



# **CERTIFICATION TEST REPORT**

Report Number. : 11696948-E7V2

**Applicant** : APPLE, INC.  
1 INFINITE LOOP  
CUPERTINO, CA 95014, U.S.A.

**Model** : A1864, A1899

**FCC ID** : BCG-E3160A

**IC** : 579C-E3160A

**EUT Description** : SMARTPHONE

**Test Standard(s)** : FCC CFR47 PART 22H, 24E, 27L, AND 90S  
IC RSS-132 ISSUE 3, RSS-133 ISSUE 6 AND RSS-139 ISSUE 3

**Date Of Issue:**

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Revision History

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|------|------------|-------------------------------------------|------------|
| V1   | 7/6/2017   | Initial Review                            | --         |
| V2   | 7/26/2017  | Updated report to address TCB's questions | Tina Chu   |

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** APPLE, INC.  
1 INFINITE LOOP  
CUPERTINO, CA 95014, U.S.A.

**EUT DESCRIPTION:** SMARTPHONE

**MODEL:** A1864, A1899

**SERIAL NUMBER:** C39TQ00FJ6KP

**DATE TESTED:** March 1, 2017 – July 26, 2017

| APPLICABLE STANDARDS                                     |              |
|----------------------------------------------------------|--------------|
| STANDARD                                                 | TEST RESULTS |
| CFR 47 Part 22H, 24E, 27L, AND 90S                       | Pass         |
| IC RSS-132 ISSUE 3, RSS-133 ISSUE 6, AND RSS-139 ISSUE 3 | Pass         |

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For  
UL Verification Services Inc. By:

Prepared By:



CHIN PANG  
SENIOR ENGINEER  
UL VERIFICATION SERVICES INC.



TINA CHU  
TEST ENGINEER  
UL VERIFICATION SERVICES INC.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 22, FCC CFR Part 24, FCC Part 27, FCC Part 90 and FCC KDB 971168 D01 v02r02, KDB 971168 D02 v01. RSS-132 Issue 3, RSS-133 Issue 6 and RSS-139 Issue 3 and ANSI C63.26:2015.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

| 47173 Benicia Street                            | 47266 Benicia Street                                       |
|-------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> Chamber A (IC:2324B-1) | <input type="checkbox"/> Chamber D (IC:22541-1)            |
| <input type="checkbox"/> Chamber B (IC:2324B-2) | <input checked="" type="checkbox"/> Chamber E (IC:22541-2) |
| <input type="checkbox"/> Chamber C (IC:2324B-3) | <input type="checkbox"/> Chamber F (IC:22541-3)            |
|                                                 | <input type="checkbox"/> Chamber G (IC:22541-4)            |
|                                                 | <input type="checkbox"/> Chamber H (IC:22541-5)            |

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

## 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)  
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

## 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| PARAMETER                                | UNCERTAINTY |
|------------------------------------------|-------------|
| Conducted Disturbance, 9KHz to 0.15 MHz  | 3.84 dB     |
| Conducted Disturbance, 0.15 to 30 MHz    | 3.65 dB     |
| Radiated Disturbance, 9KHz to 30 MHz     | 3.15 dB     |
| Radiated Disturbance, 30 to 1000 MHz     | 5.36 dB     |
| Radiated Disturbance, 1000 to 18000 MHz  | 4.32 dB     |
| Radiated Disturbance, 18000 to 26000 MHz | 4.45 dB     |
| Radiated Disturbance, 26000 to 40000 MHz | 5.24 dB     |
| Occupied Channel Bandwidth               | ±0.39 %     |
| Temperature                              | ±0.9 °C     |
| Supply voltages                          | ±0.45 %     |
| Time                                     | ±0.02 %     |

Uncertainty figures are valid to a confidence level of 95%.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The Equipment Under Test is a mobile phone with GSM, GPRS, EGPRS, UMTS, LTE, TD-SCDMA and CDMA technologies. It also supports IEEE 802.11a/b/g/n/ac, Bluetooth®, GPS and NFC. The device has a built-in inductive charging receiver which is not user accessible. The rechargeable battery is not user accessible.

### 5.2. DIFFERENCE IN MODEL NUMBER

Model A1864 and A1899 are identical. Two models numbers are allocated for marketing and logistic purpose only.

### 5.3. MAXIMUM OUTPUT POWER

#### EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015  
KDB 971168 Section 5.6

$$\text{ERP/EIRP} = \text{PMeas} + \text{GT} - \text{LC}$$

where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);

PMeas = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted and ERP/EIRP output powers as follows:

### 5.3.1. LAT 1

#### **GSM MODES**

| <b><u>RSS 132 850MHz Band IC</u></b>         |            |                           |                    |       |        |             |             |
|----------------------------------------------|------------|---------------------------|--------------------|-------|--------|-------------|-------------|
| Frequency range (MHz)                        | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |        | Limit (dBm) | Margin (dB) |
|                                              |            |                           |                    | dBm   | mW     |             |             |
| 824- 849                                     | GPRS       | 33.30                     | -1.69              | 31.61 | 1448.8 | 40.6        | -9.0        |
|                                              | EGPRS      | 28.00                     | -1.69              | 26.31 | 427.6  | 40.6        | -14.3       |
| <b><u>Part 22 850MHz Band FCC</u></b>        |            |                           |                    |       |        |             |             |
| Frequency range (MHz)                        | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | ERP   |        | Limit (dBm) | Margin (dB) |
|                                              |            |                           |                    | dBm   | mW     |             |             |
| 824-849                                      | GPRS       | 33.30                     | -1.69              | 29.46 | 883.1  | 38.5        | -9.0        |
|                                              | EGPRS      | 28.00                     | -1.69              | 24.16 | 260.6  | 38.5        | -14.3       |
| <b><u>Part 24 / RSS 133 1900MHz Band</u></b> |            |                           |                    |       |        |             |             |
| Frequency range (MHz)                        | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |        | Limit (dBm) | Margin (dB) |
|                                              |            |                           |                    | dBm   | mW     |             |             |
| 1850-1910                                    | GPRS       | 31.30                     | -0.36              | 30.94 | 1241.7 | 33.0        | -2.1        |
|                                              | EGPRS      | 27.00                     | -0.36              | 26.64 | 461.3  | 33.0        | -6.4        |

## CDMA2000 MODES

| <b>Part 90 800MHz Band</b>            |                 |                           |                    |       |       |             |             |
|---------------------------------------|-----------------|---------------------------|--------------------|-------|-------|-------------|-------------|
| Frequency range (MHz)                 | Modulation      | Conducted (Average) (dBm) | Antenna Gain (dBi) | ERP   |       | Limit (dBm) | Margin (dB) |
|                                       |                 |                           |                    | dBm   | mW    |             |             |
| 816-824                               | CDMA 1xRTT      | 24.80                     | -2.41              | 20.24 | 105.7 | 50.0        | -29.8       |
|                                       | CDMA EVDO Rev A | 24.80                     | -2.41              | 20.24 | 105.7 | 50.0        | -29.8       |
| <b>RSS 132 850MHz Band IC</b>         |                 |                           |                    |       |       |             |             |
| Frequency range (MHz)                 | Modulation      | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |       | Limit (dBm) | Margin (dB) |
|                                       |                 |                           |                    | dBm   | mW    |             |             |
| 824- 849                              | CDMA 1xRTT      | 24.80                     | -1.69              | 23.11 | 204.6 | 40.6        | -17.5       |
|                                       | CDMA EVDO-Rev A | 24.80                     | -1.69              | 23.11 | 204.6 | 40.6        | -17.5       |
| <b>Part 22 850MHz Band FCC</b>        |                 |                           |                    |       |       |             |             |
| Frequency range (MHz)                 | Modulation      | Conducted (Average) (dBm) | Antenna Gain (dBi) | ERP   |       | Limit (dBm) | Margin (dB) |
|                                       |                 |                           |                    | dBm   | mW    |             |             |
| 824- 849                              | CDMA 1xRTT      | 24.80                     | -1.69              | 20.96 | 124.7 | 38.5        | -17.5       |
|                                       | CDMA EVDO-Rev A | 24.80                     | -1.69              | 20.96 | 124.7 | 38.5        | -17.5       |
| <b>Part 24 / RSS 133 1900MHz Band</b> |                 |                           |                    |       |       |             |             |
| Frequency range (MHz)                 | Modulation      | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |       | Limit (dBm) | Margin (dB) |
|                                       |                 |                           |                    | dBm   | mW    |             |             |
| 1850-1910                             | CDMA 1xRTT      | 25.30                     | -0.36              | 24.94 | 311.9 | 33.0        | -8.1        |
|                                       | CDMA EVDO Rev A | 25.30                     | -0.36              | 24.94 | 311.9 | 33.0        | -8.1        |

## UMTS MODE

| <b>RSS 132 850MHz Band IC</b>         |            |                           |                    |       |       |             |             |
|---------------------------------------|------------|---------------------------|--------------------|-------|-------|-------------|-------------|
| Frequency range (MHz)                 | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |       | Limit (dBm) | Margin (dB) |
|                                       |            |                           |                    | dBm   | mW    |             |             |
| 824- 849                              | REL 99     | 24.80                     | -1.69              | 23.11 | 204.6 | 40.6        | -17.5       |
|                                       | HSDPA      | 24.70                     | -1.69              | 23.01 | 200.0 | 40.6        | -17.6       |
| <b>Part 22 850MHz Band FCC</b>        |            |                           |                    |       |       |             |             |
| Frequency range (MHz)                 | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | ERP   |       | Limit (dBm) | Margin (dB) |
|                                       |            |                           |                    | dBm   | mW    |             |             |
| 824-849                               | REL 99     | 24.80                     | -1.69              | 20.96 | 124.7 | 38.5        | -17.5       |
|                                       | HSDPA      | 24.70                     | -1.69              | 20.86 | 121.9 | 38.5        | -17.6       |
| <b>Part 24 / RSS 133 1900MHz Band</b> |            |                           |                    |       |       |             |             |
| Frequency range (MHz)                 | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |       | Limit (dBm) | Margin (dB) |
|                                       |            |                           |                    | dBm   | mW    |             |             |
| 1850-1910                             | REL 99     | 25.30                     | -0.36              | 24.94 | 311.9 | 33.0        | -8.1        |
|                                       | HSDPA      | 25.20                     | -0.36              | 24.84 | 304.8 | 33.0        | -8.2        |
| <b>Part 27 / RSS 139 1700MHz Band</b> |            |                           |                    |       |       |             |             |
| Frequency range (MHz)                 | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |       | Limit (dBm) | Margin (dB) |
|                                       |            |                           |                    | dBm   | mW    |             |             |
| 1710-1755                             | REL 99     | 25.30                     | -0.02              | 25.28 | 337.3 | 30.0        | -4.7        |
|                                       | HSDPA      | 25.20                     | -0.02              | 25.18 | 329.6 | 30.0        | -4.8        |

### 5.3.2. UAT 1

#### **GSM MODES**

| <b><u>RSS 132 850MHz Band IC</u></b>         |            |                           |                    |       |       |             |             |
|----------------------------------------------|------------|---------------------------|--------------------|-------|-------|-------------|-------------|
| Frequency range (MHz)                        | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |       | Limit (dBm) | Margin (dB) |
|                                              |            |                           |                    | dBm   | mW    |             |             |
| 824- 849                                     | GPRS       | 30.80                     | -3.17              | 27.63 | 579.4 | 40.6        | -13.0       |
|                                              | EGPRS      | 25.50                     | -3.17              | 22.33 | 171.0 | 40.6        | -18.3       |
| <b><u>Part 22 850MHz Band FCC</u></b>        |            |                           |                    |       |       |             |             |
| Frequency range (MHz)                        | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | ERP   |       | Limit (dBm) | Margin (dB) |
|                                              |            |                           |                    | dBm   | mW    |             |             |
| 824-849                                      | GPRS       | 30.80                     | -3.17              | 25.48 | 353.2 | 38.5        | -13.0       |
|                                              | EGPRS      | 25.50                     | -3.17              | 20.18 | 104.2 | 38.5        | -18.3       |
| <b><u>Part 24 / RSS 133 1900MHz Band</u></b> |            |                           |                    |       |       |             |             |
| Frequency range (MHz)                        | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |       | Limit (dBm) | Margin (dB) |
|                                              |            |                           |                    | dBm   | mW    |             |             |
| 1850-1910                                    | GPRS       | 28.30                     | 0.37               | 28.67 | 736.2 | 33.0        | -4.3        |
|                                              | EGPRS      | 24.50                     | 0.37               | 24.87 | 306.9 | 33.0        | -8.1        |

#### **CDMA2000 MODES**

| <b><u>Part 90 800MHz Band</u></b>            |                 |                           |                    |       |       |             |             |
|----------------------------------------------|-----------------|---------------------------|--------------------|-------|-------|-------------|-------------|
| Frequency range (MHz)                        | Modulation      | Conducted (Average) (dBm) | Antenna Gain (dBi) | ERP   |       | Limit (dBm) | Margin (dB) |
|                                              |                 |                           |                    | dBm   | mW    |             |             |
| 816-824                                      | CDMA 1xRTT      | 23.30                     | -4.04              | 17.11 | 51.4  | 50.0        | -32.9       |
|                                              | CDMA EVDO Rev A | 23.30                     | -4.04              | 17.11 | 51.4  | 50.0        | -32.9       |
| <b><u>RSS 132 850MHz Band IC</u></b>         |                 |                           |                    |       |       |             |             |
| Frequency range (MHz)                        | Modulation      | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |       | Limit (dBm) | Margin (dB) |
|                                              |                 |                           |                    | dBm   | mW    |             |             |
| 824- 849                                     | CDMA 1xRTT      | 23.30                     | -3.17              | 20.13 | 103.0 | 40.6        | -20.5       |
|                                              | CDMA EVDO-Rev A | 23.30                     | -3.17              | 20.13 | 103.0 | 40.6        | -20.5       |
| <b><u>Part 22 850MHz Band FCC</u></b>        |                 |                           |                    |       |       |             |             |
| Frequency range (MHz)                        | Modulation      | Conducted (Average) (dBm) | Antenna Gain (dBi) | ERP   |       | Limit (dBm) | Margin (dB) |
|                                              |                 |                           |                    | dBm   | mW    |             |             |
| 824- 849                                     | CDMA 1xRTT      | 23.30                     | -3.17              | 17.98 | 62.8  | 38.5        | -20.5       |
|                                              | CDMA EVDO-Rev A | 23.30                     | -3.17              | 17.98 | 62.8  | 38.5        | -20.5       |
| <b><u>Part 24 / RSS 133 1900MHz Band</u></b> |                 |                           |                    |       |       |             |             |
| Frequency range (MHz)                        | Modulation      | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |       | Limit (dBm) | Margin (dB) |
|                                              |                 |                           |                    | dBm   | mW    |             |             |
| 1850-1910                                    | CDMA 1xRTT      | 20.00                     | 0.37               | 20.37 | 108.9 | 33.0        | -12.6       |
|                                              | CDMA EVDO Rev A | 20.00                     | 0.37               | 20.37 | 108.9 | 33.0        | -12.6       |

## UMTS MODE

| <b><u>RSS 132 850MHz Band IC</u></b>         |            |                           |                    |       |       |             |             |
|----------------------------------------------|------------|---------------------------|--------------------|-------|-------|-------------|-------------|
| Frequency range (MHz)                        | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |       | Limit (dBm) | Margin (dB) |
|                                              |            |                           |                    | dBm   | mW    |             |             |
| 824- 849                                     | REL 99     | 23.80                     | -3.17              | 20.63 | 115.6 | 40.6        | -20.0       |
|                                              | HSDPA      | 23.70                     | -3.17              | 20.53 | 113.0 | 40.6        | -20.1       |
| <b><u>Part 22 850MHz Band FCC</u></b>        |            |                           |                    |       |       |             |             |
| Frequency range (MHz)                        | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | ERP   |       | Limit (dBm) | Margin (dB) |
|                                              |            |                           |                    | dBm   | mW    |             |             |
| 824-849                                      | REL 99     | 23.80                     | -3.17              | 18.48 | 70.5  | 38.5        | -20.0       |
|                                              | HSDPA      | 23.70                     | -3.17              | 18.38 | 68.9  | 38.5        | -20.1       |
| <b><u>Part 24 / RSS 133 1900MHz Band</u></b> |            |                           |                    |       |       |             |             |
| Frequency range (MHz)                        | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |       | Limit (dBm) | Margin (dB) |
|                                              |            |                           |                    | dBm   | mW    |             |             |
| 1850-1910                                    | REL 99     | 20.00                     | 0.37               | 20.37 | 108.9 | 33.0        | -12.6       |
|                                              | HSDPA      | 19.90                     | 0.37               | 20.27 | 106.4 | 33.0        | -12.7       |
| <b><u>Part 27 / RSS 139 1700MHz Band</u></b> |            |                           |                    |       |       |             |             |
| Frequency range (MHz)                        | Modulation | Conducted (Average) (dBm) | Antenna Gain (dBi) | EIRP  |       | Limit (dBm) | Margin (dB) |
|                                              |            |                           |                    | dBm   | mW    |             |             |
| 1710-1755                                    | REL 99     | 21.00                     | -0.56              | 20.44 | 110.7 | 30.0        | -9.6        |
|                                              | HSDPA      | 20.90                     | -0.56              | 20.34 | 108.1 | 30.0        | -9.7        |

## 5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version 00.28.00.

## 5.5. MAXIMUM ANTENNA GAIN

| Frequency (MHz) | LAT 1 Antenna Gain (dBi) | UAT 1 Antenna Gain (dBi) |
|-----------------|--------------------------|--------------------------|
| 816 - 824       | -2.41                    | -4.04                    |
| 824 - 849       | -1.69                    | -3.17                    |
| 1850 - 1910     | -0.36                    | 0.37                     |
| 1710 - 1755     | -0.02                    | -0.56                    |

## 5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case is EUT on the highest power. Based on Average Power measurement investigations, the following modes should be considered as worst-case scenario for all other measurements.

Worst-case modes:

- GSM GPRS
- GSM EGPRS
- CDMA 2000 1xRTT
- CDMA 2000 EVDO REV. A
- UMTS REL 99
- UMTS HSDPA

CDMA BC10 band is supported in USA only.

The EUT was investigated in three orthogonal orientations X/Y/Z on both LAT 1 and UAT 1 antennas. It was determined that X (Flatbed) orientation was the worst-case orientation for all bands on both LAT 1 and UAT 1 antennas without AC/DC adapter, headphones, or laptop.

Radiated spurious emissions were investigated below 30MHz, 30MHz-1GHz and above 1GHz. There were no emissions found on below 30MHz and 30MHz-1GHz.

For simultaneous transmission of multiple channels in the 2.4GHz and Cellular bands, tests were conducted for various configurations having the highest power, least separation in frequencies and widest operation bandwidths. No noticeable new emission was found.

## 5.7. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Support Equipment List |              |                   |                |
|------------------------|--------------|-------------------|----------------|
| Description            | Manufacturer | Model             | Serial Number  |
| AC/DC adapter          | HP           | HNSTNN-DA40       | WDWR70BAR9AKS8 |
| Laptop                 | HP           | HP ProBook 450 G2 | CND5367Z97     |

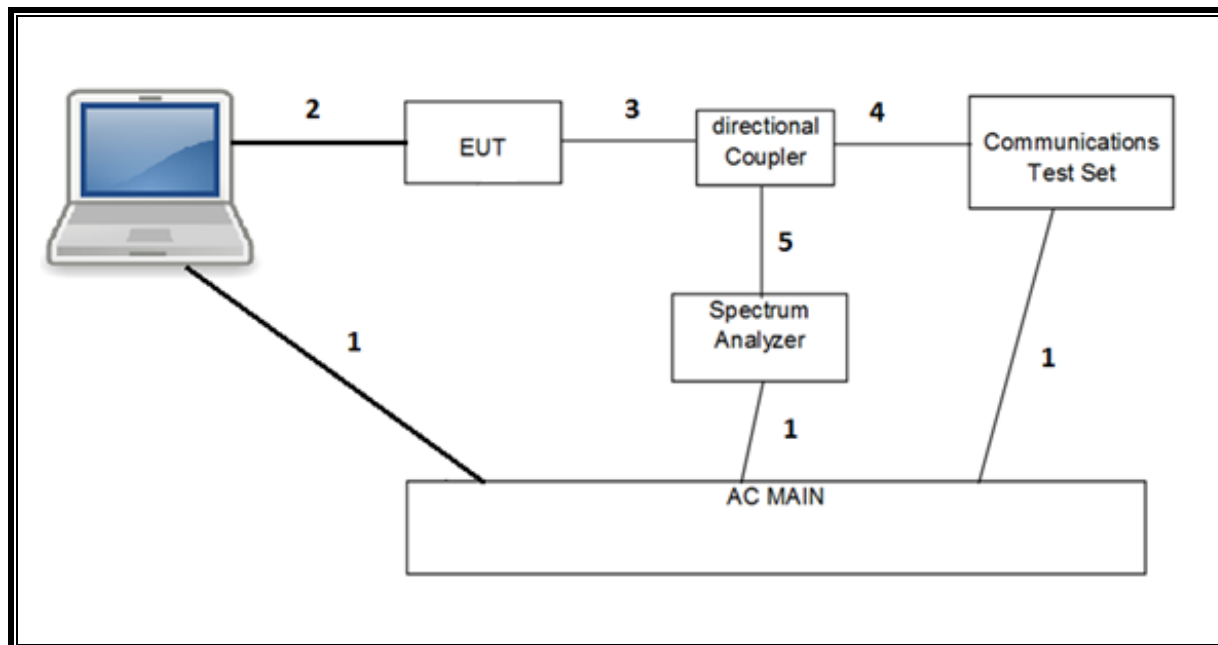
### I/O CABLES (RF Conducted Test)

| I/O Cable List |           |                      |                        |             |                  |         |
|----------------|-----------|----------------------|------------------------|-------------|------------------|---------|
| Cable No       | Port      | # of identical ports | Connector Type         | Cable Type  | Cable Length (m) | Remarks |
| 1              | AC        | 1                    | US 115V                | Un-shielded | 2.0m             | N/A     |
| 2              | USB       | 1                    | DC                     | Un-shielded | 1.0m             | N/A     |
| 3              | RF In/Out | 1                    | EUT                    | Un-shielded | 0.6m             | N/A     |
| 4              | RF In/Out | 1                    | Communication Test Set | Un-shielded | 1.2m             | N/A     |
| 5              | RF In/Out | 1                    | Barrel                 | N/A         | N/A              | N/A     |

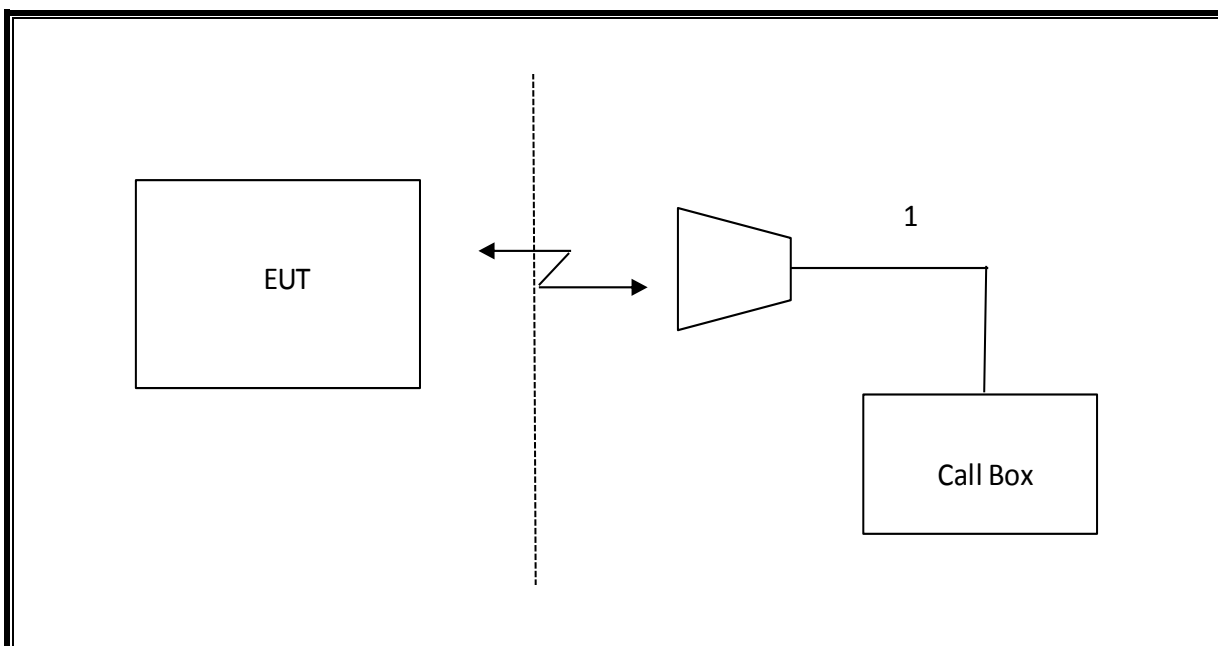
### I/O CABLES (RF Radiated Test)

| I/O Cable List |           |                      |                |             |                  |         |
|----------------|-----------|----------------------|----------------|-------------|------------------|---------|
| Cable No       | Port      | # of identical ports | Connector Type | Cable Type  | Cable Length (m) | Remarks |
| 1              | RF In/Out | 1                    | Antenna        | Un-shielded | 5m               | NA      |

### CONDUCTED SETUP



### RADIATED SETUP



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| TEST EQUIPMENT LIST                               |                     |                        |       |            |
|---------------------------------------------------|---------------------|------------------------|-------|------------|
| Description                                       | Manufacturer        | Model                  | Asset | Cal Due    |
| *Antenna, Horn 1-18GHz                            | ETS Lindgren        | 3117                   | T863  | 4/26/2017  |
| Antenna, Horn 1-18GHz                             | ETS Lindgren        | 3117                   | T863  | 6/9/2018   |
| *Antenna, Broadband Hybrid, 30MHz to 2000MHz      | Sunol Sciences      | JB3                    | T900  | 5/3/2017   |
| Antenna, Broadband Hybrid, 30MHz to 2000MHz       | Sunol Sciences      | JB3                    | T900  | 5/31/2018  |
| Amplifier, 1 to 18GHz                             | Miteq               | AFS42-00101800-25-S-42 | T741  | 11/29/2017 |
| *Amplifier, 10KHz to 1GHz, 32dB                   | Sonoma              | 310N                   | T285  | 6/20/2017  |
| Amplifier, 10KHz to 1GHz, 32dB                    | Sonoma              | 310N                   | T286  | 6/2/2018   |
| Spectrum Analyzer, PXA 3Hz to 44GHz               | Keysight            | N9030A                 | T1113 | 12/20/2017 |
| Spectrum Analyzer, PXA, 3Hz to 50GHz w/Ext. Mixer | Keysight            | N9030A                 | T342  | 2/23/2018  |
| Spectrum Analyzer, PSA 3Hz to 44GHz               | Keysight            | E4446A                 | T123  | 10/20/2017 |
| *Directional Coupler                              | KRYTAR              | 152610                 | T1537 | 4/11/2017  |
| Directional Coupler                               | KRYTAR              | 152610                 | T1537 | 4/24/2018  |
| Wireless Communications Test Set, 8960 Series 10  | Agilent             | E5515C                 | T213  | 2/21/2018  |
| Filter, HPF 3.0GHz                                | MICROTRONICS        | HPM17543               | T487  | 1/28/2018  |
| *Filter, HPF 1.2GHz                               | Micro-Tronics       | WHKX1.2/15G-6ST        | T1182 | 5/31/2017  |
| *Spectrum Analyzer, PXA, 3Hz to 44GHz             | Keysight            | N9030A                 | T1210 | 6/30/2017  |
| Wideband Communication Test Set, Call Box         | R&S GmbH & Co. KG   | CMW500                 | T959  | 7/09/2017  |
| Wideband Communication Test Set, Call Box         | R&S GmbH & Co. KG   | CMW500                 | T971  | 8/05/2017  |
| Chamber, Environmental                            | Cincinnati Sub Zero | ZPHS-8-3.5-SCT/WC      | T754  | 9/10/2017  |
| Antenna, Horn 1-18GHz                             | Emco                | 3115                   | T59   | 11/18/2017 |
| *Tuned Dipole, 400 - 1000MHz                      | ETS Lindgren        | 3121C DB4              | T273  | 5/16/17    |
| *Amplifier, 26.5GHz to 40GHz                      | Miteq               | NSP 4000 SP2           | T88   | 4/7/2017   |
| Amplifier, 26.5GHz to 40GHz                       | Miteq               | NSP 4000 SP2           | T88   | 4/29/2018  |
| *Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum     | Keysight            | 8449B                  | T404  | 7/5/2017   |
| *Antenna, Horn 18 to 26.5GHz                      | ARA                 | MWH-1826/B             | T447  | 6/16/2017  |
| Antenna, Horn 26.5GHz to 40GHz                    | ARA                 | MWH-2640               | T90   | 8/19/2017  |
| Spectrum Analyzer                                 | Keysight            | 8564E                  | T106  | 9/7/2017   |
| Antenna, Active Loop 9KHz to 30MHz                | EMCO                | 6502                   | T1616 | 12/12/2017 |

NOTE: Equipment that calibrated during the testing period was set for test after the calibration.

\*Testing is completed before equipment expiration date.

## 7. RF POWER OUTPUT VERIFICATION

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted output powers as follows:

### 7.1. GSM

#### Using CMW500 Communication Test Set

Function: Menu select > GSM Mobile Station > GSM 850/900/1800/1900

Press **Connection control** to choose the different menus

Press **RESET** > choose all to reset all settings

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection | Press <b>Signal Off</b> to turn off the signal and change settings<br>Network Support > GSM+GPRS or GSM+EGPRS<br>Main Service > Packet Data<br>Service selection > Test Mode A – Auto Slot Config. off                                                                                                                                                                                                                                                                                                                       |
| MS Signal  | Press Slot Config bottom on the right twice to select and change the number of time slots and power setting<br>> Slot configuration > Uplink/Gamma<br>> 33 dBm for GPRS 850/900<br>> 27 dBm for EGPRS 850/900<br>> 30 dBm for GPRS1800/1900<br>> 26 dBm for EGPRS1800/1900                                                                                                                                                                                                                                                   |
| BS Signal  | Enter the same channel number for TCH channel (test channel) and BCCH channel<br><br>Frequency Offset > + 0 Hz<br>Mode > BCCH and TCH<br>BCCH Level > -85 dBm (May need to adjust if link is not stable)<br>BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]<br><br>Channel Type > Off<br>P0> 4 dB<br>Slot Config > Unchanged (if already set under MS Signal)<br>TCH > choose desired test channel<br>Hopping > Off<br>Main Timeslot > 3 (Default) |
| Network    | Coding Scheme > CS 4 (GPRS) and MCS5-9 (EGPRS)<br>Bit Stream > 2E9-1PSR Bit Pattern                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| AF/RF      | Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Connection | Press <b>Signal On</b> to turn on the signal and change settings                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## Using Agilent 8960A Communication Test Set

**System Config:** GSM/GPRS Mobile Test  
E1968A A.06.31

**Call Params:** BCH → Cell Band: GSM850/PCS  
TCH → Traffic Band: GSM850/PCS  
Traffic Channel: 128/192/251 or 512/661/810  
MS Tx Level: 0  
PDTCH → Traffic Band: GSM850/PCS  
Traffic Channel: 128/192/251 512/661/810  
MS Tx Level: 0  
Coding Scheme: CS-4 (GPRS)  
Coding Scheme: MCS-5 to 9 (EGPRS)  
MultiSlot Config: 1up, 1 down (Assuming that the highest

conducted power)

**Control:** Active Cell → GSM/GPRS

## RESULT

### 7.1.1. GPRS/EGPRS

#### LAT 1

| ID:  | 50820 | Date: | 3/3/17  |                              |                               |
|------|-------|-------|---------|------------------------------|-------------------------------|
| Band | Mode  | Ch.   | f (MHz) | 1 time slot<br>Average (dBm) | 2 time slots<br>Average (dBm) |
| 850  | GPRS  | 128   | 824.2   | 33.3                         | 32.0                          |
|      |       | 190   | 836.6   | 33.0                         | 32.3                          |
|      |       | 251   | 848.8   | 33.2                         | 32.2                          |
|      | EGPRS | 128   | 824.2   | 27.9                         | 26.9                          |
|      |       | 190   | 836.6   | 28.0                         | 27.0                          |
|      |       | 251   | 848.8   | 27.8                         | 26.9                          |
| 1900 | GPRS  | 512   | 1850.2  | 31.2                         | 30.1                          |
|      |       | 661   | 1880.0  | 31.3                         | 30.2                          |
|      |       | 810   | 1909.8  | 31.3                         | 30.3                          |
|      | EGPRS | 512   | 1850.2  | 27.0                         | 25.9                          |
|      |       | 661   | 1880.0  | 26.6                         | 25.7                          |
|      |       | 810   | 1909.8  | 26.8                         | 25.9                          |

**UAT 1**

| ID:  | 29439 | Date: | 3/31/17 |               |               |
|------|-------|-------|---------|---------------|---------------|
| Band | Mode  | Ch.   | f (MHz) | 1 time slot   | 2 time slots  |
|      |       |       |         | Average (dBm) | Average (dBm) |
| 850  | GPRS  | 128   | 824.2   | <b>30.8</b>   | 29.8          |
|      |       | 190   | 836.6   | 30.6          | 29.7          |
|      |       | 251   | 848.8   | 30.6          | 29.7          |
|      | EGPRS | 128   | 824.2   | 25.4          | 24.5          |
|      |       | 190   | 836.6   | 25.4          | 24.3          |
|      |       | 251   | 848.8   | <b>25.5</b>   | 24.2          |
| 1900 | GPRS  | 512   | 1850.2  | <b>28.3</b>   | 25.3          |
|      |       | 661   | 1880.0  | 28.2          | 25.1          |
|      |       | 810   | 1909.8  | 28.2          | 25.1          |
|      | EGPRS | 512   | 1850.2  | 24.4          | 23.5          |
|      |       | 661   | 1880.0  | <b>24.5</b>   | 23.4          |
|      |       | 810   | 1909.8  | 24.4          | 23.3          |

## 7.2. CDMA200 Power

Maximum output power is verified on the Low, Middle and High channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E for 1xRTT, section 3.1.2.3.4 of 3GPP2 C.S0033-0/TIA-866 for Rel. 0 and section 4.3.4 of 3GPP2 C.S0033-A for Rev. A

### 7.2.1. 1xRTT

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

| <u>Application</u>   | <u>Rev, License</u> |
|----------------------|---------------------|
| CDMA2000 Mobile Test | B.15.18, L          |

- Protocol Rev > 6 (IS-2000-0)
- System ID: 18; NID: 65535, Reg. Ch. #: 610 for Cell, 600 for PCS & 450 for AWS
- Radio Config (RC) > RC1 or RC3
- Service Option (SO) Setup > SO55 or SO32
- Traffic Data Rate > Full
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

## RESULT

**LAT 1**

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 29439 | <b>Date:</b> | 3/31/17 |
|------------|-------|--------------|---------|

**1xRTT, BC10, SECONDARY 800**

| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) |                 |                    |
|--------------------------|---------------------|------------------------------|-----------------|--------------------|
|                          |                     | CH 450 - 817.25MHz           | CH 560 - 820MHz | CH 670 - 822.75MHz |
|                          |                     | Average                      | Average         | Average            |
| RC1                      | 2 (Loopback)        | 24.76                        | 24.80           | 24.74              |
|                          | 55 (Loopback)       | 24.76                        | 24.79           | 24.76              |
| RC2                      | 9 (Loopback)        | 24.76                        | 24.79           | 24.74              |
|                          | 55 (Loopback)       | 24.75                        | 24.79           | 24.74              |
| RC3                      | 2 (Loopback)        | 24.69                        | 24.71           | 24.74              |
|                          | 55 (Loopback)       | 24.69                        | 24.72           | 24.73              |
|                          | 32 (+ F-SCH)        | 24.69                        | 24.71           | 24.74              |
|                          | 32 (+ SCH)          | 24.69                        | 24.70           | 24.74              |
| RC4                      | 2 (Loopback)        | 24.69                        | 24.69           | 24.69              |
|                          | 55 (Loopback)       | 24.67                        | 24.69           | 24.69              |
|                          | 32 (+ F-SCH)        | 24.66                        | 24.69           | 24.69              |
|                          | 32 (+ SCH)          | 24.67                        | 24.69           | 24.68              |
| RC5                      | 9 (Loopback)        | 24.66                        | 24.74           | 24.69              |
|                          | 55 (Loopback)       | 24.66                        | 24.76           | 24.73              |
| RC11                     | 2 (Loopback)        | 24.66                        | 24.71           | 24.77              |
|                          | 75 (Loopback)       | 24.73                        | 24.70           | 24.78              |
|                          | 32 (+ F-SCH)        | 24.75                        | 24.70           | 24.74              |
|                          | 32 (+ SCH)          | 24.68                        | 24.74           | 24.74              |

**1xRTT, BC0, CELL BAND**

| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) |                    |                    |
|--------------------------|---------------------|------------------------------|--------------------|--------------------|
|                          |                     | CH 1013 - 824.7MHz           | CH 384 - 836.52MHz | CH 777 - 848.31MHz |
|                          |                     | Average                      | Average            | Average            |
| RC1                      | 2 (Loopback)        | 24.77                        | <b>24.80</b>       | 24.79              |
|                          | 55 (Loopback)       | 24.71                        | 24.77              | 24.79              |
| RC2                      | 9 (Loopback)        | 24.75                        | 24.77              | 24.75              |
|                          | 55 (Loopback)       | 24.77                        | 24.78              | 24.77              |
| RC3                      | 2 (Loopback)        | 24.72                        | 24.77              | 24.76              |
|                          | 55 (Loopback)       | 24.72                        | 24.75              | 24.72              |
|                          | 32 (+ F-SCH)        | 24.73                        | 24.77              | 24.75              |
|                          | 32 (+ SCH)          | 24.72                        | 24.77              | 24.75              |
| RC4                      | 2 (Loopback)        | 24.71                        | 24.77              | 24.75              |
|                          | 55 (Loopback)       | 24.73                        | 24.77              | 24.75              |
|                          | 32 (+ F-SCH)        | 24.73                        | 24.75              | 24.75              |
|                          | 32 (+ SCH)          | 24.75                        | 24.76              | 24.75              |
| RC5                      | 9 (Loopback)        | 24.73                        | 24.76              | 24.75              |
|                          | 55 (Loopback)       | 24.73                        | 24.78              | 24.77              |
| RC11                     | 2 (Loopback)        | 24.79                        | 24.76              | 24.72              |
|                          | 75 (Loopback)       | 24.77                        | 24.79              | 24.75              |
|                          | 32 (+ F-SCH)        | 24.76                        | 24.77              | 24.76              |
|                          | 32 (+ SCH)          | 24.75                        | 24.77              | 24.73              |

**1xRTT, BC1, PCS BAND**

| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) |                  |                      |
|--------------------------|---------------------|------------------------------|------------------|----------------------|
|                          |                     | CH 25 - 1851.25MHz           | CH 600 - 1880MHz | CH 1175 - 1908.75MHz |
|                          |                     | Average                      | Average          | Average              |
| RC1                      | 2 (Loopback)        | <b>25.30</b>                 | 25.29            | 25.29                |
|                          | 55 (Loopback)       | 25.25                        | 25.27            | 25.27                |
| RC2                      | 9 (Loopback)        | 25.29                        | 25.28            | 25.23                |
|                          | 55 (Loopback)       | 25.29                        | 25.22            | 25.21                |
| RC3                      | 2 (Loopback)        | 25.26                        | 25.16            | 25.22                |
|                          | 55 (Loopback)       | 25.24                        | 25.23            | 25.23                |
|                          | 32 (+ F-SCH)        | 25.25                        | 25.22            | 25.23                |
|                          | 32 (+ SCH)          | 25.27                        | 25.23            | 25.22                |
| RC4                      | 2 (Loopback)        | 25.24                        | 25.20            | 25.22                |
|                          | 55 (Loopback)       | 25.27                        | 25.18            | 25.18                |
|                          | 32 (+ F-SCH)        | 25.26                        | 25.22            | 25.19                |
|                          | 32 (+ SCH)          | 25.23                        | 25.17            | 25.23                |
| RC5                      | 9 (Loopback)        | 25.24                        | 25.22            | 25.22                |
|                          | 55 (Loopback)       | 25.25                        | 25.22            | 25.17                |
| RC11                     | 2 (Loopback)        | 25.22                        | 25.16            | 25.24                |
|                          | 75 (Loopback)       | 25.22                        | 25.25            | 25.25                |
|                          | 32 (+ F-SCH)        | 25.21                        | 25.17            | 25.19                |
|                          | 32 (+ SCH)          | 25.26                        | 25.21            | 25.20                |

**UAT 1**

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 39005 | <b>Date:</b> | 3/31/17 |
|------------|-------|--------------|---------|

**1xRTT, BC10, SECONDARY 800**

| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) |                 |                    |
|--------------------------|---------------------|------------------------------|-----------------|--------------------|
|                          |                     | CH 450 - 817.25MHz           | CH 560 - 820MHz | CH 670 - 822.75MHz |
|                          |                     | Average                      | Average         | Average            |
| RC1                      | 2 (Loopback)        | 23.22                        | 23.28           | <b>23.30</b>       |
|                          | 55 (Loopback)       | 23.22                        | 23.28           | 23.25              |
| RC2                      | 9 (Loopback)        | 23.20                        | 23.28           | 23.27              |
|                          | 55 (Loopback)       | 23.19                        | 23.27           | 23.26              |
| RC3                      | 2 (Loopback)        | 23.18                        | 23.28           | 23.27              |
|                          | 55 (Loopback)       | 23.19                        | 23.28           | 23.27              |
|                          | 32 (+ F-SCH)        | 23.18                        | 23.25           | 23.28              |
|                          | 32 (+ SCH)          | 23.20                        | 23.28           | 23.28              |
| RC4                      | 2 (Loopback)        | 23.18                        | 23.26           | 23.27              |
|                          | 55 (Loopback)       | 23.18                        | 23.26           | 23.27              |
|                          | 32 (+ F-SCH)        | 23.19                        | 23.26           | 23.26              |
|                          | 32 (+ SCH)          | 23.17                        | 23.28           | 23.26              |
| RC5                      | 9 (Loopback)        | 23.18                        | 23.28           | 23.28              |
|                          | 55 (Loopback)       | 23.17                        | 23.27           | 23.28              |
| RC11                     | 2 (Loopback)        | 23.27                        | 23.27           | 23.28              |
|                          | 75 (Loopback)       | 23.28                        | 23.28           | 23.28              |
|                          | 32 (+ F-SCH)        | 23.28                        | 23.26           | 23.27              |
|                          | 32 (+ SCH)          | 23.28                        | 23.27           | 23.27              |

**1xRTT, BC0, CELL BAND**

| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) |                    |                    |
|--------------------------|---------------------|------------------------------|--------------------|--------------------|
|                          |                     | CH 1013 - 824.7MHz           | CH 384 - 836.52MHz | CH 777 - 848.31MHz |
|                          |                     | Average                      | Average            | Average            |
| RC1                      | 2 (Loopback)        | 23.21                        | <b>23.30</b>       | 23.25              |
|                          | 55 (Loopback)       | 23.20                        | 23.25              | 23.26              |
| RC2                      | 9 (Loopback)        | 23.21                        | 23.27              | 23.27              |
|                          | 55 (Loopback)       | 23.20                        | 23.26              | 23.25              |
| RC3                      | 2 (Loopback)        | 23.20                        | 23.25              | 23.25              |
|                          | 55 (Loopback)       | 23.19                        | 23.23              | 23.25              |
|                          | 32 (+ F-SCH)        | 23.19                        | 23.23              | 23.25              |
|                          | 32 (+ SCH)          | 23.18                        | 23.23              | 23.24              |
| RC4                      | 2 (Loopback)        | 23.17                        | 23.23              | 23.23              |
|                          | 55 (Loopback)       | 23.18                        | 23.22              | 23.23              |
|                          | 32 (+ F-SCH)        | 23.19                        | 23.23              | 23.22              |
|                          | 32 (+ SCH)          | 23.17                        | 23.22              | 23.24              |
| RC5                      | 9 (Loopback)        | 23.17                        | 23.25              | 23.23              |
|                          | 55 (Loopback)       | 23.17                        | 23.23              | 23.22              |
| RC11                     | 2 (Loopback)        | 23.29                        | 23.25              | 23.25              |
|                          | 75 (Loopback)       | 23.27                        | 23.27              | 23.28              |
|                          | 32 (+ F-SCH)        | 23.29                        | 23.29              | 23.26              |
|                          | 32 (+ SCH)          | 23.23                        | 23.27              | 23.27              |

**1xRTT, BC1, PCS BAND**

| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) |                  |                      |
|--------------------------|---------------------|------------------------------|------------------|----------------------|
|                          |                     | CH 25 - 1851.25MHz           | CH 600 - 1880MHz | CH 1175 - 1908.75MHz |
|                          |                     | Average                      | Average          | Average              |
| RC1                      | 2 (Loopback)        | <b>20.00</b>                 | 19.85            | 19.85                |
|                          | 55 (Loopback)       | 19.99                        | 19.85            | 19.85                |
| RC2                      | 9 (Loopback)        | 19.98                        | 19.89            | 19.85                |
|                          | 55 (Loopback)       | 19.98                        | 19.85            | 19.84                |
| RC3                      | 2 (Loopback)        | 19.96                        | 19.90            | 19.86                |
|                          | 55 (Loopback)       | 19.95                        | 19.87            | 19.85                |
|                          | 32 (+ F-SCH)        | 19.85                        | 19.86            | 19.90                |
|                          | 32 (+ SCH)          | 19.88                        | 19.88            | 19.86                |
| RC4                      | 2 (Loopback)        | 19.95                        | 19.86            | 19.90                |
|                          | 55 (Loopback)       | 19.98                        | 19.85            | 19.90                |
|                          | 32 (+ F-SCH)        | 19.97                        | 19.86            | 19.90                |
|                          | 32 (+ SCH)          | 19.98                        | 19.85            | 19.96                |
| RC5                      | 9 (Loopback)        | 19.92                        | 19.91            | 19.96                |
|                          | 55 (Loopback)       | 19.97                        | 19.83            | 19.93                |
| RC11                     | 2 (Loopback)        | 19.96                        | 19.97            | 19.92                |
|                          | 75 (Loopback)       | 19.97                        | 19.98            | 19.94                |
|                          | 32 (+ F-SCH)        | 19.95                        | 19.98            | 19.92                |
|                          | 32 (+ SCH)          | 19.94                        | 19.96            | 19.95                |

### 7.2.2. 1xEV-DO - Release 0 (REL 0)

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

#### EVDO Release 0 - RTAP

- Call Setup > Shift & Preset
- Call Control:
  - Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - Cell Power > -105.5 dBm/1.23 MHz
  - Channel > (Enter channel number)
  - Application Config > Enhanced Test Application Protocol > RTAP
  - RTAP Rate > 153.6 kbps
  - Rvs Power Ctrl > Active bits
  - Protocol Rel > 0 (1xEV-DO)
- Press “Start Data Connection” when “Session Open” appear in “Active Cell”
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

#### EVDO Release 0 - FTAP

- Call Setup > Shift & Preset
- Call Control:
  - Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - Cell Power > -105.5 dBm/1.23 MHz
  - Cell Band > (Select US Cellular or US PCS)
  - Channel > (Enter channel number)
  - Application Config > Enhanced Test Application Protocol > FTAP (default)
  - FTAP Rate > 307.2 kbps (2 Slot, QPSK)
  - Rvs Power Ctrl > Active bits
  - Protocol Rel > 0 (1xEV-DO)
- Press “Start Data Connection” when “Session Open” appear in “Active Cell”
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

## RESULTS

**LAT 1**

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 29439 | <b>Date:</b> | 4/3/17 |
|------------|-------|--------------|--------|

**EVDO REL 0 800MHz SECONDARY BAND**

| FTAP Rate                   | RTAP Rate  | Channel | Frequency (MHz) | Conducted Output Power (dBm) |
|-----------------------------|------------|---------|-----------------|------------------------------|
|                             |            |         |                 | Average                      |
| 307.2 kbps<br>(2 Slot QPSK) | 153.6 kbps | 450     | 817.25          | 24.74                        |
|                             |            | 560     | 820.00          | <b>24.78</b>                 |
|                             |            | 670     | 822.75          | 24.71                        |

**EVDO REL 0 850MHz BAND**

| FTAP Rate                   | RTAP Rate  | Channel | Frequency (MHz) | Conducted Output Power (dBm) |
|-----------------------------|------------|---------|-----------------|------------------------------|
|                             |            |         |                 | Average                      |
| 307.2 kbps<br>(2 Slot QPSK) | 153.6 kbps | 1013    | 824.70          | 24.75                        |
|                             |            | 384     | 836.52          | <b>24.77</b>                 |
|                             |            | 777     | 848.31          | 24.73                        |

**EVDO REL 0 1900MHz BAND**

| FTAP Rate                   | RTAP Rate  | Channel | Frequency (MHz) | Conducted Output Power (dBm) |
|-----------------------------|------------|---------|-----------------|------------------------------|
|                             |            |         |                 | Average                      |
| 307.2 kbps<br>(2 Slot QPSK) | 153.6 kbps | 25      | 1851.25         | 25.20                        |
|                             |            | 600     | 1880.00         | 25.20                        |
|                             |            | 1175    | 1908.75         | <b>25.27</b>                 |

**UAT 1**

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 29439 | <b>Date:</b> | 4/3/17 |
|------------|-------|--------------|--------|

**EVDO REL 0 800MHz SECONDARY BAND**

| FTAP Rate                   | RTAP Rate  | Channel | Frequency (MHz) | Conducted Output Power (dBm) |
|-----------------------------|------------|---------|-----------------|------------------------------|
|                             |            |         |                 | Average                      |
| 307.2 kbps<br>(2 Slot QPSK) | 153.6 kbps | 450     | 817.25          | 23.20                        |
|                             |            | 560     | 820.00          | <b>23.25</b>                 |
|                             |            | 670     | 822.75          | 23.20                        |

**EVDO REL 0 850MHz BAND**

| FTAP Rate                   | RTAP Rate  | Channel | Frequency (MHz) | Conducted Output Power (dBm) |
|-----------------------------|------------|---------|-----------------|------------------------------|
|                             |            |         |                 | Average                      |
| 307.2 kbps<br>(2 Slot QPSK) | 153.6 kbps | 1013    | 824.70          | 23.20                        |
|                             |            | 384     | 836.52          | 23.25                        |
|                             |            | 777     | 848.31          | <b>23.28</b>                 |

**EVDO REL 0 1900MHz BAND**

| FTAP Rate                   | RTAP Rate  | Channel | Frequency (MHz) | Conducted Output Power (dBm) |
|-----------------------------|------------|---------|-----------------|------------------------------|
|                             |            |         |                 | Average                      |
| 307.2 kbps<br>(2 Slot QPSK) | 153.6 kbps | 25      | 1851.25         | 19.90                        |
|                             |            | 600     | 1880.00         | 19.94                        |
|                             |            | 1175    | 1908.75         | <b>19.98</b>                 |

### 7.2.3. 1xEV-DO - Revision A (REV A)

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

| <u>Application</u>    | <u>Rev, License</u> |
|-----------------------|---------------------|
| 1xEV-DO Terminal Test | A.09.13             |

#### EVDO Rev. A – RETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > RETAP
- R-Data Pkt Size > 4096
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000: 00000000: 00000000: 00000000
- > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
- > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

#### EVDO Rev. A - FETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > FETAP
- F-Traffic Format > 4 (1024, 2,128) Canonical (307.2k, QPSK)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000: 00000000: 00000000: 00000000
- > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
- > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

### RESULTS

**LAT 1**

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 29439 | <b>Date:</b> | 4/3/17 |
|------------|-------|--------------|--------|

**EVDO REV A 800MHz SECONDARY BAND**

| FETAP - Traffic Format                                   | RETAP - Data Payload Size | Channel | Frequency (MHz) | Conducted Output Power (dBm) |
|----------------------------------------------------------|---------------------------|---------|-----------------|------------------------------|
|                                                          |                           |         |                 | Average                      |
| 307.2k QPSK/ ACK channel is transmitted at all the slots | 4096                      | 450     | 817.25          | 24.77                        |
|                                                          |                           | 560     | 820.00          | 24.76                        |
|                                                          |                           | 670     | 822.75          | <b>24.80</b>                 |

**EVDO REV A 850MHz BAND**

| FETAP - Traffic Format                                   | RETAP - Data Payload Size | Channel | Frequency (MHz) | Conducted Output Power (dBm) |
|----------------------------------------------------------|---------------------------|---------|-----------------|------------------------------|
|                                                          |                           |         |                 | Average                      |
| 307.2k QPSK/ ACK channel is transmitted at all the slots | 4096                      | 1013    | 824.70          | 24.78                        |
|                                                          |                           | 384     | 836.52          | 24.75                        |
|                                                          |                           | 777     | 848.31          | <b>24.80</b>                 |

**EVDO REV A 1900MHz BAND**

| FETAP - Traffic Format                                   | RETAP - Data Payload Size | Channel | Frequency (MHz) | Conducted Output Power (dBm) |
|----------------------------------------------------------|---------------------------|---------|-----------------|------------------------------|
|                                                          |                           |         |                 | Average                      |
| 307.2k QPSK/ ACK channel is transmitted at all the slots | 4096                      | 25      | 1851.25         | 25.25                        |
|                                                          |                           | 600     | 1880.00         | <b>25.30</b>                 |
|                                                          |                           | 1175    | 1908.75         | 25.28                        |

# UAT 1

|            |       |              |        |
|------------|-------|--------------|--------|
| <b>ID:</b> | 29439 | <b>Date:</b> | 4/3/17 |
|------------|-------|--------------|--------|

## EVDO REV A 800MHz SECONDARY BAND

| FETAP - Traffic Format                                   | RETAP - Data Payload Size | Channel | Frequency (MHz) | Conducted Output Power (dBm) |
|----------------------------------------------------------|---------------------------|---------|-----------------|------------------------------|
|                                                          |                           |         |                 | Average                      |
| 307.2k QPSK/ ACK channel is transmitted at all the slots | 4096                      | 450     | 817.25          | 23.14                        |
|                                                          |                           | 560     | 820.00          | <b>23.30</b>                 |
|                                                          |                           | 670     | 822.75          | 23.24                        |

## EVDO REV A 850MHz BAND

| FETAP - Traffic Format                                   | RETAP - Data Payload Size | Channel | Frequency (MHz) | Conducted Output Power (dBm) |
|----------------------------------------------------------|---------------------------|---------|-----------------|------------------------------|
|                                                          |                           |         |                 | Average                      |
| 307.2k QPSK/ ACK channel is transmitted at all the slots | 4096                      | 1013    | 824.70          | <b>23.30</b>                 |
|                                                          |                           | 384     | 836.52          | 23.23                        |
|                                                          |                           | 777     | 848.31          | 23.20                        |

## EVDO REV A 1900MHz BAND

| FETAP - Traffic Format                                   | RETAP - Data Payload Size | Channel | Frequency (MHz) | Conducted Output Power (dBm) |
|----------------------------------------------------------|---------------------------|---------|-----------------|------------------------------|
|                                                          |                           |         |                 | Average                      |
| 307.2k QPSK/ ACK channel is transmitted at all the slots | 4096                      | 25      | 1851.25         | 19.86                        |
|                                                          |                           | 600     | 1880.00         | <b>20.00</b>                 |
|                                                          |                           | 1175    | 1908.75         | 19.93                        |

### 7.3. UMTS

#### **TEST PROCEDURE**

The transmitter output was connected to the input terminal of Directional Coupler via calibrated coaxial cable. The output coupling terminal of the Directional Coupler was directly connected to a spectrum analyzer while the output through terminal connected to the communication test set via calibrated coaxial cable.

The output power was measured with the spectrum analyzer at the low, middle and high channel in each band.

- Set the spectrum analyzer span wide enough or greater than the modulated signal BW.
- Set a spectrum analyzer at peak detection mode with VBW  $\geq$  RBW  $\geq$  26dB BW, typically 5MHz.
- Set a marker to point the corresponding peak value.

#### 7.3.1. UMTS REL99

The following summary of these settings are illustrated below:

|                        |                         |                |
|------------------------|-------------------------|----------------|
|                        | Mode                    | Rel99          |
|                        | Subtest                 | -              |
| WCDMA General Settings | Loopback Mode           | Test Mode 2    |
|                        | Rel99 RMC               | 12.2kbps RMC   |
|                        | HSDPA FRC               | Not Applicable |
|                        | HSUPA Test              | Not Applicable |
|                        | Power Control Algorithm | Algorithm2     |
|                        | $\beta_c$               | Not Applicable |
|                        | $\beta_d$               | Not Applicable |
|                        | $\beta_{ec}$            | Not Applicable |
|                        | $\beta_c/\beta_d$       | 8/15           |
|                        | $\beta_{hs}$            | Not Applicable |
|                        | $\beta_{ed}$            | Not Applicable |

#### **RESULTS**

**LAT 1**

| <b>ID:</b>          | 50820 | <b>Date:</b> | 3/3/17          |                              |
|---------------------|-------|--------------|-----------------|------------------------------|
| Band                | UL Ch | DL Ch        | Frequency (MHz) | Conducted Output Power (dBm) |
|                     |       |              |                 | Average                      |
| UMTS Rel. 99 850MHz | 4132  | 4357         | 826.4           | 24.7                         |
|                     | 4183  | 4408         | 836.6           | 24.7                         |
|                     | 4233  | 4458         | 846.6           | 24.8                         |

| Band                 | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |
|----------------------|-------|-------|-----------------|------------------------------|
|                      |       |       |                 | Average                      |
| UMTS Rel. 99 1900MHz | 9262  | 9662  | 1852.4          | 25.1                         |
|                      | 9400  | 9800  | 1880.0          | 25.2                         |
|                      | 9538  | 9938  | 1907.6          | 25.3                         |

| Band                 | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |
|----------------------|-------|-------|-----------------|------------------------------|
|                      |       |       |                 | Average                      |
| UMTS Rel. 99 1700MHz | 1312  | 1537  | 1712.4          | 25.2                         |
|                      | 1413  | 1638  | 1732.6          | 25.3                         |
|                      | 1513  | 1738  | 1752.6          | 25.1                         |

**UAT 1**

| <b>ID:</b>          | 29439 | <b>Date:</b> | 3/31/17         |                              |
|---------------------|-------|--------------|-----------------|------------------------------|
| Band                | UL Ch | DL Ch        | Frequency (MHz) | Conducted Output Power (dBm) |
|                     |       |              |                 | Average                      |
| UMTS Rel. 99 850MHz | 4132  | 4357         | 826.4           | 23.6                         |
|                     | 4183  | 4408         | 836.6           | 23.8                         |
|                     | 4233  | 4458         | 846.6           | 23.6                         |

| Band                 | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |
|----------------------|-------|-------|-----------------|------------------------------|
|                      |       |       |                 | Average                      |
| UMTS Rel. 99 1900MHz | 9262  | 9662  | 1852.4          | 20.0                         |
|                      | 9400  | 9800  | 1880.0          | 19.8                         |
|                      | 9538  | 9938  | 1907.6          | 19.9                         |

| Band                 | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |
|----------------------|-------|-------|-----------------|------------------------------|
|                      |       |       |                 | Average                      |
| UMTS Rel. 99 1700MHz | 1312  | 1537  | 1712.4          | 21.0                         |
|                      | 1413  | 1638  | 1732.6          | 21.0                         |
|                      | 1513  | 1738  | 1752.6          | 21.0                         |

### 7.3.2. HSDPA REL 5

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121.

Summary of settings are illustrated below:

|                               | Mode                                 | Rel5 HSDPA   |       |       |       |
|-------------------------------|--------------------------------------|--------------|-------|-------|-------|
|                               | Subtest                              | 1            | 2     | 3     | 4     |
| WCDMA<br>General<br>Settings  | Loopback Mode                        | Test Mode 1  |       |       |       |
|                               | Rel99 RMC                            | 12.2kbps RMC |       |       |       |
|                               | HSDPA FRC                            | H-Set1       |       |       |       |
|                               | Power Control Algorithm              | Algorithm 2  |       |       |       |
|                               | $\beta_c$                            | 2/15         | 11/15 | 15/15 | 15/15 |
|                               | $\beta_d$                            | 15/15        | 15/15 | 8/15  | 4/15  |
|                               | Bd (SF)                              | 64           |       |       |       |
|                               | $\beta_c/\beta_d$                    | 2/15         | 11/15 | 15/8  | 15/4  |
|                               | $\beta_{hs}$                         | 4/15         | 24/15 | 30/15 | 30/15 |
|                               | MPR (dB)                             | 0            | 0     | 0.5   | 0.5   |
| HSDPA<br>Specific<br>Settings | $D_{ACK}$                            | 8            |       |       |       |
|                               | $D_{NAK}$                            | 8            |       |       |       |
|                               | DCQI                                 | 8            |       |       |       |
|                               | Ack-Nack repetition factor           | 3            |       |       |       |
|                               | CQI Feedback (Table 5.2B.4)          | 4ms          |       |       |       |
|                               | CQI Repetition Factor (Table 5.2B.4) | 2            |       |       |       |
|                               | $A_{hs} = \beta_{hs}/\beta_c$        | 30/15        |       |       |       |

## RESULT

**LAT 1**

| ID:               | 29439   | Date: | 7/26/17 |                 |                              |  |
|-------------------|---------|-------|---------|-----------------|------------------------------|--|
| Band              | Subtest | UL Ch | DL Ch   | Frequency (MHz) | Conducted Output Power (dBm) |  |
|                   |         |       |         |                 | Average                      |  |
| UMTS HSDPA 850MHz | 1       | 4132  | 4357    | 826.4           | 24.7                         |  |
|                   |         | 4183  | 4408    | 836.6           | 24.7                         |  |
|                   |         | 4233  | 4458    | 846.6           | 24.6                         |  |
|                   | 2       | 4132  | 4357    | 826.4           | 24.6                         |  |
|                   |         | 4183  | 4408    | 836.6           | 24.4                         |  |
|                   |         | 4233  | 4458    | 846.6           | 24.4                         |  |
|                   | 3       | 4132  | 4357    | 826.4           | 24.0                         |  |
|                   |         | 4183  | 4408    | 836.6           | 24.1                         |  |
|                   |         | 4233  | 4458    | 846.6           | 24.3                         |  |
|                   | 4       | 4132  | 4357    | 826.4           | 24.0                         |  |
|                   |         | 4183  | 4408    | 836.6           | 24.1                         |  |
|                   |         | 4233  | 4458    | 846.6           | 23.9                         |  |

| Band               | Subtest | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |  |
|--------------------|---------|-------|-------|-----------------|------------------------------|--|
|                    |         |       |       |                 | Average                      |  |
| UMTS HSDPA 1900MHz | 1       | 9262  | 9662  | 1852.4          | 24.9                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 25.0                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 25.2                         |  |
|                    | 2       | 9262  | 9662  | 1852.4          | 25.2                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 24.9                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 25.1                         |  |
|                    | 3       | 9262  | 9662  | 1852.4          | 24.7                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 24.5                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 24.6                         |  |
|                    | 4       | 9262  | 9662  | 1852.4          | 24.5                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 24.6                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 24.5                         |  |

| Band               | Subtest | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |  |
|--------------------|---------|-------|-------|-----------------|------------------------------|--|
|                    |         |       |       |                 | Average                      |  |
| UMTS HSDPA 1700MHz | 1       | 1312  | 1537  | 1712.4          | 25.2                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 25.2                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 25.1                         |  |
|                    | 2       | 1312  | 1537  | 1712.4          | 25.1                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 25.1                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 24.9                         |  |
|                    | 3       | 1312  | 1537  | 1712.4          | 24.5                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 24.4                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 24.5                         |  |
|                    | 4       | 1312  | 1537  | 1712.4          | 24.4                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 24.7                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 24.6                         |  |

**UAT 1**

| ID:               | 29439   | Date: | 7/26/17 |                 |                              |  |
|-------------------|---------|-------|---------|-----------------|------------------------------|--|
| Band              | Subtest | UL Ch | DL Ch   | Frequency (MHz) | Conducted Output Power (dBm) |  |
|                   |         |       |         |                 | Average                      |  |
| UMTS HSDPA 850MHz | 1       | 4132  | 4357    | 826.4           | 23.6                         |  |
|                   |         | 4183  | 4408    | 836.6           | 23.7                         |  |
|                   |         | 4233  | 4458    | 846.6           | 23.4                         |  |
|                   | 2       | 4132  | 4357    | 826.4           | 23.5                         |  |
|                   |         | 4183  | 4408    | 836.6           | 23.6                         |  |
|                   |         | 4233  | 4458    | 846.6           | 23.3                         |  |
|                   | 3       | 4132  | 4357    | 826.4           | 23.1                         |  |
|                   |         | 4183  | 4408    | 836.6           | 22.9                         |  |
|                   |         | 4233  | 4458    | 846.6           | 23.0                         |  |
|                   | 4       | 4132  | 4357    | 826.4           | 23.0                         |  |
|                   |         | 4183  | 4408    | 836.6           | 23.0                         |  |
|                   |         | 4233  | 4458    | 846.6           | 23.0                         |  |

| Band               | Subtest | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |  |
|--------------------|---------|-------|-------|-----------------|------------------------------|--|
|                    |         |       |       |                 | Average                      |  |
| UMTS HSDPA 1900MHz | 1       | 9262  | 9662  | 1852.4          | 19.9                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 19.7                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 19.8                         |  |
|                    | 2       | 9262  | 9662  | 1852.4          | 19.7                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 19.6                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 19.8                         |  |
|                    | 3       | 9262  | 9662  | 1852.4          | 19.1                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 19.2                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 19.1                         |  |
|                    | 4       | 9262  | 9662  | 1852.4          | 19.1                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 19.2                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 19.1                         |  |

| Band               | Subtest | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |  |
|--------------------|---------|-------|-------|-----------------|------------------------------|--|
|                    |         |       |       |                 | Average                      |  |
| UMTS HSDPA 1700MHz | 1       | 1312  | 1537  | 1712.4          | 20.9                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 20.9                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 20.9                         |  |
|                    | 2       | 1312  | 1537  | 1712.4          | 20.6                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 20.8                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 20.7                         |  |
|                    | 3       | 1312  | 1537  | 1712.4          | 19.8                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 20.2                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 20.1                         |  |
|                    | 4       | 1312  | 1537  | 1712.4          | 20.0                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 20.3                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 20.0                         |  |

### 7.3.3. HSPA REL 6 (HSDPA & HSUPA)

#### TEST PROCEDURE

The following summary of these settings are illustrated below:

|                               | Mode                                 | Rel6<br>HSUPA                                                                                                                                | Rel6<br>HSUPA | Rel6<br>HSUPA                                         | Rel6<br>HSUPA                                                                                                                                | Rel6<br>HSUPA |
|-------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------|
|                               | Subtest                              | 1                                                                                                                                            | 2             | 3                                                     | 4                                                                                                                                            | 5             |
| WCDMA<br>General<br>Settings  | Loopback Mode                        | Test Mode 1                                                                                                                                  |               |                                                       |                                                                                                                                              |               |
|                               | Rel99 RMC                            | 12.2kbps RMC                                                                                                                                 |               |                                                       |                                                                                                                                              |               |
|                               | HSDPA FRC                            | H-Set1                                                                                                                                       |               |                                                       |                                                                                                                                              |               |
|                               | HSUPA Test                           | HSUPA Loopback                                                                                                                               |               |                                                       |                                                                                                                                              |               |
|                               | Power Control Algorithm              | Algorithm2                                                                                                                                   |               |                                                       |                                                                                                                                              |               |
|                               | $\beta_c$                            | 11/15                                                                                                                                        | 6/15          | 15/15                                                 | 2/15                                                                                                                                         | 15/15         |
|                               | $\beta_d$                            | 15/15                                                                                                                                        | 15/15         | 9/15                                                  | 15/15                                                                                                                                        | 0             |
|                               | $\beta_{ec}$                         | 209/225                                                                                                                                      | 12/15         | 30/15                                                 | 2/15                                                                                                                                         | 5/15          |
|                               | $\beta_c/\beta_d$                    | 11/15                                                                                                                                        | 6/15          | 15/9                                                  | 2/15                                                                                                                                         | 15/1          |
|                               | $\beta_{hs}$                         | 22/15                                                                                                                                        | 12/15         | 30/15                                                 | 4/15                                                                                                                                         | 5/15          |
|                               | $\beta_{ed}$                         | 1309/225                                                                                                                                     | 94/75         | 47/15                                                 | 56/75                                                                                                                                        | 47/15         |
|                               | CM (dB)                              | 1                                                                                                                                            | 3             | 2                                                     | 3                                                                                                                                            | 1             |
|                               | MPR (dB)                             | 0                                                                                                                                            | 2             | 1                                                     | 2                                                                                                                                            | 0             |
| HSDPA<br>Specific<br>Settings | DACK                                 | 8                                                                                                                                            |               |                                                       |                                                                                                                                              |               |
|                               | DNAK                                 | 8                                                                                                                                            |               |                                                       |                                                                                                                                              |               |
|                               | DCQI                                 | 8                                                                                                                                            |               |                                                       |                                                                                                                                              |               |
|                               | Ack-Nack repetition factor           | 3                                                                                                                                            |               |                                                       |                                                                                                                                              |               |
|                               | CQI Feedback (Table 5.2B.4)          | 4ms                                                                                                                                          |               |                                                       |                                                                                                                                              |               |
|                               | CQI Repetition Factor (Table 5.2B.4) | 2                                                                                                                                            |               |                                                       |                                                                                                                                              |               |
|                               | $A_{hs} = \beta_{hs}/\beta_c$        | 30/15                                                                                                                                        |               |                                                       |                                                                                                                                              |               |
| HSUPA<br>Specific<br>Settings | D E-DPCCH                            | 6                                                                                                                                            | 8             | 8                                                     | 5                                                                                                                                            | 7             |
|                               | DHARQ                                | 0                                                                                                                                            | 0             | 0                                                     | 0                                                                                                                                            | 0             |
|                               | AG Index                             | 20                                                                                                                                           | 12            | 15                                                    | 17                                                                                                                                           | 12            |
|                               | ETFCI (from 34.121 Table C.11.1.3)   | 75                                                                                                                                           | 67            | 92                                                    | 71                                                                                                                                           | 67            |
|                               | Associated Max UL Data Rate kbps     | 242.1                                                                                                                                        | 174.9         | 482.8                                                 | 205.8                                                                                                                                        | 308.9         |
|                               | Reference E_TFCIs                    | E-TFCI 11<br>E-TFCI PO 4<br>E-TFCI 67<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO 23<br>E-TFCI 75<br>E-TFCI PO 26<br>E-TFCI 81<br>E-TFCI PO 27 |               | E-TFCI 11<br>E-TFCI PO 4<br>E-TFCI 92<br>E-TFCI PO 18 | E-TFCI 11<br>E-TFCI PO 4<br>E-TFCI 67<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO 23<br>E-TFCI 75<br>E-TFCI PO 26<br>E-TFCI 81<br>E-TFCI PO 27 |               |
|                               |                                      |                                                                                                                                              |               |                                                       |                                                                                                                                              |               |
|                               |                                      |                                                                                                                                              |               |                                                       |                                                                                                                                              |               |

#### RESULTS

**LAT 1**

| ID:               | 29439   | Date: | 7/26/17 |                 |                              |  |
|-------------------|---------|-------|---------|-----------------|------------------------------|--|
| Band              | Subtest | UL Ch | DL Ch   | Frequency (MHz) | Conducted Output Power (dBm) |  |
|                   |         |       |         |                 | Average                      |  |
| UMTS HSUPA 850MHz | 1       | 4132  | 4357    | 826.4           | 24.6                         |  |
|                   |         | 4183  | 4408    | 836.6           | 24.6                         |  |
|                   |         | 4233  | 4458    | 846.6           | 24.5                         |  |
|                   | 2       | 4132  | 4357    | 826.4           | 22.6                         |  |
|                   |         | 4183  | 4408    | 836.6           | 22.6                         |  |
|                   |         | 4233  | 4458    | 846.6           | 22.5                         |  |
|                   | 3       | 4132  | 4357    | 826.4           | 23.6                         |  |
|                   |         | 4183  | 4408    | 836.6           | 23.6                         |  |
|                   |         | 4233  | 4458    | 846.6           | 23.7                         |  |
|                   | 4       | 4132  | 4357    | 826.4           | 22.6                         |  |
|                   |         | 4183  | 4408    | 836.6           | 22.5                         |  |
|                   |         | 4233  | 4458    | 846.6           | 22.6                         |  |
|                   | 5       | 4132  | 4357    | 826.4           | 24.5                         |  |
|                   |         | 4183  | 4408    | 836.6           | 24.4                         |  |
|                   |         | 4233  | 4458    | 846.6           | 24.5                         |  |

| Band               | Subtest | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |  |
|--------------------|---------|-------|-------|-----------------|------------------------------|--|
|                    |         |       |       |                 | Average                      |  |
| UMTS HSUPA 1900MHz | 1       | 9262  | 9662  | 1852.4          | 24.9                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 25.1                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 25.1                         |  |
|                    | 2       | 9262  | 9662  | 1852.4          | 22.6                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 22.9                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 23.0                         |  |
|                    | 3       | 9262  | 9662  | 1852.4          | 23.7                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 24.0                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 24.0                         |  |
|                    | 4       | 9262  | 9662  | 1852.4          | 22.7                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 23.0                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 22.9                         |  |
|                    | 5       | 9262  | 9662  | 1852.4          | 25.0                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 25.0                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 25.1                         |  |

| Band               | Subtest | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |  |
|--------------------|---------|-------|-------|-----------------|------------------------------|--|
|                    |         |       |       |                 | Average                      |  |
| UMTS HSUPA 1700MHz | 1       | 1312  | 1537  | 1712.4          | 25.1                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 25.0                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 25.0                         |  |
|                    | 2       | 1312  | 1537  | 1712.4          | 23.2                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 23.2                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 23.0                         |  |
|                    | 3       | 1312  | 1537  | 1712.4          | 24.2                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 24.2                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 23.9                         |  |
|                    | 4       | 1312  | 1537  | 1712.4          | 23.2                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 23.2                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 23.0                         |  |
|                    | 5       | 1312  | 1537  | 1712.4          | 25.1                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 24.9                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 25.0                         |  |

**UAT 1**

| ID:               | 29439   | Date: | 7/26/17 |                 |                              |
|-------------------|---------|-------|---------|-----------------|------------------------------|
| Band              | Subtest | UL Ch | DL Ch   | Frequency (MHz) | Conducted Output Power (dBm) |
|                   |         |       |         |                 | Average                      |
| UMTS HSUPA 850MHz | 1       | 4132  | 4357    | 826.4           | 23.6                         |
|                   |         | 4183  | 4408    | 836.6           | 23.6                         |
|                   |         | 4233  | 4458    | 846.6           | 23.5                         |
|                   | 2       | 4132  | 4357    | 826.4           | 21.6                         |
|                   |         | 4183  | 4408    | 836.6           | 21.8                         |
|                   |         | 4233  | 4458    | 846.6           | 21.7                         |
|                   | 3       | 4132  | 4357    | 826.4           | 22.6                         |
|                   |         | 4183  | 4408    | 836.6           | 22.7                         |
|                   |         | 4233  | 4458    | 846.6           | 22.7                         |
|                   | 4       | 4132  | 4357    | 826.4           | 21.5                         |
|                   |         | 4183  | 4408    | 836.6           | 21.8                         |
|                   |         | 4233  | 4458    | 846.6           | 21.7                         |
|                   | 5       | 4132  | 4357    | 826.4           | 23.6                         |
|                   |         | 4183  | 4408    | 836.6           | 23.6                         |
|                   |         | 4233  | 4458    | 846.6           | 23.5                         |

| Band               | Subtest | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |
|--------------------|---------|-------|-------|-----------------|------------------------------|
|                    |         |       |       |                 | Average                      |
| UMTS HSUPA 1900MHz | 1       | 9262  | 9662  | 1852.4          | 19.8                         |
|                    |         | 9400  | 9800  | 1880.0          | 19.7                         |
|                    |         | 9538  | 9938  | 1907.6          | 19.7                         |
|                    | 2       | 9262  | 9662  | 1852.4          | 17.9                         |
|                    |         | 9400  | 9800  | 1880.0          | 17.8                         |
|                    |         | 9538  | 9938  | 1907.6          | 17.7                         |
|                    | 3       | 9262  | 9662  | 1852.4          | 18.8                         |
|                    |         | 9400  | 9800  | 1880.0          | 18.7                         |
|                    |         | 9538  | 9938  | 1907.6          | 18.7                         |
|                    | 4       | 9262  | 9662  | 1852.4          | 17.8                         |
|                    |         | 9400  | 9800  | 1880.0          | 17.6                         |
|                    |         | 9538  | 9938  | 1907.6          | 17.6                         |
|                    | 5       | 9262  | 9662  | 1852.4          | 19.8                         |
|                    |         | 9400  | 9800  | 1880.0          | 19.6                         |
|                    |         | 9538  | 9938  | 1907.6          | 19.8                         |

| Band               | Subtest | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |
|--------------------|---------|-------|-------|-----------------|------------------------------|
|                    |         |       |       |                 | Average                      |
| UMTS HSUPA 1700MHz | 1       | 1312  | 1537  | 1712.4          | 20.8                         |
|                    |         | 1413  | 1638  | 1732.6          | 20.8                         |
|                    |         | 1513  | 1738  | 1752.6          | 20.7                         |
|                    | 2       | 1312  | 1537  | 1712.4          | 18.8                         |
|                    |         | 1413  | 1638  | 1732.6          | 18.6                         |
|                    |         | 1513  | 1738  | 1752.6          | 18.6                         |
|                    | 3       | 1312  | 1537  | 1712.4          | 19.7                         |
|                    |         | 1413  | 1638  | 1732.6          | 19.7                         |
|                    |         | 1513  | 1738  | 1752.6          | 19.8                         |
|                    | 4       | 1312  | 1537  | 1712.4          | 18.7                         |
|                    |         | 1413  | 1638  | 1732.6          | 18.7                         |
|                    |         | 1513  | 1738  | 1752.6          | 18.6                         |
|                    | 5       | 1312  | 1537  | 1712.4          | 20.7                         |
|                    |         | 1413  | 1638  | 1732.6          | 20.7                         |
|                    |         | 1513  | 1738  | 1752.6          | 20.7                         |

### 7.3.4. DUAL CARRIER HSDPA

#### DC-HSDPA (Rel 8, CAT 24)

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0.

A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

**Table E.5.0: Levels for HSDPA connection setup**

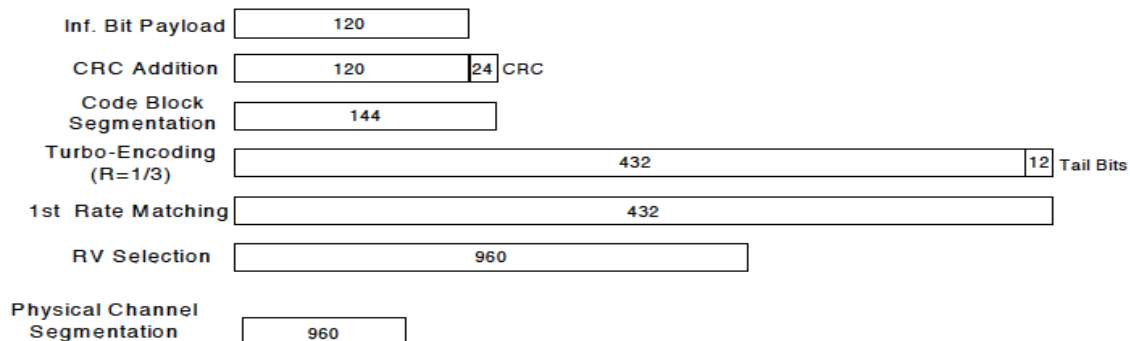
| Parameter<br>During Connection setup | Unit | Value |
|--------------------------------------|------|-------|
| P-CPICH_Ec/Ior                       | dB   | -10   |
| P-CCPCH and SCH_Ec/Ior               | dB   | -12   |
| PICH_Ec/Ior                          | dB   | -15   |
| HS-PDSCH                             | dB   | off   |
| HS-SCCH_1                            | dB   | off   |
| DPCH_Ec/Ior                          | dB   | -5    |
| OCNS_Ec/Ior                          | dB   | -3.1  |

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

**Table C.8.1.12: Fixed Reference Channel H-Set 12**

| Parameter                                                                                                                                                                                                                                                                                          | Unit      | Value |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|
| Nominal Avg. Inf. Bit Rate                                                                                                                                                                                                                                                                         | kbps      | 60    |
| Inter-TTI Distance                                                                                                                                                                                                                                                                                 | TTI's     | 1     |
| Number of HARQ Processes                                                                                                                                                                                                                                                                           | Processes | 6     |
| Information Bit Payload ( $N_{INF}$ )                                                                                                                                                                                                                                                              | Bits      | 120   |
| Number Code Blocks                                                                                                                                                                                                                                                                                 | Blocks    | 1     |
| Binary Channel Bits Per TTI                                                                                                                                                                                                                                                                        | Bits      | 960   |
| Total Available SML's in UE                                                                                                                                                                                                                                                                        | SML's     | 19200 |
| Number of SML's per HARQ Proc.                                                                                                                                                                                                                                                                     | SML's     | 3200  |
| Coding Rate                                                                                                                                                                                                                                                                                        |           | 0.15  |
| Number of Physical Channel Codes                                                                                                                                                                                                                                                                   | Codes     | 1     |
| Modulation                                                                                                                                                                                                                                                                                         |           | QPSK  |
| Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.<br>Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used. |           |       |



**Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)**

The following 4 Sub-tests for HSDPA were completed according to Release 8 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

|                               | Mode                            | Rel6 HSDPA   |       | Rel6 HSDPA |       |
|-------------------------------|---------------------------------|--------------|-------|------------|-------|
|                               | Subtest                         | 1            | 2     | 3          | 4     |
| WCDMA<br>General<br>Settings  | Loopback Mode                   | Test Mode 1  |       |            |       |
|                               | Rel99 RMC                       | 12.2kbps RMC |       |            |       |
|                               | HSDPA FRC                       | H-Set1       |       |            |       |
|                               | Power Control Algorithm         | Algorithm2   |       |            |       |
|                               | $\beta_c$                       | 2/15         | 11/15 | 15/15      | 15/15 |
|                               | $\beta_d$                       | 15/15        | 15/15 | 8/15       | 4/15  |
|                               | $\beta_d$ (SF)                  | 64           |       |            |       |
|                               | $\beta_c/\beta_d$               | 2/15         | 11/15 | 15/8       | 15/4  |
|                               | $\beta_{hs}$                    | 4/15         | 24/15 | 30/15      | 30/15 |
| HSDPA<br>Specific<br>Settings | MPR                             | 0            | 0     | 0.5        | 0.5   |
|                               | DACK                            | 8            |       |            |       |
|                               | DNAK                            | 8            |       |            |       |
|                               | DCQI                            | 8            |       |            |       |
|                               | Ack-Nack Repetition factor      | 3            |       |            |       |
|                               | CQI Feedback                    | 4ms          |       |            |       |
|                               | CQI Repetition Factor           | 2            |       |            |       |
|                               | $A_{hs} = \beta_{hs} / \beta_c$ | 30/15        |       |            |       |

## **RESULT**

**LAT 1**

| ID:               | 29439   | Date: | 7/26/17 |                 |                              |  |
|-------------------|---------|-------|---------|-----------------|------------------------------|--|
| Band              | Subtest | UL Ch | DL Ch   | Frequency (MHz) | Conducted Output Power (dBm) |  |
|                   |         |       |         |                 | Average                      |  |
| UMTS HSDPA 850MHz | 1       | 4132  | 4357    | 826.4           | 24.5                         |  |
|                   |         | 4183  | 4408    | 836.6           | 24.5                         |  |
|                   |         | 4233  | 4458    | 846.6           | 24.4                         |  |
|                   | 2       | 4132  | 4357    | 826.4           | 24.4                         |  |
|                   |         | 4183  | 4408    | 836.6           | 24.5                         |  |
|                   |         | 4233  | 4458    | 846.6           | 24.5                         |  |
|                   | 3       | 4132  | 4357    | 826.4           | 24.1                         |  |
|                   |         | 4183  | 4408    | 836.6           | 24.1                         |  |
|                   |         | 4233  | 4458    | 846.6           | 23.9                         |  |
|                   | 4       | 4132  | 4357    | 826.4           | 24.1                         |  |
|                   |         | 4183  | 4408    | 836.6           | 24.0                         |  |
|                   |         | 4233  | 4458    | 846.6           | 24.0                         |  |

| Band               | Subtest | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |  |
|--------------------|---------|-------|-------|-----------------|------------------------------|--|
|                    |         |       |       |                 | Average                      |  |
| UMTS HSDPA 1900MHz | 1       | 9262  | 9662  | 1852.4          | 24.9                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 24.8                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 24.9                         |  |
|                    | 2       | 9262  | 9662  | 1852.4          | 24.9                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 24.9                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 24.9                         |  |
|                    | 3       | 9262  | 9662  | 1852.4          | 24.4                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 24.4                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 24.4                         |  |
|                    | 4       | 9262  | 9662  | 1852.4          | 24.4                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 24.3                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 24.4                         |  |

| Band               | Subtest | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |  |
|--------------------|---------|-------|-------|-----------------|------------------------------|--|
|                    |         |       |       |                 | Average                      |  |
| UMTS HSDPA 1700MHz | 1       | 1312  | 1537  | 1712.4          | 25.0                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 25.0                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 24.9                         |  |
|                    | 2       | 1312  | 1537  | 1712.4          | 24.9                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 25.0                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 24.9                         |  |
|                    | 3       | 1312  | 1537  | 1712.4          | 24.5                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 24.4                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 24.4                         |  |
|                    | 4       | 1312  | 1537  | 1712.4          | 24.5                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 24.4                         |  |
|                    |         |       |       |                 |                              |  |

**UAT 1**

| <b>ID:</b>        | 29439   | <b>Date:</b> | 7/26/17 |                 |                              |  |
|-------------------|---------|--------------|---------|-----------------|------------------------------|--|
| Band              | Subtest | UL Ch        | DL Ch   | Frequency (MHz) | Conducted Output Power (dBm) |  |
|                   |         |              |         |                 | Average                      |  |
| UMTS HSDPA 850MHz | 1       | 4132         | 4357    | 826.4           | 23.2                         |  |
|                   |         | 4183         | 4408    | 836.6           | <b>23.4</b>                  |  |
|                   |         | 4233         | 4458    | 846.6           | 23.3                         |  |
|                   | 2       | 4132         | 4357    | 826.4           | 23.2                         |  |
|                   |         | 4183         | 4408    | 836.6           | 23.3                         |  |
|                   |         | 4233         | 4458    | 846.6           | 23.3                         |  |
|                   | 3       | 4132         | 4357    | 826.4           | 22.8                         |  |
|                   |         | 4183         | 4408    | 836.6           | 22.9                         |  |
|                   |         | 4233         | 4458    | 846.6           | 22.7                         |  |
|                   | 4       | 4132         | 4357    | 826.4           | 22.7                         |  |
|                   |         | 4183         | 4408    | 836.6           | 22.9                         |  |
|                   |         | 4233         | 4458    | 846.6           | 22.8                         |  |

| Band               | Subtest | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |  |
|--------------------|---------|-------|-------|-----------------|------------------------------|--|
|                    |         |       |       |                 | Average                      |  |
| UMTS HSDPA 1900MHz | 1       | 9262  | 9662  | 1852.4          | <b>19.5</b>                  |  |
|                    |         | 9400  | 9800  | 1880.0          | 19.2                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 19.2                         |  |
|                    | 2       | 9262  | 9662  | 1852.4          | 19.3                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 19.2                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 19.4                         |  |
|                    | 3       | 9262  | 9662  | 1852.4          | 18.9                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 18.9                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 18.9                         |  |
|                    | 4       | 9262  | 9662  | 1852.4          | 19.0                         |  |
|                    |         | 9400  | 9800  | 1880.0          | 18.9                         |  |
|                    |         | 9538  | 9938  | 1907.6          | 18.9                         |  |

| Band               | Subtest | UL Ch | DL Ch | Frequency (MHz) | Conducted Output Power (dBm) |  |
|--------------------|---------|-------|-------|-----------------|------------------------------|--|
|                    |         |       |       |                 | Average                      |  |
| UMTS HSDPA 1700MHz | 1       | 1312  | 1537  | 1712.4          | <b>20.6</b>                  |  |
|                    |         | 1413  | 1638  | 1732.6          | 20.4                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 20.4                         |  |
|                    | 2       | 1312  | 1537  | 1712.4          | 20.3                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 20.3                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 20.5                         |  |
|                    | 3       | 1312  | 1537  | 1712.4          | 19.9                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 20.1                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 20.1                         |  |
|                    | 4       | 1312  | 1537  | 1712.4          | 20.1                         |  |
|                    |         | 1413  | 1638  | 1732.6          | 20.1                         |  |
|                    |         | 1513  | 1738  | 1752.6          | 20.1                         |  |

## **8. CONDUCTED TEST RESULTS**

### **8.1. OCCUPIED BANDWIDTH**

#### **RULE PART(S)**

FCC: §2.1049

IC: RSS132; RSS133§2.3; RSS139

#### **LIMITS**

For reporting purposes only

#### **TEST PROCEDURE**

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the middle channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

#### **RESULTS**

There is no limit required and power is the same for low, middle and high channel; therefore, only middle channel was tested.

**GSM GPRS MODE PART 22 AND 24 / RSS 132 AND 133**

| Band | Mode | Channel | f(MHz) | 99% BW (KHz) | -26dB BW (KHz) |
|------|------|---------|--------|--------------|----------------|
| CELL | GPRS | 190     | 836.6  | 247.2779     | 318.639        |
| PCS  |      | 661     | 1880   | 247.4430     | 313.826        |

**GSM EGPRS MODE PART 22 AND 24 / RSS 132 AND 133**

| Band | Mode  | Channel | f(MHz) | 99% BW (KHz) | -26dB BW (KHz) |
|------|-------|---------|--------|--------------|----------------|
| CELL | EGPRS | 190     | 836.6  | 252.4148     | 313.279        |
| PCS  |       | 661     | 1880   | 237.5551     | 310.748        |

**CDMA2000 1xRTT MODE PART 22, 24 AND 90 / RSS 132 AND 133**

| Band             | Mode            | Channel | f(MHz) | 99% BW (MHz) | -26dB BW (MHz) |
|------------------|-----------------|---------|--------|--------------|----------------|
| CELL             | CDMA 2000 1xRTT | 384     | 836.5  | 1.2759       | 1.427          |
| PCS              |                 | 600     | 1880   | 1.2745       | 1.432          |
| 800MHz Secondary |                 | 560     | 820    | 1.2802       | 1.431          |

**CDMA2000 EVDO Rev A MODE PART 22, 24 AND 90 / RSS 132 AND 133**

| Band             | Mode                  | Channel | f(MHz) | 99% BW (MHz) | -26dB BW (MHz) |
|------------------|-----------------------|---------|--------|--------------|----------------|
| CELL             | CDMA 2000 EVDO Rev. A | 384     | 836.5  | 1.2764       | 1.436          |
| PCS              |                       | 600     | 1880   | 1.2777       | 1.446          |
| 800MHz Secondary |                       | 560     | 820    | 1.2823       | 1.436          |

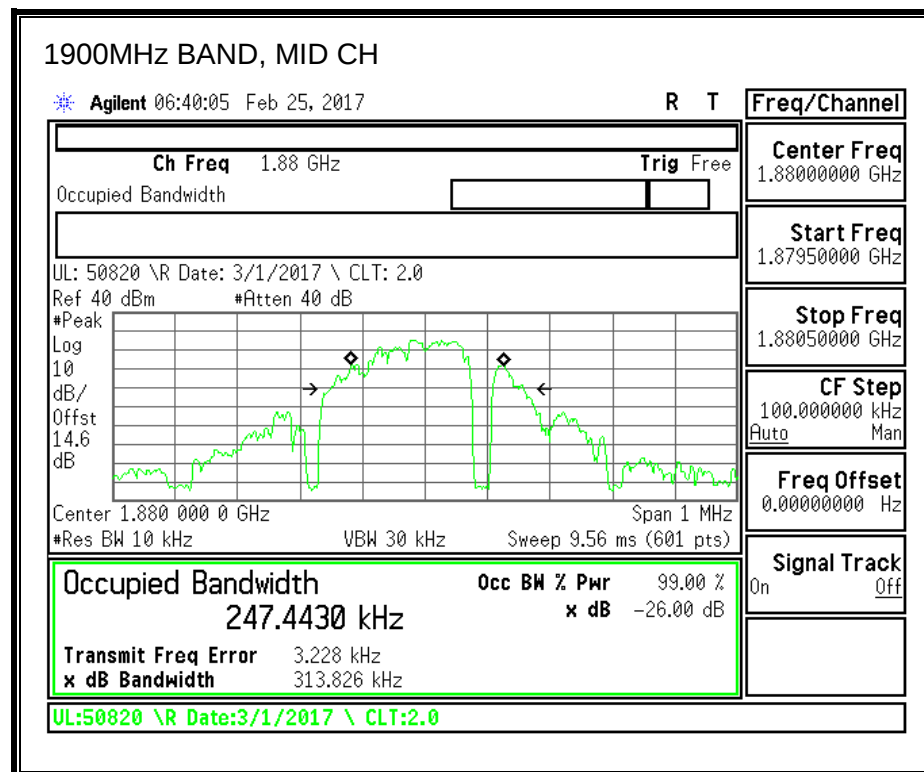
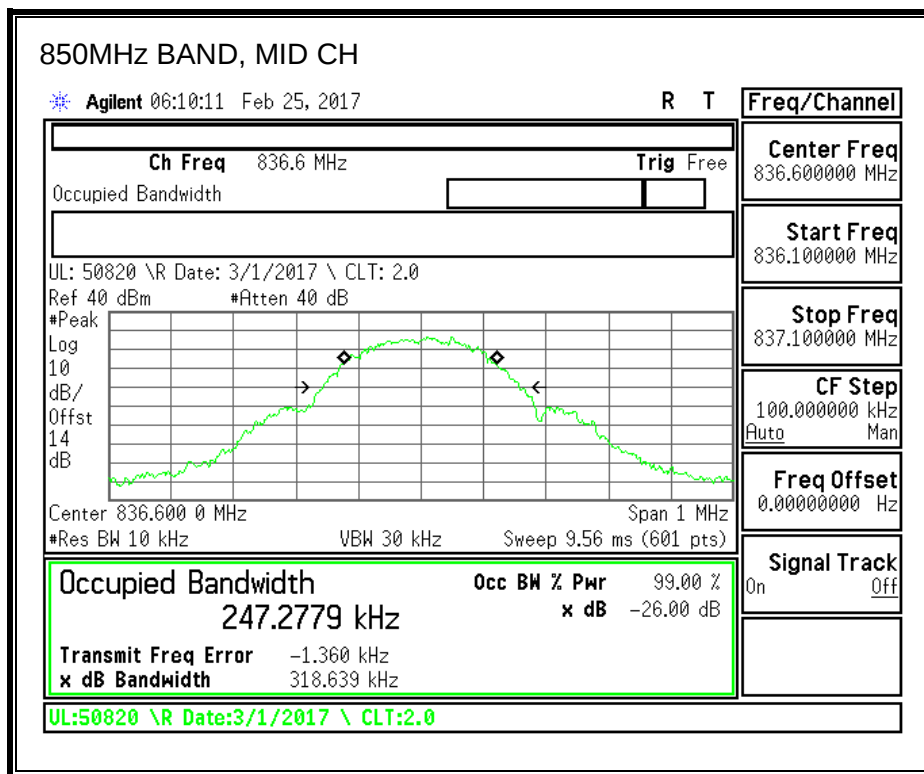
**UMTS REL 99 MODE PART 22, 24, AND 27 / RSS 132, 133 AND 139**

| Band    | Mode         | DL Channel | f(MHz) | 99% BW (MHz) | -26dB BW (MHz) |
|---------|--------------|------------|--------|--------------|----------------|
| 850MHz  | UMTS Rel. 99 | 4408       | 836.6  | 4.1235       | 4.691          |
| 1900MHz |              | 9800       | 1880   | 4.1265       | 4.694          |
| 1700MHz |              | 1638       | 1732.6 | 4.1334       | 4.627          |

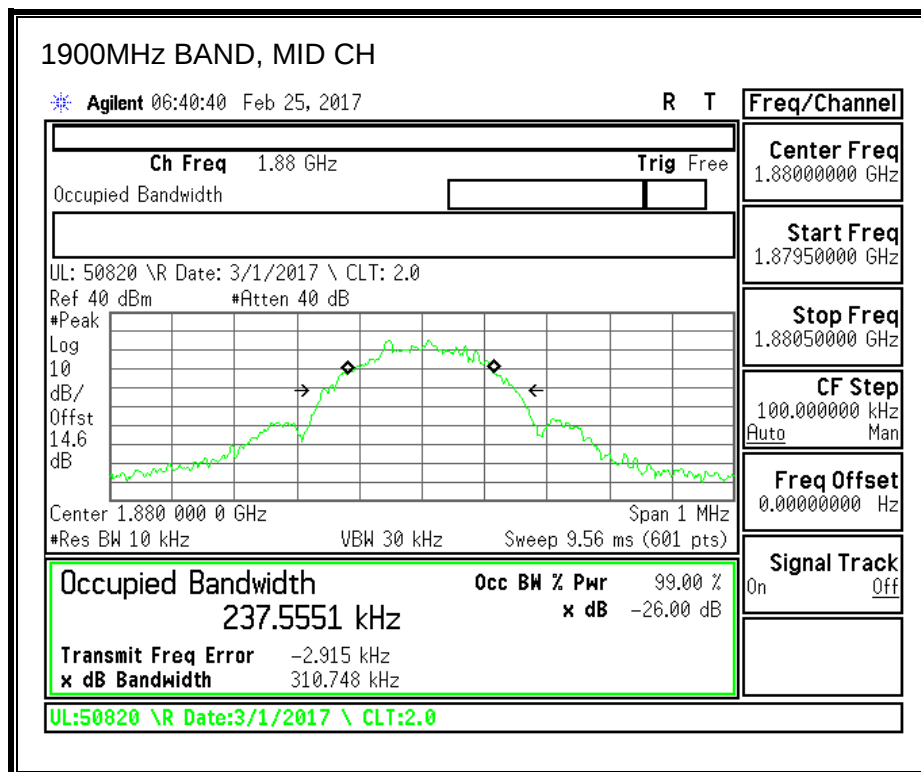
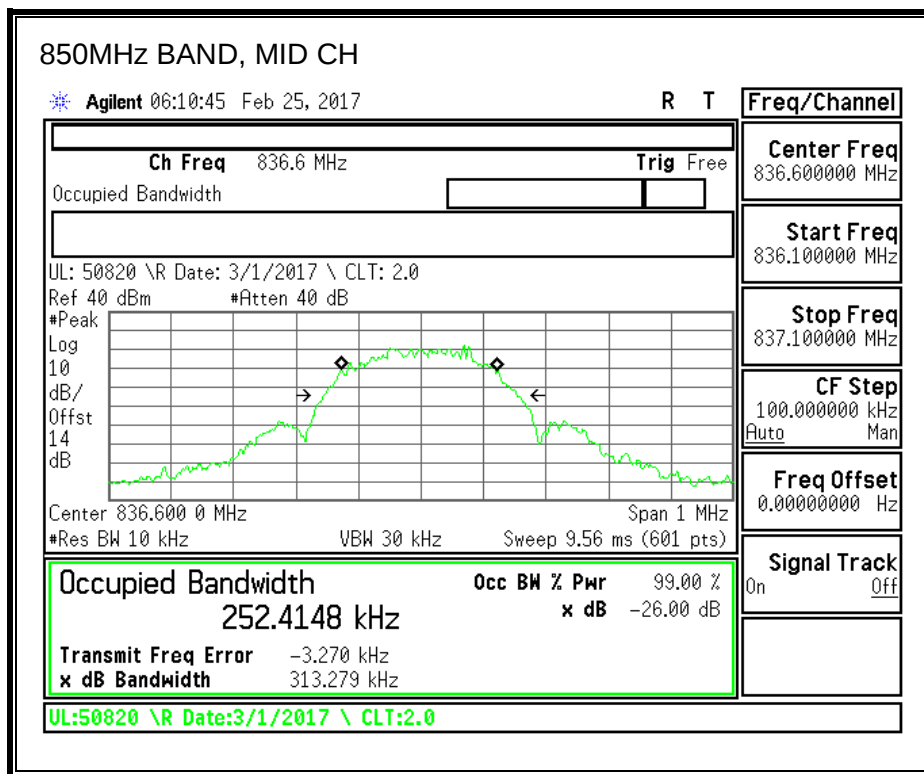
**UMTS HSDPA MODE PART 22, 24 AND 27 / RSS 132, 133 AND 139**

| Band    | Mode       | DL Channel | f(MHz) | 99% BW (MHz) | -26dB BW (MHz) |
|---------|------------|------------|--------|--------------|----------------|
| 850MHz  | UMTS HSDPA | 4408       | 836.6  | 4.1310       | 4.693          |
| 1900MHz |            | 9800       | 1880   | 4.1289       | 4.663          |
| 1700MHz |            | 1638       | 1732.6 | 4.1309       | 4.660          |

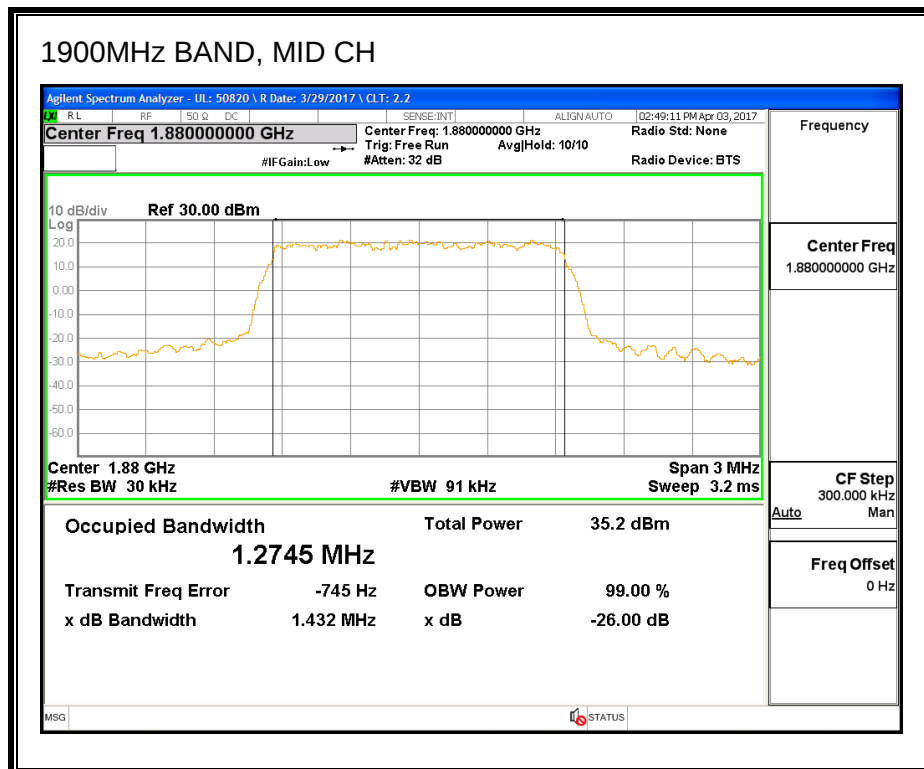
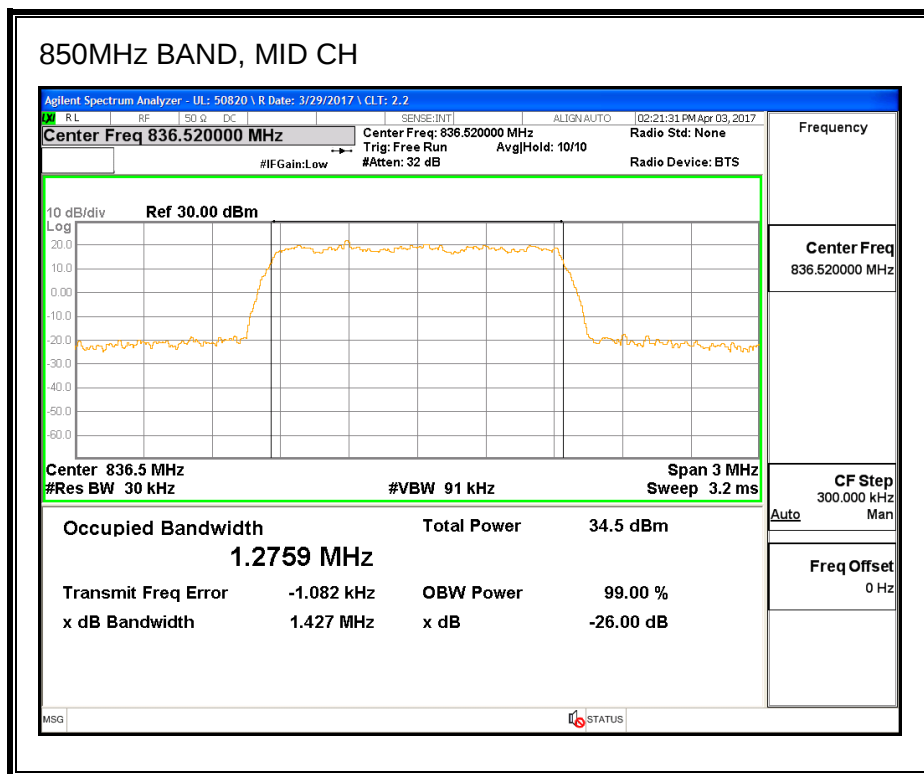
### 8.1.1. GSM GPRS

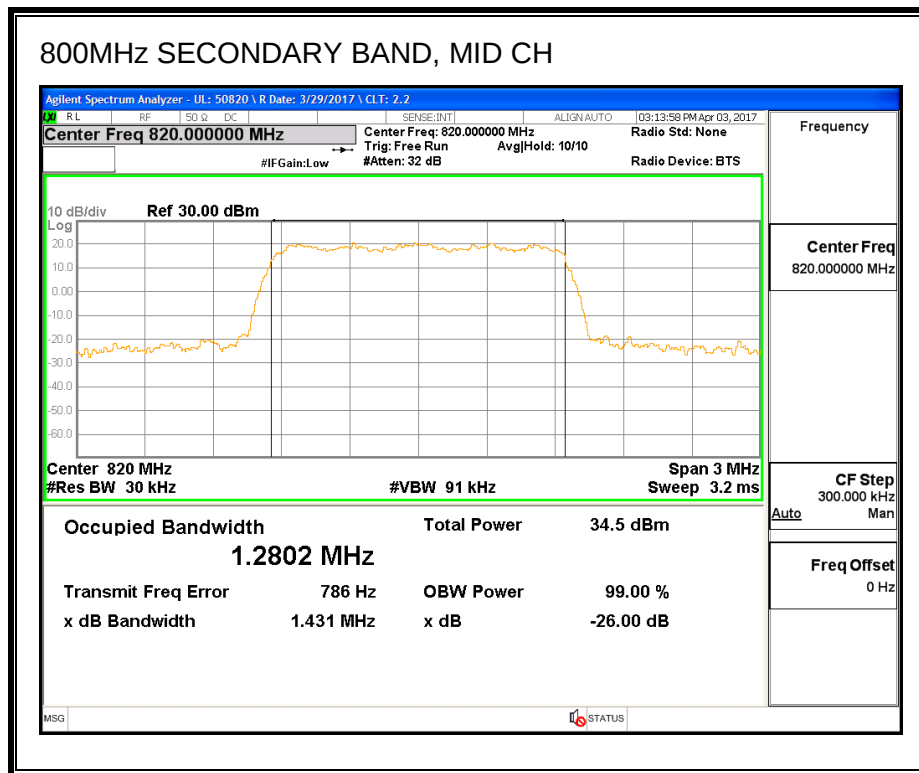


## 8.1.2. GSM EGPRS

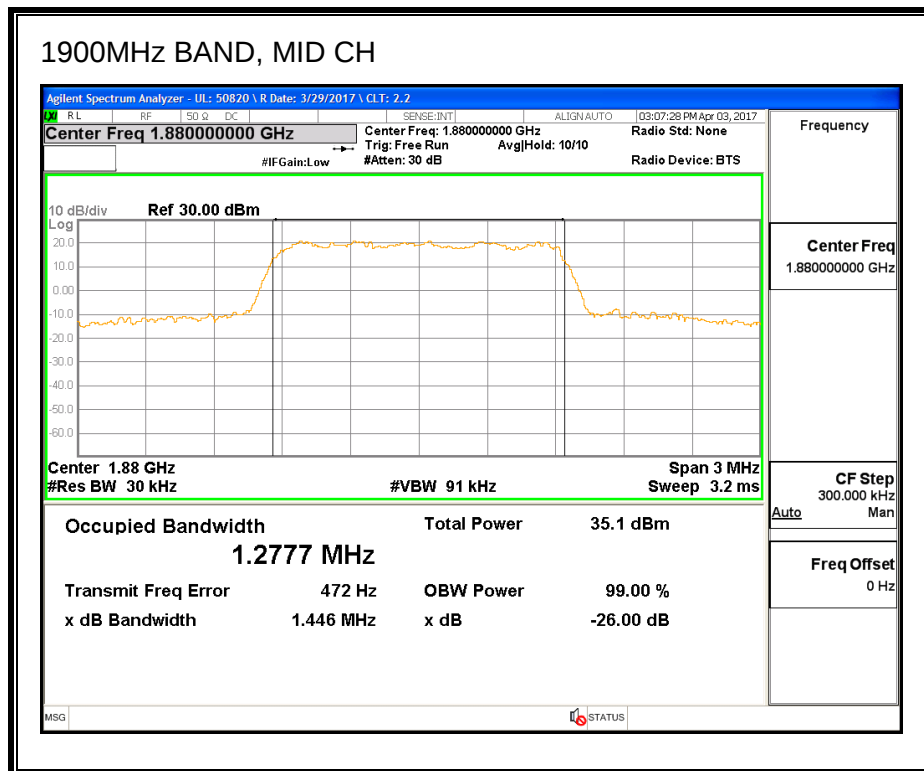
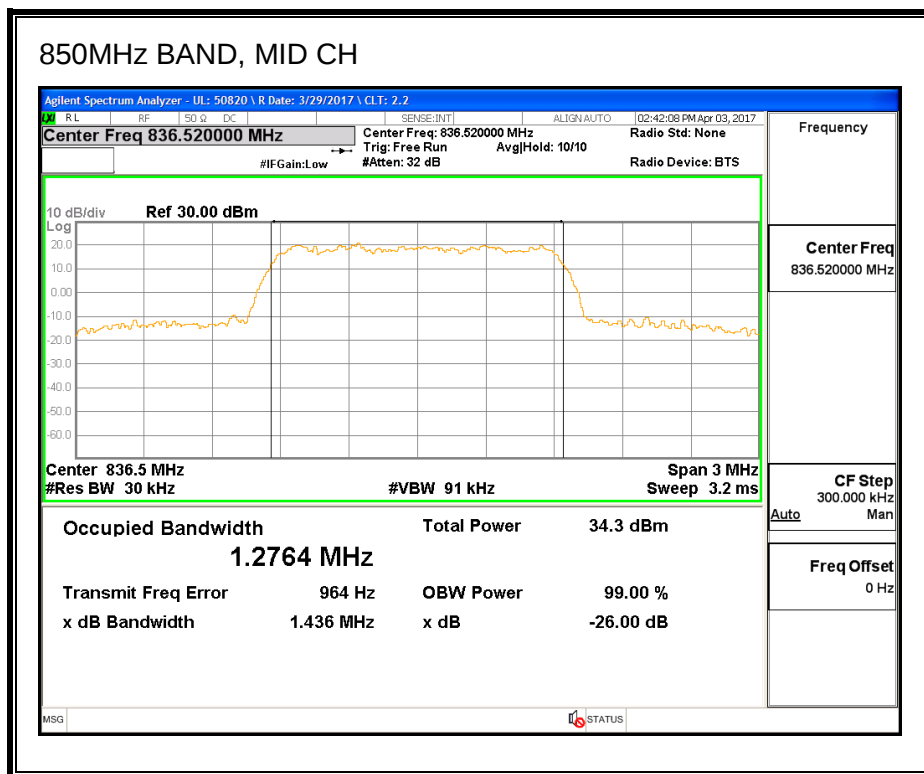


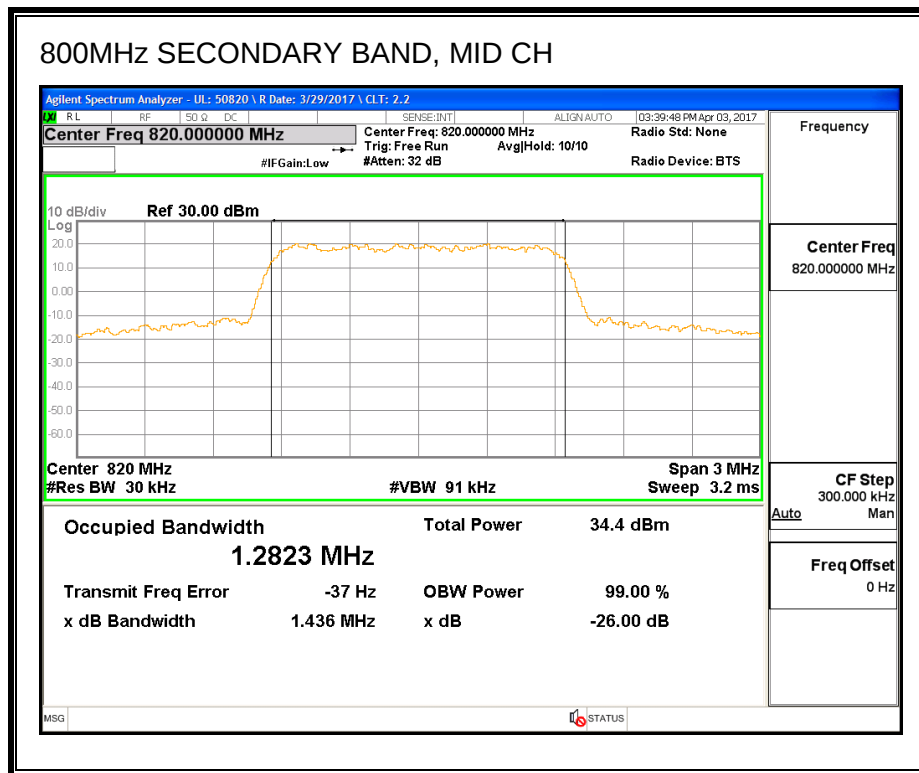
### 8.1.3. CDMA2000 1xRTT



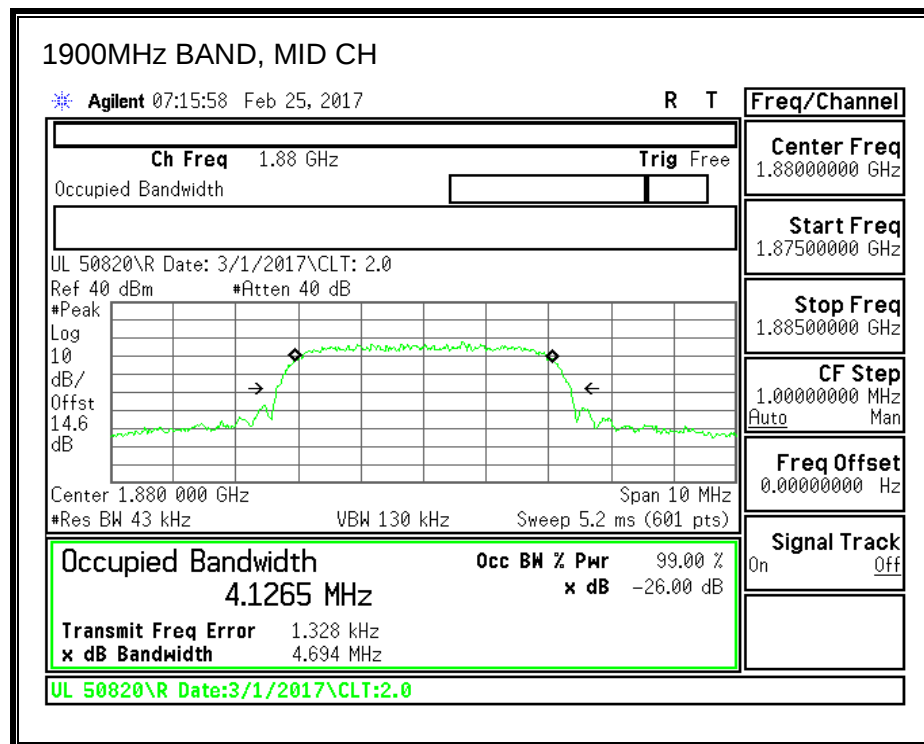
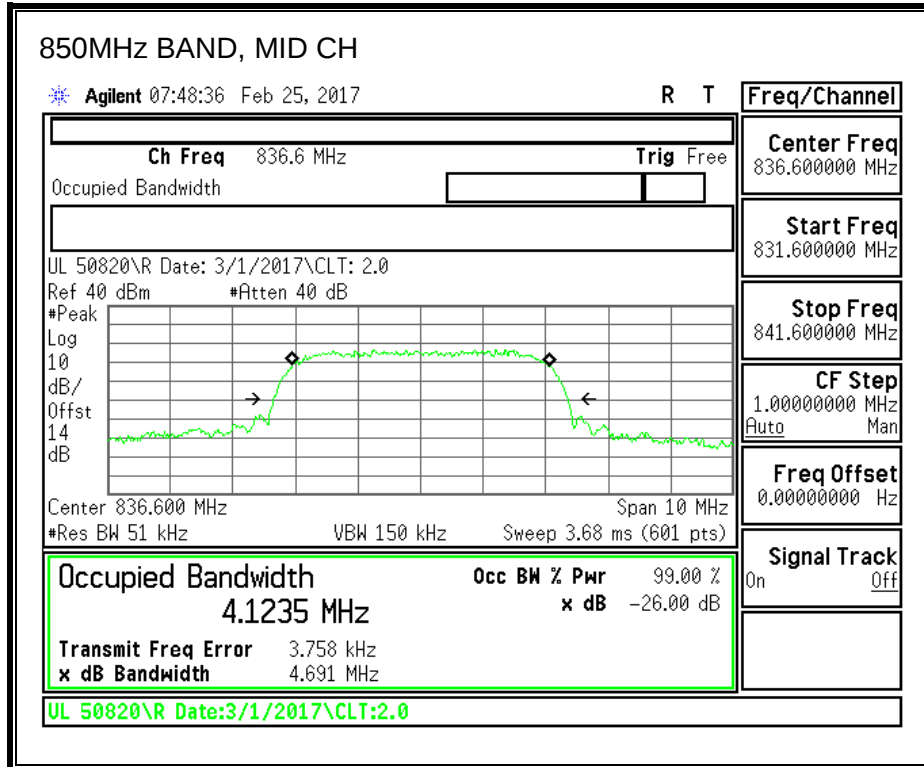


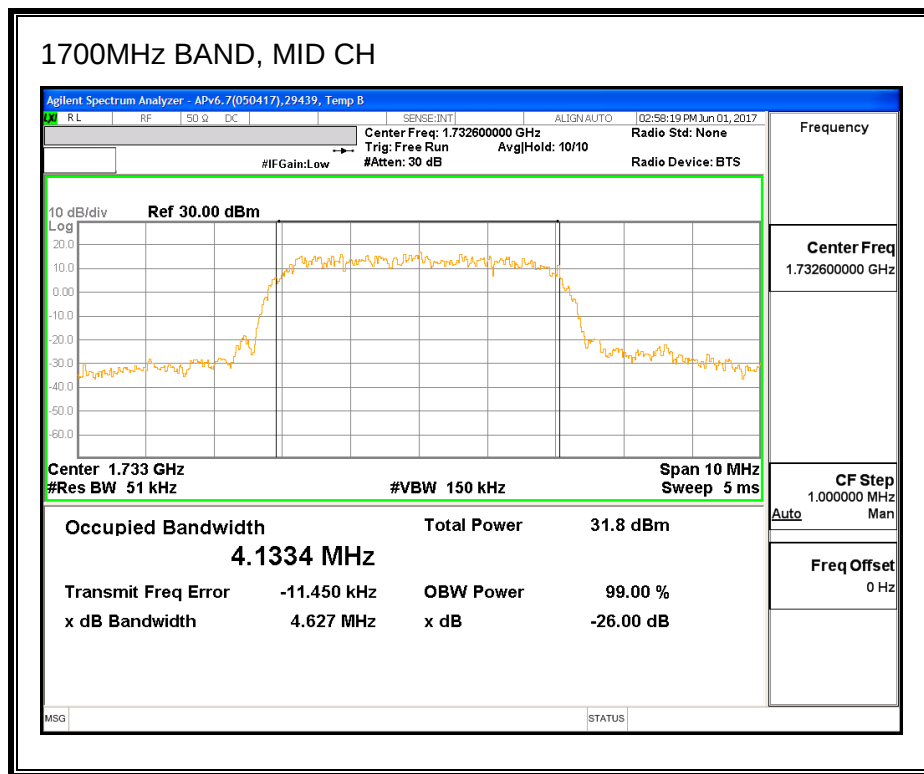
#### 8.1.4. CDMA2000 EVDO Rev. A



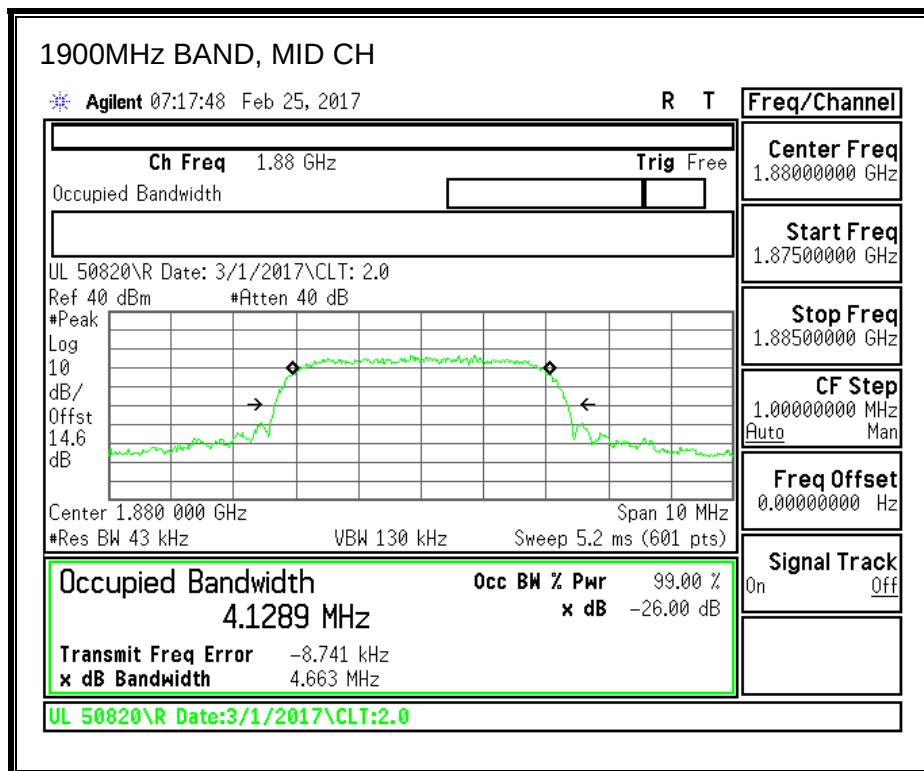
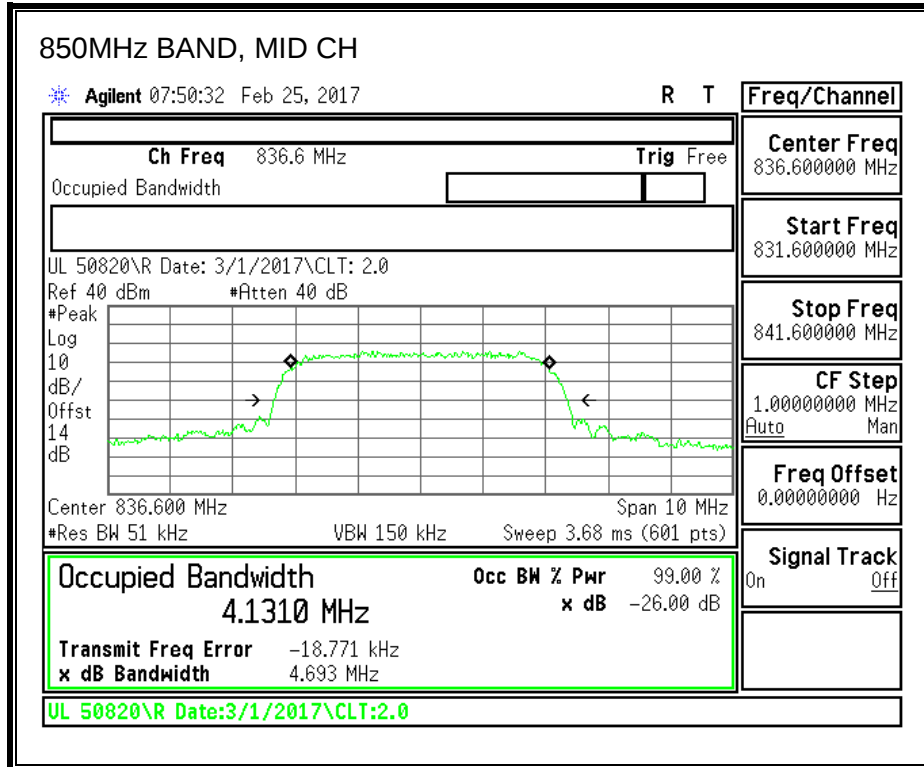


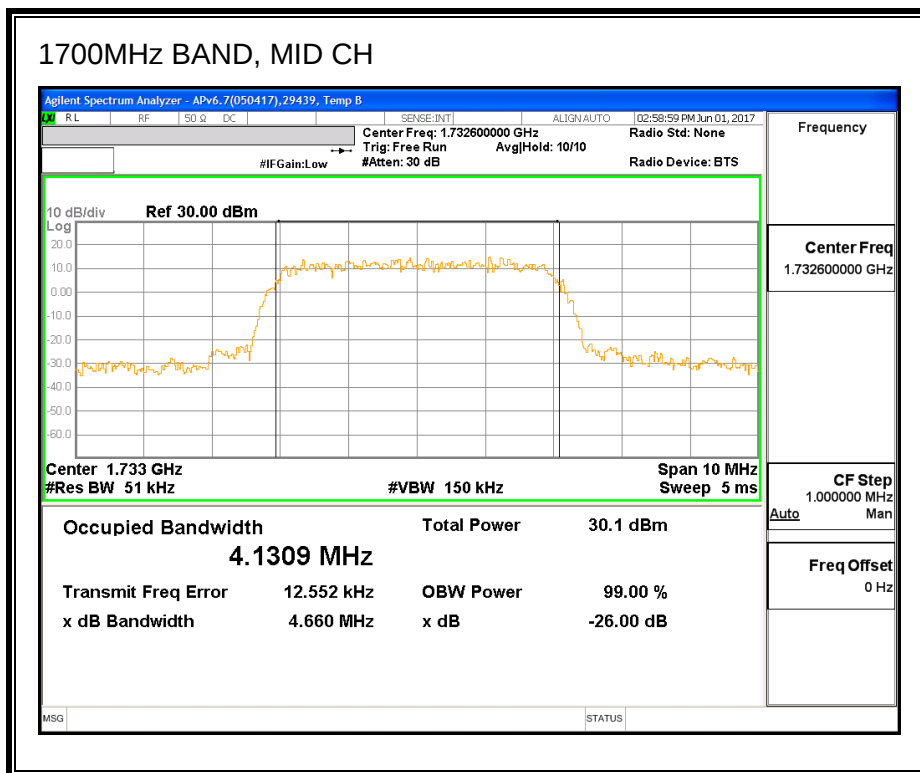
### 8.1.5. UMTS REL 99





### 8.1.6. UMTS HSDPA





## 8.2. BAND EDGE

### RULE PART(S)

FCC: §2.1051, §22.917, §24.238, §27.53 and §90.691  
IC: RSS132§5.5; RSS133§6.5 and RSS139§6.6

### LIMITS

FCC: §22.917, §24.238, §27.53

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.

FCC: §90.691 Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10}(f/6.1)$  decibels or  $50 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

#### RSS132§5.5

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

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

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

#### RSS133§6.5

Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10}p$  (watts).

(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10}p$  (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

RSS139§6.6

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, Footnote 2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

**TEST PROCEDURE**

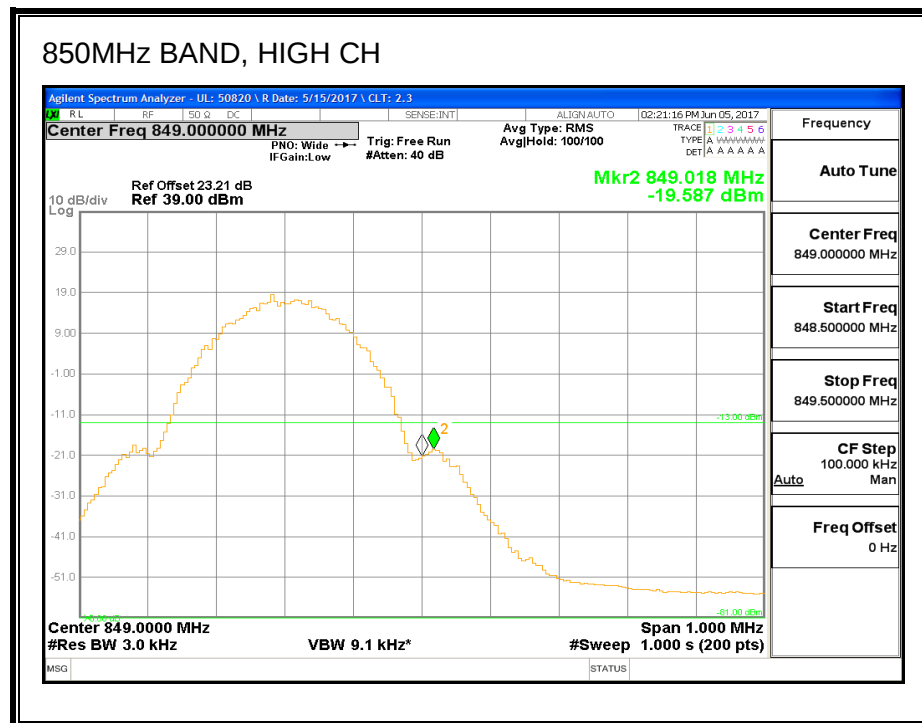
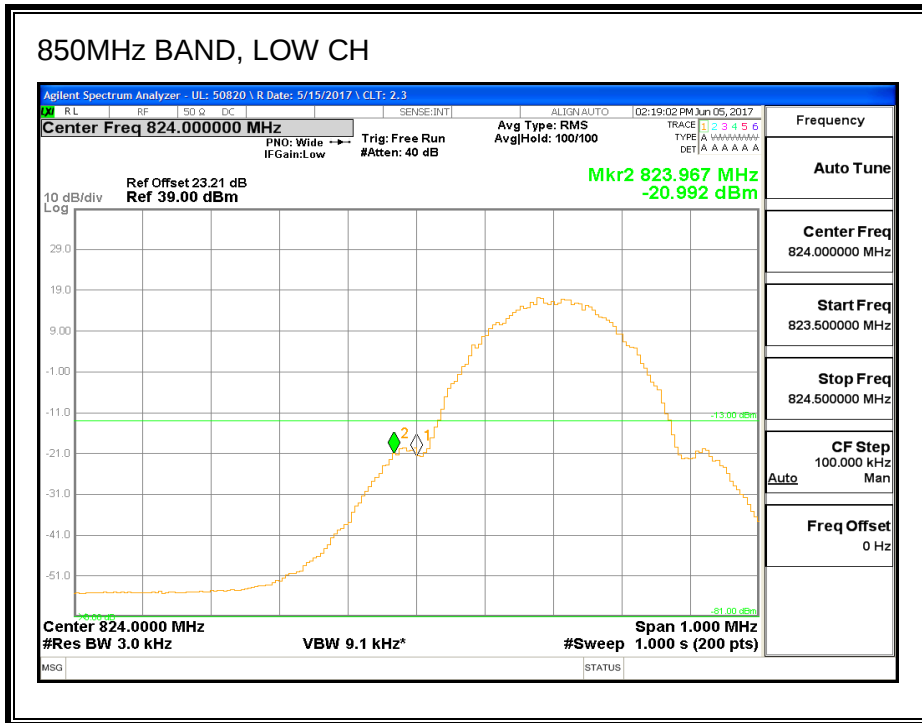
The transmitter output was connected to a Agilent 8960 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

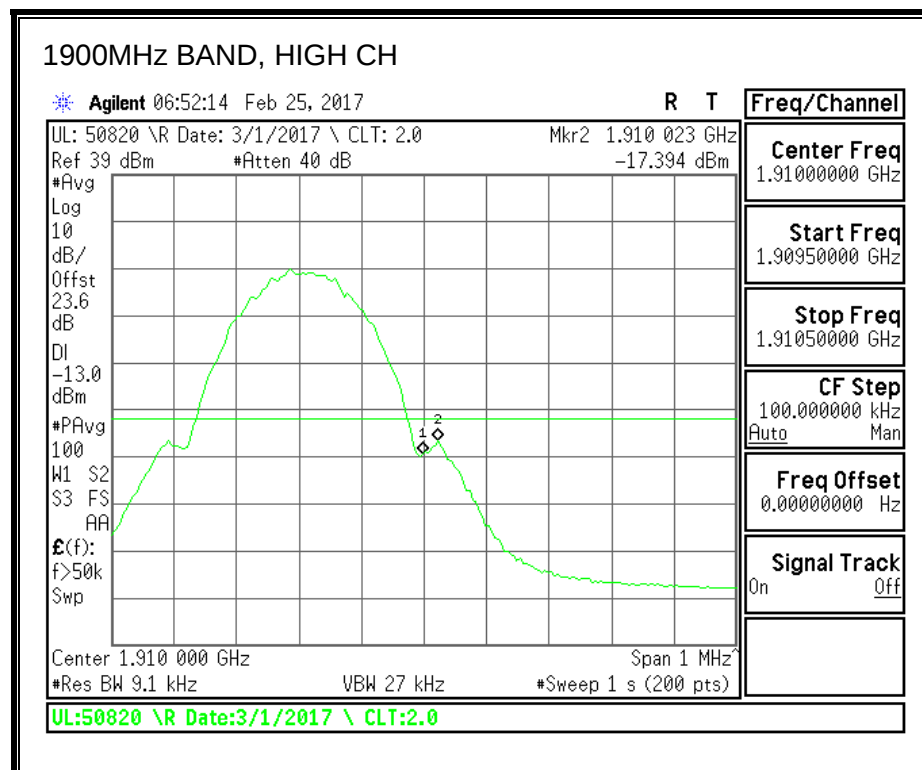
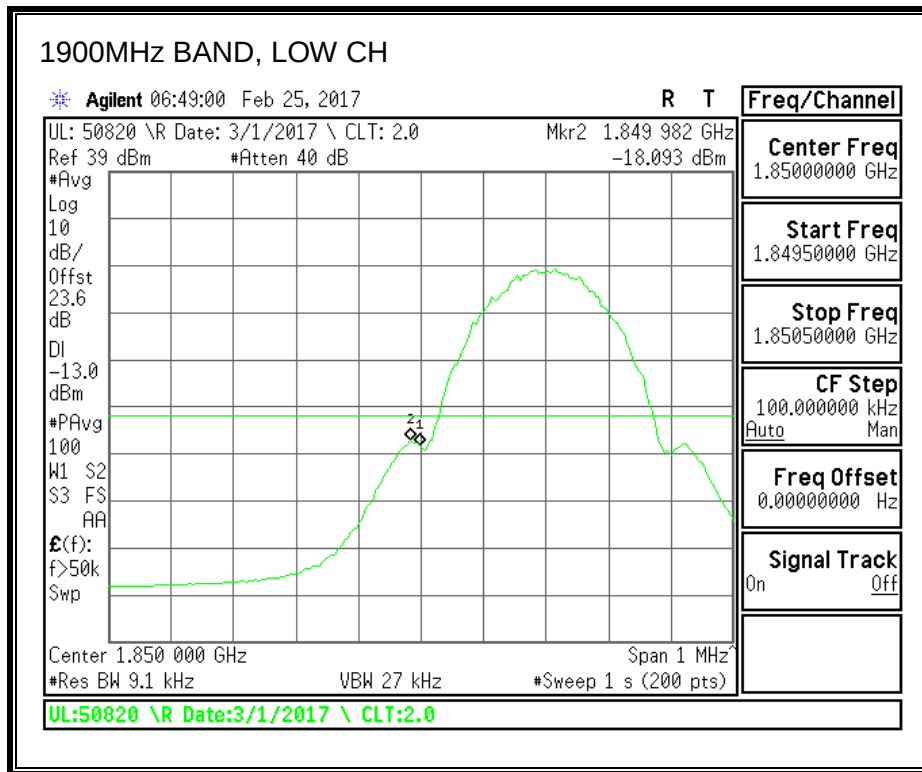
For each band edge measurement:

- Set the spectrum analyzer span to include the block edge frequency.
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13 dBm
- Set resolution bandwidth to at least 1% of emission bandwidth.

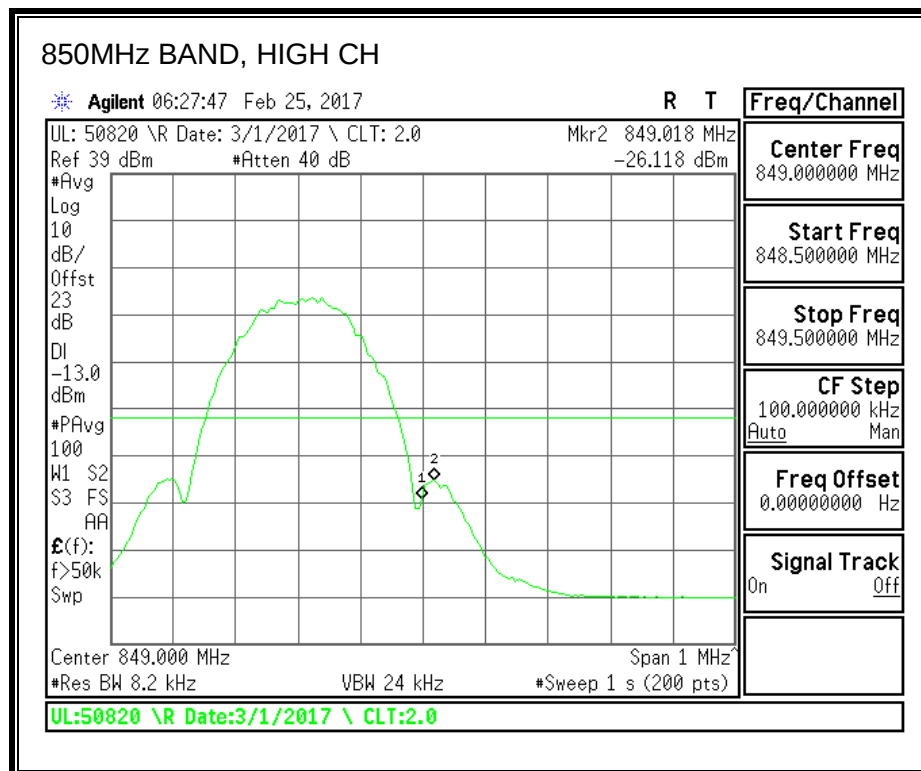
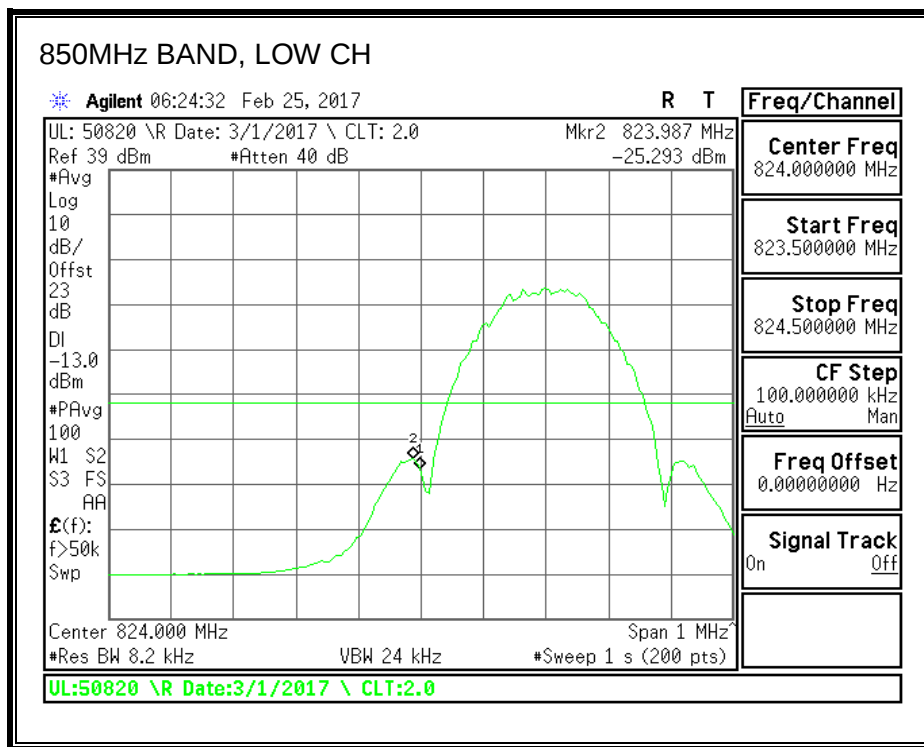
## RESULTS

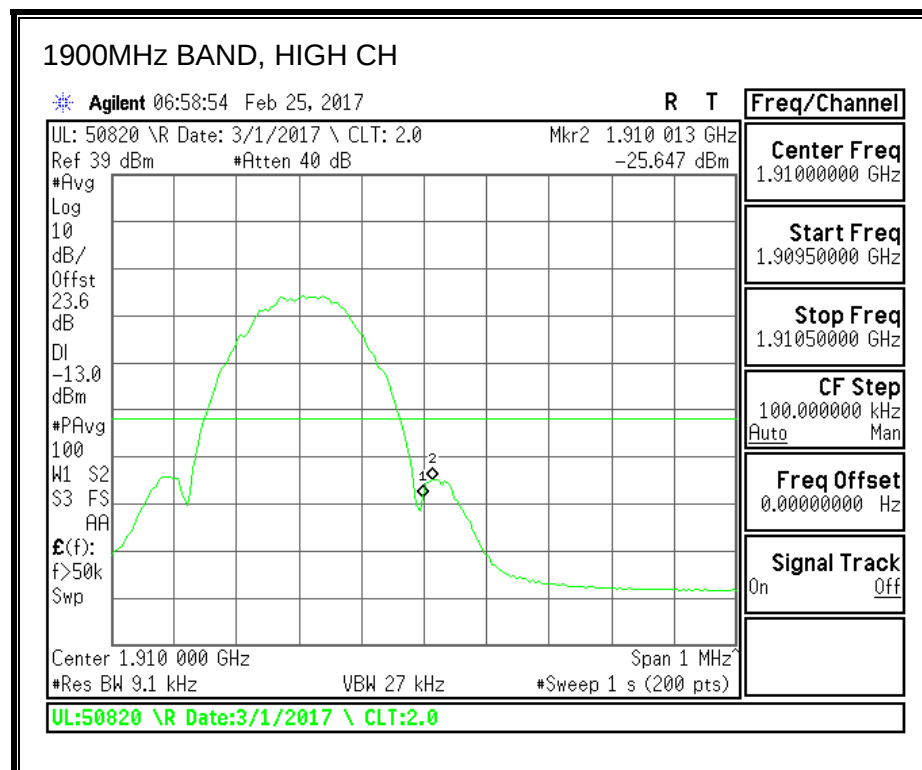
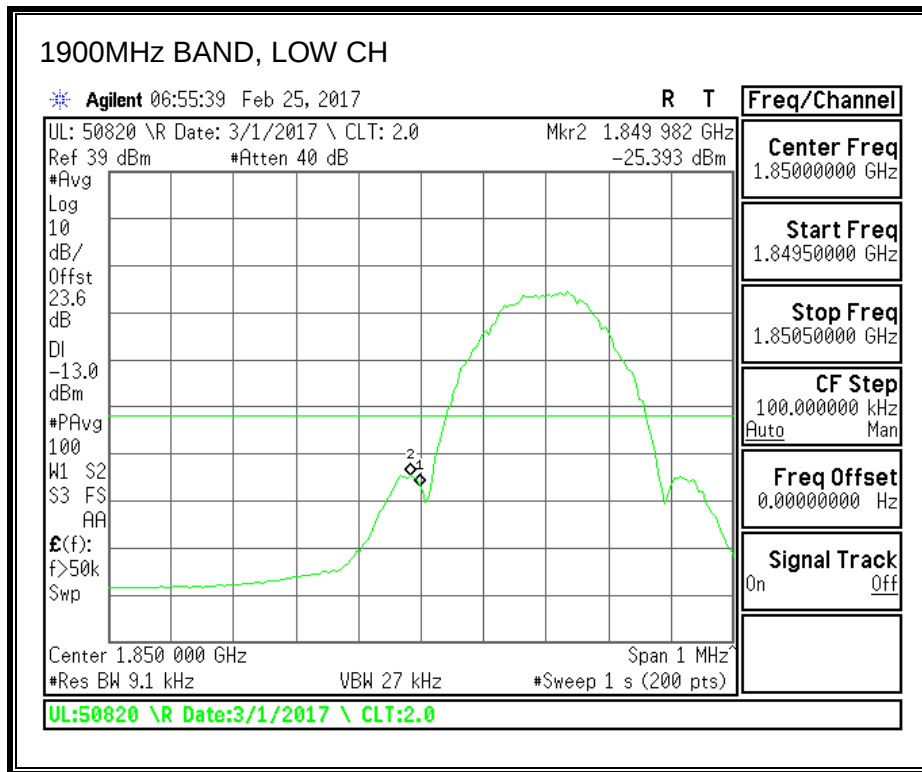
### 8.2.1. GSM-GPRS



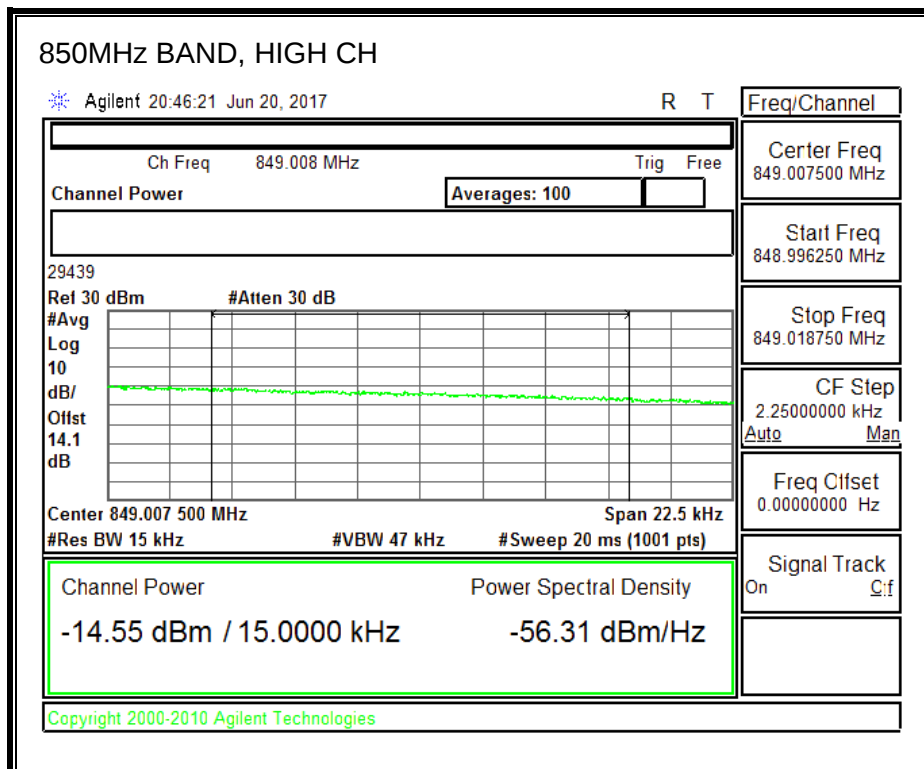
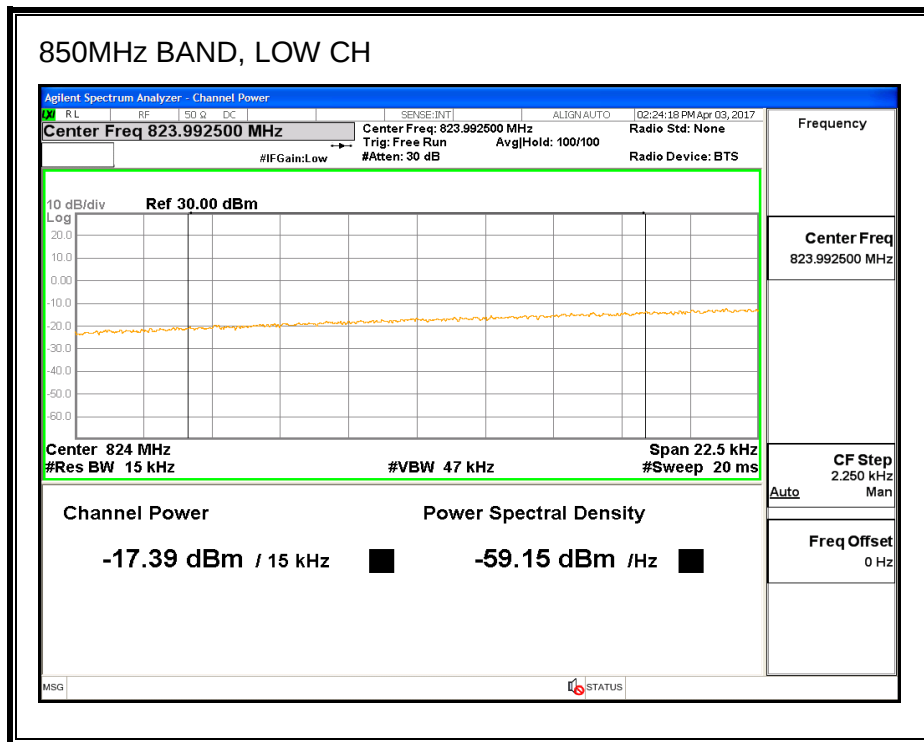


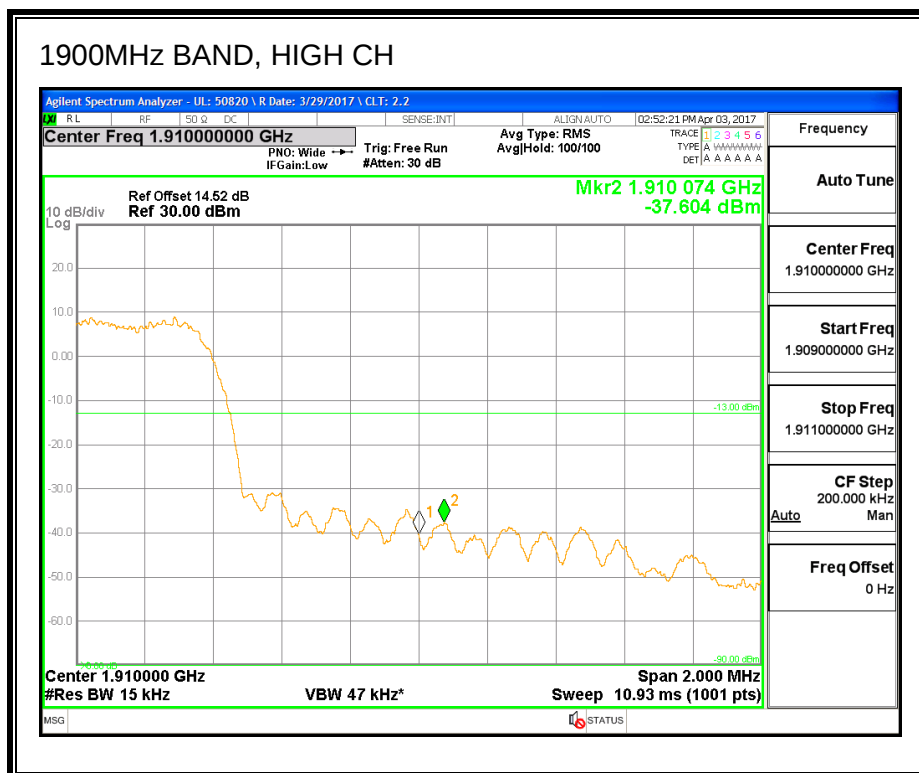
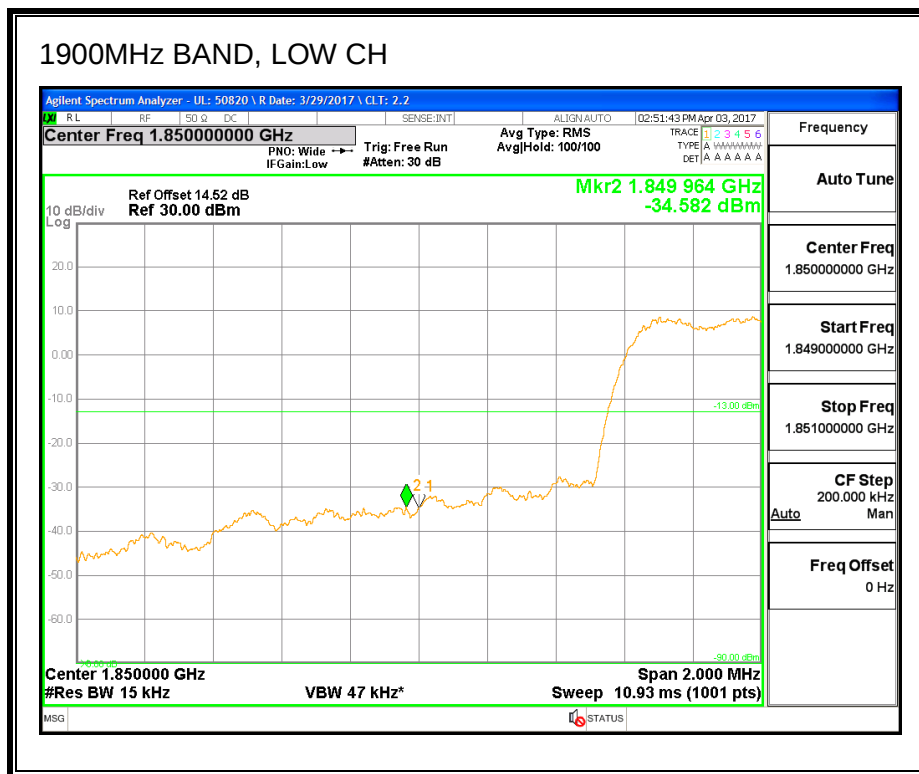
## 8.2.2. GSM-EGPRS



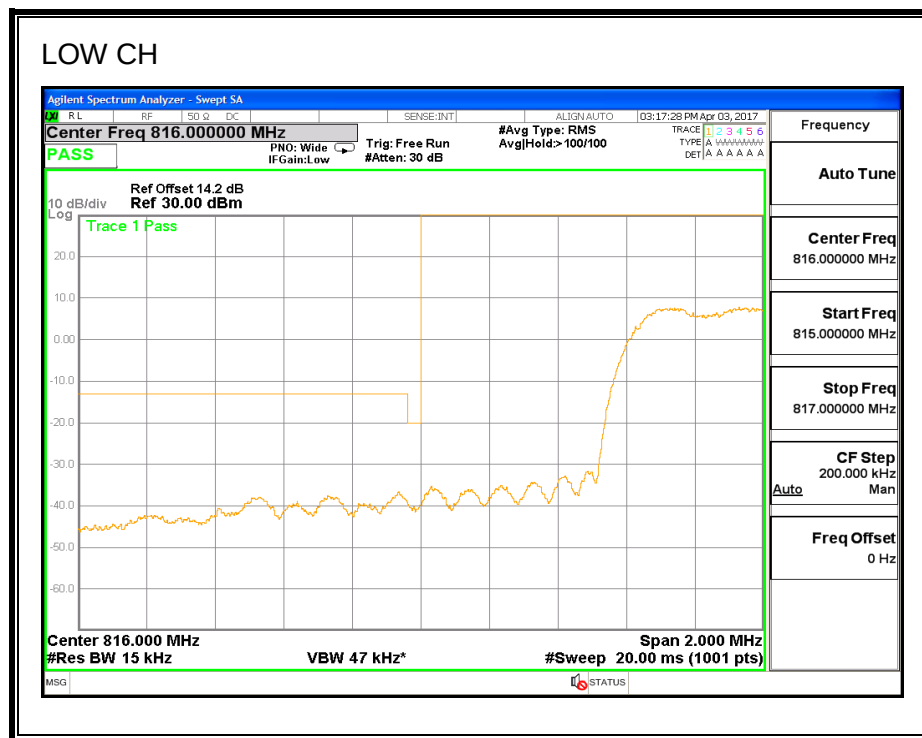


### 8.2.3. CDMA2000 1xRTT

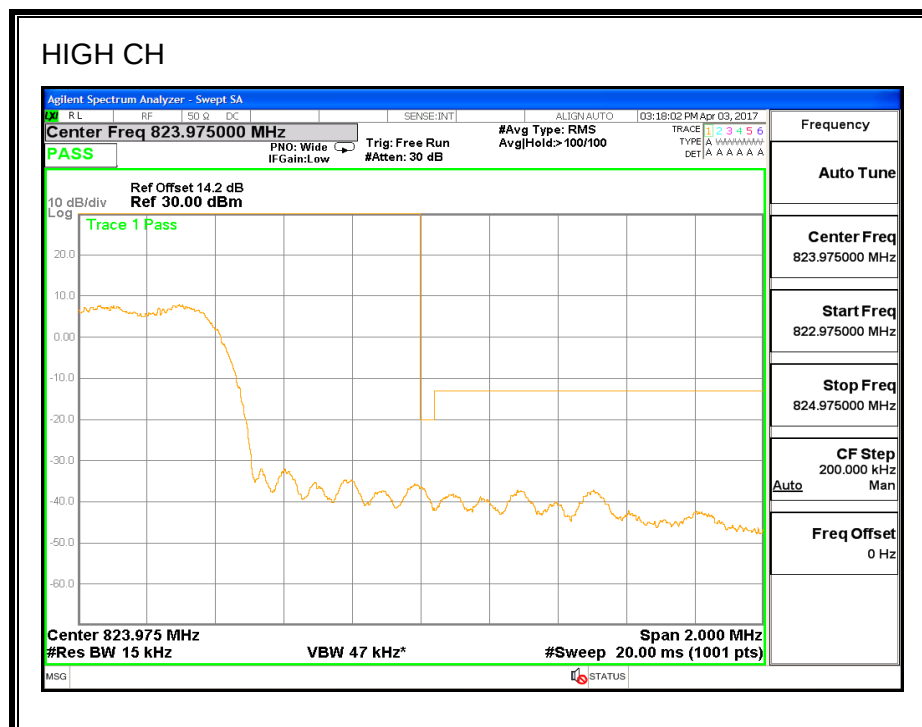




## 8.2.4. CDMA2000 1xRTT BC10 MASK

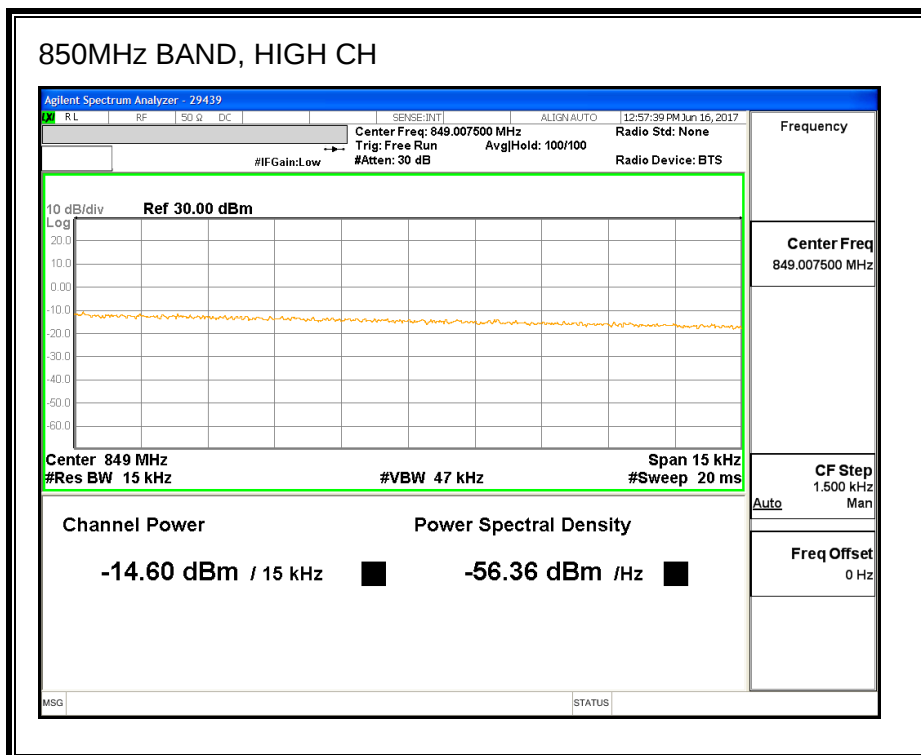
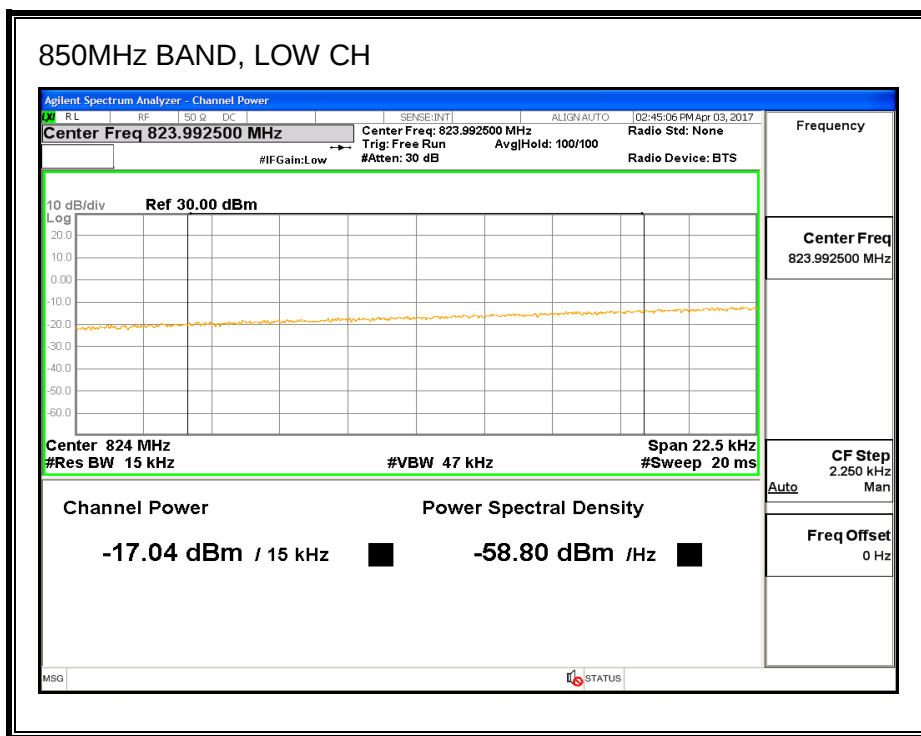


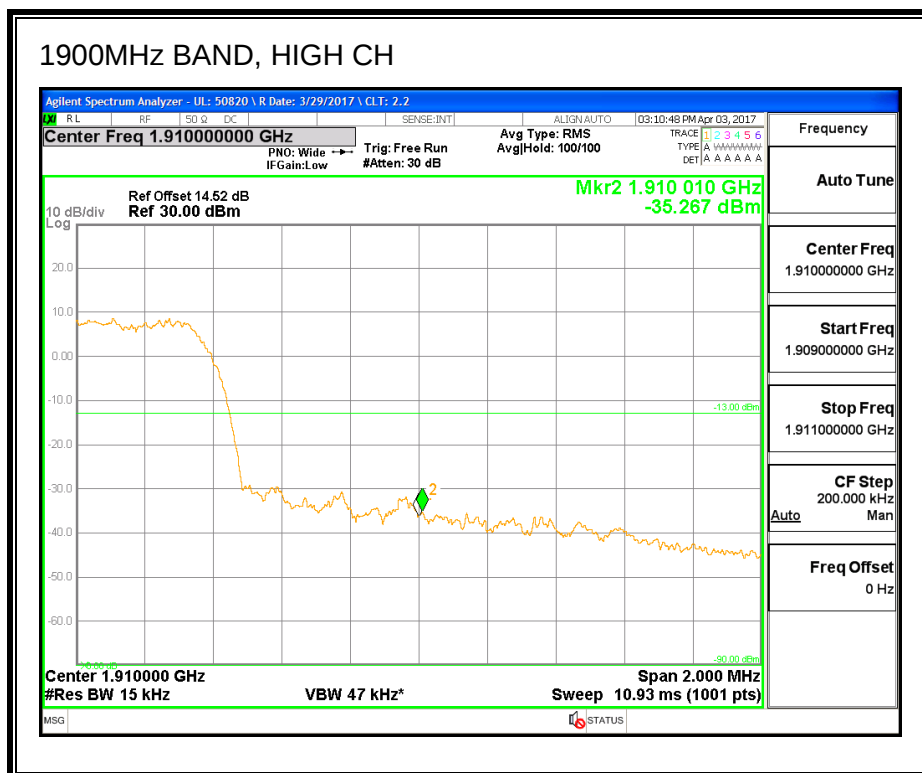
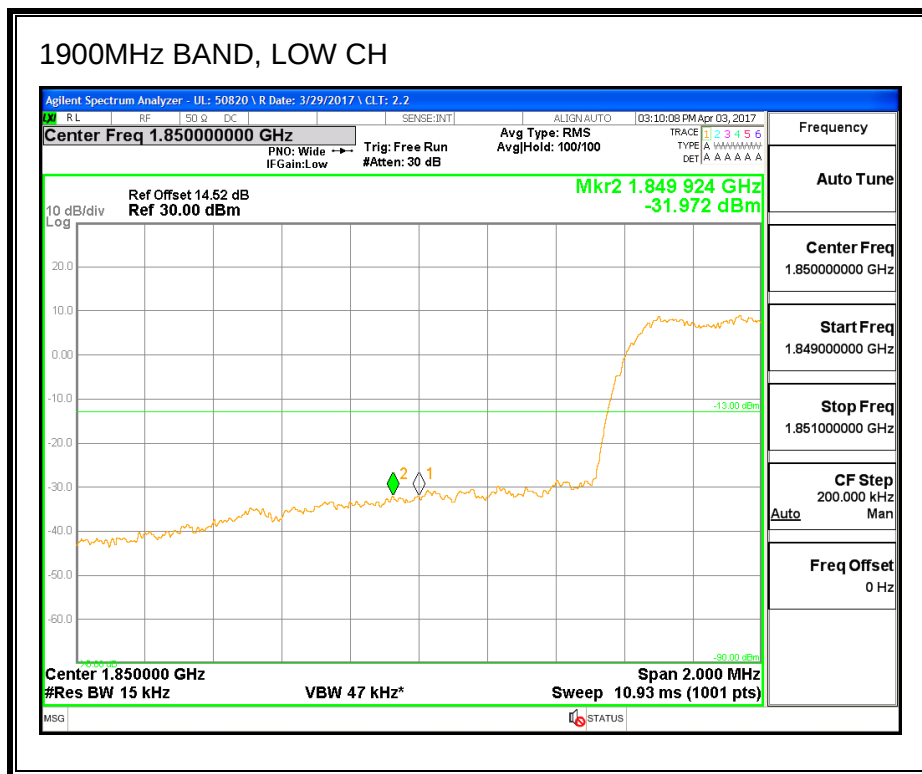
Note: RBW=1% of EBW



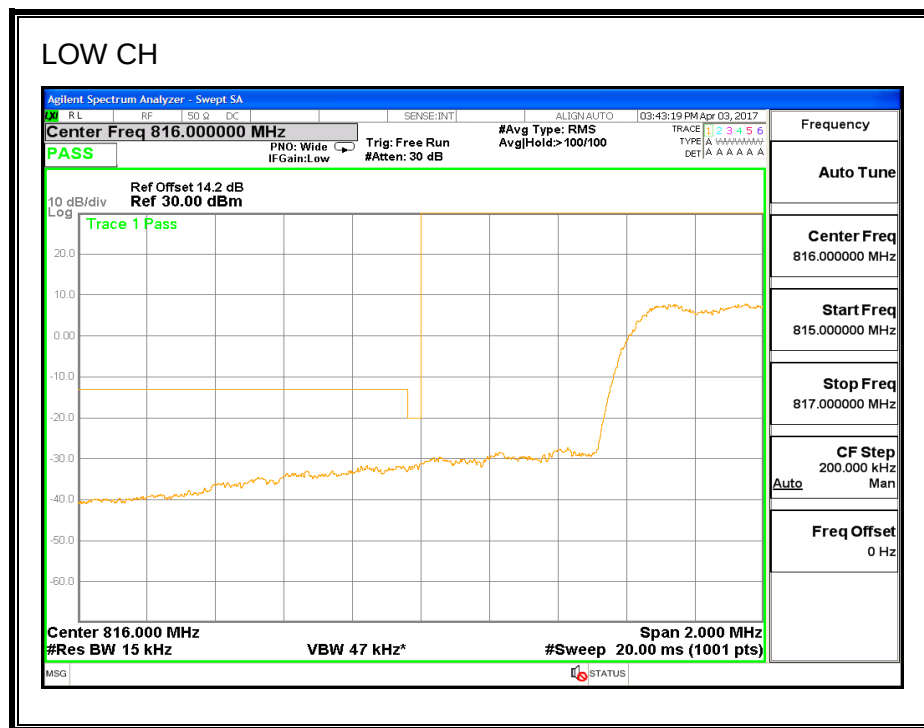
Note: RBW=1% of EBW

## 8.2.5. CDMA2000 EVDO REV A

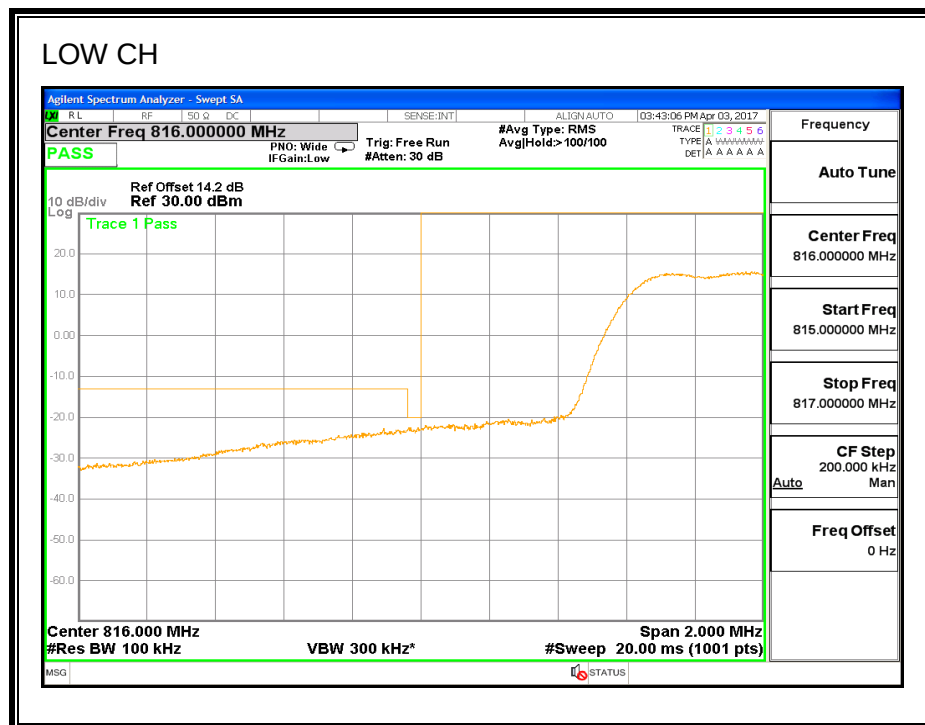




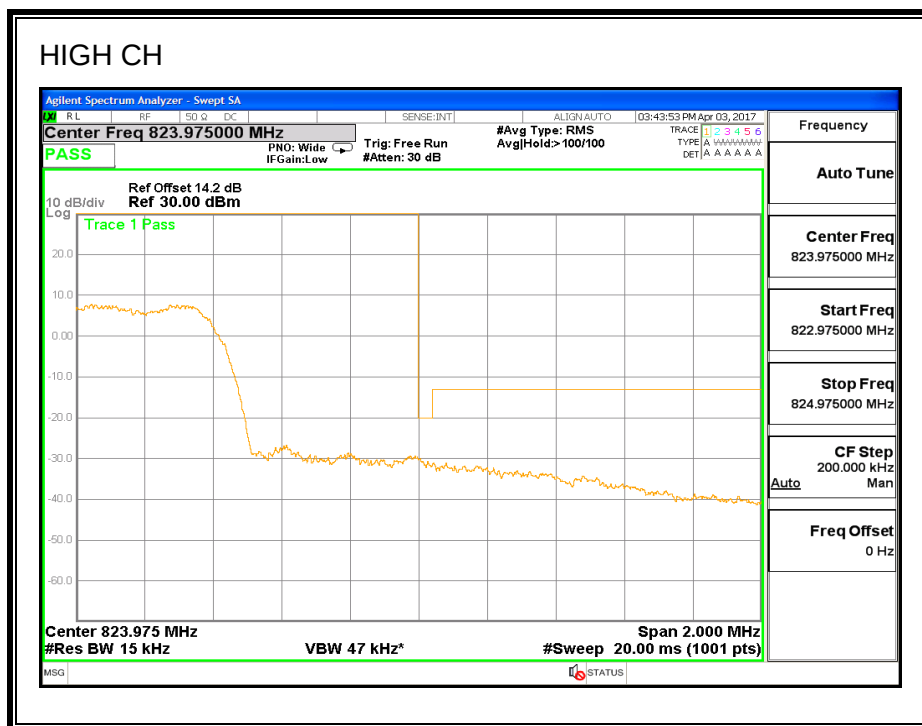
## 8.2.6. CDMA2000 EVDO REV A BC10 MASK



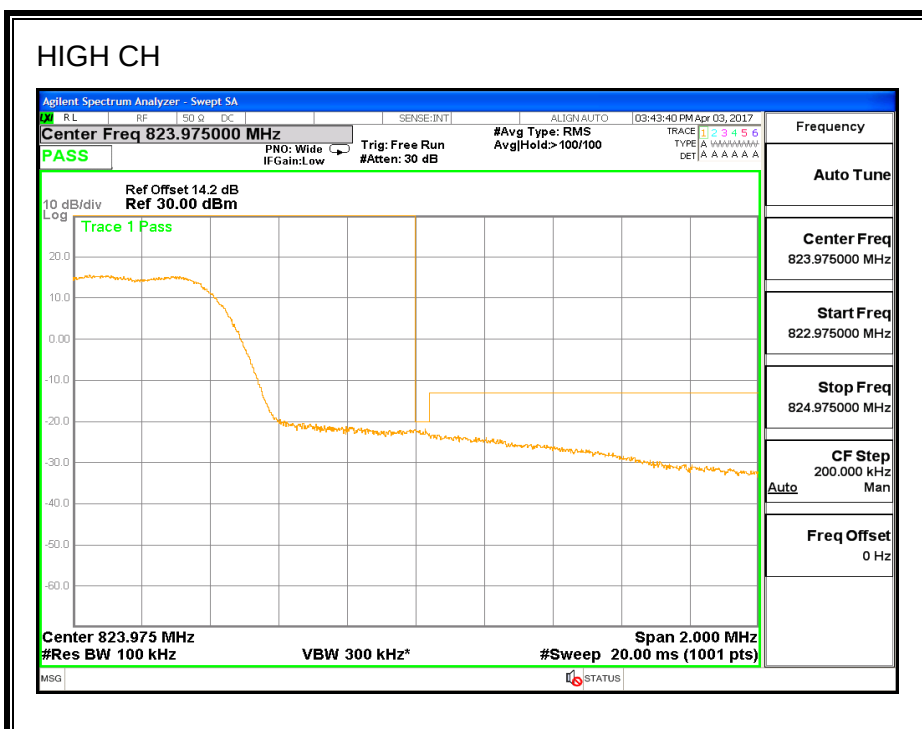
Note: RBW=1% of EBW



Note: RBW of 1% of 37.5KHz of outer channel frequency block

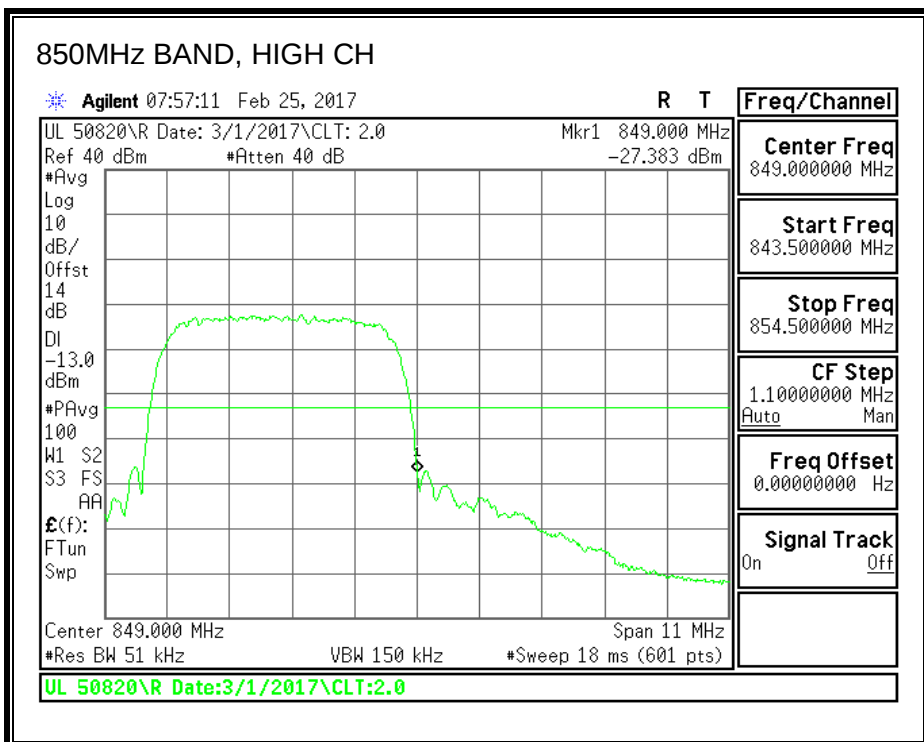
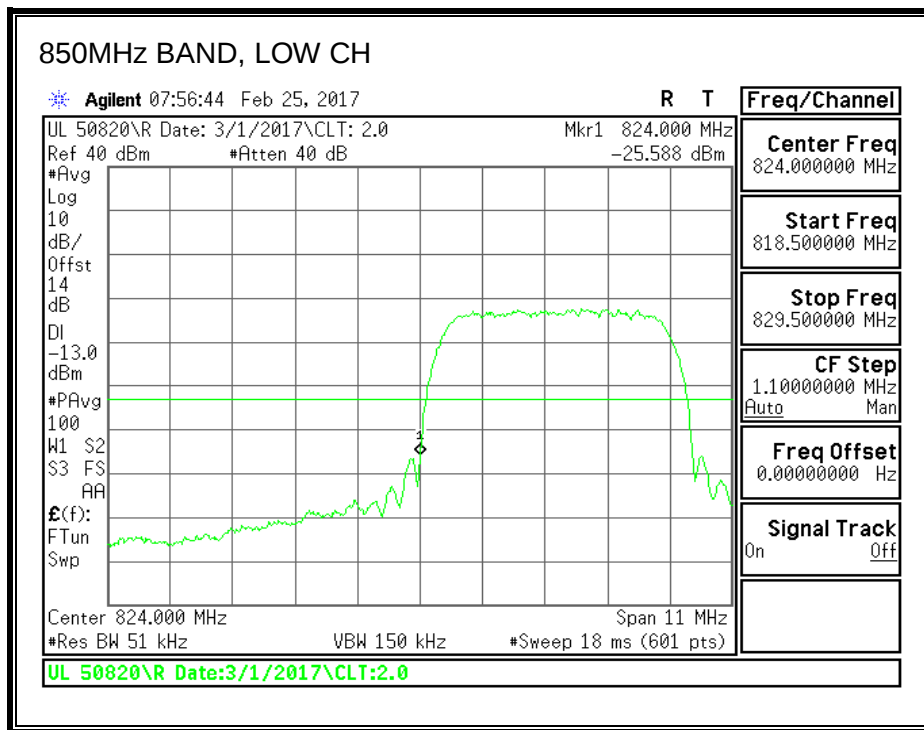


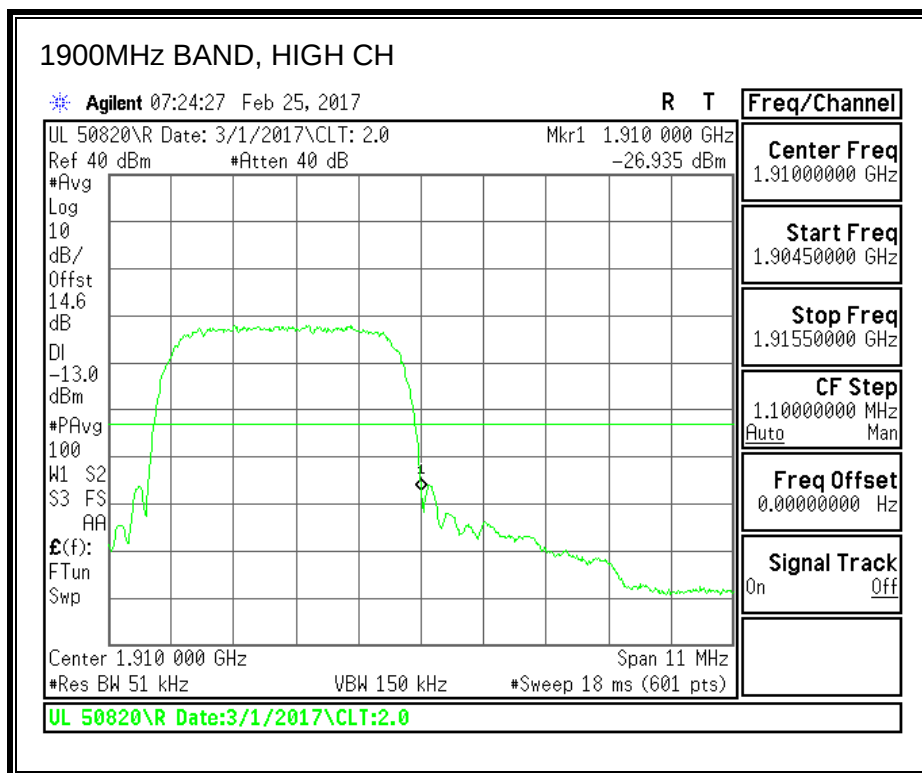
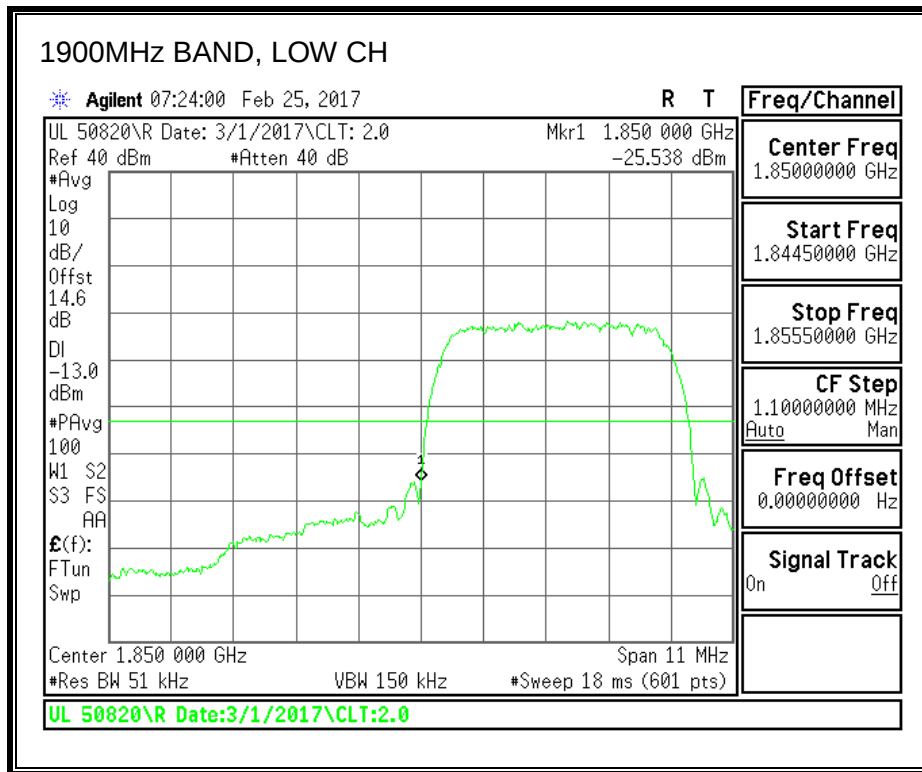
Note: RBW=1% of EBW

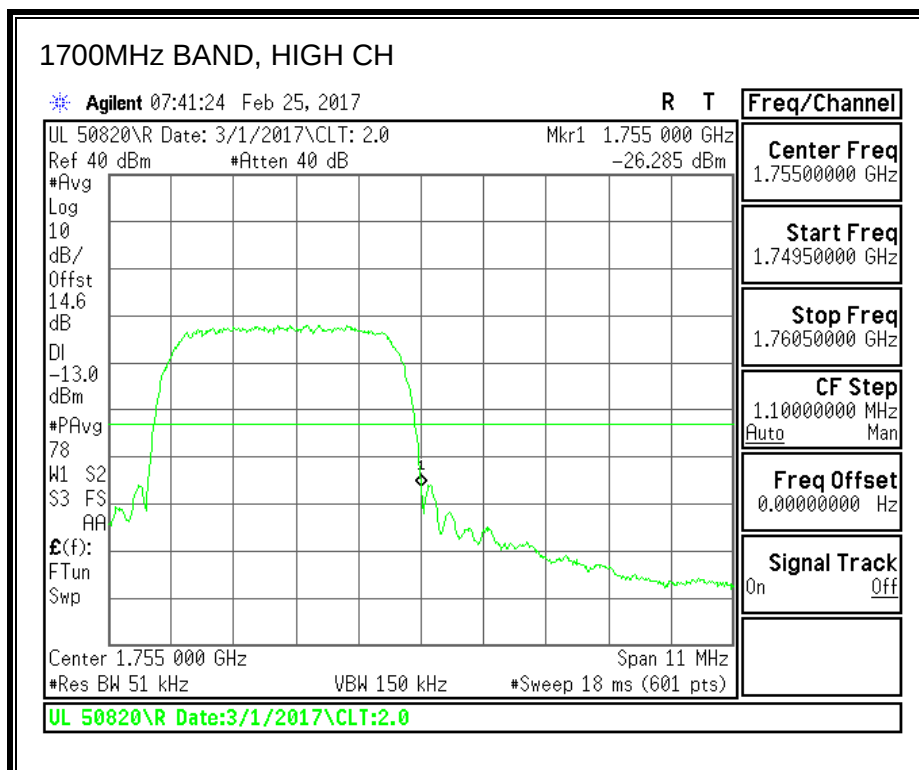
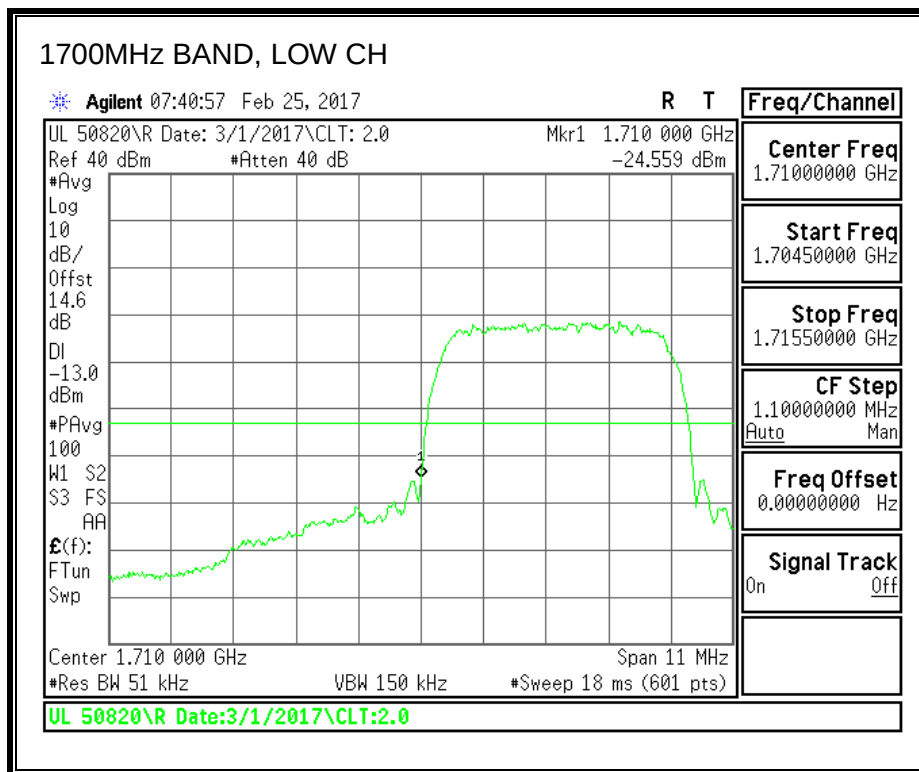


Note: RBW of 1% of 37.5KHz of outer channel frequency block

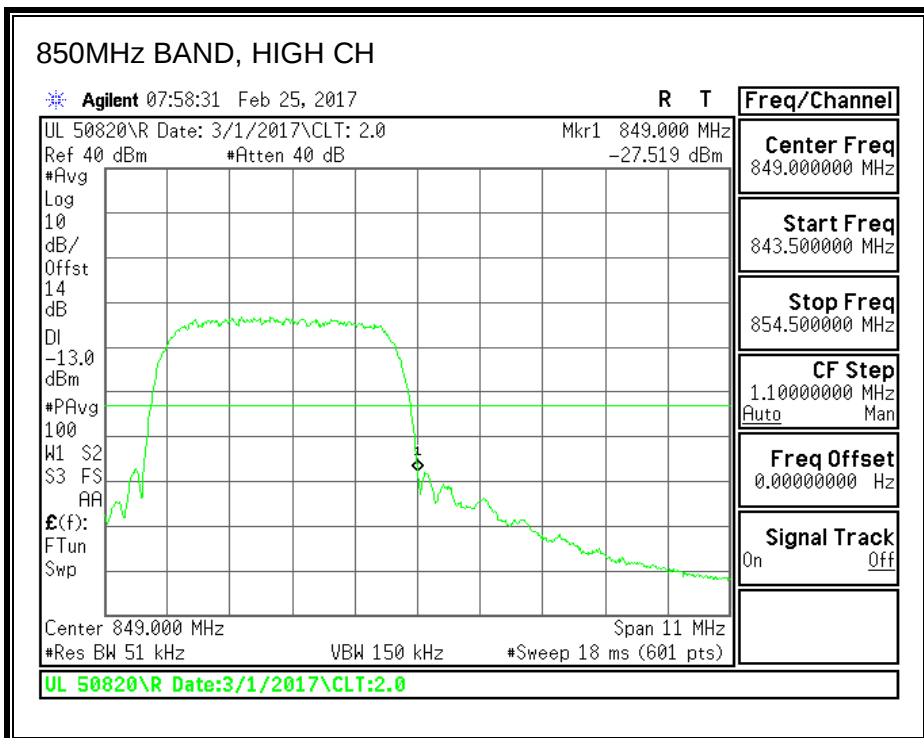
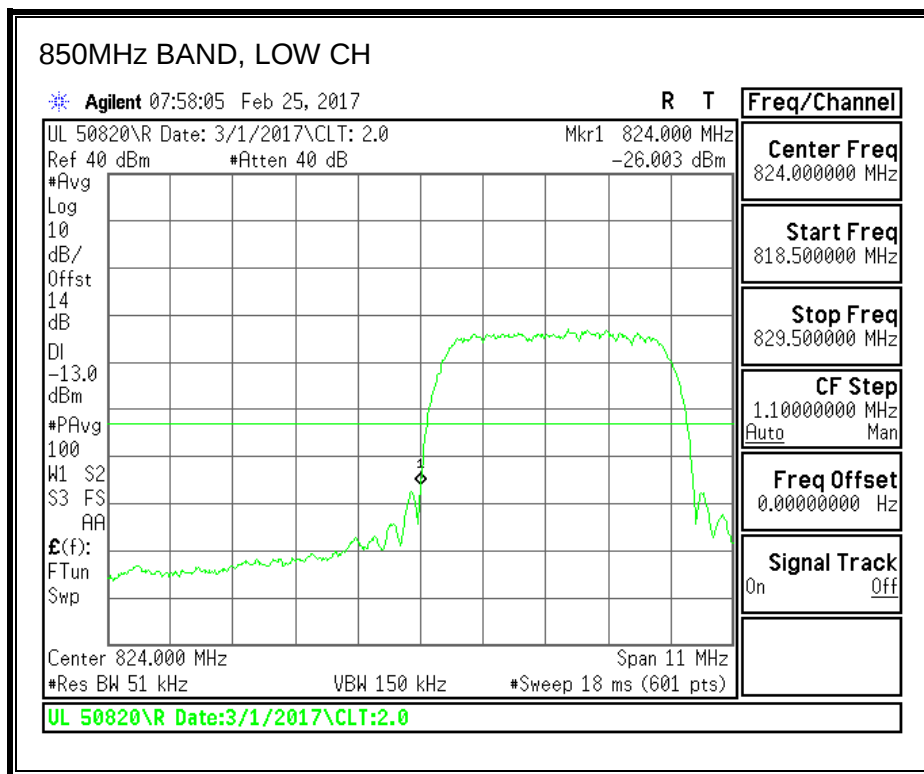
## 8.2.7. UMTS REL 99

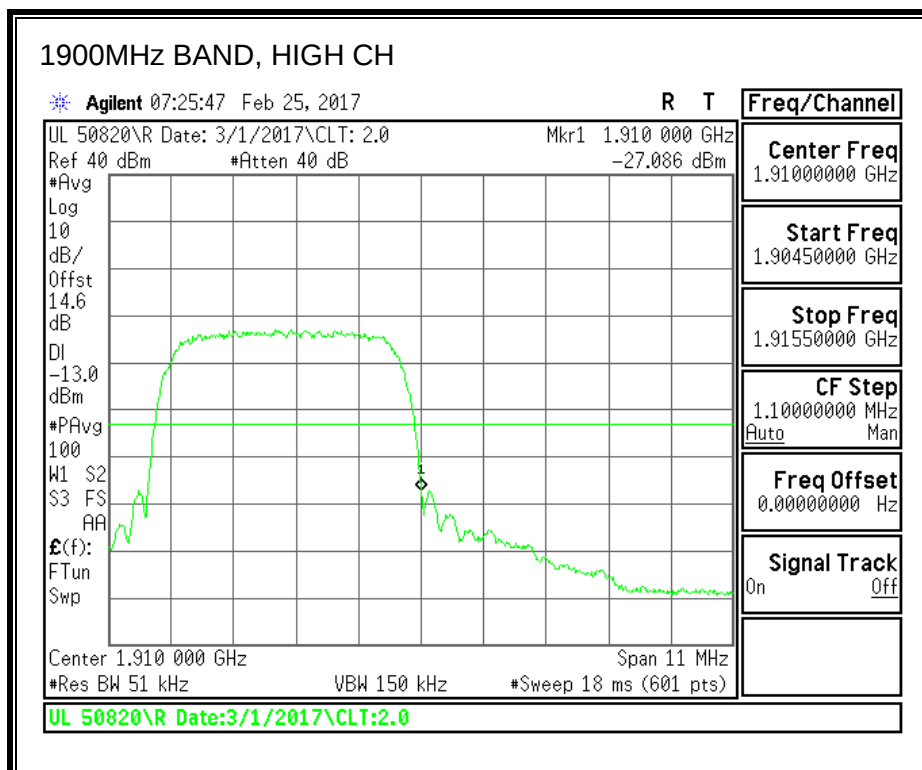
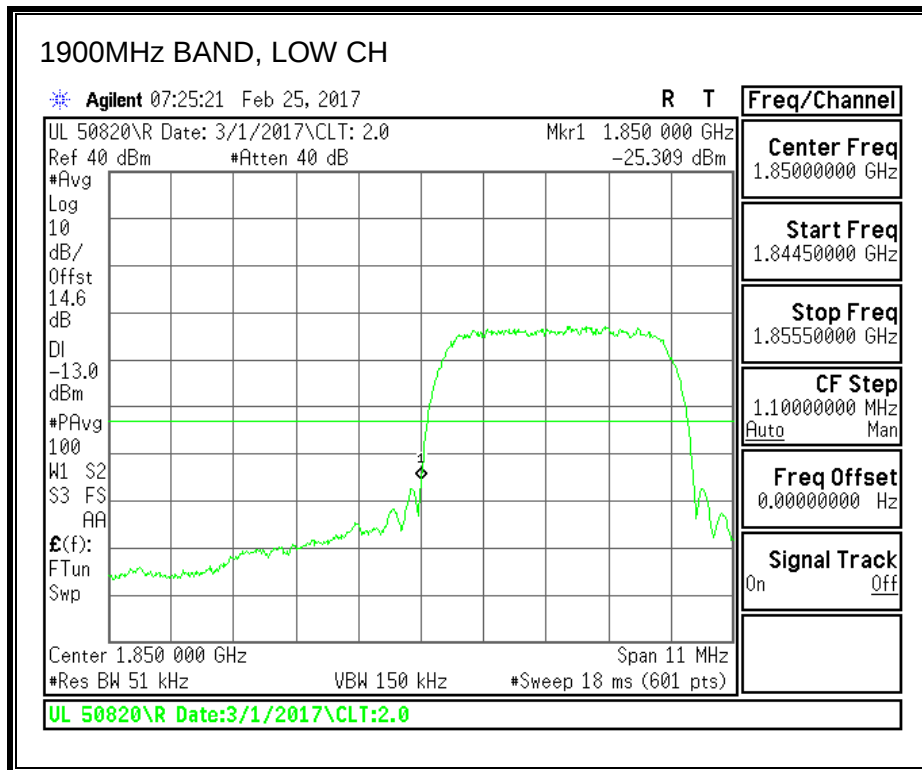


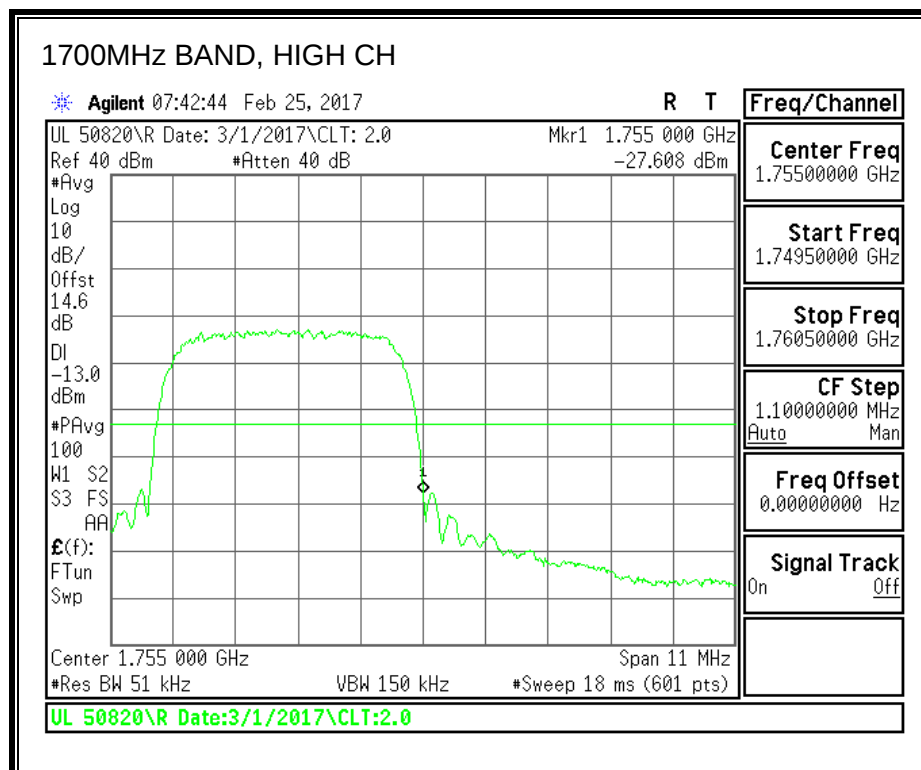
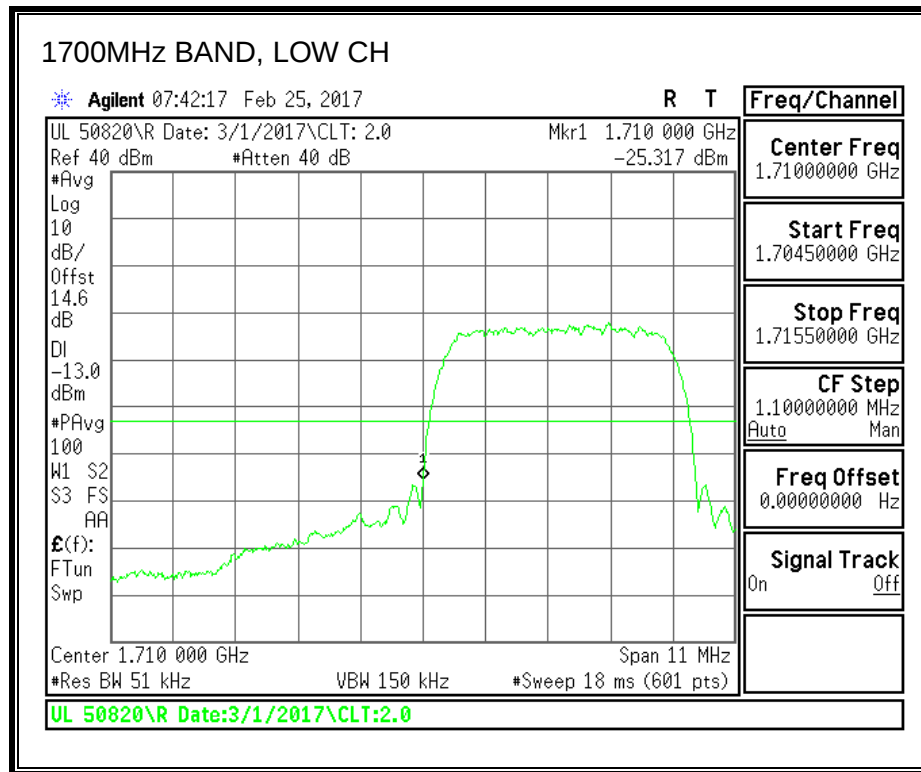




## 8.2.8. UMTS HSDPA







### 8.3. OUT OF BAND EMISSIONS

#### RULE PART(S)

FCC: §2.1051, §22.917, §24.238, §27.53 and §90.691  
IC: RSS132§5.5; RSS133§6.5 and RSS139§6.6

#### LIMITS

FCC: §22.917, §24.238, §27.53

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.

FCC: §90.691 Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10}(f/6.1)$  decibels or  $50 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

#### RSS132§5.5

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

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

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

#### RSS133§6.5

Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10}p$  (watts).

(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10}p$  (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

RSS139§6.6

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, Footnote 2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

**TEST PROCEDURE**

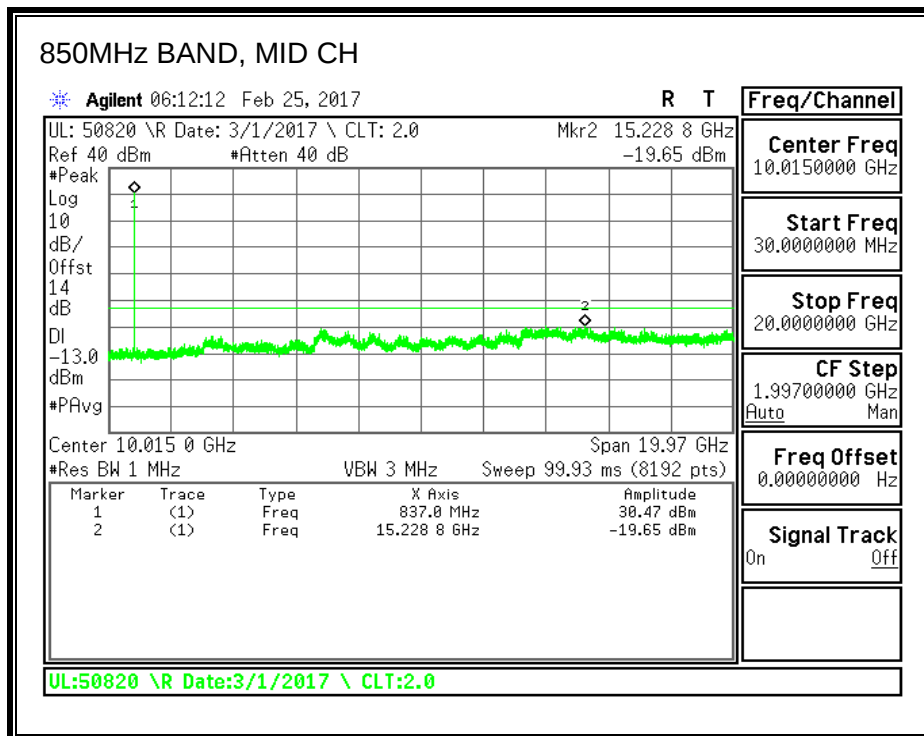
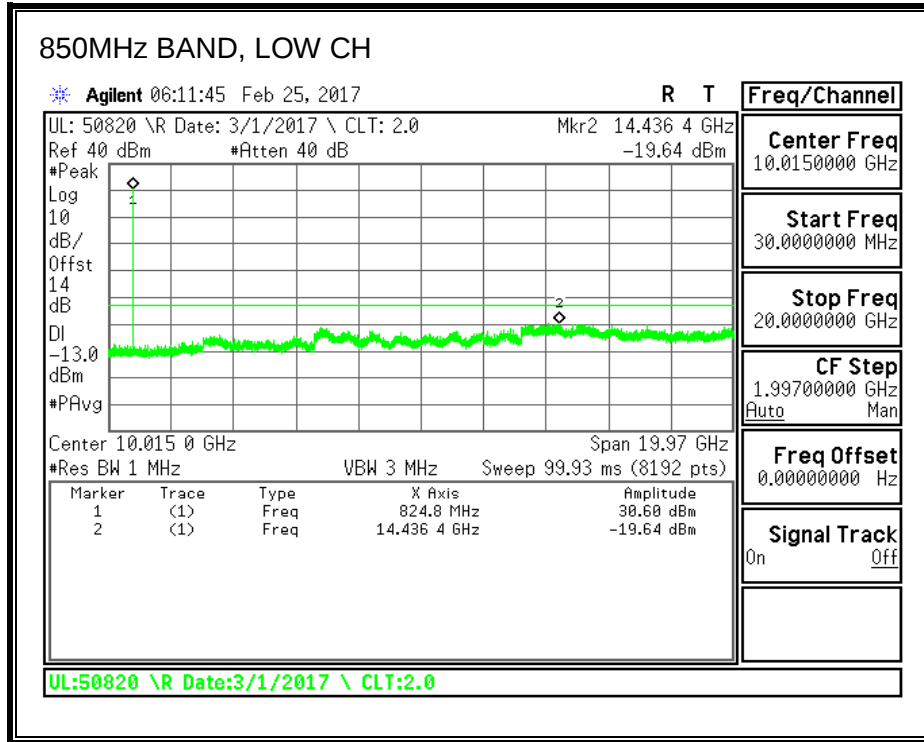
The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

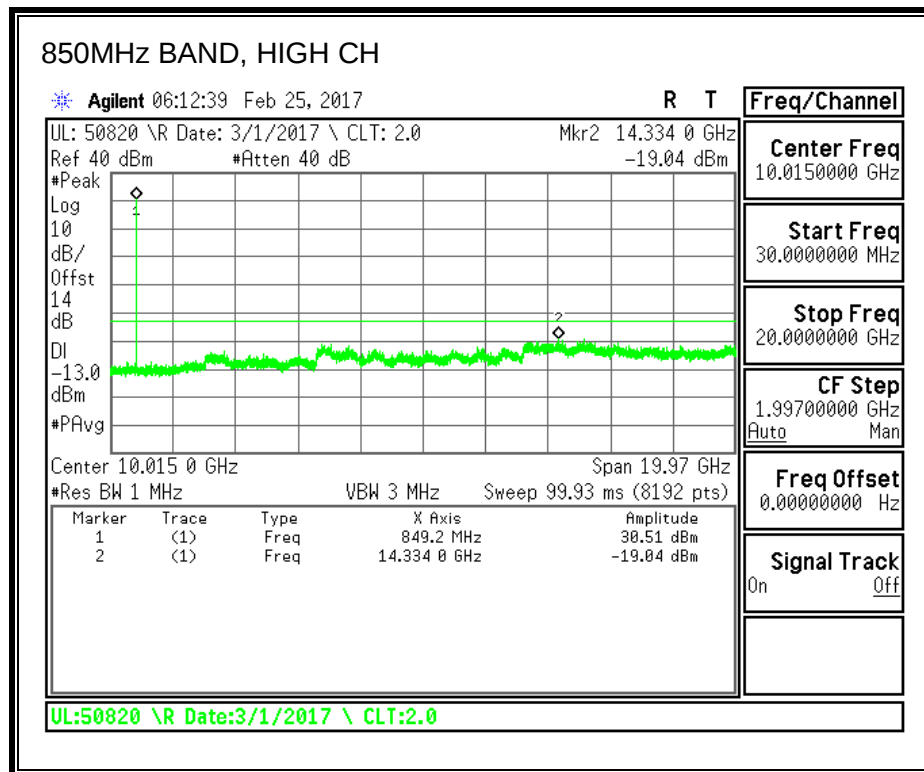
For each out of band emissions measurement:

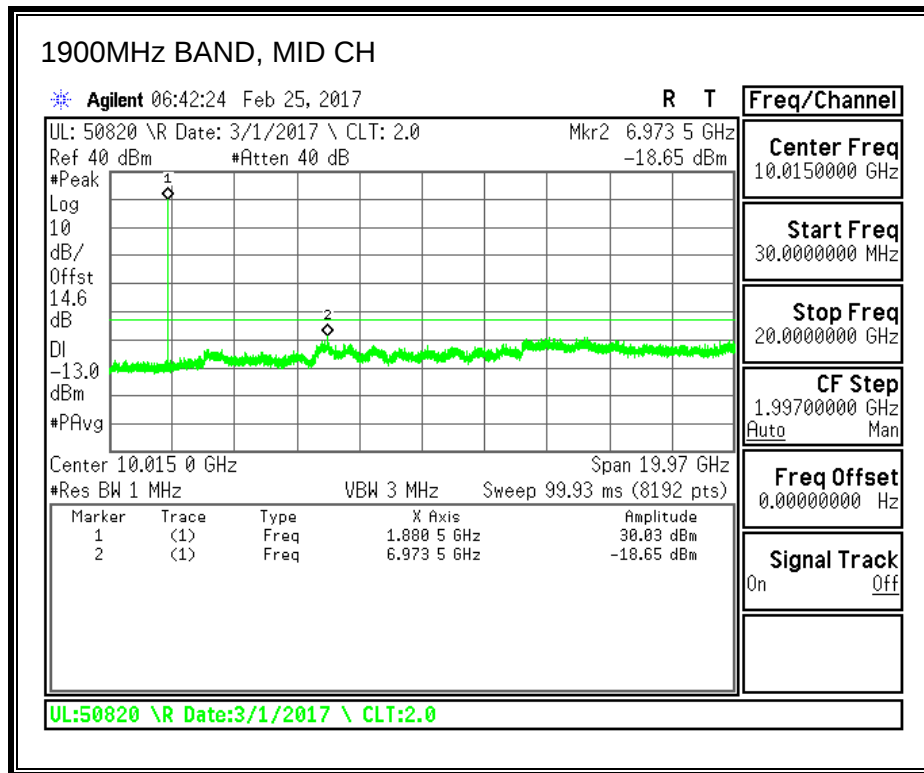
- Set display line at -13 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

**RESULTS**

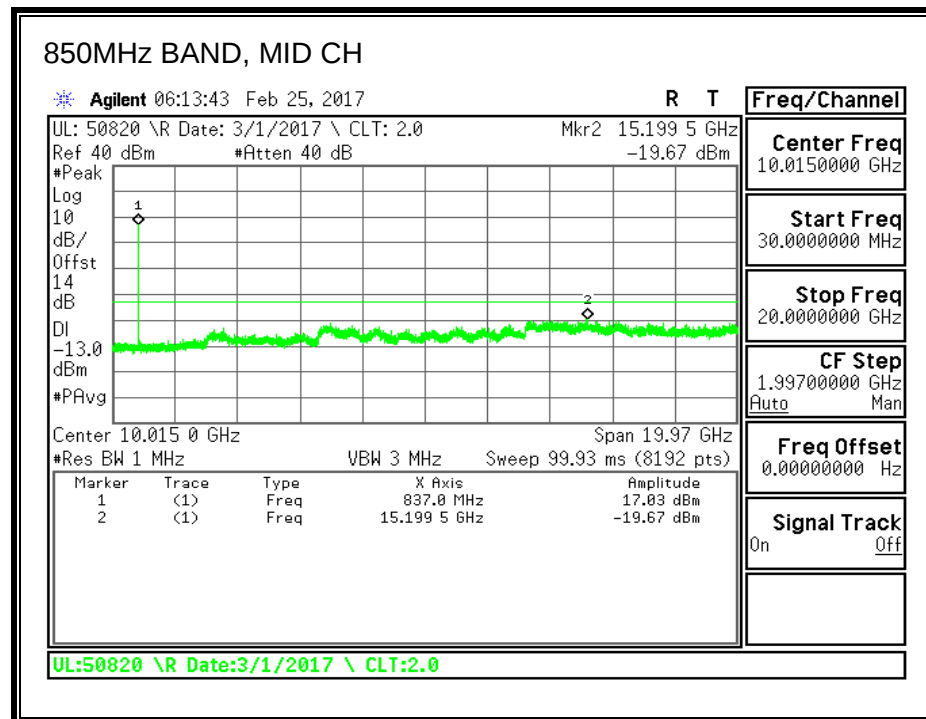
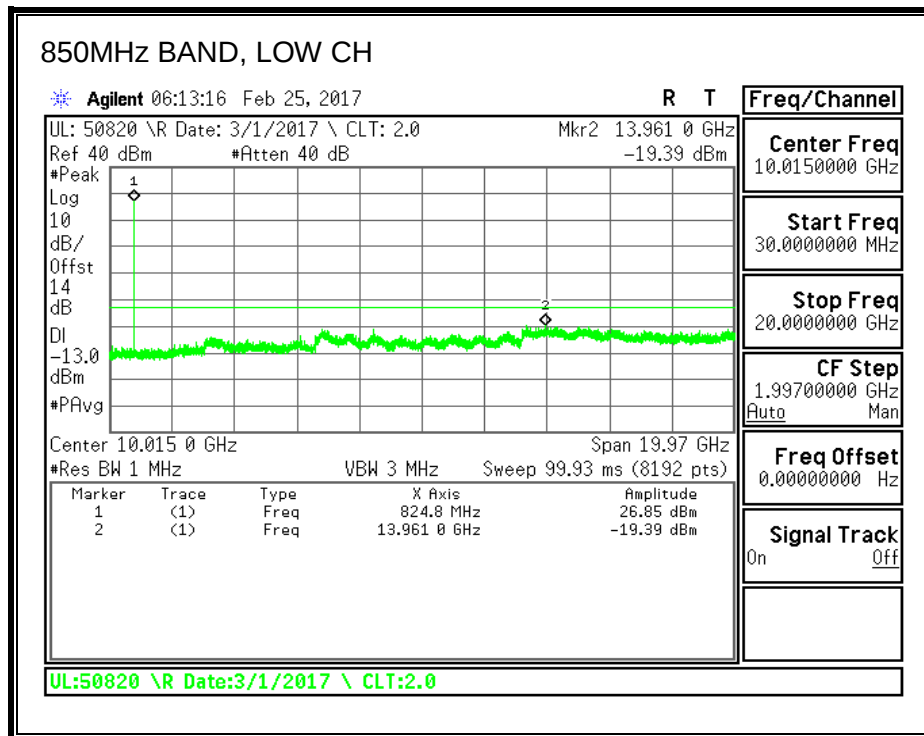
### 8.3.1. GSM-GPRS

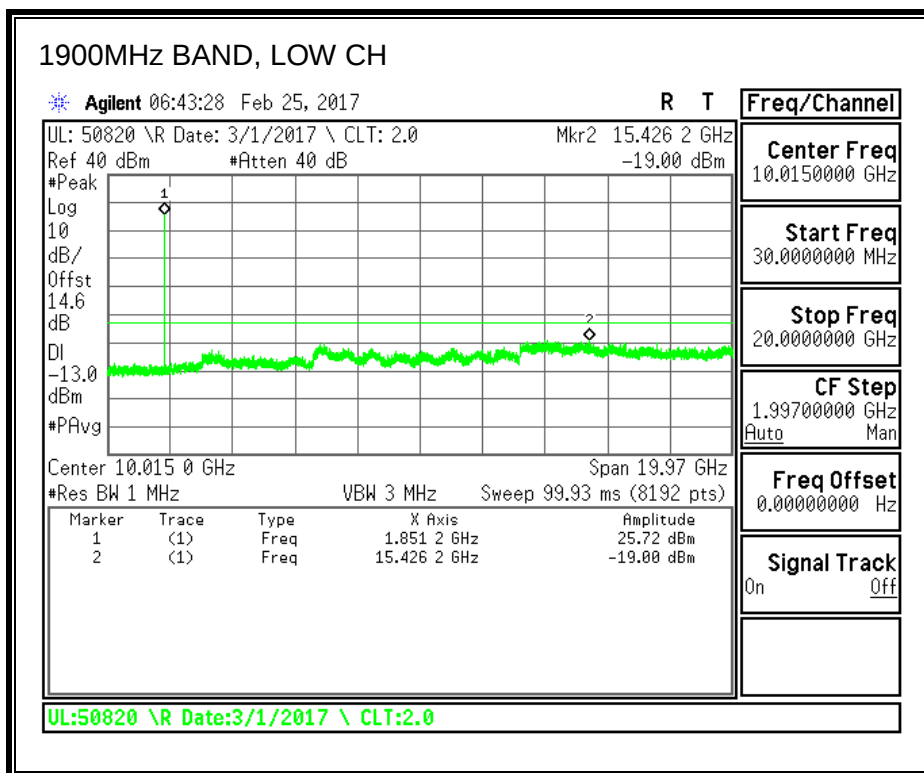
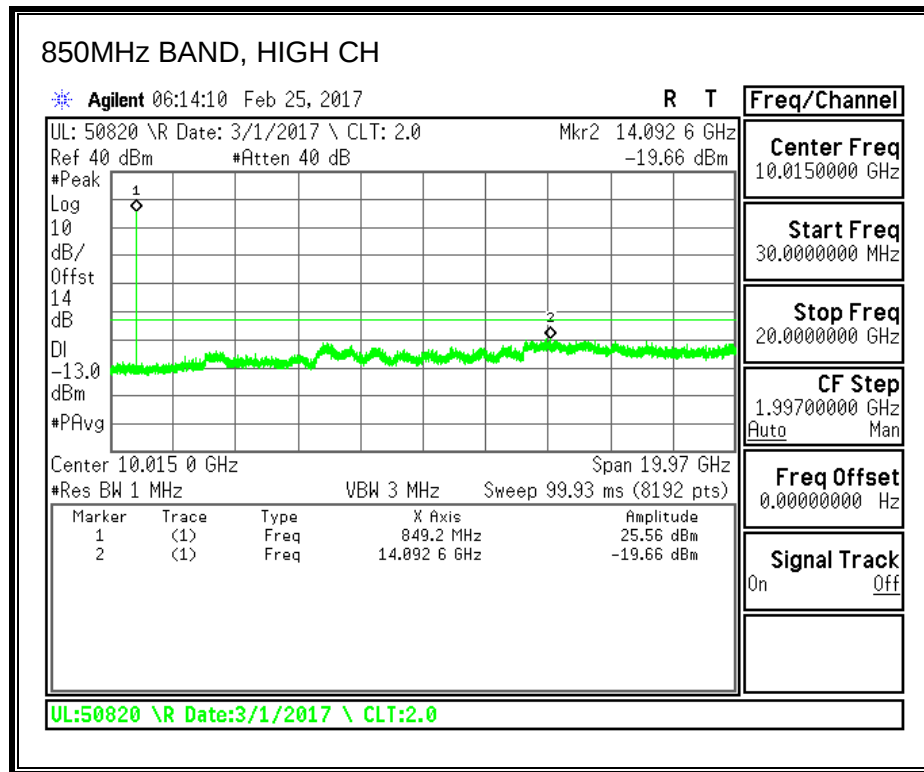


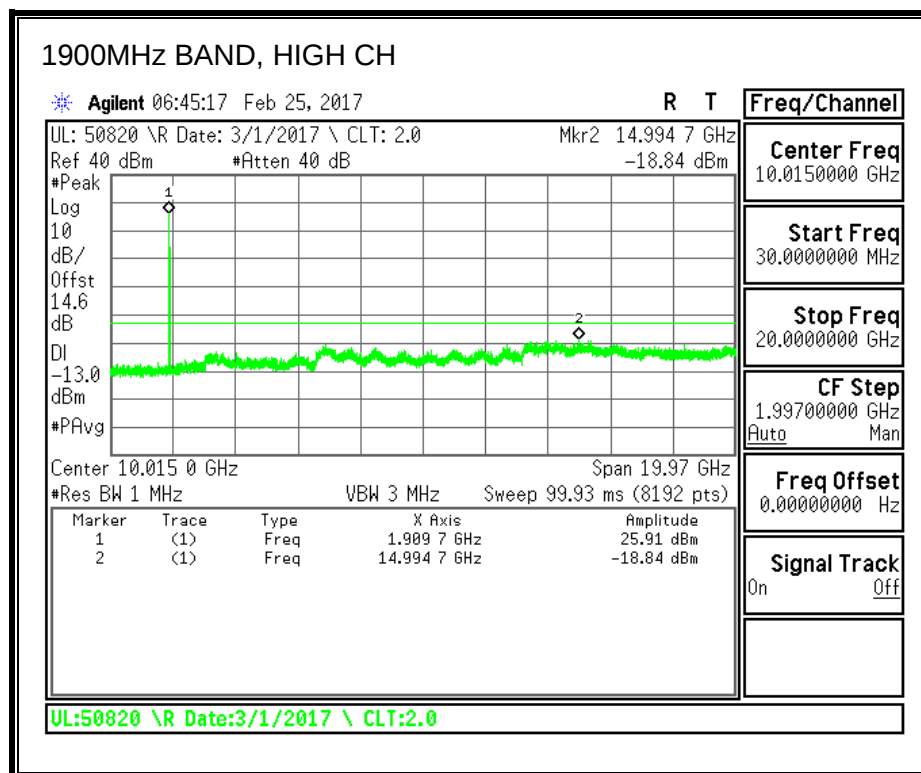
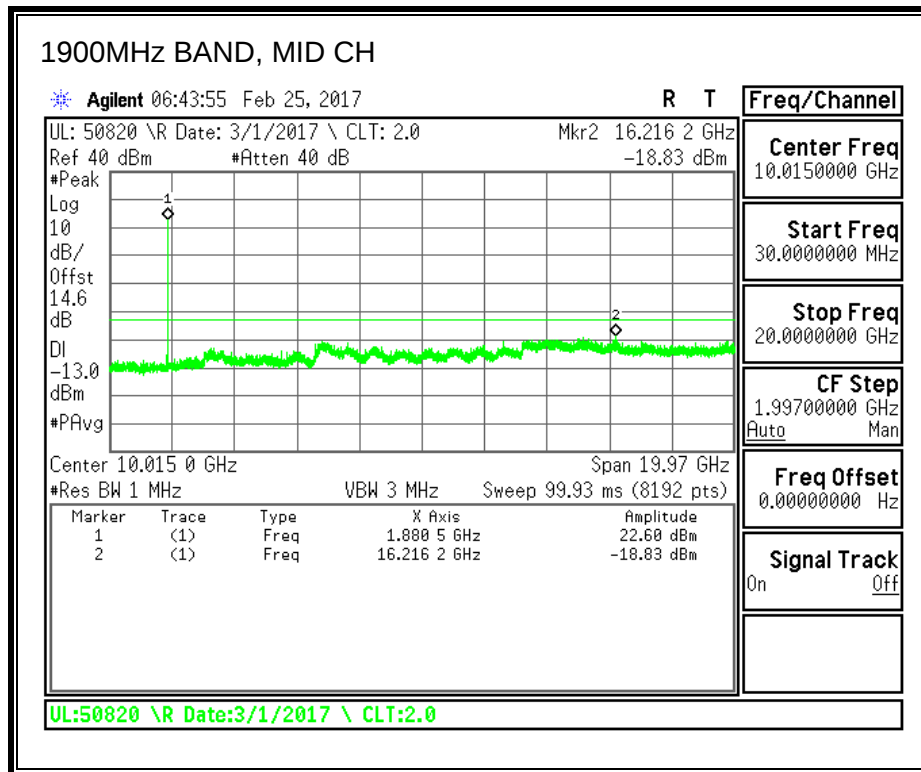




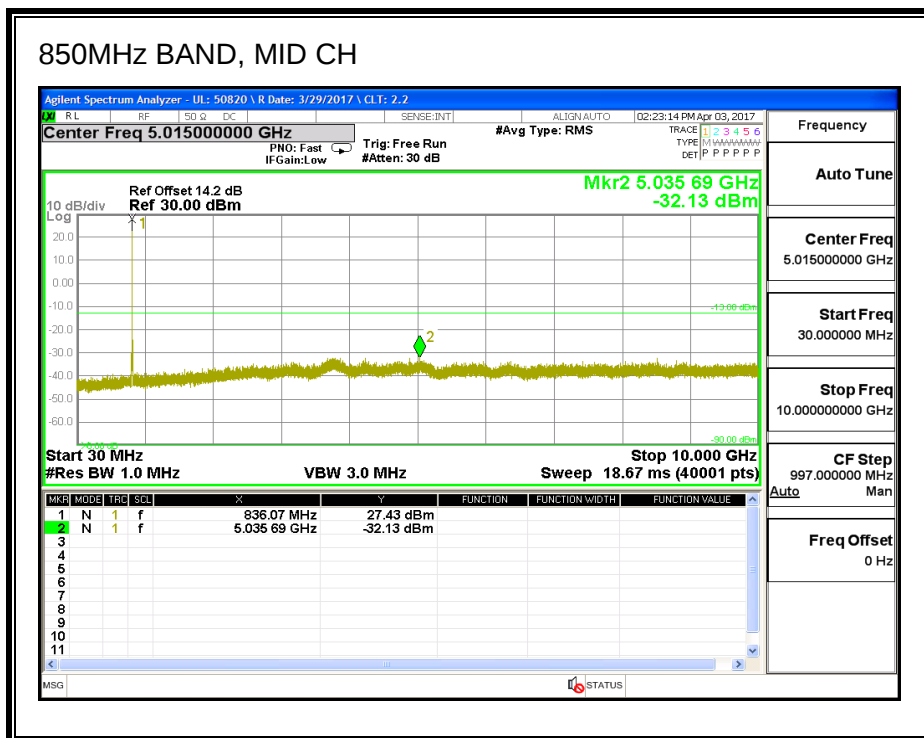
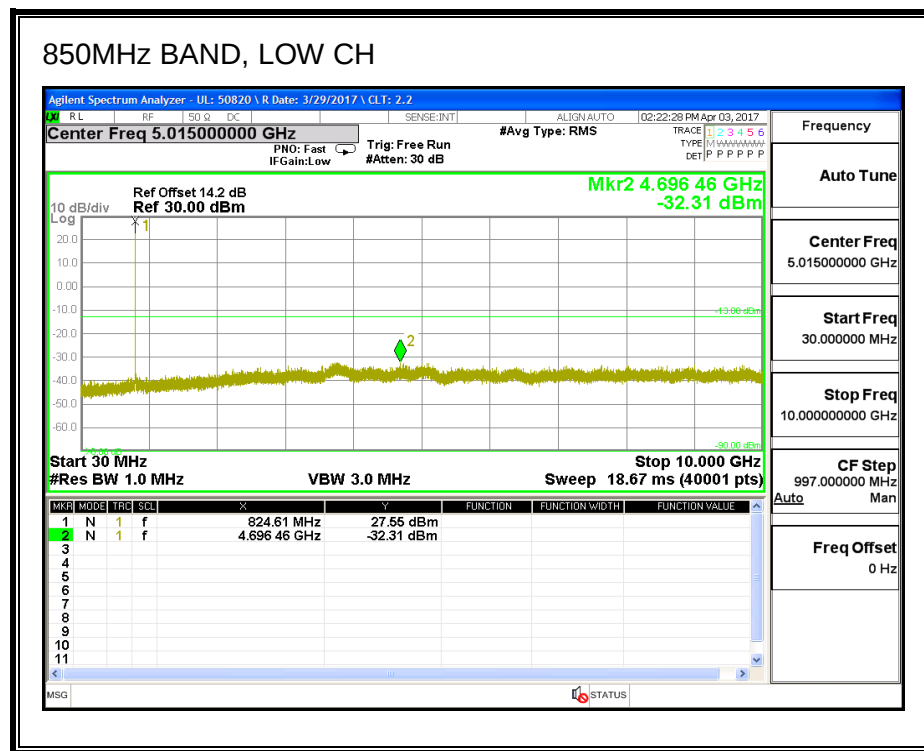
### 8.3.2. GSM-EGPRS



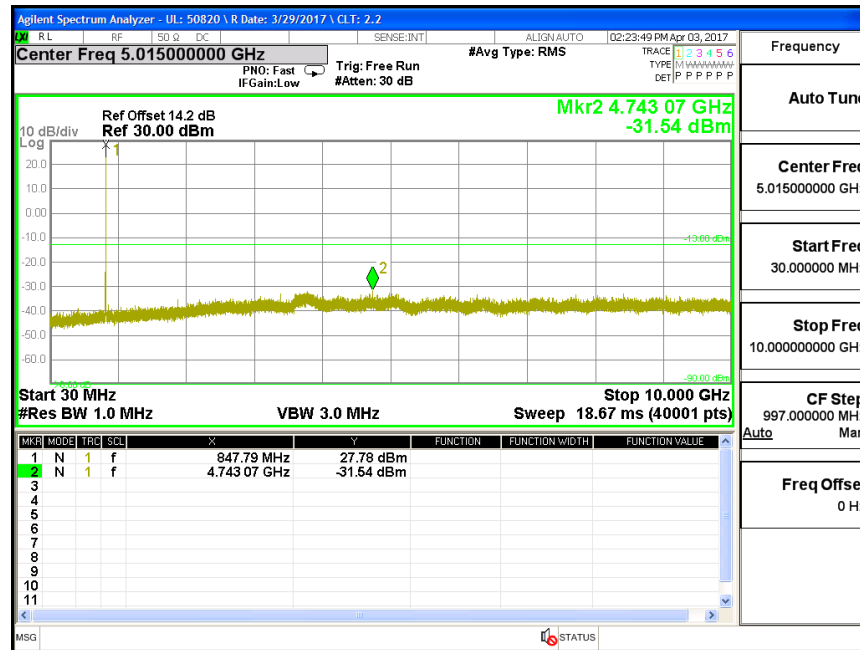




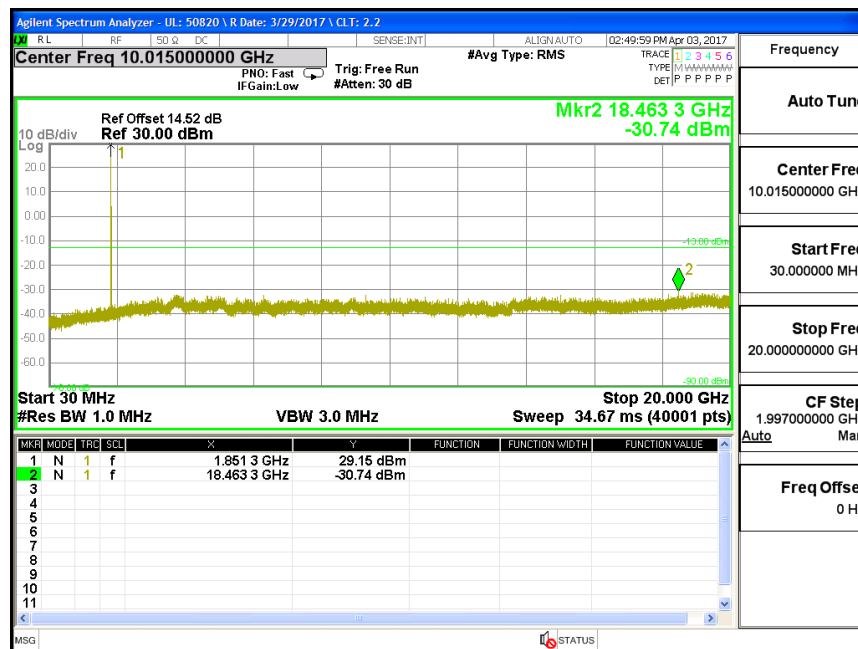
### 8.3.3. CDMA2000 1xRTT

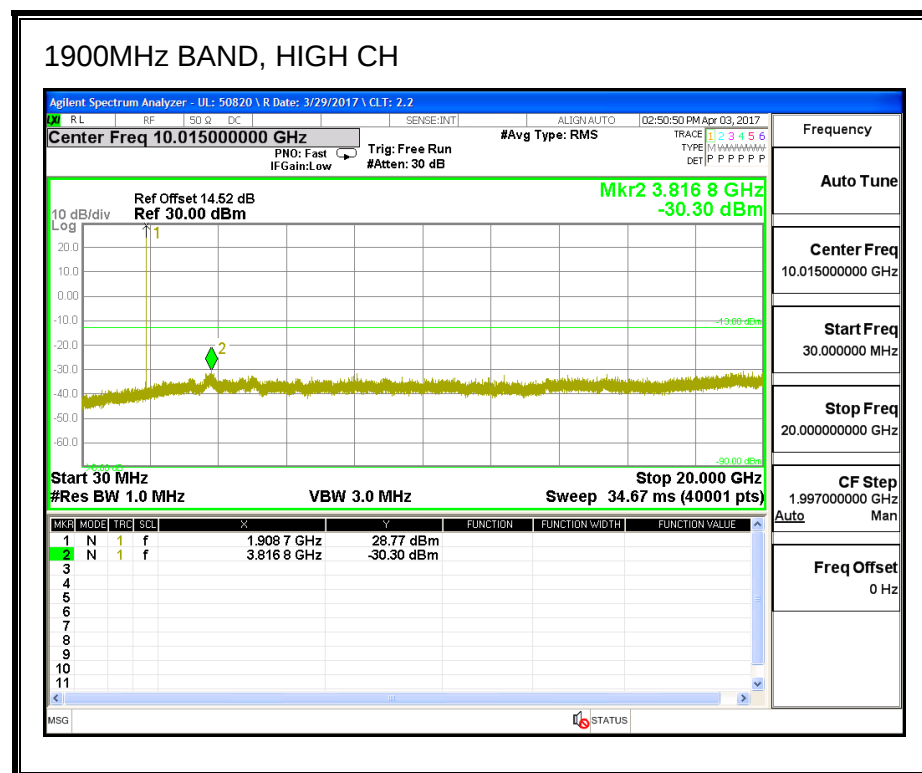
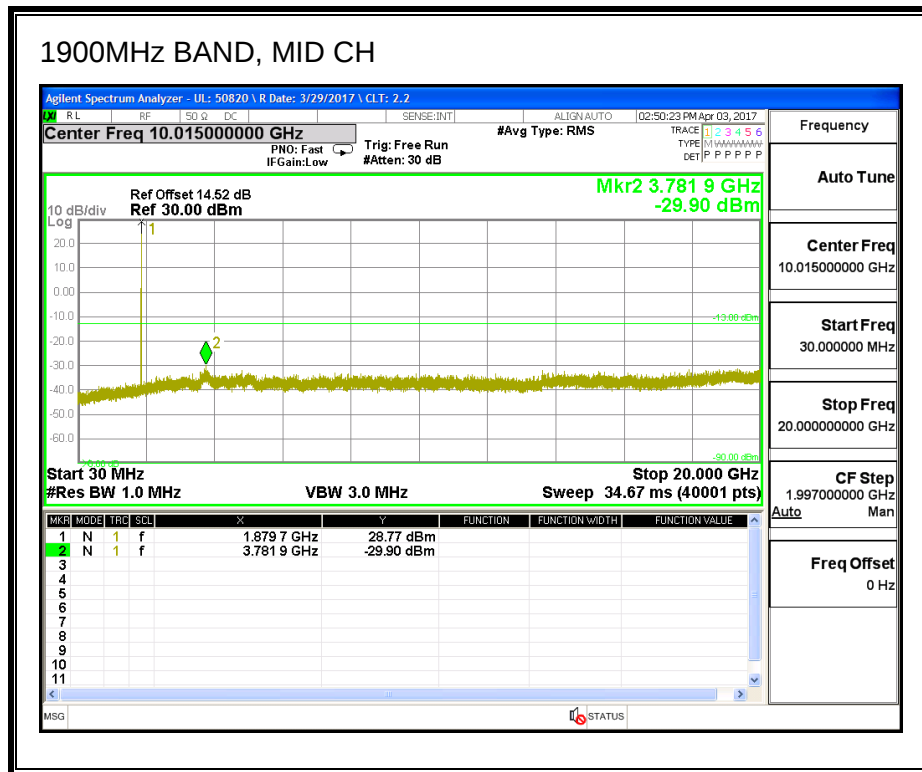


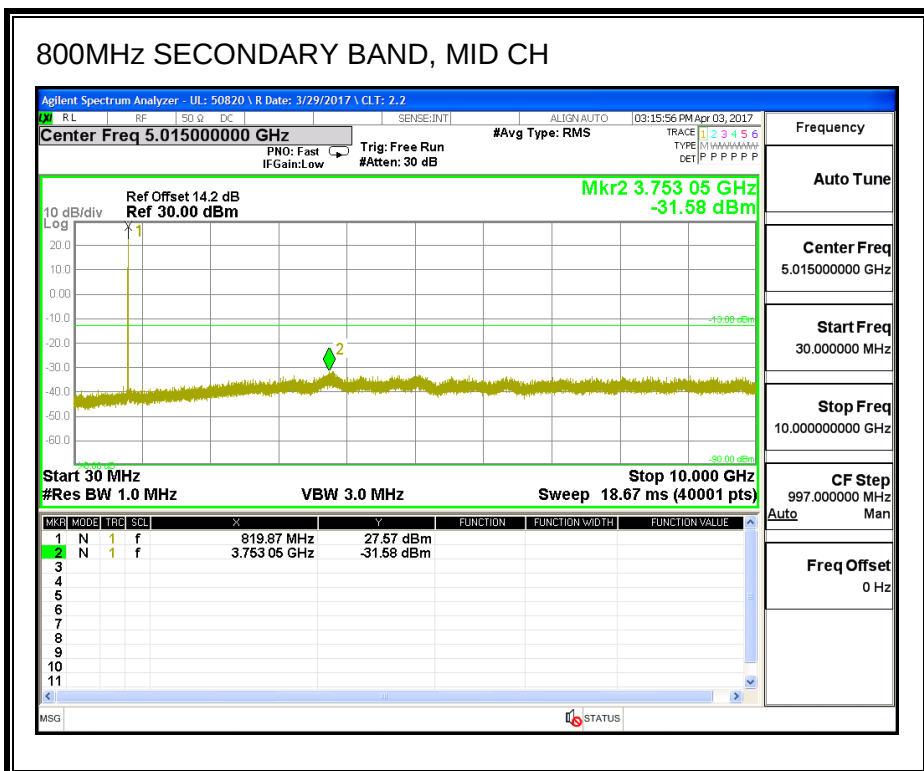
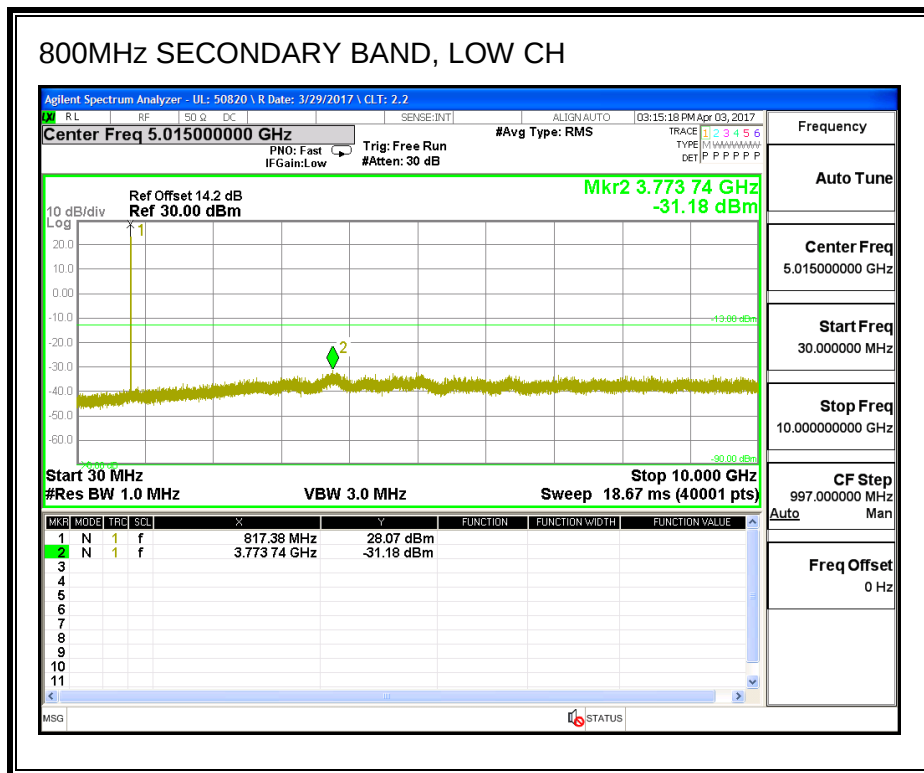
### 850MHz BAND, HIGH CH

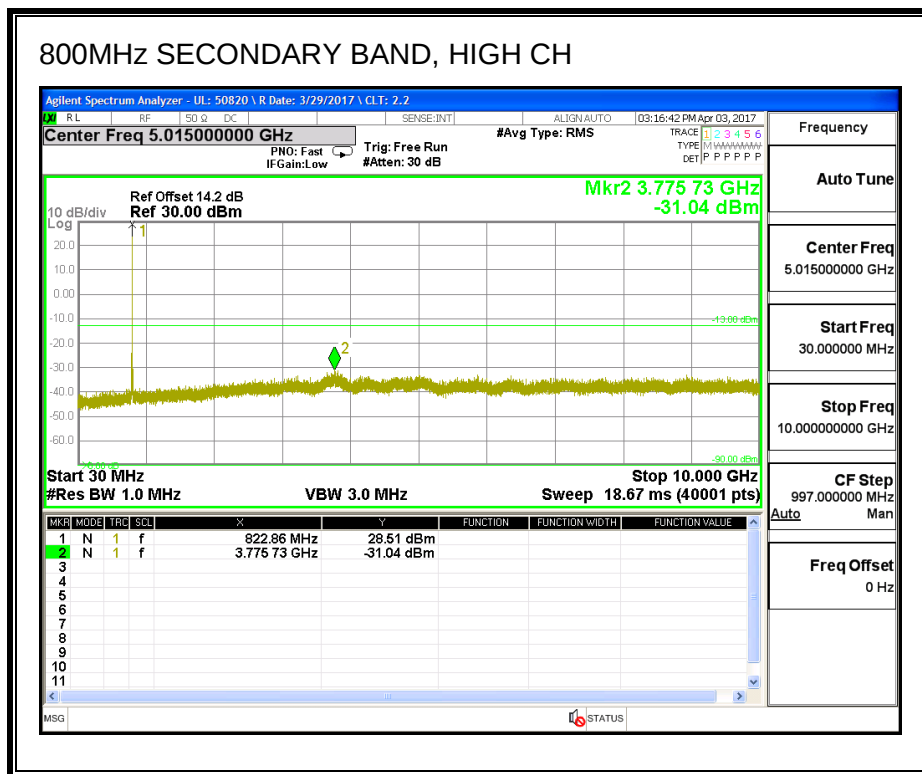


### 1900MHz BAND, LOW CH

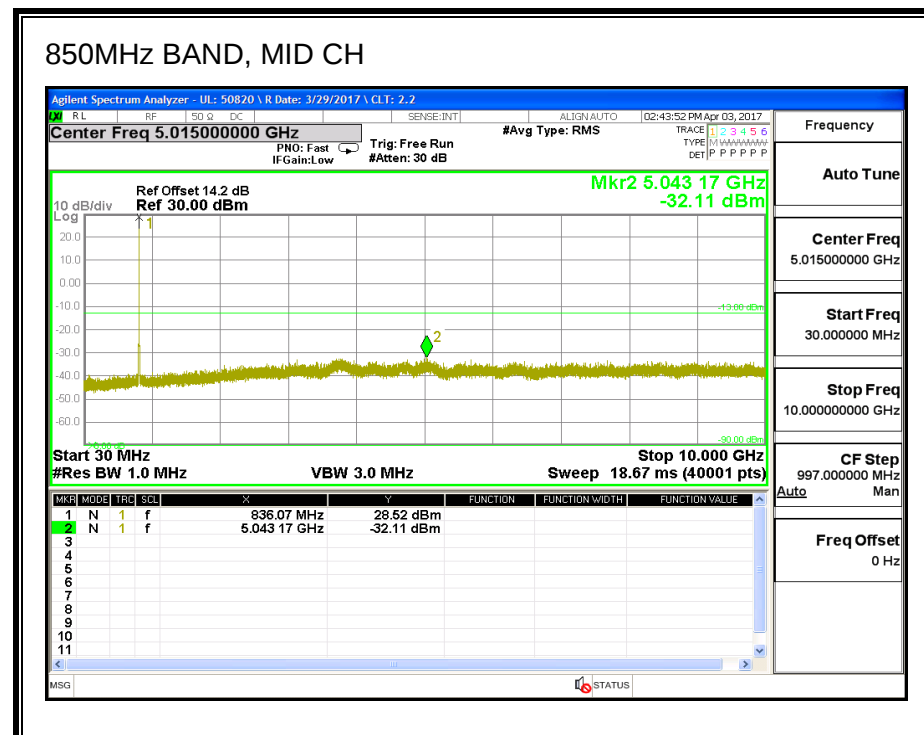
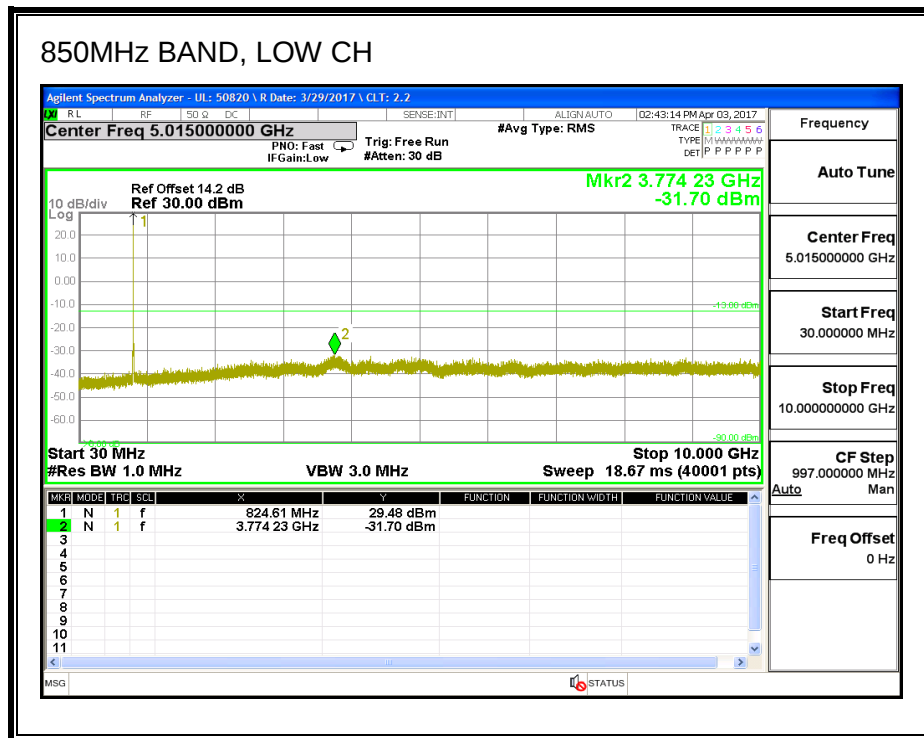




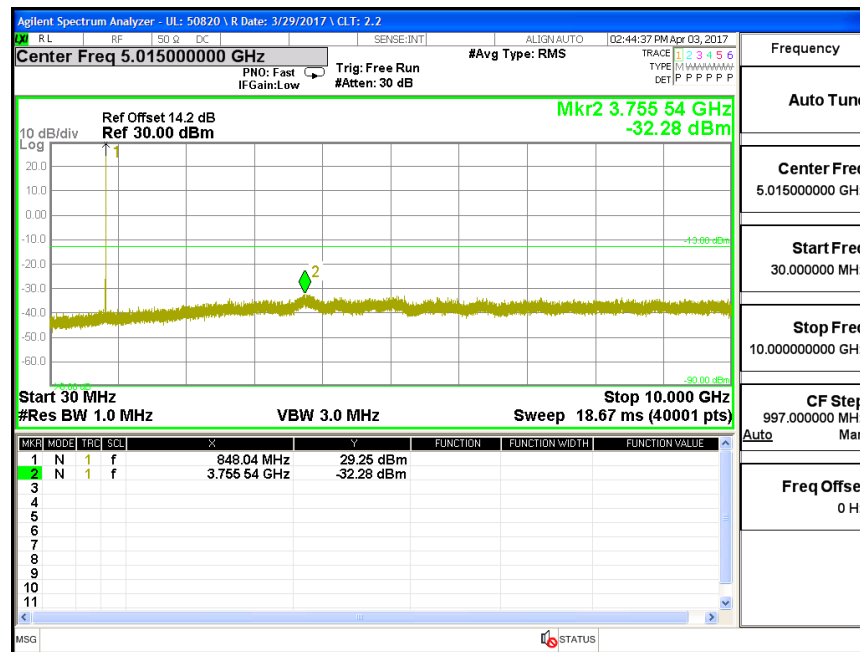




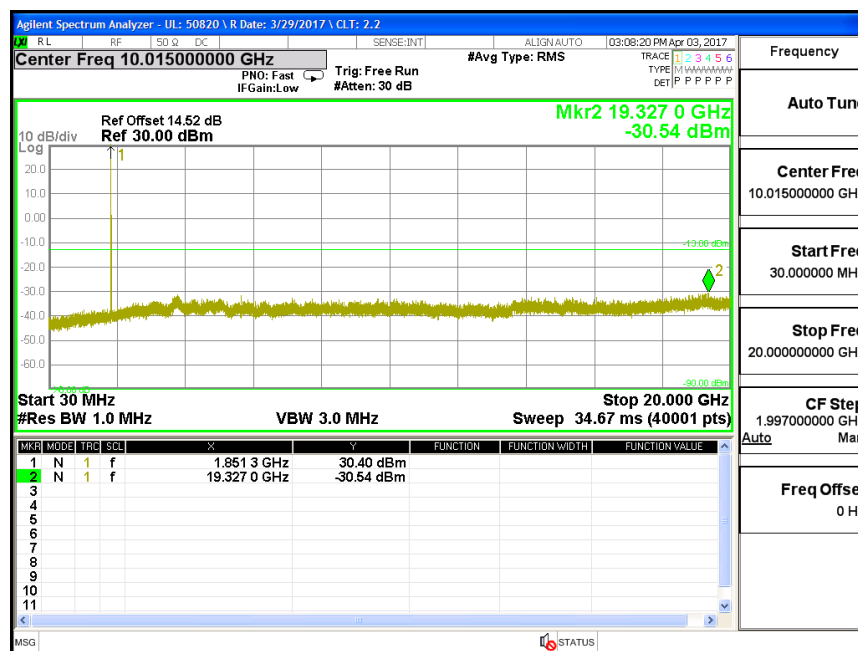
### 8.3.4. CDMA2000 EVDO REV A

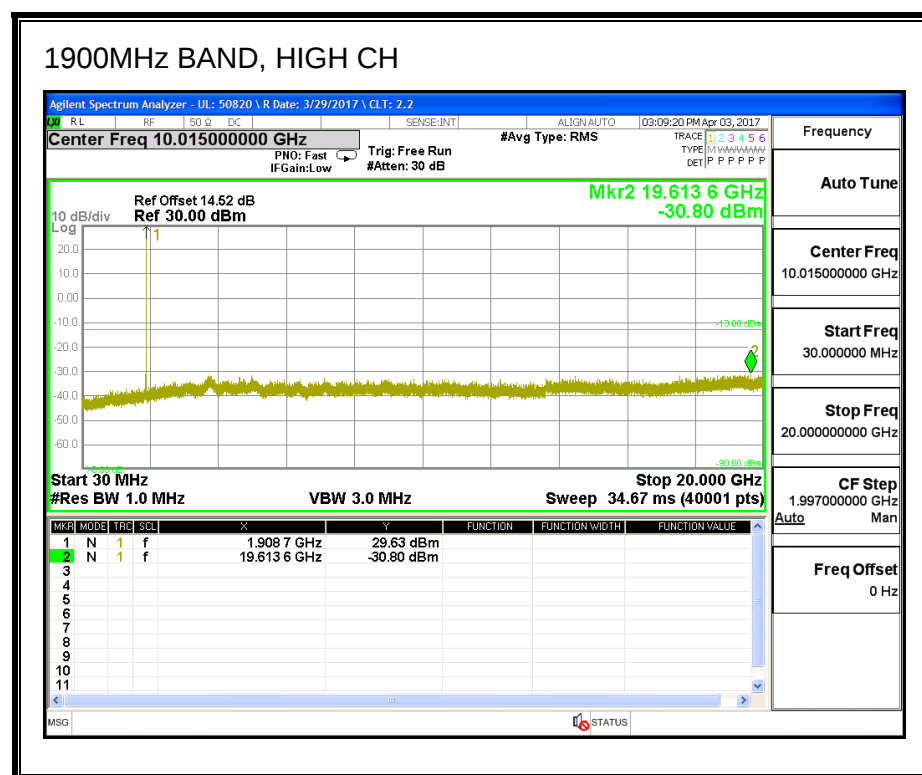
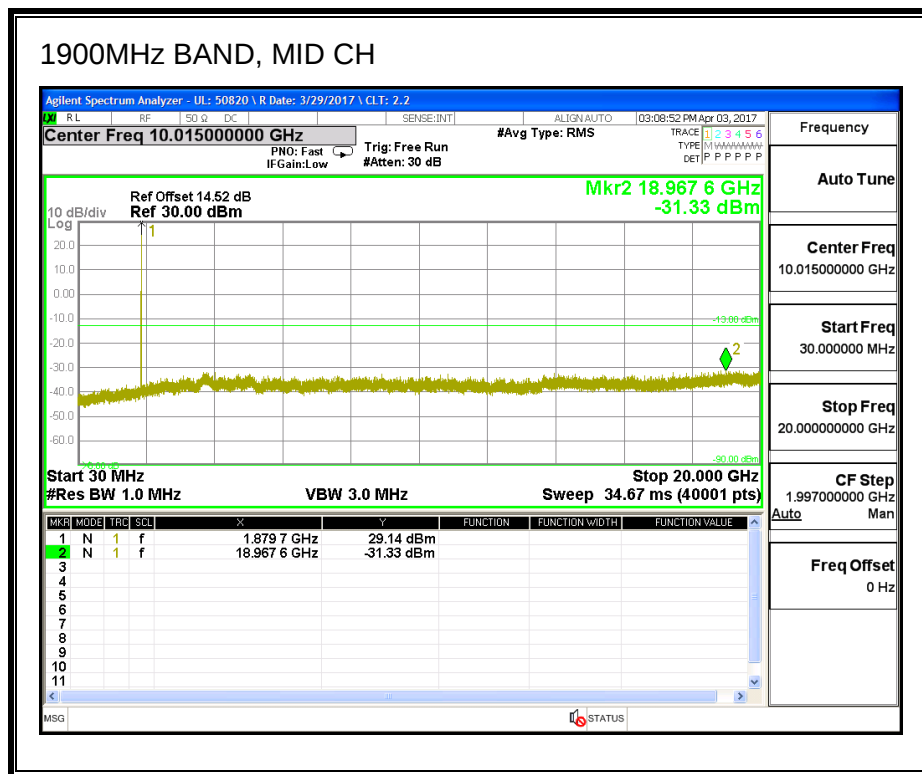


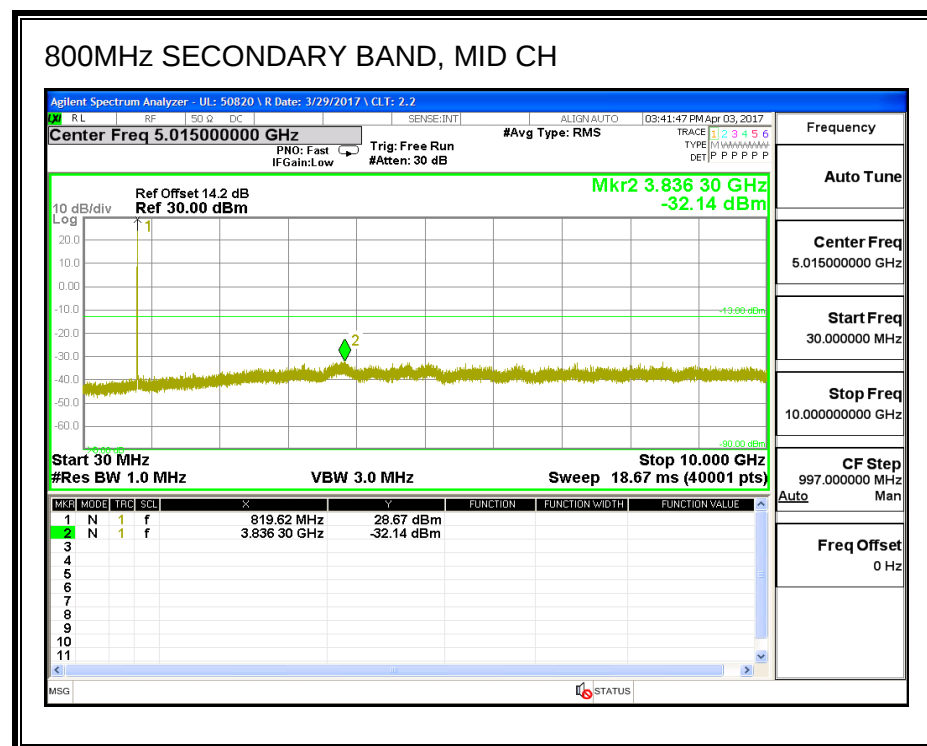
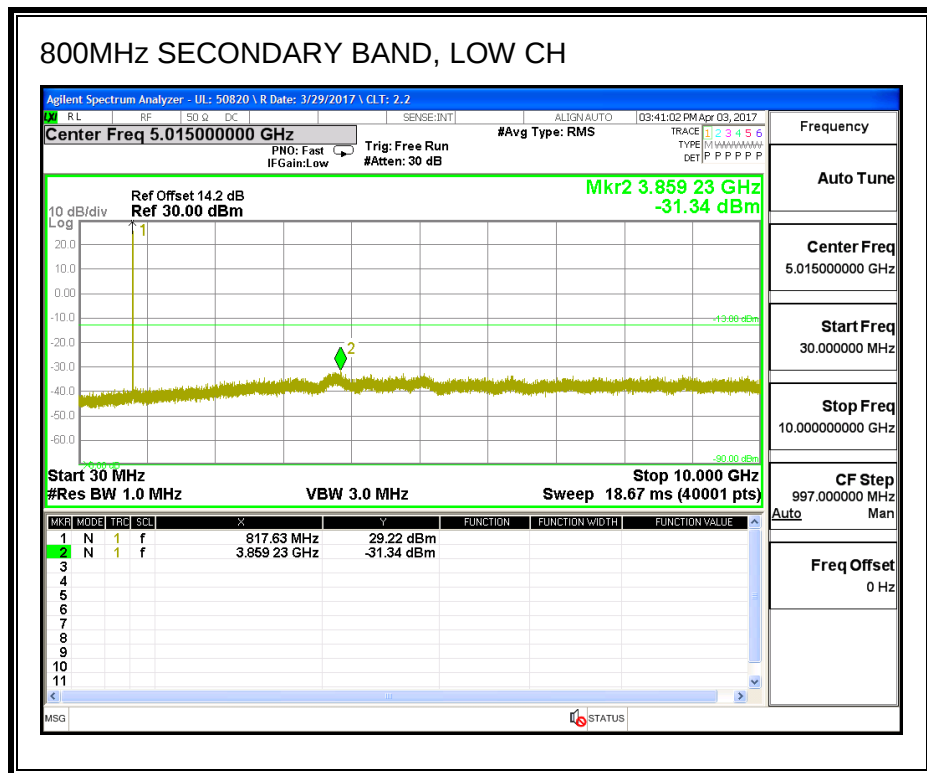
### 850MHz BAND, HIGH CH

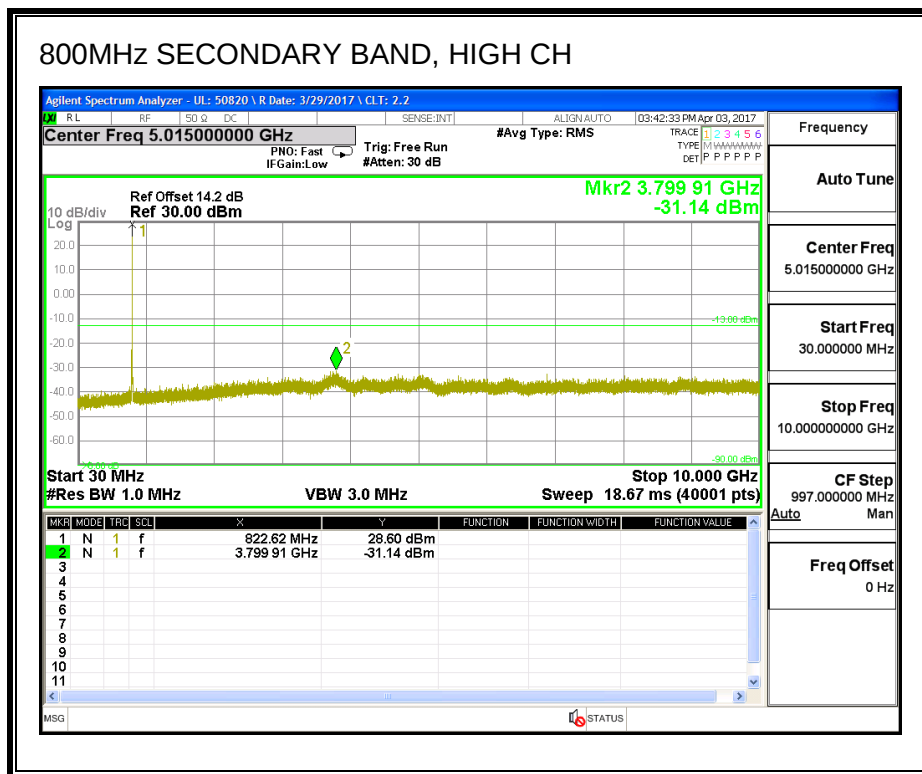


### 1900MHz BAND, LOW CH

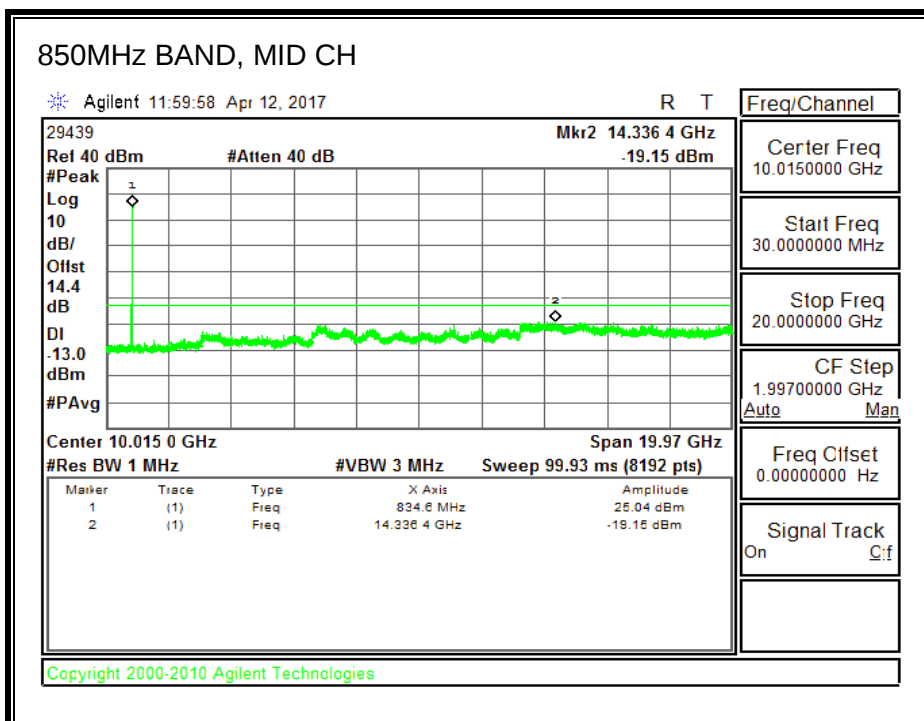
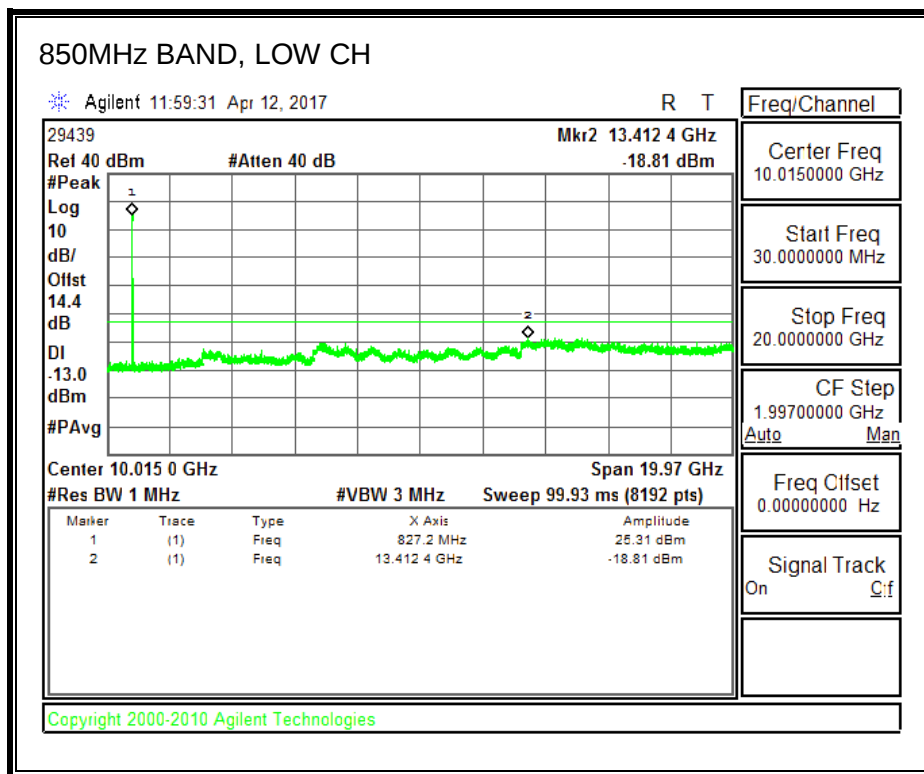


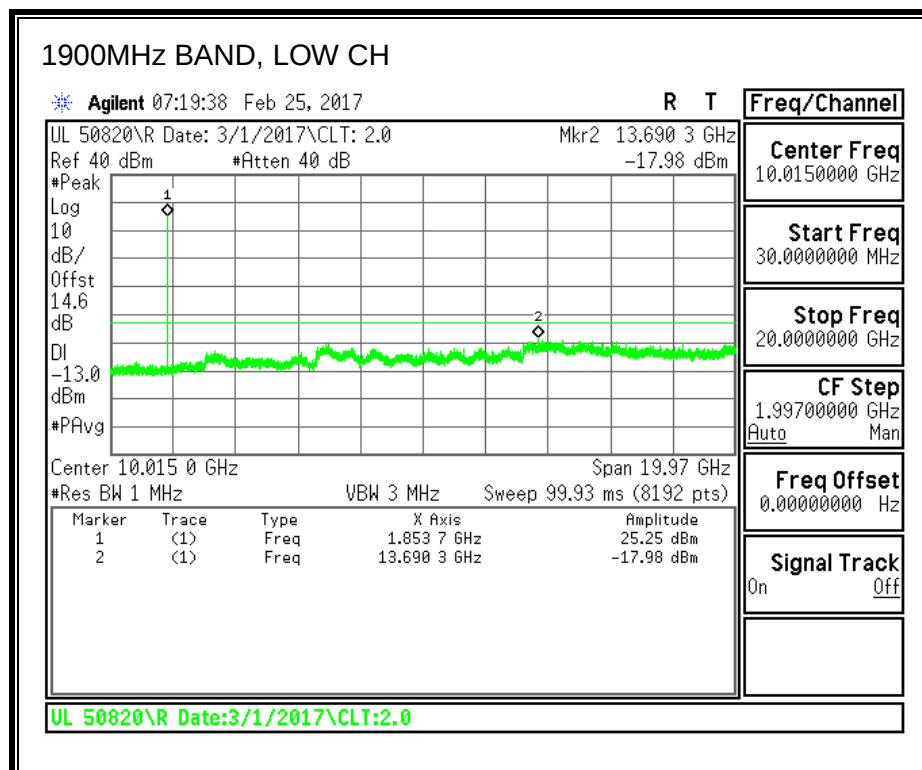
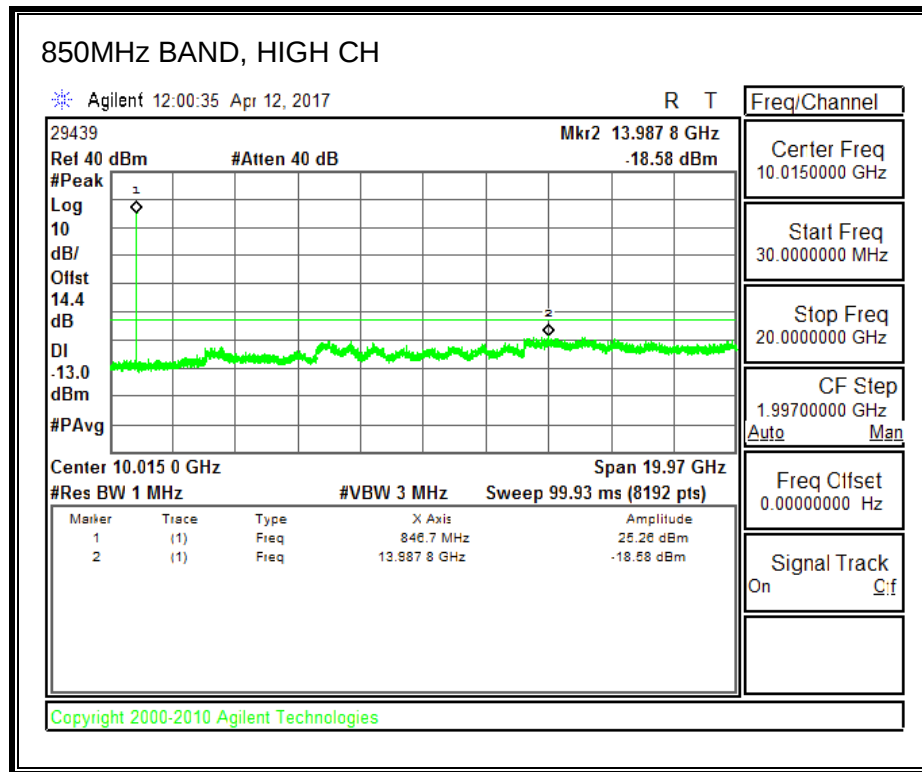


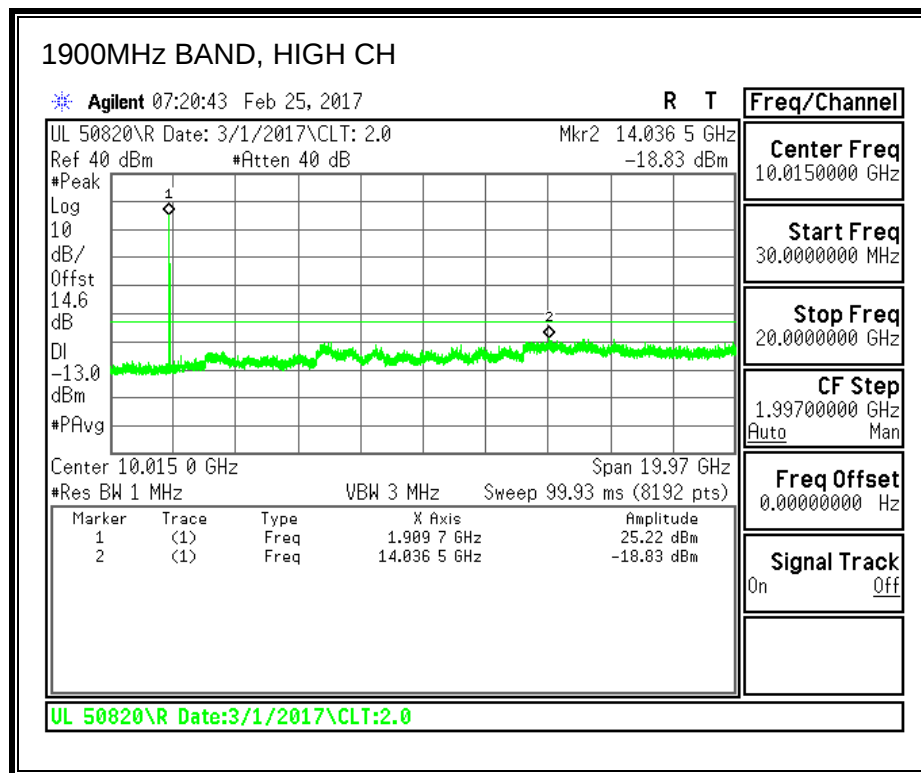
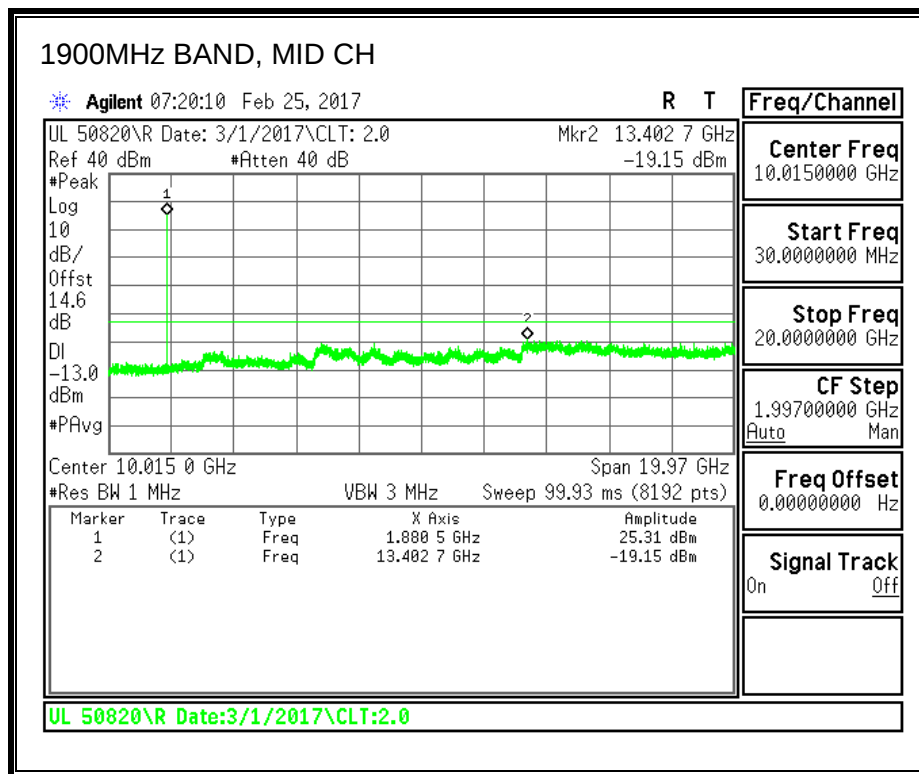


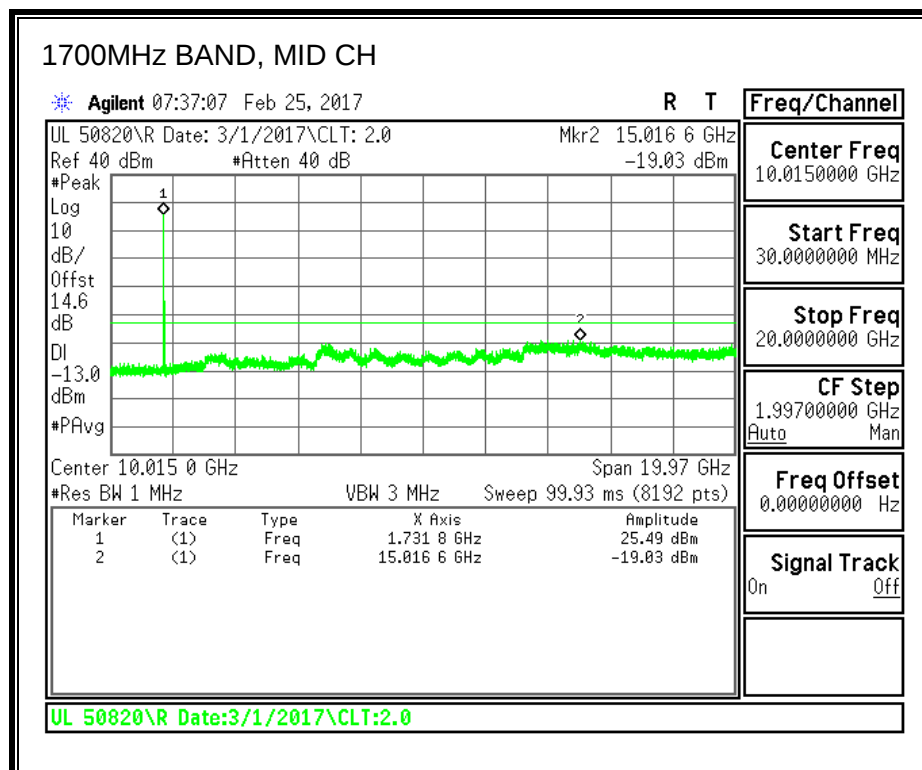
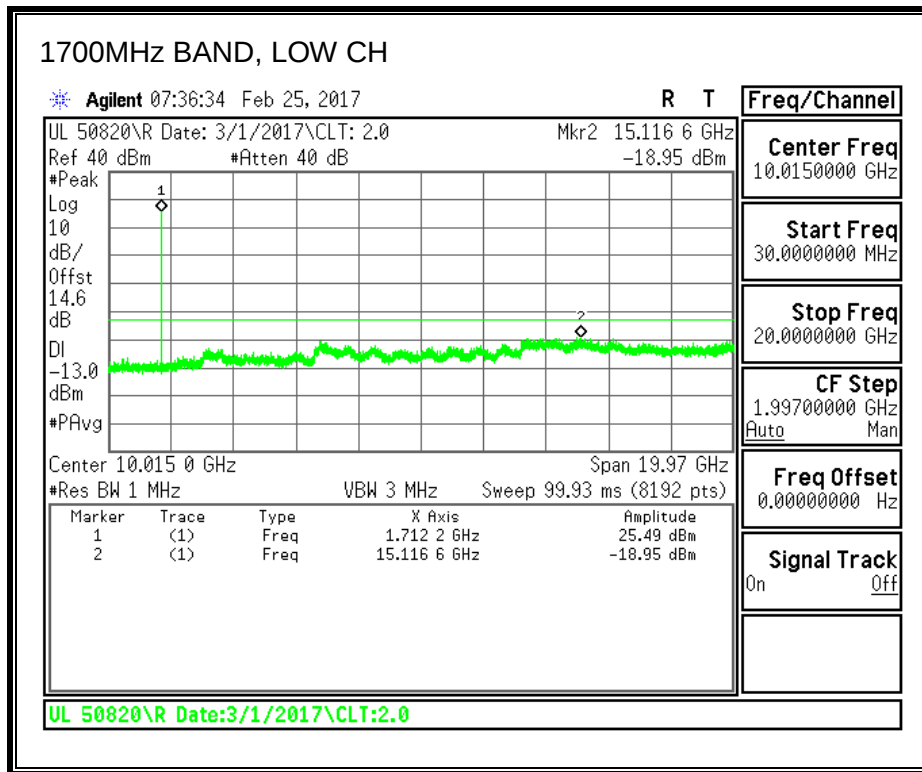


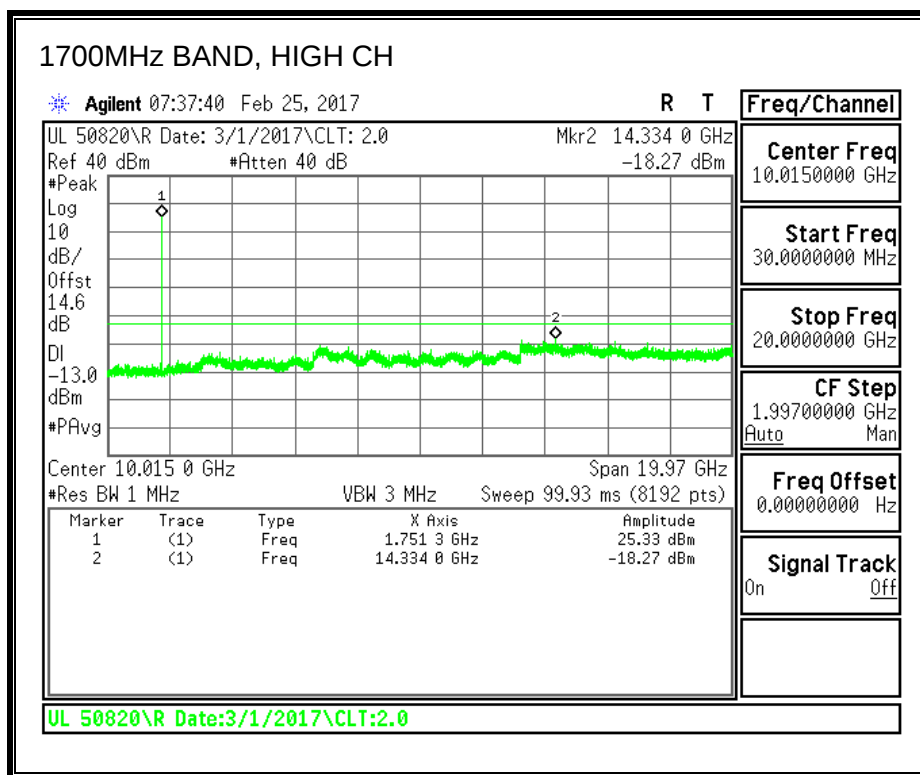
### 8.3.5. UMTS REL 99



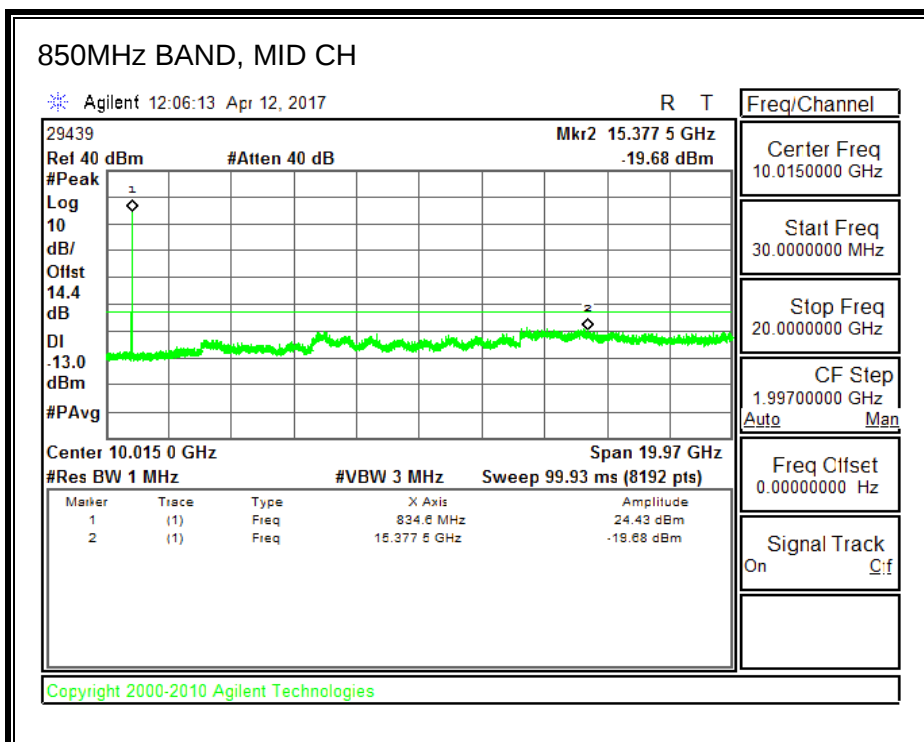
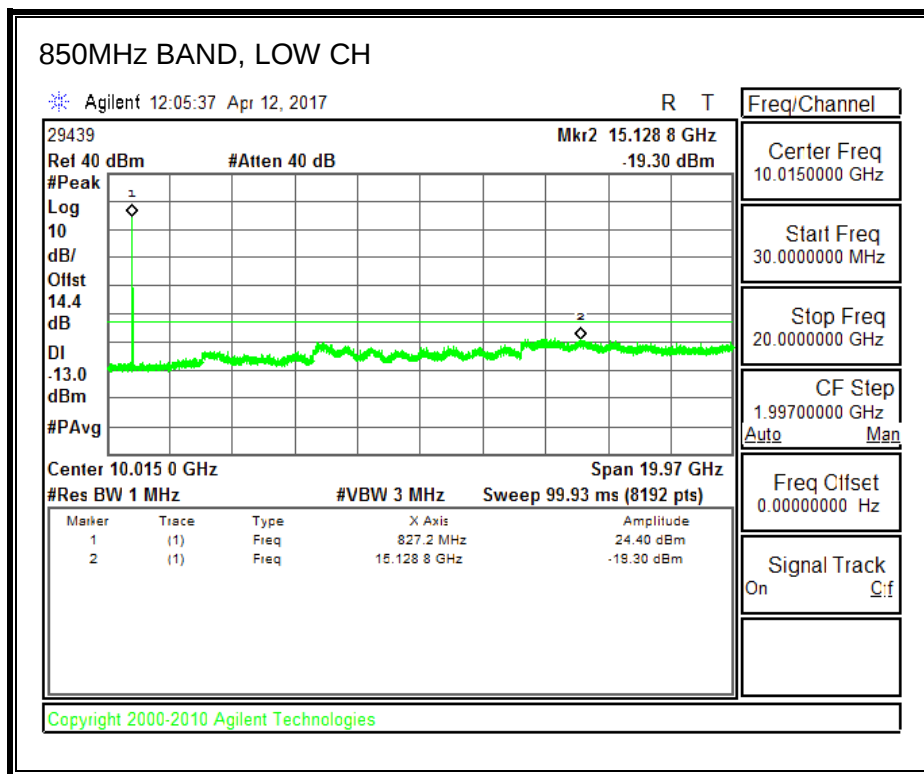


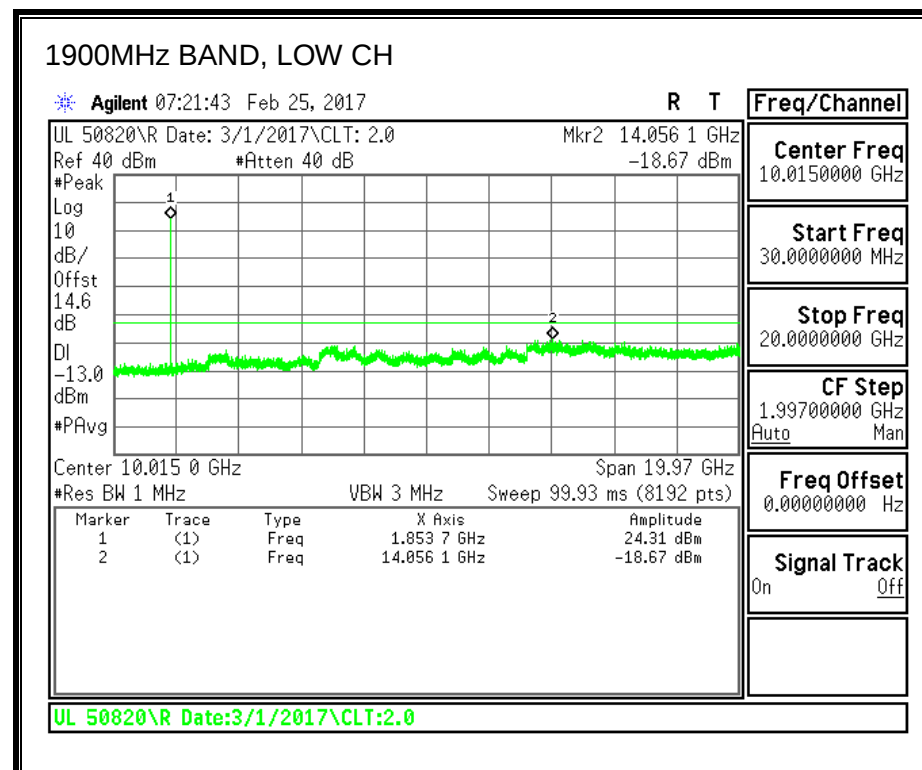
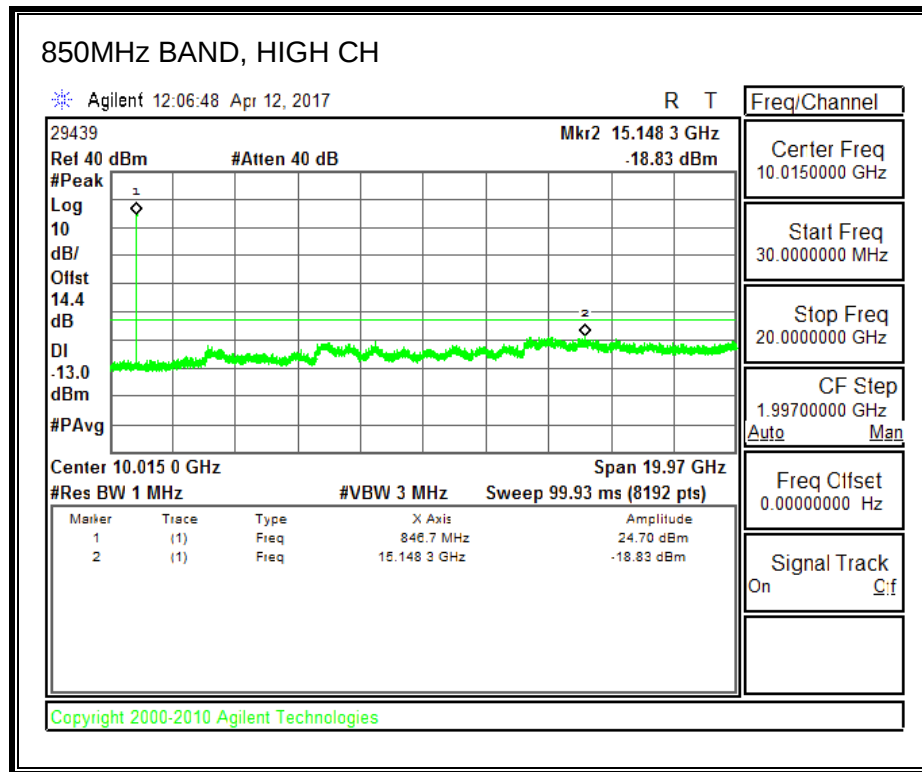


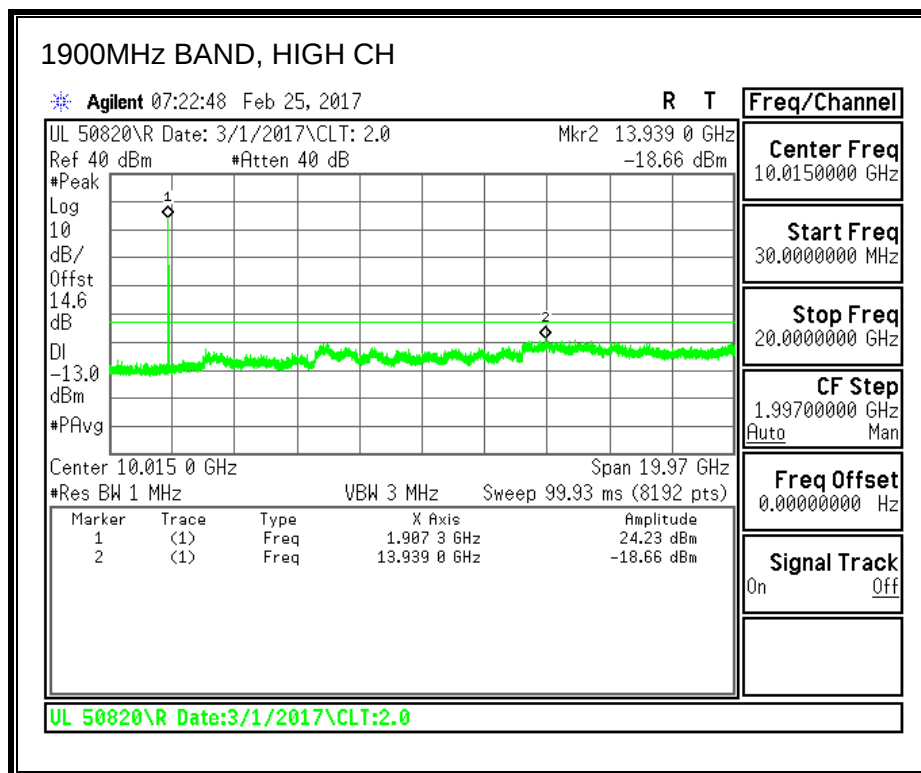
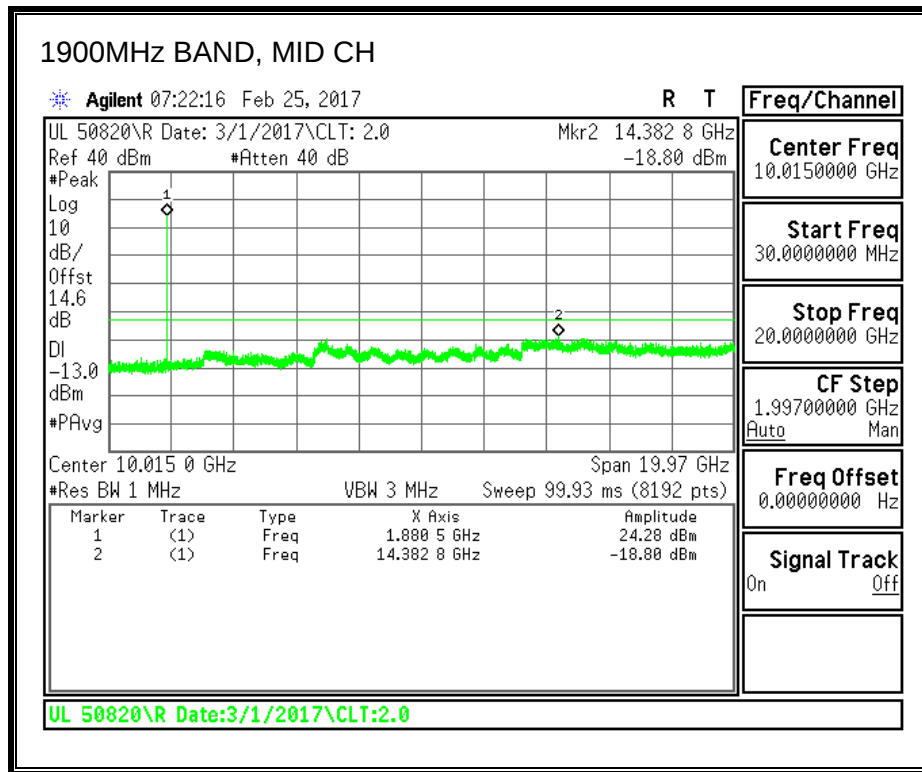


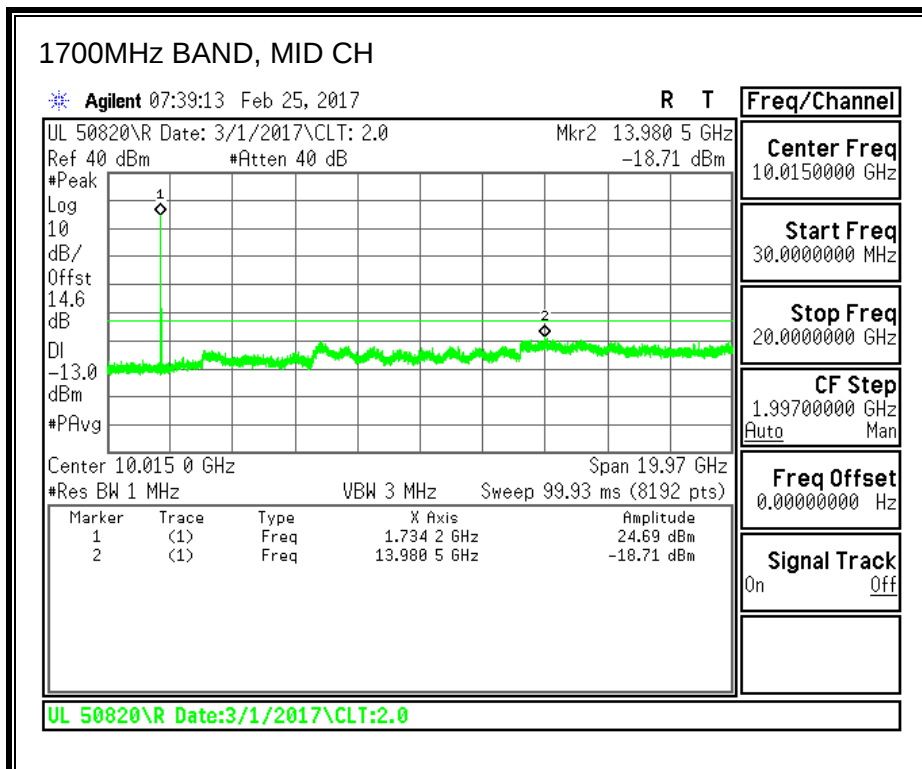
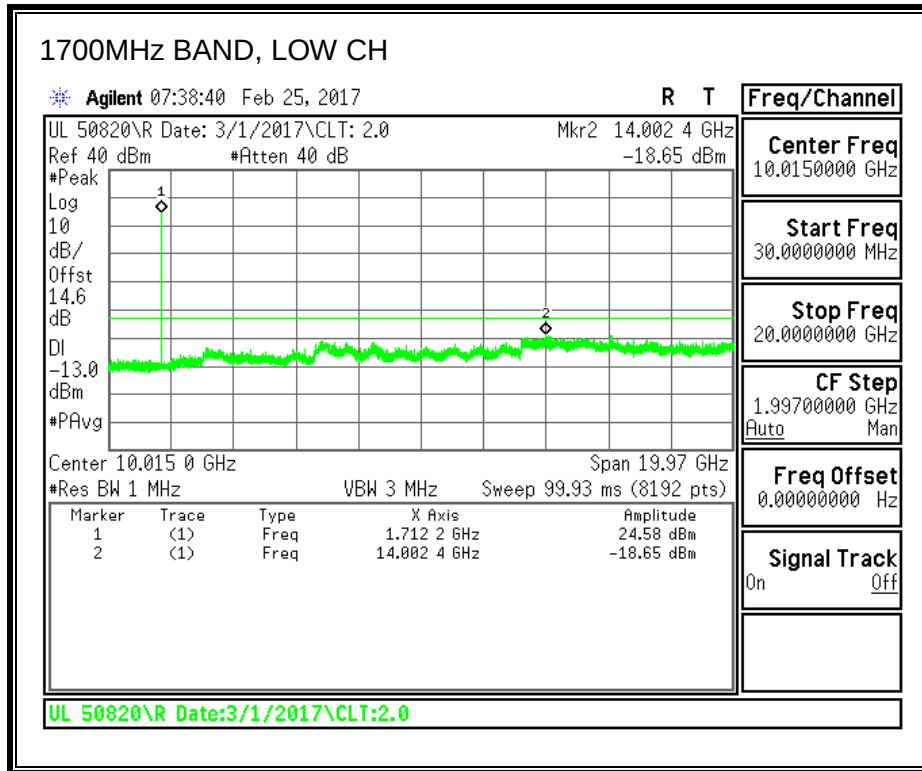


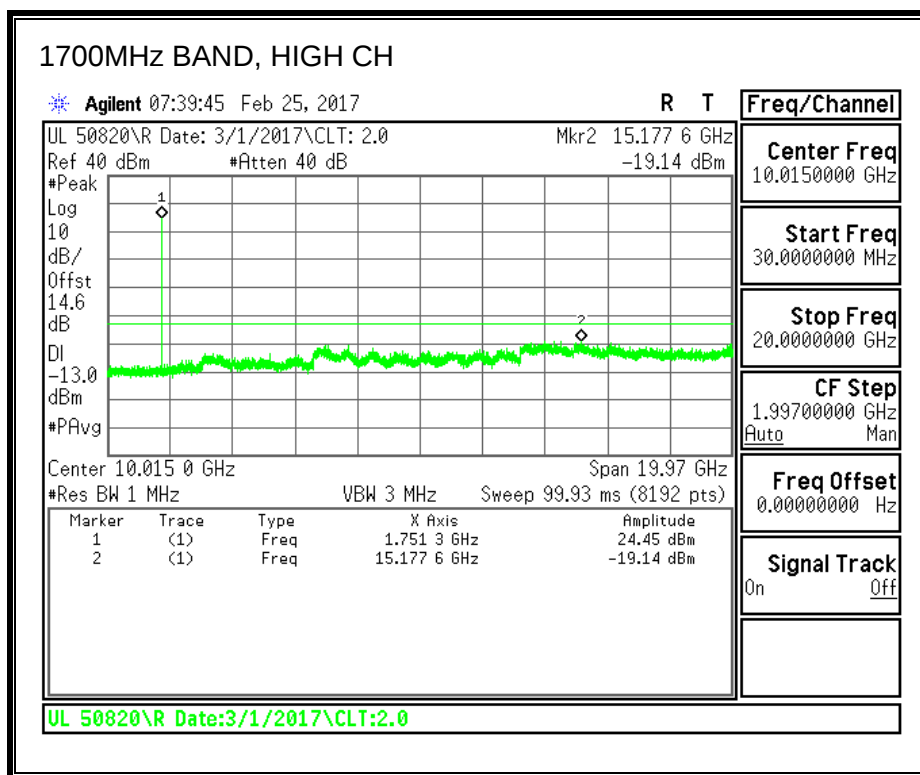
### 8.3.6. UMTS HSDPA











## 9. FREQUENCY STABILITY

### RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54 and §90.213

IC: RSS132§5.3; RSS133§6.3 and RSS139§6.4

### LIMITS

FCC §22.355

The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

FCC §24.235 & §27.54

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

FCC §90.213

The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations

RSS132§5.3

The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  SRSP for mobile stations and  $\pm 1.5$  ppm for base stations.

In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the occupied bandwidth stays within each of the sub-bands (see Section 5.1) when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS133§6.3

The carrier frequency shall not depart from the reference frequency, in excess of  $\pm 2.5$  ppm for mobile stations and  $\pm 1.0$  ppm for base stations.

In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS139§6.4

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

## **TEST PROCEDURE**

Use CMW 500 with Frequency Error measurement capability.

- Temp. =  $-30^{\circ}$  to  $+50^{\circ}\text{C}$
- Voltage = (85% - 115%)

Low voltage, 3.23VDC, Normal, 3.8VDC and High voltage, 4.37VDC.  
End Voltage, 3.2VDC.

### **Frequency Stability vs Temperature:**

The EUT is placed inside a temperature chamber. The temperature is set to  $20^{\circ}\text{C}$  and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until  $+50^{\circ}\text{C}$  is reached.

### **Frequency Stability vs Voltage:**

The peak frequency error is recorded (worst-case).

## **RESULTS**

See the following pages.

## 9.1. GSM

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 39919 | <b>Date:</b> | 3/30/17 |
|------------|-------|--------------|---------|

### GPRS 850MHz

| Limit          |           | 824                  | 849                   | Delta (Hz) | Frequency Stability (ppm) |      |
|----------------|-----------|----------------------|-----------------------|------------|---------------------------|------|
| Condition      |           | F low @ -13dBm (MHz) | F high @ -13dBm (MHz) |            |                           |      |
| Temperature    | Voltage   |                      |                       |            |                           |      |
| Normal (20C)   |           | Normal               | 824.0352              | 848.9755   |                           |      |
| Extreme (50C)  |           |                      | 824.0352              | 848.9755   | 9.1                       | 0.01 |
| Extreme (40C)  |           |                      | 824.0352              | 848.9755   | 12.0                      | 0.01 |
| Extreme (30C)  |           |                      | 824.0352              | 848.9755   | 13.6                      | 0.02 |
| Extreme (10C)  |           |                      | 824.0352              | 848.9755   | 9.4                       | 0.01 |
| Extreme (0C)   |           |                      | 824.0352              | 848.9755   | 12.4                      | 0.01 |
| Extreme (-10C) |           |                      | 824.0352              | 848.9755   | 14.0                      | 0.02 |
| Extreme (-20C) |           |                      | 824.0352              | 848.9755   | 16.1                      | 0.02 |
| Extreme (-30C) |           |                      | 824.0352              | 848.9755   | 15.4                      | 0.02 |
|                |           |                      |                       |            |                           |      |
| 20C            | 15%       | 824.0352             | 848.9755              | 15.1       | 0.02                      |      |
|                | -15%      | 824.0352             | 848.9755              | 14.3       | 0.02                      |      |
|                | End Point | 824.0352             | 848.9755              | 14.1       | 0.02                      |      |

### EGPRS 850MHz

| Limit          |           | 824                        | 849                         | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |      |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |      |
| Temperature    | Voltage   |                            |                             |               |                                 |      |
| Normal (20C)   |           | Normal                     | 824.0414                    | 848.9638      |                                 |      |
| Extreme (50C)  |           |                            | 824.0414                    | 848.9638      | 16.2                            | 0.02 |
| Extreme (40C)  |           |                            | 824.0414                    | 848.9638      | 12.9                            | 0.02 |
| Extreme (30C)  |           |                            | 824.0414                    | 848.9638      | 14.4                            | 0.02 |
| Extreme (10C)  |           |                            | 824.0414                    | 848.9638      | 15.8                            | 0.02 |
| Extreme (0C)   |           |                            | 824.0414                    | 848.9638      | 16.5                            | 0.02 |
| Extreme (-10C) |           |                            | 824.0414                    | 848.9638      | 18.8                            | 0.02 |
| Extreme (-20C) |           |                            | 824.0414                    | 848.9638      | 13.2                            | 0.02 |
| Extreme (-30C) |           |                            | 824.0414                    | 848.9638      | 17.2                            | 0.02 |
|                |           |                            |                             |               |                                 |      |
| 20C            | 15%       | 824.0414                   | 848.9638                    | 14.8          | 0.02                            |      |
|                | -15%      | 824.0414                   | 848.9638                    | 16.2          | 0.02                            |      |
|                | End Point | 824.0414                   | 848.9638                    | 14.4          | 0.02                            |      |

**GPRS 1900MHz**

| Limit          |           | 1850                       | 1910                        | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 1850.0290                  | 1909.9730                   |               |                                 |
| Extreme (50C)  |           | 1850.0290                  | 1909.9730                   | 23.5          | 0.01                            |
| Extreme (40C)  |           | 1850.0290                  | 1909.9730                   | 24.3          | 0.01                            |
| Extreme (30C)  |           | 1850.0290                  | 1909.9730                   | 25.1          | 0.01                            |
| Extreme (10C)  |           | 1850.0290                  | 1909.9730                   | 26.3          | 0.01                            |
| Extreme (0C)   |           | 1850.0290                  | 1909.9730                   | 25.3          | 0.01                            |
| Extreme (-10C) |           | 1850.0290                  | 1909.9730                   | 31.4          | 0.02                            |
| Extreme (-20C) |           | 1850.0290                  | 1909.9730                   | 25.5          | 0.01                            |
| Extreme (-30C) |           | 1850.0290                  | 1909.9730                   | 28.3          | 0.02                            |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 1850.0290                  | 1909.9730                   | 26.3          | 0.01                            |
|                | -15%      | 1850.0290                  | 1909.9730                   | 29.2          | 0.02                            |
|                | End Point | 1850.0290                  | 1909.9730                   | 23.7          | 0.01                            |

**EGPRS 1900MHz**

| Limit          |           | 1850                       | 1910                        | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 1850.0422                  | 1909.9625                   |               |                                 |
| Extreme (50C)  |           | 1850.0422                  | 1909.9625                   | 13.8          | 0.01                            |
| Extreme (40C)  |           | 1850.0422                  | 1909.9625                   | 13.9          | 0.01                            |
| Extreme (30C)  |           | 1850.0422                  | 1909.9625                   | 15.8          | 0.01                            |
| Extreme (10C)  |           | 1850.0422                  | 1909.9625                   | 17.2          | 0.01                            |
| Extreme (0C)   |           | 1850.0422                  | 1909.9625                   | 16.7          | 0.01                            |
| Extreme (-10C) |           | 1850.0422                  | 1909.9625                   | 16.4          | 0.01                            |
| Extreme (-20C) |           | 1850.0422                  | 1909.9625                   | 18.6          | 0.01                            |
| Extreme (-30C) |           | 1850.0422                  | 1909.9625                   | 19.5          | 0.01                            |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 1850.0422                  | 1909.9625                   | 15.8          | 0.01                            |
|                | -15%      | 1850.0422                  | 1909.9625                   | 17.3          | 0.01                            |
|                | End Point | 1850.0422                  | 1909.9625                   | 14.7          | 0.01                            |

## 9.2. CDMA2000

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 45200 | <b>Date:</b> | 3/23/17 |
|------------|-------|--------------|---------|

### CDMA 1xRTT BC0

| Limit          |           | 824                  | 849                   | Delta (Hz) | Frequency Stability (ppm) |
|----------------|-----------|----------------------|-----------------------|------------|---------------------------|
| Condition      |           | F low @ -13dBm (MHz) | F high @ -13dBm (MHz) |            |                           |
| Temperature    | Voltage   |                      |                       |            |                           |
| Normal (20C)   | Normal    | 824.0227             | 848.9887              |            |                           |
| Extreme (50C)  |           | 824.0227             | 848.9887              | -4.2       | 0.00                      |
| Extreme (40C)  |           | 824.0227             | 848.9887              | -5.0       | -0.01                     |
| Extreme (30C)  |           | 824.0227             | 848.9887              | -3.3       | 0.00                      |
| Extreme (10C)  |           | 824.0227             | 848.9887              | 2.8        | 0.00                      |
| Extreme (0C)   |           | 824.0227             | 848.9887              | 4.5        | 0.01                      |
| Extreme (-10C) |           | 824.0227             | 848.9887              | 6.1        | 0.01                      |
| Extreme (-20C) |           | 824.0227             | 848.9887              | 5.4        | 0.01                      |
| Extreme (-30C) |           | 824.0227             | 848.9887              | 5.5        | 0.01                      |
|                |           |                      |                       |            |                           |
| 20C            | 15%       | 824.0227             | 848.9887              | -1.3       | 0.00                      |
|                | -15%      | 824.0227             | 848.9887              | -0.6       | 0.00                      |
|                | End Point | 824.0227             | 848.9887              | -1.2       | 0.00                      |

### CDMA 1x RTT BC1

| Limit          |           | 1850                 | 1910                  | Delta (Hz) | Frequency Stability (ppm) |
|----------------|-----------|----------------------|-----------------------|------------|---------------------------|
| Condition      |           | F low @ -13dBm (MHz) | F high @ -13dBm (MHz) |            |                           |
| Temperature    | Voltage   |                      |                       |            |                           |
| Normal (20C)   | Normal    | 1850.5420            | 1909.4580             |            |                           |
| Extreme (50C)  |           | 1850.5420            | 1909.4580             | 11.1       | 0.01                      |
| Extreme (40C)  |           | 1850.5420            | 1909.4580             | 10.5       | 0.01                      |
| Extreme (30C)  |           | 1850.5420            | 1909.4580             | 12.0       | 0.01                      |
| Extreme (10C)  |           | 1850.5420            | 1909.4580             | 15.7       | 0.01                      |
| Extreme (0C)   |           | 1850.5420            | 1909.4580             | 21.6       | 0.01                      |
| Extreme (-10C) |           | 1850.5420            | 1909.4580             | 22.1       | 0.01                      |
| Extreme (-20C) |           | 1850.5420            | 1909.4580             | 23.4       | 0.01                      |
| Extreme (-30C) |           | 1850.5420            | 1909.4580             | 22.8       | 0.01                      |
|                |           |                      |                       |            |                           |
| 20C            | 15%       | 1850.5420            | 1909.4580             | 10.4       | 0.01                      |
|                | -15%      | 1850.5420            | 1909.4580             | 10.9       | 0.01                      |
|                | End Point | 1850.5420            | 1909.4580             | 10.3       | 0.01                      |

**CDMA 1xRTT BC10**

| Limit          |           | 816.35                     | 823.65                      | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 816.5434                   | 823.4580                    |               |                                 |
| Extreme (50C)  |           | 816.5434                   | 823.4580                    | -3.8          | 0.00                            |
| Extreme (40C)  |           | 816.5434                   | 823.4580                    | -3.2          | 0.00                            |
| Extreme (30C)  |           | 816.5434                   | 823.4580                    | -2.1          | 0.00                            |
| Extreme (10C)  |           | 816.5434                   | 823.4580                    | 3.2           | 0.00                            |
| Extreme (0C)   |           | 816.5434                   | 823.4580                    | 4.7           | 0.01                            |
| Extreme (-10C) |           | 816.5434                   | 823.4580                    | 5.3           | 0.01                            |
| Extreme (-20C) |           | 816.5434                   | 823.4580                    | 5.2           | 0.01                            |
| Extreme (-30C) |           | 816.5434                   | 823.4580                    | 5.6           | 0.01                            |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 816.5434                   | 823.4580                    | -0.9          | 0.00                            |
|                | -15%      | 816.5434                   | 823.4580                    | -0.2          | 0.00                            |
|                | End Point | 816.5434                   | 823.4580                    | -0.2          | 0.00                            |

### 9.3. UMTS

|            |       |              |         |
|------------|-------|--------------|---------|
| <b>ID:</b> | 39472 | <b>Date:</b> | 3/22/17 |
|------------|-------|--------------|---------|

#### UMTS REL99 BAND 5

| Limit          |           | 824                  | 849                   | Delta (Hz) | Frequency Stability (ppm) |
|----------------|-----------|----------------------|-----------------------|------------|---------------------------|
| Condition      |           | F low @ -13dBm (MHz) | F high @ -13dBm (MHz) |            |                           |
| Temperature    | Voltage   |                      |                       |            |                           |
| Normal (20C)   | Normal    | 824.1165             | 848.8722              |            |                           |
| Extreme (50C)  |           | 824.1165             | 848.8722              | -2.4       | 0.00                      |
| Extreme (40C)  |           | 824.1165             | 848.8722              | -1.7       | 0.00                      |
| Extreme (30C)  |           | 824.1165             | 848.8722              | -2.1       | 0.00                      |
| Extreme (10C)  |           | 824.1165             | 848.8723              | 2.2        | 0.00                      |
| Extreme (0C)   |           | 824.1165             | 848.8723              | 2.0        | 0.00                      |
| Extreme (-10C) |           | 824.1165             | 848.8723              | 2.6        | 0.00                      |
| Extreme (-20C) |           | 824.1165             | 848.8723              | 2.8        | 0.00                      |
| Extreme (-30C) |           | 824.1165             | 848.8723              | 3.6        | 0.00                      |
|                |           |                      |                       |            |                           |
| 20C            | 15%       | 824.1165             | 848.8722              | -0.9       | 0.00                      |
|                | -15%      | 824.1165             | 848.8722              | 0.8        | 0.00                      |
|                | End Point | 824.1165             | 848.8722              | -0.9       | 0.00                      |

#### UMTS REL99 BAND 2

| Limit          |           | 1850                       | 1910                        | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 1850.1233                  | 1909.8694                   |               |                                 |
| Extreme (50C)  |           | 1850.1233                  | 1909.8694                   | 15.0          | 0.01                            |
| Extreme (40C)  |           | 1850.1233                  | 1909.8694                   | 14.3          | 0.01                            |
| Extreme (30C)  |           | 1850.1233                  | 1909.8694                   | 13.6          | 0.01                            |
| Extreme (10C)  |           | 1850.1233                  | 1909.8694                   | 14.6          | 0.01                            |
| Extreme (0C)   |           | 1850.1233                  | 1909.8694                   | 15.6          | 0.01                            |
| Extreme (-10C) |           | 1850.1233                  | 1909.8694                   | 15.7          | 0.01                            |
| Extreme (-20C) |           | 1850.1233                  | 1909.8694                   | 15.8          | 0.01                            |
| Extreme (-30C) |           | 1850.1233                  | 1909.8694                   | 16.1          | 0.01                            |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 1850.1233                  | 1909.8694                   | 12.7          | 0.01                            |
|                | -15%      | 1850.1233                  | 1909.8694                   | 13.2          | 0.01                            |
|                | End Point | 1850.1233                  | 1909.8694                   | 12.6          | 0.01                            |

**UMTS REL99 BAND 4**

| Limit          |           | 1710                       | 1755                        | Delta<br>(Hz) | Frequency<br>Stability<br>(ppm) |
|----------------|-----------|----------------------------|-----------------------------|---------------|---------------------------------|
| Condition      |           | F low @<br>-13dBm<br>(MHz) | F high @<br>-13dBm<br>(MHz) |               |                                 |
| Temperature    | Voltage   |                            |                             |               |                                 |
| Normal (20C)   | Normal    | 1710.1378                  | 1754.8835                   |               |                                 |
| Extreme (50C)  |           | 1710.1378                  | 1754.8835                   | -4.3          | 0.00                            |
| Extreme (40C)  |           | 1710.1378                  | 1754.8835                   | -4.3          | 0.00                            |
| Extreme (30C)  |           | 1710.1378                  | 1754.8835                   | -3.3          | 0.00                            |
| Extreme (10C)  |           | 1710.1378                  | 1754.8835                   | -3.2          | 0.00                            |
| Extreme (0C)   |           | 1710.1378                  | 1754.8835                   | 3.3           | 0.00                            |
| Extreme (-10C) |           | 1710.1378                  | 1754.8835                   | 3.6           | 0.00                            |
| Extreme (-20C) |           | 1710.1378                  | 1754.8835                   | 3.8           | 0.00                            |
| Extreme (-30C) |           | 1710.1378                  | 1754.8835                   | 3.9           | 0.00                            |
|                |           |                            |                             |               |                                 |
| 20C            | 15%       | 1710.1378                  | 1754.8835                   | -1.6          | 0.00                            |
|                | -15%      | 1710.1378                  | 1754.8835                   | 1.4           | 0.00                            |
|                | End Point | 1710.1378                  | 1754.8835                   | -1.3          | 0.00                            |

## 10. PEAK-TO-AVERAGE RATIO

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

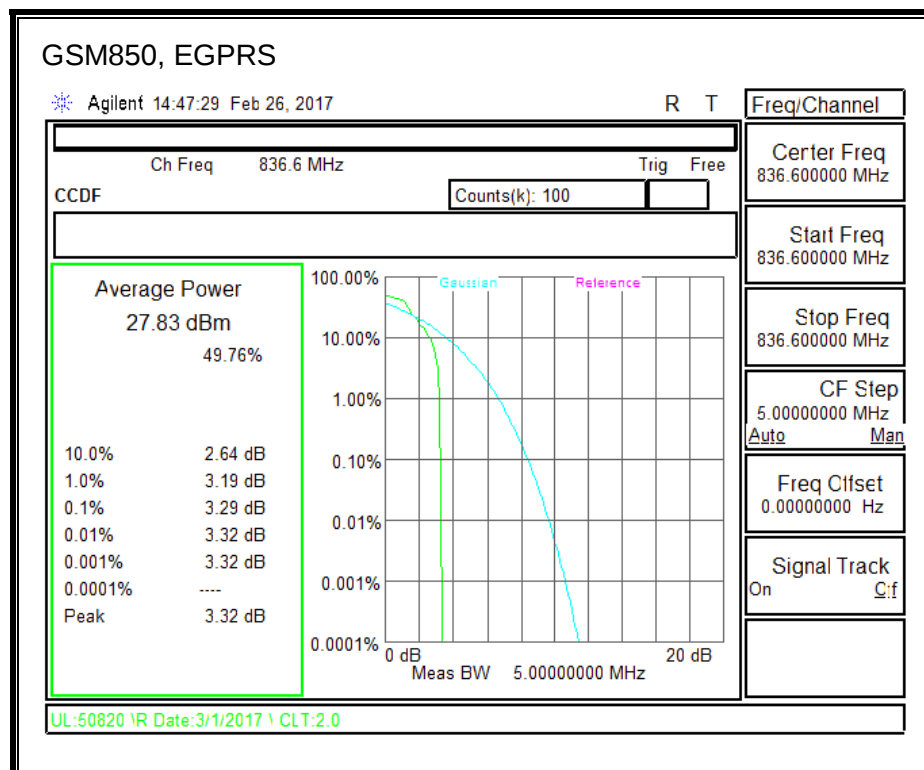
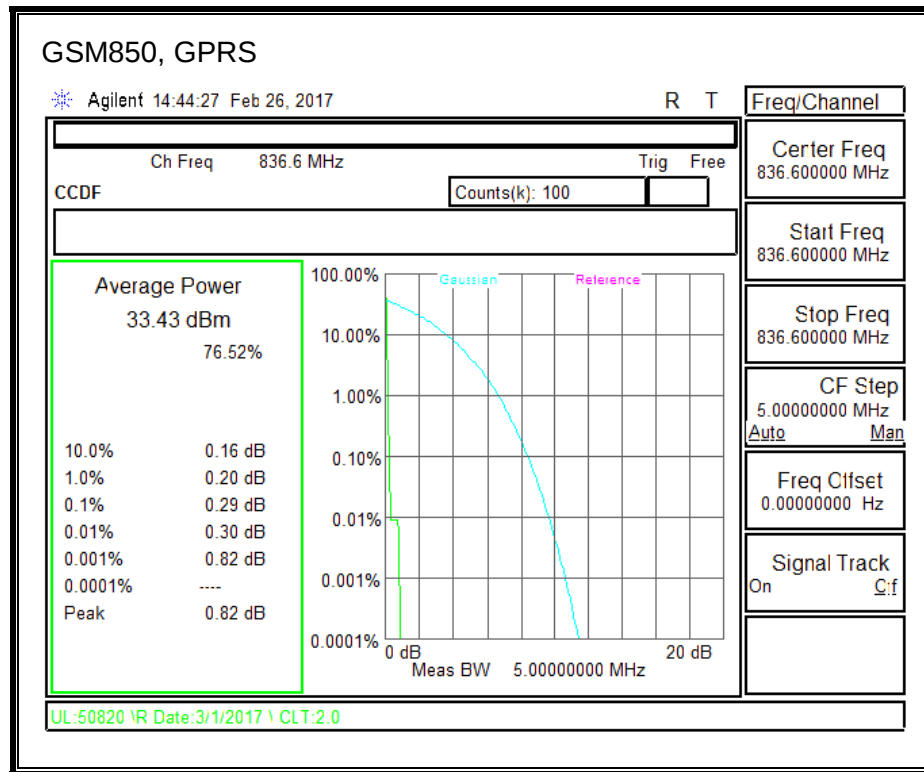
### RESULT

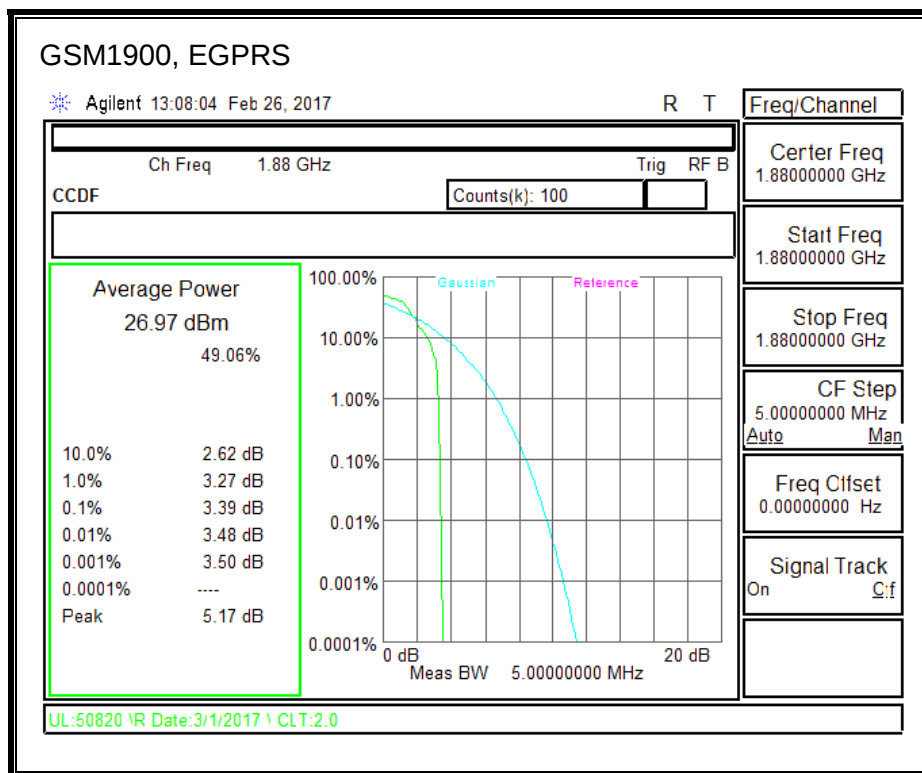
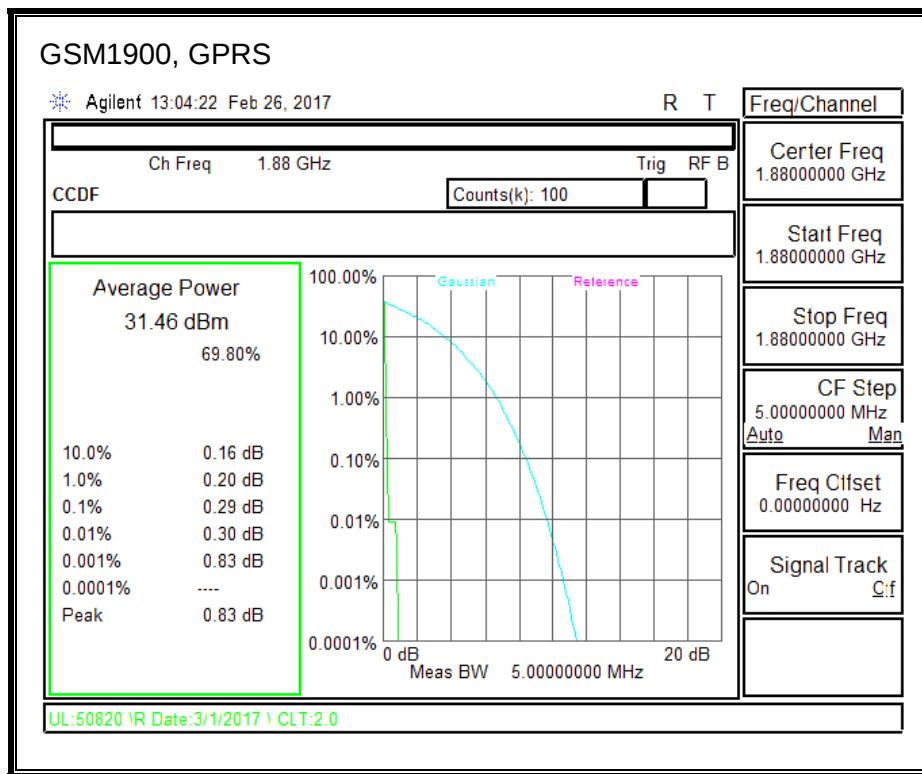
LAT 1 antenna was used to measure as the worst case. The results from all CCDF plots are passed with 13dB peak-to-average ratio criteria.

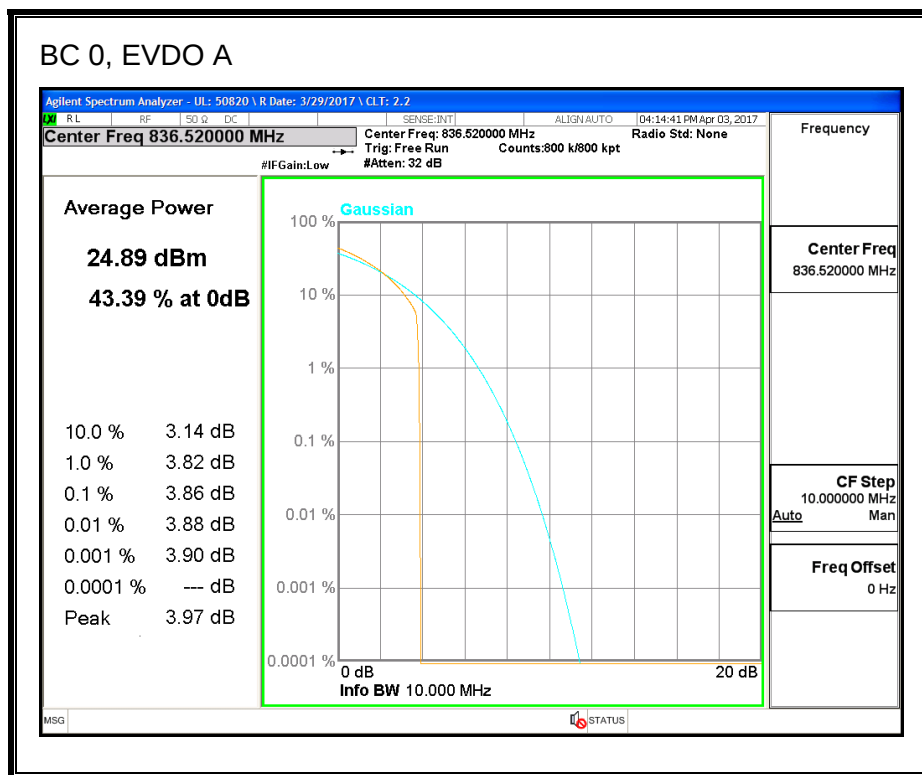
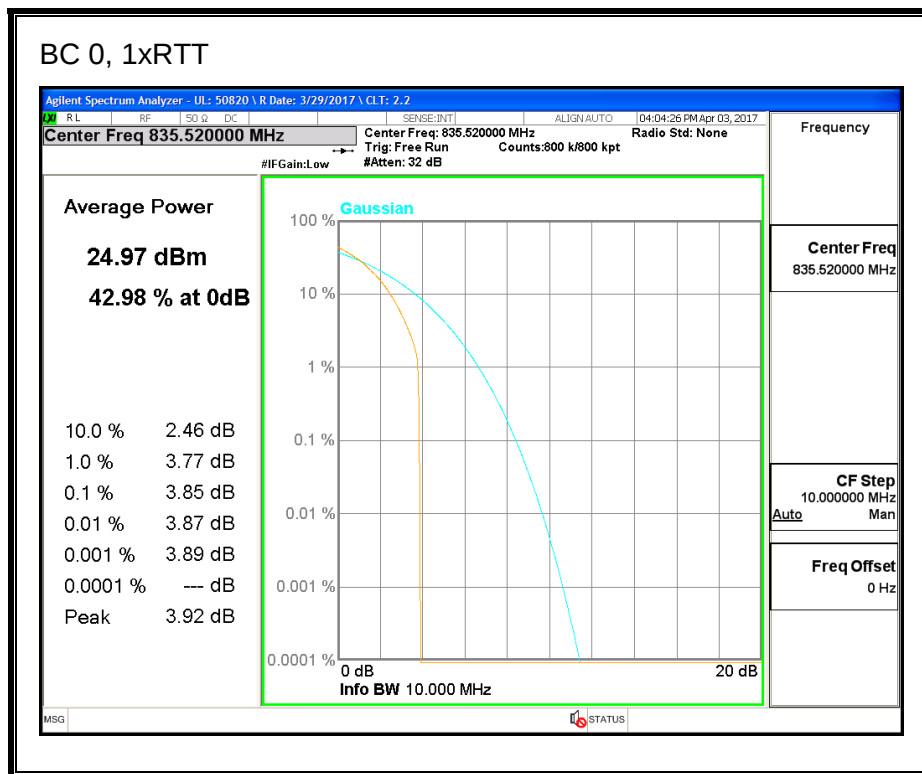
| Mode                                                        | Modulation | Conducted Power (dBm) |         | Peak-to-Average Ratio |
|-------------------------------------------------------------|------------|-----------------------|---------|-----------------------|
|                                                             |            | *Peak                 | Average |                       |
| GSM850                                                      | GPRS       | 33.72                 | 33.43   | 0.29                  |
| GSM850                                                      | EGPRS      | 31.12                 | 27.83   | 3.29                  |
| GSM1900                                                     | GPRS       | 31.75                 | 31.46   | 0.29                  |
| GSM1900                                                     | EGPRS      | 30.36                 | 26.97   | 3.39                  |
| *Peak Reading = Average Reading + Peak - to - Average Ratio |            |                       |         |                       |

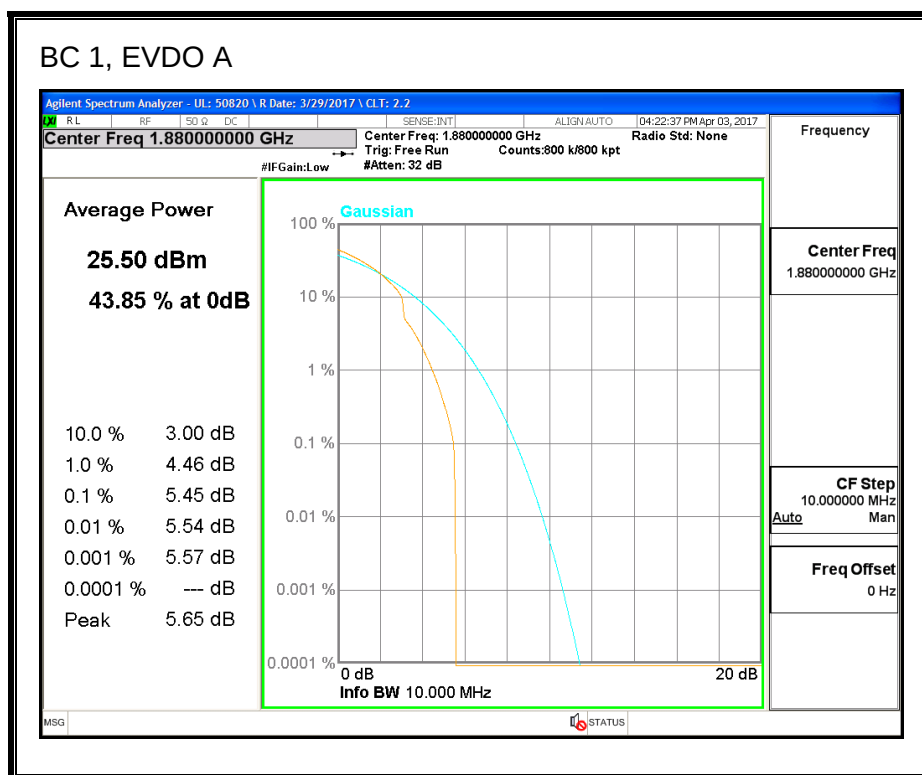
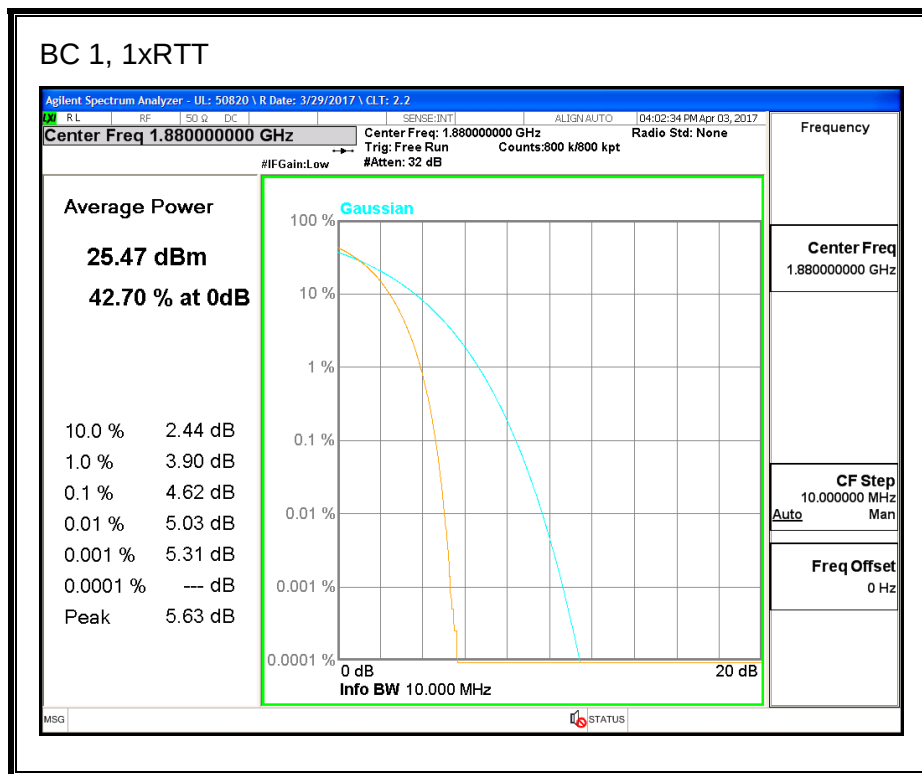
| Mode                                                        | Modulation | Conducted Power (dBm) |         | Peak-to-Average Ratio |
|-------------------------------------------------------------|------------|-----------------------|---------|-----------------------|
|                                                             |            | *Peak                 | Average |                       |
| CDMA2000 BC0                                                | 1xRTT      | 28.82                 | 24.97   | 3.85                  |
|                                                             | EVDO A     | 28.75                 | 24.89   | 3.86                  |
| CDMA2000 BC1                                                | 1xRTT      | 30.09                 | 25.47   | 4.62                  |
|                                                             | EVDO A     | 30.95                 | 25.50   | 5.45                  |
| CDMA2000 BC10                                               | 1xRTT      | 28.84                 | 24.91   | 3.93                  |
|                                                             | EVDO A     | 30.37                 | 24.96   | 5.41                  |
| *Peak Reading = Average Reading + Peak - to - Average Ratio |            |                       |         |                       |

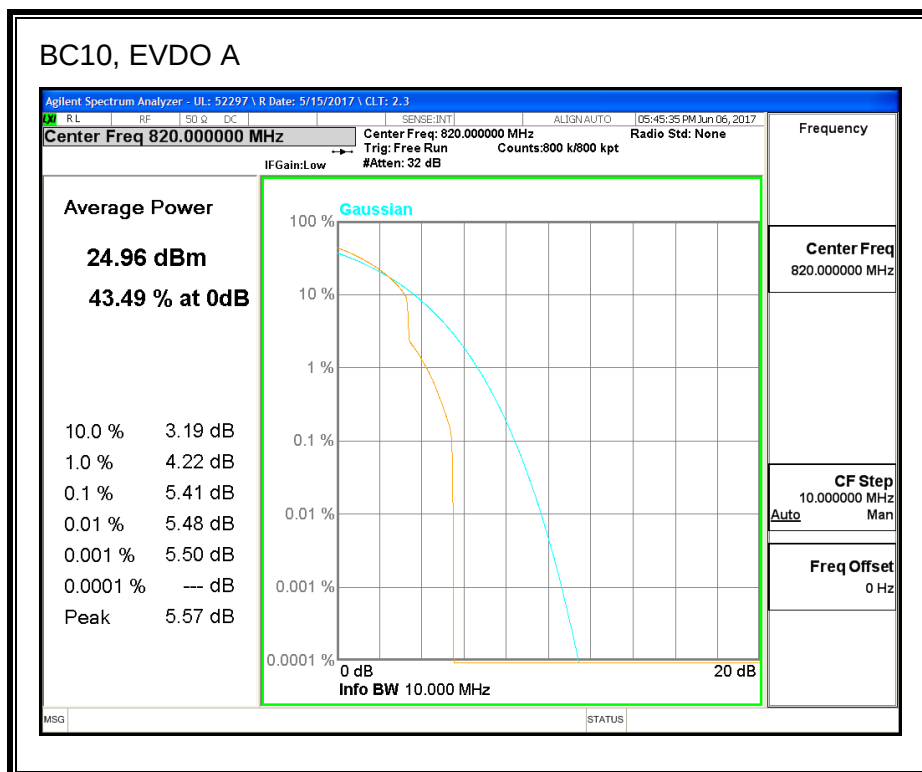
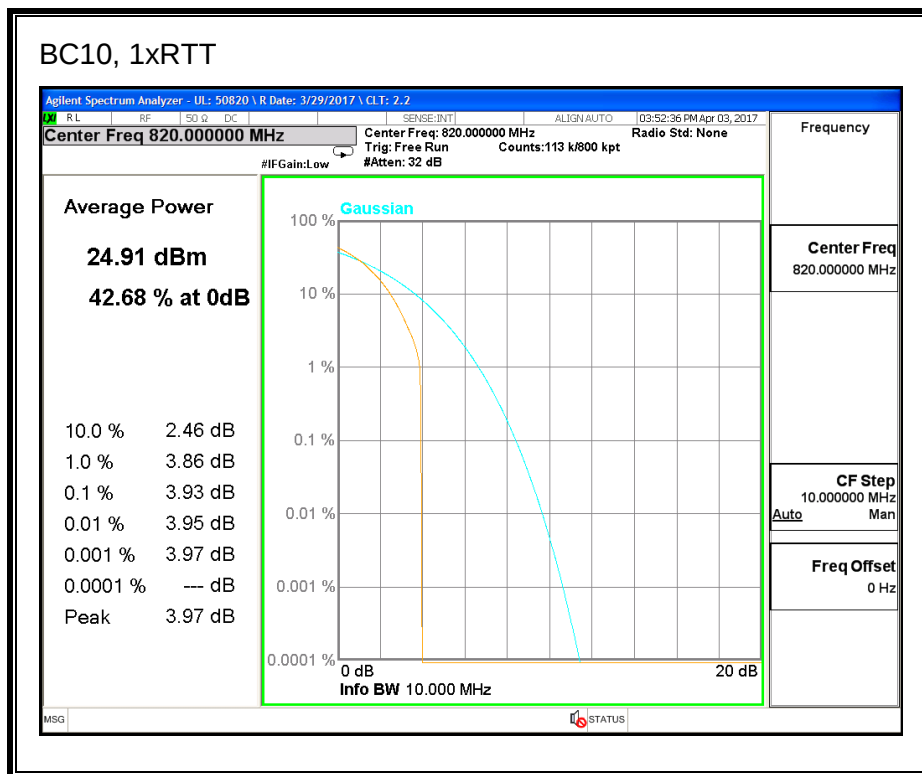
| Mode                                                        | Modulation | Conducted Power (dBm) |         | Peak-to-Average Ratio |
|-------------------------------------------------------------|------------|-----------------------|---------|-----------------------|
|                                                             |            | *Peak                 | Average |                       |
| UMTS Band 5                                                 | REL99      | 27.64                 | 24.77   | 2.87                  |
|                                                             | HSDPA      | 27.49                 | 24.59   | 2.90                  |
| UMTS Band 2                                                 | REL99      | 28.29                 | 25.17   | 3.12                  |
|                                                             | HSDPA      | 28.30                 | 25.14   | 3.16                  |
| UMTS Band 4                                                 | REL99      | 28.31                 | 25.20   | 3.11                  |
|                                                             | HSDPA      | 28.35                 | 25.17   | 3.18                  |
| *Peak Reading = Average Reading + Peak - to - Average Ratio |            |                       |         |                       |

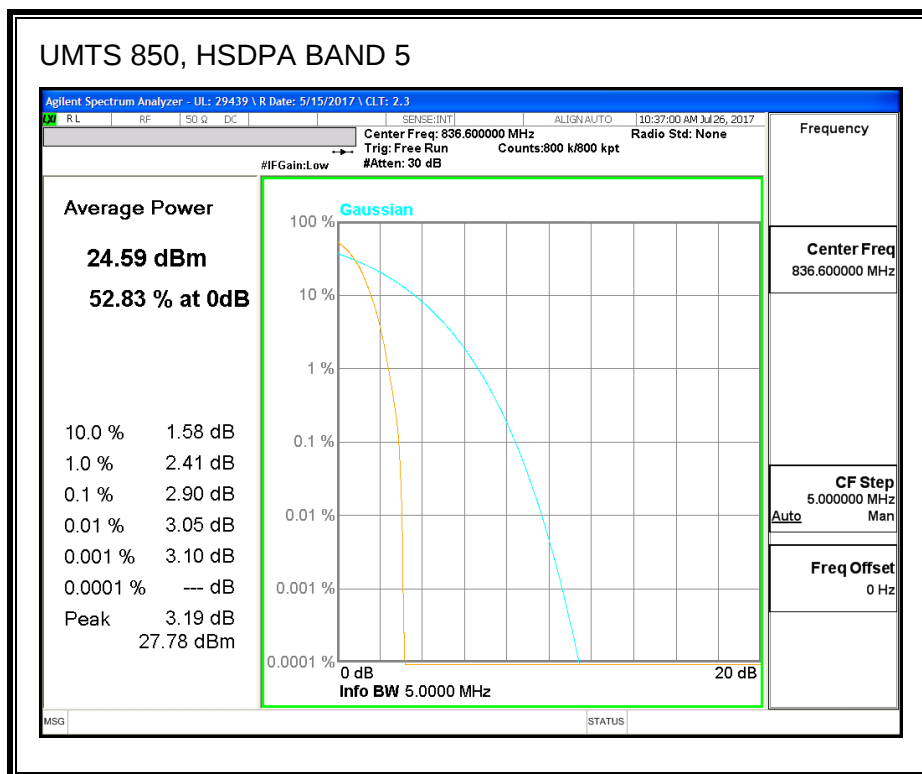
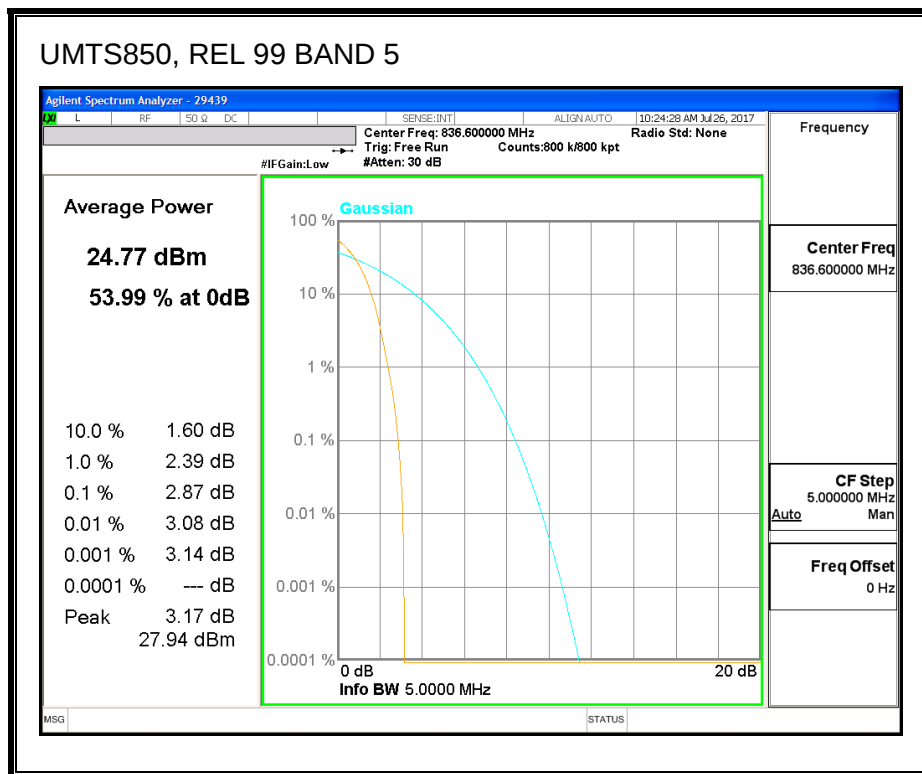


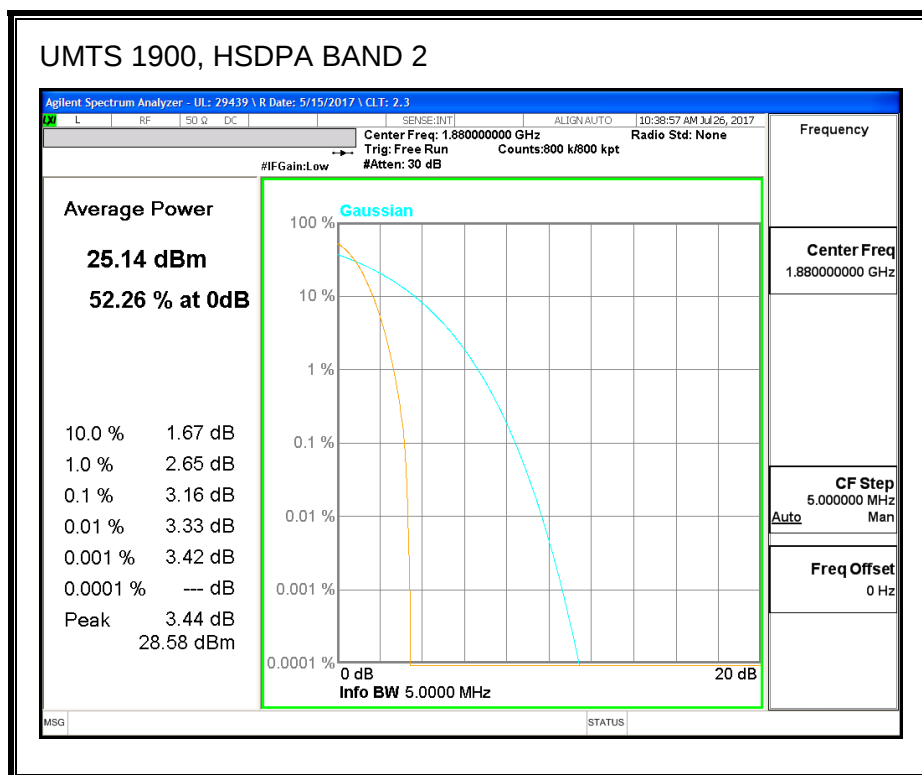
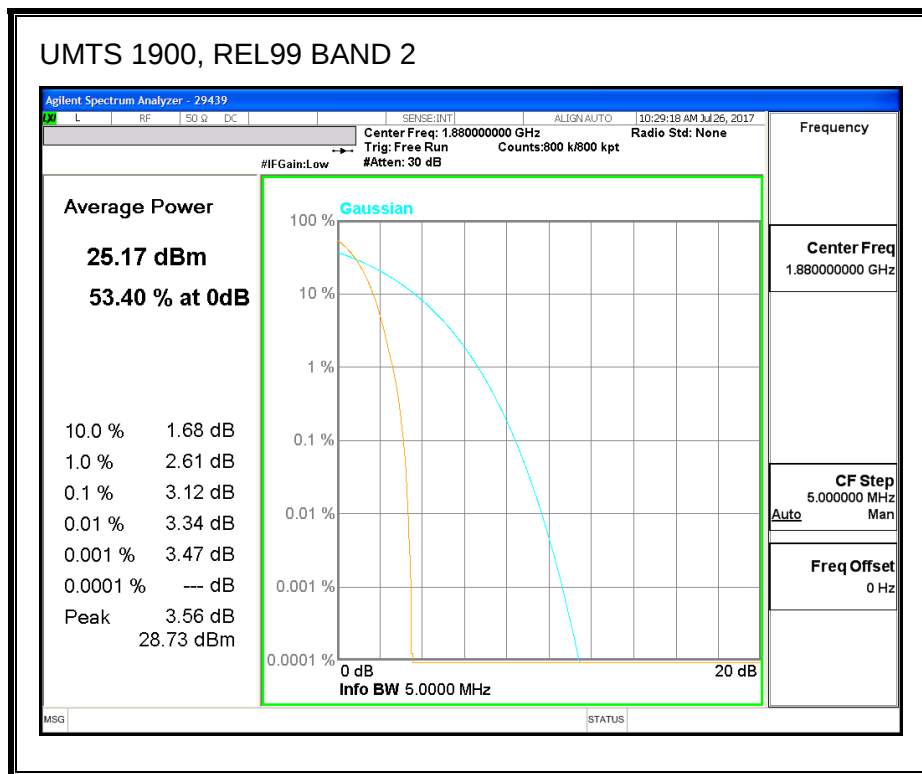


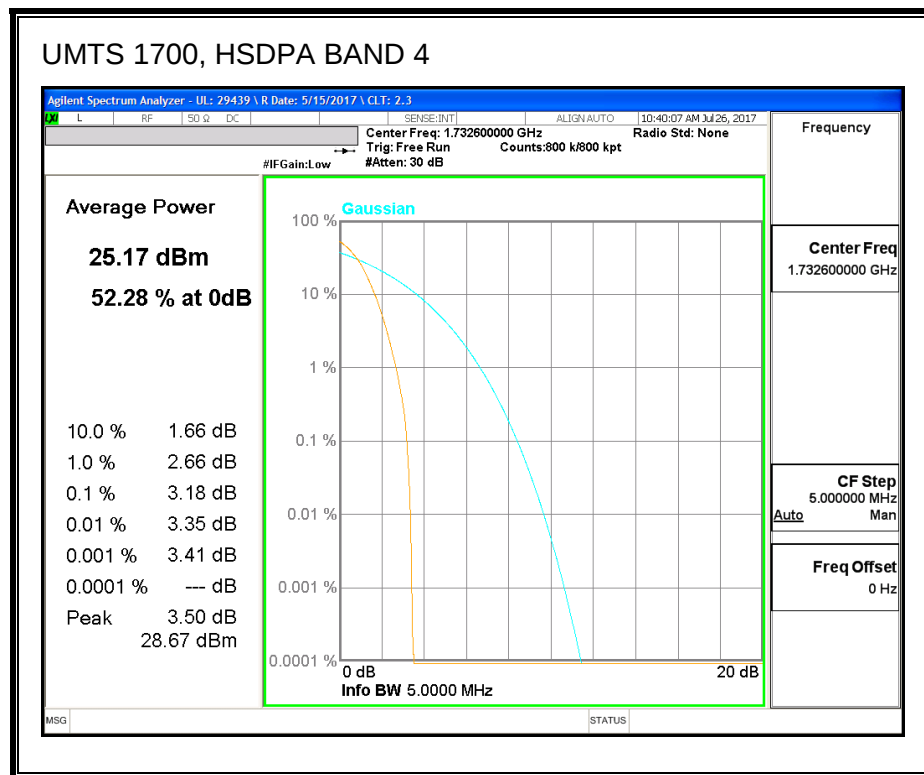
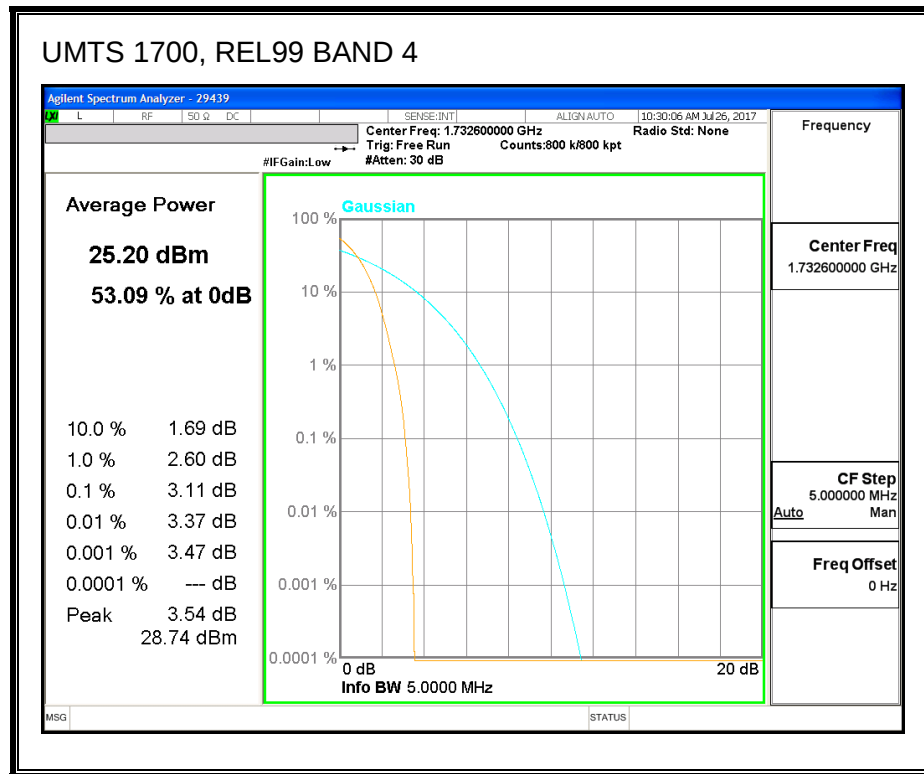












## 11. RADIATED TEST RESULTS

### 11.1. FIELD STRENGTH OF SPURIOUS RADIATION, LAT 1

#### RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53 and §90.691.  
IC: RSS132§5.5; RSS133§6.5 and RSS139§6.6

#### LIMIT

FCC: §22.917, §24.238, §27.53

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.

FCC: §90.691 Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10} (f/6.1)$  decibels or  $50 + 10 \log_{10} (P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

#### RSS132§5.5

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

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

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

#### RSS133§6.5

Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts).

(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

**RSS139§6.6**

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, Footnote 2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

**TEST PROCEDURE**

For Cellular equipment - 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.

For PCS equipment - Compliance with these rules 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. 1 MHz 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.

**MODES TESTED**

- GPRS/EGPRS
- UMTS, REL 99 and HSDPA
- CDMA2000, 1xRTT and EVDO, Rev A

**RESULTS**

# 11.1.1. GSM

## GPRS, 850MHz

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber                                                                                                                                                                                |                     |                    |          |                               |        |            |       |       |       |       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <div style="display: flex; justify-content: space-between;"> <div> <b>Company:</b><br/> <b>Project #:</b><br/> <b>Date:</b> 04/05/17<br/> <b>Test Engineer:</b> 39004<br/> <b>Configuration:</b> EUT only<br/> <b>Mode:</b> GPRS 850MHz </div> </div> |                     |                    |          |                               |        |            |       |       |       |       |
| <b>Test Equipment:</b><br>Substitution: Horn T59 Substitution, and 8ft SMA Cable                                                                                                                                                                      |                     |                    |          |                               |        |            |       |       |       |       |
| Chamber                                                                                                                                                                                                                                               |                     | Pre-amplifier      |          | Filter                        |        | Limit      |       |       |       |       |
| 3m Chamber E                                                                                                                                                                                                                                          |                     | 3m Chamber E       |          | Filter                        |        | EIRP       |       |       |       |       |
| Frequency<br>(GHz)                                                                                                                                                                                                                                    | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
| <b>Low Channel (824.2MHz)</b>                                                                                                                                                                                                                         |                     |                    |          |                               |        |            |       |       |       |       |
| 1.65                                                                                                                                                                                                                                                  | -56.9               | H                  | 3.0      | -14.5                         | 37.8   | 1.0        | -51.3 | -13.0 | -38.3 |       |
| 2.47                                                                                                                                                                                                                                                  | -63.3               | H                  | 3.0      | -18.3                         | 38.5   | 1.0        | -55.7 | -13.0 | -42.7 |       |
| 3.30                                                                                                                                                                                                                                                  | -63.6               | H                  | 3.0      | -14.7                         | 38.5   | 1.0        | -52.2 | -13.0 | -39.2 |       |
| 1.65                                                                                                                                                                                                                                                  | -54.5               | V                  | 3.0      | -12.4                         | 37.8   | 1.0        | -49.2 | -13.0 | -36.2 |       |
| 2.47                                                                                                                                                                                                                                                  | -63.7               | V                  | 3.0      | -18.6                         | 38.5   | 1.0        | -56.0 | -13.0 | -43.0 |       |
| 3.30                                                                                                                                                                                                                                                  | -63.9               | V                  | 3.0      | -15.2                         | 38.5   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| <b>Mid Channel (836.6MHz)</b>                                                                                                                                                                                                                         |                     |                    |          |                               |        |            |       |       |       |       |
| 1.67                                                                                                                                                                                                                                                  | -57.9               | H                  | 3.0      | -15.4                         | 37.8   | 1.0        | -52.2 | -13.0 | -39.2 |       |
| 2.51                                                                                                                                                                                                                                                  | -58.5               | H                  | 3.0      | -13.3                         | 38.6   | 1.0        | -50.9 | -13.0 | -37.9 |       |
| 3.35                                                                                                                                                                                                                                                  | -63.8               | H                  | 3.0      | -14.7                         | 38.5   | 1.0        | -52.2 | -13.0 | -39.2 |       |
| 1.67                                                                                                                                                                                                                                                  | -55.3               | V                  | 3.0      | -13.1                         | 37.8   | 1.0        | -49.9 | -13.0 | -36.9 |       |
| 2.51                                                                                                                                                                                                                                                  | -59.9               | V                  | 3.0      | -14.5                         | 38.6   | 1.0        | -52.1 | -13.0 | -39.1 |       |
| 3.35                                                                                                                                                                                                                                                  | -63.7               | V                  | 3.0      | -14.8                         | 38.5   | 1.0        | -52.3 | -13.0 | -39.3 |       |
| <b>High Channel (848.8MHz)</b>                                                                                                                                                                                                                        |                     |                    |          |                               |        |            |       |       |       |       |
| 1.70                                                                                                                                                                                                                                                  | -57.8               | H                  | 3.0      | -15.3                         | 37.9   | 1.0        | -52.1 | -13.0 | -39.1 |       |
| 2.55                                                                                                                                                                                                                                                  | -56.5               | H                  | 3.0      | -11.0                         | 38.6   | 1.0        | -48.6 | -13.0 | -35.6 |       |
| 3.40                                                                                                                                                                                                                                                  | -64.4               | H                  | 3.0      | -15.1                         | 38.5   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| 1.70                                                                                                                                                                                                                                                  | -53.7               | V                  | 3.0      | -11.3                         | 37.9   | 1.0        | -48.1 | -13.0 | -35.1 |       |
| 2.55                                                                                                                                                                                                                                                  | -55.9               | V                  | 3.0      | -10.3                         | 38.6   | 1.0        | -47.8 | -13.0 | -34.8 |       |
| 3.40                                                                                                                                                                                                                                                  | -64.3               | V                  | 3.0      | -15.3                         | 38.5   | 1.0        | -52.8 | -13.0 | -39.8 |       |
| Rev. 03.19.15                                                                                                                                                                                                                                         |                     |                    |          |                               |        |            |       |       |       |       |

**EGPRS, 850MHz**

**High Frequency Substitution Measurement**  
**UL Fremont Radiated Chamber**

**Company:**  
**Project #:**  
**Date:** 04/05/17  
**Test Engineer:** 39004  
**Configuration:** EUT only  
**Mode:** EGPRS 850MHz

**Test Equipment:**  
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

**Chamber**  
 3m Chamber E

**Pre-amplifier**  
 3m Chamber E

**Filter**  
 Filter

**Limit**  
 EIRP

| Frequency<br>(GHz)             | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|--------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (824.2MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 1.65                           | -57.3               | H                  | 3.0      | -14.9                         | 37.8   | 1.0        | -51.7 | -13.0 | -38.7 |       |
| 2.47                           | -63.9               | H                  | 3.0      | -18.9                         | 38.5   | 1.0        | -56.3 | -13.0 | -43.3 |       |
| 3.30                           | -63.7               | H                  | 3.0      | -14.8                         | 38.5   | 1.0        | -52.2 | -13.0 | -39.2 |       |
| 1.65                           | -55.9               | V                  | 3.0      | -13.7                         | 37.8   | 1.0        | -50.6 | -13.0 | -37.6 |       |
| 2.47                           | -63.9               | V                  | 3.0      | -18.8                         | 38.5   | 1.0        | -56.2 | -13.0 | -43.2 |       |
| 3.30                           | -63.7               | V                  | 3.0      | -15.0                         | 38.5   | 1.0        | -52.5 | -13.0 | -39.5 |       |
| <b>Mid Channel (836.6MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 1.67                           | -57.2               | H                  | 3.0      | -14.7                         | 37.8   | 1.0        | -51.6 | -13.0 | -38.6 |       |
| 2.51                           | -59.4               | H                  | 3.0      | -14.2                         | 38.6   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| 3.35                           | -63.4               | H                  | 3.0      | -14.4                         | 38.5   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| 1.67                           | -51.2               | V                  | 3.0      | -9.0                          | 37.8   | 1.0        | -45.8 | -13.0 | -32.8 |       |
| 2.51                           | -60.5               | V                  | 3.0      | -15.1                         | 38.6   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| 3.35                           | -64.3               | V                  | 3.0      | -15.4                         | 38.5   | 1.0        | -52.9 | -13.0 | -39.9 |       |
| <b>High Channel (848.8MHz)</b> |                     |                    |          |                               |        |            |       |       |       |       |
| 1.70                           | -58.3               | H                  | 3.0      | -15.7                         | 37.9   | 1.0        | -52.6 | -13.0 | -39.6 |       |
| 2.55                           | -57.2               | H                  | 3.0      | -11.7                         | 38.6   | 1.0        | -49.3 | -13.0 | -36.3 |       |
| 3.40                           | -64.4               | H                  | 3.0      | -15.2                         | 38.5   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| 1.70                           | -54.8               | V                  | 3.0      | -12.4                         | 37.9   | 1.0        | -49.3 | -13.0 | -36.3 |       |
| 2.55                           | -56.3               | V                  | 3.0      | -10.7                         | 38.6   | 1.0        | -48.3 | -13.0 | -35.3 |       |
| 3.40                           | -64.4               | V                  | 3.0      | -15.4                         | 38.5   | 1.0        | -52.9 | -13.0 | -39.9 |       |

Rev. 03.19.15

**GPRS, 1900MHz**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 04/05/17  
Test Engineer: 39004  
Configuration: EUT only  
Mode: GPRS 1900MHz

Test Equipment:  
Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1850.2MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                            | -56.5            | H               | 3.0      | -6.5                    | 38.6   | 1.0        | -44.2 | -13.0 | -31.2 |       |
| 5.55                            | -61.5            | H               | 3.0      | -7.5                    | 38.6   | 1.0        | -45.0 | -13.0 | -32.0 |       |
| 7.40                            | -64.3            | H               | 3.0      | -6.6                    | 37.8   | 1.0        | -43.4 | -13.0 | -30.4 |       |
| 3.70                            | -57.8            | V               | 3.0      | -7.9                    | 38.6   | 1.0        | -45.5 | -13.0 | -32.5 |       |
| 5.55                            | -61.0            | V               | 3.0      | -7.3                    | 38.6   | 1.0        | -44.8 | -13.0 | -31.8 |       |
| 7.40                            | -63.8            | V               | 3.0      | -6.3                    | 37.8   | 1.0        | -43.1 | -13.0 | -30.1 |       |
| <b>Mid Channel (1880.0)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                            | -56.0            | H               | 3.0      | -5.9                    | 38.6   | 1.0        | -43.5 | -13.0 | -30.5 |       |
| 5.64                            | -61.0            | H               | 3.0      | -6.8                    | 38.5   | 1.0        | -44.3 | -13.0 | -31.3 |       |
| 7.52                            | -63.8            | H               | 3.0      | -6.0                    | 37.7   | 1.0        | -42.7 | -13.0 | -29.7 |       |
| 3.76                            | -57.6            | V               | 3.0      | -7.5                    | 38.6   | 1.0        | -45.1 | -13.0 | -32.1 |       |
| 5.64                            | -60.7            | V               | 3.0      | -6.8                    | 38.5   | 1.0        | -44.3 | -13.0 | -31.3 |       |
| 7.52                            | -63.8            | V               | 3.0      | -6.2                    | 37.7   | 1.0        | -42.9 | -13.0 | -29.9 |       |
| <b>High Channel (1909.8MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                            | -58.0            | H               | 3.0      | -7.7                    | 38.7   | 1.0        | -45.4 | -13.0 | -32.4 |       |
| 5.73                            | -60.8            | H               | 3.0      | -6.4                    | 38.5   | 1.0        | -43.9 | -13.0 | -30.9 |       |
| 7.54                            | -63.6            | H               | 3.0      | -5.8                    | 37.7   | 1.0        | -42.5 | -13.0 | -29.5 |       |
| 3.82                            | -59.0            | V               | 3.0      | -8.8                    | 38.7   | 1.0        | -46.4 | -13.0 | -33.4 |       |
| 5.73                            | -61.1            | V               | 3.0      | -7.0                    | 38.5   | 1.0        | -44.5 | -13.0 | -31.5 |       |
| 7.54                            | -64.3            | V               | 3.0      | -6.7                    | 37.7   | 1.0        | -43.4 | -13.0 | -30.4 |       |

Rev. 03.19.15

**EGPRS, 1900MHz**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber                                                                                       |                     |                    |          |                               |        |            |       |       |       |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <b>Company:</b><br><b>Project #:</b><br><b>Date:</b> 04/05/17<br><b>Test Engineer:</b> 39004<br><b>Configuration:</b> EUT only<br><b>Mode:</b> EGPRS 1900MHz |                     |                    |          |                               |        |            |       |       |       |       |
| <b>Test Equipment:</b><br>Substitution: Horn T59 Substitution, and 8ft SMA Cable                                                                             |                     |                    |          |                               |        |            |       |       |       |       |
| Chamber                                                                                                                                                      |                     | Pre-amplifier      |          | Filter                        |        | Limit      |       |       |       |       |
| 3m Chamber E                                                                                                                                                 |                     | 3m Chamber E       |          | Filter                        |        | EIRP       |       |       |       |       |
| Frequency<br>(GHz)                                                                                                                                           | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
| <b>Low Channel (1850.2MHz)</b>                                                                                                                               |                     |                    |          |                               |        |            |       |       |       |       |
| 3.70                                                                                                                                                         | -59.1               | H                  | 3.0      | -9.1                          | 38.6   | 1.0        | -46.8 | -13.0 | -33.8 |       |
| 5.55                                                                                                                                                         | -62.2               | H                  | 3.0      | -8.2                          | 38.6   | 1.0        | -45.7 | -13.0 | -32.7 |       |
| 7.40                                                                                                                                                         | -64.8               | H                  | 3.0      | -7.1                          | 37.8   | 1.0        | -43.9 | -13.0 | -30.9 |       |
| 3.70                                                                                                                                                         | -59.0               | V                  | 3.0      | -9.1                          | 38.6   | 1.0        | -46.7 | -13.0 | -33.7 |       |
| 5.55                                                                                                                                                         | -60.9               | V                  | 3.0      | -7.2                          | 38.6   | 1.0        | -44.7 | -13.0 | -31.7 |       |
| 7.40                                                                                                                                                         | -63.9               | V                  | 3.0      | -6.4                          | 37.8   | 1.0        | -43.3 | -13.0 | -30.3 |       |
| <b>Mid Channel (1880.0)</b>                                                                                                                                  |                     |                    |          |                               |        |            |       |       |       |       |
| 3.76                                                                                                                                                         | -57.9               | H                  | 3.0      | -7.8                          | 38.6   | 1.0        | -45.4 | -13.0 | -32.4 |       |
| 5.64                                                                                                                                                         | -60.8               | H                  | 3.0      | -6.6                          | 38.5   | 1.0        | -44.1 | -13.0 | -31.1 |       |
| 7.52                                                                                                                                                         | -64.8               | H                  | 3.0      | -7.0                          | 37.7   | 1.0        | -43.7 | -13.0 | -30.7 |       |
| 3.76                                                                                                                                                         | -57.5               | V                  | 3.0      | -7.4                          | 38.6   | 1.0        | -45.1 | -13.0 | -32.1 |       |
| 5.64                                                                                                                                                         | -61.0               | V                  | 3.0      | -7.1                          | 38.5   | 1.0        | -44.6 | -13.0 | -31.6 |       |
| 7.52                                                                                                                                                         | -63.6               | V                  | 3.0      | -6.0                          | 37.7   | 1.0        | -42.7 | -13.0 | -29.7 |       |
| <b>High Channel (1909.8MHz)</b>                                                                                                                              |                     |                    |          |                               |        |            |       |       |       |       |
| 3.82                                                                                                                                                         | -58.7               | H                  | 3.0      | -8.4                          | 38.7   | 1.0        | -46.1 | -13.0 | -33.1 |       |
| 5.73                                                                                                                                                         | -61.2               | H                  | 3.0      | -6.8                          | 38.5   | 1.0        | -44.3 | -13.0 | -31.3 |       |
| 7.54                                                                                                                                                         | -63.7               | H                  | 3.0      | -5.9                          | 37.7   | 1.0        | -42.6 | -13.0 | -29.6 |       |
| 3.82                                                                                                                                                         | -58.8               | V                  | 3.0      | -8.5                          | 38.7   | 1.0        | -46.2 | -13.0 | -33.2 |       |
| 5.73                                                                                                                                                         | -61.6               | V                  | 3.0      | -7.5                          | 38.5   | 1.0        | -45.0 | -13.0 | -32.0 |       |
| 7.54                                                                                                                                                         | -64.0               | V                  | 3.0      | -6.3                          | 37.7   | 1.0        | -43.1 | -13.0 | -30.1 |       |
| Rev. 03.19.15                                                                                                                                                |                     |                    |          |                               |        |            |       |       |       |       |

## 11.1.2. CDMA2000 Rev A

### CDMA2000 1xRTT, 850MHz BC0

**High Frequency Substitution Measurement**  
**UL Fremont Radiated Chamber**

**Company:**  
**Project #:**  
**Date:** 04/06/17  
**Test Engineer:** 39004  
**Configuration:** EUT Only  
**Mode:** 1xRTT 850MHz

**Test Equipment:**  
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

**Chamber**  
 3m Chamber E

**Pre-amplifier**  
 3m Chamber E

**Filter**  
 Filter

**Limit**  
 EIRP

| Frequency<br>(GHz)              | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (824.7MHz)</b>   |                     |                    |          |                               |        |            |       |       |       |       |
| 1.65                            | -63.6               | H                  | 3.0      | -21.2                         | 37.8   | 1.0        | -58.0 | -13.0 | -45.0 |       |
| 2.47                            | -63.5               | H                  | 3.0      | -18.5                         | 38.5   | 1.0        | -55.9 | -13.0 | -42.9 |       |
| 3.30                            | -63.7               | H                  | 3.0      | -14.7                         | 38.5   | 1.0        | -52.2 | -13.0 | -39.2 |       |
| 1.65                            | -63.5               | V                  | 3.0      | -21.3                         | 37.8   | 1.0        | -58.2 | -13.0 | -45.2 |       |
| 2.47                            | -63.7               | V                  | 3.0      | -18.5                         | 38.5   | 1.0        | -56.0 | -13.0 | -43.0 |       |
| 3.30                            | -62.2               | V                  | 3.0      | -13.5                         | 38.5   | 1.0        | -51.0 | -13.0 | -38.0 |       |
| <b>Mid Channel (836.52MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 1.67                            | -65.4               | H                  | 3.0      | -22.9                         | 37.8   | 1.0        | -59.7 | -13.0 | -46.7 |       |
| 2.51                            | -63.9               | H                  | 3.0      | -18.7                         | 38.6   | 1.0        | -56.2 | -13.0 | -43.2 |       |
| 3.35                            | -65.4               | H                  | 3.0      | -16.3                         | 38.5   | 1.0        | -53.8 | -13.0 | -40.8 |       |
| 1.67                            | -64.8               | V                  | 3.0      | -22.5                         | 37.8   | 1.0        | -59.4 | -13.0 | -46.4 |       |
| 2.51                            | -64.2               | V                  | 3.0      | -18.8                         | 38.6   | 1.0        | -56.4 | -13.0 | -43.4 |       |
| 3.35                            | -65.3               | V                  | 3.0      | -16.4                         | 38.5   | 1.0        | -53.9 | -13.0 | -40.9 |       |
| <b>High Channel (848.31MHz)</b> |                     |                    |          |                               |        |            |       |       |       |       |
| 1.70                            | -62.5               | H                  | 3.0      | -19.9                         | 37.9   | 1.0        | -56.8 | -13.0 | -43.8 |       |
| 2.54                            | -63.7               | H                  | 3.0      | -18.3                         | 38.6   | 1.0        | -55.8 | -13.0 | -42.8 |       |
| 3.39                            | -66.5               | H                  | 3.0      | -17.3                         | 38.5   | 1.0        | -54.8 | -13.0 | -41.8 |       |
| 1.70                            | -62.9               | V                  | 3.0      | -20.5                         | 37.9   | 1.0        | -57.3 | -13.0 | -44.3 |       |
| 2.54                            | -62.8               | V                  | 3.0      | -17.3                         | 38.6   | 1.0        | -54.9 | -13.0 | -41.9 |       |
| 3.39                            | -65.2               | V                  | 3.0      | -16.2                         | 38.5   | 1.0        | -53.7 | -13.0 | -40.7 |       |

Rev. 03.19.15

**EVDO-Rev A, 850MHz BC0**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 06/17/17  
Test Engineer: 10641  
Configuration: EUT only  
Mode: Rev 0/A 850MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency<br>(GHz)              | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (824.7MHz)</b>   |                     |                    |          |                               |        |            |       |       |       |       |
| 1.65                            | -69.4               | H                  | 3.0      | -27.0                         | 37.8   | 1.0        | -63.8 | -13.0 | -50.8 |       |
| 2.47                            | -69.2               | H                  | 3.0      | -24.2                         | 38.5   | 1.0        | -61.7 | -13.0 | -48.7 |       |
| 3.30                            | -67.6               | H                  | 3.0      | -18.7                         | 38.5   | 1.0        | -56.2 | -13.0 | -43.2 |       |
| 1.65                            | -69.7               | V                  | 3.0      | -27.6                         | 37.8   | 1.0        | -64.4 | -13.0 | -51.4 |       |
| 2.47                            | -69.1               | V                  | 3.0      | -24.0                         | 38.5   | 1.0        | -61.4 | -13.0 | -48.4 |       |
| 3.30                            | -67.4               | V                  | 3.0      | -18.7                         | 38.5   | 1.0        | -56.2 | -13.0 | -43.2 |       |
| <b>Mid Channel (836.52MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 1.67                            | -70.0               | H                  | 3.0      | -27.5                         | 37.8   | 1.0        | -64.4 | -13.0 | -51.4 |       |
| 2.51                            | -68.0               | H                  | 3.0      | -22.8                         | 38.6   | 1.0        | -60.4 | -13.0 | -47.4 |       |
| 3.35                            | -68.2               | H                  | 3.0      | -19.1                         | 38.5   | 1.0        | -56.6 | -13.0 | -43.6 |       |
| 1.67                            | -69.5               | V                  | 3.0      | -27.3                         | 37.8   | 1.0        | -64.1 | -13.0 | -51.1 |       |
| 2.51                            | -67.6               | V                  | 3.0      | -22.2                         | 38.6   | 1.0        | -59.8 | -13.0 | -46.8 |       |
| 3.35                            | -67.9               | V                  | 3.0      | -19.0                         | 38.5   | 1.0        | -56.5 | -13.0 | -43.5 |       |
| <b>High Channel (848.31MHz)</b> |                     |                    |          |                               |        |            |       |       |       |       |
| 1.70                            | -68.1               | H                  | 3.0      | -25.5                         | 37.9   | 1.0        | -62.4 | -13.0 | -49.4 |       |
| 2.54                            | -67.7               | H                  | 3.0      | -22.3                         | 38.6   | 1.0        | -59.8 | -13.0 | -46.8 |       |
| 3.39                            | -67.9               | H                  | 3.0      | -18.7                         | 38.5   | 1.0        | -56.2 | -13.0 | -43.2 |       |
| 1.70                            | -70.4               | V                  | 3.0      | -28.0                         | 37.9   | 1.0        | -64.8 | -13.0 | -51.8 |       |
| 2.54                            | -67.2               | V                  | 3.0      | -21.6                         | 38.6   | 1.0        | -59.2 | -13.0 | -46.2 |       |
| 3.39                            | -69.2               | V                  | 3.0      | -20.2                         | 38.5   | 1.0        | -57.7 | -13.0 | -44.7 |       |

Rev. 03.19.15

**CDMA2000 1xRTT, 1900MHz BC1**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 04/06/17  
Test Engineer: 39004  
Configuration: EUT only  
Mode: 1xRTT 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                  | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|----------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1851.25MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                             | -63.6            | H               | 3.0      | -13.7                   | 38.6   | 1.0        | -51.3 | -13.0 | -38.3 |       |
| 5.55                             | -63.8            | H               | 3.0      | -9.7                    | 38.6   | 1.0        | -47.3 | -13.0 | -34.3 |       |
| 7.41                             | -63.7            | H               | 3.0      | -6.0                    | 37.8   | 1.0        | -42.8 | -13.0 | -29.8 |       |
| 3.70                             | -63.6            | V               | 3.0      | -13.7                   | 38.6   | 1.0        | -51.4 | -13.0 | -38.4 |       |
| 5.55                             | -63.7            | V               | 3.0      | -10.0                   | 38.6   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 7.41                             | -62.1            | V               | 3.0      | -4.7                    | 37.8   | 1.0        | -41.5 | -13.0 | -28.5 |       |
| <b>Mid Channel (1880MHz)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                             | -65.4            | H               | 3.0      | -15.3                   | 38.6   | 1.0        | -52.9 | -13.0 | -39.9 |       |
| 5.64                             | -63.9            | H               | 3.0      | -9.6                    | 38.5   | 1.0        | -47.2 | -13.0 | -34.2 |       |
| 7.52                             | -65.5            | H               | 3.0      | -7.7                    | 37.7   | 1.0        | -44.4 | -13.0 | -31.4 |       |
| 3.76                             | -64.8            | V               | 3.0      | -14.7                   | 38.6   | 1.0        | -52.3 | -13.0 | -39.3 |       |
| 5.64                             | -64.2            | V               | 3.0      | -10.2                   | 38.5   | 1.0        | -47.8 | -13.0 | -34.8 |       |
| 7.52                             | -65.3            | V               | 3.0      | -7.6                    | 37.7   | 1.0        | -44.4 | -13.0 | -31.4 |       |
| <b>High Channel (1908.75MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                             | -62.4            | H               | 3.0      | -12.2                   | 38.7   | 1.0        | -49.8 | -13.0 | -36.8 |       |
| 5.73                             | -63.6            | H               | 3.0      | -9.2                    | 38.5   | 1.0        | -46.7 | -13.0 | -33.7 |       |
| 7.64                             | -66.6            | H               | 3.0      | -8.6                    | 37.7   | 1.0        | -45.3 | -13.0 | -32.3 |       |
| 3.82                             | -62.9            | V               | 3.0      | -12.7                   | 38.7   | 1.0        | -50.3 | -13.0 | -37.3 |       |
| 5.73                             | -62.9            | V               | 3.0      | -8.7                    | 38.5   | 1.0        | -46.3 | -13.0 | -33.3 |       |
| 7.64                             | -66.2            | V               | 3.0      | -8.4                    | 37.7   | 1.0        | -45.1 | -13.0 | -32.1 |       |

Rev. 03.19.15

**EVDO-Rev A, 1900MHz BC1**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 06/17/17  
Test Engineer: 10641  
Configuration: EUT only  
Mode: Rev 0/A 1900MHz

**Test Equipment:**  
Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                  | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|----------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1851.25MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                             | -64.3            | H               | 3.0      | -14.3                   | 38.6   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| 5.55                             | -67.5            | H               | 3.0      | -13.5                   | 38.6   | 1.0        | -51.0 | -13.0 | -38.0 |       |
| 7.41                             | -67.9            | H               | 3.0      | -10.3                   | 37.8   | 1.0        | -47.1 | -13.0 | -34.1 |       |
| 3.70                             | -65.6            | V               | 3.0      | -15.7                   | 38.6   | 1.0        | -53.4 | -13.0 | -40.4 |       |
| 5.55                             | -65.6            | V               | 3.0      | -11.9                   | 38.6   | 1.0        | -49.5 | -13.0 | -36.5 |       |
| 7.41                             | -66.8            | V               | 3.0      | -9.3                    | 37.8   | 1.0        | -46.2 | -13.0 | -33.2 |       |
| <b>Mid Channel (1880MHz)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                             | -66.2            | H               | 3.0      | -16.1                   | 38.6   | 1.0        | -53.7 | -13.0 | -40.7 |       |
| 5.64                             | -67.3            | H               | 3.0      | -13.1                   | 38.5   | 1.0        | -50.6 | -13.0 | -37.6 |       |
| 7.52                             | -68.4            | H               | 3.0      | -10.6                   | 37.7   | 1.0        | -47.3 | -13.0 | -34.3 |       |
| 3.76                             | -65.2            | V               | 3.0      | -15.1                   | 38.6   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| 5.64                             | -67.7            | V               | 3.0      | -13.8                   | 38.5   | 1.0        | -51.3 | -13.0 | -38.3 |       |
| 7.52                             | -67.8            | V               | 3.0      | -10.2                   | 37.7   | 1.0        | -46.9 | -13.0 | -33.9 |       |
| <b>High Channel (1908.75MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                             | -66.4            | H               | 3.0      | -16.1                   | 38.7   | 1.0        | -53.7 | -13.0 | -40.7 |       |
| 5.73                             | -67.1            | H               | 3.0      | -12.7                   | 38.5   | 1.0        | -50.2 | -13.0 | -37.2 |       |
| 7.64                             | -67.8            | H               | 3.0      | -9.8                    | 37.7   | 1.0        | -46.5 | -13.0 | -33.5 |       |
| 3.82                             | -65.8            | V               | 3.0      | -15.6                   | 38.7   | 1.0        | -53.3 | -13.0 | -40.3 |       |
| 5.73                             | -67.3            | V               | 3.0      | -13.2                   | 38.5   | 1.0        | -50.7 | -13.0 | -37.7 |       |
| 7.64                             | -67.8            | V               | 3.0      | -10.0                   | 37.7   | 1.0        | -46.7 | -13.0 | -33.7 |       |

Rev. 03.19.15

**CDMA2000 1xRTT, 800MHz BC10**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 04/06/17  
Test Engineer: 39004  
Configuration: EUT only  
Mode: 1xRTT 800MHz

**Test Equipment:**  
Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (817.25MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.63                            | -64.3            | H               | 3.0      | -21.9                   | 37.8   | 1.0        | -58.8 | -13.0 | -45.8 |       |
| 2.45                            | -65.6            | H               | 3.0      | -20.7                   | 38.4   | 1.0        | -58.1 | -13.0 | -45.1 |       |
| 3.27                            | -64.3            | H               | 3.0      | -15.4                   | 38.5   | 1.0        | -52.8 | -13.0 | -39.8 |       |
| 1.63                            | -63.4            | V               | 3.0      | -21.3                   | 37.8   | 1.0        | -58.2 | -13.0 | -45.2 |       |
| 2.45                            | -63.7            | V               | 3.0      | -18.6                   | 38.4   | 1.0        | -56.0 | -13.0 | -43.0 |       |
| 3.27                            | -63.3            | V               | 3.0      | -14.7                   | 38.5   | 1.0        | -52.2 | -13.0 | -39.2 |       |
| <b>Mid Channel (820MHz)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 1.64                            | -64.1            | H               | 3.0      | -21.7                   | 37.8   | 1.0        | -58.5 | -13.0 | -45.5 |       |
| 2.46                            | -64.6            | H               | 3.0      | -19.7                   | 38.4   | 1.0        | -57.1 | -13.0 | -44.1 |       |
| 3.28                            | -64.4            | H               | 3.0      | -15.5                   | 38.5   | 1.0        | -52.9 | -13.0 | -39.9 |       |
| 1.64                            | -64.7            | V               | 3.0      | -22.6                   | 37.8   | 1.0        | -59.5 | -13.0 | -46.5 |       |
| 2.46                            | -64.2            | V               | 3.0      | -19.0                   | 38.4   | 1.0        | -56.5 | -13.0 | -43.5 |       |
| 3.28                            | -64.2            | V               | 3.0      | -15.6                   | 38.5   | 1.0        | -53.1 | -13.0 | -40.1 |       |
| <b>High Channel (822.75MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                            | -64.6            | H               | 3.0      | -22.2                   | 37.8   | 1.0        | -59.0 | -13.0 | -46.0 |       |
| 2.47                            | -63.8            | H               | 3.0      | -18.8                   | 38.5   | 1.0        | -56.3 | -13.0 | -43.3 |       |
| 3.29                            | -63.6            | H               | 3.0      | -14.7                   | 38.5   | 1.0        | -52.2 | -13.0 | -39.2 |       |
| 1.65                            | -63.4            | V               | 3.0      | -21.2                   | 37.8   | 1.0        | -58.1 | -13.0 | -45.1 |       |
| 2.47                            | -64.3            | V               | 3.0      | -19.1                   | 38.5   | 1.0        | -56.6 | -13.0 | -43.6 |       |
| 3.29                            | -63.6            | V               | 3.0      | -15.0                   | 38.5   | 1.0        | -52.4 | -13.0 | -39.4 |       |

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**EVDO-Rev A, 800MHz BC10**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber                                                                                         |                     |                    |          |                               |        |            |       |       |       |       |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|--|
| <b>Company:</b><br><b>Project #:</b><br><b>Date:</b> 06/17/17<br><b>Test Engineer:</b> 10641<br><b>Configuration:</b> EUT only<br><b>Mode:</b> Rev O/A, 800MHz |                     |                    |          |                               |        |            |       |       |       |       |  |
| <b>Test Equipment:</b><br>Substitution: Horn T59 Substitution, and 8ft SMA Cable                                                                               |                     |                    |          |                               |        |            |       |       |       |       |  |
| Chamber                                                                                                                                                        |                     | Pre-amplifier      |          | Filter                        |        | Limit      |       |       |       |       |  |
| 3m Chamber E                                                                                                                                                   |                     | 3m Chamber E       |          | Filter                        |        | EIRP       |       |       |       |       |  |
| Frequency<br>(GHz)                                                                                                                                             | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |  |
| <b>Low Channel (817.25MHz)</b>                                                                                                                                 |                     |                    |          |                               |        |            |       |       |       |       |  |
| 1.63                                                                                                                                                           | -69.0               | H                  | 3.0      | -26.6                         | 37.8   | 1.0        | -63.4 | -13.0 | -50.4 |       |  |
| 2.45                                                                                                                                                           | -68.6               | H                  | 3.0      | -23.8                         | 38.4   | 1.0        | -61.1 | -13.0 | -48.1 |       |  |
| 3.27                                                                                                                                                           | -66.4               | H                  | 3.0      | -17.5                         | 38.5   | 1.0        | -55.0 | -13.0 | -42.0 |       |  |
| 1.63                                                                                                                                                           | -67.2               | V                  | 3.0      | -25.2                         | 37.8   | 1.0        | -62.0 | -13.0 | -49.0 |       |  |
| 2.45                                                                                                                                                           | -67.3               | V                  | 3.0      | -22.3                         | 38.4   | 1.0        | -59.7 | -13.0 | -46.7 |       |  |
| 3.27                                                                                                                                                           | -66.3               | V                  | 3.0      | -17.7                         | 38.5   | 1.0        | -55.2 | -13.0 | -42.2 |       |  |
| <b>Mid Channel (820MHz)</b>                                                                                                                                    |                     |                    |          |                               |        |            |       |       |       |       |  |
| 1.64                                                                                                                                                           | -68.0               | H                  | 3.0      | -25.5                         | 37.8   | 1.0        | -62.4 | -13.0 | -49.4 |       |  |
| 2.46                                                                                                                                                           | -68.0               | H                  | 3.0      | -23.1                         | 38.4   | 1.0        | -60.5 | -13.0 | -47.5 |       |  |
| 3.28                                                                                                                                                           | -65.6               | H                  | 3.0      | -16.7                         | 38.5   | 1.0        | -54.2 | -13.0 | -41.2 |       |  |
| 1.64                                                                                                                                                           | -67.5               | V                  | 3.0      | -25.4                         | 37.8   | 1.0        | -62.2 | -13.0 | -49.2 |       |  |
| 2.46                                                                                                                                                           | -66.7               | V                  | 3.0      | -21.6                         | 38.4   | 1.0        | -59.0 | -13.0 | -46.0 |       |  |
| 3.28                                                                                                                                                           | -66.3               | V                  | 3.0      | -17.7                         | 38.5   | 1.0        | -55.1 | -13.0 | -42.1 |       |  |
| <b>High Channel (822.75MHz)</b>                                                                                                                                |                     |                    |          |                               |        |            |       |       |       |       |  |
| 1.65                                                                                                                                                           | -68.1               | H                  | 3.0      | -25.6                         | 37.8   | 1.0        | -62.5 | -13.0 | -49.5 |       |  |
| 2.47                                                                                                                                                           | -68.0               | H                  | 3.0      | -23.0                         | 38.5   | 1.0        | -60.5 | -13.0 | -47.5 |       |  |
| 3.29                                                                                                                                                           | -65.8               | H                  | 3.0      | -16.8                         | 38.5   | 1.0        | -54.3 | -13.0 | -41.3 |       |  |
| 1.65                                                                                                                                                           | -67.4               | V                  | 3.0      | -25.2                         | 37.8   | 1.0        | -62.1 | -13.0 | -49.1 |       |  |
| 2.47                                                                                                                                                           | -66.7               | V                  | 3.0      | -21.6                         | 38.5   | 1.0        | -59.0 | -13.0 | -46.0 |       |  |
| 3.29                                                                                                                                                           | -66.3               | V                  | 3.0      | -17.6                         | 38.5   | 1.0        | -55.1 | -13.0 | -42.1 |       |  |
| Rev. 03.19.15                                                                                                                                                  |                     |                    |          |                               |        |            |       |       |       |       |  |

### 11.1.3. UMTS

#### UMTS REL 99, 850MHz BAND 5

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber                                                                                                                                                                                   |                  |                 |          |                         |        |            |       |       |       |       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <div style="display: flex; justify-content: space-between;"> <div> <b>Company:</b><br/> <b>Project #:</b><br/> <b>Date:</b> 04/05/17<br/> <b>Test Engineer:</b> 39004<br/> <b>Configuration:</b> EUT Only<br/> <b>Mode:</b> REL 99, 850MHz </div> </div> |                  |                 |          |                         |        |            |       |       |       |       |
| <b>Test Equipment:</b><br>Substitution: Horn T59 Substitution, and 8ft SMA Cable                                                                                                                                                                         |                  |                 |          |                         |        |            |       |       |       |       |
| Chamber                                                                                                                                                                                                                                                  |                  | Pre-amplifier   |          | Filter                  |        | Limit      |       |       |       |       |
| 3m Chamber E                                                                                                                                                                                                                                             |                  | 3m Chamber E    |          | Filter                  |        | EIRP       |       |       |       |       |
| Frequency (GHz)                                                                                                                                                                                                                                          | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
| <b>Low Channel (826.4MHz)</b>                                                                                                                                                                                                                            |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                                                                                                                                                                                                                                                     | -64.2            | H               | 3.0      | -21.7                   | 37.8   | 1.0        | -58.6 | -13.0 | -45.6 |       |
| 2.48                                                                                                                                                                                                                                                     | -63.9            | H               | 3.0      | -18.9                   | 38.5   | 1.0        | -56.4 | -13.0 | -43.4 |       |
| 3.31                                                                                                                                                                                                                                                     | -63.3            | H               | 3.0      | -14.3                   | 38.5   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| 1.65                                                                                                                                                                                                                                                     | -63.5            | V               | 3.0      | -21.3                   | 37.8   | 1.0        | -58.1 | -13.0 | -45.1 |       |
| 2.48                                                                                                                                                                                                                                                     | -64.6            | V               | 3.0      | -19.4                   | 38.5   | 1.0        | -56.9 | -13.0 | -43.9 |       |
| 3.31                                                                                                                                                                                                                                                     | -64.2            | V               | 3.0      | -15.5                   | 38.5   | 1.0        | -53.0 | -13.0 | -40.0 |       |
| <b>Mid Channel (836.6MHz)</b>                                                                                                                                                                                                                            |                  |                 |          |                         |        |            |       |       |       |       |
| 1.67                                                                                                                                                                                                                                                     | -64.4            | H               | 3.0      | -21.9                   | 37.8   | 1.0        | -58.7 | -13.0 | -45.7 |       |
| 2.51                                                                                                                                                                                                                                                     | -64.6            | H               | 3.0      | -19.4                   | 38.6   | 1.0        | -57.0 | -13.0 | -44.0 |       |
| 3.35                                                                                                                                                                                                                                                     | -65.1            | H               | 3.0      | -16.0                   | 38.5   | 1.0        | -53.5 | -13.0 | -40.5 |       |
| 1.67                                                                                                                                                                                                                                                     | -64.1            | V               | 3.0      | -21.8                   | 37.8   | 1.0        | -58.7 | -13.0 | -45.7 |       |
| 2.51                                                                                                                                                                                                                                                     | -64.3            | V               | 3.0      | -18.9                   | 38.6   | 1.0        | -56.5 | -13.0 | -43.5 |       |
| 3.35                                                                                                                                                                                                                                                     | -64.2            | V               | 3.0      | -15.4                   | 38.5   | 1.0        | -52.9 | -13.0 | -39.9 |       |
| <b>High Channel (846.6MHz)</b>                                                                                                                                                                                                                           |                  |                 |          |                         |        |            |       |       |       |       |
| 1.69                                                                                                                                                                                                                                                     | -64.3            | H               | 3.0      | -21.8                   | 37.9   | 1.0        | -58.6 | -13.0 | -45.6 |       |
| 2.54                                                                                                                                                                                                                                                     | -64.1            | H               | 3.0      | -18.7                   | 38.6   | 1.0        | -56.3 | -13.0 | -43.3 |       |
| 3.39                                                                                                                                                                                                                                                     | -63.5            | H               | 3.0      | -14.3                   | 38.5   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| 1.69                                                                                                                                                                                                                                                     | -64.2            | V               | 3.0      | -21.9                   | 37.9   | 1.0        | -58.7 | -13.0 | -45.7 |       |
| 2.54                                                                                                                                                                                                                                                     | -63.3            | V               | 3.0      | -17.8                   | 38.6   | 1.0        | -55.4 | -13.0 | -42.4 |       |
| 3.39                                                                                                                                                                                                                                                     | -64.0            | V               | 3.0      | -15.1                   | 38.5   | 1.0        | -52.6 | -13.0 | -39.6 |       |
| Rev. 03.19.15                                                                                                                                                                                                                                            |                  |                 |          |                         |        |            |       |       |       |       |

**UMTS HSDPA, 850MHz BAND 5**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber                                                                                      |                  |                 |          |                         |        |            |       |       |       |       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Company:</b><br><b>Project #:</b><br><b>Date:</b> 04/05/17<br><b>Test Engineer:</b> 39004<br><b>Configuration:</b> EUT Only<br><b>Mode:</b> HSDPA 850MHz |                  |                 |          |                         |        |            |       |       |       |       |
| <b>Test Equipment:</b><br>Substitution: Horn T59 Substitution, and 8ft SMA Cable                                                                            |                  |                 |          |                         |        |            |       |       |       |       |
| Chamber                                                                                                                                                     |                  | Pre-amplifier   |          | Filter                  |        | Limit      |       |       |       |       |
| 3m Chamber E                                                                                                                                                |                  | 3m Chamber E    |          | Filter                  |        | EIRP       |       |       |       |       |
| Frequency (GHz)                                                                                                                                             | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
| <b>Low Channel (826.4MHz)</b>                                                                                                                               |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                                                                                                                                                        | -63.2            | H               | 3.0      | -20.8                   | 37.8   | 1.0        | -57.6 | -13.0 | -44.6 |       |
| 2.48                                                                                                                                                        | -62.9            | H               | 3.0      | -17.8                   | 38.5   | 1.0        | -55.3 | -13.0 | -42.3 |       |
| 3.31                                                                                                                                                        | -62.0            | H               | 3.0      | -13.0                   | 38.5   | 1.0        | -50.5 | -13.0 | -37.5 |       |
| 1.65                                                                                                                                                        | -62.7            | V               | 3.0      | -20.5                   | 37.8   | 1.0        | -57.3 | -13.0 | -44.3 |       |
| 2.48                                                                                                                                                        | -63.5            | V               | 3.0      | -18.3                   | 38.5   | 1.0        | -55.8 | -13.0 | -42.8 |       |
| 3.31                                                                                                                                                        | -63.2            | V               | 3.0      | -14.4                   | 38.5   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| <b>Mid Channel (836.6MHz)</b>                                                                                                                               |                  |                 |          |                         |        |            |       |       |       |       |
| 1.67                                                                                                                                                        | -63.5            | H               | 3.0      | -21.0                   | 37.8   | 1.0        | -57.8 | -13.0 | -44.8 |       |
| 2.51                                                                                                                                                        | -63.3            | H               | 3.0      | -18.1                   | 38.6   | 1.0        | -55.6 | -13.0 | -42.6 |       |
| 3.35                                                                                                                                                        | -62.5            | H               | 3.0      | -13.4                   | 38.5   | 1.0        | -50.9 | -13.0 | -37.9 |       |
| 1.67                                                                                                                                                        | -62.9            | V               | 3.0      | -20.6                   | 37.8   | 1.0        | -57.4 | -13.0 | -44.4 |       |
| 2.51                                                                                                                                                        | -63.7            | V               | 3.0      | -18.3                   | 38.6   | 1.0        | -55.9 | -13.0 | -42.9 |       |
| 3.35                                                                                                                                                        | -63.8            | V               | 3.0      | -15.0                   | 38.5   | 1.0        | -52.5 | -13.0 | -39.5 |       |
| <b>High Channel (846.6MHz)</b>                                                                                                                              |                  |                 |          |                         |        |            |       |       |       |       |
| 1.69                                                                                                                                                        | -63.1            | H               | 3.0      | -20.6                   | 37.9   | 1.0        | -57.4 | -13.0 | -44.4 |       |
| 2.54                                                                                                                                                        | -63.0            | H               | 3.0      | -17.6                   | 38.6   | 1.0        | -55.2 | -13.0 | -42.2 |       |
| 3.39                                                                                                                                                        | -62.3            | H               | 3.0      | -13.1                   | 38.5   | 1.0        | -50.6 | -13.0 | -37.6 |       |
| 1.69                                                                                                                                                        | -62.9            | V               | 3.0      | -20.5                   | 37.9   | 1.0        | -57.4 | -13.0 | -44.4 |       |
| 2.54                                                                                                                                                        | -63.8            | V               | 3.0      | -18.3                   | 38.6   | 1.0        | -55.9 | -13.0 | -42.9 |       |
| 3.39                                                                                                                                                        | -63.4            | V               | 3.0      | -14.5                   | 38.5   | 1.0        | -52.0 | -13.0 | -39.0 |       |
| Rev. 03.19.15                                                                                                                                               |                  |                 |          |                         |        |            |       |       |       |       |

**UMTS REL 99, 1900MHz BAND 2**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber                                                                                         |                     |                    |          |                               |        |            |       |       |       |       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <b>Company:</b><br><b>Project #:</b><br><b>Date:</b> 04/05/17<br><b>Test Engineer:</b> 39004<br><b>Configuration:</b> EUT Only<br><b>Mode:</b> REL 99, 1900MHz |                     |                    |          |                               |        |            |       |       |       |       |
| <b>Test Equipment:</b><br>Substitution: Horn T59 Substitution, and 8ft SMA Cable                                                                               |                     |                    |          |                               |        |            |       |       |       |       |
| Chamber                                                                                                                                                        |                     | Pre-amplifier      |          | Filter                        |        | Limit      |       |       |       |       |
| 3m Chamber E                                                                                                                                                   |                     | 3m Chamber E       |          | Filter                        |        | EIRP       |       |       |       |       |
| Frequency<br>(GHz)                                                                                                                                             | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
| <b>Low Channel (1852.4MHz)</b>                                                                                                                                 |                     |                    |          |                               |        |            |       |       |       |       |
| 3.70                                                                                                                                                           | -61.7               | H                  | 3.0      | -11.8                         | 38.6   | 1.0        | -49.4 | -13.0 | -36.4 |       |
| 5.56                                                                                                                                                           | -63.6               | H                  | 3.0      | -9.6                          | 38.6   | 1.0        | -47.1 | -13.0 | -34.1 |       |
| 7.41                                                                                                                                                           | -64.3               | H                  | 3.0      | -6.6                          | 37.8   | 1.0        | -43.4 | -13.0 | -30.4 |       |
| 3.70                                                                                                                                                           | -62.2               | V                  | 3.0      | -12.3                         | 38.6   | 1.0        | -49.9 | -13.0 | -36.9 |       |
| 5.55                                                                                                                                                           | -63.8               | V                  | 3.0      | -10.0                         | 38.6   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 7.42                                                                                                                                                           | -64.8               | V                  | 3.0      | -7.4                          | 37.8   | 1.0        | -44.2 | -13.0 | -31.2 |       |
| <b>Mid Channel (1880MHz)</b>                                                                                                                                   |                     |                    |          |                               |        |            |       |       |       |       |
| 3.76                                                                                                                                                           | -62.1               | H                  | 3.0      | -12.0                         | 38.6   | 1.0        | -49.6 | -13.0 | -36.6 |       |
| 5.64                                                                                                                                                           | -63.3               | H                  | 3.0      | -9.0                          | 38.5   | 1.0        | -46.5 | -13.0 | -33.5 |       |
| 7.52                                                                                                                                                           | -63.9               | H                  | 3.0      | -6.1                          | 37.7   | 1.0        | -42.8 | -13.0 | -29.8 |       |
| 3.76                                                                                                                                                           | -62.2               | V                  | 3.0      | -12.2                         | 38.6   | 1.0        | -49.8 | -13.0 | -36.8 |       |
| 5.64                                                                                                                                                           | -63.6               | V                  | 3.0      | -9.6                          | 38.5   | 1.0        | -47.2 | -13.0 | -34.2 |       |
| 7.52                                                                                                                                                           | -64.5               | V                  | 3.0      | -6.9                          | 37.7   | 1.0        | -43.7 | -13.0 | -30.7 |       |
| <b>High Channel (1907.6MHz)</b>                                                                                                                                |                     |                    |          |                               |        |            |       |       |       |       |
| 3.81                                                                                                                                                           | -61.6               | H                  | 3.0      | -11.4                         | 38.7   | 1.0        | -49.0 | -13.0 | -36.0 |       |
| 5.72                                                                                                                                                           | -63.7               | H                  | 3.0      | -9.3                          | 38.5   | 1.0        | -46.8 | -13.0 | -33.8 |       |
| 7.66                                                                                                                                                           | -64.3               | H                  | 3.0      | -6.4                          | 37.7   | 1.0        | -43.0 | -13.0 | -30.0 |       |
| 3.82                                                                                                                                                           | -62.2               | V                  | 3.0      | -12.0                         | 38.7   | 1.0        | -49.6 | -13.0 | -36.6 |       |
| 5.72                                                                                                                                                           | -64.1               | V                  | 3.0      | -10.0                         | 38.5   | 1.0        | -47.5 | -13.0 | -34.5 |       |
| 7.63                                                                                                                                                           | -64.3               | V                  | 3.0      | -6.6                          | 37.7   | 1.0        | -43.2 | -13.0 | -30.2 |       |
| Rev. 03.19.15                                                                                                                                                  |                     |                    |          |                               |        |            |       |       |       |       |

**UMTS HSDPA, 1900MHz BAND 2**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                     |                    |          |                               |        |            |       |       |       |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <div style="display: flex; justify-content: space-between;"> <div> <b>Company:</b><br/> <b>Project #:</b><br/> <b>Date:</b> 04/05/17<br/> <b>Test Engineer:</b> 39004<br/> <b>Configuration:</b> EUT Only<br/> <b>Mode:</b> HSDPA 1900MHz </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |                    |          |                               |        |            |       |       |       |       |
| <b>Test Equipment:</b><br>Substitution: Horn T59 Substitution, and 8ft SMA Cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                     |                    |          |                               |        |            |       |       |       |       |
| <div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> <span style="background-color: #e0f7fa; padding: 2px 10px; border: 1px solid black;">Chamber</span> <span style="background-color: #e0f7fa; padding: 2px 10px; border: 1px solid black;">Pre-amplifier</span> <span style="background-color: #e0f7fa; padding: 2px 10px; border: 1px solid black;">Filter</span> <span style="background-color: #e0f7fa; padding: 2px 10px; border: 1px solid black;">Limit</span> </div> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px; width: 150px;">3m Chamber E</div> <div style="border: 1px solid black; padding: 2px; width: 150px;">3m Chamber E</div> <div style="border: 1px solid black; padding: 2px; width: 150px;">Filter</div> <div style="border: 1px solid black; padding: 2px; width: 150px;">EIRP</div> </div> |                     |                    |          |                               |        |            |       |       |       |       |
| Frequency<br>(GHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
| <b>Low Channel (1852.4MHz)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                     |                    |          |                               |        |            |       |       |       |       |
| 3.70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -61.0               | H                  | 3.0      | -11.0                         | 38.6   | 1.0        | -48.7 | -13.0 | -35.7 |       |
| 5.56                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -62.3               | H                  | 3.0      | -8.2                          | 38.6   | 1.0        | -45.8 | -13.0 | -32.8 |       |
| 7.41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -63.0               | H                  | 3.0      | -5.3                          | 37.8   | 1.0        | -42.1 | -13.0 | -29.1 |       |
| 3.70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -60.3               | V                  | 3.0      | -10.4                         | 38.6   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| 5.56                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -61.9               | V                  | 3.0      | -8.1                          | 38.6   | 1.0        | -45.7 | -13.0 | -32.7 |       |
| 7.41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -62.5               | V                  | 3.0      | -5.0                          | 37.8   | 1.0        | -41.8 | -13.0 | -28.8 |       |
| <b>Mid Channel (1880MHz)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                     |                    |          |                               |        |            |       |       |       |       |
| 3.76                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -60.5               | H                  | 3.0      | -10.4                         | 38.6   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| 5.64                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -62.3               | H                  | 3.0      | -8.1                          | 38.5   | 1.0        | -45.6 | -13.0 | -32.6 |       |
| 7.52                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -63.2               | H                  | 3.0      | -5.4                          | 37.7   | 1.0        | -42.1 | -13.0 | -29.1 |       |
| 3.76                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -60.5               | V                  | 3.0      | -10.4                         | 38.6   | 1.0        | -48.1 | -13.0 | -35.1 |       |
| 5.64                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -62.6               | V                  | 3.0      | -8.7                          | 38.5   | 1.0        | -46.2 | -13.0 | -33.2 |       |
| 7.52                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -62.5               | V                  | 3.0      | -4.9                          | 37.7   | 1.0        | -41.6 | -13.0 | -28.6 |       |
| <b>High Channel (1907.6MHz)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                     |                    |          |                               |        |            |       |       |       |       |
| 3.82                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -60.8               | H                  | 3.0      | -10.5                         | 38.7   | 1.0        | -48.2 | -13.0 | -35.2 |       |
| 5.72                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -62.5               | H                  | 3.0      | -8.1                          | 38.5   | 1.0        | -45.6 | -13.0 | -32.6 |       |
| 7.63                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -62.6               | H                  | 3.0      | -4.7                          | 37.7   | 1.0        | -41.3 | -13.0 | -28.3 |       |
| 3.82                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -60.2               | V                  | 3.0      | -10.0                         | 38.7   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 5.72                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -62.4               | V                  | 3.0      | -8.3                          | 38.5   | 1.0        | -45.8 | -13.0 | -32.8 |       |
| 7.63                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -62.6               | V                  | 3.0      | -4.9                          | 37.7   | 1.0        | -41.5 | -13.0 | -28.5 |       |
| Rev. 03.19.15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                     |                    |          |                               |        |            |       |       |       |       |

**UMTS REL 99, 1700MHz BAND 4**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 04/05/17  
Test Engineer: 39004  
Configuration: EUT Only  
Mode: REL 99, 1700MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1712.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.42                            | -63.6            | H               | 3.0      | -14.3                   | 38.5   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| 5.14                            | -62.9            | H               | 3.0      | -9.7                    | 38.7   | 1.0        | -47.4 | -13.0 | -34.4 |       |
| 6.85                            | -63.4            | H               | 3.0      | -6.6                    | 38.1   | 1.0        | -43.7 | -13.0 | -30.7 |       |
| 3.42                            | -63.5            | V               | 3.0      | -14.4                   | 38.5   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| 5.14                            | -62.4            | V               | 3.0      | -9.5                    | 38.7   | 1.0        | -47.2 | -13.0 | -34.2 |       |
| 6.85                            | -63.5            | V               | 3.0      | -6.9                    | 38.1   | 1.0        | -44.0 | -13.0 | -31.0 |       |
| <b>Mid Channel (1732.6MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.47                            | -63.4            | H               | 3.0      | -14.1                   | 38.5   | 1.0        | -51.6 | -13.0 | -38.6 |       |
| 5.20                            | -62.3            | H               | 3.0      | -9.0                    | 38.7   | 1.0        | -46.7 | -13.0 | -33.7 |       |
| 6.93                            | -62.8            | H               | 3.0      | -5.7                    | 38.1   | 1.0        | -42.8 | -13.0 | -29.8 |       |
| 3.47                            | -63.6            | V               | 3.0      | -14.4                   | 38.5   | 1.0        | -52.0 | -13.0 | -39.0 |       |
| 5.20                            | -62.2            | V               | 3.0      | -9.3                    | 38.7   | 1.0        | -46.9 | -13.0 | -33.9 |       |
| 6.93                            | -63.1            | V               | 3.0      | -6.3                    | 38.1   | 1.0        | -43.4 | -13.0 | -30.4 |       |
| <b>High Channel (1752.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.51                            | -63.8            | H               | 3.0      | -14.3                   | 38.5   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| 5.26                            | -63.1            | H               | 3.0      | -9.7                    | 38.7   | 1.0        | -47.4 | -13.0 | -34.4 |       |
| 7.01                            | -62.7            | H               | 3.0      | -5.5                    | 38.1   | 1.0        | -42.5 | -13.0 | -29.5 |       |
| 3.51                            | -63.8            | V               | 3.0      | -14.5                   | 38.5   | 1.0        | -52.1 | -13.0 | -39.1 |       |
| 5.26                            | -62.8            | V               | 3.0      | -9.7                    | 38.7   | 1.0        | -47.4 | -13.0 | -34.4 |       |
| 7.01                            | -62.7            | V               | 3.0      | -5.7                    | 38.1   | 1.0        | -42.8 | -13.0 | -29.8 |       |

Rev. 03.19.15

**UMTS HSDPA, 1700MHz BAND 4**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber                                                                                       |                     |                    |          |                               |        |            |       |       |       |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <b>Company:</b><br><b>Project #:</b><br><b>Date:</b> 04/05/17<br><b>Test Engineer:</b> 39004<br><b>Configuration:</b> EUT Only<br><b>Mode:</b> HSDPA 1700MHz |                     |                    |          |                               |        |            |       |       |       |       |
| <b>Test Equipment:</b><br>Substitution: Horn T59 Substitution, and 8ft SMA Cable                                                                             |                     |                    |          |                               |        |            |       |       |       |       |
| Chamber                                                                                                                                                      |                     | Pre-amplifier      |          | Filter                        |        | Limit      |       |       |       |       |
| 3m Chamber E                                                                                                                                                 |                     | 3m Chamber E       |          | Filter                        |        | EIRP       |       |       |       |       |
| Frequency<br>(GHz)                                                                                                                                           | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
| <b>Low Channel (1712.4MHz)</b>                                                                                                                               |                     |                    |          |                               |        |            |       |       |       |       |
| 3.42                                                                                                                                                         | -63.7               | H                  | 3.0      | -14.4                         | 38.5   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| 5.14                                                                                                                                                         | -62.6               | H                  | 3.0      | -9.4                          | 38.7   | 1.0        | -47.1 | -13.0 | -34.1 |       |
| 6.85                                                                                                                                                         | -62.9               | H                  | 3.0      | -6.0                          | 38.1   | 1.0        | -43.1 | -13.0 | -30.1 |       |
| 3.42                                                                                                                                                         | -63.4               | V                  | 3.0      | -14.3                         | 38.5   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| 5.14                                                                                                                                                         | -62.3               | V                  | 3.0      | -9.4                          | 38.7   | 1.0        | -47.1 | -13.0 | -34.1 |       |
| 6.85                                                                                                                                                         | -63.3               | V                  | 3.0      | -6.6                          | 38.1   | 1.0        | -43.8 | -13.0 | -30.8 |       |
| <b>Mid Channel (1732.6MHz)</b>                                                                                                                               |                     |                    |          |                               |        |            |       |       |       |       |
| 3.47                                                                                                                                                         | -63.3               | H                  | 3.0      | -14.0                         | 38.5   | 1.0        | -51.5 | -13.0 | -38.5 |       |
| 5.20                                                                                                                                                         | -62.0               | H                  | 3.0      | -8.7                          | 38.7   | 1.0        | -46.4 | -13.0 | -33.4 |       |
| 6.93                                                                                                                                                         | -62.6               | H                  | 3.0      | -5.5                          | 38.1   | 1.0        | -42.6 | -13.0 | -29.6 |       |
| 3.47                                                                                                                                                         | -63.2               | V                  | 3.0      | -14.0                         | 38.5   | 1.0        | -51.5 | -13.0 | -38.5 |       |
| 5.20                                                                                                                                                         | -61.9               | V                  | 3.0      | -8.9                          | 38.7   | 1.0        | -46.6 | -13.0 | -33.6 |       |
| 6.93                                                                                                                                                         | -63.1               | V                  | 3.0      | -6.3                          | 38.1   | 1.0        | -43.4 | -13.0 | -30.4 |       |
| <b>High Channel (1752.6MHz)</b>                                                                                                                              |                     |                    |          |                               |        |            |       |       |       |       |
| 3.51                                                                                                                                                         | -63.6               | H                  | 3.0      | -14.1                         | 38.5   | 1.0        | -51.6 | -13.0 | -38.6 |       |
| 5.26                                                                                                                                                         | -62.8               | H                  | 3.0      | -9.4                          | 38.7   | 1.0        | -47.0 | -13.0 | -34.0 |       |
| 7.01                                                                                                                                                         | -62.4               | H                  | 3.0      | -5.2                          | 38.1   | 1.0        | -42.3 | -13.0 | -29.3 |       |
| 3.51                                                                                                                                                         | -63.2               | V                  | 3.0      | -13.8                         | 38.5   | 1.0        | -51.4 | -13.0 | -38.4 |       |
| 5.26                                                                                                                                                         | -62.9               | V                  | 3.0      | -9.8                          | 38.7   | 1.0        | -47.4 | -13.0 | -34.4 |       |
| 7.01                                                                                                                                                         | -62.5               | V                  | 3.0      | -5.5                          | 38.1   | 1.0        | -42.6 | -13.0 | -29.6 |       |
| Rev. 03.19.15                                                                                                                                                |                     |                    |          |                               |        |            |       |       |       |       |

## 11.2. FIELD STRENGTH OF SPURIOUS RADIATION, UAT 1

### 11.2.1. GSM

#### GPRS, 850MHz

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber                                                                                     |                  |                                      |          |                         |        |                      |       |       |       |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------------------|----------|-------------------------|--------|----------------------|-------|-------|-------|-------|
| <b>Company:</b><br><b>Project #:</b><br><b>Date:</b> 04/05/17<br><b>Test Engineer:</b> 40813<br><b>Configuration:</b> EUT only<br><b>Mode:</b> GPRS 850MHz |                  |                                      |          |                         |        |                      |       |       |       |       |
| <b>Test Equipment:</b><br>Substitution: Horn T59 Substitution, and 8ft SMA Cable                                                                           |                  |                                      |          |                         |        |                      |       |       |       |       |
| <b>Chamber</b><br>3m Chamber E                                                                                                                             |                  | <b>Pre-amplifier</b><br>3m Chamber E |          | <b>Filter</b><br>Filter |        | <b>Limit</b><br>EIRP |       |       |       |       |
| Frequency (GHz)                                                                                                                                            | SA reading (dBm) | Ant. Pol. (H/V)                      | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator           | EIRP  | Limit | Delta | Notes |
| <b>Low Channel (824.2MHz)</b>                                                                                                                              |                  |                                      |          |                         |        |                      |       |       |       |       |
| 1.65                                                                                                                                                       | -62.8            | H                                    | 3.0      | -20.4                   | 37.8   | 1.0                  | -57.2 | -13.0 | -44.2 |       |
| 2.47                                                                                                                                                       | -61.4            | H                                    | 3.0      | -16.5                   | 38.5   | 1.0                  | -53.9 | -13.0 | -40.9 |       |
| 3.30                                                                                                                                                       | -63.7            | H                                    | 3.0      | -14.7                   | 38.5   | 1.0                  | -52.2 | -13.0 | -39.2 |       |
| 1.65                                                                                                                                                       | -63.5            | V                                    | 3.0      | -21.3                   | 37.8   | 1.0                  | -58.2 | -13.0 | -45.2 |       |
| 2.47                                                                                                                                                       | -61.6            | V                                    | 3.0      | -16.5                   | 38.5   | 1.0                  | -53.9 | -13.0 | -40.9 |       |
| 3.30                                                                                                                                                       | -64.2            | V                                    | 3.0      | -15.5                   | 38.5   | 1.0                  | -53.0 | -13.0 | -40.0 |       |
| <b>Mid Channel (836.6MHz)</b>                                                                                                                              |                  |                                      |          |                         |        |                      |       |       |       |       |
| 1.67                                                                                                                                                       | -61.5            | H                                    | 3.0      | -19.0                   | 37.8   | 1.0                  | -55.9 | -13.0 | -42.9 |       |
| 2.51                                                                                                                                                       | -62.7            | H                                    | 3.0      | -17.5                   | 38.6   | 1.0                  | -55.1 | -13.0 | -42.1 |       |
| 3.35                                                                                                                                                       | -64.0            | H                                    | 3.0      | -14.9                   | 38.5   | 1.0                  | -52.4 | -13.0 | -39.4 |       |
| 1.67                                                                                                                                                       | -62.9            | V                                    | 3.0      | -20.6                   | 37.8   | 1.0                  | -57.5 | -13.0 | -44.5 |       |
| 2.51                                                                                                                                                       | -63.4            | V                                    | 3.0      | -18.1                   | 38.6   | 1.0                  | -55.6 | -13.0 | -42.6 |       |
| 3.35                                                                                                                                                       | -63.7            | V                                    | 3.0      | -14.9                   | 38.5   | 1.0                  | -52.4 | -13.0 | -39.4 |       |
| <b>High Channel (848.8MHz)</b>                                                                                                                             |                  |                                      |          |                         |        |                      |       |       |       |       |
| 1.70                                                                                                                                                       | -62.8            | H                                    | 3.0      | -20.3                   | 37.9   | 1.0                  | -57.1 | -13.0 | -44.1 |       |
| 2.55                                                                                                                                                       | -64.4            | H                                    | 3.0      | -19.0                   | 38.6   | 1.0                  | -56.5 | -13.0 | -43.5 |       |
| 3.40                                                                                                                                                       | -64.6            | H                                    | 3.0      | -15.4                   | 38.5   | 1.0                  | -52.9 | -13.0 | -39.9 |       |
| 1.70                                                                                                                                                       | -63.4            | V                                    | 3.0      | -21.0                   | 37.9   | 1.0                  | -57.9 | -13.0 | -44.9 |       |
| 2.55                                                                                                                                                       | -64.0            | V                                    | 3.0      | -18.4                   | 38.6   | 1.0                  | -55.9 | -13.0 | -42.9 |       |
| 3.40                                                                                                                                                       | -64.7            | V                                    | 3.0      | -15.7                   | 38.5   | 1.0                  | -53.2 | -13.0 | -40.2 |       |
| Rev. 03.19.15                                                                                                                                              |                  |                                      |          |                         |        |                      |       |       |       |       |

**EGPRS, 850MHz**

**High Frequency Substitution Measurement**  
**UL Fremont Radiated Chamber**

**Company:**  
**Project #:**  
**Date:** 04/05/17  
**Test Engineer:** 40813  
**Configuration:** EUT only  
**Mode:** EGPRS 850MHz

**Test Equipment:**  
 Substitution: Horn T59 Substitution, and 8ft SMA Cable

**Chamber**  
 3m Chamber E

**Pre-amplifier**  
 3m Chamber E

**Filter**  
 Filter

**Limit**  
 EIRP

| Frequency<br>(GHz)             | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|--------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (824.2MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 1.65                           | -62.8               | H                  | 3.0      | -20.4                         | 37.8   | 1.0        | -57.2 | -13.0 | -44.2 |       |
| 2.47                           | -63.3               | H                  | 3.0      | -18.3                         | 38.5   | 1.0        | -55.8 | -13.0 | -42.8 |       |
| 3.30                           | -63.8               | H                  | 3.0      | -14.8                         | 38.5   | 1.0        | -52.3 | -13.0 | -39.3 |       |
| 1.65                           | -62.8               | V                  | 3.0      | -20.6                         | 37.8   | 1.0        | -57.5 | -13.0 | -44.5 |       |
| 2.47                           | -63.8               | V                  | 3.0      | -18.6                         | 38.5   | 1.0        | -56.0 | -13.0 | -43.0 |       |
| 3.30                           | -65.0               | V                  | 3.0      | -16.4                         | 38.5   | 1.0        | -53.8 | -13.0 | -40.8 |       |
| <b>Mid Channel (836.6MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 1.67                           | -63.0               | H                  | 3.0      | -20.5                         | 37.8   | 1.0        | -57.3 | -13.0 | -44.3 |       |
| 2.51                           | -64.0               | H                  | 3.0      | -18.7                         | 38.6   | 1.0        | -56.3 | -13.0 | -43.3 |       |
| 3.35                           | -63.4               | H                  | 3.0      | -14.3                         | 38.5   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| 1.67                           | -63.0               | V                  | 3.0      | -20.7                         | 37.8   | 1.0        | -57.6 | -13.0 | -44.6 |       |
| 2.51                           | -63.8               | V                  | 3.0      | -18.4                         | 38.6   | 1.0        | -56.0 | -13.0 | -43.0 |       |
| 3.35                           | -64.0               | V                  | 3.0      | -15.2                         | 38.5   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| <b>High Channel (848.8MHz)</b> |                     |                    |          |                               |        |            |       |       |       |       |
| 1.70                           | -62.8               | H                  | 3.0      | -20.2                         | 37.9   | 1.0        | -57.1 | -13.0 | -44.1 |       |
| 2.55                           | -63.1               | H                  | 3.0      | -17.6                         | 38.6   | 1.0        | -55.2 | -13.0 | -42.2 |       |
| 3.40                           | -64.8               | H                  | 3.0      | -15.6                         | 38.5   | 1.0        | -53.1 | -13.0 | -40.1 |       |
| 1.70                           | -62.6               | V                  | 3.0      | -20.2                         | 37.9   | 1.0        | -57.1 | -13.0 | -44.1 |       |
| 2.55                           | -64.0               | V                  | 3.0      | -18.4                         | 38.6   | 1.0        | -56.0 | -13.0 | -43.0 |       |
| 3.40                           | -64.2               | V                  | 3.0      | -15.2                         | 38.5   | 1.0        | -52.7 | -13.0 | -39.7 |       |

Rev. 03.19.15

**GPRS, 1900MHz**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 04/04/17  
Test Engineer: 40813  
Configuration: EUT only  
Mode: GPRS 1900MHz

Test Equipment:  
Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1850.2MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                            | -61.5            | H               | 3.0      | -11.5                   | 38.6   | 1.0        | -49.1 | -13.0 | -36.1 |       |
| 5.55                            | -63.2            | H               | 3.0      | -9.1                    | 38.6   | 1.0        | -46.7 | -13.0 | -33.7 |       |
| 7.40                            | -65.0            | H               | 3.0      | -7.3                    | 37.8   | 1.0        | -44.1 | -13.0 | -31.1 |       |
| 3.70                            | -61.6            | V               | 3.0      | -11.7                   | 38.6   | 1.0        | -49.4 | -13.0 | -36.4 |       |
| 5.55                            | -63.7            | V               | 3.0      | -10.0                   | 38.6   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 7.40                            | -64.6            | V               | 3.0      | -7.1                    | 37.8   | 1.0        | -44.0 | -13.0 | -31.0 |       |
| <b>Mid Channel (1880.0)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                            | -62.3            | H               | 3.0      | -12.2                   | 38.6   | 1.0        | -49.9 | -13.0 | -36.9 |       |
| 5.64                            | -64.3            | H               | 3.0      | -10.0                   | 38.5   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 7.52                            | -64.5            | H               | 3.0      | -6.7                    | 37.7   | 1.0        | -43.5 | -13.0 | -30.5 |       |
| 3.76                            | -62.5            | V               | 3.0      | -12.5                   | 38.6   | 1.0        | -50.1 | -13.0 | -37.1 |       |
| 5.64                            | -64.0            | V               | 3.0      | -10.1                   | 38.5   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 7.52                            | -64.8            | V               | 3.0      | -7.2                    | 37.7   | 1.0        | -43.9 | -13.0 | -30.9 |       |
| <b>High Channel (1909.8MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                            | -61.9            | H               | 3.0      | -11.6                   | 38.7   | 1.0        | -49.3 | -13.0 | -36.3 |       |
| 5.73                            | -64.2            | H               | 3.0      | -9.7                    | 38.5   | 1.0        | -47.2 | -13.0 | -34.2 |       |
| 7.54                            | -64.8            | H               | 3.0      | -6.9                    | 37.7   | 1.0        | -43.6 | -13.0 | -30.6 |       |
| 3.82                            | -61.9            | V               | 3.0      | -11.6                   | 38.7   | 1.0        | -49.3 | -13.0 | -36.3 |       |
| 5.73                            | -63.4            | V               | 3.0      | -9.2                    | 38.5   | 1.0        | -46.8 | -13.0 | -33.8 |       |
| 7.54                            | -64.9            | V               | 3.0      | -7.3                    | 37.7   | 1.0        | -44.0 | -13.0 | -31.0 |       |

Rev. 03.19.15

**EGPRS, 1900MHz**

**High Frequency Substitution Measurement**  
**UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 04/04/17  
Test Engineer: 40813  
Configuration: EUT only  
Mode: EGPRS 1900MHz

Test Equipment:  
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber

Pre-amplifier

Filter

Limit

3m Chamber E

3m Chamber E

Filter

EIRP

| Frequency<br>(GHz)              | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1850.2MHz)</b>  |                     |                    |          |                               |        |            |       |       |       |       |
| 3.70                            | -62.5               | H                  | 3.0      | -12.5                         | 38.6   | 1.0        | -50.1 | -13.0 | -37.1 |       |
| 5.55                            | -63.7               | H                  | 3.0      | -9.7                          | 38.6   | 1.0        | -47.2 | -13.0 | -34.2 |       |
| 7.40                            | -64.6               | H                  | 3.0      | -6.9                          | 37.8   | 1.0        | -43.8 | -13.0 | -30.8 |       |
| 3.70                            | -62.0               | V                  | 3.0      | -12.1                         | 38.6   | 1.0        | -49.8 | -13.0 | -36.8 |       |
| 5.55                            | -63.1               | V                  | 3.0      | -9.4                          | 38.6   | 1.0        | -47.0 | -13.0 | -34.0 |       |
| 7.40                            | -64.9               | V                  | 3.0      | -7.5                          | 37.8   | 1.0        | -44.3 | -13.0 | -31.3 |       |
| <b>Mid Channel (1880.0)</b>     |                     |                    |          |                               |        |            |       |       |       |       |
| 3.76                            | -62.2               | H                  | 3.0      | -12.1                         | 38.6   | 1.0        | -49.7 | -13.0 | -36.7 |       |
| 5.64                            | -63.8               | H                  | 3.0      | -9.5                          | 38.5   | 1.0        | -47.1 | -13.0 | -34.1 |       |
| 7.52                            | -63.7               | H                  | 3.0      | -5.8                          | 37.7   | 1.0        | -42.6 | -13.0 | -29.6 |       |
| 3.76                            | -62.7               | V                  | 3.0      | -12.7                         | 38.6   | 1.0        | -50.3 | -13.0 | -37.3 |       |
| 5.64                            | -64.3               | V                  | 3.0      | -10.4                         | 38.5   | 1.0        | -47.9 | -13.0 | -34.9 |       |
| 7.52                            | -65.2               | V                  | 3.0      | -7.6                          | 37.7   | 1.0        | -44.4 | -13.0 | -31.4 |       |
| <b>High Channel (1909.8MHz)</b> |                     |                    |          |                               |        |            |       |       |       |       |
| 3.82                            | -62.0               | H                  | 3.0      | -11.8                         | 38.7   | 1.0        | -49.4 | -13.0 | -36.4 |       |
| 5.73                            | -64.0               | H                  | 3.0      | -9.6                          | 38.5   | 1.0        | -47.1 | -13.0 | -34.1 |       |
| 7.54                            | -65.5               | H                  | 3.0      | -7.6                          | 37.7   | 1.0        | -44.3 | -13.0 | -31.3 |       |
| 3.82                            | -61.9               | V                  | 3.0      | -11.7                         | 38.7   | 1.0        | -49.3 | -13.0 | -36.3 |       |
| 5.73                            | -64.2               | V                  | 3.0      | -10.1                         | 38.5   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 7.54                            | -64.7               | V                  | 3.0      | -7.0                          | 37.7   | 1.0        | -43.8 | -13.0 | -30.8 |       |

Rev. 03.19.15

## 11.2.2. CDMA2000

### CDMA2000 1xRTT, 850MHz BC0

**High Frequency Substitution Measurement**  
**UL Fremont Radiated Chamber**

**Company:**  
**Project #:**  
**Date:** 04/05/17  
**Test Engineer:** 40813  
**Configuration:** EUT Only  
**Mode:** 1xRTT 850MHz

**Test Equipment:**  
Substitution: Horn T59 Substitution, and 8ft SMA Cable

**Chamber**  
 3m Chamber E

**Pre-amplifier**  
 3m Chamber E

**Filter**  
 Filter

**Limit**  
 EIRP

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (824.7MHz)</b>   |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                            | -63.4            | H               | 3.0      | -21.0                   | 37.8   | 1.0        | -57.8 | -13.0 | -44.8 |       |
| 2.47                            | -64.5            | H               | 3.0      | -19.5                   | 38.5   | 1.0        | -57.0 | -13.0 | -44.0 |       |
| 3.30                            | -64.3            | H               | 3.0      | -15.3                   | 38.5   | 1.0        | -52.8 | -13.0 | -39.8 |       |
| 1.65                            | -62.9            | V               | 3.0      | -20.8                   | 37.8   | 1.0        | -57.6 | -13.0 | -44.6 |       |
| 2.47                            | -64.0            | V               | 3.0      | -18.8                   | 38.5   | 1.0        | -56.3 | -13.0 | -43.3 |       |
| 3.30                            | -64.0            | V               | 3.0      | -15.3                   | 38.5   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| <b>Mid Channel (836.52MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.67                            | -63.4            | H               | 3.0      | -20.9                   | 37.8   | 1.0        | -57.7 | -13.0 | -44.7 |       |
| 2.51                            | -64.1            | H               | 3.0      | -18.9                   | 38.6   | 1.0        | -56.4 | -13.0 | -43.4 |       |
| 3.35                            | -64.2            | H               | 3.0      | -15.1                   | 38.5   | 1.0        | -52.6 | -13.0 | -39.6 |       |
| 1.67                            | -62.9            | V               | 3.0      | -20.7                   | 37.8   | 1.0        | -57.5 | -13.0 | -44.5 |       |
| 2.51                            | -64.5            | V               | 3.0      | -19.1                   | 38.6   | 1.0        | -56.6 | -13.0 | -43.6 |       |
| 3.35                            | -64.5            | V               | 3.0      | -15.7                   | 38.5   | 1.0        | -53.2 | -13.0 | -40.2 |       |
| <b>High Channel (848.31MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 1.70                            | -63.8            | H               | 3.0      | -21.2                   | 37.9   | 1.0        | -58.1 | -13.0 | -45.1 |       |
| 2.54                            | -63.2            | H               | 3.0      | -17.8                   | 38.6   | 1.0        | -55.4 | -13.0 | -42.4 |       |
| 3.39                            | -63.9            | H               | 3.0      | -14.7                   | 38.5   | 1.0        | -52.2 | -13.0 | -39.2 |       |
| 1.70                            | -63.6            | V               | 3.0      | -21.2                   | 37.9   | 1.0        | -58.1 | -13.0 | -45.1 |       |
| 2.54                            | -63.8            | V               | 3.0      | -18.3                   | 38.6   | 1.0        | -55.9 | -13.0 | -42.9 |       |
| 3.39                            | -64.3            | V               | 3.0      | -15.4                   | 38.5   | 1.0        | -52.9 | -13.0 | -39.9 |       |

Rev. 03.19.15

**EVDO-Rev A, 850MHz BC0**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 06/22/17  
Test Engineer: 39004  
Configuration: EUT only  
Mode: Rev 0/A 850MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (824.7MHz)</b>   |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                            | -63.8            | H               | 3.0      | -21.4                   | 37.8   | 1.0        | -58.2 | -13.0 | -45.2 |       |
| 2.47                            | -65.6            | H               | 3.0      | -20.6                   | 38.5   | 1.0        | -58.1 | -13.0 | -45.1 |       |
| 3.30                            | -66.3            | H               | 3.0      | -17.4                   | 38.5   | 1.0        | -54.8 | -13.0 | -41.8 |       |
| 1.65                            | -64.1            | V               | 3.0      | -22.0                   | 37.8   | 1.0        | -58.8 | -13.0 | -45.8 |       |
| 2.47                            | -65.2            | V               | 3.0      | -20.1                   | 38.5   | 1.0        | -57.5 | -13.0 | -44.5 |       |
| 3.30                            | -66.1            | V               | 3.0      | -17.4                   | 38.5   | 1.0        | -54.8 | -13.0 | -41.8 |       |
| <b>Mid Channel (836.52MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.67                            | -64.6            | H               | 3.0      | -22.1                   | 37.8   | 1.0        | -58.9 | -13.0 | -45.9 |       |
| 2.51                            | -65.4            | H               | 3.0      | -20.2                   | 38.6   | 1.0        | -57.8 | -13.0 | -44.8 |       |
| 3.35                            | -66.2            | H               | 3.0      | -17.2                   | 38.5   | 1.0        | -54.6 | -13.0 | -41.6 |       |
| 1.67                            | -64.2            | V               | 3.0      | -22.0                   | 37.8   | 1.0        | -58.8 | -13.0 | -45.8 |       |
| 2.51                            | -65.2            | V               | 3.0      | -19.8                   | 38.6   | 1.0        | -57.4 | -13.0 | -44.4 |       |
| 3.35                            | -66.1            | V               | 3.0      | -17.3                   | 38.5   | 1.0        | -54.8 | -13.0 | -41.8 |       |
| <b>High Channel (848.31MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 1.70                            | -63.9            | H               | 3.0      | -21.4                   | 37.9   | 1.0        | -58.2 | -13.0 | -45.2 |       |
| 2.54                            | -65.2            | H               | 3.0      | -19.8                   | 38.6   | 1.0        | -57.4 | -13.0 | -44.4 |       |
| 3.39                            | -66.8            | H               | 3.0      | -17.6                   | 38.5   | 1.0        | -55.1 | -13.0 | -42.1 |       |
| 1.70                            | -64.1            | V               | 3.0      | -21.7                   | 37.9   | 1.0        | -58.5 | -13.0 | -45.5 |       |
| 2.54                            | -65.8            | V               | 3.0      | -20.2                   | 38.6   | 1.0        | -57.8 | -13.0 | -44.8 |       |
| 3.39                            | -66.3            | V               | 3.0      | -17.4                   | 38.5   | 1.0        | -54.9 | -13.0 | -41.9 |       |

Rev. 03.19.15

**CDMA2000 1xRTT, 1900MHz BC1**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 04/05/17  
Test Engineer: 40813  
Configuration: EUT only  
Mode: 1xRTT 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                  | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|----------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1851.25MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                             | -62.3            | H               | 3.0      | -12.3                   | 38.6   | 1.0        | -50.0 | -13.0 | -37.0 |       |
| 5.55                             | -64.2            | H               | 3.0      | -10.1                   | 38.6   | 1.0        | -47.7 | -13.0 | -34.7 |       |
| 7.41                             | -64.9            | H               | 3.0      | -7.2                    | 37.8   | 1.0        | -44.0 | -13.0 | -31.0 |       |
| 3.70                             | -62.4            | V               | 3.0      | -12.5                   | 38.6   | 1.0        | -50.1 | -13.0 | -37.1 |       |
| 5.55                             | -63.8            | V               | 3.0      | -10.0                   | 38.6   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 7.41                             | -65.2            | V               | 3.0      | -7.7                    | 37.8   | 1.0        | -44.6 | -13.0 | -31.6 |       |
| <b>Mid Channel (1880MHz)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                             | -62.3            | H               | 3.0      | -12.1                   | 38.6   | 1.0        | -49.8 | -13.0 | -36.8 |       |
| 5.64                             | -64.2            | H               | 3.0      | -9.9                    | 38.5   | 1.0        | -47.5 | -13.0 | -34.5 |       |
| 7.52                             | -64.9            | H               | 3.0      | -7.1                    | 37.7   | 1.0        | -43.8 | -13.0 | -30.8 |       |
| 3.76                             | -62.6            | V               | 3.0      | -12.6                   | 38.6   | 1.0        | -50.2 | -13.0 | -37.2 |       |
| 5.64                             | -64.0            | V               | 3.0      | -10.1                   | 38.5   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 7.52                             | -64.9            | V               | 3.0      | -7.3                    | 37.7   | 1.0        | -44.1 | -13.0 | -31.1 |       |
| <b>High Channel (1908.75MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                             | -62.3            | H               | 3.0      | -12.0                   | 38.7   | 1.0        | -49.7 | -13.0 | -36.7 |       |
| 5.73                             | -64.0            | H               | 3.0      | -9.6                    | 38.5   | 1.0        | -47.1 | -13.0 | -34.1 |       |
| 7.64                             | -65.3            | H               | 3.0      | -7.3                    | 37.7   | 1.0        | -44.0 | -13.0 | -31.0 |       |
| 3.82                             | -62.8            | V               | 3.0      | -12.6                   | 38.7   | 1.0        | -50.2 | -13.0 | -37.2 |       |
| 5.73                             | -64.7            | V               | 3.0      | -10.6                   | 38.5   | 1.0        | -48.1 | -13.0 | -35.1 |       |
| 7.64                             | -64.5            | V               | 3.0      | -6.7                    | 37.7   | 1.0        | -43.4 | -13.0 | -30.4 |       |

Rev. 03.19.15

**EVDO-Rev A, 1900MHz BC1**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 06/22/17  
Test Engineer: 39004  
Configuration: EUT only  
Mode: Rev 0/A 1900MHz

**Test Equipment:**  
Substitution: Horn T59 Substitution, and 8ft SMA Cable

| Chamber      | Pre-amplifier | Filter | Limit |
|--------------|---------------|--------|-------|
| 3m Chamber E | 3m Chamber E  | Filter | EIRP  |

| Frequency (GHz)                  | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|----------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1851.25MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                             | -63.8            | H               | 3.0      | -13.9                   | 38.6   | 1.0        | -51.5 | -13.0 | -38.5 |       |
| 5.55                             | -65.9            | H               | 3.0      | -11.8                   | 38.6   | 1.0        | -49.4 | -13.0 | -36.4 |       |
| 7.41                             | -66.2            | H               | 3.0      | -8.5                    | 37.8   | 1.0        | -45.4 | -13.0 | -32.4 |       |
| 3.70                             | -64.1            | V               | 3.0      | -14.2                   | 38.6   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| 5.55                             | -65.9            | V               | 3.0      | -12.1                   | 38.6   | 1.0        | -49.7 | -13.0 | -36.7 |       |
| 7.41                             | -66.4            | V               | 3.0      | -8.9                    | 37.8   | 1.0        | -45.7 | -13.0 | -32.7 |       |
| <b>Mid Channel (1880MHz)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                             | -64.4            | H               | 3.0      | -14.2                   | 38.6   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| 5.64                             | -66.2            | H               | 3.0      | -12.0                   | 38.5   | 1.0        | -49.5 | -13.0 | -36.5 |       |
| 7.52                             | -66.8            | H               | 3.0      | -8.9                    | 37.7   | 1.0        | -45.7 | -13.0 | -32.7 |       |
| 3.76                             | -64.7            | V               | 3.0      | -14.6                   | 38.6   | 1.0        | -52.2 | -13.0 | -39.2 |       |
| 5.64                             | -66.2            | V               | 3.0      | -12.3                   | 38.5   | 1.0        | -49.8 | -13.0 | -36.8 |       |
| 7.52                             | -66.5            | V               | 3.0      | -8.9                    | 37.7   | 1.0        | -45.7 | -13.0 | -32.7 |       |
| <b>High Channel (1908.75MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                             | -64.3            | H               | 3.0      | -14.1                   | 38.7   | 1.0        | -51.7 | -13.0 | -38.7 |       |
| 5.73                             | -65.2            | H               | 3.0      | -10.8                   | 38.5   | 1.0        | -48.3 | -13.0 | -35.3 |       |
| 7.64                             | -66.2            | H               | 3.0      | -8.3                    | 37.7   | 1.0        | -44.9 | -13.0 | -31.9 |       |
| 3.82                             | -64.1            | V               | 3.0      | -13.9                   | 38.7   | 1.0        | -51.5 | -13.0 | -38.5 |       |
| 5.73                             | -65.5            | V               | 3.0      | -11.4                   | 38.5   | 1.0        | -48.9 | -13.0 | -35.9 |       |
| 7.64                             | -66.3            | V               | 3.0      | -8.6                    | 37.7   | 1.0        | -45.2 | -13.0 | -32.2 |       |

Rev. 03.19.15

**CDMA2000 1xRTT, 800MHz BC10**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 04/05/17  
Test Engineer: 40813  
Configuration: EUT only  
Mode: 1xRTT 800MHz

**Test Equipment:**  
Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (817.25MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.63                            | -62.9            | H               | 3.0      | -20.5                   | 37.8   | 1.0        | -57.3 | -13.0 | -44.3 |       |
| 2.45                            | -63.2            | H               | 3.0      | -18.3                   | 38.4   | 1.0        | -55.7 | -13.0 | -42.7 |       |
| 3.27                            | -64.3            | H               | 3.0      | -15.4                   | 38.5   | 1.0        | -52.9 | -13.0 | -39.9 |       |
| 1.63                            | -62.7            | V               | 3.0      | -20.7                   | 37.8   | 1.0        | -57.5 | -13.0 | -44.5 |       |
| 2.45                            | -64.0            | V               | 3.0      | -19.0                   | 38.4   | 1.0        | -56.3 | -13.0 | -43.3 |       |
| 3.27                            | -63.5            | V               | 3.0      | -14.9                   | 38.5   | 1.0        | -52.4 | -13.0 | -39.4 |       |
| <b>Mid Channel (820MHz)</b>     |                  |                 |          |                         |        |            |       |       |       |       |
| 1.64                            | -62.7            | H               | 3.0      | -20.3                   | 37.8   | 1.0        | -57.1 | -13.0 | -44.1 |       |
| 2.46                            | -63.2            | H               | 3.0      | -18.3                   | 38.4   | 1.0        | -55.7 | -13.0 | -42.7 |       |
| 3.28                            | -64.2            | H               | 3.0      | -15.3                   | 38.5   | 1.0        | -52.8 | -13.0 | -39.8 |       |
| 1.64                            | -62.8            | V               | 3.0      | -20.7                   | 37.8   | 1.0        | -57.5 | -13.0 | -44.5 |       |
| 2.46                            | -63.5            | V               | 3.0      | -18.4                   | 38.4   | 1.0        | -55.8 | -13.0 | -42.8 |       |
| 3.28                            | -64.2            | V               | 3.0      | -15.6                   | 38.5   | 1.0        | -53.0 | -13.0 | -40.0 |       |
| <b>High Channel (822.75MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                            | -63.4            | H               | 3.0      | -20.9                   | 37.8   | 1.0        | -57.8 | -13.0 | -44.8 |       |
| 2.47                            | -63.7            | H               | 3.0      | -18.7                   | 38.5   | 1.0        | -56.2 | -13.0 | -43.2 |       |
| 3.29                            | -63.3            | H               | 3.0      | -14.3                   | 38.5   | 1.0        | -51.8 | -13.0 | -38.8 |       |
| 1.65                            | -62.9            | V               | 3.0      | -20.8                   | 37.8   | 1.0        | -57.6 | -13.0 | -44.6 |       |
| 2.47                            | -64.1            | V               | 3.0      | -18.9                   | 38.5   | 1.0        | -56.4 | -13.0 | -43.4 |       |
| 3.29                            | -63.2            | V               | 3.0      | -14.5                   | 38.5   | 1.0        | -52.0 | -13.0 | -39.0 |       |

Rev. 03.19.15

**EVDO-Rev A, 800MHz BC10**

| High Frequency Substitution Measurement<br>UL Fremont Radiated Chamber                                                                                         |                     |                    |          |                               |        |            |       |       |       |       |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|----------|-------------------------------|--------|------------|-------|-------|-------|-------|--|
| <b>Company:</b><br><b>Project #:</b><br><b>Date:</b> 06/22/17<br><b>Test Engineer:</b> 39004<br><b>Configuration:</b> EUT only<br><b>Mode:</b> Rev O/A, 800MHz |                     |                    |          |                               |        |            |       |       |       |       |  |
| <b>Test Equipment:</b><br>Substitution: Horn T59 Substitution, and 8ft SMA Cable                                                                               |                     |                    |          |                               |        |            |       |       |       |       |  |
| Chamber                                                                                                                                                        |                     | Pre-amplifier      |          | Filter                        |        | Limit      |       |       |       |       |  |
| 3m Chamber E                                                                                                                                                   |                     | 3m Chamber E       |          | Filter                        |        | EIRP       |       |       |       |       |  |
| Frequency<br>(GHz)                                                                                                                                             | SA reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance | EIRP @ TX<br>Ant End<br>(dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |  |
| <b>Low Channel (817.25MHz)</b>                                                                                                                                 |                     |                    |          |                               |        |            |       |       |       |       |  |
| 1.63                                                                                                                                                           | -65.4               | H                  | 3.0      | -23.0                         | 37.8   | 1.0        | -59.8 | -13.0 | -46.8 |       |  |
| 2.45                                                                                                                                                           | -66.5               | H                  | 3.0      | -21.6                         | 38.4   | 1.0        | -59.0 | -13.0 | -46.0 |       |  |
| 3.27                                                                                                                                                           | -66.1               | H                  | 3.0      | -17.2                         | 38.5   | 1.0        | -54.6 | -13.0 | -41.6 |       |  |
| 1.63                                                                                                                                                           | -65.2               | V                  | 3.0      | -23.2                         | 37.8   | 1.0        | -60.0 | -13.0 | -47.0 |       |  |
| 2.45                                                                                                                                                           | -66.3               | V                  | 3.0      | -21.3                         | 38.4   | 1.0        | -58.7 | -13.0 | -45.7 |       |  |
| 3.27                                                                                                                                                           | -66.4               | V                  | 3.0      | -17.8                         | 38.5   | 1.0        | -55.3 | -13.0 | -42.3 |       |  |
| <b>Mid Channel (820MHz)</b>                                                                                                                                    |                     |                    |          |                               |        |            |       |       |       |       |  |
| 1.64                                                                                                                                                           | -65.9               | H                  | 3.0      | -23.4                         | 37.8   | 1.0        | -60.3 | -13.0 | -47.3 |       |  |
| 2.46                                                                                                                                                           | -66.1               | H                  | 3.0      | -21.2                         | 38.4   | 1.0        | -58.6 | -13.0 | -45.6 |       |  |
| 3.28                                                                                                                                                           | -65.7               | H                  | 3.0      | -16.7                         | 38.5   | 1.0        | -54.2 | -13.0 | -41.2 |       |  |
| 1.64                                                                                                                                                           | -65.3               | V                  | 3.0      | -23.2                         | 37.8   | 1.0        | -60.1 | -13.0 | -47.1 |       |  |
| 2.46                                                                                                                                                           | -66.4               | V                  | 3.0      | -21.2                         | 38.4   | 1.0        | -58.7 | -13.0 | -45.7 |       |  |
| 3.28                                                                                                                                                           | -65.9               | V                  | 3.0      | -17.3                         | 38.5   | 1.0        | -54.7 | -13.0 | -41.7 |       |  |
| <b>High Channel (822.75MHz)</b>                                                                                                                                |                     |                    |          |                               |        |            |       |       |       |       |  |
| 1.65                                                                                                                                                           | -64.9               | H                  | 3.0      | -22.4                         | 37.8   | 1.0        | -59.3 | -13.0 | -46.3 |       |  |
| 2.47                                                                                                                                                           | -65.4               | H                  | 3.0      | -20.4                         | 38.5   | 1.0        | -57.8 | -13.0 | -44.8 |       |  |
| 3.29                                                                                                                                                           | -65.9               | H                  | 3.0      | -16.9                         | 38.5   | 1.0        | -54.4 | -13.0 | -41.4 |       |  |
| 1.65                                                                                                                                                           | -64.4               | V                  | 3.0      | -22.2                         | 37.8   | 1.0        | -59.1 | -13.0 | -46.1 |       |  |
| 2.47                                                                                                                                                           | -65.8               | V                  | 3.0      | -20.6                         | 38.5   | 1.0        | -58.1 | -13.0 | -45.1 |       |  |
| 3.29                                                                                                                                                           | -66.2               | V                  | 3.0      | -17.5                         | 38.5   | 1.0        | -55.0 | -13.0 | -42.0 |       |  |
| Rev. 03.19.15                                                                                                                                                  |                     |                    |          |                               |        |            |       |       |       |       |  |

### 11.2.3. UMTS

#### UMTS REL 99, 850MHz BAND 5

**High Frequency Substitution Measurement**  
**UL Fremont Radiated Chamber**

**Company:**

**Project #:**

**Date:** 04/05/17

**Test Engineer:** 40813

**Configuration:** EUT Only

**Mode:** REL 99, 850MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

**Chamber**  
3m Chamber E

**Pre-amplifier**  
3m Chamber E

**Filter**  
Filter

**Limit**  
EIRP

| Frequency (GHz)                | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|--------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (826.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                           | -63.0            | H               | 3.0      | -20.6                   | 37.8   | 1.0        | -57.4 | -13.0 | -44.4 |       |
| 2.48                           | -64.2            | H               | 3.0      | -19.1                   | 38.5   | 1.0        | -56.6 | -13.0 | -43.6 |       |
| 3.31                           | -64.7            | H               | 3.0      | -15.8                   | 38.5   | 1.0        | -53.3 | -13.0 | -40.3 |       |
| 1.65                           | -63.1            | V               | 3.0      | -21.0                   | 37.8   | 1.0        | -57.8 | -13.0 | -44.8 |       |
| 2.48                           | -64.1            | V               | 3.0      | -18.9                   | 38.5   | 1.0        | -56.4 | -13.0 | -43.4 |       |
| 3.31                           | -64.5            | V               | 3.0      | -15.8                   | 38.5   | 1.0        | -53.3 | -13.0 | -40.3 |       |
| <b>Mid Channel (836.6MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.67                           | -62.6            | H               | 3.0      | -20.1                   | 37.8   | 1.0        | -56.9 | -13.0 | -43.9 |       |
| 2.51                           | -63.5            | H               | 3.0      | -18.2                   | 38.6   | 1.0        | -55.8 | -13.0 | -42.8 |       |
| 3.35                           | -64.0            | H               | 3.0      | -14.9                   | 38.5   | 1.0        | -52.4 | -13.0 | -39.4 |       |
| 1.67                           | -63.2            | V               | 3.0      | -20.9                   | 37.8   | 1.0        | -57.8 | -13.0 | -44.8 |       |
| 2.51                           | -63.8            | V               | 3.0      | -18.4                   | 38.6   | 1.0        | -56.0 | -13.0 | -43.0 |       |
| 3.35                           | -64.1            | V               | 3.0      | -15.3                   | 38.5   | 1.0        | -52.8 | -13.0 | -39.8 |       |
| <b>High Channel (846.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 1.69                           | -63.3            | H               | 3.0      | -20.7                   | 37.9   | 1.0        | -57.6 | -13.0 | -44.6 |       |
| 2.54                           | -64.4            | H               | 3.0      | -19.0                   | 38.6   | 1.0        | -56.6 | -13.0 | -43.6 |       |
| 3.39                           | -63.6            | H               | 3.0      | -14.4                   | 38.5   | 1.0        | -51.9 | -13.0 | -38.9 |       |
| 1.69                           | -62.9            | V               | 3.0      | -20.5                   | 37.9   | 1.0        | -57.4 | -13.0 | -44.4 |       |
| 2.54                           | -63.5            | V               | 3.0      | -18.0                   | 38.6   | 1.0        | -55.5 | -13.0 | -42.5 |       |
| 3.39                           | -63.9            | V               | 3.0      | -14.9                   | 38.5   | 1.0        | -52.4 | -13.0 | -39.4 |       |

Rev. 03.19.15

**UMTS HSDPA, 850MHz BAND 5**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 04/05/17  
Test Engineer: 40813  
Configuration: EUT Only  
Mode: HSDPA 850MHz

Test Equipment:  
Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)         | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|-------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| Low Channel (826.4MHz)  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.65                    | -63.1            | H               | 3.0      | -20.6                   | 37.8   | 1.0        | -57.4 | -13.0 | -44.4 |       |
| 2.48                    | -63.7            | H               | 3.0      | -18.7                   | 38.5   | 1.0        | -56.2 | -13.0 | -43.2 |       |
| 3.31                    | -64.0            | H               | 3.0      | -15.0                   | 38.5   | 1.0        | -52.5 | -13.0 | -39.5 |       |
| 1.65                    | -62.9            | V               | 3.0      | -20.7                   | 37.8   | 1.0        | -57.6 | -13.0 | -44.6 |       |
| 2.48                    | -63.8            | V               | 3.0      | -18.5                   | 38.5   | 1.0        | -56.0 | -13.0 | -43.0 |       |
| 3.31                    | -64.7            | V               | 3.0      | -16.0                   | 38.5   | 1.0        | -53.5 | -13.0 | -40.5 |       |
| Mid Channel (836.6MHz)  |                  |                 |          |                         |        |            |       |       |       |       |
| 1.67                    | -63.1            | H               | 3.0      | -20.6                   | 37.8   | 1.0        | -57.5 | -13.0 | -44.5 |       |
| 2.51                    | -64.7            | H               | 3.0      | -19.4                   | 38.6   | 1.0        | -57.0 | -13.0 | -44.0 |       |
| 3.35                    | -64.4            | H               | 3.0      | -15.4                   | 38.5   | 1.0        | -52.9 | -13.0 | -39.9 |       |
| 1.67                    | -62.4            | V               | 3.0      | -20.1                   | 37.8   | 1.0        | -57.0 | -13.0 | -44.0 |       |
| 2.51                    | -64.0            | V               | 3.0      | -18.6                   | 38.6   | 1.0        | -56.2 | -13.0 | -43.2 |       |
| 3.35                    | -64.1            | V               | 3.0      | -15.2                   | 38.5   | 1.0        | -52.7 | -13.0 | -39.7 |       |
| High Channel (846.6MHz) |                  |                 |          |                         |        |            |       |       |       |       |
| 1.69                    | -63.2            | H               | 3.0      | -20.7                   | 37.9   | 1.0        | -57.5 | -13.0 | -44.5 |       |
| 2.54                    | -64.2            | H               | 3.0      | -18.8                   | 38.6   | 1.0        | -56.3 | -13.0 | -43.3 |       |
| 3.39                    | -63.7            | H               | 3.0      | -14.5                   | 38.5   | 1.0        | -52.0 | -13.0 | -39.0 |       |
| 1.69                    | -63.2            | V               | 3.0      | -20.8                   | 37.9   | 1.0        | -57.7 | -13.0 | -44.7 |       |
| 2.54                    | -64.1            | V               | 3.0      | -18.6                   | 38.6   | 1.0        | -56.1 | -13.0 | -43.1 |       |
| 3.39                    | -64.4            | V               | 3.0      | -15.4                   | 38.5   | 1.0        | -52.9 | -13.0 | -39.9 |       |

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**UMTS REL 99, 1900MHz BAND 2**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 04/04/17  
Test Engineer: 40813  
Configuration: EUT Only  
Mode: REL 99, 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1852.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                            | -63.1            | H               | 3.0      | -13.1                   | 38.6   | 1.0        | -50.8 | -13.0 | -37.8 |       |
| 5.56                            | -63.8            | H               | 3.0      | -9.7                    | 38.6   | 1.0        | -47.3 | -13.0 | -34.3 |       |
| 7.41                            | -64.4            | H               | 3.0      | -6.7                    | 37.8   | 1.0        | -43.5 | -13.0 | -30.5 |       |
| 3.70                            | -61.7            | V               | 3.0      | -11.8                   | 38.6   | 1.0        | -49.4 | -13.0 | -36.4 |       |
| 5.55                            | -64.0            | V               | 3.0      | -10.3                   | 38.6   | 1.0        | -47.9 | -13.0 | -34.9 |       |
| 7.42                            | -64.8            | V               | 3.0      | -7.3                    | 37.8   | 1.0        | -44.2 | -13.0 | -31.2 |       |
| <b>Mid Channel (1880MHz)</b>    |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                            | -62.0            | H               | 3.0      | -11.9                   | 38.6   | 1.0        | -49.6 | -13.0 | -36.6 |       |
| 5.64                            | -64.0            | H               | 3.0      | -9.8                    | 38.5   | 1.0        | -47.3 | -13.0 | -34.3 |       |
| 7.52                            | -65.4            | H               | 3.0      | -7.6                    | 37.7   | 1.0        | -44.3 | -13.0 | -31.3 |       |
| 3.76                            | -62.1            | V               | 3.0      | -12.0                   | 38.6   | 1.0        | -49.7 | -13.0 | -36.7 |       |
| 5.64                            | -64.4            | V               | 3.0      | -10.5                   | 38.5   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| 7.52                            | -65.1            | V               | 3.0      | -7.5                    | 37.7   | 1.0        | -44.2 | -13.0 | -31.2 |       |
| <b>High Channel (1907.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.81                            | -61.6            | H               | 3.0      | -11.4                   | 38.7   | 1.0        | -49.0 | -13.0 | -36.0 |       |
| 5.72                            | -64.0            | H               | 3.0      | -9.6                    | 38.5   | 1.0        | -47.1 | -13.0 | -34.1 |       |
| 7.66                            | -65.2            | H               | 3.0      | -7.2                    | 37.7   | 1.0        | -43.8 | -13.0 | -30.8 |       |
| 3.82                            | -62.5            | V               | 3.0      | -12.3                   | 38.7   | 1.0        | -50.0 | -13.0 | -37.0 |       |
| 5.72                            | -63.2            | V               | 3.0      | -9.1                    | 38.5   | 1.0        | -46.6 | -13.0 | -33.6 |       |
| 7.63                            | -65.3            | V               | 3.0      | -7.6                    | 37.7   | 1.0        | -44.2 | -13.0 | -31.2 |       |

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**UMTS HSDPA, 1900MHz BAND 2**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 04/04/17  
Test Engineer: 40813  
Configuration: EUT Only  
Mode: HSDPA 1900MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1852.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.70                            | -62.6            | H               | 3.0      | -12.7                   | 38.6   | 1.0        | -50.3 | -13.0 | -37.3 |       |
| 5.56                            | -63.2            | H               | 3.0      | -9.1                    | 38.6   | 1.0        | -46.7 | -13.0 | -33.7 |       |
| 7.41                            | -63.3            | H               | 3.0      | -5.6                    | 37.8   | 1.0        | -42.4 | -13.0 | -29.4 |       |
| 3.70                            | -62.3            | V               | 3.0      | -12.4                   | 38.6   | 1.0        | -50.0 | -13.0 | -37.0 |       |
| 5.56                            | -63.1            | V               | 3.0      | -9.4                    | 38.6   | 1.0        | -46.9 | -13.0 | -33.9 |       |
| 7.41                            | -64.9            | V               | 3.0      | -7.5                    | 37.8   | 1.0        | -44.3 | -13.0 | -31.3 |       |
| <b>Mid Channel (1880MHz)</b>    |                  |                 |          |                         |        |            |       |       |       |       |
| 3.76                            | -63.0            | H               | 3.0      | -12.9                   | 38.6   | 1.0        | -50.5 | -13.0 | -37.5 |       |
| 5.64                            | -64.2            | H               | 3.0      | -9.9                    | 38.5   | 1.0        | -47.5 | -13.0 | -34.5 |       |
| 7.52                            | -65.2            | H               | 3.0      | -7.4                    | 37.7   | 1.0        | -44.1 | -13.0 | -31.1 |       |
| 3.76                            | -62.2            | V               | 3.0      | -12.2                   | 38.6   | 1.0        | -49.8 | -13.0 | -36.8 |       |
| 5.64                            | -63.5            | V               | 3.0      | -9.6                    | 38.5   | 1.0        | -47.1 | -13.0 | -34.1 |       |
| 7.52                            | -64.5            | V               | 3.0      | -6.9                    | 37.7   | 1.0        | -43.7 | -13.0 | -30.7 |       |
| <b>High Channel (1907.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.82                            | -61.9            | H               | 3.0      | -11.7                   | 38.7   | 1.0        | -49.3 | -13.0 | -36.3 |       |
| 5.72                            | -63.9            | H               | 3.0      | -9.5                    | 38.5   | 1.0        | -47.0 | -13.0 | -34.0 |       |
| 7.63                            | -64.8            | H               | 3.0      | -6.9                    | 37.7   | 1.0        | -43.6 | -13.0 | -30.6 |       |
| 3.82                            | -61.6            | V               | 3.0      | -11.4                   | 38.7   | 1.0        | -49.0 | -13.0 | -36.0 |       |
| 5.72                            | -64.2            | V               | 3.0      | -10.1                   | 38.5   | 1.0        | -47.6 | -13.0 | -34.6 |       |
| 7.63                            | -64.6            | V               | 3.0      | -6.9                    | 37.7   | 1.0        | -43.6 | -13.0 | -30.6 |       |

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**UMTS REL 99, 1700MHz BAND 4**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 04/04/17  
Test Engineer: 40813  
Configuration: EUT Only  
Mode: REL 99, 1700MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1712.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.42                            | -64.4            | H               | 3.0      | -15.1                   | 38.5   | 1.0        | -52.6 | -13.0 | -39.6 |       |
| 5.14                            | -63.3            | H               | 3.0      | -10.1                   | 38.7   | 1.0        | -47.8 | -13.0 | -34.8 |       |
| 6.85                            | -65.0            | H               | 3.0      | -8.2                    | 38.1   | 1.0        | -45.3 | -13.0 | -32.3 |       |
| 3.42                            | -65.0            | V               | 3.0      | -16.0                   | 38.5   | 1.0        | -53.5 | -13.0 | -40.5 |       |
| 5.14                            | -63.1            | V               | 3.0      | -10.3                   | 38.7   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| 6.85                            | -64.5            | V               | 3.0      | -7.9                    | 38.1   | 1.0        | -45.0 | -13.0 | -32.0 |       |
| <b>Mid Channel (1732.6MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.47                            | -64.7            | H               | 3.0      | -15.3                   | 38.5   | 1.0        | -52.8 | -13.0 | -39.8 |       |
| 5.20                            | -63.8            | H               | 3.0      | -10.5                   | 38.7   | 1.0        | -48.2 | -13.0 | -35.2 |       |
| 6.93                            | -64.1            | H               | 3.0      | -7.1                    | 38.1   | 1.0        | -44.2 | -13.0 | -31.2 |       |
| 3.47                            | -65.3            | V               | 3.0      | -16.1                   | 38.5   | 1.0        | -53.6 | -13.0 | -40.6 |       |
| 5.20                            | -64.0            | V               | 3.0      | -11.0                   | 38.7   | 1.0        | -48.7 | -13.0 | -35.7 |       |
| 6.93                            | -64.2            | V               | 3.0      | -7.4                    | 38.1   | 1.0        | -44.5 | -13.0 | -31.5 |       |
| <b>High Channel (1752.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.51                            | -63.5            | H               | 3.0      | -14.1                   | 38.5   | 1.0        | -51.6 | -13.0 | -38.6 |       |
| 5.26                            | -64.5            | H               | 3.0      | -11.1                   | 38.7   | 1.0        | -48.8 | -13.0 | -35.8 |       |
| 7.01                            | -65.1            | H               | 3.0      | -7.9                    | 38.1   | 1.0        | -45.0 | -13.0 | -32.0 |       |
| 3.51                            | -65.0            | V               | 3.0      | -15.7                   | 38.5   | 1.0        | -53.2 | -13.0 | -40.2 |       |
| 5.26                            | -63.7            | V               | 3.0      | -10.6                   | 38.7   | 1.0        | -48.3 | -13.0 | -35.3 |       |
| 7.01                            | -65.4            | V               | 3.0      | -8.5                    | 38.1   | 1.0        | -45.5 | -13.0 | -32.5 |       |

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**UMTS HSDPA, 1700MHz BAND 4**

**High Frequency Substitution Measurement  
UL Fremont Radiated Chamber**

Company:  
Project #:  
Date: 04/04/17  
Test Engineer: 40813  
Configuration: EUT Only  
Mode: HSDPA 1700MHz

**Test Equipment:**

Substitution: Horn T59 Substitution, and 8ft SMA Cable

|                |                      |               |              |
|----------------|----------------------|---------------|--------------|
| <b>Chamber</b> | <b>Pre-amplifier</b> | <b>Filter</b> | <b>Limit</b> |
| 3m Chamber E   | 3m Chamber E         | Filter        | EIRP         |

| Frequency (GHz)                 | SA reading (dBm) | Ant. Pol. (H/V) | Distance | EIRP @ TX Ant End (dBm) | Preamp | Attenuator | EIRP  | Limit | Delta | Notes |
|---------------------------------|------------------|-----------------|----------|-------------------------|--------|------------|-------|-------|-------|-------|
| <b>Low Channel (1712.4MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.42                            | -65.2            | H               | 3.0      | -15.9                   | 38.5   | 1.0        | -53.4 | -13.0 | -40.4 |       |
| 5.14                            | -63.3            | H               | 3.0      | -10.1                   | 38.7   | 1.0        | -47.8 | -13.0 | -34.8 |       |
| 6.85                            | -64.6            | H               | 3.0      | -7.7                    | 38.1   | 1.0        | -44.8 | -13.0 | -31.8 |       |
| 3.42                            | -64.6            | V               | 3.0      | -15.5                   | 38.5   | 1.0        | -53.1 | -13.0 | -40.1 |       |
| 5.14                            | -63.3            | V               | 3.0      | -10.5                   | 38.7   | 1.0        | -48.2 | -13.0 | -35.2 |       |
| 6.85                            | -65.1            | V               | 3.0      | -8.5                    | 38.1   | 1.0        | -45.6 | -13.0 | -32.6 |       |
| <b>Mid Channel (1732.6MHz)</b>  |                  |                 |          |                         |        |            |       |       |       |       |
| 3.47                            | -64.8            | H               | 3.0      | -15.5                   | 38.5   | 1.0        | -53.0 | -13.0 | -40.0 |       |
| 5.20                            | -63.9            | H               | 3.0      | -10.6                   | 38.7   | 1.0        | -48.3 | -13.0 | -35.3 |       |
| 6.93                            | -63.4            | H               | 3.0      | -6.4                    | 38.1   | 1.0        | -43.5 | -13.0 | -30.5 |       |
| 3.47                            | -64.7            | V               | 3.0      | -15.5                   | 38.5   | 1.0        | -53.1 | -13.0 | -40.1 |       |
| 5.20                            | -63.3            | V               | 3.0      | -10.3                   | 38.7   | 1.0        | -48.0 | -13.0 | -35.0 |       |
| 6.93                            | -64.1            | V               | 3.0      | -7.3                    | 38.1   | 1.0        | -44.4 | -13.0 | -31.4 |       |
| <b>High Channel (1752.6MHz)</b> |                  |                 |          |                         |        |            |       |       |       |       |
| 3.51                            | -65.0            | H               | 3.0      | -15.5                   | 38.5   | 1.0        | -53.0 | -13.0 | -40.0 |       |
| 5.26                            | -64.0            | H               | 3.0      | -10.6                   | 38.7   | 1.0        | -48.3 | -13.0 | -35.3 |       |
| 7.01                            | -64.2            | H               | 3.0      | -7.0                    | 38.1   | 1.0        | -44.0 | -13.0 | -31.0 |       |
| 3.51                            | -65.3            | V               | 3.0      | -16.0                   | 38.5   | 1.0        | -53.6 | -13.0 | -40.6 |       |
| 5.26                            | -64.3            | V               | 3.0      | -11.2                   | 38.7   | 1.0        | -48.9 | -13.0 | -35.9 |       |
| 7.01                            | -65.0            | V               | 3.0      | -8.1                    | 38.1   | 1.0        | -45.2 | -13.0 | -32.2 |       |

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