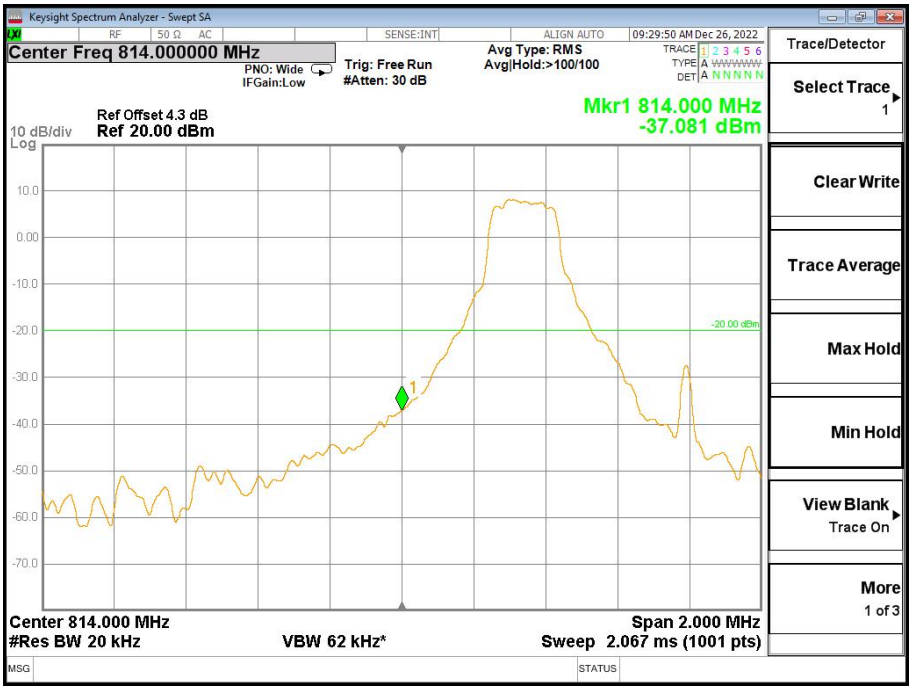
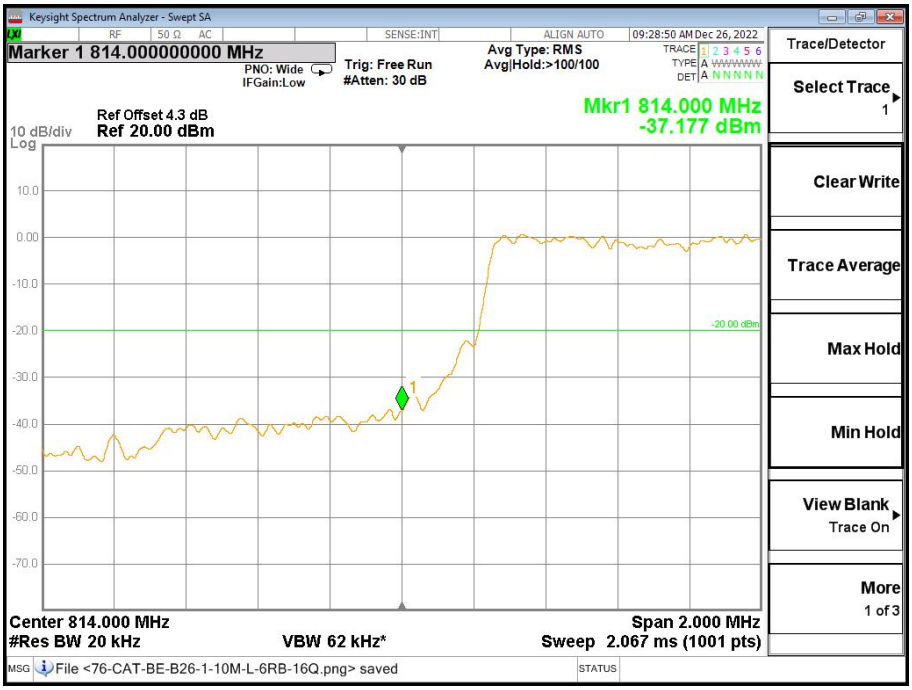


Band26-Low Channel-5MHz Bandwidth-1RB-16QAM

Band26-Low Channel-5MHz Bandwidth-1RB-QPSK



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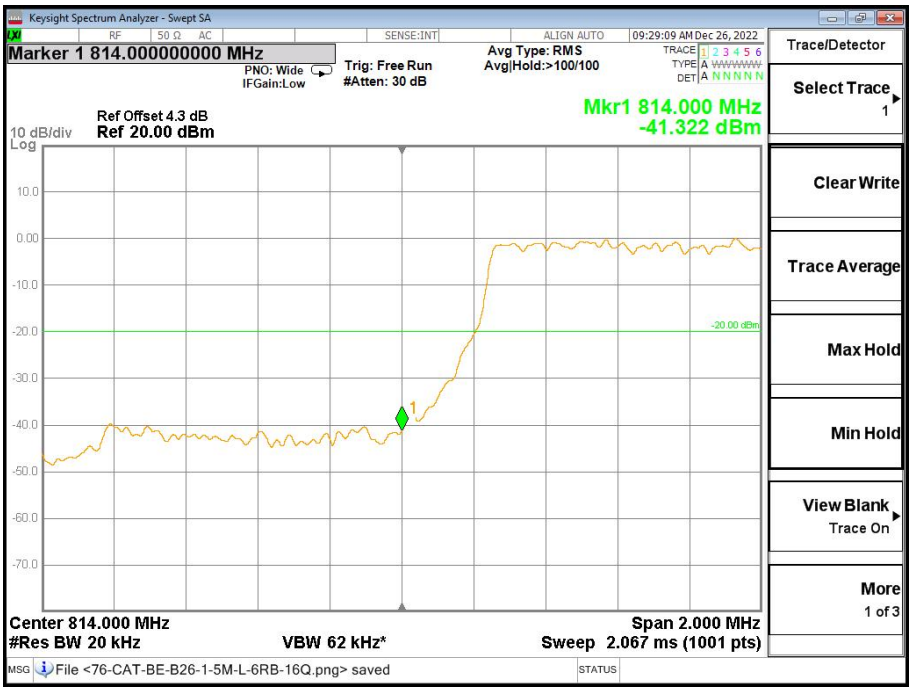

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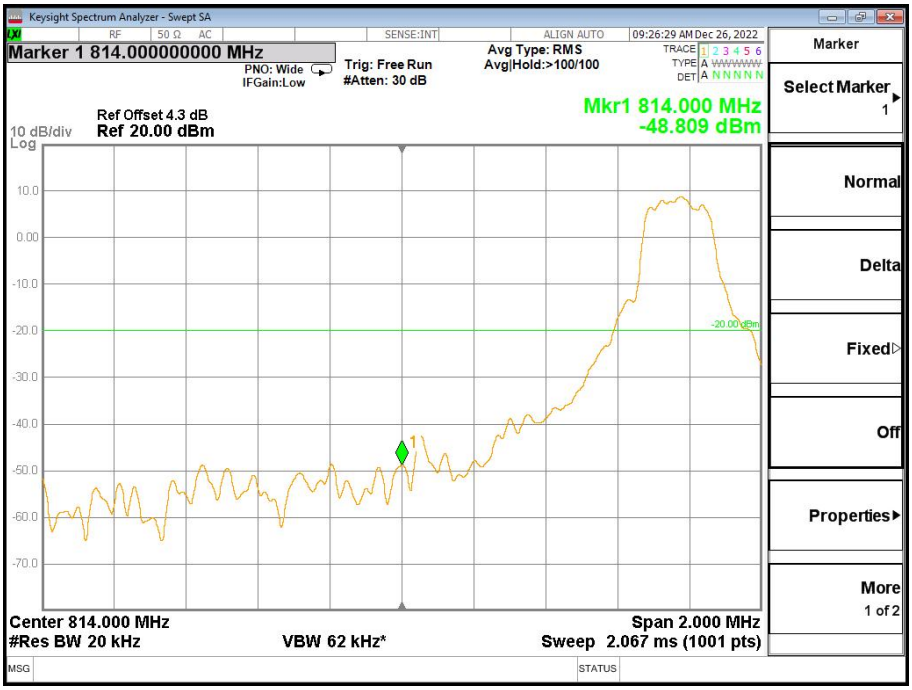
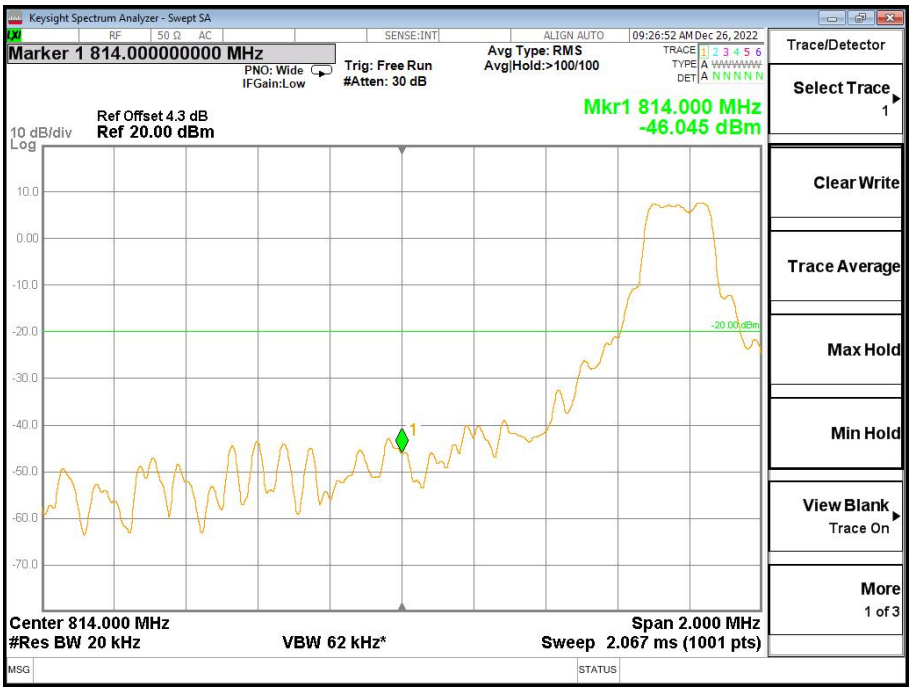


Band26-Low Channel-10MHz Bandwidth-1RB-16QAM



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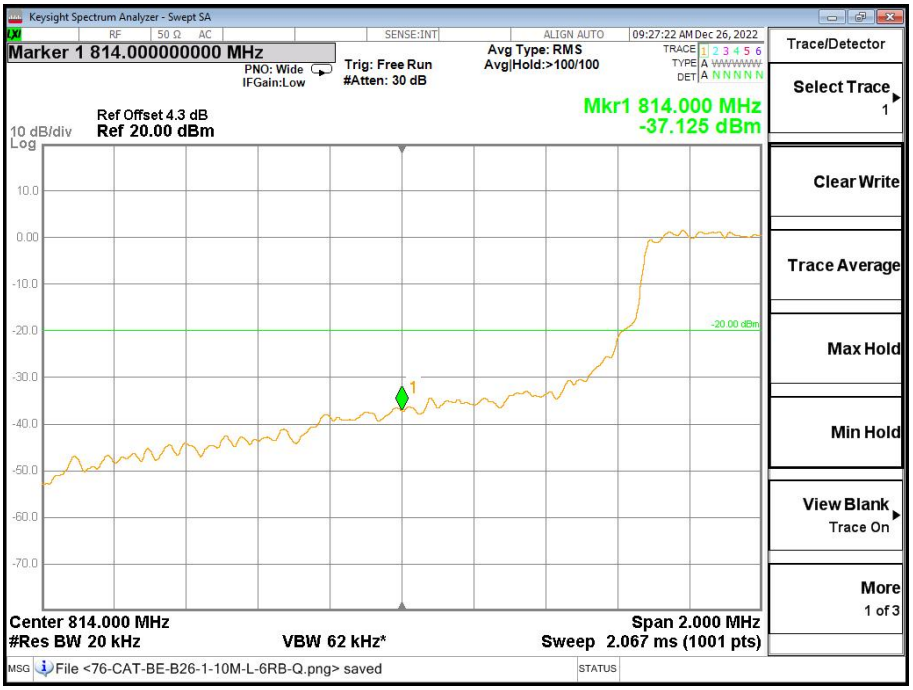

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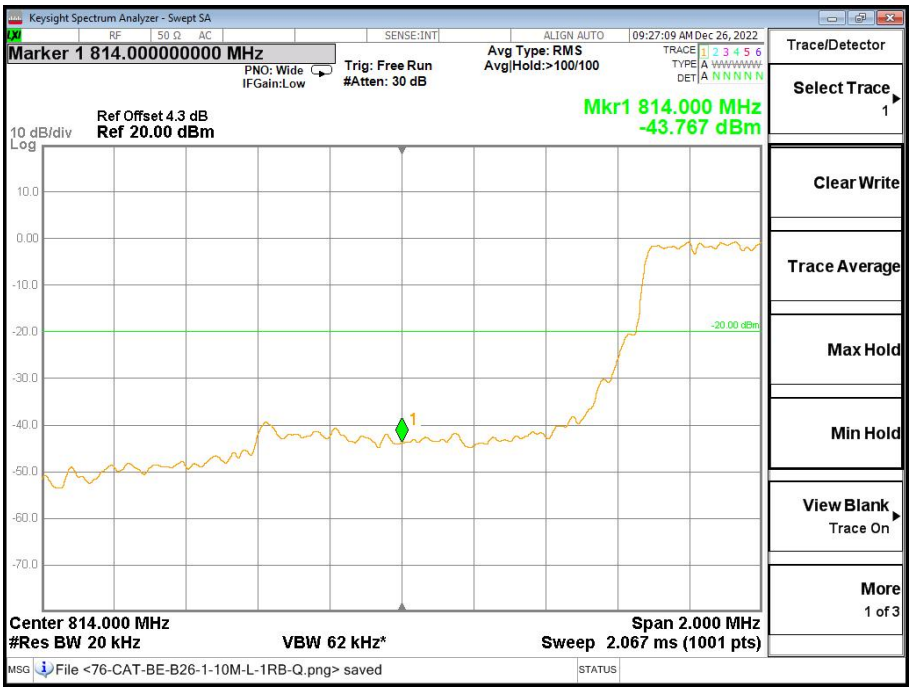
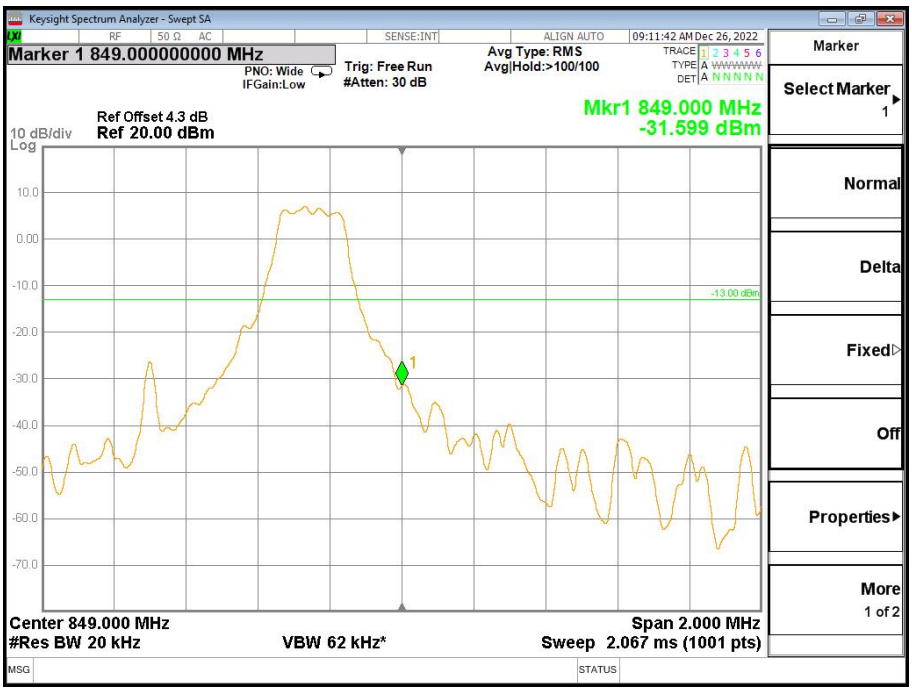
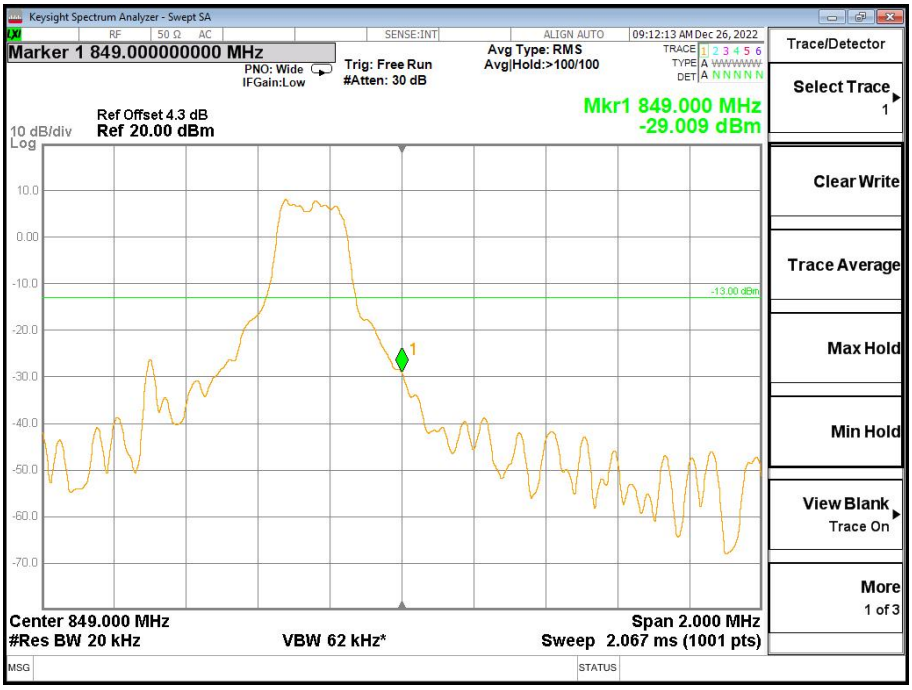


Band26-Low Channel-10MHz Bandwidth-6RB-QPSK

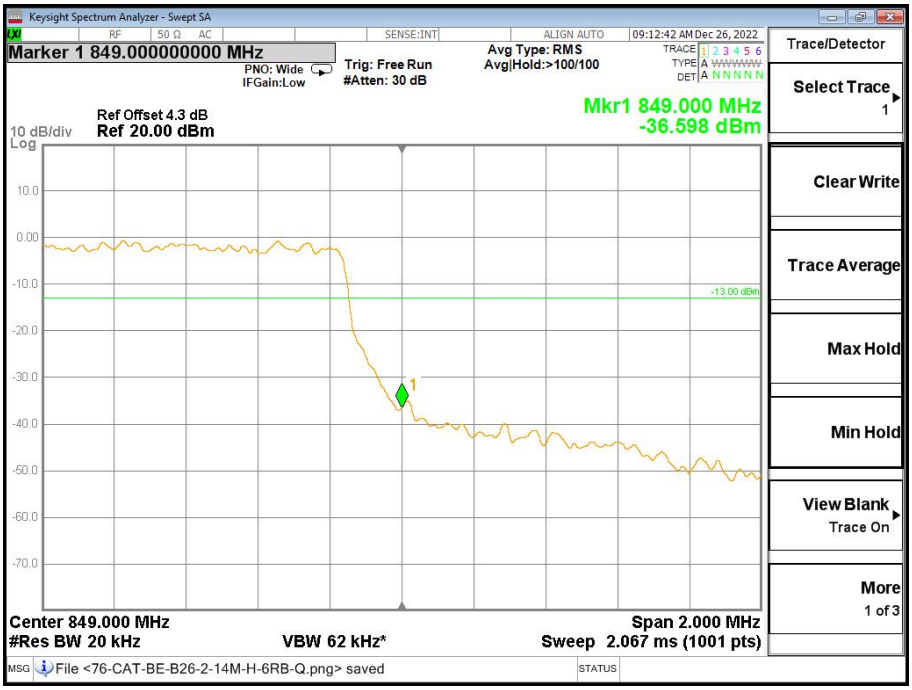
(824MHz-849MHz)



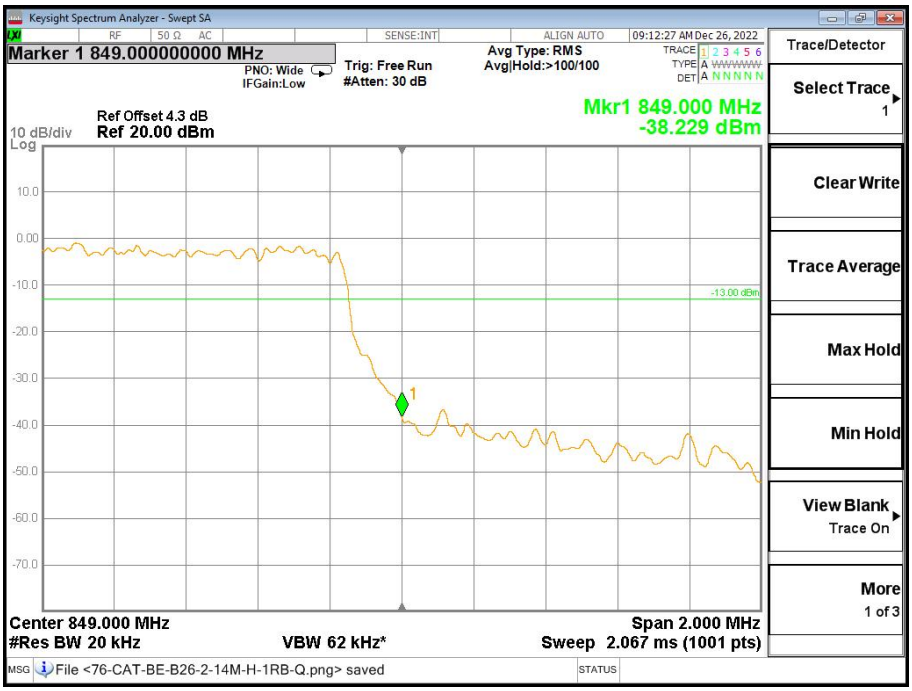
Band26-High Channel-1.4MHz Bandwidth-1RB-16QAM



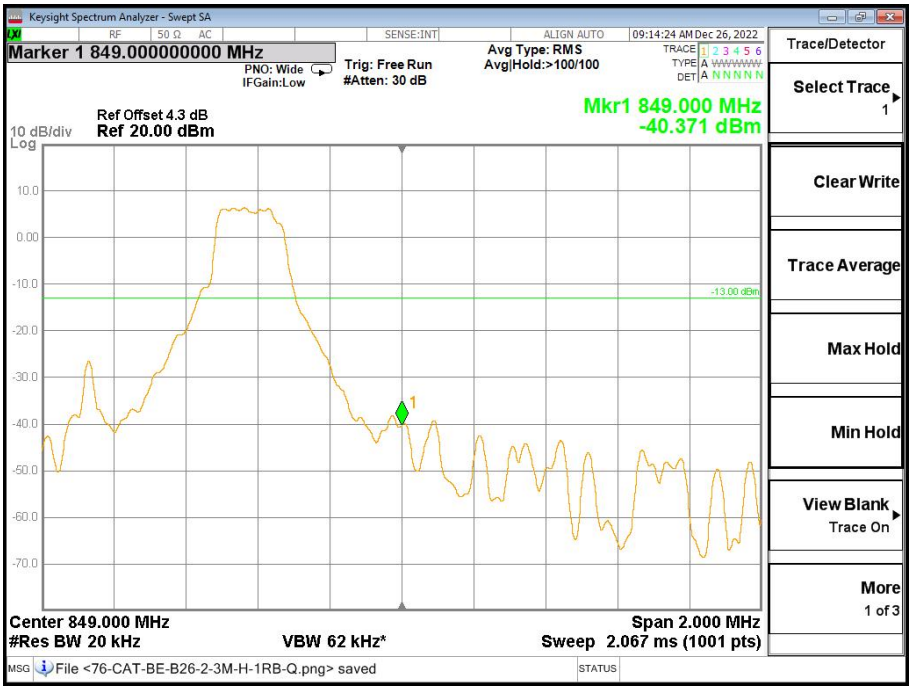
Band26-High Channel-1.4MHz Bandwidth-1RB-QPSK



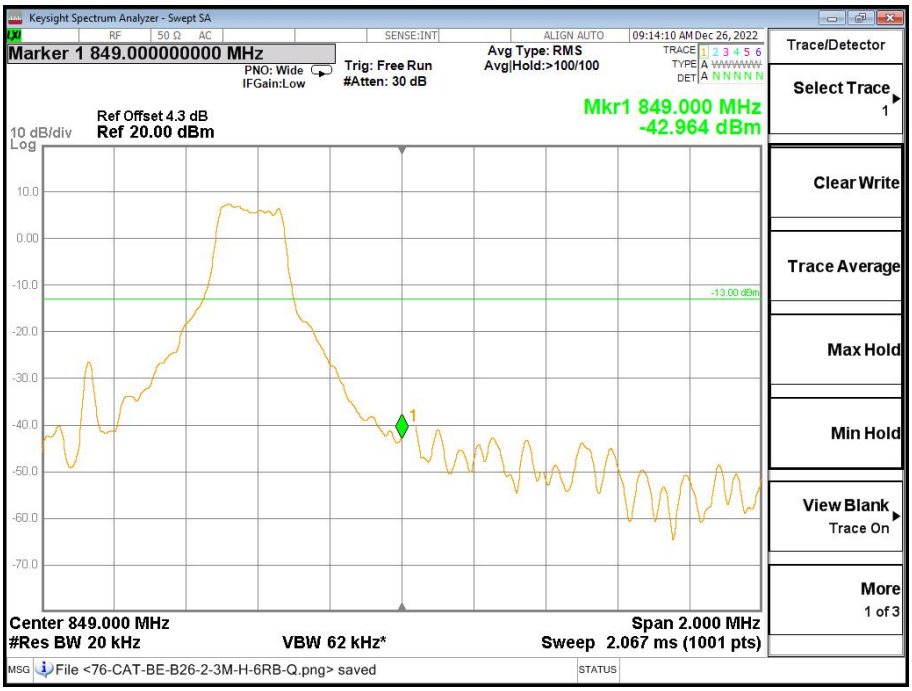
Band26-High Channel-1.4MHz Bandwidth-5RB-16QAM



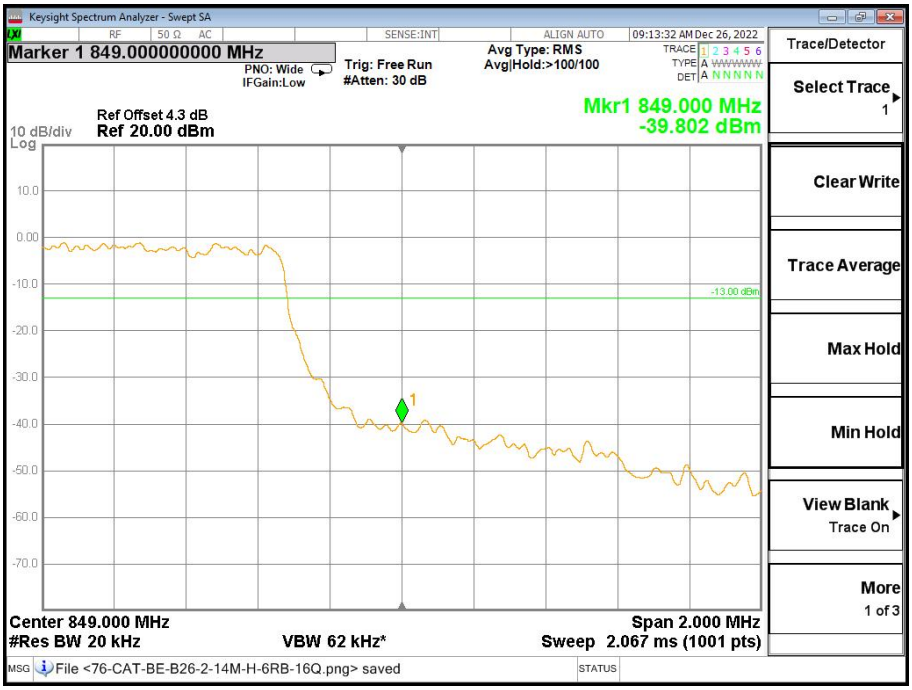
Band26-High Channel-1.4MHz Bandwidth-6RB-QPSK



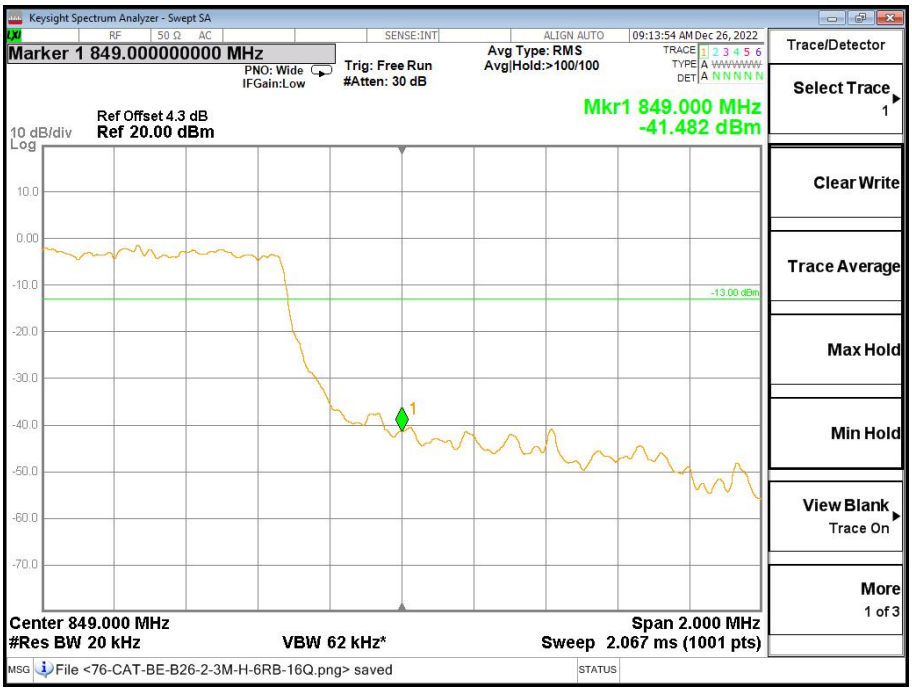
Band26-High Channel-3MHz Bandwidth-1RB-16QAM



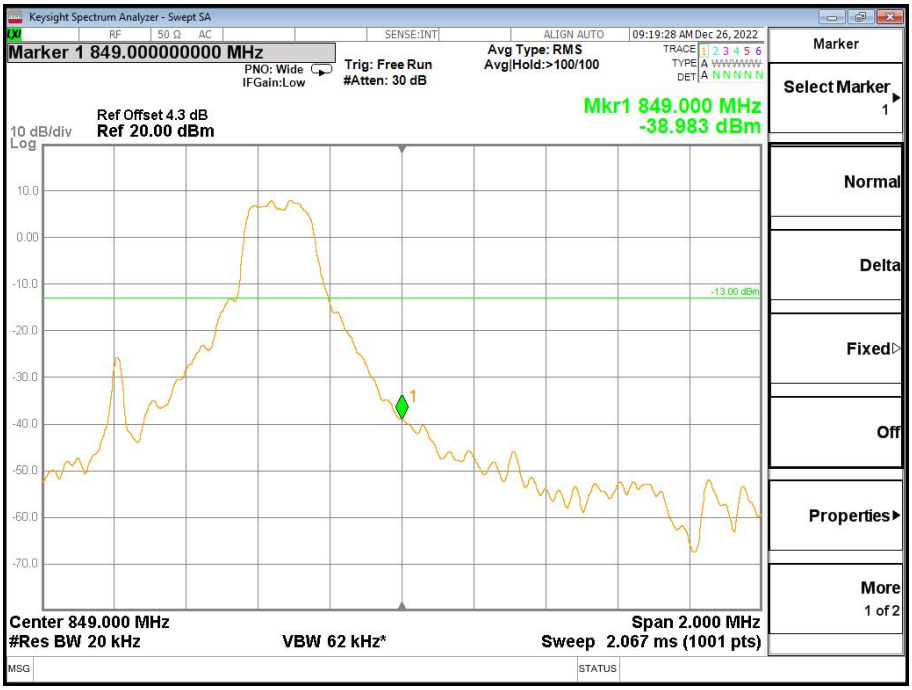
Band26-High Channel-3MHz Bandwidth-1RB-QPSK



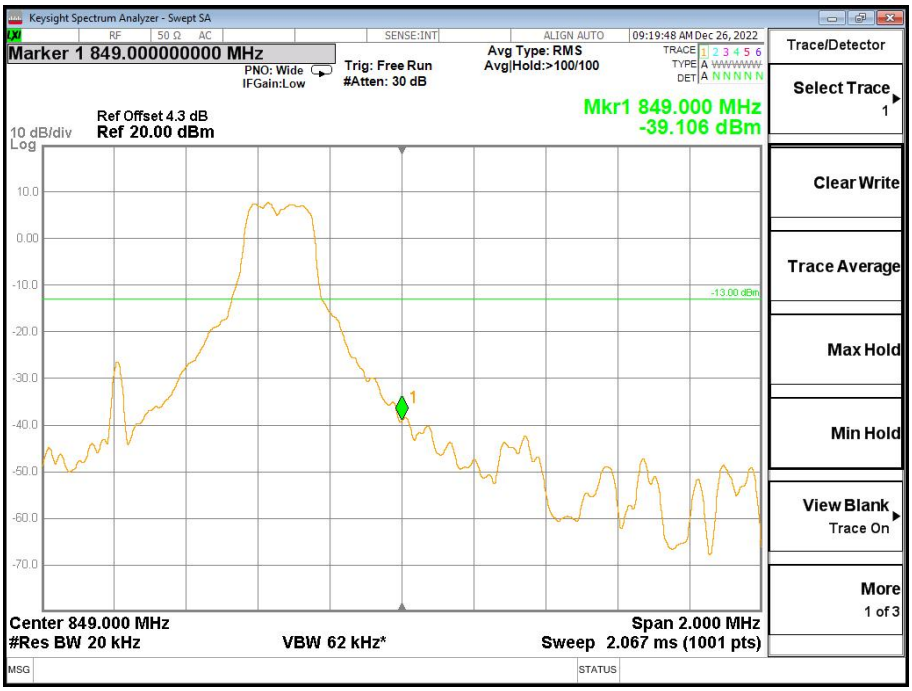
Band26-High Channel-3MHz Bandwidth-5RB-16QAM



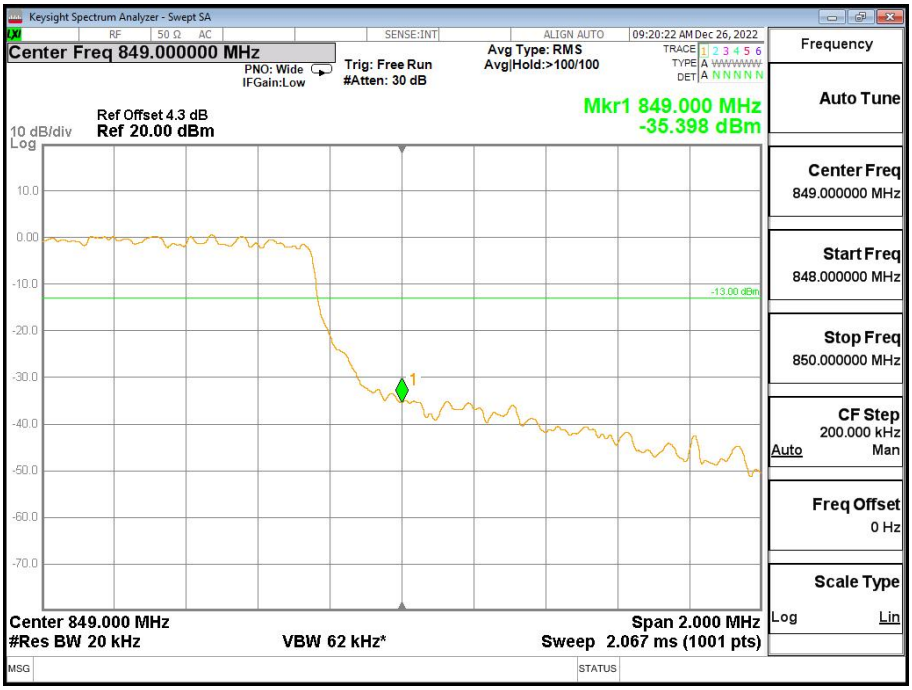
Band26-High Channel-3MHz Bandwidth-6RB-QPSK



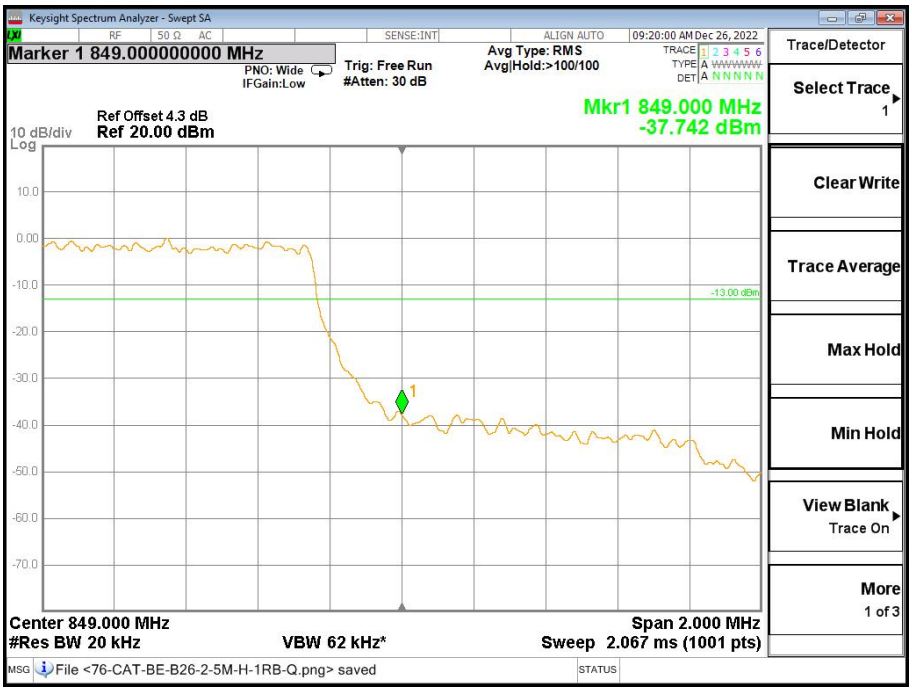
Band26-High Channel-5MHz Bandwidth-1RB-16QAM



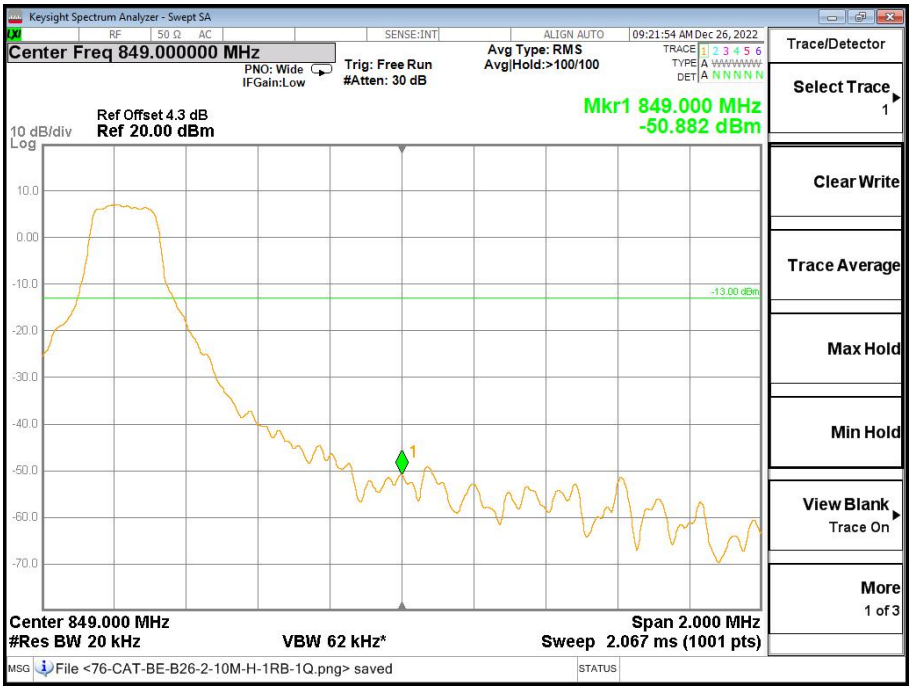
Band26-High Channel-5MHz Bandwidth-1RB-QPSK



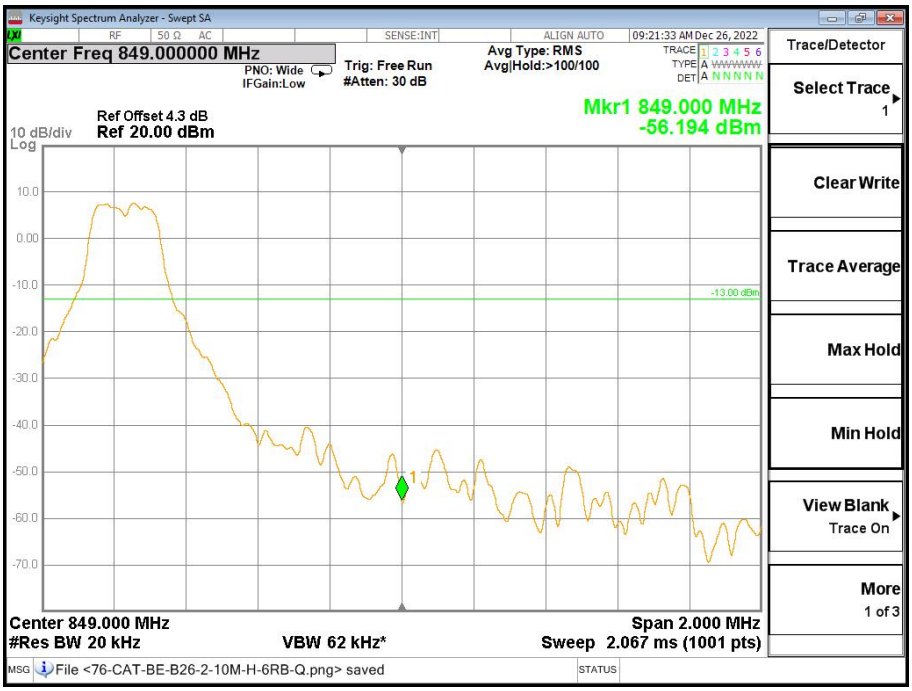
Band26-High Channel-5MHz Bandwidth-5RB-16QAM



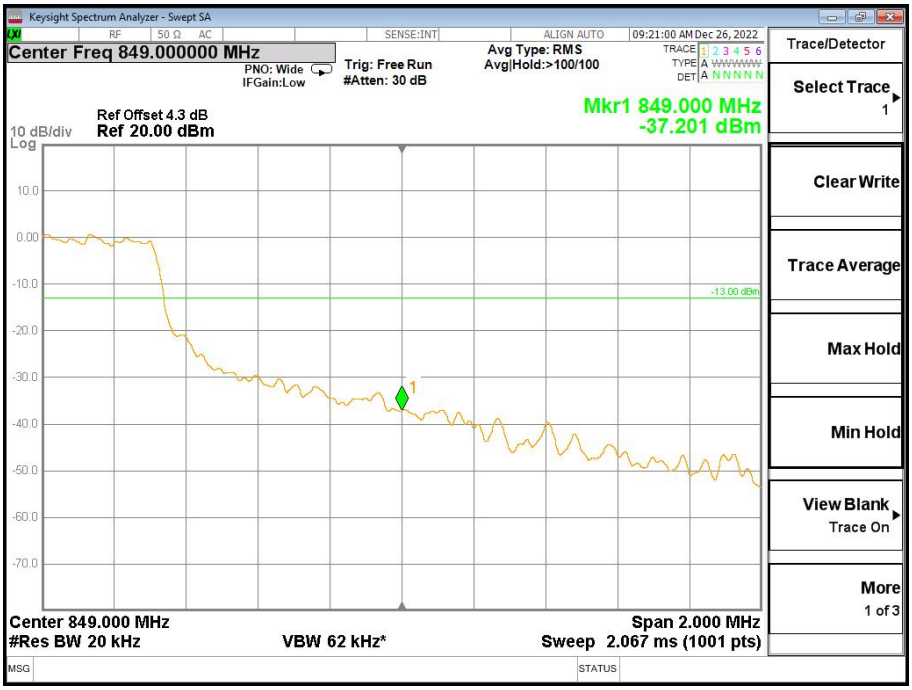
Band26-High Channel-5MHz Bandwidth-6RB-QPSK



Band26-High Channel-10MHz Bandwidth-1RB-16QAM

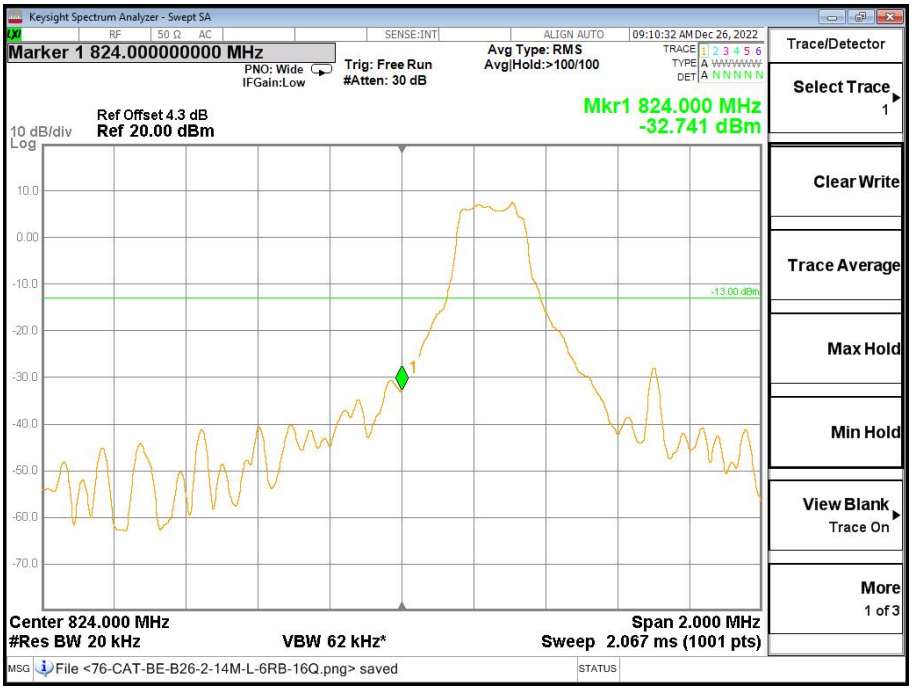


Band26-High Channel-10MHz Bandwidth-1RB-QPSK

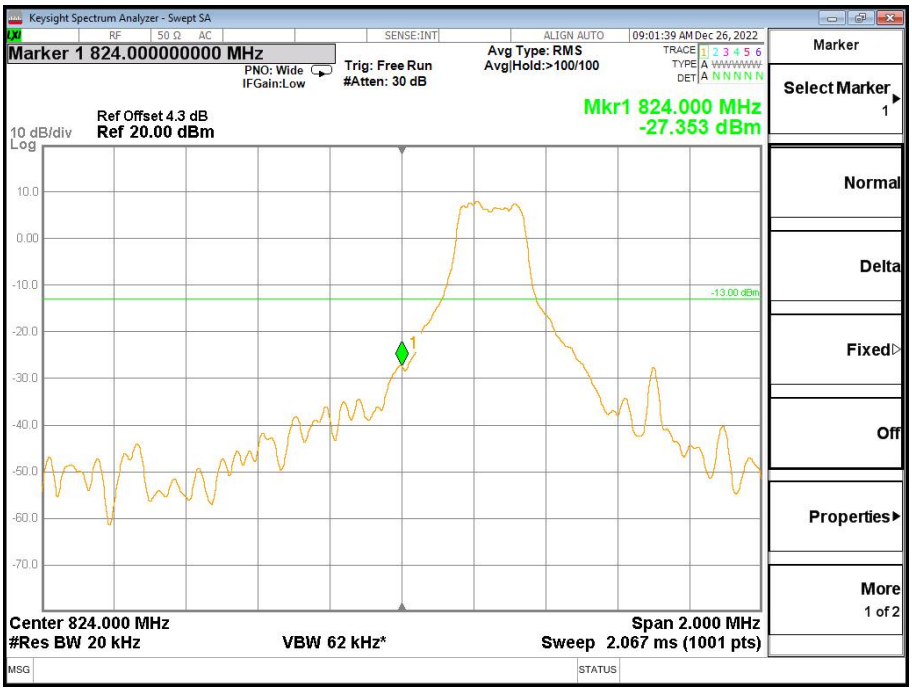


Band26-High Channel-10MHz Bandwidth-5RB-16QAM

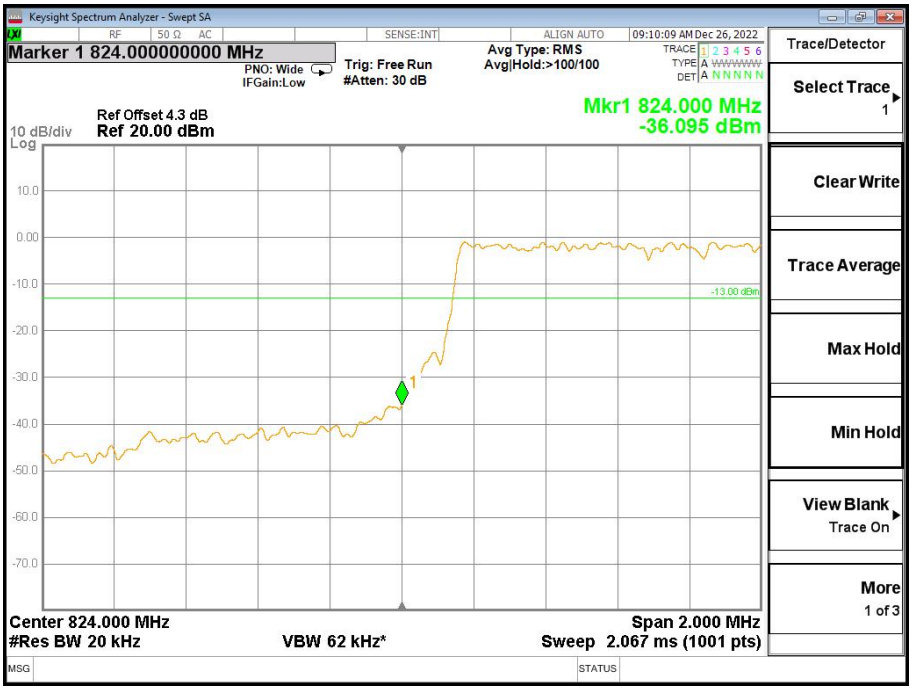
Band26-High Channel-10MHz Bandwidth-6RB-QPSK



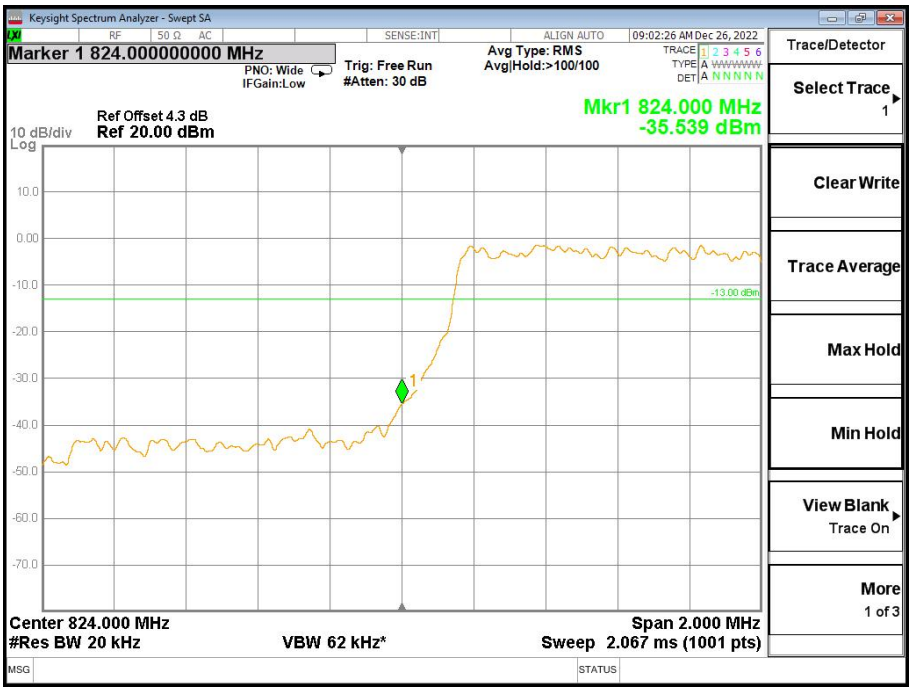
Band26-Low Channel-1.4MHz Bandwidth-1RB-16QAM



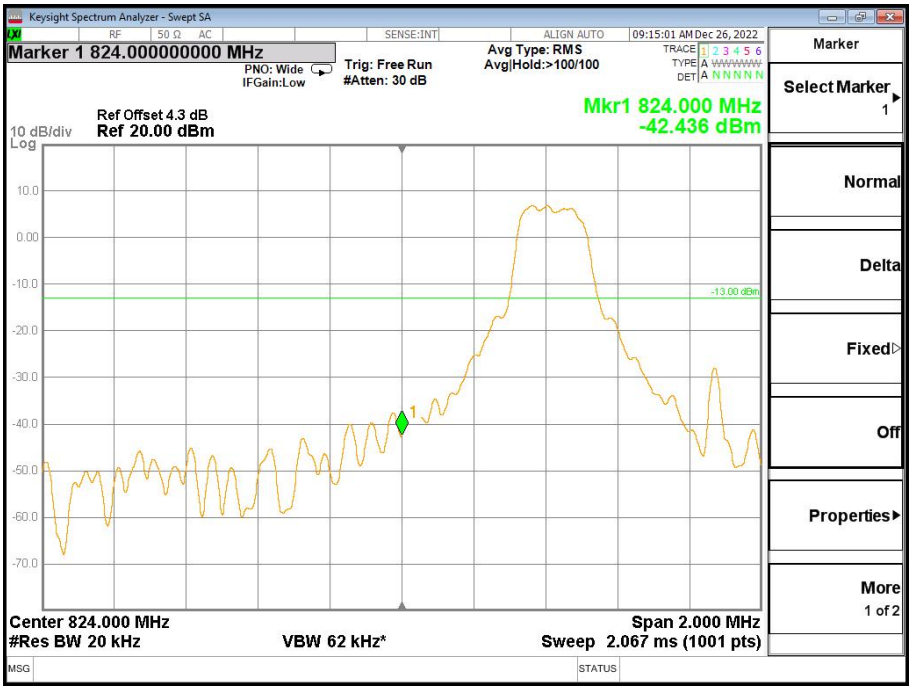
Band26-Low Channel-1.4MHz Bandwidth-1RB-QPSK



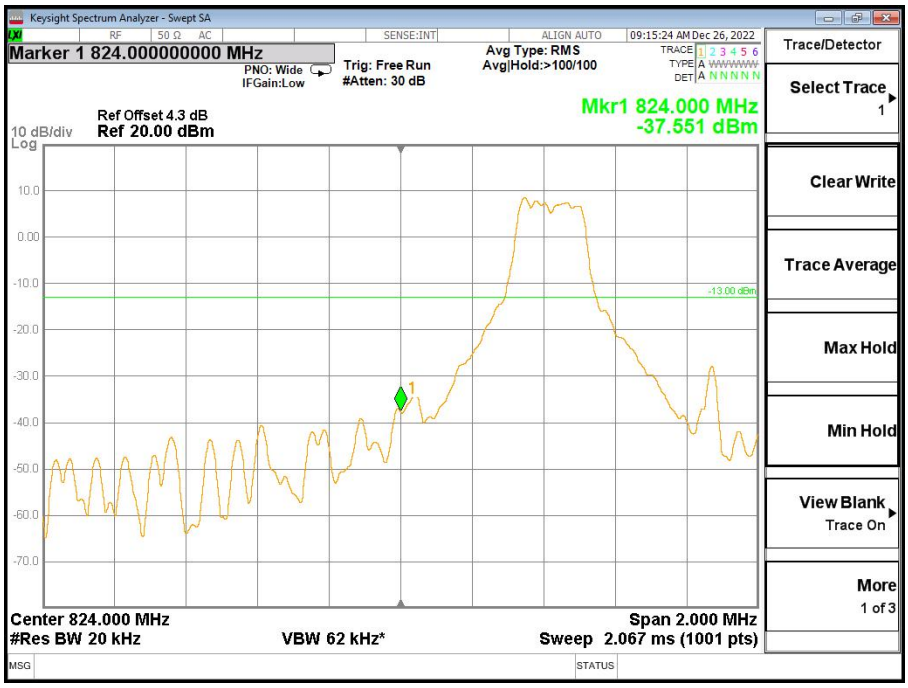
Band26-Low Channel-1.4MHz Bandwidth-5RB-16QAM



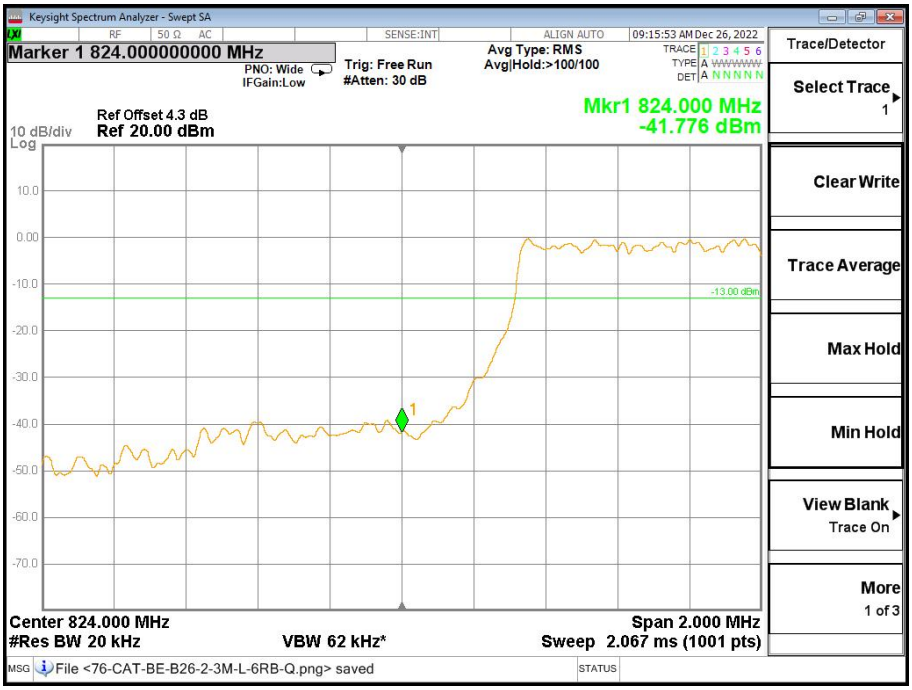
Band26-Low Channel-1.4MHz Bandwidth-6RB-QPSK



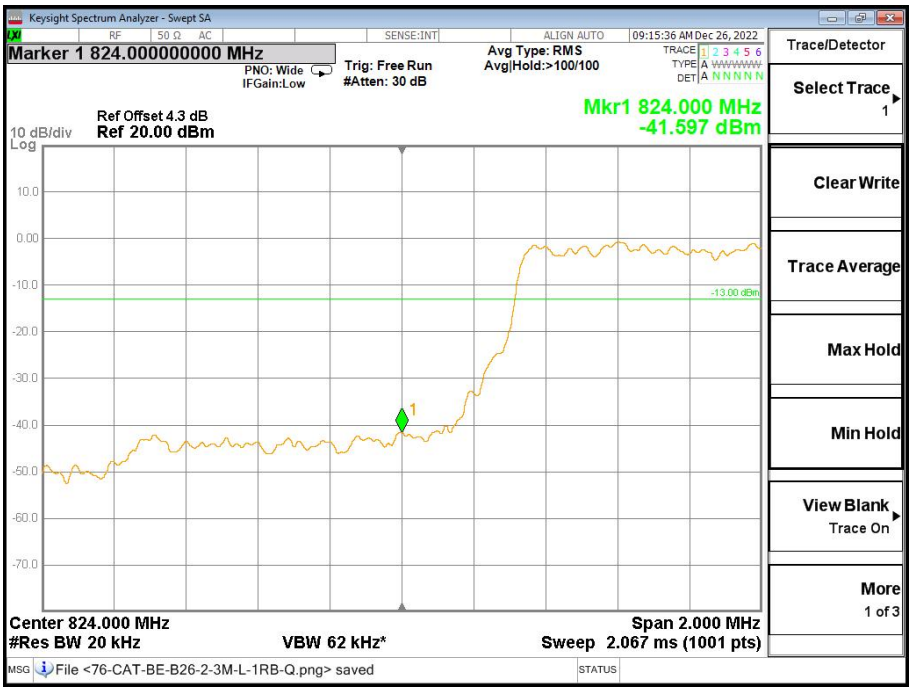
Band26-Low Channel-3MHz Bandwidth-1RB-16QAM



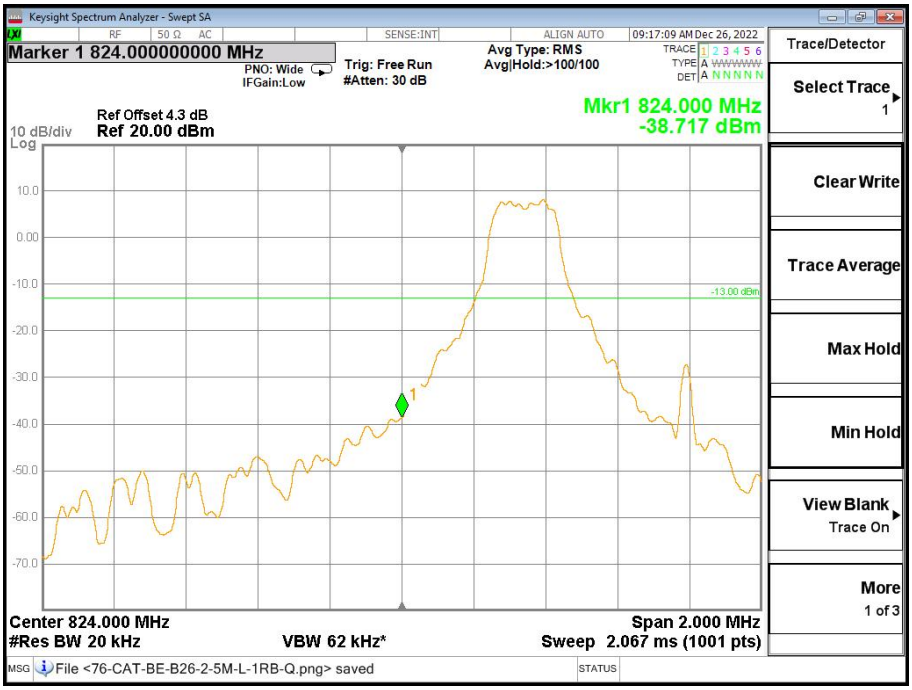
Band26-Low Channel-3MHz Bandwidth-1RB-QPSK



Band26-Low Channel-3MHz Bandwidth-5RB-16QAM

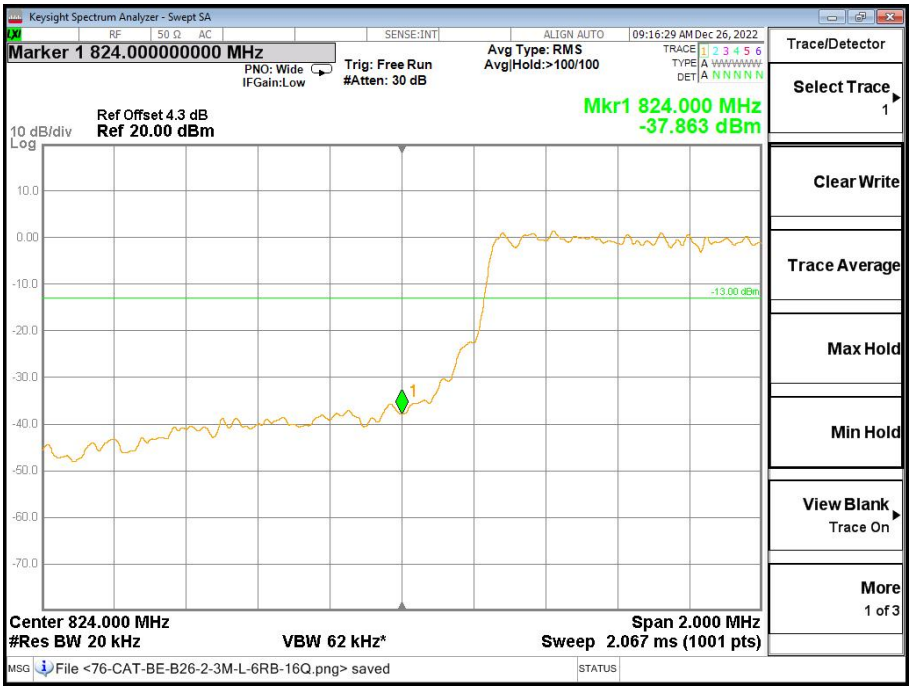


Band26-Low Channel-3MHz Bandwidth-6RB-QPSK

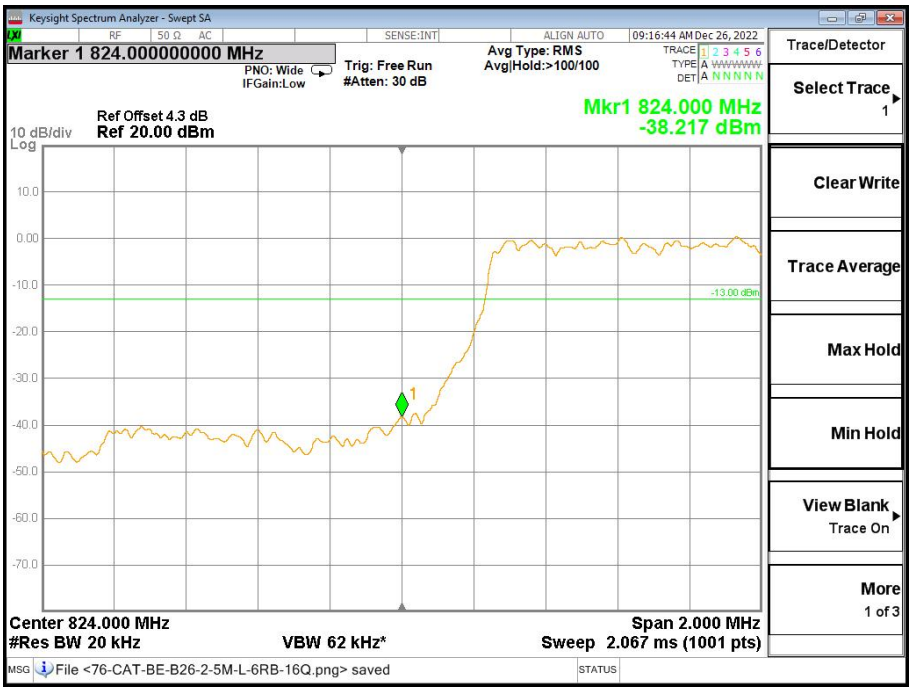


Band26-Low Channel-5MHz Bandwidth-1RB-16QAM

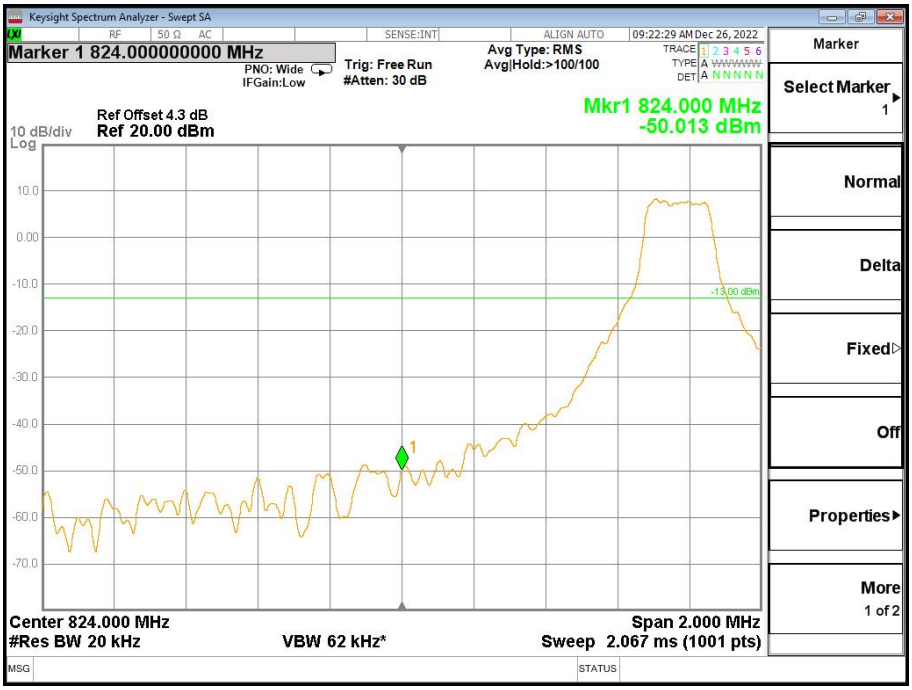
Band26-Low Channel-5MHz Bandwidth-1RB-QPSK



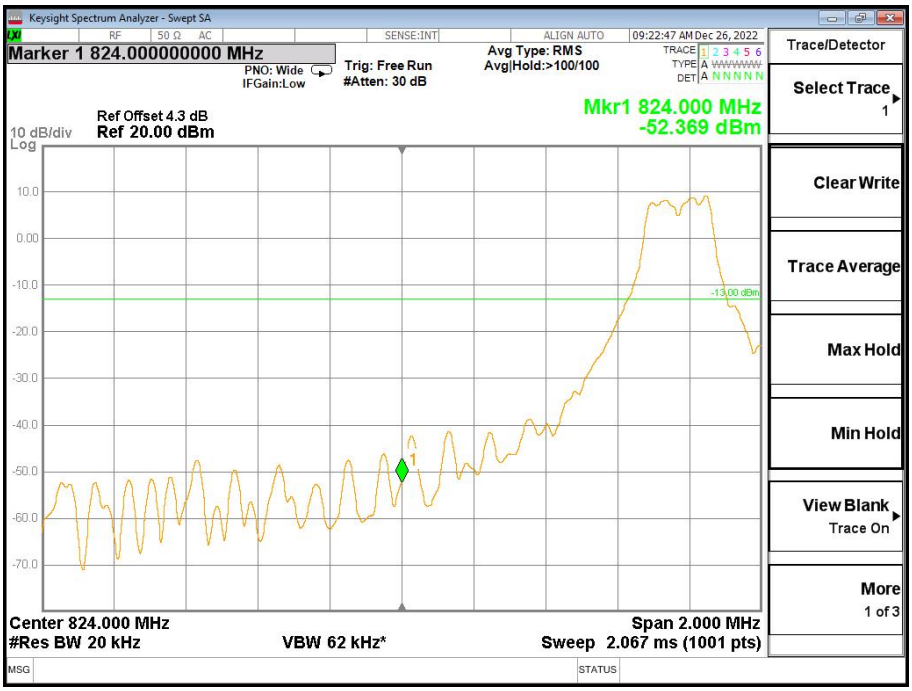
Band26-Low Channel-5MHz Bandwidth-5RB-16QAM



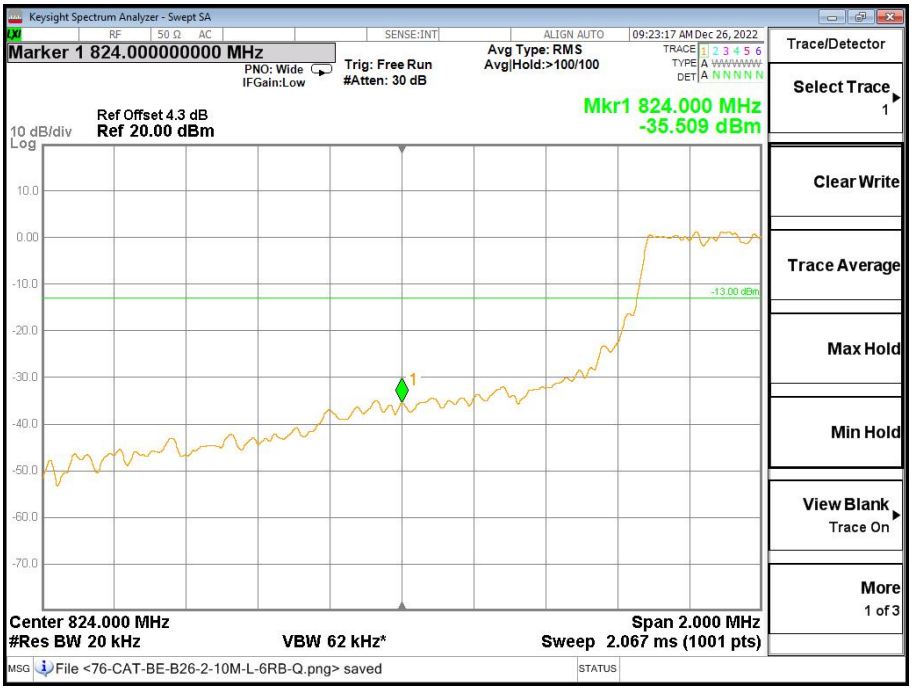
Band26-Low Channel-5MHz Bandwidth-6RB-QPSK



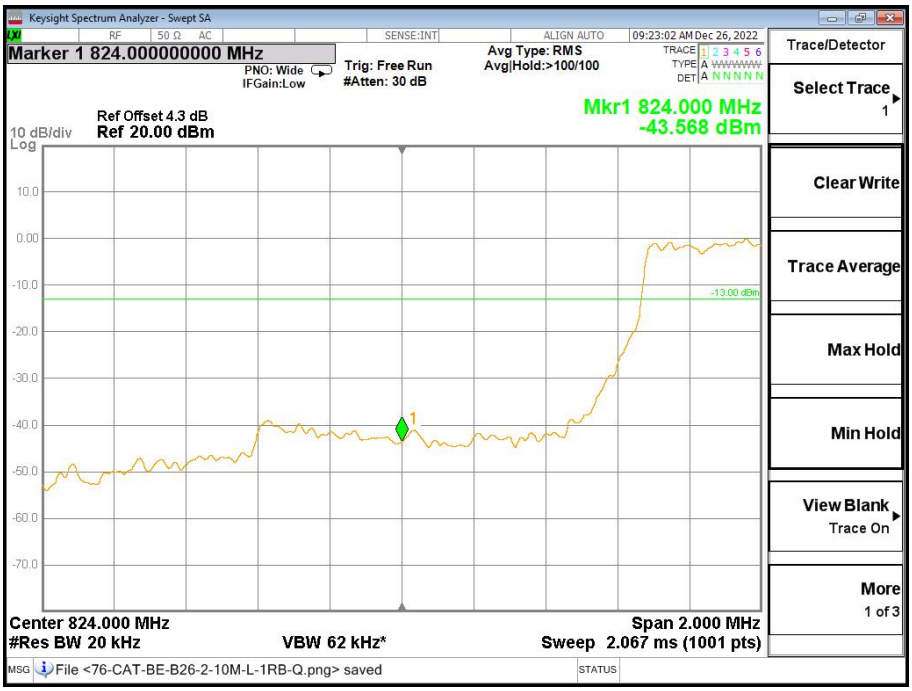
Band26-Low Channel-10MHz Bandwidth-1RB-16QAM



Band26-Low Channel-10MHz Bandwidth-1RB-QPSK



Band26-Low Channel-10MHz Bandwidth-5RB-16QAM



Band26-Low Channel-10MHz Bandwidth-6RB-QPSK

6.8. Frequency Stability

Specifications:	FCC Part 2.1055, 22.355,24.235, 27.54,90.213
DUT Serial Number:	865456056939661
Test conditions:	Ambient Temperature:15℃-35℃ 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℃.
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℃ increments from -30℃ to +50℃. 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.

6. Subject the EUT to overnight soak at +50℃.
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 ℃increments from +50℃ to -30℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

6.8.1 Frequency Stability over Temperature Variation Results

6.8.1.2 CAT-M Band Frequency Stability over Temperature Variation Results

Band	Reference channel frequency (MHz)	Offset	Temperature[℃]								
			-30	-20	-10	0	10	20	30	40	50
2	1880	Hz	3.69	9.34	5.19	3.33	4.63	4.18	8.31	1.79	3.24
		ppm	0.0019	0.0050	0.0028	0.0018	0.0025	0.0022	0.0044	0.0010	0.0017
4	1732.5	Hz	7.51	2.92	6.59	3.13	4.55	3.86	4.79	4.82	2.45
		ppm	0.0043	0.0017	0.0038	0.0018	0.0026	0.0022	0.0028	0.0028	0.0014
12	707.5	Hz	-3.53	-2.42	-3.60	-4.88	-2.39	-3.78	-0.33	-2.82	-1.12
		ppm	-0.0050	-0.0034	-0.0051	-0.0069	-0.0034	-0.0053	-0.0005	-0.0040	-0.0016
13	782	Hz	-1.37	-3.23	-4.61	-5.68	-3.98	-2.72	3.13	2.85	-6.62
		ppm	-0.0017	-0.0041	-0.0059	-0.0073	-0.0051	-0.0035	0.0040	0.0036	-0.0085
26	819	Hz	-4.26	-3.93	-3.31	-5.19	-5.02	-7.04	-8.13	-9.14	-4.35
		ppm	-0.0052	-0.0048	-0.0040	-0.0063	-0.0061	-0.0086	-0.0099	-0.0112	-0.0053
	836.5	Hz	-3.38	-2.55	-1.83	-4.73	-1.00	-5.61	-3.49	-6.95	-4.92
		ppm	-0.0040	-0.0030	-0.0022	-0.0056	-0.0012	-0.0067	-0.0042	-0.0083	-0.0059

6.8.2 Frequency Stability over Voltage Variation

6.8.2.2 CAT-M 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	1.49	4.18	5.35
		ppm	0.0008	0.0022	0.0028
4	1732.5	Hz	6.19	3.86	7.38
		ppm	0.0036	0.0022	0.0043
12	707.5	Hz	-2.82	-3.78	-1.26
		ppm	-0.0040	-0.0053	-0.0018
13	782	Hz	-1.62	-2.72	-3.63
		ppm	-0.0021	-0.0035	-0.0046
26	819	Hz	-3.68	-7.04	-5.75
		ppm	-0.0045	-0.0086	-0.0070
	836.5	Hz	-6.77	-5.61	-4.03
		ppm	-0.0081	-0.0067	-0.0048

6.9. Peak to Average Ratio

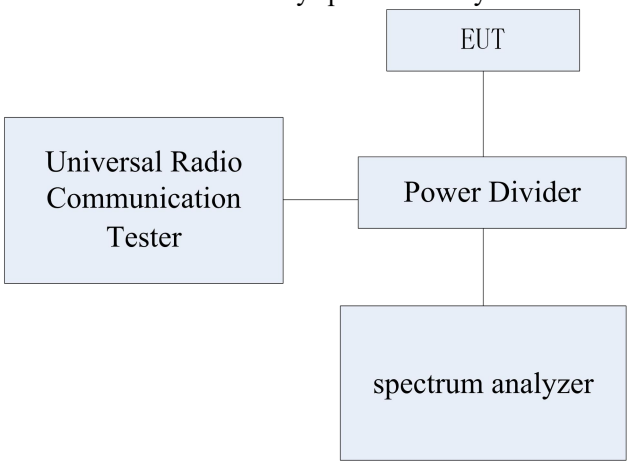
Specifications:	FCC Part 24.232, 27.50
DUT Serial Number:	865456056939661
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

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

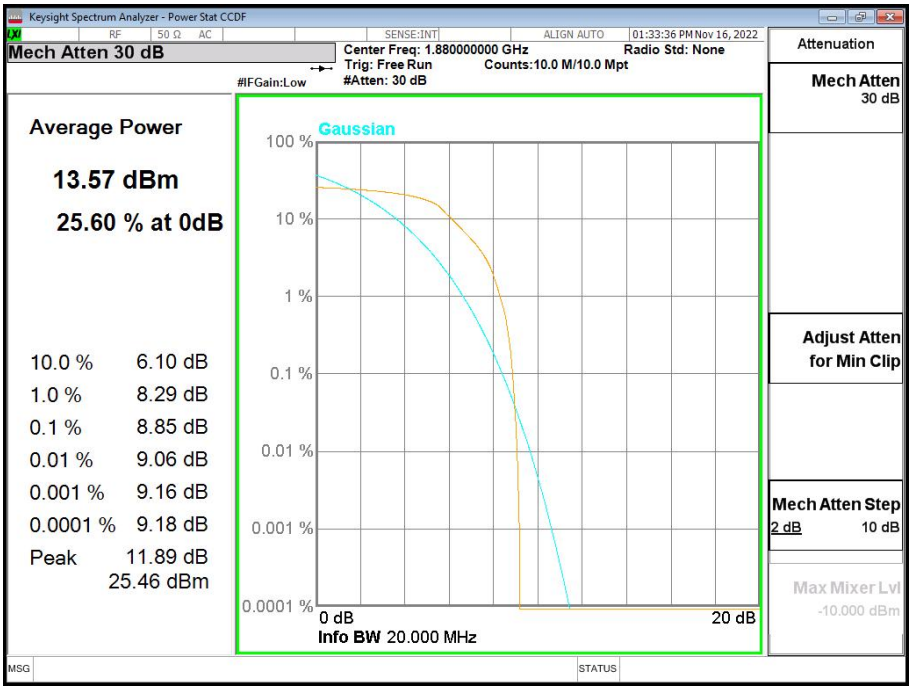
The transmitter output was connected to a CMW500 through a coaxial RF cable and directional coupler, and configured to operate at maximum power. The peak to average ratio was measured at the required operating frequencies in each Band on the Spectrum Analyzer.

6.9.1 CAT-M Peak to Average Ratio Results

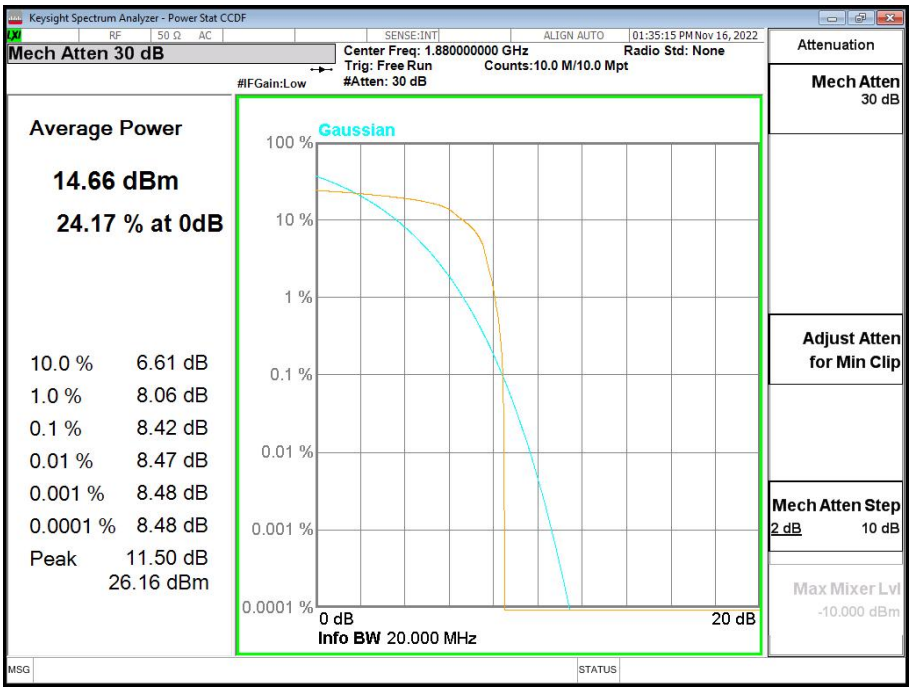
Mode	Bandwidth	Modulation	Channel/Frequency（MHz）	PAPR（dB）
Band2	1.4MHz	QPSK	18900/1880	8.85
		16QAM	18900/1880	8.42
	3MHz	QPSK	18900/1880	8.93
		16QAM	18900/1880	8.52
	5MHz	QPSK	18900/1880	8.25
		16QAM	18900/1880	7.81
	10MHz	QPSK	18900/1880	8.45
		16QAM	18900/1880	7.09
	15MHz	QPSK	18900/1880	7.75
		16QAM	18900/1880	8.07
	20MHz	QPSK	18900/1880	7.90
		16QAM	18900/1880	7.49
Band4	1.4MHz	QPSK	20175/1732.5	9.04
		16QAM	20175/1732.5	8.74
	3MHz	QPSK	20175/1732.5	9.10
		16QAM	20175/1732.5	8.66
	5MHz	QPSK	20175/1732.5	8.65
		16QAM	20175/1732.5	8.08
	10MHz	QPSK	20175/1732.5	8.52
		16QAM	20175/1732.5	7.15
	15MHz	QPSK	20175/1732.5	8.07
		16QAM	20175/1732.5	8.04
	20MHz	QPSK	20175/1732.5	7.99
		16QAM	20175/1732.5	7.37
Band12	1.4MHz	QPSK	23095/707.5	9.66
		16QAM	23095/707.5	9.53
	3MHz	QPSK	23095/707.5	9.98
		16QAM	23095/707.5	9.80
	5MHz	QPSK	23095/707.5	9.52
		16QAM	23095/707.5	9.10
	10MHz	QPSK	23095/707.5	9.31
		16QAM	23095/707.5	9.09
Band13	5MHz	QPSK	23230/782.0	9.53
		16QAM	23230/782.0	9.27

	10MHz	QPSK	23230/782.0	9.60
		16QAM	23230/782.0	9.24
Band26（814MHz-824MHz）	1.4MHz	QPSK	26740/819	10.22
		16QAM	26740/819	9.81
	3MHz	QPSK	26740/819	9.89
		16QAM	26740/819	10.30
	5MHz	QPSK	26740/819	9.89
		16QAM	26740/819	9.30
	10MHz	QPSK	26740/819	9.81
		16QAM	26740/819	9.28
Band26（824MHz-849MHz）	1.4MHz	QPSK	26915/836.5	9.99
		16QAM	26915/836.5	9.78
	3MHz	QPSK	26915/836.5	10.07
		16QAM	26915/836.5	9.89
	5MHz	QPSK	26915/836.5	9.47
		16QAM	26915/836.5	9.33
	10MHz	QPSK	26915/836.5	9.52
		16QAM	26915/836.5	9.10

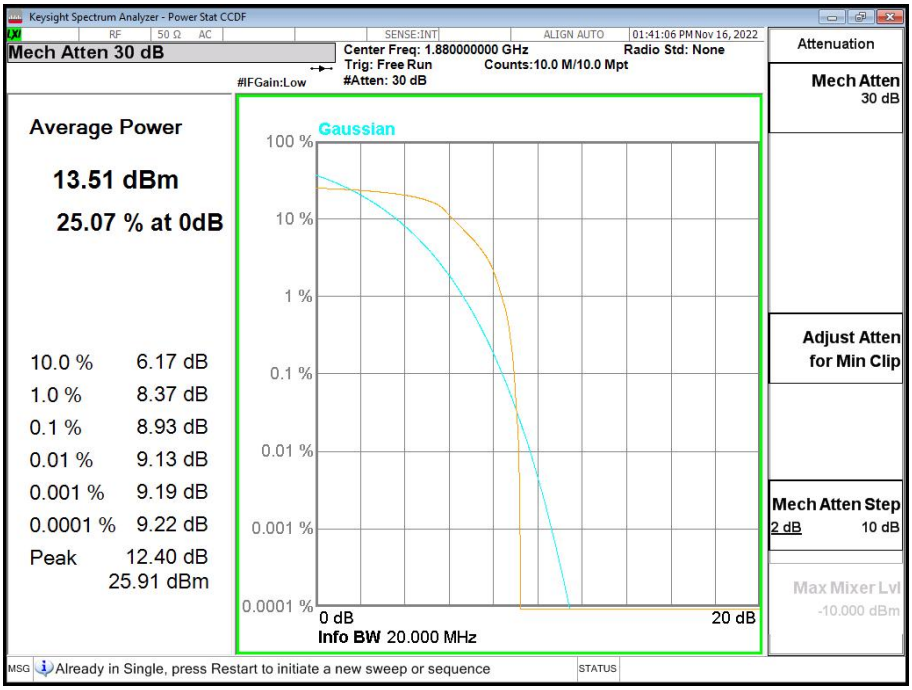
Graphical for Peak to Average Ratio Results for CAT-M:



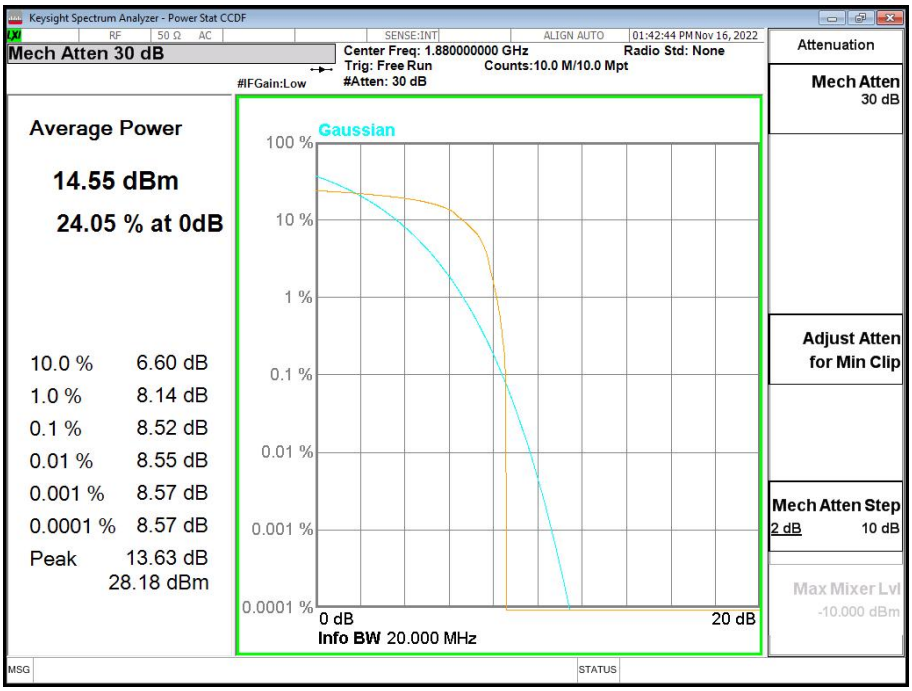
Band2-CH18900-1880MHz-1.4MHz Bandwidth-QPSK



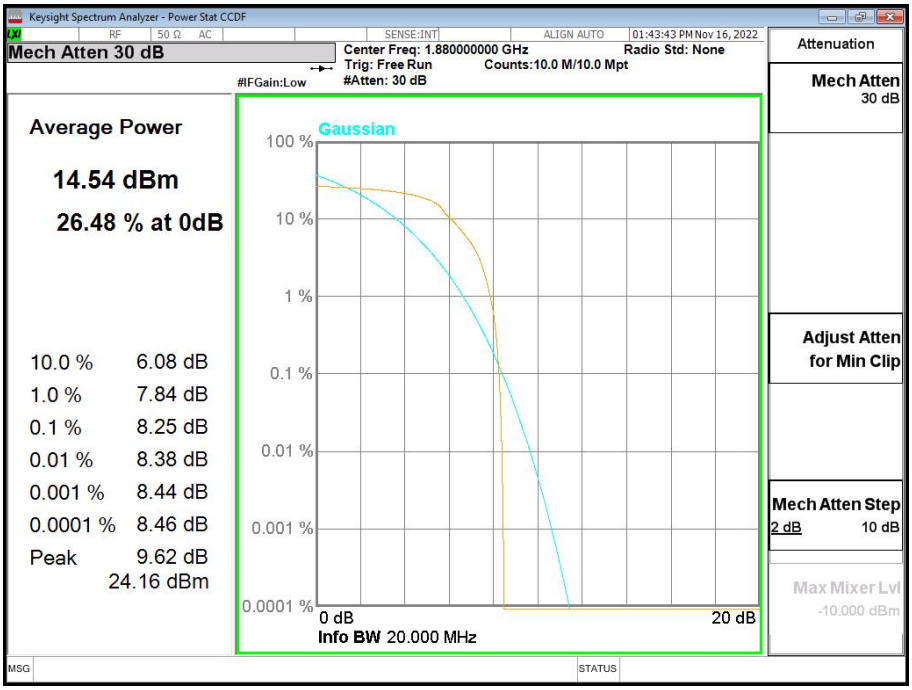
Band2-CH18900-1880MHz-1.4MHz Bandwidth-16QAM



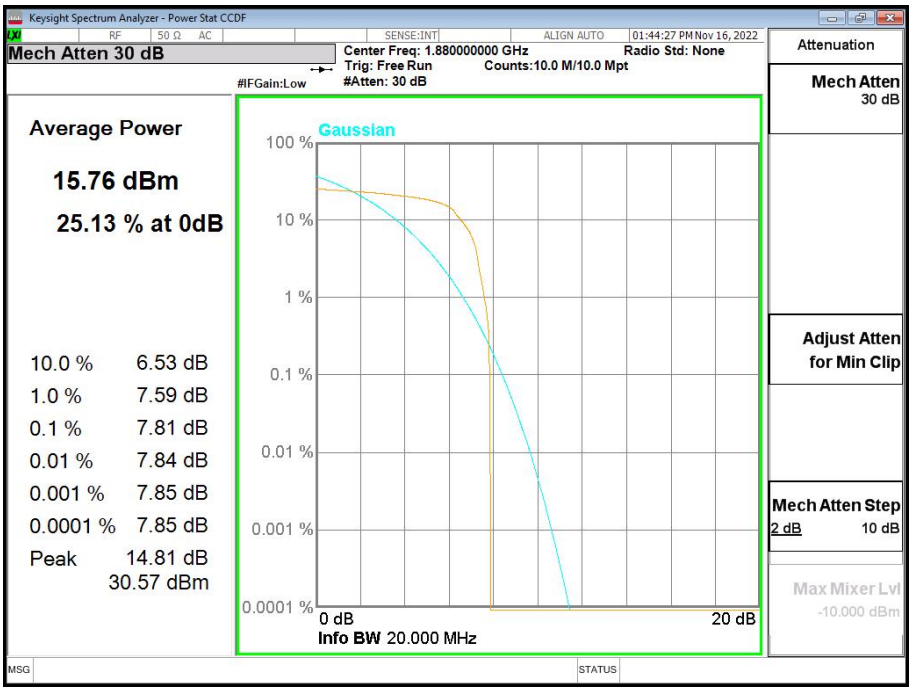
Band2-CH18900-1880MHz-3MHz Bandwidth-QPSK



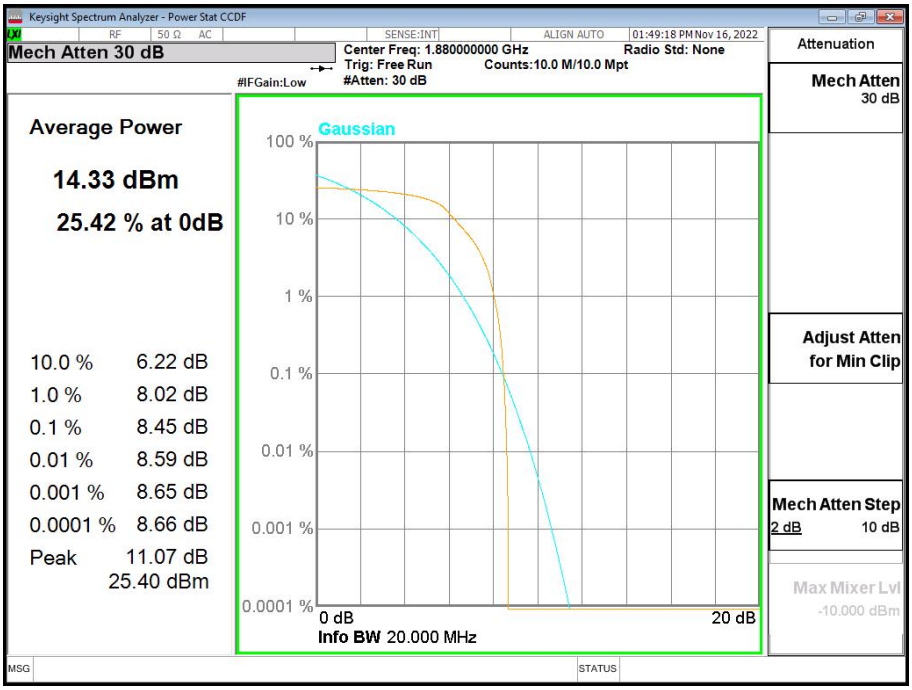
Band2-CH18900-1880MHz-3MHz Bandwidth-16QAM



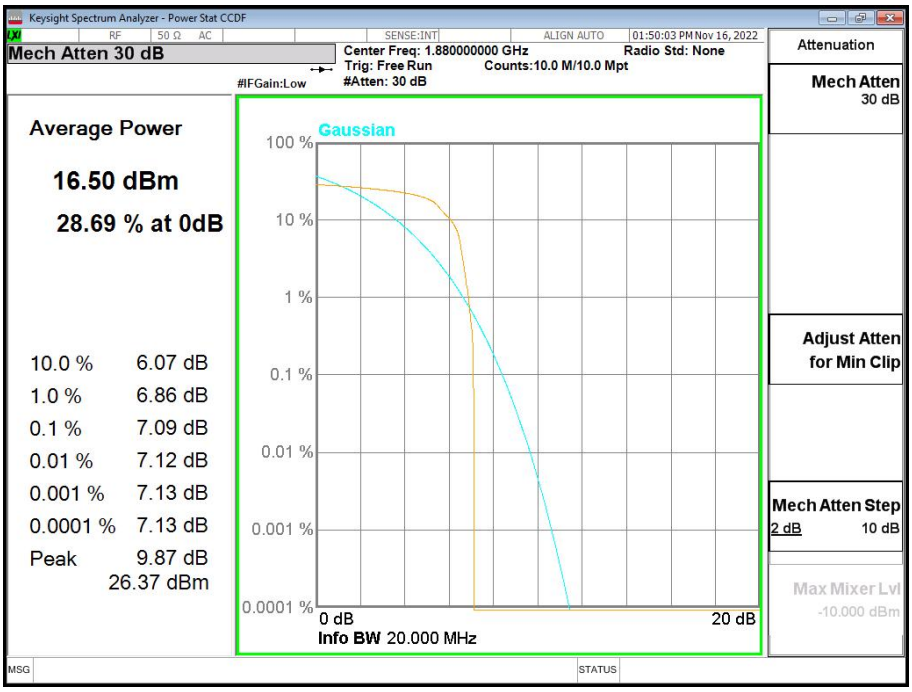
Band2-CH18900-1880MHz-5MHz Bandwidth-QPSK



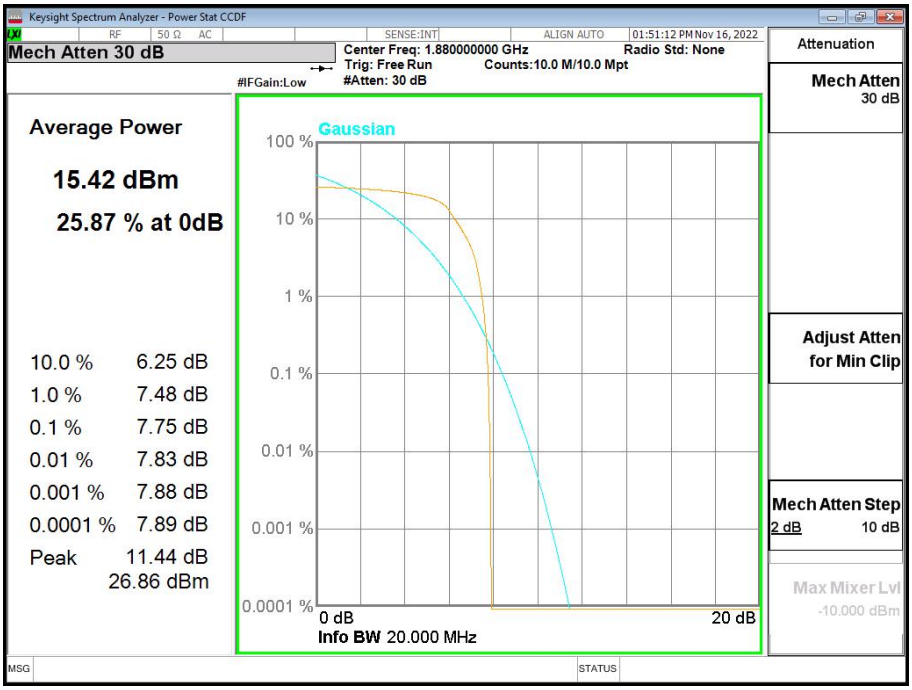
Band2-CH18900-1880MHz-5MHz Bandwidth-16QAM



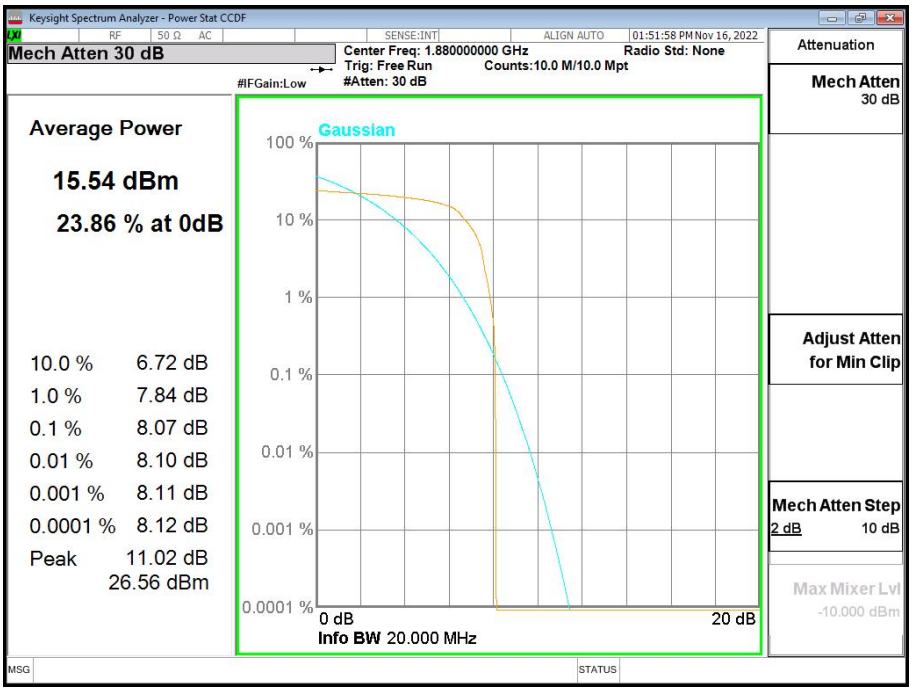
Band2-CH18900-1880MHz-10MHz Bandwidth-QPSK



Band2-CH18900-1880MHz-10MHz Bandwidth-16QAM



Band2-CH18900-1880MHz-15MHz Bandwidth-QPSK



Band2-CH18900-1880MHz-15MHz Bandwidth-16QAM