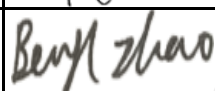


**TEST REPORT**

|                                        |                                                                                                                                               |                                                                                       |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| FCC ID. .... :                         | 2ALGR-HF50                                                                                                                                    |                                                                                       |
| Test Report No..... :                  | TCT210727E007                                                                                                                                 |                                                                                       |
| Date of issue..... :                   | Sep. 08, 2021                                                                                                                                 |                                                                                       |
| Testing laboratory .....               | SHENZHEN TONGCE TESTING LAB                                                                                                                   |                                                                                       |
| Testing location/ address:             | TCT Testing Industrial Park Fuqiao 5th Industrial Zone, Fuhai Street, Bao'an District Shenzhen, Guangdong, 518103, People's Republic of China |                                                                                       |
| Applicant's name..... :                | Shenzhen Fuzhixing Electronics Co., Ltd.                                                                                                      |                                                                                       |
| Address..... :                         | 5/F, Block C, Penglongpan Hi-technology Park, Dafu Ind. Zone, Guanlan, Longhua New Dist., Shenzhen, Guangdong, China                          |                                                                                       |
| Manufacturer's name ... :              | Shenzhen Fuzhixing Electronics Co., Ltd.                                                                                                      |                                                                                       |
| Address..... :                         | 5/F, Block C, Penglongpan Hi-technology Park, Dafu Ind. Zone, Guanlan, Longhua New Dist., Shenzhen, Guangdong, China                          |                                                                                       |
| Standard(s) .....                      | FCC CFR Title 47 Part 20.21<br>KDB935210 D03 Signal Booster Measurements v04r04                                                               |                                                                                       |
| Test item description .....            | cell phone signal booster                                                                                                                     |                                                                                       |
| Trade Mark .....                       | N/A                                                                                                                                           |                                                                                       |
| Model/Type reference..... :            | HF50                                                                                                                                          |                                                                                       |
| Rating(s)..... :                       | Adapter Information:<br>MODEL: 65W<br>INPUT: AC 100-240V, 50/60Hz, 1.5A<br>OUTPUT: DC 12V, 5A                                                 |                                                                                       |
| Date of receipt of test item .....     | Jul. 27, 2021                                                                                                                                 |                                                                                       |
| Date (s) of performance of test..... : | See dates for each test case                                                                                                                  |                                                                                       |
| Tested by (+signature) ... :           | Rleo                                                                                                                                          |  |
| Check by (+signature).... :            | Beryl Zhao                                                                                                                                    |  |
| Approved by (+signature):              | Tomsin                                                                                                                                        |  |

**General disclaimer:**

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## 1. General Product Information

### 1.1. EUT description

|                             |                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test item description ..... | cell phone signal booster                                                                                                                                                                                                                                                                                                                              |
| Model/Type reference.....   | HF50                                                                                                                                                                                                                                                                                                                                                   |
| Sample Number.....          | TCT210727E007-0101                                                                                                                                                                                                                                                                                                                                     |
| Operation Frequency .....   | PCS<br>Uplink: 1850 MHz - 1910MHz, Downlink: 1930 MHz - 1990MHz<br>AWS-1<br>Uplink: 1710 MHz - 1755MHz, Downlink: 2110 MHz - 2155MHz<br>Cellular<br>Uplink: 824 MHz - 849MHz, Downlink: 869 MHz - 894MHz<br>Lower700MHz<br>Uplink: 698 MHz - 716MHz, Downlink: 728 MHz - 746MHz<br>Upper700MHz<br>Uplink: 776 MHz - 787MHz, Downlink: 746 MHz - 757MHz |
| Signal Booster Type.....    | Fixed Consumer Signal Booster                                                                                                                                                                                                                                                                                                                          |
| Emission Designator .....   | F9W, G7D, G7W, GXW, W7D                                                                                                                                                                                                                                                                                                                                |
| FCC Classification .....    | B2W/Wideband Consumer Booster(CMRS)                                                                                                                                                                                                                                                                                                                    |
| Rating(s).....              | Adapter Information:<br>MODEL: 65W<br>INPUT: AC 100-240V, 50/60Hz, 1.5A<br>OUTPUT: DC 12V, 5A                                                                                                                                                                                                                                                          |

Note: The antenna gain listed in this report is provided by applicant, and the test laboratory is not responsible for this parameter.

### 1.2. Model(s) list

None.

## 2. Test Result Summary

| Requirement                                                      | CFR 47 Section                                                          | Result |
|------------------------------------------------------------------|-------------------------------------------------------------------------|--------|
| Authorized Frequency Band Verification Test                      | §20.21(e)(3)                                                            | PASS   |
| Maximum Power Measurement Procedure                              | §2.1046/20.21(e)(8)(i)(D)                                               | PASS   |
| Maximum Booster Gain Computation                                 | §20.21(e)(8)(i)(B)                                                      | PASS   |
| Intermodulation Product                                          | §20.21(e)(8)(i)(F)                                                      | PASS   |
| Out of Band Emissions                                            | §20.21(e)(8)(i)(E)                                                      | PASS   |
| Conducted Spurious Emission                                      | §2.1051/§27                                                             | PASS   |
| Noise Limit Procedure<br>Variable Noise Variable<br>Noise Timing | §20.21(e)(8)(i)(A)(2)(i)<br>§20.21(e)(8)(i)(A)(1)<br>§20.21(e)(8)(i)(H) | PASS   |
| Uplink inactivity                                                | §20.21(e)(8)(i)(I)                                                      | PASS   |
| Variable Booster Gain<br>Variable Uplink Gain Timing             | §20.21(e)(8)(i)(C) (1), (2)(i)<br>§20.21(e)(8)(i)(H)                    | PASS   |
| Occupied Band Width                                              | §2.1049/§27                                                             | PASS   |
| Anti-Oscillation                                                 | §20.21(e)(8)(ii)(A)                                                     | PASS   |
| Radiated Spurious Emission                                       | §2.1053/§27                                                             | PASS   |
| Spectrum Block Filter                                            | N/A                                                                     | N/A    |

**Note:**

1. PASS: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

### 3. General Information

#### 3.1. Test environment

| Operating Environment: |           |
|------------------------|-----------|
| Temperature:           | 25.0 °C   |
| Humidity:              | 56 % RH   |
| Atmospheric Pressure:  | 1010 mbar |

#### 3.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Equipment | Model No. | Serial No. | FCC ID | Trade Name |
|-----------|-----------|------------|--------|------------|
| /         | /         | /          | /      | /          |

## 4. Facilities and Accreditations

### 4.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 645098

SHENZHEN TONGCE TESTING LAB

Designation Number: CN1205

The testing lab has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

SHENZHEN TONGCE TESTING LAB

CAB identifier: CN0031

The testing lab has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

### 4.2. Location

SHENZHEN TONGCE TESTING LAB

Address: TCT Testing Industrial Park Fuqiao 5th Industrial Zone, Fuhai Street, Bao'an District Shenzhen, Guangdong, 518103, People's Republic of China

TEL: +86-755-27673339

### 4.3. Measurement Uncertainty

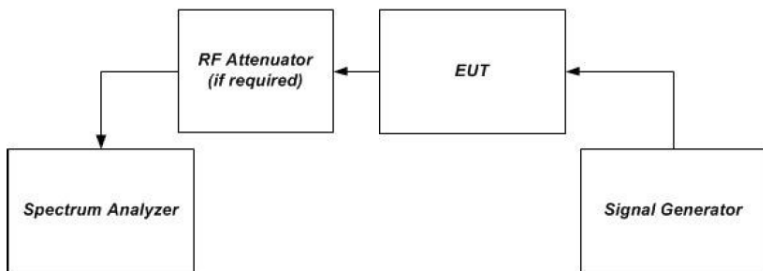
The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

| No. | Item                                    | MU            |
|-----|-----------------------------------------|---------------|
| 1   | Conducted Emission                      | $\pm 3.10$ dB |
| 2   | RF power, conducted                     | $\pm 0.12$ dB |
| 3   | Spurious emissions, conducted           | $\pm 0.11$ dB |
| 4   | All emissions, radiated(<1 GHz)         | $\pm 4.56$ dB |
| 5   | All emissions, radiated(1 GHz - 18 GHz) | $\pm 4.22$ dB |
| 6   | All emissions, radiated(18 GHz- 40 GHz) | $\pm 4.36$ dB |

## 5. Test Results and Measurement Data

### 5.1. Authorized Frequency Band Verification

#### 5.1.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC Part20 Section 20.21(e)(3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Test Method:</b>      | KDB935210 D03 Signal Booster Measurements v04r04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Limit</b>             | <p>PCS<br/>Uplink: 1850 MHz - 1910MHz, Downlink: 1930 MHz - 1990MHz</p> <p>AWS-1<br/>Uplink: 1710 MHz - 1755MHz, Downlink: 2110 MHz - 2155MHz</p> <p>Cellular<br/>Uplink: 824 MHz - 849MHz, Downlink: 869 MHz - 894MHz</p> <p>Lower700MHz<br/>Uplink: 698 MHz - 716MHz, Downlink: 728 MHz - 746MHz</p> <p>Upper700MHz<br/>Uplink: 776 MHz - 787MHz, Downlink: 746 MHz - 757MHz</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Test Setup:</b>       |  <pre> graph RL     SG[Signal Generator] --&gt; EUT[EUT]     EUT --&gt; RA[RF Attenuator (if required)]     RA --&gt; SA[Spectrum Analyzer]         </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Test Procedure:</b>   | <p>935210 D03 Signal Booster Measurement v04r04</p> <ol style="list-style-type: none"> <li>Connect the EUT to the test equipment as shown in Figure 1. Begin with the uplink output (donor) port connected to the spectrum analyzer.</li> <li>Set the spectrum analyzer resolution bandwidth (RBW) for 100 kHz with the video bandwidth (VBW) <math>\geq 3 \times</math> the RBW, using a PEAK detector with the MAX HOLD function.</li> <li>Set the center frequency of the spectrum analyzer to the center of the operational band under test with a span of 1 MHz.</li> <li>Set the signal generator for CW mode and tune to the center frequency of the operational band under test.</li> <li>Set the initial signal generator power to a level that is at least 6 dB below the AGC level specified by the manufacturer.</li> <li>Slowly increase the signal generator power level until the output signal reaches the AGC operational level.</li> <li>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).</li> <li>Reset the spectrum analyzer span to 2xthe width of the CMRS band under test. Adjust the tuned frequency of the signal generator to sweep 2xthe width of the CMRS band using the sweep function. The AGC must be deactivated throughout the entire sweep.</li> <li>Using three markers, identify the CMRS band edges and the frequency with the highest power. Affirm that the values of all markers are visible on the display of the spectrum analyzer (e.g., marker table set to on).</li> <li>Capture the spectrum analyzer trace for inclusion in the test report.</li> <li>Repeat 7.1c) to 7.1j) for all operational uplink and downlink bands.</li> </ol> |

**Test Result:** PASS**5.1.2. Test Instruments**

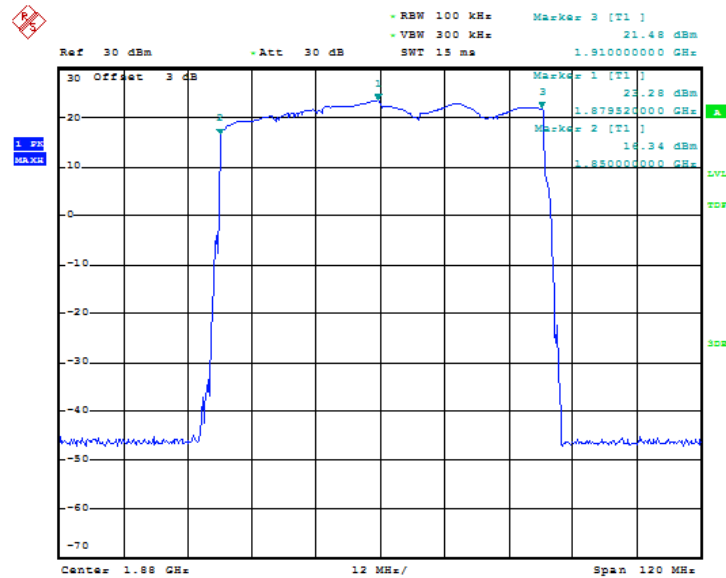
| Equipment         | Manufacturer | Model  | Serial Number | Calibration Date | Calibration Due |
|-------------------|--------------|--------|---------------|------------------|-----------------|
| Signal Generator  | Agilent      | N5182A | MY47070282    | Jul. 19, 2021    | Jul. 18, 2022   |
| Spectrum Analyzer | Agilent      | N9020A | MY49100619    | Jul. 19, 2021    | Jul. 18, 2022   |
| Spectrum Analyzer | R&S          | FSU    | 200054        | Jul. 19, 2021    | Jul. 18, 2022   |
| Attenuator        | 50FP-006-H3  | JFW    | 907763        | N/A              | N/A             |

## 5.1.3. Test data

### Test Plots

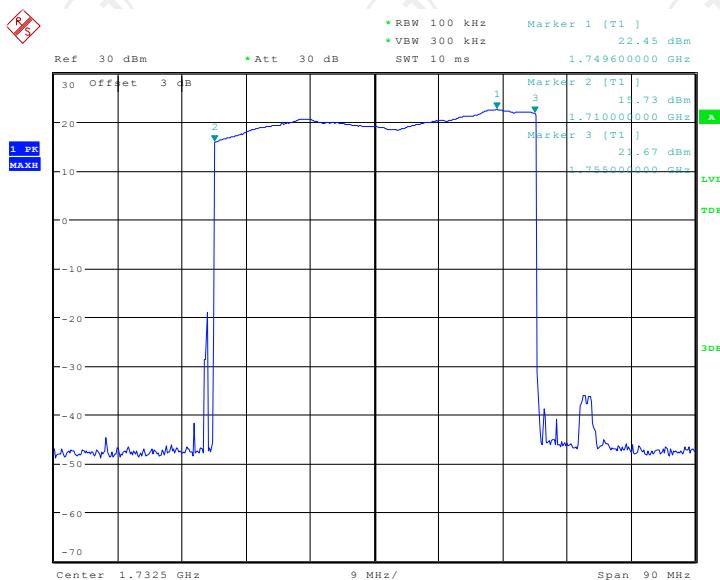
#### Uplink

#### PCS



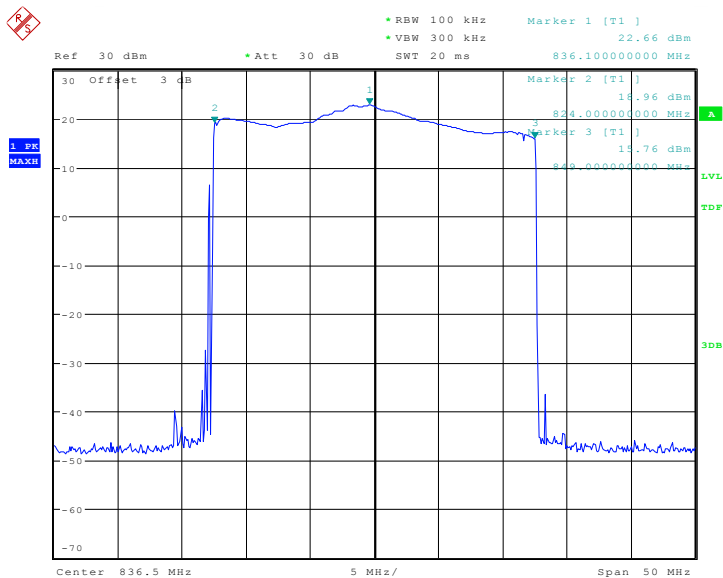
Date: 24.AUG.2021 17:11:23

#### AWS-1



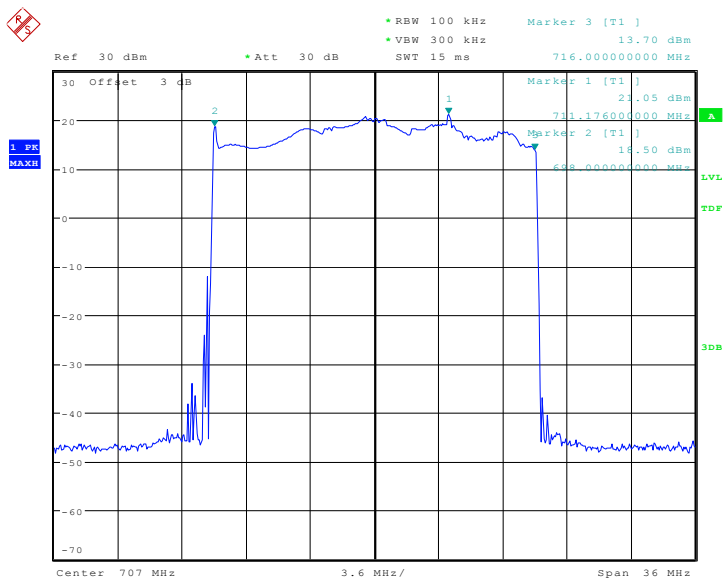
Date: 24.AUG.2021 17:20:54

## Cellular



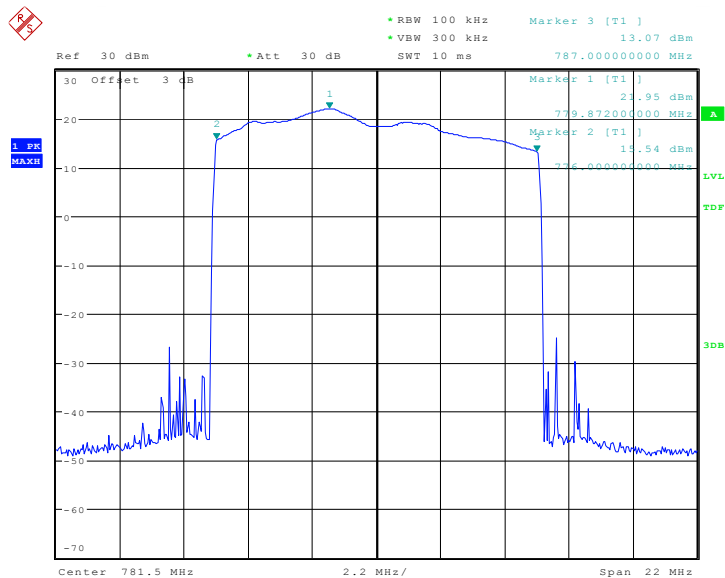
Date: 24.AUG.2021 17:23:25

## Lower700MHz



Date: 24.AUG.2021 18:04:26

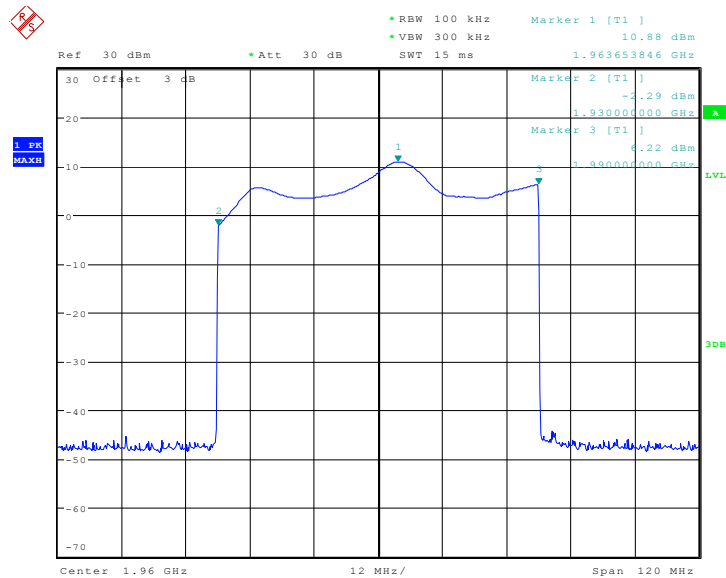
## Upper700MHz



Date: 24.AUG.2021 18:05:27

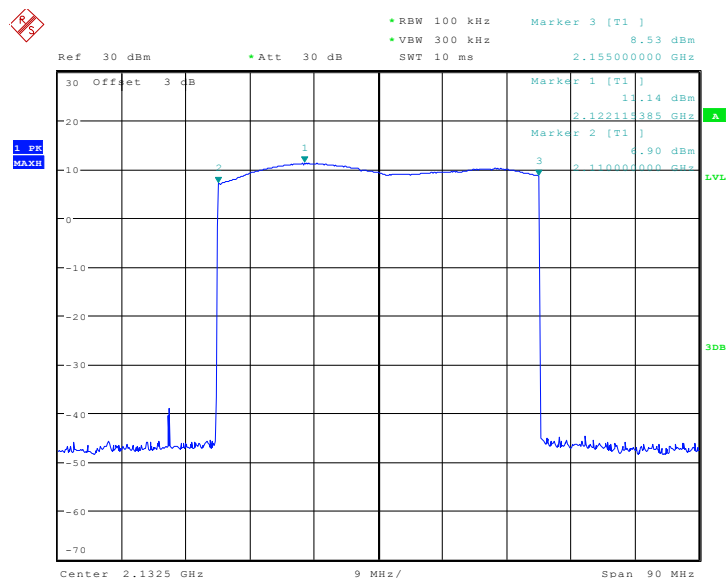
## Downlink

### PCS



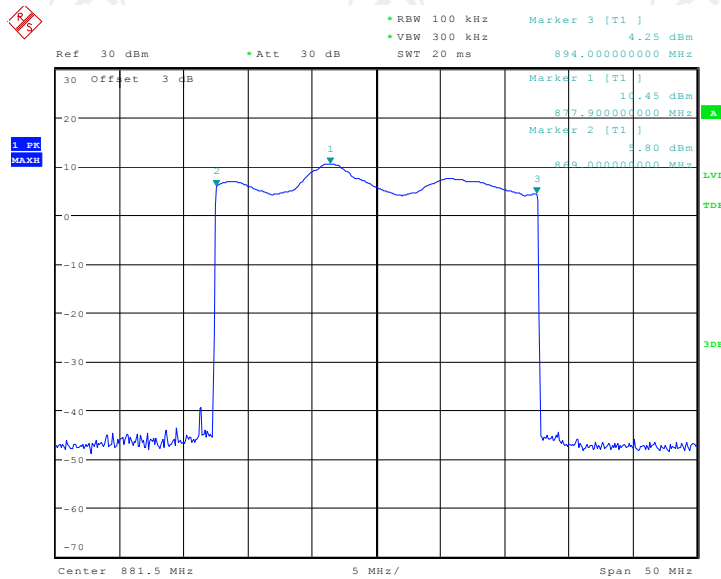
Date: 24.AUG.2021 18:29:05

### AWS-1



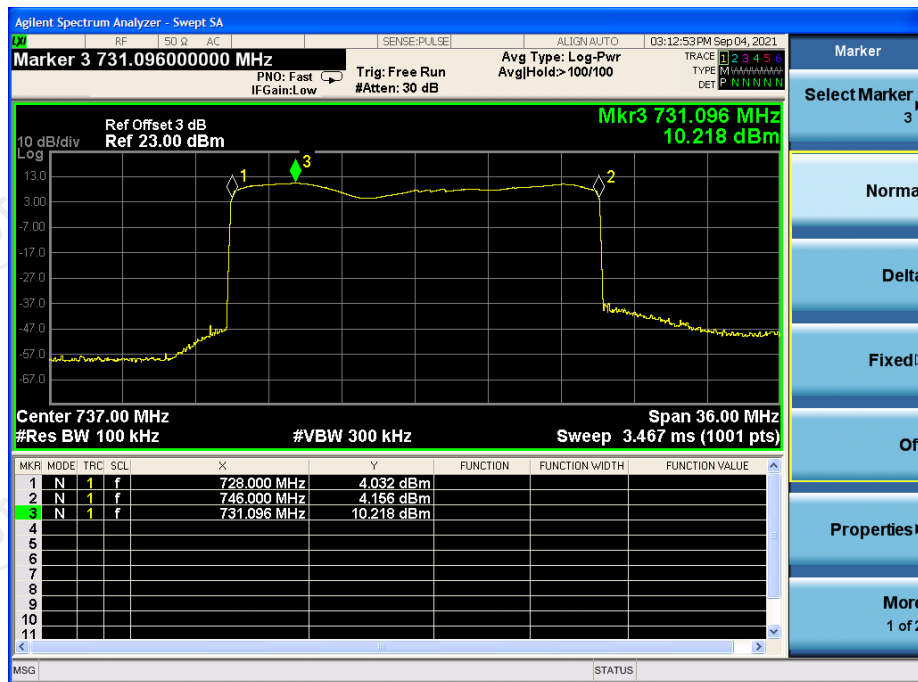
Date: 24.AUG.2021 19:05:02

## Cellular

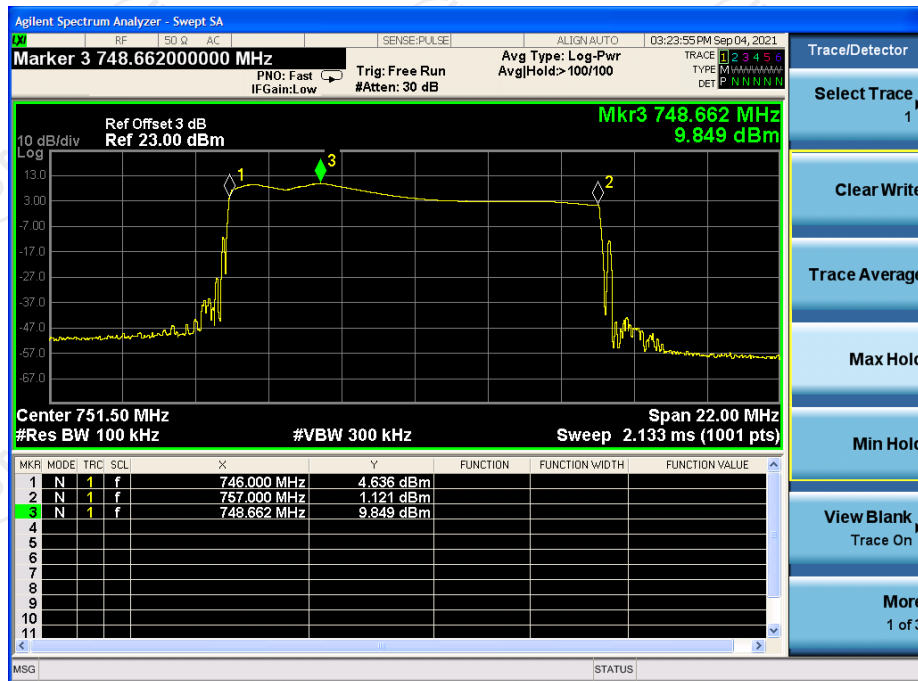


Date: 24.AUG.2021 18:17:45

## Lower700MHz

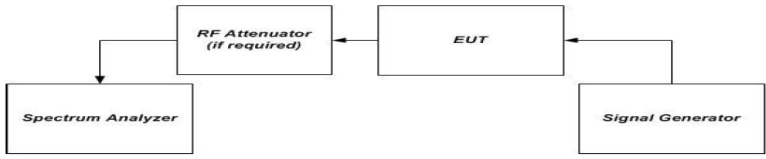


## Upper700MHz



## 5.2. Maximum Power

### 5.2.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC Part 20.21 (e)(8)(i)(B); FCC Part 20.21 (e)(8)(i)(D)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Test Method:</b>      | KDB935210 D03 Signal Booster Measurements v04r04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Limit:</b>            | <p>Gain: Fixed Booster maximum gain shall not exceed <math>6.5 \text{ dB} + 20 \text{ Log}_{10}(\text{Frequency})</math><br/> <i>Where, Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.</i></p> <p>Conducted Output Power: <math>17\text{dBm} &lt; P_{\text{uplink}} &lt; 30\text{dBm}</math>,<br/> <math>P_{\text{downlink}} &lt; 17\text{dBm}</math>.</p> <p>EIRP: Uplink <math>&lt; 30\text{dBm}</math>, Downlink <math>&lt; 17\text{dBm}</math>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Test Setup:</b>       |  <pre> graph LR     SG[Signal Generator] --&gt; EUT[EUT]     EUT --&gt; RA[RF Attenuator<br/>(if required)]     RA --&gt; SA[Spectrum Analyzer] </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Test Procedure:</b>   | <ol style="list-style-type: none"> <li>Connect the EUT to the test equipment as shown in Set-Up. Begin with the uplink output (donor port) connected to the spectrum analyzer.</li> <li>Configure the signal generator and spectrum analyzer for operation on the frequency determined in Frequency Band with the highest power level, but with the center frequency of the signal no closer than 2.5 MHz from the band edge. The spectrum analyzer span shall be set to at least 10 MHz.</li> <li>Set the initial signal generator power to a level well below that which causes AGC control.</li> <li>Slowly increase the signal generator power level until the output signal reaches the AGC operational limit (from observation of signal behavior on the spectrum analyzer; e.g., no further increase in output power as input power is increased).</li> <li>Reduce power sufficiently on the signal generator to ensure that the AGC is not controlling the power output.</li> <li>Slowly increase the signal generator power to a level just below (within 0.5 dB of) the AGC limit without triggering the AGC. Note the signal generator power level as (<math>P_{\text{in}}</math>).</li> <li>Measure the output power (<math>P_{\text{out}}</math>) with the spectrum analyzer as follows.</li> <li>Set RBW = 100 kHz for AWGN signal type and 300 kHz for CW or GSM signal type</li> <li>Set VBW <math>\geq 3 \times \text{RBW}</math></li> <li>Select either the BURST POWER or CHANNEL POWER measurement tool, as required for each signal type.<br/>The channel power integration bandwidth shall be 99% occupied bandwidth (4.1 MHz).</li> <li>Select the RMS (power averaging) detector.</li> <li>Ensure that the number of measurement points per sweep <math>\geq (2 \times \text{span})/\text{RBW}</math> (Note: This requirement does not apply for BURST power measurement mode).</li> <li>Set sweep time = auto couple, or as necessary (but no less than auto couple value).</li> <li>Trace average at least 100 traces in power averaging (i.e., RMS) mode.</li> <li>Record the measured power level as <math>P_{\text{out}}</math> with one set of results for the GSM or CW input stimulus and another set of results for the AWGN input stimulus.</li> <li>Repeat the procedure for each operational uplink and downlink frequency band supported by the booster.</li> </ol> |

**Test Result:** PASS**5.2.2. Test Instruments**

| Equipment         | Manufacturer | Model  | Serial Number | Calibration Date | Calibration Due |
|-------------------|--------------|--------|---------------|------------------|-----------------|
| Signal Generator  | Agilent      | N5182A | MY47070282    | Jul. 19, 2021    | Jul. 18, 2022   |
| Spectrum Analyzer | Agilent      | N9020A | MY49100619    | Jul. 19, 2021    | Jul. 18, 2022   |
| Spectrum Analyzer | R&S          | FSU    | 200054        | Jul. 19, 2021    | Jul. 18, 2022   |
| Attenuator        | 50FP-006-H3  | JFW    | 907763        | N/A              | N/A             |

### 5.2.3. Test Data

#### Max. Gain

| Frequency Band        | Signal Type | Pre AGC Input Level (dBm) | Conducted Output Level (dBm) | Gain (dB) | Gain Limit (dB) |
|-----------------------|-------------|---------------------------|------------------------------|-----------|-----------------|
| PCS Uplink            | CW          | -37                       | 21.75                        | 58.75     | 71.98           |
|                       | AWGN        | -37                       | 22.16                        | 59.16     |                 |
| AWS-1 Uplink          | CW          | -36                       | 24.29                        | 60.29     | 71.27           |
|                       | AWGN        | -36                       | 21.34                        | 57.34     |                 |
| Cellular Uplink       | CW          | -38                       | 24.36                        | 62.36     | 64.95           |
|                       | AWGN        | -38                       | 23.36                        | 61.36     |                 |
| Lower700M Hz Uplink   | CW          | -44                       | 18.00                        | 62.00     | 63.49           |
|                       | AWGN        | -44                       | 19.36                        | 63.36     |                 |
| Upper700M Hz Uplink   | CW          | -38                       | 22.01                        | 60.01     | 64.36           |
|                       | AWGN        | -35                       | 21.30                        | 56.30     |                 |
| PCS Downlink          | CW          | -46                       | 10.48                        | 56.48     | 71.98           |
|                       | AWGN        | -46                       | 11.57                        | 57.57     |                 |
| AWS-1 Downlink        | CW          | -45                       | 11.84                        | 56.84     | 71.27           |
|                       | AWGN        | -45                       | 11.80                        | 56.80     |                 |
| Cellular Downlink     | CW          | -49                       | 11.32                        | 60.32     | 64.95           |
|                       | AWGN        | -49                       | 10.89                        | 59.89     |                 |
| Lower700M Hz Downlink | CW          | -50                       | 10.24                        | 60.24     | 63.49           |
|                       | AWGN        | -49                       | 10.58                        | 59.58     |                 |
| Upper700M Hz Downlink | CW          | -45                       | 10.84                        | 55.84     | 64.36           |
|                       | AWGN        | -45                       | 10.65                        | 55.65     |                 |

Note: Fixed Booster maximum gain shall not exceed  $6.5 \text{ dB} + 20 \text{ Log}_{10}(\text{Frequency})$ , where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.

**Conducted output power at max. Input test level**

| Frequency Band        | Signal Type | Input Level (dBm) | Conducted Output Level (dBm) | Lower Limit(dBm) | Upper Limit(dBm) |
|-----------------------|-------------|-------------------|------------------------------|------------------|------------------|
| PCS Uplink            | CW          | -10               | 21.88                        | 17               | 30               |
|                       | AWGN        | -10               | 22.05                        |                  |                  |
| AWS-1 Uplink          | CW          | -11               | 21.42                        |                  |                  |
|                       | AWGN        | -11               | 24.30                        |                  |                  |
| Cellular Uplink       | CW          | -10               | 24.24                        |                  |                  |
|                       | AWGN        | -10               | 23.29                        |                  |                  |
| Lower700M Hz Uplink   | CW          | -15               | 18.13                        |                  |                  |
|                       | AWGN        | -15               | 19.40                        |                  |                  |
| Upper700M Hz Uplink   | CW          | -13               | 22.11                        |                  |                  |
|                       | AWGN        | -13               | 21.25                        |                  |                  |
| PCS Downlink          | CW          | -24               | 10.55                        | N/A              | 17               |
|                       | AWGN        | -24               | 10.42                        |                  |                  |
| AWS-1 Downlink        | CW          | -25               | 11.77                        |                  |                  |
|                       | AWGN        | -25               | 11.75                        |                  |                  |
| Cellular Downlink     | CW          | -24               | 11.31                        |                  |                  |
|                       | AWGN        | -24               | 10.80                        |                  |                  |
| Lower700M Hz Downlink | CW          | -28               | 10.34                        |                  |                  |
|                       | AWGN        | -28               | 10.71                        |                  |                  |
| Upper700M Hz Downlink | CW          | -25               | 10.65                        |                  |                  |
|                       | AWGN        | -25               | 10.60                        |                  |                  |

## Max. EIRP

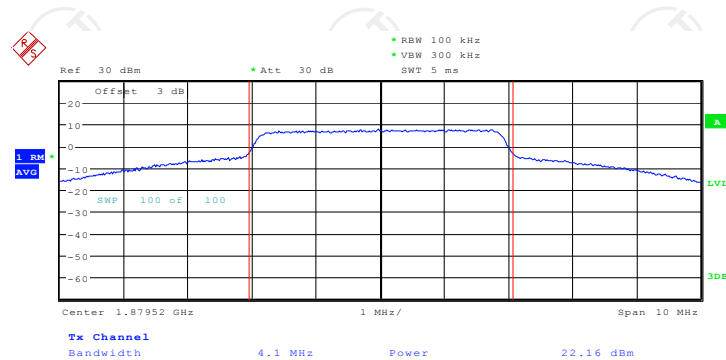
| Frequency Band        | Signal Type | Max Conducted Output Level (dBm) | Max. Antenna Gain (dBi) | Min. Cable Loss (dB) | EIRP (dBm) | EIRP Limit (dBm) |
|-----------------------|-------------|----------------------------------|-------------------------|----------------------|------------|------------------|
| PCS Uplink            | CW          | 21.75                            | 7                       | 4.5                  | 24.25      | <30              |
|                       | AWGN        | 22.16                            | 7                       | 4.5                  | 24.66      |                  |
| AWS-1 Uplink          | CW          | 24.29                            | 7                       | 4.3                  | 26.99      |                  |
|                       | AWGN        | 21.34                            | 7                       | 4.3                  | 24.04      |                  |
| Cellular Uplink       | CW          | 24.36                            | 8                       | 3.7                  | 28.66      |                  |
|                       | AWGN        | 23.36                            | 8                       | 3.7                  | 27.66      |                  |
| Lower700M Hz Uplink   | CW          | 18.00                            | 8                       | 3.5                  | 22.50      |                  |
|                       | AWGN        | 19.36                            | 8                       | 3.5                  | 23.86      |                  |
| Upper700M Hz Uplink   | CW          | 22.01                            | 8                       | 3.7                  | 26.31      | <17              |
|                       | AWGN        | 21.30                            | 8                       | 3.7                  | 25.60      |                  |
| PCS Downlink          | CW          | 10.48                            | 4                       | 2.2                  | 12.28      |                  |
|                       | AWGN        | 11.57                            | 4                       | 2.2                  | 13.37      |                  |
| AWS-1 Downlink        | CW          | 11.84                            | 4                       | 2.3                  | 13.54      |                  |
|                       | AWGN        | 11.80                            | 4                       | 2.3                  | 13.50      |                  |
| Cellular Downlink     | CW          | 11.32                            | 5                       | 1.5                  | 14.82      |                  |
|                       | AWGN        | 10.89                            | 5                       | 1.5                  | 14.39      |                  |
| Lower700M Hz Downlink | CW          | 10.24                            | 6                       | 1.3                  | 14.94      |                  |
|                       | AWGN        | 10.58                            | 6                       | 1.3                  | 15.28      |                  |
| Upper700M Hz Downlink | CW          | 10.84                            | 5.5                     | 1.3                  | 15.04      |                  |
|                       | AWGN        | 10.65                            | 5.5                     | 1.3                  | 14.85      |                  |

## Uplink Gain VS Downlink Gain

| Band        | Signal Type | Uplink Gain (dB) | Downlink Gain (dB) | D-value | Limit (dB) |
|-------------|-------------|------------------|--------------------|---------|------------|
| PCS         | CW          | 58.75            | 56.48              | 2.27    | <9         |
|             | AWGN        | 59.16            | 57.57              | 1.59    |            |
| AWS-1       | CW          | 60.29            | 56.84              | 3.45    |            |
|             | AWGN        | 57.34            | 56.80              | 0.54    |            |
| Cellular    | CW          | 62.36            | 60.32              | 2.04    |            |
|             | AWGN        | 61.36            | 59.89              | 1.47    |            |
| Lower700MHz | CW          | 62.00            | 60.24              | 1.76    |            |
|             | AWGN        | 63.36            | 59.58              | 3.78    |            |
| Upper700MHz | CW          | 60.01            | 55.84              | 4.17    |            |
|             | AWGN        | 56.30            | 55.65              | 0.65    |            |

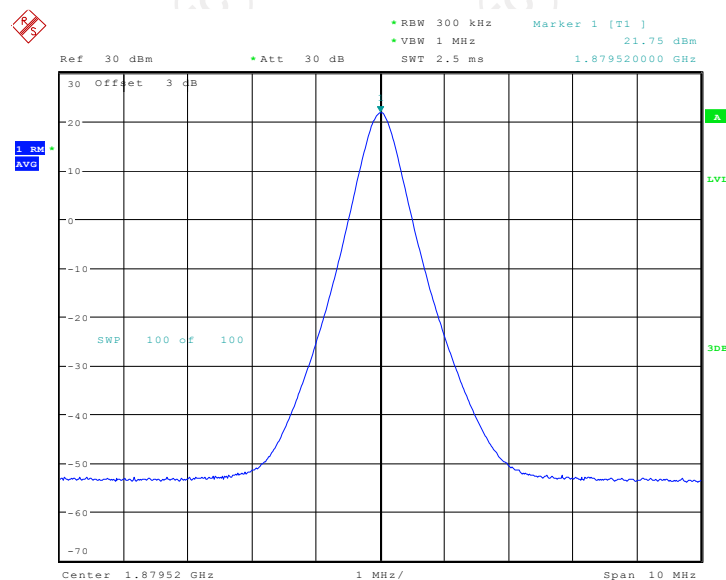
## Test Plots

### PCS AWGN, UL



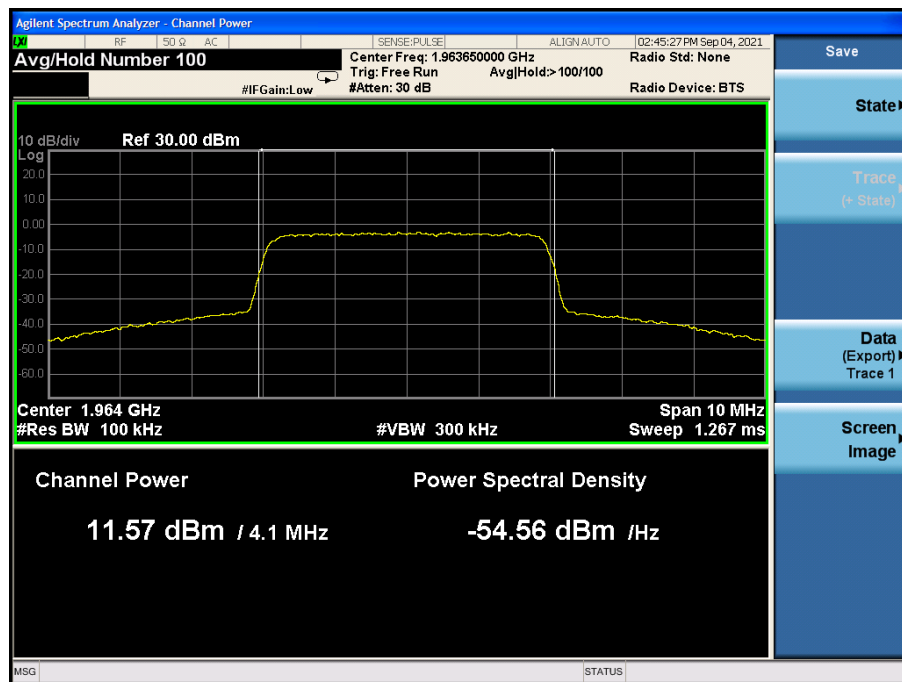
Date: 25.AUG.2021 12:36:48

### PCS CW, UL

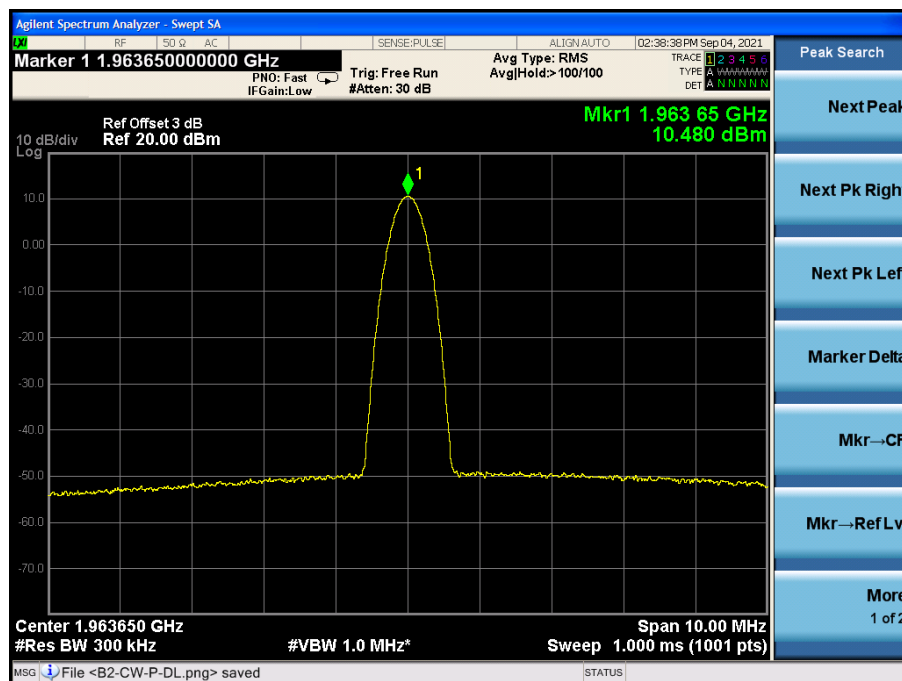


Date: 25.AUG.2021 12:15:58

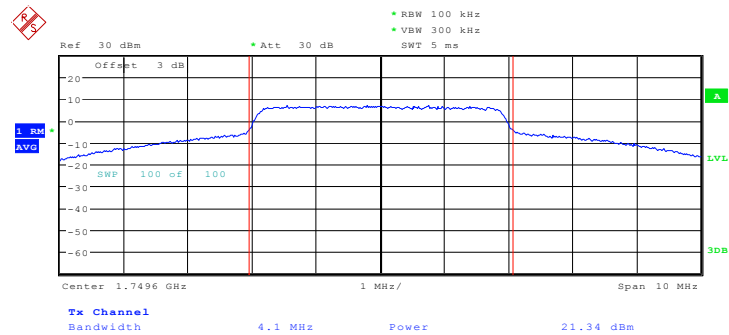
## PCS AWGN, DL



## PCS CW, DL

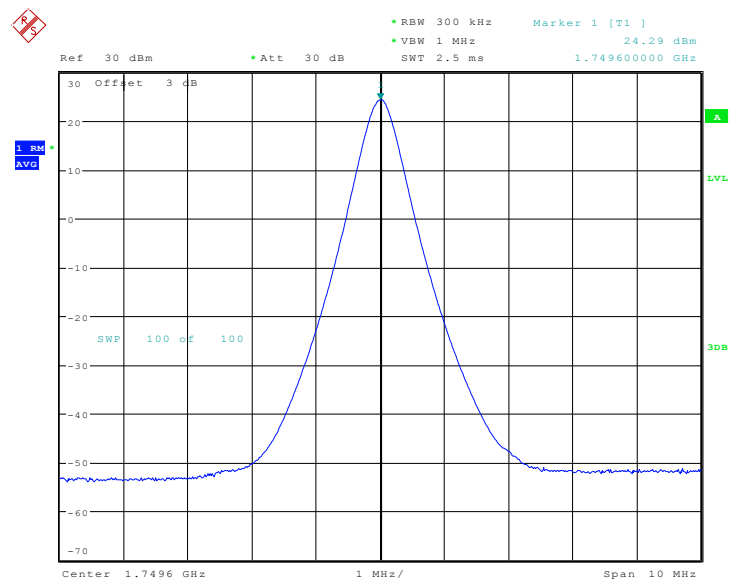


## AWS-1 AWGN, UL



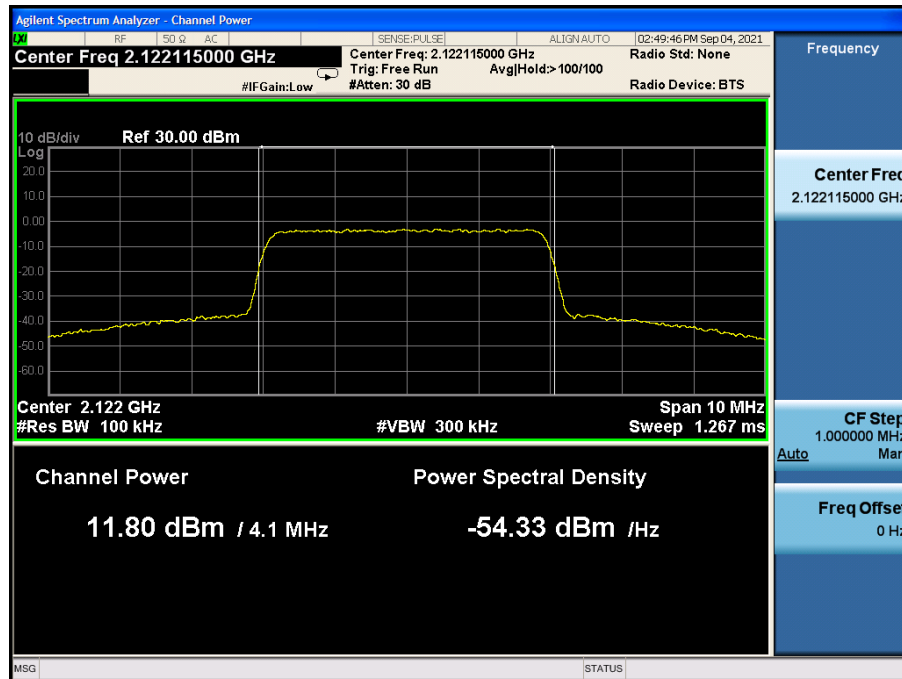
Date: 25.AUG.2021 12:45:56

## AWS-1 CW, UL

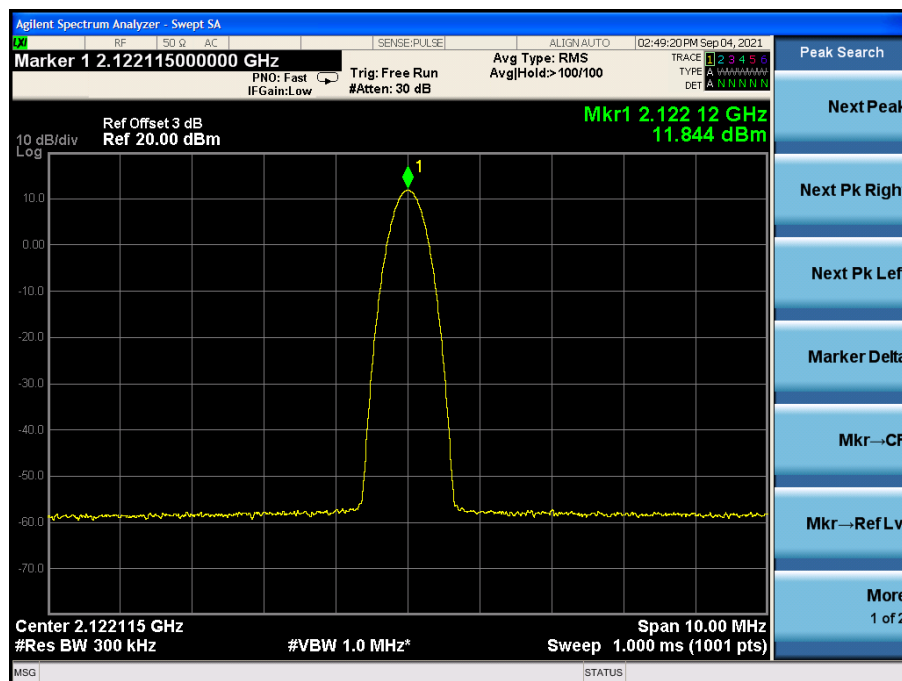


Date: 25.AUG.2021 12:49:22

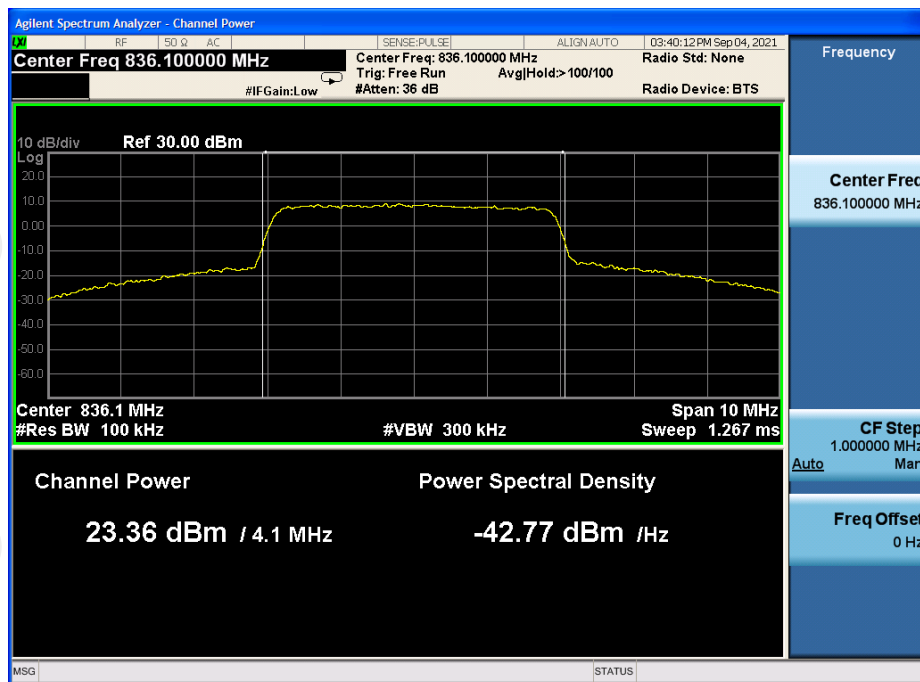
## AWS-1 AWGN, DL



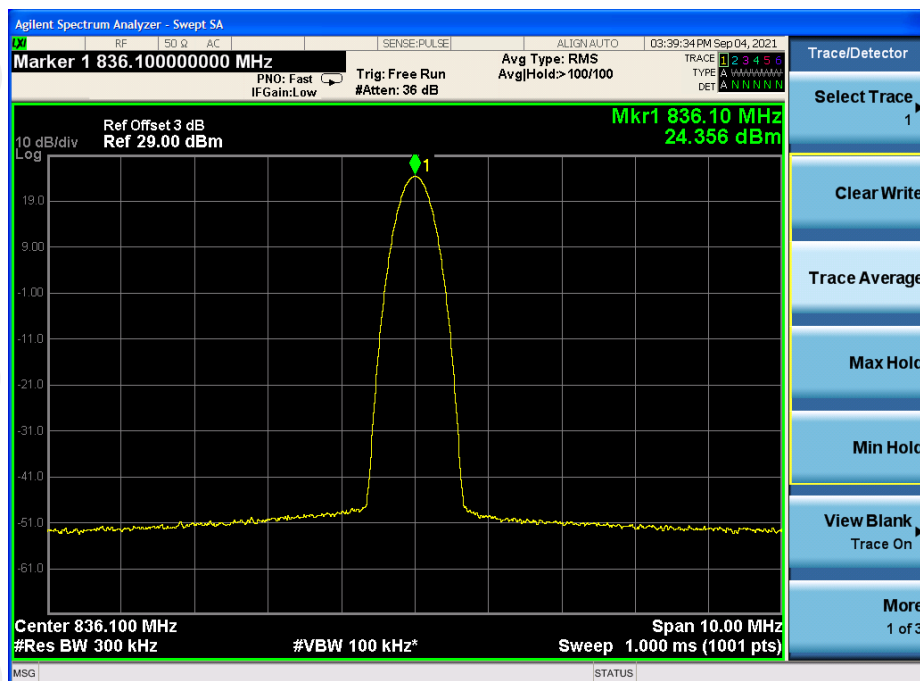
## AWS-1 CW, DL



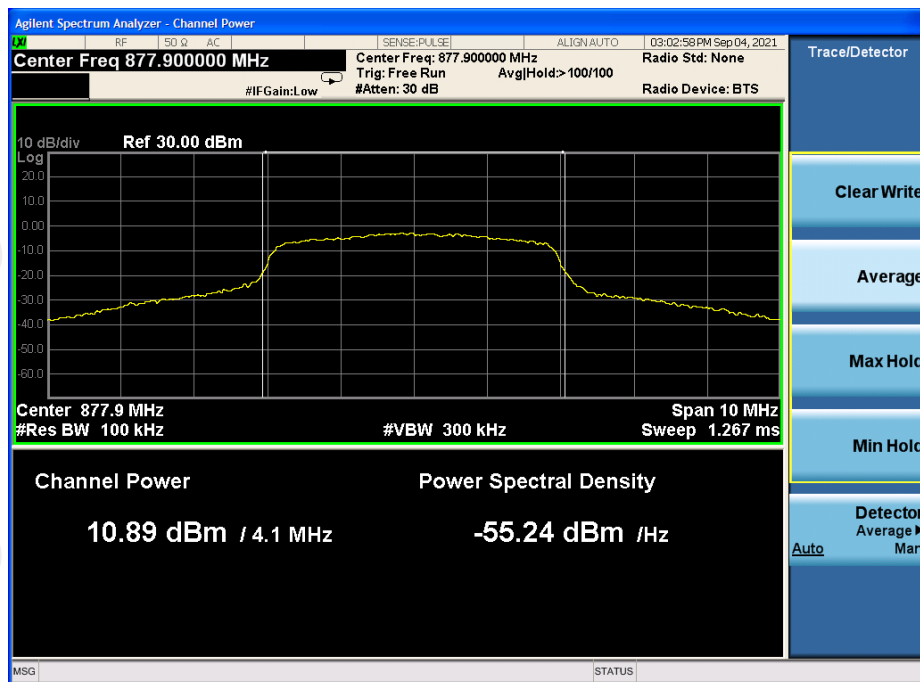
## Cellular AWGN, UL



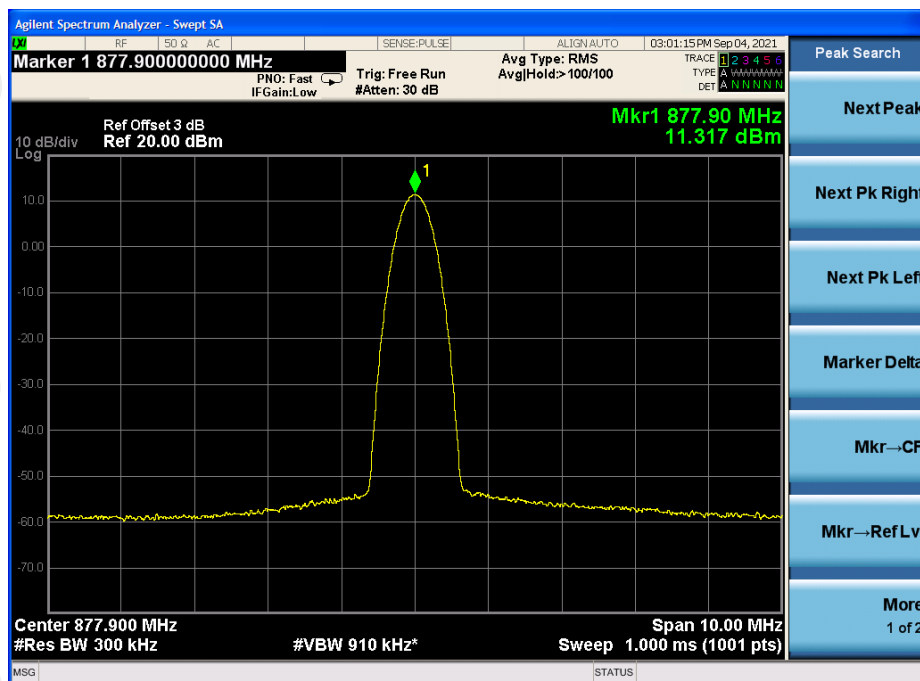
## Cellular CW, UL



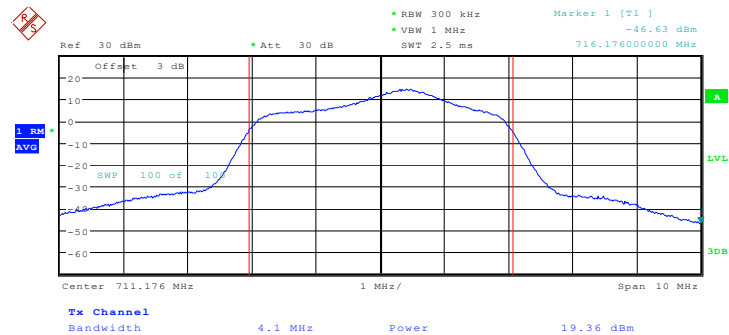
## Cellular AWGN, DL



## Cellular CW, DL

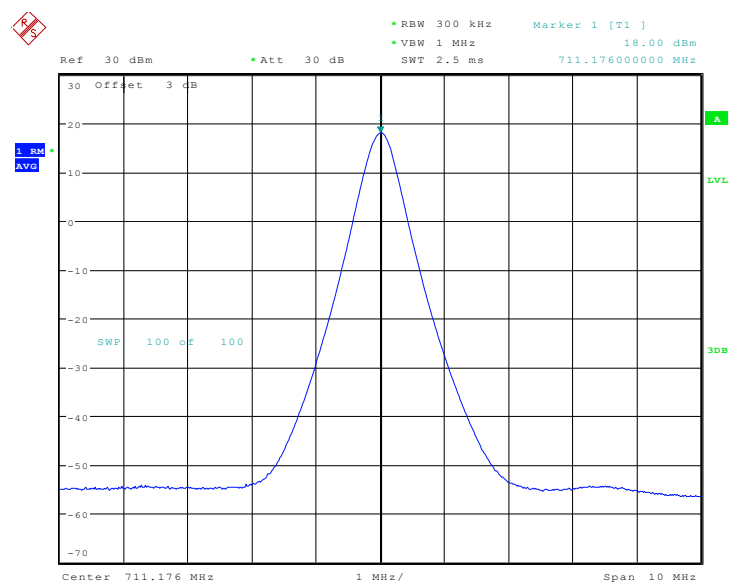


## Lower700MHz AWGN, UL



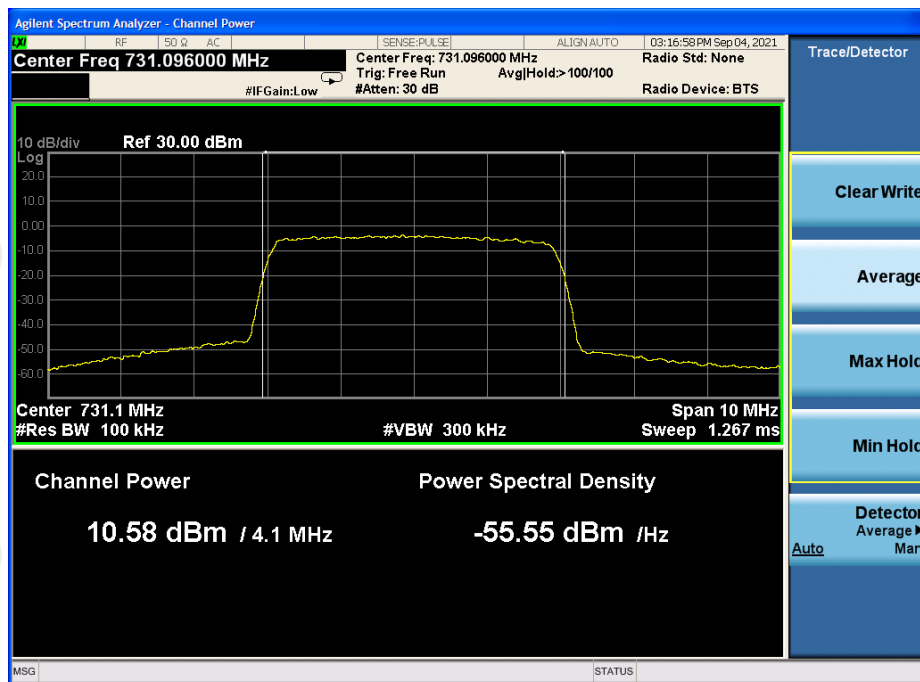
Date: 25.AUG.2021 15:06:47

## Lower700MHz CW, UL

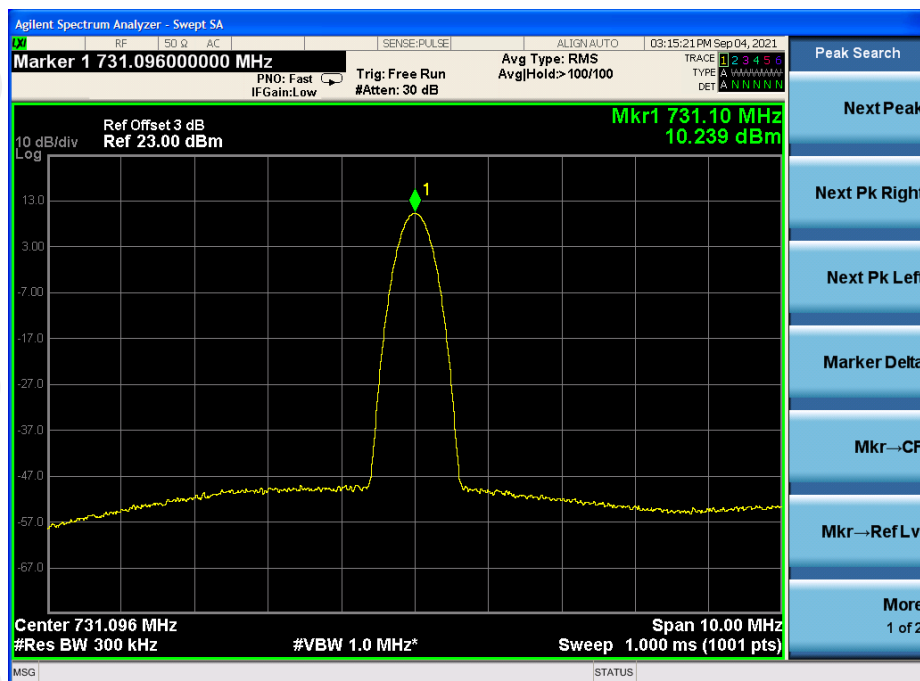


Date: 25.AUG.2021 15:14:41

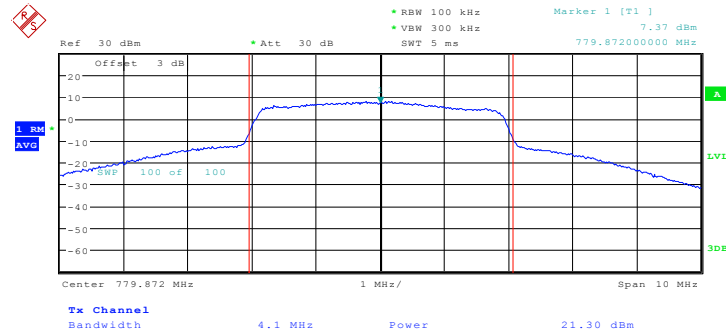
## Lower700MHz AWGN, DL



## Lower700MHz CW, DL

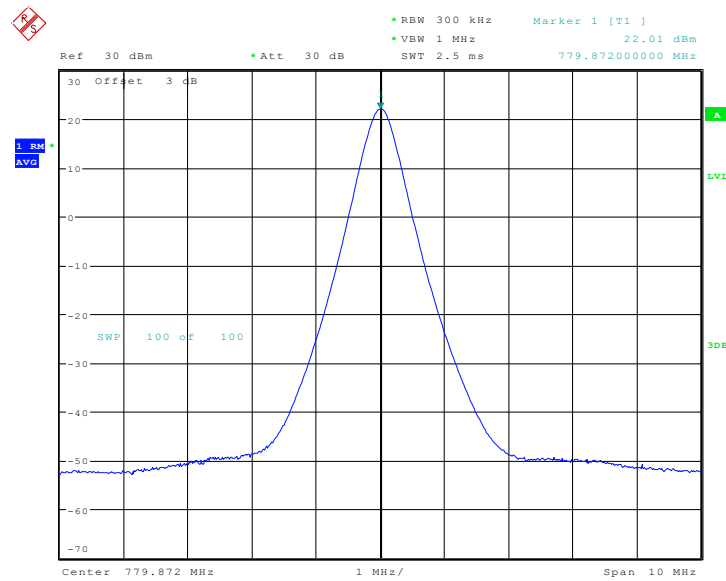


## Upper700MHz AWGN, UL



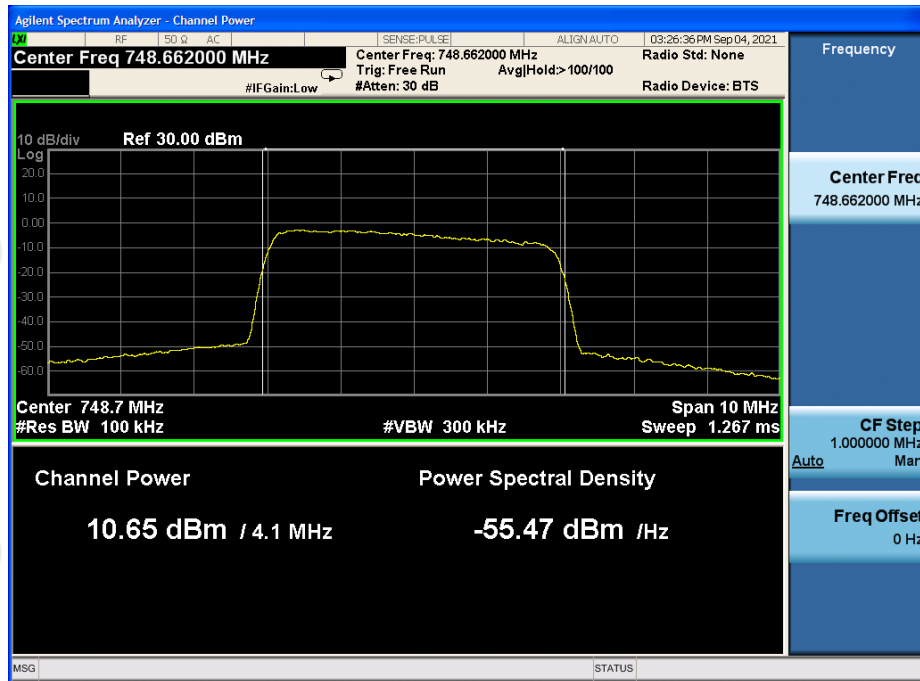
Date: 25.AUG.2021 15:24:25

## Upper700MHz CW, UL

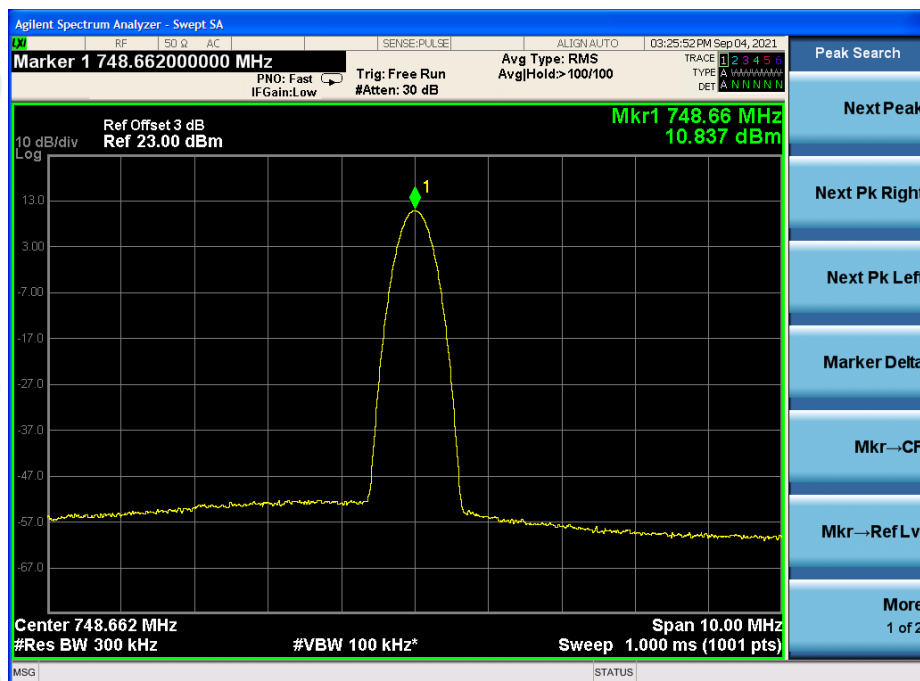


Date: 25.AUG.2021 15:19:40

## Upper700MHz AWGN, DL

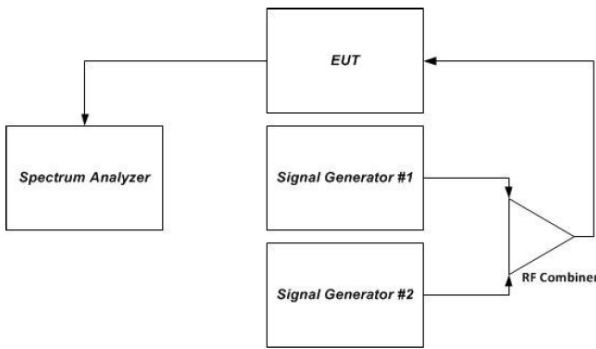


## Upper700MHz CW, DL



### 5.3. Intermodulation Product

#### 5.3.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC Part20 Section 20.21(e)(8)(i)(F)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Test Method:</b>      | KDB935210 D03 Signal Booster Measurements v04r04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Limit:</b>            | -19dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Test Setup:</b>       |  <p>Figure 2 – Intermodulation product instrumentation test setup</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Test Procedure:</b>   | <p>a) Connect the signal booster to the test equipment as shown in Set-Up. Begin with the uplink output connected to the spectrum analyzer.</p> <p>b) Set the spectrum analyzer RBW = 3 kHz.</p> <p>c) Set the VBW <math>\geq 3 \times</math> the RBW.</p> <p>d) Select the RMS detector.</p> <p>e) Set the spectrum analyzer center frequency to the center of the supported operational band under test.</p> <p>f) Set the span to 5 MHz.</p> <p>g) Configure the two signal generators for CW operation with generator 1 tuned 300 kHz below the operational band center frequency and generator 2 tuned 300 kHz above the operational band center frequency.</p> <p>h) Set the signal generator amplitudes so that the power from each into the RF combiner is equivalent and turn on the RF output.</p> <p>i) Increase the signal generators' amplitudes equally until just before the EUT begins AGC and ensure that all intermodulation products (if any exist), are below the specified limit of -19 dBm.</p> <p>j) Utilize the trace averaging function of the spectrum analyzer and wait for the trace to stabilize. Place a marker at the highest amplitude intermodulation product.</p> <p>k) Record the maximum intermodulation product amplitude level that is observed.</p> <p>l) Capture the spectrum analyzer trace for inclusion in the test report.</p> <p>m) Repeat steps e) to l) for all uplink and downlink operational bands.</p> <p><b>Note:</b> If using a single signal generator with dual outputs, ensure that intermodulation products are not the result of the generator.</p> <p>n) Increase the signal generator amplitude in 2 dB steps to 10 dB above the AGC threshold determined in i) to ensure that the EUT maintains compliance with the intermodulation</p> |
| <b>Test Result:</b>      | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

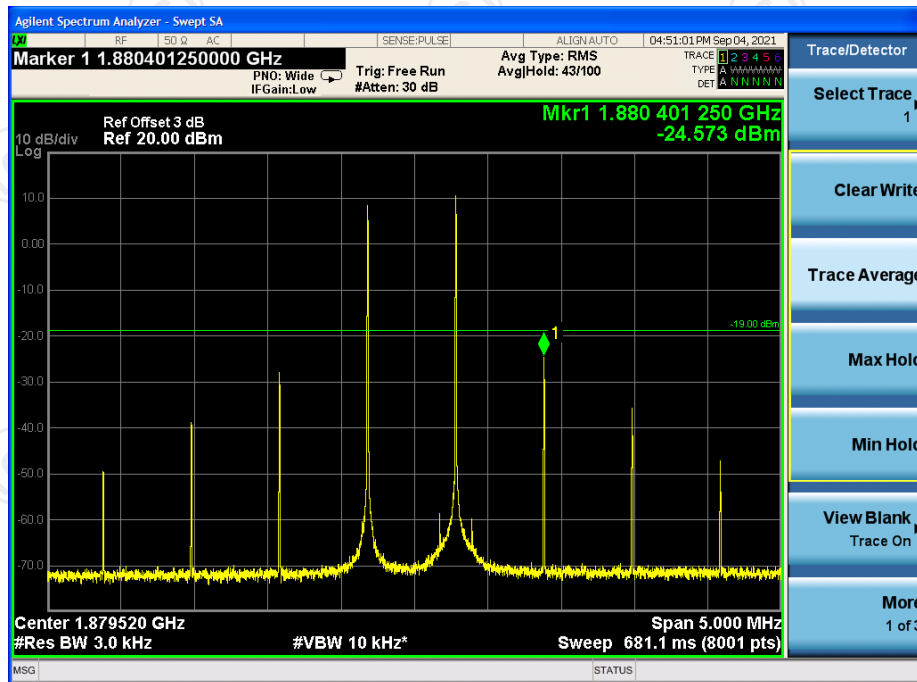
**5.3.2. Test Instruments**

| Equipment         | Manufacturer | Model       | Serial Number | Calibration Date | Calibration Due |
|-------------------|--------------|-------------|---------------|------------------|-----------------|
| Signal Generator  | Agilent      | E4421B      | GB39340839    | Jul. 19, 2021    | Jul. 18, 2022   |
| Signal Generator  | Agilent      | N5182A      | MY47070282    | Jul. 19, 2021    | Jul. 18, 2022   |
| Spectrum Analyzer | Agilent      | N9020A      | MY49100619    | Jul. 19, 2021    | Jul. 18, 2022   |
| RF Combiner       | SUNVNDN      | SUD-CS 0800 | 16230009      | N/A              | N/A             |
| Attenuator        | 50FP-006-H3  | JFW         | 907763        | N/A              | N/A             |

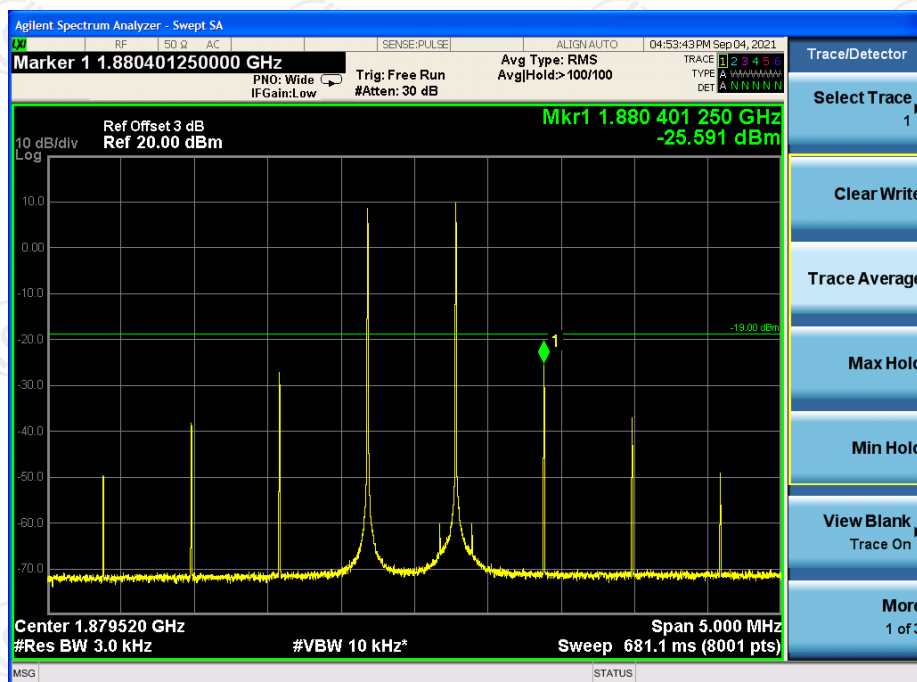
## 5.3.3. Test data

### Test Plots

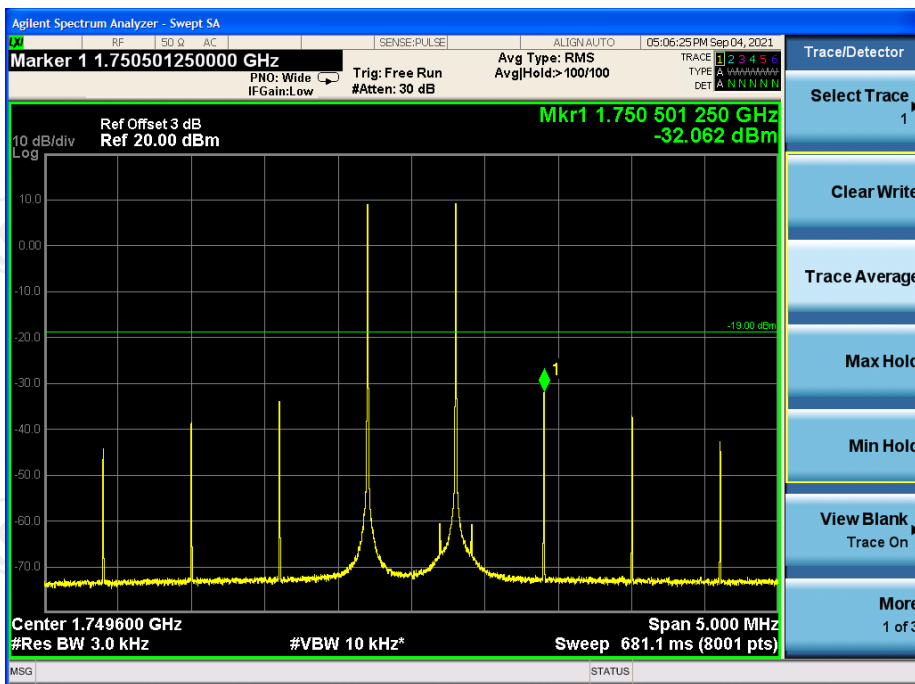
PCS Pre AGC, UL



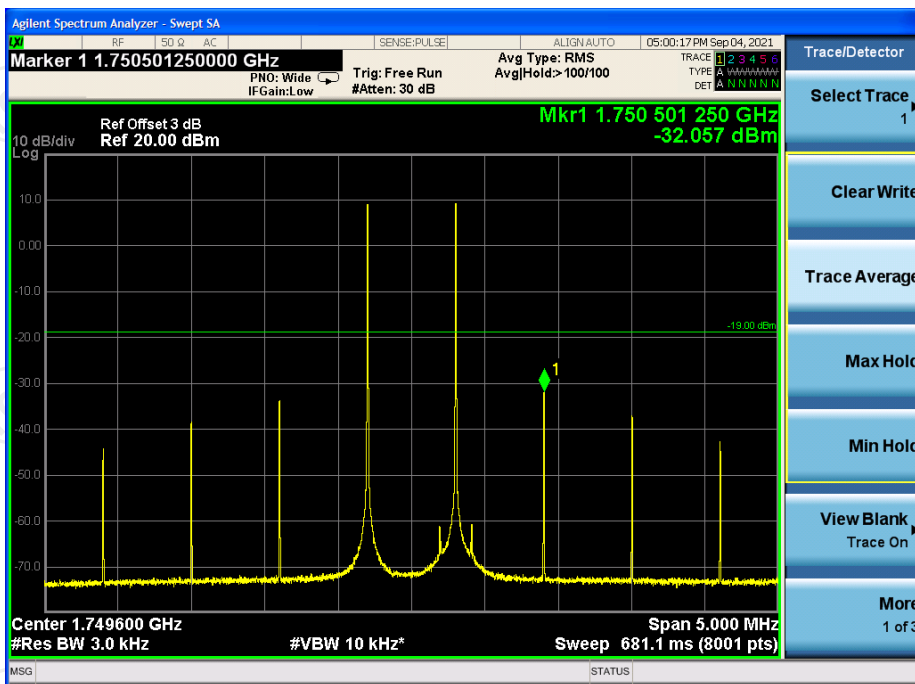
PCS AGC +10dB, UL



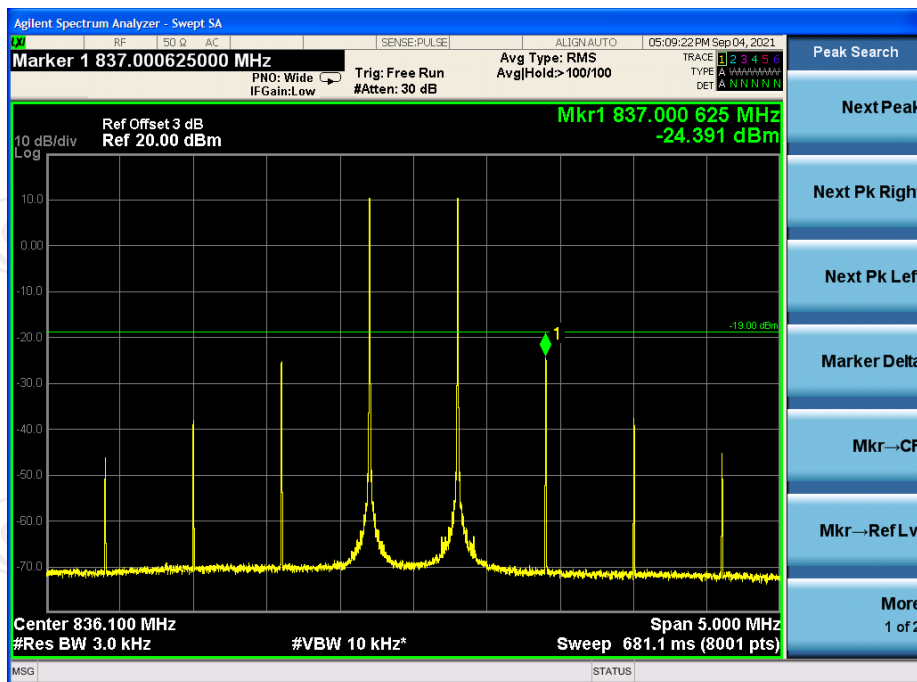
## AWS-1 Pre AGC, UL



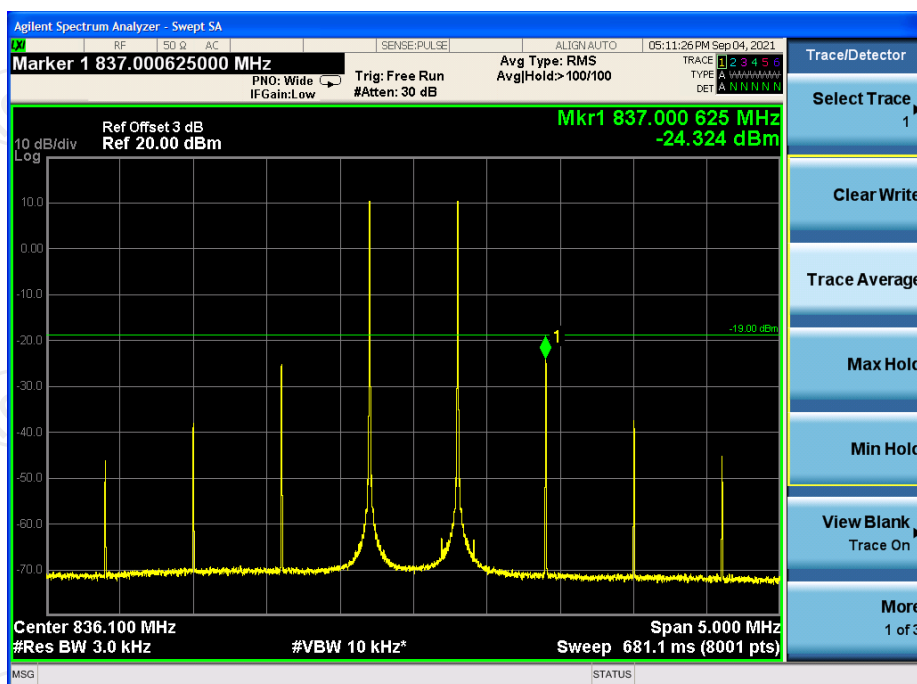
## AWS-1 AGC +10dB, UL



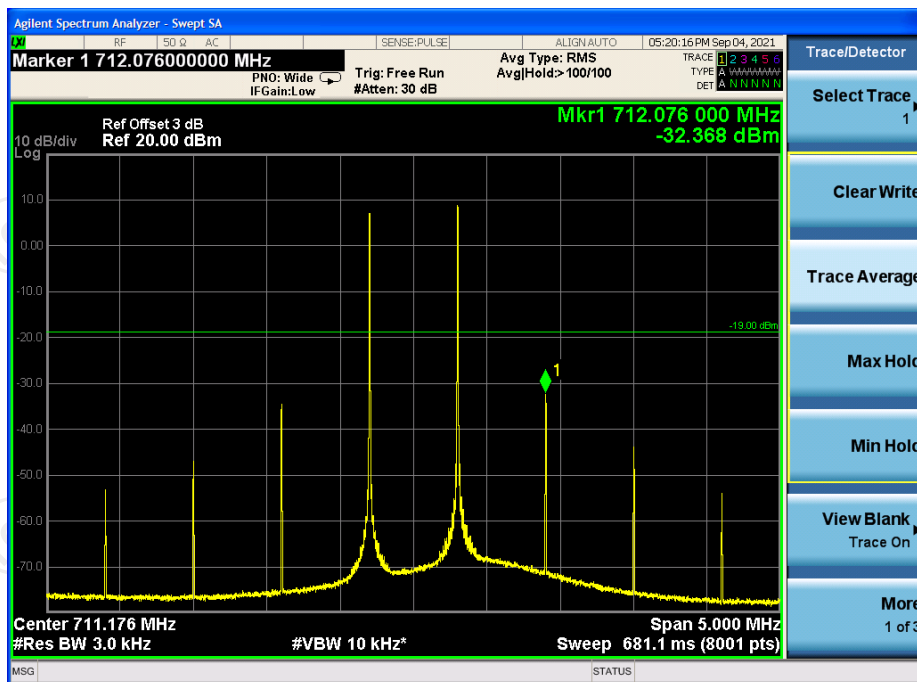
## Cellular Pre AGC, UL



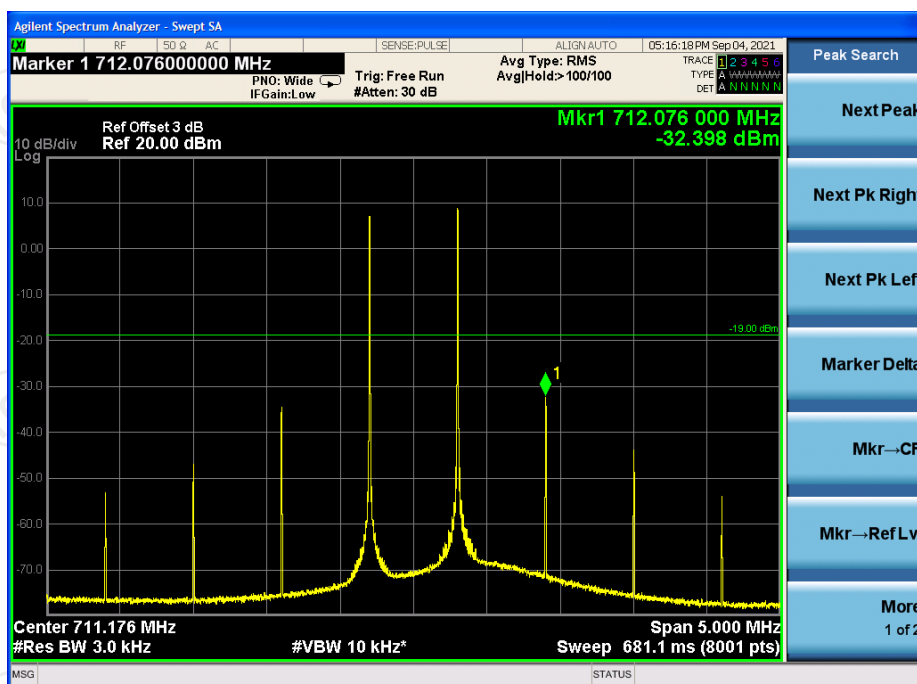
## Cellular AGC +10dB, UL



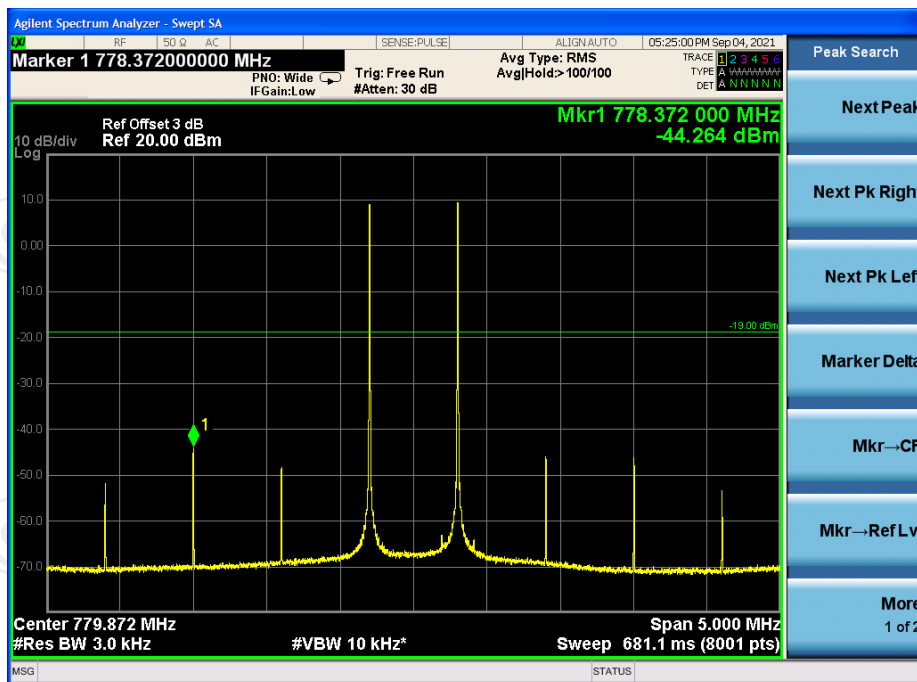
## Lower700MHz Pre AGC, UL



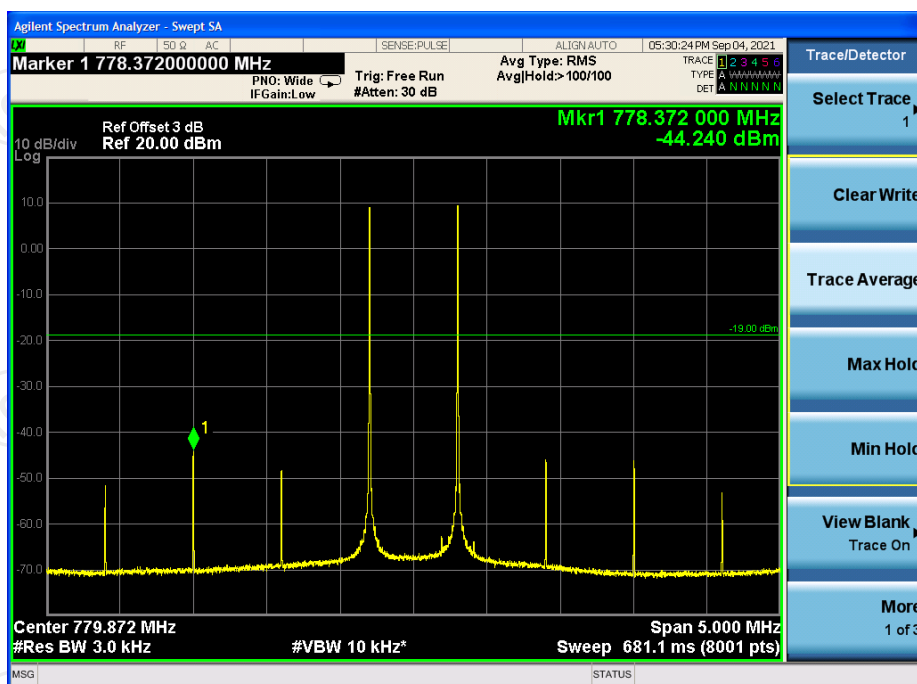
## Lower700MHz AGC +10dB , UL



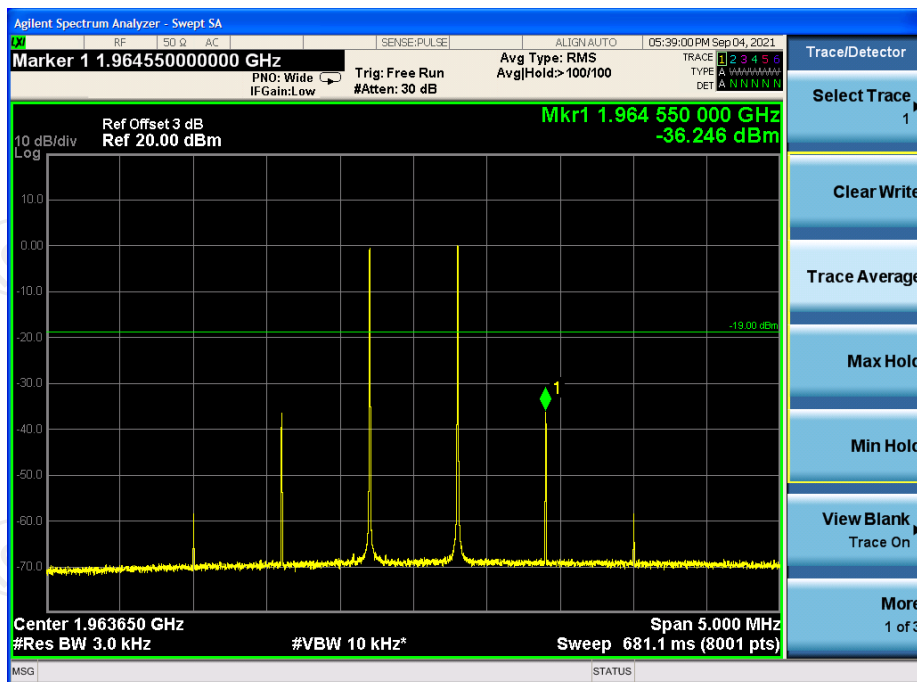
## Upper700MHz Pre AGC, UL



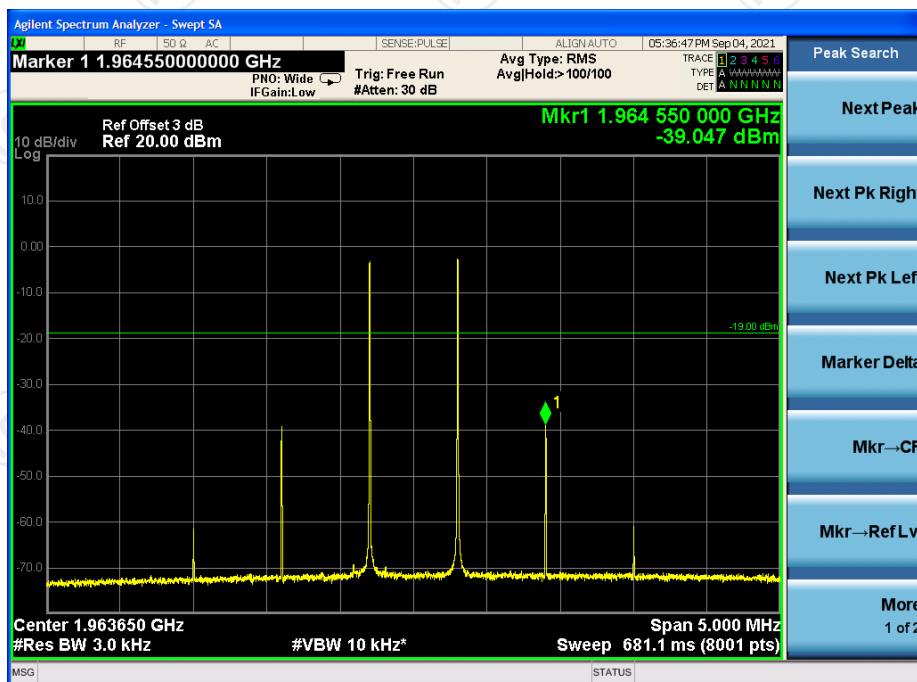
## Upper700MHz AGC +10dB , UL



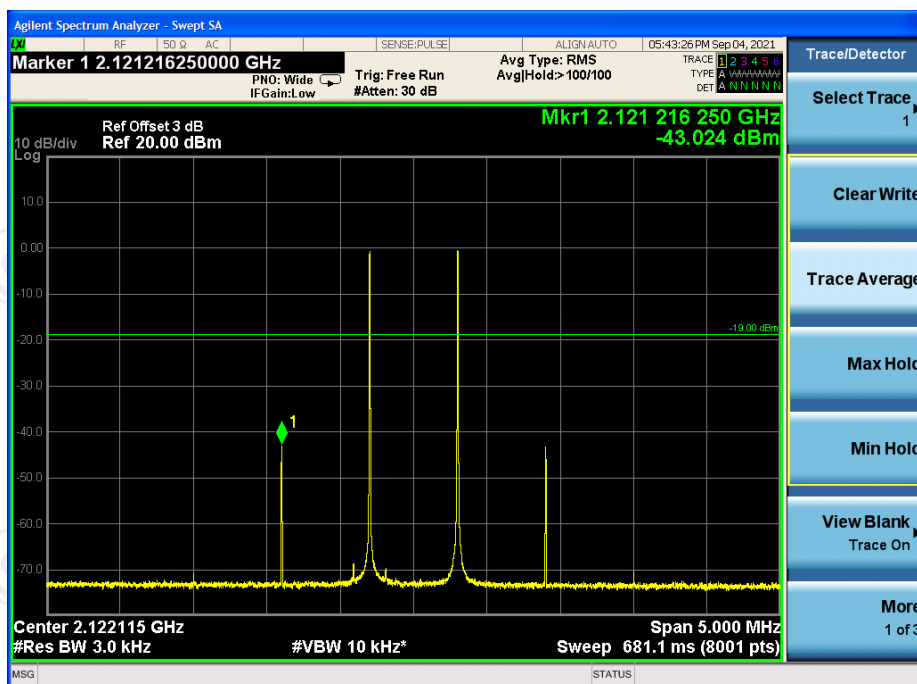
## PCS Pre AGC, DL



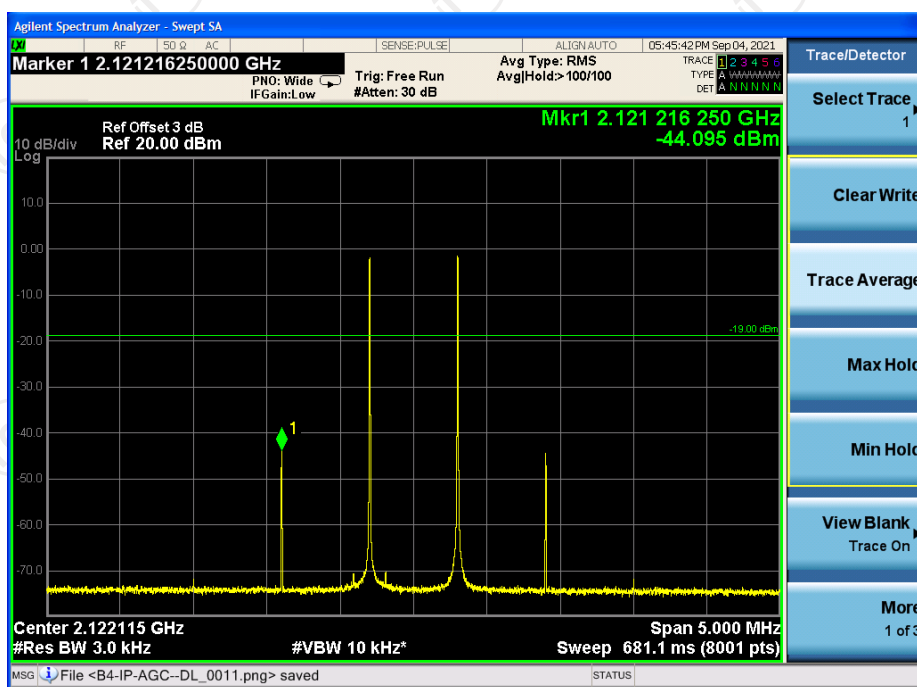
## PCS AGC +10dB, DL



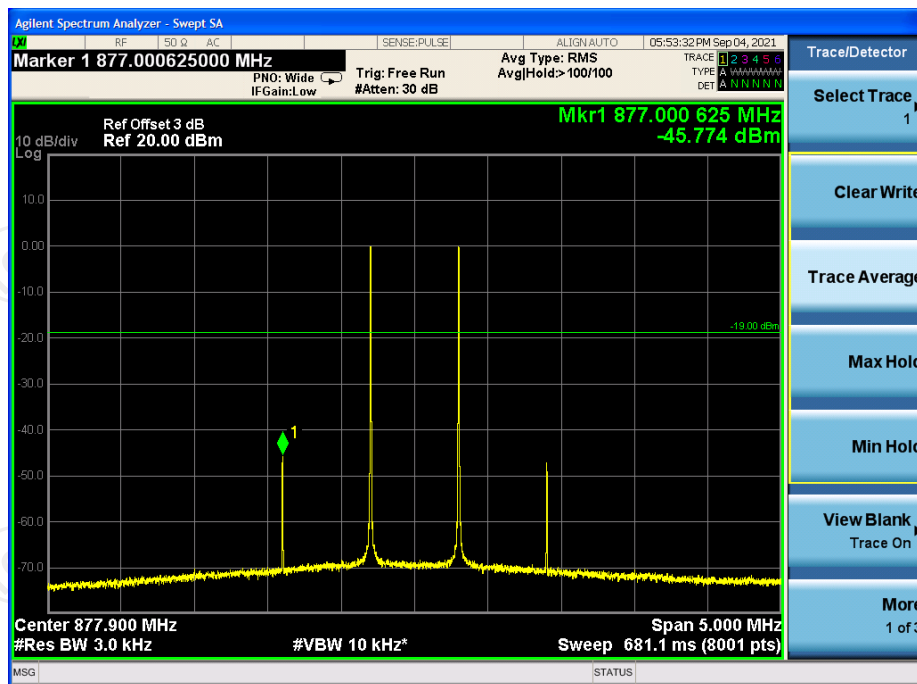
## AWS-1 Pre AGC, DL



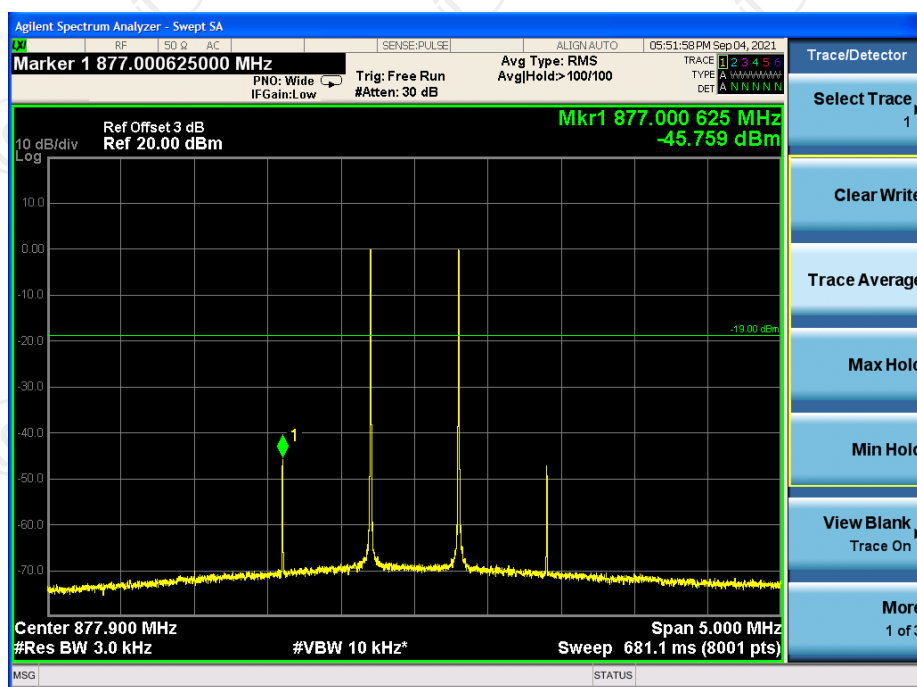
## AWS-1 AGC +10dB, DL



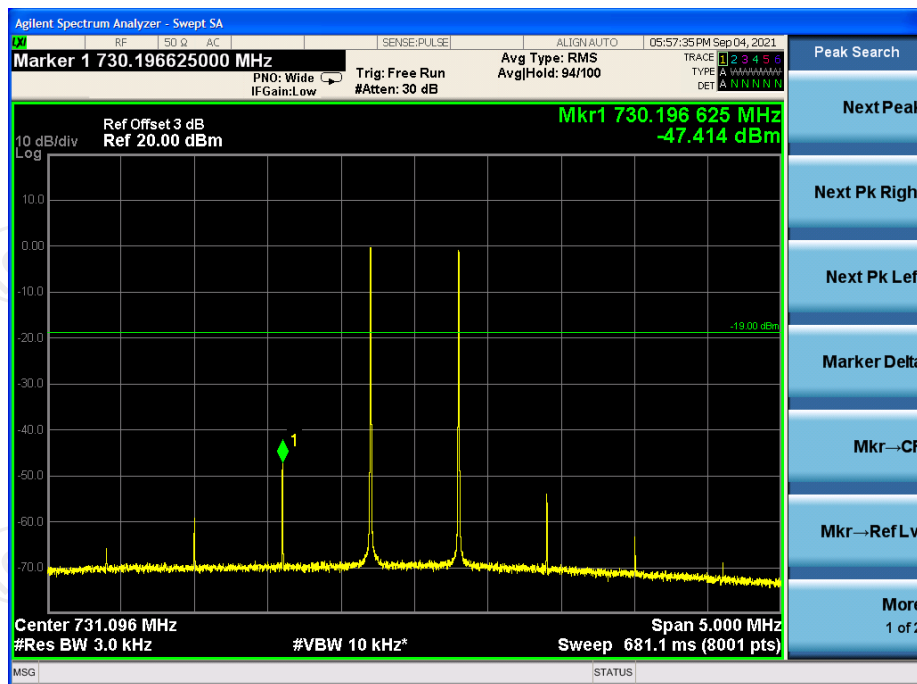
## Cellular Pre AGC, DL



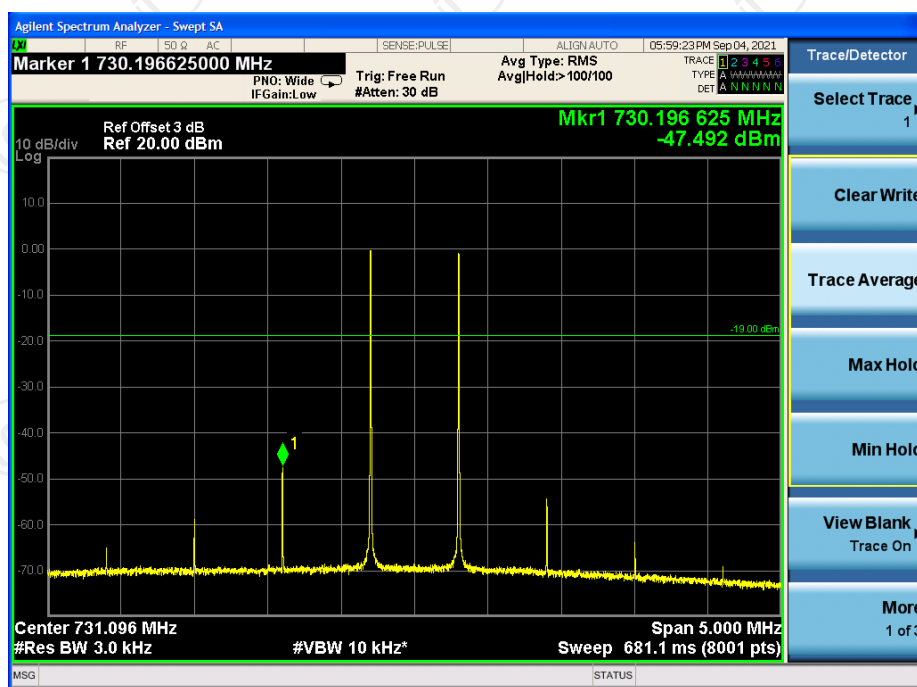
## Cellular AGC +10dB, DL



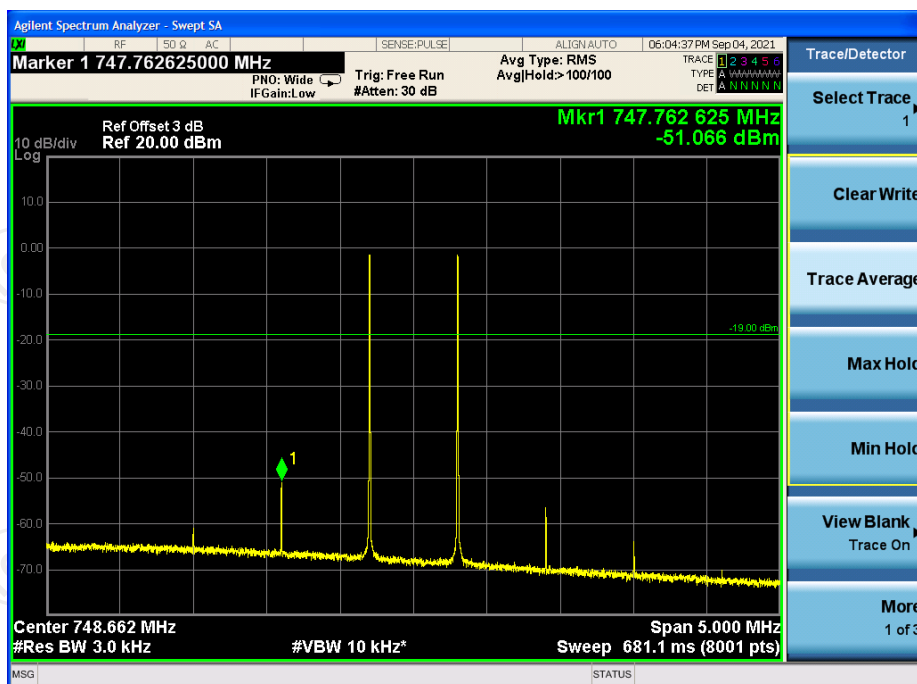
## Lower700MHz Pre AGC, DL



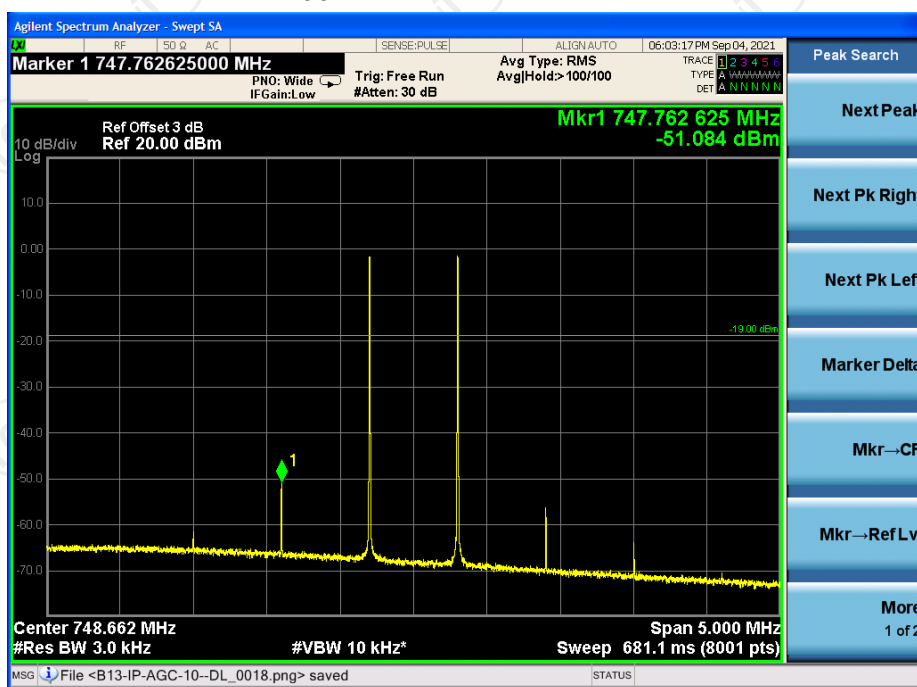
## Lower700MHz AGC +10dB, DL



## Upper700MHz Pre AGC, DL

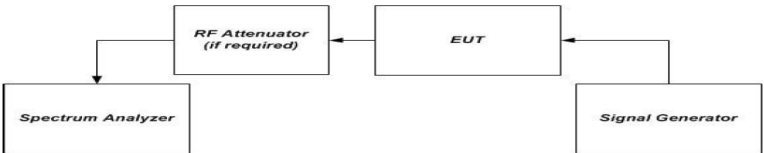


## Upper700MHz AGC +10dB, DL



## 5.4. Out of Band Emission

### 5.4.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC Part20 Section 20.21(e)(8)(i)(E)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Test Method:</b>      | KDB935210 D03 Signal Booster Measurements v04r04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Limit:</b>            | -19dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Test Setup:</b>       |  <pre> graph LR     SG[Signal Generator] --&gt; EUT[EUT]     EUT --&gt; RA[RF Attenuator (if required)]     RA --&gt; SA[Spectrum Analyzer]             </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Test Procedure:</b>   | <p>a) Connect the EUT to the test equipment as shown in Set-Up. Begin with the uplink output connected to the spectrum analyzer.</p> <p>b) Configure the signal generator for the appropriate operation for all uplink and downlink bands:</p> <ul style="list-style-type: none"> <li>i) GSM: 0.2 MHz from upper and lower band edge</li> <li>ii) LTE (5 MHz): 2.5 MHz from upper and lower band edge</li> <li>iii) CDMA: 1.25 MHz from upper and lower band edge, except for cellular as follows (only the upper and lower frequencies need to be tested): 824.88 MHz, 845.73 MHz, 836.52 MHz, 848.10 MHz, 869.88 MHz, 890.73 MHz, 881.52 MHz, 893.10 MHz.</li> </ul> <p>Note 1: Alternative test modulation types:</p> <ul style="list-style-type: none"> <li>• CDMA (alternative 1.25 MHz AWGN)</li> <li>• LTE 5 MHz (alternative W-CDMA or 4.1 MHz AWGN)</li> </ul> <p>Note 2: For LTE, the signal generator should utilize the uplink and downlink signal types for these modulations in uplink and downlink tests, respectively. LTE shall use 5 MHz signal 25 resource blocks transmitting.</p> <p>Note 3: AWGN is the measured 99% occupied bandwidth.</p> <p>c) Set the signal generator amplitude to the maximum power level prior to AGC similar to the procedures in method of Maximum power d) to f) of power measurement procedure for appropriate modulations.</p> <p>d) Set RBW = measurement bandwidth specified in the applicable rule section for the supported frequency band.</p> <p>e) Set VBW = 3 x RBW.</p> <p>f) Select the RMS (power averaging) detector.</p> <p>g) Sweep time = auto-couple.</p> <p>h) Set the analyzer start frequency to the upper band/block edge frequency and the stop frequency to the upper band/block edge frequency plus 300 kHz (when operational frequency is &lt; 1 GHz) or 3 MHz (when operational frequency is ≥ 1 GHz).</p> <p>i) Trace average at least 100 traces in power averaging (i.e., RMS) mode.</p> <p>j) Use peak marker function to find the maximum power level.</p> <p>k) Capture the spectrum analyzer trace of the power level for inclusion in the test report.</p> <p>l) Increase the signal generator amplitude in 2 dB steps until the maximum input level indicated in 5.4 is reached. Ensure that the EUT maintains compliance with the OOB limits.</p> <p>m) Reset the analyzer start frequency to the lower band/block edge frequency minus 100 kHz or 1 MHz, as per applicable rule part, and the stop frequency to the lower band/block edge frequency and repeat steps j) to l).</p> |

|                     |                                                                              |
|---------------------|------------------------------------------------------------------------------|
|                     | n) Repeat steps b) through m) for each uplink and downlink operational band. |
| <b>Test Result:</b> | PASS                                                                         |

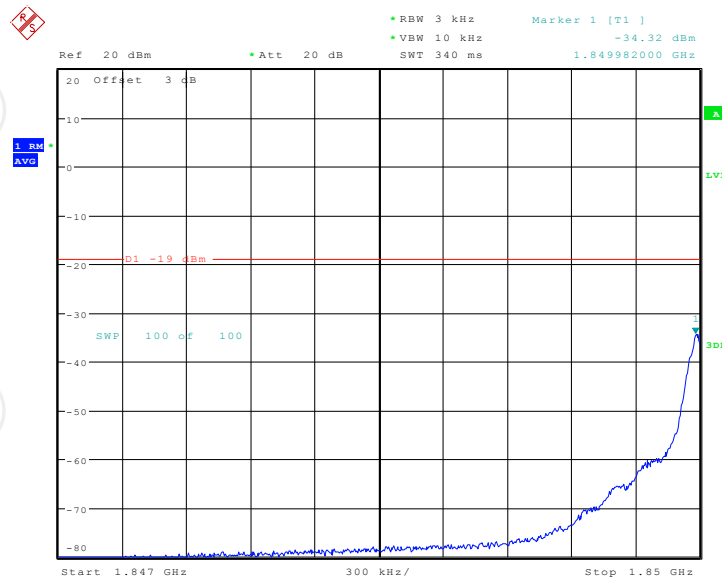
## 5.4.2. Test Instruments

| Equipment         | Manufacturer | Model  | Serial Number | Calibration Date | Calibration Due |
|-------------------|--------------|--------|---------------|------------------|-----------------|
| Signal Generator  | Agilent      | N5182A | MY47070282    | Jul. 19, 2021    | Jul. 18, 2022   |
| Spectrum Analyzer | R&S          | FSU    | 200054        | Jul. 19, 2021    | Jul. 18, 2022   |
| Attenuator        | 50FP-006-H3  | JFW    | 907763        | N/A              | N/A             |

## 5.4.3. Test data

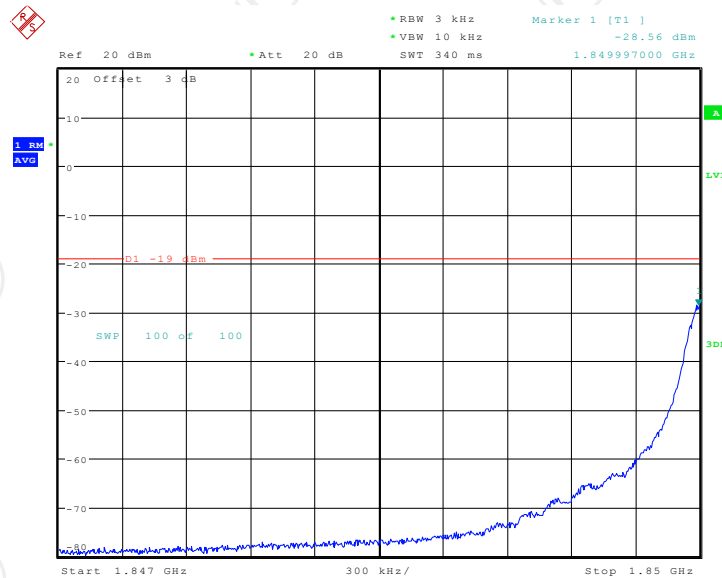
### Test Plots

#### PCS GSM UL Left Side Pre AGC



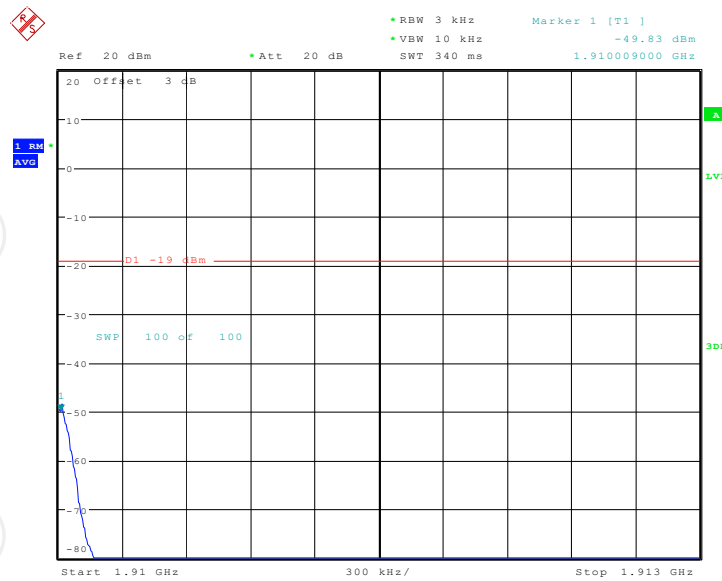
Date: 6.SEP.2021 14:30:35

#### PCS GSM UL Left Side Pre AGC+10dB



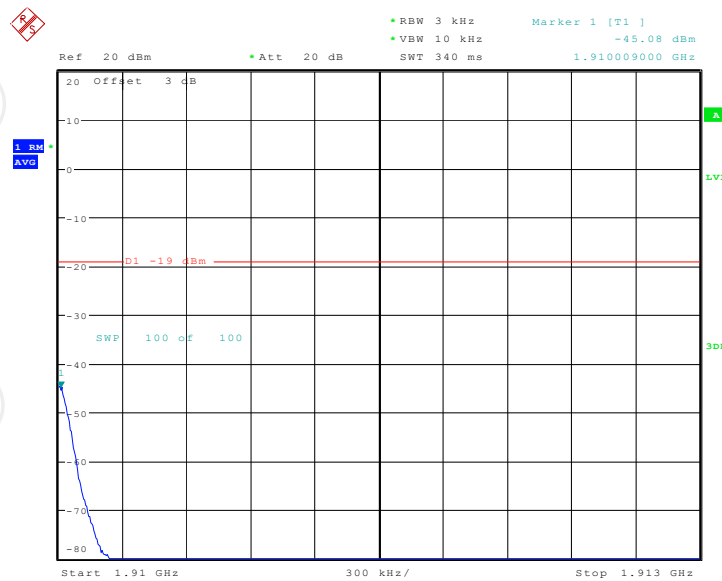
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## PCS GSM UL Right Side Pre AGC



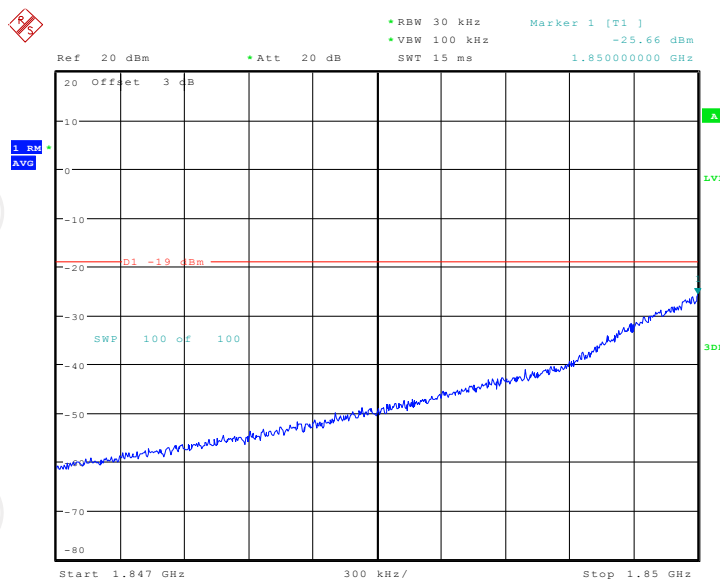
Date: 6.SEP.2021 19:52:20

## PCS GSM UL Right Side Pre AGC+10dB



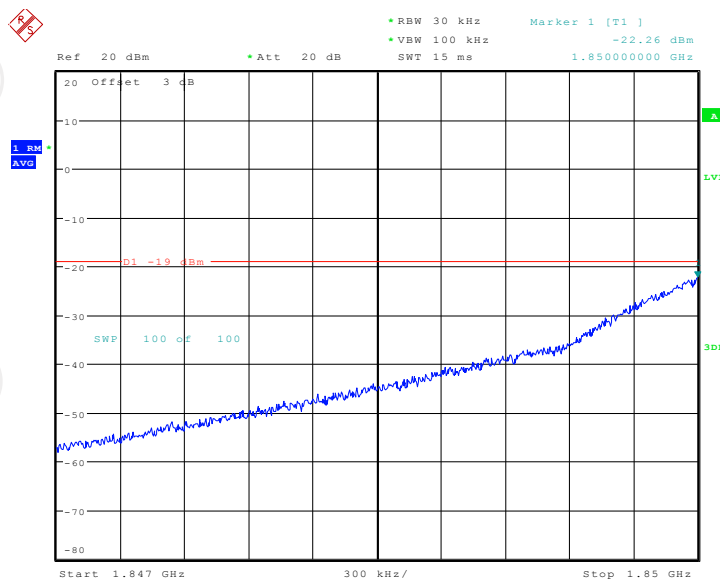
Date: 6.SEP.2021 19:51:19

## PCS CDMA UL Left Side Pre AGC



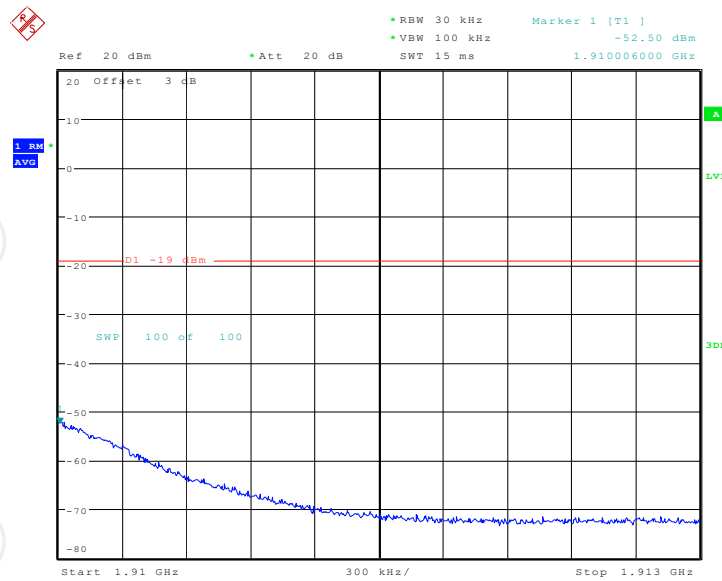
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## PCS CDMA UL Left Side Pre AGC+10dB



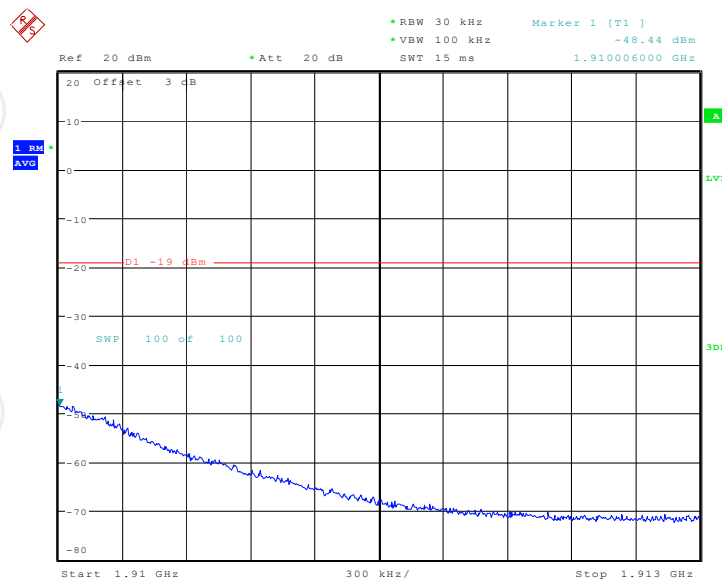
Date: 6.SEP.2021 14:37:04

PCS CDMA UL Right Side Pre AGC



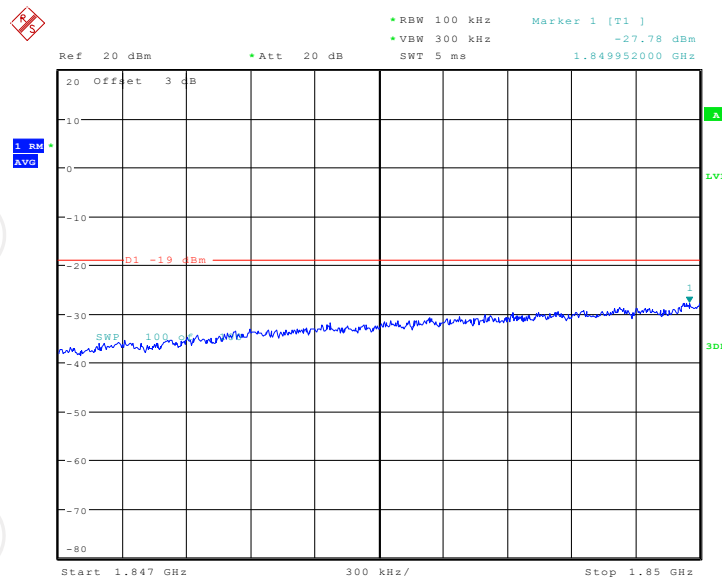
Date: 6.SEP.2021 19:47:30

PCS CDMA UL Right Side Pre AGC+10dB



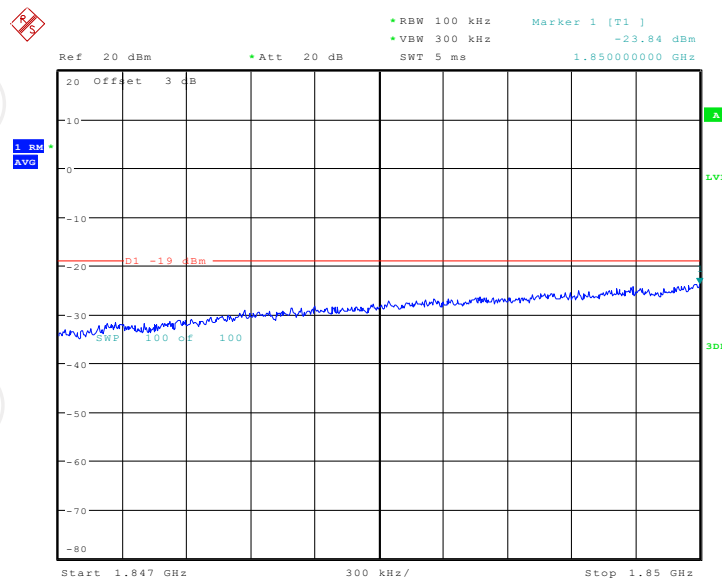
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## PCS LTE UL Left Side Pre AGC



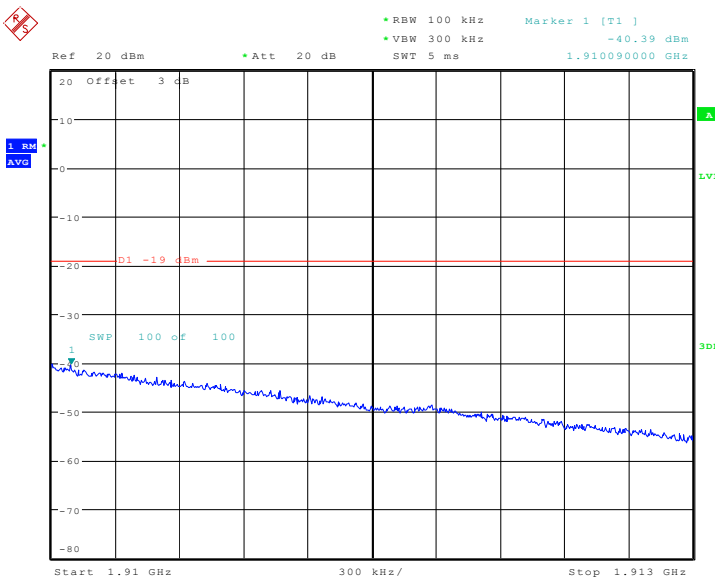
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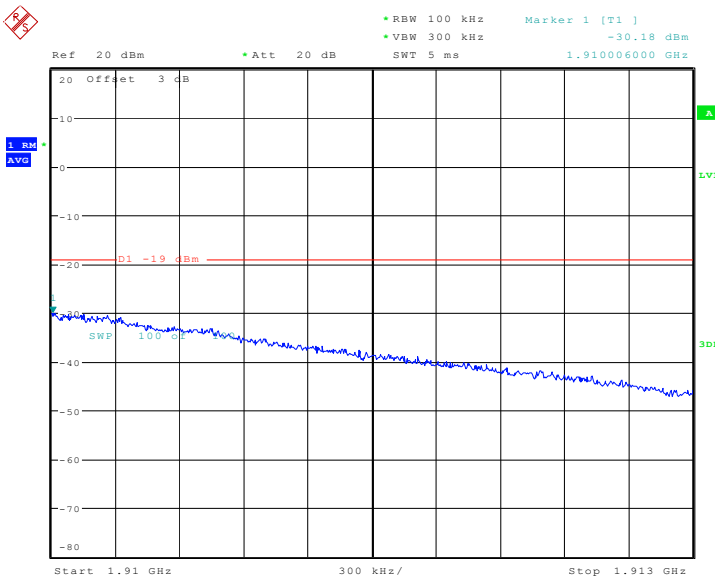
Date: 6.SEP.2021 14:38:35

### PCS LTE UL Right Side Pre AGC



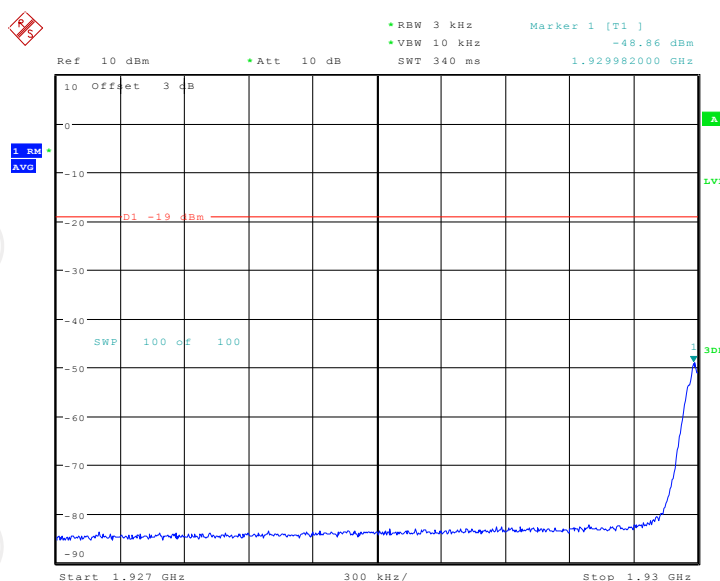
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PCS LTE UL Right Side Pre AGC+10dB



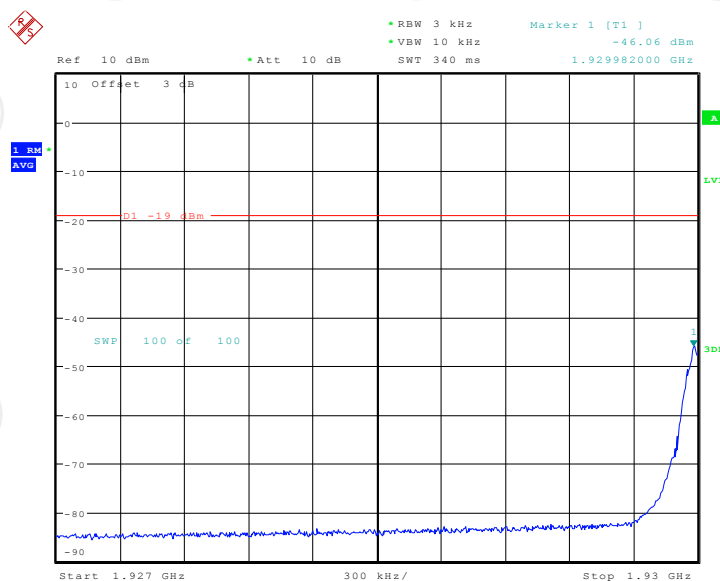
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**PCS GSM DL Left Side Pre AGC**



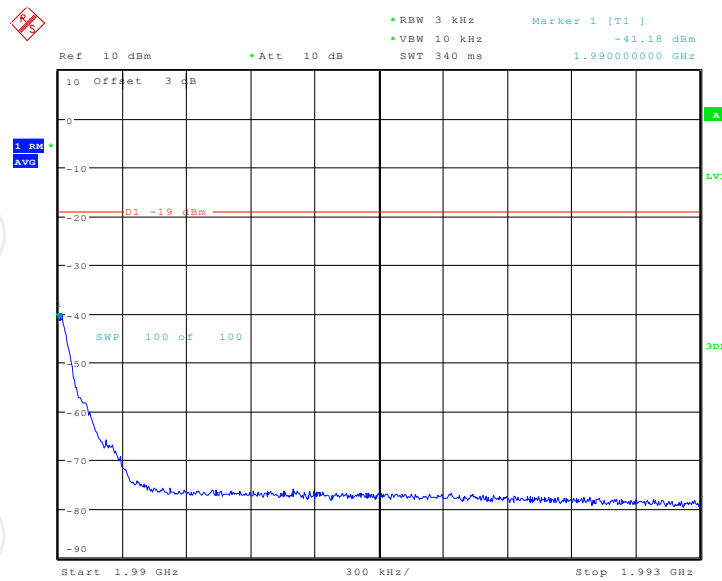
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PCS GSM DL Left Side Pre AGC+10dB



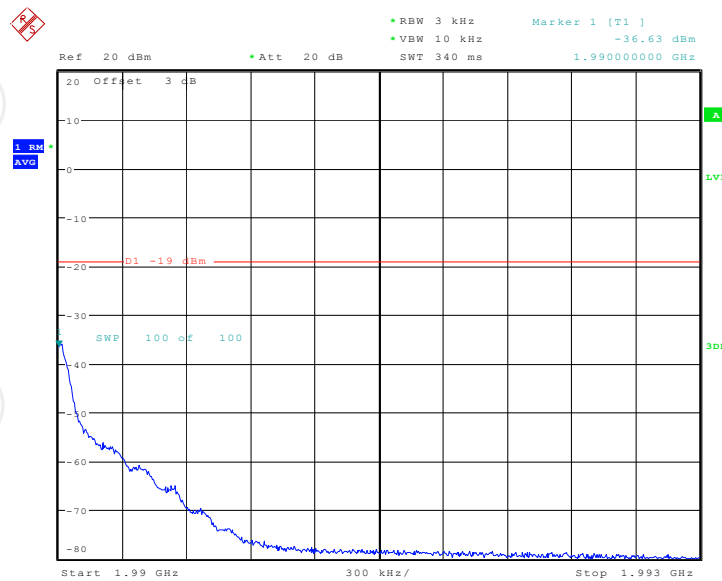
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## PCS GSM DL Right Side Pre AGC



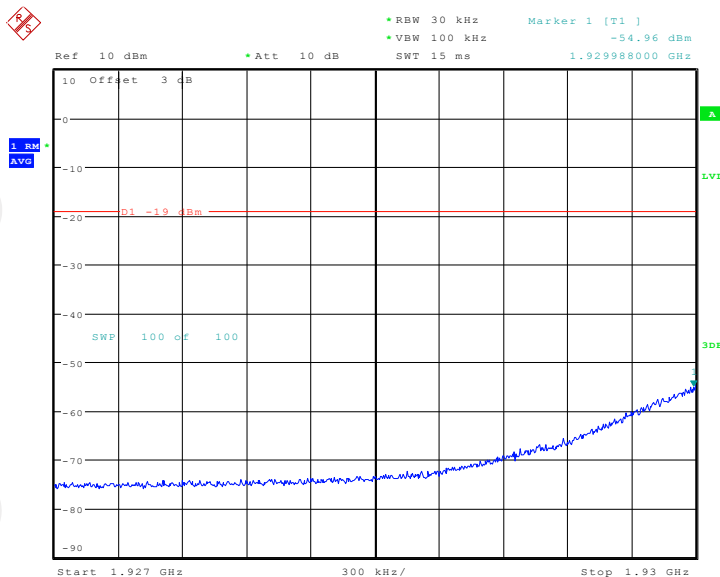
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## PCS GSM DL Right Side Pre AGC+10dB



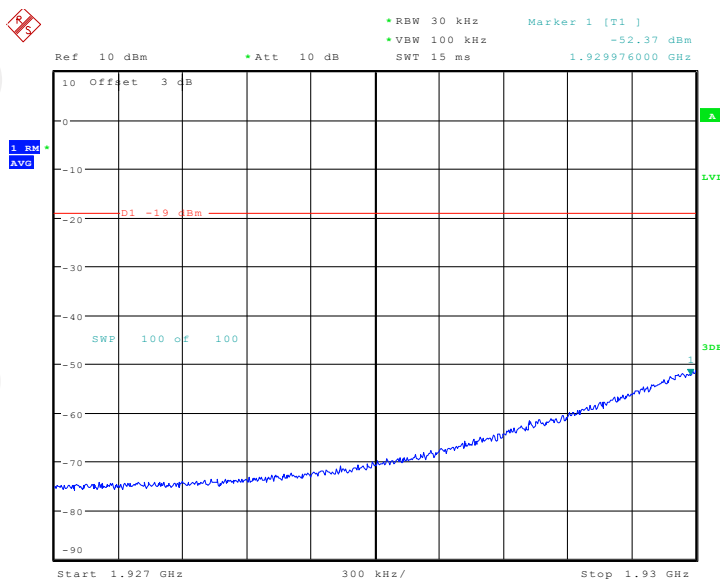
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PCS CDMA DL Left Side Pre AGC



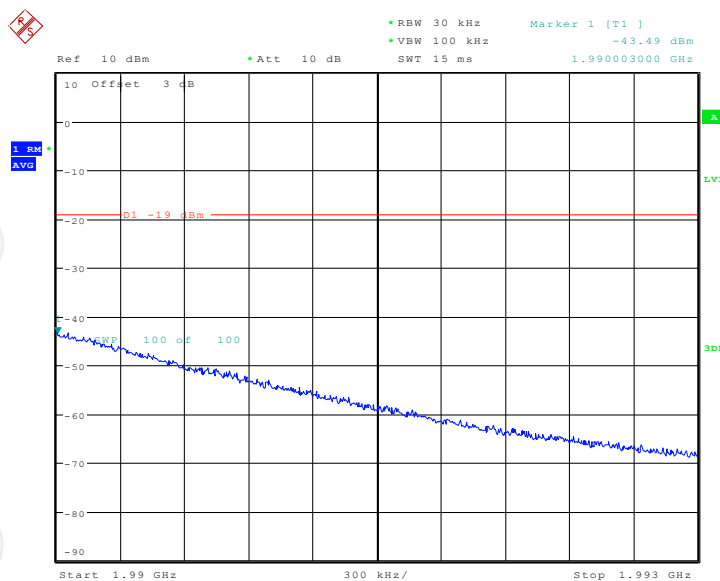
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PCS CDMA DL Left Side Pre AGC+10dB



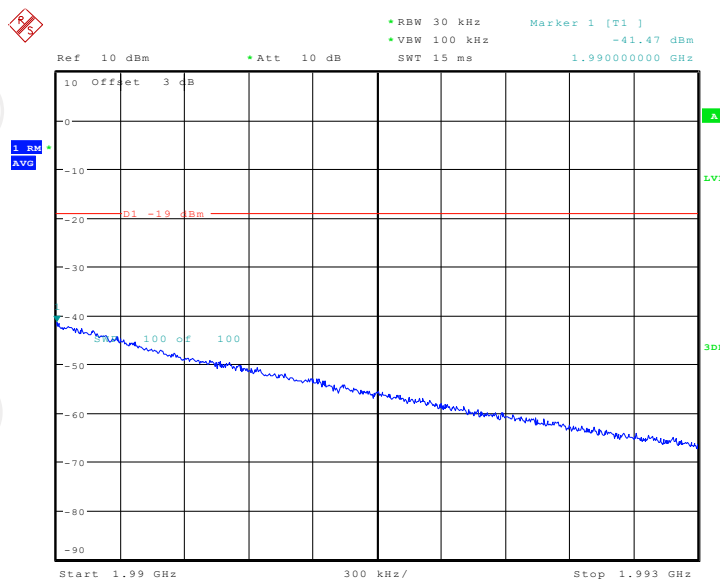
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PCS CDMA DL Right Side Pre AGC



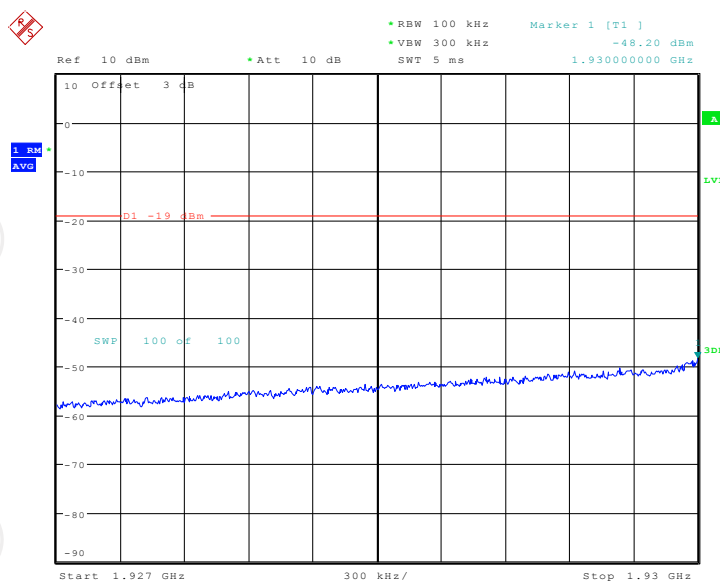
Date: 6.SEP.2021 17:51:25

PCS CDMA DL Right Side Pre AGC+10dB



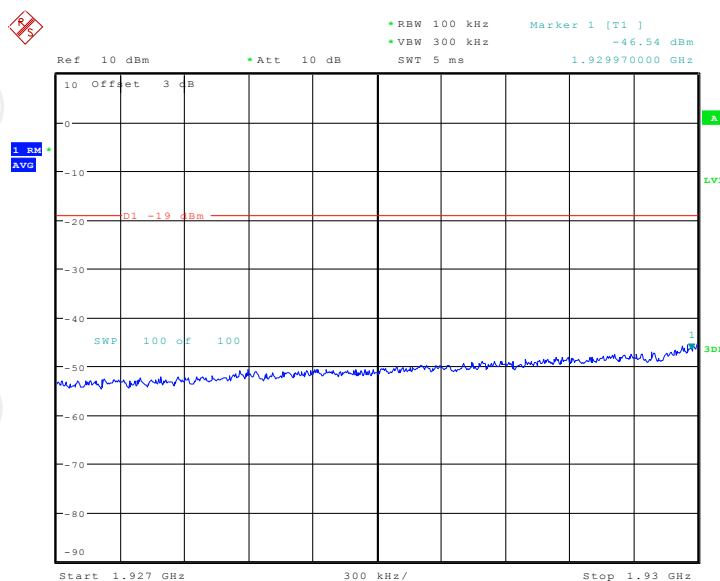
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## PCS LTE DL Left Side Pre AGC



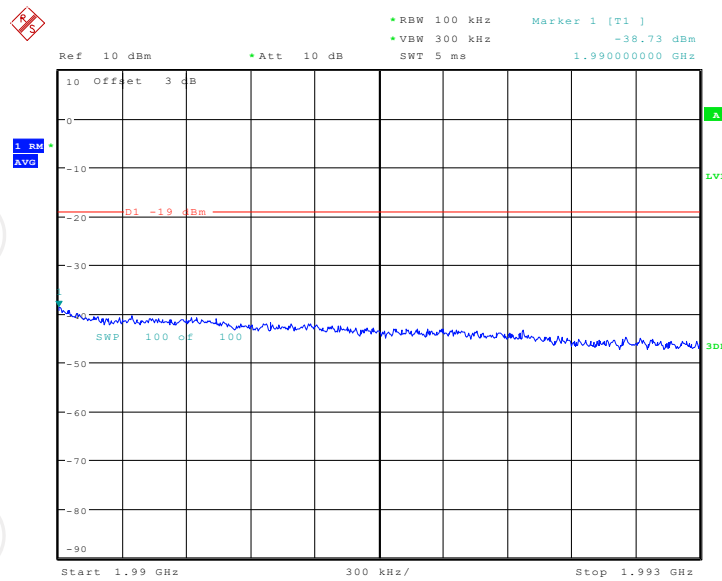
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## PCS LTE DL Left Side Pre AGC+10dB



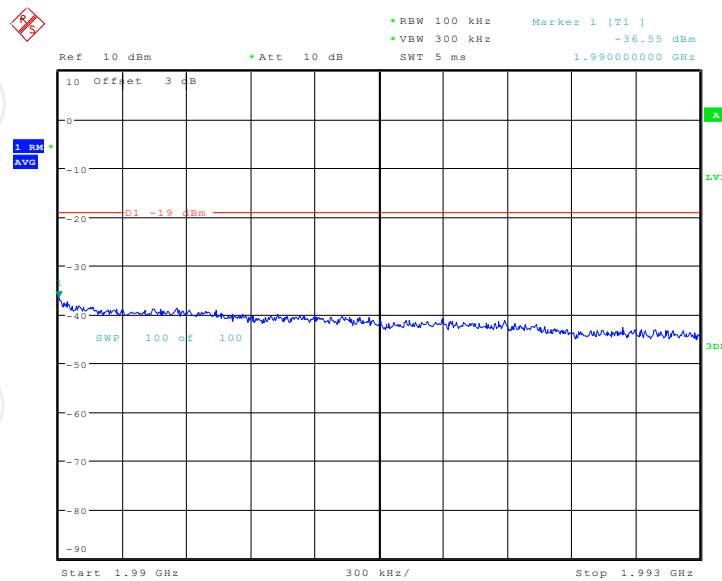
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## PCS LTE DL Right Side Pre AGC



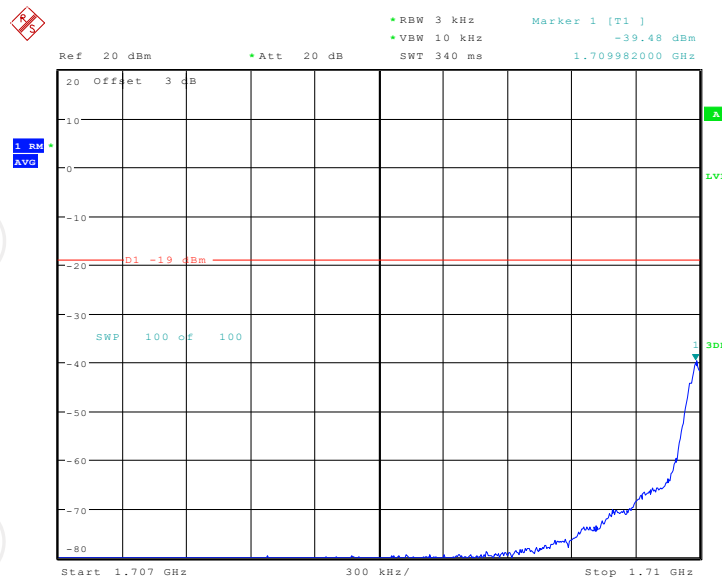
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## PCS LTE DL Right Side Pre AGC+10dB



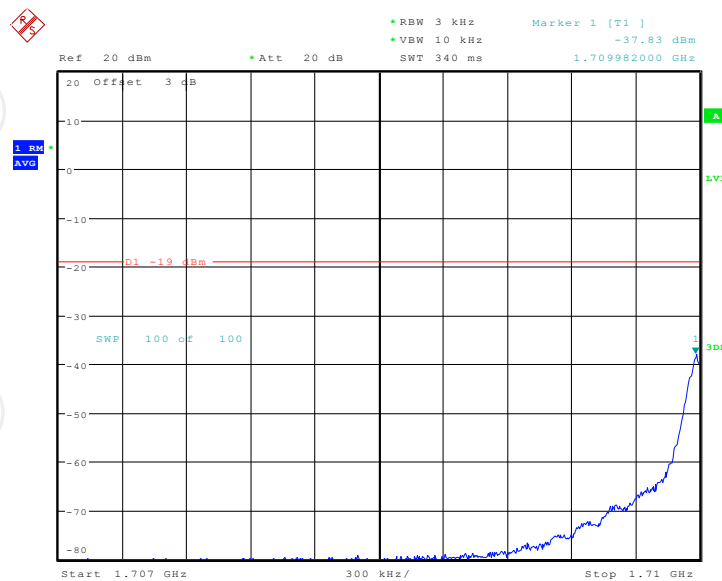
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**AWS-1 GSM UL Left Side Pre AGC**



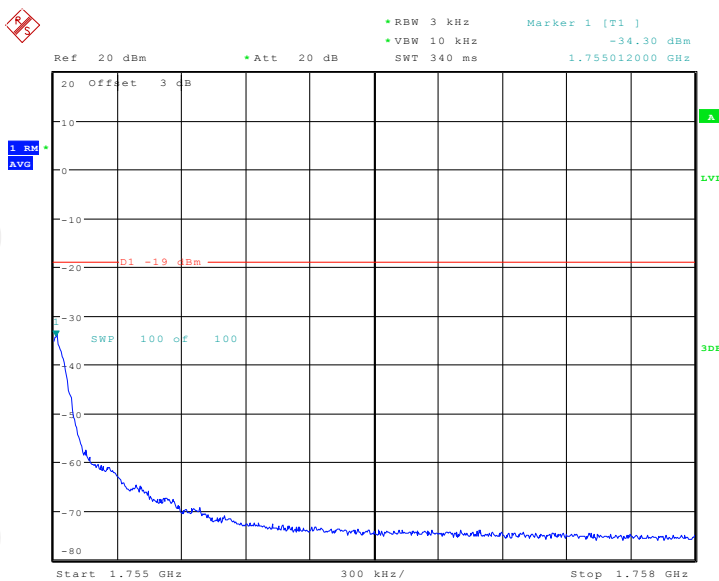
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**AWS-1 GSM UL Left Side Pre AGC+10dB**



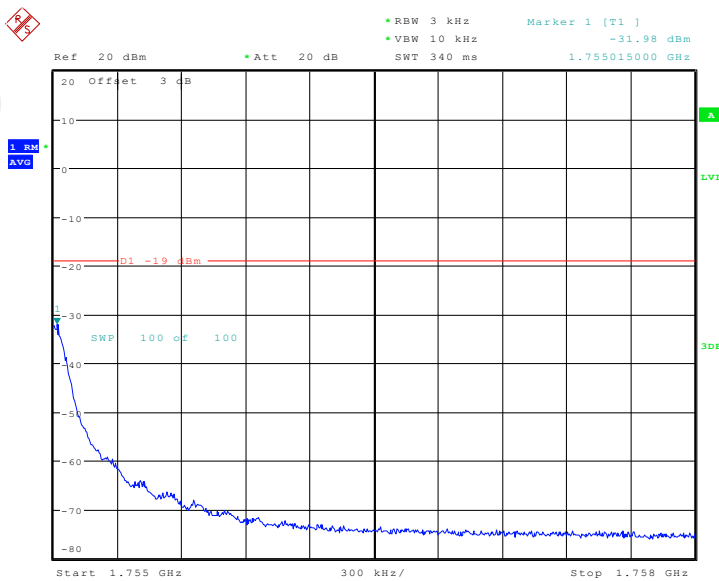
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**AWS-1 GSM UL Right Side Pre AGC**



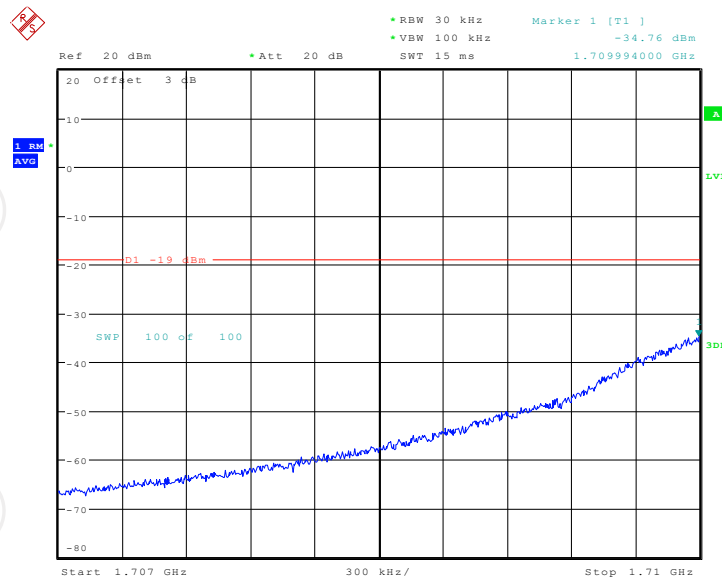
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**AWS-1 GSM UL Right Side Pre AGC+10dB**



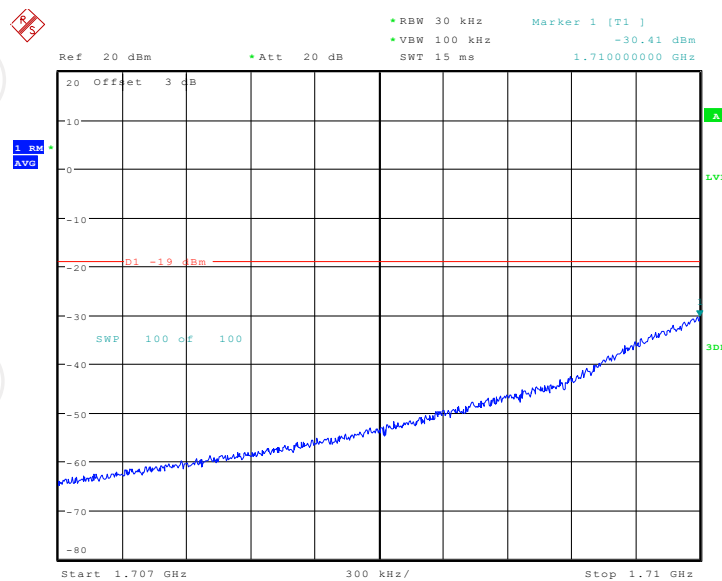
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### AWS-1 CDMA UL Left Side Pre AGC



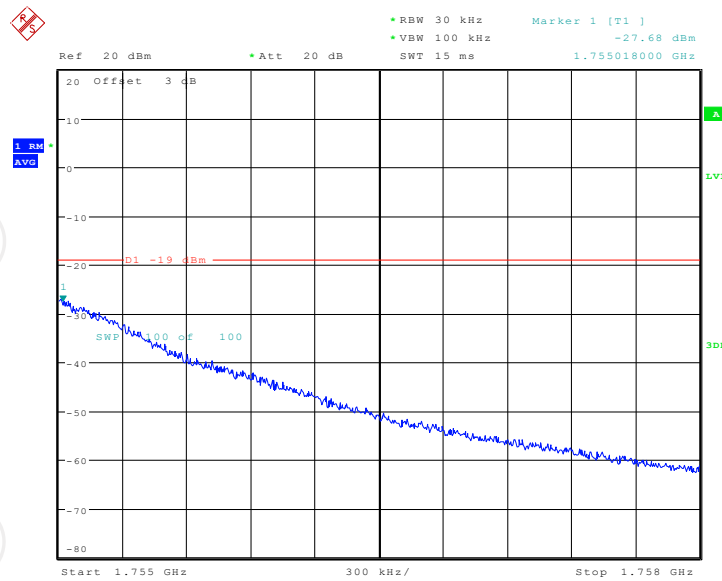
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### AWS-1 CDMA UL Left Side Pre AGC+10dB



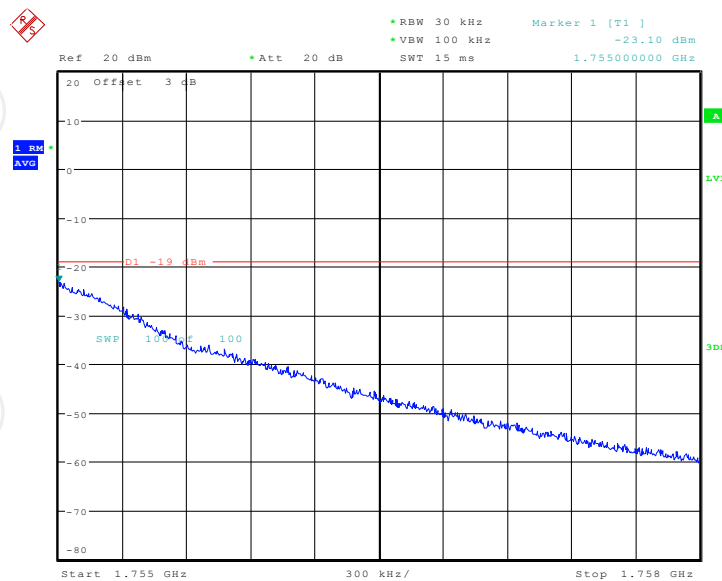
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**AWS-1 CDMA UL Right Side Pre AGC**



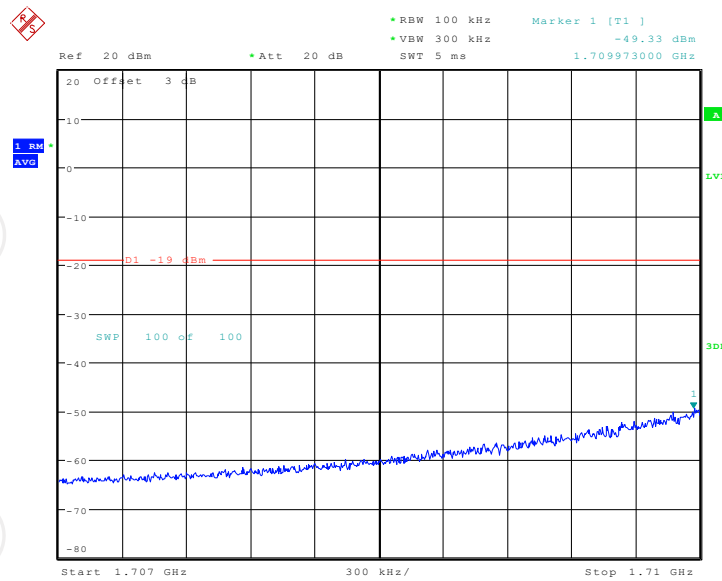
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**AWS-1 CDMA UL Right Side Pre AGC+10dB**



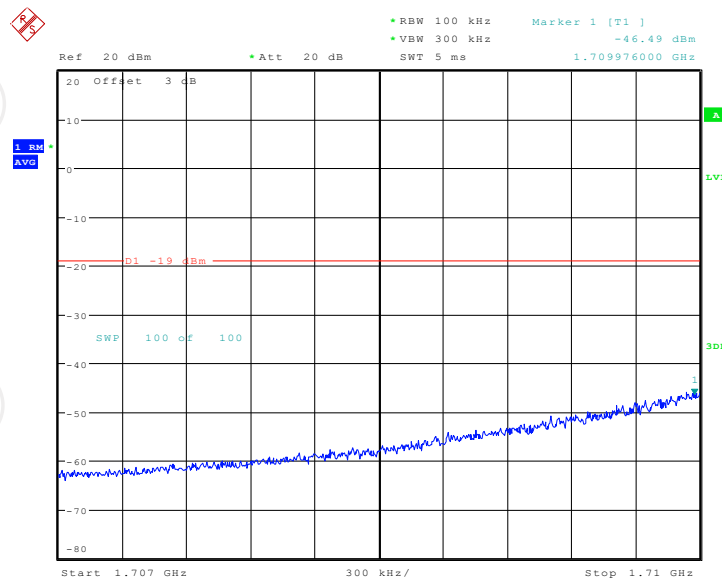
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## AWS-1 LTE UL Left Side Pre AGC



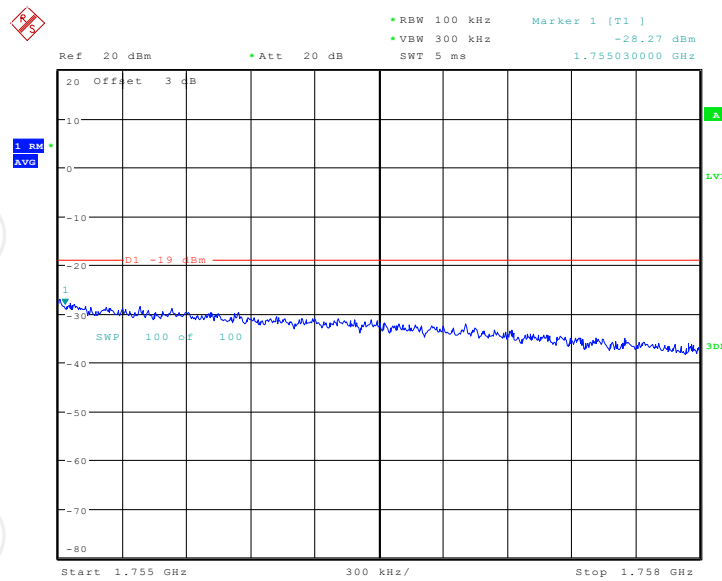
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## AWS-1 LTE UL Left Side Pre AGC+10dB



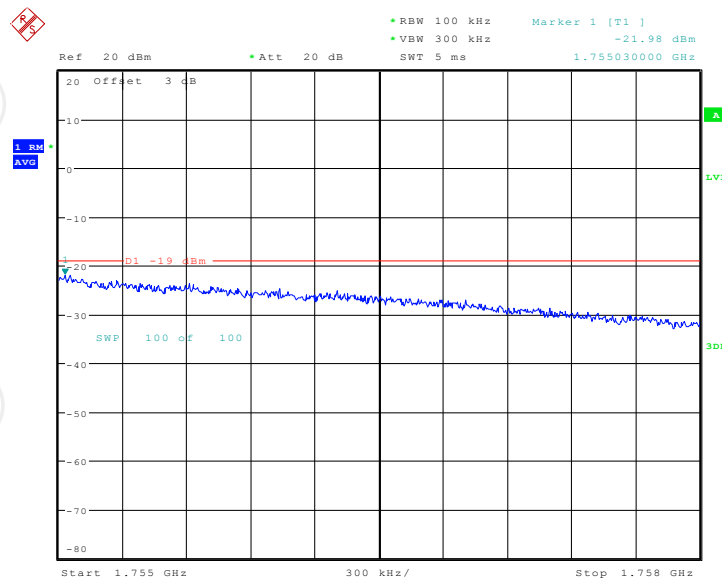
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## AWS-1 LTE UL Right Side Pre AGC



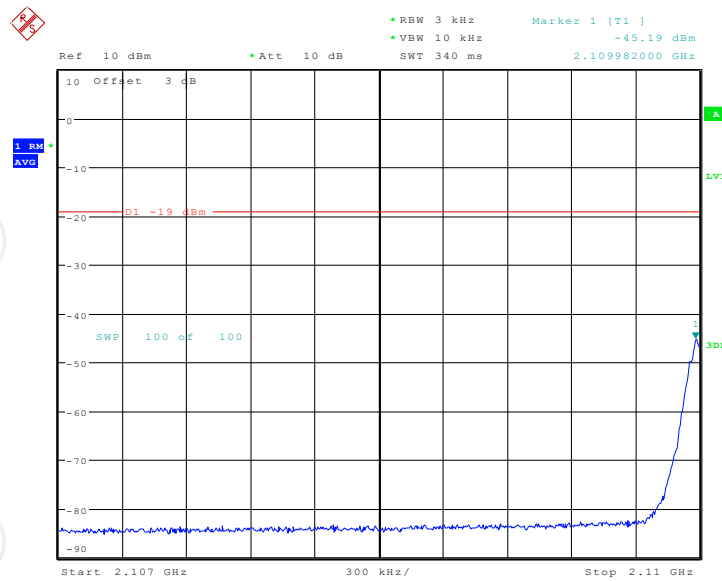
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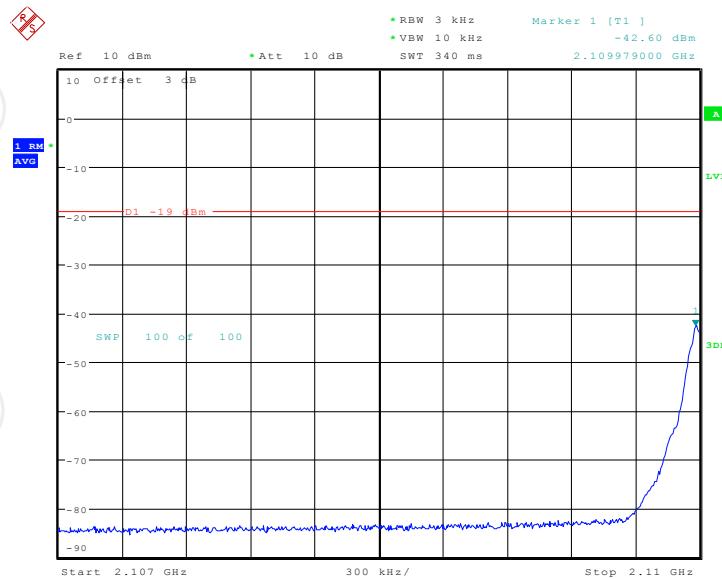
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## AWS-1 GSM DL Left Side Pre AGC



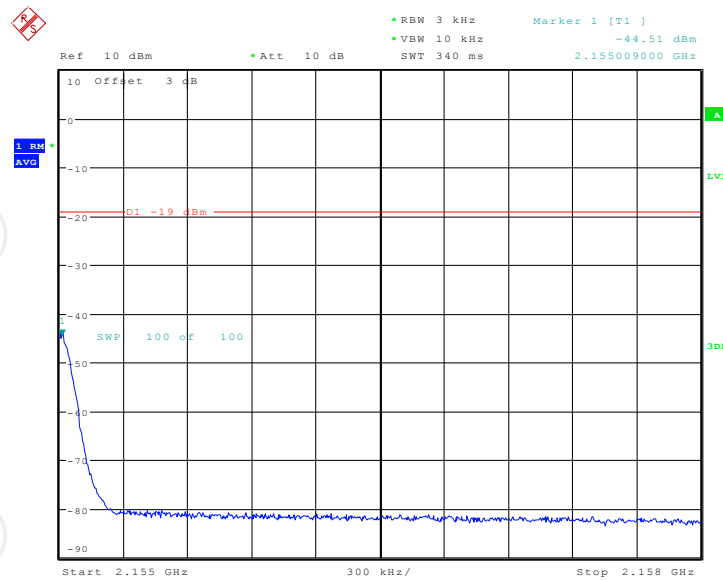
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## AWS-1 GSM DL Left Side Pre AGC+10dB



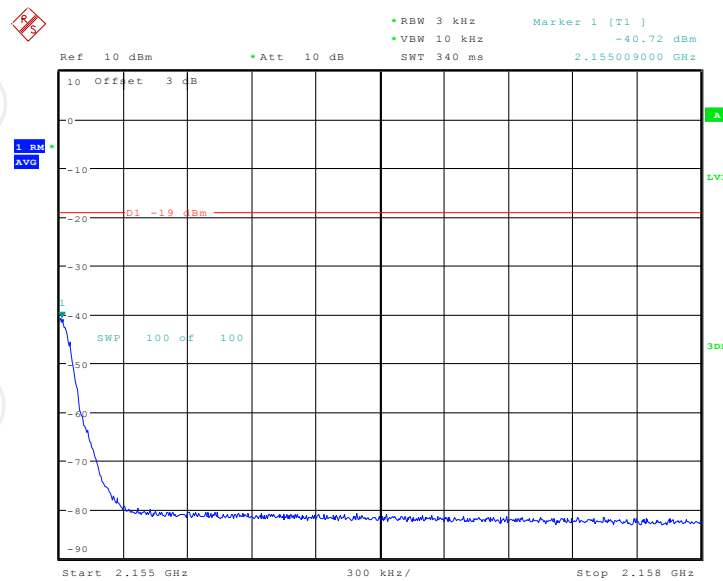
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## AWS-1 GSM DL Right Side Pre AGC



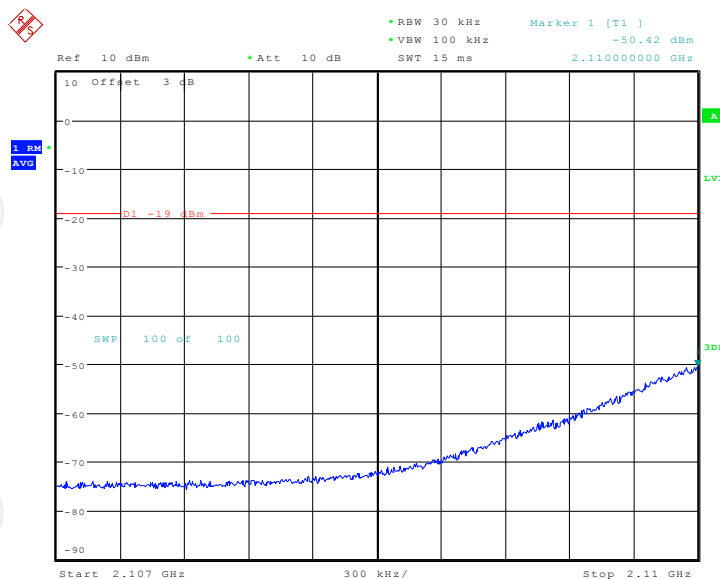
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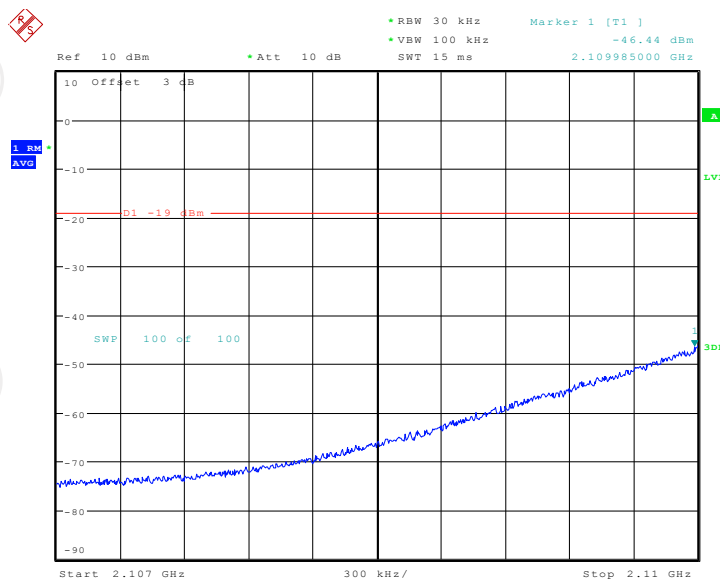
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## AWS-1 CDMA DL Left Side Pre AGC



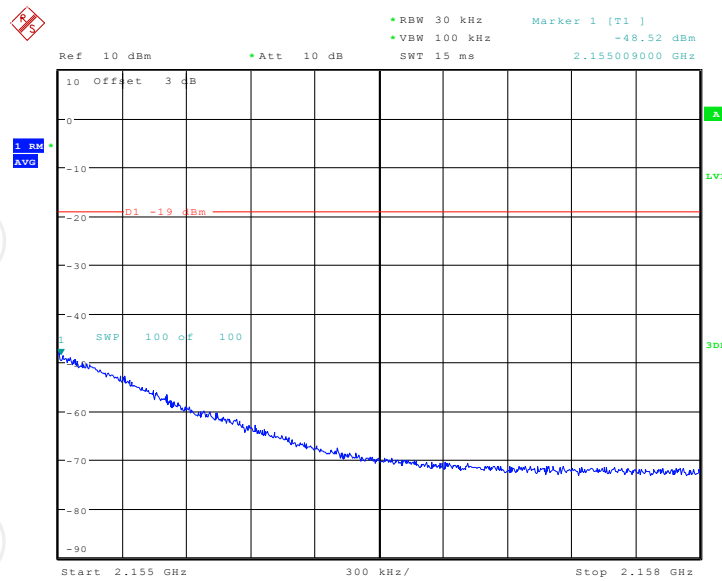
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## AWS-1 CDMA DL Left Side Pre AGC+10dB



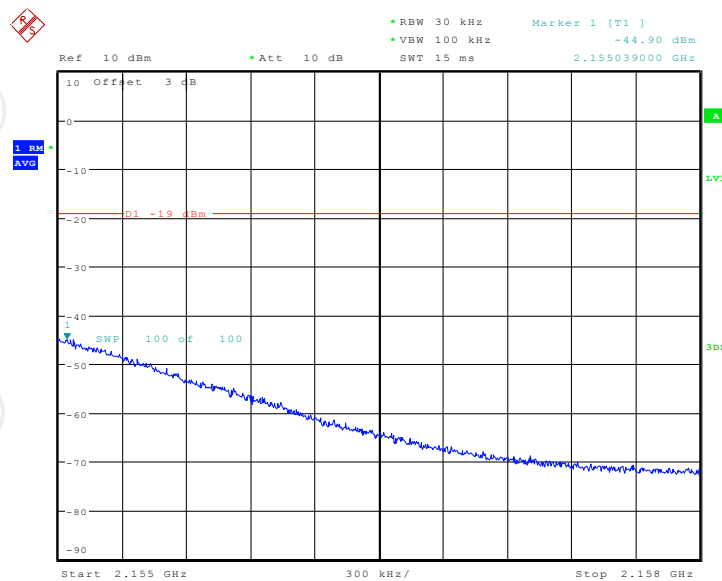
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**AWS-1 CDMA DL Right Side Pre AGC**



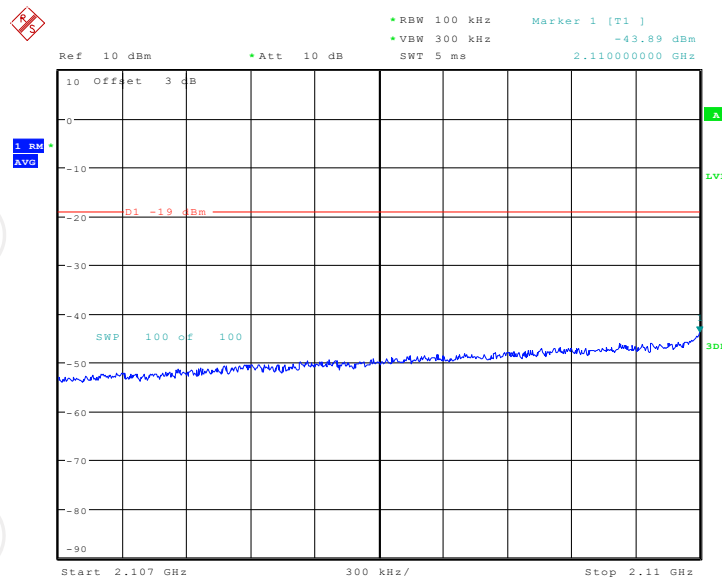
Date: 6.SEP.2021 18:00:12

**AWS-1 CDMA DL Right Side Pre AGC+10dB**



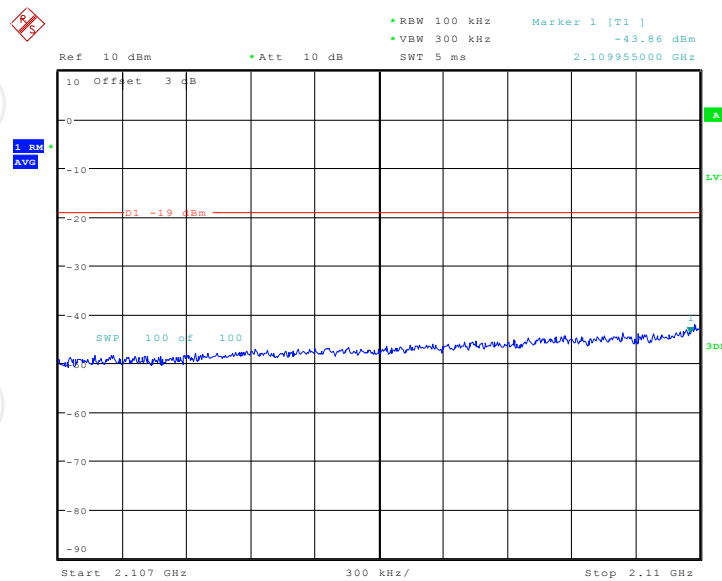
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## AWS-1 LTE DL Left Side Pre AGC



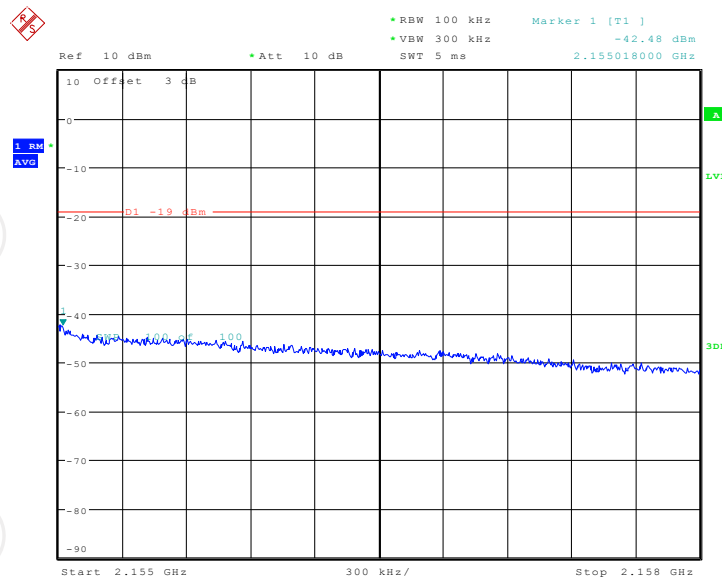
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## AWS-1 LTE DL Left Side Pre AGC+10dB



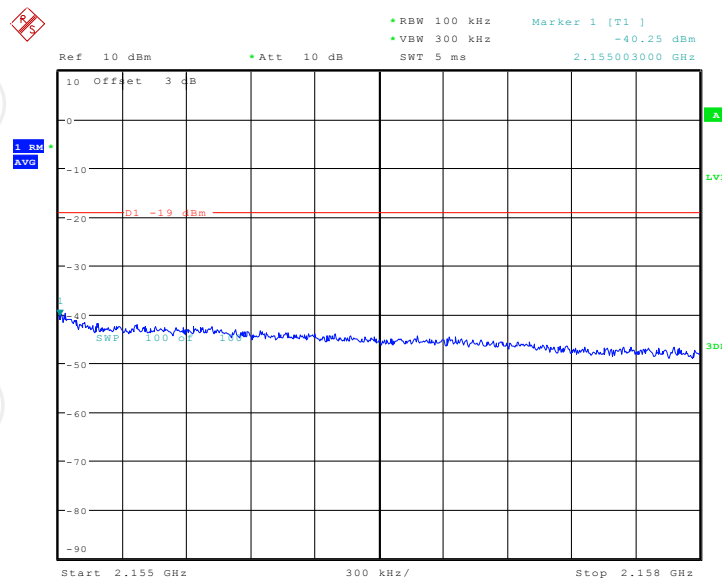
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## AWS-1 LTE DL Right Side Pre AGC



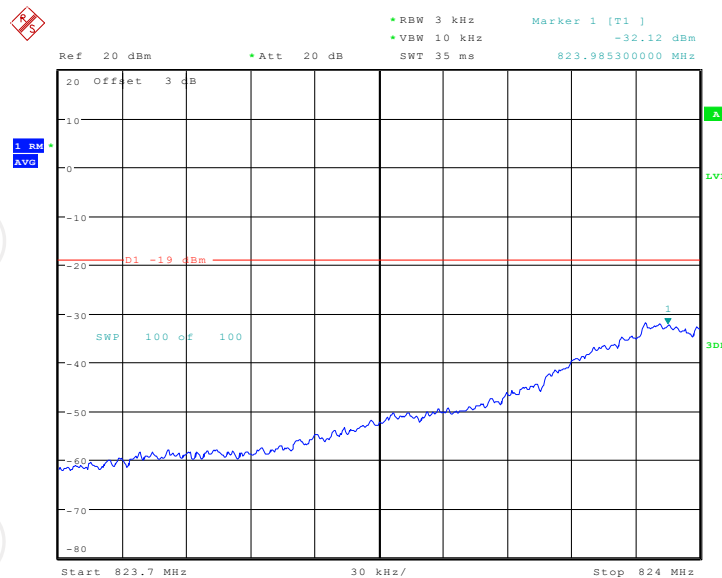
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## AWS-1 LTE DL Right Side Pre AGC+10dB



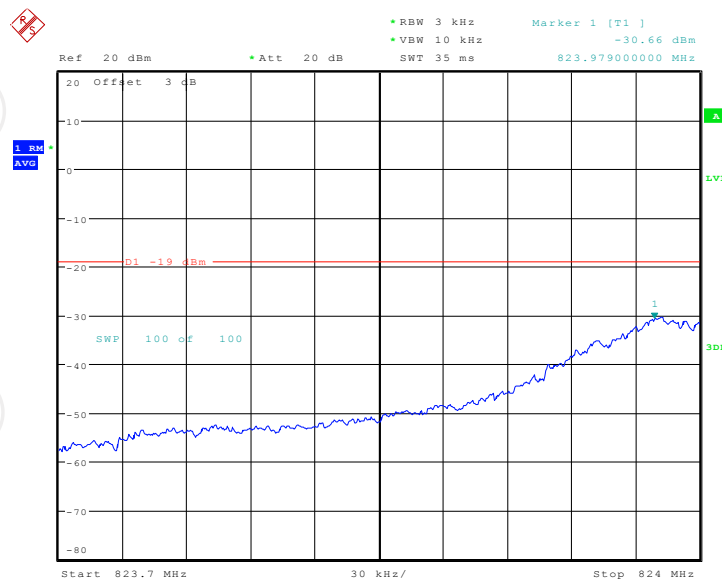
Date: 6.SEP.2021 18:01:18

## Cellular GSM UL Left Side Pre AGC



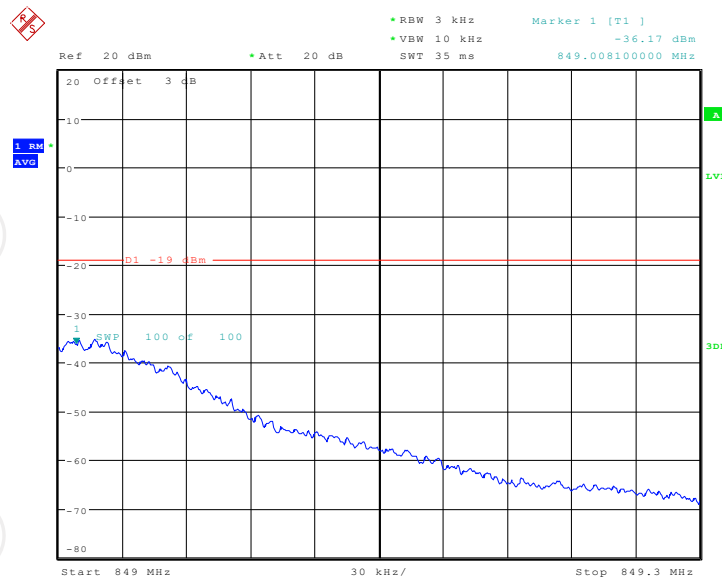
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## Cellular GSM UL Left Side Pre AGC+10dB



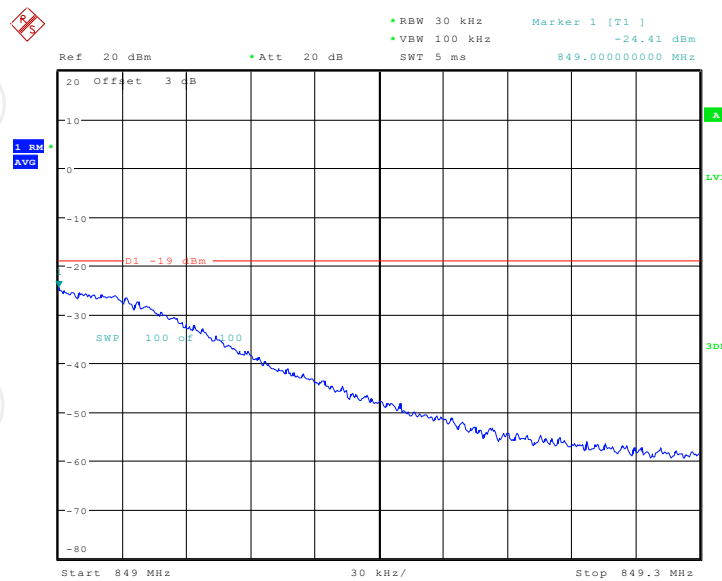
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## Cellular GSM UL Right Side Pre AGC



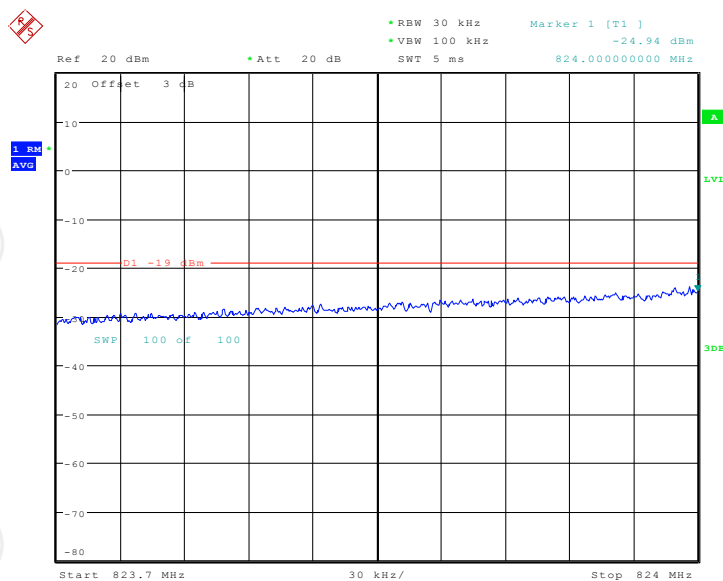
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## Cellular GSM UL Right Side Pre AGC+10dB



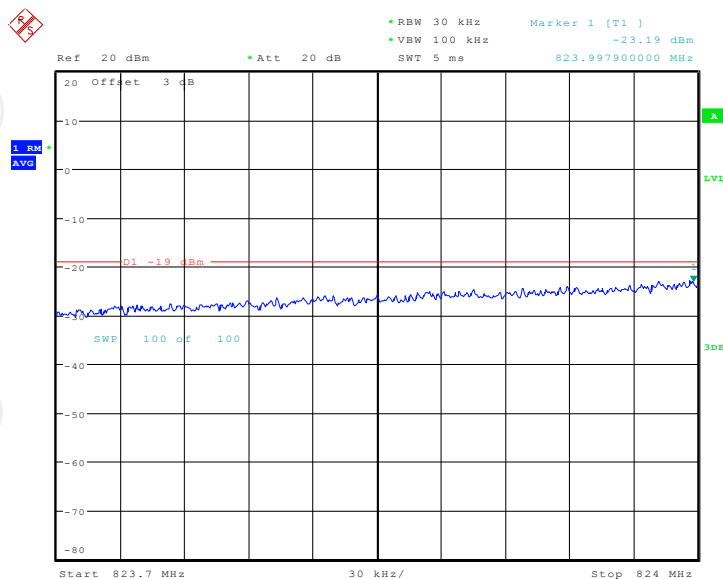
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## Cellular CDMA UL Left Side Pre AGC



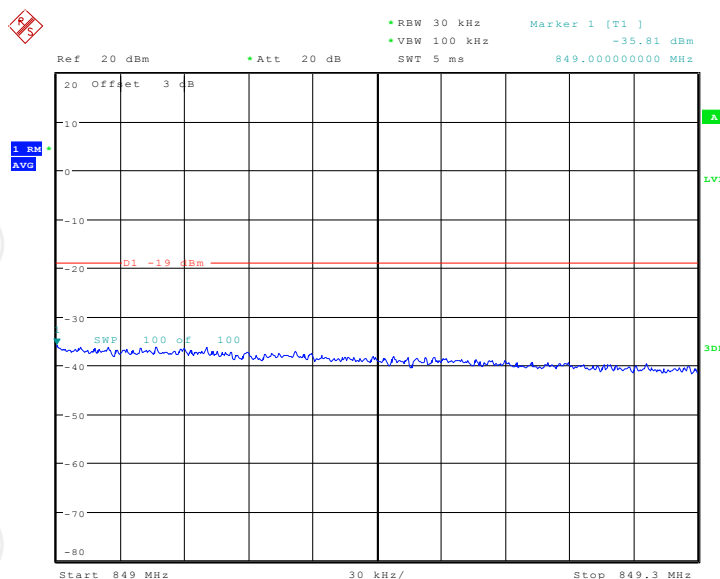
Date: 6.SEP.2021 15:10:33

## Cellular CDMA UL Left Side Pre AGC+10dB



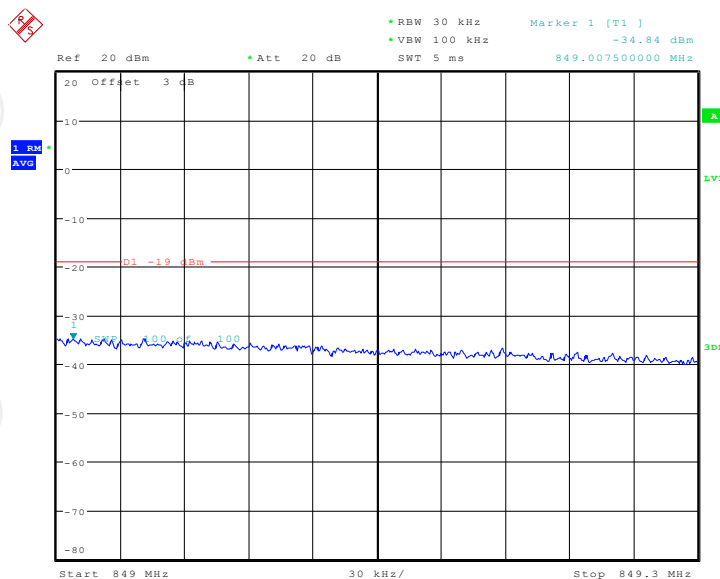
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## Cellular CDMA UL Right Side Pre AGC



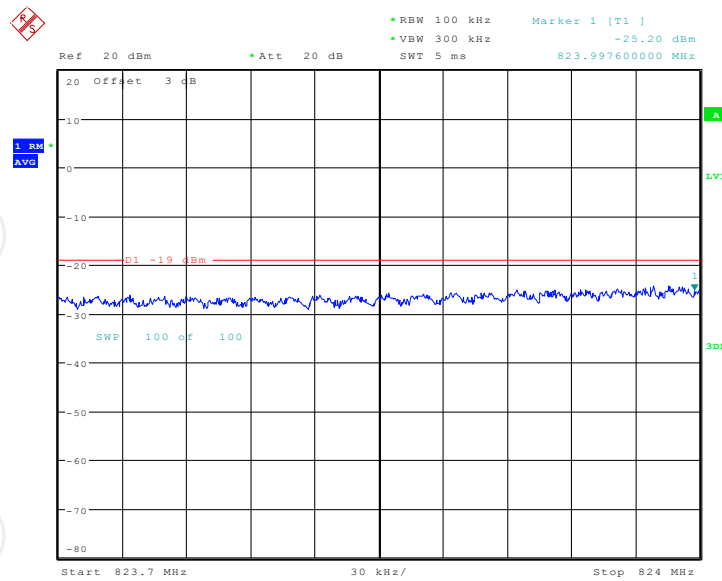
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## Cellular CDMA UL Right Side Pre AGC+10dB



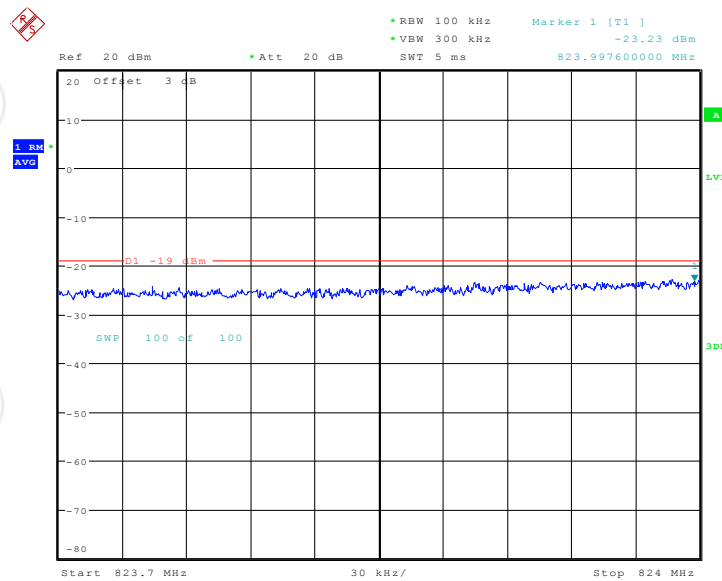
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## Cellular LTE UL Left Side Pre AGC



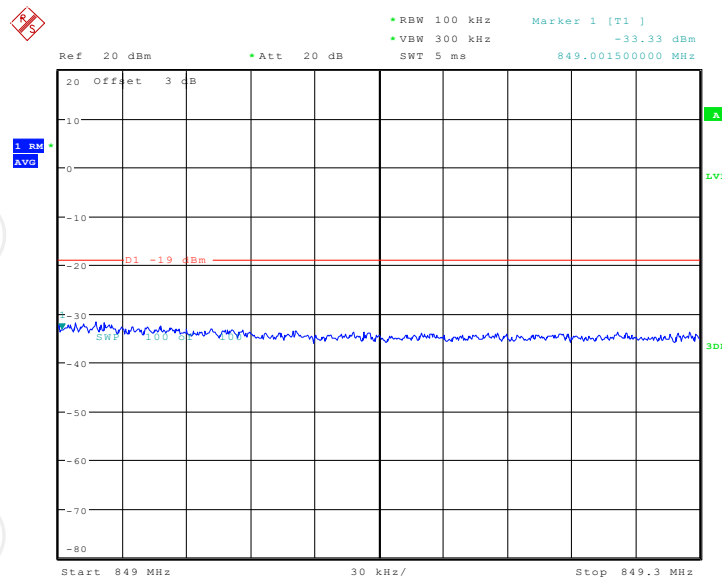
Date: 6.SEP.2021 15:12:23

## Cellular LTE UL Left Side Pre AGC+10dB



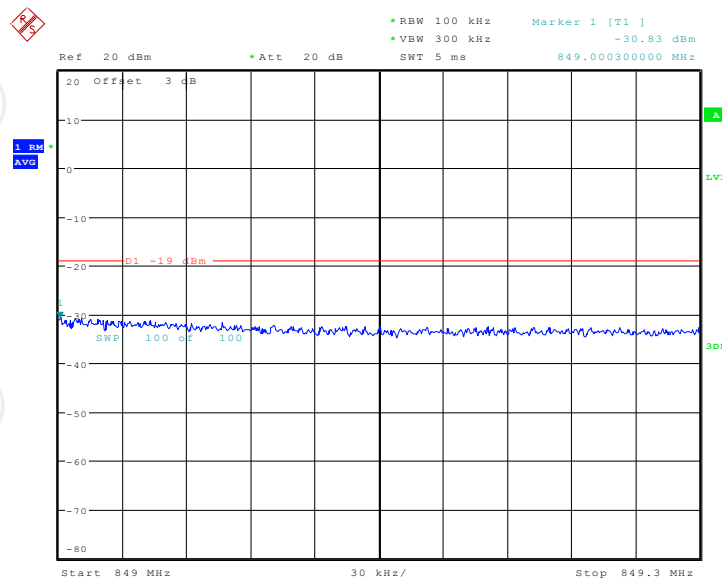
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## Cellular LTE UL Right Side Pre AGC



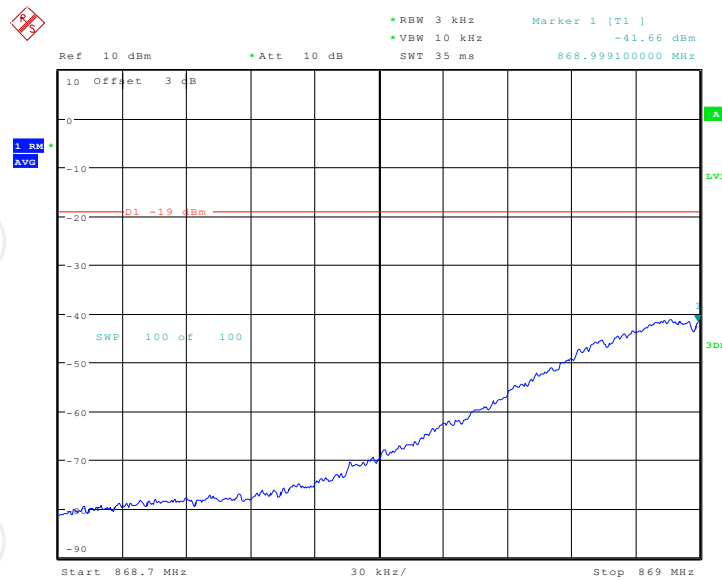
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## Cellular LTE UL Right Side Pre AGC+10dB



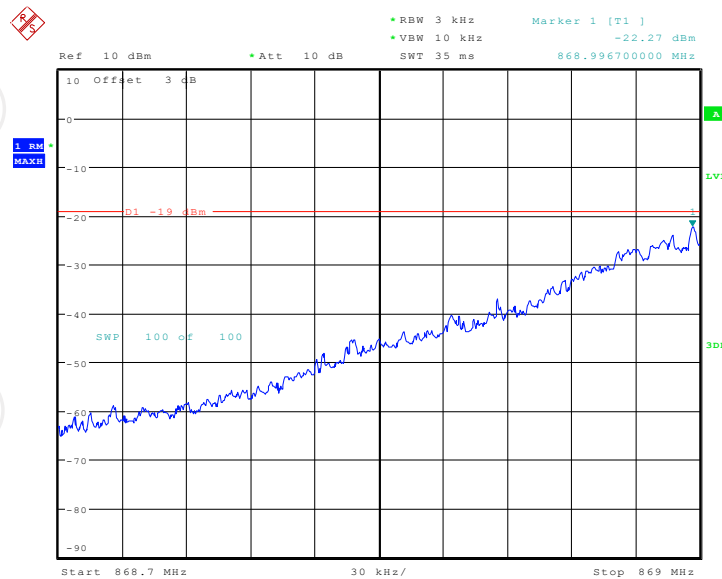
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Cellular GSM DL Left Side Pre AGC



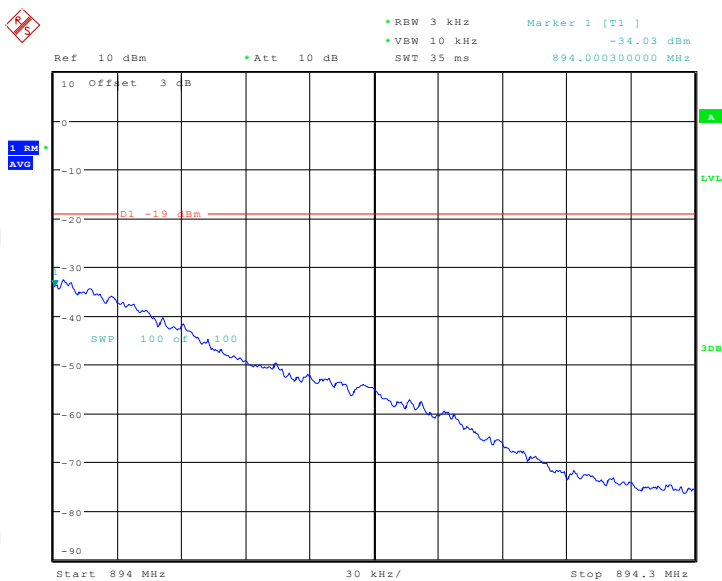
Date: 6.SEP.2021 18:09:27

Cellular GSM DL Left Side Pre AGC+10dB



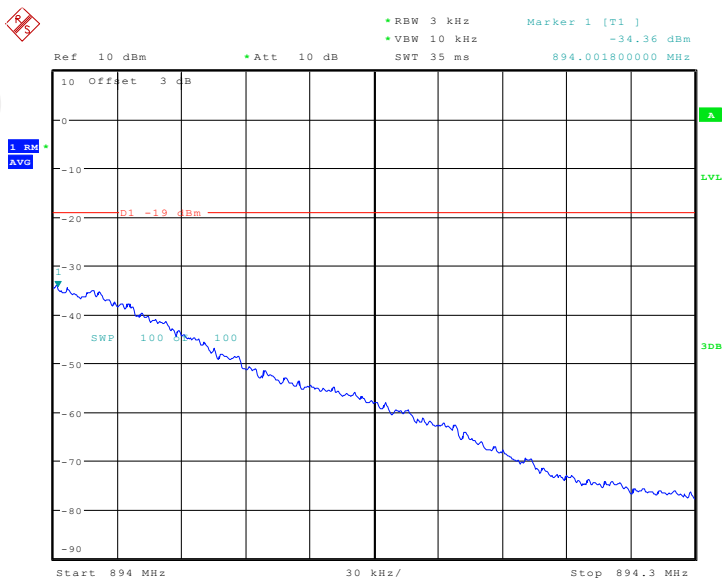
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## Cellular GSM DL Right Side Pre AGC



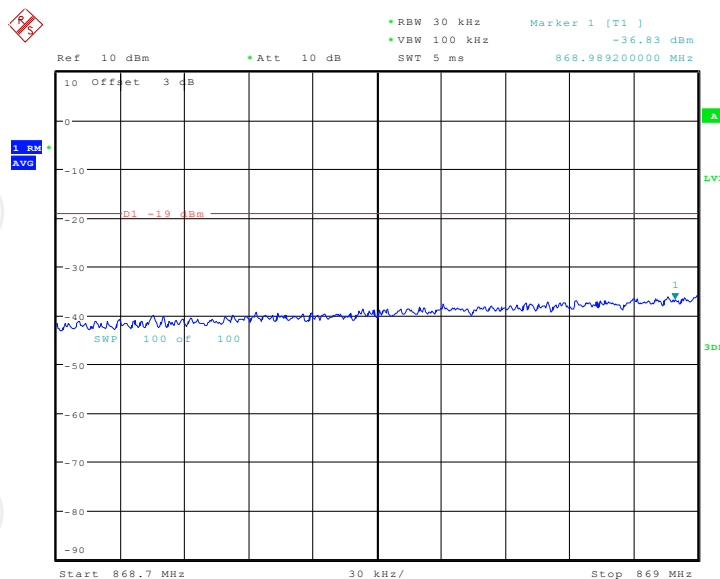
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## Cellular GSM DL Right Side Pre AGC+10dB



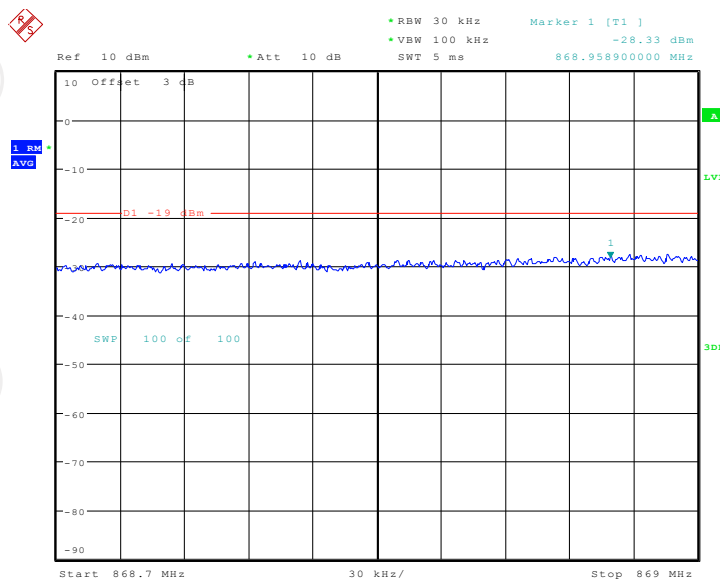
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## Cellular CDMA DL Left Side Pre AGC



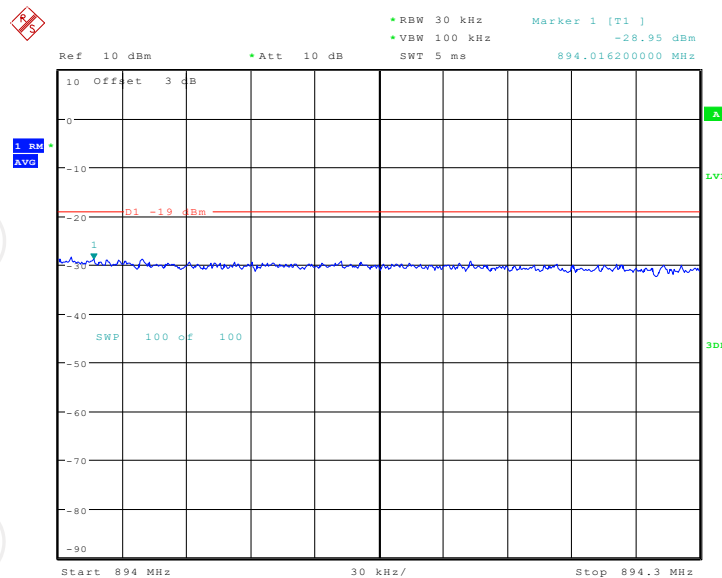
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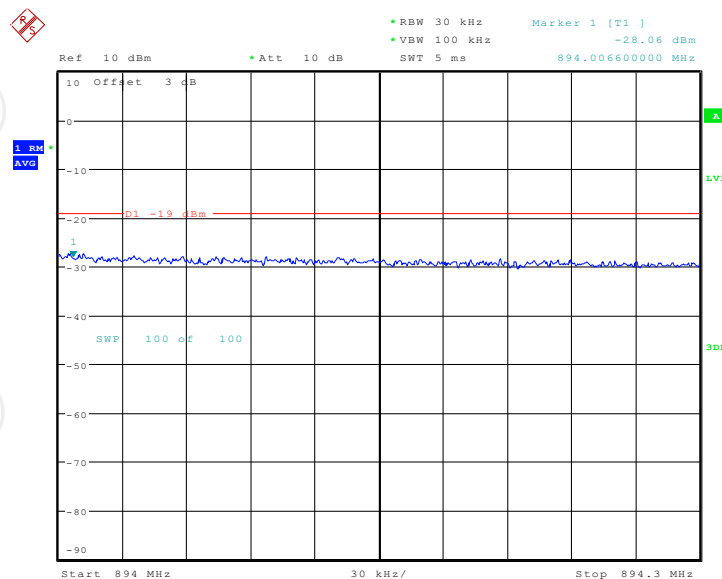
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Cellular CDMA DL Right Side Pre AGC



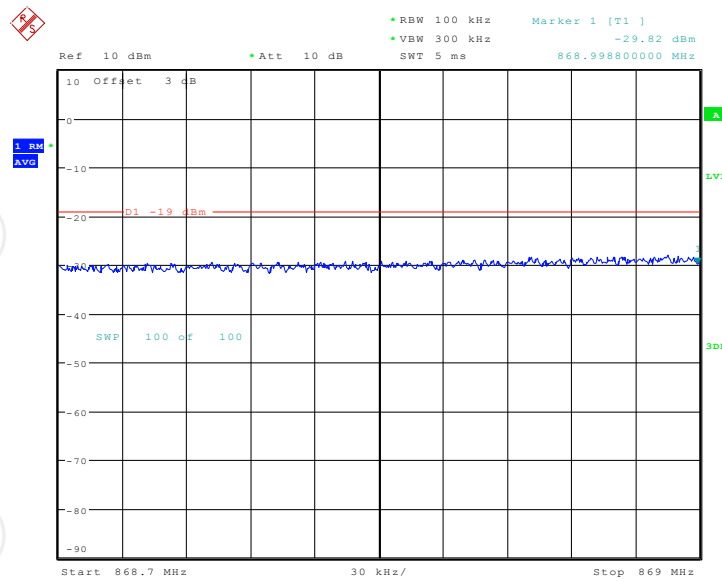
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Cellular CDMA DL Right Side Pre AGC+10dB



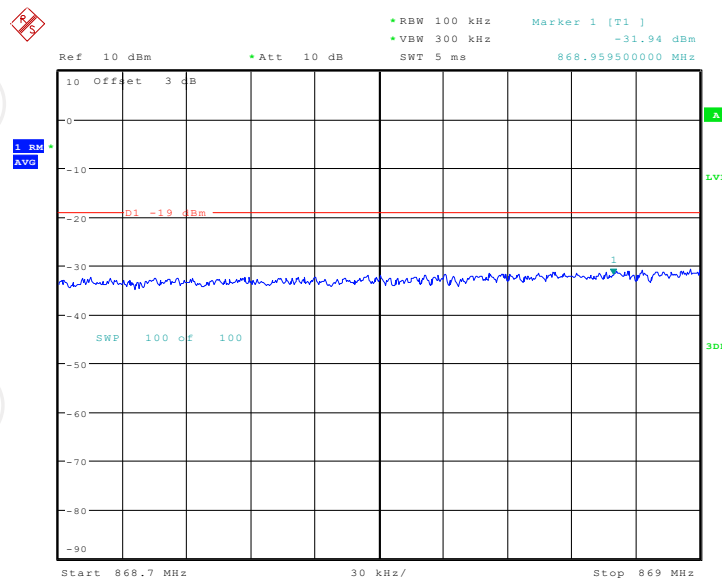
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## Cellular LTE DL Left Side Pre AGC



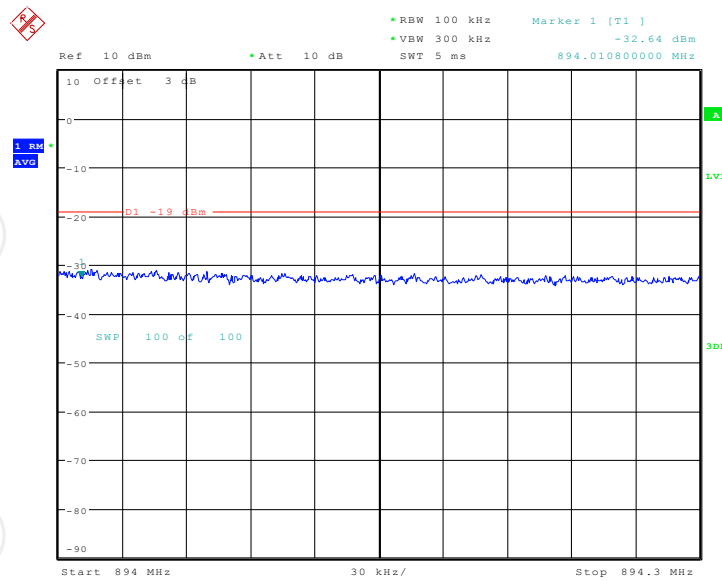
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## Cellular LTE DL Left Side Pre AGC+10dB



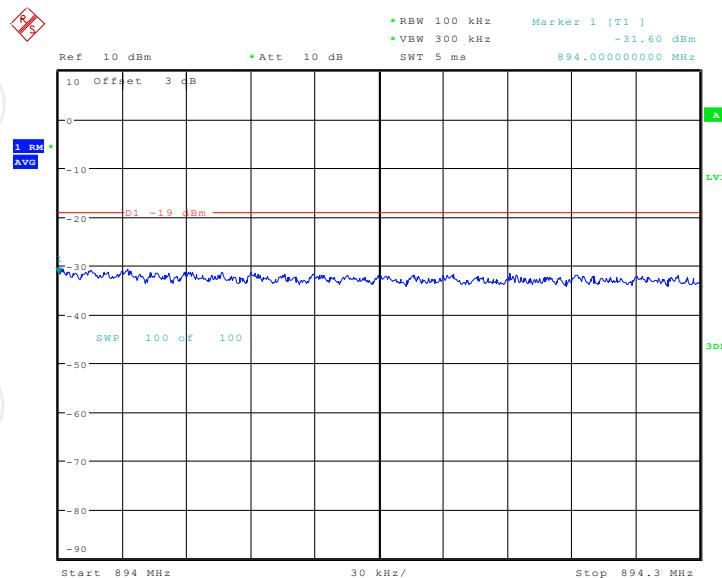
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### Cellular LTE DL Right Side Pre AGC



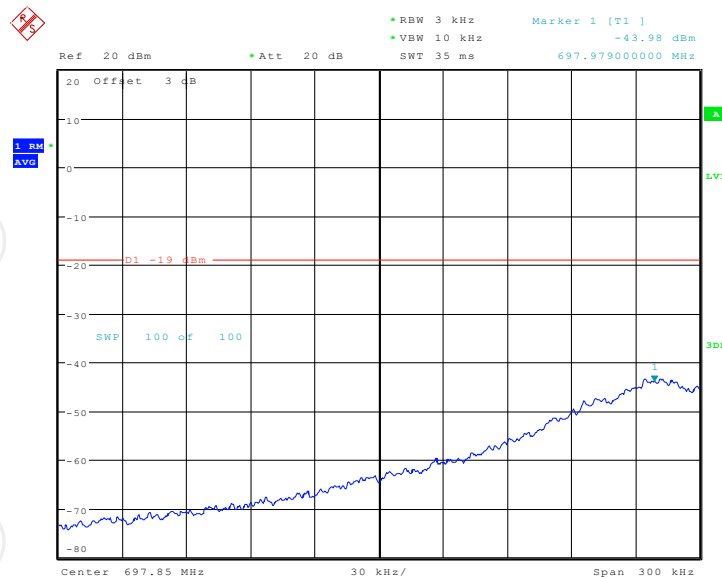
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### Cellular LTE DL Right Side Pre AGC+10dB



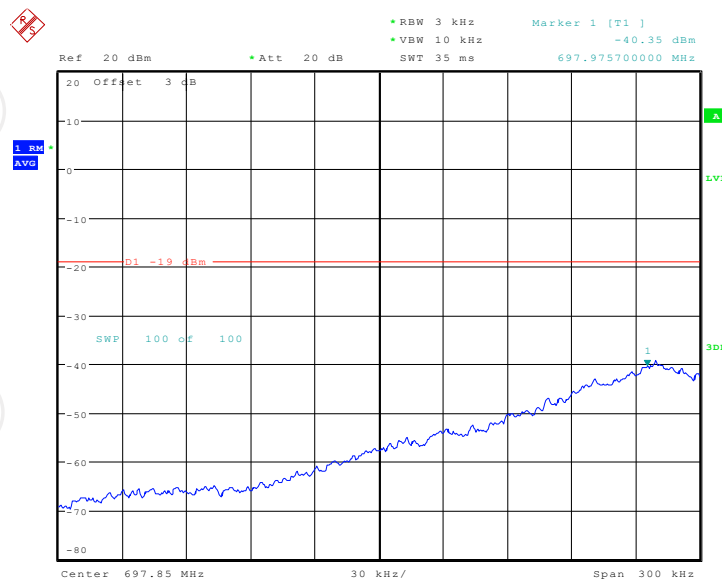
Date: 6.SEP.2021 18:14:00

Lower700MHz GSM UL Left Side Pre AGC



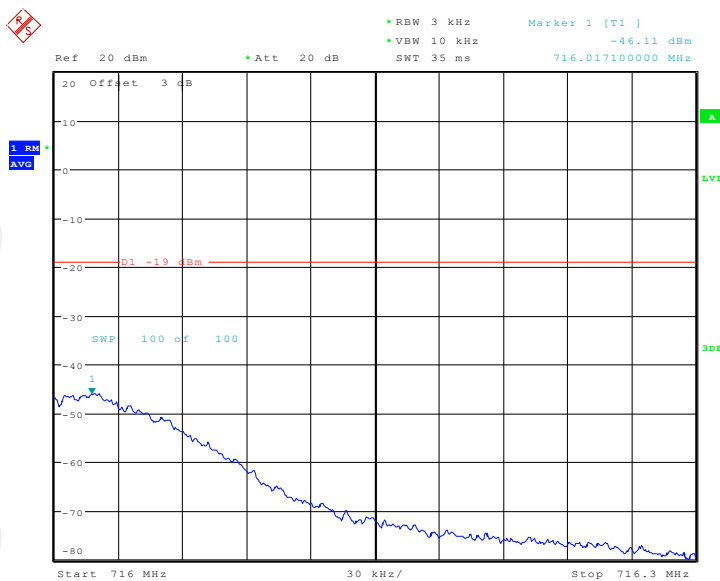
Date: 6.SEP.2021 16:53:09

Lower700MHz GSM UL Left Side Pre AGC+10dB



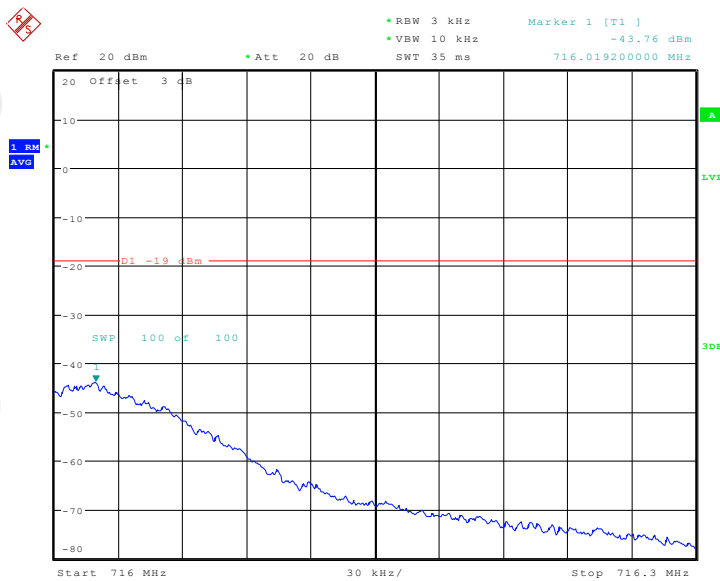
Date: 6.SEP.2021 16:53:33

### Lower700MHz GSM UL Right Side Pre AGC



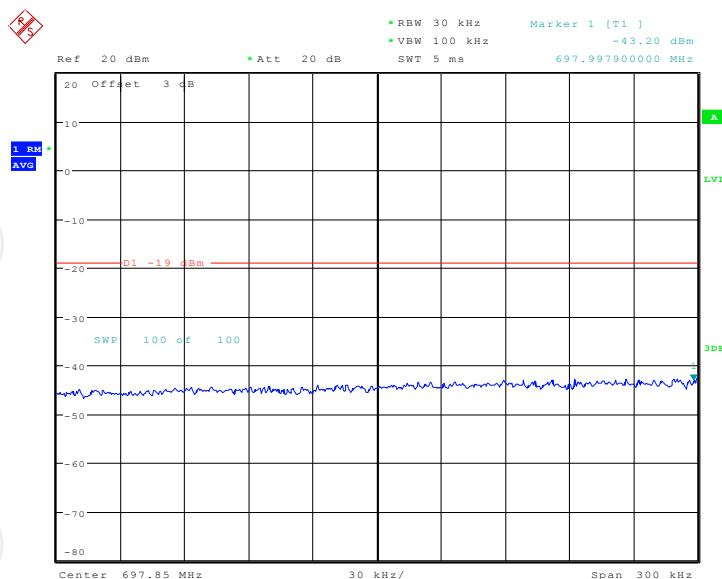
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Lower700MHz GSM UL Right Side Pre AGC+10dB



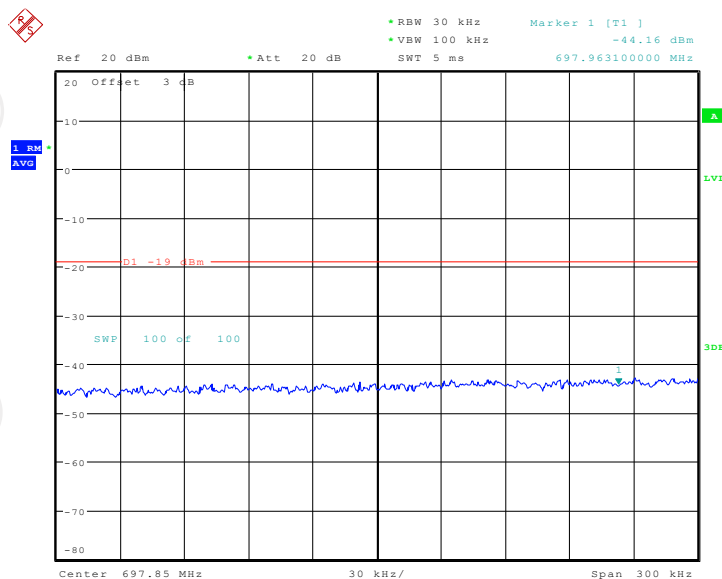
Date: 6.SEP.2021 15:21:22

## Lower700MHz CDMA UL Left Side Pre AGC



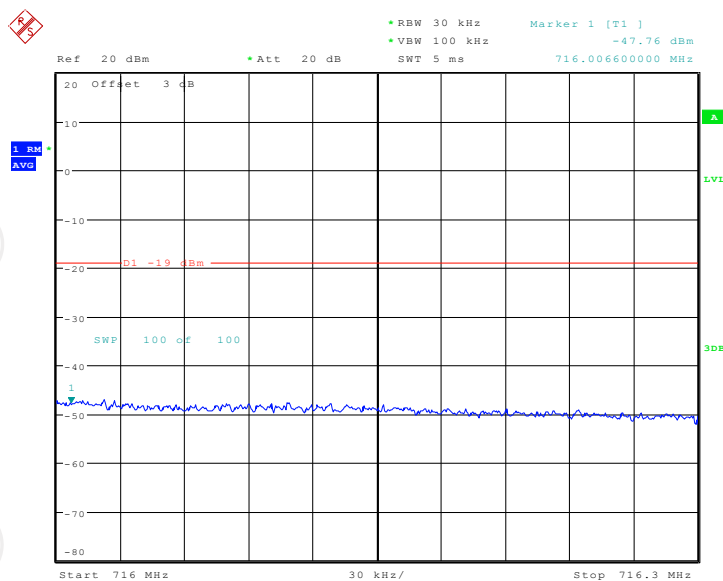
Date: 6.SEP.2021 16:52:19

## Lower700MHz CDMA UL Left Side Pre AGC+10dB



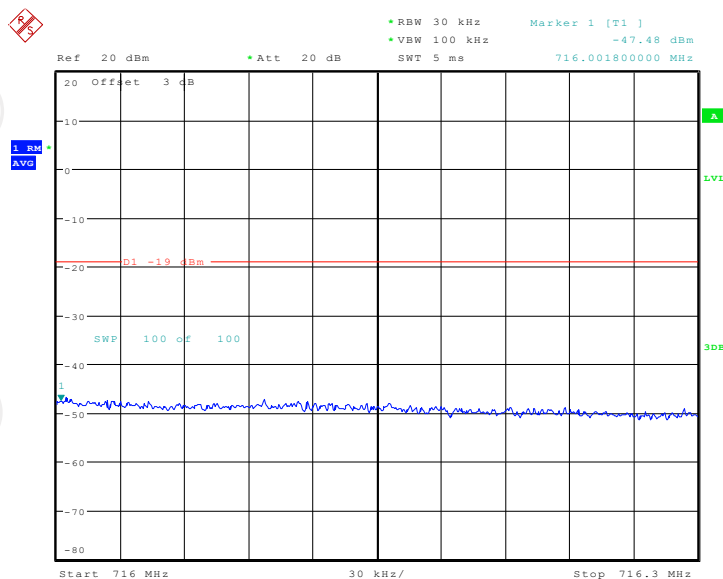
Date: 6.SEP.2021 16:51:56

## Lower700MHz CDMA UL Right Side Pre AGC



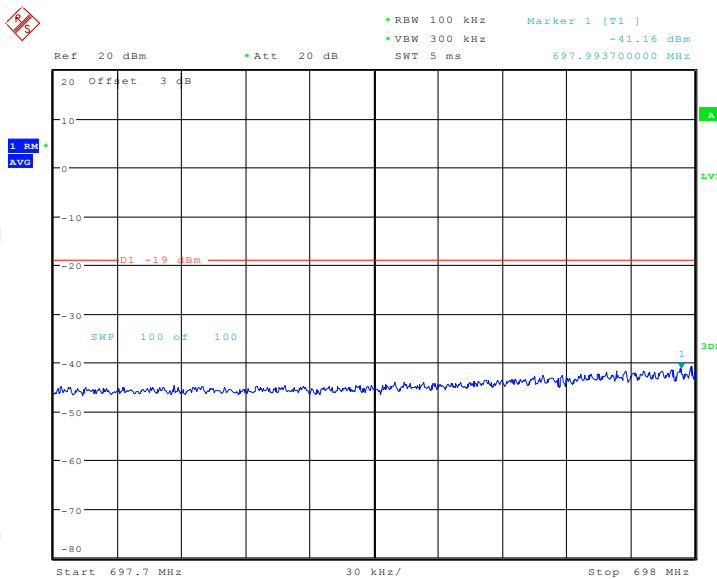
Date: 6.SEP.2021 15:31:40

## Lower700MHz CDMA UL Right Side Pre AGC+10dB



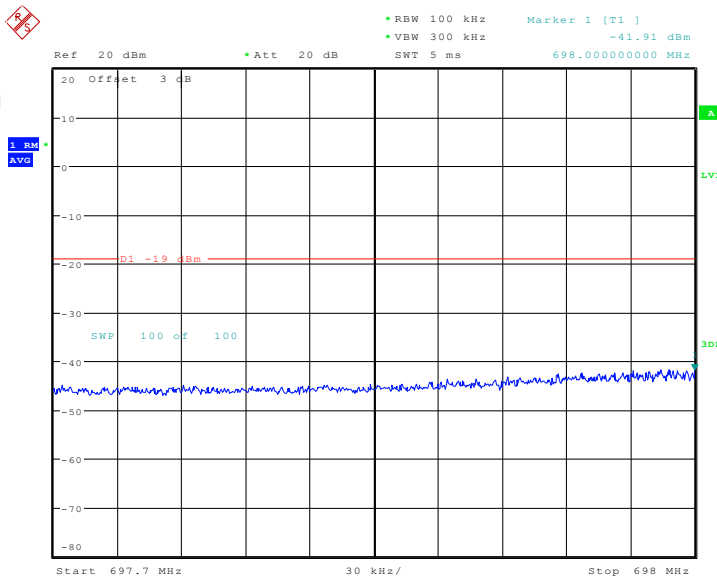
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Lower700MHz LTE UL Left Side Pre AGC



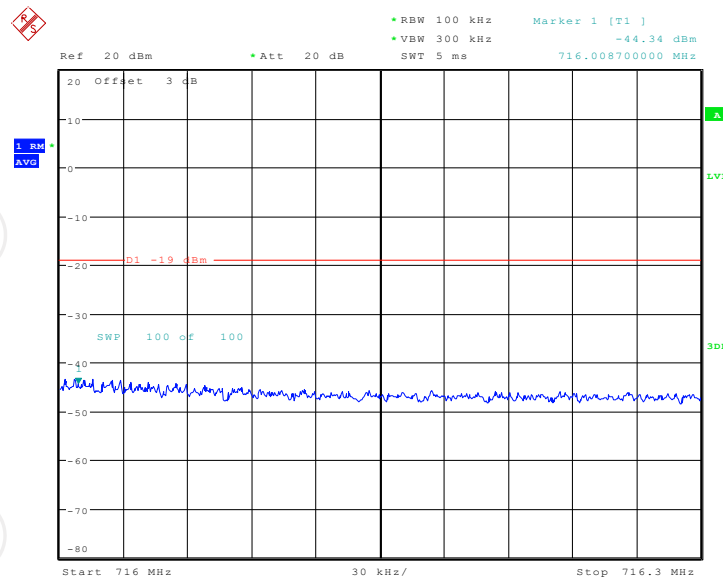
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Lower700MHz LTE UL Left Side Pre AGC+10dB



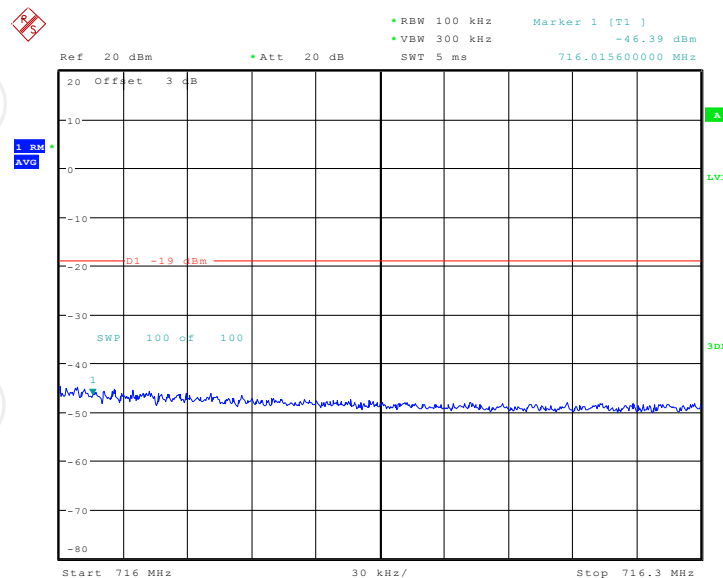
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## Lower700MHz LTE UL Right Side Pre AGC



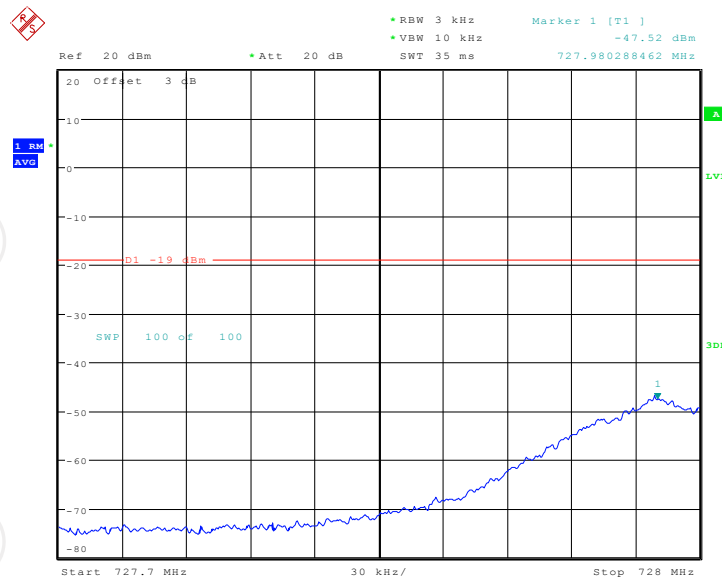
Date: 6.SEP.2021 16:48:20

## Lower700MHz LTE UL Right Side Pre AGC+10dB



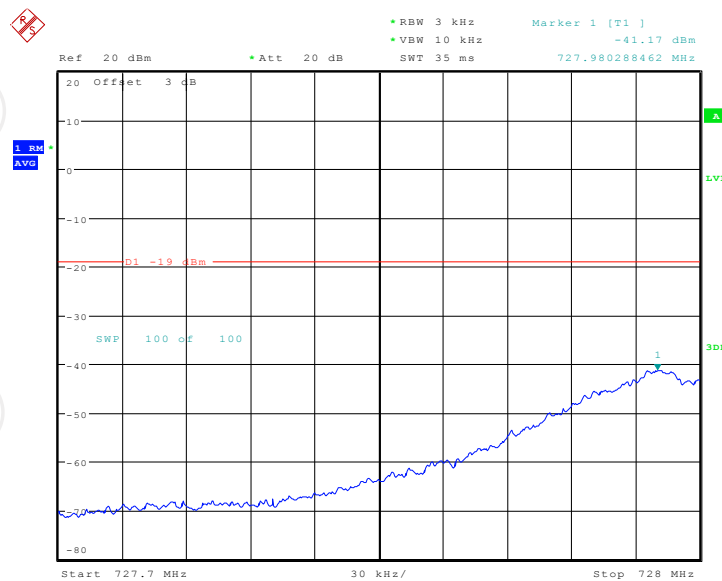
Date: 6.SEP.2021 16:48:55

## Lower700MHz GSM DL Left Side Pre AGC



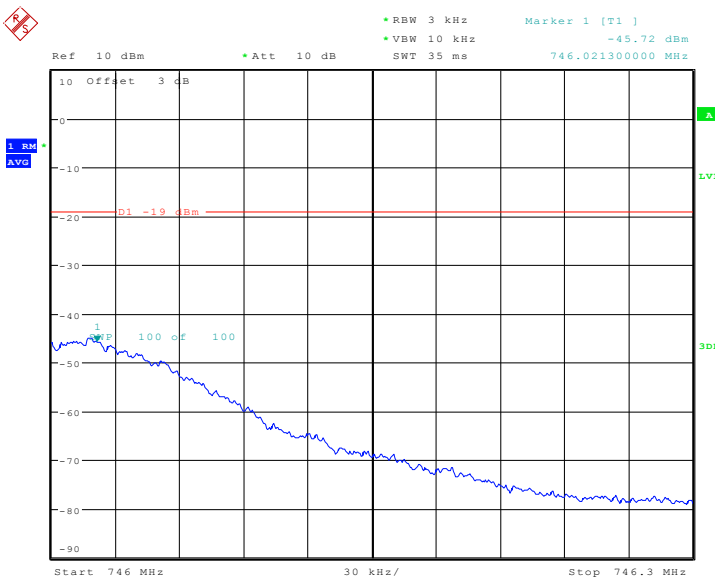
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## Lower700MHz GSM DL Left Side Pre AGC+10dB



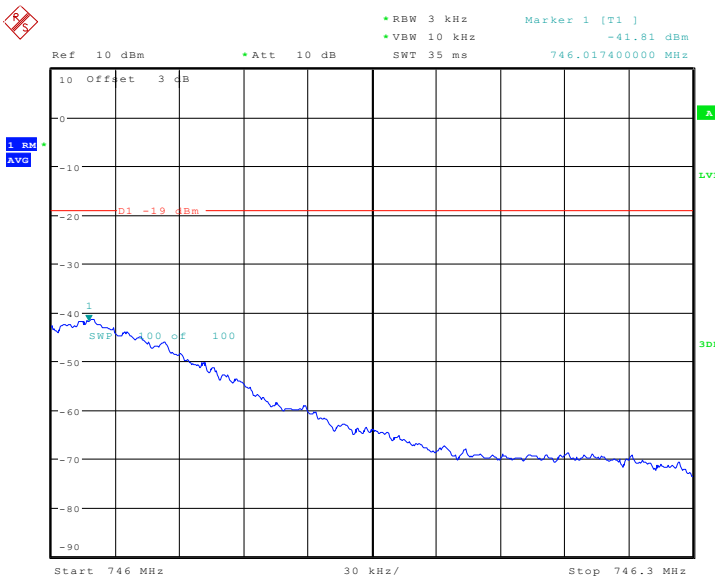
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### Lower700MHz GSM DL Right Side Pre AGC



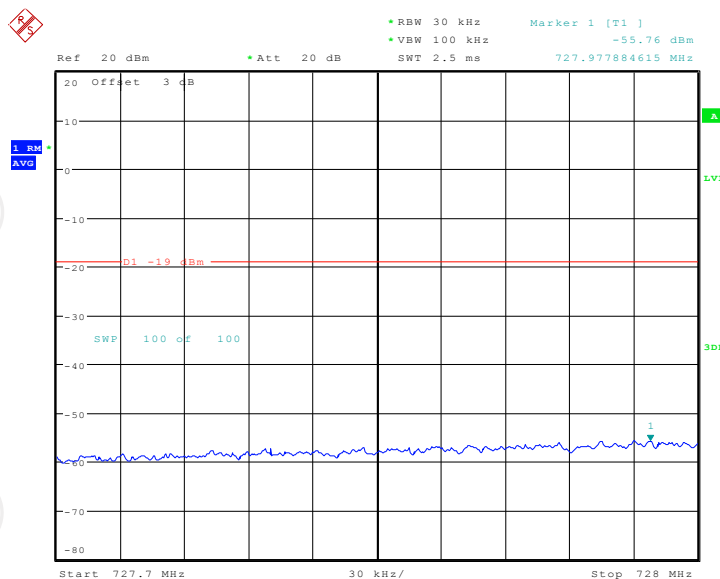
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Lower700MHz GSM DL Right Side Pre AGC+10dB



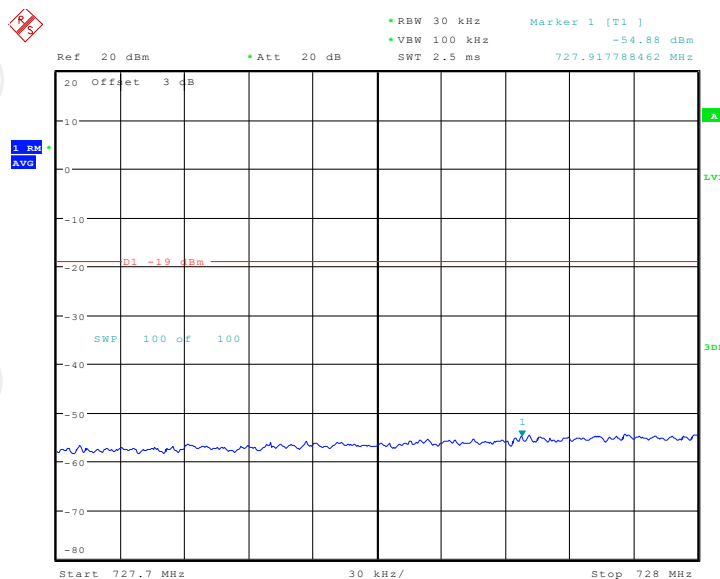
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## Lower700MHz CDMA DL Left Side Pre AGC



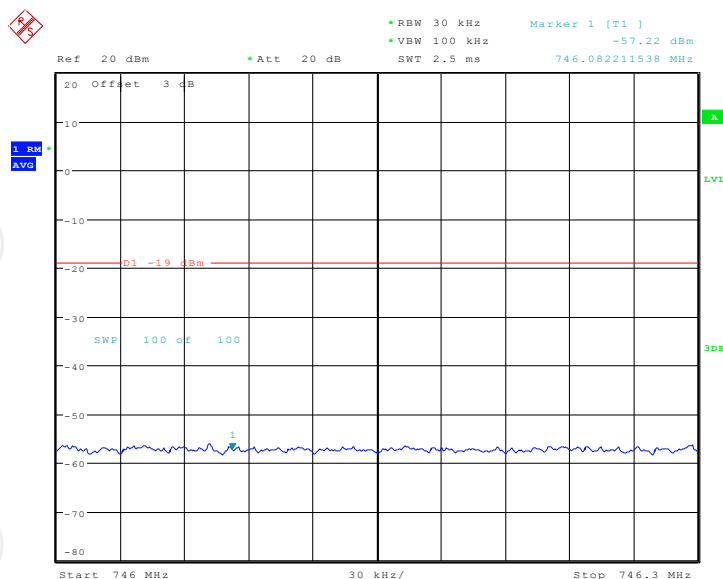
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## Lower700MHz CDMA DL Left Side Pre AGC+10dB



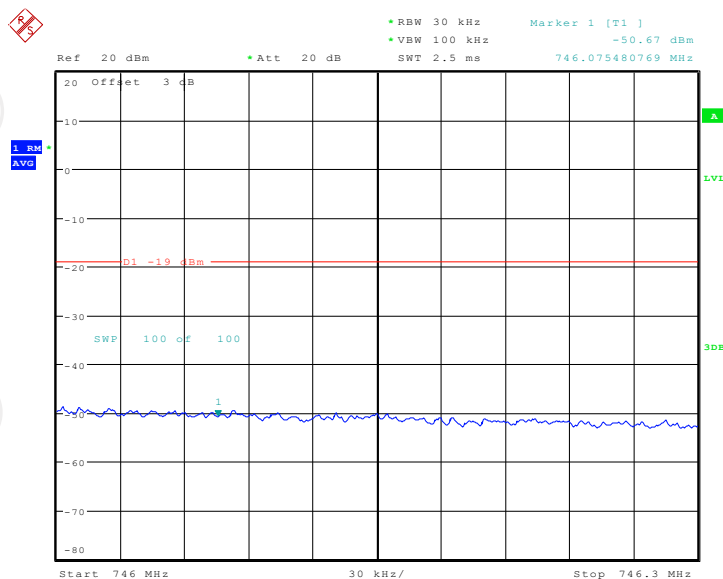
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## Lower700MHz CDMA DL Right Side Pre AGC



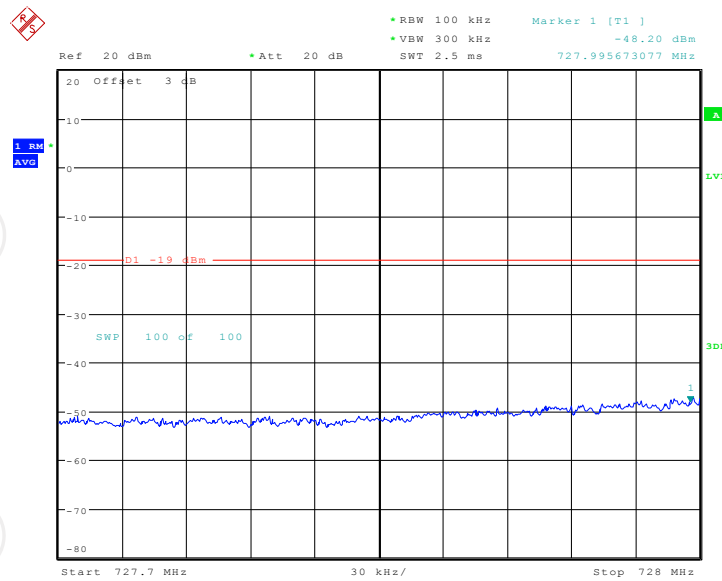
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## Lower700MHz CDMA DL Right Side Pre AGC+10dB



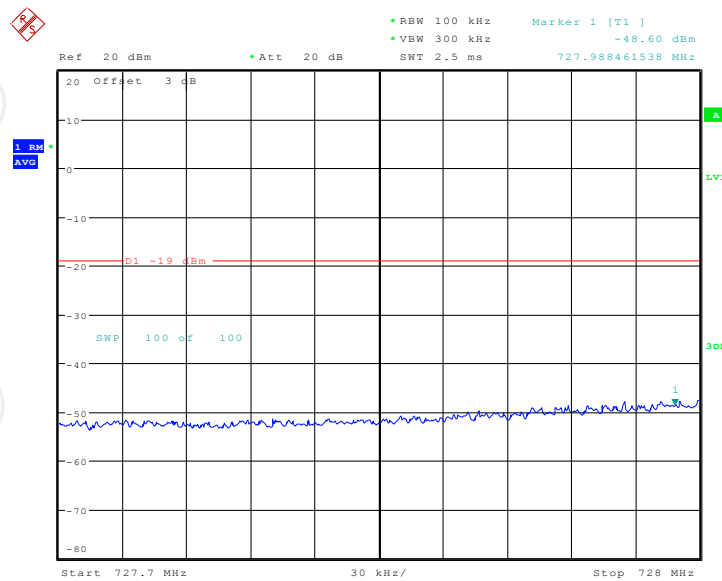
Date: 6.SEP.2021 18:34:20

Lower700MHz LTE DL Left Side Pre AGC



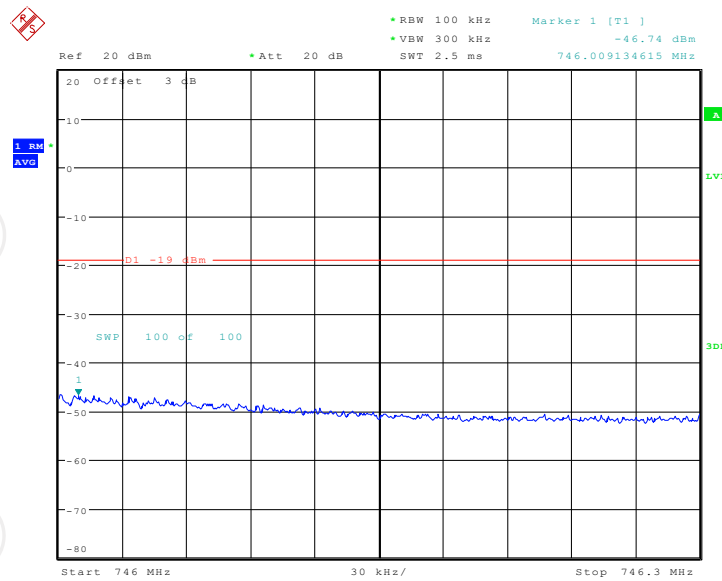
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Lower700MHz LTE DL Left Side Pre AGC+10dB



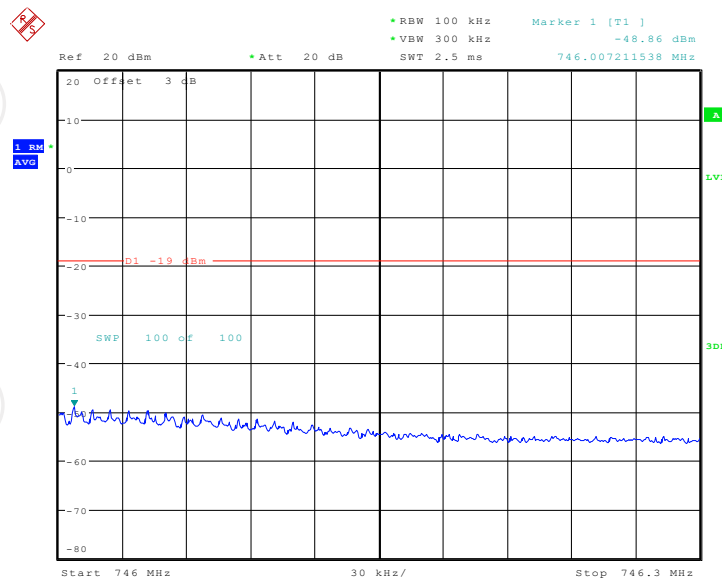
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## Lower700MHz LTE DL Right Side Pre AGC



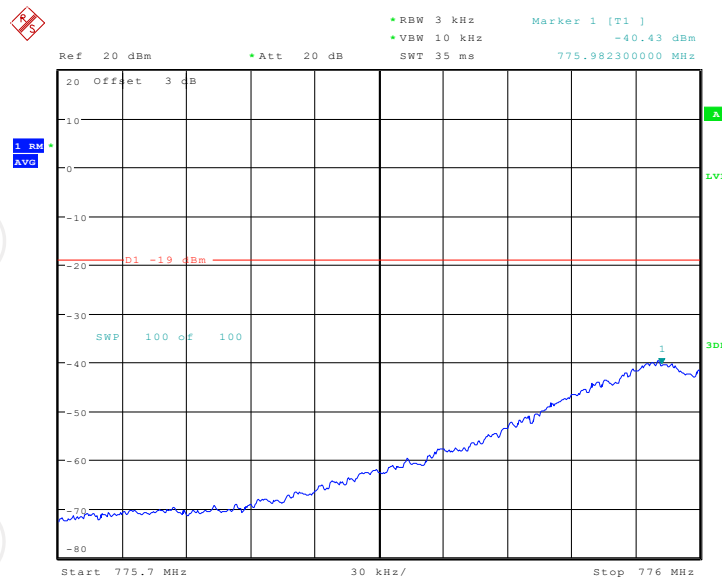
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## Lower700MHz LTE DL Right Side Pre AGC+10dB



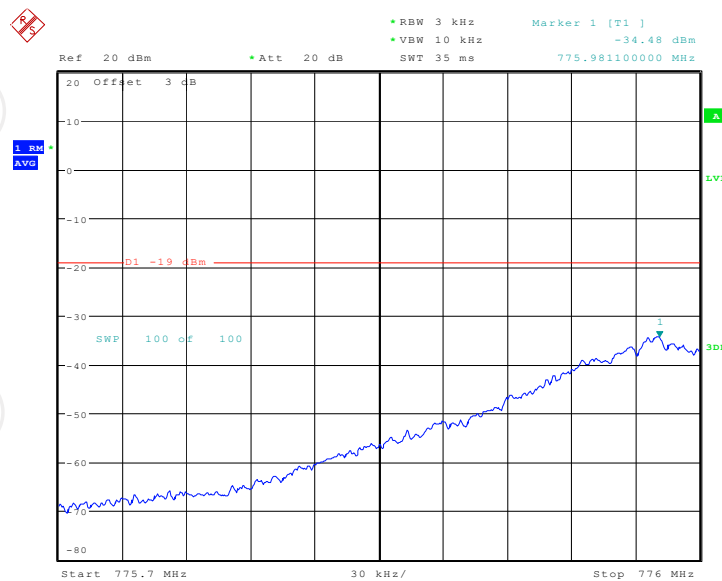
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## Upper700MHz GSM UL Left Side Pre AGC



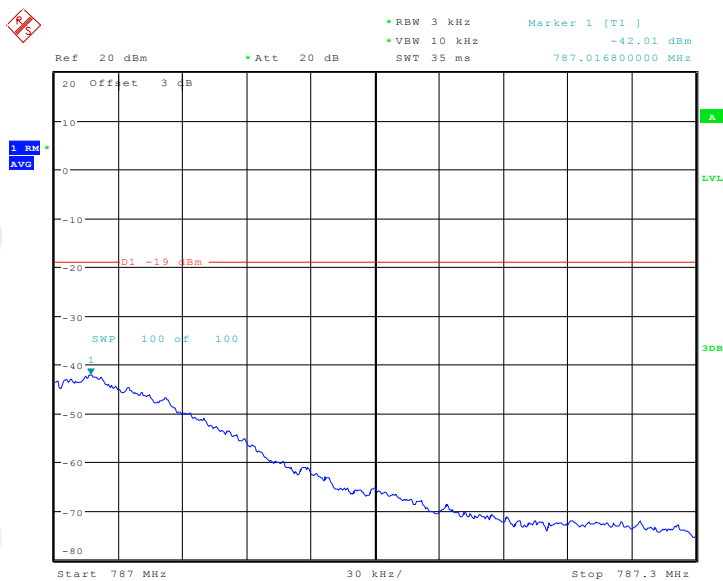
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## Upper700MHz GSM UL Left Side Pre AGC+10dB



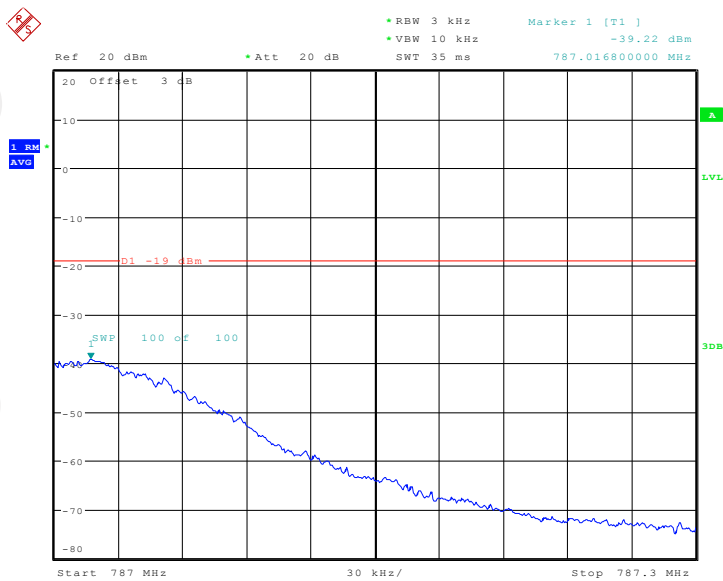
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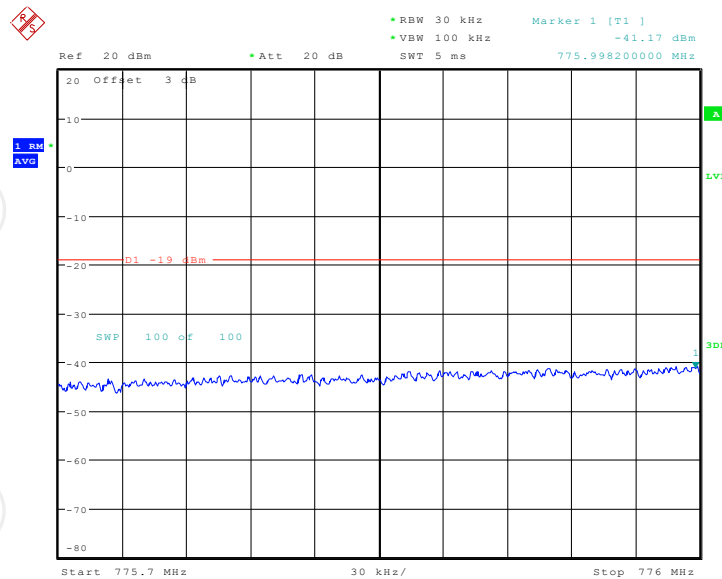
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Upper700MHz GSM UL Right Side Pre AGC+10dB



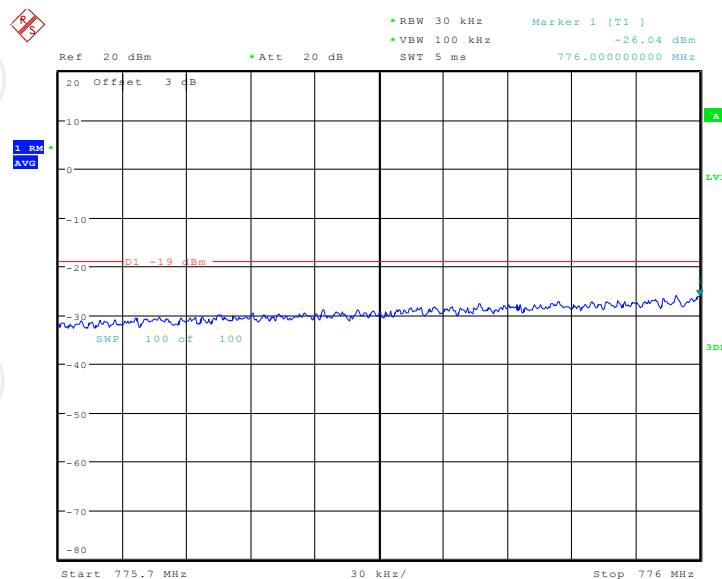
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## Upper700MHz CDMA UL Left Side Pre AGC



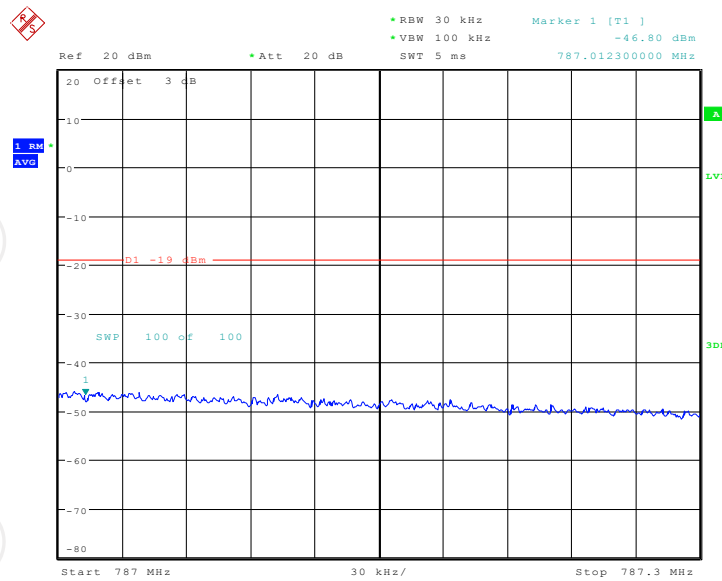
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## Upper700MHz CDMA UL Left Side Pre AGC+10dB



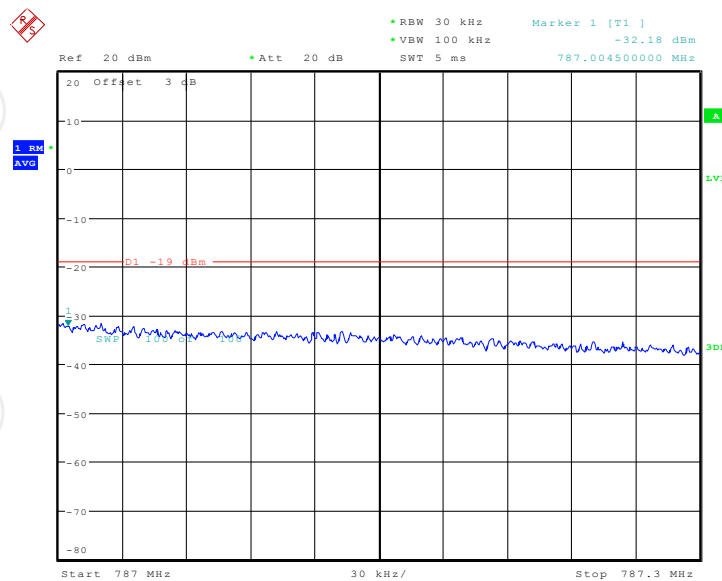
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Upper700MHz CDMA UL Right Side Pre AGC



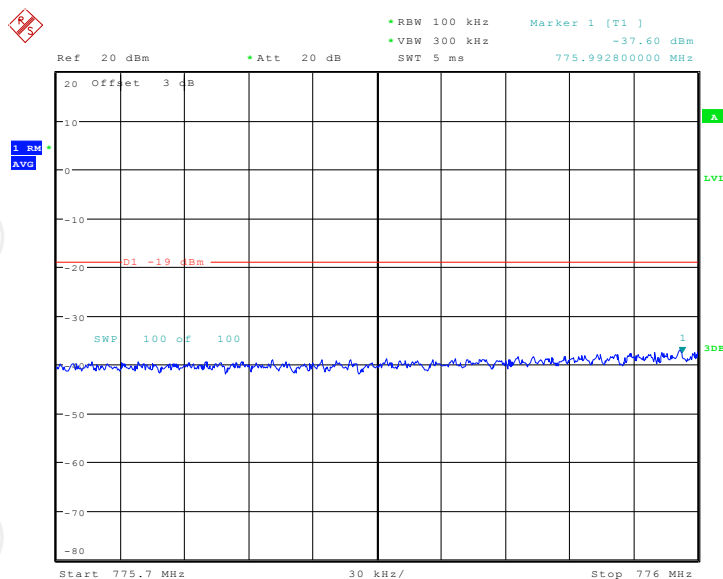
Date: 6.SEP.2021 17:01:29

Upper700MHz CDMA UL Right Side Pre AGC+10dB



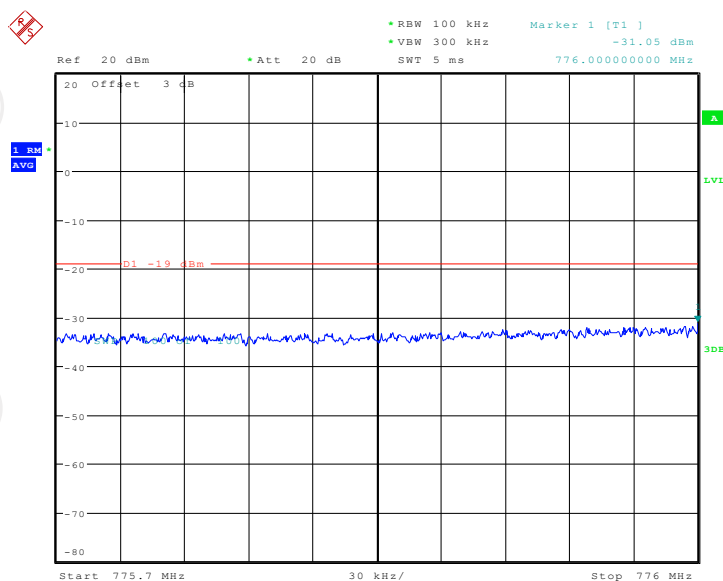
Date: 6.SEP.2021 17:01:06

## Upper700MHz LTE UL Left Side Pre AGC



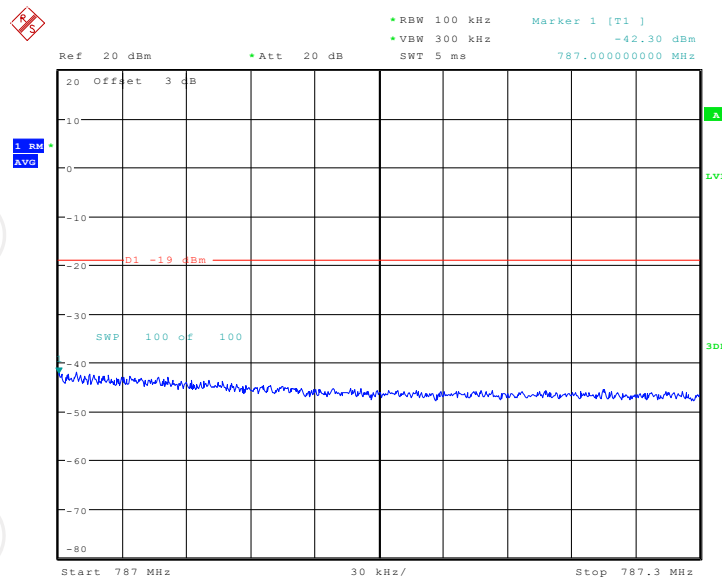
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## Upper700MHz LTE UL Left Side Pre AGC+10dB



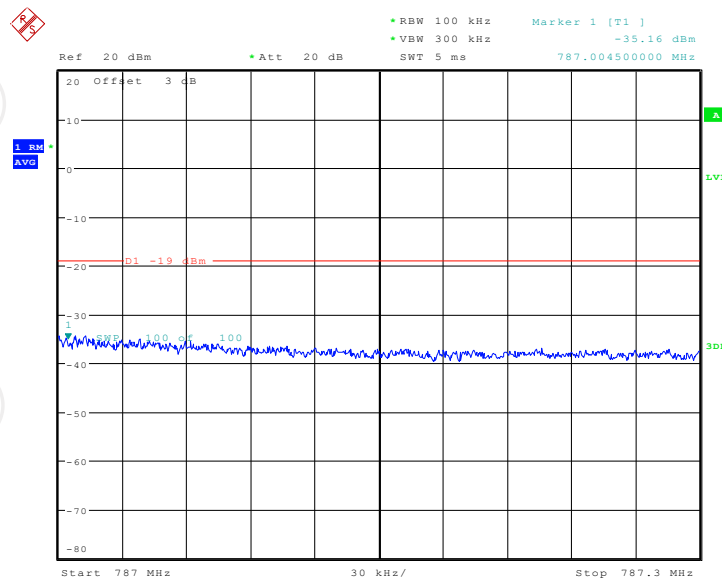
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## Upper700MHz LTE UL Right Side Pre AGC



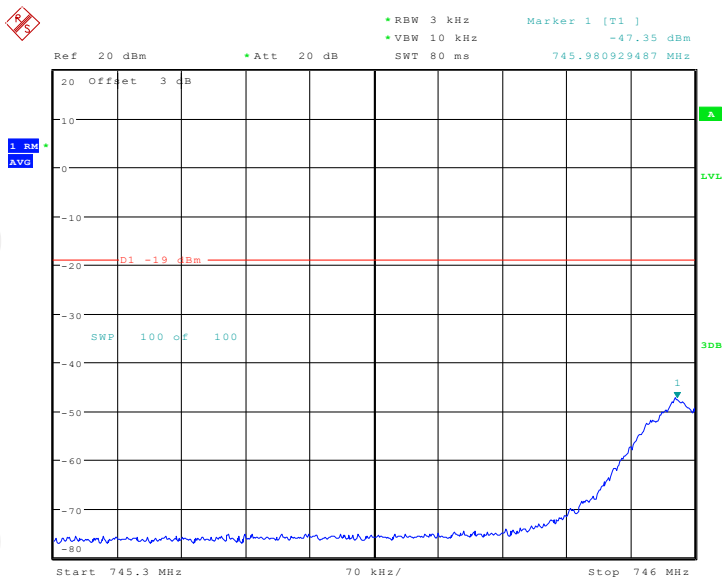
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## Upper700MHz LTE UL Right Side Pre AGC+10dB



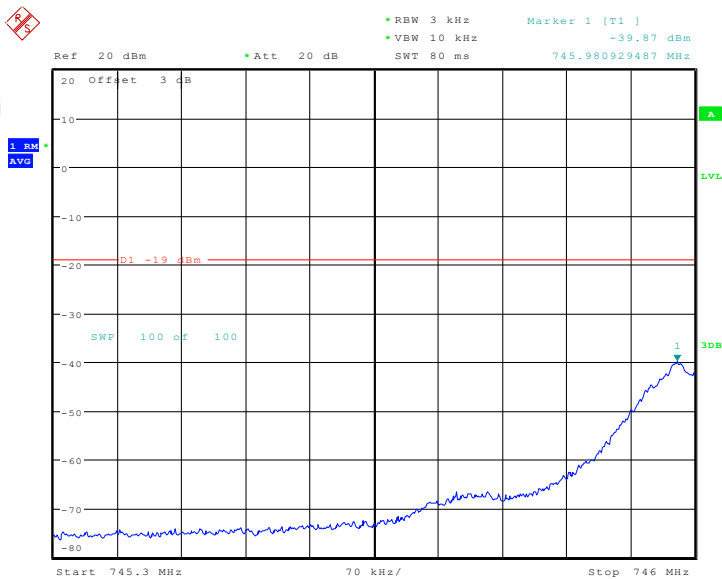
Date: 6.SEP.2021 17:00:10

### Upper700MHz GSM DL Left Side Pre AGC



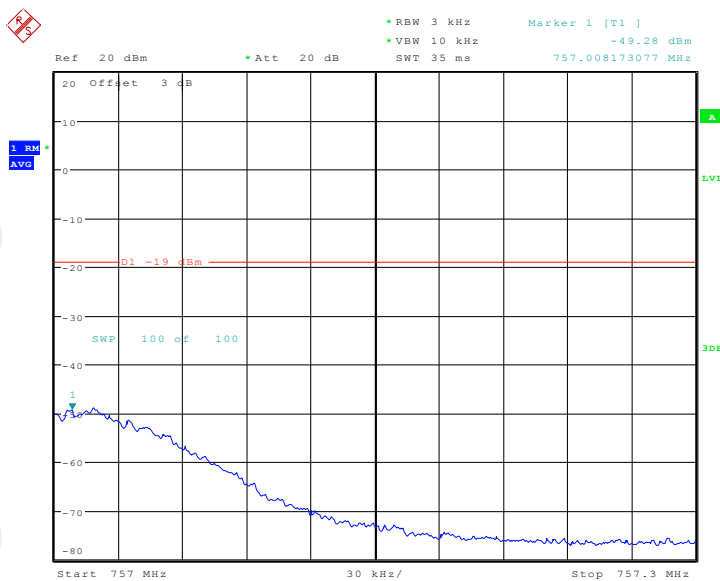
Date: 6.SEP.2021 18:41:33

Upper700MHz GSM DL Left Side Pre AGC+10dB



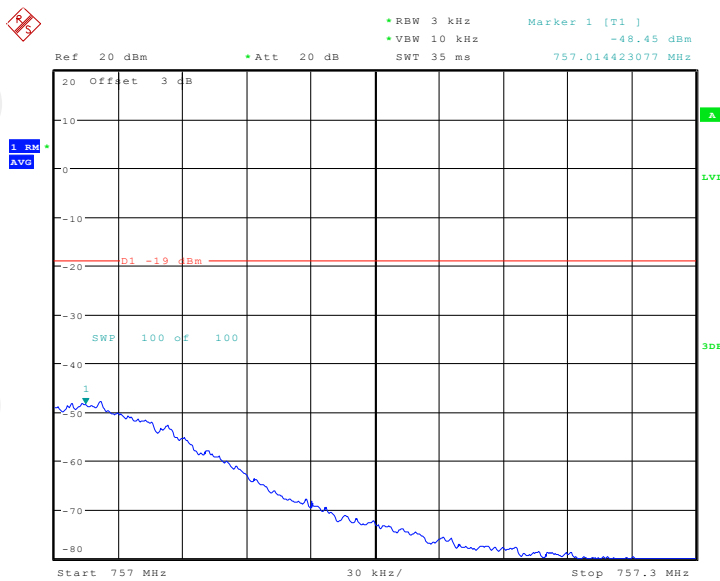
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## Upper700MHz GSM DL Right Side Pre AGC



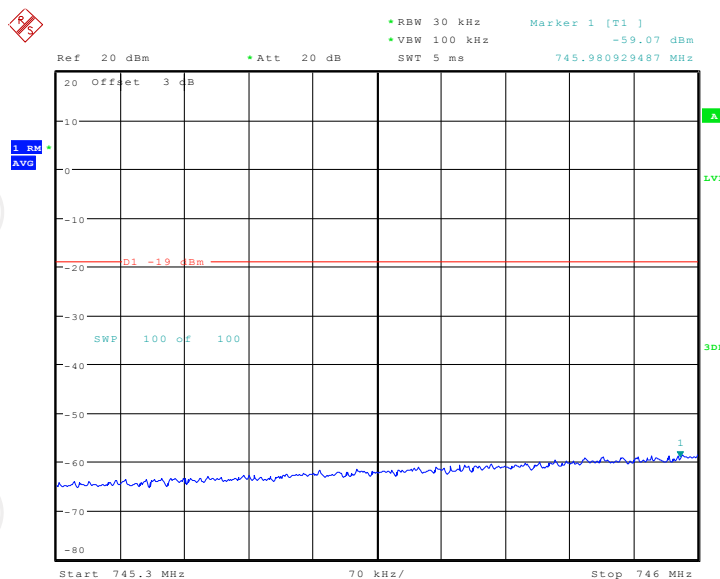
Date: 6.SEP.2021 18:47:18

Upper700MHz GSM DL Right Side Pre AGC+10dB



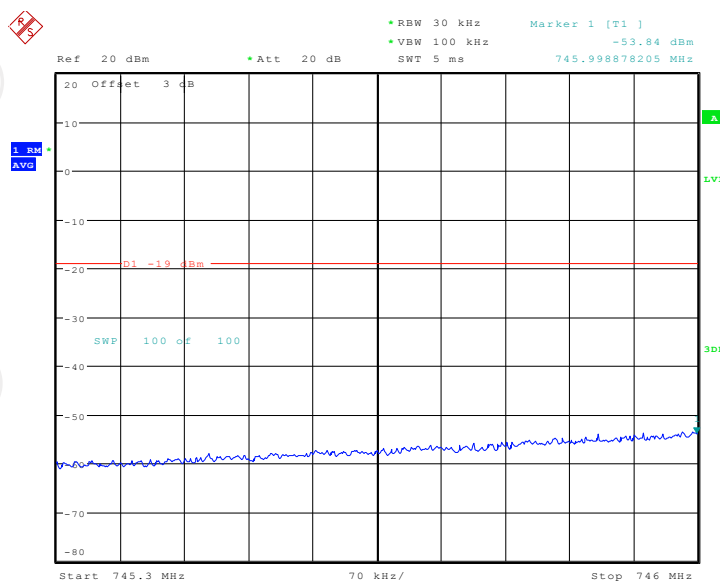
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## Upper700MHz CDMA DL Left Side Pre AGC



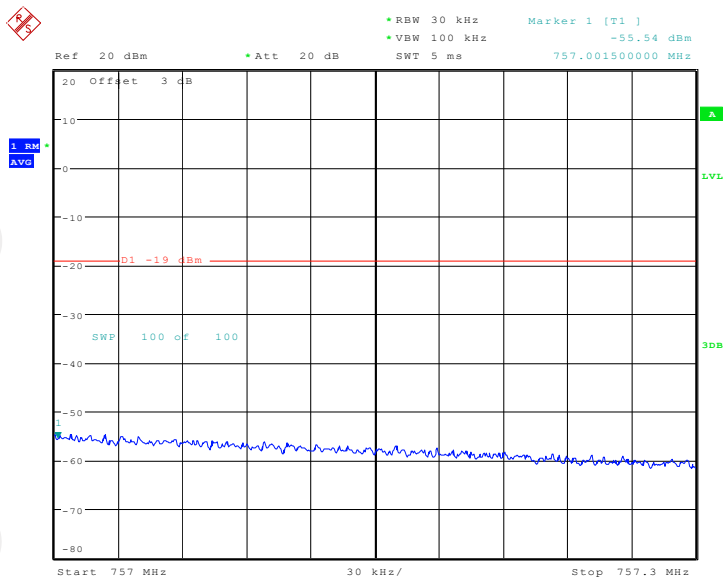
Date: 6.SEP.2021 18:42:17

## Upper700MHz CDMA DL Left Side Pre AGC+10dB



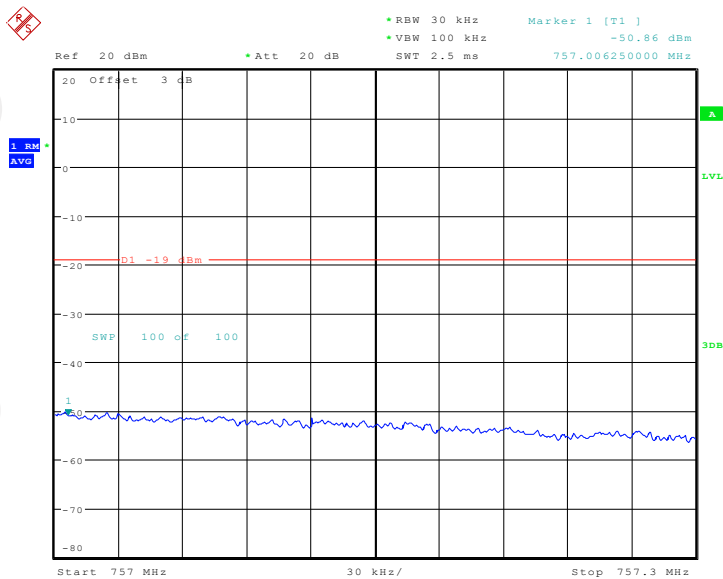
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## Upper700MHz CDMA DL Right Side Pre AGC



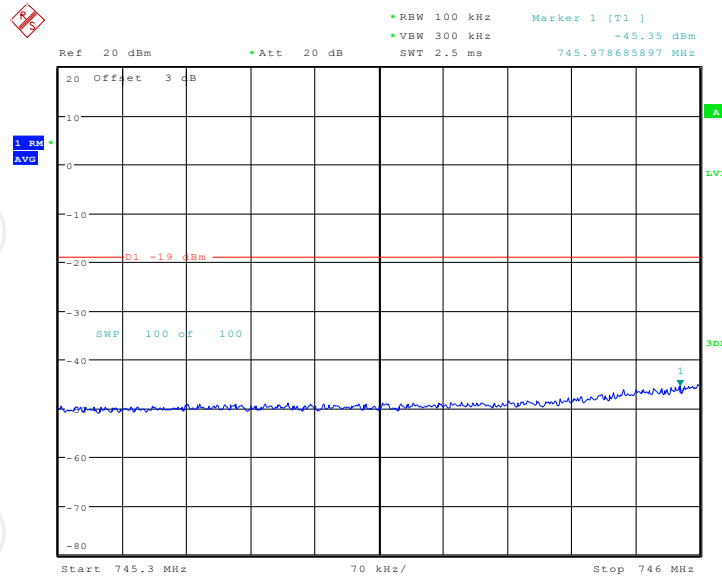
Date: 6.SEP.2021 20:02:23

## Upper700MHz CDMA DL Right Side Pre AGC+10dB



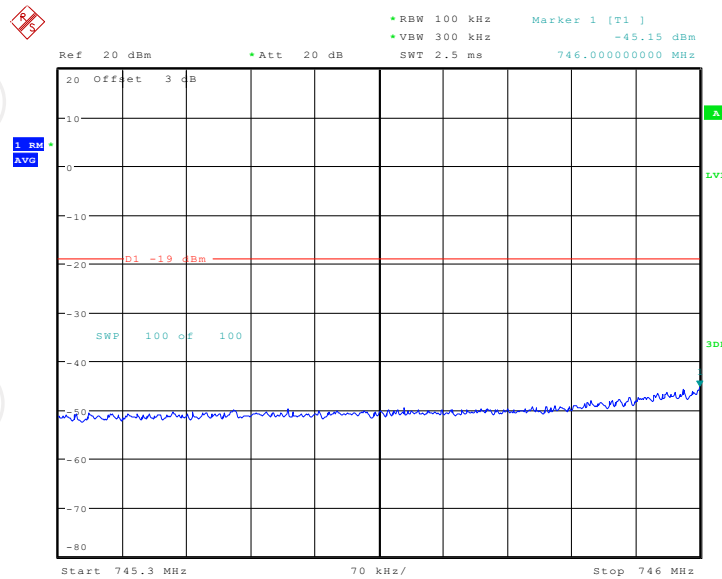
Date: 6.SEP.2021 18:46:15

Upper700MHz LTE DL Left Side Pre AGC



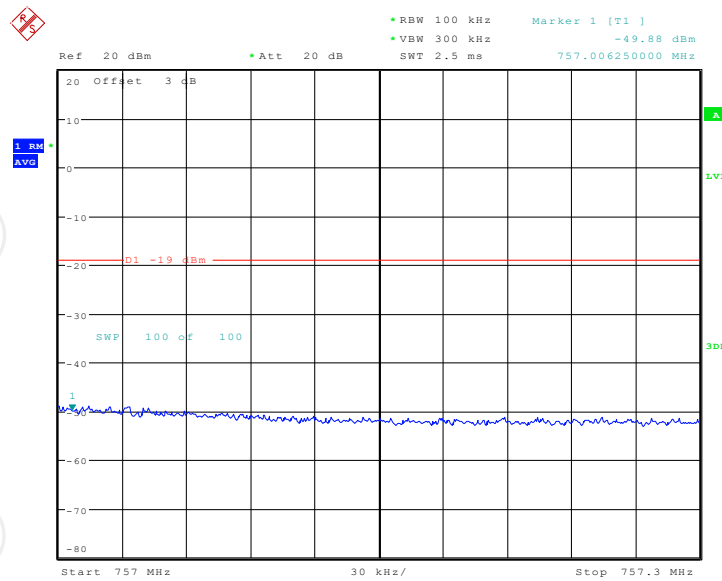
Date: 6.SEP.2021 18:43:44

Upper700MHz LTE DL Left Side Pre AGC+10dB



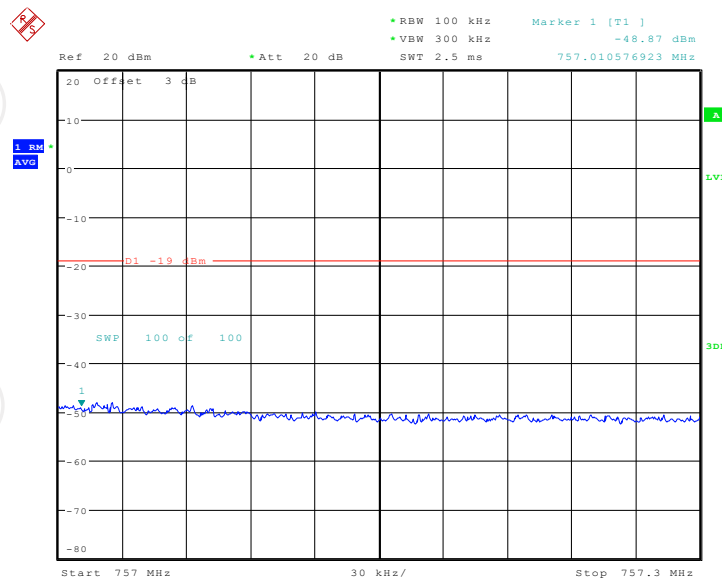
Date: 6.SEP.2021 18:43:22

## Upper700MHz LTE DL Right Side Pre AGC



Date: 6.SEP.2021 18:44:45

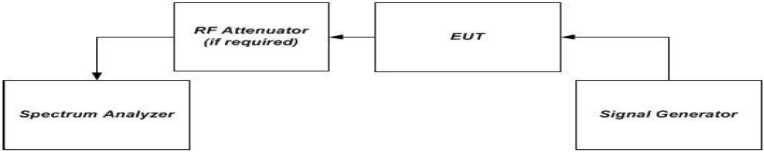
## Upper700MHz LTE DL Right Side Pre AGC+10dB



Date: 6.SEP.2021 18:45:02

## 5.5. Conducted Spurious Emission

### 5.5.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC Part2 Section 1051; FCC Rules Part 27 Subpart C, Section 27.53                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Test Method:</b>      | KDB 935210 D03 Signal Booster Measurements v04r04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Limit:</b>            | -13 dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Test Setup:</b>       |  <pre> graph LR     SG[Signal Generator] --&gt; EUT[EUT]     EUT --&gt; RA[RF Attenuator (if required)]     RA --&gt; SA[Spectrum Analyzer] </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Test Procedure:</b>   | <p>a) Connect the EUT to the test equipment as shown in Set-Up. Begin with the uplink output connected to the spectrum analyzer.</p> <p>b) Configure the signal generator for AWGN with a 99% occupied bandwidth of 4.1 MHz operation with a center frequency corresponding to the center of the CMRS band under test.</p> <p>c) Set the signal generator amplitude to the level determined in the power measurement procedure in Maximum power.</p> <p>d) Turn on the signal generator RF output and measure the spurious emission power levels with an appropriate measurement instrument as follows.</p> <p>e) Set RBW = measurement bandwidth specified in the applicable rule section for the operational frequency band under consideration (see Annex A for relevant cross-references). Note that many of the individual rule sections permit the use of a narrower RBW (typically <math>\geq 1\%</math> of the emission bandwidth) to enhance measurement accuracy, but the result must then be integrated over the specified measurement bandwidth.</p> <p>f) Set VBW = 3 X RBW.</p> <p>g) Select the power averaging (RMS) detector. (See above note regarding the use of a peak detector for preliminary measurements.)</p> <p>h) Sweep time = auto-couple.</p> <p>i) Set the analyzer start frequency to the lowest radio frequency signal generated in the equipment, without going below 9 kHz, and the stop frequency to the lower band/block edge frequency minus 100 kHz or 1 MHz, as specified in the applicable rule part. Note that the number of measurement points in each sweep must be <math>\geq (2 \times \text{span}/\text{RBW})</math> which may require that the measurement range defined by the start and stop frequencies above be subdivided, depending on the available number of measurement points provided by the spectrum analyzer. Trace average at least 10 traces in power averaging (i.e., RMS) mode.</p> <p>j) Use the peak marker function to identify the highest amplitude level over each measured frequency range Record the frequency and amplitude and capture a Test Plots for inclusion in the test report.</p> <p>k) Reset the analyzer start frequency to the upper band/block edge frequency plus 100 kHz or 1 MHz, as specified in the applicable rule part, and the analyzer stop frequency to 10 times the highest frequency of the fundamental emission. Note that the number of measurement points in each sweep must be <math>\geq (2 \times \text{span}/\text{RBW})</math> which may require that the measurement range defined by the start and stop frequencies above be subdivided, depending on the available number of measurement points provided by the</p> |

|                     |                                                                                                                                                                                                                                                                                                                          |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | spectrum analyzer.<br>l) Use the peak marker function to identify the highest amplitude level over each of the measured frequency ranges. Record the frequency and amplitude and capture a Test Plots for inclusion in the test report.<br>m) Repeat steps b) through l) for each supported frequency band of operation. |
| <b>Test Result:</b> | PASS                                                                                                                                                                                                                                                                                                                     |

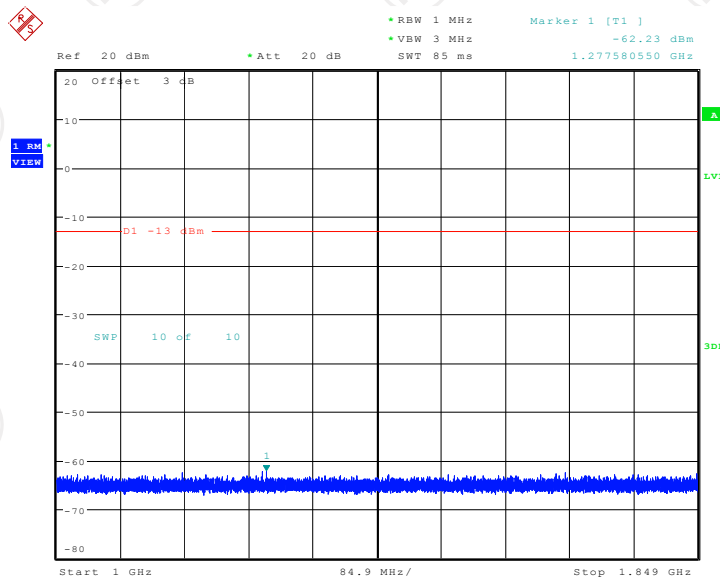
### 5.5.2. Test Instruments

| Equipment         | Manufacturer | Model  | Serial Number | Calibration Date | Calibration Due |
|-------------------|--------------|--------|---------------|------------------|-----------------|
| Signal Generator  | Agilent      | N5182A | MY47070282    | Jul. 19, 2021    | Jul. 18, 2022   |
| Spectrum Analyzer | R&S          | FSU    | 200054        | Jul. 19, 2021    | Jul. 18, 2022   |
| Attenuator        | 50FP-006-H3  | JFW    | 907763        | N/A              | N/A             |

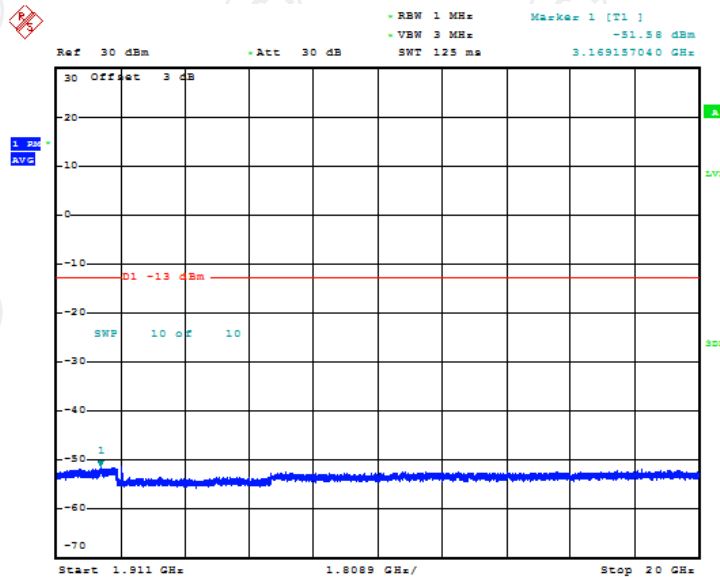
## 5.5.3. Test data

### Test Plots

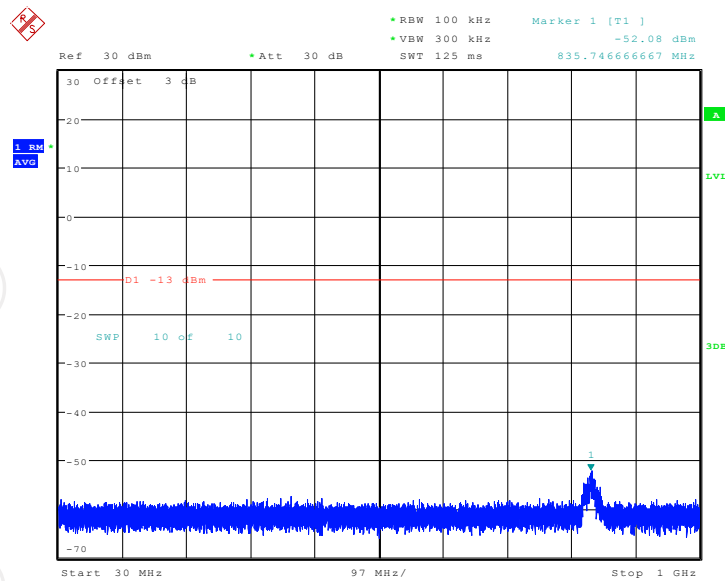
#### PCS Uplink



Date: 6.SEP.2021 20:16:41

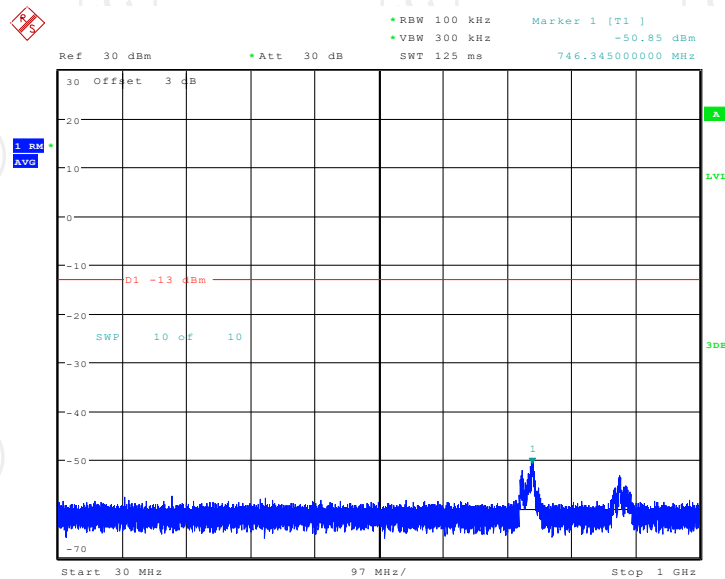


Date: 6.SEP.2021 19:19:27

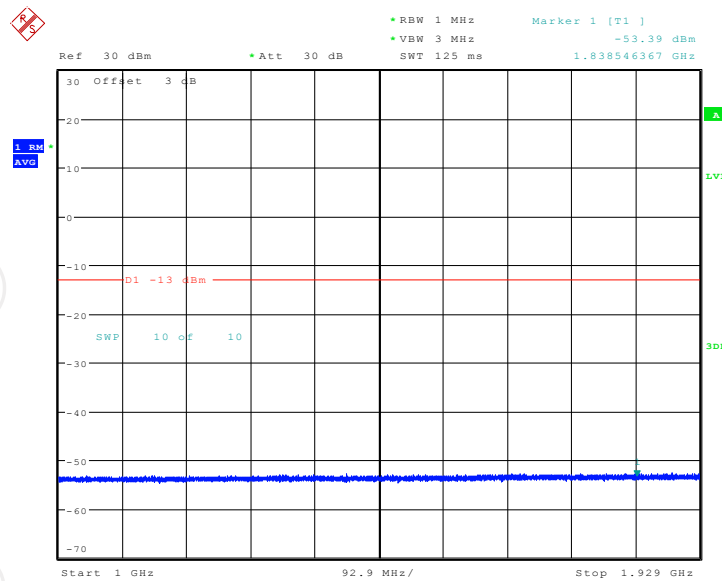


Date: 6.SRP.2021 19:19:53

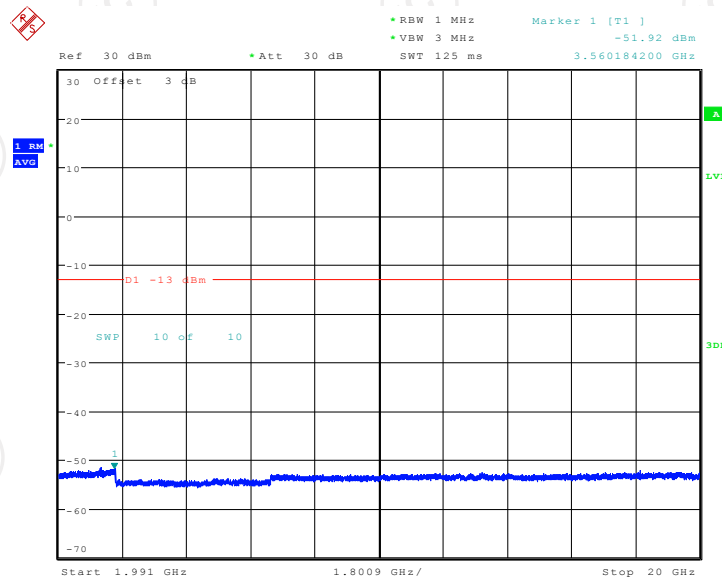
## PCS Downlink



Date: 6.SRP.2021 19:01:58



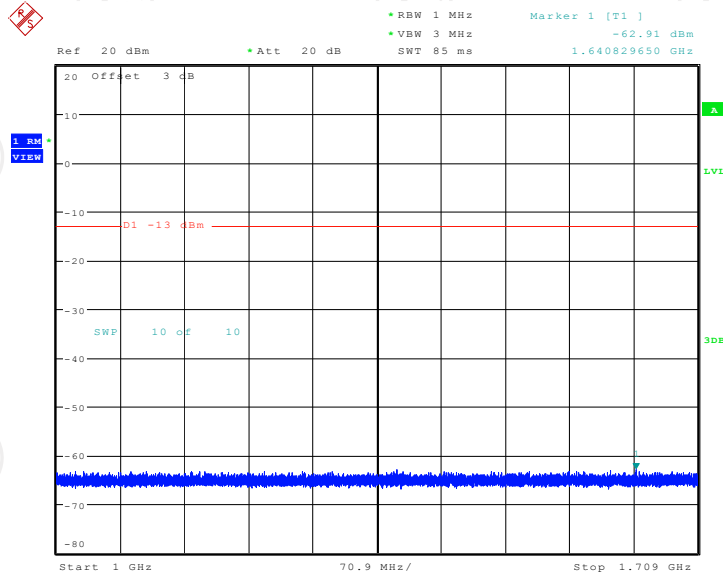
Date: 6.SRP.2021 19:01:22



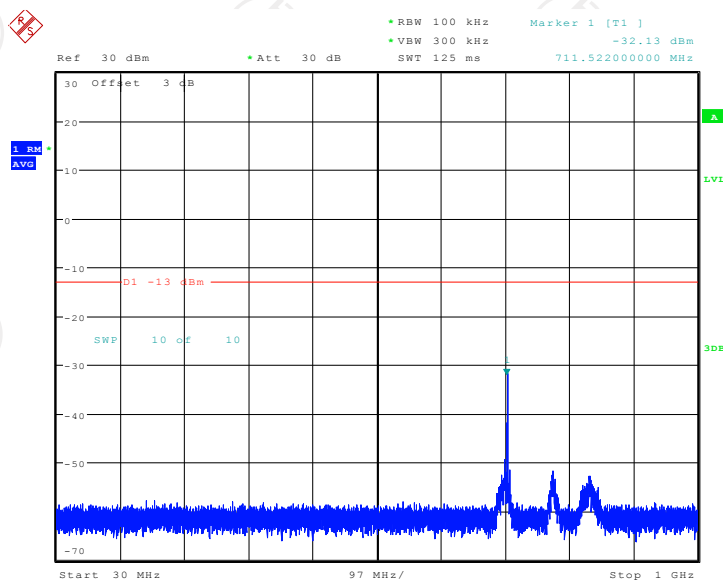
Date: 6.SRP.2021 19:00:37

## Test Plots

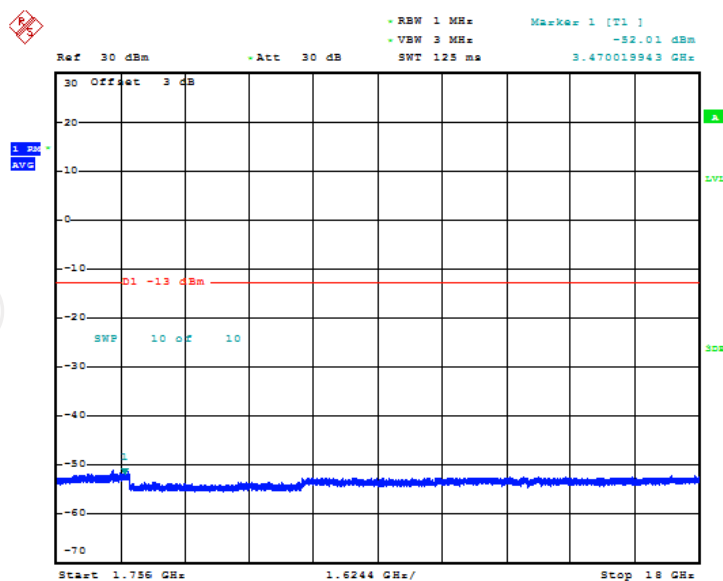
### AWS-1 Uplink



Date: 6.SEP.2021 20:15:48

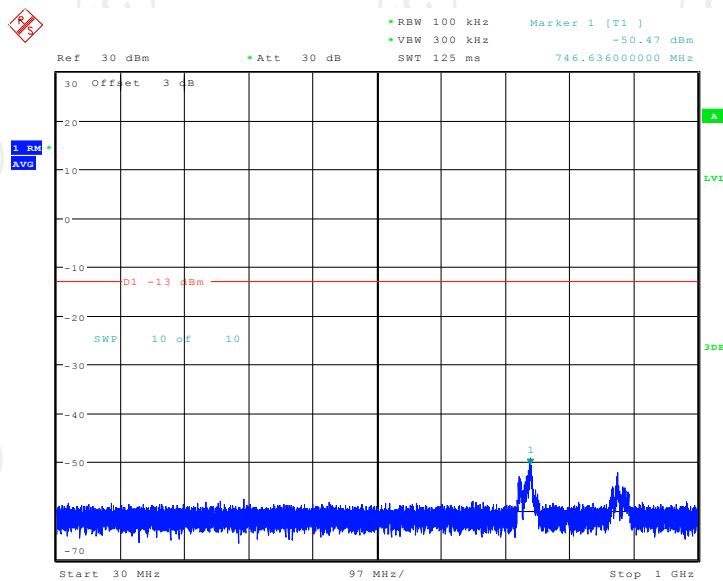


Date: 6.SEP.2021 19:17:32

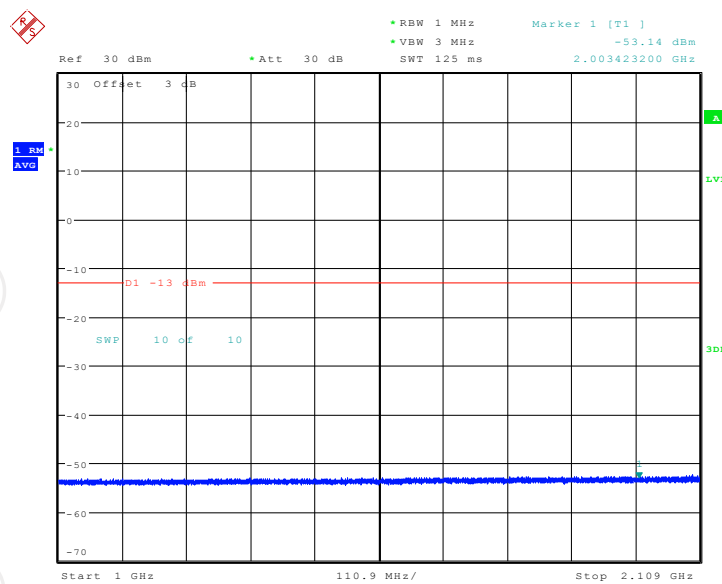


Date: 6.SEP.2021 19:18:30

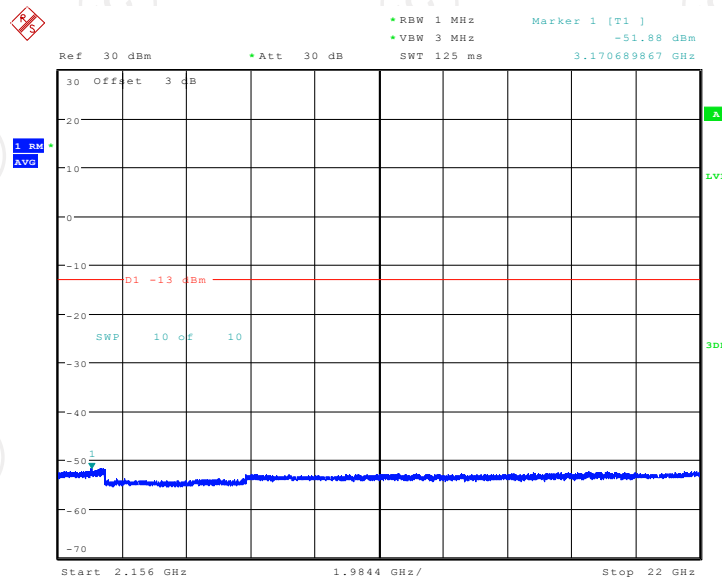
## AWS-1 Downlink



Date: 6.SEP.2021 19:02:24



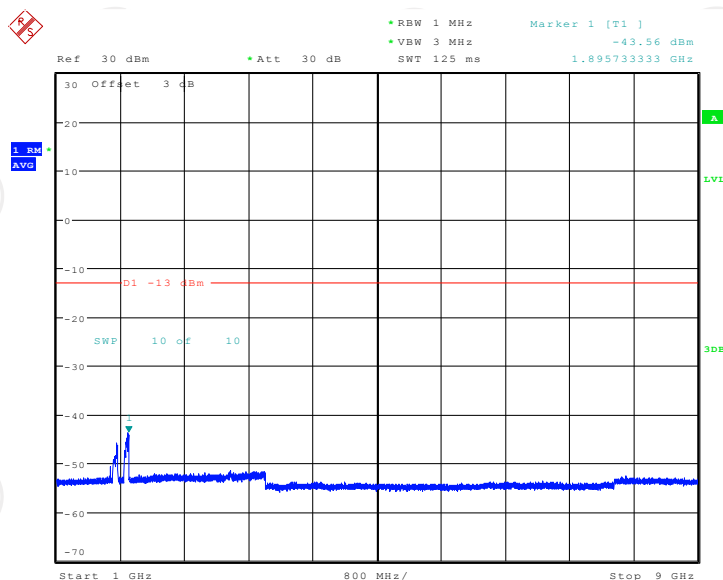
Date: 6.SRP.2021 19:03:00



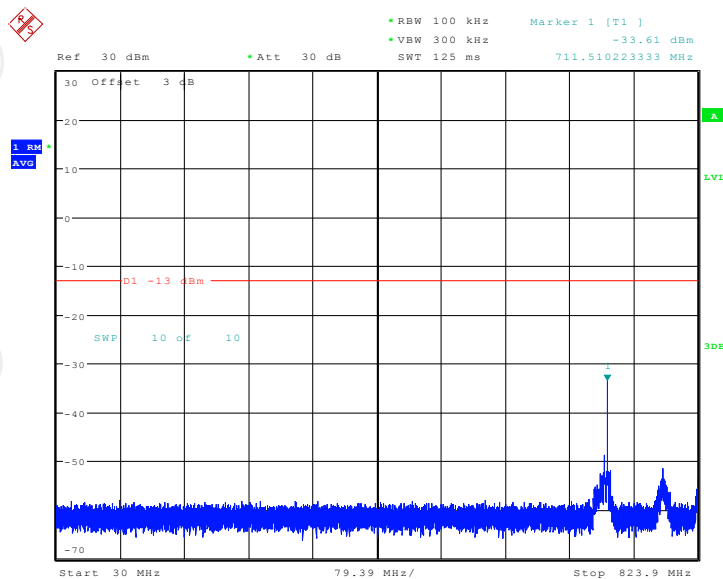
Date: 6.SRP.2021 19:03:32

## Test Plots

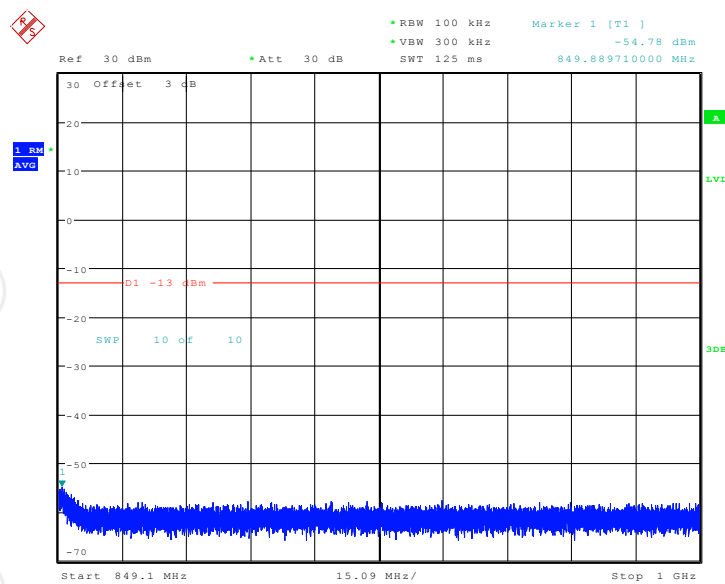
### Cellular Uplink



Date: 6.SRP.2021 19:16:09

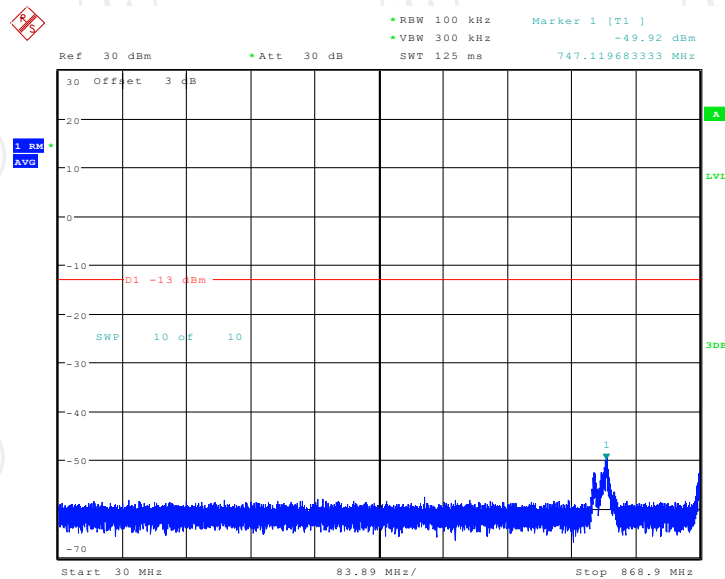


Date: 6.SRP.2021 19:16:42

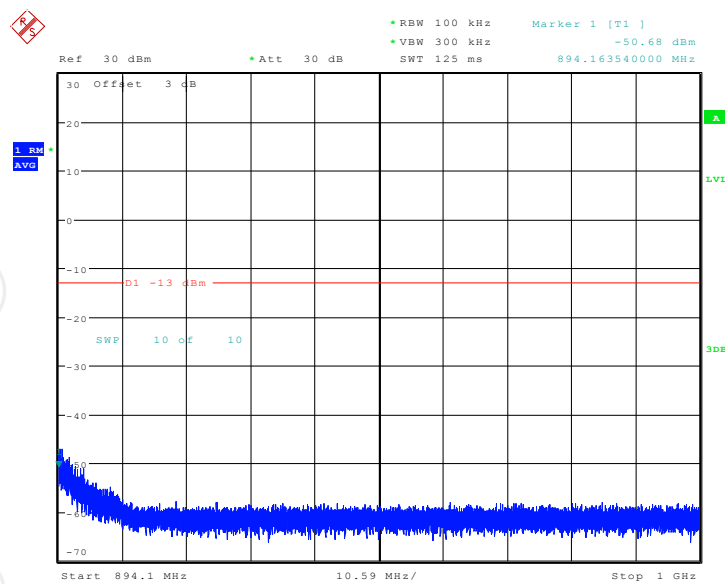


Date: 6.SRP.2021 19:17:02

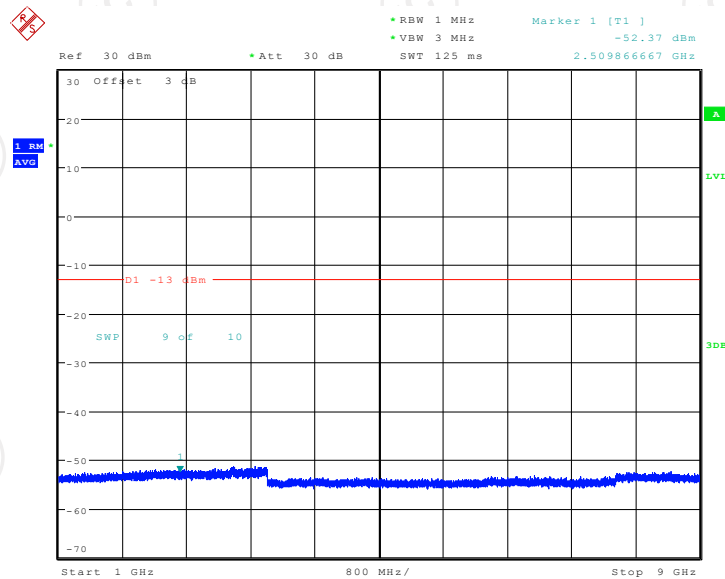
## Cellular Downlink



Date: 6.SRP.2021 19:04:23



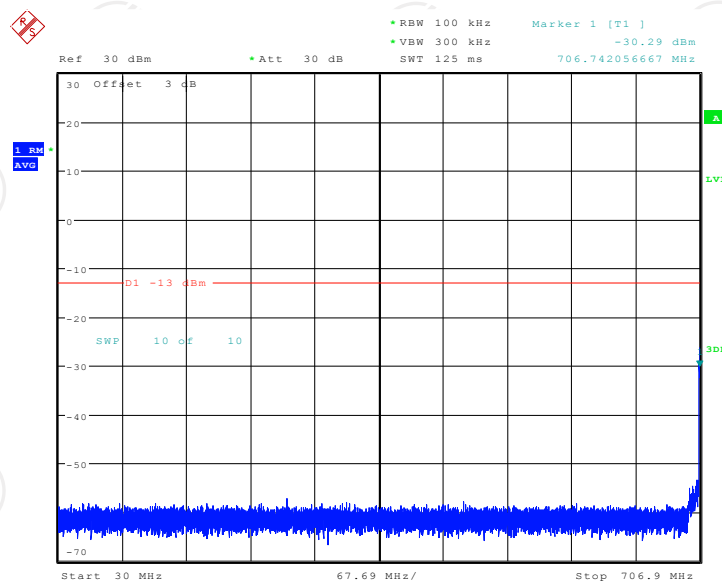
Date: 6.SRP.2021 19:04:59



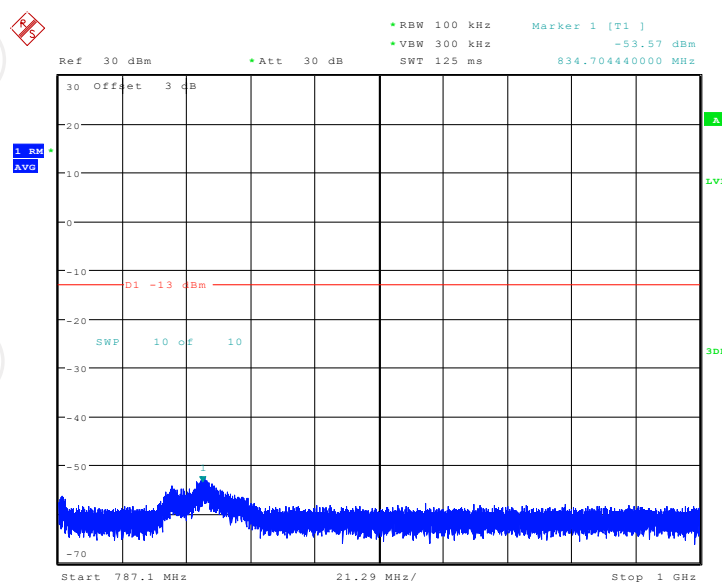
Date: 6.SRP.2021 19:05:29

## Test Plots

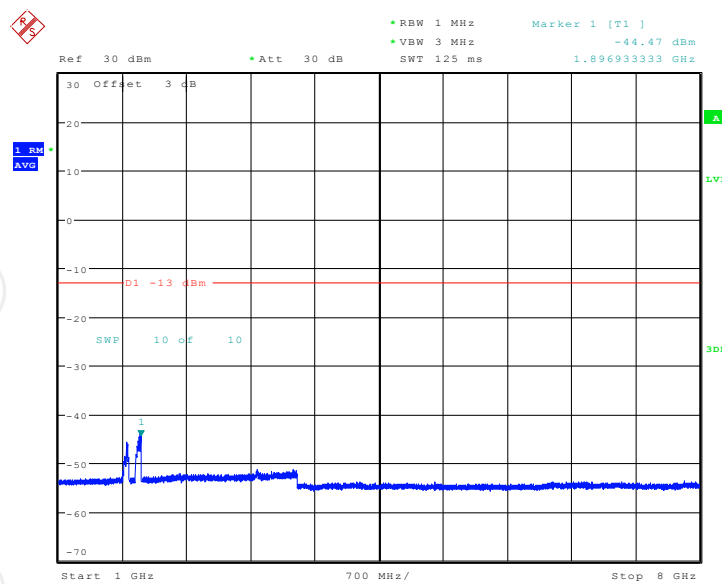
### Lower700MHz Uplink



Date: 6.SEP.2021 19:14:27

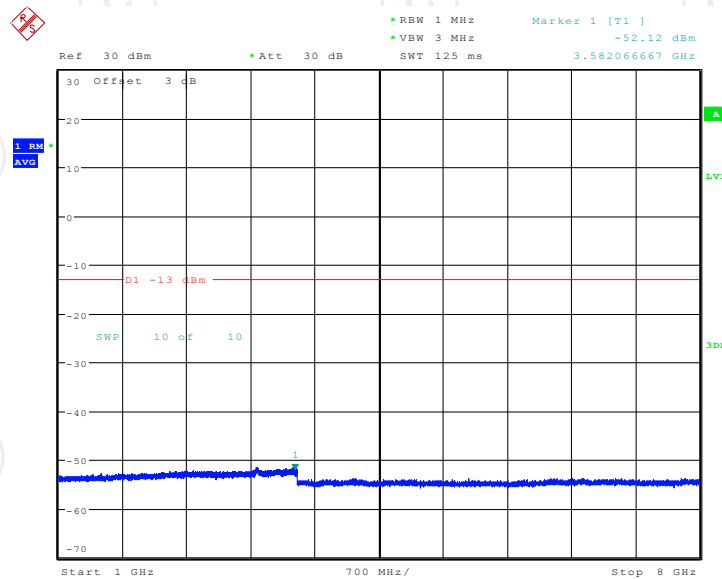


Date: 6.SEP.2021 19:14:53

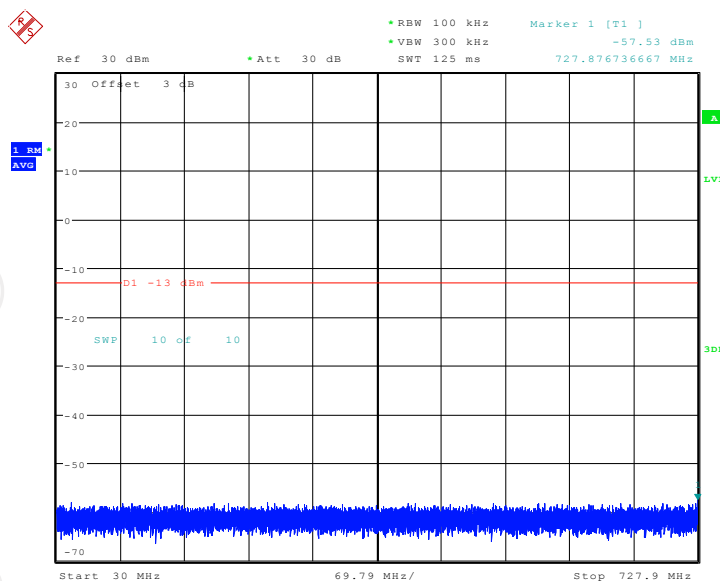


Date: 6.SRP.2021 19:15:24

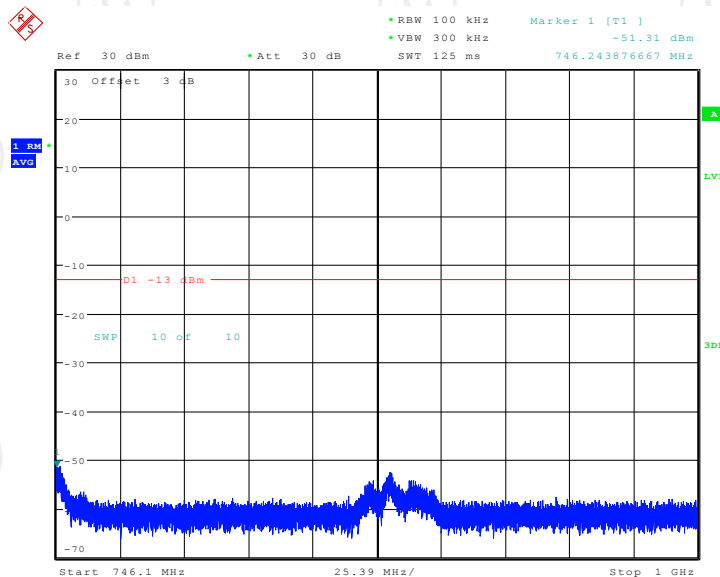
## Lower700MHz Downlink



Date: 6.SRP.2021 19:05:56



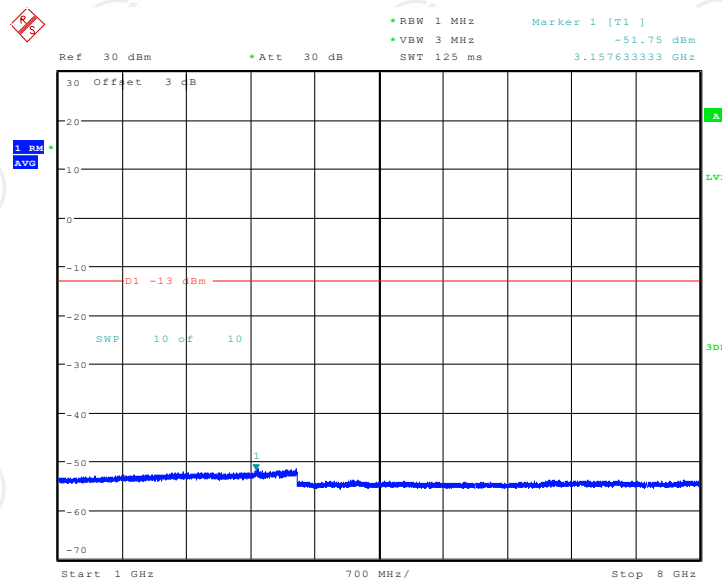
Date: 6.SRP.2021 19:06:44



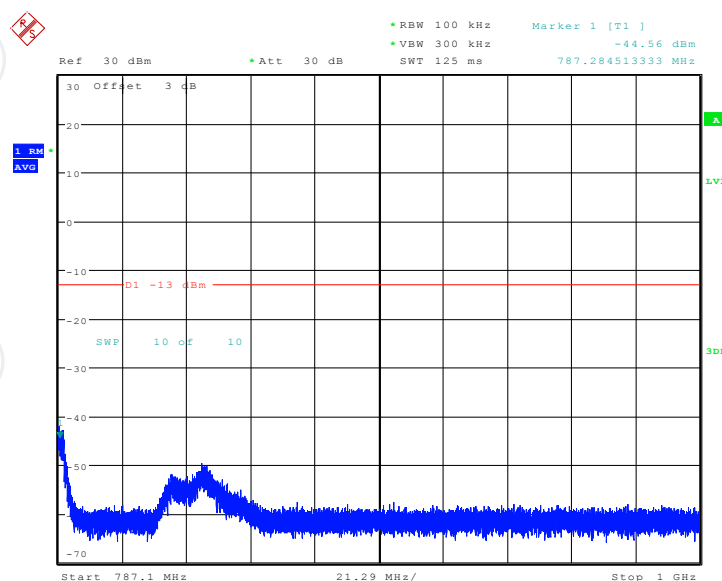
Date: 6.SRP.2021 19:07:08

## Test Plots

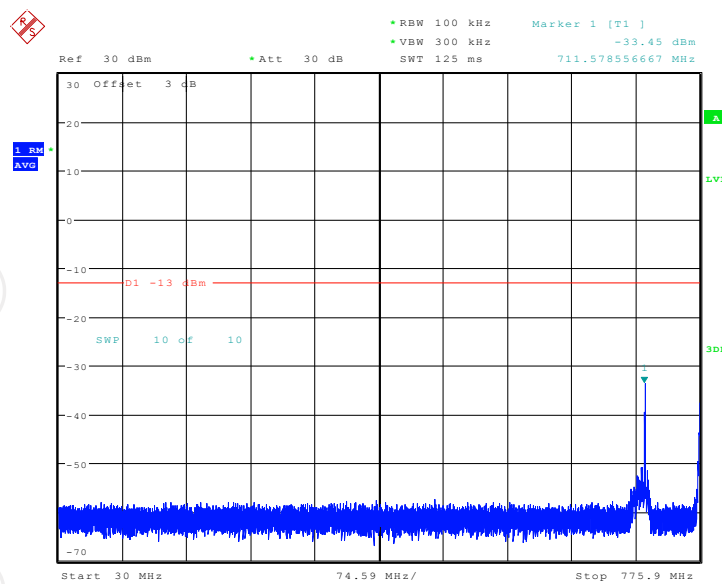
### Upper700MHz Uplink



Date: 6.SEP.2021 19:10:46

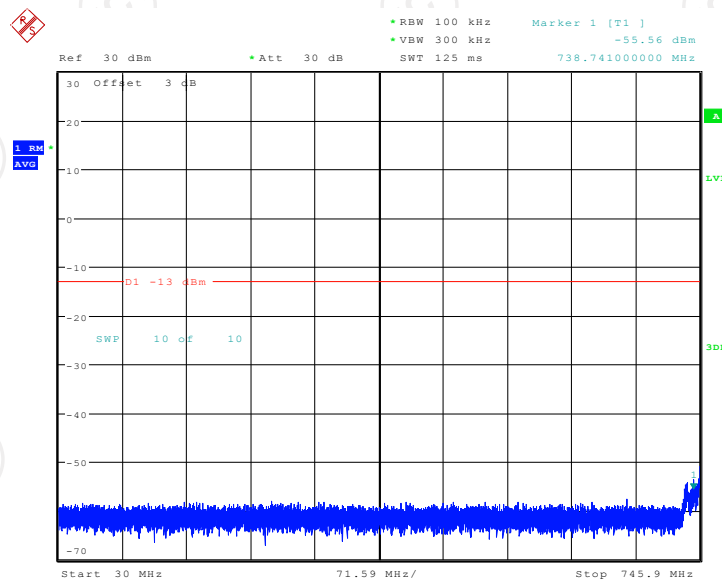


Date: 6.SEP.2021 19:12:34

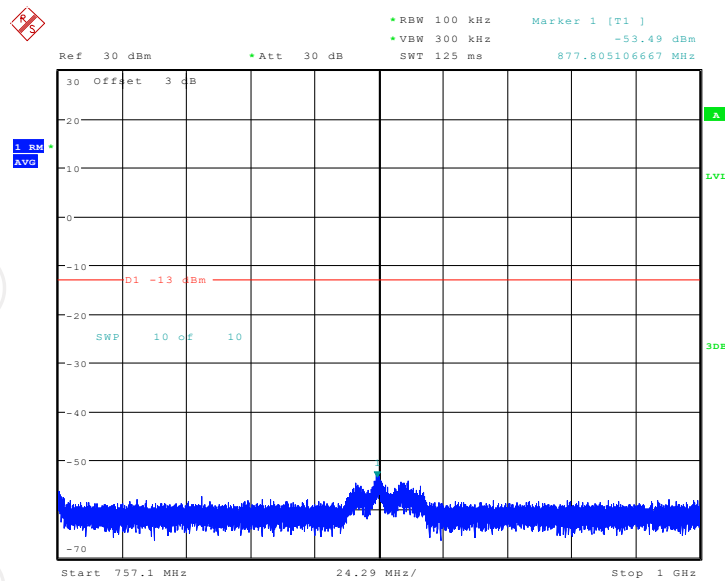


Date: 6.SRP.2021 19:12:57

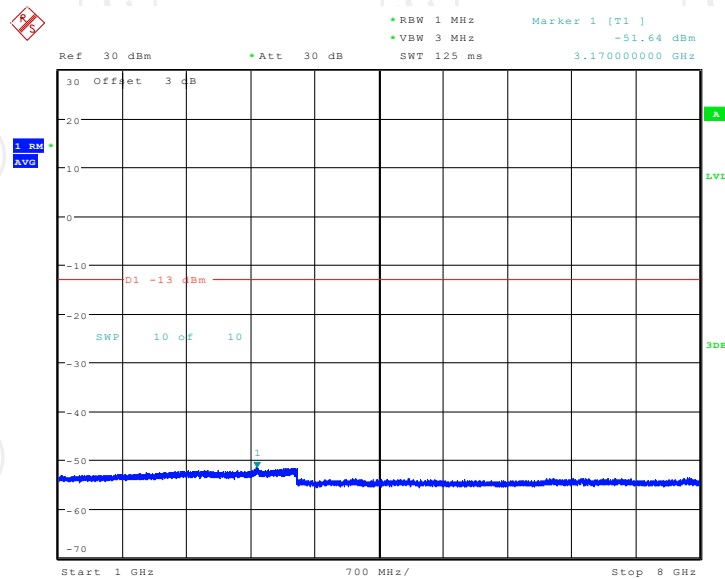
## Upper700MHz Downlink



Date: 6.SRP.2021 19:07:46



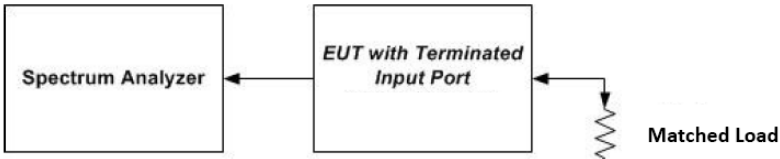
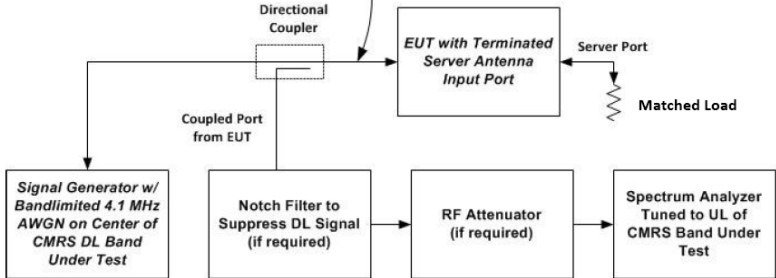
Date: 6.SRP.2021 19:08:26



Date: 6.SRP.2021 19:08:49

## 5.6. Noise Limits

### 5.6.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC Part20 Section 20.21(e)(8)(i)(A); 20.21(e)(8)(i)(H)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Test Method:</b>      | KDB935210 D03 Signal Booster Measurements v04r04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Limit:</b>            | not exceed $-103 \text{ dBm/MHz}$ —RSSI.<br>not exceed $-102.5 \text{ dBm/MHz} + 20 \log (F)$ , where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Test Setup:</b>       |  <p>Figure 3 – Noise limit test setup (also used for 7.8)</p>  <p>Figure 4 – Test setup for uplink noise power measurement in the presence of a downlink signal</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Test Procedure:</b>   | <ol style="list-style-type: none"> <li>Connect the EUT to the test equipment as shown in Figure 3. Begin with the uplink output (donor) port connected to the spectrum analyzer. When measuring downlink noise, connect the downlink output (server) port to the spectrum analyzer.</li> <li>Set the spectrum analyzer RBW to 1 MHz with the VBW <math>\geq 3 \cdot</math> RBW.</li> <li>Select the power averaging (rms) detector and trace average over at least 100 traces.</li> <li>Set the center frequency of the spectrum analyzer to the center of the CMRS band under test with the span <math>\geq 2 \cdot</math> the CMRS band.</li> <li>Measure the maximum transmitter noise power level.</li> <li>Save the spectrum analyzer Test Plots as necessary for inclusion in the final test report.</li> <li>Repeat 7.7b) to 7.7f) for all operational uplink and downlink bands.</li> <li>Connect the EUT to the test equipment as shown in Figure 4 for uplink noise power measurement in the presence a downlink signal. Affirm the coupled path of the RF coupler is connected to the spectrum analyzer.</li> <li>Configure the signal generator for AWGN operation with a 99% OBW of 4.1 MHz.</li> <li>Set the spectrum analyzer RBW for 1 MHz, VBW <math>\geq 3 \cdot</math> RBW, with a power averaging (rms) detector with at least 100 trace averages.</li> <li>Set the center frequency of the spectrum analyzer to the center of</li> </ol> |

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | <p>the CMRS band under test, with the span <math>\geq 2</math> the CMRS band. This shall include all spectrum blocks in the particular CMRS band under test (see Appendix A).</p> <p>l) For uplink noise measurements, set the spectrum analyzer center frequency for the uplink band under test, and tune the signal generator to the center of the paired downlink band.</p> <p>m) Measure the maximum transmitter noise power level while varying the downlink signal generator output level from -90 dBm to -20 dBm, as measured at the input port (i.e., downlink signal level at the booster donor port node of Figure 4), in 1 dB steps inside the RSSI-dependent region, and in 10 dB steps outside the RSSI-dependent region. Report the six values closest to the limit, with at least two points within the RSSI-dependent region of the limit. See Appendix D for noise limits graphs.</p> <p>n) Repeat 7.7.1h) through 7.7.1m) for all operational uplink bands.</p> <p><b>Variable uplink noise timing</b></p> <p>Variable uplink noise timing is to be measured as follows, using the test setup shown in Figure 4.</p> <p>a) Set the spectrum analyzer to the uplink frequency to be measured.</p> <p>b) Set the span to 0 Hz, with a sweep time of 10 seconds.</p> <p>c) Set the power level of signal generator to the lowest level of the RSSI-dependent noise [see 7.7.1m)].</p> <p>d) Select MAX HOLD and increase the power level of signal generator by 10 dB for mobile boosters, and 20 dB for fixed boosters.</p> <p>e) Confirm that the uplink noise decreases to the specified level within 1 second for mobile devices, and within 3 seconds for fixed devices.<sup>12</sup></p> <p>f) Repeat 7.7.2a) to 7.7.2e) for all operational uplink bands.</p> <p>g) Include Test Plotss and summary table in test report.</p> |
| <b>Test Result:</b> | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## 5.6.2. Test Instruments

| Equipment         | Manufacturer | Model       | Serial Number | Calibration Date | Calibration Due |
|-------------------|--------------|-------------|---------------|------------------|-----------------|
| Signal Generator  | Agilent      | N5182A      | MY47070282    | Jul. 19, 2021    | Jul. 18, 2022   |
| Spectrum Analyzer | R&S          | FSU         | 200054        | Jul. 19, 2021    | Jul. 18, 2022   |
| RF Combiner       | SUNVNDN      | SUD-CS 0800 | 16230009      | N/A              | N/A             |
| Attenuator        | 50FP-006-H3  | JFW         | 907763        | N/A              | N/A             |

### 5.6.3. Test Data

| Max Noise Power      |                  |               |             |
|----------------------|------------------|---------------|-------------|
| Frequency Band (MHz) | Measured dBm/MHz | Limit dBm/MHz | Result (dB) |
| PCS Uplink           | -46.23           | -37.02        | PASS        |
| AWS-1 Uplink         | -46.67           | -37.73        | PASS        |
| Cellular Uplink      | -45.89           | -44.05        | PASS        |
| Lower700MHz Uplink   | -52.44           | -45.51        | PASS        |
| Upper700MHz Uplink   | -46.33           | -44.64        | PASS        |
| PCS Downlink         | -44.04           | -37.02        | PASS        |
| AWS-1 Downlink       | -48.81           | -37.73        | PASS        |
| Cellular Downlink    | -45.82           | -44.05        | PASS        |
| Lower700MHz Downlink | -50.84           | -45.51        | PASS        |
| Upper700MHz Downlink | -51.16           | -44.64        | PASS        |

**Note:** Fixed booster maximum noise power shall not exceed  $-102.5 \text{ dBm/MHz} + 20 \log (F)$ , where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.

| Variable Uplink Noise |          |                  |               |         |
|-----------------------|----------|------------------|---------------|---------|
| Operation Bands       | RSSI dBm | Measured dBm/MHz | Limit dBm/MHz | Results |
| PCS                   | -75      | -46.23           | -37.02        | PASS    |
|                       | -65      | -47.44           | -38.00        | PASS    |
|                       | -63      | -52.06           | -40.00        | PASS    |
|                       | -61      | -53.14           | -42.00        | PASS    |
|                       | -58      | -55.22           | -45.00        | PASS    |
|                       | -57      | -57.91           | -46.00        | PASS    |
| AWS-1                 | -77      | -45.89           | -37.73        | PASS    |
|                       | -73      | -47.21           | -37.73        | PASS    |
|                       | -69      | -49.37           | -37.73        | PASS    |
|                       | -65      | -52.44           | -38.00        | PASS    |
|                       | -60      | -52.87           | -43.00        | PASS    |
|                       | -57      | -53.69           | -46.00        | PASS    |
| Cellular              | -75      | -48.16           | -44.05        | PASS    |
|                       | -73      | -50.23           | -44.05        | PASS    |

|             |     |        |        |      |
|-------------|-----|--------|--------|------|
|             | -67 | -52.58 | -44.05 | PASS |
|             | -63 | -53.49 | -44.05 | PASS |
|             | -58 | -55.94 | -45.00 | PASS |
|             | -55 | -56.88 | -48.00 | PASS |
| Lower700MHz | -78 | -48.03 | -45.51 | PASS |
|             | -75 | -51.13 | -45.51 | PASS |
|             | -70 | -52.76 | -45.51 | PASS |
|             | -65 | -54.49 | -45.51 | PASS |
|             | -62 | -55.19 | -45.51 | PASS |
|             | -58 | -56.82 | -45.51 | PASS |
| Upper700MHz | -75 | -47.36 | -44.64 | PASS |
|             | -68 | -48.25 | -44.64 | PASS |
|             | -65 | -50.70 | -44.64 | PASS |
|             | -60 | -52.14 | -44.64 | PASS |
|             | -58 | -55.62 | -45.00 | PASS |
|             | -56 | -57.08 | -47.00 | PASS |

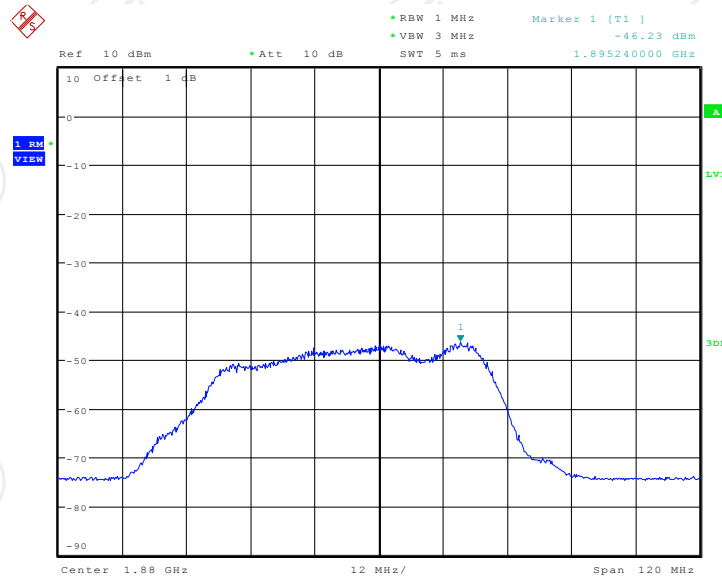
**Note:** According to the KDB 935210 D03 Signal Booster Measurements v04r04 APPENDIX D, when outside of RSSI Dependent limit (20.21.e.8.1.A.1),fixed booster maximum noise power shall not exceed  $-102.5 \text{ dBm/MHz} + 20 \log (F)$ .RSSI limit not exceed  $-103 \text{ dBm/MHz-RSSI}$ .

## Variable Uplink Noise Timing

| Operation Bands | Measured Sec | Limit Sec | Results |
|-----------------|--------------|-----------|---------|
| PCS             | 0.096        | 3         | PASS    |
| AWS-1           | 0.064        | 3         | PASS    |
| Cellular        | 0.096        | 3         | PASS    |
| Lower700MHz     | 0.064        | 3         | PASS    |
| Upper700MHz     | 0.080        | 3         | PASS    |

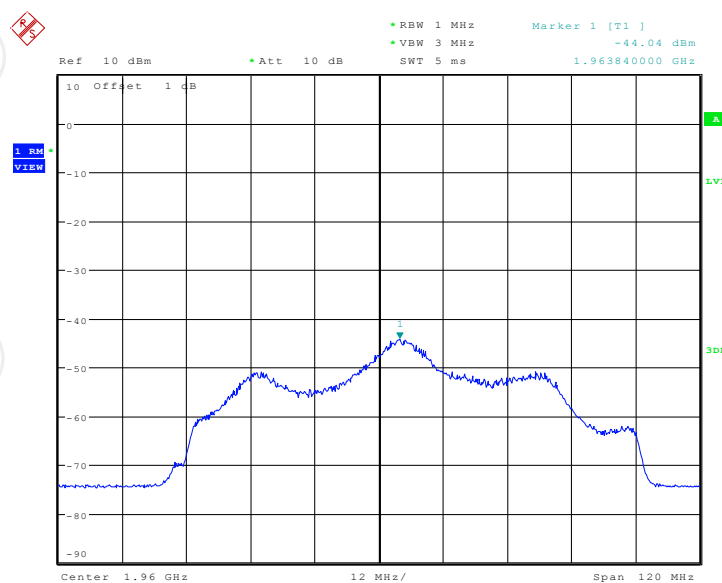
## Test Plots

### PCS



Date: 6.SEP.2021 19:25:11

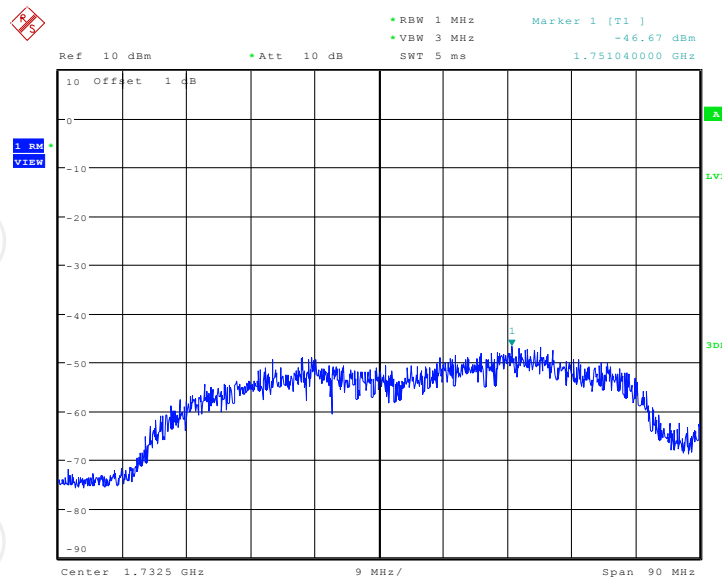
### Uplink Noise



Date: 6.SEP.2021 19:30:49

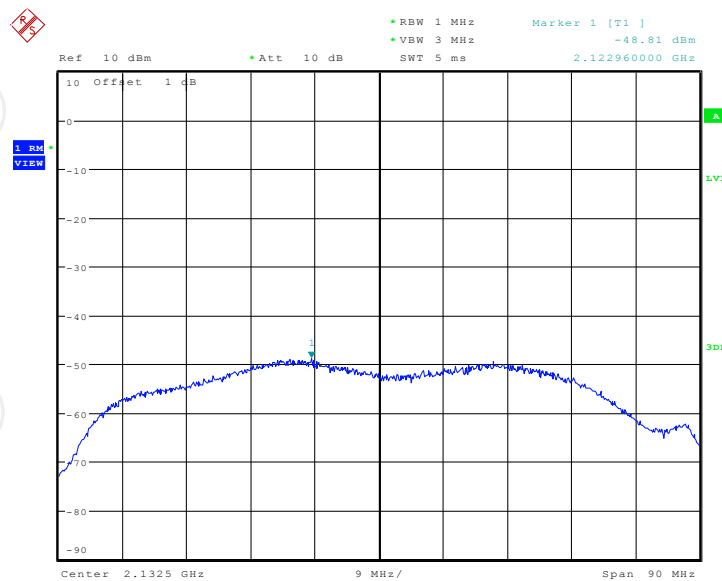
### Downlink Noise

## AWS-1



Date: 6.SEP.2021 19:26:29

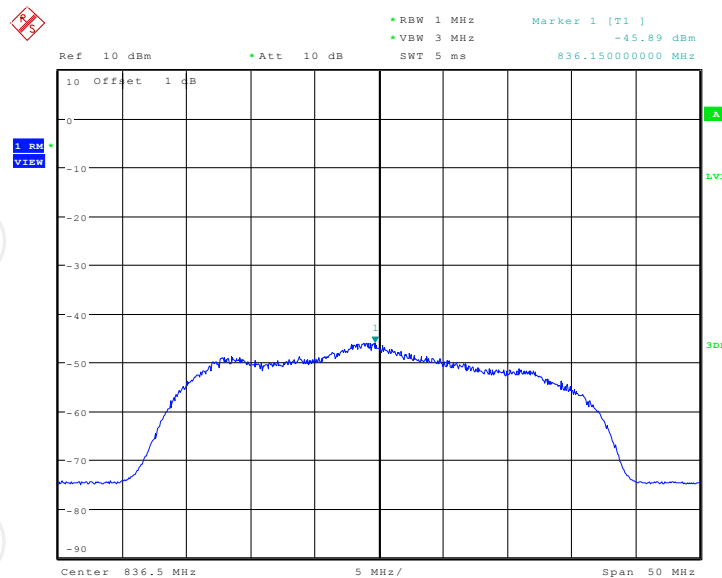
## Uplink Noise



Date: 6.SEP.2021 19:30:24

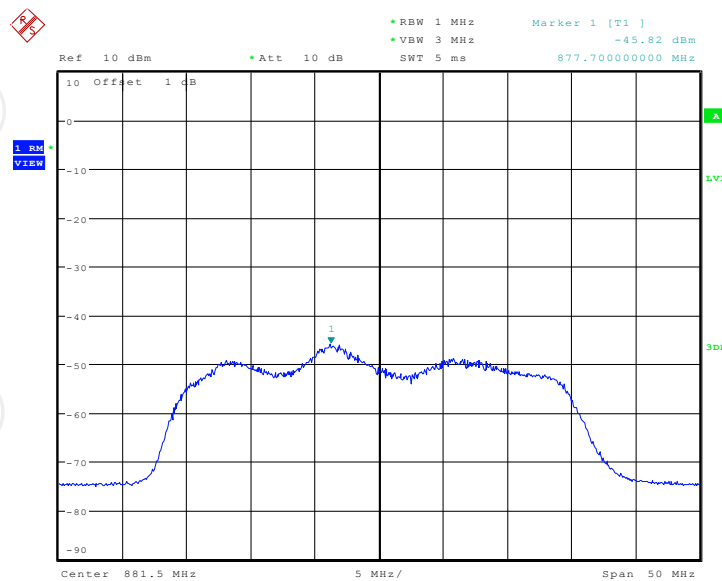
## Downlink Noise

## Cellular



Date: 6.SEP.2021 19:26:59

## Uplink Noise



Date: 6.SEP.2021 19:29:56

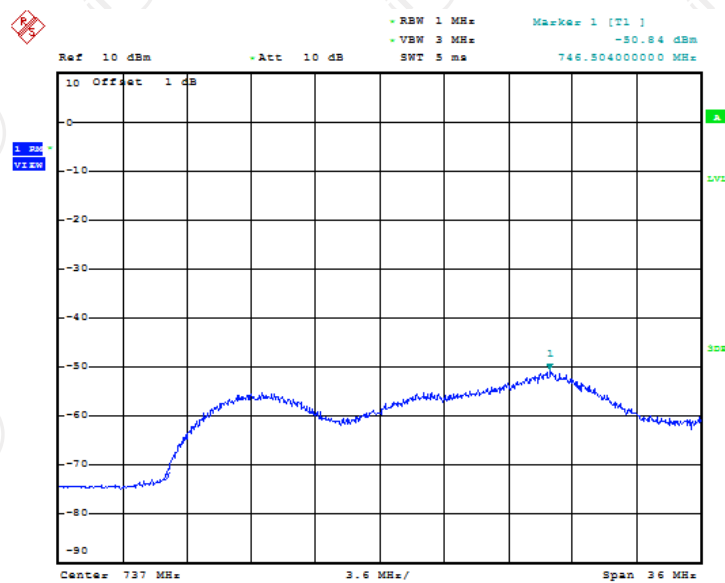
## Downlink Noise

## Lower700MHz



Date: 6.SEP.2021 19:27:41

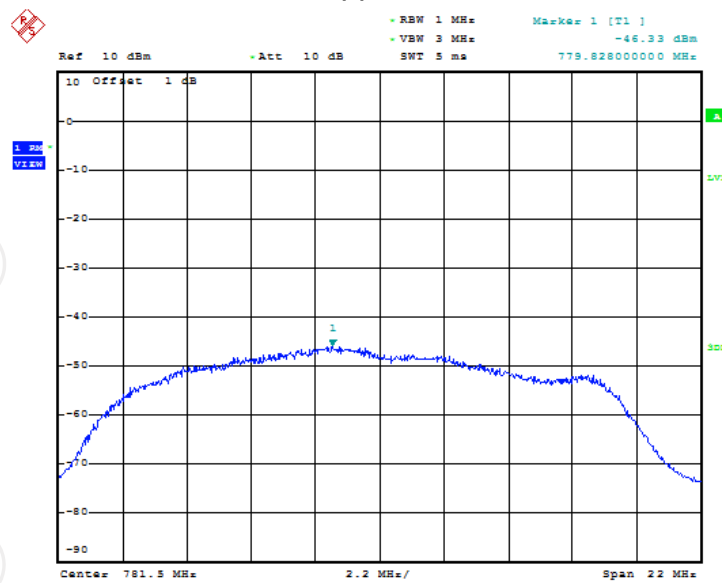
## Uplink Noise



Date: 6.SEP.2021 19:29:34

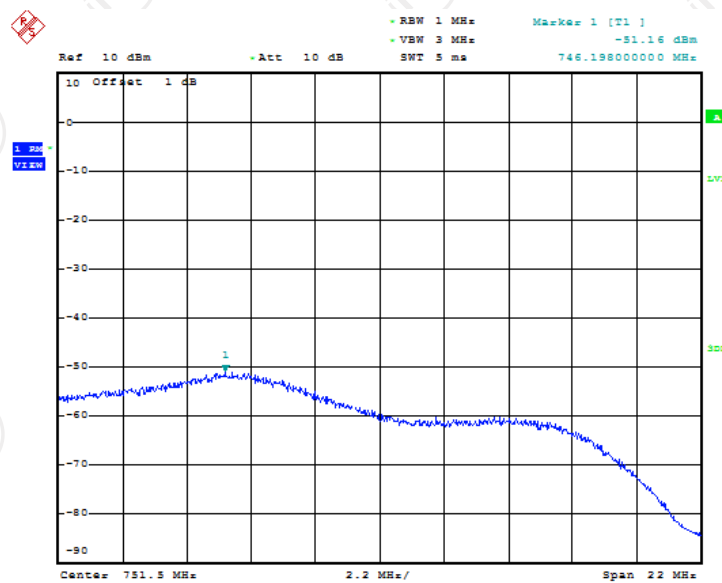
## Downlink Noise

## Upper700MHz



Date: 6.SEP.2021 19:28:03

## Uplink Noise

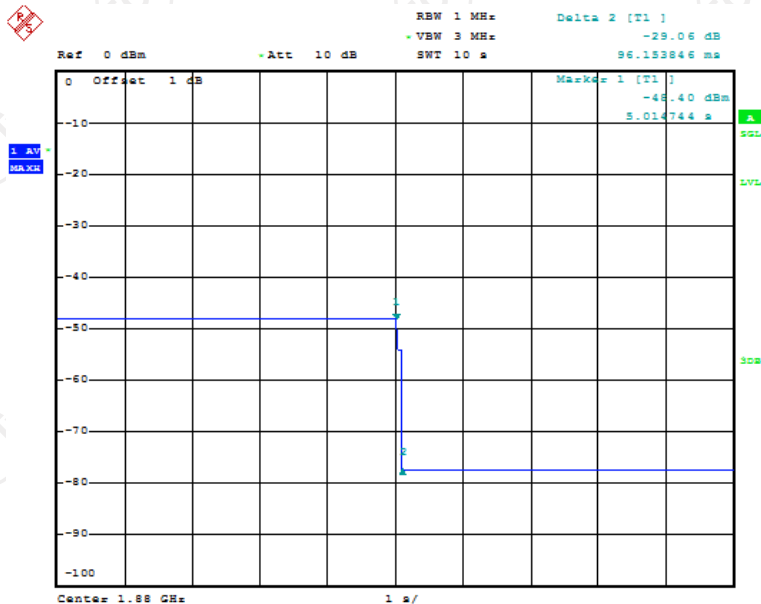


Date: 6.SEP.2021 19:29:10

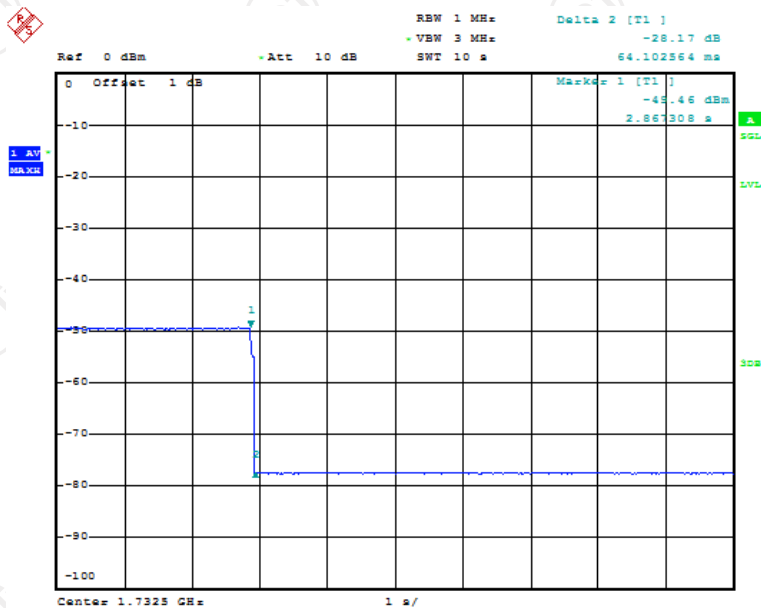
## Downlink Noise

## Variable Noise Timing Test Plots

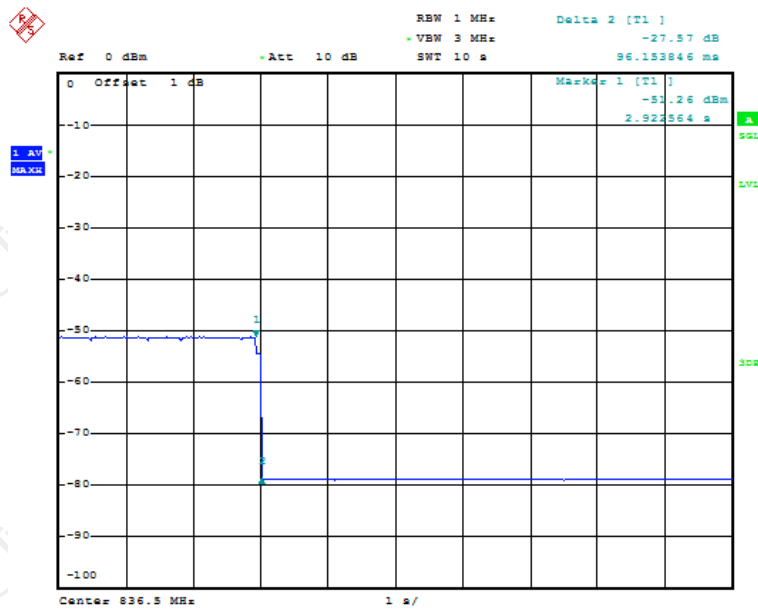
### PCS



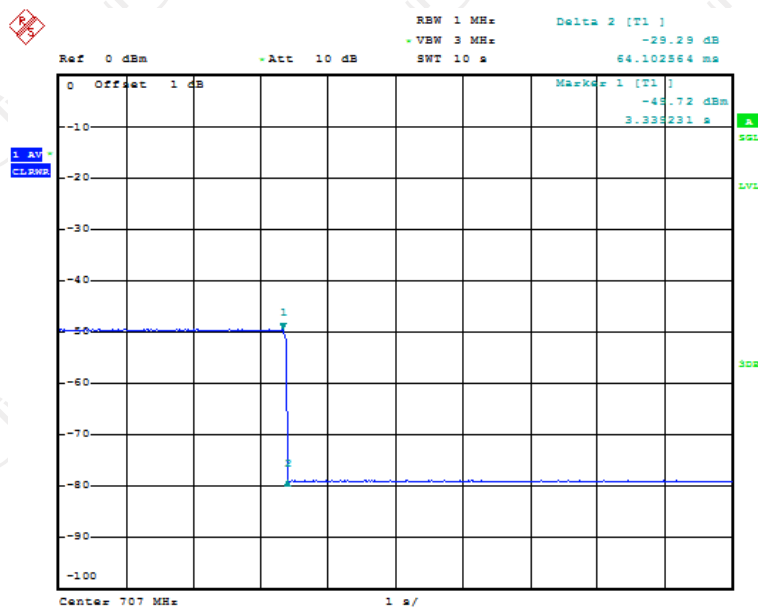
### AWS-1



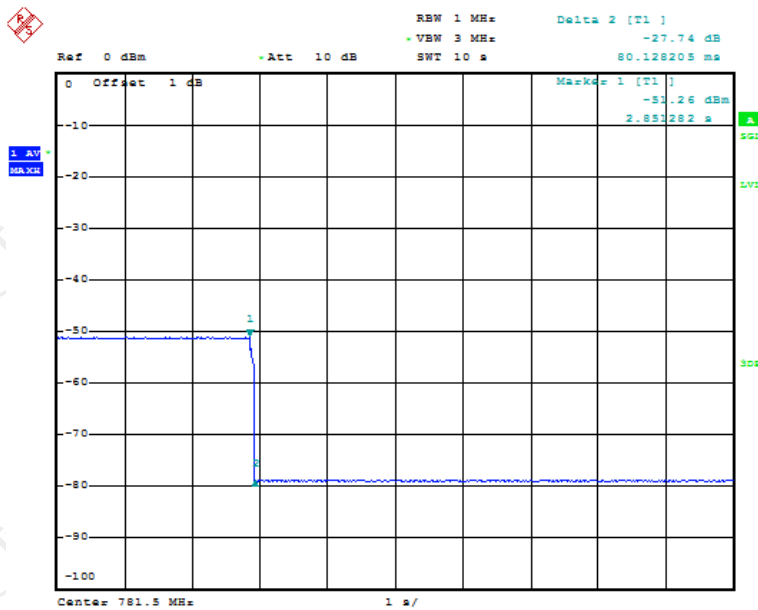
## Cellular



## Lower700MHz

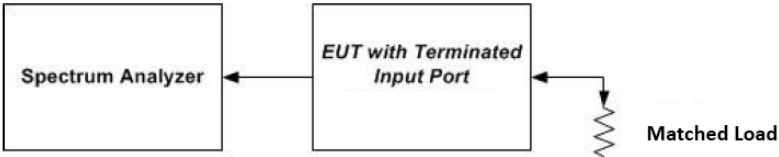


### Upper700MHz



## 5.7. Uplink Inactivity

### 5.7.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC Part20 Section 20.21(e)(8)(i)(I)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Test Method:</b>      | KDB935210 D03 Signal Booster Measurements v04r04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Limit:</b>            | 20.21(e), When a consumer booster is not serving an active device connection after 5 minutes the uplink noise power shall not exceed -70 dBm/MHz.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Test Setup:</b>       |  <p style="text-align: center;">Figure 3 – Noise limit test setup (also used for 7.8)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Test Procedure:</b>   | <ol style="list-style-type: none"> <li>Connect the EUT to the test equipment as shown in Set-Up with the uplink output connected to the spectrum analyzer.</li> <li>Select the RMS power averaging detector.</li> <li>Set the spectrum analyzer RBW for 1 MHz with the VBW <math>\geq 3X</math> RBW.</li> <li>Set the center frequency of the spectrum analyzer to the center of the uplink operational band.</li> <li>Set the span for 0 Hz with a single sweep time for a minimum of 330 seconds.</li> <li>Start to capture a new trace using MAX HOLD.</li> <li>After approximately 15 seconds turn on the EUT power.</li> <li>Once the full spectrum analyzer trace is complete place a MARKER on the leading edge of the pulse and use the DELTA MARKER METHOD to measure the time until the uplink was squelched.</li> <li>Ensure the noise level for the squelched signal is below the uplink inactivity noise power limit, as specified by the rules.</li> <li>Capture the Test Plots for inclusion in the test report.</li> <li>Measure noise using procedures in a) to e).</li> <li>Repeat steps c) to k) for all operational uplink bands.</li> </ol> |
| <b>Test Result:</b>      | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

### 5.7.2. Test Instruments

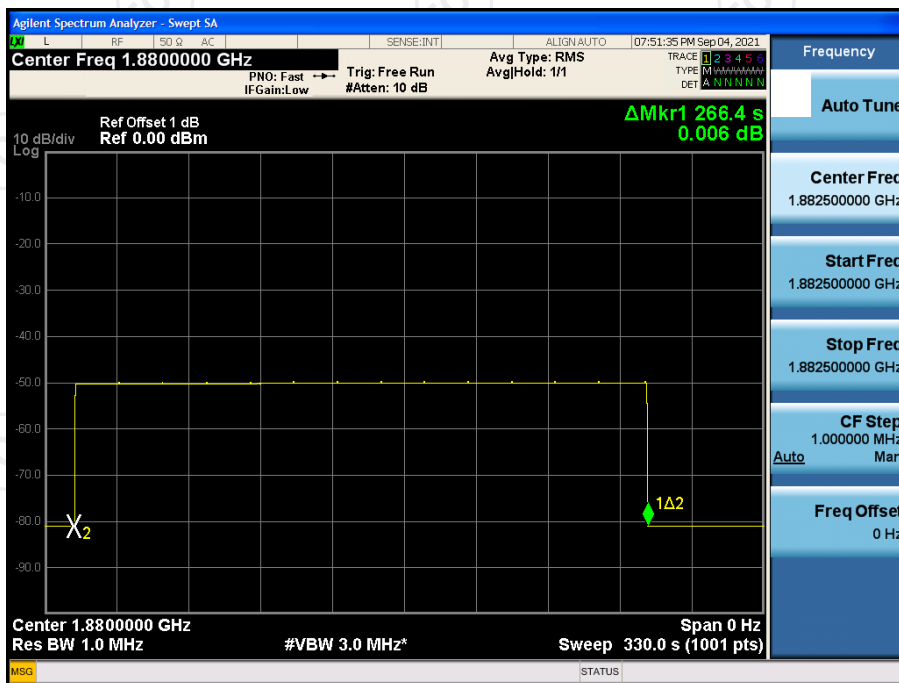
| Equipment         | Manufacturer | Model  | Serial Number | Calibration Date | Calibration Due |
|-------------------|--------------|--------|---------------|------------------|-----------------|
| Spectrum Analyzer | Agilent      | N9020A | MY49100619    | Jul. 19, 2021    | Jul. 18, 2022   |

**5.7.3. Test Data**

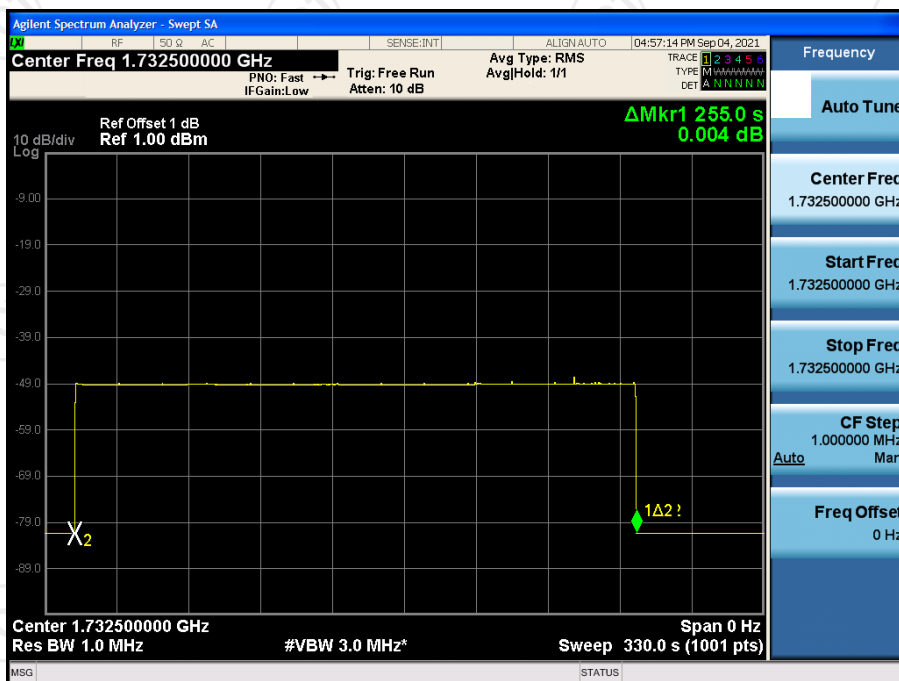
| Uplink Inactivity |              |           |        |
|-------------------|--------------|-----------|--------|
| Operation Bands   | Measured (s) | Limit (s) | Result |
| PCS               | 266.4        | 300.0     | PASS   |
| AWS-1             | 255.0        | 300.0     | PASS   |
| Cellular          | 259.7        | 300.0     | PASS   |
| Lower700MHz       | 265.5        | 300.0     | PASS   |
| Upper700MHz       | 266.4        | 300.0     | PASS   |

## Test Plots

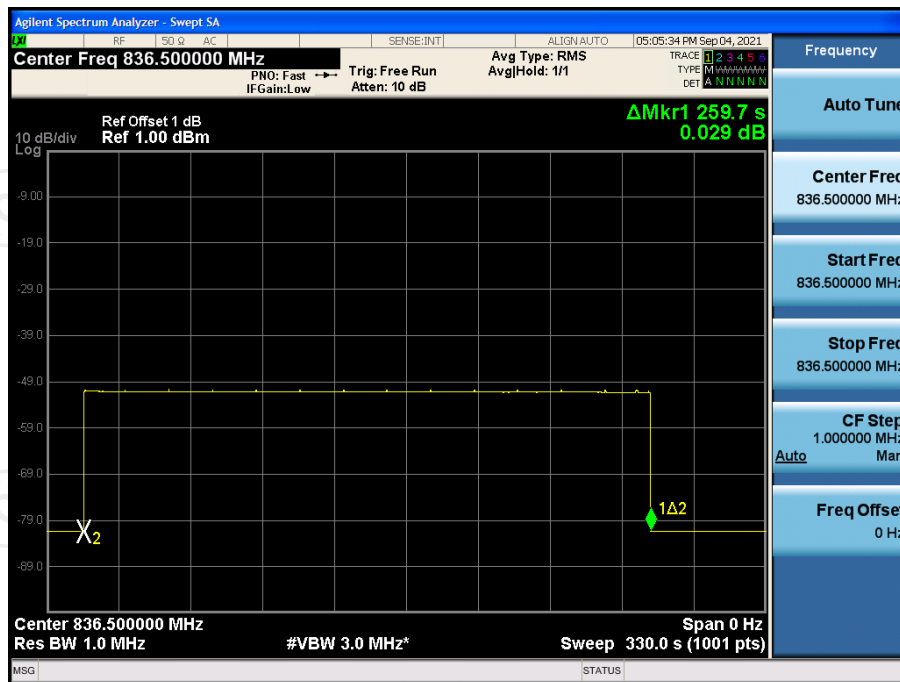
### PCS



### AWS-1



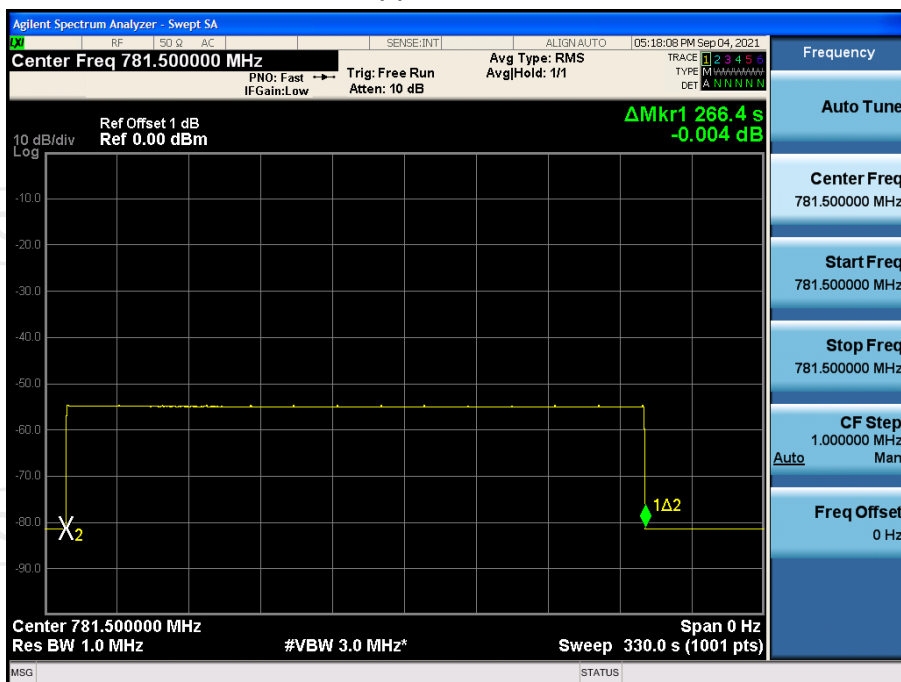
## Cellular



## Lower700MHz

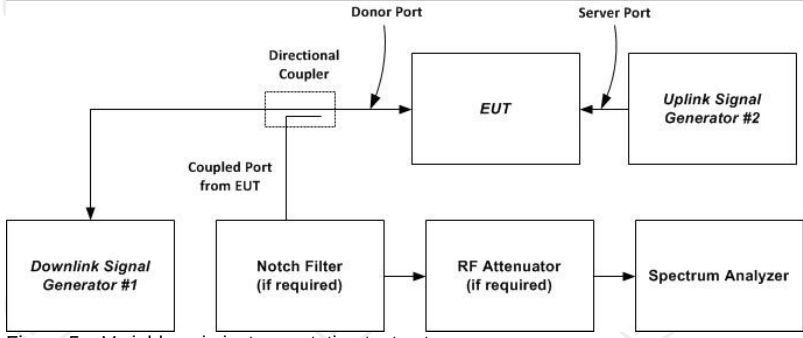


## Upper700MHz



## 5.8. Variable Booster Gain

### 5.8.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC Part20 Section 120.21(e)(8)(i)(C)(1)<br>FCC Part20 Section 120.21(e)(8)(i)(H)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Test Method:</b>      | KDB935210 D03 Signal booster Measurements v04r04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Limit:</b>            | -34 dB - RSSI + MSCL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Test Setup:</b>       |  <p>Figure 5 – Variable gain instrumentation test setup</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Test Procedure:</b>   | <p><b>Variable gain:</b></p> <ol style="list-style-type: none"> <li>Connect the EUT to the test equipment as shown in Figure 5 with the uplink output (donor) port connected to signal generator #1. Affirm that the coupled path of the RF coupler is connected to the spectrum analyzer.</li> <li>Configure downlink signal generator #1 for AWGN operation with a 99% OBW of 4.1 MHz, tuned to the center of the operational band.</li> <li>Set the power level and frequency of signal generator #2 to a value that is 5 dB below the AGC level determined from 7.2. The signal type is AWGN with a 99% OBW of 4.1 MHz.</li> <li>Set RBW = 100 kHz.</li> <li>Set VBW ≥ 300 kHz.</li> <li>Select the CHANNEL POWER measurement mode.</li> <li>Select the power averaging (rms) detector.</li> <li>Affirm that the number of measurement points per sweep ≥ (2 . span)/RBW.</li> <li>Sweep time = auto couple or as necessary (but no less than auto couple value).</li> <li>Trace average at least 10 traces in power averaging (i.e., rms) mode.</li> <li>Measure the maximum channel power and compute maximum gain when varying the signal generator #1 output to a level from .90 dBm to .20 dBm, as measured at the input port (i.e., downlink signal level at the booster donor port node of Figure 5), in 1 dB steps inside the RSSI-dependent region, and 10 dB steps outside the RSSI-dependent region. Report the six values closest to the limit, including at least two points from within the RSSI-dependent region of operation. See gain limit in charts in Appendix D for uplink gain requirements. Additionally, document that the EUT provides equivalent uplink and downlink gain, and when operating in shutoff mode that the uplink and downlink gain is within the transmit power off mode gain limits.</li> <li>Repeat 7.9.1b) to 7.9.1k) for all operational uplink bands.</li> </ol> <p><b>Variable uplink gain timing:</b><br/>Variable uplink gain timing is to be measured as follows, using the test setup shown in Figure 5.</p> <ol style="list-style-type: none"> <li>Set the spectrum analyzer to the uplink frequency to be</li> </ol> |

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | <p>measured.</p> <p>b) Set the span to 0 Hz with a sweep time of 10 seconds.</p> <p>c) Set the power level of signal generator #1 to the lowest level of the RSSI-dependent gain [see 7.9.1k)].</p> <p>d) Select MAX HOLD and increase the power level of signal generator #1 by 10 dB for mobile boosters, and by 20 dB for fixed indoor boosters. Signal generator #2 remains same, as described in 7.9.1c).</p> <p>e) Confirm that the uplink gain decreases to the specified levels, within 1 second for mobile devices, and within 3 seconds for fixed devices.13</p> <p>f) Repeat 7.9.2a) to 7.9.2e) for all operational uplink bands.</p> |
| Test Result: | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## 5.8.2. Test Instruments

| Equipment         | Manufacturer | Model       | Serial Number | Calibration Date | Calibration Due |
|-------------------|--------------|-------------|---------------|------------------|-----------------|
| Signal Generator  | Agilent      | E4421B      | GB39340839    | Jul. 19, 2021    | Jul. 18, 2022   |
| Signal Generator  | Agilent      | N5182A      | MY47070282    | Jul. 19, 2021    | Jul. 18, 2022   |
| Spectrum Analyzer | R&S          | FSU         | 200054        | Jul. 19, 2021    | Jul. 18, 2022   |
| RF Combiner       | SUNVNDN      | SUD-CS 0800 | 16230009      | N/A              | N/A             |
| Attenuator        | 50FP-006-H3  | JFW         | 907763        | N/A              | N/A             |

## 5.8.3. Test Data

**Mobile station coupling loss (MSCL):** the minimum coupling loss (in dB) between the wireless device and the input (server) port of the consumer booster. MSCL must be calculated or measured for each band of operation and provided in compliance test reports. MSCL includes the path loss from the wireless device, and the booster's server antenna gain and cable loss. The wireless device is assumed to be an isotropic (0 dBi) antenna reference. Minimum standoff distances from inside wireless devices to the booster's server antenna must be reasonable and specified by the manufacturer in customer provided installation manuals.

| MSCL Calculation |                 |              |                |                          |                       |                   |              |
|------------------|-----------------|--------------|----------------|--------------------------|-----------------------|-------------------|--------------|
| Operation Bands  | Frequency (MHz) | Distance (m) | Path loss (dB) | Indoor Antenna Gain(dBi) | Indoor Cable Loss(dB) | Polarity Loss(dB) | MSCL (dB)    |
| PCS              | 1850            | 2            | 43.86          | 4                        | 2.2                   | 3.01              | <b>45.07</b> |
| AWS-1            | 1710            | 2            | 43.18          | 4                        | 2.3                   | 3.01              | <b>44.49</b> |
| Cellular         | 824             | 2            | 36.84          | 5                        | 1.5                   | 3.01              | <b>36.35</b> |
| Lower700 MHz     | 698             | 2            | 35.40          | 6                        | 1.3                   | 3.01              | <b>33.71</b> |
| Upper700 MHz     | 776             | 2            | 36.32          | 5.5                      | 1.3                   | 3.01              | <b>35.13</b> |

Note : Path loss =  $20\log f + 20\log d - 27.5$

Polarity loss =  $20\log (1/\sin (45\deg))$  dB = 3.01dB

| Variable booster gain |            |                   |                    |                    |       |       |         |
|-----------------------|------------|-------------------|--------------------|--------------------|-------|-------|---------|
| Operation Band        | RSSI (dBm) | Input Power (dBm) | Output Power (dBm) | Measured Gain (dB) | MSCL  | Limit | Results |
| PCS                   | -80        | -42               | 14.48              | 56.48              | 45.07 | 71.98 | PASS    |
|                       | -73        | -42               | 14.12              | 56.12              | 45.07 | 71.98 | PASS    |
|                       | -68        | -42               | 10.70              | 52.70              | 45.07 | 71.98 | PASS    |
|                       | -64        | -42               | 6.19               | 48.19              | 45.07 | 71.98 | PASS    |
|                       | -58        | -42               | 1.28               | 43.28              | 45.07 | 69.07 | PASS    |
|                       | -55        | -42               | -1.90              | 40.10              | 45.07 | 66.07 | PASS    |
| AWS-1                 | -80        | -41               | 14.76              | 55.76              | 44.49 | 71.27 | PASS    |
|                       | -75        | -41               | 14.87              | 55.87              | 44.49 | 71.27 | PASS    |
|                       | -70        | -41               | 10.11              | 51.11              | 44.49 | 71.27 | PASS    |
|                       | -66        | -41               | 5.74               | 46.74              | 44.49 | 71.27 | PASS    |
|                       | -60        | -41               | 0.25               | 41.25              | 44.49 | 70.49 | PASS    |
|                       | -58        | -41               | -1.38              | 39.62              | 44.49 | 68.49 | PASS    |
| Cellular              | -80        | -43               | 14.27              | 57.27              | 36.35 | 64.95 | PASS    |
|                       | -71        | -43               | 13.84              | 56.84              | 36.35 | 64.95 | PASS    |
|                       | -66        | -43               | 9.34               | 52.34              | 36.35 | 64.95 | PASS    |
|                       | -62        | -43               | 5.73               | 48.73              | 36.35 | 64.35 | PASS    |
|                       | -56        | -43               | 0.14               | 43.14              | 36.35 | 58.35 | PASS    |
|                       | -51        | -43               | -4.60              | 38.40              | 36.35 | 53.35 | PASS    |
|                       | -80        | -49               | 14.08              | 63.08              | 33.71 | 63.49 | PASS    |

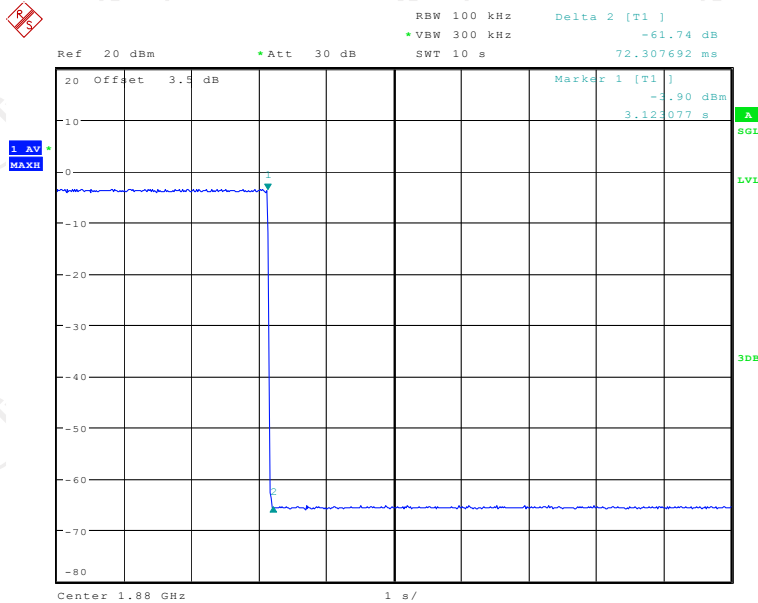
|                 |     |     |       |       |       |       |      |
|-----------------|-----|-----|-------|-------|-------|-------|------|
| Lower700M<br>Hz | -70 | -49 | 13.16 | 62.16 | 33.71 | 63.49 | PASS |
|                 | -65 | -49 | 10.42 | 59.42 | 33.71 | 63.49 | PASS |
|                 | -61 | -49 | 7.72  | 56.72 | 33.71 | 60.71 | PASS |
|                 | -53 | -49 | 2.07  | 51.07 | 33.71 | 52.71 | PASS |
|                 | -49 | -49 | -0.66 | 48.34 | 33.71 | 48.71 | PASS |
| Upper700M<br>Hz | -80 | -40 | 15.61 | 55.61 | 35.13 | 64.36 | PASS |
|                 | -70 | -40 | 15.09 | 55.09 | 35.13 | 64.36 | PASS |
|                 | -64 | -40 | 11.23 | 51.23 | 35.13 | 64.36 | PASS |
|                 | -60 | -40 | 7.25  | 47.25 | 35.13 | 61.13 | PASS |
|                 | -56 | -40 | 3.85  | 43.85 | 35.13 | 57.13 | PASS |
|                 | -52 | -40 | -0.76 | 39.24 | 35.13 | 53.13 | PASS |

## Variable Uplink Gain Timing

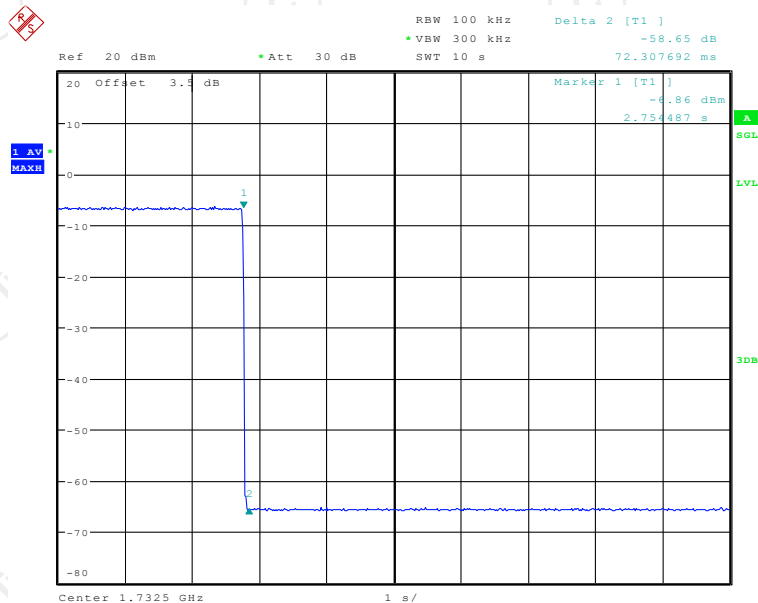
| Operation Band | Measured Sec | Limit Sec | Result |
|----------------|--------------|-----------|--------|
| PCS            | 0.072        | 3.0       | PASS   |
| AWS-1          | 0.072        | 3.0       | PASS   |
| Cellular       | 0.072        | 3.0       | PASS   |
| Lower700MHz    | 0.072        | 3.0       | PASS   |
| Upper700MHz    | 0.072        | 3.0       | PASS   |

## Variable Uplink Gain Timing Test Plots

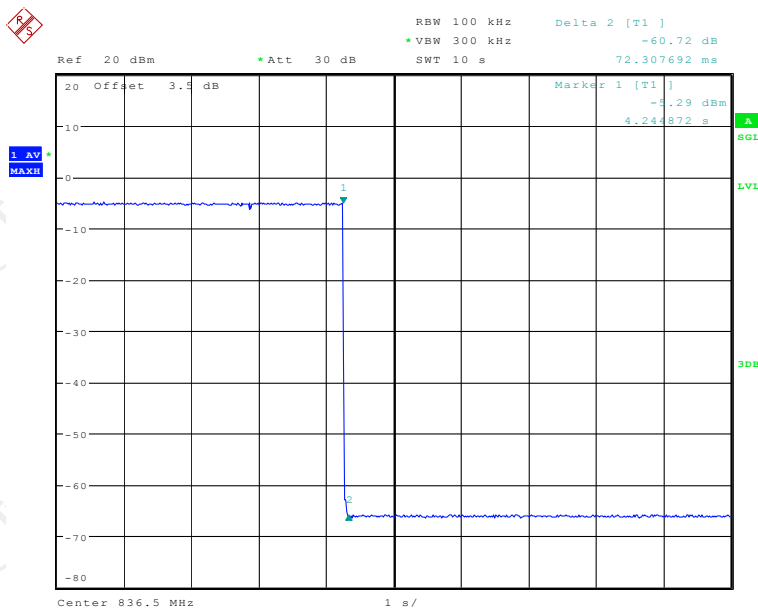
### PCS



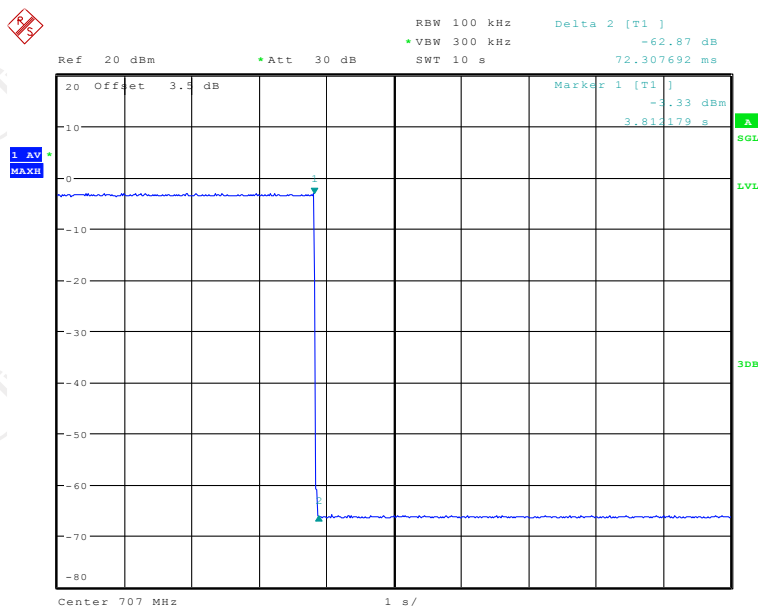
### AWS-1



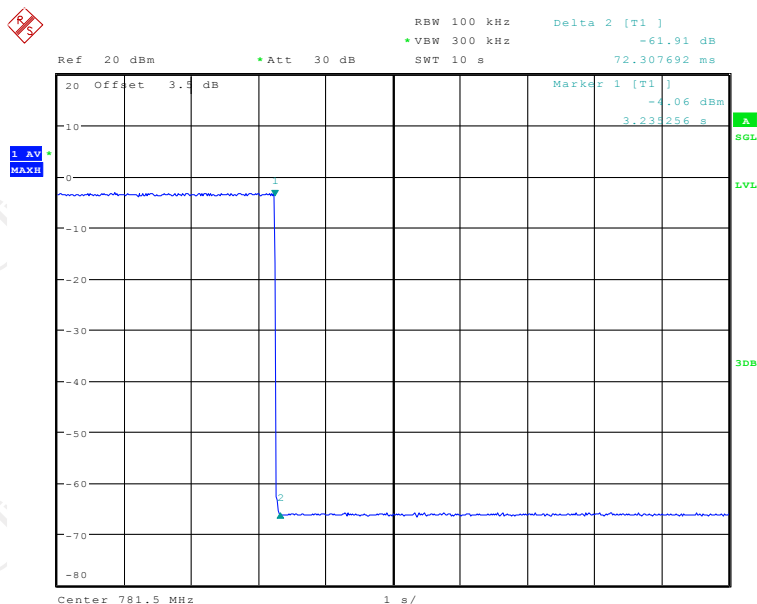
## Cellular



## Lower700MHz

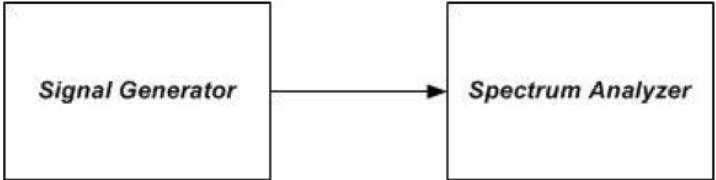


### Upper700MHz



## 5.9. Occupied Bandwidth

### 5.9.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC Part2 Section 2.1049                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Test Method:</b>      | KDB935210 D03 Signal booster Measurements v04r04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Limit:</b>            | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Test setup:</b>       |  <p>Figure 6 – Test setup for measuring characteristics of test signals used for subsequent EUT occupied bandwidth testing</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Test Procedure:</b>   | <ol style="list-style-type: none"> <li>Connect the test equipment as shown in Figure 6 to firstly measure the characteristics of the test signals produced by the signal generator.</li> <li>Set VBW <math>\geq 3</math> RBW.</li> <li>Set the center frequency of the spectrum analyzer to the center of the operational band. The span will be adjusted for each modulation type and OBW as necessary for accurately viewing the signals.</li> <li>Set the signal generator for power level to match the values obtained from the tests of 7.2.</li> <li>Set the signal generator modulation type for GSM with a PRBS pattern and allow the trace on the signal generator to stabilize adjusting the span as necessary.</li> <li>Set the spectrum analyzer RBW for 1% to 5% of the EBW.</li> <li>Capture the spectrum analyzer trace for inclusion in the test report.</li> <li>Repeat 7.10c) to 7.10g) for CDMA and W-CDMA modulation, adjusting the span as necessary. AWGN or LTE may be used in place of W-CDMA, as an option.</li> <li>Repeat 7.10c) to 7.10h) for all uplink and downlink operational bands.</li> <li>Connect the test equipment as shown in Figure 1, with the uplink output (donor) port connected to the spectrum analyzer, and the server port connected to the signal generator.</li> <li>Repeat 7.10c) to 7.10i) with this EUT uplink path test setup.</li> <li>Connect the test equipment as shown in Figure 1, with the downlink output (server) port connected to the spectrum analyzer, and the donor port connected to the signal generator.</li> <li>Repeat 7.10c) to 7.10j) with this EUT downlink path test setup.</li> </ol> |
| <b>Test results:</b>     | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

**5.9.2. Test Instruments**

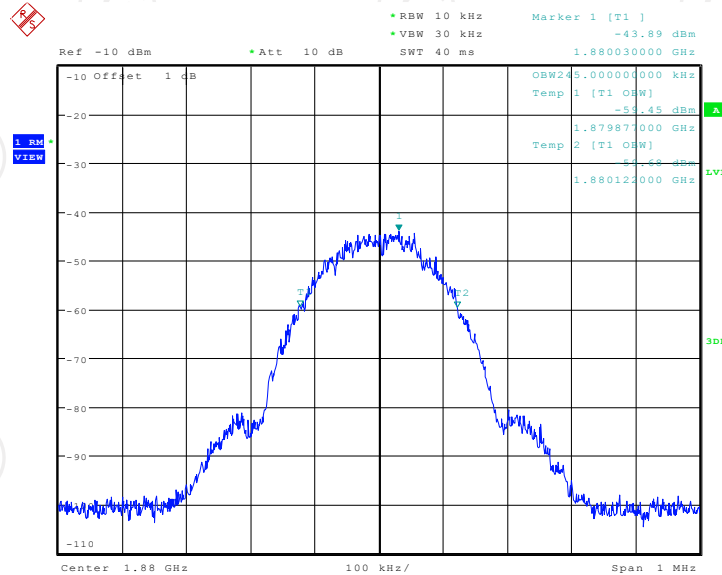
| Equipment         | Manufacturer | Model  | Serial Number | Calibration Date | Calibration Due |
|-------------------|--------------|--------|---------------|------------------|-----------------|
| Signal Generator  | Agilent      | N5182A | MY47070282    | Jul. 19, 2021    | Jul. 18, 2022   |
| Spectrum Analyzer | R&S          | FSU    | 200054        | Jul. 19, 2021    | Jul. 18, 2022   |

### 5.9.3. Test Data

| Operation Band |              | Signal Type | Input OBW [MHz] | Output OBW [MHz] | Results |
|----------------|--------------|-------------|-----------------|------------------|---------|
| Uplink         | PCS          | GSM         | 0.245           | 0.247            | PASS    |
|                |              | CDMA        | 1.239           | 1.284            | PASS    |
|                |              | LTE         | 4.470           | 4.490            | PASS    |
|                | AWS-1        | GSM         | 0.248           | 0.247            | PASS    |
|                |              | CDMA        | 1.239           | 1.269            | PASS    |
|                |              | LTE         | 4.480           | 4.480            | PASS    |
|                | Cellular     | GSM         | 0.247           | 0.247            | PASS    |
|                |              | CDMA        | 1.239           | 1.242            | PASS    |
|                |              | LTE         | 4.487           | 4.460            | PASS    |
|                | Lower700M Hz | GSM         | 0.248           | 0.251            | PASS    |
|                |              | CDMA        | 1.242           | 1.239            | PASS    |
|                |              | LTE         | 4.490           | 4.470            | PASS    |
|                | Upper700M Hz | GSM         | 0.248           | 0.248            | PASS    |
|                |              | CDMA        | 1.242           | 1.242            | PASS    |
|                |              | LTE         | 4.500           | 4.490            | PASS    |
| Downlink       | PCS          | GSM         | 0.247           | 0.245            | PASS    |
|                |              | CDMA        | 1.245           | 1.242            | PASS    |
|                |              | LTE         | 4.500           | 4.490            | PASS    |
|                | AWS-1        | GSM         | 0.248           | 0.246            | PASS    |
|                |              | CDMA        | 1.239           | 1.242            | PASS    |
|                |              | LTE         | 4.490           | 4.480            | PASS    |
|                | Cellular     | GSM         | 0.246           | 0.245            | PASS    |
|                |              | CDMA        | 1.242           | 1.272            | PASS    |
|                |              | LTE         | 4.490           | 4.510            | PASS    |
|                | Lower700M Hz | GSM         | 0.249           | 0.249            | PASS    |
|                |              | CDMA        | 1.242           | 1.239            | PASS    |
|                |              | LTE         | 4.500           | 4.470            | PASS    |
|                | Upper700M Hz | GSM         | 0.245           | 0.248            | PASS    |
|                |              | CDMA        | 1.242           | 1.242            | PASS    |
|                |              | LTE         | 4.500           | 4.490            | PASS    |

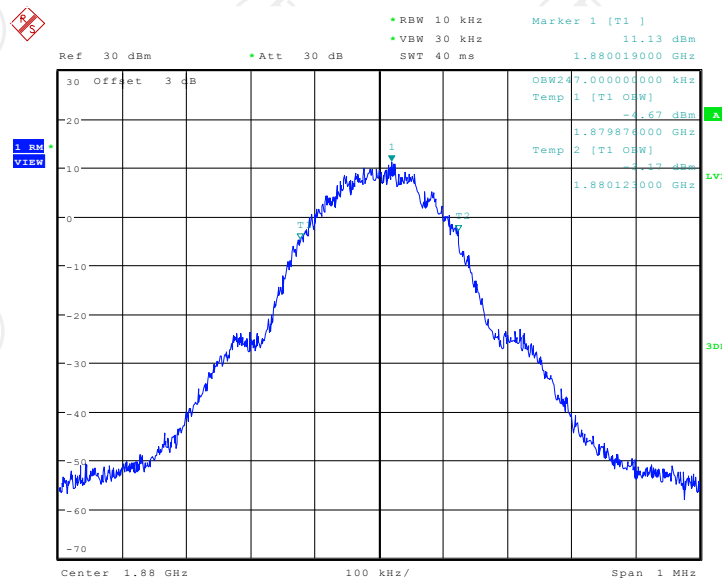
## Test Plots

### PCS GSM UL Input



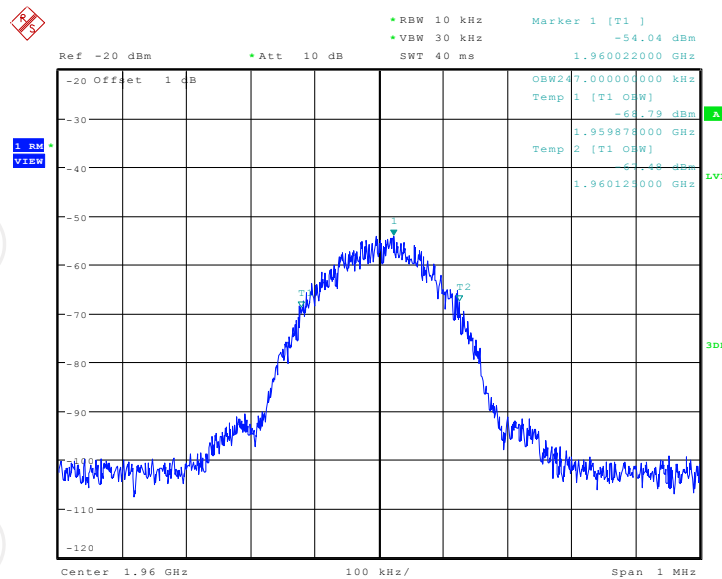
Date: 7.SEP.2021 10:34:10

### PCS GSM UL output



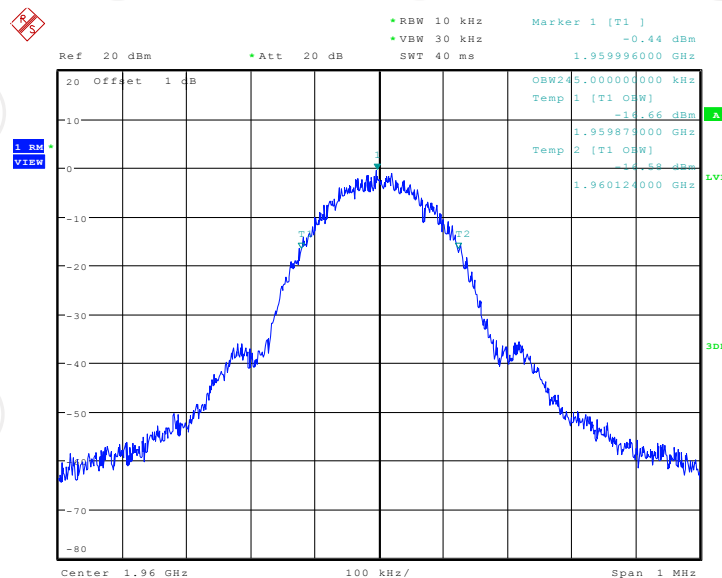
Date: 7.SEP.2021 10:03:44

## PCS GSM DL Input



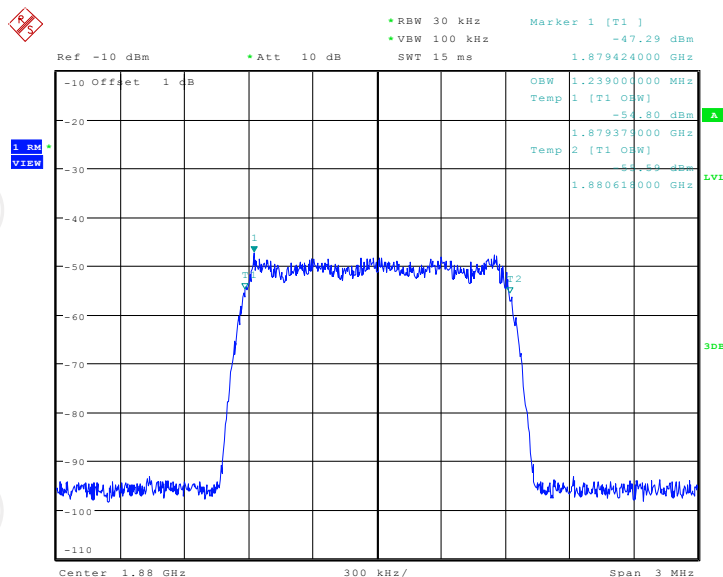
Date: 7.SEP.2021 09:55:18

## PCS GSM DL Output



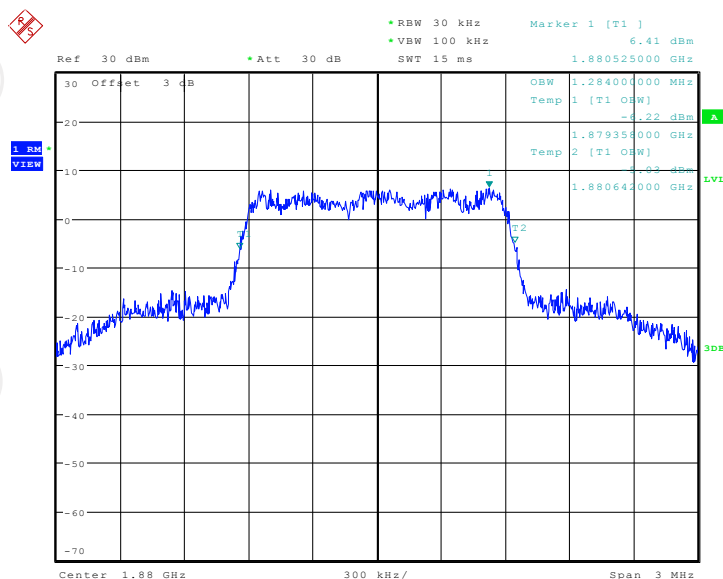
Date: 6.SEP.2021 19:44:57

## PCS CDMA UL Input



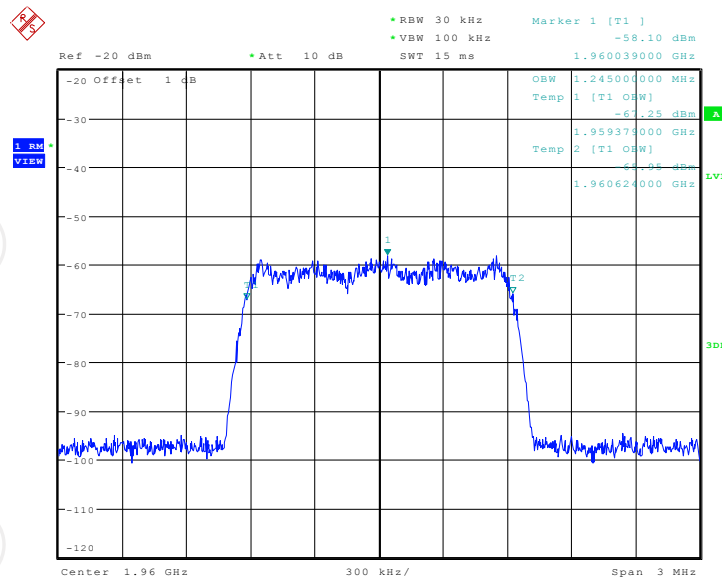
Date: 7.SEP.2021 10:34:41

## PCS CDMA UL output



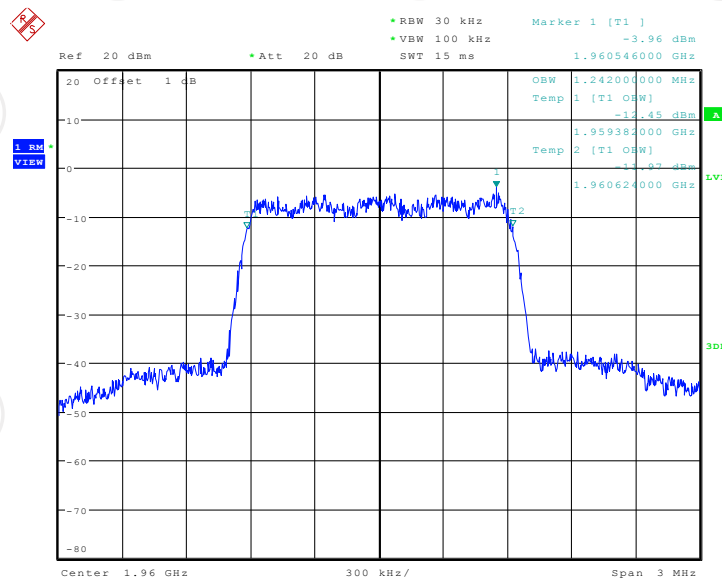
Date: 7.SEP.2021 10:03:10

## PCS CDMA DL Input



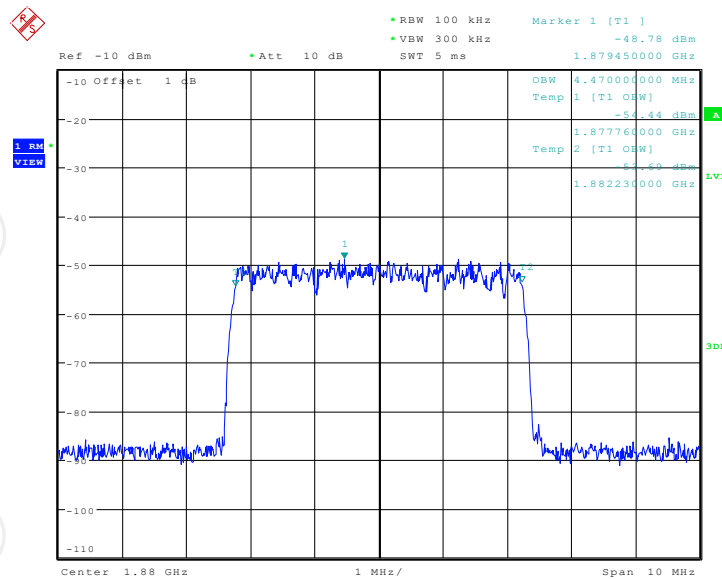
Date: 7.SEP.2021 09:55:58

## PCS CDMA DL Output



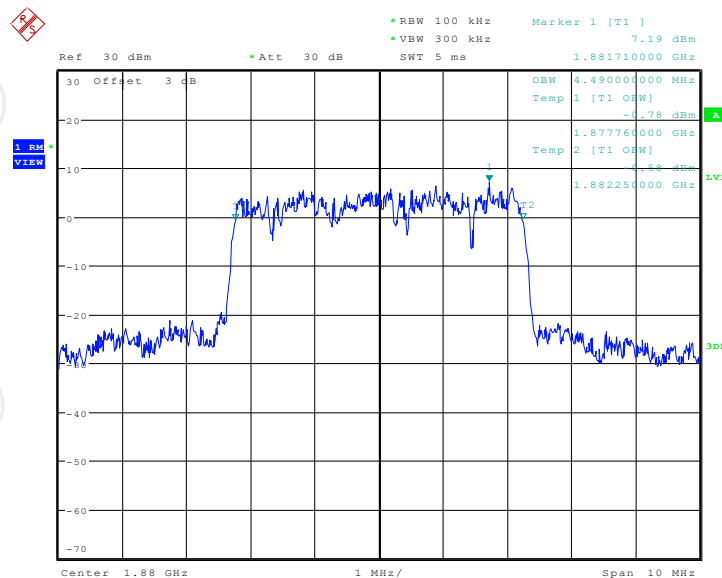
Date: 6.SEP.2021 19:52:02

## PCS LTE UL Input



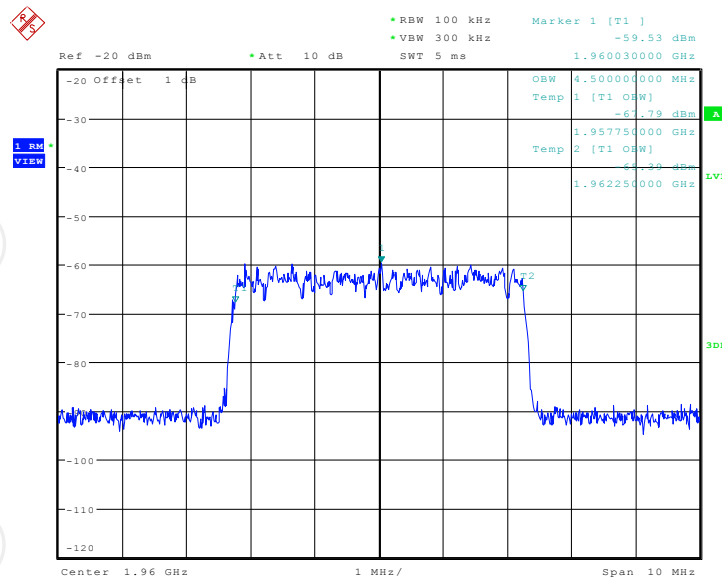
Date: 7.SEP.2021 10:35:15

## PCS LTE UL output



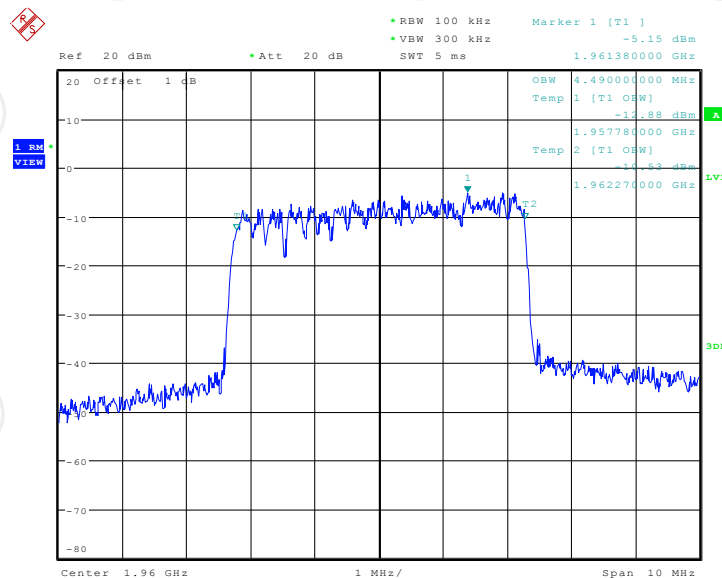
Date: 7.SEP.2021 10:04:17

## PCS LTE DL Input



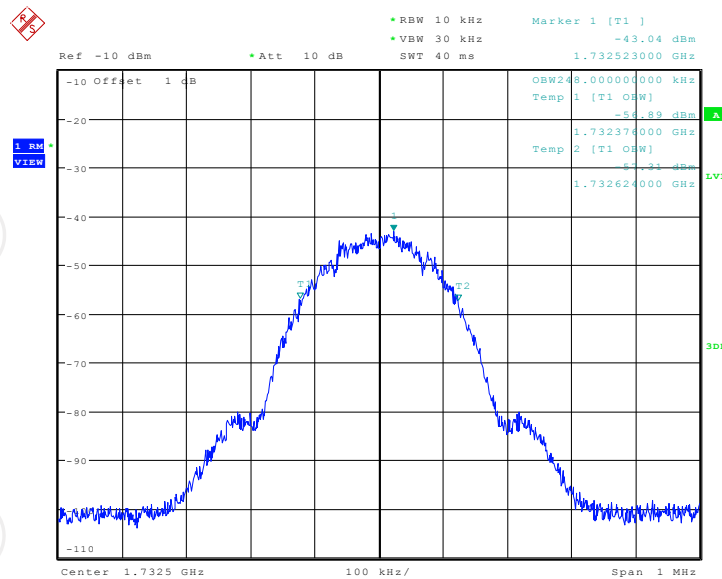
Date: 7.SEP.2021 09:56:32

## PCS LTE DL Output



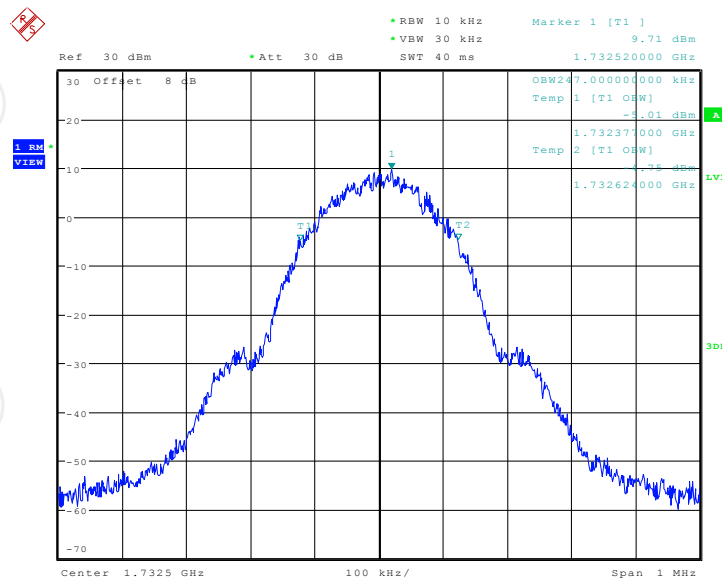
Date: 6.SEP.2021 19:52:54

## AWS-1 GSM UL Input



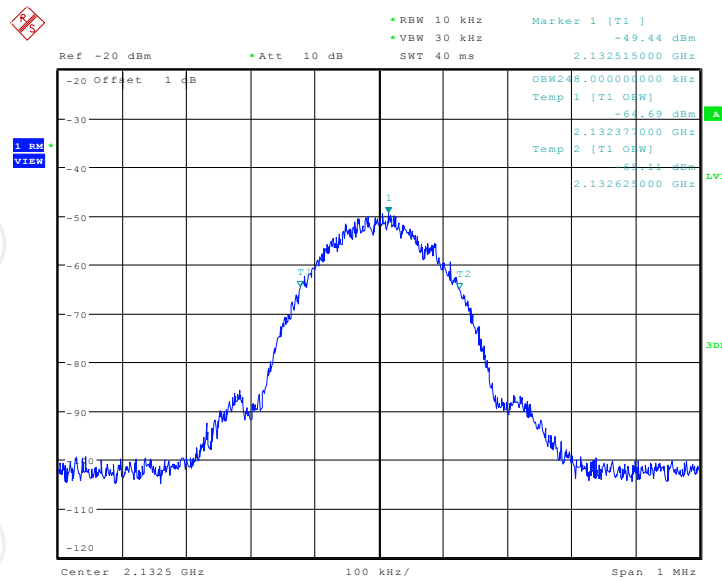
Date: 7.SEP.2021 10:33:40

## AWS-1 GSM UL output



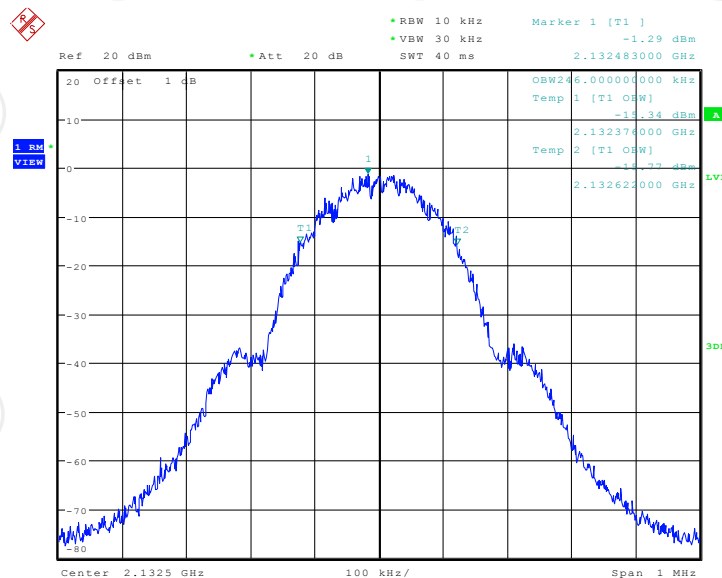
Date: 7.SEP.2021 10:13:37

## AWS-1 GSM DL Input



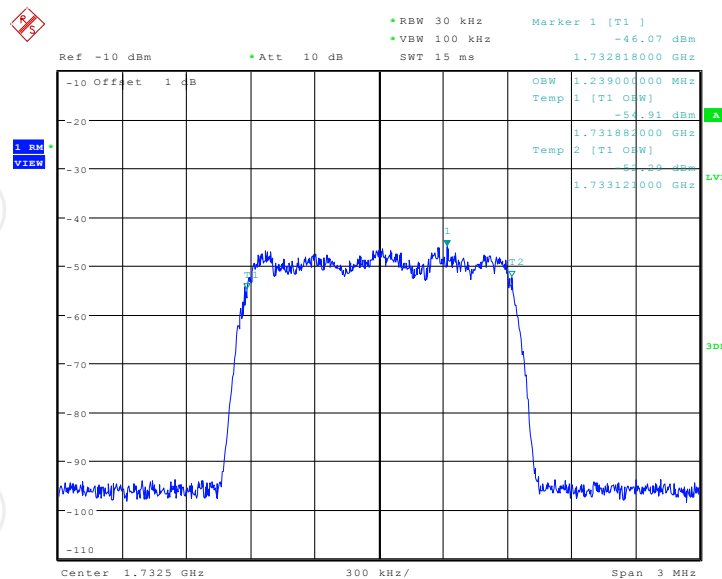
Date: 7.SEP.2021 09:53:55

## AWS-1 GSM DL Output



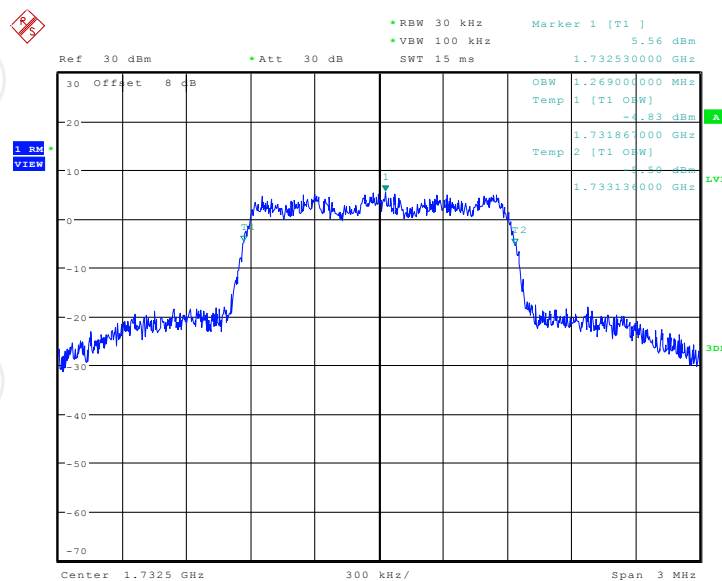
Date: 6.SEP.2021 19:55:25

## AWS-1 CDMA UL Input



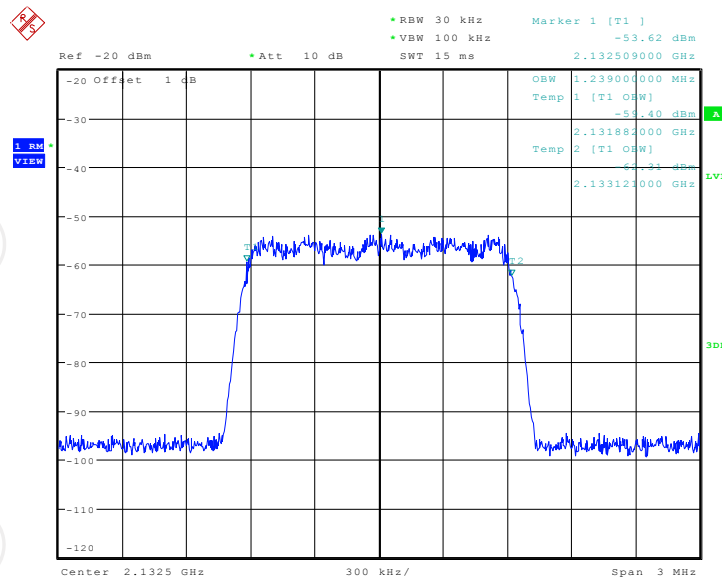
Date: 7.SEP.2021 10:33:00

## AWS-1 CDMA UL output



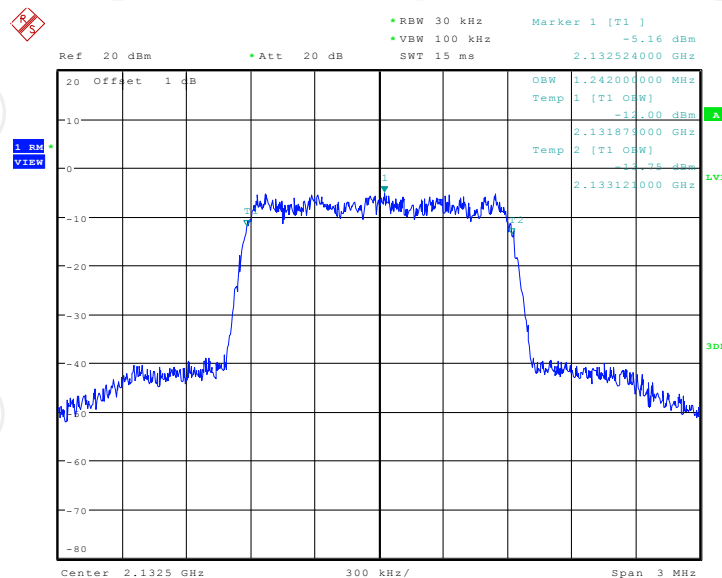
Date: 7.SEP.2021 10:13:07

## AWS-1 CDMA DL Input



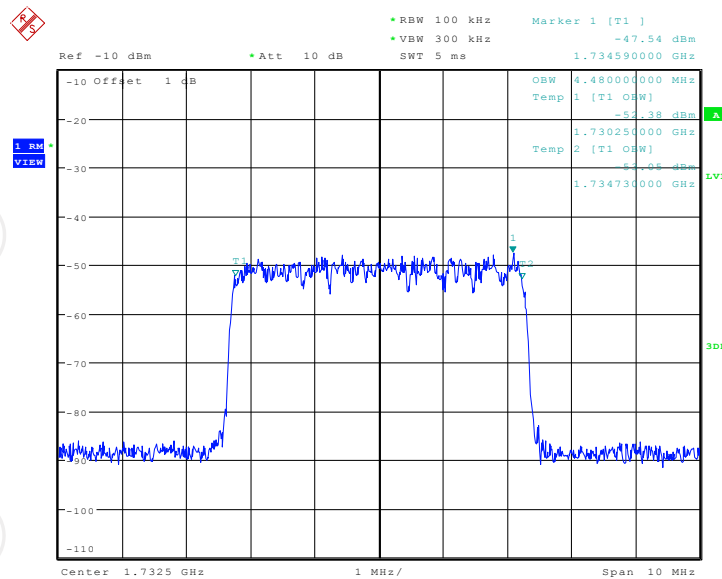
Date: 7.SEP.2021 09:52:20

## AWS-1 CDMA DL Output



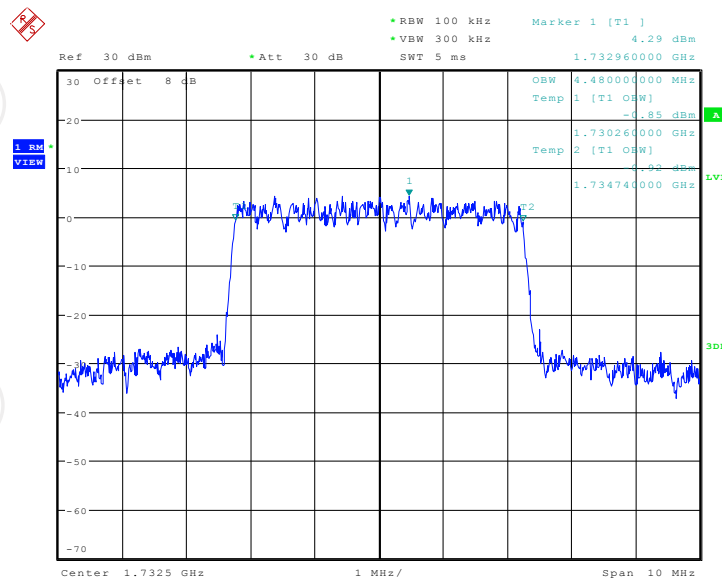
Date: 6.SEP.2021 19:56:34

## AWS-1 LTE UL Input



Date: 7.SEP.2021 10:32:21

## AWS-1 LTE UL output



Date: 7.SEP.2021 10:12:38