



# FCC Test Report

FOR:

**iRhythm Technologies**

**Model Name / Model No: ZIO SR / K102A5001**

**Product Description: ZIO SR ECG Gateway.**

**FCC ID: 2AFBP-SR15G**

**47 CFR Part 22, 24**

**TEST REPORT #: EMC-IRHYT-003-15001-FCC-22-24-Rev1**

**DATE: 2015-10-09**



**FCC: Recognized**

**IC recognized #  
3462B-1**

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## **Table of Contents**

|       |                                                                          |           |
|-------|--------------------------------------------------------------------------|-----------|
| 1     | Assessment.....                                                          | 3         |
| 2     | Administrative Data .....                                                | 4         |
| 2.1   | Identification of the Testing Laboratory Issuing the Test Report .....   | 4         |
| 2.2   | Identification of the Client .....                                       | 4         |
| 2.3   | Identification of the Manufacturer .....                                 | 4         |
| 2.4   | Dates of Testing: .....                                                  | 4         |
| 3     | Equipment under Test (EUT).....                                          | 5         |
| 3.1   | Specification of the Equipment under Test .....                          | 5         |
| 3.2   | Identification of the Equipment under Test (EUT) .....                   | 6         |
| 3.3   | Identification of Accessory equipment.....                               | 6         |
| 3.4   | Identification of Ancillary equipment .....                              | 6         |
| 4     | Summary of Measurement Results .....                                     | 7         |
| 5     | Measurements.....                                                        | 9         |
| 5.1   | Measurement Uncertainty .....                                            | 9         |
| 5.2   | Nominal Environmental Conditions.....                                    | 9         |
| 5.3   | Nominal Environmental Test Conditions.....                               | 9         |
| 5.4   | Inheriting Test Results from Incorporated Module Certification:.....     | 9         |
| 5.5   | Nominal Cellular Test Conditions.....                                    | 9         |
| 5.6   | Additional Test Information.....                                         | 9         |
| 6     | RF Power Output verification .....                                       | 10        |
| 6.1   | References .....                                                         | 10        |
| 6.2   | Limits: .....                                                            | 10        |
| 6.4   | Measurement Results Summary:.....                                        | 11        |
| 6.5   | Test Verdic: .....                                                       | 11        |
| 7     | Spurious Emissions Radiated.....                                         | 12        |
| 7.1   | References:.....                                                         | 12        |
| 7.2   | Limits: .....                                                            | 12        |
| 7.2.1 | <i>FCC 22.917 Emission limitations for cellular equipment.....</i>       | <i>12</i> |
| 7.2.2 | <i>FCC 24.238 Emission limitations for Broadband PCS equipment. ....</i> | <i>12</i> |
| 7.3   | Radiated out of band measurement procedure: .....                        | 13        |
| 7.3.1 | <i>Sample Calculations for Radiated Measurements: .....</i>              | <i>14</i> |
| 7.3.2 | <i>Spectrum Analyzer Settings.....</i>                                   | <i>14</i> |
| 7.4   | Test Results .....                                                       | 15        |
| 7.4.1 | <i>CDMA 850.....</i>                                                     | <i>15</i> |
| 7.4.2 | <i>CDMA 1900.....</i>                                                    | <i>15</i> |
| 7.5   | BC0 Band Radiated Emission Plots:.....                                   | 16        |
| 7.6   | BC1 Band Radiated Emission Plots .....                                   | 23        |
| 8     | Test Equipment and Ancillaries used for tests. ....                      | 31        |
| 9     | Block Diagrams.....                                                      | 32        |
| 10    | Revision History .....                                                   | 34        |

## 1 Assessment

The following equipment as further described in section 3 of this test report was evaluated against the applicable criteria specified in FCC CFR47 Parts 22 and 24 and No deviations were ascertained during the course of the tests performed.

| Company              | Description        | Model #   |
|----------------------|--------------------|-----------|
| iRhythm Technologies | ZIO SR ECG Gateway | K102A5001 |

### Report reviewed by:

| Franz Engert<br>Manager<br>Compliance Services |            |      |           |
|------------------------------------------------|------------|------|-----------|
| 2015-10-09                                     | Compliance |      |           |
| Date                                           | Section    | Name | Signature |

### Responsible for the Report:

| James Donnellan<br>(Sr. EMC Engineer) |            |      |           |
|---------------------------------------|------------|------|-----------|
| 2015-10-09                            | Compliance |      |           |
| 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 Test Report

|                                   |                                                            |
|-----------------------------------|------------------------------------------------------------|
| <b>Company Name:</b>              | CETECOM Inc.                                               |
| <b>Department:</b>                | Compliance                                                 |
| <b>Address:</b>                   | CETECOM Inc.<br>411 Dixon Landing Rd<br>Milpitas, CA 95035 |
| <b>Telephone:</b>                 | +1 (408) 586 6200                                          |
| <b>Fax:</b>                       | +1 (408) 586 6299                                          |
| <b>Compliance Manager:</b>        | Franz Engert                                               |
| <b>Responsible Project Leader</b> | James Donnellan                                            |

### 2.2 Identification of the Client

|                          |                           |
|--------------------------|---------------------------|
| <b>Client Firm/Name:</b> | iRhythm Technologies      |
| <b>Street Address:</b>   | 650 Townsend St., Ste 380 |
| <b>City/Zip Code</b>     | San Francisco, CA 94103   |
| <b>Country</b>           | USA                       |
| <b>Contact Person:</b>   | Matt Ho                   |
| <b>Phone No.</b>         | 415-632-5714              |
| <b>Fax:</b>              | 415-632-5701              |
| <b>e-mail:</b>           | mho@irhythmtech.com       |

### 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>                |                 |

### 2.4 Dates of Testing:

2015/05/25 – 2015/06/03

### 3 Equipment under Test (EUT)

#### 3.1 Specification of the Equipment under Test

|                                                     |                                                                                                                                                                                                     |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Marketing Name / Description:</b>                | SkyRunner Gateway                                                                                                                                                                                   |
| <b>Model Number:</b>                                | K102A5001                                                                                                                                                                                           |
| <b>FCC-ID :</b>                                     | 2AFBP-SR15G                                                                                                                                                                                         |
| <b>Product Description:</b>                         | ZIO SR ECG Gateway                                                                                                                                                                                  |
| <b>Technology / Type(s) of Modulation:</b>          | CDMA 850/1900MHz                                                                                                                                                                                    |
| <b>Operating Frequency Ranges (MHz) / Channels:</b> | Incorporated integrated radio module: Telit, model CE910-DUAL<br>FCC-ID: RI7CE910-DUAL IC ID: 5131A-CE910DUAL<br>CDMA 850: 825.03-848.97; 800 channels<br>CDMA 1900: 1850.05-1909.95; 1200 channels |
| <b>Antenna info:</b>                                | Internal Hexa-Band Cellular SMD Antenna from Toglas<br>Product Name: Anam P/N PA.25a<br>Documented Max Antenna Gain:<br>850MHz: 1.5 dBi,<br>1900MHz: 2.3 dBi                                        |
| <b>Rated Operating Voltage Range:</b>               | Low: 3.7 Nom: 3.9 High: 4.2                                                                                                                                                                         |
| <b>Rated Operating Temperature Range:</b>           | 0°C to 45°C                                                                                                                                                                                         |
| <b>Test Sample Status:</b>                          | Production                                                                                                                                                                                          |
| <b>Other Radios contained in the device:</b>        | A Bluetooth LE TiWi-uB1 Module from LS Research, LLC.<br>FCC ID: TFB-BT2 IC ID: 5969A-BT2                                                                                                           |

### 3.2 Identification of the Equipment under Test (EUT)

| EUT # | Serial Number | Sample    | HW / SW Version         |
|-------|---------------|-----------|-------------------------|
| 1     | J152001511    | Radiated  | 2 / CC2541_SmartRF_Host |
| 2     | J152001503    | Conducted | 2 / CC2541_SmartRF_Host |

### 3.3 Identification of Accessory equipment

| STE # | Type               | Manufacturer       | Model                 | Serial Number |
|-------|--------------------|--------------------|-----------------------|---------------|
| 2     | 3.6 V Battery Pack | House Of Batteries | NCA103450-PC-1 Rev. B | -             |

### 3.4 Identification of Ancillary equipment

| STE # | Type                         | Manufacturer | Model           | Serial Number |
|-------|------------------------------|--------------|-----------------|---------------|
| 1     | Gateway Programming Assembly | iRhythm      | -               | -             |
| 2     | Laptop                       | Dell         | Latitude E6430s | 966X7W1       |

#### 4 Summary of Measurement Results

##### CDMA 850MHz Band:

| Test Specification     | Test Case                    | Temperature and Voltage Conditions | Mode | Pass | Fail | NA | NP | Result   |
|------------------------|------------------------------|------------------------------------|------|------|------|----|----|----------|
| §2.1046<br>§22.913 (a) | RF Output Power              | Nominal                            | CDMA | ■    | □    | □  | □  | Complies |
| §2.1055<br>§22.355     | Frequency Stability          | Nominal                            | CDMA | □    | □    | □  | ■  | Note 1   |
| §2.1049<br>§22.917(b)  | Occupied Bandwidth           | Nominal                            | CDMA | □    | □    | □  | ■  | Note 1   |
| §2.1051<br>§22.917     | Band Edge Compliance         | Nominal                            | CDMA | □    | □    | □  | ■  | Note 1   |
| §2.1051<br>§22.917     | Conducted Spurious Emissions | Nominal                            | CDMA | □    | □    | □  | ■  | Note 1   |
| §2.1053<br>§22.917     | Radiated Spurious Emissions  | Nominal                            | CDMA | ■    | □    | □  | □  | Complies |

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

Note 1: Leveraged from module certification. See Section 5.4

**CDMA 1900 MHz Band:**

| Test Specification     | Test Case                    | Temperature and Voltage Conditions | Mode | Pass | Fail | NA | NP | Result   |
|------------------------|------------------------------|------------------------------------|------|------|------|----|----|----------|
| §2.1046<br>§24.232 (a) | RF Output Power              | Nominal                            | CDMA | ■    | □    | □  | □  | Complies |
| §2.1055<br>§24.235     | Frequency Stability          | Nominal                            | CDMA | □    | □    | □  | ■  | Note 1   |
| §2.1049<br>§24.238(b)  | Occupied Bandwidth           | Nominal                            | CDMA | □    | □    | □  | ■  | Note 1   |
| §2.1051<br>§24.238     | Band Edge Compliance         | Nominal                            | CDMA | □    | □    | □  | ■  | Note 1   |
| §2.1051<br>§24.238     | Conducted Spurious Emissions | Nominal                            | CDMA | □    | □    | □  | ■  | Note 1   |
| §2.1053<br>§24.238     | Radiated Spurious Emissions  | Nominal                            | CDMA | ■    | □    | □  | □  | Complies |

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

Note 1: Leveraged from module certification. See Section 5.4



## 5 Measurements

### 5.1 Measurement Uncertainty

|                                                             | Uncertainty<br>in dB<br>radiated<br><30MHz | Uncertainty<br>in dB<br>radiated<br>30MHz -<br>1GHz | Uncertainty<br>in dB<br>radiated ><br>1GHz | Uncertainty<br>in dB<br>Conducted<br>measurement |
|-------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------|--------------------------------------------|--------------------------------------------------|
| <b>standard deviation k=1</b>                               | 2.48                                       | 1.94                                                | 2.16                                       | 0.64                                             |
| <b>95% confidence interval<br/>in dB</b>                    | 4.86                                       | 3.79                                                | 4.24                                       | 1.25                                             |
| <b>95% confidence interval<br/>in dB in delta to Result</b> | +/-2.5 dB                                  | +/-2.0 dB                                           | +/- 2.3dB                                  | +/-0.7dB                                         |

### 5.2 Nominal Environmental Conditions

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

### 5.3 Nominal Environmental Test Conditions

- Test Temperature: 20°C (nominal);
- Test Voltage: 3.7 VDC( nominal);

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

### 5.4 Inheriting Test Results from Incorporated Module Certification:

The EUT integrates the certified Telit UE910-NAD module (details see EUT spec in section 3.1)

Test Report No. : NK-12-R-098 for this integrated module issued on July 27, 2012 by Nemko Korea Co., Ltd. Results are leveraged in this report.

Taking into account guidance from FCC KDB 996369 (modular approval) and where relevant test procedures did not change conducted test results are leveraged.

This test report contains full radiated testing as per FCC 22H/24E

### 5.5 Nominal Cellular Test Conditions

1. The different cellular operation modes of the EUT as required for testing are controlled through the link with the Digital Radio Communication Tester (R&S CMU200).
2. The EUT is tested on the low, mid and high channel of each of the supported cellular operation modes.

### 5.6 Additional Test Information.

Testing is performed according to the guidelines provided in FCC publication (KDB) 971168 D01 v02r02, *Measurement Guidance for Certification of Licensed Digital Transmitters* and according to relevant parts of TIA-603C 2004 as detailed below.

---

## **6 RF Power Output verification**

### **6.1 References**

FCC: CFR Part 2.1046, CFR Part 22.913, CFR Part 24.232

### **6.2 Limits:**

#### **ERP/EIRP (850 MHz Band)**

FCC Part 22.913 (a)

#### **FCC: ERP < 38.45 dBm (7W)**

The effective radiated power (ERP) of mobile transmitters must not exceed 7 Watts.

#### **EIRP (1900 MHz Band)**

FCC Part 24.232 (c) (e) &

#### **FCC: EIRP < 33 dBm (2W)**

(b) Mobile/portable stations are limited to 2 Watts effective isotropic radiated power (EIRP).

(c) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement over the full bandwidth of the channel.

#### 6.4 Measurement Results Summary:

The measurements were made on the CMU 200 while connected directly to the device. The cable attenuations are accounted for in the measurements and using the appropriate gains from the antenna Specification document SPE-11-8-061/G we calculate the EIRP.

| Conducted Measurement and EIRP Summary |         |                 |                       |              |       |
|----------------------------------------|---------|-----------------|-----------------------|--------------|-------|
| Band                                   | Channel | Frequency [MHz] | Max Average power dBm | Antenna Gain | EIRP  |
| BC0                                    | 1013    | 824.7           | 24.09                 | 1.5          | 25.59 |
|                                        | 384     | 836.6           | 23.96                 | 1.5          | 25.46 |
|                                        | 777     | 848.31          | 23.93                 | 1.5          | 25.43 |
| BC1                                    | 25      | 1851.25         | 23.76                 | 2.3          | 26.06 |
|                                        | 600     | 1880            | 23.99                 | 2.3          | 26.29 |
|                                        | 1175    | 1908.75         | 24.05                 | 2.3          | 26.35 |

Given the conducted measurements above are in line with the FCC module report for the integrated module, I am using results from the integrated module report to calculate the PAPR below. Referencing KDB) 971168 section 5.7.2 Alternate procedure for PAPR I get the values indicated below for Peak to Average Power Ratio..

| Conducted Measurement From FCC Module Report NK-12-R-098 |         |                   |                |                                |
|----------------------------------------------------------|---------|-------------------|----------------|--------------------------------|
| Band                                                     | Channel | Average power dBm | Peak power dBm | Peak to Average Power Ratio dB |
| Cellular                                                 | 1013    | 24.65             | 29.05          | 4.40                           |
|                                                          | 384     | 24.49             | 29.22          | 4.73                           |
|                                                          | 777     | 24.10             | 28.88          | 4.78                           |
| PCS                                                      | 25      | 24.08             | 27.33          | 3.25                           |
|                                                          | 600     | 24.29             | 27.85          | 3.56                           |
|                                                          | 1175    | 24.44             | 28.47          | 4.03                           |

#### 6.5 Test Verdict:

PASS: All ERP/EIRP are within the regulatory limits

## **7 Spurious Emissions Radiated**

### **7.1 References:**

FCC: CFR Part 2.1053, CFR Part 22.917, CFR Part 24.238, CFR Part 27.53

### **7.2 Limits:**

(a) *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.

For all power levels +30dBm to 0dBm, this becomes a constant specification of -13dBm.

#### **7.2.1 FCC 22.917 Emission limitations for cellular equipment.**

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

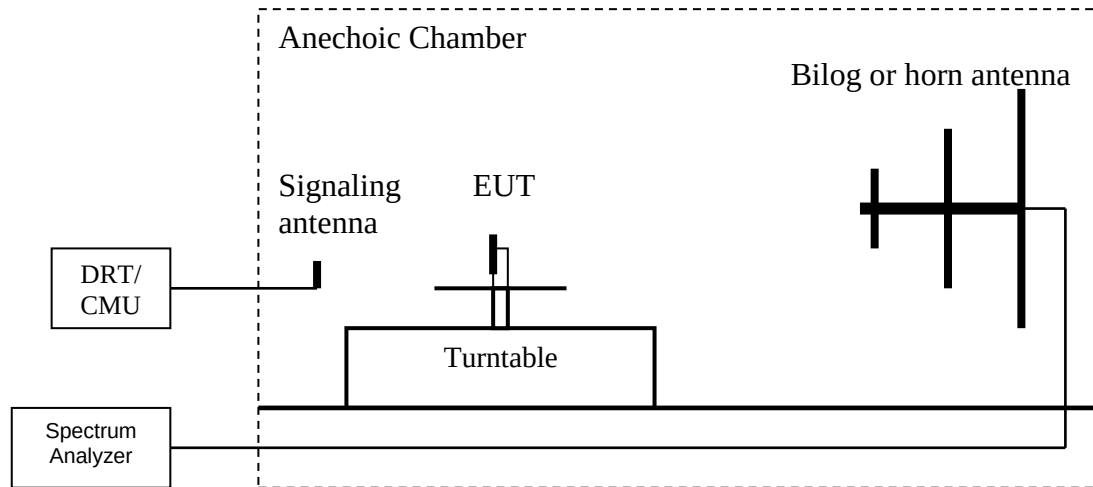
#### **7.2.2 FCC 24.238 Emission limitations for Broadband PCS equipment.**

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

### 7.3 Radiated out of band measurement procedure:

#### Ref: TIA-603C 2004- 2.2.12 Unwanted emissions: Radiated Spurious



1. Connect the equipment as shown in the above diagram with the EUT's antenna in a horizontal orientation.
2. Adjust the settings of the Digital Radio Communication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to measure peak hold with the required settings.
4. Place the measurement antenna in a horizontal orientation. Rotate the EUT 360°. Raise the measurement antenna up to 4 meters in 0.5 meters increments and rotate the EUT 360° at each height to maximize all emissions. Measure and record all spurious emissions (**LVL**) up to the tenth harmonic of the carrier frequency.
5. Replace the EUT with a horizontally polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal generator with known output power and record the path loss in dB (**LOSS**). **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).
7. Determine the level of spurious emissions using the following equation:  
**Spurious** (dBm) = **LVL** (dBm) + **LOSS** (dB):
8. Repeat steps 4, 5 and 6 with all antennas vertically polarized.
9. Determine the level of spurious emissions using the following equation:  
**Spurious** (dBm) = **LVL** (dBm) + **LOSS** (dB):
10. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.  
(**Note:** Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4 and 7 above are performed with test software.)

### 7.3.1 Sample Calculations for Radiated Measurements: **Power Measurements using Substitution Procedure:**

The measurement on the Spectrum Analyzer is used as a basis for the Substitution procedure. The EUT is replaced with a Signal Generator and an antenna. The setting on the Signal Generator is varied until the Spectrum Analyzer displays the original reading. EIRP is calculated as-

EIRP (dBm)= Signal Generator setting (dBm)- Cable Loss (dB)+ Antenna Gain (dBi). Example below.

| Frequency (MHz) | Measured SA (dBμV) | Signal Generator setting (dBm) | Antenna Gain (dBi) | Dipole Gain (dBd) | Cable Loss (dB) | EIRP (dBm) |
|-----------------|--------------------|--------------------------------|--------------------|-------------------|-----------------|------------|
| 1000            | 95.5               | 24.5                           | 6.5                | 0                 | 3.5             | 27.5       |

### 7.3.2 Spectrum Analyzer Settings **Settings for FCC 22**

|                             | 30MHz – 1 GHz | 1 – 1.58 GHz | 1.58 – 9 GHz |
|-----------------------------|---------------|--------------|--------------|
| <b>Resolution Bandwidth</b> | 100 kHz       | 1 MHz        | 1 MHz        |
| <b>Video Bandwidth</b>      | 100 kHz       | 1 MHz        | 1 MHz        |
| <b>Detector</b>             | Peak          | Peak         | Peak         |
| <b>Trace Mode</b>           | Max Hold      | Max Hold     | Max Hold     |
| <b>Sweep Time</b>           | Auto          | Auto         | Auto         |

### **Settings for FCC 24**

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

## 7.4 Test Results

### 7.4.1 CDMA 850.

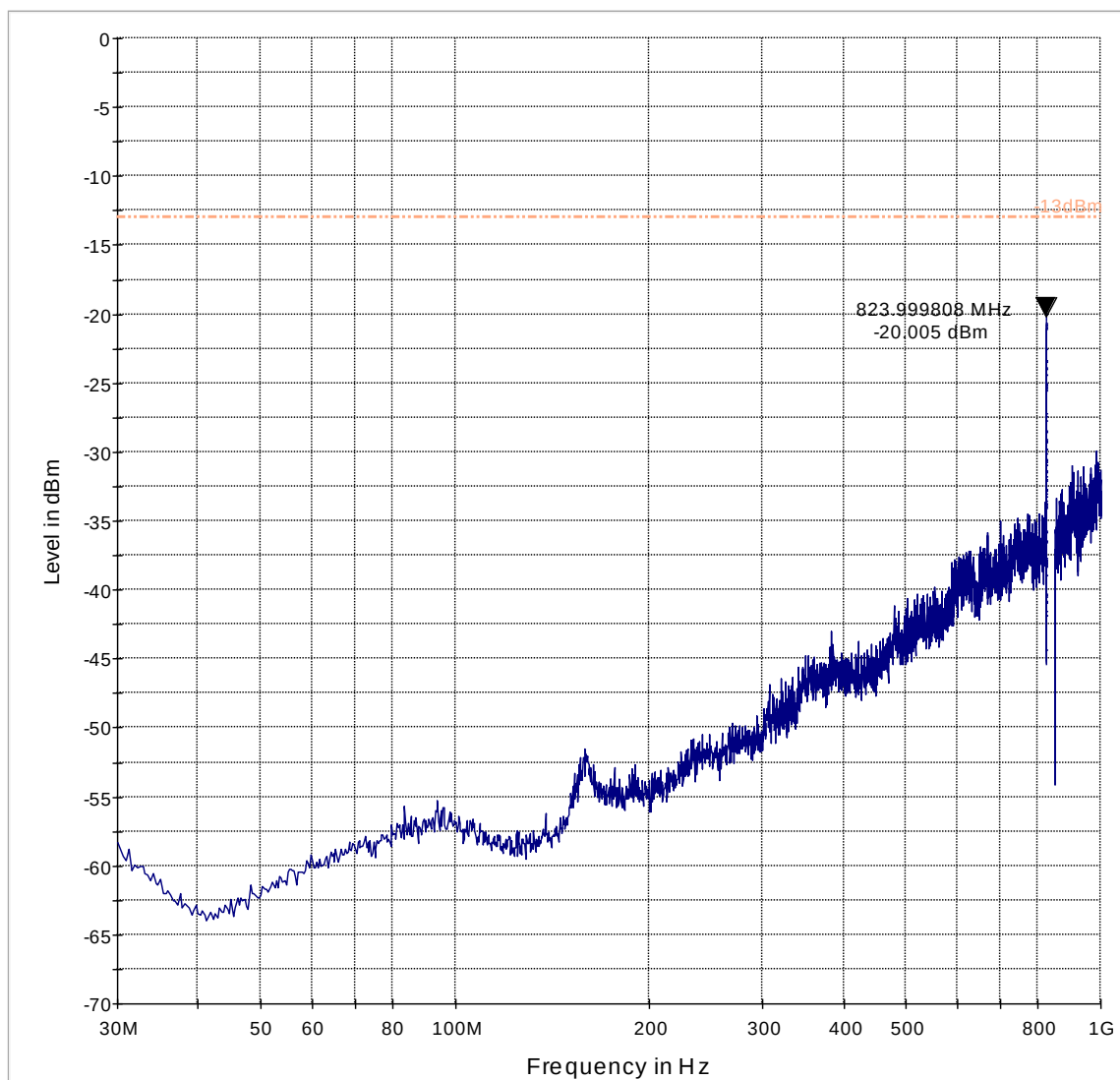
| Harmonic                                          | Tx ch-128<br><br>Freq.<br>(MHz) | Level<br>(dBm) | Tx ch-190<br><br>Freq. (MHz) | Level<br>(dBm) | Tx ch-251<br><br>Freq.<br>(MHz) | Level<br>(dBm) | Limit FCC<br>and IC<br>(dBm) |
|---------------------------------------------------|---------------------------------|----------------|------------------------------|----------------|---------------------------------|----------------|------------------------------|
| 2                                                 | 1648.4                          | -38.8          | 1673.2                       | -43.1          | 1697.6                          | NF             | -13                          |
| 3                                                 | 2472.6                          | NF             | 2509.8                       | NF             | 2546.4                          | NF             |                              |
| 4                                                 | 3296.8                          | NF             | 3346.4                       | NF             | 3395.2                          | NF             |                              |
| 5                                                 | 4121                            | NF             | 4183                         | NF             | 4244                            | NF             |                              |
| 6                                                 | 4945.2                          | NF             | 5019.6                       | NF             | 5092.8                          | NF             |                              |
| 7                                                 | 5769.4                          | NF             | 5856.2                       | NF             | 5941.6                          | NF             |                              |
| 8                                                 | 6593.6                          | NF             | 6692.8                       | NF             | 6790.4                          | NF             |                              |
| 9                                                 | 7417.8                          | NF             | 7529.4                       | NF             | 7639.2                          | NF             |                              |
| 10                                                | 8242                            | NF             | 8366                         | NF             | 8488                            | NF             |                              |
| NF = Noise Floor<br>Measurement Uncertainty: ±3dB |                                 |                |                              |                |                                 |                |                              |

### 7.4.2 CDMA 1900

| Harmonic                                          | Tx ch-512<br>Freq. (MHz) | Level<br>(dBm) | Tx ch-661<br>Freq. (MHz) | Level<br>(dBm) | Tx ch-810<br>Freq. (MHz) | Level<br>(dBm) | Limit<br>FCC<br>and IC<br>(dBm) |
|---------------------------------------------------|--------------------------|----------------|--------------------------|----------------|--------------------------|----------------|---------------------------------|
| 2                                                 | 3700.4                   | -29.7          | 3760                     | NF             | 3819.6                   | -35.0          | -13                             |
| 3                                                 | 5550.6                   | NF             | 5640                     | NF             | 5729.4                   | NF             |                                 |
| 4                                                 | 7400.8                   | NF             | 7520                     | NF             | 7639.2                   | NF             |                                 |
| 5                                                 | 9251                     | NF             | 9400                     | NF             | 9549                     | NF             |                                 |
| 6                                                 | 11101.2                  | NF             | 11280                    | NF             | 11458.8                  | NF             |                                 |
| 7                                                 | 12951.4                  | NF             | 13160                    | NF             | 13368.6                  | NF             |                                 |
| 8                                                 | 14801.6                  | NF             | 15040                    | NF             | 15278.4                  | NF             |                                 |
| 9                                                 | 16651.8                  | NF             | 16920                    | NF             | 17188.2                  | NF             |                                 |
| 10                                                | 18502                    | NF             | 18800                    | NF             | 19098                    | NF             |                                 |
| NF = Noise Floor<br>Measurement Uncertainty: ±3dB |                          |                |                          |                |                          |                |                                 |

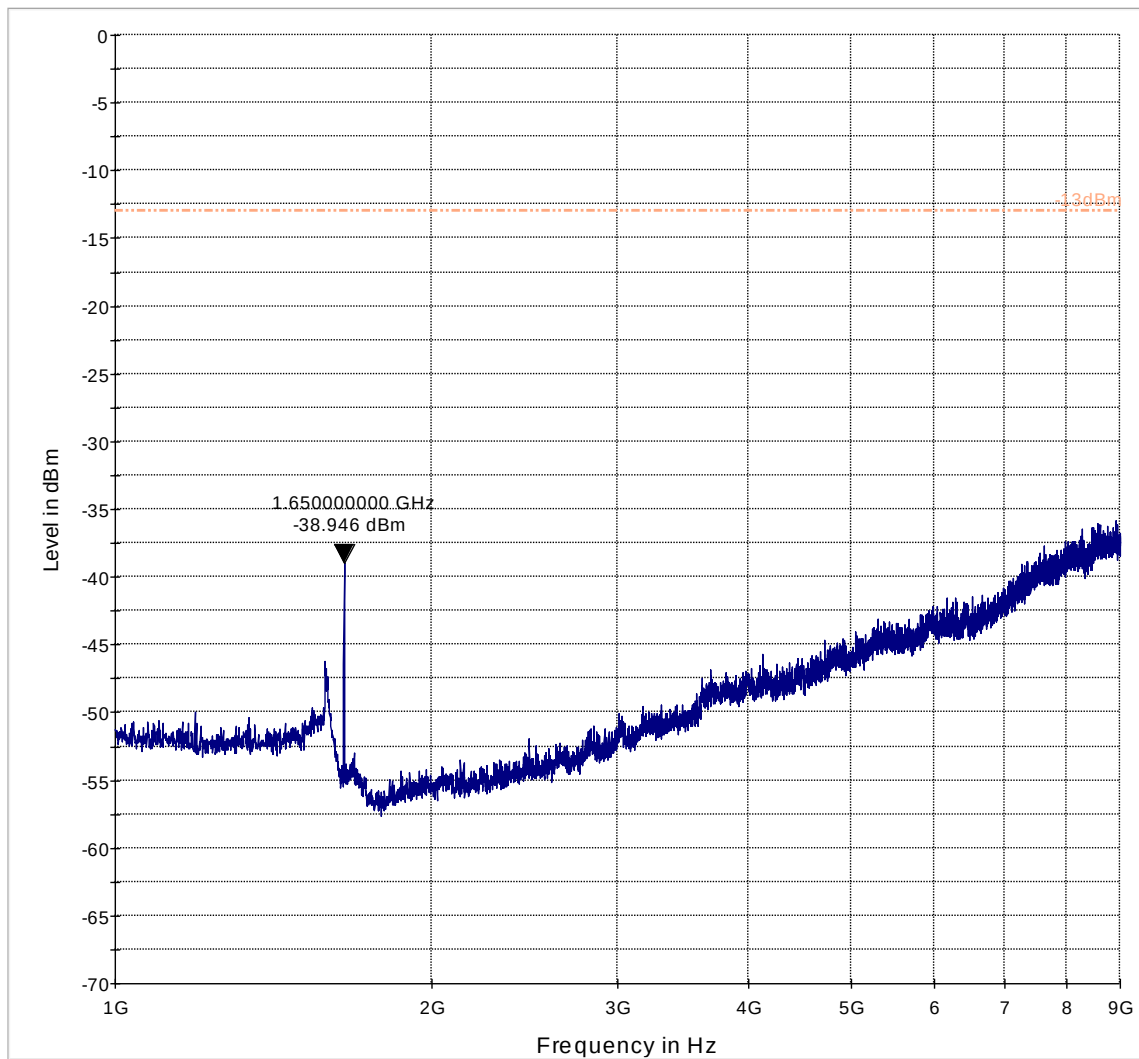
## 7.5 BC0 Band Radiated Emission Plots:

### 30 MHz – 1 GHz, CDMA 850, Tx: Ch. Low

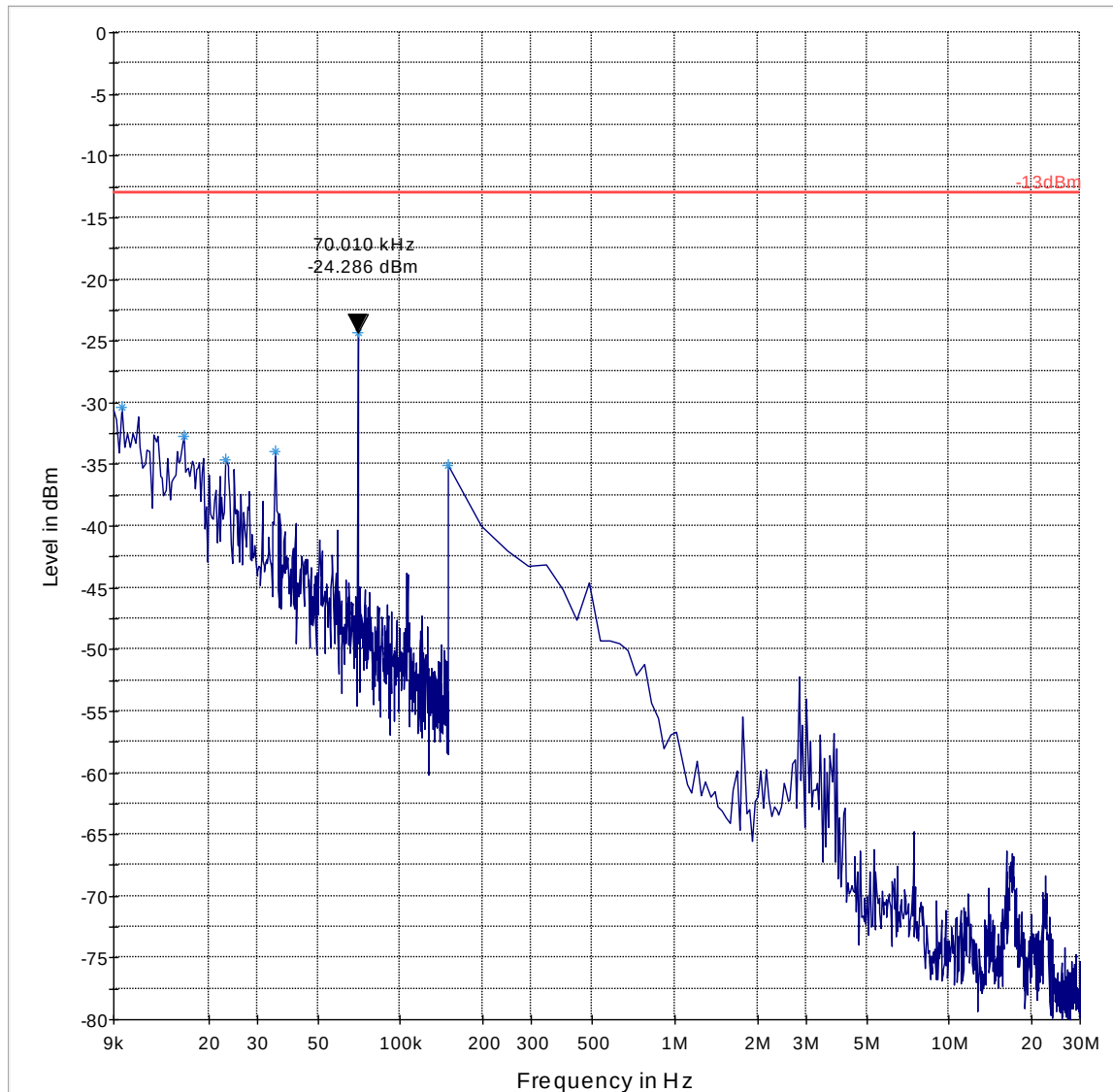




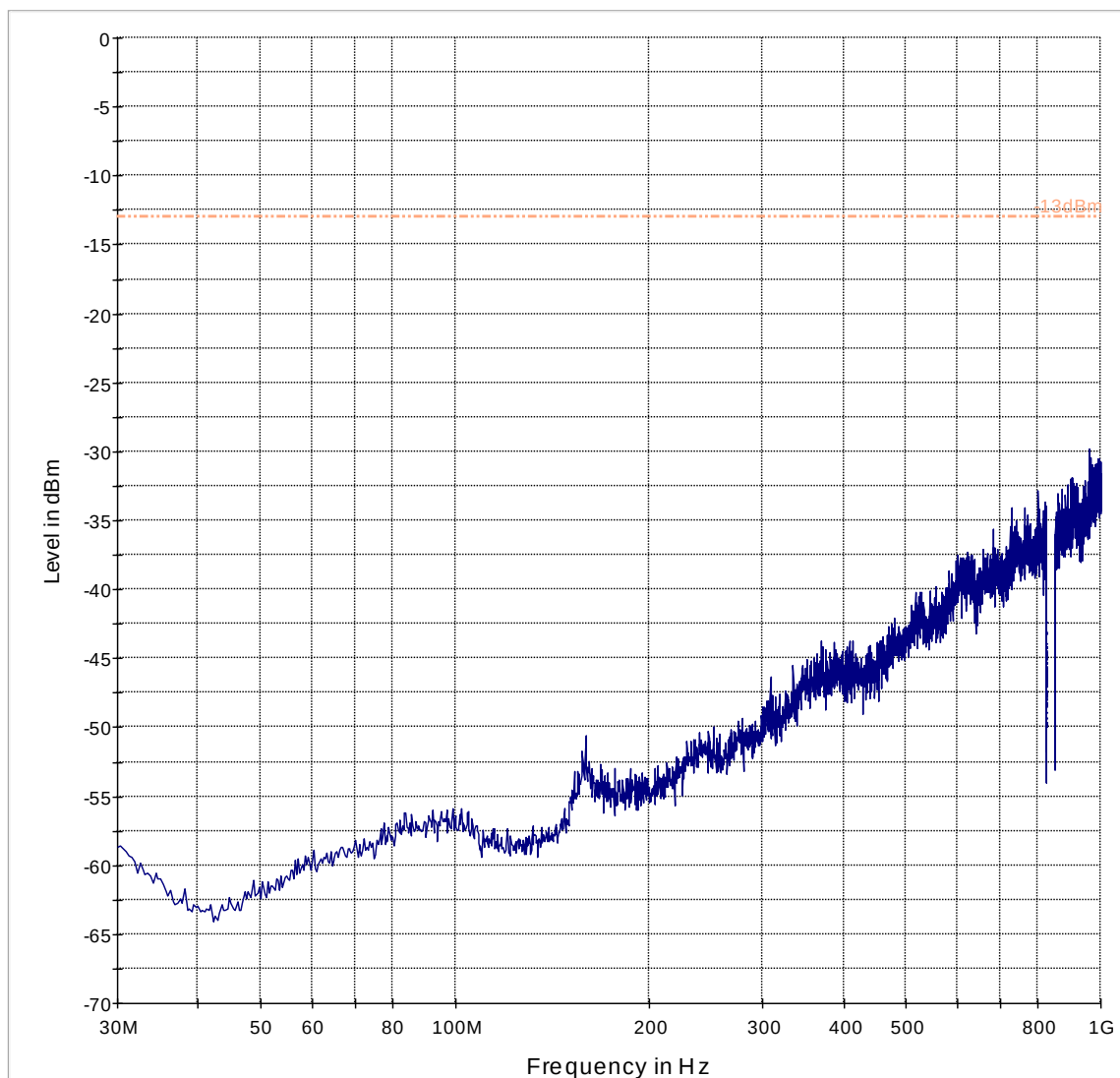
**1 GHz – 9 GHz, CDMA 850, Tx: Ch. Low**



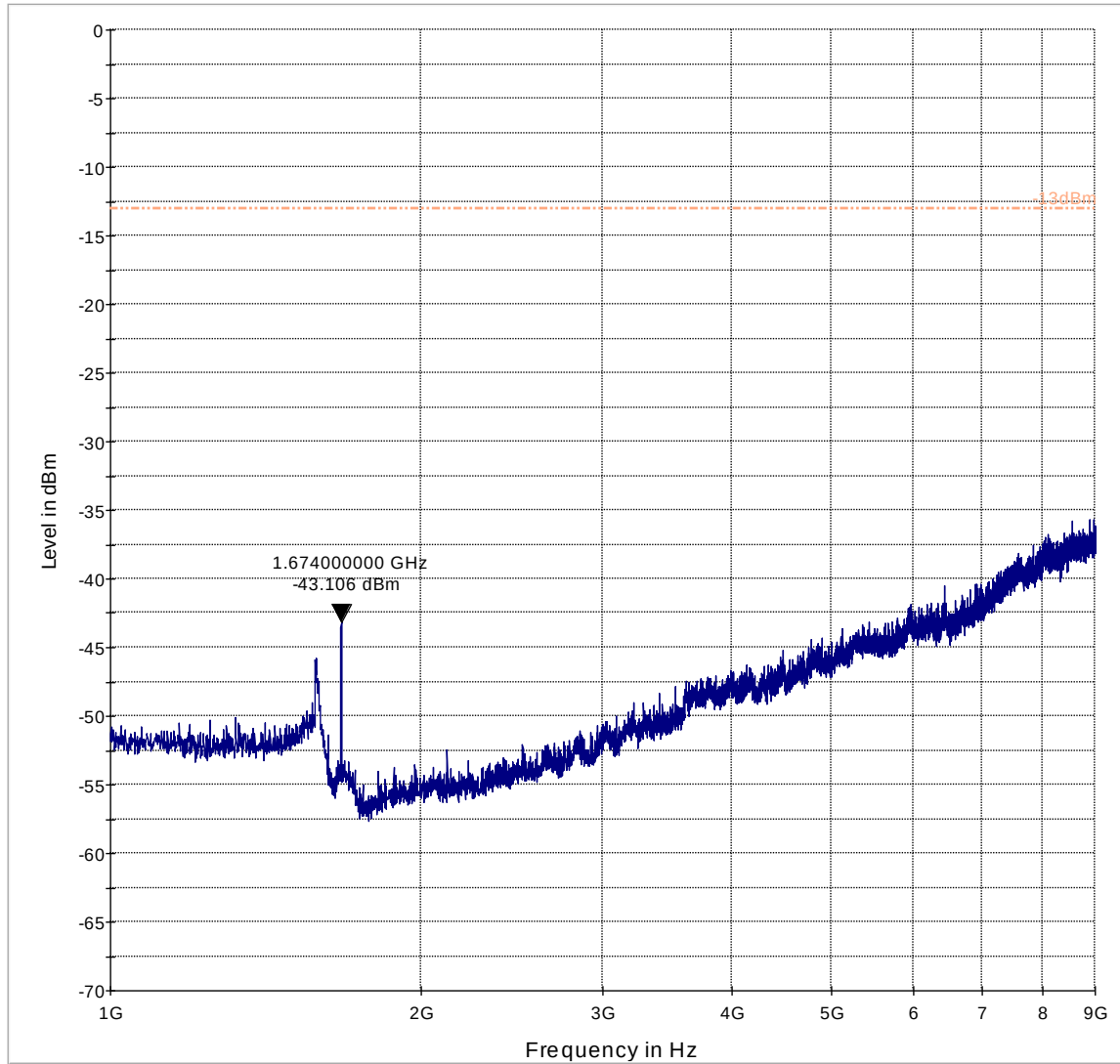
**9 KHz – 30 MHz, CDMA 850, Tx: Ch. Mid**



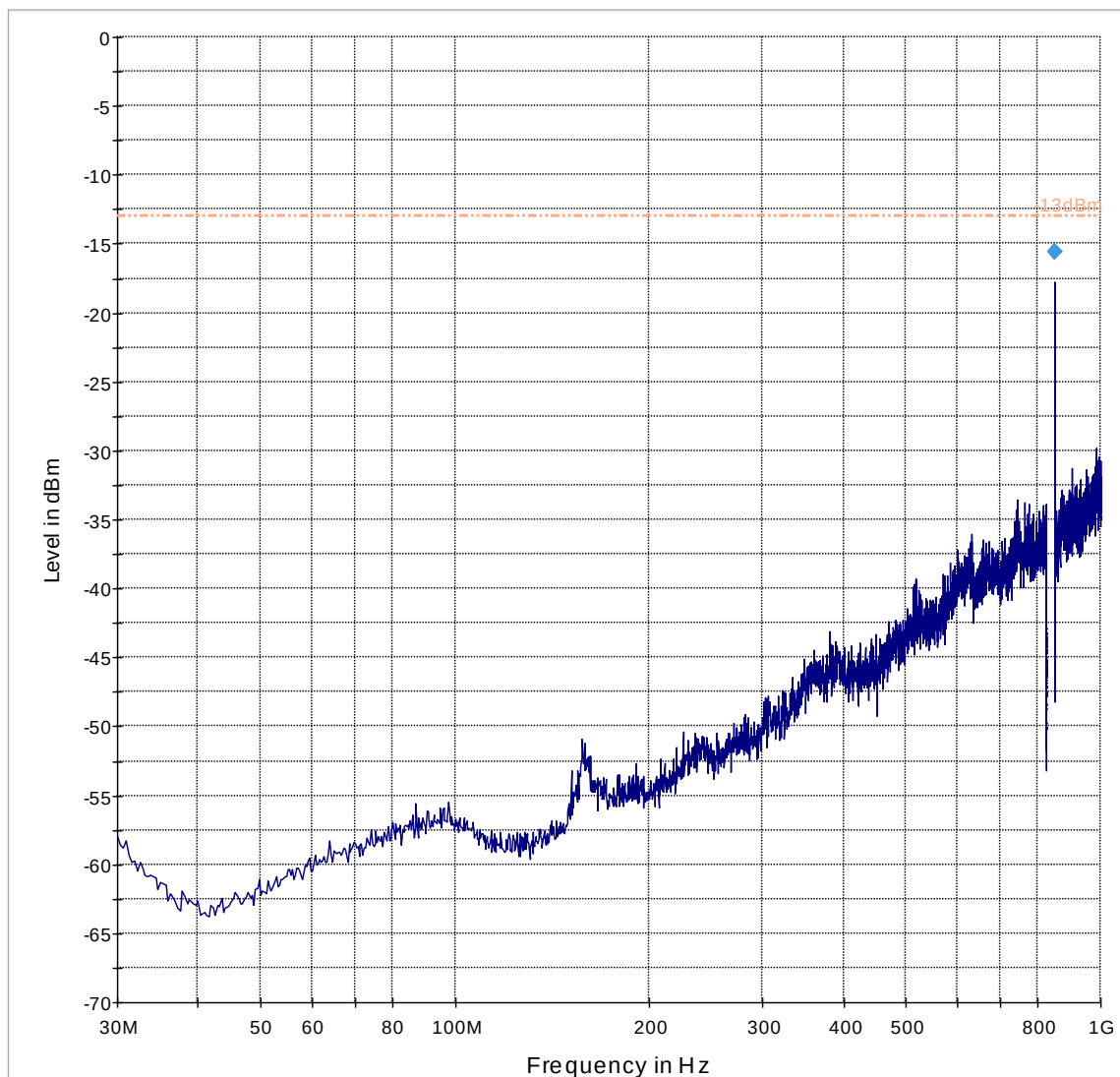
**30 MHz – 1 GHz, CDMA 850, Tx: Ch. Mid**



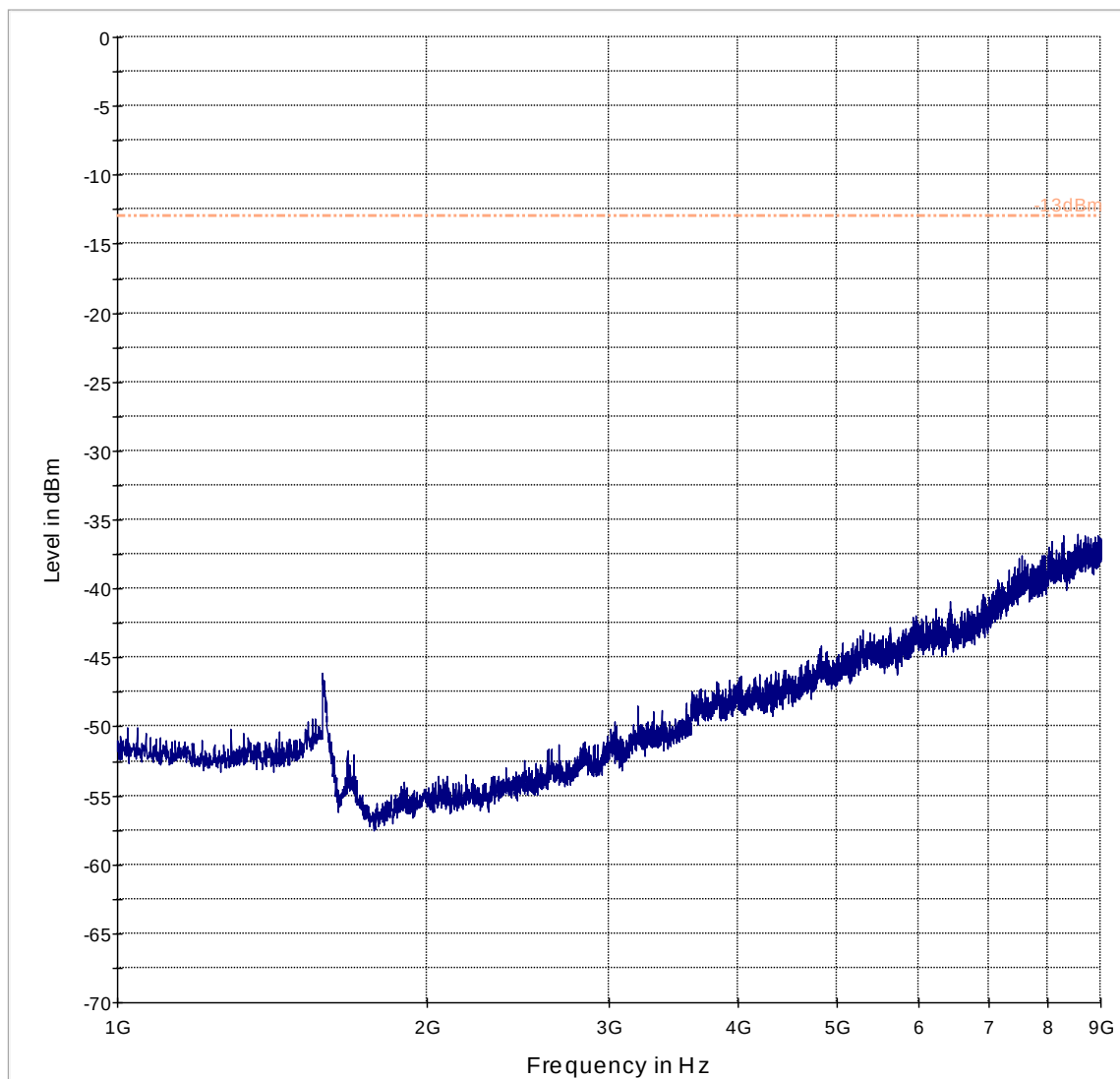
**1 GHz – 9 GHz, CDMA 850, Tx: Ch. Mid**



**30 MHz – 1 GHz, CDMA 850, Tx: Ch. High**

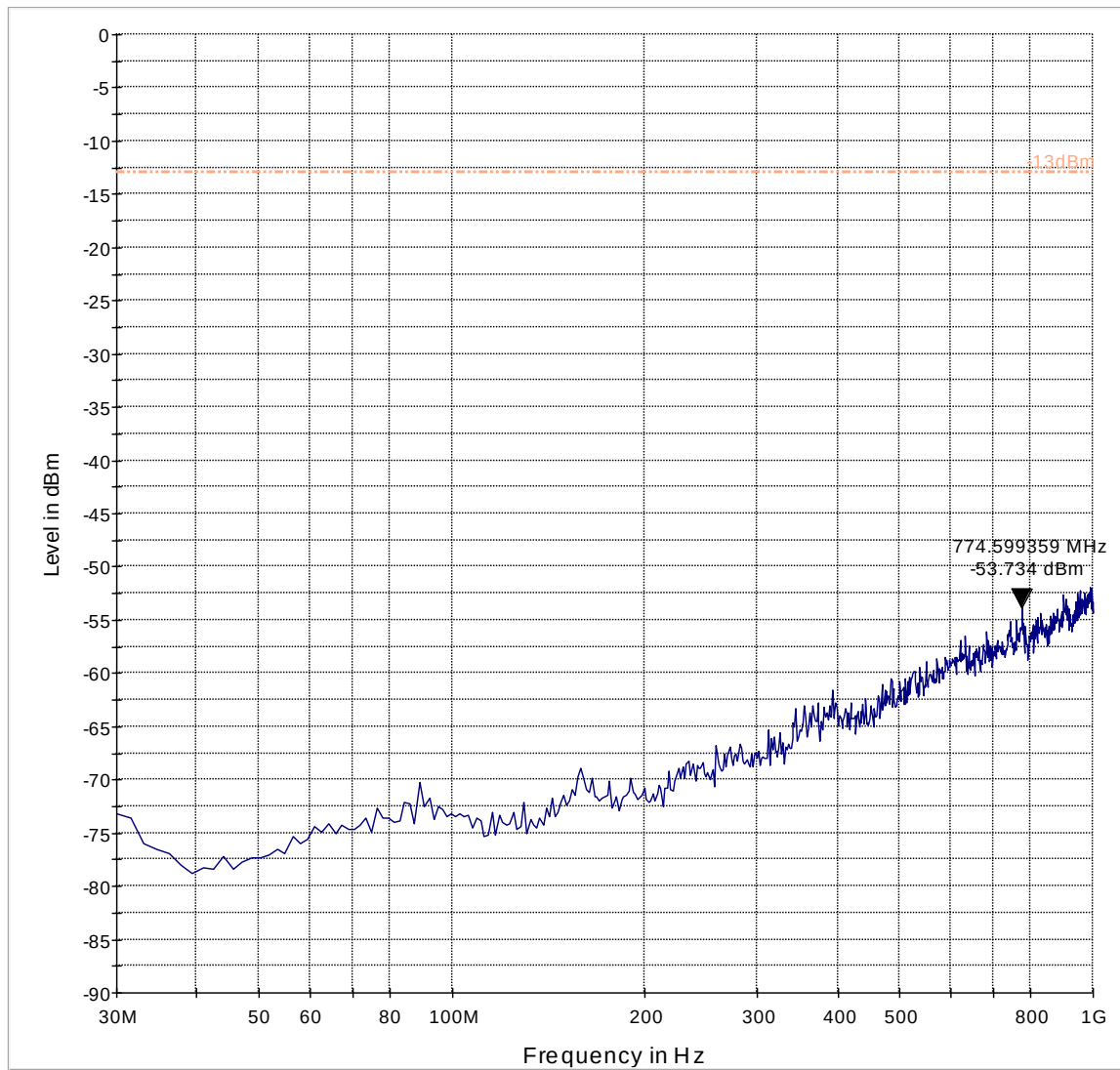


**1 GHz – 9 GHz, CDMA 850, Tx: Ch. High**

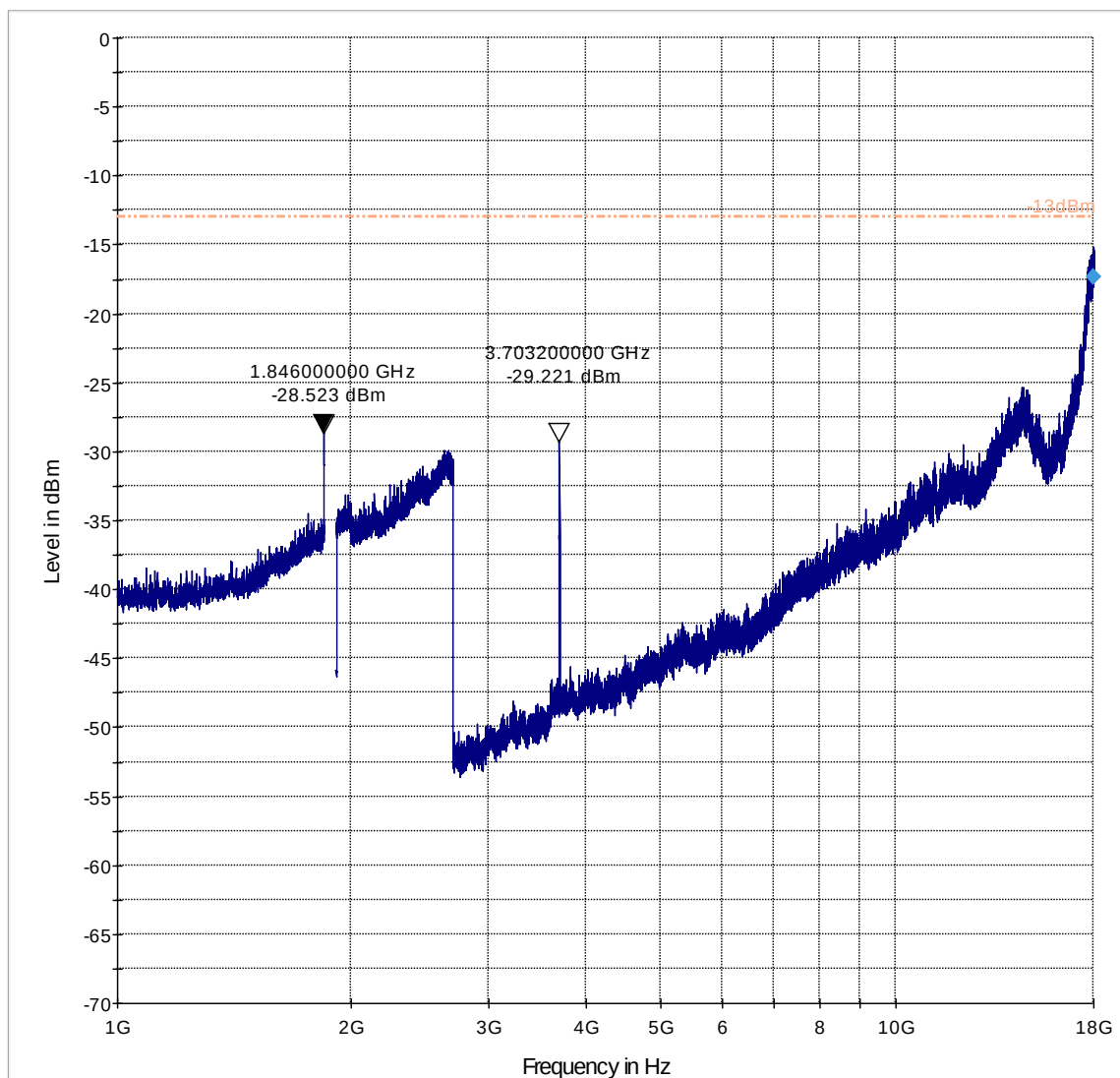


## 7.6 BC1 Band Radiated Emission Plots

### 30 MHz – 1 GHz, CDMA 1900, Tx: Ch. Low

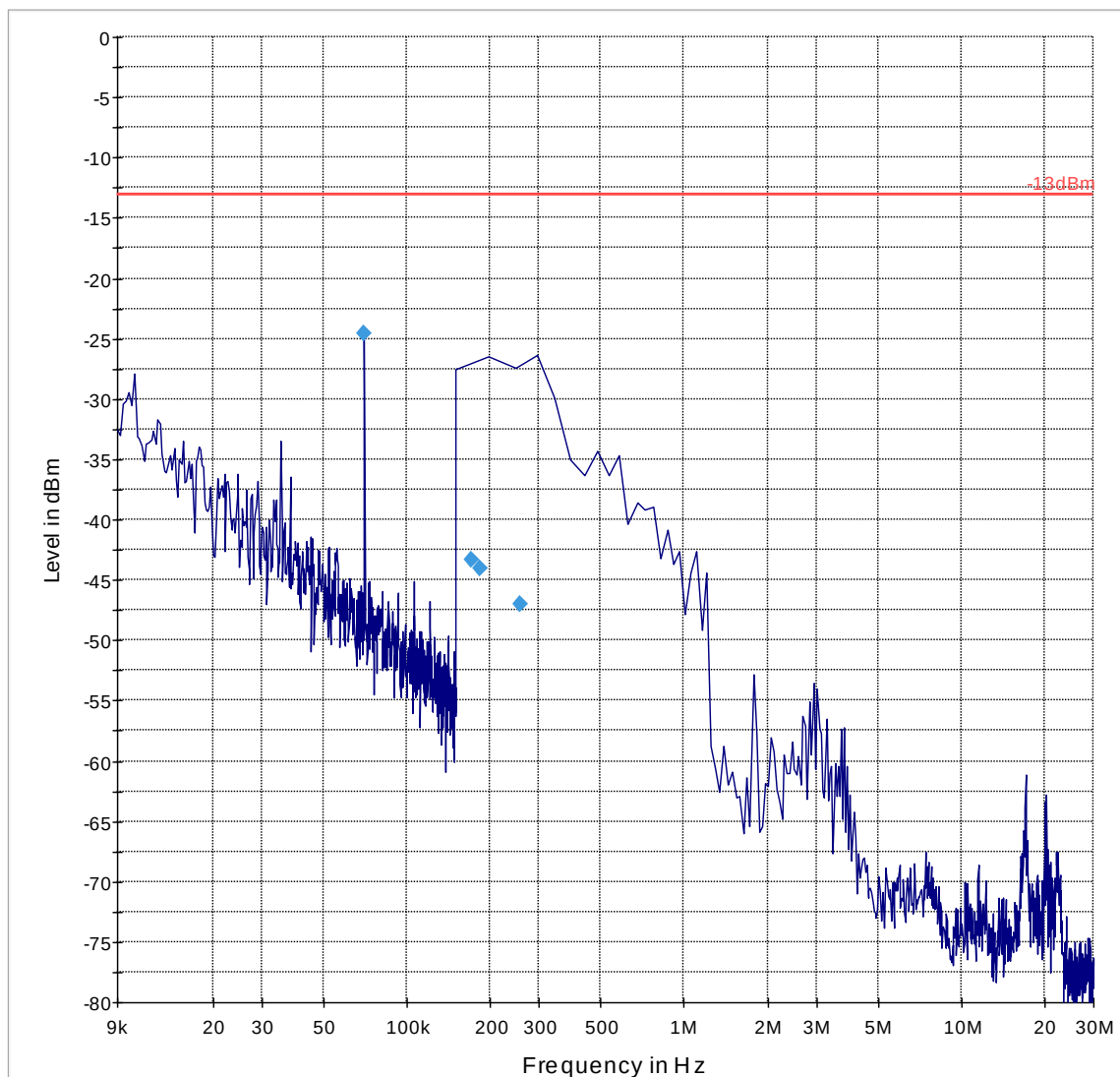


**1 GHz – 18 GHz, CDMA 1900, Tx: Ch. Low**

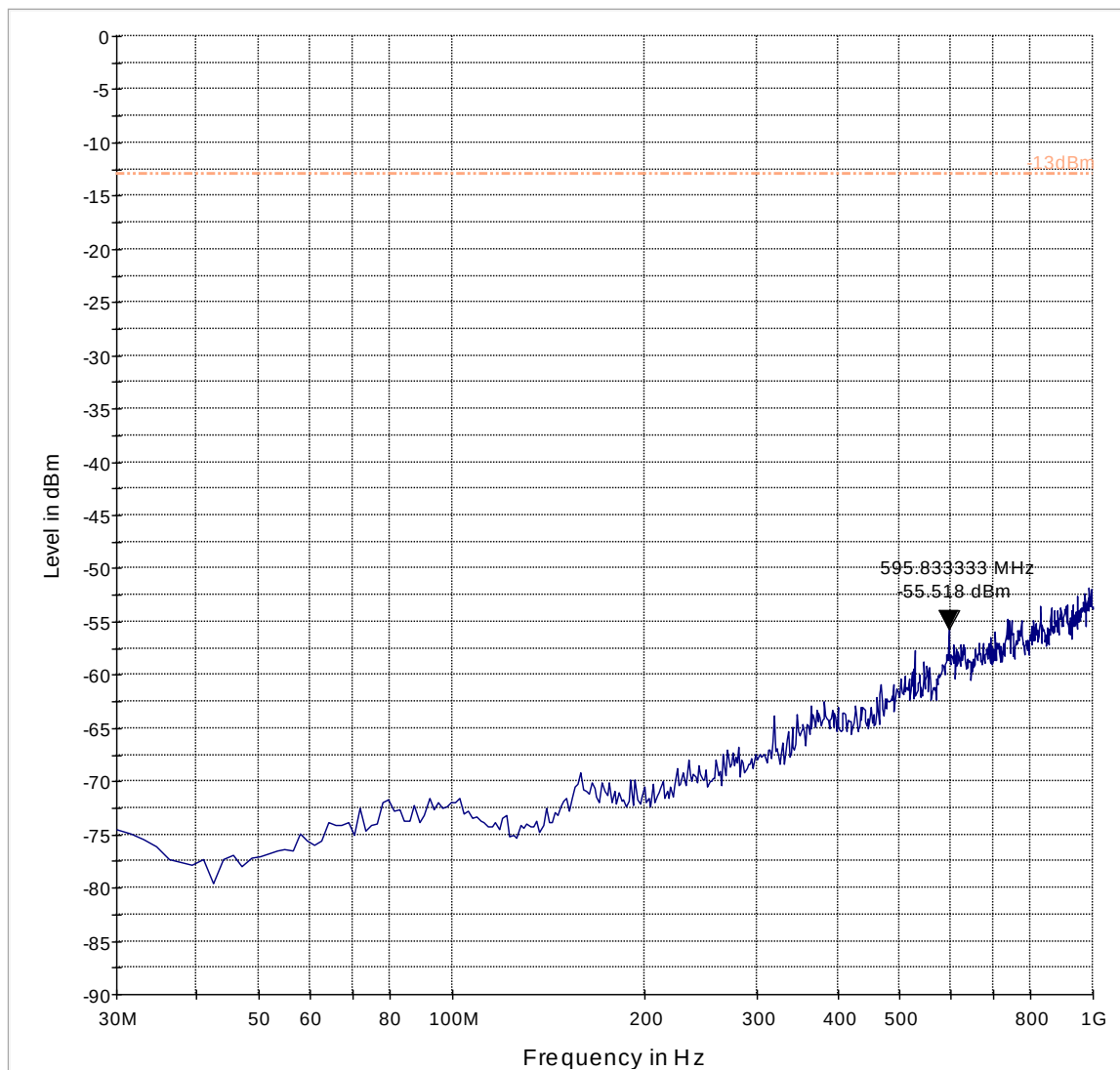




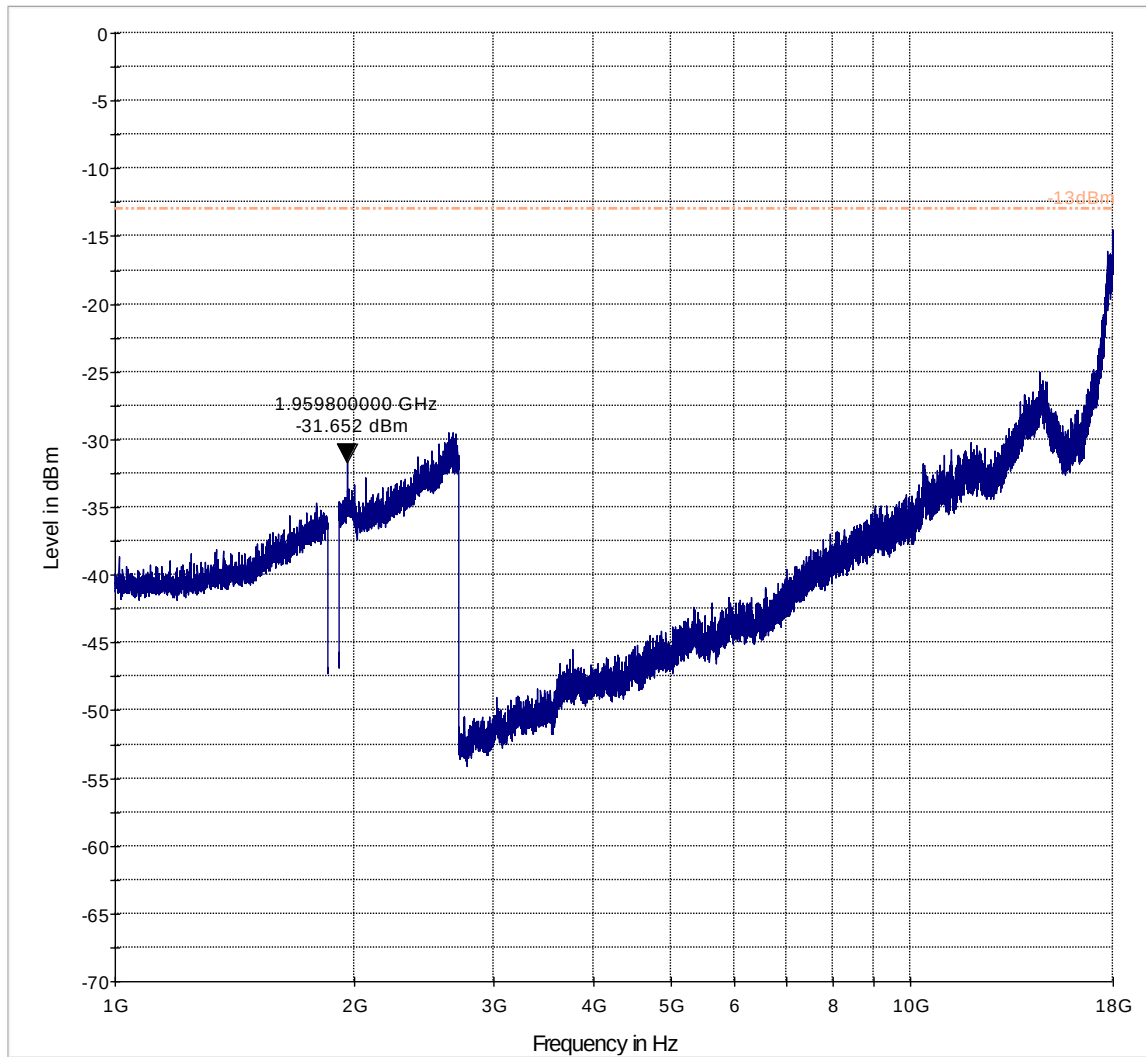
**9 KHz – 30 MHz, CDMA 1900, Tx: Ch. Mid**



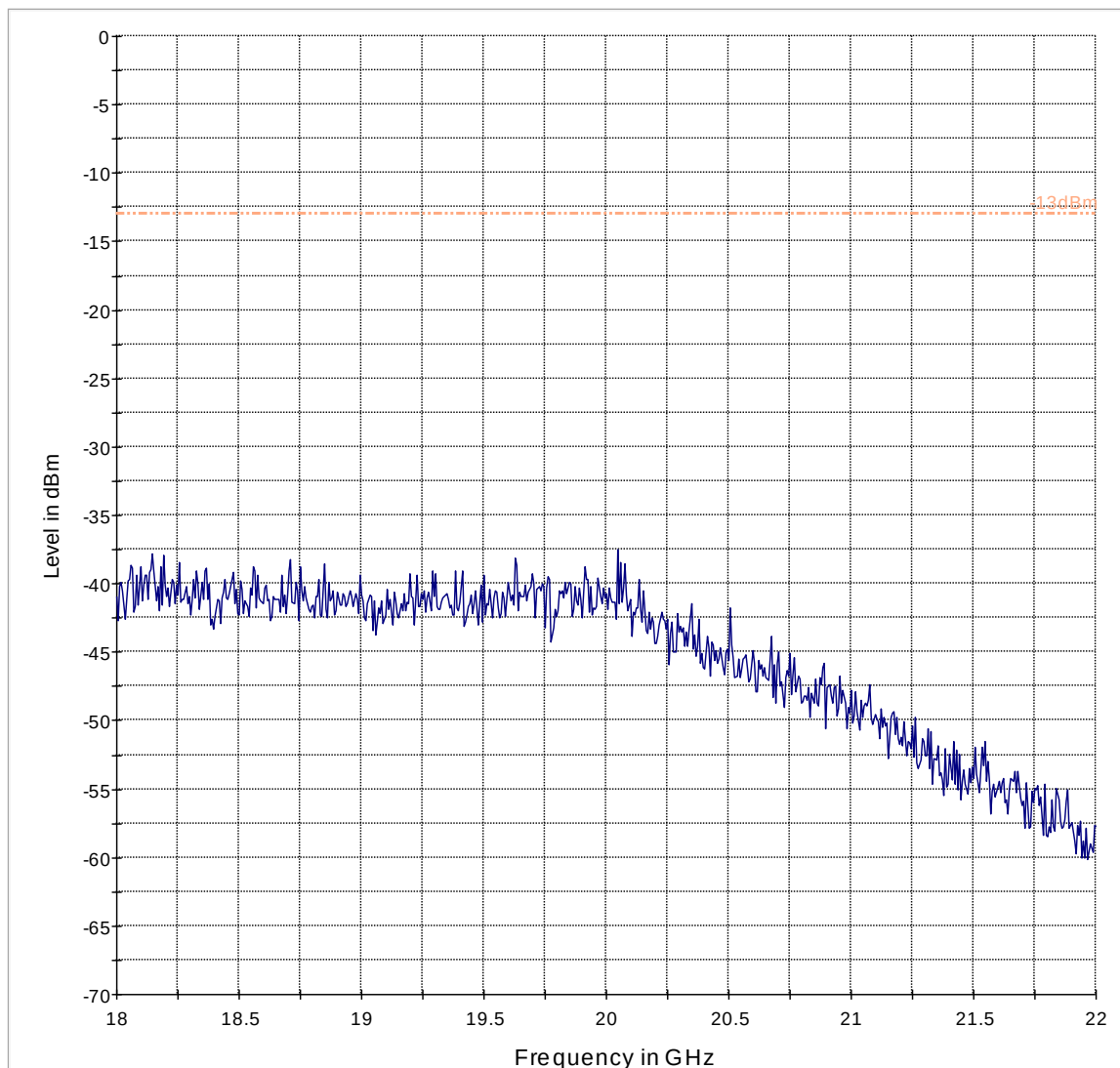
**30 MHz – 1 GHz, CDMA 1900, Tx: Ch. Mid**



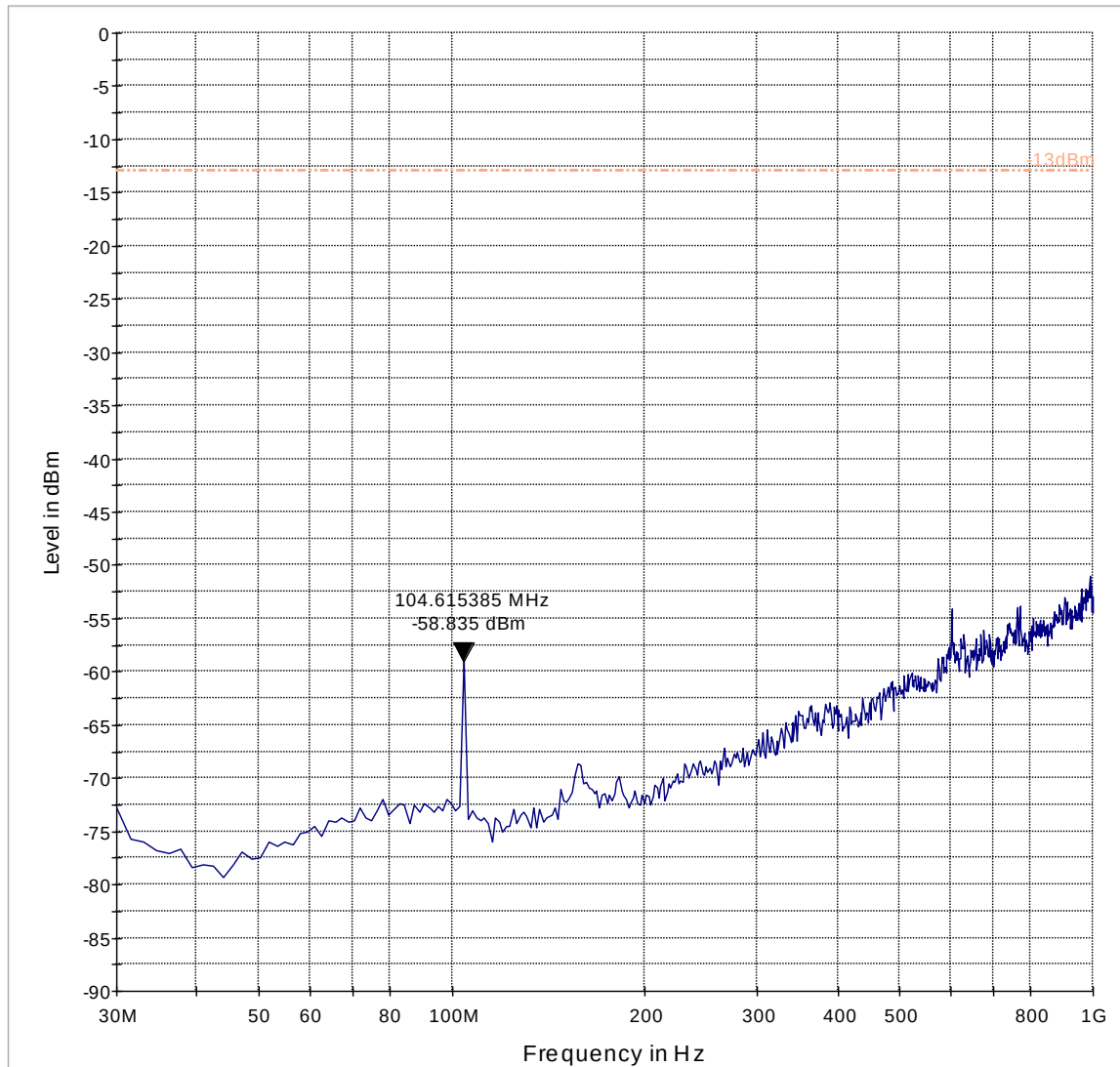
**1 GHz – 18 GHz, CDMA 1900, Tx: Ch. Mid**



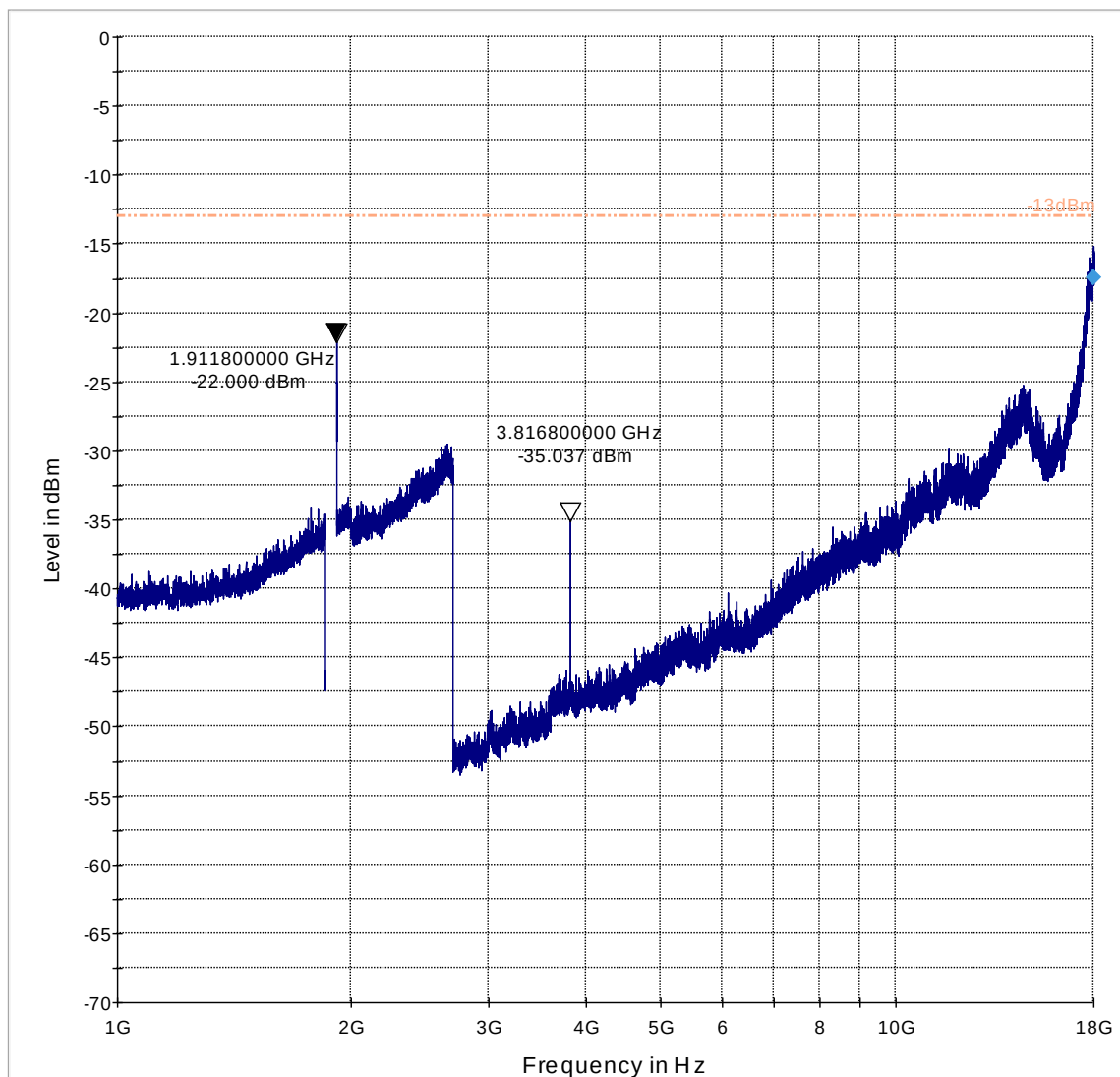
**18 GHz - 22 GHz, CDMA 1900, Tx: Ch. Mid**



**30 MHz – 1 GHz, CDMA 1900, Tx: Ch. High**



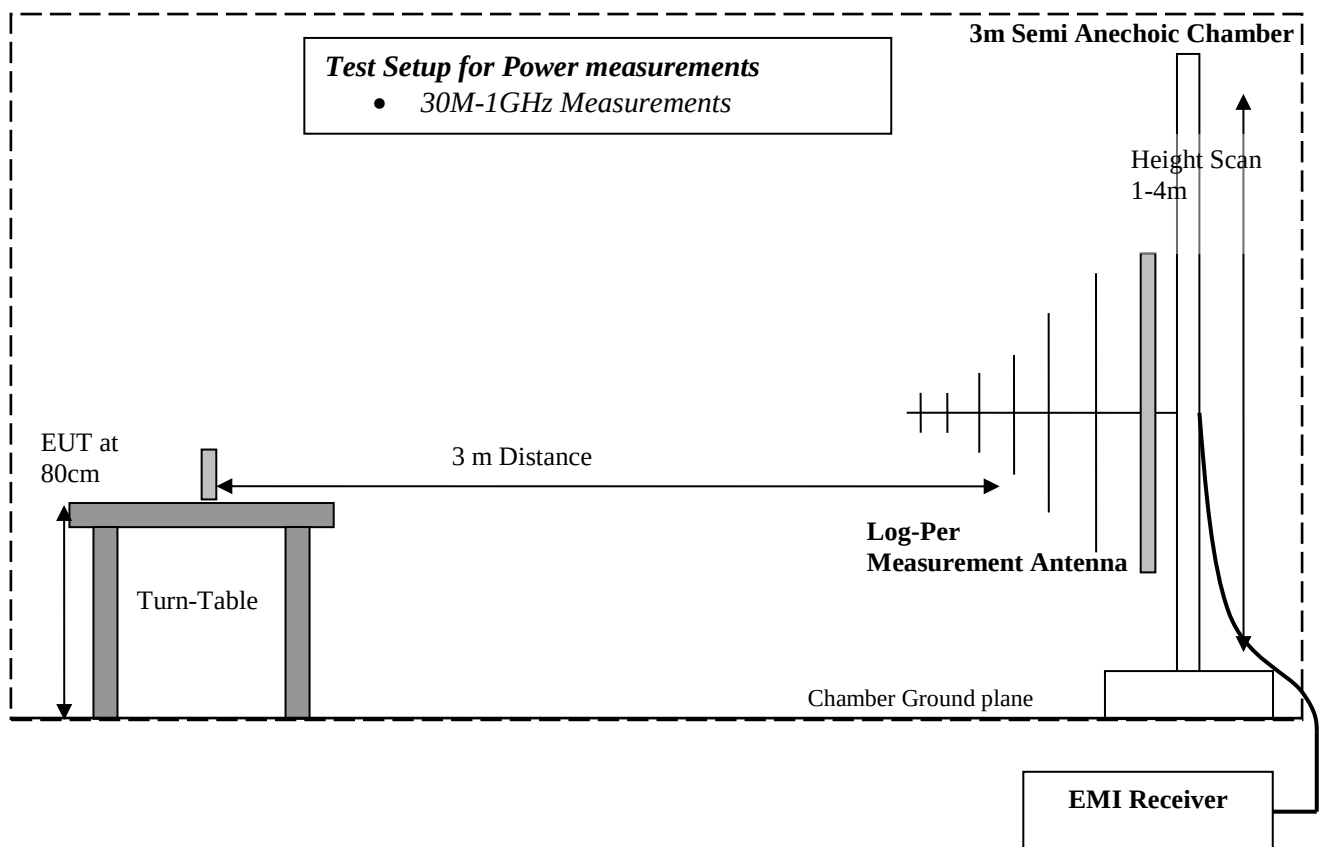
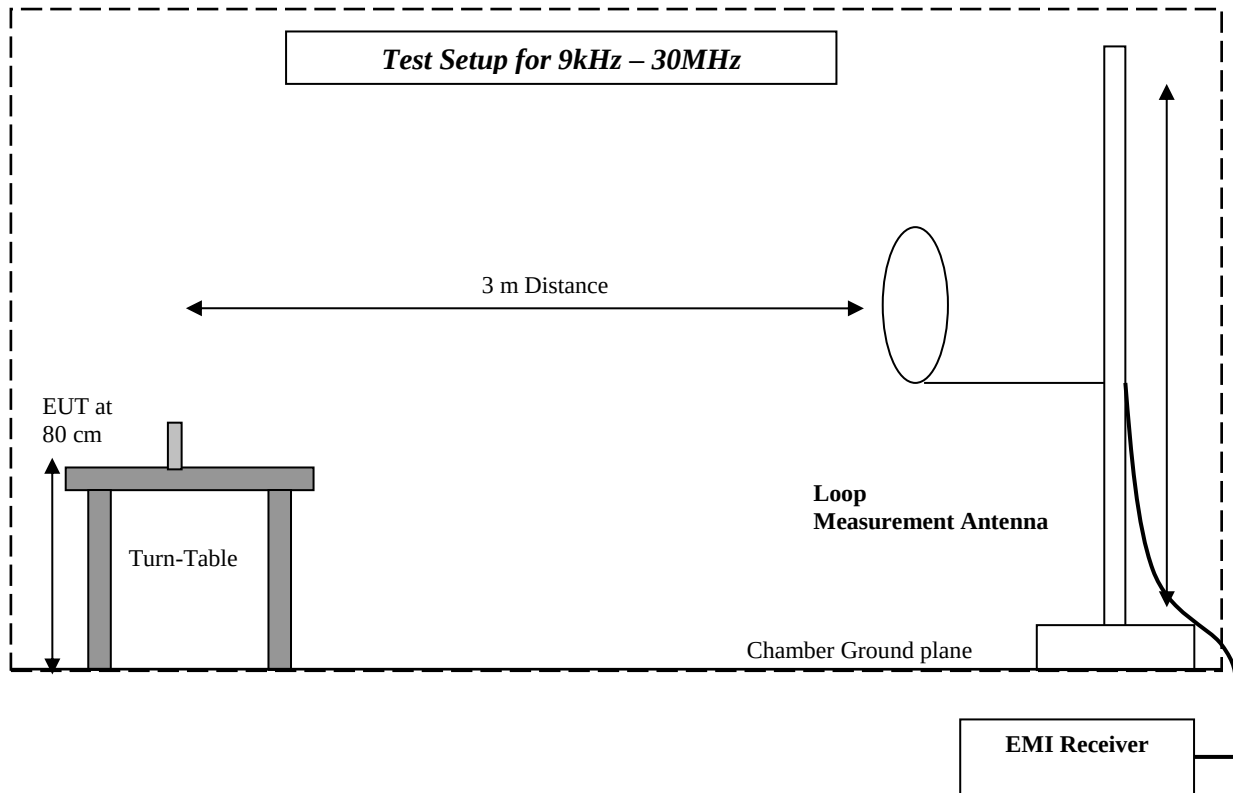
**1 GHz – 18 GHz, CDMA 1900, Tx: Ch. High**



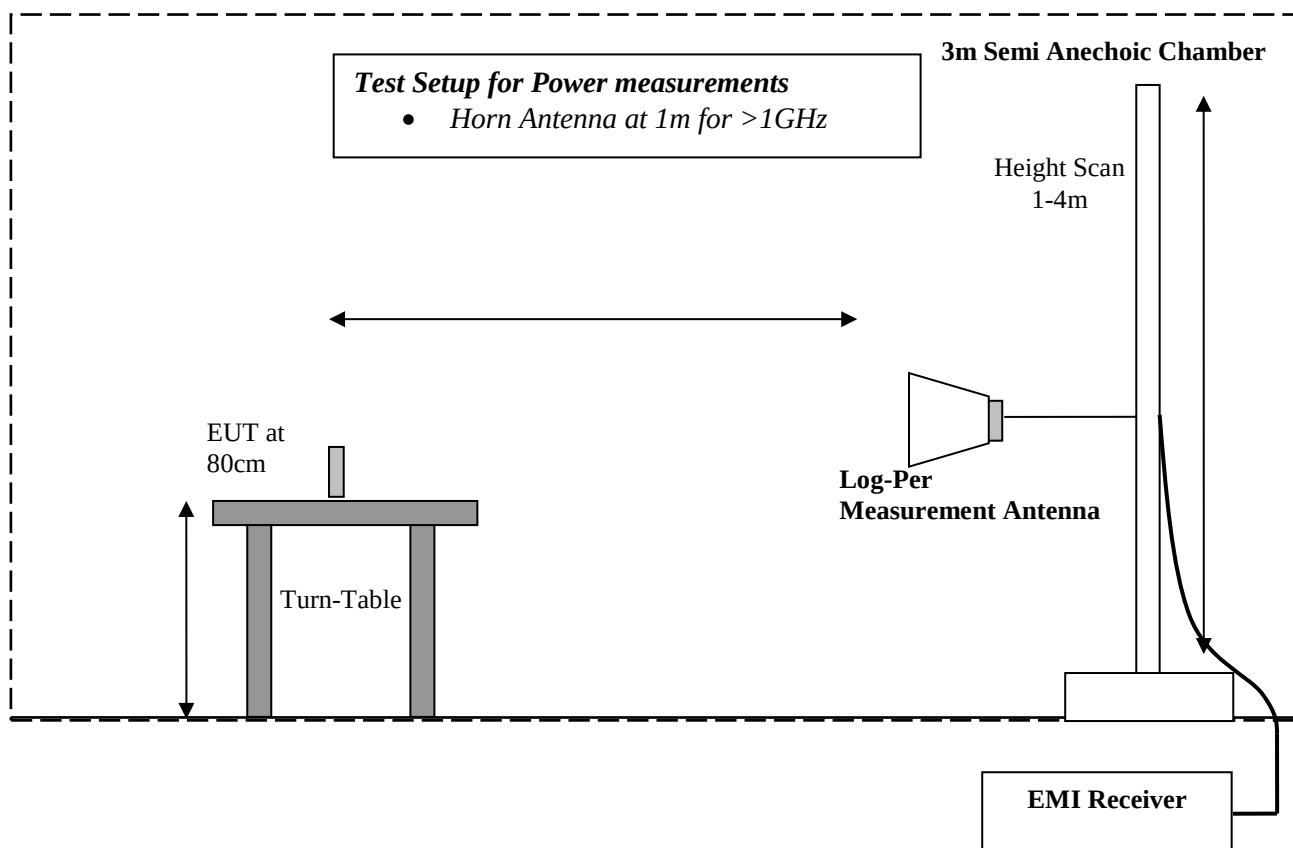
## 8 Test Equipment and Ancillaries used for tests.

| No.                        | Equipment Name              | Manufacturer  | Type/model | Serial No. | Cal Date | Cal Interval |
|----------------------------|-----------------------------|---------------|------------|------------|----------|--------------|
| 3m Semi- Anechoic Chamber: |                             |               |            |            |          |              |
|                            | Digital Radio Comm. Tester  | Rohde&Schwarz | CMU 200    | 110759     | Jul 2015 | 3 Years      |
|                            | EMC32 Measurement Software  | Rohde&Schwarz | 8.52.0     | N/A        | N/A      | N/A          |
|                            | Turn table                  | EMCO          | 2075       | N/A        | N/A      | N/A          |
|                            | MAPS Position Controller    | ETS Lindgren  | 2092       | 0004-1510  | N/A      | N/A          |
|                            | Antenna Mast                | EMCO          | 2075       | N/A        | N/A      | N/A          |
|                            | Relay Switch Unit           | Rohde&Schwarz | RSU        | 338964/001 | N/A      | N/A          |
|                            | EMI Receiver/Analyzer       | Rohde&Schwarz | ESU 40     | 100251     | Jul 2015 | 2 Year       |
|                            | 1500MHz HP Filter           | Filtek        | HP12/1700  | 14c48      | N/A      | N/A          |
|                            | 2800 MHz HP Filter          | Filtek        | HP12/2800  | 14C47      | N/A      | N/A          |
|                            | Pre-Amplifier               | Miteq         | JS40010260 | 340125     | N/A      | N/A          |
|                            | Binconilog Antenna          | EMCO          | 3149       | J000123908 | Feb 2014 | 3 Years      |
|                            | Horn Antenna                | EMCO          | 3115       | 35114      | Jul 2015 | 3 Years      |
|                            | Spectrum Analyzer           | Rohde&Schwarz | FSU        | 100189     | Jul 2015 | 2 Years      |
|                            | Loop Antenna 6512           | ETS Lindgren  | 6507       | 161344     | Feb 2015 | 3 Years      |
| Ancillary equipment        |                             |               |            |            |          |              |
|                            | Humidity Temperature Logger | Dickson       | TM320      | 03280063   | Apr 2015 | 2 Year       |
|                            | Communication Antenna       | IBP5-900/1940 | Kathrein   | N/A        | N/A      | N/A          |

## 9 Block Diagrams







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## 10 Revision History

| Date       | Report Name                        | Changes to Report     | Report prepared by |
|------------|------------------------------------|-----------------------|--------------------|
| 2015-07-15 | EMC-IRHYT-003-15001-FCC-22-24      | Initial Report        | James Donnellan    |
| 2015-10-09 | EMC-IRHYT-003-15001-FCC-22-24-Rev1 | Updated after Review. | James Donnellan    |