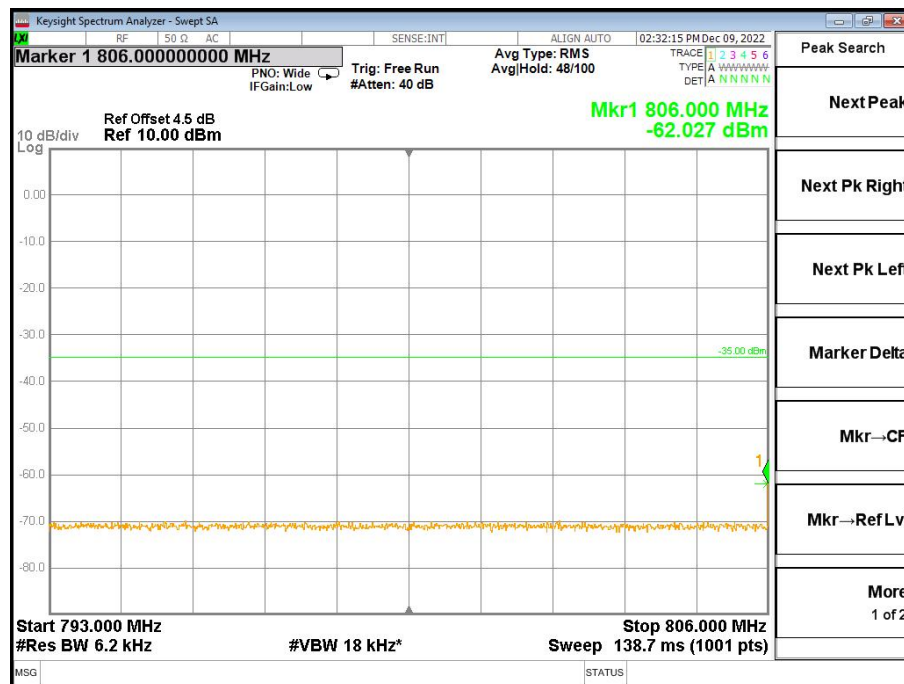
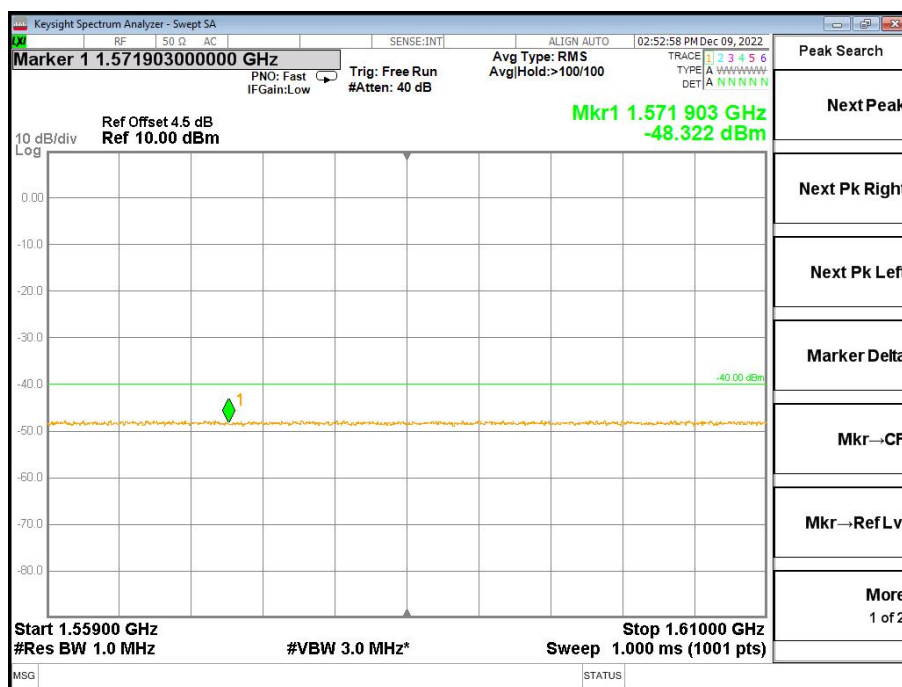
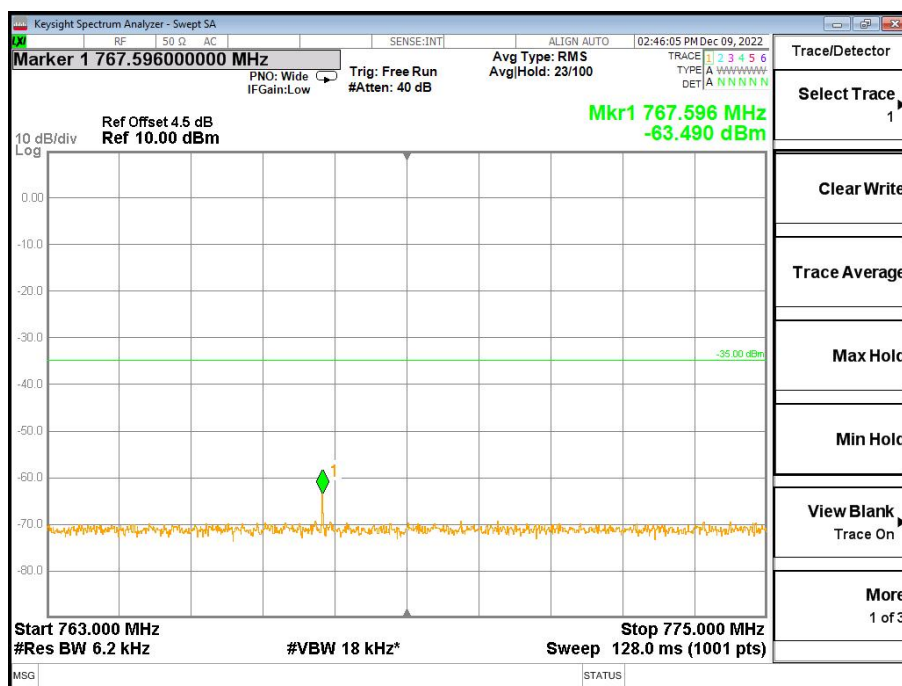


Report No.: I22W00076-NB-IoT RF-FCC_Rev2



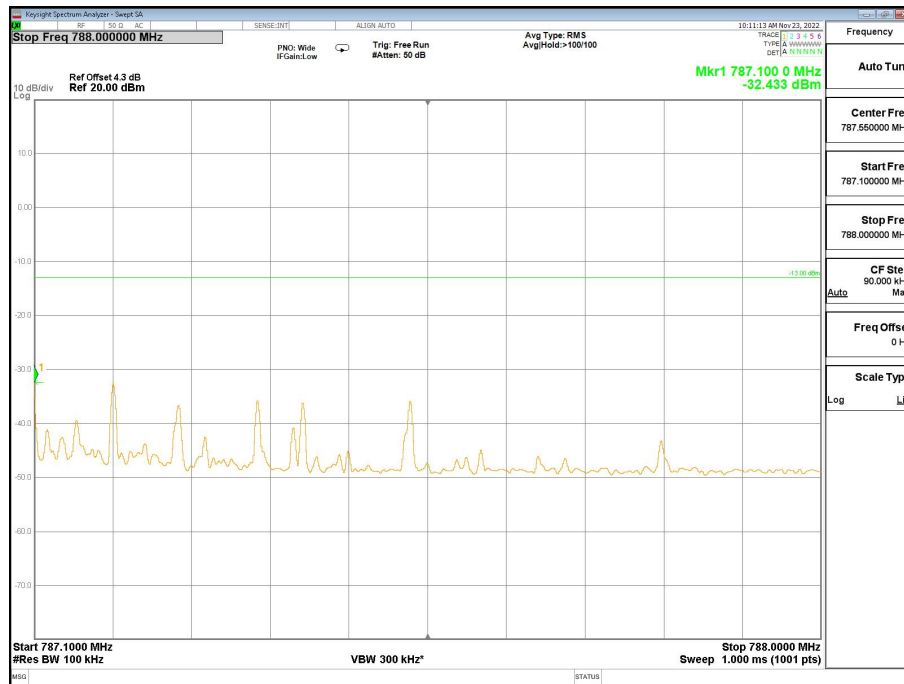
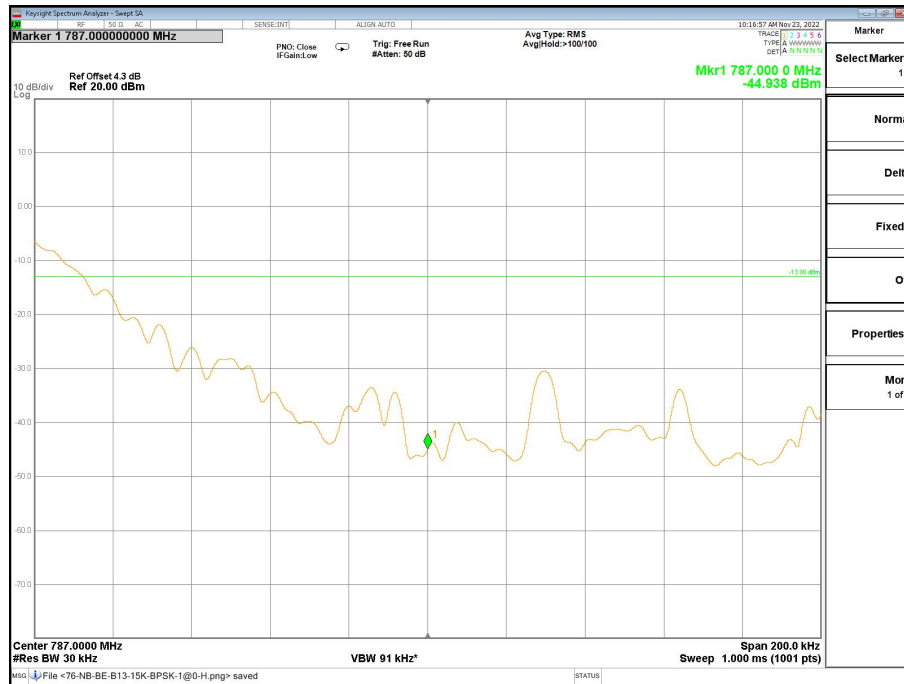
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For the 1559-1610MHz test band, the worst case: $-48.322\text{dBm} + \text{Antenna Gain}(4\text{dBi}) = -44.322\text{dBm}$
High Channel, Subcarrier (15kHz), QPSK, 1@11

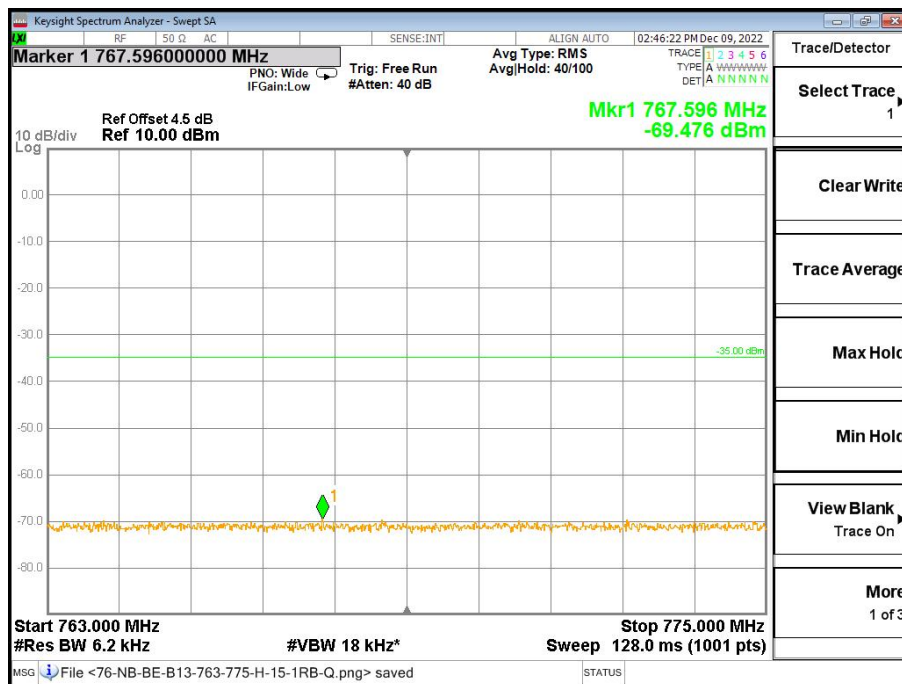
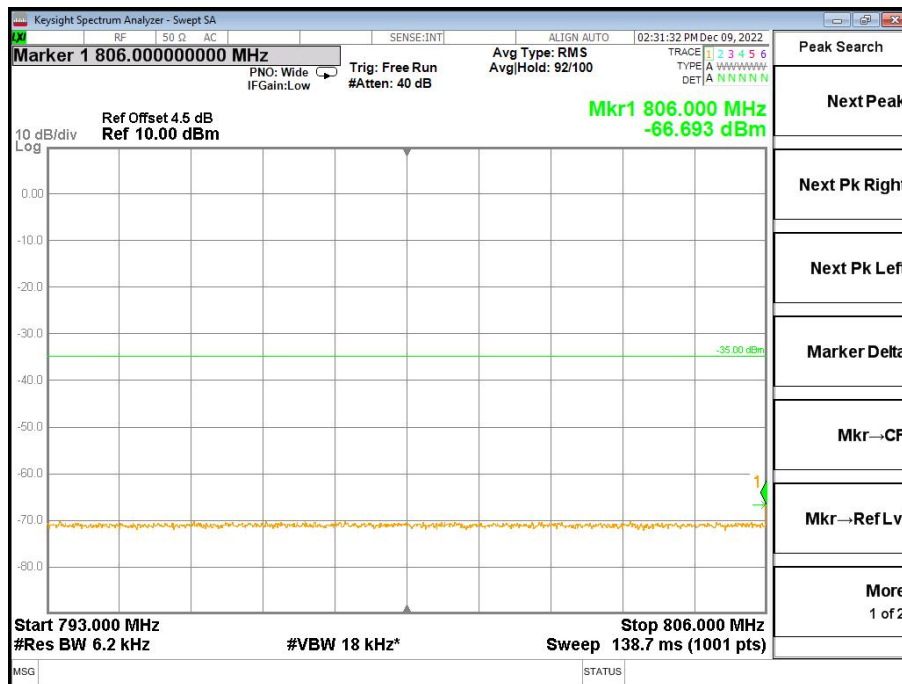
Report No.: I22W00076-NB-IoT RF-FCC_Rev2



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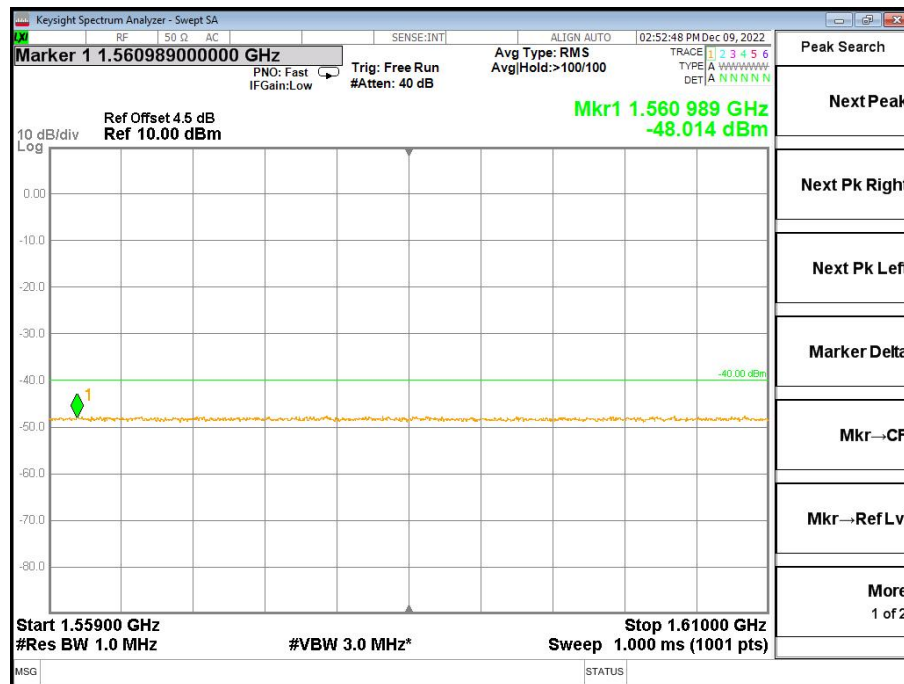
Report No.: I22W00076-NB-IoT RF-FCC_Rev2



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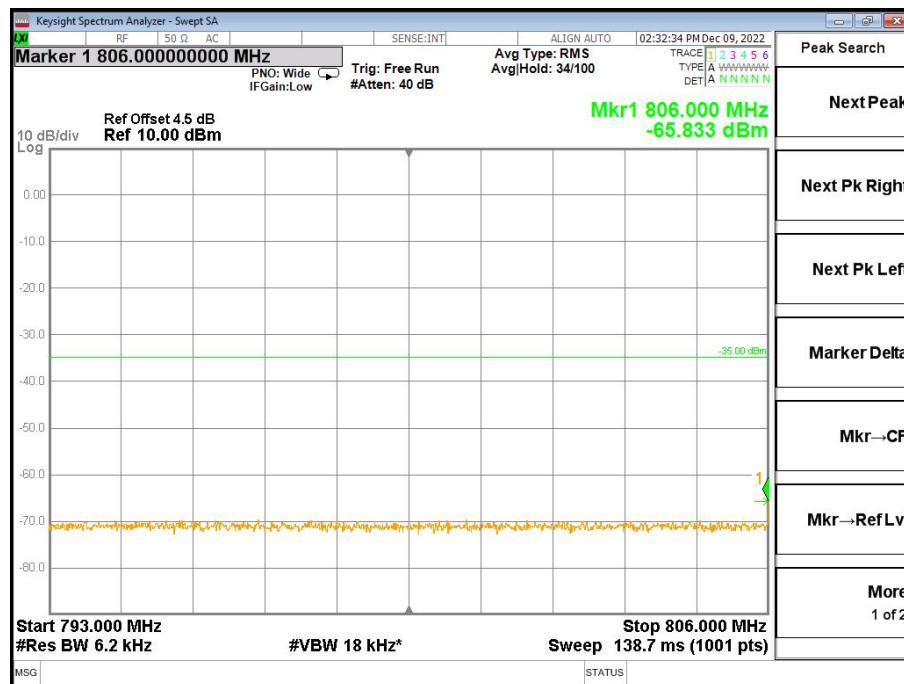
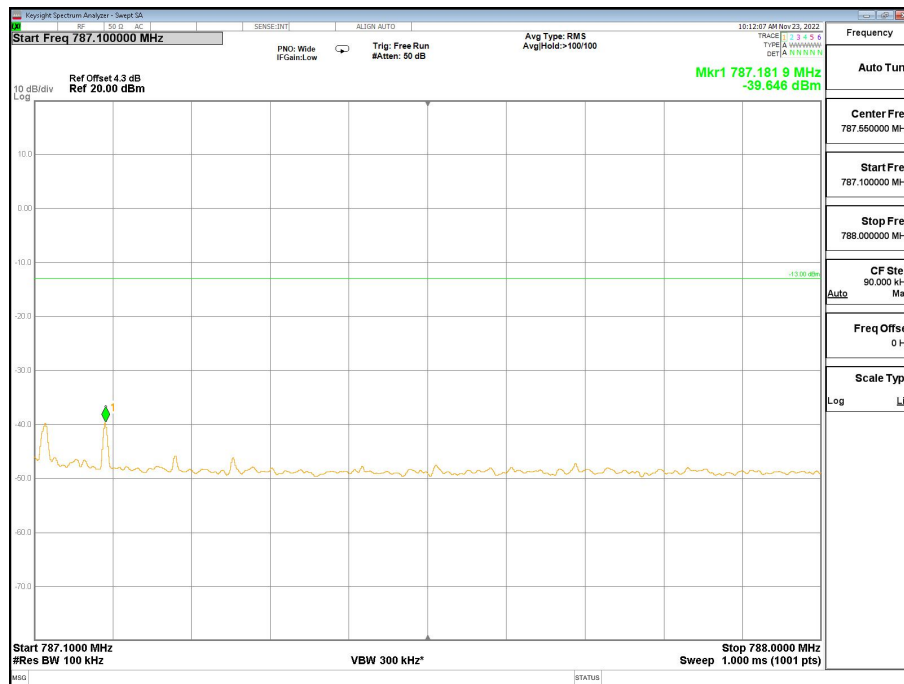
For the 1559-1610MHz test band, the worst case: $-48.014\text{dBm} + \text{Antenna Gain}(4\text{dBi}) = -44.014\text{dBm}$
High Channel, Subcarrier (15kHz), QPSK, 12@0



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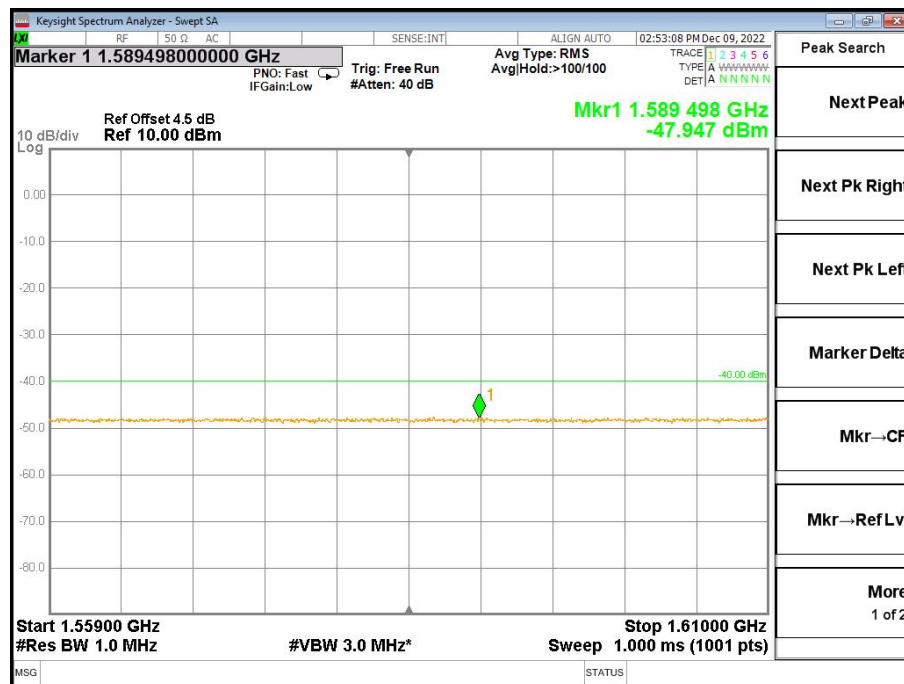
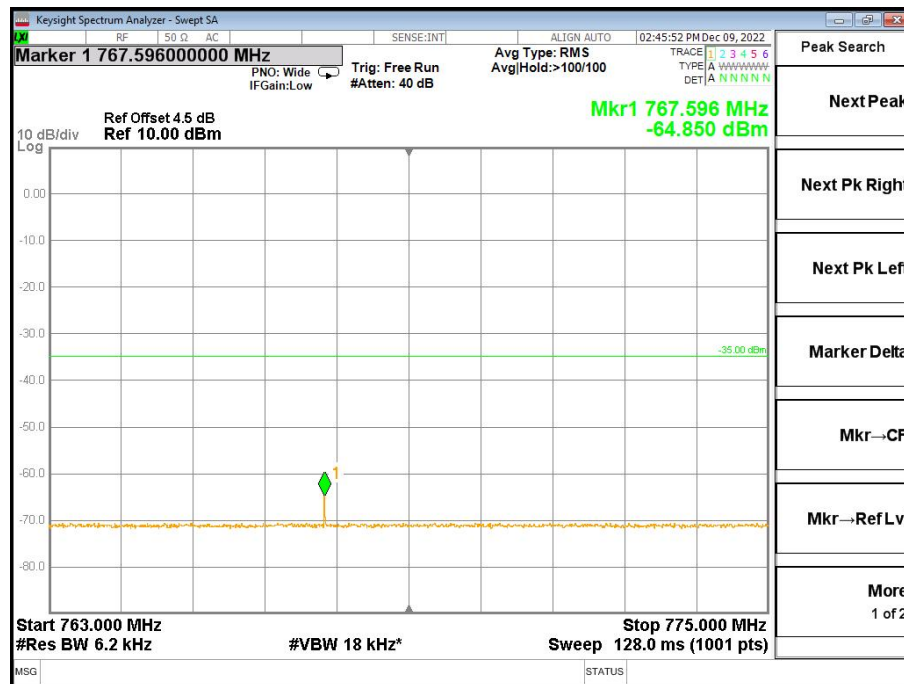
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Tel: 0086-23-88069965 FAX:0086-23-88608777

Report No.: I22W00076-NB-IoT RF-FCC_Rev2



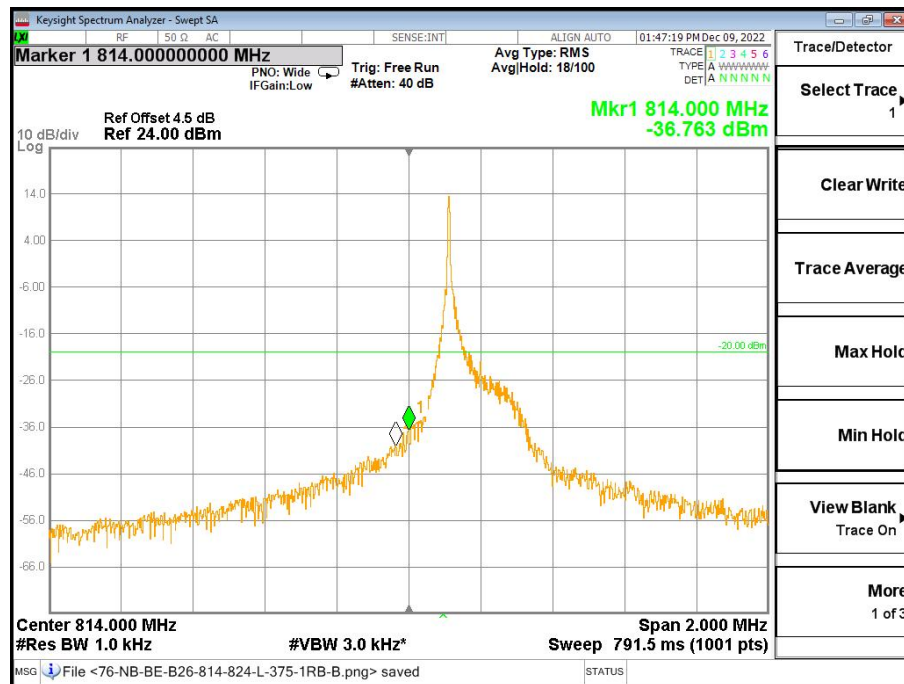
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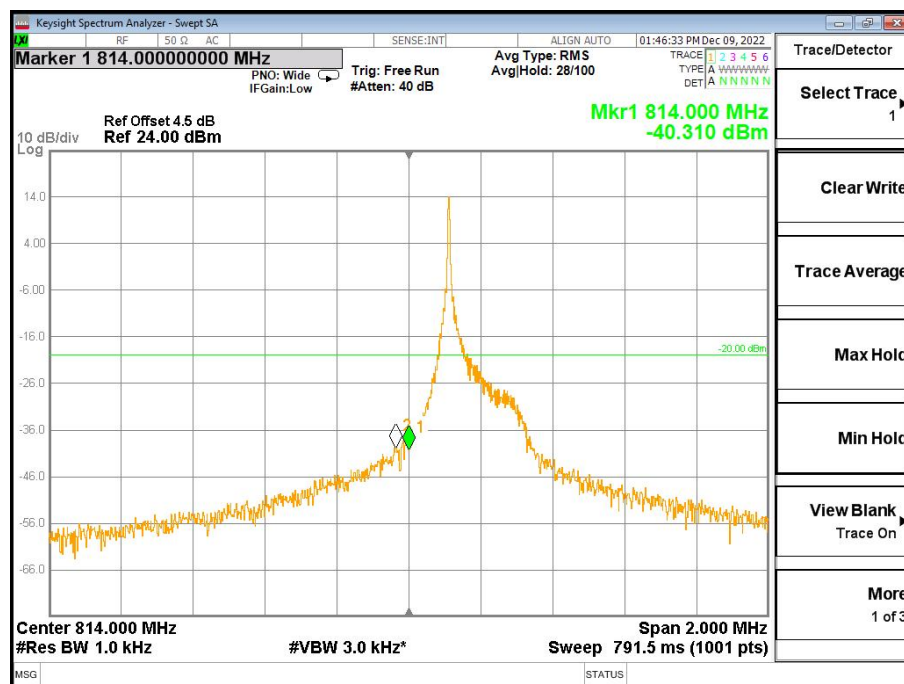


For the 1559-1610MHz test band, the worst case: $-47.947\text{dBm} + \text{Antenna Gain}(4\text{dBi}) = -43.947\text{dBm}$
High Channel, Subcarrier (15kHz), BPSK, 1@11

6.7.5 NB-IoT Band 26 Edge Results



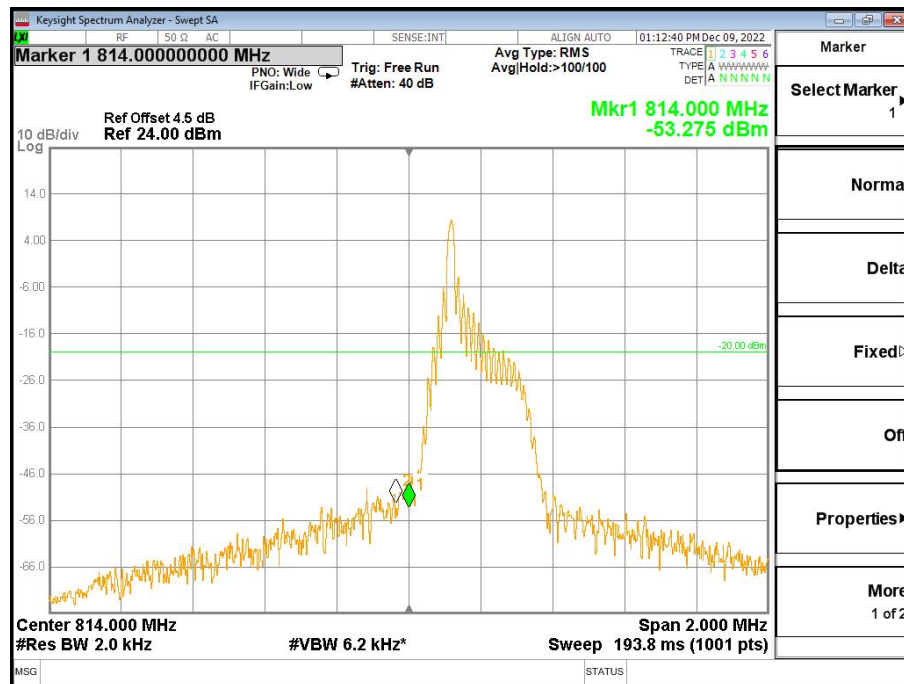
Low Channel, Subcarrier (3.75kHz), QPSK, 1@0



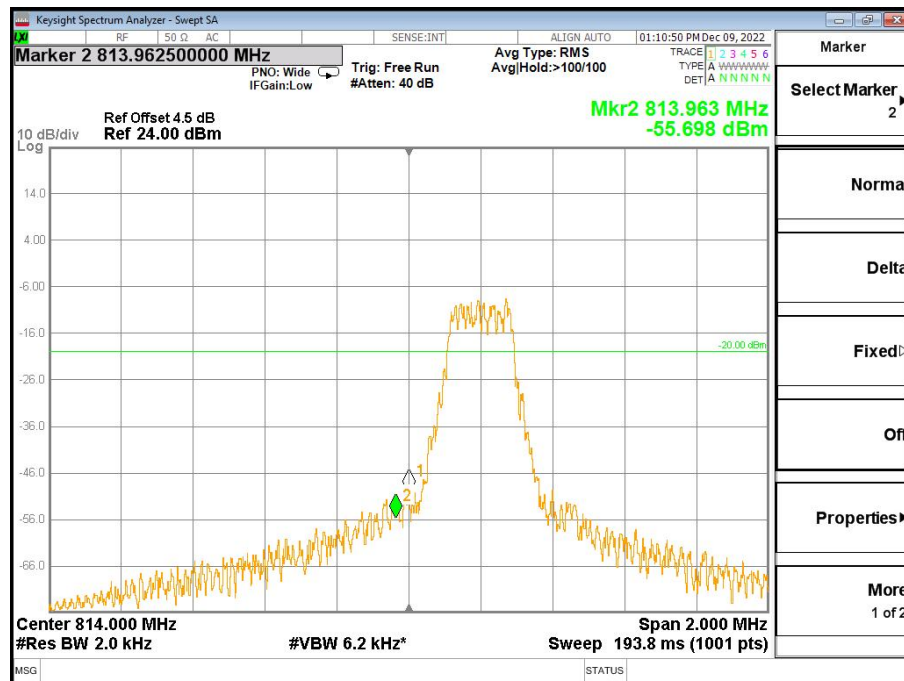
Low Channel, Subcarrier (3.75kHz), BPSK, 1@0

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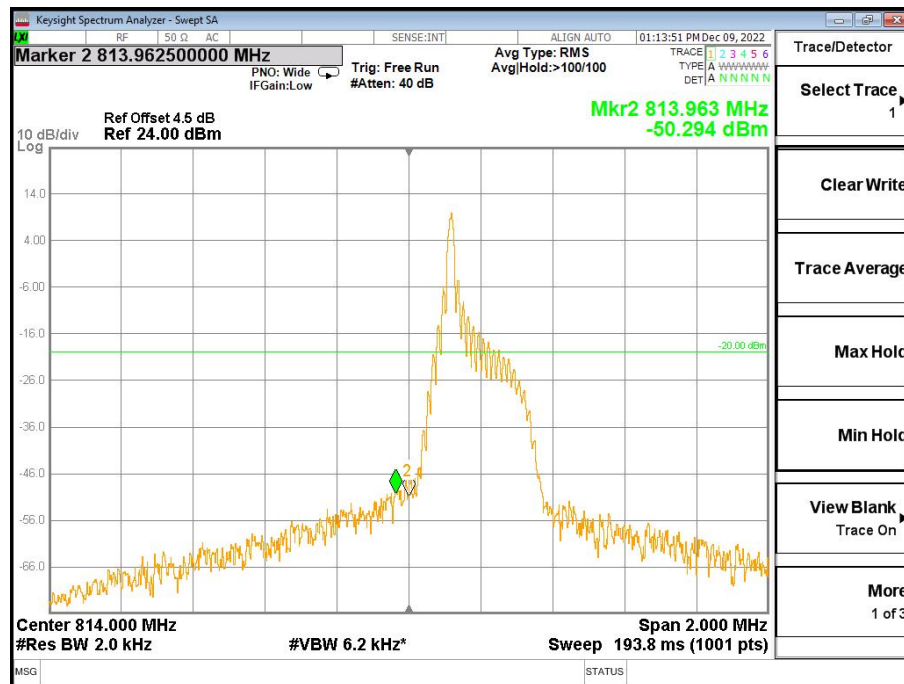
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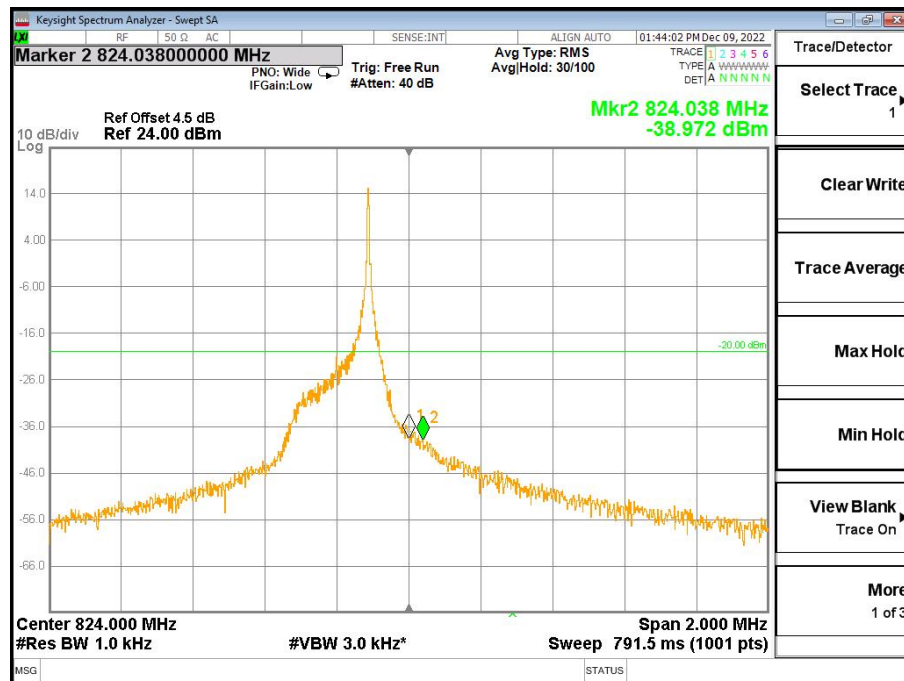
Low Channel, Subcarrier (15kHz), QPSK, 1@0



Low Channel, Subcarrier (15kHz), QPSK, 12@0



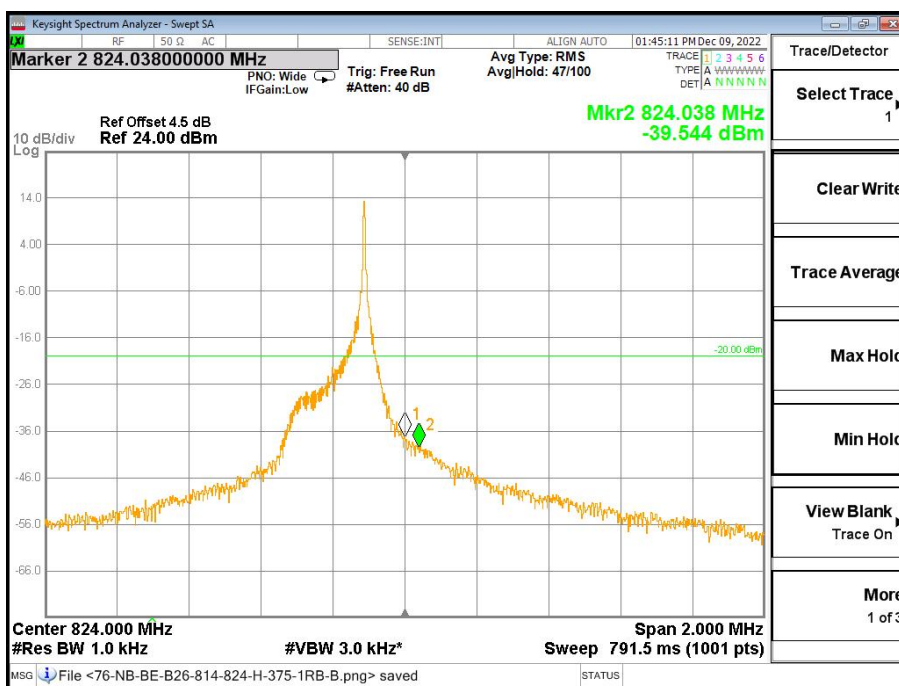
Low Channel, Subcarrier (15kHz), BPSK, 1@0



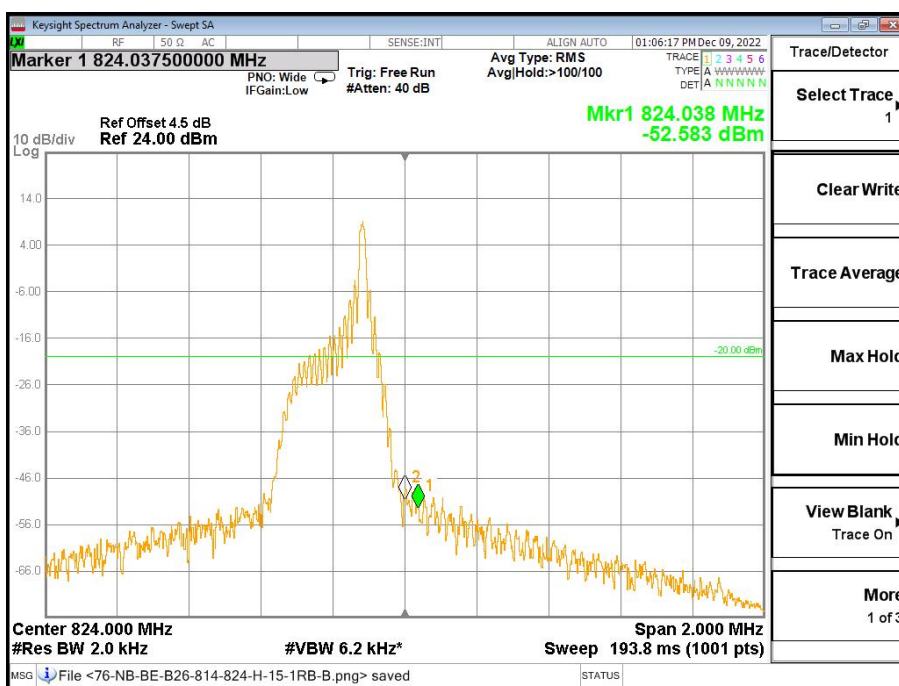
High Channel, Subcarrier (3.75kHz), QPSK, 1@47

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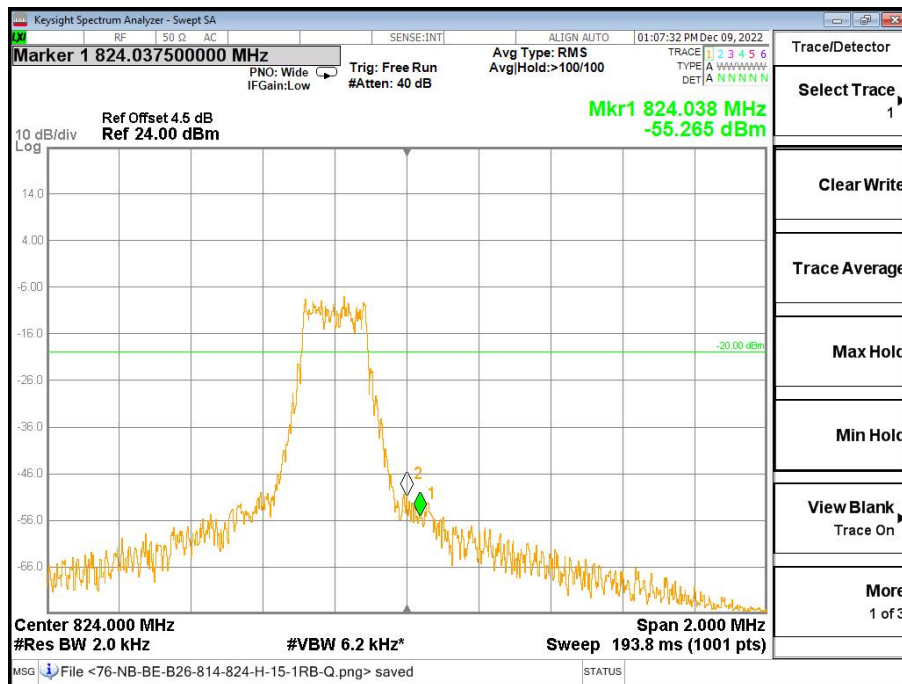
High Channel, Subcarrier (3.75kHz), BPSK, 1@47



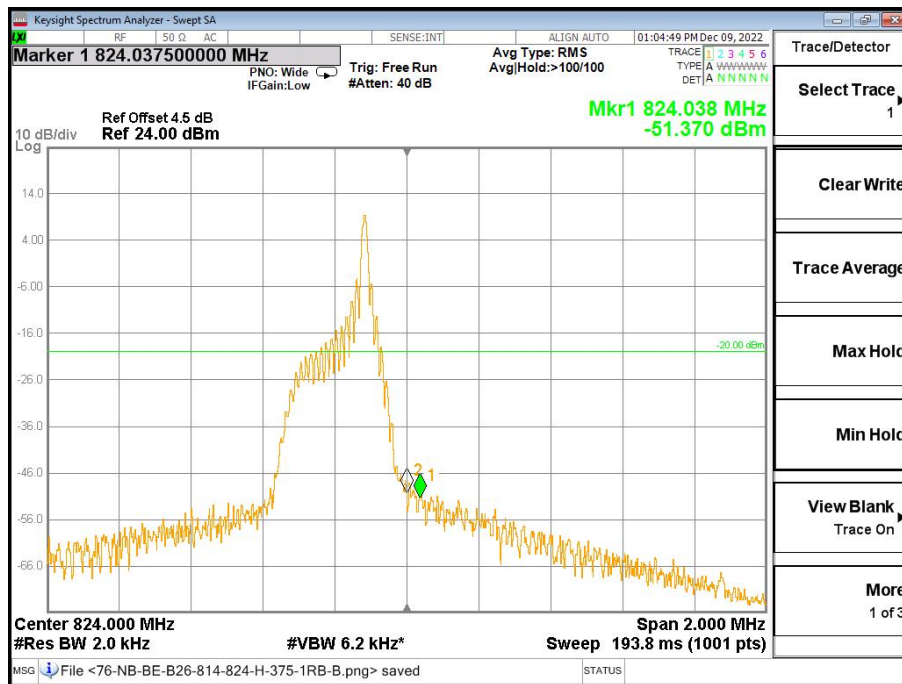
High Channel, Subcarrier (15kHz), QPSK, 1@11

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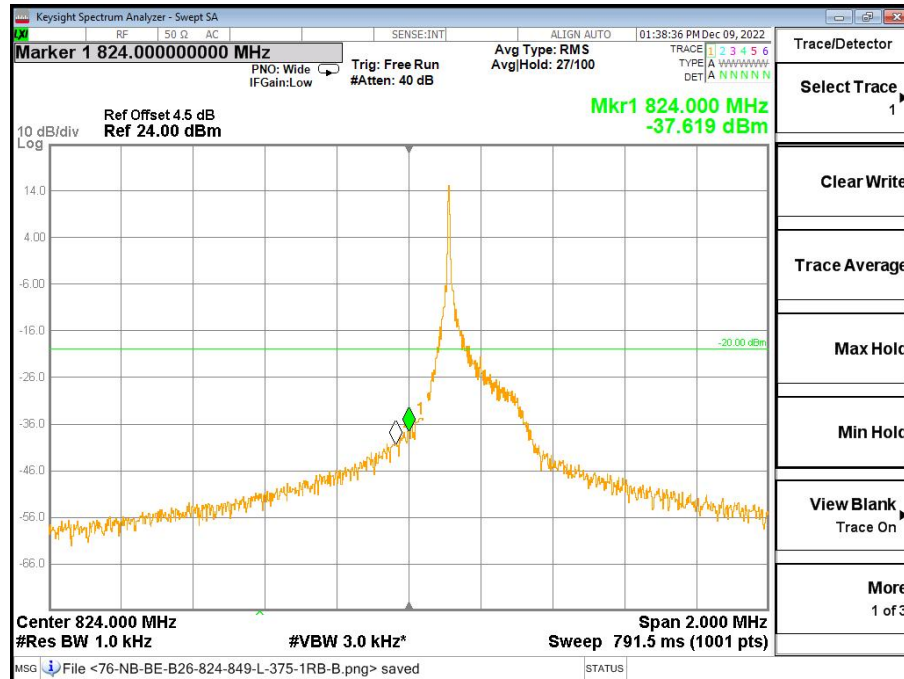


High Channel, Subcarrier (15kHz), QPSK, 12@0

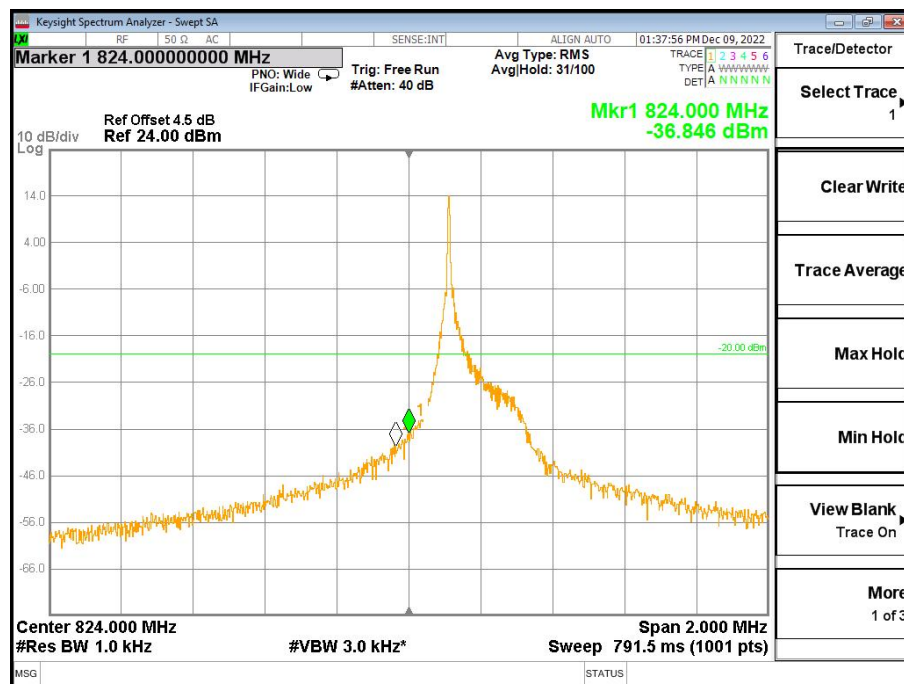


High Channel, Subcarrier (15kHz), BPSK, 1@11

(824MHz-849MHz)



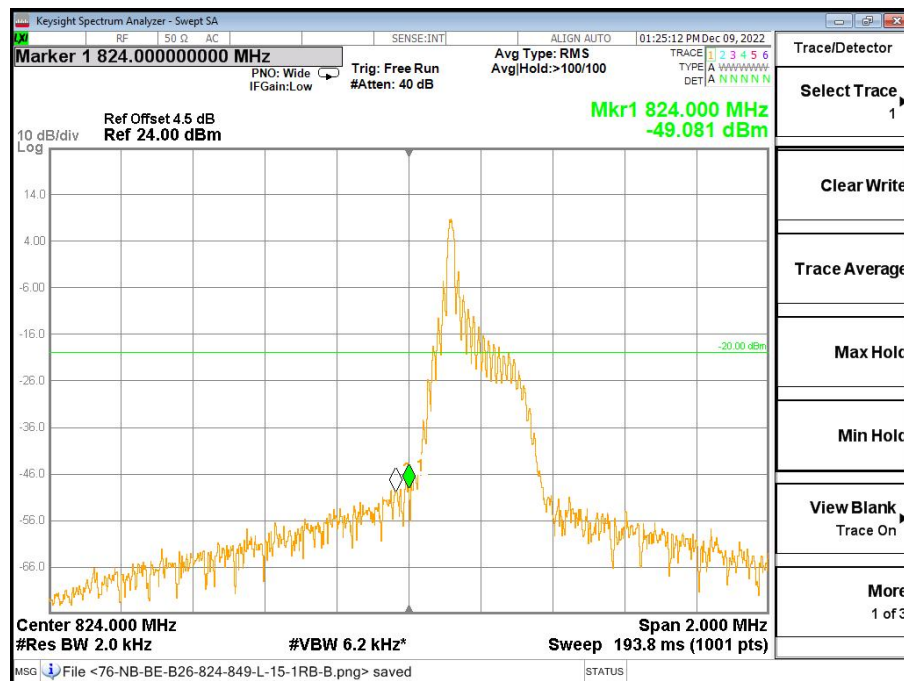
Low Channel, Subcarrier (3.75kHz), QPSK, 1@0



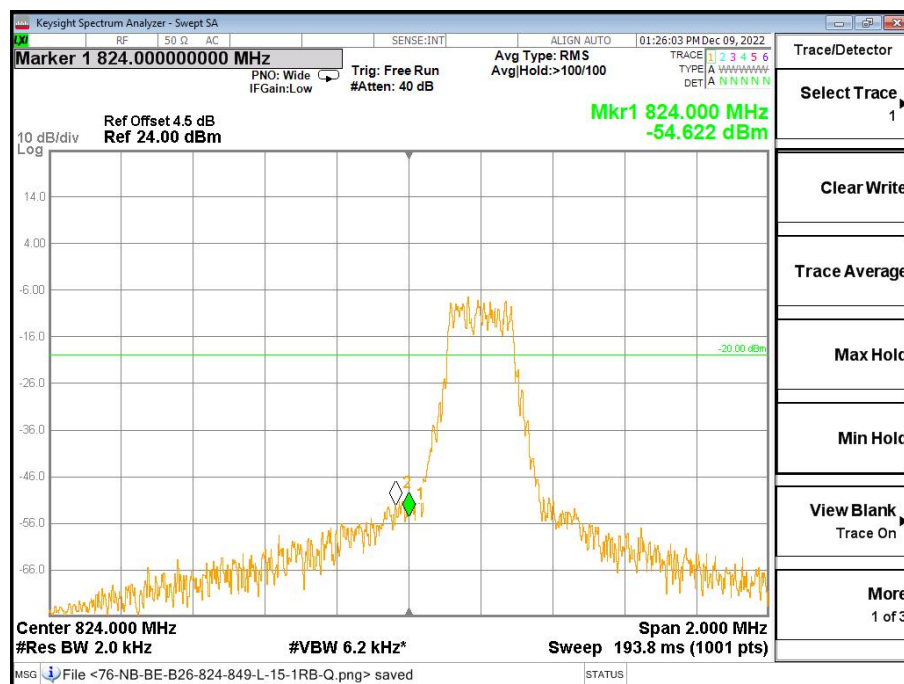
Low Channel, Subcarrier (3.75kHz), BPSK, 1@0

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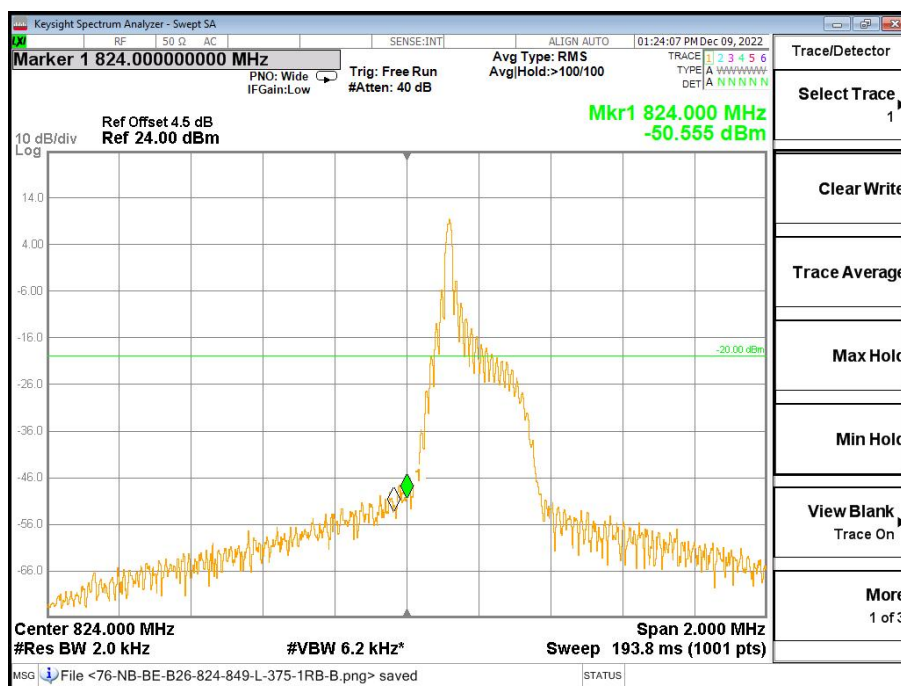
Low Channel, Subcarrier (15kHz), QPSK, 1@0



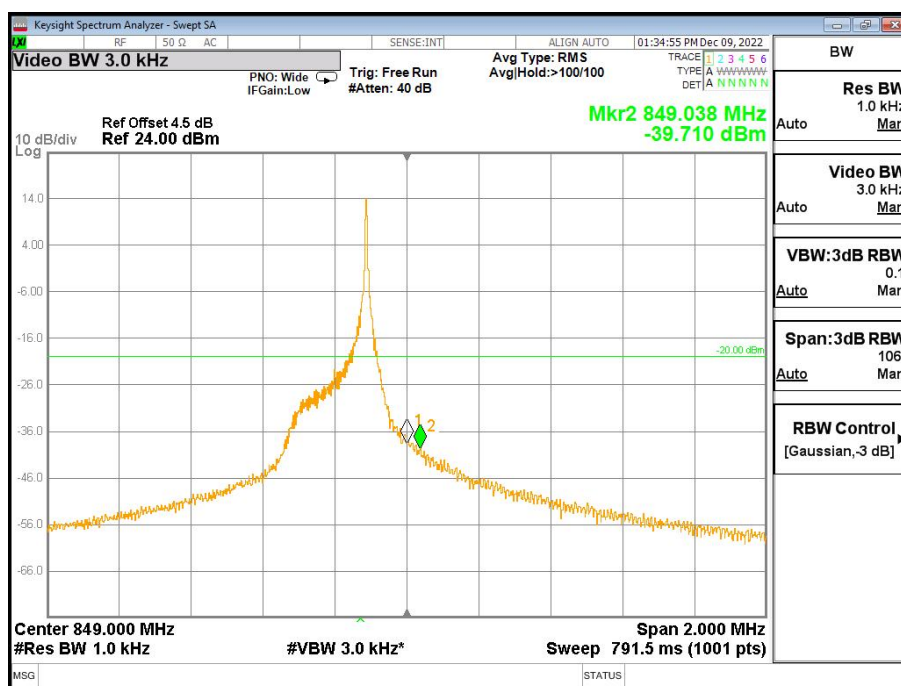
Low Channel, Subcarrier (15kHz), QPSK, 12@0

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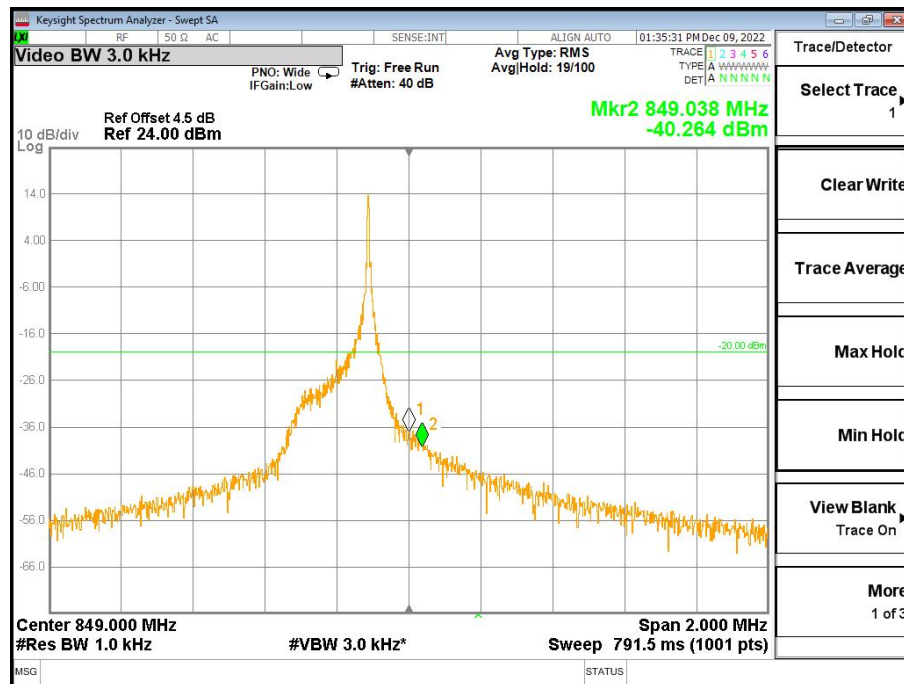
Low Channel, Subcarrier (15kHz), BPSK, 1@0



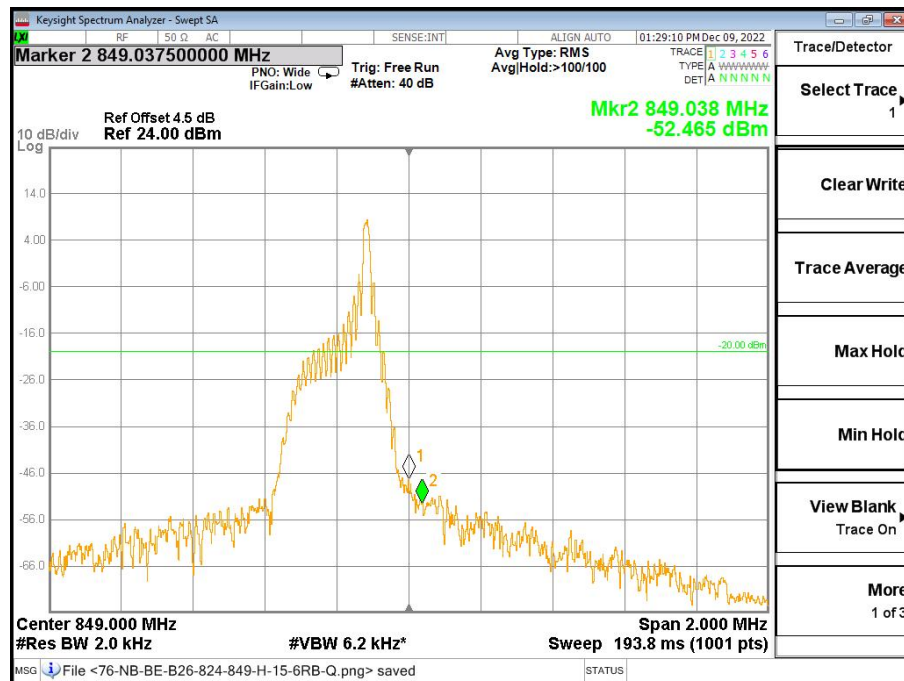
High Channel, Subcarrier (3.75kHz), QPSK, 1@47

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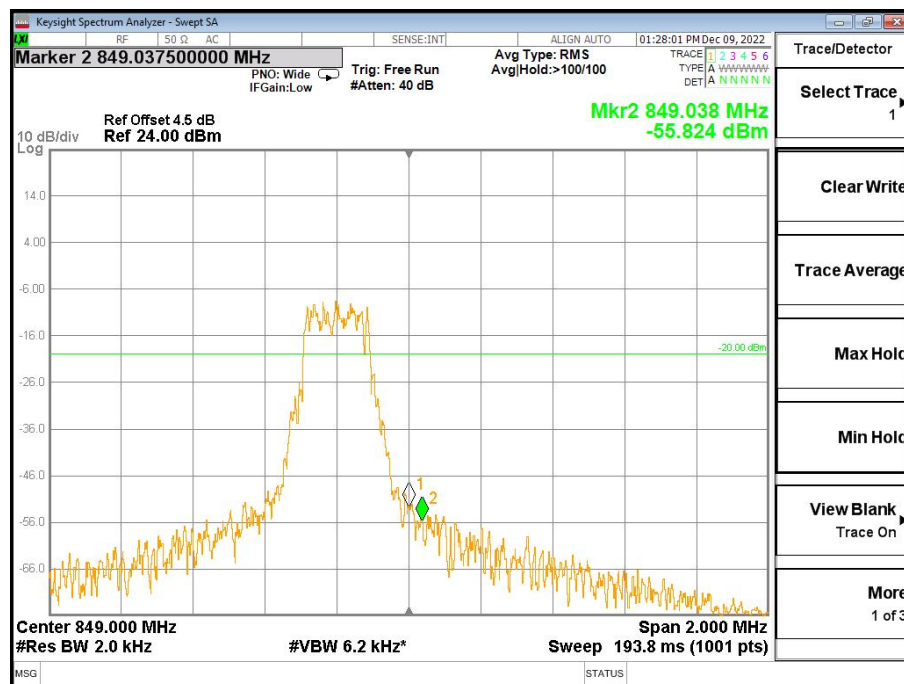
High Channel, Subcarrier (3.75kHz), BPSK, 1@47



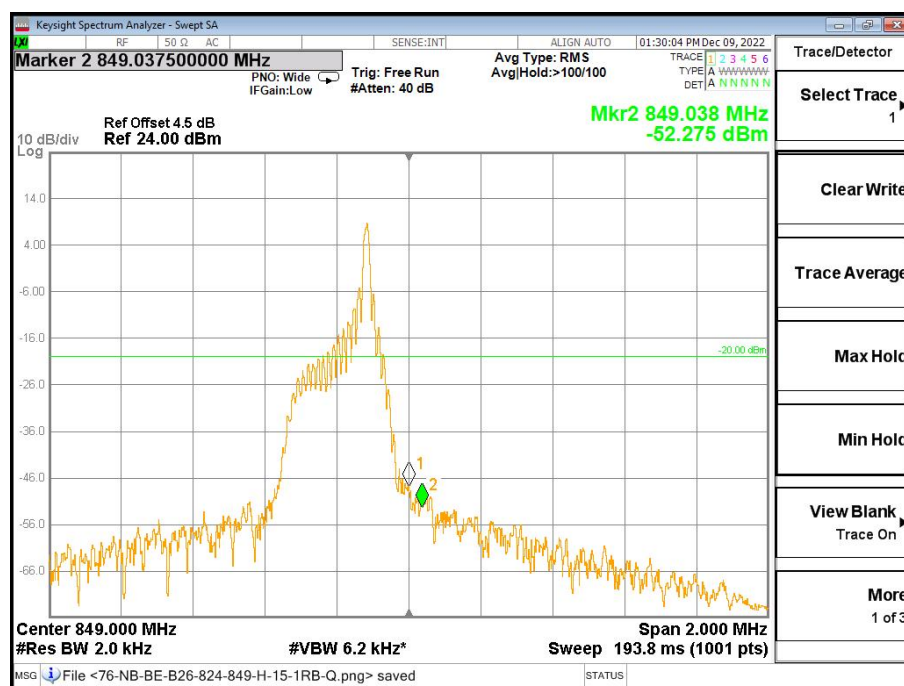
High Channel, Subcarrier (15kHz), QPSK, 1@11

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High Channel, Subcarrier (15kHz), QPSK, 12@0



High Channel, Subcarrier (15kHz), BPSK, 1@11

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6.7. Frequency Stability

Specifications:	FCC Part 2.1055, 22.355,24.235, 27.54,90.213
DUT Serial Number:	866884049909625
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit	
Frequency deviation [ppm]	±2.5

Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	1.54 Hz (k=2)

Test Method

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage. Two reference points are established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as FL and FH respectively.

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of CMW500.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the CMW500, and in a simulated call on middle channel for each LTE band, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.

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6. Subject the EUT to overnight soak at +50°C.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the center channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 °C increments from +50°C to -30°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

6.8.1 Frequency Stability over Temperature Variation Results

6.8.1.1 NB-IoT Band Frequency Stability over Temperature Variation Results

Band	Reference channel frequency (MHz)	Offset	Temperature[°C]								
			-30	-20	-10	0	10	20	30	40	50
2	1880	Hz	-9.88	7.11	16.09	18.74	13.69	8.74	9.21	-10.18	-16.48
		ppm	-0.005	0.004	0.009	0.010	0.007	0.005	0.005	-0.005	-0.009
4	1732.5	Hz	-9.63	4.86	9.46	9.48	6.64	5.25	6.79	-8.24	-17.01
		ppm	-0.006	0.003	0.005	0.005	0.004	0.003	0.004	-0.005	-0.010
12	707.5	Hz	-1.63	8.14	8.85	11.43	10.54	6.62	3.42	-1.36	-2.70
		ppm	-0.002	0.012	0.013	0.016	0.015	0.009	0.005	-0.002	-0.004
13	782	Hz	-3.08	4.36	8.25	8.71	8.82	3.88	8.47	-7.16	-8.15
		ppm	-0.004	0.006	0.011	0.011	0.011	0.005	0.011	-0.009	-0.010
26	819	Hz	-5.36	0.80	2.33	3.82	5.43	-2.75	-6.47	-6.24	-13.30
		ppm	-0.006	0.001	0.003	0.005	0.007	-0.003	-0.008	-0.008	-0.016
	836.5	Hz	-3.10	4.68	5.38	5.94	3.22	1.63	4.15	-5.81	-8.71
		ppm	-0.003	0.006	0.006	0.007	0.004	0.002	0.005	-0.007	-0.010

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6.8.2 Frequency Stability over Voltage Variation

6.8.2.1 NB-IoT Band Frequency Stability over Voltage Variation Results

Test data:

Band	Reference channel frequency (MHz)	Offset	Voltage (V)		
			3.4	3.8	4.2
2	1880	Hz	9.30	8.74	6.94
		ppm	0.005	0.005	0.004
4	1732.5	Hz	3.58	5.25	4.84
		ppm	0.002	0.003	0.003
12	707.5	Hz	6.75	6.62	6.55
		ppm	0.010	0.009	0.009
13	782	Hz	3.09	3.88	3.81
		ppm	0.004	0.005	0.005
26	819	Hz	-1.39	-2.75	-0.20
		ppm	-0.002	-0.003	-0.0002
	836.5	Hz	5.55	1.63	3.05
		ppm	0.007	0.002	0.004

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6.8. Peak to Average Ratio

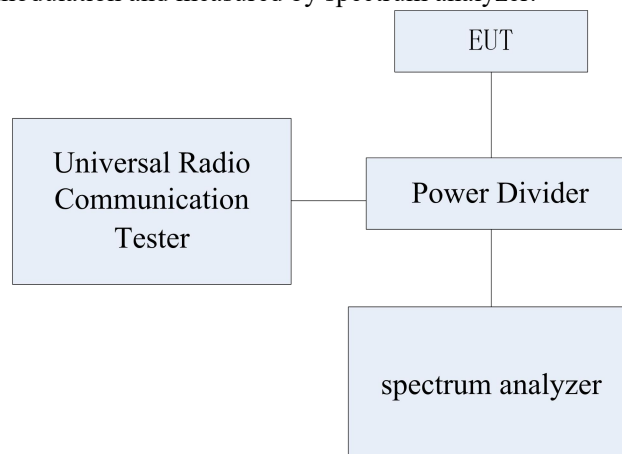
Specifications:	FCC Part 24.232, 27.50
DUT Serial Number:	866884049909625
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit

The EUT meets the requirement of having a peak to average ratio of less than 13dB.

Test Setup

During the test, the EUT was controlled via the Wireless Communications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.



Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	0.62 dB (k=2)

Test Method

The transmitter output was connected to a CMW500 through a coaxial RF cable and directional coupler, and configured to operate at maximum power. The peak to average ratio was measured at the required operating frequencies in each Band on the Spectrum Analyzer.

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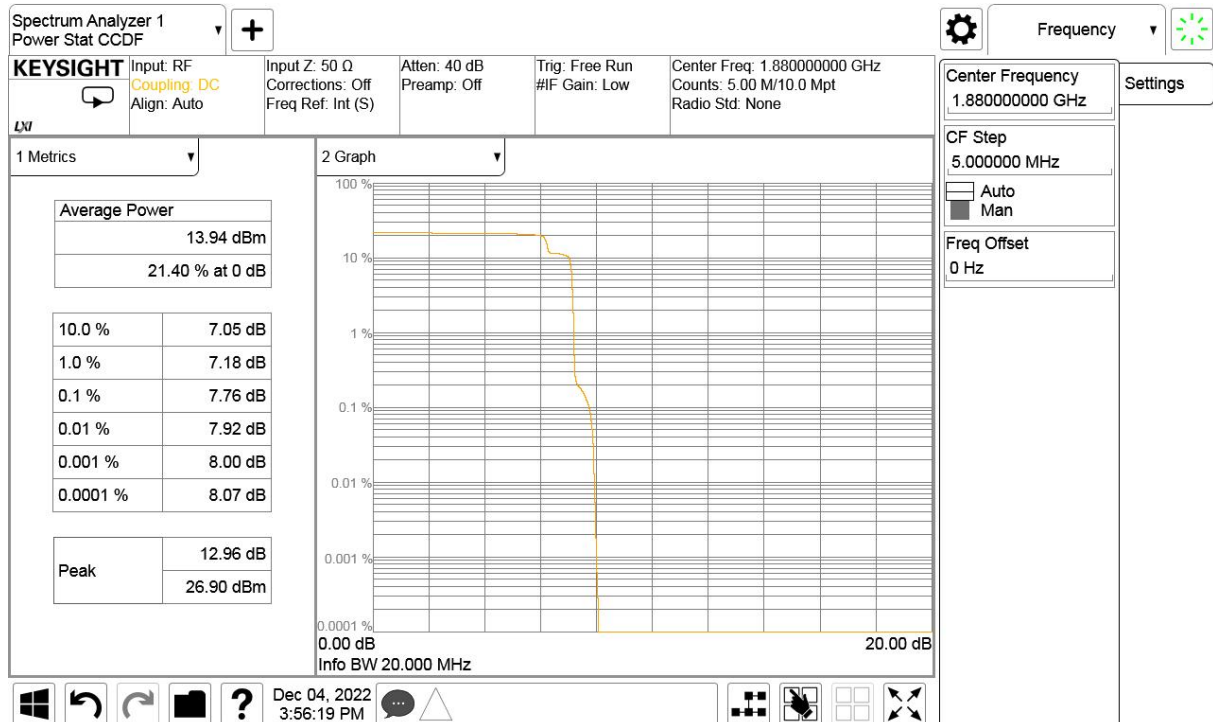
6.9.1 NB-IoT Peak to Average Ratio Results

Mode	Channel	Frequency (MHz)	PAPR(dB)	PAPR(dB)
			QPSK	BPSK
Band2	18900	1880	7.76	7.69
Band4	20175	1732.5	7.74	8.12
Band12	23095	707.5	8.14	8.87
Band13	23230	782.0	8.95	8.20
Band26 (814MH-824MHz)	26740	819	8.45	9.46
Band26 (824MH-849MHz)	26915	836.5	8.20	8.33

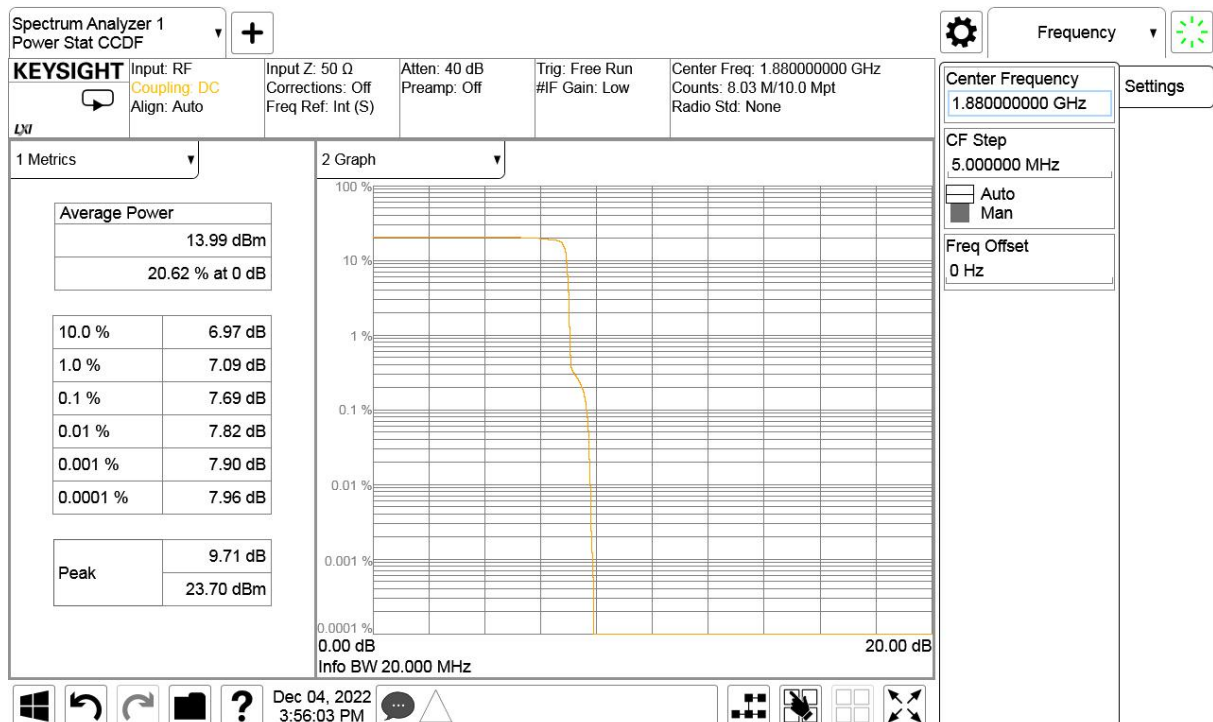
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Graphical for Peak to Average Ratio Results for NB-IoT:



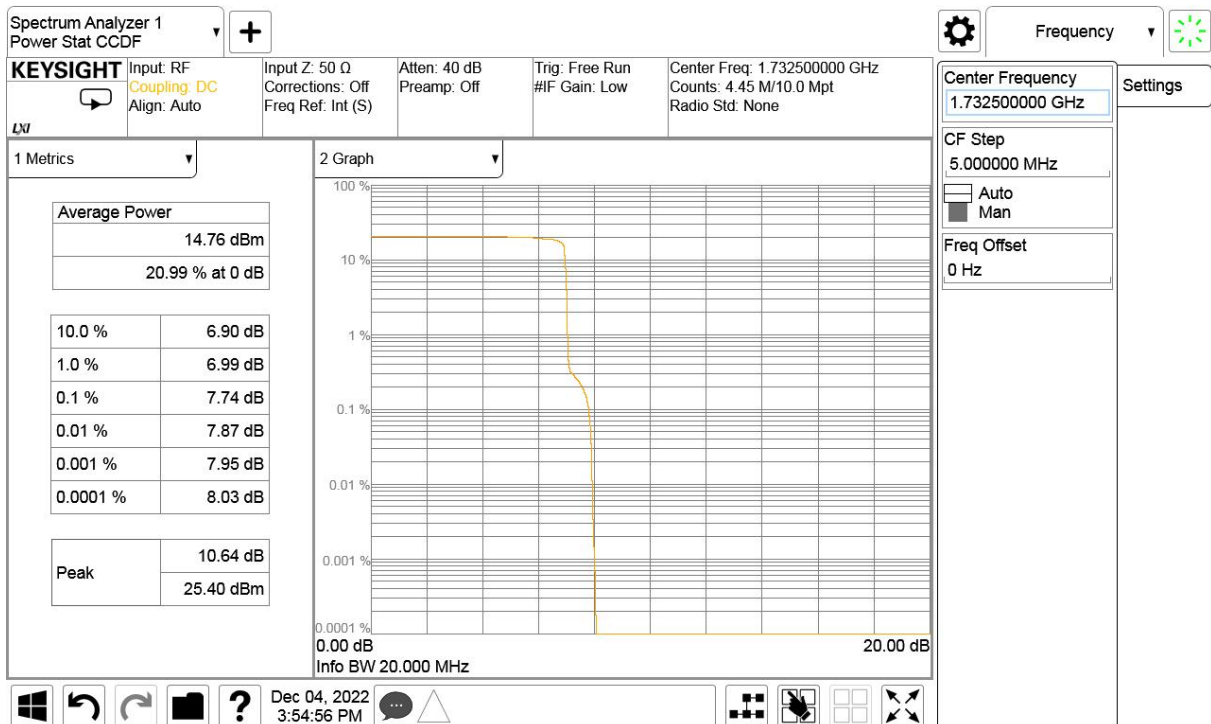
Band2-CH18900-1880MHz-QPSK



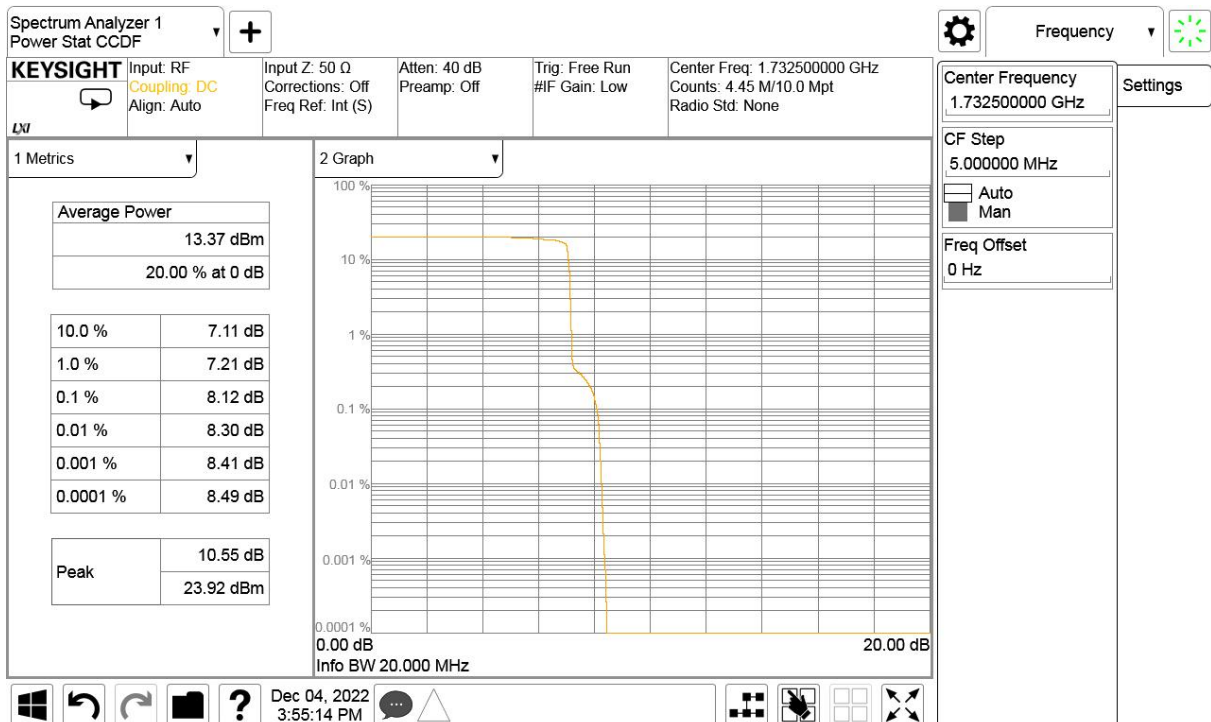
Band2-CH18900-1880MHz-BPSK

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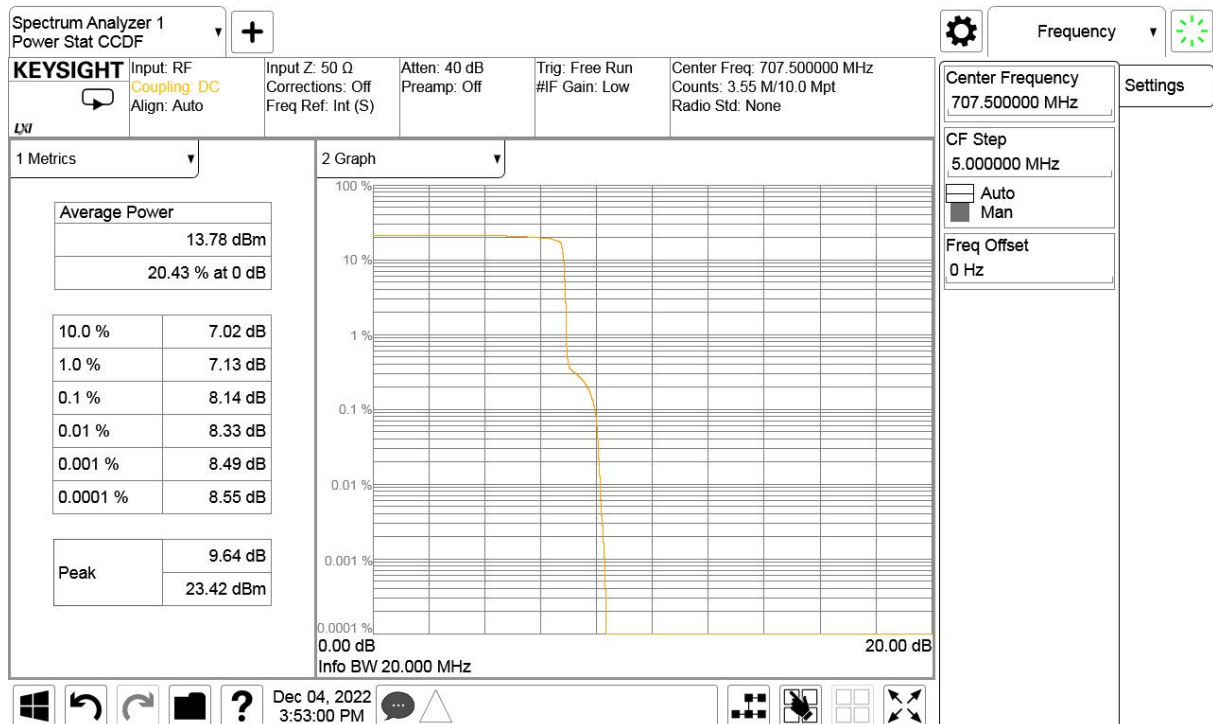
Address: No. 8,Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336
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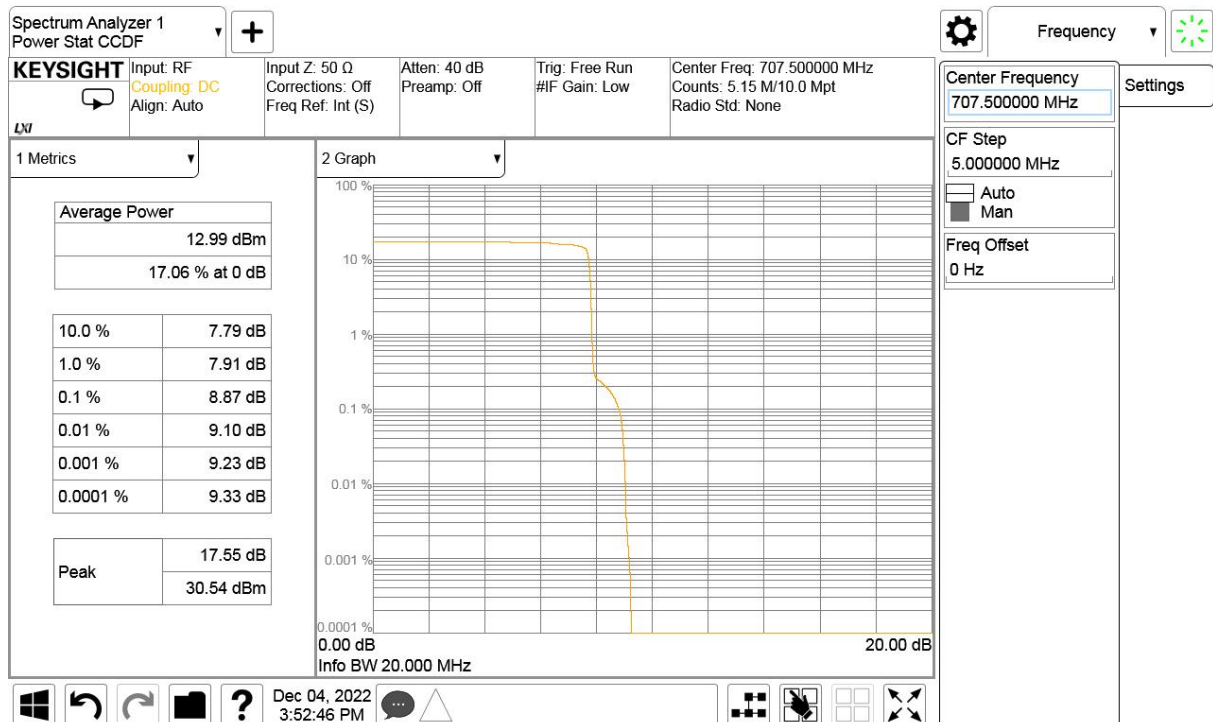
Band4-CH20175-1732.5MHz-QPSK



Band4- CH20175-1732.5MHz -BPSK



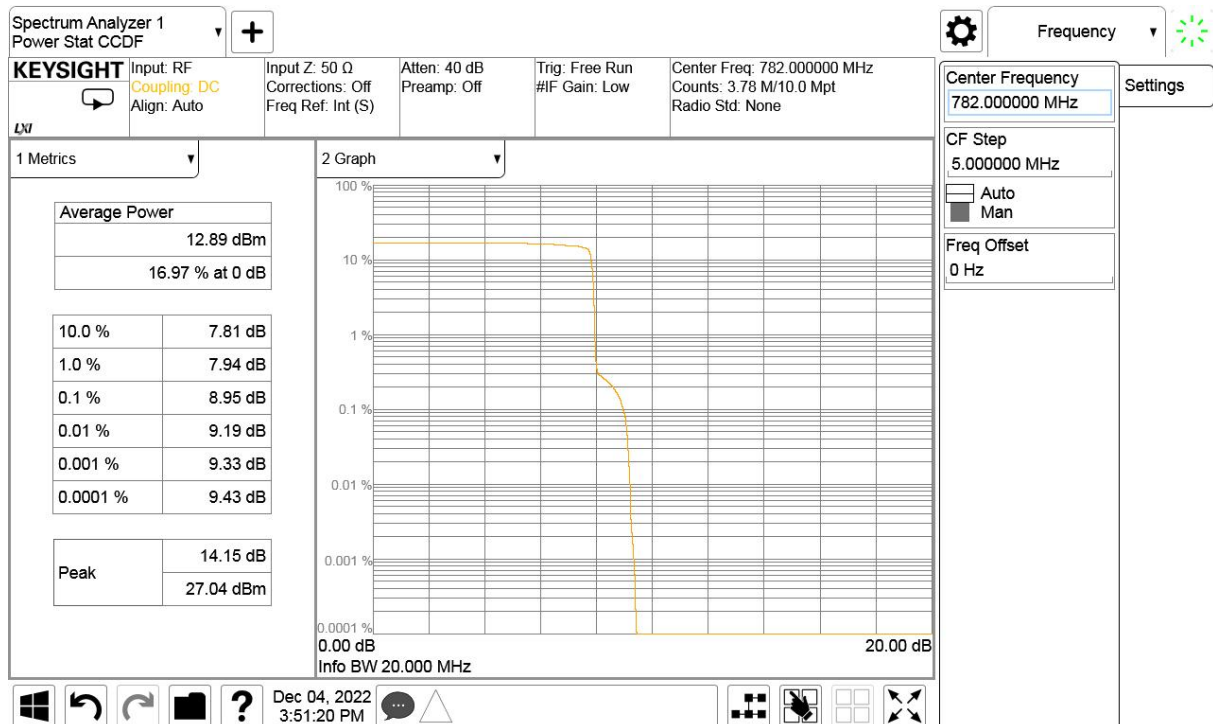
Band12-CH23095-707.5MHz-QPSK



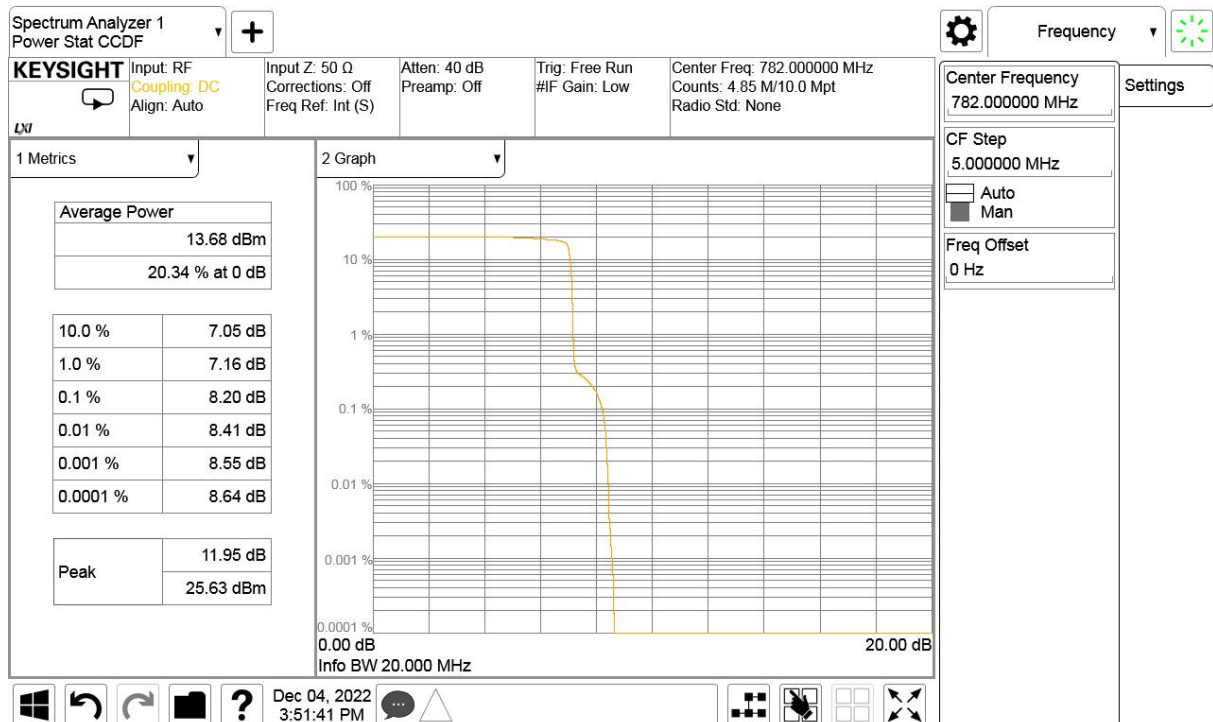
Band12- CH23095-707.5MHz -BPSK

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Band13-CH23230-782MHz-QPSK



Band13- CH23230-782MHz -BPSK