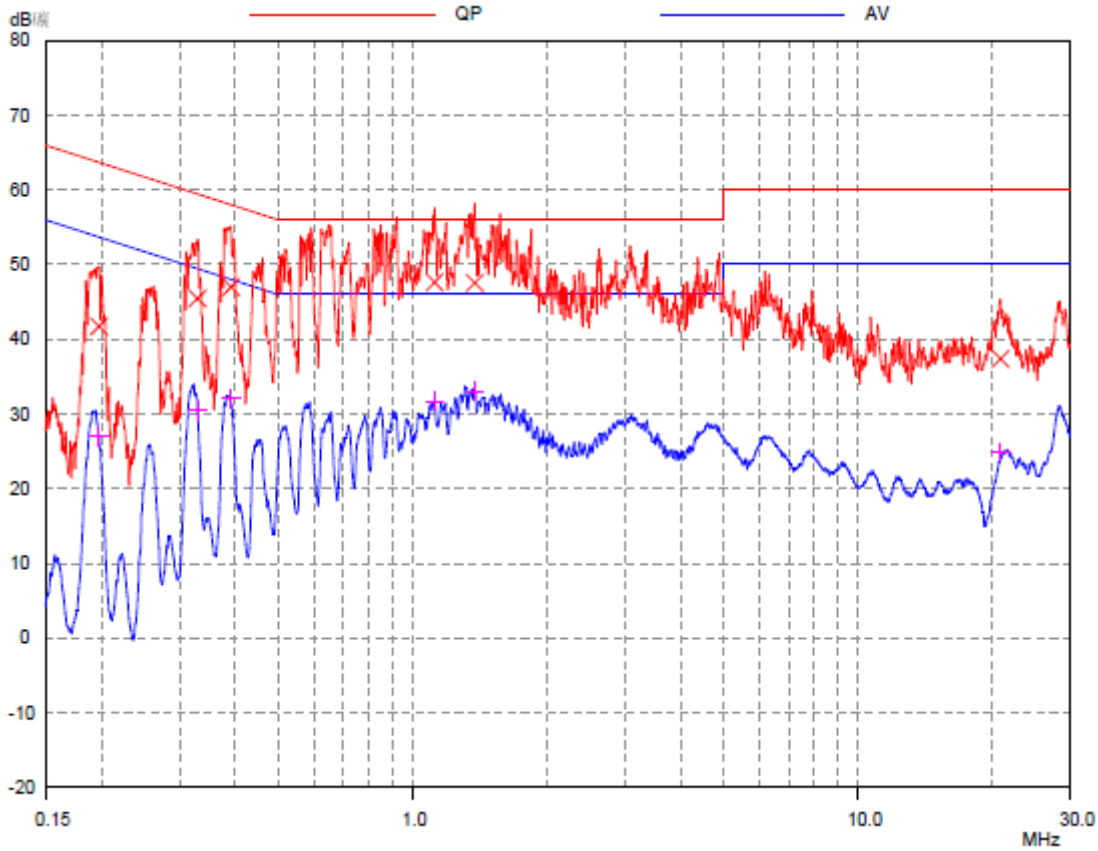
N line



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.198	41.74	63.71	21.97	27.00	53.71	26.71
0.329	45.48	59.47	13.99	30.47	49.47	19.00
0.391	47.00	58.04	11.04	32.10	48.04	15.94
1.122	47.63	56.00	8.37	31.75	46.00	14.25
1.380	47.55	56.00	8.45	33.02	46.00	12.98
20.926	37.41	60.00	22.59	24.96	50.00	25.04

Remark: 1. Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = Limit - Corrected Reading
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

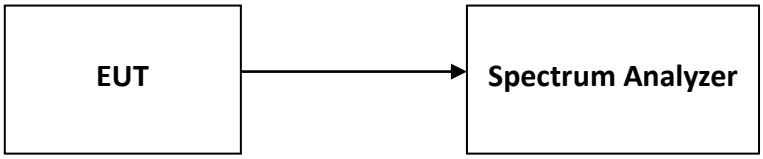
9 Number of Hopping Frequencies

Test result:Pass

9.1 Limit

Number of Hopping Frequencies in the 2400-2483.5 MHz band shall use at least 15 channels.

9.2 Test Configuration



9.3 Test procedure and test setup

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
c) VBW ≥ RBW.
d) Sweep: Auto.
e) Detector function: Peak.
f) Trace: Max hold.
g) Allow the trace to stabilize.

9.4 Test Results of Number of Hopping Frequencies

Please refer to Appendix A

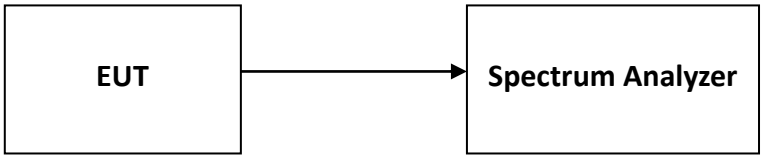
10 Dwell Time

Test result:Pass

10.1 Limit

The dwell time on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

10.2 Test Configuration



10.3 Test procedure and test setup

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

a) Span: Zero span, centered on a hopping channel.
b) RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
d) Detector function: Peak.
e) Trace: Max hold.

Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:
(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time)

The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.

The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT.

10.4 Test Results of Dwell Time

Please refer to Appendix A

11 Occupied Bandwidth

Test result: **Tested**

11.1 Limit

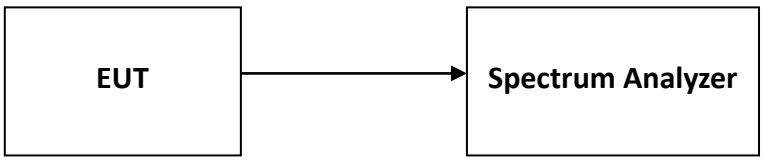
None

11.2 Measurement Procedure

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

11.3 Test Configuration



11.4 The results of Occupied Bandwidth

Please refer to Appendix A

12 Antenna requirement

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.

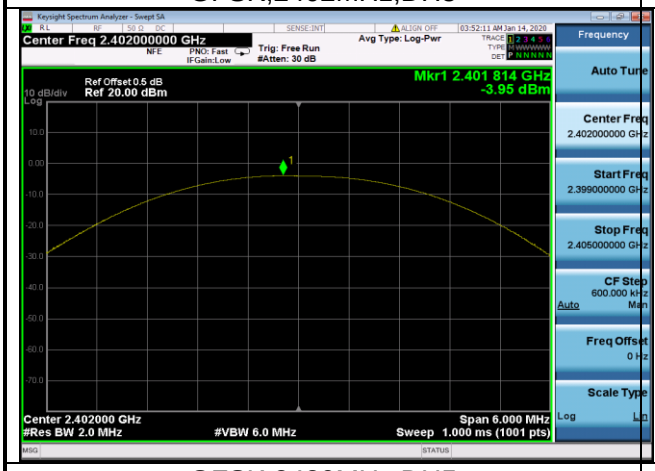
Result:
EUT uses permanently attached antenna to the intentional radiator, so it can comply with the provisions of this section.

Appendix A

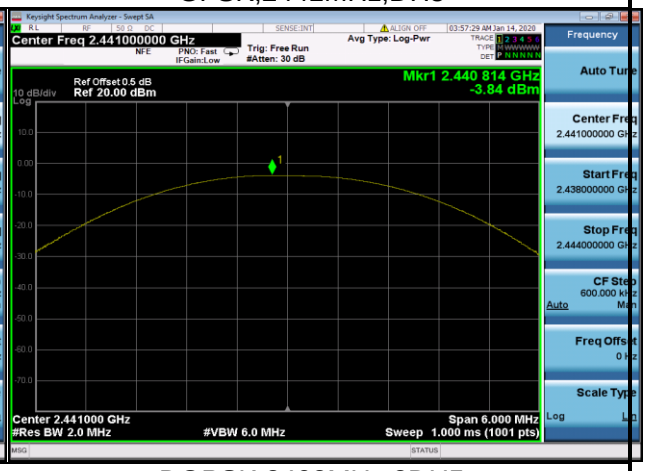
1. RF Output Power

BT Maximum Output Power				
Mode	Test Frequency (MHz)	Packet Type	Power (dBm)	Result
GFSK	2402	DH5	-3.95	Pass
GFSK	2441	DH5	-3.84	Pass
GFSK	2480	DH5	-3.43	Pass
DQPSK	2402	2DH5	-3.46	Pass
DQPSK	2441	2DH5	-3.17	Pass
DQPSK	2480	2DH5	-2.72	Pass

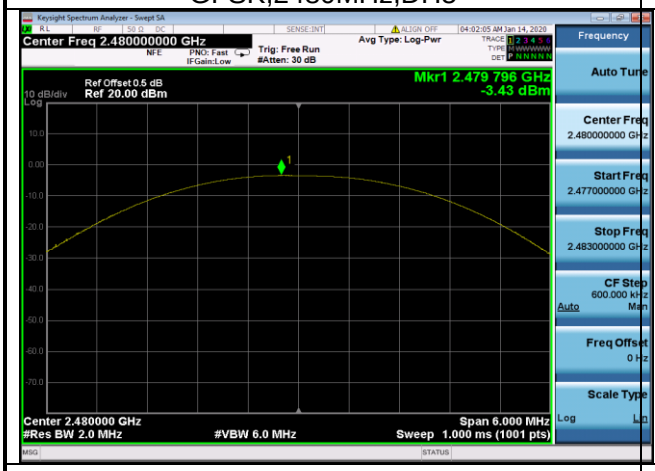
GFSK,2402MHz,DH5



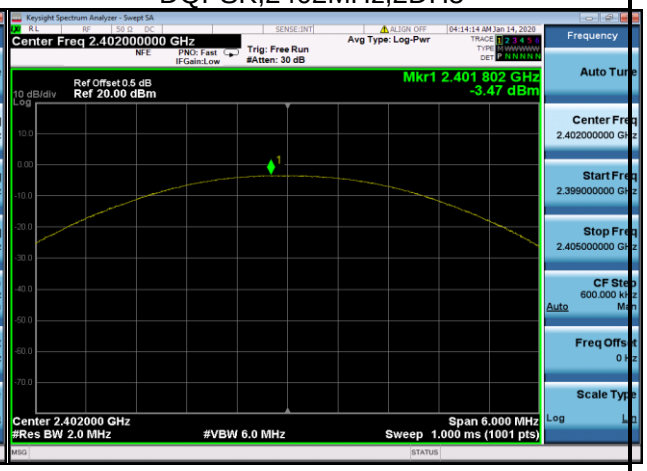
GFSK,2441MHz,DH5



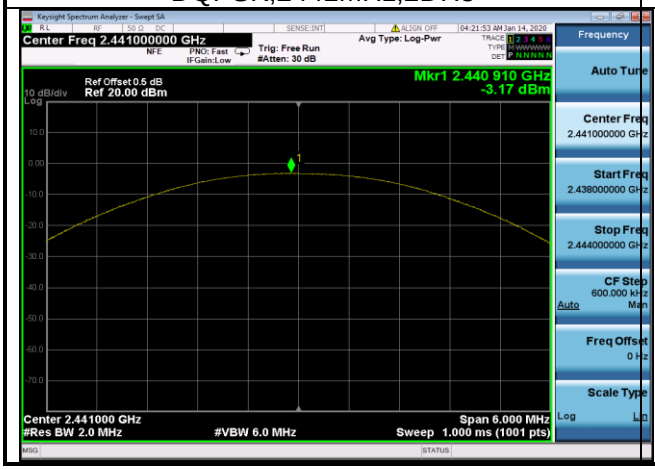
GFSK,2480MHz,DH5



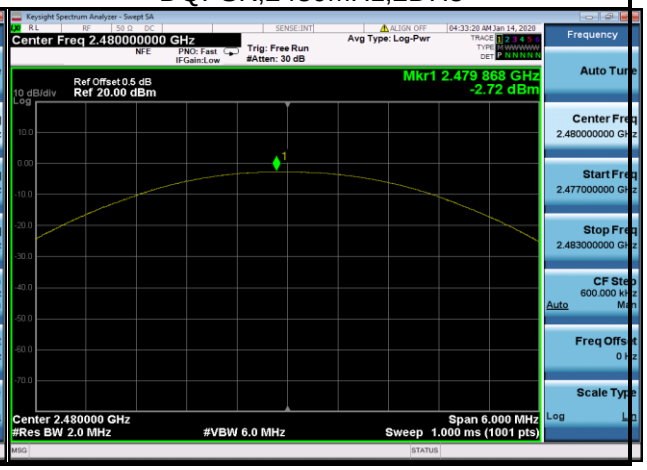
DQPSK,2402MHz,2DH5



DQPSK,2441MHz,2DH5



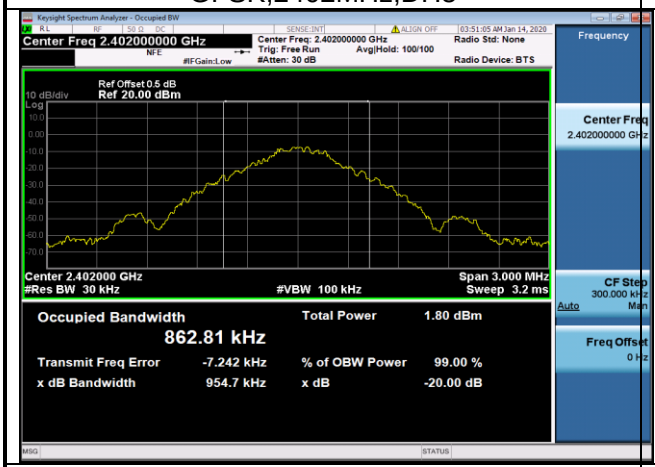
DQPSK,2480MHz,2DH5



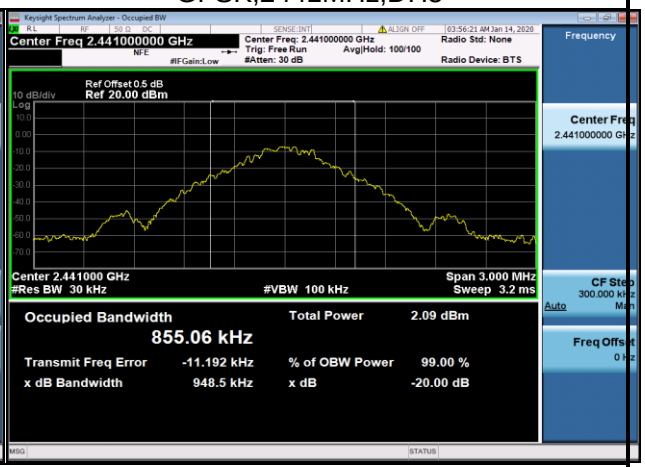
2. 20dB Down Bandwidth

BT Occupied 20dB Bandwidth				
Mode	Test Frequency (MHz)	Packet Type	20dB Bandwidth (kHz)	Result
GFSK	2402	DH5	954.7	Pass
GFSK	2441	DH5	948.5	Pass
GFSK	2480	DH5	951.9	Pass
DQPSK	2402	2DH5	1325.8	Pass
DQPSK	2441	2DH5	1316.7	Pass
DQPSK	2480	2DH5	1331.7	Pass

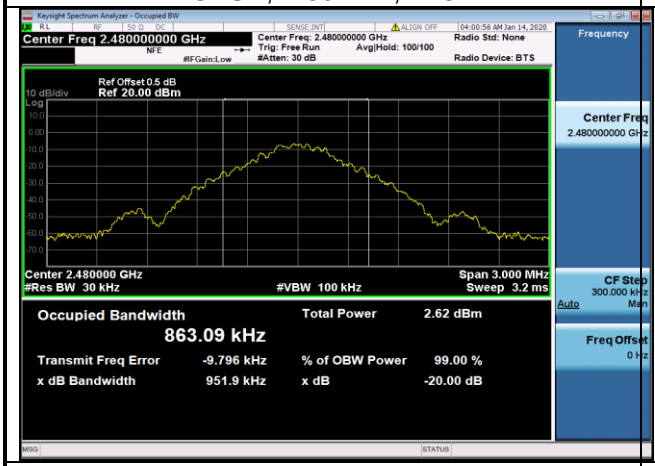
GFSK,2402MHz,DH5



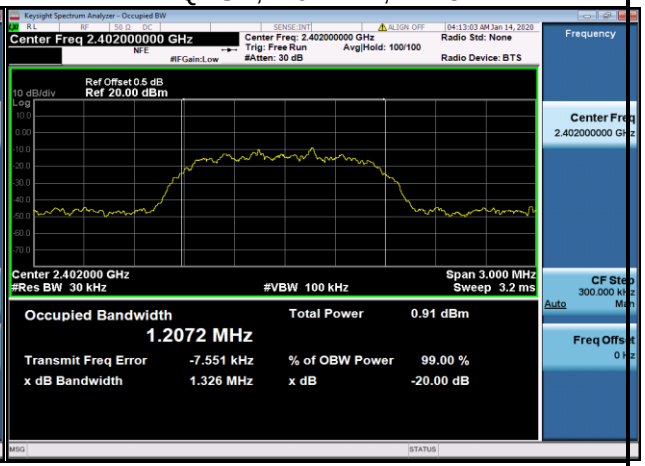
GFSK,2441MHz,DH5



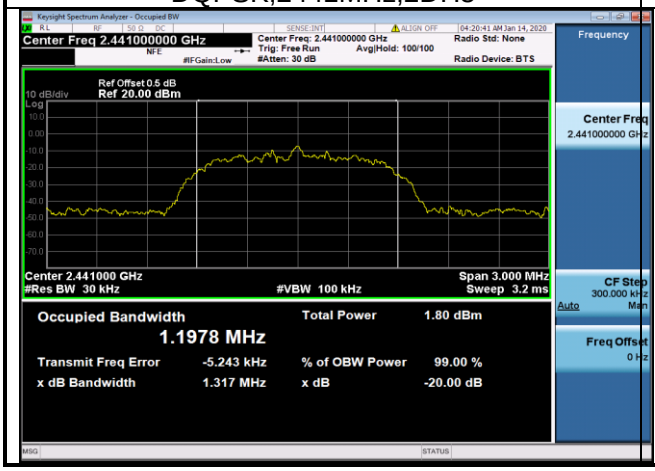
GFSK,2480MHz,DH5



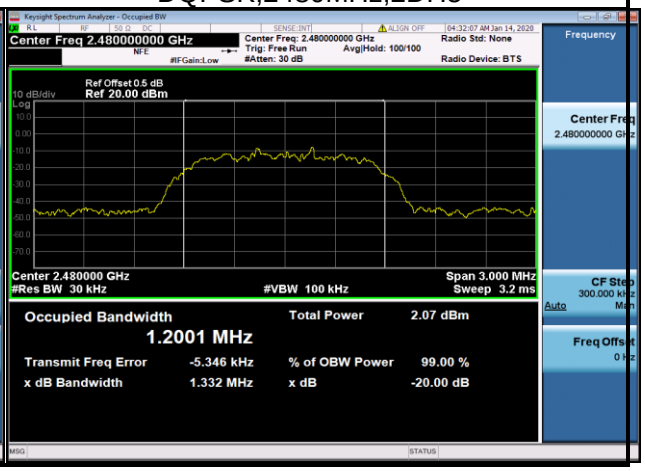
DQPSK,2402MHz,2DH5



DQPSK,2441MHz,2DH5



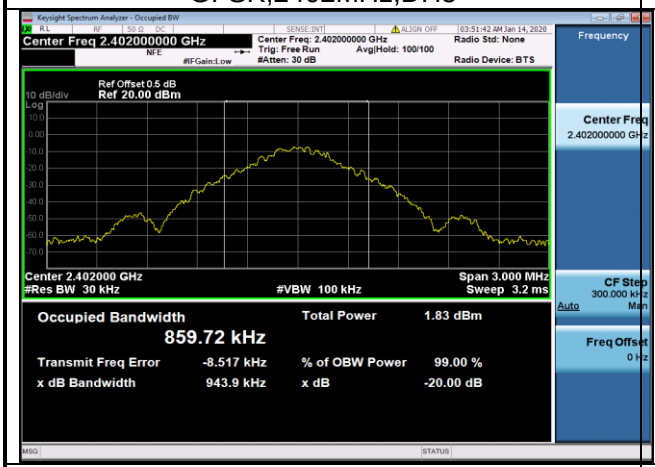
DQPSK,2480MHz,2DH5



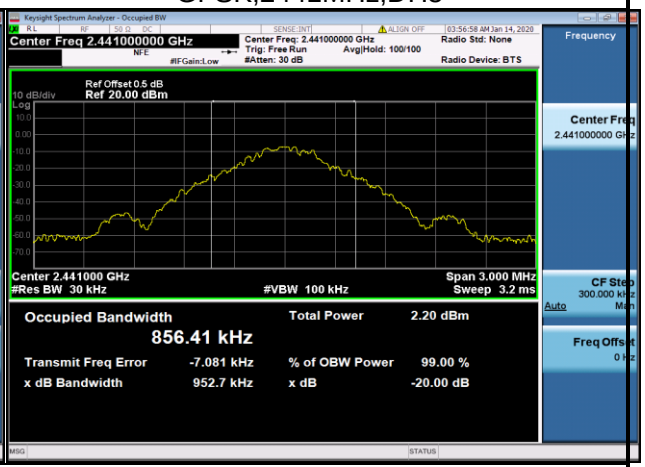
3. 99% BandWidth

BT 99% Occupied Bandwidth				
Mode	Test Frequency (MHz)	Packet Type	99% Occupied Bandwidth (kHz)	Result
GFSK	2402	DH5	859.72	Pass
GFSK	2441	DH5	856.41	Pass
GFSK	2480	DH5	859.72	Pass
DQPSK	2402	2DH5	1198.08	Pass
DQPSK	2441	2DH5	1196.51	Pass
DQPSK	2480	2DH5	1188.02	Pass

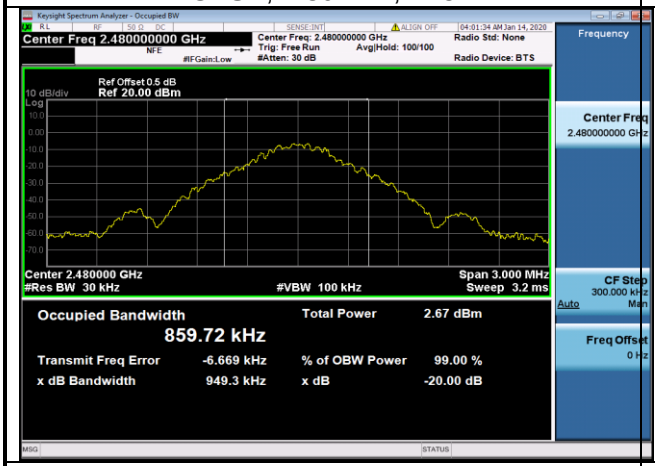
GFSK,2402MHz,DH5



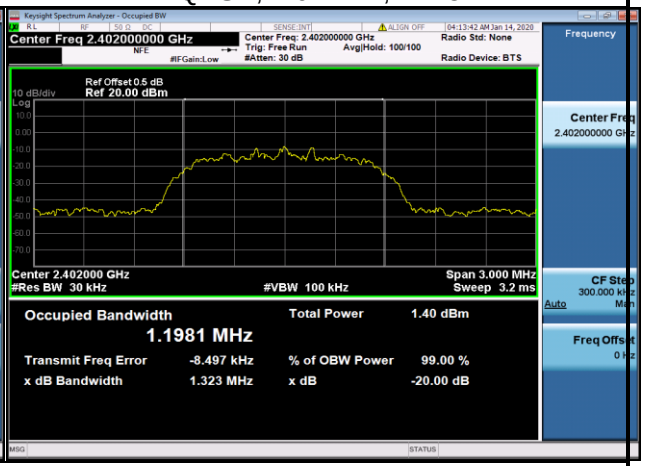
GFSK,2441MHz,DH5



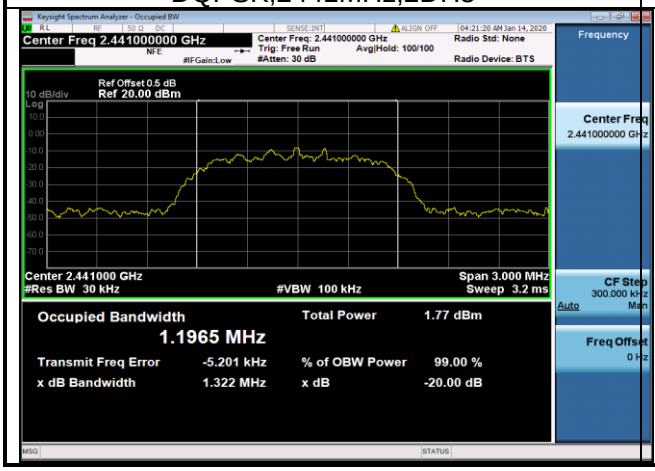
GFSK,2480MHz,DH5



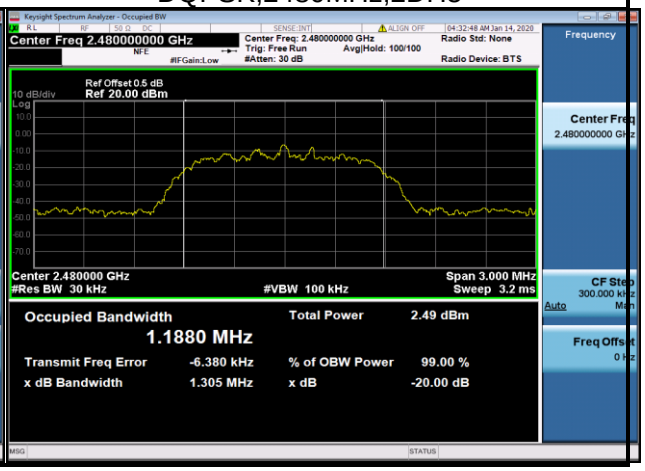
DQPSK,2402MHz,2DH5



DQPSK,2441MHz,2DH5



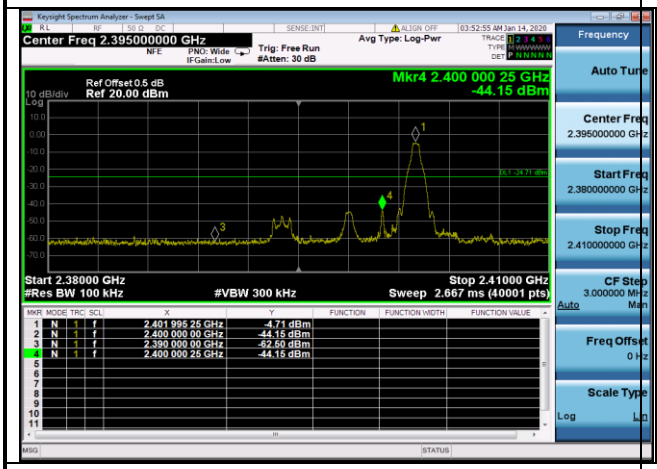
DQPSK,2480MHz,2DH5



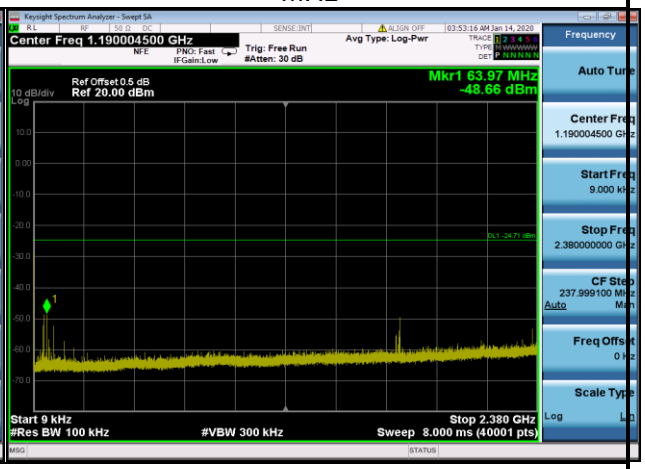
4. Transmitter Spurious Emission

BT Transmitter Spurious Emission					
Mode	Test Frequency (MHz)	Packet Type	Frequency Range	Power (dBm)	Result
GFSK	2402	DH5	0.009MHz~2380MHz	-48.66	Pass
GFSK	2402	DH5	10000MHz~25000MHz	-52.84	Pass
GFSK	2402	DH5	2410MHz~10000MHz	-50.72	Pass
GFSK	2402	DH5	Band Edge	-44.15	Pass
GFSK	2441	DH5	0.009MHz~2300MHz	-47.81	Pass
GFSK	2441	DH5	10000MHz~25000MHz	-52.66	Pass
GFSK	2441	DH5	2500MHz~10000MHz	-49.44	Pass
GFSK	2441	DH5	Band Edge	-49.35	Pass
GFSK	2480	DH5	0.009MHz~2475MHz	-44.93	Pass
GFSK	2480	DH5	10000MHz~25000MHz	-53.11	Pass
GFSK	2480	DH5	2505MHz~10000MHz	-47.58	Pass
GFSK	2480	DH5	Band Edge	-56.41	Pass
DQPSK	2402	2DH5	0.009MHz~2380MHz	-41.07	Pass
DQPSK	2402	2DH5	10000MHz~25000MHz	-53.02	Pass
DQPSK	2402	2DH5	2410MHz~10000MHz	-49.36	Pass
DQPSK	2402	2DH5	Band Edge	-43.95	Pass
DQPSK	2441	2DH5	0.009MHz~2300MHz	-46.27	Pass
DQPSK	2441	2DH5	10000MHz~25000MHz	-52.53	Pass
DQPSK	2441	2DH5	2500MHz~10000MHz	-50.22	Pass
DQPSK	2441	2DH5	Band Edge	-49.83	Pass
DQPSK	2480	2DH5	0.009MHz~2475MHz	-42.85	Pass
DQPSK	2480	2DH5	10000MHz~25000MHz	-52.24	Pass
DQPSK	2480	2DH5	2505MHz~10000MHz	-48.52	Pass
DQPSK	2480	2DH5	Band Edge	-56.06	Pass

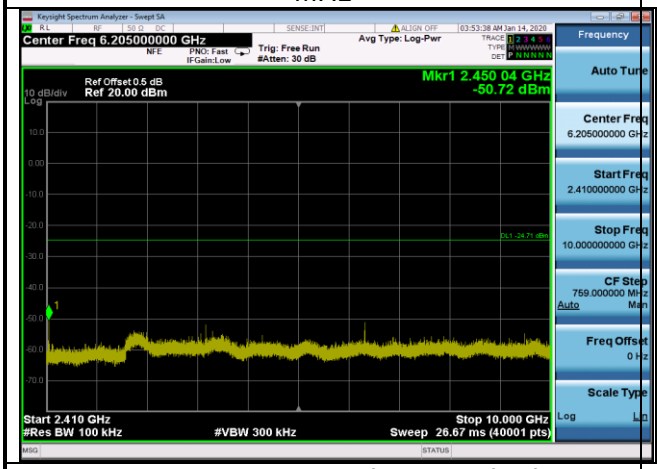
GFSK,2402MHz,DH5,Plot 1,Band Edge



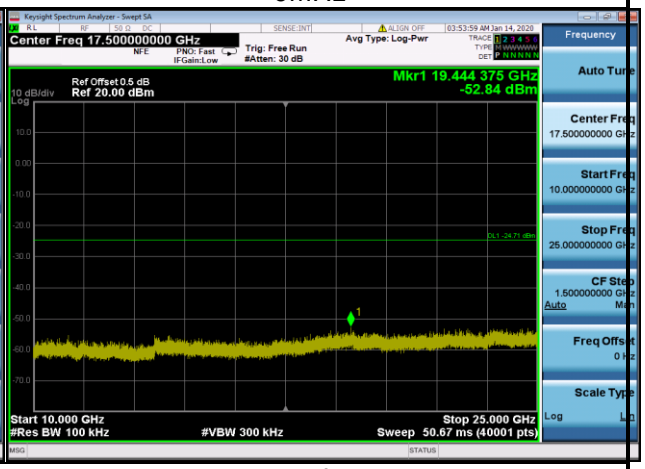
GFSK,2402MHz,DH5,Plot 2,0.009MHz~2380 MHz



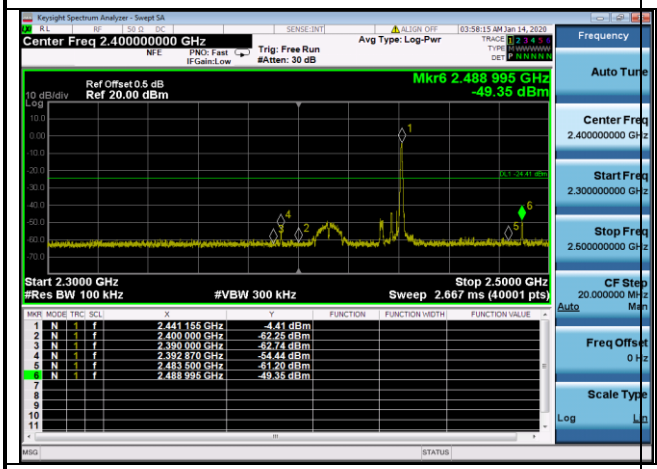
GFSK,2402MHz,DH5,Plot 3,2410MHz~10000 MHz



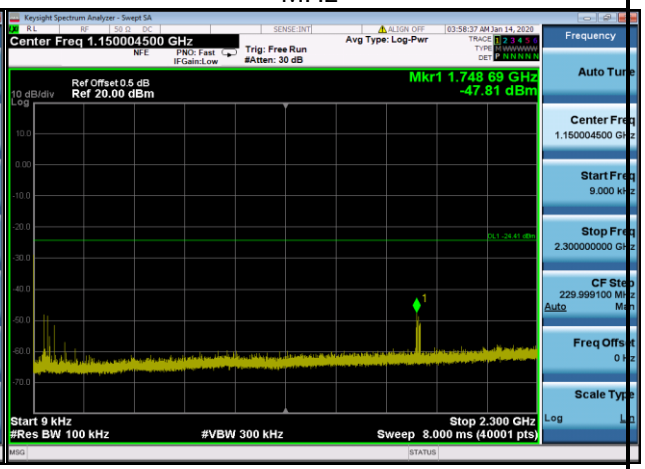
GFSK,2402MHz,DH5,Plot 4,10000MHz~25000MHz



GFSK,2441MHz,DH5,Plot 1,Band Edge

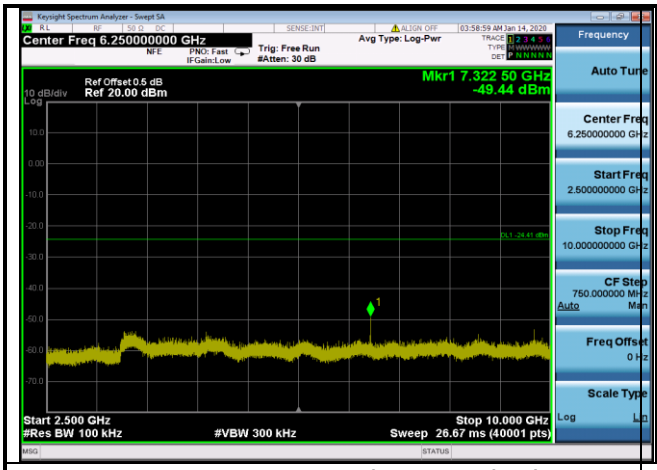


GFSK,2441MHz,DH5,Plot 2,0.009MHz~2300 MHz

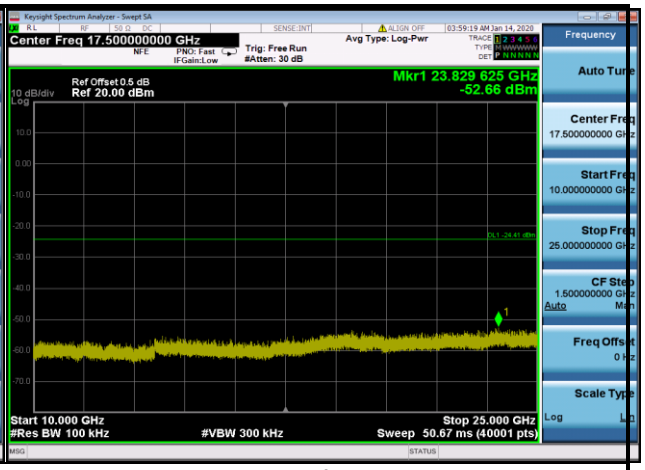


GFSK,2441MHz,DH5,Plot 3,2500MHz~10000 MHz

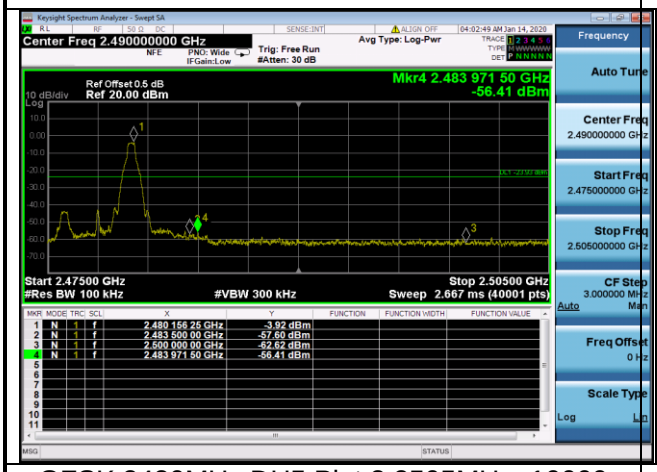
GFSK,2441MHz,DH5,Plot 4,10000MHz~25000MHz



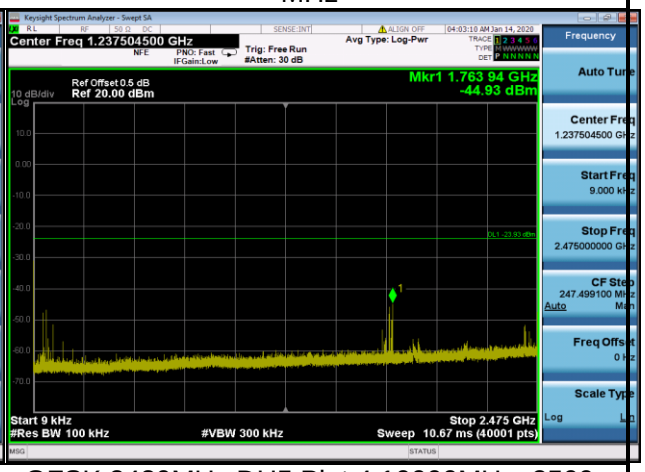
GFSK,2480MHz,DH5,Plot 1,Band Edge



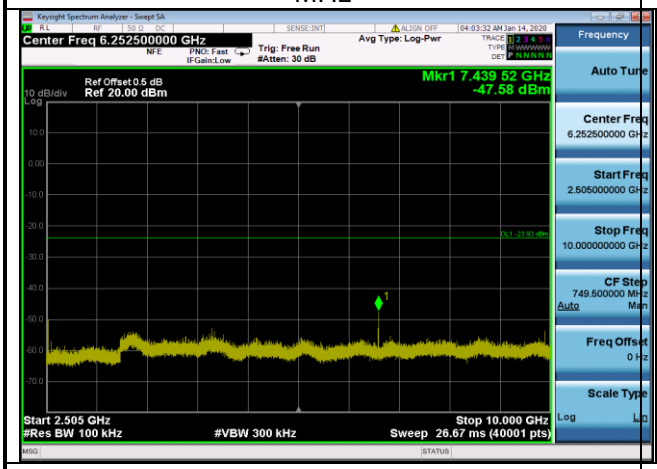
GFSK,2480MHz,DH5,Plot 2,0.009MHz~2475 MHz



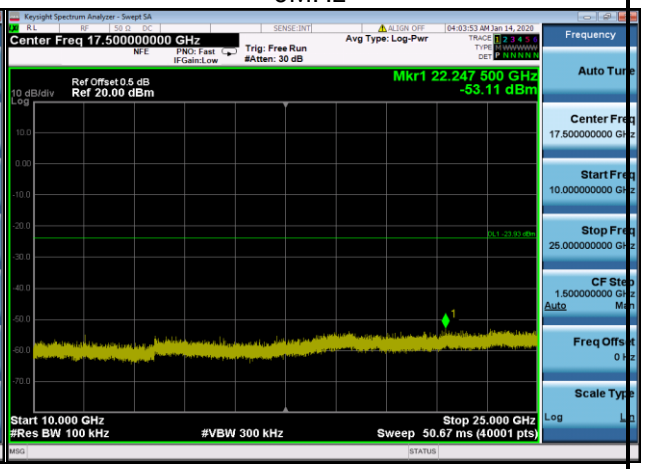
GFSK,2480MHz,DH5,Plot 3,2505MHz~10000 MHz



GFSK,2480MHz,DH5,Plot 4,10000MHz~25000MHz



DQPSK,2402MHz,2DH5,Plot 1,Band Edge



DQPSK,2402MHz,2DH5,Plot 2,0.009MHz~2380MHz