

TEST REPORT

FCC Test for SOLiD BARS HERU
Certification

APPLICANT
SOLiD,Inc.

REPORT NO.
HCT-RF-2507-FC096-R2

DATE OF ISSUE
September 15, 2026

Tested by
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Applicant**SOLiD,Inc.**

10, 9th Floor, SOLiD Space, 220, Pangyoyeok-ro, Bundang-gu,
Seongnam-si, Gyeonggi-do, Republic of Korea, 13493

**Product Name
Model Name**

SOLiD BARS
HE: SOLiD_BARS_HE
RU: SOLiD_BARS_RU

FCC ID

HE: W6UBARS-HE
RU: W6UBARS-HERU

Date of Test

March 20, 2025 ~ July 14, 2025

Location of Test

■ Permanent Testing Lab □ On Site Testing
(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do,
Republic of Korea)

Test Standard Used

CFR 47 Part 20, Part 22, Part 24, Part 27

Test Results

PASS

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	July 23, 2025	Initial Release
1	November 26, 2025	- Revised the FCC ID for the Wi-Fi (WLAN) module and added the FCC ID for the LTE module in section 3.2. - Revised Note 7 in Section 5.13.
2	September 15, 2026	- Separated the FCC ID and Model Name into two versions: HE and RU. - Added the 'Technical Description' to section 1.2. - Added a statement to the 2nd and 3rd notes in section 3.2. to clarify that HE refers to Uplink and RU refers to Downlink.

Notice

Content

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated. The test results have only been applied with the test methods required by the standard(s).

The laboratory is not accredited for the test results marked *.

Information provided by the applicant is marked **.

Test results provided by external providers are marked ***.

When confirmation of authenticity of this test report is required, please contact www.hct.co.kr

The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

CONTENTS

1. GENERAL INFORMATION	5
1.1. APPLICANT INFORMATION	5
1.2. PRODUCT INFORMATION	5
1.3. TEST INFORMATION	6
2. FACILITIES AND ACCREDITATIONS	7
2.1. FACILITIES	7
2.2. EQUIPMENT	7
3. TEST SPECIFICATIONS	8
3.1. STANDARDS	8
3.2. ADDITIONAL DESCRIPTIONS ABOUT TEST	9
3.3. MEASUREMENT UNCERTAINTY	12
3.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS	12
3.5. TEST DIAGRAMS	13
4. TEST EQUIPMENTS	17
5. TEST RESULT	18
5.1. AUTHORIZED FREQUENCY BAND VERIFICATION	18
5.2. AUTHORIZED CMRS PROVIDER SPECTRUM BLOCKS	31
5.3. MAXIMUM POWER MEASUREMENT	80
5.4. MAXIMUM BOOSTER GAIN COMPUTATION	85
5.5. INTERMODULATION-PRODUCT	88
5.6. OUT-OF-BAND EMISSIONS	115
5.7. CONDUCTED SPURIOUS EMISSIONS	267
5.8. NOISE LIMITS	354
5.9. UPLINK INACTIVITY	379
5.10. VARIABLE BOOSTER GAIN	393
5.11. OCCUPIED BANDWIDTH	409
5.12. OSCILLATION	484
5.13. RADIATED SPURIOUS EMISSIONS	525
5.14. OUT-OF-BAND GAIN LIMITS	528
5.15. FREQUENCY STABILITY	547
6. Annex A EUT AND TEST SETUP PHOTO	564

1. GENERAL INFORMATION

1.1. APPLICANT INFORMATION

Company Name	SOLiD,Inc.
Company Address	10, 9th Floor, SOLiD Space, 220, Pangyoyeok-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea, 13493

1.2. PRODUCT INFORMATION

EUT Type	SOLiD BARS		
EUT Serial Number	HE : 01110M786G0125300001 RU : 01110M786G6125300001		
Power Supply	HE: AC 90~264 V, 47~63 Hz RU: DC -57 ~ -41.1 V @ PoE from HE, HUB		
Frequency Range	Band Name	Uplink (MHz, HE)	Downlink (MHz, RU)
	Lower 700 MHz	699 ~ 716	729 ~ 746
	Upper 700 MHz	777 ~ 787	746 ~ 756
	Cellular	824 ~ 849	869 ~ 894
	AWS-1	1 710 ~ 1 755	2 110 ~ 2 155
	Broadband PCS	1 850 ~ 1 915	1 930 ~ 1 995
Tx Output Power	HE(Uplink) : 22 dBm RU(Downlink) : 9.0 dBm		
Antenna Peak Gain	Band Name	Donor (dBi)	Server (dBi)
	Lower 700 MHz	12	2
	Upper 700 MHz	12	2
	Cellular	12	2
	AWS-1	14	5
	Broadband PCS	14	5
Technical Description	SOLiD BARS is an advanced solution designed to enhance cellular signals inside buildings. It provides stable multi-carrier coverage for up to three mobile network operators. The system supports up to 40 Remote Units (RUs) through a single Head-End (HE) and can support up to 4 Hubs (HUBs). The HE includes transmitters and receivers for communication with the base station and RUs. The RUs are installed in central locations within homes or offices or at locations where improved signal quality is required. The HE and RUs are installed at a certain distance from each other and communicate via Ethernet cables. In this test report, the functionality of the EUT for Bands 4, 5, 12, 13, and 25 was verified.		

1.3. TEST INFORMATION

FCC Rule Parts	CFR 47 Part 20, Part 22, Part 24, Part 27
Measurement Standards	KDB 935210 D04 v02r04, ANSI C63.26-2015
Test Location	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea

2. FACILITIES AND ACCREDITATIONS

2.1. FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated March 11, 2024 (Registration Number: KR0032).

2.2. EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

3. TEST SPECIFICATIONS

3.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC CFR 47 Part 20, Part 22, Part 24 and Part 27.

Description	Reference		Results
	FCC Rule Part	KDB 935210 D04	
Authorized frequency band verification	§20.21(e)(3)	7.1.1	Compliant
Authorized CMRS provider spectrum blocks	§20.21(e)(3) §20.21(e)(4)	7.1.2	Compliant
Maximum power measurement	§20.21(e)(9)(i)(B), §20.21(e)(9)(i)(D), §20.21(e)(9)(ii)(B),	7.2	Compliant
Maximum booster gain computation	§20.21(e)(9)(i)(B), §20.21(e)(9)(i)(C)(2)	7.3	Compliant
Intermodulation-product	§20.21(e)(9)(i)(G)	7.4	Compliant
Out-of-band emissions	§20.21(e)(9)(i)(F) §22.917, §24.238, §27.53(c),(g),(h)	7.5	Compliant
Conducted spurious emissions	§2.1051, §22.917, §24.238, §27.53(c),(f),(g),(h)	7.6	Compliant
Noise limits	§20.21(e)(9)(i)(A), §20.21(e)(9)(i)(I)	7.7	Compliant
Uplink inactivity	§20.21(e)(9)(i)(J)	7.8	Compliant
Variable booster gain	§20.21(e)(9)(i)(C)(1), §20.21(e)(9)(i)(I)	7.9	Compliant
Occupied bandwidth	§2.1049	7.10	Compliant
Oscillation	§20.21(e)(5), §20.21(e)(9)(ii)(A)	7.11	Compliant
Radiated spurious emissions	§2.1053	7.13	Compliant
Spectrum block filtering	§20.21(e)(3) §20.21(e)(9)(i)(B)	7.14	Not Required [#]
Out-of-band gain limits	§20.21(e)(9)(i)(E)	7.15.1	Compliant
Frequency stability	§2.1055 §22.355, §24.235, §27.54	7.16	Compliant

[#] The Spectrum block filtering test case was not required because, per Section 7.14(b) and 7.14(c) of KDB 935210 D04, the EUT is compliant with the uplink transmitted noise power level and uplink variable gain test cases, respectively.

Note: The decision rule applies 'simple acceptance'

3.2. ADDITIONAL DESCRIPTIONS ABOUT TEST

- The test was generally based on the method of KDB 935210 D04 v02r04 and only followed ANSI C63.26-2015 if there was no test method in KDB standard.
- The Head-end (He, Uplink) has three antenna ports, and each antenna port is assigned to support one operator. The table below shows the configurations for each channel/band by operator.

Band Configuration	Frequency		Full Bandwidth (MHz)	Max Ch Bandwidth (MHz)	ANT 1	ANT 2	ANT 3
					Operator A	Operator B	Operator C
Band 12 (Lower 700 MHz)	UL	699–716	17	10	Not supported.	•	•
	DL	729–746					
Band 13 (Upper 700 MHz)	UL	777–787	10	10	•	Not supported.	Not supported.
	DL	746–756					
Band 5 (Cellular)	UL	824–849	25	20	•	•	•
	DL	869–894					
Band 4 (AWS-1)	UL	1710–1755	45	20	•	•	•
	DL	2110–2155					
Band 25 (Broadband PCS)	UL	1850–1915	65	20	•	•	•
	DL	1930–1995					

- The RU(Downlink) has a single antenna port, but the downlink was measured in three different configurations depending on the uplink port path of the HE.
- The EUT is equipped with a Wi-Fi (WLAN) module(FCC ID: W6UWIFI) and LTE module(FCC ID: XMR202008EG91NAXD) that has been certified, and radiated measurements were performed with the module operating simultaneously.
- The following switch coupled loss was corrected in the signal generation.

Band	Uplink generating loss (dB)	Downlink generating loss (dB)
Lower 700 MHz	4.58	4.43
Upper 700 MHz	4.46	4.28
Cellular	4.33	4.63
AWS-1	4.33	4.75
Broadband PCS	5.57	4.60

- The tests results included actual loss value for attenuator and cable combination as shown in the table below. Measurements were taken for each antenna port, and the same correction factor was applied.

: Output Path (Direct)

Correction factor table			
Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
600	0.664	1 800	1.218
700	0.782	1 900	1.333
800	0.834	2 000	1.469
900	0.866	2 100	1.370
1 600	1.250	2 200	1.427
1 700	1.237	2 300	1.657

: Coupled Path (Switch Coupled)

Correction factor table			
Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
600	4.056	1 800	4.300
700	3.862	1 900	4.327
800	3.891	2 000	5.024
900	3.906	2 100	4.875
1 600	4.925	2 200	4.526
1 700	4.901	2 300	4.945

: Outut Path (20 dB Attenuator)

Correction factor table			
Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
0.009	19.144	4 500	23.908
100	19.476	5 000	24.506
200	19.741	5 500	24.708
300	19.958	6 000	24.906
400	20.139	6 500	25.083
500	20.263	7 000	25.419
600	20.394	7 500	25.666
700	20.577	8 000	25.697
800	20.662	8 500	25.948
900	20.773	9 000	26.045
1 000	20.959	9 500	26.296
1 100	21.049	10 000	26.650
1 200	21.147	11 000	27.085
1 300	21.171	12 000	27.272
1 400	21.329	13 000	27.295
1 500	21.335	14 000	28.384
1 600	21.441	15 000	29.100
1 700	21.469	16 000	29.478
1 800	21.539	17 000	29.257
1 900	21.728	18 000	30.420
2 000	21.749	19 000	30.060
2 100	21.740	20 000	31.025
2 200	21.861	21 000	32.086
2 300	22.176	22 000	31.604
2 400	22.188	23 000	32.528
2 500	22.124	24 000	34.152
3 000	22.310	25 000	34.873
3 500	22.622	26 000	35.476
4 000	23.704	26 500	35.778

3.3. MEASUREMENT UNCERTAINTY

Parameter		Expanded Uncertainty
Radiated Disturbance	9 kHz ~ 30 MHz	4.36 dB
	30 MHz ~ 1 GHz	5.68 dB
	1 GHz ~ 18 GHz	5.75 dB
	18 GHz ~ 40 GHz	5.82 dB

Coverage factor $k = 2$, Confidence levels of 95 %

3.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature	+15 °C to +35 °C
Relative humidity	30 % to 60 %
Air pressure	860 mbar to 1 060 mbar

3.5. TEST DIAGRAMS

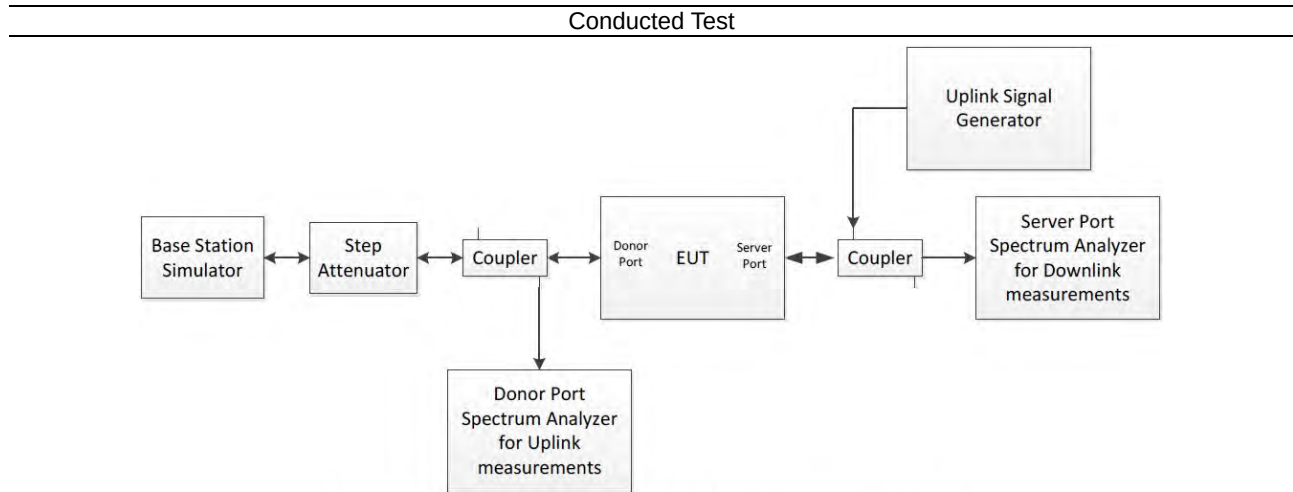


Figure 1 – Test configuration in EUT normal operational mode

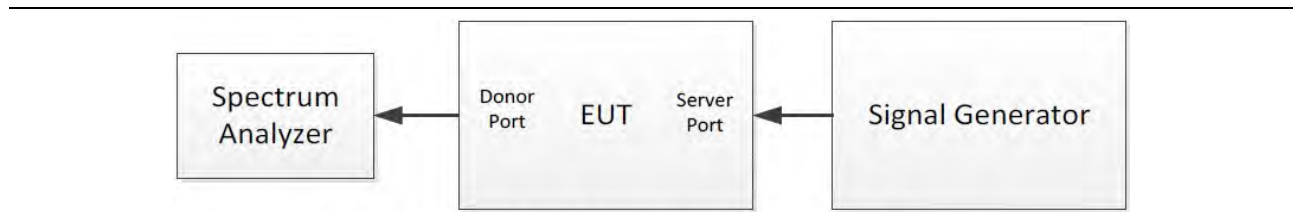


Figure 2 – Uplink test configuration in EUT test mode

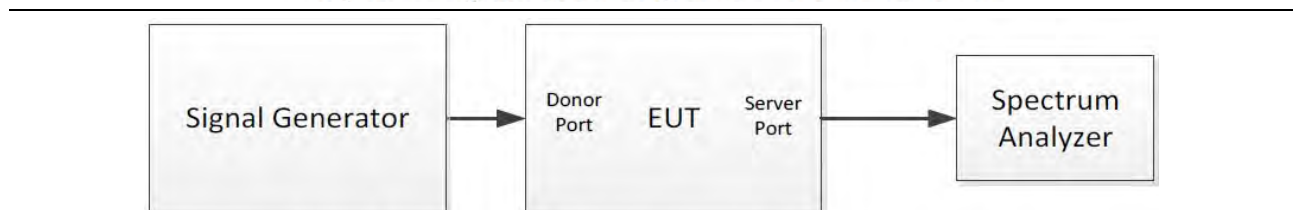


Figure 3 – Downlink test configuration in EUT test mode

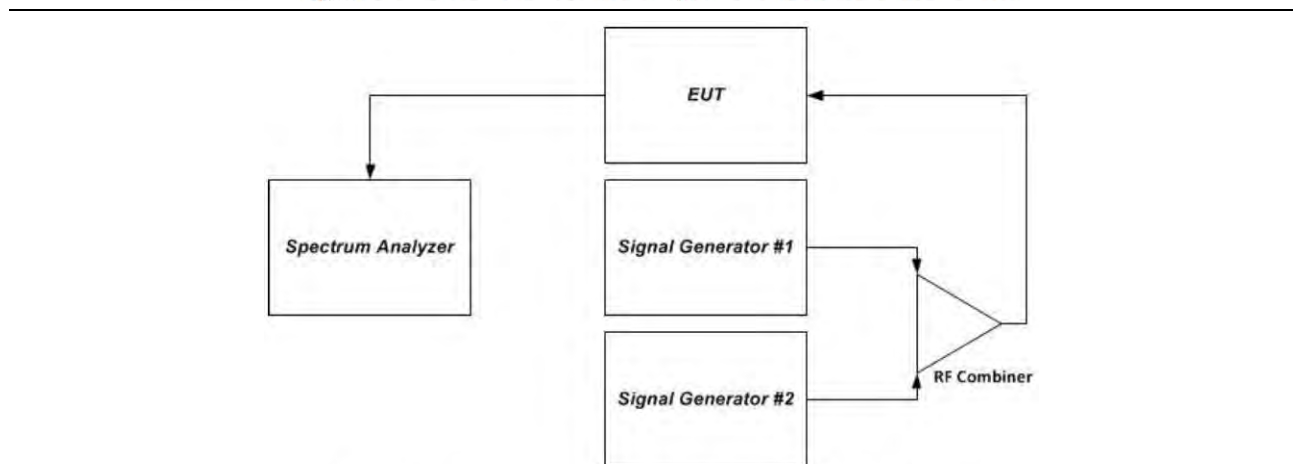


Figure 5 – Intermodulation product instrumentation test setup



Figure 6 – Maximum downlink noise limit test configuration

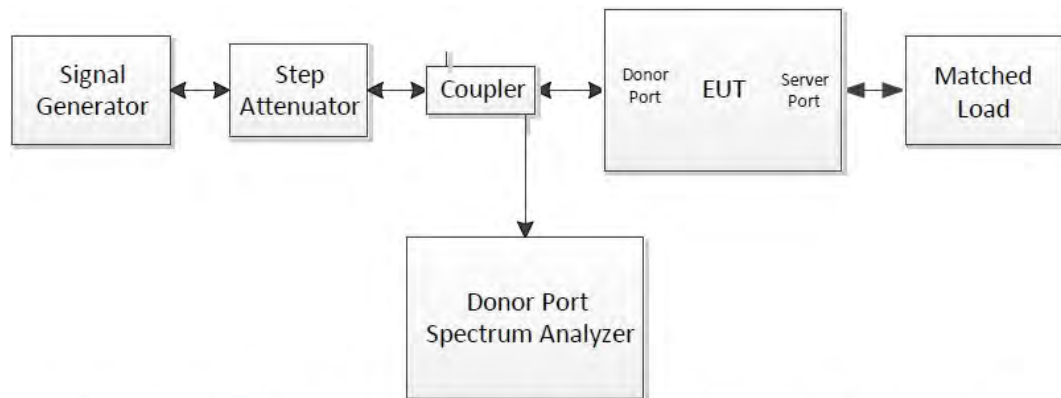


Figure 7 – Uplink RSSI-dependent noise limit test configuration

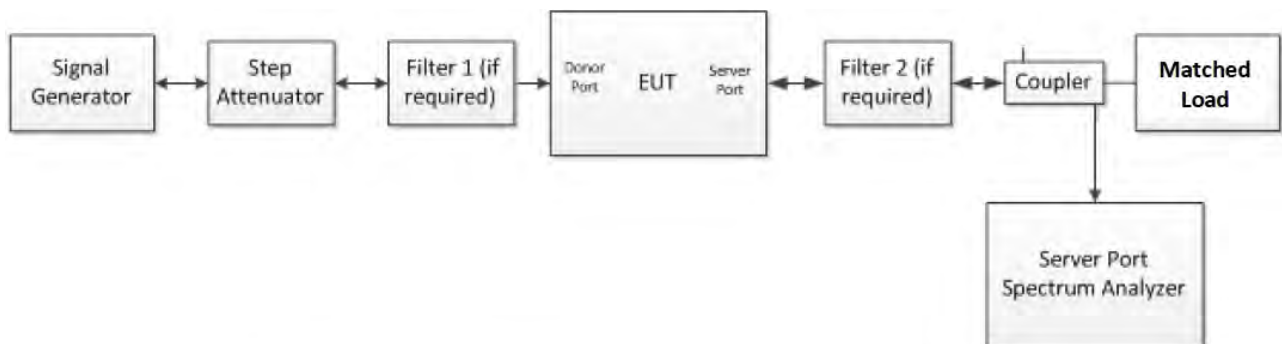
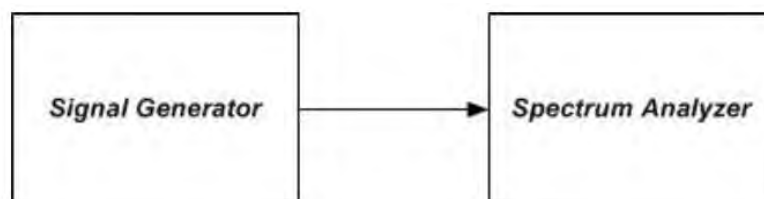


Figure 8 – Downlink RSSI-dependent noise limit test configuration



**Figure 9 – Test setup for measuring characteristics of test signals
used for subsequent EUT occupied bandwidth testing**

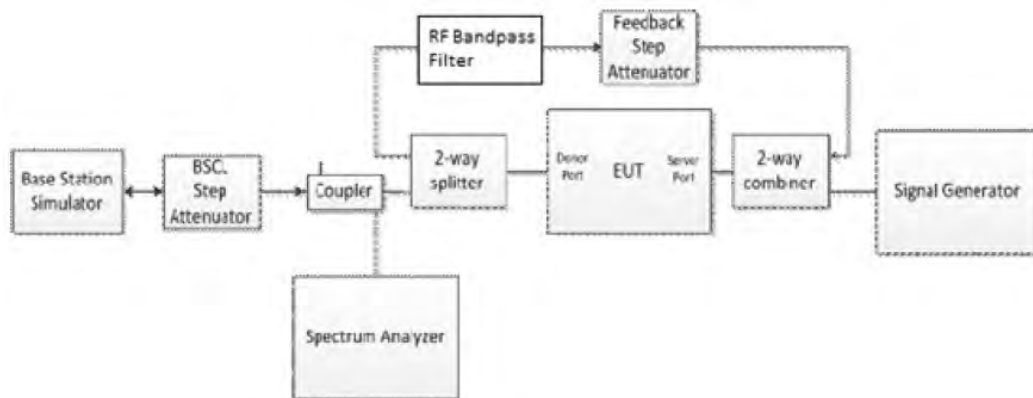


Figure 10 – Uplink oscillation detection test setup

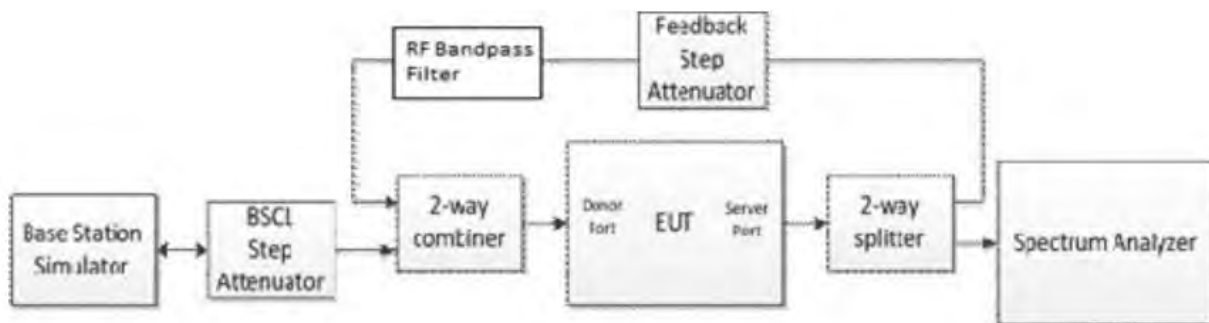
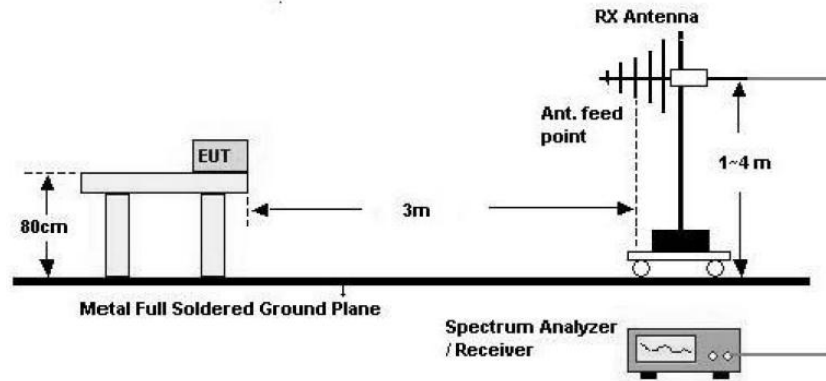


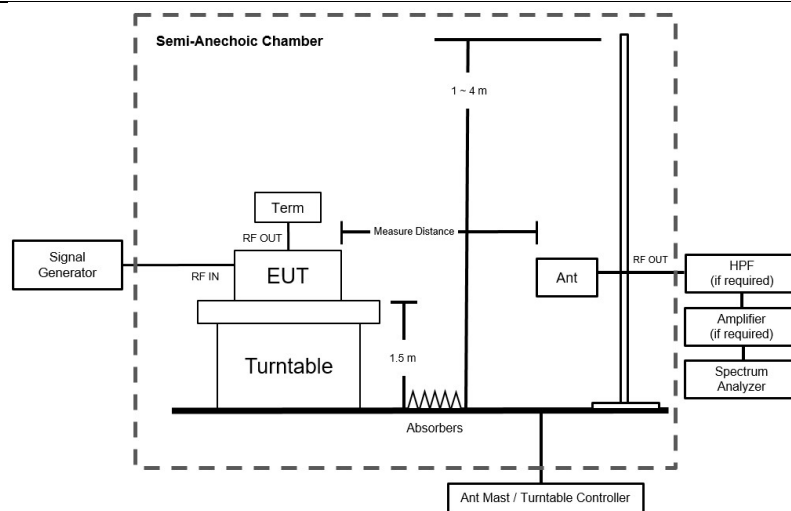
Figure 11 – Downlink oscillation detection test setup

Radiated Test

30 MHz ~ 1 GHz



Above 1 GHz



※ EUT position is adopted by placement of tabletop refer to section 5.5.2.3.1 of ANSI C63.26-2015

4. TEST EQUIPMENTS

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Wireless Communication Tester	CMW500	Rohde & Schwarz	169839	05/22/2026	Annual
PXA Signal Analyzer	N9030A	Keysight	MY55410714	12/13/2025	Annual
MXG Vector Signal Generator	N5182A	Agilent	MY46240523	12/16/2025	Annual
MXG Vector Signal Generator	N5182A	Agilent	MY46240807	03/11/2026	Annual
Switch	S46-SV11	KEITHLEY	1035126	N/A	N/A
Bi-Directional Coupler	ZGBDC20-33HP+	Mini-Circuits	0518	08/08/2025	Annual
AC Power Supply	PCR2000MA	KIKUSUI	ZL002530	12/20/2025	Annual
Coxial Attenuator	FAS-23-20	MCLI	103756	12/23/2025	Annual
# 30 dB Attenuator	WA93-30-33	Weinschel Associates	0113	11/14/2025	Annual
# 50Ω Termination	908A	H.P.	N/A	N/A	N/A
Switch Driver	11713A	Agilent	MY44321466	03/13/2026	Annual
Step Attenuator	8494G	Agilent	3246A16047	03/13/2026	Annual
Step Attenuator	8496G	Agilent	3837M00518	03/13/2026	Annual
Temperature and Humidity Chamber	NY-THR18750	NANGYEAL	NY-200912201A	12/17/2025	Annual
Antenna Mast & Turn Table Controller	CO3000	Innco systems	CO3000/1250/48920320/P	N/A	N/A
Antenna Mast	MA4640	Innco system	S4AM	08/07/2025	Annual
Turn Table	1060	Innco systems	N/A	N/A	N/A
Turn Table	Turn Table	Ets	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Rohde & Schwarz	1513-333	03/07/2026	Biennial
BILOG Antenna	VULB 9168	Schwarzbeck	9168-0895	08/28/2026	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	9120D-937	02/07/2027	Biennial
Horn Antenna	BBHA9170	Schwarzbeck	BBHA9170342	09/20/2026	Biennial
RF Switching System	FBSR-04C (3 GHz HPF + LNA)	TNM system	S4L1	03/12/2026	Annual
RF Switching System	FBSR-04C (10 dB ATT + LNA)	TNM system	S4L2	03/12/2026	Annual
RF Switching System	FBSR-04C (3 dB ATT + LNA)	TNM system	S4L3	03/12/2026	Annual
RF Switching System	FBSR-04C (LNA)	TNM system	S4L4	03/12/2026	Annual
RF Switching System	FBSR-04C (Thru)	TNM system	S4L6	03/12/2026	Annual
Low Noise Amplifier	TK-PA1840H	TESTEK	170011-L	10/11/2025	Annual
High Pass Filter	WHKX10-900-1000-15000-40SS	WAINWRIGHT INSTRUMENTS	16	07/24/2025	Annual

This equipment has been used to each port, but we only listed one equipment for simplicity.

Notes:

- Equipment listed above that calibrated during the testing period was set for test after the calibration.
- Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

5. TEST RESULT

5.1. AUTHORIZED FREQUENCY BAND VERIFICATION

Test Requirement:

§ 20.21(e)(3) Frequency Bands.

Consumer Signal Boosters must be designed and manufactured such that they only operate on the frequencies used for the provision of subscriber-based services under parts 22 (Cellular), 24 (Broadband PCS), 27 (AWS-1, 700 MHz Lower A-E Blocks, and 700 MHz Upper C Block), and 90 (Specialized Mobile Radio) of this chapter. The Commission will not certificate any Consumer Signal Boosters for operation on part 90 of this chapter (Specialized Mobile Radio) frequencies until the Commission releases a public notice announcing the date Consumer Signal Boosters may be used in the band.

Test Procedures:

Measurements were in accordance with the test methods section 7.1.1 of KDB 935210 D04 v02r04.

EUT operating mode: normal mode (Figure 1) or test mode (Figure 2 and Figure 3), with the gain manually set to the maximum gain and a minimum bandwidth setting (e.g., 5 MHz) in the CMRS band under test.

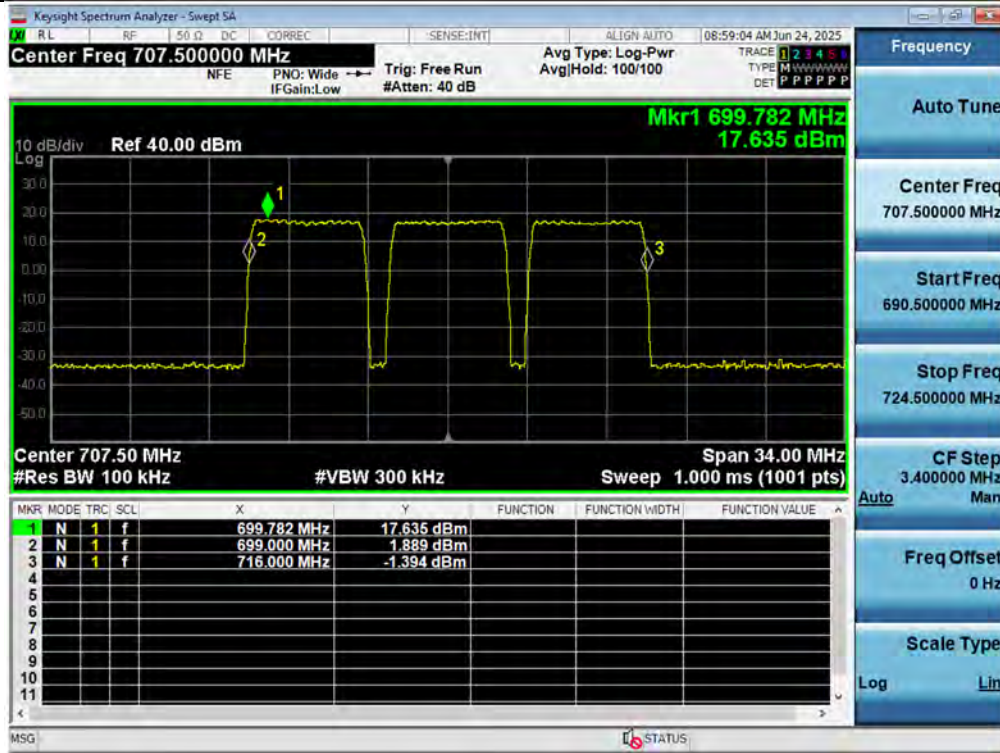
- a) Connect the EUT to the test equipment either in test mode or normal mode and set the passband of the EUT to the lowest passband frequency of the booster in the CMRS band.
- b) Set the spectrum analyzer resolution bandwidth (RBW) for 100 kHz with the video bandwidth (VBW) $\geq 3 \times$ the RBW, using a PEAK detector with the MAX HOLD function.
- c) Set the center frequency of the spectrum analyzer to the center of the operational band under test with a span of 5 MHz.
- d) Set the signal generator for CW mode and tune to the center frequency of the operational band under test. Alternatively, for signal boosters that implement narrowband rejection protection capability, a 200 kHz or an AWGN signal with a 99% occupied bandwidth (OBW) of 4.1 MHz can be used, as appropriate.
- e) Set the initial signal generator power to a level that is at least 6 dB below the AGC level specified by the manufacturer.
- f) Slowly increase the signal generator power level until the output signal reaches the AGC operational level.
- g) Reduce the signal generator power to a level that is 3 dB below the level noted above, then manually reset the EUT (e.g., cycle ac/dc power).
- h) Reset the spectrum analyzer span to $2 \times$ the width of the CMRS band under test. Adjust the tuned frequency of the signal generator to sweep $2 \times$ the width of the CMRS band using the sweep function. The AGC must be deactivated throughout the entire sweep.
- i) Using three markers, identify the CMRS band edges and the frequency with the highest power. Ensure that the values of all markers are visible on the display of the spectrum analyzer (e.g., marker table set to on).
- j) Capture the spectrum analyzer trace for inclusion in the test report.
- k) Repeat 7.1c) to 7.1j) for all operational uplink and downlink bands with the passband of the booster set to the center of the CMRS band and the highest and lowest passband frequencies of the booster in the CMRS band.

Notes:

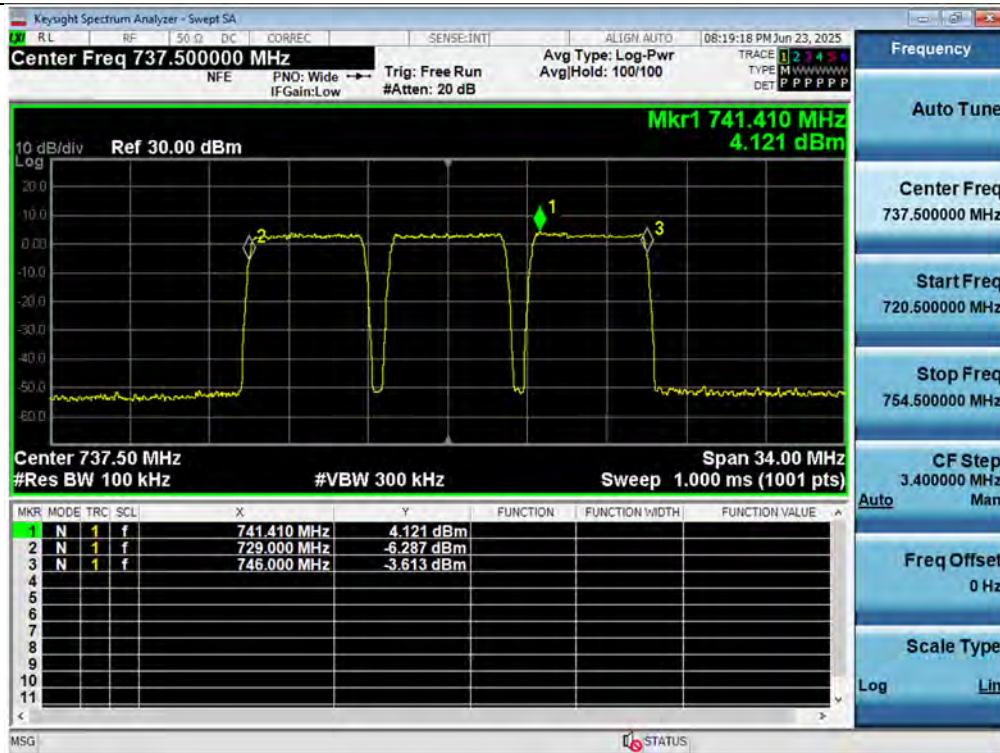
1. The EUT was configured with the gain set to the maximum and the bandwidth set to the minimum (5 MHz).
2. The EUT operated in test mode and was configured according to Figure 2 and 3 of KDB 935210 D04.

Test Results: Plot data of Authorized Frequency Band

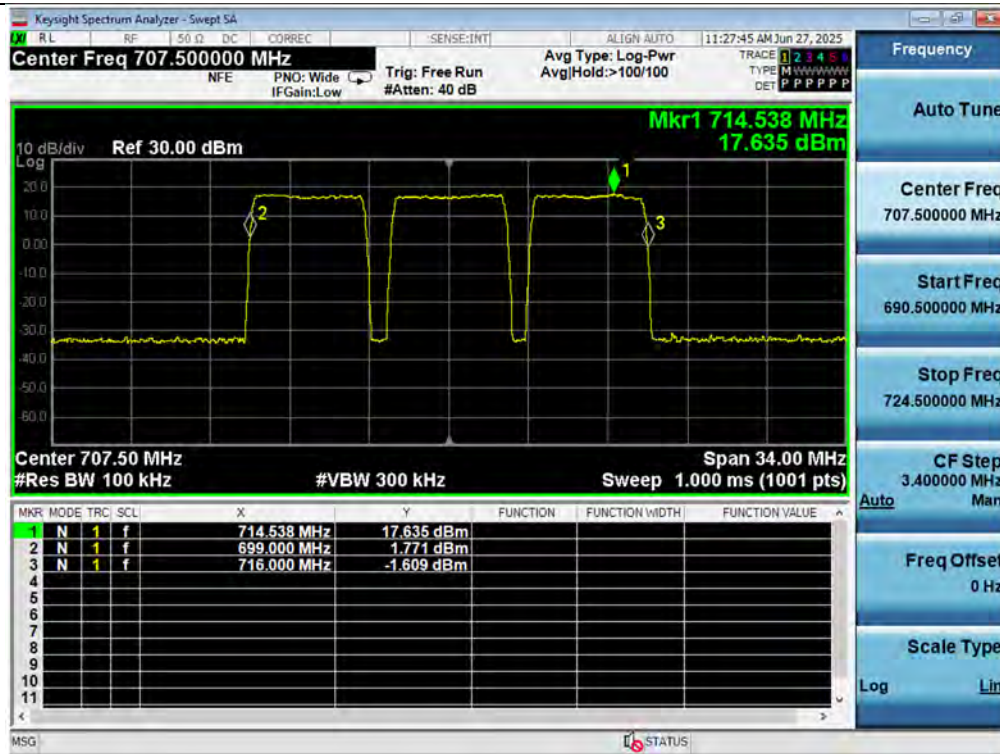
Lower 700 MHz (699 ~ 716 MHz) / Uplink / ANT 2



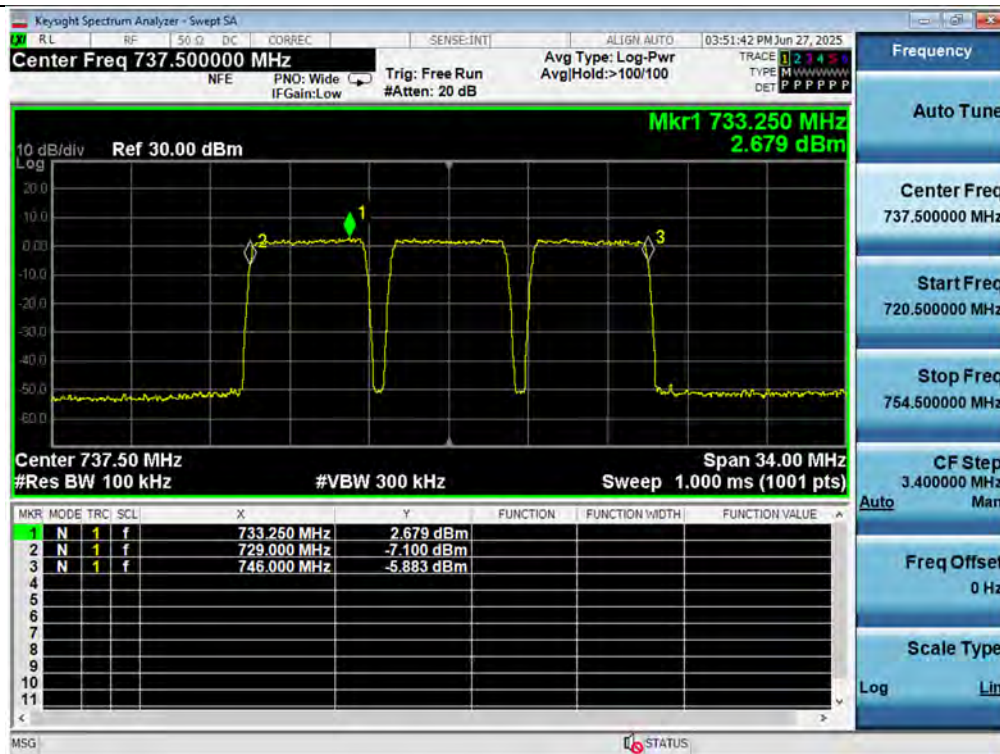
Lower 700 MHz (729 ~ 746 MHz) / Downlink / ANT 2



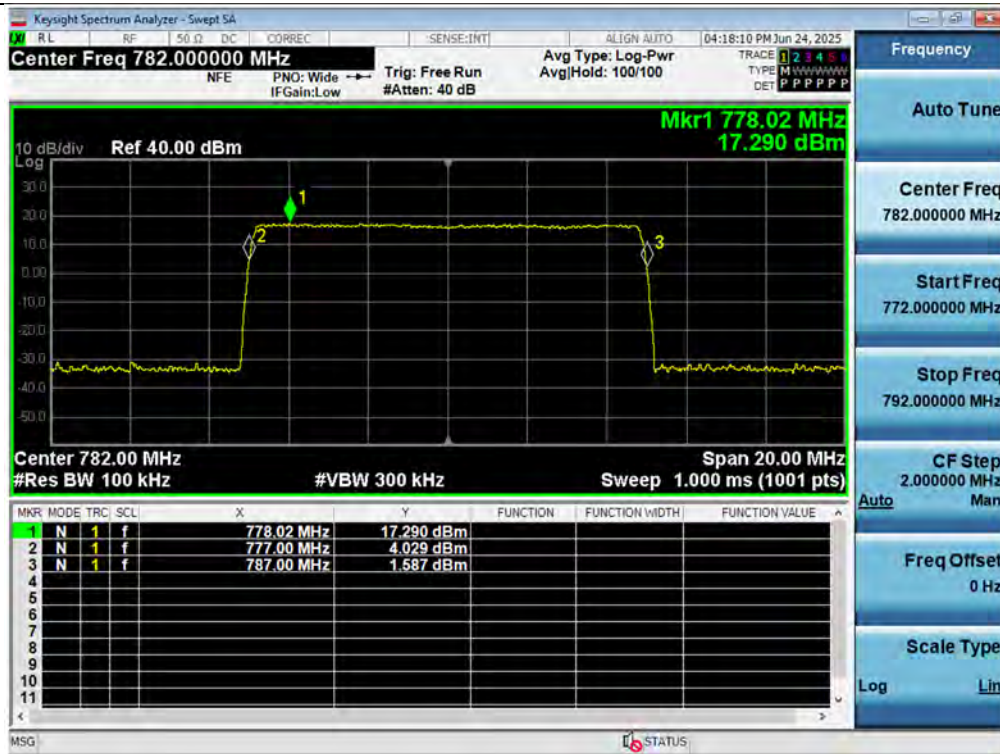
Lower 700 MHz (699 ~ 716 MHz) / Uplink / ANT 3



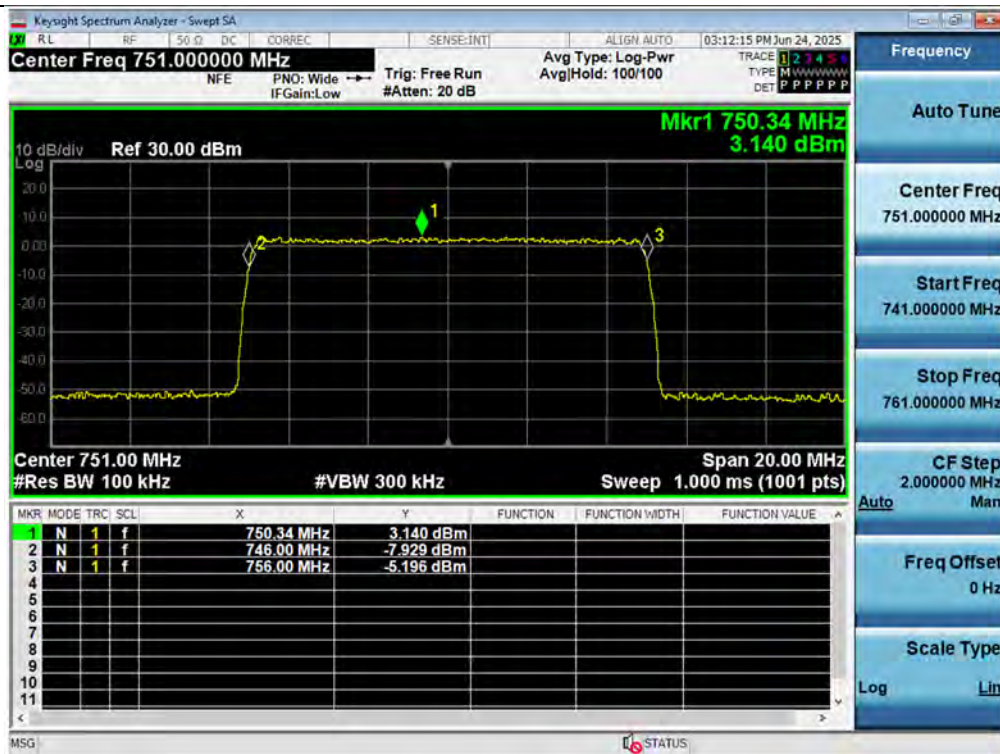
Lower 700 MHz (729 ~ 746 MHz) / Downlink / ANT 3



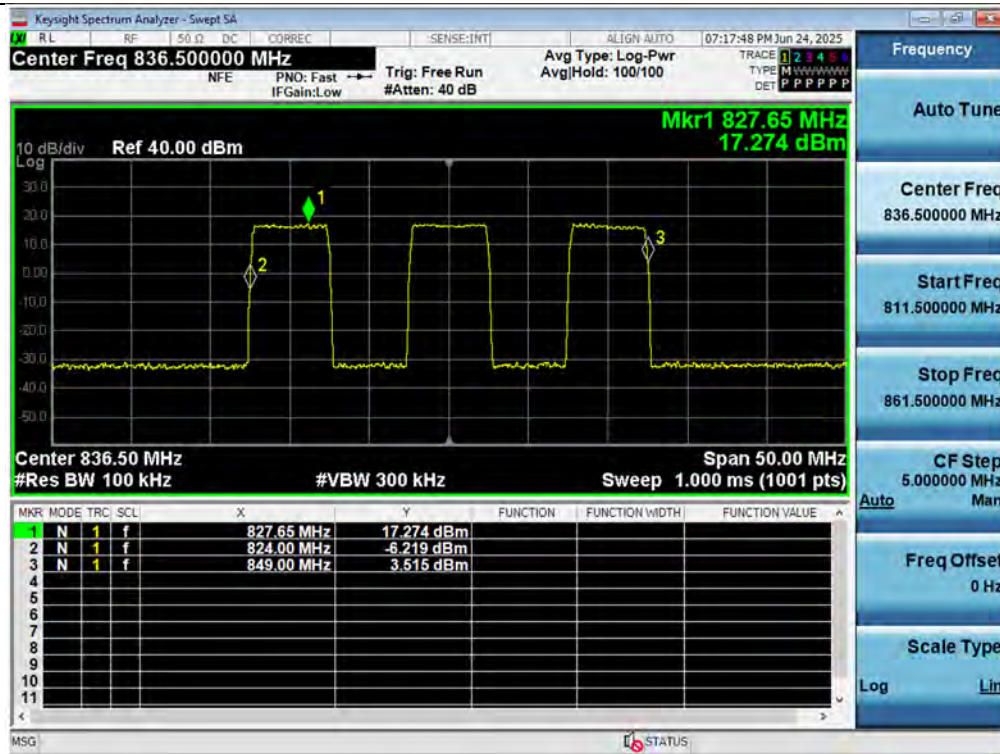
Upper 700 MHz (777 ~ 787 MHz) / Uplink / ANT 1



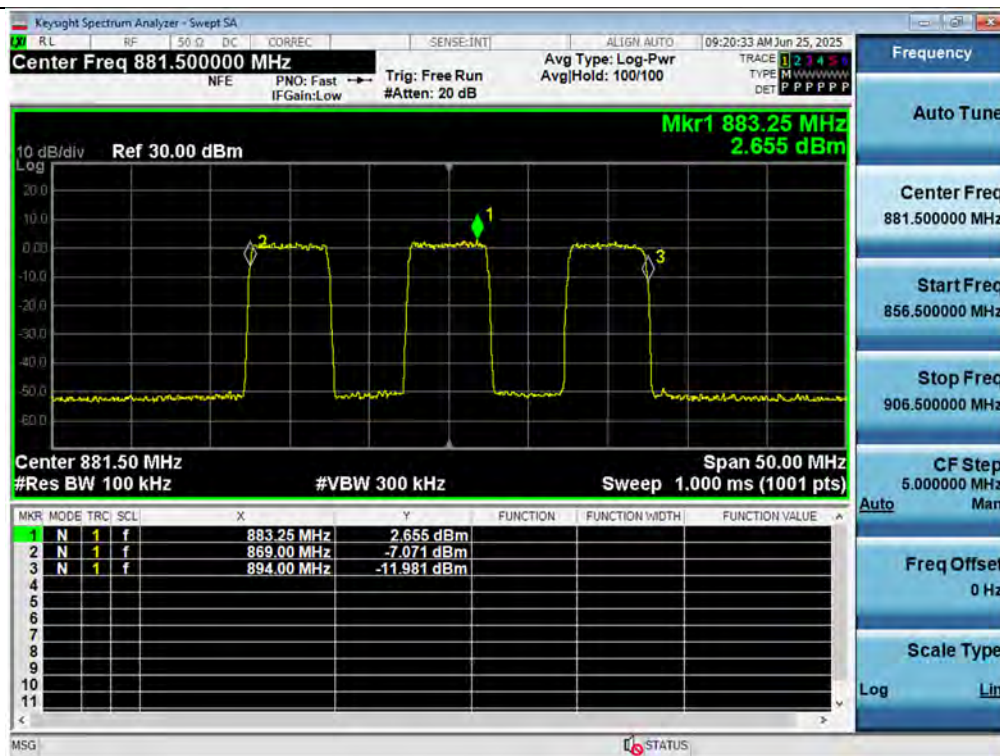
Upper 700 MHz (746 ~ 756 MHz) / Downlink / ANT 1



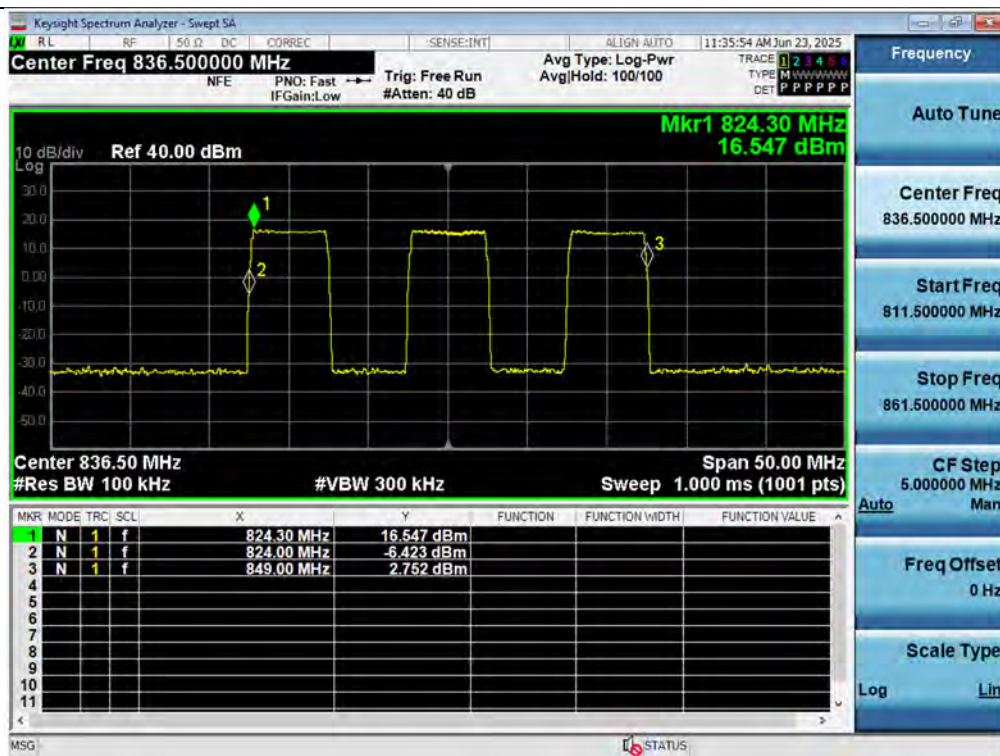
Cellular (824 ~ 849 MHz) / Uplink / ANT 1



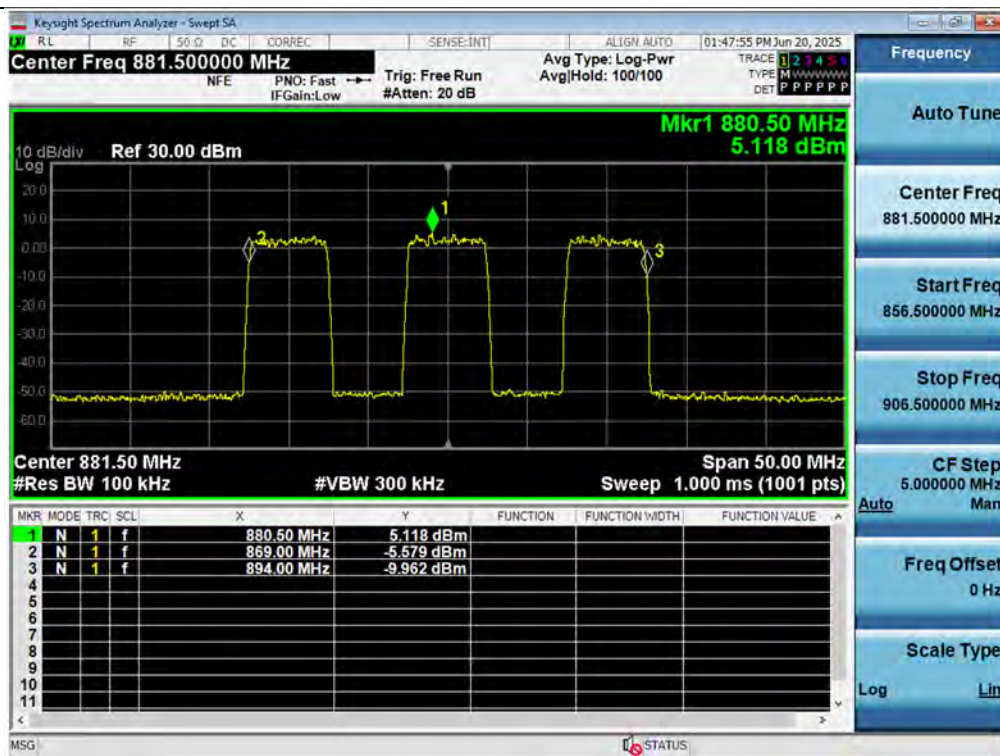
Cellular (869 ~ 894 MHz) / Downlink / ANT 1



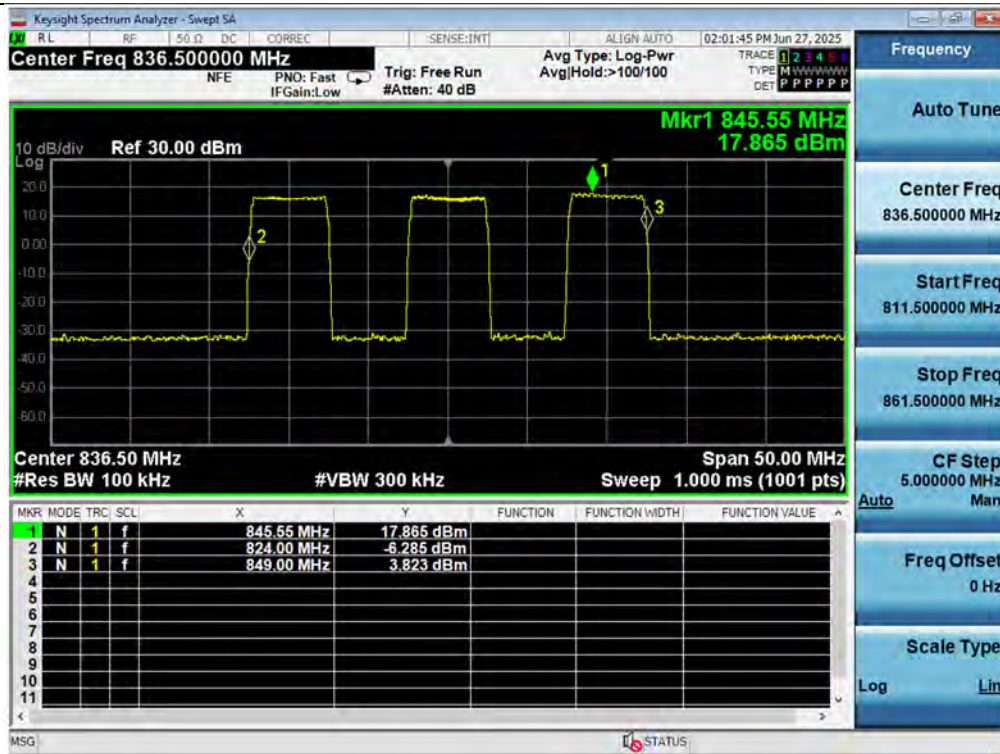
Cellular (824 ~ 849 MHz) / Uplink / ANT 2



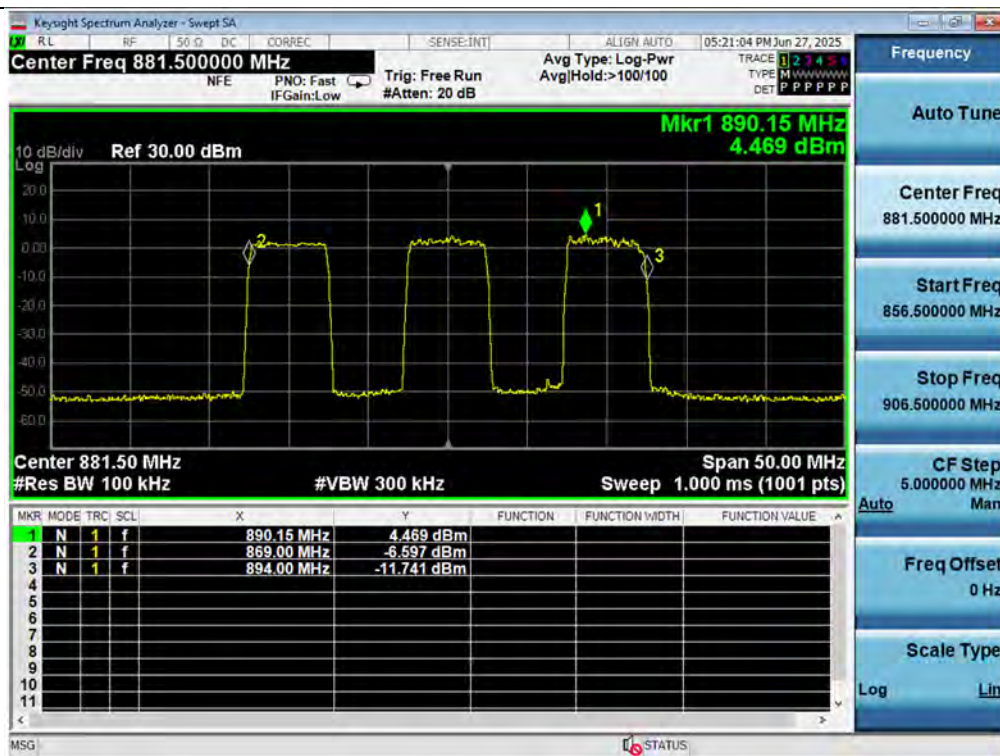
Cellular (869 ~ 894 MHz) / Downlink / ANT 2



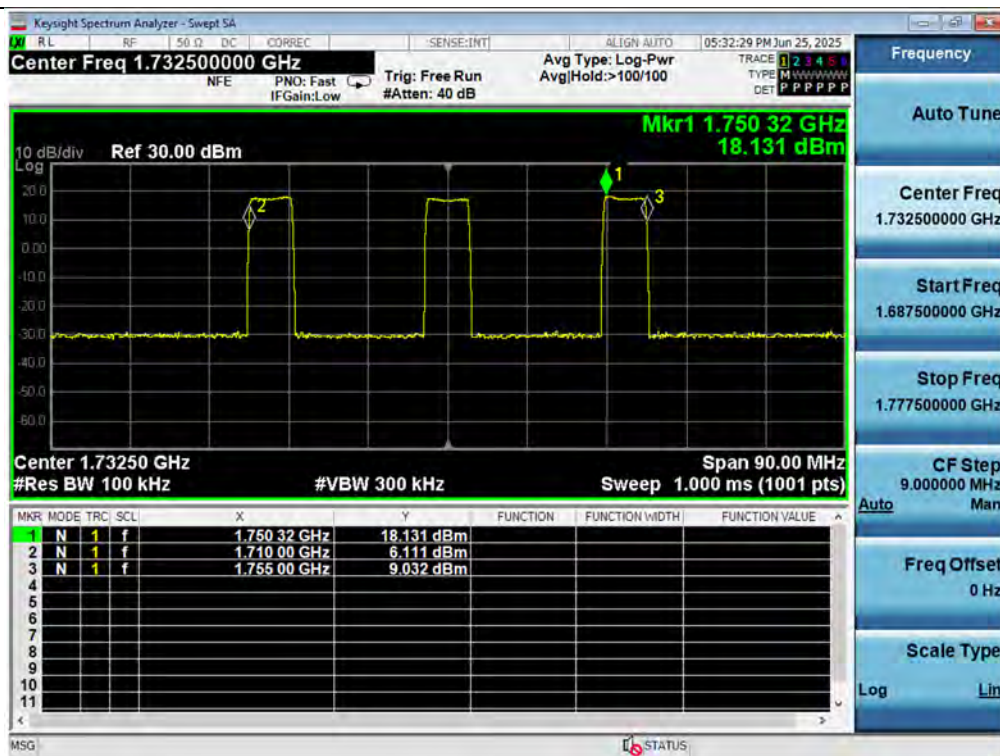
Cellular (824 ~ 849 MHz) / Uplink / ANT 3



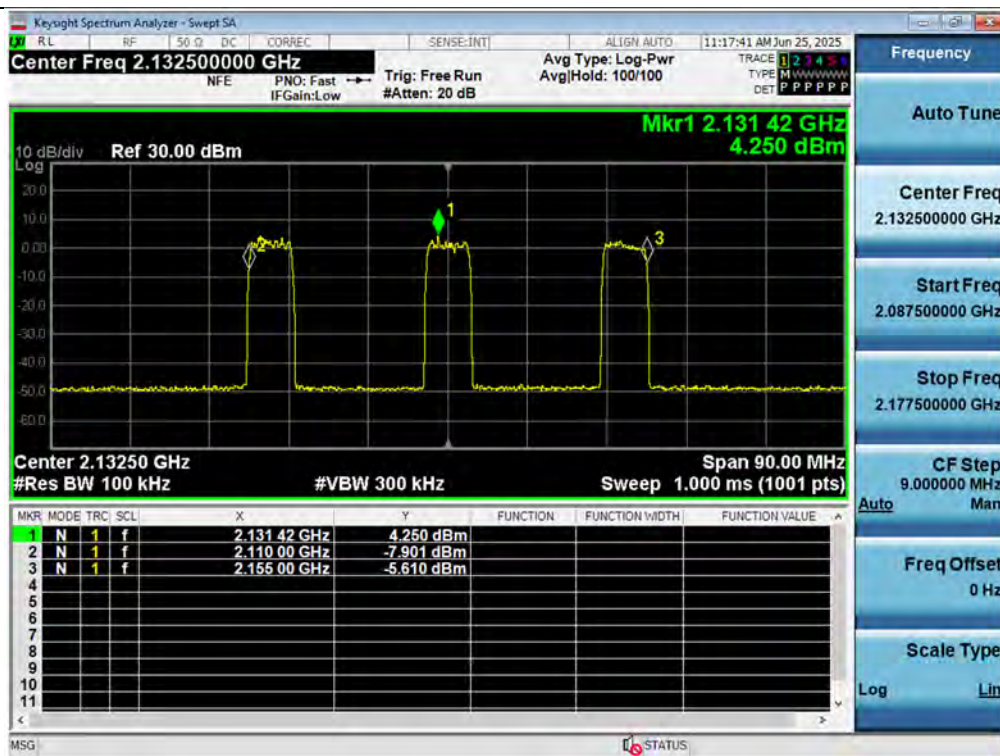
Cellular (869 ~ 894 MHz) / Downlink / ANT 3



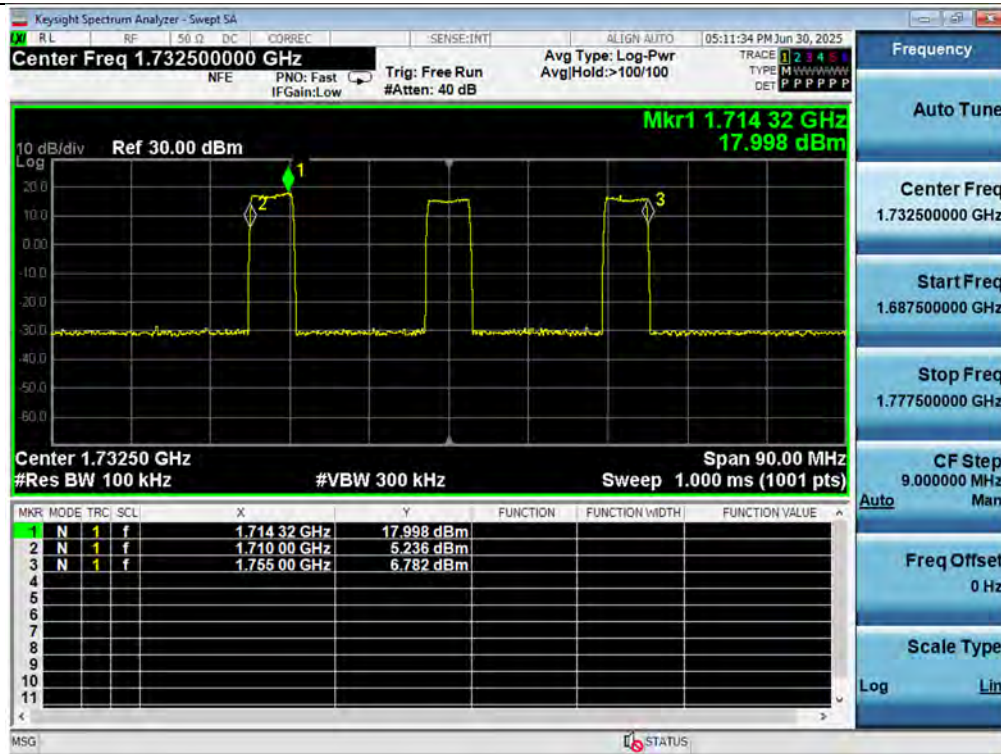
AWS-1 (1710 ~ 1755 MHz) / Uplink / ANT 1



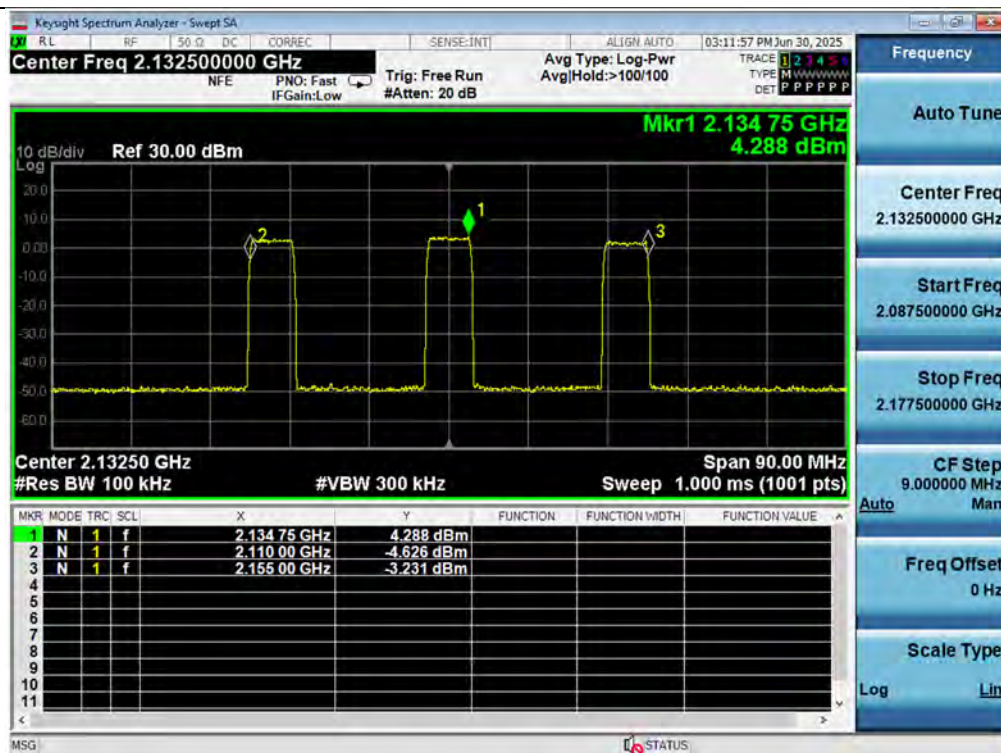
AWS-1 (2110 ~ 2155 MHz) / Downlink / ANT 1



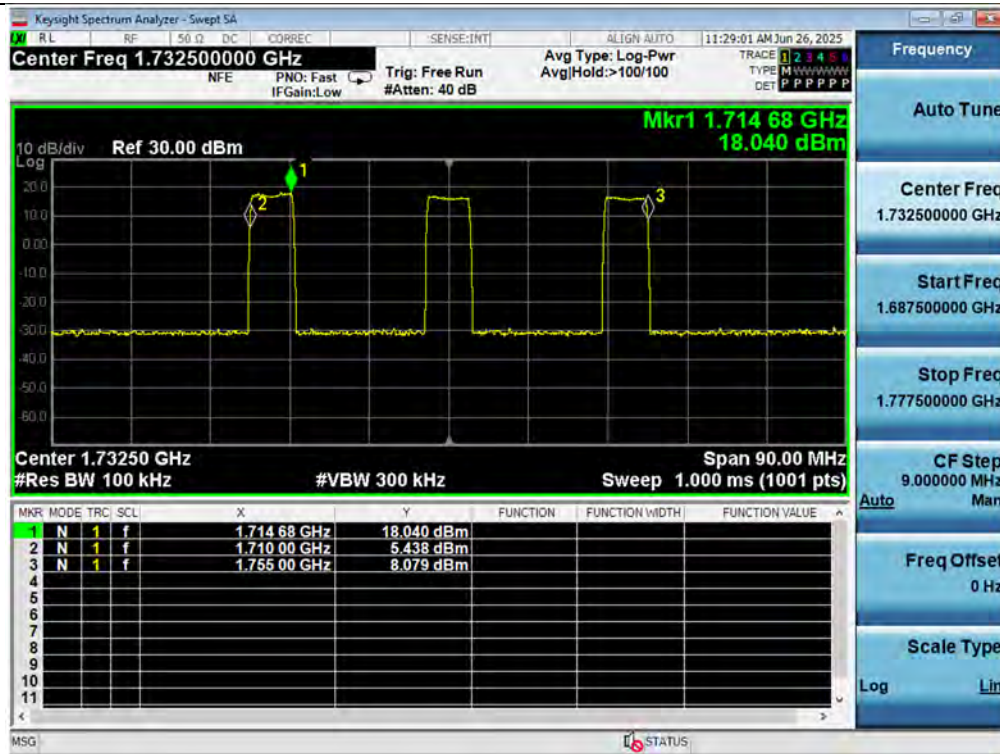
AWS-1 (1710 ~ 1755 MHz) / Uplink / ANT 2



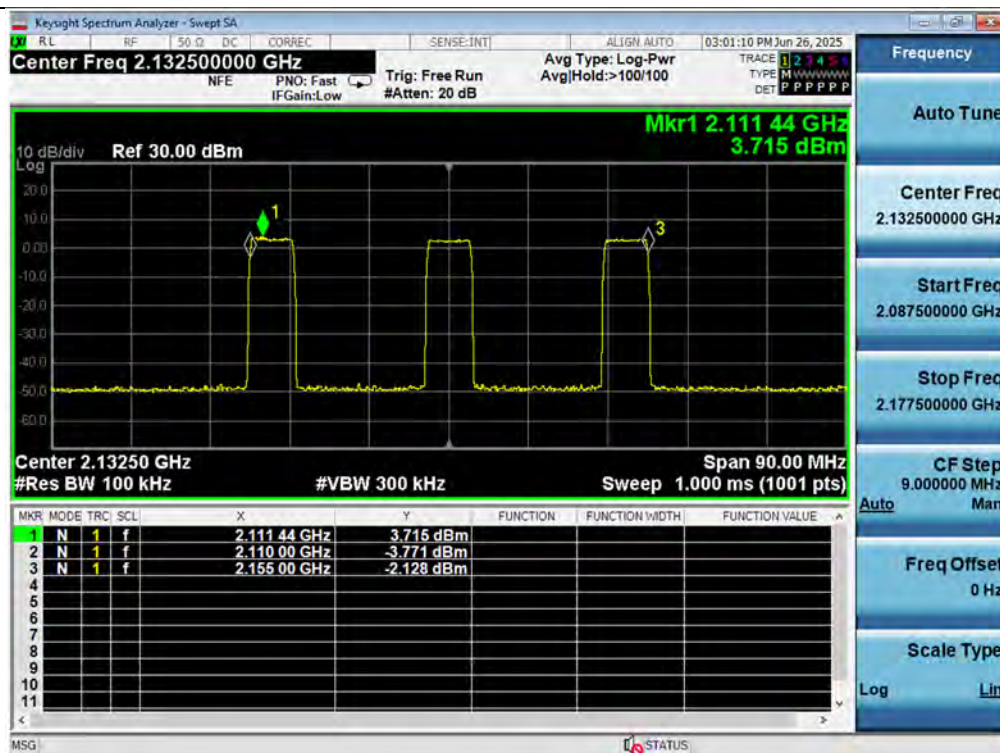
AWS-1 (2110 ~ 2155 MHz) / Downlink / ANT 2



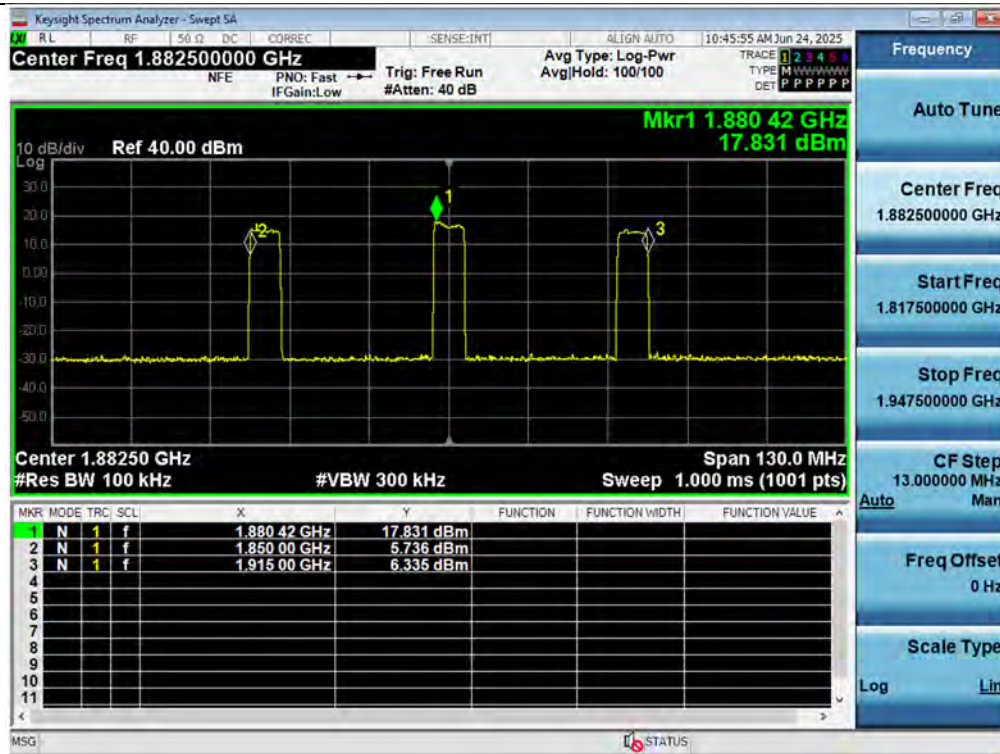
AWS-1 (1710 ~ 1755 MHz) / Uplink / ANT 3



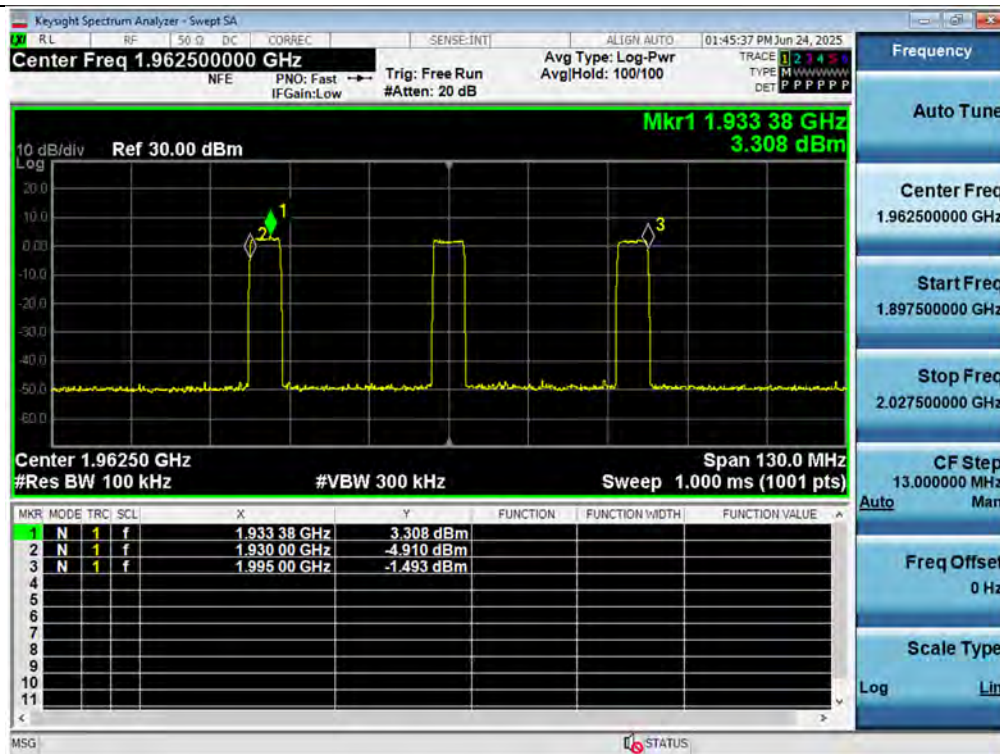
AWS-1 (2110 ~ 2155 MHz) / Downlink / ANT 3



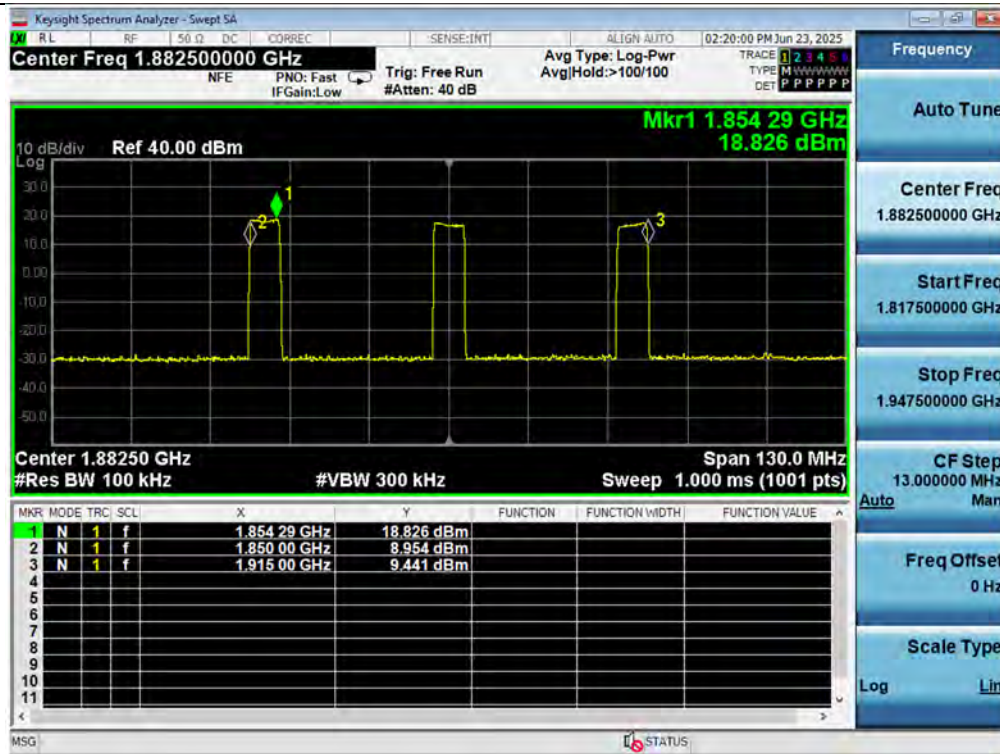
Broadband PCS (1850 ~ 1915 MHz) / Uplink / ANT 1



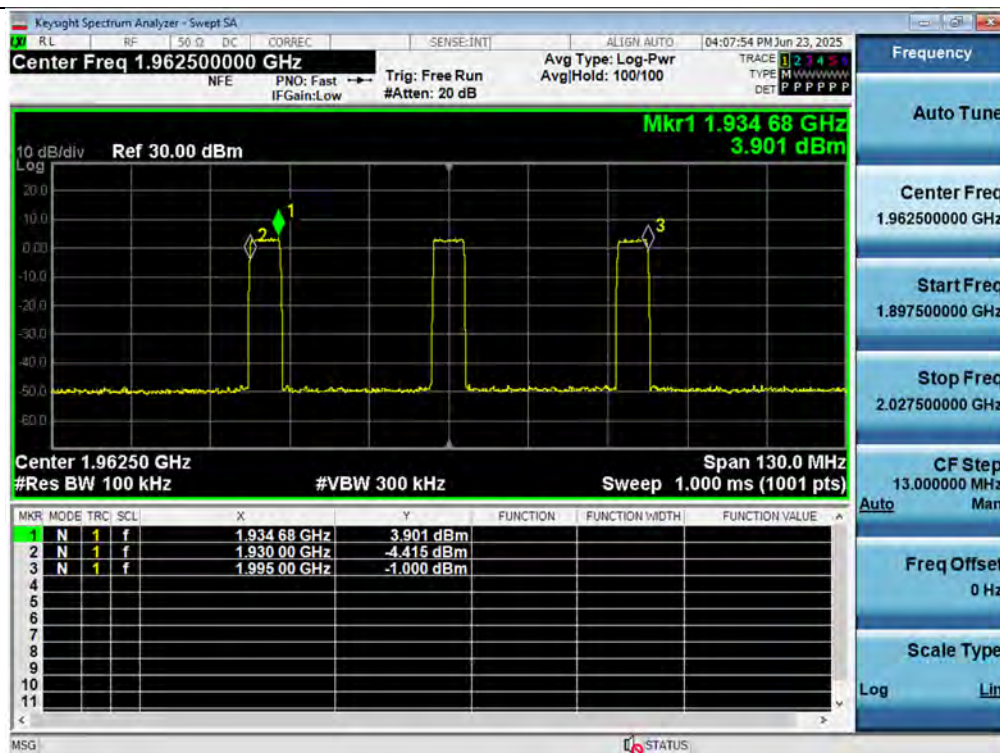
Broadband PCS (1930 ~ 1995 MHz) / Downlink / ANT 1



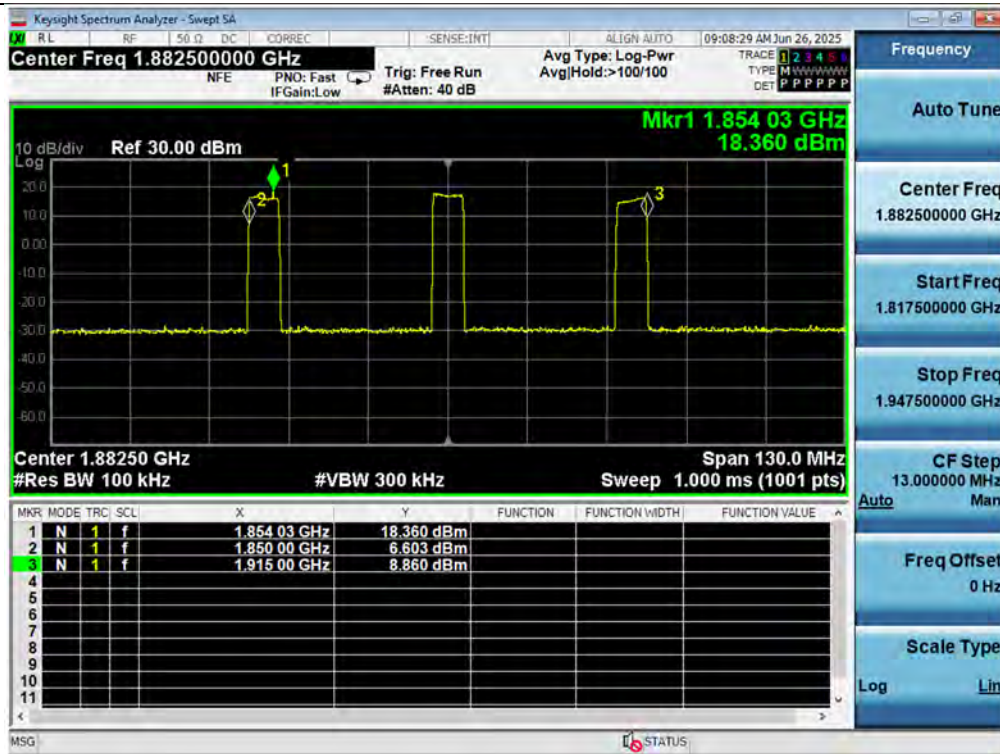
Broadband PCS (1850 ~ 1915 MHz) / Uplink / ANT 2



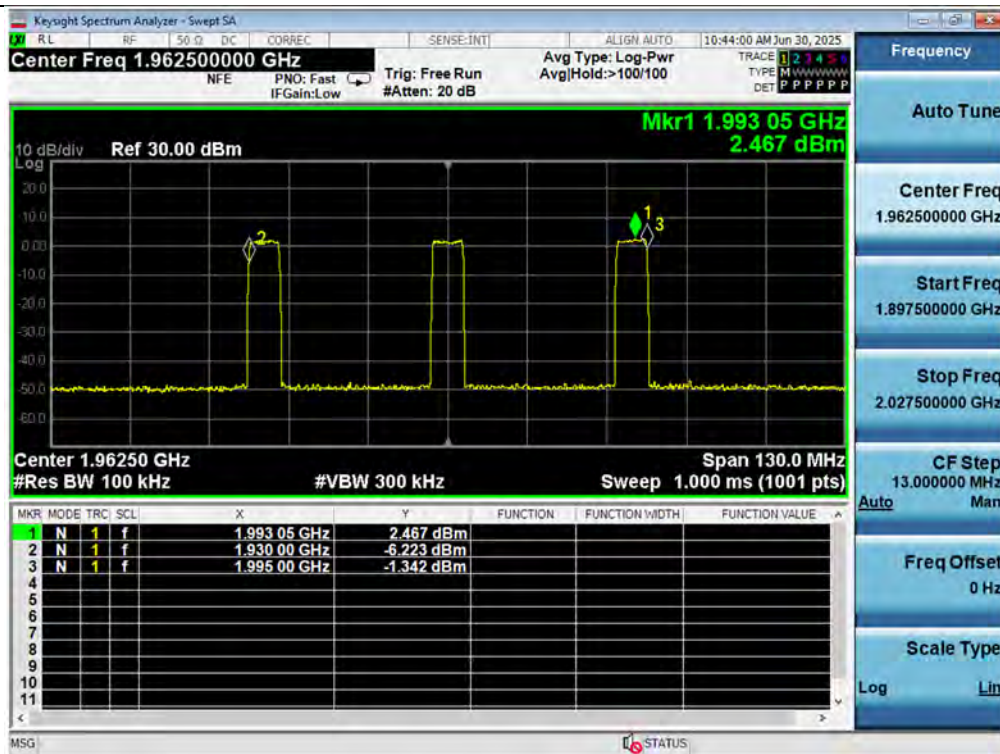
Broadband PCS (1930 ~ 1995 MHz) / Downlink / ANT 2



Broadband PCS (1850 ~ 1915 MHz) / Uplink / ANT 3



Broadband PCS (1930 ~ 1995 MHz) / Downlink / ANT 3



5.2. AUTHORIZED CMRS PROVIDER SPECTRUM BLOCKS

Test Requirement:

§ 20.21(e)(3) Frequency Bands.

Consumer Signal Boosters must be designed and manufactured such that they only operate on the frequencies used for the provision of subscriber-based services under parts 22 (Cellular), 24 (Broadband PCS), 27 (AWS-1, 700 MHz Lower A-E Blocks, and 700 MHz Upper C Block), and 90 (Specialized Mobile Radio) of this chapter. The Commission will not certificate any Consumer Signal Boosters for operation on part 90 of this chapter (Specialized Mobile Radio) frequencies until the Commission releases a public notice announcing the date Consumer Signal Boosters may be used in the band.

§ 20.21(e)(4) Self-monitoring.

Consumer Signal Boosters must automatically self-monitor their operation to ensure compliance with applicable noise and gain limits and either self-correct or shut down automatically if their operation exceeds those parameters.

Test Procedures:

Measurements were in accordance with the test methods section 7.1.2 of KDB 935210 D04 v02r04.

- a) Set up the booster in normal mode as shown in Figure 1, with the base station simulator transmitting an authorized CMRS provider signal to the booster.
- b) Set the level of the base station simulator such that the booster reaches maximum output power in the downlink direction.
- c) Set the level of the uplink signal generator such that the booster reaches maximum output power in the uplink direction.
- d) Set the center frequency of the donor port spectrum analyzer to the one of the authorized uplink spectrum blocks, and server port spectrum analyzer to the one of the authorized downlink spectrum blocks
- e) Set the spectrum analyzer RBW to 1 MHz with the VBW $\geq 3 \times$ RBW.
- f) Select the power averaging (rms) detector and trace average over at least 100 traces.
- g) Measure the transmit power levels in both the uplink and downlink directions.
- h) Change the base station simulator signal to a non-authorized CMRS provider signal at the same center frequency.
- i) Reset the EUT (e.g., cycle ac/dc power).
- j) Measure the maximum transmitter noise power level in both the uplink and downlink directions.
- k) Calculate the booster gain level in the uplink direction.
- l) Save the spectrum analyzer plot as necessary for inclusion in the final test report.
- m) Check compliance from reset condition (which includes the manufacturer's declared boot-up time) or change in provider code set [see 7.1.2h)] by verifying that the booster is inactive for at least 30 seconds after reset and is in compliance with the noise power and gain limits as specified in Section 20.21(e)(9)(i)(l) for all non-authorized spectrum block(s) within the CMRS band under test.
- n) Repeat 7.1.2h) through 7.1.2m) for two additional non-authorized CMRS provider Signals.
- o) Repeat 7.1.2a) through 7.1.2n) for all CMRS bands.

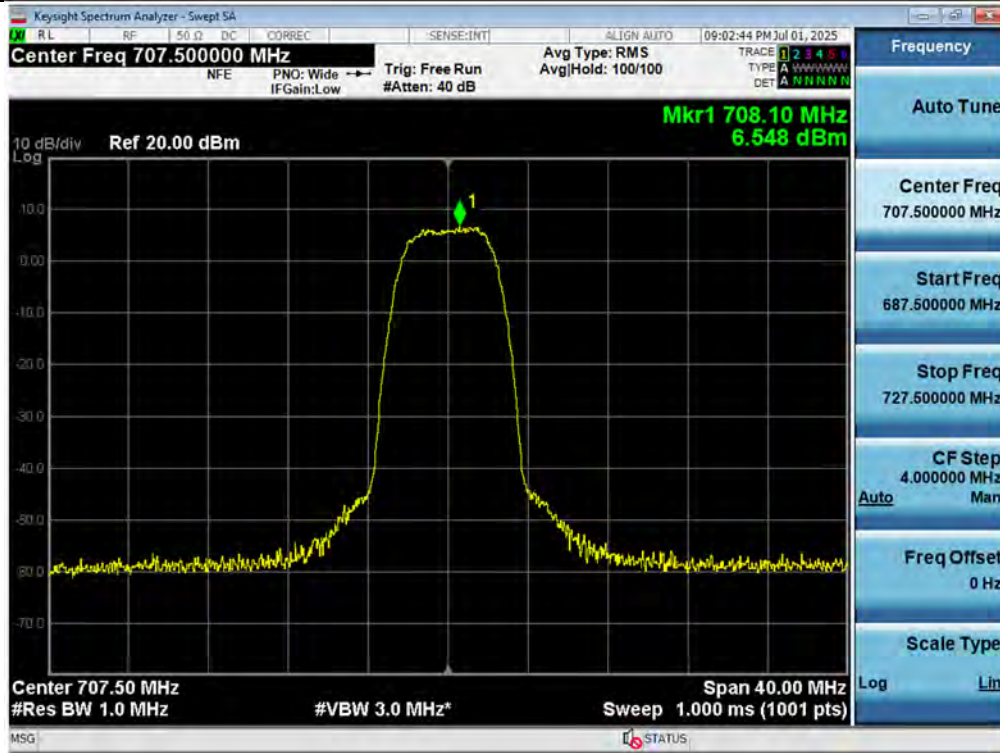
Notes:

1. The EUT operated in normal mode and was configured according to Figure 1 of KDB 935210 D04.
2. The base station simulator was tested separately with an authorized CMRS provider signal and a non-authorized CMRS provider signal.

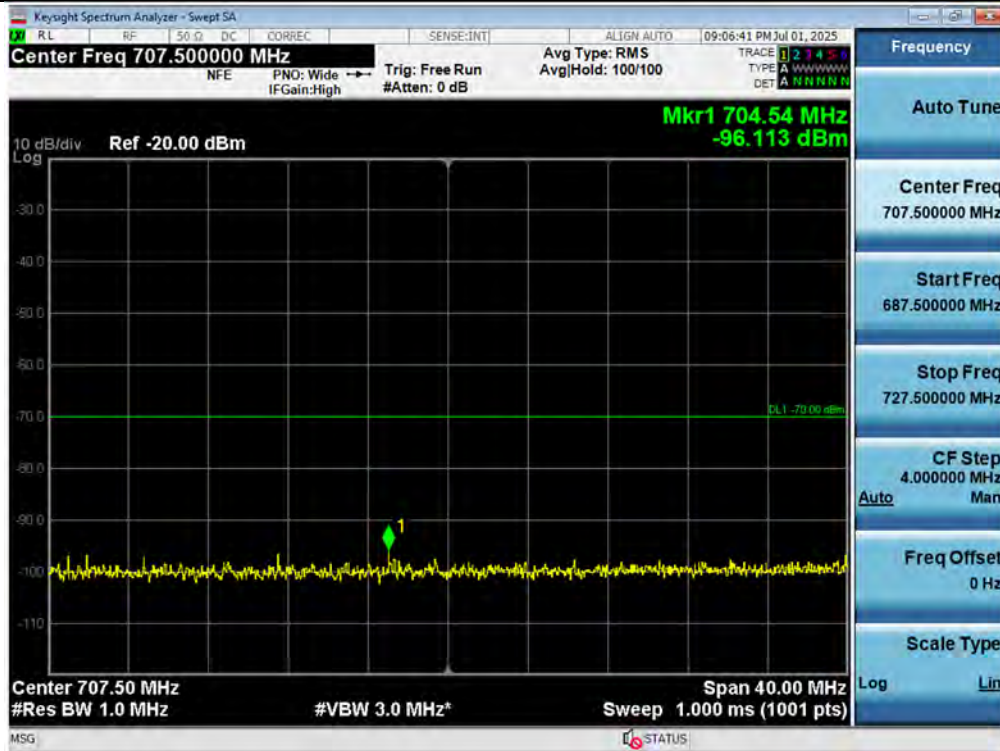
ANT	Authorized CMRS Provider MCC/MNC Code	Non- Authorized CMRS Provider MCC/MNC Code
1	311/480	311/123 311/456 311/789
2	310/260	310/123 310/456 310/789
3	310/410	

Test Results: Plot data of Authorized CMRS Provider Spectrum Blocks

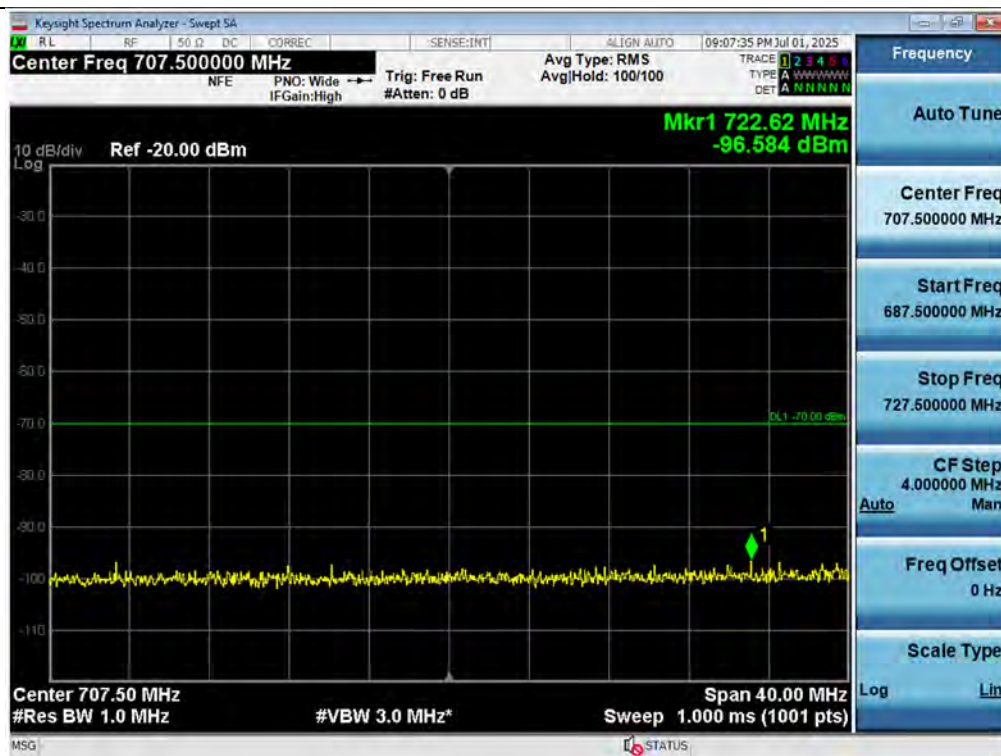
Lower 700 MHz (699 ~ 716 MHz) / Uplink / Authorized signal (MCC/MNC: 310/260) / ANT 2



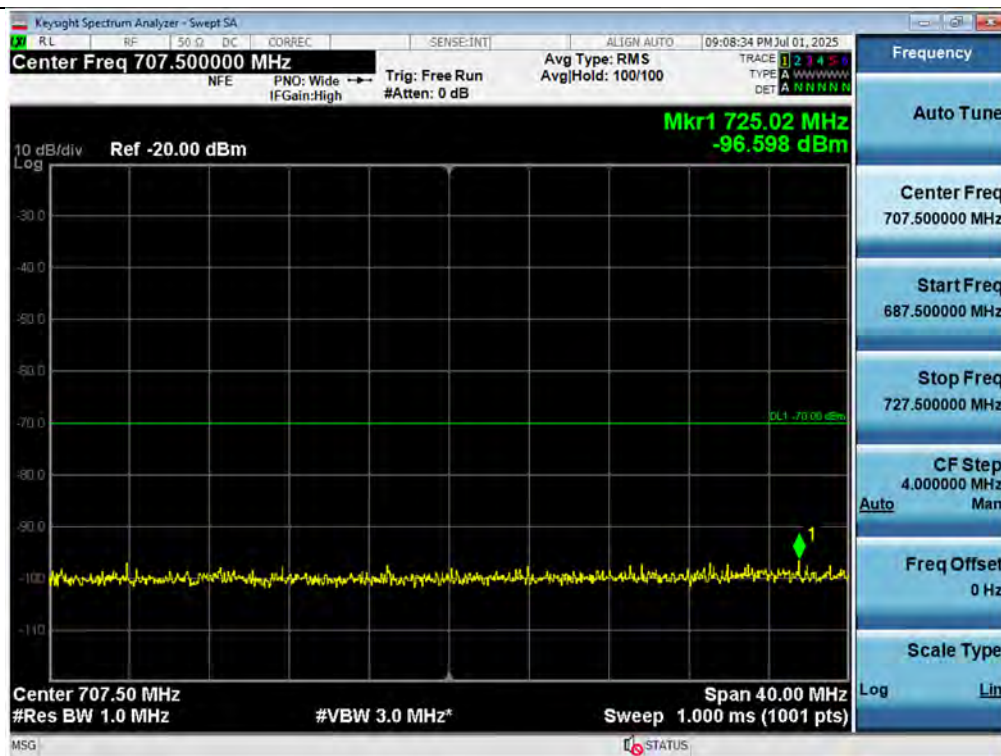
Lower 700 MHz (699 ~ 716 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 2



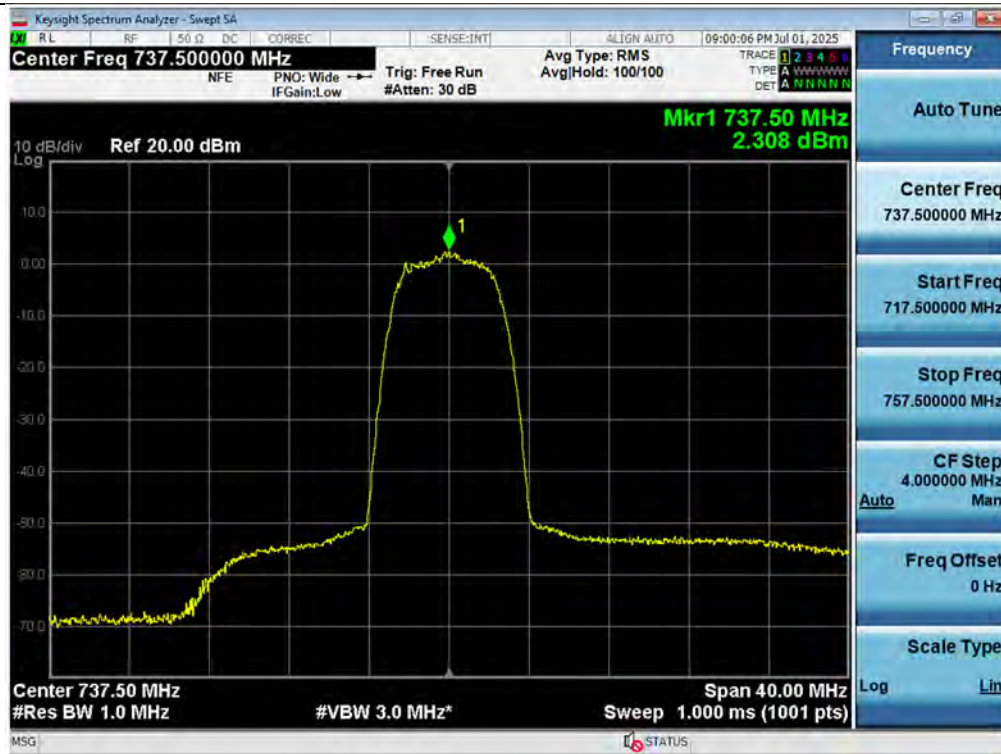
Lower 700 MHz (699 ~ 716 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 2



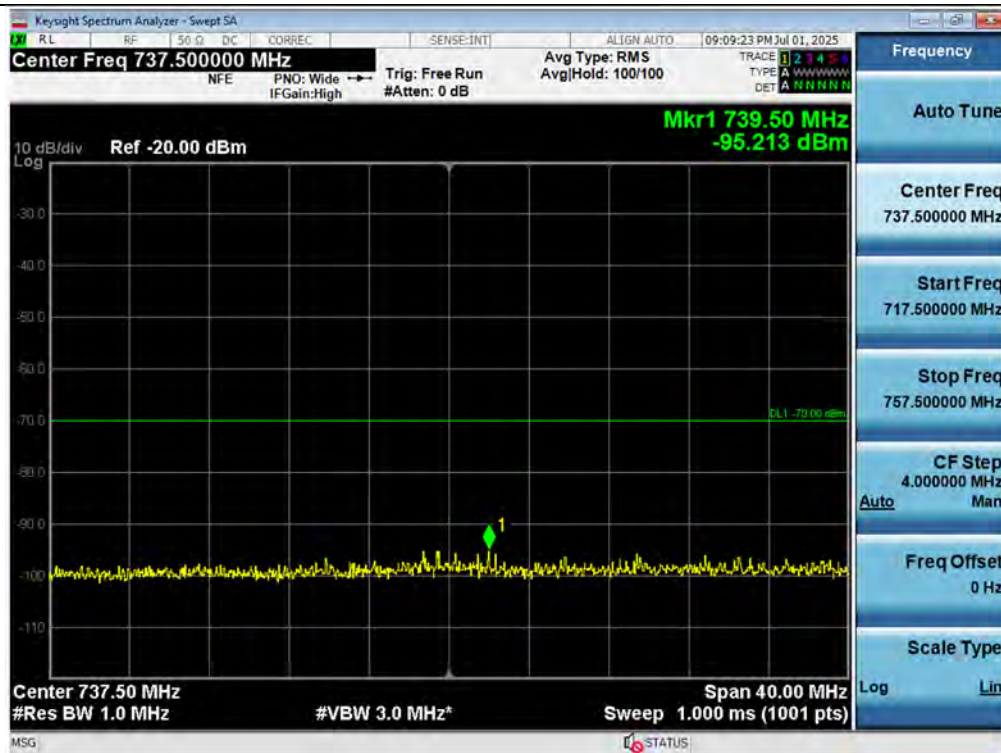
Lower 700 MHz (699 ~ 716 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 2



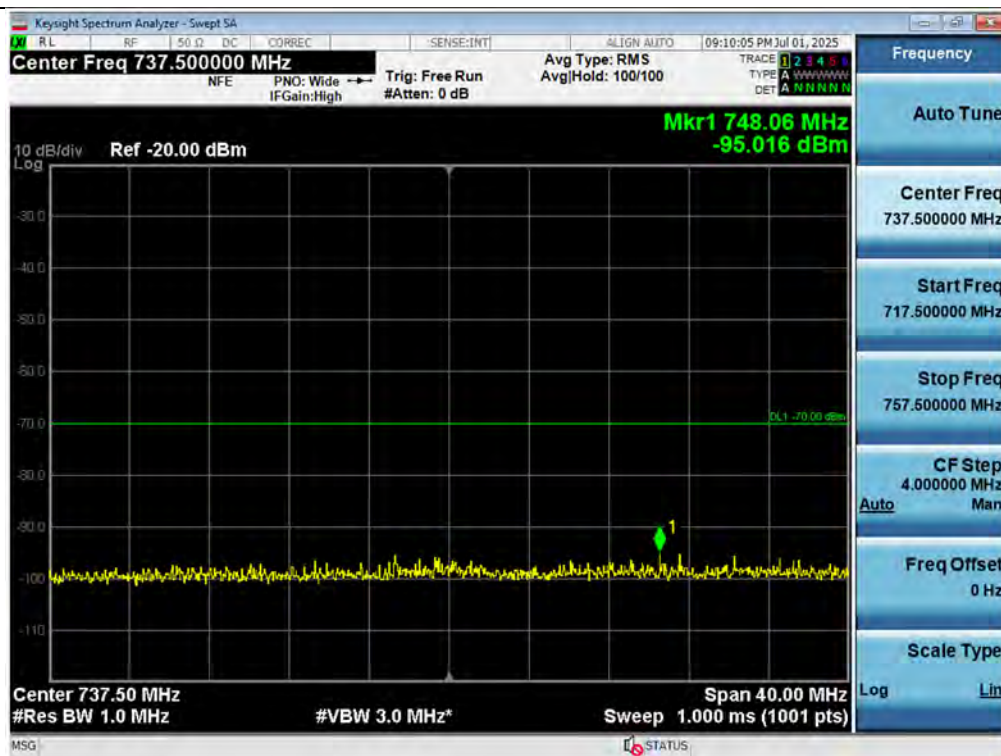
Lower 700 MHz (729 ~ 746 MHz) / Downlink / Authorized signal (MCC/MNC: 310/260) / ANT 2



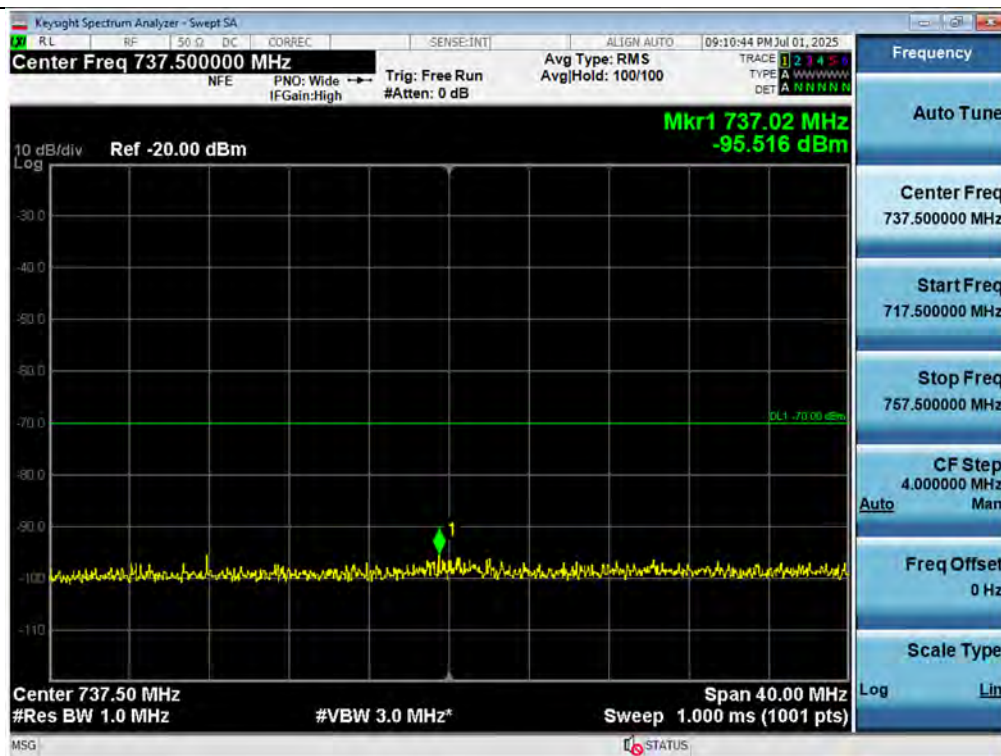
Lower 700 MHz (729 ~ 746 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 2



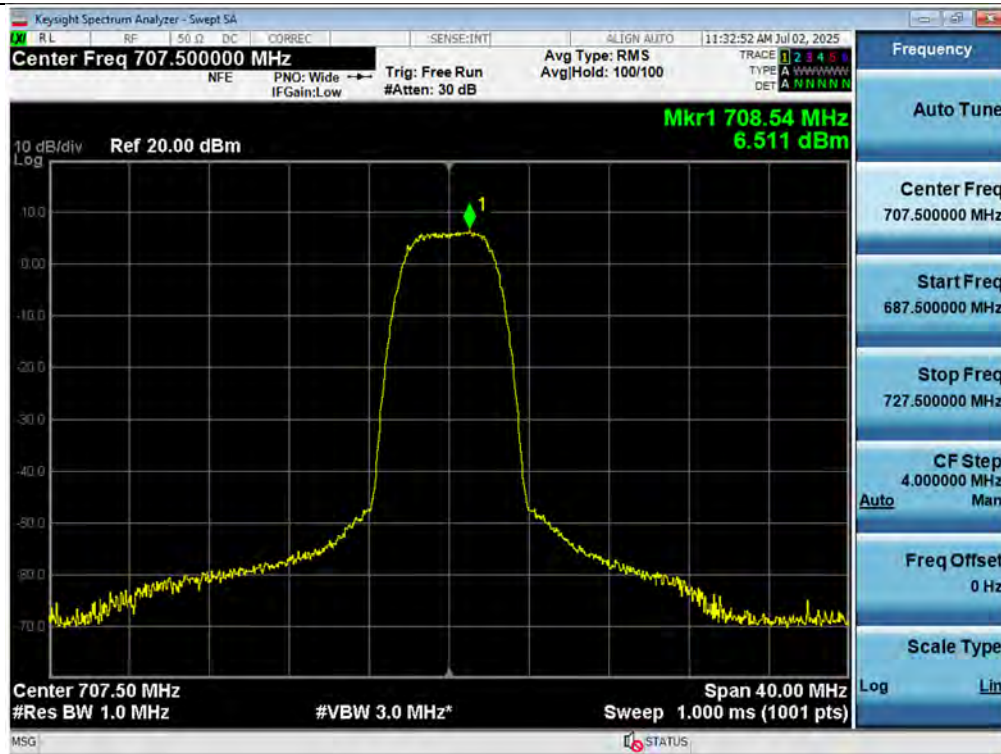
Lower 700 MHz (729 ~ 746 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 2



Lower 700 MHz (729 ~ 746 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 2



Lower 700 MHz (699 ~ 716 MHz) / Uplink / Authorized signal (MCC/MNC: 310/410) / ANT 3



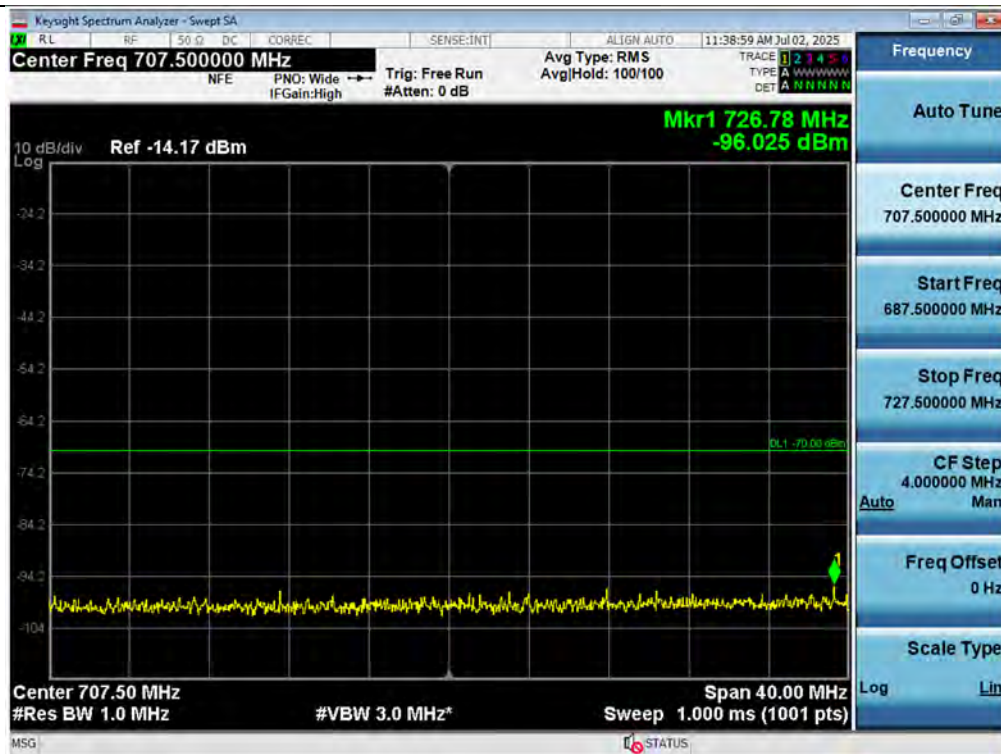
Lower 700 MHz (699 ~ 716 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 3



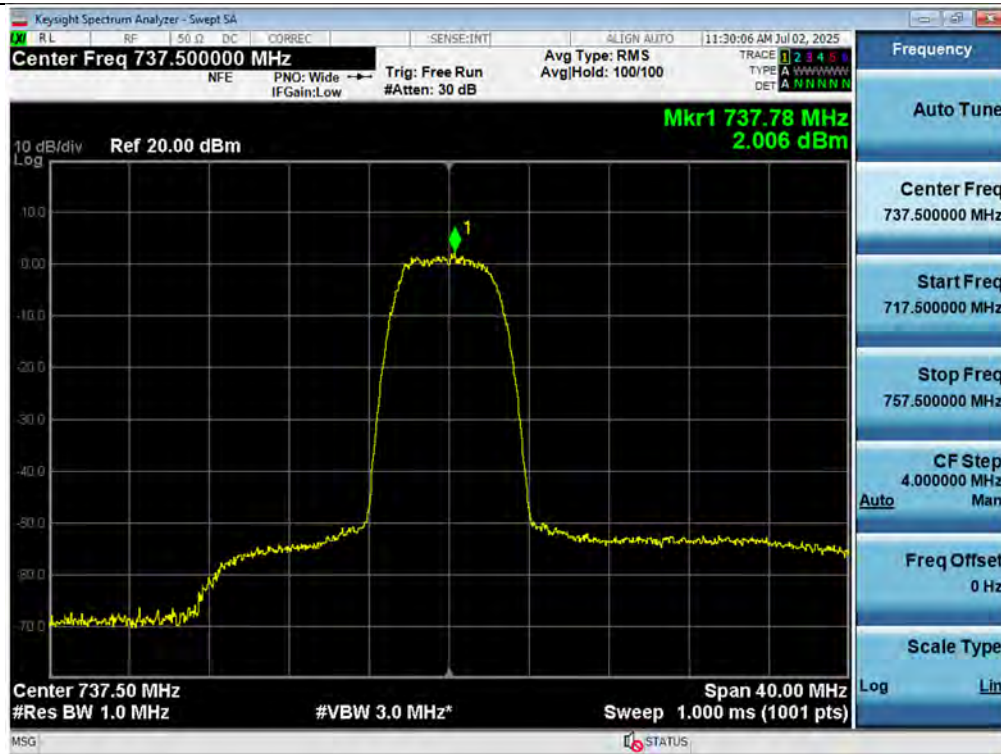
Lower 700 MHz (699 ~ 716 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 3



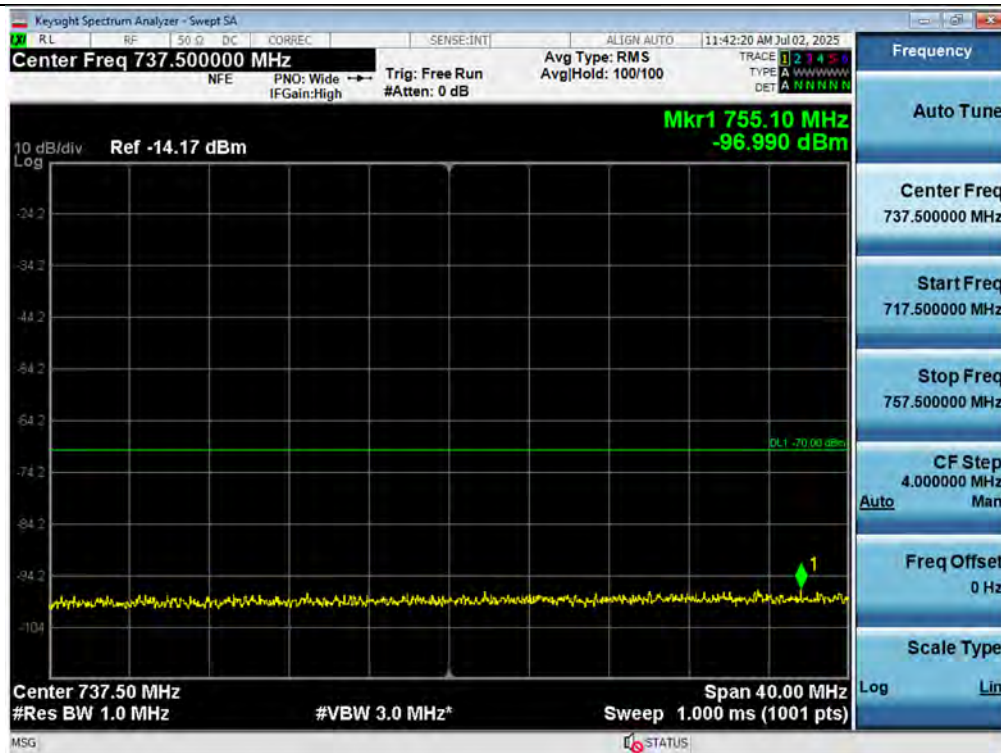
Lower 700 MHz (699 ~ 716 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 3



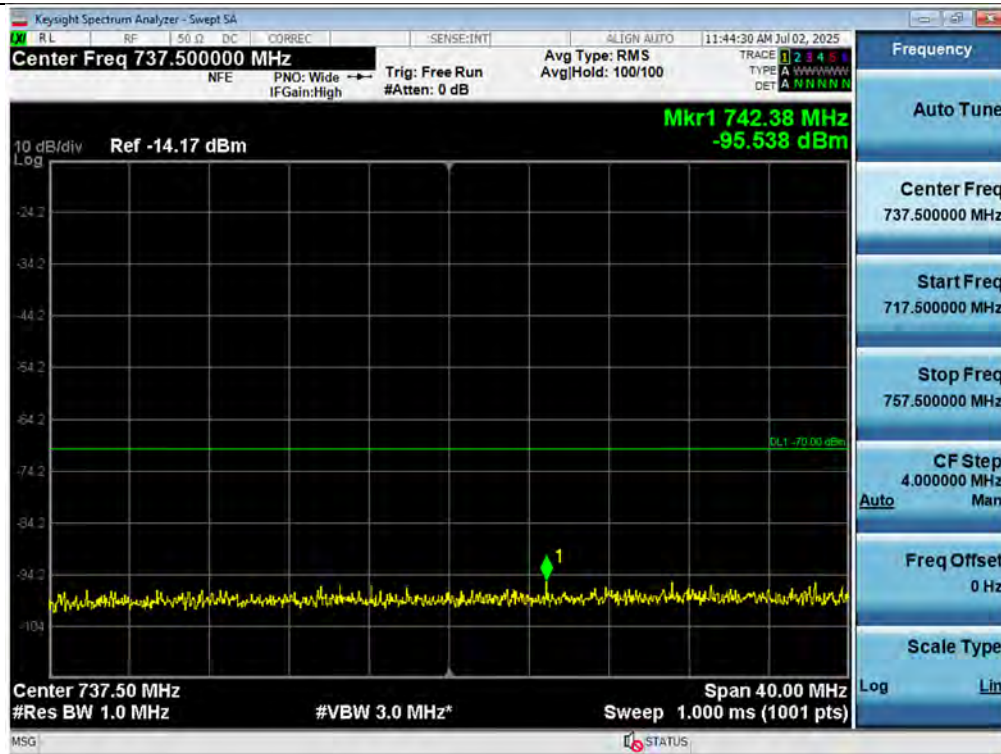
Lower 700 MHz (729 ~ 746 MHz) / Downlink / Authorized signal (MCC/MNC: 310/410) / ANT 3



Lower 700 MHz (729 ~ 746 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 3



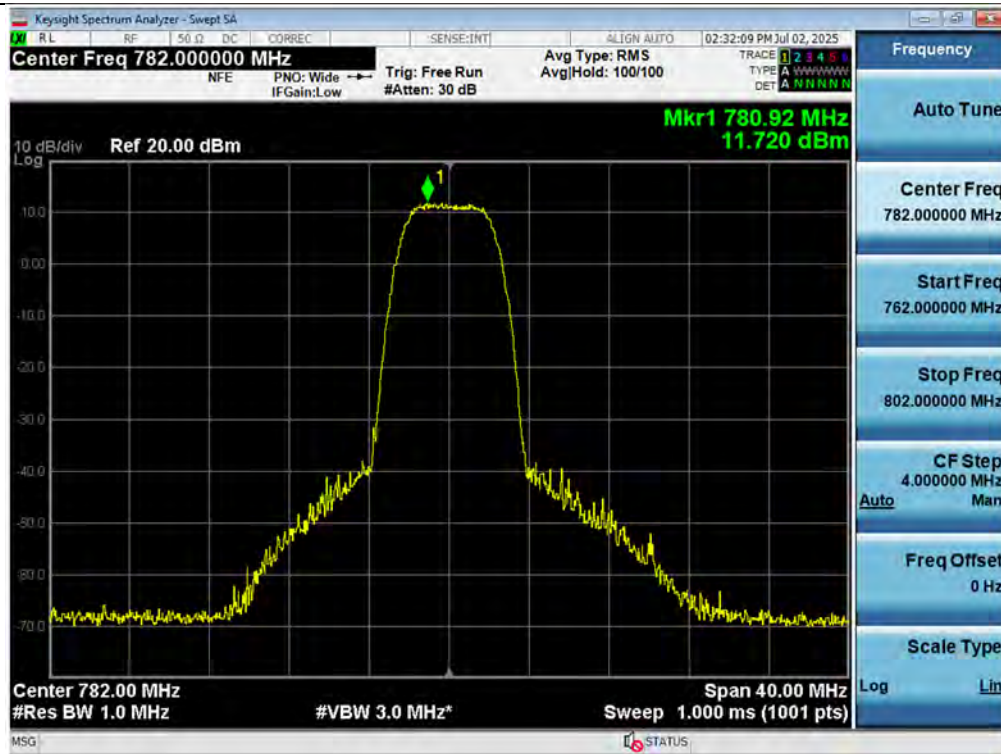
Lower 700 MHz (729 ~ 746 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 3



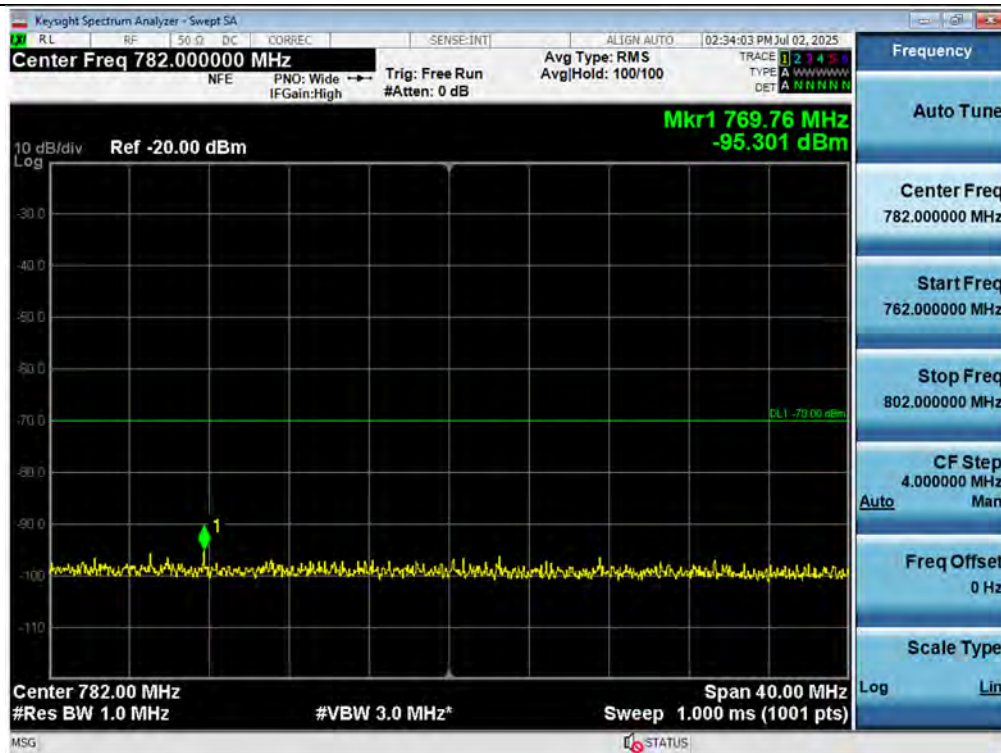
Lower 700 MHz (729 ~ 746 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 3



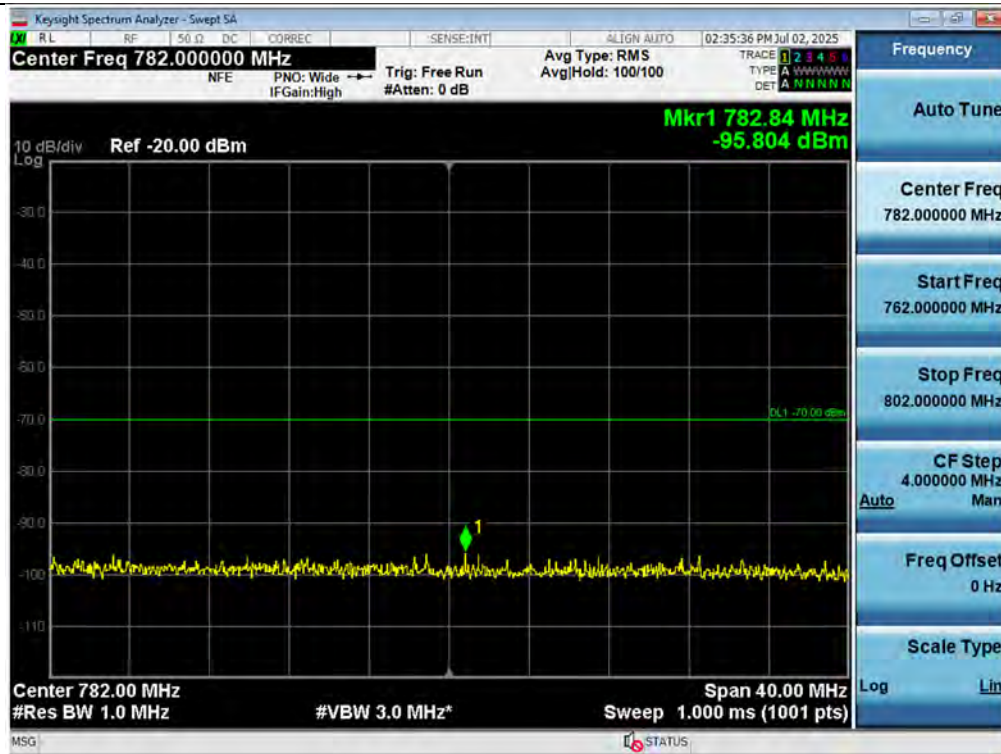
Upper 700 MHz (777 ~ 787 MHz) / Uplink / Authorized signal (MCC/MNC: 311/480) / ANT 1



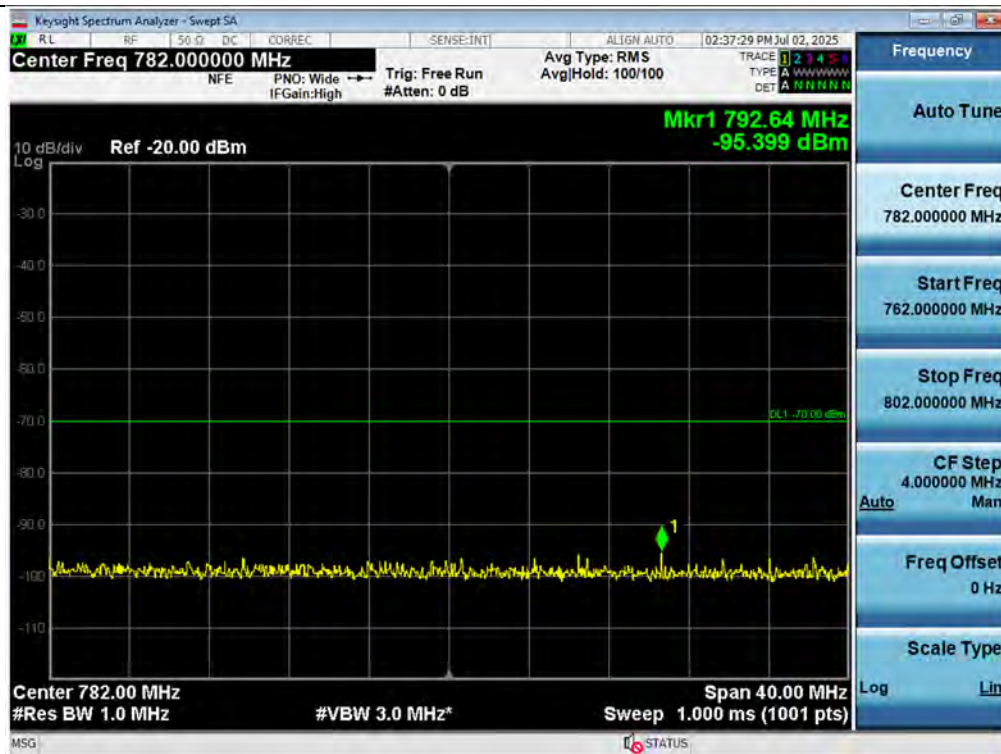
Upper 700 MHz (777 ~ 787 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 311/123) / ANT 1



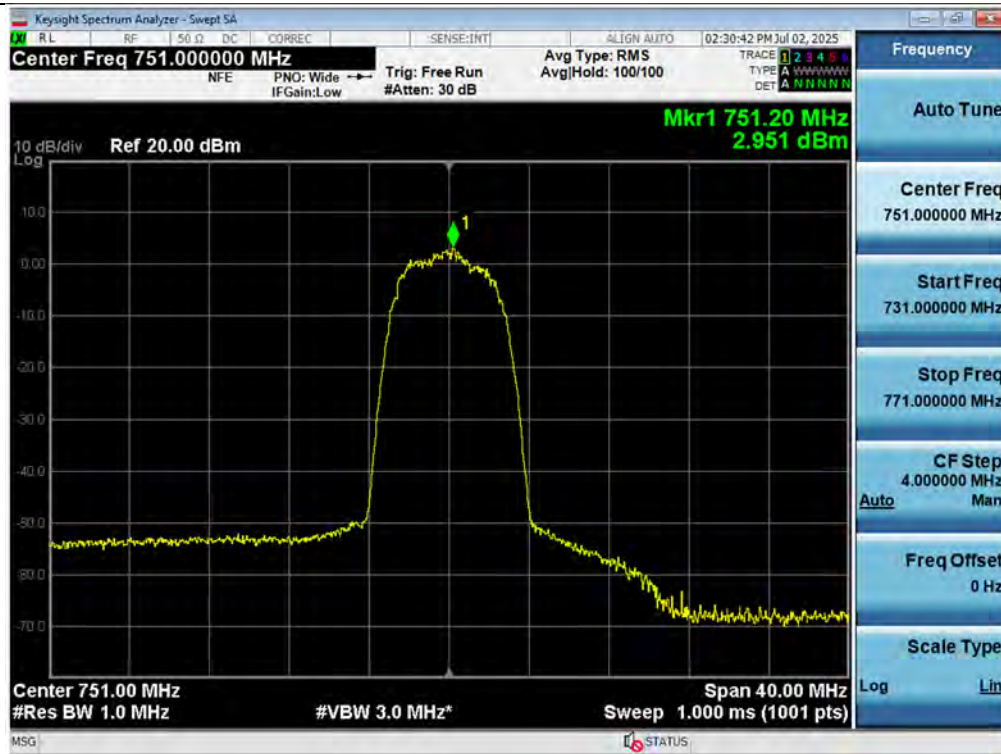
Upper 700 MHz (777 ~ 787 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 311/456) / ANT 1



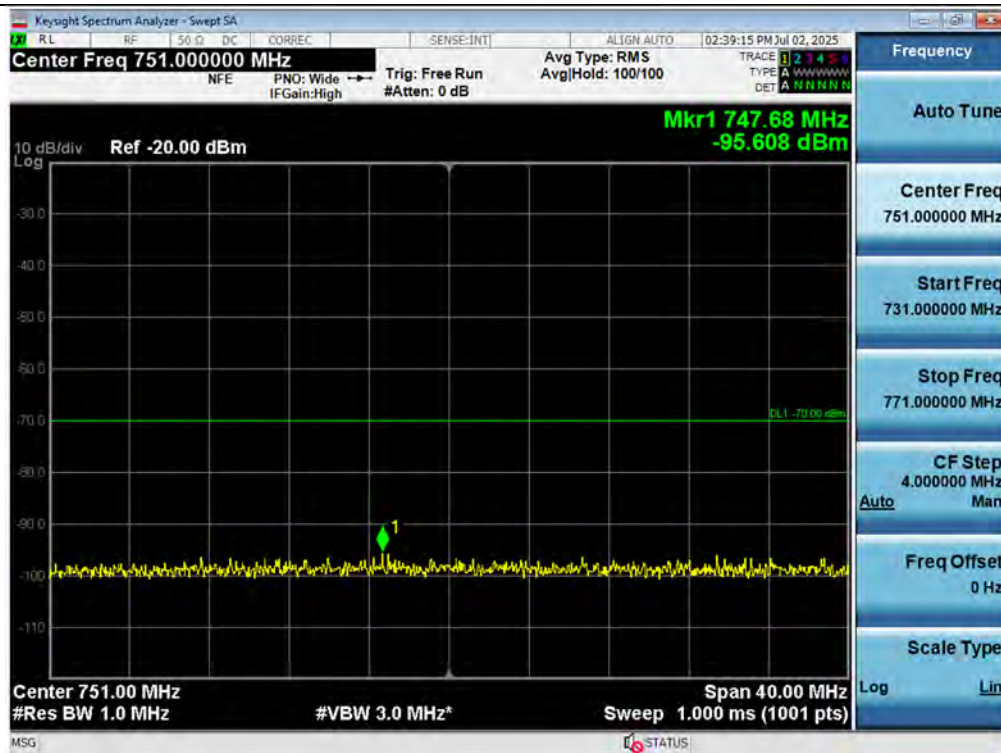
Upper 700 MHz (777 ~ 787 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 311/789) / ANT 1



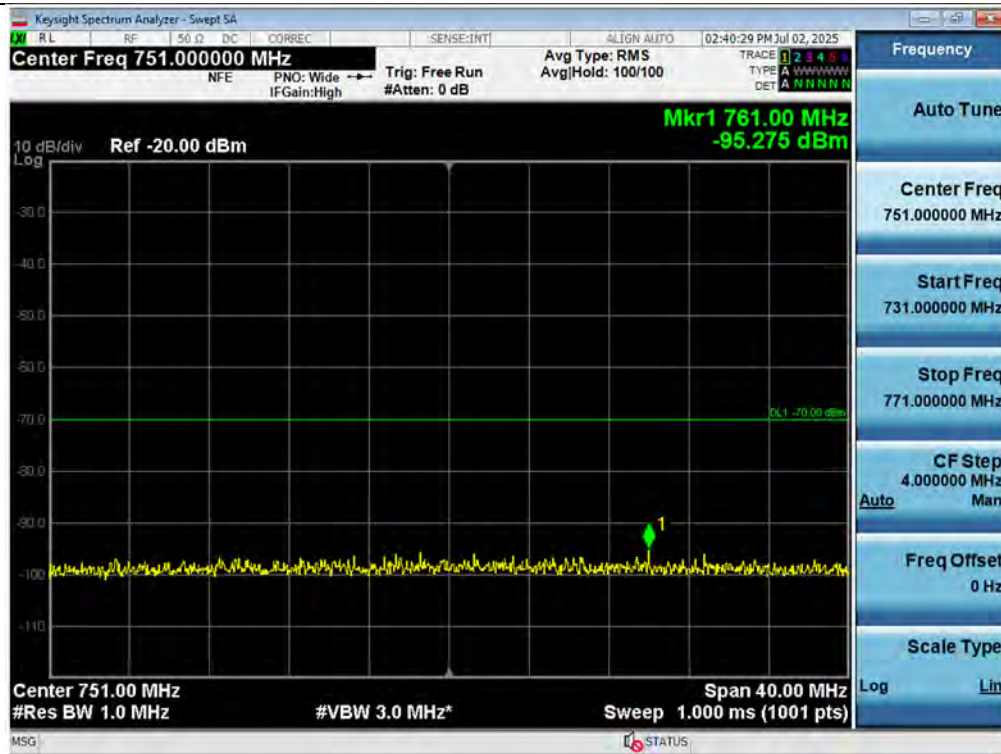
Upper 700 MHz (746 ~ 756 MHz) / Downlink / Authorized signal (MCC/MNC: 311/480) / ANT 1



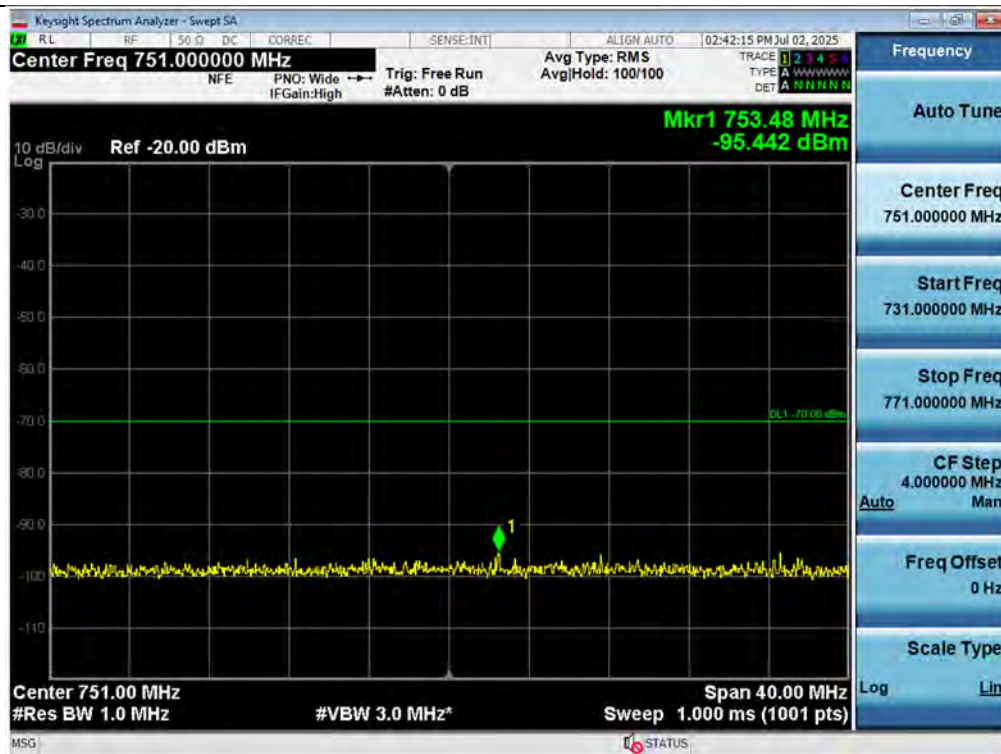
Upper 700 MHz (746 ~ 756 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 311/123) / ANT 1



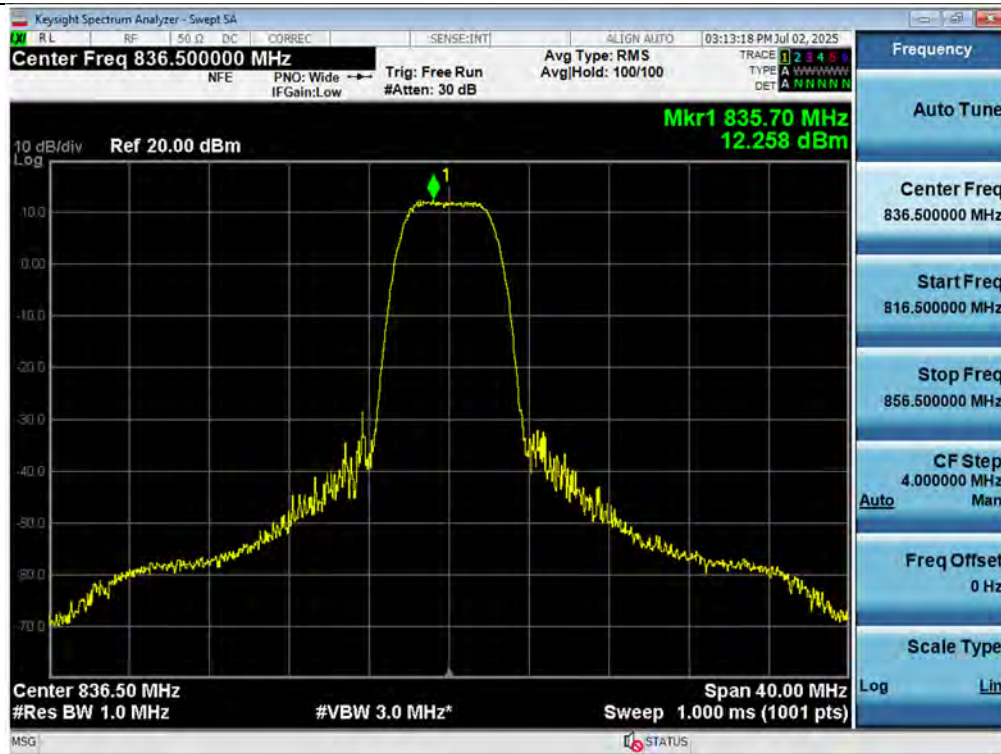
Upper 700 MHz (746 ~ 756 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 311/456) / ANT 1



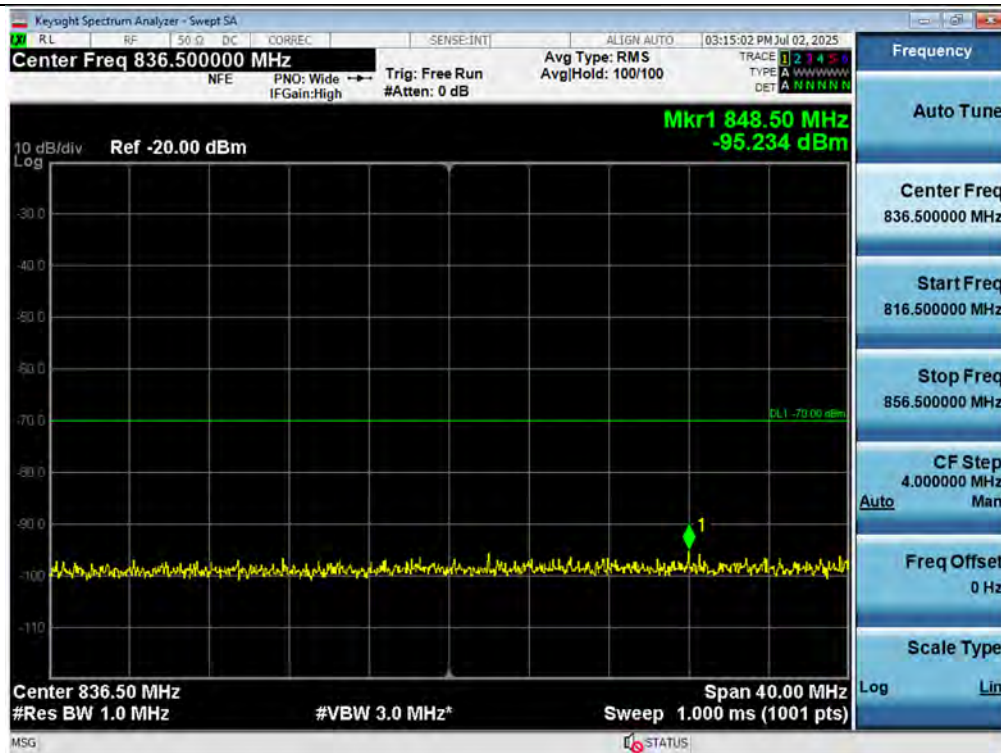
Upper 700 MHz (746 ~ 756 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 311/789) / ANT 1



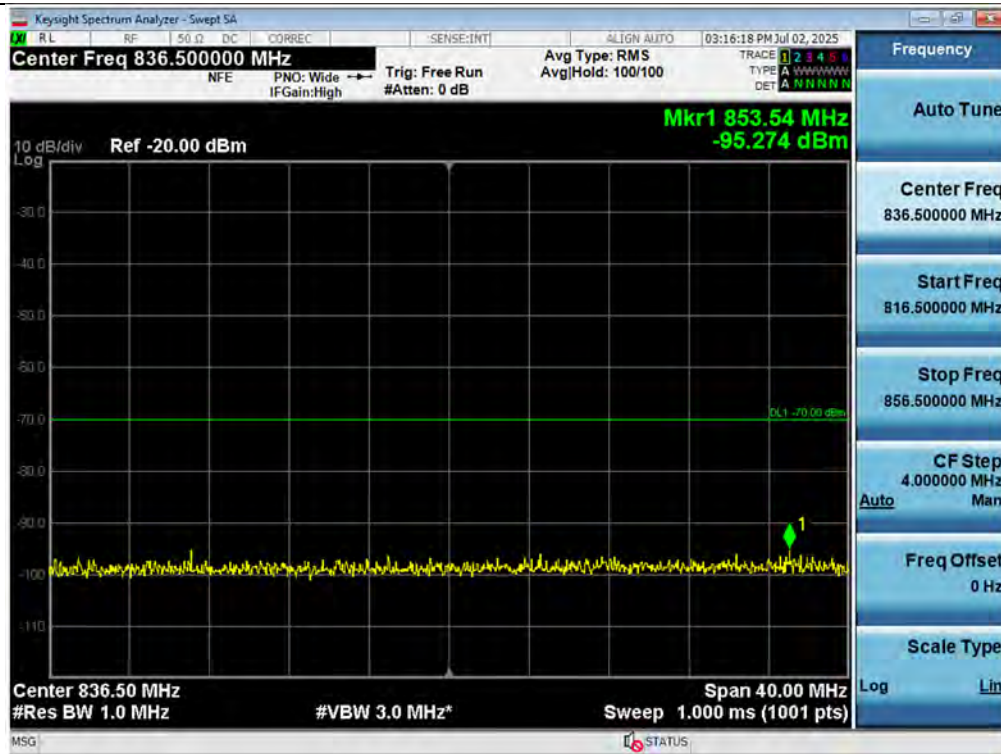
Cellular (824 ~ 849 MHz) / Uplink / Authorized signal (MCC/MNC: 311/480) / ANT 1



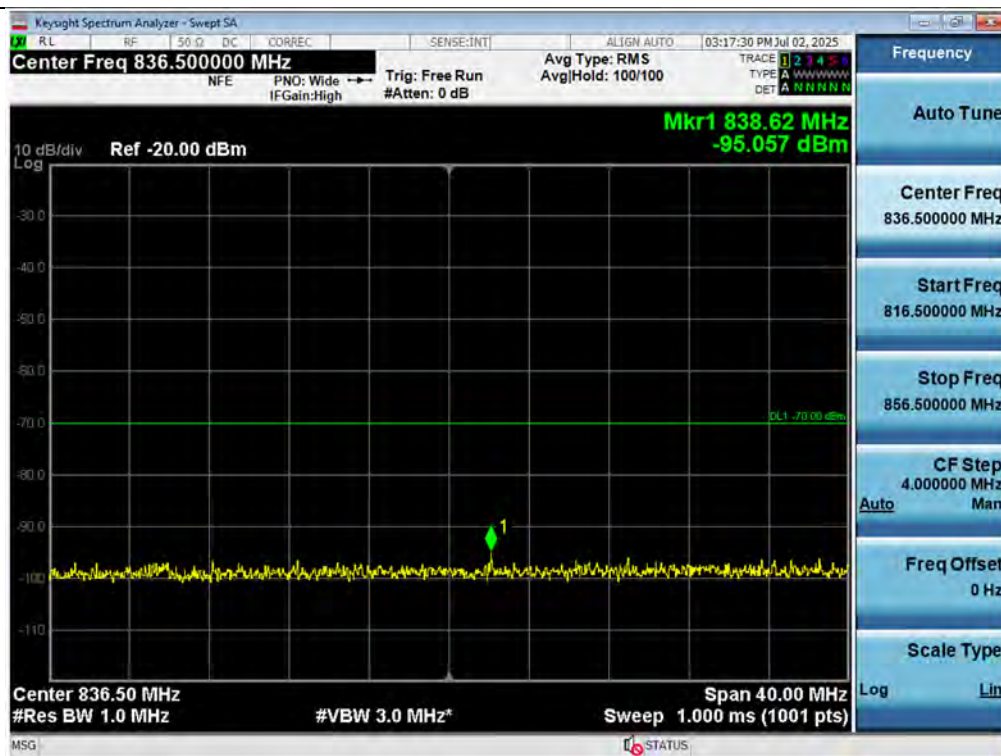
Cellular (824 ~ 849 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 311/123) / ANT 1



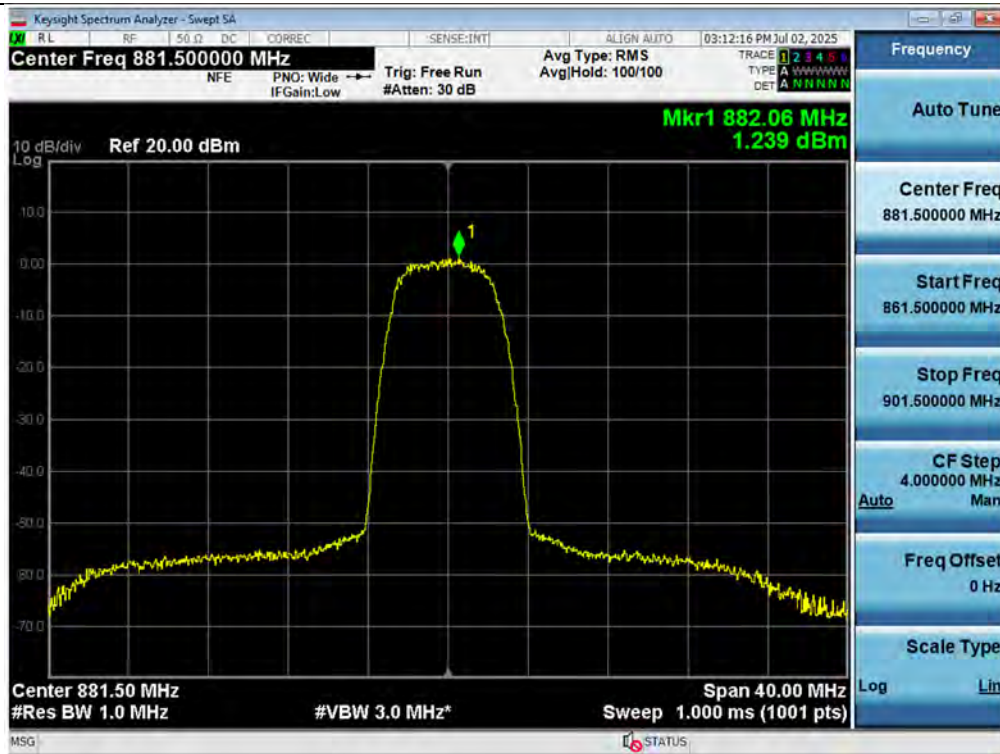
Cellular (824 ~ 849 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 311/456) / ANT 1



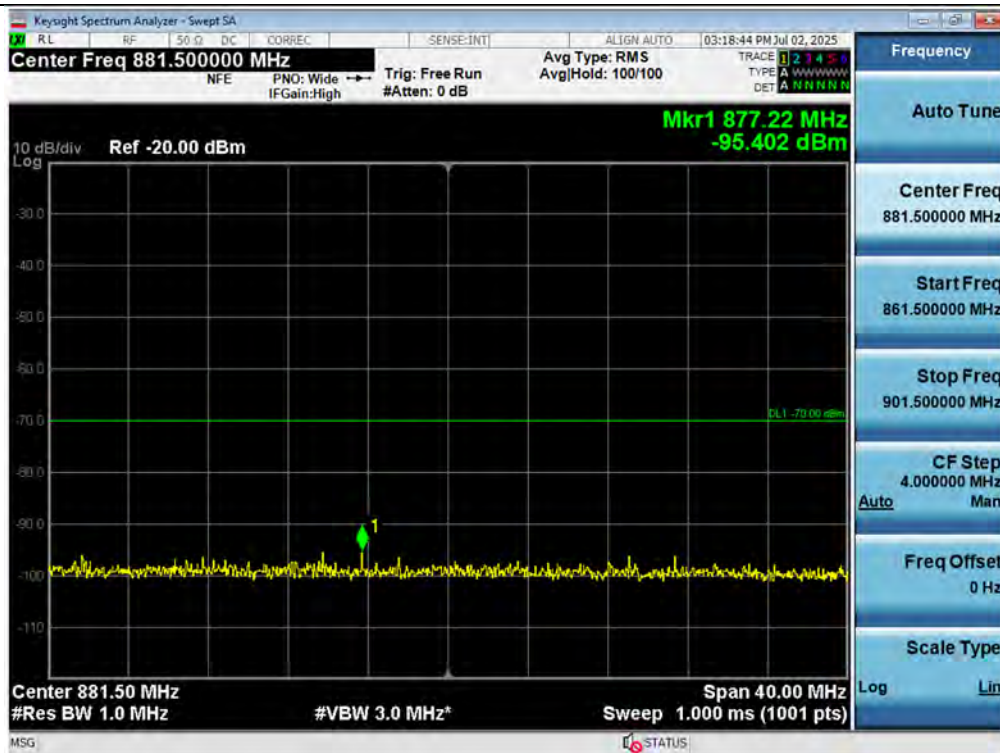
Cellular (824 ~ 849 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 311/789) / ANT 1



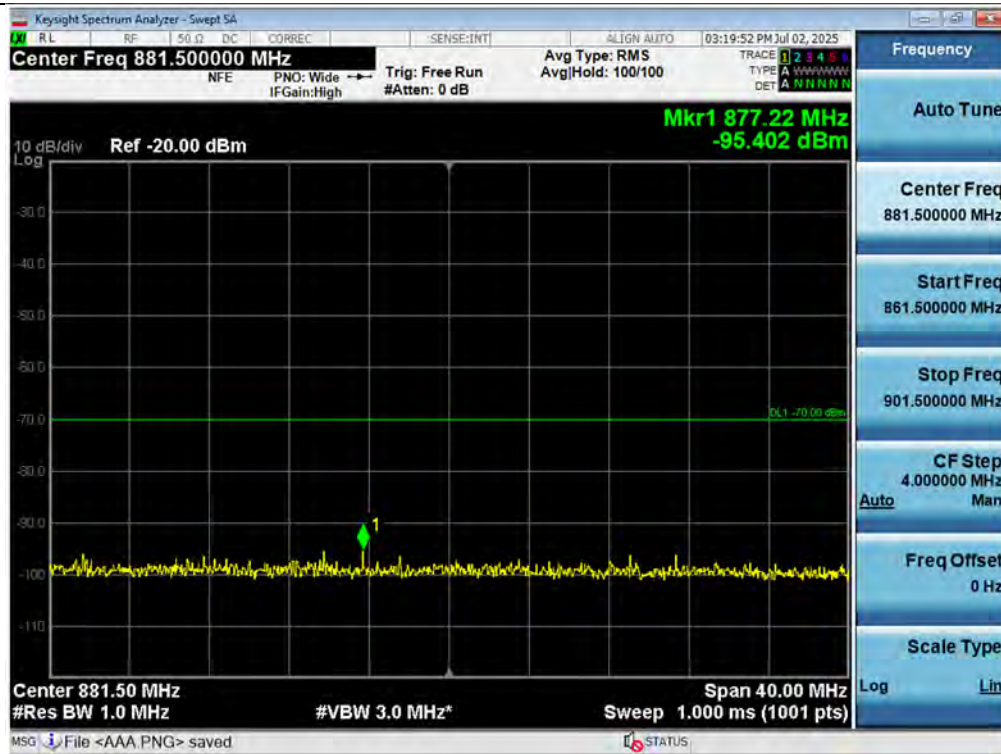
Cellular (869 ~ 894 MHz) / Downlink / Authorized signal (MCC/MNC: 311/480) / ANT 1



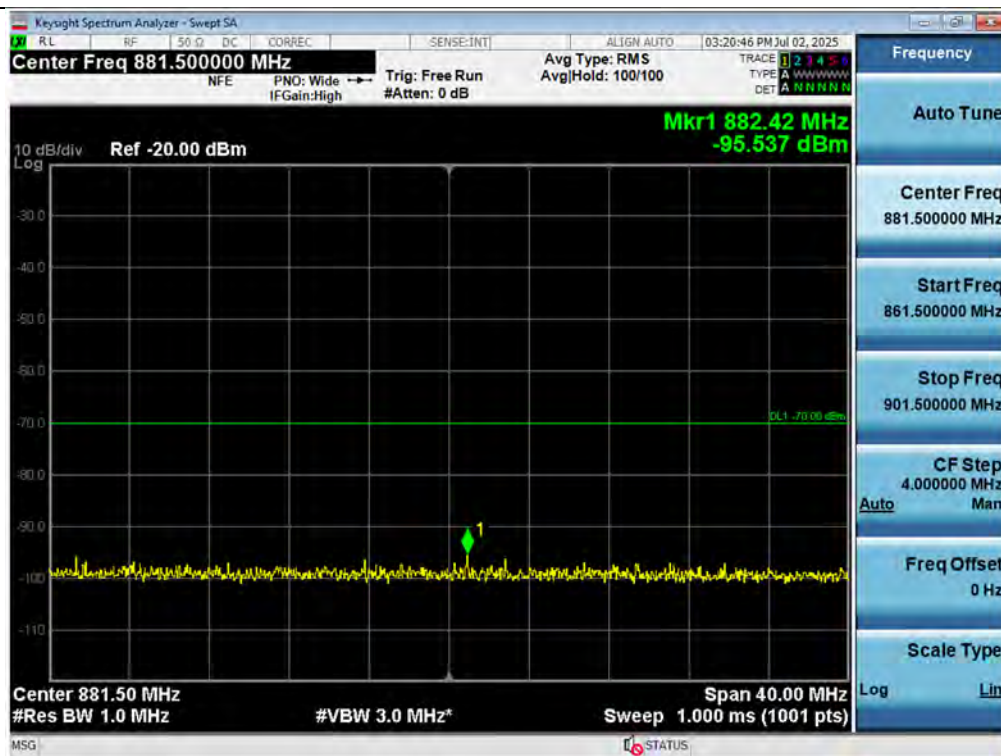
Cellular (869 ~ 894 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 311/123) / ANT 1



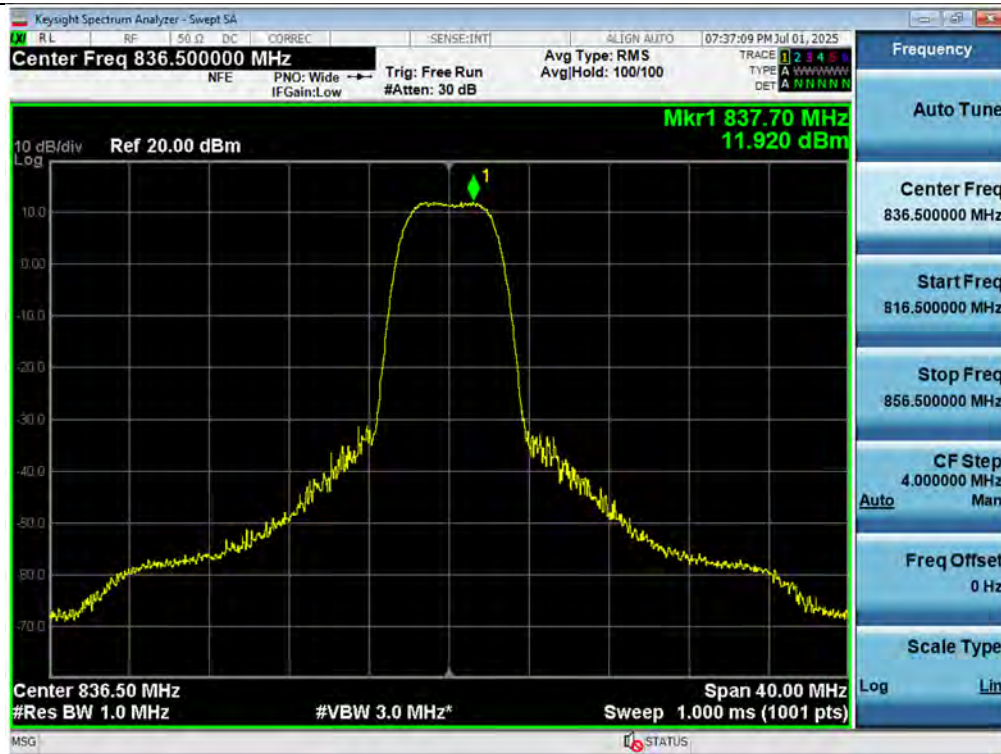
Cellular (869 ~ 894 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 311/456) / ANT 1



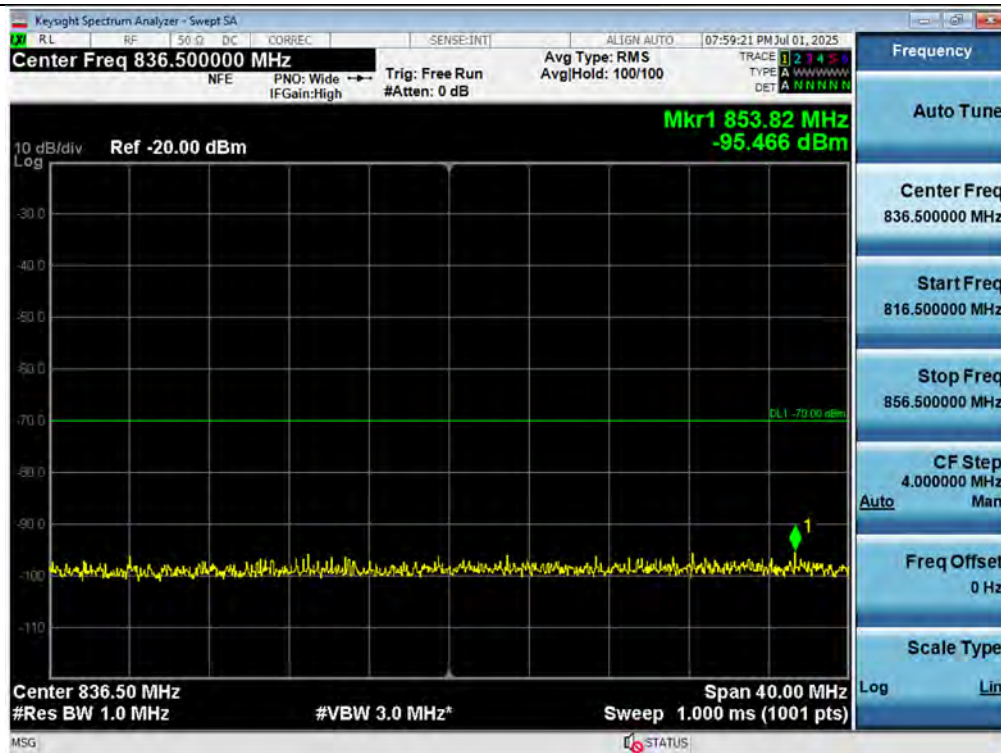
Cellular (869 ~ 894 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 311/789) / ANT 1



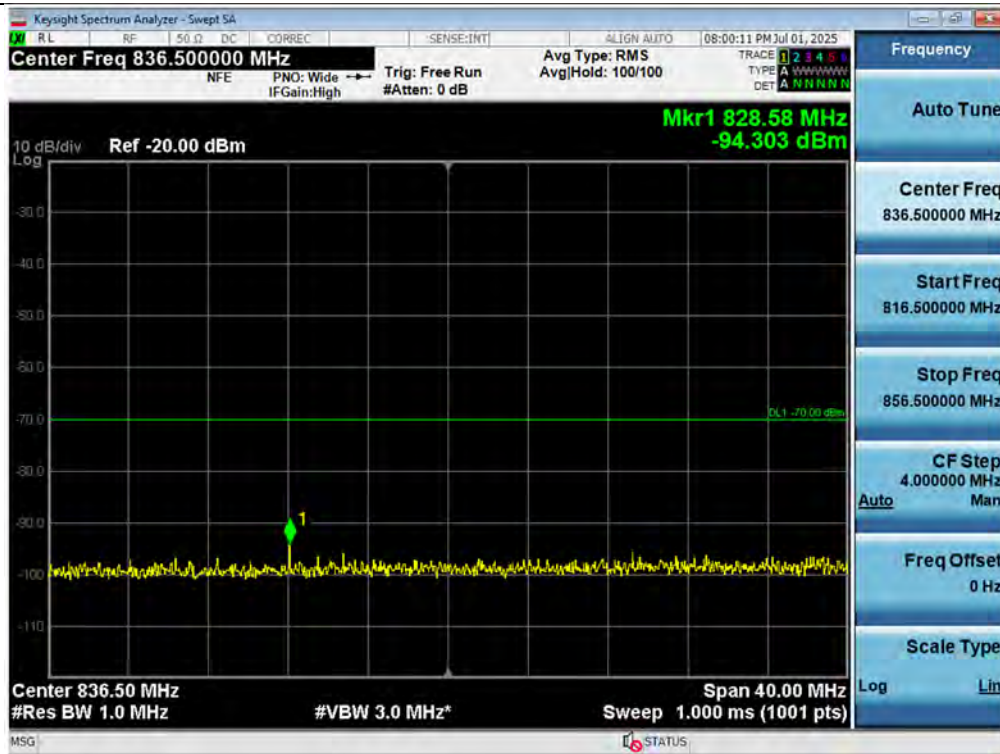
Cellular (824 ~ 849 MHz) / Uplink / Authorized signal (MCC/MNC: 310/260) / ANT 2



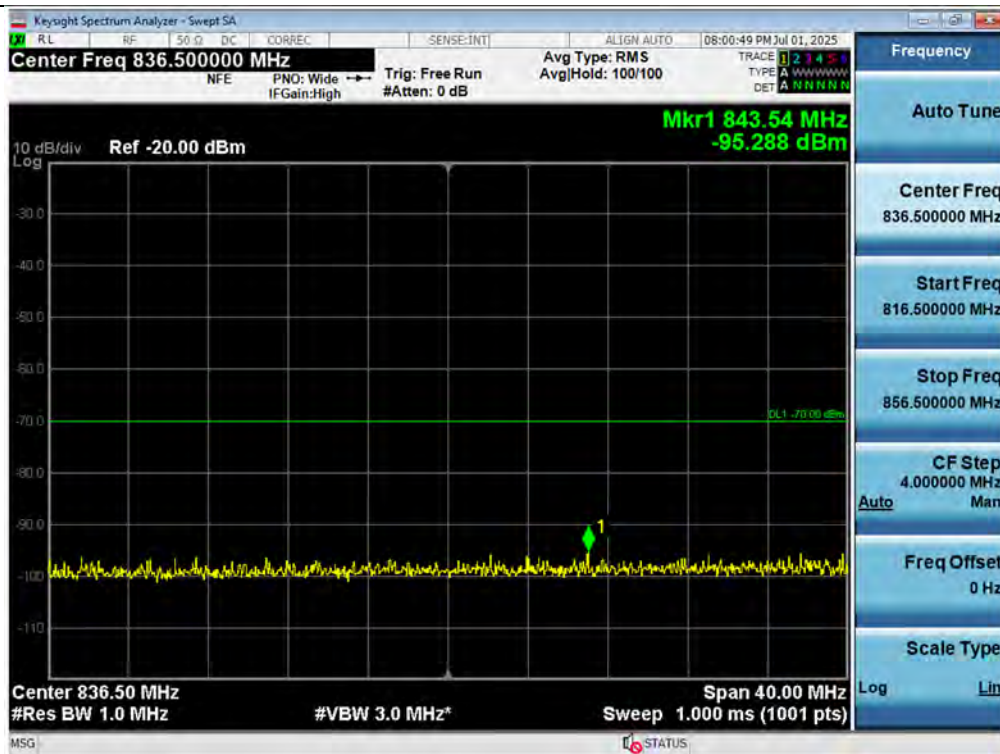
Cellular (824 ~ 849 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 2



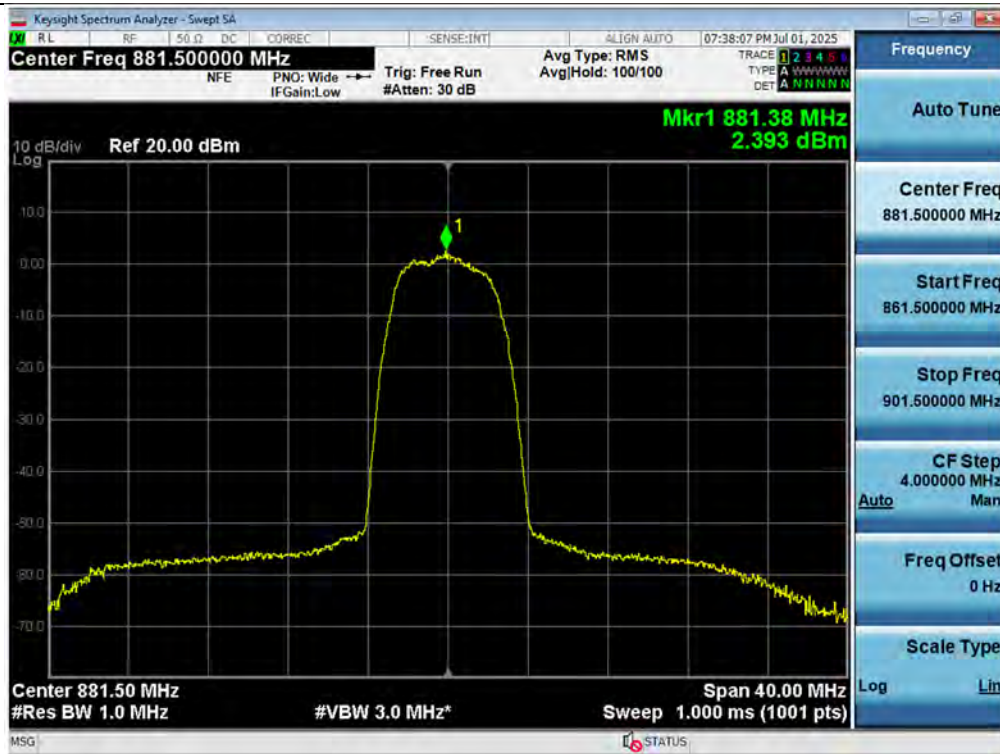
Cellular (824 ~ 849 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 2



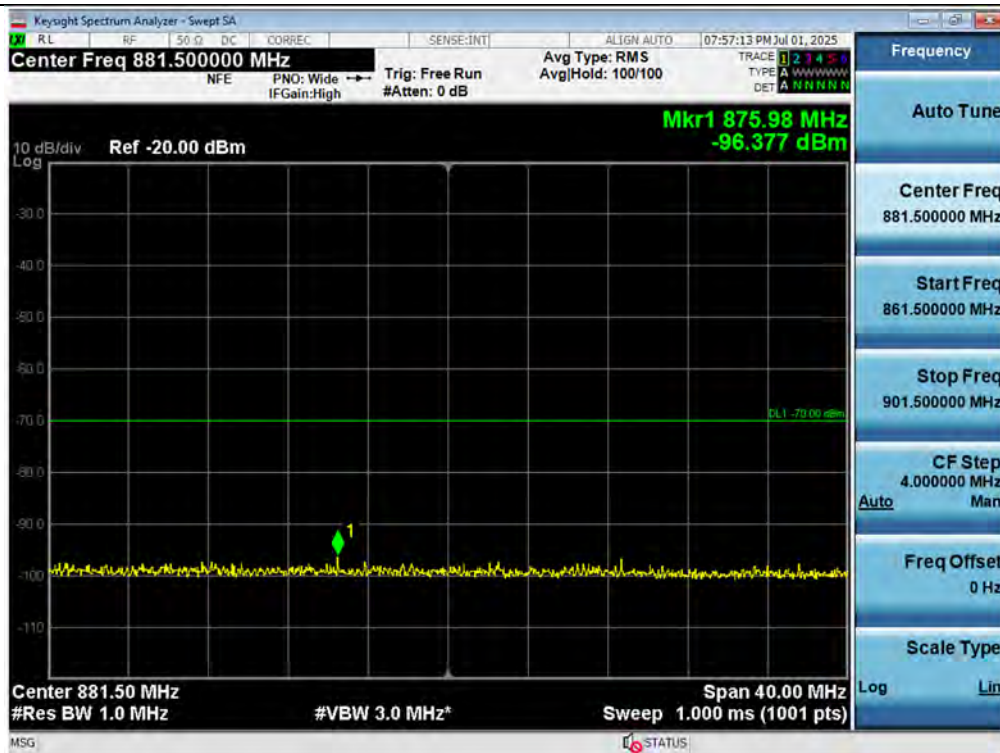
Cellular (824 ~ 849 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 2



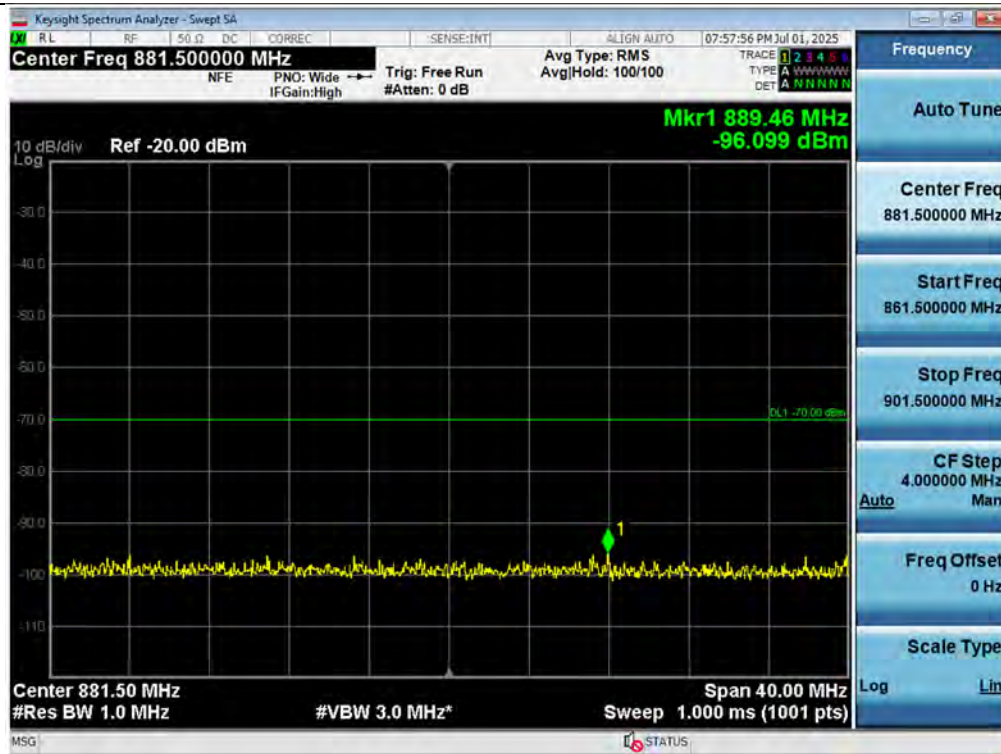
Cellular (869 ~ 894 MHz) / Downlink / Authorized signal (MCC/MNC: 310/260) / ANT 2



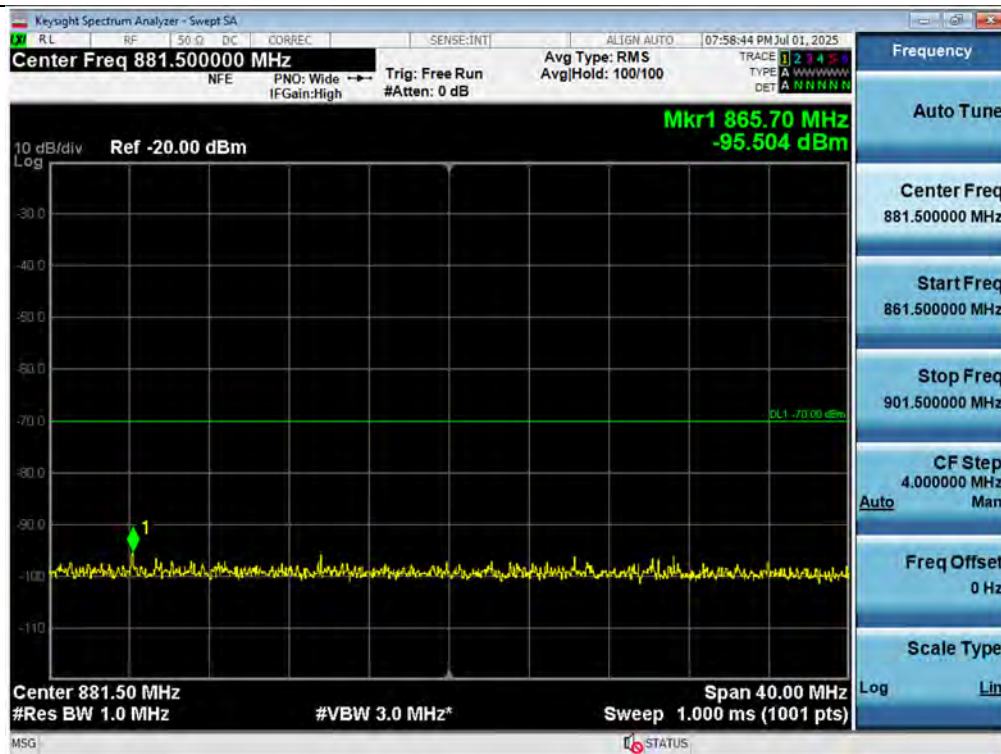
Cellular (869 ~ 894 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 2



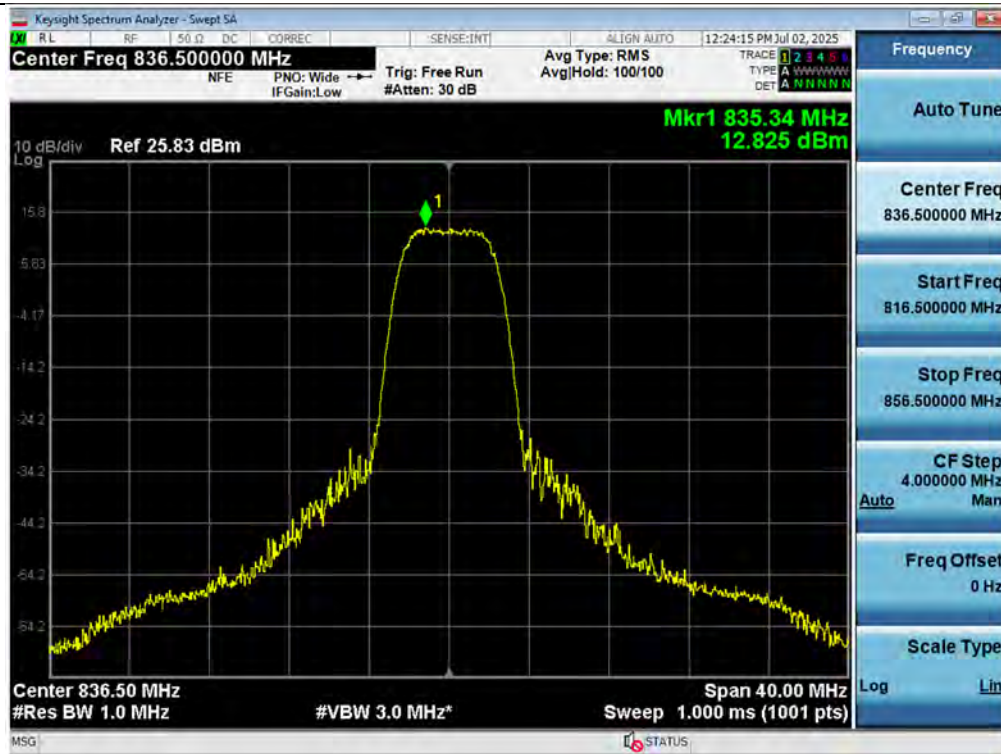
Cellular (869 ~ 894 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 2



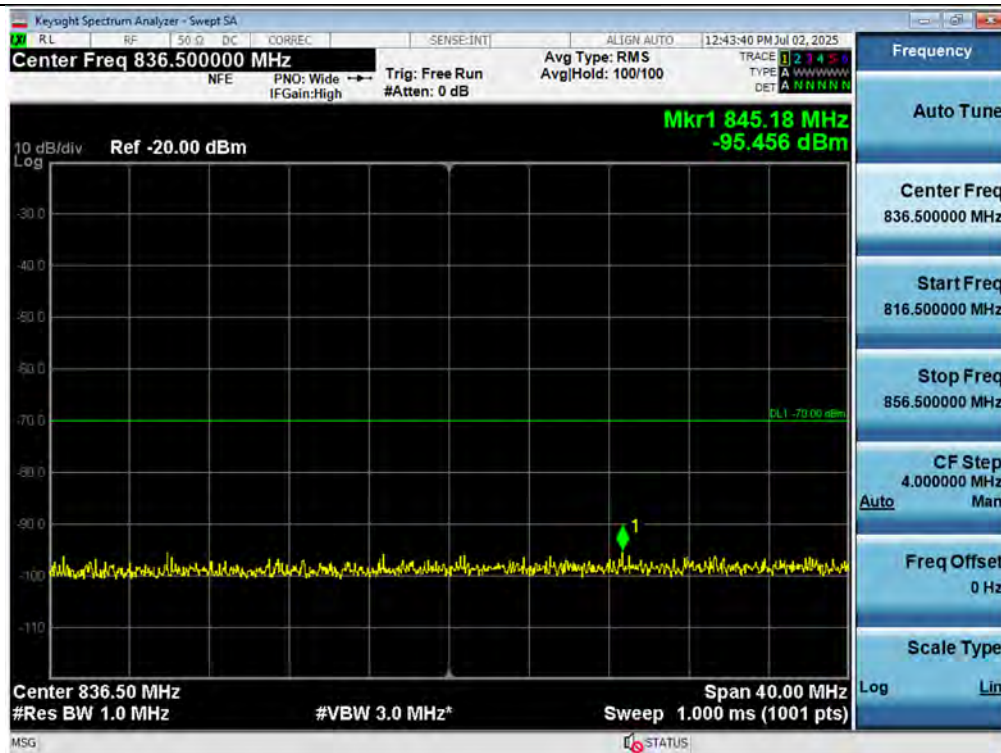
Cellular (869 ~ 894 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 2



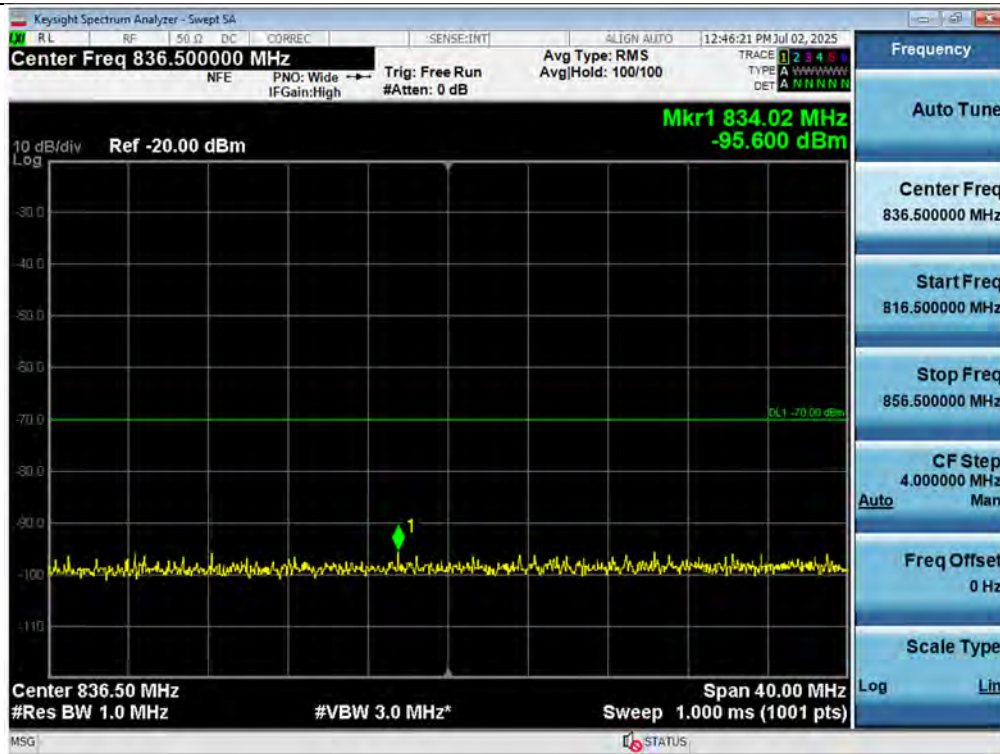
Cellular (824 ~ 849 MHz) / Uplink / Authorized signal (MCC/MNC: 310/410) / ANT 3



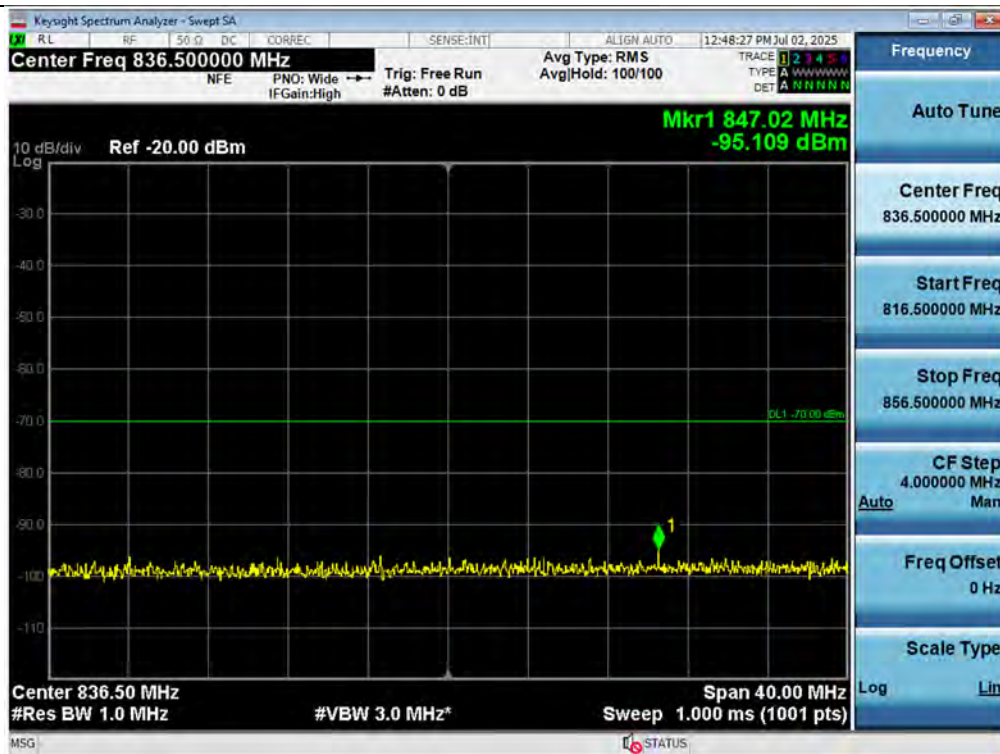
Cellular (824 ~ 849 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 3



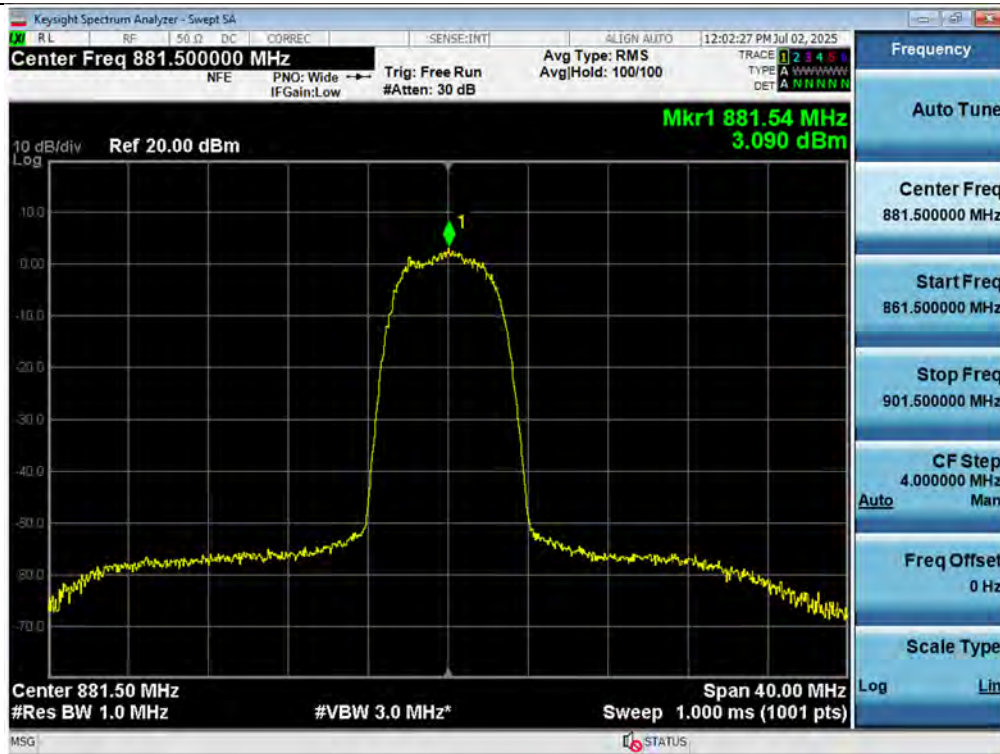
Cellular (824 ~ 849 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 3



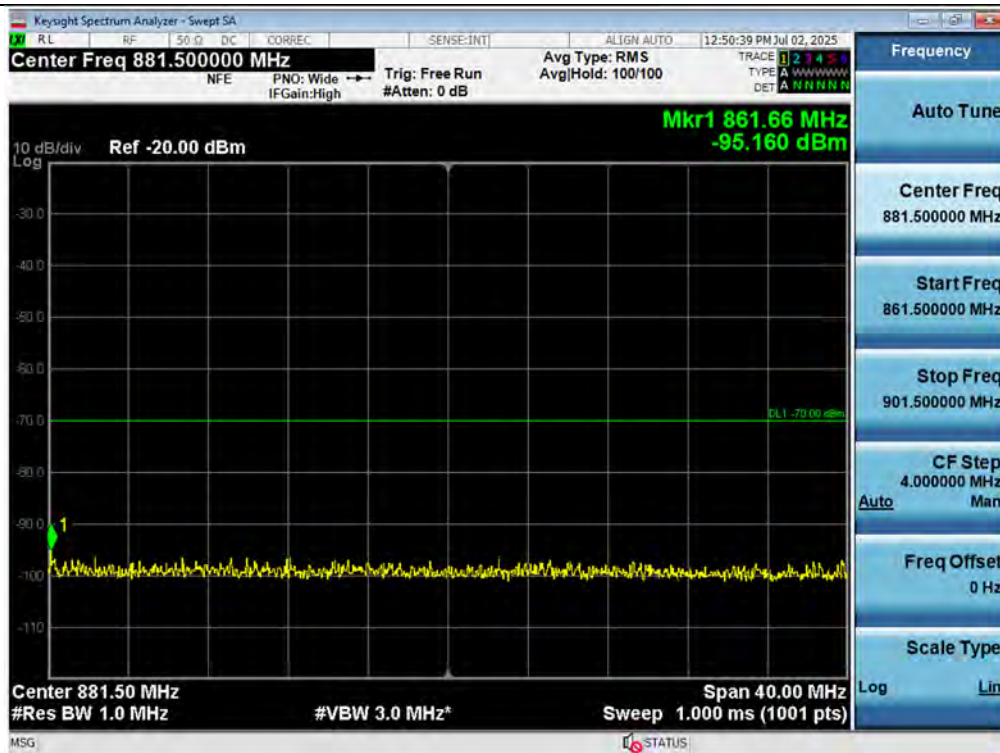
Cellular (824 ~ 849 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 3



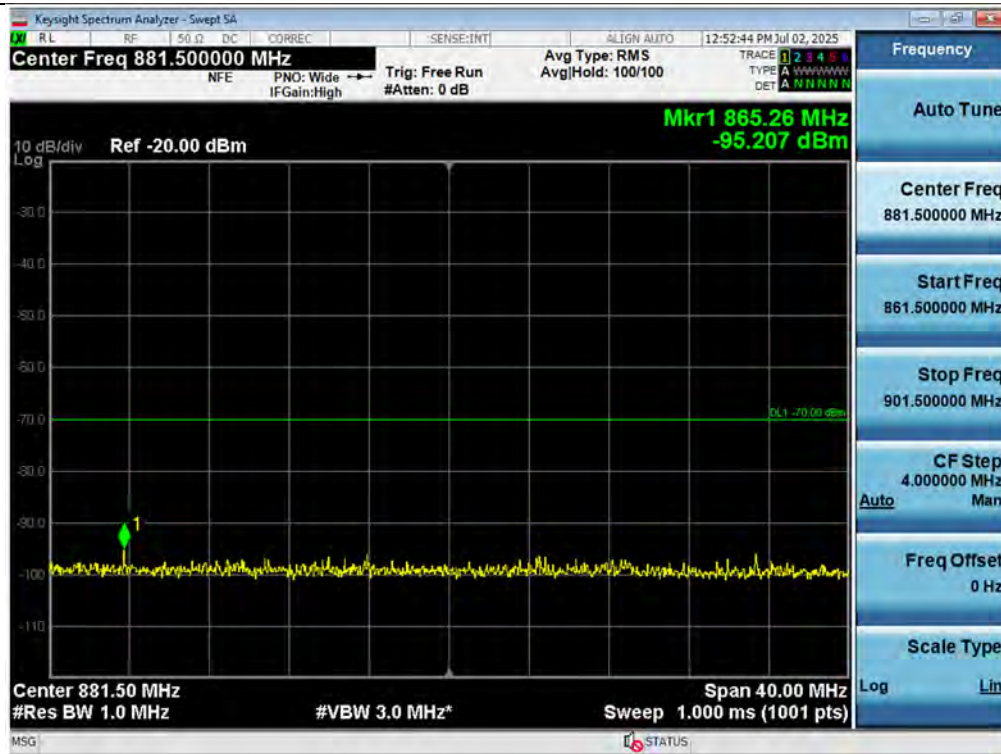
Cellular (869 ~ 894 MHz) / Downlink / Authorized signal (MCC/MNC: 310/410) / ANT 3



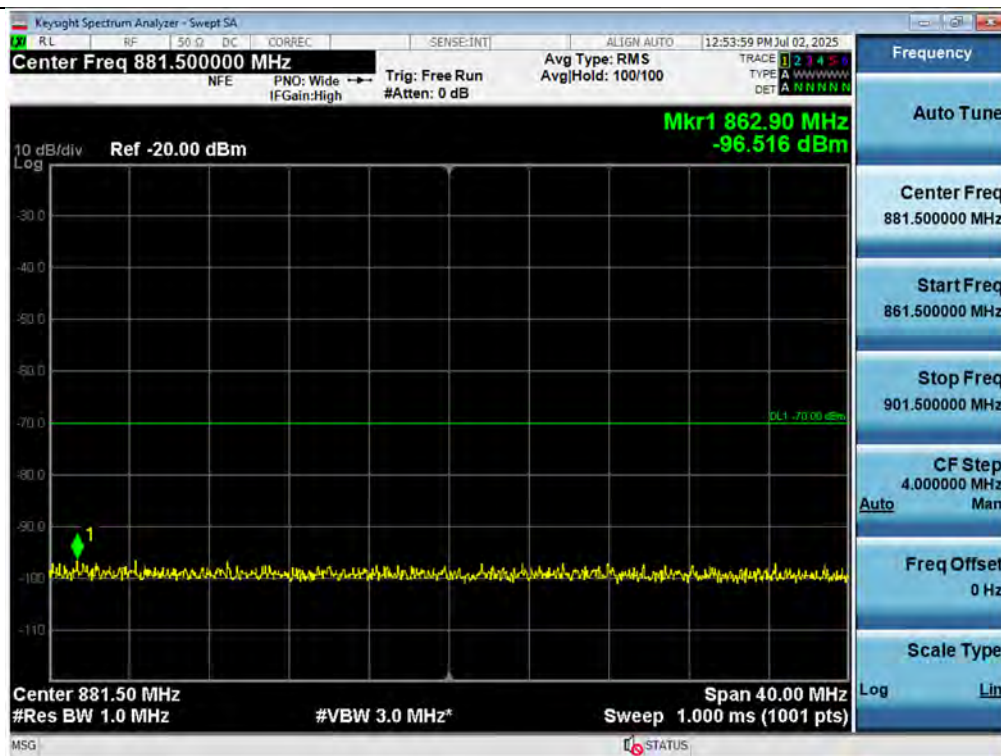
Cellular (869 ~ 894 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 3



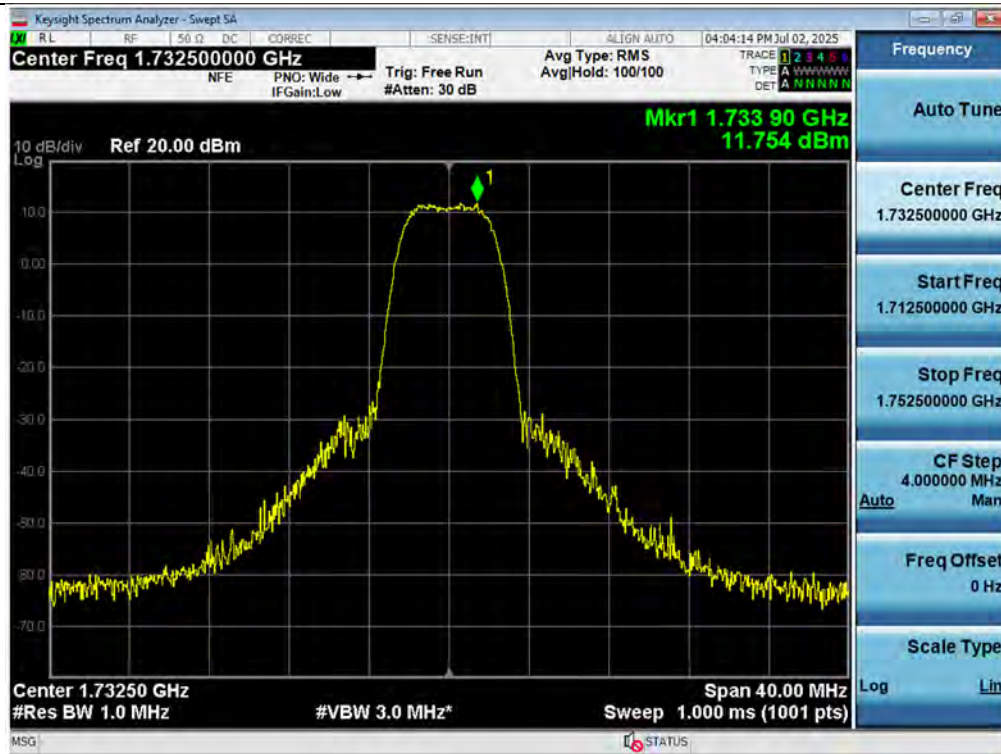
Cellular (869 ~ 894 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 3



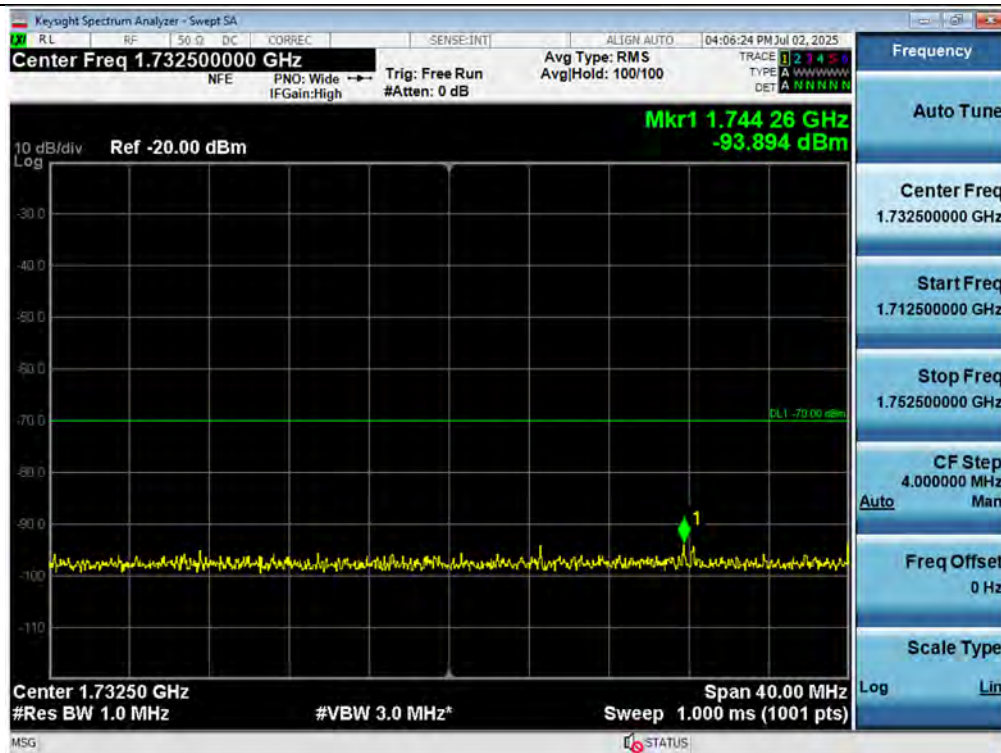
Cellular (869 ~ 894 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 3



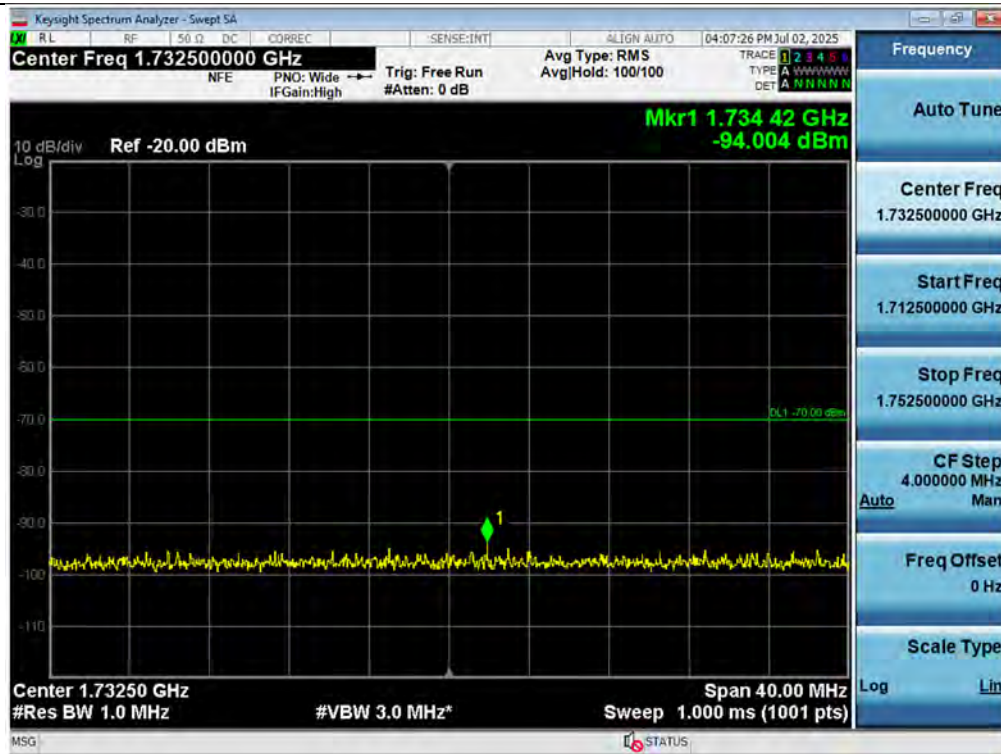
AWS-1 (1710 ~ 1755 MHz) / Uplink / Authorized signal (MCC/MNC: 311/480) / ANT 1



AWS-1 (1710 ~ 1755 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 311/123) / ANT 1



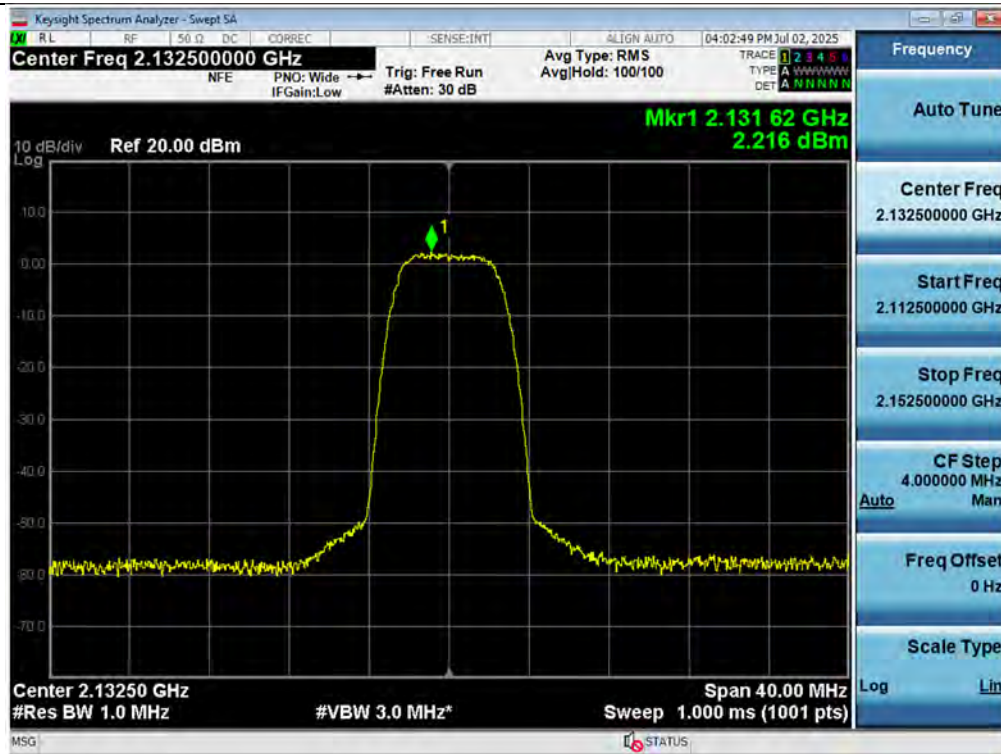
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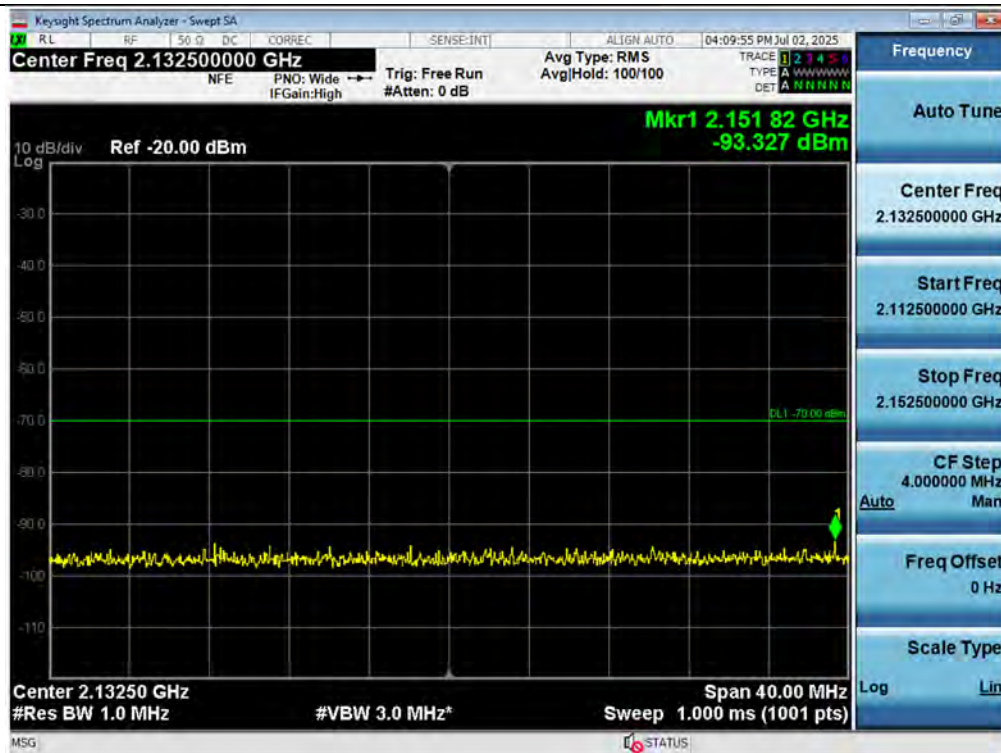
AWS-1 (1710 ~ 1755 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 311/789) / ANT 1



AWS-1 (2110 ~ 2155 MHz) / Downlink / Authorized signal (MCC/MNC: 311/480) / ANT 1



AWS-1 (2110 ~ 2155 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 311/123) / ANT 1



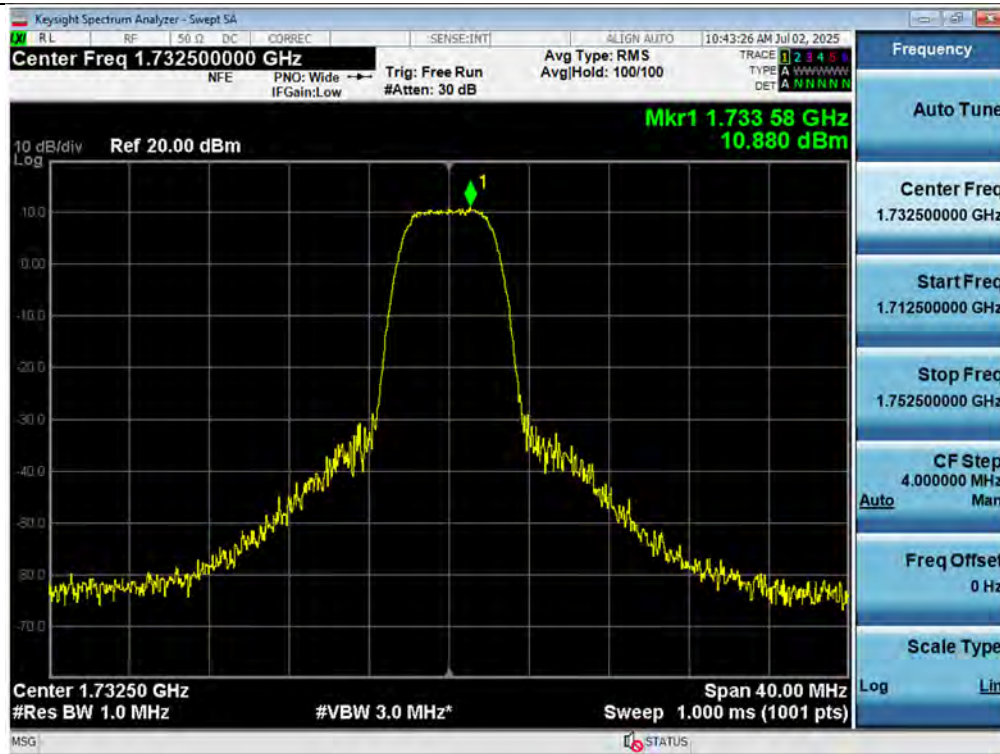
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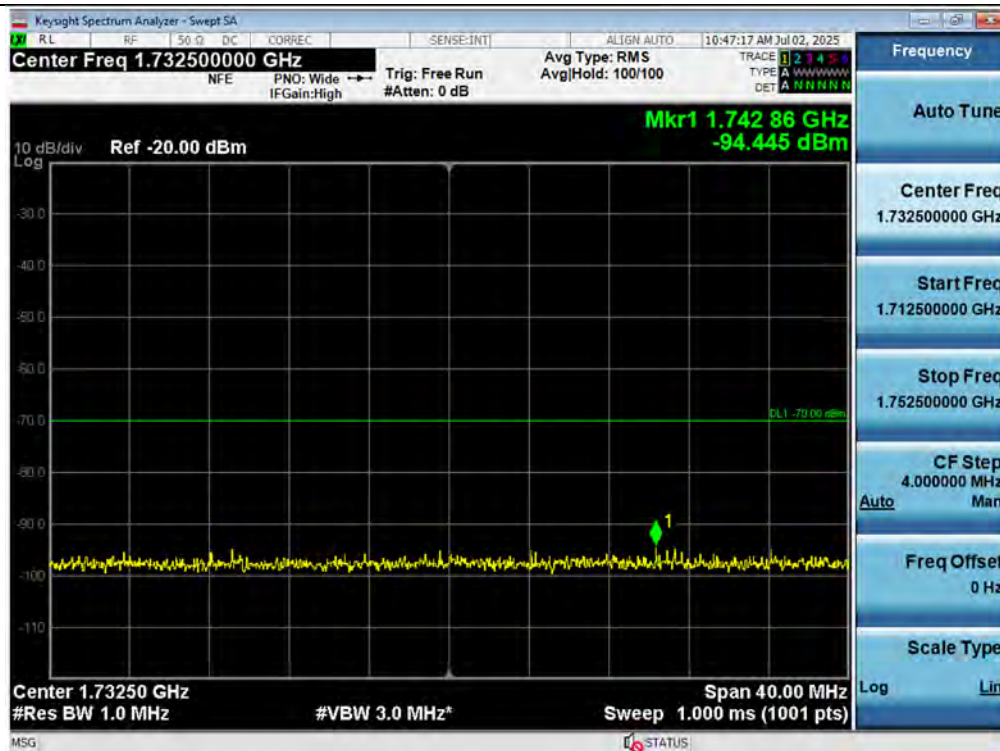
AWS-1 (2110 ~ 2155 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 311/789) / ANT 1



AWS-1 (1710 ~ 1755 MHz) / Uplink / Authorized signal (MCC/MNC: 310/260) / ANT 2



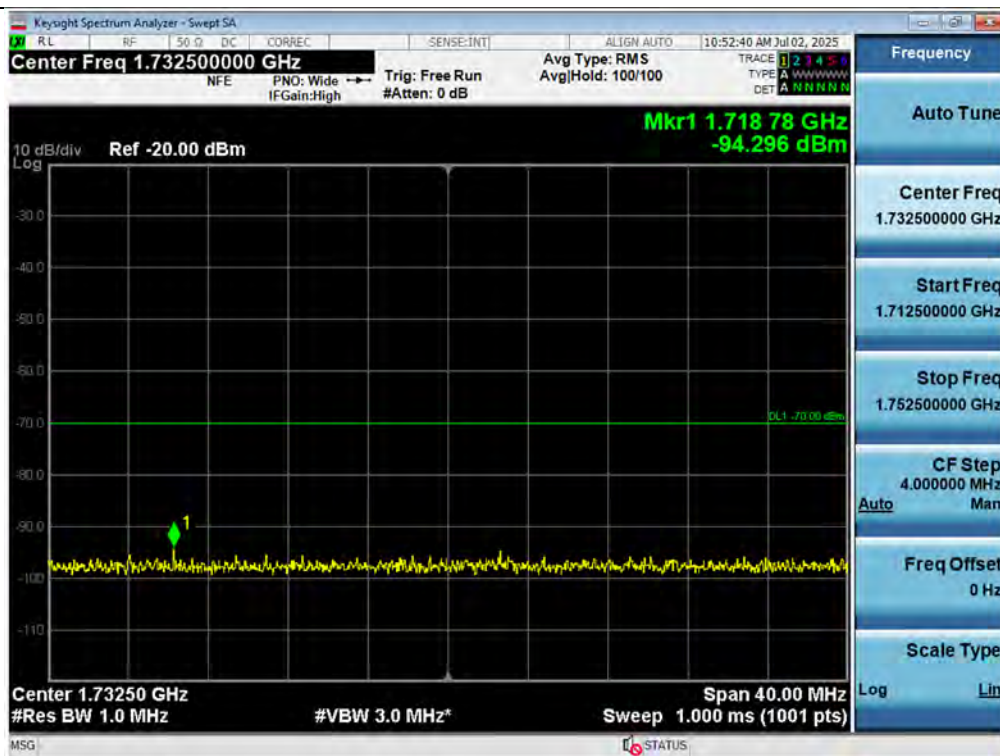
AWS-1 (1710 ~ 1755 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 2



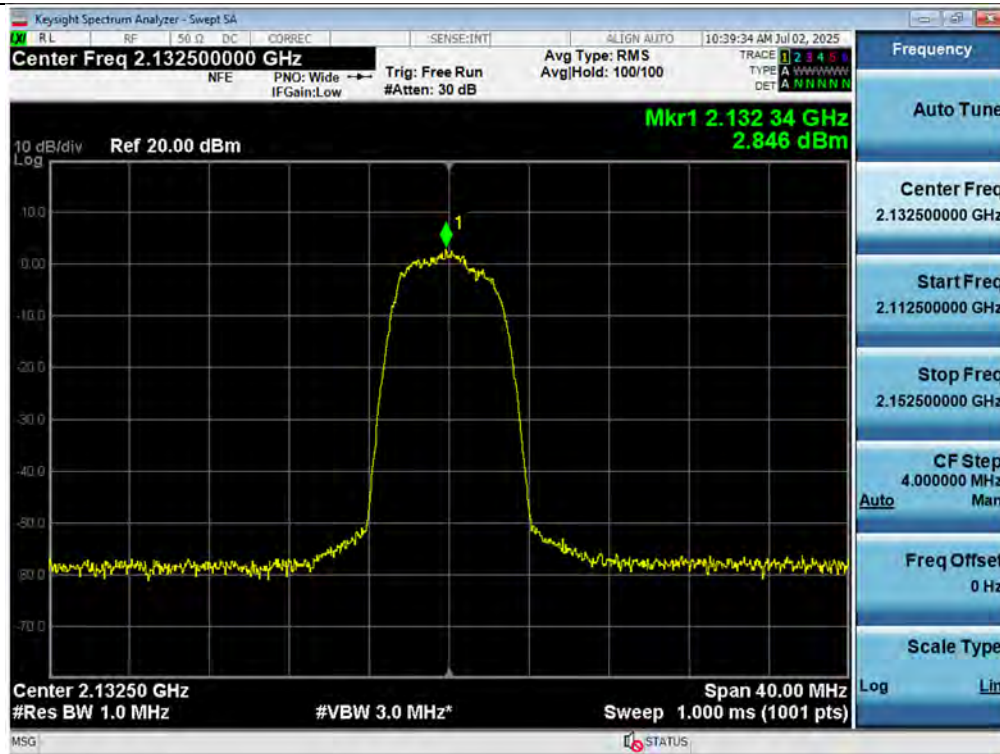
AWS-1 (1710 ~ 1755 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 2



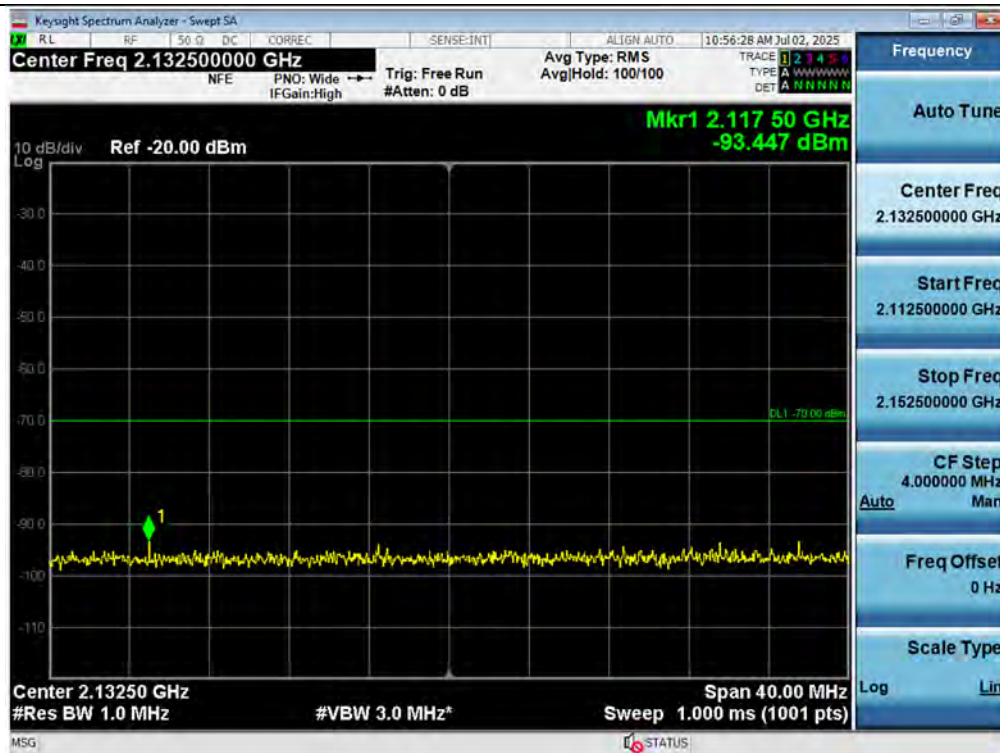
AWS-1 (1710 ~ 1755 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 2



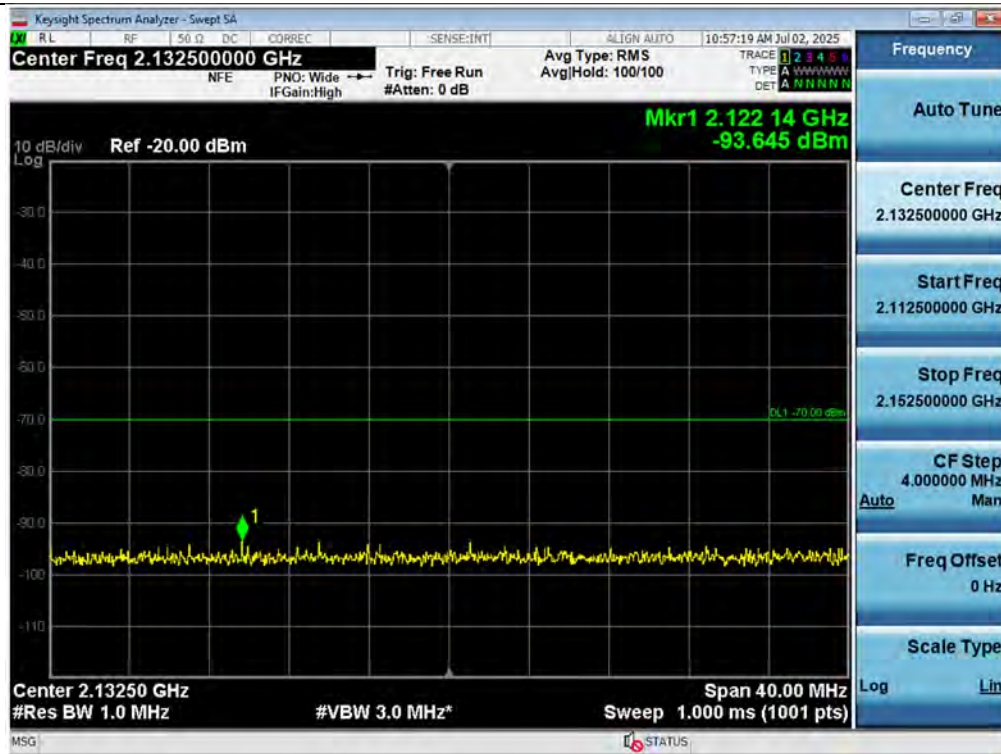
AWS-1 (2110 ~ 2155 MHz) / Downlink / Authorized signal (MCC/MNC: 310/260) / ANT 2



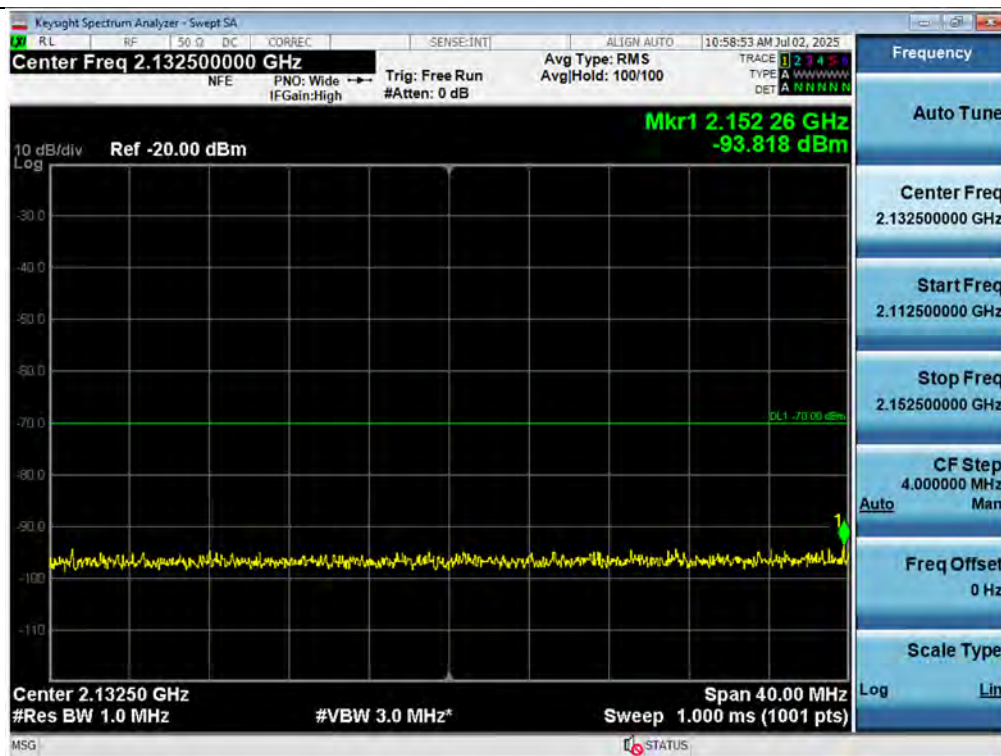
AWS-1 (2110 ~ 2155 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 2



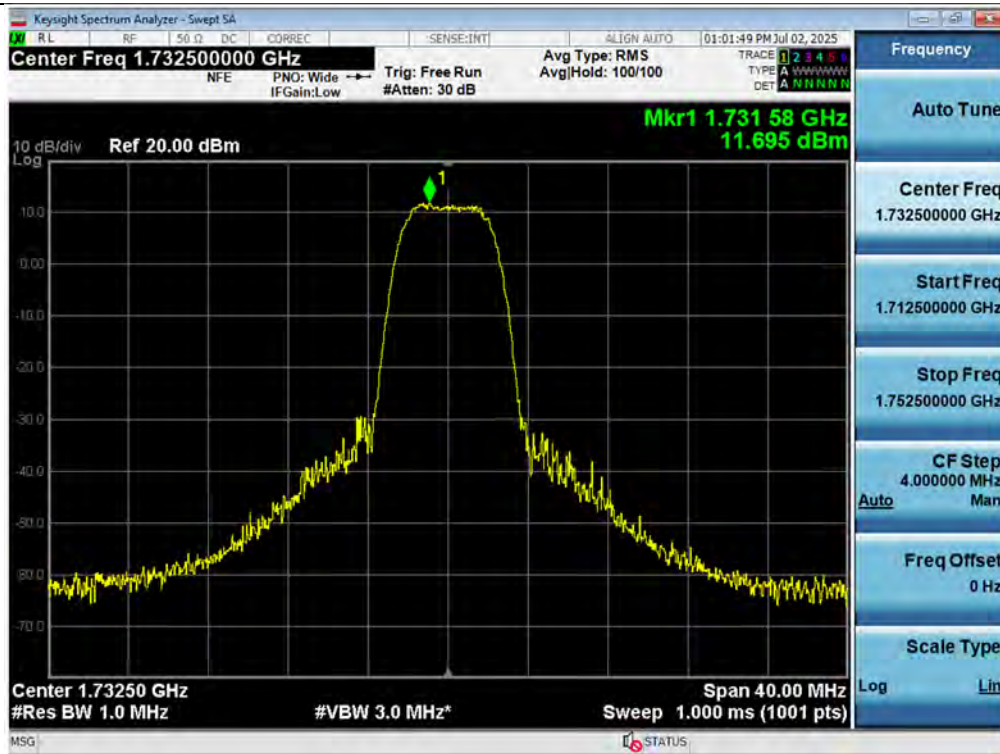
AWS-1 (2110 ~ 2155 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 2



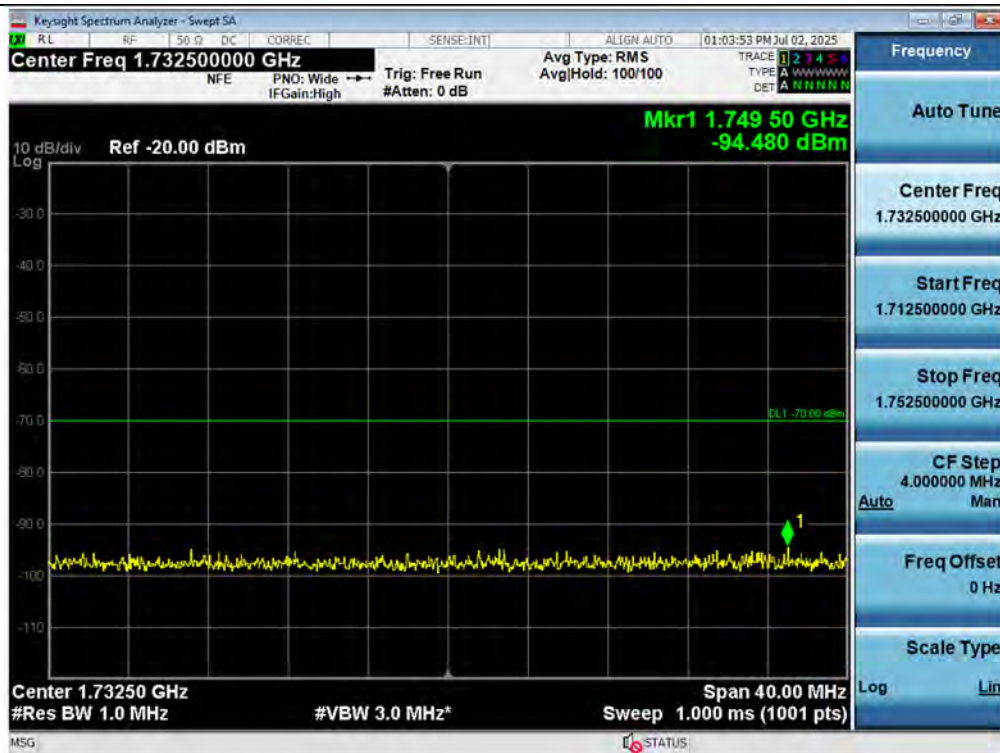
AWS-1 (2110 ~ 2155 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 2



AWS-1 (1710 ~ 1755 MHz) / Uplink / Authorized signal (MCC/MNC: 310/410) / ANT 3



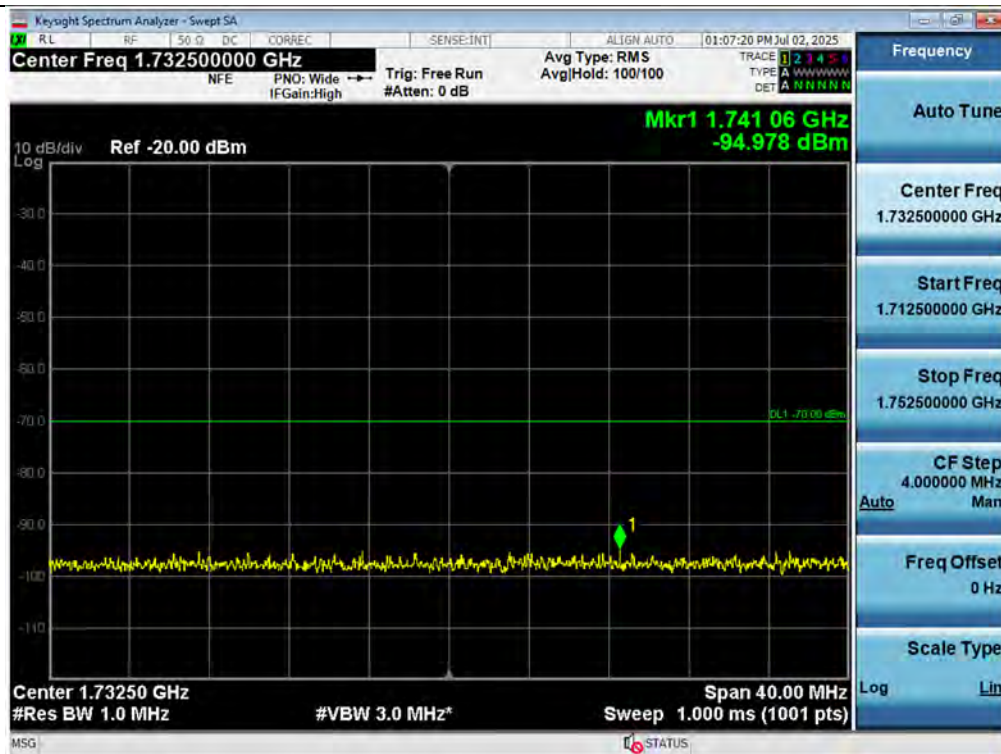
AWS-1 (1710 ~ 1755 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 3



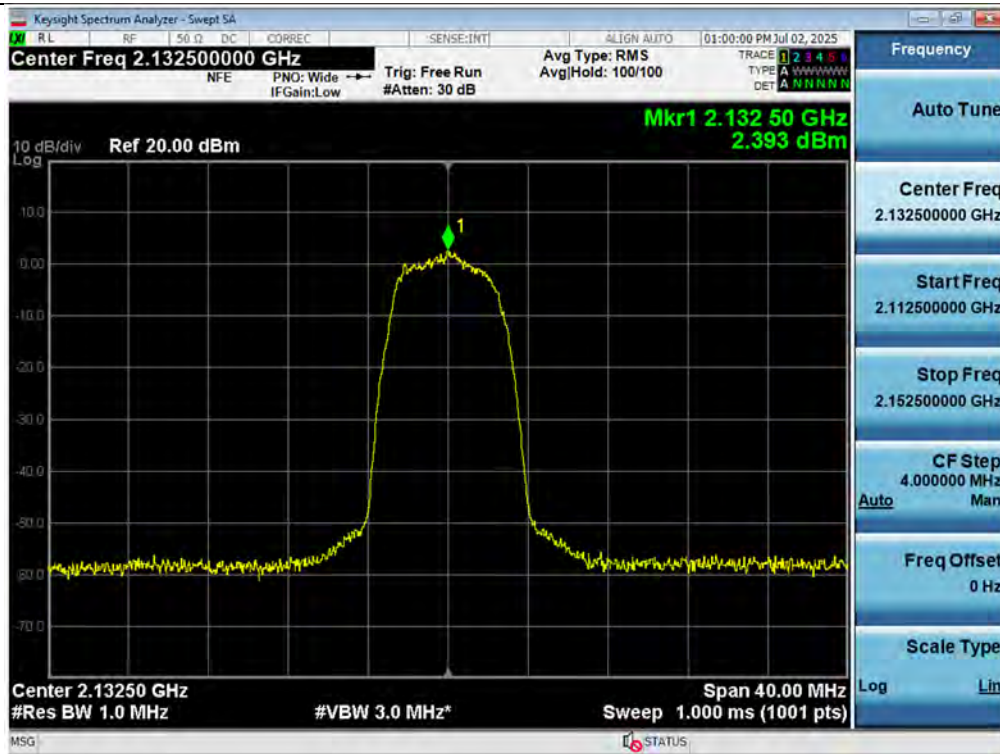
AWS-1 (1710 ~ 1755 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 3



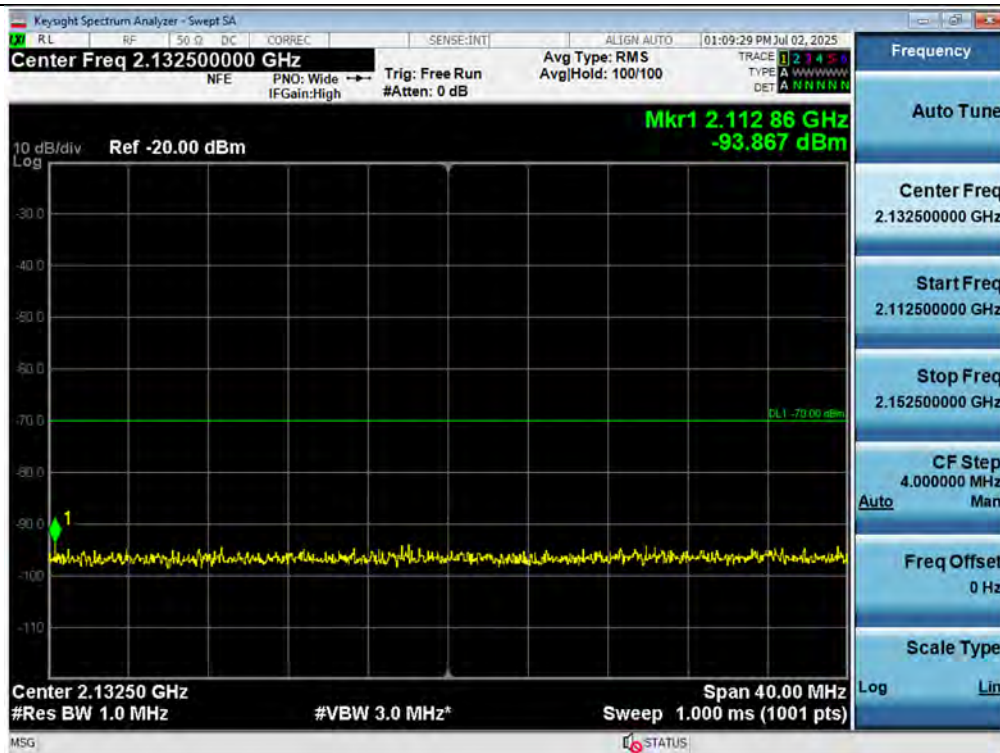
AWS-1 (1710 ~ 1755 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 3



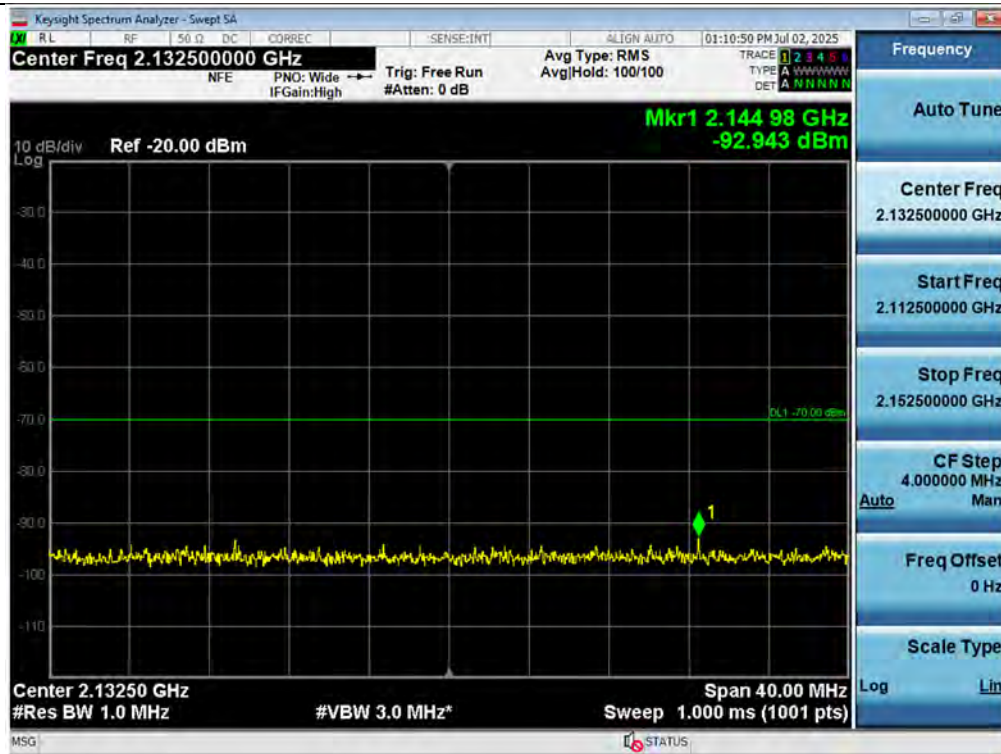
AWS-1 (2110 ~ 2155 MHz) / Downlink / Authorized signal (MCC/MNC: 310/410) / ANT 3



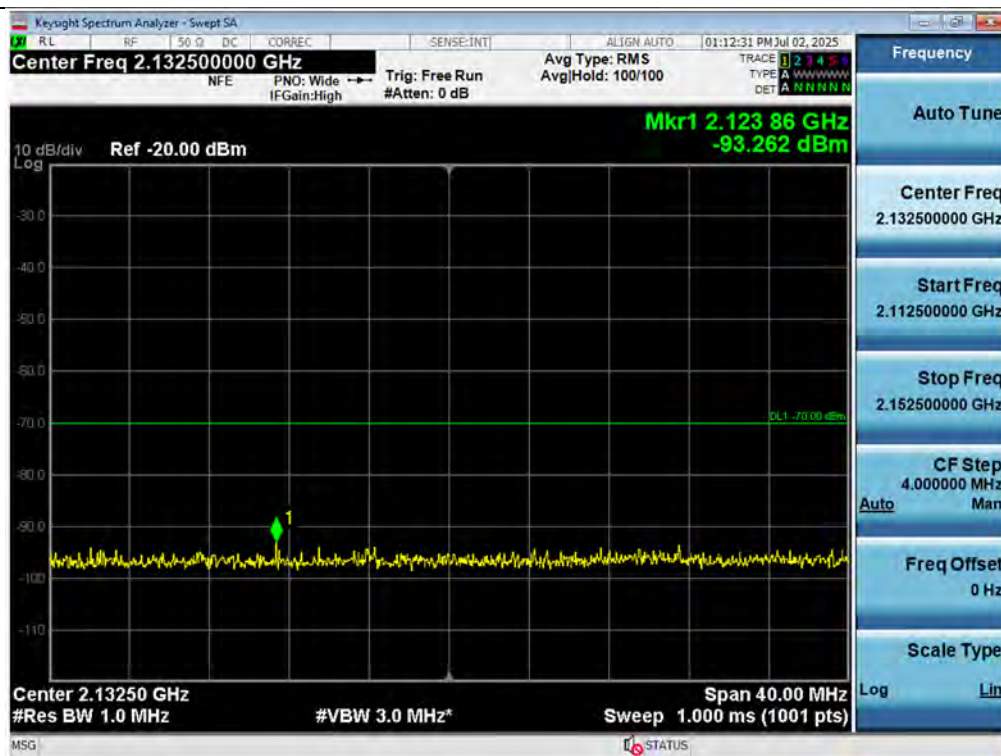
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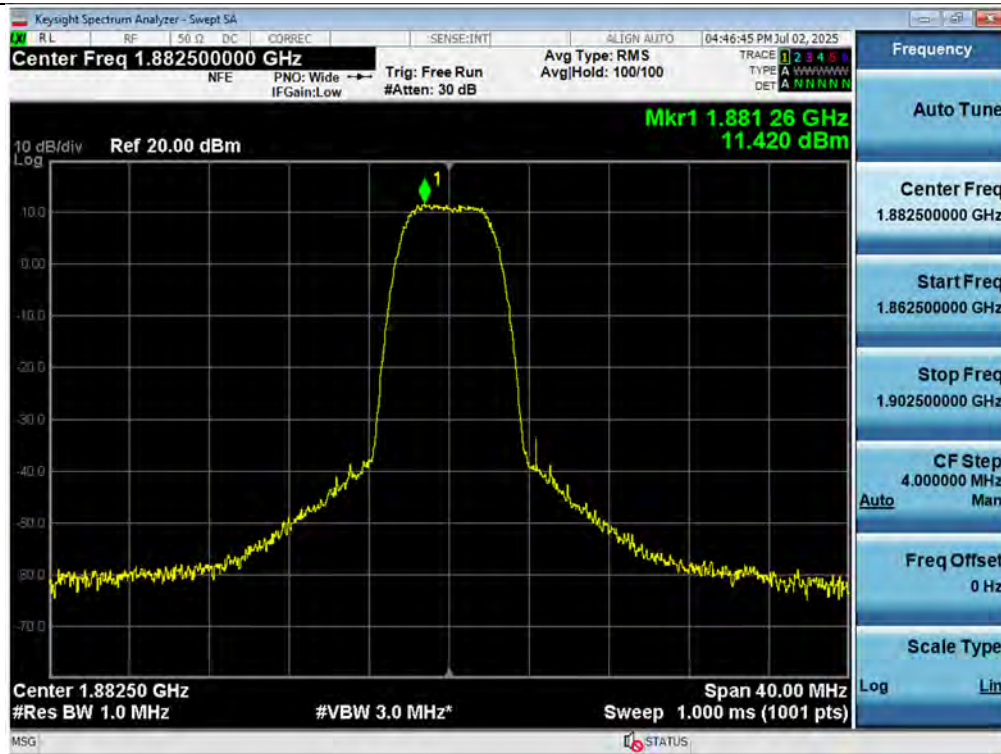
AWS-1 (2110 ~ 2155 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 3



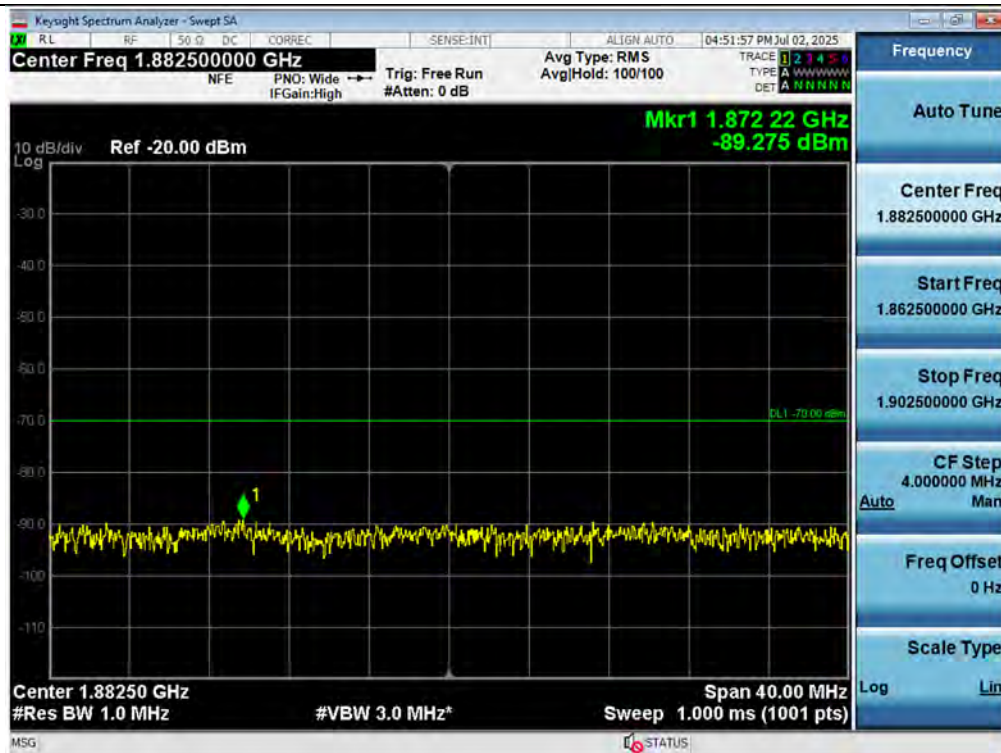
AWS-1 (2110 ~ 2155 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 3



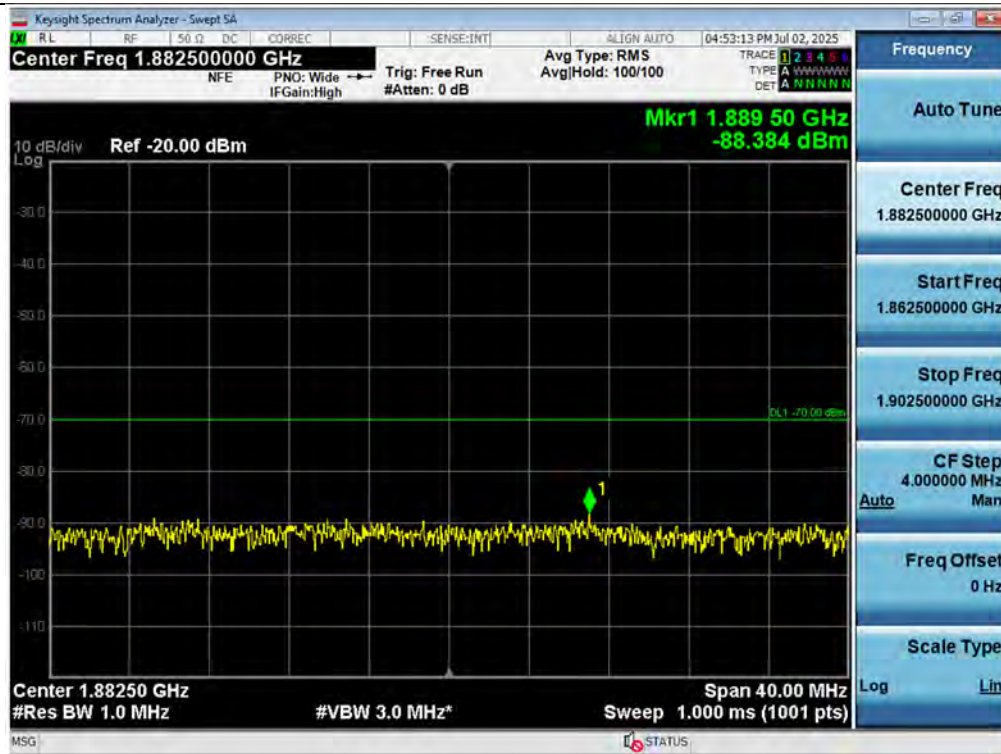
Broadband PCS (1850 ~ 1915 MHz) / Uplink / Authorized signal (MCC/MNC: 311/480) / ANT 1



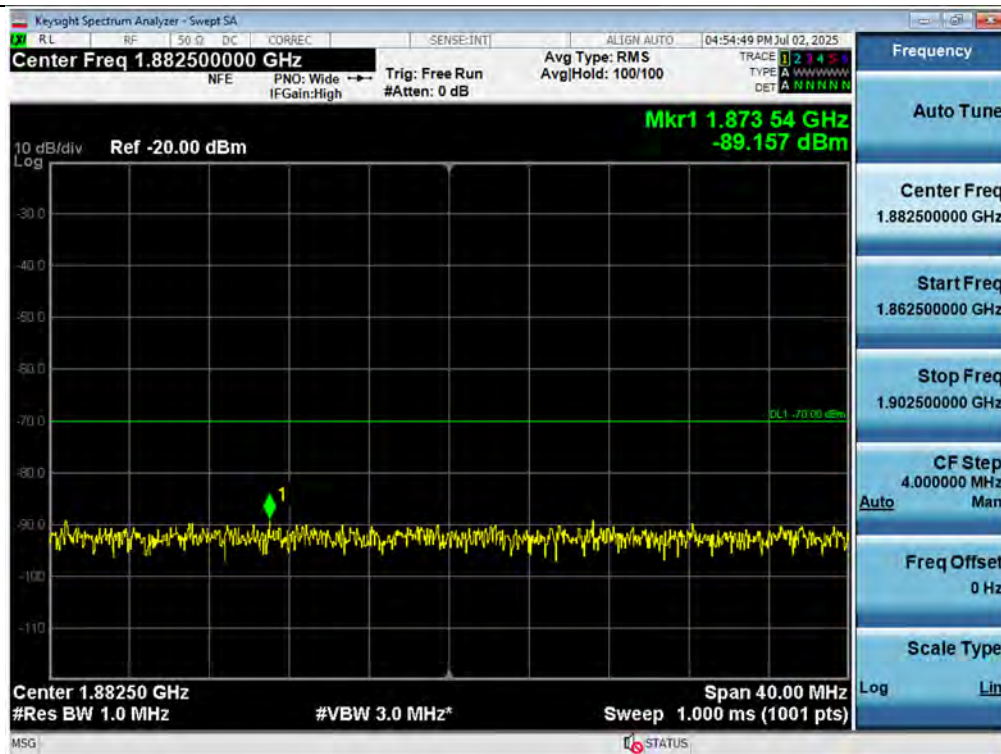
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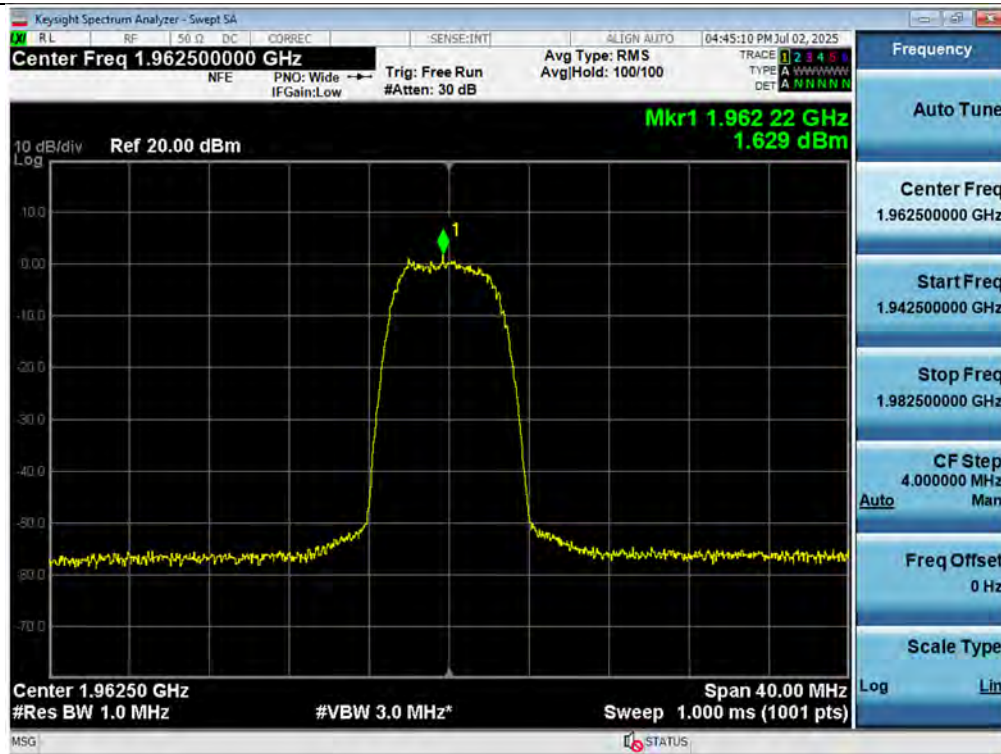
Broadband PCS (1850 ~ 1915 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 311/456) / ANT 1



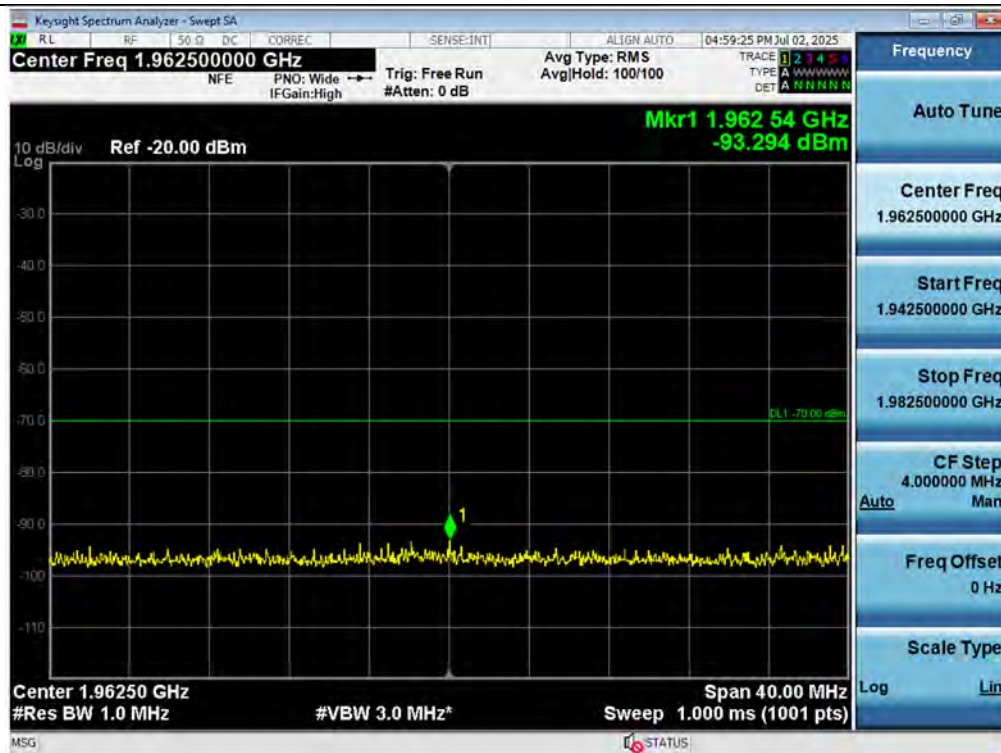
Broadband PCS (1850 ~ 1915 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 311/789) / ANT 1



Broadband PCS (1930 ~ 1995 MHz) / Downlink / Authorized signal (MCC/MNC: 311/480) / ANT 1



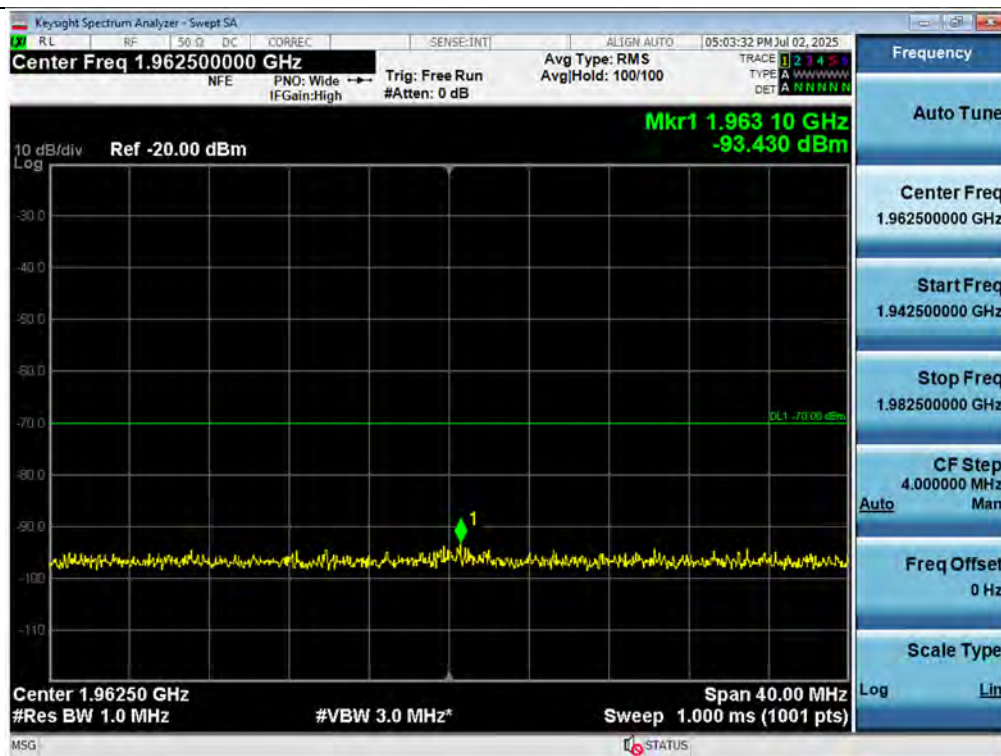
Broadband PCS (1930 ~ 1995 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 311/123) / ANT 1



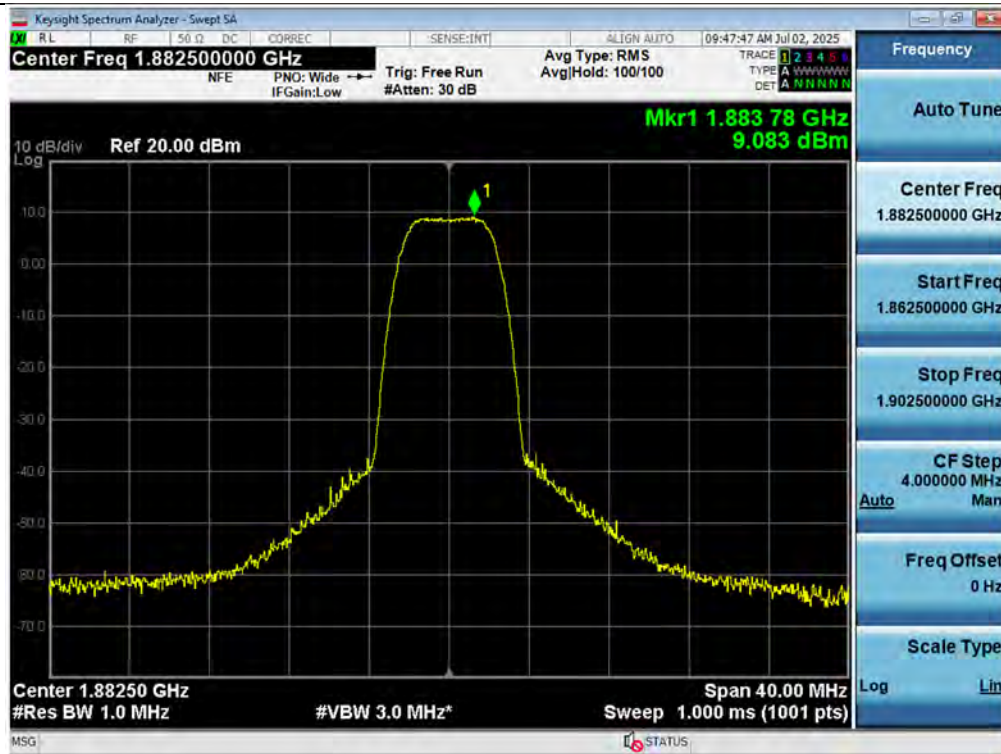
Broadband PCS (1930 ~ 1995 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 311/456) / ANT 1



Broadband PCS (1930 ~ 1995 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 311/789) / ANT 1



Broadband PCS (1850 ~ 1915 MHz) / Uplink / Authorized signal (MCC/MNC: 310/260) / ANT 2



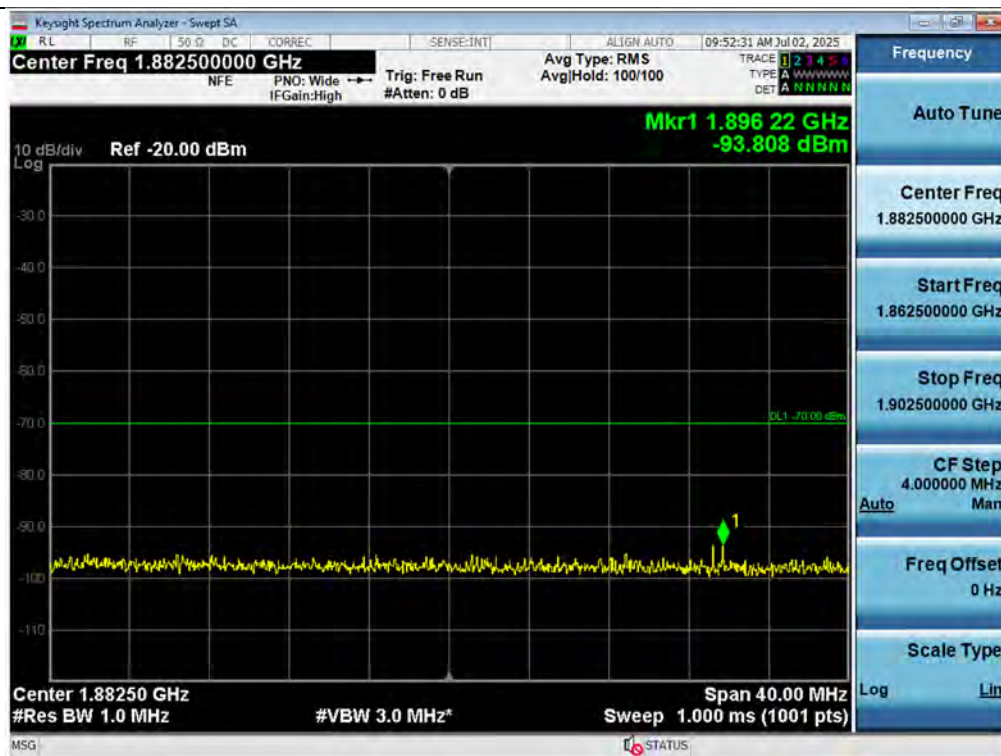
Broadband PCS (1850 ~ 1915 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 2



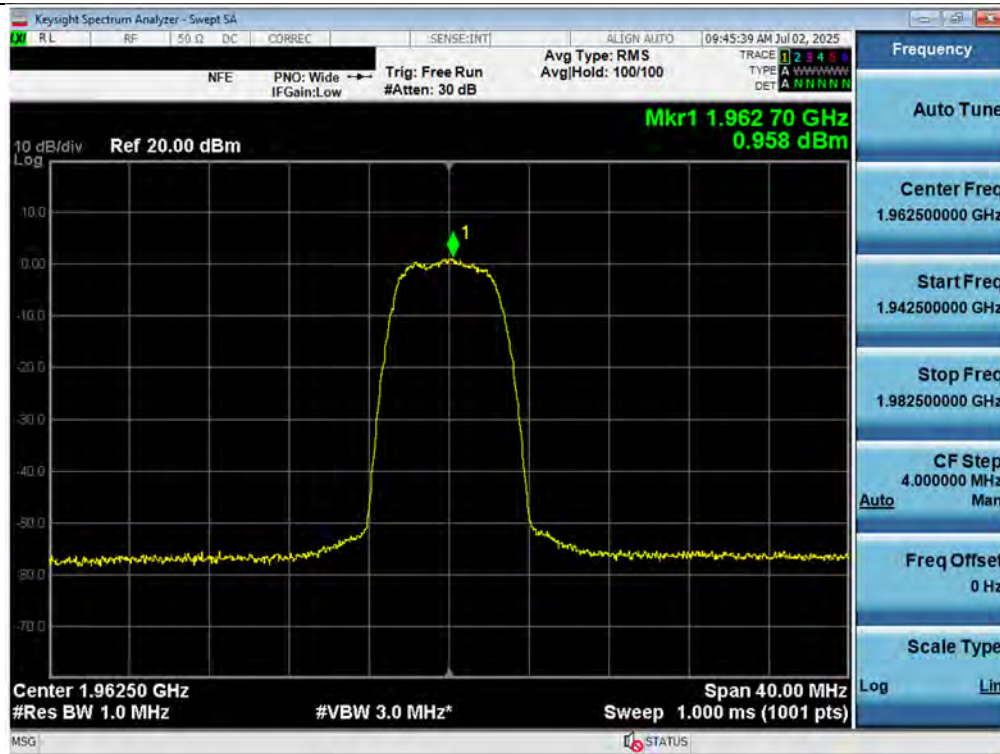
Broadband PCS (1850 ~ 1915 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 2



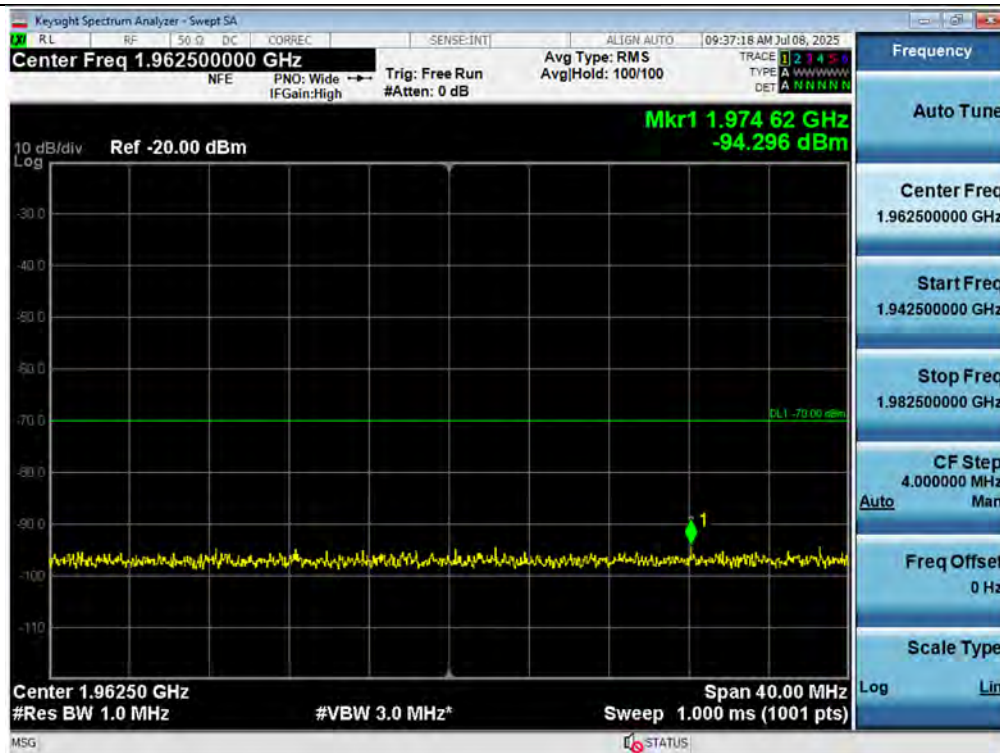
Broadband PCS (1850 ~ 1915 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 2



Broadband PCS (1930 ~ 1995 MHz) / Downlink / Authorized signal (MCC/MNC: 310/260) / ANT 2



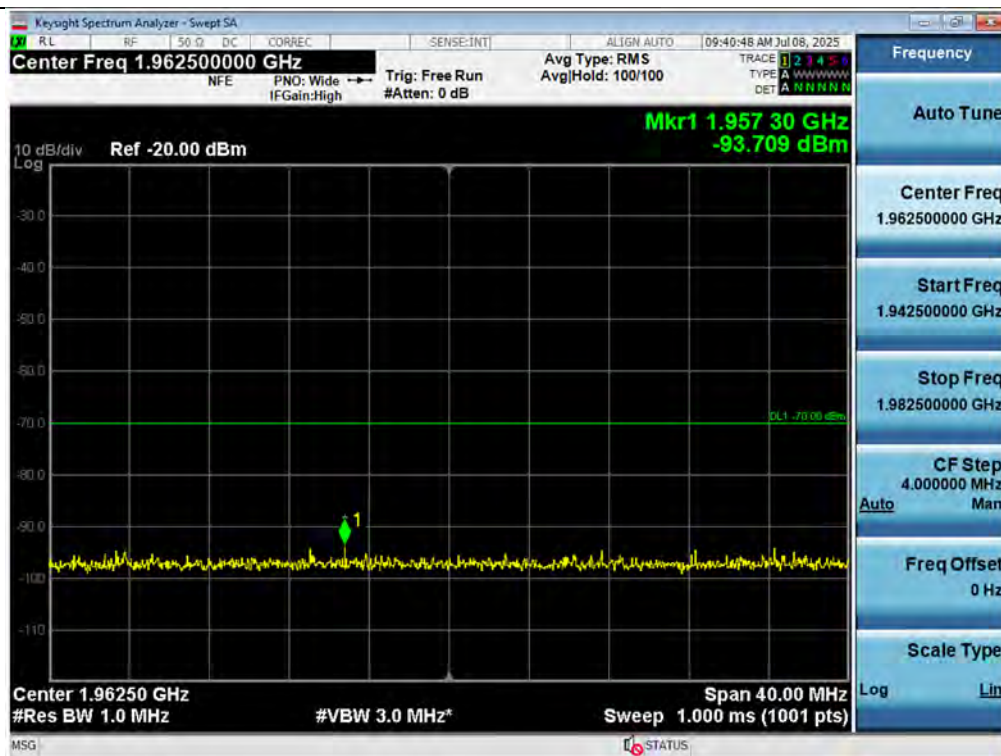
Broadband PCS (1930 ~ 1995 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 2



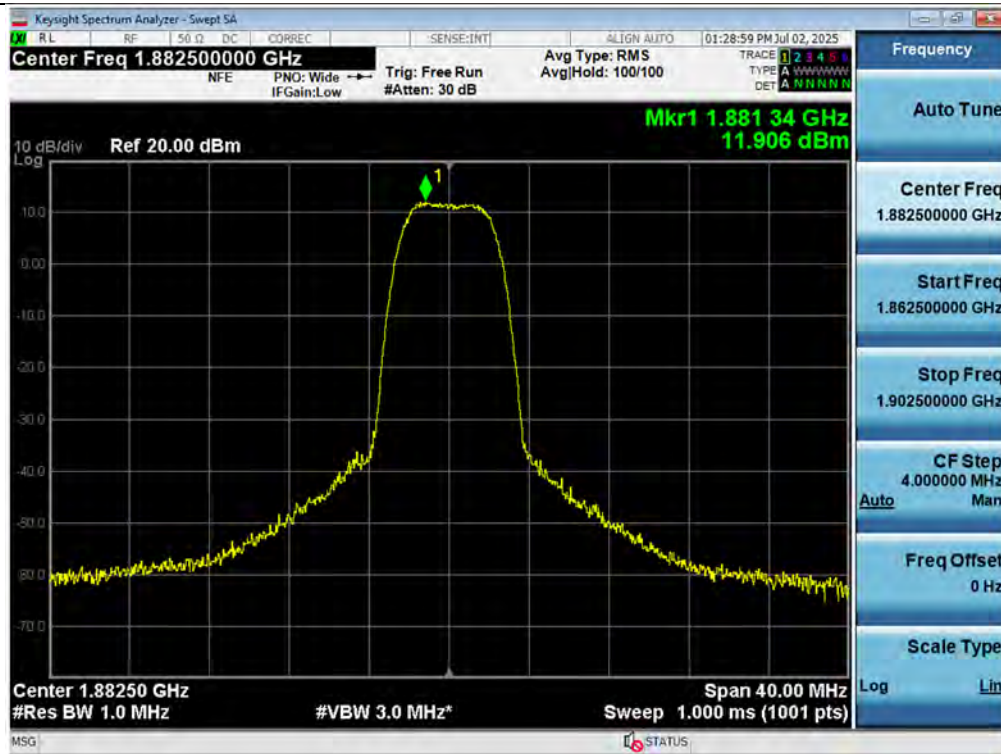
Broadband PCS (1930 ~ 1995 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 2



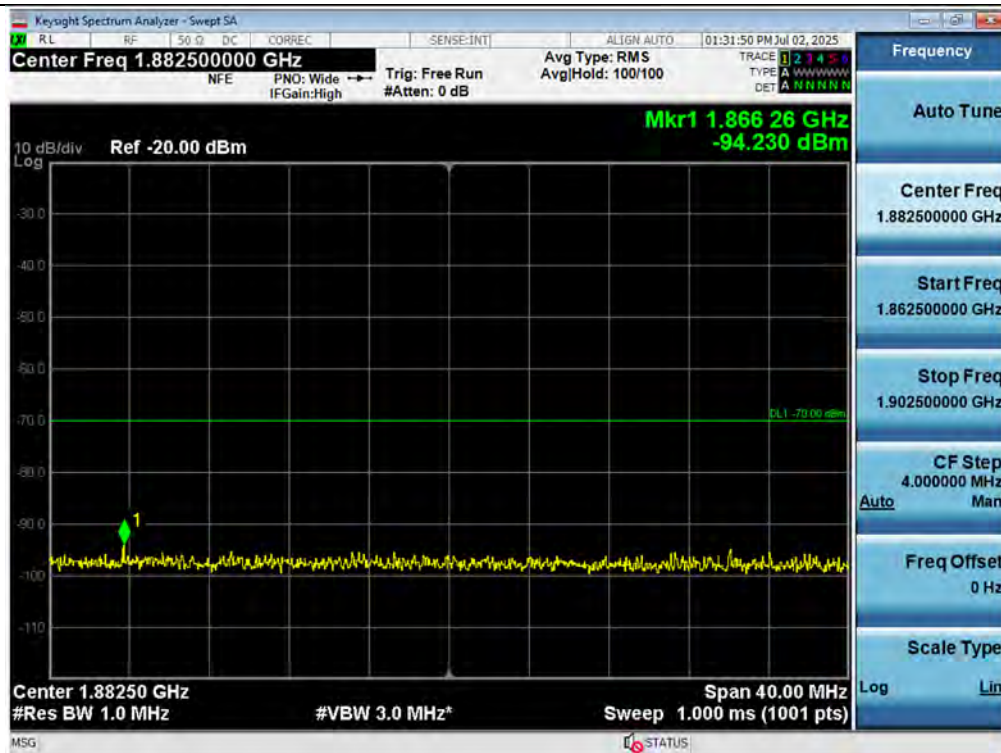
Broadband PCS (1930 ~ 1995 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 2



Broadband PCS (1850 ~ 1915 MHz) / Uplink / Authorized signal (MCC/MNC: 310/410) / ANT 3



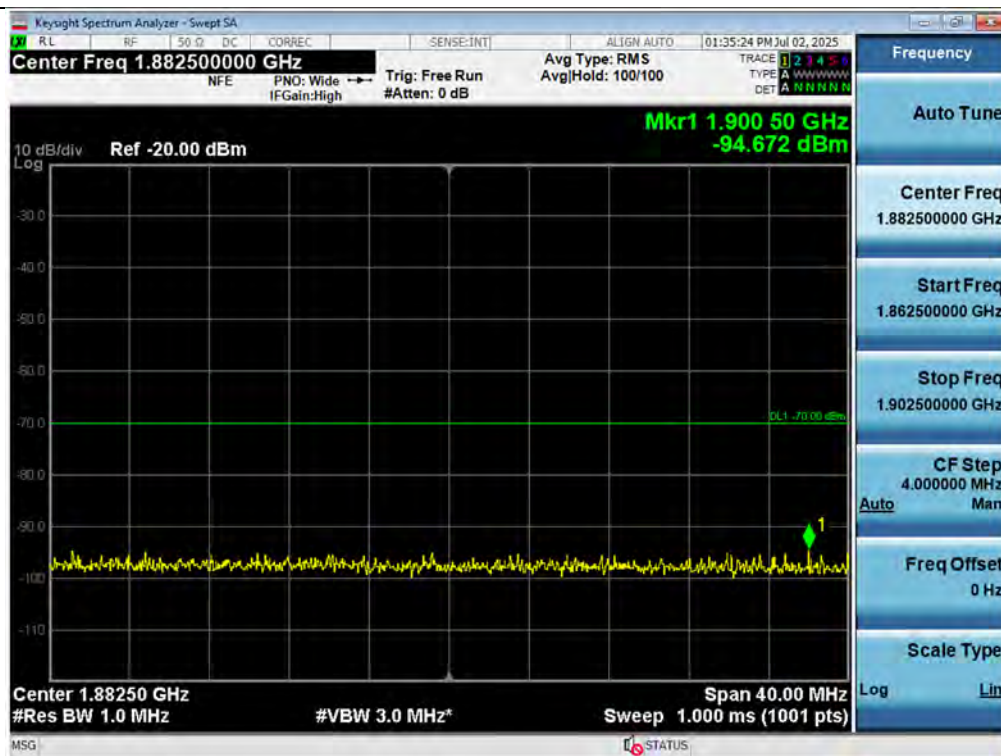
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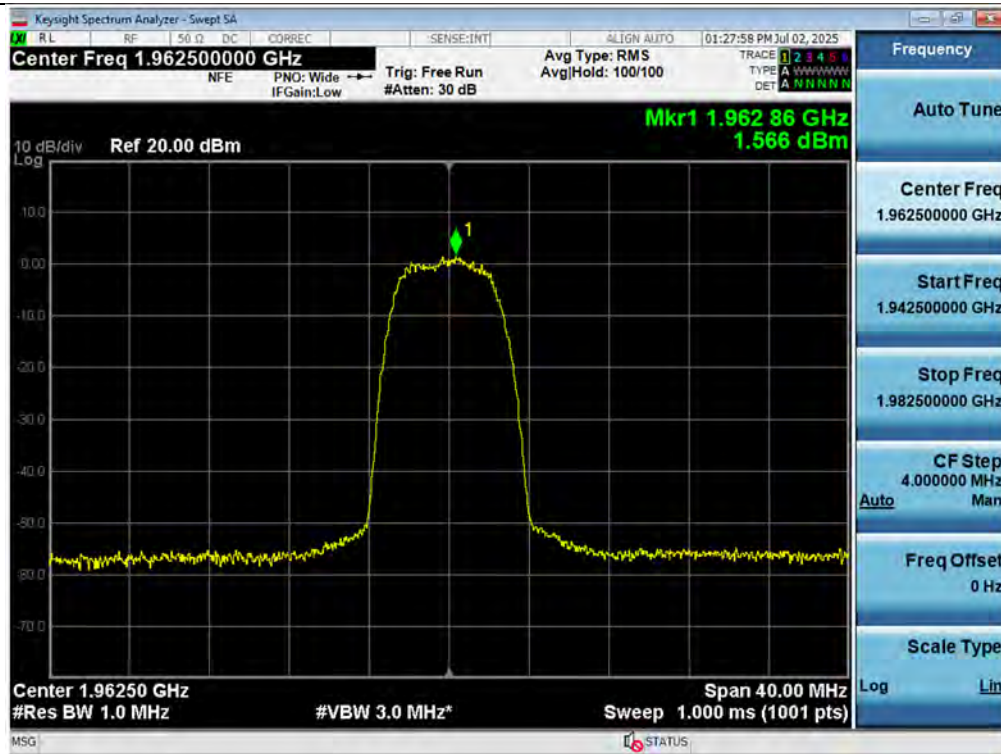
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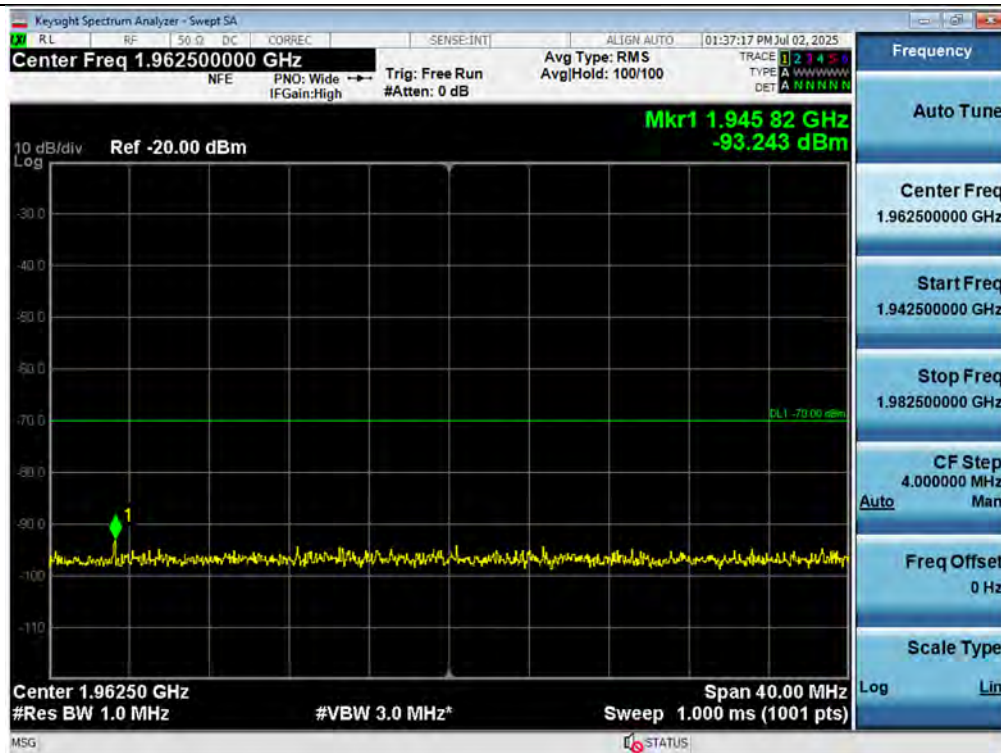
Broadband PCS (1850 ~ 1915 MHz) / Uplink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 3



Broadband PCS (1930 ~ 1995 MHz) / Downlink / Authorized signal (MCC/MNC: 310/410) / ANT 3



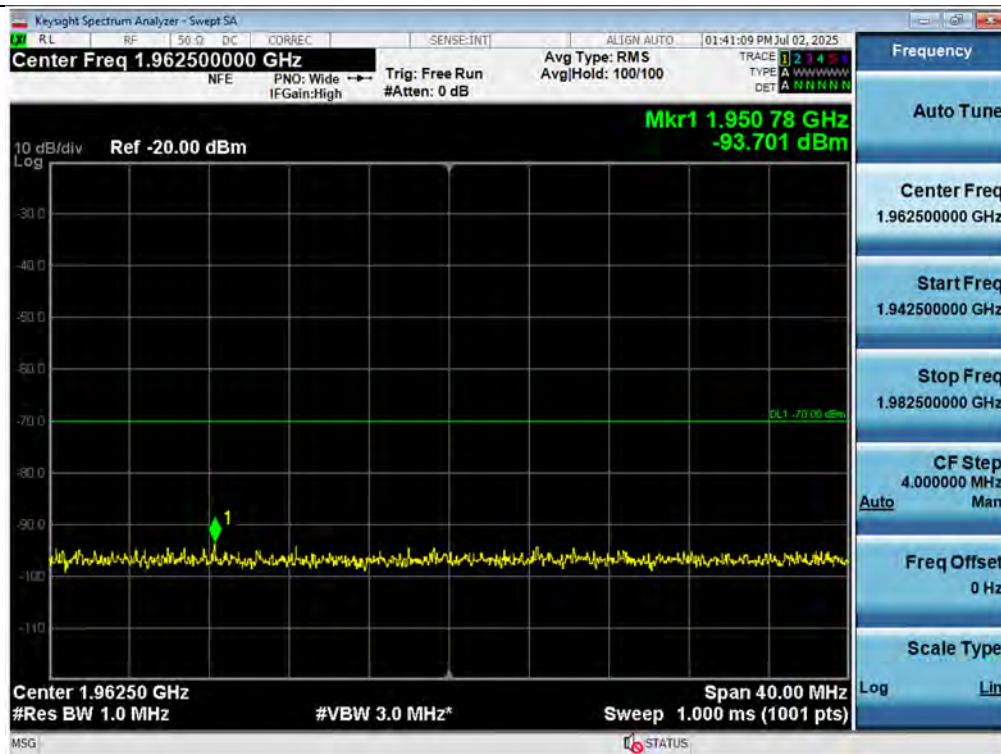
Broadband PCS (1930 ~ 1995 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/123) / ANT 3



Broadband PCS (1930 ~ 1995 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/456) / ANT 3



Broadband PCS (1930 ~ 1995 MHz) / Downlink / Non-Authorized signal (MCC/MNC: 310/789) / ANT 3



5.3. MAXIMUM POWER MEASUREMENT

Test Requirement:

§20.21(e)(9)(i)(B) Bidirectional Capability

Consumer Boosters must be able to provide equivalent uplink and downlink gain and conducted uplink power output that is at least 0.05 watts. One-way consumer boosters (*i.e.*, uplink only, downlink only, uplink impaired, downlink impaired) are prohibited. Spectrum block filtering used must provide uplink filter attenuation not less than the downlink filter attenuation, and where RSSI is measured after spectrum block filtering is applied referenced to the booster's input port for each band of operation.

§20.21(e)(9)(i)(D) Power Limits

A booster's uplink power must not exceed 1 watt composite conducted power and equivalent isotropic radiated power (EIRP) for each band of operation. Downlink power shall not exceed 0.05 watt (17 dBm) composite and 10 dBm per channel conducted and EIRP for each band of operation. Compliance with power limits will use instrumentation calibrated in terms of RMS equivalent voltage.

§20.21(e)(9)(ii)(B) Gain Control

Consumer boosters must have automatic limiting control to protect against excessive input signals that would cause output power and emissions in excess of that authorized by the Commission.

Test Procedures:

Measurements were in accordance with the test methods section 7.2 of KDB 935210 D04 v02r04.

7.2.1 General

- a) Compliance to applicable EIRP limits must be shown using the highest gains from the list of antennas, cabling and coupling devices declared by the manufacturer for use with the consumer booster.
- b) The maximum power levels to be measured using this procedure will also be used in calculating the maximum gain as described in the next subclause.
- c) The frequency with the highest power level in each operational band as determined in 7.1 is to be measured discretely by applying the following procedure using the stated emission and power detector types independently.
- d) This test can be performed in either normal mode (see Figure 1) or test mode (see Figure 2 and Figure 3).
- e) For an uplink test signal, in either normal mode or test mode, an AWGN signal with occupied bandwidth equal to that of the technology deployed in the band can be used (*e.g.*, 4.1 MHz 99% OBW, to represent a UMTS signal or 5 MHz LTE signal).
- f) For a downlink test signal:
 - in test mode, an AWGN signal with occupied bandwidth equal to that of the technology deployed in the band can be used (*e.g.*, 4.1 MHz 99% OBW, to represent a UMTS signal or 5 MHz LTE signal).
 - in normal mode, a simulated base station signal with technology type the same as exists in the CMRS band.
- g) All operating modes must be verified to maintain operation within applicable limits at the maximum uplink and downlink test levels per device type as defined in 5.5.

7.2.2 Procedure

- a) Connect the EUT in either normal mode or test mode.
- b) Configure the signal generator and spectrum analyzer for operation on the frequency with the highest power level as determined in 7.1. Set for appropriate signal type as specified in 7.2.1e) and 7.2.1f).
- c) Set the initial signal generator power to a level far below the AGC threshold level.
- d) Slowly increase the signal generator power level until the output signal reaches the AGC threshold level as determined from observation of the signal behavior on the spectrum analyzer (*i.e.*, no further increase in output power as input power is increased).
- e) Reduce power sufficiently on the signal generator to ensure that the AGC is not limiting the output power.
- f) Slowly increase the signal generator power to a level just below (and within 0.5 dB of) the AGC threshold without triggering the AGC. Note the signal generator power level as (P_{in}).
- g) Measure the output power (P_{out}) with the spectrum analyzer as follows.
 - 1) Set RBW = 100 kHz for AWGN signal type, or 300 kHz for CW or GSM signal type.
 - 2) Set VBW $\geq 3 \times$ RBW.
 - 3) Select either the BURST POWER or CHANNEL POWER measurement mode, as appropriate for each signal type. For AWGN, the channel power integration bandwidth shall be the 99% OBW of the 4.1 MHz signal.
 - 4) Select the power averaging (rms) detector.
 - 5) Affirm that the number of measurement points per sweep $\geq (2 \times \text{span})/\text{RBW}$.
NOTE—This requirement does not apply for BURST power measurement mode.
 - 6) Set sweep time = auto couple, or as necessary (but no less than auto couple value).
 - 7) Trace average at least 100 traces in power averaging (*i.e.*, rms) mode.

- 8) Record the measured power level P_{out} , with one set of results for the GSM or CW input stimulus, and another set of results for the AWGN input stimulus.
- h) Repeat step 7.2.2g) while increasing the signal generator amplitude in 2 dB steps until the maximum input level indicated in 5.5 is reached. Ensure that the EUT maintains compliance with applicable power limits. The test report shall include either a statement describing that the device complies at 10 dB above AGC or at the 5.5 power levels, or a table showing compliance at the additional input power(s) required.
- i) Repeat the procedure for each operational uplink and downlink frequency band supported by the booster.
- j) Provide tabulated results in the test report.

Notes:

1. The EUT was configured with the gain set to the maximum and the bandwidth set to the minimum (5 MHz).
2. The EUT operated in test mode and was configured according to Figure 2 and 3 of KDB 935210 D04.
3. The following test signal is used.

Signal	Detail	Measurement mode
4.1 MHz AWGN	AWGN signal with a 99% occupied bandwidth of 4.1 MHz	Channel power

4. The test limits are based on the worst value among all applicable rule parts.
 - §20.21(e)(9)(i)(B): Conducted uplink power output that is at least 0.05 watt (16.99 dBm).
 - §20.21(e)(9)(i)(D): Uplink power must not exceed 1 watt (30 dBm) for EIRP and conducted output. Downlink power shall not exceed 0.05 watt (16.99 dBm) and 10 dBm per channel conducted and EIRP.
5. Coupling Gain is calculated using the following formula.

$$\text{Coupled Gain} = \text{Antenna gain} - \text{Cable loss}$$

Coupling Gain of each band is shown in the table below.

Port	Frequency (MHz)	Ant. Gain (dBi)	Cable length (m)	Cable Loss (dB)	Coupled Gain (dB)
Donor	707	12	100	6.08	5.93
	781.5	12	100	6.39	5.61
	836.5	12	100	6.65	5.35
	1732.5	14	100	9.84	4.16
	1882.5	14	100	10.33	3.67
Server	737	2	10	2.91	-0.91
	751.5	2	10	2.93	-0.93
	881.5	2	10	3.22	-1.22
	2132.5	5	10	5.09	-0.09
	1962.5	5	10	4.88	0.12

The antenna gain, cable length, and loss are based on the specifications provided by the vendor.

6. EIRP is calculated according to the following formula.

$$\text{EIRP} = \text{Conducted Output Power} + \text{Coupling Gain}$$

Test Results:

Tabulated Result of Uplink Maximum Power (AGC Threshold input level)

ANT	Band	Frequency (MHz)	P _{in} (dBm)	Low Limit (dBm)	EIRP Limit (dBm)	Coupling Gain (dB)	P _{out} (dBm)	EIRP (dBm)
1	Upper 700 MHz	799.50	-78.20	16.99	30	5.61	21.65	27.26
	Cellular	827.65	-78.30			5.35	21.61	26.96
	AWS-1	1 750.32	-78.30			4.16	21.64	25.80
	Broadband PCS	1 880.42	-77.60			3.67	21.66	25.33
2	Lower 700 MHz	701.50	-78.63	16.99	30	5.93	21.18	27.11
	Cellular	826.50	-78.10			5.35	21.55	26.90
	AWS-1	1 714.32	-78.30			4.16	21.38	25.54
	Broadband PCS	1 854.29	-78.20			3.67	21.76	25.43
3	Lower 700 MHz	713.50	-77.50	16.99	30	5.93	21.52	27.45
	Cellular	845.55	-78.50			5.35	21.46	26.81
	AWS-1	1 712.50	-78.39			4.16	21.47	25.63
	Broadband PCS	1 854.03	-78.09			3.67	21.56	25.23

Tabulated Result of Uplink Maximum Power (AGC Threshold +10)

ANT	Band	Frequency (MHz)	P _{in} (dBm)	Low Limit (dBm)	EIRP Limit (dBm)	Coupling Gain (dB)	P _{out} (dBm)	EIRP (dBm)
1	Upper 700 MHz	799.50	-68.20	16.99	30	5.61	21.57	27.18
	Cellular	827.65	-68.30			5.35	21.66	27.01
	AWS-1	1 750.32	-68.30			4.16	21.59	25.75
	Broadband PCS	1 880.42	-67.60			3.67	21.66	25.33
2	Lower 700 MHz	701.50	-68.63	16.99	30	5.93	21.19	27.12
	Cellular	826.50	-68.10			5.35	21.14	26.49
	AWS-1	1 714.32	-68.30			4.16	21.09	25.25
	Broadband PCS	1 854.29	-68.20			3.67	21.54	25.21
3	Lower 700 MHz	713.50	-67.50	16.99	30	5.93	21.43	27.36
	Cellular	845.55	-68.50			5.35	21.37	26.72
	AWS-1	1 712.50	-68.39			4.16	21.57	25.73
	Broadband PCS	1 854.03	-68.09			3.67	21.55	25.22

Tabulated Result of Downlink Maximum Power (AGC Threshold input level)

ANT	Band	Frequency (MHz)	P _{in} (dBm)	Conducted and EIRP Limit (dBm)	Coupling Gain (dB)	P _{out} (dBm)	EIRP (dBm)
1	Upper 700 MHz	750.34	-90.60	10	-0.93	8.09	7.16
	Cellular	883.25	-91.20		-1.22	7.77	6.55
	AWS-1	2 131.42	-91.41		-0.09	7.16	7.07
	Broadband PCS	1 933.38	-90.50		0.12	7.74	7.86
2	Lower 700 MHz	741.41	-90.30	10	-0.91	8.06	7.15
	Cellular	880.500	-90.25		-1.22	8.10	6.88
	AWS-1	2 134.75	-90.20		-0.09	8.09	8.00
	Broadband PCS	1 934.68	-90.40		0.12	7.51	7.63
3	Lower 700 MHz	733.25	-90.60	10	-0.91	8.27	7.36
	Cellular	890.15	-90.90		-1.22	7.66	6.44
	AWS-1	2 112.50	-90.55		-0.09	7.93	7.84
	Broadband PCS	1 992.50	-90.70		0.12	7.60	7.72

Tabulated Result of Downlink Maximum Power (AGC Threshold +10)

ANT	Band	Frequency (MHz)	P _{in} (dBm)	Conducted and EIRP Limit (dBm)	Coupling Gain (dB)	P _{out} (dBm)	EIRP (dBm)
1	Upper 700 MHz	750.34	-80.60	10	-0.93	8.19	7.26
	Cellular	883.25	-81.20		-1.22	7.98	6.76
	AWS-1	2 131.42	-81.41		-0.09	7.52	7.43
	Broadband PCS	1 933.38	-80.50		0.12	7.90	8.02
2	Lower 700 MHz	741.41	-80.30	10	-0.91	8.13	7.22
	Cellular	880.500	-80.25		-1.22	8.12	6.90
	AWS-1	2 134.75	-80.20		-0.09	8.21	8.12
	Broadband PCS	1 934.68	-80.40		0.12	7.56	7.68
3	Lower 700 MHz	733.25	-80.60	10	-0.91	8.41	7.50
	Cellular	890.15	-80.90		-1.22	7.72	6.50
	AWS-1	2 112.50	-80.55		-0.09	7.94	7.85
	Broadband PCS	1 992.50	-80.70		0.12	7.67	7.79

5.4. MAXIMUM BOOSTER GAIN COMPUTATION

Test Requirement:**§20.21(e)(9)(i)(B) Bidirectional Capability**

Consumer Boosters must be able to provide equivalent uplink and downlink gain and conducted uplink power output that is at least 0.05 watts. One-way consumer boosters (*i.e.*, uplink only, downlink only, uplink impaired, downlink impaired) are prohibited. Spectrum block filtering used must provide uplink filter attenuation not less than the downlink filter attenuation, and where RSSI is measured after spectrum block filtering is applied referenced to the booster's input port for each band of operation.

§20.21(e)(9)(i)(C)(2) Booster Gain Limits

The uplink and downlink maximum gain of a frequency selective consumer booster referenced to its input and output ports shall not exceed the following limits:

- (i) Fixed Booster maximum gain shall not exceed $19.5 \text{ dB} + 20 \text{ Log}_{10} (\text{Frequency})$, or 100 dB for systems having automatic gain adjustment based on isolation measurements between booster donor and server antennas.
- (ii) Where, Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.

Test Procedures:

Measurements were in accordance with the test methods section 7.3 of KDB 935210 D04 v02r04.

- a) Calculate the maximum gain of the booster as follows to demonstrate compliance to the applicable gain limits as specified.
- b) For both the uplink and downlink in each supported frequency band, use each of the POUT and PIN value pairs for all input signal types used in 7.2 in the following equation to determine the maximum gain, G:
$$G \text{ (dB)} = P_{\text{OUT}}(\text{dBm}) - P_{\text{IN}}(\text{dBm}).$$
- c) Record the maximum gain of the uplink and downlink paths for each supported frequency band and verify that the each gain value complies with the applicable limit.
- d) Provide tabulated results in test report.

Notes:

- 1. Test limits were applied as follows.
 - §20.21(e)(8)(i)(B): Consumer Boosters must be able to provide equivalent uplink and downlink gain. A 9 dB equivalent gain margin is applied in accordance with note 17 of section 7.3 in KDB 935210 D04.
- 2. The test results were calculated based on the measurements in Section 5.3.

Test Results:
Tabulated Result of Uplink Booster Gain

ANT	Band	Frequency (MHz)	Pin (dBm)	Pout (dBm)	Limit (dB)	Gain (dB)
1	Upper 700 MHz	779.500	-78.20	21.65	100	99.85
	Cellular	827.650	-78.30	21.61		99.91
	AWS-1	1 750.320	-78.30	21.64		99.94
	Broadband PCS	1 880.420	-77.60	21.66		99.26
2	Lower 700 MHz	701.500	-78.63	21.18		99.81
	Cellular	826.500	-78.10	21.55		99.65
	AWS-1	1 714.320	-78.30	21.38		99.68
	Broadband PCS	1 854.290	-78.20	21.76		99.96
3	Lower 700 MHz	713.500	-77.50	21.52		99.02
	Cellular	845.550	-78.50	21.46		99.96
	AWS-1	1 712.500	-78.39	21.47		99.86
	Broadband PCS	1 854.030	-78.09	21.56		99.65

Tabulated Result of Downlink Booster Gain

ANT	Band	Frequency (MHz)	Pin (dBm)	Pout (dBm)	Limit (dB)	Gain (dB)
1	Upper 700 MHz	750.340	-90.60	8.09	100	98.69
	Cellular	883.250	-91.20	7.77		98.97
	AWS-1	2 131.420	-91.41	7.16		98.57
	Broadband PCS	1 933.380	-90.50	7.74		98.24
2	Lower 700 MHz	741.410	-90.30	8.06		98.36
	Cellular	880.500	-90.25	8.10		98.35
	AWS-1	2 134.750	-90.20	8.09		98.29
	Broadband PCS	1 934.680	-90.40	7.51		97.91
3	Lower 700 MHz	733.250	-90.60	8.27		98.87
	Cellular	890.150	-90.90	7.66		98.56
	AWS-1	2 112.500	-90.55	7.93		98.48
	Broadband PCS	1 992.500	-90.70	7.60		98.30

Tabulated Result of Uplink and Downlink Gain Comparison

ANT	Band	UL Gain (dB)	DL Gain (dB)	Limit (dB)	Difference (dB)
1	Upper 700 MHz	99.85	98.69	9	1.17
	Cellular	99.91	98.97		1.37
	AWS-1	99.94	98.57		1.37
	Broadband PCS	99.26	98.24		1.02
2	Lower 700 MHz	99.81	98.36		1.44
	Cellular	99.65	98.35		1.31
	AWS-1	99.68	98.29		1.39
	Broadband PCS	99.96	97.91		2.05
3	Lower 700 MHz	99.02	98.87		0.16
	Cellular	99.96	98.56		1.40
	AWS-1	99.86	98.48		1.38
	Broadband PCS	99.65	98.30		1.35

5.5. INTERMODULATION-PRODUCT

Test Requirement:

§ 20.21(e)(9)(i)(G) Intermodulation Limits.

The transmitted intermodulation products of a consumer booster at its uplink and downlink ports shall not exceed the power level of -19 dBm for the supported bands of operation. Compliance with intermodulation limits will use boosters operating at maximum gain and maximum rated output power, with two continuous wave (CW) input signals spaced 600 kHz apart and centered in the pass band of the booster, and with a 3 kHz measurement bandwidth.

Test Procedures:

Measurements were in accordance with the test methods section 7.4 of KDB 935210 D04 v02r04.

- a) Connect the signal booster to the test equipment as shown in Figure 5 and configure it for operation in either normal mode or test mode.
- b) Set the spectrum analyzer RBW = 3 kHz.
- c) Set the VBW $\geq 3 \times$ the RBW.
- d) Select the power averaging (rms) detector.
- e) Set the spectrum analyzer center frequency to the center of the supported operational band under test.
- f) Set the span to 5 MHz.
- g) Configure the two signal generators for CW operation, with signal generator #1 tuned 300 kHz below the operational band center frequency, and signal generator #2 tuned 300 kHz above the operational band center frequency.
- h) Set the signal generator amplitudes so that the power from each into the EUT is equivalent, then turn on the RF output.
- i) Simultaneously increase the signal generators' amplitudes equally until just before the EUT begins AGC, then affirm that all intermodulation products (if any occur), are below the specified limit of -19 dBm.
- j) Utilize the MAX HOLD function of the spectrum analyzer and wait for the trace to stabilize. Place a marker at the highest amplitude intermodulation product.
- k) Record the maximum intermodulation product amplitude level that is observed.
- l) Capture the spectrum analyzer trace for inclusion in the test report.
- m) Increase the signal generator amplitude in 2 dB steps to 10 dB above the AGC threshold determined in 7.4i), but to not to exceed the maximum input level specified in 5.5, to ensure that the EUT maintains compliance with the intermodulation limit. The test report shall include either a statement describing that the device complies at 10 dB above AGC or at the 5.5 power levels, or a table showing compliance at the additional input power(s) required.
- n) Repeat 7.4e) to 7.4m) for all uplink and downlink operational bands.

NOTE—If using a single signal generator with dual outputs, ensure that intermodulation products are not the result of the generator.

Notes:

1. The EUT was configured with the gain set to the maximum and the bandwidth set to the minimum (5 MHz).
2. The EUT operated in test mode and was configured according to Figure 5 of KDB 935210 D04.
3. The test was performed using a single signal generator with a two-tone generation function.

Test Results:

Tabulated Result of Uplink Intermodulation

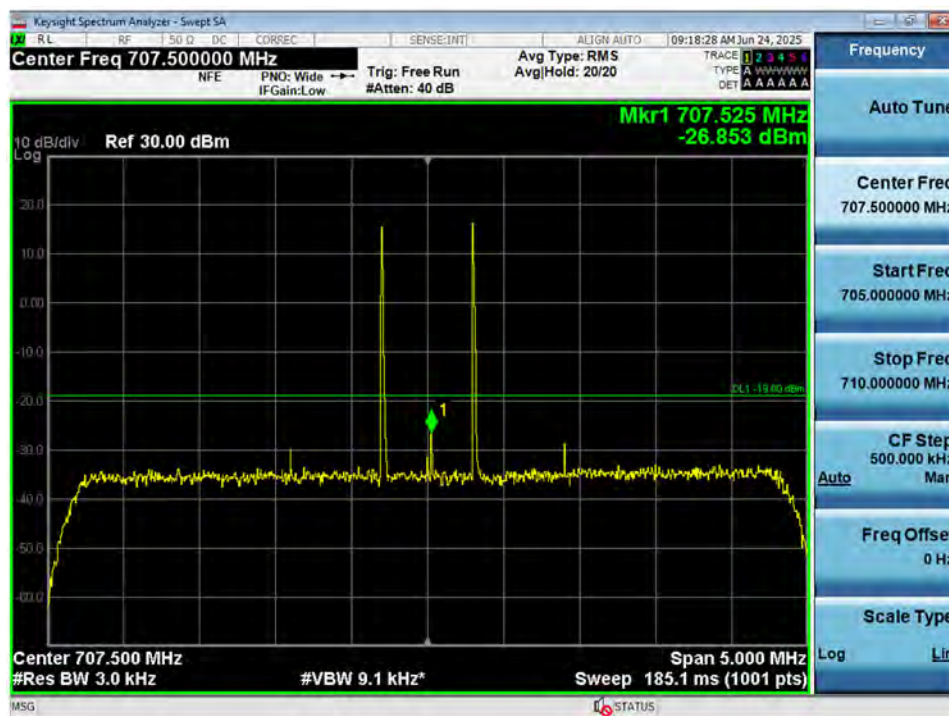
ANT	Band	Input Level	Frequency (MHz)	Limit (dBm)	Intermodulation (dBm)
1	Upper 700 MHz	AGC threshold	782.000	-19	-24.929
		AGC threshold +10 dB	782.000		-25.963
	Cellular	AGC threshold	836.500		-20.156
		AGC threshold +10 dB	836.500		-20.531
	AWS-1	AGC threshold	1 732.480		-25.074
		AGC threshold +10 dB	1 732.500		-28.461
	Broadband PCS	AGC threshold	1 882.550		-24.228
		AGC threshold +10 dB	1 882.500		-24.863
2	Lower 700 MHz	AGC threshold	707.525		-26.853
		AGC threshold +10 dB	708.400		-30.005
	Cellular	AGC threshold	836.500		-20.359
		AGC threshold +10 dB	836.500		-20.813
	AWS-1	AGC threshold	1 732.480		-24.639
		AGC threshold +10 dB	1 732.500		-27.766
	Broadband PCS	AGC threshold	1 882.550		-22.514
		AGC threshold +10 dB	1 882.500		-25.249
3	Lower 700 MHz	AGC threshold	707.525		-26.185
		AGC threshold +10 dB	708.400		-32.814
	Cellular	AGC threshold	836.500		-21.196
		AGC threshold +10 dB	836.500		-20.427
	AWS-1	AGC threshold	1 732.480		-24.994
		AGC threshold +10 dB	1 732.500		-27.583
	Broadband PCS	AGC threshold	1 882.550		-22.819
		AGC threshold +10 dB	1 882.500		-27.901

Tabulated Result of Downlink Intermodulation

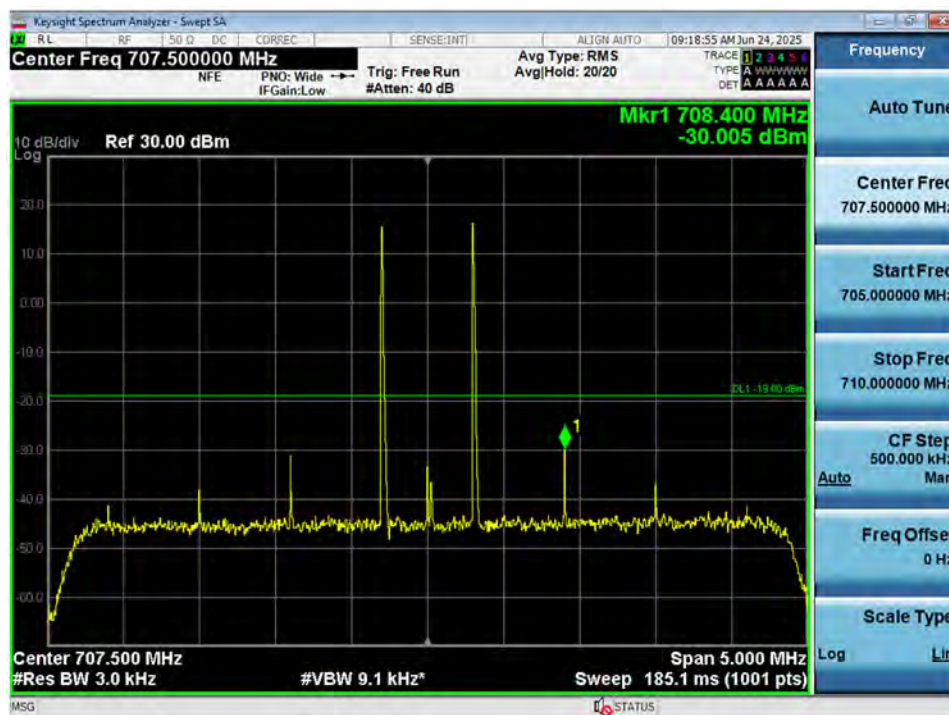
ANT	Band	Input Level	Frequency (MHz)	Limit (dBm)	Intermodulation (dBm)
1	Upper 700 MHz	AGC threshold	749.005	-19	-32.647
		AGC threshold +10 dB	751.000		-39.920
	Cellular	AGC threshold	882.270		-30.551
		AGC threshold +10 dB	881.500		-31.823
	AWS-1	AGC threshold	2,131.025		-25.868
		AGC threshold +10 dB	2,132.500		-31.408
	Broadband PCS	AGC threshold	1,961.100		-34.546
		AGC threshold +10 dB	1,962.500		-35.860
2	Lower 700 MHz	AGC threshold	738.370		-33.362
		AGC threshold +10 dB	735.745		-43.146
	Cellular	AGC threshold	881.500		-29.612
		AGC threshold +10 dB	881.500		-30.631
	AWS-1	AGC threshold	2,132.500		-29.168
		AGC threshold +10 dB	2,132.500		-29.692
	Broadband PCS	AGC threshold	1,962.920		-33.803
		AGC threshold +10 dB	1,962.500		-36.022
3	Lower 700 MHz	AGC threshold	739.260		-32.800
		AGC threshold +10 dB	737.500		-41.556
	Cellular	AGC threshold	880.380		-30.080
		AGC threshold +10 dB	881.500		-31.842
	AWS-1	AGC threshold	2,132.500		-29.404
		AGC threshold +10 dB	2,132.500		-31.130
	Broadband PCS	AGC threshold	1,962.500		-32.897
		AGC threshold +10 dB	1,962.500		-37.136

Plot data of Intermodulation

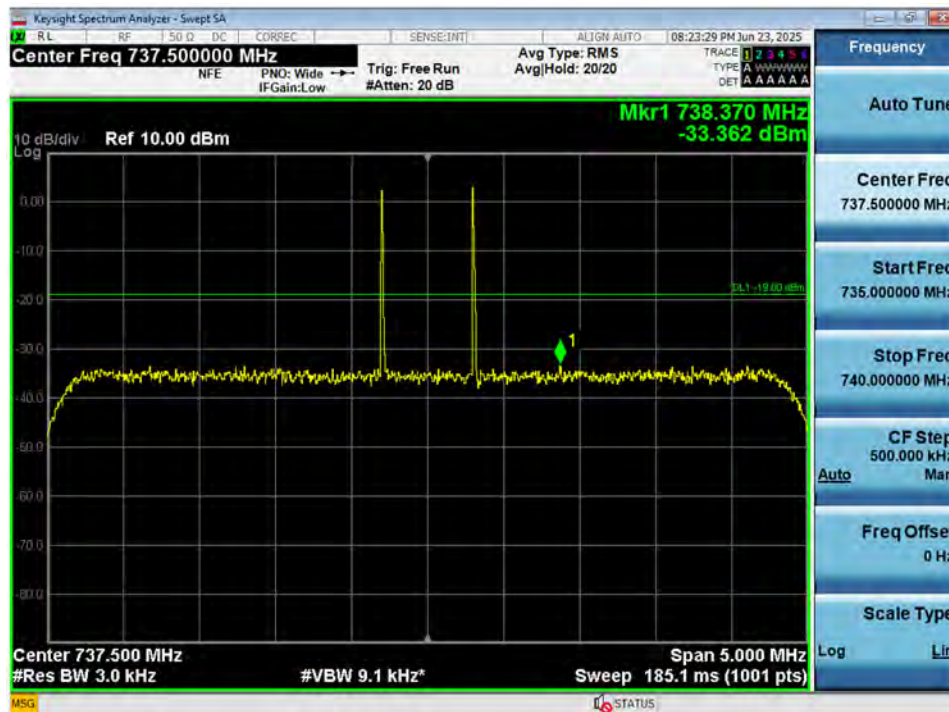
Intermodulation / Lower 700 MHz / Uplink / AGC threshold / ANT 2



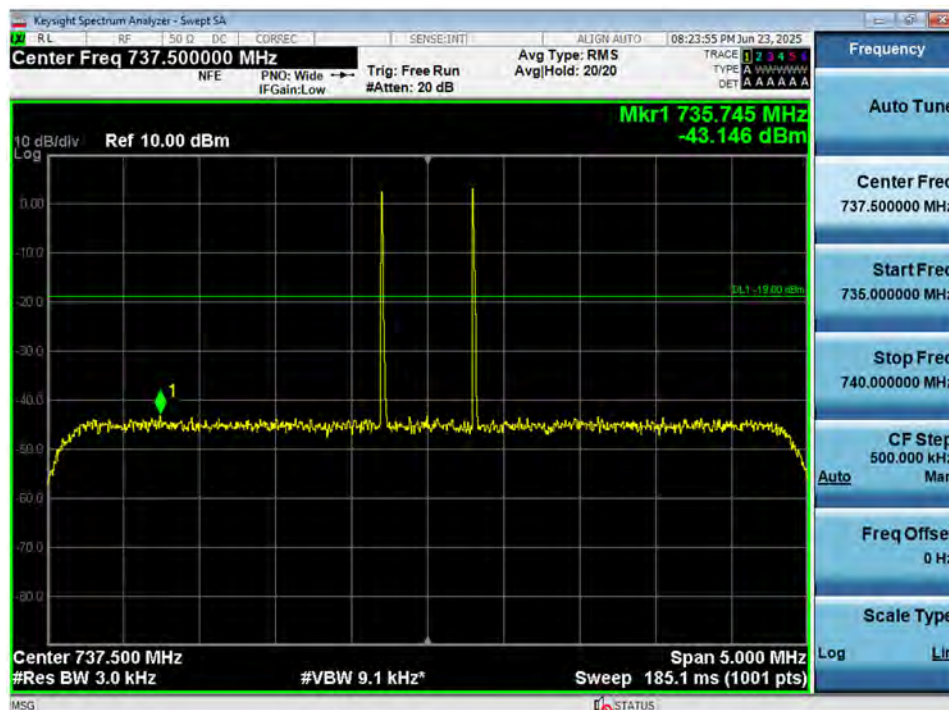
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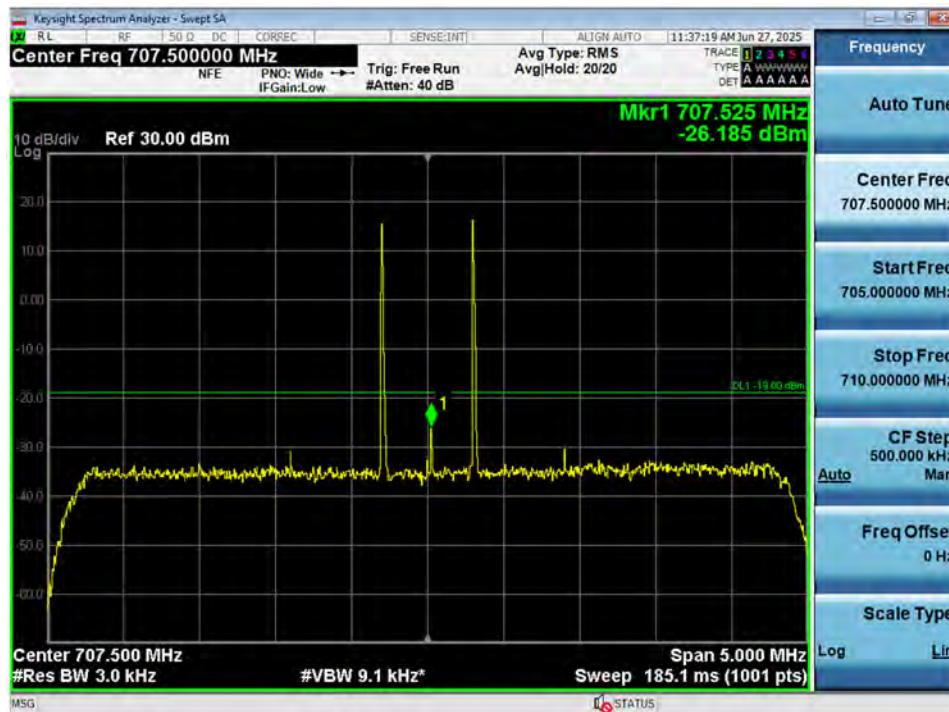
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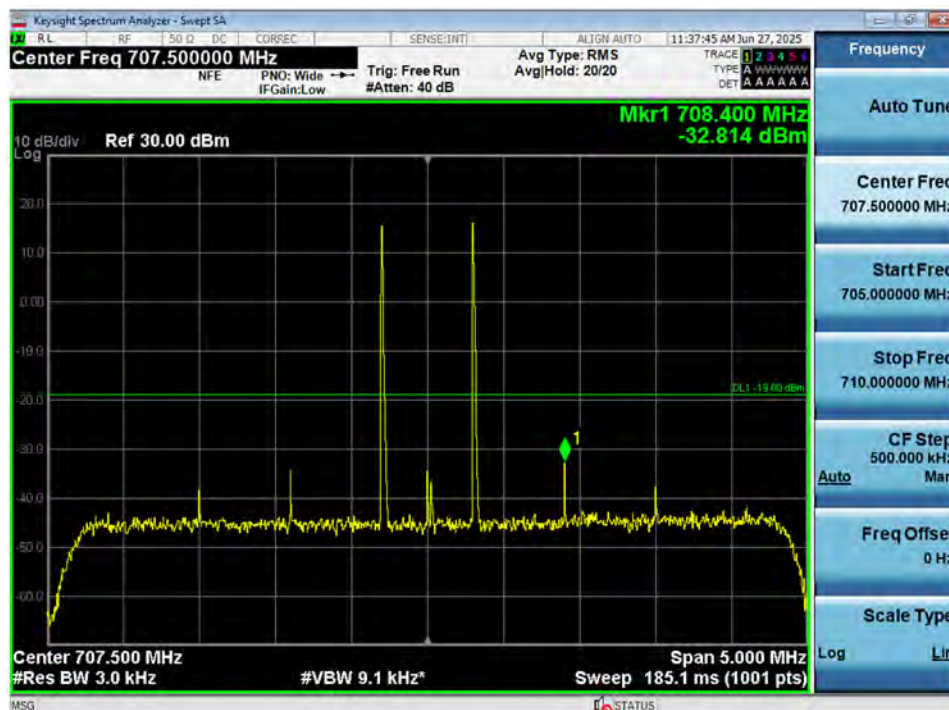
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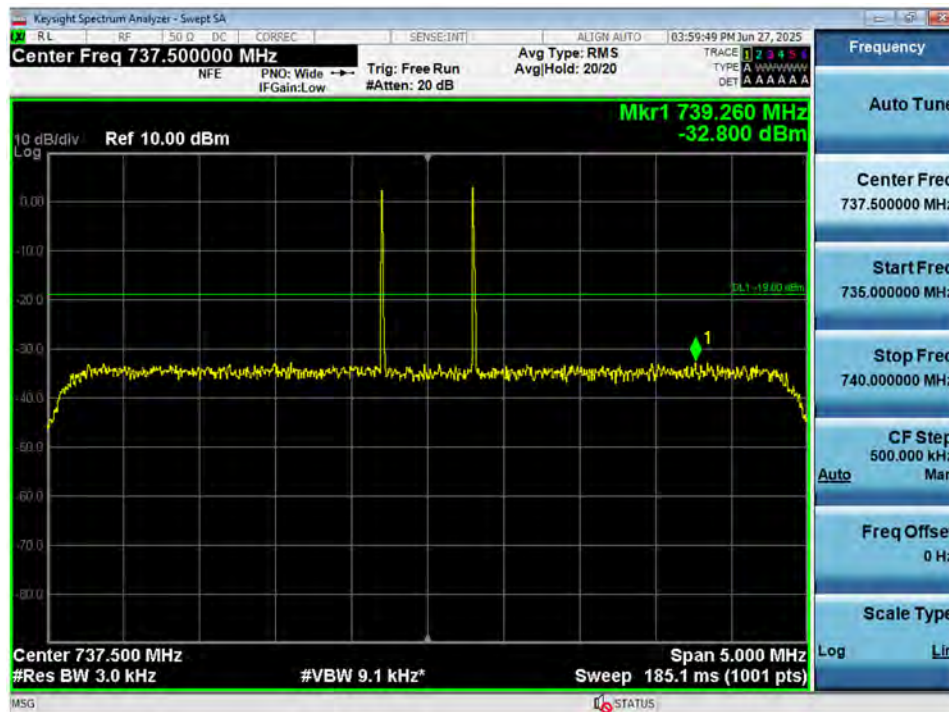
Intermodulation / Lower 700 MHz / Uplink / AGC threshold / ANT 3



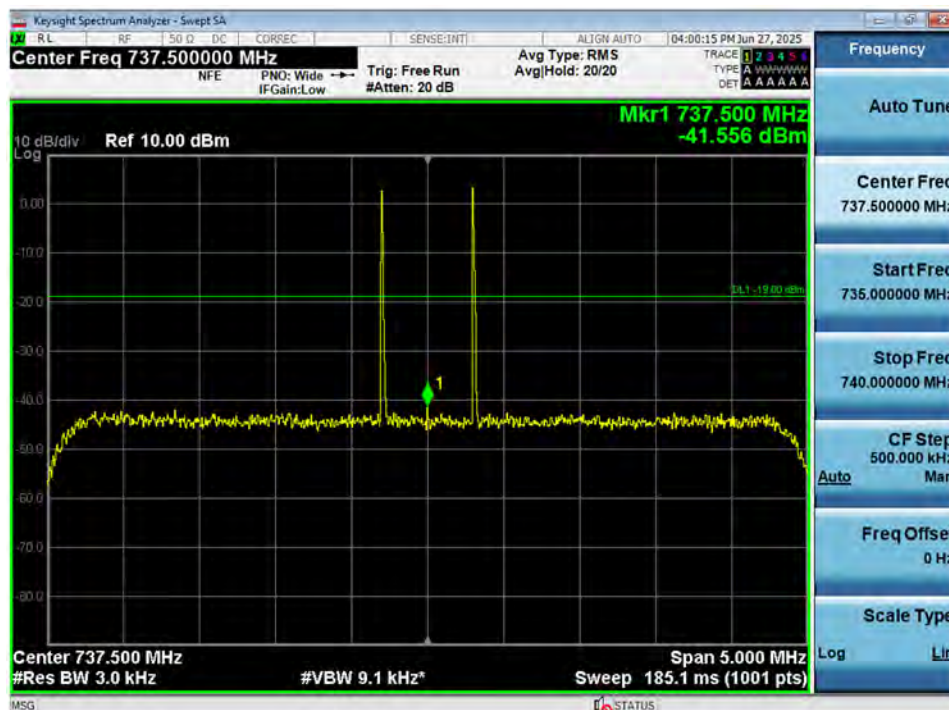
Intermodulation / Lower 700 MHz / Uplink / AGC threshold +10 dB / ANT 3



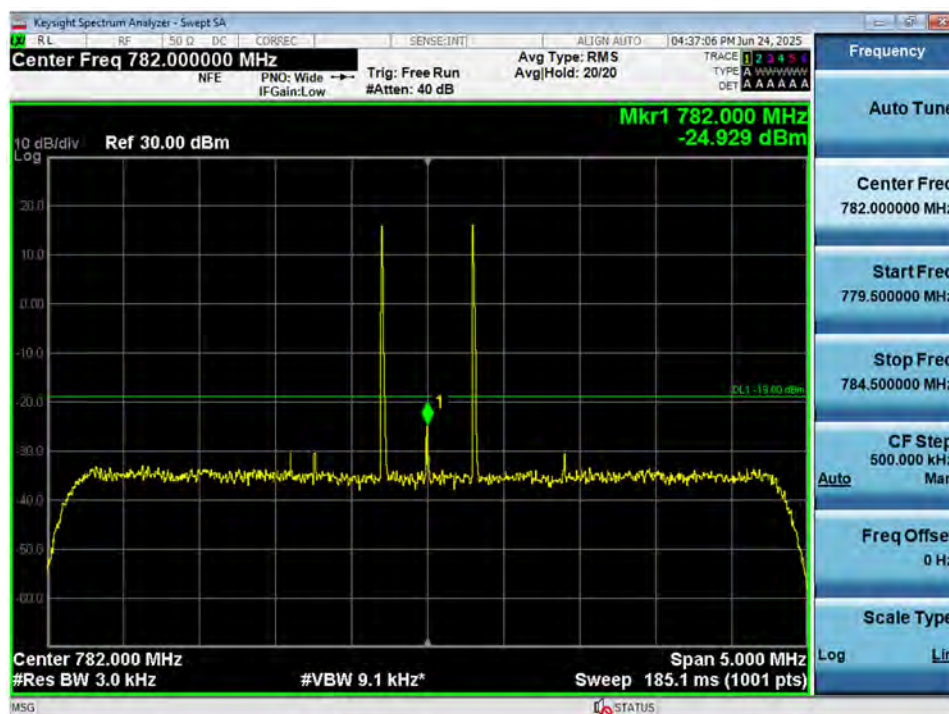
Intermodulation / Lower 700 MHz / Downlink / AGC threshold / ANT 3



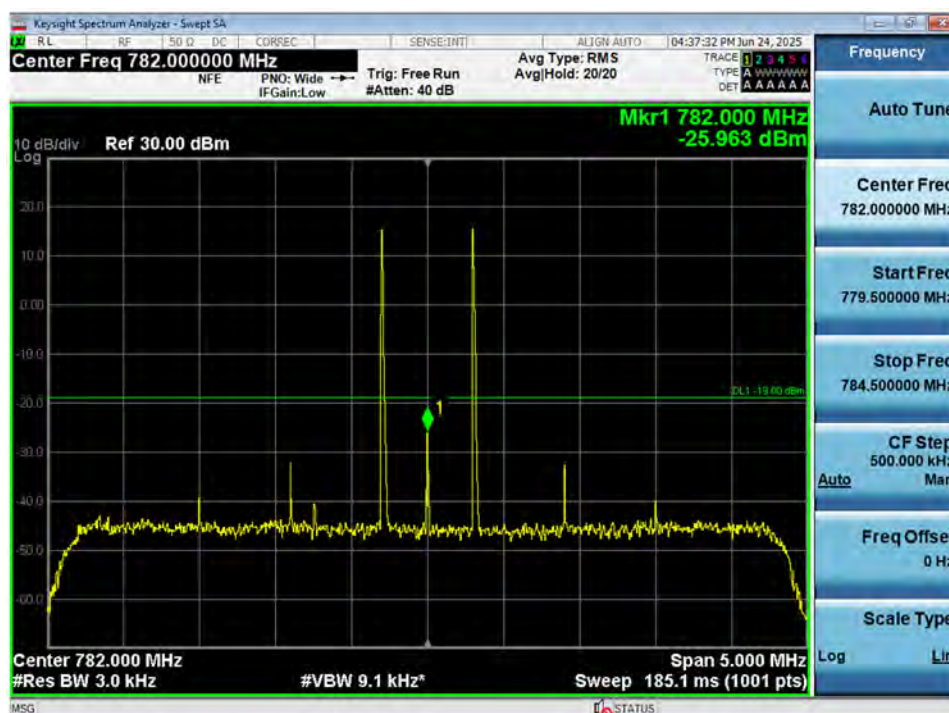
Intermodulation / Lower 700 MHz / Downlink / AGC threshold +10 dB / ANT 3



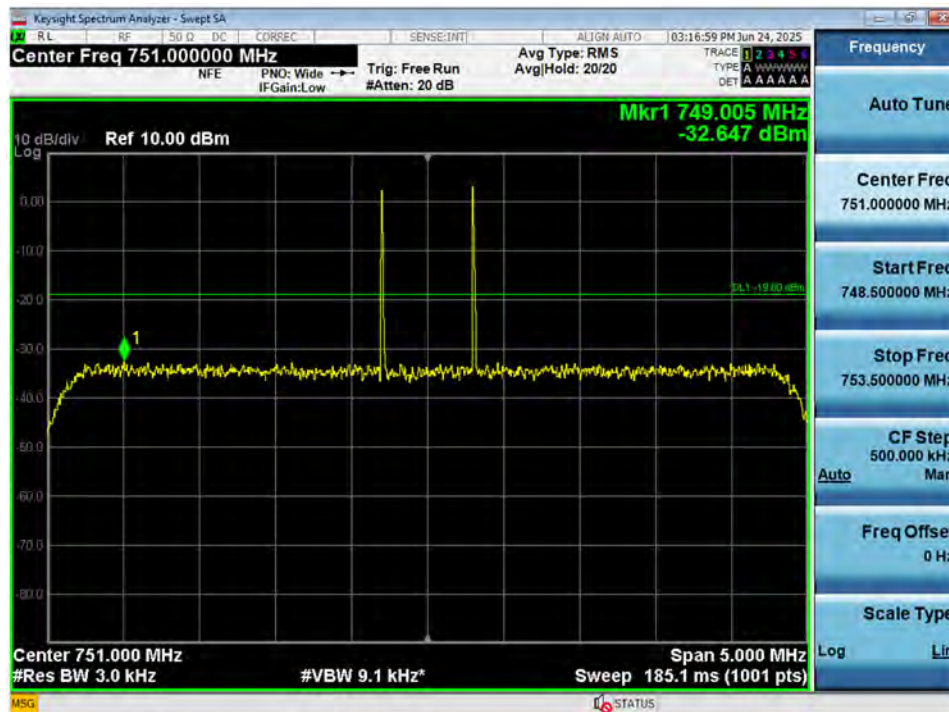
Intermodulation / Upper 700 MHz / Uplink / AGC threshold / ANT 1



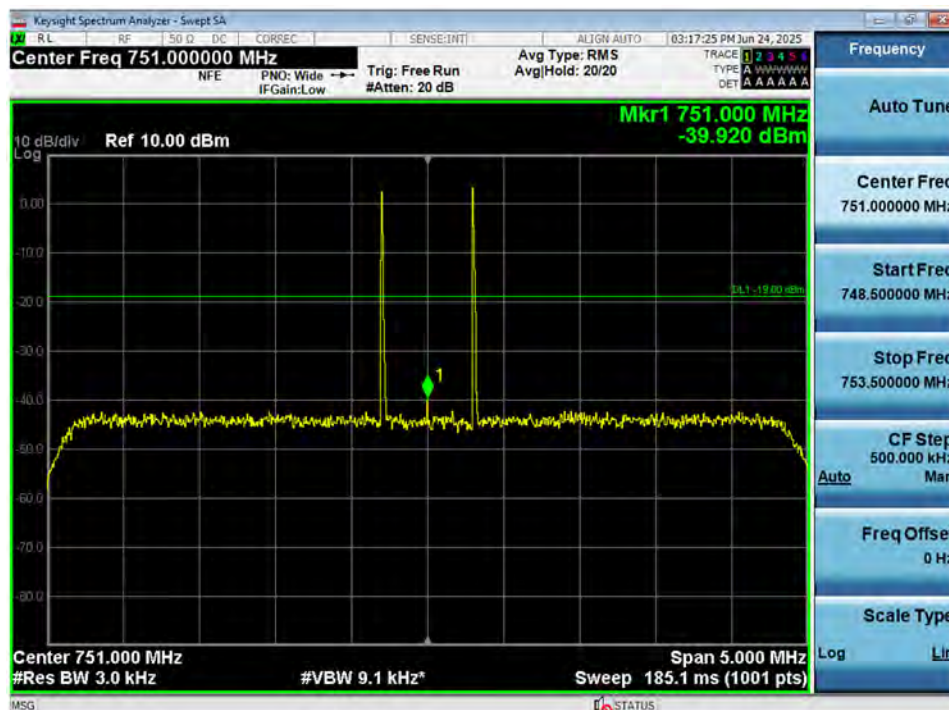
Intermodulation / Upper 700 MHz / Uplink / AGC threshold +10 dB / ANT 1



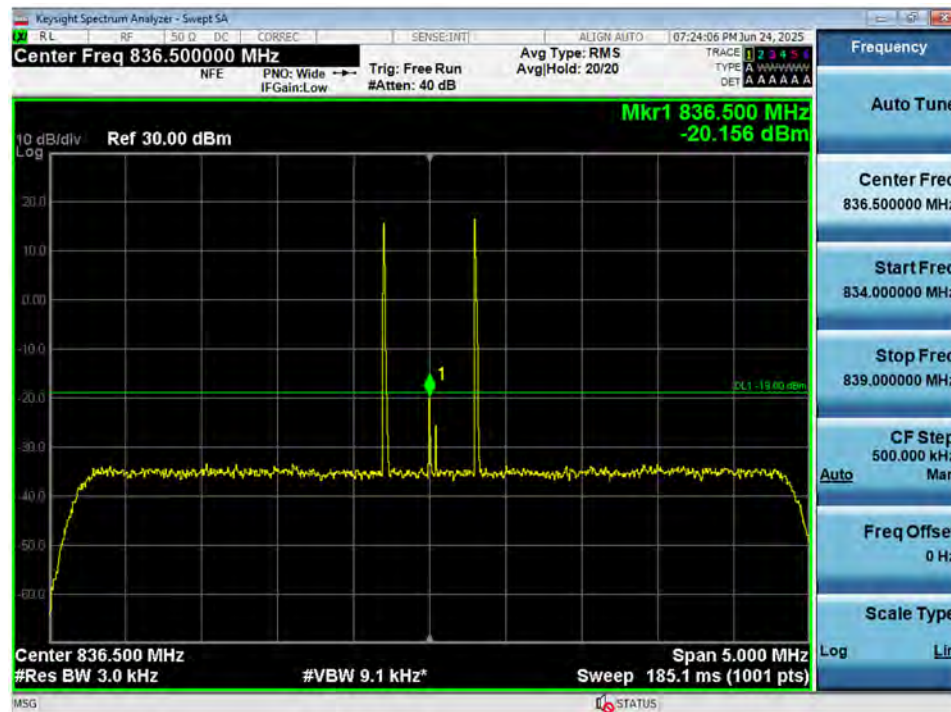
Intermodulation / Upper 700 MHz / Downlink / AGC threshold / ANT 1



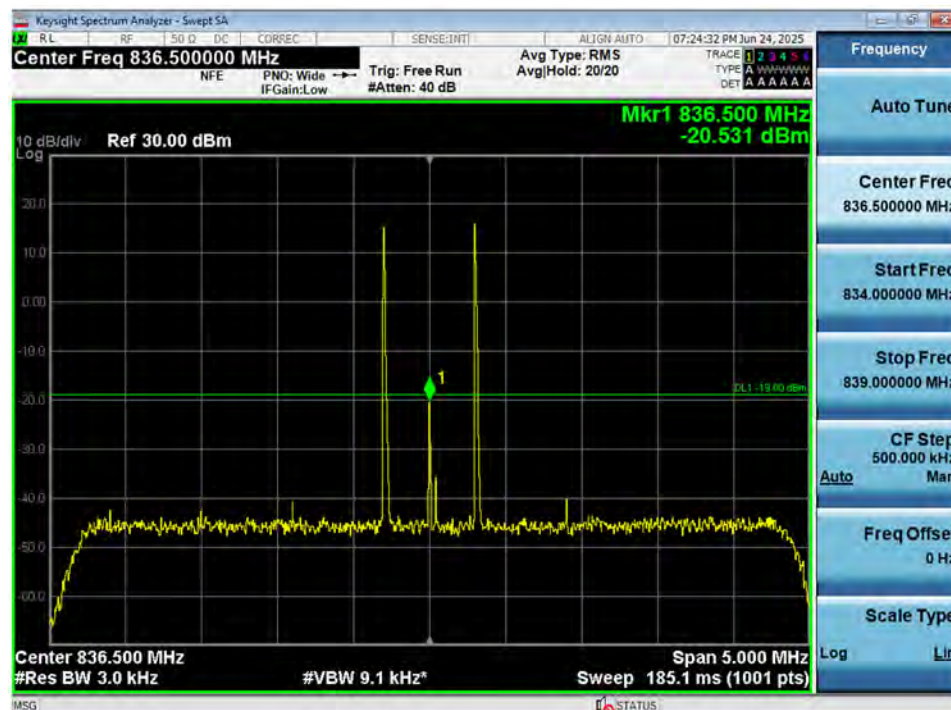
Intermodulation / Upper 700 MHz / Downlink / AGC threshold +10 dB / ANT 1



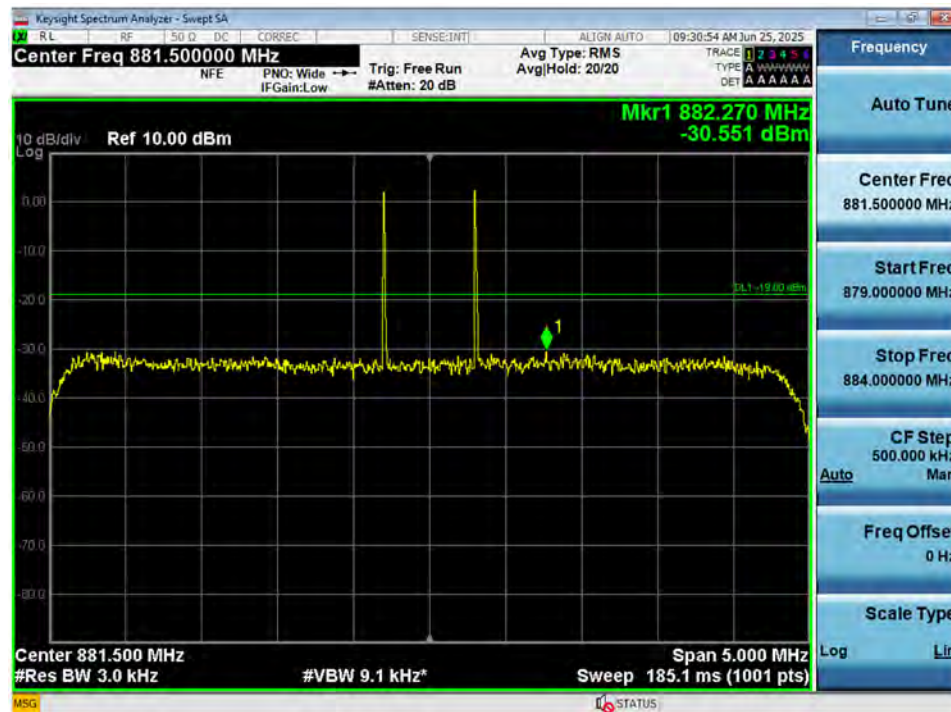
Intermodulation / Cellular / Uplink / AGC threshold / ANT 1



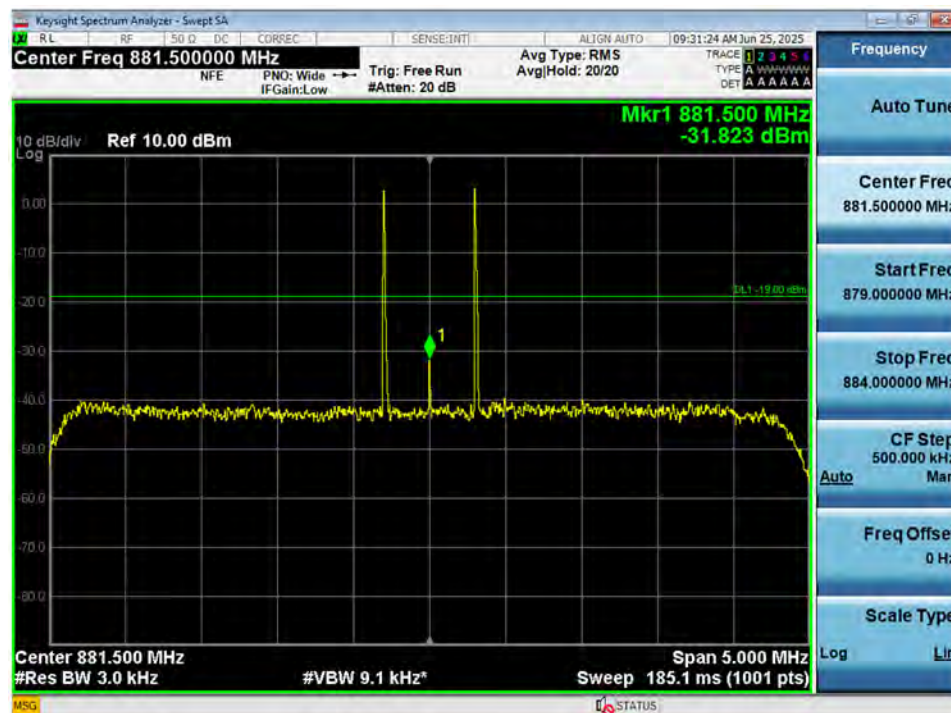
Intermodulation / Cellular / Uplink / AGC threshold +10 dB / ANT 1



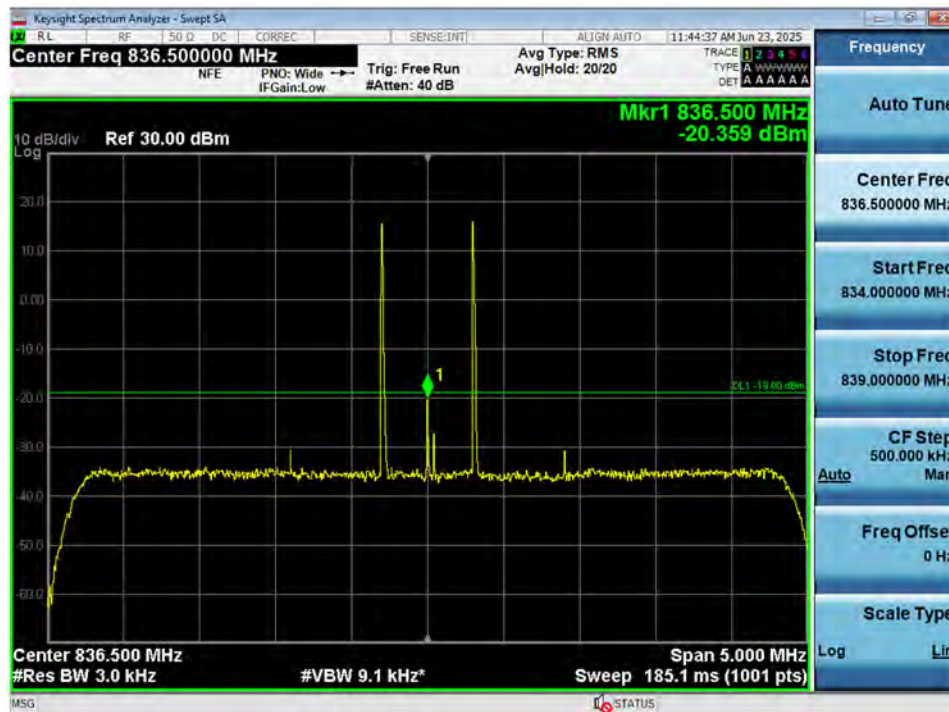
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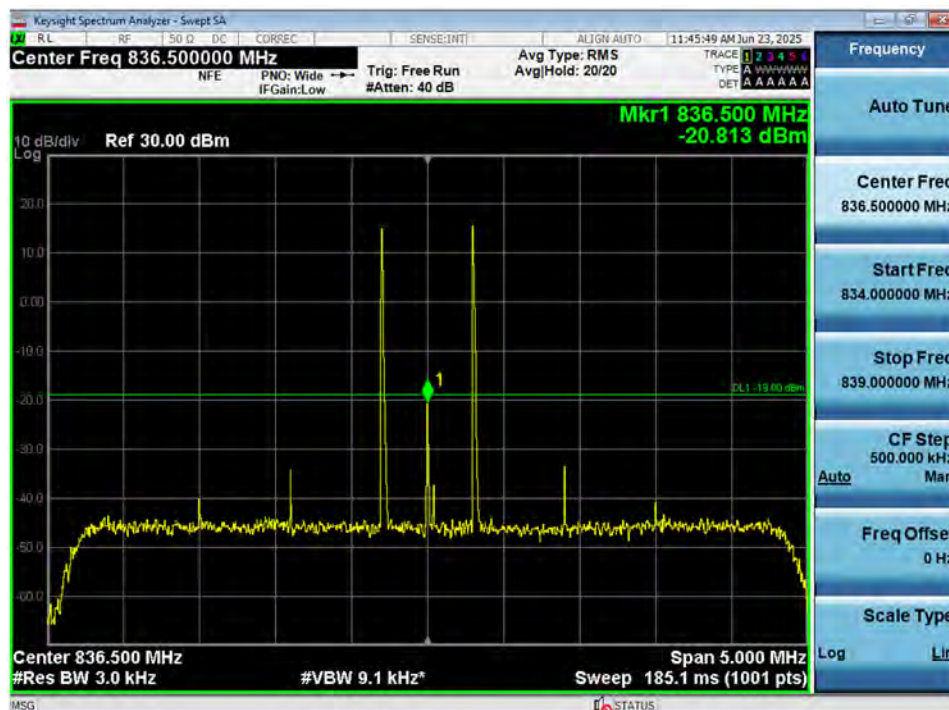
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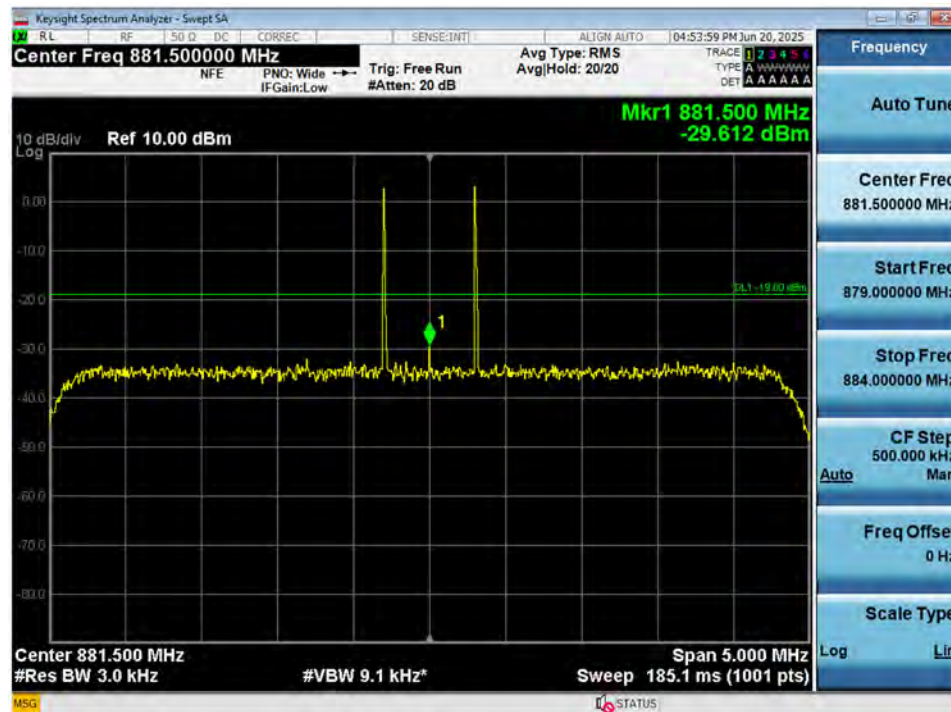
Intermodulation / Cellular / Uplink / AGC threshold / ANT 2



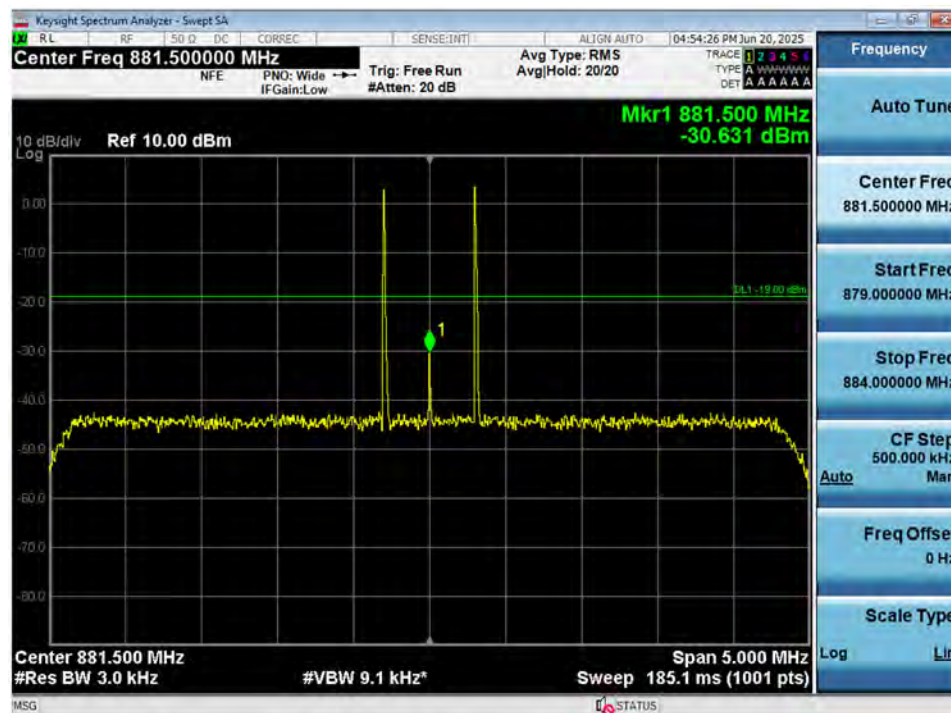
Intermodulation / Cellular / Uplink / AGC threshold +10 dB / ANT 2



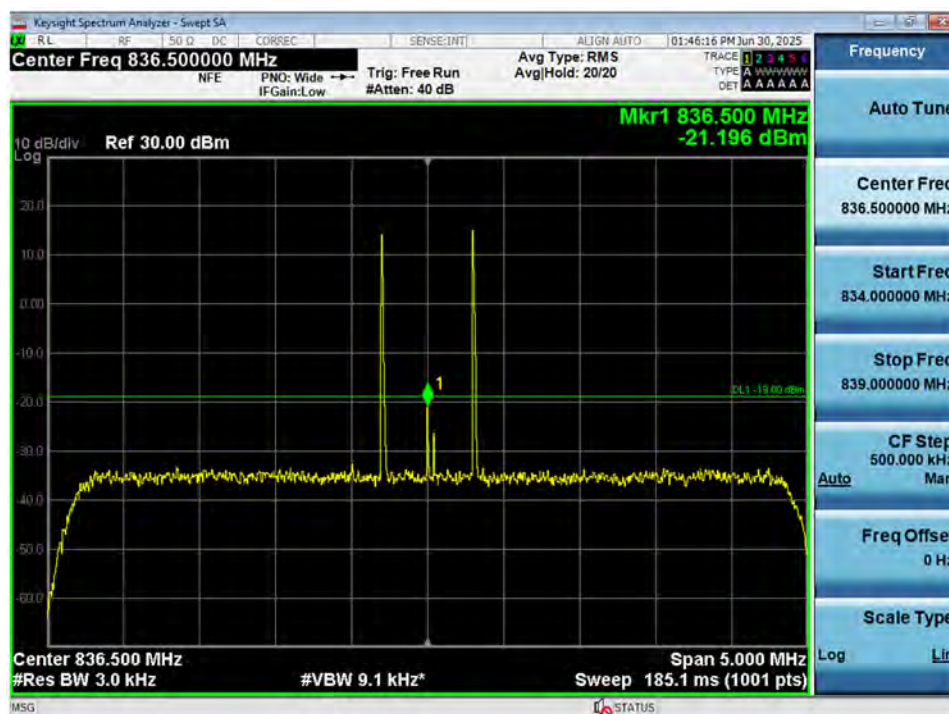
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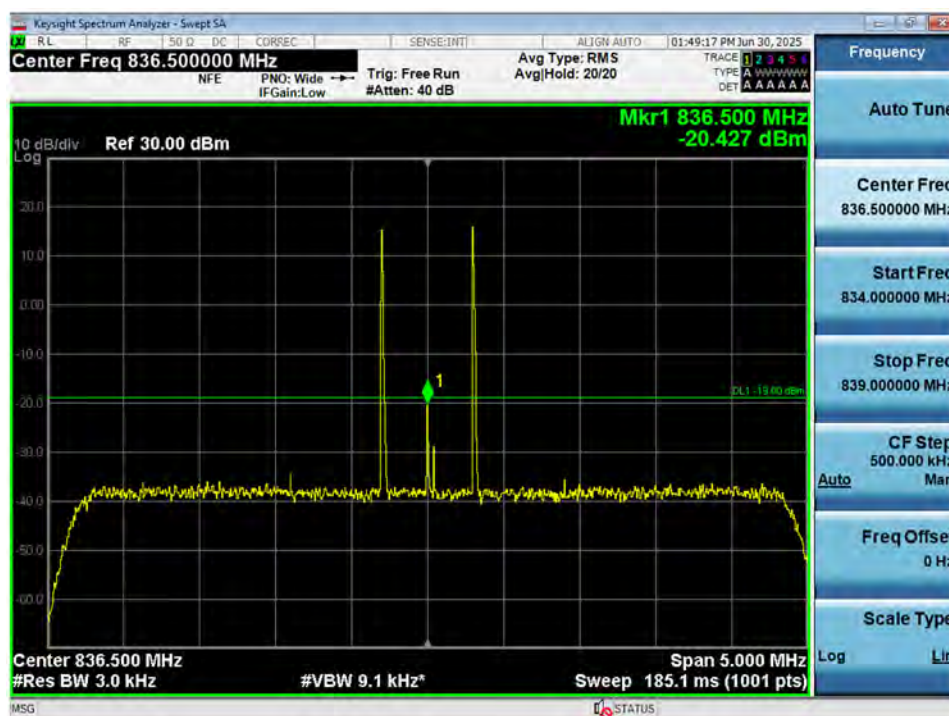
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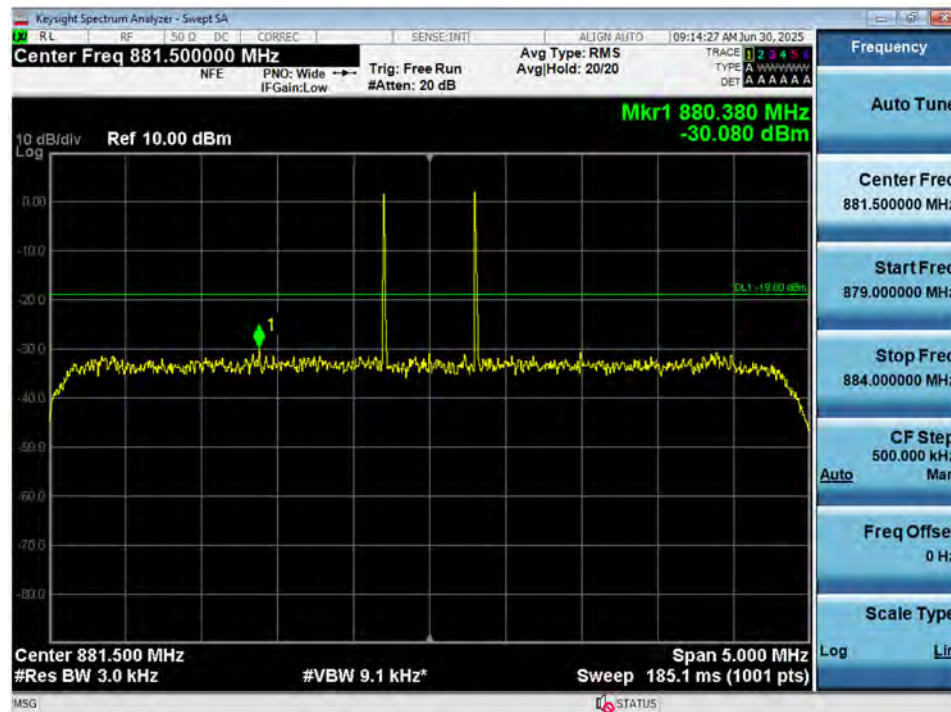
Intermodulation / Cellular / Uplink / AGC threshold / ANT 3



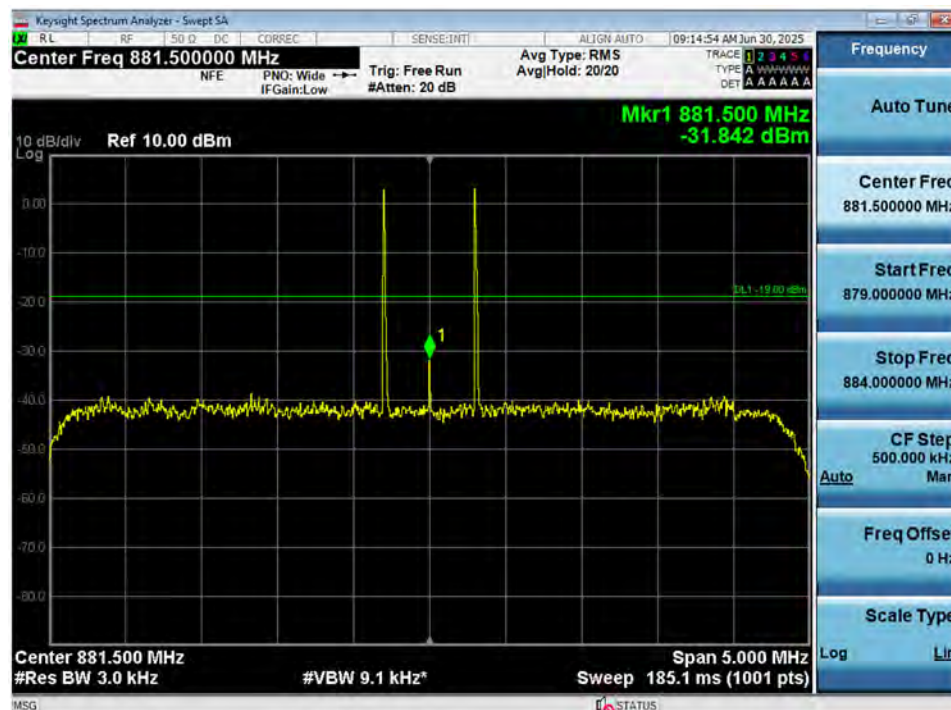
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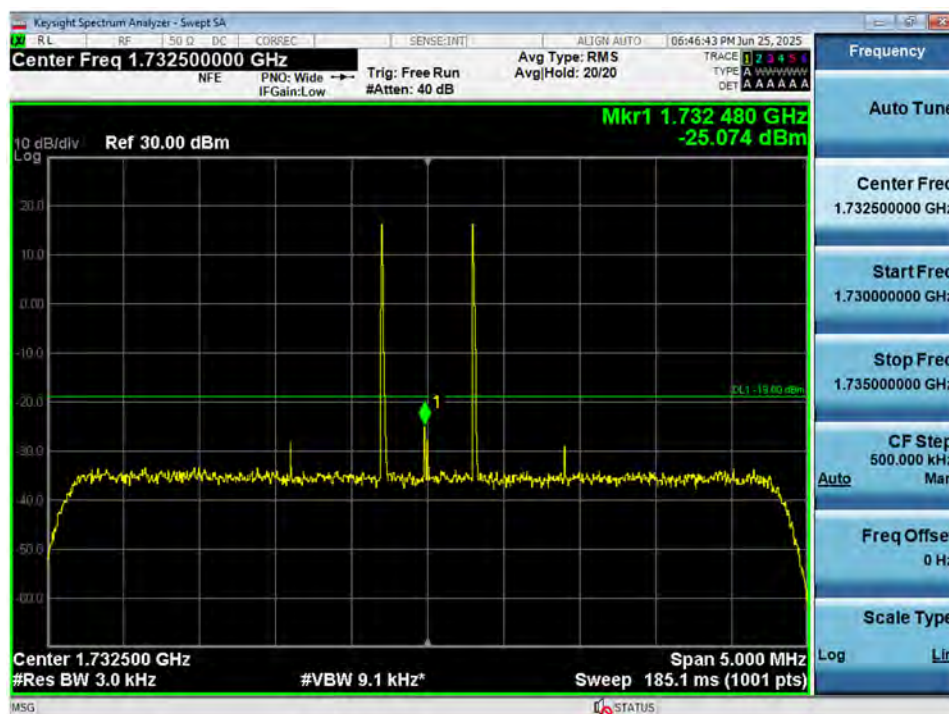
Intermodulation / Cellular / Downlink / AGC threshold / ANT 3



Intermodulation / Cellular / Downlink / AGC threshold +10 dB / ANT 3



Intermodulation / AWS-1 / Uplink / AGC threshold / ANT 1



Intermodulation / AWS-1 / Uplink / AGC threshold +10 dB / ANT 1

