InterLab®

# Final Report on

# **Cellular Device**

according to FCC Part 22, Subpart H

**Report Reference:** MDE_HONEY_1602_FCCa

**Date:** February 17, 2017

**Test Laboratory:**
7layers GmbH
Borsigstraße 11
40880 Ratingen
Germany

Deutsche
Akkreditierungsstelle
D-PL-12140-01-00

# 1 Administrative Data

## 1.1 Project Data

| | |
|---|---|
| *Project Responsible:* | Dirk Bratsch |
| *Date Of Test Report:* | 2017/02/17 |
| *Date of first test:* | 2016/12/21 |
| *Date of last test:* | 2017/01/18 |

## 1.2 Applicant Data

*Company Name:* 7layers Inc.

| | |
|---|---|
| *Street:* | 15 Musick |
| *City:* | 92618 Irvine CA |
| *Country:* | United States of America |

*Contact Person:* Mrs. Denise Trevayne-Smith

| | |
|---|---|
| *Phone:* | +1 (949) 297 8061 |
| *Mobile:* | +1 949 874 7062 |

## 1.3 Test Laboratory Data

The following list shows all places and laboratories involved for test result generation:

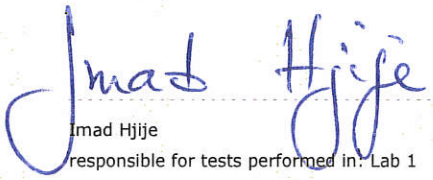
**7 layers DE**

| | |
|---|---|
| *Company Name :* | 7layers GmbH |
| *Street :* | Borsigstrasse 11 |
| *City :* | 40880 Ratingen |
| *Country :* | Germany |
| *Contact Person :* | Mr. Michael Albert |
| *Phone :* | +49 2102 749 201 |
| *Fax :* | +49 2102 749 444 |
| *E Mail :* | Michael.Albert@7Layers.com |

### Laboratory Details

| *Lab ID* | *Identification* | *Responsible* | *Accreditation Info* |
|---|---|---|---|
| Lab 1 | Radiated Emissions | Mr. Marco Kullik<br>Mr. Jens Dörwald | DAkkS-Registration no. D-PL-12140-01-00<br>ISEDC OATS registration number 3699A-1<br>FCC accreditation registration number 929146 |

### 1.4 Signature of the Testing Responsible



Imad Hjije
responsible for tests performed in: Lab 1

### 1.5 Signature of the Accreditation Responsible

Accreditation scope responsible person
responsible for Lab 1

## 2 Test Object Data

### 2.1 General OUT Description

The following section lists all OUTs (Object's Under Test) involved during testing.

**OUT: Cellular Device**

***Parameter List:***

| *Parameter name* | *Value* |
|---|---|
| AC Power Supply | 120V/60Hz AC |
| highest channel | 9538 (1907.6MHz) for FDD2<br>4233 (846.6MHz) for FDD5<br>1513 (1752.6MHz) for FDD4<br>19175 (1907.5MHz) for eFDD2<br>20625 (846.5MHz) for eFDD5<br>20375 (1752.5MHz) for eFDD4<br>23825 (713.5MHz) for eFDD17 |
| lowest channel | 9262 (1852.4MHz)for FDD2<br>4132 (826.4MHz) for FDD5<br>1312 (1712.4MHz) for FDD4<br>18625 (1852.5MHz) for eFDD2<br>20425 (826.5MHz) for eFDD5<br>19975 (1712.5MHz) for eFDD4<br>23755 (706.5MHz) for eFDD17 |
| mid channel | 9400 (1880MHz) for FDD2<br>4183 (836.6MHz) for FDD5<br>1412 (1732.4MHz)/1450 (1740.0MHz) for FDD4<br>18900 (1880MHz) for eFDD2<br>20525 (836.5MHz) for eFDD5<br>20175 (1732.5MHz) for eFDD4<br>23790 (710MHz) for eFDD17 |

## 2.2 Detailed Description of OUT Samples

**Sample : aa02**

| | |
|---|---|
| *OUT Identifier* | Cellular Device |
| *Sample Description* | Sample #03 |
| *Serial No.* | 014606000000602 |
| *HW Status* | 1.0 |
| *SW Status* | 1.00 |

**Sample : ab01**

| | |
|---|---|
| *OUT Identifier* | Cellular Device |
| *Sample Description* | Sample #02 |
| *Serial No.* | 014606000000644 |
| *HW Status* | 1.0 |
| *SW Status* | 1.00 |

## 2.3 OUT Features

**Features for OUT: Cellular Device**

| *Designation* | *Description* | *Allowed Values* | *Supported Value(s)* |
|---|---|---|---|
| **Features for scope: FCC_v2** | | | |
| DC | The OUT is powered by or connected to DC | | |
| eFDD2 | | | |
| eFDD4 | | | |
| eFDD5 | | | |
| eFDD17 | | | |
| HSDPA-FDD2 | EUT supports UMTS FDD2 HSDPA in the band 1850 MHz - 1910 MHz | | |
| HSDPA-FDD4 | EUT supports UMTS FDD4 HSDPA in the band 1710 MHz - 1755 MHz | | |
| HSDPA-FDD5 | EUT supports UMTS FDD5 HSDPA in the band 824 MHz - 849 MHz | | |
| HSUPA-FDD2 | EUT supports UMTS FDD2 HSUPA in the band 1850 MHz - 1910 MHz | | |
| HSUPA-FDD4 | EUT supports UMTS FDD4 HSUPA in the band 1710 MHz - 1755 MHz | | |
| HSUPA-FDD5 | EUT supports UMTS FDD5 HSUPA in the band 824 MHz - 849 MHz | | |
| Iant | Integral Antenna: permanent fixed antenna, which may be built-in, designed as an indispensable part of the equipment | | |

## 2.4 Setups used for Testing

For each setup a relation is given to determine if and which samples and auxiliary equipment is used.
The left side list all OUT samples and the right side lists all auxiliary equipment for the given setup.

| *Setup No.* | *List of OUT samples* | | *List of auxiliary equipment* | |
|---|---|---|---|---|
| | *Sample No.* | *Sample Description* | *AE No.* | *AE Description* |
| **S01_AA02** | **(Setup #03)** | | | |
| | *Sample:* aa02 | Sample #03 | | |
| **S01_AB01** | **(Setup #02)** | | | |
| | *Sample:* ab01 | Sample #02 | | |

# 3 Results

## 3.1 General

**Documentation of tested devices:** Available at the test laboratory.

**Interpretation of the test results:** The results of the inspection are described on the following pages, where 'Conformity' or 'Passed' means that the certification criteria were verified and that the tested device is conform to the applied standard.

In cases where 'Declaration' is printed, the required documents are available in the manufacturers product documentation.

In cases where 'not applicable' is printed, the test case requirements are not relevant to the specific equipment implementation.

**Note:**

1. This report contains the abbreviated information content pertaining to services rendered. Supporting documentation not included herein is maintained and available at the laboratory.

2. All tests are performed under environmental conditions within the requirements of the specifications. Environmental conditions are available at the laboratory.

3. Testing was done on customers demand.

## 3.2 List of the Applicable Body

(Body for Scope: FCC_v2)

| *Designation* | *Description* |
|---|---|
| FCC47CFRChIPART22PUBLIC MOBILE SERVICES | Part 22, Subpart H - Cellular Radiotelephone Service |

## 3.3 List of Test Specification

| | |
|---|---|
| *Test Specification:* | **FCC part 2 and 22** |
| *Version* | 10-1-13 Edition |
| *Title:* | PART 2 - GENERAL RULES AND REGULATIONS<br>PART 22 - PUBLIC MOBILE SERVICES |

## 3.4 Summary

| Test Case Identifier / Name<br>Test (condition) | Cat | Result | Date of Test | Lab Ref. | Setup |
|---|---|---|---|---|---|
| **22.4 Field strength of spurious radiation §2.1053, §22.917** | | | | | |
| 22.4; Frequency Band = eFDD5, Mode = QPSK 5MHz, Channel = 20425, Frequency = 826.5MHz, Method = radiated | - | Passed | 2016/12/24 | Lab 1 | S01_AB01 |
| 22.4; Frequency Band = eFDD5, Mode = QPSK 5MHz, Channel = 20525, Frequency = 836.5MHz, Method = radiated | - | Passed | 2017/01/13 | Lab 1 | S01_AA02 |
| | - | Passed | 2016/12/24 | Lab 1 | S01_AB01 |
| 22.4; Frequency Band = eFDD5, Mode = QPSK 5MHz, Channel = 20625, Frequency = 846.5MHz, Method = radiated | - | Passed | 2016/12/28 | Lab 1 | S01_AB01 |
| 22.4; Frequency Band = FDD5, Mode = HSDPA, Channel = 4132, Frequency = 826.4MHz | - | Passed | 2016/12/22 | Lab 1 | S01_AB01 |
| 22.4; Frequency Band = FDD5, Mode = HSDPA, Channel = 4183, Frequency = 836.6MHz | - | Passed | 2017/01/13 | Lab 1 | S01_AA02 |
| | - | Passed | 2016/12/21 | Lab 1 | S01_AB01 |
| 22.4; Frequency Band = FDD5, Mode = HSDPA, Channel = 4233, Frequency = 846.6MHz | - | Passed | 2016/12/22 | Lab 1 | S01_AB01 |
| 22.4; Frequency Band = FDD5, Mode = HSUPA, Channel = 4132, Frequency = 826.4MHz | - | Passed | 2016/12/28 | Lab 1 | S01_AB01 |
| 22.4; Frequency Band = FDD5, Mode = HSUPA, Channel = 4183, Frequency = 836.6MHz | - | Passed | 2017/01/13 | Lab 1 | S01_AA02 |
| | - | Passed | 2016/12/28 | Lab 1 | S01_AB01 |
| 22.4; Frequency Band = FDD5, Mode = HSUPA, Channel = 4233, Frequency = 846.6MHz | - | Passed | 2016/12/28 | Lab 1 | S01_AB01 |
| 22.4; Frequency Band = FDD5, Mode = W-CDMA, Channel = 4132, Frequency = 826.4MHz | - | Passed | 2017/01/18 | Lab 1 | S01_AB01 |
| 22.4; Frequency Band = FDD5, Mode = W-CDMA, Channel = 4183, Frequency = 836.6MHz | - | Passed | 2017/01/17 | Lab 1 | S01_AB01 |
| | - | Passed | 2017/01/17 | Lab 1 | S01_AA02 |
| 22.4; Frequency Band = FDD5, Mode = W-CDMA, Channel = 4233, Frequency = 846.6MHz | - | Passed | 2017/01/18 | Lab 1 | S01_AB01 |

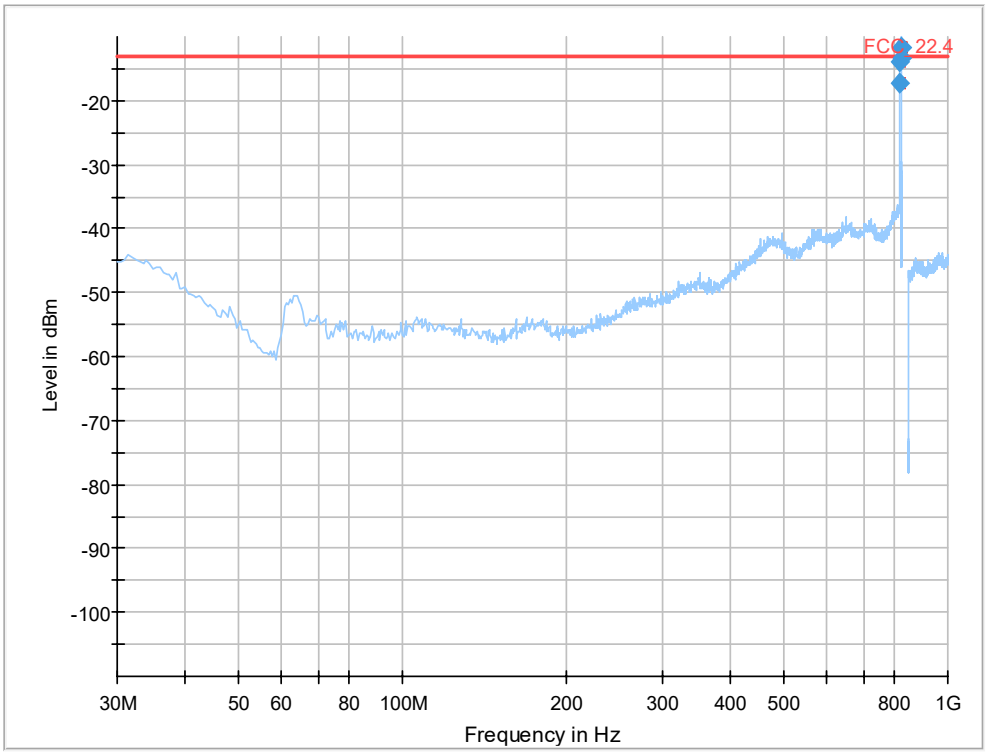
## 3.5 Detailed Results

### 3.5.1 22.4 Field strength of spurious radiation §2.1053, §22.917

**Test: 22.4; Frequency Band = eFDD5, Mode = QPSK 5MHz, Channel = 20425, Frequency = 826.5MHz, Method = radiated**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AB01 |
| *Date of Test:* | 2016/12/24 23:00 |
| *Body:* | FCC47CFRChIPART22PUBLIC MOBILE SERVICES |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

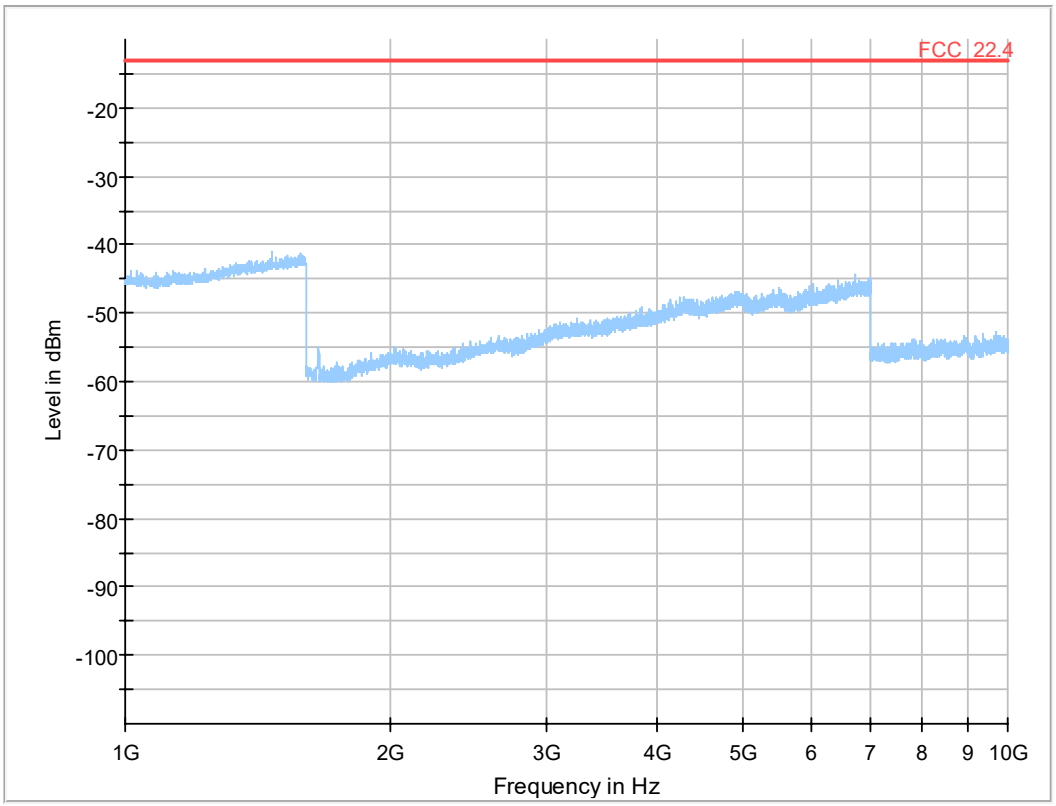



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 818.539375 | -17.18 | -13.00 | 4.18 | 7000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.1 |
| 819.035000 | -13.82 | -13.00 | 0.82 | 7000.0 | 1000.000 | 150.0 | H | -135.0 | 0.0 | -72.1 |
| 819.530625 | -13.44 | -13.00 | 0.44 | 7000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.1 |
| 820.026250 | -11.81 | -13.00 | -1.19 | 7000.0 | 1000.000 | 150.0 | H | -135.0 | 0.0 | -72.1 |
| 820.521875 | -11.65 | -13.00 | -1.35 | 7000.0 | 1000.000 | 150.0 | H | 135.0 | 90.0 | -72.1 |
| 821.017500 | -7.80 | -13.00 | -5.20 | 7000.0 | 1000.000 | 150.0 | H | -135.0 | 0.0 | -72.1 |
| 821.513125 | -7.48 | -13.00 | -5.52 | 7000.0 | 1000.000 | 150.0 | V | -135.0 | 90.0 | -71.8 |
| 822.008750 | -7.18 | -13.00 | -5.82 | 7000.0 | 1000.000 | 150.0 | H | 135.0 | 90.0 | -72.1 |
| 822.504375 | -6.85 | -13.00 | -6.15 | 7000.0 | 1000.000 | 150.0 | H | -135.0 | 0.0 | -72.1 |
| 823.000000 | -3.36 | -13.00 | -9.64 | 7000.0 | 1000.000 | 150.0 | H | -135.0 | 0.0 | -72.1 |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 818.539375 | -17.18 | -13.00 | 4.18 | 7000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.1 |
| 819.035000 | -13.82 | -13.00 | 0.82 | 7000.0 | 1000.000 | 150.0 | H | -135.0 | 0.0 | -72.1 |
| 819.530625 | -13.44 | -13.00 | 0.44 | 7000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.1 |
| 820.026250 | -11.81 | -13.00 | -1.19 | 7000.0 | 1000.000 | 150.0 | H | -135.0 | 0.0 | -72.1 |
| 820.521875 | -11.65 | -13.00 | -1.35 | 7000.0 | 1000.000 | 150.0 | H | 135.0 | 90.0 | -72.1 |
| 821.017500 | -7.80 | -13.00 | -5.20 | 7000.0 | 1000.000 | 150.0 | H | -135.0 | 0.0 | -72.1 |
| 821.513125 | -7.48 | -13.00 | -5.52 | 7000.0 | 1000.000 | 150.0 | V | -135.0 | 90.0 | -71.8 |
| 822.008750 | -7.18 | -13.00 | -5.82 | 7000.0 | 1000.000 | 150.0 | H | 135.0 | 90.0 | -72.1 |
| 822.504375 | -6.85 | -13.00 | -6.15 | 7000.0 | 1000.000 | 150.0 | H | -135.0 | 0.0 | -72.1 |
| 823.000000 | -3.36 | -13.00 | -9.64 | 7000.0 | 1000.000 | 150.0 | H | -135.0 | 0.0 | -72.1 |

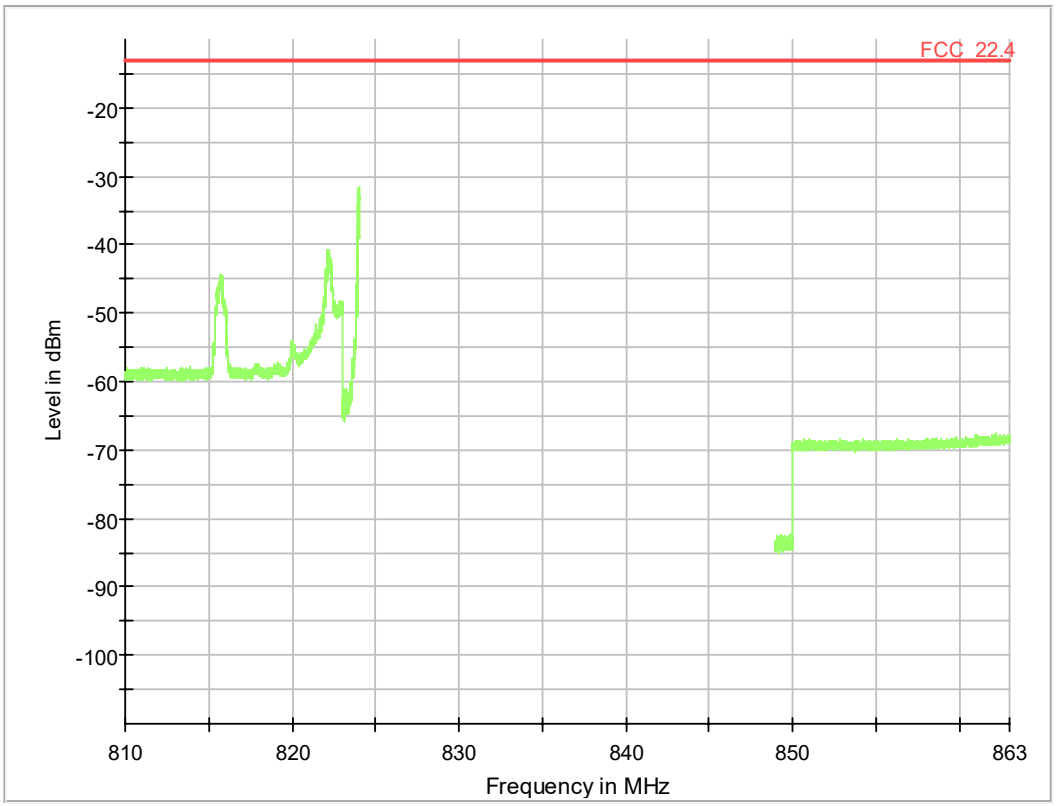



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

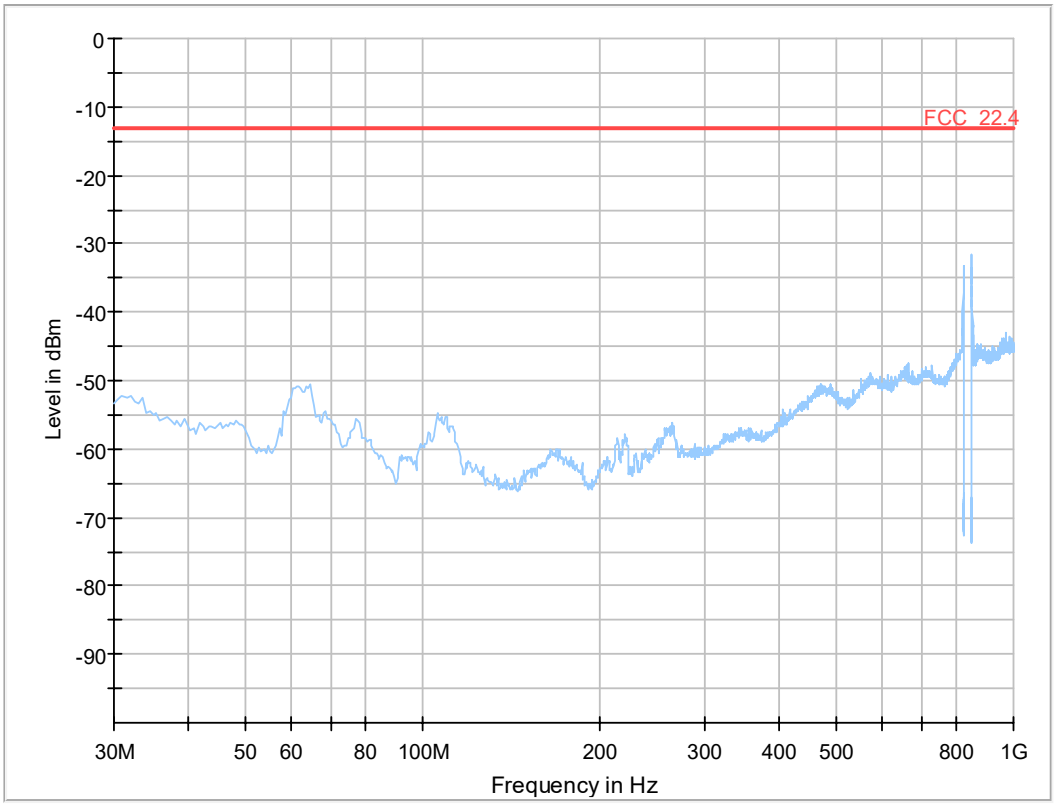
| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

Final measurement with RMS detector.

**Test1: 22.4; Frequency Band = eFDD5, Mode = QPSK 5MHz, Channel = 20525, Frequency = 836.5MHz, Method = radiated**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AB01 |
| *Date of Test:* | 2016/12/24 5:00 |
| *Body:* | FCC47CFRChIPART22PUBLIC MOBILE SERVICES |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

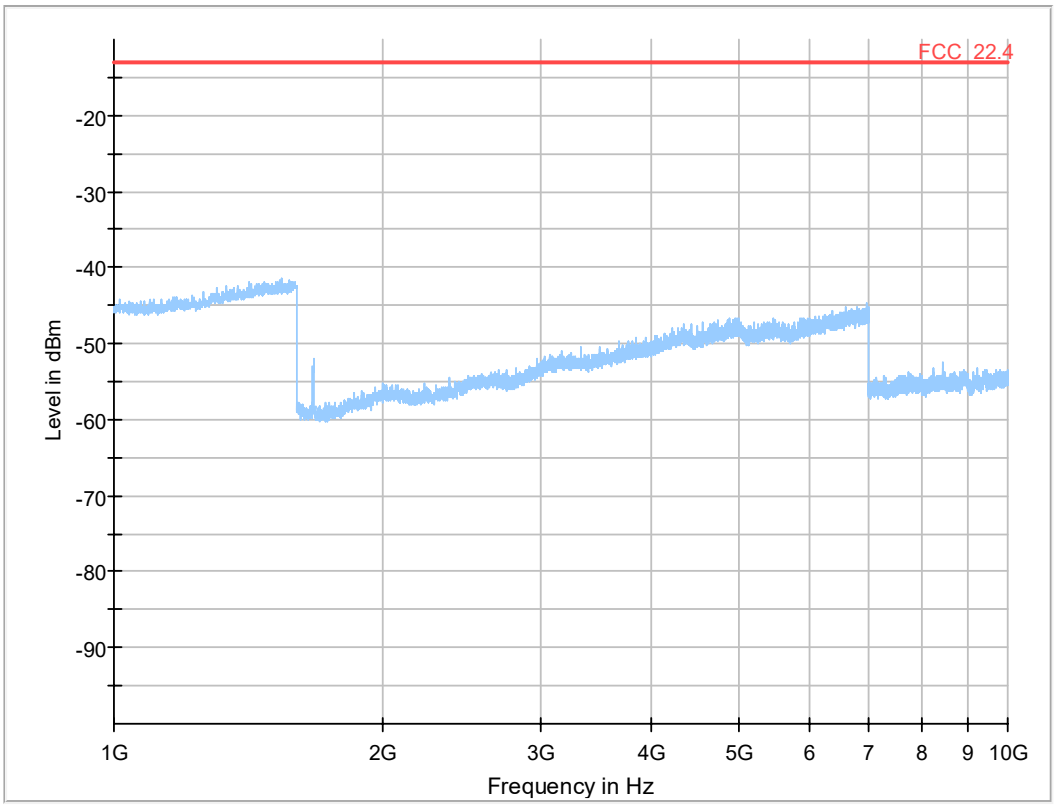



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

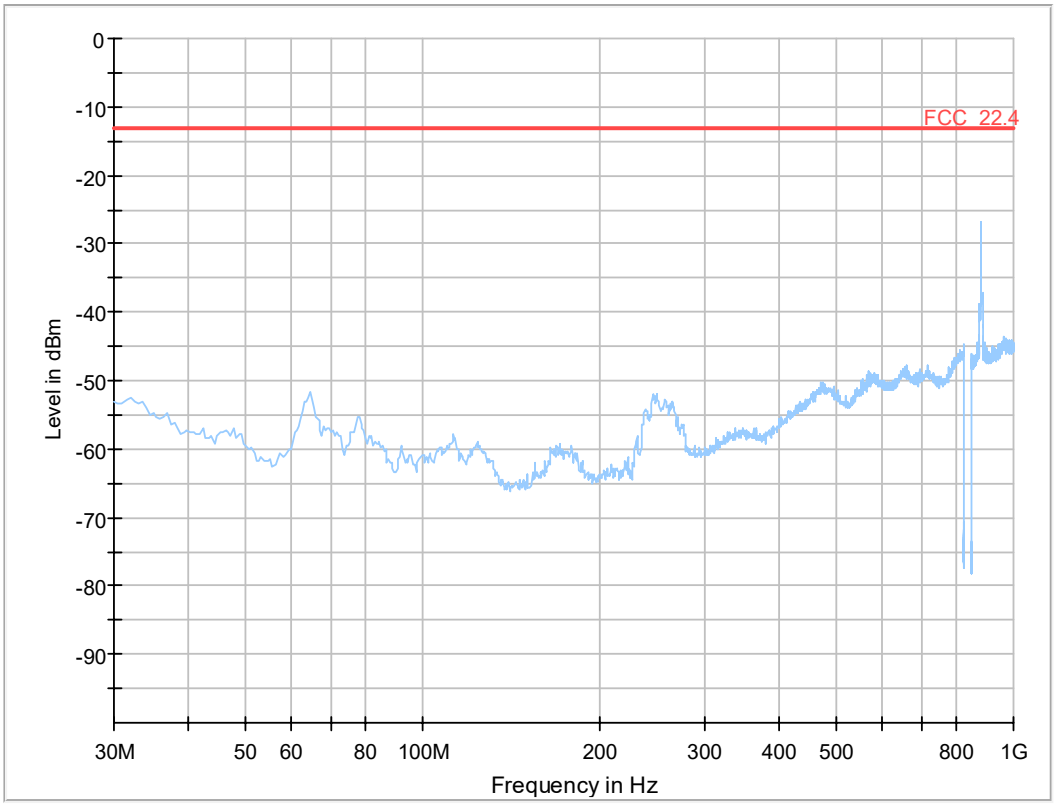
## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

**Test2: 22.4; Frequency Band = eFDD5, Mode = QPSK 5MHz, Channel = 20525, Frequency = 836.5MHz, Method = radiated**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AA02 |
| *Date of Test:* | 2017/01/13 14:30 |
| *Body:* | FCC47CFRChIPART22PUBLIC MOBILE SERVICES |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

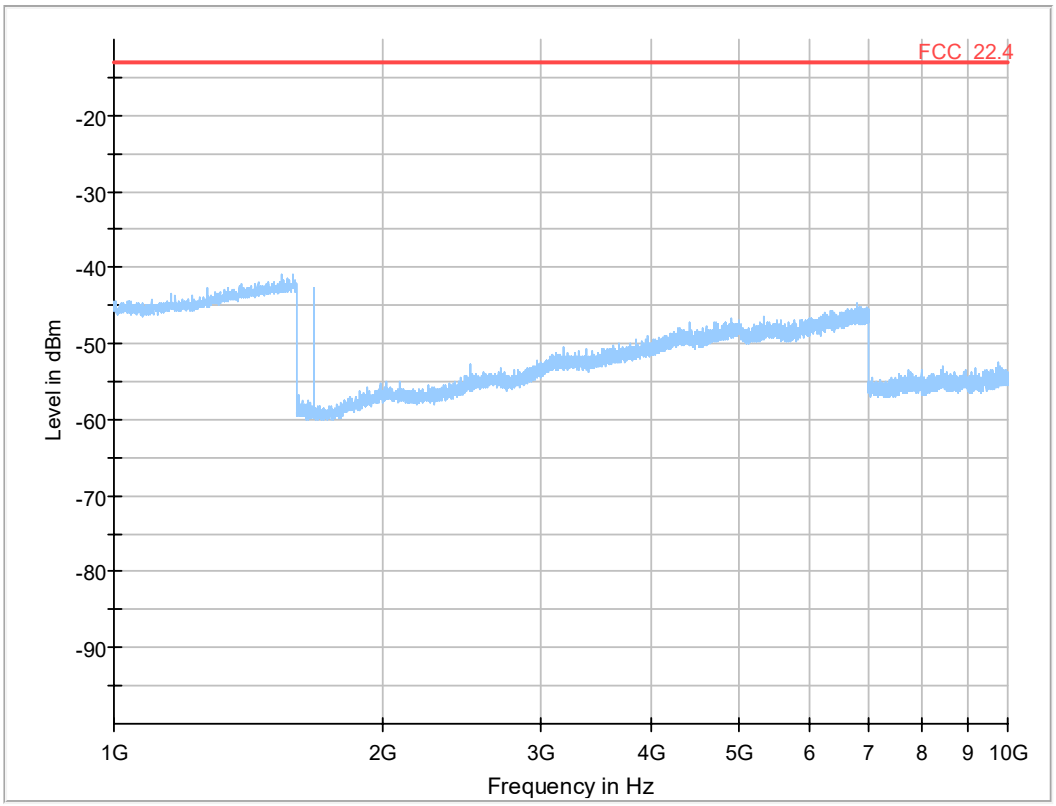



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

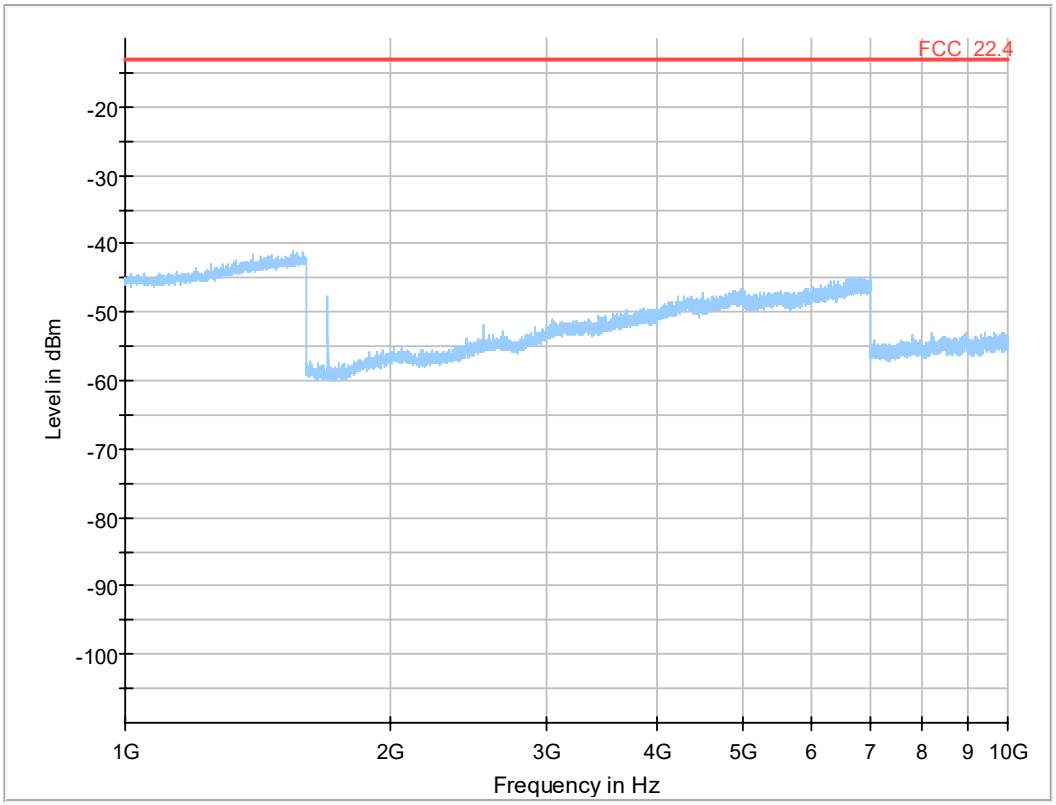
## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

**Test: 22.4; Frequency Band = eFDD5, Mode = QPSK 5MHz, Channel = 20625, Frequency = 846.5MHz, Method = radiated**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AB01 |
| *Date of Test:* | 2016/12/28 11:57 |
| *Body:* | FCC47CFRChIPART22PUBLIC MOBILE SERVICES |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

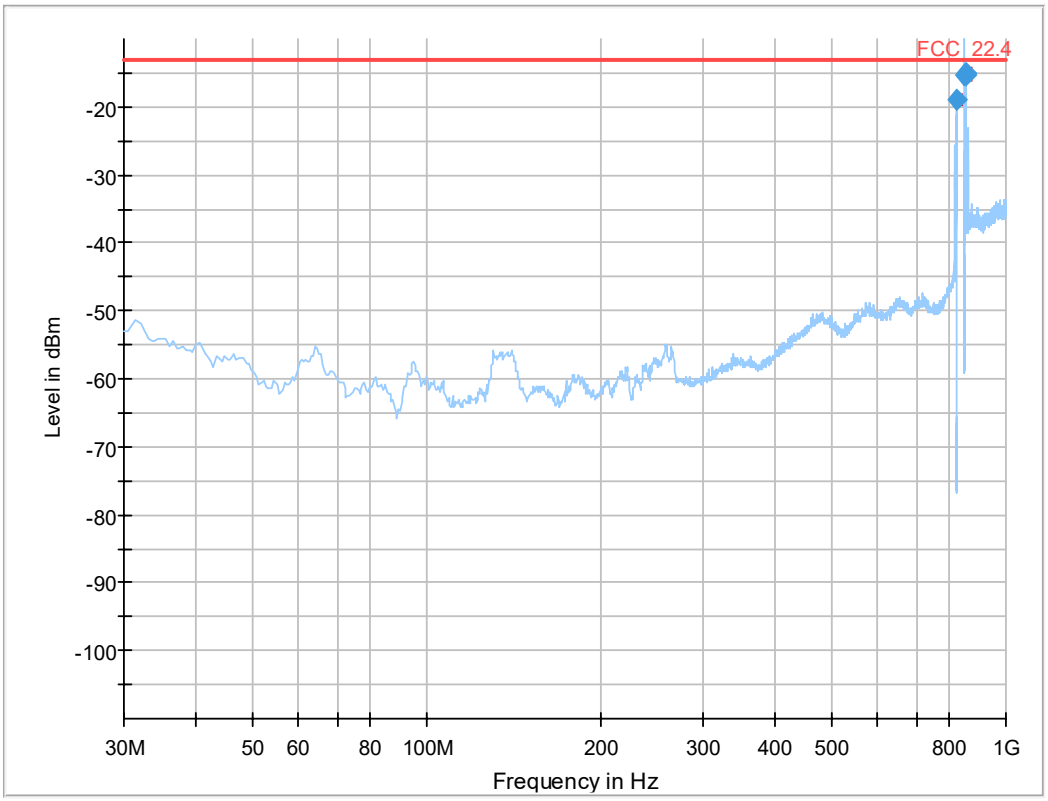



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

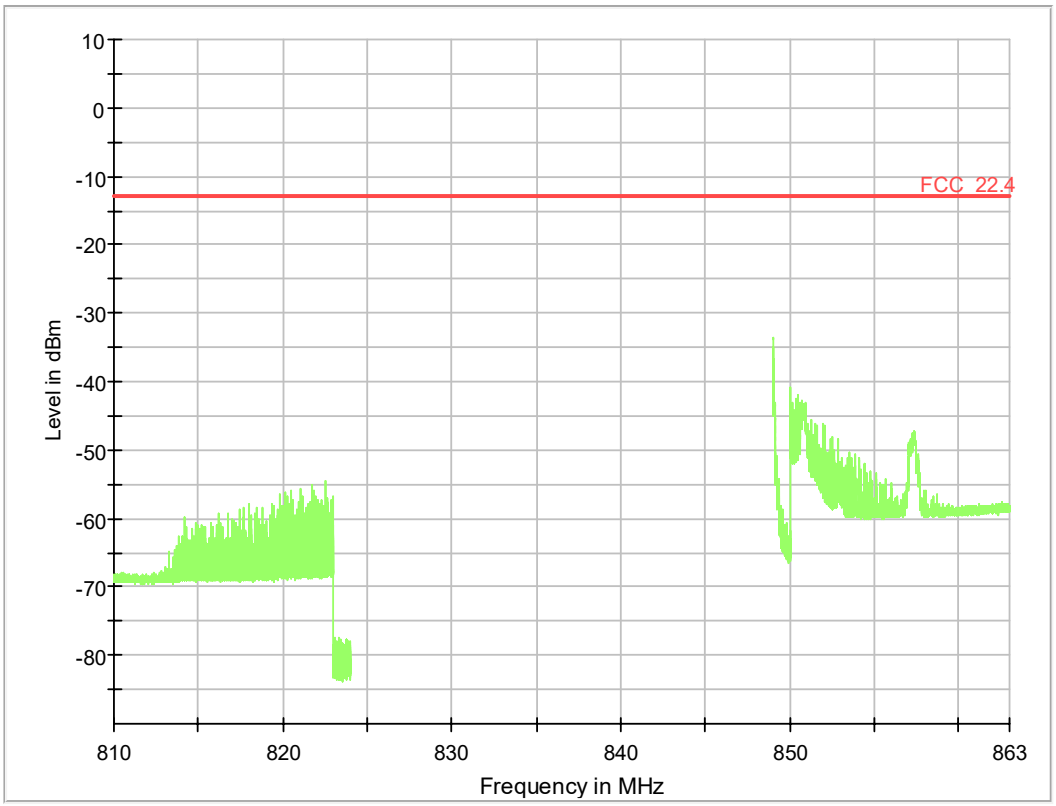



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 822.504375 | -18.85 | -13.00 | 5.85 | 7000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.1 |
| 850.000000 | 5.28 | -13.00 | -18.28 | 2000.0 | 1000.000 | 150.0 | V | 45.0 | 90.0 | -73.5 |
| 850.150000 | -0.08 | -13.00 | -12.92 | 2000.0 | 1000.000 | 150.0 | V | 45.0 | 90.0 | -73.5 |
| 850.300000 | -4.67 | -13.00 | -8.33 | 2000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.7 |
| 850.450000 | -9.83 | -13.00 | -3.17 | 2000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.6 |
| 850.600000 | -15.28 | -13.00 | 2.28 | 2000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.6 |
| 853.000000 | -15.05 | -13.00 | 2.05 | 2000.0 | 1000.000 | 150.0 | H | -45.0 | 90.0 | -72.5 |
| 853.750000 | -15.22 | -13.00 | 2.22 | 2000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.4 |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 822.504375 | -18.85 | -13.00 | 5.85 | 7000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.1 |
| 850.000000 | 5.28 | -13.00 | -18.28 | 2000.0 | 1000.000 | 150.0 | V | 45.0 | 90.0 | -73.5 |
| 850.150000 | -0.08 | -13.00 | -12.92 | 2000.0 | 1000.000 | 150.0 | V | 45.0 | 90.0 | -73.5 |
| 850.300000 | -4.67 | -13.00 | -8.33 | 2000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.7 |
| 850.450000 | -9.83 | -13.00 | -3.17 | 2000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.6 |
| 850.600000 | -15.28 | -13.00 | 2.28 | 2000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.6 |
| 853.000000 | -15.05 | -13.00 | 2.05 | 2000.0 | 1000.000 | 150.0 | H | -45.0 | 90.0 | -72.5 |
| 853.750000 | -15.22 | -13.00 | 2.22 | 2000.0 | 1000.000 | 150.0 | H | 45.0 | 0.0 | -72.4 |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

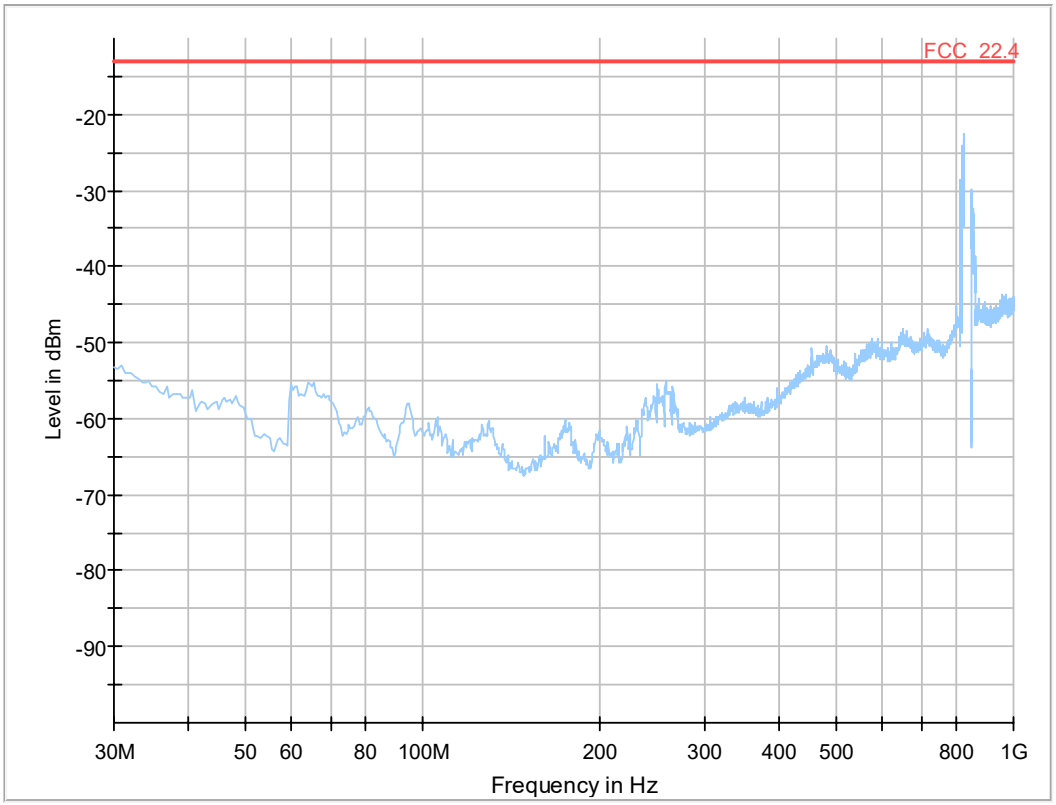
| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

Final measurement with RMS detector.

**Test: 22.4; Frequency Band = FDD5, Mode = HSDPA, Channel = 4132, Frequency = 826.4MHz**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AB01 |
| *Date of Test:* | 2016/12/22 3:30 |
| *Body:* | FCC47CFRChIPART22PUBLIC MOBILE SERVICES |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

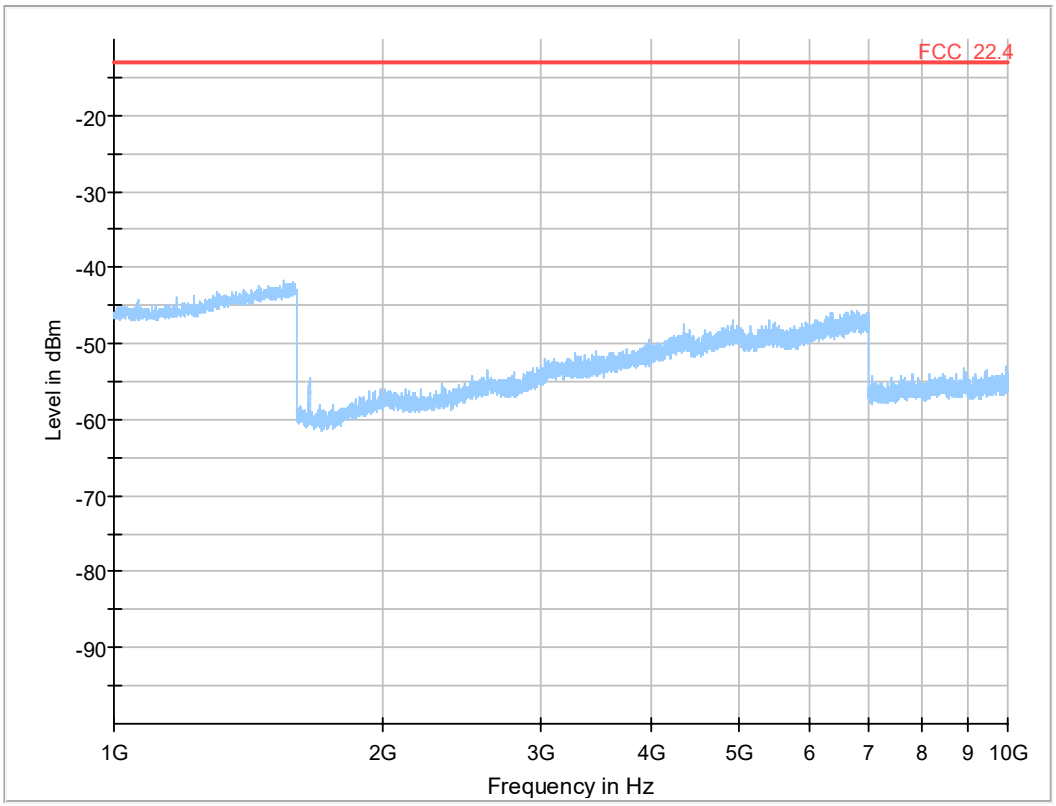



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

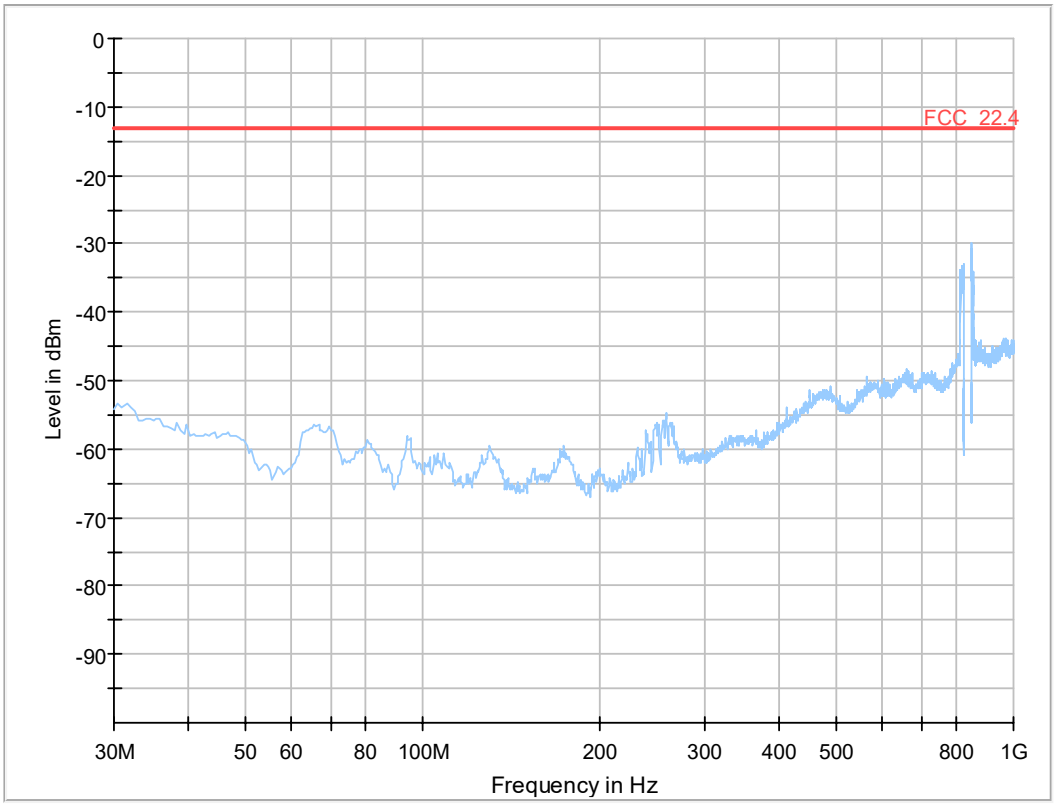
## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

**Test1: 22.4; Frequency Band = FDD5, Mode = HSDPA, Channel = 4183, Frequency = 836.6MHz**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AB01 |
| *Date of Test:* | 2016/12/21 23:00 |
| *Body:* | FCC47CFRChIPART22PUBLIC MOBILE SERVICES |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

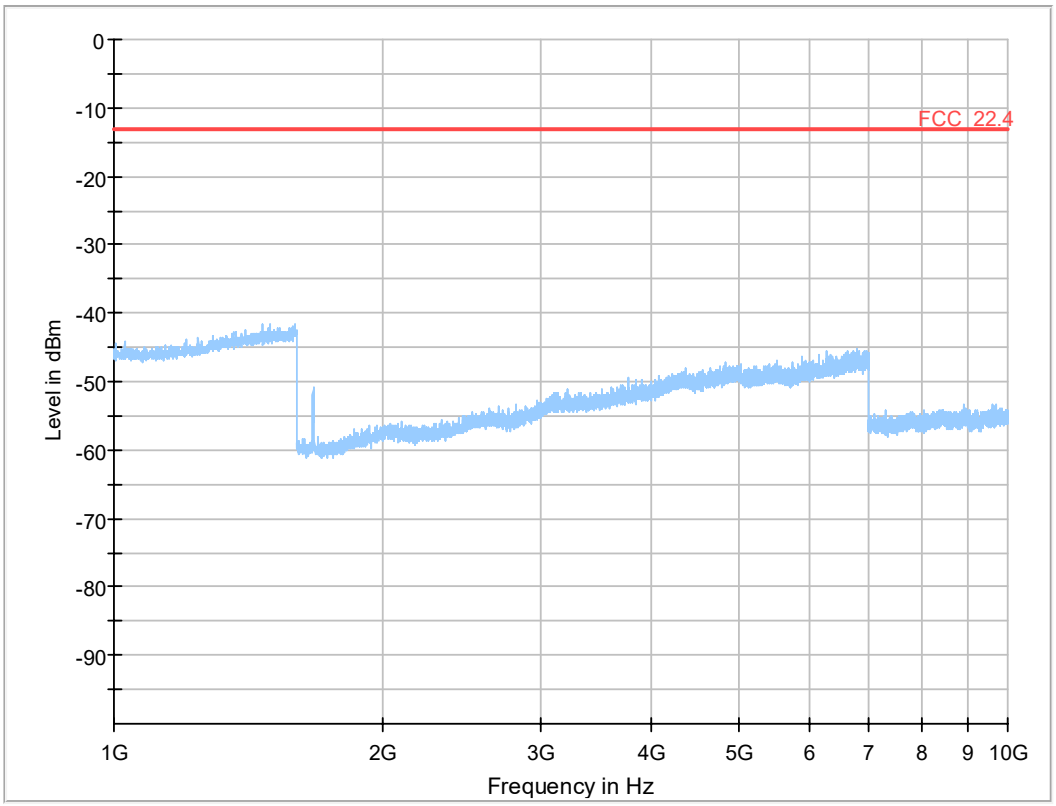



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

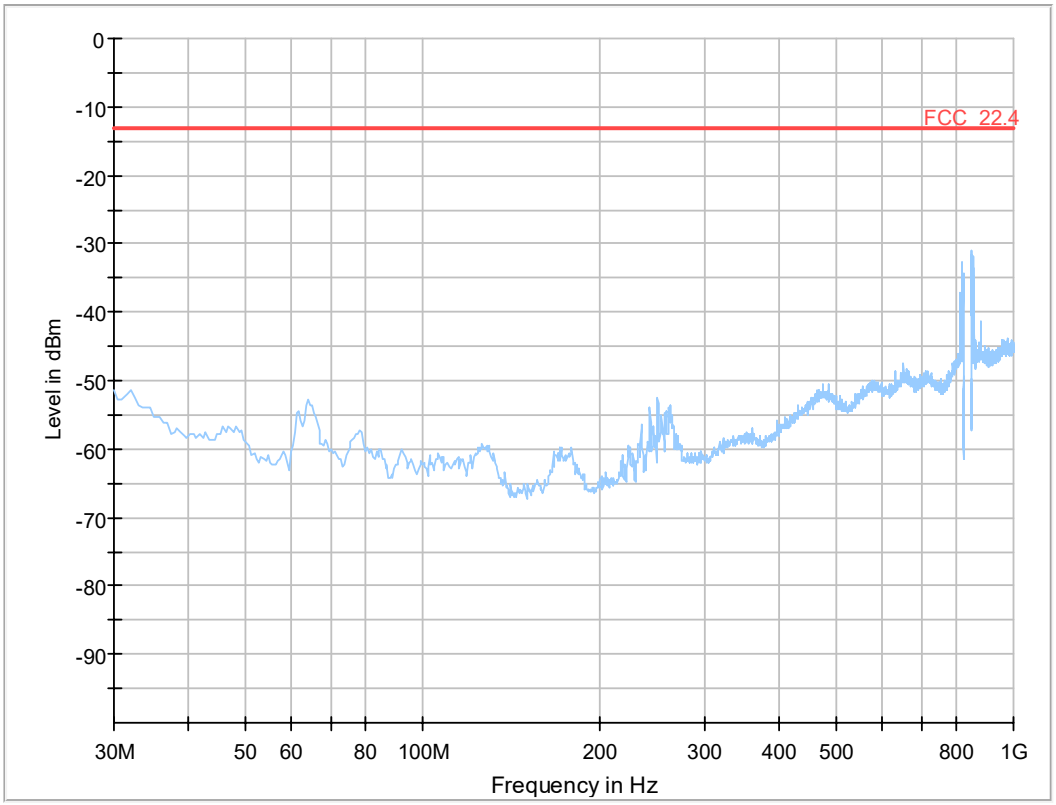
## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

**Test2: 22.4; Frequency Band = FDD5, Mode = HSDPA, Channel = 4183, Frequency = 836.6MHz**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AA02 |
| *Date of Test:* | 2017/01/13 14:31 |
| *Body:* | FCC47CFRChIPART22PUBLIC MOBILE SERVICES |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

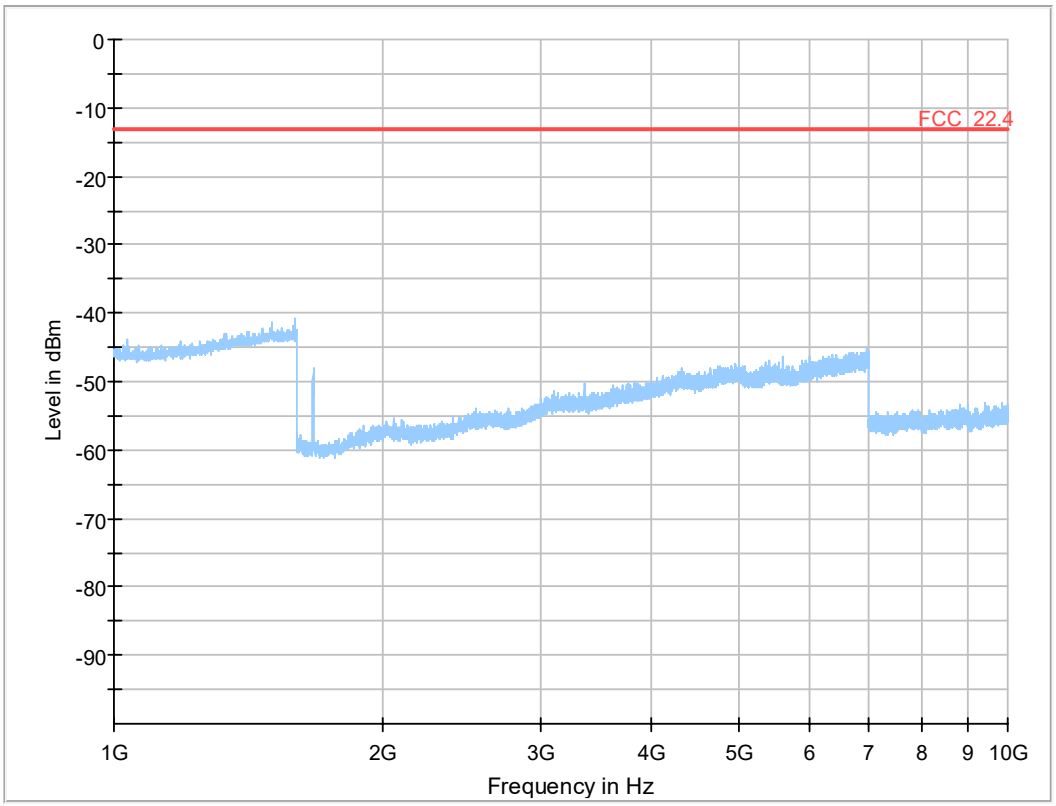



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

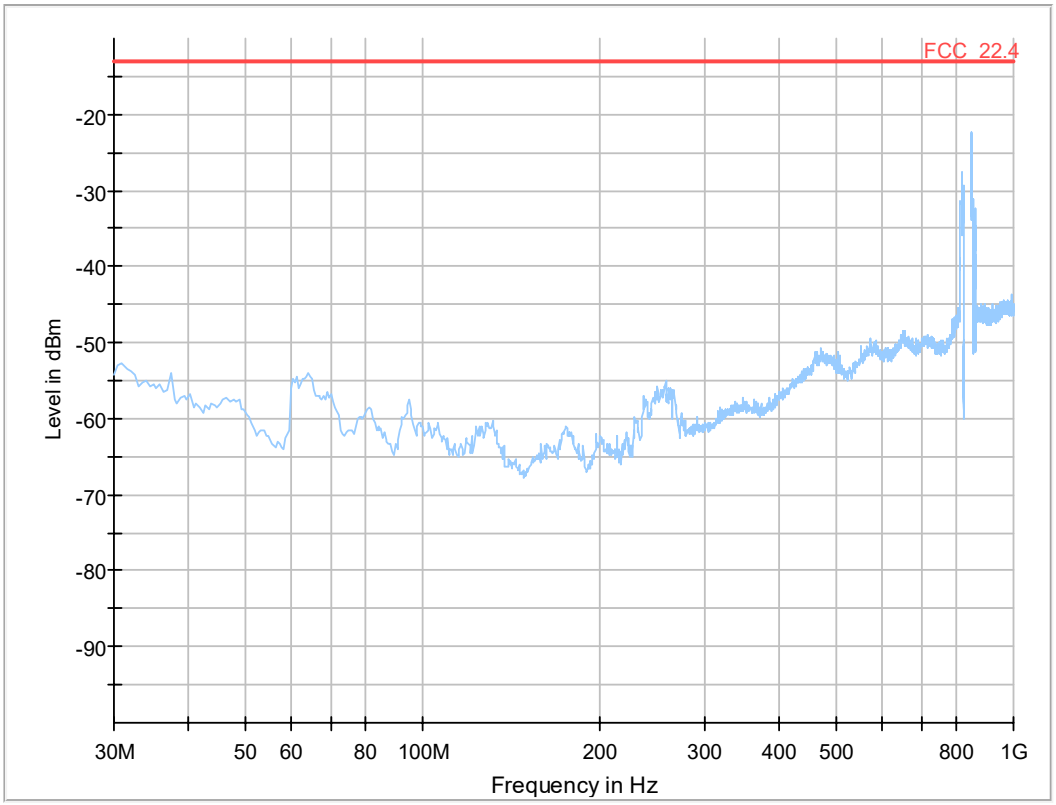
## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

**Test: 22.4; Frequency Band = FDD5, Mode = HSDPA, Channel = 4233, Frequency = 846.6MHz**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AB01 |
| *Date of Test:* | 2016/12/22 4:00 |
| *Body:* | FCC47CFRChIPART22PUBLIC MOBILE SERVICES |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

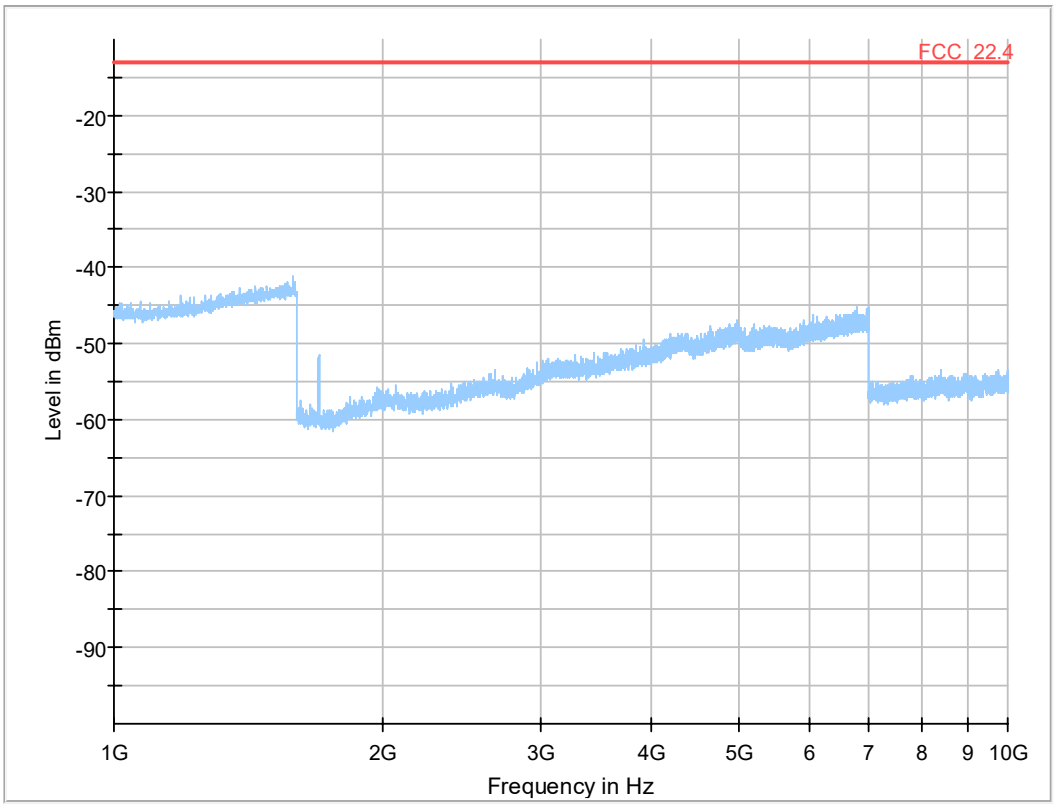



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

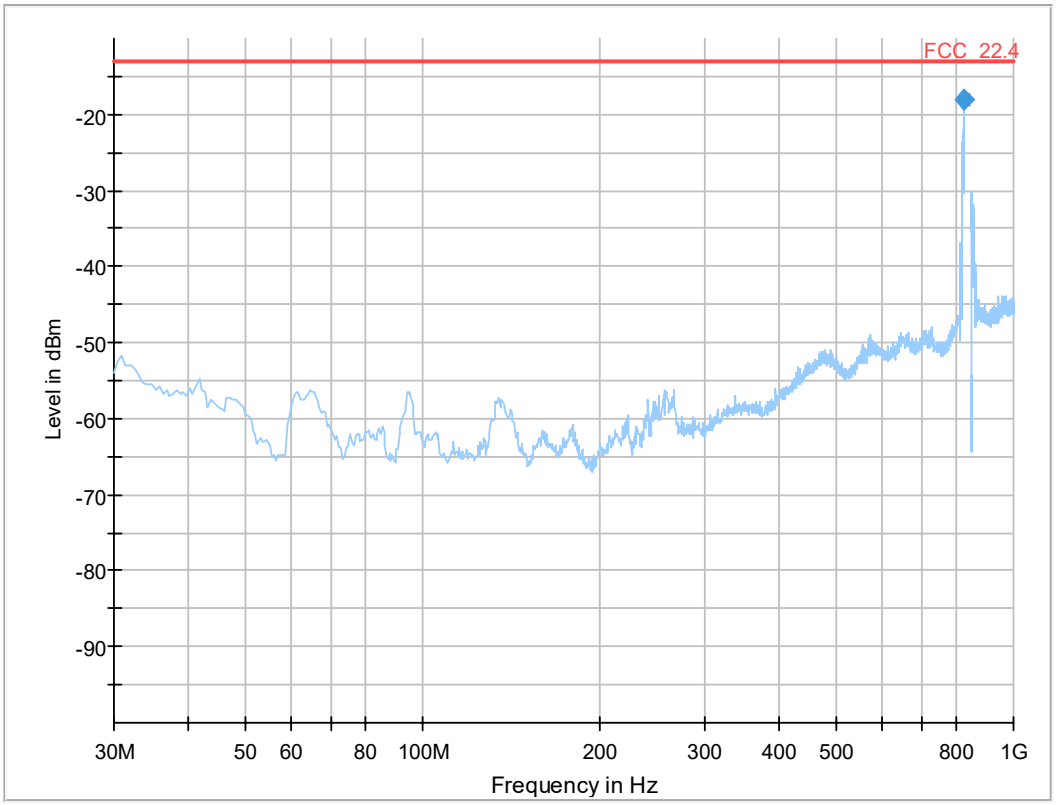
## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

**Test: 22.4; Frequency Band = FDD5, Mode = HSUPA, Channel = 4132, Frequency = 826.4MHz**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AB01 |
| *Date of Test:* | 2016/12/28 16:14 |
| *Body:* | FCC47CFRChIPART22PUBLIC MOBILE SERVICES |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

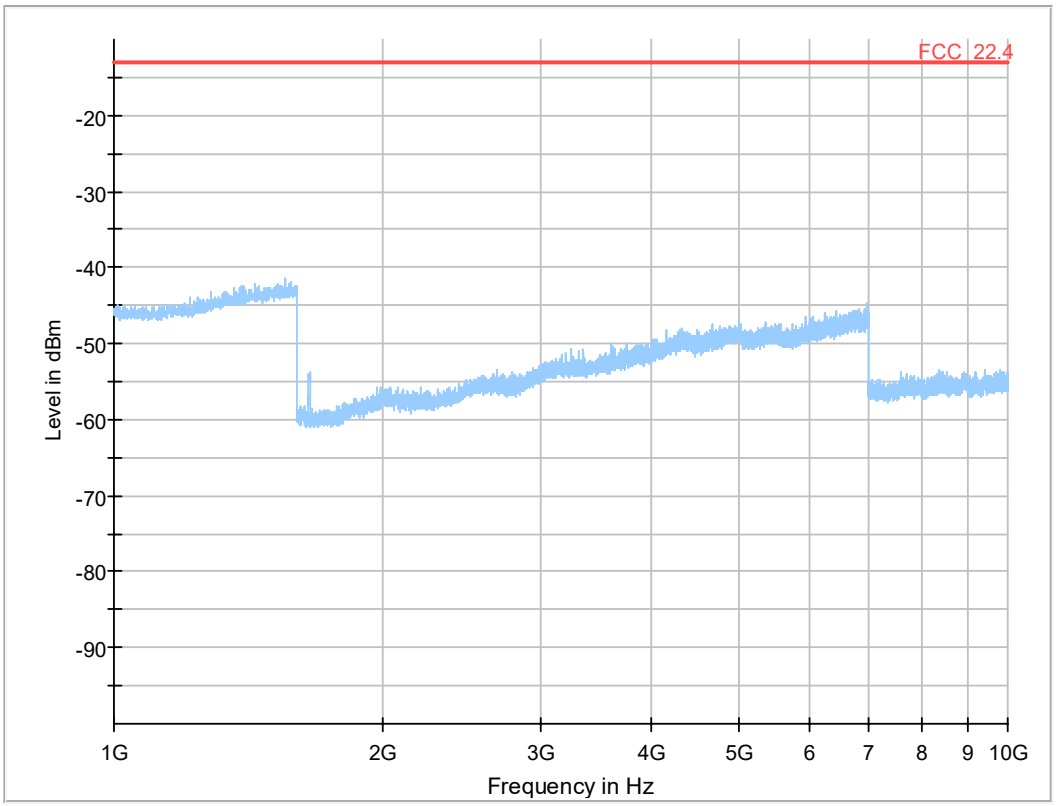



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 823.821000 | -18.11 | -13.00 | 5.11 | 1000.0 | 50.000 | 150.0 | H | 45.0 | 0.0 | -72.2 |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 823.821000 | -18.11 | -13.00 | 5.11 | 1000.0 | 50.000 | 150.0 | H | 45.0 | 0.0 | -72.2 |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

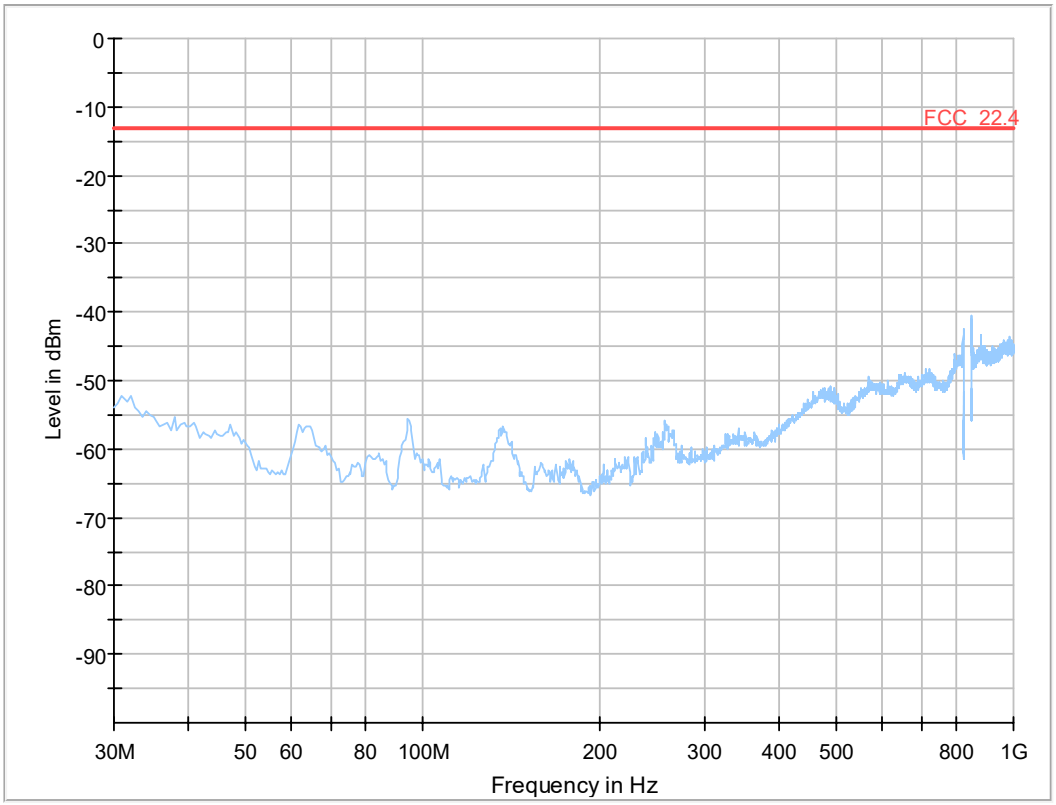
## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

**Test1: 22.4; Frequency Band = FDD5, Mode = HSUPA, Channel = 4183, Frequency = 836.6MHz**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AB01 |
| *Date of Test:* | 2016/12/28 16:45 |
| *Body:* | FCC47CFRChIPART22PUBLIC MOBILE SERVICES |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

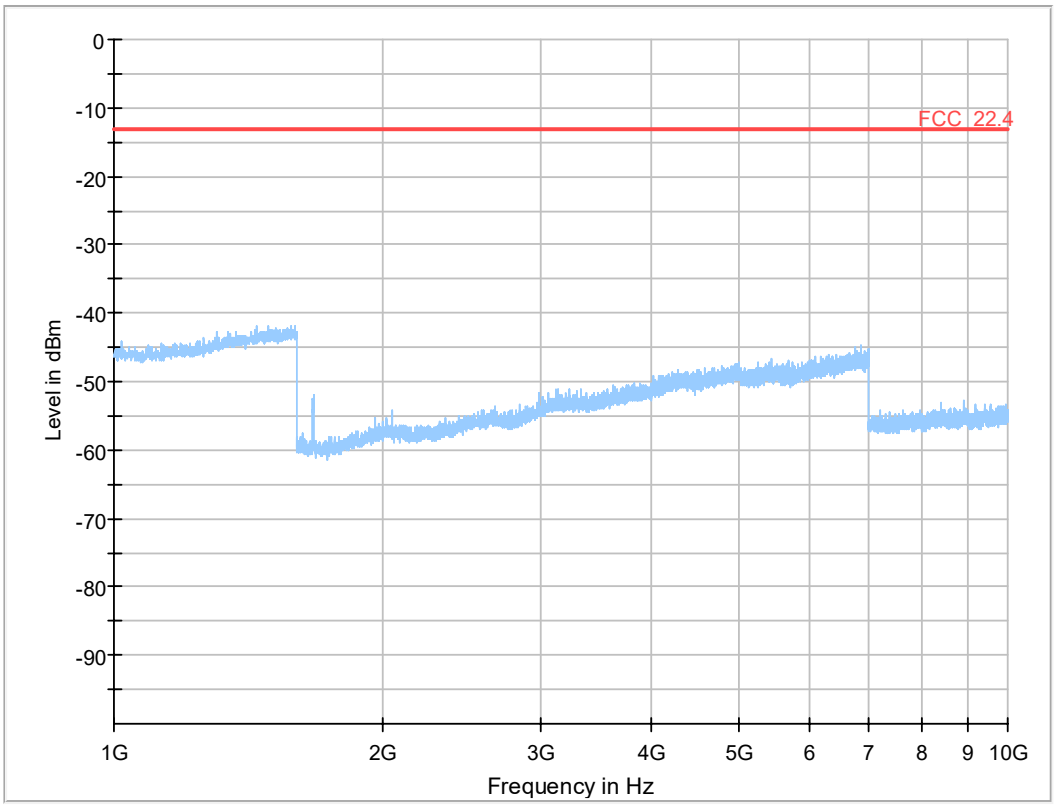



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

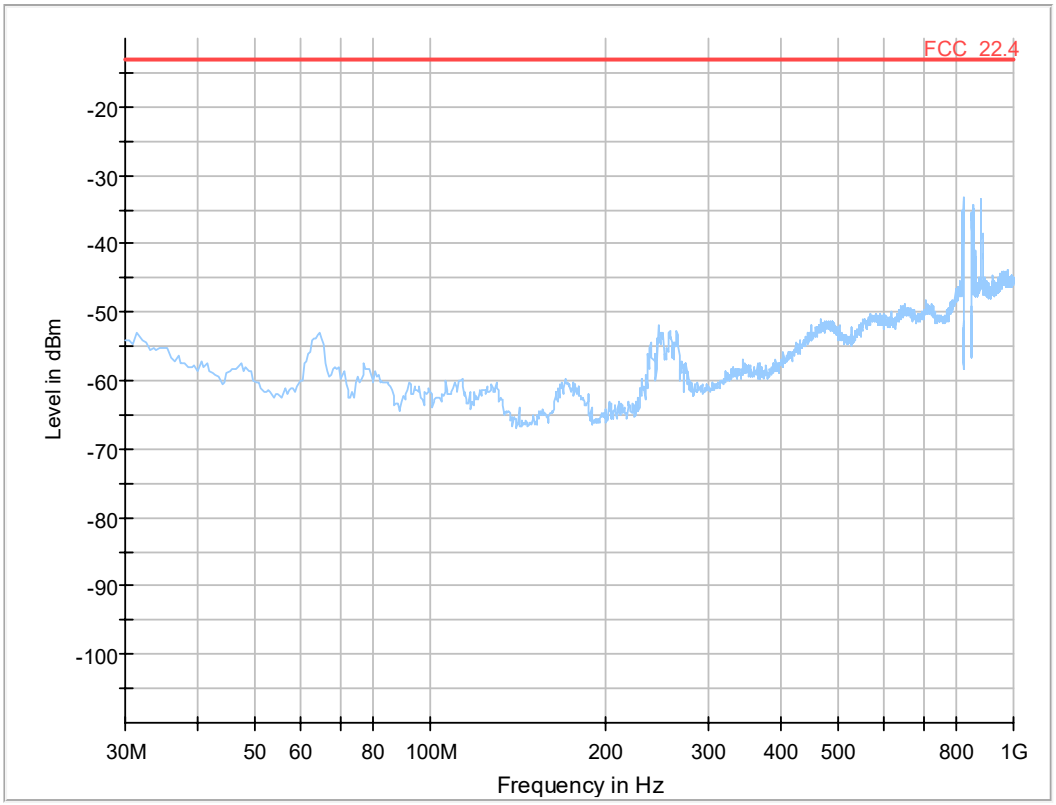
## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

**Test2: 22.4; Frequency Band = FDD5, Mode = HSUPA, Channel = 4183, Frequency = 836.6MHz**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AA02 |
| *Date of Test:* | 2017/01/13 14:32 |
| *Body:* | FCC47CFRChIPART22PUBLIC MOBILE SERVICES |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

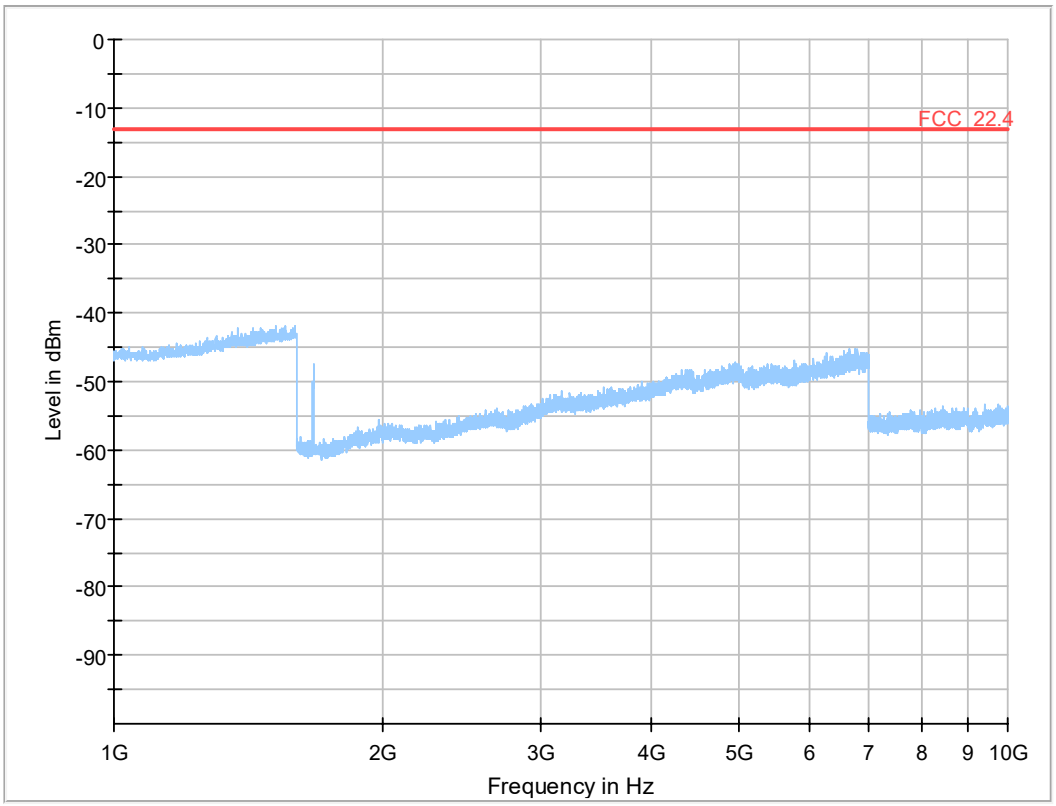



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

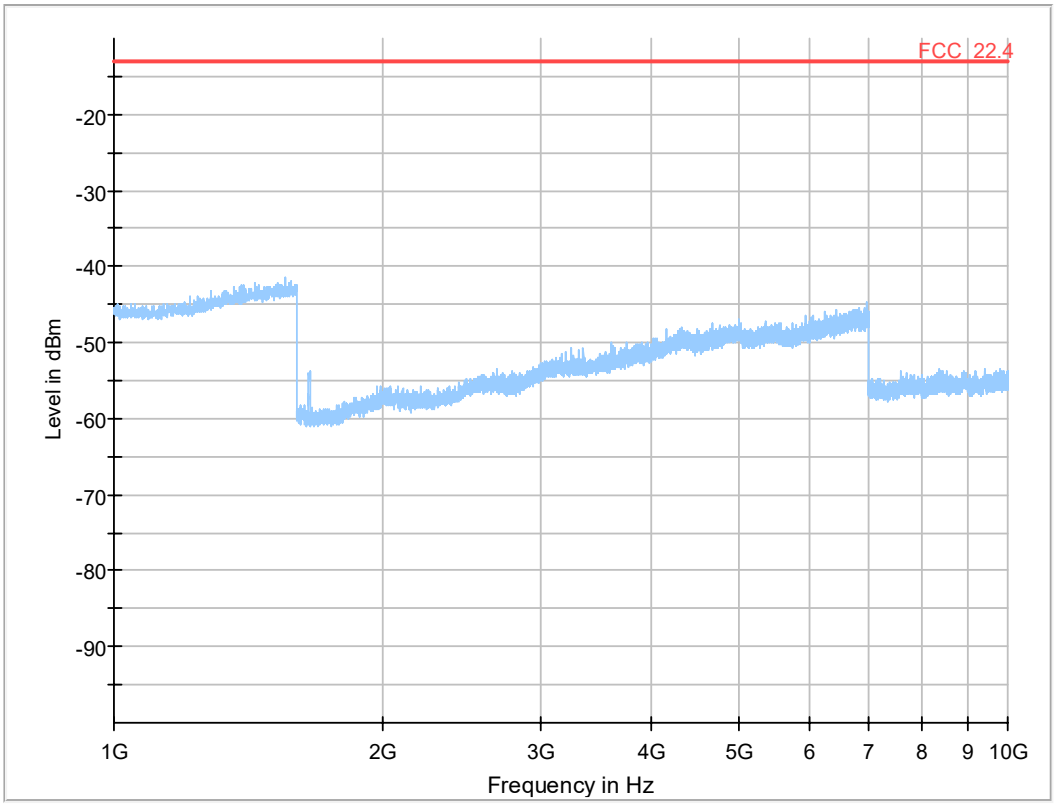
## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

**Test: 22.4; Frequency Band = FDD5, Mode = HSUPA, Channel = 4233, Frequency = 846.6MHz**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AB01 |
| *Date of Test:* | 2016/12/28 18:32 |
| *Body:* | FCC47CFRChIPART22PUBLIC MOBILE SERVICES |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

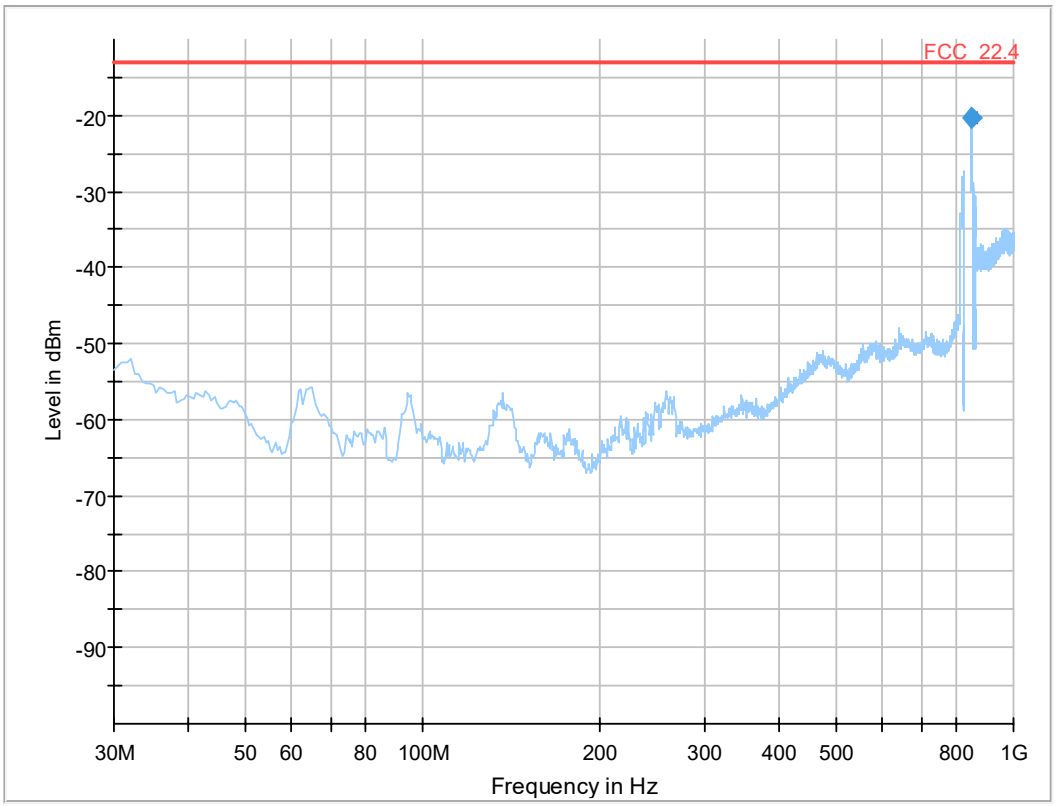



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 850.180000 | -20.21 | -13.00 | 7.21 | 1000.0 | 100.000 | 150.0 | H | -180.0 | 90.0 | -72.7 |

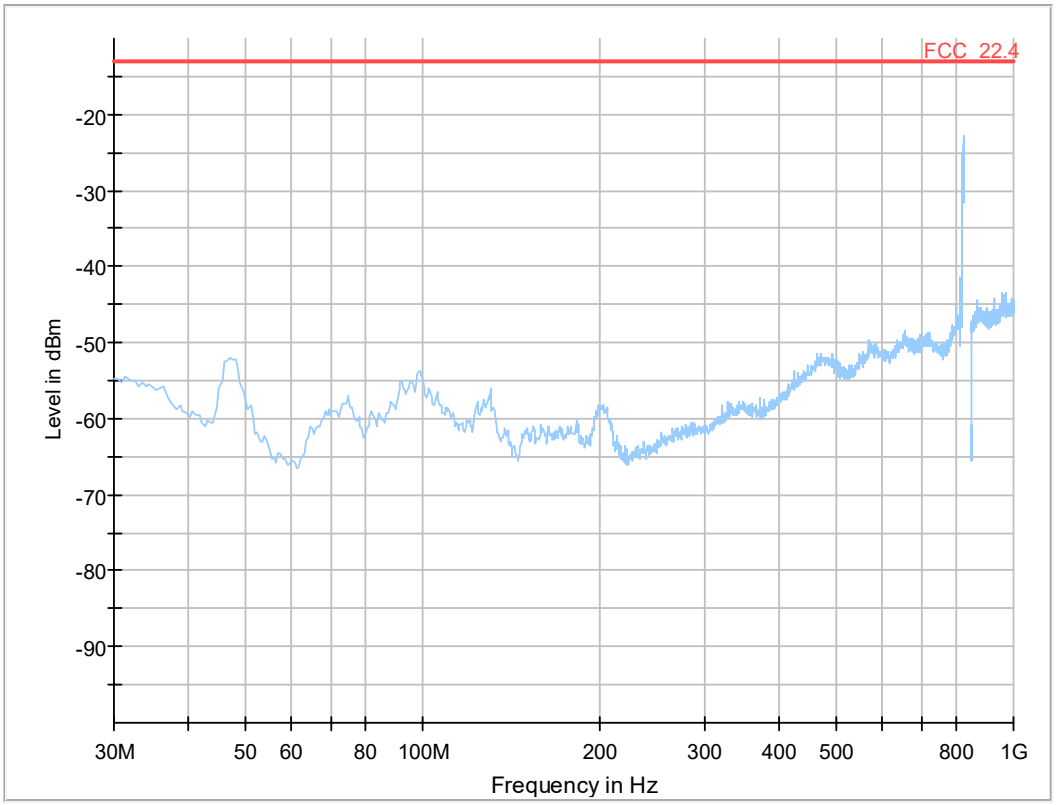
## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 850.180000 | -20.21 | -13.00 | 7.21 | 1000.0 | 100.000 | 150.0 | H | -180.0 | 90.0 | -72.7 |

**Test: 22.4; Frequency Band = FDD5, Mode = W-CDMA, Channel = 4132, Frequency = 826.4MHz**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AB01 |
| *Date of Test:* | 2017/01/18 15:02 |
| *Body:* | NO BODY |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

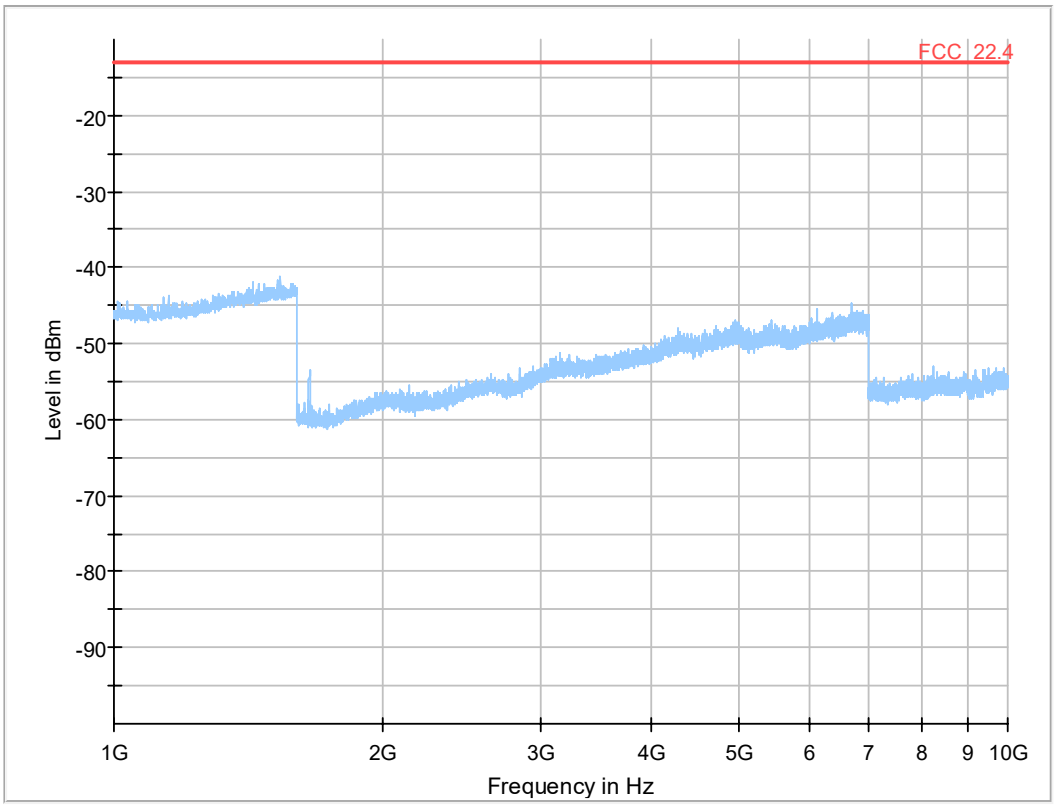



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

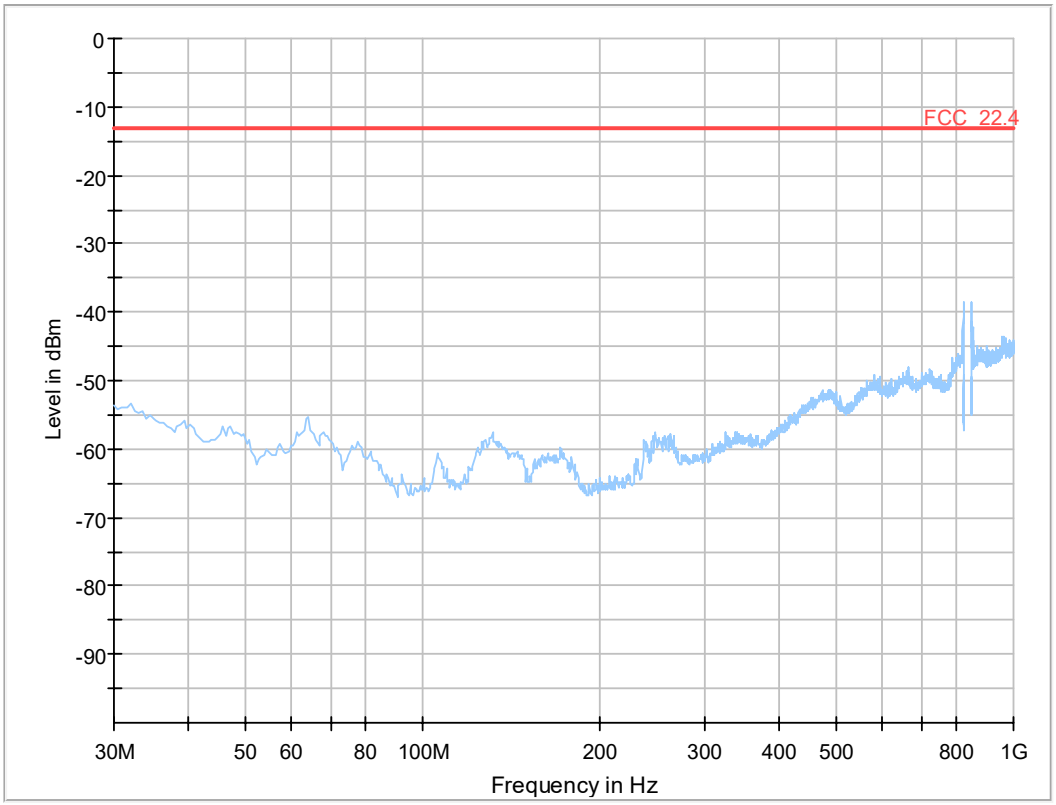
## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

**Test1: 22.4; Frequency Band = FDD5, Mode = W-CDMA, Channel = 4183, Frequency = 836.6MHz**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AB01 |
| *Date of Test:* | 2017/01/17 18:28 |
| *Body:* | NO BODY |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

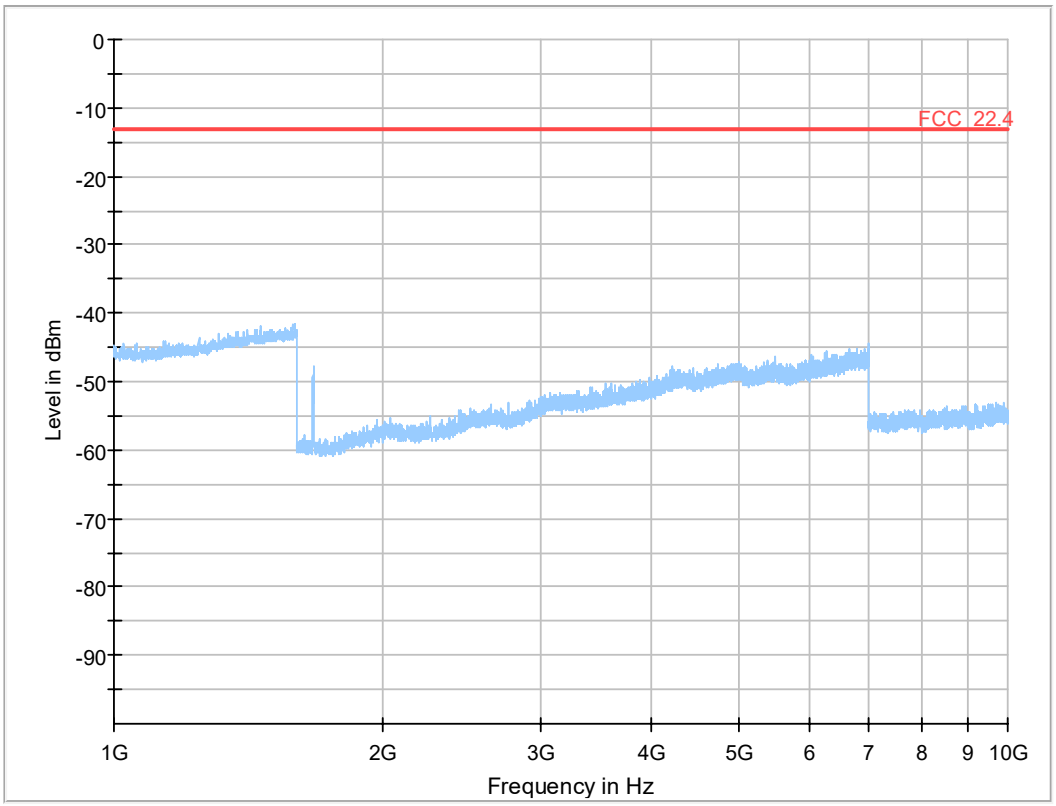



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

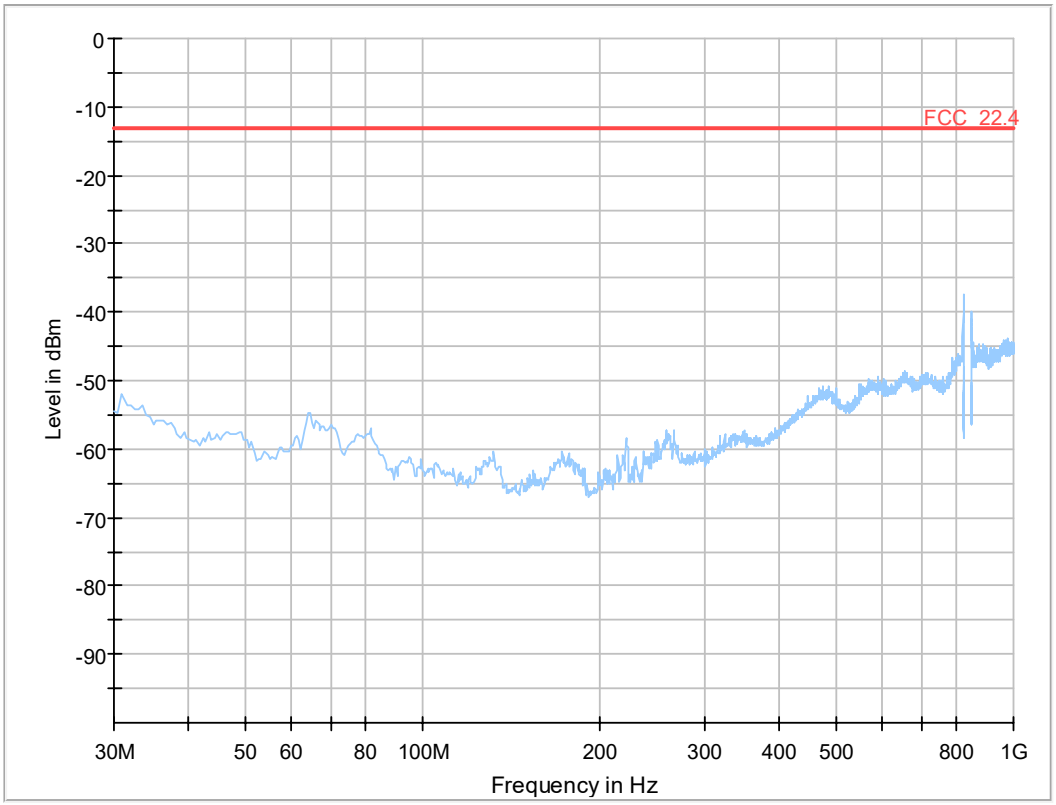
## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

**Test2: 22.4; Frequency Band = FDD5, Mode = W-CDMA, Channel = 4183, Frequency = 836.6MHz**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AA02 |
| *Date of Test:* | 2017/01/17 18:27 |
| *Body:* | NO BODY |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

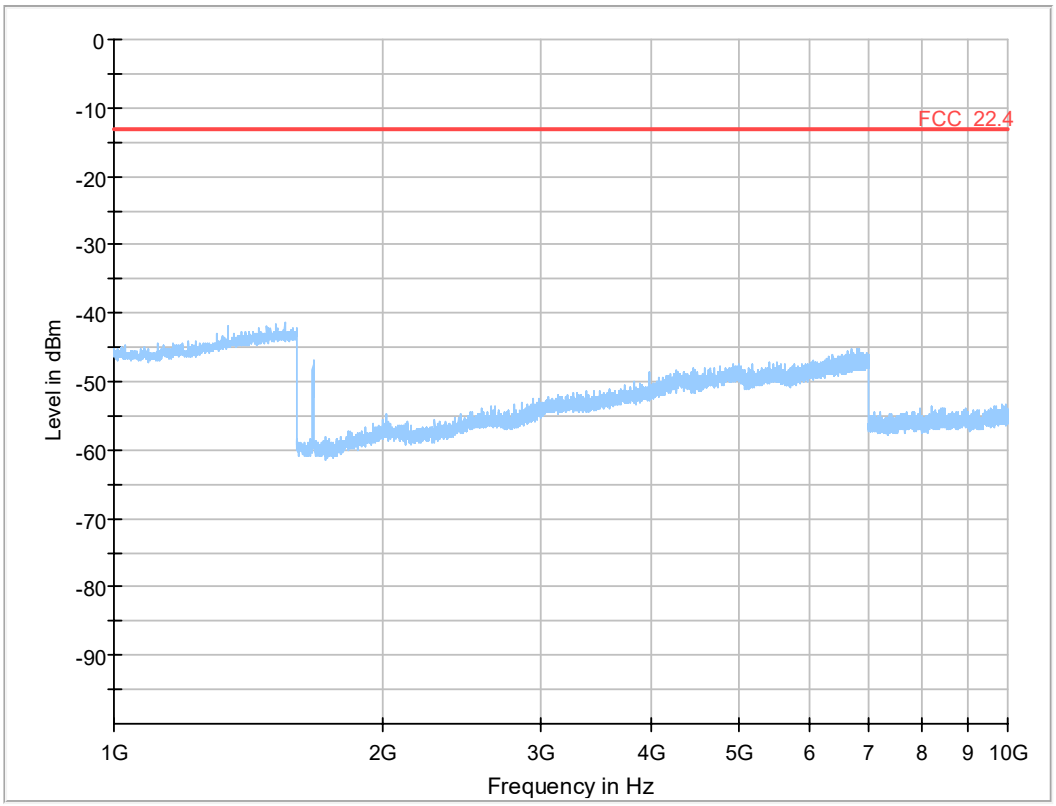



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

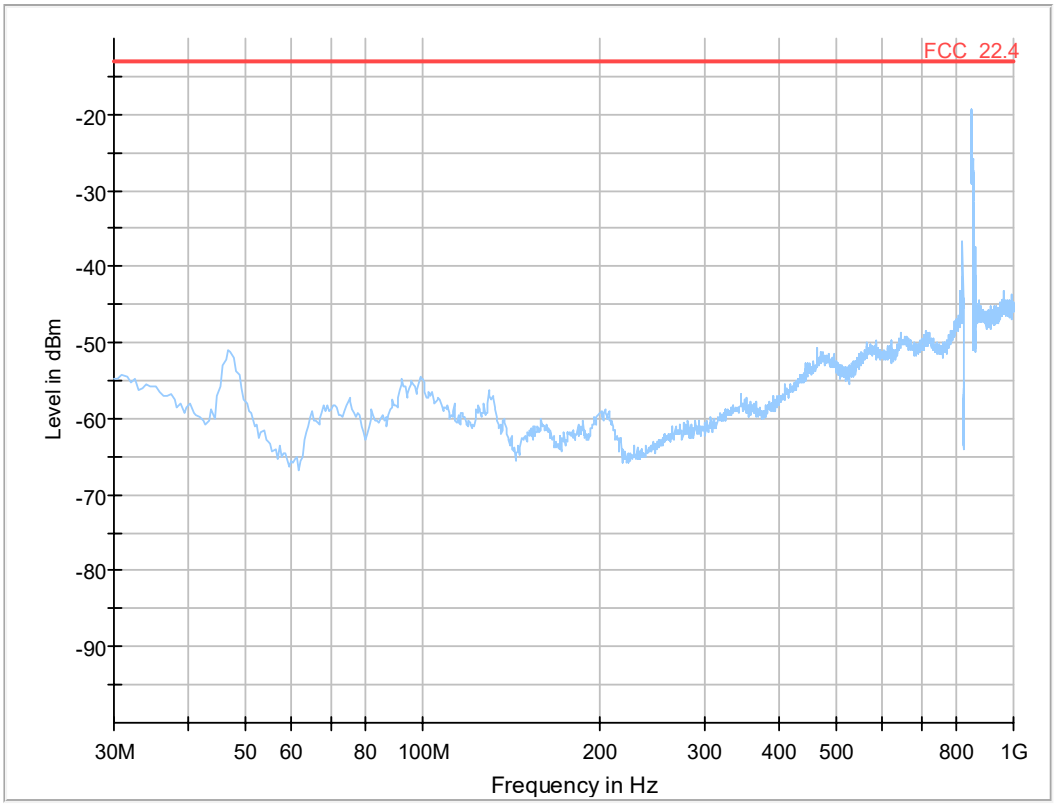
## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

**Test: 22.4; Frequency Band = FDD5, Mode = W-CDMA, Channel = 4233, Frequency = 846.6MHz**

| | |
|---|---|
| *Result:* | Passed |
| *Setup No.:* | S01_AB01 |
| *Date of Test:* | 2017/01/18 15:02 |
| *Body:* | NO BODY |
| *Test Specification:* | FCC part 2 and 22 |

**Detailed Results:**

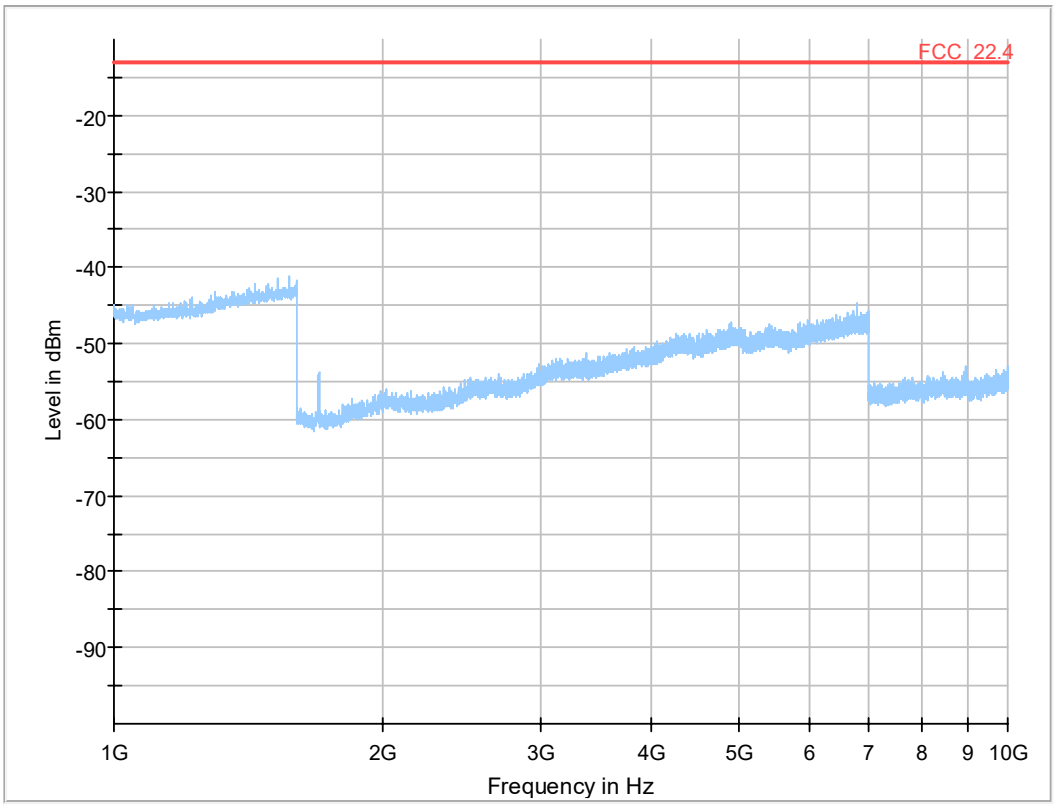



## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

## Final_Result

| Frequency (MHz) | MaxPeak (dBm) | Limit (dBm) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

# 4 Test Equipment Details

## 4.1 List of Used Test Equipment

The calibration, hardware and software states are shown for the testing period.

### Test Equipment Anechoic Chamber

| | |
|---|---|
| ***Lab ID:*** | **Lab 1** |
| *Description:* | Anechoic Chamber for radiated testing |

| *Calibration Details* | *Last Execution* | *Next Execution* |
|---|---|---|
| NSA (FCC) | 2014/01/09 | 2017/01/09 |

### Single Devices for Anechoic Chamber

| *Single Device Name* | *Type* | *Serial Number* | *Manufacturer* |
|---|---|---|---|
| Air compressor | none | - | |
| Anechoic Chamber | 10.58 x 6.38 x 6.00 m³ | none | |

| *Calibration Details* | *Last Execution* | *Next Execution* |
|---|---|---|
| FCC listing 96716 3m Part15/18 | 2014/01/09 | 2017/01/08 |

| | | | |
|---|---|---|---|
| Anechoic Chamber | 8.8m x 4.6m x 4.05 m | B83117-S40-X191 | Albatross Projects GmbH |
| Controller Maturo | MCU | 961208 | Maturo GmbH |
| EMC camera | CE-CAM/1 | - | |
| EMC camera Nr.2 | CCD-400E | 0005033 | |
| Filter ISDN | B84312-C110-E1 | | |
| Filter Universal 1A | BB4312-C30-H3 | - | |

### Test Equipment Auxiliary Equipment for Radiated emissions

| | |
|---|---|
| ***Lab ID:*** | **Lab 1** |
| *Description:* | Equipment for emission measurements |
| *Serial Number:* | see single devices |

### Single Devices for Auxiliary Equipment for Radiated emissions

| *Single Device Name* | *Type* | *Serial Number* | *Manufacturer* |
|---|---|---|---|
| Antenna mast | AM 4.0 | AM4.0/180/11920513 | Maturo GmbH |
| Biconical Broadband Antenna | SBA 9119 | 9119-005 | |
| Biconical dipole | VUBA 9117 | 9117-108 | |
| Broadband Amplifier 1 GHz - 4 GHz | AFS4-01000400-1Q-10P-4 | - | |
| Broadband Amplifier 18 GHz - 26 GHz | JS4-18002600-32-5P | 849785 | |
| Broadband Amplifier 30 MHz - 18 GHz | JS4-00101800-35-5P | 896037 | |
| Cable "ESI to EMI Antenna" | EcoFlex10 | W18.01-2+W38.01-2 | |
| Cable "ESI to Horn Antenna" | SucoFlex | W18.02-2+W38.02-2 | |
| Double-ridged horn | HF 906 | 357357/002 | Rohde & Schwarz GmbH & Co. KG |

| *Calibration Details* | *Last Execution* | *Next Execution* |
|---|---|---|
| Standard Calibration | 2015/06/23 | 2018/06/22 |

**Single Devices for Auxiliary Equipment for Radiated emissions (continued)**

| *Single Device Name* | *Type* | *Serial Number* | *Manufacturer* | |
|---|---|---|---|---|
| Double-ridged horn | HF 907 | 102444 | Rohde & Schwarz GmbH & Co. KG | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | Standard Calibration | | 2015/05/11 | 2018/05/10 |
| Double-ridged horn-duplicated 2015-07-15 10:47:55 | HF 906 | 357357/001 | Rohde & Schwarz GmbH & Co. KG | |
| High Pass Filter | 4HC1600/12750-1.5-KK | 9942011 | | |
| High Pass Filter | 5HC2700/12750-1.5-KK | 9942012 | | |
| High Pass Filter | 5HC3500/18000-1.2-KK | 200035008 | | |
| High Pass Filter | WHKX 7.0/18G-8SS | 09 | | |
| Horn Antenna Schwarzbeck 15-26.5 GHz BBHA 9170 | BBHA 9170 | BBHA9170262 | | |
| Log.-per. Antenna | HL 562 Ultralog | 100609 | Rohde & Schwarz GmbH & Co. KG | |
| Log.-per. Antenna (upgraded) | HL 562 Ultralog new biconicals | 830547/003 | Rohde & Schwarz GmbH & Co. KG | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | Standard Calibration | | 2015/06/30 | 2018/06/29 |
| Loop Antenna | HFH2-Z2 | 829324/006 | Rohde & Schwarz GmbH & Co. KG | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | DKD Calibration | | 2014/11/27 | 2017/11/27 |
| Standard Gain / Pyramidal Horn Antenna 40 GHz | 3160-10 | 00086675 | | |
| Tilt device Maturo (Rohacell) | Antrieb TD1.5-10kg | TD1.5-10kg/024/3790709 | Maturo GmbH | |

## Test Equipment Auxiliary Test Equipment

| | |
|---|---|
| ***Lab ID:*** | **Lab 1** |
| *Description:* | Single Devices for various Test Equipment |
| *Type:* | various |
| *Serial Number:* | none |

### Single Devices for Auxiliary Test Equipment

| *Single Device Name* | *Type* | *Serial Number* | *Manufacturer* | |
|---|---|---|---|---|
| Broadband Power Divider N (Aux) | 1506A / 93459 | LM390 | | |
| Broadband Power Divider SMA | WA1515 | A855 | | |
| Digital Multimeter 03 (Multimeter) | Fluke 177 | 86670383 | | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | DAkkS Calibration | | 2016/02/04 | 2018/02/28 |
| Digital Multimeter 13 (Clamp Meter) | Fluke 325 | 31270091WS | FLUKE | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | DAkkS-Calibration | | 2016/02/04 | 2019/02/28 |
| Fibre optic link Satellite (Aux) | FO RS232 Link | 181-018 | | |
| Fibre optic link Transceiver (Aux) | FO RS232 Link | 182-018 | | |
| Isolating Transformer | LTS 604 | 1888 | | |
| Notch Filter Ultra Stable (Aux) | WRCA800/960-6EEK | 24 | | |
| Signal Analyzer | FSV30 | 103005 | Rohde & Schwarz GmbH & Co. KG | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | DKD calibration | | 2016/02/25 | 2018/02/24 |
| Spectrum Analyser | FSU26 | 200418 | | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | Standard calibration | | 2016/11/03 | 2017/11/02 |
| Spectrum Analyzer | FSP3 | 836722/011 | Rohde & Schwarz GmbH & Co. KG | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | DKD calibration | | 2015/06/23 | 2018/06/22 |
| Vector Signal Generator | SMIQ 03B | 832492/061 | | |

### Test Equipment Digital Signalling Devices

| | |
|---|---|
| ***Lab ID:*** | **Lab 1** |
| *Description:* | Signalling equipment for various wireless technologies. |

### Single Devices for Digital Signalling Devices

| *Single Device Name* | *Type* | *Serial Number* | *Manufacturer* | |
|---|---|---|---|---|
| CMW500 | CMW500 | 107500 | | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | Standard calibration | | 2015/07/13 | 2017/07/14 |
| Digital Radio Communication Tester | CMD 55 | 831050/020 | Rohde & Schwarz GmbH & Co. KG | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | DKD calibration | | 2014/12/02 | 2017/12/01 |
| Universal Radio Communication Tester | CMU 200 | 837983/052 | Rohde & Schwarz GmbH & Co. KG | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | DKD calibration | | 2014/12/03 | 2017/12/02 |
| | *HW/SW Status* | | *Date of Start* | *Date of End* |
| | HW options:<br>B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B54V14, B56V14, B68 3v04, B95, PCMCIA, U65V02<br>SW options:<br>K21 4v11, K22 4v11, K23 4v11, K24 4v11, K27 4v10, K28 4v10, K42 4v11, K43 4v11, K53 4v10, K65 4v10, K66 4v10, K68 4v10,<br>Firmware:<br>µP1 8v40 01.12.05<br>---<br>SW:<br>K62, K69 | | 2007/01/02<br><br>2008/11/03 | |
| Vector Signal Generator | SMU200A | 100912 | Rohde & Schwarz GmbH & Co. KG | |

### Test Equipment Emission measurement devices

| | |
|---|---|
| ***Lab ID:*** | **Lab 1** |
| *Description:* | Equipment for emission measurements |
| *Serial Number:* | see single devices |

### Single Devices for Emission measurement devices

| *Single Device Name* | *Type* | *Serial Number* | *Manufacturer* | |
|---|---|---|---|---|
| EMI Receiver / Spectrum Analyzer | ESR 7 | 101424 | | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | DKD Calibration | | 2016/11/29 | 2018/11/28 |
| Personal Computer | Dell | 30304832059 | | |
| Power Meter | NRVD | 828110/016 | | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | Standard calibration | | 2016/05/24 | 2017/05/23 |
| Sensor Head A | NRV-Z1 | 827753/005 | | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | Standard calibration | | 2016/05/27 | 2017/05/26 |
| Signal Generator | SMR 20 | 846834/008 | Rohde & Schwarz GmbH & Co. KG | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | Standard Calibration | | 2014/06/24 | 2017/06/23 |
| Spectrum Analyzer | ESIB 26 | 830482/004 | Rohde & Schwarz GmbH & Co. KG | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | DAkkS Calibration (DK) | | 2015/12/09 | 2017/12/08 |
| | *HW/SW Status* | | *Date of Start* | *Date of End* |
| | Firmware-Update 4.34.4 from 3.45 during calibration | | 2009/12/03 | |
| Spectrum Analyzer | FSW 43 | 103779 | | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | DKD calibration | | 2016/12/02 | 2018/12/01 |

### Test Equipment Multimeter 03

| | |
|---|---|
| ***Lab ID:*** | **Lab 1** |
| *Description:* | Fluke 177 |
| *Serial Number:* | 86670383 |

### Single Devices for Multimeter 03

| *Single Device Name* | *Type* | *Serial Number* | *Manufacturer* | |
|---|---|---|---|---|
| Digital Multimeter 03 (Multimeter) | Fluke 177 | 86670383 | | |
| | *Calibration Details* | | *Last Execution* | *Next Execution* |
| | DAkkS Calibration | | 2016/02/04 | 2018/02/28 |

### Test Equipment T/A Logger 13

| | |
|---|---|
| ***Lab ID:*** | **Lab 1** |
| *Description:* | Lufft Opus10 TPR |
| *Type:* | Opus10 TPR |
| *Serial Number:* | 13936 |

### Single Devices for T/A Logger 13

| *Single Device Name* | *Type* | *Serial Number* | *Manufacturer* |
|---|---|---|---|
| ThermoAirpressure Datalogger 13 (Environ) | Opus10 TPR (8253.00) | 13936 | |

| *Calibration Details* | *Last Execution* | *Next Execution* |
|---|---|---|
| Customized calibration | 2015/02/27 | 2017/02/26 |

### Test Equipment T/H Logger 12

| | |
|---|---|
| ***Lab ID:*** | **Lab 1** |
| *Description:* | Lufft Opus10 |
| *Serial Number:* | 12482 |

### Single Devices for T/H Logger 12

| *Single Device Name* | *Type* | *Serial Number* | *Manufacturer* |
|---|---|---|---|
| ThermoHygro Datalogger 12 (Environ) | Opus10 THI (8152.00) | 12482 | |

| *Calibration Details* | *Last Execution* | *Next Execution* |
|---|---|---|
| Customized calibration | 2015/03/10 | 2017/03/09 |

# 5 Annex

## 5.1 Additional Information for Report

Summary of Test Results

The EUT complied with all performed tests as listed in the summary section of this report.

Technical Report Summary

Type of Authorization :

Certification for a GSM/WCDMA/CDMA2000 cellular radiotelephone device

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 0 to 69. The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

§ 2.1046 Measurement required: RF power output
§ 2.1049 Measurement required: Occupied bandwidth
§ 2.1051 Measurement required: Spurious emissions at antenna terminals
§ 2.1053 Measurement required: Field strength of spurious radiation
§ 2.1055 Measurement required: Frequency stability
§ 2.1057 Frequency spectrum to be investigated

Part 22, Subpart C – Operational and Technical Requirements

§ 22.355 Frequency tolerance

Part 22, Subpart H – Cellular Radiotelephone Service

§ 22.913 Effective radiated power limits
§ 22.917 Emission limitations for cellular equipment

additional documents

ANSI TIA-603-D-2004

Description of Methods of Measurements

RF Power Output

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §2.1046

Test Description (conducted measurement procedure)

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Channel (Frequency): please refer to the detailed results
4) The transmitted power of the EUT was recorded by using a spectrum analyser.

Test Description (radiated measurement procedure)

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.
2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
3) A substitution procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lamda/2 dipole).
4) The output power was measured in both vertical and horizontal antenna polarisation during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case power all orientations (X, Y, Z) of the EUT have been measured.
5) The test procedure according to TIA-603-C-2004 has been considered.

Test Requirements / Limits

§2.1046 Measurements Required: RF Power Output
(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the output terminals when this test is made shall be stated.
§22.913 Effective radiated power limits
(a)(2) Maximum ERP. … The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

---

Emission and Occupied Bandwidth

---

Standard FCC Part 22, Subpart H

The test was performed according to: FCC §2.1049

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings:
- Resolution Bandwidth: >1% of the manufacturer’s stated occupied bandwidth
5) The maximum spectral level of the modulated signal was recorded as the reference.
6) The emission bandwidth is measured as follows:
the two furthest frequencies above and below the frequency of the maximum reference level where the spectrum is –26 dB down have to be found.
7) The occupied bandwidth (99% Bandwidth) is measured as follows:
the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 percent of the total mean power.

Test Requirements / Limits

§ 2.1049 Measurements required: Occupied bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions (as applicable):

(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

---

Spurious emissions at antenna terminals

---

Standard FCC Part 22, Subpart H

The test was performed according to FCC §2.1051

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings
- [Resolution Bandwidth]:
a) [>=1% of wanted signal bandwidth] in the Span of 1 MHz directly below and above the PCS-Band,
b) otherwise [100 kHz] (or [1 MHz] for accelerated sweep times)
c) [reduced resolution bandwidth] in case the curve of the analyser IF-Filter or the wanted EUT signal leads to an exceeding of the limit, in this case a correction factor was used
- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth
5) The spurious emissions peaks were measured in the frequency range from 9 kHz to 10 GHz (up to the 10th harmonic) during the call was established

Test Requirements / Limits

§ 2.1051 Spurious emissions at antenna terminals

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in Sec. 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:
(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.
(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value

need not be reported.
(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 22.917 Emission limitations for cellular equipment

(a) 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.
Remark of the test laboratory: This is calculated to be -13 dBm.
(b) Compliance with these rules 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 or 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.
(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].
(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

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Field strength of spurious radiation

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Standard FCC Part 22, Subpart H

The test was performed according to: FCC §2.1053

Test Description

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.
2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
3) A pre-calibration procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lamda/2 dipole).
4) All spurious radiation measurements were made with spectrum analyser and the appropriate calibrated antennas for the frequency range of 30 MHz to 10 GHz (up to the 10th harmonic of the transmit frequency). The frequency range from 9 kHz to 30 MHz has been examined during the conducted spurious emission measurements.
5) Important Analyser Settings
- [Resolution Bandwidth / Video Bandwidth]:
a) [3 kHz / 10 kHz] in the Span of 1 MHz directly below and above the Band,
b) [10 kHz / 30 kHz] in case the curve of the analyser IF-Filter leads to an exceeding of the limit, in this case a worst case correction factor of 20 dB (1 MHz -> 10 kHz) was used
c) [1 MHz / 3 MHz] otherwise
- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth
6) The spurious emissions peaks were measured in both vertical and horizontal antenna polarization during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case peaks all orientations (X, Y, Z) of the EUT have been measured.
7) After this initial test, a final test according to TIA-603-C 2.2.12 Unwanted Emissions is performed on signals which are identified as being close to the limit. For any emissions found to be within 10 dB of the limit, a specific signal substitution measurement is performed at the frequency of the emission to determine the exact e.i.r.p. value.

Test Requirements / Limits

§ 2.1053 Measurements required: Field strength of spurious radiation.

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of Sec. 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.
(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:
(2) All equipment operating on frequencies higher than 25 MHz.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:
(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.
(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.
(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 22.917 Emission limitations for cellular equipment

(a) 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.
This is calculated to be -13 dBm (effective radiated power) which corresponds to 84.6 dBµV/m (field strength) in a distance of 3 m.

(b) Compliance with these rules 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 or 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.
(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].
(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

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Frequency stability

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Standard FCC Part 22, Subpart H

The test was performed according to FCC §2.1055

Test Description

1) The EUT was placed inside a temperature chamber.
2) The EUT was coupled to a Digital Communication Tester. Refer to chapter "Setup Drawings".

3) The climatic chamber was cycled down/up to a certain temperature, starting with the EUT minimum temperature.
4) After the temperature was stabilized the EUT was switched on and a call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Mid Channel
5) The frequency error of the EUT was recorded by using an internal measurement function of the Digital Communication Tester immediately after the call was established, five minutes after the call was established and ten minutes after the call was established.
6) This measurement procedure was performed for temperature variation from –30°C to +50°C in increments of 10°C, if not otherwise stated in the detailed results.
When the EUT did not operate at certain temperature levels, these measurements were left out.

Test Requirements / Limits

§2.1055 Measurements required: Frequency stability

(a) The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.
(d) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

§22.355 Frequency tolerance

…the carrier frequency of each transmitter in the Public Mobile Service must be maintained within the tolerances given in table C-1 of this section.

Table C-1.- Frequency Tolerance for Transmitters in the Public Mobile Services

| Frequency range (MHz) | Base, fixed (ppm) | Mobile up to 3 watts (ppm) | Mobile above 3 watts (ppm) |
|---|---|---|---|
| 25 to 50 | 20.0 | 20.0 | 50.0 |
| 50 to 450 | 5.0 | 5.0 | 50.0 |
| 450 to 512 | 2.5 | 5.0 | 5.0 |
| 821 to 896 | 1.5 | 2.5 | 2.5 |
| 928 to 929 | 5.0 | n/a | n/a |
| 929 to 960 | 1.5 | n/a | n/a |
| 2110 to 2220 | 10.0 | n/a | n/aFor the mid |

channel (836.6 MHz) the frequency tolerance is 2.5 ppm (2091.5 Hz).

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Band edge compliance

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Standard FCC Part 22, Subpart H

The test was performed according to: FCC §22.913

Test Description

1) The EUT was coupled to a Spectrum Analyser and a Digital Communication Tester through a Power

Divider. Refer to chapter "Setup Drawings".
2) The total insertion losses for signal path 1 and signal path 2 were measured. The values were used to correct the readings from the Spectrum Analyser and the Digital Communication Tester.
3) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.
Important Settings:
- Output Power: Maximum
- Channel: please refer to the detailed results
4) Important Analyser Settings:
- Resolution Bandwidth = Video Bandwidth: >1% of the manufacturer’s stated occupied bandwidth

Test Requirements / Limits

§ 22.917 Emission limitations for cellular equipment

Refer to chapter "Field strength of spurious radiation".

Appendix 1

Subtests HSDPA

| Sub-test | βc | βd | βd (SF) | βc/βd | βHS (Note1, Note 2) | CM (dB) (Note 3) | MPR (dB) (Note 3) |
|---|---|---|---|---|---|---|---|
| 1 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 0.0 | 0.0 |
| 2 | 12/15 (Note 4) | 15/15 (Note 4) | 64 | 12/15 (Note 4) | 24/15 | 1.0 | 0.0 |
| 3 | 15/15 | 8/15 | 64 | 15/8 | 30/15 | 1.5 | 0.5 |
| 4 | 15/15 | 4/15 | 64 | 15/4 | 30/15 | 1.5 | 0.5 |

Note 1: $?_{ACK}$, $?_{NACK}$ and $?_{CQI}$ = 30/15 with $\beta_{hs}$ = 30/15 * $\beta_c$ .

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, $?_{ACK}$ and $?_{NACK}$ = 30/15 with $\beta_{hs}$ = 30/15 * $\beta_c$ , and $?_{CQI}$ = 24/15 with $\beta_{hs}$ = 24/15 * $\beta_c$ .

Note 3: CM = 1 for $\beta_c/\beta_d$ =12/15, $\beta_{hs}/\beta_c$=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the $\beta_c/\beta_d$ ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c$ = 11/15 and $\beta_d$ = 15/15.

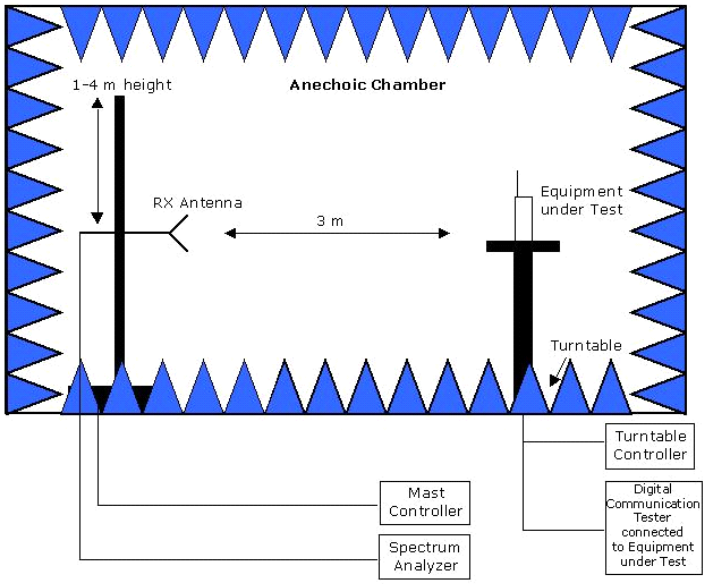
Subtests HSUPA

| Subtest | Mode | Loopback Mode | Rel99 RMC | HSDPA FRC | HSUPA Test | Number of E-DPDCH Channels |
|---|---|---|---|---|---|---|
| 1 | Rel6 HSUPA | Test Mode 1 | 12.2kbps RMC | H-Set1 | HSUPA Loopback | 1 |
| 2 | Rel6 HSUPA | Test Mode 1 | 12.2kbps RMC | H-Set1 | HSUPA Loopback | 1 |
| 3 | Rel6 HSUPA | Test Mode 1 | 12.2kbps RMC | H-Set1 | HSUPA Loopback | 2 |
| 4 | Rel6 HSUPA | Test Mode 1 | 12.2kbps RMC | H-Set1 | HSUPA Loopback | 1 |
| 5 | Rel6 HSUPA | Test Mode 1 | 12.2kbps RMC | H-Set1 | HSUPA Loopback | 1 |

| Subtest | Max UL Data Rate (kb/s) | βc/βd | βhs | βed | CM |
|---|---|---|---|---|---|
| 1 | 242.1 | 11/15 | 22/15 | 1309/225 | 1 |
| 2 | 161.3 | 6/15 | 12/15 | 94/75 | 3 |
| 3 | 524.7 | 15/9 | 30/15 | 47/15 | 2 |
| 4 | 197.6 | 2/15 | 4/15 | 56/75 | 3 |
| 5 | 299.6 | 15/15 | 30/15 | 134/15 | 1 |

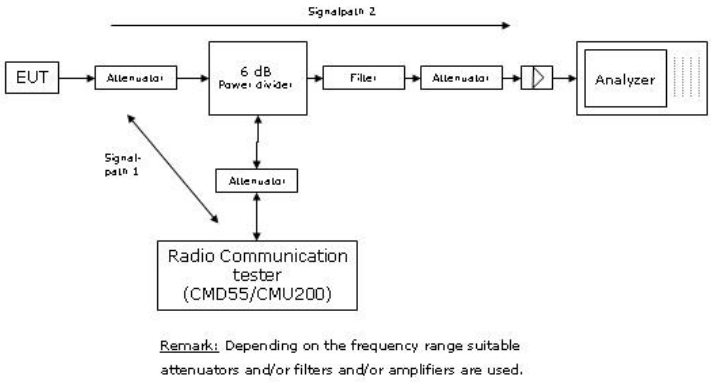
Appendix 2

## Setup Drawings

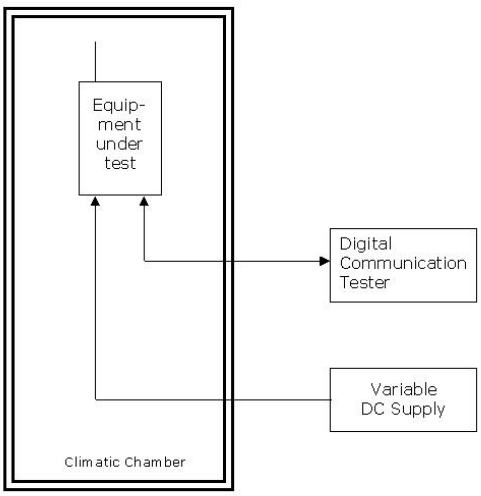



Principle set-up for radiated measurements

Appendix 3




Principle set-up for conducted measurements under nominal conditions




Principle set-up for tests under extreme test conditions

Appendix 4

# 6 Index