FCC LTE REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

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

Date of Issue:
December 09, 2021

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

Report No.: HCT-RF-2111-FC082-R1

FCC ID: A3LSMX806B

APPLICANT: SAMSUNG Electronics Co., Ltd.

According to the Evaluation report, all of the data contained herein is reused from the reference FCC ID : A3LSMX808U report.

Model(s): SM-X806B
EUT Type: Tablet
FCC Classification: PCS Licensed Transmitter (PCB)
FCC Rule Part(s): §24, §2

-Lower Ant-

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	EIRP	
				Max. Power (W)	Max. Power (dBm)
LTE – Band2 (1.4)	1850.7 - 1909.3	1M12G7D	QPSK	0.109	20.38
		1M12W7D	16QAM	0.090	19.55
		1M13W7D	64QAM	0.074	18.71
		1M12W7D	256QAM	0.039	15.89
LTE – Band2 (3)	1851.5 - 1908.5	2M77G7D	QPSK	0.114	20.55
		2M78W7D	16QAM	0.087	19.41
		2M74W7D	64QAM	0.070	18.47
		2M75W7D	256QAM	0.036	15.55
LTE – Band2 (5)	1852.5 - 1907.5	4M53G7D	QPSK	0.124	20.95
		4M52W7D	16QAM	0.104	20.16
		4M52W7D	64QAM	0.087	19.37
		4M51W7D	256QAM	0.045	16.52
LTE – Band2 (10)	1855.0 - 1905.0	9M01G7D	QPSK	0.127	21.03
		9M02W7D	16QAM	0.096	19.81
		9M01W7D	64QAM	0.077	18.84
		9M00W7D	256QAM	0.039	15.90
LTE – Band2 (15)	1857.5 - 1902.5	13M5G7D	QPSK	0.099	19.97
		13M5W7D	16QAM	0.082	19.14
		13M5W7D	64QAM	0.069	18.39
		13M5W7D	256QAM	0.036	15.51
LTE – Band2 (20)	1860.0 - 1900.0	18M0G7D	QPSK	0.120	20.78
		18M0W7D	16QAM	0.092	19.65
		18M1W7D	64QAM	0.075	18.72
		18M0W7D	256QAM	0.038	15.81

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)

REVIEWED BY

Report prepared by : Jung Ki Lim
Engineer of Telecommunication Testing Center

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

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

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

* The report shall not be reproduced except in full(only partly) without approval of the laboratory.

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2111-FC082	November 26, 2021	- First Approval Report
HCT-RF-2111-FC082-R1	December 09, 2021	- Revised the 3.9 & 3.10 Section.

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

Table of Contents

MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMX806B
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§24, §2
EUT Type:	Tablet
Model(s):	SM-X806B
Tx Frequency:	1850.7 MHz – 1909.3 MHz (LTE – Band2 (1.4 MHz)) 1851.5 MHz – 1908.5 MHz (LTE – Band2 (3 MHz)) 1852.5 MHz – 1907.5 MHz (LTE – Band2 (5 MHz)) 1855.0 MHz – 1905.0 MHz (LTE – Band2 (10 MHz)) 1857.5 MHz – 1902.5 MHz (LTE – Band2 (15 MHz)) 1860.0 MHz – 1900.0 MHz (LTE – Band2 (20 MHz))
Date(s) of Tests:	September 17, 2021 ~ November 16, 2021
Serial number:	R32R9001FVV

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Tablet with GSM/GPRS/EGPRS/UMTS and LTE, Sub6.

It also supports IEEE 802.11 a/b/g/n/ac/ax (20/40/80/160), WIFI 6E, Bluetooth, BT LE, WPT.

2.2. MEASURING INSTRUMENT CALIBRATION

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

2.3. TEST FACILITY

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

3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

Test Description	Test Procedure Used
Occupied Bandwidth	- KDB 971168 D01 v03r01 – Section 4.3 - ANSI C63.26-2015 – Section 5.4.4
Band Edge	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Spurious and Harmonic Emissions at Antenna Terminal	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Conducted Output Power	- N/A (See SAR Report)
Peak- to- Average Ratio	- KDB 971168 D01 v03r01 – Section 5.7 - ANSI C63.26-2015 – Section 5.2.3.4 - ANSI C63.26-2015 – Section 5.2.6(only GSM)
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Effective Radiated Power/ Effective Isotropic Radiated Power	- KDB 971168 D01 v03r01 – Section 5.2 & 5.8 - ANSI/TIA-603-E-2016 – Section 2.2.17
Radiated Spurious and Harmonic Emissions	- KDB 971168 D01 v03r01 – Section 6.2 - ANSI/TIA-603-E-2016 – Section 2.2.12

3.2 RADIATED POWER

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-E-2016 Clause 2.2.17.

Test Settings

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

Test Note

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

   The power is calculated by the following formula;

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

   Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.

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

3.3 RADIATED SPURIOUS EMISSIONS

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

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

Test Settings

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

Test Note

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

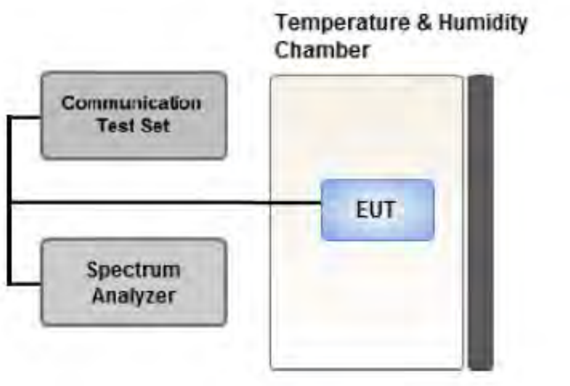
$$\text{Result}_{(dBm)} = Pg_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

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

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

$$EIRP_{(dBm)} = ERP_{(dBm)} + 2.15$$

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)

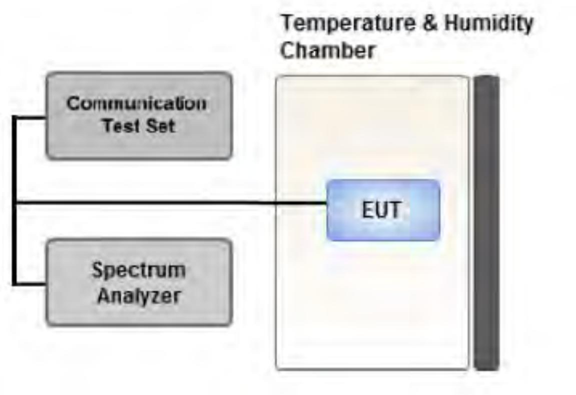
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

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.

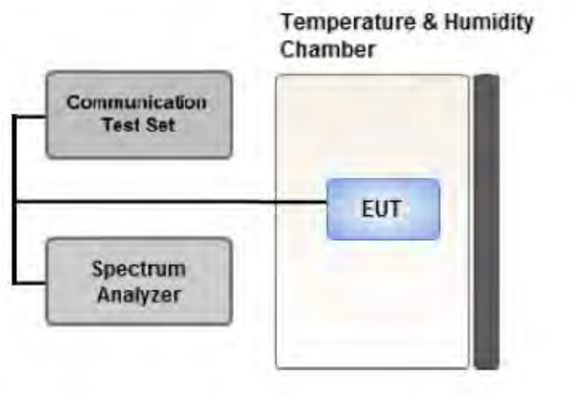
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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

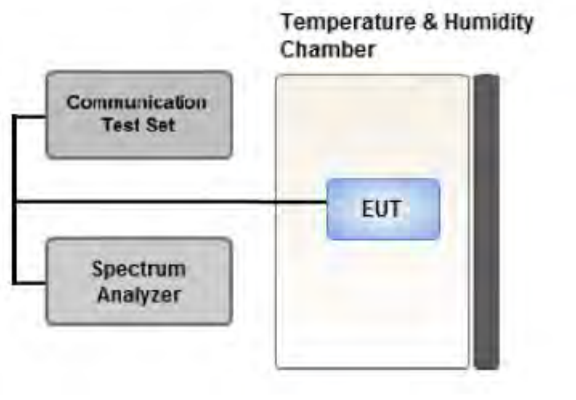
Test Overview

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 * 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

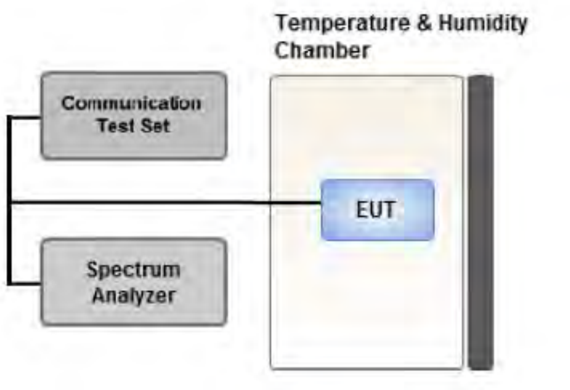
Test Notes

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.

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.
- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth results are reported. (Worst case : 10 MHz)
- 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.
- The test results below, the lower antenna is the Sub1 antenna.
- All modes of operation were investigated and the worst case configuration results are reported.
  Mode : Stand alone, Stand alone + External accessories (Earphone, Keyboard, AC adapter, etc)
  Worst case : Stand alone

[Lower Ant Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Isotropic Radiated Power	QPSK, 16QAM, 64QAM, 256QAM	1	0	X
Radiated Spurious and Harmonic Emissions	QPSK	1	0	Z

3.10 WORST CASE(CONDUCTED TEST)

[Worst case]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Occupied Bandwidth	QPSK, 16QAM, 64QAM, 256QAM	1.4, 3, 5, 10, 15, 20	Mid	Full RB	0
Peak-To-Average Ratio	QPSK, 16QAM, 64QAM, 256QAM	1.4, 3, 5, 10, 15, 20	Mid	Full RB	0
Band Edge	QPSK	1.4	Low	1	0
			High	1	5
		3	Low	1	0
			High	1	14
		5	Low	1	0
			High	1	24
		10	Low	1	0
			High	1	49
		15	Low	1	0
			High	1	74
		20	Low	1	0
			High	1	99
		1.4, 3, 5, 10, 15, 20	Low, High	Full RB	0
Spurious and Harmonic Emissions at Antenna Terminal	QPSK	1.4, 3, 5, 10, 15, 20	Low, Mid, High	1	0

- All modes of operation were investigated and the worst case configuration results are reported.
- Tested with Sub1 antenna.

4. LIST OF TEST EQUIPMENT

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
H.P.F	FBSR-02B(WHK1.2/15 G-10EF)	T&M SYSTEM	-	03/02/2022	Annual
H.P.F	FBSR-02B(WHK3.3/18 G-10EF)	T&M SYSTEM	-	03/02/2022	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	11275	04/07/2022	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/28/2022	Annual
Dipole Antenna	UHAP	Schwarzbeck	557	04/05/2023	Biennial
Dipole Antenna	UHAP	Schwarzbeck	558	04/05/2023	Biennial
Chamber	SU-642	ESPEC	93008124	03/15/2022	Annual
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	147	08/30/2022	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1298	09/15/2023	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	10/13/2022	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	02/11/2022	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	05/18/2022	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	06/01/2022	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	100931	09/29/2022	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/18/2022	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/19/2022	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/03/2023	Biennial
Hybrid Antenna	VULB9168	Schwarzbeck	760	02/22/2023	Biennial
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262116770	07/12/2022	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6201026545	01/07/2022	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	07/05/2022	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	06/02/2022	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. Espectially, 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)	1.82 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05 (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	**See Note1**
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. See SAR Report

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

7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

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

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

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.

2) During the test , the turn table is rotated until the maximum signal is found.

3) Record the field strength meter's level.

4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.

5) Increase the signal generator output till the field strength meter's level is equal to the item (3).

6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power.

7.2 EIRP Sample Calculation

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

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

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.

2) During the test , the turn table is rotated until the maximum signal is found.

3) Record the field strength meter's level.

4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.

5) Increase the signal generator output till the field strength meter's level is equal to the item (3).

6) The signal generator output level with Ant. Gain and cable loss are the rating of equivalent isotropic radiated power.

7.3. Emission Designator

GSM Emission Designator

Emission Designator = 249KGXW

GSM BW = 249 kHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 249KG7W

GSM BW = 249 kHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M17F9W

WCDMA BW = 4.17 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

QPSK Modulation

Emission Designator = 4M48G7D

LTE BW = 4.48 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

QAM Modulation

Emission Designator = 4M48W7D

LTE BW = 4.48 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

8. TEST DATA

8.1 EQUIVALENT ISOTROPIC RADIATED POWER

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1850.7	LTE B2/ 1.4 MHz	QPSK	-21.29	12.43	10.10	2.15	H	< 2.00	0.109	20.38
		16-QAM	-22.12	11.60	10.10	2.15	H		0.090	19.55
		64-QAM	-22.96	10.76	10.10	2.15	H		0.074	18.71
		256-QAM	-25.78	7.94	10.10	2.15	H		0.039	15.89
1880.0		QPSK	-20.98	12.21	9.98	2.25	H		0.099	19.94
		16-QAM	-21.84	11.35	9.98	2.25	H		0.081	19.08
		64-QAM	-22.73	10.46	9.98	2.25	H		0.066	18.19
		256-QAM	-25.70	7.49	9.98	2.25	H		0.033	15.22
1909.3		QPSK	-22.53	11.26	9.88	2.17	H		0.079	18.97
		16-QAM	-23.68	10.11	9.88	2.17	H		0.061	17.82
		64-QAM	-24.51	9.28	9.88	2.17	H		0.050	16.99
		256-QAM	-27.47	6.32	9.88	2.17	H		0.025	14.03

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1851.5	LTE B2/ 3 MHz	QPSK	-21.12	12.60	10.10	2.15	H	< 2.00	0.114	20.55
		16-QAM	-22.26	11.46	10.10	2.15	H		0.087	19.41
		64-QAM	-23.20	10.52	10.10	2.15	H		0.070	18.47
		256-QAM	-26.12	7.60	10.10	2.15	H		0.036	15.55
1880.0		QPSK	-21.72	11.47	9.98	2.25	H		0.083	19.20
		16-QAM	-22.60	10.59	9.98	2.25	H		0.068	18.32
		64-QAM	-23.43	9.76	9.98	2.25	H		0.056	17.49
		256-QAM	-26.30	6.89	9.98	2.25	H		0.029	14.62
1908.5		QPSK	-22.62	11.17	9.88	2.17	H		0.077	18.88
		16-QAM	-23.41	10.38	9.88	2.17	H		0.064	18.09
		64-QAM	-24.17	9.62	9.88	2.17	H		0.054	17.33
		256-QAM	-27.10	6.69	9.88	2.17	H		0.028	14.40

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol	Limit W	EIRP W	EIRP dBm
1852.5	LTE B2/ 5 MHz	QPSK	-20.72	13.00	10.10	2.15	H	< 2.00	0.124	20.95
		16-QAM	-21.51	12.21	10.10	2.15	H		0.104	20.16
		64-QAM	-22.30	11.42	10.10	2.15	H		0.087	19.37
		256-QAM	-25.15	8.57	10.10	2.15	H		0.045	16.52
1880.0		QPSK	-20.76	12.43	9.98	2.25	H		0.104	20.16
		16-QAM	-21.83	11.36	9.98	2.25	H		0.081	19.09
		64-QAM	-22.74	10.45	9.98	2.25	H		0.066	18.18
		256-QAM	-25.71	7.48	9.98	2.25	H		0.033	15.21
1907.5		QPSK	-22.00	11.79	9.88	2.17	H		0.089	19.50
		16-QAM	-23.13	10.66	9.88	2.17	H		0.069	18.37
		64-QAM	-24.03	9.76	9.88	2.17	H		0.056	17.47
		256-QAM	-27.00	6.79	9.88	2.17	H		0.028	14.50

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol	Limit W	EIRP W	EIRP dBm
1855.0	LTE B2/ 10 MHz	QPSK	-20.29	13.12	10.08	2.17	H	< 2.00	0.127	21.03
		16-QAM	-21.51	11.90	10.08	2.17	H		0.096	19.81
		64-QAM	-22.48	10.93	10.08	2.17	H		0.077	18.84
		256-QAM	-25.42	7.99	10.08	2.17	H		0.039	15.90
1880.0		QPSK	-21.43	11.76	9.98	2.25	H		0.089	19.49
		16-QAM	-22.31	10.88	9.98	2.25	H		0.073	18.61
		64-QAM	-23.20	9.99	9.98	2.25	H		0.059	17.72
		256-QAM	-25.86	7.33	9.98	2.25	H		0.032	15.06
1905.0		QPSK	-22.71	11.01	9.89	2.19	H		0.074	18.71
		16-QAM	-23.48	10.24	9.89	2.19	H		0.062	17.94
		64-QAM	-24.23	9.49	9.89	2.19	H		0.052	17.19
		256-QAM	-26.58	7.14	9.89	2.19	H		0.031	14.84

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1857.5	LTE B2/ 15 MHz	QPSK	-21.17	12.08	10.06	2.17	H	< 2.00	0.099	19.97
		16-QAM	-22.00	11.25	10.06	2.17	H		0.082	19.14
		64-QAM	-22.75	10.50	10.06	2.17	H		0.069	18.39
		256-QAM	-25.63	7.62	10.06	2.17	H		0.036	15.51
1880.0		QPSK	-21.01	12.18	9.98	2.25	H		0.098	19.91
		16-QAM	-22.07	11.12	9.98	2.25	H		0.077	18.85
		64-QAM	-22.93	10.26	9.98	2.25	H		0.063	17.99
		256-QAM	-25.48	7.71	9.98	2.25	H		0.035	15.44
1902.5		QPSK	-22.78	10.86	9.90	2.20	H		0.072	18.56
		16-QAM	-23.55	10.09	9.90	2.20	H		0.060	17.79
		64-QAM	-24.29	9.35	9.90	2.20	H		0.051	17.05
		256-QAM	-26.58	7.06	9.90	2.20	H		0.030	14.76

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1860.0	LTE B2/ 20 MHz	QPSK	-20.18	12.91	10.06	2.19	H	< 2.00	0.120	20.78
		16-QAM	-21.31	11.78	10.06	2.19	H		0.092	19.65
		64-QAM	-22.24	10.85	10.06	2.19	H		0.075	18.72
		256-QAM	-25.15	7.94	10.06	2.19	H		0.038	15.81
1880.0		QPSK	-21.03	12.16	9.98	2.25	H		0.097	19.89
		16-QAM	-21.96	11.23	9.98	2.25	H		0.079	18.96
		64-QAM	-22.83	10.36	9.98	2.25	H		0.064	18.09
		256-QAM	-25.68	7.51	9.98	2.25	H		0.033	15.24
1900.0		QPSK	-22.24	11.40	9.90	2.20	H		0.081	19.10
		16-QAM	-22.99	10.65	9.90	2.20	H		0.068	18.35
		64-QAM	-23.77	9.87	9.90	2.20	H		0.057	17.57
		256-QAM	-26.64	7.00	9.90	2.20	H		0.029	14.70

8.2 RADIATED SPURIOUS EMISSIONS

- ▣ OPERATING FREQUENCY: 1855.0 MHz
- ▣ MEASURED OUTPUT POWER: 21.03 dBm = 0.127 W
- ▣ MODE: LTE B2
- ▣ MODULATION SIGNAL: 10 MHz QPSK
- ▣ DISTANCE: 3 meters
- ▣ LIMIT: 43 + 10 log10 (W) = 34.03 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
18650 (1855.0)	3 710.00	-58.94	11.70	-59.45	3.15	V	-50.90	71.93
	5 565.00	-60.66	12.07	-55.22	3.91	H	-47.06	68.09
	7 420.00	-64.40	11.28	-49.80	4.42	V	-42.94	63.97
18900 (1880.0)	3 760.00	-58.44	11.64	-58.67	3.16	V	-50.19	71.22
	5 640.00	-60.47	12.00	-54.29	3.93	H	-46.22	67.25
	7 520.00	-63.94	11.54	-49.49	4.51	V	-42.46	63.49
19150 (1905.0)	3 810.00	-58.84	11.36	-59.15	3.17	V	-50.96	71.99
	5 715.00	-60.96	11.77	-55.30	3.97	H	-47.50	68.53
	7 620.00	-64.17	11.60	-49.73	4.55	V	-42.68	63.71

8.3 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
2	1.4 MHz	1880.0	QPSK	6	0	4.84
			16-QAM	6	0	5.58
			64-QAM	6	0	6.24
			256-QAM	6	0	6.72
	3 MHz		QPSK	15	0	4.90
			16-QAM	15	0	5.61
			64-QAM	15	0	6.20
			256-QAM	15	0	6.69
	5 MHz		QPSK	25	0	4.98
			16-QAM	25	0	5.80
			64-QAM	25	0	6.19
			256-QAM	25	0	6.69
	10 MHz		QPSK	50	0	5.17
			16-QAM	50	0	5.88
			64-QAM	50	0	6.26
			256-QAM	50	0	6.76
	15 MHz		QPSK	75	0	5.04
			16-QAM	75	0	5.77
			64-QAM	75	0	6.27
			256-QAM	75	0	6.72
	20 MHz		QPSK	100	0	5.11
			16-QAM	100	0	5.86
			64-QAM	100	0	6.33
			256-QAM	100	0	6.78

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 109 ~ 132.

8.4 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
2	1.4 MHz	1880.0	QPSK	6	0	1.1173
			16-QAM	6	0	1.1147
			64-QAM	6	0	1.1281
			256-QAM	6	0	1.1235
	3 MHz		QPSK	15	0	2.7677
			16-QAM	15	0	2.7844
			64-QAM	15	0	2.7414
			256-QAM	15	0	2.7531
	5 MHz		QPSK	25	0	4.5256
			16-QAM	25	0	4.5168
			64-QAM	25	0	4.5184
			256-QAM	25	0	4.5129
	10 MHz		QPSK	50	0	9.0053
			16-QAM	50	0	9.0233
			64-QAM	50	0	9.0096
			256-QAM	50	0	8.9962
	15 MHz		QPSK	75	0	13.506
			16-QAM	75	0	13.526
			64-QAM	75	0	13.528
			256-QAM	75	0	13.496
	20 MHz		QPSK	100	0	18.014
			16-QAM	100	0	18.026
			64-QAM	100	0	18.052
			256-QAM	100	0	18.026

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 85 ~ 108.

8.5 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
2	1.4	1850.7	9.6979	31.815	-81.277	-49.462	-13.00
		1880.0	4.9492	31.200	-80.623	-49.423	
		1909.3	3.7588	31.200	-80.525	-49.325	
	3	1851.5	3.7005	31.200	-62.930	-31.730	
		1880.0	3.7573	31.200	-62.055	-30.855	
		1908.5	3.8196	31.200	-61.422	-30.222	
	5	1852.5	3.7005	31.200	-65.865	-34.665	
		1880.0	3.7558	31.200	-63.305	-32.105	
		1907.5	3.8191	31.200	-61.388	-30.188	
	10	1855.0	3.7010	31.200	-65.861	-34.661	
		1880.0	2.4263	31.200	-76.184	-44.984	
		1905.0	3.8186	31.200	-61.945	-30.745	
	15	1857.5	3.7015	31.200	-73.720	-42.520	
		1880.0	3.7468	31.200	-69.802	-38.602	
		1902.5	3.8181	31.200	-60.033	-28.833	
	20	1860.0	3.7020	31.200	-73.137	-41.937	
		1880.0	3.7423	31.200	-61.324	-30.124	
		1900.0	3.8176	31.200	-61.299	-30.099	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 133 ~ 168.
2. Conducted Spurious Emissions was Tested QPSK Modulation, Resource Block Size 1 and Resource Block Offset 0
3. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)
4. Factor (dB) = Cable Loss + Attenuator + Power Splitter

Frequency Range (GHz)	Factor [dB]
0.03 – 1	27.294
1 – 5	31.200
5 – 10	31.815
10 – 15	32.340
15 – 20	32.713
Above 20(26.5)	33.355

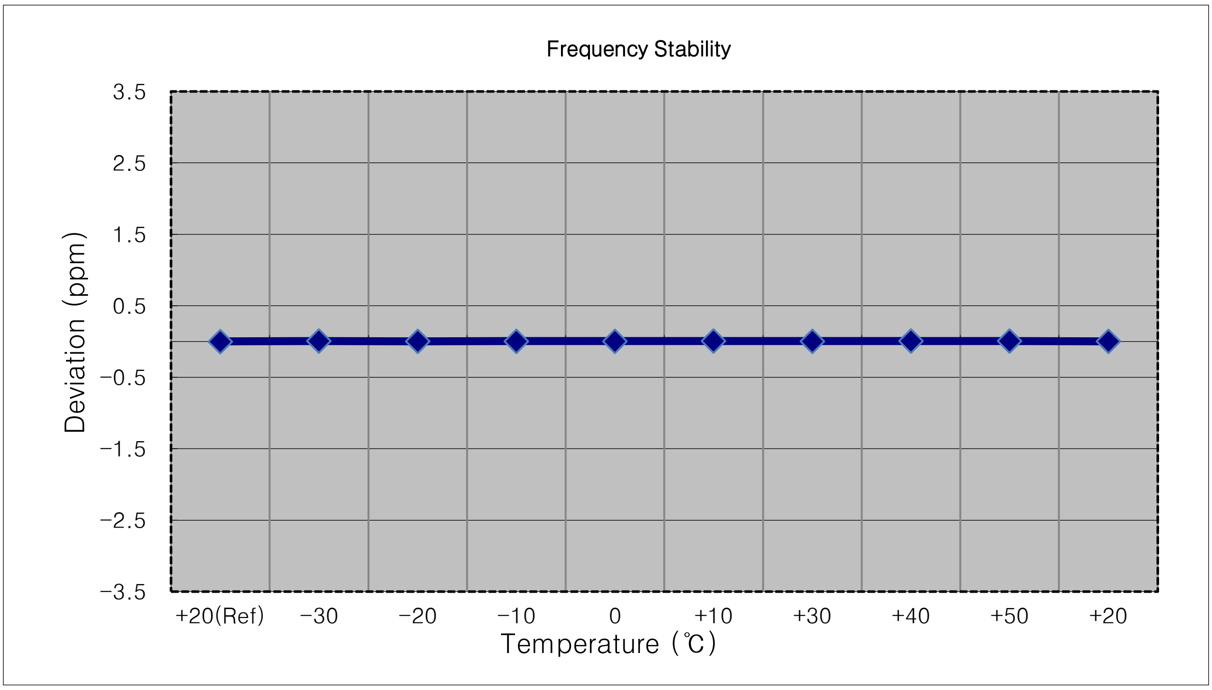
8.6 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 49 ~ 84.

8.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

- ▣ MODE: LTE B2
- ▣ OPERATING FREQUENCY: 1850,700,000 Hz
- ▣ CHANNEL: 18607 (1.4 MHz)
- ▣ REFERENCE VOLTAGE: 3.860 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1850 700 010	0.0	0.000 000	0.000
100 %		-30	1850 700 022	12.4	0.000 001	0.007
100 %		-20	1850 700 013	3.6	0.000 000	0.002
100 %		-10	1850 700 018	8.7	0.000 000	0.005
100 %		0	1850 700 019	8.9	0.000 000	0.005
100 %		+10	1850 700 023	13.3	0.000 001	0.007
100 %		+30	1850 700 019	9.5	0.000 001	0.005
100 %		+40	1850 700 022	12.0	0.000 001	0.006
100 %		+50	1850 700 022	12.3	0.000 001	0.007
Batt. Endpoint	3.400	+20	1850 700 015	5.1	0.000 000	0.003



▣ MODE: LTE B2

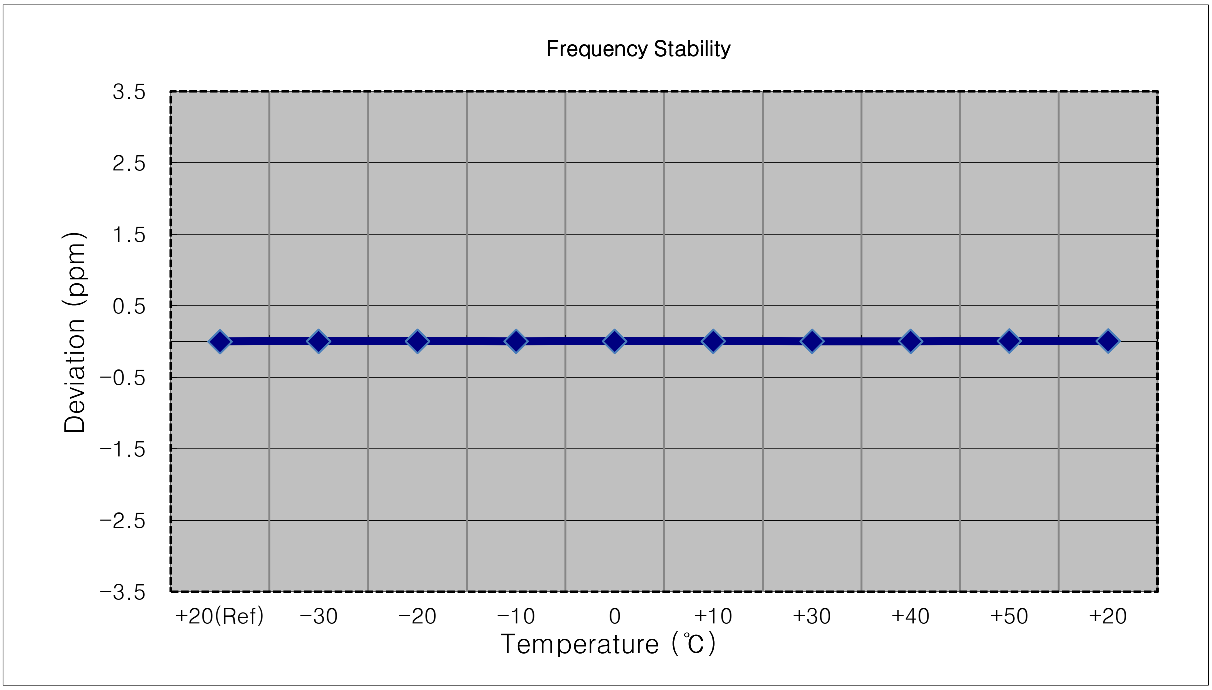
▣ OPERATING FREQUENCY: 1851,500,000 Hz

▣ CHANNEL: 18615 (3 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1851 500 006	0.0	0.000 000	0.000
100 %		-30	1851 500 016	10.5	0.000 001	0.006
100 %		-20	1851 500 013	7.1	0.000 000	0.004
100 %		-10	1851 500 010	4.1	0.000 000	0.002
100 %		0	1851 500 016	10.0	0.000 001	0.005
100 %		+10	1851 500 015	8.5	0.000 000	0.005
100 %		+30	1851 500 011	5.2	0.000 000	0.003
100 %		+40	1851 500 010	4.1	0.000 000	0.002
100 %		+50	1851 500 020	14.0	0.000 001	0.008
Batt. Endpoint	3.400	+20	1851 500 021	15.2	0.000 001	0.008



▣ MODE: LTE B2

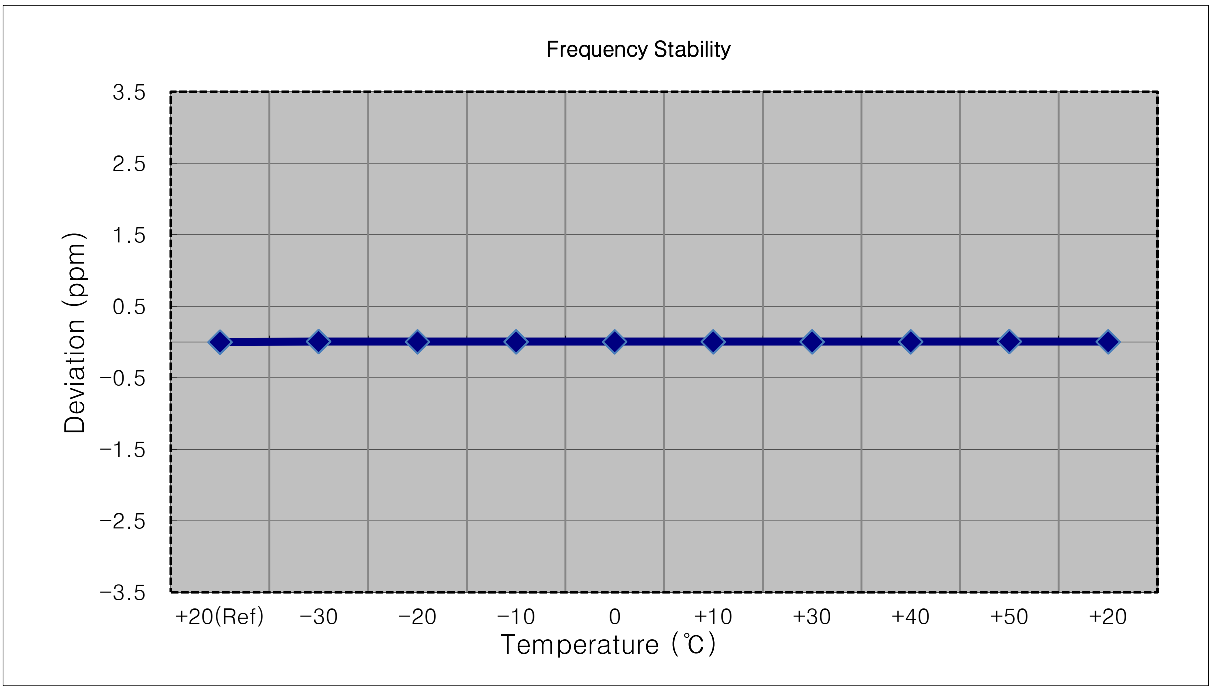
▣ OPERATING FREQUENCY: 1852,500,000 Hz

▣ CHANNEL: 18625 (5 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1852 499 995	0.0	0.000 000	0.000
100 %		-30	1852 500 008	13.1	0.000 001	0.007
100 %		-20	1852 500 005	9.4	0.000 001	0.005
100 %		-10	1852 500 004	8.3	0.000 000	0.004
100 %		0	1852 500 006	10.7	0.000 001	0.006
100 %		+10	1852 500 003	7.4	0.000 000	0.004
100 %		+30	1852 500 006	10.6	0.000 001	0.006
100 %		+40	1852 500 006	10.4	0.000 001	0.006
100 %		+50	1852 500 010	14.9	0.000 001	0.008
Batt. Endpoint	3.400	+20	1852 500 006	10.5	0.000 001	0.006



▣ MODE: LTE B2

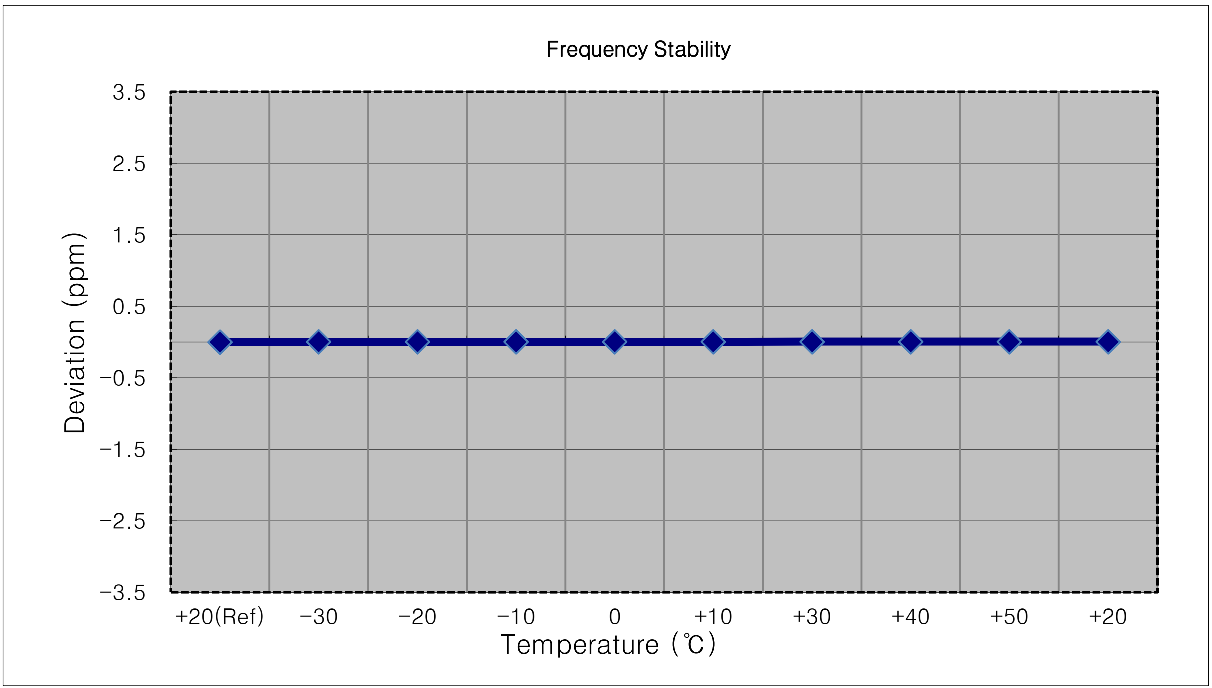
▣ OPERATING FREQUENCY: 1855,000,000 Hz

▣ CHANNEL: 18650 (10 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1854 999 929	0.0	0.000 000	0.000
100 %		-30	1854 999 935	6.3	0.000 000	0.003
100 %		-20	1854 999 936	6.8	0.000 000	0.004
100 %		-10	1854 999 932	3.2	0.000 000	0.002
100 %		0	1854 999 934	5.7	0.000 000	0.003
100 %		+10	1854 999 935	6.7	0.000 000	0.004
100 %		+30	1854 999 936	7.2	0.000 000	0.004
100 %		+40	1854 999 937	8.4	0.000 000	0.005
100 %		+50	1854 999 939	10.3	0.000 001	0.006
Batt. Endpoint	3.400	+20	1854 999 939	10.3	0.000 001	0.006



▣ MODE: LTE B2

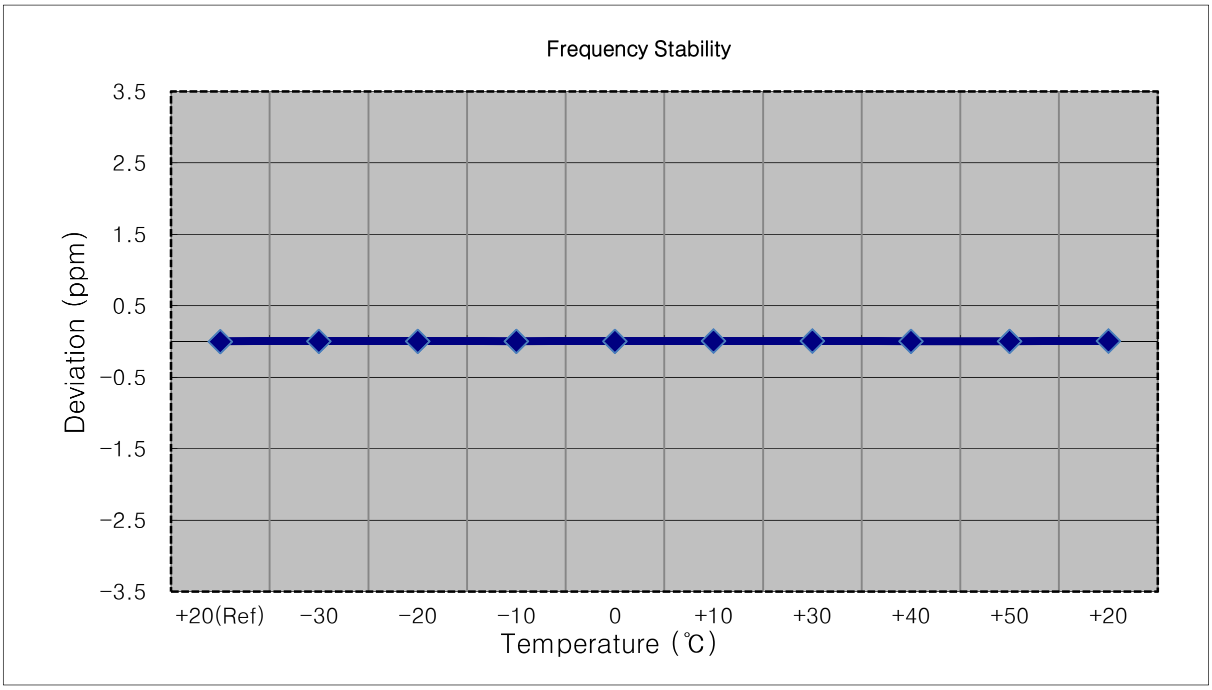
▣ OPERATING FREQUENCY: 1857,500,000 Hz

▣ CHANNEL: 18675 (15 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1857 500 015	0.0	0.000 000	0.000
100 %		-30	1857 500 023	7.9	0.000 000	0.004
100 %		-20	1857 500 024	9.0	0.000 000	0.005
100 %		-10	1857 500 020	4.5	0.000 000	0.002
100 %		0	1857 500 024	8.4	0.000 000	0.005
100 %		+10	1857 500 027	11.3	0.000 001	0.006
100 %		+30	1857 500 030	14.9	0.000 001	0.008
100 %		+40	1857 500 021	5.3	0.000 000	0.003
100 %		+50	1857 500 021	6.1	0.000 000	0.003
Batt. Endpoint	3.400	+20	1857 500 028	12.9	0.000 001	0.007



▣ MODE: LTE B2

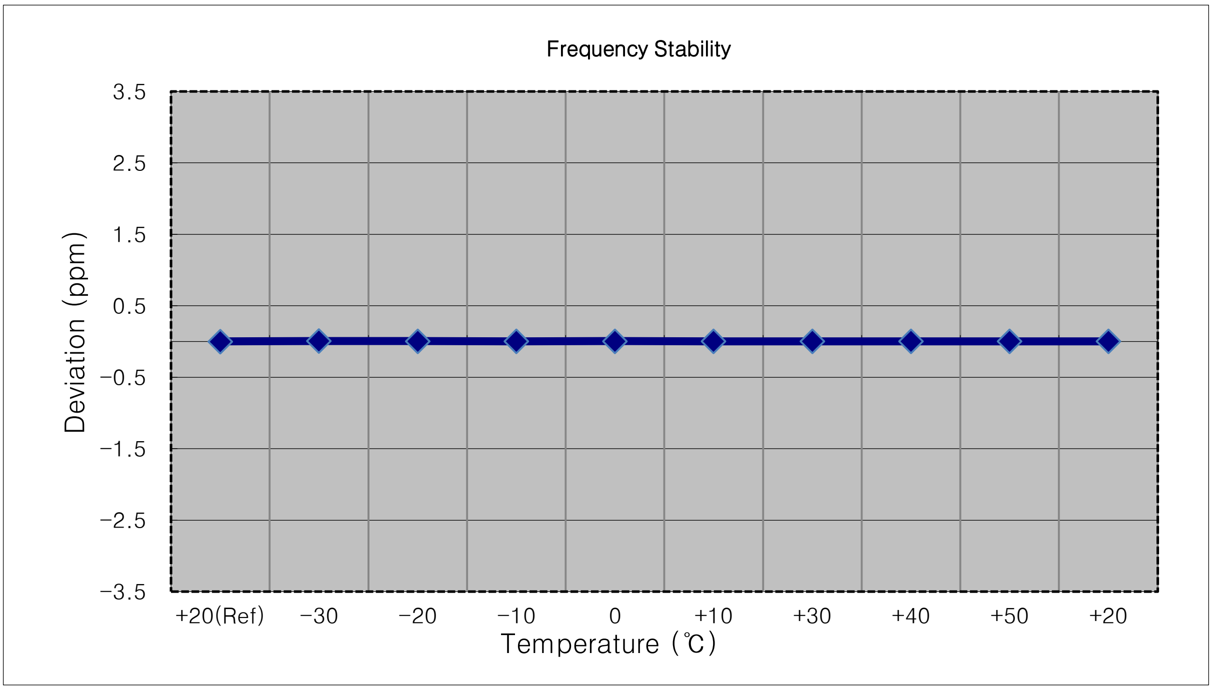
▣ OPERATING FREQUENCY: 1860,000,000 Hz

▣ CHANNEL: 18700 (20 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1860 000 007	0.0	0.000 000	0.000
100 %		-30	1860 000 019	12.3	0.000 001	0.007
100 %		-20	1860 000 016	9.7	0.000 001	0.005
100 %		-10	1860 000 012	5.2	0.000 000	0.003
100 %		0	1860 000 016	9.6	0.000 001	0.005
100 %		+10	1860 000 011	4.3	0.000 000	0.002
100 %		+30	1860 000 012	5.1	0.000 000	0.003
100 %		+40	1860 000 013	6.7	0.000 000	0.004
100 %		+50	1860 000 012	5.7	0.000 000	0.003
Batt. Endpoint	3.400	+20	1860 000 010	3.2	0.000 000	0.002



▣ MODE: LTE B2

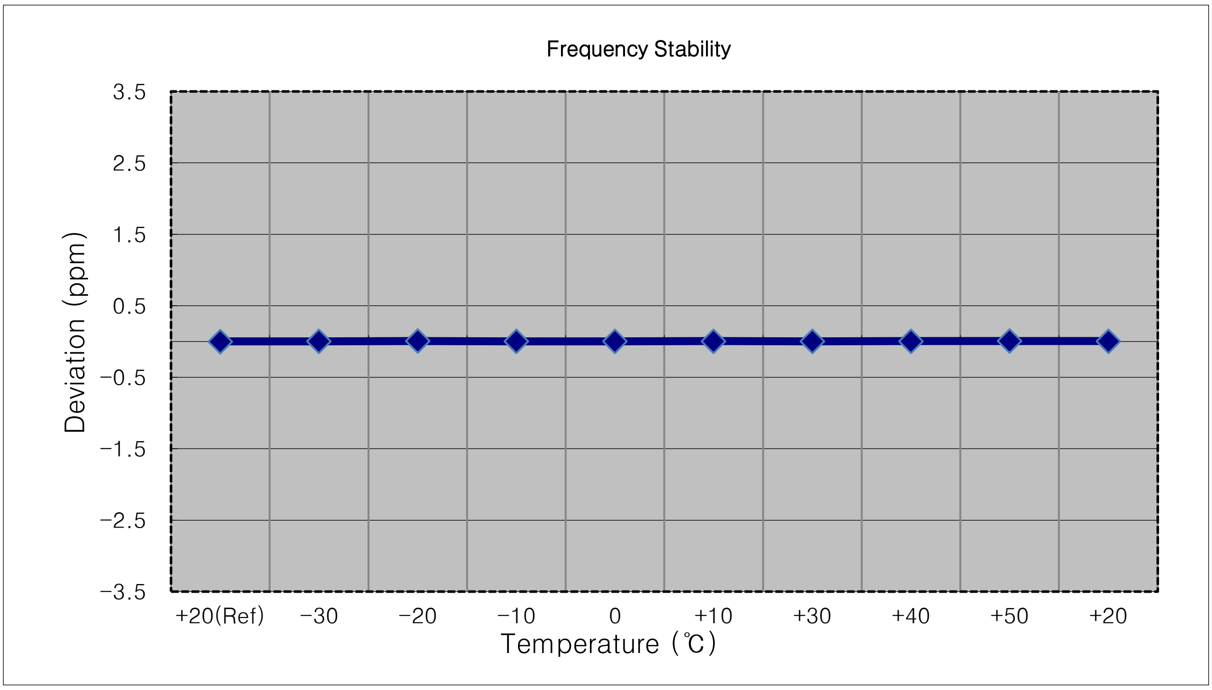
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (1.4 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1880 000 004	0.0	0.000 000	0.000
100 %		-30	1880 000 010	5.9	0.000 000	0.003
100 %		-20	1880 000 016	11.5	0.000 001	0.006
100 %		-10	1880 000 008	3.4	0.000 000	0.002
100 %		0	1880 000 010	5.4	0.000 000	0.003
100 %		+10	1880 000 014	9.7	0.000 001	0.005
100 %		+30	1880 000 008	3.4	0.000 000	0.002
100 %		+40	1880 000 013	8.5	0.000 000	0.004
100 %		+50	1880 000 018	13.7	0.000 001	0.007
Batt. Endpoint	3.400	+20	1880 000 012	7.5	0.000 000	0.004



▣ MODE: LTE B2

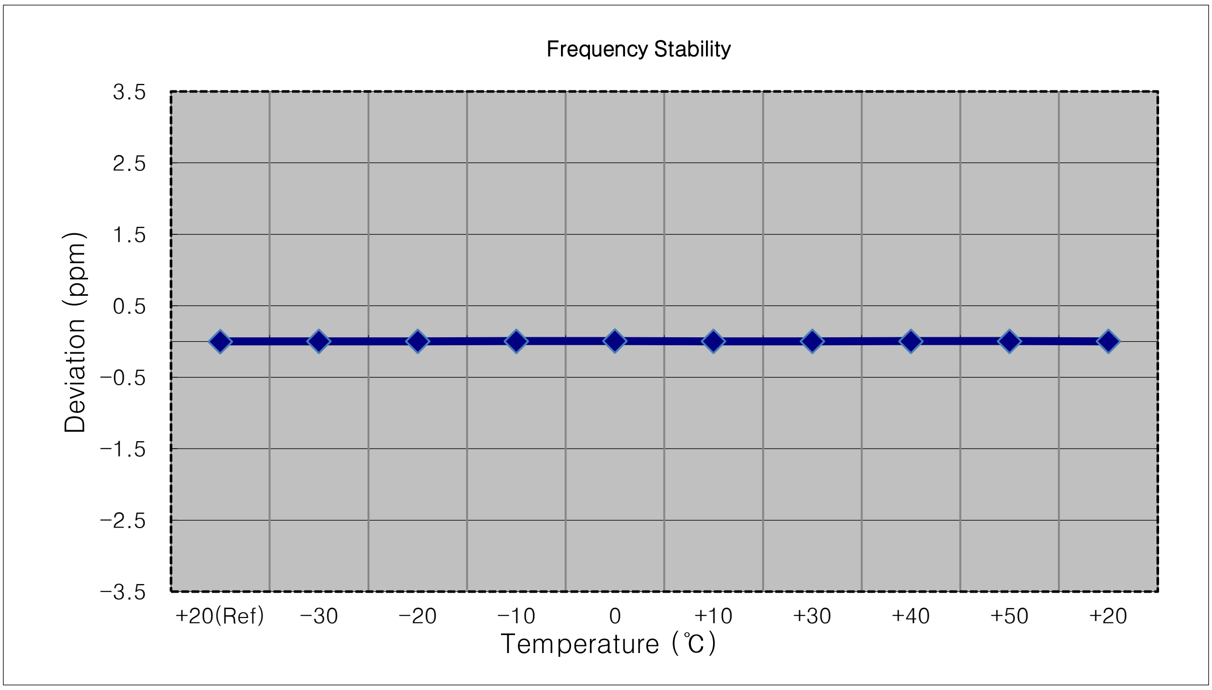
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (3 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1880 000 013	0.0	0.000 000	0.000
100 %		-30	1880 000 018	4.9	0.000 000	0.003
100 %		-20	1880 000 018	5.2	0.000 000	0.003
100 %		-10	1880 000 022	9.6	0.000 001	0.005
100 %		0	1880 000 028	15.2	0.000 001	0.008
100 %		+10	1880 000 019	6.6	0.000 000	0.004
100 %		+30	1880 000 017	4.1	0.000 000	0.002
100 %		+40	1880 000 021	8.4	0.000 000	0.004
100 %		+50	1880 000 023	10.0	0.000 001	0.005
Batt. Endpoint	3.400	+20	1880 000 019	6.0	0.000 000	0.003



▣ MODE: LTE B2

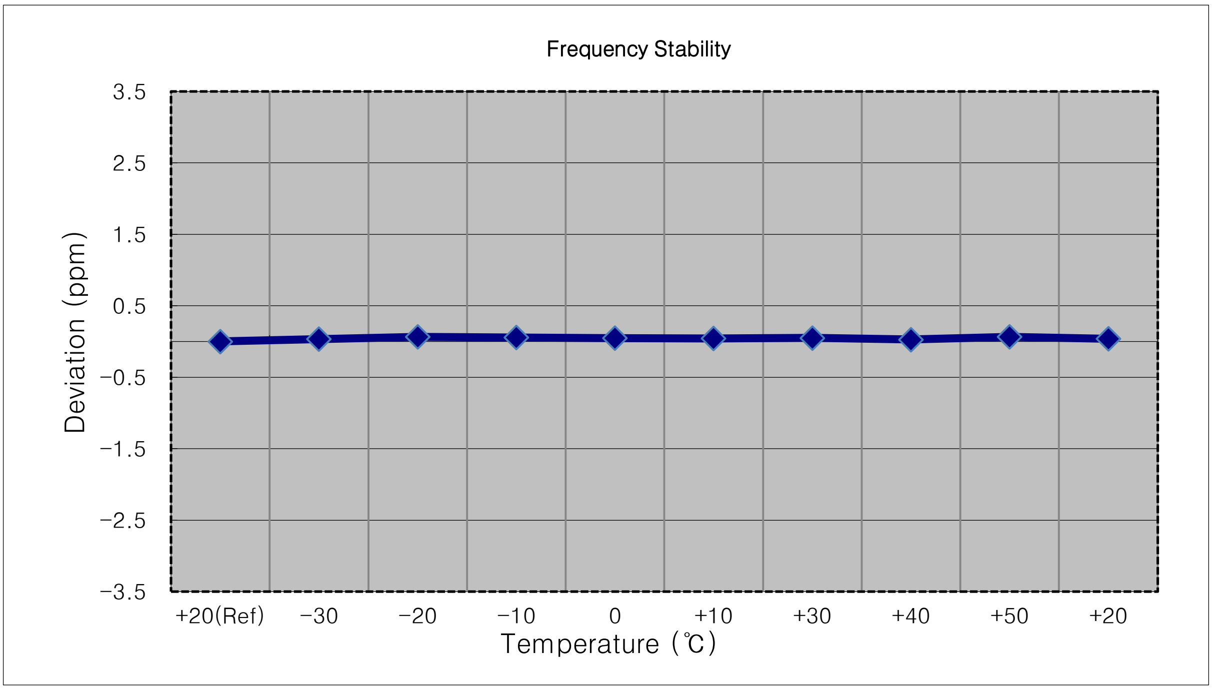
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (5 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1880 000 001	0.0	0.000 000	0.000
100 %		-30	1880 000 008	6.5	0.000 000	0.003
100 %		-20	1880 000 014	12.4	0.000 001	0.007
100 %		-10	1880 000 012	10.5	0.000 001	0.006
100 %		0	1880 000 010	9.0	0.000 000	0.005
100 %		+10	1880 000 009	8.2	0.000 000	0.004
100 %		+30	1880 000 011	9.4	0.000 000	0.005
100 %		+40	1880 000 006	4.9	0.000 000	0.003
100 %		+50	1880 000 014	12.4	0.000 001	0.007
Batt. Endpoint	3.400	+20	1880 000 008	7.1	0.000 000	0.004



▣ MODE: LTE B2

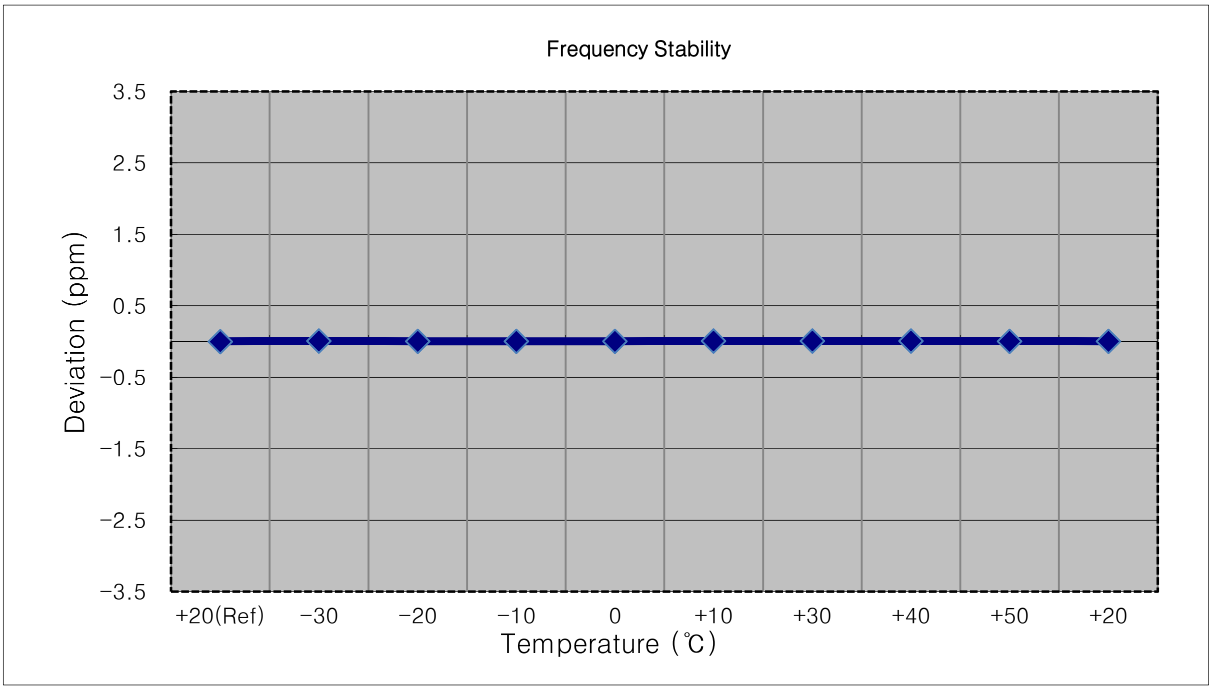
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (10 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1879 999 938	0.0	0.000 000	0.000
100 %		-30	1879 999 950	11.8	0.000 001	0.006
100 %		-20	1879 999 941	3.1	0.000 000	0.002
100 %		-10	1879 999 944	6.0	0.000 000	0.003
100 %		0	1879 999 943	4.5	0.000 000	0.002
100 %		+10	1879 999 951	12.8	0.000 001	0.007
100 %		+30	1879 999 950	12.3	0.000 001	0.007
100 %		+40	1879 999 953	14.6	0.000 001	0.008
100 %		+50	1879 999 945	7.0	0.000 000	0.004
Batt. Endpoint	3.400	+20	1879 999 942	3.4	0.000 000	0.002



▣ MODE: LTE B2

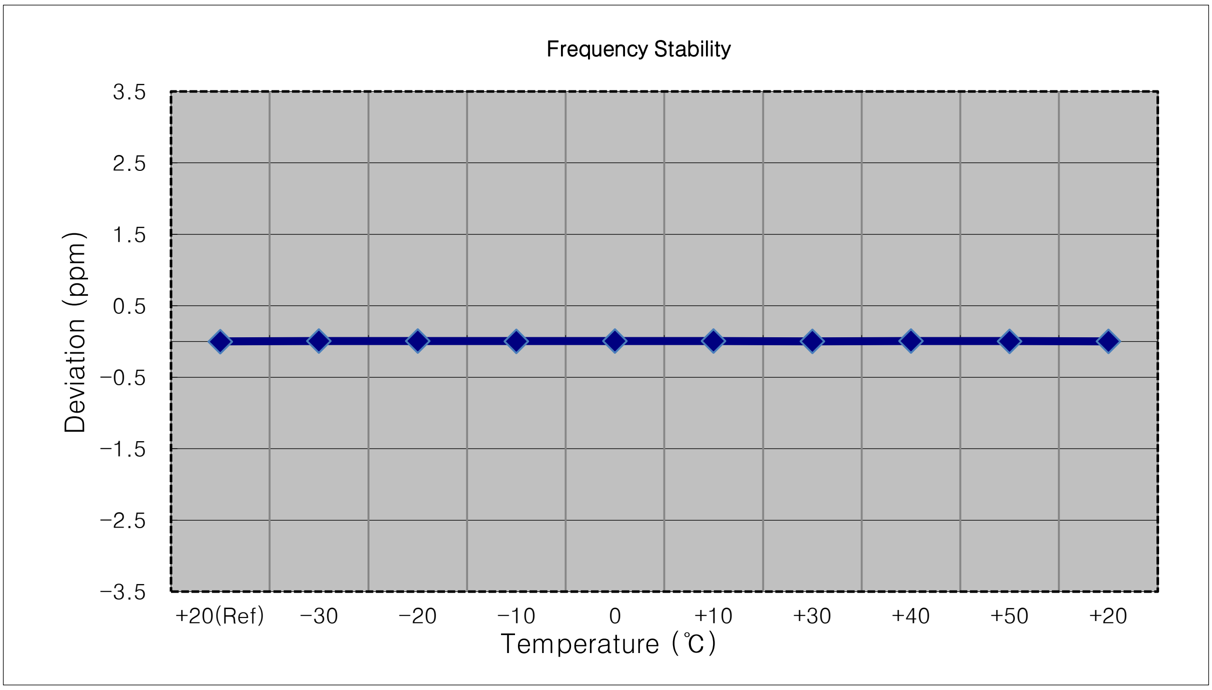
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (15 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1880 000 011	0.0	0.000 000	0.000
100 %		-30	1880 000 023	11.7	0.000 001	0.006
100 %		-20	1880 000 026	14.3	0.000 001	0.008
100 %		-10	1880 000 021	9.4	0.000 001	0.005
100 %		0	1880 000 026	14.7	0.000 001	0.008
100 %		+10	1880 000 024	13.0	0.000 001	0.007
100 %		+30	1880 000 014	3.2	0.000 000	0.002
100 %		+40	1880 000 025	14.3	0.000 001	0.008
100 %		+50	1880 000 019	8.2	0.000 000	0.004
Batt. Endpoint	3.400	+20	1880 000 017	5.4	0.000 000	0.003



▣ MODE: LTE B2

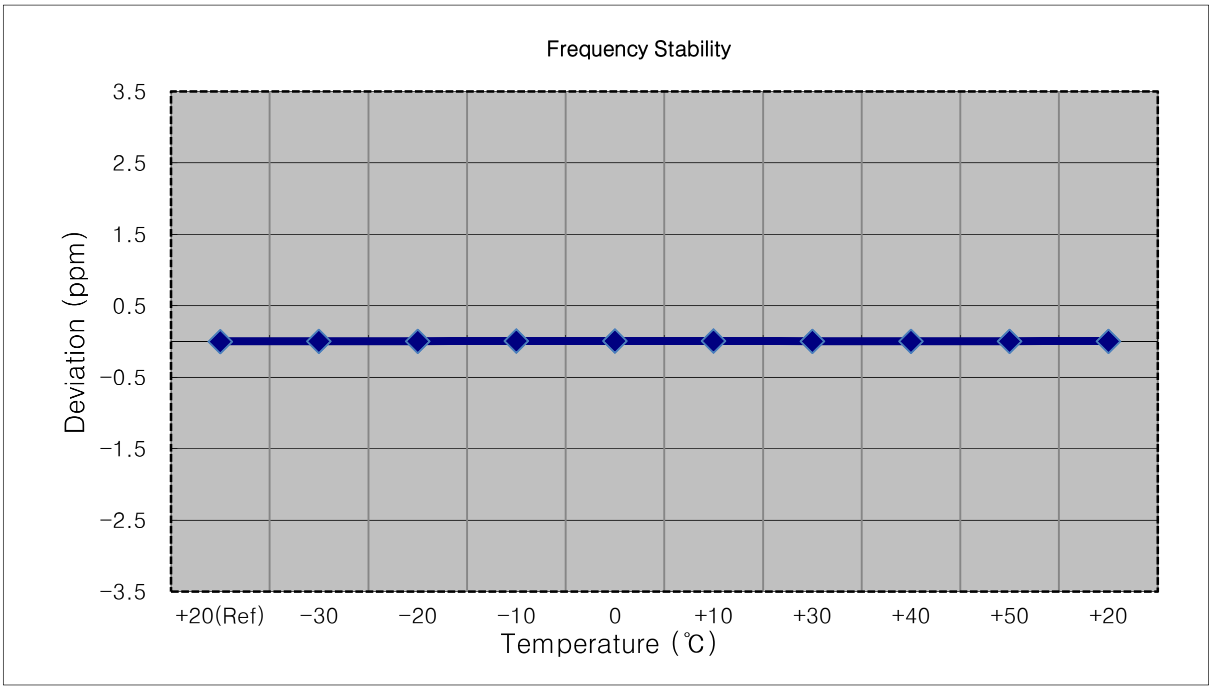
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (20 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1880 000 019	0.0	0.000 000	0.000
100 %		-30	1880 000 025	6.2	0.000 000	0.003
100 %		-20	1880 000 022	3.3	0.000 000	0.002
100 %		-10	1880 000 032	13.2	0.000 001	0.007
100 %		0	1880 000 031	11.5	0.000 001	0.006
100 %		+10	1880 000 032	13.3	0.000 001	0.007
100 %		+30	1880 000 024	5.2	0.000 000	0.003
100 %		+40	1880 000 022	3.2	0.000 000	0.002
100 %		+50	1880 000 025	5.8	0.000 000	0.003
Batt. Endpoint	3.400	+20	1880 000 027	8.3	0.000 000	0.004



▣ MODE: LTE B2

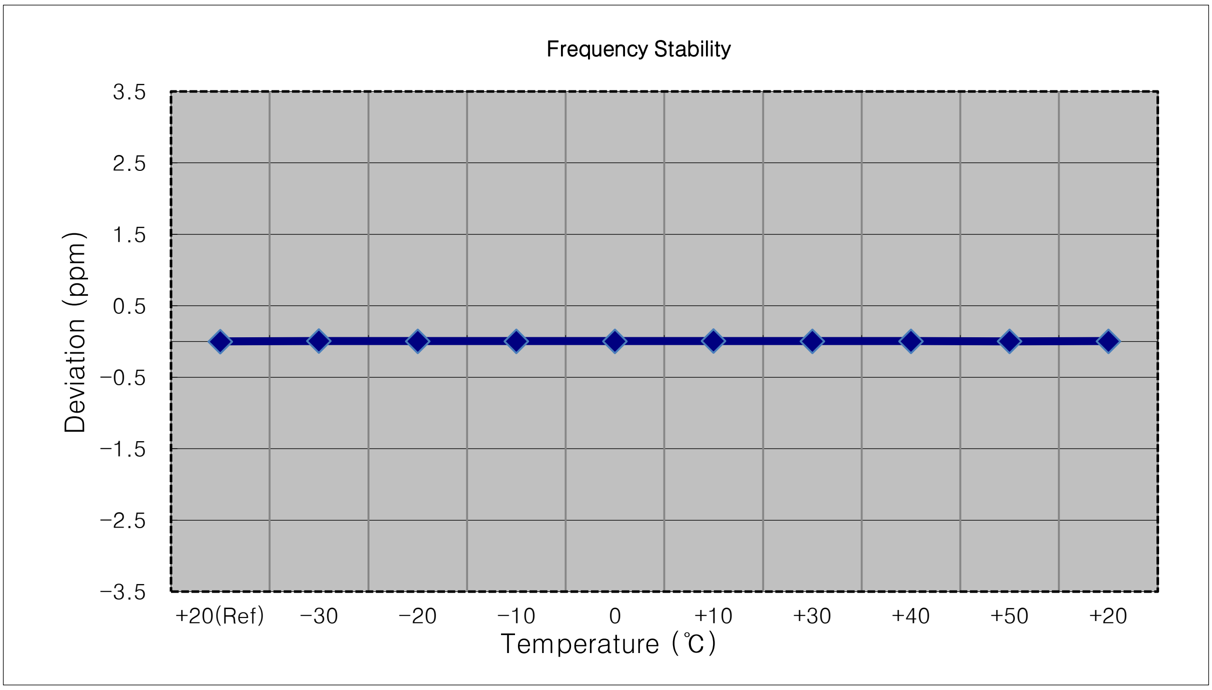
▣ OPERATING FREQUENCY: 1909,300,000 Hz

▣ CHANNEL: 19193 (1.4 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1909 299 991	0.0	0.000 000	0.000
100 %		-30	1909 300 006	14.9	0.000 001	0.008
100 %		-20	1909 300 001	10.2	0.000 001	0.005
100 %		-10	1909 300 001	10.1	0.000 001	0.005
100 %		0	1909 300 001	9.8	0.000 001	0.005
100 %		+10	1909 300 005	13.6	0.000 001	0.007
100 %		+30	1909 299 998	7.2	0.000 000	0.004
100 %		+40	1909 299 999	8.1	0.000 000	0.004
100 %		+50	1909 299 997	6.1	0.000 000	0.003
Batt. Endpoint	3.400	+20	1909 300 002	11.1	0.000 001	0.006



▣ MODE: LTE B2

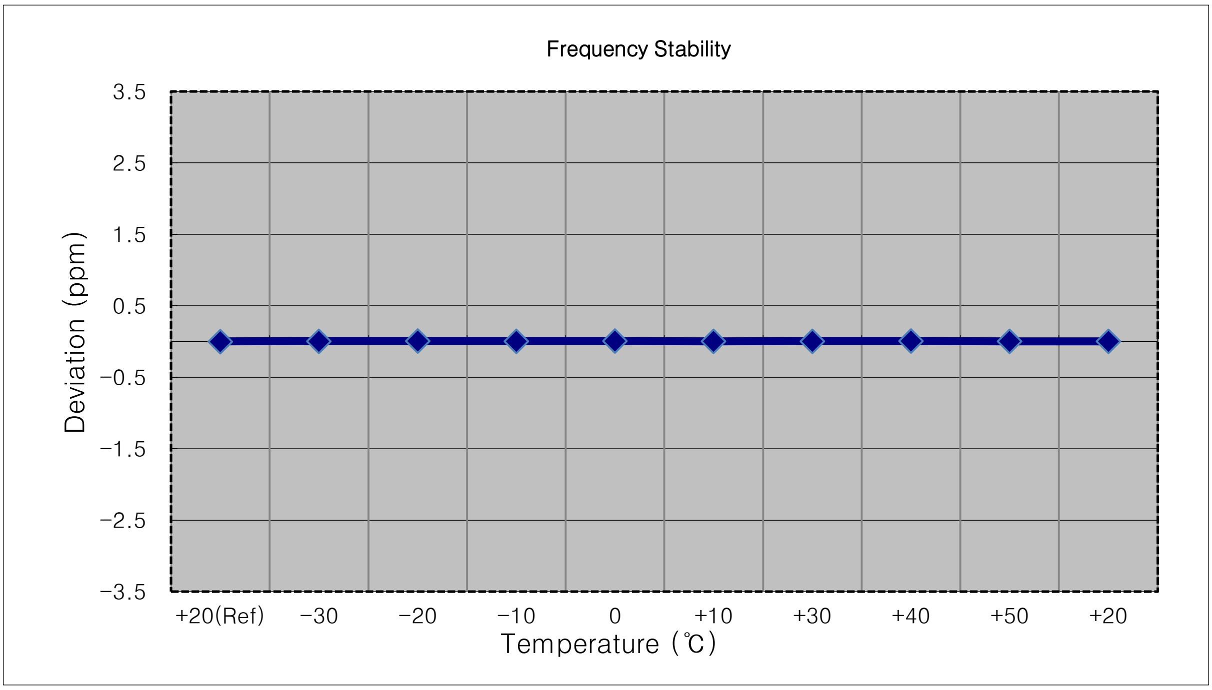
▣ OPERATING FREQUENCY: 1908,500,000 Hz

▣ CHANNEL: 19185 (3 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1908 500 011	0.0	0.000 000	0.000
100 %		-30	1908 500 019	7.5	0.000 000	0.004
100 %		-20	1908 500 026	15.4	0.000 001	0.008
100 %		-10	1908 500 022	10.6	0.000 001	0.006
100 %		0	1908 500 027	15.5	0.000 001	0.008
100 %		+10	1908 500 016	4.9	0.000 000	0.003
100 %		+30	1908 500 018	7.5	0.000 000	0.004
100 %		+40	1908 500 025	13.9	0.000 001	0.007
100 %		+50	1908 500 016	5.2	0.000 000	0.003
Batt. Endpoint	3.400	+20	1908 500 016	4.7	0.000 000	0.002



▣ MODE: LTE B2

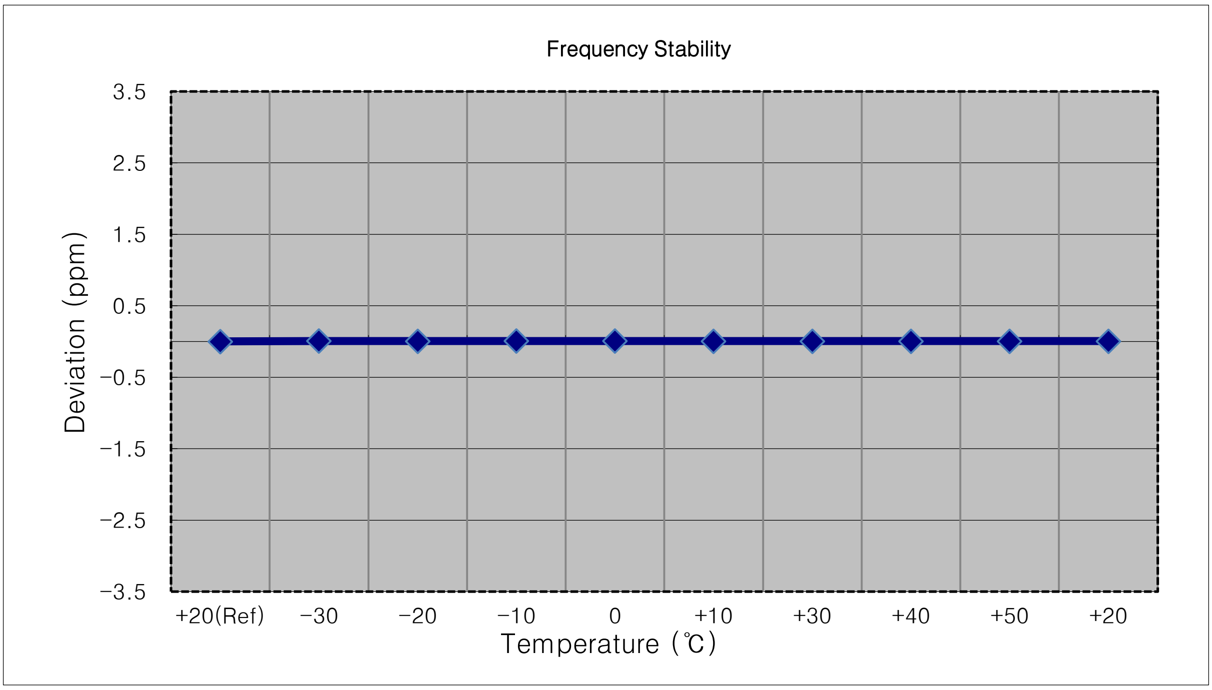
▣ OPERATING FREQUENCY: 1907,500,000 Hz

▣ CHANNEL: 19175 (5 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1907 500 008	0.0	0.000 000	0.000
100 %		-30	1907 500 022	14.3	0.000 001	0.007
100 %		-20	1907 500 016	7.8	0.000 000	0.004
100 %		-10	1907 500 019	11.5	0.000 001	0.006
100 %		0	1907 500 023	15.0	0.000 001	0.008
100 %		+10	1907 500 019	10.9	0.000 001	0.006
100 %		+30	1907 500 018	10.0	0.000 001	0.005
100 %		+40	1907 500 015	7.1	0.000 000	0.004
100 %		+50	1907 500 016	7.9	0.000 000	0.004
Batt. Endpoint	3.400	+20	1907 500 016	8.5	0.000 000	0.004



▣ MODE: LTE B2

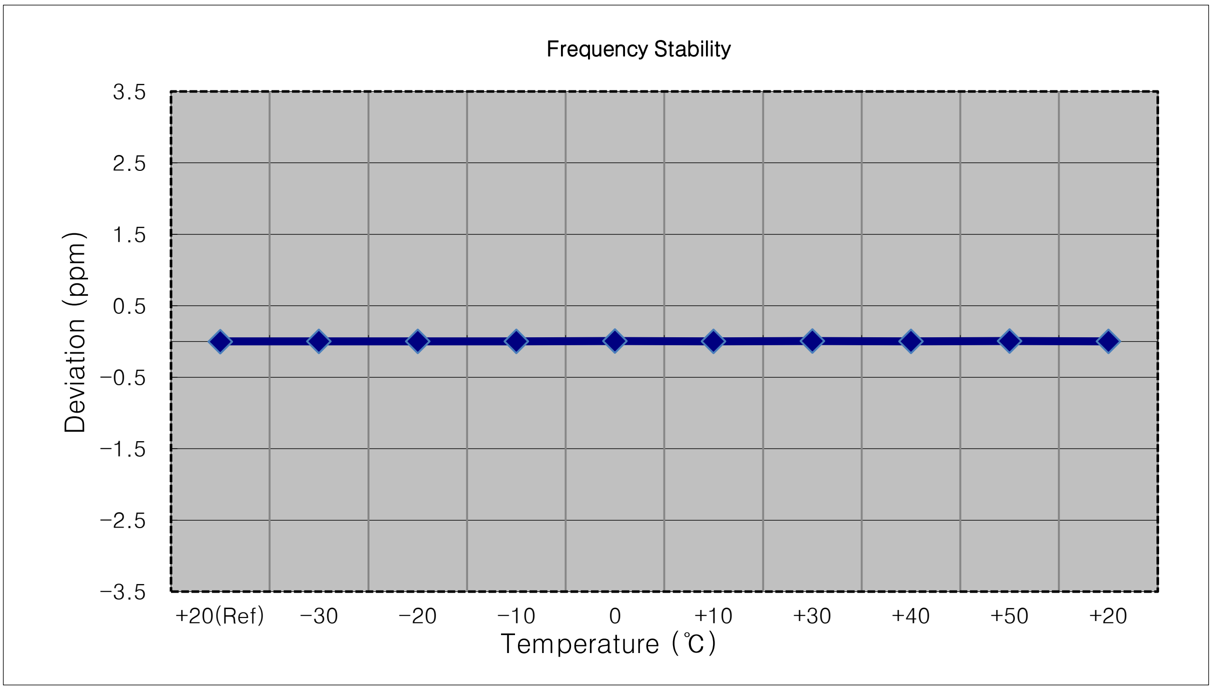
▣ OPERATING FREQUENCY: 1905,000,000 Hz

▣ CHANNEL: 19150 (10 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1904 999 992	0.0	0.000 000	0.000
100 %		-30	1904 999 997	4.9	0.000 000	0.003
100 %		-20	1904 999 996	4.1	0.000 000	0.002
100 %		-10	1904 999 999	6.4	0.000 000	0.003
100 %		0	1905 000 004	11.9	0.000 001	0.006
100 %		+10	1904 999 999	6.5	0.000 000	0.003
100 %		+30	1905 000 006	14.2	0.000 001	0.007
100 %		+40	1904 999 995	3.1	0.000 000	0.002
100 %		+50	1905 000 006	14.1	0.000 001	0.007
Batt. Endpoint	3.400	+20	1904 999 996	4.3	0.000 000	0.002



▣ MODE: LTE B2

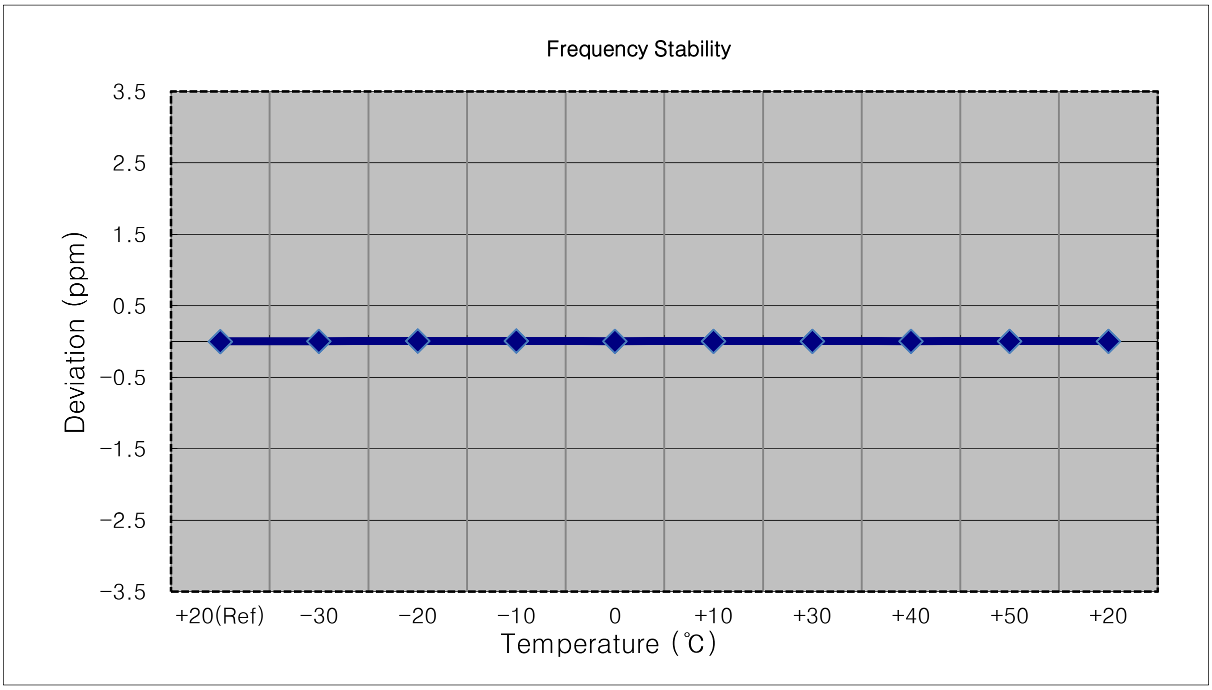
▣ OPERATING FREQUENCY: 1902,500,000 Hz

▣ CHANNEL: 19125 (15 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1902 500 012	0.0	0.000 000	0.000
100 %		-30	1902 500 018	5.3	0.000 000	0.003
100 %		-20	1902 500 024	12.0	0.000 001	0.006
100 %		-10	1902 500 025	12.7	0.000 001	0.007
100 %		0	1902 500 017	4.8	0.000 000	0.003
100 %		+10	1902 500 021	9.1	0.000 000	0.005
100 %		+30	1902 500 023	10.8	0.000 001	0.006
100 %		+40	1902 500 016	3.4	0.000 000	0.002
100 %		+50	1902 500 022	9.3	0.000 000	0.005
Batt. Endpoint	3.400	+20	1902 500 023	10.3	0.000 001	0.005



▣ MODE: LTE B2

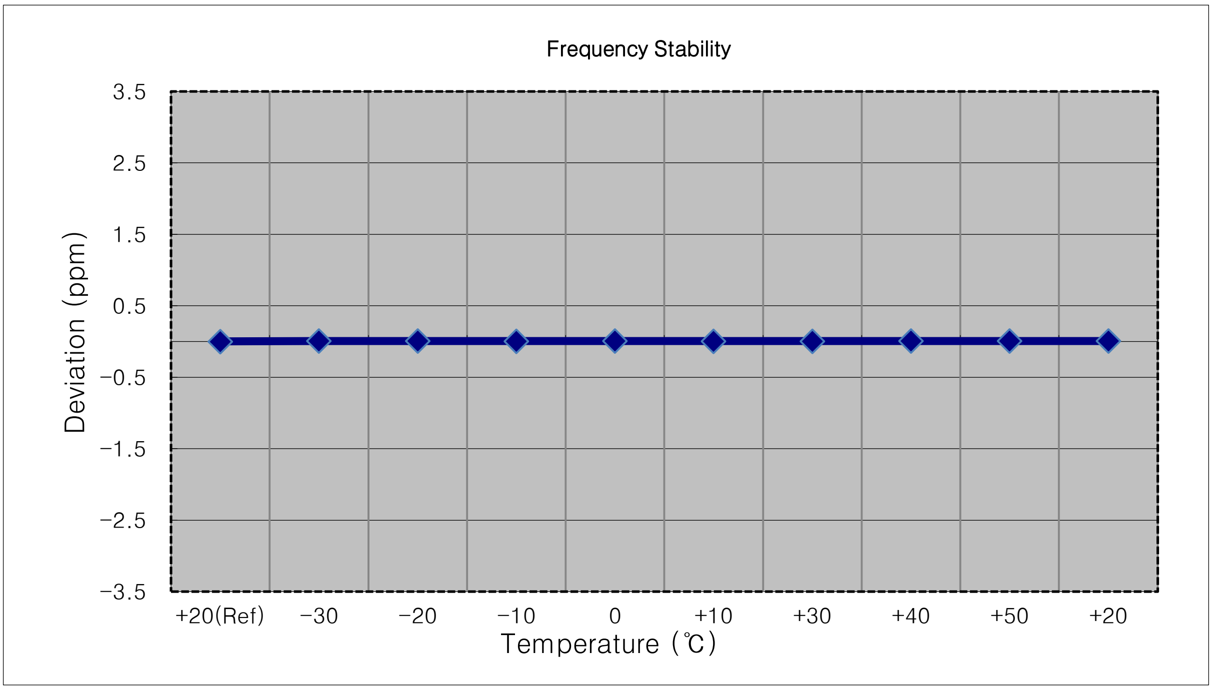
▣ OPERATING FREQUENCY: 1900,000,000 Hz

▣ CHANNEL: 19100 (20 MHz)

▣ REFERENCE VOLTAGE: 3.860 VDC

▣ DEVIATION LIMIT: Emission must remain in band

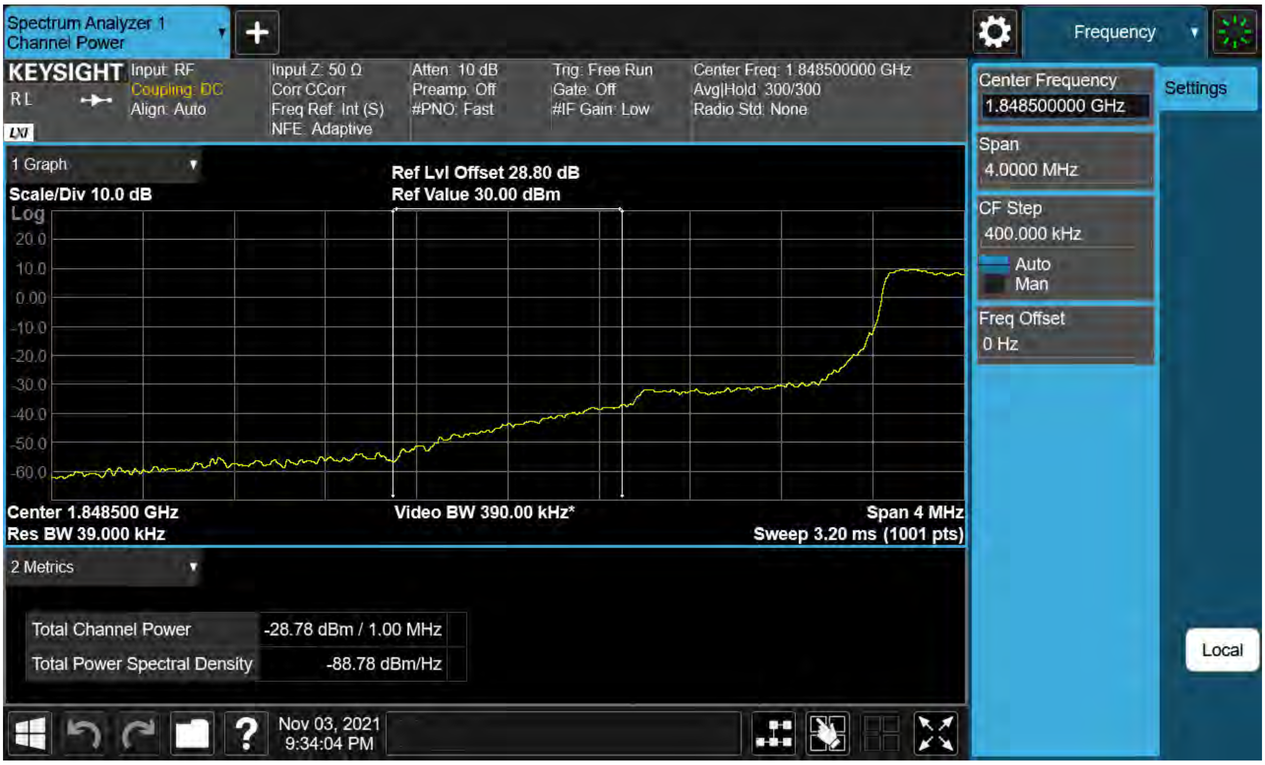
Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.860	+20(Ref)	1900 000 014	0.0	0.000 000	0.000
100 %		-30	1900 000 027	12.4	0.000 001	0.007
100 %		-20	1900 000 027	12.8	0.000 001	0.007
100 %		-10	1900 000 021	7.1	0.000 000	0.004
100 %		0	1900 000 029	14.5	0.000 001	0.008
100 %		+10	1900 000 024	9.4	0.000 000	0.005
100 %		+30	1900 000 022	8.0	0.000 000	0.004
100 %		+40	1900 000 026	11.8	0.000 001	0.006
100 %		+50	1900 000 028	13.7	0.000 001	0.007
Batt. Endpoint	3.400	+20	1900 000 026	11.7	0.000 001	0.006



9. TEST PLOTS

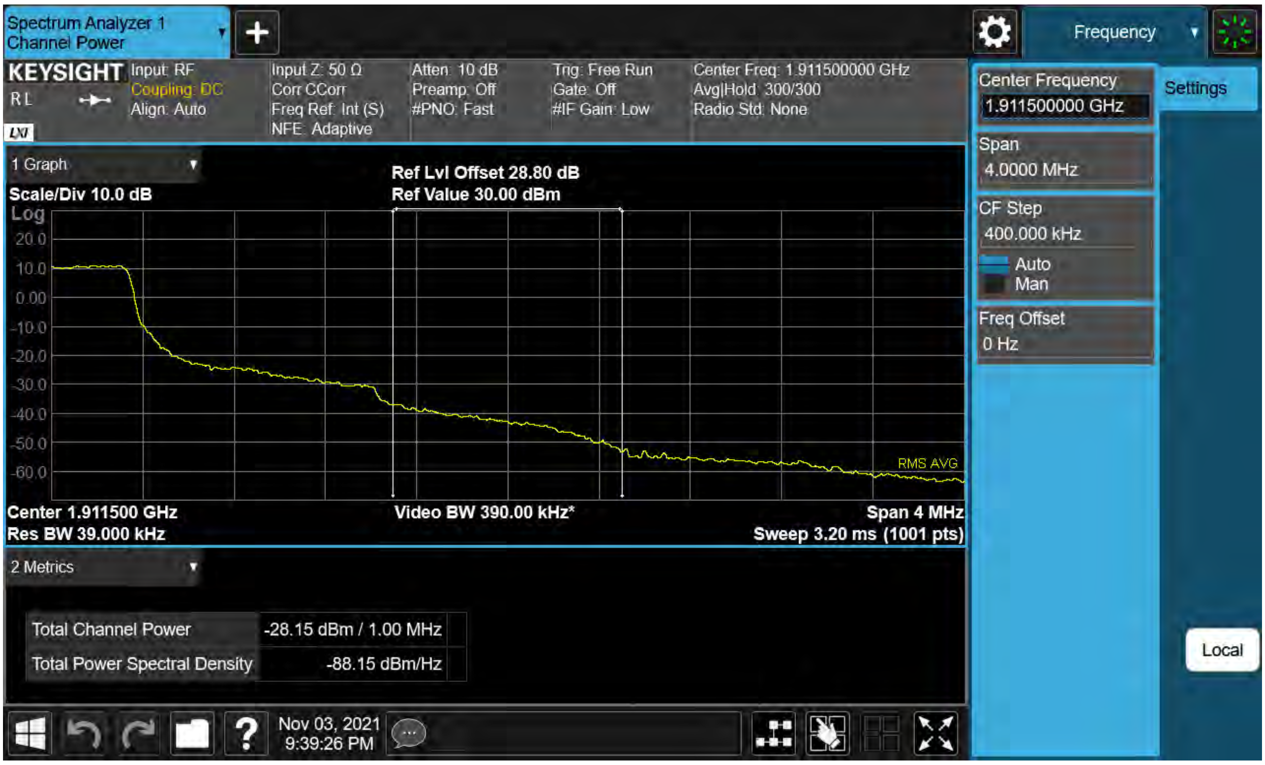
BW1.4 M_BandEdge_Lowest Channel_QPSK_FullRB(1) (Lower)

BW1.4 M_BandEdge_Lowest Channel_QPSK_FullRB(2) (Lower)

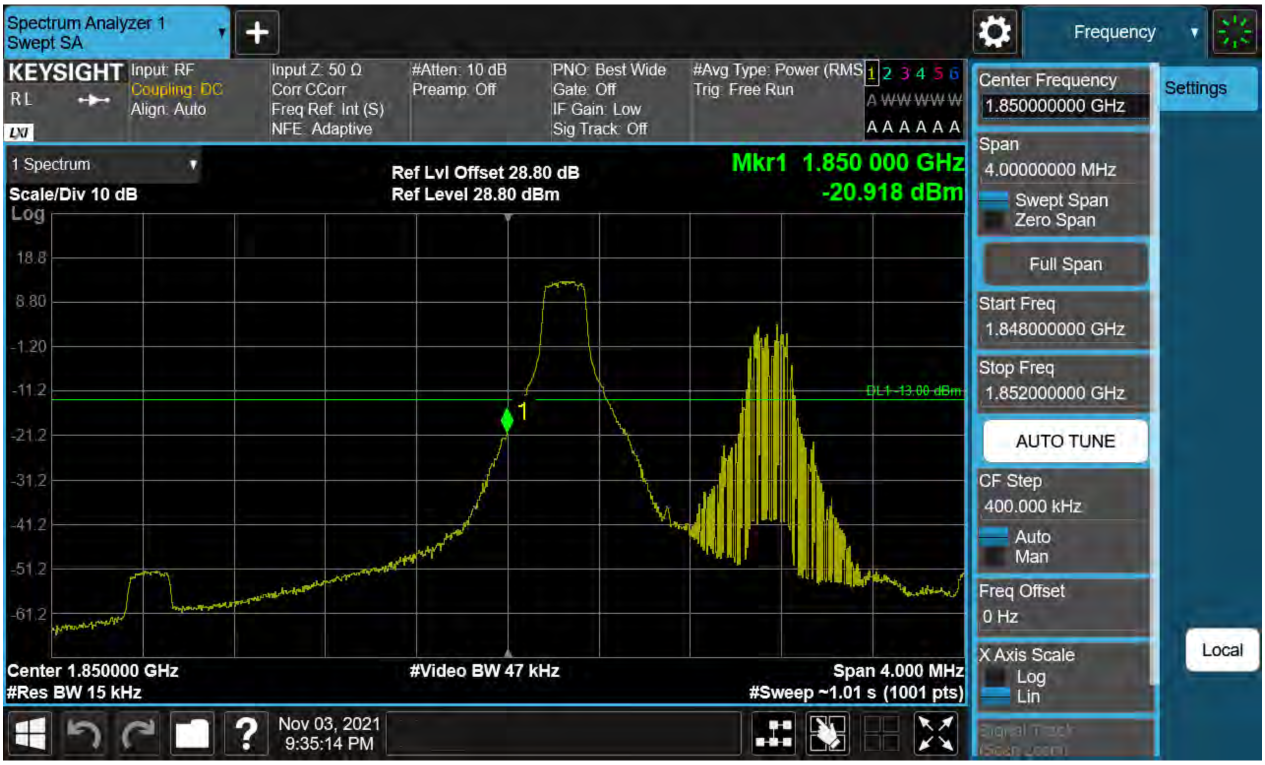


BW1.4 M_BandEdge_Highest Channel_QPSK_FullRB(1) (Lower)

BW1.4 M_BandEdge_Highest Channel_QPSK_FullRB(2) (Lower)



BW1.4 M_BandEdge_Lowest Channel_QPSK_1RB(Lower)



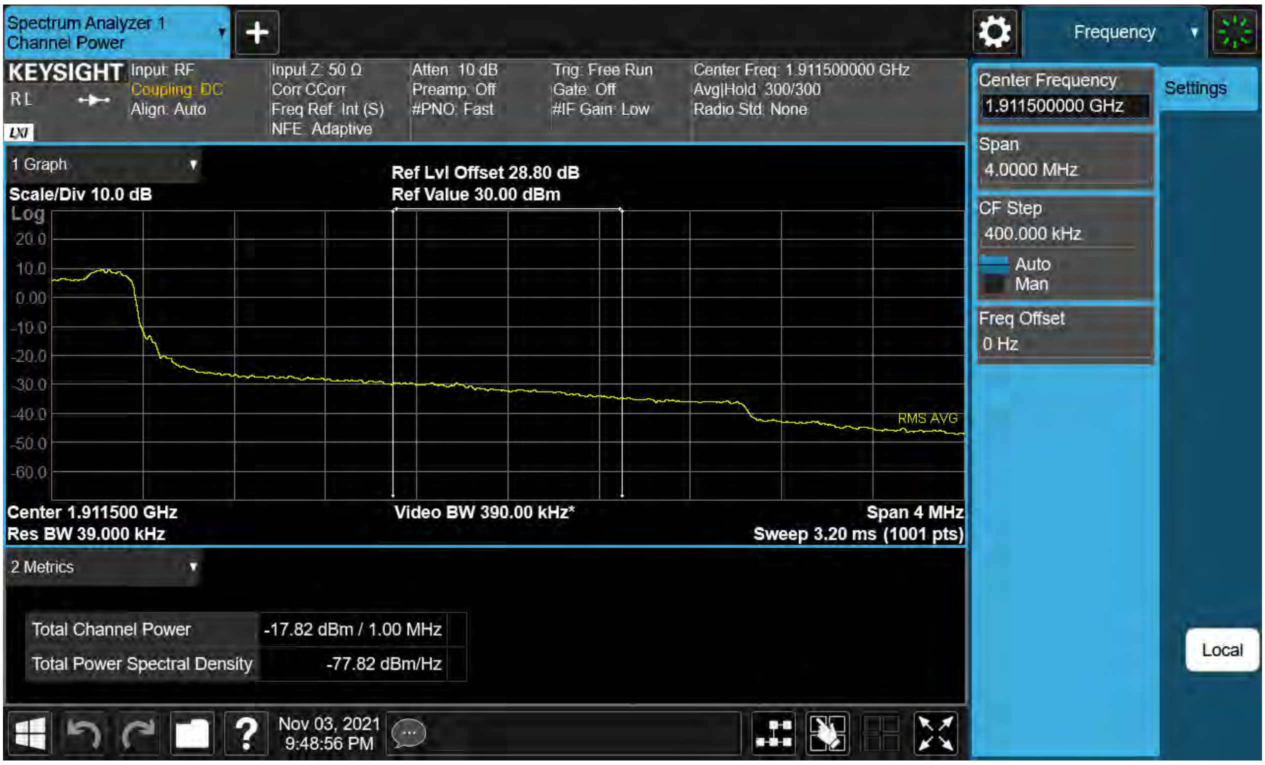
BW1.4 M_BandEdge_Highest Channel_QPSK_1RB(Lower)

BW3 M_BandEdge_Lowest Channel_QPSK_FullRB(1) (Lower)

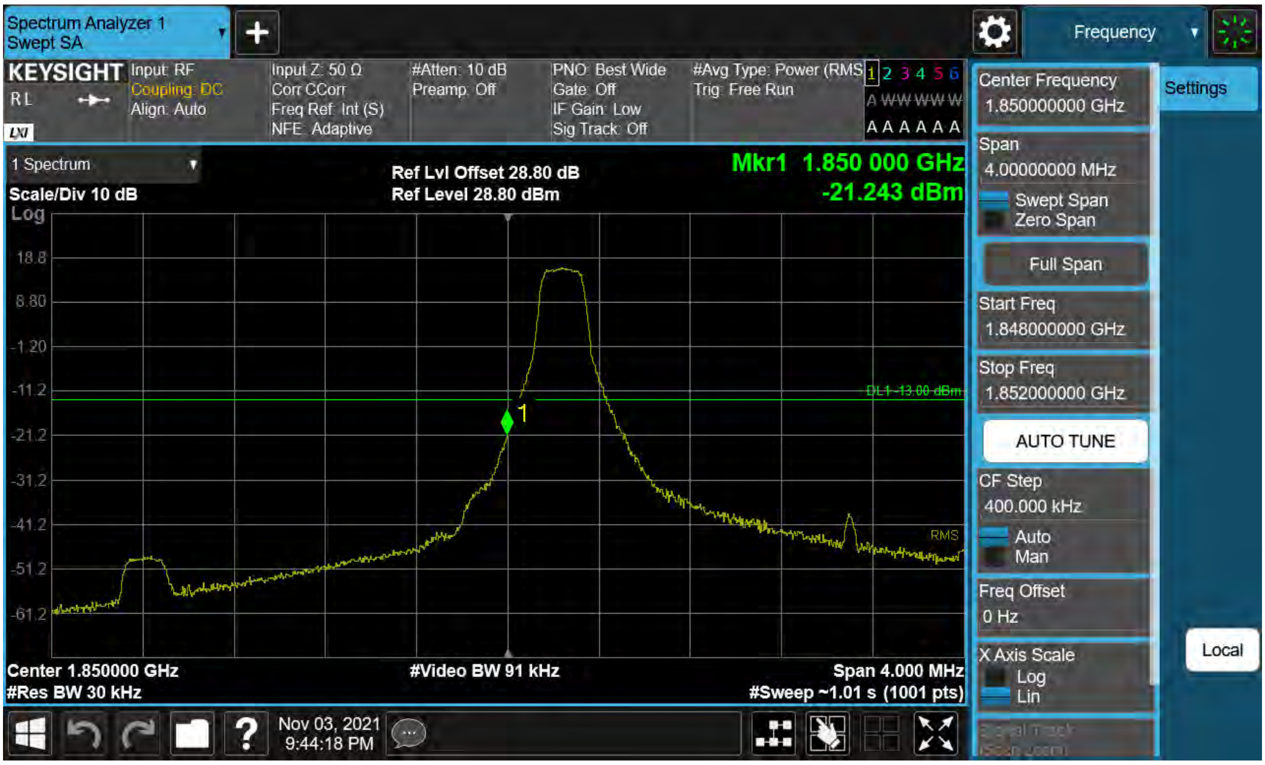
BW3 M_BandEdge_Lowest Channel_QPSK_FullRB(2) (Lower)

BW3 M_BandEdge_Highest Channel_QPSK_FullRB(1) (Lower)

BW3 M_BandEdge_Highest Channel_QPSK_FullRB(2) (Lower)



BW3 M_BandEdge_Lowest Channel_QPSK_1RB(Lower)



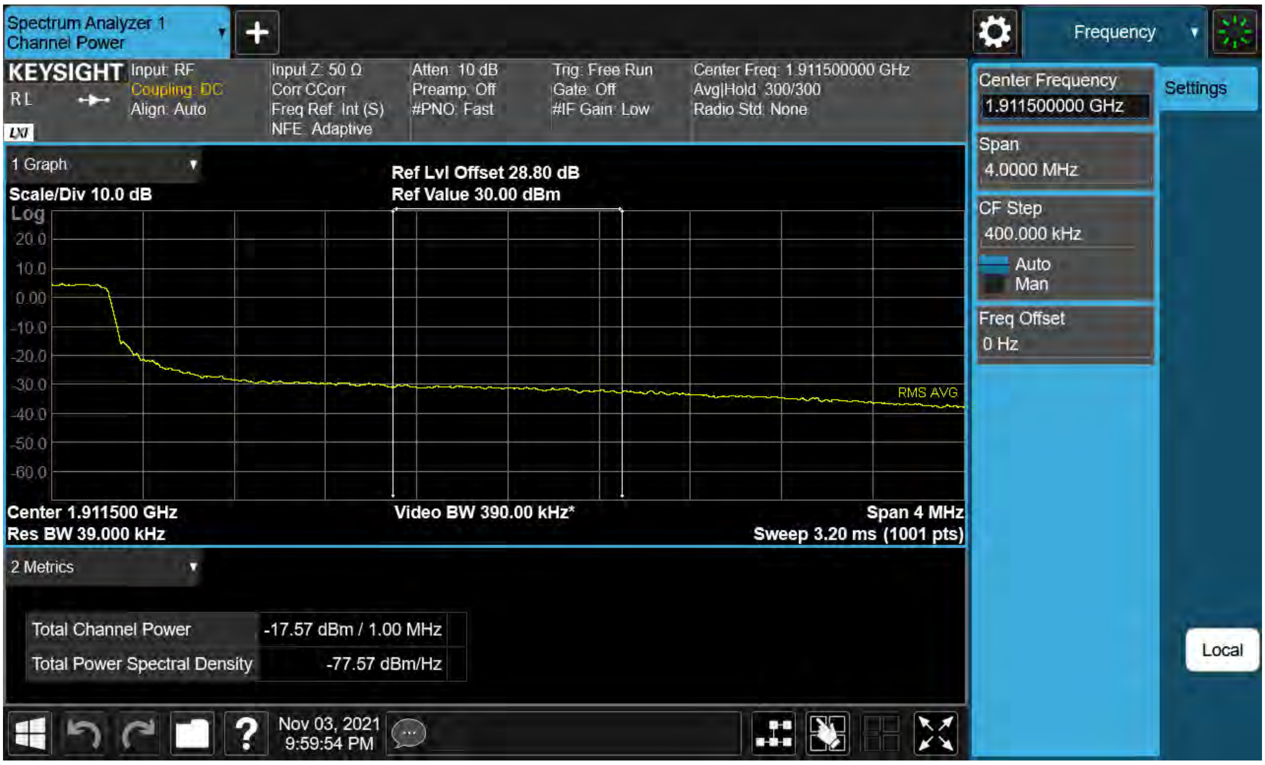
BW3 M_BandEdge_Highest Channel_QPSK_1RB(Lower)

BW5 M_BandEdge_Lowest Channel_QPSK_FullRB(1) (Lower)

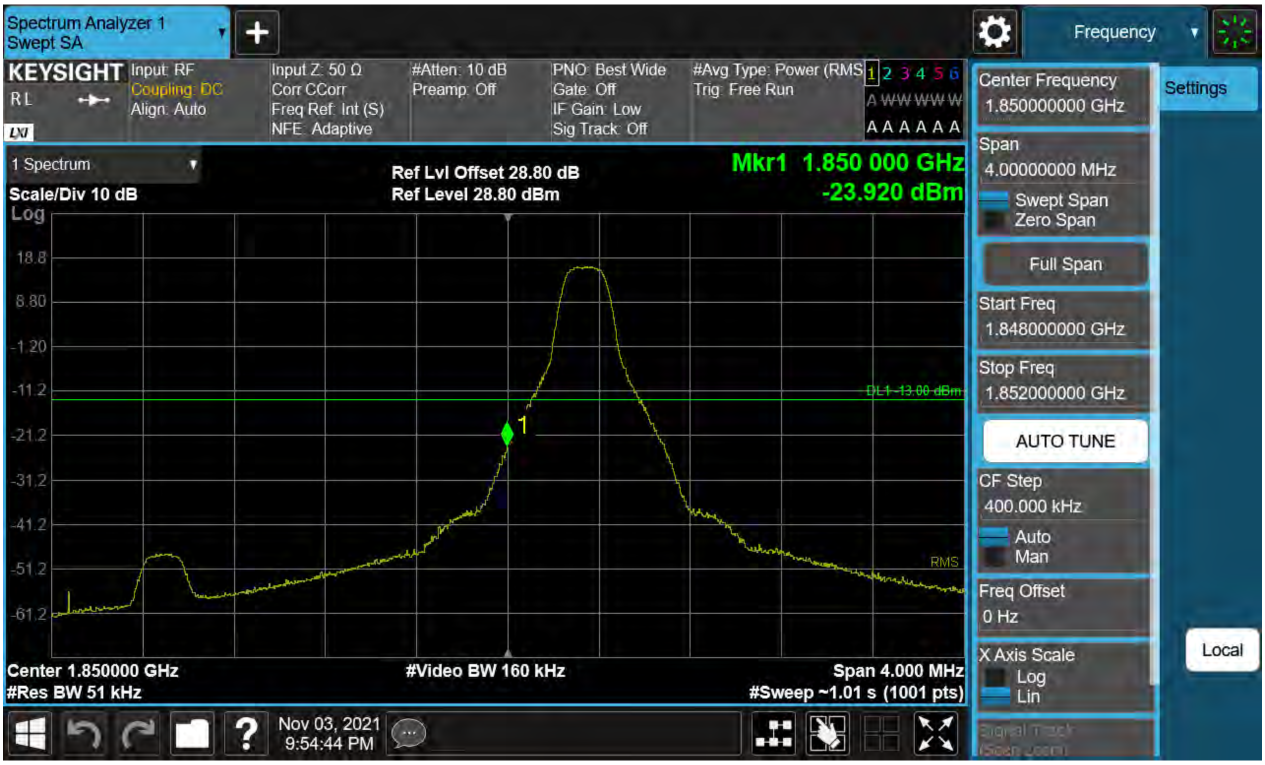
BW5 M_BandEdge_Lowest Channel_QPSK_FullRB(2) (Lower)

BW5 M_BandEdge_Highest Channel_QPSK_FullRB(1) (Lower)

BW5 M_BandEdge_Highest Channel_QPSK_FullRB(2) (Lower)



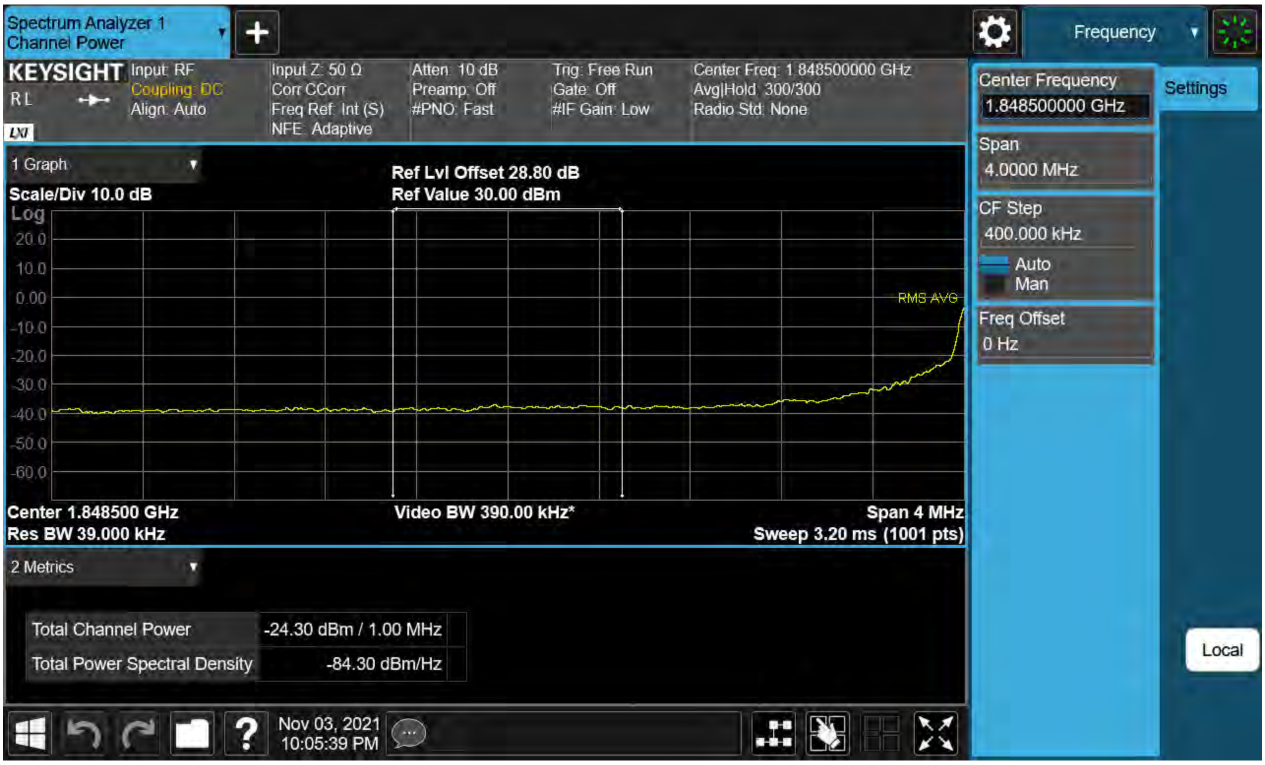
BW5 M_BandEdge_Lowest Channel_QPSK_1RB(Lower)



BW5 M_BandEdge_Highest Channel_QPSK_1RB(Lower)

BW10 M_BandEdge_Lowest Channel_QPSK_FullRB(1) (Lower)

BW10 M_BandEdge_Lowest Channel_QPSK_FullRB(2) (Lower)



BW10 M_BandEdge_Highest Channel_QPSK_FullRB(1) (Lower)

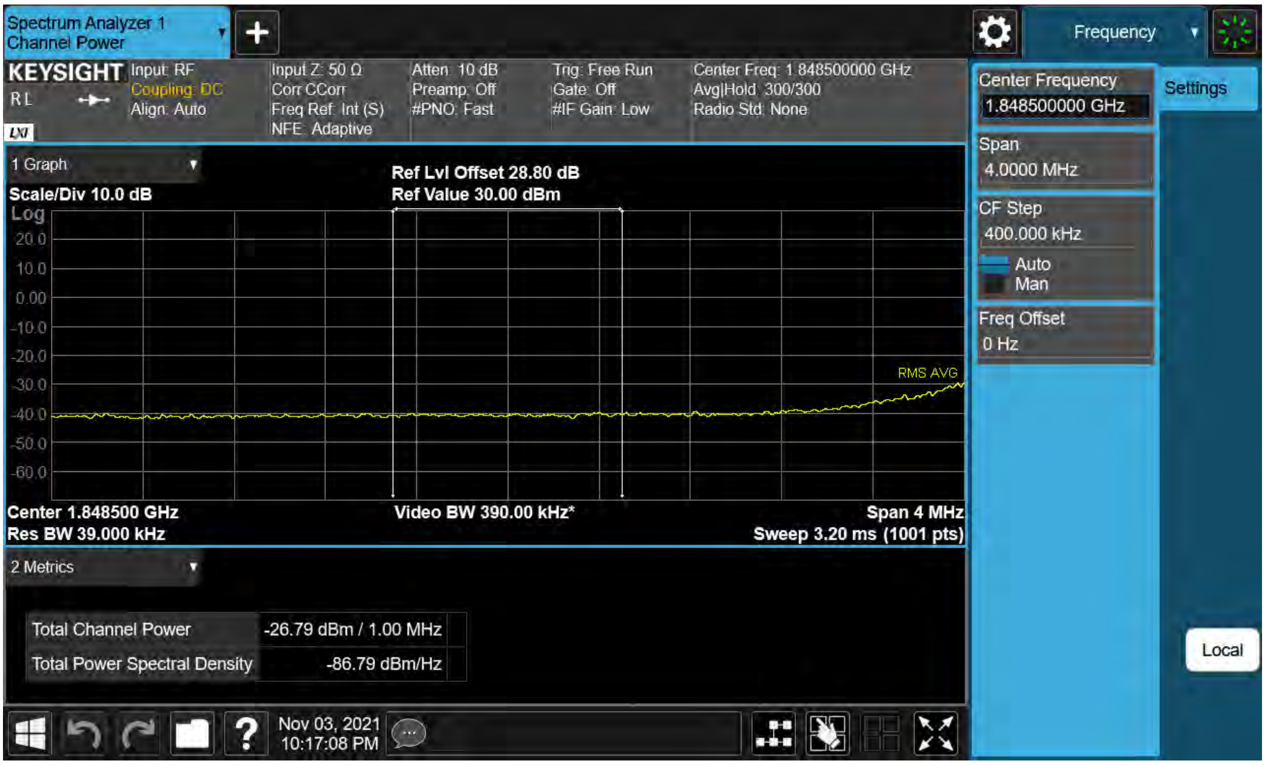
BW10 M_BandEdge_Highest Channel_QPSK_FullRB(2) (Lower)

BW10 M_BandEdge_Lowest Channel_QPSK_1RB(Lower)

BW10 M_BandEdge_Highest Channel_QPSK_1RB(Lower)

BW15 M_BandEdge_Lowest Channel_QPSK_FullRB(1) (Lower)

BW15 M_BandEdge_Lowest Channel_QPSK_FullRB(2) (Lower)



BW15 M_BandEdge_Highest Channel_QPSK_FullRB(1) (Lower)

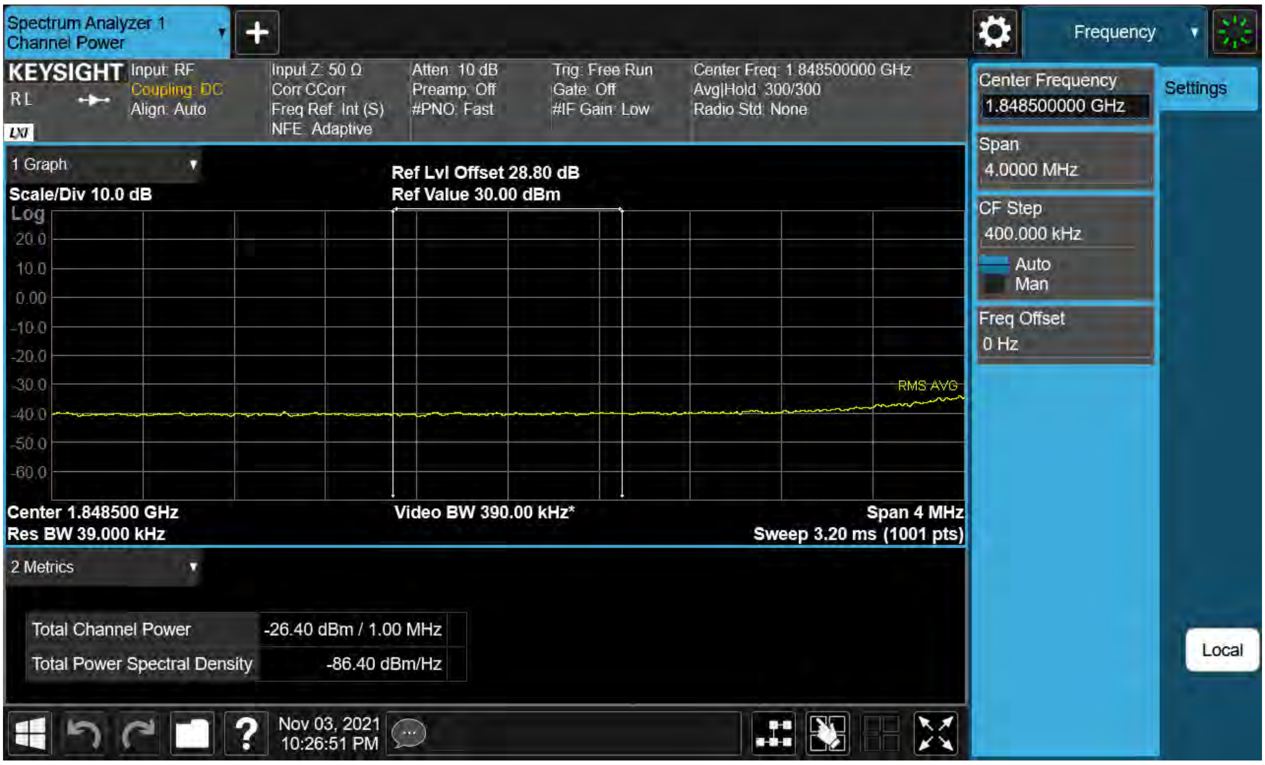
BW15 M_BandEdge_Highest Channel_QPSK_FullRB(2) (Lower)

BW15 M_BandEdge_Lowest Channel_QPSK_1RB(Lower)

BW15 M_BandEdge_Highest Channel_QPSK_1RB(Lower)

BW20 M_BandEdge_Lowest Channel_QPSK_FullRB(1) (Lower)

BW20 M_BandEdge_Lowest Channel_QPSK_FullRB(2) (Lower)



BW20 M_BandEdge_Highest Channel_QPSK_FullRB(1) (Lower)

BW20 M_BandEdge_Highest Channel_QPSK_FullRB(2) (Lower)

BW20 M_BandEdge_Lowest Channel_QPSK_1RB(Lower)

BW20 M_BandEdge_Highest Channel_QPSK_1RB(Lower)

BW1.4 M_OBW_Middle Channel_QPSK_FullRB(Lower)

BW1.4 M_OBW_Middle Channel_16QAM_FullRB(Lower)

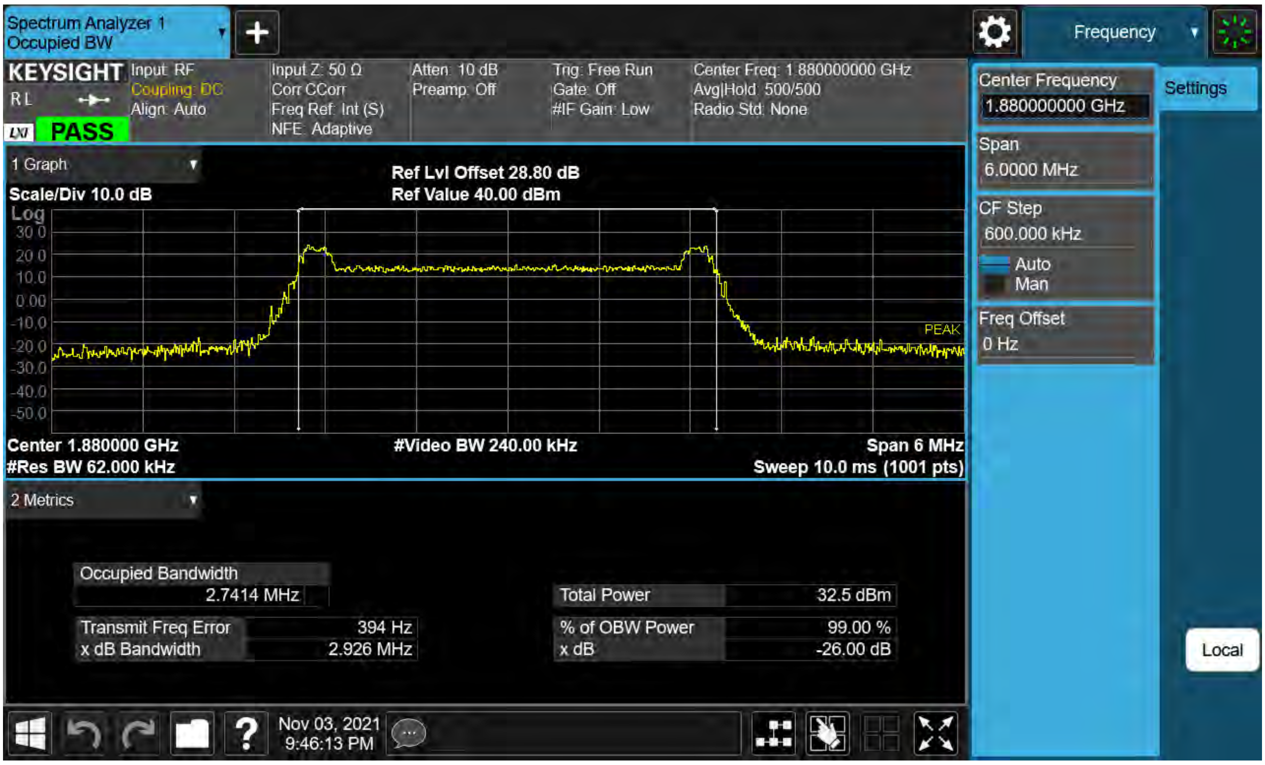
BW1.4 M_OBW_Middle Channel_64QAM_FullRB(Lower)

BW1.4 M_OBW_Middle Channel_256QAM_FullRB(Lower)

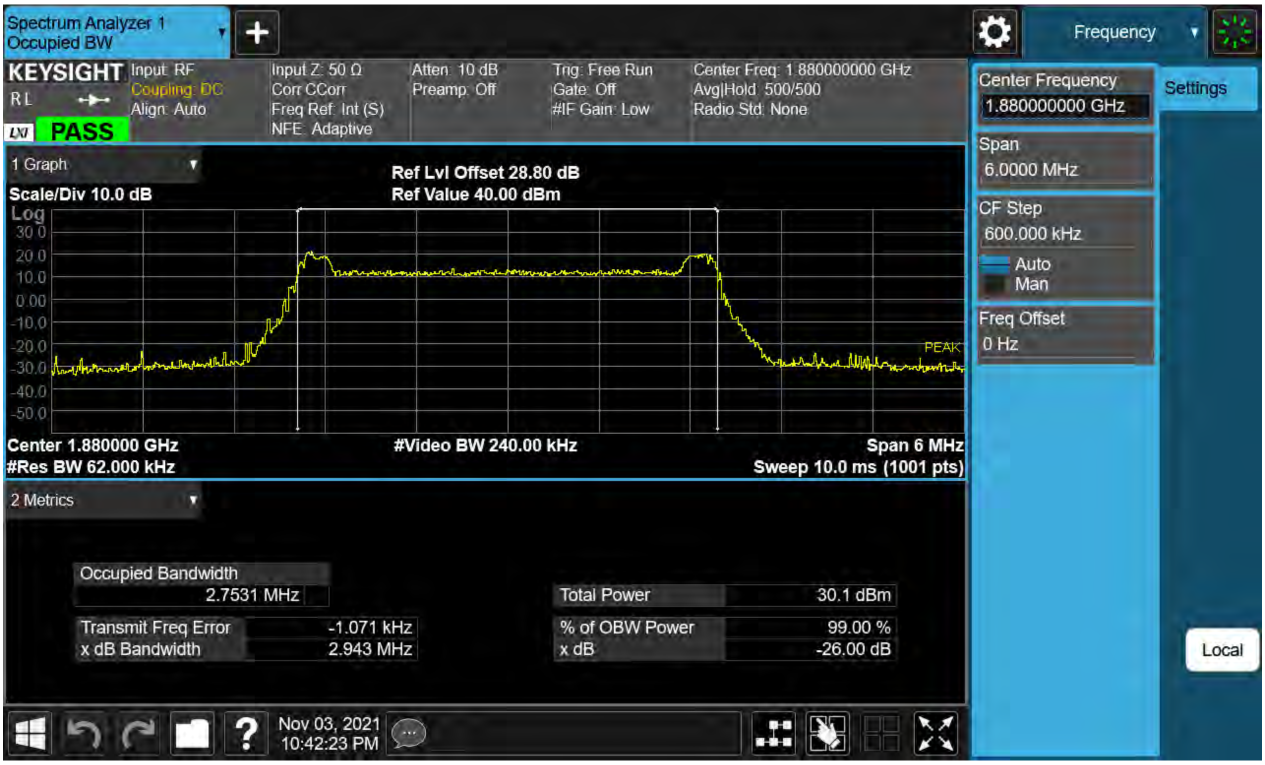
BW3 M_OBW_Middle Channel_QPSK_FullRB(Lower)

BW3 M_OBW_Middle Channel_16QAM_FullRB(Lower)

BW3 M_OBW_Middle Channel_64QAM_FullRB(Lower)

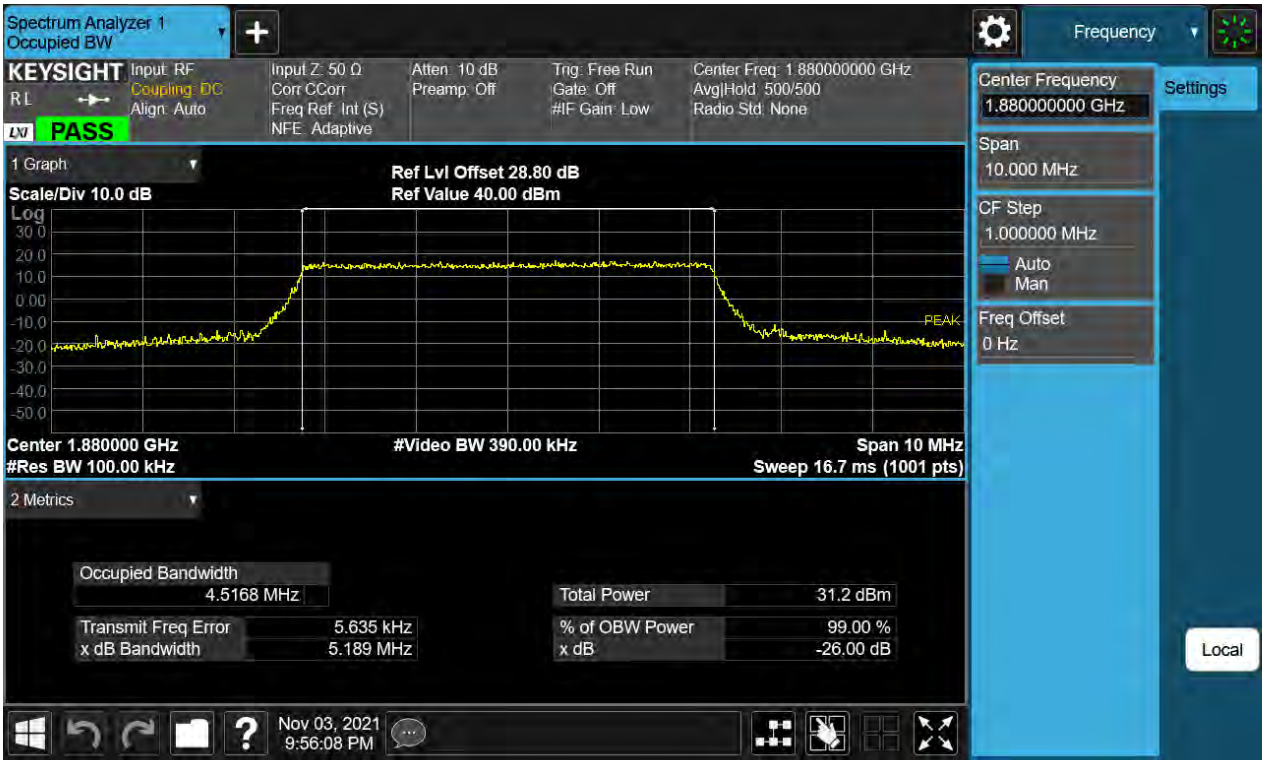


BW3 M_OBW_Middle Channel_256QAM_FullRB(Lower)

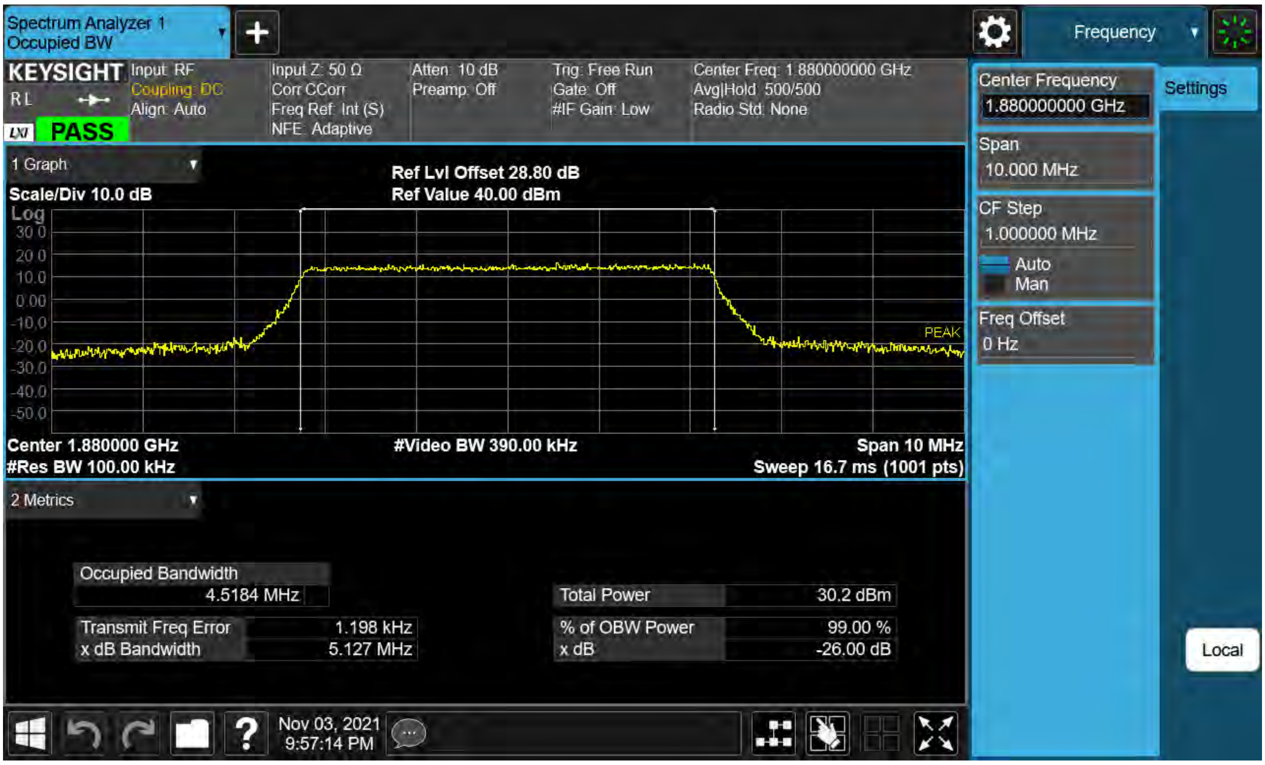


BW5 M_OBW_Middle Channel_QPSK_FullRB(Lower)

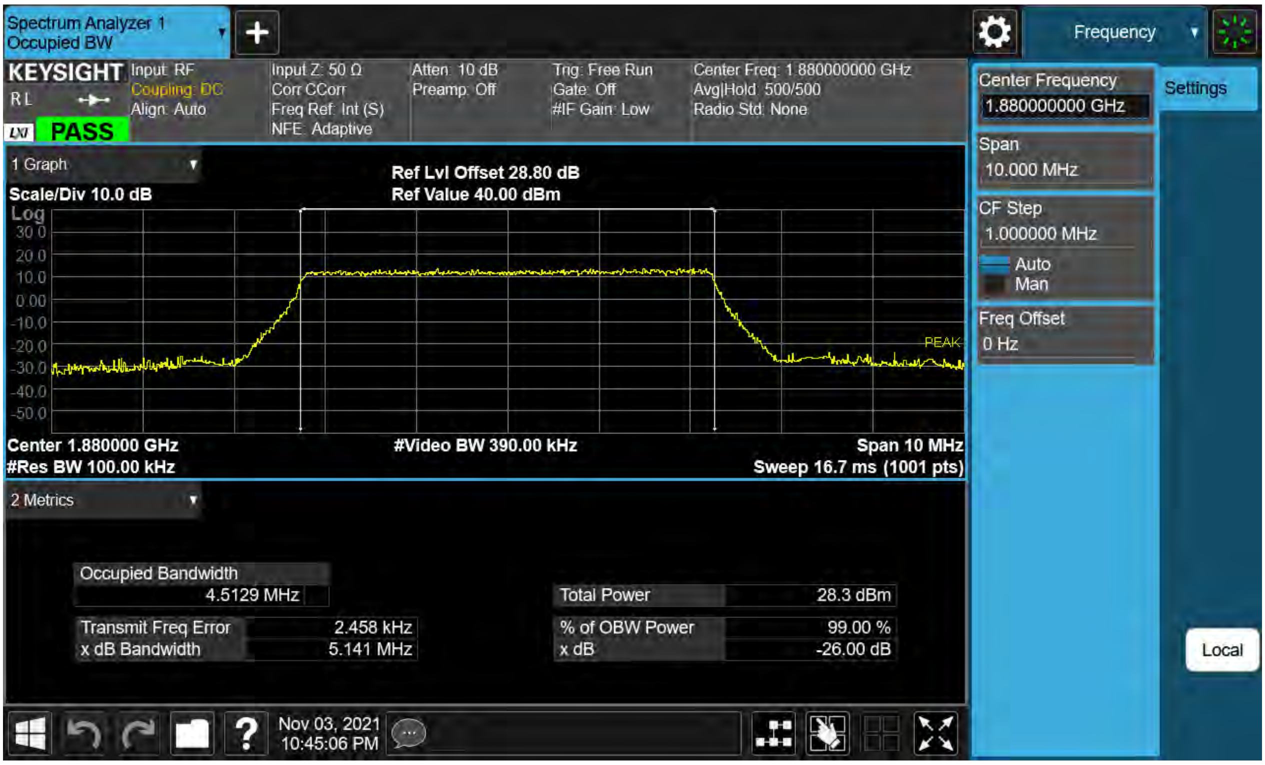
BW5 M_OBW_Middle Channel_16QAM_FullRB(Lower)



BW5 M_OBW_Middle Channel_64QAM_FullRB(Lower)



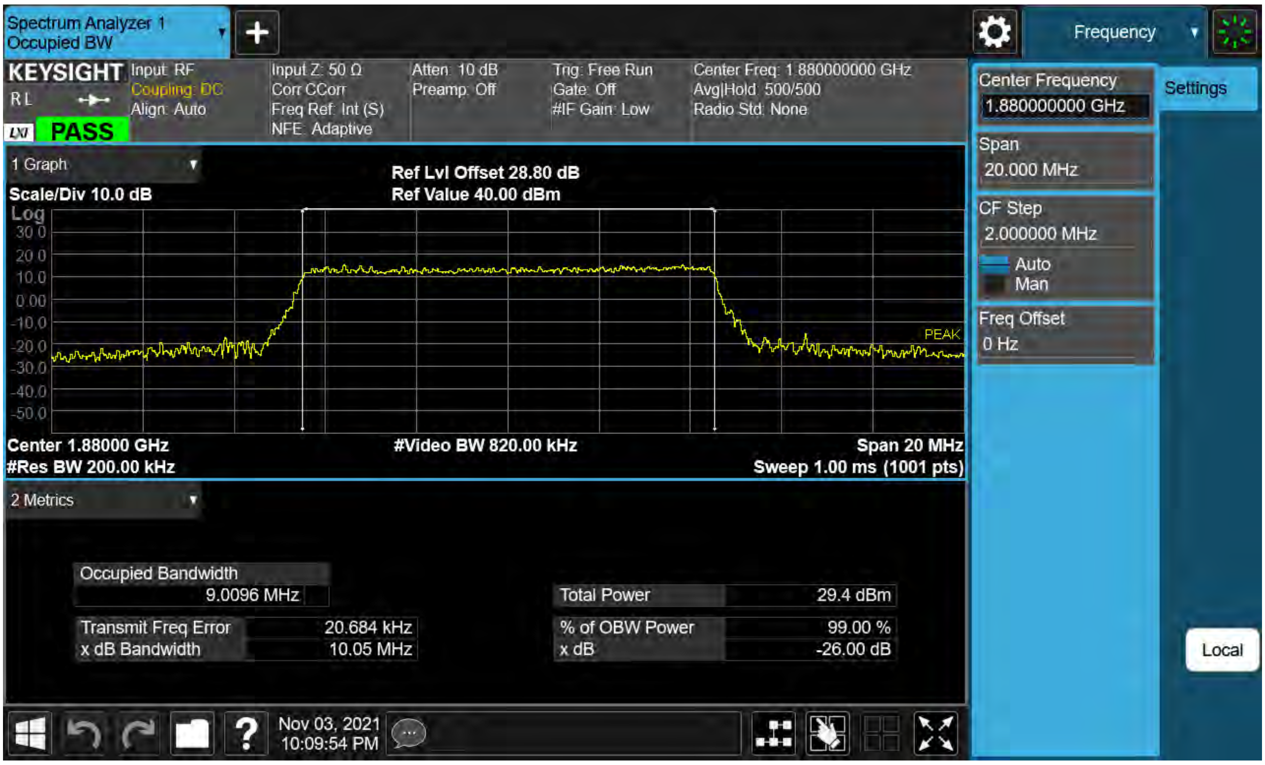
BW5 M_OBW_Middle Channel_256QAM_FullRB(Lower)



BW10 M_OBW_Middle Channel_QPSK_FullRB(Lower)

BW10 M_OBW_Middle Channel_16QAM_FullRB(Lower)

BW10 M_OBW_Middle Channel_64QAM_FullRB(Lower)



BW10 M_OBW_Middle Channel_256QAM_FullRB(Lower)

BW15 M_OBW_Middle Channel_QPSK_FullRB(Lower)

BW15 M_OBW_Middle Channel_16QAM_FullRB(Lower)

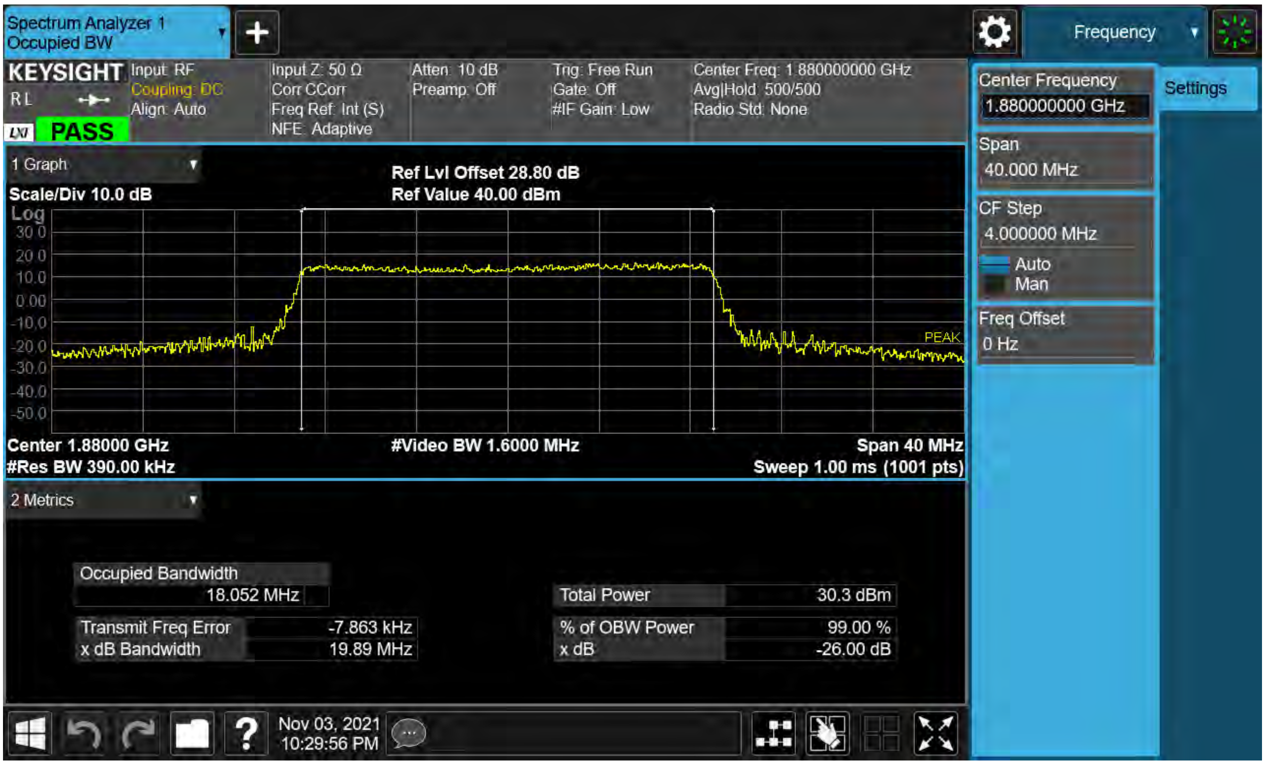
BW15 M_OBW_Middle Channel_64QAM_FullRB(Lower)

BW15 M_OBW_Middle Channel_256QAM_FullRB(Lower)

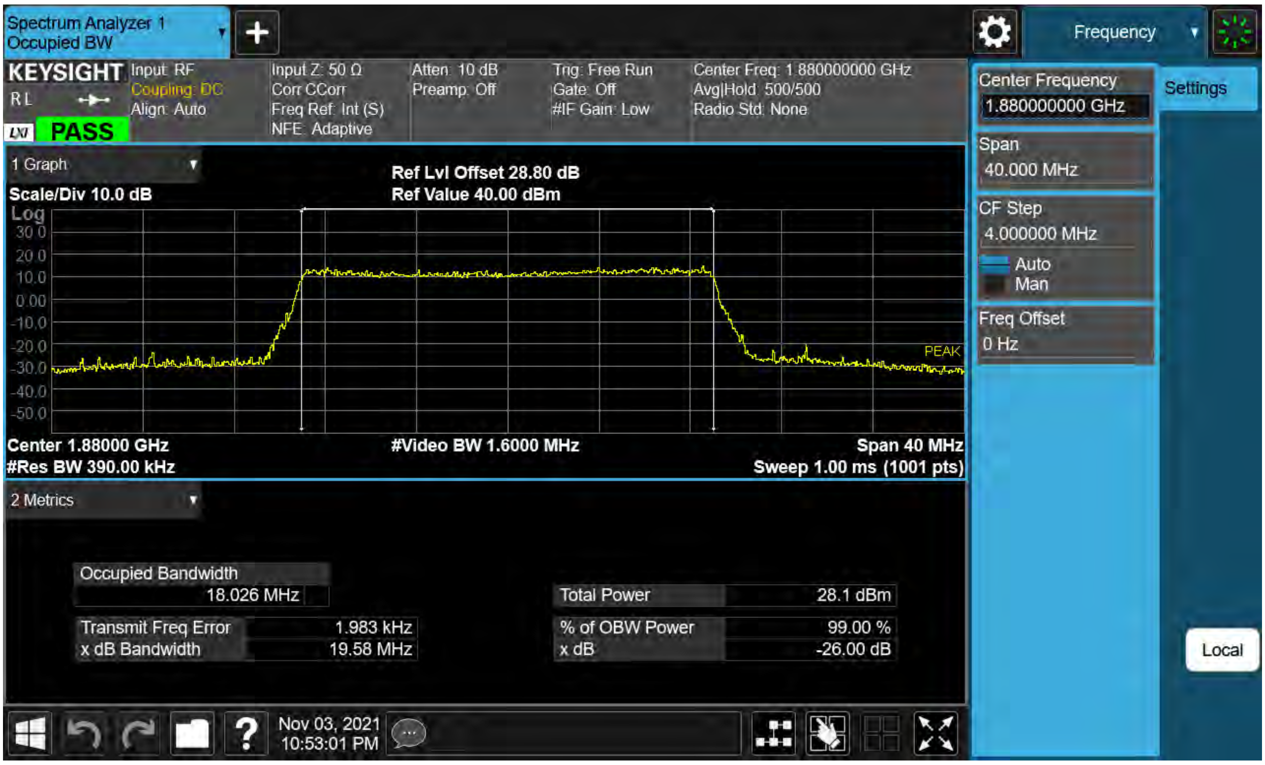
BW20 M_OBW_Middle Channel_QPSK_FullRB(Lower)

BW20 M_OBW_Middle Channel_16QAM_FullRB(Lower)

BW20 M_OBW_Middle Channel_64QAM_FullRB(Lower)



BW20 M_OBW_Middle Channel_256QAM_FullRB(Lower)



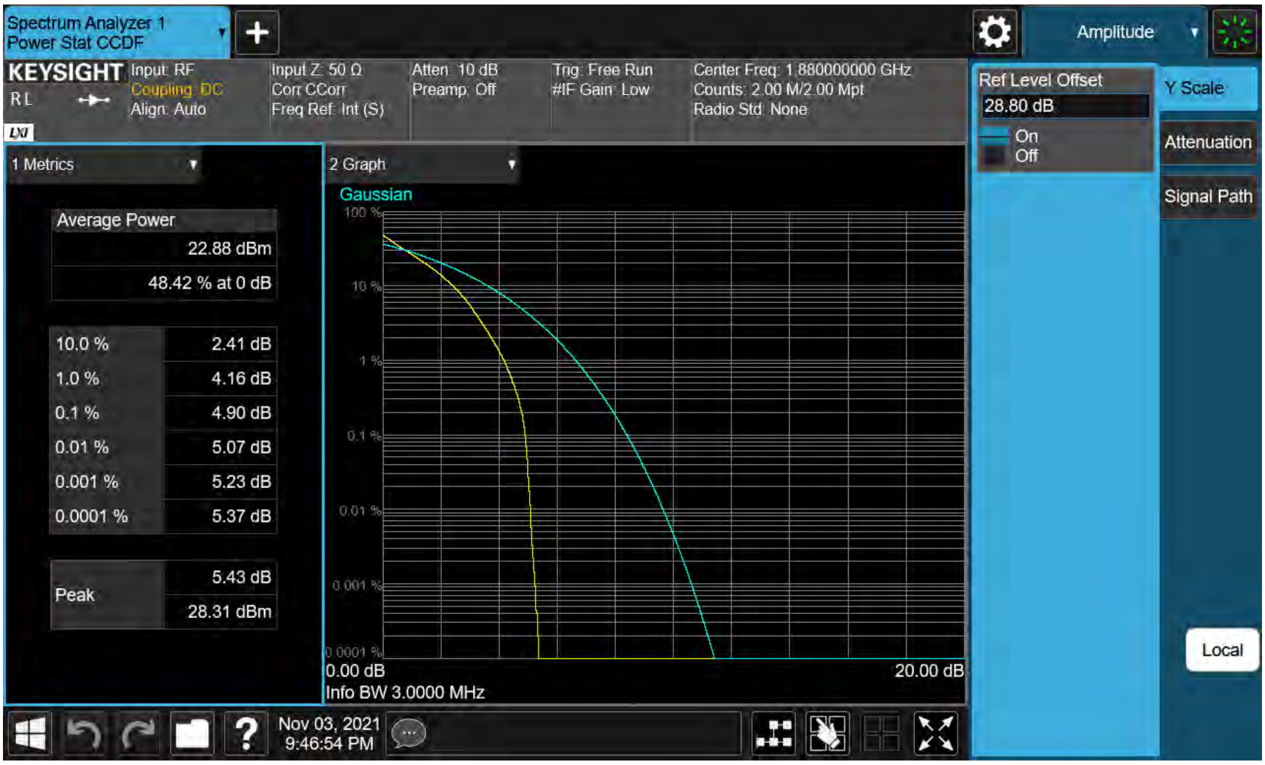
BW1.4 M_PAR_Middle Channel_QPSK_FullRB(Lower)

BW1.4 M_PAR_Middle Channel_16QAM_FullRB(Lower)

BW1.4 M_PAR_Middle Channel_64QAM_FullRB(Lower)

BW1.4 M_PAR_Middle Channel_256QAM_FullRB(Lower)

BW3 M_PAR_Middle Channel_QPSK_FullRB(Lower)

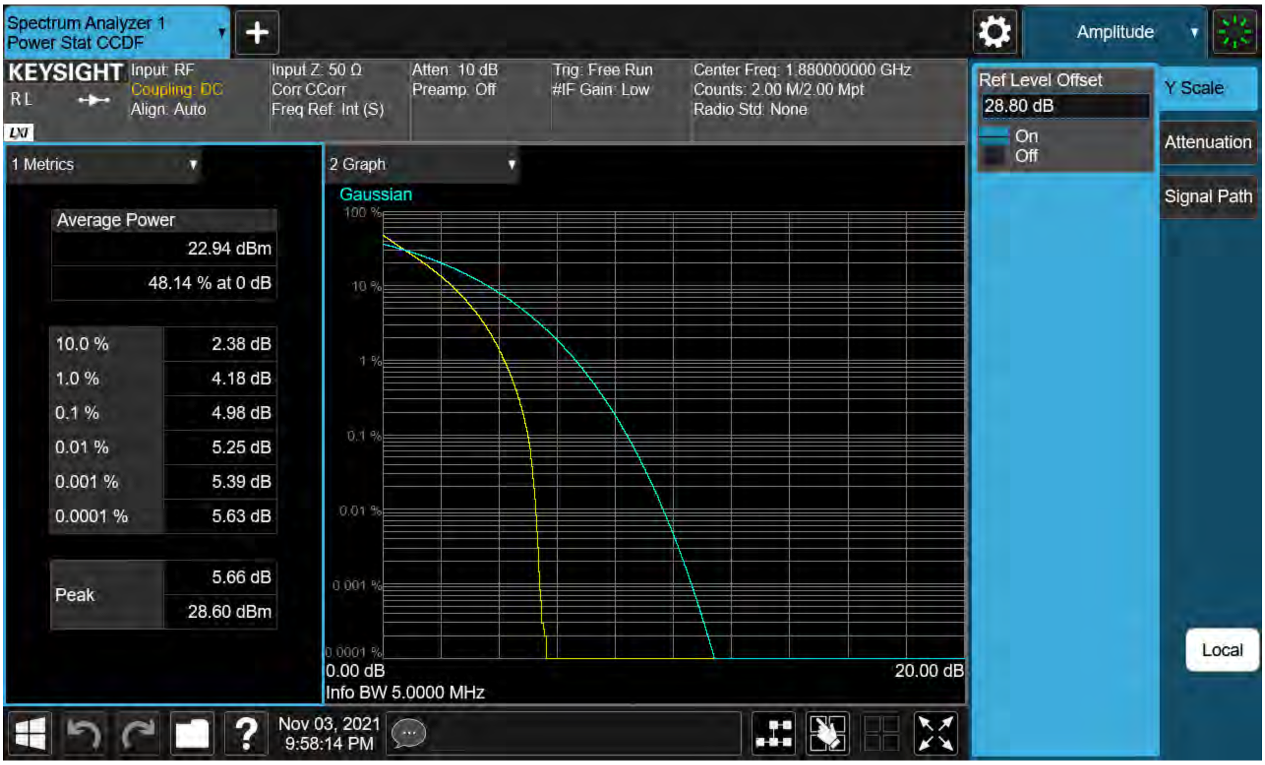


BW3 M_PAR_Middle Channel_16QAM_FullRB(Lower)

BW3 M_PAR_Middle Channel_64QAM_FullRB(Lower)

BW3 M_PAR_Middle Channel_256QAM_FullRB(Lower)

BW5 M_PAR_Middle Channel_QPSK_FullRB(Lower)

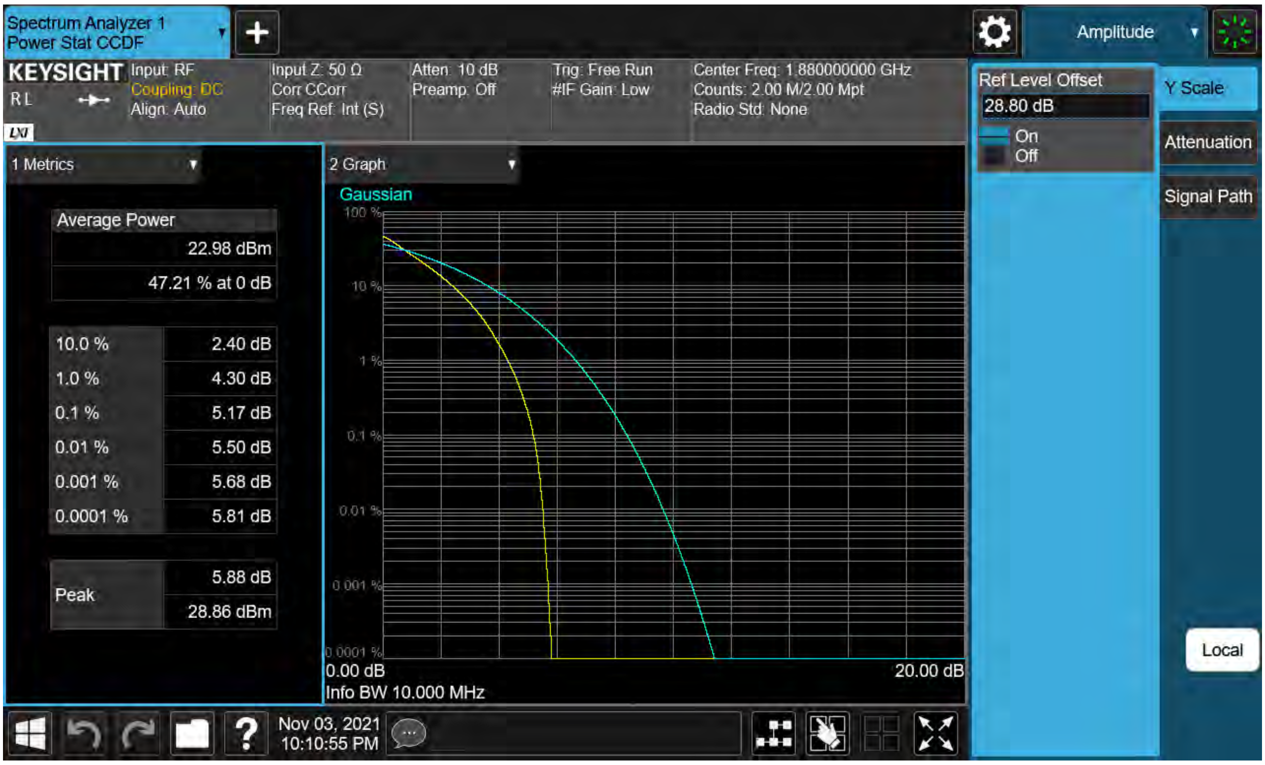


BW5 M_PAR_Middle Channel_16QAM_FullRB(Lower)

BW5 M_PAR_Middle Channel_64QAM_FullRB(Lower)

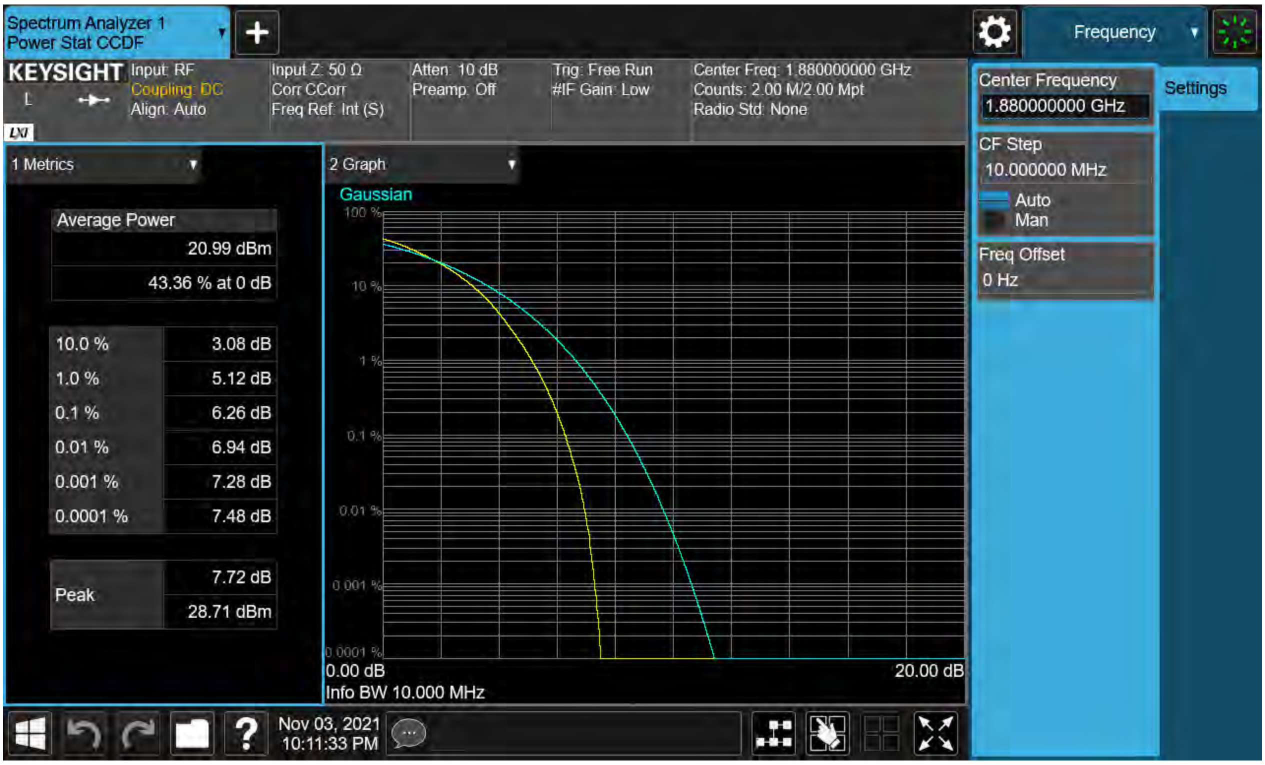
BW5 M_PAR_Middle Channel_256QAM_FullRB(Lower)

BW10 M_PAR_Middle Channelz_QPSK_FullRB(Lower)

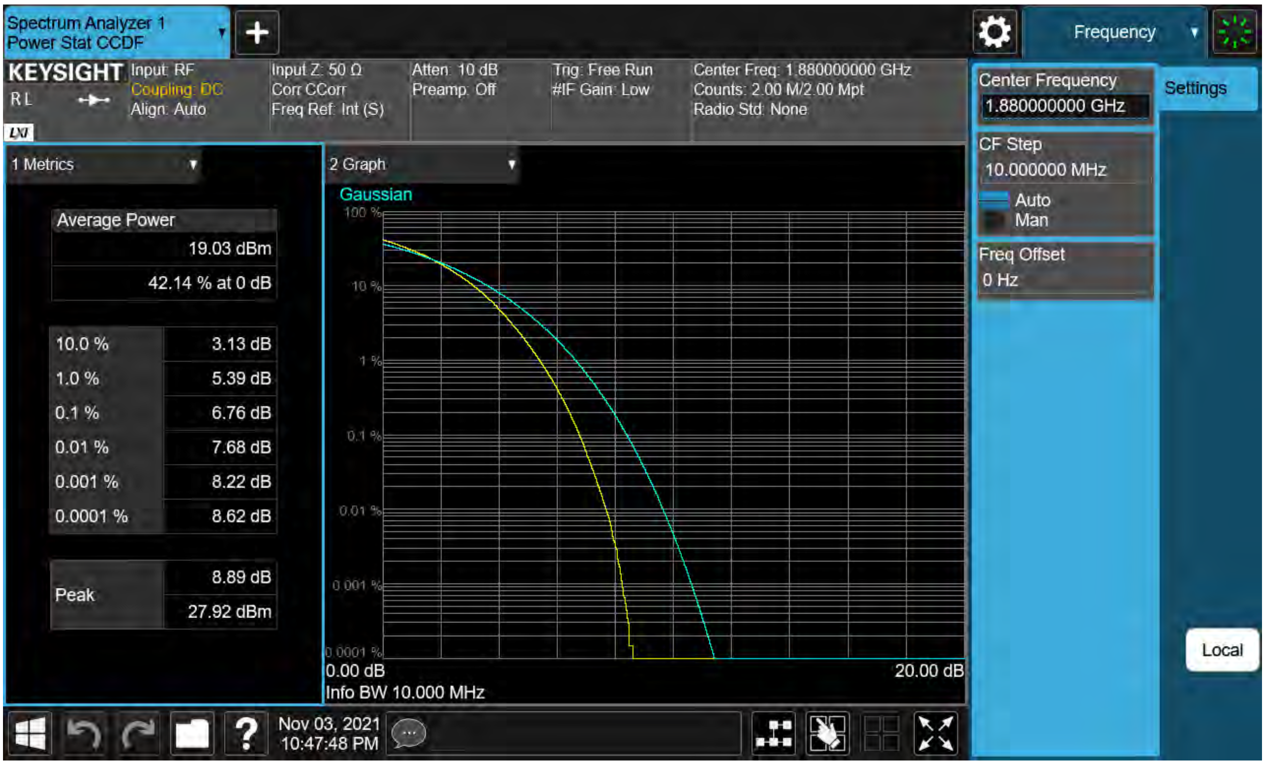


BW10 M_PAR_Middle Channel_16QAM_FullRB(Lower)

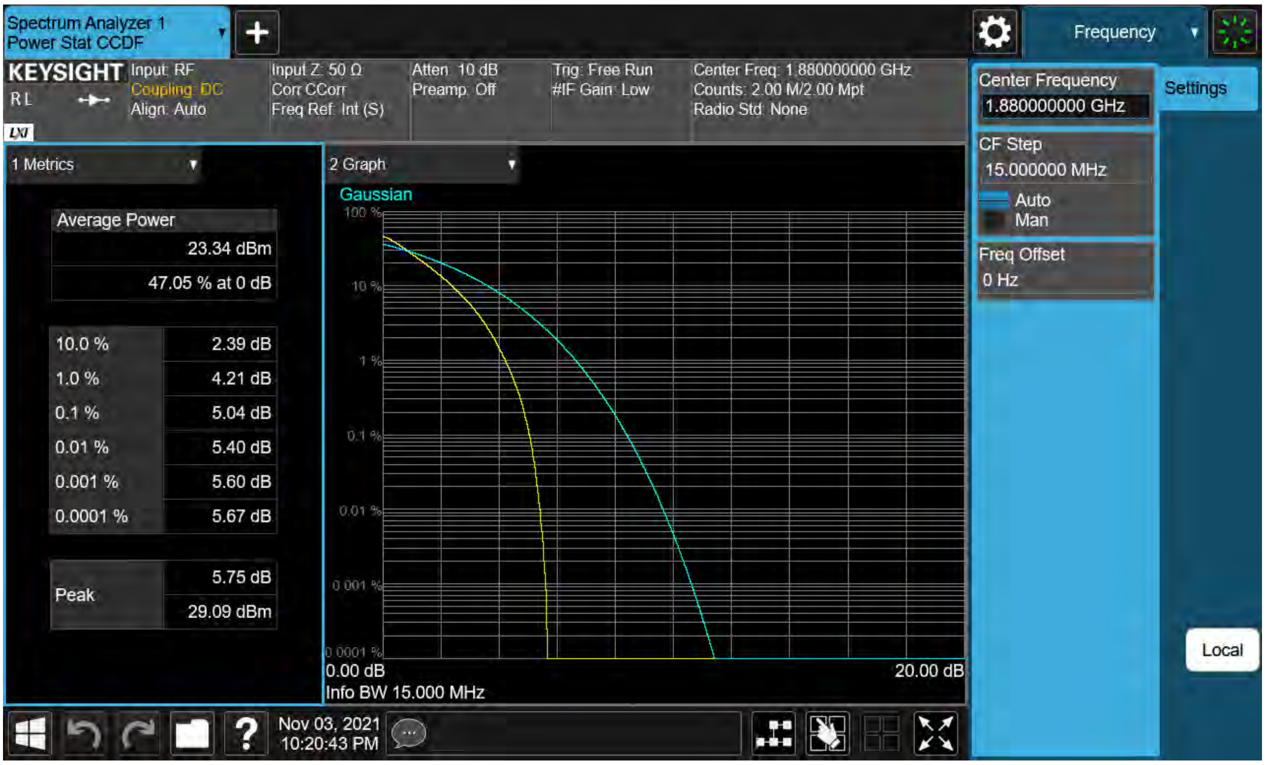
BW10 M_PAR_Middle Channel_64QAM_FullRB(Lower)



BW10 M_PAR_Middle Channel_256QAM_FullRB(Lower)



BW15 M_PAR_Middle Channel_QPSK_FullRB(Lower)

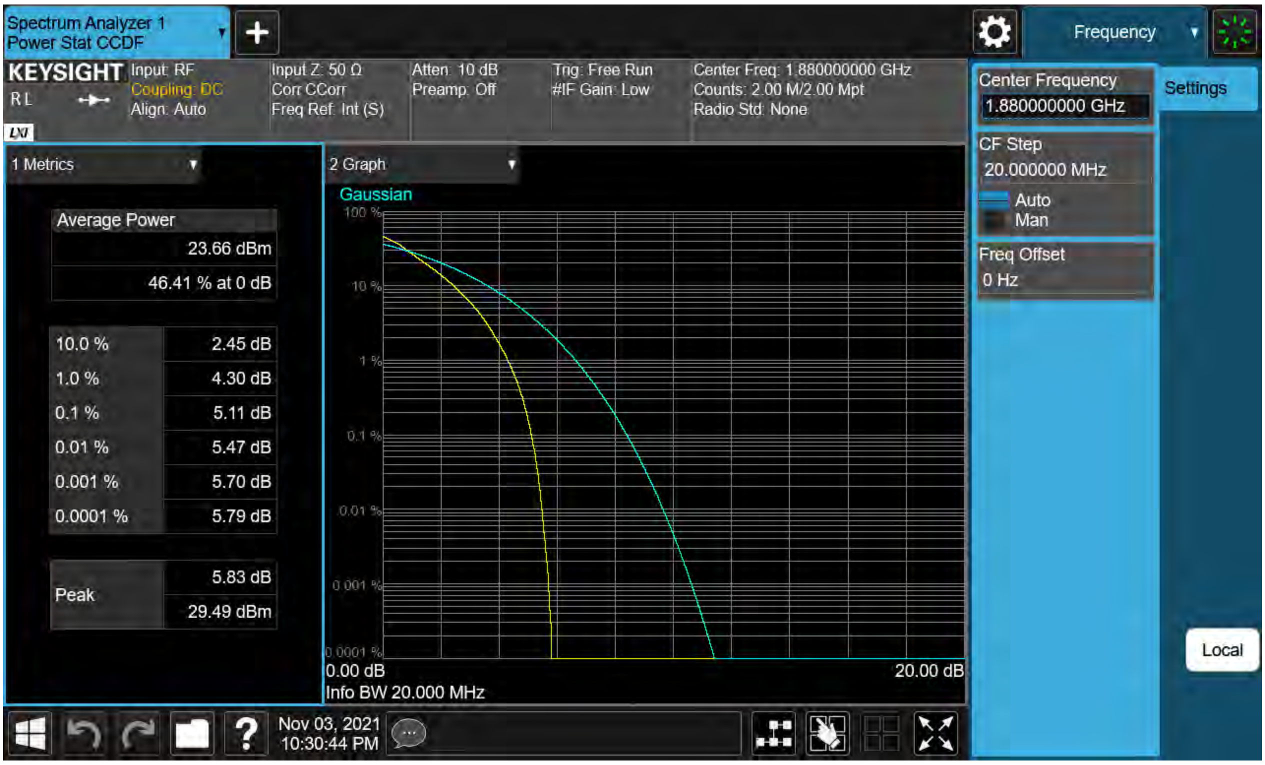


BW15 M_PAR_Middle Channel_16QAM_FullRB(Lower)

BW15 M_PAR_Middle Channel_64QAM_FullRB(Lower)

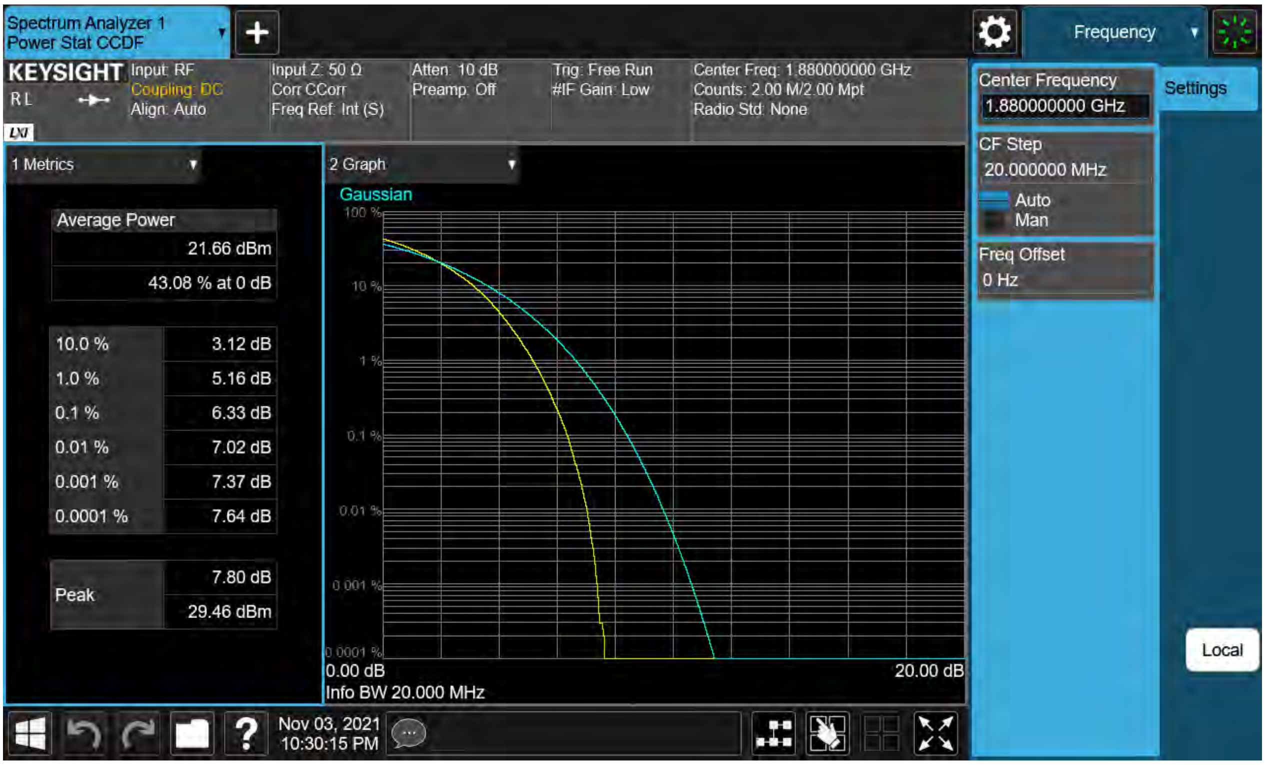
BW15 M_PAR_Middle Channel_256QAM_FullRB(Lower)

BW20 M_PAR_Middle Channel_QPSK_FullRB(Lower)

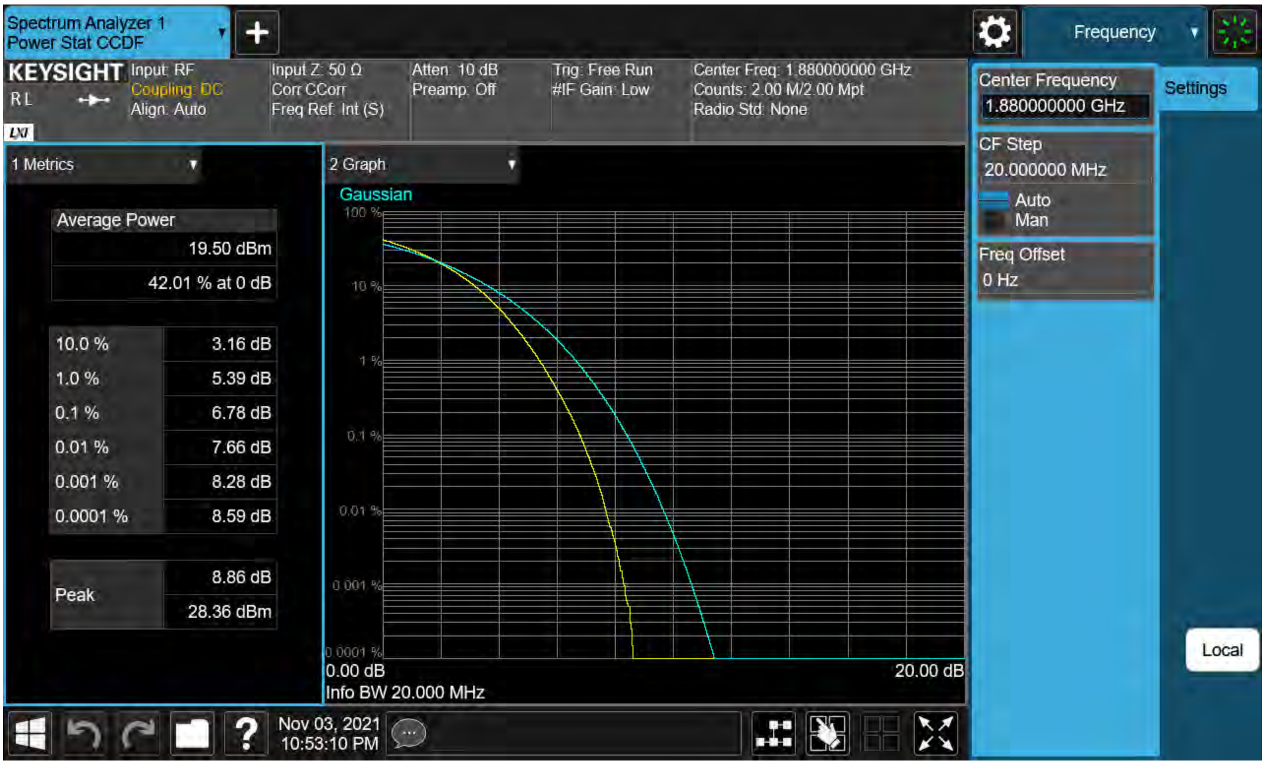


BW20 M_PAR_Middle Channel_16QAM_FullRB(Lower)

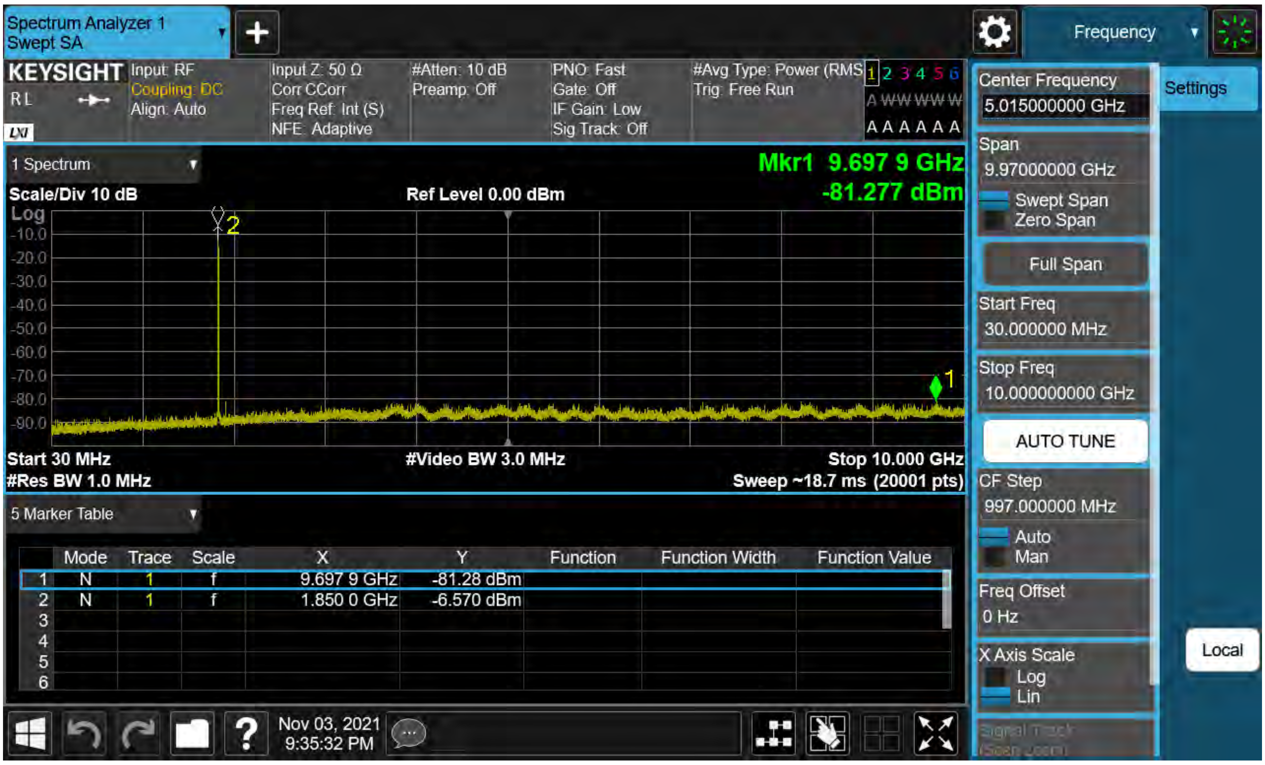
BW20 M_PAR_Middle Channel_64QAM_FullRB(Lower)



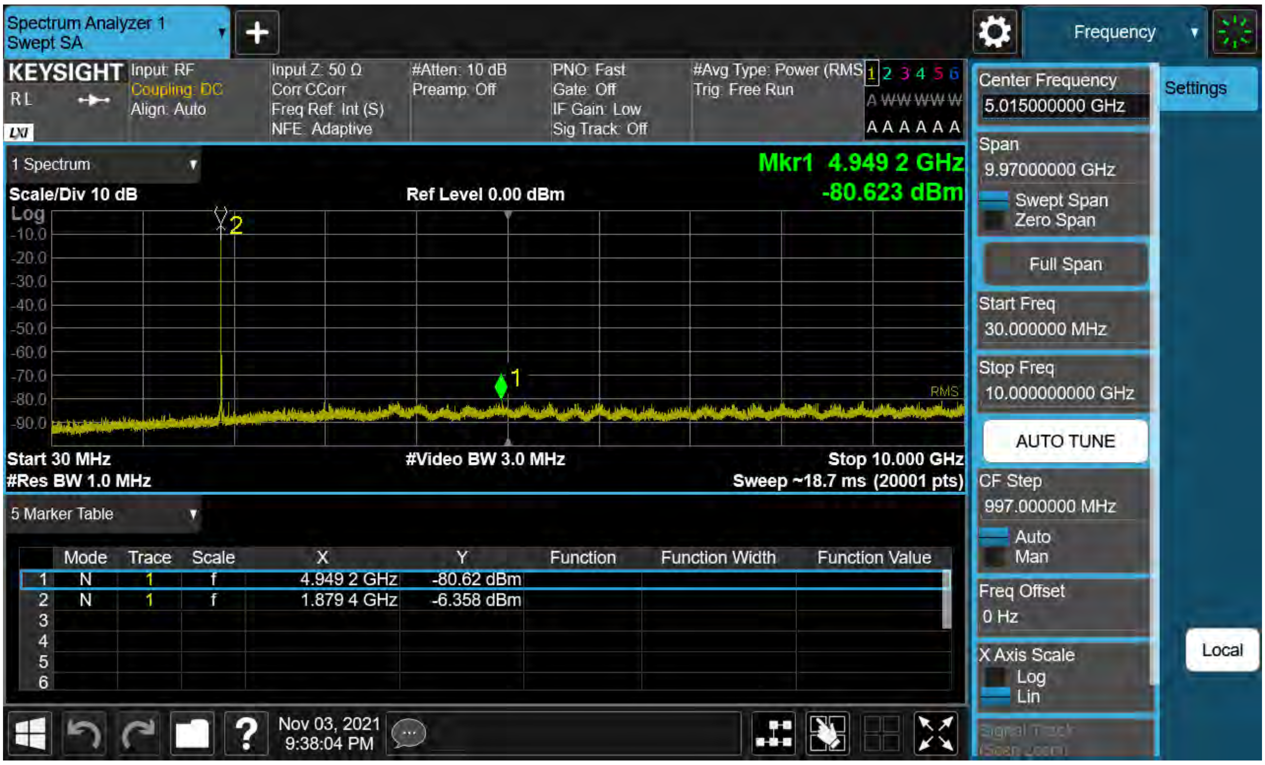
BW20 M_PAR_Middle Channel_256QAM_FullRB(Lower)



BW1.4 M_CSE(30 M-10 G)_Lowest Channel_QPSK_1RB(Lower)

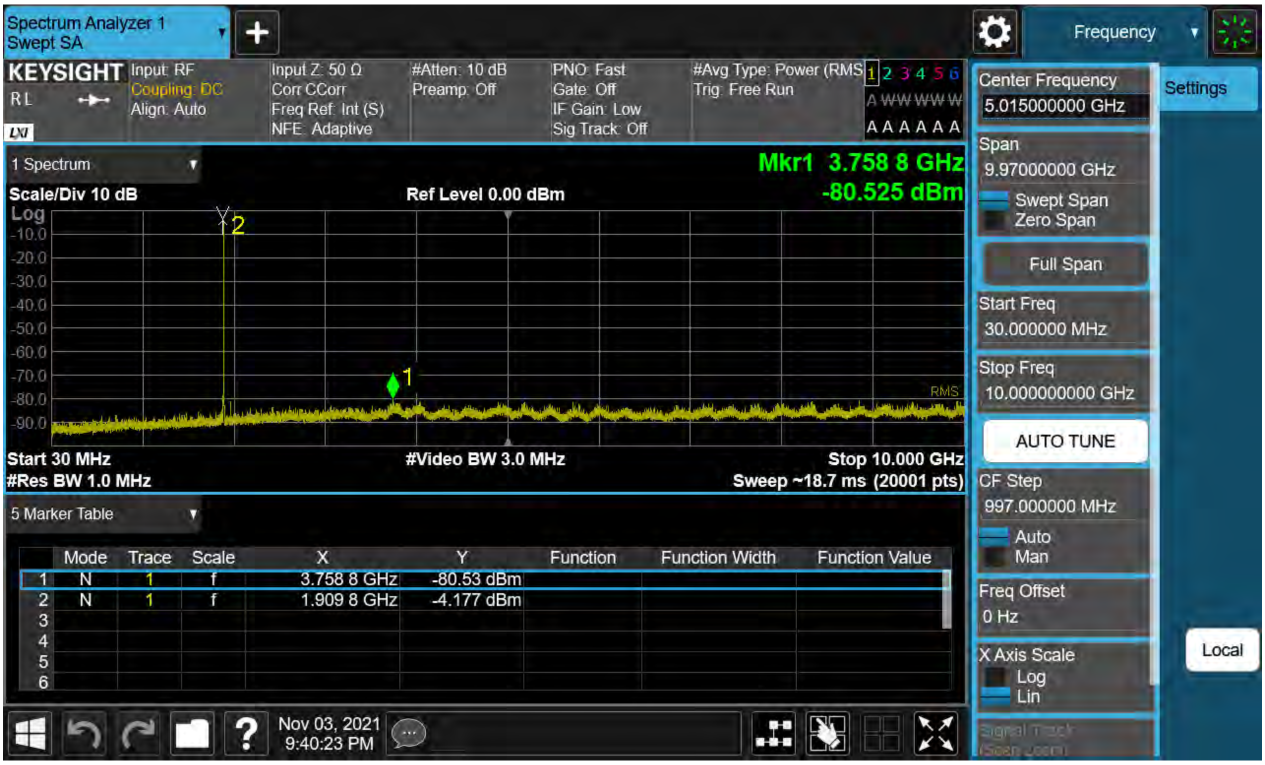


BW1.4 M_CSE(30 M-10 G)_Middle Channel_QPSK_1RB(Lower)



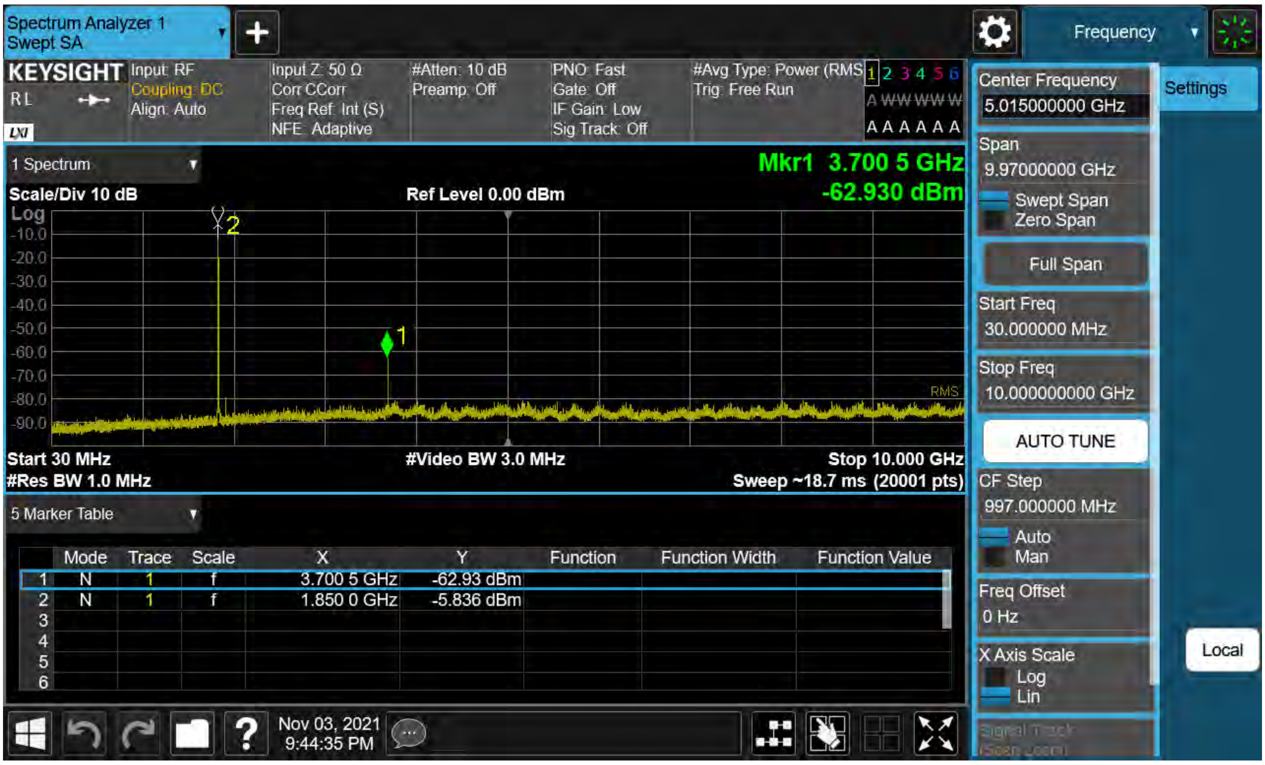
	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	4.949 2 GHz	-80.62 dBm			
2	N	1	f	1.879 4 GHz	-6.358 dBm			
3								
4								
5								
6								

BW1.4 M_CSE(30 M-10 G)_Highest Channel_QPSK_1RB(Lower)



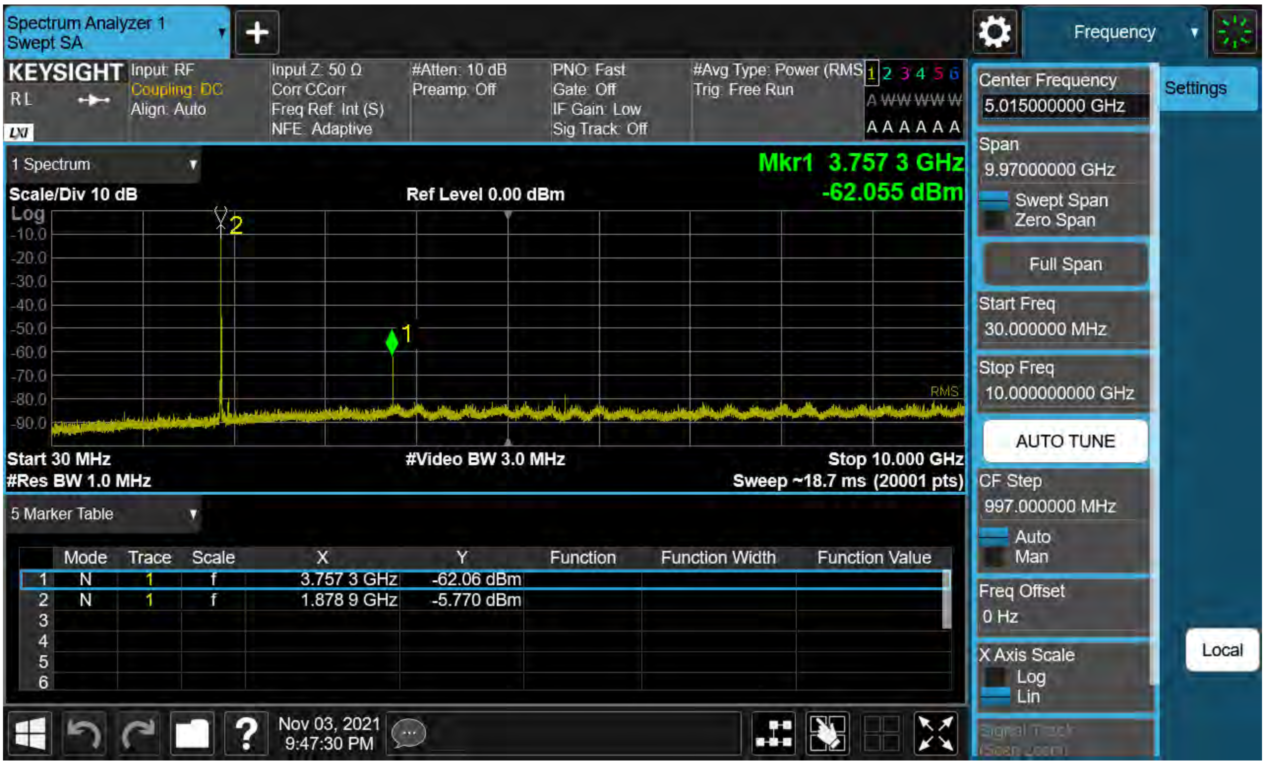
	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	3.758 8 GHz	-80.53 dBm			
2	N	1	f	1.909 8 GHz	-4.177 dBm			
3								
4								
5								
6								

BW3 M_CSE(30 M-10 G)_Lowest Channel_QPSK_1RB(Lower)

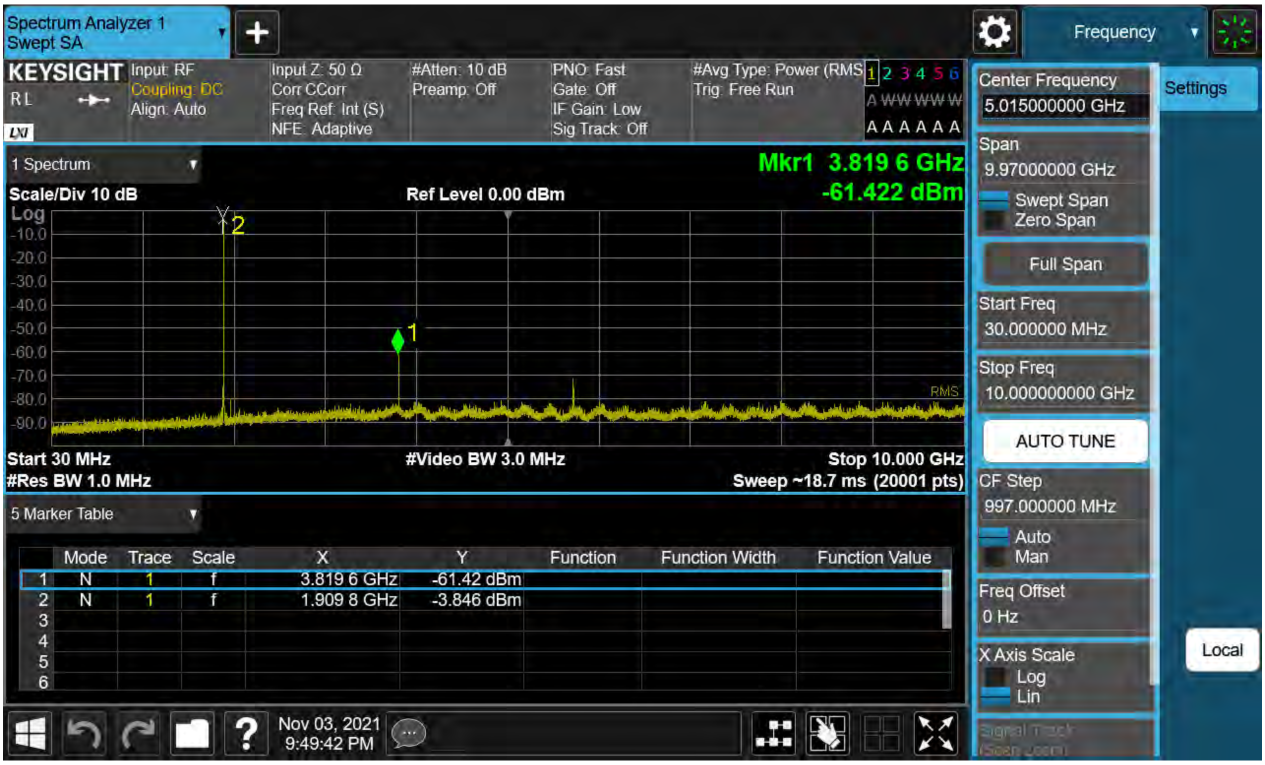


	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	3.700 5 GHz	-62.93 dBm			
2	N	1	f	1.850 0 GHz	-5.836 dBm			
3								
4								
5								
6								

BW3 M_CSE(30 M-10 G)_Middle Channel_QPSK_1RB(Lower)

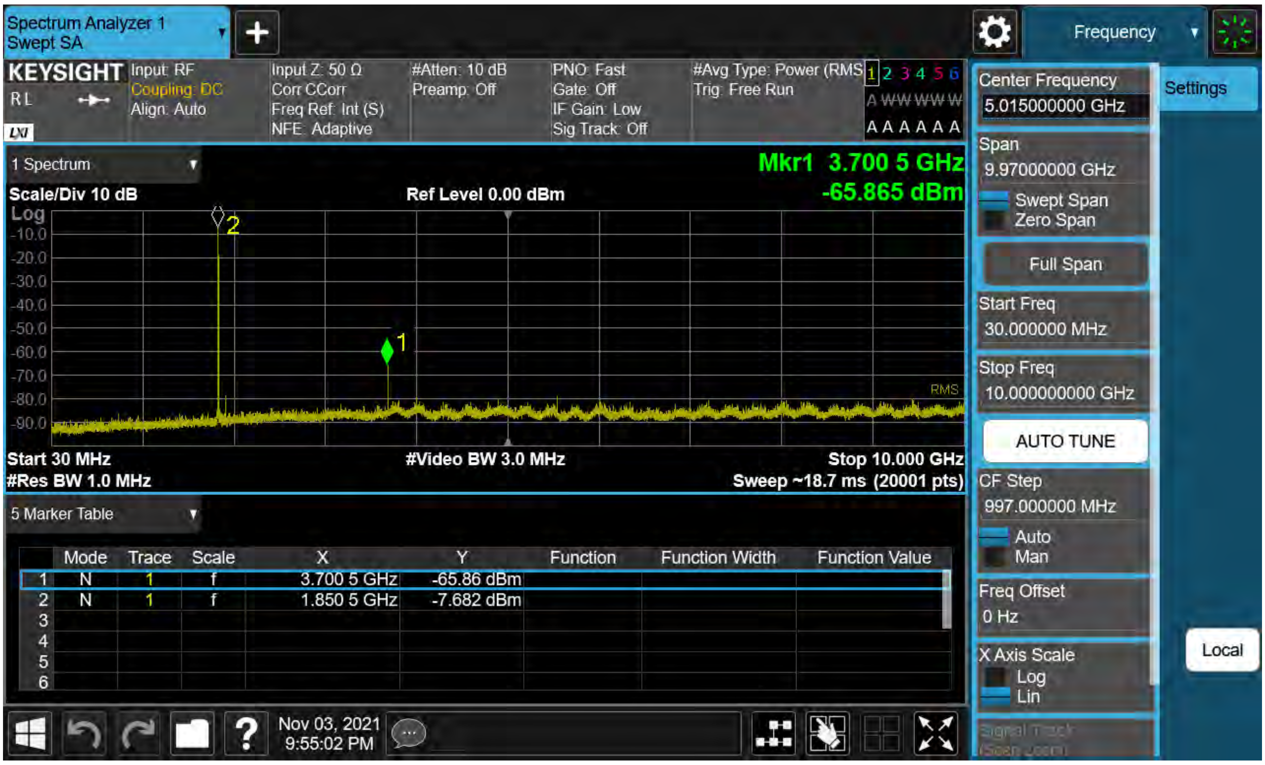


BW3 M_CSE(30 M-10 G)_Highest Channel_QPSK_1RB(Lower)

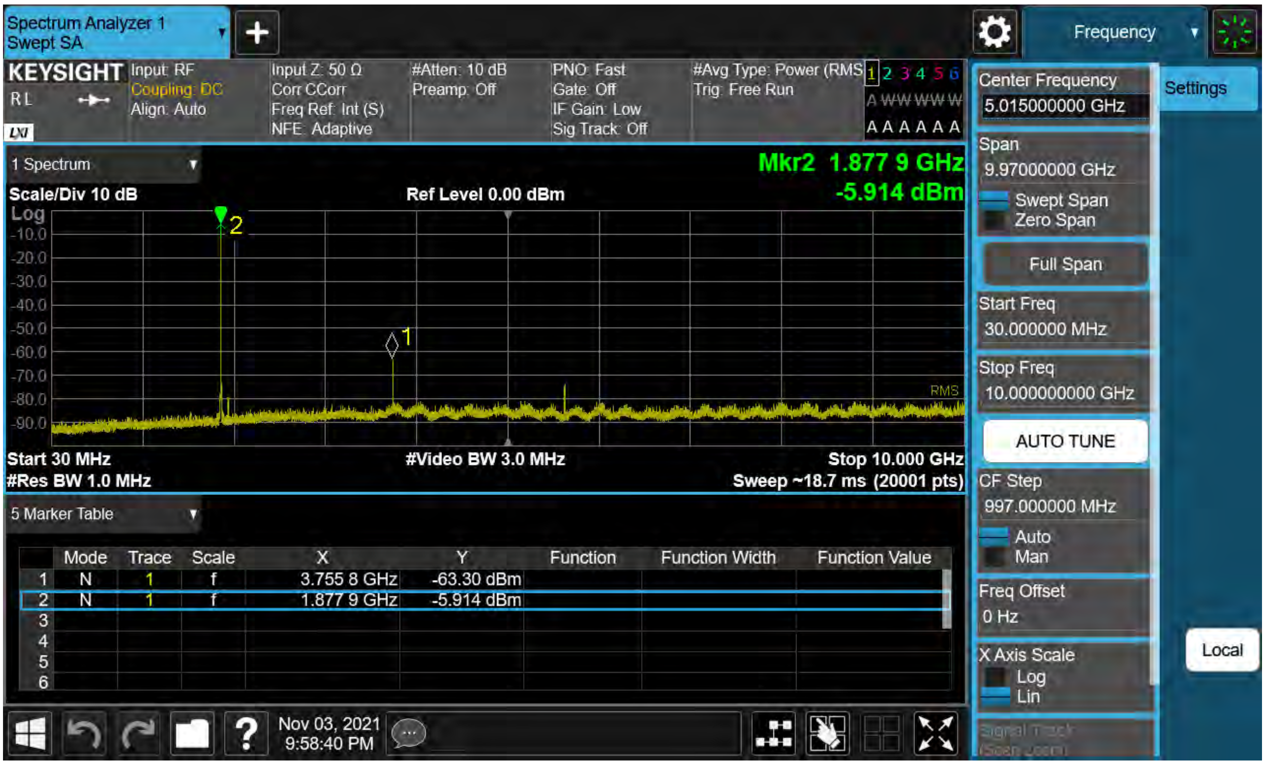


	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	3.819 6 GHz	-61.42 dBm			
2	N	1	f	1.909 8 GHz	-3.846 dBm			
3								
4								
5								
6								

BW5 M_CSE(30 M-10 G)_Lowest Channel_QPSK_1RB(Lower)



BW5 M_CSE(30 M-10 G)_Middle Channel_QPSK_1RB(Lower)



BW5 M_CSE(30 M-10 G)_Highest Channel_QPSK_1RB(Lower)