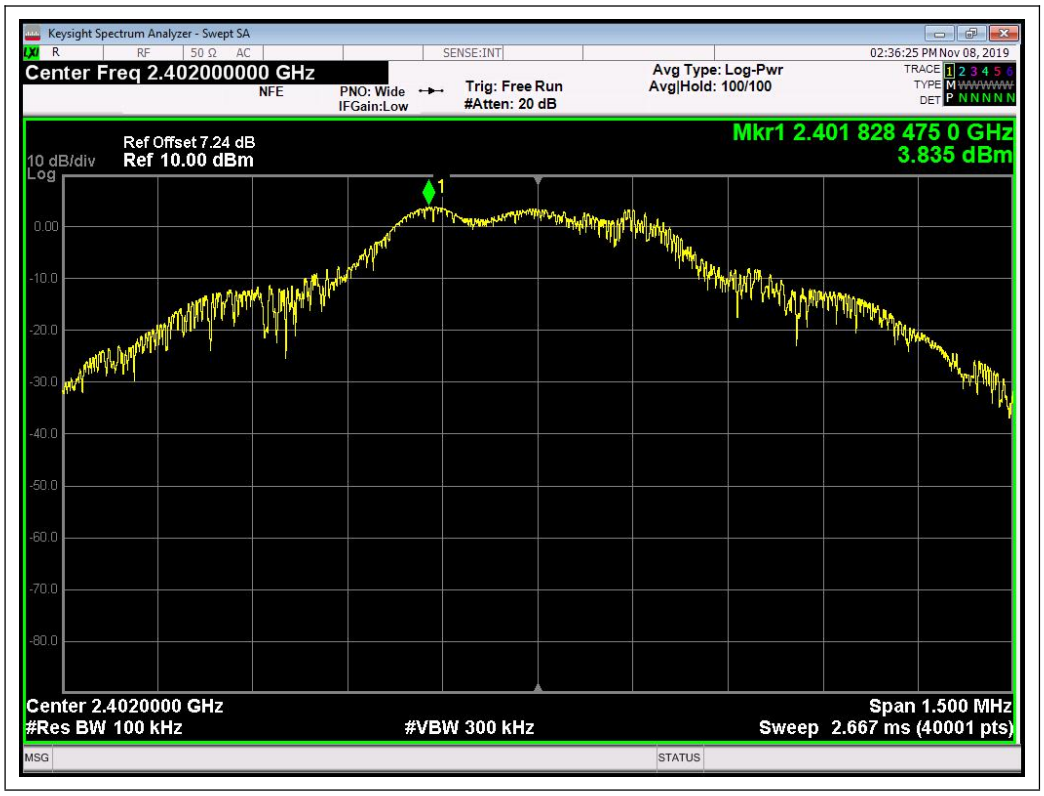
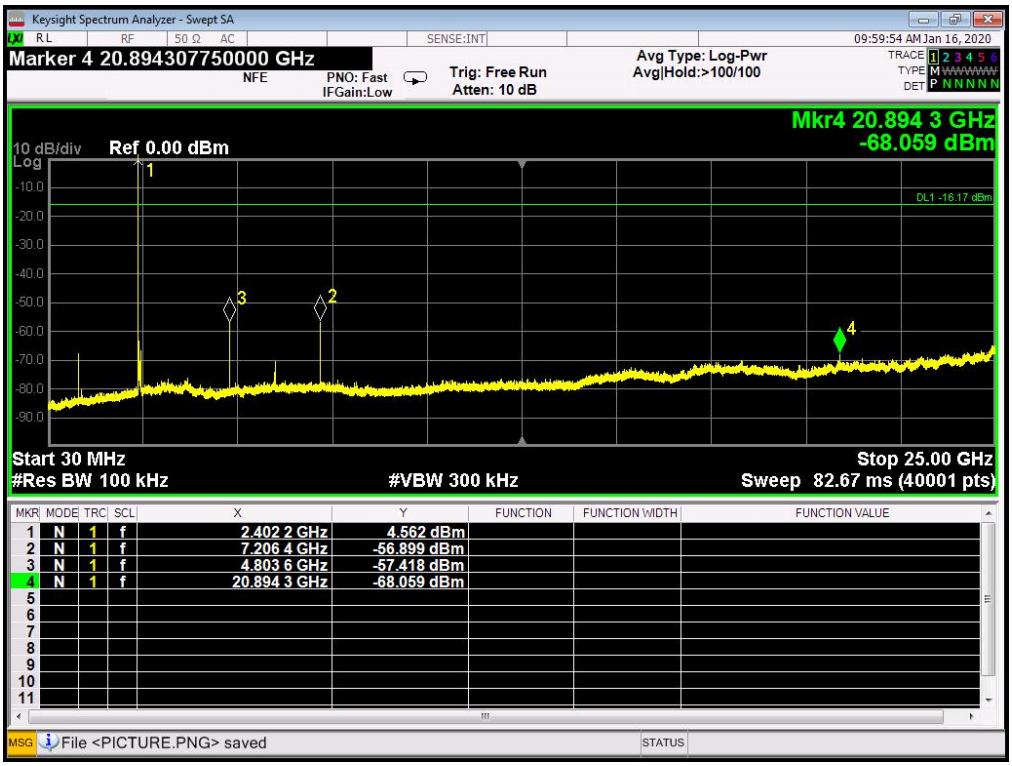
2.7.4. Test Result

The Bluetooth Module operates at hopping-off test mode. The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

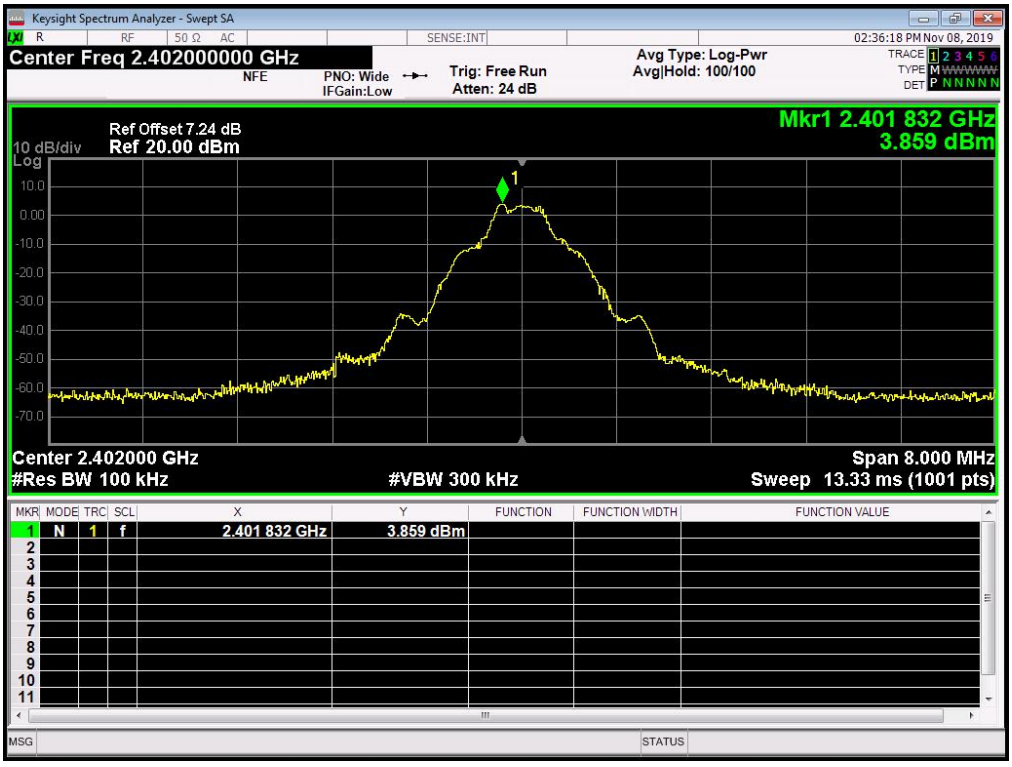
GFSK Mode



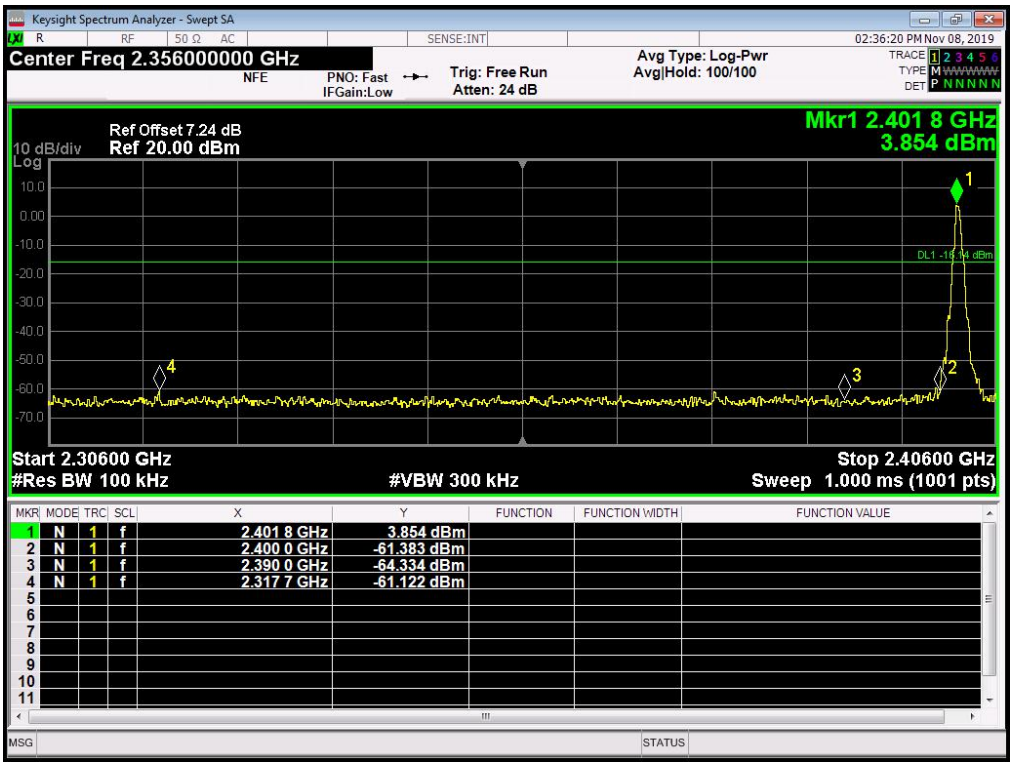
(Channel = 0, 30MHz to 25GHz, GFSK Mode peak power)



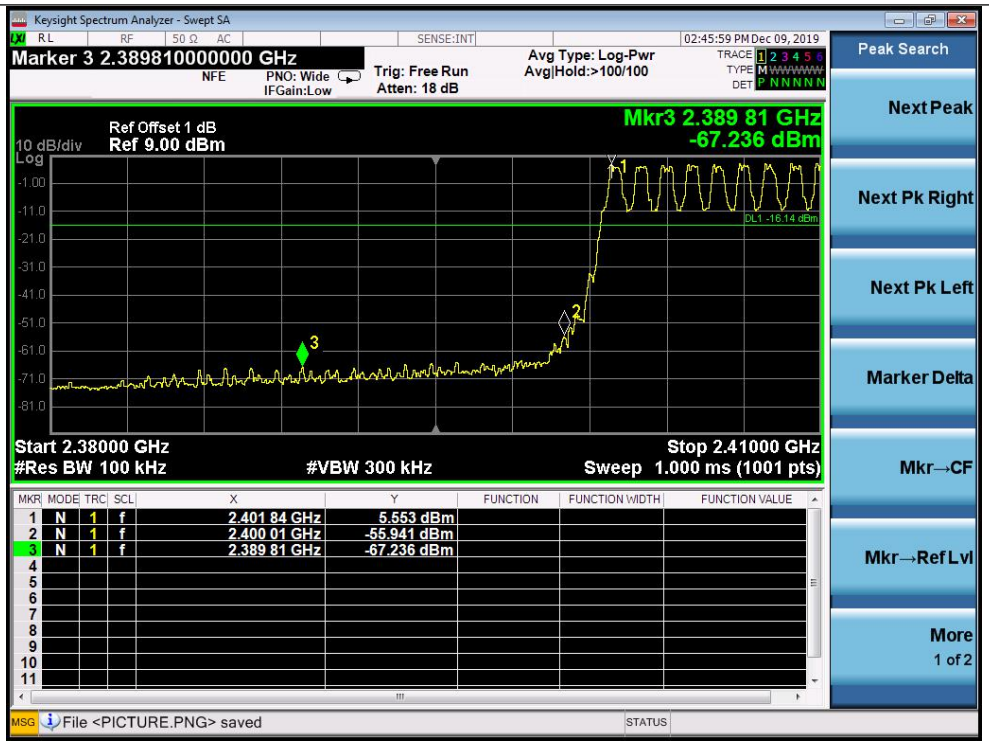
(Channel = 0, 30MHz to 25GHz, GFSK Mode)



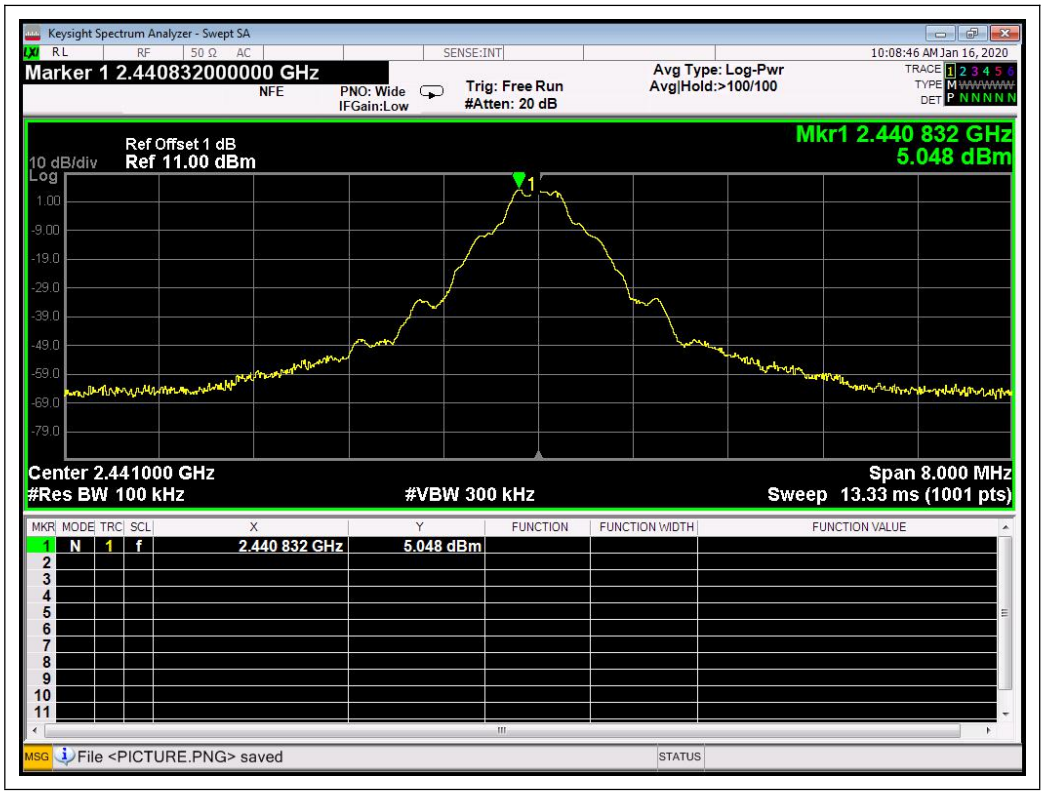
(Channel = 0, Band edge,GFSK Mode peak power)



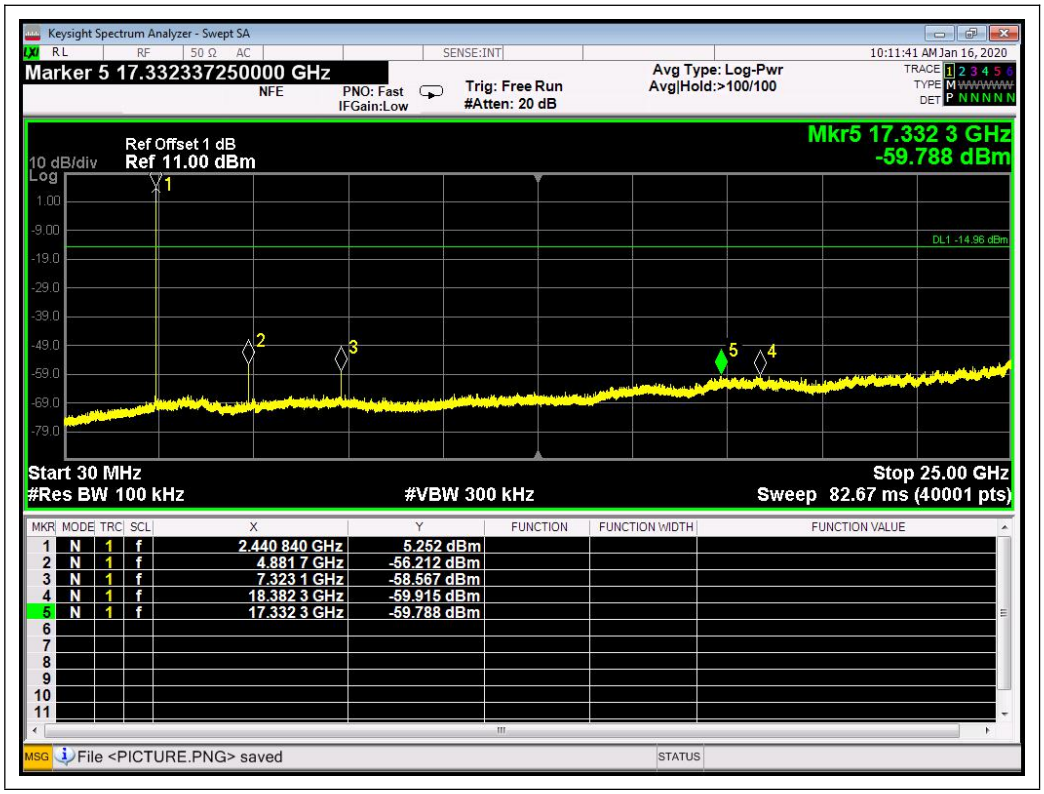
(Channel = 0, Band edge,GFSK Mode)



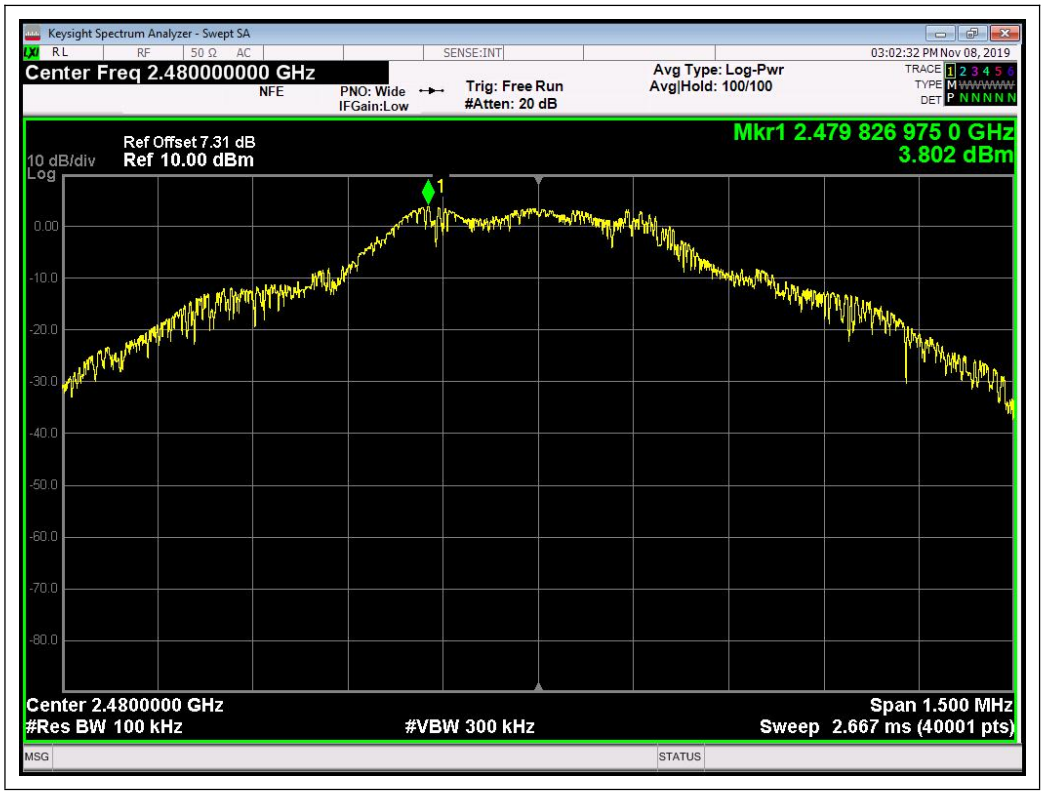
(Channel = 0, Band edge with hopping on, GFSK Mode)



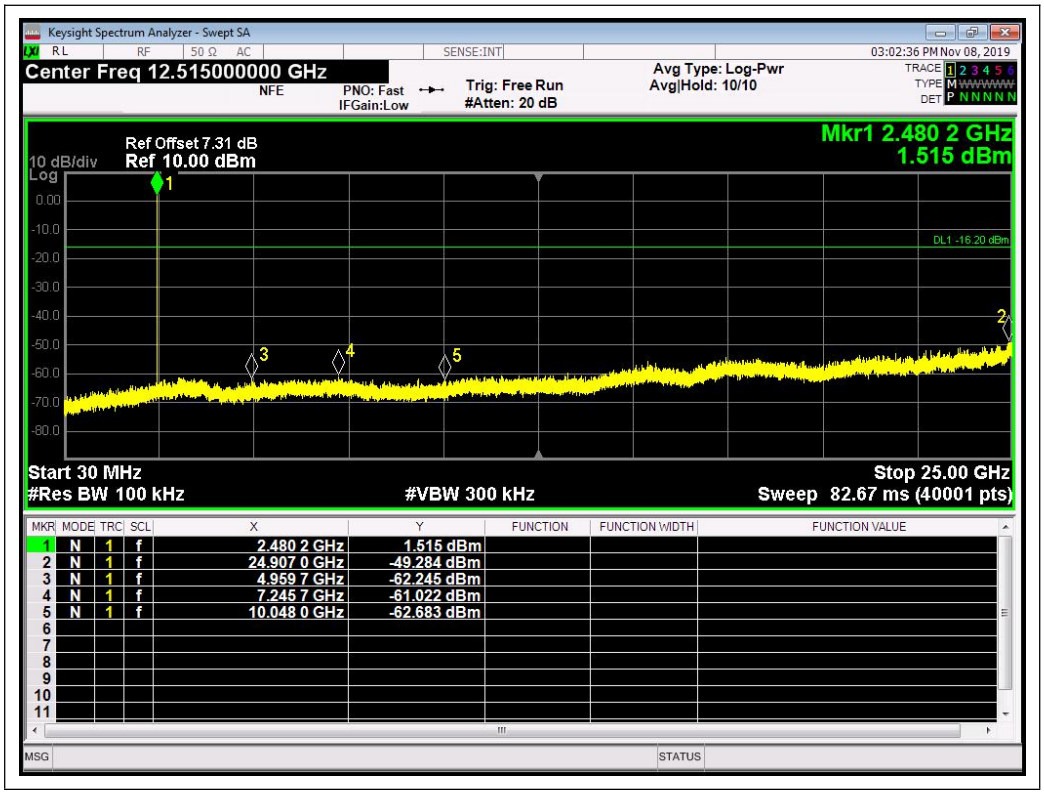
(Channel = 39, 30MHz to 25GHz, GFSK Mode peak power)



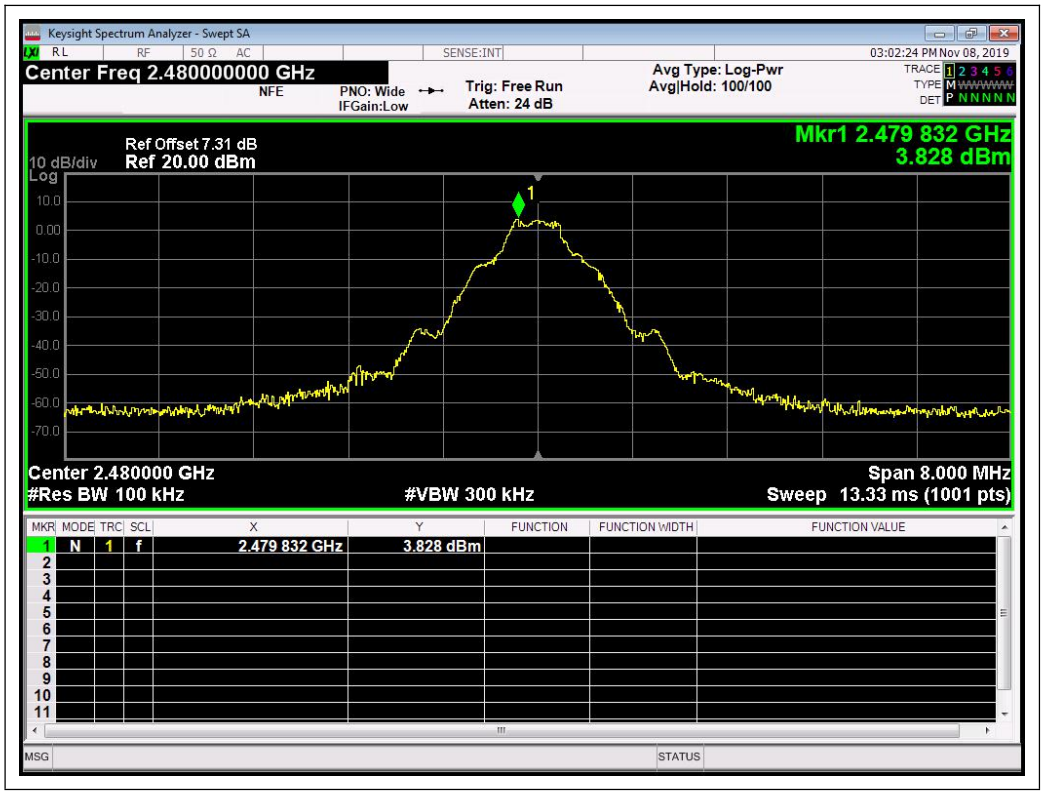
(Channel = 39, 30MHz to 25GHz, GFSK Mode)



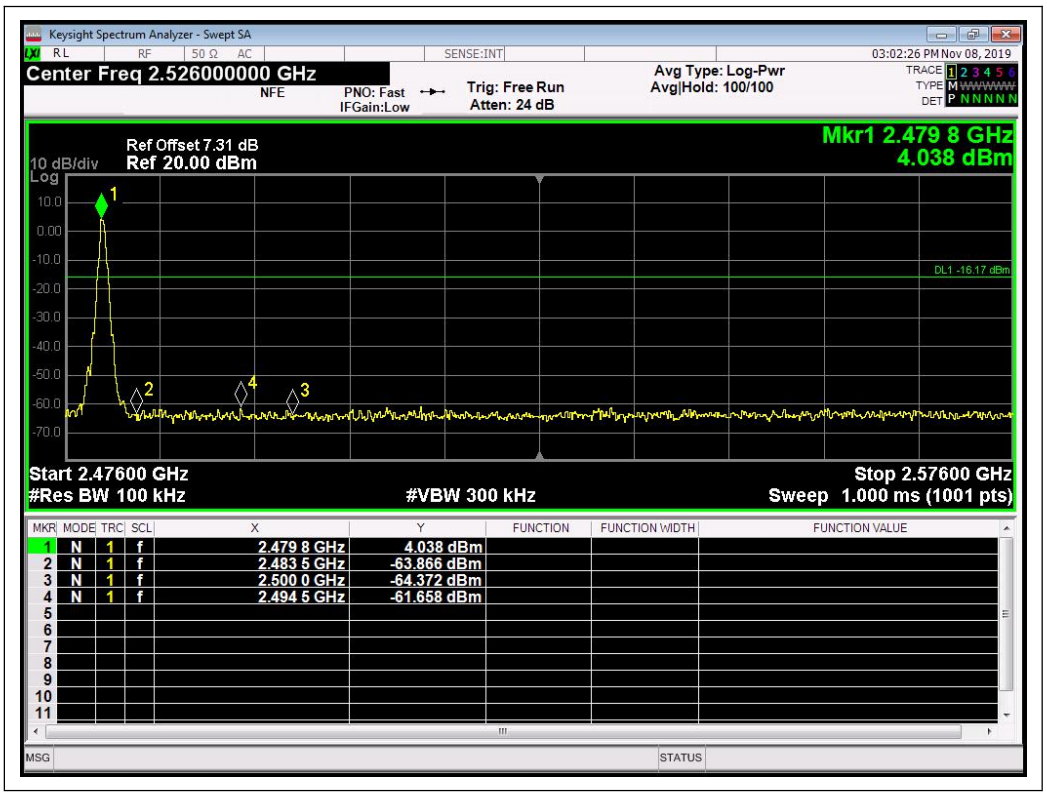
(Channel = 78, 30MHz to 25GHz, GFSK Mode peak power)



(Channel = 78, 30MHz to 25GHz, GFSK Mode)



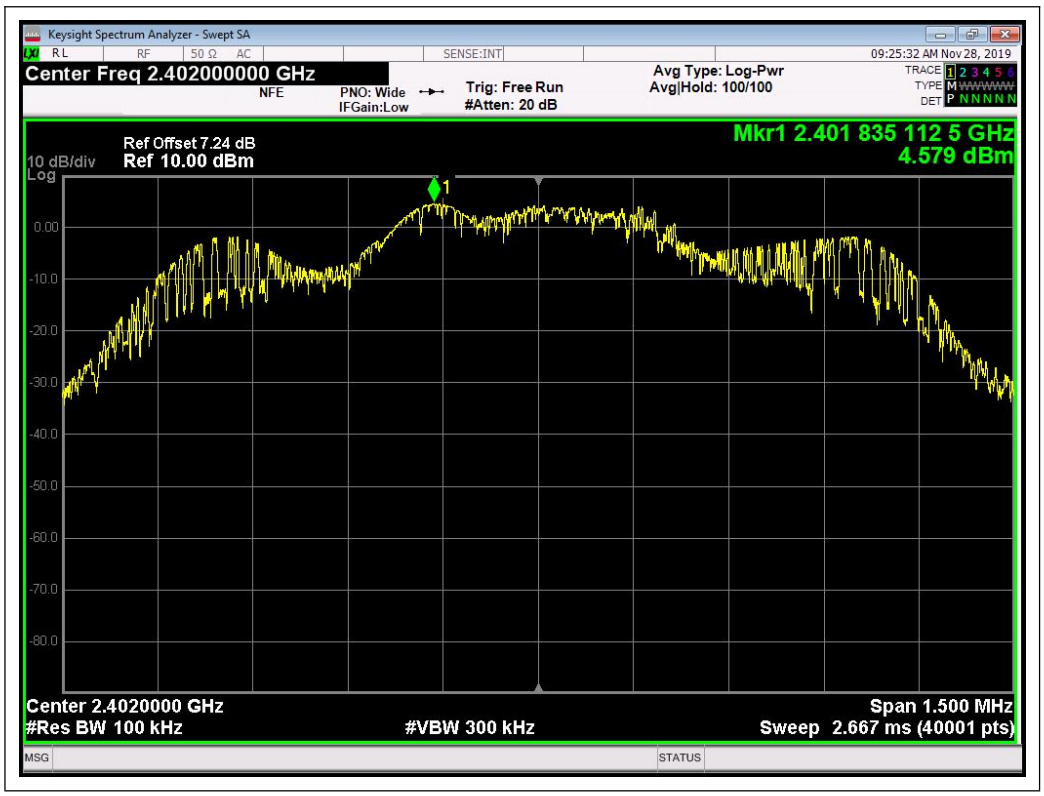
(Channel = 78, Band edge, GFSK Mode peak power)



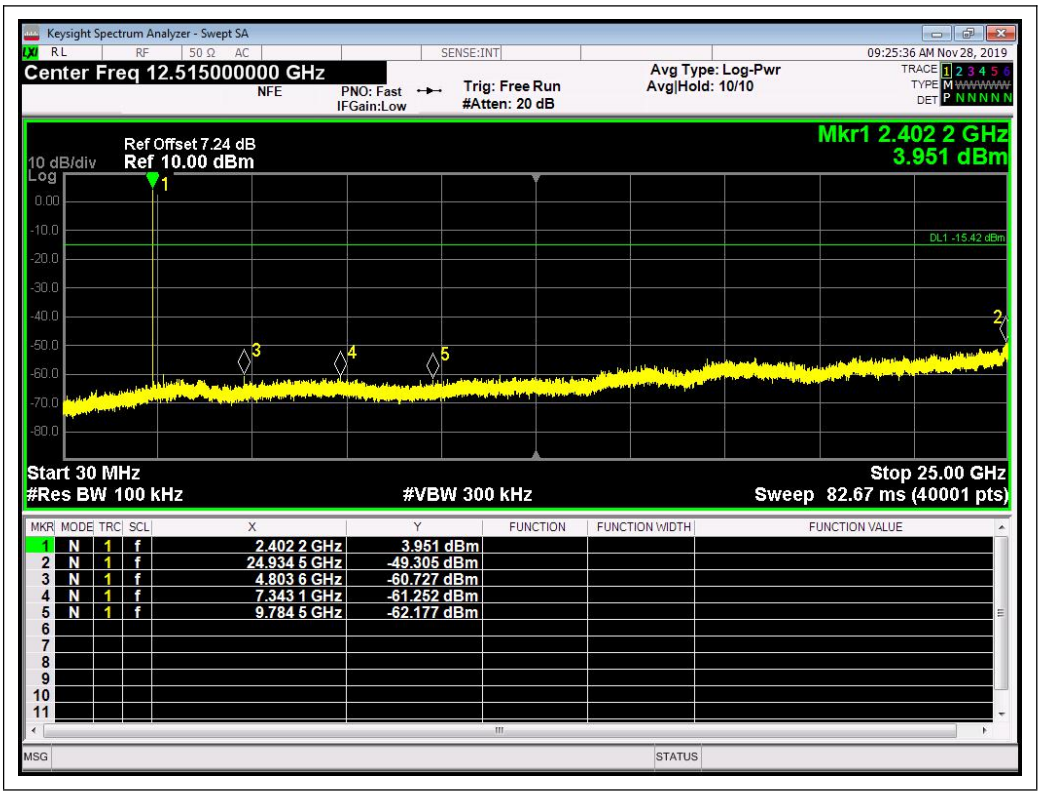
(Channel = 78, Band edge, GFSK Mode)

(Channel = 78, Band edge with hopping on, GFSK Mode)

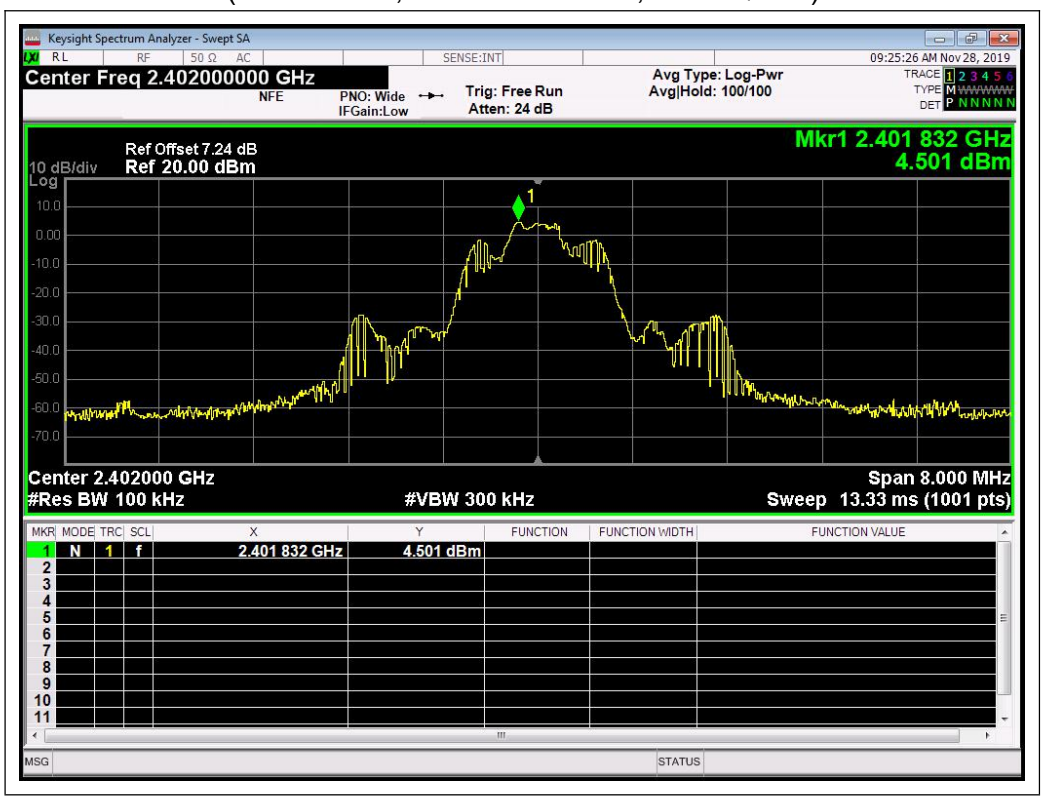
π/4-DQPSK Mode



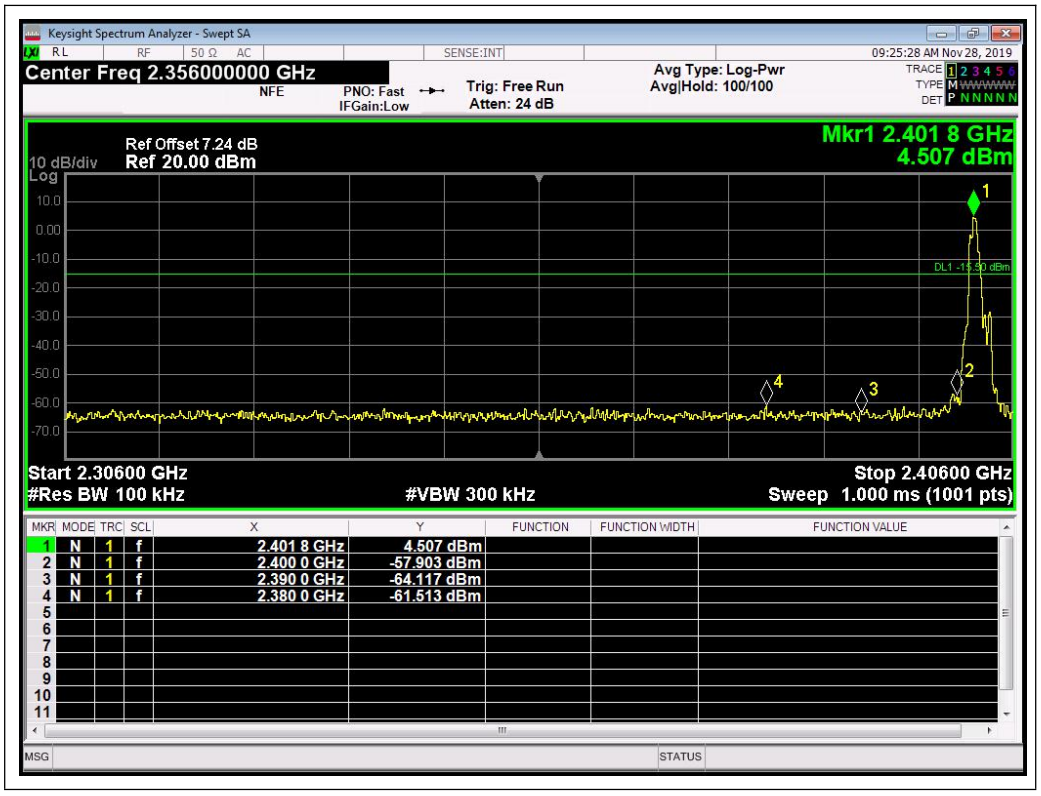
(Channel = 0, 30MHz to 25GHz, π/4-DQPSK peak power)



(Channel = 0, 30MHz to 25GHz, π/4-DQPSK)

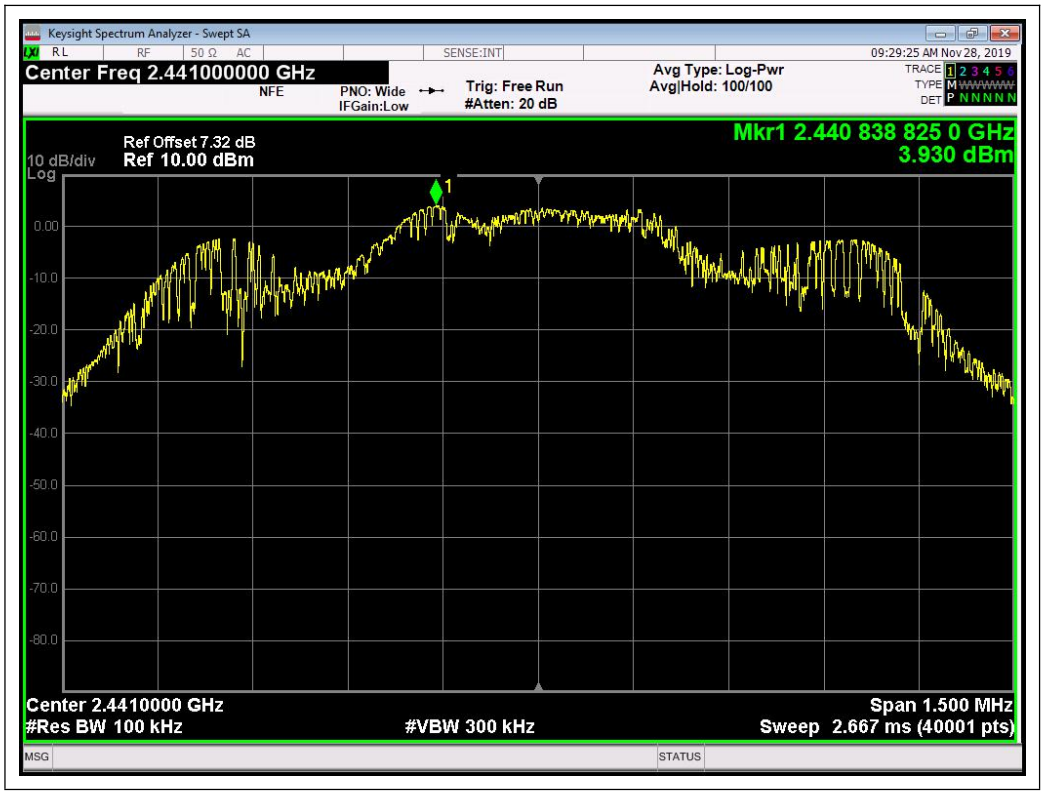


(Channel = 0, Band edge, π/4-DQPSK peak power)

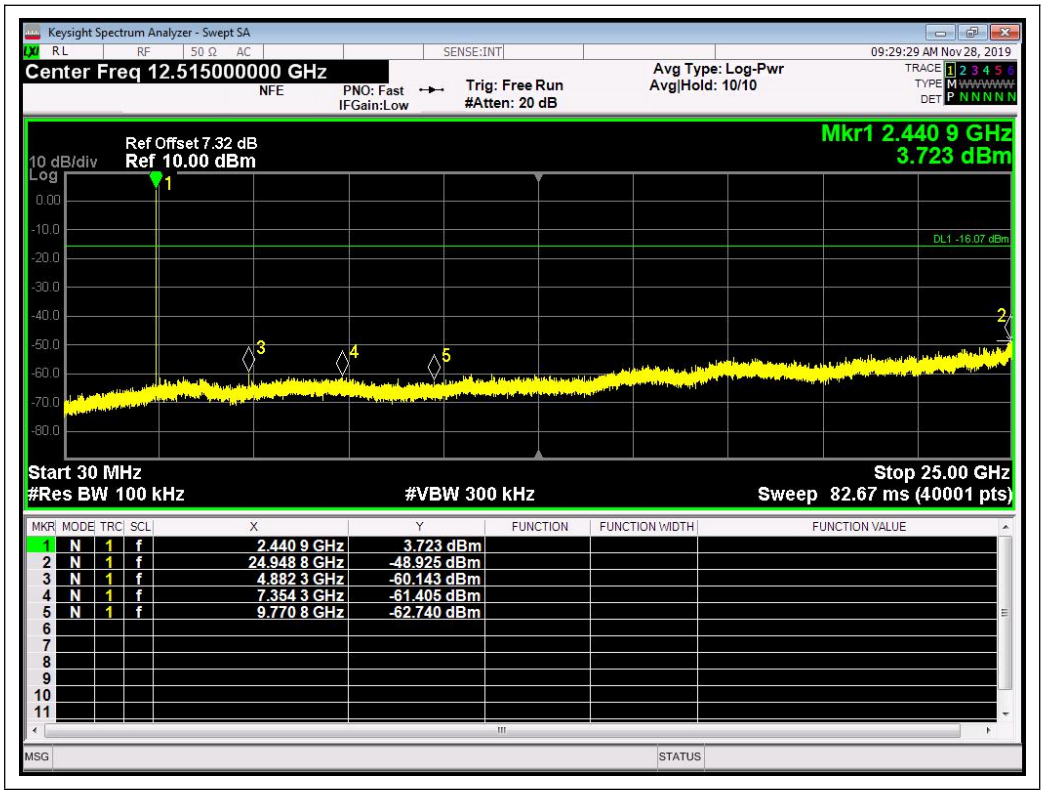


(Channel = 0, Band edge, π/4-DQPSK)

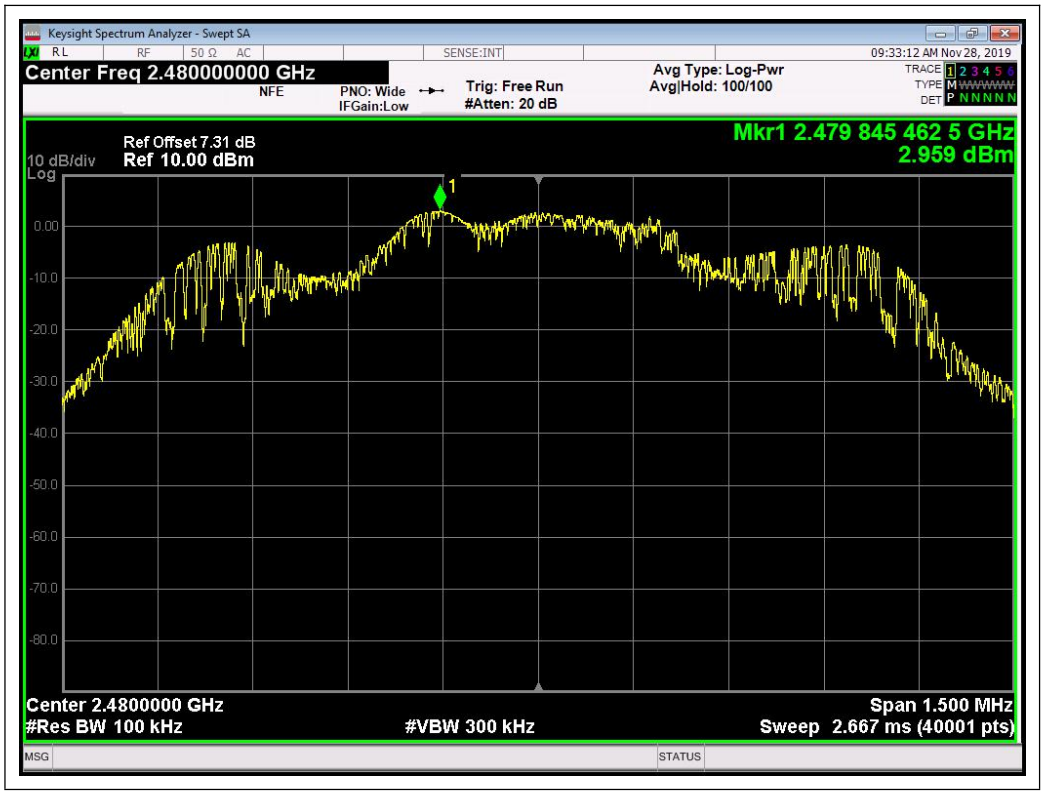
(Channel = 0, Band edge with hopping on, π/4-DQPSK)



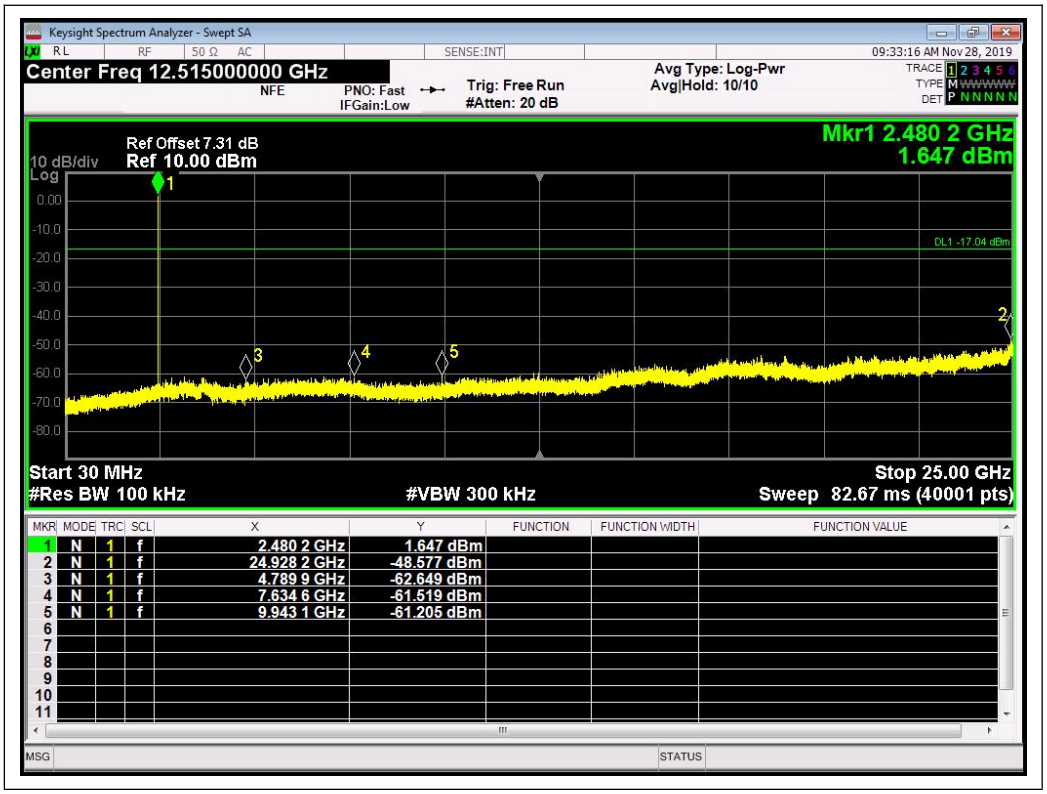
(Channel = 39, 30MHz to 25GHz, π/4-DQPSK peak power)



(Channel = 39, 30MHz to 25GHz, π/4-DQPSK)

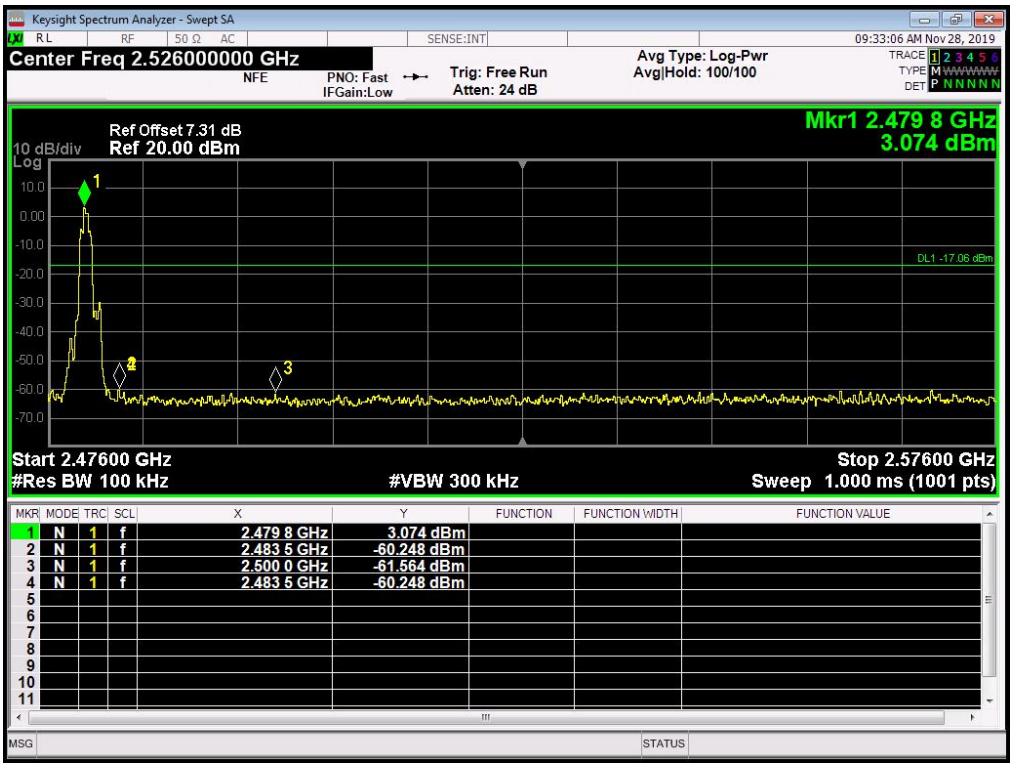


(Channel = 78, 30MHz to 25GHz, π/4-DQPSK peak power)



(Channel = 78, 30MHz to 25GHz, π/4-DQPSK)

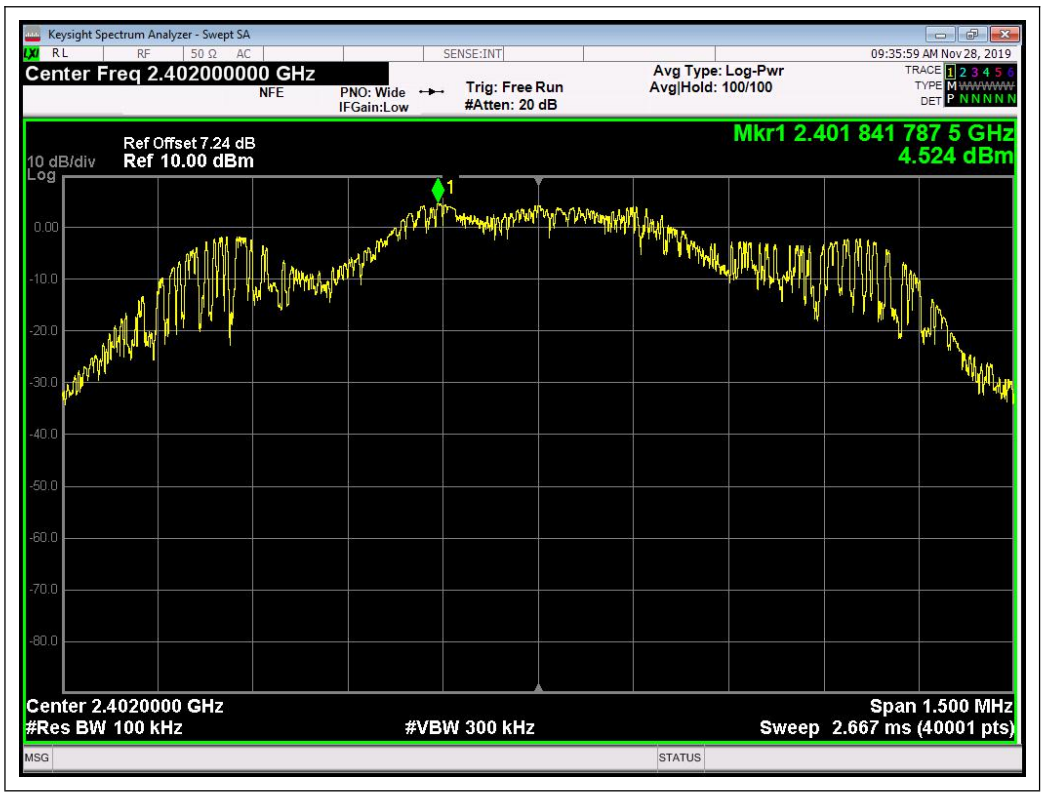
(Channel = 78, Band edge, π/4-DQPSK peak power)



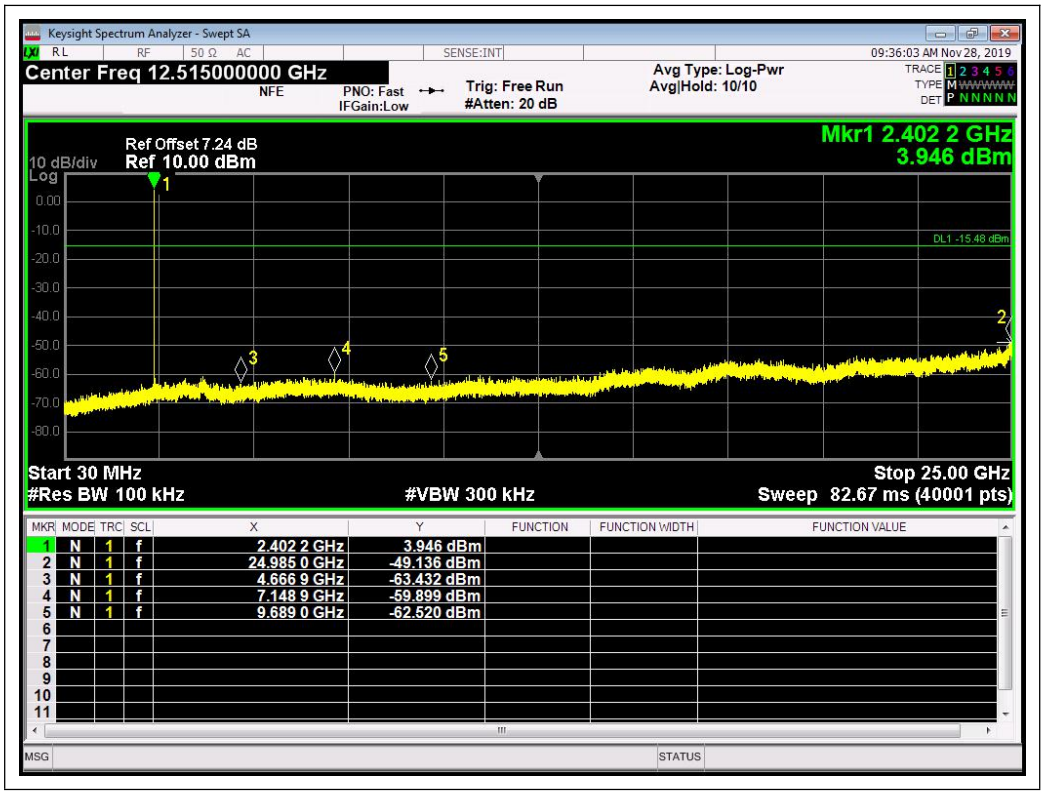
(Channel = 78, Band edge, π/4-DQPSK)

(Channel = 78, Band edge with hopping on, π/4-DQPSK)

8-DPSK Mode

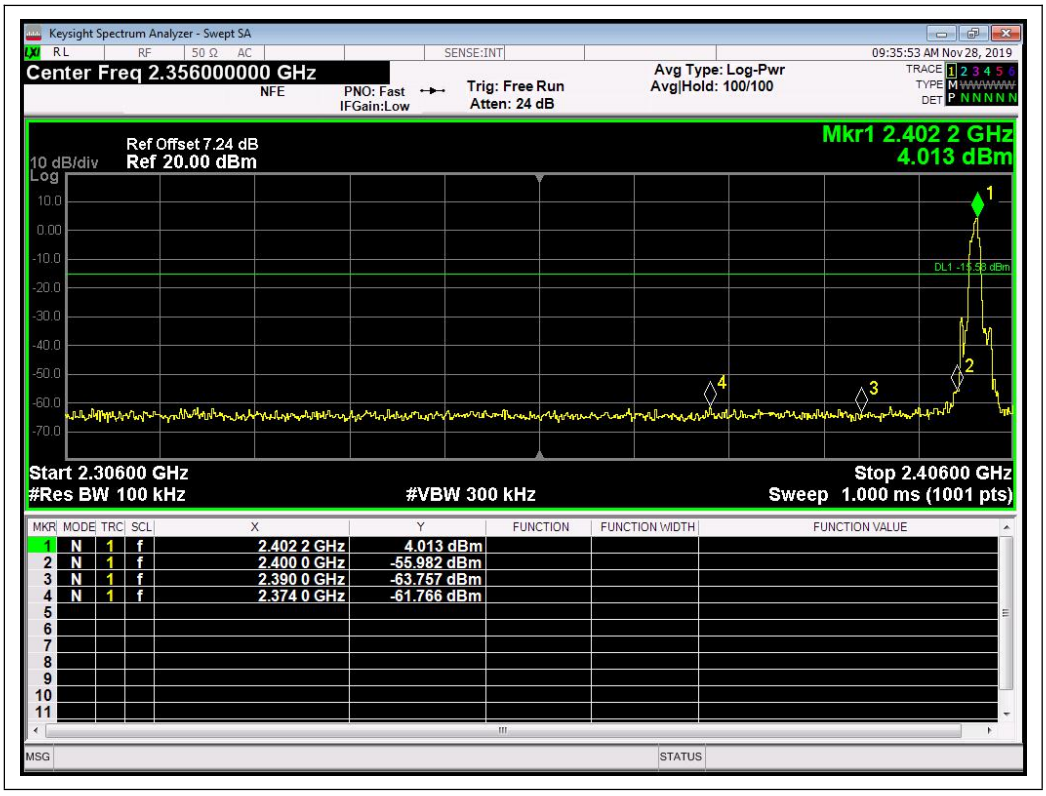


(Channel = 0, 30MHz to 25GH, 8-DPSK peak power)

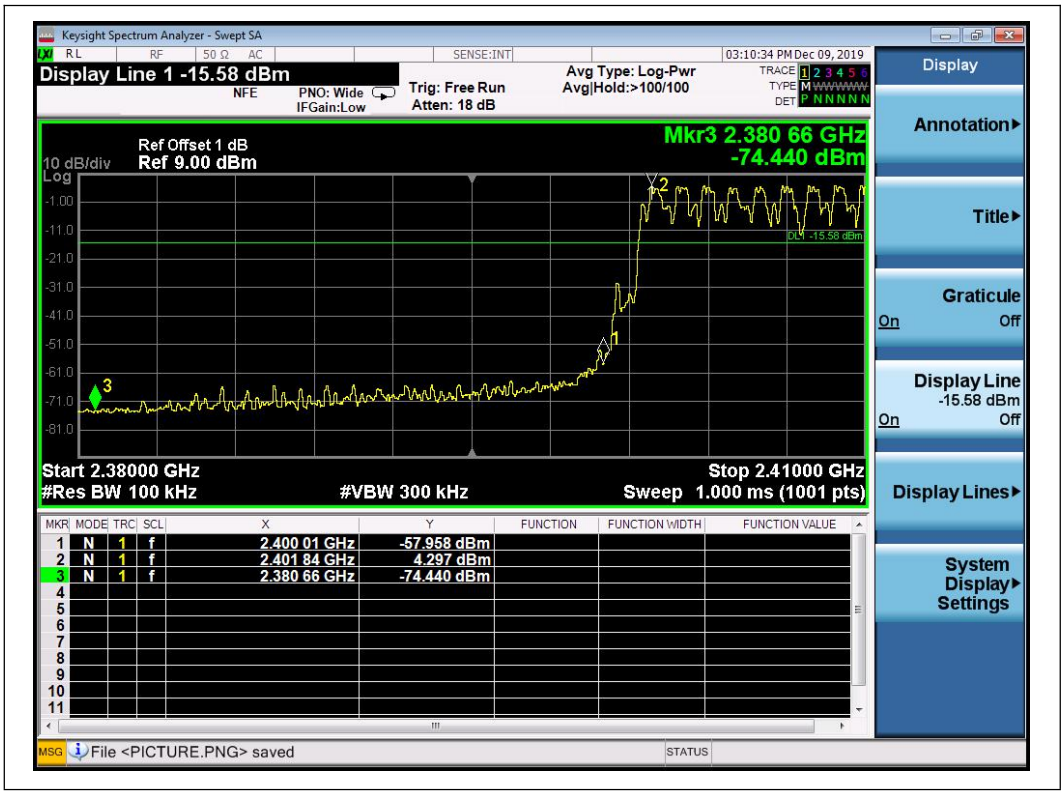


(Channel = 0, 30MHz to 25GH, 8-DPSK)

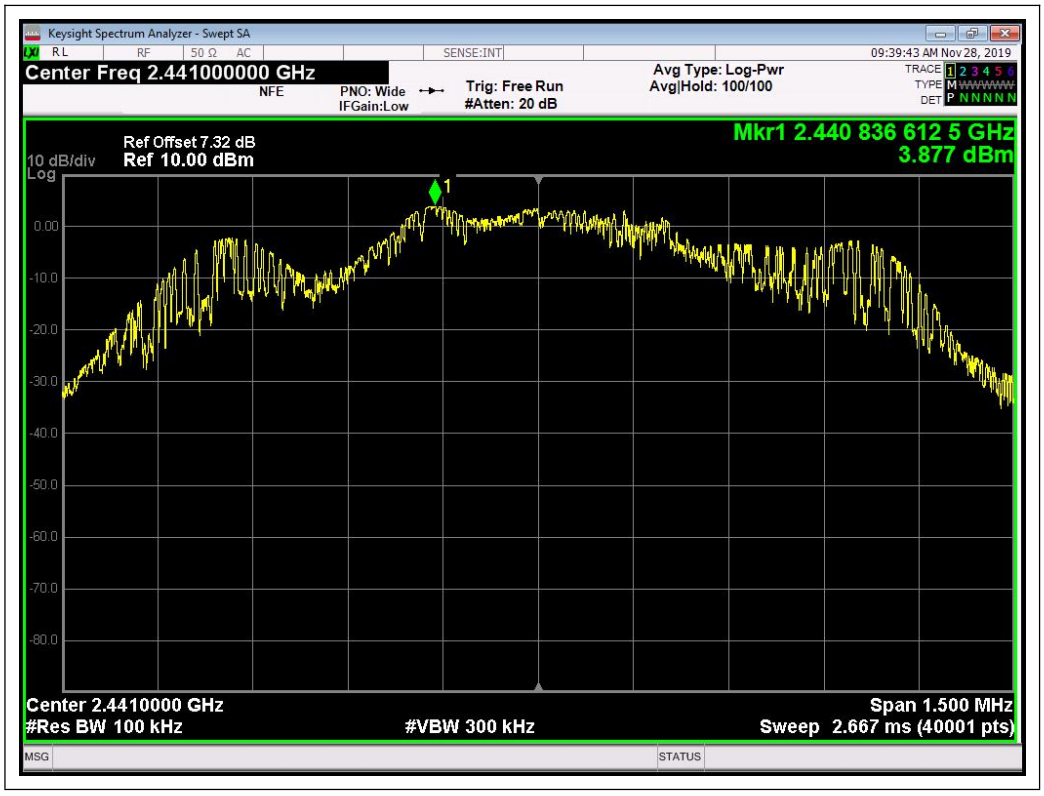
(Channel = 0, Band edge, 8-DPSK peak power)



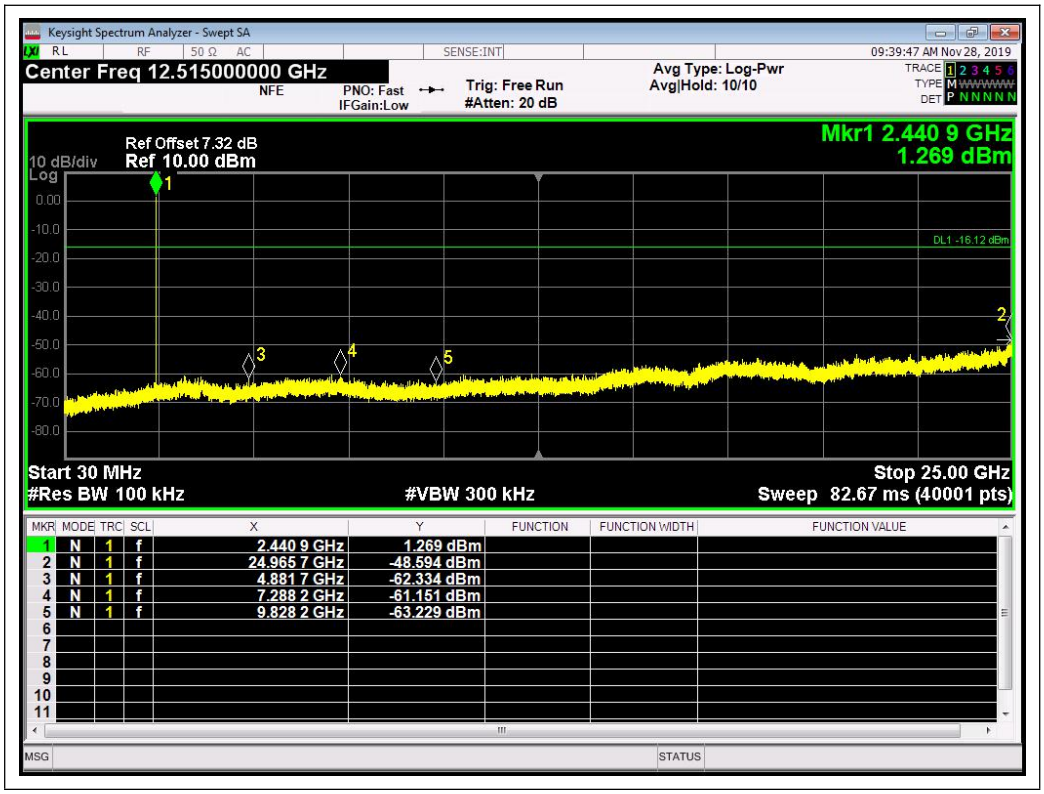
(Channel = 0, Band edge, 8-DPSK)



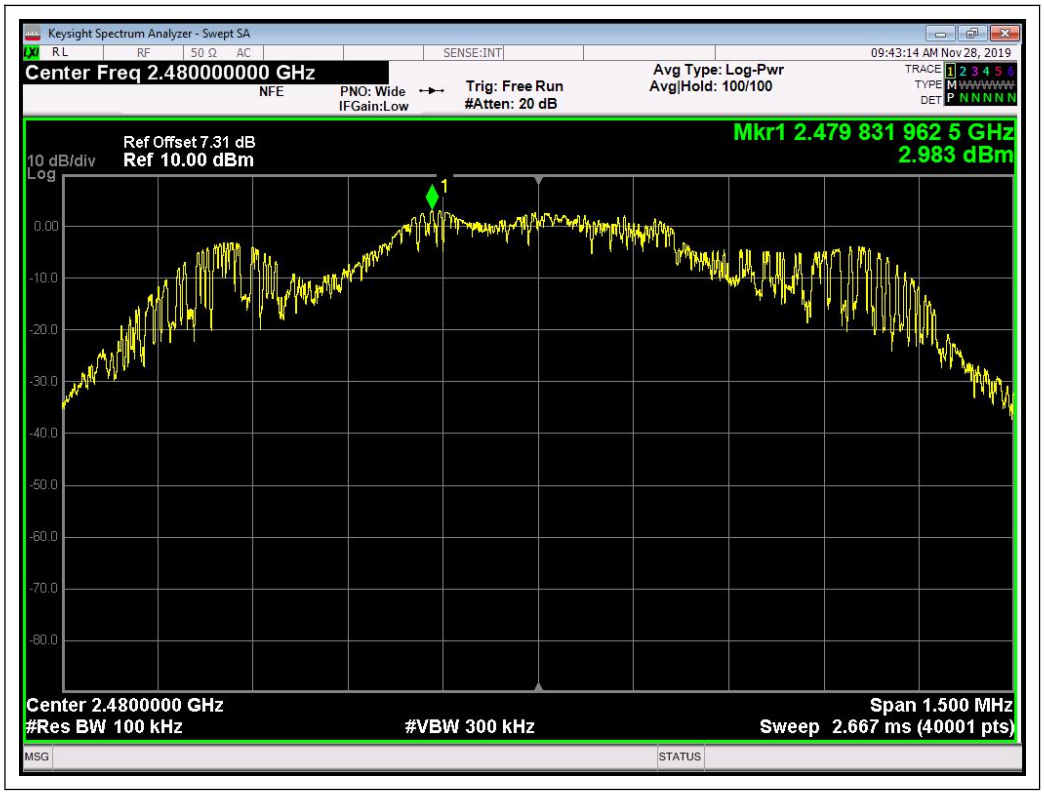
(Channel = 0, Band edge with hopping on, 8-DPSK)



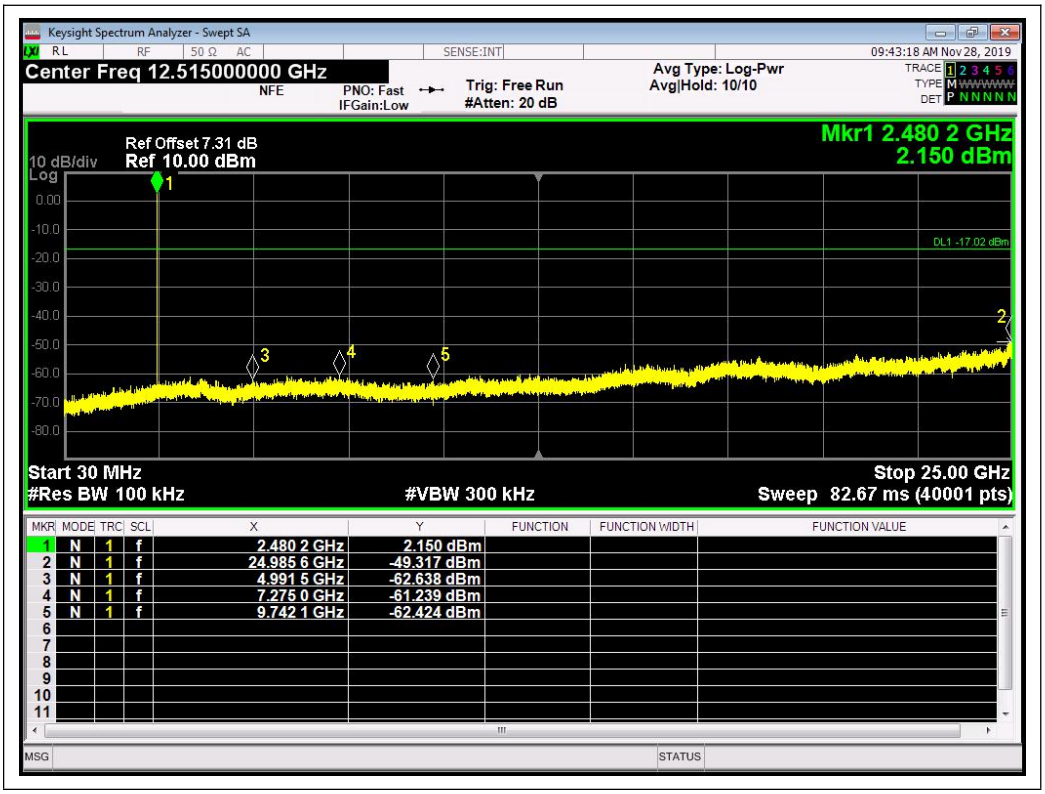
(Channel = 39, 30MHz to 25GHz, 8-DPSK peak power)



(Channel = 39, 30MHz to 25GHz, 8-DPSK)

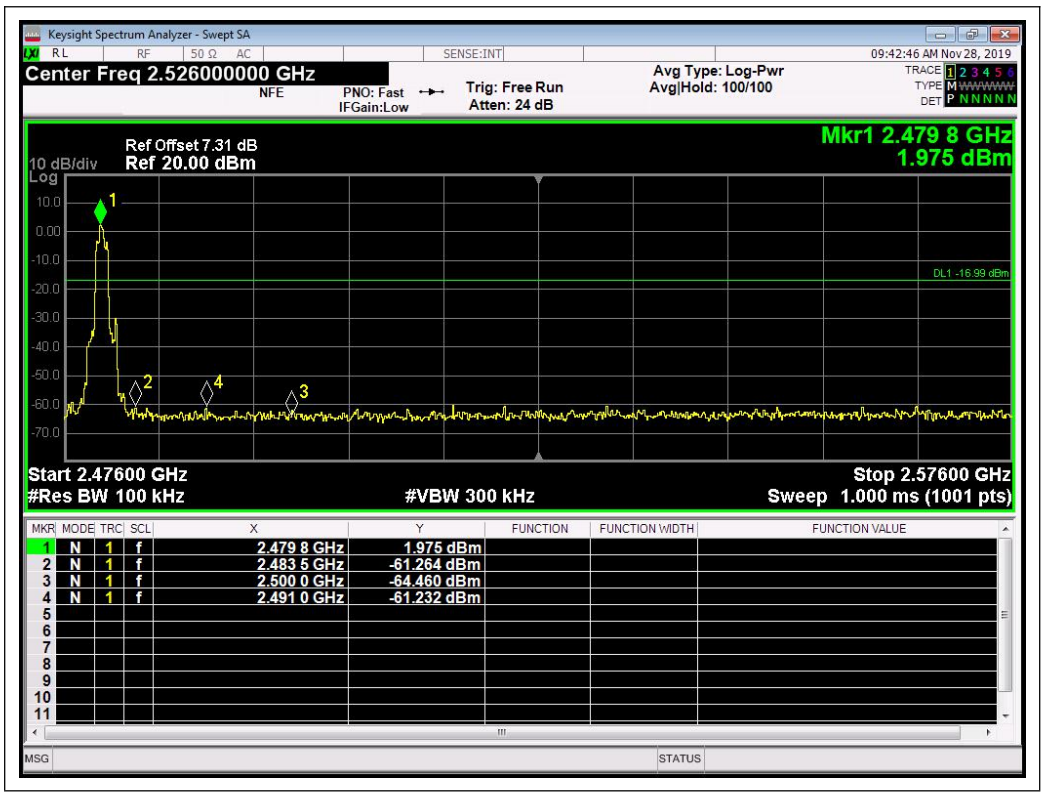


(Channel = 78, 30MHz to 25GH, 8-DPSK peak power)



(Channel = 78, 30MHz to 25GH, 8-DPSK)

(Channel = 78, Band edge, s8-DPSK peak power)



(Channel = 78, Band edge, 8-DPSK)

(Channel = 78, Band edge with hopping on, 8-DPSK)

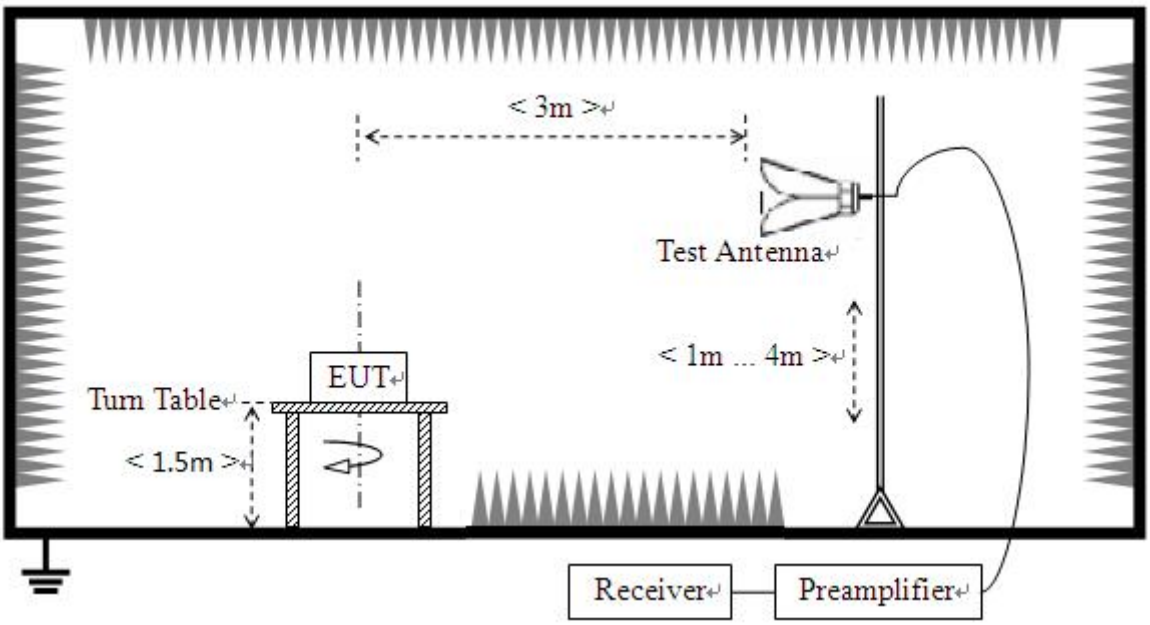
2.8. Restricted Frequency Bands

2.8.1. Requirement

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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).

2.8.2. Test Description

A. Test Setup:



The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under non hopping-on test mode transmitting 339 bytes DH5, 679 bytes 2DH5 and 1021 bytes 3DH5 packages at maximum power.
For the Test Antenna:

Horn Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna 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.

d. 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasipeak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

B. Equipments List:

Please refer ANNEX B(4).

2.8.3. Test Result

The lowest and highest channels are tested to verify Restricted Frequency Bands.

The measurement results are obtained as below:

E [dBμV/m] $=U_R + A_T + A_{Factor}$ [dB]; AT $=L_{Cable\ loss}$ [dB]$-G_{preamp}$ [dB]

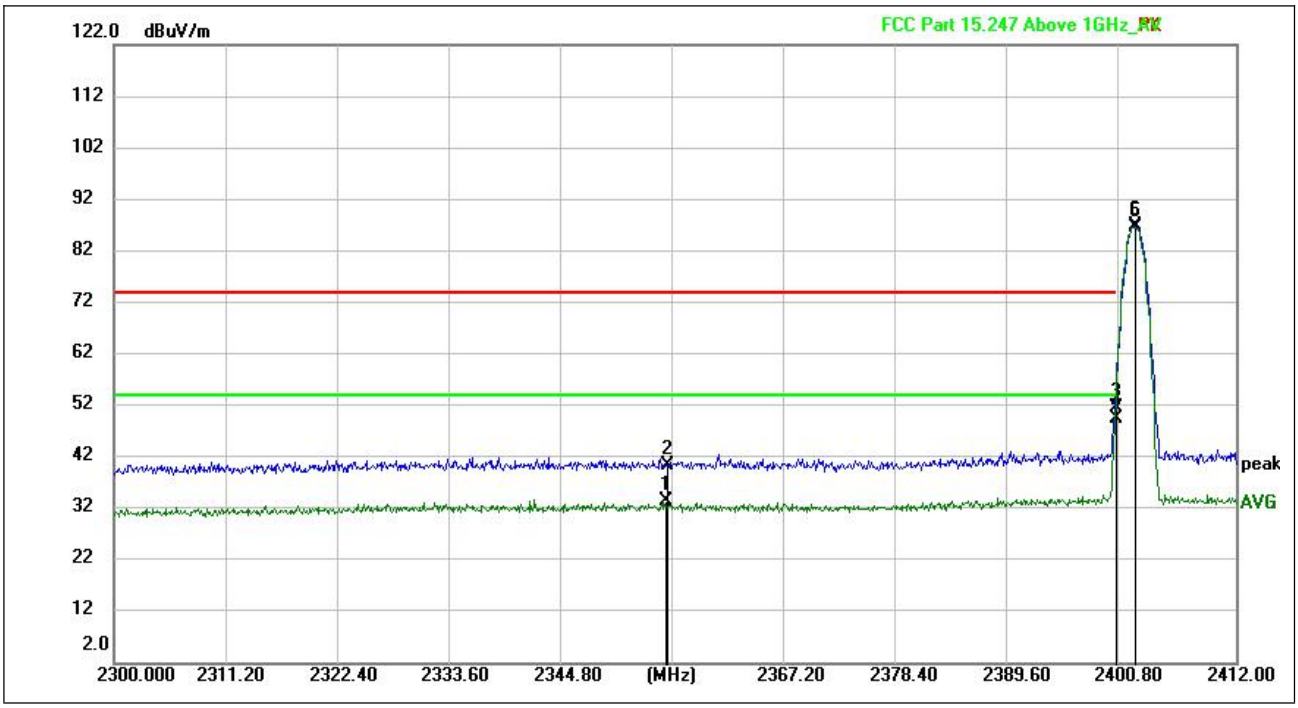
AT: Total correction Factor except Antenna

UR: Receiver Reading

Gpreamp: Preamplifier Gain

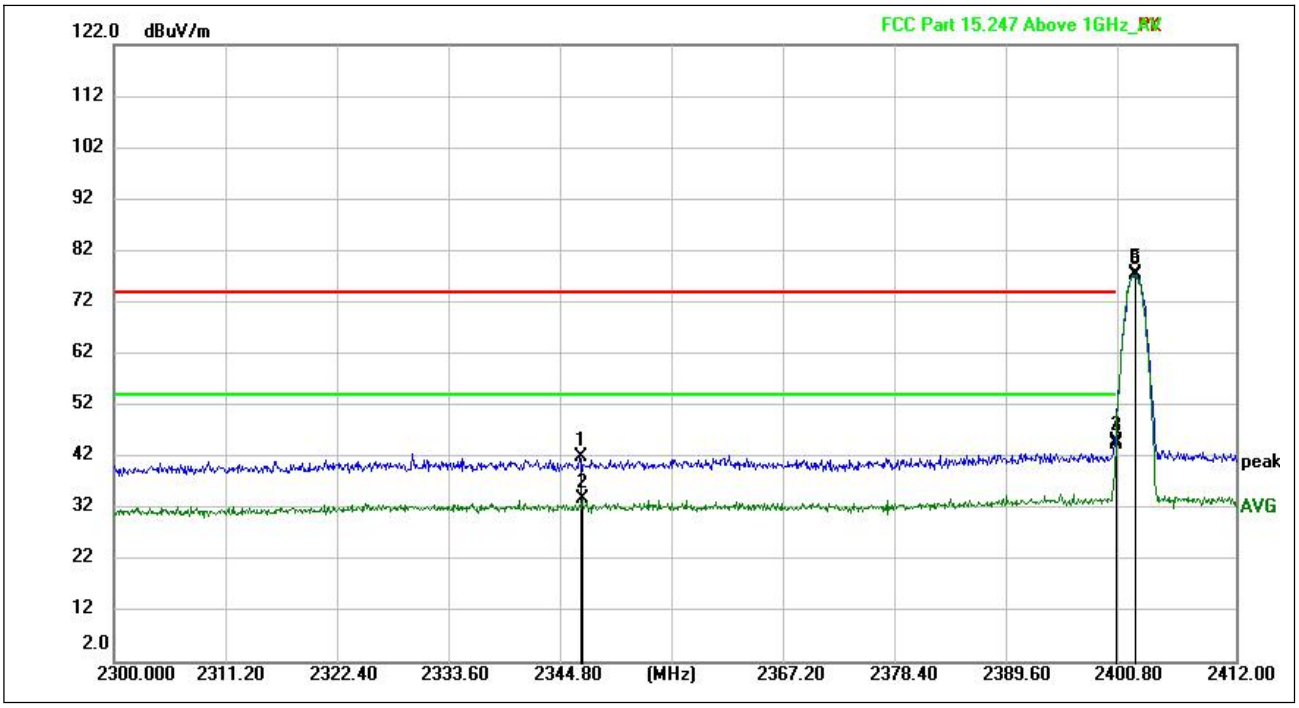
AFactor: Antenna Factor at 3m

GFSK Test mode



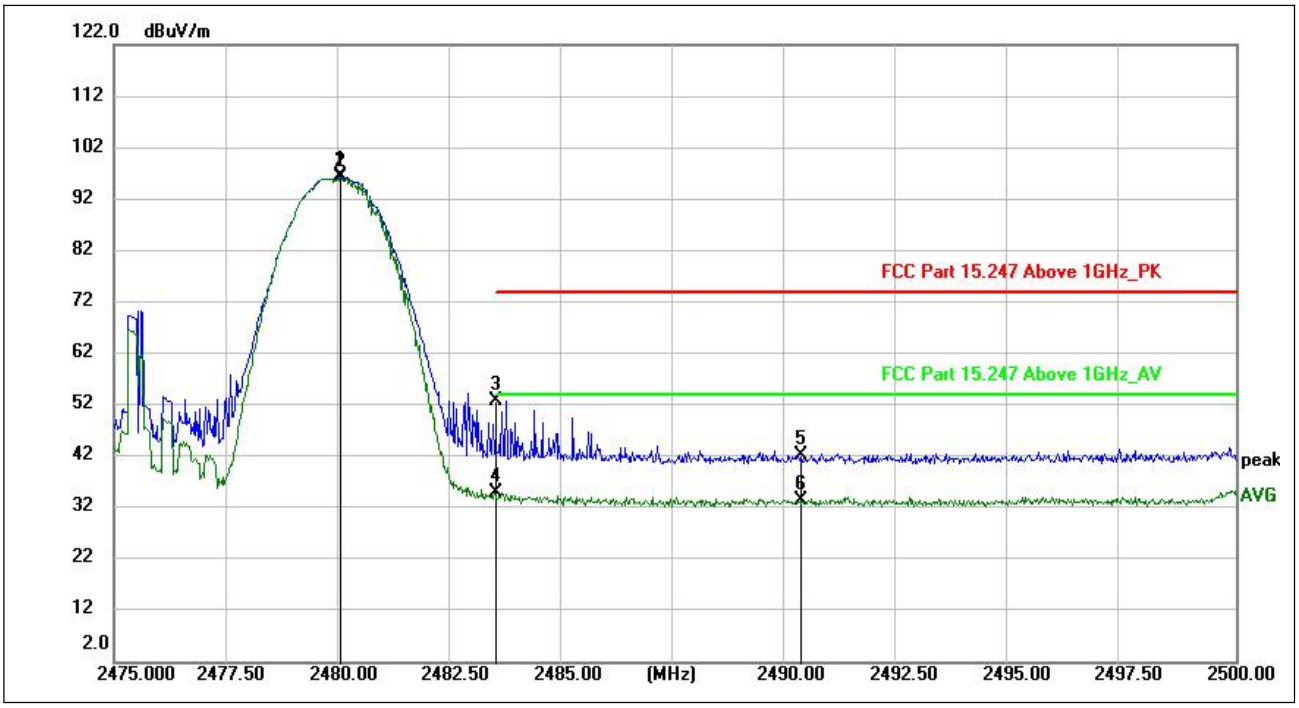
(GFSK _2402MHz, Antenna Horizontal)

Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
2355.042	---	33.43	54.00	20.57	H	30.07	PASS
2355.306	40.48	---	74.00	33.52	H	30.07	PASS
2400.000	51.55	---	74.00	22.45	H	31.70	PASS
2400.000	---	49.53	54.00	4.47	H	31.70	PASS
2401.853	---	86.66	---	---	H	31.60	PASS
2401.920	86.74	---	---	---	H	31.60	PASS



(GFSK _2402MHz, Antenna Vertical)

Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
2346.586	41.91	---	74.00	32.09	V	7.67	PASS
2346.771	---	33.69	54.00	20.31	V	7.67	PASS
2400.000	45.06	---	74.00	28.94	V	8.70	PASS
2400.000	---	44.33	54.00	9.67	V	8.70	PASS
2402.000	77.39	---	---	---	V	8.68	PASS
2402.000	---	77.16	---	---	V	8.68	PASS



(GFSK _2480MHz, Antenna Horizontal)

Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
2480.026	96.42	---	---	---	H	8.26	PASS
2480.026	---	96.25	---	---	H	8.26	PASS
2483.500	52.66	---	74.00	21.34	H	8.36	PASS
2483.500	---	34.90	54.00	19.10	H	8.36	PASS
2490.280	42.26	---	74.00	31.74	H	8.35	PASS
2490.280	---	33.38	54.00	20.62	H	8.35	PASS