

TEST REPORT

Applicant Name : SHENZHEN HUAPTEC CO., LTD
 Address : 3rd FL,E BLDG, Sogood Science Park, SanWei community,
 Hangcheng Street, Bao'an District, Shenzhen, China
 Report Number : SZNS220622-27964E-RF-00
 FCC ID: OWWF115715S

Test Standard (s)

FCC PART 20.21

Sample Description

Product Type: Signal Booster
 Model No.: F20GTI-5S-IOT.Pro
 Multiple Model(s) No.: F20GTI-5S-IOT ; F15GTI-5S-IOT.Pro ; F15GTI-5S-IOT ;
 F10GTI-5S-IOT.Pro ; F10GTI-5S-IOT (Please refer to DOS for
 Model difference)
 Trade Mark: HiBoost
 Date Received: 2022/06/22
 Report Date: 2022/08/26

| | |
|--------------|-------|
| Test Result: | Pass* |
|--------------|-------|

* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Approved By:

Roger Ling

Candy Li

Roger Ling
 EMC Engineer

Candy Li
 EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk "*". Customer model name, addresses, names, trademarks etc. are not considered data.

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Shenzhen Accurate Technology Co., Ltd.

1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China
 Tel: +86 755-26503290 Fax: +86 755-26503396 Web: www.atc-lab.com

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

| | |
|----------------------|---|
| Voltage Range | DC 12V from adapter |
| Sample serial number | SZNS220622-27964E-RF-S1 (Assigned by ATC) |
| Sample/EUT Status | Good condition |
| Adapter information | Model: GM50-120300-F Input: AC 100-240V, 50/60Hz, 1.5A Output: DC 12V, 3.0A |

This device is a fixed wideband consumer and the Booster Operating frequency bands list below:

| Electrical specification | Uplink | Downlink |
|--------------------------|----------------|----------------|
| Frequency Range | 698 ~ 716MHz | 728 ~ 746MHz |
| | 776 ~ 787MHz | 746 ~ 757MHz |
| | 824 ~ 849 MHz | 869 ~ 894 MHz |
| | 1850 ~ 1915MHz | 1930 ~ 1995MHz |
| | 1710 ~ 1755MHz | 2110 ~ 2155MHz |

Objective

This test report is in accordance with Part 2, Part 20.21 and Part 22, Part 24, Part 27 of the Federal Communication Commissions rules.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Applicable Standards: KDB 935210 D03 Signal Booster Measurements v04r04.
ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

| Parameter | | Uncertainty |
|------------------------------------|-----------------|------------------------|
| Occupied Channel Bandwidth | | 5% |
| RF Frequency | | 0.082×10^{-7} |
| RF output power, conducted | | 0.73dB |
| Unwanted Emission, conducted | | 1.6dB |
| AC Power Lines Conducted Emissions | | 2.72dB |
| Audio Frequency Response | | 0.1dB |
| Low Pass Filter Response | | 1.2dB |
| Modulation Limiting | | 1% |
| Emissions, Radiated | 9kHz - 30MHz | 2.66dB |
| | 30MHz - 1GHz | 4.28dB |
| | 1GHz - 18GHz | 4.98dB |
| | 18GHz - 26.5GHz | 5.06dB |
| | 26.5GHz - 40GHz | 4.72dB |
| Temperature | | 1°C |
| Humidity | | 6% |
| Supply voltages | | 0.4% |

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISED), the Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a test mode which has been done in the factory.

Antenna kitting requirement: EUT has some antennas kitting for marketing, the antenna gain and cable loss for varies band were listed below, fulfill the requirement of FCC Part 20.21(e)(8)(i)(G), more detail information please refer to the user manuals.

Outdoor antenna:

| Frequency Range (MHz) | Yagi antenna (model: HODL698-2700V8i60A) | Cable loss (dB) |
|-----------------------|---|-----------------|
| | (dBi) | |
| 698-716 | 7.5 | 4.97 |
| 776-787 | 7.5 | 4.97 |
| 824-849 | 8 | 5.17 |
| 1710-1755 | 9 | 7.51 |
| 1850-1915 | 9 | 7.51 |

Indoor antenna:

| Frequency Range (MHz) | Panel antenna (model: AI698-2700V09iB) | Internal antenna | Cable loss (dB) |
|-----------------------|---|------------------|-----------------|
| | (dBi) | (dBi) | |
| 728-746 | 6.5 | 0 | 4.97 |
| 746-757 | 6.5 | 0 | 4.97 |
| 869-894 | 6.5 | 0 | 5.17 |
| 1930-1995 | 8.5 | 0 | 7.51 |
| 2110-2155 | 8.5 | 0 | 7.51 |

Note: Antenna port of indoor 1 connects to the internal antenna, this port is only used for internal antenna port conducted test, indoor 1 port cannot connect to any external indoor antenna, the cable loss is 0 dB.

The antenna port of indoor 1 and indoor 2 has the same circuit path, there is a switch between these ports. There are two testing configurations:

Configuration 1: EUT will be connected to internal antenna, testing was conducted at port of indoor 1

Configuration 2: EUT will be connected to external indoor antenna, testing was conducted at port of indoor 2.

The antenna gain and cable loss list above was provide by manufacturer.

EUT Exercise Software

No exercise software was used.

Special Accessories

No special accessory was used.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

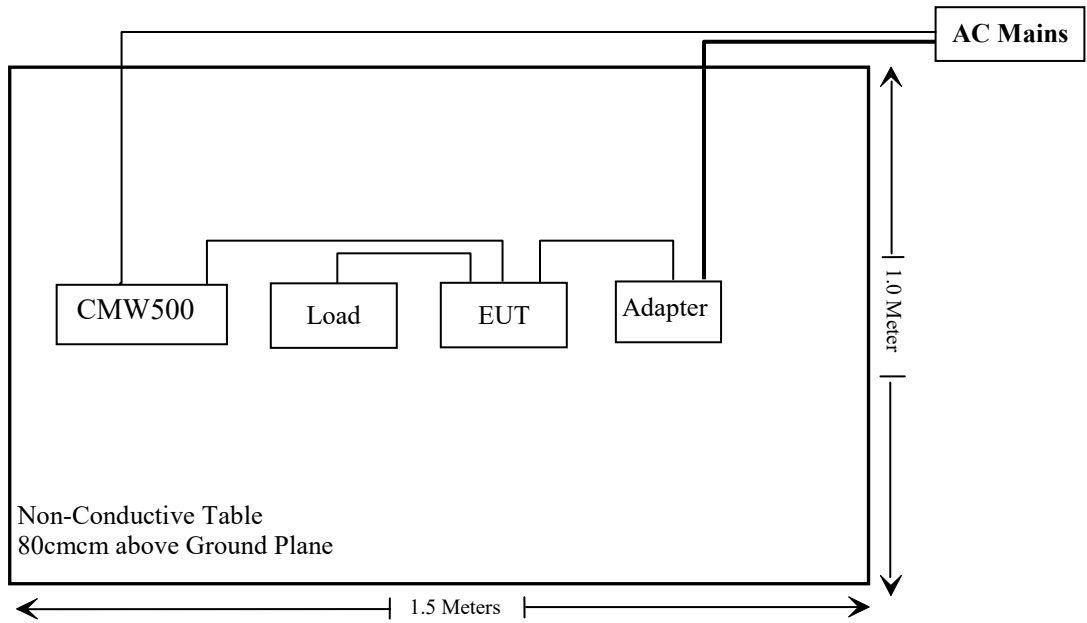
| Manufacturer | Description | Model | Serial Number |
|-----------------|-------------------------------------|---------|---------------|
| Unknown | 50ΩLoad | Unknown | BACLload002 |
| Rohde & Schwarz | Wideband Radio Communication Tester | CMW500 | 154606 |

External I/O Cable

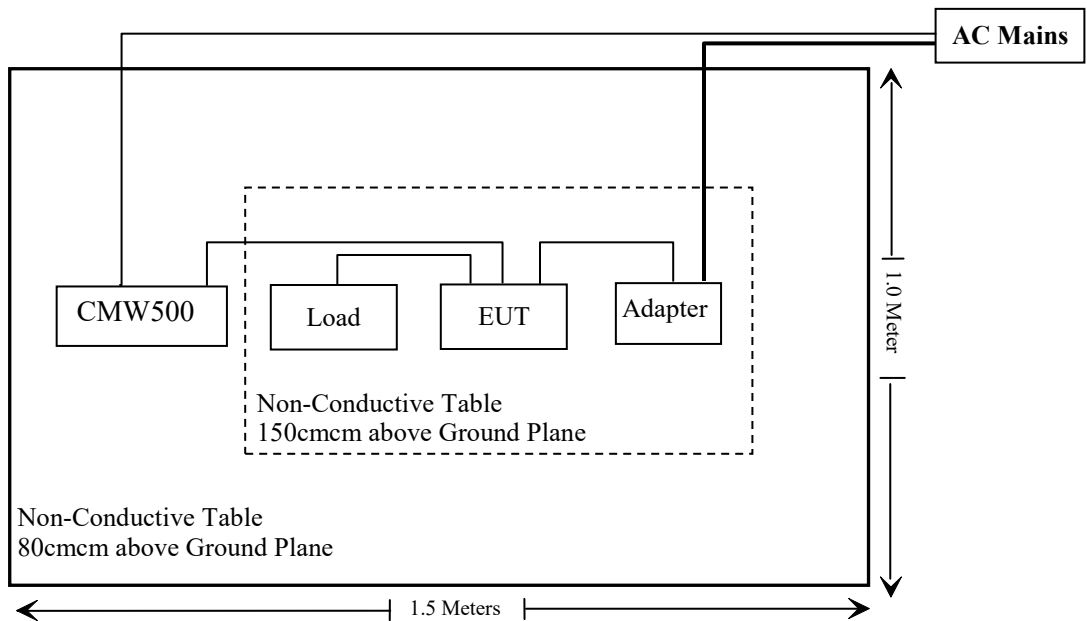
| Cable Description | Length (m) | From/Port | To |
|------------------------------------|------------|-----------|-----|
| Un-shielded Un-Detachable DC cable | 1.2 | Adapter | EUT |
| Shielded Detachable RF cable | 1.0 | CMW500 | EUT |

Block Diagram of Test Setup

Radiated emission(below 1GHz):



Radiated emission(above 1GHz):



SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Results |
|---|--|----------------|
| §20.21(e)(3) | 7.1 Authorized Frequency Band Verification | Compliant |
| § 20.21(e)(8)(i)(D) § 20.21(e)(8)(i)(B) & §20.21(e)(4) | 7.2 Maximum Power Measurement | Compliant |
| § 20.21(e)(8)(i)(C)(2) § 20.21(e)(8)(i)(B) & §20.21(e)(4) | 7.3 Maximum Booster Gain Computation | Compliant |
| § 20.21(e)(8)(i)(B) § 20.21(e)(3) | 7.13 Spectrum block filtering test procedure | Not applicable |
| § 20.21(e)(8)(i)(F) | 7.4 Intermodulation Product | Compliant |
| § 20.21(e)(8)(i)(E) | 7.5 Out Of Band Emissions | Compliant |
| § 20.21(e)(8)(i)(A) § 20.21(e)(8)(i)(H) &§20.21(e)(4) | 7.7 Noise Limits | Compliant |
| § 20.21(e)(8)(i)(I) &§20.21(e)(4) | 7.8 Uplink Inactivity | Compliant |
| § 20.21(e)(8)(i)(C)(1) & § 20.21(e)(8)(i)(H) | 7.9 Variable Booster Gain | Compliant |
| § 2.1049 | 7.10 Occupied Bandwidth | Compliant |
| § 20.21(e)(8)(ii)(A) &§20.21(e)(4) | 7.11 Oscillation Detection | Compliant |
| §2.1051 | 7.6 Spurious Emissions At Antenna Terminals | Compliant |
| § 2.1053 | 7.12 Radiated Spurious Emissions | Compliant |

Not applicable: This item only for wideband consumer boosters utilizing spectrum block filtering.

TEST EQUIPMENT LIST

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|-------------------|-------------------|------------------------|------------------|----------------------|
| Radiated Emissions Test | | | | | |
| Rohde& Schwarz | Test Receiver | ESR | 102725 | 2021/12/13 | 2022/12/12 |
| Rohde&Schwarz | Spectrum Analyzer | FSV40 | 101949 | 2021/12/13 | 2022/12/12 |
| SONOMA INSTRUMENT | Amplifier | 310 N | 186131 | 2021/11/09 | 2022/11/08 |
| A.H. Systems, inc. | Preamplifier | PAM-0118P | 135 | 2021/11/09 | 2022/11/08 |
| Quinstar | Amplifier | QLW-18405536-J0 | 15964001002 | 2021/11/11 | 2022/11/10 |
| Radiated Emission Test Software: e3 19821b (V9) | | | | | |
| Unknown | RF Coaxial Cable | No.10 | N050 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.11 | N1000 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.12 | N040 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.13 | N300 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.14 | N800 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.15 | N600 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.16 | N650 | 2021/12/14 | 2022/12/13 |
| Wainwright | High Pass Filter | WHKX3.6/18 G-10SS | 5 | 2021/12/14 | 2022/12/13 |
| CD | High Pass Filter | HPM-1.2/18G-60 | 110 | 2021/12/14 | 2022/12/13 |
| Schwarzbeck | Bilog Antenna | VULB9163 | 9163-194 | 2020/01/05 | 2023/01/04 |
| Schwarzbeck | Bilog Antenna | VULB9163 | 9163-323 | 2021/07/06 | 2024/07/05 |
| Schwarzbeck | Horn Antenna | BBHA9120D | 9120D-655 | 2020/01/05 | 2023/01/04 |
| Schwarzbeck | Horn Antenna | BBHA9120D | 9120D-1067 | 2020/01/05 | 2023/01/04 |
| PASTERNAK | Horn Antenn | PE9852/2F-20 | 1120 (ATC-BA-024-1) | 2020/01/05 | 2023/01/04 |
| PASTERNAK | Horn Antenn | PE9852/2F-20 | 1120 (ATC-BA-025-1) | 2020/01/05 | 2023/01/04 |
| Agilent | Signal Generator | N5183A | MY51040755 | 2021/12/13 | 2022/12/12 |

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|--------------------------|-------------------------------------|-------------|---------------|------------------|----------------------|
| RF Conducted Test | | | | | |
| Rohde&Schwarz | Spectrum Analyzer | FSV-40 | 101948 | 2021/12/13 | 2022/12/12 |
| Rohde & Schwarz | Wideband Radio Communication Tester | CMW500 | 154606 | 2021/12/13 | 2022/12/12 |
| WEINSCHEL | 10dB Attenuator | 5324 | AU 3842 | 2021/12/14 | 2022/12/13 |
| Rohde&Schwarz | Vector Signal Generator | SMBV100A | 260434 | 2021/12/13 | 2022/12/12 |
| Mini-Circuits | Power Splitter | DC-18000MHz | SF10944151S | 2021/12/14 | 2022/12/13 |
| Agilent | adjustable attenuator | 8494B-001 | F-03-EM221 | 2021/11/26 | 2023/11/25 |
| Unknown | RF Coaxial Cable | No.31 | RF-01 | Each time | |
| Unknown | RF Coaxial Cable | No.32 | RF-02 | Each time | |

* **Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

§ 20.21(E)(3) – AUTHORIZED FREQUENCY BAND VERIFICATION

Applicable Standard

According to § 20.21(e)(3) Frequency Bands

This test is intended to confirm that the signal booster only operates on the CMRS frequency bands authorized for use by the NPS. In addition, this test will identify the frequency at which the maximum gain is realized within each CMRS operational band, which then serves as a basis for subsequent tests.

Test Procedure

- a) Connect the EUT to the test equipment as shown in Figure 1. Begin with the uplink output connected to the spectrum analyzer.
- b) Set the spectrum analyzer RBW for 100 kHz with the VBW $\geq 3 \times$ the RBW using a PEAK detector with the MAX HOLD function.
- c) Set the center frequency of the spectrum analyzer to the center of the operational band under test with a span of 1 MHz.
- d) Set the signal generator for CW mode and tune to the center frequency of the operational band under test.
- e) Set the initial signal generator power to a level that is at least 6 dB below the AGC level specified by the manufacturer.
- f) Slowly increase the signal generator power level until the output signal reaches the AGC operational level.
- g) Reduce the signal generator power to a level that is 3 dB below the level noted above and manually reset the EUT.
- h) Reset the spectrum analyzer span to $2 \times$ the CMRS band under test. Adjust the tuned frequency of the signal generator to sweep $2 \times$ the CMRS band using the sweep function. The AGC must not be activated throughout the entire sweep.
- i) 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).
- j) Capture the spectrum analyzer trace for inclusion in the test report.
- k) Repeat 7.1(c) to 7.1(j) for all operational uplink and downlink bands.

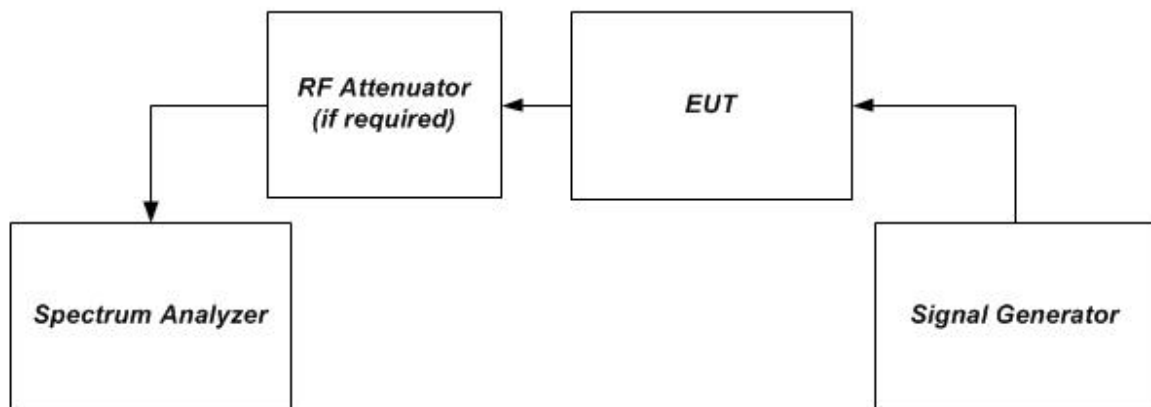


Figure 1 – Band verification test instrumentation setup

Test Data

Environmental Conditions

| | |
|---------------------------|-----------|
| Temperature: | 25.3°C |
| Relative Humidity: | 56 % |
| ATM Pressure: | 101.0 kPa |

The testing was performed by Andy Yu on 2022-07-25.

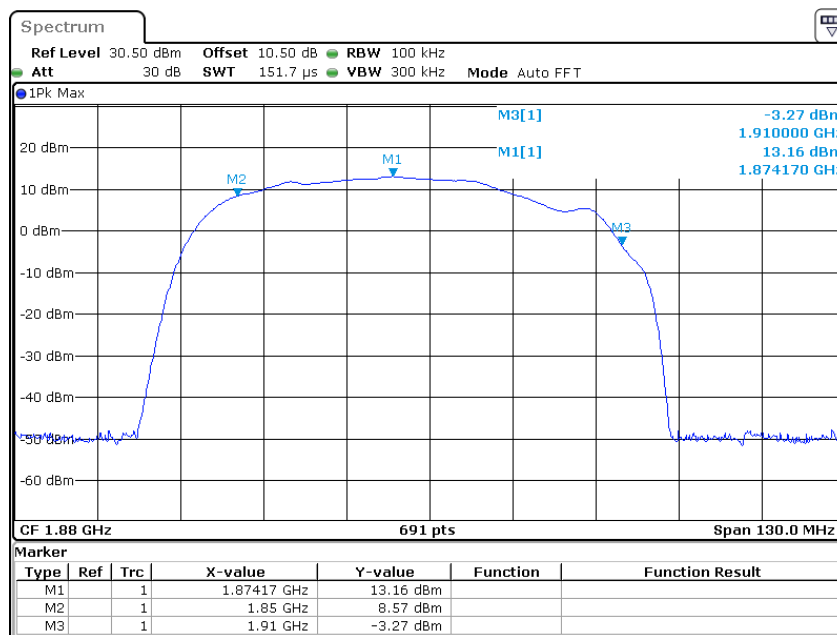
Test Result: Pass

Please refer to following plots.

For Configuration 1:

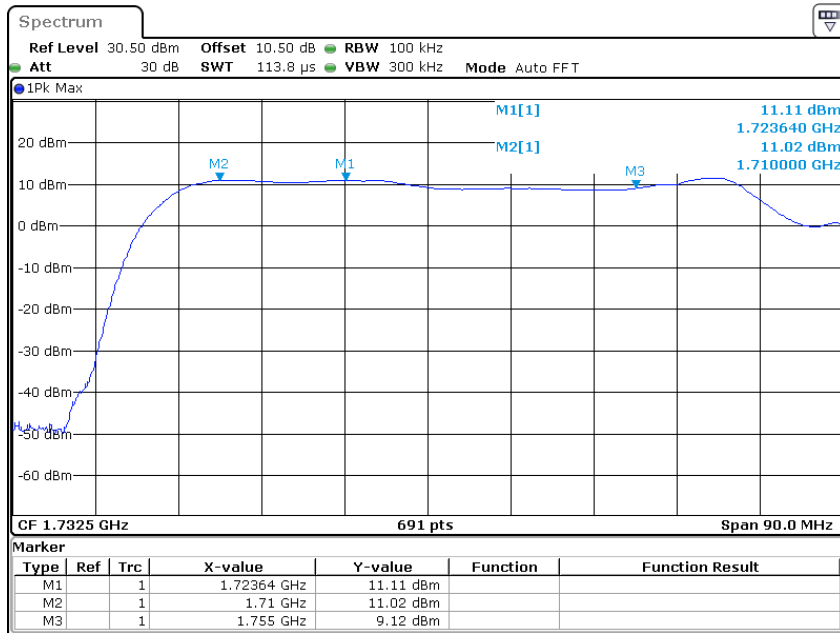
Uplink:

PCS Band



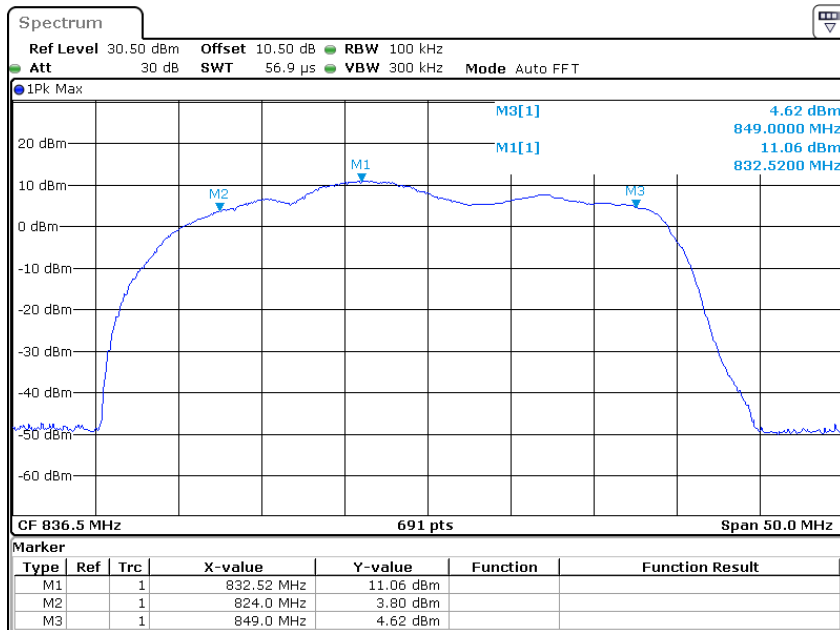
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AWS Band



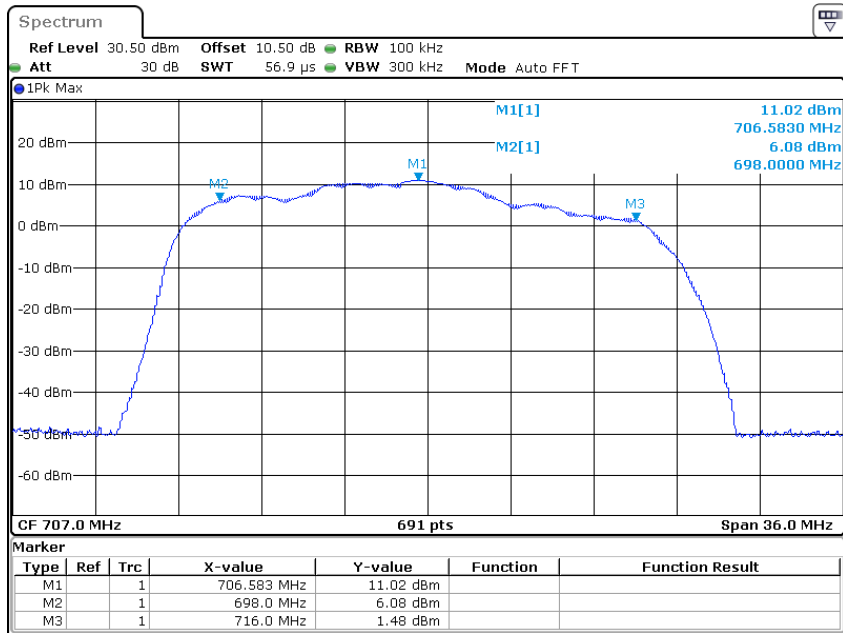
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Cellular Band



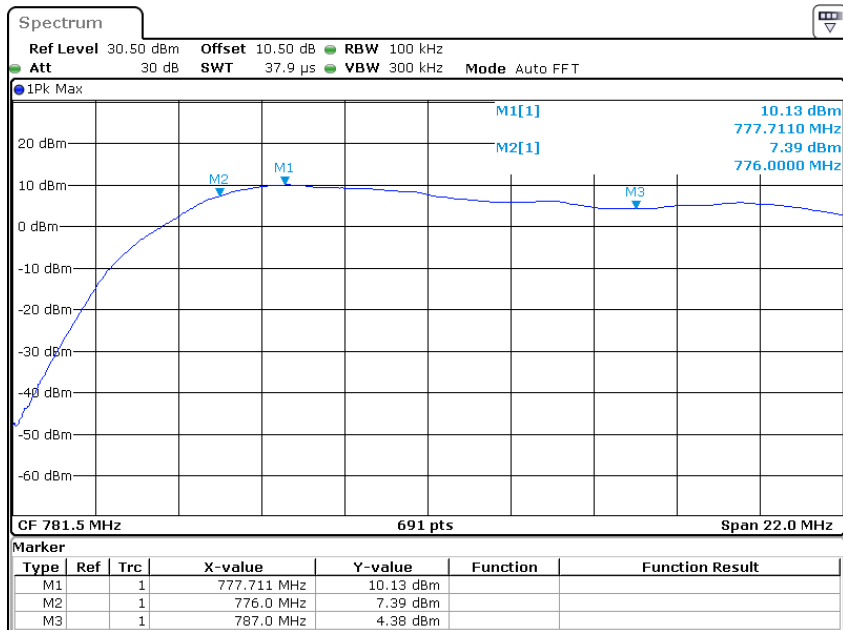
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Lower 700MHz



Date: 25.JUL.2022 11:41:59

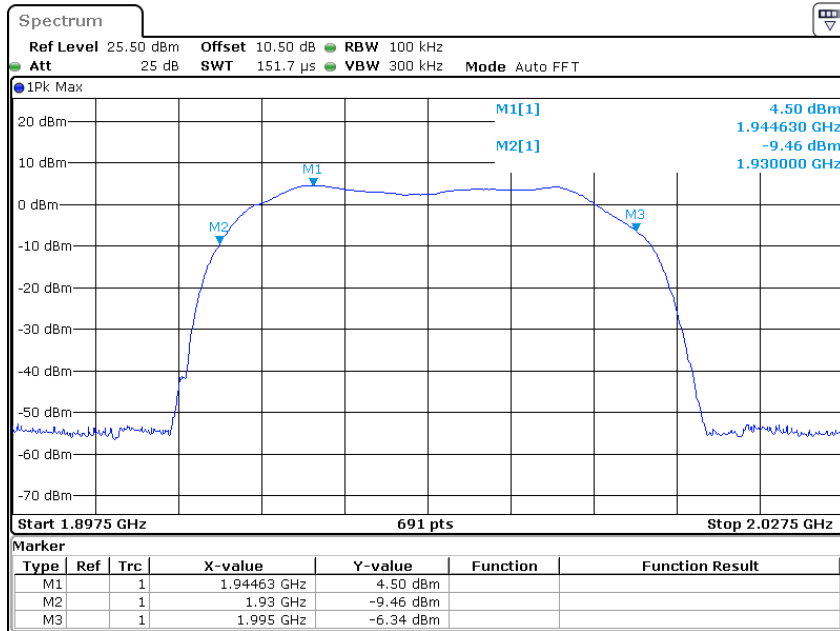
Upper 700MHz



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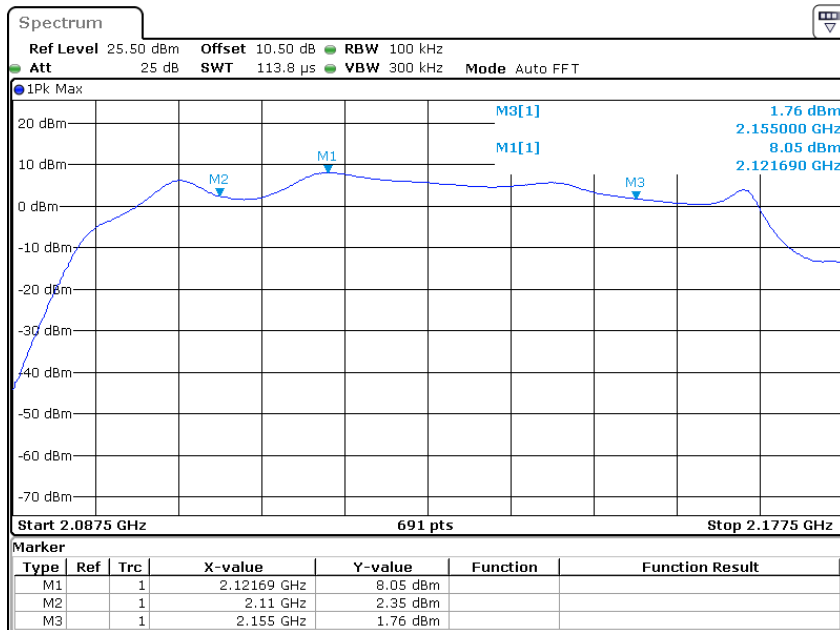
Downlink:

PCS Band



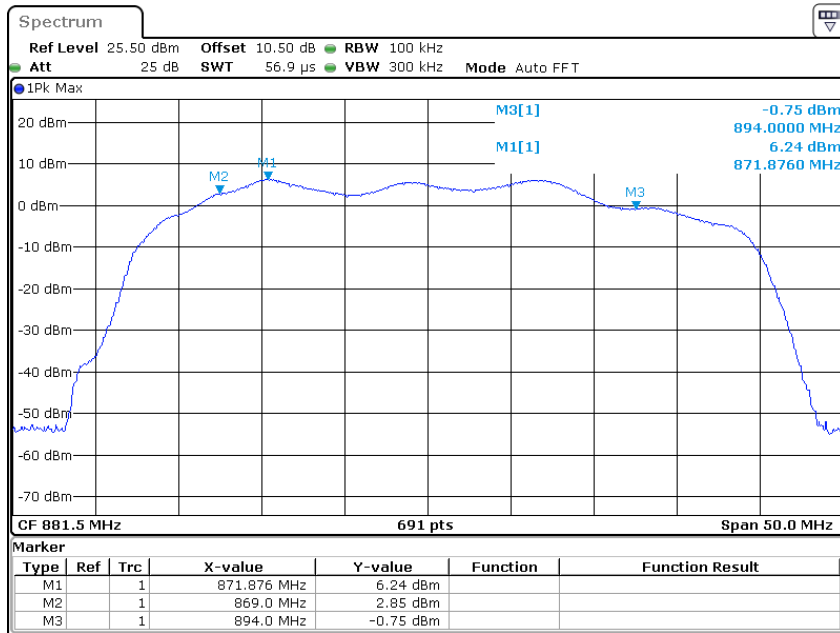
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AWS Band



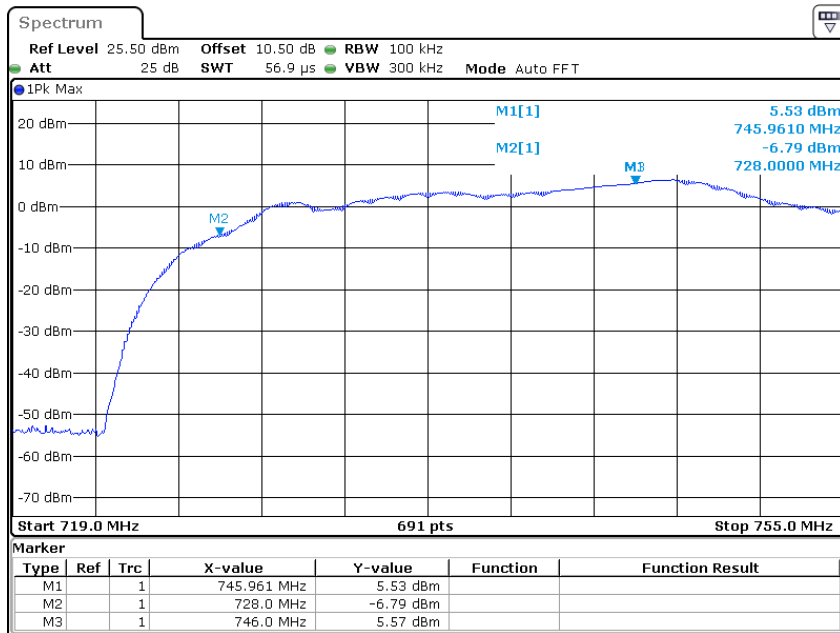
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Cellular Band



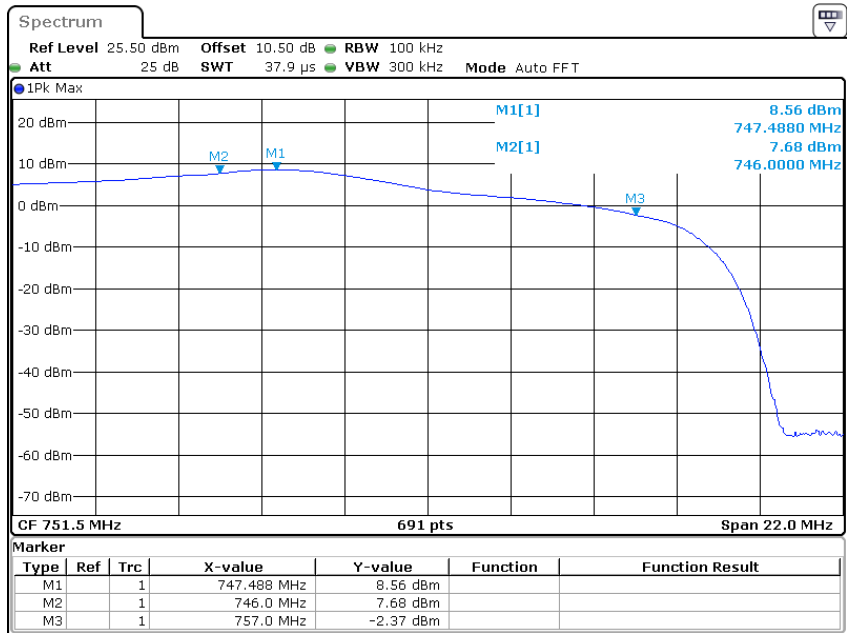
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Lower 700MHz



Date: 25.JUL.2022 10:56:59

Upper 700MHz

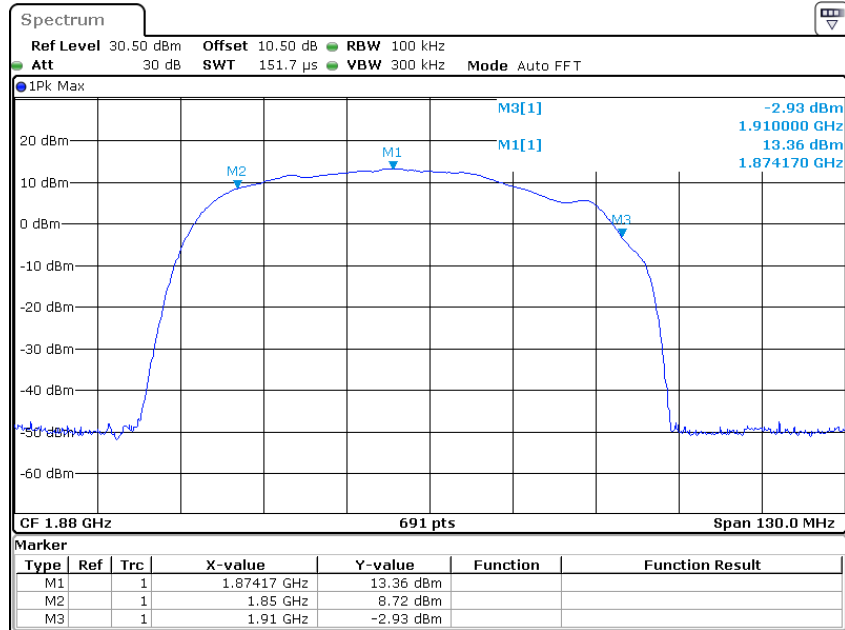


Date: 25.JUL.2022 10:52:33

For Configuration 2:

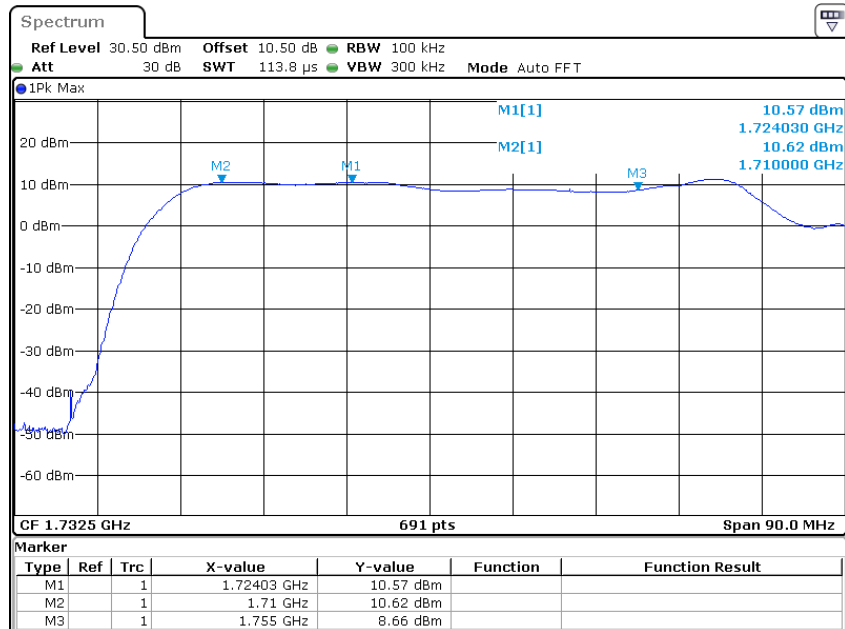
Uplink:

PCS Band



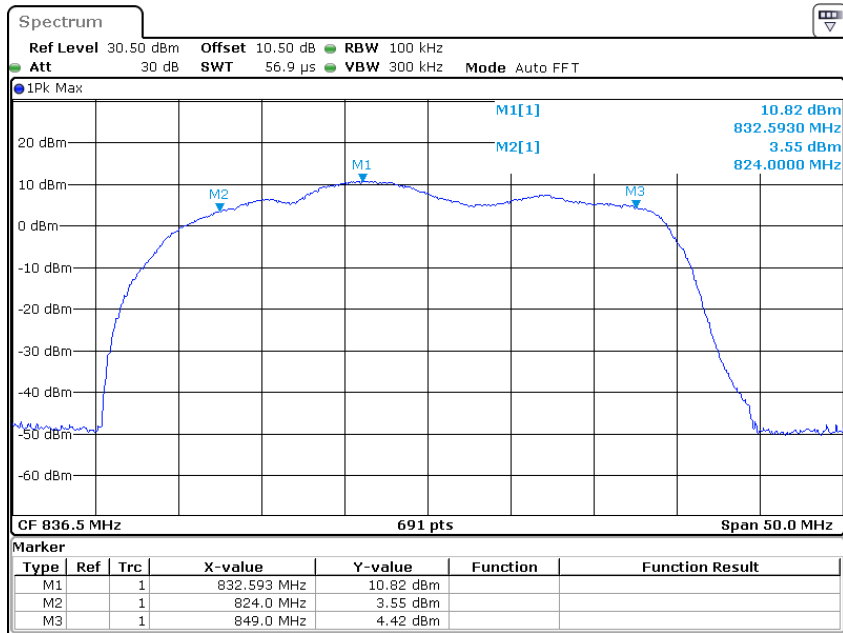
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AWS Band



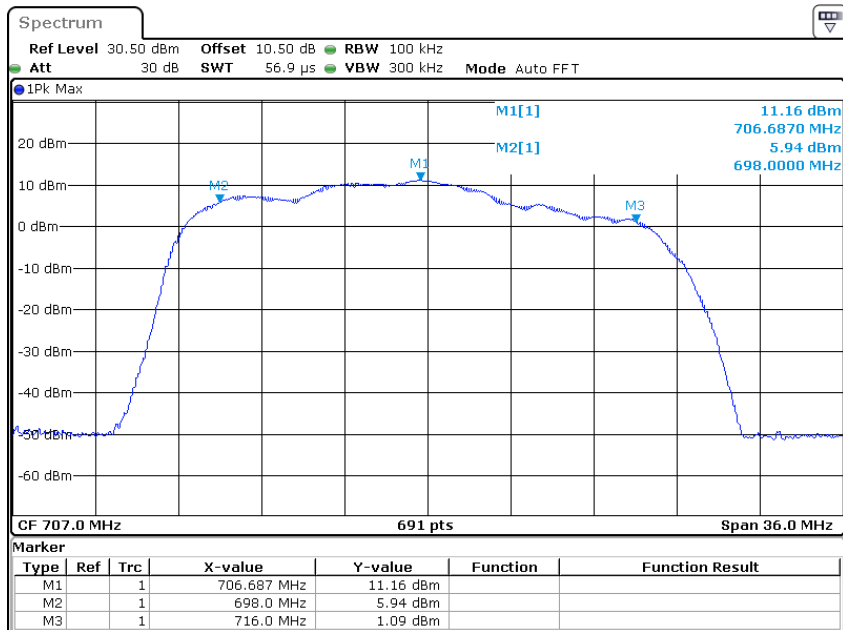
Date: 25.JUL.2022 12:04:14

Cellular Band



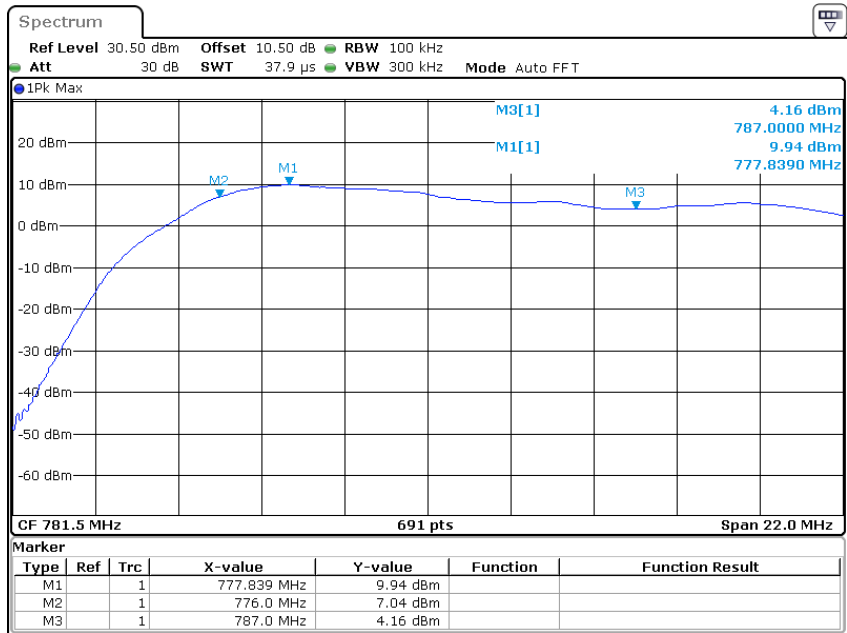
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Lower 700MHz



Date: 25.JUL.2022 11:53:29

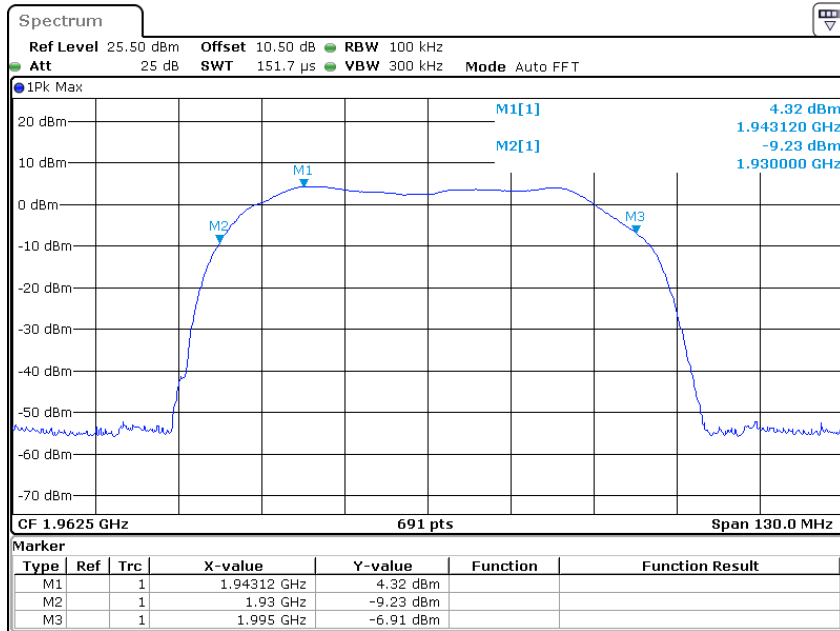
Upper 700MHz



Date: 25.JUL.2022 11:56:13

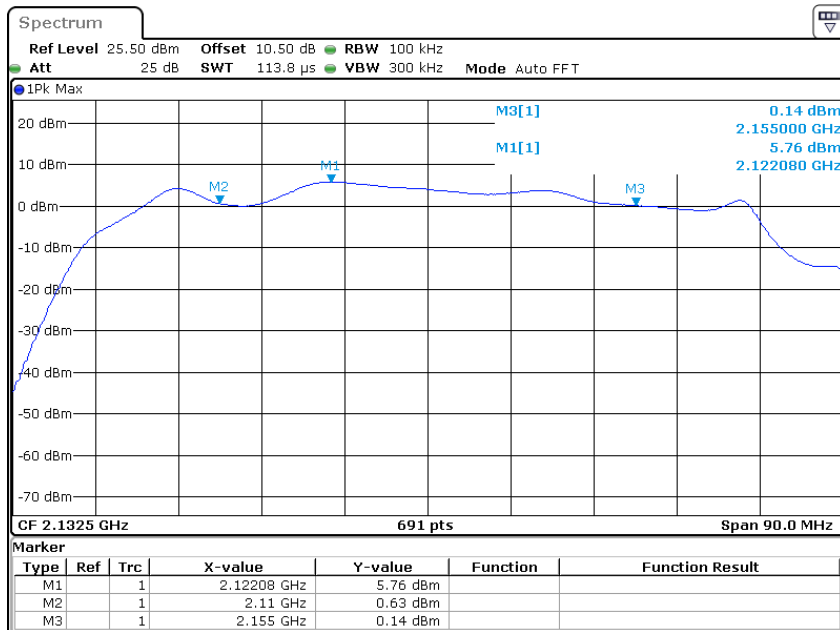
Downlink:

PCS Band



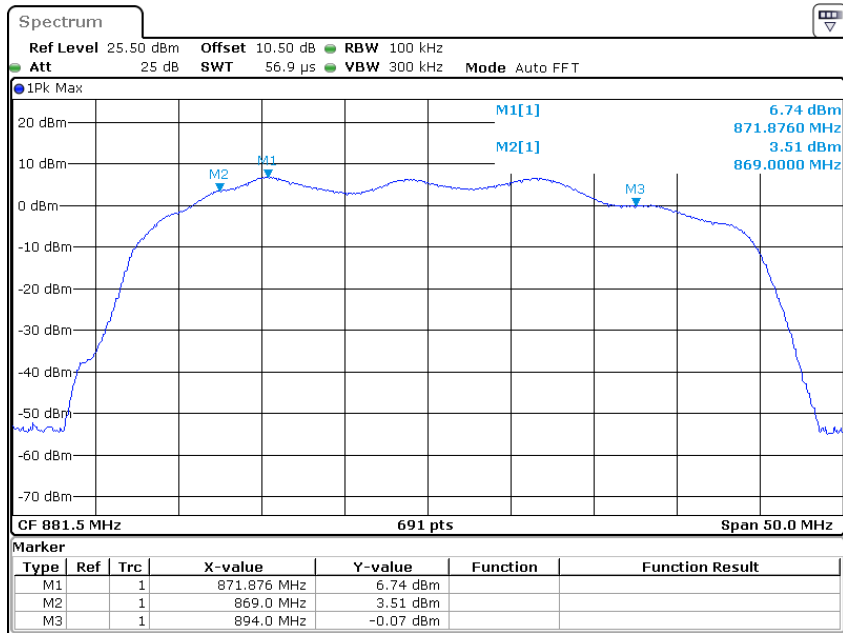
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AWS Band



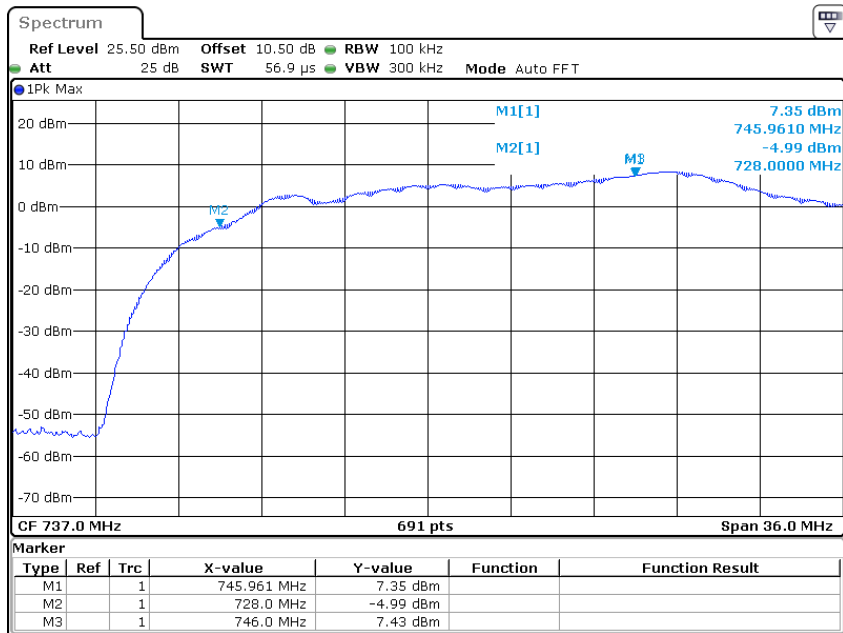
Date: 25.JUL.2022 11:04:12

Cellular Band



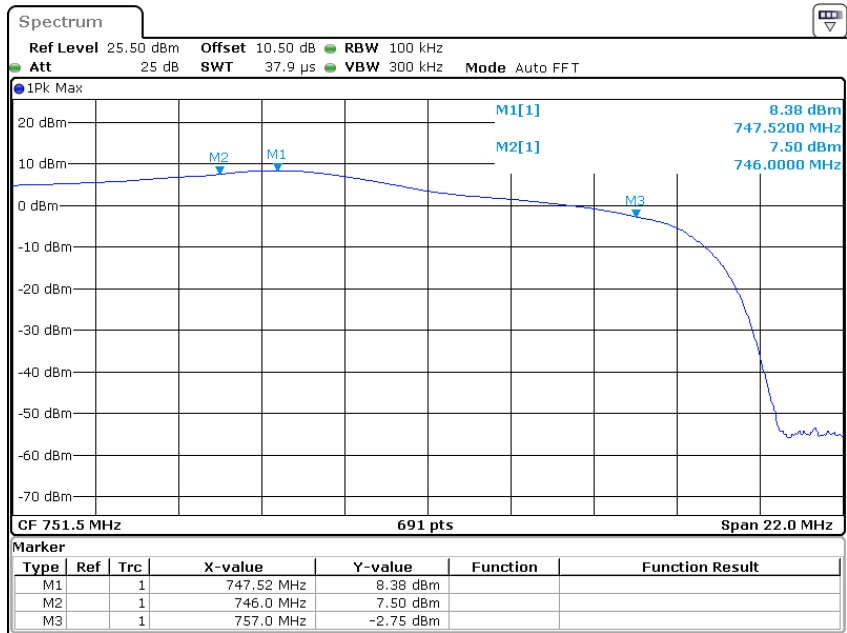
Date: 25.JUL.2022 11:08:15

Lower 700MHz



Date: 25.JUL.2022 11:19:48

Upper 700MHz



Date: 25.JUL.2022 11:15:45

§ 20.21(e)(8)(i)(D) ,§ 20.21(e)(8)(i)(B)& §20.21(e)(4)– MAXIMUM POWER MEASUREMENT

Applicable Standard

According to § 20.21(e)(8)(i)(D) Power Limits; § 20.21(e)(8)(i)(B) Bidirectional Capability (uplink minimum conducted power output); §20.21(e)(4) Self-monitoring.

This procedure shall be used to demonstrate compliance to the signal booster power limits and requirements as specified in §§ 20.21(e)(8)(i)(D) and 20.21(e)(8)(i)(B) for wideband consumer signal boosters.

- a) Compliance to authorized EIRP limits must be shown using the highest gains from the list of antennas, cabling, and coupling devices declared by the manufacturer for use with the consumer booster.
- b) In addition, the maximum power levels measured in this procedure will be utilized in calculating the maximum gain as described in the next subclause.
- c) The frequency with the highest power level in each operational band as determined in 7.1 is to be measured discretely by applying the following procedure utilizing the stated emission and power detector types independently.
- d) Use a signal generator to create a pulsed CW or GSM signal with a pulse width of 570 μ s and a duty cycle of 12.5% (i.e., one GSM timeslot), then measure utilizing the burst power function of the measuring instrument.
- e) Use a signal generator to create an AWGN signal with a 99% occupied bandwidth of 4.1 MHz, then measure utilizing the channel power or band power function of the measuring instrumentation.
- f) All modes of operation must be verified to maintain operation within authorized limits at the maximum uplink and downlink test levels per device type as defined in 5.4, by increasing the power level in 2 dB steps from the AGC level to the maximum input level specified in 5.5.

Test Procedure

- a) Connect the EUT to the test equipment as shown in Figure 1. Begin with the uplink output (donor port) connected to the spectrum analyzer.
- b) Configure the signal generator and spectrum analyzer for operation on the frequency determined in 7.1 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.
- c) Set the initial signal generator power to a level well below that which causes AGC control.
- d) 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; i.e., no further increase in output power as input power is increased).
- e) Reduce power sufficiently on the signal generator to ensure that the AGC is not controlling the power output.
- f) 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 P_{in} .
- g) Measure the output power P_{out} with the spectrum analyzer as follows.
 - 1) Set RBW = 100 kHz for AWGN signal type and 300 kHz for CW or GSM signal type.
 - 2) Set VBW $\geq 3 \times$ RBW.
 - 3) Select either the BURST POWER or CHANNEL POWER measurement tool, as required for each signal type. The channel power integration bandwidth shall be 99% occupied bandwidth (4.1 MHz).
 - 4) Select the RMS (power averaging) detector.
 - 5) Ensure that the number Note: This requirement
 - 6) Set sweep time = auto

- 7) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
- h) Record the measured power level as P_{OUT} with one set of results for the GSM or CW input stimulus and another set of results for the AWGN input stimulus.
- i) Repeat step h) while increasing the signal generator amplitude in 2 dB steps until the maximum input level indicated in 5.5 is reached. If the booster has shut down at any point during the input power steps it should be noted and step h) shall be repeated at an input level 1 dB less than that found to cause the shutdown.
- j) Repeat the entire procedure for each operational uplink and downlink frequency band supported by the booster.
- k) Provide tabulated results in the test report.

Test Data

Environmental Conditions

| | |
|---------------------------|-----------|
| Temperature: | 25.3°C |
| Relative Humidity: | 56 % |
| ATM Pressure: | 101.0 kPa |

The testing was performed by Andy Yu on 2022-07-28.

Test Result: Pass

Please refer to the following tables

Configuration 1:

AGC Level:

| Mode | Operation Band | Signal type | AGC level | Mode | Operation Band | Signal type | AGC level |
|--------|----------------|-------------|-----------|----------|----------------|-------------|-----------|
| | | | dBm | | | | dBm |
| Uplink | Lower 700 MHz | AWGN | -41.54 | Downlink | Lower 700 MHz | AWGN | -49.97 |
| | | GSM | -42.54 | | | GSM | -49.47 |
| | Upper 700 MHz | AWGN | -42.56 | | Upper 700 MHz | AWGN | -51.95 |
| | | GSM | -42.56 | | | GSM | -51.95 |
| | cellular | AWGN | -41.53 | | cellular | AWGN | -50.54 |
| | | GSM | -43.03 | | | GSM | -50.04 |
| | PCS | AWGN | -49.59 | | PCS | AWGN | -55.55 |
| | | GSM | -50.59 | | | GSM | -55.05 |
| | AWS | AWGN | -48.95 | | AWS | AWGN | -58.23 |
| | | GSM | -48.95 | | | GSM | -57.23 |

Output Power: (worst case using panel antenna for indoor)

| Mode | Operation Band | Signal type | Pre AGC Input level | Conducted Output level | Limit | Antenna Gain | Cable loss | EIRP | EIRP Limit |
|----------|----------------|-------------|---------------------|------------------------|-------|--------------|------------|-------|------------|
| | | | dBm | dBm | dBm | dB | dB | dBm | dBm |
| Uplink | Lower 700 MHz | AWGN | -42.04 | 19.75 | 17-30 | 7.5 | 4.97 | 22.28 | ≤30 |
| | | GSM | -43.04 | 19.86 | | | | 22.39 | |
| | Upper 700 MHz | AWGN | -43.06 | 20.40 | | 7.5 | 4.97 | 22.93 | |
| | | GSM | -43.06 | 20.89 | | | | 23.42 | |
| | cellular | AWGN | -42.03 | 19.12 | | 8 | 5.17 | 21.95 | |
| | | GSM | -43.53 | 18.47 | | | | 21.30 | |
| | PCS | AWGN | -50.09 | 20.19 | | 9 | 7.51 | 21.68 | |
| | | GSM | -51.09 | 20.06 | | | | 21.55 | |
| | AWS | AWGN | -49.45 | 20.25 | | 9 | 7.51 | 21.74 | |
| | | GSM | -49.45 | 20.69 | | | | 22.18 | |
| Downlink | Lower 700 MHz | AWGN | -50.47 | 12.13 | ≤17 | 6.5 | 4.97 | 13.66 | ≤17 |
| | | GSM | -49.97 | 12.73 | | | | 14.26 | |
| | Upper 700 MHz | AWGN | -52.45 | 11.45 | | 6.5 | 4.97 | 12.98 | |
| | | GSM | -52.45 | 11.88 | | | | 13.41 | |
| | cellular | AWGN | -51.04 | 11.92 | | 6.5 | 5.17 | 13.25 | |
| | | GSM | -50.54 | 13.53 | | | | 14.86 | |
| | PCS | AWGN | -56.05 | 12.73 | | 8.5 | 7.51 | 13.72 | |
| | | GSM | -55.55 | 13.77 | | | | 14.76 | |
| | AWS | AWGN | -58.73 | 12.21 | | 8.5 | 7.51 | 13.20 | |
| | | GSM | -57.73 | 13.44 | | | | 14.43 | |

Maximum Input level:

| Mode | Operation Band | Signal type | Maximum Input level | Maximum Input level Limits | Conducted Output level |
|----------|----------------|-------------|---------------------|----------------------------|------------------------|
| | | | dBm | dBm | dBm |
| Uplink | Lower 700 MHz | AWGN | -29.04 | 27.0 | 19.32 |
| | | GSM | -30.04 | | 19.53 |
| | Upper 700 MHz | AWGN | -29.06 | | 19.86 |
| | | GSM | -29.06 | | 21.09 |
| | cellular | AWGN | -29.03 | | 19.23 |
| | | GSM | -30.53 | | 18.08 |
| | PCS | AWGN | -37.09 | | 20.75 |
| | | GSM | -37.09 | | 20.30 |
| | AWS | AWGN | -36.45 | | 19.99 |
| | | GSM | -36.45 | | 20.46 |
| Downlink | Lower 700 MHz | AWGN | -37.47 | -20 | 11.91 |
| | | GSM | -36.97 | | 12.86 |
| | Upper 700 MHz | AWGN | -38.45 | | 11.24 |
| | | GSM | -38.45 | | 11.77 |
| | cellular | AWGN | -51.04 | | 11.67 |
| | | GSM | -37.54 | | 13.95 |
| | PCS | AWGN | -56.05 | | 12.47 |
| | | GSM | -43.55 | | 13.89 |
| | AWS | AWGN | -58.73 | | 12.05 |
| | | GSM | -43.23 | | 13.71 |

Configuration 2:**AGC Level:**

| Mode | Operation Band | Signal type | AGC level | Mode | Operation Band | Signal type | AGC level |
|--------|----------------|-------------|-----------|----------|----------------|-------------|-----------|
| | | | dBm | | | | dBm |
| Uplink | Lower 700 MHz | AWGN | -42.04 | Downlink | Lower 700 MHz | AWGN | -49.97 |
| | | GSM | -42.04 | | | GSM | -49.47 |
| | Upper 700 MHz | AWGN | -42.56 | | Upper 700 MHz | AWGN | -51.45 |
| | | GSM | -42.06 | | | GSM | -51.95 |
| | cellular | AWGN | -41.53 | | cellular | AWGN | -50.04 |
| | | GSM | -42.53 | | | GSM | -50.04 |
| | PCS | AWGN | -49.09 | | PCS | AWGN | -55.55 |
| | | GSM | -50.09 | | | GSM | -55.55 |
| | AWS | AWGN | -47.95 | | AWS | AWGN | -57.23 |
| | | GSM | -48.45 | | | GSM | -56.73 |

Output Power: (worst case using panel antenna for indoor)

| Mode | Operation Band | Signal type | Pre AGC Input level | Conducted Output level | Limit | Antenna Gain | Cable loss | EIRP | EIRP Limit | | | |
|---------------|----------------|---------------|---------------------|------------------------|-------|--------------|------------|-------|------------|------|-------|-----|
| | | | dBm | dBm | | | | dBm | dBm | | | |
| Uplink | Lower 700 MHz | AWGN | -42.54 | 19.66 | 17-30 | 7.5 | 4.97 | 22.19 | ≤30 | | | |
| | | GSM | -42.54 | 20.50 | | | | 23.03 | | | | |
| | Upper 700 MHz | AWGN | -43.06 | 20.24 | | 7.5 | 4.97 | 22.77 | | | | |
| | | GSM | -42.56 | 21.30 | | | | 23.83 | | | | |
| | cellular | AWGN | -42.03 | 19.00 | | 8 | 5.17 | 21.83 | | | | |
| | | GSM | -43.03 | 18.85 | | | | 21.68 | | | | |
| | PCS | AWGN | -49.59 | 20.60 | | 9 | 7.51 | 22.09 | | | | |
| | | GSM | -50.59 | 21.07 | | | | 22.56 | | | | |
| | AWS | AWGN | -48.45 | 20.65 | | 9 | 7.51 | 22.14 | | | | |
| | | GSM | -48.95 | 20.90 | | | | 22.39 | | | | |
| | Downlink | Lower 700 MHz | AWGN | -50.47 | | 11.82 | ≤17 | 6.5 | | 4.97 | 13.35 | ≤17 |
| | | | GSM | -49.97 | | 12.39 | | | | | 13.92 | |
| Upper 700 MHz | | AWGN | -51.95 | 11.51 | 6.5 | 4.97 | | 13.04 | | | | |
| | | GSM | -52.45 | 11.82 | | | | 13.35 | | | | |
| cellular | | AWGN | -50.54 | 11.60 | 6.5 | 5.17 | | 12.93 | | | | |
| | | GSM | -50.54 | 12.95 | | | | 14.28 | | | | |
| PCS | | AWGN | -56.05 | 12.66 | 8.5 | 7.51 | | 13.65 | | | | |
| | | GSM | -56.05 | 13.48 | | | | 14.47 | | | | |
| AWS | | AWGN | -57.73 | 11.81 | 8.5 | 7.51 | | 12.80 | | | | |
| | | GSM | -57.23 | 13.01 | | | | 14.00 | | | | |

Maximum Input level:

| Mode | Operation Band | Signal type | Maximum Input level | Maximum Input level Limits | Conducted Output level | | |
|---------------|----------------|---------------|---------------------|----------------------------|------------------------|-----|-------|
| | | | dBm | dBm | dBm | | |
| Uplink | Lower 700 MHz | AWGN | -29.54 | 27.0 | 19.47 | | |
| | | GSM | -29.54 | | 20.47 | | |
| | Upper 700 MHz | AWGN | -29.06 | | 20.43 | | |
| | | GSM | -29.56 | | 21.15 | | |
| | cellular | AWGN | -28.03 | | 19.41 | | |
| | | GSM | -30.03 | | 18.39 | | |
| | PCS | AWGN | -36.59 | | 20.38 | | |
| | | GSM | -37.59 | | 20.60 | | |
| | AWS | AWGN | -35.45 | | 20.34 | | |
| | | GSM | -34.95 | | 20.46 | | |
| | Downlink | Lower 700 MHz | AWGN | | -37.47 | -20 | 11.65 |
| | | | GSM | | -36.97 | | 12.63 |
| Upper 700 MHz | | AWGN | -37.95 | 11.90 | | | |
| | | GSM | -39.45 | 11.66 | | | |
| cellular | | AWGN | -37.04 | 11.37 | | | |
| | | GSM | -37.54 | 13.15 | | | |
| PCS | | AWGN | -43.05 | 12.88 | | | |
| | | GSM | -43.05 | 13.38 | | | |
| AWS | | AWGN | -43.73 | 11.35 | | | |
| | | GSM | -42.23 | 13.54 | | | |

§ 20.21(e)(8)(i)(C)(2), § 20.21(e)(8)(i)(B)&§20.21(e)(4) – MAXIMUM BOOSTER GAIN COMPUTATION

Applicable Standards

According to § 20.21(e)(8)(i)(C)(2) (ii) Booster Gain Limits (maximum gain); § 20.21(e)(8)(i)(B) Bidirectional Capability (equivalent uplink and downlink gain); §20.21(e)(4) Self-monitoring.

This subclause provides guidance on the computation of the maximum gain based on the results obtained from previous measurements. The NPS limits on maximum gain for fixed and mobile wideband consumer signal boosters are provided in § 20.21(e)(8)(i)(C)(2). Additionally, § 20.21(e)(8)(i)(B) requires that wideband consumer signal boosters be able to provide equivalent uplink and downlink gain (within 9 dB)

Test Procedure

- a) Calculate the maximum gain of the booster as follows to demonstrate compliance to the applicable gain limits as specified.
- b) For both the uplink and downlink in each supported frequency band, use each of the P_{OUT} and P_{IN} result pairs for all signal types used in 7.2 in the following equation to determine the maximum gain (G) of the booster:

$$G \text{ (dB)} = P_{OUT} \text{ (dBm)} - P_{IN} \text{ (dBm)}$$
- c) Record the maximum gain of the uplink and downlink paths for each supported frequency band, and verify that the each gain value complies with the applicable limit.
- d) Provide tabulated results in the test report.

Test Data

Environmental Conditions

| | |
|---------------------------|-----------|
| Temperature: | 25.3°C |
| Relative Humidity: | 56 % |
| ATM Pressure: | 101.0 kPa |

The testing was performed by Andy Yu on 2022-07-28.

Test Result: Pass

Please refer to the following tables

Configuration 1:**Maximum gain:**

| Mode | Operation Band | Signal type | Pre AGC | Conducted | Gain | Limit | |
|---------------|----------------|---------------|-------------|--------------|-------|-------|-------|
| | | | Input level | Output level | dB | dB | |
| | | | dBm | dBm | dB | dB | |
| Uplink | Lower 700 MHz | AWGN | -42.04 | 19.75 | 61.79 | 63.49 | |
| | | GSM | -43.04 | 19.86 | 62.90 | | |
| | Upper 700 MHz | AWGN | -43.06 | 20.40 | 63.46 | 64.36 | |
| | | GSM | -43.06 | 20.89 | 63.95 | | |
| | cellular | AWGN | -42.03 | 19.12 | 61.15 | 64.95 | |
| | | GSM | -43.53 | 18.47 | 62.00 | | |
| | PCS | AWGN | -50.09 | 20.19 | 70.28 | 71.99 | |
| | | GSM | -51.09 | 20.06 | 71.15 | | |
| | AWS | AWGN | -49.45 | 20.25 | 69.70 | 71.27 | |
| | | GSM | -49.45 | 20.69 | 70.14 | | |
| | Downlink | Lower 700 MHz | AWGN | -50.47 | 12.13 | 62.60 | 63.49 |
| | | | GSM | -49.97 | 12.73 | 62.70 | |
| Upper 700 MHz | | AWGN | -52.45 | 11.45 | 63.90 | 64.36 | |
| | | GSM | -52.45 | 11.88 | 64.33 | | |
| cellular | | AWGN | -51.04 | 11.92 | 62.96 | 64.95 | |
| | | GSM | -50.54 | 13.53 | 64.07 | | |
| PCS | | AWGN | -56.05 | 12.73 | 68.78 | 71.99 | |
| | | GSM | -55.55 | 13.77 | 69.32 | | |
| AWS | | AWGN | -58.73 | 12.21 | 70.94 | 71.27 | |
| | | GSM | -57.73 | 13.44 | 71.17 | | |

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.

Equivalent Uplink and downlink gain:

| Operating Band | Signal type | Uplink | Downlink | Calculated | Limit |
|----------------|-------------|--------|----------|------------|-------|
| MHz | | Gain | Gain | Value | dB |
| | | dB | | dB | |
| Lower 700 MHz | AWGN | 61.79 | 62.60 | 0.81 | 9 |
| | GSM | 62.90 | 62.70 | 0.20 | |
| Upper 700 MHz | AWGN | 63.46 | 63.90 | 0.44 | |
| | GSM | 63.95 | 64.33 | 0.38 | |
| cellular | AWGN | 61.15 | 62.96 | 1.81 | |
| | GSM | 62.00 | 64.07 | 2.07 | |
| PCS | AWGN | 70.28 | 68.78 | 1.50 | |
| | GSM | 71.15 | 69.32 | 1.83 | |
| AWS | AWGN | 69.70 | 70.94 | 1.24 | |
| | GSM | 70.14 | 71.17 | 1.03 | |

Configuration 2:**Maximum gain:**

| Mode | Operation Band | Signal type | Pre AGC | Conducted | Gain | Limit | |
|---------------|----------------|---------------|-------------|--------------|-------|-------|-------|
| | | | Input level | Output level | dB | dB | |
| | | | dBm | dBm | dB | dB | |
| Uplink | Lower 700 MHz | AWGN | -42.54 | 19.66 | 62.20 | 63.49 | |
| | | GSM | -42.54 | 20.50 | 63.04 | | |
| | Upper 700 MHz | AWGN | -43.06 | 20.24 | 63.30 | 64.36 | |
| | | GSM | -42.56 | 21.30 | 63.86 | | |
| | Cellular | AWGN | -42.03 | 19.00 | 61.03 | 64.95 | |
| | | GSM | -43.03 | 18.85 | 61.88 | | |
| | PCS | AWGN | -49.59 | 20.60 | 70.19 | 71.99 | |
| | | GSM | -50.59 | 21.07 | 71.66 | | |
| | AWS | AWGN | -48.45 | 20.65 | 69.10 | 71.27 | |
| | | GSM | -48.95 | 20.90 | 69.85 | | |
| | Downlink | Lower 700 MHz | AWGN | -50.47 | 11.82 | 62.29 | 63.49 |
| | | | GSM | -49.97 | 12.39 | 62.36 | |
| Upper 700 MHz | | AWGN | -51.95 | 11.51 | 63.46 | 64.36 | |
| | | GSM | -52.45 | 11.82 | 64.27 | | |
| Cellular | | AWGN | -50.54 | 11.60 | 62.14 | 64.95 | |
| | | GSM | -50.54 | 12.95 | 63.49 | | |
| PCS | | AWGN | -56.05 | 12.66 | 68.71 | 71.99 | |
| | | GSM | -56.05 | 13.48 | 69.53 | | |
| AWS | | AWGN | -57.73 | 11.81 | 69.54 | 71.27 | |
| | | GSM | -57.23 | 13.01 | 70.24 | | |

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.

Equivalent Uplink and downlink gain:

| Operating Band | Signal type | Uplink | Downlink | Calculated | Limit |
|----------------|-------------|--------|----------|------------|-------|
| MHz | | Gain | Gain | Value | dB |
| | | dB | dB | dB | dB |
| Lower 700 MHz | AWGN | 62.20 | 62.29 | 0.09 | 9 |
| | GSM | 63.04 | 62.36 | 0.68 | |
| Upper 700 MHz | AWGN | 63.30 | 63.46 | 0.16 | |
| | GSM | 63.86 | 64.27 | 0.41 | |
| Cellular | AWGN | 61.03 | 62.14 | 1.11 | |
| | GSM | 61.88 | 63.49 | 1.61 | |
| PCS | AWGN | 70.19 | 68.71 | 1.48 | |
| | GSM | 71.66 | 69.53 | 2.13 | |
| AWS | AWGN | 69.10 | 69.54 | 0.44 | |
| | GSM | 69.85 | 70.24 | 0.39 | |

§ 20.21(e)(8)(i)(F)- INTERMODULATION PRODUCT

Applicable Standards

According to § 20.21(e)(8)(i)(F) Intermodulation Limits.

Test Procedure

The following procedures shall be used to demonstrate compliance to the intermodulation limit specified in § 20.21(e)(8)(i)(F) for wideband consumer signal boosters.

- a) Connect the signal booster to the test equipment as shown in **Figure 2**. Begin with the uplink output connected to the spectrum analyzer.
- b) Set the spectrum analyzer RBW = 3 kHz.
- c) Set the VBW $\geq 3 \times$ RBW.
- d) Select the RMS detector
- e) Set the spectrum analyzer center frequency to the center of the supported operational band under test.
- f) Set the span to 5 MHz. Affirm that the number of measurement points per sweep $\geq (2 \times \text{span})/\text{RBW}$.
- 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.
- h) Set the signal generator amplitudes so that the power from each into the RF combiner is equivalent, then turn on the RF output.
- i) Increase the signal generators' amplitudes equally until just before the EUT begins AGC and affirm that all intermodulation products (if any exist) are below the specified limit of -19 dBm.
- 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.
- k) Record the maximum intermodulation product amplitude level that is observed.
- l) Capture the spectrum analyzer trace for inclusion in the test report.
- m) Repeat 7.4e) to 7.4l) for all uplink and downlink operational bands.

Note: *If using a single signal generator with dual outputs, affirm that intermodulation products are not the result of the generator.*

- n) Increase the signal generator amplitude in 2 dB steps to 10 dB above the AGC threshold determined in 7.4i), but to not to exceed the maximum input level in 5.5, to affirm that the EUT maintains compliance with the intermodulation limit

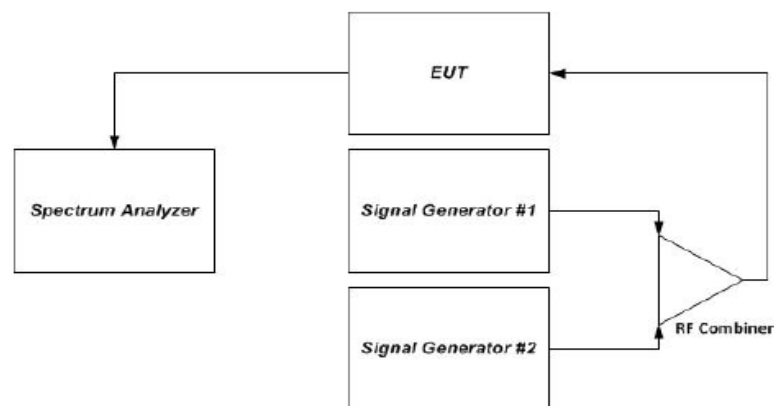


Figure 2 – Intermodulation product instrumentation test setup

Test Data

Environmental Conditions

| | |
|---------------------------|-----------|
| Temperature: | 25.3°C |
| Relative Humidity: | 56 % |
| ATM Pressure: | 101.0 kPa |

The testing was performed by Andy Yu on 2022-07-25.

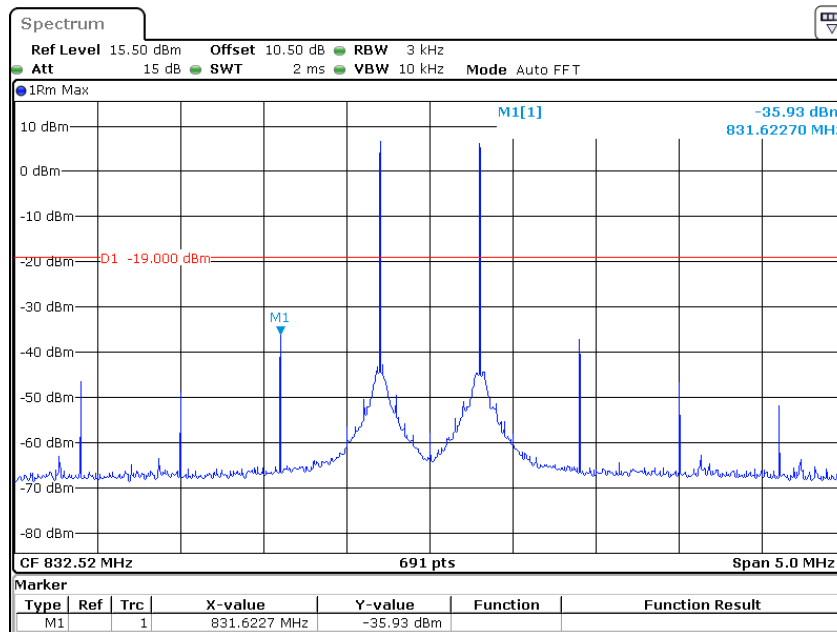
Test Result: Pass

Worst case: Configuration 1:

Please refer to the following plots

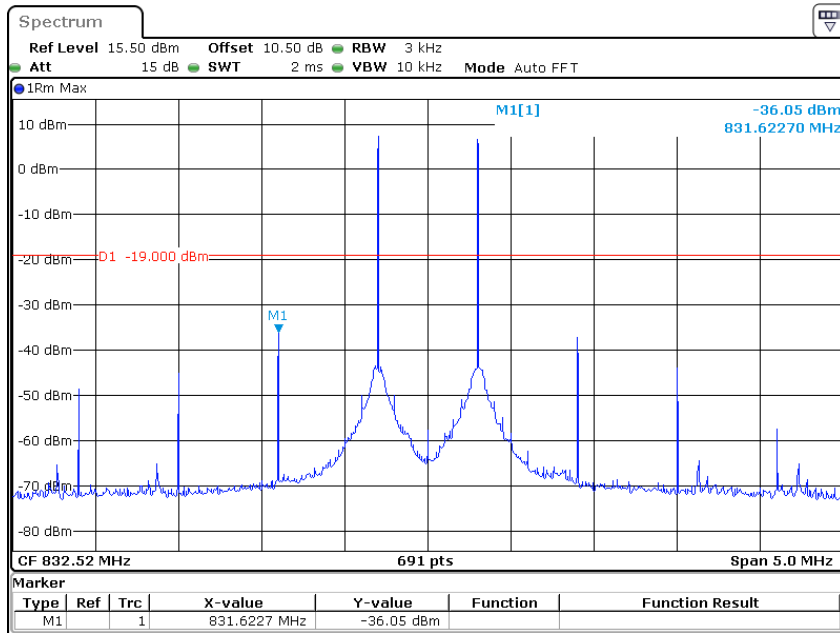
Uplink

Cellular Pre-AGC



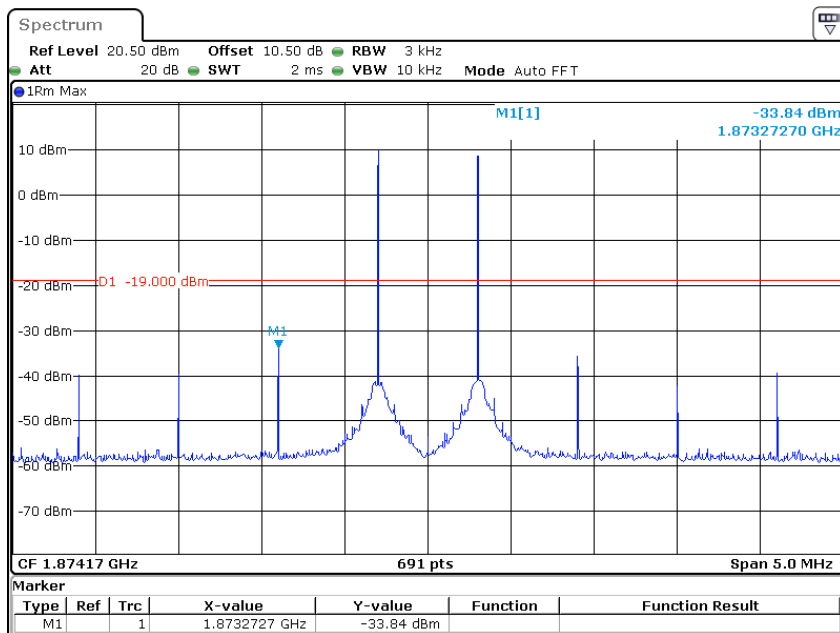
Date: 25.JUL.2022 17:20:50

Cellular Above AGC



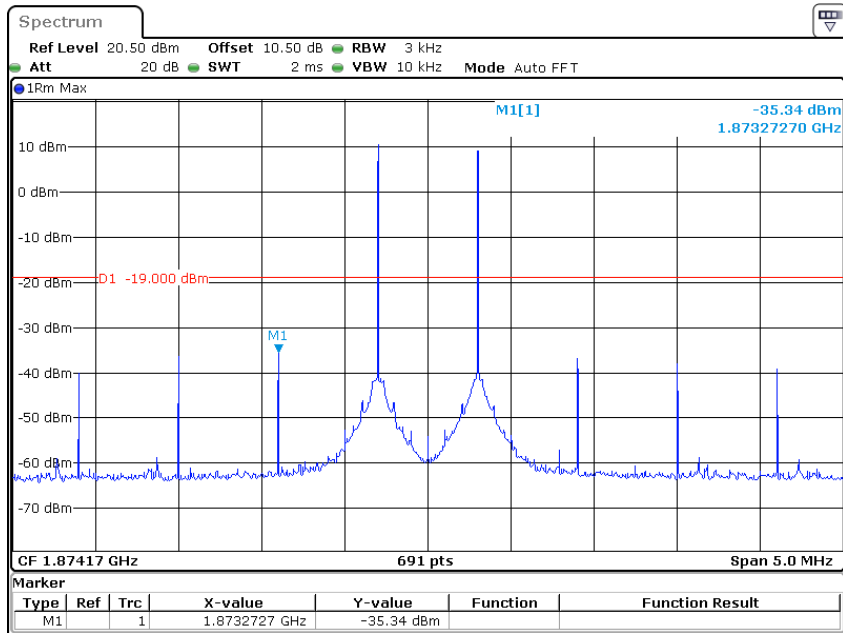
Date: 25.JUL.2022 17:21:11

PCS Pre-AGC



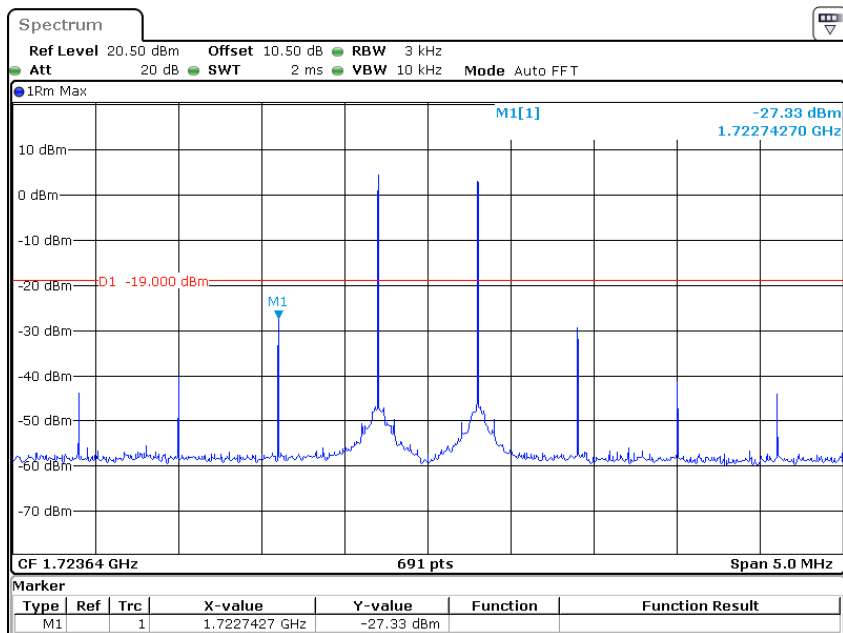
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PCS Above AGC



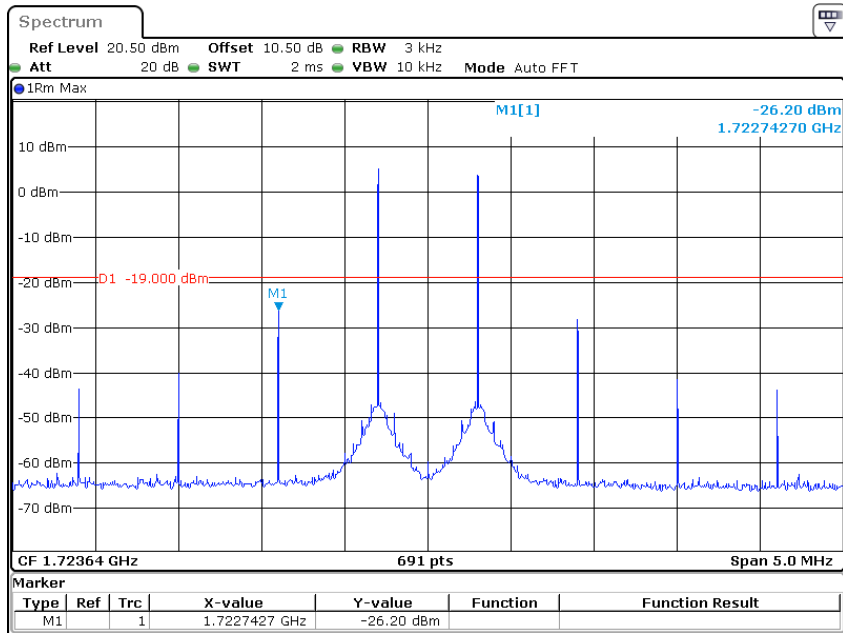
Date: 25.JUL.2022 17:22:34

AWS Pre-AGC



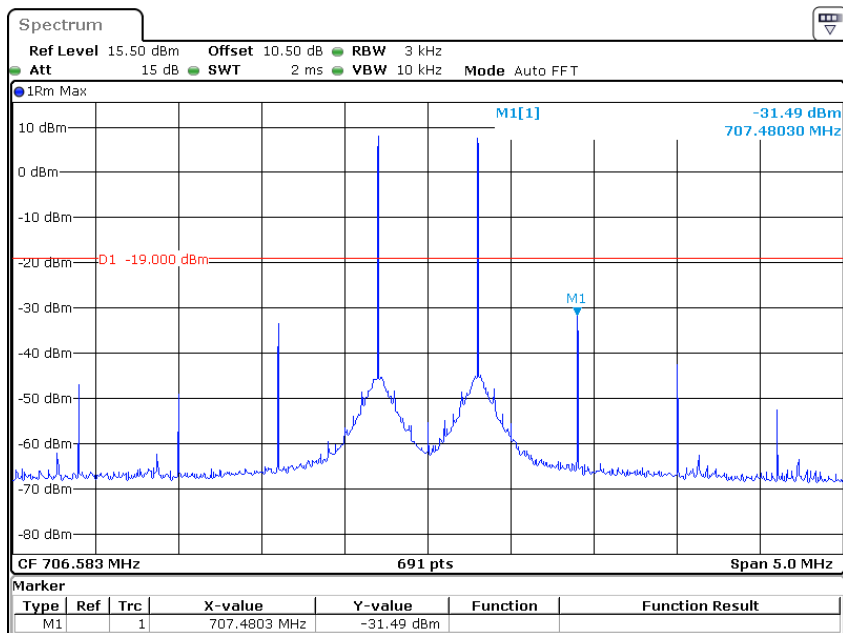
Date: 25.JUL.2022 17:23:53

AWS Above AGC



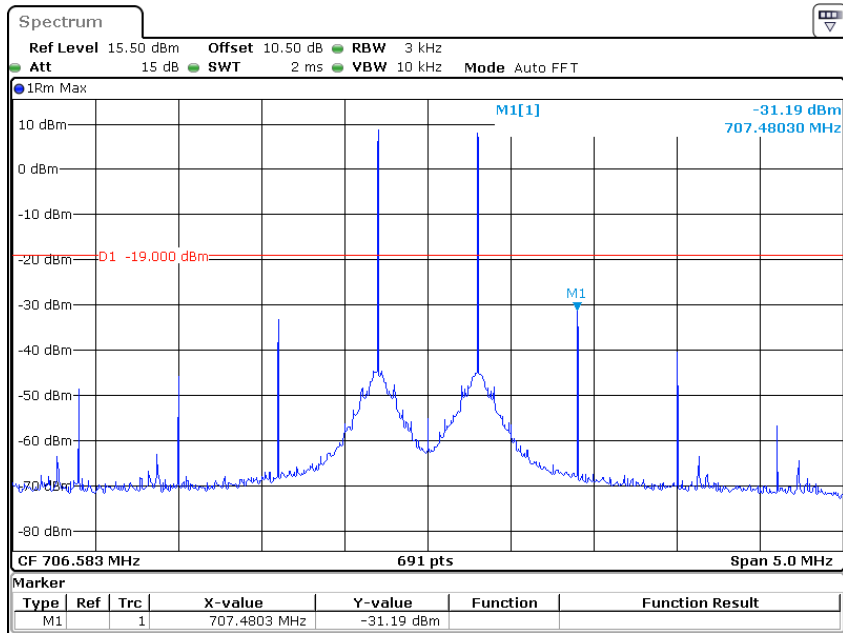
Date: 25.JUL.2022 17:24:14

Lower 700MHz Pre-AGC



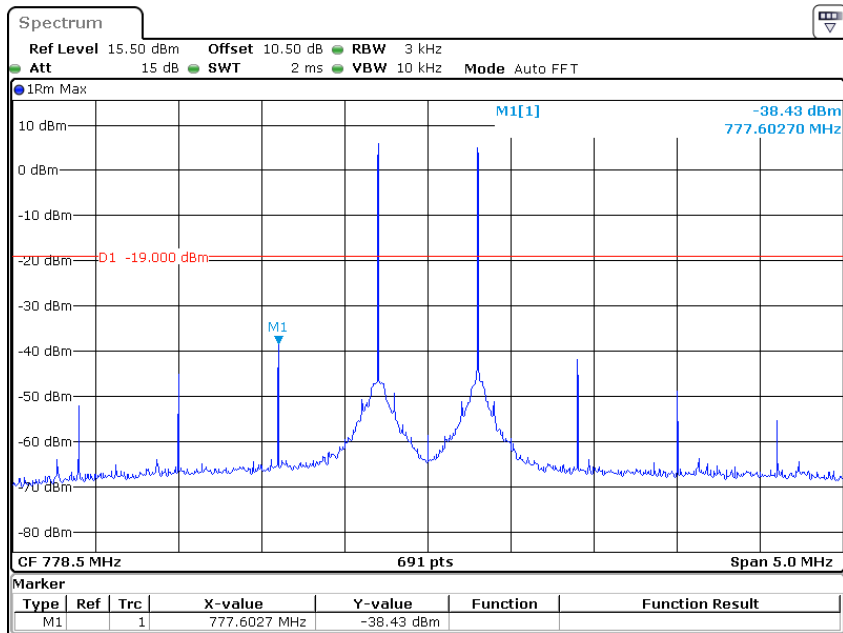
Date: 25.JUL.2022 17:14:18

Lower 700MHz Above AGC



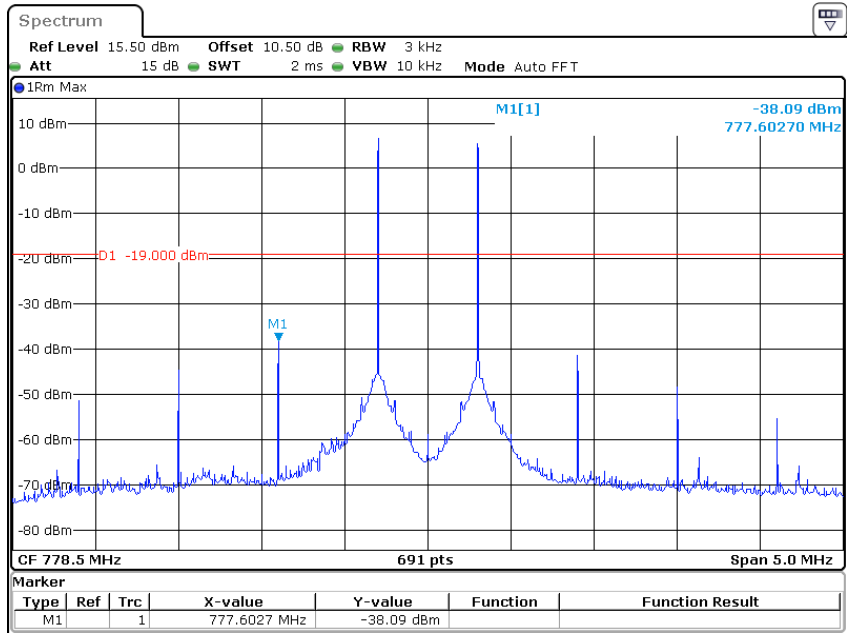
Date: 25.JUL.2022 17:14:44

Upper 700MHz Pre-AGC



Date: 25.JUL.2022 17:16:27

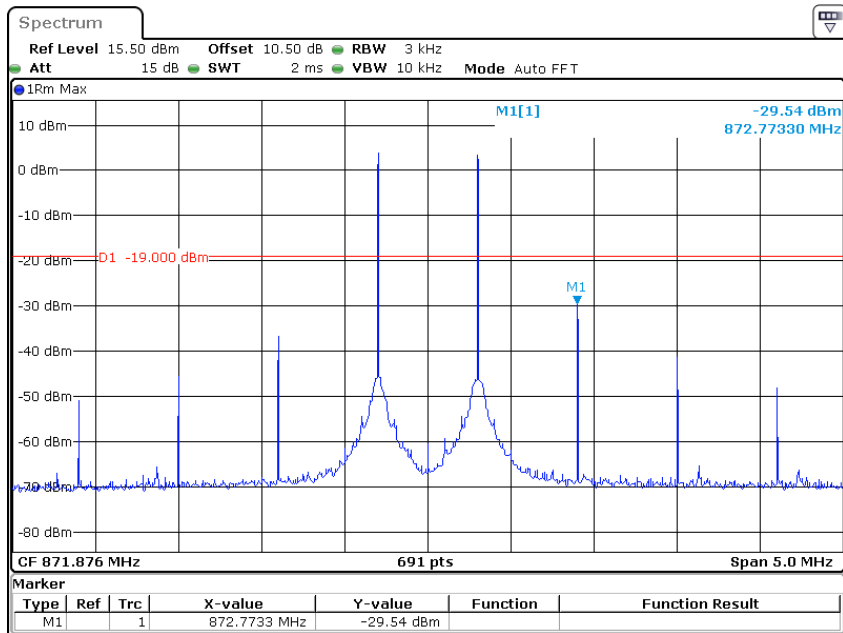
Upper 700MHz Above AGC



Date: 25.JUL.2022 17:16:57

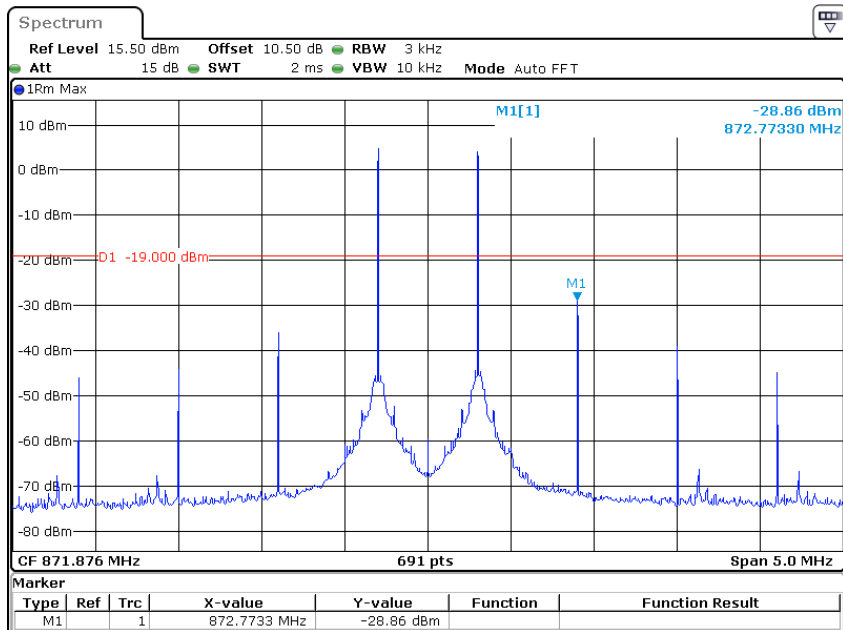
Downlink

Cellular Pre-AGC



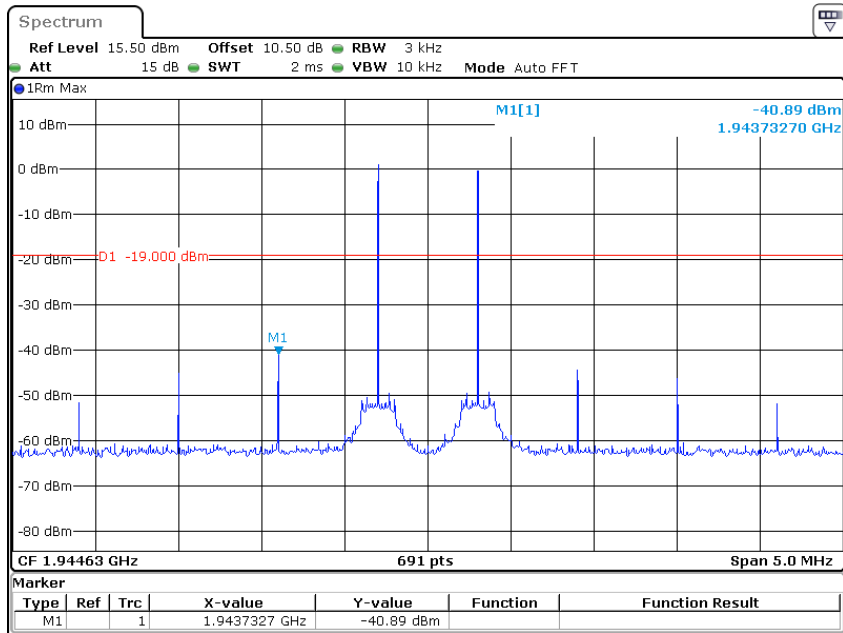
Date: 25.JUL.2022 17:06:02

Cellular Above AGC



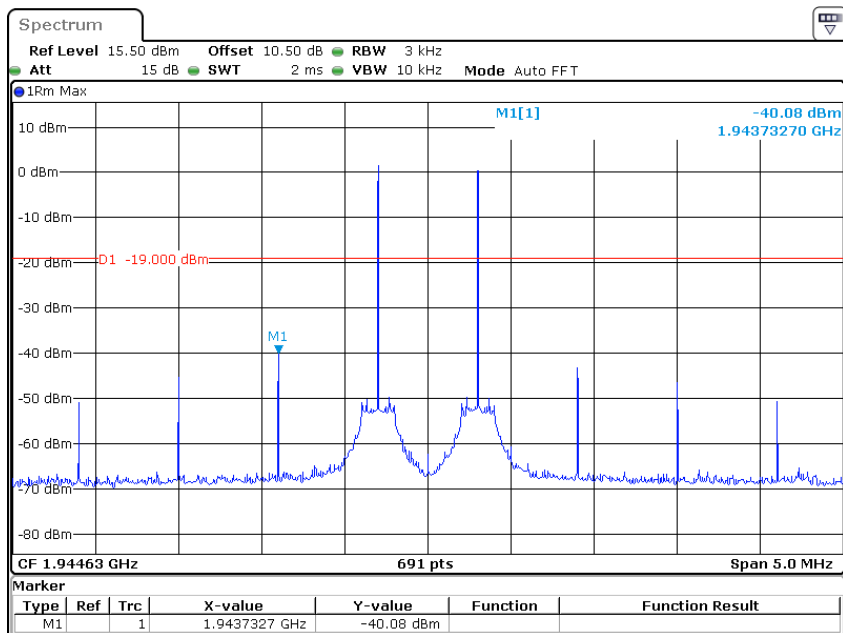
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PCS Pre-AGC



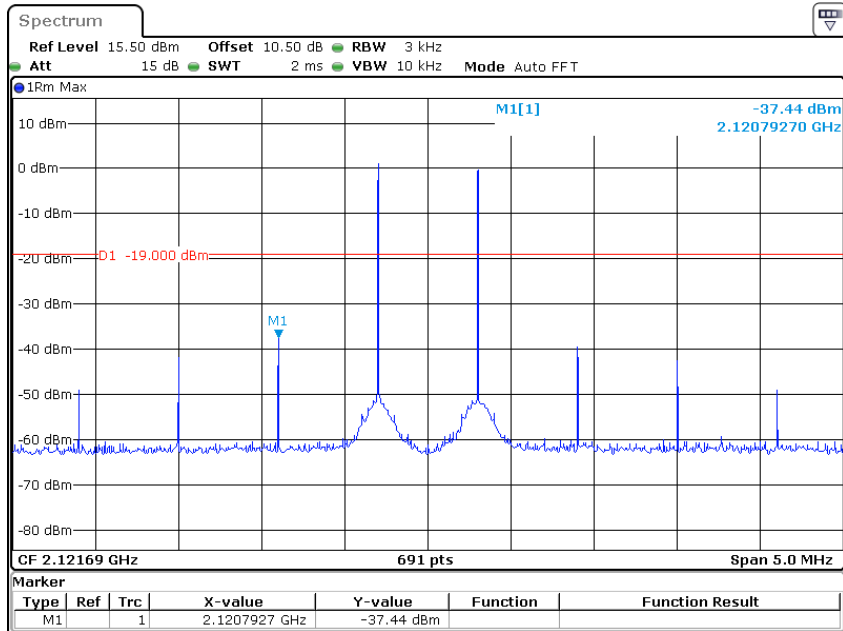
Date: 25.JUL.2022 16:44:10

PCS Above AGC



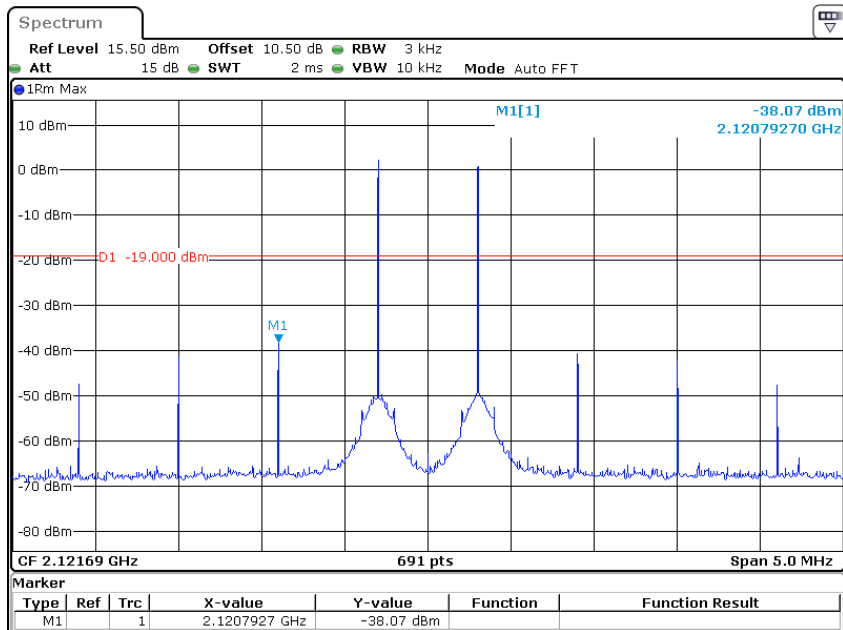
Date: 25.JUL.2022 16:46:08

AWS Pre-AGC



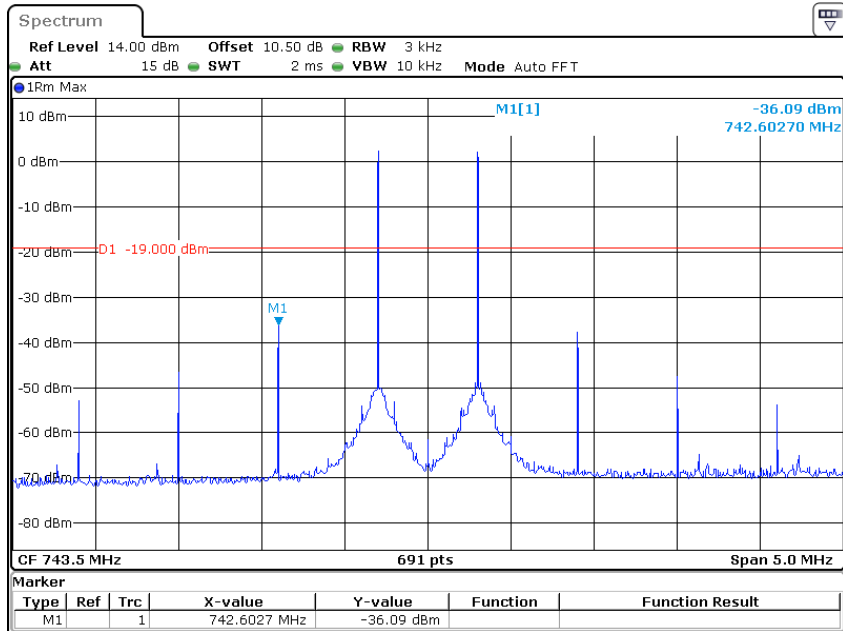
Date: 25.JUL.2022 16:41:22

AWS Above AGC



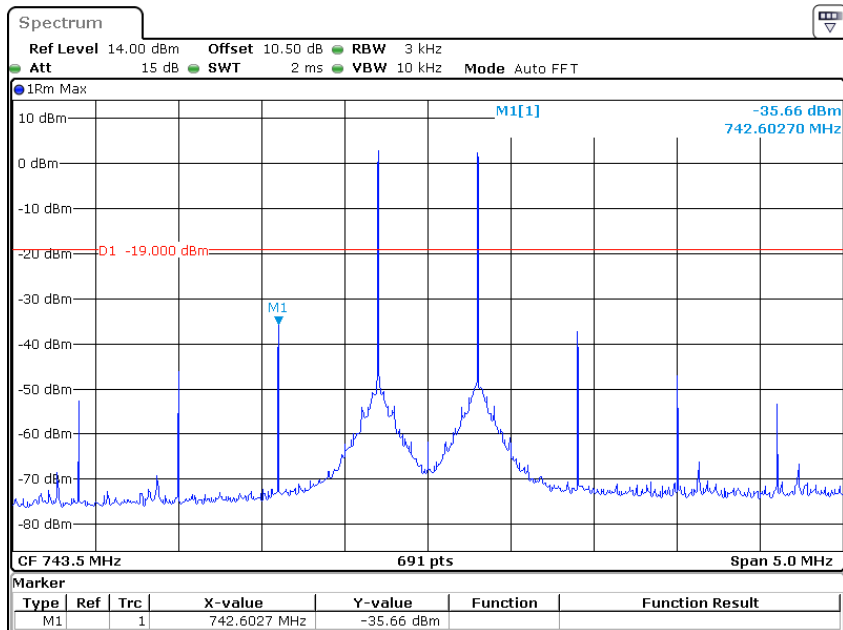
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Lower 700MHz Pre-AGC



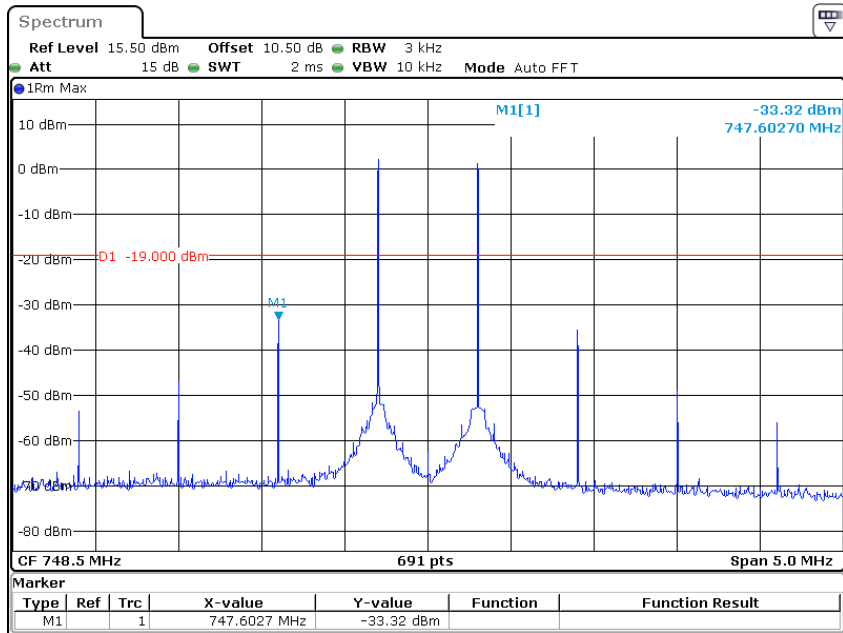
Date: 25.JUL.2022 17:10:09

Lower 700MHz Above AGC



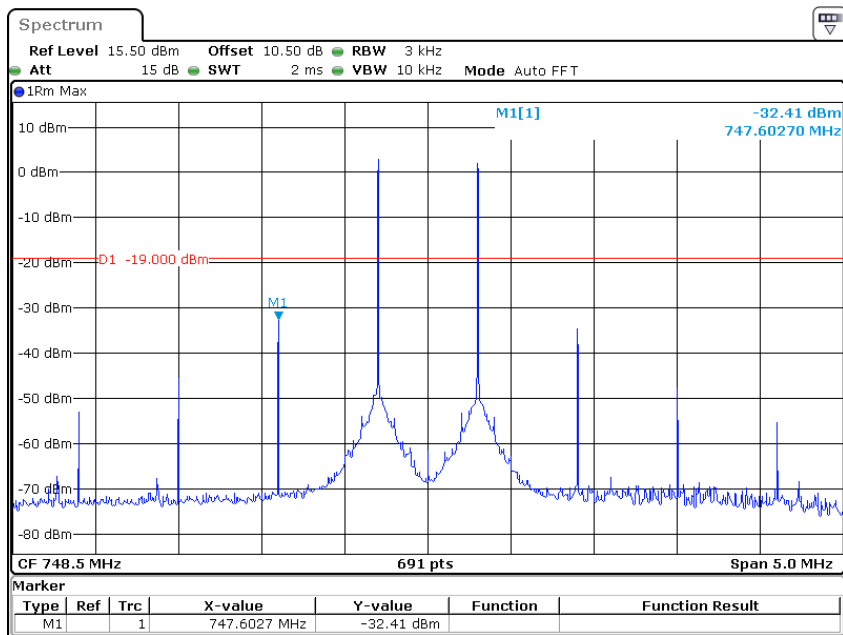
Date: 25.JUL.2022 17:10:39

Upper 700MHz Pre-AGC



Date: 25.JUL.2022 17:08:27

Upper 700MHz Above AGC



Date: 25.JUL.2022 17:09:01

§ 20.21(e)(8)(i)(E)- OUT OF BAND EMISSIONS

Applicable Standards

According to § 20.21(e)(8)(i)(E) Out of Band Emission Limits.

Test Procedure

This measurement is intended to demonstrate compliance to the limit specified in § 20.21(e)(8)(i)(E). The mobile emission limit applicable to the supported band of operation can be determined from the applicable rule part as listed in Annex A for each authorized operating band.

- a) Connect the EUT to the test equipment as shown in **Figure 1**. Begin with the uplink output connected to the spectrum analyzer.
- b) Configure the signal generator for the appropriate operation for all uplink and downlink bands:
 - i) GSM: 0.2 MHz from upper and lower band edges.
 - ii) LTE (5 MHz): 2.5 MHz from upper and lower band edges.
 - iii) CDMA: 1.25 MHz from upper and lower band edges, except for cellular band 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.

Note 1: *Alternative test modulation types:*

- CDMA (alternative 1.25 MHz AWGN)
- LTE 5 MHz (alternative W-CDMA or 4.1 MHz AWGN)

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.*

Note 3: *When using an AWGN test signal, the bandwidth shall be the measured 99% occupied bandwidth.*

- c) Set the signal generator amplitude to the maximum power level prior to AGC similar to the procedures in 7.2.2e) to 7.2.2f) of power measurement procedure for appropriate modulations.
- d) Set RBW = measurement bandwidth specified in the applicable rule section for the supported frequency band (*see Annex A for cross-reference to applicable rule section*).
- e) Set VBW = $3 \times$ RBW.
- f) Select the RMS (power averaging) detector.
- g) Sweep time = auto-couple.
- 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 < 1 GHz) or 3 MHz (when operational frequency is ≥ 1 GHz).
- i) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
- j) Use peak marker function to find the maximum power level.
- k) Capture the spectrum analyzer trace of the power level for inclusion in the test report.
- l) Increase the signal generator amplitude in 2 dB steps until the maximum input level indicated in 5.5 is reached. Affirm that the EUT maintains compliance with the OOB limits.
- m) Reset the analyzer start frequency to the lower band/block edge frequency minus 300 kHz (when operational frequency is < 1 GHz) or 3 MHz (when operational frequency is ≥ 1 GHz), and the stop frequency to the lower band/block edge frequency and repeat 7.5j) to 7.5l).
- n) Repeat 7.5b) through 7.5m) for each uplink and downlink operational band.

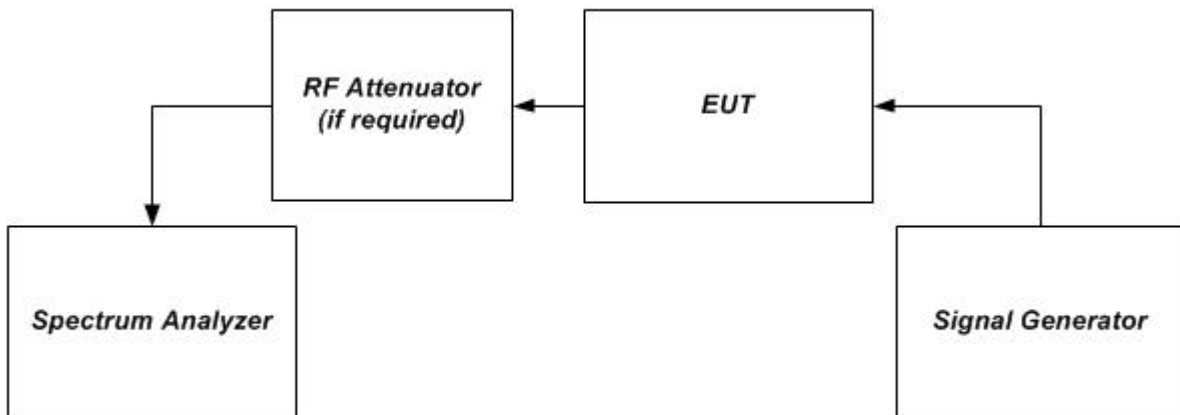


Figure 1 – Band verification test instrumentation setup

Test Data

Environmental Conditions

| | |
|---------------------------|-----------|
| Temperature: | 24.8 °C |
| Relative Humidity: | 58 % |
| ATM Pressure: | 101.0 kPa |

The testing was performed by Andy Yu from 2022-08-12 to 2022-08-25.

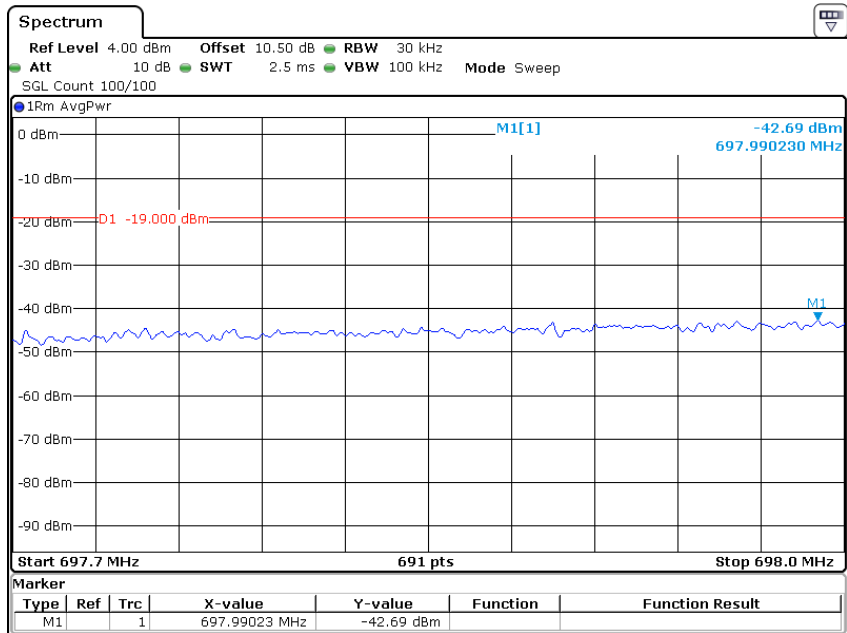
Test Result: Pass

Worst case: Configuration 1:

Please refer to the following plots

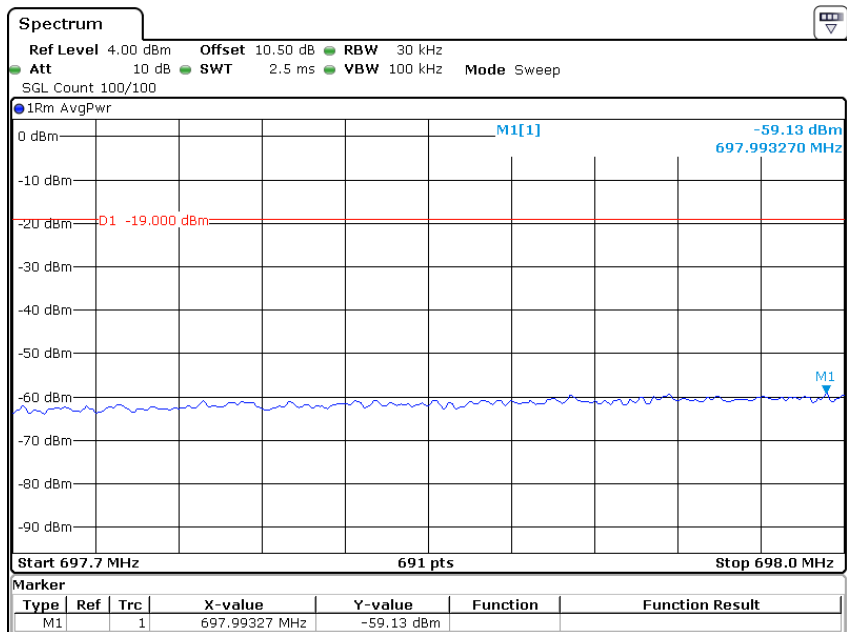
Uplink

Lower 700MHz CDMA Left Side Pre-AGC



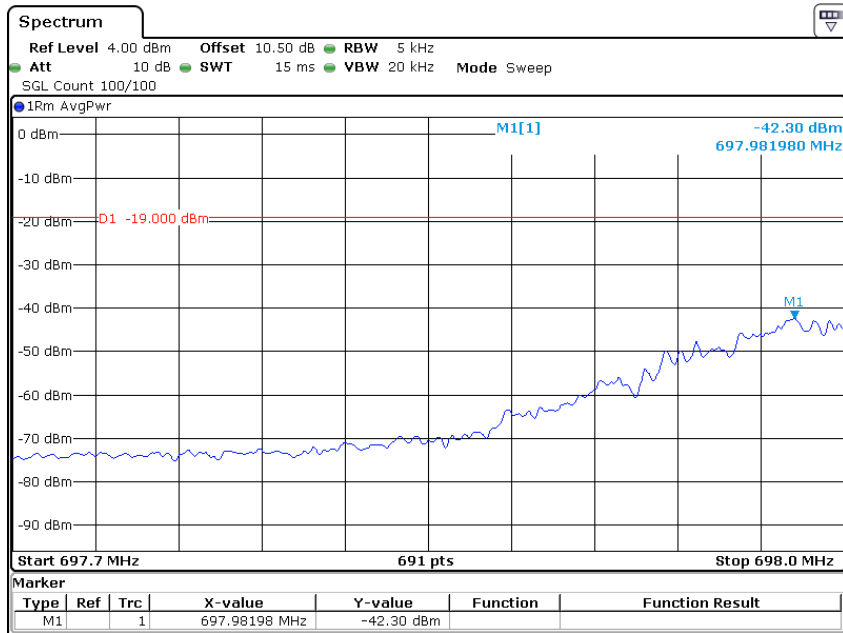
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Lower 700MHz CDMA Left Side Above AGC



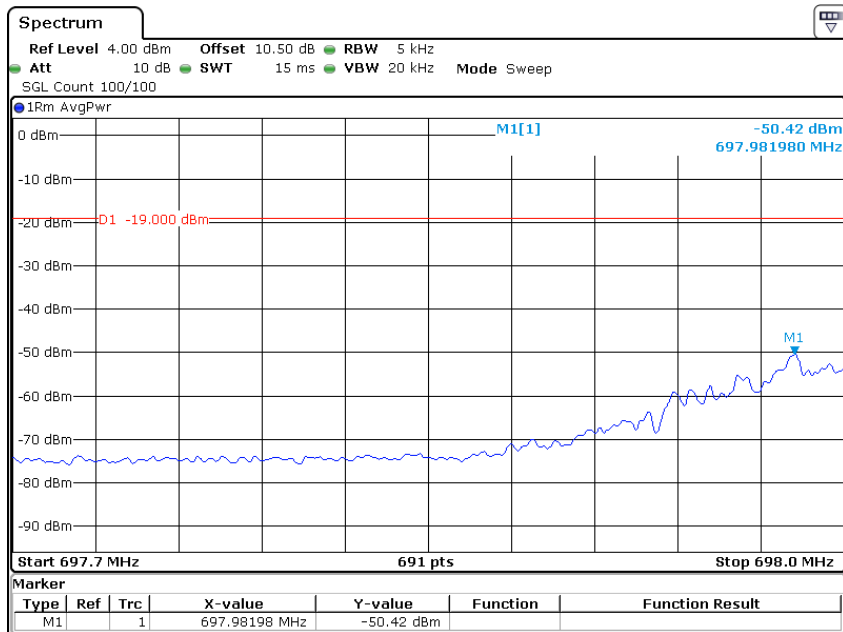
Date: 18.AUG.2022 16:28:43

Lower 700MHz GSM Left Side Pre-AGC



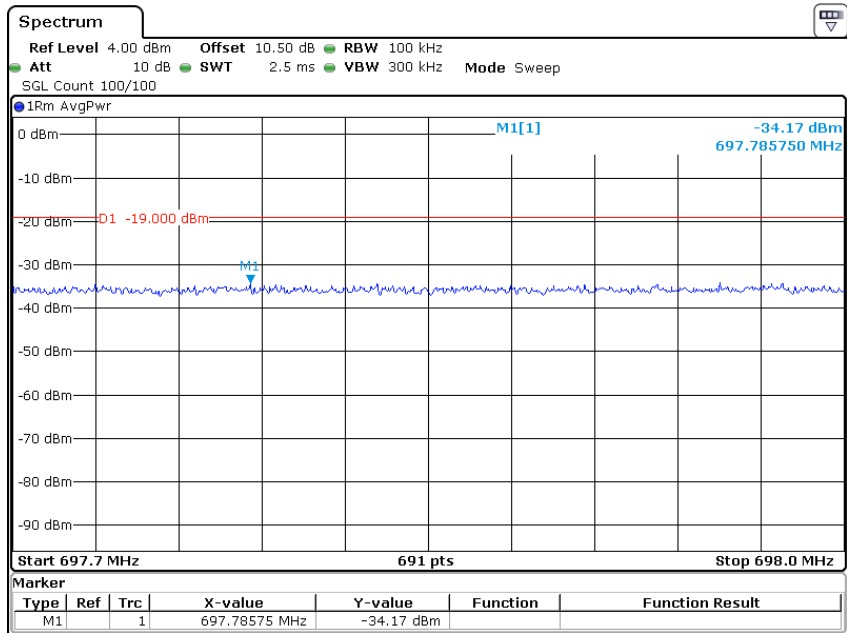
Date: 18.AUG.2022 16:21:37

Lower 700MHz GSM Left Side Above AGC



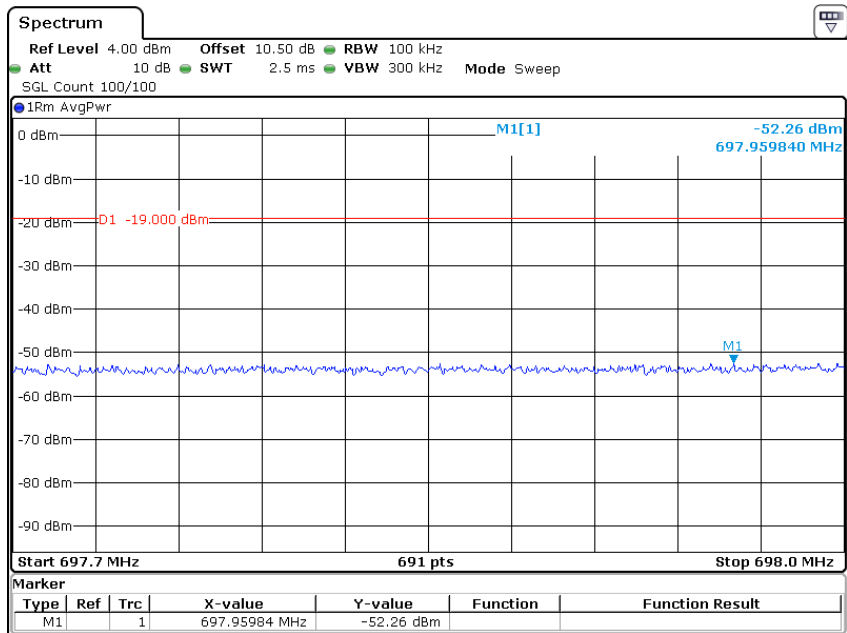
Date: 18.AUG.2022 16:22:13

Lower 700MHz WCDMA Left Side Pre-AGC



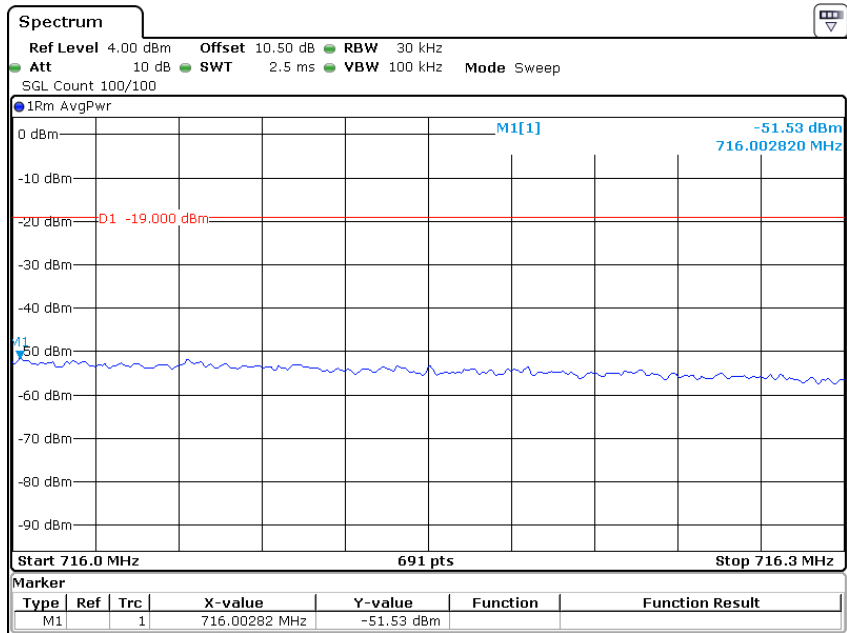
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Lower 700MHz WCDMA Left Side Above AGC



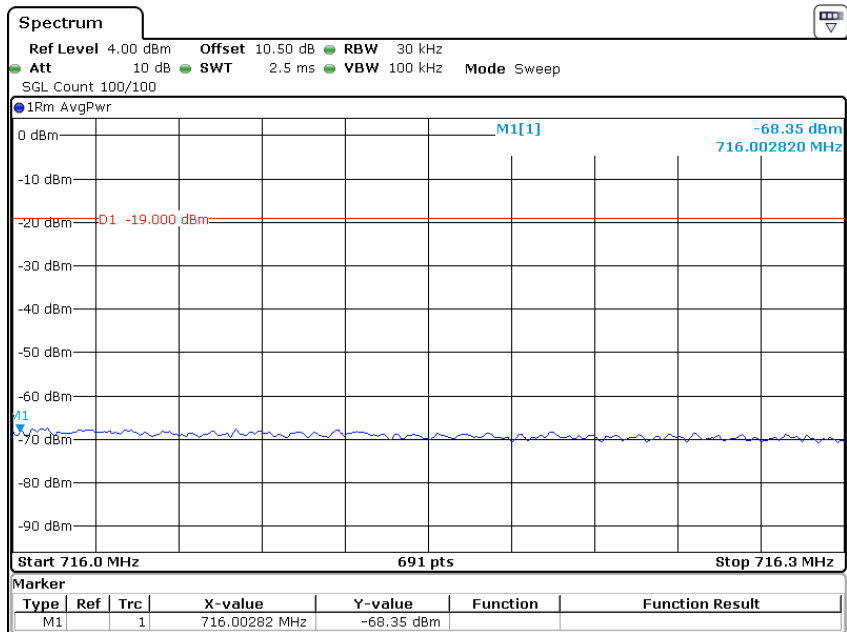
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Lower 700MHz CDMA Right Side Pre-AGC



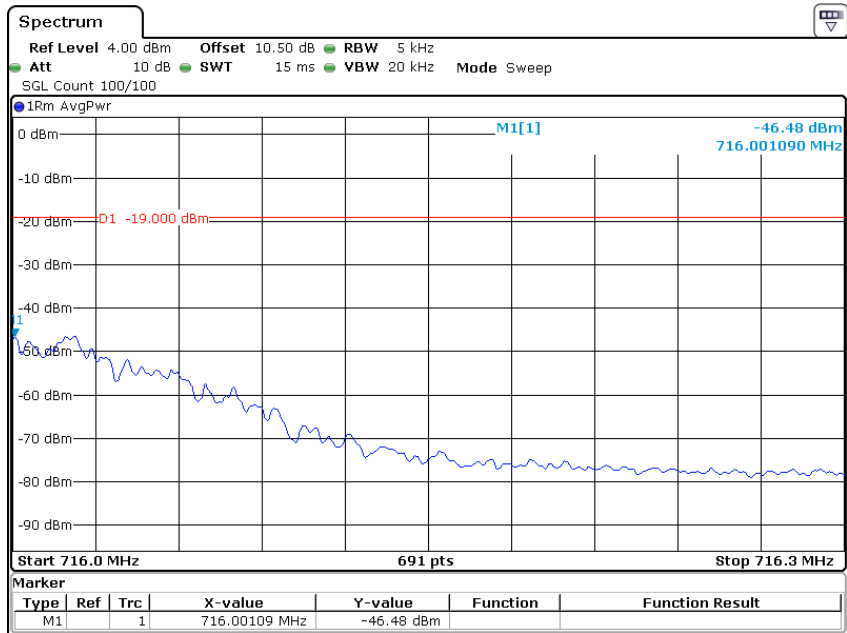
Date: 18.AUG.2022 16:30:58

Lower 700MHz CDMA Right Side Above AGC



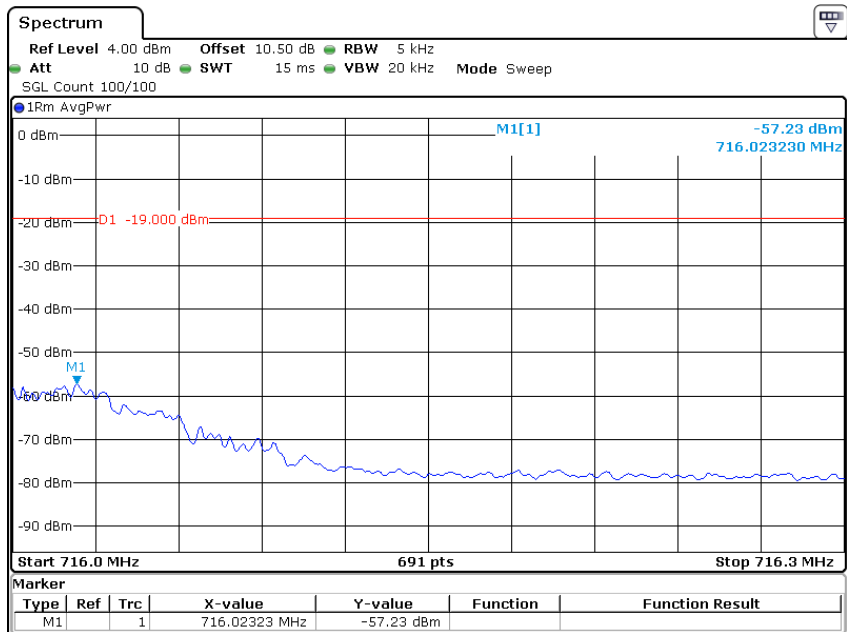
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Lower 700MHz GSM Right Side Pre-AGC



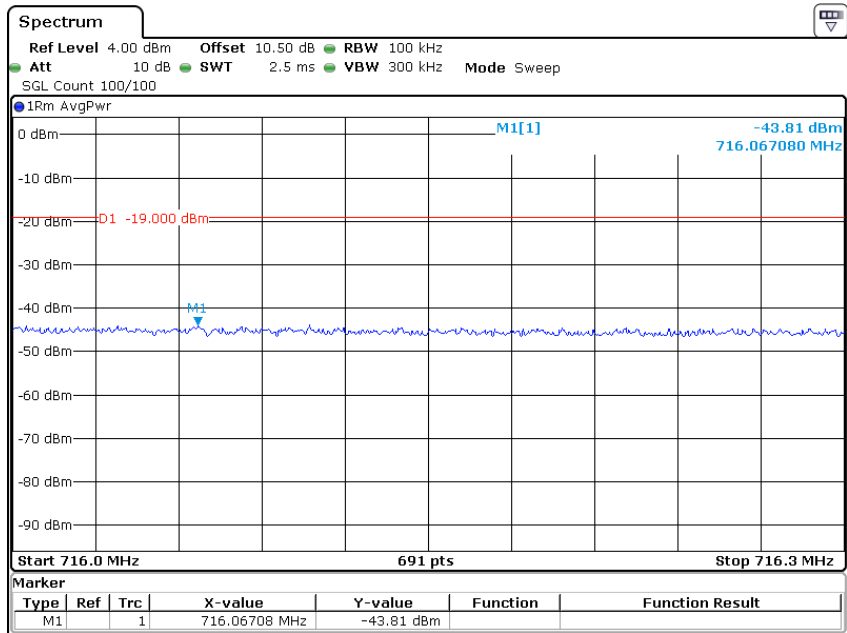
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Lower 700MHz GSM Right Side Above AGC



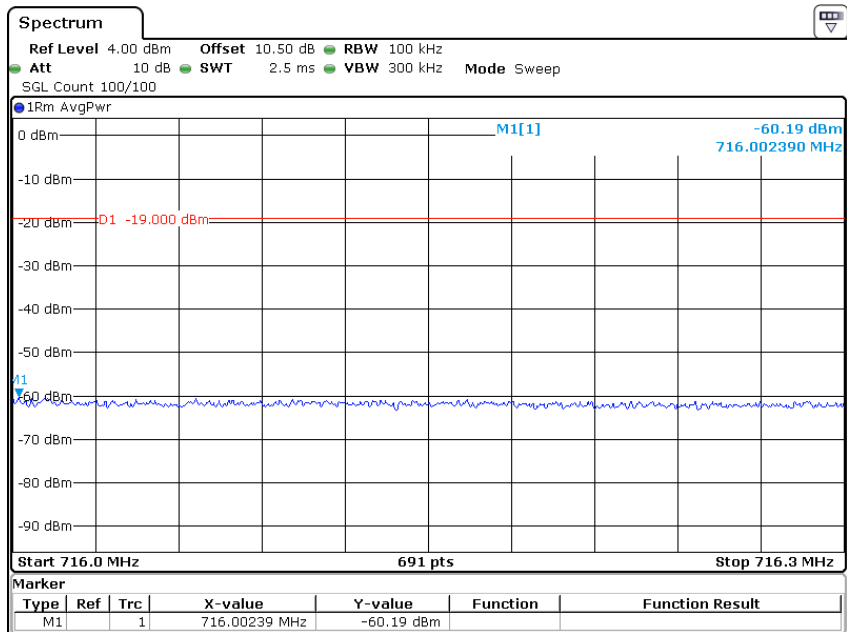
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Lower 700MHz WCDMA Right Side Pre-AGC



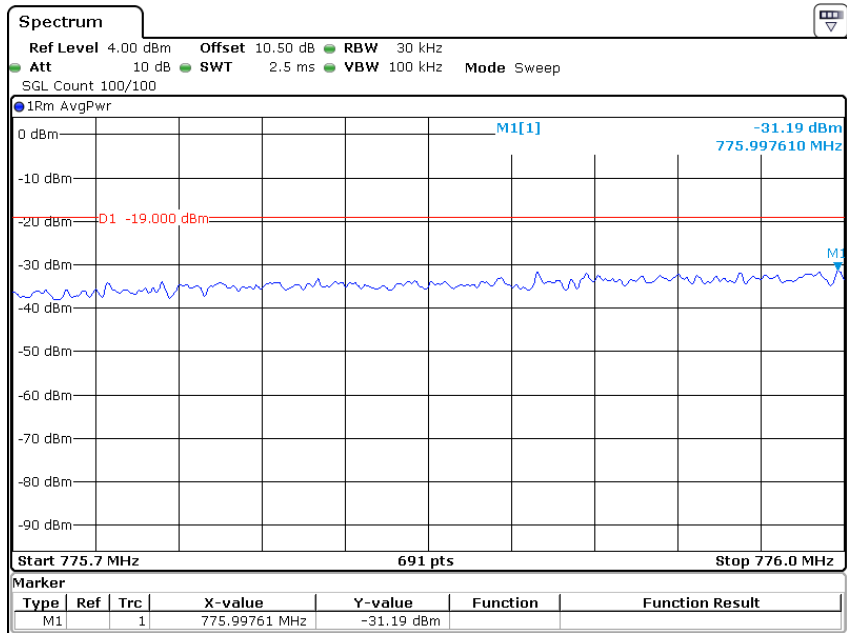
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Lower 700MHz WCDMA Right Side Above AGC



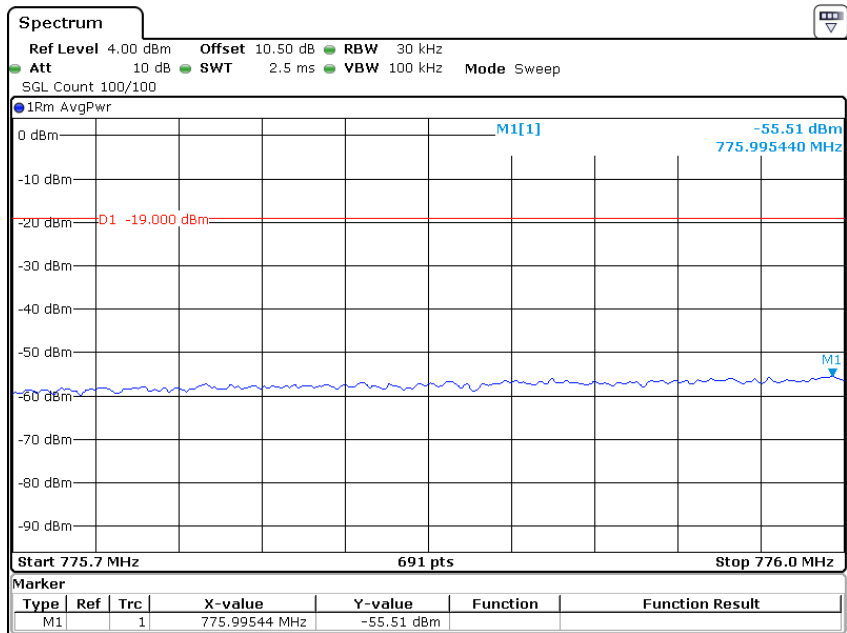
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Upper 700MHz CDMA Left Side Pre-AGC



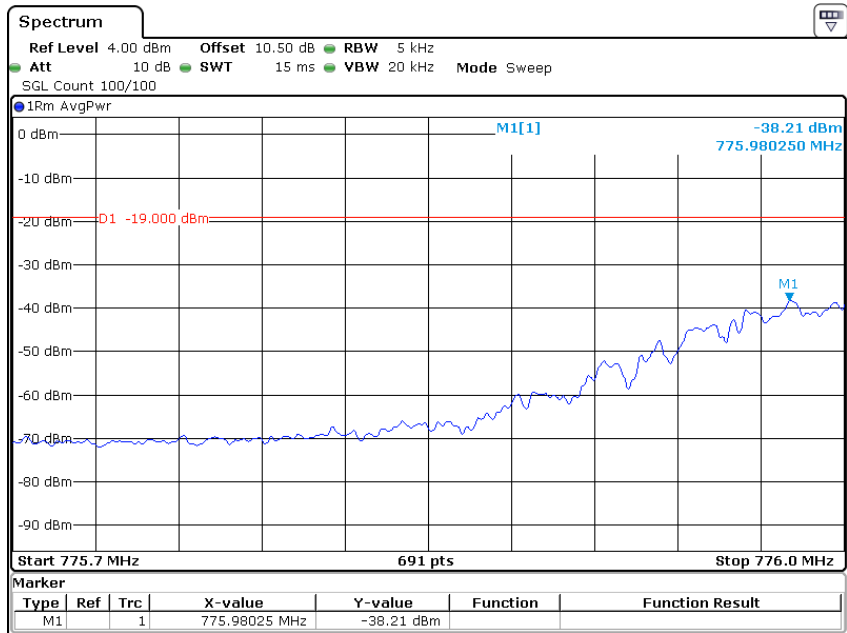
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Upper 700MHz CDMA Left Side Above AGC



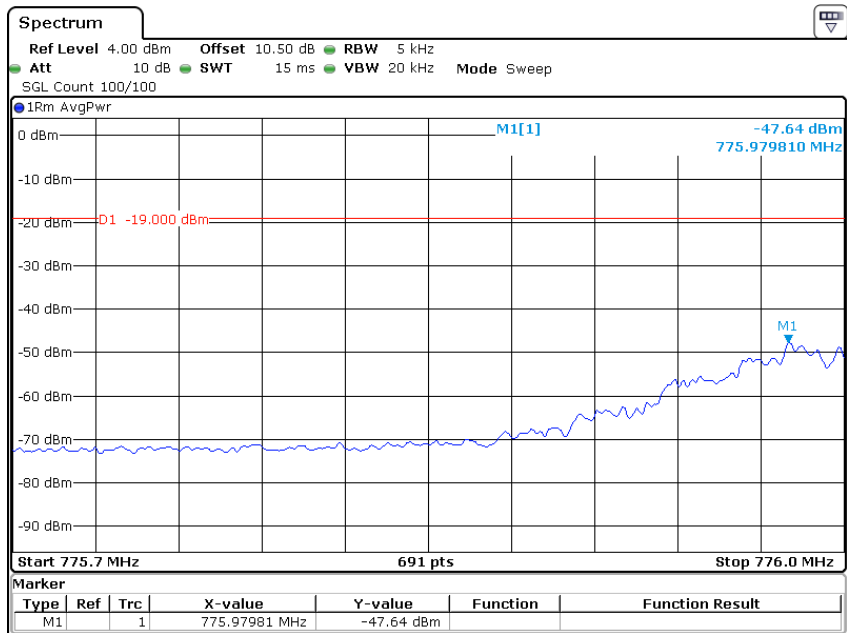
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Upper 700MHz GSM Left Side Pre-AGC



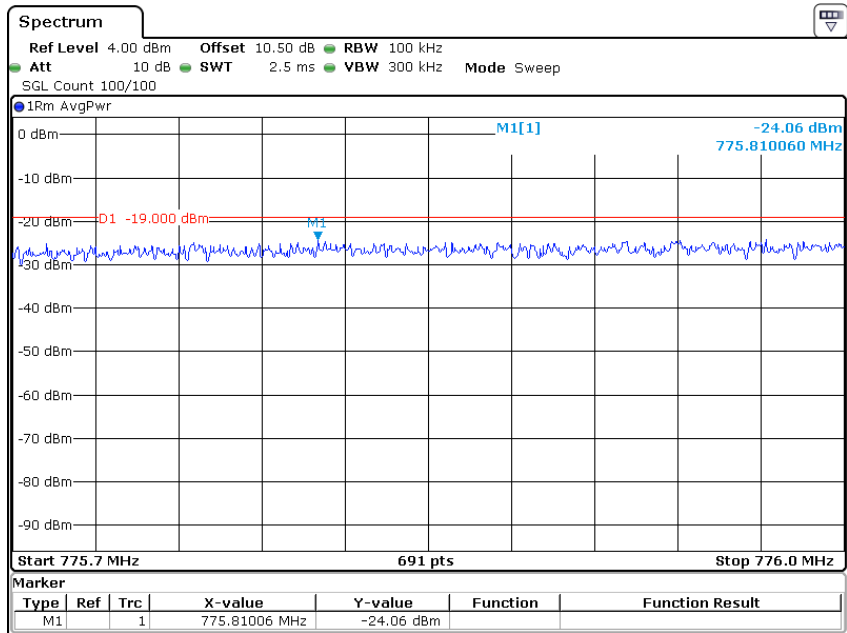
Date: 18.AUG.2022 15:45:41

Upper 700MHz GSM Left Side Above AGC



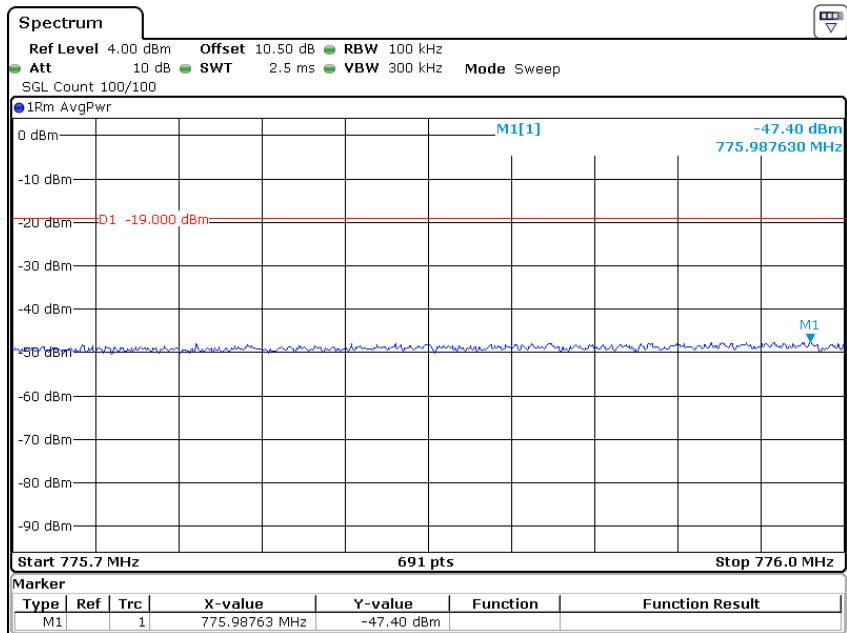
Date: 18.AUG.2022 15:46:15

Upper 700MHz WCDMA Left Side Pre-AGC



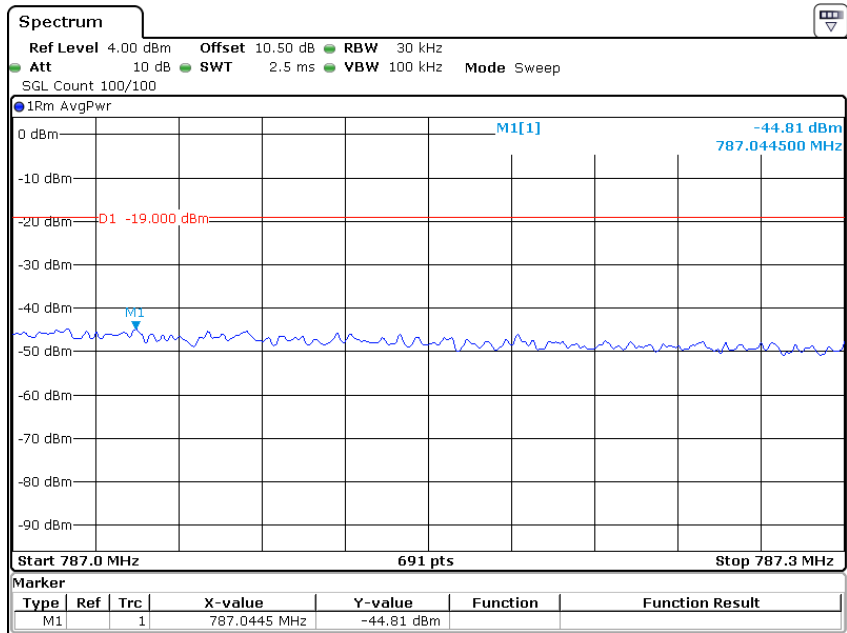
Date: 18.AUG.2022 16:12:02

Upper 700MHz WCDMA Left Side Above AGC



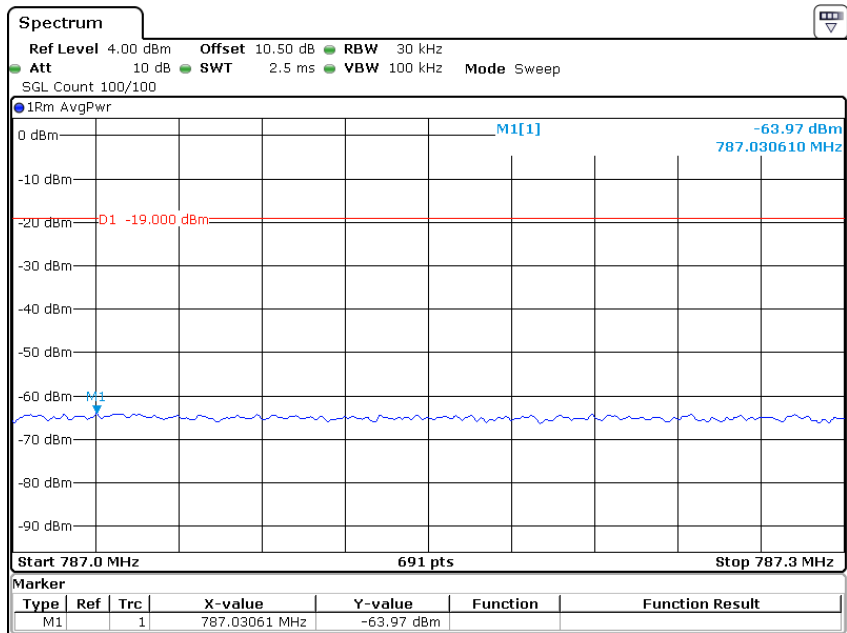
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Upper 700MHz CDMA Right Side Pre-AGC



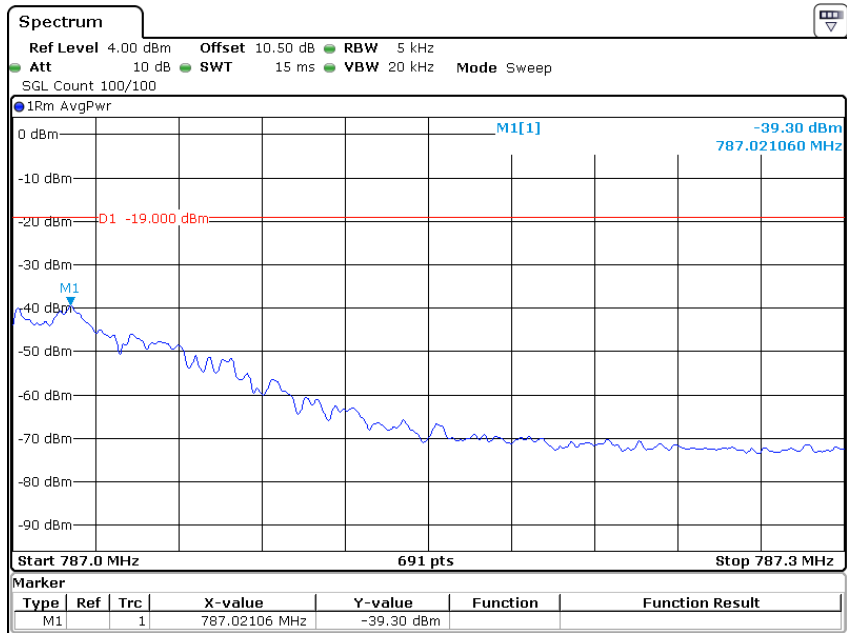
Date: 18.AUG.2022 16:04:05

Upper 700MHz CDMA Right Side Above AGC



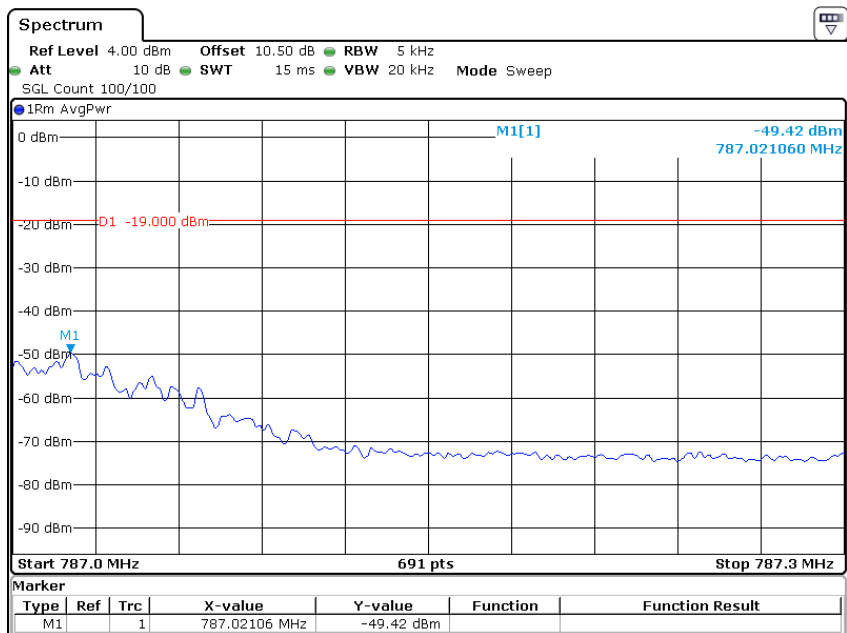
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Upper 700MHz GSM Right Side Pre-AGC



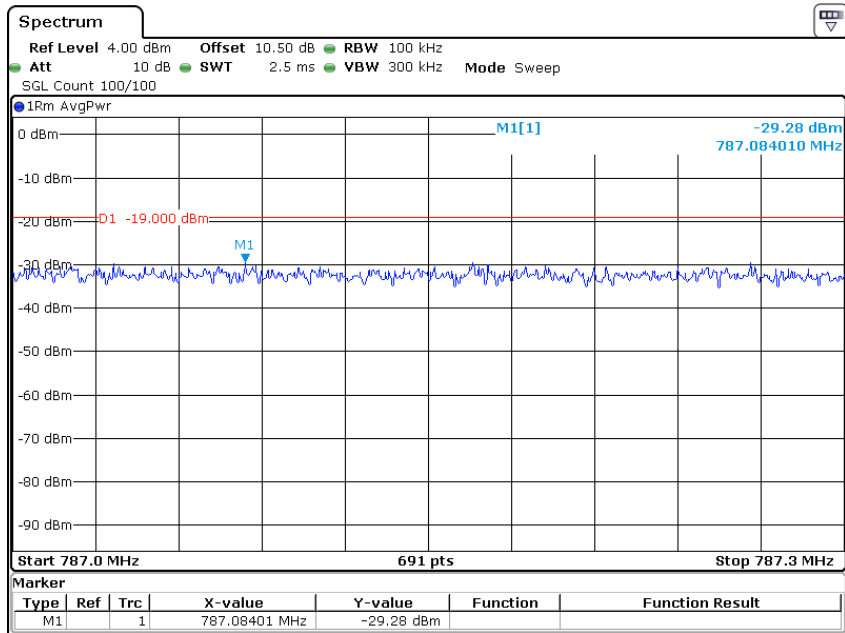
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Upper 700MHz GSM Right Side Above AGC



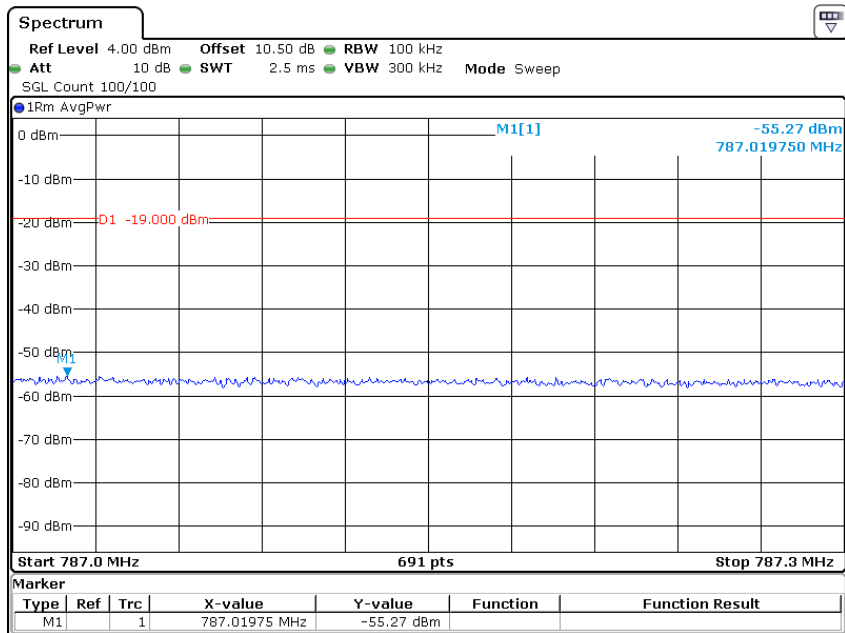
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Upper 700MHz WCDMA Right Side Pre-AGC



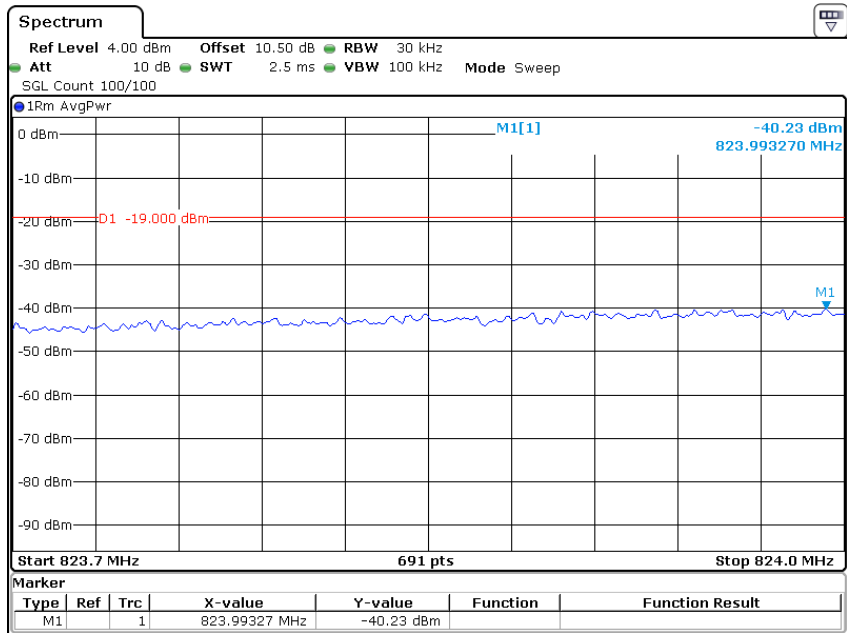
Date: 18.AUG.2022 16:17:21

Upper 700MHz WCDMA Right Side Above AGC



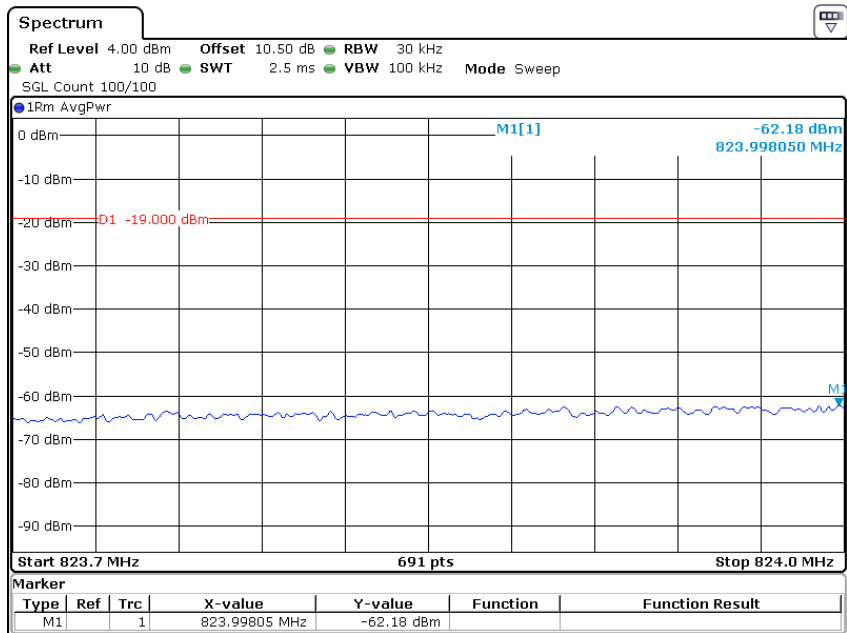
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Cellular Band CDMA Left Side Pre-AGC



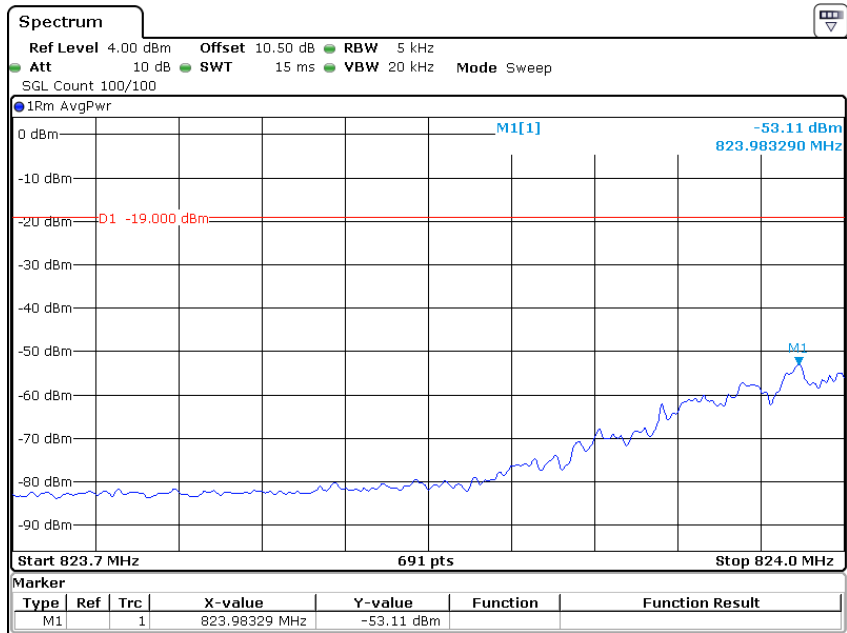
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Cellular Band CDMA Left Side Above AGC



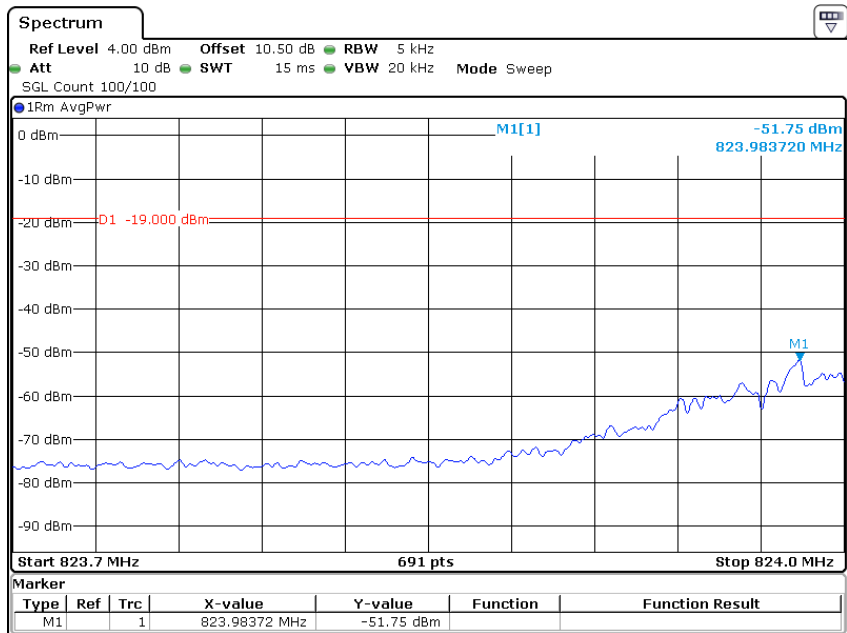
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Cellular Band GSM Left Side Pre-AGC



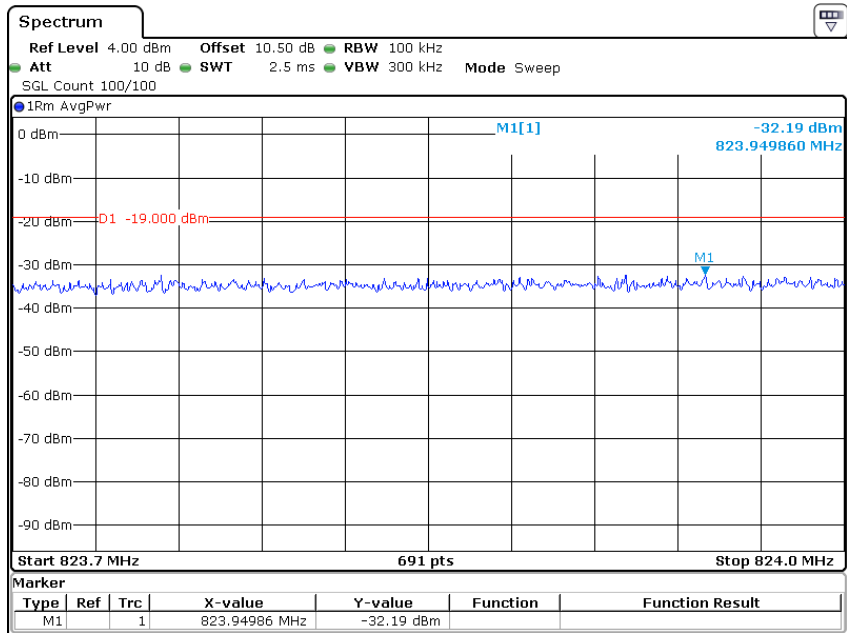
Date: 18.AUG.2022 17:39:42

Cellular Band GSM Left Side Above AGC



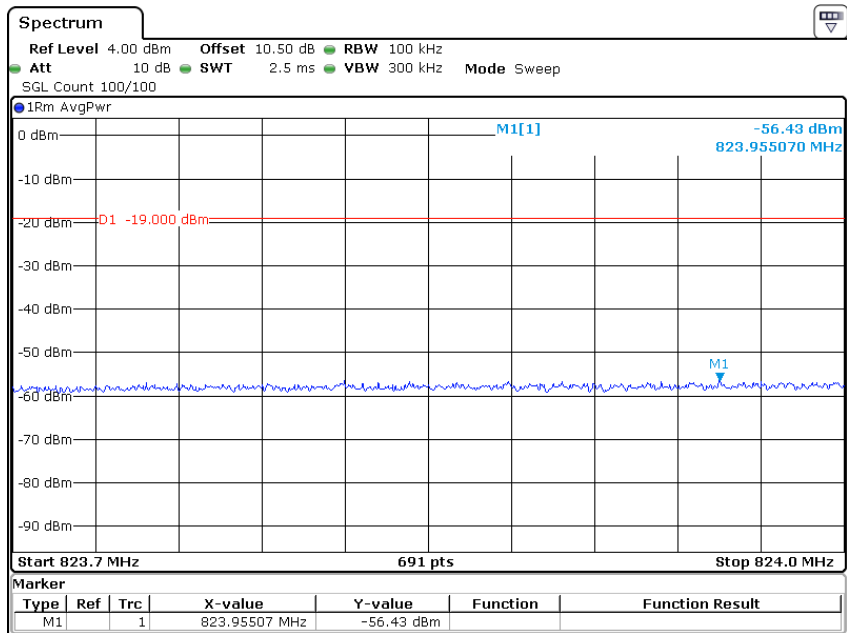
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Cellular Band WCDMA Left Side Pre-AGC



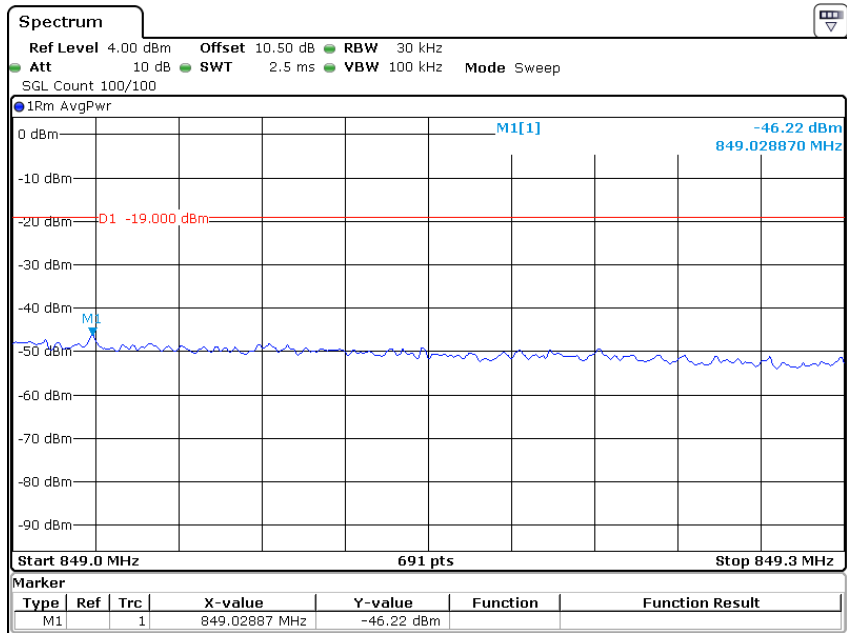
Date: 18.AUG.2022 17:52:02

Cellular Band WCDMA Left Side Above AGC



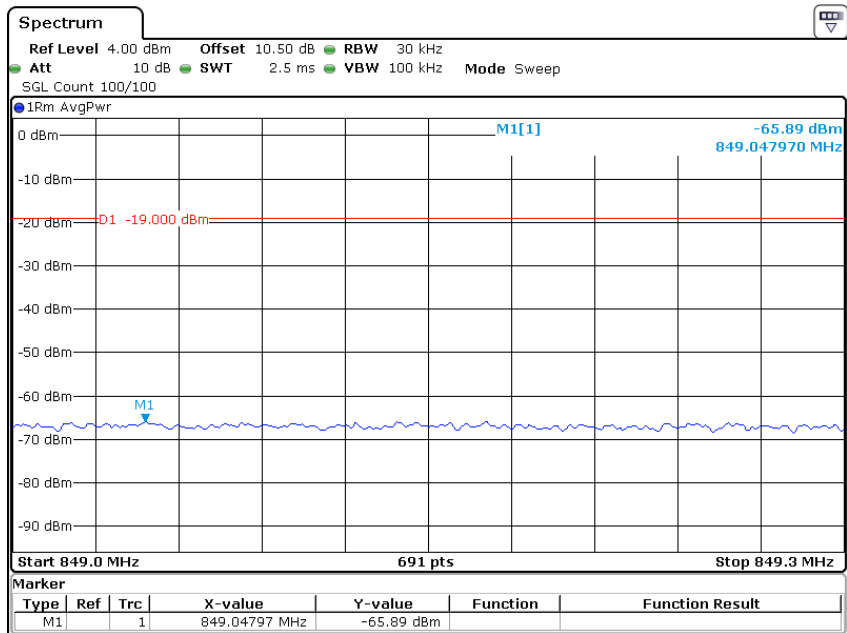
Date: 18.AUG.2022 17:52:43

Cellular Band CDMA Right Side Pre-AGC



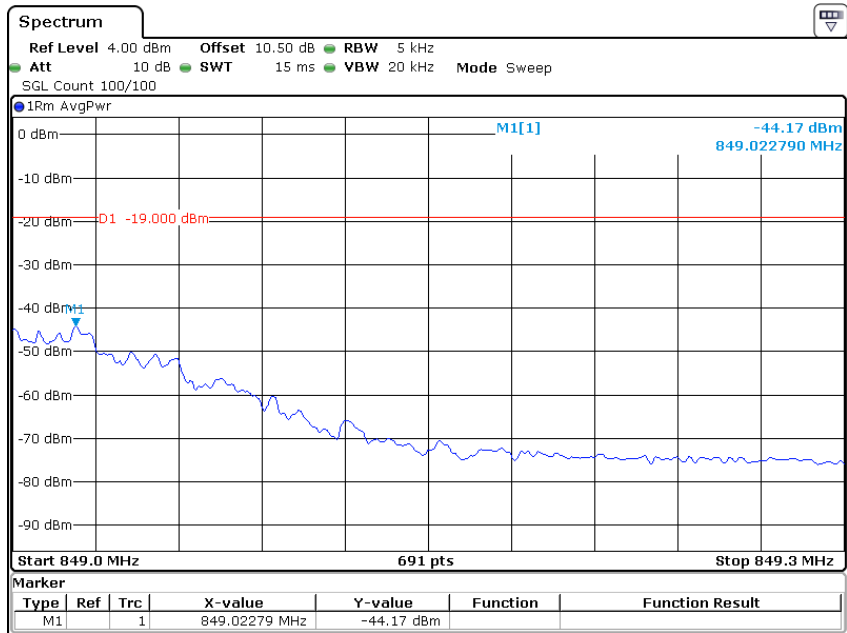
Date: 18.AUG.2022 17:50:37

Cellular Band CDMA Right Side Above AGC



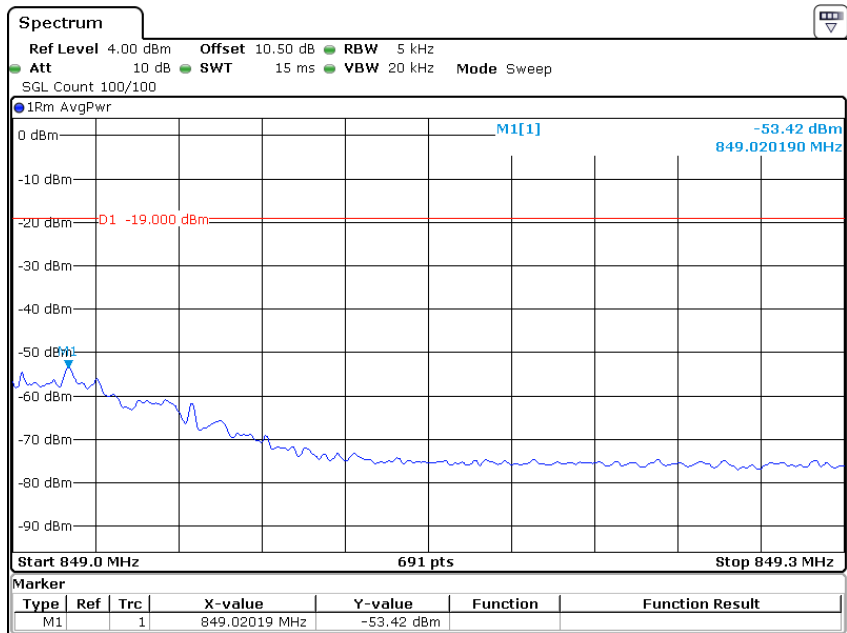
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Cellular Band GSM Right Side Pre-AGC



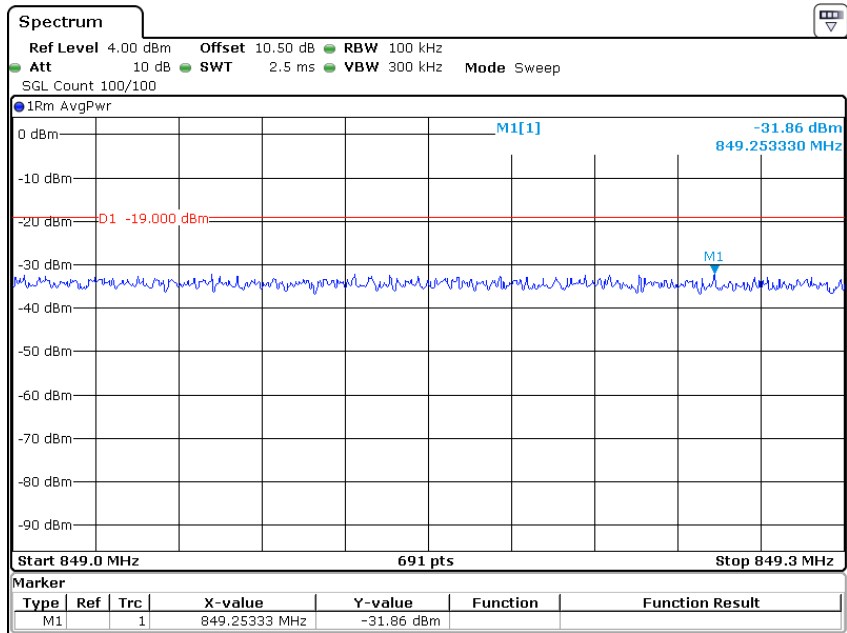
Date: 18.AUG.2022 17:43:21

Cellular Band GSM Right Side Above AGC



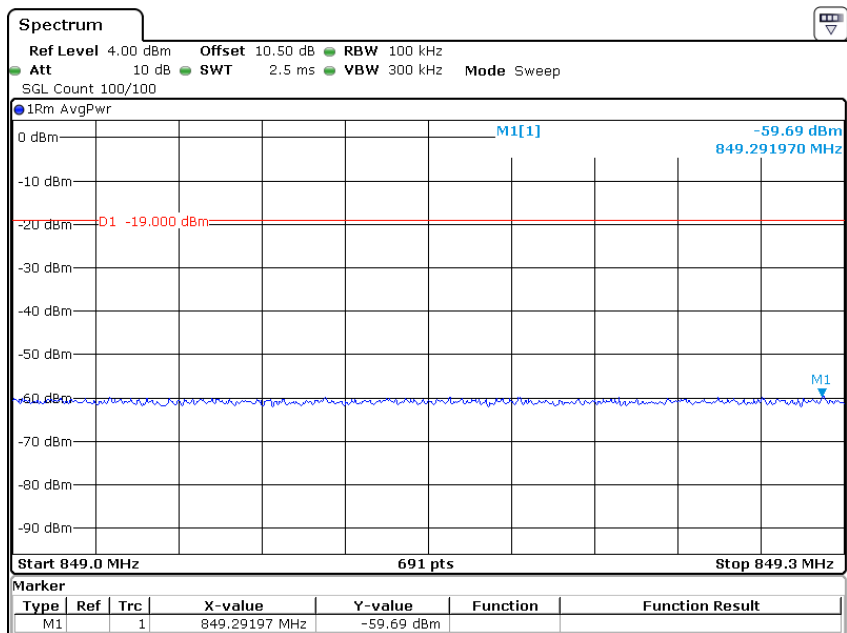
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Cellular Band WCDMA Right Side Pre-AGC



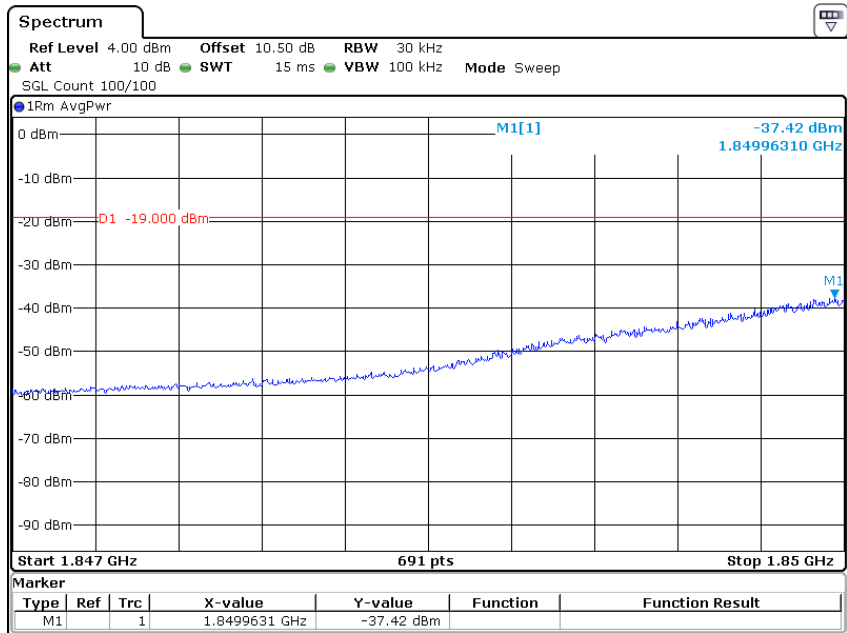
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Cellular Band WCDMA Right Side Above AGC



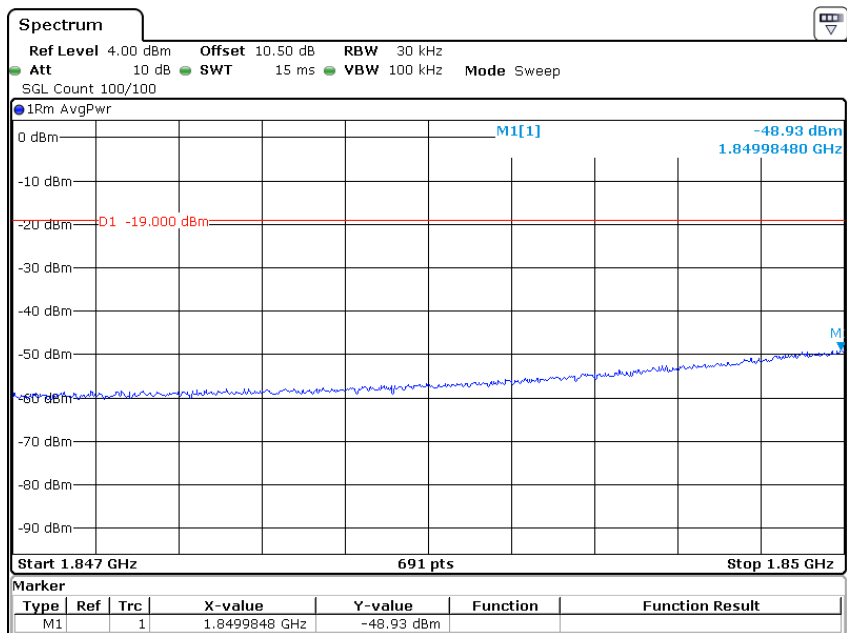
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PCS Band CDMA Left Side Pre-AGC



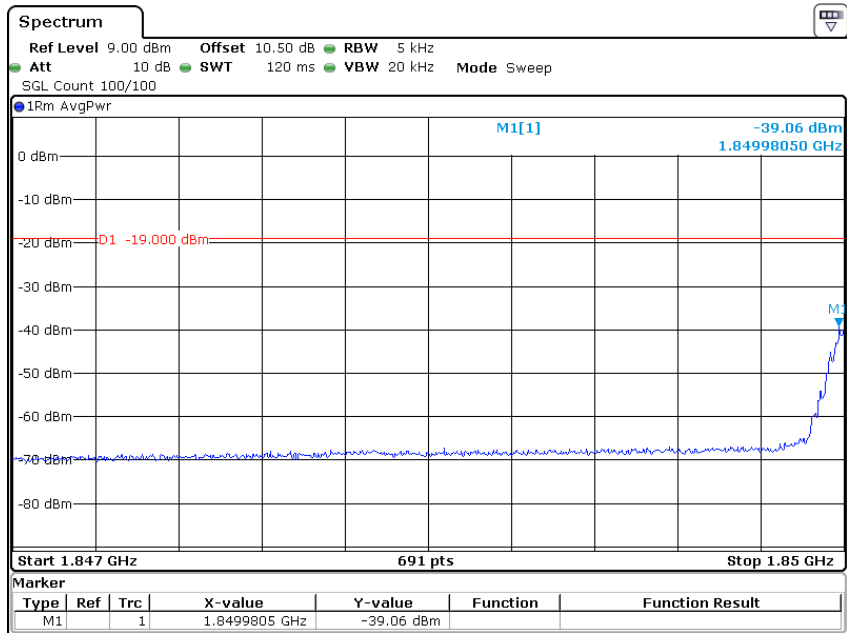
Date: 18.AUG.2022 15:28:20

PCS Band CDMA Left Side Above AGC



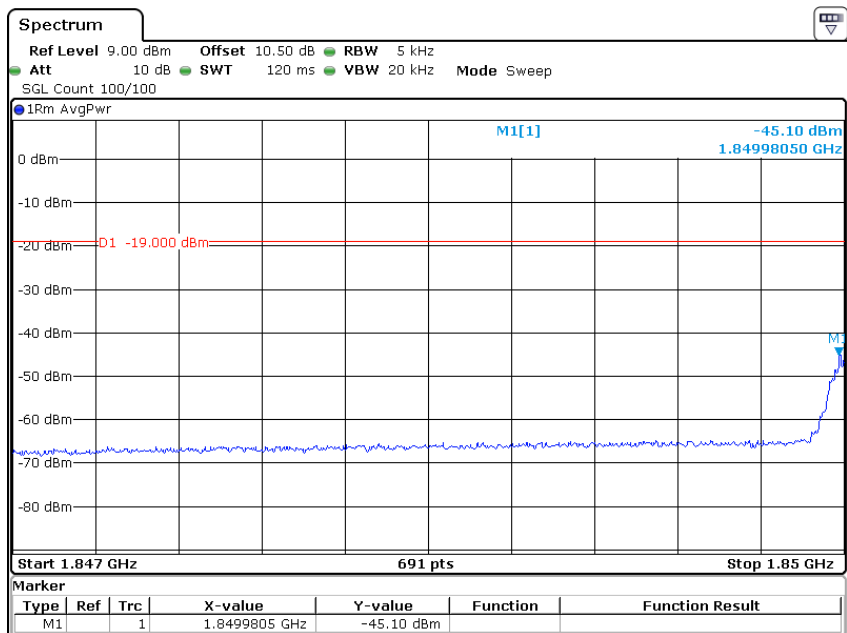
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PCS Band GSM Left Side Pre-AGC



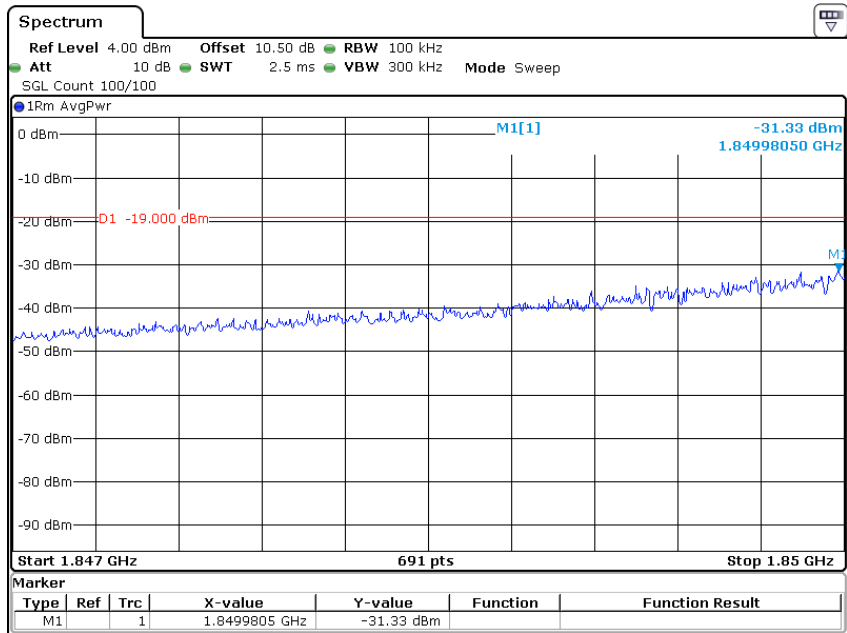
Date: 18.AUG.2022 15:18:58

PCS Band GSM Left Side Above AGC



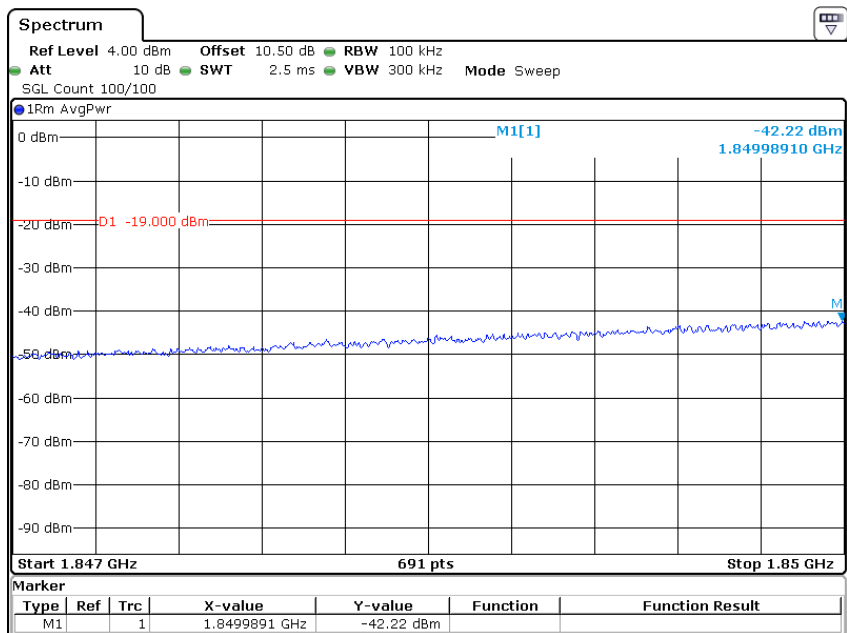
Date: 18.AUG.2022 15:19:36

PCS Band WCDMA Left Side Pre-AGC



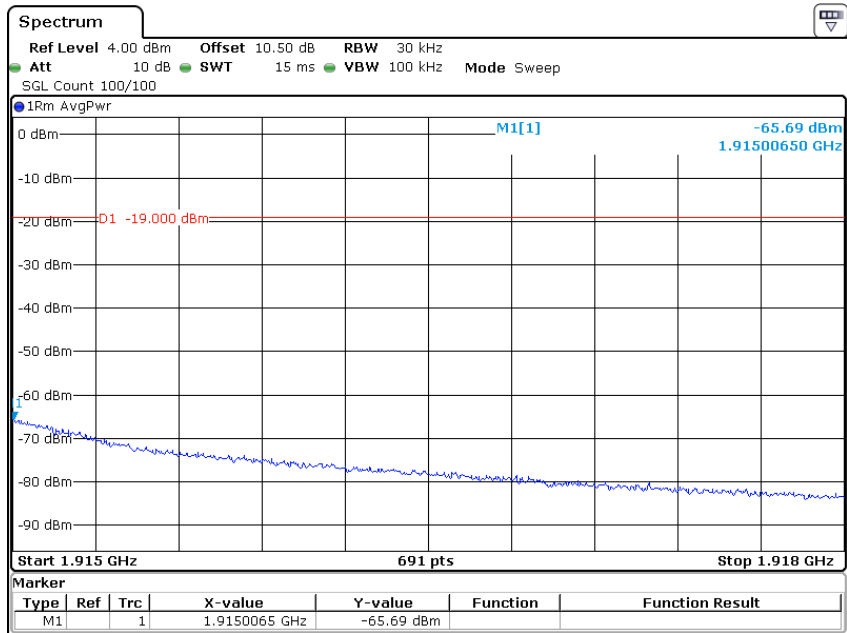
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PCS Band WCDMA Left Side Above AGC



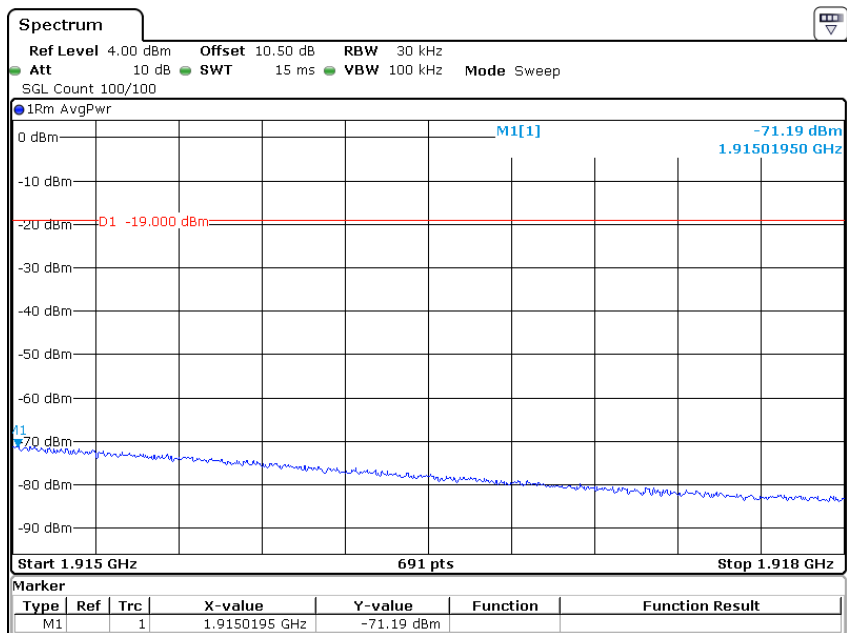
Date: 18.AUG.2022 15:35:12

PCS Band CDMA Right Side Pre-AGC



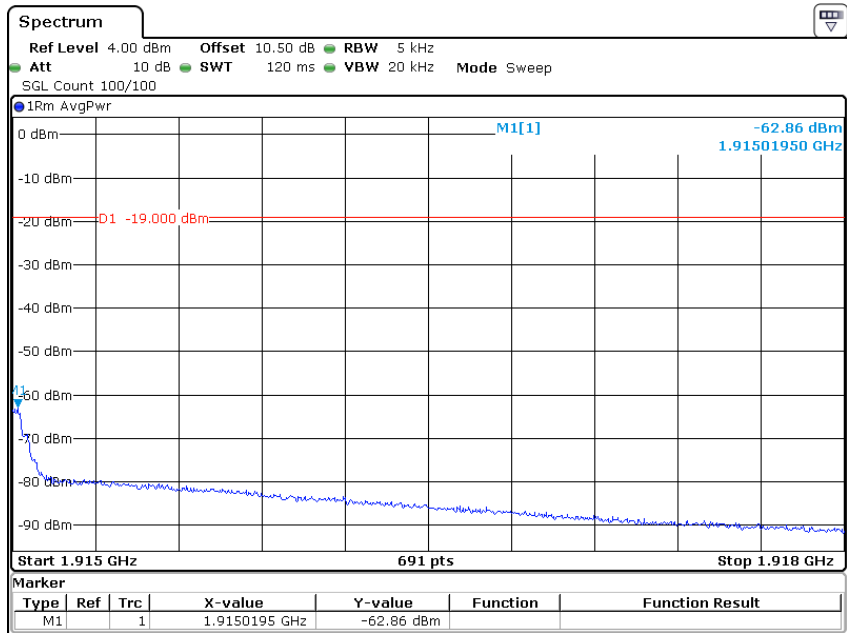
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PCS Band CDMA Right Side Above AGC



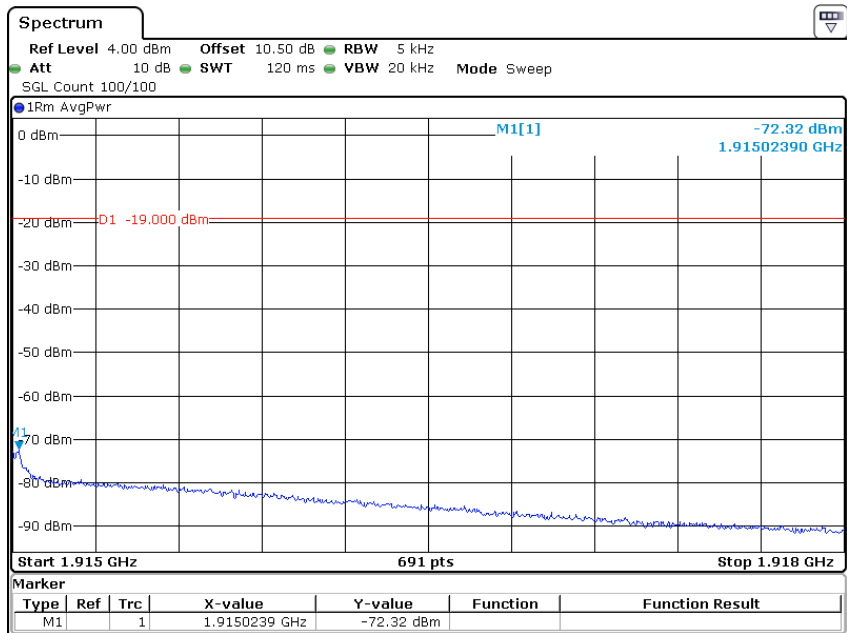
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PCS Band GSM Right Side Pre-AGC



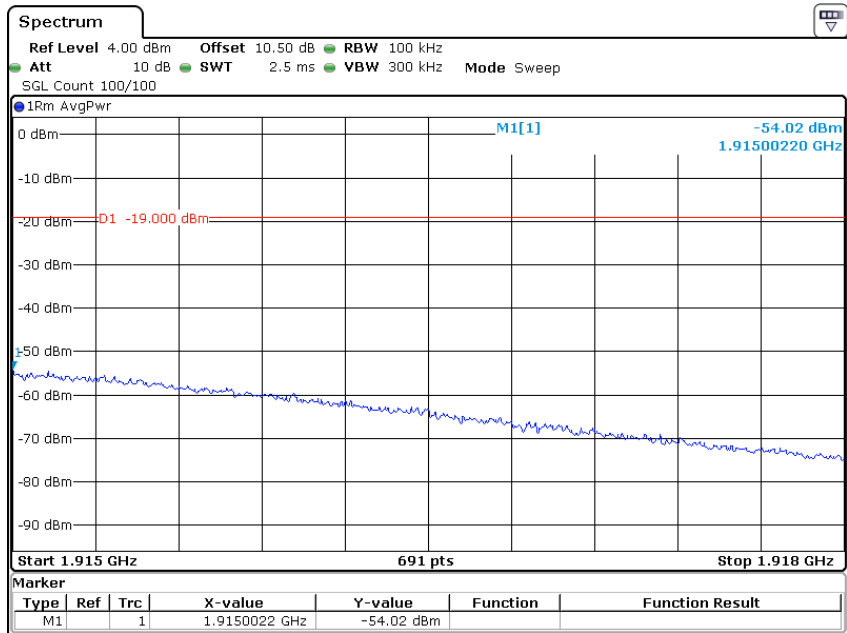
Date: 18.AUG.2022 15:24:20

PCS Band GSM Right Side Above AGC



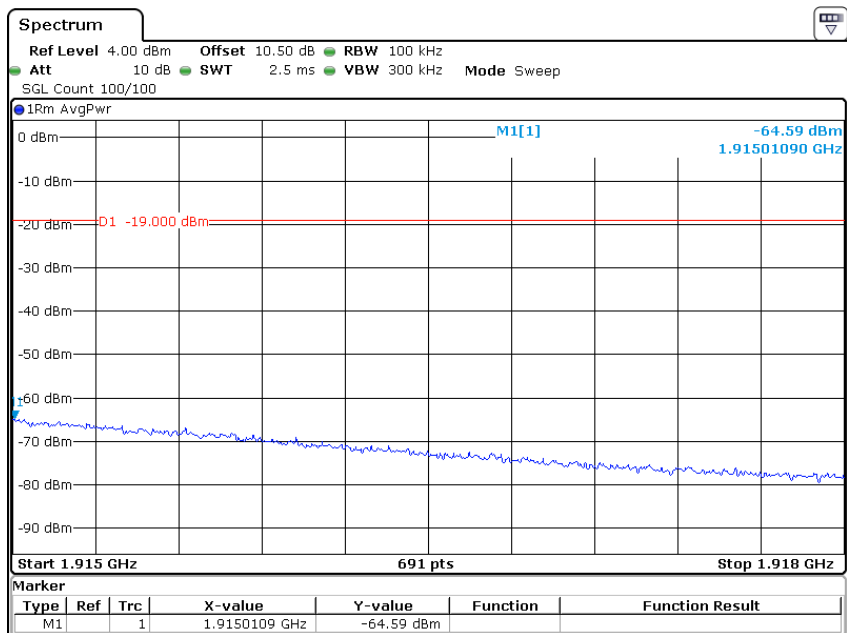
Date: 18.AUG.2022 15:25:23

PCS Band WCDMA Right Side Pre-AGC



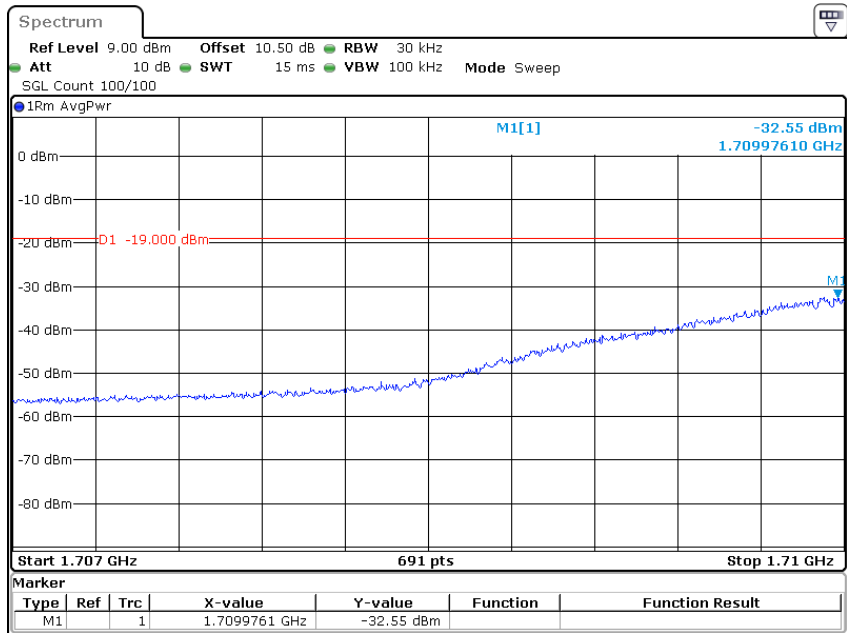
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PCS Band WCDMA Right Side Above AGC



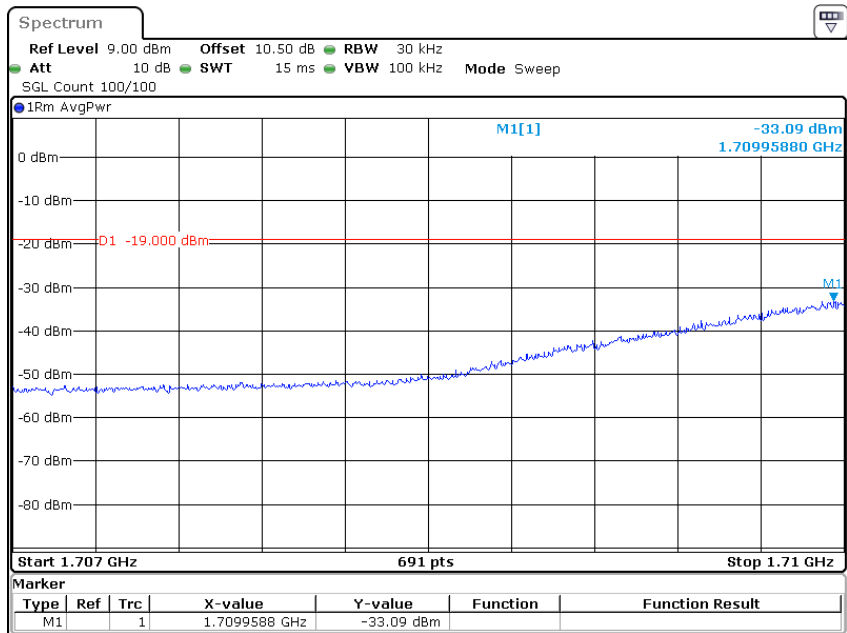
Date: 18.AUG.2022 15:37:13

AWS Band CDMA Left Side Pre-AGC



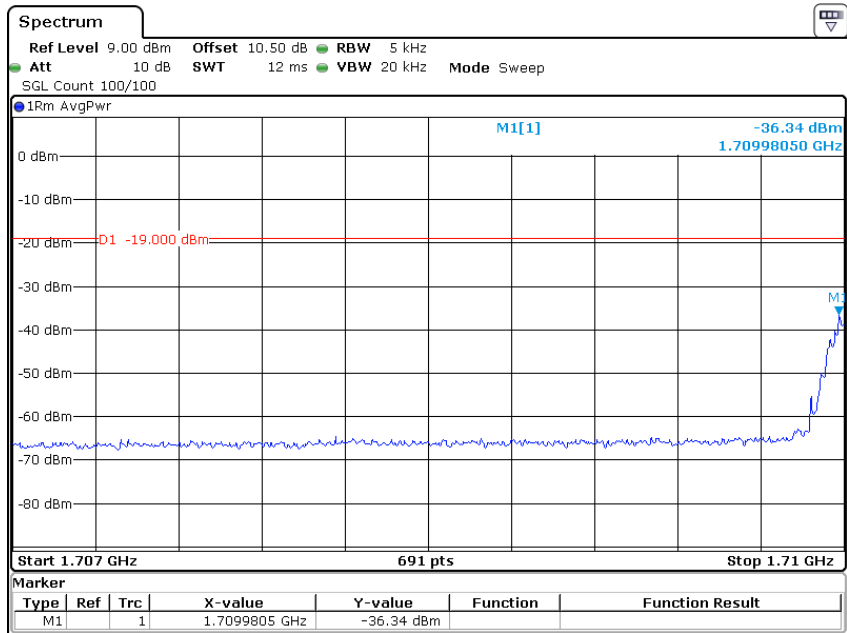
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AWS Band CDMA Left Side Above AGC



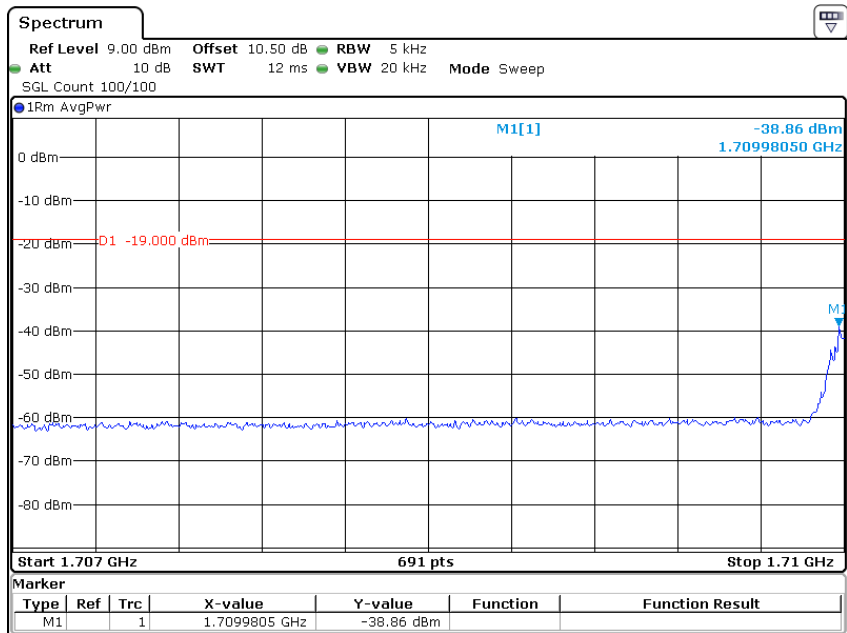
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AWS Band GSM Left Side Pre-AGC



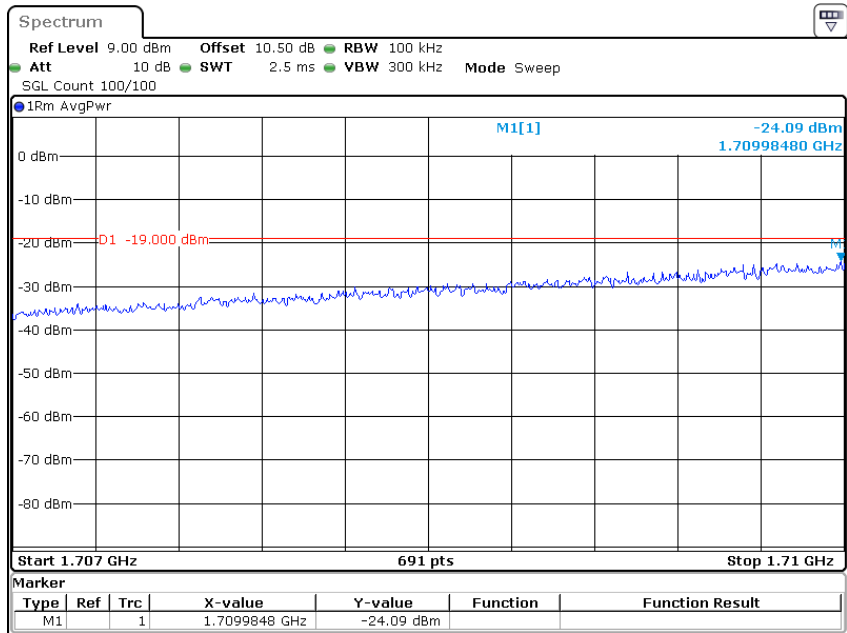
Date: 18.AUG.2022 14:11:45

AWS Band GSM Left Side Above AGC



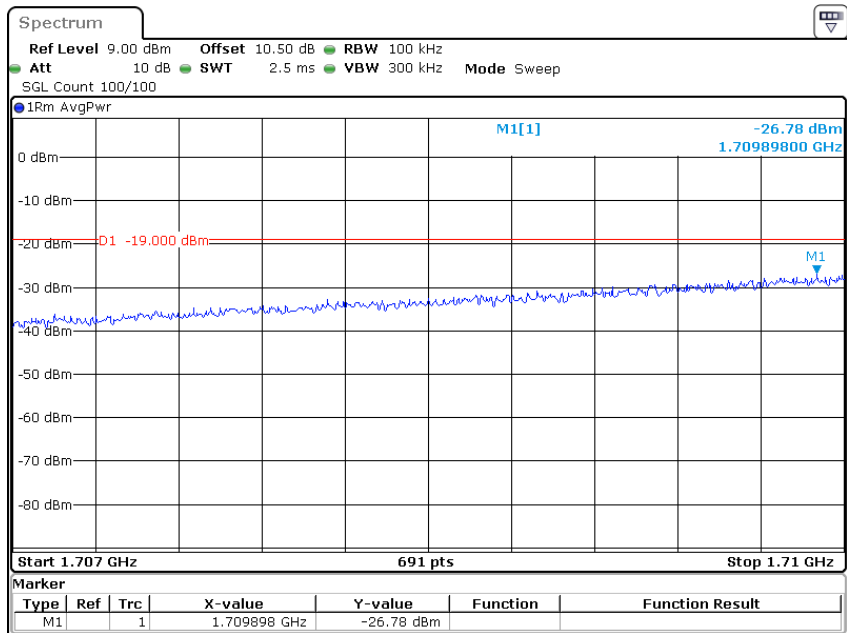
Date: 18.AUG.2022 14:12:36

AWS Band WCDMA Left Side Pre-AGC



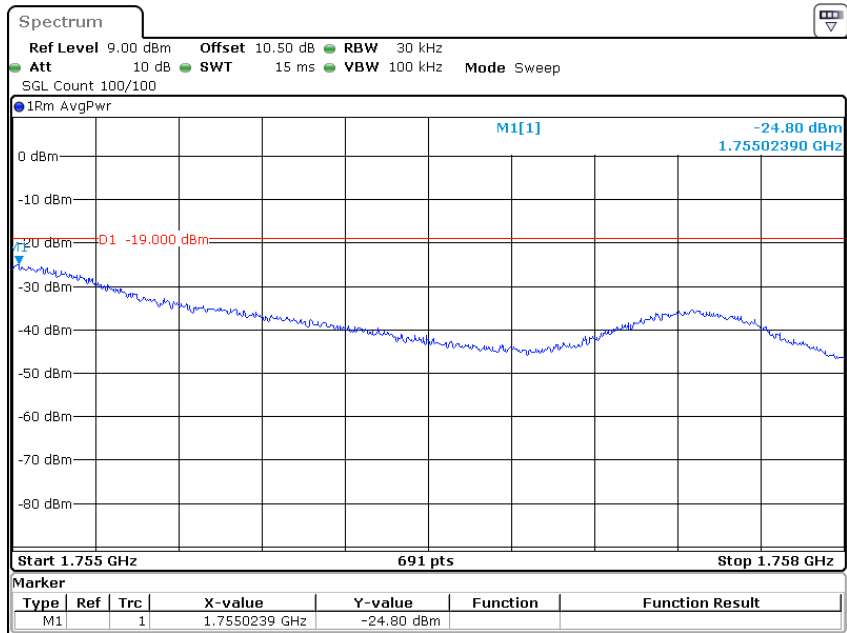
Date: 18.AUG.2022 14:57:35

AWS Band WCDMA Left Side Above AGC



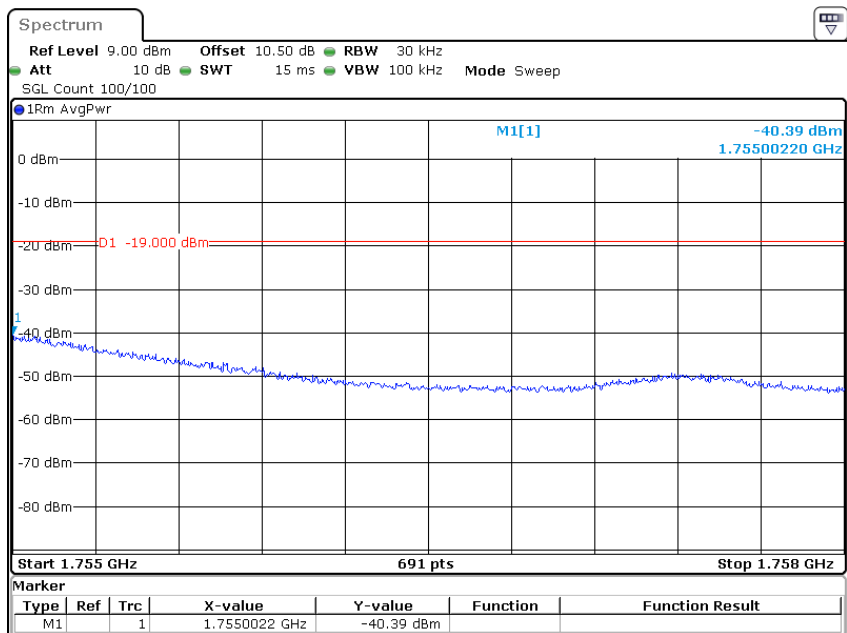
Date: 18.AUG.2022 14:58:52

AWS Band CDMA Right Side Pre-AGC



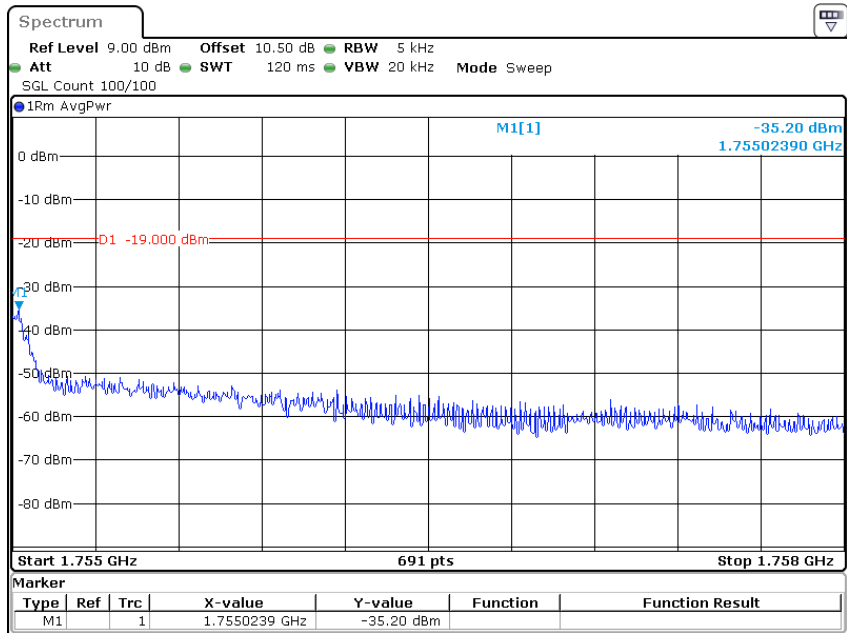
Date: 18.AUG.2022 14:53:11

AWS Band CDMA Right Side Above AGC



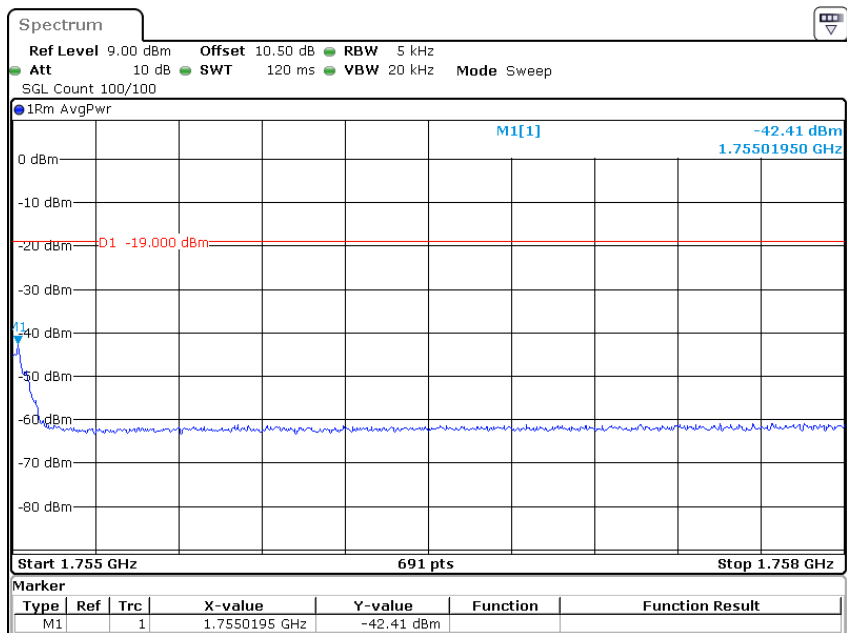
Date: 18.AUG.2022 14:54:45

AWS Band GSM Right Side Pre-AGC



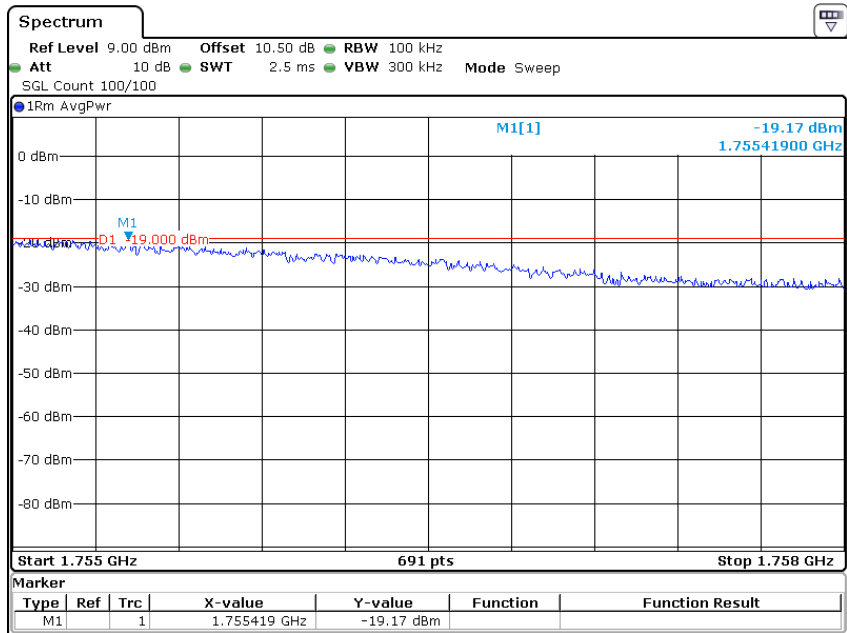
Date: 18.AUG.2022 14:37:50

AWS Band GSM Right Side Above AGC



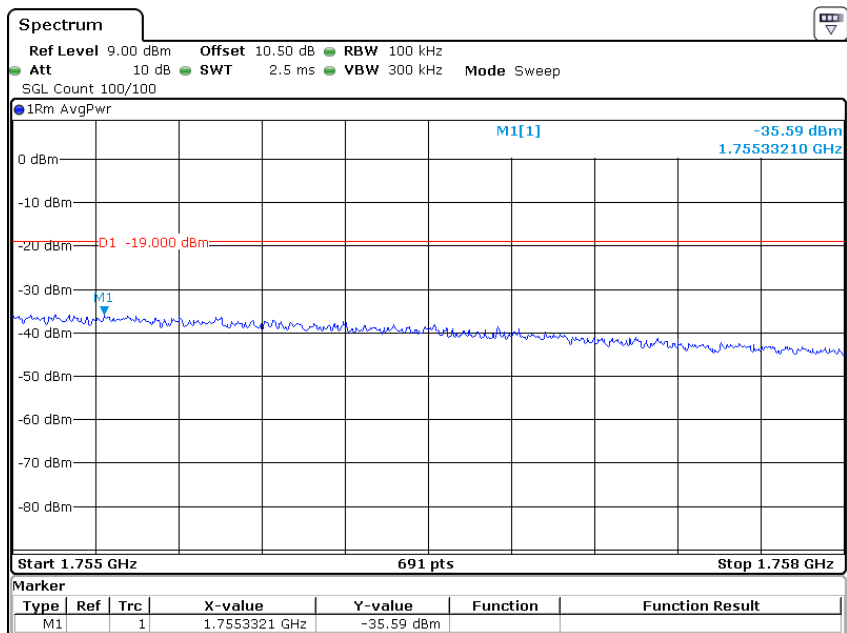
Date: 18.AUG.2022 14:38:54

AWS Band WCDMA Right Side Pre-AGC



Date: 18.AUG.2022 15:11:05

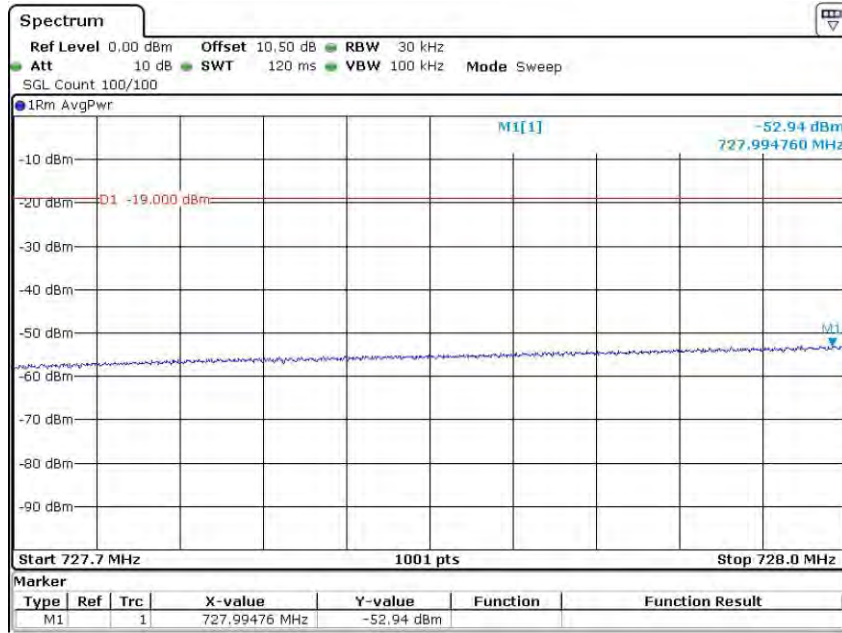
AWS Band WCDMA Right Side Above AGC



Date: 18.AUG.2022 15:12:04

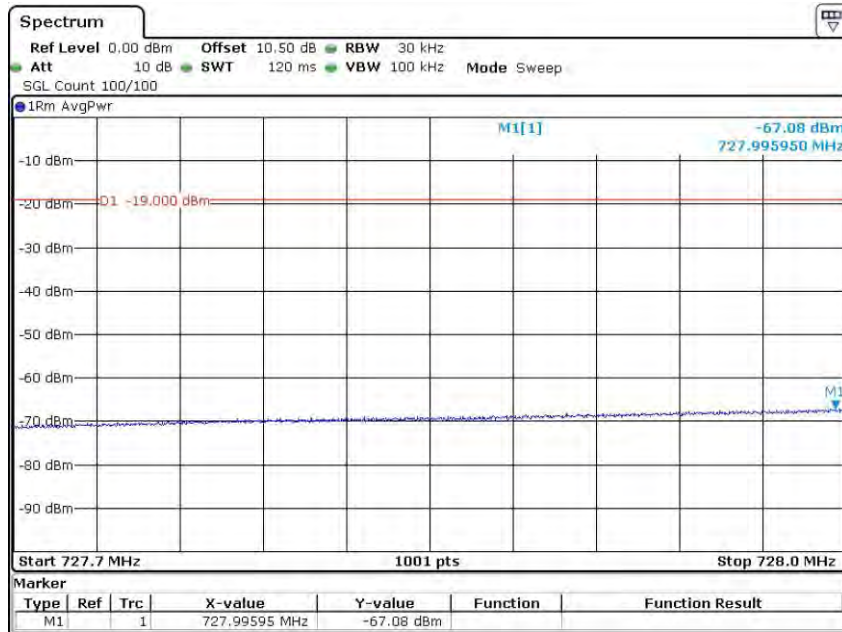
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Lower 700MHz CDMA Left Side Pre-AGC



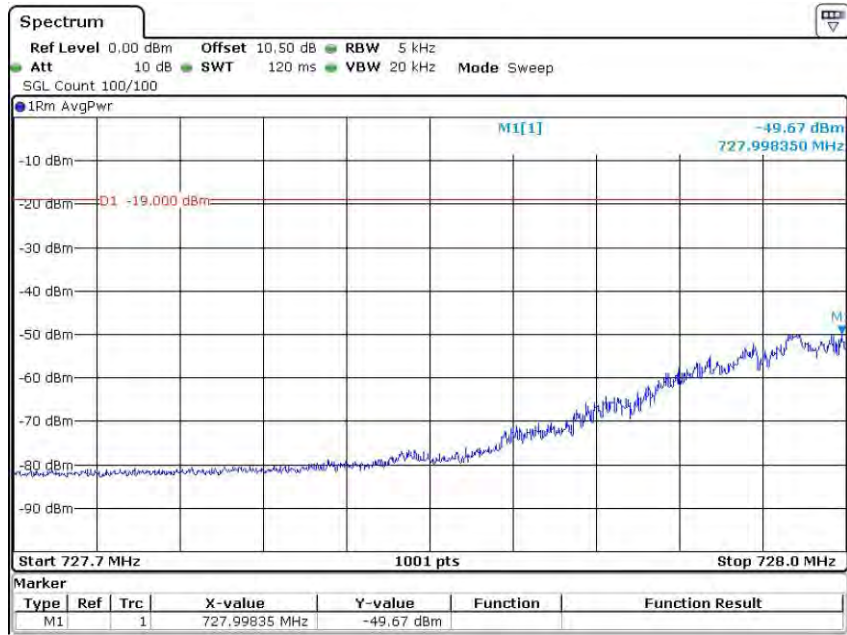
Date: 12.AUG.2022 19:20:43

Lower 700MHz CDMA Left Side Above AGC



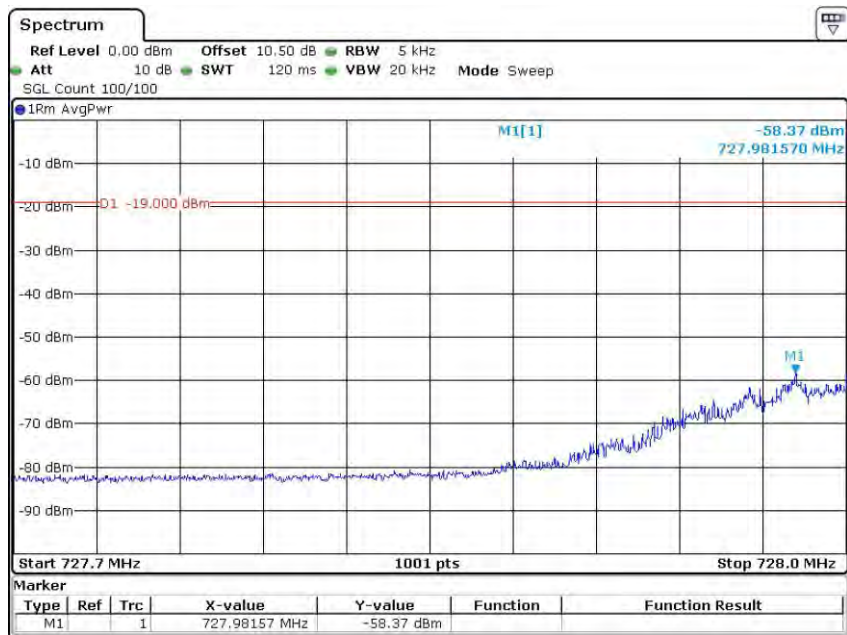
Date: 12.AUG.2022 19:21:28

Lower 700MHz GSM Left Side Pre-AGC



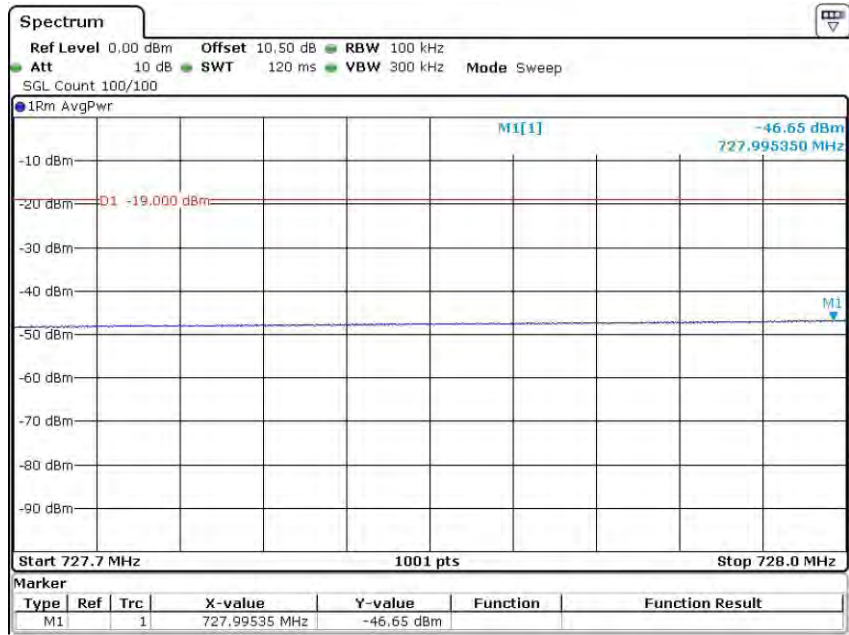
Date: 12.AUG.2022 19:14:42

Lower 700MHz GSM Left Side Above AGC



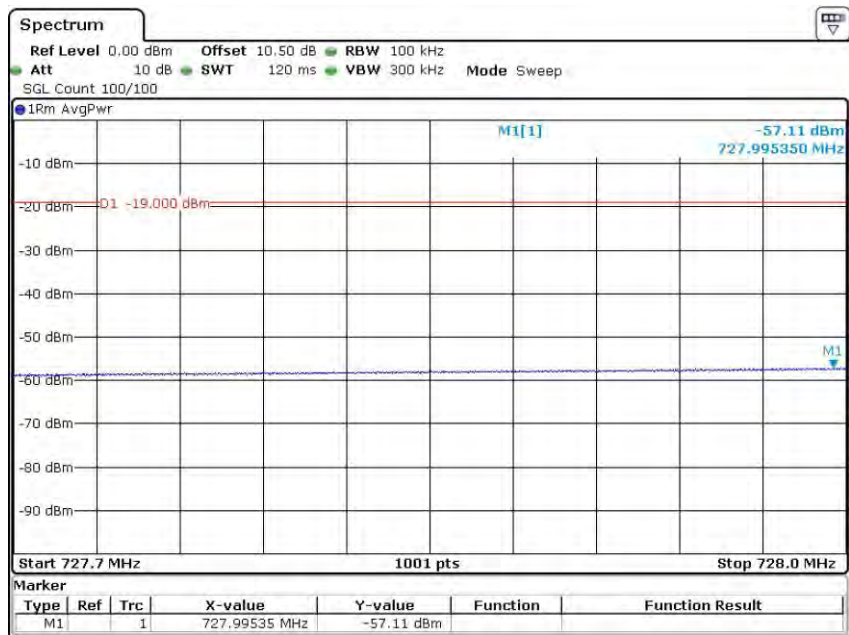
Date: 12.AUG.2022 19:15:27

Lower 700MHz WCDMA Left Side Pre-AGC



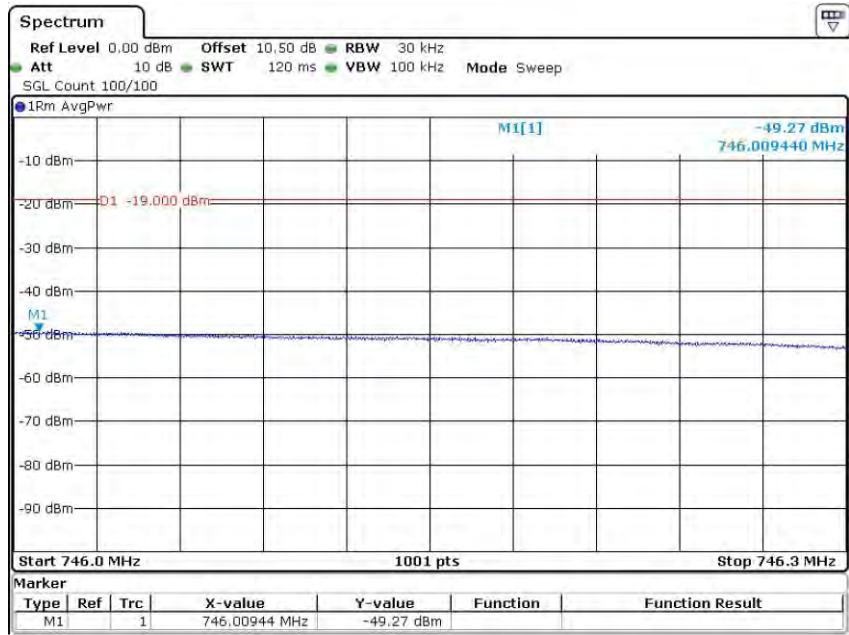
Date: 12.AUG.2022 19:33:13

Lower 700MHz WCDMA Left Side Above AGC



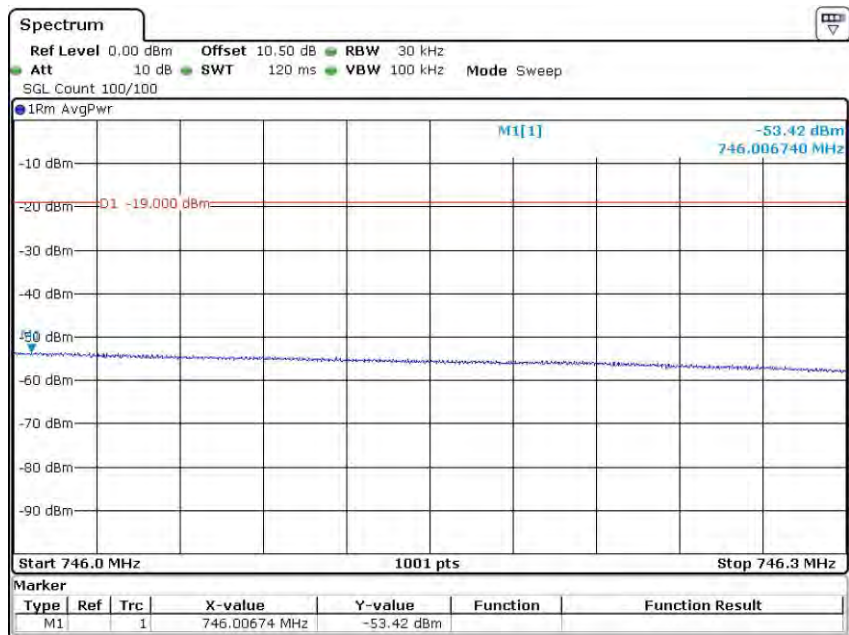
Date: 12.AUG.2022 19:33:51

Lower 700MHz CDMA Right Side Pre-AGC



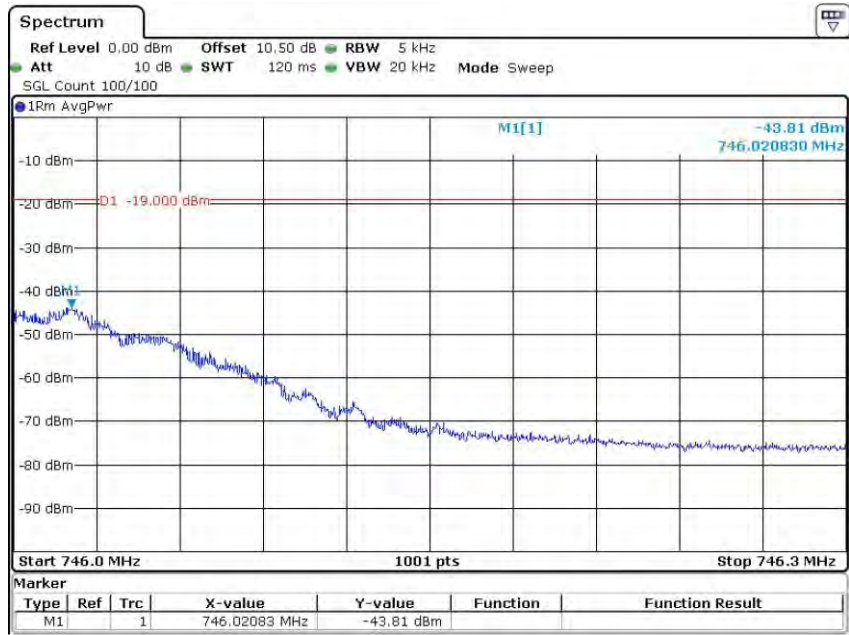
Date: 12.AUG.2022 19:29:20

Lower 700MHz CDMA Right Side Above AGC



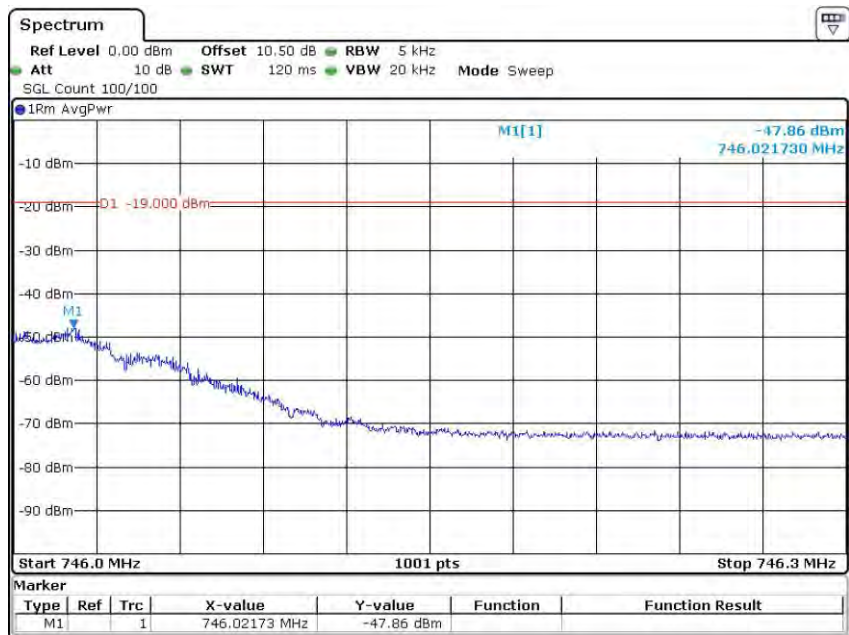
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Lower 700MHz GSM Right Side Pre-AGC



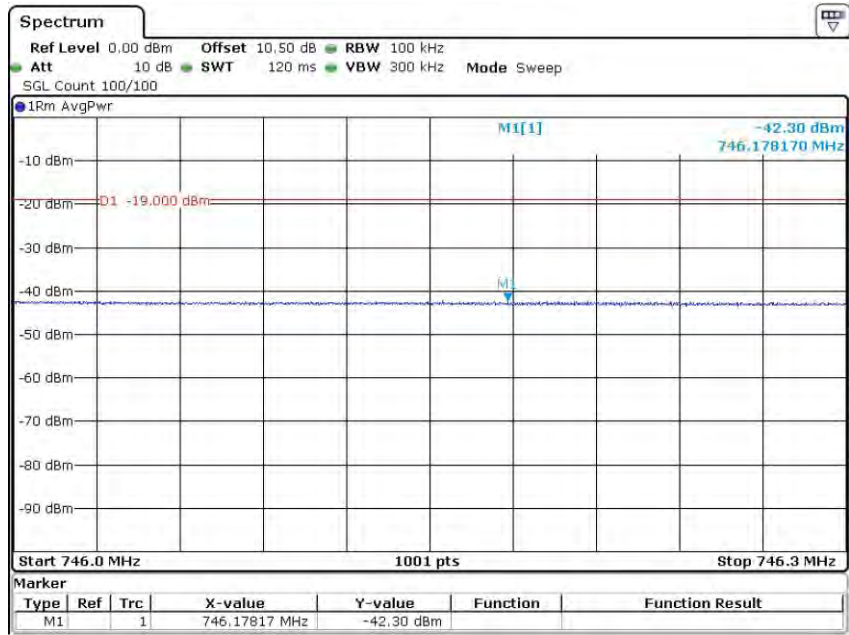
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Lower 700MHz GSM Right Side Above AGC



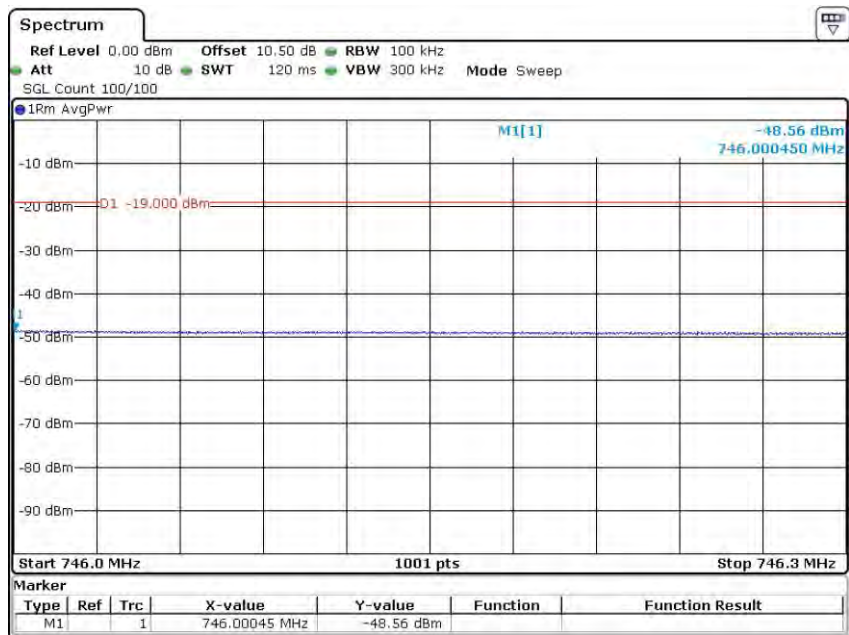
Date: 12.AUG.2022 19:18:23

Lower 700MHz WCDMA Right Side Pre-AGC



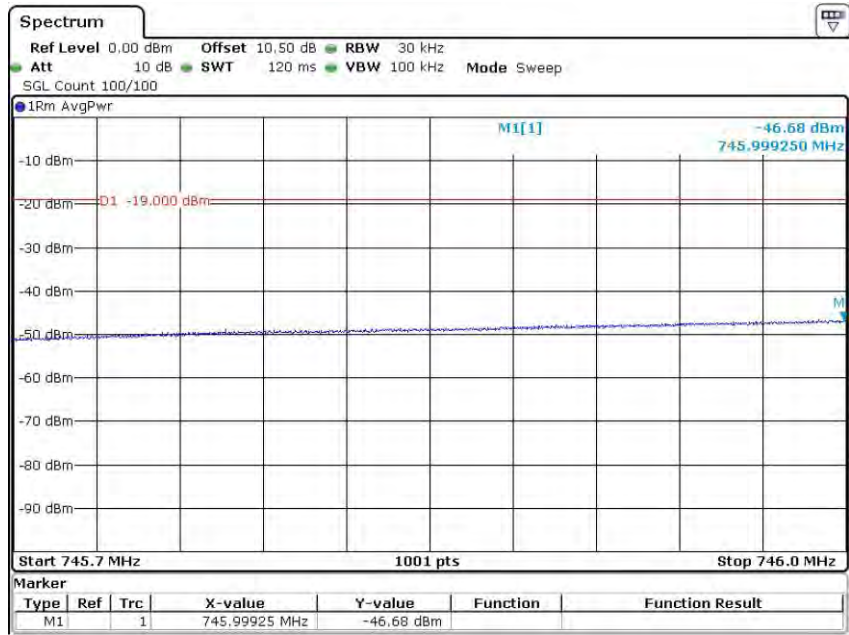
Date: 12.AUG.2022 19:36:26

Lower 700MHz WCDMA Right Side Above AGC



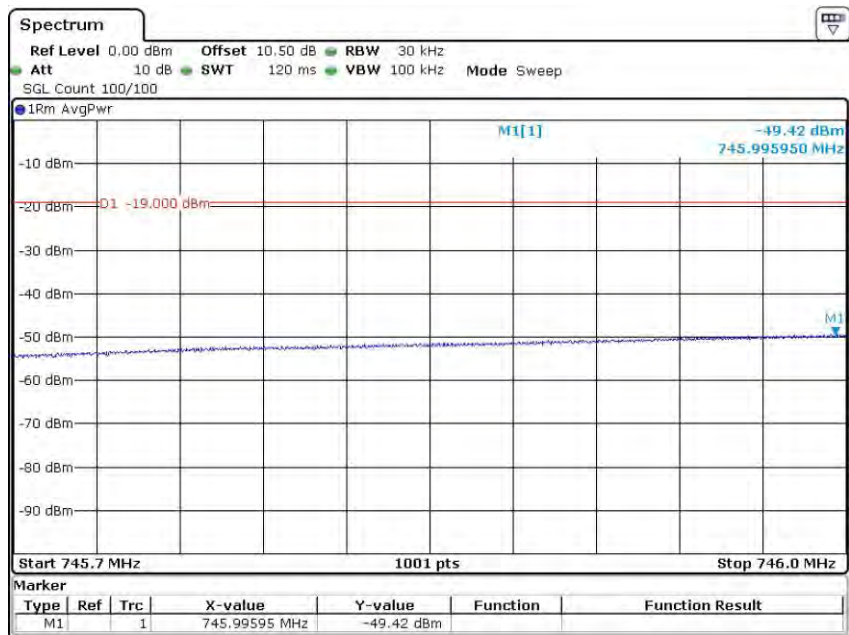
Date: 12.AUG.2022 19:37:05

Upper 700MHz CDMA Left Side Pre-AGC



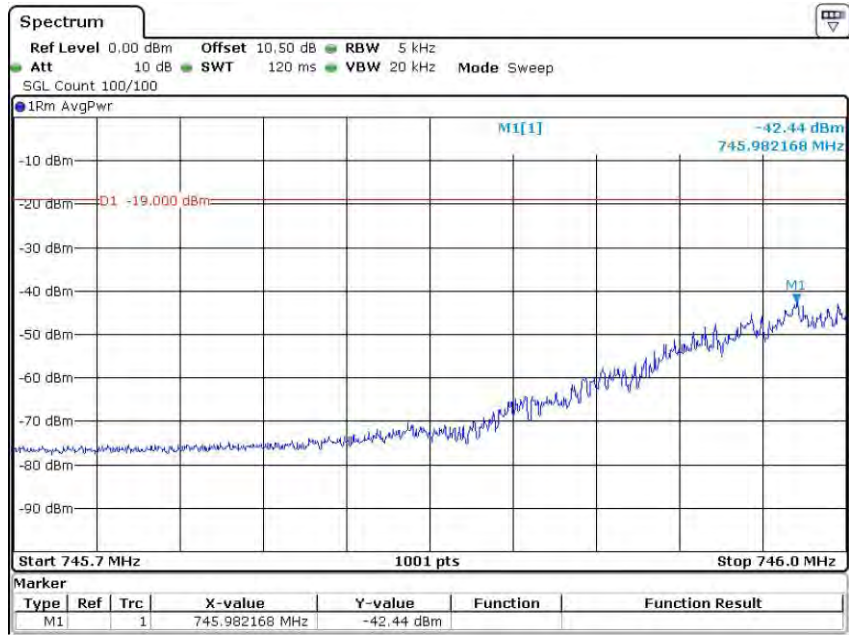
Date: 12.AUG.2022 20:13:56

Upper 700MHz CDMA Left Side Above AGC



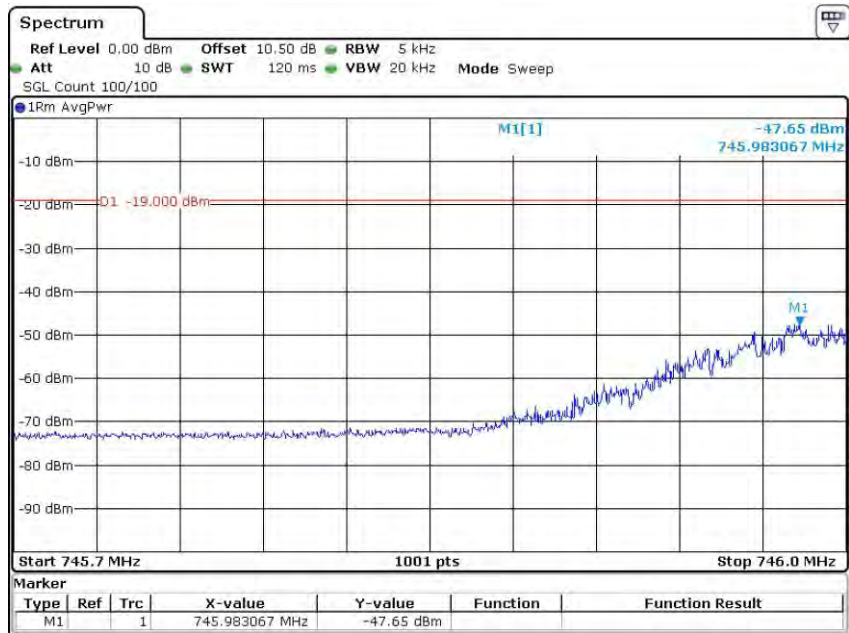
Date: 12.AUG.2022 20:17:02

Upper 700MHz GSM Left Side Pre-AGC



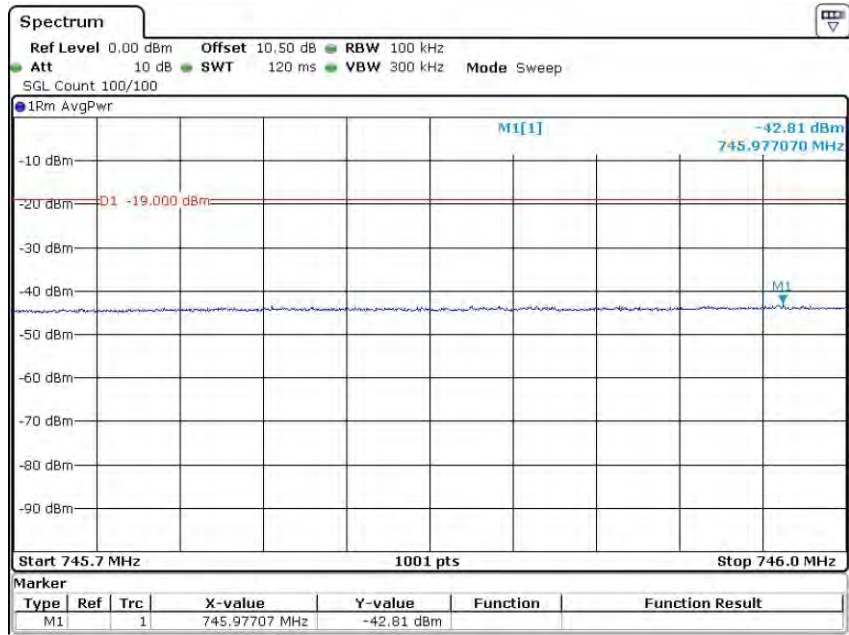
Date: 13.AUG.2022 09:38:12

Upper 700MHz GSM Left Side Above AGC



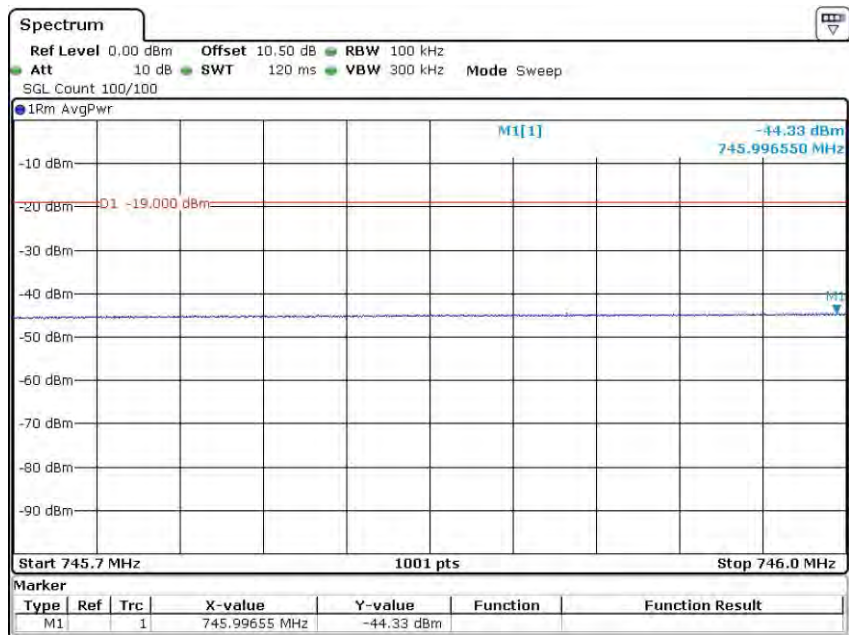
Date: 13.AUG.2022 09:39:11

Upper 700MHz WCDMA Left Side Pre-AGC



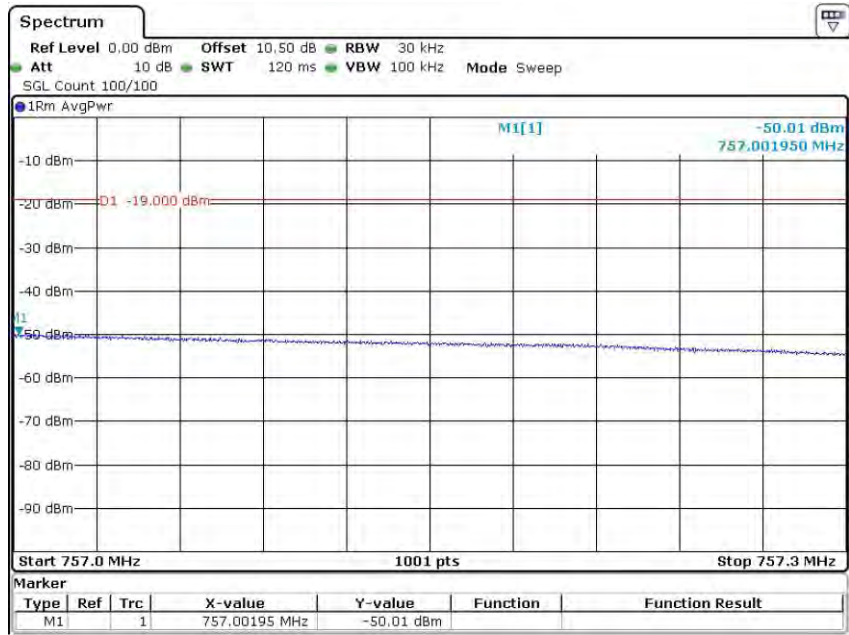
Date: 12.AUG.2022 21:08:18

Upper 700MHz WCDMA Left Side Above AGC



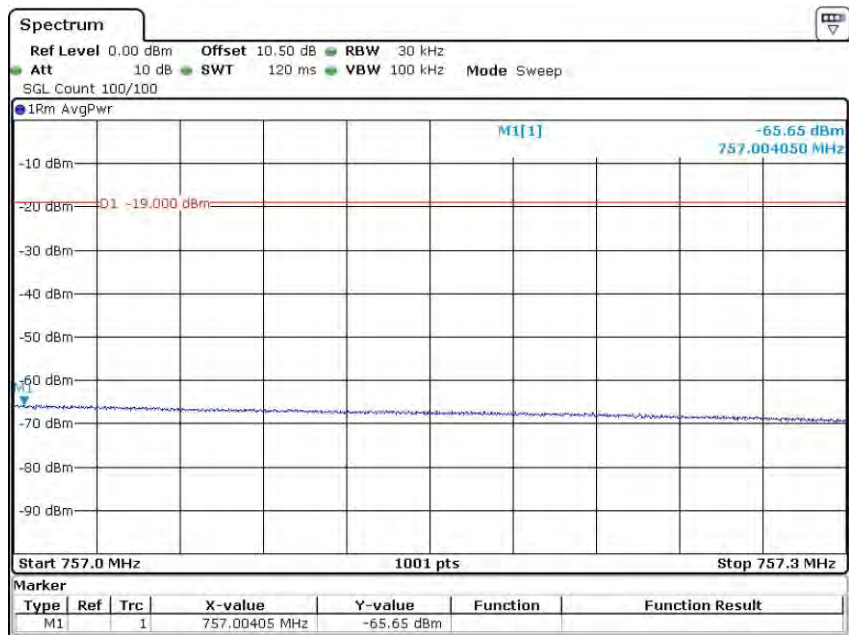
Date: 12.AUG.2022 21:09:14

Upper 700MHz CDMA Right Side Pre-AGC



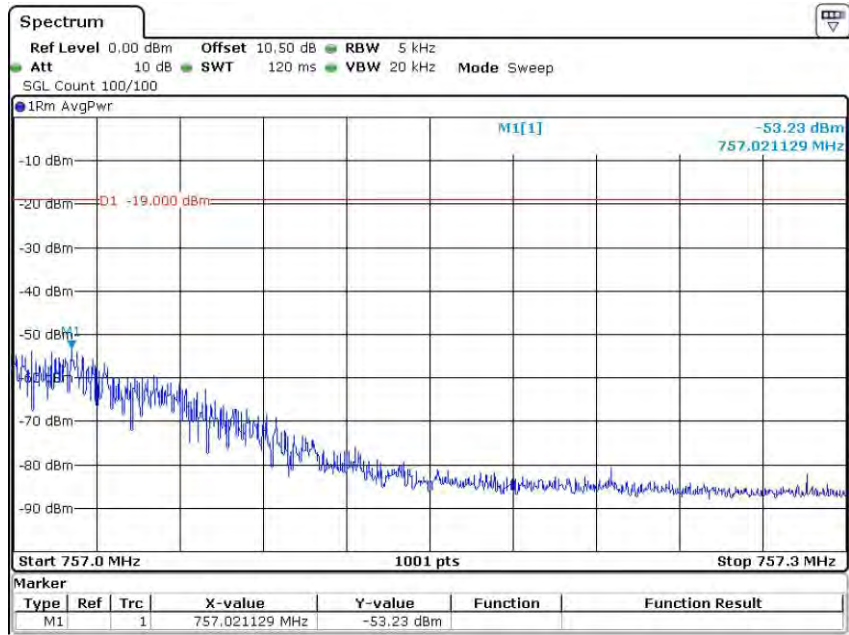
Date: 12.AUG.2022 20:18:56

Upper 700MHz CDMA Right Side Above AGC



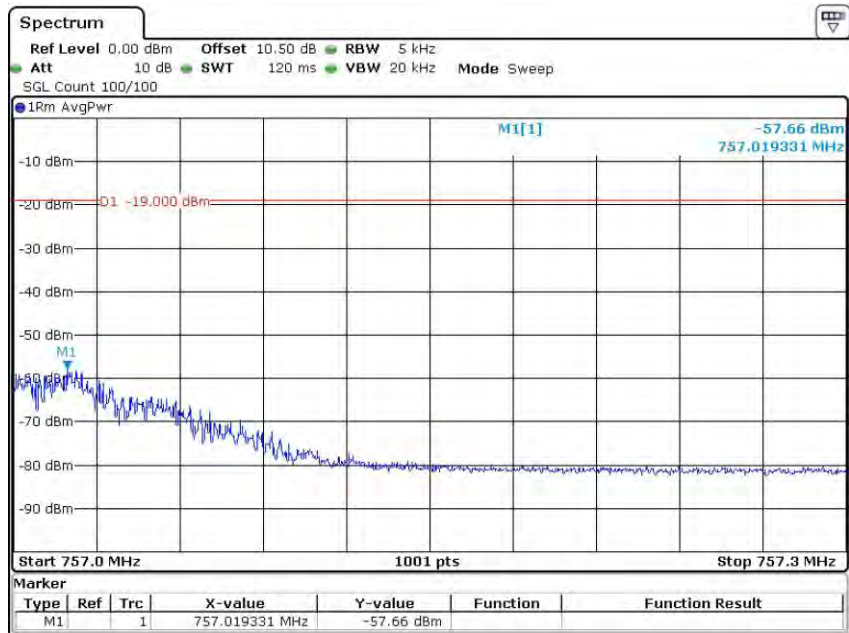
Date: 12.AUG.2022 20:19:59

Upper 700MHz GSM Right Side Pre-AGC



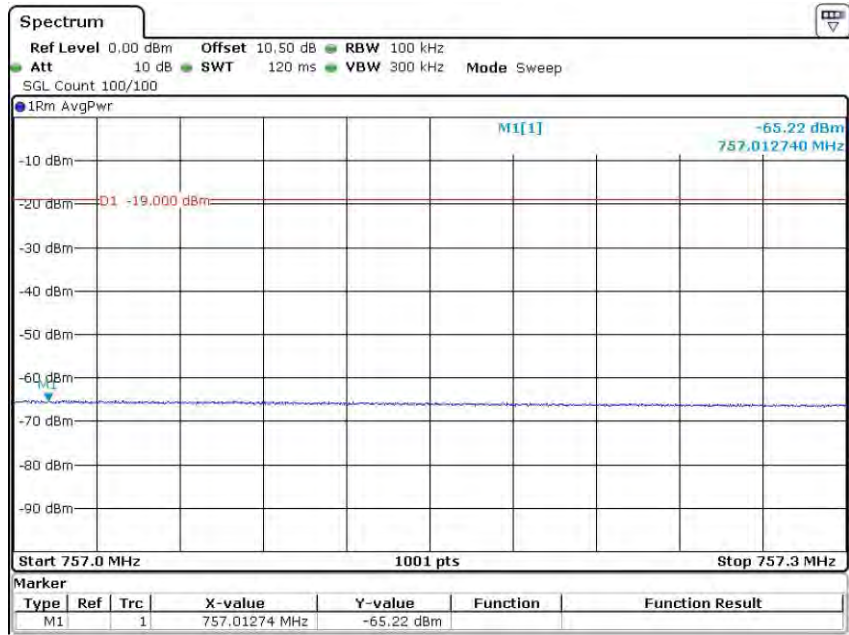
Date: 13.AUG.2022 09:42:53

Upper 700MHz GSM Right Side Above AGC



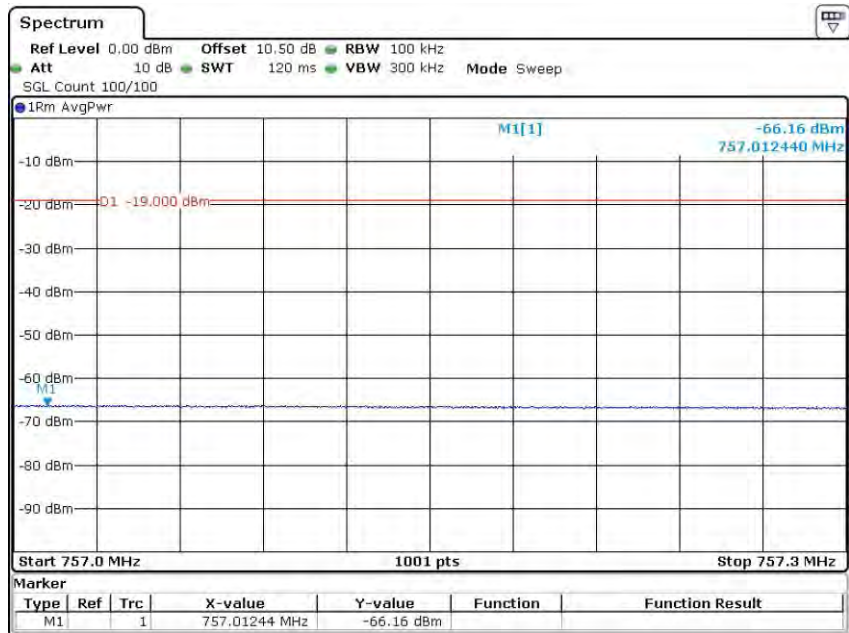
Date: 13.AUG.2022 09:43:37

Upper 700MHz WCDMA Right Side Pre-AGC



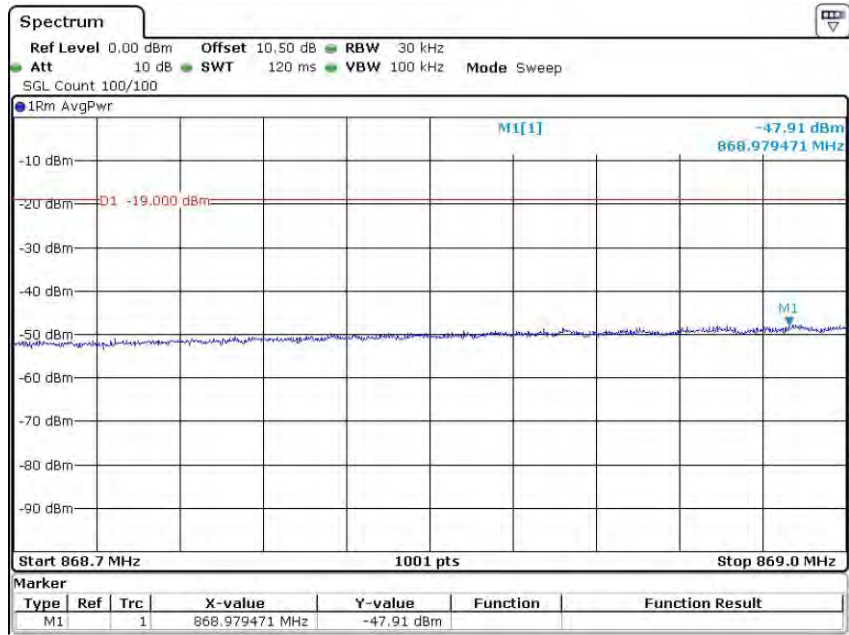
Date: 12.AUG.2022 21:11:01

Upper 700MHz WCDMA Right Side Above AGC



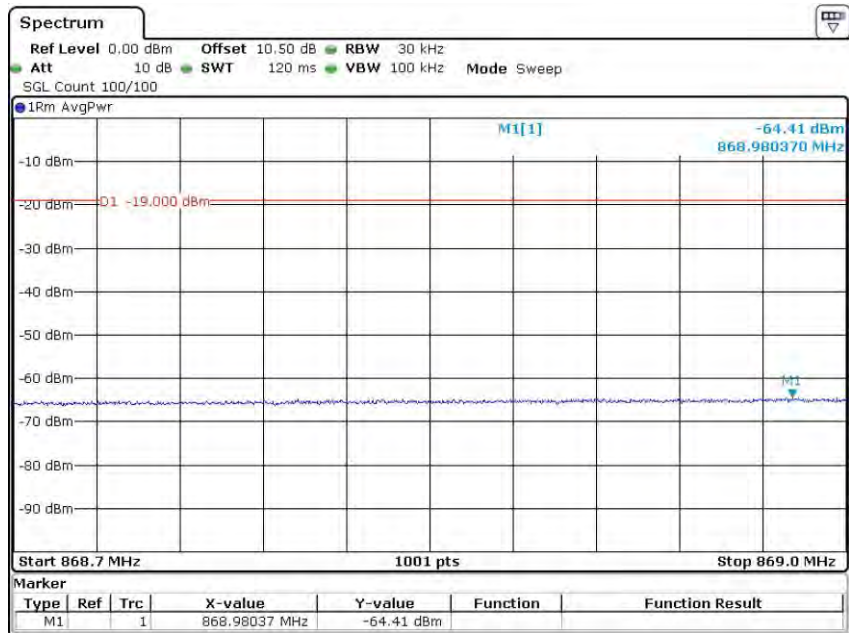
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Cellular Band CDMA Left Side Pre-AGC



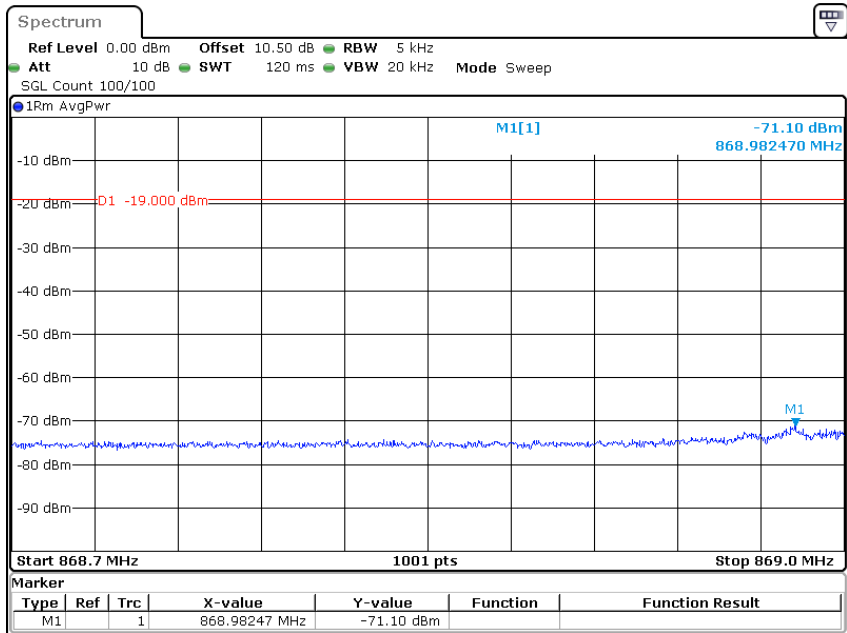
Date: 13.AUG.2022 09:10:55

Cellular Band CDMA Left Side Above AGC



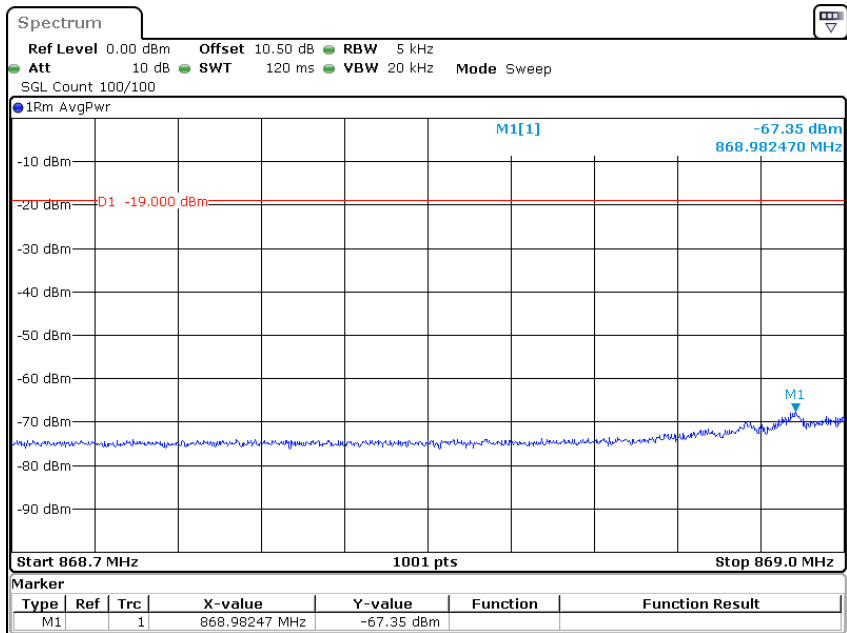
Date: 13.AUG.2022 09:11:48

Cellular Band GSM Left Side Pre-AGC



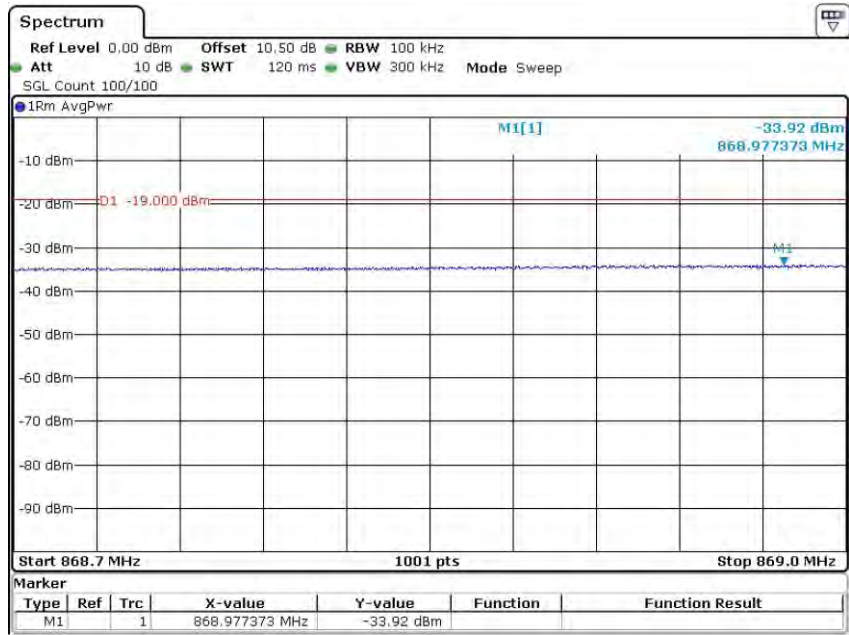
Date: 25.AUG.2022 14:47:37

Cellular Band GSM Left Side Above AGC



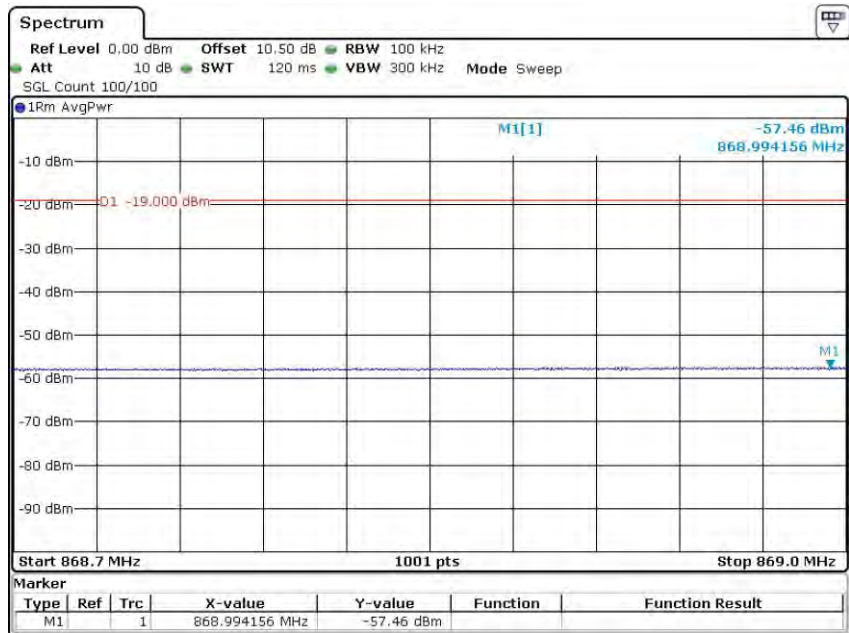
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Cellular Band WCDMA Left Side Pre-AGC



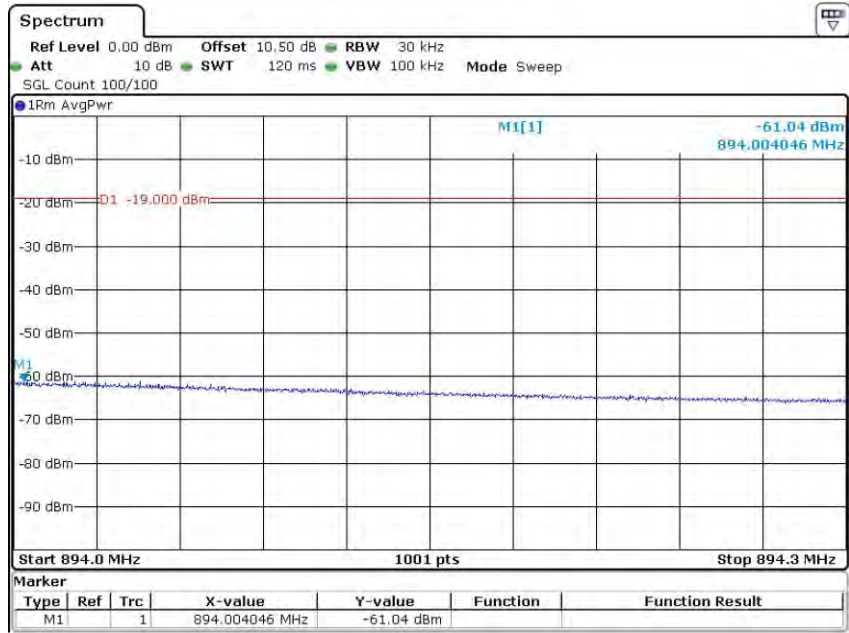
Date: 13.AUG.2022 09:32:21

Cellular Band WCDMA Left Side Above AGC



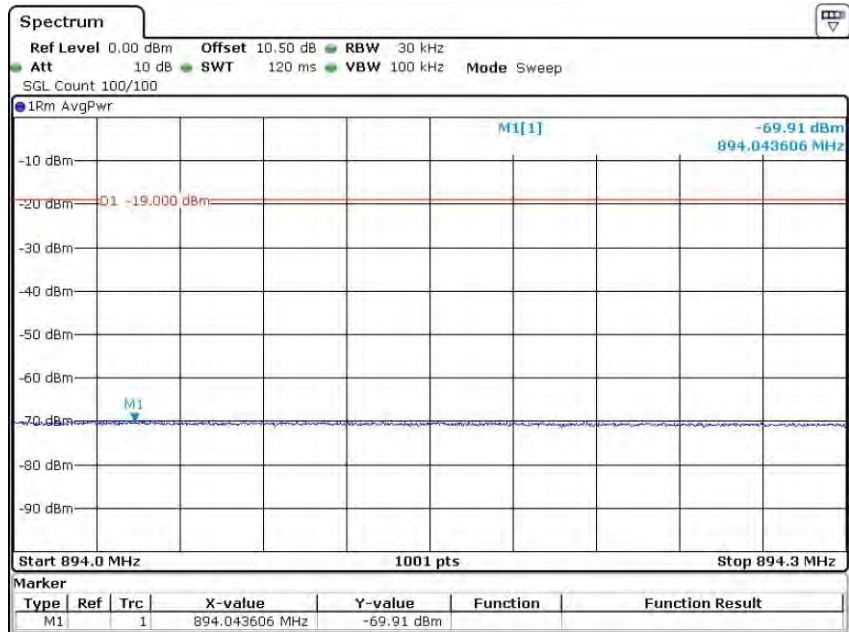
Date: 13.AUG.2022 09:33:44

Cellular Band CDMA Right Side Pre-AGC



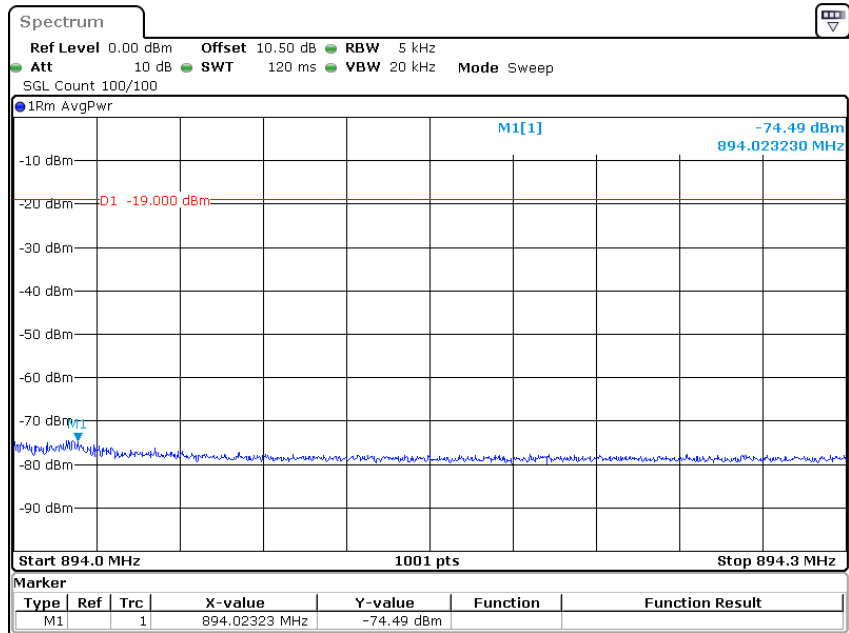
Date: 13.AUG.2022 09:18:43

Cellular Band CDMA Right Side Above AGC

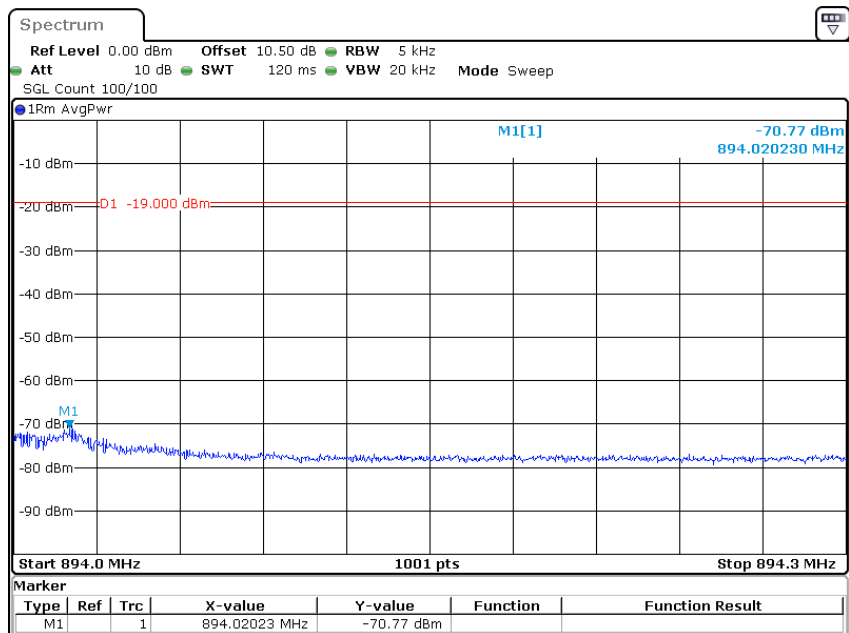


Date: 13.AUG.2022 09:17:57

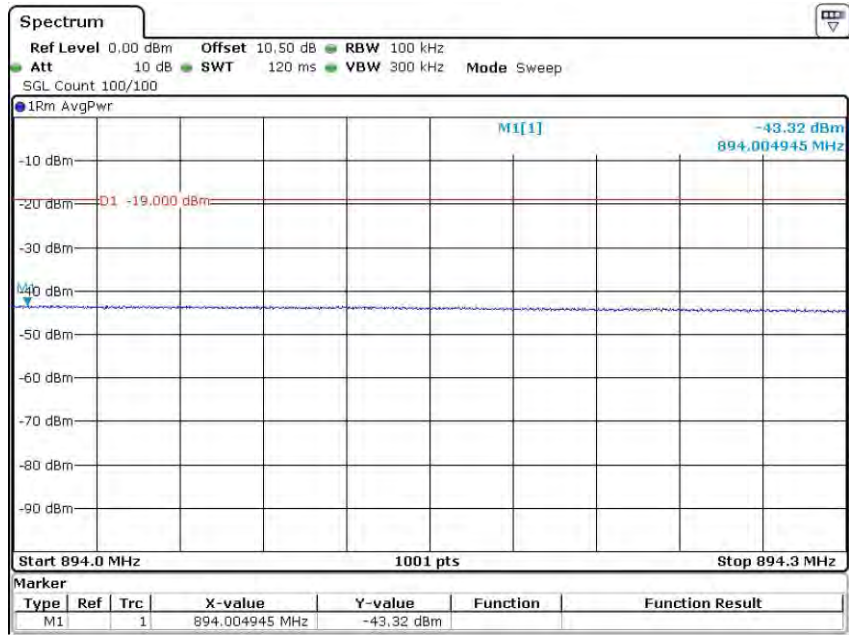
Cellular Band GSM Right Side Pre-AGC



Cellular Band GSM Right Side Above AGC

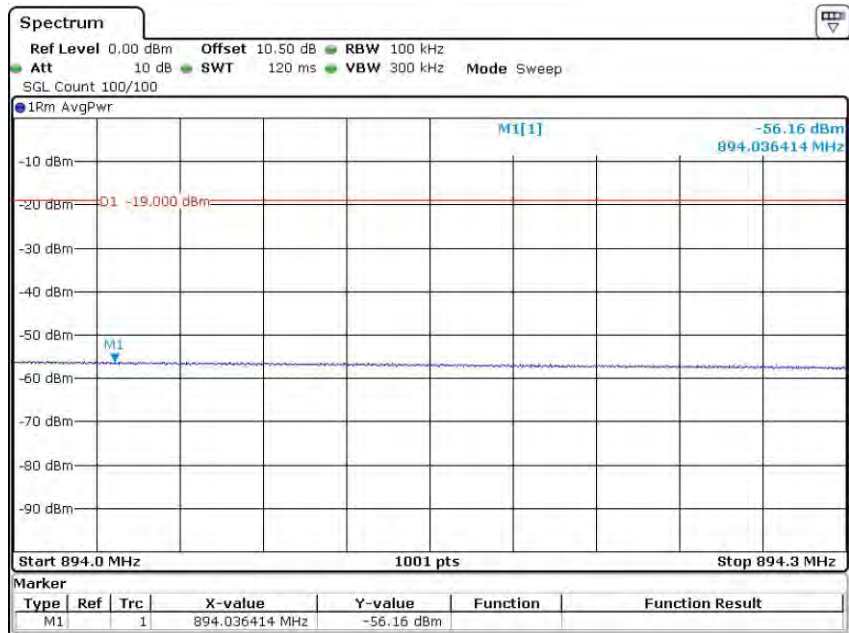


Cellular Band WCDMA Right Side Pre-AGC



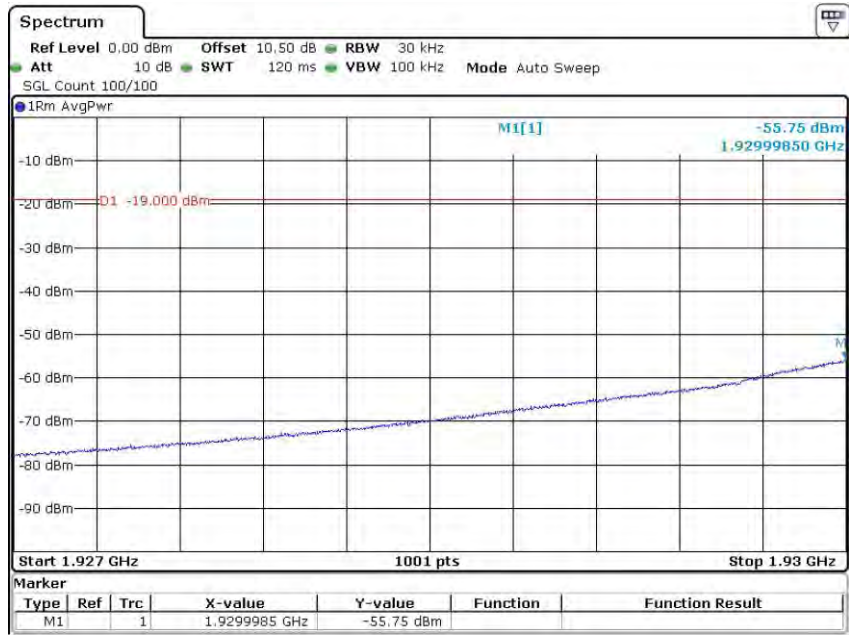
Date: 13.AUG.2022 09:30:03

Cellular Band WCDMA Right Side Above AGC



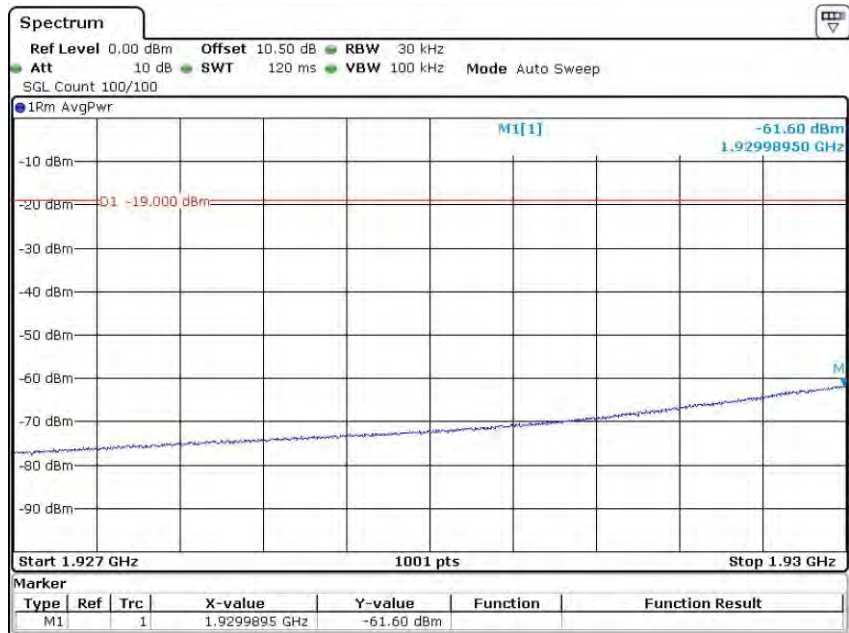
Date: 13.AUG.2022 09:30:49

PCS Band CDMA Left Side Pre-AGC



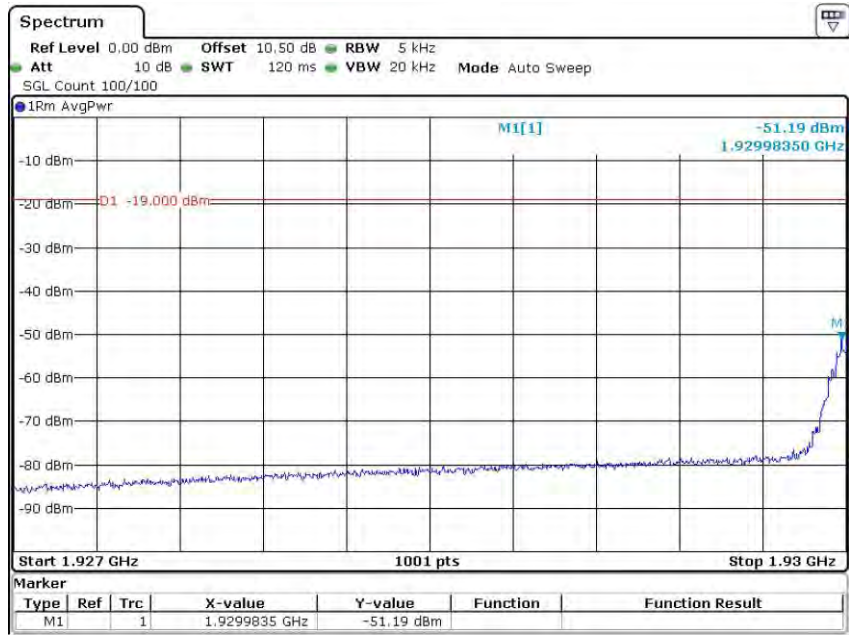
Date: 12.AUG.2022 17:09:58

PCS Band CDMA Left Side Above AGC



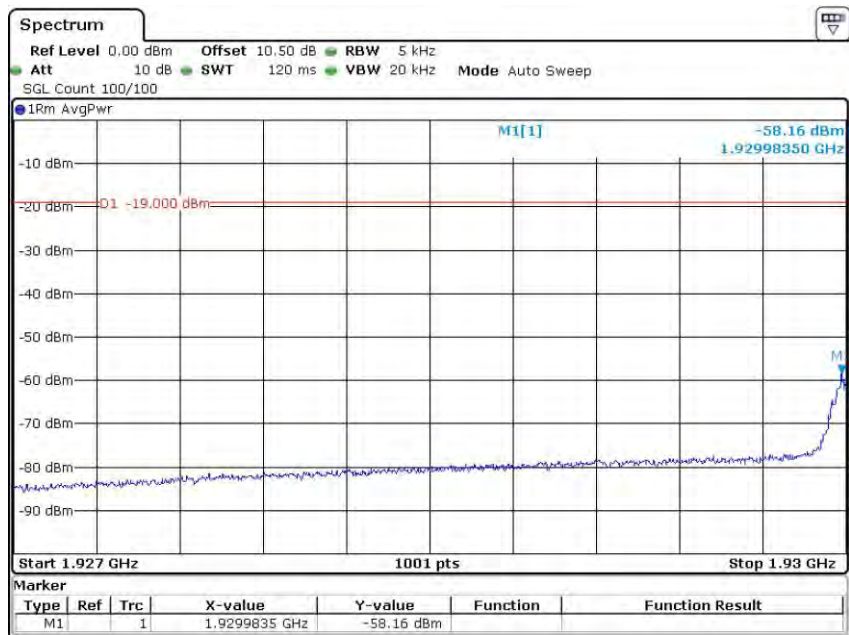
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PCS Band GSM Left Side Pre-AGC



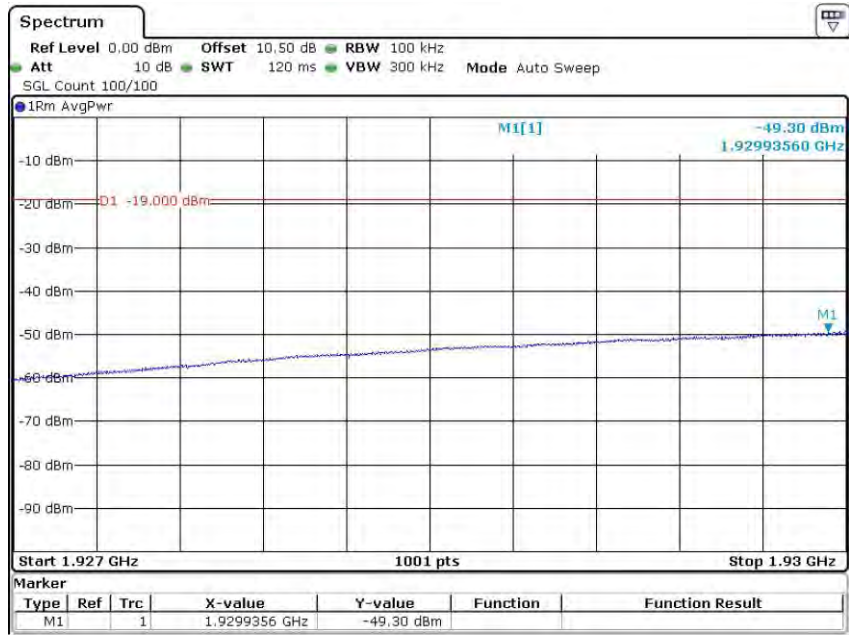
Date: 12.AUG.2022 17:04:38

PCS Band GSM Left Side Above AGC



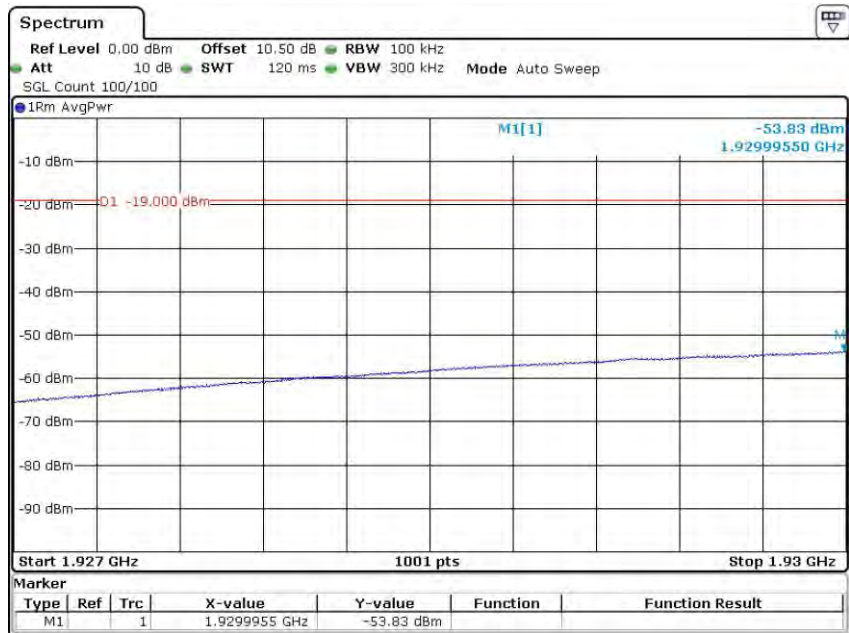
Date: 12.AUG.2022 17:05:16

PCS Band WCDMA Left Side Pre-AGC



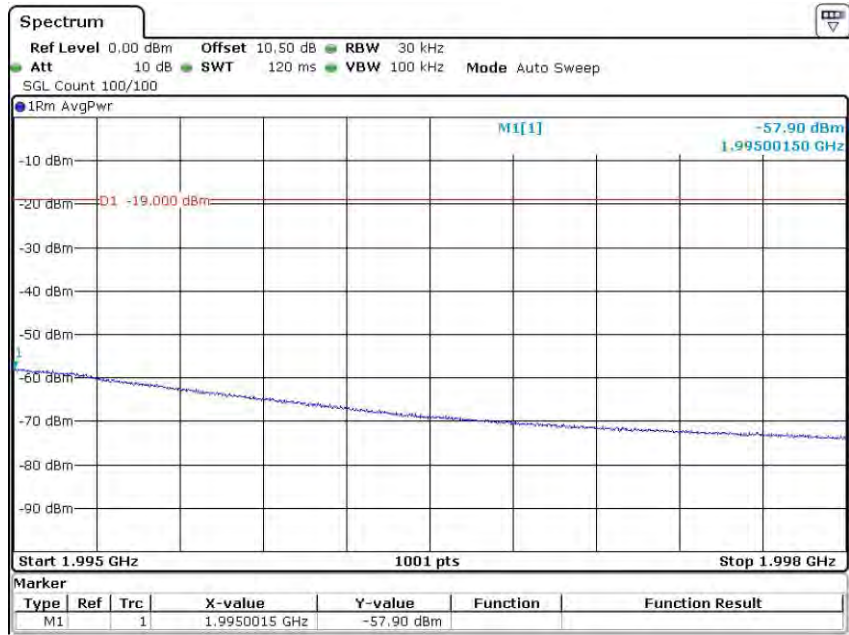
Date: 12.AUG.2022 19:09:26

PCS Band WCDMA Left Side Above AGC



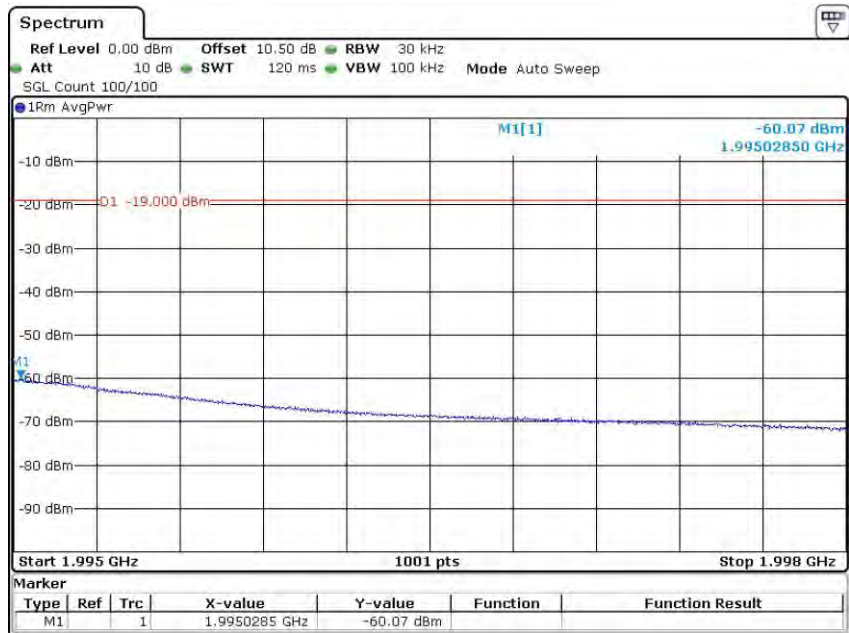
Date: 12.AUG.2022 19:10:10

PCS Band CDMA Right Side Pre-AGC



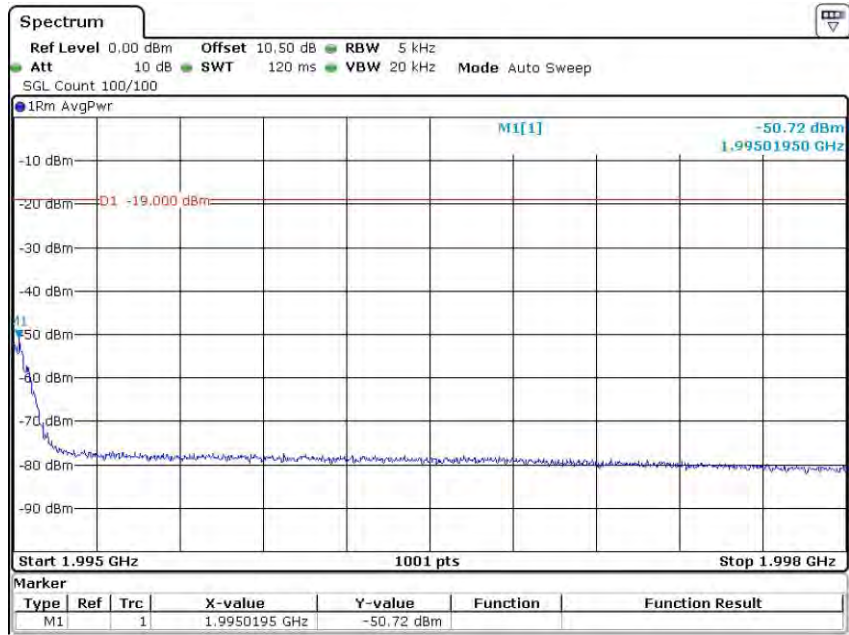
Date: 12.AUG.2022 17:12:35

PCS Band CDMA Right Side Above AGC



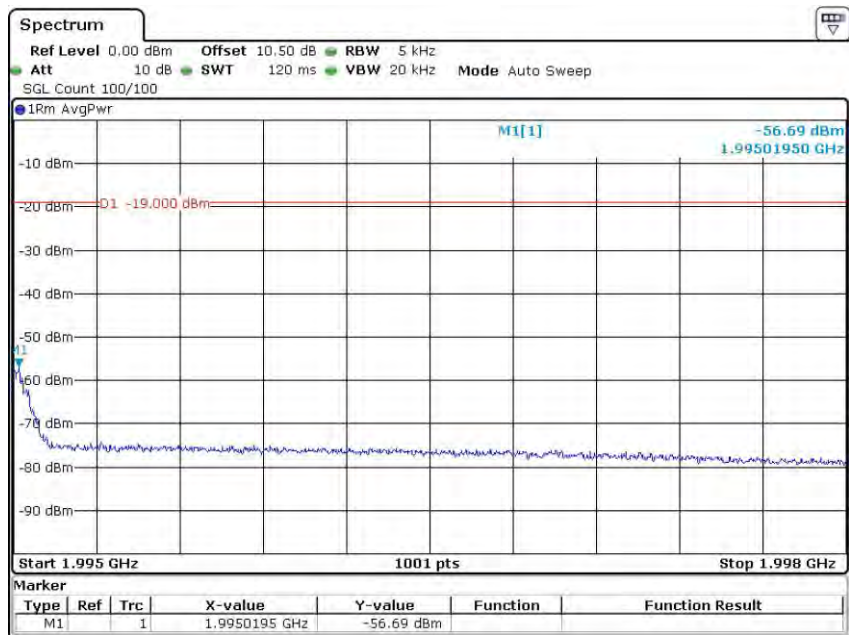
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PCS Band GSM Right Side Pre-AGC



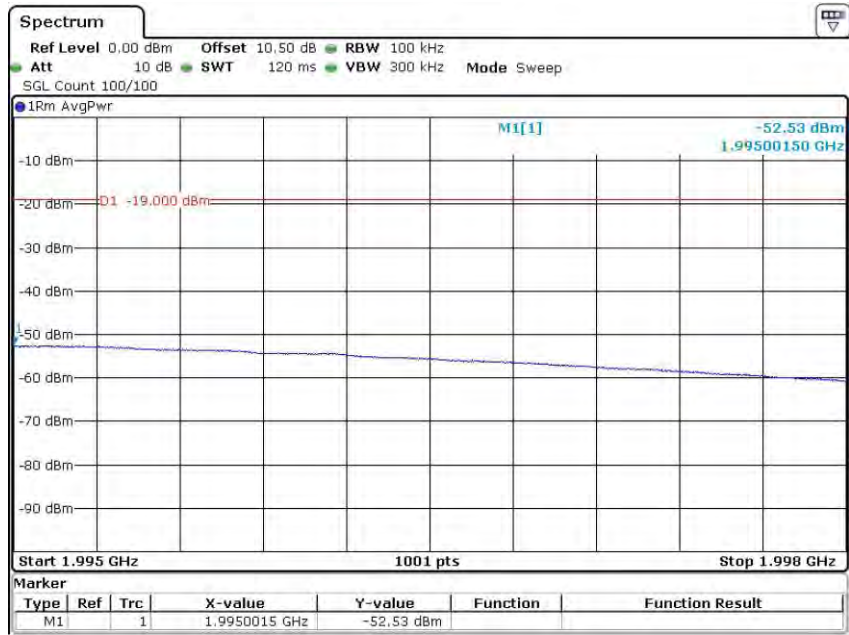
Date: 12.AUG.2022 17:07:30

PCS Band GSM Right Side Above AGC



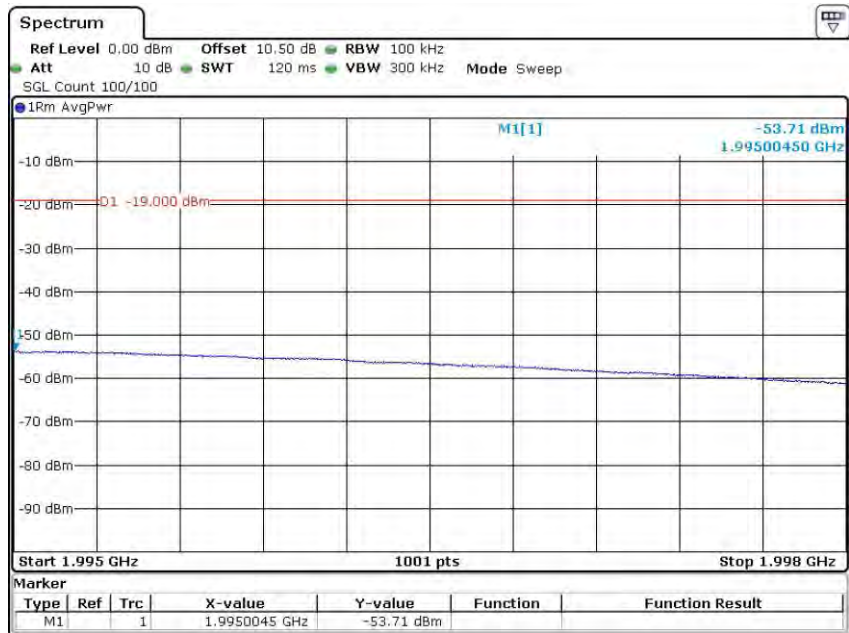
Date: 12.AUG.2022 17:07:59

PCS Band WCDMA Right Side Pre-AGC



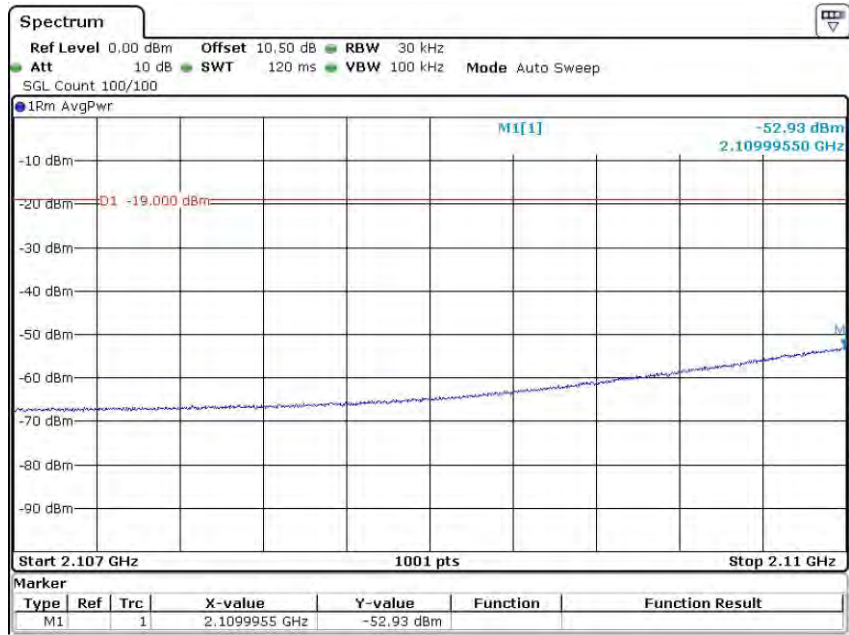
Date: 13.AUG.2022 08:57:46

PCS Band WCDMA Right Side 2107MHz Above AGC



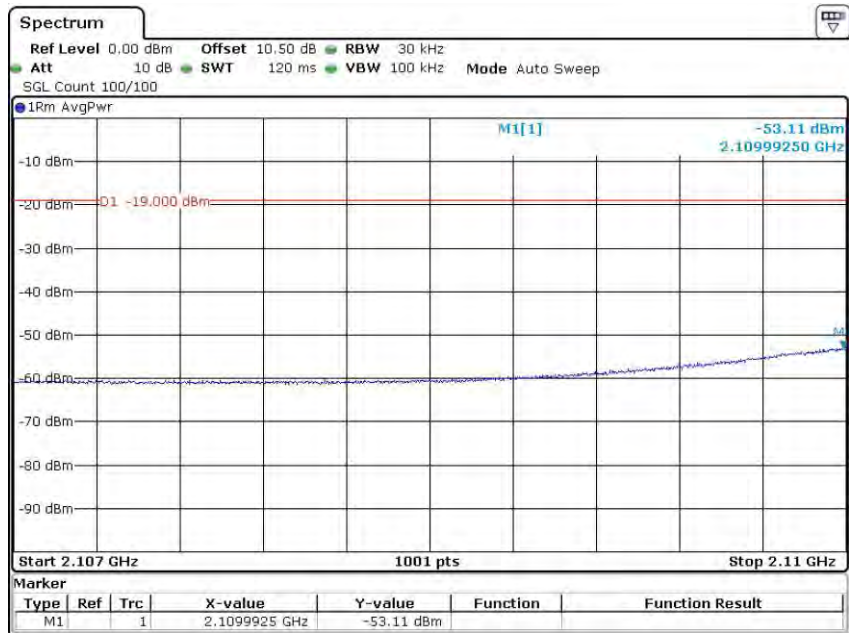
Date: 13.AUG.2022 08:58:29

AWS Band CDMA Left Side Pre-AGC



Date: 12.AUG.2022 16:51:38

AWS Band CDMA Left Side Above AGC



Date: 12.AUG.2022 16:52:20