TEST REPORT

FCC Sub6 n2 Test for TM19FNNAHD4
Certification

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2411-FC014

DATE OF ISSUE
December 6, 2024

Tested by
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Applicant	**LG Electronics Inc.** 128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Republic of Korea
Product Name Model Name	Telematics TM19FNNAHD4
Date of Test	September 30, 2024 ~ December 5, 2024
Location of Test	■ Permanent Testing Lab ☐ On Site Testing (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)
FCC ID	BEJTM19FNNAHD4
FCC Classification	PCS Licensed Transmitter (PCB)
Test Standard Used	FCC Rule Part(s) : § 24
Test Results	PASS

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	December 06, 2024	Initial Release

Notice

Content
The measurements shown in this report were made in accordance with the procedures specified in CFR47 section § 2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)
The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated. The test results have only been applied with the test methods required by the standard(s).
The laboratory is not accredited for the test results marked *. Information provided by the applicant is marked **. Test results provided by external providers are marked ***.
When confirmation of authenticity of this test report is required, please contact www.hct.co.kr
The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

CONTENTS

MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	LG Electronics Inc.
Address:	128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Republic of Korea
FCC ID:	BEJTM19FNNAHD4
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§ 24
EUT Type:	Telematics
Model(s):	TM19FNNAHD4
SCS(kHz):	15
Bandwidth(MHz):	5, 10, 15, 20
Waveform:	CP-OFDM, DFT-S-OFDM
Modulation:	DFT-S-OFDM: PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM CP-OFDM: QPSK, 16QAM, 64QAM, 256QAM
Tx Frequency:	1852.5 MHz – 1907.5 MHz (Sub6 n2 (5 MHz)) 1855.0 MHz – 1905.0 MHz (Sub6 n2 (10 MHz)) 1857.5 MHz – 1902.5 MHz (Sub6 n2 (15 MHz)) 1860.0 MHz – 1900.0 MHz (Sub6 n2 (20 MHz))
Date(s) of Tests:	September 30, 2024 ~ December 5, 2024
EUT Serial number:	Radiated : Honda MY26 #02 Conducted : Honda MY26 #01
External Antenna Serial number	8B505-3NAF-A000 : C03640005
Antenna Information	Please refer to the Antenna Approval Specification document.

1.1. MAXIMUM OUTPUT POWER

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	Conducted Output Power	
				Max. Power (W)	Max. Power (dBm)
Sub6 n2 (5)	1852.5 - 1907.5	4M50G7D	PI/2 BPSK	0.227	23.56
		4M50G7D	QPSK	0.219	23.40
		4M51W7D	16QAM	0.179	22.52
		4M50W7D	64QAM	0.126	21.00
		4M51W7D	256QAM	0.072	18.55
Sub6 n2 (10)	1855.0 - 1905.0	8M98G7D	PI/2 BPSK	0.228	23.57
		8M98G7D	QPSK	0.219	23.41
		8M96W7D	16QAM	0.179	22.53
		8M98W7D	64QAM	0.125	20.98
		8M97W7D	256QAM	0.071	18.51
Sub6 n2 (15)	1857.5 - 1902.5	13M5G7D	PI/2 BPSK	0.232	23.66
		13M5G7D	QPSK	0.223	23.48
		13M5W7D	16QAM	0.181	22.57
		13M5W7D	64QAM	0.125	20.97
		13M4W7D	256QAM	0.074	18.67
Sub6 n2 (20)	1860.0 - 1900.0	17M9G7D	PI/2 BPSK	0.229	23.60
		17M9G7D	QPSK	0.225	23.52
		17M9W7D	16QAM	0.176	22.46
		17M9W7D	64QAM	0.132	21.19
		17M9W7D	256QAM	0.073	18.61

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Telematics with LTE, Sub 6.

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

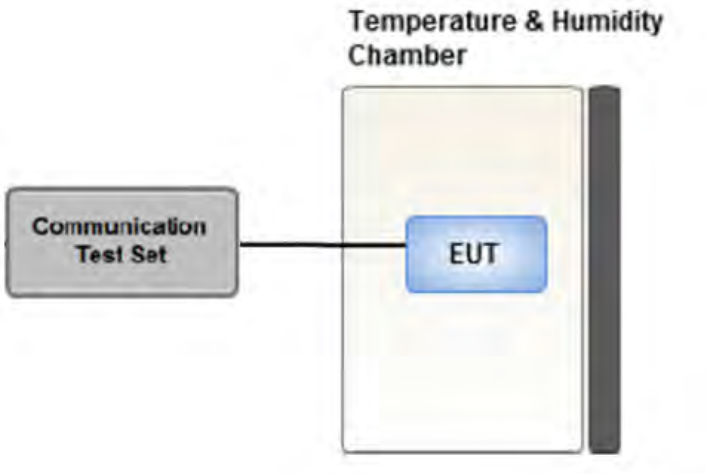
The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea

3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

Test Description	Test Procedure Used
Occupied Bandwidth	- KDB 971168 D01 v03r01 – Section 4.3 - ANSI C63.26-2015 – Section 5.4.4
Band Edge	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Spurious and Harmonic Emissions at Antenna Terminal	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Conducted Output Power	- KDB 971168 D01 v03r01 – Section 5.2
Peak- to- Average Ratio	- KDB 971168 D01 v03r01 – Section 5.7 - ANSI C63.26-2015 – Section 5.2.3.4
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Radiated Power	- ANSI C63.26-2015 – Section 5.2.4.4 - KDB 971168 D01 v03r01 – Section 5.8
Radiated Spurious and Harmonic Emissions	- ANSI C63.26-2015 – Section 5.5.3 - KDB 971168 D01 v03r01 – Section 5.8

3.2 CONDUCTED OUTPUT POWER



Test setup

Test Overview

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurements be performed only over durations of active transmissions at maximum output power level applies.

Conducted Output Power was tested in accordance with KDB971168 D01 Power Meas License Digital Systems v03r01, Section 5.2.

3.3 RADIATED POWER

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.
The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna.

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5 % of the expected OBW, not to exceed 1 MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points > 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

Test Note

1. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission.
2. A half wave dipole is then substituted in place of the EUT. For emissions above 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.
   The power is calculated by the following formula;

$$P_{d\ (dBm)} = Pg_{\ (dBm)} - \text{cable loss}_{\ (dB)} + \text{antenna gain}_{\ (dB)}$$

   Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.
3. The maximum value is calculated by adding the forward power to the calibrated source plus its appropriate gain value.
   These steps are repeated with the receiving antenna in both vertical and horizontal polarization.
   the difference between the gain of the horn and an isotropic antenna are taken into consideration
4. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
5. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

3.4 RADIATED SPURIOUS EMISSIONS

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method.

Test Settings

1. RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points > 2 x span / RBW
5. Detector = Peak
6. Trace mode = Max Hold
7. The trace was allowed to stabilize
8. Test channel : Low/ Middle/ High
9. Frequency range : We are performed all frequency to 10^{th} harmonics from 9 kHz.

Test Note

1. Measurements value show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
2. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
   The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the test data
3. For spurious emissions above 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.
   The spurious emissions is calculated by the following formula;

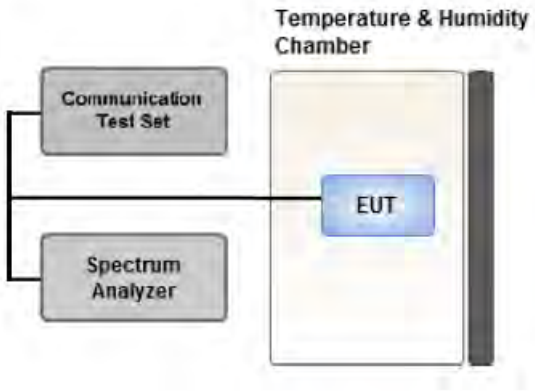
$$\text{Result}_{(dBm)} = \text{Pg}_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

   Where: P_g is the generator output power into the substitution antenna.

   If the fundamental frequency is below 1 GHz, RF output power has been converted to EIRP.

$$\text{EIRP}_{(dBm)} = \text{ERP}_{(dBm)} + 2.15$$

3.5 PEAK- TO- AVERAGE RATIO



Test setup

① CCDF Procedure for PAPR

Test Settings

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Set the measurement interval as follows:
   .- for continuous transmissions, set to 1 ms,
   .- or burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
4. Record the maximum PAPR level associated with a probability of 0.1 %.

② Alternate Procedure for PAPR

Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as P_{Pk}.

Use one of the applicable procedures presented 5.2(ANSI C63.26-2015) to measure the total average power and record as P_{Avg}. Determine the P.A.R. from:

$$P.A.R_{(dB)} = P_{Pk\ (dBm)} - P_{Avg\ (dBm)}\ (P_{Avg} = \text{Average Power} + \text{Duty cycle Factor})$$

Test Settings(Peak Power)

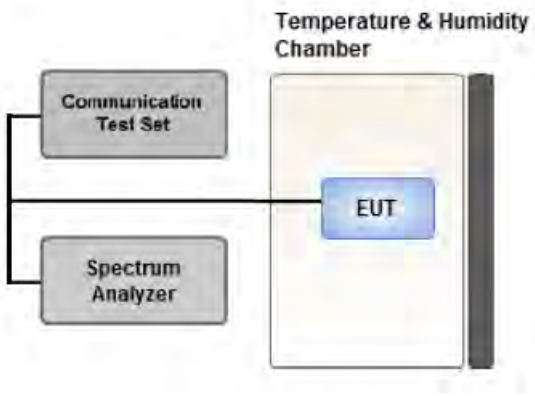
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

1. Set the RBW ≥ OBW.
2. Set VBW ≥ 3 × RBW.
3. Set span ≥ 2 × OBW.
4. Sweep time ≥ 10 × (number of points in sweep) × (transmission symbol period).
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the peak amplitude level.

Test Settings(Average Power)

1. Set span to 2 × to 3 × the OBW.
2. Set RBW ≥ OBW.
3. Set VBW ≥ 3 × RBW.
4. Set number of measurement points in sweep ≥ 2 × span / RBW.
5. Sweep time:
   Set ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. The transmission period is the (on + off) time.
6. Detector = power averaging (rms).
7. Set sweep trigger to "free run."
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. (To accurately determine the average power over the on and off period of the transmitter, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.)
9. Use the peak marker function to determine the maximum amplitude level.
10. Add [10 log (1/duty cycle)] to the measured maximum power level to compute the average power during continuous transmission. For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is a constant 25 %.

3.6 OCCUPIED BANDWIDTH.



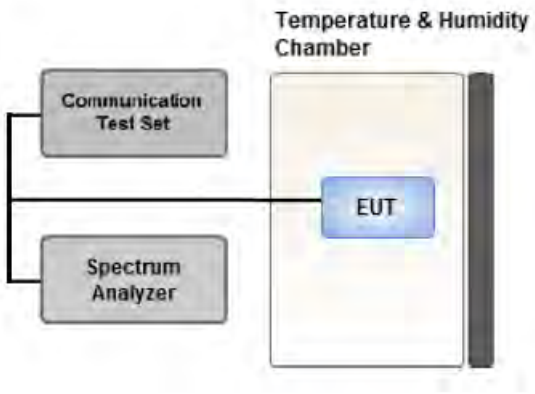
Test setup

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.
The EUT makes a call to the communication simulator.
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5 % of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5 % of the 99 % occupied bandwidth observed in Step 7

3.7 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

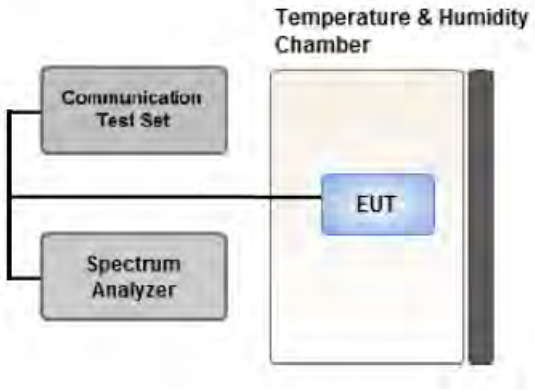
Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

1. RBW = 1 MHz
2. VBW ≥ 3 MHz
3. Detector = Peak
4. Trace Mode = Max Hold
5. Sweep time = auto
6. Number of points in sweep ≥ 2 x Span / RBW

3.8 BAND EDGE



Test setup

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

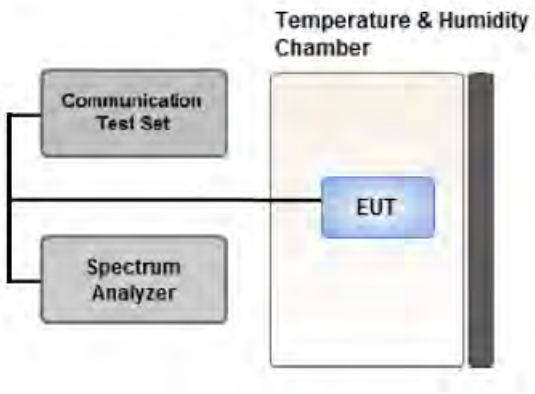
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1 % of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Notes

According to FCC 22.917, 24.238, 27.53 specified that power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.
All measurements were done at 2 channels(low and high operational frequency range.)
The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

Where Margin < 1 dB the emission level is either corrected by 10 log(1 MHz/ RB) or the emission is integrated over a 1 MHz bandwidth to determine the final result. When using the integration method the integration window is either centered on the emission or, for emissions at the band edge, centered by an offset of 500 kHz from the block edge so that the integration window is the 1 MHz adjacent to the block edge.

3.9 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



Test setup

Test Overview

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015.
The frequency stability of the transmitter is measured by:

1. Temperature:
   The temperature is varied from -30 °C to +50 °C in 10 °C increments using an environmental chamber.
2. Primary Supply Voltage:
   .- Unless otherwise specified, vary primary supply voltage from 85 % to 115 % of the nominal value for other than hand carried battery equipment.
   .- For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20 °C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter.
   Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

3.10 WORST CASE(RADIATED TEST)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.
  Mode : SA, NSA
  Worst case : SA
- All simultaneous transmission scenarios of operation were investigated, and the test results showed no additional significant emissions relative to the least restrictive limit were observed.
  Therefore, only the worst case(stand-alone) results were reported.
- Radiated Spurious emissions are measured while operating in EN-DC mode with Sub 6 NR carrier as well as an LTE carrier (anchor).
  All EN-DC mode of operation (=anchor) were investigated and the test results were measured No Peak Found.
  The test results which are attenuated more than 20 dB below the permissible value, so it was not reported.
- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data.
- All RB sizes, offsets of operation were investigated and the worst case configuration results are reported.
  Please refer to the table below.
- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth results are reported.
  (External Antenna Worst case : 10 MHz)
  (Internal Antenna Worst case : 5 MHz)

[External Antenna Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Equivalent Isotropic Radiated Power	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	See Section 8.2.1		Y
Radiated Spurious Emissions	PI/2 BPSK	See Section 8.3.1		X

[Internal Antenna Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Equivalent Isotropic Radiated Power	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	See Section 8.2.2		Z
Radiated Spurious Emissions	PI/2 BPSK	See Section 8.3.2		X

3.11 WORST CASE (CONDUCTED TEST)

- Waveform : All Waveform of operation were investigated and the worst case configuration results are reported. (Worst case: DFT-S-OFDM)
- Modulation : All Modulation of operation were investigated and the worst case configuration results are reported. (Worst case: PI/2 BPSK)
- All modes of operation were investigated and the worst case configuration results are reported.
  Mode : SA, NSA
  Worst case : SA
- All RB sizes, offsets of operation were investigated and the worst case configuration results are reported.
  Please refer to the table below.

[Worst case]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Occupied Bandwidth	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	5, 10, 15, 20	Mid	Full RB	0
Peak-To-Average Ratio	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	5, 10, 15, 20	Mid	Full RB	0
Band Edge	PI/2 BPSK	5	Low	1	0
			High	1	24
		10	Low	1	0
			High	1	51
		15	Low	1	0
			High	1	78
		20	Low	1	0
			High	1	105
		5, 10, 15, 20	Low, High	Full RB	0
Spurious and Harmonic Emissions at Antenna Terminal	PI/2 BPSK	5, 10, 15, 20	Low, Mid, High	1	1

4. LIST OF TEST EQUIPMENT

Equipment	Model	Manufacture	Serial No.	Due to Calibration	Calibration Interval
Precision Dipole Antenna	UHAP	Schwarzbeck	01273	03/10/2026	Biennial
Precision Dipole Antenna	UHAP	Schwarzbeck	01274	03/10/2026	Biennial
Horn Antenna(1~18 GHz)	BBHA 9120D	Schwarzbeck	02289	02/14/2026	Biennial
Horn Antenna(1~18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1299	04/27/2025	Biennial
Horn Antenna(15~40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/20/2026	Biennial
Horn Antenna(15~40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	03/28/2025	Biennial
Loop Antenna(9 kHz~30 MHz)	FMZB1513	Rohde & Schwarz	1513-175	01/16/2025	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/09/2025	Biennial
Hybrid Antenna	VULB9160	Schwarzbeck	760	02/24/2025	Biennial
RF Switching System	FBSR-06B (1G HPF + LNA)	T&M SYSTEM	F3L1	05/14/2025	Annual
RF Switching System	FBSR-06B (3G HPF + LNA)	T&M SYSTEM	F3L2	05/14/2025	Annual
RF Switching System	FBSR-06B (6G HPF + LNA)	T&M SYSTEM	F3L3	05/14/2025	Annual
RF Switching System	FBSR-06B (LNA)	T&M SYSTEM	F3L4	05/14/2025	Annual
Power Amplifier	CBL18265035	CERNEX	22966	11/07/2025	Annual
Power Amplifier	CBL26405040	CERNEX	25956	02/26/2025	Annual
DC Power Supply	E3632A	Hewlett Packard	MY40004427	08/22/2025	Annual
Power Splitter(DC~26.5 GHz)	11667B	Hewlett Packard	11275	02/29/2025	Annual
Chamber	SU-642	ESPEC	93008124	02/19/2025	Annual
Signal Analyzer(10 Hz~26.5 GHz)	N9020A	Agilent	MY51110063	04/04/2025	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/17/2025	Annual
Spectrum Analyzer (10 Hz~40 GHz)	FSV40	REOHDE & SCHWARZ	101436	02/13/2025	Annual
Signal & Spectrum Analyzer (2 Hz~67 GHz)	FSW67	REOHDE & SCHWARZ	101736	23/05/2025	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/05/2025	Annual
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262287701	05/16/2025	Annual
Wideband Radio Communication Tester	MT8000A	Anritsu Corp.	6262302511	05/14/2025	Annual
Signal Analyzer(5 Hz~40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/17/2025	Annual
4-Way Divider	ZC4PD-K1844+	Mini-Circuits	942907	09/10/2025	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

Note:

1. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
2. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.98 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.36 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.70 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.52 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.66 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.58 (Confidence level about 95 %, k=2)

6. SUMMARY OF TEST RESULTS

6.1 Test Condition : Conducted Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Occupied Bandwidth	§ 2.1049	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§ 2.1051, § 24.238(a)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Conducted Output Power	§ 2.1046	N/A	PASS
Peak- to- Average Ratio	§ 24.232(d)	< 13 dB	PASS
Frequency stability / variation of ambient temperature	§ 24.235	Emission must remain in band	PASS

Note:

1. All conducted tests were tested using 5G Wireless Tester.

6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Equivalent Isotropic Radiated Power	§ 24.232(c)	< 2 Watts max. EIRP	PASS
Radiated Spurious and Harmonic Emissions	§ 2.1053, § 24.238(a)	< 43 + 10log10 (P[Watts]) for all out-of band emissions	PASS

Note:

1. Radiated tests were tested using 5G Wireless Tester.

7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

Ch./ Freq.		Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol.	ERP	
channel	Freq.(MHz)						W	dBm
128	824.20	-21.37	38.40	-10.61	0.95	H	0.483	26.84

ERP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.
2) During the test, the turn table is rotated until the maximum signal is found.
3) Record the field strength meter's level.
4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power.

7.2 EIRP Sample Calculation

Ch./ Freq.		Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol.	EIRP	
channel	Freq.(MHz)						W	dBm
20175	1,732.50	-15.75	18.45	9.90	1.76	H	0.456	26.59

EIRP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.
2) During the test, the turn table is rotated until the maximum signal is found.
3) Record the field strength meter's level.
4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
6) The signal generator output level with Ant. Gain and cable loss are the rating of equivalent isotropic radiated power.

7.3. Emission Designator

GSM Emission Designator

Emission Designator = 249KGXW
GSM BW = 249 kHz
G = Phase Modulation
X = Cases not otherwise covered
W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 249KG7W
GSM BW = 249 kHz
G = Phase Modulation
7 = Quantized/Digital Info
W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M17F9W
WCDMA BW = 4.17 MHz
F = Frequency Modulation
9 = Composite Digital Info
W = Combination (Audio/Data)

QPSK Modulation

Emission Designator = 4M48G7D
LTE BW = 4.48 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission; telemetry; telecommand

QAM Modulation

Emission Designator = 4M48W7D
LTE BW = 4.48 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data transmission; telemetry; telecommand

8. TEST DATA

8.1 Conducted Output Power

Bandwidth	SCS(kHz)	OFDM	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
						370500	376000	381500
						1852.5 MHz	1880 MHz	1907.5 MHz
5 MHz	15	DFT-s	pi/2 BPSK	1	1	23.51	23.56	23.52
				1	13	23.48	23.51	23.45
				1	23	23.43	23.45	23.50
				12	0	22.88	22.93	22.92
				12	7	23.46	23.52	23.48
				12	13	22.94	22.99	23.01
				25	0	22.85	22.90	22.92
			QPSK	1	1	23.36	23.34	23.40
			16QAM	1	1	22.41	22.34	22.52
			64QAM	1	1	21.00	20.87	20.86
			256QAM	1	1	18.55	18.53	18.51
		CP	QPSK	1	1	21.97	21.82	21.98

Bandwidth	SCS(kHz)	OFDM	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
						371000	376000	381000
						1855 MHz	1880 MHz	1905 MHz
10 MHz	15	DFT-s	pi/2 BPSK	1	1	23.49	23.52	23.49
				1	26	23.47	23.48	23.48
				1	50	23.46	23.51	23.48
				25	0	22.91	22.98	22.97
				25	14	23.45	23.57	23.50
				25	27	22.96	23.03	22.96
				50	0	23.00	22.98	23.03
			QPSK	1	1	23.26	23.31	23.41
			16QAM	1	1	22.36	22.37	22.53
			64QAM	1	1	20.85	20.84	20.98
			256QAM	1	1	18.51	18.42	18.48
		CP	QPSK	1	1	21.79	21.79	22.04

Bandwidth	SCS(kHz)	OFDM	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
						371500	376000	380500
						1857.5 MHz	1880 MHz	1857.5 MHz
15 MHz	15	DFT-s	pi/2 BPSK	1	1	23.59	23.66	23.50
				1	40	23.51	23.59	23.47
				1	77	23.58	23.62	23.49
				36	0	23.01	23.06	22.94
				36	22	23.63	23.54	23.47
				36	43	23.06	23.06	23.01
				75	0	22.99	23.03	22.96
			QPSK	1	1	23.44	23.48	23.39
			16QAM	1	1	22.57	22.57	22.36
			64QAM	1	1	20.97	20.92	20.92
			256QAM	1	1	18.42	18.67	18.58
		CP	QPSK	1	1	21.86	21.92	21.86

Bandwidth	SCS(kHz)	OFDM	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
						372000	376000	380000
						1860 MHz	1880 MHz	1900 MHz
20 MHz	15	DFT-s	pi/2 BPSK	1	1	23.47	23.53	23.54
				1	53	23.55	23.58	23.49
				1	104	23.60	23.50	23.52
				50	0	22.95	23.01	22.99
				50	28	23.55	23.55	23.48
				50	56	22.68	23.07	22.97
				100	0	23.00	23.06	22.94
			QPSK	1	1	23.47	23.52	23.45
			16QAM	1	1	22.43	22.46	22.39
			64QAM	1	1	21.06	21.03	21.19
			256QAM	1	1	18.55	18.58	18.61
		CP	QPSK	1	1	22.01	22.05	21.90

8.2 EQUIVALENT ISOTROPIC RADIATED POWER

8.2.1 External Antenna

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP		RB	
								W	W	dBm	Size	Offset
1852.5	Sub6 n2/ 5 MHz [15 kHz]	PI/2 BPSK	-14.81	18.82	10.45	2.08	H	< 2.00	0.524	27.19	1	23
		QPSK	-14.84	18.79	10.45	2.08	H		0.520	27.16		
		16-QAM	-15.86	17.77	10.45	2.08	H		0.411	26.14		
		64-QAM	-17.33	16.30	10.45	2.08	H		0.293	24.67		
		256-QAM	-19.32	14.31	10.45	2.08	H		0.185	22.68		
1880.0		PI/2 BPSK	-15.02	18.55	10.34	2.21	H		0.466	26.68	1	1
		QPSK	-15.03	18.54	10.34	2.21	H		0.465	26.67		
		16-QAM	-16.06	17.51	10.34	2.21	H		0.366	25.64		
		64-QAM	-17.56	16.01	10.34	2.21	H		0.259	24.14		
		256-QAM	-19.57	14.00	10.34	2.21	H		0.163	22.13		
1907.5		PI/2 BPSK	-16.28	17.62	10.21	2.17	H		0.368	25.66	1	12
		QPSK	-16.34	17.56	10.21	2.17	H		0.363	25.60		
		16-QAM	-17.38	16.52	10.21	2.17	H		0.286	24.56		
		64-QAM	-18.85	15.05	10.21	2.17	H		0.204	23.09		
		256-QAM	-20.81	13.09	10.21	2.17	H		0.130	21.13		

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP		RB	
								W	W	dBm	Size	Offset
1855.0	Sub6 n2/ 10 MHz [15 kHz]	PI/2 BPSK	-14.72	18.91	10.45	2.08	H	< 2.00	0.535	27.28	1	50
		QPSK	-14.80	18.83	10.45	2.08	H		0.525	27.20		
		16-QAM	-15.81	17.82	10.45	2.08	H		0.416	26.19		
		64-QAM	-17.26	16.37	10.45	2.08	H		0.298	24.74		
		256-QAM	-19.28	14.35	10.45	2.08	H		0.187	22.72		
1880.0		PI/2 BPSK	-14.96	18.61	10.34	2.21	H		0.472	26.74	1	50
		QPSK	-14.99	18.58	10.34	2.21	H		0.469	26.71		
		16-QAM	-16.02	17.55	10.34	2.21	H		0.370	25.68		
		64-QAM	-17.45	16.12	10.34	2.21	H		0.266	24.25		
		256-QAM	-19.47	14.10	10.34	2.21	H		0.167	22.23		
1905.0		PI/2 BPSK	-15.67	18.37	10.23	2.19	H		0.438	26.41	1	1
		QPSK	-15.72	18.32	10.23	2.19	H		0.433	26.36		
		16-QAM	-16.72	17.32	10.23	2.19	H		0.344	25.36		
		64-QAM	-18.20	15.84	10.23	2.19	H		0.244	23.88		
		256-QAM	-20.20	13.84	10.23	2.19	H		0.154	21.88		

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP		RB	
								W	W	dBm	Size	Offset
1857.5	Sub6 n2/ 15 MHz [15 kHz]	PI/2 BPSK	-14.64	18.68	10.43	2.10	H	< 2.00	0.502	27.01	1	77
		QPSK	-14.68	18.64	10.43	2.10	H		0.498	26.97		
		16-QAM	-15.68	17.64	10.43	2.10	H		0.395	25.97		
		64-QAM	-17.13	16.19	10.43	2.10	H		0.283	24.52		
		256-QAM	-19.14	14.18	10.43	2.10	H		0.178	22.51		
1880.0		PI/2 BPSK	-14.86	18.71	10.34	2.21	H		0.483	26.84	1	1
		QPSK	-14.94	18.63	10.34	2.21	H		0.474	26.76		
		16-QAM	-15.95	17.62	10.34	2.21	H		0.376	25.75		
		64-QAM	-17.40	16.17	10.34	2.21	H		0.269	24.30		
		256-QAM	-19.41	14.16	10.34	2.21	H		0.169	22.29		
1902.5		PI/2 BPSK	-15.63	18.41	10.23	2.19	H		0.442	26.45	1	1
		QPSK	-15.74	18.30	10.23	2.19	H		0.431	26.34		
		16-QAM	-16.71	17.33	10.23	2.19	H		0.344	25.37		
		64-QAM	-18.16	15.88	10.23	2.19	H		0.247	23.92		
		256-QAM	-20.16	13.88	10.23	2.19	H		0.156	21.92		

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP		RB	
								W	W	dBm	Size	Offset
1860.0	Sub6 n2/ 20 MHz [15 kHz]	PI/2 BPSK	-14.57	18.75	10.43	2.10	H	< 2.00	0.511	27.08	1	104
		QPSK	-14.63	18.69	10.43	2.10	H		0.504	27.02		
		16-QAM	-15.63	17.69	10.43	2.10	H		0.400	26.02		
		64-QAM	-17.10	16.22	10.43	2.10	H		0.285	24.55		
		256-QAM	-19.09	14.23	10.43	2.10	H		0.180	22.56		
1880.0		PI/2 BPSK	-14.73	18.84	10.34	2.21	H		0.498	26.97	1	1
		QPSK	-14.83	18.74	10.34	2.21	H		0.486	26.87		
		16-QAM	-15.76	17.81	10.34	2.21	H		0.393	25.94		
		64-QAM	-17.24	16.33	10.34	2.21	H		0.279	24.46		
		256-QAM	-19.25	14.32	10.34	2.21	H		0.176	22.45		
1900.0		PI/2 BPSK	-15.44	18.73	10.25	2.20	H		0.476	26.78	1	1
		QPSK	-15.46	18.71	10.25	2.20	H		0.474	26.76		
		16-QAM	-16.45	17.72	10.25	2.20	H		0.378	25.77		
		64-QAM	-17.93	16.24	10.25	2.20	H		0.269	24.29		
		256-QAM	-19.93	14.24	10.25	2.20	H		0.169	22.29		

8.2.2 Internal Antenna

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP		RB	
								W	W	dBm	Size	Offset
1852.5	Sub6 n2/ 5 MHz [15 kHz]	PI/2 BPSK	-15.38	18.25	10.45	2.08	H	< 2.00	0.459	26.62	1	12
		QPSK	-15.45	18.18	10.45	2.08	H		0.452	26.55		
		16-QAM	-16.42	17.21	10.45	2.08	H		0.361	25.58		
		64-QAM	-17.89	15.74	10.45	2.08	H		0.258	24.11		
		256-QAM	-19.88	13.75	10.45	2.08	H		0.163	22.12		
1880.0		PI/2 BPSK	-15.65	17.92	10.34	2.21	H		0.403	26.05	1	1
		QPSK	-15.73	17.84	10.34	2.21	H		0.395	25.97		
		16-QAM	-16.65	16.92	10.34	2.21	H		0.320	25.05		
		64-QAM	-18.12	15.45	10.34	2.21	H		0.228	23.58		
		256-QAM	-20.11	13.46	10.34	2.21	H		0.144	21.59		
1907.5		PI/2 BPSK	-16.86	17.04	10.21	2.17	H		0.322	25.08	1	23
		QPSK	-16.96	16.94	10.21	2.17	H		0.315	24.98		
		16-QAM	-17.82	16.08	10.21	2.17	H		0.258	24.12		
		64-QAM	-19.29	14.61	10.21	2.17	H		0.184	22.65		
		256-QAM	-21.25	12.65	10.21	2.17	H		0.117	20.69		

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP		RB	
								W	W	dBm	Size	Offset
1855.0	Sub6 n2/ 10 MHz [15 kHz]	PI/2 BPSK	-15.47	18.16	10.45	2.08	H	< 2.00	0.450	26.53	1	26
		QPSK	-15.50	18.13	10.45	2.08	H		0.447	26.50		
		16-QAM	-16.44	17.19	10.45	2.08	H		0.360	25.56		
		64-QAM	-17.91	15.72	10.45	2.08	H		0.256	24.09		
		256-QAM	-19.89	13.74	10.45	2.08	H		0.163	22.11		
1880.0		PI/2 BPSK	-15.48	18.09	10.34	2.21	H		0.419	26.22	1	1
		QPSK	-15.53	18.04	10.34	2.21	H		0.414	26.17		
		16-QAM	-16.52	17.05	10.34	2.21	H		0.330	25.18		
		64-QAM	-17.98	15.59	10.34	2.21	H		0.236	23.72		
		256-QAM	-20.00	13.57	10.34	2.21	H		0.148	21.70		
1905.0		PI/2 BPSK	-16.30	17.74	10.23	2.19	H		0.378	25.78	1	1
		QPSK	-16.32	17.72	10.23	2.19	H		0.377	25.76		
		16-QAM	-17.28	16.76	10.23	2.19	H		0.302	24.80		
		64-QAM	-18.72	15.32	10.23	2.19	H		0.217	23.36		
		256-QAM	-20.68	13.36	10.23	2.19	H		0.138	21.40		

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP		RB	
								W	W	dBm	Size	Offset
1857.5	Sub6 n2/ 15 MHz [15 kHz]	PI/2 BPSK	-15.27	18.05	10.43	2.10	H	< 2.00	0.435	26.38	1	39
		QPSK	-15.30	18.02	10.43	2.10	H		0.432	26.35		
		16-QAM	-16.29	17.03	10.43	2.10	H		0.344	25.36		
		64-QAM	-17.75	15.57	10.43	2.10	H		0.246	23.90		
		256-QAM	-19.76	13.56	10.43	2.10	H		0.155	21.89		
1880.0		PI/2 BPSK	-15.25	18.32	10.34	2.21	H		0.442	26.45	1	1
		QPSK	-15.30	18.27	10.34	2.21	H		0.437	26.40		
		16-QAM	-16.34	17.23	10.34	2.21	H		0.344	25.36		
		64-QAM	-17.79	15.78	10.34	2.21	H		0.246	23.91		
		256-QAM	-19.80	13.77	10.34	2.21	H		0.155	21.90		
1902.5		PI/2 BPSK	-16.04	18.00	10.23	2.19	H		0.402	26.04	1	1
		QPSK	-16.08	17.96	10.23	2.19	H		0.398	26.00		
		16-QAM	-17.07	16.97	10.23	2.19	H		0.317	25.01		
		64-QAM	-18.54	15.50	10.23	2.19	H		0.226	23.54		
		256-QAM	-20.52	13.52	10.23	2.19	H		0.143	21.56		

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP		RB	
								W	W	dBm	Size	Offset
1860.0	Sub6 n2/ 20 MHz [15 kHz]	PI/2 BPSK	-15.14	18.18	10.43	2.10	H	< 2.00	0.448	26.51	1	53
		QPSK	-15.20	18.12	10.43	2.10	H		0.442	26.45		
		16-QAM	-16.24	17.08	10.43	2.10	H		0.348	25.41		
		64-QAM	-17.69	15.63	10.43	2.10	H		0.249	23.96		
		256-QAM	-19.70	13.62	10.43	2.10	H		0.157	21.95		
1880.0		PI/2 BPSK	-15.35	18.22	10.34	2.21	H		0.432	26.35	1	1
		QPSK	-15.38	18.19	10.34	2.21	H		0.429	26.32		
		16-QAM	-16.40	17.17	10.34	2.21	H		0.339	25.30		
		64-QAM	-17.88	15.69	10.34	2.21	H		0.241	23.82		
		256-QAM	-19.87	13.70	10.34	2.21	H		0.152	21.83		
1900.0		PI/2 BPSK	-15.93	18.24	10.25	2.20	H		0.426	26.29	1	1
		QPSK	-15.95	18.22	10.25	2.20	H		0.424	26.27		
		16-QAM	-16.94	17.23	10.25	2.20	H		0.337	25.28		
		64-QAM	-18.40	15.77	10.25	2.20	H		0.241	23.82		
		256-QAM	-20.40	13.77	10.25	2.20	H		0.152	21.82		

8.3 RADIATED SPURIOUS EMISSIONS

8.3.1 External Antenna

▣ NR Band: N2
▣ Bandwidth: 10 MHz
▣ Modulation: PI/2 BPSK
▣ Distance: 3 meters
▣ SCS: 15 kHz

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit (dBm)	RB	
									Size	Offset
371000 (1855.0)	3 710.00	-60.55	12.08	-60.92	3.08	V	-51.92	-13.00	1	50
	5 565.00	-62.61	12.22	-56.77	3.88	V	-48.43	-13.00		
	7 420.00	-63.06	11.23	-47.63	4.55	V	-40.95	-13.00		
376000 (1880.0)	3 760.00	-56.26	11.90	-55.89	3.12	H	-47.11	-13.00	1	50
	5 640.00	-62.54	12.14	-56.22	3.92	V	-48.00	-13.00		
	7 520.00	-63.51	11.56	-48.66	4.61	V	-41.71	-13.00		
381000 (1905.0)	3 810.00	-61.92	11.67	-61.41	3.20	V	-52.94	-13.00	1	1
	5 715.00	-63.62	11.91	-56.86	4.01	V	-48.96	-13.00		
	7 620.00	-62.81	11.58	-48.73	4.65	V	-41.80	-13.00		

8.3.2 Internal Antenna

▣ NR Band: N2
▣ Bandwidth: 5 MHz
▣ Modulation: PI/2 BPSK
▣ Distance: 3 meters
▣ SCS: 15 kHz

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit (dBm)	RB	
									Size	Offset
370500 (1852.5)	3 705.00	-55.73	12.08	-56.42	3.08	H	-47.42	-13.00	1	12
	5 557.50	-61.19	12.22	-55.42	3.88	V	-47.08	-13.00		
	7 410.00	-63.52	11.19	-48.09	4.57	V	-41.47	-13.00		
376000 (1880.0)	3 760.00	-57.30	11.90	-56.93	3.12	V	-48.15	-13.00	1	1
	5 640.00	-62.60	12.14	-56.28	3.92	V	-48.06	-13.00		
	7 520.00	-64.20	11.56	-49.35	4.61	V	-42.40	-13.00		
381500 (1907.5)	3 815.00	-56.18	11.65	-55.43	3.20	V	-46.98	-13.00	1	23
	5 722.50	-62.31	11.88	-56.17	4.00	V	-48.29	-13.00		
	7 630.00	-63.16	11.56	-48.96	4.66	V	-42.06	-13.00		

8.4 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
Sub6 n2	5 MHz	1880.0	BPSK	25	0	4.09
			QPSK			4.66
			16-QAM			5.88
			64-QAM			6.25
			256-QAM			6.92
	10 MHz		BPSK	50		3.95
			QPSK			4.59
			16-QAM			5.61
			64-QAM			6.13
			256-QAM			6.71
	15 MHz		BPSK	75		4.01
			QPSK			4.55
			16-QAM			5.49
			64-QAM			6.03
			256-QAM			6.68
	20 MHz		BPSK	100		4.06
			QPSK			4.61
			16-QAM			5.55
			64-QAM			6.04
			256-QAM			6.65

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 46 ~ 65.

8.5 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
Sub6 n2	5 MHz	1880.0	BPSK	25	0	4.5035
			QPSK			4.5017
			16-QAM			4.5093
			64-QAM			4.5018
			256-QAM			4.5058
	10 MHz		BPSK	50		8.9764
			QPSK			8.9803
			16-QAM			8.9621
			64-QAM			8.9844
			256-QAM			8.9660
	15 MHz		BPSK	75		13.513
			QPSK			13.488
			16-QAM			13.459
			64-QAM			13.492
			256-QAM			13.440
	20 MHz		BPSK	100		17.927
			QPSK			17.893
			16-QAM			17.935
			64-QAM			17.894
			256-QAM			17.910

Note:
1. Plots of the EUT's Occupied Bandwidth are shown Page 66 ~ 85.

8.6 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
Sub6 n2	5	1852.5	9.8106	30.815	-62.983	-32.168	-13.00
		1880.0	4.9652	30.200	-62.214	-32.014	
		1907.5	9.7208	30.815	-63.267	-32.452	
	10	1855.0	3.7388	30.200	-63.206	-33.006	
		1880.0	5.0050	30.815	-62.376	-31.561	
		1905.0	9.6909	30.815	-63.298	-32.483	
	15	1857.5	8.1057	30.815	-63.068	-32.253	
		1880.0	8.0259	30.815	-62.853	-32.038	
		1902.5	3.7887	30.200	-63.069	-32.869	
	20	1860.0	3.8385	30.200	-62.754	-32.554	
		1880.0	4.0679	30.200	-63.094	-32.894	
		1900.0	9.7109	30.815	-62.953	-32.138	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 86 ~ 109.
2. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)
3. Factor(dB) = Cable Loss + Attenuator + Power Splitter

Frequency Range (GHz)	Factor [dB]
0.03 – 1	27.494
1 – 5	30.200
5 – 10	30.815
10 – 15	31.340
15 – 20	31.713
Above 20	32.355

8.7 BLOCK EDGE

- Plots of the EUT's Block edge are shown Page 110 ~ 133.

8.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

▣ BandWidth: 5 MHz

▣ Voltage(100 %): 13.200 VDC

▣ LIMIT: Emission must remain in band

Test. Frequncy	Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(MHz)	(%)	(°C)	(Hz)	Error (Hz)	(%)	
1852.5	100 %	+20(Ref)	1852 499 996	0.0	0.000 000	0.000
	100 %	-30	1852 499 989	-7.6	0.000 000	-0.004
	100 %	-20	1852 499 987	-9.3	-0.000 001	-0.005
	100 %	-10	1852 499 985	-11.6	-0.000 001	-0.006
	100 %	0	1852 500 002	5.1	0.000 000	0.003
	100 %	+10	1852 499 999	2.9	0.000 000	0.002
	100 %	+30	1852 499 997	0.2	0.000 000	0.000
	100 %	+40	1852 499 994	-2.0	0.000 000	-0.001
	100 %	+50	1852 499 993	-3.5	0.000 000	-0.002
	85 %	+20	1852 499 992	-4.5	0.000 000	-0.002
	115 %	+20	1852 499 990	-6.1	0.000 000	-0.003
1907.5	100 %	+20(Ref)	1907 500 008	0.0	0.000 000	0.000
	100 %	-30	1907 499 997	-10.9	-0.000 001	-0.006
	100 %	-20	1907 500 014	6.1	0.000 000	0.003
	100 %	-10	1907 500 014	5.9	0.000 000	0.003
	100 %	0	1907 499 995	-13.2	-0.000 001	-0.007
	100 %	+10	1907 500 012	3.7	0.000 000	0.002
	100 %	+30	1907 500 011	3.0	0.000 000	0.002
	100 %	+40	1907 500 010	2.1	0.000 000	0.001
	100 %	+50	1907 500 010	1.2	0.000 000	0.001
	85 %	+20	1907 500 010	2.2	0.000 000	0.001
	115 %	+20	1907 500 008	-0.4	0.000 000	0.000

▣ BandWidth: 10 MHz

▣ Voltage(100 %): 13.200 VDC

▣ LIMIT: Emission must remain in band

Test. Frequncy	Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(MHz)	(%)	(°C)	(Hz)	Error (Hz)	(%)	
1855.0	100 %	+20(Ref)	1854 999 999	0.0	0.000 000	0.000
	100 %	-30	1854 999 994	-4.3	0.000 000	-0.002
	100 %	-20	1854 999 991	-7.4	0.000 000	-0.004
	100 %	-10	1854 999 989	-9.9	-0.000 001	-0.005
	100 %	0	1855 000 004	5.2	0.000 000	0.003
	100 %	+10	1854 999 997	-1.8	0.000 000	-0.001
	100 %	+30	1855 000 000	1.1	0.000 000	0.001
	100 %	+40	1854 999 997	-1.6	0.000 000	-0.001
	100 %	+50	1854 999 994	-4.4	0.000 000	-0.002
	85 %	+20	1855 000 003	3.9	0.000 000	0.002
	115 %	+20	1855 000 010	11.6	0.000 001	0.006
1905.0	100 %	+20(Ref)	1904 999 997	0.0	0.000 000	0.000
	100 %	-30	1904 999 995	-2.4	0.000 000	-0.001
	100 %	-20	1904 999 995	-2.8	0.000 000	-0.001
	100 %	-10	1904 999 994	-3.5	0.000 000	-0.002
	100 %	0	1904 999 994	-3.3	0.000 000	-0.002
	100 %	+10	1904 999 994	-3.0	0.000 000	-0.002
	100 %	+30	1904 999 994	-3.5	0.000 000	-0.002
	100 %	+40	1904 999 994	-3.4	0.000 000	-0.002
	100 %	+50	1904 999 993	-4.4	0.000 000	-0.002
	85 %	+20	1904 999 994	-3.2	0.000 000	-0.002
	115 %	+20	1904 999 992	-5.9	0.000 000	-0.003

▣ BandWidth: 15 MHz

▣ Voltage(100 %): 13.200 VDC

▣ LIMIT: Emission must remain in band

Test. Frequncy	Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(MHz)	(%)	(°C)	(Hz)	Error (Hz)	(%)	
1857.5	100 %	+20(Ref)	1857 500 020	0.0	0.000 000	0.000
	100 %	-30	1857 500 036	16.9	0.000 001	0.009
	100 %	-20	1857 500 034	14.7	0.000 001	0.008
	100 %	-10	1857 500 032	11.9	0.000 001	0.006
	100 %	0	1857 500 029	9.4	0.000 001	0.005
	100 %	+10	1857 500 045	25.2	0.000 001	0.014
	100 %	+30	1857 500 024	4.0	0.000 000	0.002
	100 %	+40	1857 500 022	2.5	0.000 000	0.001
	100 %	+50	1857 500 038	18.0	0.000 001	0.010
	85 %	+20	1857 500 016	-3.6	0.000 000	-0.002
	115 %	+20	1857 500 016	-4.1	0.000 000	-0.002
1902.5	100 %	+20(Ref)	1902 500 008	0.0	0.000 000	0.000
	100 %	-30	1902 500 016	8.1	0.000 000	0.004
	100 %	-20	1902 500 016	8.1	0.000 000	0.004
	100 %	-10	1902 500 017	8.7	0.000 000	0.005
	100 %	0	1902 500 016	8.3	0.000 000	0.004
	100 %	+10	1902 500 016	7.7	0.000 000	0.004
	100 %	+30	1902 500 016	8.4	0.000 000	0.004
	100 %	+40	1902 500 017	8.9	0.000 000	0.005
	100 %	+50	1902 500 017	9.1	0.000 000	0.005
	85 %	+20	1902 500 004	-3.6	0.000 000	-0.002
	115 %	+20	1902 500 003	-5.2	0.000 000	-0.003

▣ BandWidth: 20 MHz

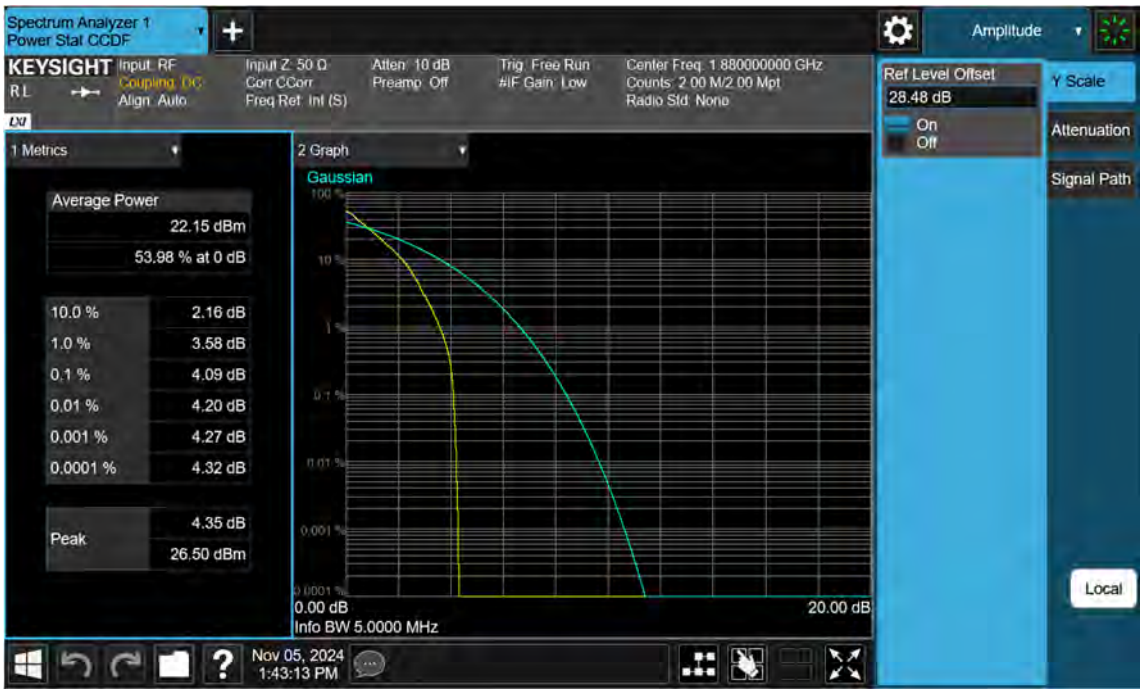
▣ Voltage(100 %): 13.200 VDC

▣ LIMIT: Emission must remain in band

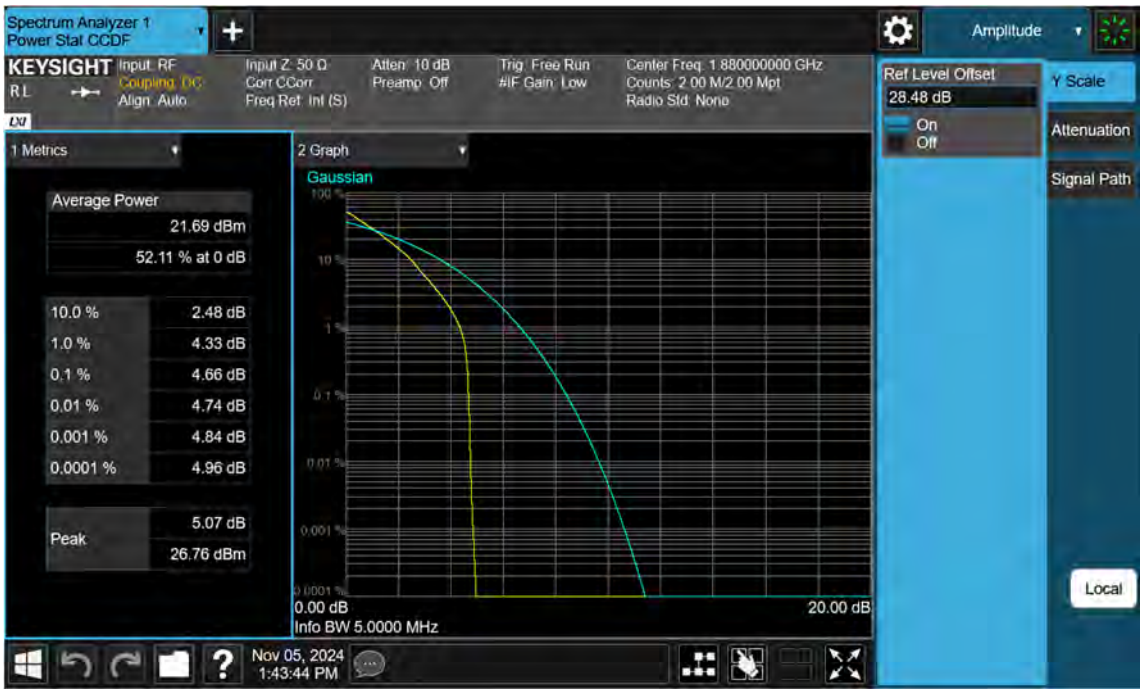
Test. Frequncy	Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(MHz)	(%)	(°C)	(Hz)	Error (Hz)	(%)	
1860.0	100 %	+20(Ref)	1859 999 998	0.0	0.000 000	0.000
	100 %	-30	1859 999 998	-0.3	0.000 000	0.000
	100 %	-20	1859 999 997	-1.3	0.000 000	-0.001
	100 %	-10	1859 999 995	-2.9	0.000 000	-0.002
	100 %	0	1859 999 992	-6.0	0.000 000	-0.003
	100 %	+10	1859 999 991	-7.5	0.000 000	-0.004
	100 %	+30	1859 999 990	-8.2	0.000 000	-0.004
	100 %	+40	1859 999 988	-9.8	-0.000 001	-0.005
	100 %	+50	1859 999 986	-12.1	-0.000 001	-0.006
	85 %	+20	1859 999 989	-8.7	0.000 000	-0.005
	115 %	+20	1859 999 992	-6.2	0.000 000	-0.003
1900.0	100 %	+20(Ref)	1900 000 010	0.0	0.000 000	0.000
	100 %	-30	1900 000 018	8.9	0.000 000	0.005
	100 %	-20	1900 000 018	8.1	0.000 000	0.004
	100 %	-10	1900 000 016	6.8	0.000 000	0.004
	100 %	0	1900 000 016	6.0	0.000 000	0.003
	100 %	+10	1900 000 015	5.1	0.000 000	0.003
	100 %	+30	1900 000 013	3.8	0.000 000	0.002
	100 %	+40	1900 000 013	3.9	0.000 000	0.002
	100 %	+50	1900 000 012	2.5	0.000 000	0.001
	85 %	+20	1900 000 011	1.5	0.000 000	0.001
	115 %	+20	1900 000 013	3.0	0.000 000	0.002

9. TEST PLOTS

NR2_5 M_PAR_Mid_BPSK_FullRB



NR2_5 M_PAR_Mid_QPSK_FullRB



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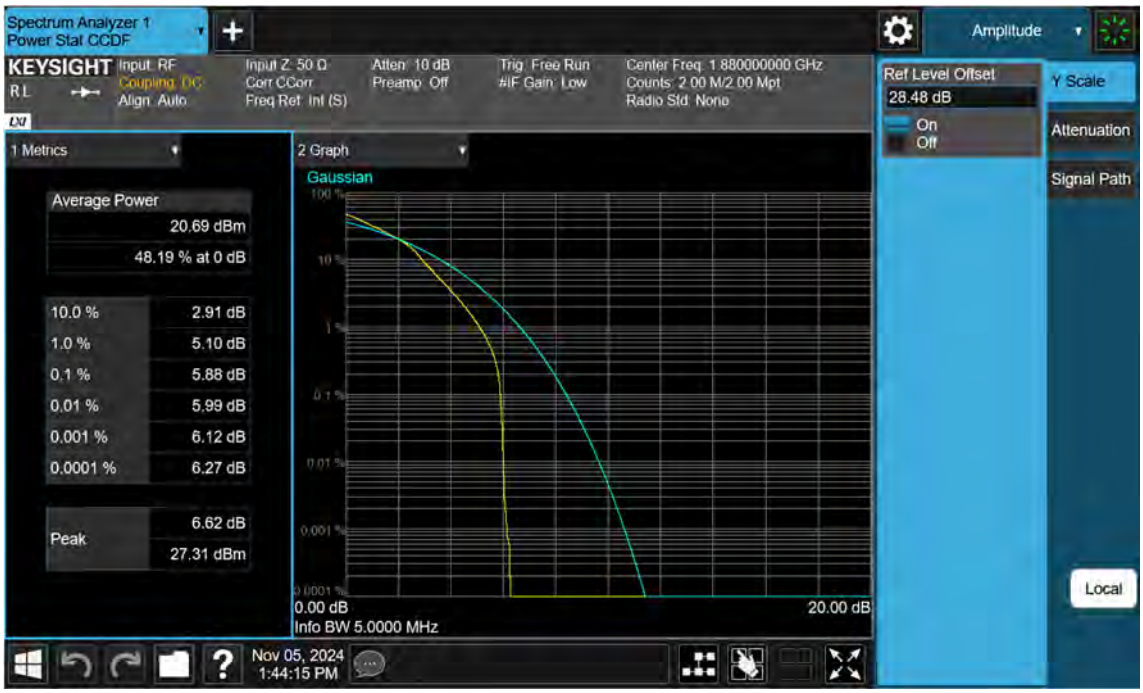

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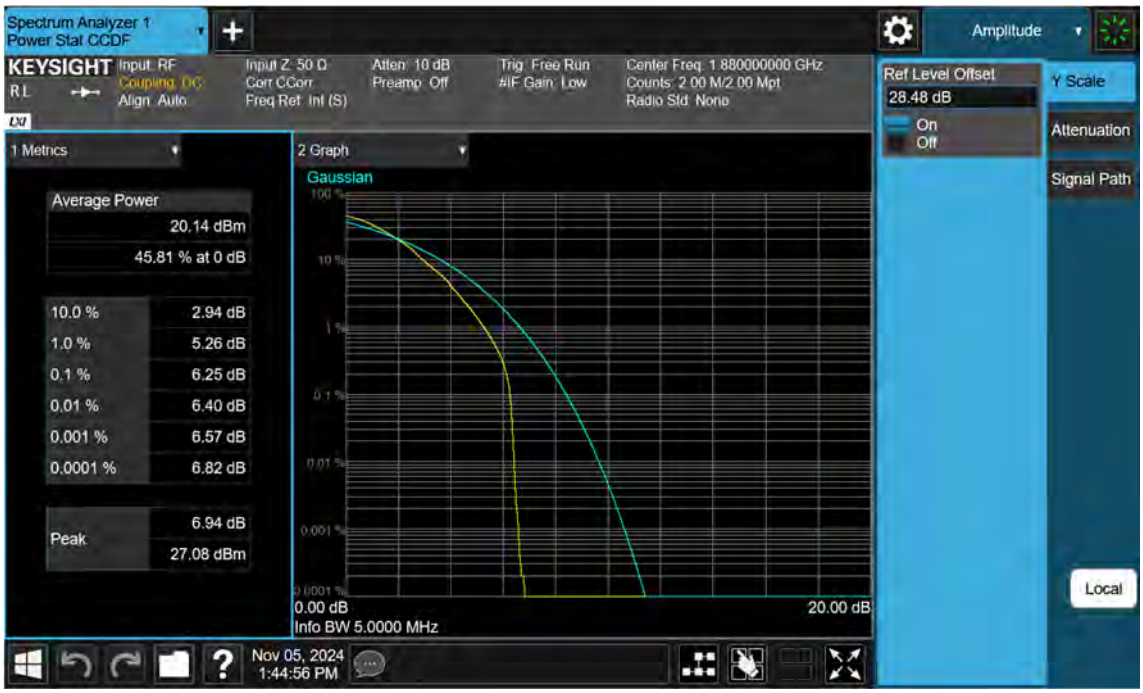
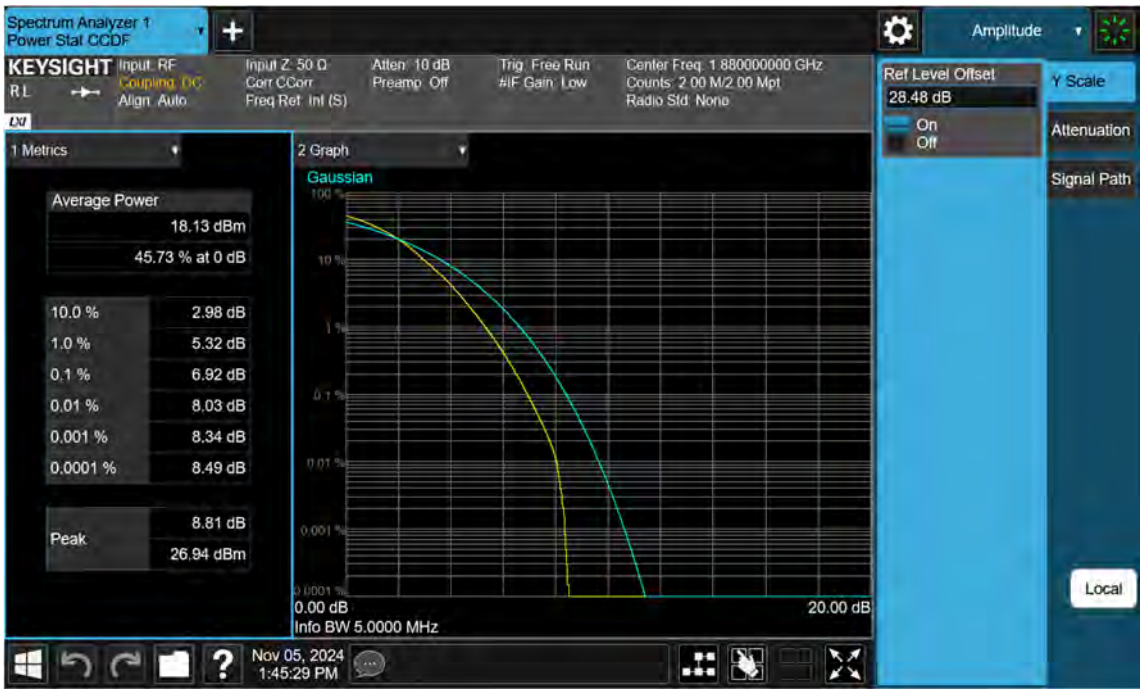
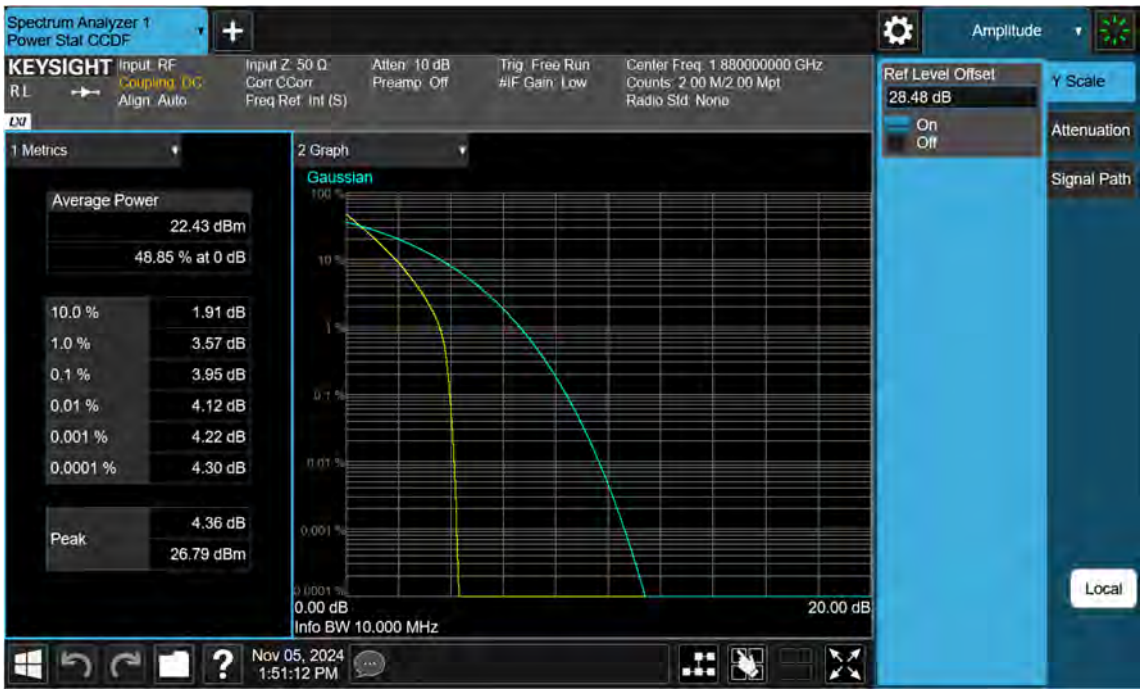


NR2_5 M_PAR_Mid_256QAM_FullRB



NR2_10 M_PAR_Mid_BPSK_FullRB



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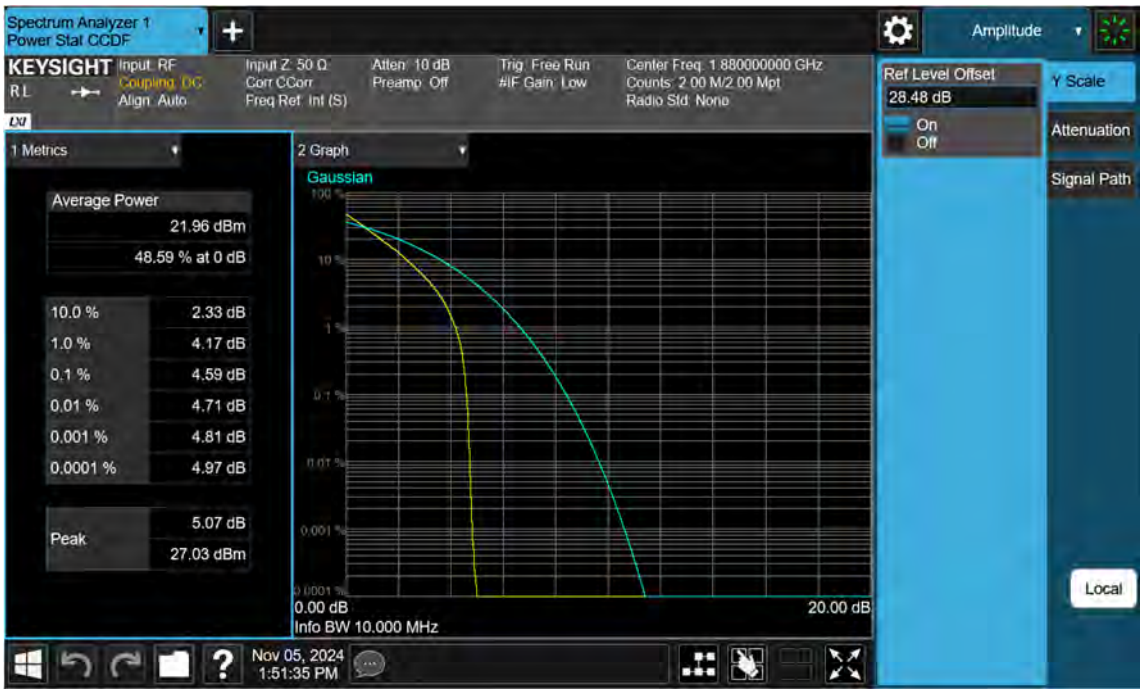

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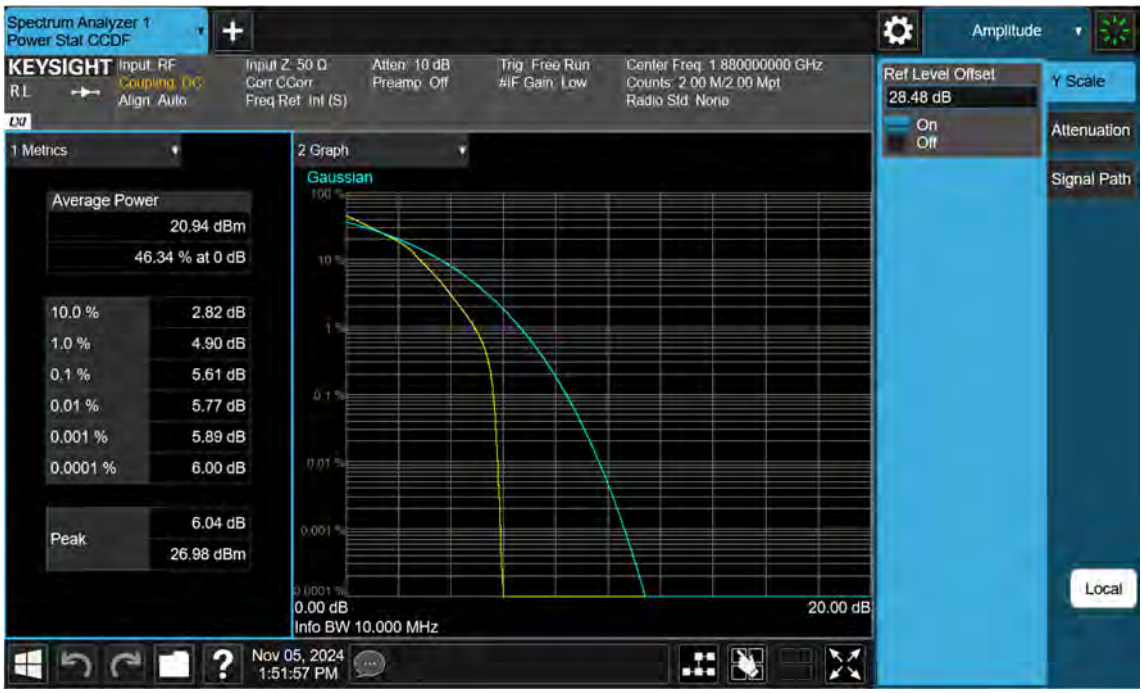
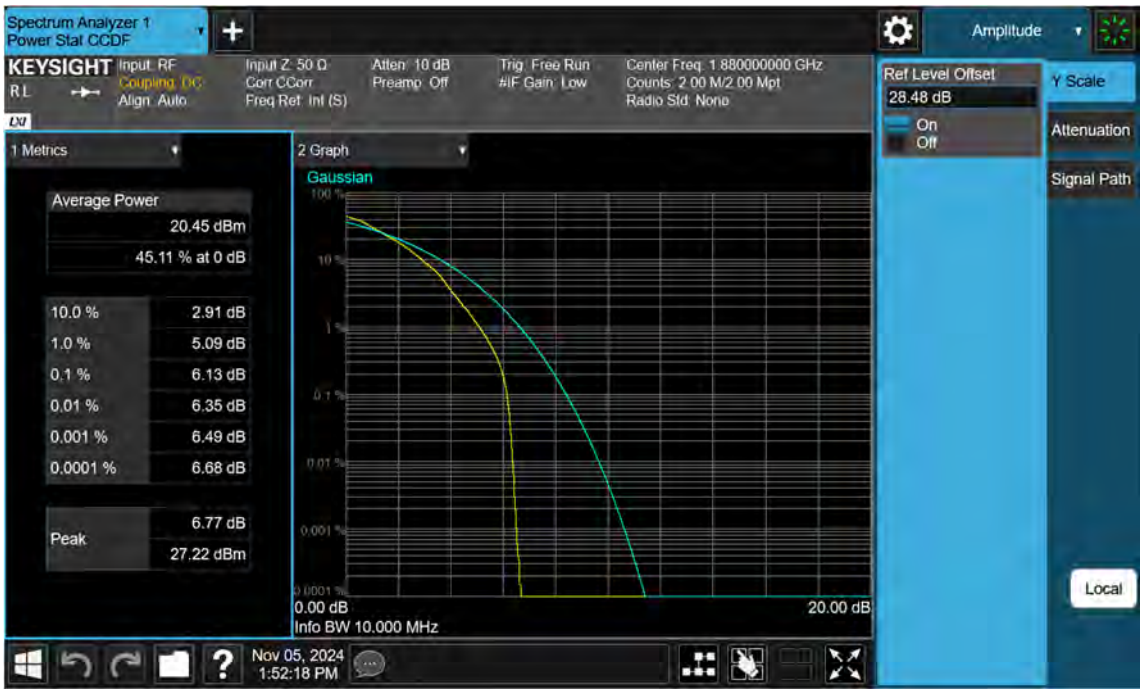
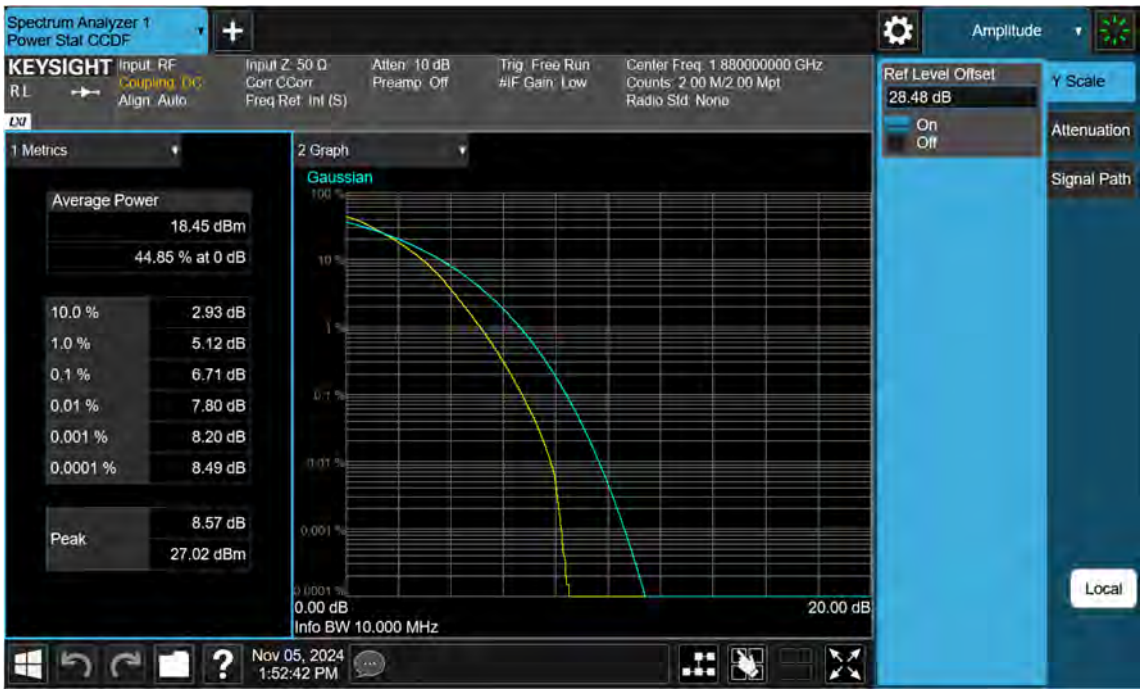


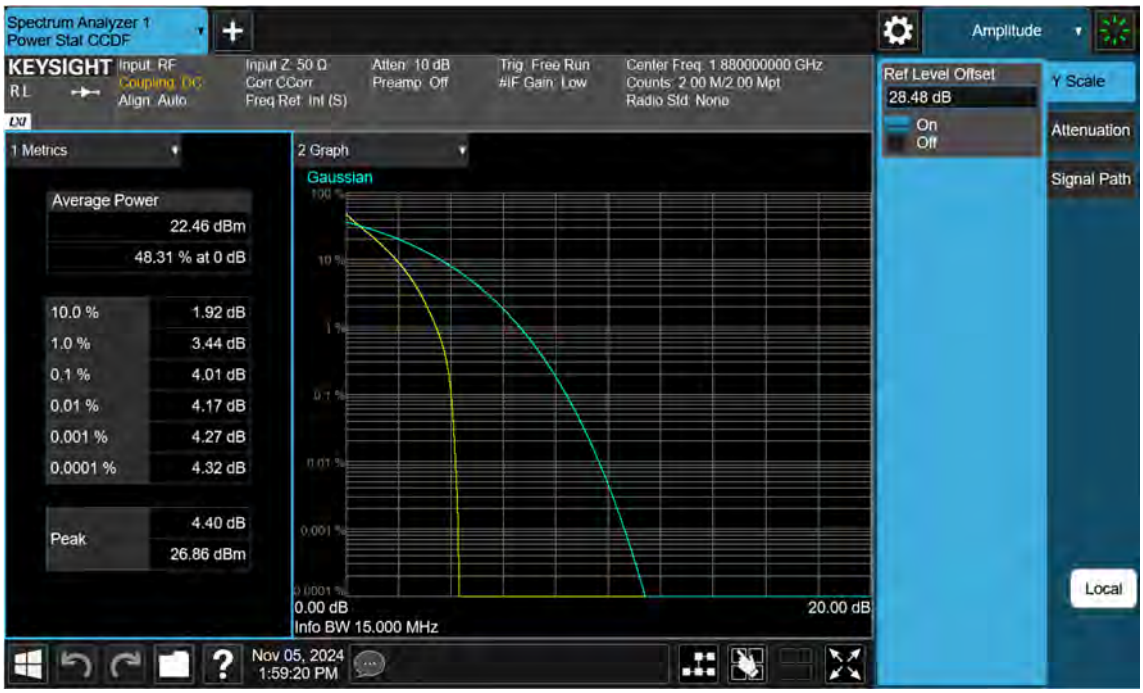
NR2_10 M_PAR_Mid_64QAM_FullRB



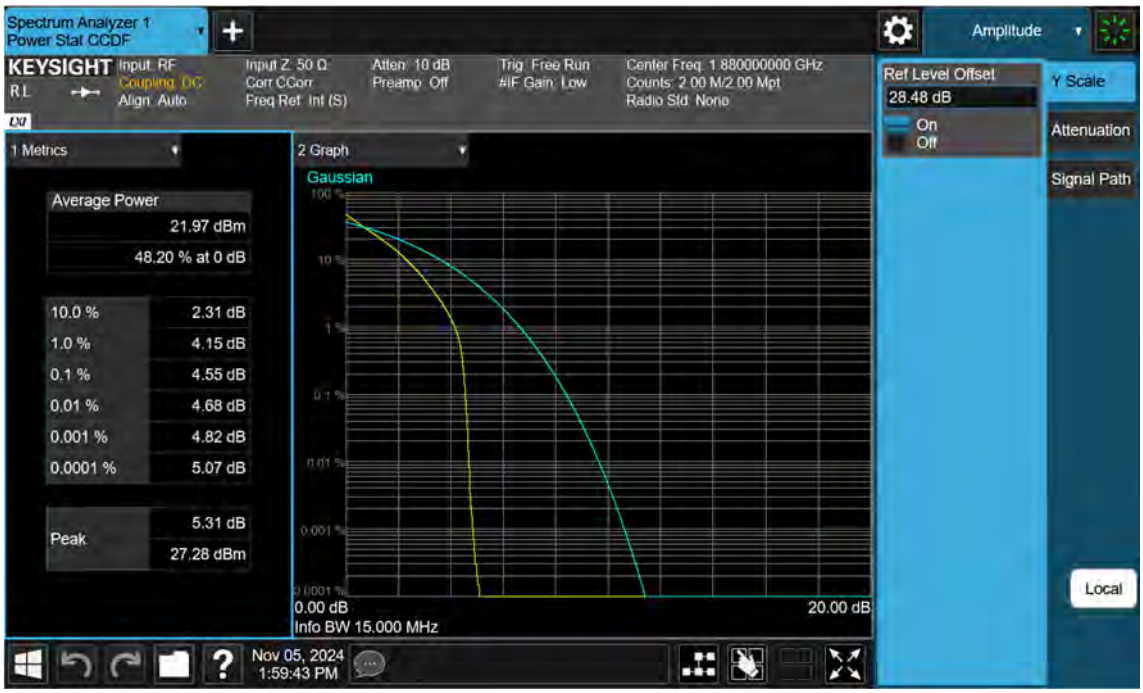
NR2_10 M_PAR_Mid_256QAM_FullRB



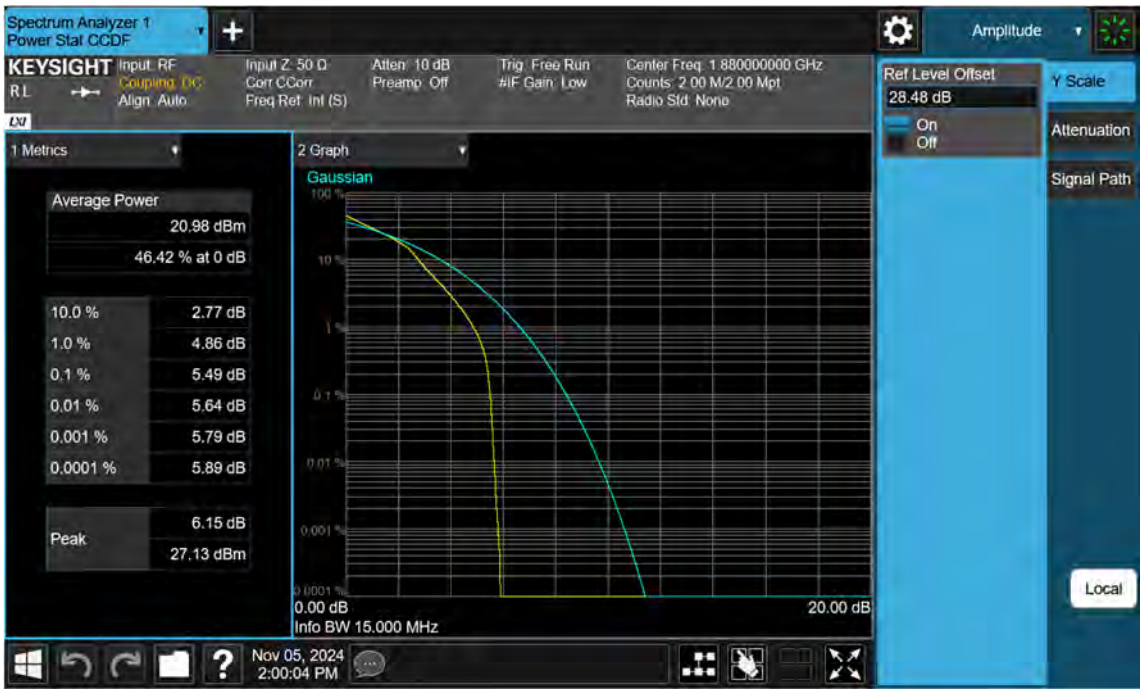
NR2_15 M_PAR_Mid_BPSK_FullRB



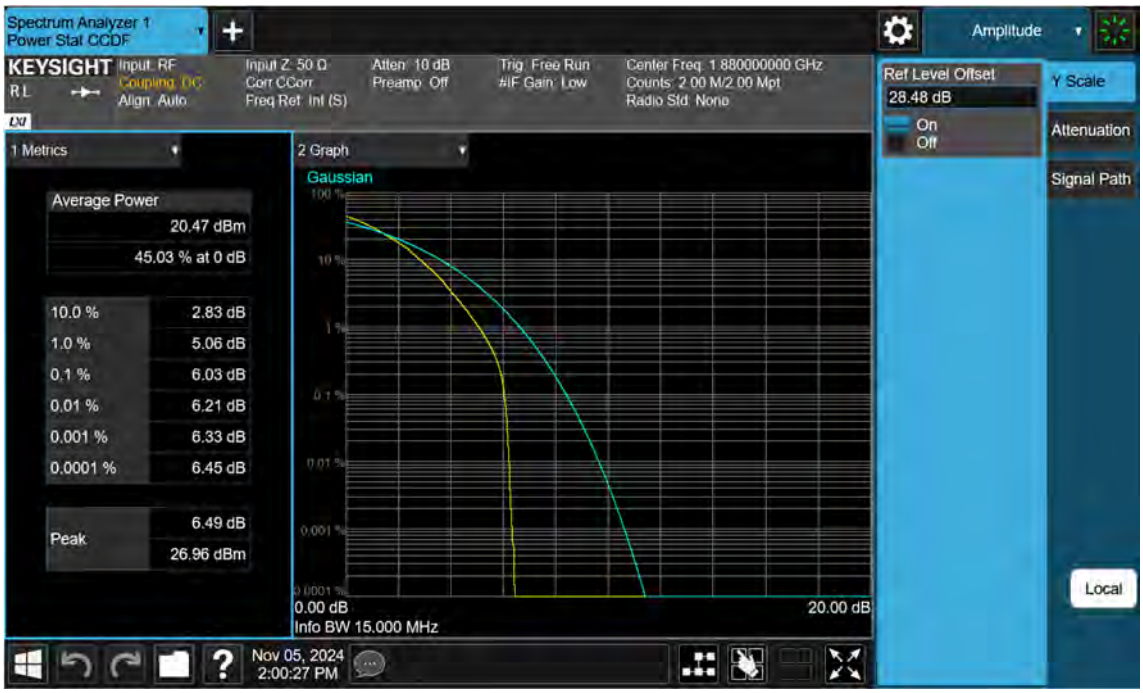
NR2_15 M_PAR_Mid_QPSK_FullRB



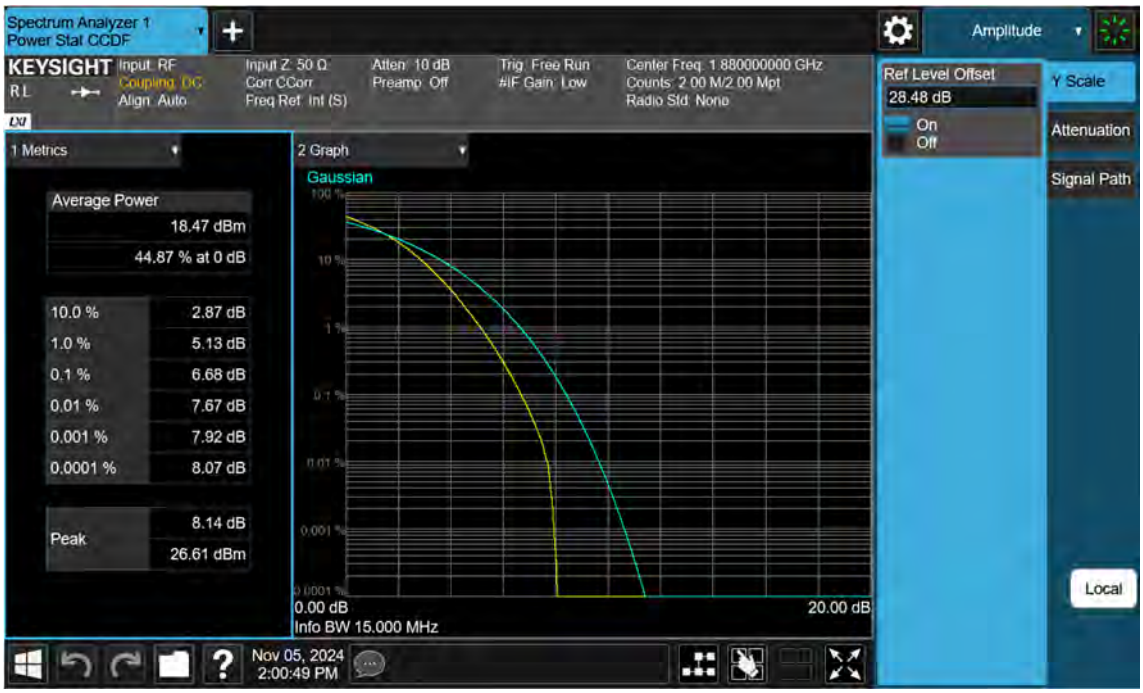
NR2_15 M_PAR_Mid_16QAM_FullRB



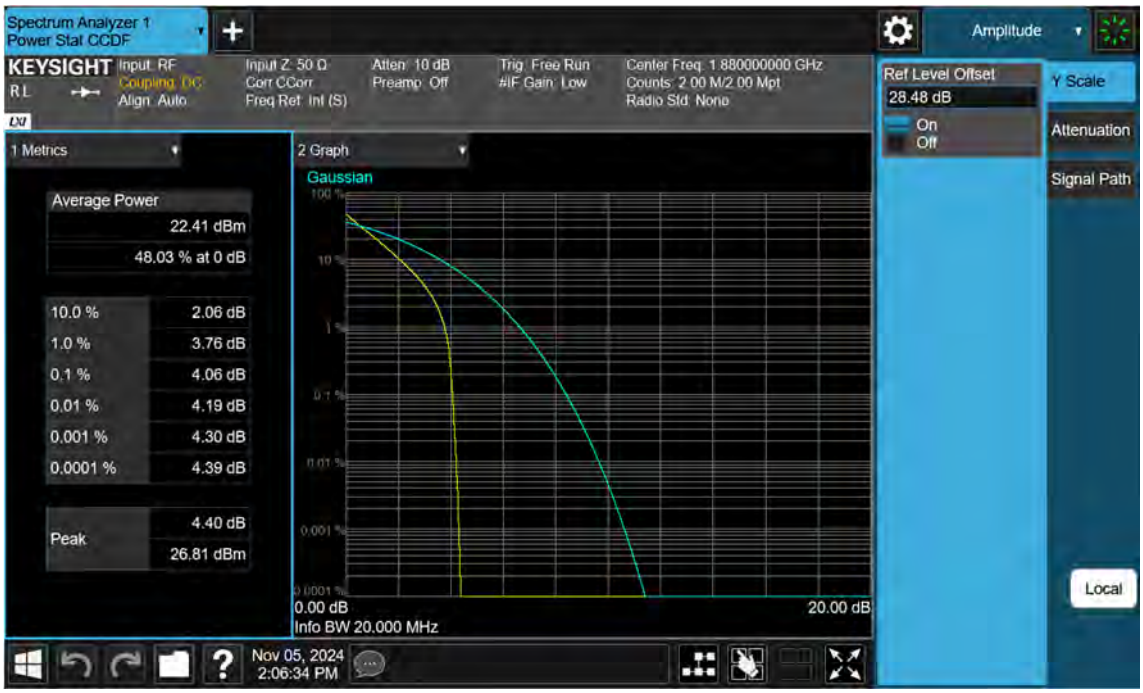
NR2_15 M_PAR_Mid_64QAM_FullRB



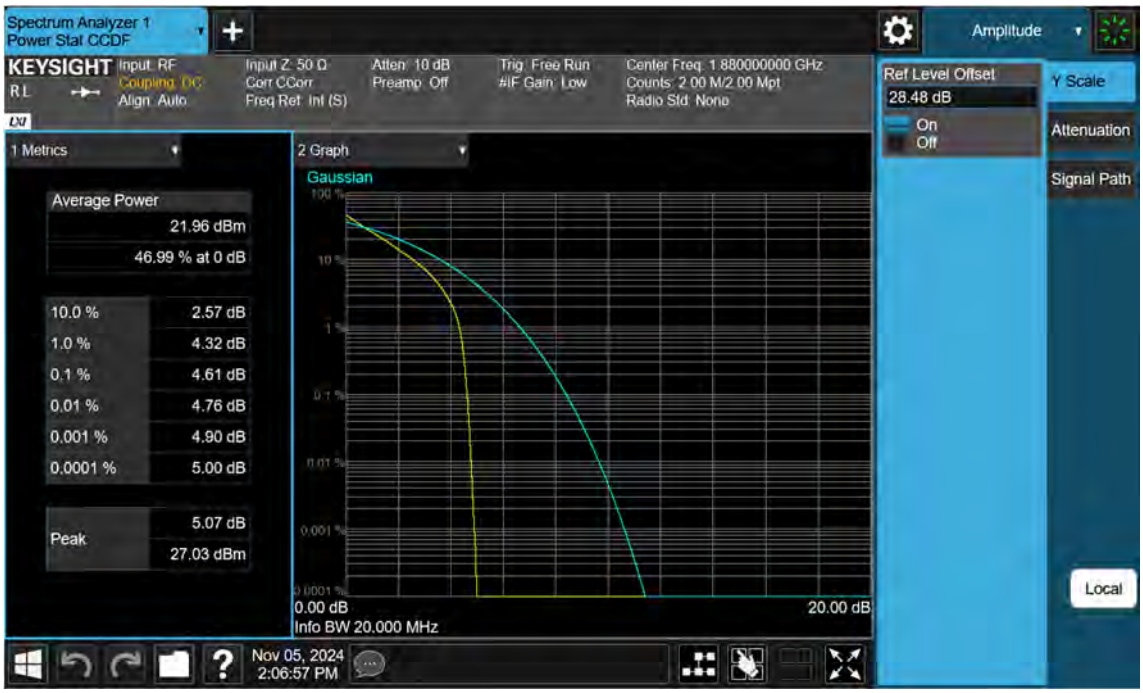
NR2_15 M_PAR_Mid_256QAM_FullRB



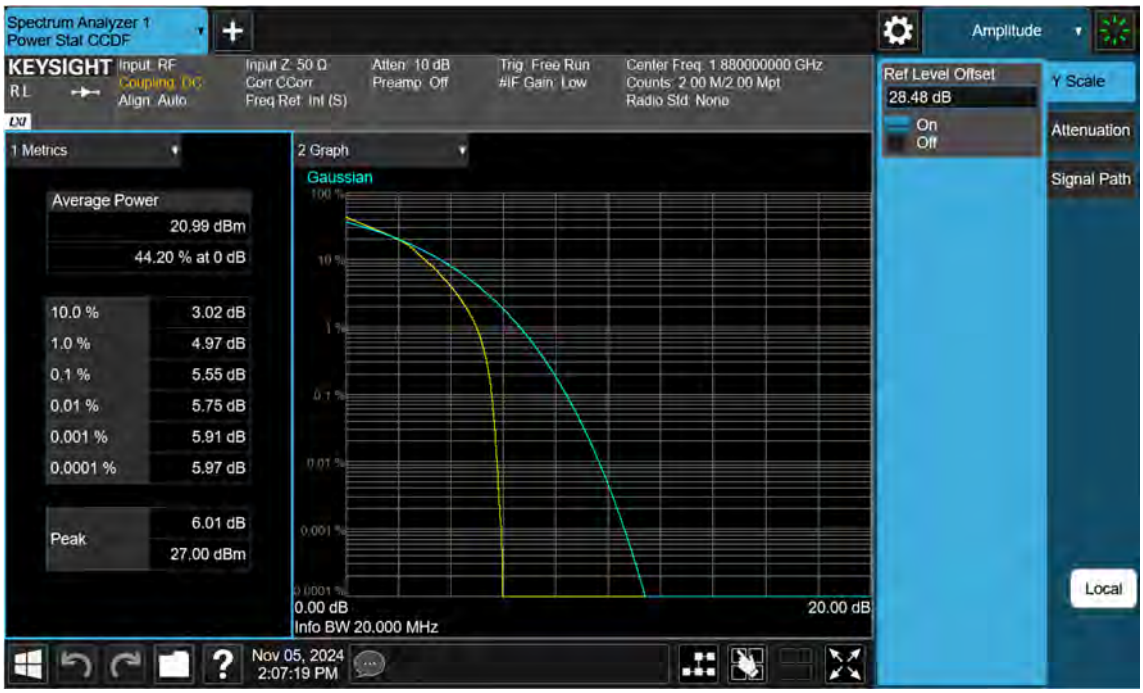
NR2_20 M_PAR_Mid_BPSK_FullRB



NR2_20 M_PAR_Mid_QPSK_FullRB

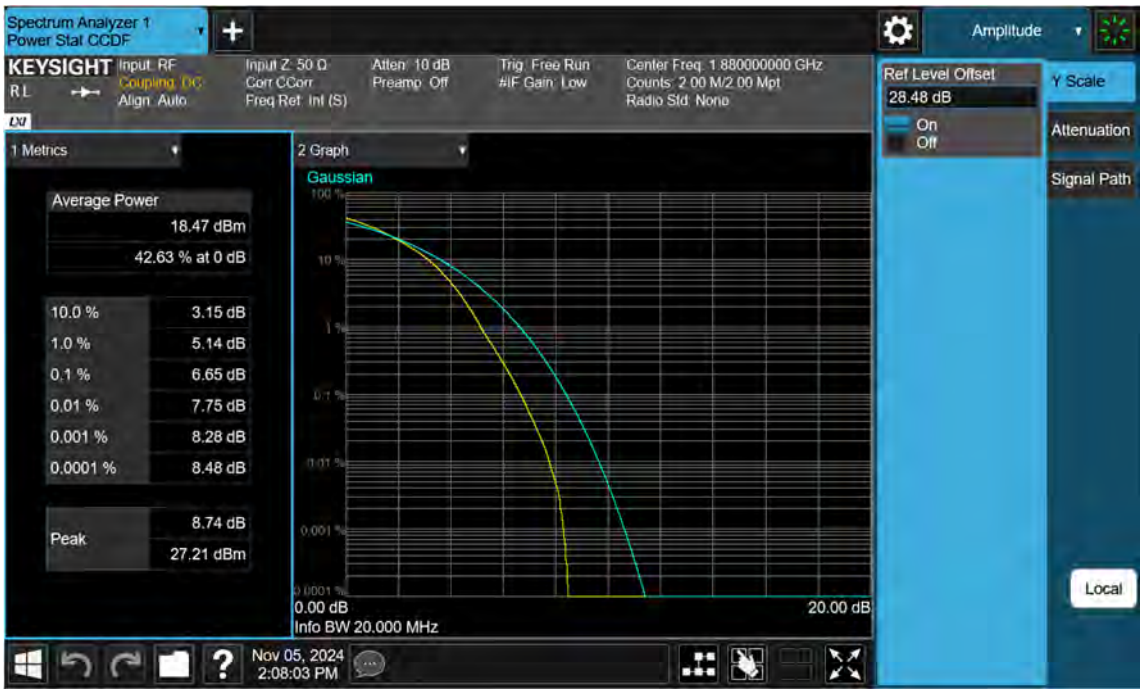


NR2_20 M_PAR_Mid_16QAM_FullRB



NR2_20 M_PAR_Mid_64QAM_FullRB

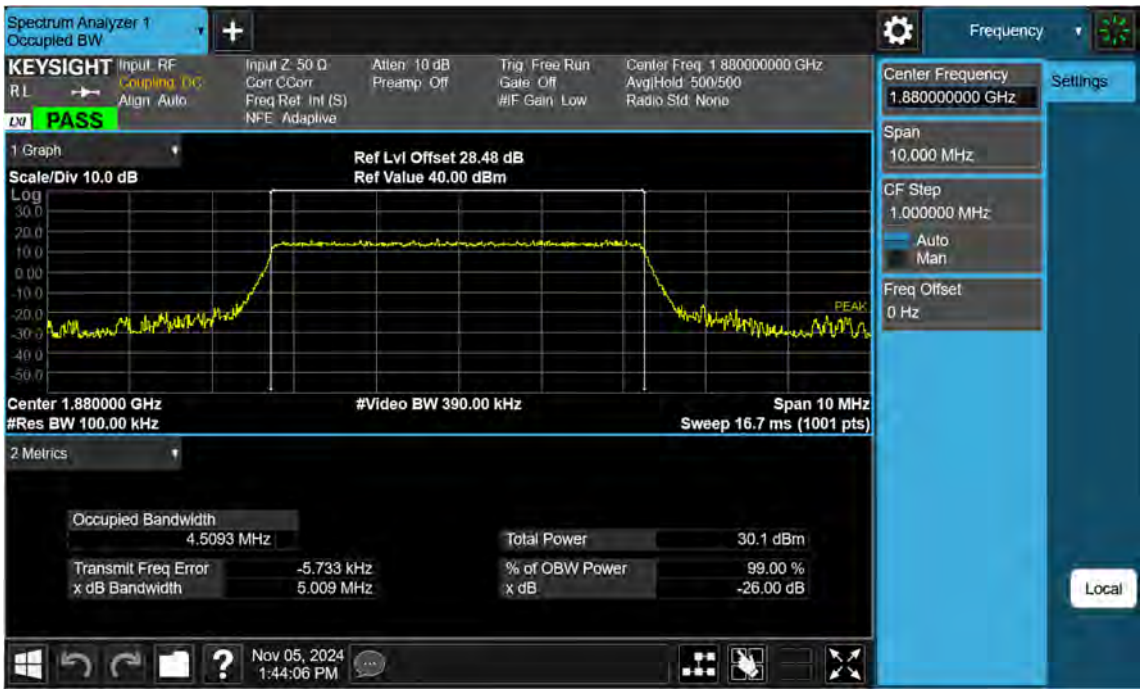
NR2_20 M_PAR_Mid_256QAM_FullRB



NR2_5 M_OBW_Mid_BPSK_FullRB

NR2_5 M_OBW_Mid_QPSK_FullRB

NR2_5 M_OBW_Mid_16QAM_FullRB



NR2_5 M_OBW_Mid_64QAM_FullRB

NR2_5 M_OBW_Mid_256QAM_FullRB

NR2_10 M_OBW_Mid_BPSK_FullRB

NR2_10 M_OBW_Mid_QPSK_FullRB

NR2_10 M_OBW_Mid_16QAM_FullRB

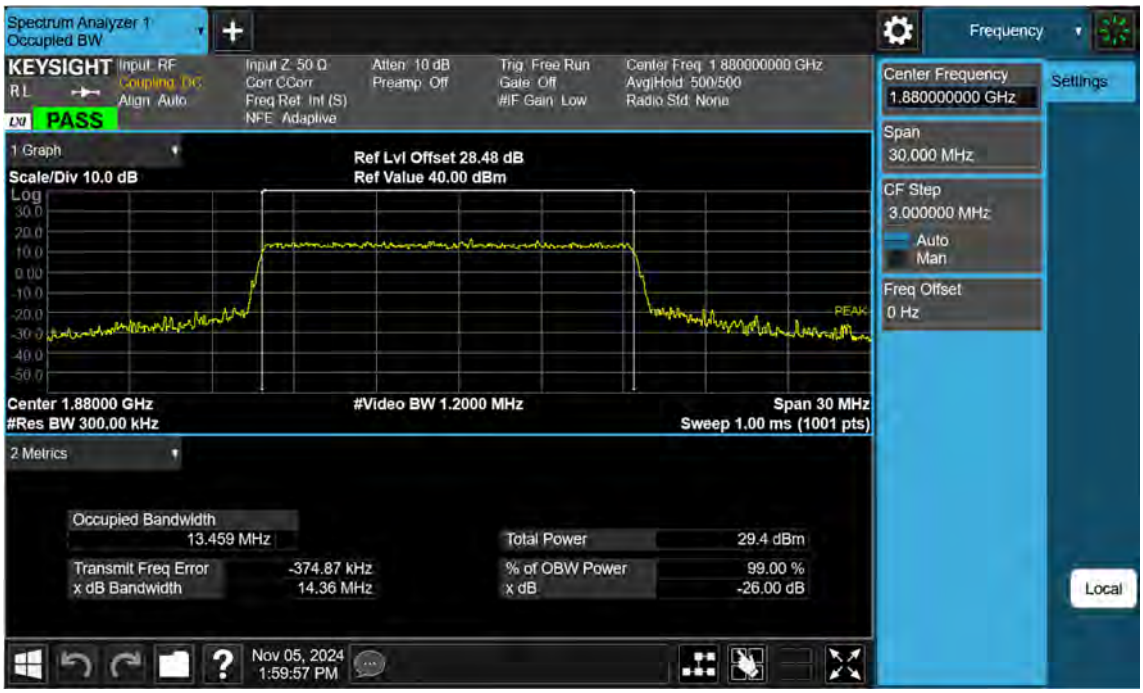
NR2_10 M_OBW_Mid_64QAM_FullRB

NR2_10 M_OBW_Mid_256QAM_FullRB

NR2_15 M_OBW_Mid_BPSK_FullRB

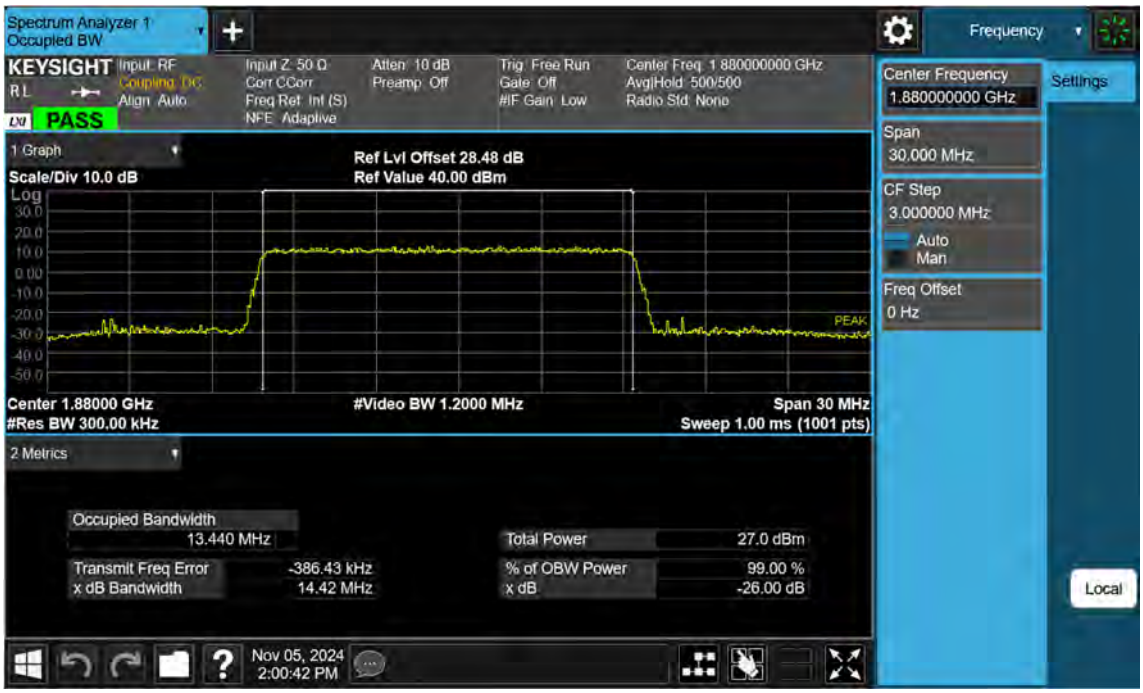
NR2_15 M_OBW_Mid_QPSK_FullRB

NR2_15 M_OBW_Mid_16QAM_FullRB



NR2_15 M_OBW_Mid_64QAM_FullRB

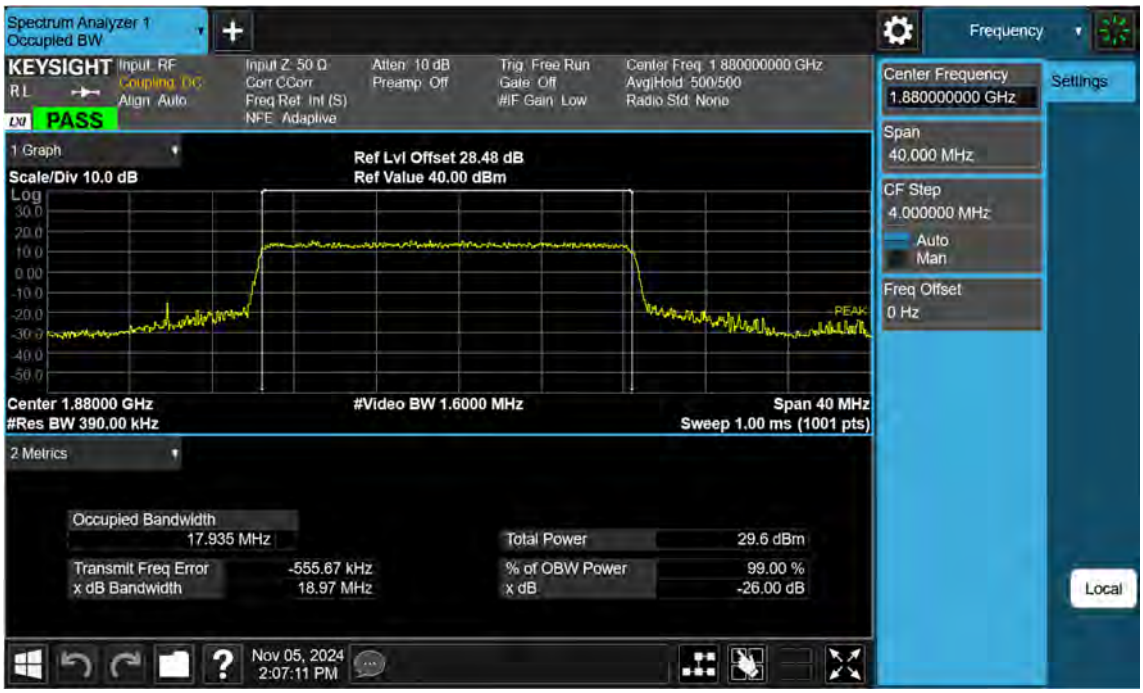
NR2_15 M_OBW_Mid_256QAM_FullRB



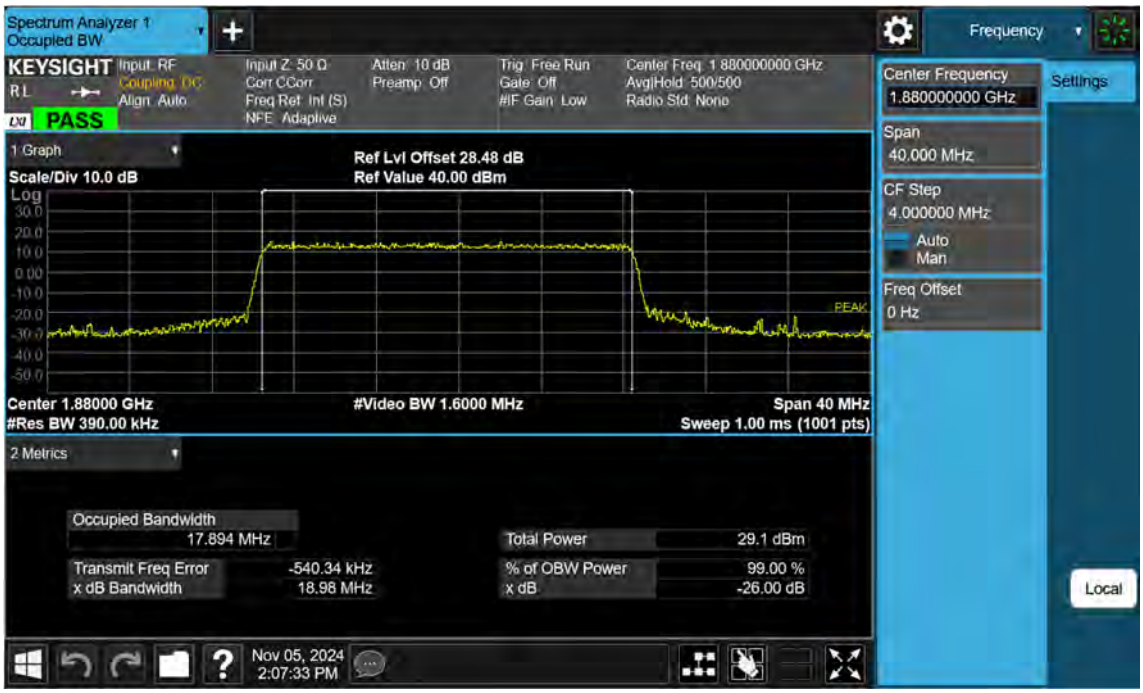
NR2_20 M_OBW_Mid_BPSK_FullRB

NR2_20 M_OBW_Mid_QPSK_FullRB

NR2_20 M_OBW_Mid_16QAM_FullRB



NR2_20 M_OBW_Mid_64QAM_FullRB

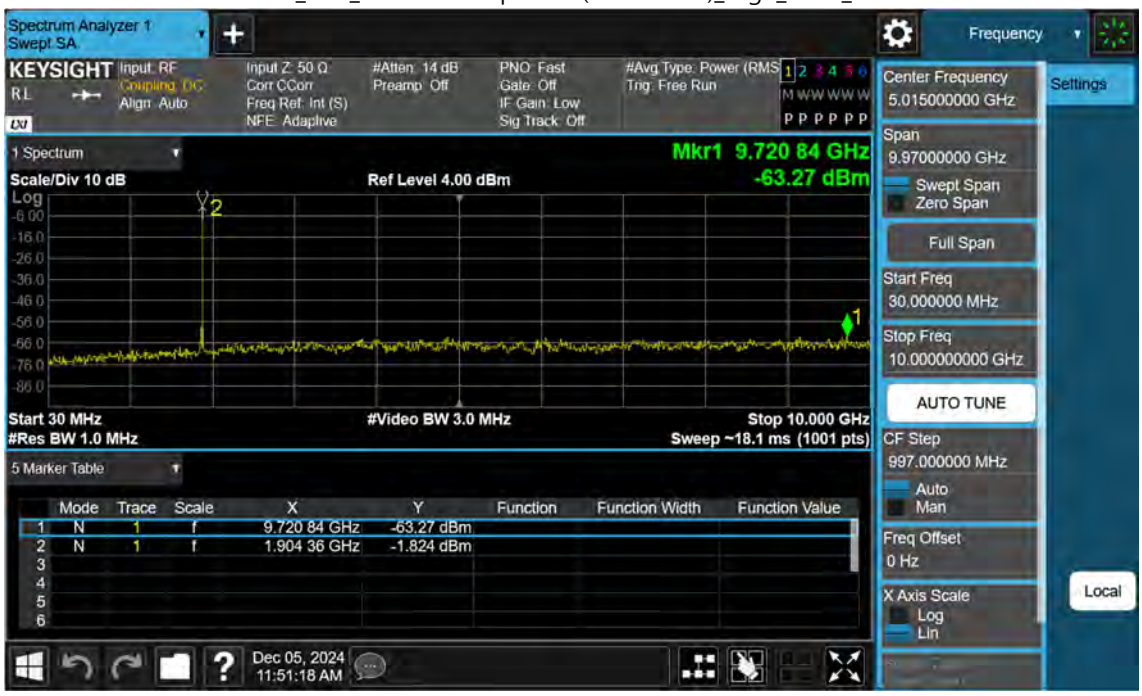


NR2_20 M_OBW_Mid_256QAM_FullRB

NR2_5 M_Conducted Spurious(30 M-10 G)_Low_BPSK_1RB

NR2_5 M_Conducted Spurious(30 M-10 G)_Mid_BPSK_1RB

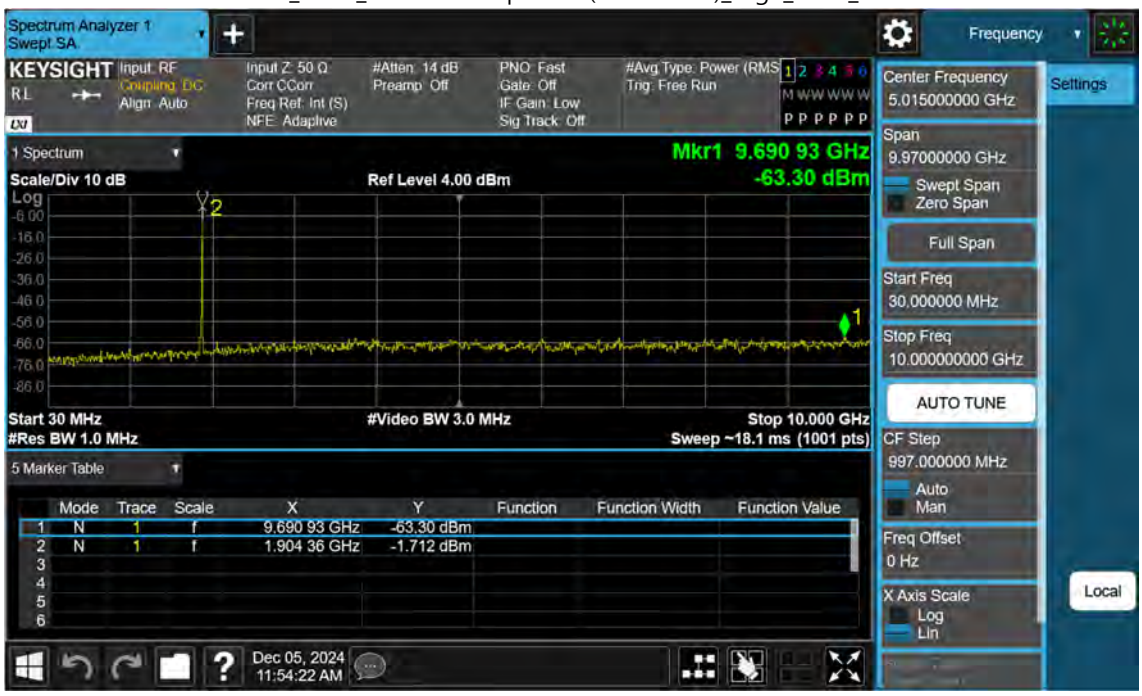
NR2_5 M_Conducted Spurious(30 M-10 G)_High_BPSK_1RB



NR2_10 M_Conducted Spurious(30 M-10 G)_Low_BPSK_1RB

NR2_10 M_Conducted Spurious(30 M-10 G)_Mid_BPSK_1RB

NR2_10 M_Conducted Spurious(30 M-10 G)_High_BPSK_1RB



NR2_15 M_Conducted Spurious(30 M-10 G)_Low_BPSK_1RB

NR2_15 M_Conducted Spurious(30 M-10 G)_Mid_BPSK_1RB

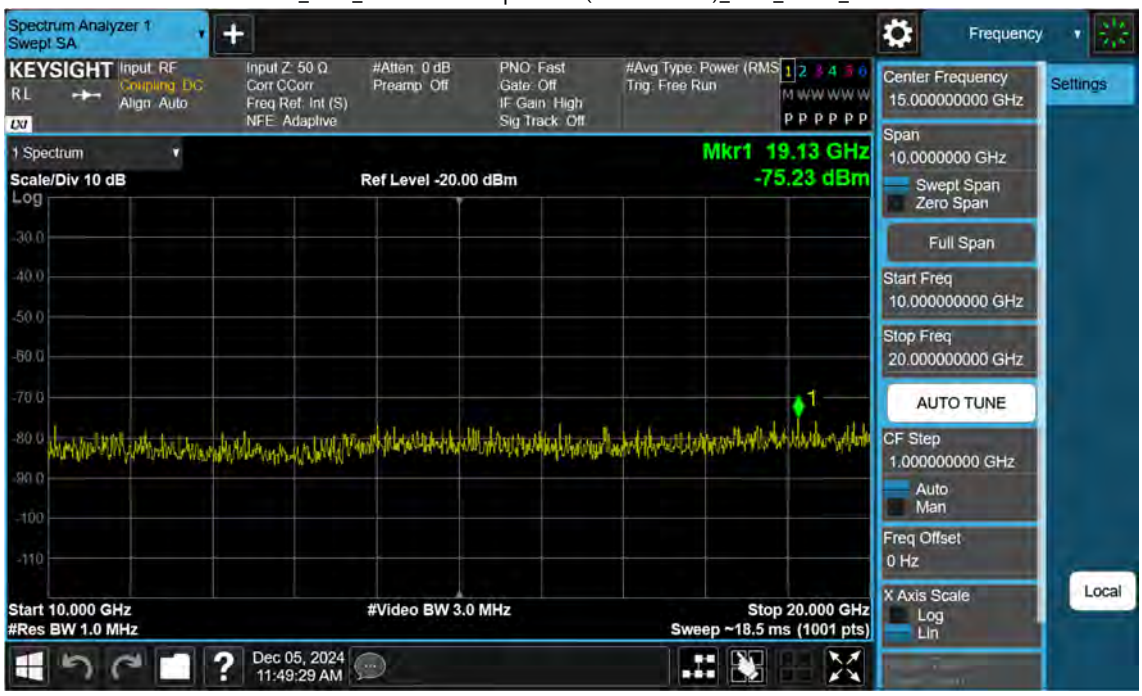
NR2_15 M_Conducted Spurious(30 M-10 G)_High_BPSK_1RB

NR2_20 M_Conducted Spurious(30 M-10 G)_Low_BPSK_1RB

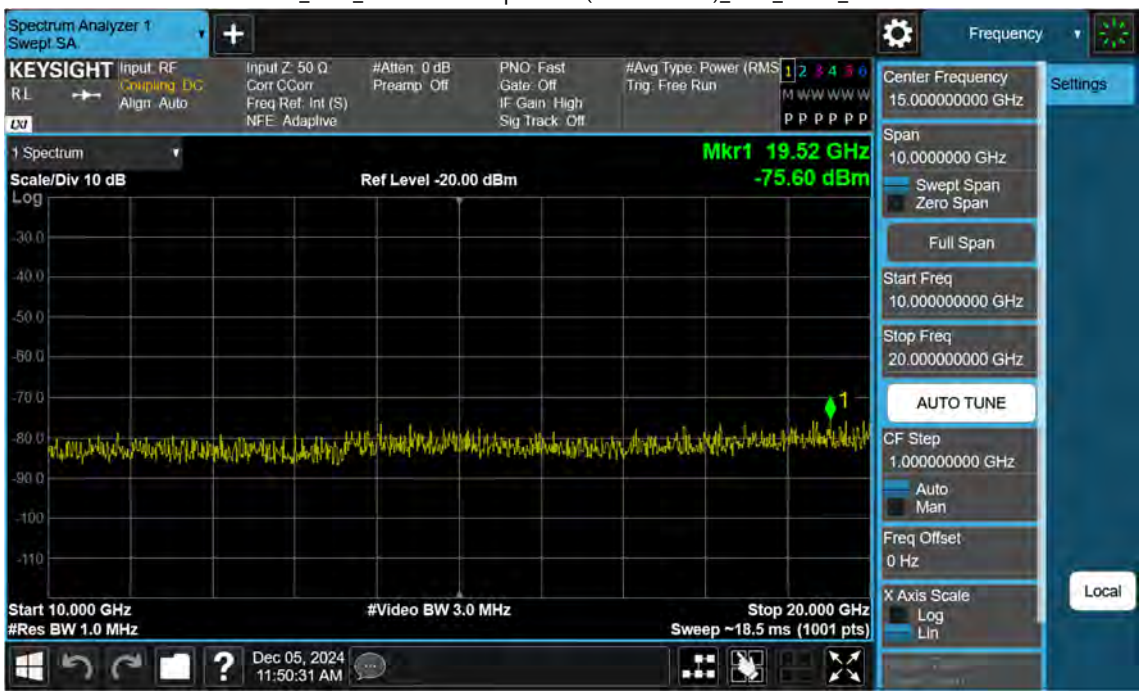
NR2_20 M_Conducted Spurious(30 M-10 G)_Mid_BPSK_1RB

NR2_20 M_Conducted Spurious(30 M-10 G)_High_BPSK_1RB

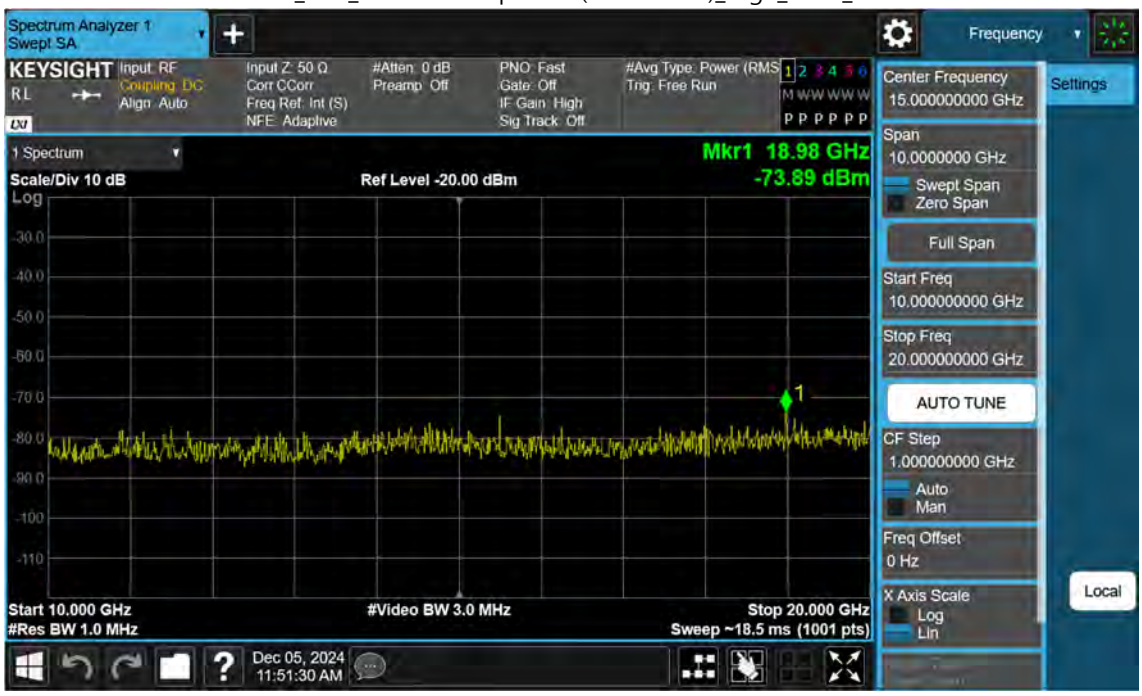
NR2_5 M_Conducted Spurious(Above10 G)_Low_BPSK_1RB



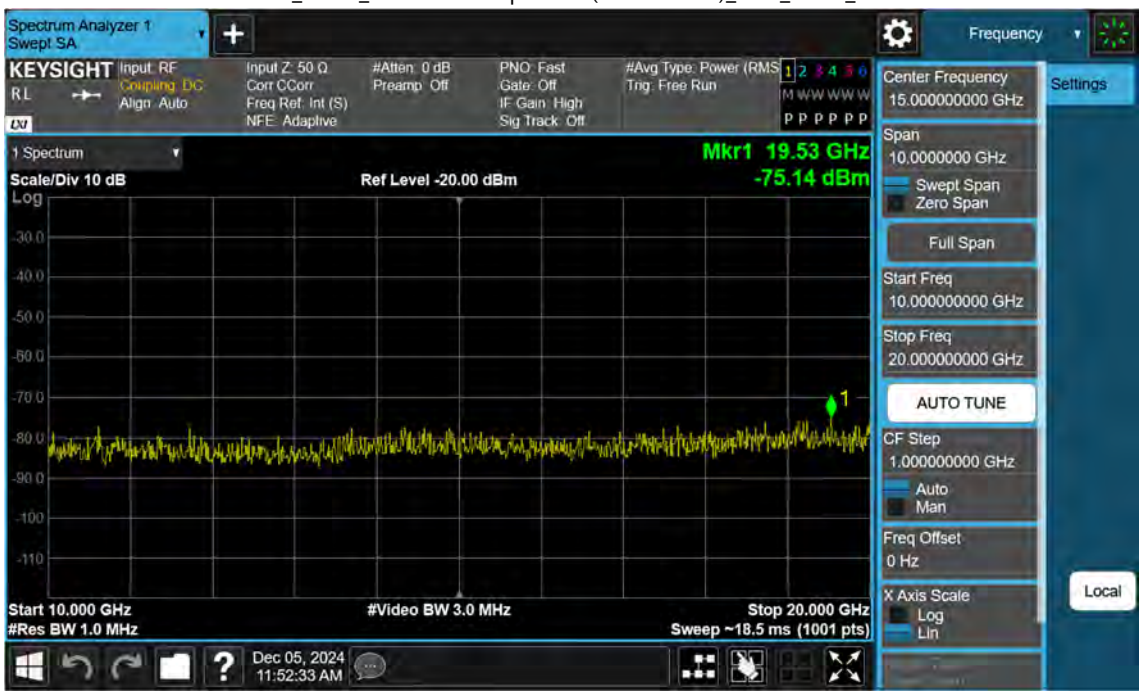
NR2_5 M_Conducted Spurious(Above10 G)_Mid_BPSK_1RB



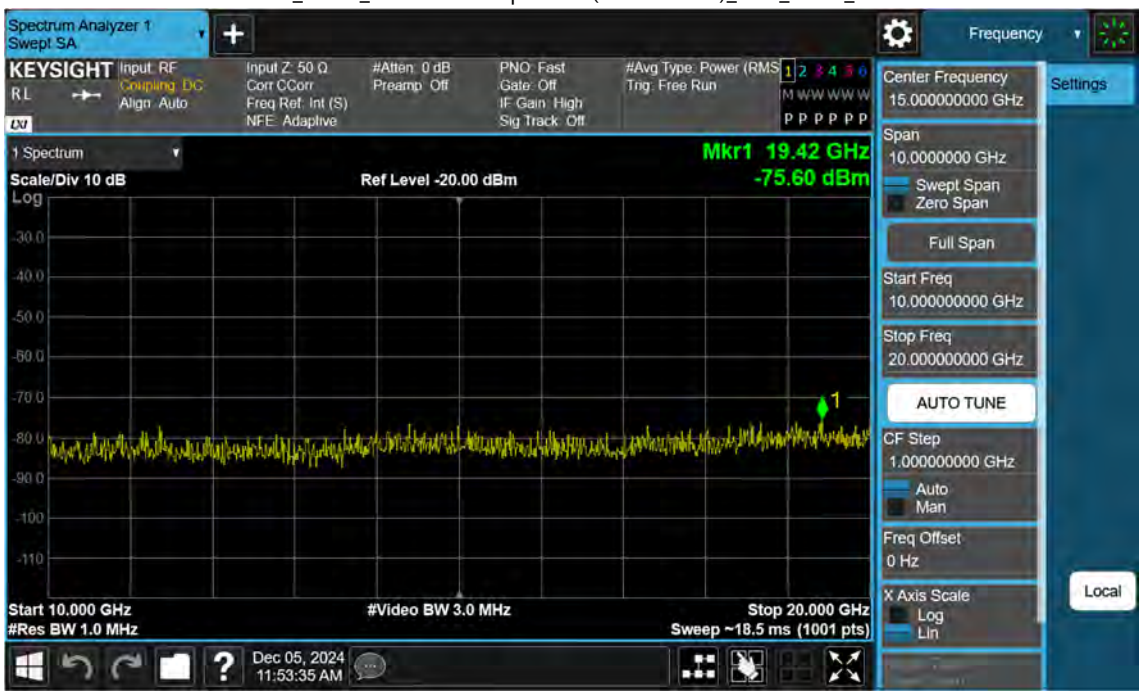
NR2_5 M_Conducted Spurious(Above10 G)_High_BPSK_1RB



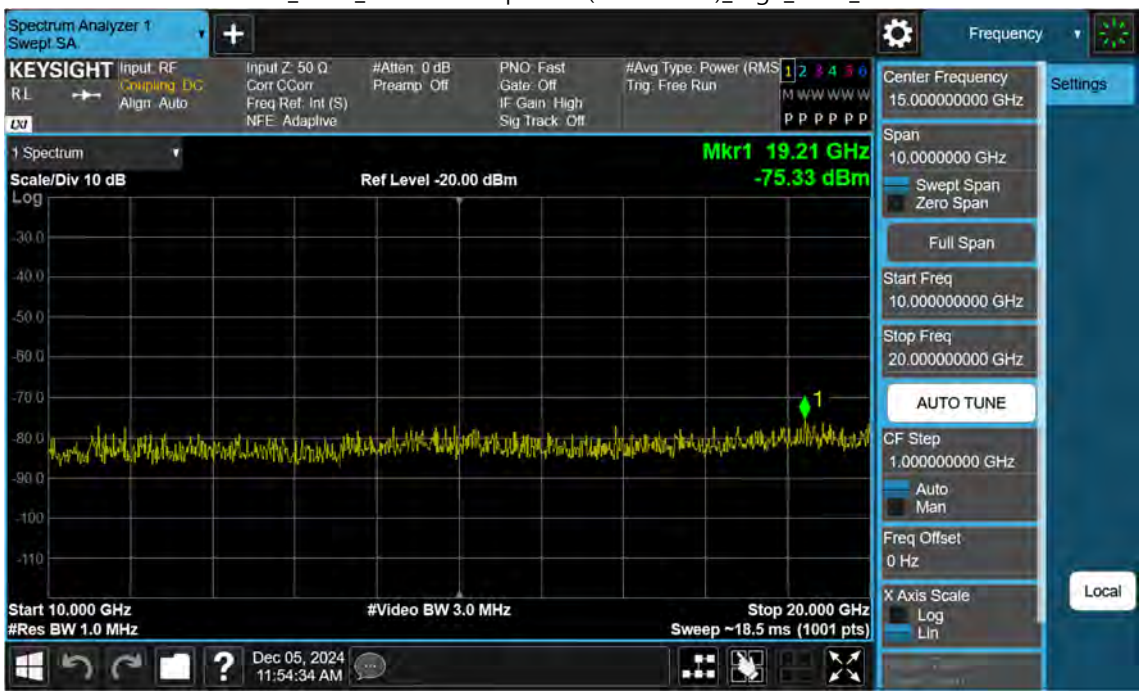
NR2_10 M_Conducted Spurious(Above10 G)_Low_BPSK_1RB



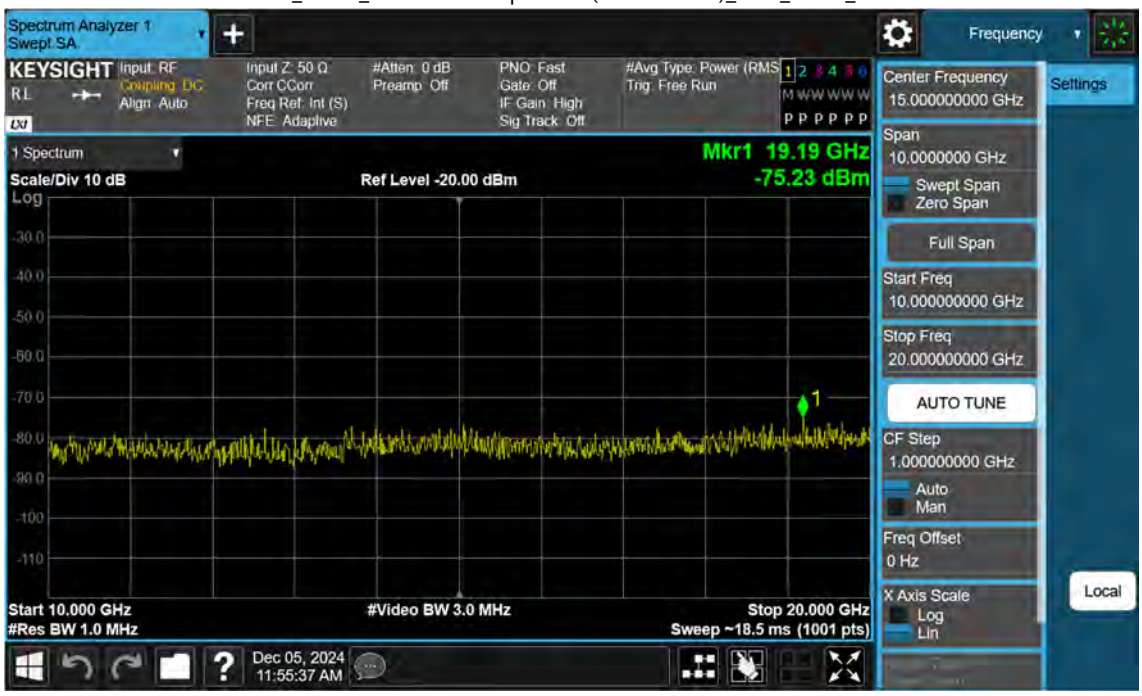
NR2_10 M_Conducted Spurious(Above10 G)_Mid_BPSK_1RB



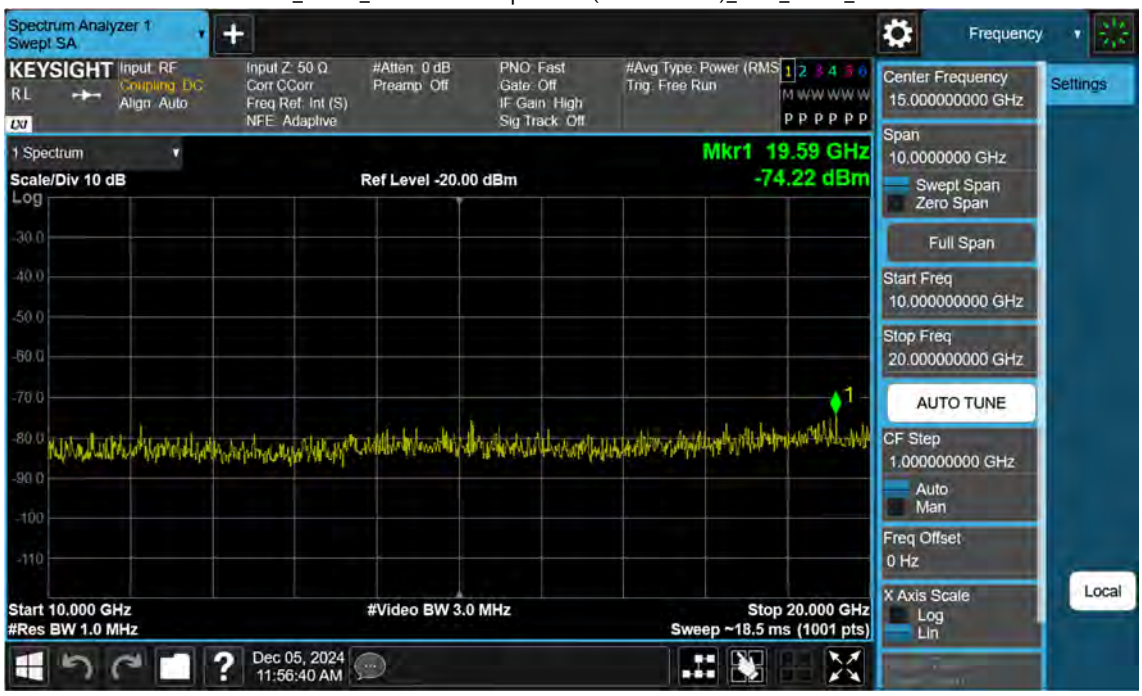
NR2_10 M_Conducted Spurious(Above10 G)_High_BPSK_1RB



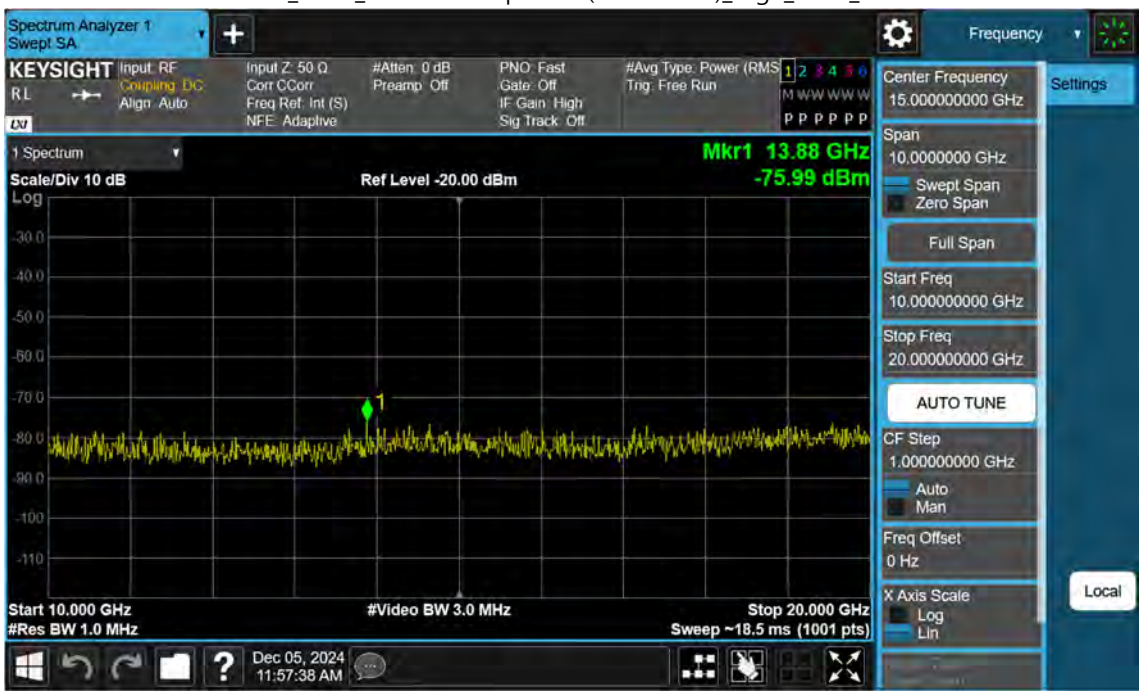
NR2_15 M_Conducted Spurious(Above10 G)_Low_BPSK_1RB



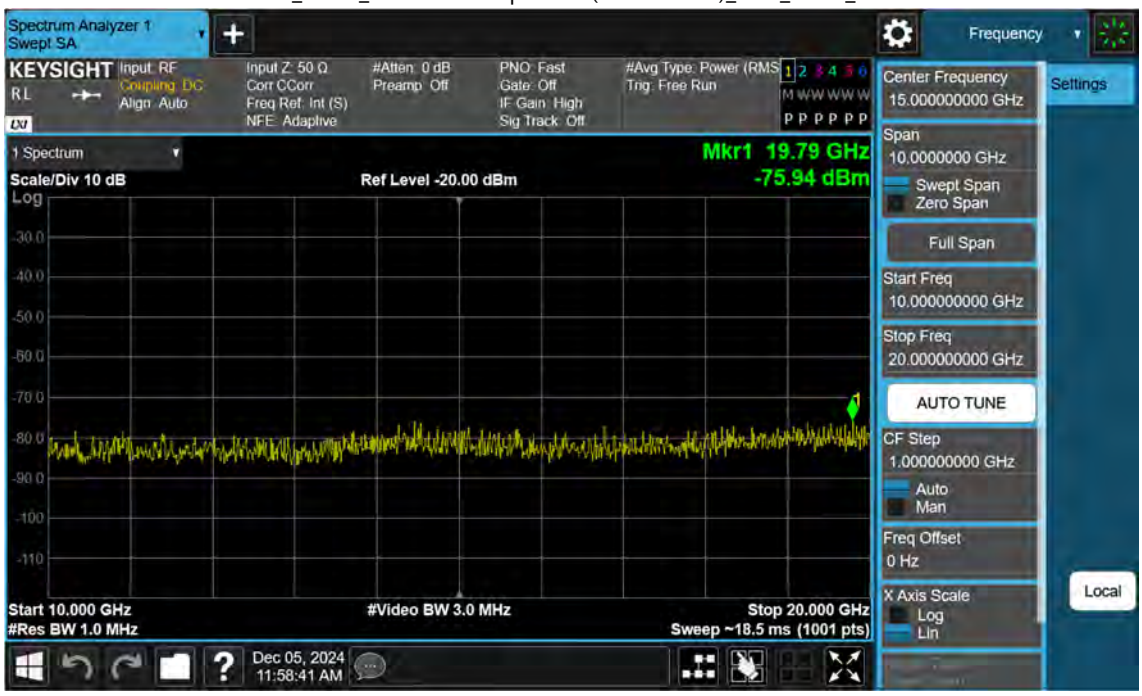
NR2_15 M_Conducted Spurious(Above10 G)_Mid_BPSK_1RB



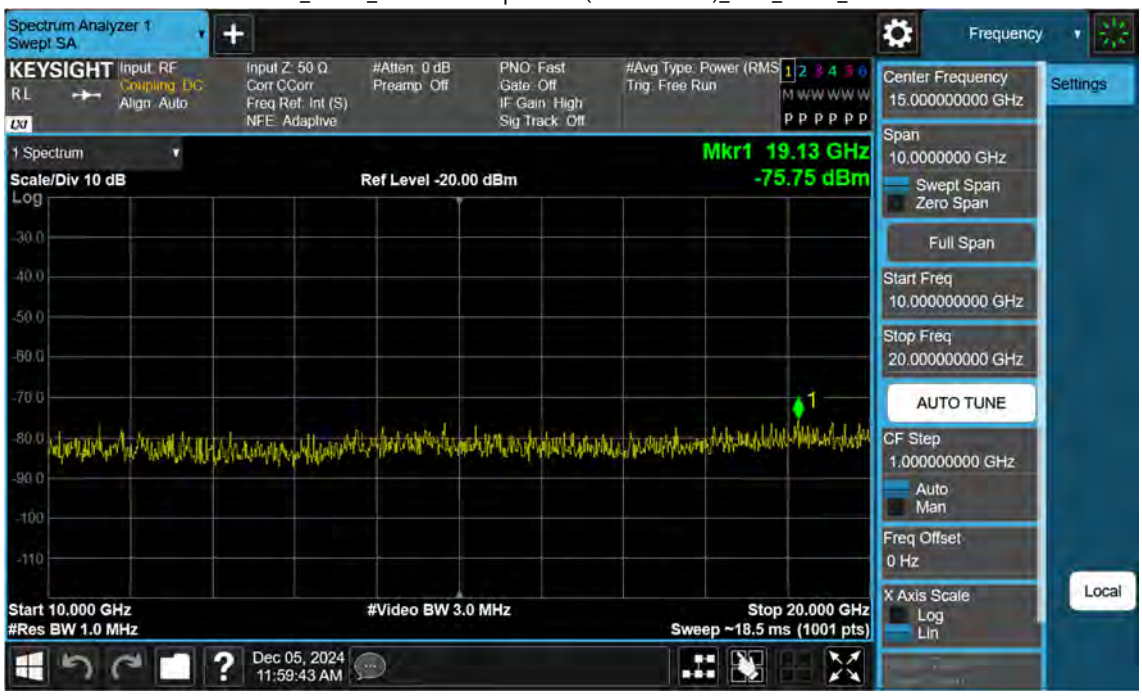
NR2_15 M_Conducted Spurious(Above10 G)_High_BPSK_1RB



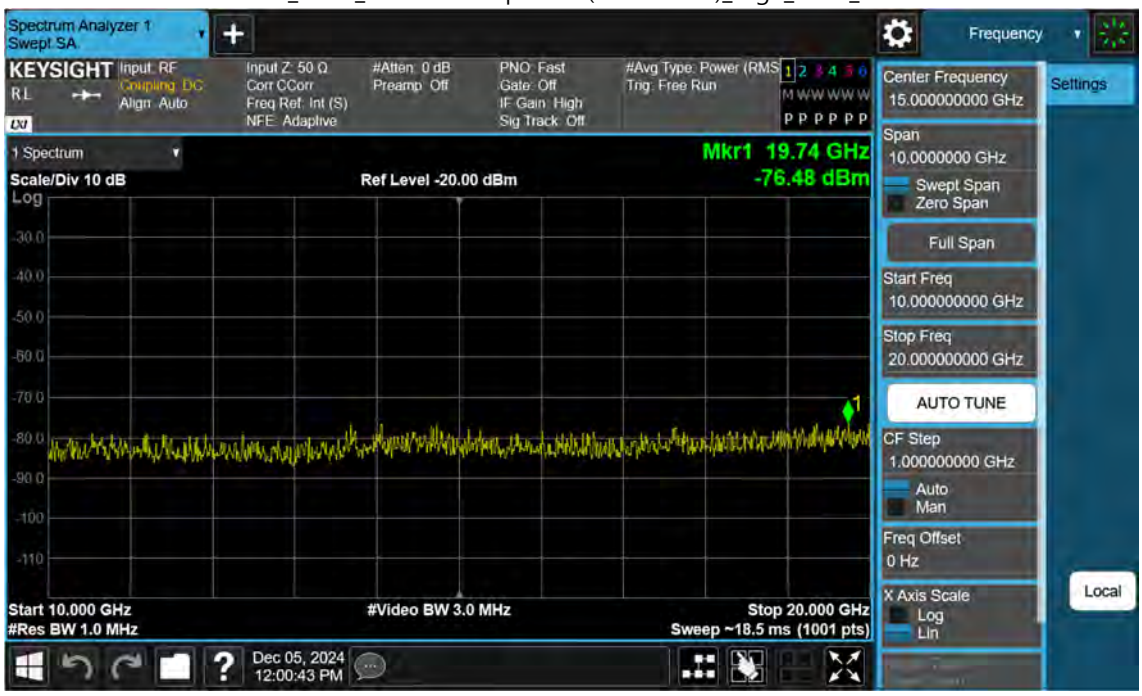
NR2_20 M_Conducted Spurious(Above10 G)_Low_BPSK_1RB



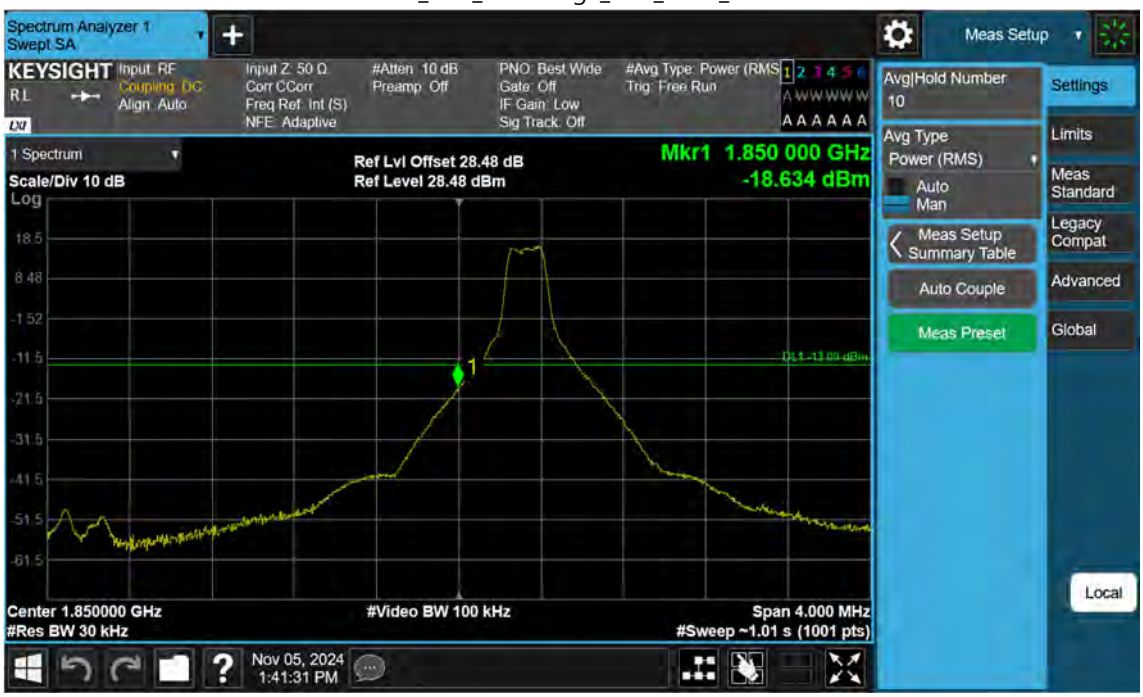
NR2_20 M_Conucted Spurious(Above10 G)_Mid_BPSK_1RB



NR2_20 M_Conducted Spurious(Above10 G)_High_BPSK_1RB



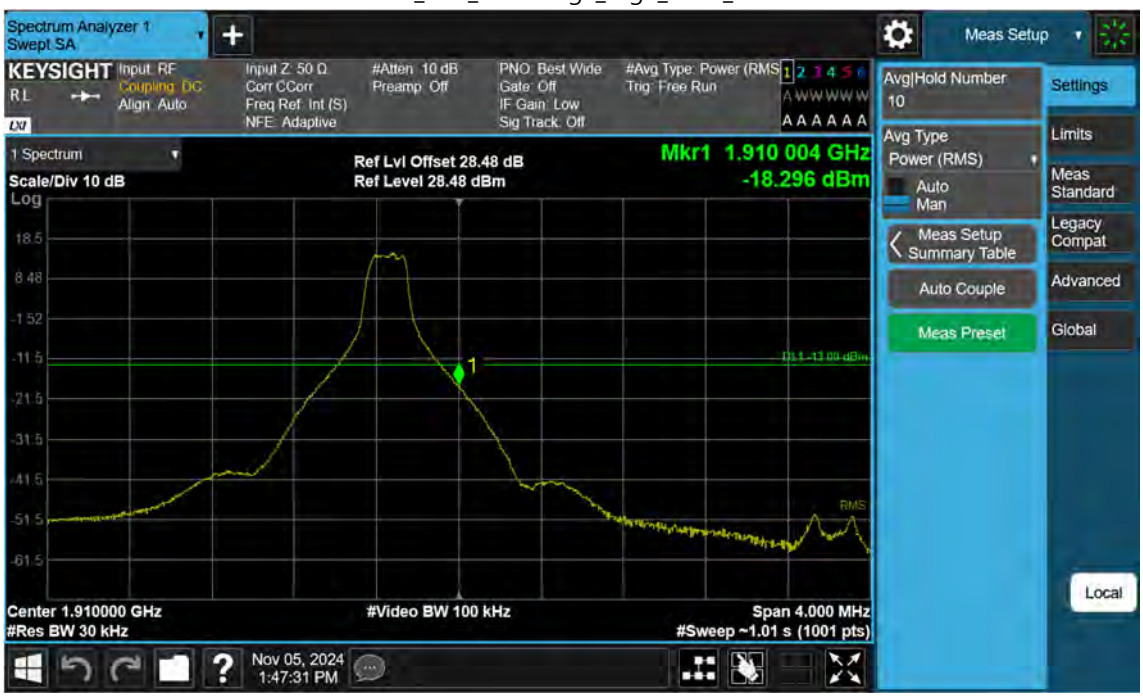
NR2_5 M_Band Edge_Low_BPSK_1RB



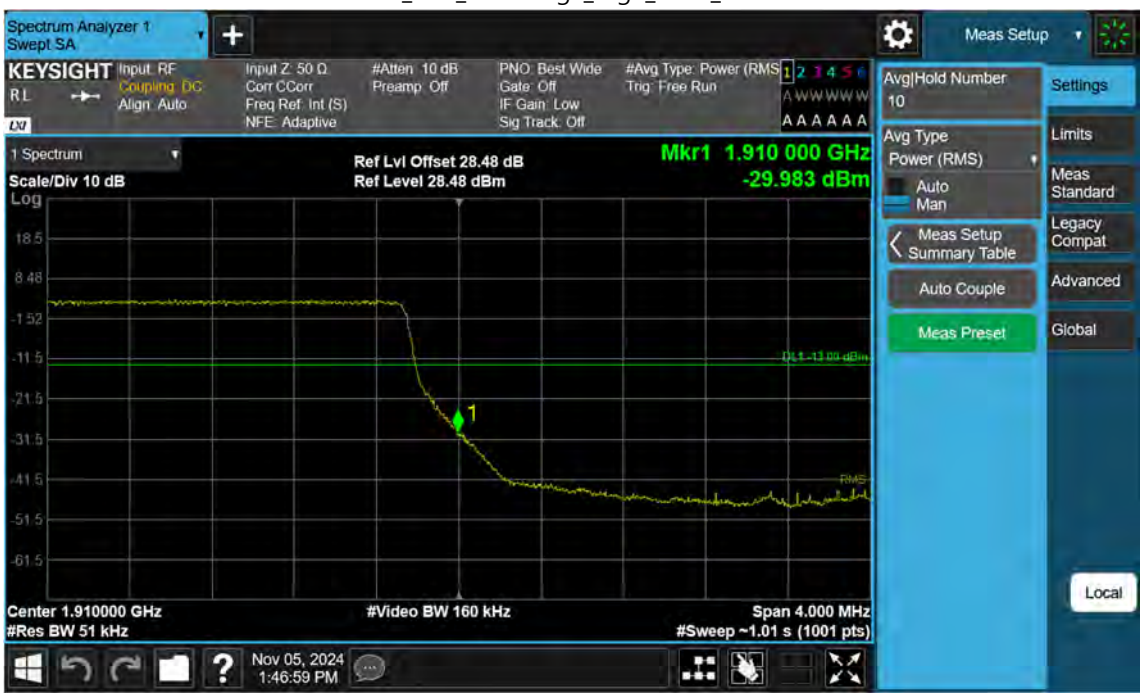
NR2_5 M_Band Edge_Low_BPSK_FullRB

NR2_5 M_Extended Band Edge_Low_BPSK_FullRB

NR2_5 M_Band Edge_High_BPSK_1RB

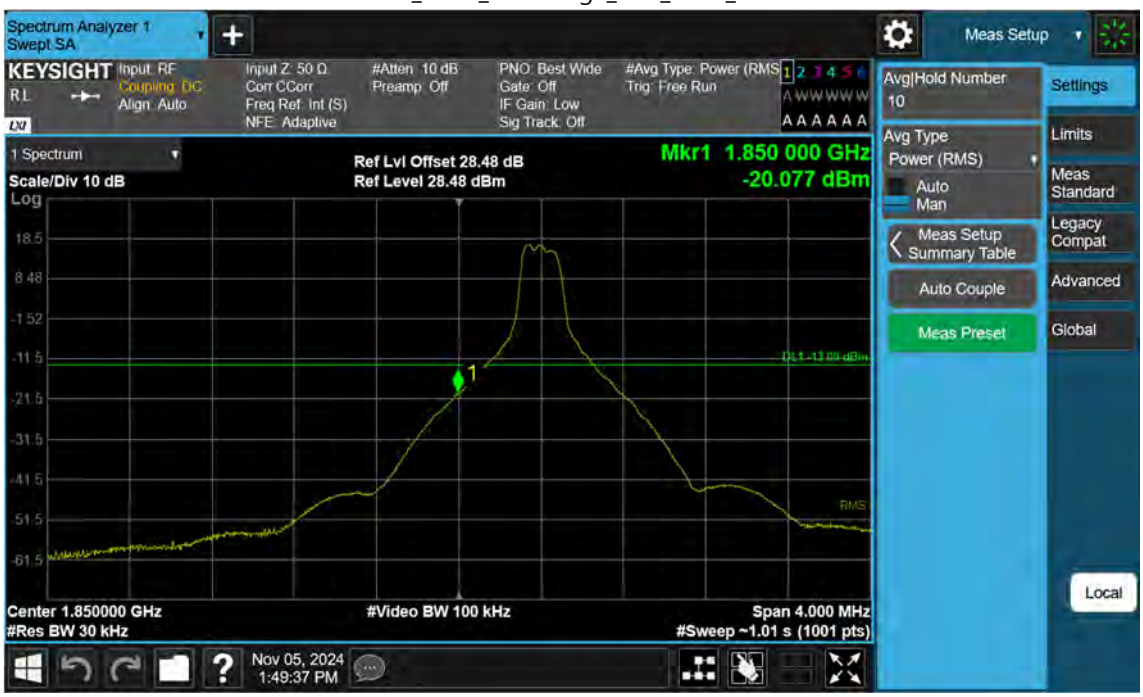


NR2_5 M_Band Edge_High_BPSK_FullRB

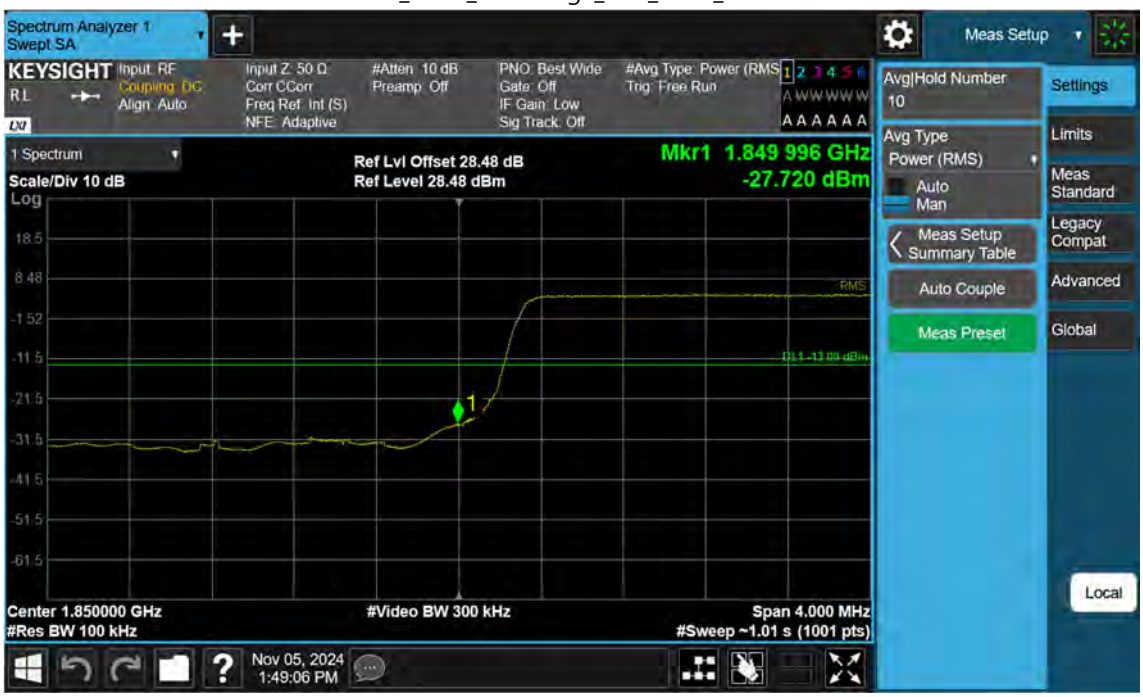


NR2_5 M_Extended Band Edge_High_BPSK_FullRB

NR2_10 M_Band Edge_Low_BPSK_1RB

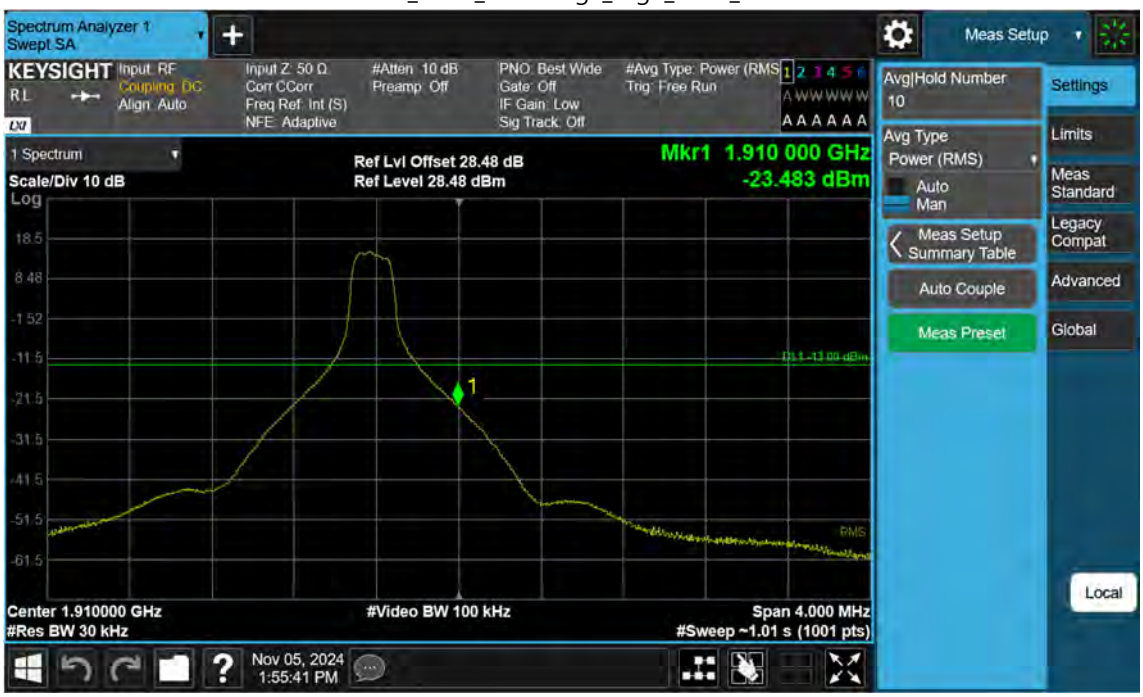


NR2_10 M_Band Edge_Low_BPSK_FullRB



NR2_10 M_Extended Band Edge_Low_BPSK_FullRB

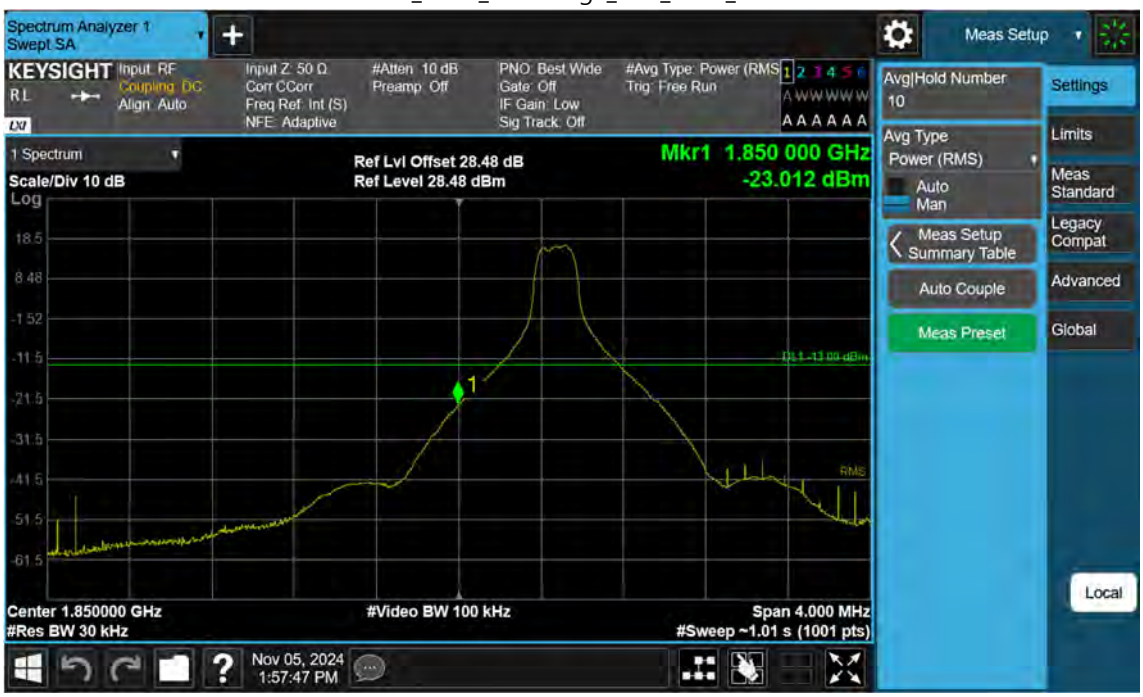
NR2_10 M_Band Edge_High_BPSK_1RB



NR2_10 M_Band Edge_High_BPSK_FullRB

NR2_10 M_Extended Band Edge_High_BPSK_FullRB

NR2_15 M_Band Edge_Low_BPSK_1RB



NR2_15 M_Band Edge_Low_BPSK_FullRB

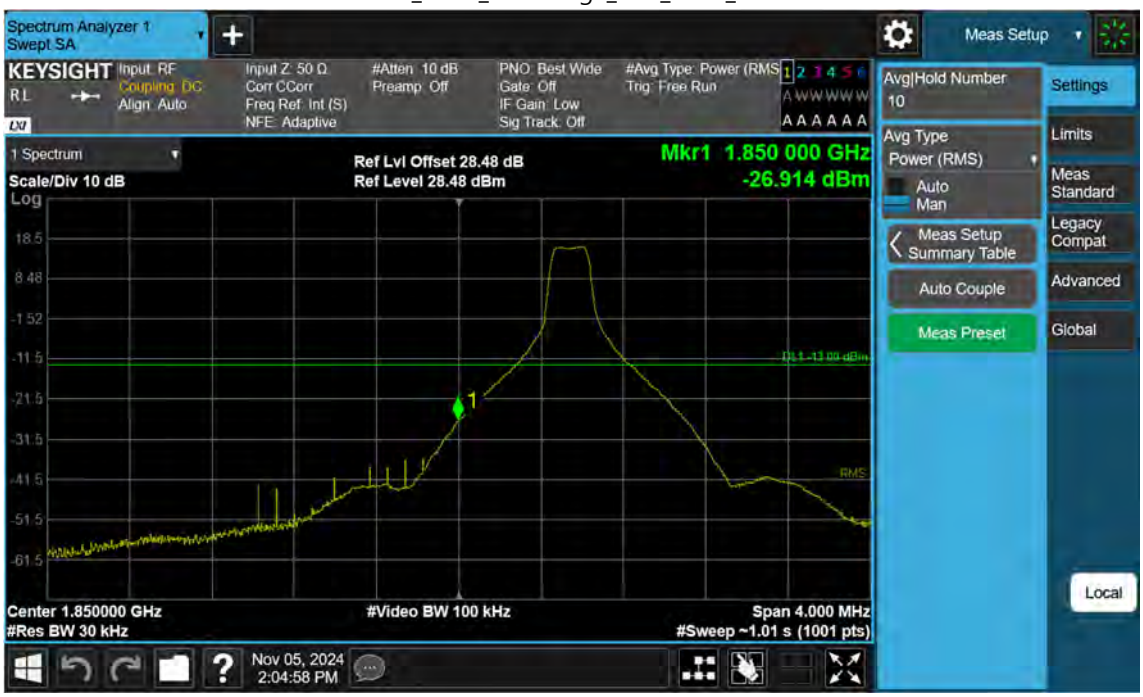
NR2_15 M_Extended Band Edge_Low_BPSK_FullRB

NR2_15 M_Band Edge_High_BPSK_1RB

NR2_15 M_Band Edge_High_BPSK_FullRB

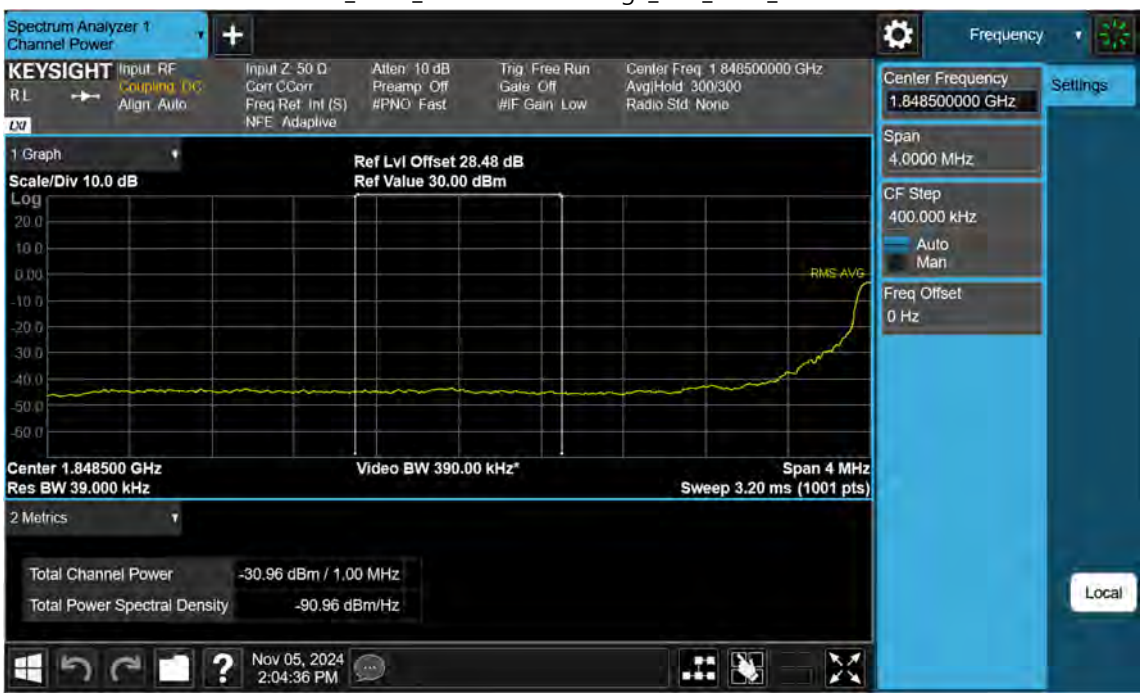
NR2_15 M_Extended Band Edge_High_BPSK_FullRB

NR2_20 M_Band Edge_Low_BPSK_1RB



NR2_20 M_Band Edge_Low_BPSK_FullRB

NR2_20 M_Extended Band Edge_Low_BPSK_FullRB



NR2_20 M_Band Edge_High_BPSK_1RB

NR2_20 M_Band Edge_High_BPSK_FullRB

NR2_20 M_Extended Band Edge_High_BPSK_FullRB

10. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2411-FC014-P