

TEST REPORT

FCC Sub6 n48 Test for TM19FNN4HD4
Certification

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2412-FC047

DATE OF ISSUE
December 13, 2024

Tested by
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Applicant

LG Electronics Inc.

128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Republic of Korea

Product Name

Telematics

Model Name

TM19FNNAHD4

Date of Test

September 30, 2024 ~ December 10, 2024

FCC ID

BEJTM19FNNAHD4

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 Classification:

PCS Licensed Transmitter (PCB)

Test Standard Used

FCC Rule Part: § 96

Test Results

PASS

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	December 13, 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).

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	LG Electronics Inc.
Address:	128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Republic of Korea
FCC ID:	BEJTM19FNNNAHD4
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§ 96
EUT Type:	Telematics
Model(s):	TM19FNNNAHD4
SCS(kHz):	30
Bandwidth(MHz):	20, 40
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:	3560.01 – 3690.00 : (Sub6 n48(20 MHz)) 3570.00 – 3679.98 : (Sub6 n48(40 MHz))
Date(s) of Tests:	September 30, 2024 ~ December 10, 2024
EUT Serial number:	Radiated : Honda MY26 #02 Conducted : Honda MY26 #01
External Antenna Information	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 n48 (20)	3560.01 – 3690.00	17M9G7D	PI/2 BPSK	0.144	21.57
		17M9G7D	QPSK	0.143	21.56
		17M9W7D	16QAM	0.115	20.60
		17M9W7D	64QAM	0.081	19.09
		17M9W7D	256QAM	0.052	17.12
Sub6 n48 (40)	3570.00 – 3679.98	35M8G7D	PI/2 BPSK	0.147	21.66
		35M8G7D	QPSK	0.145	21.61
		35M8W7D	16QAM	0.116	20.65
		35M8W7D	64QAM	0.083	19.17
		35M8W7D	256QAM	0.052	17.12

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

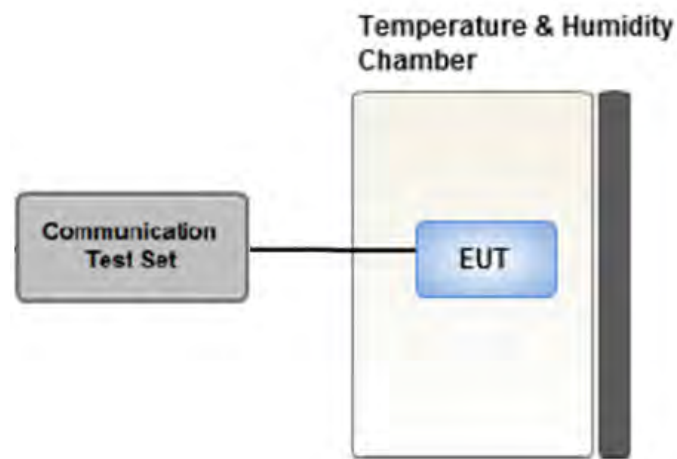
The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea**

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 $\geq$ 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;

$$P_d \text{ (dBm)} = P_g \text{ (dBm)} - \text{cable loss (dB)} + \text{antenna gain (dB)}$$

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 $\geq$ 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 10th 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;

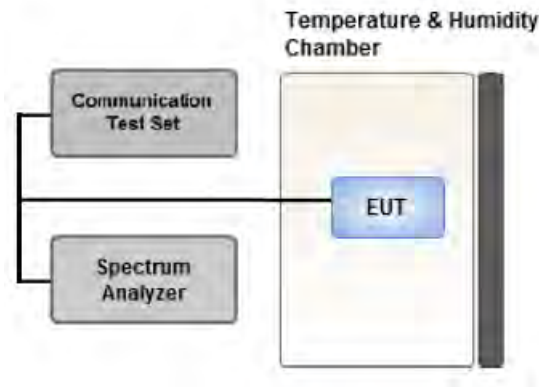
$$\text{Result}_{(\text{dBm})} = P_{\text{g}}_{(\text{dBm})} - \text{cable loss}_{(\text{dB})} + \text{antenna gain}_{(\text{dBi})}$$

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.

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

3.5 PEAK- TO- AVERAGE RATIO



Test setup

① CCDF Procedure for PAPR

Test Settings

1. Set resolution/measurement bandwidth $\geq$ 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:

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

Test Settings(Peak Power)

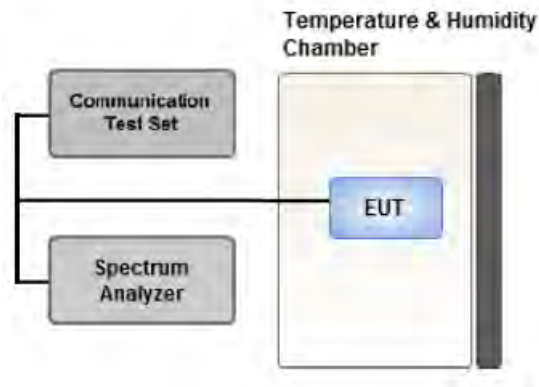
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW $\geq 3 \times$ RBW.

1. Set the RBW $\geq$ OBW.
2. Set VBW $\geq 3 \times$ RBW.
3. Set span $\geq 2 \times$ OBW.
4. Sweep time $\geq 10 \times$ (number of points in sweep) $\times$ (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 $2 \times$ to $3 \times$ the OBW.
2. Set RBW $\geq$ OBW.
3. Set VBW $\geq 3 \times$ RBW.
4. Set number of measurement points in sweep $\geq 2 \times$ span / RBW.
5. Sweep time:
Set $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$ 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 $[10 \log (1/\text{duty cycle})]$ to the measured maximum power level to compute the average power during continuous transmission. For example, add $[10 \log (1/0.25)] = 6 \text{ dB}$ 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.

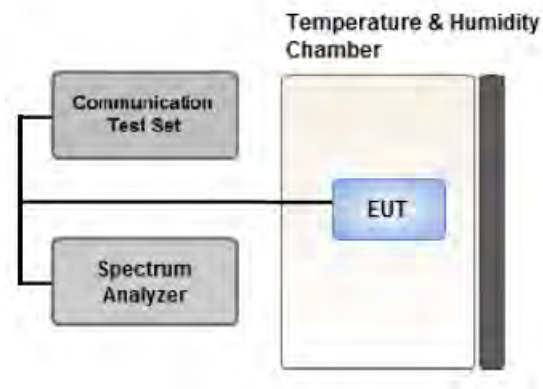
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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 $\geq$ 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

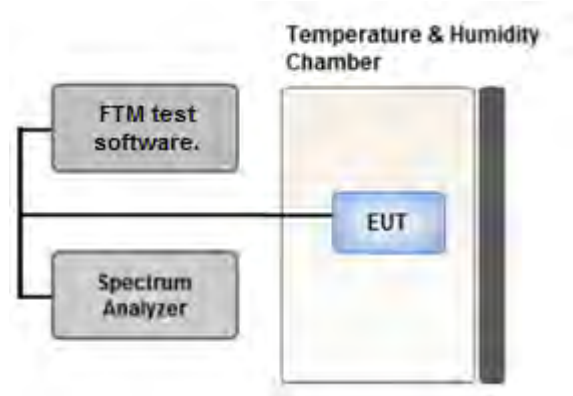
Test Overview

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 $\geq$ 3 MHz
3. Detector = RMS
4. Trace Mode = trace average
5. Sweep time > (number of points in sweep) $\times$ (symbol period)
6. Number of points in sweep $\geq$ 2 x Span / RBW

3.8 CHANNEL EDGE



Test setup

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. Within 1 MHz of the channel edge the RBW should be 2% of EBW, then 1 MHz after that.
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points $\geq 2 \times \text{Span/RBW}$
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

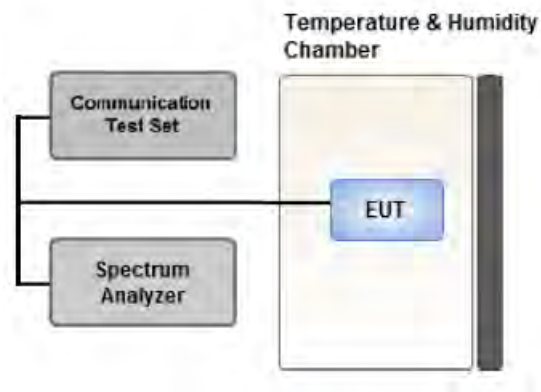
Test Notes

The conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed -25 dBm/MHz .

The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz

Where Margin < 1 dB the emission level is either corrected by $10 \log(1 \text{ MHz/RB})$ 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 Adjacent Channel Leakage Ratio



Test setup

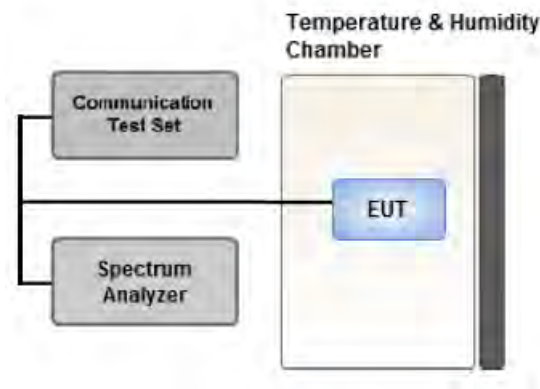
Test Settings

1. Use ACP measurement function of Spectrum analyzer to measure adjacent channel leakage ratio
2. Integral BW = Assigned channel bandwidth
5. Detector = RMS
6. Number of sweep points $\geq 2 \times \text{Span/RBW}$
7. Trace mode = trace average
8. Sweep time = 1 s
9. The trace was allowed to stabilize

Test Notes

the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

3.10 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.

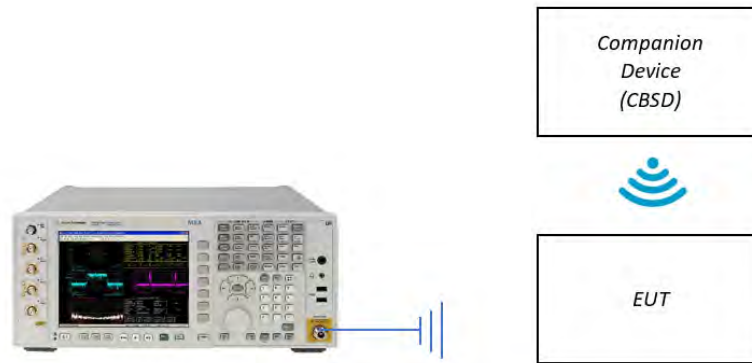
2. Primary Supply Voltage:

- .- 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.

3.11 End User Device Additional Requirement (CBSD Protocol)



Test setup

Test Overview

End user device additional requirements (CBSD Protocol) are tested per the test procedures listed below. During testing, the EUT is connected to a certified CBSD (FCC ID: PIDAS2900) as a companion device to show compliance with Part 96.47.

End User Devices may operate only if they can positively receive and decode an authorization signal transmitted by a CBSD, including the frequencies and power limits for their operation.

Test Channel & Power

1. Setup companion device with 3606.74 MHz – 3626.74 MHz(BW 20MHz) and power level 20 dBm
2. Setup companion device with 3614.99 MHz – 3634.99 MHz(BW 20MHz) and power level 20 dBm

Test Procedure

1. Enable AP service from companion device.
2. EUT is connected to a companion device.
3. Check EUT Tx frequency and power.
4. Disable AP service from companion device and check EUT stop transmission within 10 s.

3.12 WORST CASE(RADIATED TEST)

- Waveform : All Waveform of operation were investigated and the worst case configuration results are reported.
(Worst case: DFT-S-OFDM)
- 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
Worst case : Only External Antenna
- 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.

[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		Z
Radiated Spurious and Harmonic Emissions	PI/2 BPSK	See Section 8.3		X

3.13 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, Peak-To-Average Ratio	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	20, 40	Mid	Full RB	0
Channel Edge	PI/2 BPSK	20	Low	1	0
			High	1	50
		40	Low	1	0
			High	1	105
		20, 40	Low, Mid, High	Full RB	0
Spurious and Harmonic Emissions at Antenna Terminal	PI/2 BPSK	20, 40	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
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:

- Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
- 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 ($\pm$ 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, § 96.41(e)	■ -13 dBm/MHz at frequencies within 0-10 MHz of channel edge ■ -25 dBm/MHz at frequencies greater than 10 MHz above and below channel edge ■ -40 dBm/MHz at frequencies below 3530 MHz and above 3720 MHz	PASS
Adjacent Channel Leakage Ratio	§ 96.41(e)	At least 30 dB.	PASS
Conducted Output Power	§ 2.1046	N/A	PASS
Peak- to- Average Ratio	§ 96.41(g)	< 13 dB	PASS
Frequency stability / variation of ambient temperature	§ 2.1055,	Emission must remain in band	PASS

Note:

1. 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	§ 96.41(b)	23 dBm/10 MHz	PASS
Radiated Spurious and Harmonic Emissions	§ 2.1053, § 96.41(e)	-40 dBm/MHz	PASS
End User Device Additional Requirements (CBSD Protocol)	§ 96.47	End User Devices may operate only if they can positively receive and decode an authorization signal transmitted by a CBSD, including the frequencies and power limits for their operation. An End User Device must discontinue operations, change frequencies, or change its operational power level within 10 seconds of receiving instructions from its associated CBSD.	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

$$\text{ERP} = \text{Substitute LEVEL(dBm)} + \text{Ant. Gain} - \text{CL(Cable Loss)}$$

- 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

$$\text{EIRP} = \text{Substitute LEVEL(dBm)} + \text{Ant. Gain} - \text{CL(Cable Loss)}$$

- 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)		
						637334	641666	646000
						3560.01 MHz	3624.99 MHz	3690.00 MHz
20MHz	30	DFT-s	pi/2 BPSK	1	1	21.26	21.34	21.57
				1	26	21.17	21.19	21.35
				1	49	21.25	21.29	21.37
				25	0	20.78	20.86	20.98
				25	13	21.30	21.33	21.46
				25	26	20.82	20.81	20.94
				50	0	20.80	20.84	20.96
			QPSK	1	1	21.19	21.34	21.56
			16QAM	1	1	20.18	20.36	20.60
			64QAM	1	1	18.74	18.85	19.09
			256QAM	1	1	16.70	16.83	17.12
		CP	QPSK	1	1	19.77	19.89	20.12

Bandwidth	SCS(kHz)	OFDM	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
						638000	641666	645332
						3570.00 MHz	3624.99 MHz	3679.98 MHz
40MHz	30	DFT-s	pi/2 BPSK	1	1	21.48	21.60	21.66
				1	53	21.42	21.42	21.58
				1	104	21.44	21.46	21.50
				50	0	20.88	21.03	21.17
				50	28	21.50	21.47	21.60
				50	56	21.03	21.02	21.16
				100	0	21.01	21.04	21.09
			QPSK	1	1	21.38	21.61	21.61
			16QAM	1	1	20.40	20.63	20.65
			64QAM	1	1	18.91	19.13	19.17
			256QAM	1	1	16.87	17.09	17.12
		CP	QPSK	1	1	19.91	20.15	20.19

8.2 EQUIVALENT ISOTROPIC RADIATED POWER

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	RB	
								dBm/10MHz	dBm	Size	Offset
3560.01	Sub6 n48/ 20 MHz [30 kHz]	PI/2 BPSK	-27.25	11.40	12.05	3.09	H	23.00	20.36	1	1
		QPSK	-27.27	11.38	12.05	3.09	H		20.34		
		16-QAM	-27.28	11.37	12.05	3.09	H		20.33		
		64-QAM	-27.29	11.36	12.05	3.09	H		20.32		
		256-QAM	-27.31	11.34	12.05	3.09	H		20.30		
3624.99		PI/2 BPSK	-27.65	11.19	12.11	3.13	H		20.17	1	1
		QPSK	-27.74	11.10	12.11	3.13	H		20.08		
		16-QAM	-27.75	11.09	12.11	3.13	H		20.07		
		64-QAM	-27.78	11.06	12.11	3.13	H		20.04		
		256-QAM	-27.81	11.03	12.11	3.13	H		20.01		
3690.00	PI/2 BPSK	-29.18	9.44	12.09	3.08	H	18.45	1	1		
	QPSK	-29.20	9.42	12.09	3.08	H	18.43				
	16-QAM	-29.31	9.31	12.09	3.08	H	18.32				
	64-QAM	-29.32	9.30	12.09	3.08	H	18.31				
	256-QAM	-29.26	9.36	12.09	3.08	H	18.37				

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	RB	
								dBm/10MHz	dBm	Size	Offset
3570.00	Sub6 n48/ 40 MHz [30 kHz]	PI/2 BPSK	-27.10	11.50	12.06	3.09	H	23.00	20.47	1	1
		QPSK	-27.18	11.42	12.06	3.09	H		20.39		
		16-QAM	-27.18	11.42	12.06	3.09	H		20.39		
		64-QAM	-27.19	11.41	12.06	3.09	H		20.38		
		256-QAM	-27.16	11.44	12.06	3.09	H		20.41		
3624.99		PI/2 BPSK	-27.61	11.23	12.11	3.13	H		20.21	1	1
		QPSK	-27.64	11.20	12.11	3.13	H		20.18		
		16-QAM	-27.67	11.17	12.11	3.13	H		20.15		
		64-QAM	-27.66	11.18	12.11	3.13	H		20.16		
		256-QAM	-27.69	11.15	12.11	3.13	H		20.13		
3679.98	PI/2 BPSK	-29.26	9.45	12.10	3.11	H	18.44	1	1		
	QPSK	-29.27	9.44	12.10	3.11	H	18.43				
	16-QAM	-29.31	9.40	12.10	3.11	H	18.39				
	64-QAM	-29.32	9.39	12.10	3.11	H	18.38				
	256-QAM	-29.34	9.37	12.10	3.11	H	18.36				

8.3 RADIATED SPURIOUS EMISSIONS

NR Band:	<u>N48</u>
Bandwidth:	<u>20 MHz</u>
Modulation:	<u>PI/2 BPSK</u>
Distance:	<u>1 meters</u>
SCS:	<u>30 kHz</u>

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit (dBm)	RB	
									Size	Offset
637334 (3560.01)	7 120.02	-64.03	10.77	-56.26	4.46	H	-49.95	-40.00	1	1
	10 680.03	-64.14	11.57	-52.12	5.71	V	-46.26	-40.00		
	14 240.04	-59.54	12.95	-51.28	6.54	V	-44.87	-40.00		
641666 (3624.99)	7 249.98	-63.92	10.58	-55.52	4.53	V	-49.47	-40.00	1	1
	10 874.97	-64.84	11.73	-53.84	5.82	V	-47.93	-40.00		
	14 499.96	-57.04	13.20	-50.14	6.69	H	-43.63	-40.00		
646000 (3690.00)	7 380.00	-64.31	11.07	-56.76	4.61	V	-50.30	-40.00	1	1
	11 070.00	-65.47	12.12	-53.67	5.79	H	-47.34	-40.00		
	14 760.00	-58.24	13.47	-51.67	6.71	H	-44.91	-40.00		

■ NR Band: N48
 ■ Bandwidth: 40 MHz
 ■ Modulation: PI/2 BPSK
 ■ Distance: 1 meters
 ■ SCS: 30 kHz

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit (dBm)	RB	
									Size	Offset
638000 (3570.00)	7 140.00	-63.80	10.71	-56.20	4.48	H	-49.97	-40.00	1	1
	10 710.00	-65.69	11.57	-54.24	5.65	H	-48.32	-40.00		
	14 280.00	-60.21	13.04	-51.76	6.57	H	-45.29	-40.00		
641666 (3624.99)	7 249.98	-65.12	10.58	-56.72	4.53	H	-50.67	-40.00	1	1
	10 874.97	-64.34	11.73	-53.34	5.82	H	-47.43	-40.00		
	14 499.96	-58.39	13.20	-51.49	6.69	H	-44.98	-40.00		
645332 (3679.98)	7 359.96	-64.14	11.00	-56.13	4.59	H	-49.72	-40.00	1	1
	11 039.94	-65.03	12.11	-52.64	5.73	H	-46.26	-40.00		
	14 719.92	-58.68	13.36	-51.63	6.71	H	-44.98	-40.00		

8.4 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
Sub6 n48	20 MHz	3624.99	BPSK	50	0	4.64
			QPSK			5.71
			16-QAM			6.46
			64-QAM			6.66
			256-QAM			6.70
	40 MHz		BPSK	100		4.90
			QPSK			5.47
			16-QAM			6.33
			64-QAM			6.58
			256-QAM			6.59

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 55 ~ 64.

8.5 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
Sub6 n48	20 MHz	3624.99	BPSK	50	0	17.937
			QPSK			17.913
			16-QAM			17.911
			64-QAM			17.924
			256-QAM			17.932
	40 MHz		BPSK	100		35.755
			QPSK			35.791
			16-QAM			35.797
			64-QAM			35.830
			256-QAM			35.840

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 45 ~ 54.

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 n48	20	3560.01	8.8604	37.805	-81.384	-43.579	-40
		3624.99	8.2711	37.805	-81.816	-44.011	
		3690.00	8.2796	37.805	-81.730	-43.925	
	40	3570.00	3.5142	37.190	-80.104	-42.914	
		3624.99	8.2567	37.805	-81.961	-44.156	
		3679.98	8.2945	37.805	-82.177	-44.372	

Note:

- Plots of the EUT's Conducted Spurious Emissions are shown Page 93 ~ 104.
- Factor(dB) = Cable Loss + Ext. Attenuator + Power Splitter + Duty Cycle factor
- Result(dBm) = Reading + Factor

3. Factor(dB)

Frequency Range (GHz)	Factor [dB]
0.03 – 1	34.484
1 – 5	37.190
5 – 10	37.805
10 – 15	38.330
15 – 20	38.703
Above 20	39.345

8.7 CHANNEL EDGE

BW (MHz)	RB (Size/ Offset)	Freq. (MHz)	Outside of the authorized band (dBm)							
			Lower Side(MHz)				Upper Side(MHz)			
			Below 3530 MHz	-[B]MHz ~ 3530 MHz	-1 MHz ~ -[B]MHz	0 MHz ~ -1 MHz	0 MHz ~ +1 MHz	1 MHz ~ +[B]MHz	+ [B]MHz ~ 3720 MHz	Above 3720 MHz
20	50/0	3560.01	-47.22	-44.41	-37.03	-35.76	-42.39	-38.46	-41.83	—
		3624.99	—	-45.12	-35.90	-36.24	-39.86	-35.57	-40.07	—
		3690.00	—	-43.28	-36.87	-36.67	-38.72	-32.98	-36.14	-41.18
40	100/0	3570.00	-46.63	-44.97	-40.96	-39.22	-44.35	-39.07	-47.36	—
		3624.99	—	-47.62	-40.60	-39.10	-42.10	-37.16	-42.57	—
		3679.98	—	-46.91	-39.08	-38.56	-45.55	-37.10	-36.62	-42.70
Limit (dBm)			-40.00	-25.00	-13.00	-13.00	-13.00	-13.00	-25.00	-40.00

Note:

1. C.E = Channel Edge
2. Plots of the EUT's Channel Edge are shown 71 ~ 92.
3. Duty Cycle factor already applied on the factor.
 - Duty Cycle Factor(dB) = 6.99
 - Factor(dB) = Duty Cycle factor + Cable Loss + Ext. Attenuator
 - Result(dBm) = Reading + Factor

BW (MHz)	RB (Size/ Offset)	Freq. (MHz)	Outside of the authorized band (dBm)							
			Lower Side(MHz)				Upper Side(MHz)			
			Below 3530 MHz	-[B]MHz ~ 3530 MHz	-1 MHz ~ -[B]MHz	0 MHz ~ -1 MHz	0 MHz ~ +1 MHz	1 MHz ~ +[B]MHz	+ [B]MHz ~ 3720 MHz	Above 3720 MHz
20	Lower Side: 1/0 Upper Side: 1/50	3560.01	-53.46	-43.73	-29.81	-30.37	-30.31	-31.00	-50.86	—
		3624.99	—	-52.43	-31.65	-30.89	-28.52	-30.32	-53.00	—
		3690.00	—	-53.14	-30.50	-28.63	-30.03	-31.92	-45.84	-50.58
40	Lower Side: 1/0 Upper Side: 1/105	3570.00	-45.16	-45.93	-33.97	-30.17	-32.75	-35.87	-54.05	—
		3624.99	—	-56.09	-34.83	-32.22	-34.22	-35.60	-52.26	—
		3679.98	—	-52.72	-34.03	-32.39	-35.88	-34.58	-42.37	-44.60
Limit (dBm)			-40.00	-25.00	-13.00	-13.00	-13.00	-13.00	-25.00	-40.00

Note:

1. C.E = Channel Edge
2. Plots of the EUT's Channel Edge are shown Page 71 ~ 92.
3. Duty Cycle factor already applied on the factor.
 - Duty Cycle Factor(dB) = 6.99
 - Factor(dB) = Duty Cycle factor + Cable Loss + Ext. Attenuator
 - Result(dBm) = Reading + Factor

8.8 Adjacent Channel Leakage Ratio(ACLR)

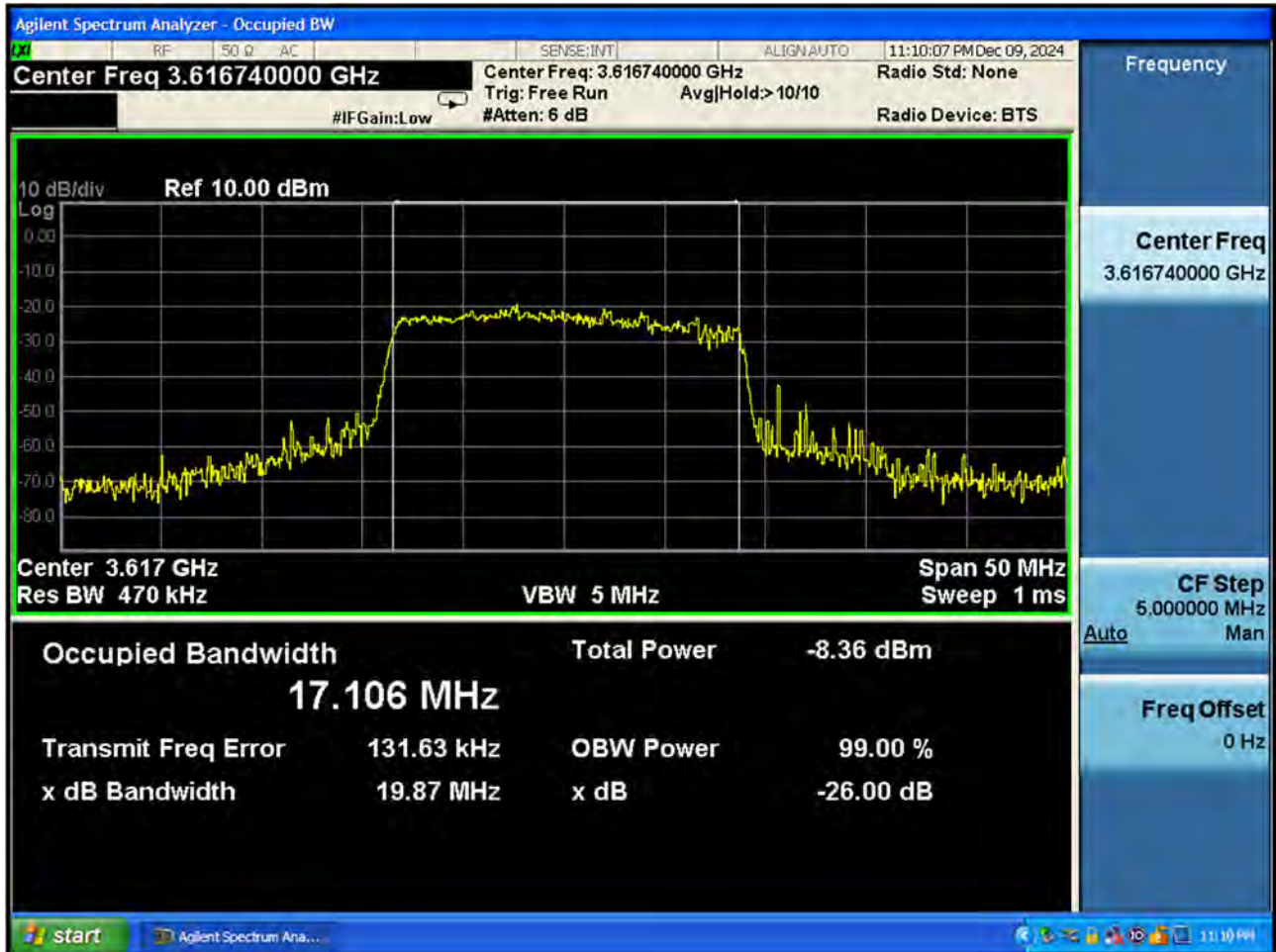
Band Width	RB (Size/ Offset)	Frequency (MHz)	Adjacent Channel Leakage Ratio(dB)	
			Lower Side	Upper Side
20 MHz	50/0	3560.01	48.27	48.62
		3624.99	47.76	48.17
		3690.00	48.84	48.74
40 MHz	100/0	3570.00	38.56	46.59
		3624.99	38.55	46.49
		3679.98	39.87	47.74
Limit (dB)			ACLR > 30dB	ACLR > 30dB

Note:

- Duty Cycle factor already applied on the factor.
 - Factor(dB) = Duty Cycle factor + Cable Loss + Ext. Attenuator + Power Splitter
 - Result(dBm) = Reading + Factor
 - Duty Cycle Factor(dB) = 6.990
- Plots of the EUT's Adjacent Channel Leakage Ratio(ACLR) are shown Page 65 ~ 70.

8.9 End User Device Additional Requirement (CBSD Protocol)

Test#1: 3616.74 MHz(BW: 20 MHz)



Stop Operation Within 10 s



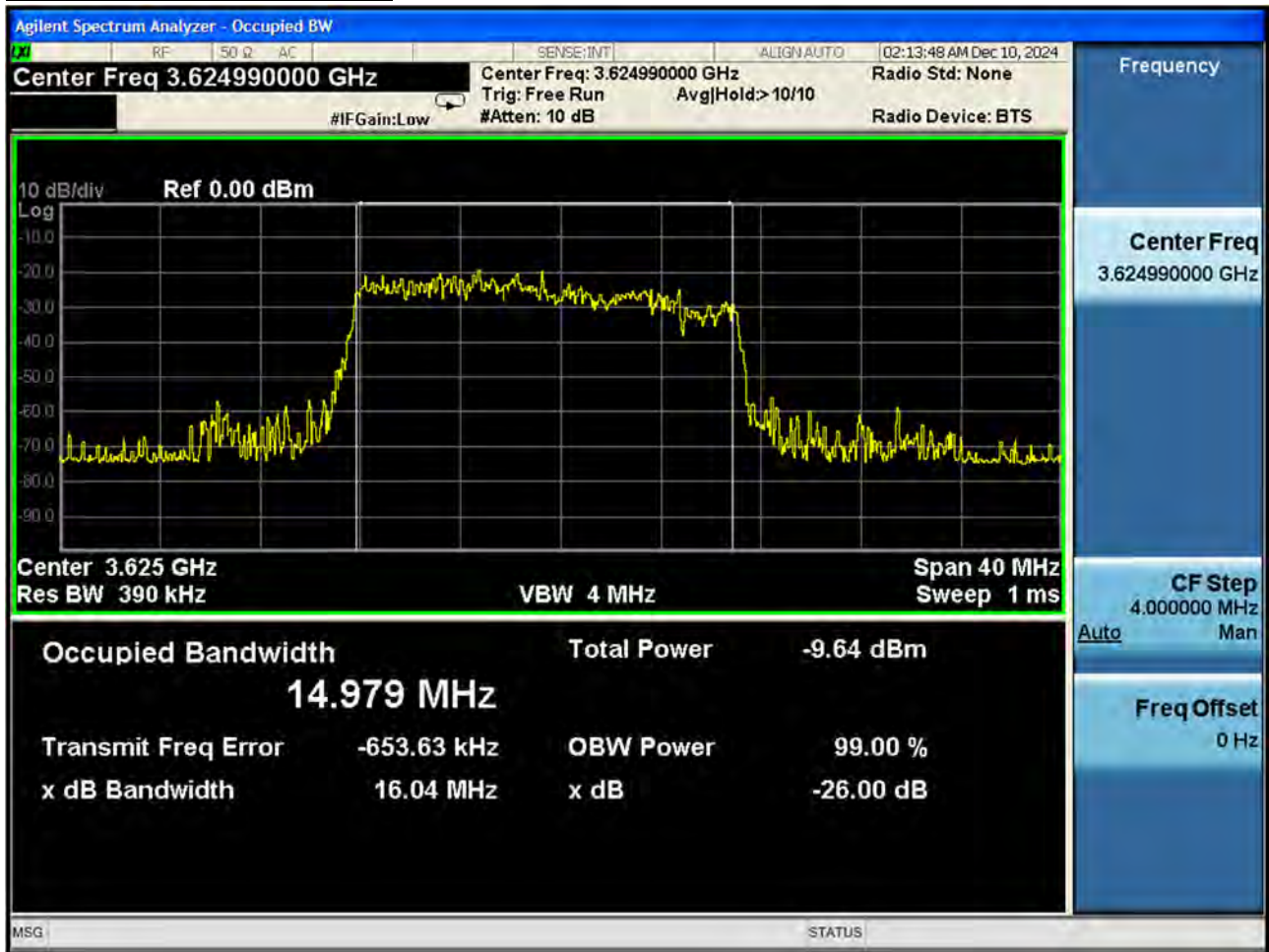
Note:

Marker 2: CBSD sends instructions to discontinue NR n48 operations.

Marker 1△2: EUT discontinues operation. (1.560 s)

Marker 3△4: 10 seconds elapsed time from CBSD sending instructions to EUT.(10.0 s)

Test#2: 3624.99 MHz(BW: 20 MHz)



Stop Operation Within 10 s



Note:

Marker 2: CBSD sends instructions to discontinue NR n48 operations.

Marker 1Δ2: EUT discontinues operation. (0.30 s)

Marker 3Δ4: 10 seconds elapsed time from CBSD sending instructions to EUT(10.0 s).

8.10 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

- ▣ BandWidth: 20 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.300 VDC
- ▣ LIMIT: Emission must remain in band

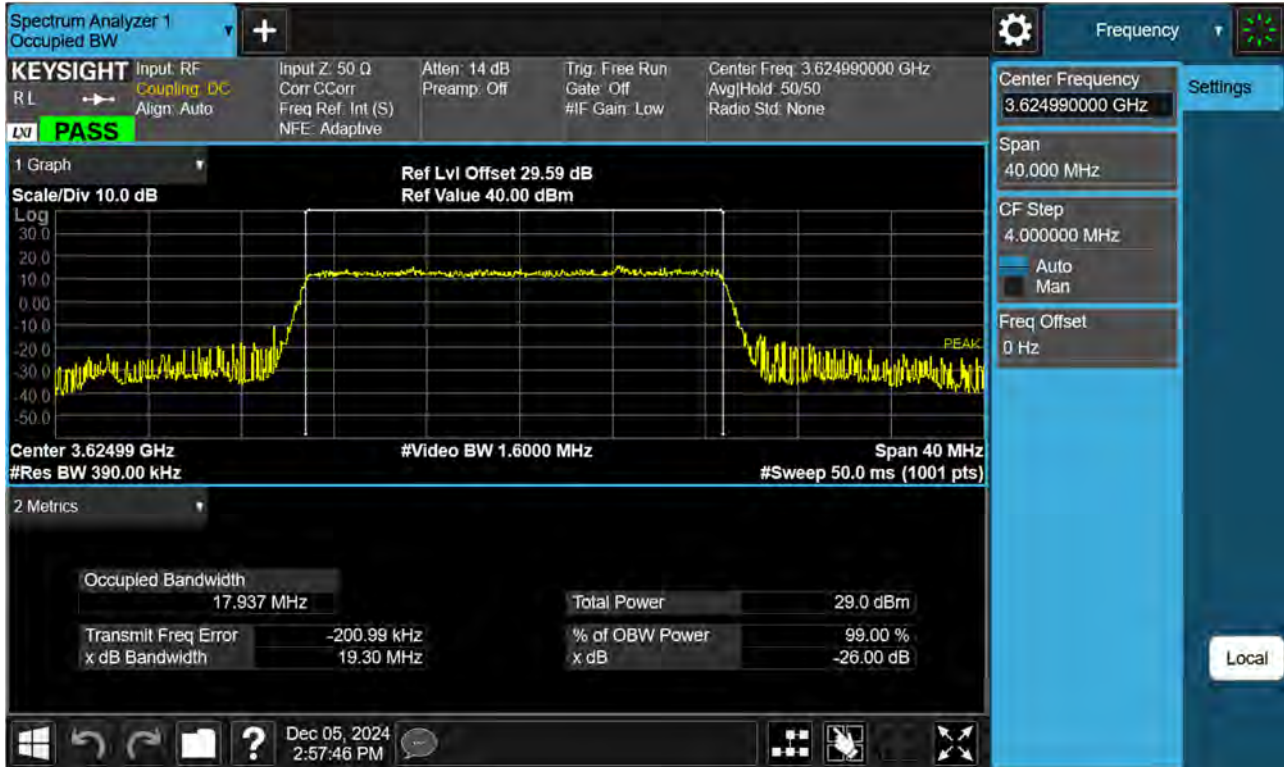
Test. Frequency	Voltage	Temp.	Frequency	Frequency Error	Deviation	ppm
(MHz)	(%)	(°C)	(Hz)	(Hz)	(%)	
3560.010	100 %	+20(Ref)	3560 009 970	0.0	0.000 000	0.000
	100 %	-30	3560 009 941	-29.7	-0.000 001	-0.008
	100 %	-20	3560 009 944	-26.5	-0.000 001	-0.007
	100 %	-10	3560 009 946	-24.3	-0.000 001	-0.007
	100 %	0	3560 009 949	-21.7	-0.000 001	-0.006
	100 %	+10	3560 009 949	-21.3	-0.000 001	-0.006
	100 %	+30	3560 009 948	-22.7	-0.000 001	-0.006
	100 %	+40	3560 009 933	-37.4	-0.000 001	-0.010
	100 %	+50	3560 009 950	-20.3	-0.000 001	-0.006
	Batt. Endpoint	+20	3560 009 937	-33.9	-0.000 001	-0.010
3690.000	100 %	+20(Ref)	3689 999 959	0.0	0.000 000	0.000
	100 %	-30	3689 999 919	-39.8	-0.000 001	-0.011
	100 %	-20	3689 999 940	-18.7	-0.000 001	-0.005
	100 %	-10	3689 999 917	-41.2	-0.000 001	-0.011
	100 %	0	3689 999 919	-39.6	-0.000 001	-0.011
	100 %	+10	3689 999 918	-40.5	-0.000 001	-0.011
	100 %	+30	3689 999 920	-38.2	-0.000 001	-0.010
	100 %	+40	3689 999 920	-38.2	-0.000 001	-0.010
	100 %	+50	3689 999 943	-15.6	0.000 000	-0.004
	Batt. Endpoint	+20	3689 999 922	-36.4	-0.000 001	-0.010

- ▣ BandWidth: 40 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.300 VDC
- ▣ LIMIT: Emission must remain in band

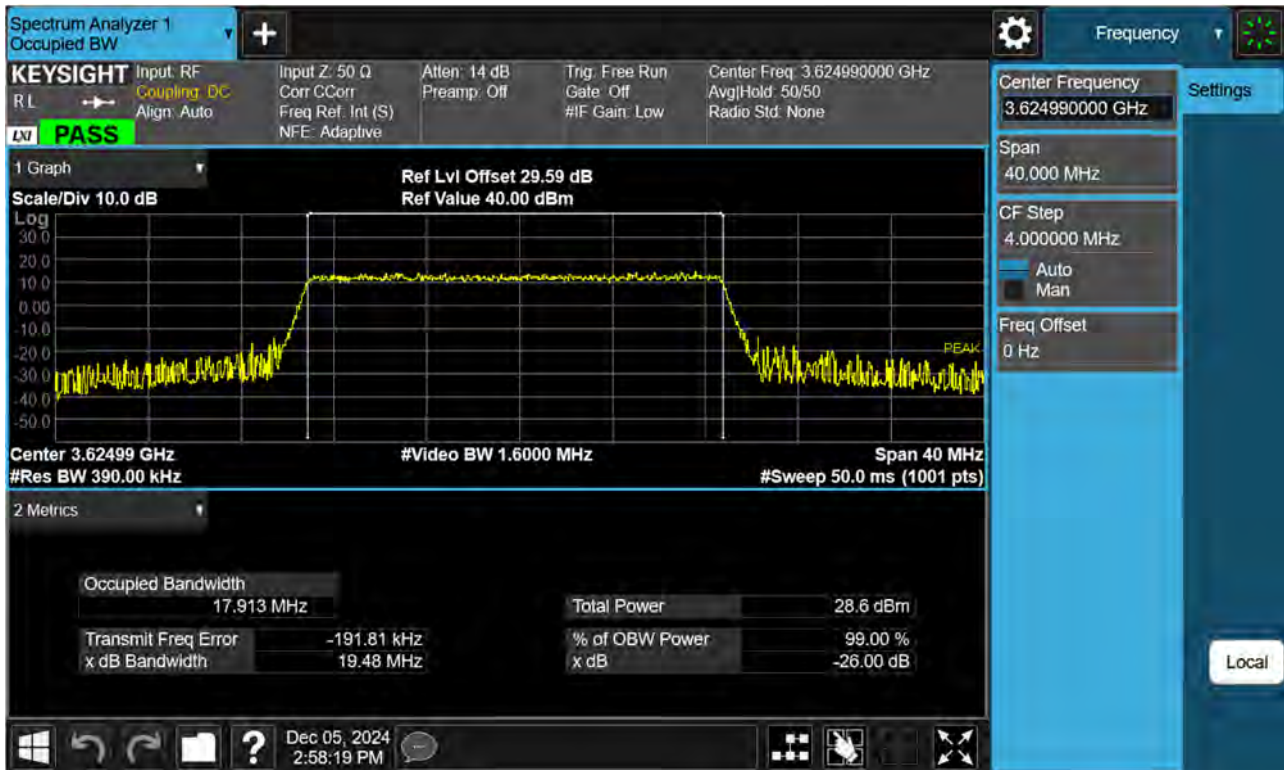
Test. Frequency	Voltage	Temp.	Frequency	Frequency Error	Deviation	ppm
(MHz)	(%)	(°C)	(Hz)	(Hz)	(%)	
3570.000	100 %	+20(Ref)	3569 999 966	0.0	0.000 000	0.000
	100 %	-30	3569 999 934	-31.8	-0.000 001	-0.009
	100 %	-20	3569 999 931	-34.9	-0.000 001	-0.010
	100 %	-10	3569 999 953	-12.9	0.000 000	-0.004
	100 %	0	3569 999 930	-35.6	-0.000 001	-0.010
	100 %	+10	3569 999 953	-12.7	0.000 000	-0.004
	100 %	+30	3569 999 928	-37.7	-0.000 001	-0.011
	100 %	+40	3569 999 947	-18.5	-0.000 001	-0.005
	100 %	+50	3569 999 949	-17.4	0.000 000	-0.005
	Batt. Endpoint	+20	3569 999 947	-18.9	-0.000 001	-0.005
3679.980	100 %	+20(Ref)	3679 979 982	0.0	0.000 000	0.000
	100 %	-30	3679 979 944	-38.1	-0.000 001	-0.010
	100 %	-20	3679 979 965	-17.4	0.000 000	-0.005
	100 %	-10	3679 979 964	-18.0	0.000 000	-0.005
	100 %	0	3679 979 966	-16.4	0.000 000	-0.004
	100 %	+10	3679 979 966	-16.1	0.000 000	-0.004
	100 %	+30	3679 979 963	-18.8	-0.000 001	-0.005
	100 %	+40	3679 979 964	-17.7	0.000 000	-0.005
	100 %	+50	3679 979 963	-19.3	-0.000 001	-0.005
	Batt. Endpoint	+20	3679 979 963	-18.8	-0.000 001	-0.005

9. TEST PLOTS

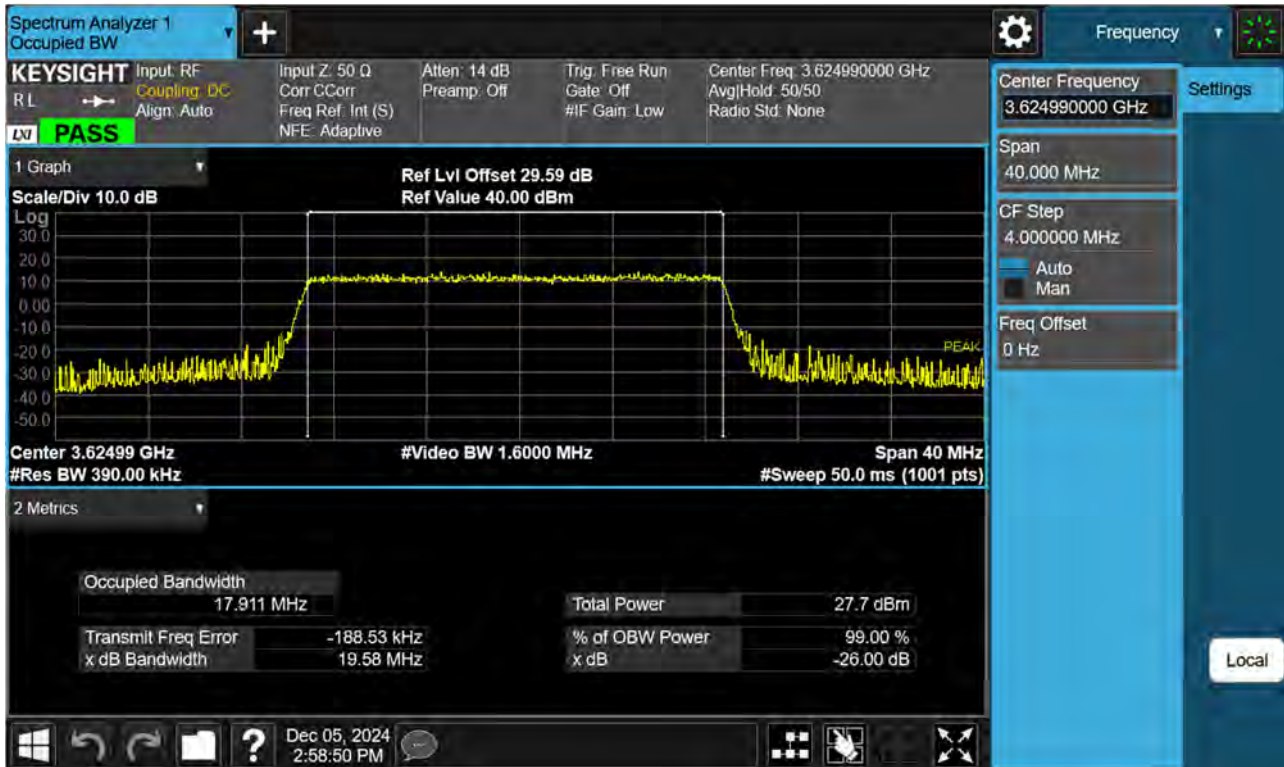
Sub6 n48. Occupied Bandwidth Plot (20 MHz Ch. 641666 BPSK RB 50)



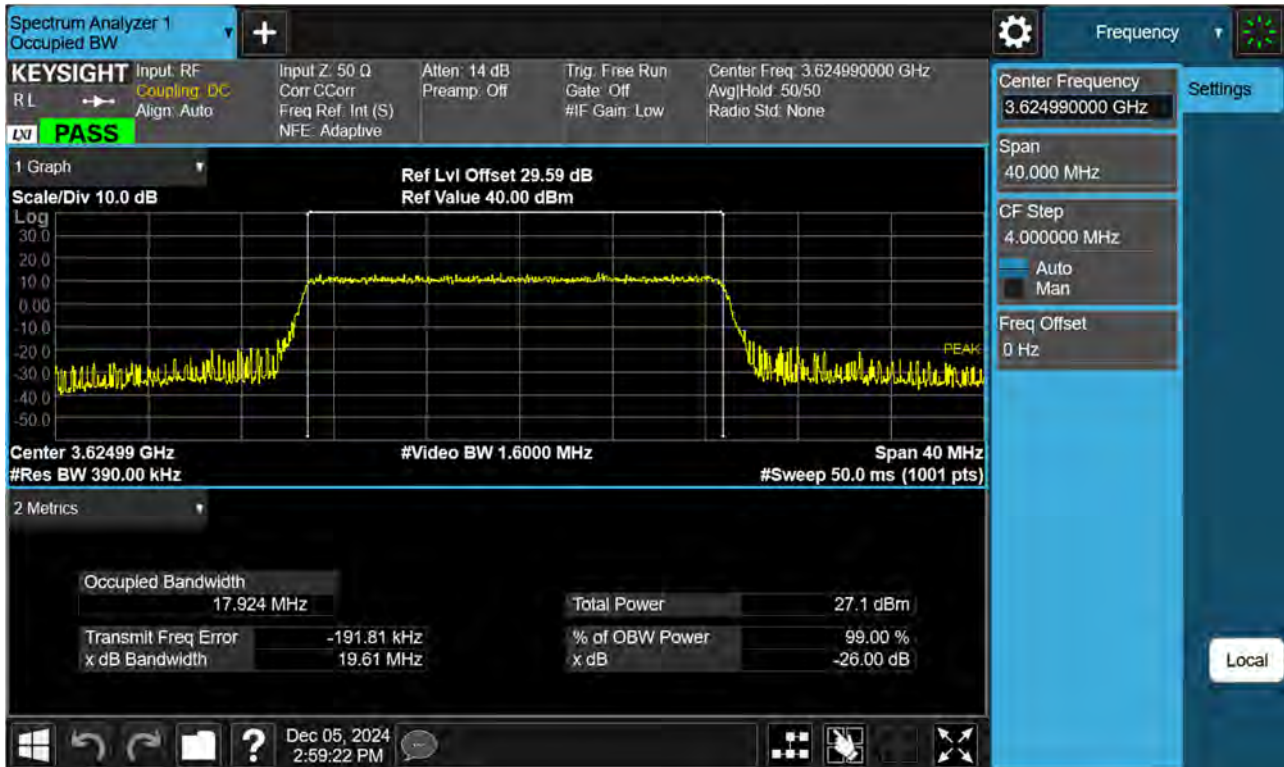
Sub6 n48. Occupied Bandwidth Plot (20 MHz Ch. 641666 QPSK RB 50)



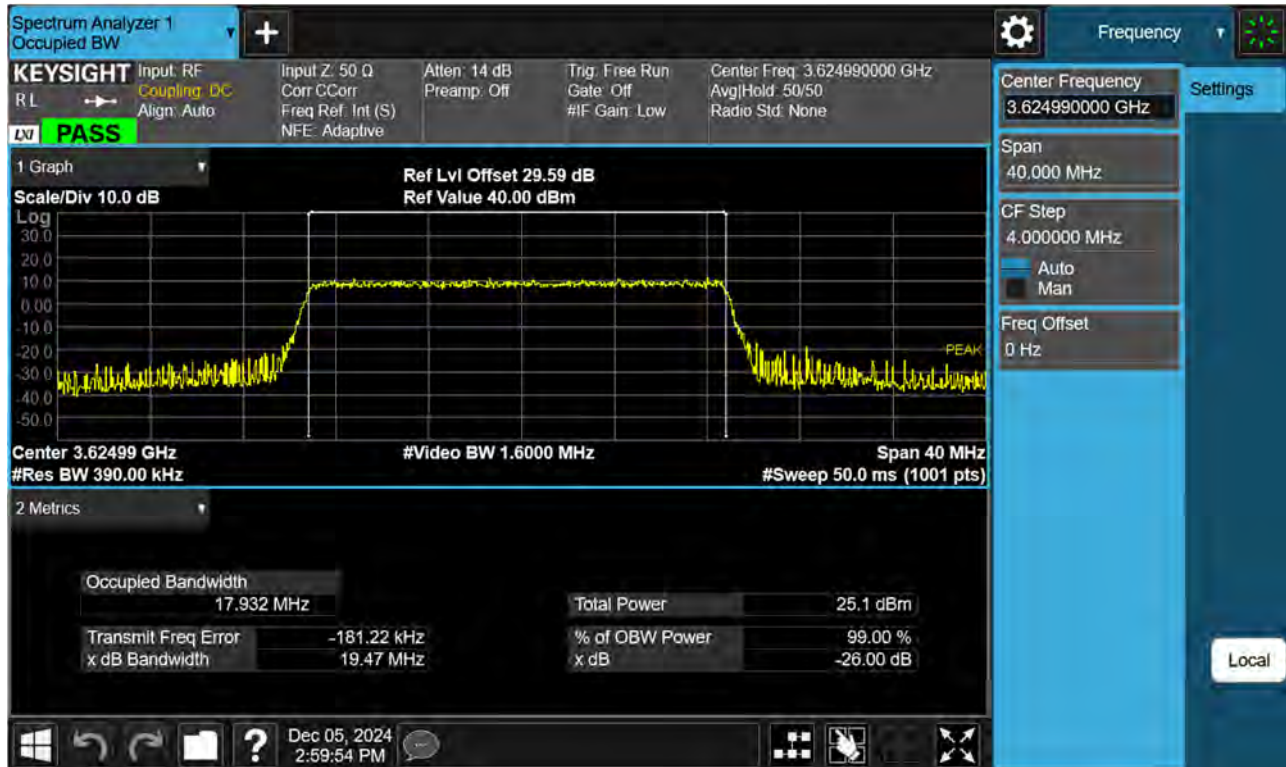
Sub6 n48. Occupied Bandwidth Plot (20 MHz Ch.641666 16-QAM RB 50)



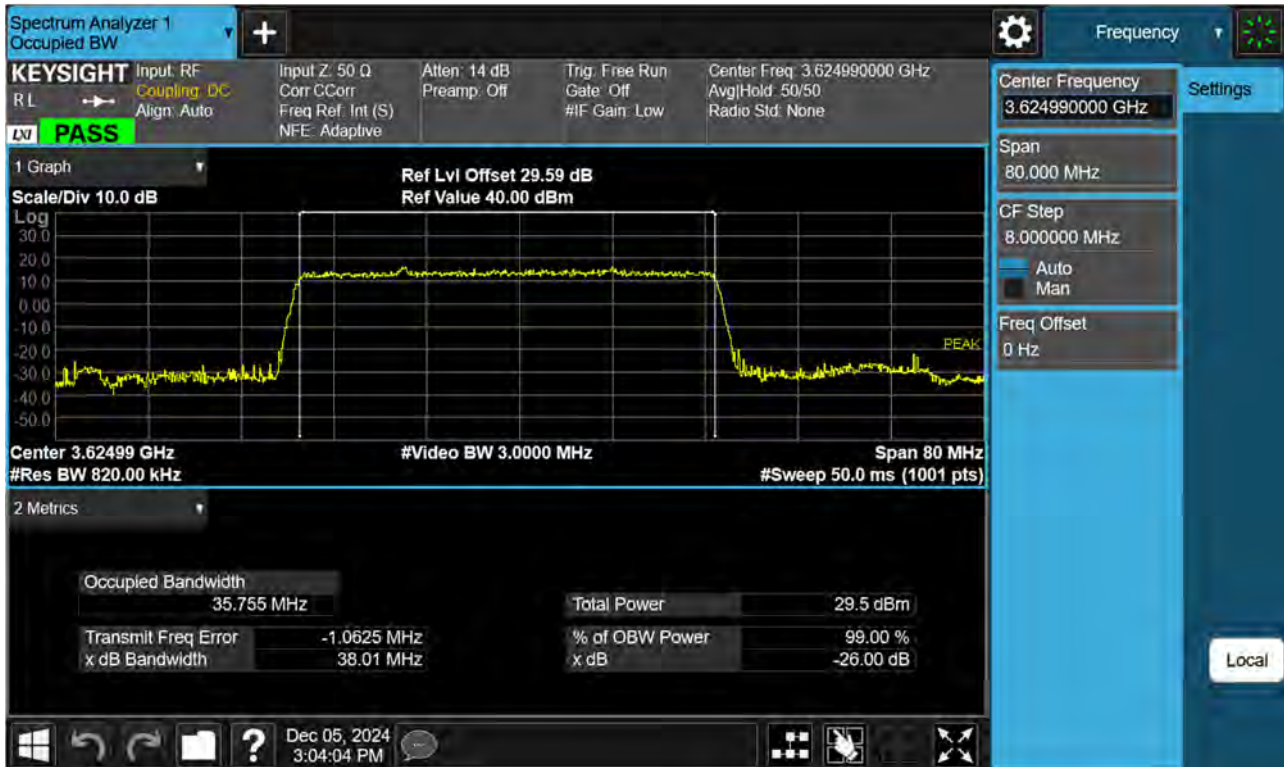
Sub6 n48. Occupied Bandwidth Plot (20 MHz Ch.641666 64-QAM RB 50)



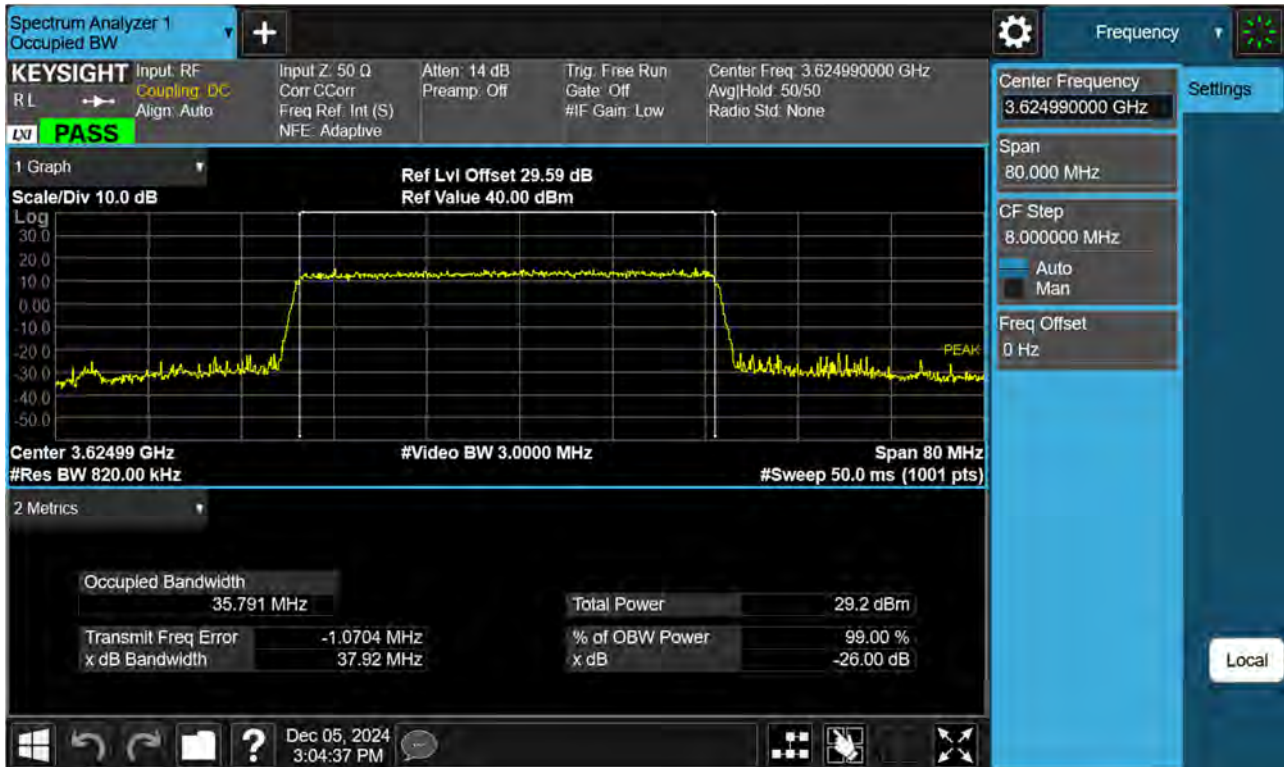
Sub6 n48. Occupied Bandwidth Plot (20 MHz Ch.641666 256-QAM RB 50)



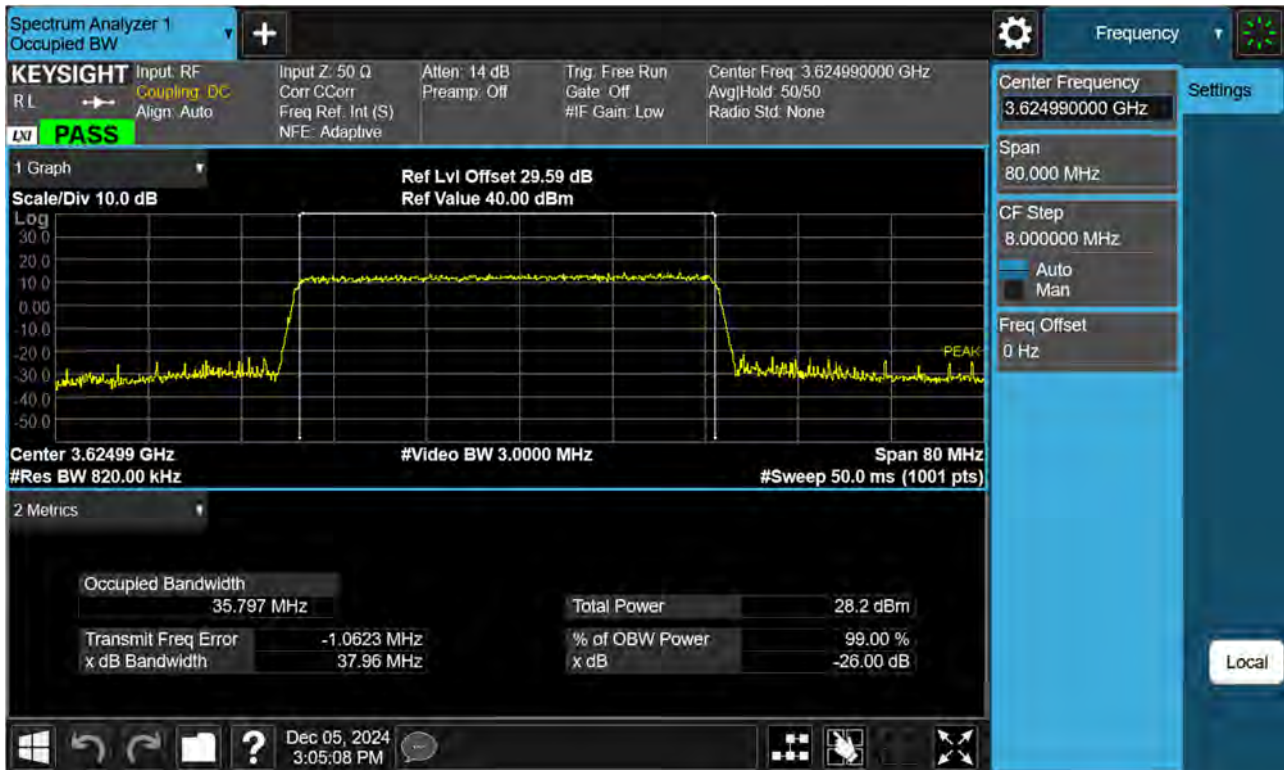
Sub6 n48. Occupied Bandwidth Plot (40 MHz Ch. 641666 BPSK RB 100)



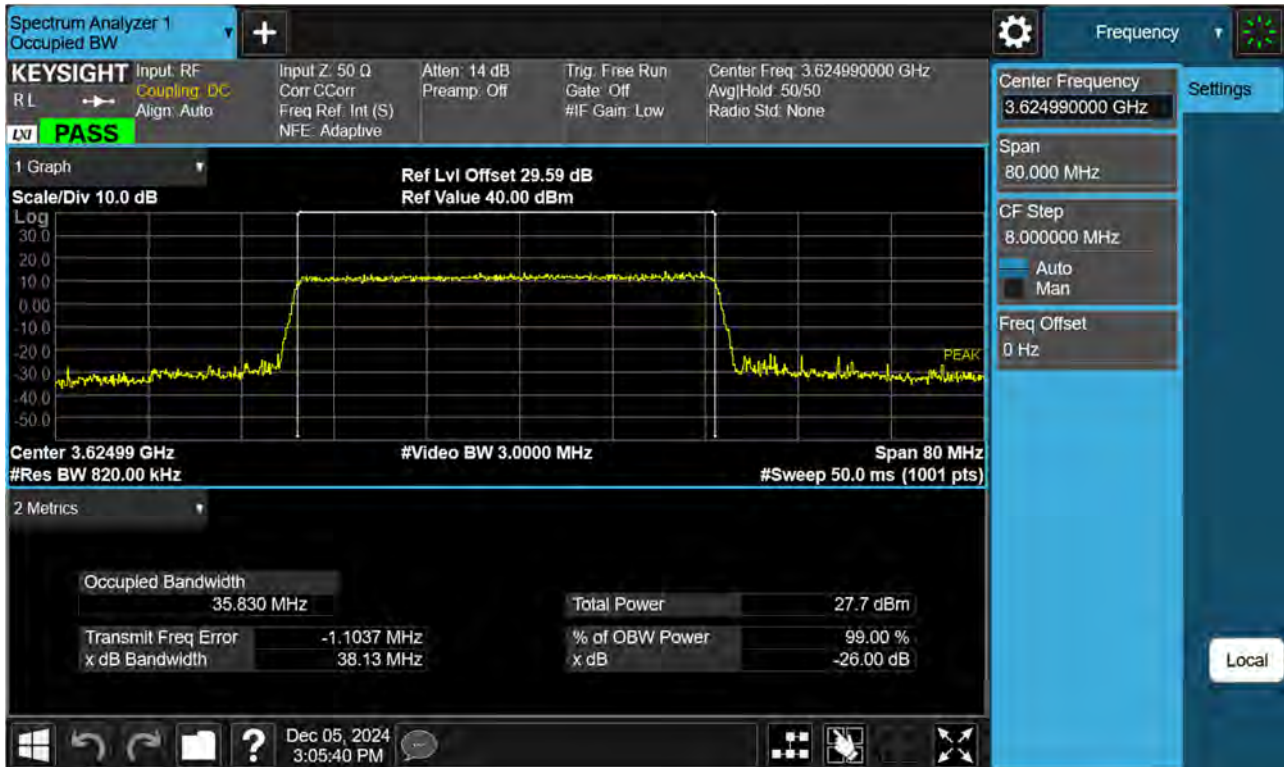
Sub6 n48. Occupied Bandwidth Plot (40 MHz Ch. 641666 QPSK RB 100)



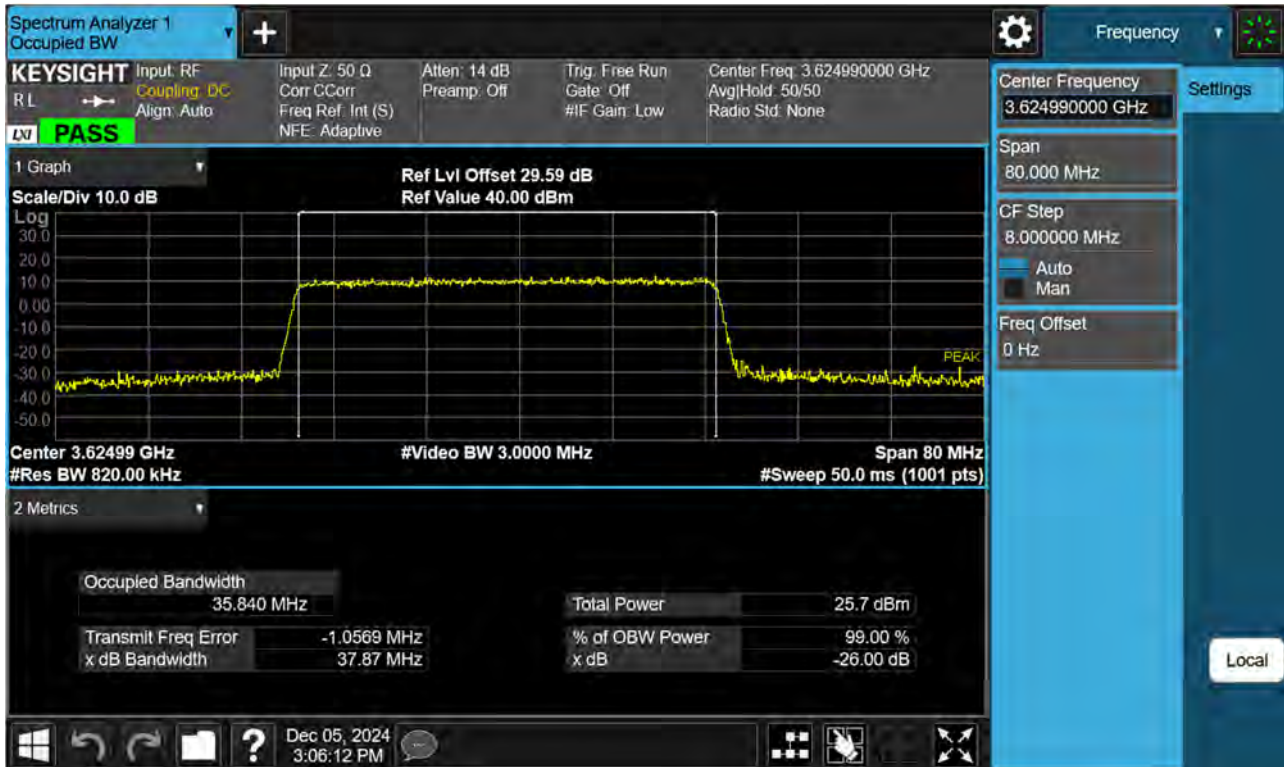
Sub6 n48. Occupied Bandwidth Plot (40 MHz Ch.641666 16-QAM RB 100)



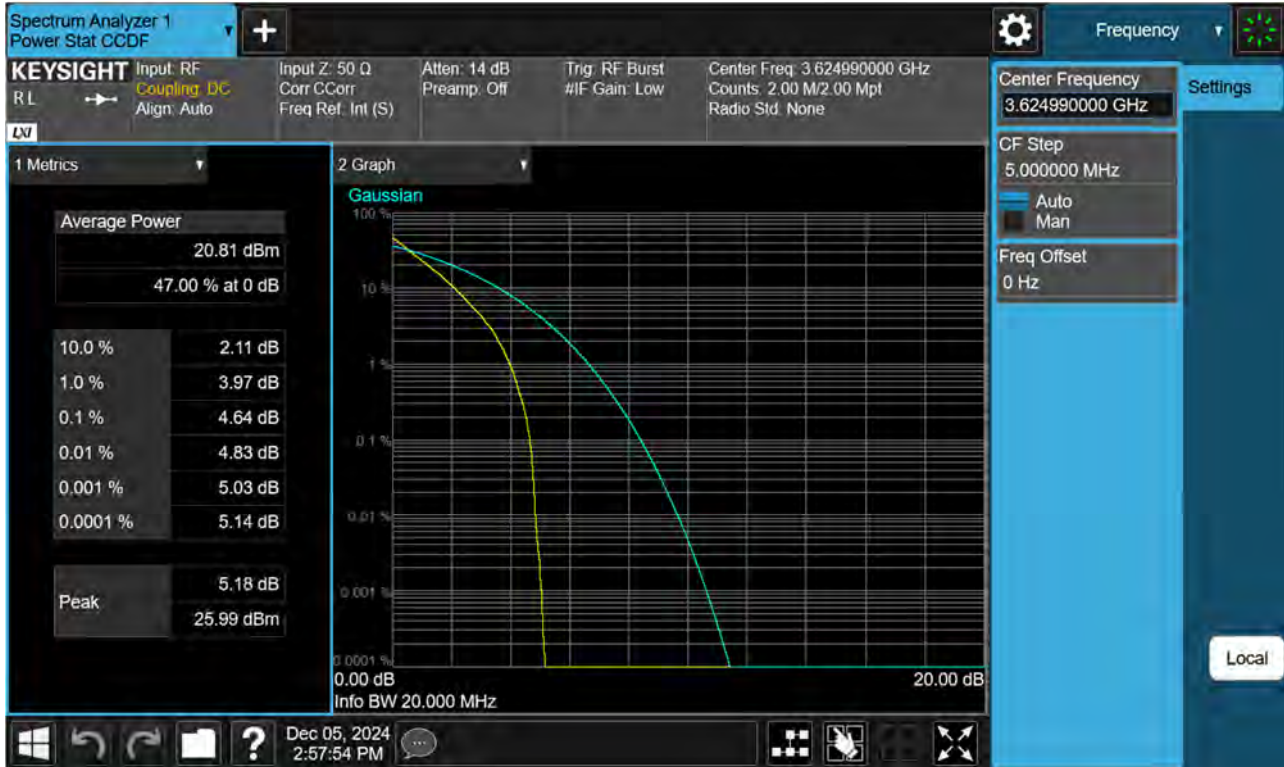
Sub6 n48. Occupied Bandwidth Plot (40 MHz Ch.641666 64-QAM RB 100)



Sub6 n48. Occupied Bandwidth Plot (40 MHz Ch.641666 256-QAM RB 100)



Sub6 n48. PAR Plot (20 MHz Ch. 641666 BPSK RB 50)



Sub6 n48. PAR Plot (20 MHz Ch. 641666 QPSK RB 50)



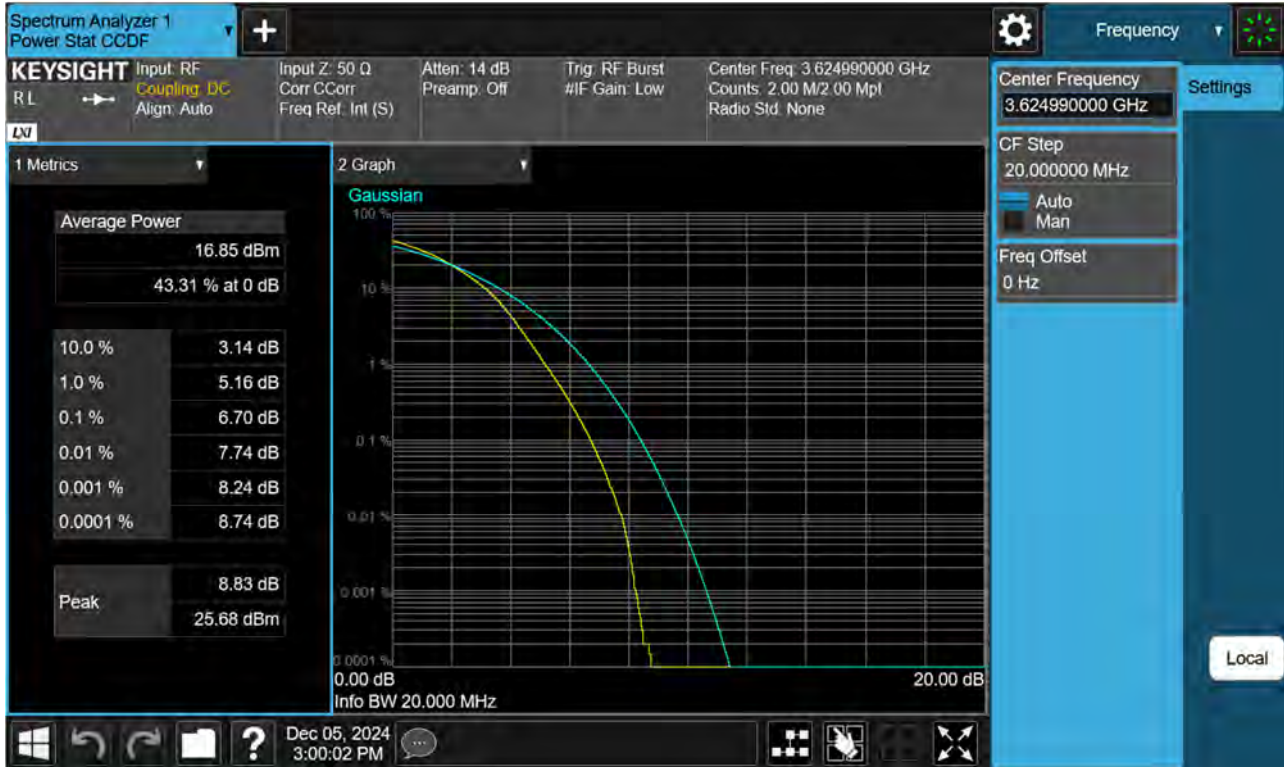
Sub6 n48. PAR Plot (20 MHz Ch.641666 16-QAM RB 50)



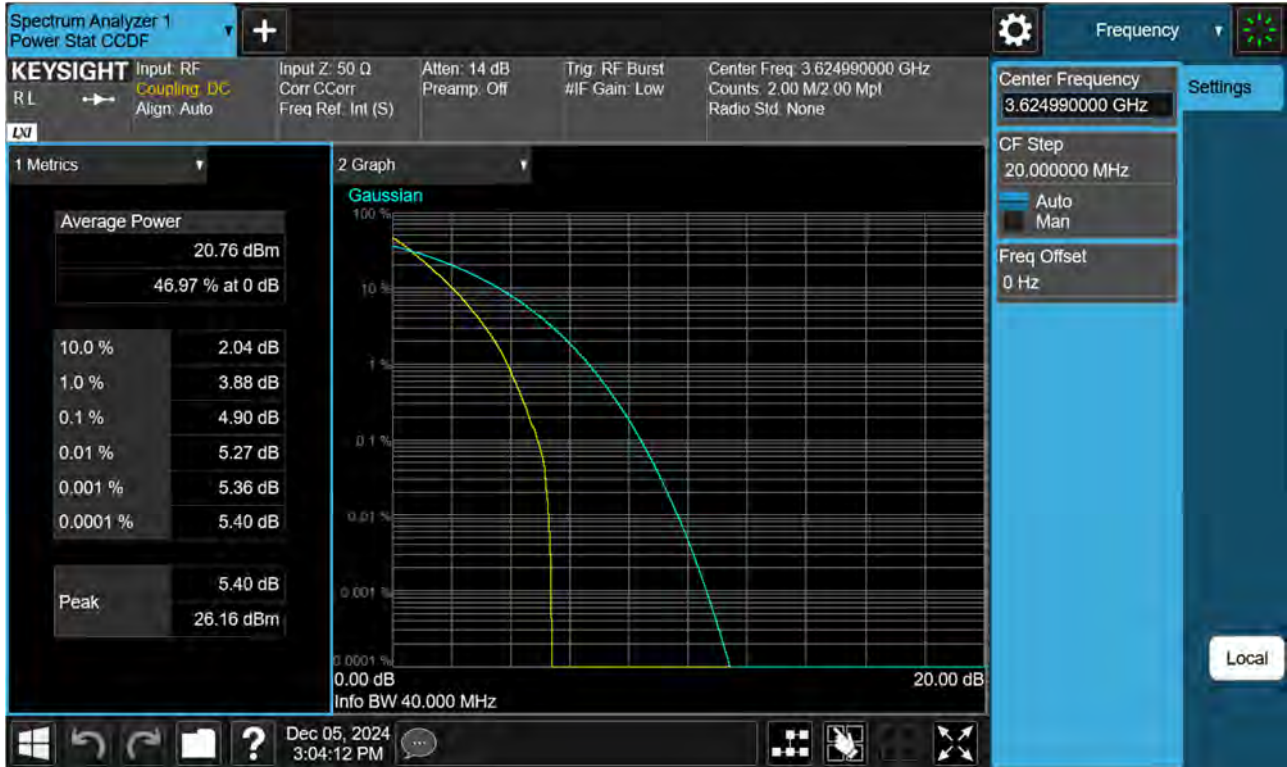
Sub6 n48. PAR Plot (20 MHz Ch.641666 64-QAM RB 50)



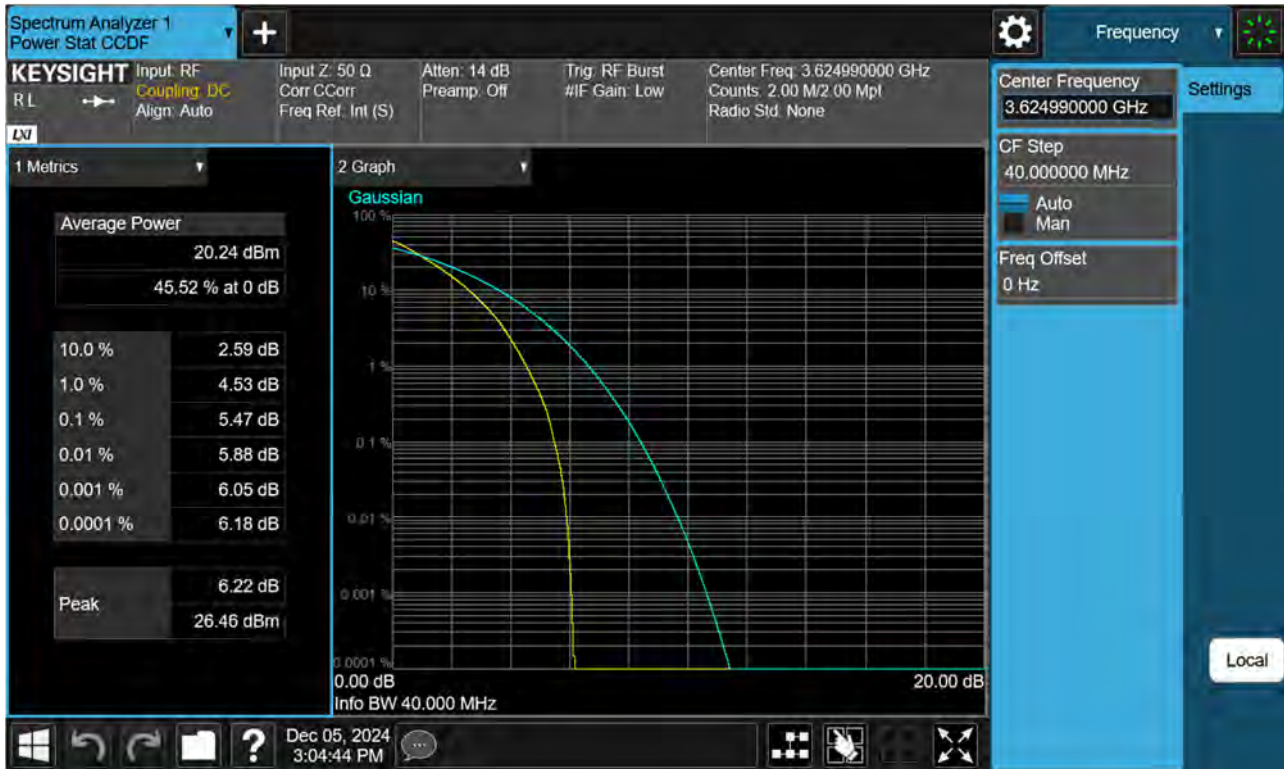
Sub6 n48. PAR Plot (20 MHz Ch.641666 256-QAM RB 50)



Sub6 n48. PAR Plot (40 MHz Ch. 641666 BPSK RB 100)



Sub6 n48. PAR Plot (40 MHz Ch. 641666 QPSK RB 100)



Sub6 n48. PAR Plot (40 MHz Ch.641666 16-QAM RB 100)



Sub6 n48. PAR Plot (40 MHz Ch.641666 64-QAM RB 100)



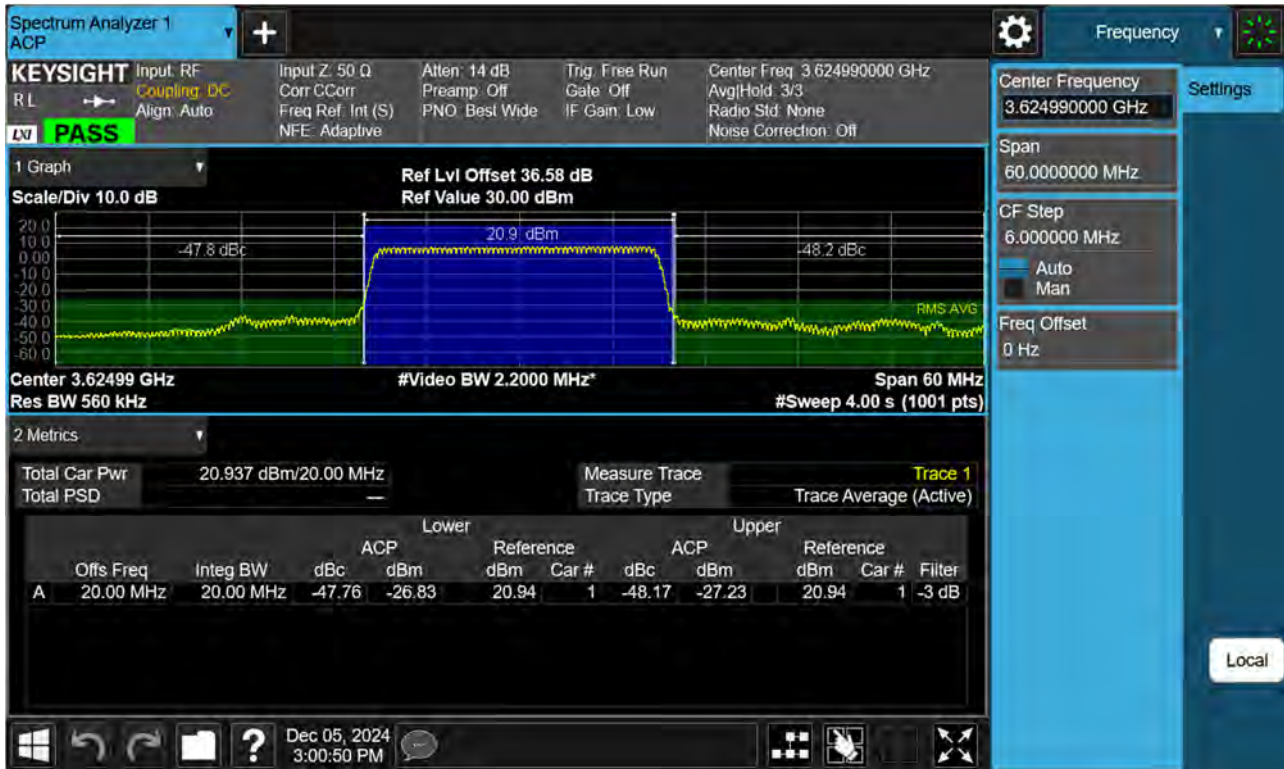
Sub6 n48. PAR Plot (40 MHz Ch.641666 256-QAM RB 100)



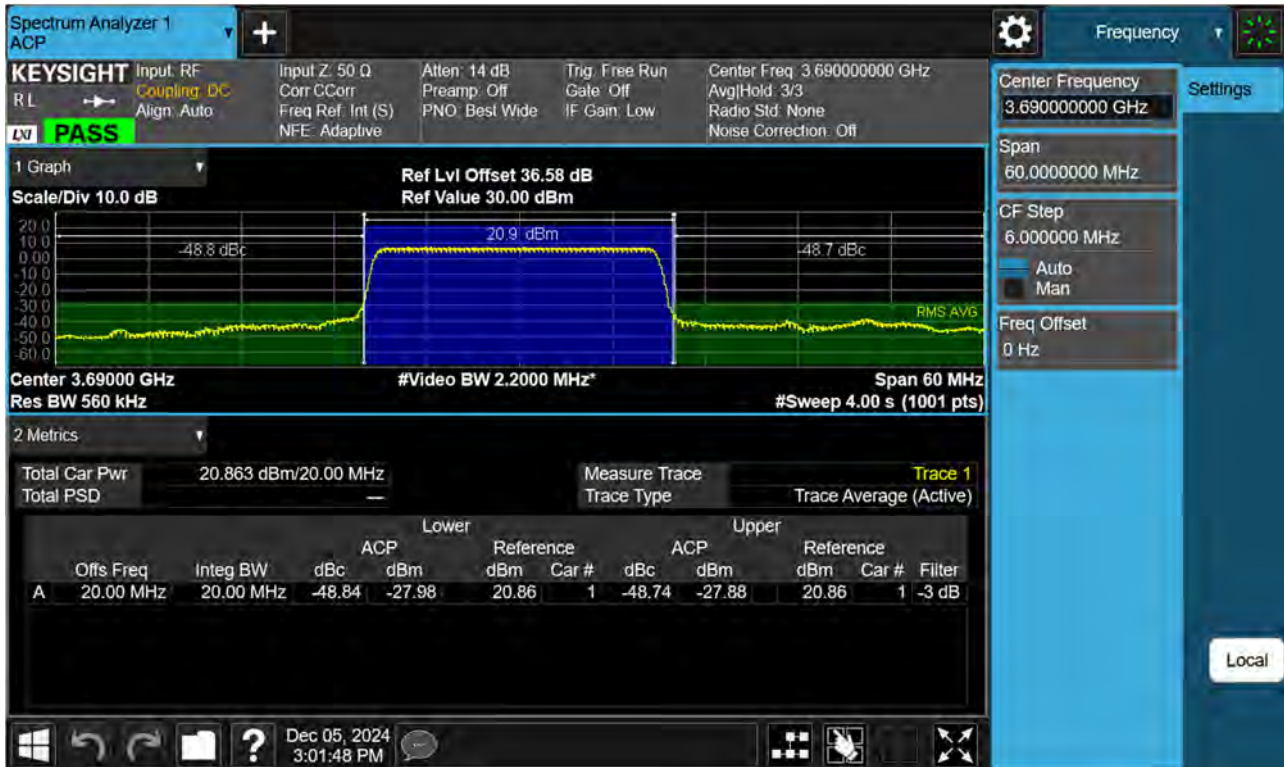
Sub6 n48. Adjacent Channel Leakage Ratio(ACLR) Plot (20 MHz Ch.637334 BPSK RB 50, Offset 0)



Sub6 n48. Adjacent Channel Leakage Ratio(ACLR) Plot (20 MHz Ch.641666 BPSK RB 50, Offset 0)



Sub6 n48. Adjacent Channel Leakage Ratio(ACLR) Plot (20 MHz Ch.646000 BPSK RB 50, Offset 0)



Sub6 n48. Adjacent Channel Leakage Ratio(ACLR) Plot (40 MHz Ch.638000 BPSK RB 100, Offset 0)



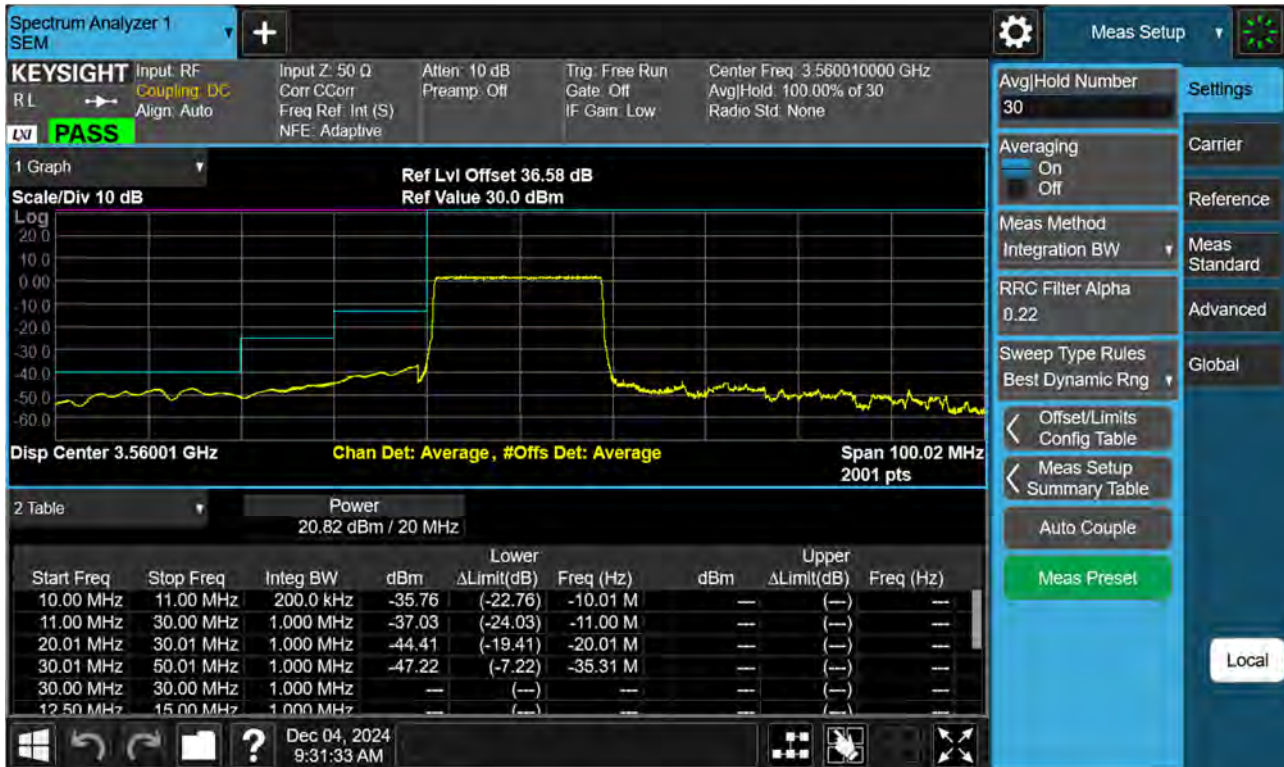
Sub6 n48. Adjacent Channel Leakage Ratio(ACLR) Plot (40 MHz Ch.641666 BPSK RB 100, Offset 0)



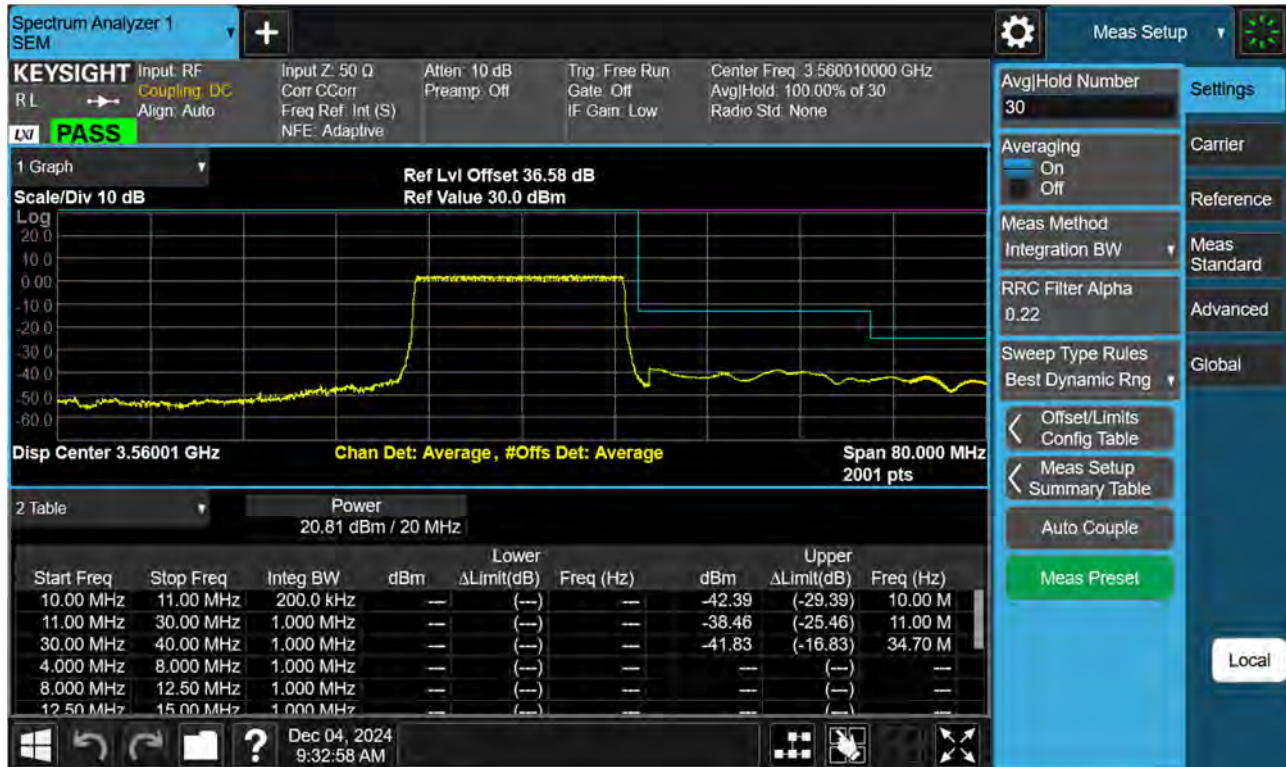
Sub6 n48. Adjacent Channel Leakage Ratio(ACLR) Plot (40 MHz Ch.645332 BPSK RB 100, Offset 0)



Sub6 n48. 20 M BandEdge(Lower)_Low_ 3560.01 MHz_BPSK_FullRB



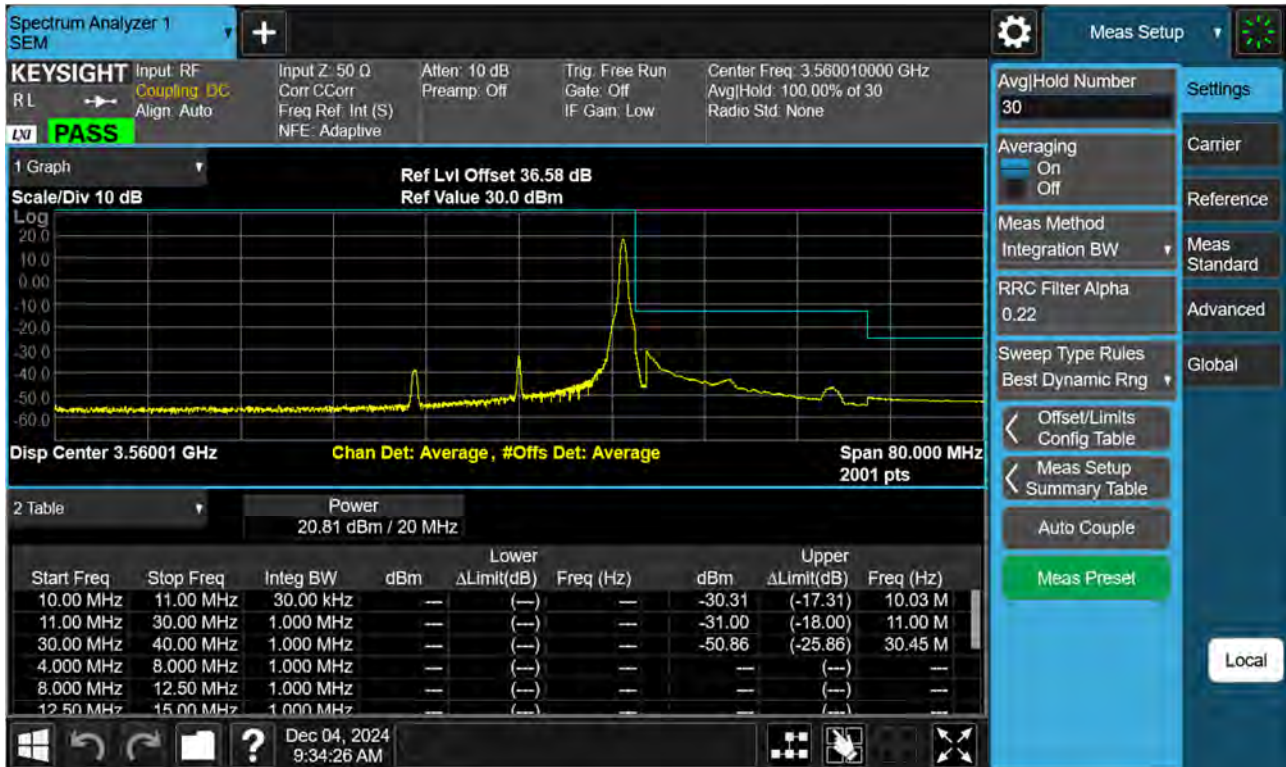
Sub6 n48, 20 M_BandEdge(Upper)_Low_ 3560.01 MHz_BPSK_FullRB



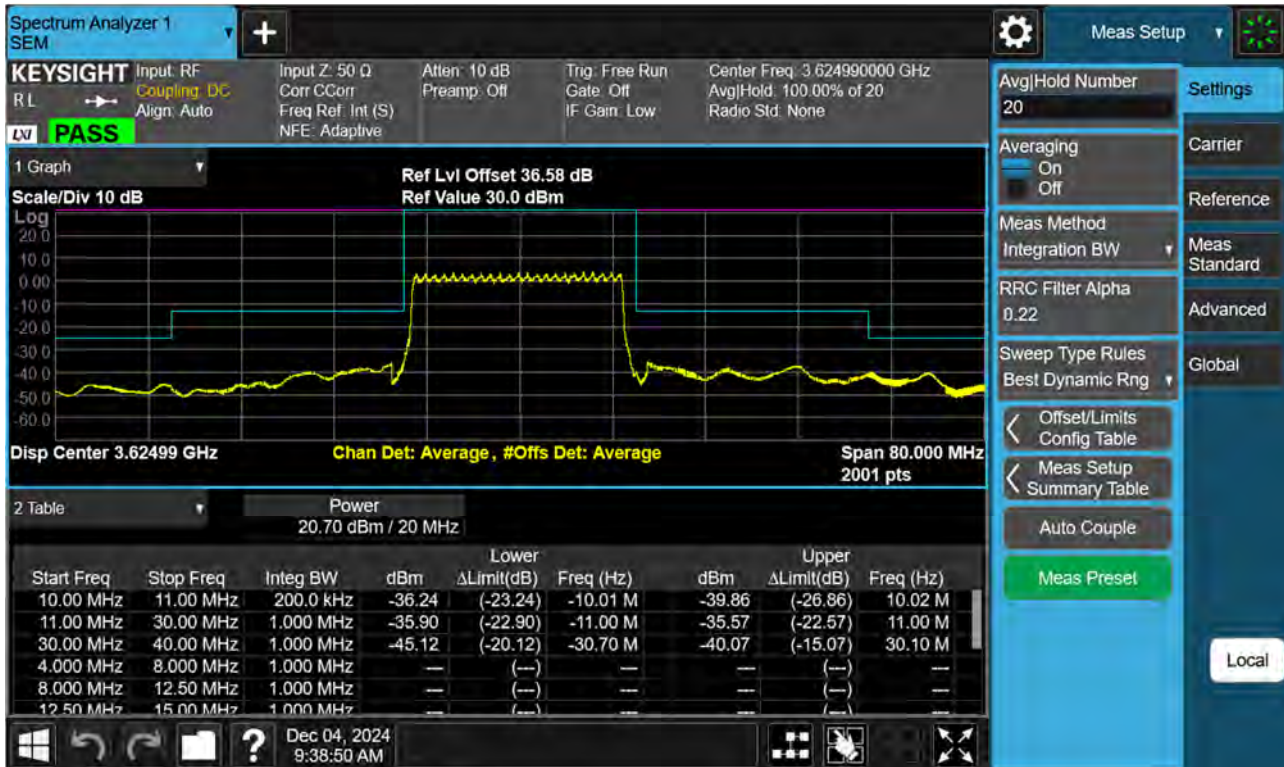
Sub6 n48. 20 M_BandEdge(Lower)_Low_ 3560.01 MHz_BPSK_1RB



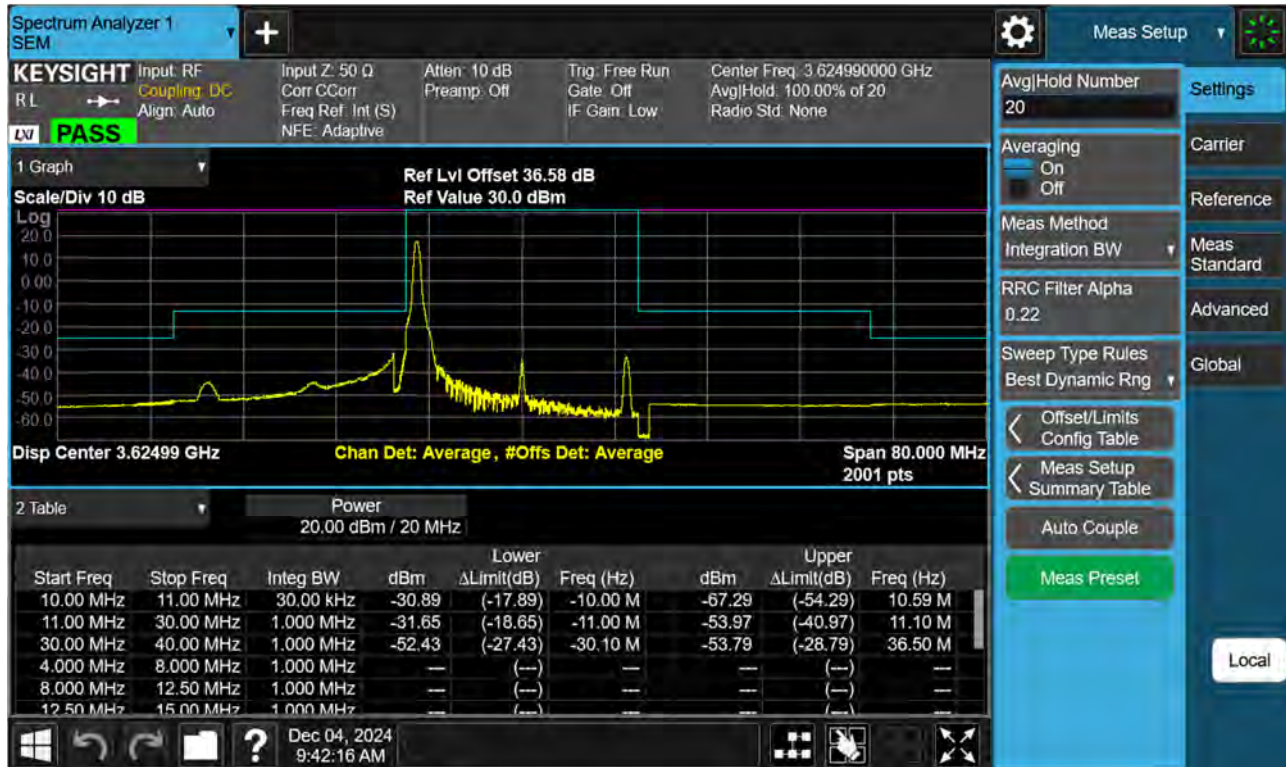
Sub6 n48. 20 M_BandEdge(Upper)_Low_ 3560.01 MHz_BPSK_1RB



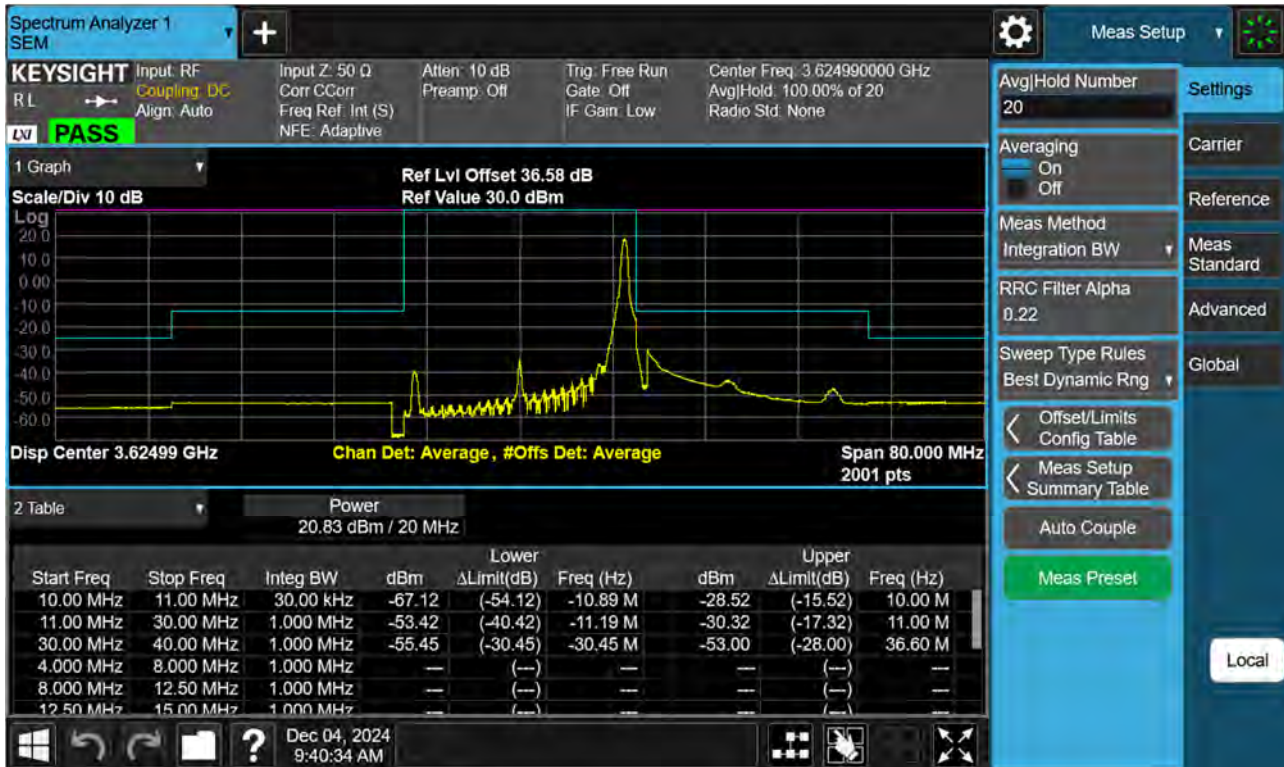
Sub6 n48. 20 M_BandEdge(Center)_Mid_3624.99 MHz_BPSK_FullRB



Sub6 n48. 20 M_BandEdge(Lower)_Mid_3624.99 MHz_BPSK_1RB



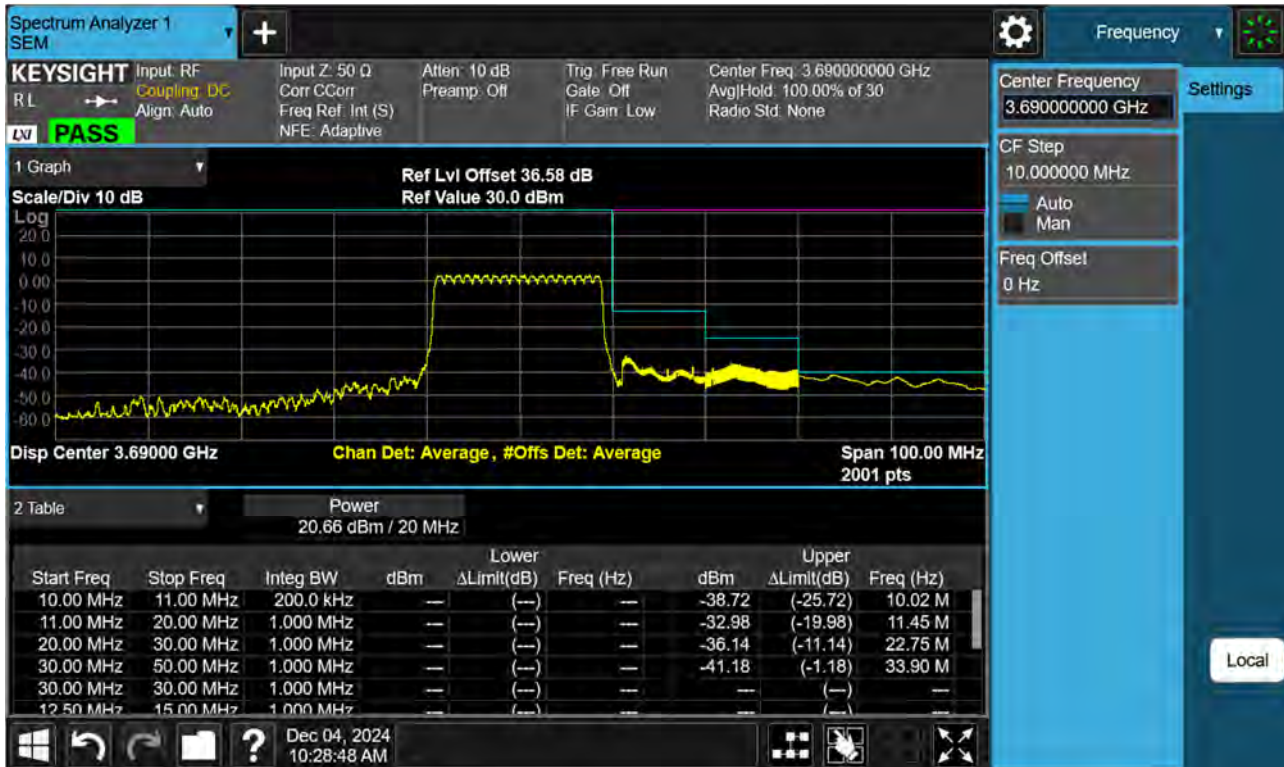
Sub6 n48. 20 M_BandEdge(Upper)_Mid_3624.99 MHz_BPSK_1RB



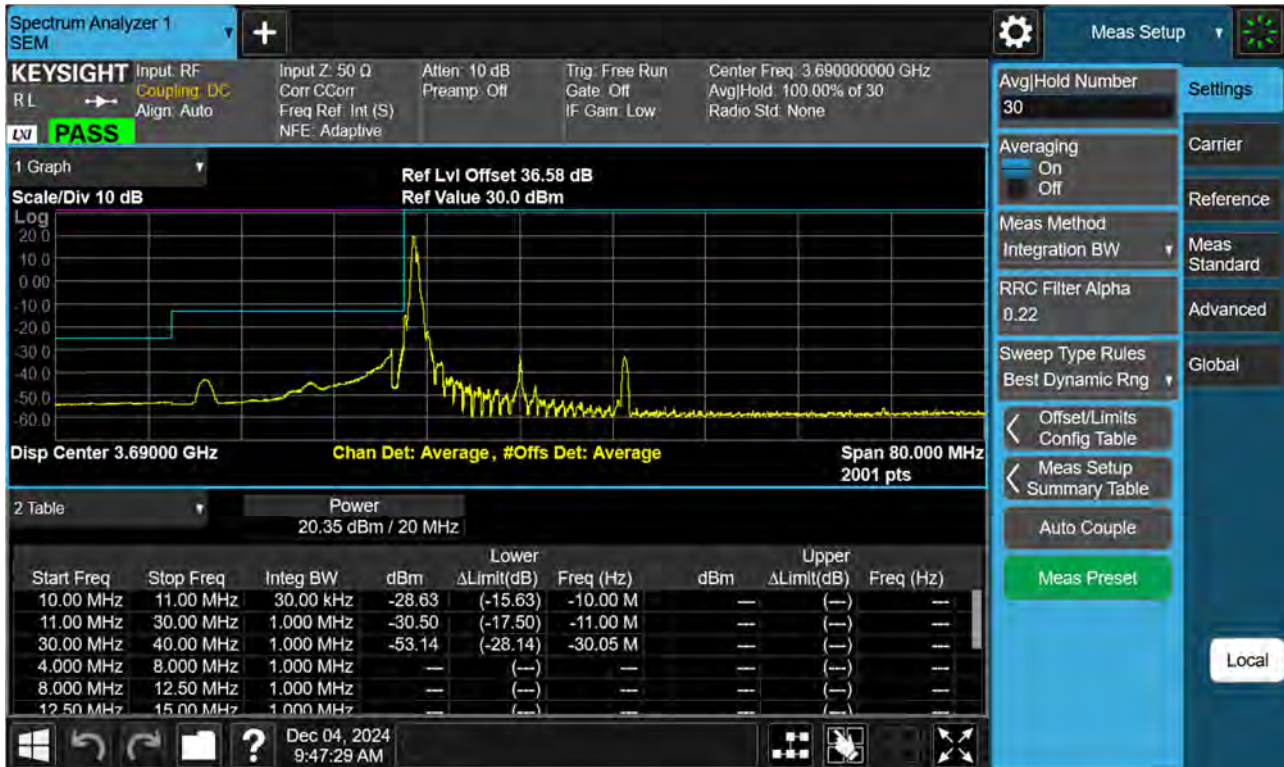
Sub6 n48. 20 M_BandEdge(Lower)_High_ 3690.00 MHz_BPSK_FullRB



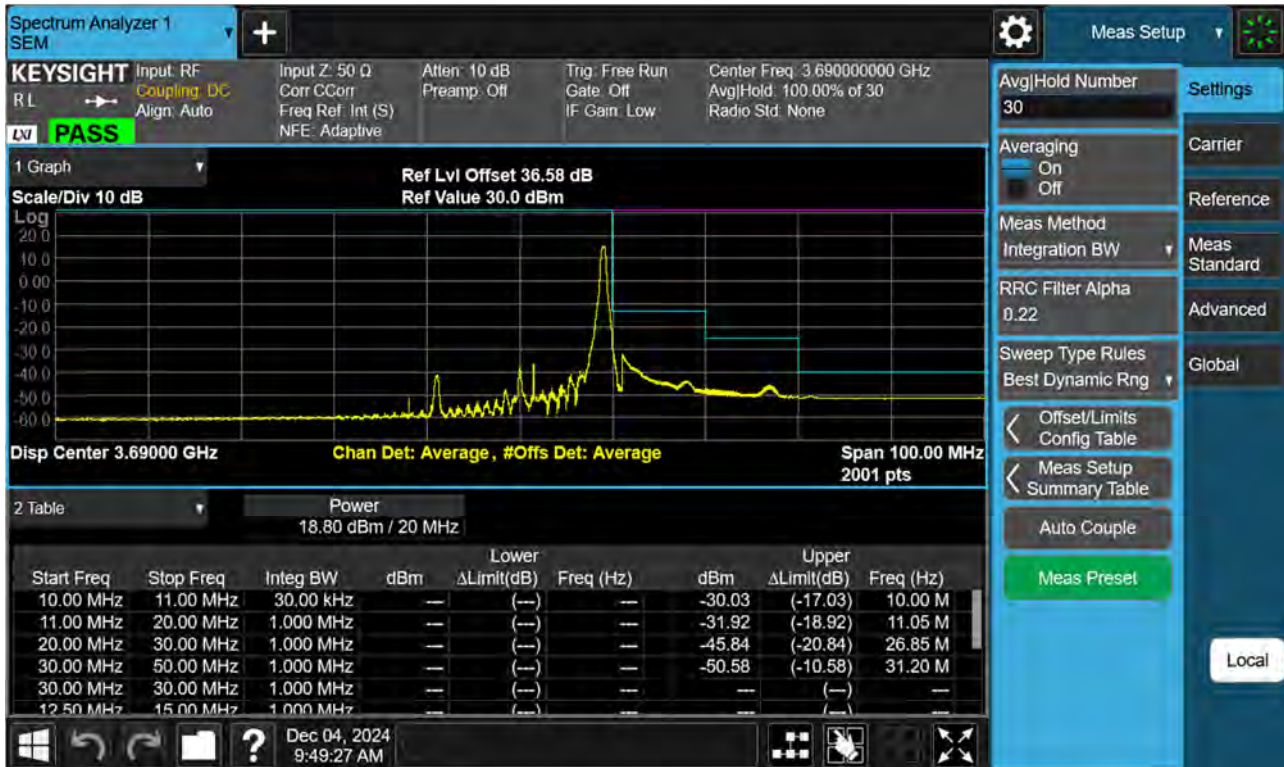
Sub6 n48. 20 M_BandEdge(Upper)_High_ 3690.00 MHz_BPSK_FullIRB



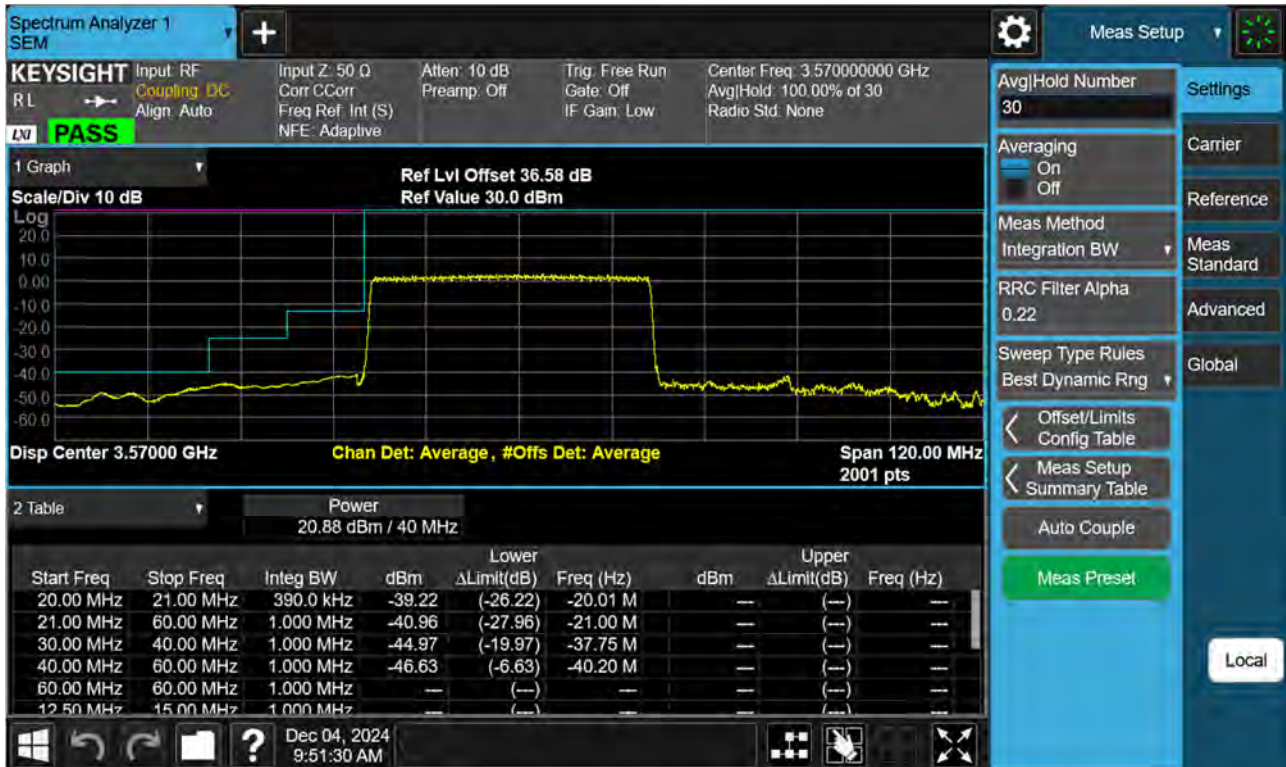
Sub6 n48. 20 M_BandEdge(Lower)_High_ 3690.00 MHz_BPSK_1RB



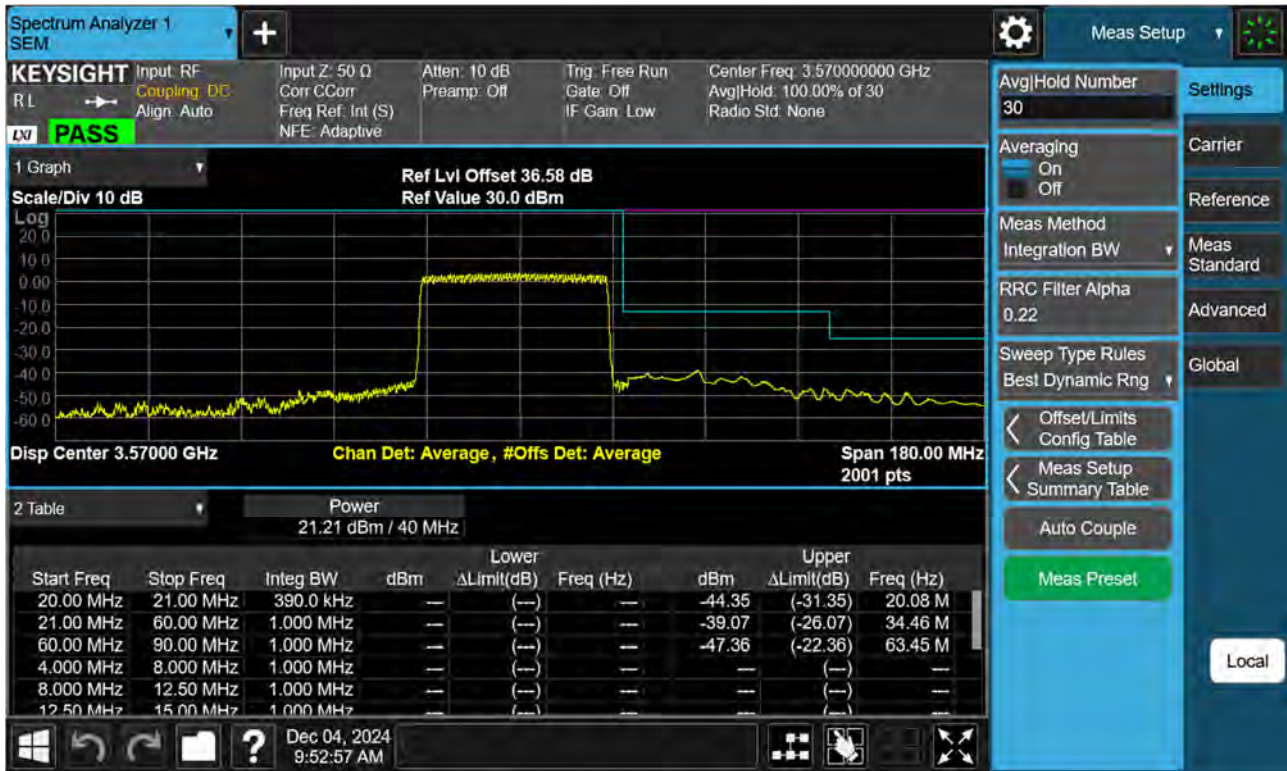
Sub6 n48. 20 M_BandEdge(Upper)_High_ 3690.00 MHz_BPSK_1RB



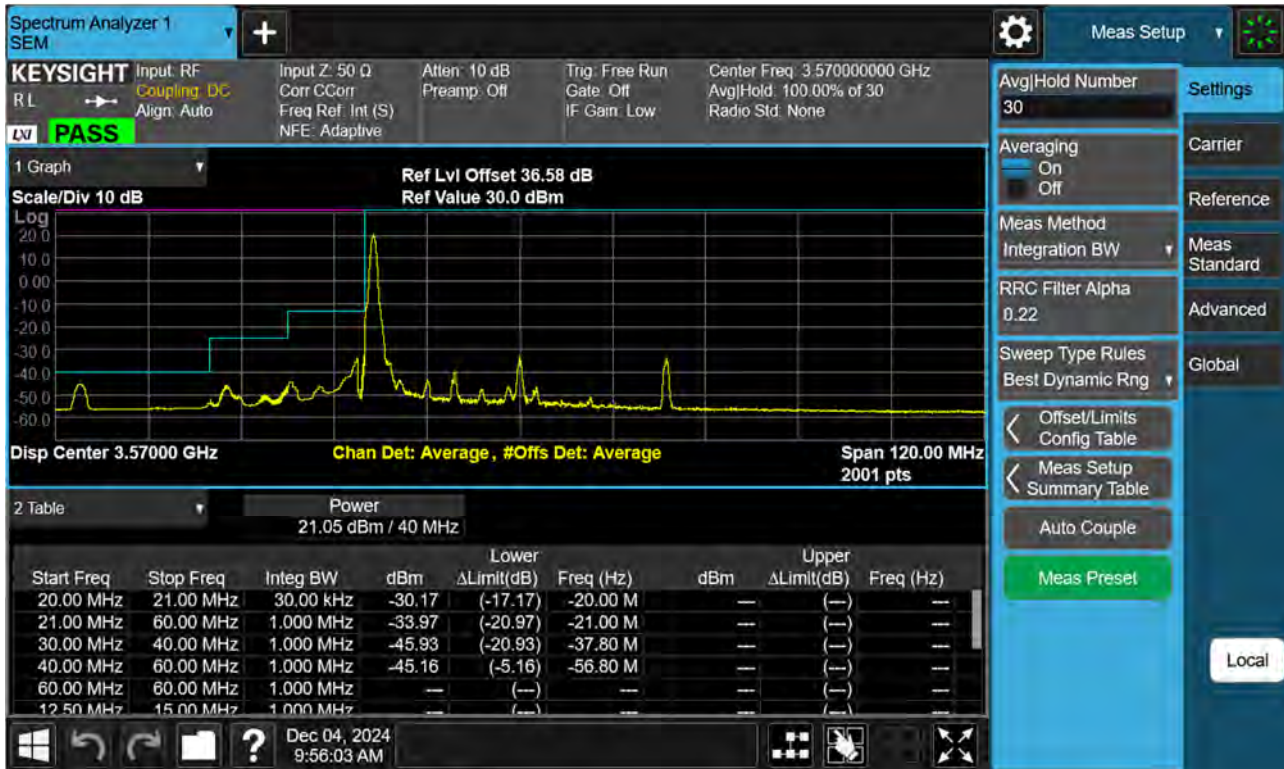
Sub6 n48. 40 M BandEdge(Lower)_Low_ 3570.00 MHz_BPSK_FullRB_



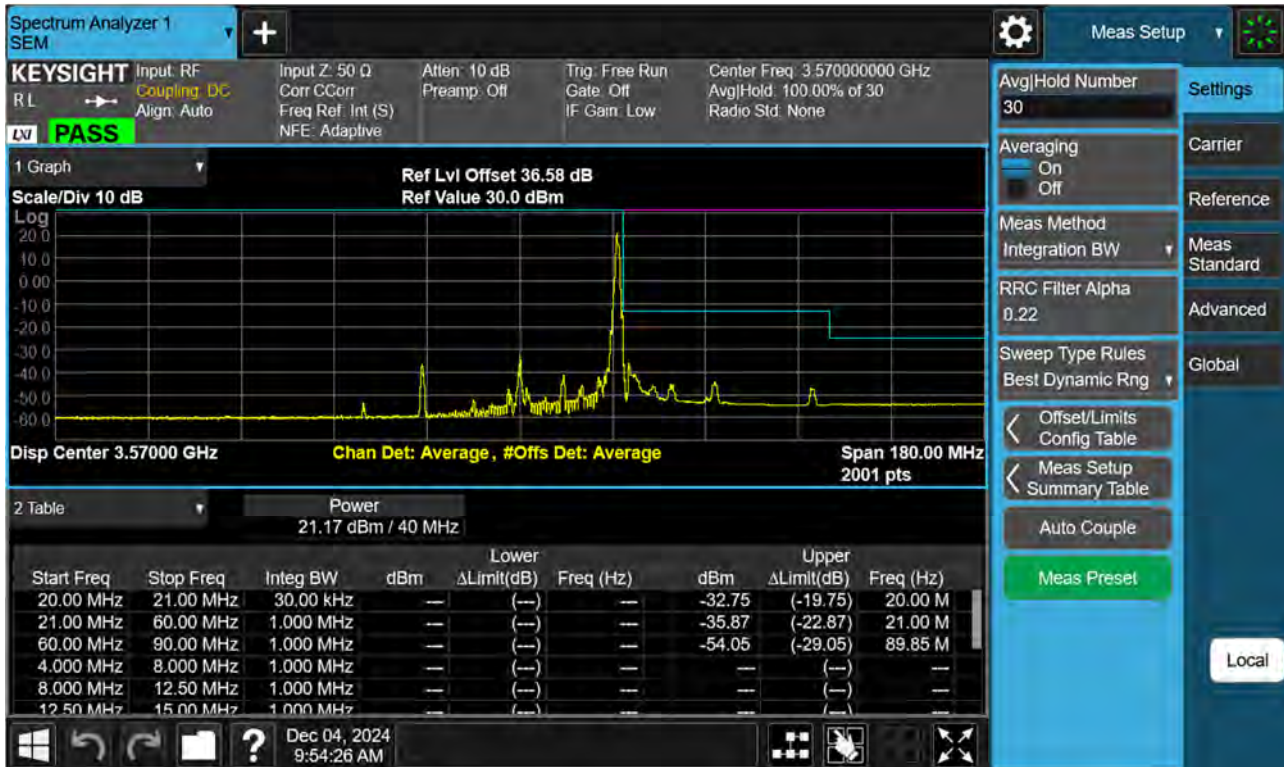
Sub6 n48. 40 M_BandEdge(Upper)_Low_ 3570.00 MHz_BPSK_FullRB



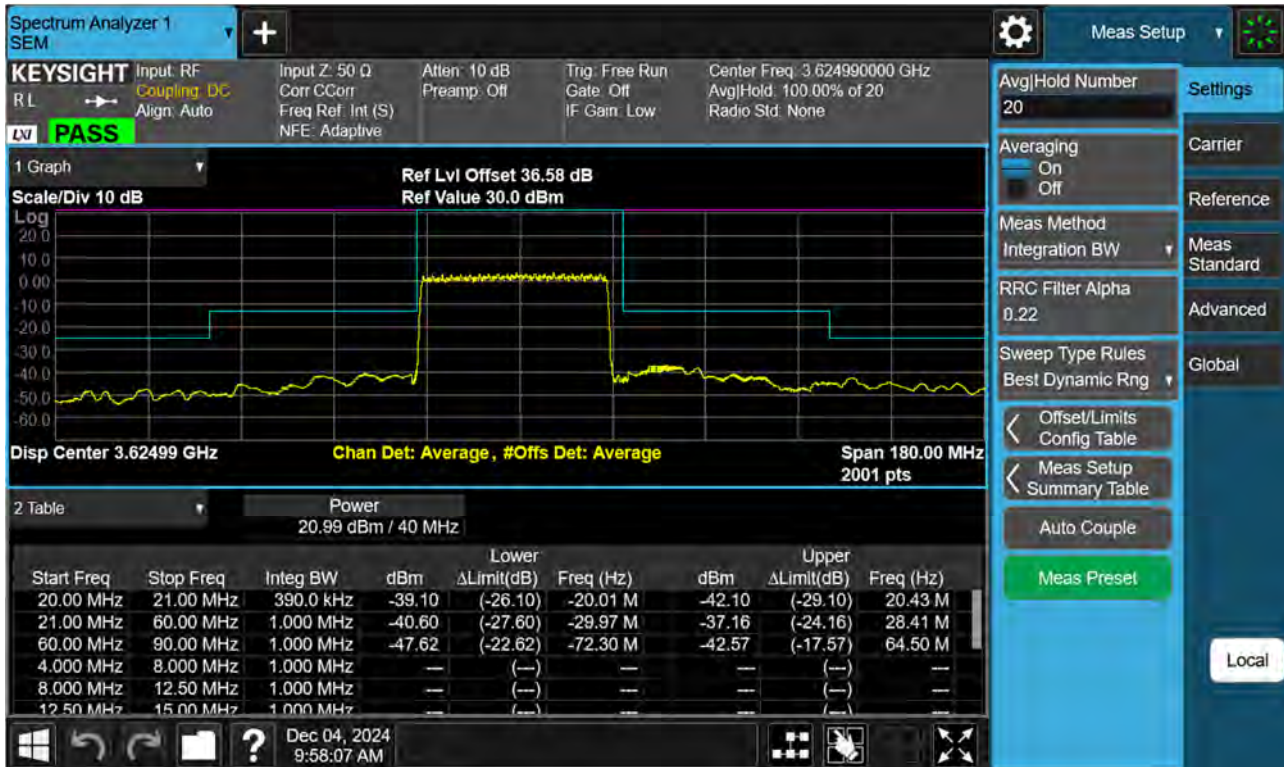
Sub6 n48. 40 M_BandEdge(Lower)_Low_ 3570.00 MHz_BPSK_1RB



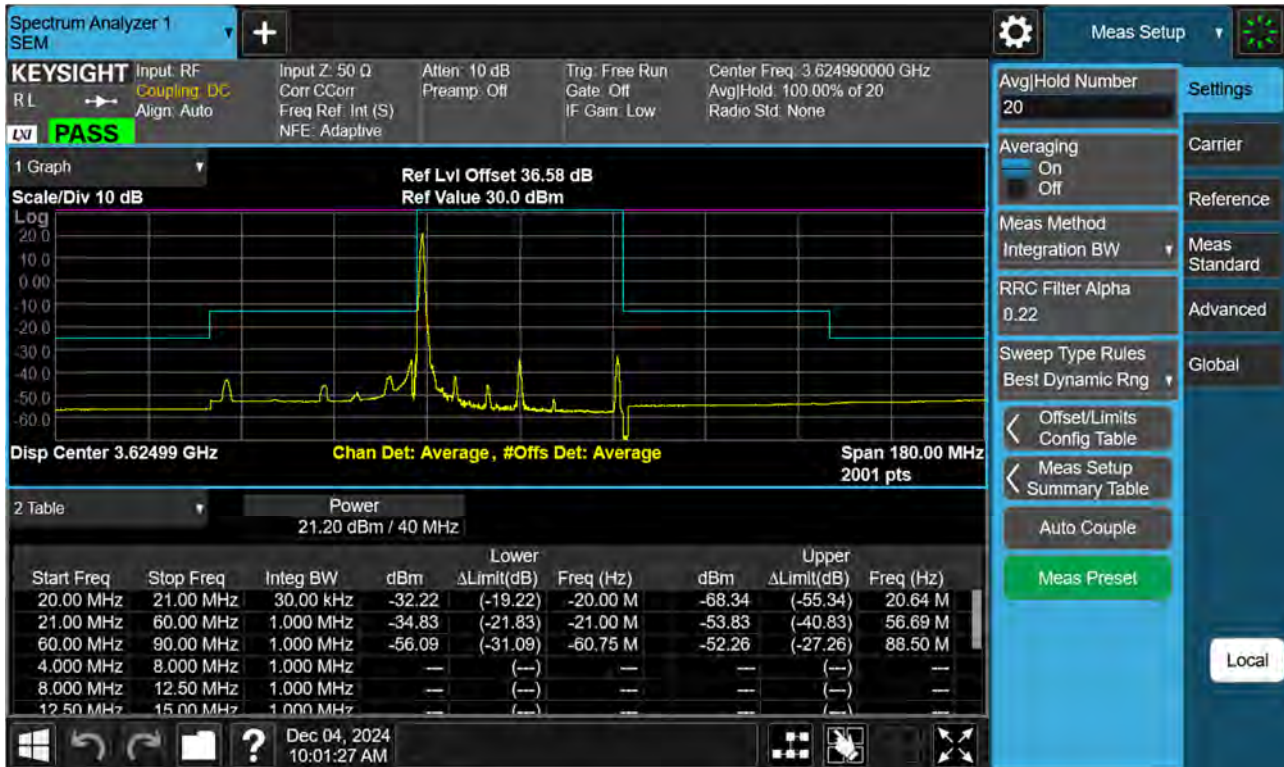
Sub6 n48. 40 M_BandEdge(Upper)_Low_ 3570.00 MHz_BPSK_1RB



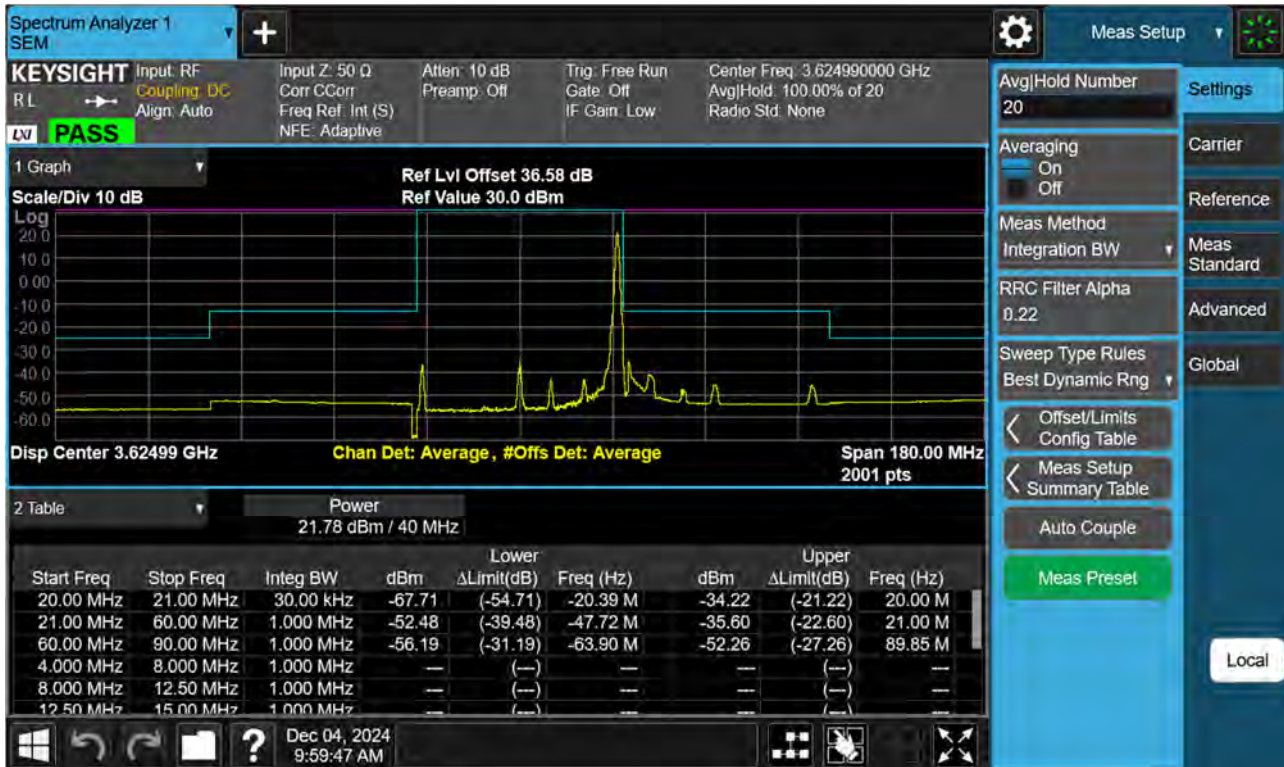
Sub6 n48. 40 M_BandEdge(Center)_Mid_3624.99 MHz_BPSK_FullRB



Sub6 n48. 40 M_BandEdge(Lower)_Mid_3624.99 MHz_BPSK_1RB



Sub6 n48. 40 M_BandEdge(Upper)_Mid_3624.99 MHz_BPSK_1RB



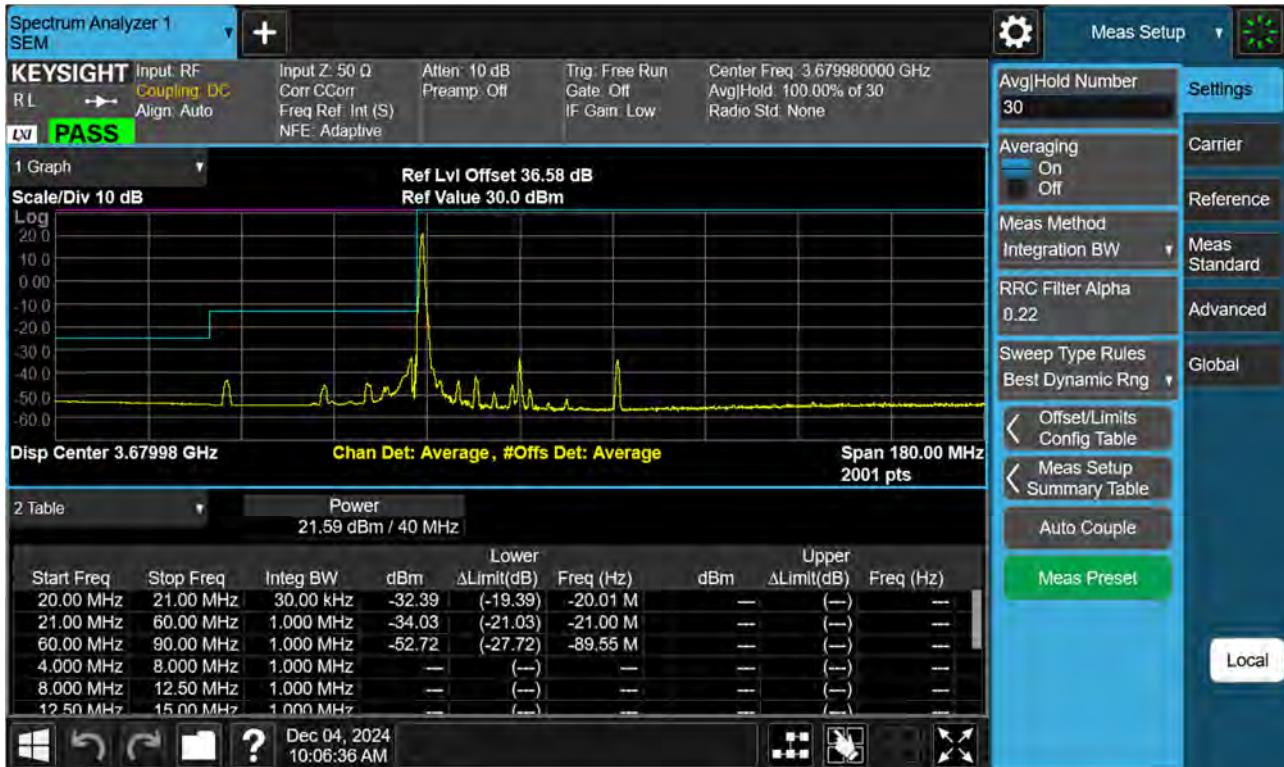
Sub6 n48. 40 M_BandEdge(Lower)_High_ 3679.98 MHz_BPSK_FullRB



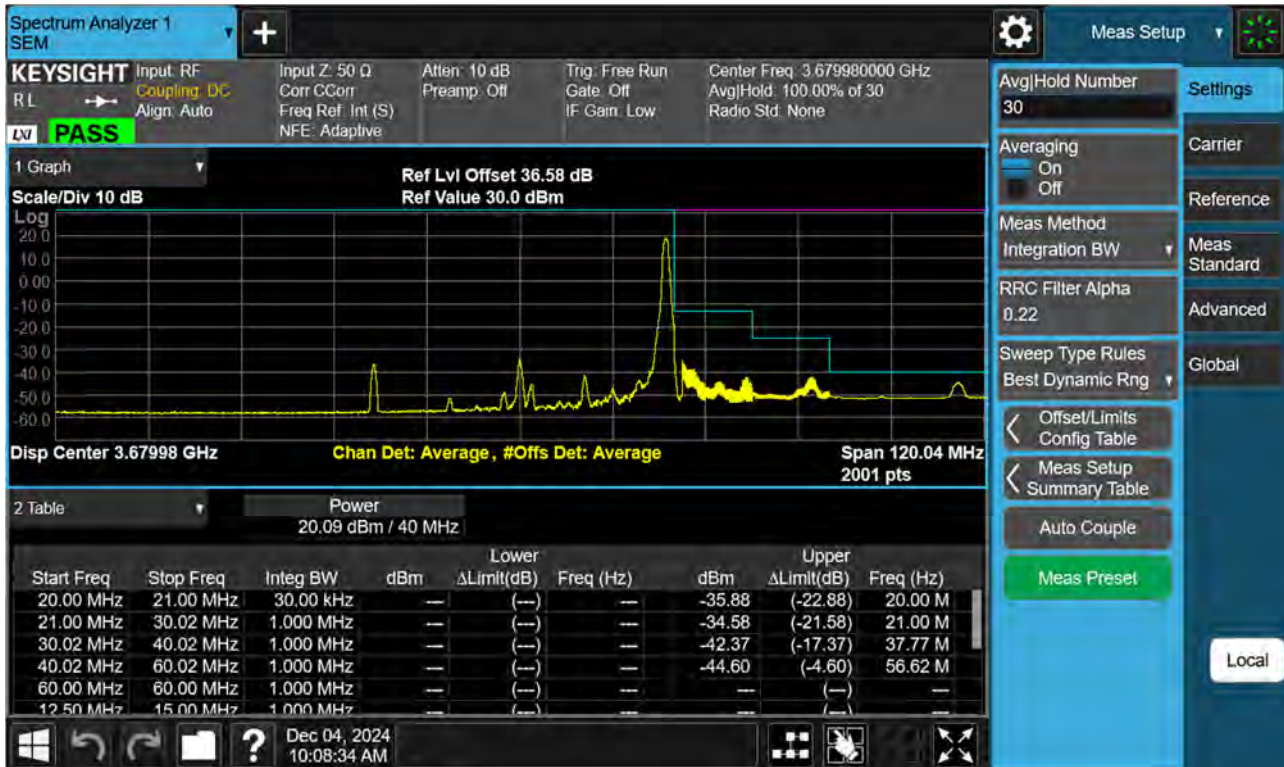
Sub6 n48. 40 M_BandEdge(Upper)_High_ 3679.98 MHz_BPSK_FullIRB



Sub6 n48. 40 M_BandEdge(Lower)_High_ 3679.98 MHz_BPSK_1RB



Sub6 n48. 40 M_BandEdge(Upper)_High_ 3679.98 MHz_BPSK_1RB



Sub6 n48. Conducted Spurious Plot 1 (20 MHz Ch. 637334 BPSK RB 1, Offset 1)



Sub6 n48. Conducted Spurious Plot 2 (20 MHz Ch. 637334 BPSK RB 1, Offset 1)



Sub6 n48. Conducted Spurious Plot 1 (20 MHz Ch. 641666 BPSK RB 1, Offset 1)



Sub6 n48. Conducted Spurious Plot 2 (20 MHz Ch. 641666 BPSK RB 1, Offset 1)



Sub6 n48. Conducted Spurious Plot 1 (20 MHz Ch. 646000 BPSK RB 1, Offset 1)



Sub6 n48. Conducted Spurious Plot 2 (20 MHz Ch. 646000 BPSK RB 1, Offset 1)



Sub6 n48. Conducted Spurious Plot 1 (40 MHz Ch. 638000 BPSK RB 1, Offset 1)



Sub6 n48. Conducted Spurious Plot 2 (40 MHz Ch. 638000 BPSK RB 1, Offset 1)



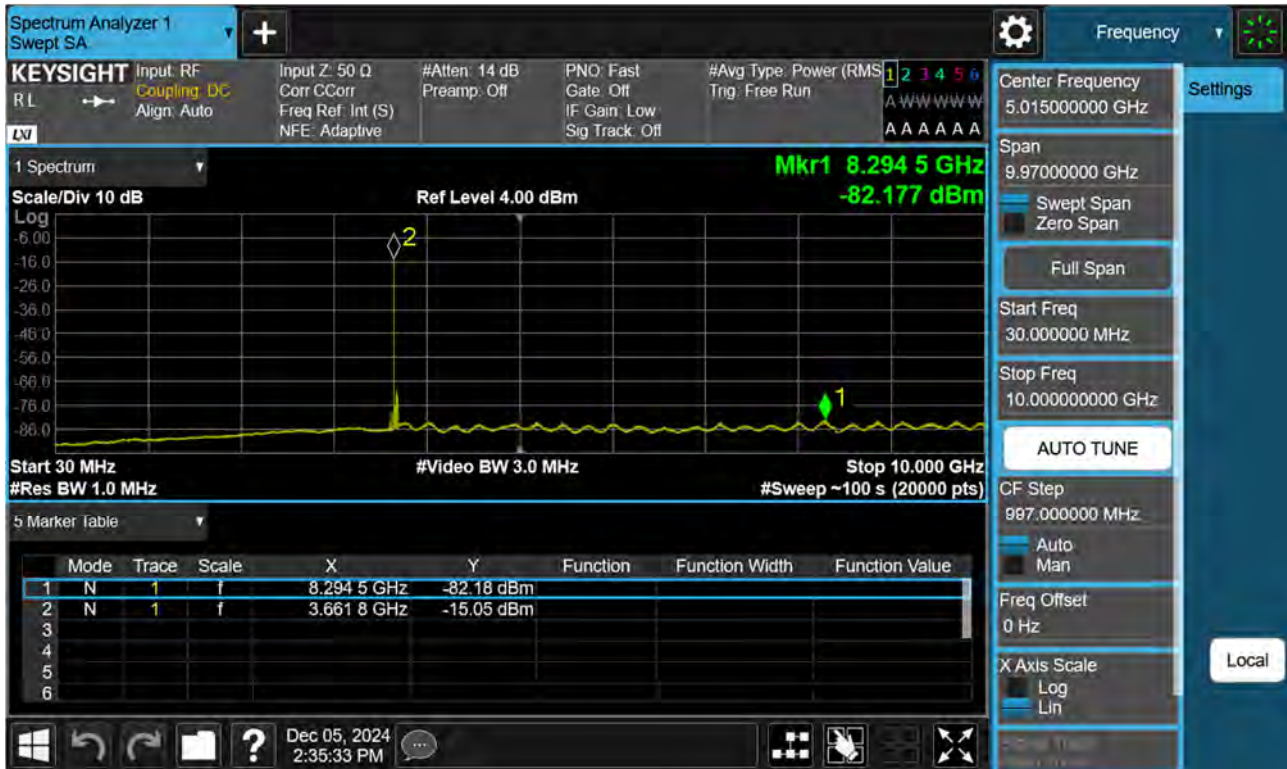
Sub6 n48. Conducted Spurious Plot 1 (40 MHz Ch. 641666 BPSK RB 1, Offset 1)



Sub6 n48. Conducted Spurious Plot 2 (40 MHz Ch. 641666 BPSK RB 1, Offset 1)



Sub6 n48. Conducted Spurious Plot 1 (40 MHz Ch. 645332 BPSK RB 1, Offset 1)



Sub6 n48. Conducted Spurious Plot 2 (40 MHz Ch. 645332 BPSK RB 1, Offset 1)



10. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2412-FC047-P