74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
TEL: +82-31-645-6300 FAX: +82-31-645-6401

FCC Carrier Aggregation 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:
May 09, 2023

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

Report No.: HCT-RF-2305-FC034

FCC ID:	**A3LSMX818U**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

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

Mode (PCC+SCC)	Tx Frequency (MHz)	Modulation	Emission Designator	EIRP	
				Max. Power (dBm)	Max. Power (W)
5 MHz+5 MHz	1712.5 - 1777.5	QPSK	9M24G7D	24.44	0.278
		16QAM	9M23W7D	23.86	0.243
		64QAM	9M23W7D	22.68	0.185
		256QAM	9M28W7D	19.66	0.092
5 MHz+10 MHz	1712.8 - 1775.0	QPSK	13M9G7D	24.32	0.270
		16QAM	13M9W7D	23.55	0.226
		64QAM	13M9W7D	22.40	0.174
		256QAM	13M9W7D	19.42	0.087
10 MHz+5 MHz	1715.0 - 1777.2	QPSK	13M9G7D	24.26	0.267
		16QAM	13M9W7D	23.62	0.230
		64QAM	13M9W7D	22.53	0.179
		256QAM	13M9W7D	19.45	0.088
5 MHz+15 MHz	1713.0 - 1772.5	QPSK	18M2G7D	24.28	0.268
		16QAM	18M3W7D	23.51	0.224
		64QAM	18M2W7D	22.40	0.174
		256QAM	18M2W7D	19.38	0.087
15 MHz+5 MHz	1717.5 - 1777.0	QPSK	18M2G7D	24.16	0.261
		16QAM	18M2W7D	23.48	0.223
		64QAM	18M3W7D	22.38	0.173
		256QAM	18M3W7D	19.26	0.084
10 MHz+10 MHz	1715.0 - 1775.0	QPSK	18M8G7D	24.38	0.274
		16QAM	18M8W7D	23.51	0.224
		64QAM	18M7W7D	22.52	0.179
		256QAM	18M8W7D	19.52	0.090

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 : Jae Mun Do
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)

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2305-FC034	May 09, 2023	- First Approval Report

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:	A3LSMX818U
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§27, §2
EUT Type:	Tablet
Model(s):	SM-X818U
Tx Frequency:	1712.5 - 1777.5: 5 MHz+5 MHz 1712.8 - 1775.0: 5 MHz+10 MHz 1715.0 - 1777.2: 10 MHz+5 MHz 1713.0 - 1772.5: 5 MHz+15 MHz 1717.5 - 1777.0: 15 MHz+5 MHz 1715.0 - 1775.0: 10 MHz+10 MHz
Date(s) of Tests:	March 13, 2023 ~ April 27, 2023
Serial number:	Radiated: R32W2003H3M Conducted: R32W2003JJD
LTE CA :	CA 66B (Uplink)

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

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

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

2.2. MEASURING INSTRUMENT CALIBRATION

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

2.3. TEST FACILITY

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

3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

Test Description	Test Procedure Used
Occupied Bandwidth	- KDB 971168 D01 v03r01 – Section 4.3 - ANSI C63.26-2015 – Section 5.4.4
Band Edge	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Spurious and Harmonic Emissions at Antenna Terminal	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Conducted Output Power	- KDB 971168 D01 v03r01 - Section 5.2.4 - ANSI C63.26-2015 - Section 5.2.1 & 5.2.4.2
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 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;

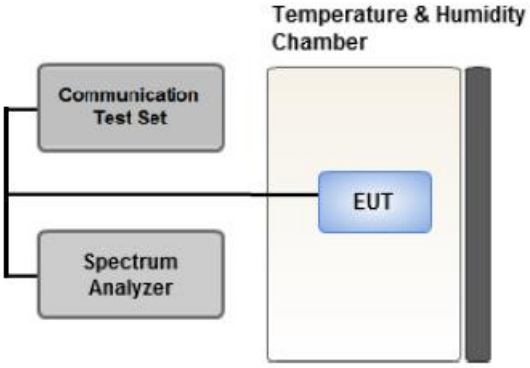
$$\text{Result}_{(dBm)} = \text{Pg}_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

   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.

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

3.4 PEAK- TO- AVERAGE RATIO



Test setup

① CCDF Procedure for PAPR

Test Settings

1. Set resolution/measurement bandwidth ≥ 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)

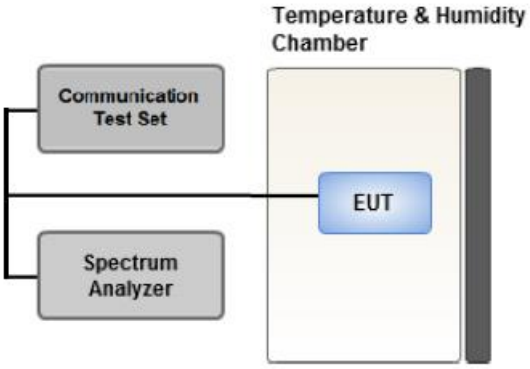
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

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.

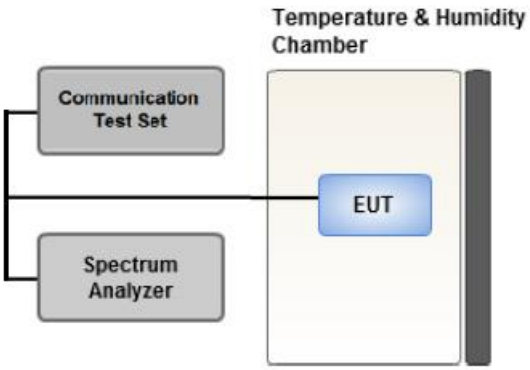
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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

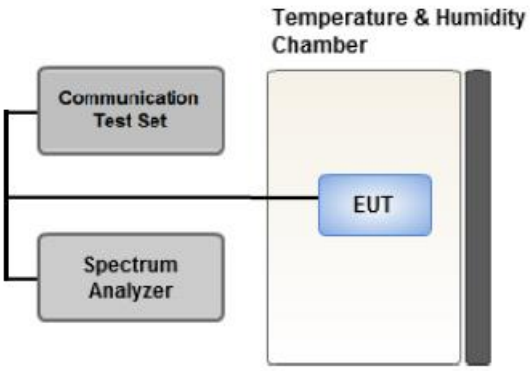
Test Overview

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 = 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

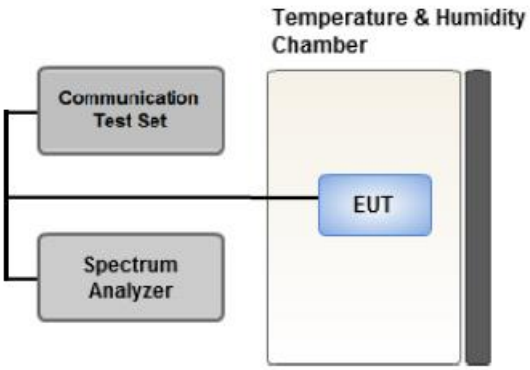
According to FCC 22.917, 24.238, 27.53 specified that power of any emission outside of The authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a 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.

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	-	01/19/2024	Annual
H.P.F	FBSR-02B(WHK3.3/18 G-10EF)	T&M SYSTEM	-	01/19/2024	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	5001	04/19/2024	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/21/2023	Annual
Dipole Antenna	UHAP	Schwarzbeck	557	03/09/2025	Biennial
Dipole Antenna	UHAP	Schwarzbeck	558	03/09/2025	Biennial
Chamber	SU-642	ESPEC	93008124	02/22/2024	Annual
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	147	08/30/2023	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1298	09/15/2023	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/29/2024	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	03/28/2025	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	04/20/2024	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/19/2024	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	100931	08/29/2023	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/18/2023	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/17/2024	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	895	08/16/2024	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	1135	03/21/2024	Biennial
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262094331	12/01/2023	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6201026545	01/05/2024	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	07/05/2023	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/30/2023	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

Note:

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

5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.90 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.14 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.82 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.74 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.76 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.52 (Confidence level about 95 %, k=2)

6. SUMMARY OF TEST RESULTS

6.1 Test Condition : Conducted Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Occupied Bandwidth	§2.1049	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§2.1051, §27.53(h)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Conducted Output Power	§2.1046	N/A	PASS
Peak- to- Average Ratio	§27.50(d)(5)	< 13 dB	PASS
Frequency stability / variation of ambient temperature	§2.1055, §27.54	Emission must remain in band	PASS

6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Equivalent Isotropic Radiated Power	§27.50(d)(4)	< 1 Watts max. EIRP	PASS
Radiated Spurious and Harmonic Emissions	§2.1053, §27.53(h)	< 43 + 10log10 (P[Watts]) for all out-of band emissions	PASS

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

Test Overview

The EUT is set up to transmit two contiguous LTE channels. The power level of both carriers 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 Note

1. All tests were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth.
2. Channel bandwidth is shown in the tables below based only on the channel bandwidths that were supported in this device.

Channel Bandwidth (PCC)	Channel Bandwidth (SCC)	Maximum aggregated bandwidth (MHz)
5	5	10
5	10	15
10	5	15
5	15	20
15	5	20
10	10	20

3. All modes of operation were investigated and the worst case configuration results are reported in this section.
   Please refer to the table below.
   - Worst case(Conducted Spurious Emissions, Band Edge)
     : We have selected higher of the Conduction Output Power.
   - Worst case(Radiated Spurious Emissions) : We have selected higher of the EIRP.
   - Worst case(OBW, PAR, Frequency stability)
     : All modes of operation were investigated and the worst case configuration results are reported.
4. All modes of operation were investigated and the worst case configuration results are reported.
   Mode : Stand alone, Stand alone + External accessories (Earphone, AC adapter, etc)
   Worst case : Stand alone
5. We were performed the RSE test in condition of co-location.
   Mode : Stand alone, Simultaneous transmission scenarios
   Worst case : Stand alone
6. All 3 channels(low/mid/high) of conducted power and radiated power were investigated
   and the worst case channel results are reported.

[Worst case]

Test Description	Mod	Operating frequency	PCC					SCC				
			BW (MHz)	Freq. (MHz)	Ch.	RB	RB Offset	BW (MHz)	Freq. (MHz)	Ch.	RB	RB Offset
Conducted Spurious Emissions/ Band Edge	QPSK	Low	5	1712.5	131997	1	24	5	1717.3	132045	1	0
		Mid	5	1752.6	132398	1	24	5	1757.4	132446	1	0
		High	5	1772.7	132599	1	24	5	1777.5	132647	1	0
		Low	5	1712.5	131997	1	0	5	1717.3	132045	1	24
		Mid	5	1752.6	132398	1	0	5	1757.4	132446	1	24
		High	5	1772.7	132599	1	0	5	1777.5	132647	1	24
		Low	5	1712.5	131997	25	0	5	1717.3	132045	25	0
		Mid	5	1752.6	132398	25	0	5	1757.4	132446	25	0
		High	5	1772.7	132599	25	0	5	1777.5	132647	25	0
		Low	10	1715.0	132022	50	0	10	1724.9	132121	50	0
		Mid	10	1750.1	132373	50	0	10	1760.0	132472	50	0
		High	10	1765.1	132523	50	0	10	1775.0	132622	50	0
Radiated Spurious Emissions	QPSK	Low	15	1717.5	132047	1	74	5	1726.8	132140	1	0
		Mid	5	1748.1	132353	1	24	15	1757.4	132446	1	0
		High	5	1772.7	132599	1	24	5	1777.5	132647	1	0

[Worst case]

Test Description	Mod	Operating frequency	PCC					SCC				
			BW (MHz)	Freq. (MHz)	Ch.	RB	RB Offset	BW (MHz)	Freq. (MHz)	Ch.	RB	RB Offset
OBW, PAR	QPSK, 16QAM, 64QAM 256QAM	Mid	5	1752.6	132398	25	0	5	1757.4	132446	25	0
			5	1750.3	132375	25	0	10	1757.5	132447	50	0
			10	1752.5	132397	50	0	5	1759.7	132469	25	0
			5	1748.1	132353	25	0	15	1757.4	132446	75	0
			15	1752.6	132398	75	0	5	1761.9	132491	25	0
			10	1750.1	132373	50	0	10	1760.0	132472	50	0
Frequency stability	QPSK	Low	5	1712.5	131997	25	0	5	1717.3	132045	25	0
			10	1715.0	132022	50	0	5	1722.2	132094	25	0
			15	1717.5	132047	75	0	5	1726.8	132140	25	0
		High	5	1772.7	132599	25	0	5	1777.5	132647	25	0
			10	1770.0	132572	50	0	5	1777.2	132644	25	0
			15	1767.7	132549	75	0	5	1777.0	132642	25	0

.

8.1 Conducted Power

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	**5**	**1712.5**	**131997**	**1**	**24**	**5**	**1717.3**	**132045**	**1**	**0**	**24.02**
	5	1712.8	132000	1	24	10	1720.0	132072	1	0	23.71
	10	1715.0	132022	1	49	5	1722.2	132094	1	0	23.82
	5	1713.0	132002	1	24	15	1722.3	132095	1	0	23.75
	15	1717.5	132047	1	74	5	1726.8	132140	1	0	23.99
	10	1715.0	132022	1	49	10	1724.9	132121	1	0	23.85
Mid	**5**	**1752.6**	**132398**	**1**	**24**	**5**	**1757.4**	**132446**	**1**	**0**	**24.14**
	5	1750.3	132375	1	24	10	1757.5	132447	1	0	24.11
	10	1752.5	132397	1	49	5	1759.7	132469	1	0	23.95
	5	1748.1	132353	1	24	15	1757.4	132446	1	0	24.13
	15	1752.6	132398	1	74	5	1761.9	132491	1	0	24.11
	10	1750.1	132373	1	49	10	1760.0	132472	1	0	23.92
High	**5**	**1772.7**	**132599**	**1**	**24**	**5**	**1777.5**	**132647**	**1**	**0**	**24.15**
	5	1767.8	132550	1	24	10	1775.0	132622	1	0	24.02
	10	1770.0	132572	1	49	5	1777.2	132644	1	0	23.92
	5	1763.2	132504	1	24	15	1772.5	132597	1	0	23.99
	15	1767.7	132549	1	74	5	1777.0	132642	1	0	23.95
	10	1765.1	132523	1	49	10	1775.0	132622	1	0	24.09

Note:

Modulation : QPSK(1RB)

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	***5***	***1712.5***	***131997***	***25***	***0***	***5***	***1717.3***	***132045***	***25***	***0***	***21.89***
	5	1712.8	132000	25	0	10	1720.0	132072	50	0	21.73
	10	1715.0	132022	50	0	5	1722.2	132094	25	0	21.75
	5	1713.0	132002	25	0	15	1722.3	132095	75	0	21.69
	15	1717.5	132047	75	0	5	1726.8	132140	25	0	21.78
	10	1715.0	132022	50	0	10	1724.9	132121	50	0	21.80
Mid	***5***	***1752.6***	***132398***	***25***	***0***	***5***	***1757.4***	***132446***	***25***	***0***	***22.15***
	5	1750.3	132375	25	0	10	1757.5	132447	50	0	22.01
	10	1752.5	132397	50	0	5	1759.7	132469	25	0	22.02
	5	1748.1	132353	25	0	15	1757.4	132446	75	0	21.99
	15	1752.6	132398	75	0	5	1761.9	132491	25	0	22.03
	10	1750.1	132373	50	0	10	1760.0	132472	50	0	21.97
High	***5***	***1772.7***	***132599***	***25***	***0***	***5***	***1777.5***	***132647***	***25***	***0***	***22.06***
	5	1767.8	132550	25	0	10	1775.0	132622	50	0	21.97
	10	1770.0	132572	50	0	5	1777.2	132644	25	0	21.92
	5	1763.2	132504	25	0	15	1772.5	132597	75	0	21.99
	15	1767.7	132549	75	0	5	1777.0	132642	25	0	21.99
	10	1765.1	132523	50	0	10	1775.0	132622	50	0	21.96

Note:

Modulation : QPSK(Full RB)

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	5	1712.5	131997	1	24	5	1717.3	132045	1	0	23.12
Mid	5	1752.6	132398	1	24	5	1757.4	132446	1	0	23.31
High	5	1772.7	132599	1	24	5	1777.5	132647	1	0	23.45
Low	5	1712.5	131997	25	0	5	1717.3	132045	25	0	20.90
Mid	5	1752.6	132398	25	0	5	1757.4	132446	25	0	21.13
High	5	1772.7	132599	25	0	5	1777.5	132647	25	0	21.12

Note:

Modulation : 16QAM

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	5	1712.5	131997	1	24	5	1717.3	132045	1	0	21.58
Mid	5	1752.6	132398	1	24	5	1757.4	132446	1	0	22.38
High	5	1772.7	132599	1	24	5	1777.5	132647	1	0	22.34
Low	5	1712.5	131997	25	0	5	1717.3	132045	25	0	20.80
Mid	5	1752.6	132398	25	0	5	1757.4	132446	25	0	21.05
High	5	1772.7	132599	25	0	5	1777.5	132647	25	0	20.97

Note:

Modulation : 64QAM

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	5	1712.5	131997	1	24	5	1717.3	132045	1	0	18.88
Mid	5	1752.6	132398	1	24	5	1757.4	132446	1	0	19.35
High	5	1772.7	132599	1	24	5	1777.5	132647	1	0	19.15
Low	5	1712.5	131997	25	0	5	1717.3	132045	25	0	18.88
Mid	5	1752.6	132398	25	0	5	1757.4	132446	25	0	19.12
High	5	1772.7	132599	25	0	5	1777.5	132647	25	0	19.05

Note:

Modulation : 256QAM

8.2 Equivalent Isotropic Radiated Power

	PCC			SCC			Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol.	E.I.R.P	
	BW [MHz]	Channel	RB/ Offset	BW [MHz]	Channel	RB/ Offset						W	dBm
Low	5	131997	1/24	5	132045	1/0	-17.08	16.03	10.06	2.06	H	0.253	24.03
	5	132000	1/24	10	132072	1/0	-17.20	15.91	10.06	2.06	H	0.246	23.91
	10	132022	1/49	5	132094	1/0	-17.07	16.05	10.08	2.06	H	0.255	24.07
	5	132002	1/24	15	132095	1/0	-17.12	16.00	10.08	2.06	H	0.252	24.02
	15	***132047***	***1/74***	***5***	***132140***	***1/0***	***-17.01***	***16.11***	***10.08***	***2.06***	***H***	***0.259***	***24.13***
	10	132022	1/49	10	132121	1/0	-17.24	15.88	10.08	2.06	H	0.245	23.90
Mid	5	132398	1/24	5	132446	1/0	-17.25	15.88	10.21	2.11	H	0.250	23.98
	5	132375	1/24	10	132447	1/0	-17.13	16.00	10.21	2.11	H	0.257	24.10
	10	132397	1/49	5	132469	1/0	-17.29	15.84	10.21	2.11	H	0.248	23.94
	5	***132353***	***1/24***	***15***	***132446***	***1/0***	***-16.98***	***16.17***	***10.20***	***2.09***	***H***	***0.268***	***24.28***
	15	132398	1/74	5	132491	1/0	-17.03	16.06	10.22	2.12	H	0.261	24.16
	10	132373	1/49	10	132472	1/0	-17.36	15.77	10.21	2.11	H	0.244	23.87
High	***5***	***132599***	***1/24***	***5***	***132647***	***1/0***	***-16.84***	***16.32***	***10.25***	***2.13***	***H***	***0.278***	***24.44***
	5	132550	1/24	10	132622	1/0	-16.94	16.21	10.24	2.13	H	0.270	24.32
	10	132572	1/49	5	132644	1/0	-17.00	16.15	10.24	2.13	H	0.267	24.26
	5	132504	1/24	15	132597	1/0	-17.01	16.14	10.24	2.13	H	0.266	24.25
	15	132549	1/74	5	132642	1/0	-17.34	15.81	10.24	2.13	H	0.246	23.92
	10	132523	1/49	10	132622	1/0	-16.88	16.27	10.24	2.13	H	0.274	24.38

Note:

1. Modulation : QPSK
2. Limit : < 1 Watts

PCC			SCC			Measured	Substitute	Ant.			E.I.R.P	
BW [MHz]	Channel	RB/ Offset	BW [MHz]	Channel	RB/ Offset	Level (dBm)	Level (dBm)	Gain (dBi)	C.L	Pol.	W	dBm
15	132047	1/74	5	132140	1/0	-17.66	15.46	10.08	2.06	H	0.223	23.48
5	132353	1/24	15	132446	1/0	-18.03	15.12	10.20	2.09	H	0.210	23.23
5	132599	1/24	5	132647	1/0	-17.42	15.74	10.25	2.13	H	0.243	23.86
5	132550	1/24	10	132622	1/0	-17.71	15.44	10.24	2.13	H	0.226	23.55
10	132572	1/49	5	132644	1/0	-17.64	15.51	10.24	2.13	H	0.230	23.62
5	132504	1/24	15	132597	1/0	-17.75	15.40	10.24	2.13	H	0.224	23.51
15	132549	1/74	5	132642	1/0	-18.02	15.13	10.24	2.13	H	0.211	23.24
10	132523	1/49	10	132622	1/0	-17.75	15.40	10.24	2.13	H	0.224	23.51

Note:

1. Modulation : 16QAM

2. Limit : < 1 Watts

PCC			SCC			Measured	Substitute	Ant.			E.I.R.P	
BW [MHz]	Channel	RB/ Offset	BW [MHz]	Channel	RB/ Offset	Level (dBm)	Level (dBm)	Gain (dBi)	C.L	Pol.	W	dBm
15	132047	1/74	5	132140	1/0	-18.76	14.36	10.08	2.06	H	0.173	22.38
5	132353	1/24	15	132446	1/0	-19.10	14.05	10.20	2.09	H	0.164	22.16
5	132599	1/24	5	132647	1/0	-18.60	14.56	10.25	2.13	H	0.185	22.68
5	132550	1/24	10	132622	1/0	-18.86	14.29	10.24	2.13	H	0.174	22.40
10	132572	1/49	5	132644	1/0	-18.73	14.42	10.24	2.13	H	0.179	22.53
5	132504	1/24	15	132597	1/0	-18.86	14.29	10.24	2.13	H	0.174	22.40
15	132549	1/74	5	132642	1/0	-19.25	13.90	10.24	2.13	H	0.159	22.01
10	132523	1/49	10	132622	1/0	-18.74	14.41	10.24	2.13	H	0.179	22.52

Note:

1. Modulation : 64QAM

2. Limit : < 1 Watts

PCC			SCC			Measured	Substitute	Ant.			E.I.R.P	
BW [MHz]	Channel	RB/ Offset	BW [MHz]	Channel	RB/ Offset	Level (dBm)	Level (dBm)	Gain (dBi)	C.L	Pol.	W	dBm
15	132047	1/74	5	132140	1/0	-21.88	11.24	10.08	2.06	H	0.084	19.26
5	132353	1/24	15	132446	1/0	-22.18	10.97	10.20	2.09	H	0.081	19.08
5	132599	1/24	5	132647	1/0	-21.62	11.54	10.25	2.13	H	0.092	19.66
5	132550	1/24	10	132622	1/0	-21.84	11.31	10.24	2.13	H	0.087	19.42
10	132572	1/49	5	132644	1/0	-21.81	11.34	10.24	2.13	H	0.088	19.45
5	132504	1/24	15	132597	1/0	-21.88	11.27	10.24	2.13	H	0.087	19.38
15	132549	1/74	5	132642	1/0	-22.13	11.02	10.24	2.13	H	0.082	19.13
10	132523	1/49	10	132622	1/0	-21.74	11.41	10.24	2.13	H	0.090	19.52

Note:

1. Modulation : 256QAM

2. Limit : < 1 Watts

8.3 Conducted Spurious Emissions

Operating frequency	PCC				SCC				Measurement Maximum Frequency (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)
	BW [MHz]	Ch.	Freq. (MHz)	RB/ Offset	BW [MHz]	Ch.	Freq. (MHz)	RB/ Offset				
Low	5	131997	1712.5	1/24	5	132045	1717.3	1/0	9.1590	28.591	-75.96	-47.37
Mid	5	132398	1752.6	1/24	5	132446	1757.4	1/0	9.4457	28.591	-76.23	-47.64
High	5	132599	1772.7	1/24	5	132647	1777.5	1/0	3.7972	27.976	-76.47	-48.50
Low	5	131997	1712.5	1/0	5	132045	1717.3	1/24	3.7658	27.976	-76.52	-48.54
Mid	5	132398	1752.6	1/0	5	132446	1757.4	1/24	3.7593	27.976	-75.87	-47.90
High	5	132599	1772.7	1/0	5	132647	1777.5	1/24	8.8445	28.591	-76.18	-47.59
Low	5	131997	1712.5	25/0	5	132045	1717.3	25/0	4.0125	27.976	-76.50	-48.52
Mid	5	132398	1752.6	25/0	5	132446	1757.4	25/0	9.1132	28.591	-75.59	-47.00
High	5	132599	1772.7	25/0	5	132647	1777.5	25/0	8.8988	28.591	-76.16	-47.57
Low	10	132022	1715.0	50/0	10	132121	1724.9	50/0	8.2602	28.591	-76.00	-47.41
Mid	10	132373	1750.1	50/0	10	132472	1760.0	50/0	8.3056	28.591	-76.37	-47.77
High	10	132523	1765.1	50/0	10	132622	1775.0	50/0	3.7977	27.976	-76.24	-48.27

Note:

1. Modulation : QPSK

2. Factor(dB) = Cable Loss + Ext. Attenuator + Power Splitter

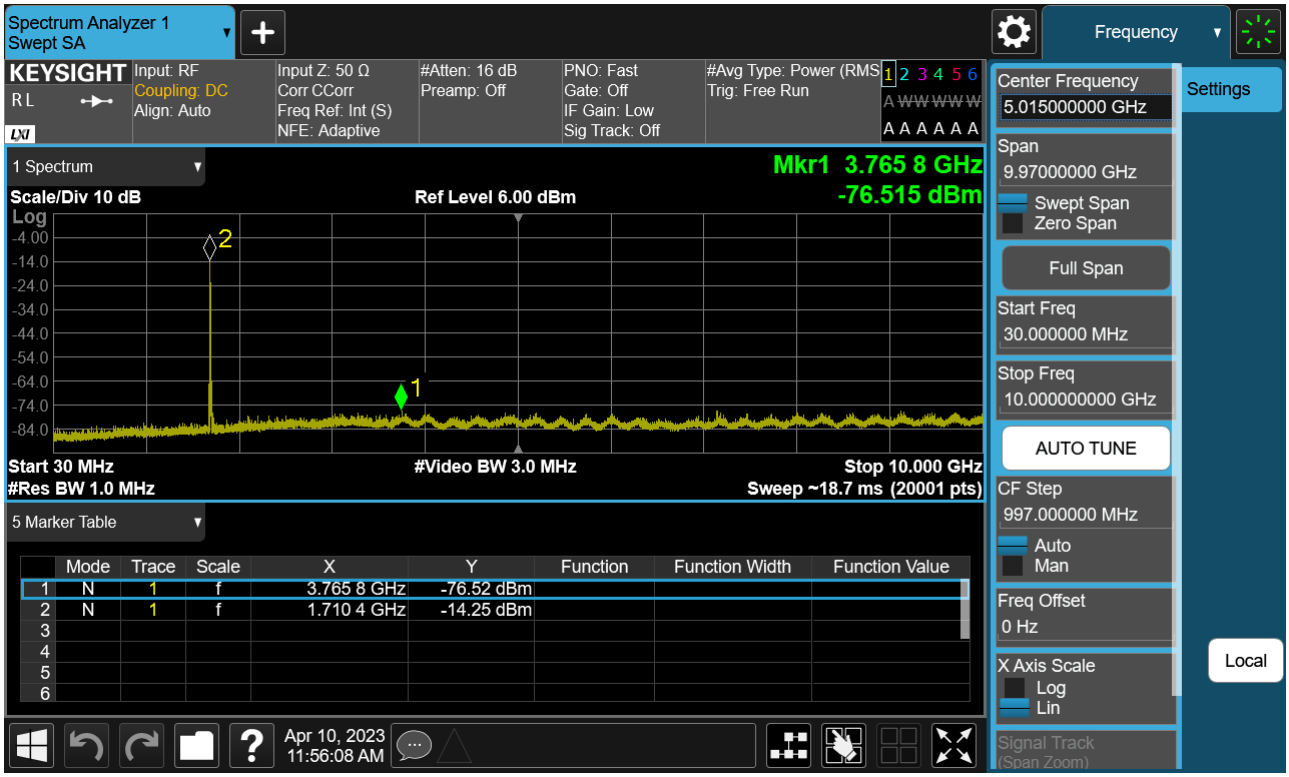
3. Factors for frequency :

Frequency Range (GHz)	Factor [dB]
0.03 – 1	25.270
1 – 5	27.976
5 – 10	28.591
10 – 15	29.116
15 – 20	29.489
Above 20(26.5)	30.131

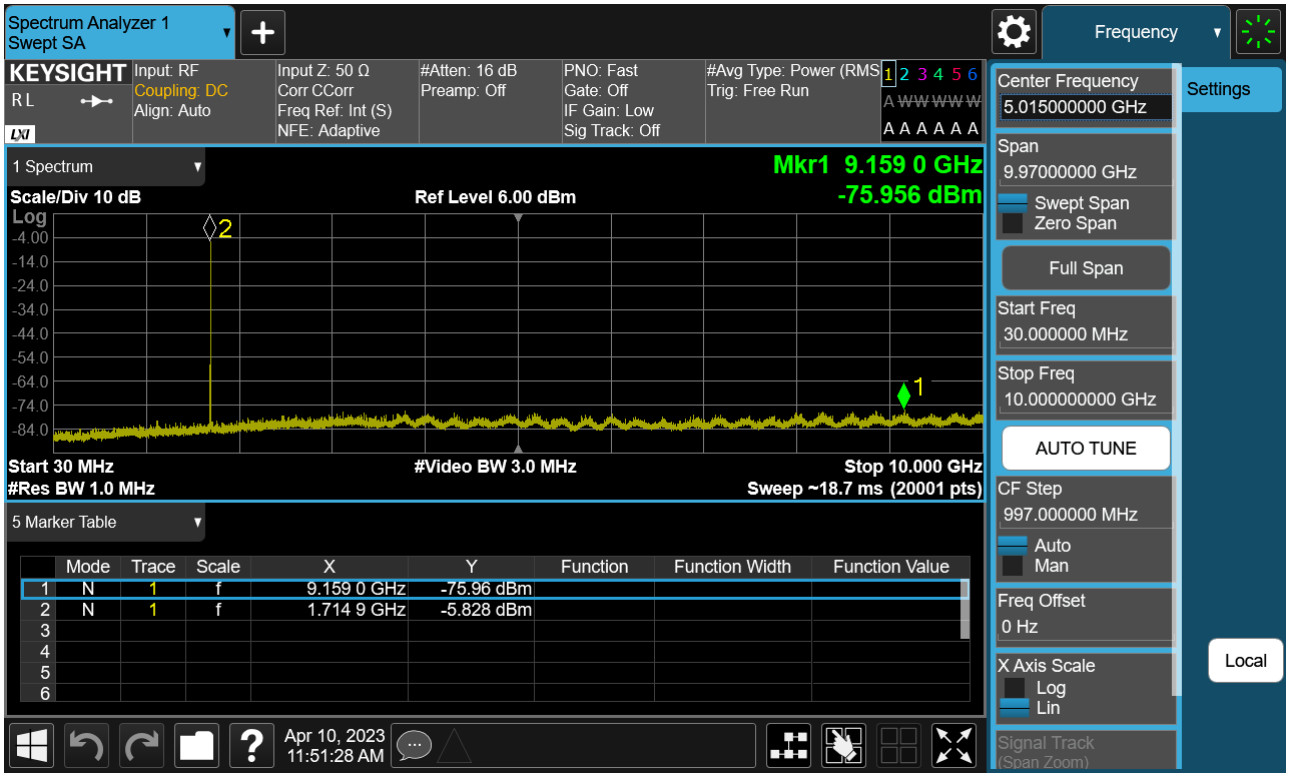
4. Limit : -13.0 dBm

Frequency Range : 30 MHz ~ 10 GHz

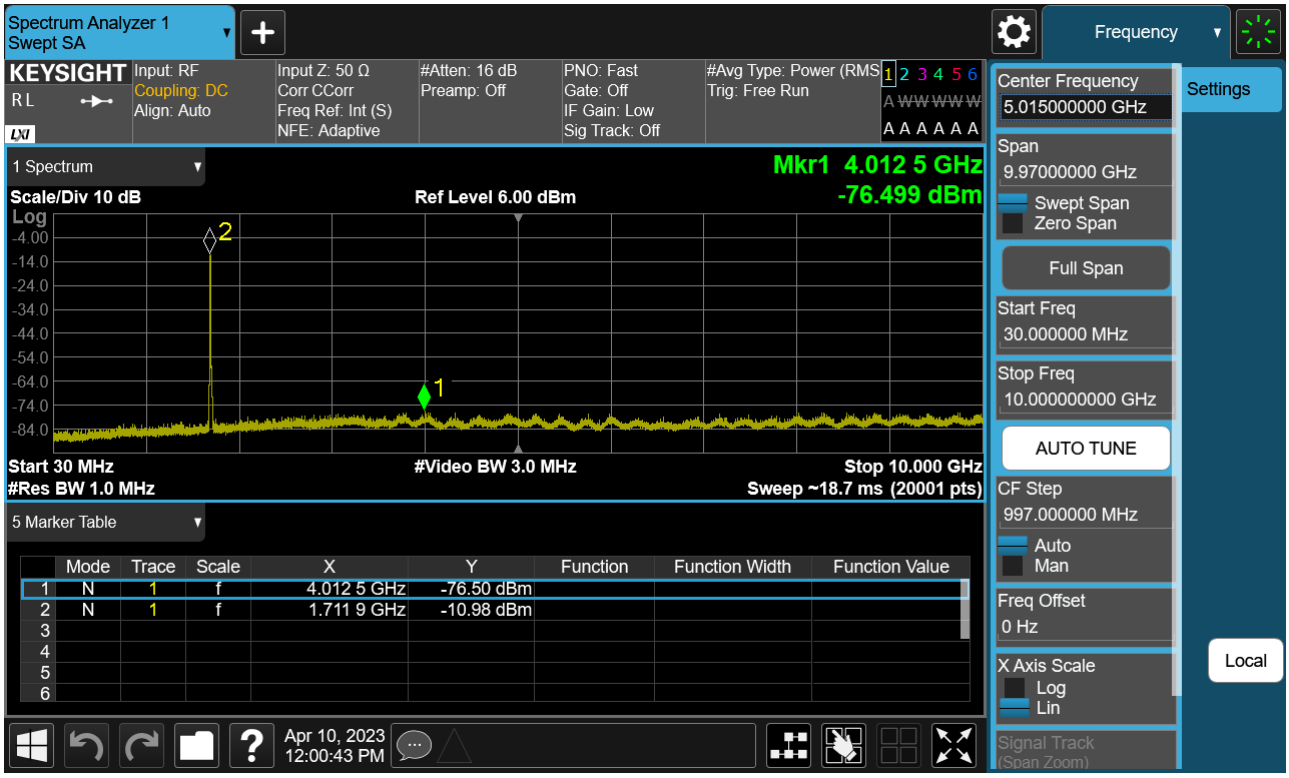
PCC 5 MHz Ch131997 RB1 Offset0 SCC 5 MHz Ch132045 RB1 Offset24



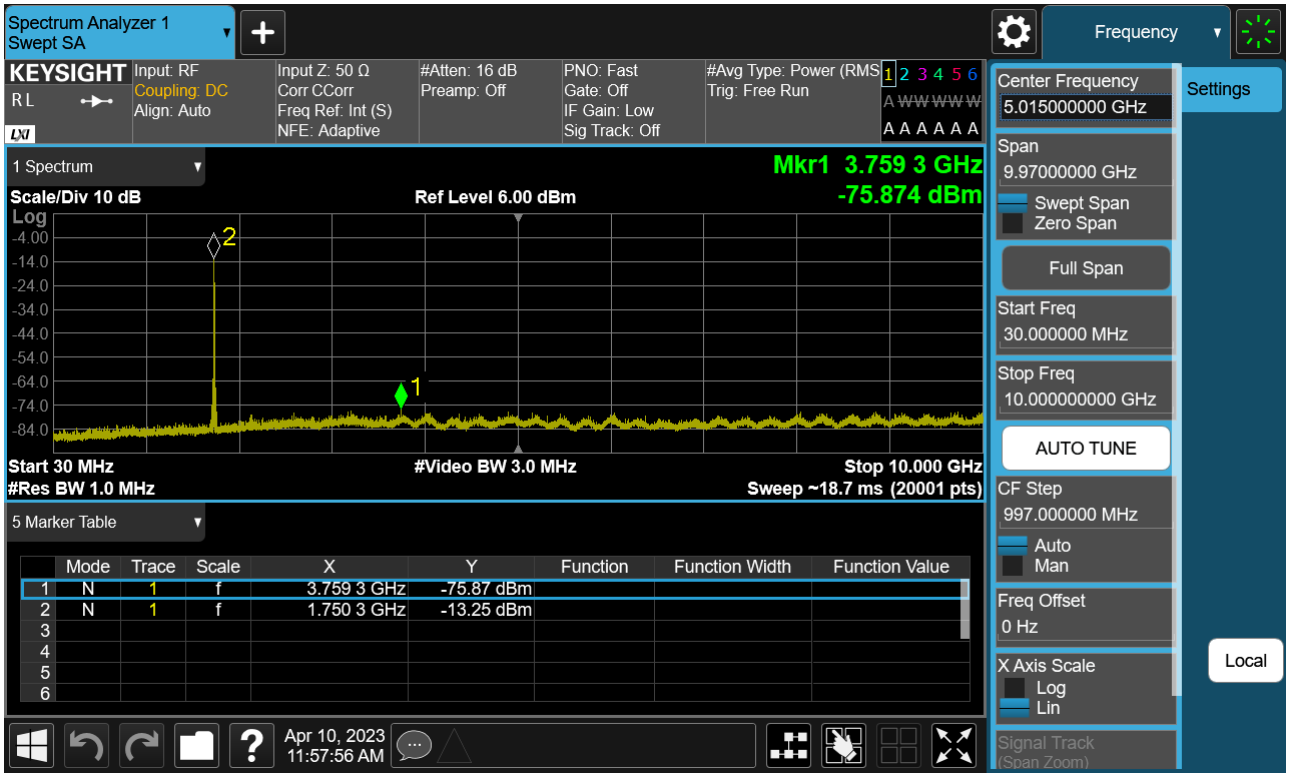
PCC 5 MHz Ch131997 RB1 Offset24 SCC 5 MHz Ch132045 RB1 Offset0



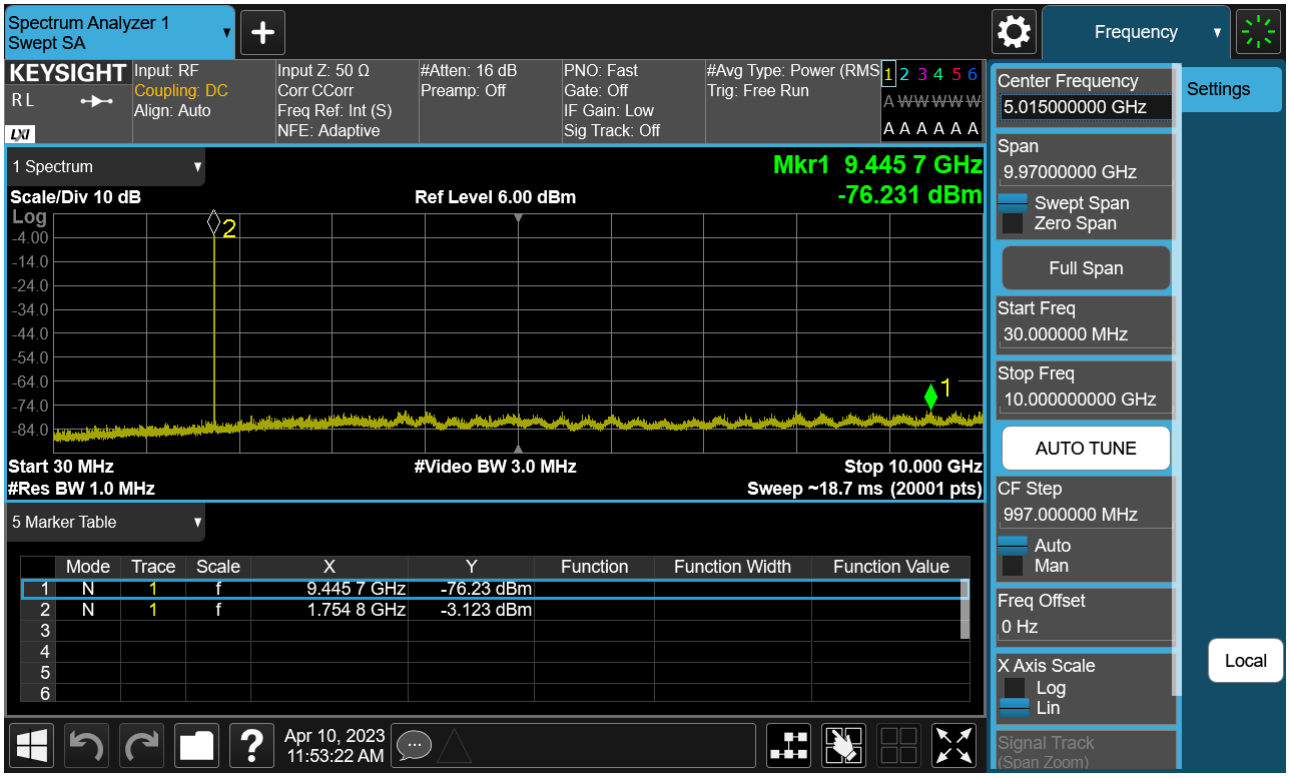
PCC 5 MHz Ch131997 RB25 Offset0 SCC 5 MHz Ch132045 RB25 Offset0



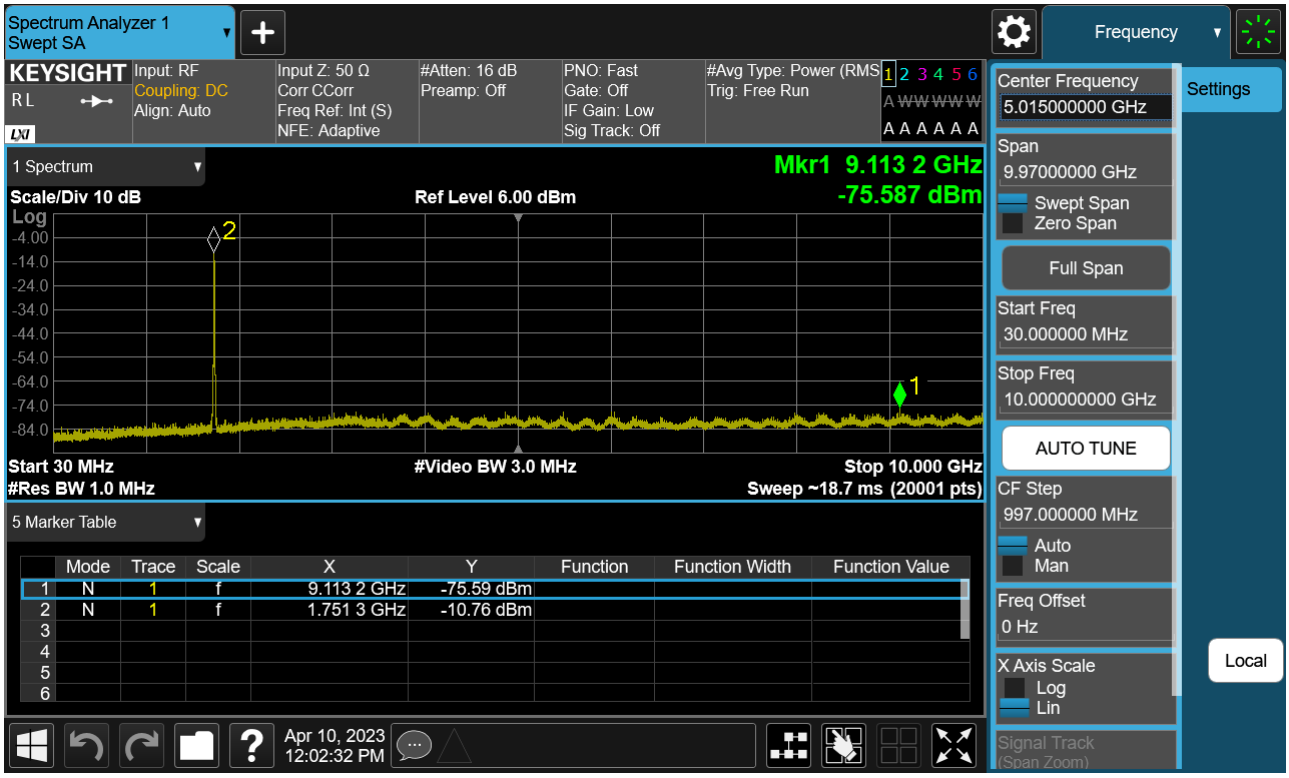
PCC 5 MHz Ch132398 RB1 Offset0 SCC 5 MHz Ch132446 RB1 Offset24



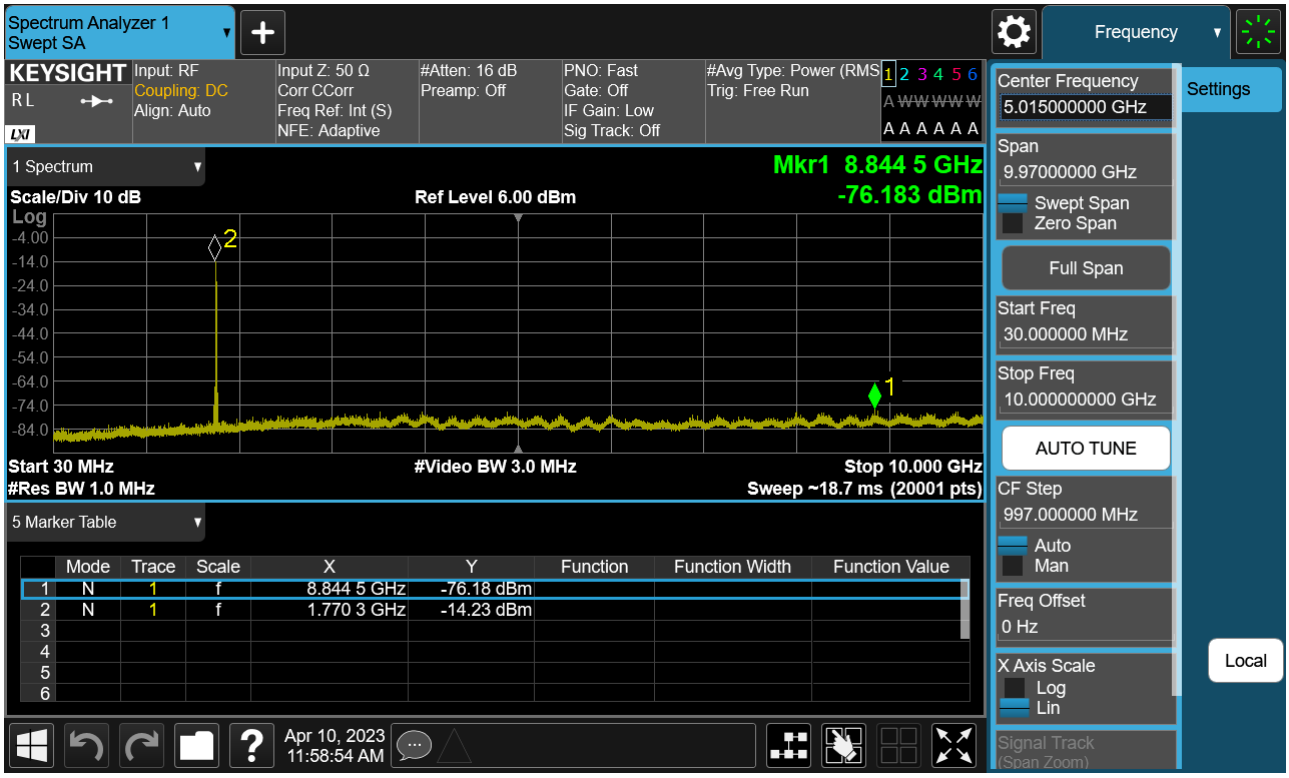
PCC 5 MHz Ch132398 RB1 Offset24 SCC 5 MHz Ch132446 RB1 Offset0



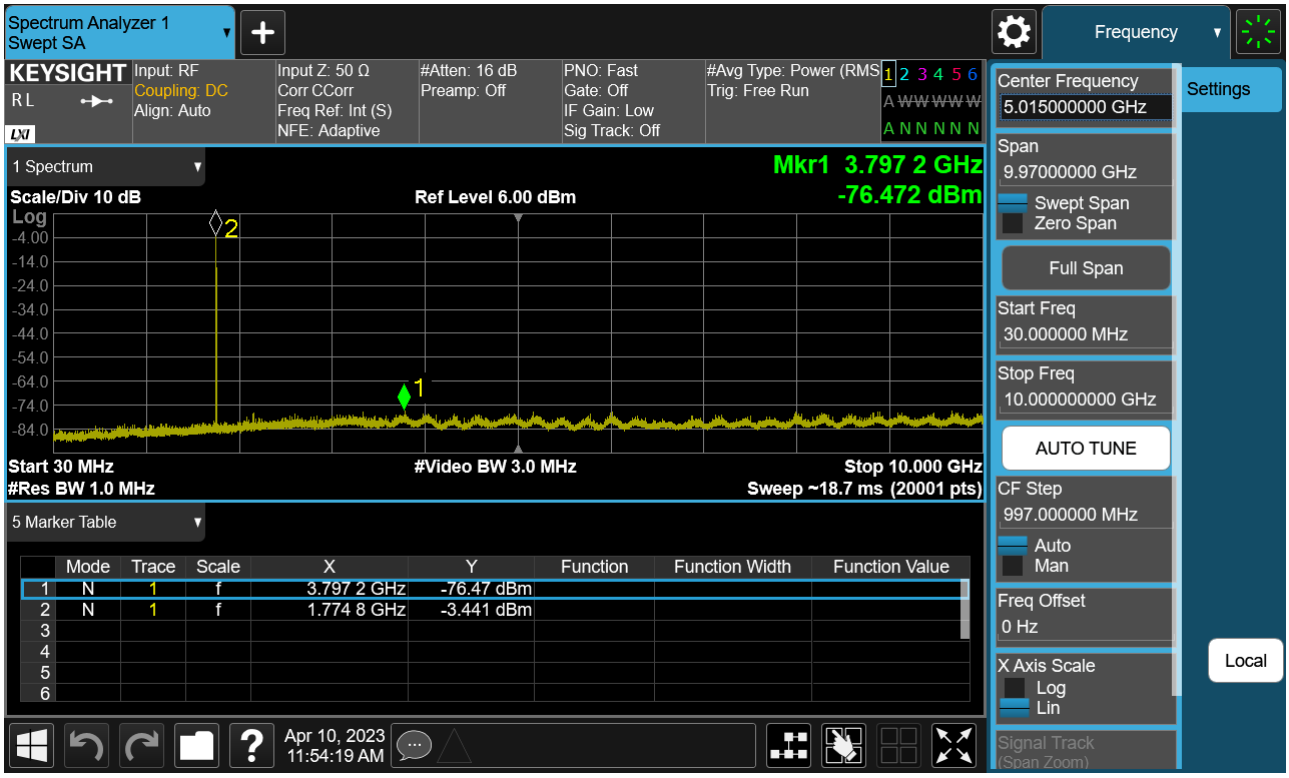
PCC 5 MHz Ch132398 RB25 Offset0 SCC 5 MHz Ch132446 RB25 Offset0



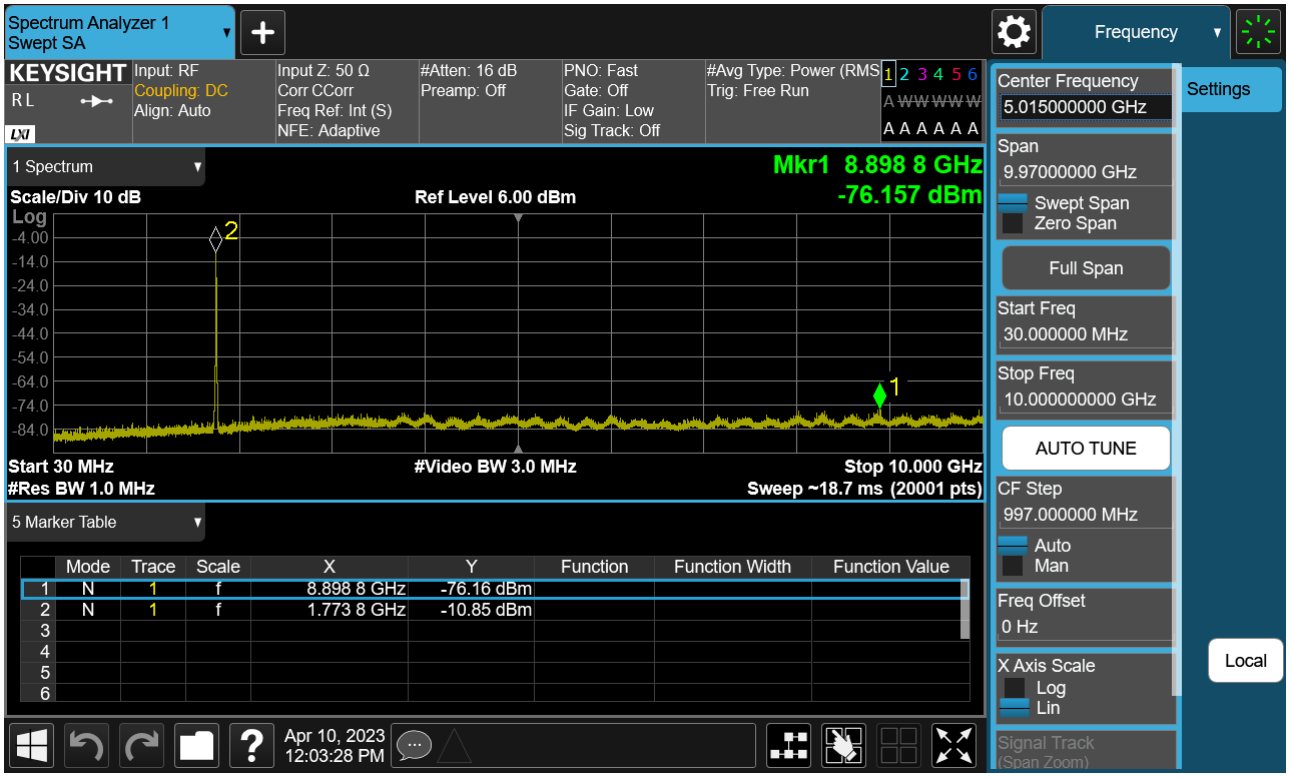
PCC 5 MHz Ch132599 RB1 Offset0 SCC 5 MHz Ch132647 RB1 Offset24



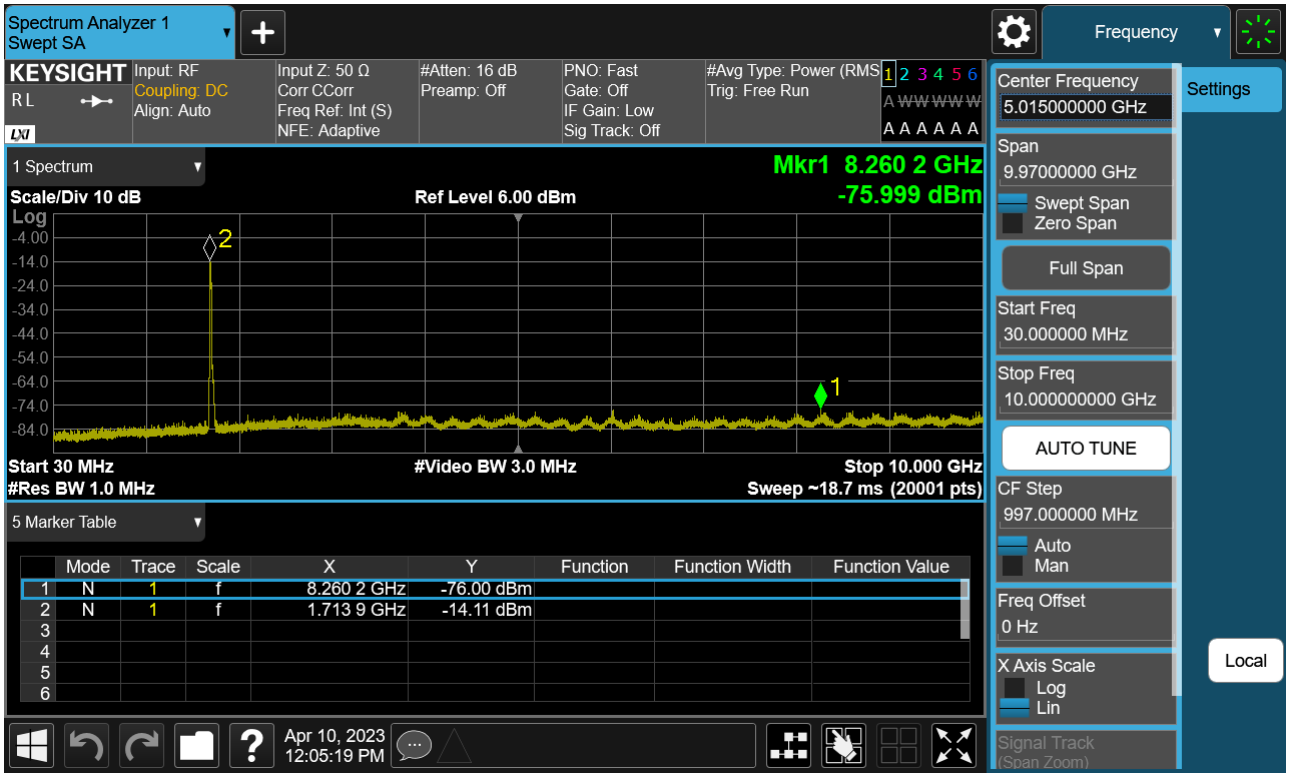
PCC 5 MHz Ch132599 RB1 Offset24 SCC 5 MHz Ch132647 RB1 Offset0



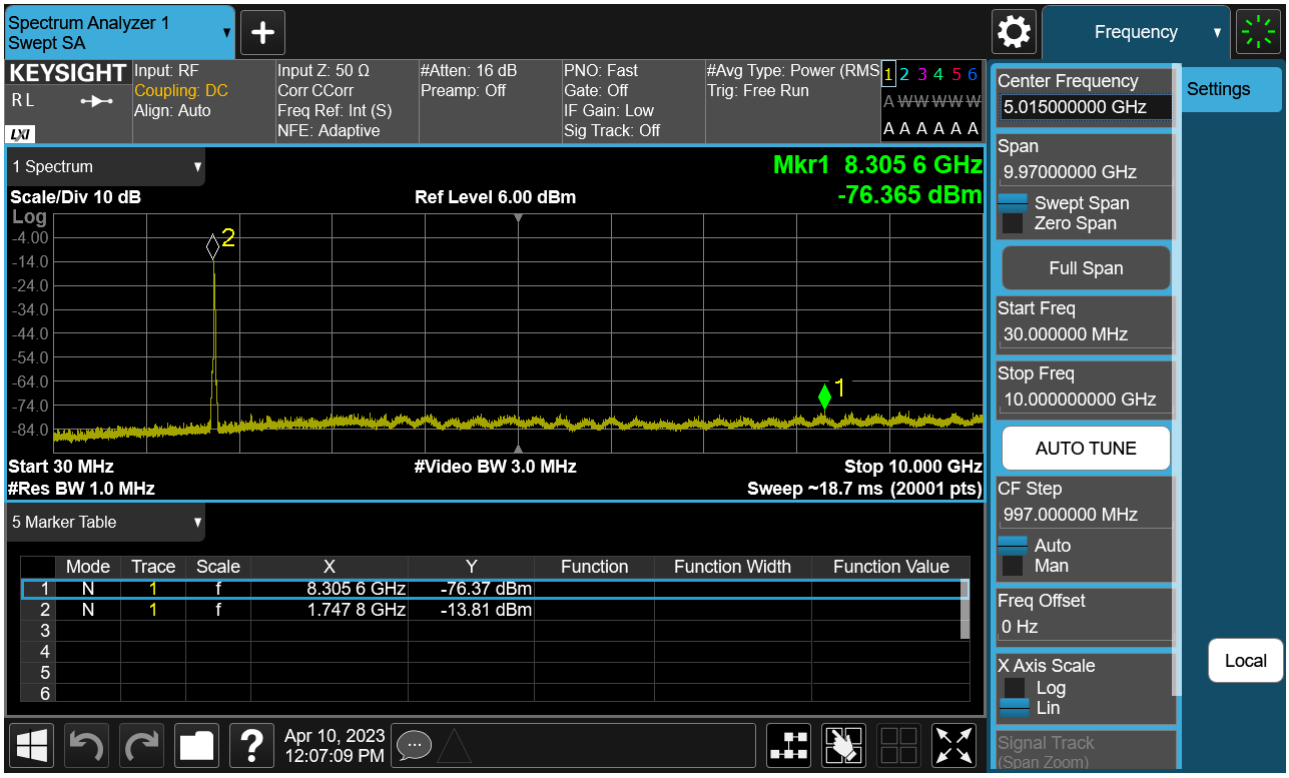
PCC 5 MHz Ch132599 RB25 Offset0 SCC 5 MHz Ch132647 RB25 Offset0



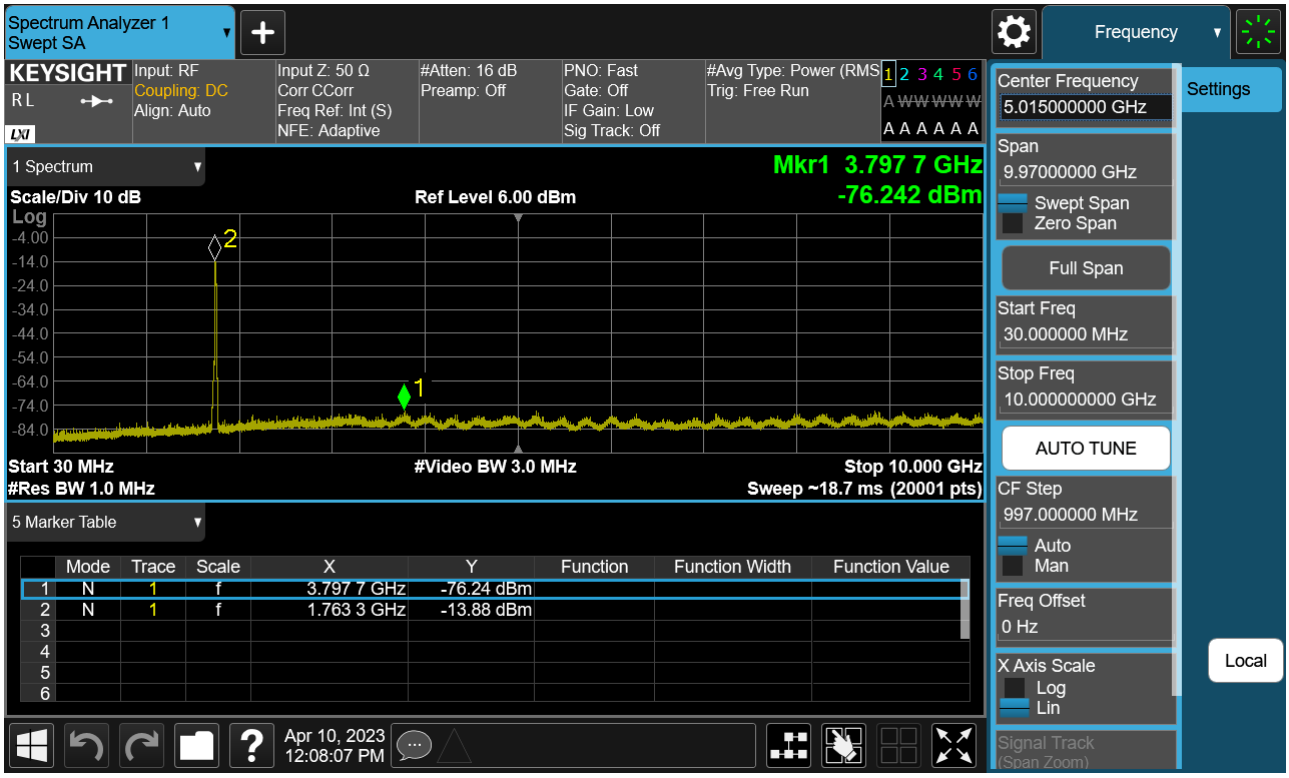
PCC 10 MHz Ch132022 RB50 Offset0 SCC 10 MHz Ch132121 RB50 Offset0



PCC 10 MHz Ch132373 RB50 Offset0 SCC 10 MHz Ch132472 RB50 Offset0

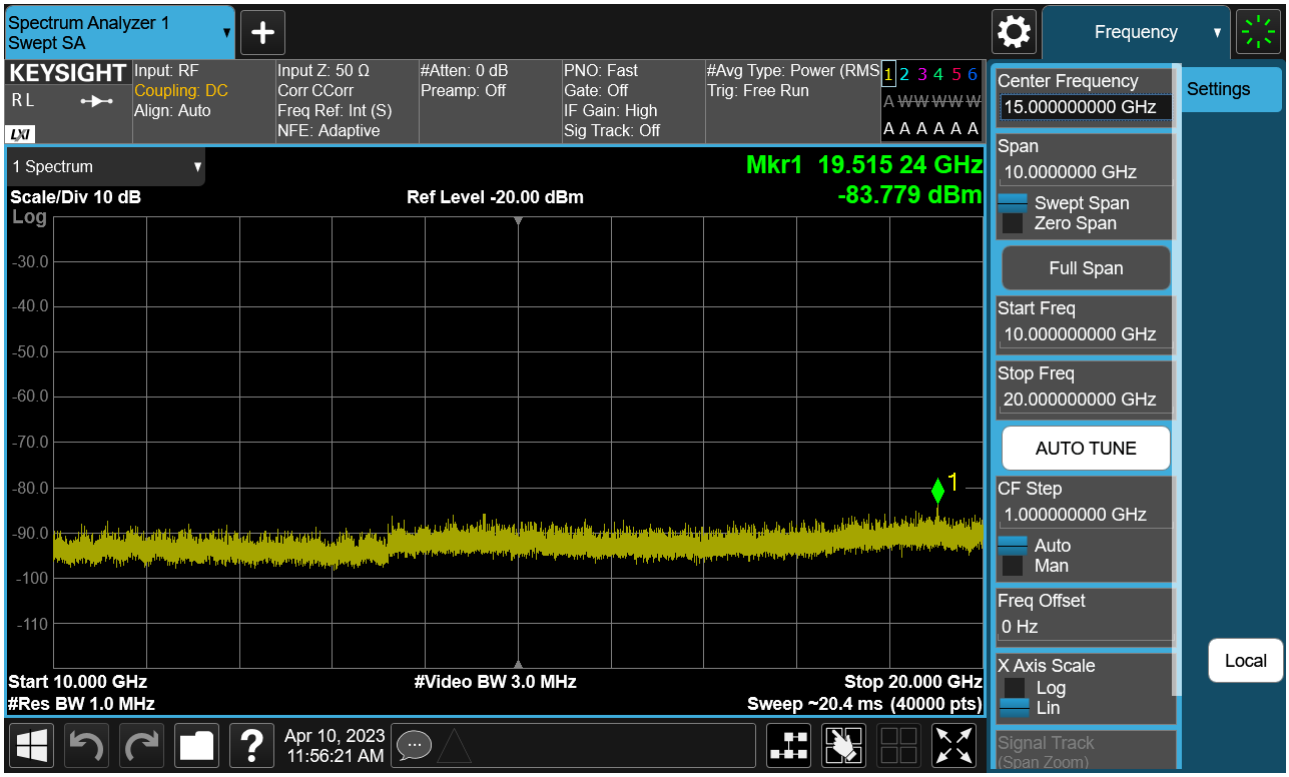


PCC 10 MHz Ch132523 RB50 Offset0 SCC 10 MHz Ch132622 RB50 Offset0

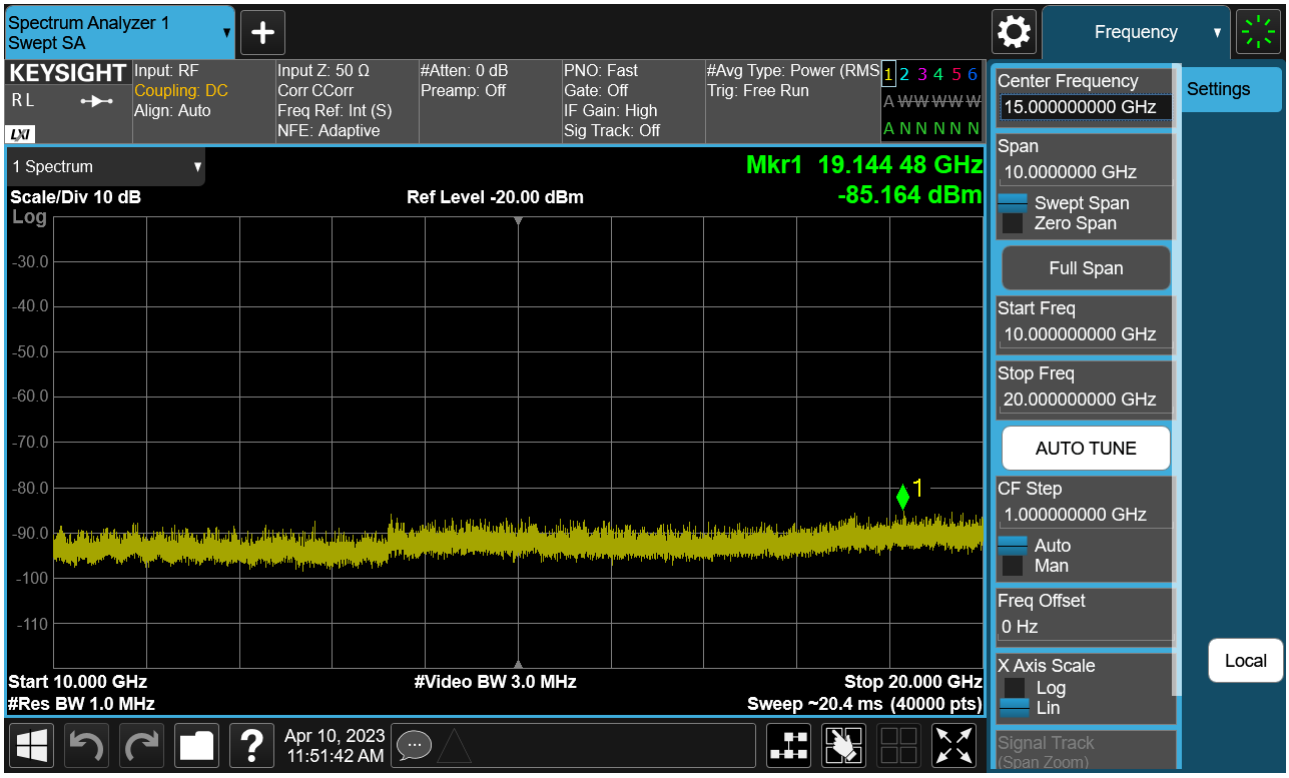


Frequency Range : 10 GHz ~ 26.5 GHz

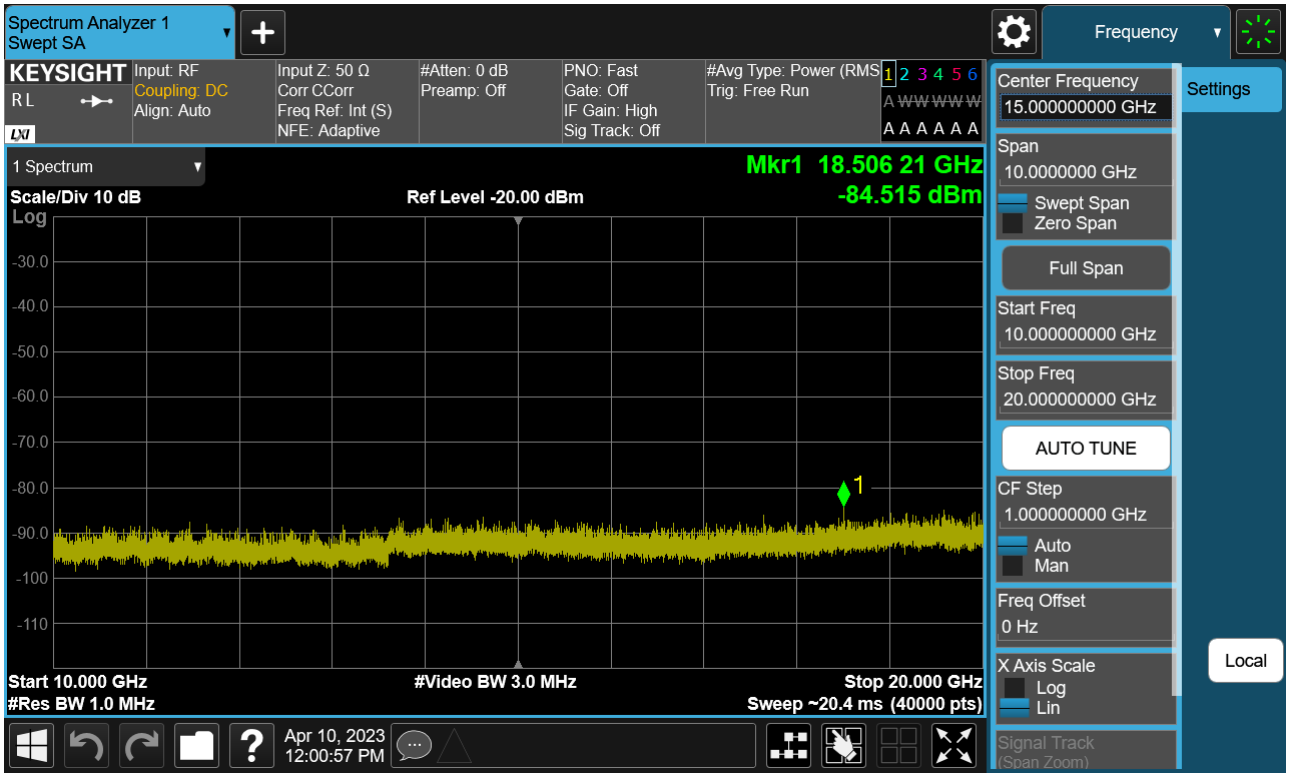
PCC 5 MHz Ch131997 RB1 Offset0, SCC 5 MHz Ch132045 RB1 Offset24



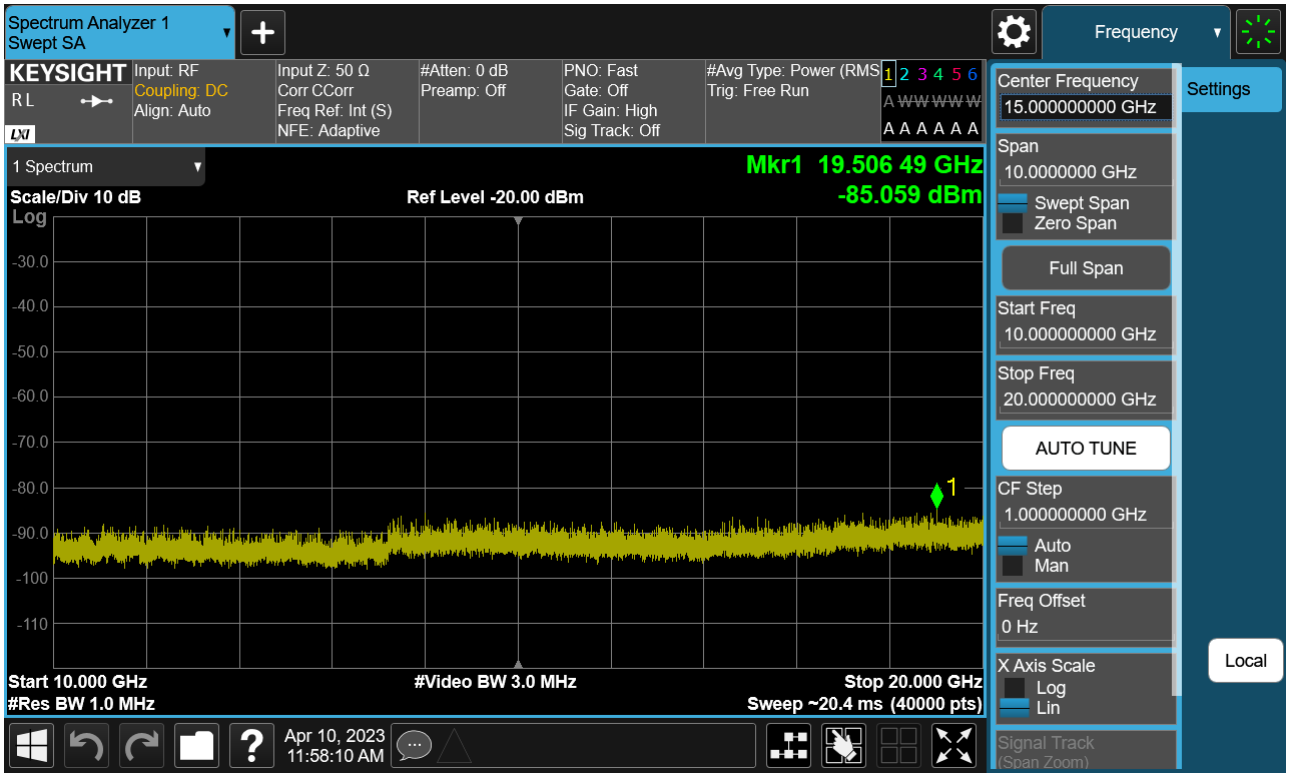
PCC 5 MHz Ch131997 RB1 Offset24, SCC 5 MHz Ch132045 RB1 Offset0



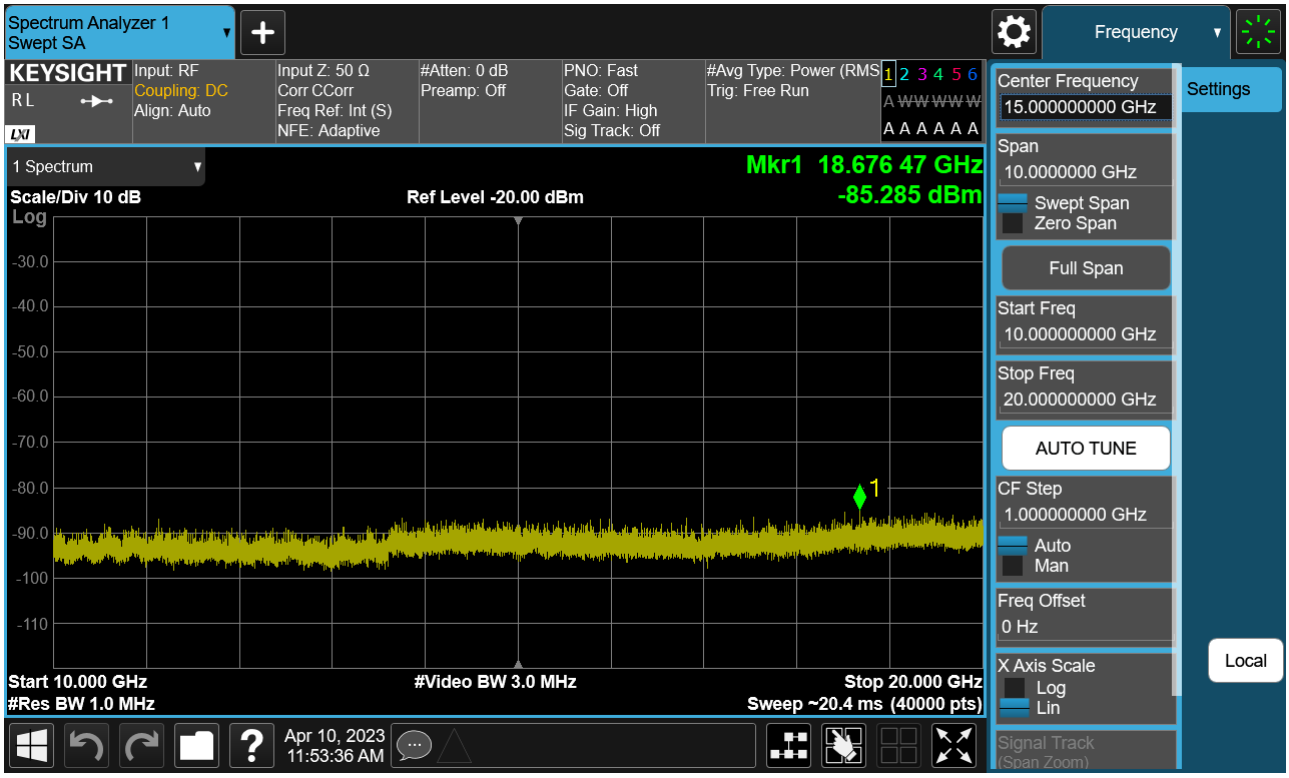
PCC 5 MHz Ch131997 RB25 Offset0, SCC 5 MHz Ch132045 RB25 Offset0



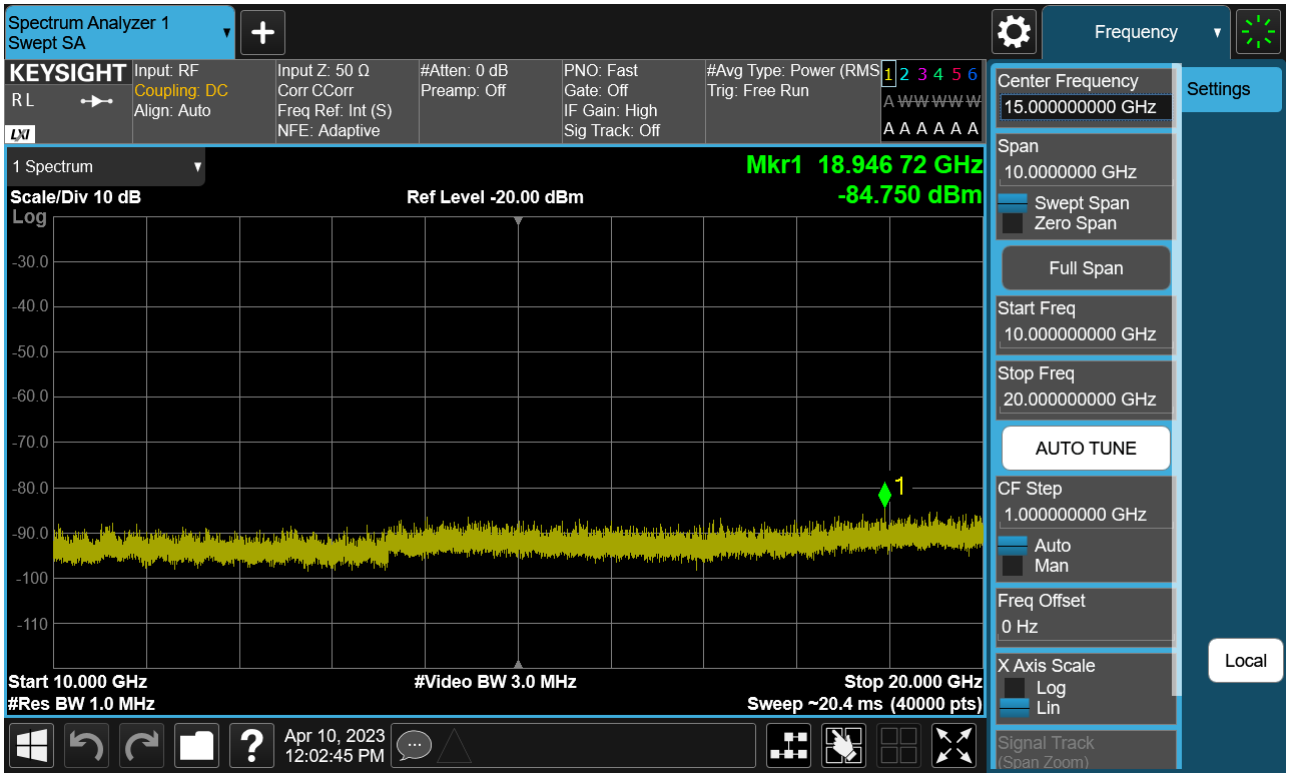
PCC 5 MHz Ch132398 RB1 Offset0, SCC 5 MHz Ch132446 RB1 Offset24



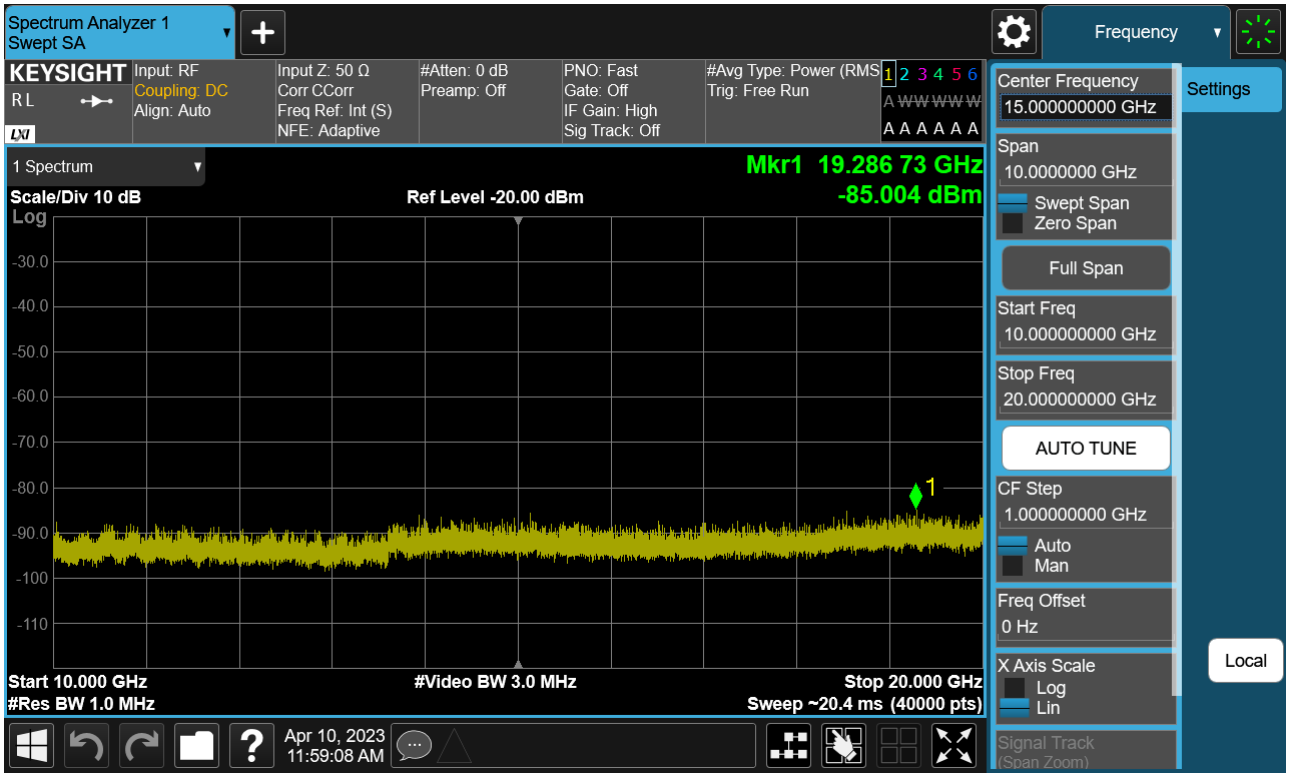
PCC 5 MHz Ch132398 RB1 Offset24, SCC 5 MHz Ch132446 RB1 Offset0



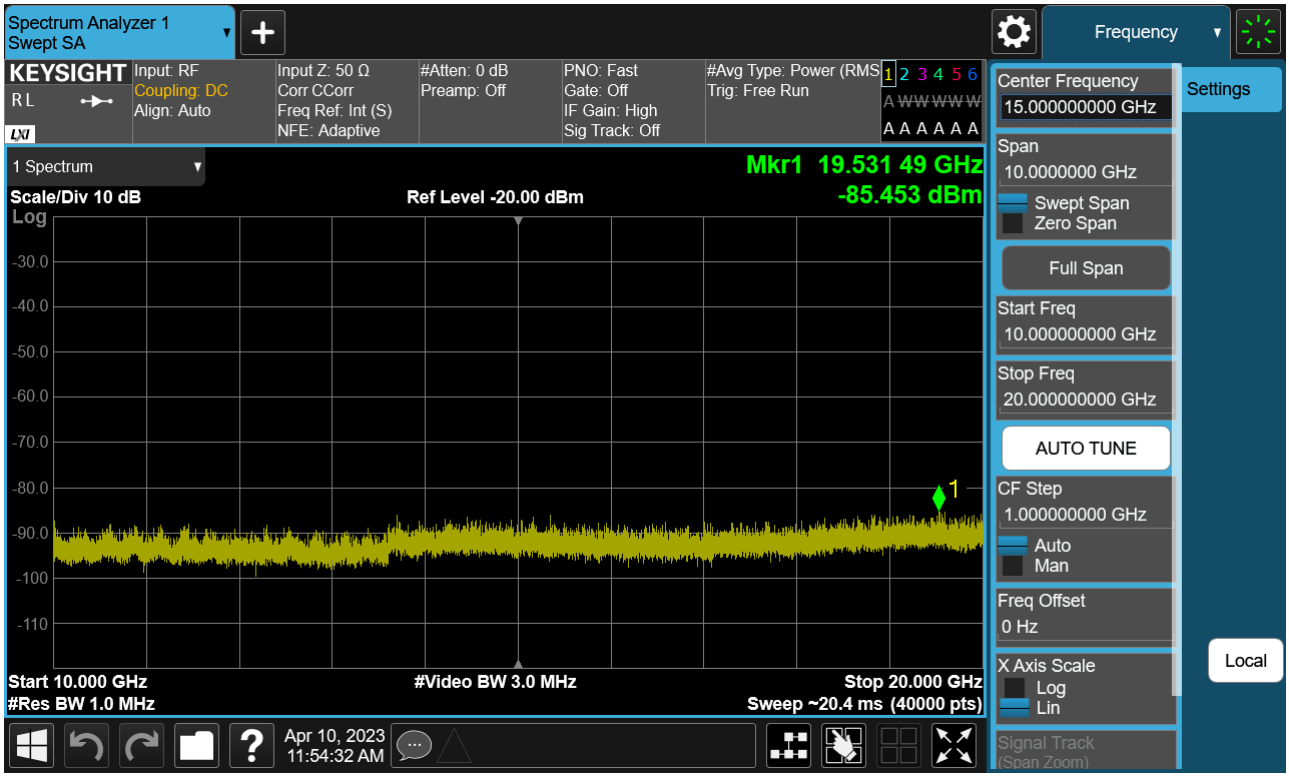
PCC 5 MHz Ch132398 RB25 Offset0, SCC 5 MHz Ch132446 RB25 Offset0



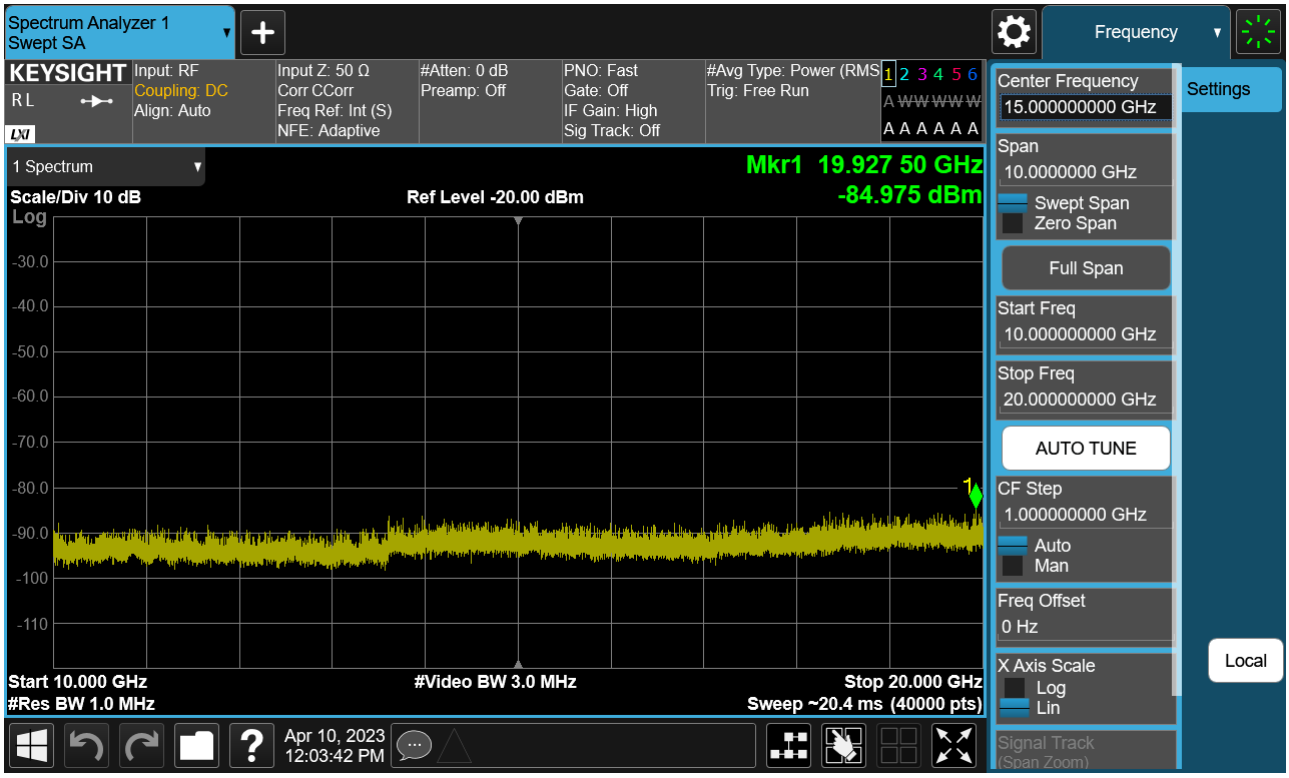
PCC 5 MHz Ch132599 RB1 Offset0, SCC 5 MHz Ch132647 RB1 Offset24



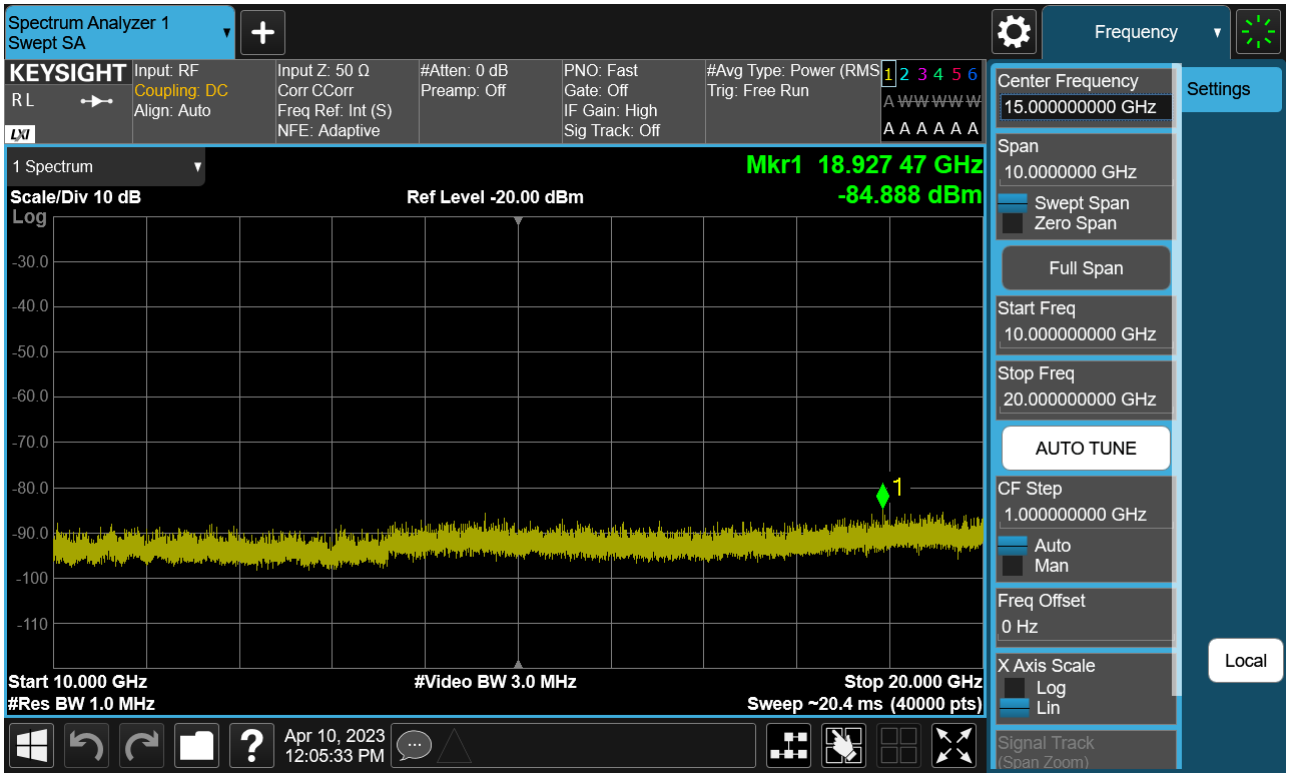
PCC 5 MHz Ch132599 RB1 Offset24, SCC 5 MHz Ch132647 RB1 Offset0



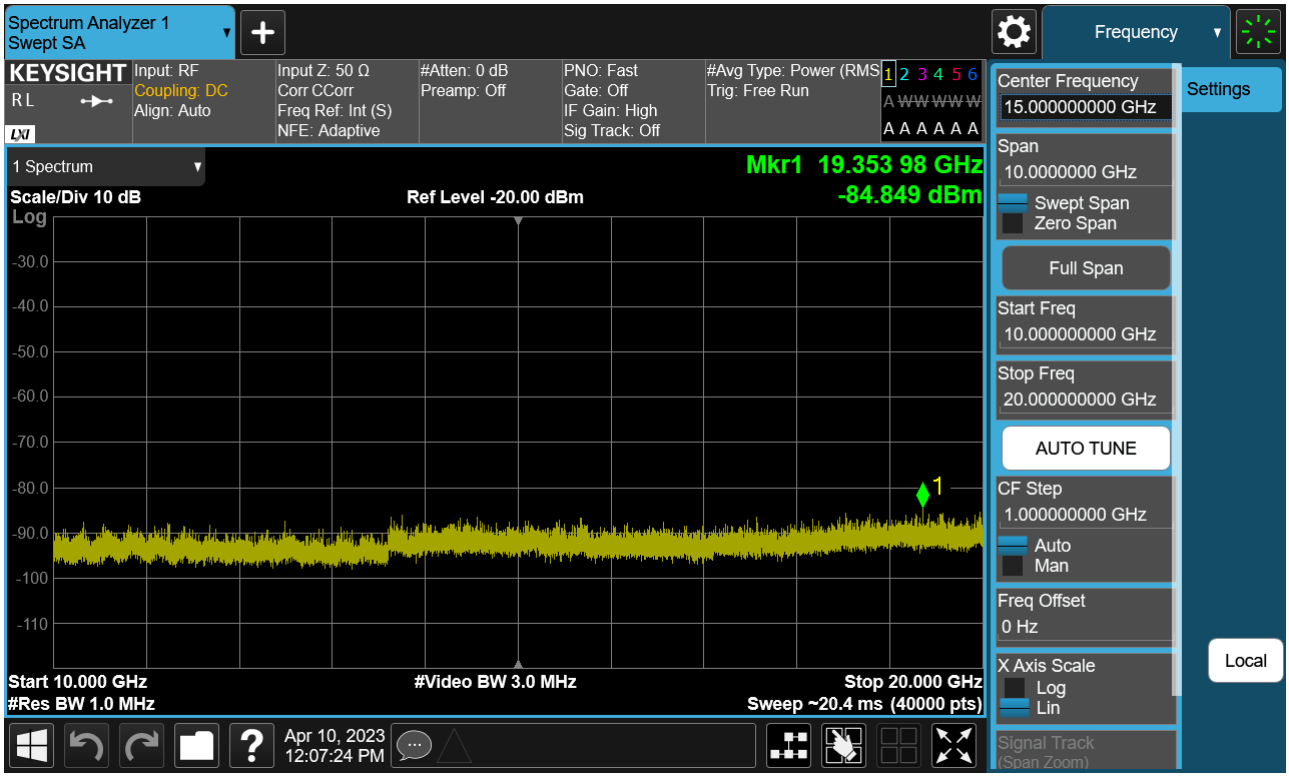
PCC 5 MHz Ch132599 RB25 Offset0, SCC 5 MHz Ch132647 RB25 Offset0



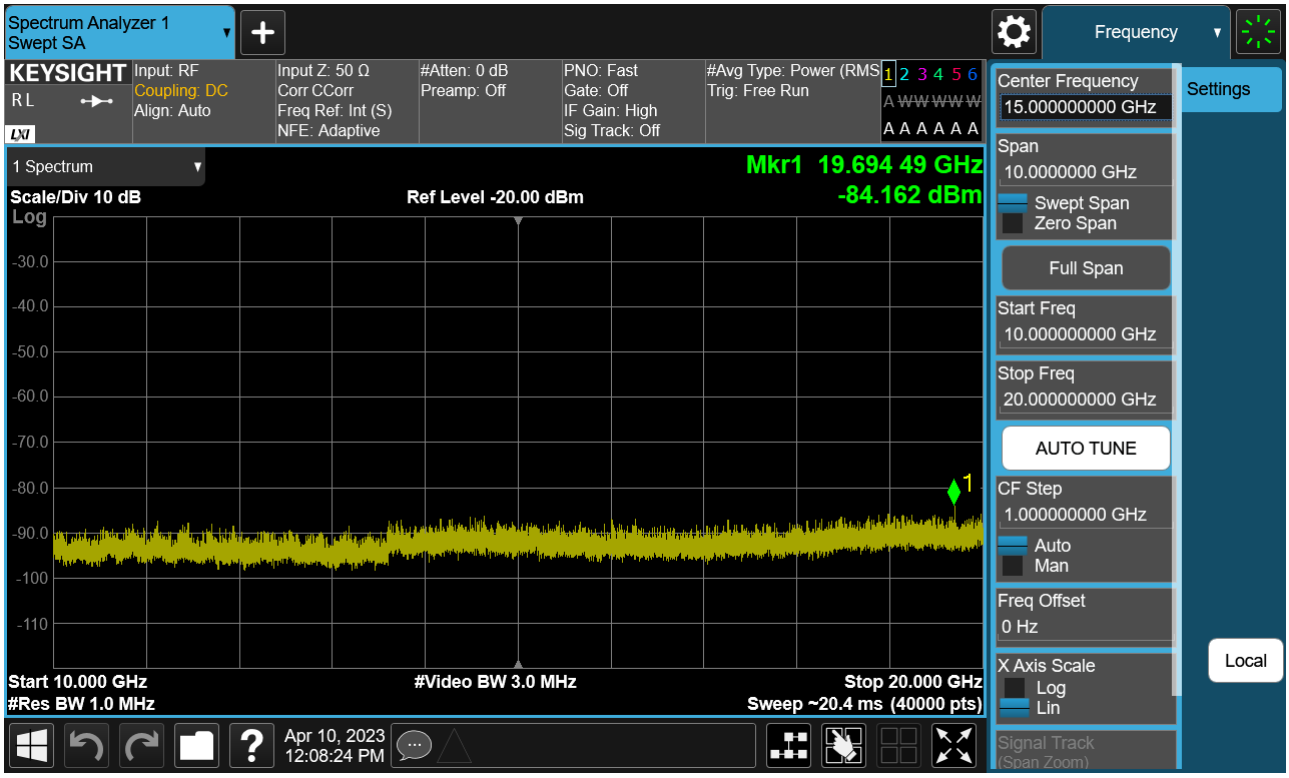
PCC 10 MHz Ch132022 RB50 Offset0, SCC 10 MHz Ch132121 RB50 Offset0



PCC 10 MHz Ch132373 RB50 Offset0, SCC 10 MHz Ch132472 RB50 Offset0

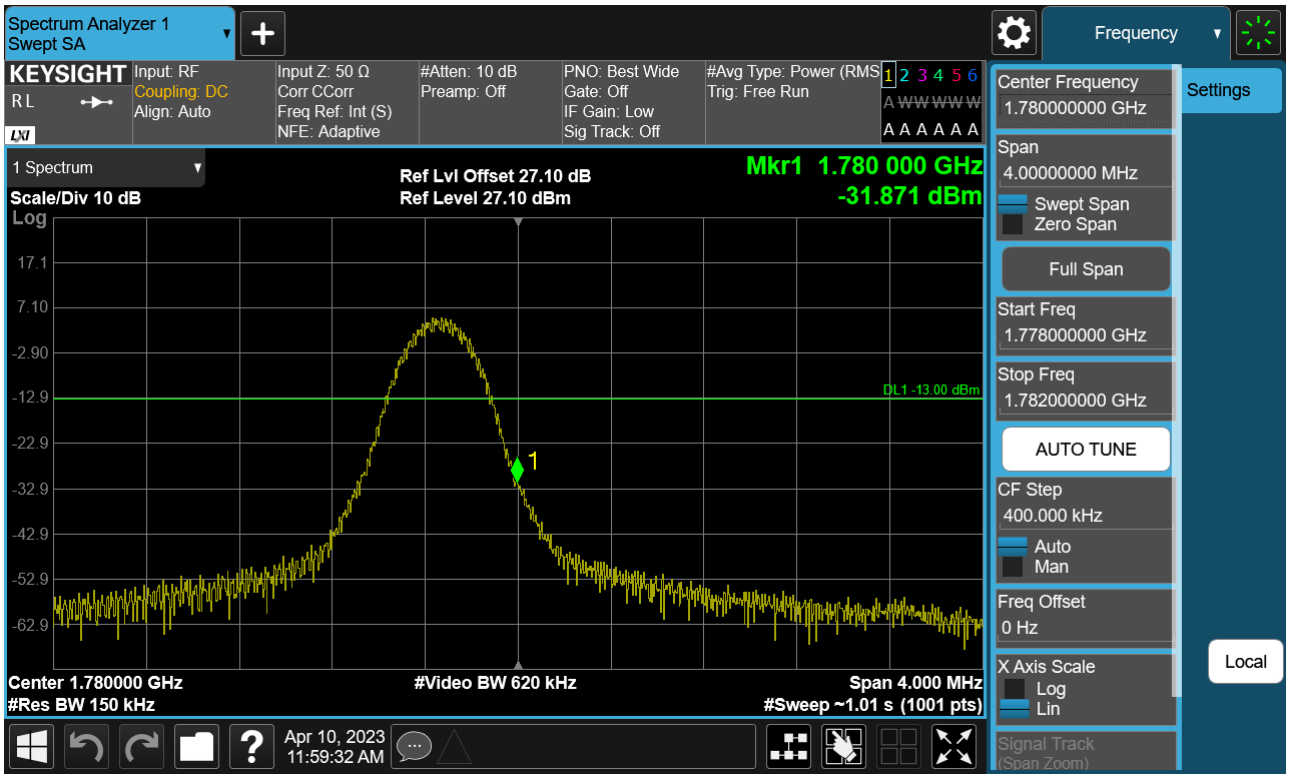


PCC 10 MHz Ch132523 RB50 Offset0, SCC 10 MHz Ch132622 RB50 Offset0

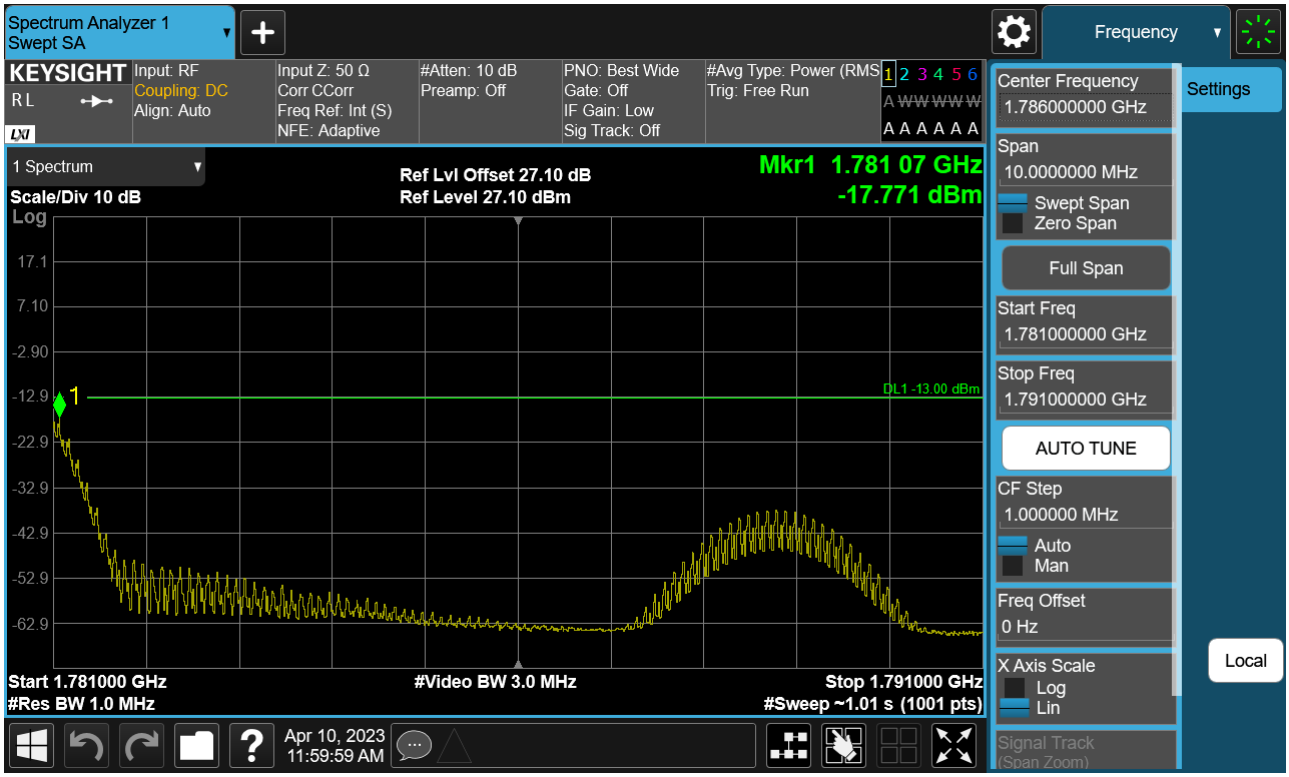


8.4 Channel Edge

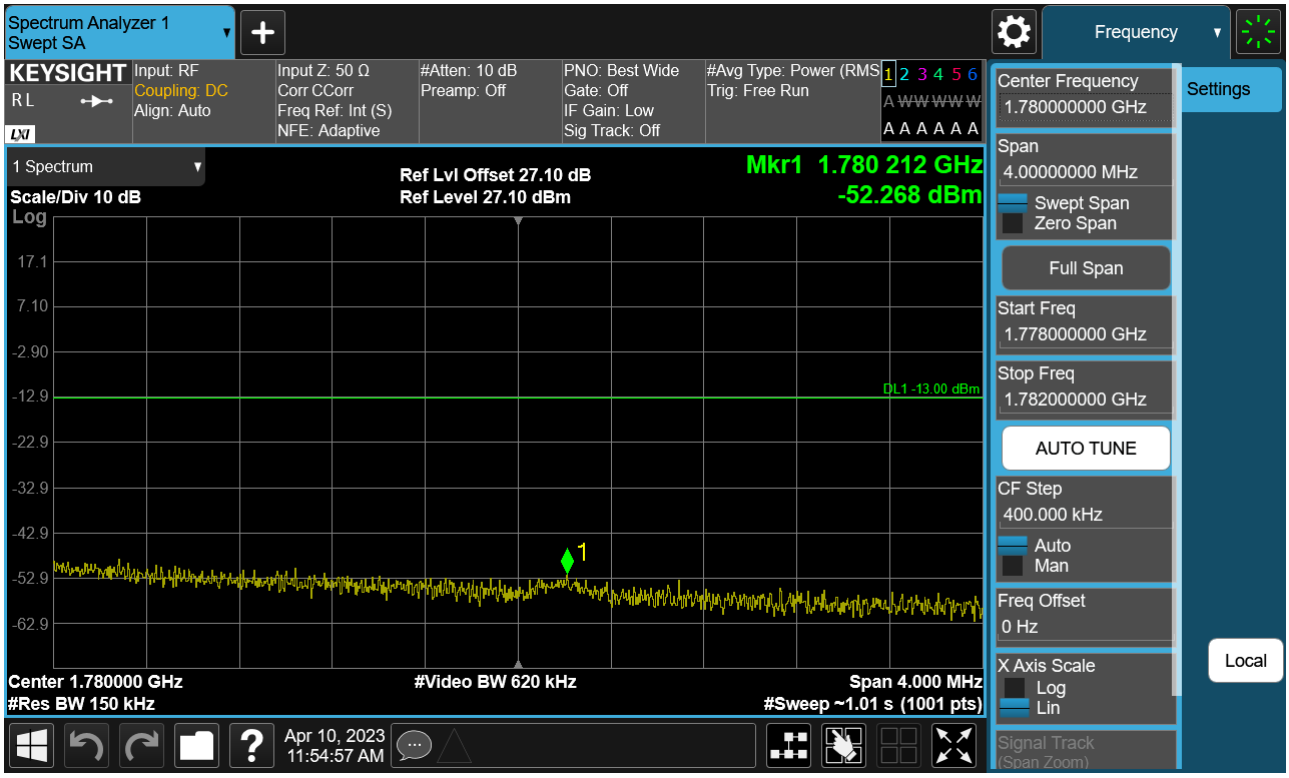
Highest Channel_PCC 5 MHz Ch132599 RB1 Offset0 SCC 5 MHz Ch132647 RB1 Offset24(1)



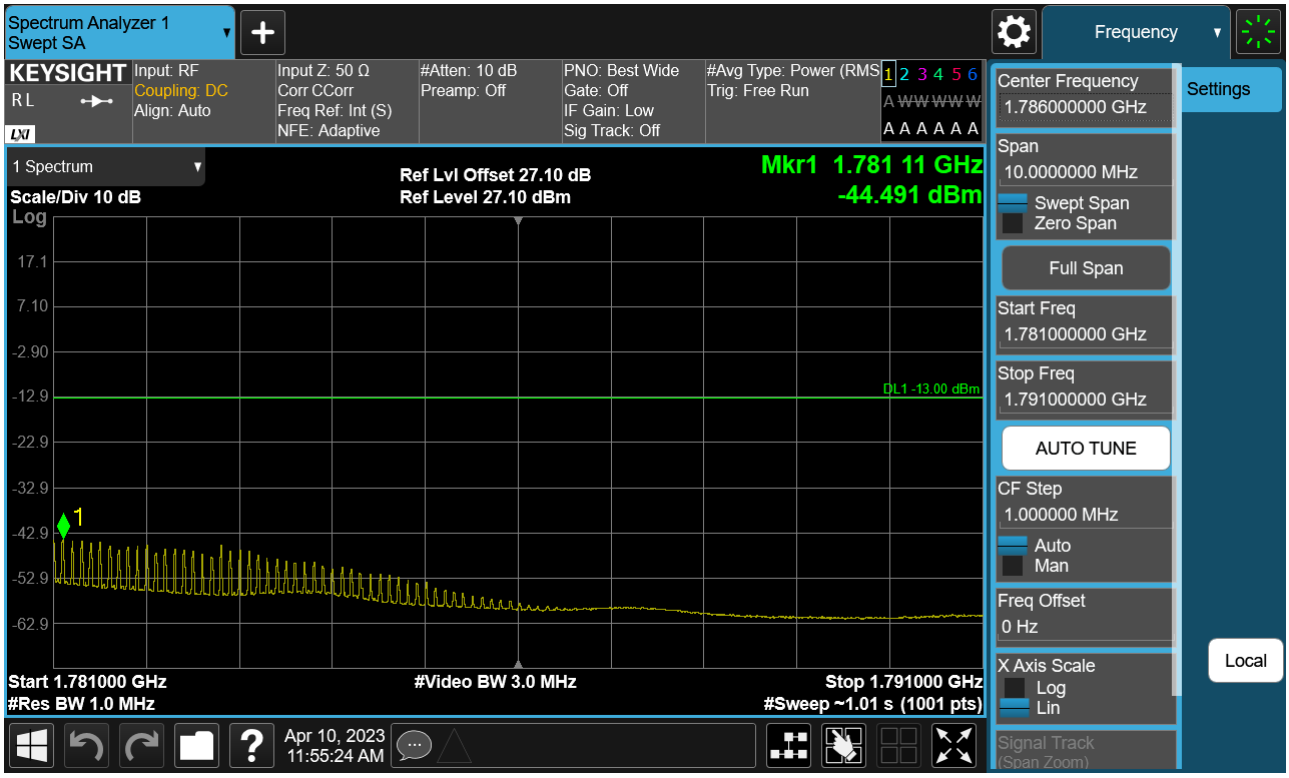
Highest Channel_PCC 5 MHz Ch132599 RB1 Offset0 SCC 5 MHz Ch132647 RB1 Offset24(2)



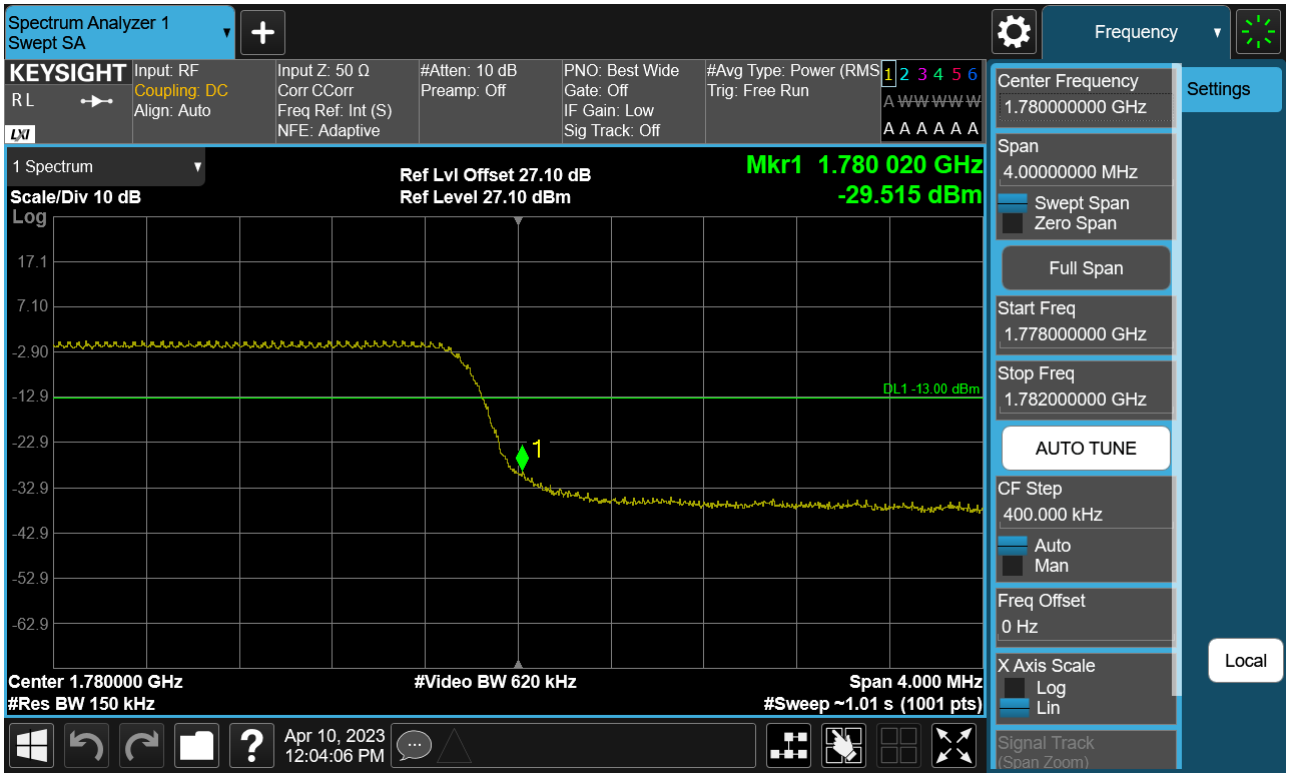
Highest Channel_PCC 5 MHz Ch132599 RB1 Offset24 SCC 5 MHz Ch132647 RB1 Offset0(1)



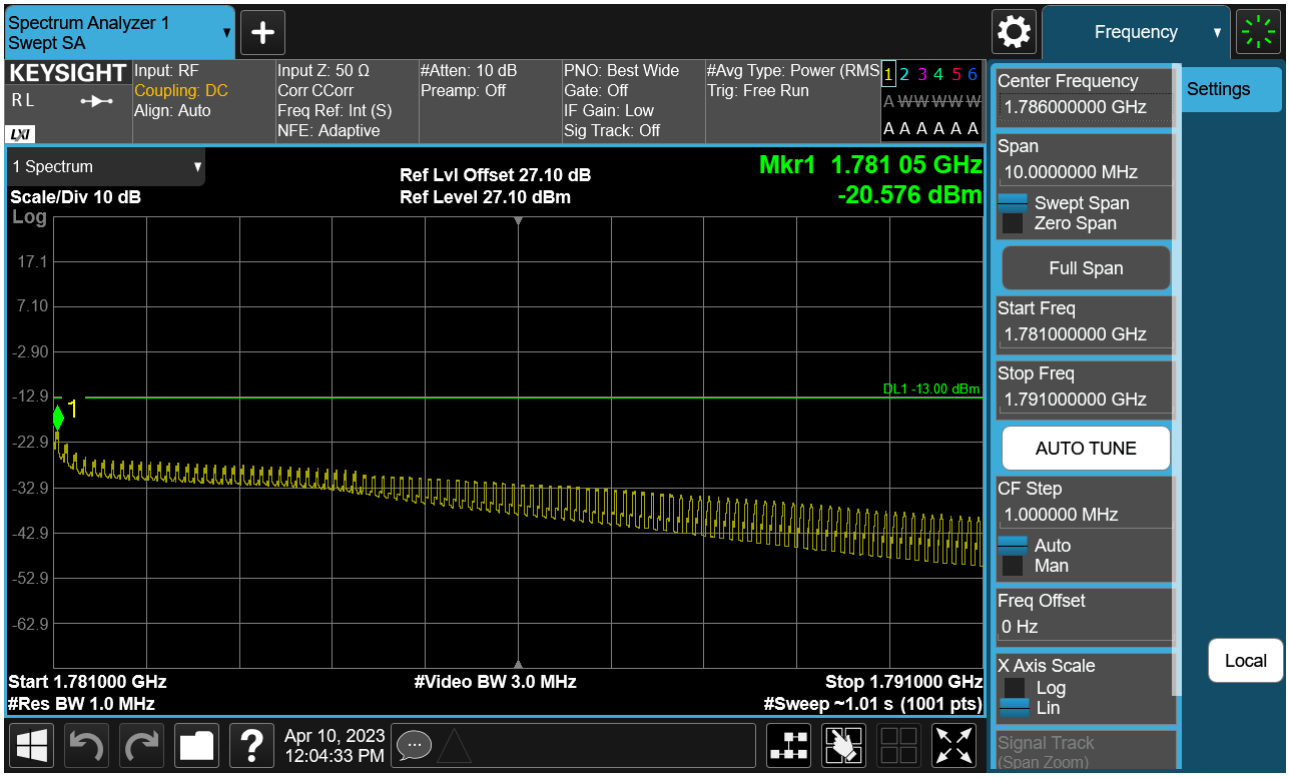
Highest Channel_PCC 5 MHz Ch132599 RB1 Offset24 SCC 5 MHz Ch132647 RB1 Offset0(2)



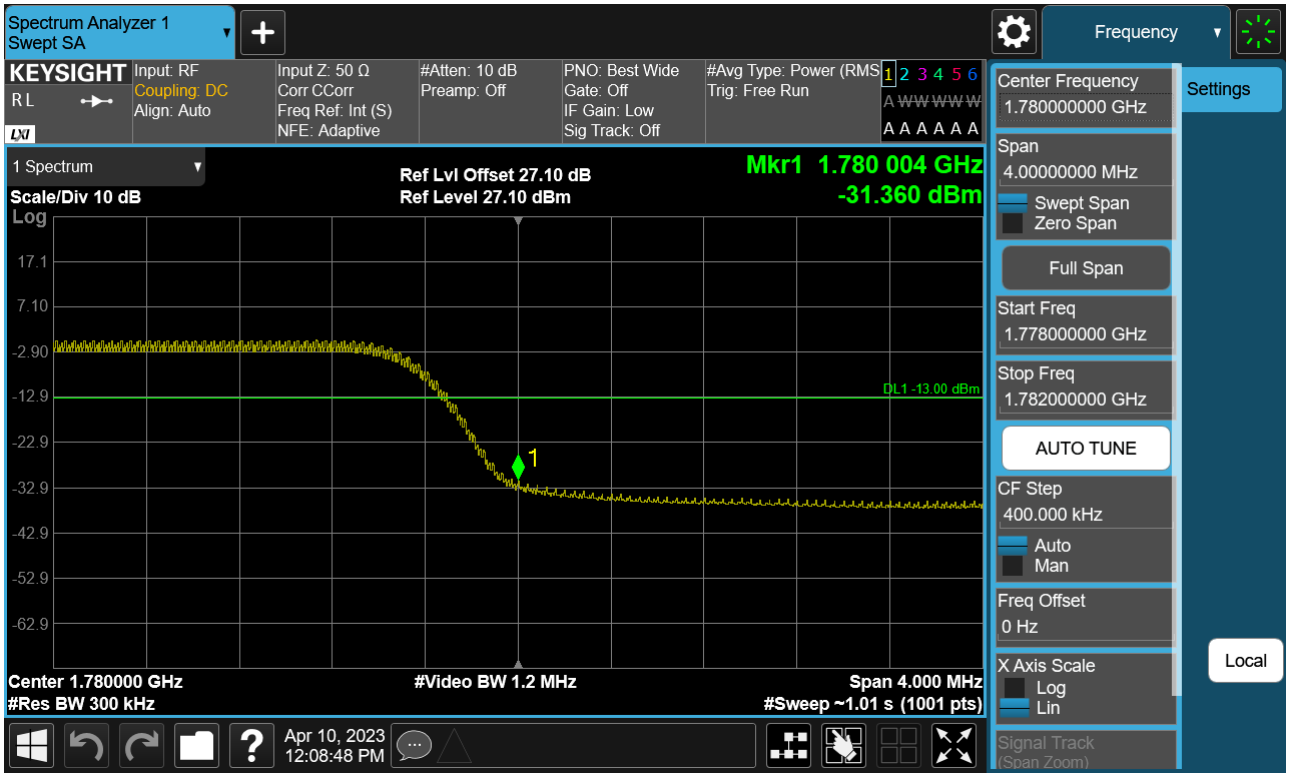
Highest Channel_PCC 5 MHz Ch132599 RB25 Offset0 SCC 5 MHz Ch132647 RB25 Offset0(1)



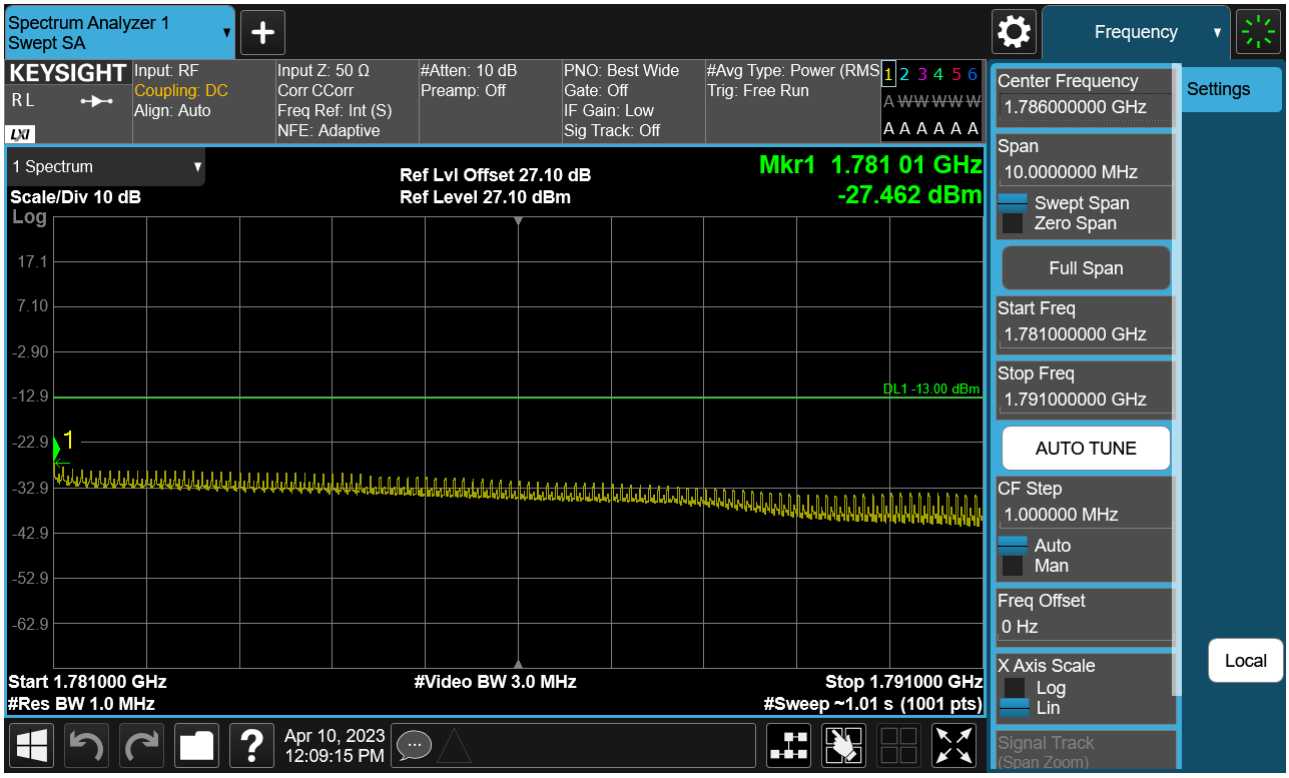
Highest Channel_PCC 5 MHz Ch132599 RB25 Offset0 SCC 5 MHz Ch132647 RB25 Offset0(2)



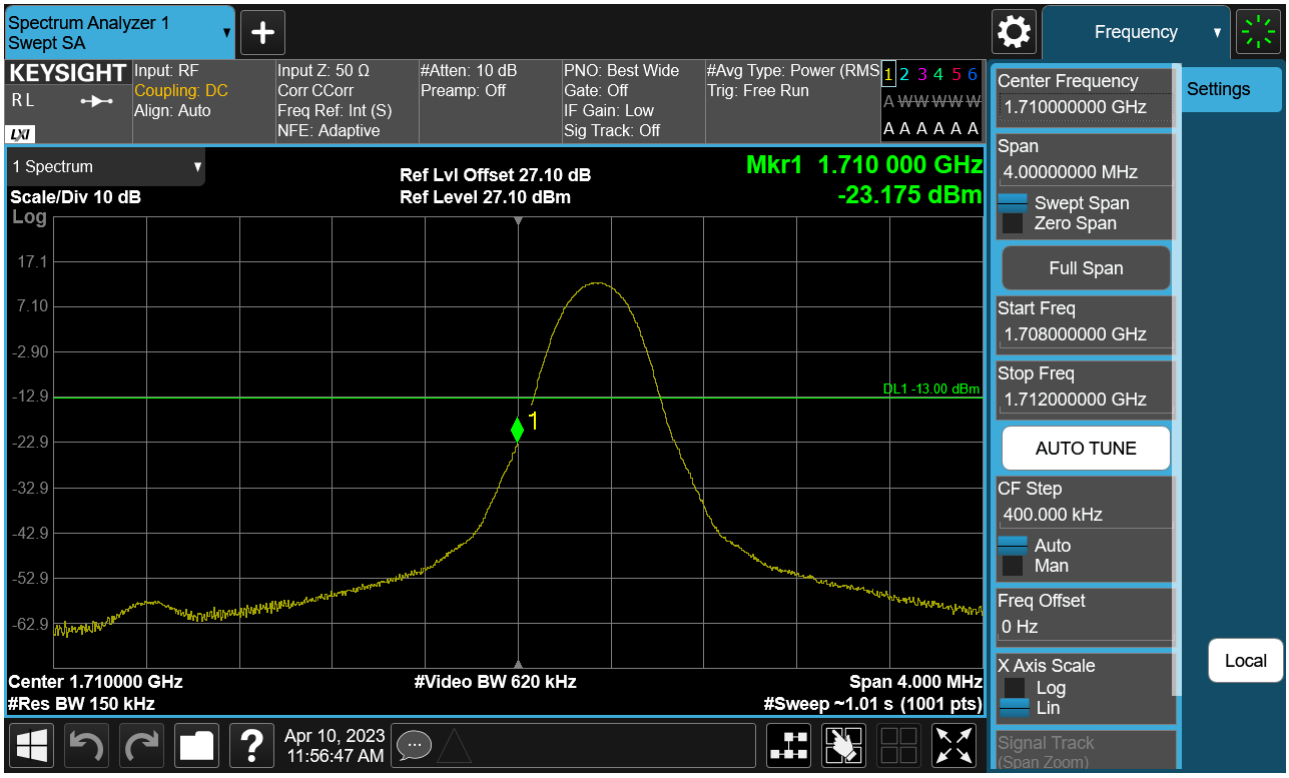
Highest Channel_PCC 10 MHz Ch132523 RB50 Offset0 SCC 10 MHz Ch132622 RB50 Offset0(1)



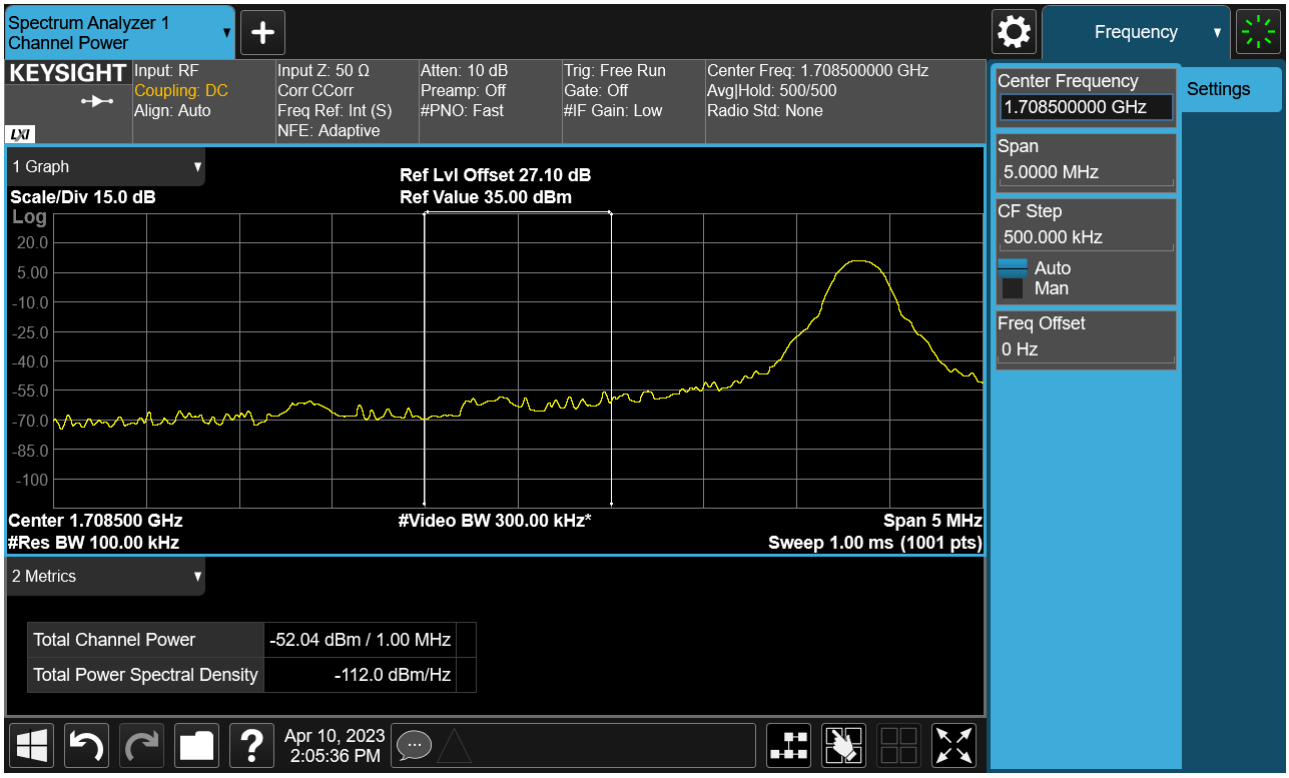
Highest Channel_PCC 10 MHz Ch132523 RB50 Offset0 SCC 10 MHz Ch132622 RB50 Offset0(2)



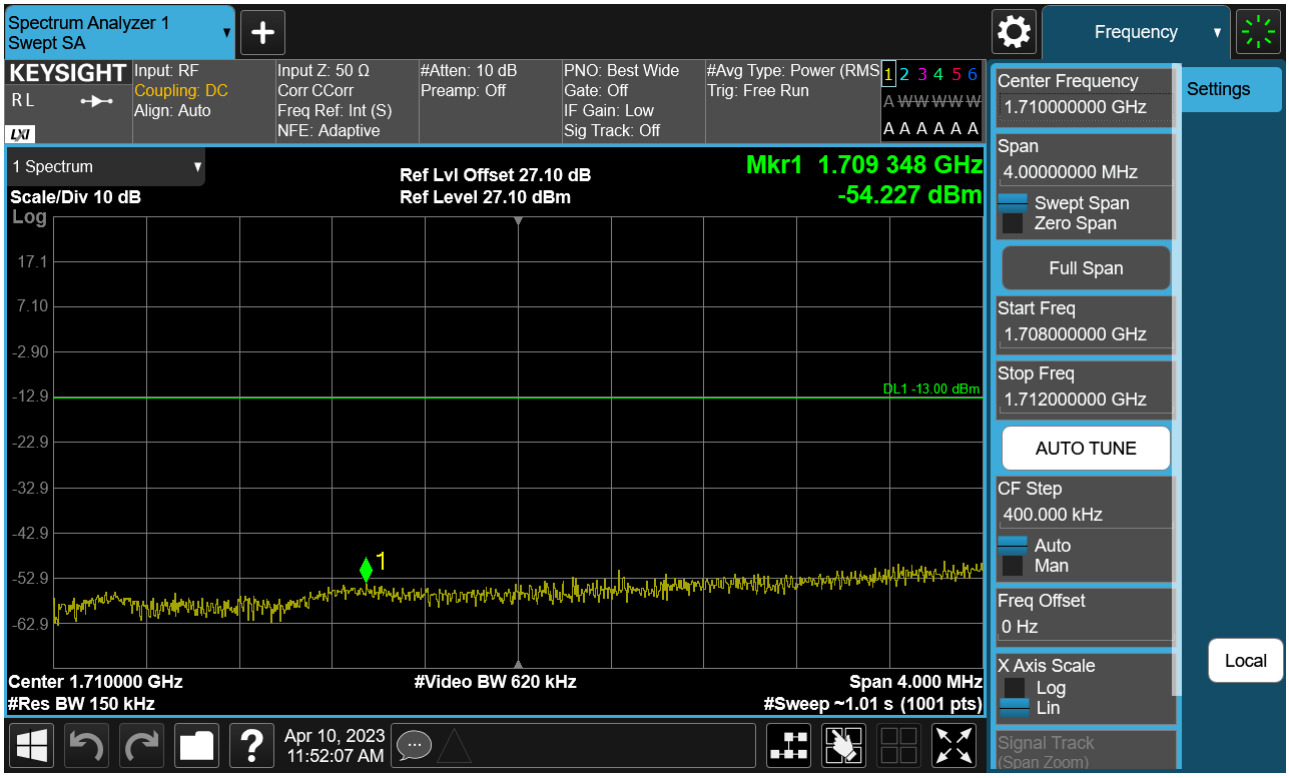
Lowest Channel_PCC 5 MHz Ch131997 RB1 Offset0 SCC 5 MHz Ch132045 RB1 Offset24(1)



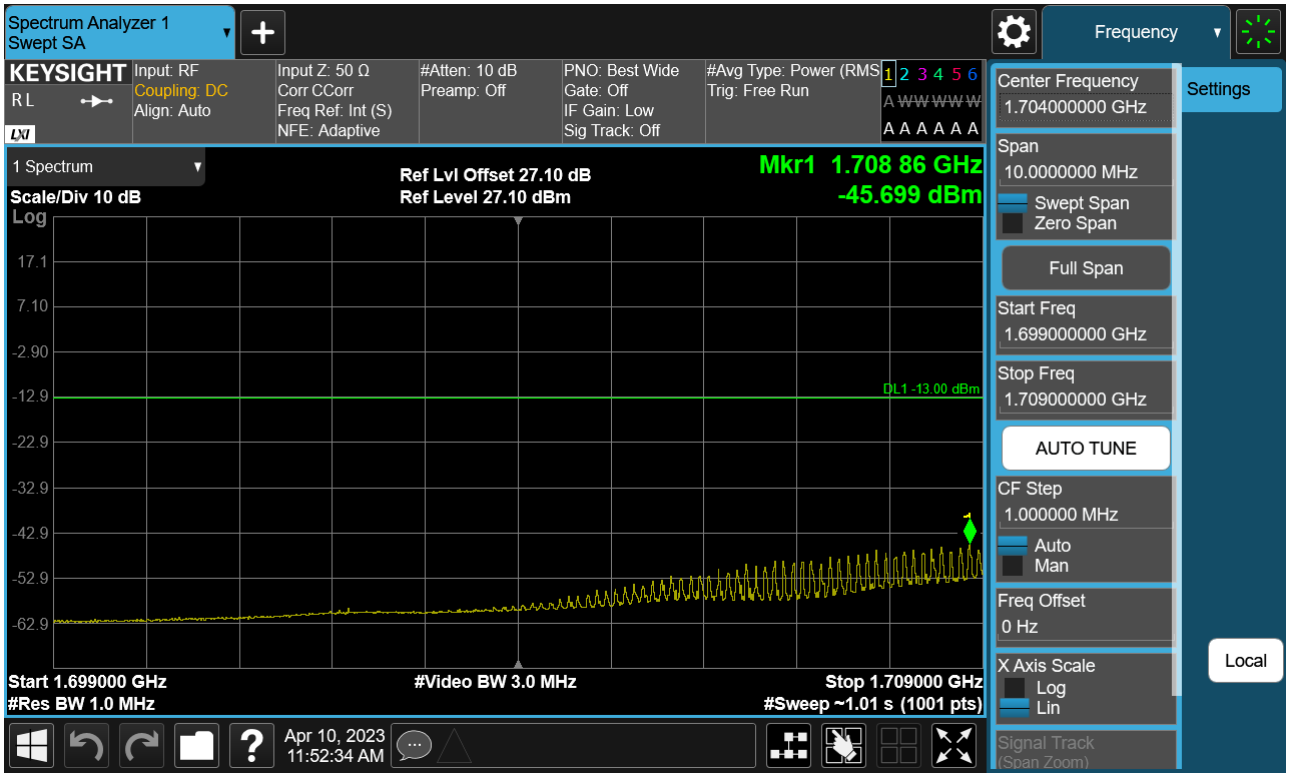
Lowest Channel_PCC 5 MHz Ch131997 RB1 Offset0 SCC 5 MHz Ch132045 RB1 Offset24(2)



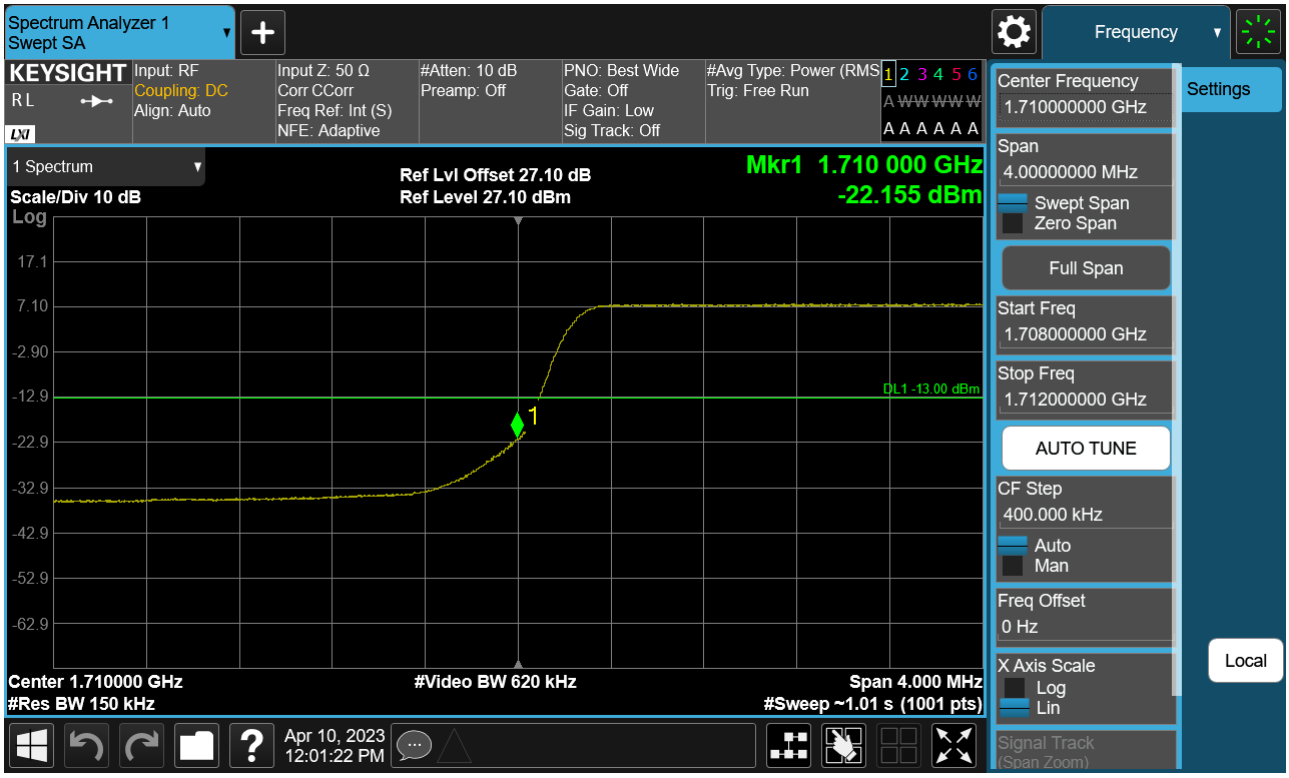
Lowest Channel_PCC 5 MHz Ch131997 RB1 Offset24 SCC 5 MHz Ch132045 RB1 Offset0(1)



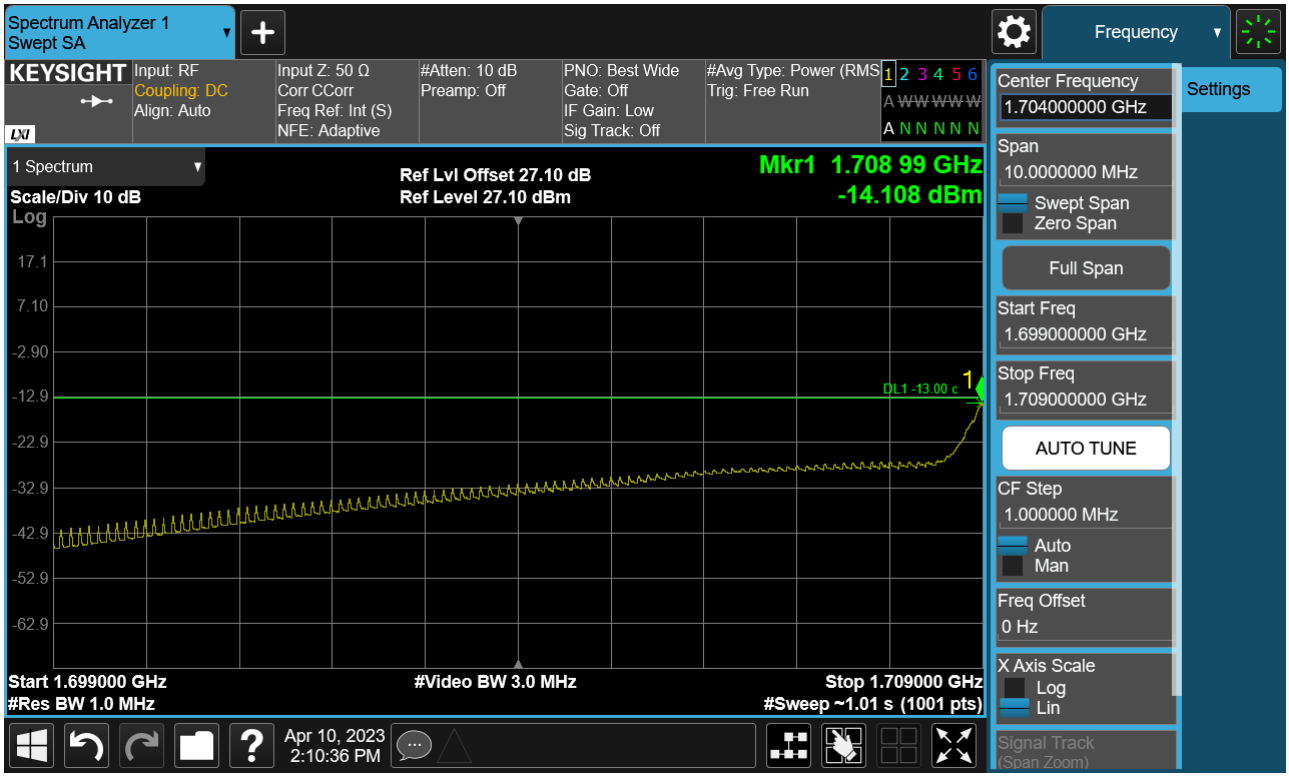
Lowest Channel_PCC 5 MHz Ch131997 RB1 Offset24 SCC 5 MHz Ch132045 RB1 Offset0(2)



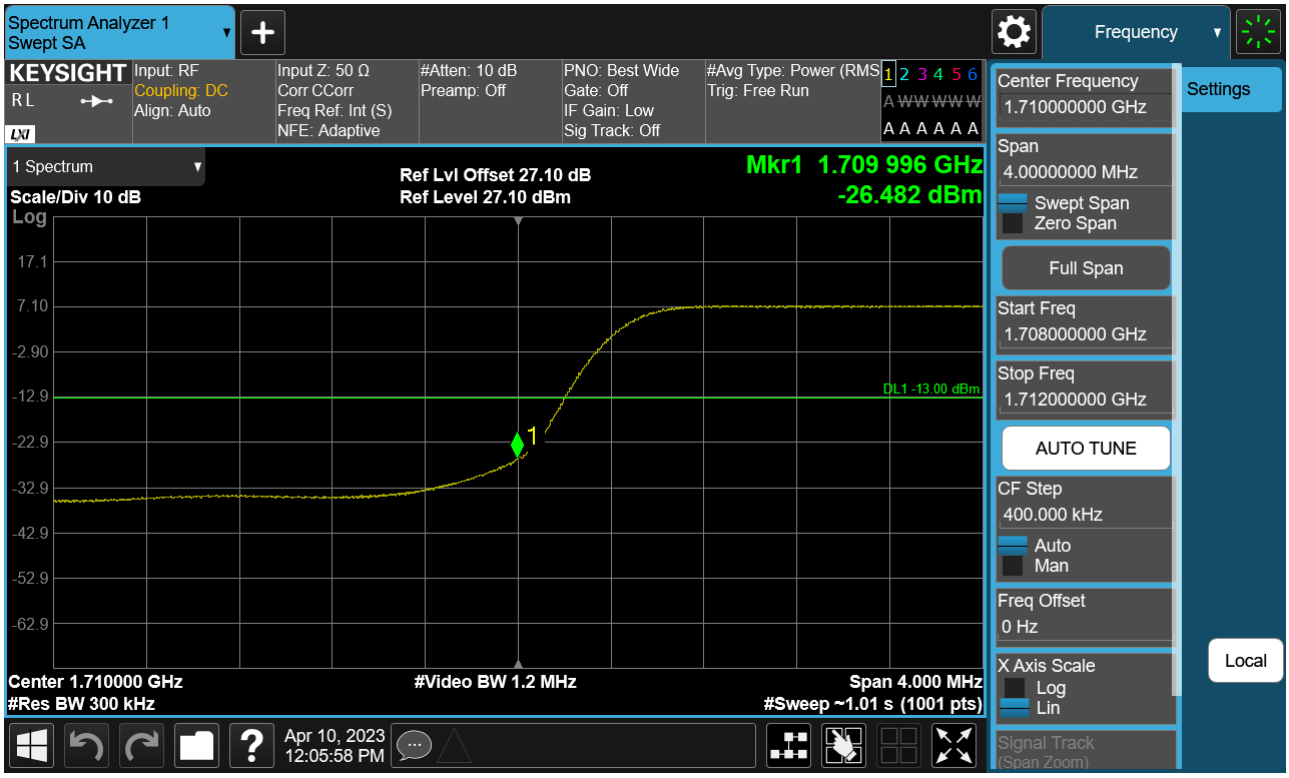
Lowest Channel_PCC 5 MHz Ch131997 RB25 Offset0 SCC 5 MHz Ch132045 RB25 Offset0(1)



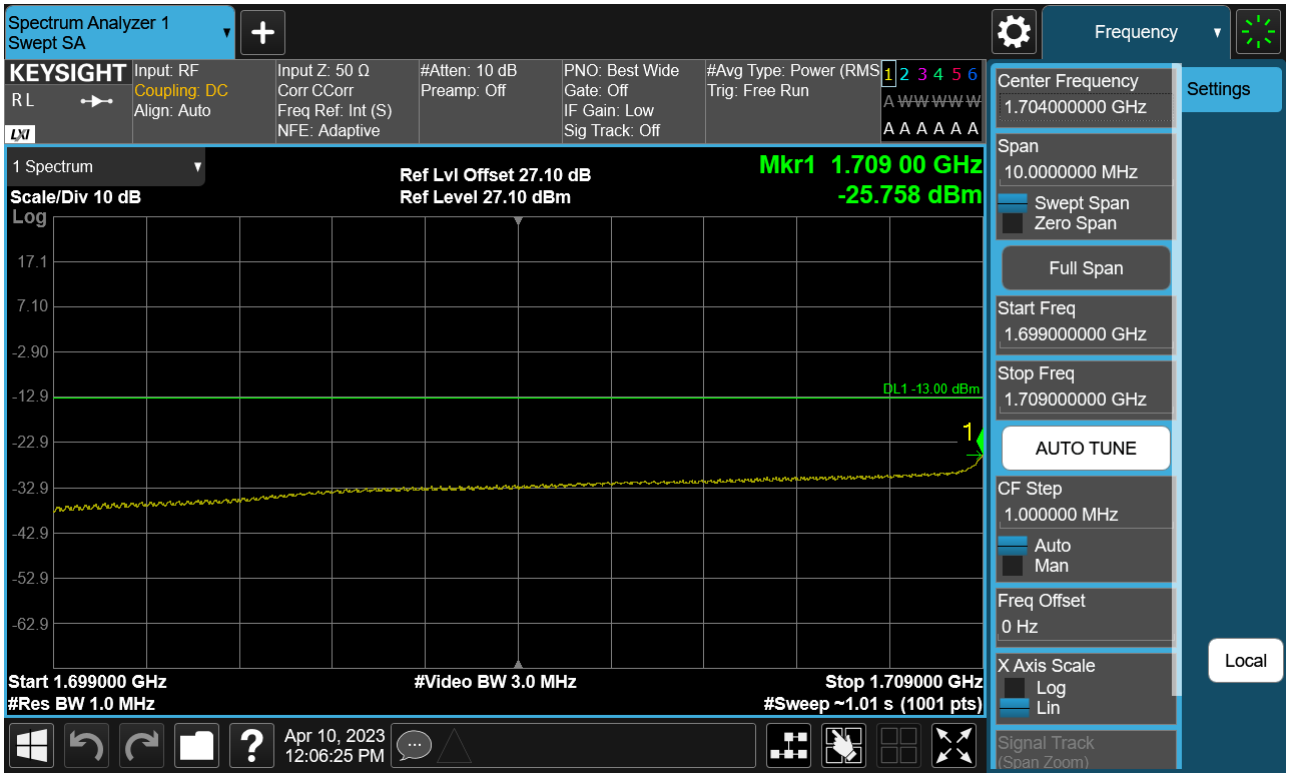
Lowest Channel_PCC 5 MHz Ch131997 RB25 Offset0 SCC 5 MHz Ch132045 RB25 Offset0(2)



Lowest Channel_PCC 10 MHz Ch132022 RB50 Offset0 SCC 10 MHz Ch132121 RB50 Offset0(1)



Lowest Channel_PCC 10 MHz Ch132022 RB50 Offset0 SCC 10 MHz Ch132121 RB50 Offset0(2)



8.5 Frequency Stability / Variation Of Ambient Temperature

▣ PCC Channel:	131997	
▣ PCC Frequency:	1712.5	MHz
▣ PCC BandWidth:	5	MHz
▣ SCC Channel:	132045	
▣ SCC Frequency:	1717.3	MHz
▣ SCC BandWidth:	5	MHz
▣ Voltage :	3.880	VDC
▣ LIMIT:	Emission must remain in band	

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100 %	3.880	+20(Ref)	0.030	-0.034	1712.500	1717.29987
100 %		-30	0.033	0.029	1712.500	1717.29998
100 %		-20	-0.041	-0.041	1712.500	1717.29986
100 %		-10	0.026	0.039	1712.500	1717.30007
100 %		0	0.039	-0.041	1712.500	1717.29987
100 %		10	-0.047	-0.037	1712.500	1717.29987
100 %		30	0.028	0.035	1712.500	1717.30002
100 %		40	-0.041	0.034	1712.500	1717.30002
100 %		50	0.029	-0.043	1712.500	1717.29989
Batt. Endpoint	3.400	20	0.028	0.022	1712.500	1717.30005

▣ PCC Channel: 132022
▣ PCC Frequency: 1715.0 MHz
▣ PCC BandWidth: 10 MHz
▣ SCC Channel: 132094
▣ SCC Frequency: 1722.2 MHz
▣ SCC BandWidth: 5 MHz
▣ Voltage : 3.880 VDC
▣ LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100 %	3.880	+20(Ref)	0.035	-0.030	1715.00006	1722.19988
100 %		-30	0.030	0.033	1715.00006	1722.19998
100 %		-20	-0.046	-0.037	1714.99988	1722.19985
100 %		-10	0.021	0.044	1714.99997	1722.20006
100 %		0	0.038	-0.040	1715.00004	1722.19986
100 %		10	-0.041	-0.041	1714.99985	1722.19988
100 %		30	0.027	0.027	1715.00003	1722.20006
100 %		40	-0.039	0.032	1714.99987	1722.20006
100 %		50	0.024	-0.049	1715.00002	1722.19992
Batt. Endpoint	3.400	20	0.027	0.021	1715.00005	1722.19999

▣ PCC Channel: 132047
▣ PCC Frequency: 1717.5 MHz
▣ PCC BandWidth: 15 MHz
▣ SCC Channel: 132140
▣ SCC Frequency: 1726.8 MHz
▣ SCC BandWidth: 5 MHz
▣ Voltage : 3.880 VDC
▣ LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100 %	3.880	+20(Ref)	0.034	-0.038	1717.49999	1726.79992
100 %		-30	0.029	0.036	1717.50005	1726.80005
100 %		-20	-0.049	-0.042	1717.49989	1726.79985
100 %		-10	0.027	0.036	1717.50000	1726.80004
100 %		0	0.036	-0.042	1717.50000	1726.79986
100 %		10	-0.042	-0.044	1717.49989	1726.79985
100 %		30	0.033	0.027	1717.50003	1726.80000
100 %		40	-0.035	0.036	1717.49987	1726.80000
100 %		50	0.026	-0.048	1717.50005	1726.79986
Batt. Endpoint	3.400	20	0.036	0.024	1717.49997	1726.80005

▣ PCC Channel: 132599
▣ PCC Frequency: 1772.7 MHz
▣ PCC BandWidth: 5 MHz
▣ SCC Channel: 132647
▣ SCC Frequency: 1777.5 MHz
▣ SCC BandWidth: 5 MHz
▣ Voltage : 3.880 VDC
▣ LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100 %	3.880	+20(Ref)	0.034	-0.031	1772.70000	1777.49987
100 %		-30	0.037	0.028	1772.70004	1777.50002
100 %		-20	-0.048	-0.044	1772.69985	1777.49994
100 %		-10	0.020	0.037	1772.70000	1777.50003
100 %		0	0.034	-0.042	1772.70003	1777.49984
100 %		10	-0.041	-0.036	1772.69990	1777.49991
100 %		30	0.034	0.026	1772.70003	1777.49998
100 %		40	-0.032	0.037	1772.69986	1777.50005
100 %		50	0.024	-0.042	1772.70004	1777.49989
Batt. Endpoint	3.400	20	0.032	0.023	1772.70002	1777.49998

▣ PCC Channel: 132572
▣ PCC Frequency: 1770.0 MHz
▣ PCC BandWidth: 10 MHz
▣ SCC Channel: 132644
▣ SCC Frequency: 1777.2 MHz
▣ SCC BandWidth: 5 MHz
▣ Voltage : 3.880 VDC
▣ LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100 %	3.880	+20(Ref)	0.031	-0.029	1770.00013	1777.19993
100 %		-30	0.038	0.027	1769.99998	1777.19998
100 %		-20	-0.046	-0.037	1769.99987	1777.19984
100 %		-10	0.019	0.044	1769.99997	1777.20000
100 %		0	0.042	-0.046	1769.99999	1777.19992
100 %		10	-0.044	-0.045	1769.99985	1777.19989
100 %		30	0.031	0.028	1770.00001	1777.19998
100 %		40	-0.040	0.041	1769.99988	1777.19999
100 %		50	0.021	-0.048	1770.00005	1777.19986
Batt. Endpoint	3.400	20	0.032	0.028	1769.99997	1777.19999

▣ PCC Channel: 132549
▣ PCC Frequency: 1767.7 MHz
▣ PCC BandWidth: 15 MHz
▣ SCC Channel: 132642
▣ SCC Frequency: 1777.0 MHz
▣ SCC BandWidth: 5 MHz
▣ Voltage : 3.880 VDC
▣ LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100 %	3.880	+20(Ref)	0.033	-0.028	1767.70004	1776.99986
100 %		-30	0.035	0.029	1767.69999	1776.99997
100 %		-20	-0.040	-0.038	1767.69988	1776.99989
100 %		-10	0.028	0.038	1767.69998	1777.00007
100 %		0	0.037	-0.049	1767.70001	1776.99984
100 %		10	-0.041	-0.045	1767.69985	1776.99990
100 %		30	0.029	0.031	1767.70006	1777.00004
100 %		40	-0.033	0.041	1767.69990	1776.99998
100 %		50	0.027	-0.049	1767.70000	1776.99986
Batt. Endpoint	3.400	20	0.036	0.022	1767.70004	1776.99997

8.6 Radiated Spurious Emissions

▣ PCC Channel : 132047 (1717.5 MHz)

▣ PCC BW(MHz) : 15

▣ PCC RB/ RB Offset : 1/ 74

▣ SCC Channel : 132140 (1726.8 MHz)

▣ SCC BW(MHz) : 5

▣ SCC RB/ RB Offset : 1/ 0

▣ DISTANCE: 3 meters

▣ LIMIT: -13.0 dBm

Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	Result (dBm)
3 444.30	-55.09	12.37	-62.42	3.02	H	-53.06
5 166.45	-54.21	12.36	-52.31	3.72	H	-43.67
6 888.60	-52.50	11.92	-45.62	4.39	V	-38.09

▣ PCC Channel : 132353 (1748.1 MHz)

▣ PCC BW(MHz) : 5

▣ PCC RB/ RB Offset : 1/ 49

▣ SCC Channel : 132446 (1757.4 MHz)

▣ SCC BW(MHz) : 15

▣ SCC RB/ RB Offset : 1/ 0

▣ DISTANCE: 3 meters

▣ LIMIT: -13.0 dBm

Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	Result (dBm)
3 505.50	-54.69	12.40	-60.64	3.00	H	-51.24
5 258.25	-54.39	12.84	-53.79	3.74	H	-44.69
7 011.00	-53.29	11.34	-44.84	4.42	H	-37.92

▣ PCC Channel : 132599 (1772.7 MHz)

▣ PCC BW(MHz) : 5

▣ PCC RB/ RB Offset : 1/ 24

▣ SCC Channel : 132647 (1777.5 MHz)

▣ SCC BW(MHz) : 5

▣ SCC RB/ RB Offset : 1/ 0

▣ DISTANCE: 3 meters

▣ LIMIT: -13.0 dBm

Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	Result (dBm)
3 550.20	-53.18	12.40	-58.66	3.09	H	-49.35
5 325.30	-55.42	13.00	-54.67	3.81	V	-45.48
7 100.40	-53.34	10.90	-44.24	4.45	H	-37.79

8.7 Occupied Bandwidth

PCC					SCC					Data (MHz)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
5	132398	1752.6	QPSK	25/ 0	5	132446	1757.4	QPSK	25/ 0	9.2369
5	132375	1750.3	QPSK	25/ 0	10	132447	1757.5	QPSK	50/ 0	13.855
10	132397	1752.5	QPSK	50/ 0	5	132469	1759.7	QPSK	25/ 0	13.921
5	132353	1748.1	QPSK	25/ 0	15	132446	1757.4	QPSK	75/ 0	18.220
15	132398	1752.6	QPSK	75/ 0	5	132491	1761.9	QPSK	25/ 0	18.220
10	132373	1750.1	QPSK	50/ 0	10	132472	1760.0	QPSK	50/ 0	18.782

PCC					SCC					Data (MHz)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
5	132398	1752.6	16QAM	25/ 0	5	132446	1757.4	16QAM	25/ 0	9.2285
5	132375	1750.3	16QAM	25/ 0	10	132447	1757.5	16QAM	50/ 0	13.909
10	132397	1752.5	16QAM	50/ 0	5	132469	1759.7	16QAM	25/ 0	13.897
5	132353	1748.1	16QAM	25/ 0	15	132446	1757.4	16QAM	75/ 0	18.278
15	132398	1752.6	16QAM	75/ 0	5	132491	1761.9	16QAM	25/ 0	18.228
10	132373	1750.1	16QAM	50/ 0	10	132472	1760.0	16QAM	50/ 0	18.757

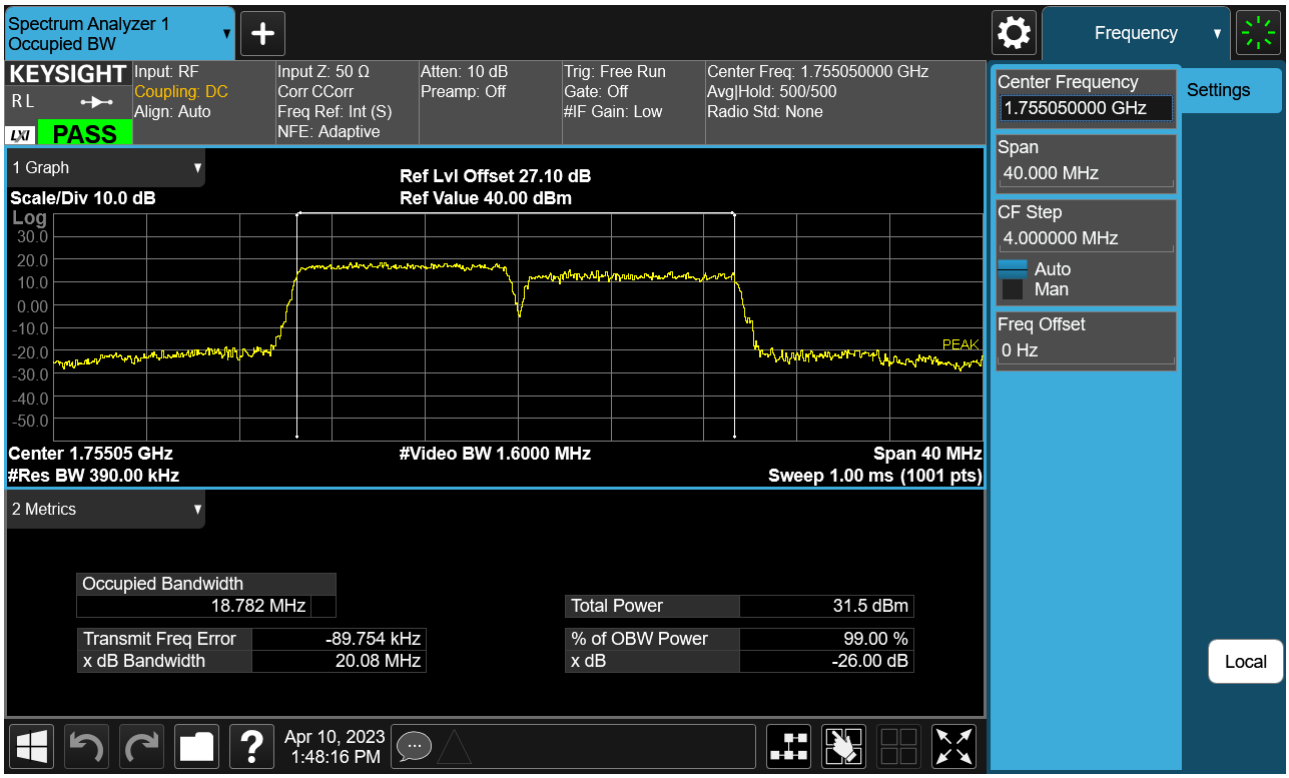
PCC					SCC					Data (MHz)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
5	132398	1752.6	64QAM	25/ 0	5	132446	1757.4	64QAM	25/ 0	9.2253
5	132375	1750.3	64QAM	25/ 0	10	132447	1757.5	64QAM	50/ 0	13.850
10	132397	1752.5	64QAM	50/ 0	5	132469	1759.7	64QAM	25/ 0	13.935
5	132353	1748.1	64QAM	25/ 0	15	132446	1757.4	64QAM	75/ 0	18.146
15	132398	1752.6	64QAM	75/ 0	5	132491	1761.9	64QAM	25/ 0	18.248
10	132373	1750.1	64QAM	50/ 0	10	132472	1760.0	64QAM	50/ 0	18.737

PCC					SCC					Data (MHz)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
5	132398	1752.6	256QAM	25/ 0	5	132446	1757.4	256QAM	25/ 0	9.2773
5	132375	1750.3	256QAM	25/ 0	10	132447	1757.5	256QAM	50/ 0	13.888
10	132397	1752.5	256QAM	50/ 0	5	132469	1759.7	256QAM	25/ 0	13.942
5	132353	1748.1	256QAM	25/ 0	15	132446	1757.4	256QAM	75/ 0	18.179
15	132398	1752.6	256QAM	75/ 0	5	132491	1761.9	256QAM	25/ 0	18.267
10	132373	1750.1	256QAM	50/ 0	10	132472	1760.0	256QAM	50/ 0	18.776

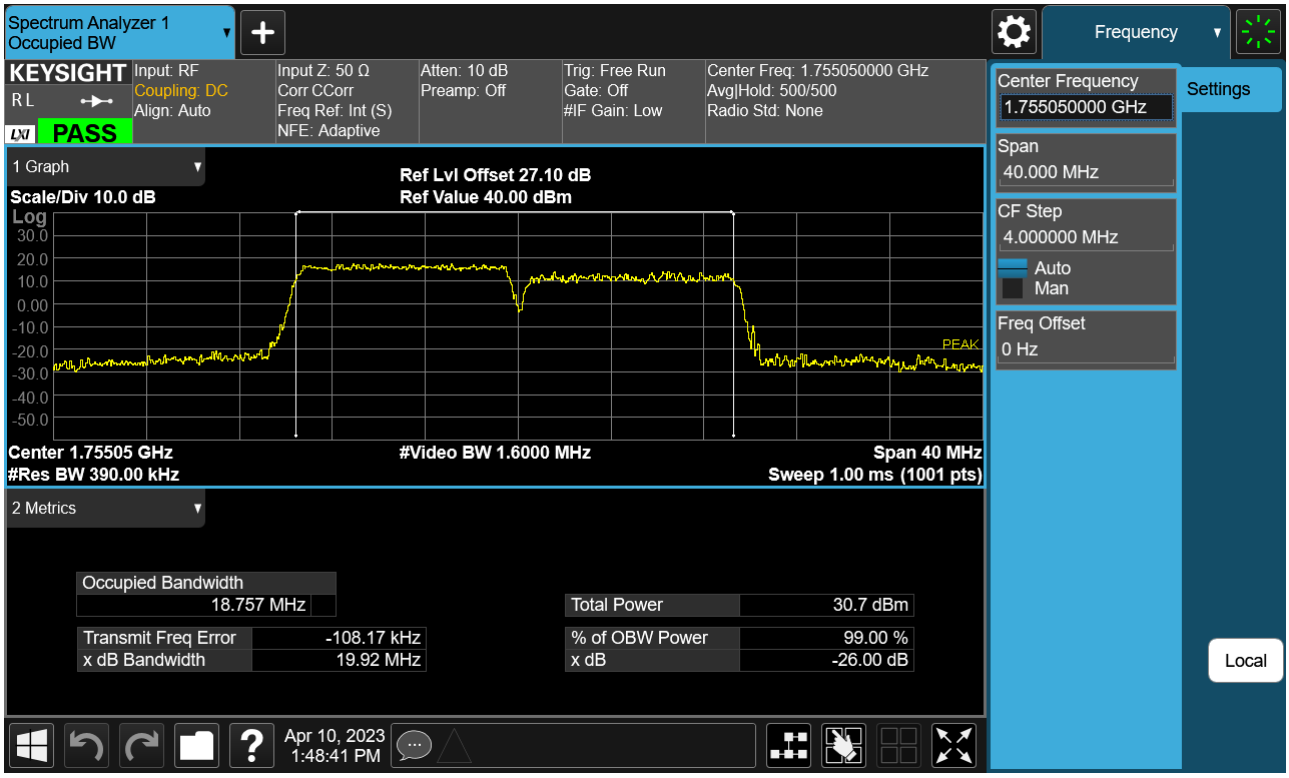
Note:

In order to simplify the report, attached plots were only Max.Bandwidth(10+10)

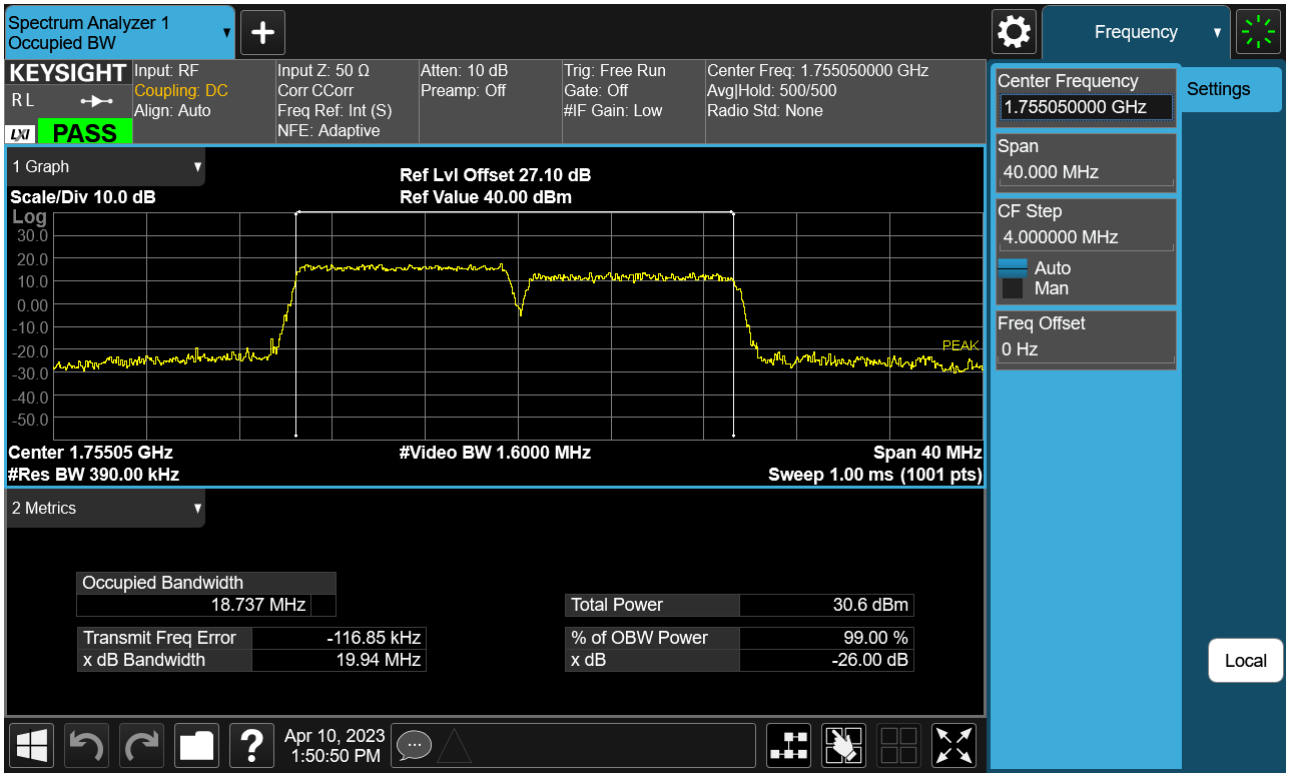
PCC 10 MHz Ch132373 RB50 Offset0, SCC 10 MHz Ch132472 RB50 Offset0_(QPSK)



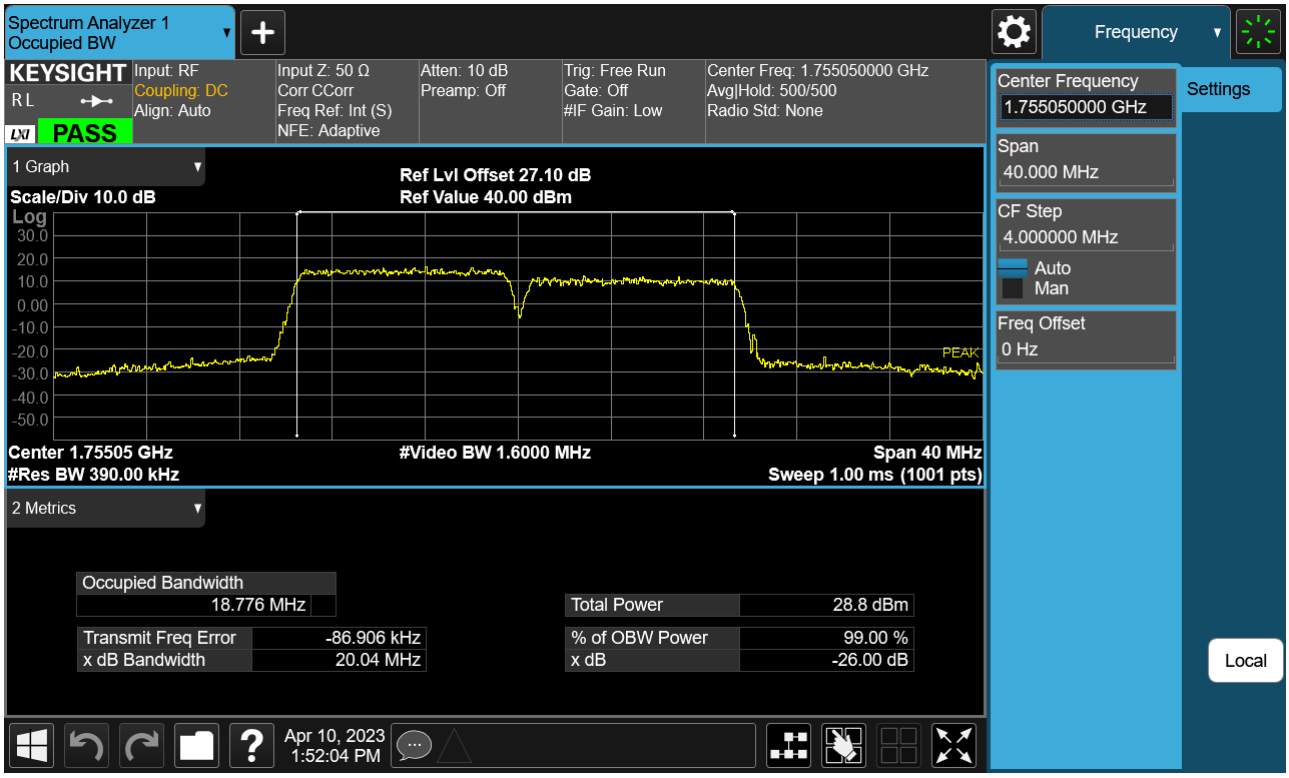
PCC 10 MHz Ch132373 RB50 Offset0, SCC 10 MHz Ch132472 RB50 Offset0_(16QAM)



PCC 10 MHz Ch132373 RB50 Offset0, SCC 10 MHz Ch132472 RB50 Offset0_(64QAM)



PCC 10 MHz Ch132373 RB50 Offset0, SCC 10 MHz Ch132472 RB50 Offset0_(256QAM)



8.8 Peak- to- Average Ratio

PCC					SCC					Data (dBm)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
5	132398	1752.6	QPSK	25/ 0	5	132446	1757.4	QPSK	25/ 0	6.00
5	132375	1750.3	QPSK	25/ 0	10	132447	1757.5	QPSK	50/ 0	5.86
10	132397	1752.5	QPSK	50/ 0	5	132469	1759.7	QPSK	25/ 0	5.97
5	132353	1748.1	QPSK	25/ 0	15	132446	1757.4	QPSK	75/ 0	5.89
15	132398	1752.6	QPSK	75/ 0	5	132491	1761.9	QPSK	25/ 0	5.88
10	132373	1750.1	QPSK	50/ 0	10	132472	1760.0	QPSK	50/ 0	6.15

PCC					SCC					Data (dBm)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
5	132398	1752.6	16QAM	25/ 0	5	132446	1757.4	16QAM	25/ 0	6.64
5	132375	1750.3	16QAM	25/ 0	10	132447	1757.5	16QAM	50/ 0	6.60
10	132397	1752.5	16QAM	50/ 0	5	132469	1759.7	16QAM	25/ 0	6.64
5	132353	1748.1	16QAM	25/ 0	15	132446	1757.4	16QAM	75/ 0	6.60
15	132398	1752.6	16QAM	75/ 0	5	132491	1761.9	16QAM	25/ 0	6.58
10	132373	1750.1	16QAM	50/ 0	10	132472	1760.0	16QAM	50/ 0	6.69

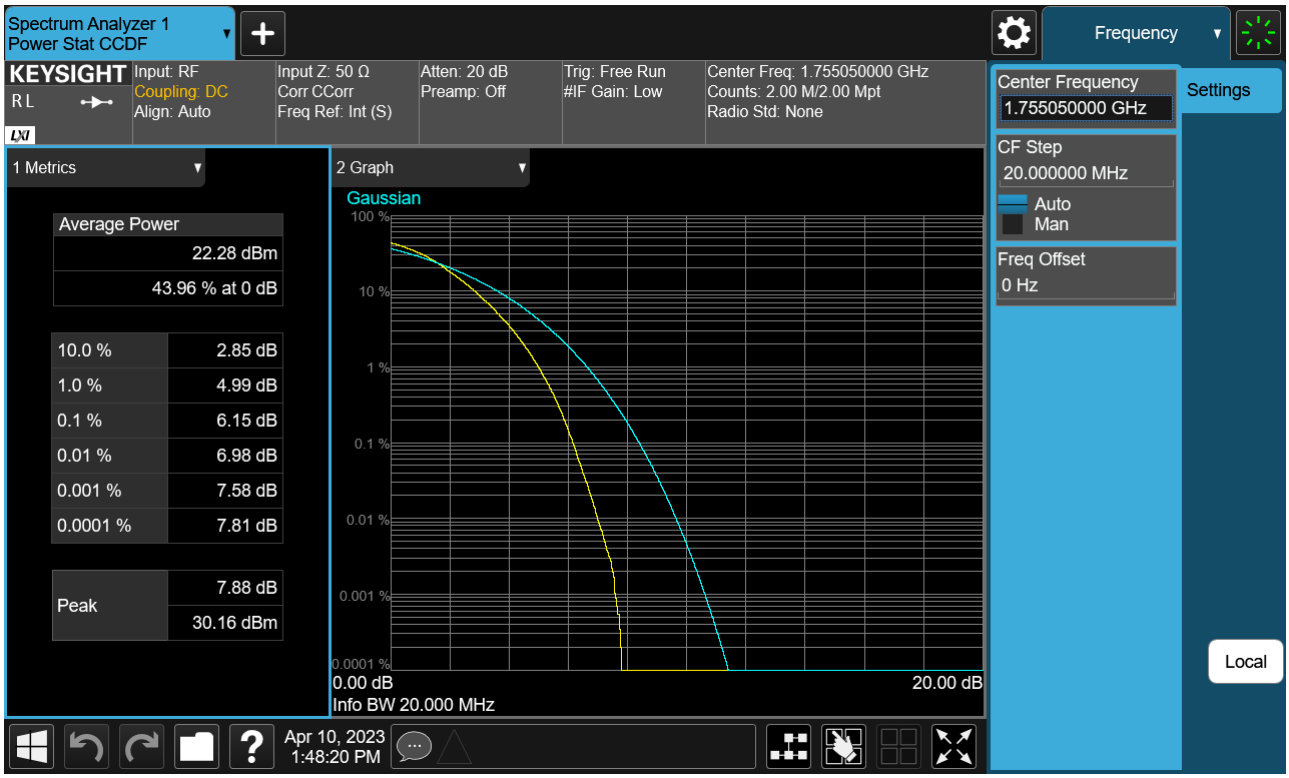
PCC					SCC					Data (dBm)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
5	132398	1752.6	64QAM	25/ 0	5	132446	1757.4	64QAM	25/ 0	6.75
5	132375	1750.3	64QAM	25/ 0	10	132447	1757.5	64QAM	50/ 0	6.74
10	132397	1752.5	64QAM	50/ 0	5	132469	1759.7	64QAM	25/ 0	6.77
5	132353	1748.1	64QAM	25/ 0	15	132446	1757.4	64QAM	75/ 0	6.70
15	132398	1752.6	64QAM	75/ 0	5	132491	1761.9	64QAM	25/ 0	6.71
10	132373	1750.1	64QAM	50/ 0	10	132472	1760.0	64QAM	50/ 0	6.83

PCC					SCC					Data (dBm)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
5	132398	1752.6	256QAM	25/ 0	5	132446	1757.4	256QAM	25/ 0	7.12
5	132375	1750.3	256QAM	25/ 0	10	132447	1757.5	256QAM	50/ 0	7.14
10	132397	1752.5	256QAM	50/ 0	5	132469	1759.7	256QAM	25/ 0	7.12
5	132353	1748.1	256QAM	25/ 0	15	132446	1757.4	256QAM	75/ 0	7.09
15	132398	1752.6	256QAM	75/ 0	5	132491	1761.9	256QAM	25/ 0	7.08
10	132373	1750.1	256QAM	50/ 0	10	132472	1760.0	256QAM	50/ 0	7.19

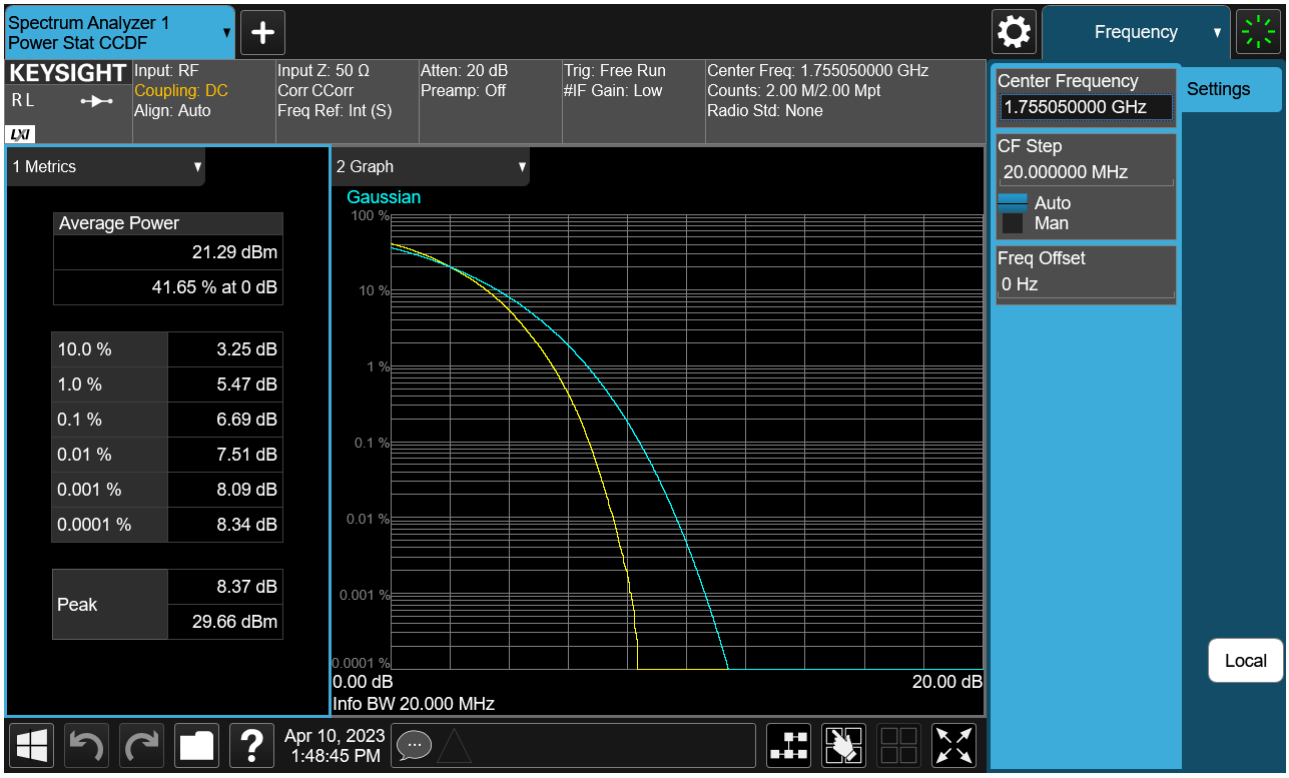
Note:

In order to simplify the report, attached plots were only Max.Bandwidth(10+10)

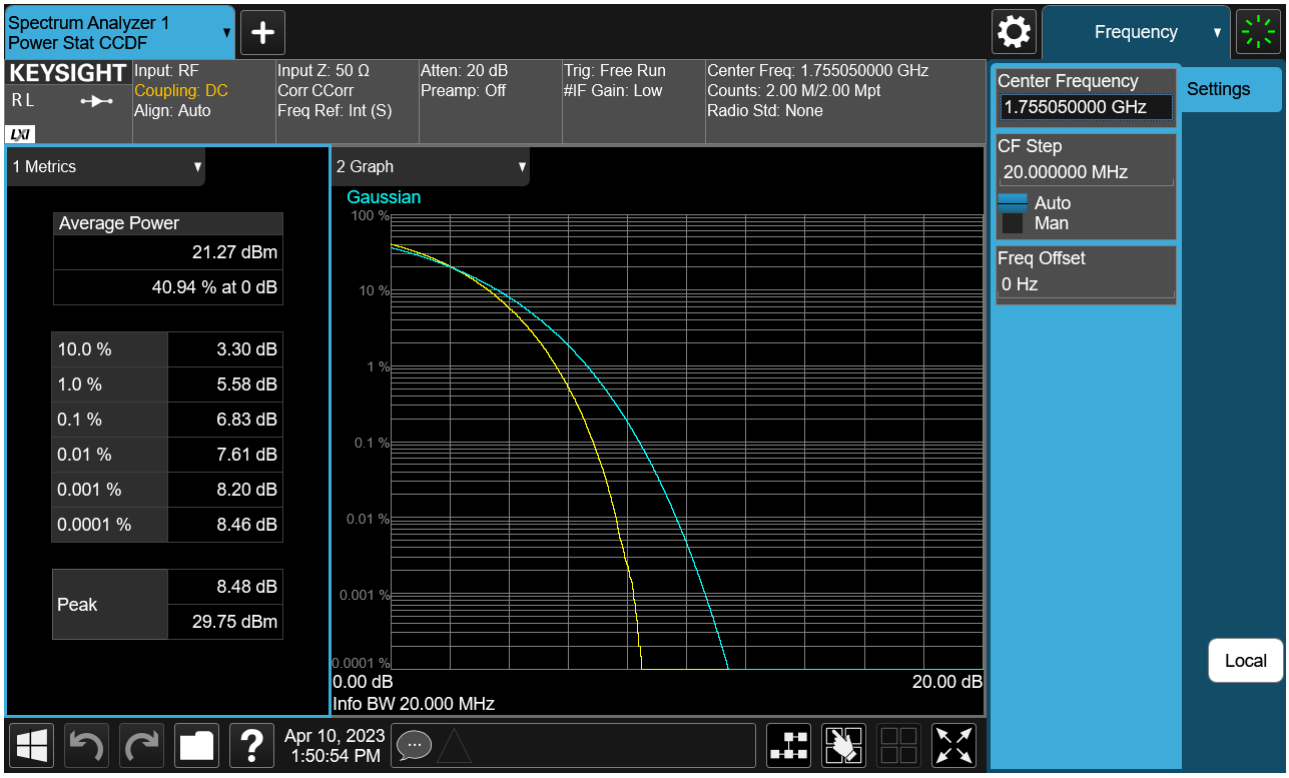
PCC 10 MHz Ch132373 RB50 Offset0, SCC 10 MHz Ch132472 RB50 Offset0_(QPSK)



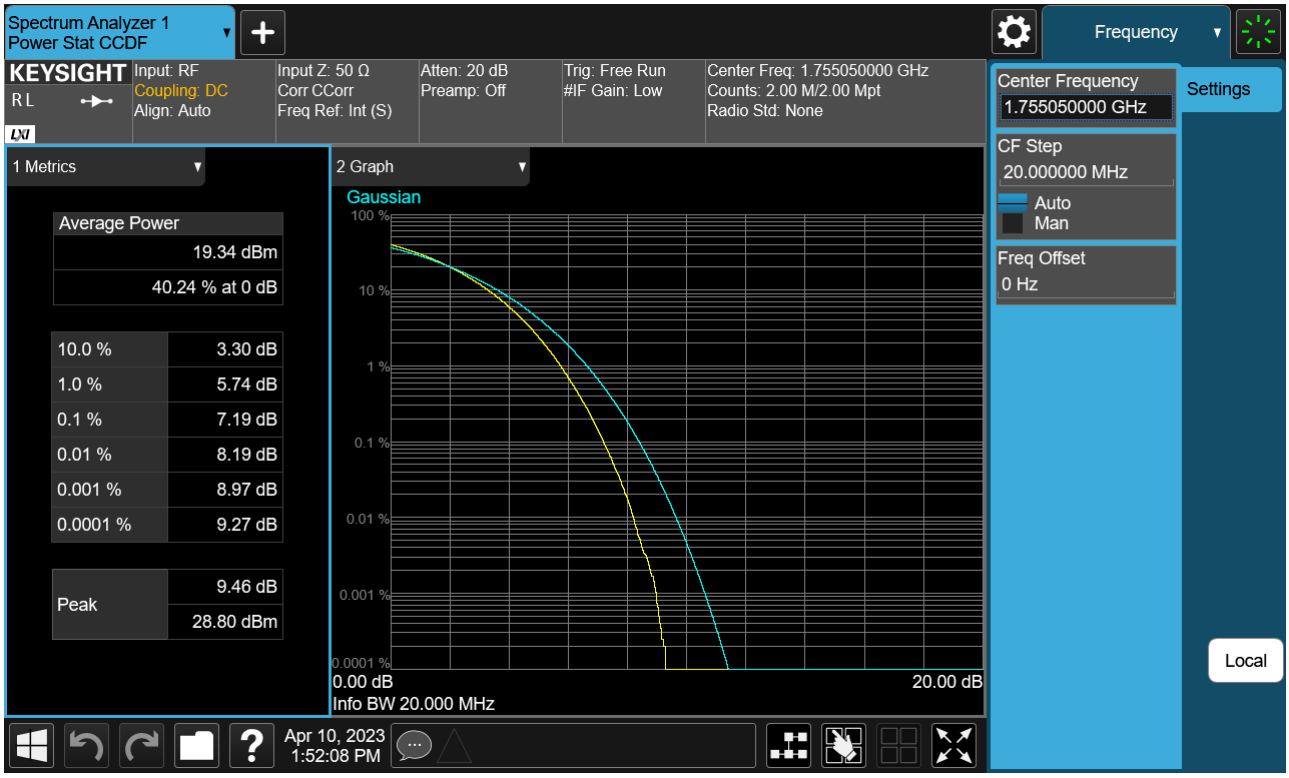
PCC 10 MHz Ch132373 RB50 Offset0, SCC 10 MHz Ch132472 RB50 Offset0_(16QAM)



PCC 10 MHz Ch132373 RB50 Offset0, SCC 10 MHz Ch132472 RB50 Offset0_(64QAM)



FCC 10 MHz Ch132373 RB50 Offset0, SCC 10 MHz Ch132472 RB50 Offset0_(256QAM)



9. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2305-FC034-P