

# FCC Sub6 REPORT

## Certification

**Applicant Name:**

SAMSUNG Electronics Co., Ltd.

**Date of Issue:**

May 09, 2023

**Address:**

129, Samsung-ro, Yeongtong-gu,  
Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

**Location:**

HCT CO., LTD.,  
74, Seoicheon-ro 578beon-gil, Majang-myeon,  
Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

**Report No.:** HCT-RF-2305-FC028

**FCC ID:** A3LSMX818U

**APPLICANT:** SAMSUNG Electronics Co., Ltd.

Model(s): SM-X818U  
EUT Type: Tablet  
FCC Classification: PCS Licensed Transmitter (PCB)  
FCC Rule Part(s): §27, §2

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	EIRP	
				Max. Power (W)	Max. Power (dBm)
Sub6 n66 (5)	1712.5 – 1777.5	4M49G7D	PI/2 BPSK	0.198	22.96
		4M52G7D	QPSK	0.194	22.88
		4M51W7D	16QAM	0.156	21.92
		4M50W7D	64QAM	0.112	20.48
		4M56W7D	256QAM	0.062	17.89
Sub6 n66 (10)	1715.0 – 1775.0	8M99G7D	PI/2 BPSK	0.200	23.01
		9M03G7D	QPSK	0.195	22.89
		9M01W7D	16QAM	0.157	21.96
		8M98W7D	64QAM	0.113	20.53
		8M99W7D	256QAM	0.061	17.86
Sub6 n66 (15)	1717.5 – 1772.5	13M5G7D	PI/2 BPSK	0.201	23.04
		13M5G7D	QPSK	0.199	22.98
		13M5W7D	16QAM	0.158	22.00
		13M5W7D	64QAM	0.118	20.72
		13M5W7D	256QAM	0.063	17.96
Sub6 n66 (20)	1720.0 – 1770.0	17M9G7D	PI/2 BPSK	0.205	23.12
		17M9G7D	QPSK	0.203	23.08
		18M0W7D	16QAM	0.162	22.09
		17M9W7D	64QAM	0.121	20.81
		18M0W7D	256QAM	0.064	18.03
Sub6 n66 (30)	1725.0 – 1765.0	28M7G7D	PI/2 BPSK	0.198	22.96
		28M7G7D	QPSK	0.197	22.94
		28M6W7D	16QAM	0.156	21.93
		28M6W7D	64QAM	0.116	20.63
		28M7W7D	256QAM	0.064	18.05
Sub6 n66 (40)	1730.0 – 1760.0	38M7G7D	PI/2 BPSK	0.190	22.78
		38M7G7D	QPSK	0.188	22.74
		38M6W7D	16QAM	0.149	21.74
		38M8W7D	64QAM	0.110	20.42
		38M7W7D	256QAM	0.065	18.15

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)

Report No.: HCT-RF-2305-FC028

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REVIEWED BY



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Report prepared by : Jae Ryang Do  
Engineer of Telecommunication Testing Center

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Report approved by : Jong Seok Lee  
Manager of Telecommunication Testing Center

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked \*.

The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

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# Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2305-FC028	May 09, 2023	- First Approval Report

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.

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# MEASUREMENT REPORT

## 1. GENERAL INFORMATION

<b>Applicant Name:</b>	SAMSUNG Electronics Co., Ltd.
<b>Address:</b>	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
<b>FCC ID:</b>	A3LSMX818U
<b>Application Type:</b>	Certification
<b>FCC Classification:</b>	PCS Licensed Transmitter (PCB)
<b>FCC Rule Part(s):</b>	§27, §2
<b>EUT Type:</b>	Tablet
<b>Model(s):</b>	SM-X818U
<b>SCS(kHz):</b>	15
<b>Bandwidth(MHz):</b>	5, 10, 15, 20, 30, 40
<b>Waveform:</b>	CP-OFDM, DFT-S-OFDM
<b>Modulation:</b>	DFT-S-OFDM: PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM CP-OFDM: QPSK, 16QAM, 64QAM, 256QAM
<b>Tx Frequency:</b>	1712.5 MHz – 1777.5 MHz (Sub6 n66(5 MHz)) 1715.0 MHz – 1775.0 MHz (Sub6 n66(10 MHz)) 1717.5 MHz – 1772.5 MHz (Sub6 n66(15 MHz)) 1720.0 MHz – 1770.0 MHz (Sub6 n66(20 MHz)) 1725.0 MHz – 1765.0 MHz (Sub6 n66(30 MHz)) 1730.0 MHz – 1760.0 MHz (Sub6 n66(40 MHz))
<b>Date(s) of Tests:</b>	March 15, 2023 ~ May 07, 2023
<b>Serial number:</b>	Radiated: R32W2003H2Z Conducted: R32W2003GWK

## **2. INTRODUCTION**

### **2.1. DESCRIPTION OF EUT**

The EUT was a Tablet with UMTS and LTE, Sub6.

It also supports IEEE 802.11 a/b/g/n/ac/ax (20/40/80/160 MHz), WIFI 6E AIT, Keyboard, S-pen, mmWave.

### **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, 17383, Rep. 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	- N/A (See SAR Report)
Peak- to- Average Ratio	- KDB 971168 D01 v03r01 – Section 5.7 - ANSI C63.26-2015 – Section 5.2.3.4 - ANSI C63.26-2015 – Section 5.2.6(only GSM)
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Effective Radiated Power/ Effective Isotropic Radiated Power	- KDB 971168 D01 v03r01 – Section 5.2 & 5.8 - ANSI/TIA-603-E-2016 – Section 2.2.17
Radiated Spurious and Harmonic Emissions	- KDB 971168 D01 v03r01 – Section 6.2 - ANSI/TIA-603-E-2016 – Section 2.2.12



## 3.2 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 in accordance with ANSI/TIA-603-E-2016 Clause 2.2.17.

### 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.

### 3.3 RADIATED SPURIOUS EMISSIONS

#### Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA-603-E-2016.

#### Test Settings

1. RBW = 100kHz 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 10<sup>th</sup> 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;

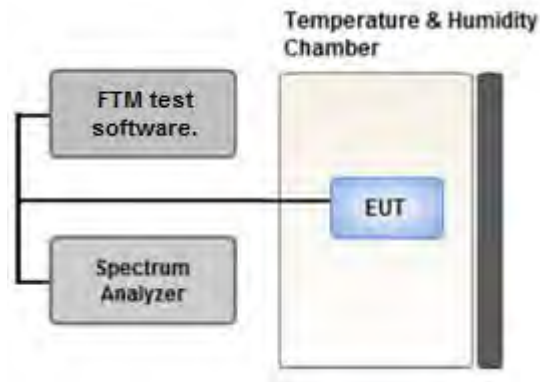
$$\text{Result}_{(dBm)} = P_g_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

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.

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

### 3.4 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)**

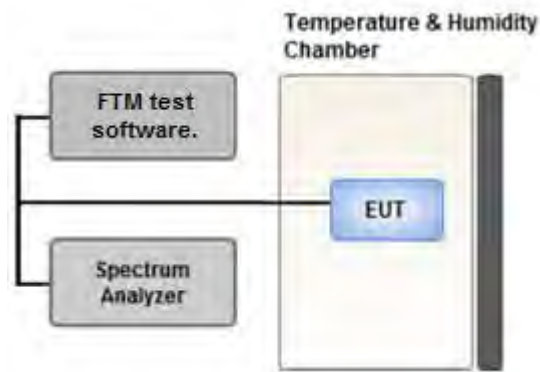
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW  $\geq 3 \times$  RBW.

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  $[10 \log (1/0.25)] = 6$  dB if the duty cycle is a constant 25 %.

### 3.5 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.

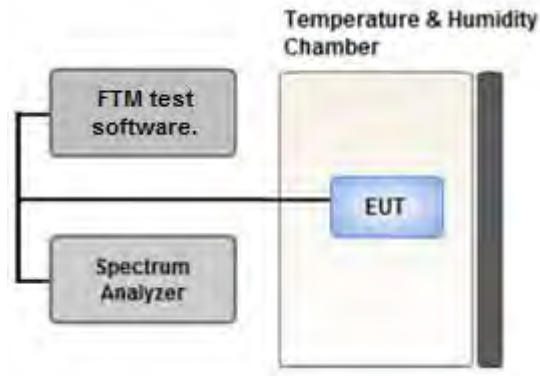
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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

### 3.6 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.

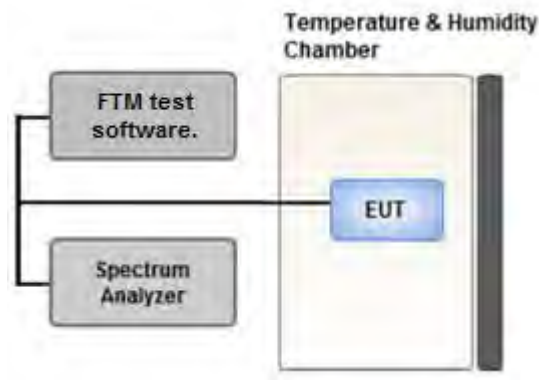
All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

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 = auto
6. Number of points in sweep  $\geq$  2 x Span / RBW

### 3.7 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  $\geq 2 \times \text{Span}/\text{RBW}$
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.

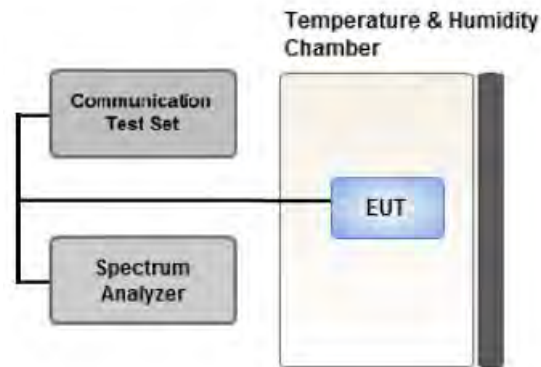
In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

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  $10 \log(1 \text{ MHz}/ \text{RB})$  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.

### 3.8 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.



**3.9 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 : Stand alone, Stand alone + External accessories (Earphone, AC adapter, etc)

Worst case : Stand alone

Mode : NSA, SA

Worst case: SA

- We were performed the RSE test in condition of co-location.

Mode : Stand alone, Simultaneous transmission scenarios

Worst case : Stand alone

- 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 were investigated and the worst case configuration results are reported.

(Worst case: 2A-n66A(10 MHz))

- 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.

(Worst case : 20 MHz)

[ Worst case ]

Test Description	Modulation	RB size	RB offset	Axis
<b>Effective Isotropic Radiated Power</b>	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	See Section 8.1		X
<b>Radiated Spurious and Harmonic Emissions</b>	PI/2 BPSK	See Section 8.2		X

**3.10 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 : NSA, SA

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	5, 10, 15, 20,30,40	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		
		30	Low	1	0		
			High	1	159		
		40	Low	1	0		
			High	1	215		
				5, 10, 15, 20,30,40	Low, High	Full RB	0
		Spurious and Harmonic Emissions at Antenna Terminal	PI/2 BPSK	5, 10, 15, 20,30,40	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	03/27/2024	Biennial
Precision Dipole Antenna	UHAP	Schwarzbeck	01274	03/27/2024	Biennial
Horn Antenna(1~18 GHz)	BBHA 9120D	Schwarzbeck	02289	03/21/2024	Biennial
Horn Antenna(1~18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1299	04/27/2025	Biennial
Horn Antenna(15~40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/29/2024	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	06/04/2023	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/09/2025	Biennial
Hybrid Antenna	VULB9160	Schwarzbeck	760	02/24/2025	Biennial
High Pass Filter	WHKX10-900-1000-15000-40SS	Wainwright Instruments	15	05/18/2023	Annual
High Pass Filter	WHKX10-2700-3000-18000-40SS	Wainwright Instruments	145	05/18/2023	Annual
High Pass Filter	WHNX6-4740-6000-26500-40CC	Wainwright Instruments	11	05/18/2023	Annual
LOW NOISE AMP (100 MHz ~ 18 GHz)	CBLU1183540B-01	CERNE X	26822	05/18/2023	Annual
Power Amplifier	CBL18265035	CERNE X	22966	12/01/2023	Annual
Power Amplifier	CBL26405040	CERNE X	25956	03/02/2024	Annual
DC Power Supply	E3632A	Hewlett Packard	MY40004427	09/05/2023	Annual
Power Splitter(DC~26.5 GHz)	11667B	Hewlett Packard	11275	03/02/2024	Annual
Chamber	SU-642	ESPEC	93008124	02/22/2024	Annual
Signal Analyzer(10 Hz~26.5 GHz)	N9020A	Agilent	MY51110063	04/11/2024	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/19/2024	Annual
Spectrum Analyzer(10 Hz~40 GHz)	FSV40	REOHDE & SCHWARZ	101436	02/22/2024	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/18/2023	Annual
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262287700	05/19/2023	Annual
Wideband Radio Communication Tester	MT8000A	Anritsu Corp.	6262302511	05/18/2023	Annual
SIGNAL GENERATOR (100 kHz~40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	07/05/2023	Annual
Signal Analyzer(5 Hz~40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/30/2023	Annual
4-Way Divider	ZC4PD-K1844+	Mini-Circuits	942907	09/27/2023	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  $U_{\text{CISPR}}$  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)	1.90 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (9 kHz ~ 30 MHz)	4.14 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (30 MHz ~ 1 GHz)	5.82 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (1 GHz ~ 18 GHz)	5.74 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (18 GHz ~ 40 GHz)	5.76 (Confidence level about 95 %, $k=2$ )
Radiated Disturbance (Above 40 GHz)	5.52 (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, §27.53(h)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Conducted Output Power	§2.1046	N/A	<b><u>See Note1</u></b>
Peak- to- Average Ratio	§27.50(d)(5)	< 13 dB	PASS
Frequency stability / variation of ambient temperature	§2.1055, §27.54	Emission must remain in band	PASS

**Note:**

1. See SAR Report
2. 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	§27.50(d)(4)	< 1 Watts max. EIRP	PASS
Radiated Spurious and Harmonic Emissions	§2.1053, §27.53(h)	< 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
349000	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)

#### PSK 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 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	
									W	W	dBm	Size
1712.5		PI/2 BPSK	-18.75	14.61	9.60	2.00	H	< 1.00	0.166	22.21	1	12
		QPSK	-18.92	14.44	9.60	2.00	H		0.160	22.04		
		16-QAM	-19.89	13.47	9.60	2.00	H		0.128	21.07		
		64-QAM	-21.29	12.07	9.60	2.00	H		0.093	19.67		
		256-QAM	-23.94	9.42	9.60	2.00	H		0.050	17.02		
1745.0	Sub6 n66/ 5 MHz [15 kHz]	PI/2 BPSK	-18.70	14.90	9.75	2.04	H	< 1.00	0.182	22.61	1	23
		QPSK	-18.77	14.83	9.75	2.04	H		0.179	22.54		
		16-QAM	-19.71	13.89	9.75	2.04	H		0.145	21.60		
		64-QAM	-20.98	12.62	9.75	2.04	H		0.108	20.33		
		256-QAM	-23.84	9.76	9.75	2.04	H		0.056	17.47		
1777.5		PI/2 BPSK	-18.40	15.14	9.90	2.08	H	< 1.00	0.198	22.96	1	12
		QPSK	-18.48	15.06	9.90	2.08	H		0.194	22.88		
		16-QAM	-19.44	14.10	9.90	2.08	H		0.156	21.92		
		64-QAM	-20.88	12.66	9.90	2.08	H		0.112	20.48		
		256-QAM	-23.47	10.07	9.90	2.08	H		0.062	17.89		



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
1715.0	Sub6 n66/ 10 MHz [15 kHz]	PI/2 BPSK	-18.78	14.58	9.60	2.00	H	< 1.00	0.165	22.18	1	1
		QPSK	-18.88	14.48	9.60	2.00	H		0.161	22.08		
		16-QAM	-19.80	13.56	9.60	2.00	H		0.131	21.16		
		64-QAM	-21.23	12.13	9.60	2.00	H		0.094	19.73		
		256-QAM	-23.85	9.51	9.60	2.00	H		0.051	17.11		
1745.0		PI/2 BPSK	-18.56	15.04	9.75	2.04	H		0.188	22.75	1	50
		QPSK	-18.67	14.93	9.75	2.04	H		0.184	22.64		
		16-QAM	-19.54	14.06	9.75	2.04	H		0.150	21.77		
		64-QAM	-20.97	12.63	9.75	2.04	H		0.108	20.34		
		256-QAM	-23.58	10.02	9.75	2.04	H		0.059	17.73		
1775.0	PI/2 BPSK	-18.35	15.19	9.90	2.08	H	0.200	23.01	1	1		
	QPSK	-18.47	15.07	9.90	2.08	H	0.195	22.89				
	16-QAM	-19.40	14.14	9.90	2.08	H	0.157	21.96				
	64-QAM	-20.83	12.71	9.90	2.08	H	0.113	20.53				
	256-QAM	-23.50	10.04	9.90	2.08	H	0.061	17.86				

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
1717.5	Sub6 n66/ 15 MHz [15 kHz]	PI/2 BPSK	-18.90	14.46	9.60	2.00	H	< 1.00	0.161	22.06	1	1
		QPSK	-18.99	14.37	9.60	2.00	H		0.157	21.97		
		16-QAM	-19.90	13.46	9.60	2.00	H		0.128	21.06		
		64-QAM	-21.31	12.05	9.60	2.00	H		0.092	19.65		
		256-QAM	-23.91	9.45	9.60	2.00	H		0.051	17.05		
1745.0		PI/2 BPSK	-18.72	14.88	9.75	2.04	H		0.182	22.59	1	77
		QPSK	-18.72	14.88	9.75	2.04	H		0.181	22.58		
		16-QAM	-19.68	13.92	9.75	2.04	H		0.146	21.63		
		64-QAM	-21.07	12.53	9.75	2.04	H		0.106	20.24		
		256-QAM	-23.78	9.82	9.75	2.04	H		0.057	17.53		
1772.5	PI/2 BPSK	-18.32	15.22	9.90	2.08	H	0.201	23.04	1	77		
	QPSK	-18.38	15.16	9.90	2.08	H	0.199	22.98				
	16-QAM	-19.36	14.18	9.90	2.08	H	0.158	22.00				
	64-QAM	-20.64	12.90	9.90	2.08	H	0.118	20.72				
	256-QAM	-23.40	10.14	9.90	2.08	H	0.063	17.96				

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
1720.0	Sub6 n66/ 20 MHz [15 kHz]	PI/2 BPSK	-18.69	14.81	9.60	2.00	H	< 1.00	0.174	22.41	1	1
		QPSK	-18.78	14.72	9.60	2.00	H		0.171	22.32		
		16-QAM	-19.72	13.78	9.60	2.00	H		0.137	21.38		
		64-QAM	-21.13	12.37	9.60	2.00	H		0.099	19.97		
		256-QAM	-23.70	9.80	9.60	2.00	H		0.055	17.40		
1745.0		PI/2 BPSK	-18.40	15.20	9.75	2.04	H		0.195	22.91	1	104
		QPSK	-18.51	15.09	9.75	2.04	H		0.191	22.80		
		16-QAM	-19.47	14.13	9.75	2.04	H		0.153	21.84		
		64-QAM	-20.77	12.83	9.75	2.04	H		0.113	20.54		
		256-QAM	-23.69	9.91	9.75	2.04	H		0.058	17.62		
1770.0	PI/2 BPSK	-18.33	15.31	9.90	2.09	H	0.205	23.12	1	104		
	QPSK	-18.37	15.27	9.90	2.09	H	0.203	23.08				
	16-QAM	-19.36	14.28	9.90	2.09	H	0.162	22.09				
	64-QAM	-20.64	13.00	9.90	2.09	H	0.121	20.81				
	256-QAM	-23.42	10.22	9.90	2.09	H	0.064	18.03				

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
1725.0	Sub6 n66/ 30 MHz [15 kHz]	PI/2 BPSK	-19.01	14.55	9.60	2.01	H	< 1.00	0.164	22.14	1	1
		QPSK	-19.11	14.45	9.60	2.01	H		0.160	22.04		
		16-QAM	-19.91	13.65	9.60	2.01	H		0.133	21.24		
		64-QAM	-21.28	12.28	9.60	2.01	H		0.097	19.87		
		256-QAM	-23.85	9.71	9.60	2.01	H		0.054	17.30		
1745.0		PI/2 BPSK	-18.94	14.66	9.75	2.04	H		0.173	22.37	1	158
		QPSK	-19.03	14.57	9.75	2.04	H		0.169	22.28		
		16-QAM	-19.93	13.67	9.75	2.04	H		0.137	21.38		
		64-QAM	-21.31	12.29	9.75	2.04	H		0.100	20.00		
		256-QAM	-23.89	9.71	9.75	2.04	H		0.055	17.42		
1765.0	PI/2 BPSK	-18.33	15.15	9.90	2.09	H	0.198	22.96	1	158		
	QPSK	-18.35	15.13	9.90	2.09	H	0.197	22.94				
	16-QAM	-19.36	14.12	9.90	2.09	H	0.156	21.93				
	64-QAM	-20.66	12.82	9.90	2.09	H	0.116	20.63				
	256-QAM	-23.24	10.24	9.90	2.09	H	0.064	18.05				

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
1730.0	Sub6 n66/ 40 MHz [15 kHz]	PI/2 BPSK	-18.87	14.74	9.60	2.01	H	< 1.00	0.171	22.33	1	214
		QPSK	-18.98	14.63	9.60	2.01	H		0.167	22.22		
		16-QAM	-19.90	13.71	9.60	2.01	H		0.135	21.30		
		64-QAM	-21.28	12.33	9.60	2.01	H		0.098	19.92		
		256-QAM	-23.75	9.86	9.60	2.01	H		0.056	17.45		
1745.0		PI/2 BPSK	-18.68	14.92	9.75	2.04	H		0.183	22.63	1	214
		QPSK	-18.82	14.78	9.75	2.04	H		0.177	22.49		
		16-QAM	-19.73	13.87	9.75	2.04	H		0.144	21.58		
		64-QAM	-21.12	12.48	9.75	2.04	H		0.104	20.19		
		256-QAM	-23.16	10.44	9.75	2.04	H		0.065	18.15		
1760.0	PI/2 BPSK	-18.35	14.97	9.90	2.09	H	0.190	22.78	1	214		
	QPSK	-18.39	14.93	9.90	2.09	H	0.188	22.74				
	16-QAM	-19.39	13.93	9.90	2.09	H	0.149	21.74				
	64-QAM	-20.71	12.61	9.90	2.09	H	0.110	20.42				
	256-QAM	-23.30	10.02	9.90	2.09	H	0.061	17.83				

**8.2 RADIATED SPURIOUS EMISSIONS**

- ▣ NR Band: N66
- ▣ Bandwidth: 20 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
344000 (1720.0)	3 440.00	-60.35	11.10	-61.30	2.97	H	-53.17	-13.00	1	1
	5 160.00	-61.37	11.00	-56.54	3.69	H	-49.23	-13.00		
	6 880.00	-63.41	10.80	-51.72	4.28	H	-45.20	-13.00		
	8 600.00	-63.16	10.40	-49.61	4.80	H	-44.01	-13.00		
	10 320.00	-64.75	11.10	-46.98	5.34	H	-41.22	-13.00		
349000 (1745.0)	3 490.00	-59.78	11.20	-61.22	3.00	H	-53.02	-13.00	1	104
	5 235.00	-61.45	11.10	-56.52	3.70	V	-49.12	-13.00		
	6 980.00	-63.84	10.90	-51.13	4.30	V	-44.53	-13.00		
	8 725.00	-61.60	10.30	-47.24	4.88	V	-41.82	-13.00		
	10 470.00	-64.52	11.30	-46.79	5.43	V	-40.92	-13.00		
354000 (1770.0)	3 540.00	-60.99	11.30	-62.79	3.02	H	-54.51	-13.00	1	104
	5 310.00	-62.96	11.40	-58.60	3.65	H	-50.85	-13.00		
	7 080.00	-63.33	10.70	-49.45	4.34	H	-43.09	-13.00		
	8 850.00	-63.01	10.50	-48.92	4.95	H	-43.37	-13.00		
	10 620.00	-64.45	11.20	-45.93	5.41	H	-40.14	-13.00		

▣ ENDC-Mode : 2A(10 MHz)-n66A(20 MHz)

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit (dBm)
18900 (1880.0)	3760.00	-60.22	11.64	-60.45	3.16	V	-51.97	-13.00
	5640.00	-61.15	12.00	-54.97	3.93	V	-46.90	-13.00
	7520.00	-61.50	11.54	-47.05	4.51	V	-40.02	-13.00

**8.3 PEAK-TO-AVERAGE RATIO**

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB )
Sub6 n66	5 MHz	1745.0	BPSK	25	0	3.95
			QPSK			4.70
			16-QAM			6.11
			64-QAM			6.43
			256-QAM			6.92
	10 MHz		BPSK	50		4.16
			QPSK			4.91
			16-QAM			6.07
			64-QAM			6.42
			256-QAM			6.61
	15 MHz		BPSK	75		4.42
			QPSK			5.36
			16-QAM			5.93
			64-QAM			6.25
			256-QAM			6.64
	20 MHz		BPSK	100		4.28
			QPSK			4.63
			16-QAM			5.89
			64-QAM			6.10
			256-QAM			6.82
30 MHz	BPSK	160	4.09			
	QPSK		4.71			
	16-QAM		5.89			
	64-QAM		6.40			
	256-QAM		6.71			
40 MHz	BPSK	216	4.05			
	QPSK		4.93			
	16-QAM		5.68			
	64-QAM		6.24			
	256-QAM		6.61			

**Note:**

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 71 ~ 100.

**8.4 OCCUPIED BANDWIDTH**

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
Sub6 n66	5 MHz	1745.0	BPSK	25	0	4.4870
			QPSK			4.5153
			16-QAM			4.5136
			64-QAM			4.5001
			256-QAM			4.5586
	10 MHz		BPSK	50		8.9867
			QPSK			9.0284
			16-QAM			9.0058
			64-QAM			8.9841
			256-QAM			8.9912
	15 MHz		BPSK	75		13.463
			QPSK			13.475
			16-QAM			13.517
			64-QAM			13.477
			256-QAM			13.450
	20 MHz		BPSK	100		17.886
			QPSK			17.918
			16-QAM			17.962
			64-QAM			17.927
			256-QAM			17.977
30 MHz	BPSK	160	28.654			
	QPSK		28.650			
	16-QAM		28.644			
	64-QAM		28.562			
	256-QAM		28.698			
40 MHz	BPSK	216	38.662			
	QPSK		38.724			
	16-QAM		38.644			
	64-QAM		38.767			
	256-QAM		38.672			

**Note:**

1. Plots of the EUT's Occupied Bandwidth are shown Page 41 ~ 70.



**8.5 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 n66	5	1712.5	8.2463	30.815	-71.181	-40.366	-13.00
		1745.0	9.1545	30.815	-70.600	-39.785	
		1777.5	4.0055	30.200	-70.997	-40.797	
	10	1715.0	8.8674	30.815	-69.879	-39.064	
		1745.0	9.9721	30.815	-70.718	-39.903	
		1775.0	3.8161	30.200	-71.022	-40.822	
	15	1717.5	5.1316	30.815	-68.112	-37.297	
		1745.0	9.1107	30.815	-70.827	-40.012	
		1772.5	3.7982	30.200	-69.704	-39.504	
	20	1720.0	3.8156	30.200	-69.877	-39.677	
		1745.0	5.1910	30.815	-70.876	-40.061	
		1770.0	8.0279	30.815	-71.393	-40.578	
	30	1725.0	4.0394	30.200	-71.329	-41.129	
		1745.0	8.2727	30.815	-70.380	-39.565	
		1765.0	3.7438	30.200	-70.622	-40.422	
	40	1730.0	3.7822	30.200	-70.402	-40.202	
		1745.0	4.0674	30.815	-70.687	-39.872	
		1760.0	8.8634	30.200	-70.562	-40.362	

**Note:**

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 137 ~ 172.
2. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)
3. Factor(dB) = Cable Loss + Ext. 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

**8.6 BAND EDGE**

- Plots of the EUT's Band Edge are shown Page 101 ~ 136.

**8.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE**

- ▣ BandWidth: 5 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.400 VDC
- ▣ LIMIT: Emission must remain in band

Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
1712.5	100 %	+20(Ref)	1712 499 999	0.0	0.000 000	0.000
	100 %	-30	1712 499 998	-0.8	0.000 000	0.000
	100 %	-20	1712 499 999	-0.1	0.000 000	0.000
	100 %	-10	1712 499 998	-1.0	0.000 000	-0.001
	100 %	0	1712 499 998	-1.2	0.000 000	-0.001
	100 %	+10	1712 499 997	-1.3	0.000 000	-0.001
	100 %	+30	1712 499 998	-0.8	0.000 000	0.000
	100 %	+40	1712 499 997	-2.2	0.000 000	-0.001
	100 %	+50	1712 499 996	-2.7	0.000 000	-0.002
	Batt. Endpoint	+20	1712 499 998	-1.1	0.000 000	-0.001
1777.5	100 %	+20(Ref)	1777 500 001	0.0	0.000 000	0.000
	100 %	-30	1777 500 000	-1.3	0.000 000	-0.001
	100 %	-20	1777 500 003	1.9	0.000 000	0.001
	100 %	-10	1777 500 003	1.5	0.000 000	0.001
	100 %	0	1777 500 002	0.4	0.000 000	0.000
	100 %	+10	1777 500 002	1.1	0.000 000	0.001
	100 %	+30	1777 500 001	0.2	0.000 000	0.000
	100 %	+40	1777 500 003	1.3	0.000 000	0.001
	100 %	+50	1777 500 003	1.4	0.000 000	0.001
	Batt. Endpoint	+20	1777 500 000	-0.9	0.000 000	-0.001

- ▣ BandWidth: 10 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.400 VDC
- ▣ LIMIT: Emission must remain in band

Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
1715.0	100 %	+20(Ref)	1715 000 000	0.0	0.000 000	0.000
	100 %	-30	1714 999 998	-1.3	0.000 000	-0.001
	100 %	-20	1714 999 999	-0.6	0.000 000	0.000
	100 %	-10	1715 000 000	0.2	0.000 000	0.000
	100 %	0	1714 999 999	-1.3	0.000 000	-0.001
	100 %	+10	1715 000 000	0.0	0.000 000	0.000
	100 %	+30	1715 000 000	0.2	0.000 000	0.000
	100 %	+40	1714 999 999	-1.1	0.000 000	-0.001
	100 %	+50	1714 999 999	-0.5	0.000 000	0.000
	Batt. Endpoint	+20	1715 000 000	0.5	0.000 000	0.000
1775.0	100 %	+20(Ref)	1774 999 999	0.0	0.000 000	0.000
	100 %	-30	1774 999 998	-1.2	0.000 000	-0.001
	100 %	-20	1774 999 999	0.2	0.000 000	0.000
	100 %	-10	1774 999 999	0.3	0.000 000	0.000
	100 %	0	1775 000 000	1.3	0.000 000	0.001
	100 %	+10	1774 999 999	0.1	0.000 000	0.000
	100 %	+30	1774 999 999	-0.1	0.000 000	0.000
	100 %	+40	1775 000 000	0.6	0.000 000	0.000
	100 %	+50	1774 999 999	0.4	0.000 000	0.000
	Batt. Endpoint	+20	1774 999 999	-0.2	0.000 000	0.000

- ▣ BandWidth: 15 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.400 VDC
- ▣ LIMIT: Emission must remain in band

Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
1717.5	100 %	+20(Ref)	1717 500 002	0.0	0.000 000	0.000
	100 %	-30	1717 500 002	-0.1	0.000 000	0.000
	100 %	-20	1717 500 003	0.8	0.000 000	0.000
	100 %	-10	1717 500 003	1.5	0.000 000	0.001
	100 %	0	1717 500 003	0.9	0.000 000	0.001
	100 %	+10	1717 500 002	0.1	0.000 000	0.000
	100 %	+30	1717 500 002	0.7	0.000 000	0.000
	100 %	+40	1717 500 002	0.6	0.000 000	0.000
	100 %	+50	1717 500 002	0.4	0.000 000	0.000
	Batt. Endpoint	+20	1717 500 003	0.9	0.000 000	0.001
1772.5	100 %	+20(Ref)	1772 499 996	0.0	0.000 000	0.000
	100 %	-30	1772 499 997	0.4	0.000 000	0.000
	100 %	-20	1772 499 994	-2.4	0.000 000	-0.001
	100 %	-10	1772 499 995	-1.2	0.000 000	-0.001
	100 %	0	1772 499 995	-1.5	0.000 000	-0.001
	100 %	+10	1772 499 996	0.1	0.000 000	0.000
	100 %	+30	1772 499 995	-1.0	0.000 000	-0.001
	100 %	+40	1772 499 994	-2.4	0.000 000	-0.001
	100 %	+50	1772 499 994	-2.6	0.000 000	-0.001
	Batt. Endpoint	+20	1772 499 994	-2.4	0.000 000	-0.001

- ▣ BandWidth: 20 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.400 VDC
- ▣ LIMIT: Emission must remain in band

Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
1720.0	100 %	+20(Ref)	1719 999 999	0.0	0.000 000	0.000
	100 %	-30	1719 999 996	-2.8	0.000 000	-0.002
	100 %	-20	1719 999 997	-1.4	0.000 000	-0.001
	100 %	-10	1719 999 996	-2.7	0.000 000	-0.002
	100 %	0	1719 999 997	-1.5	0.000 000	-0.001
	100 %	+10	1719 999 998	-0.5	0.000 000	0.000
	100 %	+30	1719 999 995	-3.5	0.000 000	-0.002
	100 %	+40	1719 999 998	-0.9	0.000 000	-0.001
	100 %	+50	1719 999 997	-1.3	0.000 000	-0.001
	Batt. Endpoint	+20	1719 999 997	-1.5	0.000 000	-0.001
1770.0	100 %	+20(Ref)	1770 000 001	0.0	0.000 000	0.000
	100 %	-30	1770 000 002	0.9	0.000 000	0.001
	100 %	-20	1770 000 001	-0.6	0.000 000	0.000
	100 %	-10	1770 000 003	2.1	0.000 000	0.001
	100 %	0	1770 000 002	0.4	0.000 000	0.000
	100 %	+10	1770 000 001	-0.2	0.000 000	0.000
	100 %	+30	1770 000 002	0.5	0.000 000	0.000
	100 %	+40	1770 000 002	0.8	0.000 000	0.000
	100 %	+50	1770 000 002	0.8	0.000 000	0.000
	Batt. Endpoint	+20	1770 000 003	2.2	0.000 000	0.001

- ▣ BandWidth: 30 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.400 VDC
- ▣ LIMIT: Emission must remain in band

Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
1725.0	100 %	+20(Ref)	1725 000 006	0.0	0.000 000	0.000
	100 %	-30	1725 000 010	4.2	0.000 000	0.002
	100 %	-20	1725 000 010	4.2	0.000 000	0.002
	100 %	-10	1725 000 010	4.1	0.000 000	0.002
	100 %	0	1725 000 011	5.8	0.000 000	0.003
	100 %	+10	1725 000 011	4.9	0.000 000	0.003
	100 %	+30	1725 000 011	5.8	0.000 000	0.003
	100 %	+40	1725 000 011	5.6	0.000 000	0.003
	100 %	+50	1725 000 012	6.6	0.000 000	0.004
	Batt. Endpoint	+20	1725 000 010	4.6	0.000 000	0.003
1765.0	100 %	+20(Ref)	1765 000 004	0.0	0.000 000	0.000
	100 %	-30	1765 000 008	3.7	0.000 000	0.002
	100 %	-20	1765 000 008	3.7	0.000 000	0.002
	100 %	-10	1765 000 008	4.2	0.000 000	0.002
	100 %	0	1765 000 007	3.6	0.000 000	0.002
	100 %	+10	1765 000 006	2.3	0.000 000	0.001
	100 %	+30	1765 000 007	3.5	0.000 000	0.002
	100 %	+40	1765 000 007	3.1	0.000 000	0.002
	100 %	+50	1765 000 008	4.1	0.000 000	0.002
	Batt. Endpoint	+20	1765 000 008	4.2	0.000 000	0.002

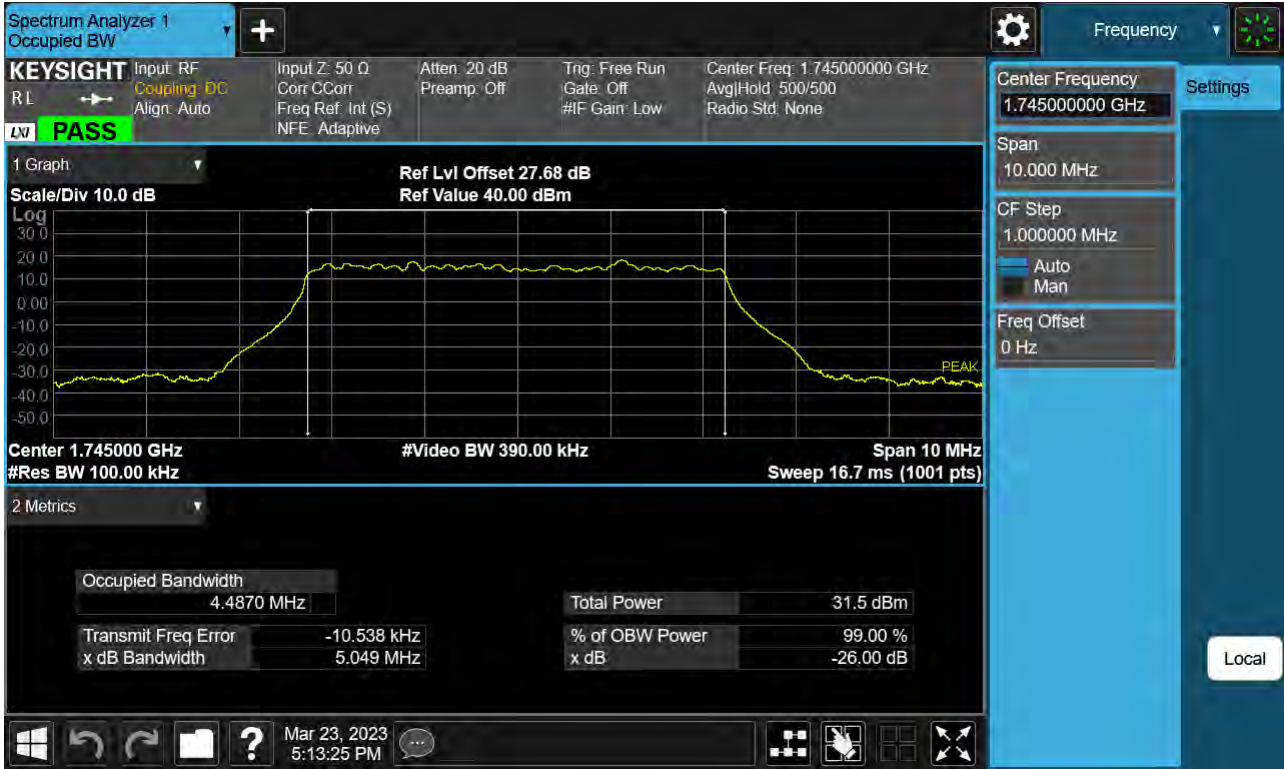
- ▣ BandWidth: 40 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.400 VDC
- ▣ LIMIT: Emission must remain in band

Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
1730.0	100 %	+20(Ref)	1730 000 010	0.0	0.000 000	0.000
	100 %	-30	1730 000 020	9.9	0.000 001	0.006
	100 %	-20	1730 000 018	7.8	0.000 000	0.005
	100 %	-10	1730 000 017	7.4	0.000 000	0.004
	100 %	0	1730 000 018	8.1	0.000 000	0.005
	100 %	+10	1730 000 018	7.9	0.000 000	0.005
	100 %	+30	1730 000 018	7.6	0.000 000	0.004
	100 %	+40	1730 000 020	9.8	0.000 001	0.006
	100 %	+50	1730 000 019	8.8	0.000 001	0.005
	Batt. Endpoint	+20	1730 000 017	7.4	0.000 000	0.004
1760.0	100 %	+20(Ref)	1760 000 009	0.0	0.000 000	0.000
	100 %	-30	1760 000 018	9.1	0.000 001	0.005
	100 %	-20	1760 000 018	9.3	0.000 001	0.005
	100 %	-10	1760 000 017	8.4	0.000 000	0.005
	100 %	0	1760 000 018	9.1	0.000 001	0.005
	100 %	+10	1760 000 018	9.2	0.000 001	0.005
	100 %	+30	1760 000 019	9.8	0.000 001	0.006
	100 %	+40	1760 000 019	9.4	0.000 001	0.005
	100 %	+50	1760 000 019	9.4	0.000 001	0.005
	Batt. Endpoint	+20	1760 000 018	9.0	0.000 001	0.005

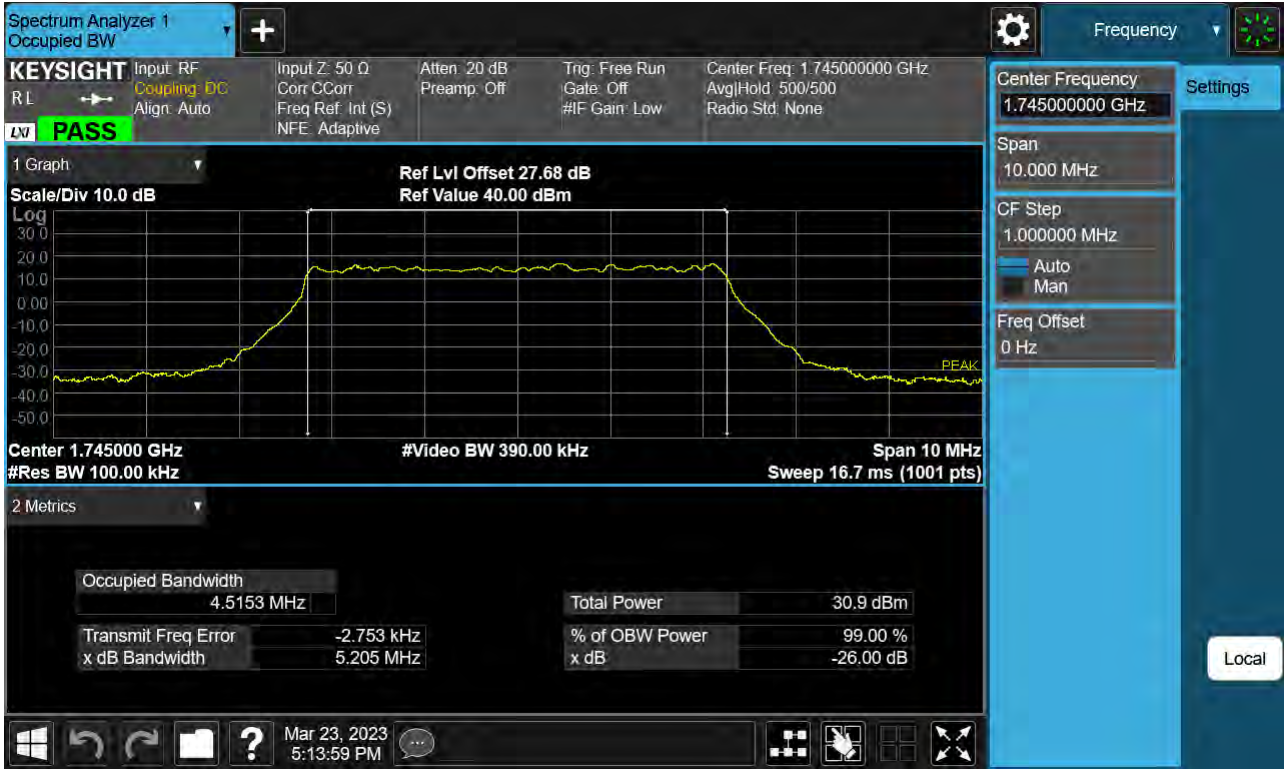
## 9. TEST PLOTS



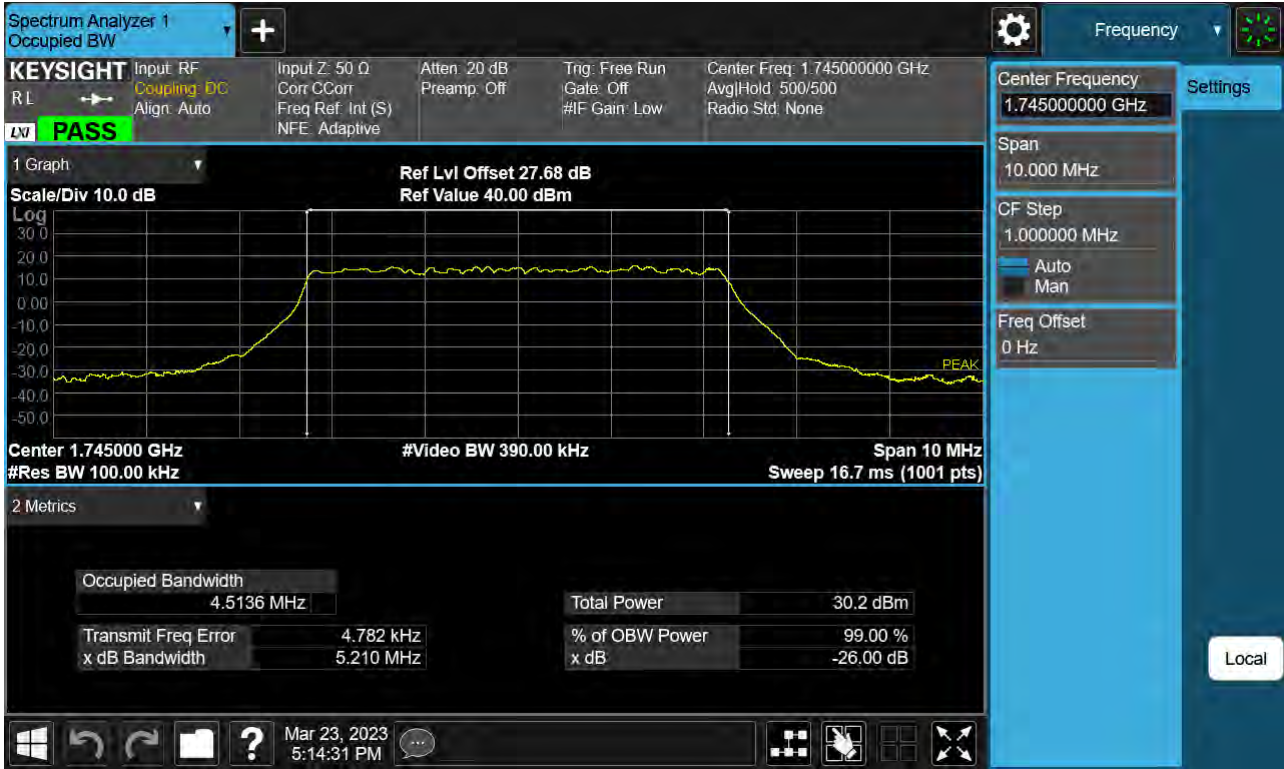
Sub6 n66. Occupied Bandwidth Plot (5 M BW Ch.349000 BPSK Full RB)



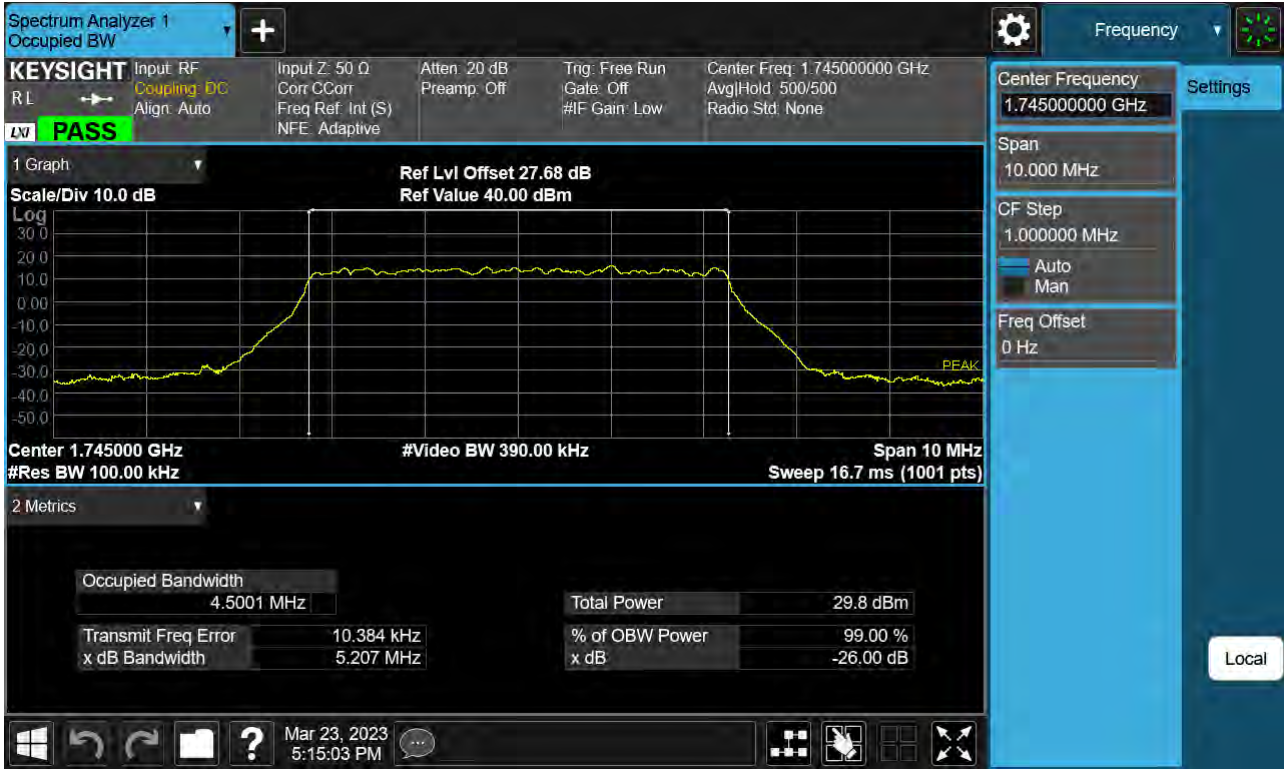
Sub6 n66. Occupied Bandwidth Plot (5 M BW Ch.349000 QPSK Full RB)



Sub6 n66. Occupied Bandwidth Plot (5 M BW Ch.349000 16QAM Full RB)

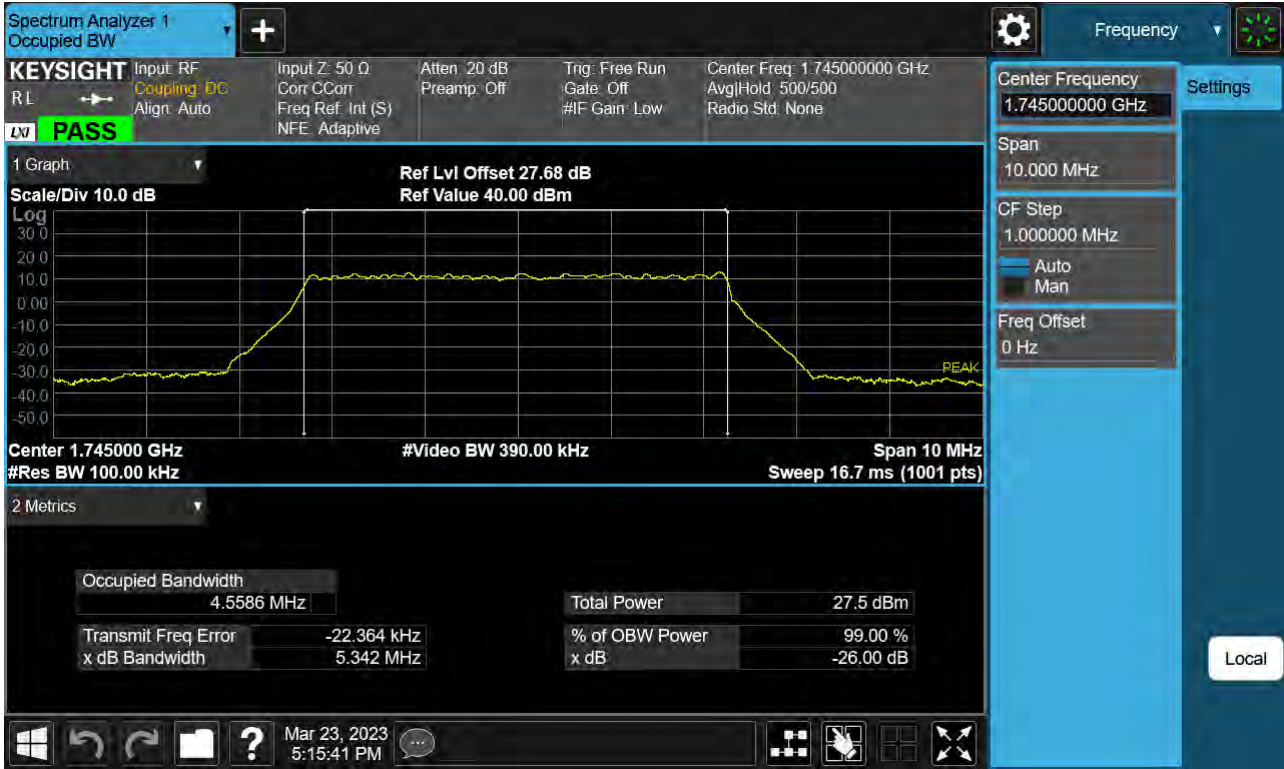


Sub6 n66. Occupied Bandwidth Plot (5 M BW Ch.349000 64QAM Full RB)

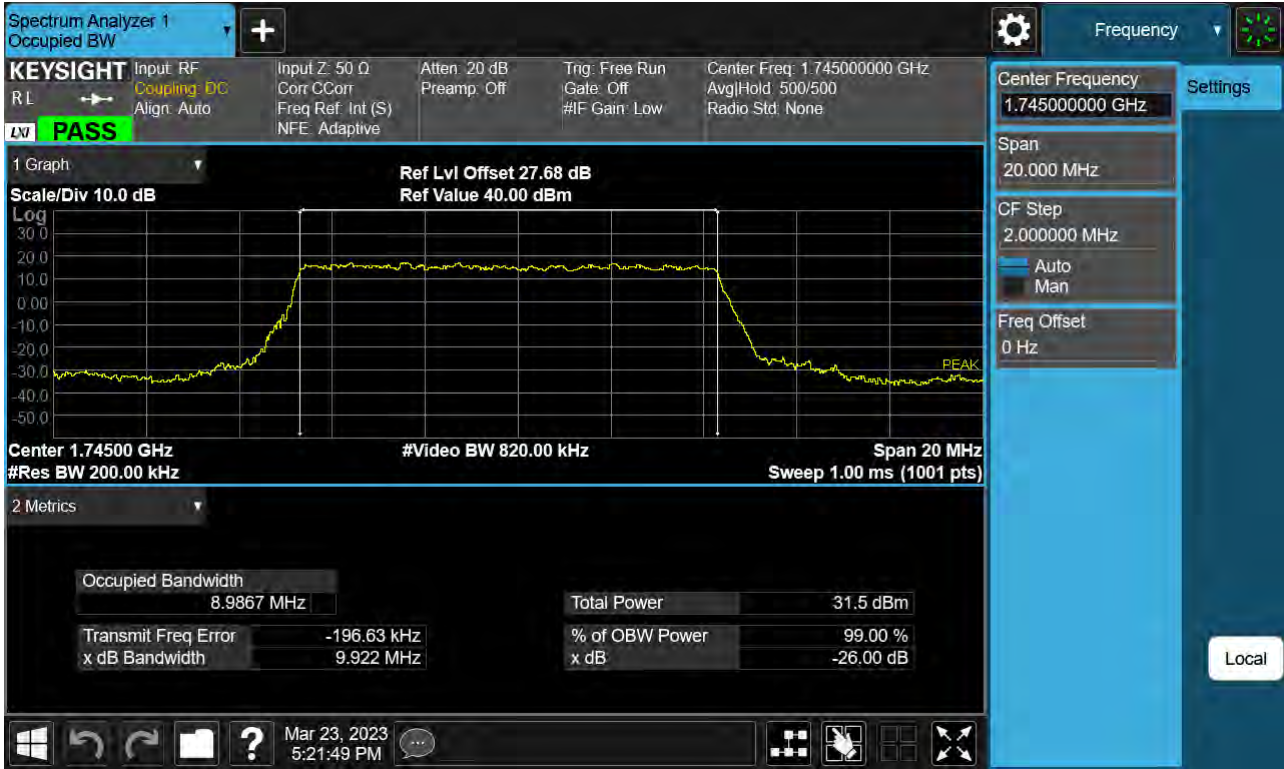




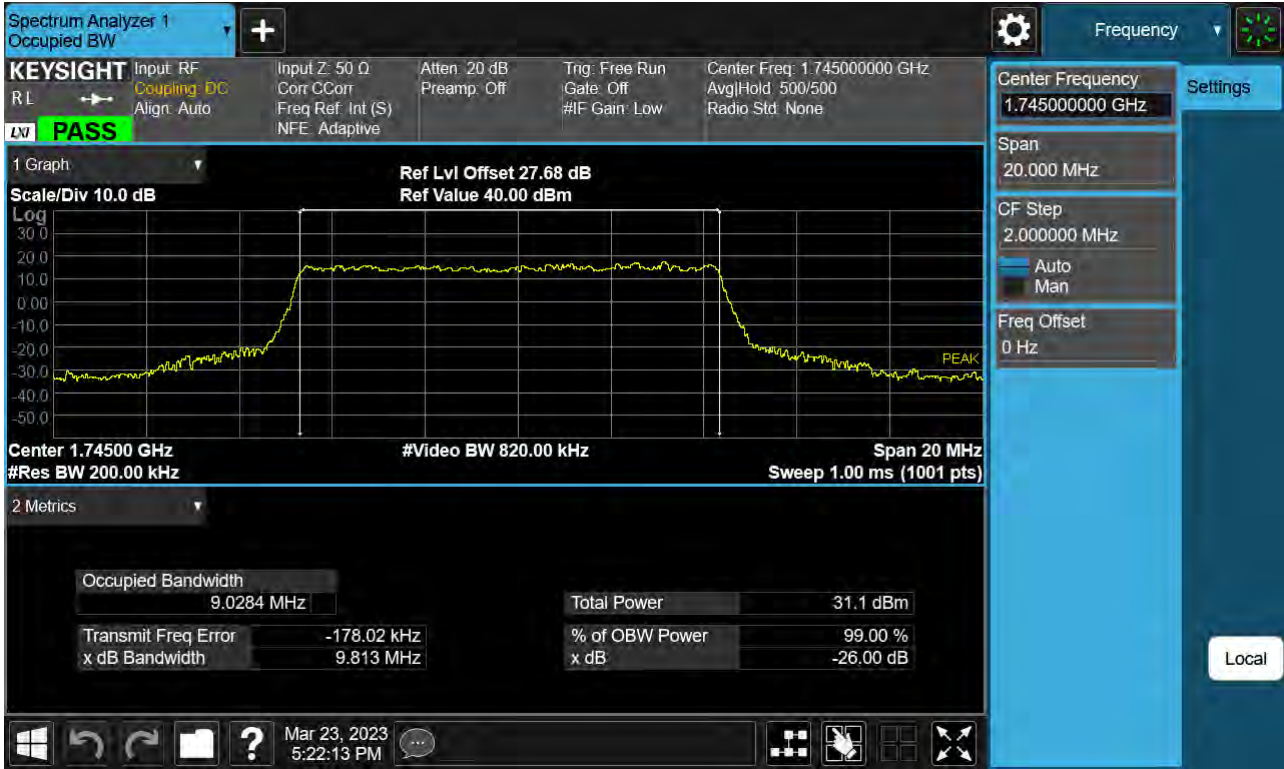
Sub6 n66. Occupied Bandwidth Plot (5 M BW Ch.349000 256QAM Full RB)



Sub6 n66. Occupied Bandwidth Plot (10 M BW Ch.349000 BPSK Full RB)



Sub6 n66. Occupied Bandwidth Plot (10 M BW Ch.349000 QPSK Full RB)

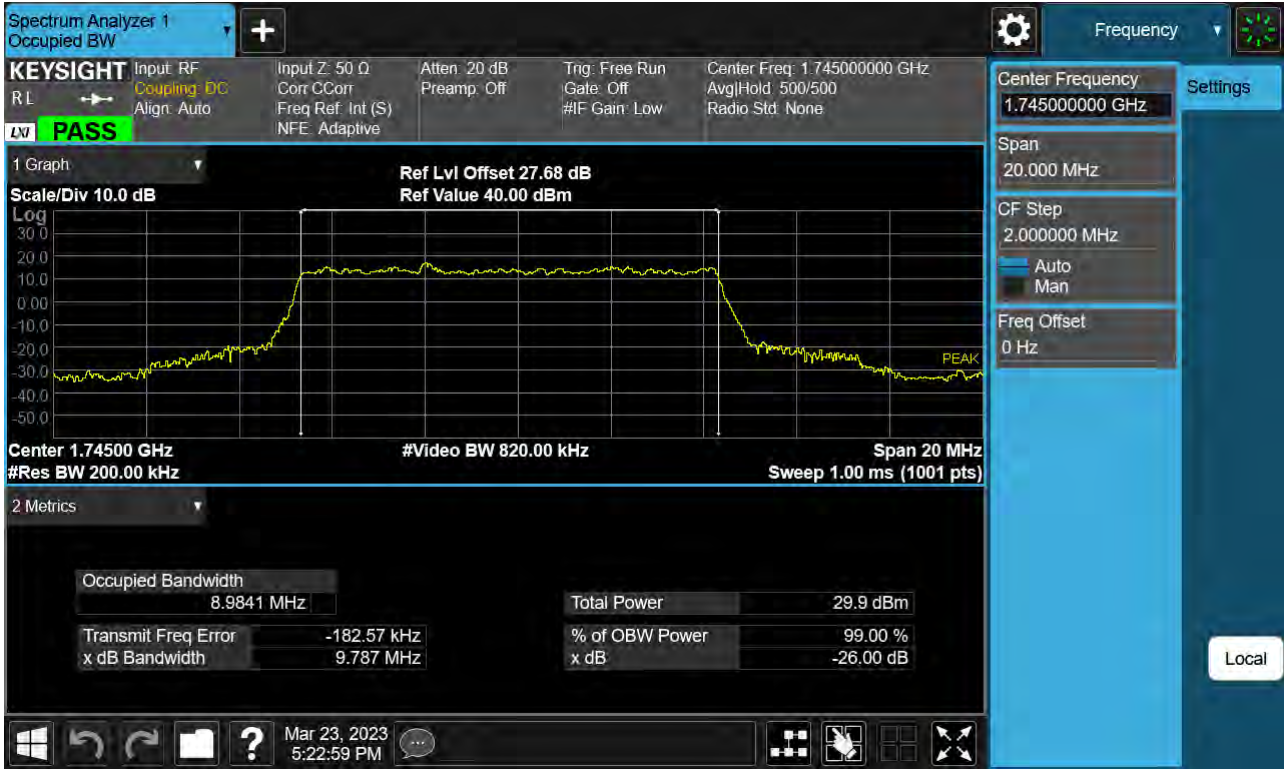


Sub6 n66. Occupied Bandwidth Plot (10 M BW Ch.349000 16QAM Full RB)

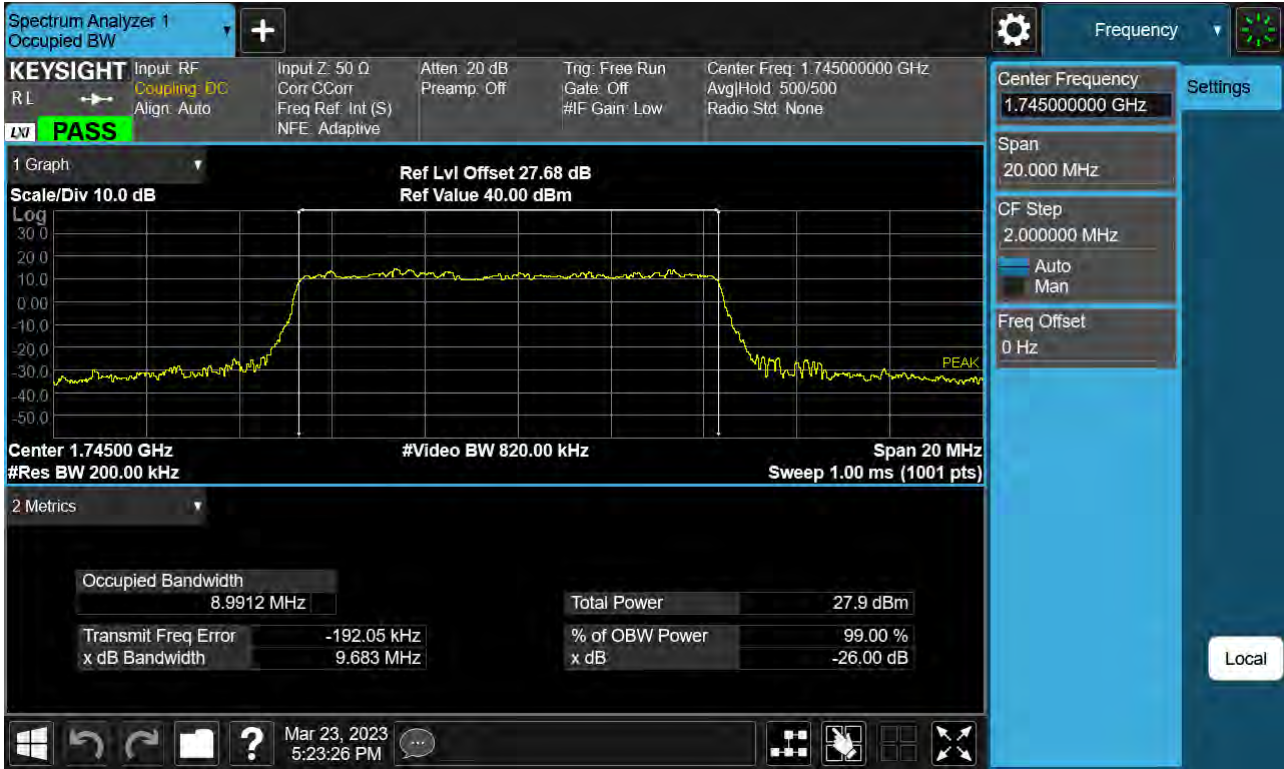




Sub6 n66. Occupied Bandwidth Plot (10 M BW Ch.349000 64QAM Full RB)



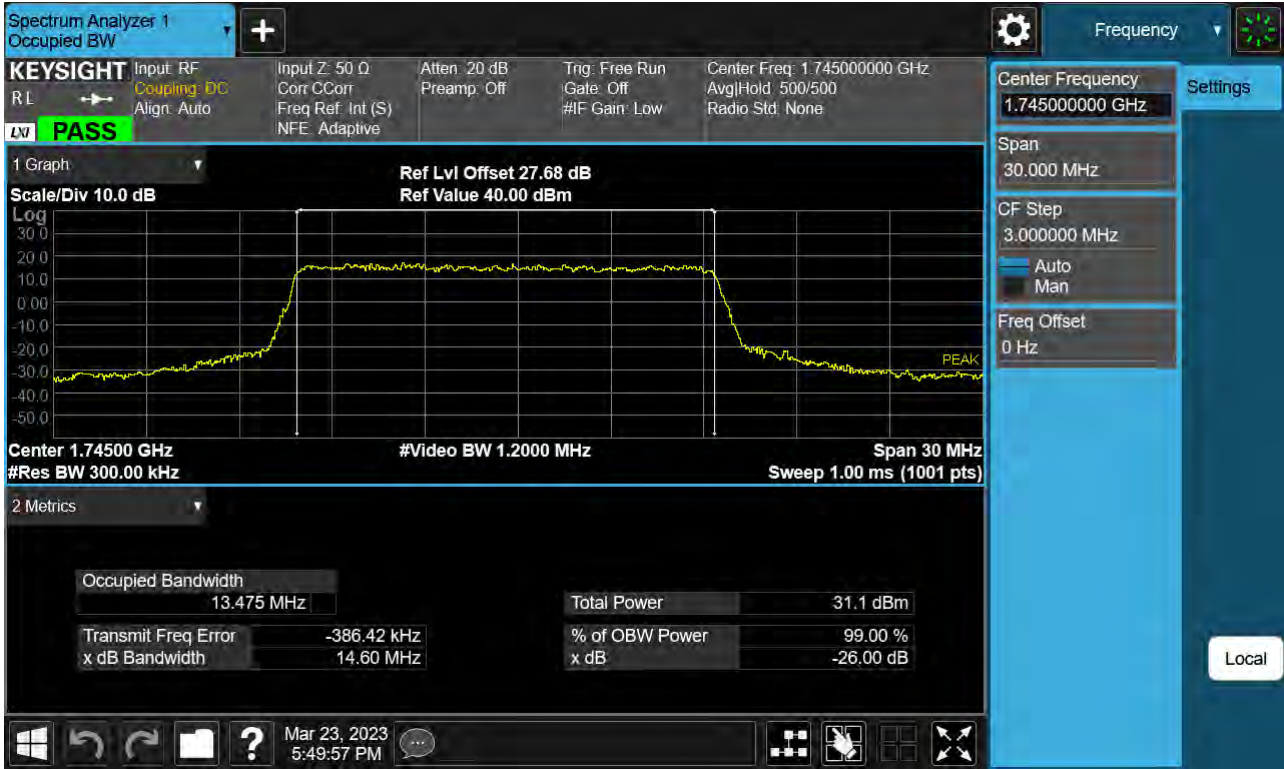
Sub6 n66. Occupied Bandwidth Plot (10 M BW Ch.349000 256QAM Full RB)



Sub6 n66. Occupied Bandwidth Plot (15 M BW Ch.349000 BPSK Full RB)

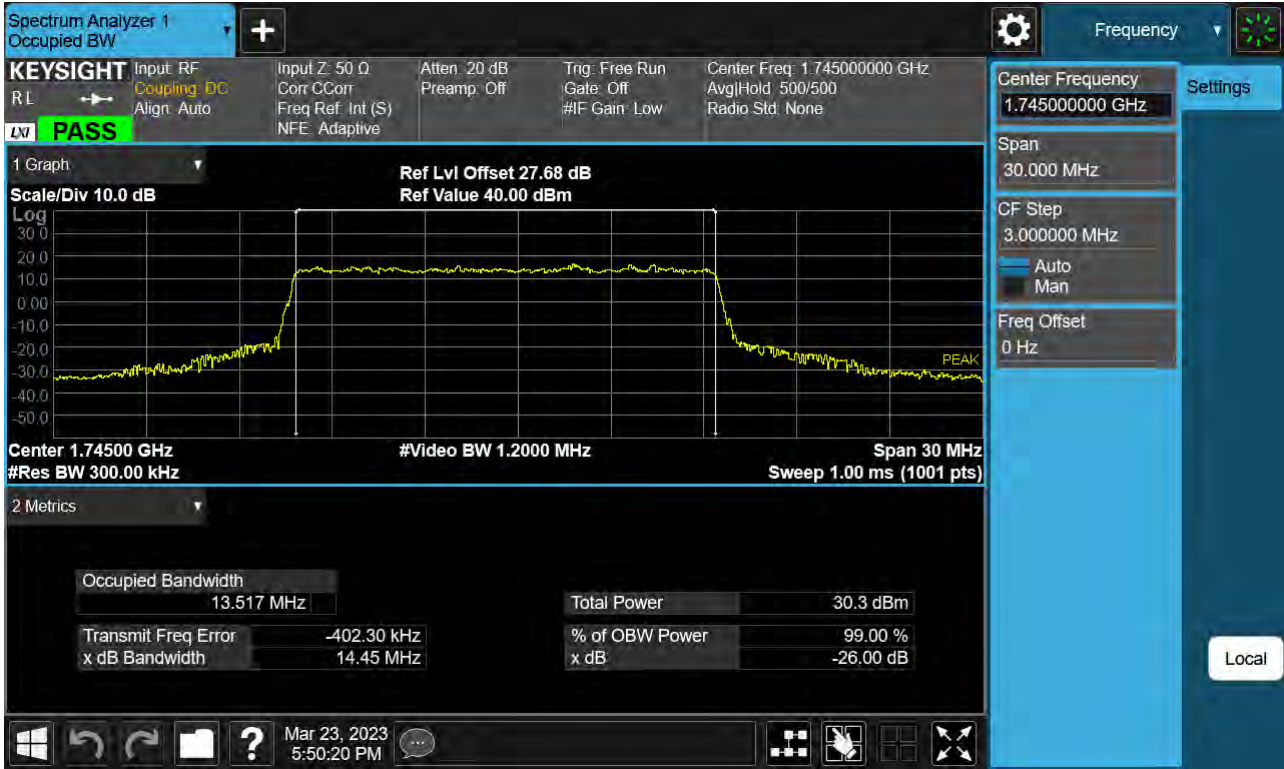


Sub6 n66. Occupied Bandwidth Plot (15 M BW Ch.349000 QPSK Full RB)





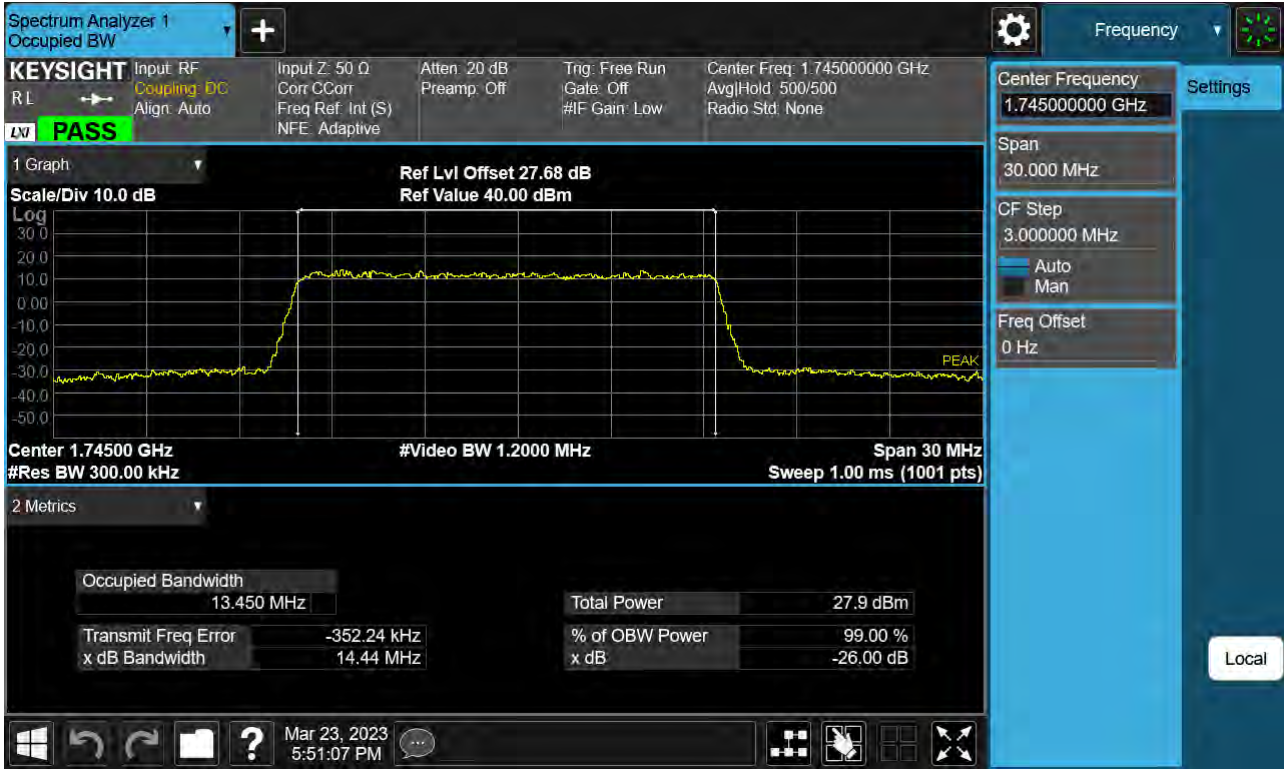
Sub6 n66. Occupied Bandwidth Plot (15 M BW Ch.349000 16QAM Full RB)



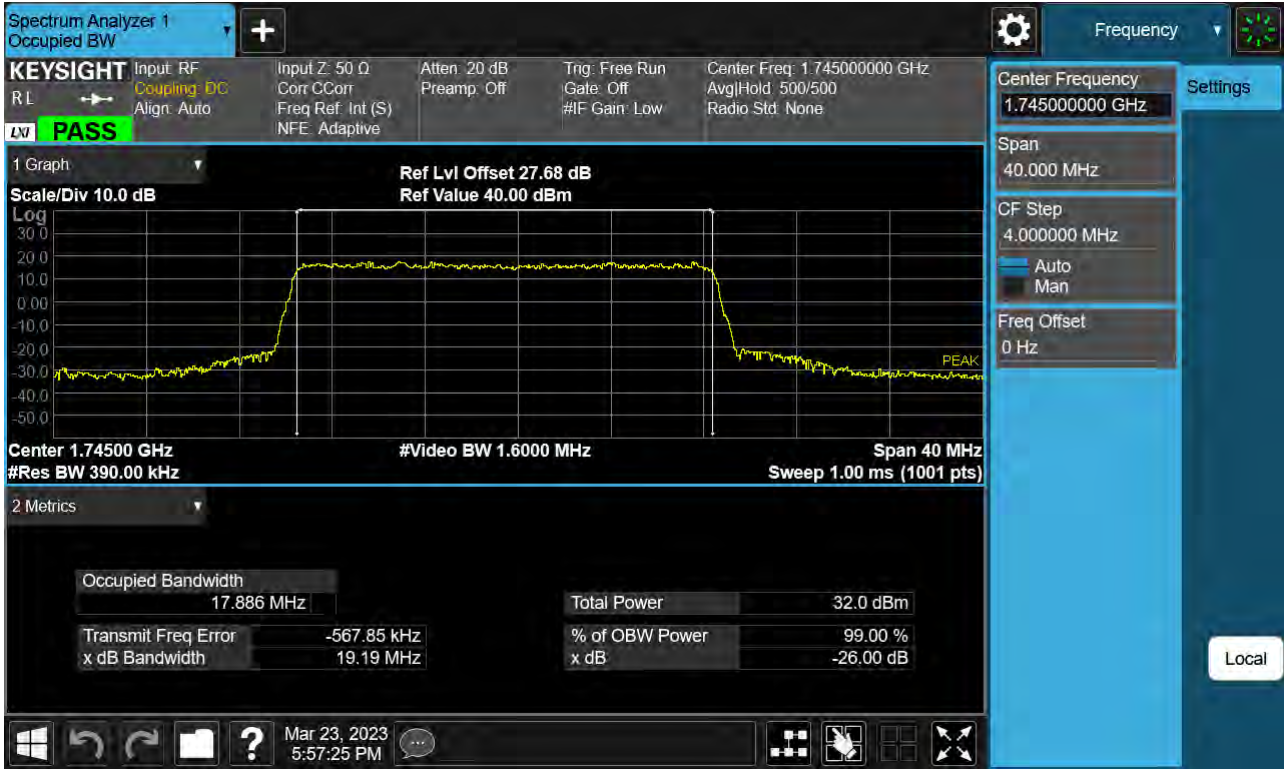
Sub6 n66. Occupied Bandwidth Plot (15 M BW Ch.349000 64QAM Full RB)



Sub6 n66. Occupied Bandwidth Plot (15 M BW Ch.349000 256QAM Full RB)

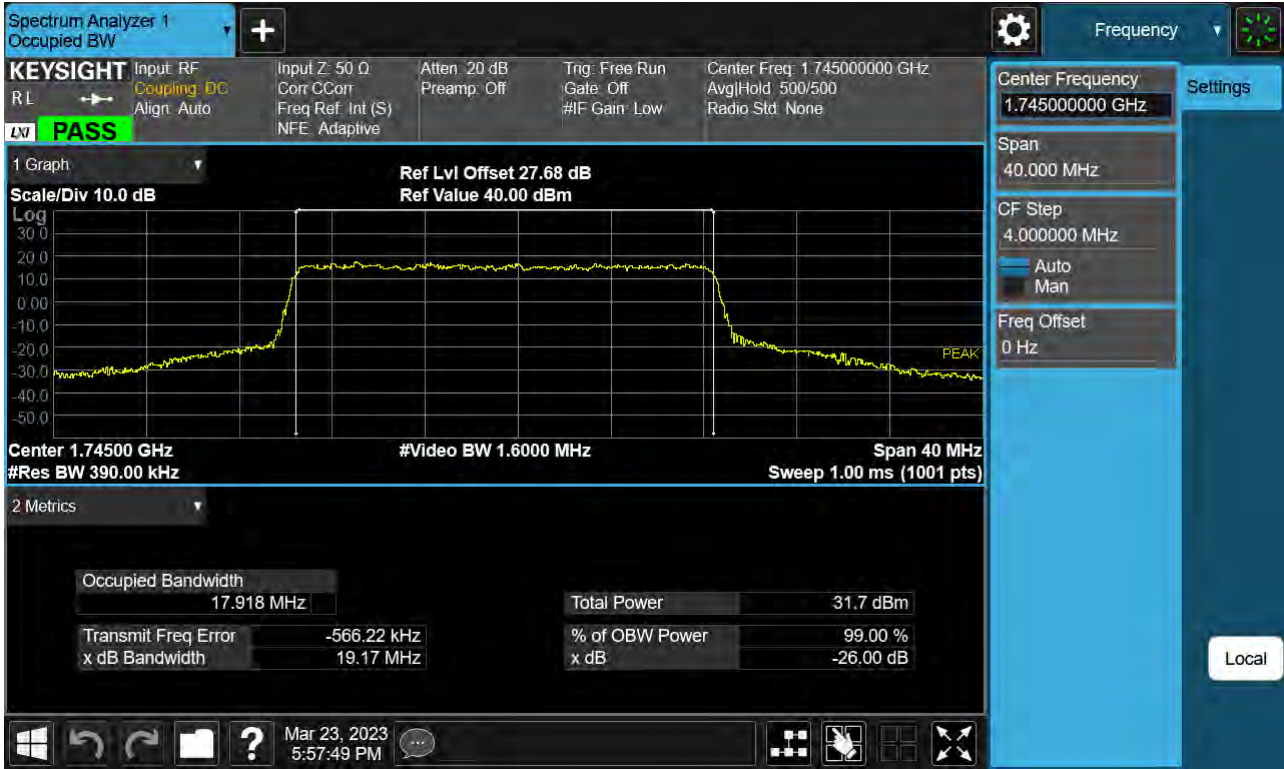


Sub6 n66. Occupied Bandwidth Plot (20 M BW Ch.349000 BPSK Full RB)

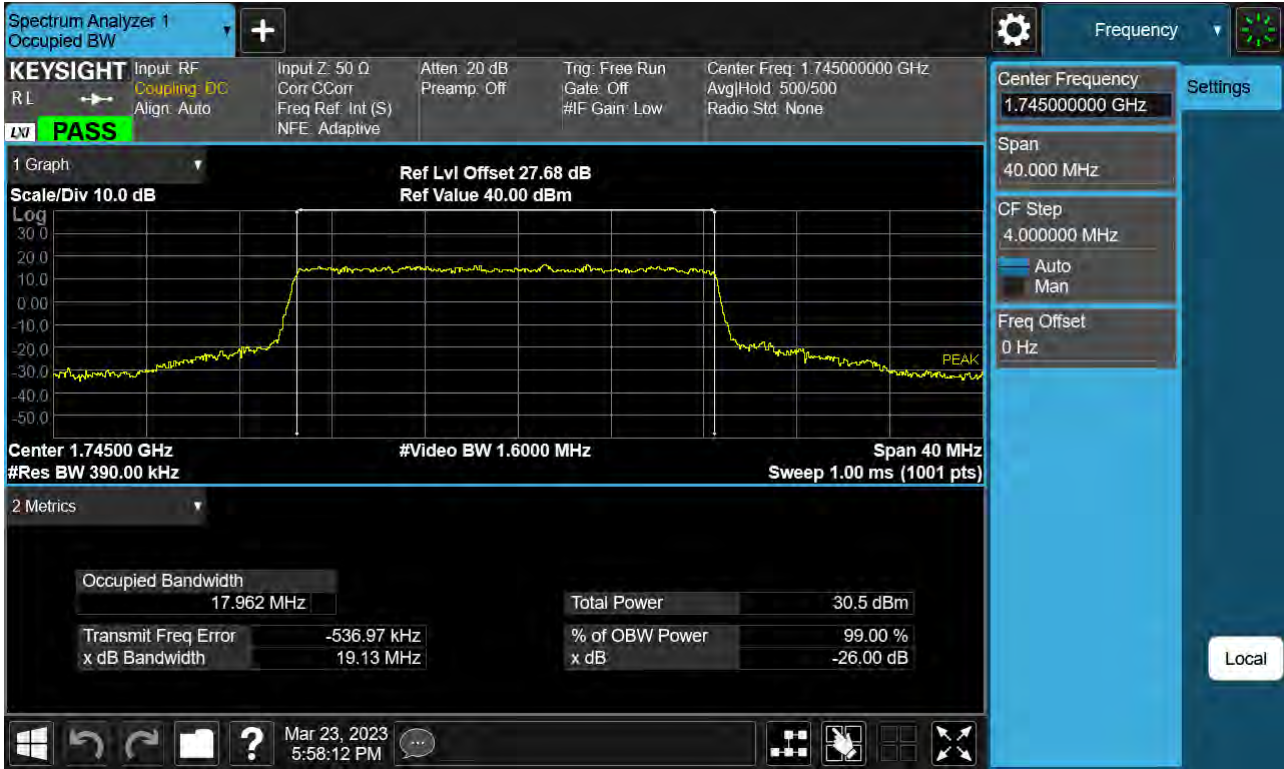




Sub6 n66. Occupied Bandwidth Plot (20 M BW Ch.349000 QPSK Full RB)



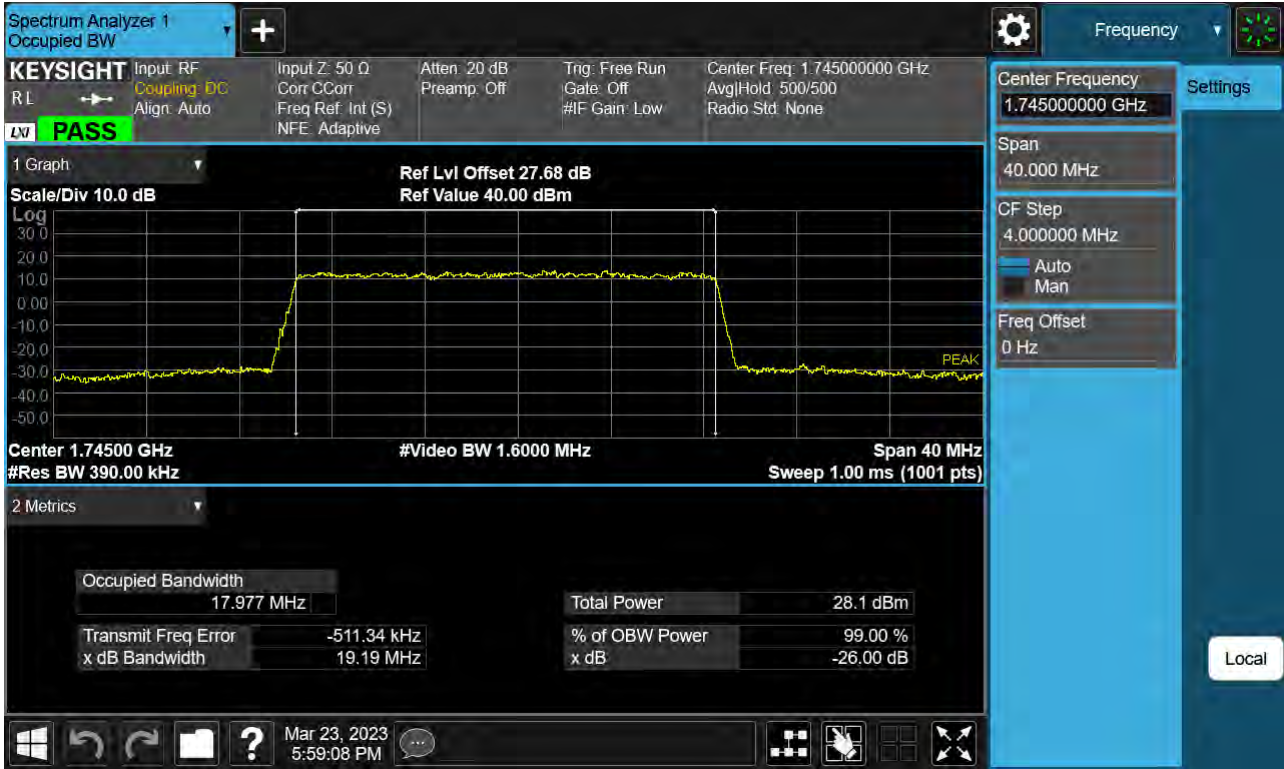
Sub6 n66. Occupied Bandwidth Plot (20 M BW Ch.349000 16QAM Full RB)



Sub6 n66. Occupied Bandwidth Plot (20 M BW Ch.349000 64QAM Full RB)

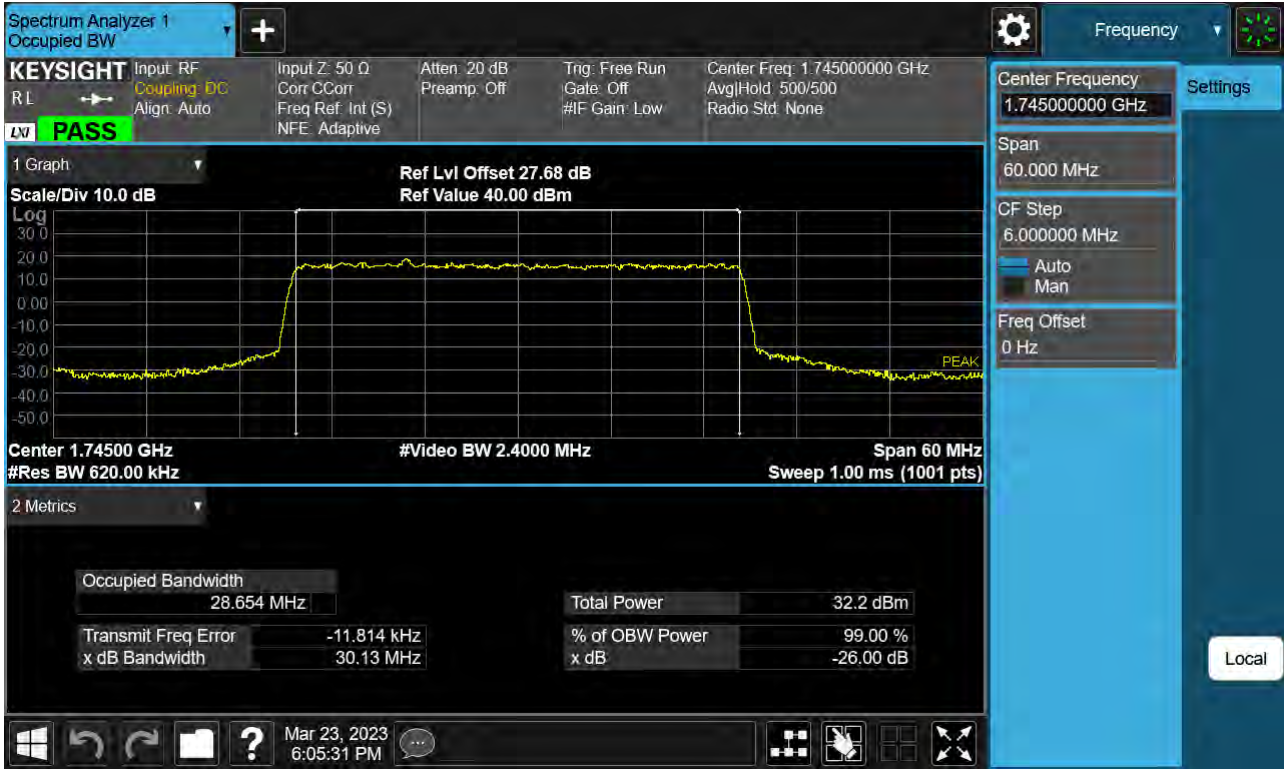


Sub6 n66. Occupied Bandwidth Plot (20 M BW Ch.349000 256QAM Full RB)

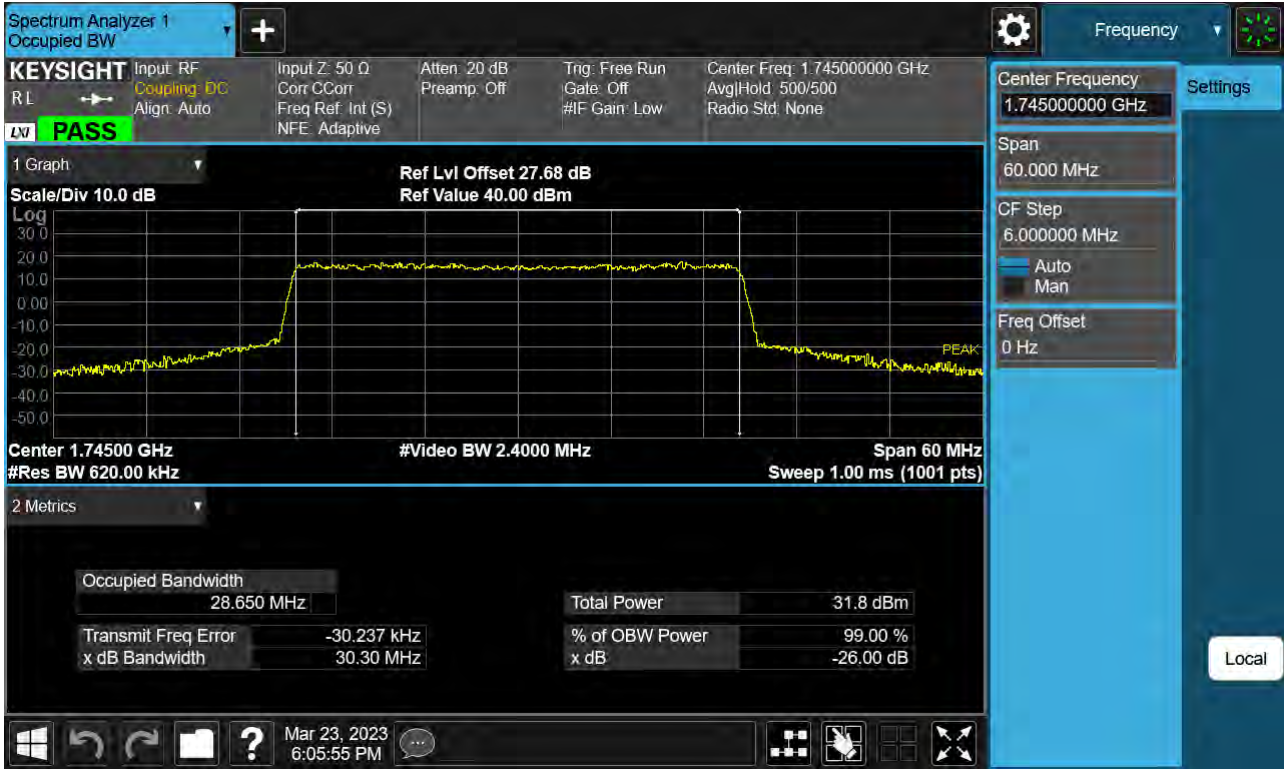




Sub6 n66. Occupied Bandwidth Plot (30 M BW Ch.349000 BPSK Full RB)



Sub6 n66. Occupied Bandwidth Plot (30 M BW Ch.349000 QPSK Full RB)



Sub6 n66. Occupied Bandwidth Plot (30 M BW Ch.349000 16QAM Full RB)

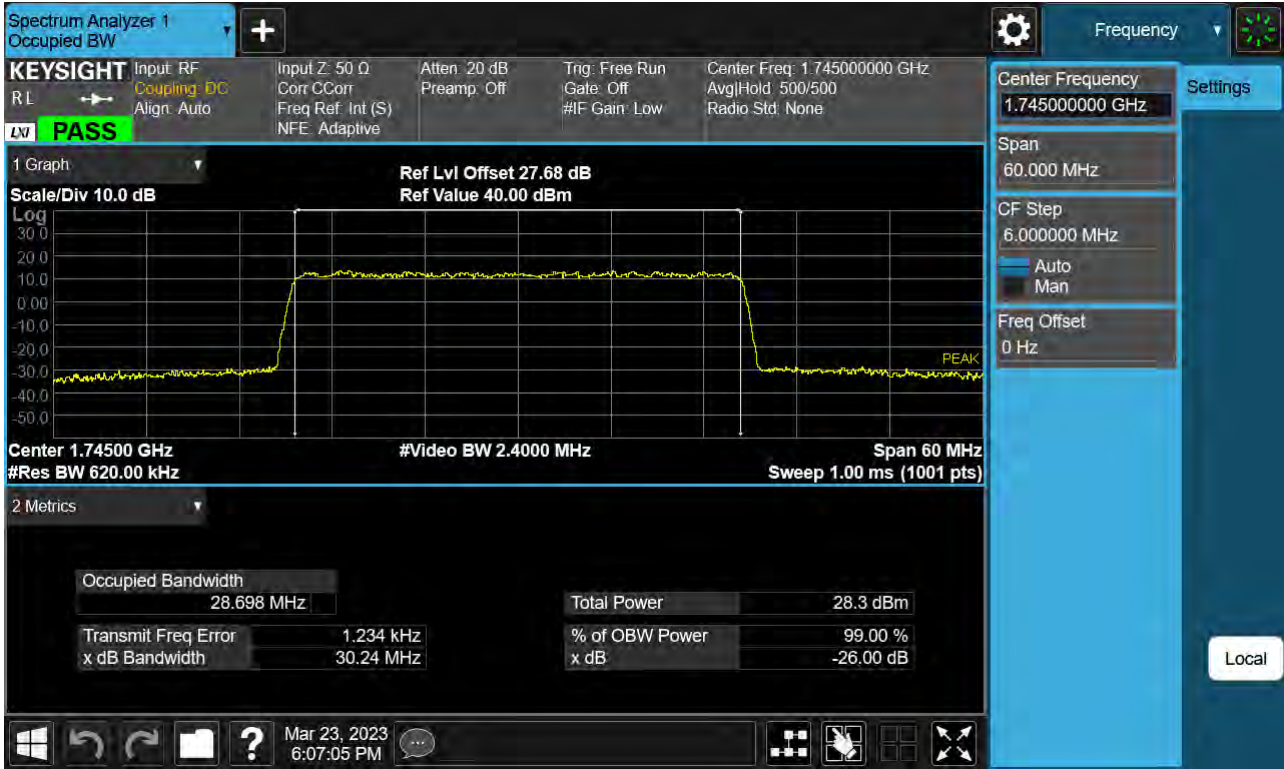


Sub6 n66. Occupied Bandwidth Plot (30 M BW Ch.349000 64QAM Full RB)

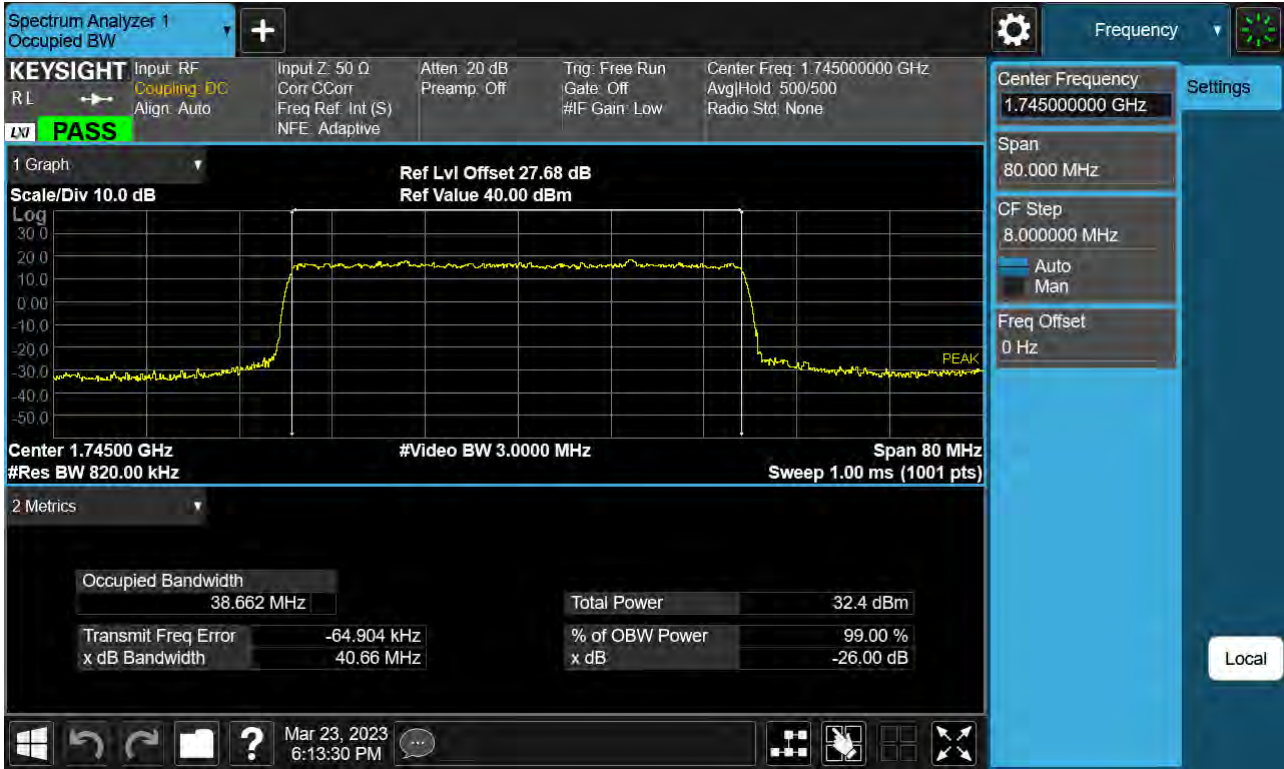




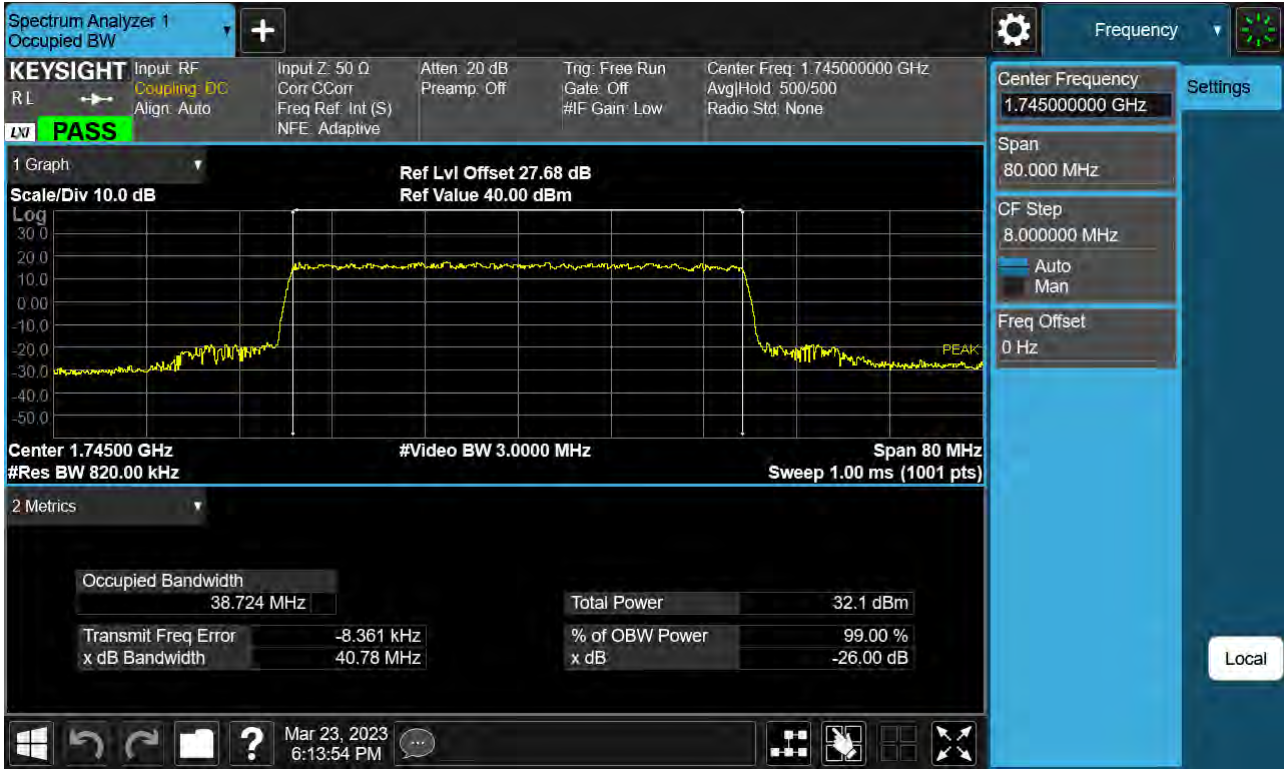
Sub6 n66. Occupied Bandwidth Plot (30 M BW Ch.349000 256QAM Full RB)



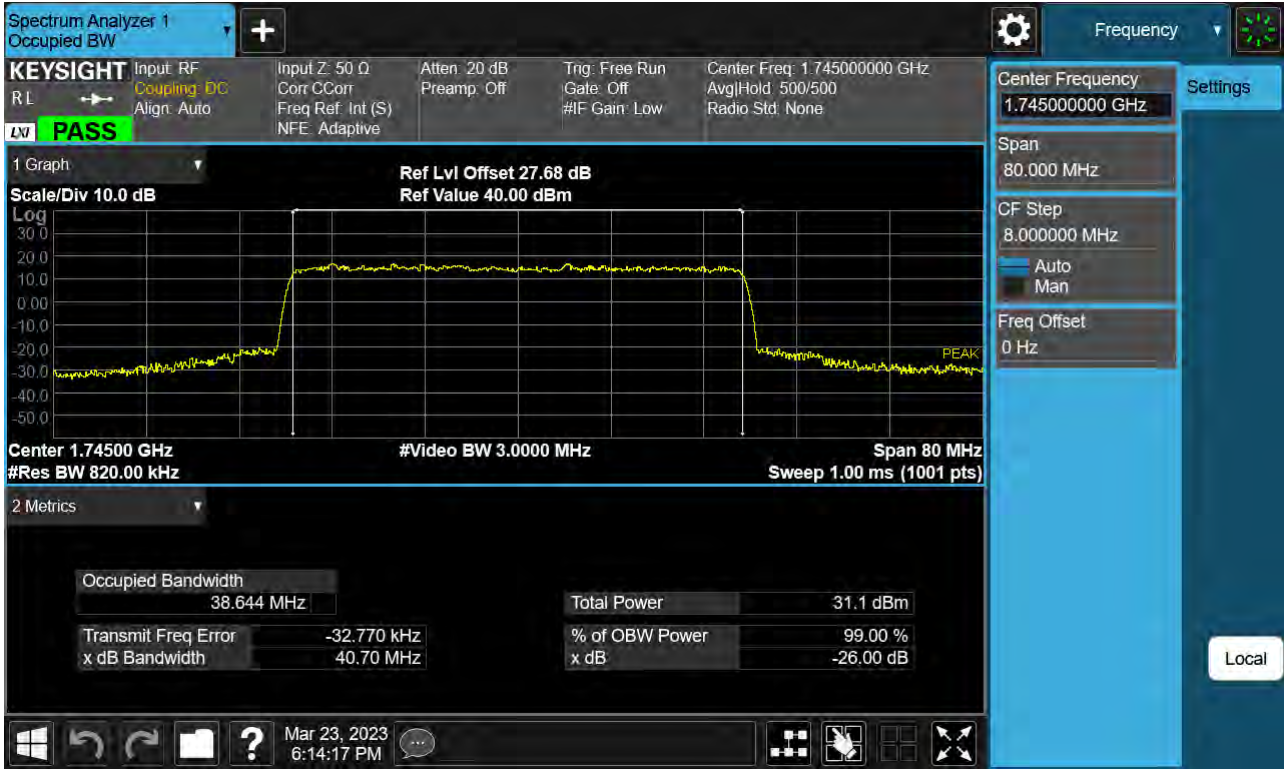
Sub6 n66. Occupied Bandwidth Plot (40 M BW Ch.349000 BPSK Full RB)



Sub6 n66. Occupied Bandwidth Plot (40 M BW Ch.349000 QPSK Full RB)

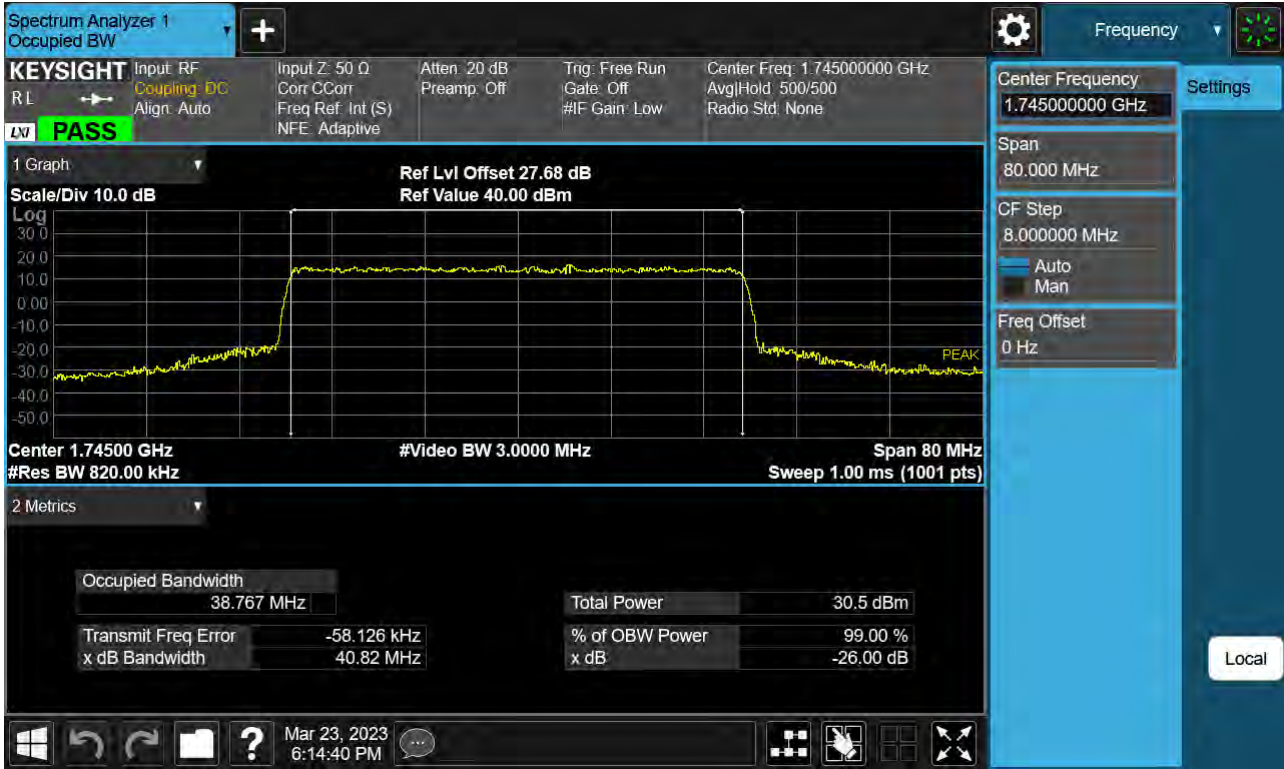


Sub6 n66. Occupied Bandwidth Plot (40 M BW Ch.349000 16QAM Full RB)

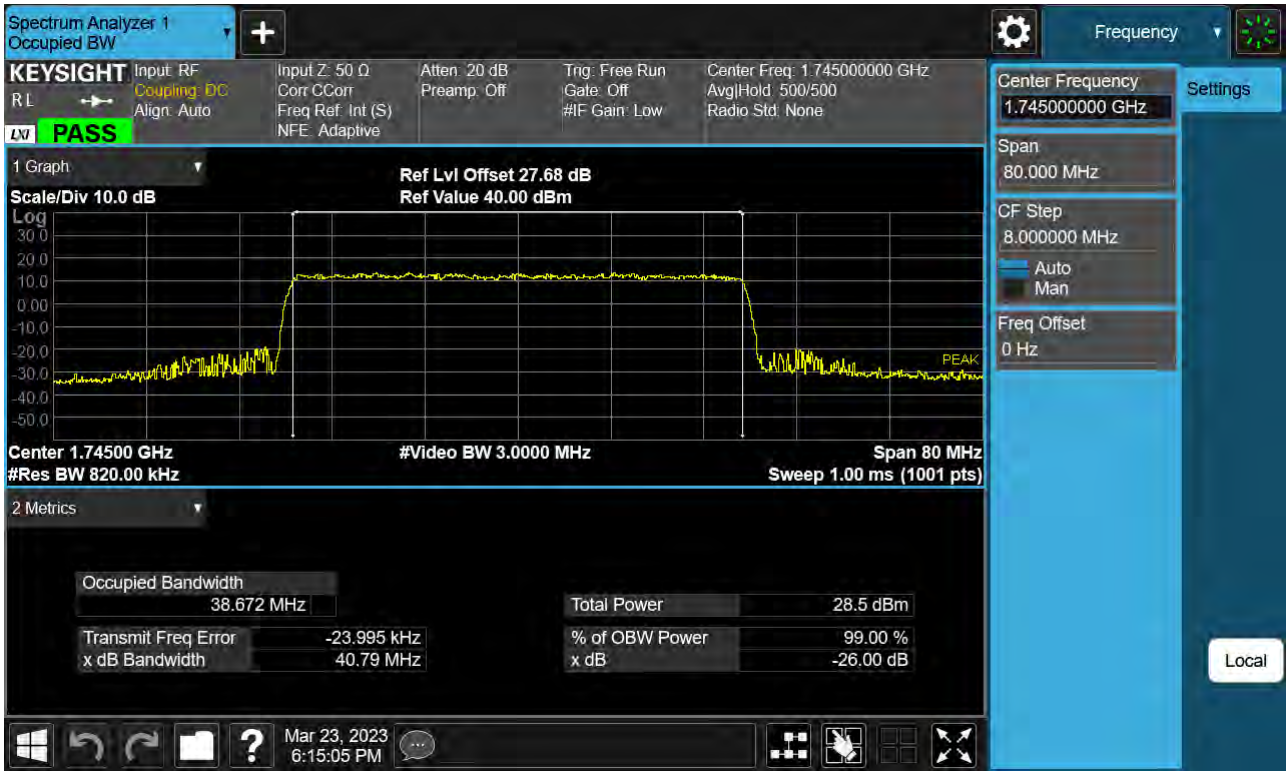




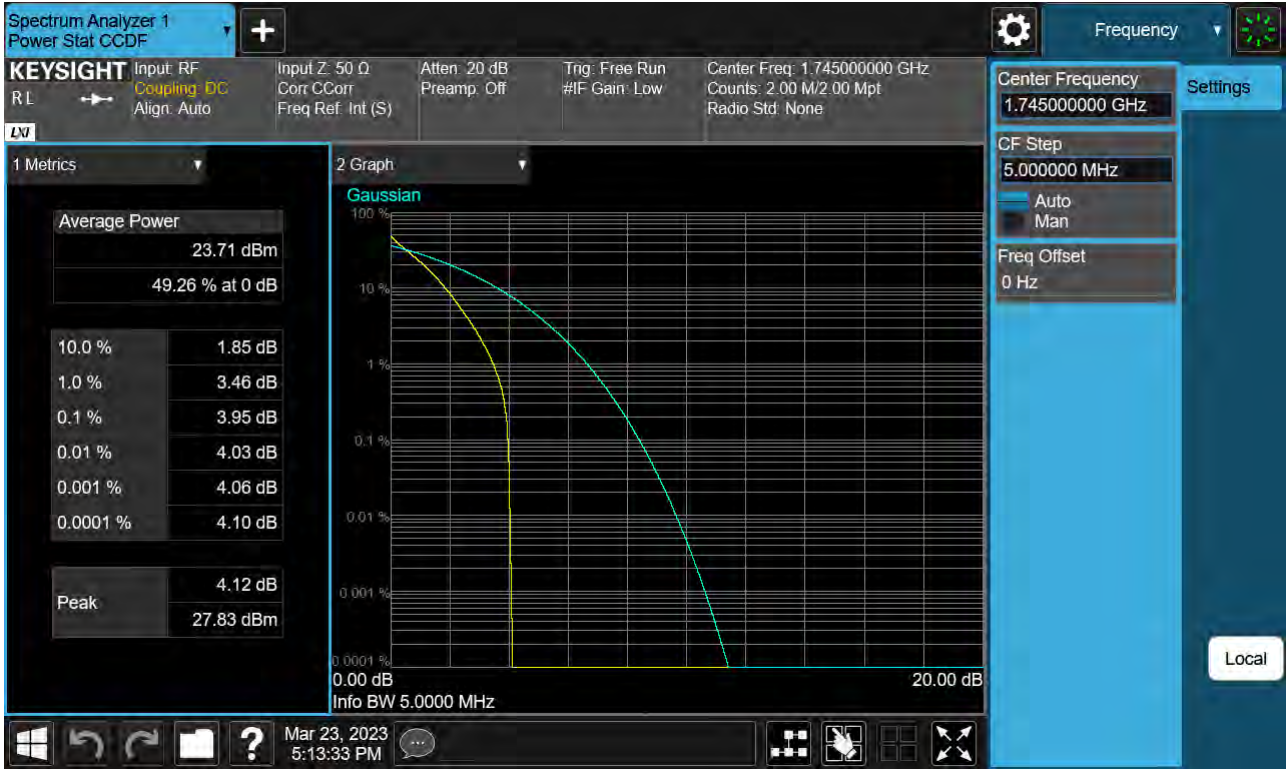
Sub6 n66. Occupied Bandwidth Plot (40 M BW Ch.349000 64QAM Full RB)



Sub6 n66. Occupied Bandwidth Plot (40 M BW Ch.349000 256QAM Full RB)



Sub6 n66. PAR Plot (5 M BW\_Ch.349000\_ BPSK\_ Full RB)

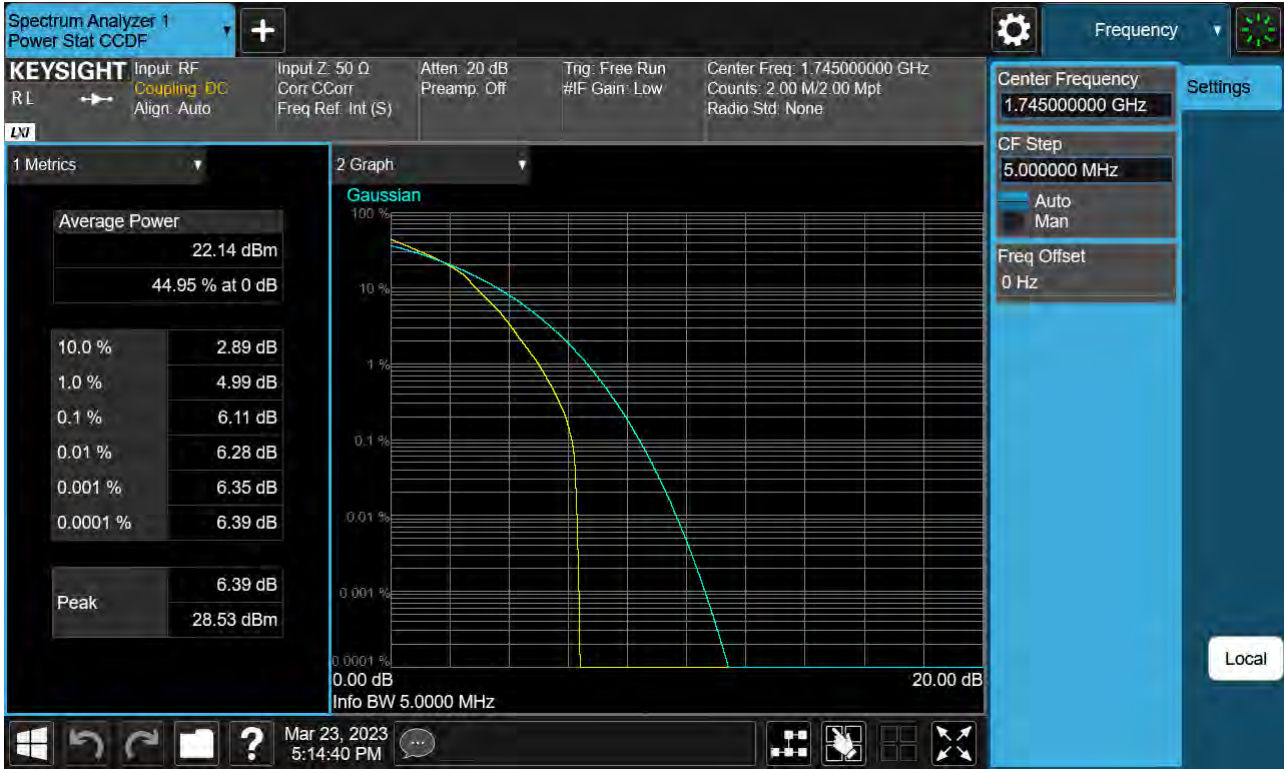


Sub6 n66. PAR Plot (5 M BW\_Ch.349000\_QPSK\_Full RB)





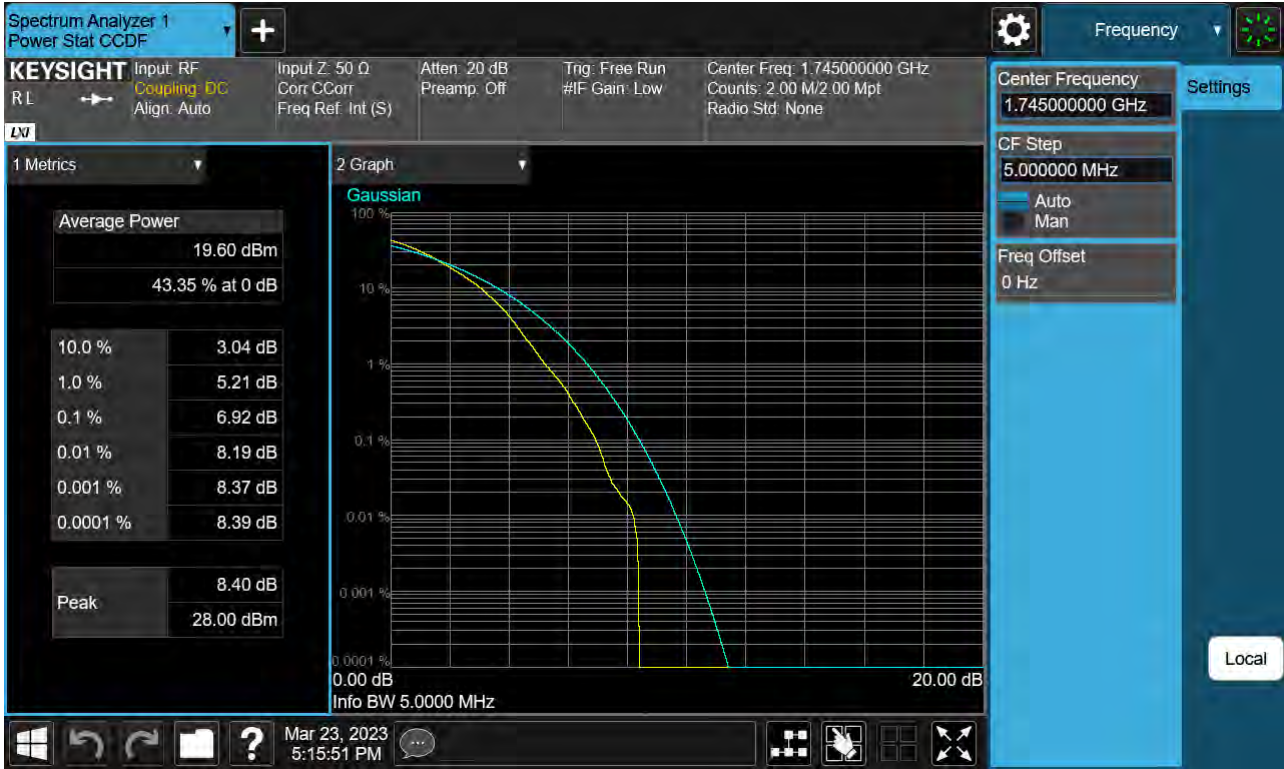
Sub6 n66. PAR Plot (5 M BW\_Ch.349000\_16QAM\_Full RB)



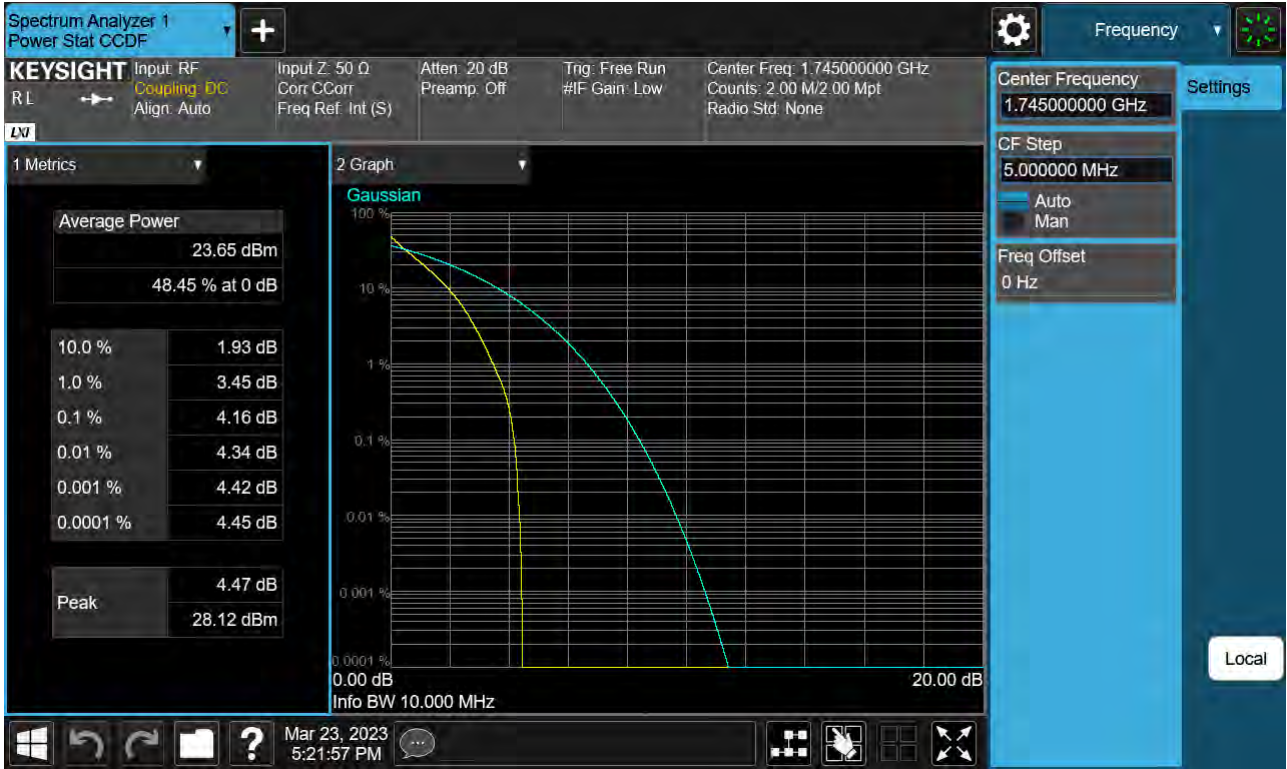
Sub6 n66. PAR Plot (5 M BW\_Ch.349000\_64QAM\_Full RB)



Sub6 n66. PAR Plot (5 M BW\_Ch.349000\_256QAM\_Full RB)

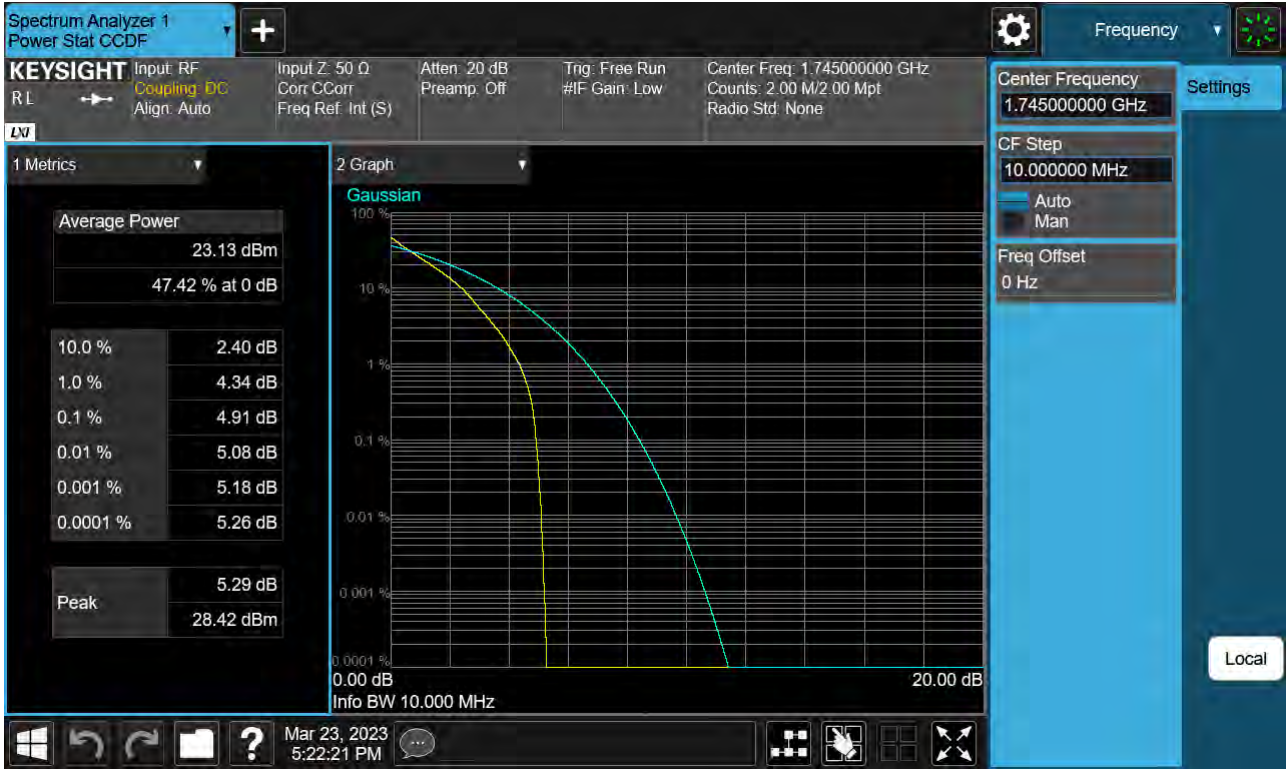


Sub6 n66. PAR Plot (10 M BW\_Ch.349000\_ BPSK\_ Full RB)





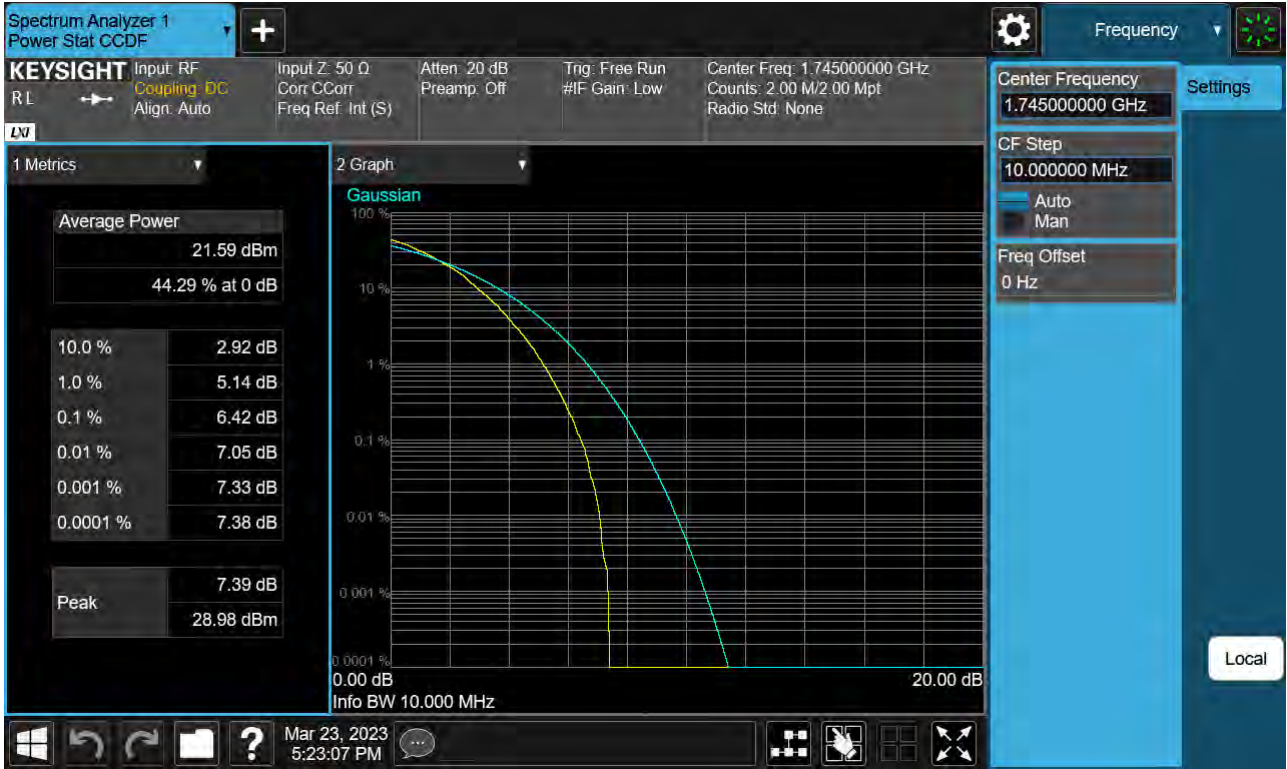
Sub6 n66. PAR Plot (10 M BW\_Ch.349000\_QPSK\_Full RB)



Sub6 n66. PAR Plot (10 M BW\_Ch.349000\_16QAM\_Full RB)



Sub6 n66. PAR Plot (10 M BW\_Ch.349000\_64QAM\_Full RB)





Sub6 n66. PAR Plot (10 M BW\_Ch.349000\_256QAM\_Full RB)



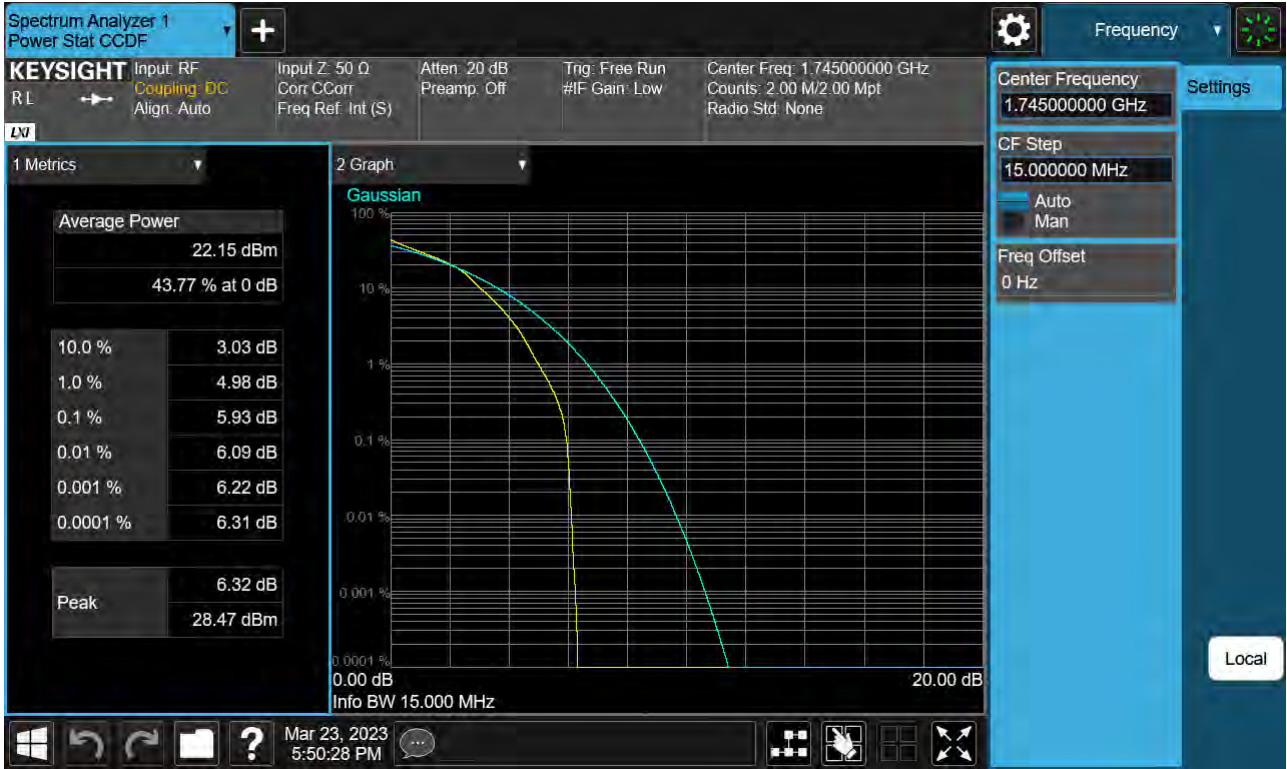
Sub6 n66. PAR Plot (15 M BW\_Ch.349000\_ BPSK\_ Full RB)



Sub6 n66. PAR Plot (15 M BW\_Ch.349000\_QPSK\_Full RB)



Sub6 n66. PAR Plot (15 M BW\_Ch.349000\_16QAM\_Full RB)

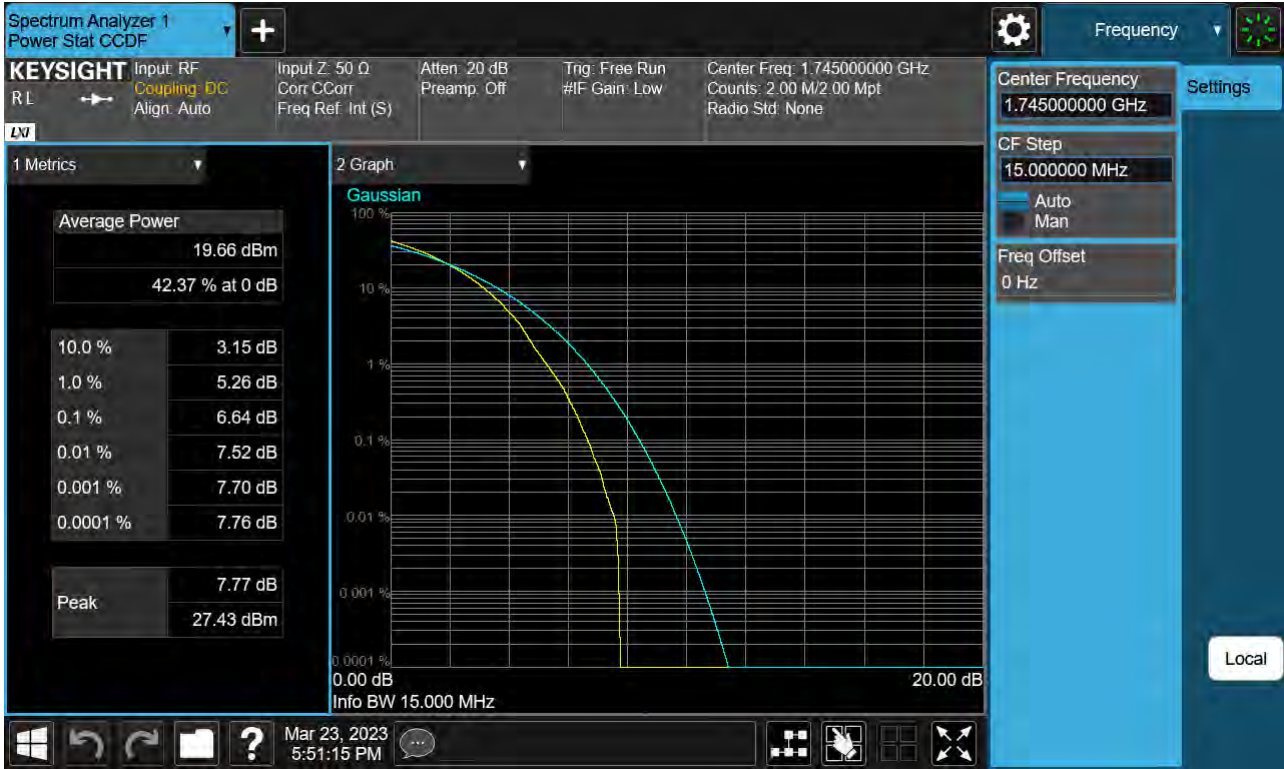




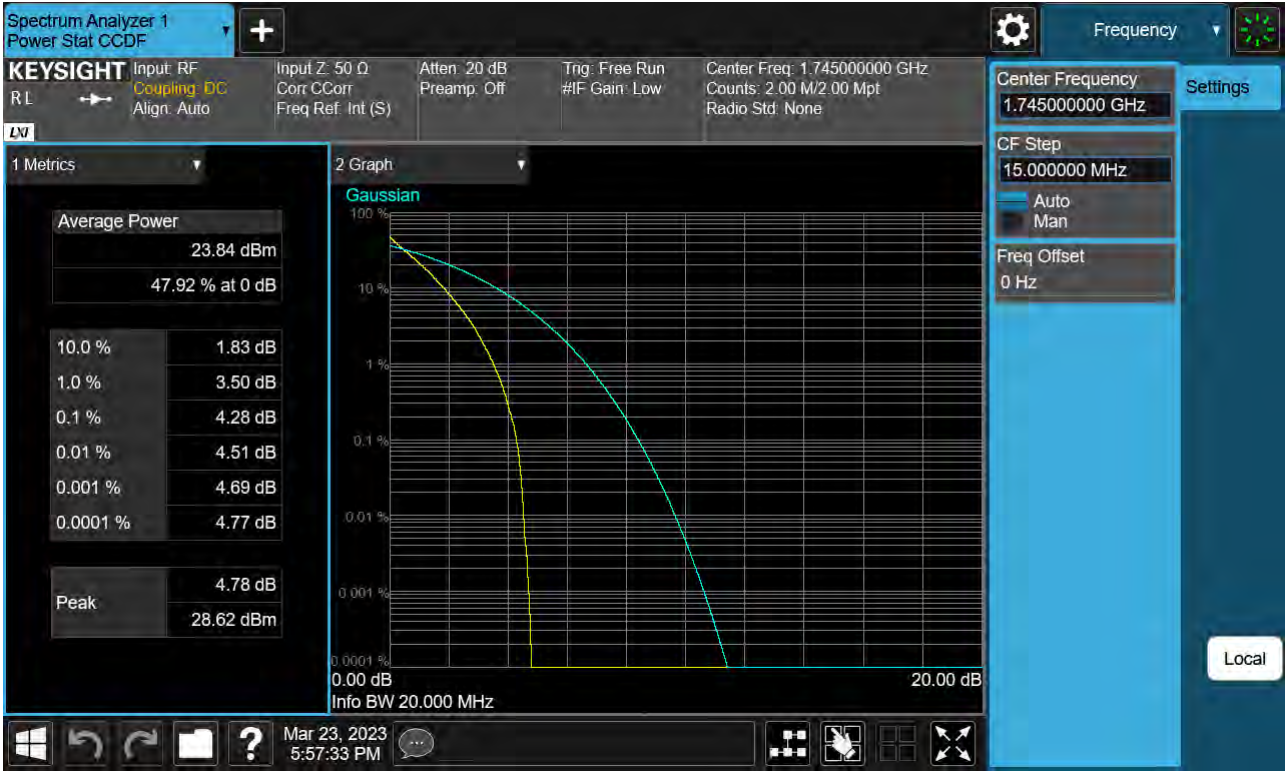
Sub6 n66. PAR Plot (15 M BW\_Ch.349000\_64QAM\_Full RB)



Sub6 n66. PAR Plot (15 M BW\_Ch.349000\_256QAM\_Full RB)



Sub6 n66. PAR Plot (20 M BW\_Ch.349000\_ BPSK\_ Full RB)





Sub6 n66. PAR Plot (20 M BW\_Ch.349000\_QPSK\_Full RB)



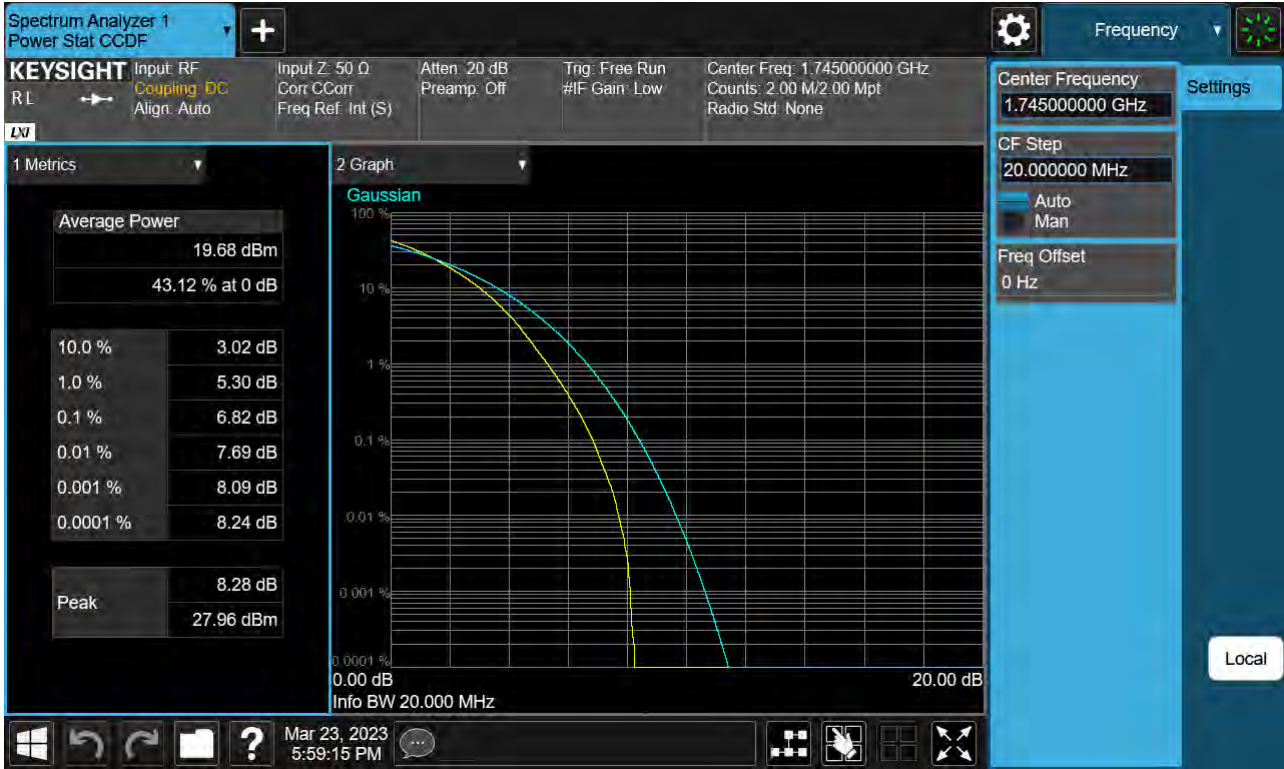
Sub6 n66. PAR Plot (20 M BW\_Ch.349000\_16QAM\_Full RB)



Sub6 n66. PAR Plot (20 M BW\_Ch.349000\_64QAM\_Full RB)



Sub6 n66. PAR Plot (20 M BW\_Ch.349000\_256QAM\_Full RB)

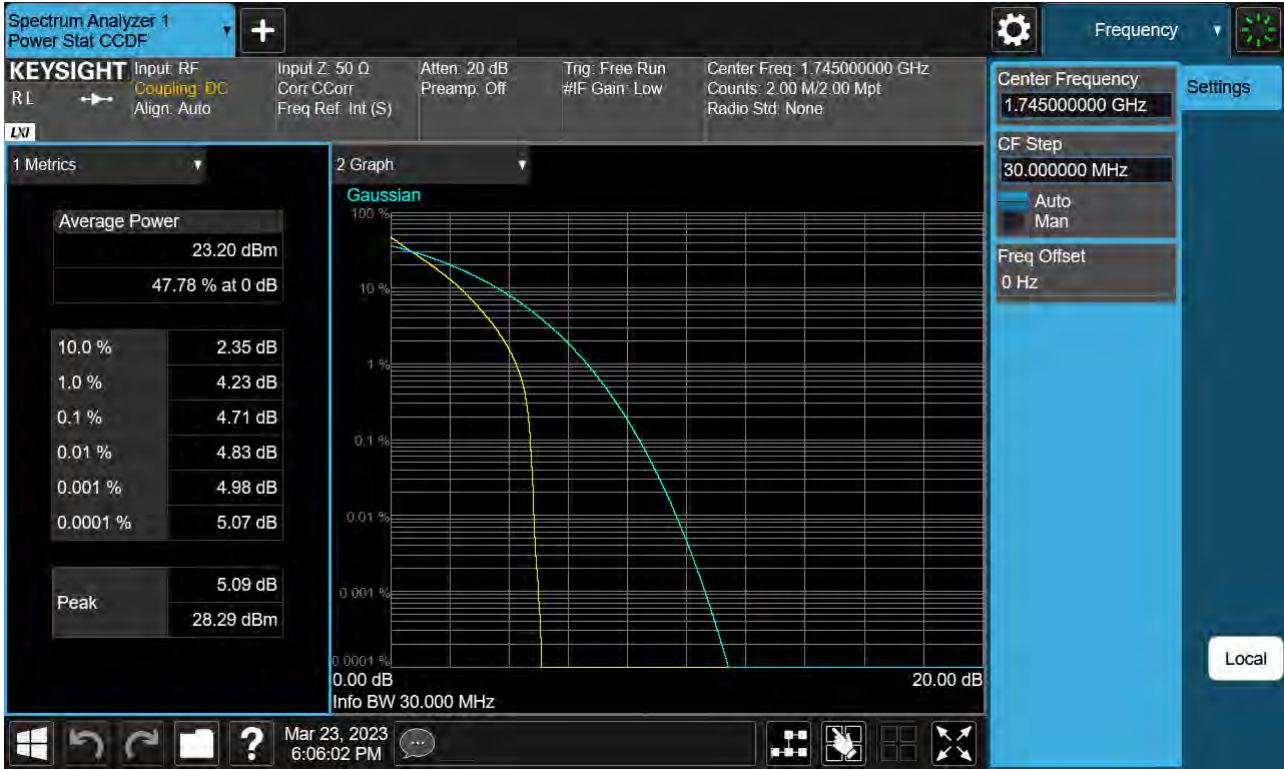




Sub6 n66. PAR Plot (30 M BW\_Ch.349000\_ BPSK\_ Full RB)



Sub6 n66. PAR Plot (30 M BW\_Ch.349000\_QPSK\_Full RB)



Sub6 n66. PAR Plot (30 M BW\_Ch.349000\_16QAM\_Full RB)





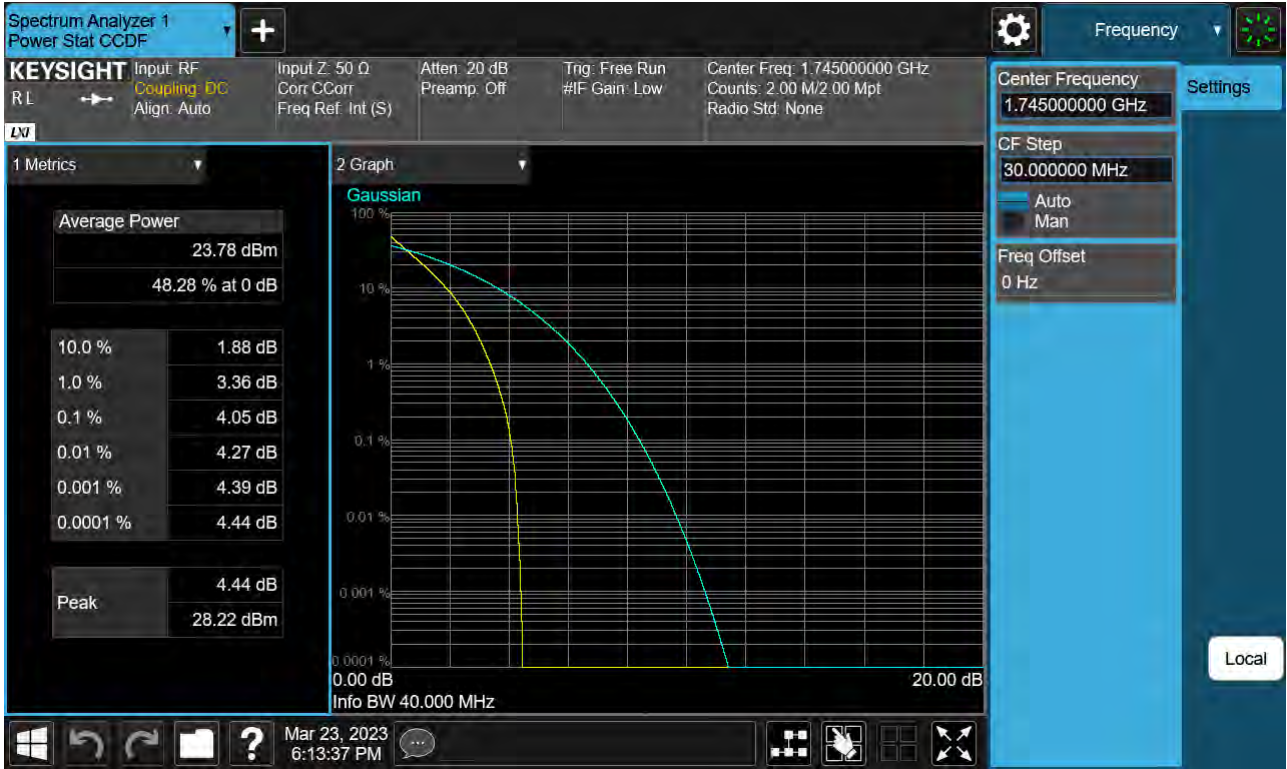
Sub6 n66. PAR Plot (30 M BW\_Ch.349000\_64QAM\_Full RB)



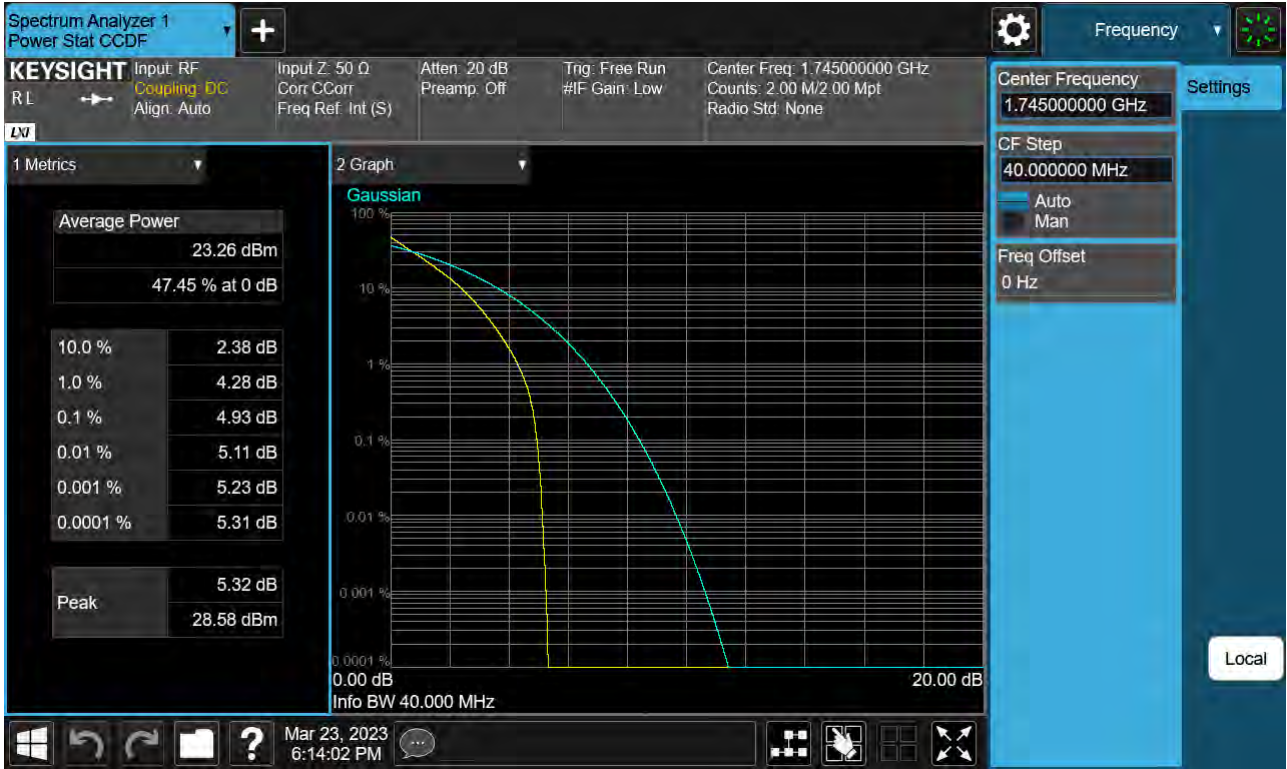
Sub6 n66. PAR Plot (30 M BW\_Ch.349000\_256QAM\_Full RB)



Sub6 n66. PAR Plot (40 M BW\_Ch.349000\_ BPSK\_ Full RB)



Sub6 n66. PAR Plot (40 M BW\_Ch.349000\_QPSK\_Full RB)

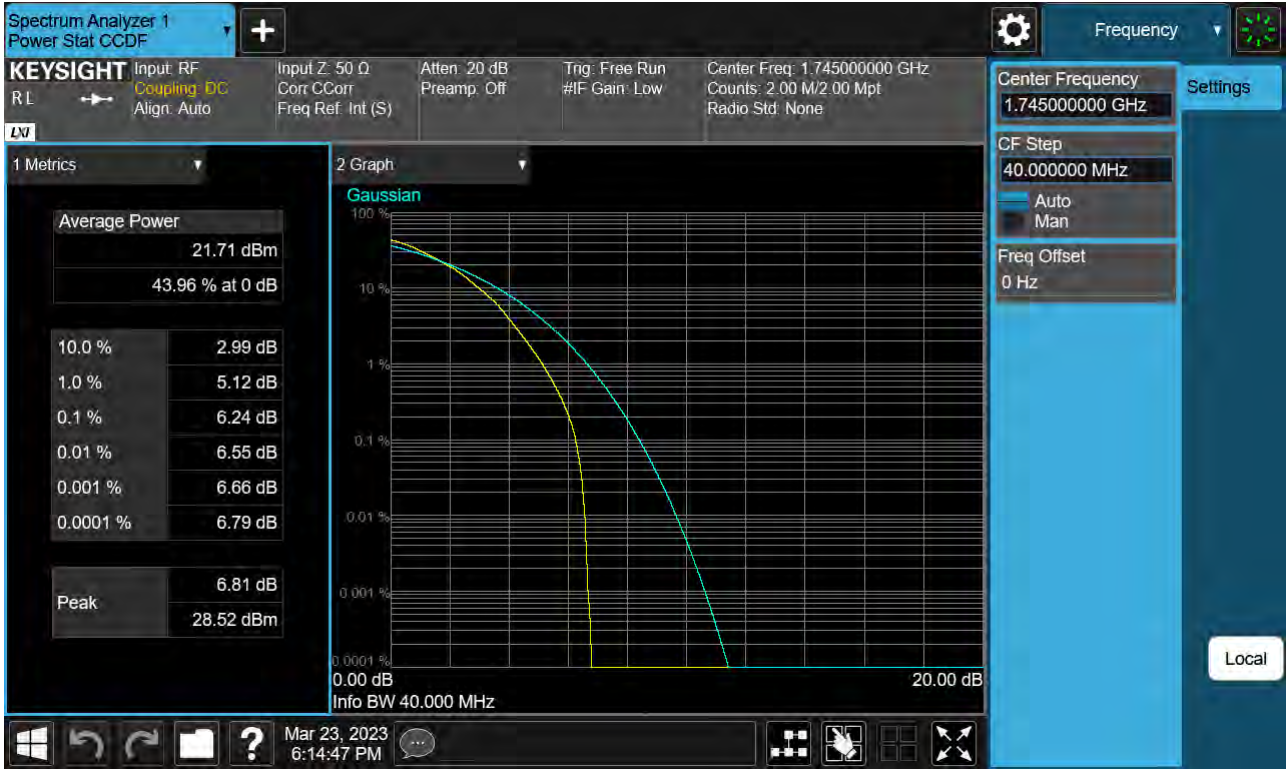




Sub6 n66. PAR Plot (40 M BW\_Ch.349000\_16QAM\_Full RB)



Sub6 n66. PAR Plot (40 M BW\_Ch.349000\_64QAM\_Full RB)

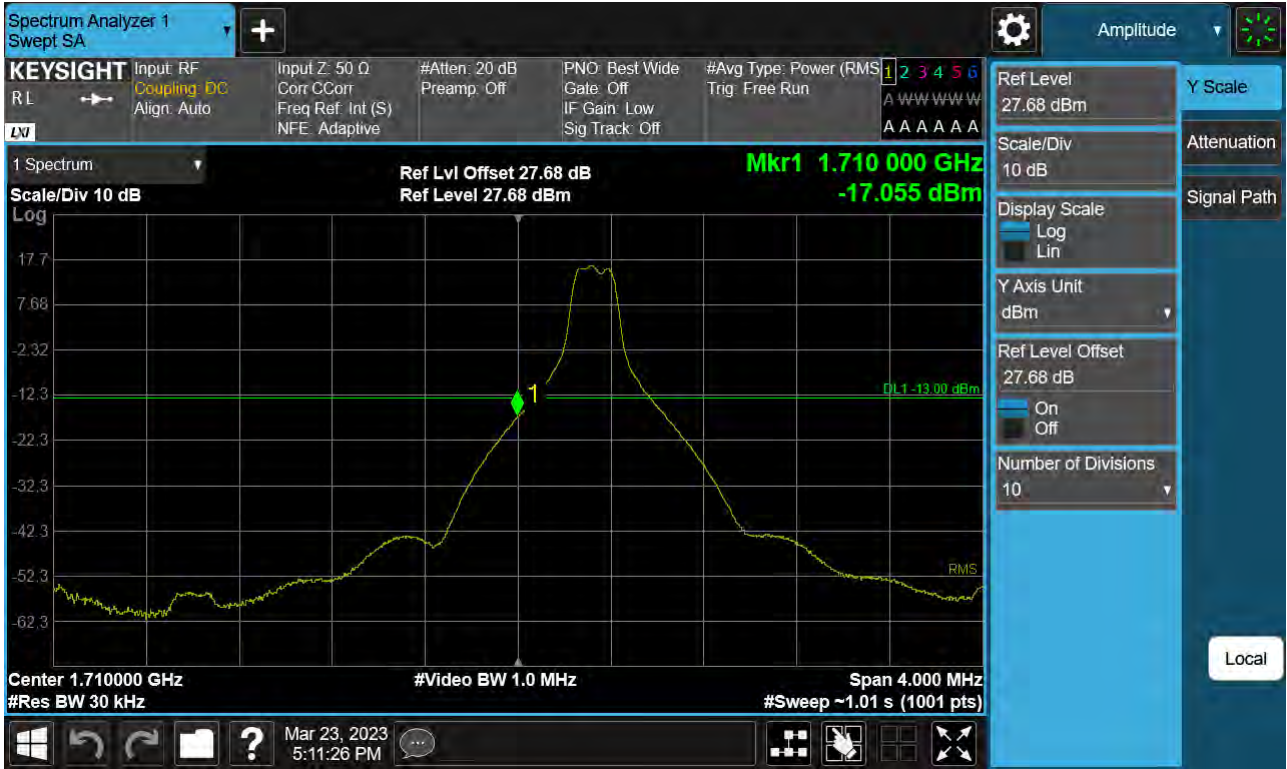


Sub6 n66. PAR Plot (40 M BW\_Ch.349000\_256QAM\_Full RB)





Sub6 n66. Lower Band Edge Plot (5 M BW Ch.342500 BPSK RB 1, Offset 0) -1



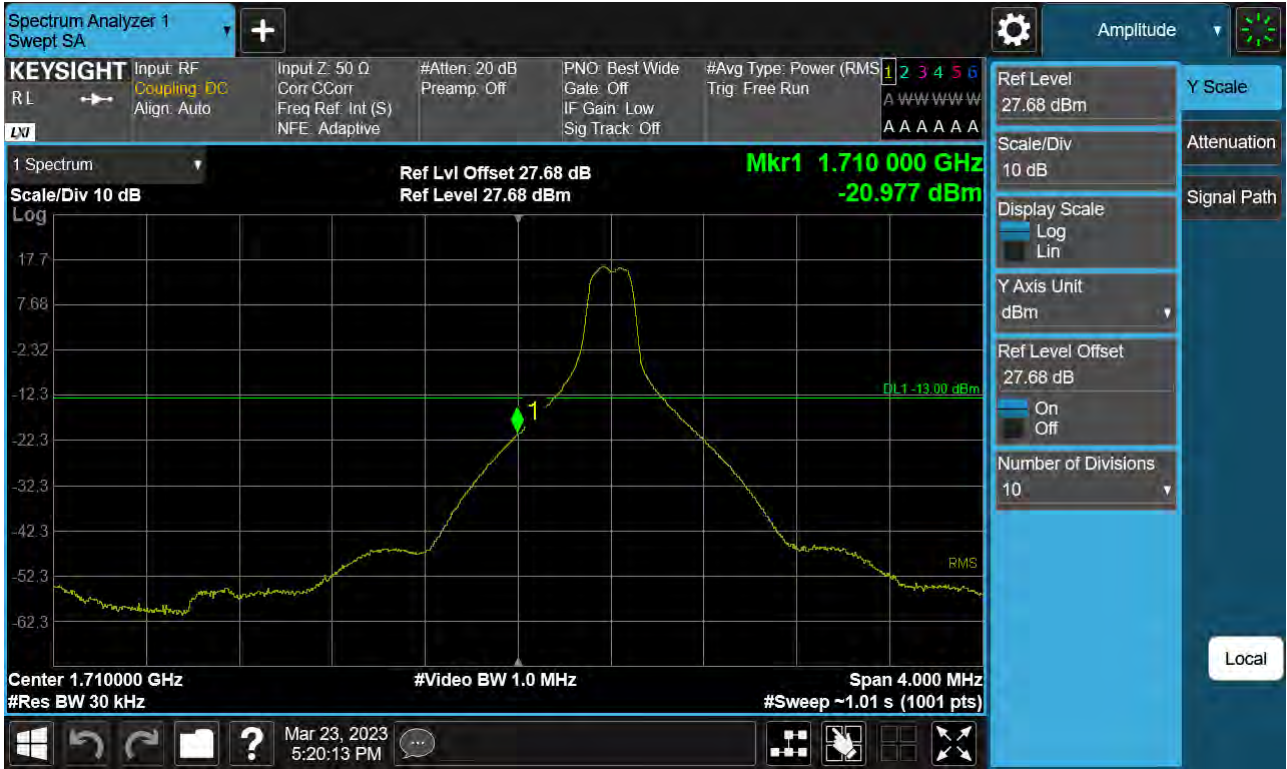
Sub6 n66. Lower Band Edge Plot (5 M BW Ch.342500 BPSK Full RB) -2



Sub6 n66. Lower Extended Band Edge Plot (5 M BW Ch.342500 BPSK\_ Full RB) -3



Sub6 n66. Lower Band Edge Plot (10 M BW Ch.343000 BPSK RB 1, Offset 0) -1





Sub6 n66. Lower Band Edge Plot (10 M BW Ch.343000 BPSK Full RB) -2

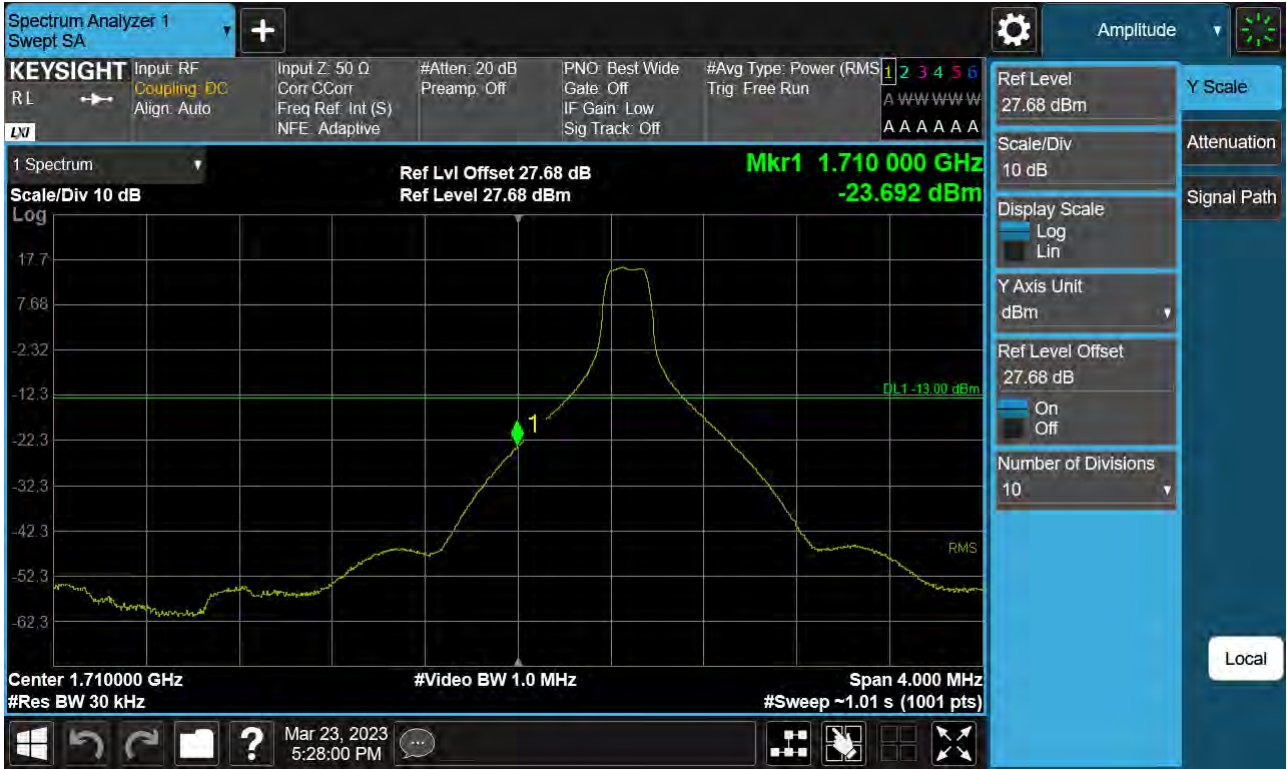


Sub6 n66. Lower Extended Band Edge Plot (10 M BW Ch.343000 BPSK\_ Full RB) -3





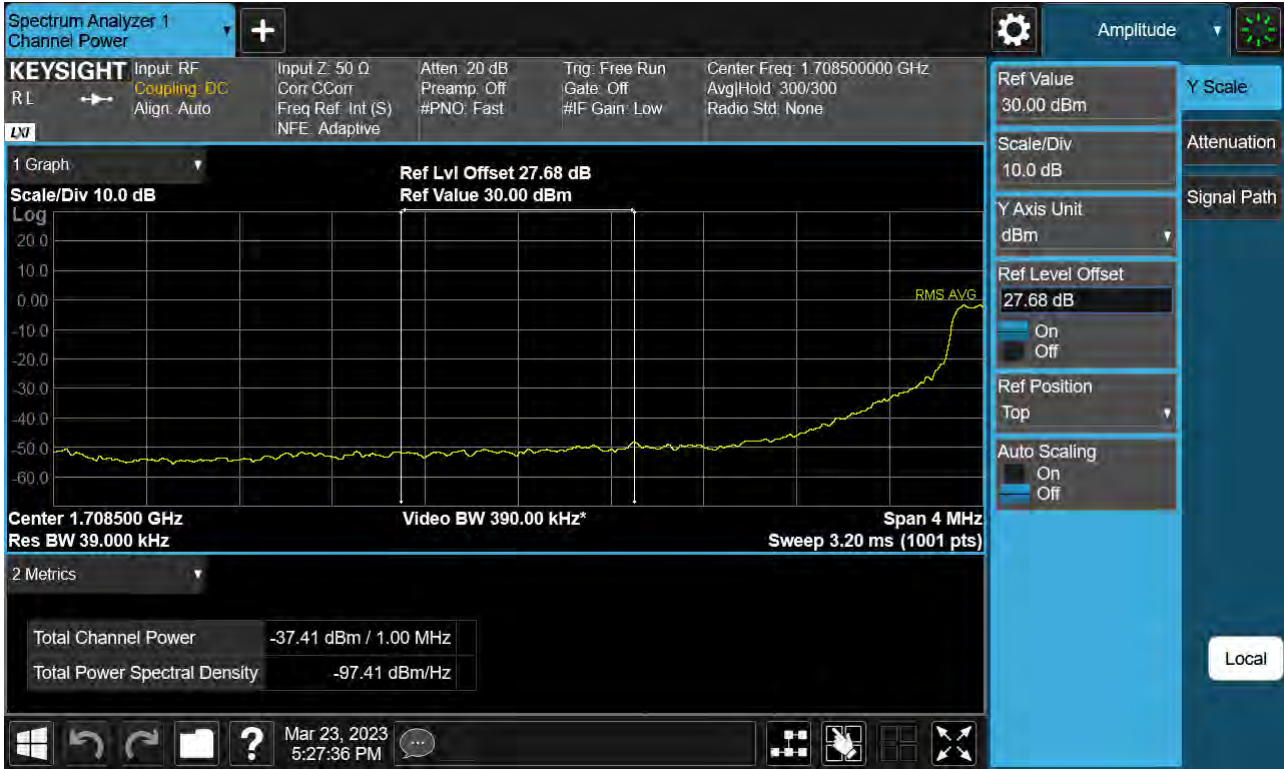
Sub6 n66. Lower Band Edge Plot (15 M BW Ch.343500 BPSK RB 1, Offset 0) -1



Sub6 n66. Lower Band Edge Plot (15 M BW Ch.343500 BPSK Full RB) -2



Sub6 n66. Lower Extended Band Edge Plot (15 M BW Ch.343500 BPSK\_ Full RB) -3

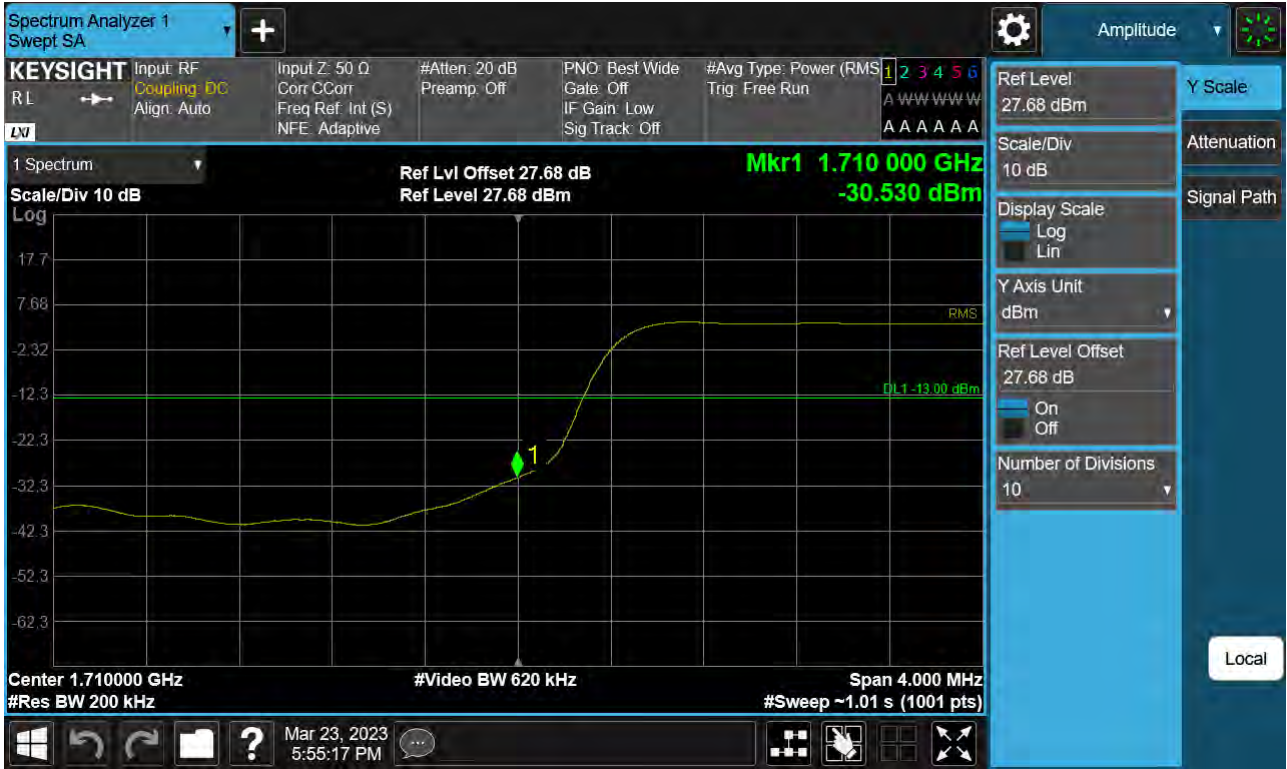


Sub6 n66. Lower Band Edge Plot (20 M BW Ch.344000 BPSK RB 1, Offset 0) -1

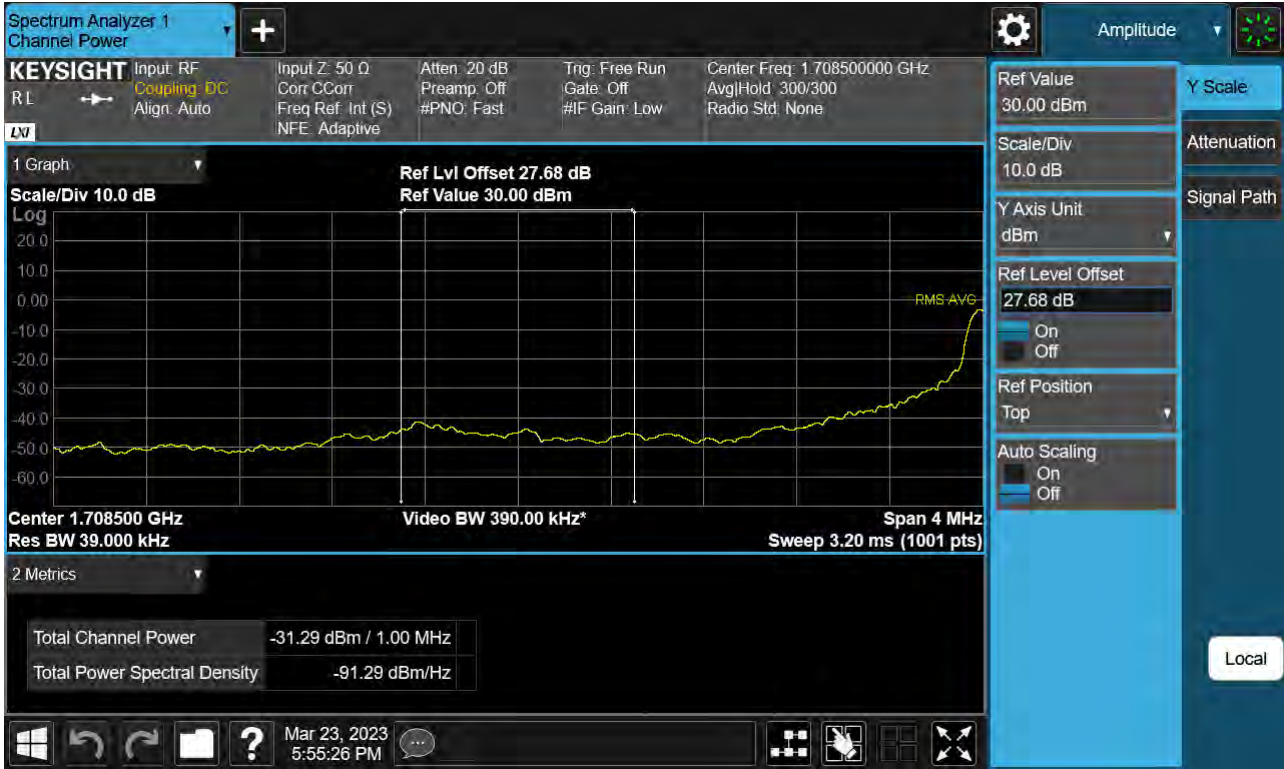




Sub6 n66. Lower Band Edge Plot (20 M BW Ch.344000 BPSK Full RB) -2



Sub6 n66. Lower Extended Band Edge Plot (20 M BW Ch.344000 BPSK\_ Full RB) -3





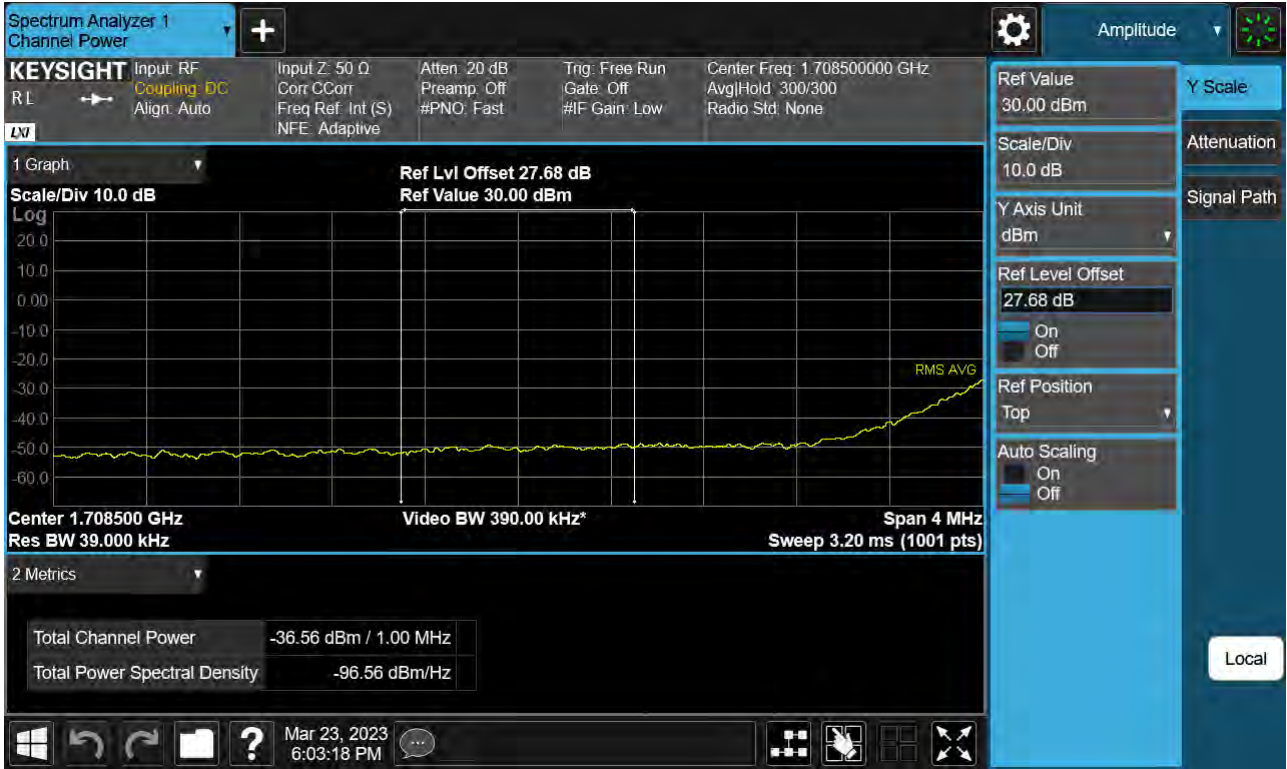
Sub6 n66. Lower Band Edge Plot (30 M BW Ch.345000 BPSK RB 1, Offset 0) -1



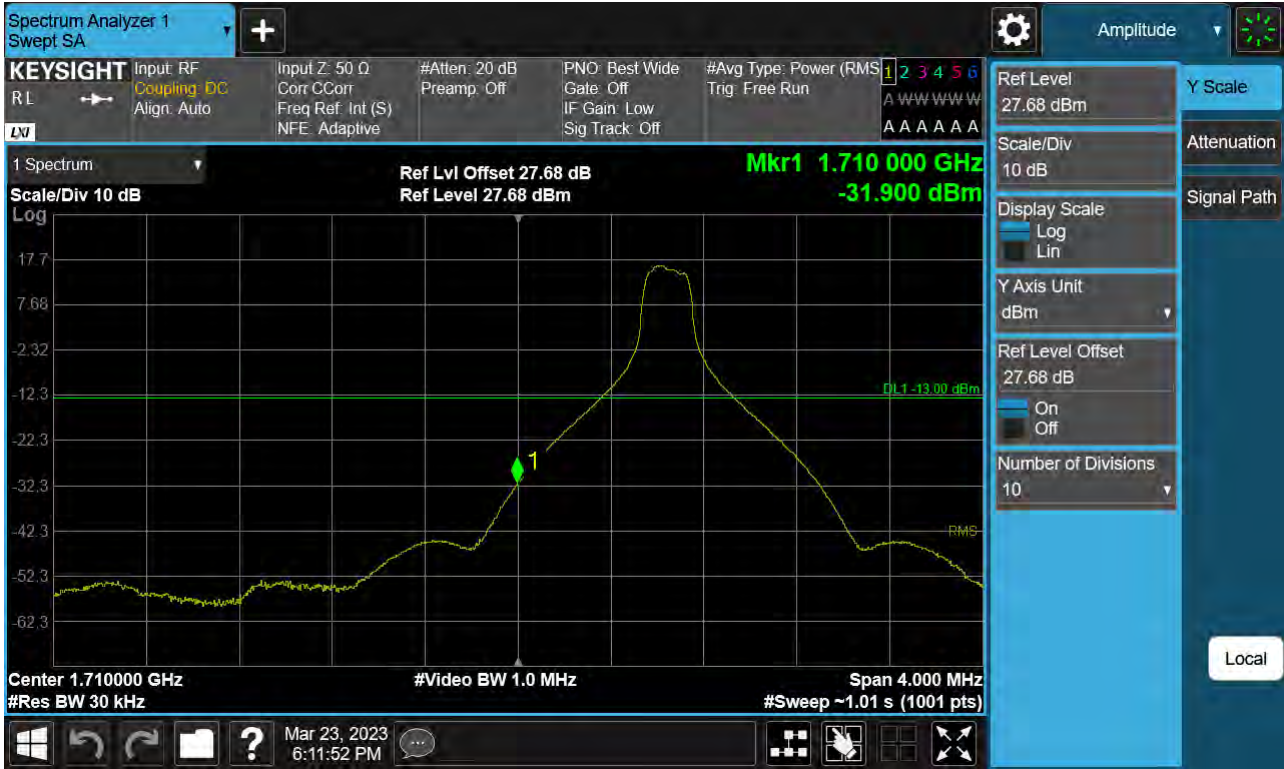
Sub6 n66. Lower Band Edge Plot (30 M BW Ch.345000 BPSK Full RB) -2



Sub6 n66. Lower Extended Band Edge Plot (30 M BW Ch.345000 BPSK\_ Full RB) -3



Sub6 n66. Lower Band Edge Plot (40 M BW Ch.346000 BPSK RB 1, Offset 0) -1





Sub6 n66. Lower Band Edge Plot (40 M BW Ch.346000 BPSK Full RB) -2



Sub6 n66. Lower Extended Band Edge Plot (40 M BW Ch.346000 BPSK\_ Full RB) -3





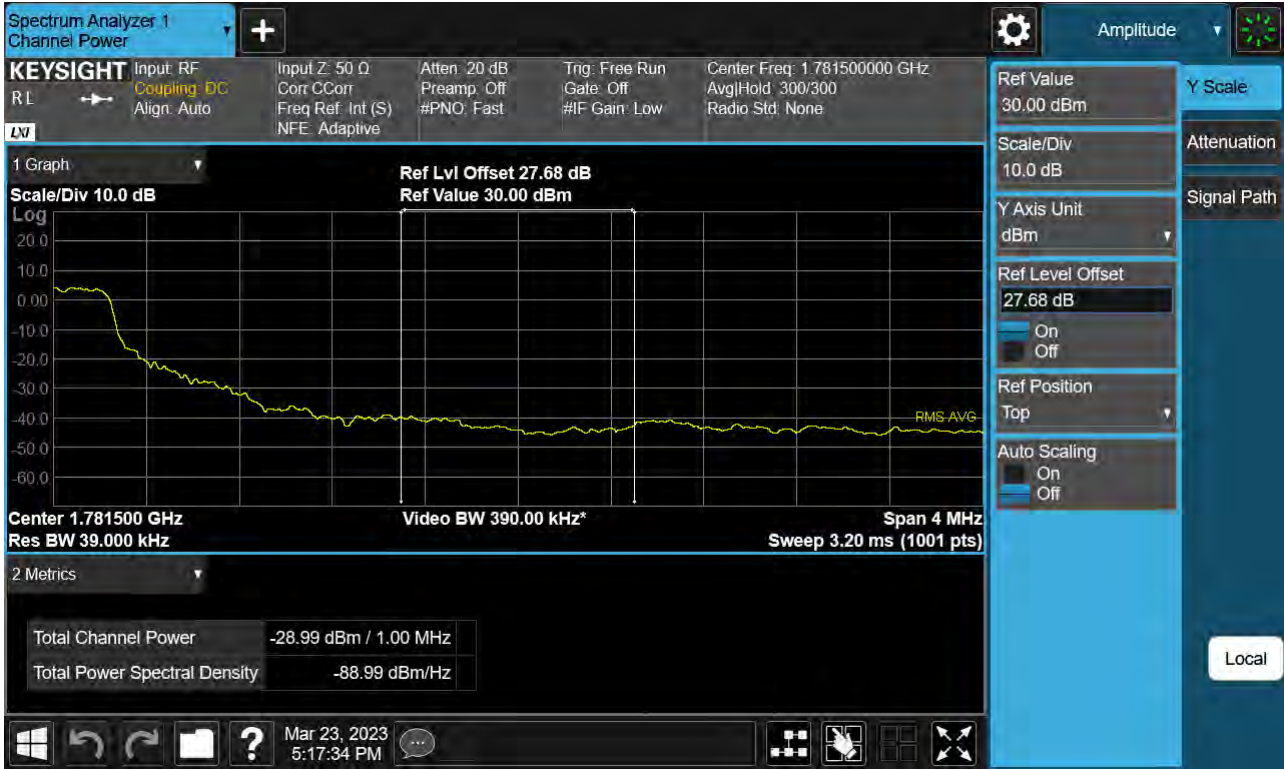
Sub6 n66. Upper Band Edge Plot (5 M BW Ch.355500 BPSK\_RB1\_Offset 24) -1



Sub6 n66. Upper Band Edge Plot (5 M BW Ch.355500 BPSK\_ Full RB) -2



Sub6 n66. Upper Extended Band Edge Plot (5 M BW Ch.355500 BPSK\_ Full RB) -3



Sub6 n66. Upper Band Edge Plot (10 M BW Ch.355000 BPSK\_RB1\_Offset 51) -1

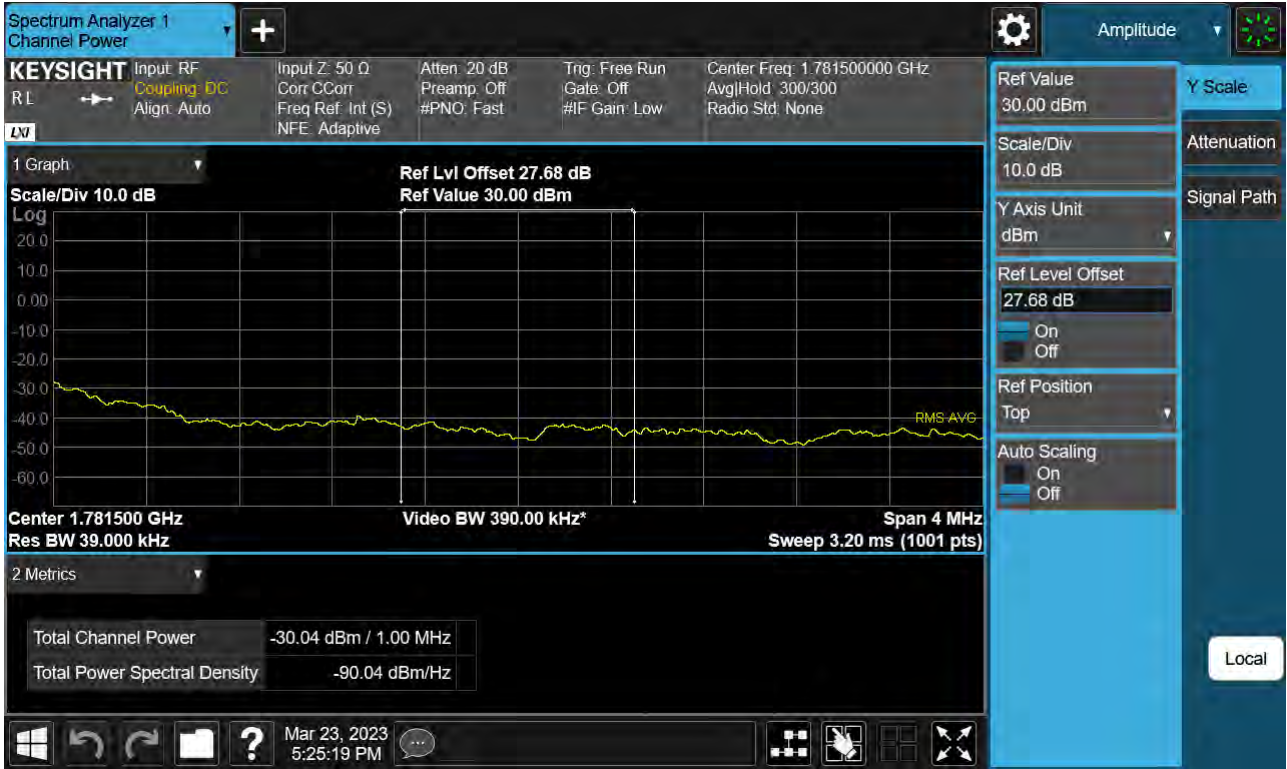




Sub6 n66. Upper Band Edge Plot (10 M BW Ch.355000 BPSK\_ Full RB) -2

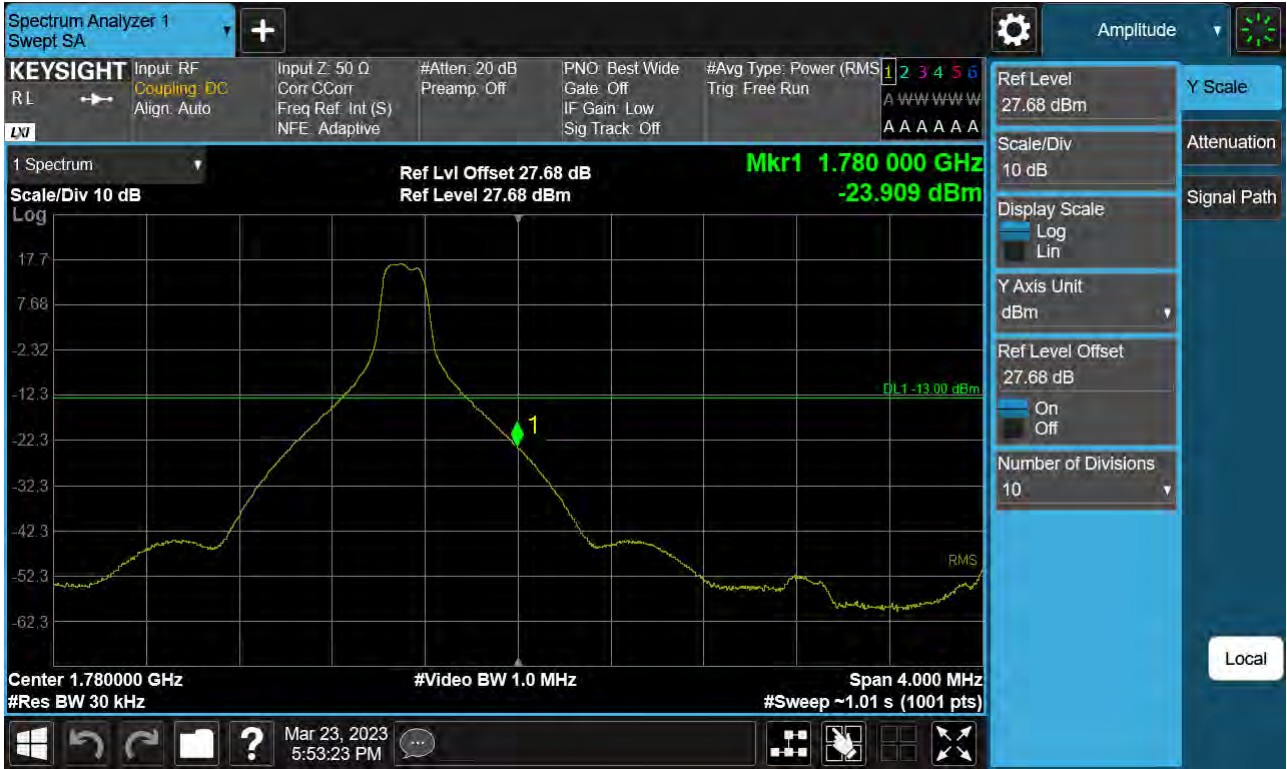


Sub6 n66. Upper Extended Band Edge Plot (10 M BW Ch.355000 BPSK\_ Full RB) -3





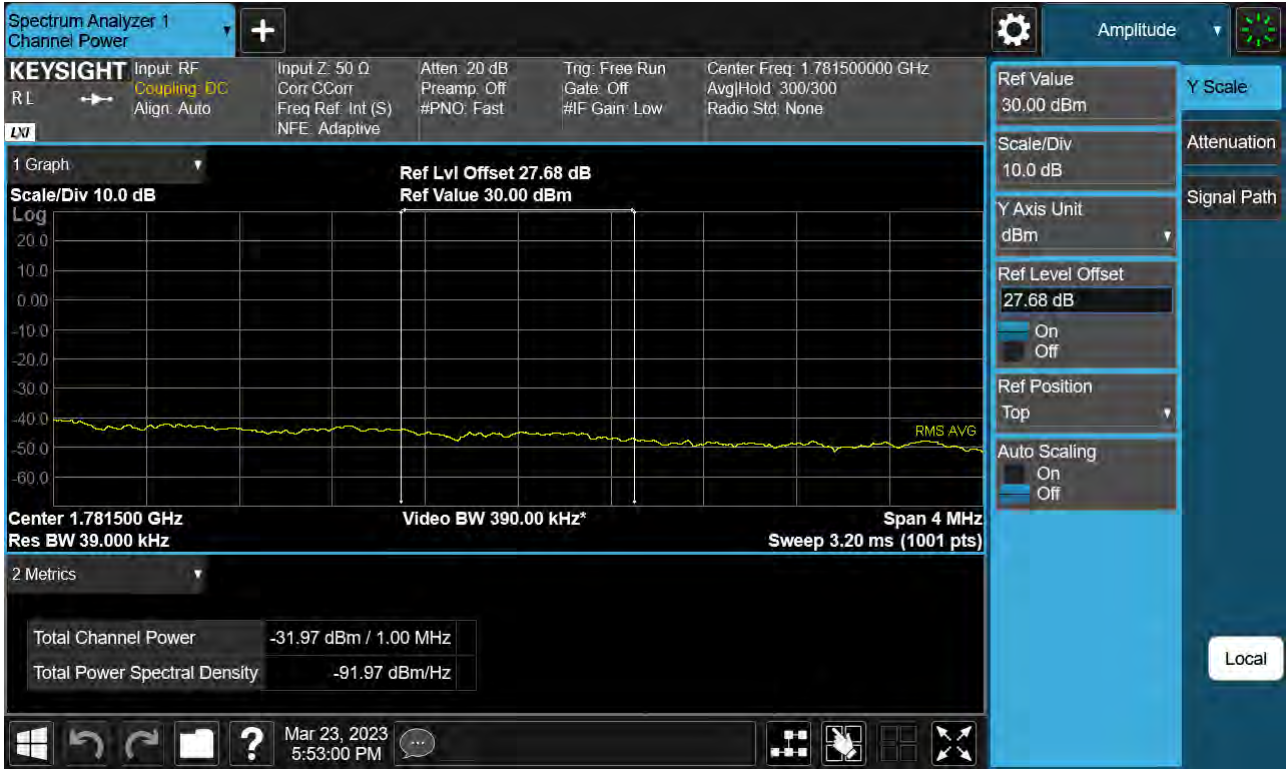
Sub6 n66. Upper Band Edge Plot (15 M BW Ch.354500 BPSK\_RB1\_Offset 78) -1



Sub6 n66. Upper Band Edge Plot (15 M BW Ch.354500 BPSK\_ Full RB) -2



Sub6 n66. Upper Extended Band Edge Plot (15 M BW Ch.354500 BPSK\_Full RB) -3



Sub6 n66. Upper Band Edge Plot (20 M BW Ch.354000 BPSK\_RB1\_Offset 105) -1

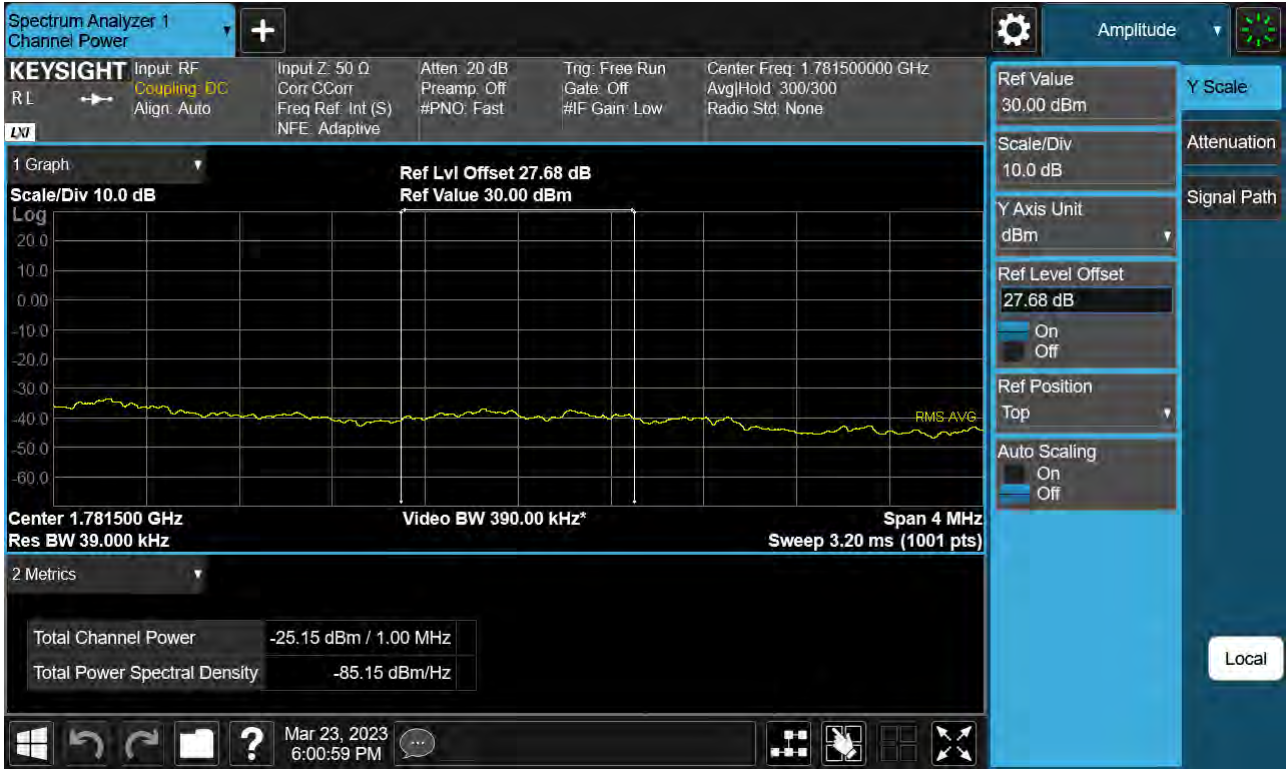




Sub6 n66. Upper Band Edge Plot (20 M BW Ch.354000 BPSK\_ Full RB) -2



Sub6 n66. Upper Extended Band Edge Plot (20 M BW Ch.354000 BPSK\_ Full RB) -3







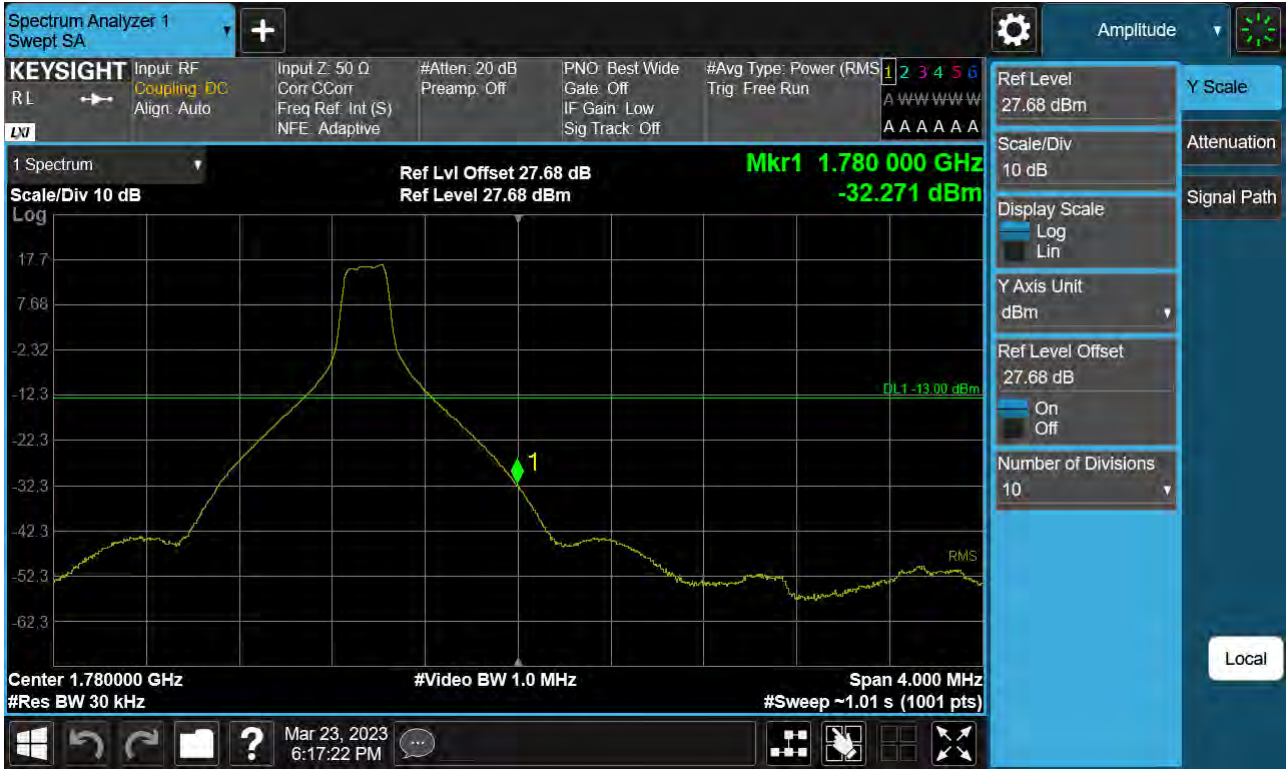
Sub6 n66. Upper Band Edge Plot (30 M BW Ch.353000 BPSK\_ Full RB) -2



Sub6 n66. Upper Extended Band Edge Plot (30 M BW Ch.353000 BPSK\_ Full RB) -3



Sub6 n66. Upper Band Edge Plot (40 M BW Ch.352000 BPSK\_RB1\_Offset 105) -1

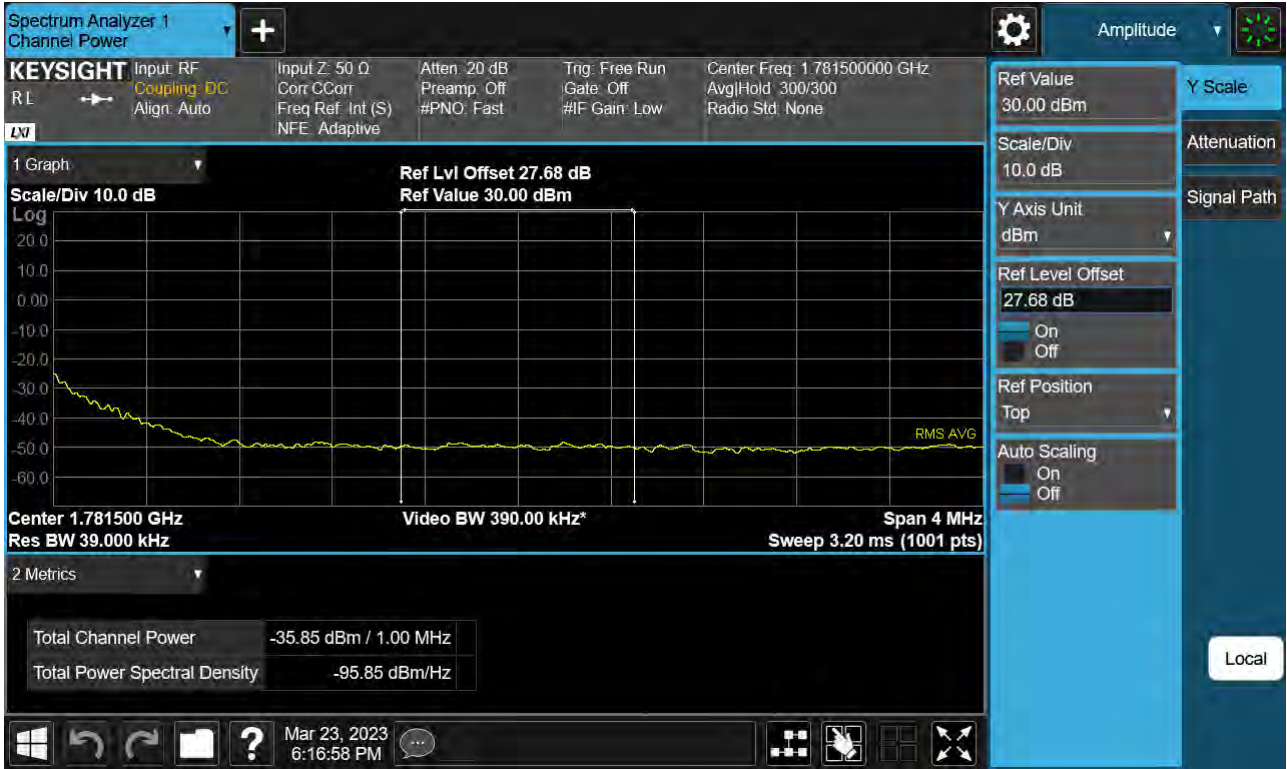




Sub6 n66. Upper Band Edge Plot (40 M BW Ch.352000 BPSK\_ Full RB) -2



Sub6 n66. Upper Extended Band Edge Plot (40 M BW Ch.352000 BPSK\_ Full RB) -3

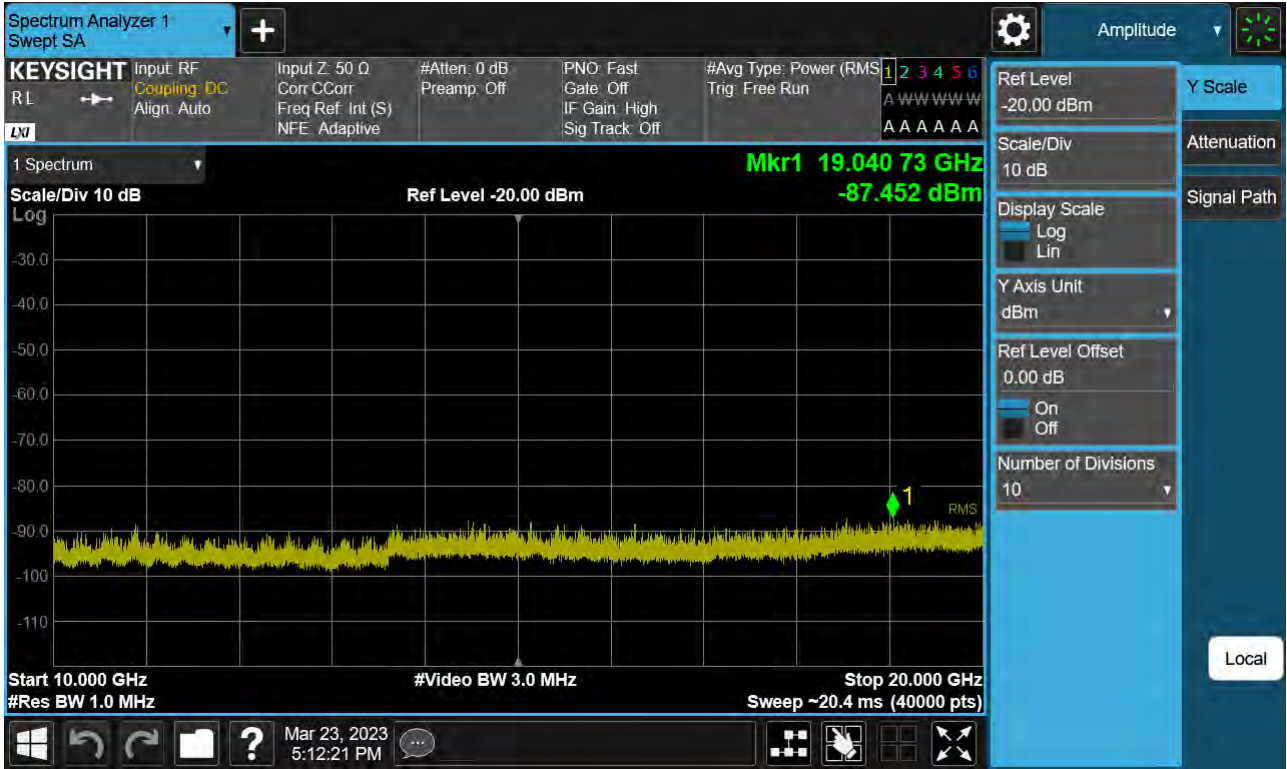




Sub6 n66. Conducted Spurious Plot\_1 (342500ch\_5 MHz\_BPSK\_RB 1\_1)



Sub6 n66. Conducted Spurious Plot\_2 (342500ch\_5 MHz\_BPSK\_RB 1\_1)



Sub6 n66. Conducted Spurious Plot\_1 (349000ch\_5 MHz\_BPSK\_RB 1\_1)

