TEST REPORT

FCC Sub6 n2 Test for TFGMEIBBCD4
Class II Permissive Change

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2409-FC006-R1

DATE OF ISSUE
October 7, 2024

Tested by
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Jong Seok Lee

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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
Product Name Model Name	GM Onstar Gen12 ROW TFGMEIBBCD4
Date of Test	February 27, 2023 ~ October 05, 2023 May 07, 2024 ~ June 19, 2024 (Only 256QAM)
Location of Test	■ Permanent Testing Lab ☐ On Site Testing (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)
FCC ID	BEJTFGMEIBBCD4
FCC Classification	PCS Licensed Transmitter (PCB)
Test Standard Used	FCC Rule Part(s) : § 24
Test Results	PASS

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	September 26, 2024	Initial Release
1	October 07, 2024	Added the note (Page 5,21,22)

Notice

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

CONTENTS

MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	LG Electronics Inc.
Address:	10, Magok Jungang-ro, Gangseo-gu, Seoul 07796, Republic of Korea
FCC ID:	BEJTFGMEIBBCD4
Application Type:	Class II Permissive Change
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§ 24
EUT Type:	GM Onstar Gen12 ROW
Model(s):	TFGMEIBBCD4
Additional Model(s)	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, 256QAM CP-OFDM: QPSK, 16QAM, 64QAM, 256QAM
Tx Frequency:	1852.5 MHz – 1907.5 MHz : 5 MHz 1855.0 MHz – 1905.0 MHz : 10 MHz 1857.5 MHz – 1902.5 MHz : 15 MHz 1860.0 MHz – 1900.0 MHz : 20 MHz
Date(s) of Tests:	February 27, 2023 ~ October 05, 2023 May 07, 2024 ~ June 19, 2024 (Only 256QAM)
Serial number:	Radiated - External Antenna : EBR36018942_#30 - Internal Antenna : EBR36018942K_#14 - EBR36018942K_#30 (Only 256QAM) Conducted : EBR36018829_#069, EBR36018942K_#30 (Only 256QAM)
External Antenna Information	ANT5 : 86531607 ANT4 : 86575530 DUT4 : 85608774

 # Note :
- Original Certification : PI/2 BPSK, QPSK, 16QAM, 64QAM (Report No. HCT-RF-2308-FC003)
- C2PC : It was tested only for 256QAM

1.1. MAXIMUM OUTPUT POWER

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	EIRP External Antenna		EIRP Internal Antenna	
				Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)
Sub6 n2 (5)	1852.5 - 1907.5	4M49G7D	PI/2 BPSK	0.442	26.45	0.478	26.79
		4M50G7D	QPSK	0.440	26.43	0.456	26.59
		4M52W7D	16QAM	0.343	25.35	0.363	25.60
		4M48W7D	64QAM	0.251	24.00	0.267	24.27
		4M61W7D	256QAM	0.163	22.13	0.168	22.25
Sub6 n2 (10)	1855.0 - 1905.0	8M99G7D	PI/2 BPSK	0.481	26.82	0.436	26.39
		8M96G7D	QPSK	0.478	26.79	0.427	26.30
		8M98W7D	16QAM	0.385	25.85	0.350	25.44
		8M94W7D	64QAM	0.280	24.47	0.253	24.03
		8M97W7D	256QAM	0.175	22.42	0.158	21.98
Sub6 n2 (15)	1857.5 - 1902.5	13M5G7D	PI/2 BPSK	0.491	26.91	0.414	26.17
		13M5G7D	QPSK	0.489	26.89	0.406	26.09
		13M4W7D	16QAM	0.379	25.79	0.329	25.17
		13M4W7D	64QAM	0.298	24.74	0.239	23.78
		13M5W7D	256QAM	0.183	22.63	0.153	21.85
Sub6 n2 (20)	1860.0 - 1900.0	17M9G7D	PI/2 BPSK	0.455	26.58	0.414	26.17
		17M9G7D	QPSK	0.454	26.57	0.406	26.09
		17M9W7D	16QAM	0.365	25.62	0.329	25.17
		18M0W7D	64QAM	0.285	24.55	0.239	23.79
		17M9W7D	256QAM	0.181	22.57	0.155	21.89

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

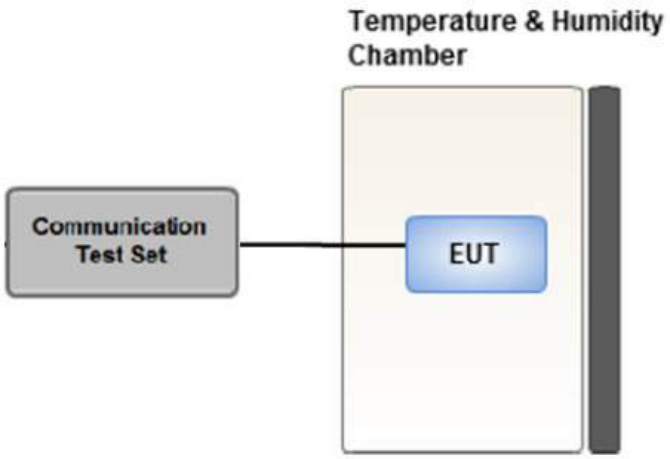
The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea

3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

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

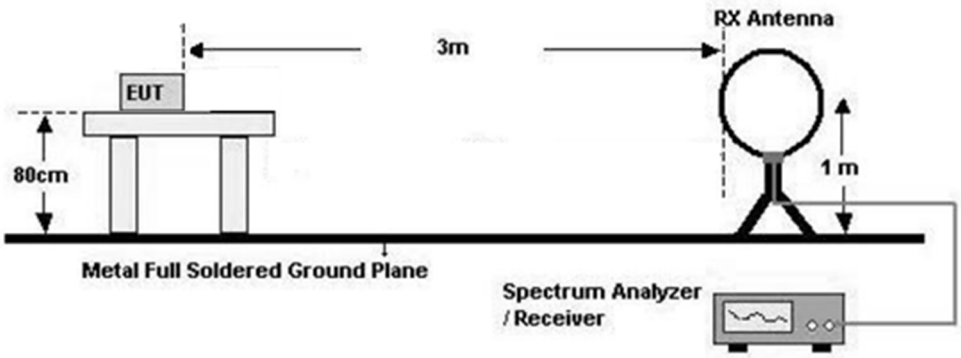
3.3 RADIATED TEST

Test Overview

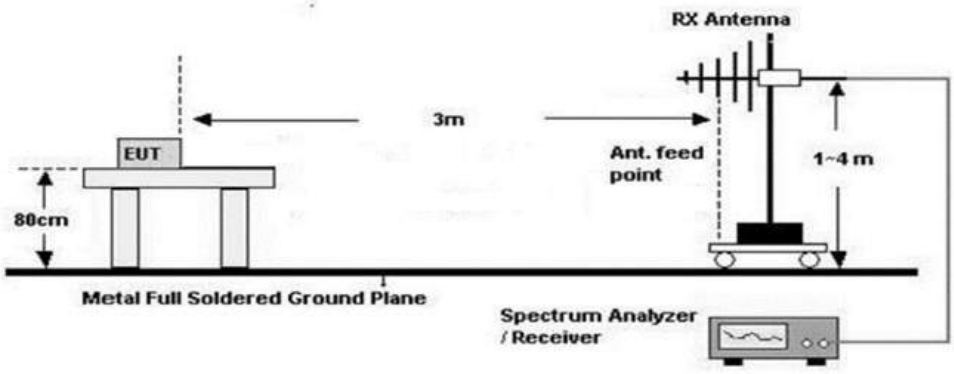
Radiated tests are performed in the semi-anechoic chamber. The equipment under test is placed on a non-conductive table on semi-anechoic chamber.

Test Configuration

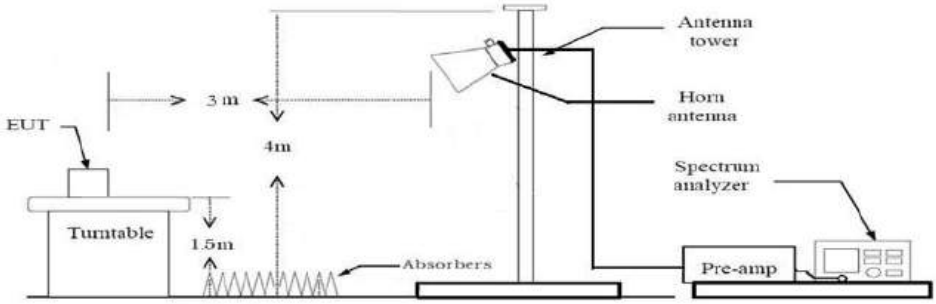
Below 30 MHz



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.

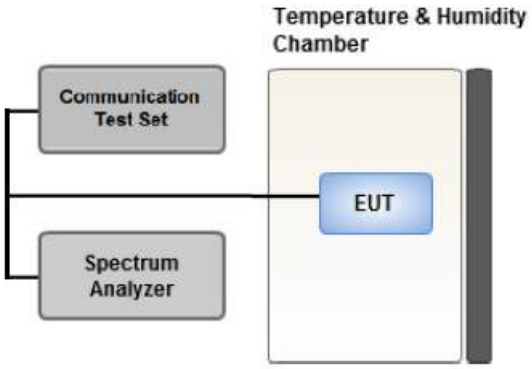
Below 1 GHz

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 P_{Pk}.

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

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

Test Settings(Peak Power)

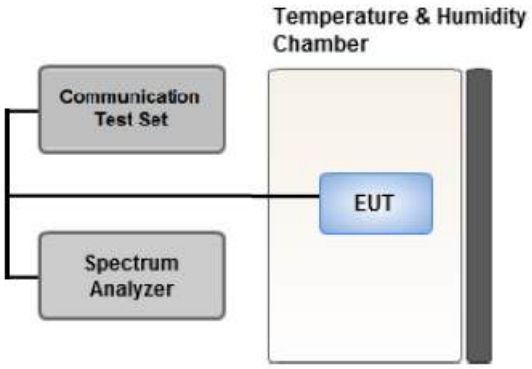
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

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

Test Settings(Average Power)

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

3.5 OCCUPIED BANDWIDTH.



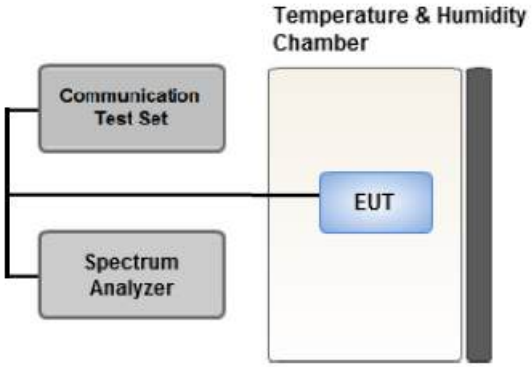
Test setup

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

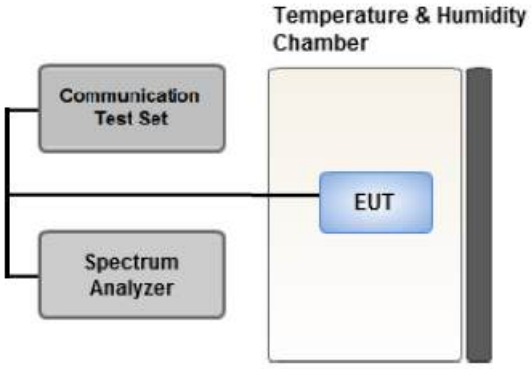
Test Overview

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 = trace 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

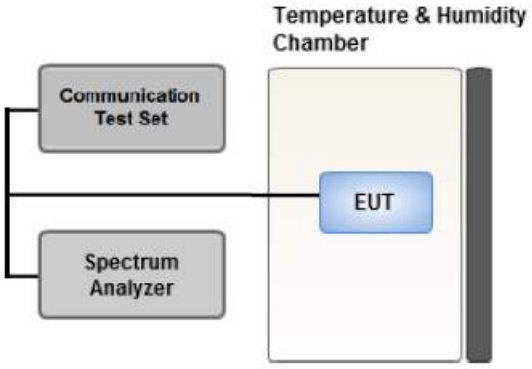
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1 % of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
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 : 15 MHz)
  (Internal Antenna Worst case : 5 MHz)
- TFGMEIBBCD4 & additional models were tested and the worst case results are reported.
  (Worst case : TFGMEIBBCD4)
- Radiated Spurious emissions are measured while operating in EN-DC mode with Sub 6 NR carrier as well as an LTE carrier (anchor).
  All EN-DC mode of operation (=anchor) were investigated and the test results were measured No Peak Found.
  The test results which are attenuated more than 20 dB below the permissible value, so it was not reported.

[External Antenna Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Isotropic Radiated Power	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	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 Isotropic Radiated Power	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	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: NSA (5A-n2A)
- All EN-DC mode of operation (=anchor) were investigated and and the worst case results are reported.
- 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	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	5, 10, 15, 20	Mid	Full RB	0
Peak-To-Average Ratio	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	5, 10, 15, 20	Mid	Full RB	0
Band Edge	PI/2 BPSK	5	Low	1	0
			High	1	24
		10	Low	1	0
			High	1	51
		15	Low	1	0
			High	1	78
		20	Low	1	0
			High	1	105
		5, 10, 15, 20	Low, High	Full RB	0
Spurious and Harmonic Emissions at Antenna Terminal	PI/2 BPSK	5, 10, 15, 20	Low, Mid, High	1	1

4. LIST OF TEST EQUIPMENT

Equipment	Model	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	CO3000/1542/ 57580623/G	N/A	N/A
Amp & Filter Bank Switch Controller	FBSM-01B	TNM system	TM20090001	N/A	N/A
RF Switch System	TMX0132C	TNM System	TM21100002	N/A	N/A
RF Switch System	FBSR-04C HPF1	TNM System	S5L1	03/12/2025	Annual
RF Switch System	FBSR-04C LNA1	TNM System	S5L4	03/12/2025	Annual
RF Switch System	FBSR-04C HPF2	TNM System	S5L5	03/12/2025	Annual
HIGHPASS FILTER	WHKX10-900-1000-15000-40SS	WAINWRIGHT INSTRUMENTS	16	07/24/2025	Annual
HIGHPASS FILTER	WHNX6.0/26.5G-6SS	WAINWRIGHT INSTRUMENTS	1	12/11/2024	Annual
Power Amplifier	CBL18265035	CERNEX	22966	11/17/2024	Annual
Power Amplifier	CBL26405040	CERNEX	25956	02/26/2025	Annual
Loop Antenna (9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/07/2026	Biennial
Horn Antenna(1 ~ 18 GHz)	HF907	ROHDE & SCHWARZ	103224	05/07/2026	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/20/2026	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	1135	08/19/2026	Biennial
Chamber	SU-642	ESPEC	93008124	02/19/2025	Annual
Power Splitter(DC~26.5 GHz)	11667B	Hewlett Packard	11275	02/19/2025	Annual
DC Power Supply	E3632A	Hewlett Packard	KR01009150	04/18/2025	Annual
4-Way Divider	ZC4PD-K1844+	Mini-Circuits	942907	09/10/2025	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/17/2025	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	ROHDE & SCHWARZ	101510	03/28/2025	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/05/2025	Annual
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262287701	05/16/2025	Annual
Wideband Radio Communication Tester	MT8000A	Anritsu Corp.	6262302511	05/14/2025	Annual
Signal Analyzer (10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	04/19/2025	Annual
Signal Analyzer (5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/17/2025	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

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

5. MEASUREMENT UNCERTAINTY

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

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

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

6. SUMMARY OF TEST RESULTS

6.1 Test Condition : Conducted Test

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

Note:

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

6.2 Test Condition : Radiated Test

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

Note:

1. Radiateded 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)		
						370500	376000	381500
						1852.5 MHz	1880 MHz	1907.5 MHz
5 MHz	15	DFT-s	pi/2 BPSK	1	1	23.59	23.70	23.89
				1	13	23.50	23.67	23.76
				1	23	23.56	23.70	23.79
				12	0	23.02	23.07	23.17
				12	7	23.54	23.68	23.82
				12	13	23.03	23.20	23.37
				25	0	23.04	23.17	23.32
			QPSK	1	1	23.53	23.54	23.68
			16QAM	1	1	22.47	22.45	22.70
			64QAM	1	1	21.21	21.19	21.31
			256QAM	1	1	19.11	19.20	19.39
		CP	QPSK	1	1	21.97	21.86	22.11

Bandwidth	SCS(kHz)	OFDM	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
						371000	376000	381000
						1855 MHz	1880 MHz	1905 MHz
10 MHz	15	DFT-s	pi/2 BPSK	1	1	23.82	23.65	23.80
				1	26	23.80	23.58	23.79
				1	50	23.77	23.63	23.71
				25	0	23.19	23.07	23.27
				25	14	23.79	23.60	23.78
				25	27	23.25	23.19	23.31
				50	0	23.28	23.09	23.30
			QPSK	1	1	23.68	23.59	23.59
			16QAM	1	1	22.67	22.56	22.61
			64QAM	1	1	21.42	21.23	21.43
			256QAM	1	1	19.16	19.22	19.58
		CP	QPSK	1	1	22.10	21.98	22.06

Bandwidth	SCS(kHz)	OFDM	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
						371500	376000	380500
						1857.5 MHz	1880 MHz	1902.5 MHz
15 MHz	15	DFT-s	pi/2 BPSK	1	1	23.87	23.73	23.69
				1	40	23.77	23.70	23.57
				1	77	23.75	23.68	23.61
				36	0	23.24	23.19	22.59
				36	22	23.74	23.68	23.60
				36	43	23.37	23.23	23.02
				75	0	23.26	23.19	23.16
			QPSK	1	1	23.84	23.71	23.61
			16QAM	1	1	22.81	22.72	22.60
			64QAM	1	1	21.48	21.42	21.25
			256QAM	1	1	19.14	19.21	19.43
		CP	QPSK	1	1	22.18	22.16	22.18

Bandwidth	SCS(kHz)	OFDM	Modulation	RB Size	RB Offset	Max.Average Power (dBm)		
						372000	376000	380000
						1860 MHz	1880 MHz	1900 MHz
20 MHz	15	DFT-s	pi/2 BPSK	1	1	23.82	23.71	23.71
				1	53	23.72	23.68	23.65
				1	104	23.64	23.57	23.36
				50	0	23.18	23.23	23.18
				50	28	23.81	23.70	23.40
				50	56	22.70	23.17	22.64
				100	0	23.01	23.18	22.93
			QPSK	1	1	23.47	23.66	23.61
			16QAM	1	1	22.40	22.58	22.45
			64QAM	1	1	21.43	21.31	21.29
			256QAM	1	1	19.06	19.22	19.37
		CP	QPSK	1	1	22.14	22.07	22.02

8.2 EQUIVALENT ISOTROPIC 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	EIRP		RB	
							W	W	dBm	Size	Offset
1852.5	Sub6 n2/ 5 MHz [15 kHz]	PI/2 BPSK	89.20	32.45	121.65	V	< 2.00	0.442	26.45	1	23
		QPSK	89.18	32.45	121.63	V		0.440	26.43		
		16-QAM	88.10	32.45	120.55	V		0.343	25.35		
		64-QAM	86.75	32.45	119.20	V		0.251	24.00		
		256-QAM	84.88	32.45	117.33	V		0.163	22.13		
1880.0		PI/2 BPSK	88.42	32.77	121.19	V		0.397	25.99	1	1
		QPSK	88.33	32.77	121.10	V		0.389	25.90		
		16-QAM	87.53	32.77	120.30	V		0.324	25.10		
		64-QAM	86.15	32.77	118.92	V		0.235	23.72		
		256-QAM	84.05	32.77	116.82	V		0.145	21.62		
1907.5		PI/2 BPSK	86.44	33.11	119.55	V		0.272	24.35	1	1
		QPSK	86.37	33.11	119.48	V		0.268	24.28		
		16-QAM	85.43	33.11	118.54	V		0.216	23.34		
		64-QAM	84.16	33.11	117.27	V		0.161	22.07		
		256-QAM	82.21	33.11	115.32	V		0.103	20.12		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	EIRP		RB	
							W	W	dBm	Size	Offset
1855.0	Sub6 n2/ 10 MHz [15 kHz]	PI/2 BPSK	89.55	32.47	122.02	V	< 2.00	0.481	26.82	1	50
		QPSK	89.52	32.47	121.99	V		0.478	26.79		
		16-QAM	88.58	32.47	121.05	V		0.385	25.85		
		64-QAM	87.20	32.47	119.67	V		0.280	24.47		
		256-QAM	85.15	32.47	117.62	V		0.175	22.42		
1880.0		PI/2 BPSK	88.72	32.77	121.49	V		0.425	26.29	1	1
		QPSK	88.66	32.77	121.43	V		0.420	26.23		
		16-QAM	87.48	32.77	120.25	V		0.320	25.05		
		64-QAM	86.47	32.77	119.24	V		0.253	24.04		
		256-QAM	84.61	32.77	117.38	V		0.165	22.18		
1905.0		PI/2 BPSK	86.40	33.06	119.46	V		0.266	24.26	1	26
		QPSK	86.38	33.06	119.44	V		0.265	24.24		
		16-QAM	85.55	33.06	118.61	V		0.219	23.41		
		64-QAM	84.62	33.06	117.68	V		0.177	22.48		
		256-QAM	82.74	33.06	115.80	V		0.115	20.60		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	EIRP		RB	
							W	W	dBm	Size	Offset
1857.5	Sub6 n2/ 15 MHz [15 kHz]	PI/2 BPSK	89.57	32.54	122.11	V	< 2.00	0.491	26.91	1	77
		QPSK	89.55	32.54	122.09	V		0.489	26.89		
		16-QAM	88.45	32.54	120.99	V		0.379	25.79		
		64-QAM	87.40	32.54	119.94	V		0.298	24.74		
		256-QAM	85.29	32.54	117.83	V		0.183	22.63		
1880.0		PI/2 BPSK	89.10	32.77	121.87	V		0.464	26.67	1	1
		QPSK	89.00	32.77	121.77	V		0.454	26.57		
		16-QAM	88.15	32.77	120.92	V		0.373	25.72		
		64-QAM	86.60	32.77	119.37	V		0.261	24.17		
		256-QAM	84.59	32.77	117.36	V		0.164	22.16		
1902.5		PI/2 BPSK	87.24	33.05	120.29	V		0.323	25.09	1	1
		QPSK	87.22	33.05	120.27	V		0.322	25.07		
		16-QAM	86.42	33.05	119.47	V		0.268	24.27		
		64-QAM	85.55	33.05	118.60	V		0.219	23.40		
		256-QAM	83.76	33.05	116.81	V		0.145	21.61		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	EIRP		RB	
							W	W	dBm	Size	Offset
1860.0	Sub6 n2/ 20 MHz [15 kHz]	PI/2 BPSK	89.10	32.59	121.69	V	< 2.00	0.445	26.49	1	104
		QPSK	89.06	32.59	121.65	V		0.441	26.45		
		16-QAM	88.02	32.59	120.61	V		0.347	25.41		
		64-QAM	87.00	32.59	119.59	V		0.275	24.39		
		256-QAM	84.98	32.59	117.57	V		0.172	22.37		
1880.0		PI/2 BPSK	89.01	32.77	121.78	V		0.455	26.58	1	1
		QPSK	89.00	32.77	121.77	V		0.454	26.57		
		16-QAM	88.05	32.77	120.82	V		0.365	25.62		
		64-QAM	86.98	32.77	119.75	V		0.285	24.55		
		256-QAM	85.00	32.77	117.77	V		0.181	22.57		
1900.0		PI/2 BPSK	87.27	33.07	120.34	V		0.327	25.14	1	1
		QPSK	87.12	33.07	120.19	V		0.316	24.99		
		16-QAM	86.24	33.07	119.31	V		0.258	24.11		
		64-QAM	85.74	33.07	118.81	V		0.230	23.61		
		256-QAM	83.81	33.07	116.88	V		0.147	21.68		

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	EIRP		RB	
							W	W	dBm	Size	Offset
1852.5	Sub6 n2/ 5 MHz [15 kHz]	PI/2 BPSK	89.54	32.45	121.99	V	< 2.00	0.478	26.79	1	12
		QPSK	89.34	32.45	121.79	V		0.456	26.59		
		16-QAM	88.35	32.45	120.80	V		0.363	25.60		
		64-QAM	87.02	32.45	119.47	V		0.267	24.27		
		256-QAM	85.00	32.45	117.45	V		0.168	22.25		
1880.0		PI/2 BPSK	86.53	32.77	119.30	V		0.257	24.10	1	1
		QPSK	86.49	32.77	119.26	V		0.255	24.06		
		16-QAM	85.64	32.77	118.41	V		0.209	23.21		
		64-QAM	84.17	32.77	116.94	V		0.149	21.74		
		256-QAM	82.01	32.77	114.78	V		0.091	19.58		
1907.5		PI/2 BPSK	84.81	33.11	117.92	H		0.187	22.72	1	1
		QPSK	84.65	33.11	117.76	H		0.180	22.56		
		16-QAM	83.57	33.11	116.68	H		0.141	21.48		
		64-QAM	82.00	33.11	115.11	H		0.098	19.91		
		256-QAM	80.18	33.11	113.29	V		0.064	18.09		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	EIRP		RB	
							W	W	dBm	Size	Offset
1855.0	Sub6 n2/ 10 MHz [15 kHz]	PI/2 BPSK	89.12	32.47	121.59	V	< 2.00	0.436	26.39	1	1
		QPSK	89.03	32.47	121.50	V		0.427	26.30		
		16-QAM	88.17	32.47	120.64	V		0.350	25.44		
		64-QAM	86.76	32.47	119.23	V		0.253	24.03		
		256-QAM	84.71	32.47	117.18	V		0.158	21.98		
1880.0		PI/2 BPSK	86.68	32.77	119.45	V		0.266	24.25	1	1
		QPSK	86.62	32.77	119.39	V		0.262	24.19		
		16-QAM	85.64	32.77	118.41	V		0.209	23.21		
		64-QAM	84.29	32.77	117.06	V		0.153	21.86		
		256-QAM	82.33	32.77	115.10	V		0.098	19.90		
1905.0		PI/2 BPSK	85.12	33.06	118.18	H		0.198	22.98	1	1
		QPSK	85.07	33.06	118.13	H		0.196	22.93		
		16-QAM	84.11	33.06	117.17	H		0.157	21.97		
		64-QAM	82.71	33.06	115.77	H		0.114	20.57		
		256-QAM	80.93	33.06	113.99	V		0.076	18.79		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	EIRP		RB	
							W	W	dBm	Size	Offset
1857.5	Sub6 n2/ 15 MHz [15 kHz]	PI/2 BPSK	88.83	32.54	121.37	V	< 2.00	0.414	26.17	1	1
		QPSK	88.75	32.54	121.29	V		0.406	26.09		
		16-QAM	87.83	32.54	120.37	V		0.329	25.17		
		64-QAM	86.44	32.54	118.98	V		0.239	23.78		
		256-QAM	84.51	32.54	117.05	V		0.153	21.85		
1880.0		PI/2 BPSK	86.94	32.77	119.71	V		0.282	24.51	1	1
		QPSK	86.85	32.77	119.62	V		0.277	24.42		
		16-QAM	85.90	32.77	118.67	V		0.222	23.47		
		64-QAM	84.50	32.77	117.27	V		0.161	22.07		
		256-QAM	82.73	32.77	115.50	V		0.107	20.30		
1902.5		PI/2 BPSK	85.68	33.05	118.73	H		0.226	23.53	1	1
		QPSK	85.58	33.05	118.63	H		0.220	23.43		
		16-QAM	84.56	33.05	117.61	H		0.174	22.41		
		64-QAM	83.17	33.05	116.22	H		0.127	21.02		
		256-QAM	81.13	33.07	114.20	V		0.083	19.17		

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	EIRP		RB	
							W	W	dBm	Size	Offset
1860.0	Sub6 n2/ 20 MHz [15 kHz]	PI/2 BPSK	88.78	32.59	121.37	V	< 2.00	0.414	26.17	1	1
		QPSK	88.70	32.59	121.29	V		0.406	26.09		
		16-QAM	87.78	32.59	120.37	V		0.329	25.17		
		64-QAM	86.40	32.59	118.99	V		0.239	23.79		
		256-QAM	84.50	32.59	117.09	V		0.155	21.89		
1880.0		PI/2 BPSK	86.98	32.77	119.75	V		0.285	24.55	1	1
		QPSK	86.82	32.77	119.59	V		0.275	24.39		
		16-QAM	85.84	32.77	118.61	V		0.219	23.41		
		64-QAM	84.63	32.77	117.40	V		0.166	22.20		
		256-QAM	82.71	32.77	115.48	V		0.107	20.28		
1900.0		PI/2 BPSK	85.47	33.07	118.54	H		0.216	23.34	1	1
		QPSK	85.43	33.07	118.50	H		0.214	23.30		
		16-QAM	84.41	33.07	117.48	H		0.169	22.28		
		64-QAM	83.09	33.07	116.16	H		0.125	20.96		
		256-QAM	81.13	33.07	114.20	V		0.080	19.00		

8.3 RADIATED SPURIOUS EMISSIONS

8.3.1 External Antenna

▣ NR Band: N2

▣ Bandwidth: 15 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
371500 (1857.5)	3 715.00	70.48	-11.63	58.85	V	-36.35	-13.00	1	77
	5 572.50	68.74	-7.14	61.60	V	-33.60	-13.00		
	7 430.00	50.84	-0.64	50.20	V	-45.00	-13.00		
	9 287.50	49.31	4.03	53.34	V	-41.86	-13.00		
	11 145.00	48.14	5.70	53.84	V	-41.36	-13.00		
376000 (1880.0)	3 760.00	68.72	-11.58	57.14	V	-38.06	-13.00	1	1
	5 640.00	64.34	-6.86	57.48	V	-37.72	-13.00		
	7 520.00	50.65	-0.81	49.84	V	-45.36	-13.00		
	9 400.00	49.88	3.50	53.38	V	-41.82	-13.00		
	11 280.00	47.58	5.54	53.12	V	-42.08	-13.00		
380500 (1902.5)	3 805.00	71.29	-11.48	59.81	V	-35.39	-13.00	1	1
	5 707.50	65.42	-6.72	58.70	V	-36.50	-13.00		
	7 610.00	50.21	-1.10	49.12	V	-46.09	-13.00		
	9 512.50	49.01	3.75	52.76	V	-42.44	-13.00		
	11 415.00	48.39	5.79	54.18	V	-41.02	-13.00		

8.3.2 Internal Antenna

▣ NR Band: N2

▣ Bandwidth: 5 MHz

▣ Modulation: PI/2 BPSK

▣ Distance: 3 meters

▣ SCS: 15 kHz

Ch	Freq (MHz)	Measured Level (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
370500 (1852.5)	3 705.00	65.03	-11.65	53.38	H	-41.82	-13.00	1	12
	5 557.50	66.41	-7.25	59.16	H	-36.04	-13.00		
	7 410.00	55.61	-0.65	54.96	V	-40.24	-13.00		
	9 262.50	50.26	3.78	54.04	H	-41.16	-13.00		
	11 115.00	50.59	5.81	56.40	V	-38.80	-13.00		
376000 (1880.0)	3 760.00	63.81	-11.58	52.23	H	-42.97	-13.00	1	1
	5 640.00	60.90	-6.86	54.04	H	-41.16	-13.00		
	7 520.00	54.51	-0.81	53.70	V	-41.50	-13.00		
	9 400.00	51.44	3.50	54.94	V	-40.26	-13.00		
	11 280.00	52.24	5.54	57.78	V	-37.42	-13.00		
381500 (1907.5)	3 815.00	65.23	-11.47	53.76	H	-41.44	-13.00	1	1
	5 722.50	57.08	-6.69	50.39	H	-44.81	-13.00		
	7 630.00	52.55	-1.13	51.42	V	-43.78	-13.00		
	9 537.50	49.24	3.76	53.00	V	-42.20	-13.00		
	11 445.00	50.54	5.97	56.51	V	-38.69	-13.00		

8.4 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
Sub6 n2	5 MHz	1880.0	BPSK	25	0	3.84
			QPSK			4.43
			16-QAM			5.59
			64-QAM			6.07
			256-QAM			6.51
	10 MHz		BPSK	50		4.01
			QPSK			4.59
			16-QAM			5.54
			64-QAM			5.96
			256-QAM			6.67
	15 MHz		BPSK	75		4.16
			QPSK			4.77
			16-QAM			5.71
			64-QAM			6.12
			256-QAM			6.65
	20 MHz		BPSK	100		3.88
			QPSK			4.53
			16-QAM			5.54
			64-QAM			6.02
			256-QAM			6.68

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 67 ~ 86.

8.5 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
Sub6 n2	5 MHz	1880.0	BPSK	25	0	4.4884
			QPSK			4.4978
			16-QAM			4.5166
			64-QAM			4.4769
			256-QAM			4.6126
	10 MHz		BPSK	50		8.9873
			QPSK			8.9637
			16-QAM			8.9766
			64-QAM			8.9394
			256-QAM			8.9732
	15 MHz		BPSK	75		13.464
			QPSK			13.476
			16-QAM			13.416
			64-QAM			13.404
			256-QAM			13.450
	20 MHz		BPSK	100		17.895
			QPSK			17.913
			16-QAM			17.846
			64-QAM			17.974
			256-QAM			17.877

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 47 ~ 66.

8.6 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
Sub6 n2	5	1852.5	3.9841	30.200	-80.544	-50.344	-13.00
		1880.0	4.9233	30.200	-79.773	-49.573	
		1907.5	3.7827	30.200	-80.584	-50.384	
	10	1855.0	9.0778	30.815	-81.019	-50.204	
		1880.0	3.7513	30.200	-77.888	-47.688	
		1905.0	9.9975	30.815	-79.767	-48.952	
	15	1857.5	4.0509	30.200	-79.631	-49.431	
		1880.0	4.9467	30.200	-79.905	-49.705	
		1902.5	4.0364	30.200	-80.888	-50.688	
	20	1860.0	8.5539	30.815	-80.007	-49.192	
		1880.0	9.1281	30.815	-80.623	-49.808	
		1900.0	9.1311	30.815	-81.085	-50.270	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 111 ~ 134.
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 87 ~ 110.

8.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

▣ BandWidth: 5 MHz

▣ Voltage(100 %): 13.500 VDC

▣ LIMIT: Emission must remain in band

Test. Frequncy	Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(MHz)	(%)	(°C)	(Hz)	Error (Hz)	(%)	
1852.5	100 %	+20(Ref)	1852 499 992	0.0	0.000 000	0.000
	100 %	-30	1852 499 985	-7.3	0.000 000	-0.004
	100 %	-20	1852 499 985	-7.1	0.000 000	-0.004
	100 %	-10	1852 499 985	-6.8	0.000 000	-0.004
	100 %	0	1852 499 985	-7.0	0.000 000	-0.004
	100 %	+10	1852 499 985	-6.9	0.000 000	-0.004
	100 %	+30	1852 499 985	-7.5	0.000 000	-0.004
	100 %	+40	1852 499 985	-7.7	0.000 000	-0.004
	100 %	+50	1852 499 984	-7.8	0.000 000	-0.004
	85 %	+20	1852 499 984	-8.1	0.000 000	-0.004
	115 %	+20	1852 499 984	-7.8	0.000 000	-0.004
1907.5	100 %	+20(Ref)	1907 499 999	0.0	0.000 000	0.000
	100 %	-30	1907 499 999	-0.9	0.000 000	0.000
	100 %	-20	1907 499 998	-1.2	0.000 000	-0.001
	100 %	-10	1907 499 998	-1.9	0.000 000	-0.001
	100 %	0	1907 499 997	-2.4	0.000 000	-0.001
	100 %	+10	1907 499 997	-2.7	0.000 000	-0.001
	100 %	+30	1907 499 996	-3.1	0.000 000	-0.002
	100 %	+40	1907 499 995	-4.1	0.000 000	-0.002
	100 %	+50	1907 499 995	-4.5	0.000 000	-0.002
	85 %	+20	1907 499 990	-9.4	0.000 000	-0.005
	115 %	+20	1907 499 992	-7.5	0.000 000	-0.004

▣ BandWidth: 10 MHz

▣ Voltage(100 %): 13.500 VDC

▣ LIMIT: Emission must remain in band

Test. Frequncy	Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(MHz)	(%)	(°C)	(Hz)	Error (Hz)	(%)	
1855.0	100 %	+20(Ref)	1854 999 994	0.0	0.000 000	0.000
	100 %	-30	1854 999 991	-2.9	0.000 000	-0.002
	100 %	-20	1854 999 992	-1.9	0.000 000	-0.001
	100 %	-10	1854 999 993	-1.3	0.000 000	-0.001
	100 %	0	1854 999 996	1.7	0.000 000	0.001
	100 %	+10	1854 999 996	1.9	0.000 000	0.001
	100 %	+30	1854 999 998	4.1	0.000 000	0.002
	100 %	+40	1854 999 998	4.5	0.000 000	0.002
	100 %	+50	1854 999 981	-12.7	-0.000 001	-0.007
	85 %	+20	1854 999 983	-11.1	-0.000 001	-0.006
	115 %	+20	1854 999 983	-10.4	-0.000 001	-0.006
1905.0	100 %	+20(Ref)	1904 999 996	0.0	0.000 000	0.000
	100 %	-30	1904 999 991	-5.0	0.000 000	-0.003
	100 %	-20	1904 999 991	-5.5	0.000 000	-0.003
	100 %	-10	1904 999 991	-4.9	0.000 000	-0.003
	100 %	0	1904 999 990	-5.8	0.000 000	-0.003
	100 %	+10	1904 999 990	-6.1	0.000 000	-0.003
	100 %	+30	1904 999 990	-6.1	0.000 000	-0.003
	100 %	+40	1904 999 988	-7.6	0.000 000	-0.004
	100 %	+50	1904 999 988	-8.0	0.000 000	-0.004
	85 %	+20	1904 999 987	-9.4	0.000 000	-0.005
	115 %	+20	1904 999 985	-11.1	-0.000 001	-0.006

▣ BandWidth: 15 MHz

▣ Voltage(100 %): 13.500 VDC

▣ LIMIT: Emission must remain in band

Test. Frequncy	Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(MHz)	(%)	(°C)	(Hz)	Error (Hz)	(%)	
1857.5	100 %	+20(Ref)	1857 500 015	0.0	0.000 000	0.000
	100 %	-30	1857 500 025	10.5	0.000 001	0.006
	100 %	-20	1857 500 023	8.9	0.000 000	0.005
	100 %	-10	1857 500 023	8.0	0.000 000	0.004
	100 %	0	1857 500 020	5.9	0.000 000	0.003
	100 %	+10	1857 500 018	3.2	0.000 000	0.002
	100 %	+30	1857 500 017	2.4	0.000 000	0.001
	100 %	+40	1857 500 032	17.5	0.000 001	0.009
	100 %	+50	1857 500 031	16.0	0.000 001	0.009
	85 %	+20	1857 500 029	14.4	0.000 001	0.008
	115 %	+20	1857 500 026	11.3	0.000 001	0.006
1902.5	100 %	+20(Ref)	1902 500 008	0.0	0.000 000	0.000
	100 %	-30	1902 500 015	7.4	0.000 000	0.004
	100 %	-20	1902 500 012	3.6	0.000 000	0.002
	100 %	-10	1902 500 010	2.2	0.000 000	0.001
	100 %	0	1902 500 010	2.4	0.000 000	0.001
	100 %	+10	1902 500 006	-1.7	0.000 000	-0.001
	100 %	+30	1902 500 024	16.0	0.000 001	0.008
	100 %	+40	1902 500 023	14.6	0.000 001	0.008
	100 %	+50	1902 500 019	10.8	0.000 001	0.006
	85 %	+20	1902 500 019	10.9	0.000 001	0.006
	115 %	+20	1902 500 016	8.5	0.000 000	0.004

▣ BandWidth: 20 MHz

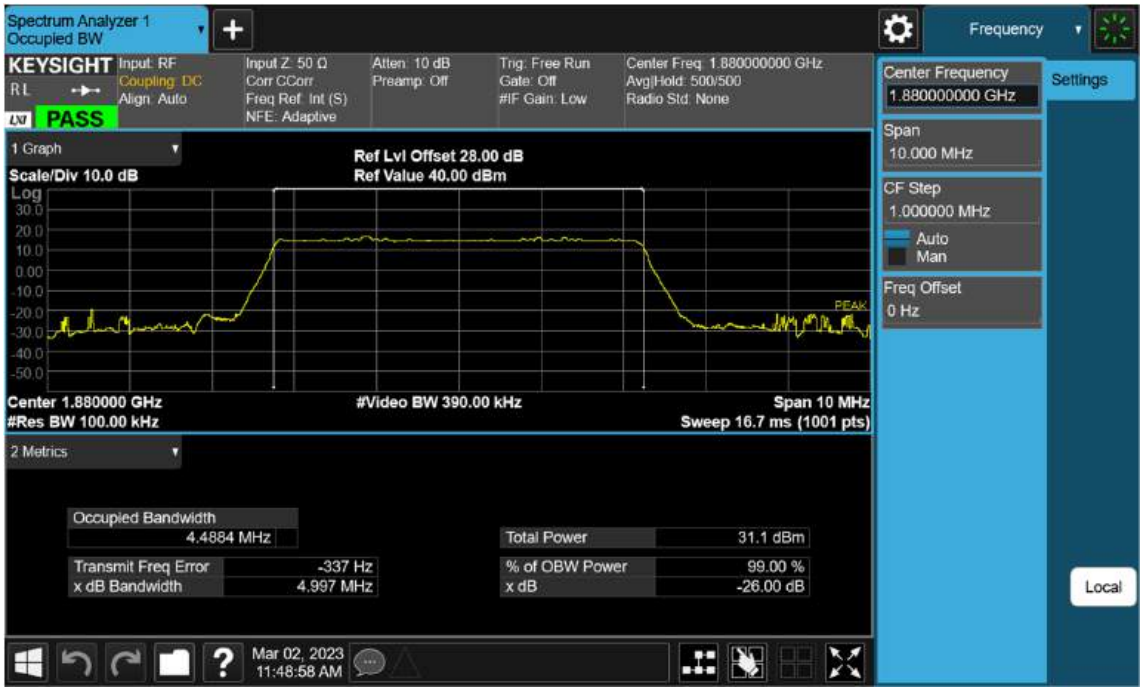
▣ Voltage(100 %): 13.500 VDC

▣ LIMIT: Emission must remain in band

Test. Frequncy	Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(MHz)	(%)	(°C)	(Hz)	Error (Hz)	(%)	
1860.0	100 %	+20(Ref)	1859 999 990	0.0	0.000 000	0.000
	100 %	-30	1859 999 976	-13.7	-0.000 001	-0.007
	100 %	-20	1859 999 992	2.4	0.000 000	0.001
	100 %	-10	1859 999 990	0.5	0.000 000	0.000
	100 %	0	1859 999 987	-2.9	0.000 000	-0.002
	100 %	+10	1859 999 984	-5.3	0.000 000	-0.003
	100 %	+30	1859 999 983	-7.1	0.000 000	-0.004
	100 %	+40	1859 999 979	-10.2	-0.000 001	-0.006
	100 %	+50	1859 999 977	-12.4	-0.000 001	-0.007
	85 %	+20	1859 999 981	-8.8	0.000 000	-0.005
	115 %	+20	1859 999 983	-6.8	0.000 000	-0.004
1900.0	100 %	+20(Ref)	1900 000 007	0.0	0.000 000	0.000
	100 %	-30	1900 000 013	6.6	0.000 000	0.003
	100 %	-20	1899 999 994	-12.6	-0.000 001	-0.007
	100 %	-10	1900 000 012	5.8	0.000 000	0.003
	100 %	0	1899 999 993	-13.1	-0.000 001	-0.007
	100 %	+10	1900 000 011	4.6	0.000 000	0.002
	100 %	+30	1900 000 010	3.7	0.000 000	0.002
	100 %	+40	1900 000 010	3.4	0.000 000	0.002
	100 %	+50	1900 000 010	3.0	0.000 000	0.002
	85 %	+20	1900 000 011	4.8	0.000 000	0.003
	115 %	+20	1900 000 010	3.5	0.000 000	0.002

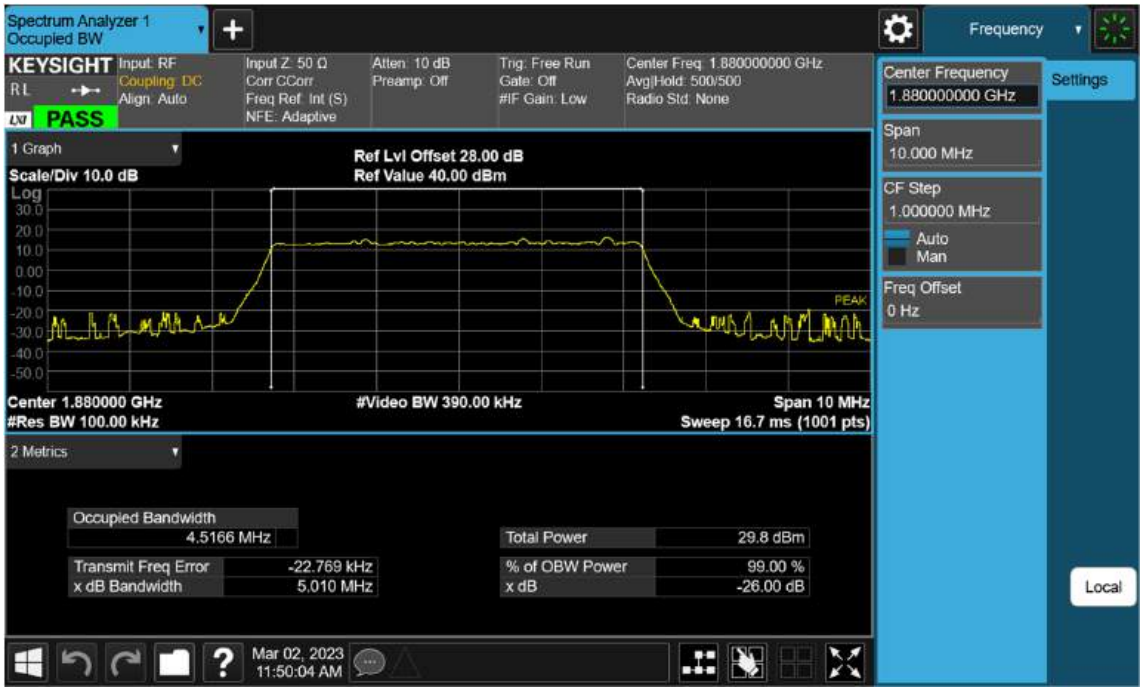
9. TEST PLOTS

Sub6 n2. Occupied Bandwidth Plot (5 M BW Ch.376000 BPSK RB 25_0)

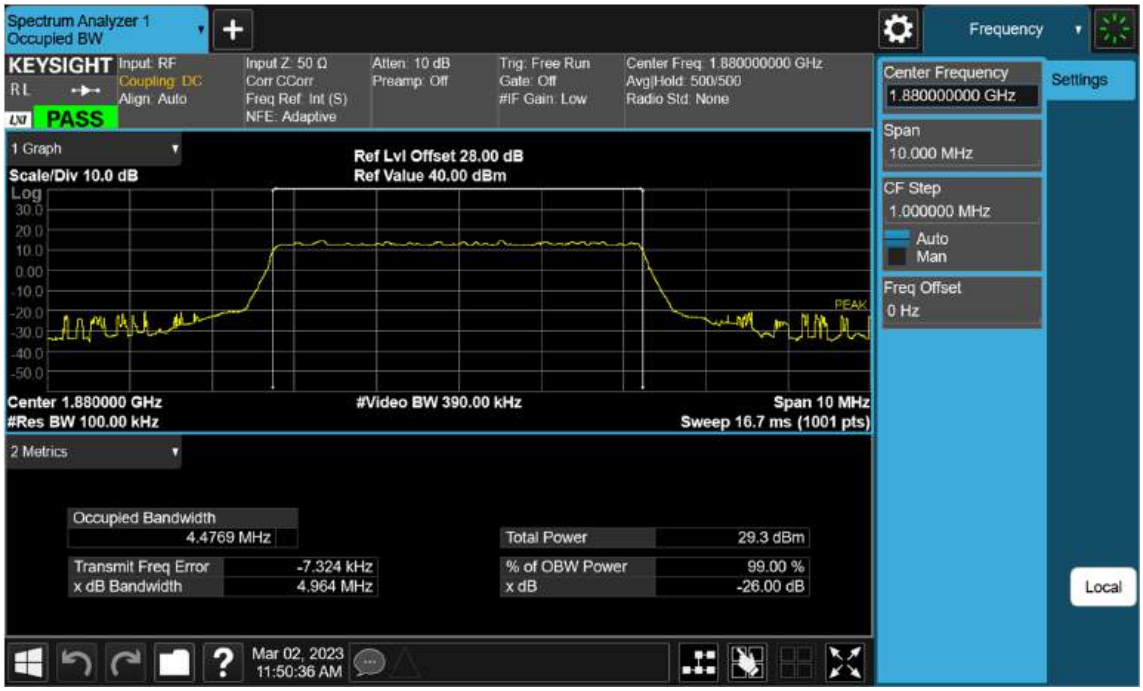


Sub6 n2. Occupied Bandwidth Plot (5 M BW Ch.376000 QPSK RB 25_0)

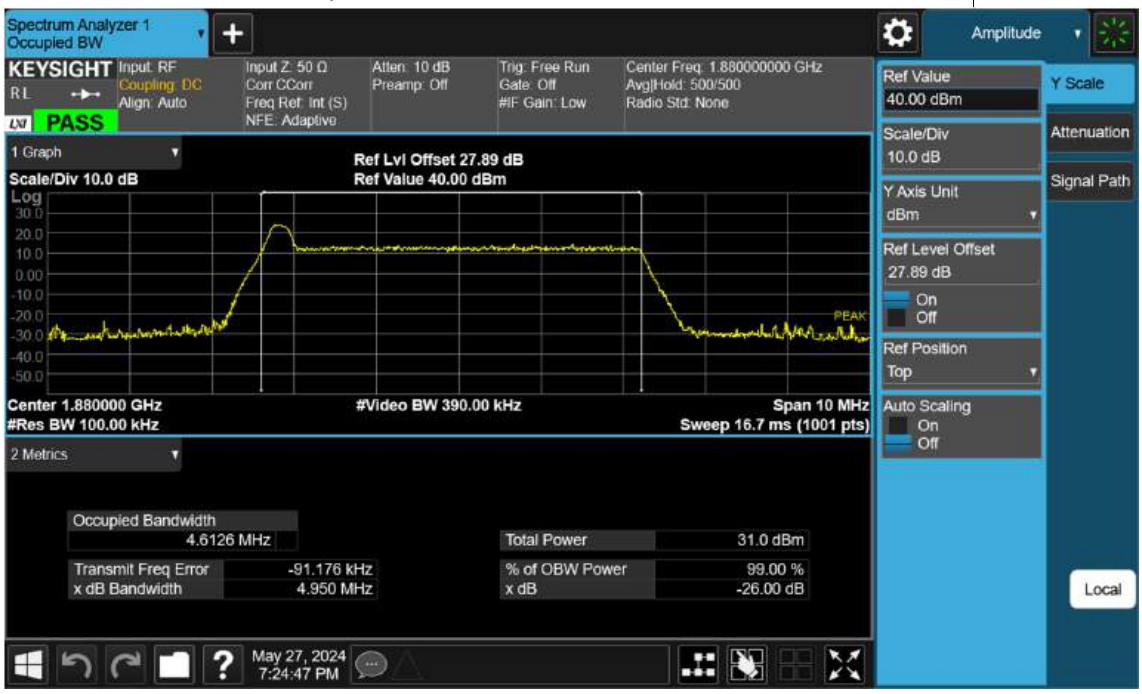
Sub6 n2. Occupied Bandwidth Plot (5 M BW Ch.376000 16QAM RB 25_0)



Sub6 n2. Occupied Bandwidth Plot (5 M BW Ch.376000 64QAM RB 25_0)



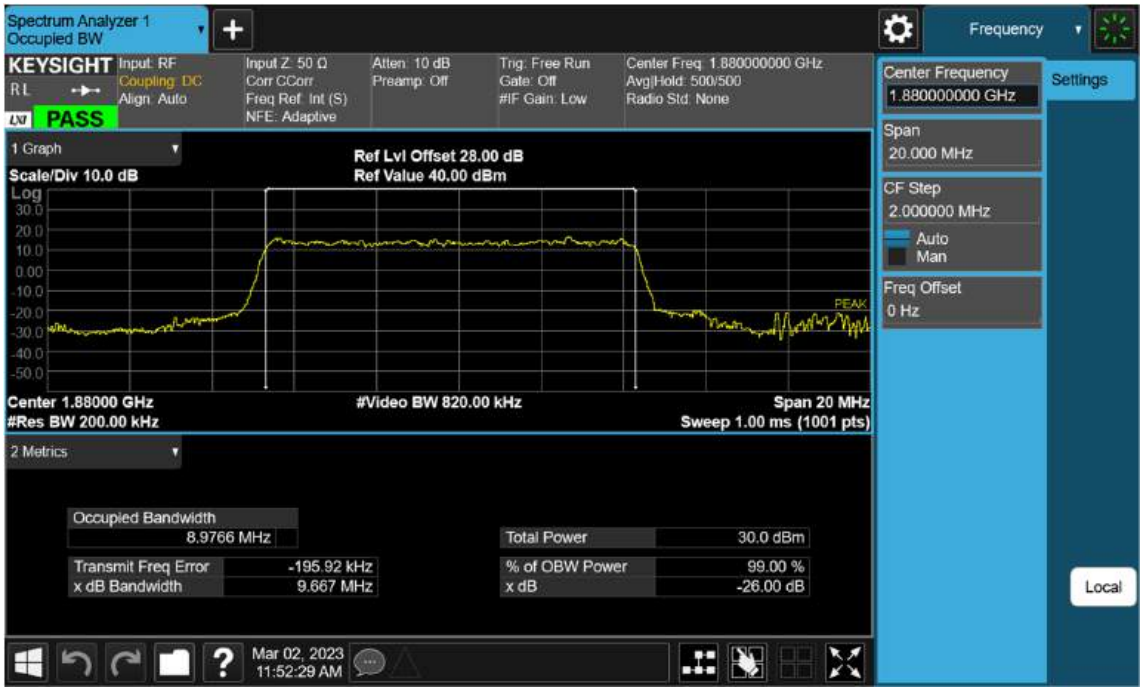
Sub6 n2. Occupied Bandwidth Plot (5 M BW Ch.376000 256QAM RB 25_0)



Sub6 n2. Occupied Bandwidth Plot (10 M BW Ch.376000 BPSK RB 50_0)

Sub6 n2. Occupied Bandwidth Plot (10 M BW Ch.376000 QPSK RB 50_0)

Sub6 n2. Occupied Bandwidth Plot (10 M BW Ch.376000 16QAM RB 50_0)



Sub6 n2. Occupied Bandwidth Plot (10 M BW Ch.376000 64QAM RB 50_0)

Sub6 n2. Occupied Bandwidth Plot (10 M BW Ch.376000 256QAM RB 50_0)

Sub6 n2. Occupied Bandwidth Plot (15 M BW Ch.376000 BPSK RB 75_0)

Sub6 n2. Occupied Bandwidth Plot (15 M BW Ch.376000 QPSK RB 75_0)

Sub6 n2. Occupied Bandwidth Plot (15 M BW Ch.376000 16QAM RB 75_0)

Sub6 n2. Occupied Bandwidth Plot (15 M BW Ch.376000 64QAM RB 75_0)

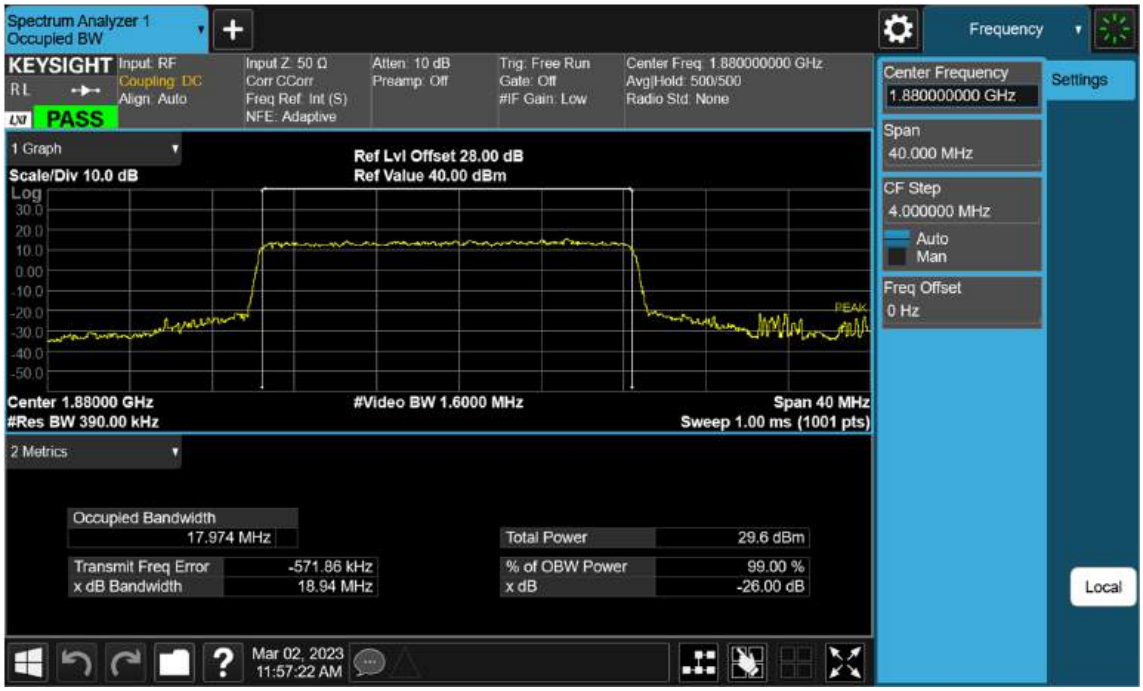
Sub6 n2. Occupied Bandwidth Plot (15 M BW Ch.376000 256QAM RB 75_0)

Sub6 n2. Occupied Bandwidth Plot (20 M BW Ch.376000 BPSK RB 100_0)

Sub6 n2. Occupied Bandwidth Plot (20 M BW Ch.376000 QPSK RB 100_0)

Sub6 n2. Occupied Bandwidth Plot (20 M BW Ch.376000 16QAM RB 100_0)

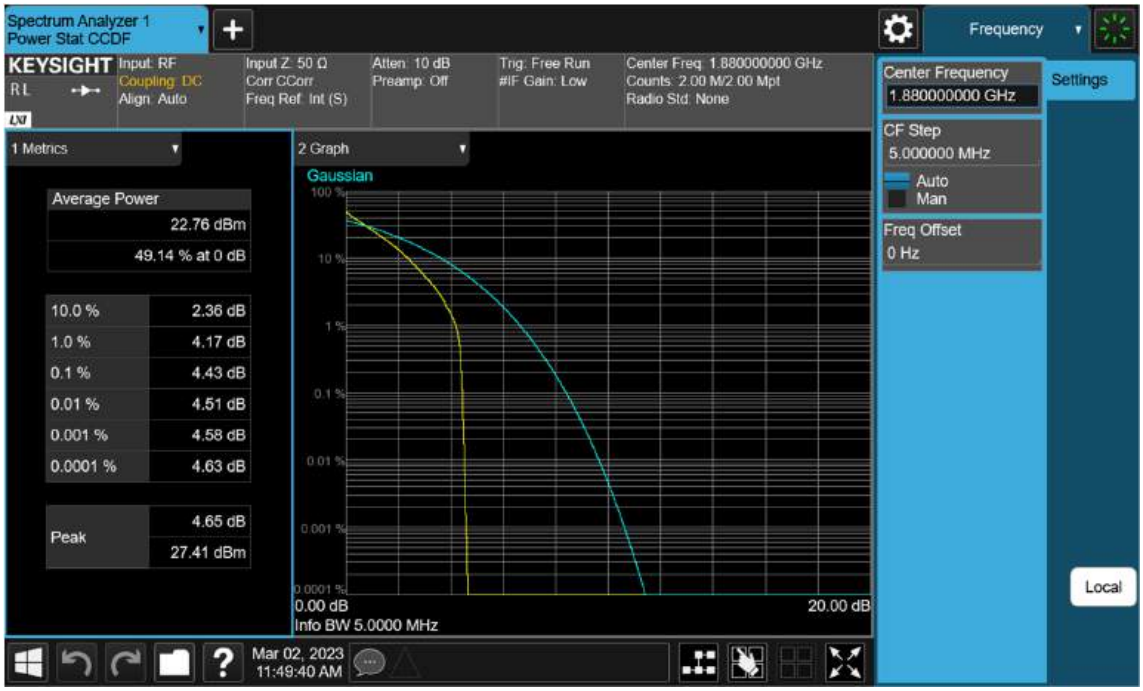
Sub6 n2. Occupied Bandwidth Plot (20 M BW Ch.376000 64QAM RB 100_0)



Sub6 n2. Occupied Bandwidth Plot (20 M BW Ch.376000 256QAM RB 100_0)

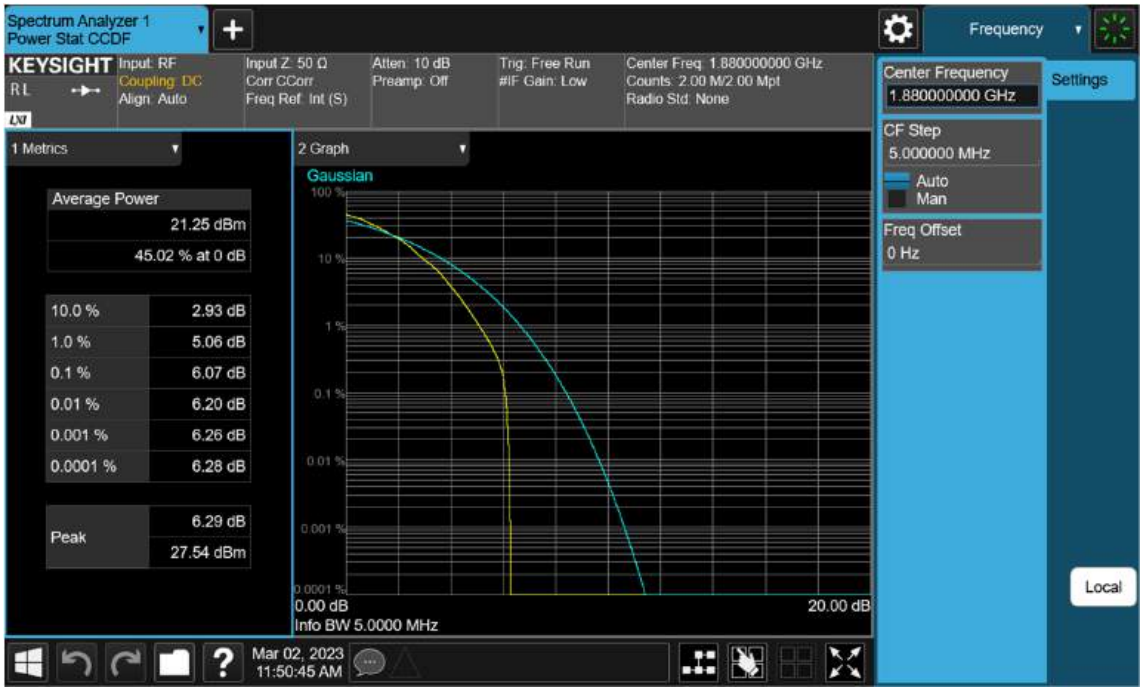
Sub6 n2. PAR Plot (5 M BW Ch.376000 BPSK RB 25_0)

Sub6 n2. PAR Plot (5 M BW Ch.376000 QPSK RB 25_0)

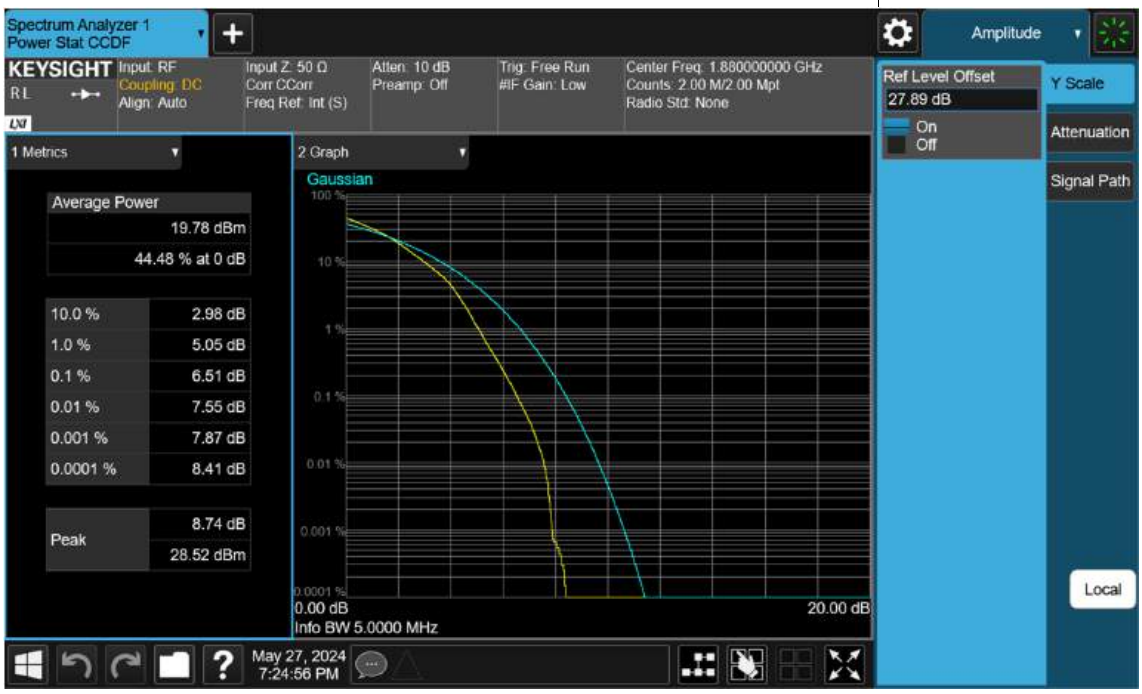


Sub6 n2. PAR Plot (5 M BW Ch.376000 16QAM RB 25_0)

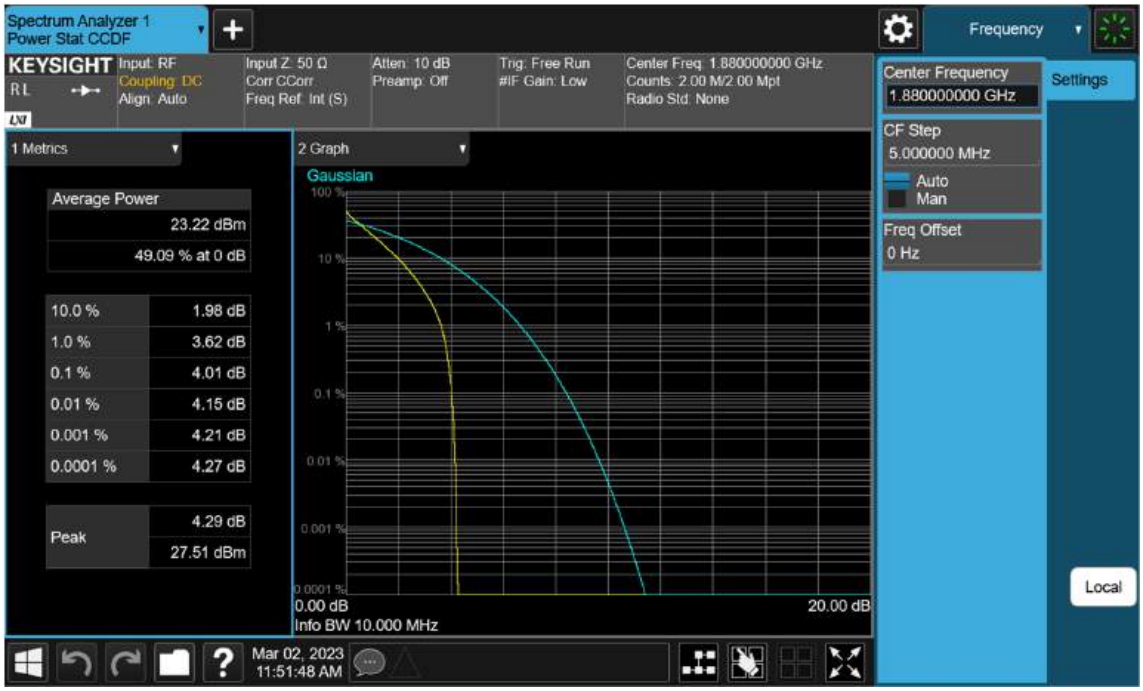
Sub6 n2. PAR Plot (5 M BW Ch.376000 64QAM RB 25_0)



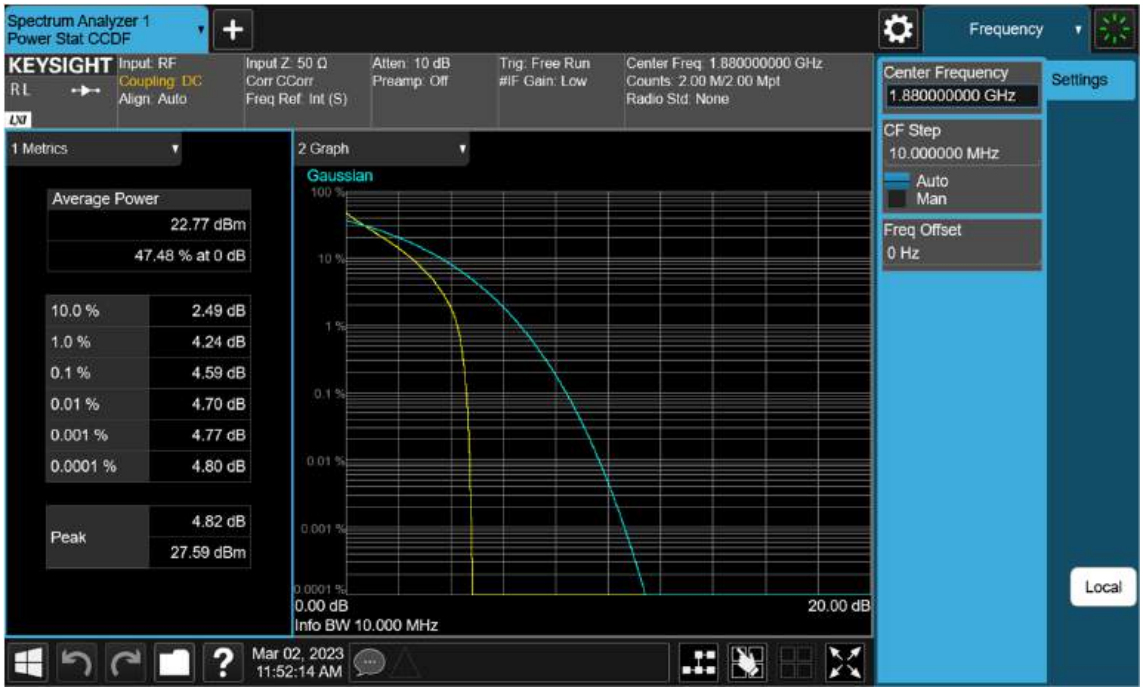
Sub6 n2. PAR Plot (5 M BW Ch.376000 256QAM RB 25_0)



Sub6 n2. PAR Plot (10 M BW Ch.376000 BPSK RB 50_0)



Sub6 n2. PAR Plot (10 M BW Ch.376000 QPSK RB 50_0)



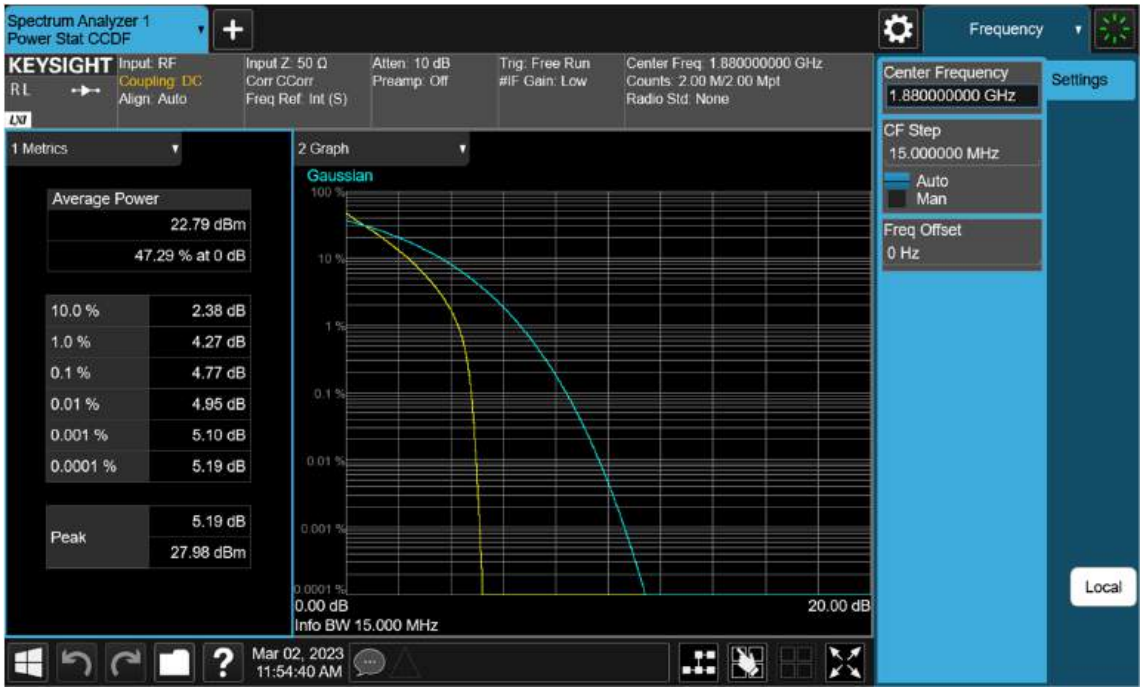
Sub6 n2. PAR Plot (10 M BW Ch.376000 16QAM RB 50_0)

Sub6 n2. PAR Plot (10 M BW Ch.376000 64QAM RB 50_0)

Sub6 n2. PAR Plot (10 M BW Ch.376000 256QAM RB 50_0)

Sub6 n2. PAR Plot (15 M BW Ch.376000 BPSK RB 75_0)

Sub6 n2. PAR Plot (15 M BW Ch.376000 QPSK RB 75_0)

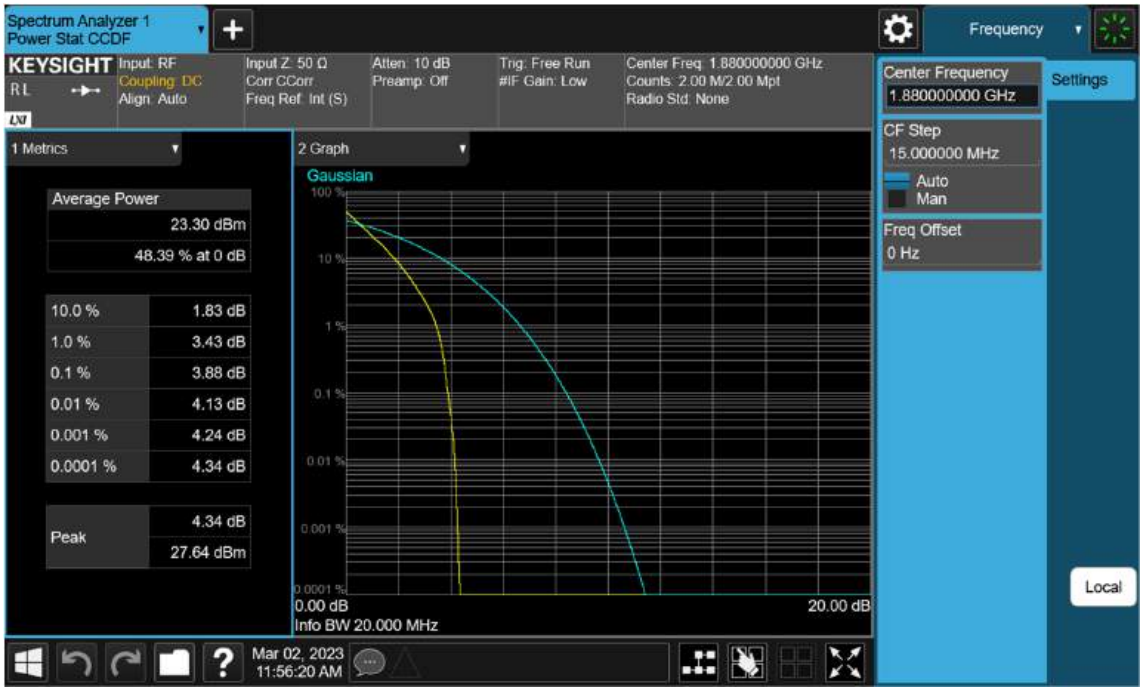


Sub6 n2. PAR Plot (15 M BW Ch.376000 16QAM RB 75_0)

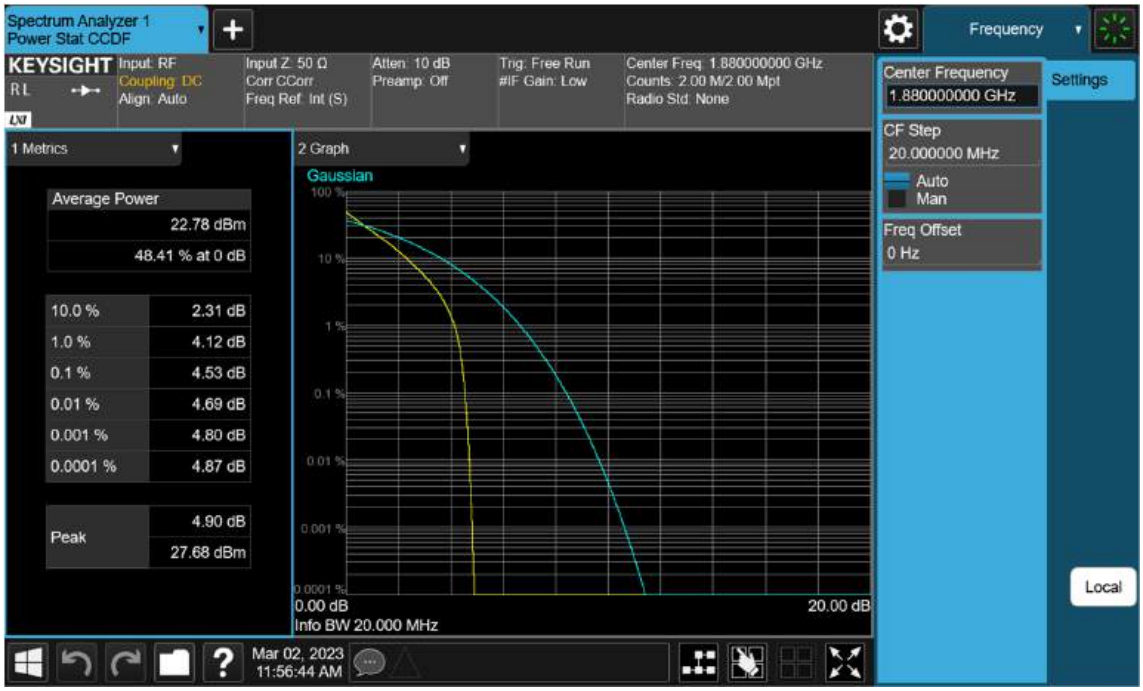
Sub6 n2. PAR Plot (15 M BW Ch.376000 64QAM RB 75_0)

Sub6 n2. PAR Plot (15 M BW Ch.376000 256QAM RB 75_0)

Sub6 n2. PAR Plot (20 M BW Ch.376000 BPSK RB 100_0)



Sub6 n2. PAR Plot (20 M BW Ch.376000 QPSK RB 100_0)

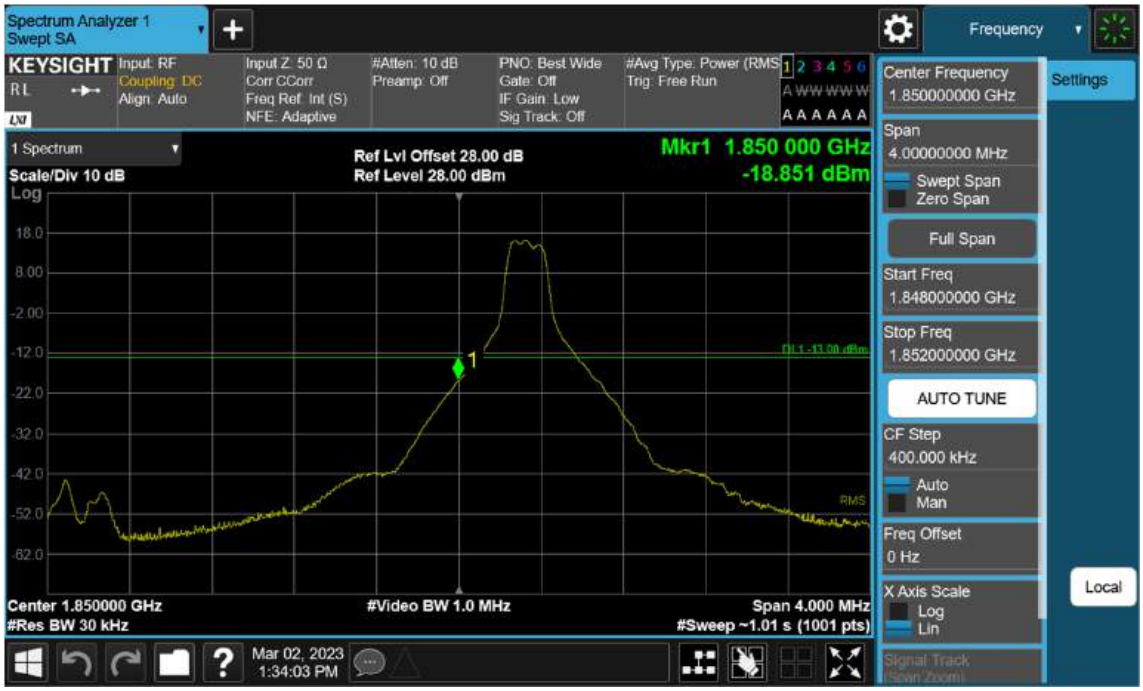


Sub6 n2. PAR Plot (20 M BW Ch.376000 16QAM RB 100_0)

Sub6 n2. PAR Plot (20 M BW Ch.376000 64QAM RB 100_0)

Sub6 n2. PAR Plot (20 M BW Ch.376000 256QAM RB 100_0)

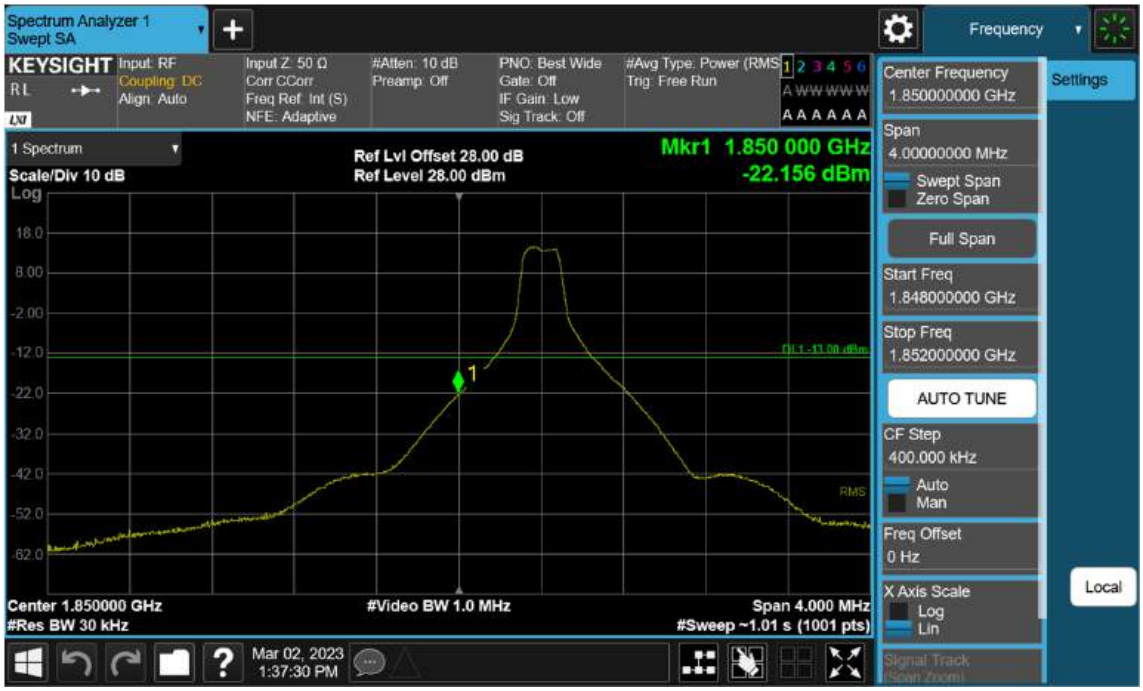
Sub6 n2. Lower Band Edge Plot (5 M BW Ch.370500 BPSK_RB1_Offset 0) -1



Sub6 n2. Lower Band Edge Plot (5 M BW Ch.370500 BPSK_RB25_Offset 0) -2

Sub6 n2. Lower Extended Band Edge Plot (5 M BW Ch.370500 BPSK_RB25_0) -3

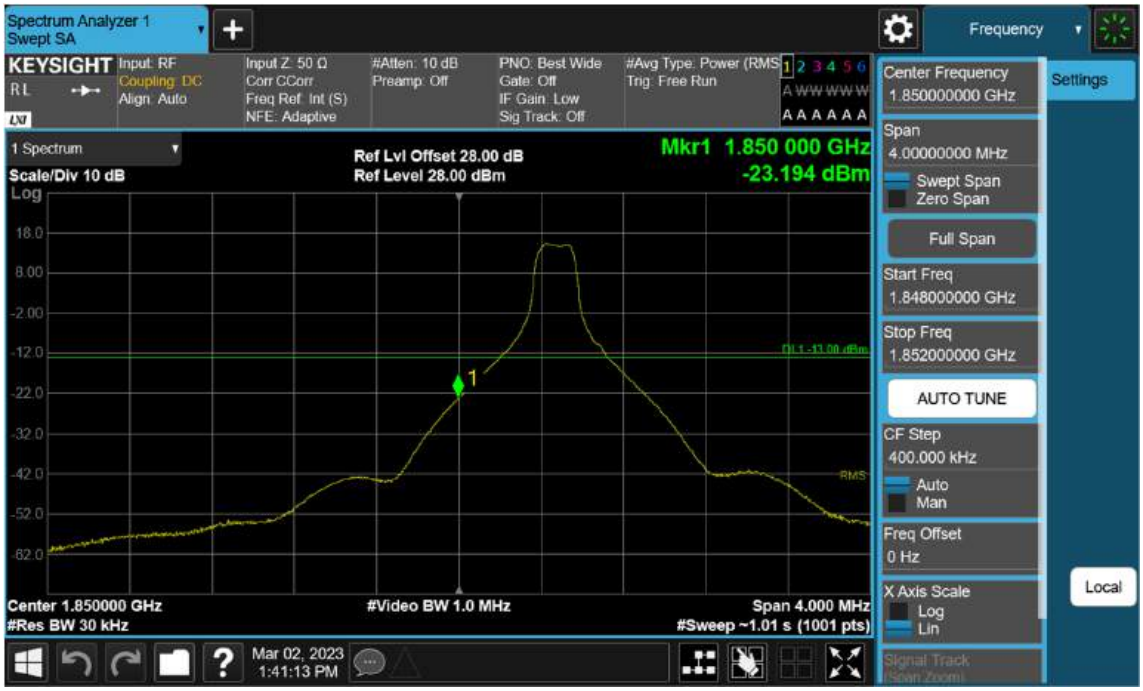
Sub6 n2. Lower Band Edge Plot (10 M BW Ch.371000 BPSK_RB1_Offset 0) -1



Sub6 n2. Lower Band Edge Plot (10 M BW Ch.371000 BPSK_RB50_Offset 0) -2

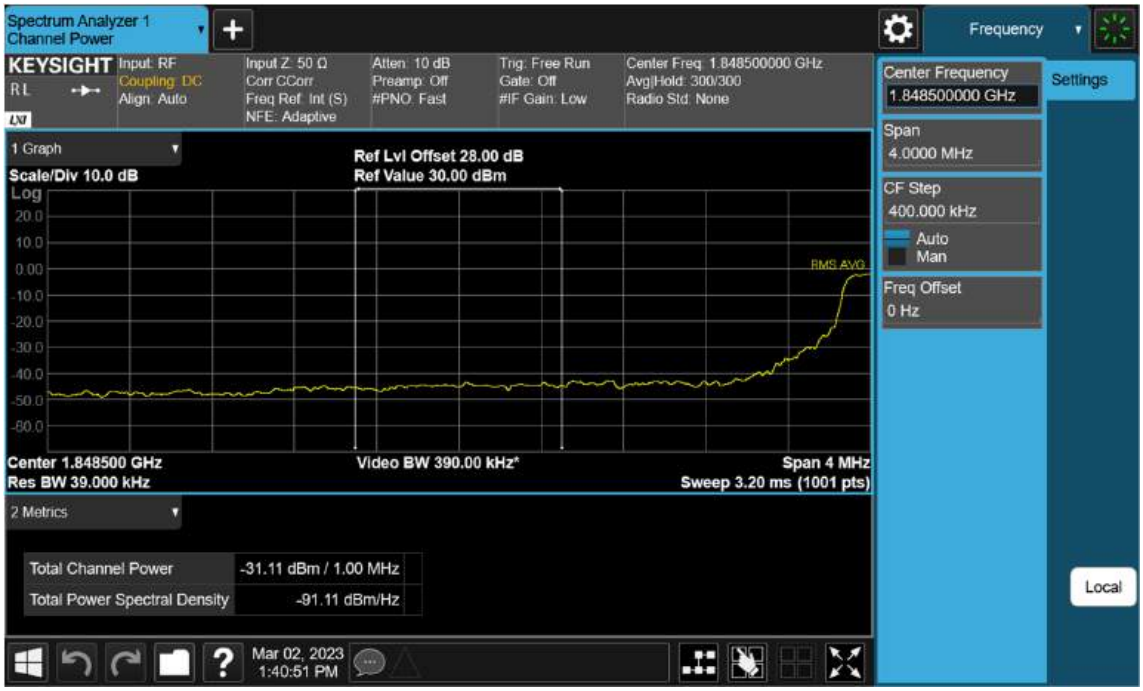
Sub6 n2. Lower Extended Band Edge Plot (10 M BW Ch.371000 BPSK_RB50_0) -3

Sub6 n2. Lower Band Edge Plot (15 M BW Ch.371500 BPSK_RB1_Offset 0) -1



Sub6 n2. Lower Band Edge Plot (15 M BW Ch.371500 BPSK_RB75_Offset 0) -2

Sub6 n2. Lower Extended Band Edge Plot (15 M BW Ch.371500 BPSK_RB75_0) -3



Sub6 n2. Lower Band Edge Plot (20 M BW Ch.372000 BPSK_RB1_Offset 0) -1

Sub6 n2. Lower Band Edge Plot (20 M BW Ch.372000 BPSK_RB100_Offset 0) -2

Sub6 n2. Lower Extended Band Edge Plot (20 M BW Ch.372000 BPSK_RB100_0) -3

Sub6 n2. Upper Band Edge Plot (5 M BW Ch.381500 BPSK_RB1_Offset 24) -1

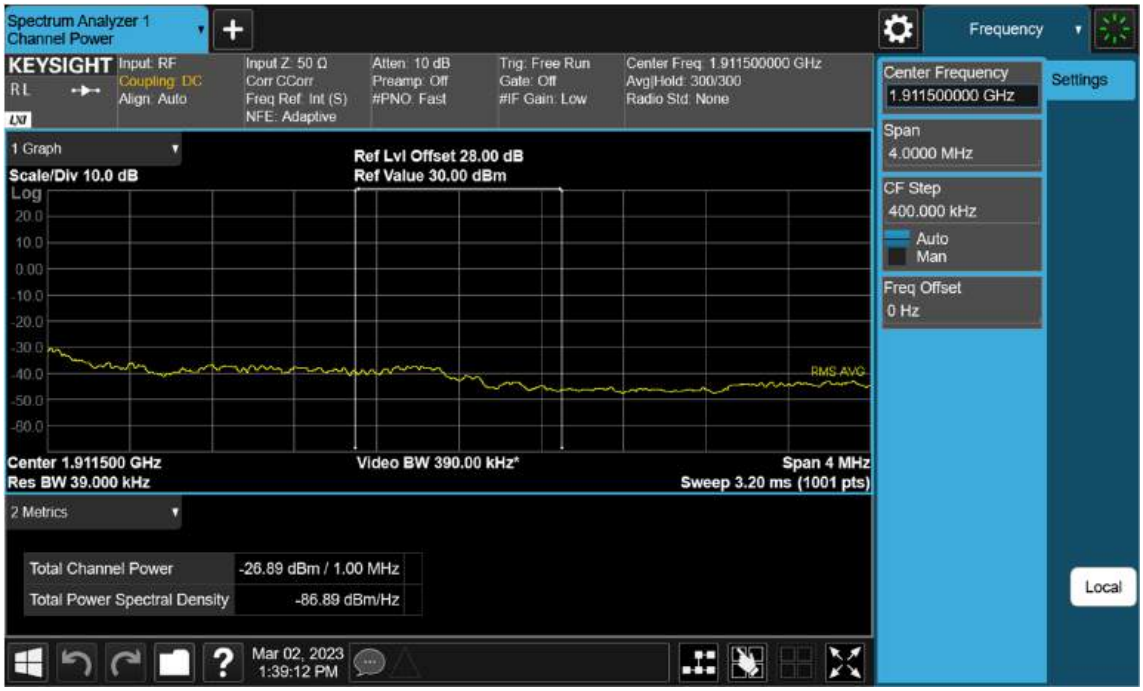
Sub6 n2. Upper Band Edge Plot (5 M BW Ch.381500 BPSK_RB25_Offset 0) -2

Sub6 n2. Upper Extended Band Edge Plot (5 M BW Ch.381500 BPSK_RB25_0) -3

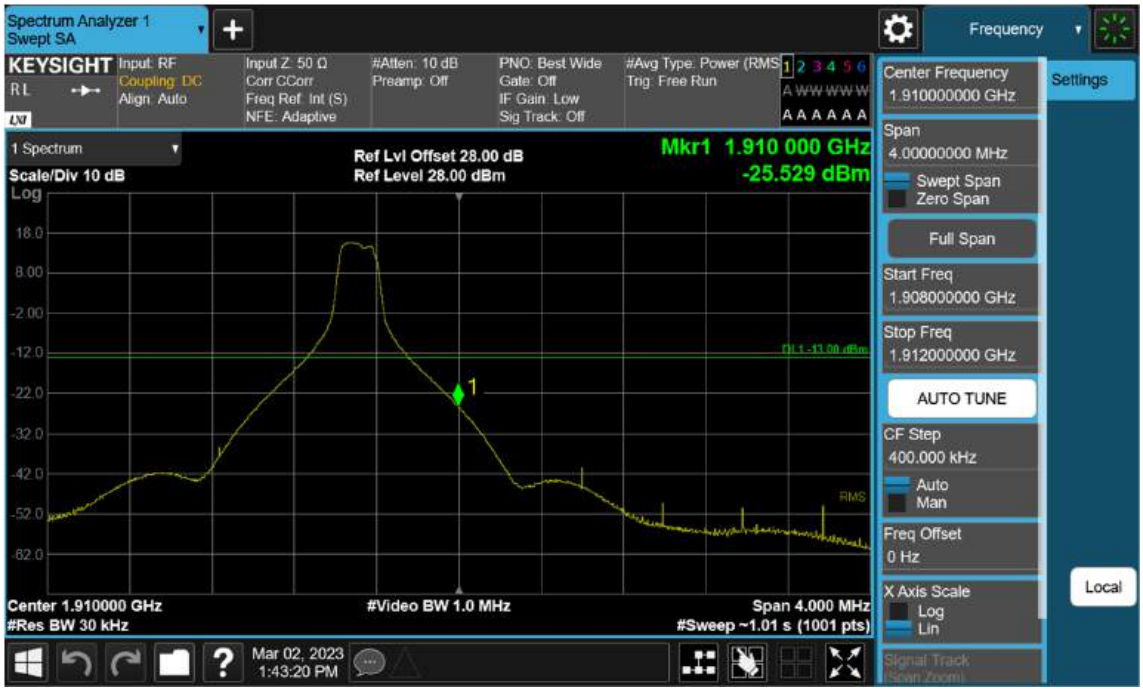
Sub6 n2. Upper Band Edge Plot (10 M BW Ch.381000 BPSK_RB1_Offset 51) -1

Sub6 n2. Upper Band Edge Plot (10 M BW Ch.381000 BPSK_RB50_Offset 0) -2

Sub6 n2. Upper Extended Band Edge Plot (10 M BW Ch.381000 BPSK_RB50_0) -3

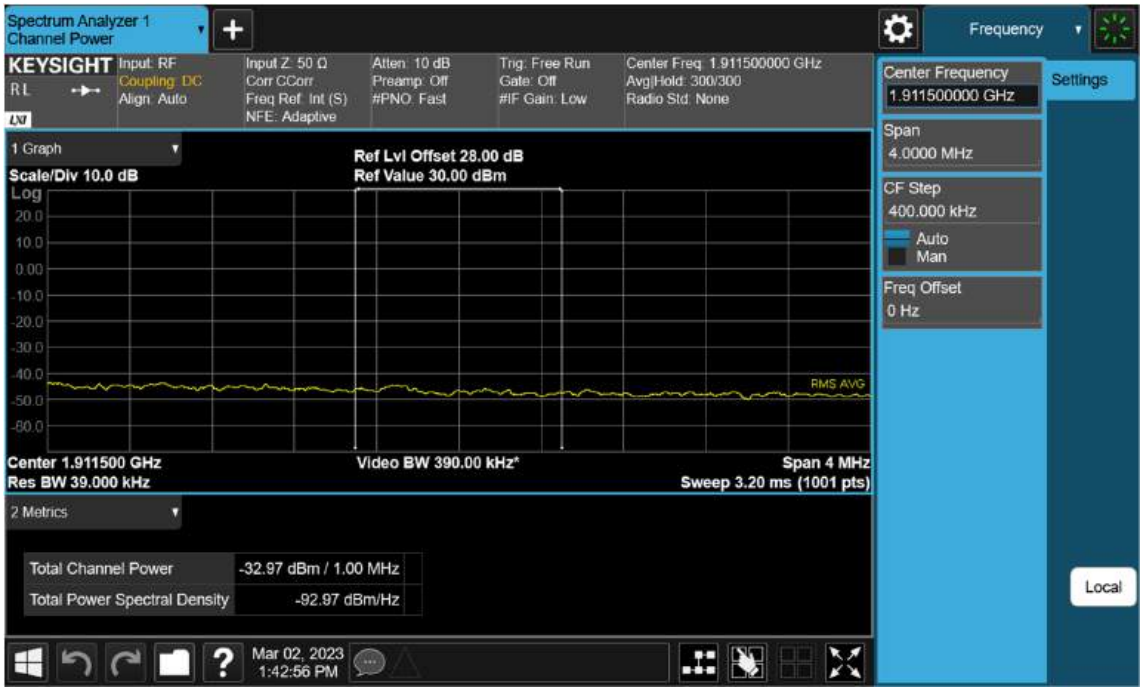


Sub6 n2. Upper Band Edge Plot (15 M BW Ch.380500 BPSK_RB1_Offset 78) -1



Sub6 n2. Upper Band Edge Plot (15 M BW Ch.380500 BPSK_RB75_Offset 0) -2

Sub6 n2. Upper Extended Band Edge Plot (15 M BW Ch.380500 BPSK_RB75_0) -3



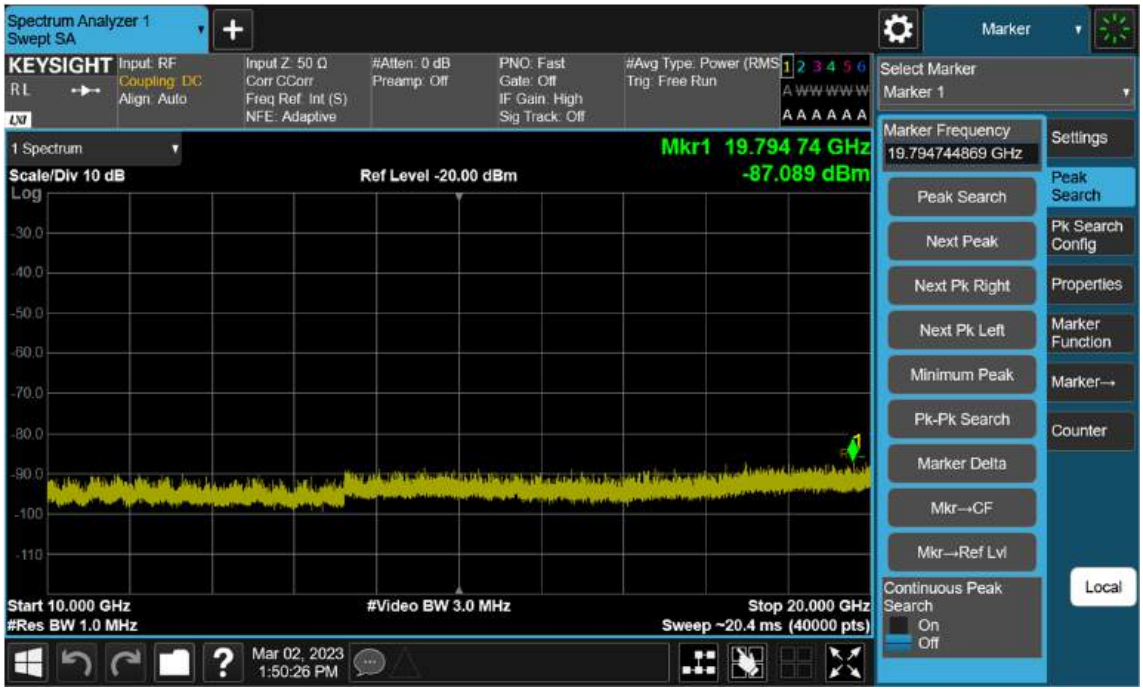
Sub6 n2. Upper Band Edge Plot (20 M BW Ch.380000 BPSK_RB1_Offset 105) -1

Sub6 n2. Upper Band Edge Plot (20 M BW Ch.380000 BPSK_RB100_Offset 0) -2

Sub6 n2. Upper Extended Band Edge Plot (20 M BW Ch.380000 BPSK _RB100_0) -3

Sub6 n2. Conducted Spurious_1 (370500ch_5 MHz_BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_2 (370500ch_5 MHz_BPSK_RB 1_1)



Sub6 n2. Conducted Spurious_1 (376000ch_5 MHz_BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_2 (376000ch_5 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_1 (381500ch_5 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_2 (381500ch_5 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_1 (371000ch_10 MHz_ BPSK _RB 1_1)

Sub6 n2. Conducted Spurious_2 (371000ch_10 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_1 (376000ch_10 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_2 (376000ch_10 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_1 (381000ch_10 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_2 (381000ch_10 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_1 (371500ch_15 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_2 (371500ch_15 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_1 (376000ch_15 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_2 (376000ch_15 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_1 (380500ch_15 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_2 (380500ch_15 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_1 (372000ch_20 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_2 (372000ch_20 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_1 (376000ch_20 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_2 (376000ch_20 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_1 (380000ch_20 MHz_ BPSK_RB 1_1)

Sub6 n2. Conducted Spurious_2 (380000ch_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-2409-FC006-P