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TEST REPORT

FCC Sub6 Test for TFGMEIBBCD4
Certification

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2308-FC001

DATE OF ISSUE
October 5, 2023

Tested by
Jung Ki Lim

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Jong Seok Lee

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TEST REPORT

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Additional Model
TFGMEIBBCD5, TFGMEIBBCD6, TFGMEIBBCD7, TFGMEIBBCD8, TFGMEIBBCD9, TFGMEIBBCDA, TFGMEIBBCDB, TFGMEIBBCDC

Applicant	**LG Electronics Inc.** 10, MagokJungang-ro, Gangseo-gu, Seoul 07796, Republic of Korea
Eut Type Model Name	GM Onstar Gen12 ROW TFGMEIBBCD4
FCC ID	BEJTFGMEIBBCD4
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§ 22, § 2

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	October 05, 2023	Initial Release

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)

Test Report Statement:
The above Test Report is not related to the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme) / A2LA(American Association for Laboratory Accreditation), which signed the ILAC-MRA.

If this report is required to confirmation of authenticity, please contact to www.hct.co.kr

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	LG Electronics Inc.
Address:	10, Magok Jungang-ro, Gangseo-gu, Seoul 07796, Republic of Korea
FCC ID:	BEJTFGMEIBBCD4
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§ 22, § 2
EUT Type:	GM Onstar Gen12 ROW
Model(s):	TFGMEIBBCD4
Additional Model:	TFGMEIBBCD5,TFGMEIBBCD6,TFGMEIBBCD7,TFGMEIBBCD8, TFGMEIBBCD9, TFGMEIBBCDA, TFGMEIBBCDB, TFGMEIBBCDC
SCS(kHz):	15
Bandwidth(MHz):	5, 10, 15, 20
Waveform:	CP-OFDM, DFT-S-OFDM
Modulation:	DFT-S-OFDM: PI/2 BPSK, QPSK, 16QAM, 64QAM CP-OFDM: QPSK, 16QAM, 64QAM
Tx Frequency:	826.5 MHz – 846.5 MHz : 5 MHz 829.0 MHz – 844.0 MHz : 10 MHz 831.5 MHz – 841.5 MHz : 15 MHz 834.0 MHz – 839.0 MHz : 20 MHz
Date(s) of Tests:	February 27, 2023 ~ October 05, 2023
Serial number:	Radiated - External Antenna : EBR36018942_#30 - Internal Antenna : EBR36018942K_#14 Conducted : EBR36018829_#069
External Antenna Information	ANT5 : 86531607 ANT4 : 86575530 DUT4 : 85608774

1.1. MAXIMUM OUTPUT POWER

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	ERP External Antenna		ERP Internal Antenna	
				Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)
Sub6 n5 (5)	826.5 – 846.5	4M50G7D	PI/2 BPSK	0.318	25.02	0.350	25.44
		4M48G7D	QPSK	0.305	24.85	0.333	25.22
		4M51W7D	16QAM	0.247	23.92	0.267	24.27
		4M49W7D	64QAM	0.187	22.72	0.188	22.74
Sub6 n5 (10)	829.0 – 844.0	8M99G7D	PI/2 BPSK	0.320	25.05	0.346	25.39
		9M00G7D	QPSK	0.303	24.82	0.329	25.17
		8M97W7D	16QAM	0.247	23.92	0.265	24.23
		8M94W7D	64QAM	0.182	22.60	0.195	22.89
Sub6 n5 (15)	831.5 – 841.5	13M4G7D	PI/2 BPSK	0.301	24.79	0.346	25.39
		13M4G7D	QPSK	0.299	24.75	0.343	25.35
		13M5W7D	16QAM	0.243	23.86	0.275	24.40
		13M5W7D	64QAM	0.189	22.77	0.197	22.95
Sub6 n5 (20)	834.0 – 839.0	17M9G7D	PI/2 BPSK	0.275	24.40	0.337	25.27
		17M9G7D	QPSK	0.274	24.38	0.333	25.23
		18M0W7D	16QAM	0.225	23.53	0.269	24.29
		17M9W7D	64QAM	0.177	22.47	0.194	22.87

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a GM Onstar Gen12 ROW with GSM/GPRS/EGPRS/UMTS and LTE, Sub6.

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

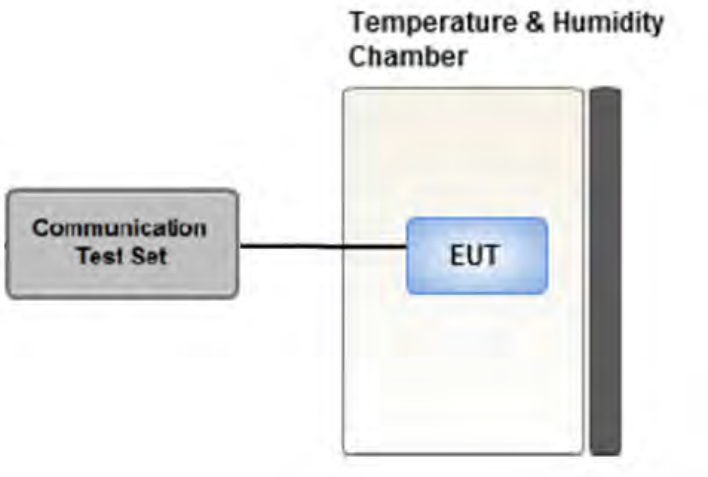
The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.**

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	- 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
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 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.

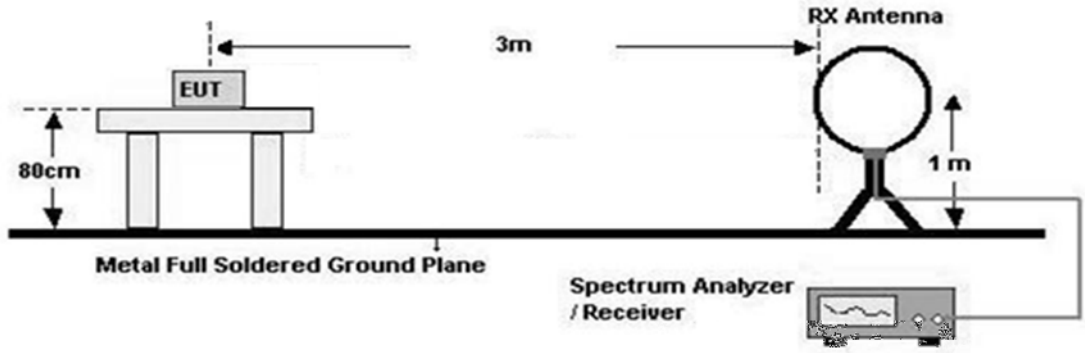
3.3 RADIATED TEST

Test Overview

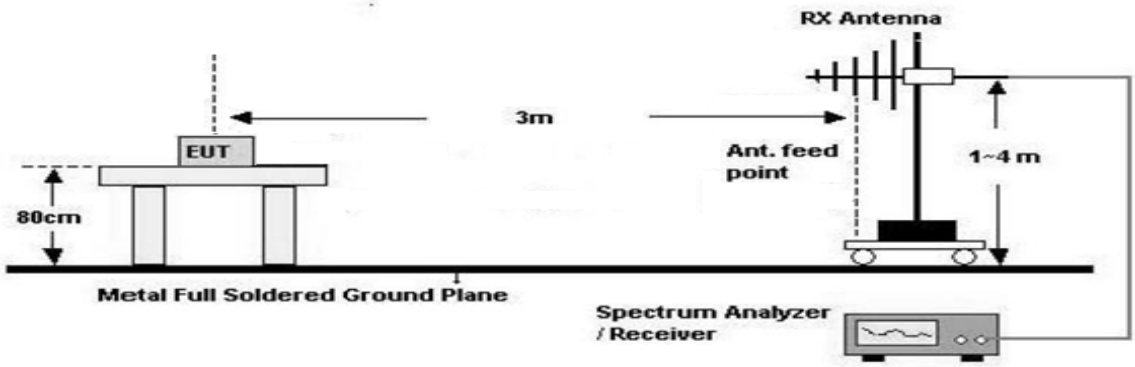
Radiated tests are performed in the semi-anechoic chamber. The equipment under test is placed on a non-conductive table on semi-anechoic chamber.

Test Configuration

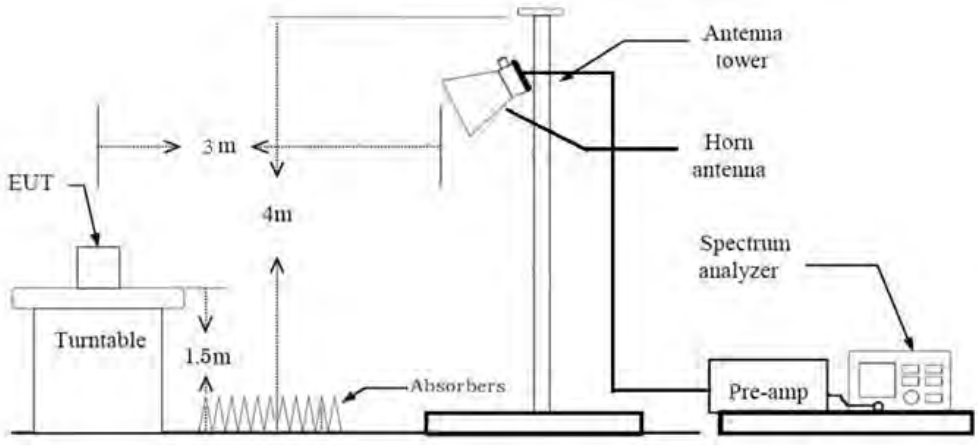
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



3.3.1 RADIATED POWER

Test Settings

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

Test Note

1. The EUT is placed on a turntable, which is 0.8 m above ground plane. (Below 1 GHz)
2. The EUT is placed on a turntable, which is 1.5 m above ground plane. (Above 1 GHz)
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
6. 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.
7. Total(dBμV/m) = Measured Value(dBμV) + Cable Loss(dB) + Antenna Factor(dB/m) + Distance Factor(D.F)
8. EIRP (dBm)
   = Total (dBμV/m) + 20 log D − 104.8 (where D is the measurement distance in meters. D=3)
   = Total (dBμV/m) - 95.2(dB)
9. ERP(dBm) = EIRP(dBm) - 2.15(dB)

3.3.2 RADIATED SPURIOUS EMISSIONS

Test Settings

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

Test Note

1. 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
2. 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.

Below 30 MHz

1. The loop antenna was placed at a location 3 m from the EUT
2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. Distance Correction Factor(0.009 MHz – 0.490 MHz) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
6. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
8. EIRP (dBm)
   = Total (dBμV/m) + 20 log D − 104.8 (where D is the measurement distance in meters. D=3)
   = Total (dBμV/m) - 95.2(dB)
9. ERP(dBm) = EIRP(dBm) - 2.15(dB)

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

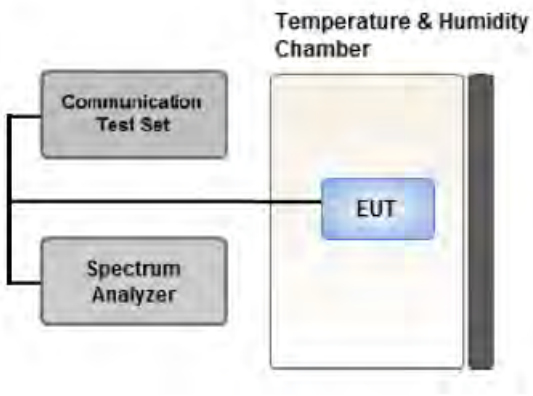
Below 1 GHz

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m to find out the highest emissions.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
7. Total(dBμV/m) = Measured Value(dBμV) + Cable Loss(dB) + Antenna Factor(dB/m) + Distance Factor(D.F)
8. EIRP (dBm)
   = Total (dBμV/m) + 20 log D − 104.8 (where D is the measurement distance in meters. D=3)
   = Total (dBμV/m) - 95.2(dB)
9. ERP(dBm) = EIRP(dBm) - 2.15(dB)

Above 1 GHz

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Total(dBμV/m) = Measured Value(dBμV) + Cable Loss(dB) + Antenna Factor(dB/m) + Distance Factor(D.F) + H.P.F(dB) - Amp Gain(dB)
8. EIRP (dBm)
   = Total (dBμV/m) + 20 log D − 104.8 (where D is the measurement distance in meters. D=3)
   = Total (dBμV/m) - 95.2(dB)

3.4 PEAK- TO- AVERAGE RATIO



Test setup

① CCDF Procedure for PAPR

Test Settings

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

② Alternate Procedure for PAPR

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

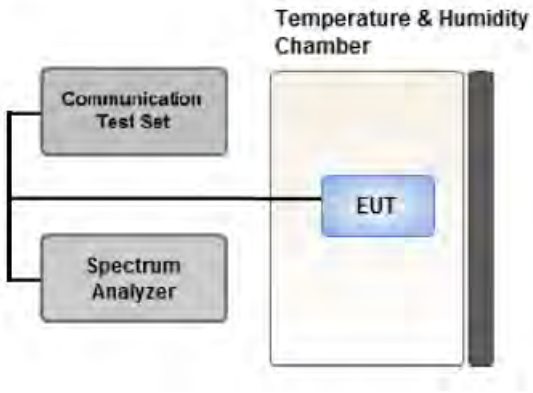
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

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

Test Settings(Average Power)

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

3.5 OCCUPIED BANDWIDTH.



Test setup

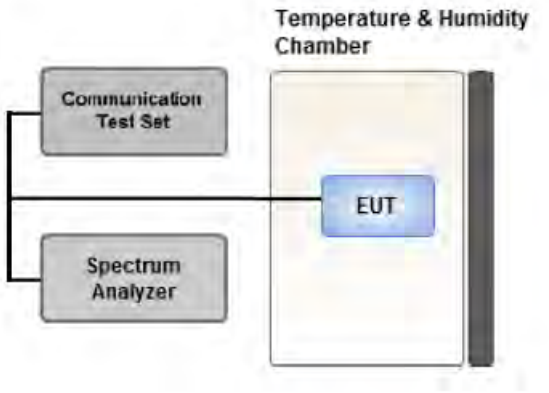
The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

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 ≥ 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

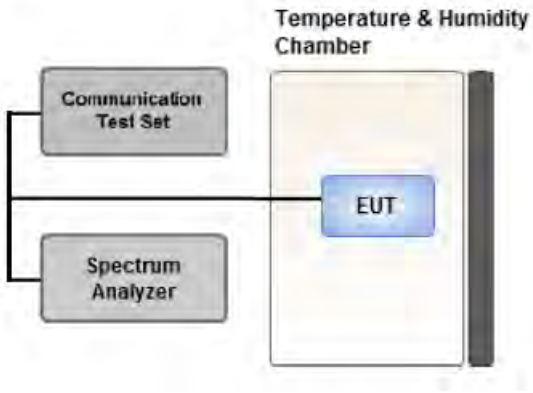
Test Overview

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 ≥ 3 MHz
3. Detector = RMS
4. Trace Mode = Average
5. Sweep time = auto
6. Number of points in sweep ≥ 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

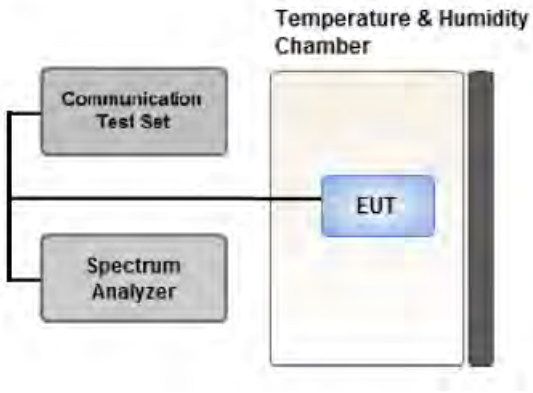
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1 % of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW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

Test Notes

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

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

3.8 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)

- 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

  Mode : Internal Antenna, External Antenna (ANT 5, ANT 4, DUT 4)

  Worst case : Internal Antenna, External Antenna (ANT 5)
- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data.
- Please refer to the table below.
- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth results are reported.

  (External Antenna Worst case : 10 MHz)

  (Internal Antenna Worst case : 5 MHz)
- TFGMEIBBCD4 & additional models were tested and the worst case results are reported.

(Worst case : TFGMEIBBCD4)

[External Antenna Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Radiated Power	PI/2 BPSK, QPSK, 16QAM, 64QAM	See Section 8.1		Only X
Radiated Spurious Emissions	PI/2 BPSK	See Section 8.1		Only X

[Internal Antenna Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Radiated Power	PI/2 BPSK, QPSK, 16QAM, 64QAM	See Section 8.1		Z
Radiated Spurious Emissions	PI/2 BPSK	See Section 8.1		Y

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: 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.
- TFGMEIBBCD4 & additional models were tested and the worst case results are reported.

(Worst case : TFGMEIBBCD4)

[Worst case]

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

4. LIST OF TEST EQUIPMENT

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Antenna Position Tower	MA4640/800-XP-ET	Innco systems	N/A	N/A	N/A
Turn Table	DS2000-S	Innco systems	N/A	N/A	N/A
Turn Table	Turn Table	Ets	N/A	N/A	N/A
Controller (Antenna mast & Turn Table)	CO3000	Innco systems	CO3000/1251/48920320/P	N/A	N/A
Amp & Filter Bank Switch Controller	FBSM-01B	TNM system	TM20090002	N/A	N/A
RF Switch System	TMX0132C	TNM System	TM21100002	N/A	N/A
RF Switch System	FBSR-04C(3G HPF+LNA)	TNM System	S4L1	08/18/2024	Annual
RF Switch System	FBSR-04C(LNA)	TNM System	S4L4	08/18/2024	Annual
RF Switch System	FBSR-04C(Thru)	TNM System	S4L6	08/18/2024	Annual
HIGHPASS FILTER	WHKX10-900-1000-15000-40SS	WAINWRIGHT INSTRUMENTS	16	08/01/2024	Annual
HIGHPASS FILTER	WHNX6.0/26.5G-6SS	WAINWRIGHT INSTRUMENTS	1	01/19/2024	Annual
Power Amplifier	CBL18265035	CERNEX	22966	12/01/2023	Annual
Power Amplifier	CBL26405040	CERNEX	25956	03/02/2024	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/17/2024	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120	Schwarzbeck	937	02/13/2025	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/29/2024	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/09/2025	Biennial
Hybrid Antenna	VULB9160	Schwarzbeck	760	02/24/2025	Biennial
Trilog Broadband Antenna	VULB 9168	Schwarzbeck	895	08/16/2024	Biennial
Chamber	SU-642	ESPEC	93008124	02/22/2024	Annual
Power Splitter(DC~26.5 GHz)	11667B	Hewlett Packard	11275	03/02/2024	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/23/2024	Annual
4-Way Divider	ZC4PD-K1844+	Mini-Circuits	942907	09/19/2024	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	08/10/2024	Annual
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262287701	05/22/2024	Annual
Wideband Radio Communication Tester	MT8000A	Anritsu Corp.	6262302511	05/23/2024	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	06/22/2024	Annual

Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	04/20/2024	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/24/2024	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

Note:

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

5. MEASUREMENT UNCERTAINTY

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

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

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.90 (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, § 22.917(a)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Conducted Output Power	§ 2.1046	N/A	PASS
Frequency stability / variation of ambient temperature	§ 2.1055, § 22.355	< 2.5 ppm	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
Effective Radiated Power	§ 22.913(a)(5)	< 7 Watts max. ERP	PASS
Radiated Spurious and Harmonic Emissions	§ 2.1053, § 22.917(a)	< 43 + 10log10 (P[Watts]) for all out-of band emissions	PASS

Note:

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

7. 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)		
						165300	167300	169300
						826.5 MHz	836.5 MHz	846.5 MHz
5 MHz	15	DFT-s	pi/2 BPSK	1	1	23.59	23.58	23.56
				1	13	23.34	23.47	23.51
				1	23	23.34	23.38	23.35
				12	0	22.98	23.01	22.95
				12	7	23.36	23.48	23.48
				12	13	22.91	22.95	22.90
				25	0	22.86	22.97	23.01
			QPSK	1	1	23.52	23.50	23.46
			16QAM	1	1	22.50	22.38	22.38
			64QAM	1	1	21.14	21.20	21.14
		CP	QPSK	1	1	21.91	21.91	21.91

Bandwidth	SCS(kHz)	OFDM	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
						165800	167300	168800
						829 MHz	836.5 MHz	844 MHz
10 MHz	15	DFT-s	pi/2 BPSK	1	1	23.57	23.59	23.56
				1	26	23.44	23.43	23.29
				1	50	23.46	23.47	23.44
				25	0	22.89	23.02	22.97
				25	14	23.45	23.52	23.46
				25	27	22.93	22.9	22.88
				50	0	22.98	23.03	22.95
			QPSK	1	1	23.43	23.47	23.33
			16QAM	1	1	22.36	22.41	22.28
			64QAM	1	1	21.07	21.16	21.02
		CP	QPSK	1	1	21.75	21.88	21.70

Bandwidth	SCS(kHz)	OFDM	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
						166300	167300	168300
						831.5 MHz	836.5 MHz	841.5 MHz
15 MHz	15	DFT-s	pi/2 BPSK	1	1	23.66	23.65	23.69
				1	40	23.53	23.57	23.42
				1	77	23.49	23.58	23.48
				36	0	22.98	23.08	22.92
				36	22	23.52	23.59	23.54
				36	43	23.08	23.02	22.92
				75	0	23.03	23.12	22.97
			QPSK	1	1	23.44	23.61	23.51
			16QAM	1	1	22.32	22.49	22.43
			64QAM	1	1	21.05	21.26	21.14
		CP	QPSK	1	1	21.84	21.97	21.93

Bandwidth	SCS(kHz)	OFDM	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
						166800	167300	167800
						834 MHz	836.5 MHz	839 MHz
20 MHz	15	DFT-s	pi/2 BPSK	1	1	23.67	23.60	23.63
				1	53	23.53	23.54	23.47
				1	104	23.43	22.97	23.53
				50	0	23.05	23.09	23.05
				50	28	23.57	23.58	23.52
				50	56	22.97	23.06	23.08
				100	0	23.07	23.13	23.05
			QPSK	1	1	23.34	23.46	23.56
			16QAM	1	1	22.22	22.33	22.48
			64QAM	1	1	20.98	21.09	21.17
		CP	QPSK	1	1	21.85	21.98	21.89

8.2 EFFECTIVE RADIATED POWER

8.2.1 External Antenna

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
826.5	Sub6 n5/ 5 MHz [15 kHz]	PI/2 BPSK	91.13	29.98	121.11	V	< 7.00	0.238	23.76	1	1
		QPSK	91.02	29.98	121.00	V		0.232	23.65		
		16-QAM	90.00	29.98	119.98	V		0.183	22.63		
		64-QAM	88.70	29.98	118.68	V		0.136	21.33		
836.5		PI/2 BPSK	91.78	29.98	121.76	V		0.276	24.41	1	23
		QPSK	91.76	29.98	121.74	V		0.275	24.39		
		16-QAM	90.80	29.98	120.78	V		0.220	23.43		
		64-QAM	89.35	29.98	119.33	V		0.158	21.98		
846.5		PI/2 BPSK	92.30	30.07	122.37	V		0.318	25.02	1	1
		QPSK	92.13	30.07	122.20	V		0.305	24.85		
		16-QAM	91.20	30.07	121.27	V		0.247	23.92		
		64-QAM	90.00	30.07	120.07	V		0.187	22.72		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
829.0	Sub6 n5/ 10 MHz [15 kHz]	PI/2 BPSK	91.35	30.09	121.44	V	< 7.00	0.257	24.09	1	50
		QPSK	91.28	30.09	121.37	V		0.252	24.02		
		16-QAM	90.40	30.09	120.49	V		0.206	23.14		
		64-QAM	88.97	30.09	119.06	V		0.148	21.71		
836.5		PI/2 BPSK	92.05	29.98	122.03	V		0.294	24.68	1	50
		QPSK	92.04	29.98	122.02	V		0.293	24.67		
		16-QAM	91.05	29.98	121.03	V		0.233	23.68		
		64-QAM	89.75	29.98	119.73	V		0.173	22.38		
844.0		PI/2 BPSK	92.43	29.97	122.40	V		0.320	25.05	1	25
		QPSK	92.20	29.97	122.17	V		0.303	24.82		
		16-QAM	91.30	29.97	121.27	V		0.247	23.92		
		64-QAM	89.98	29.97	119.95	V		0.182	22.60		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
831.5	Sub6 n5/ 15 MHz [15 kHz]	PI/2 BPSK	92.03	30.09	122.12	V	< 7.00	0.300	24.77	1	77
		QPSK	91.95	30.09	122.04	V		0.294	24.69		
		16-QAM	90.90	30.09	120.99	V		0.231	23.64		
		64-QAM	89.44	30.09	119.53	V		0.165	22.18		
836.5		PI/2 BPSK	92.16	29.98	122.14	V		0.301	24.79	1	77
		QPSK	92.12	29.98	122.10	V		0.299	24.75		
		16-QAM	91.23	29.98	121.21	V		0.243	23.86		
		64-QAM	90.03	30.09	120.12	V		0.189	22.77		
841.5		PI/2 BPSK	92.03	29.98	122.01	V		0.292	24.66	1	39
		QPSK	91.98	29.98	121.96	V		0.289	24.61		
		16-QAM	91.09	29.98	121.07	V		0.236	23.72		
		64-QAM	89.78	29.98	119.76	V		0.174	22.41		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
834.0	Sub6 n5/ 20 MHz [15 kHz]	PI/2 BPSK	91.72	29.98	121.70	V	< 7.00	0.272	24.35	1	104
		QPSK	91.55	29.98	121.53	V		0.262	24.18		
		16-QAM	90.65	29.98	120.63	V		0.213	23.28		
		64-QAM	89.84	29.98	119.82	V		0.177	22.47		
836.5		PI/2 BPSK	91.68	29.98	121.66	V		0.270	24.31	1	53
		QPSK	91.63	29.98	121.61	V		0.267	24.26		
		16-QAM	90.70	29.98	120.68	V		0.215	23.33		
		64-QAM	89.27	29.98	119.25	V		0.155	21.90		
839.0		PI/2 BPSK	91.77	29.98	121.75	V		0.275	24.40	1	53
		QPSK	91.75	29.98	121.73	V		0.274	24.38		
		16-QAM	90.90	29.98	120.88	V		0.225	23.53		
		64-QAM	89.41	29.98	119.39	V		0.160	22.04		

8.2.2 Internal Antenna

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
826.5	Sub6 n5/ 5 MHz [15 kHz]	PI/2 BPSK	92.81	29.98	122.79	H	< 7.00	0.350	25.44	1	1
		QPSK	92.59	29.98	122.57	H		0.333	25.22		
		16-QAM	91.64	29.98	121.62	H		0.267	24.27		
		64-QAM	90.11	29.98	120.09	H		0.188	22.74		
836.5		PI/2 BPSK	92.12	29.98	122.10	H		0.299	24.75	1	1
		QPSK	92.10	29.98	122.08	H		0.297	24.73		
		16-QAM	91.16	29.98	121.14	H		0.239	23.79		
		64-QAM	89.77	29.98	119.75	H		0.174	22.40		
846.5		PI/2 BPSK	89.70	30.07	119.77	H		0.175	22.42	1	1
		QPSK	89.57	30.07	119.64	H		0.169	22.29		
		16-QAM	88.64	30.07	118.71	H		0.137	21.36		
		64-QAM	87.42	30.07	117.49	H		0.103	20.14		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
829.0	Sub6 n5/ 10 MHz [15 kHz]	PI/2 BPSK	92.65	30.09	122.74	H	< 7.00	0.346	25.39	1	1
		QPSK	92.43	30.09	122.52	H		0.329	25.17		
		16-QAM	91.49	30.09	121.58	H		0.265	24.23		
		64-QAM	90.15	30.09	120.24	H		0.195	22.89		
836.5		PI/2 BPSK	92.22	29.98	122.20	H		0.305	24.85	1	1
		QPSK	92.12	29.98	122.10	H		0.299	24.75		
		16-QAM	91.13	29.98	121.11	H		0.238	23.76		
		64-QAM	89.87	29.98	119.85	H		0.178	22.50		
844.0		PI/2 BPSK	91.41	29.97	121.38	H		0.253	24.03	1	1
		QPSK	91.28	29.97	121.25	H		0.246	23.90		
		16-QAM	90.44	29.97	120.41	H		0.202	23.06		
		64-QAM	89.06	29.97	119.03	H		0.147	21.68		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
831.5	Sub6 n5/ 15 MHz [15 kHz]	PI/2 BPSK	92.65	30.09	122.74	H	< 7.00	0.346	25.39	1	1
		QPSK	92.61	30.09	122.70	H		0.343	25.35		
		16-QAM	91.66	30.09	121.75	H		0.275	24.40		
		64-QAM	90.21	30.09	120.30	H		0.197	22.95		
836.5		PI/2 BPSK	92.58	29.98	122.56	H		0.332	25.21	1	1
		QPSK	92.47	29.98	122.45	H		0.324	25.10		
		16-QAM	91.44	29.98	121.42	H		0.255	24.07		
		64-QAM	90.12	29.98	120.10	H		0.188	22.75		
841.5		PI/2 BPSK	92.13	29.98	122.11	H		0.299	24.76	1	1
		QPSK	92.02	29.98	122.00	H		0.292	24.65		
		16-QAM	90.99	29.98	120.97	H		0.230	23.62		
		64-QAM	89.72	29.98	119.70	H		0.172	22.35		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP		RB	
							W	W	dBm	Size	Offset
834.0	Sub6 n5/ 20 MHz [15 kHz]	PI/2 BPSK	92.64	29.98	122.62	H	< 7.00	0.337	25.27	1	1
		QPSK	92.54	29.98	122.52	H		0.329	25.17		
		16-QAM	91.66	29.98	121.64	H		0.269	24.29		
		64-QAM	90.24	29.98	120.22	H		0.194	22.87		
836.5		PI/2 BPSK	92.58	29.98	122.56	H		0.332	25.21	1	1
		QPSK	92.60	29.98	122.58	H		0.333	25.23		
		16-QAM	91.61	29.98	121.59	H		0.266	24.24		
		64-QAM	90.21	29.98	120.19	H		0.192	22.84		
839.0		PI/2 BPSK	92.46	29.98	122.44	H		0.323	25.09	1	1
		QPSK	92.43	29.98	122.41	H		0.321	25.06		
		16-QAM	91.41	29.98	121.39	H		0.254	24.04		
		64-QAM	90.07	29.98	120.05	H		0.186	22.70		

8.3 RADIATED SPURIOUS EMISSIONS

8.3.1 External Antenna

▣ NR Band: N5

▣ Bandwidth: 10 MHz

▣ Modulation: PI/2 BPSK

▣ Distance: 3 meters

▣ SCS: 15 kHz

Ch	Freq (MHz)	Measured Level (dBμV)	A.F+C.L+D.F+H.P.F -A.G (dB/m)	Total (dBμV/m)	Pol.	Result (dBm)	Limit (dBm)	RB	
								Size	Offset
165800 (829.0)	1 658.00	56.61	-18.56	38.05	V	-57.15	-13.00	1	50
	2 487.00	55.10	-15.04	40.06	V	-55.14	-13.00		
	3 316.00	55.16	-13.49	41.67	V	-53.53	-13.00		
	4 145.00	54.76	-11.02	43.74	V	-51.46	-13.00		
	4 974.00	52.57	-7.97	44.60	V	-50.60	-13.00		
167300 (836.5)	1 673.00	55.89	-18.57	45.49	V	-57.88	-13.00	1	50
	2 509.50	53.97	-14.87	44.27	V	-56.10	-13.00		
	3 346.00	55.96	-13.55	43.63	V	-52.79	-13.00		
	4 182.50	54.70	-10.81	42.48	V	-51.31	-13.00		
	5 019.00	52.79	-7.78	41.30	V	-50.19	-13.00		
168800 (844.0)	1 688.00	55.92	-18.56	45.52	V	-57.84	-13.00	1	25
	2 532.00	54.80	-14.84	44.25	V	-55.24	-13.00		
	3 376.00	55.86	-13.40	43.52	V	-52.74	-13.00		
	4 220.00	54.92	-10.61	42.35	V	-50.89	-13.00		
	5 064.00	52.57	-7.61	41.31	V	-50.24	-13.00		

8.3.2 Internal Antenna

▣ NR Band: N5

▣ Bandwidth: 5 MHz

▣ Modulation: PI/2 BPSK

▣ Distance: 3 meters

▣ SCS: 15 kHz

Ch	Freq (MHz)	Measured Level (dBμV)	A.F+C.L+D.F+H.P.F -A.G (dB/m)	Total (dBμV/m)	Pol.	Result (dBm)	Limit (dBm)	RB	
								Size	Offset
165300 (826.5)	1 653.00	59.63	-18.58	41.05	V	-54.15	-13.00	1	1
	2 479.50	54.53	-15.09	39.44	V	-55.76	-13.00		
	3 306.00	52.83	-13.43	39.40	V	-55.80	-13.00		
	4 132.50	54.36	-11.00	43.37	V	-51.84	-13.00		
	4 959.00	54.19	-8.03	46.16	V	-49.04	-13.00		
167300 (836.5)	1 673.00	56.50	-18.57	37.93	V	-57.27	-13.00	1	1
	2 509.50	52.24	-14.87	37.37	H	-57.83	-13.00		
	3 346.00	52.54	-13.55	38.99	H	-56.21	-13.00		
	4 182.50	58.07	-10.81	47.26	H	-47.94	-13.00		
	5 019.00	53.52	-7.78	45.74	H	-49.46	-13.00		
169300 (846.5)	1 693.00	62.38	-18.56	43.82	V	-51.38	-13.00	1	1
	2 539.50	56.79	-14.89	41.90	H	-53.30	-13.00		
	3 386.00	52.30	-13.39	38.91	V	-56.29	-13.00		
	4 232.50	52.71	-10.59	42.12	V	-53.08	-13.00		
	5 079.00	52.85	-7.38	45.47	V	-49.73	-13.00		

8.4 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
Sub6 n5	5 MHz	836.5	BPSK	25	0	3.86
			QPSK			4.39
			16-QAM			5.59
			64-QAM			6.06
	10 MHz		BPSK	50		3.95
			QPSK			4.59
			16-QAM			5.60
			64-QAM			6.01
	15 MHz		BPSK	75		4.06
			QPSK			4.79
			16-QAM			5.82
			64-QAM			6.18
	20 MHz		BPSK	100		4.21
			QPSK			4.80
			16-QAM			5.71
			64-QAM			6.13

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 63 ~ 78.

8.5 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
Sub6 n5	5 MHz	836.5	BPSK	25	0	4.4993
			QPSK			4.4792
			16-QAM			4.5051
			64-QAM			4.4922
	10 MHz		BPSK	50		8.9845
			QPSK			8.9954
			16-QAM			8.9678
			64-QAM			8.9386
	15 MHz		BPSK	75		13.420
			QPSK			13.439
			16-QAM			13.476
			64-QAM			13.500
	20 MHz		BPSK	100		17.899
			QPSK			17.848
			16-QAM			17.947
			64-QAM			17.882

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 47 ~ 62.

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 n5	5	826.5	1.6491	30.200	-76.320	-46.120	-13.00
		836.5	1.6691	30.200	-76.538	-46.338	
		846.5	1.6890	30.200	-76.426	-46.226	
	10	829.0	1.6491	30.200	-75.856	-45.656	
		836.5	4.0190	30.200	-80.400	-50.200	
		844.0	1.6790	30.200	-76.359	-46.159	
	15	831.5	1.6491	30.200	-77.479	-47.279	
		836.5	1.6591	30.200	-76.865	-46.665	
		841.5	1.6691	30.200	-76.544	-46.344	
	20	834.0	1.6496	30.200	-77.181	-46.981	
		836.5	1.6546	30.200	-76.783	-46.583	
		839.0	1.6596	30.200	-77.639	-47.439	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 103 ~ 114.
2. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)
3. Factor(dB) = Cable Loss + Attenuator + Power Splitter

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

8.7 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 79 ~ 102.

8.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

▣ BandWidth: 5 MHz

▣ Voltage(100 %): 13.500 VDC

▣Deviation Limit: ± 0.000 25 % or 2.5 ppm

Test. Frequncy	Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(MHz)	(%)	(℃)	(Hz)	Error (Hz)	(%)	
836.5	100%	+20(Ref)	836 500 000	0.0	0.000 000	0.000
	100%	-30	836 500 001	0.6	0.000 000	0.001
	100%	-20	836 500 001	0.5	0.000 000	0.001
	100%	-10	836 500 001	0.4	0.000 000	0.000
	100%	0	836 500 001	0.6	0.000 000	0.001
	100%	+10	836 500 001	0.4	0.000 000	0.000
	100%	+30	836 500 001	0.4	0.000 000	0.000
	100%	+40	836 500 001	0.4	0.000 000	0.000
	100%	+50	836 500 001	0.2	0.000 000	0.000
	85%	+20	836 500 001	0.3	0.000 000	0.000
	115%	+20	836 500 000	0.1	0.000 000	0.000

▣ BandWidth: 10 MHz

▣ Voltage(100 %): 13.500 VDC

▣Deviation Limit: ± 0.000 25 % or 2.5 ppm

Test. Frequncy	Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(MHz)	(%)	(℃)	(Hz)	Error (Hz)	(%)	
836.5	100%	+20(Ref)	836 500 002	0.0	0.000 000	0.000
	100%	-30	836 500 002	-0.4	0.000 000	0.000
	100%	-20	836 500 007	5.1	0.000 001	0.006
	100%	-10	836 500 002	-0.2	0.000 000	0.000
	100%	0	836 499 998	-4.7	-0.000 001	-0.006
	100%	+10	836 500 004	1.5	0.000 000	0.002
	100%	+30	836 500 002	-0.3	0.000 000	0.000
	100%	+40	836 499 998	-4.5	-0.000 001	-0.005
	100%	+50	836 500 005	2.7	0.000 000	0.003
	85%	+20	836 500 006	4.1	0.000 000	0.005
	115%	+20	836 500 005	2.9	0.000 000	0.003

▣ BandWidth: 15 MHz

▣ Voltage(100 %): 13.500 VDC

▣Deviation Limit: ± 0.000 25 % or 2.5 ppm

Test. Frequncy	Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(MHz)	(%)	(℃)	(Hz)	Error (Hz)	(%)	
836.5	100%	+20(Ref)	836 499 997	0.0	0.000 000	0.000
	100%	-30	836 499 993	-3.3	0.000 000	-0.004
	100%	-20	836 499 993	-3.1	0.000 000	-0.004
	100%	-10	836 499 994	-2.9	0.000 000	-0.004
	100%	0	836 499 994	-3.0	0.000 000	-0.004
	100%	+10	836 499 993	-3.2	0.000 000	-0.004
	100%	+30	836 499 993	-3.2	0.000 000	-0.004
	100%	+40	836 499 993	-3.2	0.000 000	-0.004
	100%	+50	836 499 994	-3.0	0.000 000	-0.004
	85%	+20	836 499 995	-1.9	0.000 000	-0.002
	115%	+20	836 499 994	-2.5	0.000 000	-0.003

▣ BandWidth: 20 MHz

▣ Voltage(100 %): 13.500 VDC

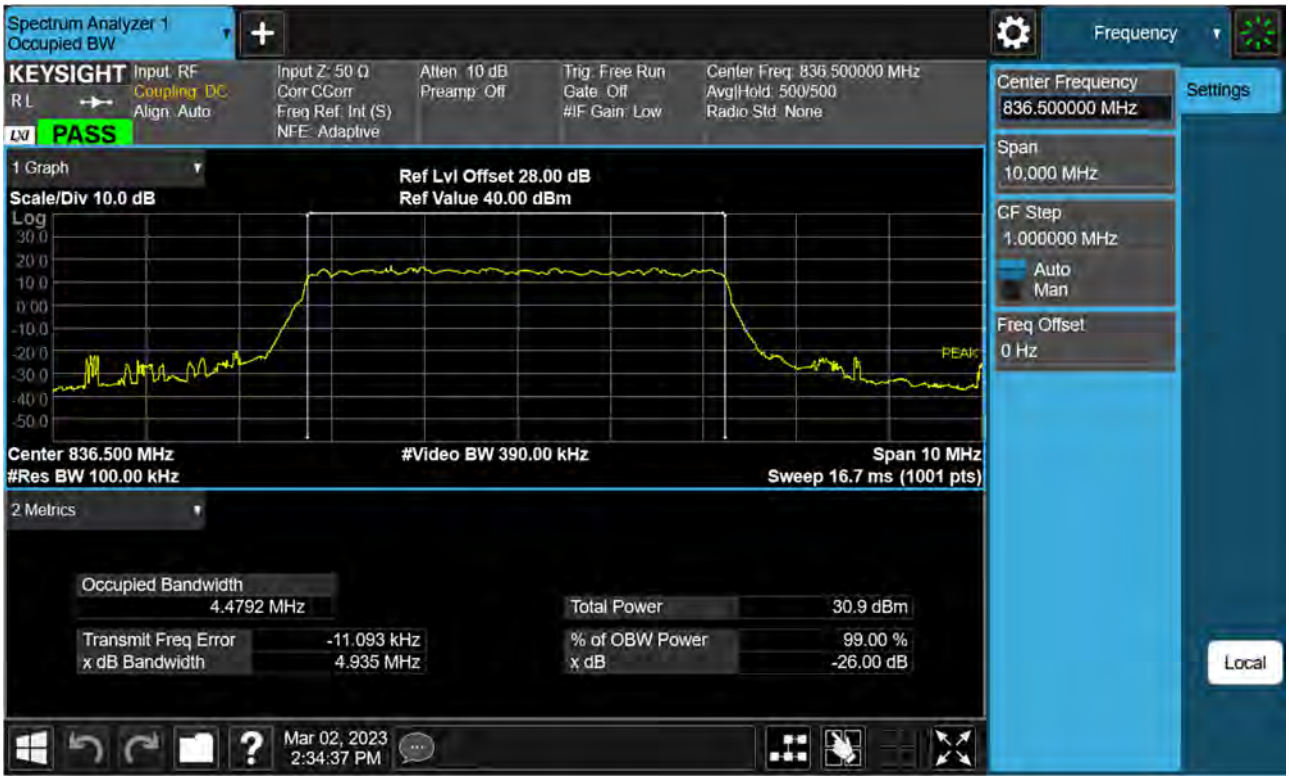
▣Deviation Limit: ± 0.000 25 % or 2.5 ppm

Test. Frequncy	Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(MHz)	(%)	(℃)	(Hz)	Error (Hz)	(%)	
836.5	100%	+20(Ref)	836 500 005	0.0	0.000 000	0.000
	100%	-30	836 499 998	-6.3	-0.000 001	-0.007
	100%	-20	836 500 009	4.4	0.000 001	0.005
	100%	-10	836 499 998	-6.3	-0.000 001	-0.008
	100%	0	836 499 998	-6.5	-0.000 001	-0.008
	100%	+10	836 499 998	-6.6	-0.000 001	-0.008
	100%	+30	836 499 998	-6.6	-0.000 001	-0.008
	100%	+40	836 499 998	-6.6	-0.000 001	-0.008
	100%	+50	836 499 998	-6.8	-0.000 001	-0.008
	85%	+20	836 499 999	-5.5	-0.000 001	-0.007
	115%	+20	836 499 998	-6.1	-0.000 001	-0.007

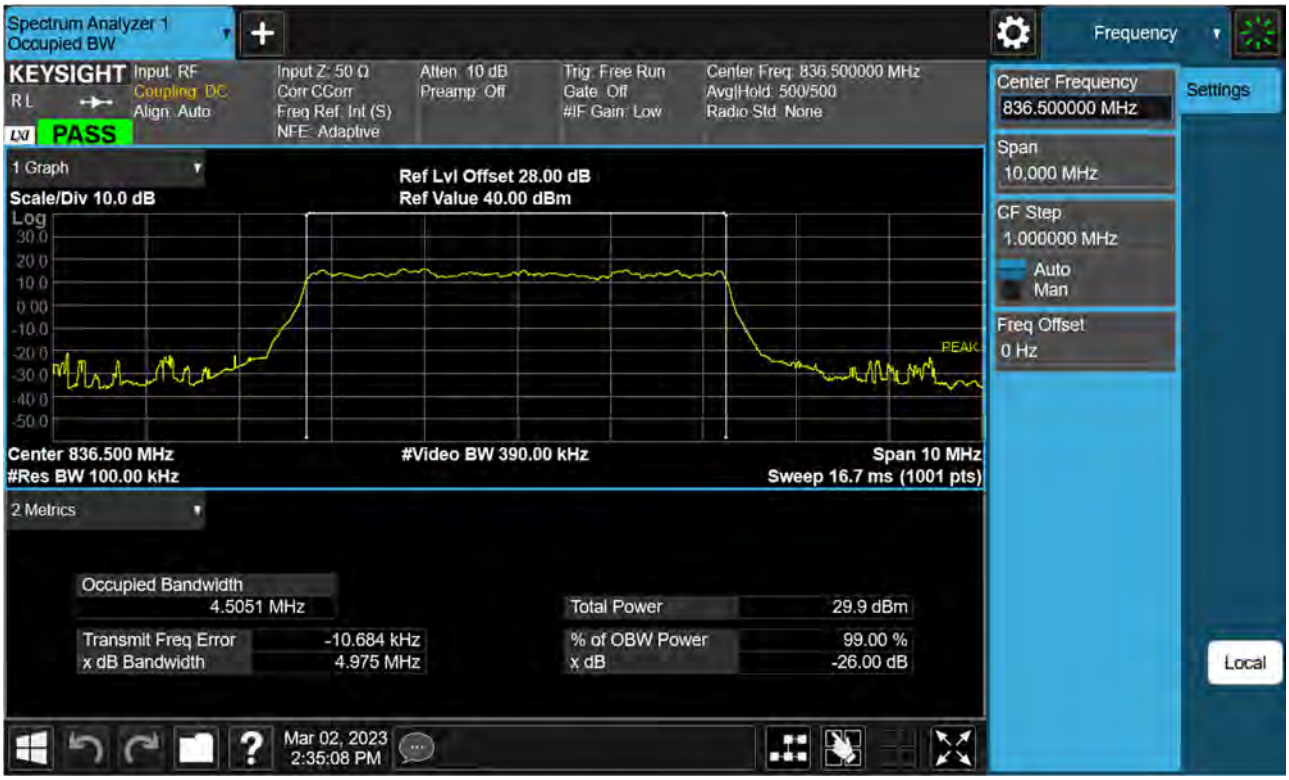
9. TEST PLOTS

Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 BPSK_Full RB_0)

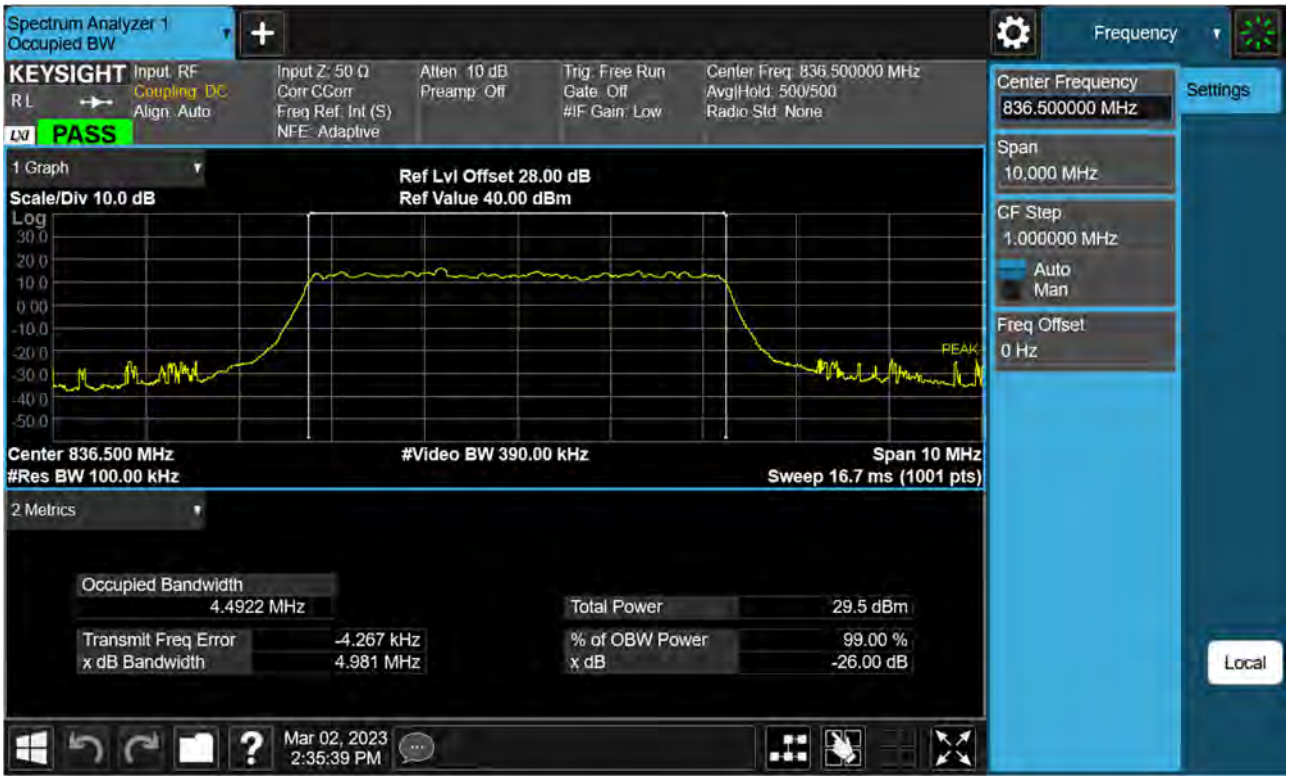
Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 QPSK_ Full RB _0)



Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 16QAM_ Full RB _0)



Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 64QAM_ Full RB _0)



Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 BPSK_ Full RB _0)

Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 QPSK_ Full RB _0)

Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 16QAM_ Full RB _0)

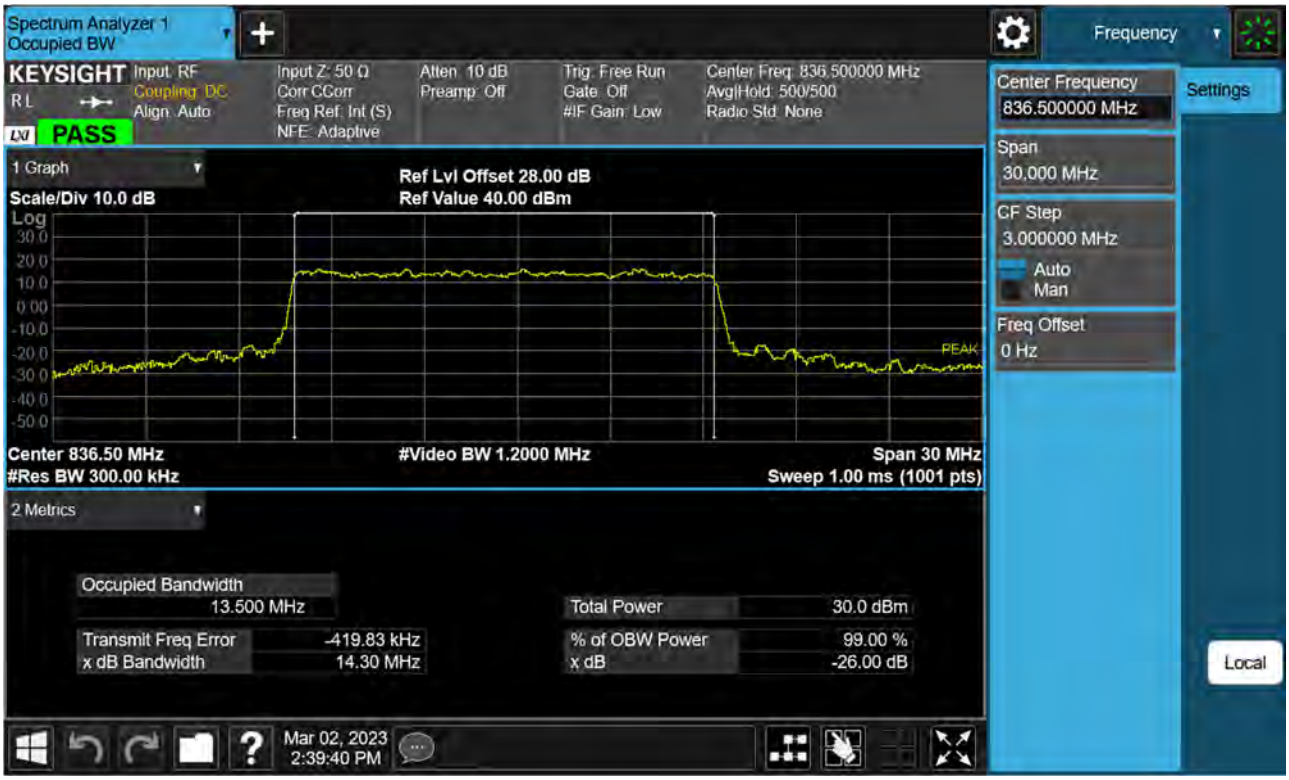
Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 64QAM_ Full RB _0)

Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 BPSK_ Full RB _0)

Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 QPSK_ Full RB _0)

Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 16QAM_ Full RB _0)

Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 64QAM_ Full RB _0)



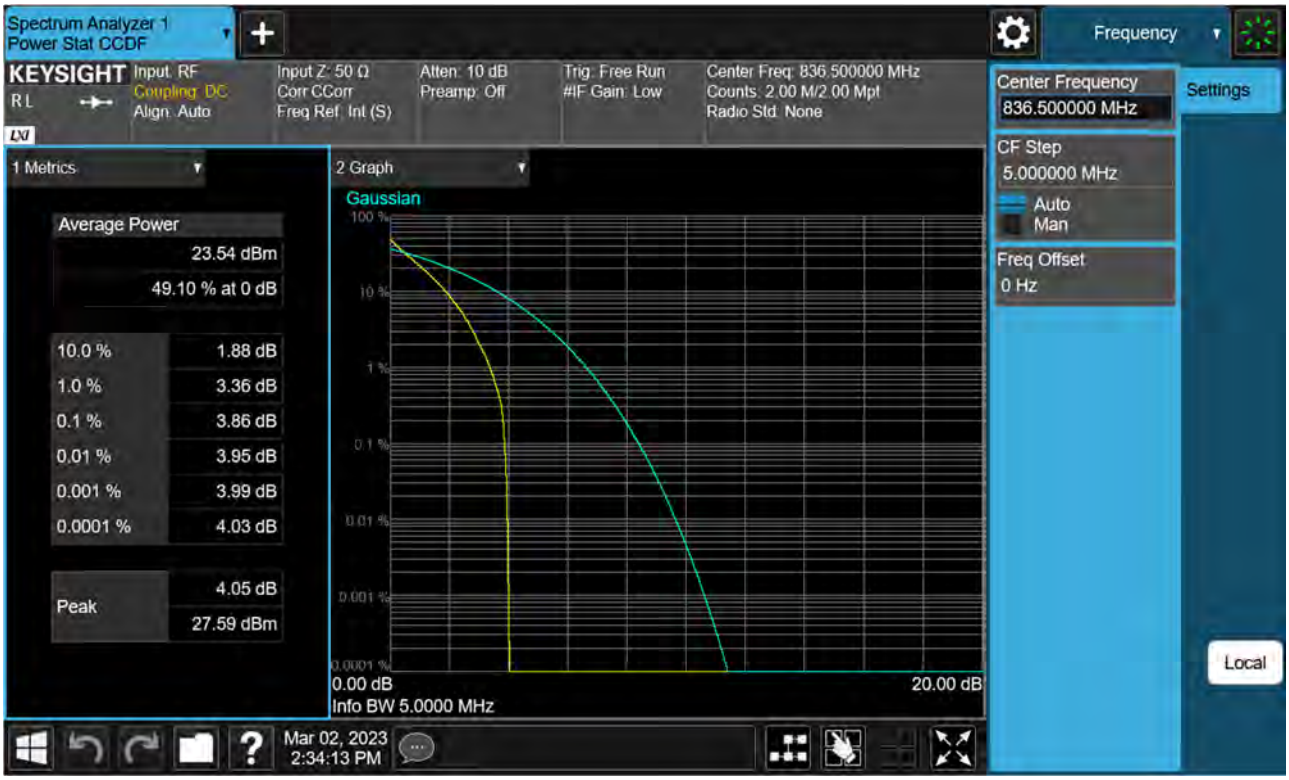
Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 BPSK_ Full RB _0)

Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 QPSK_ Full RB _0)

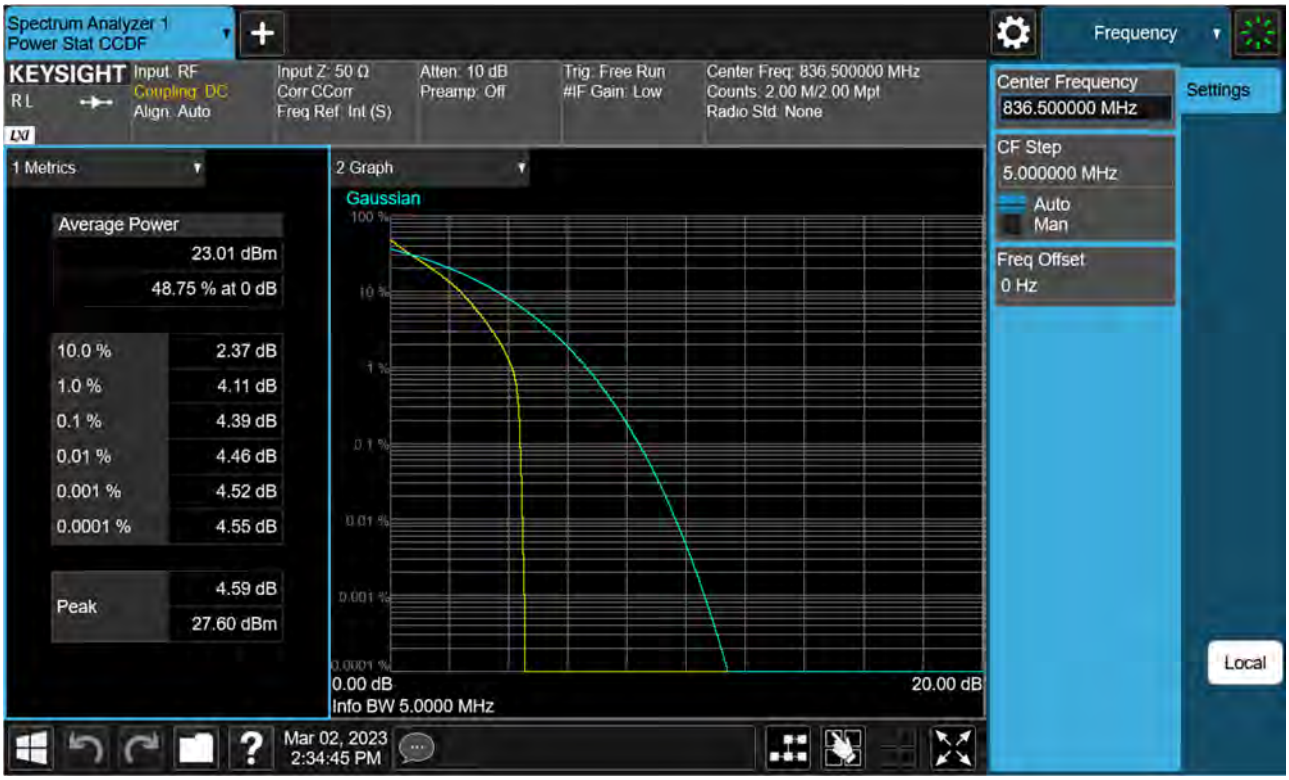
Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 16QAM_ Full RB _0)

Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 64QAM_ Full RB _0)

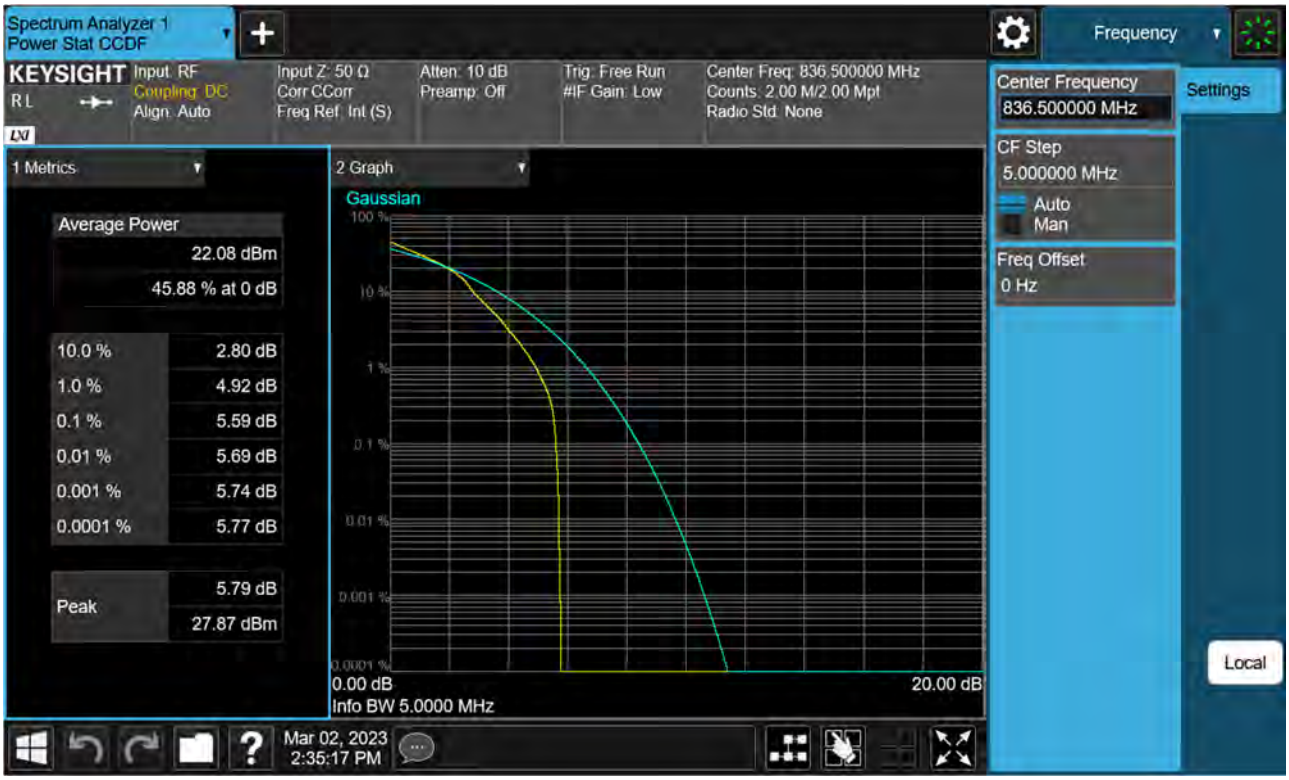
Sub6 n5. PAR Plot (5 M BW_Ch.167300_ BPSK_ Full RB _0)



Sub6 n5. PAR Plot (5 M BW_Ch. 167300_QPSK_ Full RB _0)

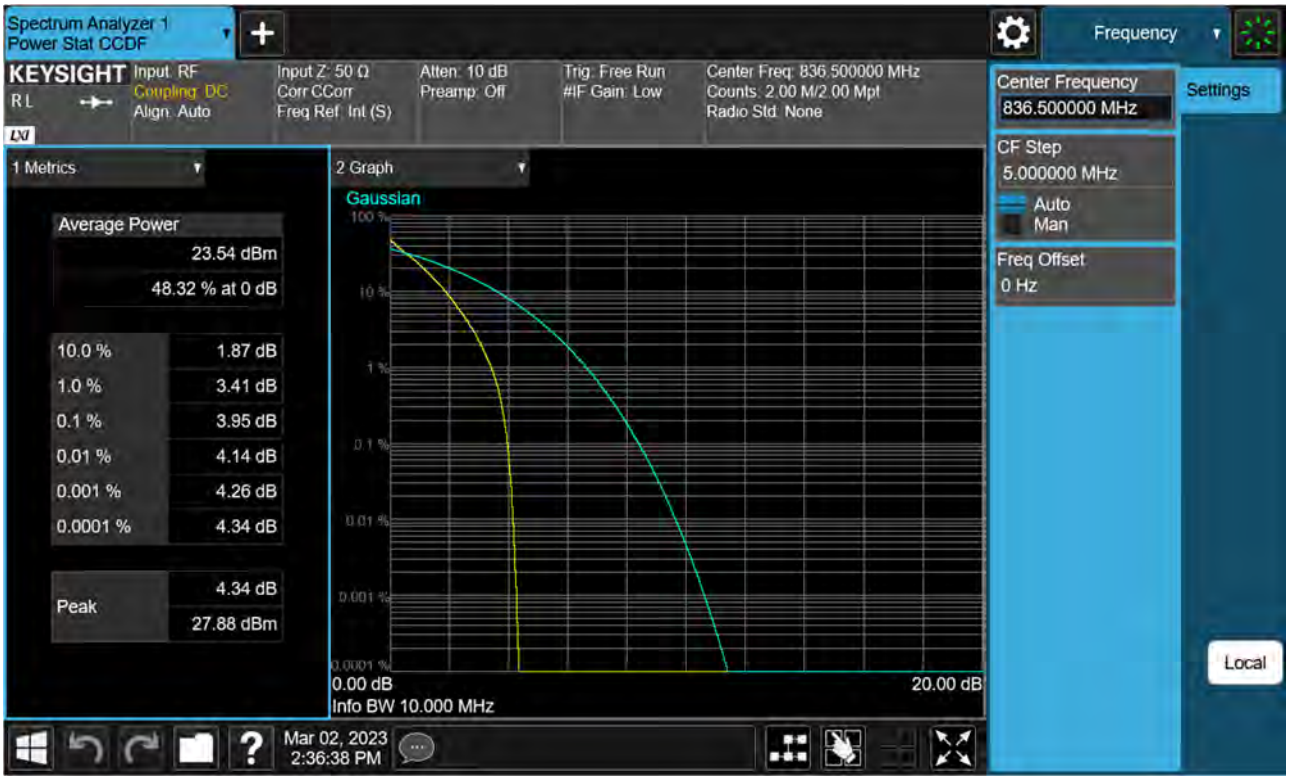


Sub6 n5. PAR Plot (5 M BW_Ch. 167300_16QAM_ Full RB _0)

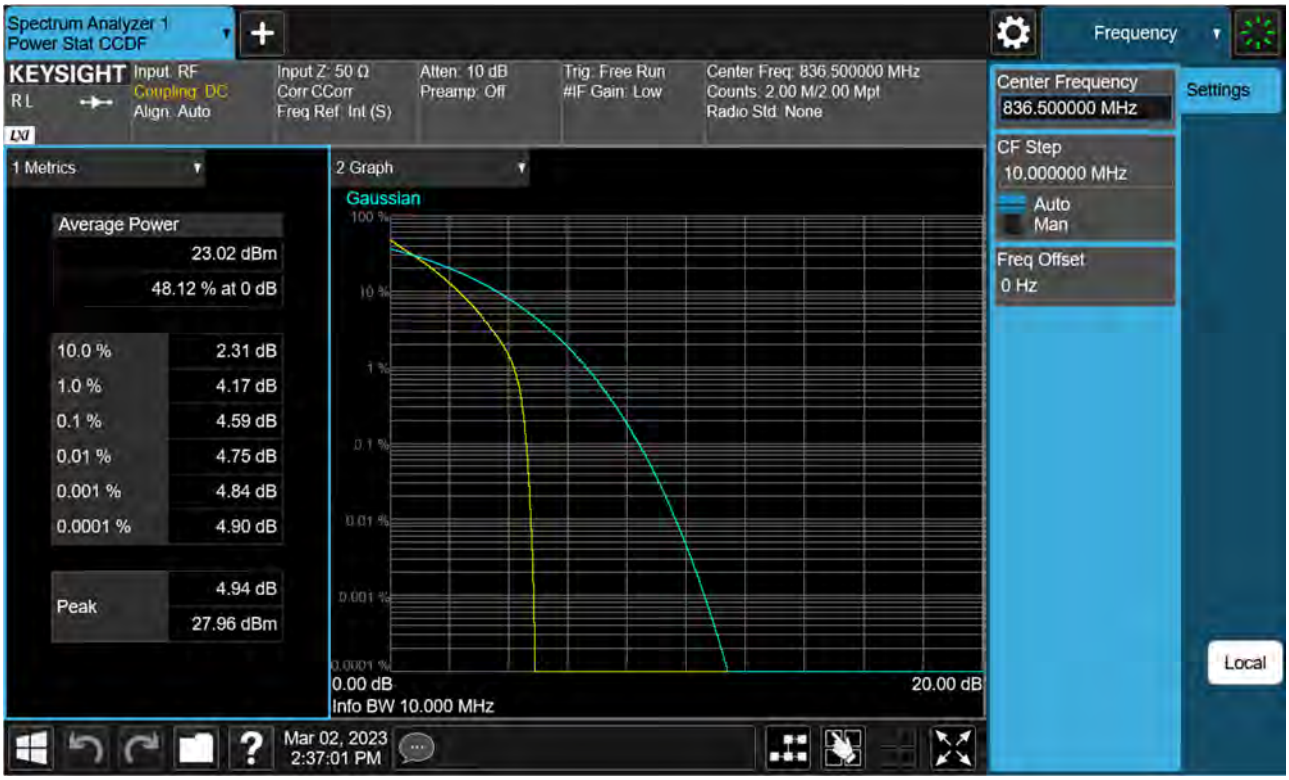


Sub6 n5. PAR Plot (5 M BW_Ch. 167300_64QAM_ Full RB _0)

Sub6 n5. PAR Plot (10 M BW_Ch. 167300_ BPSK_ Full RB _0)



Sub6 n5. PAR Plot (10 M BW_Ch. 167300_QPSK_ Full RB _0)

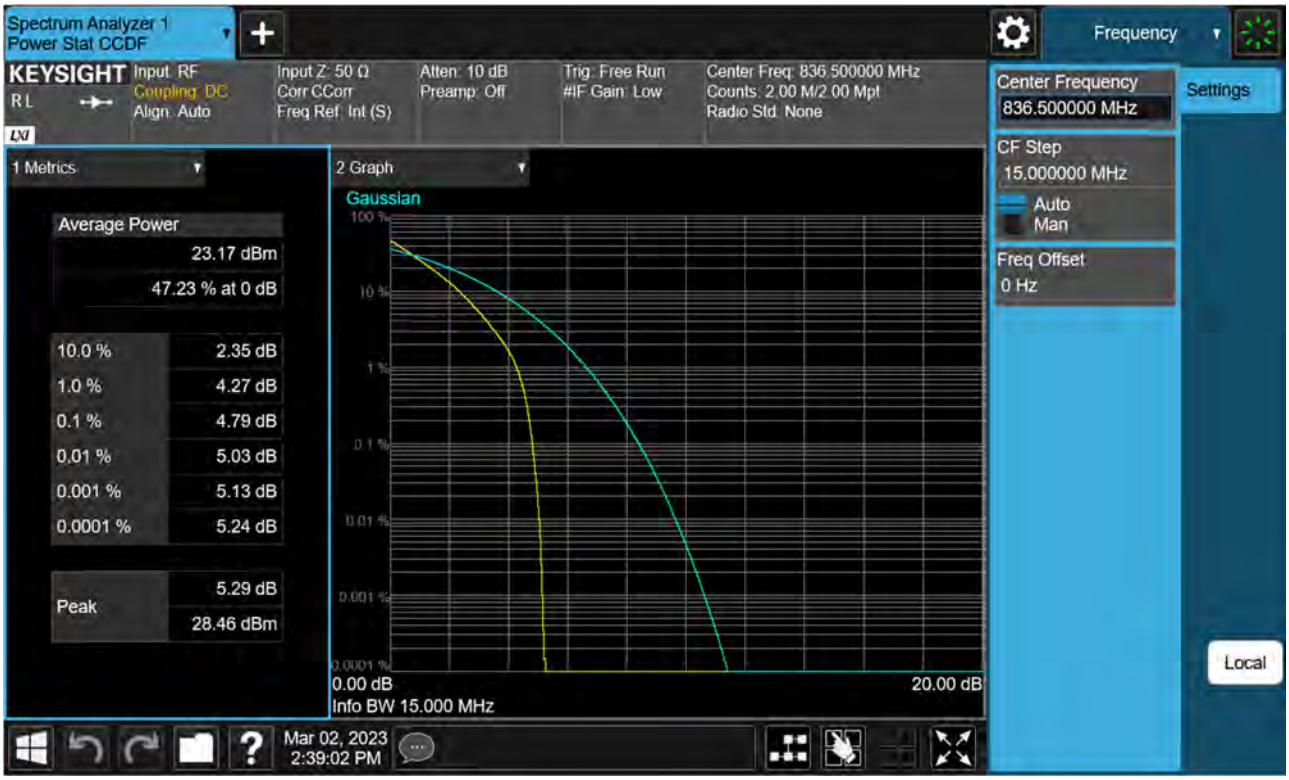


Sub6 n5. PAR Plot (10 M BW_Ch. 167300_16QAM_ Full RB _0)

Sub6 n5. PAR Plot (10 M BW_Ch. 167300_64QAM_ Full RB _0)

Sub6 n5. PAR Plot (15 M BW_Ch. 167300_ BPSK_ Full RB _0)

Sub6 n5. PAR Plot (15 M BW_Ch. 167300_QPSK_ Full RB _0)

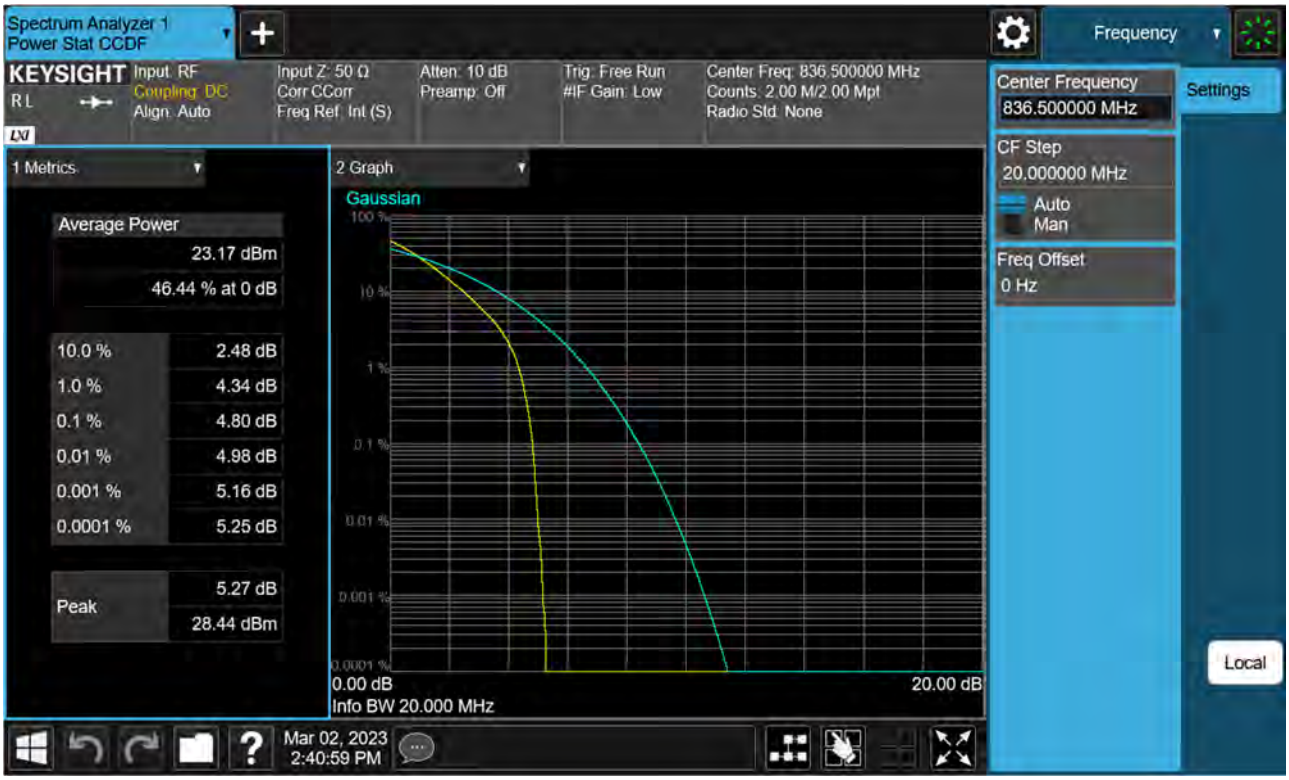


Sub6 n5. PAR Plot (15 M BW_Ch. 167300_16QAM_ Full RB _0)

Sub6 n5. PAR Plot (15 M BW_Ch. 167300_64QAM_ Full RB _0)

Sub6 n5. PAR Plot (20 M BW_Ch. 167300_ BPSK_ Full RB _0)

Sub6 n5. PAR Plot (20 M BW_Ch. 167300_QPSK_ Full RB _0)



Sub6 n5. PAR Plot (20 M BW_Ch. 167300_16QAM_ Full RB _0)

Sub6 n5. PAR Plot (20 M BW_Ch. 167300_64QAM_ Full RB _0)

Sub6 n5. Lower Band Edge Plot (5 M BW Ch.165300 BPSK_RB1_Offset 0)

Sub6 n5. Lower Band Edge Plot (5 M BW Ch.165300 BPSK_RB25_Offset 0)

Sub6 n5. Lower Extended Band Edge Plot (5 M BW Ch.165300 BPSK_RB25_0)

Sub6 n5. Lower Band Edge Plot (10 M BW Ch.165800 BPSK_RB1_Offset 0)

Sub6 n5. Lower Band Edge Plot (10 M BW Ch.165800 BPSK_RB50_Offset 0)

Sub6 n5. Lower Extended Band Edge Plot (10 M BW Ch.165800 BPSK_RB50_0)

Sub6 n5. Lower Band Edge Plot (15 M BW Ch.166300 BPSK_RB1_Offset 0)

Sub6 n5. Lower Band Edge Plot (15 M BW Ch.166300 BPSK_RB75_Offset 0)

Sub6 n5. Lower Extended Band Edge Plot (15 M BW Ch.166300 BPSK_RB75_0)

Sub6 n5. Lower Band Edge Plot (20 M BW Ch.166800 BPSK_RB1_Offset 0)

Sub6 n5. Lower Band Edge Plot (20 M BW Ch.166800 BPSK_RB100_Offset 0)

Sub6 n5. Lower Extended Band Edge Plot (20 M BW Ch.166800 BPSK_RB100_0)

Sub6 n5. Upper Band Edge Plot (5 M BW Ch.169300 BPSK_RB1_Offset 24)

Sub6 n5. Upper Band Edge Plot (5 M BW Ch.169300 BPSK_RB25_Offset 0)

Sub6 n5. Upper Extended Band Edge Plot (5 M BW Ch.169300 BPSK_RB25_0)

Sub6 n5. Upper Band Edge Plot (10 M BW Ch.168800 BPSK_RB1_Offset 51)

Sub6 n5. Upper Band Edge Plot (10 M BW Ch.168800 BPSK_RB50_Offset 0)

Sub6 n5. Upper Extended Band Edge Plot (10 M BW Ch.168800 BPSK_RB50_0)

Sub6 n5. Upper Band Edge Plot (15 M BW Ch.168300 BPSK_RB1_Offset 78)

Sub6 n5. Upper Band Edge Plot (15 M BW Ch.168300 BPSK_RB75_Offset 0)

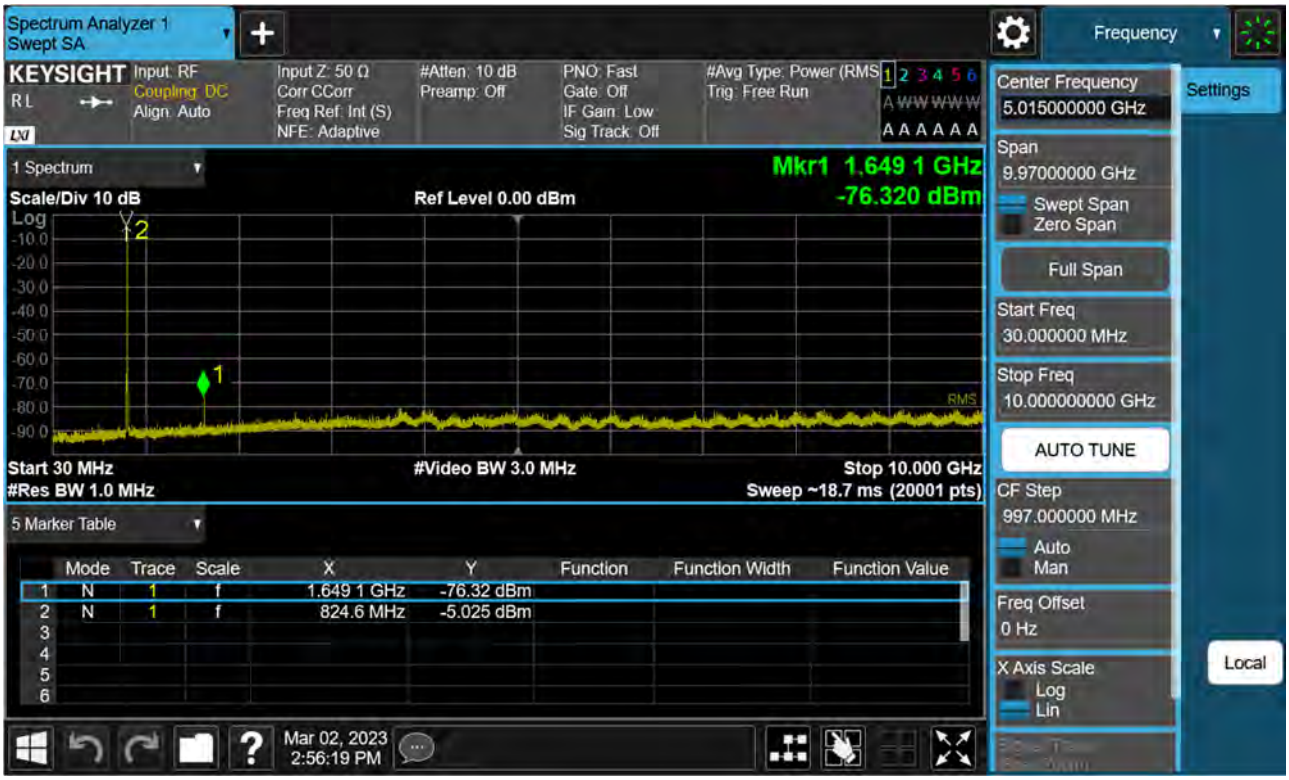
Sub6 n5. Upper Extended Band Edge Plot (15 M BW Ch.168300 BPSK_RB75_0)

Sub6 n5. Upper Band Edge Plot (20 M BW Ch.167800 BPSK_RB1_Offset 105)

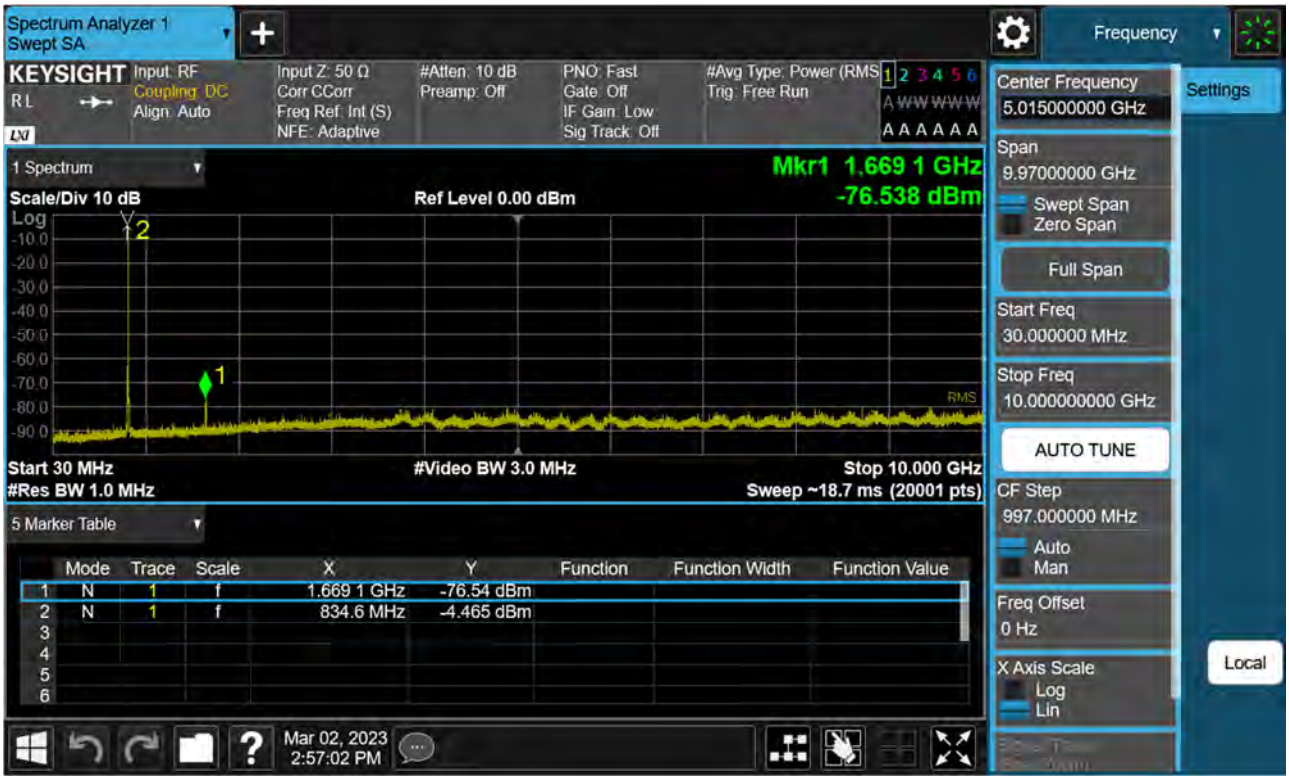
Sub6 n5. Upper Band Edge Plot (20 M BW Ch.167800 BPSK_RB100_Offset 0)

Sub6 n5. Upper Extended Band Edge Plot (20 M BW Ch.167800 BPSK_RB100_0)

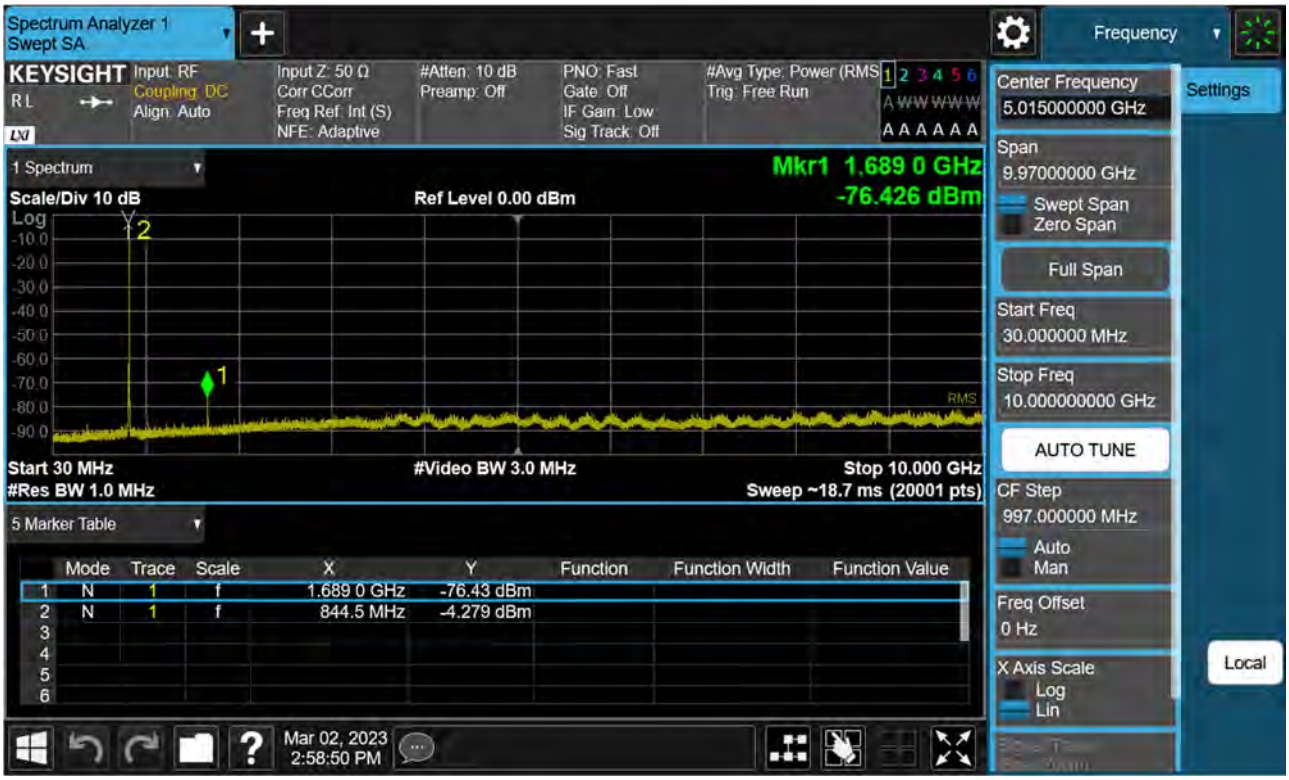
Sub6 n5. Conducted Spurious Plot (165300ch_5 MHz_BPSK_RB 1_1)



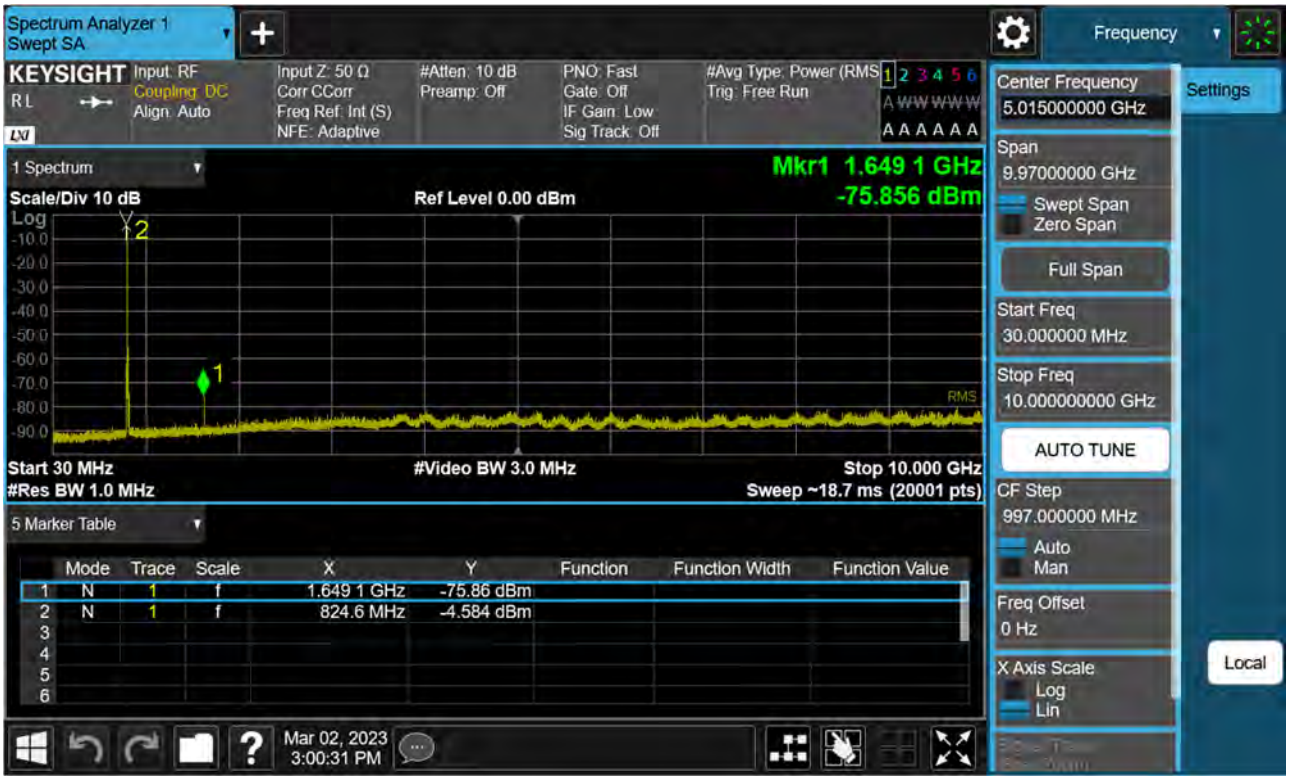
Sub6 n5. Conducted Spurious Plot (167300ch_5 MHz_BPSK_RB 1_1)



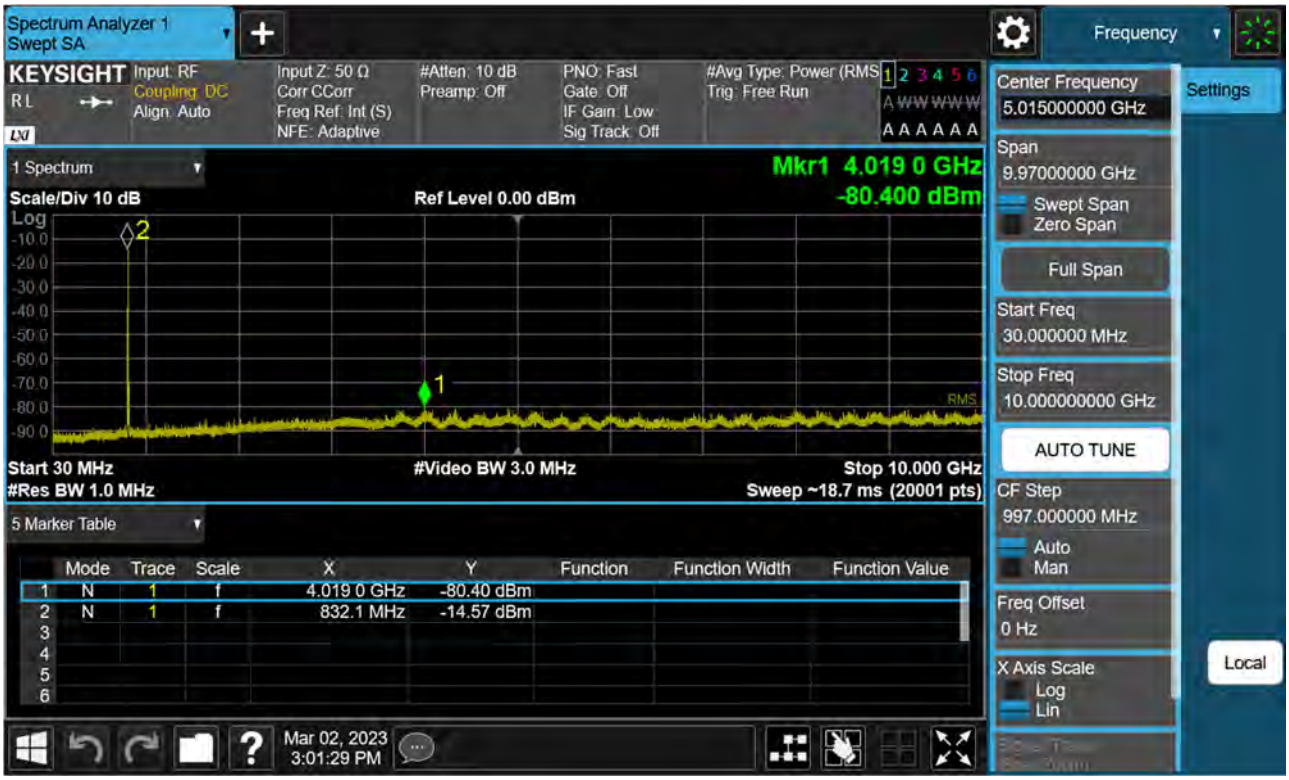
Sub6 n5. Conducted Spurious Plot (169300ch_5 MHz_BPSK_RB 1_1)



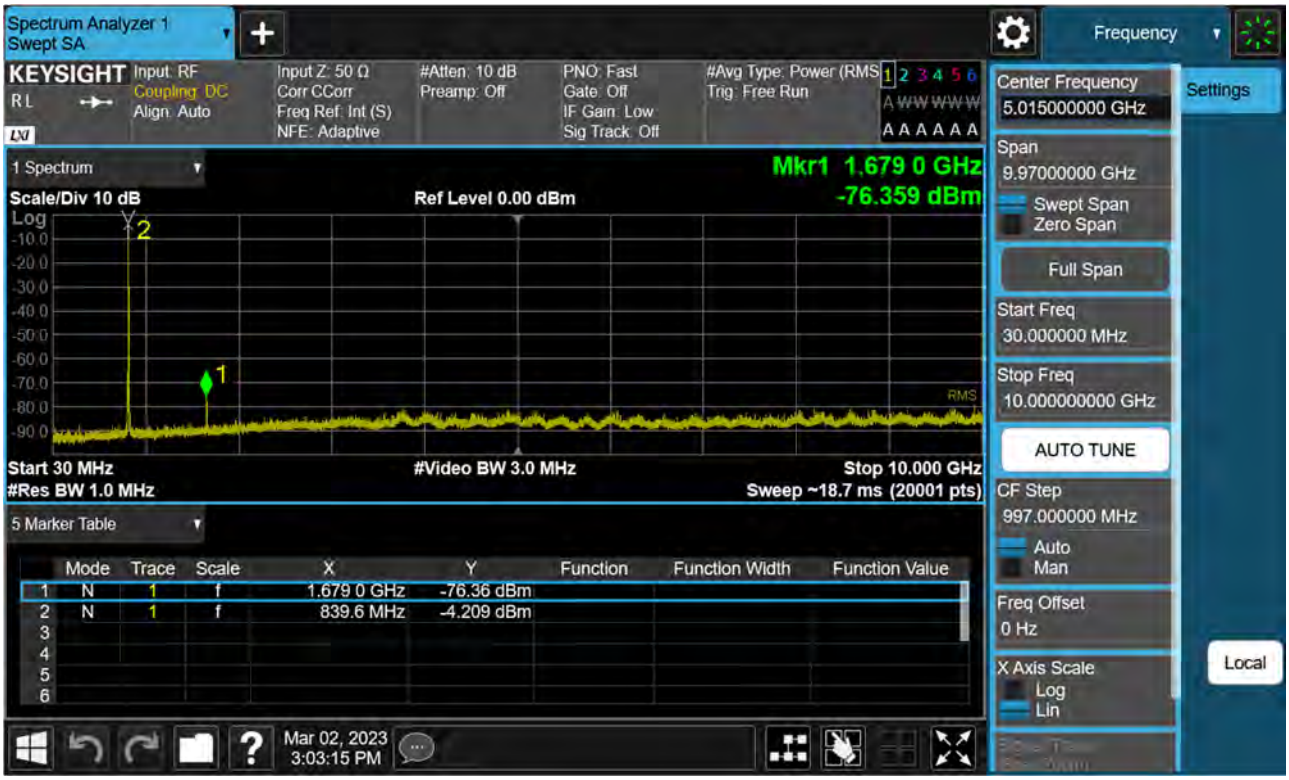
Sub6 n5. Conducted Spurious Plot (165800ch_10 MHz_BPSK_RB 1_1)



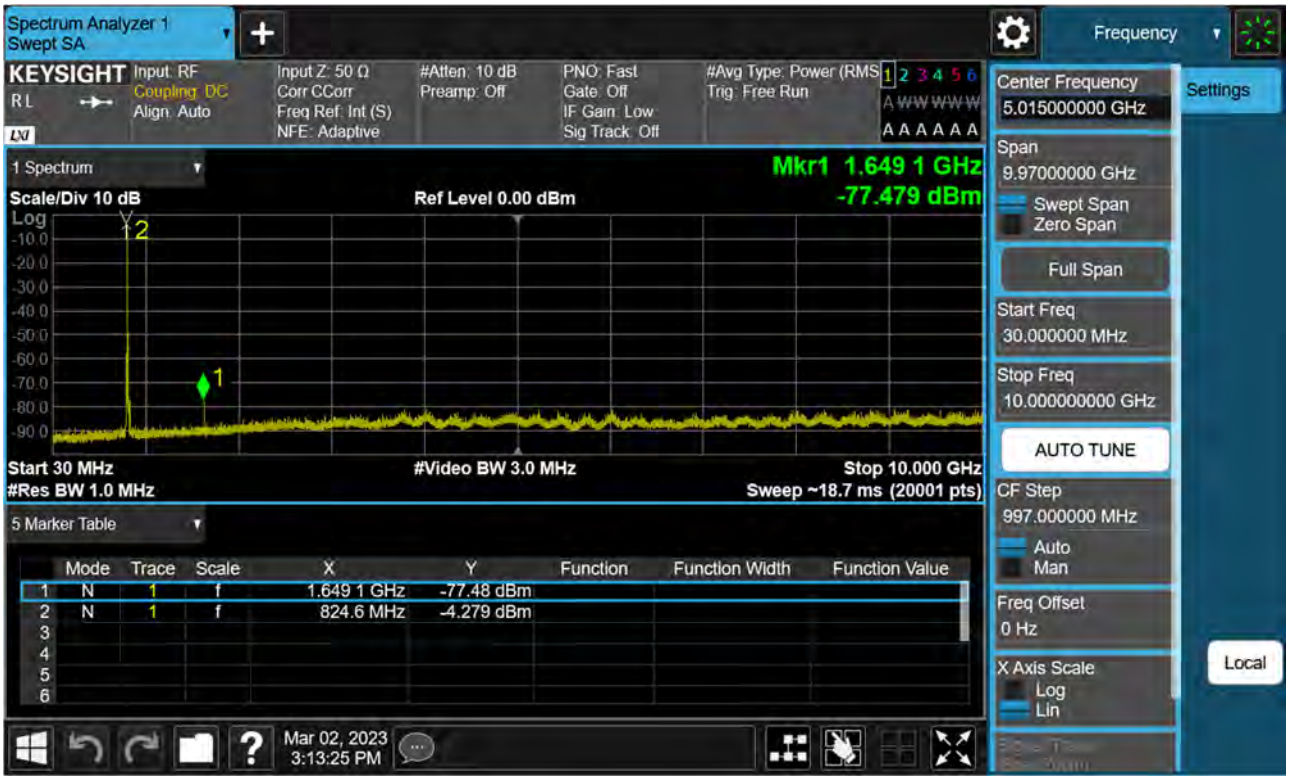
Sub6 n5. Conducted Spurious Plot (167300ch_10 MHz_BPSK_RB 1_1)



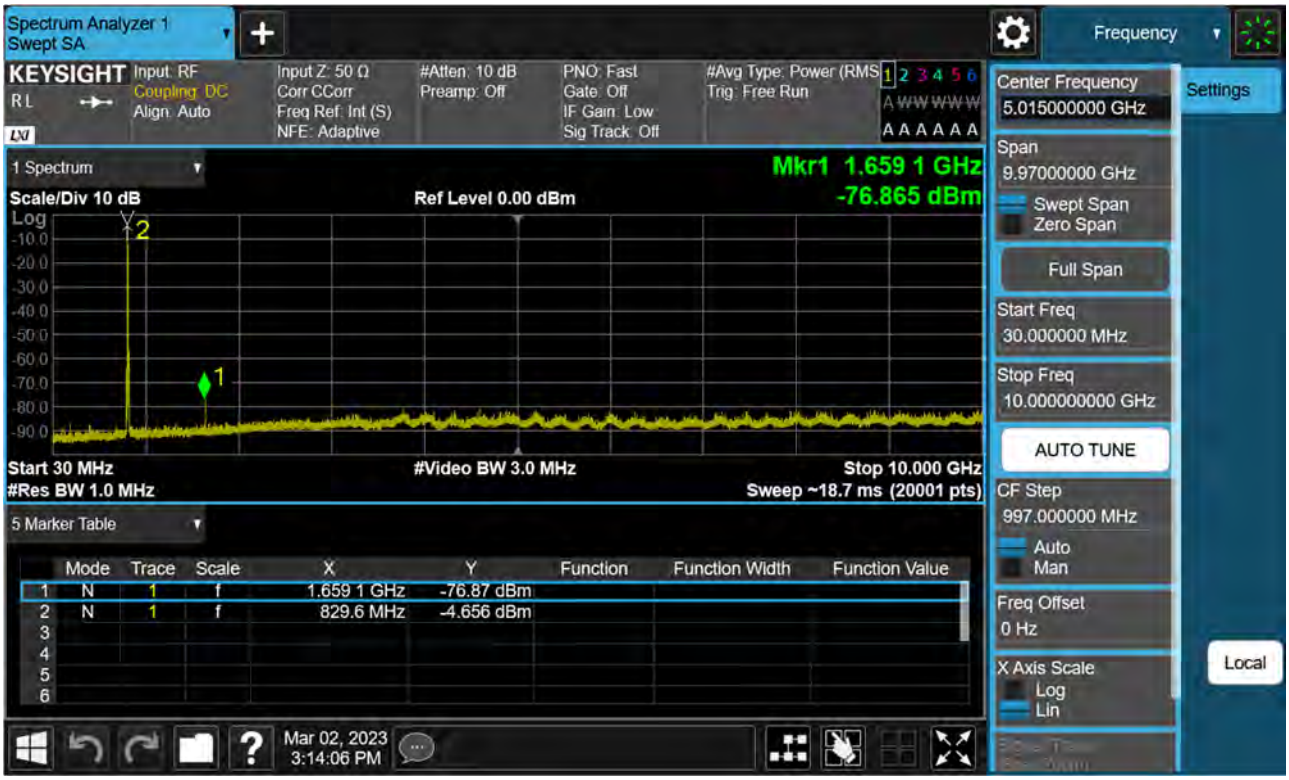
Sub6 n5. Conducted Spurious Plot (168800ch_10 MHz_BPSK_RB 1_1)



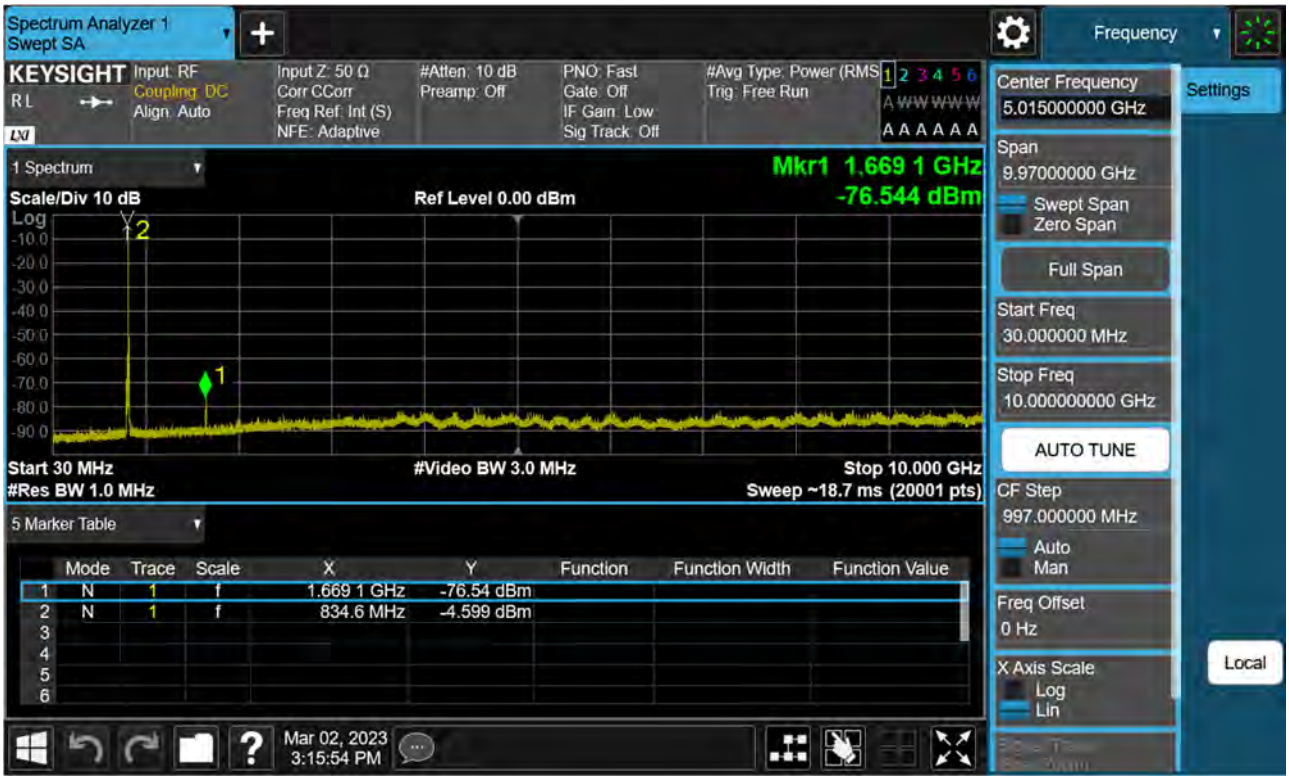
Sub6 n5. Conducted Spurious Plot (166300ch_15 MHz_BPSK_RB 1_1)



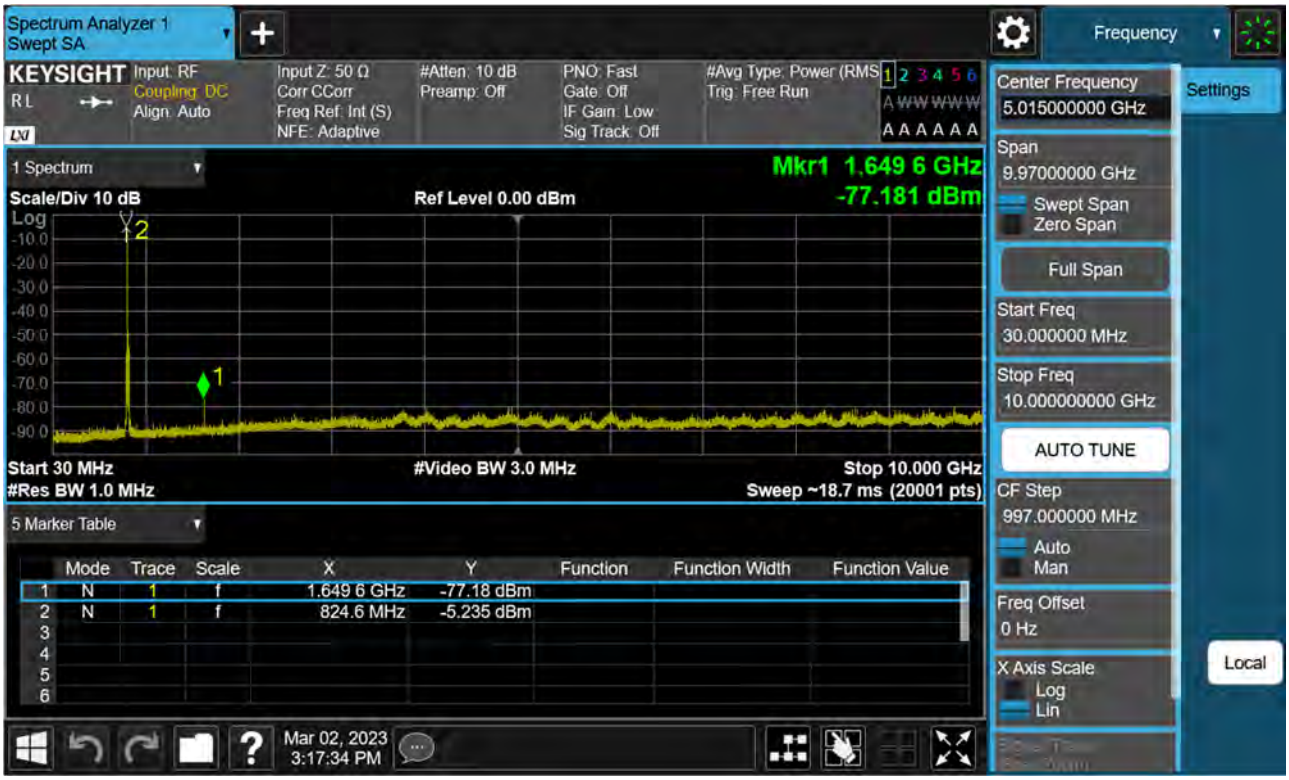
Sub6 n5. Conducted Spurious Plot (167300ch_15 MHz_BPSK_RB 1_1)



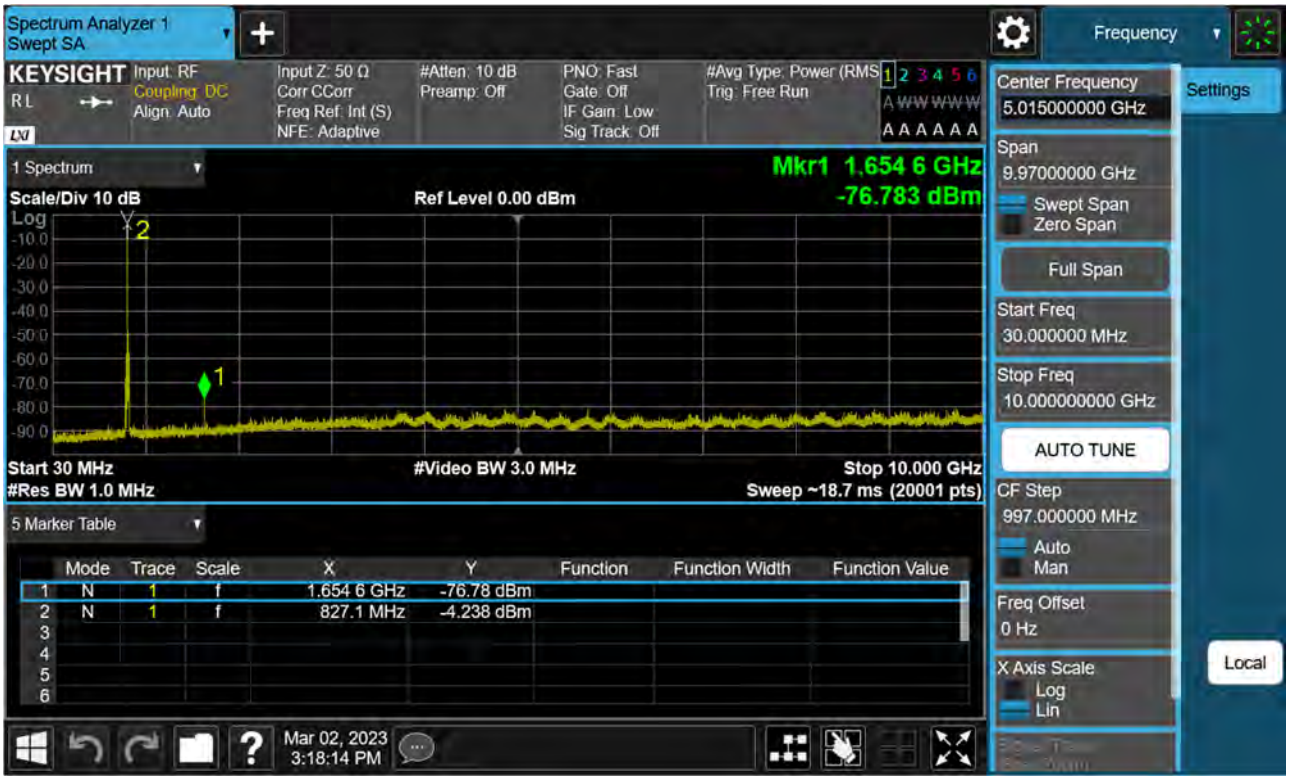
Sub6 n5. Conducted Spurious Plot (168300ch_15 MHz_BPSK_RB 1_1)



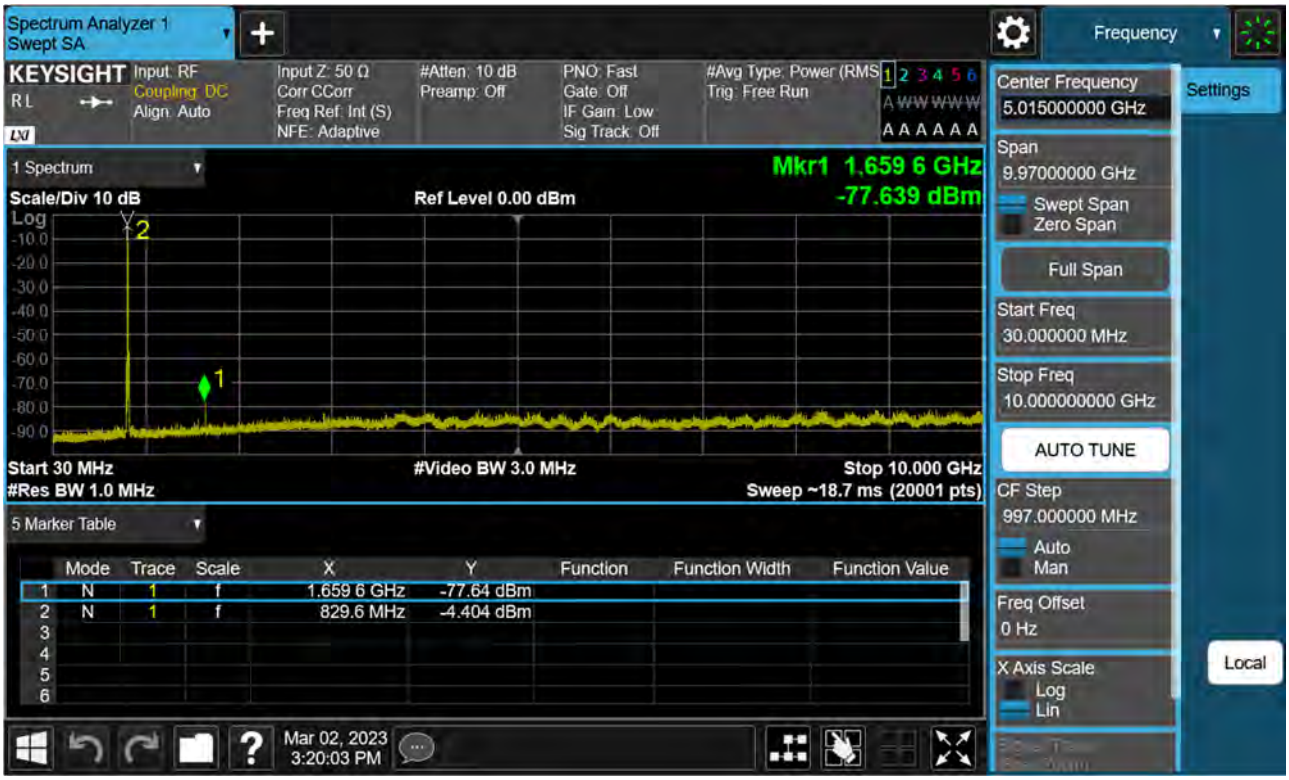
Sub6 n5. Conducted Spurious Plot (166800ch_20 MHz_BPSK_RB 1_1)



Sub6 n5. Conducted Spurious Plot (167300ch_20 MHz_BPSK_RB 1_1)



Sub6 n5. Conducted Spurious Plot (167800ch_20 MHz_BPSK_RB 1_1)



10. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2308-FC001-P