	6.13	2.73	20.97
	2480	5.67	2.13	20.97
8-DPSK (3M)	2402	7.18	3.97	20.97
	2441	6.04	2.76	20.97
	2480	5.68	2.06	20.97



10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: 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.

10.2 EUT ANTENNA

The EUT antenna is PIFA Antenna. It comply with the standard requirement.





APPENDIX-PHOTOS OF TEST SETUP

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

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