



## FCC / ISED & Test Report

**For:**  
Telular Corporation

**Model#:**  
ST90M

**Marketing Name:**  
ST90 CAT-M

**Product Description:**  
Tank level monitoring

**Applied Rules and Standards:**  
47 CFR Parts 24, 27  
RSS: 130 Issue 2, 133 Issue 6, 139 Issue 4

**FCC ID:** MTFST90M  
**IC:** 2175D-ST90M

**REPORT #:** EMC\_TELUL\_222\_24001\_FCC\_24\_27

**DATE:** 2024-05-28



A2LA Accredited

IC recognized #  
3462B-1

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## 1 Assessment

The following device as further described in section 3 of this report was evaluated against the applicable criteria specified in the Code of Federal Regulations Title 47 parts 24 and 27, and Industry Canada Standards RSS-GEN issue 5, RSS-130 issue 2, RSS-133 issue 6, and RSS-139 issue 4.

No deficiencies were ascertained.

| Company Name        | Product Description   | Model # |
|---------------------|-----------------------|---------|
| Telular Corporation | Tank level monitoring | ST90M   |

### Responsible for the Report:

| 2024-05-28 | Compliance | Cheng Song<br>(EMC Engineer) |           |
|------------|------------|------------------------------|-----------|
| Date       | Section    | Name                         | Signature |

The test results of this test report relate exclusively to the test item specified in Section3.  
CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

## 2 Administrative Data

### 2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

|                                    |                        |
|------------------------------------|------------------------|
| <b>Company Name:</b>               | CETECOM Inc.           |
| <b>Department:</b>                 | Compliance             |
| <b>Street Address:</b>             | 411 Dixon Landing Road |
| <b>City/Zip Code</b>               | Milpitas, CA 95035     |
| <b>Country</b>                     | USA                    |
| <b>Telephone:</b>                  | +1 (408) 586 6200      |
| <b>Fax:</b>                        | +1 (408) 586 6299      |
| <b>EMC Engineer:</b>               | Cheng Song             |
| <b>Responsible Project Leader:</b> | Sangeetha Sivaraman    |

### 2.2 Identification of the Client

|                        |                              |
|------------------------|------------------------------|
| <b>Client's Name:</b>  | Telular Corporation          |
| <b>Street Address:</b> | 3225 Cumberland Blvd.        |
| <b>City/Zip Code</b>   | Suite 300, Atlanta, GA 30339 |
| <b>Country</b>         | USA                          |

### 2.3 Identification of the Manufacturer

|                               |                |
|-------------------------------|----------------|
| <b>Manufacturer's Name:</b>   | Same as Client |
| <b>Manufacturers Address:</b> |                |
| <b>City/Zip Code</b>          |                |
| <b>Country</b>                |                |

### 3 Equipment Under Test (EUT)

#### 3.1 EUT Specifications

|                                                                                             |                                                                                                                                                                                                                                                                                                                                       |               |               |                 |
|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|-----------------|
| Model No:                                                                                   | ST90M                                                                                                                                                                                                                                                                                                                                 |               |               |                 |
| Brand:                                                                                      | Tank Monitoring                                                                                                                                                                                                                                                                                                                       |               |               |                 |
| HW Version :                                                                                | A                                                                                                                                                                                                                                                                                                                                     |               |               |                 |
| SW Version :                                                                                | 2.50                                                                                                                                                                                                                                                                                                                                  |               |               |                 |
| FCC-ID :                                                                                    | MTFST90M                                                                                                                                                                                                                                                                                                                              |               |               |                 |
| IC:                                                                                         | 2175D-ST90M                                                                                                                                                                                                                                                                                                                           |               |               |                 |
| HVIN:                                                                                       | ST90M                                                                                                                                                                                                                                                                                                                                 |               |               |                 |
| PMN:                                                                                        | ST90 CAT-M                                                                                                                                                                                                                                                                                                                            |               |               |                 |
| Product Description:                                                                        | Tank level monitoring                                                                                                                                                                                                                                                                                                                 |               |               |                 |
| Radio Information as declared:                                                              | <b>ISM:</b> <ul style="list-style-type: none"><li>Module: Texas Instruments CC1200 Chipset</li><li>Frequency of Operation: 902-928 MHz</li></ul> <b>Cellular:</b> <ul style="list-style-type: none"><li>Module: Telit ME910G1-W1</li><li>LTE Bands: 2, 4, 12, 13</li><li>FCC ID: RI7ME910G1W1; IC: 5131A-ME910G1W1 (CAT-M1)</li></ul> |               |               |                 |
| Antenna Information as declared:                                                            | <b>LTE ISM US FPC Dual Feed Embedded Antenna:</b>                                                                                                                                                                                                                                                                                     |               |               |                 |
|                                                                                             | <b>Feed</b>                                                                                                                                                                                                                                                                                                                           | <b>ISM</b>    | <b>LTE</b>    |                 |
|                                                                                             | Frequency (MHz)                                                                                                                                                                                                                                                                                                                       | 902 - 928 MHz | 700 - 900 MHz | 1710 – 2155 MHz |
|                                                                                             | Average Efficiency                                                                                                                                                                                                                                                                                                                    | 50%           | 52%           | 59%             |
|                                                                                             | Peak Gain                                                                                                                                                                                                                                                                                                                             | 0.5dBi        | 0.9dBi        | 3dBi            |
|                                                                                             | VSWR Match                                                                                                                                                                                                                                                                                                                            | 2.0:1 max     | 4.5:1 max     | 3.5:1 max       |
| Power Supply/ Rated Operating Voltage Range:                                                | Vmin: 5 VDC/ Vnom: 6 VDC / Vmax: 6.3 VDC                                                                                                                                                                                                                                                                                              |               |               |                 |
| Operating Temperature Range                                                                 | -30 °C to 70 °C                                                                                                                                                                                                                                                                                                                       |               |               |                 |
| Sample Revision                                                                             | <input type="checkbox"/> Production Unit; <input checked="" type="checkbox"/> Pre-Production                                                                                                                                                                                                                                          |               |               |                 |
| EUT Dimensions                                                                              | 100 x 107 x 150mm                                                                                                                                                                                                                                                                                                                     |               |               |                 |
| Note: Details about the Equipment Under Test (EUT) are provided by the client or applicant. |                                                                                                                                                                                                                                                                                                                                       |               |               |                 |

### 3.2 EUT Sample details

| EUT # | Serial Number | HW Version | SW Version | Comments |
|-------|---------------|------------|------------|----------|
| 1     | 942106500     | A          | 2.50       | -        |

### 3.3 Accessory Equipment (AE) details

| AE # | Type | Model | Manufacturer | Serial Number |
|------|------|-------|--------------|---------------|
| NA   | -    | -     | -            | -             |

### 3.4 Test Sample Configuration

| Set-up # | EUT / AE used for set-up | Comments                                                                                                                                                  |
|----------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1        | EUT#1                    | The radio of the EUT was configured to a fixed channel transmission with highest possible duty cycle using software that is not available to the end user |

### 3.5 Mode of Operation

| Mode of Operation | Description of Operating modes | Additional Information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Op. 1             | Cellular & ISM Co-TX           | Cellular functionality was evaluated on LTE CAT-M1 Low, Mid, and High Channels at maximum power, operating simultaneously with ISM. The client supplies a USB cable for device communication, enabling command transmission to configure the Cellular and ISM radios into a designated test mode. This configuration, intended solely for worst-case scenario testing, should not be used in end-user applications. The configuration is detailed as follows: <ul style="list-style-type: none"><li>Cellular: Use AT commands to establish a connection with the base station simulator (R&amp;S CMW500).</li><li>ISM: Enable continuous modulated transmission at the highest output power, maximum duty cycle, and a fixed Mid channel.</li></ul> |

### 3.6 Justification for Worst Case Mode of Operation

During the testing process the cellular radio was tested with transmitter sets to low, mid and high channels at the maximum power in simultaneous transmission mode with the highest output power of radios included in the device (ISM), as it is described in section 3.5 of this document; representing the worst case mode of operation.

For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.

## 4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to evaluate the compliance of the EUT against the relevant requirements specified in section 1.

### 4.1 Dates of Testing:

03/24/2022 - 04/02/2022

### 4.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor  $k=2$ .

| Measurement System               | EMC 2   |
|----------------------------------|---------|
| Conducted Emissions (mains port) | 0.46 dB |
| Radiated Emissions               |         |
| (<30 MHz)                        | 3.88 dB |
| (30 MHz – 1 GHz)                 | 3.34 dB |
| (1 GHz – 3 GHz)                  | 4.45 dB |
| (> 3 GHz)                        | 4.79 dB |

### 4.3 Environmental Conditions during Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25°C
- Relative humidity: 40-60%

Deviating test conditions are indicated at individual test description where applicable.

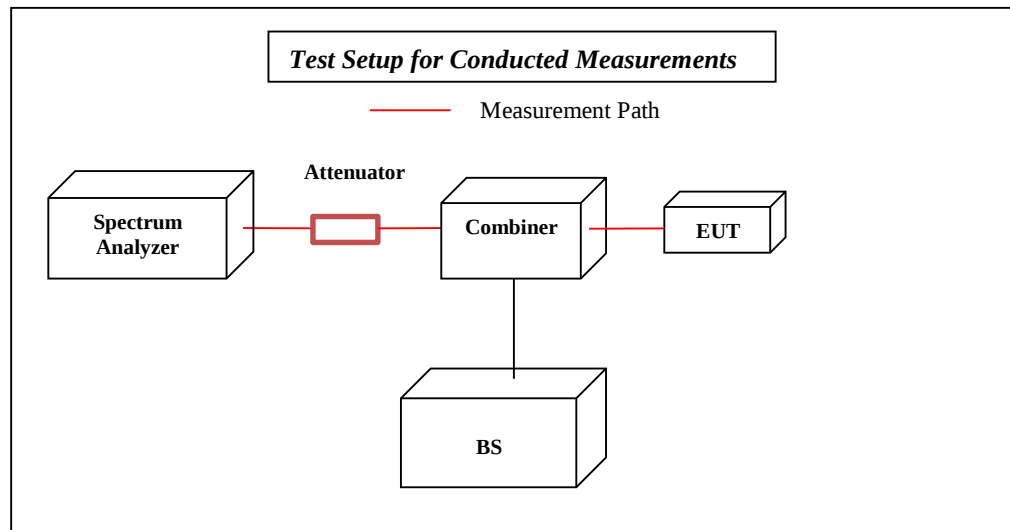
### 4.4 Decision Rule:

Cetecom advanced follows ILAC G8:2019 chapter 4.2.1 (Simple Acceptance Rule).

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3. The measurement uncertainty is mentioned in this test report, See chapter 9, but is not taken into account – neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong.

## 5 Measurement Procedures

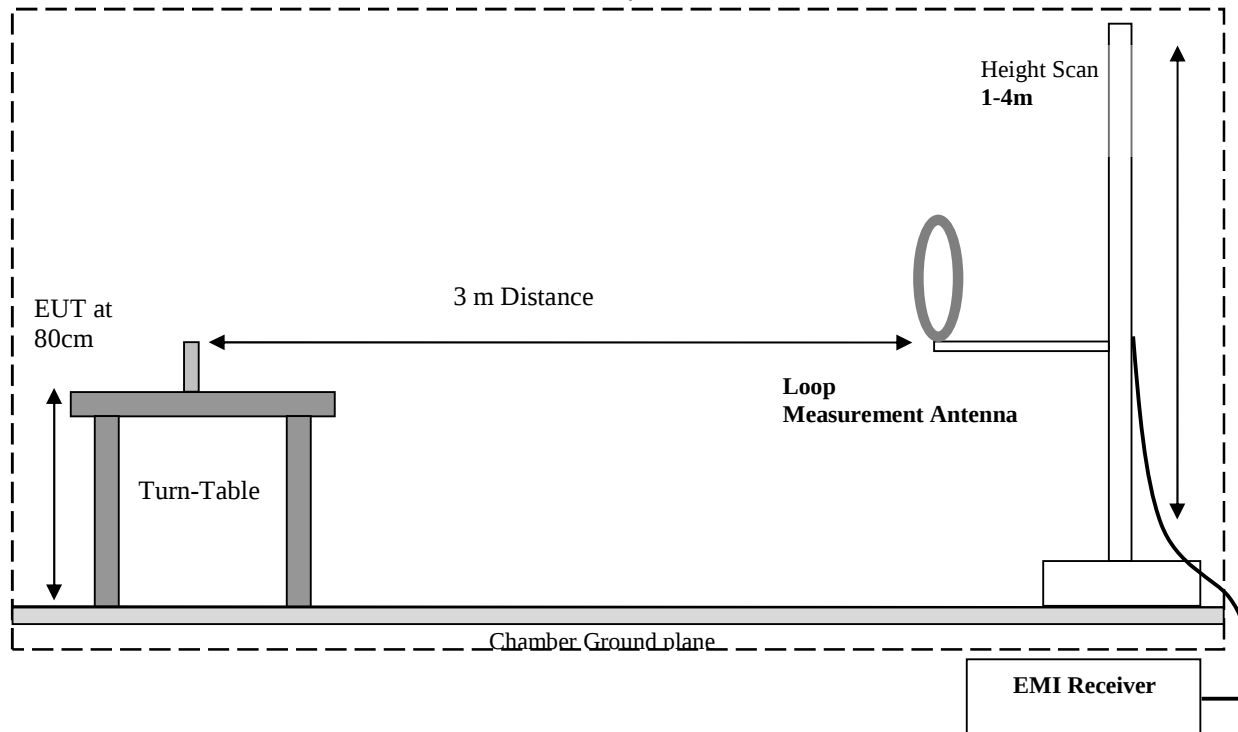
Testing is performed according to the guidelines provided in FCC publication (KDB) 971168 D01 v03r01 – “Measurement Guidance for Certification of Licensed Digital Transmitters” and according to relevant parts of ANSI/TIA-603-D-2010 as detailed below.



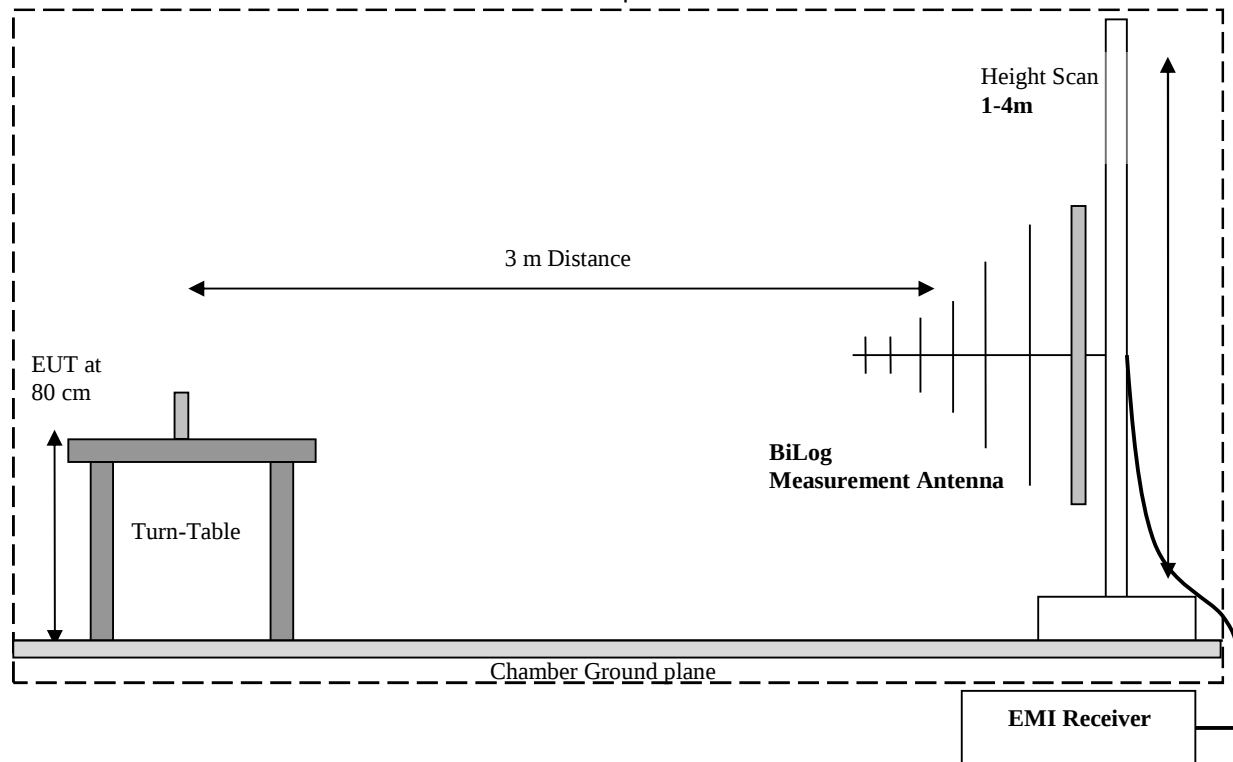
### 5.1 Radiated Measurement

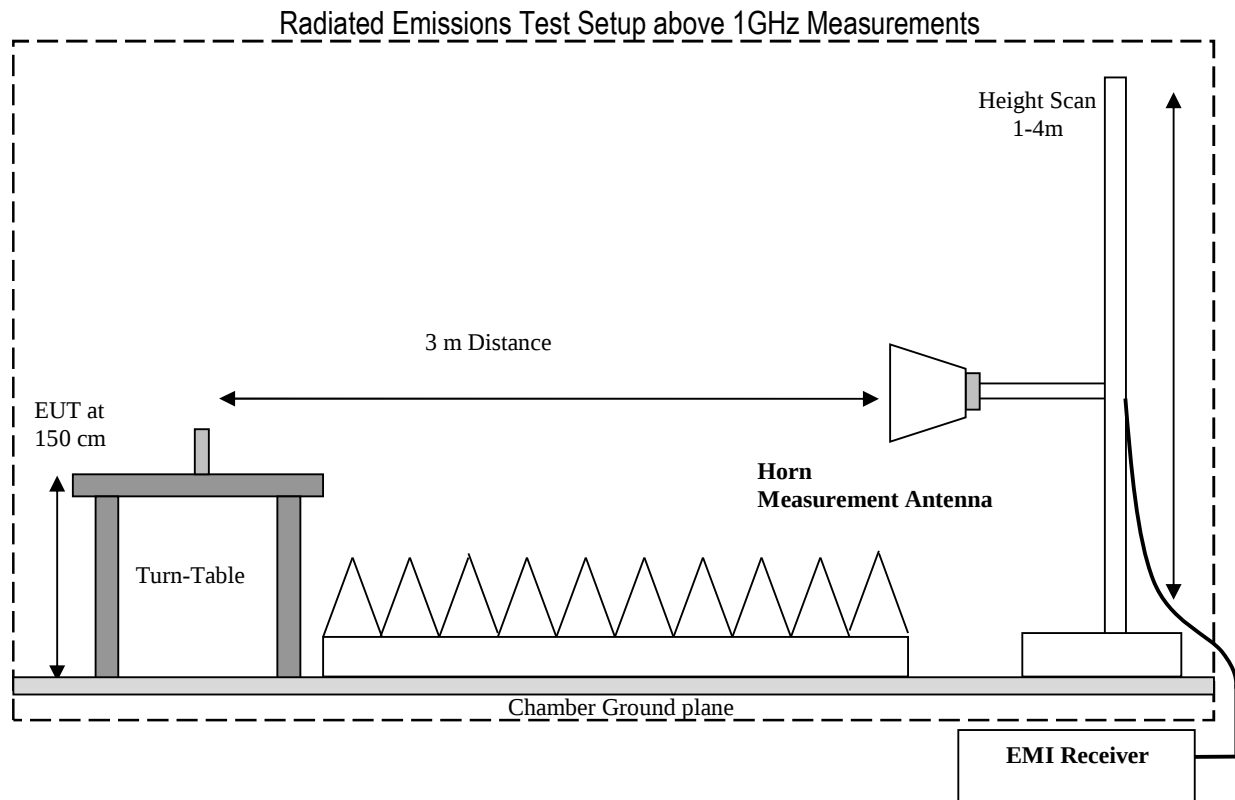
- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

### Radiated Emissions Test Setup below 30MHz Measurements



### Radiated Emissions Test Setup 30MHz-1GHz Measurements





## 5.2 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

- Measured reading in dB $\mu$ V
- Cable Loss between the receiving antenna and SA in dB and
- Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

$$FS \text{ (dB}\mu\text{V/m)} = \text{Measured Value on SA (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$$

Example:

| Frequency (MHz) | Measured SA (dB $\mu$ V) | Cable Loss (dB) | Antenna Factor Correction (dB) | Field Strength Result (dB $\mu$ V/m) |
|-----------------|--------------------------|-----------------|--------------------------------|--------------------------------------|
| 1000            | 80.5                     | 3.5             | 14                             | 98.0                                 |

## 6 Measurement Results Summary

### 6.1 ISED Leveraged reports

The reports leveraged were generated on 07.08.2019, which is more than one year prior to the evaluation date of the equipment under test (EUT).

Below is the primary difference between the RSS version used in the leveraged reports and the version against which the current equipment under test (EUT) is evaluated.

#### **RSS-139 Issue 4 from Issue 3:**

Radio Standards Specification RSS-139, Advanced Wireless Services Equipment Operating in the Bands 1710-1780 MHz and 2110-2200 MHz, issue 4, replaces RSS-139, Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710-1780 MHz and 2110-2180 MHz, issue 3, dated July 16, 2015.

The following are the main changes:

1. Added the frequency range 2180-2200 MHz and updated the title accordingly.
2. Added definitions to clarify the terms used.
3. Removed the requirements related to the mobile equipment identifier and the international mobile equipment identity number as they are no longer required.
4. Incorporated some requirements previously contained in Standard Radio System Plan SRSP-513, Technical Requirements for Advanced Wireless Services (AWS) in the Bands 1710-1780 MHz and 2110-2180 MHz, and SRSP-519, Technical Requirements for the Ancillary Terrestrial Component (ATC) of Mobile-Satellite Service (MSS) Systems Operating in the Bands 2000-2020 MHz and 2180-2200 MHz.
5. Modernized to reflect the current RSS structure.
6. Made editorial changes and clarifications, as appropriate.

The major changes do not affect the manner in which the measurements were conducted or the test results that were leveraged in this report.

## 6.2 Part 24 / RSS-133

| Test Specification                            | Test Case                    | Temperature and Voltage Conditions | Mode  | Pass                     | Fail                     | NA                       | NP                       | Result           |
|-----------------------------------------------|------------------------------|------------------------------------|-------|--------------------------|--------------------------|--------------------------|--------------------------|------------------|
| §2.1046; §24.232 (a)                          | RF Output Power              | Nominal                            | -     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■                        | Note 1<br>Note 2 |
| §2.1055; §24.235                              | Frequency Stability          | Extreme Temperature and Voltage    | -     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■                        | Note 1<br>Note 2 |
| §2.1049; §24.238                              | Occupied Bandwidth           | Nominal                            | -     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■                        | Note 1<br>Note 2 |
| §2.1051; §24.238                              | Band Edge Compliance         | Nominal                            | -     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■                        | Note 1<br>Note 2 |
| §2.1051; §24.238                              | Conducted Spurious Emissions | Nominal                            | -     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■                        | Note 1<br>Note 2 |
| §2.1053; §24.238(a);<br>RSS-133 Issue 6-6.5.1 | Radiated Spurious Emissions  | Nominal                            | Op. 1 | ■                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Note 3           |

Note 1: NA= Not Applicable; NP= Not Performed.

Note 2: The LTE CAT-M test results are leveraged from Report # 50289118 002, corresponding to FCC ID: RI7ME910G1W1, IC: 5131A-ME910G1W1.

Note 3: The testing for LTE Band 2 was performed in accordance with the test specifications outlined in FCC Part 24, and RSS-133.

## 6.3 Part 27 / RSS-130, RSS-139

| Test Specification                                                                | Test Case                    | Temperature and Voltage Conditions | Mode  | Pass                     | Fail                     | NA                       | NP                       | Result           |
|-----------------------------------------------------------------------------------|------------------------------|------------------------------------|-------|--------------------------|--------------------------|--------------------------|--------------------------|------------------|
| §2.1046; §27.50                                                                   | RF Output Power              | Nominal                            | -     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■                        | Note 1<br>Note 2 |
| §2.1055; §27.54                                                                   | Frequency Stability          | Extreme Temperature and Voltage    | -     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■                        | Note 1<br>Note 2 |
| §2.1049; §27.53                                                                   | Occupied Bandwidth           | Nominal                            | -     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■                        | Note 1<br>Note 2 |
| §2.1051; §27.53                                                                   | Band Edge Compliance         | Nominal                            | -     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■                        | Note 1<br>Note 2 |
| §2.1051; §27.53                                                                   | Conducted Spurious Emissions | Nominal                            | -     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■                        | Note 1<br>Note 2 |
| §2.1053; §27.539(g),<br>§27.539(h);<br>RSS-130 Issue 2-4.7<br>RSS-139 Issue 4-5.6 | Radiated Spurious Emissions  | Nominal                            | Op. 1 | ■                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Note 3           |

Note 1: NA= Not Applicable; NP= Not Performed.

Note 2: The LTE CAT-M test results are leveraged from Report # 50289118 002, corresponding to FCC ID: RI7ME910G1W1, IC: 5131A-ME910G1W1.

Note 3: Testing for LTE Band 4 was conducted according to the test specifications outlined in FCC Part 27 and RSS-139. Testing for LTE Bands 12 and 13 was performed in accordance with the specifications in FCC Part 27 and RSS-130.

## 6.4 Emissions Analysis

| FCC Rule Parts | Frequency Range (MHZ) | Output (Watts) | Frequency Tolerance | Emission Designator |
|----------------|-----------------------|----------------|---------------------|---------------------|
| 24E            | 1850.7 - 1909.3       | 0.138          | 0.0206 PM           | 1M12G7D             |
| 24E            | 1850.7 - 1909.3       | 0.125          | 0.0168 PM           | 1M12W7D             |
| 27             | 1710.7 - 1754.3       | 0.131          | 0.0299 PM           | 1M12G7D             |
| 27             | 1710.7 - 1754.3       | 0.121          | 0.0291 PM           | 1M12W7D             |
| 27             | 699.7 - 715.3         | 0.145          | 0.0122 PM           | 1M10G7D             |
| 27             | 699.7 - 715.3         | 0.132          | 0.015 PM            | 1M11W7D             |
| 27             | 779.5 - 784.5         | 0.138          | 0.0108 PM           | 1M10G7D             |
| 27             | 779.5 - 784.5         | 0.13           | 0.009 PM            | 1M10W7D             |

**Note 1:** Based on the operational description provided by the client or applicant, only Bands 2, 4, 12, and 13 in CAT M1 mode of the cellular module ME910G1-W1 are utilized during normal operation of the device.

**Note 2:** The output power of the original module grant aligns with the Total Radiated Power (TRP) measured at CETECOM OTA 4 in Milpitas, as detailed in the table below. For comprehensive measurement results, please refer to the report titled 'Total Radiated Power and Total Isotropic Sensitivity Spherical Pattern Measurement - TELULAR ST90M CTIA REPORT,' issued by Cetecom US.

**Note 3:** The cellular radio of the EUT can still meet the EIRP requirement, based on the conducted output power from the module grant and the antenna information provided by the client or applicant.

| LTE Band 2                                     |                                                                                                                                       |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| CTIA Report (RP_LTE-FDD<br>2_ch18900_4@25_tot) |                                                                                                                                       |
| <b>Test Information</b>                        |                                                                                                                                       |
| Test Method:                                   | Radiated Power Mobile Phone                                                                                                           |
| Test Condition:                                | FS: Free Space                                                                                                                        |
| EUT Identification:                            | IMEI: 356813105748236; UE Category: 1                                                                                                 |
| Radio Link:                                    | LTE-FDD 2 (Cat. M1); Channel 18900 (1880.360 MHz); UL RBs 4@25; DL RBs 4 (low, NB 0)<br>0.720 MHz Occupied BW / 10 MHz LTE Channel BW |
| Test Time:                                     | Start: 3/22/2022 6:45:26 AM; Stop: 3/22/2022 6:53:13 AM                                                                               |
| Cal Data Phi:                                  | In: RF2 COM (25.0 dB); Out: RF1 OUT (20.0 dB)                                                                                         |
| Cal Data Theta:                                | 51.62 dB (NRQ CHB to MA1 PHI; Chamber Cal_MA1 PHI)<br>54.05 dB (NRQ CHA to MA1 THETA_Link Bypass; Chamber Cal_MA1 THETA)              |
| <b>OTA Evaluation Results</b>                  |                                                                                                                                       |
| Total Radiated Power                           | 19.60 dBm                                                                                                                             |
| Peak EIRP                                      | 23.92 dBm                                                                                                                             |
| Directivity                                    | 4.32 dBi                                                                                                                              |
| Peak Gain                                      | 23.92 dBi                                                                                                                             |
| NHPRP 45°                                      | 17.97 dBm                                                                                                                             |
| NHPRP 45° / TRP                                | -1.63 dB                                                                                                                              |
| NHPRP 45° / TRP                                | 68.63 %                                                                                                                               |
| NHPRP 30°                                      | 16.32 dBm                                                                                                                             |
| NHPRP 30° / TRP                                | -3.28 dB                                                                                                                              |
| NHPRP 30° / TRP                                | 46.97 %                                                                                                                               |
| NHPRP 22.5°                                    | 15.09 dBm                                                                                                                             |
| NHPRP 22.5° / TRP                              | -4.51 dB                                                                                                                              |
| NHPRP 22.5° / TRP                              | 35.38 %                                                                                                                               |
| UHRP                                           | 15.36 dBm                                                                                                                             |
| UHRP / TRP                                     | -4.24 dB                                                                                                                              |
| UHRP / TRP                                     | 37.63 %                                                                                                                               |
| LHRP                                           | 17.55 dBm                                                                                                                             |
| LHRP / TRP                                     | -2.05 dB                                                                                                                              |
| LHRP / TRP                                     | 62.37 %                                                                                                                               |
| PGRP (0-120°)                                  | 17.63 dBm                                                                                                                             |
| PGRP / TRP                                     | -1.97 dB                                                                                                                              |
| PGRP / TRP                                     | 63.53 %                                                                                                                               |
| Front/Back Ratio                               | 4.76                                                                                                                                  |
| PhiBW                                          | 207.0 deg                                                                                                                             |
| PhiBW Up                                       | 62.6 deg                                                                                                                              |
| PhiBW Down                                     | 144.4 deg                                                                                                                             |
| ThetaBW                                        | 92.2 deg                                                                                                                              |
| ThetaBW Up                                     | 41.5 deg                                                                                                                              |
| ThetaBW Down                                   | 50.6 deg                                                                                                                              |
| Boresight Phi                                  | 300 deg                                                                                                                               |
| Boresight Theta                                | 135 deg                                                                                                                               |
| Maximum Power                                  | 23.92 dBm                                                                                                                             |
| Minimum Power                                  | -1.97 dBm                                                                                                                             |
| Average Power                                  | 19.72 dBm                                                                                                                             |
| Max/Min Ratio                                  | 25.89 dB                                                                                                                              |

## 7 Test Result Data

### 7.1 Radiated Spurious Emissions

#### 7.1.1 Measurement utilizing KDB 971168 D01 Power Meas License Digital Systems v03r01, and according to ANSI/TIA-603-D-2010

##### Spectrum Analyzer Settings for FCC 24, 27

| Frequency Range      | 30MHz – 1 GHz | 1 – 2.7 GHz | 2.7 – 18 GHz | 18 – 19.1 GHz |
|----------------------|---------------|-------------|--------------|---------------|
| Resolution Bandwidth | 100 kHz       | 1 MHz       | 1 MHz        | 1 MHz         |
| Video Bandwidth      | 100 kHz       | 1 MHz       | 1 MHz        | 1 MHz         |
| Detector             | Peak          | Peak        | Peak         | Peak          |
| Trace Mode           | Max Hold      | Max Hold    | Max Hold     | Max Hold      |
| Sweep Time           | Auto          | Auto        | Auto         | Auto          |

#### 7.1.2 Limits:

7.1.2.1 FCC Part 24.238 (a); FCC Part 27.53 (c); FCC Part 27.53 (f); FCC Part 27.53 (g), FCC Part 27.53 (h) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

7.1.2.2 RSS-130 Part 4.7, RSS-133 Part 6.5; RSS-139 Part 5.6 Transmitter Unwanted Emissions

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

i. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts).

ii. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

### 7.1.3 Test conditions and setup:

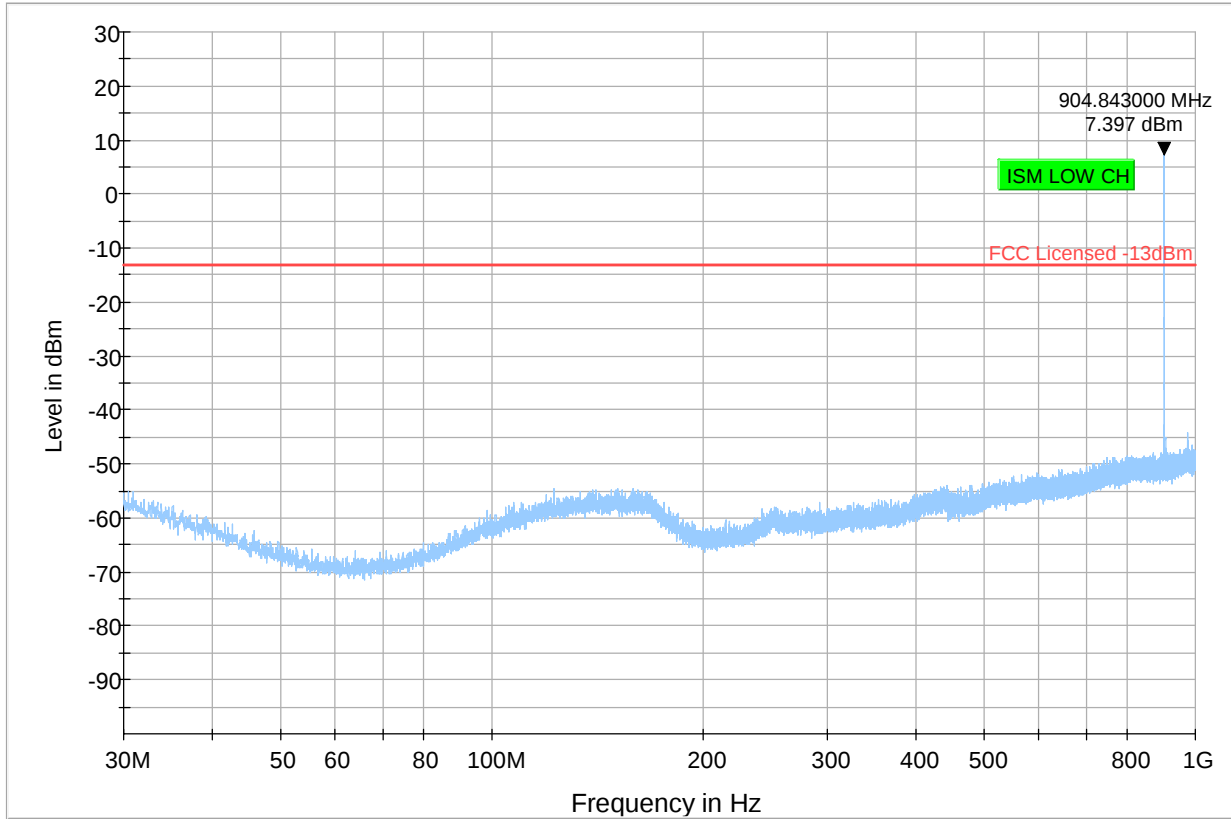
| Ambient Temperature (C) | EUT Set-Up # | EUT operating mode | Power Input |
|-------------------------|--------------|--------------------|-------------|
| 22                      | 1            | Op. 1              | Battery     |

### 7.1.4 Measurement result:

| Plot # | Channel | EUT operating mode | Scan Frequency  | Worst Case Spurious Emissions (dBm) | Limit (dBm) | Result |
|--------|---------|--------------------|-----------------|-------------------------------------|-------------|--------|
| 1-3    | Low     | LTE 2 + ISM        | 30 MHz – 18 GHz | -24.2                               | -13         | Pass   |
| 4-7    | Mid     | LTE 2 + ISM        | 30 MHz – 22 GHz | -24.26                              | -13         | Pass   |
| 8-10   | High    | LTE 2 + ISM        | 30 MHz – 18 GHz | -22.2                               | -13         | Pass   |
| 11-13  | Low     | LTE 4 + ISM        | 30 MHz – 18 GHz | -20.4                               | -13         | Pass   |
| 14-16  | Mid     | LTE 4 + ISM        | 30 MHz – 18 GHz | -21.66                              | -13         | Pass   |
| 17-19  | High    | LTE 4 + ISM        | 30 MHz – 18 GHz | -24.57                              | -13         | Pass   |
| 20-22  | Low     | LTE 12 + ISM       | 30 MHz – 18 GHz | -37.33                              | -13         | Pass   |
| 23-25  | Mid     | LTE 12 + ISM       | 30 MHz – 18 GHz | -18.13                              | -13         | Pass   |
| 26-28  | High    | LTE 12 + ISM       | 30 MHz – 18 GHz | -34.69                              | -13         | Pass   |
| 29-31  | Mid     | LTE 13 + ISM       | 30 MHz – 18 GHz | -17.54                              | -13         | Pass   |

### 7.1.5 Measurement Plots:

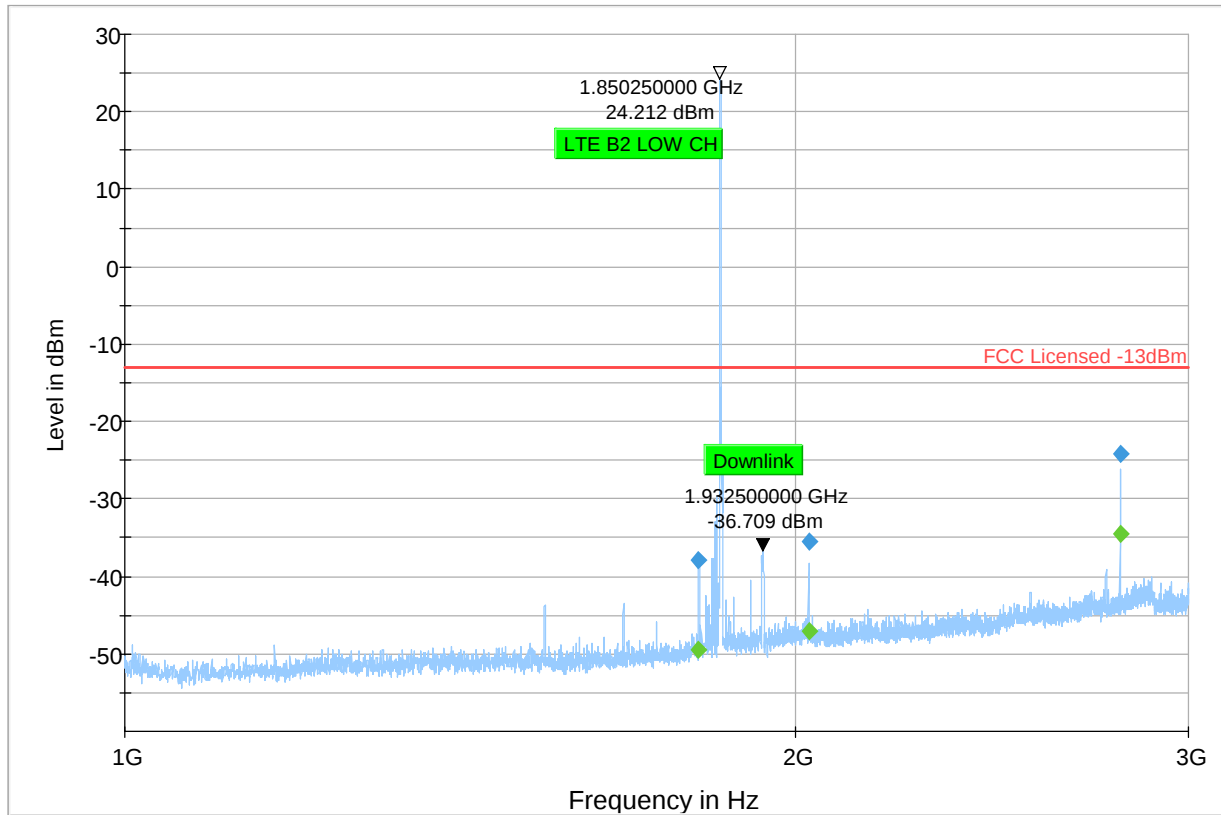
Plot # 1



Preview Result 1-PK+ \* Critical\_Freqs PK+ FCC Licensed -13dBm  
Final\_Result RMS ◆ Final\_Result PK+

Plot # 2

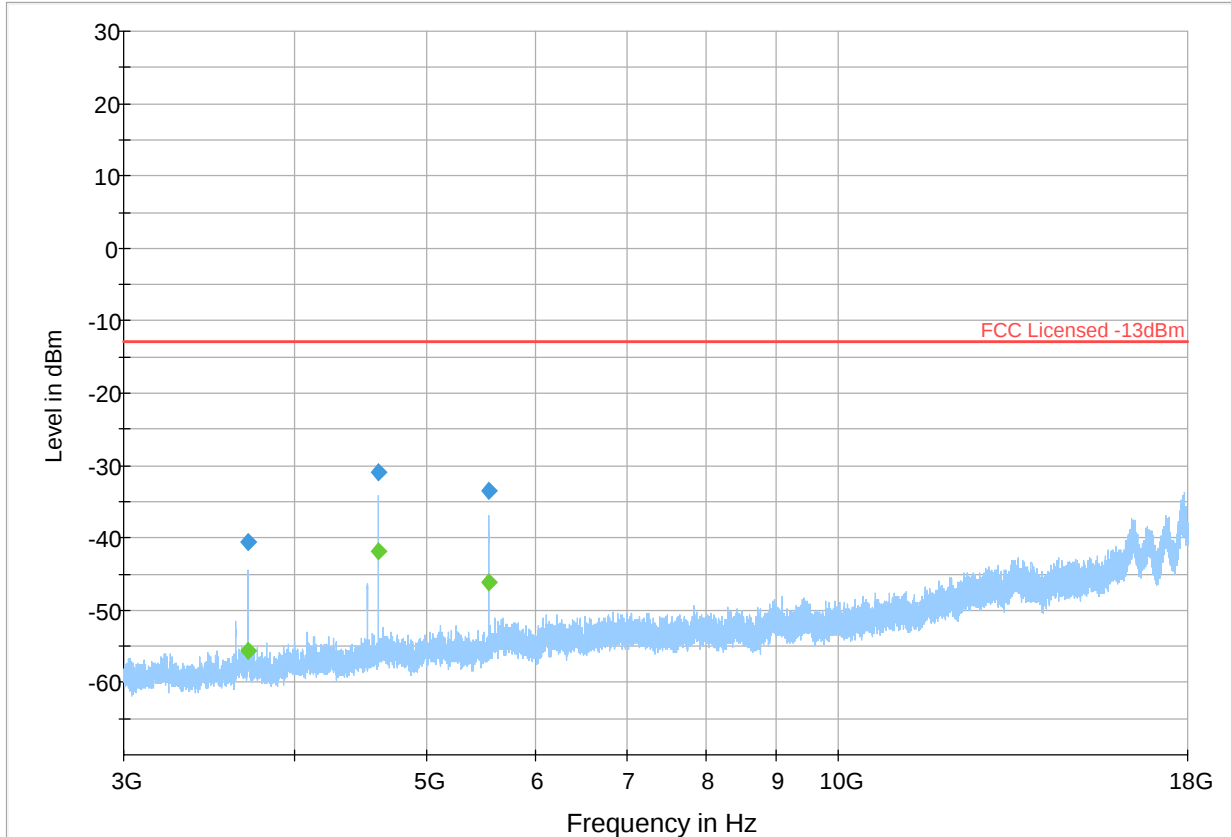
| Frequency (MHz) | MaxPeak (dBm) | RMS (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|---------------|-----------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 1809.25         | -37.99        | ---       | -13.00      | 24.99       | 500.0           | 1000.0          | 100.0       | H   | 34.0          | -64.7      |
| 1809.25         | ---           | -49.40    | ---         | ---         | 500.0           | 1000.0          | 100.0       | H   | 34.0          | -64.7      |
| 2027.00         | -35.48        | ---       | -13.00      | 22.48       | 500.0           | 1000.0          | 142.0       | H   | 349.0         | -63.6      |
| 2027.00         | ---           | -47.15    | ---         | ---         | 500.0           | 1000.0          | 142.0       | H   | 349.0         | -63.6      |
| 2796.25         | -24.20        | ---       | -13.00      | 11.20       | 500.0           | 1000.0          | 151.0       | V   | 58.0          | -61.0      |
| 2796.25         | ---           | -34.60    | ---         | ---         | 500.0           | 1000.0          | 151.0       | V   | 58.0          | -61.0      |



◆ Preview Result 1-PK+  
◆ Final\_Result PK+
 \* PK+  
◆ Final\_Result RMS
 — FCC Licensed -13dBm

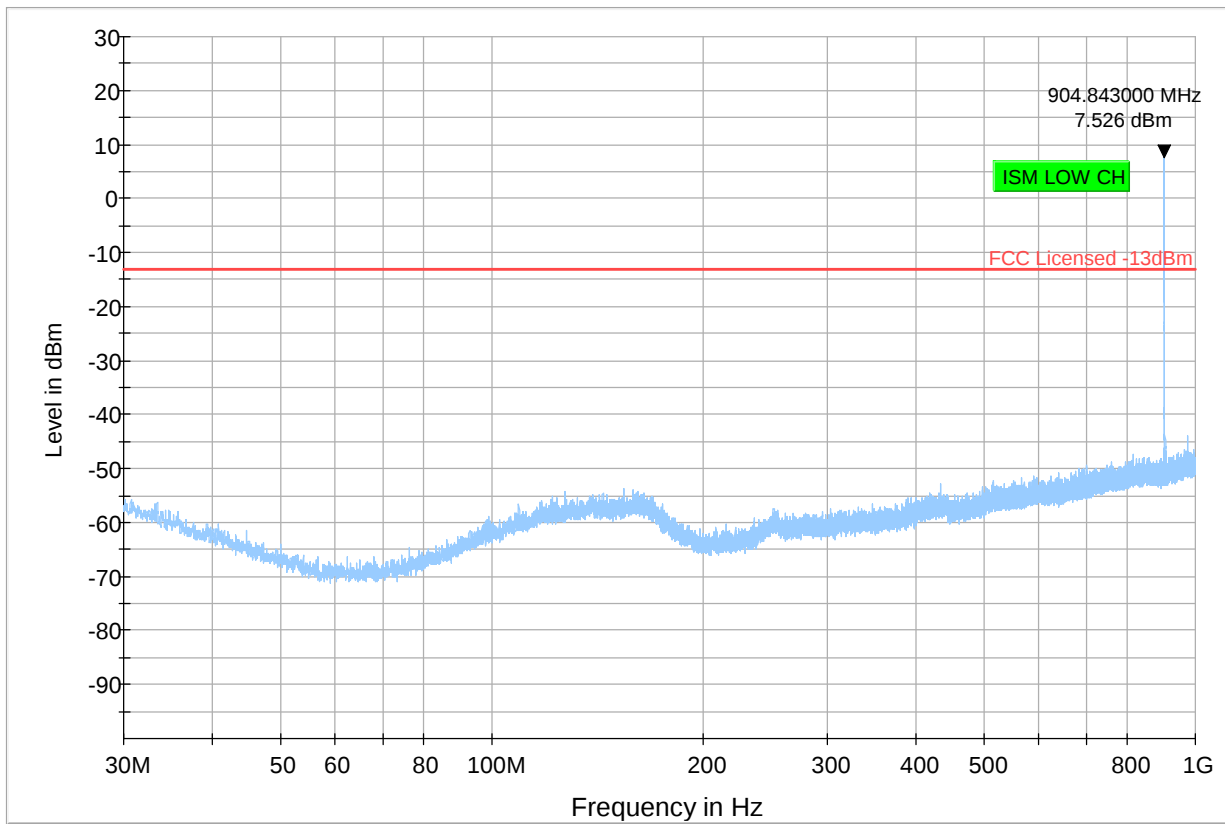
Plot # 3

| Frequency (MHz) | MaxPeak (dBm) | RMS (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|---------------|-----------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 3701.00         | ---           | -55.67    | ---         | ---         | 500.0           | 1000.0          | 167.0       | V   | 14.0          | -100.6     |
| 3701.00         | -40.66        | ---       | -13.00      | 27.66       | 500.0           | 1000.0          | 167.0       | V   | 14.0          | -100.6     |
| 4605.75         | ---           | -41.93    | ---         | ---         | 500.0           | 1000.0          | 142.0       | V   | -9.0          | -98.6      |
| 4605.75         | -30.89        | ---       | -13.00      | 17.89       | 500.0           | 1000.0          | 142.0       | V   | -9.0          | -98.6      |
| 5551.50         | ---           | -46.16    | ---         | ---         | 500.0           | 1000.0          | 117.0       | H   | -6.0          | -97.5      |
| 5551.50         | -33.58        | ---       | -13.00      | 20.58       | 500.0           | 1000.0          | 117.0       | H   | -6.0          | -97.5      |



Preview Result 1-PK+ FCC Licensed -13dBm Final\_Result PK+ Final\_Result RM

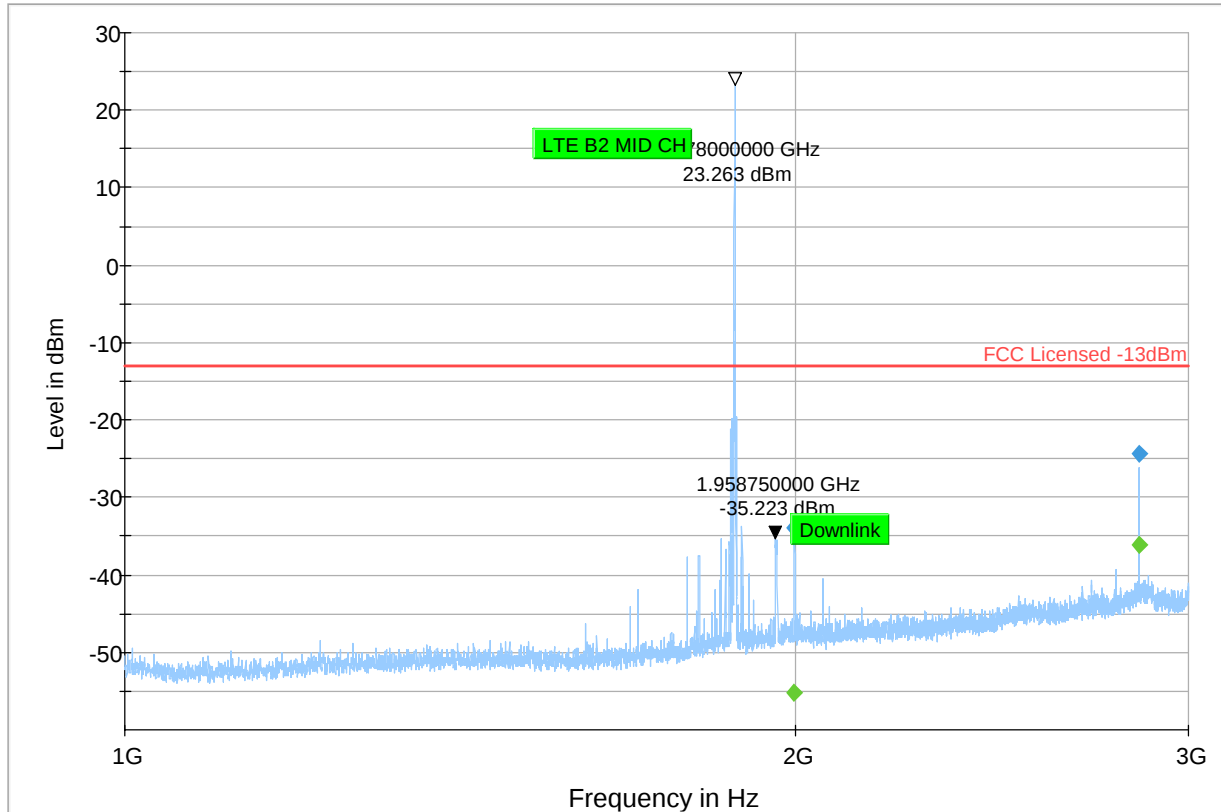
Plot # 4



◆ Preview Result 1-PK+ Final\_Result RMS \* Critical\_Freqs PK+ Final\_Result PK+ — FCC Licensed -13dBm

Plot # 5

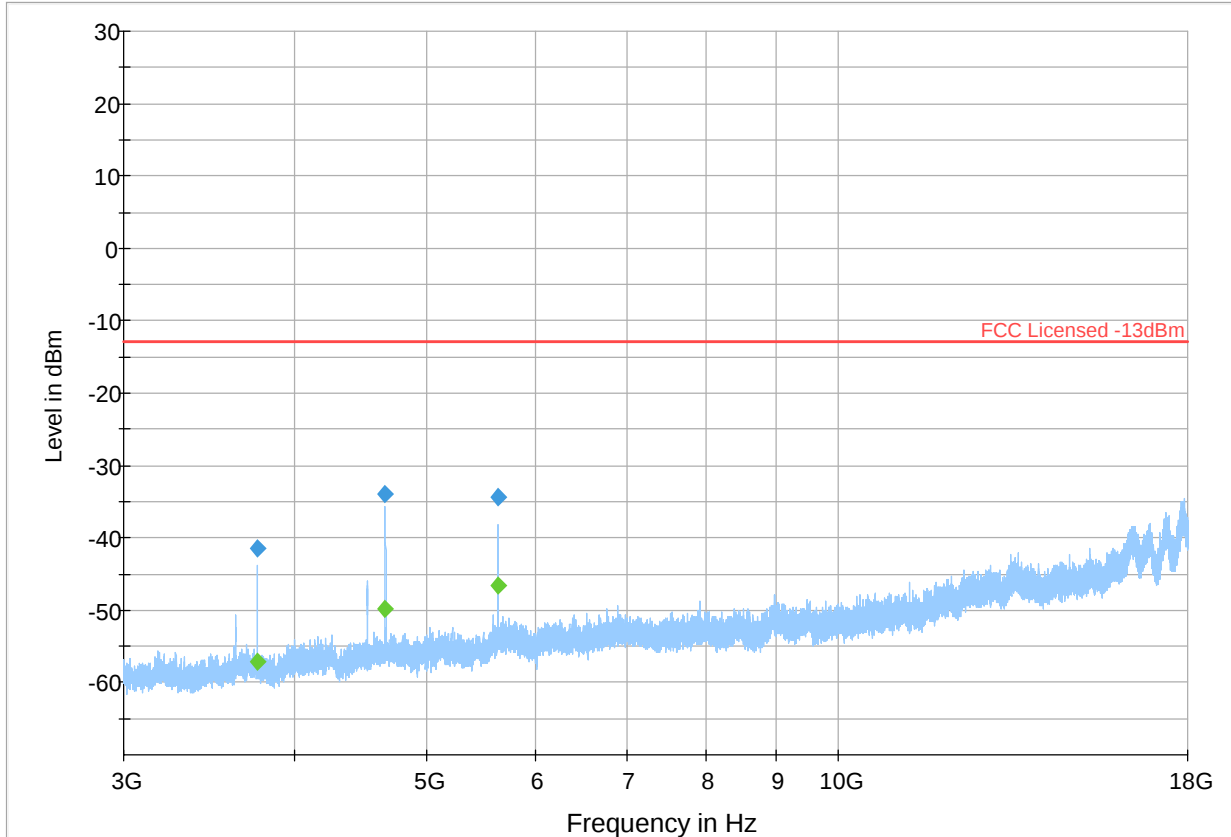
| Frequency (MHz) | MaxPeak (dBm) | RMS (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|---------------|-----------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 1997.25         | -33.82        | ---       | -13.00      | 20.82       | 500.0           | 1000.0          | 127.0       | H   | 355.0         | -63.7      |
| 1997.25         | ---           | -55.20    | ---         | ---         | 500.0           | 1000.0          | 127.0       | H   | 355.0         | -63.7      |
| 2851.25         | -24.26        | ---       | -13.00      | 11.26       | 500.0           | 1000.0          | 168.0       | V   | 52.0          | -60.7      |
| 2851.25         | ---           | -36.09    | ---         | ---         | 500.0           | 1000.0          | 168.0       | V   | 52.0          | -60.7      |



◆ Preview Result 1-PK+ Final\_Result PK+
 \* PK+
 ◆ Final\_Result RMS
 — FCC Licensed -13dBm

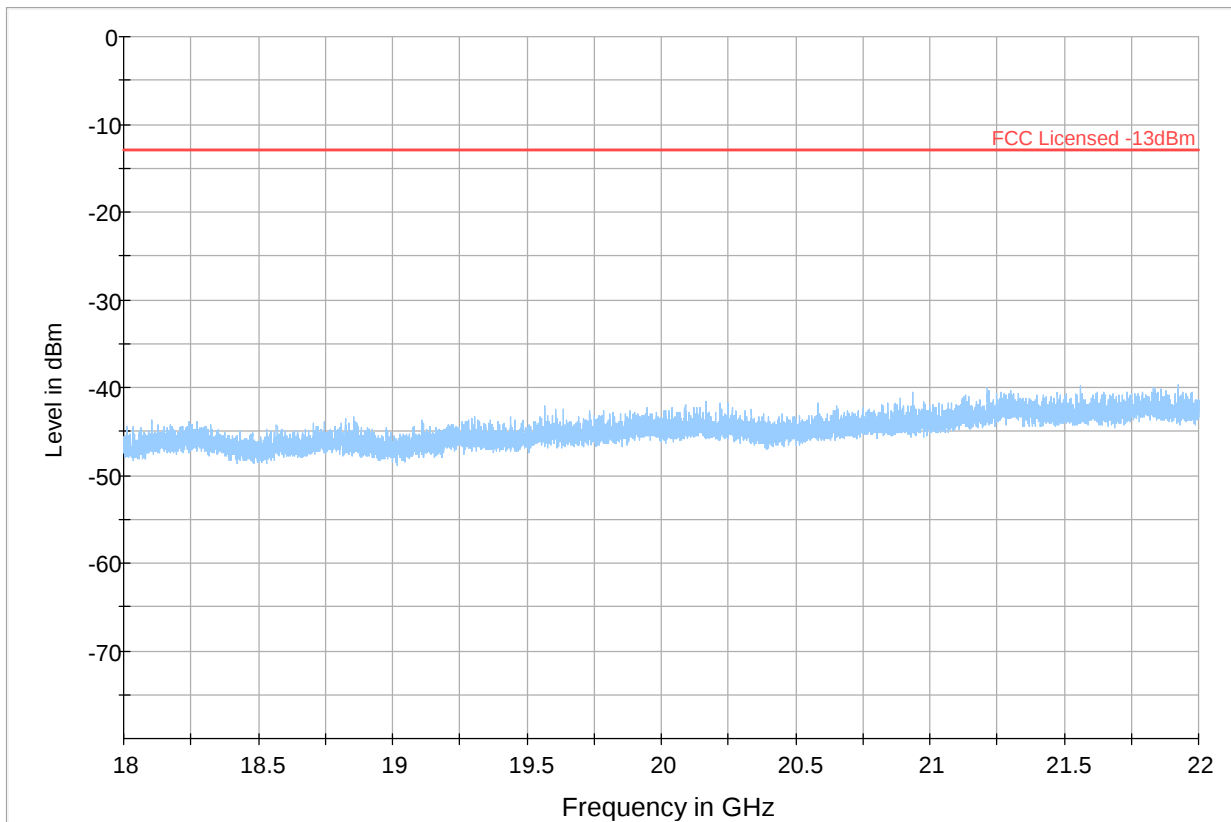
Plot # 6

| Frequency (MHz) | MaxPeak (dBm) | RMS (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|---------------|-----------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 3755.50         | ---           | -57.08    | ---         | ---         | 500.0           | 1000.0          | 218.0       | V   | 5.0           | -100.9     |
| 3755.50         | -41.52        | ---       | -13.00      | 28.52       | 500.0           | 1000.0          | 218.0       | V   | 5.0           | -100.9     |
| 4660.25         | ---           | -49.81    | ---         | ---         | 500.0           | 1000.0          | 117.0       | V   | 347.0         | -98.3      |
| 4660.25         | -33.88        | ---       | -13.00      | 20.88       | 500.0           | 1000.0          | 117.0       | V   | 347.0         | -98.3      |
| 5634.00         | ---           | -46.57    | ---         | ---         | 500.0           | 1000.0          | 186.0       | V   | 26.0          | -96.2      |
| 5634.00         | -34.28        | ---       | -13.00      | 21.28       | 500.0           | 1000.0          | 186.0       | V   | 26.0          | -96.2      |



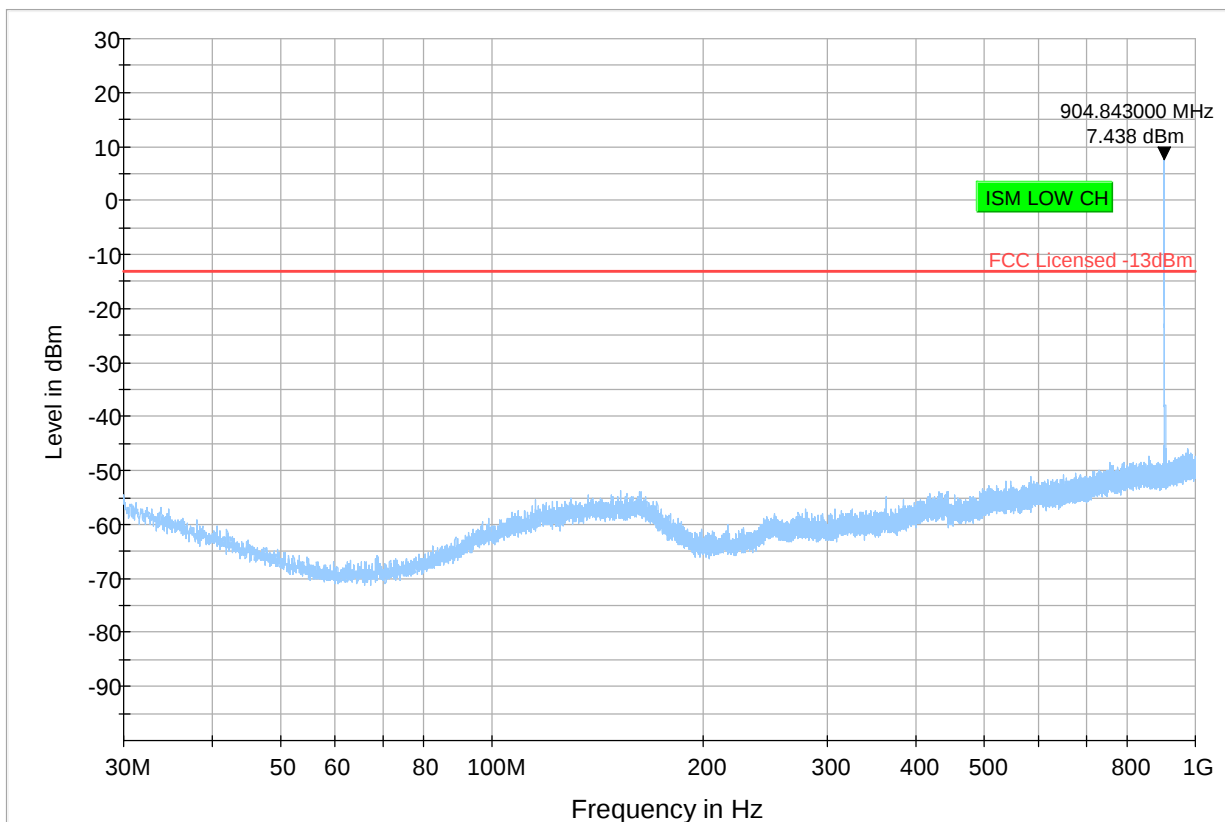
Preview Result 1-PK+ FCC Licensed -13dBm Final\_Result PK+ Final\_Result RMS

Plot # 7



◆ Preview Result 1-PK+      \* Critical\_Freqs PK+      — FCC Licensed -13dBm  
◆ Final\_Result PK+      ◆ Final\_Result RMS

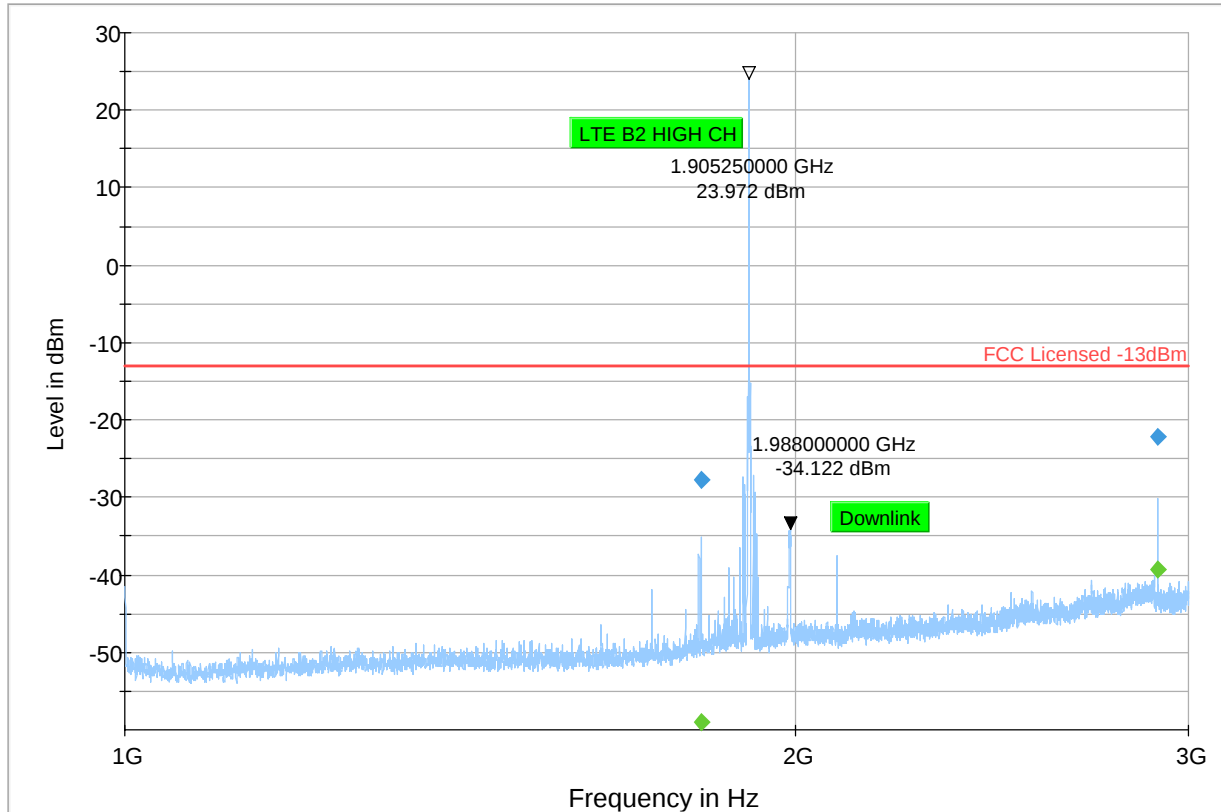
Plot # 8



◆ Preview Result 1-PK+ Final\_Result RMS \* Critical\_Freqs PK+ Final\_Result PK+ — FCC Licensed -13dBm

Plot # 9

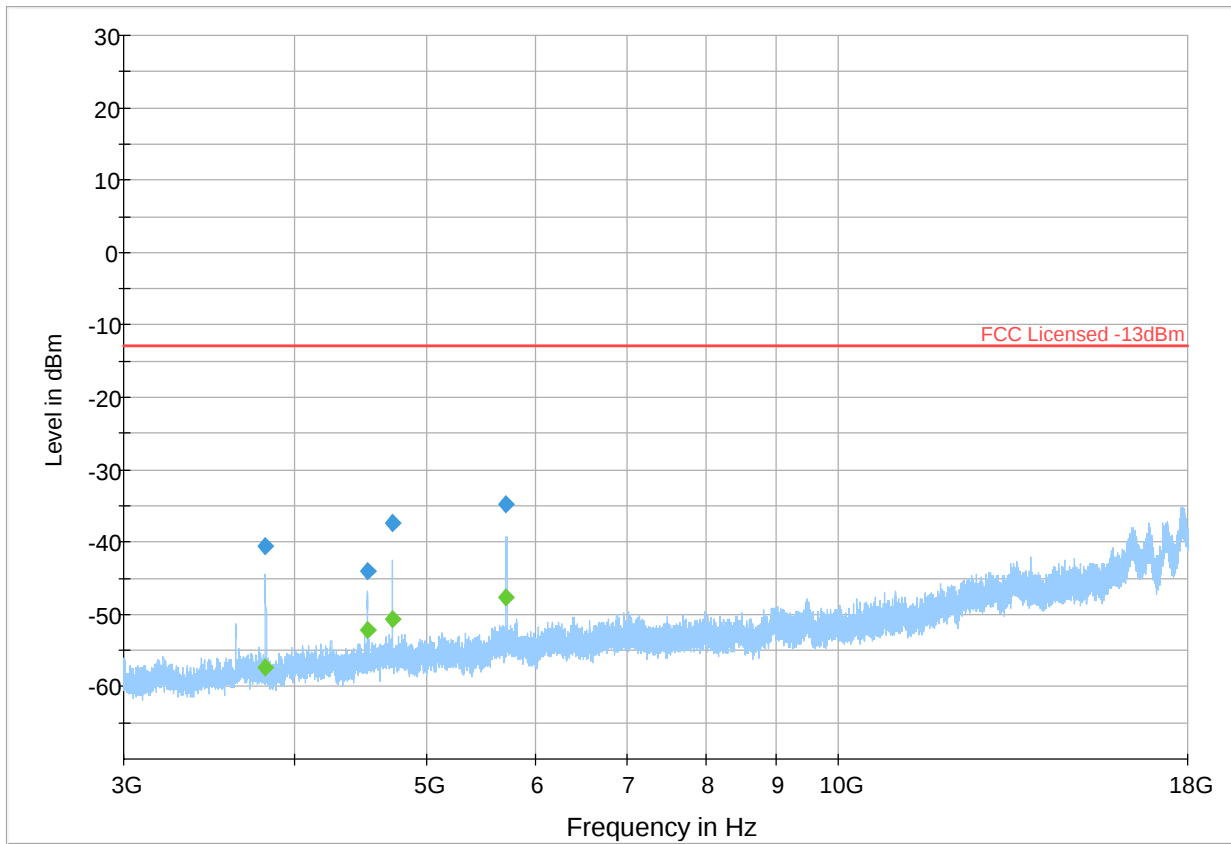
| Frequency (MHz) | MaxPeak (dBm) | RMS (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|---------------|-----------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 1814.75         | -27.80        | ---       | -13.00      | 14.80       | 500.0           | 1000.0          | 100.0       | H   | 164.0         | -64.7      |
| 1814.75         | ---           | -58.93    | ---         | ---         | 500.0           | 1000.0          | 100.0       | H   | 164.0         | -64.7      |
| 2906.25         | -22.20        | ---       | -13.00      | 9.20        | 500.0           | 1000.0          | 160.0       | H   | 22.0          | -60.4      |
| 2906.25         | ---           | -39.36    | ---         | ---         | 500.0           | 1000.0          | 160.0       | H   | 22.0          | -60.4      |



◆ Preview Result 1-PK+ Final\_Result PK+
 \* PK+
 ◆ Final\_Result RMS
 — FCC Licensed -13dBm

Plot # 10

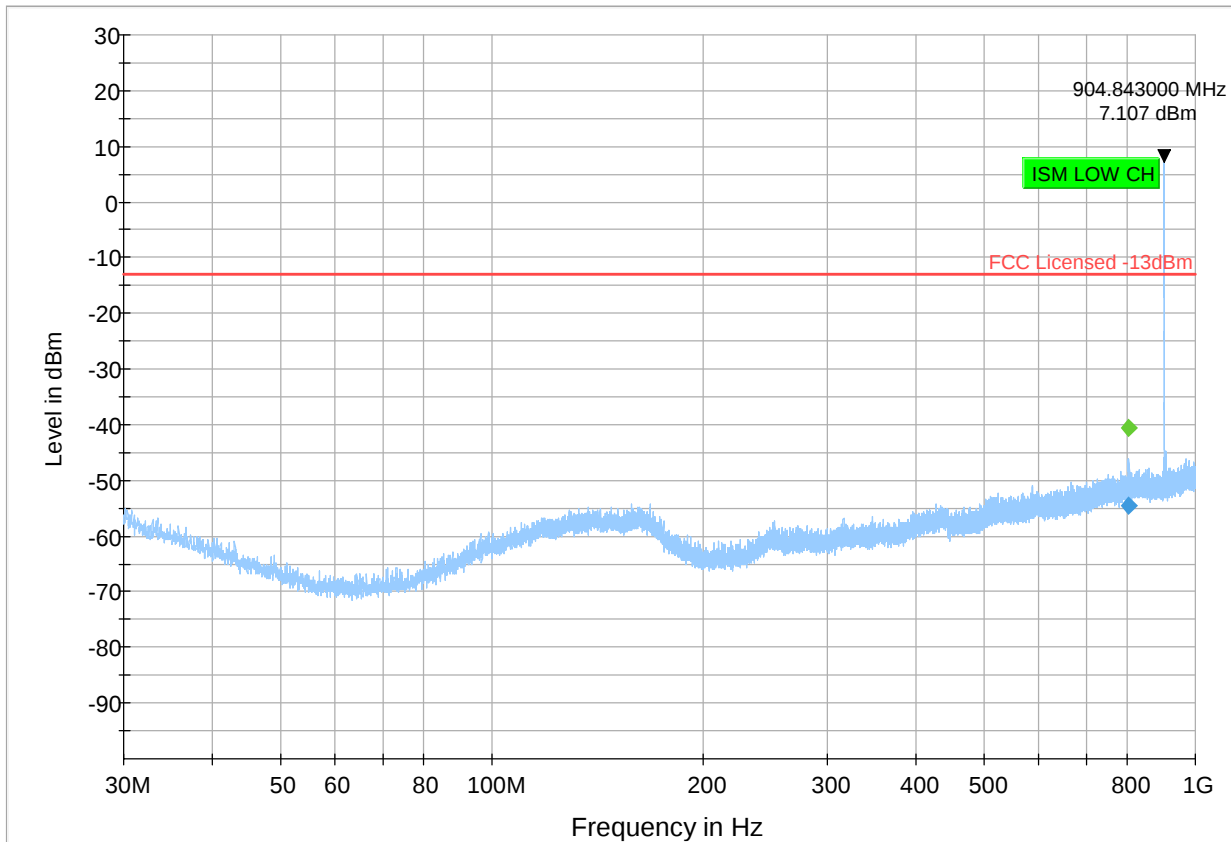
| Frequency (MHz) | MaxPeak (dBm) | RMS (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|---------------|-----------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 3810.75         | ---           | -57.28    | ---         | ---         | 500.0           | 1000.0          | 158.0       | V   | 12.0          | -101.5     |
| 3810.75         | -40.69        | ---       | -13.00      | 27.69       | 500.0           | 1000.0          | 158.0       | V   | 12.0          | -101.5     |
| 4523.75         | ---           | -52.26    | ---         | ---         | 500.0           | 1000.0          | 151.0       | V   | 288.0         | -99.2      |
| 4523.75         | -44.04        | ---       | -13.00      | 31.04       | 500.0           | 1000.0          | 151.0       | V   | 288.0         | -99.2      |
| 4716.00         | ---           | -50.64    | ---         | ---         | 500.0           | 1000.0          | 177.0       | V   | 185.0         | -98.1      |
| 4716.00         | -37.29        | ---       | -13.00      | 24.29       | 500.0           | 1000.0          | 177.0       | V   | 185.0         | -98.1      |
| 5716.50         | ---           | -47.66    | ---         | ---         | 500.0           | 1000.0          | 151.0       | V   | 32.0          | -95.9      |
| 5716.50         | -34.87        | ---       | -13.00      | 21.87       | 500.0           | 1000.0          | 151.0       | V   | 32.0          | -95.9      |



Preview Result 1-PK+ FCC Licensed -13dBm Final\_Result PK+ Final\_Result RMS

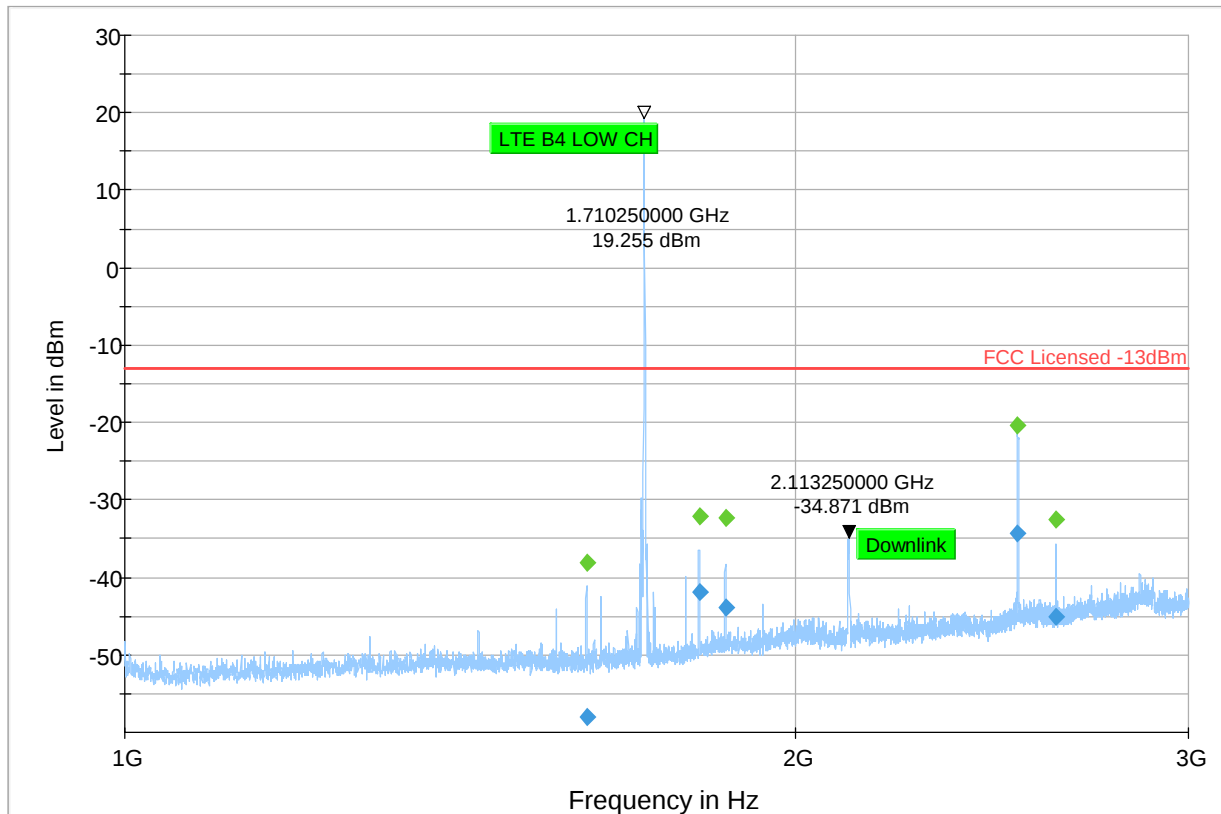
Plot # 11

| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 805.52          | ---       | -40.51        | ---         | ---         | 500.0           | 100.0           | 193.0       | H   | 288.0         | -64.3      |
| 805.52          | -54.54    | ---           | -13.00      | 41.54       | 500.0           | 100.0           | 193.0       | H   | 288.0         | -64.3      |



Plot # 12

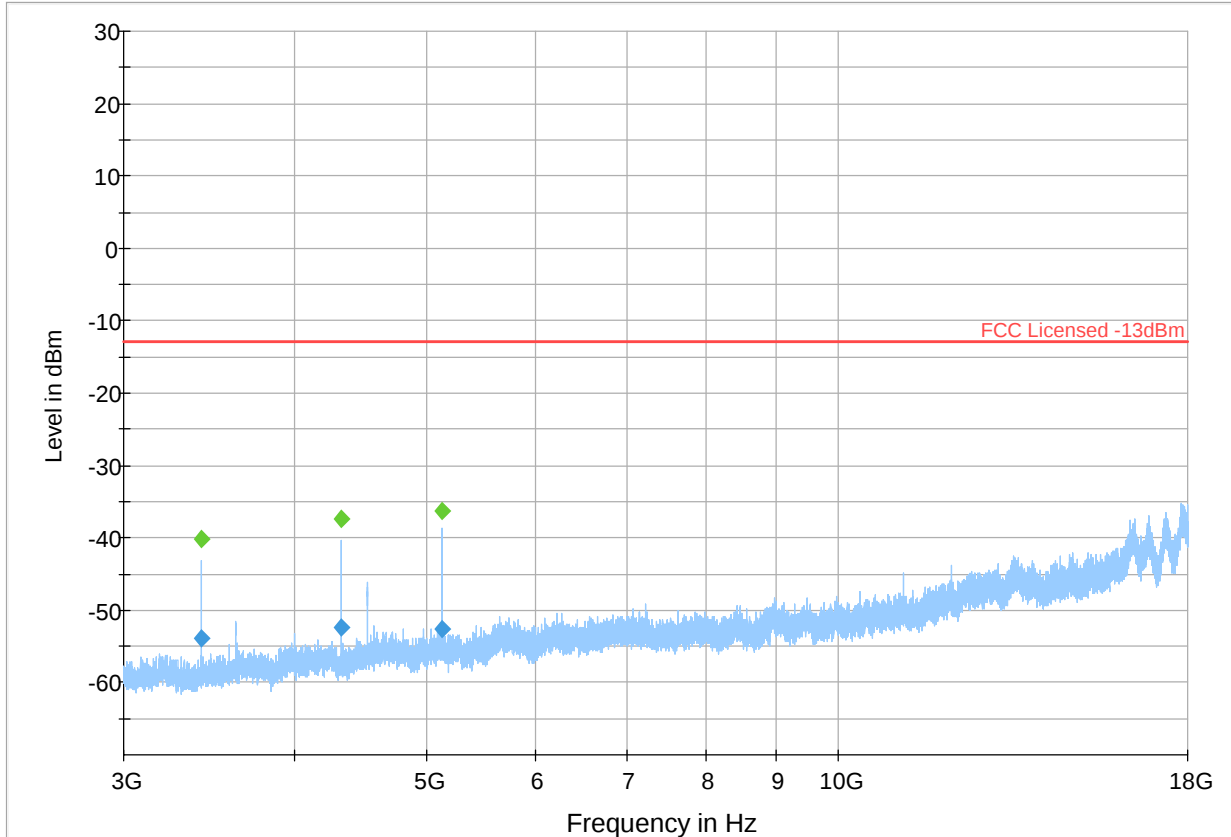
| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 1611.25         | -57.97    | ---           | -13.00      | 44.97       | 500.0           | 1000.0          | 263.0       | V   | 54.0          | -65.7      |
| 1611.25         | ---       | -38.05        | ---         | ---         | 500.0           | 1000.0          | 263.0       | V   | 54.0          | -65.7      |
| 1809.75         | -41.80    | ---           | -13.00      | 28.80       | 500.0           | 1000.0          | 125.0       | H   | 12.0          | -64.7      |
| 1809.75         | ---       | -32.08        | ---         | ---         | 500.0           | 1000.0          | 125.0       | H   | 12.0          | -64.7      |
| 1859.25         | -43.84    | ---           | -13.00      | 30.84       | 500.0           | 1000.0          | 160.0       | H   | 23.0          | -64.2      |
| 1859.25         | ---       | -32.25        | ---         | ---         | 500.0           | 1000.0          | 160.0       | H   | 23.0          | -64.2      |
| 2515.50         | -34.30    | ---           | -13.00      | 21.30       | 500.0           | 1000.0          | 125.0       | V   | 38.0          | -61.7      |
| 2515.50         | ---       | -20.40        | ---         | ---         | 500.0           | 1000.0          | 125.0       | V   | 38.0          | -61.7      |
| 2615.50         | -45.07    | ---           | -13.00      | 32.07       | 500.0           | 1000.0          | 186.0       | V   | 31.0          | -61.7      |
| 2615.50         | ---       | -32.52        | ---         | ---         | 500.0           | 1000.0          | 186.0       | V   | 31.0          | -61.7      |



◆ Preview Result 1-PK+ Final\_Result RMS
 \* PK+
 ◆ Final\_Result PK+
 — FCC Licensed -13dBm

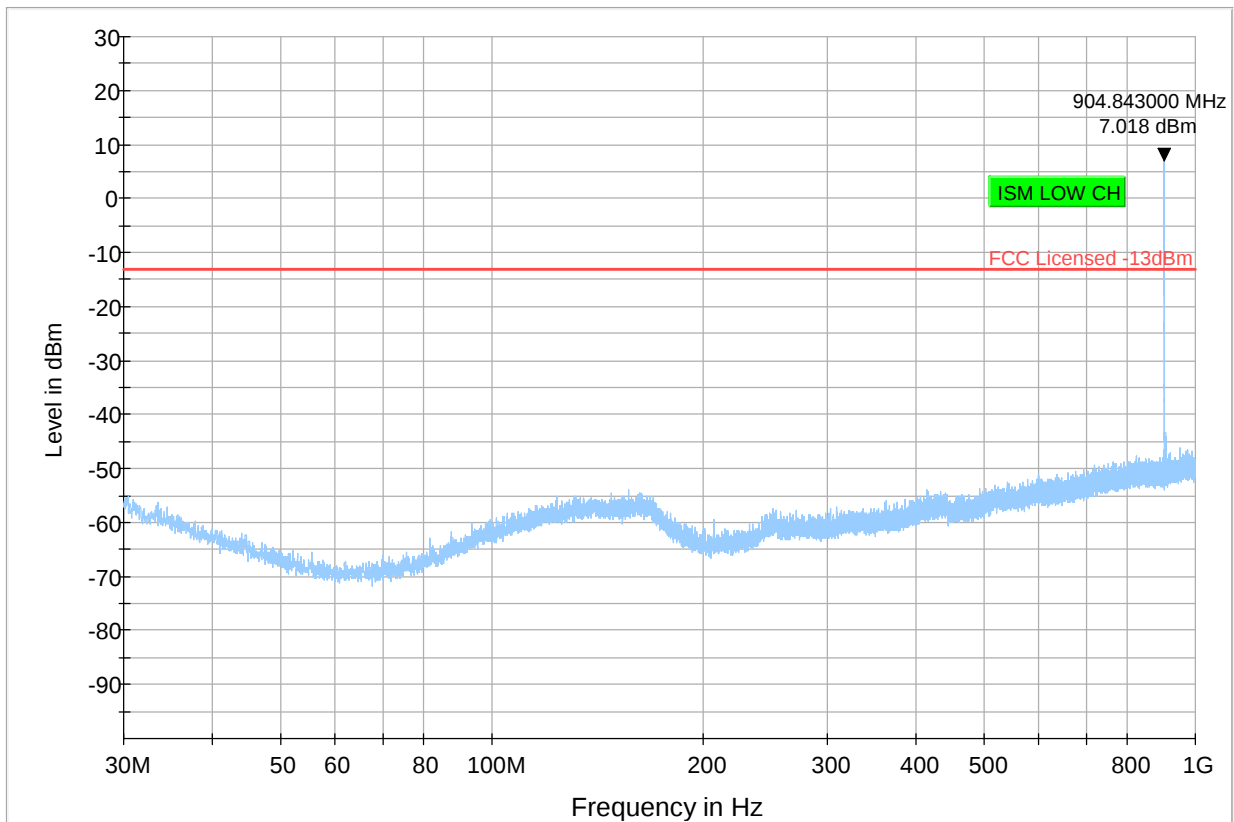
Plot # 13

| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 3420.50         | ---       | -40.09        | ---         | ---         | 500.0           | 1000.0          | 312.0       | V   | 263.0         | -102.4     |
| 3420.50         | -53.97    | ---           | -13.00      | 40.97       | 500.0           | 1000.0          | 312.0       | V   | 263.0         | -102.4     |
| 4325.50         | ---       | -37.30        | ---         | ---         | 500.0           | 1000.0          | 151.0       | V   | -10.0         | -99.8      |
| 4325.50         | -52.34    | ---           | -13.00      | 39.34       | 500.0           | 1000.0          | 151.0       | V   | -10.0         | -99.8      |
| 5130.75         | ---       | -36.39        | ---         | ---         | 500.0           | 1000.0          | 177.0       | V   | -21.0         | -97.8      |
| 5130.75         | -52.57    | ---           | -13.00      | 39.57       | 500.0           | 1000.0          | 177.0       | V   | -21.0         | -97.8      |



Preview Result 1-PK+    FCC Licensed -13dBm    Final\_Result RMS    Final\_Result PK

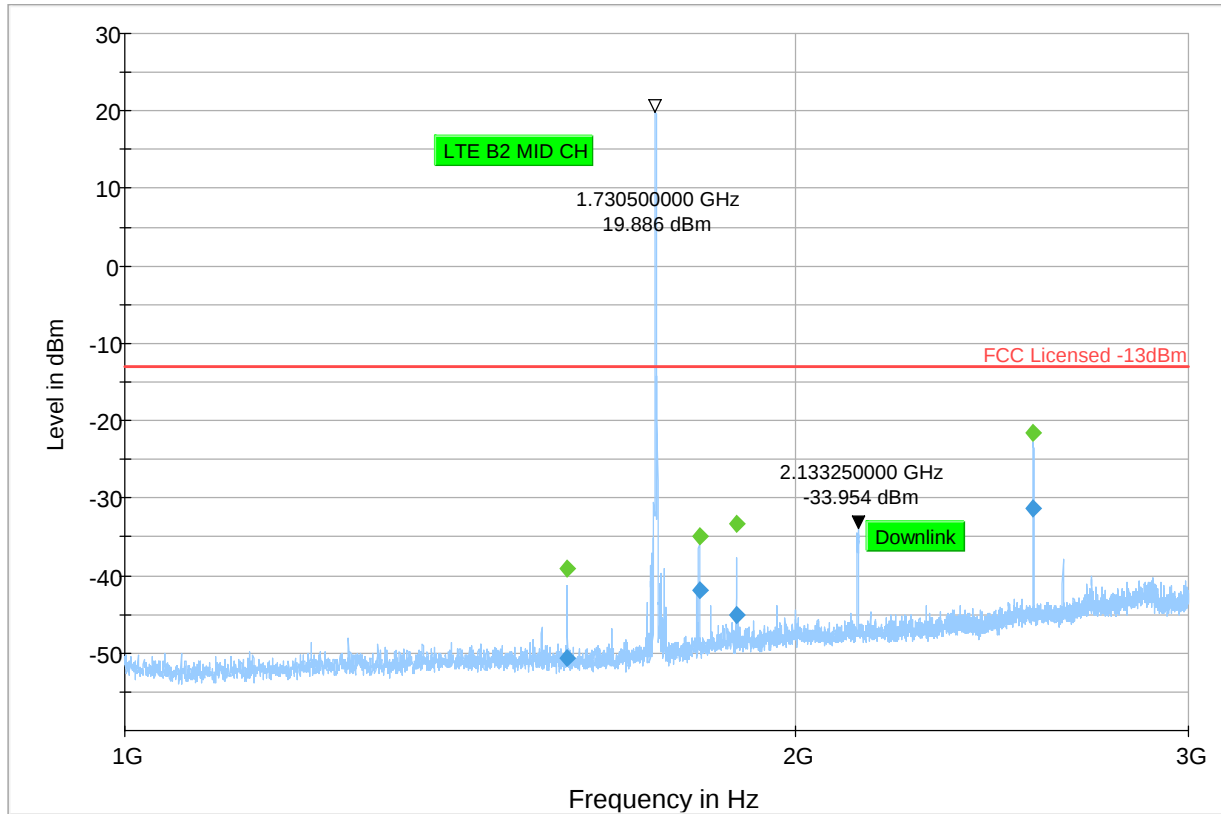
Plot # 14



◆ Preview Result 1-PK+ Final\_Result RMS \* Critical\_Freqs PK+ Final\_Result PK+ — FCC Licensed -13dBm

Plot # 15

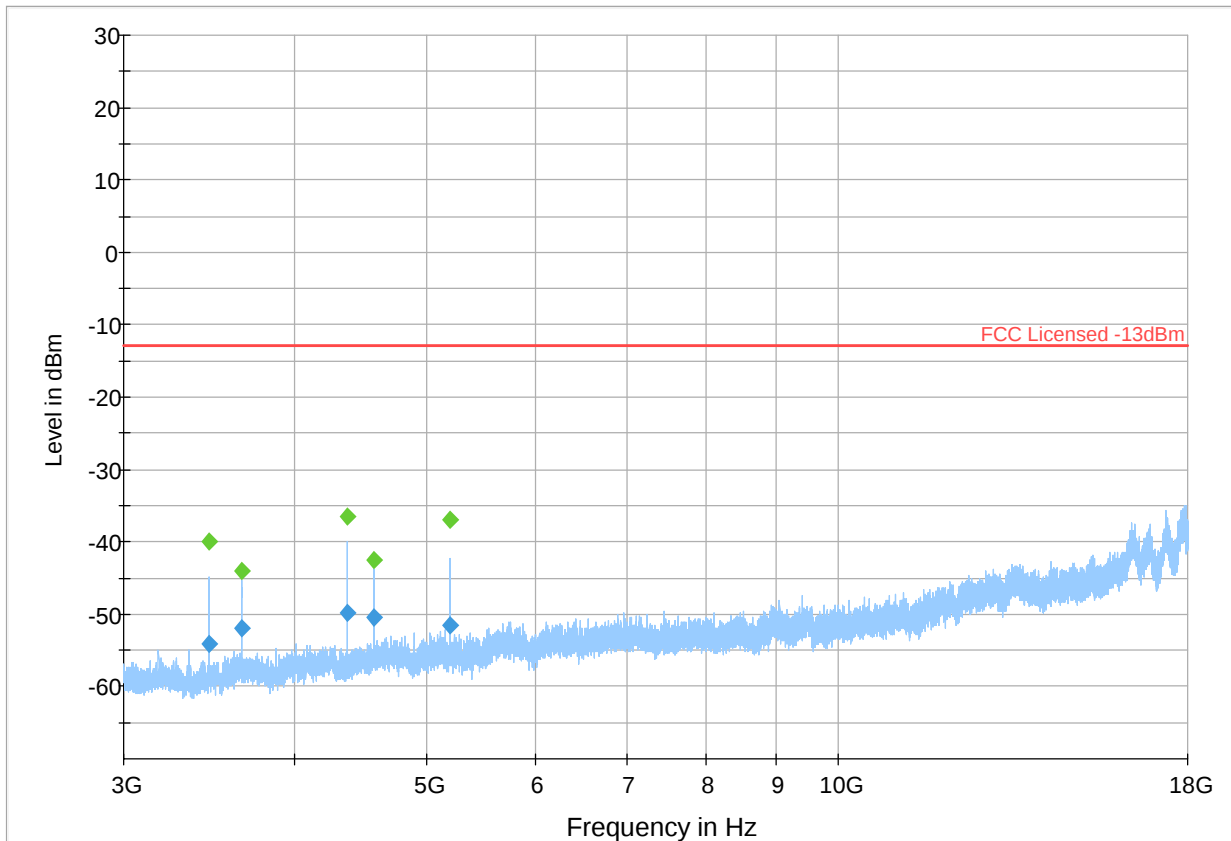
| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 1580.00         | -50.72    | ---           | -13.00      | 37.72       | 500.0           | 1000.0          | 237.0       | V   | -15.0         | -65.8      |
| 1580.00         | ---       | -39.05        | ---         | ---         | 500.0           | 1000.0          | 237.0       | V   | -15.0         | -65.8      |
| 1809.75         | -41.93    | ---           | -13.00      | 28.93       | 500.0           | 1000.0          | 150.0       | H   | 344.0         | -64.7      |
| 1809.75         | ---       | -34.82        | ---         | ---         | 500.0           | 1000.0          | 150.0       | H   | 344.0         | -64.7      |
| 1881.00         | -45.08    | ---           | -13.00      | 32.08       | 500.0           | 1000.0          | 194.0       | H   | -4.0          | -64.1      |
| 1881.00         | ---       | -33.39        | ---         | ---         | 500.0           | 1000.0          | 194.0       | H   | -4.0          | -64.1      |
| 2556.00         | -31.31    | ---           | -13.00      | 18.31       | 500.0           | 1000.0          | 134.0       | H   | 288.0         | -61.7      |
| 2556.00         | ---       | -21.66        | ---         | ---         | 500.0           | 1000.0          | 134.0       | H   | 288.0         | -61.7      |



◆ Preview Result 1-PK+ Final\_Result RMS
 \* PK+ Final\_Result PK+
 — FCC Licensed -13dBm

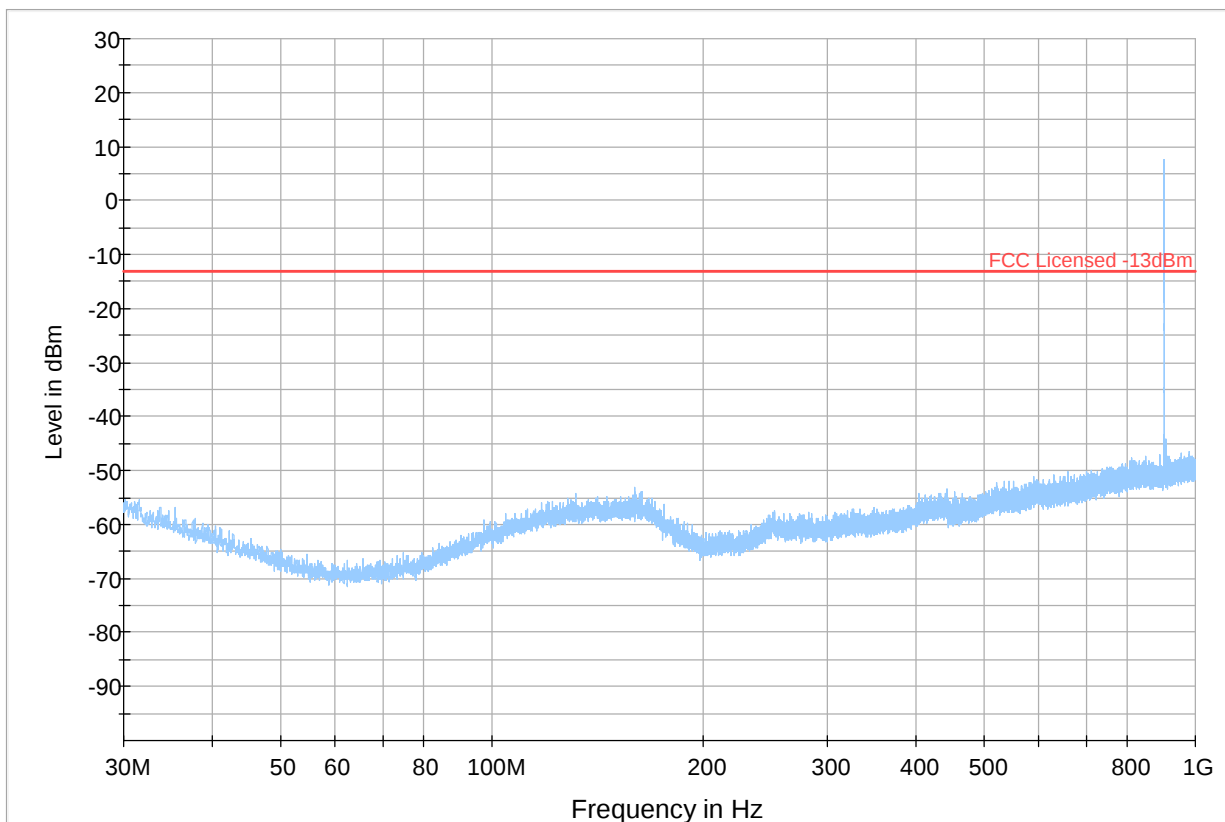
Plot # 16

| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 3460.75         | ---       | -39.92        | ---         | ---         | 500.0           | 1000.0          | 294.0       | V   | 358.0         | -102.2     |
| 3460.75         | -54.23    | ---           | -13.00      | 41.23       | 500.0           | 1000.0          | 294.0       | V   | 358.0         | -102.2     |
| 3660.00         | ---       | -44.10        | ---         | ---         | 500.0           | 1000.0          | 107.0       | H   | 288.0         | -101.0     |
| 3660.00         | -52.06    | ---           | -13.00      | 39.06       | 500.0           | 1000.0          | 107.0       | H   | 288.0         | -101.0     |
| 4375.75         | ---       | -36.44        | ---         | ---         | 500.0           | 1000.0          | 107.0       | V   | 342.0         | -99.8      |
| 4375.75         | -49.84    | ---           | -13.00      | 36.84       | 500.0           | 1000.0          | 107.0       | V   | 342.0         | -99.8      |
| 4573.75         | ---       | -42.51        | ---         | ---         | 500.0           | 1000.0          | 168.0       | V   | 246.0         | -98.7      |
| 4573.75         | -50.41    | ---           | -13.00      | 37.41       | 500.0           | 1000.0          | 168.0       | V   | 246.0         | -98.7      |
| 5191.00         | ---       | -36.86        | ---         | ---         | 500.0           | 1000.0          | 107.0       | V   | 324.0         | -97.8      |
| 5191.00         | -51.52    | ---           | -13.00      | 38.52       | 500.0           | 1000.0          | 107.0       | V   | 324.0         | -97.8      |



Preview Result 1-PK+ FCC Licensed -13dBm Final\_Result RMS Final\_Result PK

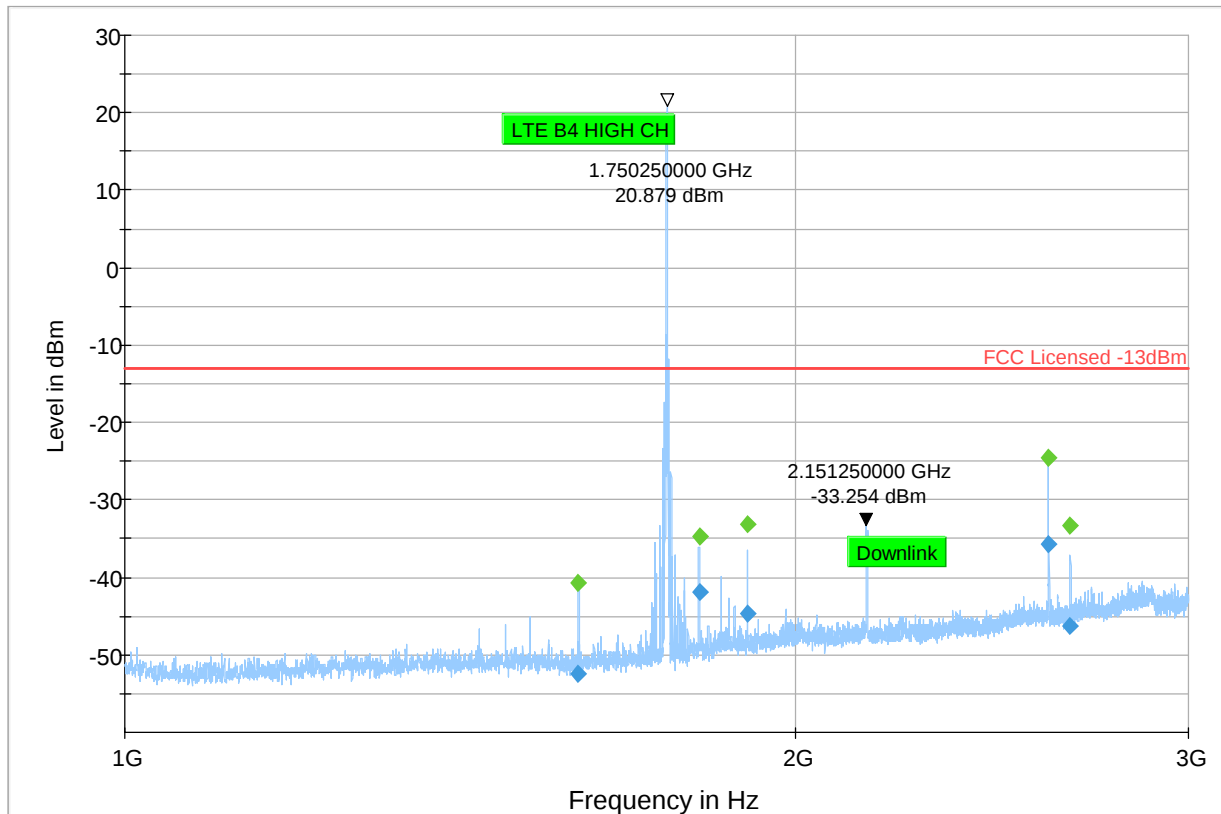
Plot # 17



◆ Preview Result 1-PK+ Final\_Result RMS \* Critical\_Freqs PK+ Final\_Result PK+ — FCC Licensed -13dBm

Plot # 18

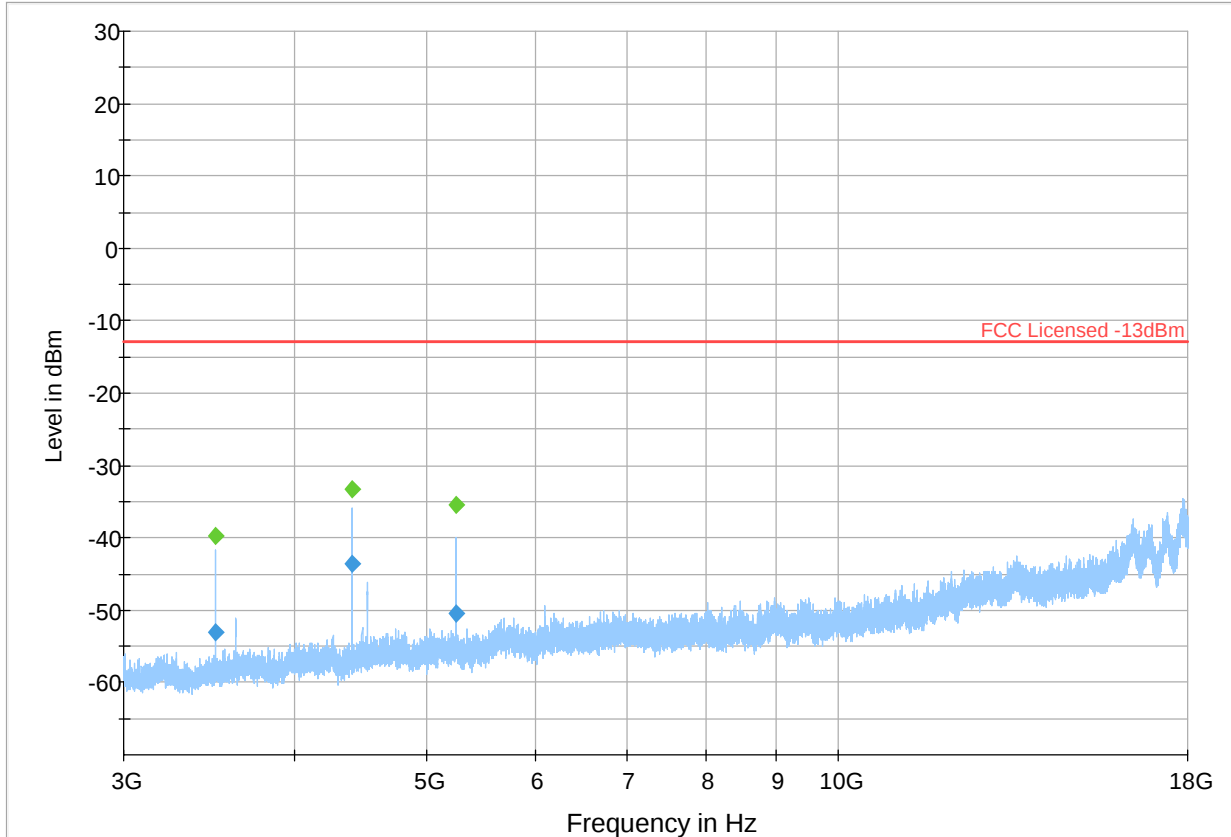
| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 1598.00         | -52.49    | ---           | -13.00      | 39.49       | 500.0           | 1000.0          | 285.0       | V   | -26.0         | -65.8      |
| 1598.00         | ---       | -40.61        | ---         | ---         | 500.0           | 1000.0          | 285.0       | V   | -26.0         | -65.8      |
| 1809.75         | -41.80    | ---           | -13.00      | 28.80       | 500.0           | 1000.0          | 150.0       | H   | 4.0           | -64.7      |
| 1809.75         | ---       | -34.81        | ---         | ---         | 500.0           | 1000.0          | 150.0       | H   | 4.0           | -64.7      |
| 1902.75         | -44.65    | ---           | -13.00      | 31.65       | 500.0           | 1000.0          | 159.0       | H   | 23.0          | -64.1      |
| 1902.75         | ---       | -33.16        | ---         | ---         | 500.0           | 1000.0          | 159.0       | H   | 23.0          | -64.1      |
| 2596.50         | -35.77    | ---           | -13.00      | 22.77       | 500.0           | 1000.0          | 142.0       | V   | 16.0          | -61.7      |
| 2596.50         | ---       | -24.57        | ---         | ---         | 500.0           | 1000.0          | 142.0       | V   | 16.0          | -61.7      |
| 2655.75         | -46.22    | ---           | -13.00      | 33.22       | 500.0           | 1000.0          | 202.0       | V   | 30.0          | -61.5      |
| 2655.75         | ---       | -33.32        | ---         | ---         | 500.0           | 1000.0          | 202.0       | V   | 30.0          | -61.5      |



◆ Preview Result 1-PK+ Final\_Result RMS
 \* PK+ Final\_Result PK+
 — FCC Licensed -13dBm

Plot # 19

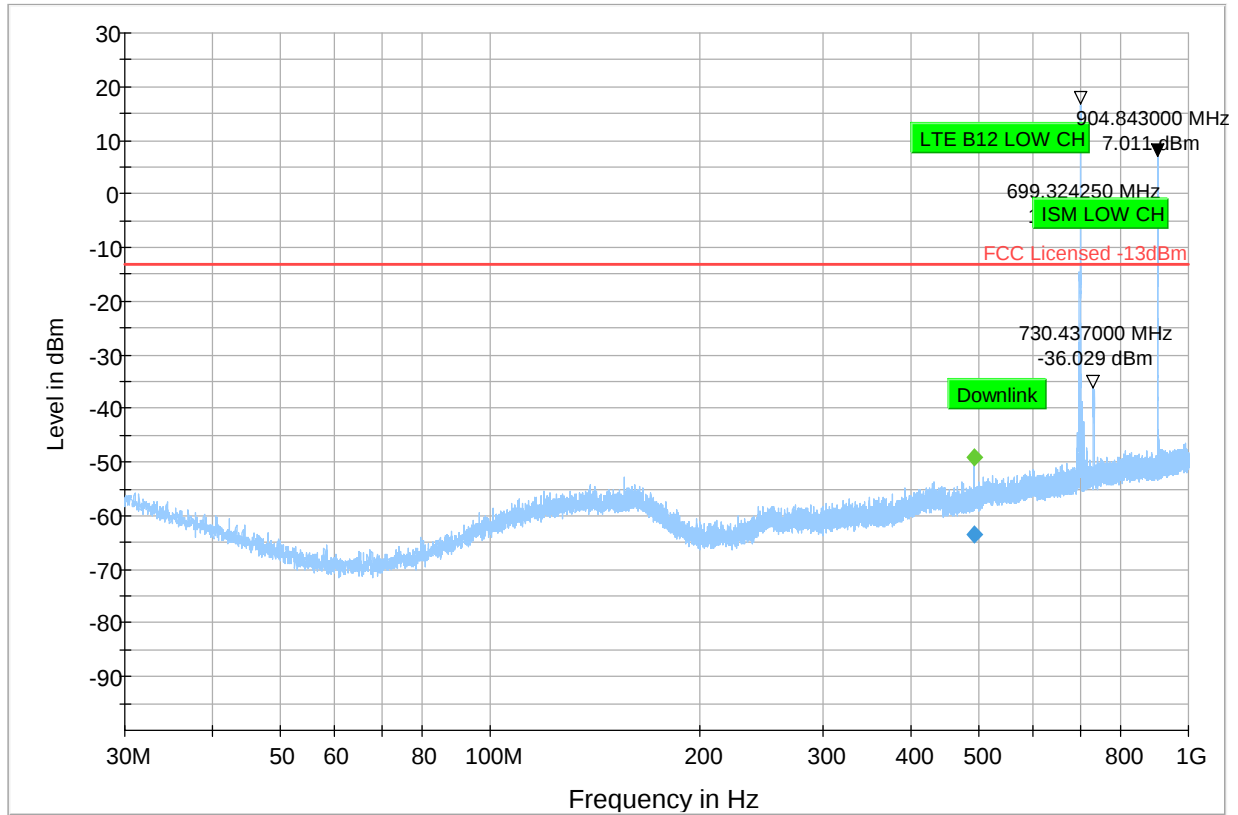
| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 3500.75         | ---       | -39.84        | ---         | ---         | 500.0           | 1000.0          | 116.0       | V   | 52.0          | -102.2     |
| 3500.75         | -52.95    | ---           | -13.00      | 39.95       | 500.0           | 1000.0          | 116.0       | V   | 52.0          | -102.2     |
| 4406.00         | ---       | -33.31        | ---         | ---         | 500.0           | 1000.0          | 325.0       | V   | -4.0          | -99.6      |
| 4406.00         | -43.66    | ---           | -13.00      | 30.66       | 500.0           | 1000.0          | 325.0       | V   | -4.0          | -99.6      |
| 5250.75         | ---       | -35.41        | ---         | ---         | 500.0           | 1000.0          | 173.0       | V   | 47.0          | -97.2      |
| 5250.75         | -50.42    | ---           | -13.00      | 37.42       | 500.0           | 1000.0          | 173.0       | V   | 47.0          | -97.2      |



Preview Result 1-PK+    FCC Licensed -13dBm    Final\_Result RMS    Final\_Result PK

Plot # 20

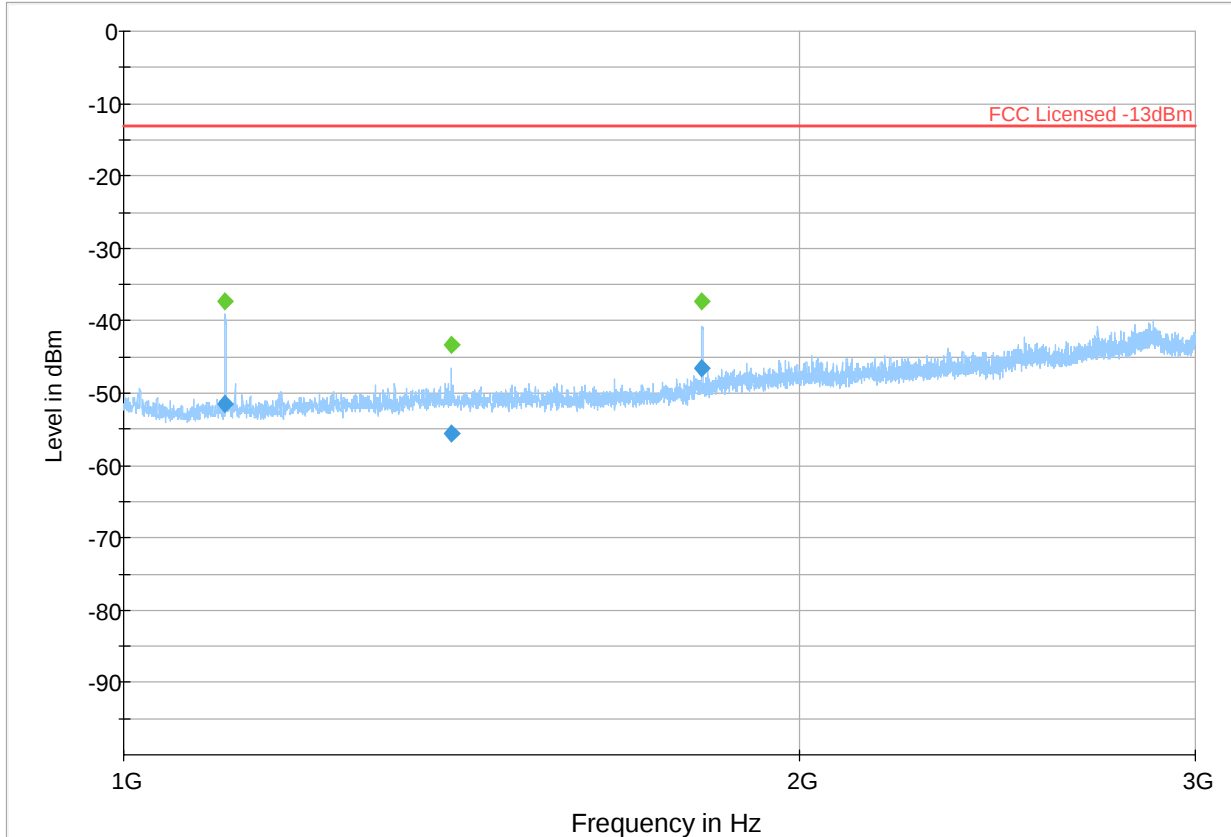
| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 493.95          | -63.42    | ---           | -13.00      | 50.42       | 500.0           | 100.0           | 133.0       | V   | 64.0          | -69.7      |
| 493.95          | ---       | -49.10        | ---         | ---         | 500.0           | 100.0           | 133.0       | V   | 64.0          | -69.7      |



◆ Preview Result 1-PK+ Final\_Result RMS
 \* PK+ Final\_Result PK+
 — FCC Licensed -13dBm

Plot # 21

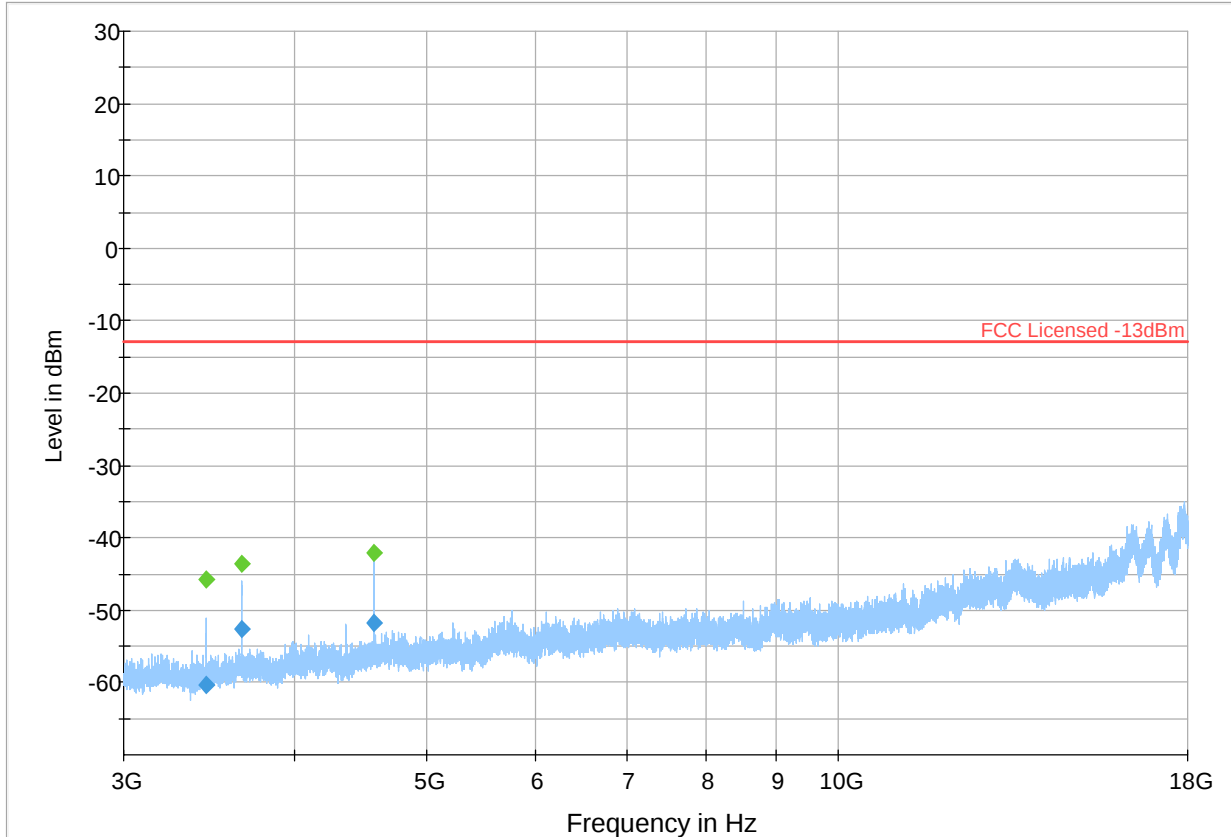
| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 1109.75         | ---       | -37.33        | ---         | ---         | 500.0           | 1000.0          | 255.0       | V   | 34.0          | -67.4      |
| 1109.75         | -51.54    | ---           | -13.00      | 38.54       | 500.0           | 1000.0          | 255.0       | V   | 34.0          | -67.4      |
| 1398.75         | ---       | -43.26        | ---         | ---         | 500.0           | 1000.0          | 286.0       | H   | 196.0         | -66.4      |
| 1398.75         | -55.67    | ---           | -13.00      | 42.67       | 500.0           | 1000.0          | 286.0       | H   | 196.0         | -66.4      |
| 1809.50         | ---       | -37.33        | ---         | ---         | 500.0           | 1000.0          | 175.0       | H   | 29.0          | -64.7      |
| 1809.50         | -46.50    | ---           | -13.00      | 33.51       | 500.0           | 1000.0          | 175.0       | H   | 29.0          | -64.7      |



Preview Result 1-PK+ FCC Licensed -13dBm Final\_Result RMS Final\_Result PK

Plot # 22

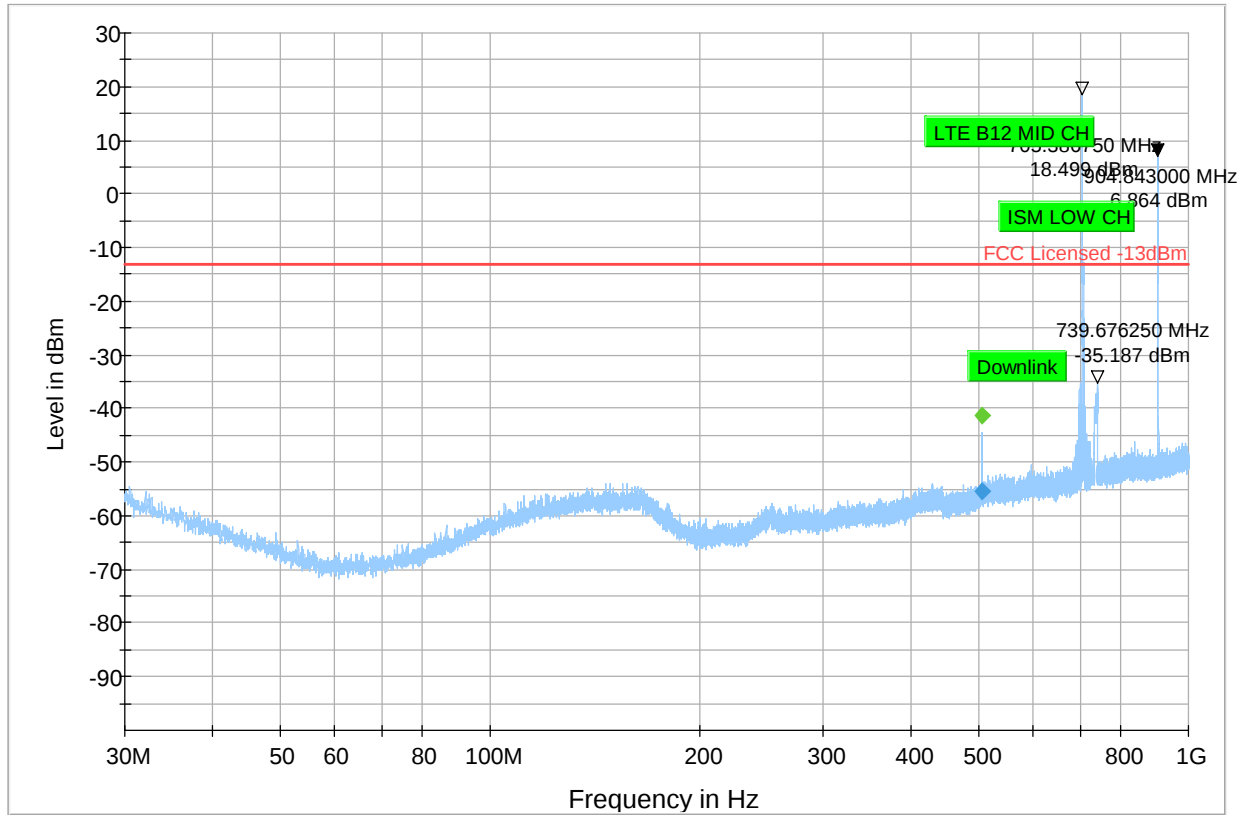
| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 3443.75         | ---       | -45.68        | ---         | ---         | 500.0           | 1000.0          | 268.0       | V   | 271.0         | -102.2     |
| 3443.75         | -60.24    | ---           | -13.00      | 47.24       | 500.0           | 1000.0          | 268.0       | V   | 271.0         | -102.2     |
| 3658.75         | ---       | -43.70        | ---         | ---         | 500.0           | 1000.0          | 151.0       | H   | 290.0         | -101.0     |
| 3658.75         | -52.57    | ---           | -13.00      | 39.57       | 500.0           | 1000.0          | 151.0       | H   | 290.0         | -101.0     |
| 4573.50         | ---       | -42.15        | ---         | ---         | 500.0           | 1000.0          | 171.0       | V   | 247.0         | -98.7      |
| 4573.50         | -51.72    | ---           | -13.00      | 38.72       | 500.0           | 1000.0          | 171.0       | V   | 247.0         | -98.7      |



Preview Result 1-PK+ FCC Licensed -13dBm Final\_Result RMS Final\_Result PK

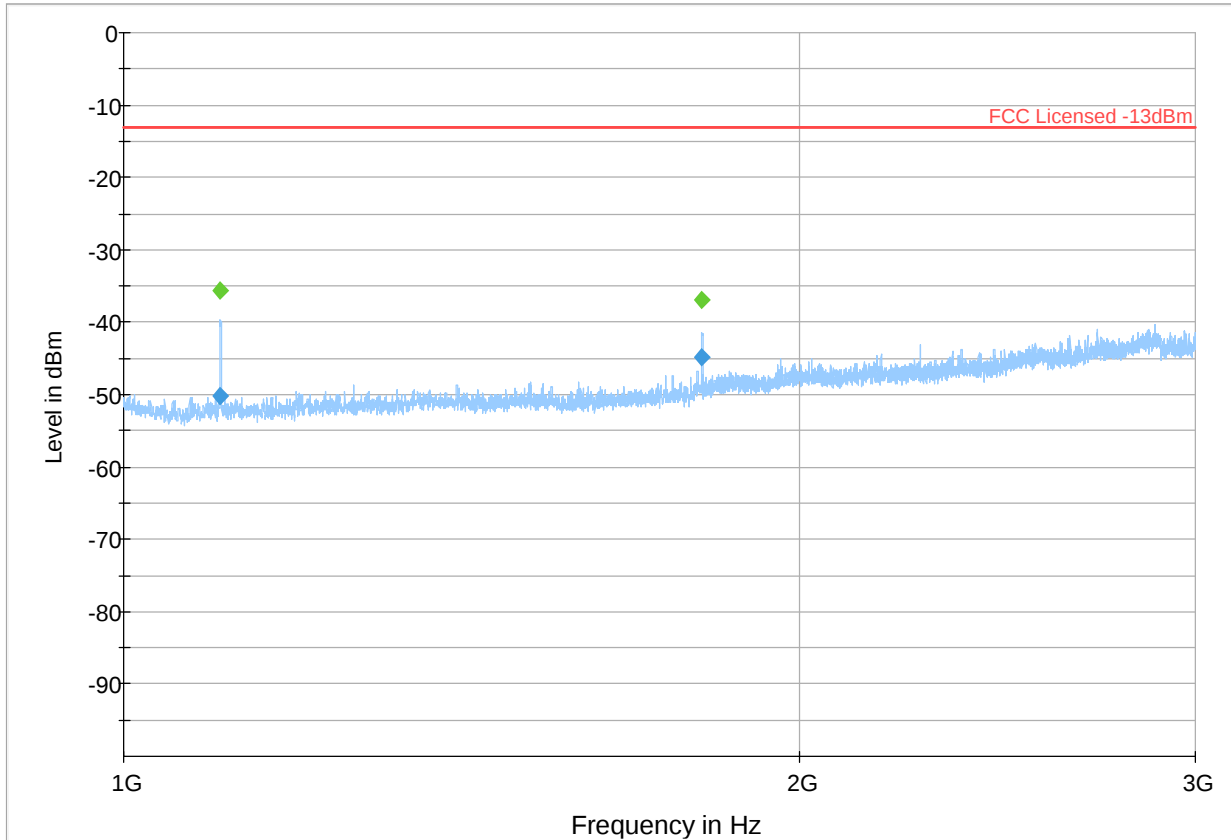
Plot # 23

| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 505.88          | -55.42    | ---           | -13.00      | 42.42       | 500.0           | 100.0           | 100.0       | V   | -27.0         | -69.2      |
| 505.88          | ---       | -41.38        | ---         | ---         | 500.0           | 100.0           | 100.0       | V   | -27.0         | -69.2      |



Plot # 24

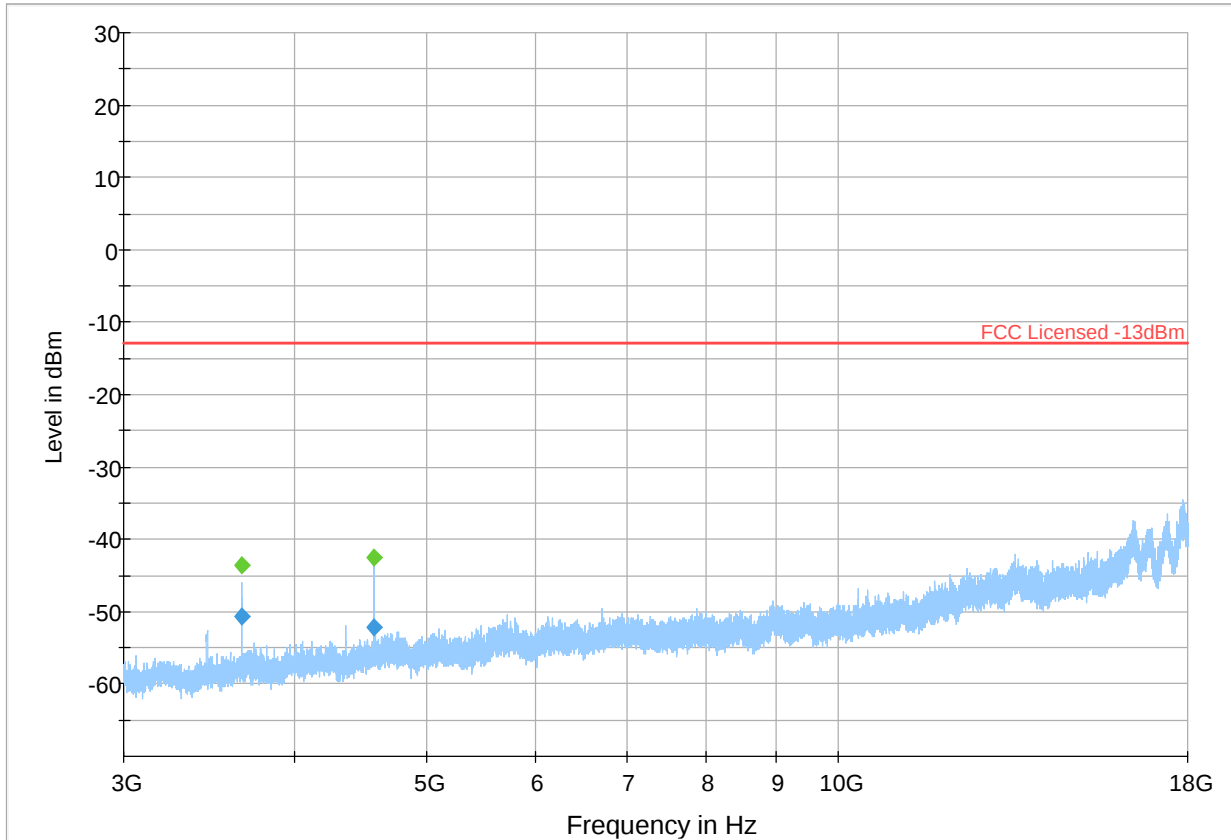
| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 1103.75         | ---       | -35.69        | ---         | ---         | 500.0           | 1000.0          | 126.0       | V   | -38.0         | -67.5      |
| 1103.75         | -50.19    | ---           | -13.00      | 37.20       | 500.0           | 1000.0          | 126.0       | V   | -38.0         | -67.5      |
| 1809.50         | ---       | -36.82        | ---         | ---         | 500.0           | 1000.0          | 165.0       | V   | 225.0         | -64.7      |
| 1809.50         | -44.87    | ---           | -13.00      | 31.87       | 500.0           | 1000.0          | 165.0       | V   | 225.0         | -64.7      |



Preview Result 1-PK+ FCC Licensed -13dBm Final\_Result RMS Final\_Result PK

Plot # 25

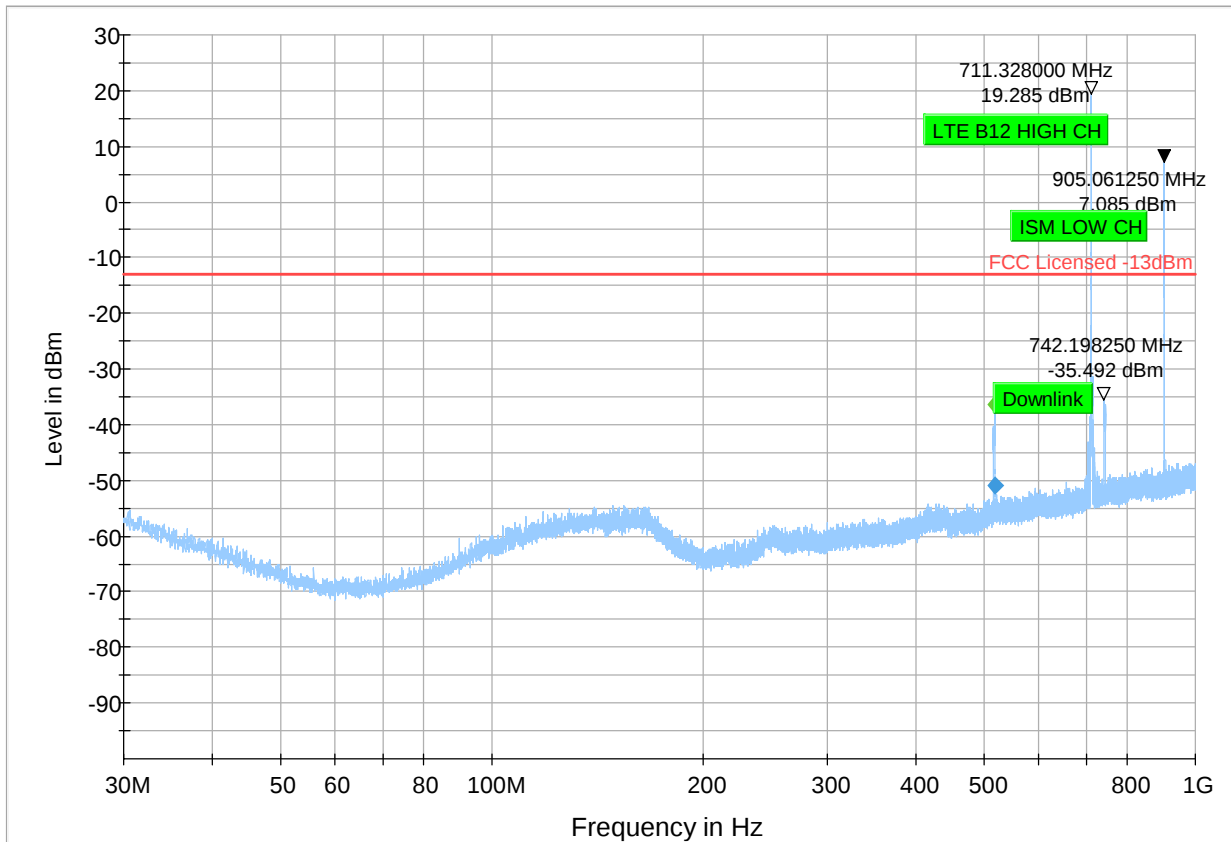
| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 3660.50         | ---       | -43.50        | ---         | ---         | 500.0           | 1000.0          | 100.0       | H   | 235.0         | -101.0     |
| 3660.50         | -50.70    | ---           | -13.00      | 37.70       | 500.0           | 1000.0          | 100.0       | H   | 235.0         | -101.0     |
| 4573.50         | ---       | -42.50        | ---         | ---         | 500.0           | 1000.0          | 168.0       | V   | 247.0         | -98.7      |
| 4573.50         | -52.13    | ---           | -13.00      | 39.13       | 500.0           | 1000.0          | 168.0       | V   | 247.0         | -98.7      |



Preview Result 1-PK+    FCC Licensed -13dBm    Final\_Result RMS    Final\_Result PK

Plot # 26

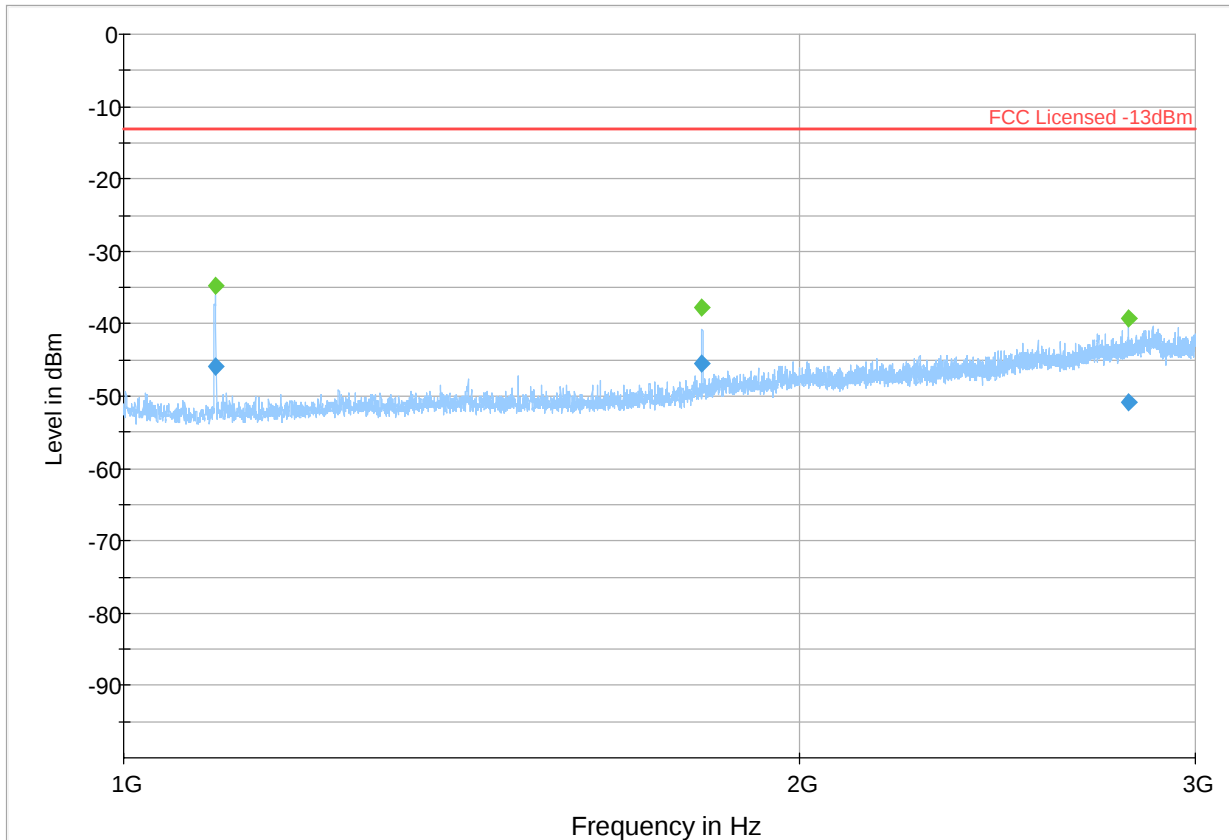
| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 518.23          | ---       | -36.32        | ---         | ---         | 500.0           | 100.0           | 100.0       | V   | 315.0         | -68.8      |
| 518.23          | -51.03    | ---           | -13.00      | 38.03       | 500.0           | 100.0           | 100.0       | V   | 315.0         | -68.8      |



Preview Result 1-PK+    FCC Licensed -13dBm    Final\_Result RMS    Final\_Result PK

Plot # 27

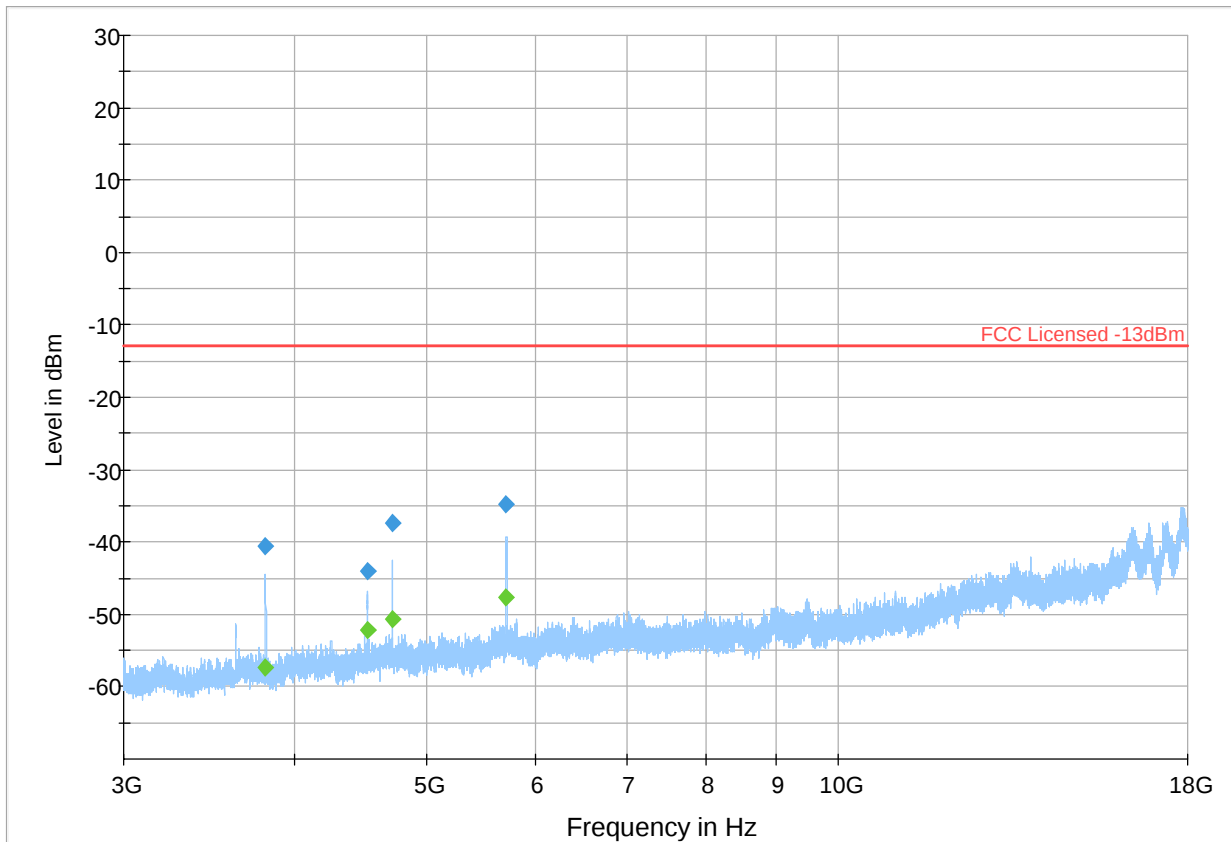
| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 1098.50         | ---       | -34.69        | ---         | ---         | 500.0           | 1000.0          | 186.0       | V   | 16.0          | -67.5      |
| 1098.50         | -45.91    | ---           | -13.00      | 32.91       | 500.0           | 1000.0          | 186.0       | V   | 16.0          | -67.5      |
| 1809.50         | ---       | -37.81        | ---         | ---         | 500.0           | 1000.0          | 134.0       | V   | 354.0         | -64.7      |
| 1809.50         | -45.43    | ---           | -13.00      | 32.43       | 500.0           | 1000.0          | 134.0       | V   | 354.0         | -64.7      |
| 2802.50         | ---       | -39.19        | ---         | ---         | 500.0           | 1000.0          | 325.0       | H   | 88.0          | -60.9      |
| 2802.50         | -50.95    | ---           | -13.00      | 37.95       | 500.0           | 1000.0          | 325.0       | H   | 88.0          | -60.9      |



Preview Result 1-PK+ FCC Licensed -13dBm Final\_Result RMS Final\_Result PK

Plot # 28

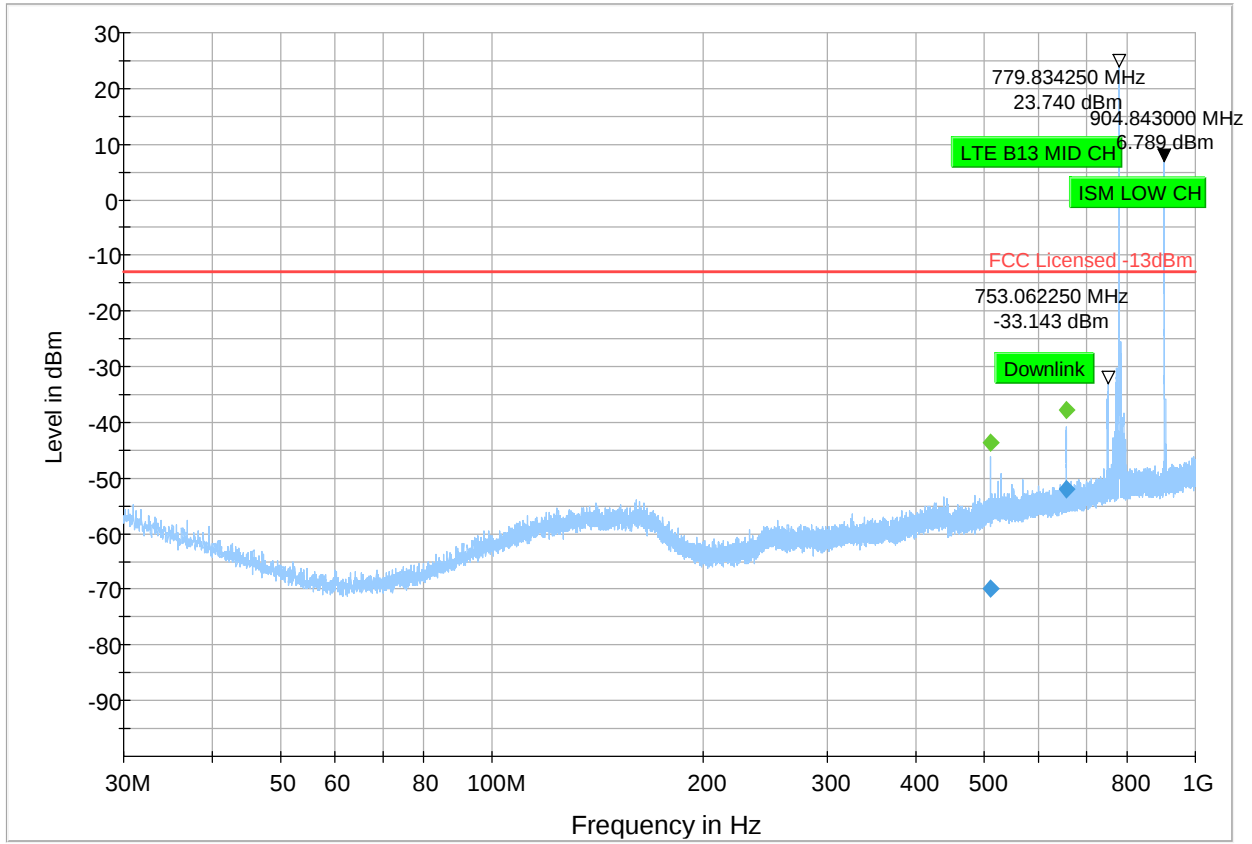
| Frequency (MHz) | MaxPeak (dBm) | RMS (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|---------------|-----------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 3810.75         | ---           | -57.28    | ---         | ---         | 500.0           | 1000.0          | 158.0       | V   | 12.0          | -101.5     |
| 3810.75         | -40.69        | ---       | -13.00      | 27.69       | 500.0           | 1000.0          | 158.0       | V   | 12.0          | -101.5     |
| 4523.75         | ---           | -52.26    | ---         | ---         | 500.0           | 1000.0          | 151.0       | V   | 288.0         | -99.2      |
| 4523.75         | -44.04        | ---       | -13.00      | 31.04       | 500.0           | 1000.0          | 151.0       | V   | 288.0         | -99.2      |
| 4716.00         | ---           | -50.64    | ---         | ---         | 500.0           | 1000.0          | 177.0       | V   | 185.0         | -98.1      |
| 4716.00         | -37.29        | ---       | -13.00      | 24.29       | 500.0           | 1000.0          | 177.0       | V   | 185.0         | -98.1      |
| 5716.50         | ---           | -47.66    | ---         | ---         | 500.0           | 1000.0          | 151.0       | V   | 32.0          | -95.9      |
| 5716.50         | -34.87        | ---       | -13.00      | 21.87       | 500.0           | 1000.0          | 151.0       | V   | 32.0          | -95.9      |



Preview Result 1-PK+ FCC Licensed -13dBm Final\_Result PK+ Final\_Result RMS

Plot # 29

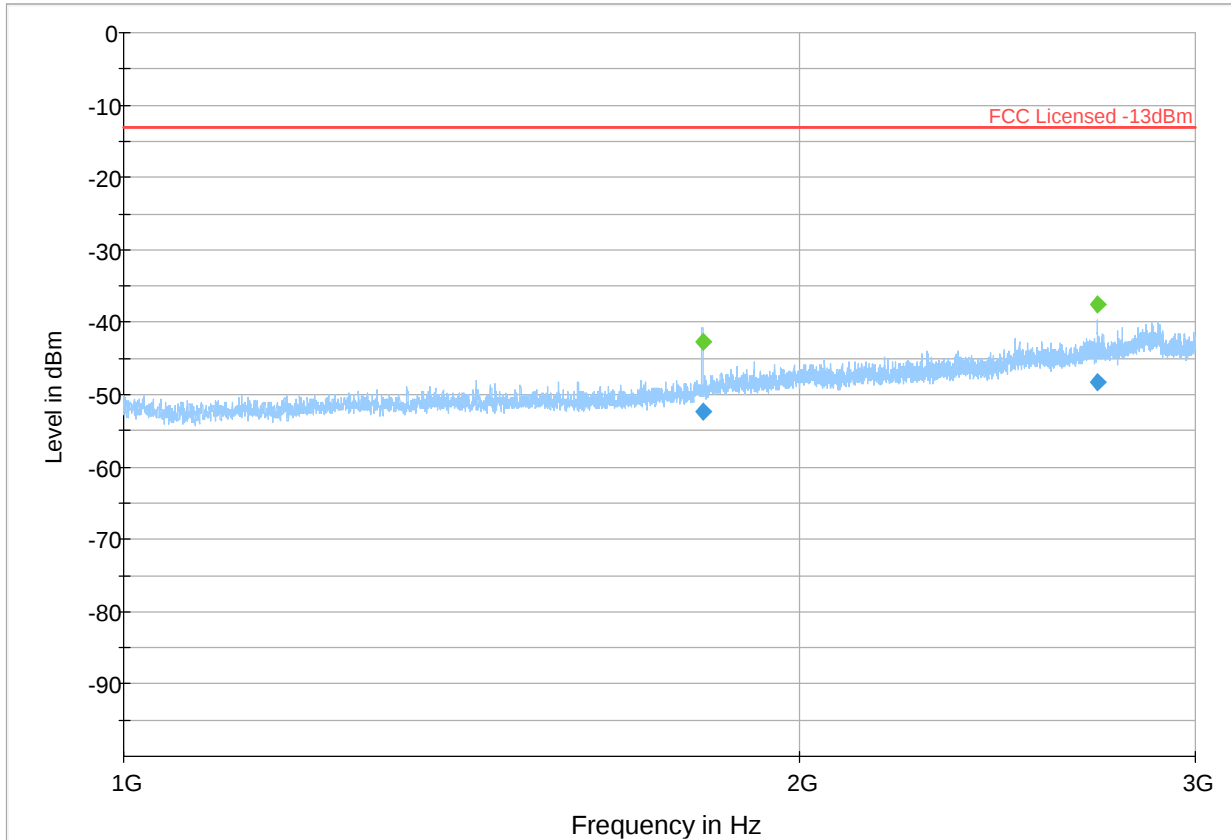
| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 511.10          | ---       | -43.56        | ---         | ---         | 500.0           | 100.0           | 100.0       | V   | 219.0         | -68.9      |
| 511.10          | -69.73    | ---           | -13.00      | 56.73       | 500.0           | 100.0           | 100.0       | V   | 219.0         | -68.9      |
| 655.19          | ---       | -37.79        | ---         | ---         | 500.0           | 100.0           | 107.0       | H   | 260.0         | -68.0      |
| 655.19          | -52.14    | ---           | -13.00      | 39.14       | 500.0           | 100.0           | 107.0       | H   | 260.0         | -68.0      |



Preview Result 1-PK+    FCC Licensed -13dBm    Final\_Result RMS    Final\_Result PK

Plot # 30

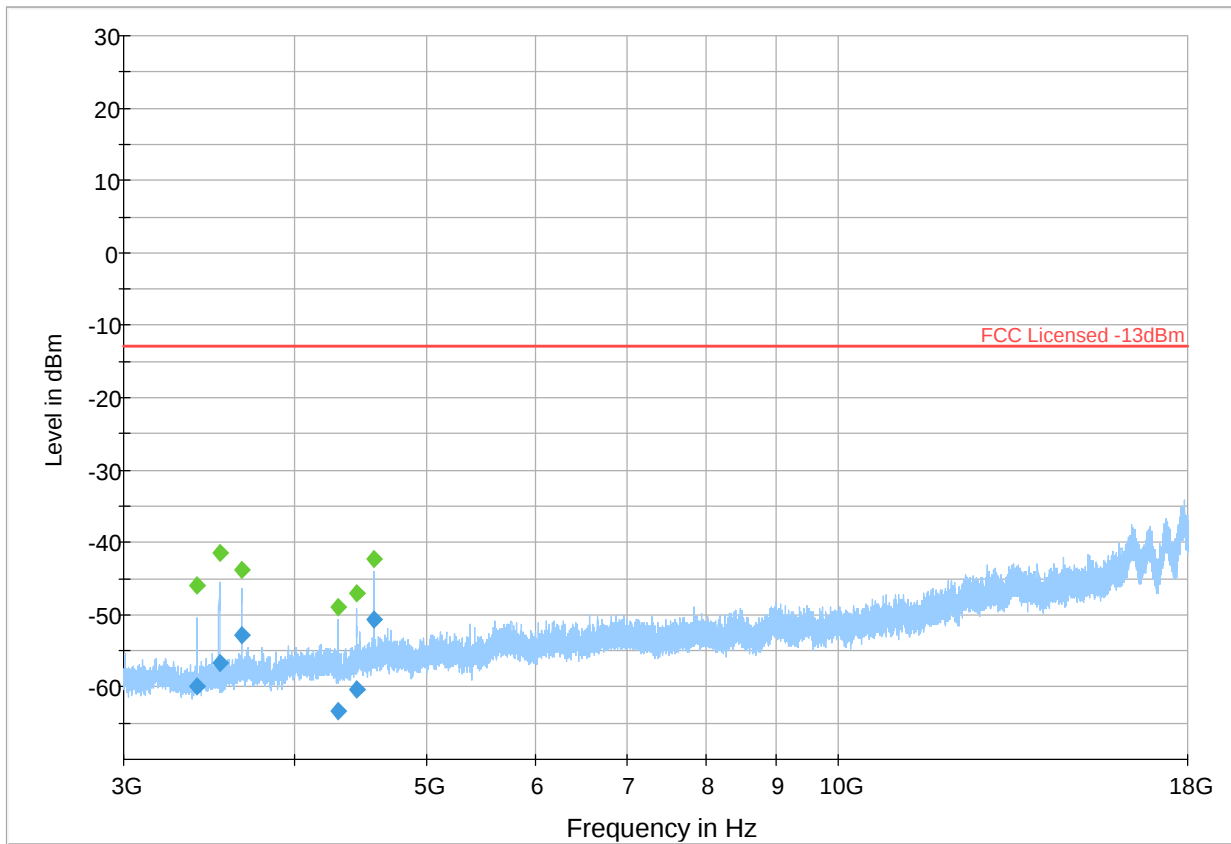
| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 1810.00         | ---       | -42.79        | ---         | ---         | 500.0           | 1000.0          | 236.0       | H   | -30.0         | -64.7      |
| 1810.00         | -52.47    | ---           | -13.00      | 39.47       | 500.0           | 1000.0          | 236.0       | H   | -30.0         | -64.7      |
| 2714.25         | ---       | -37.46        | ---         | ---         | 500.0           | 1000.0          | 277.0       | H   | 84.0          | -61.3      |
| 2714.25         | -48.21    | ---           | -13.00      | 35.21       | 500.0           | 1000.0          | 277.0       | H   | 84.0          | -61.3      |



Preview Result 1-PK+ FCC Licensed -13dBm Final\_Result RMS Final\_Result PK

Plot # 31

| Frequency (MHz) | RMS (dBm) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|-----------|---------------|-------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 3389.75         | ---       | -46.02        | ---         | ---         | 500.0           | 1000.0          | 210.0       | H   | 297.0         | -102.9     |
| 3389.75         | -59.97    | ---           | -13.00      | 46.97       | 500.0           | 1000.0          | 210.0       | H   | 297.0         | -102.9     |
| 3524.00         | ---       | -41.43        | ---         | ---         | 500.0           | 1000.0          | 273.0       | V   | 282.0         | -102.2     |
| 3524.00         | -56.60    | ---           | -13.00      | 43.60       | 500.0           | 1000.0          | 273.0       | V   | 282.0         | -102.2     |
| 3658.75         | ---       | -43.80        | ---         | ---         | 500.0           | 1000.0          | 143.0       | H   | 299.0         | -101.0     |
| 3658.75         | -52.80    | ---           | -13.00      | 39.80       | 500.0           | 1000.0          | 143.0       | H   | 299.0         | -101.0     |
| 4304.00         | ---       | -48.91        | ---         | ---         | 500.0           | 1000.0          | 221.0       | V   | 253.0         | -99.7      |
| 4304.00         | -63.39    | ---           | -13.00      | 50.39       | 500.0           | 1000.0          | 221.0       | V   | 253.0         | -99.7      |
| 4440.00         | ---       | -47.04        | ---         | ---         | 500.0           | 1000.0          | 107.0       | V   | 291.0         | -99.1      |
| 4440.00         | -60.30    | ---           | -13.00      | 47.30       | 500.0           | 1000.0          | 107.0       | V   | 291.0         | -99.1      |
| 4573.75         | ---       | -42.28        | ---         | ---         | 500.0           | 1000.0          | 169.0       | V   | 252.0         | -98.7      |
| 4573.75         | -50.62    | ---           | -13.00      | 37.62       | 500.0           | 1000.0          | 169.0       | V   | 252.0         | -98.7      |



Preview Result 1-PK+ FCC Licensed -13dBm Final\_Result RMS Final\_Result PK

## 8 Test setup photos

Setup photos are included in supporting file name: "EMC\_TELUL\_222\_24001\_FCC\_Setup\_Photos"

## 9 Test Equipment And Ancillaries Used For Testing

| Equipment Type            | Manufacturer    | Model     | Serial #  | Calibration Cycle | Last Calibration Date |
|---------------------------|-----------------|-----------|-----------|-------------------|-----------------------|
| ACTIVE LOOP ANTENNA       | ETS LINDGREN    | 6507      | 00161344  | 3 YEARS           | 10/30/2020            |
| BILOG ANTENNA             | ETS.LINDGREN    | 3142E     | 00166067  | 3 YEARS           | 03/12/2020            |
| HORN ANTENNA              | EMCO            | 3115      | 00035114  | 3 YEARS           | 08/10/2020            |
| HORN ANTENNA              | ETS.LINDGREN    | 3117      | 00215984  | 3 YEARS           | 01/31/2021            |
| HORN ANTENNA              | ETS.LINDGREN    | 3116      | 00070497  | 3 YEARS           | 11/23/2020            |
| TEST RECEIVER             | R&S             | ESU40     | 100251    | 3 YEARS           | 09/13/2021            |
| WIDEBAND COMM. TESTER     | R&S             | CMW 500   | 109825    | 3 YEARS           | 09/23/2020            |
| COMPACT DIGITAL BAROMETER | CONTROL COMPANY | 10510-922 | 200236891 | 3 YEARS           | 04/13/2020            |
| DIGITAL THRMOMETER        | CONTROL COMPANY | 36934-164 | 181230565 | 3 YEARS           | 01/10/2019            |

**Note:** Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.

Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

## 10 Revision History

| Date       | Report Name                   | Changes to report | Prepared by |
|------------|-------------------------------|-------------------|-------------|
| 2024-05-28 | EMC_TELUL_222_24001_FCC_24_27 | Initial Version   | Cheng Song  |

<<< The End >>>