

# TEST REPORT

|                   |         |                                                                                                |
|-------------------|---------|------------------------------------------------------------------------------------------------|
| Report Number     |         | RAPA12-O-631                                                                                   |
| Type of Equipment |         | Dual Band Repeater (In-Building Repeater System)                                               |
| Model Name        |         | USHR-0819H                                                                                     |
| FCC ID            |         | Q4EUSHR-0819H                                                                                  |
| IC Number         |         | 8605A-USHR0819H                                                                                |
| Applicant         | Name    | OPISYS Incorporated                                                                            |
|                   | Logo    |  OPISYS, INC. |
|                   | Address | 590 West Central Ave Unit E, Brea CA 92821, United States                                      |
| Manufacturer      | Name    | Ace Technology Corp.                                                                           |
|                   | Address | 24BL 5L, 451-4, Nonhyeon-dong, Namdong-gu, Incheon, 405-849, Korea                             |
| Test duration     |         | September 10, 2012 to October 08, 2012                                                         |
| Date of issue     |         | October 08, 2012                                                                               |
| Total Page        |         | 65 pages (including this page)                                                                 |

## SUMMARY

The equipment complies with FCC CFR 47 Part 22H/24E and IC RSS-131 Issue2.

This test report contains only the results of a single test of the sample supplied for the examination. It is not a general valid assessment of the features of the respective products of the mass-production.

Date : October 08, 2012



Tested by Chang Young Choi  
Deputy General Manager

Date : October 08, 2012



Reviewed by Sukil Park  
Executive Managing Director

## CONTENTS

|                                                 |           |
|-------------------------------------------------|-----------|
| <b>1. General description of EUT .....</b>      | <b>3</b>  |
| 1.1 Applicant .....                             | 3         |
| 1.2 Manufacturer .....                          | 3         |
| 1.3 Basic description of EUT .....              | 3         |
| 1.4 Electrical specification.....               | 4         |
| 1.5 Mechanical specification .....              | 5         |
| 1.6 Environmental specification .....           | 5         |
| <b>2. General information of test.....</b>      | <b>6</b>  |
| 2.1 Standard for measurement methods .....      | 6         |
| 2.2 Description of EUT modification .....       | 6         |
| 2.3 Test configuration .....                    | 6         |
| <b>3. Measurement data.....</b>                 | <b>7</b>  |
| 3.1 RF power output .....                       | 7         |
| 3.2 Occupied bandwidth .....                    | 10        |
| 3.3 Unwanted emission of antenna terminals..... | 29        |
| 3.4 Field strength of spurious emission .....   | 56        |
| 3.5 Amplifier gain and bandwidth.....           | 58        |
| <b>4. RF exposure statement.....</b>            | <b>61</b> |
| 4.1 Friis transmission formula .....            | 61        |
| 4.2 Information of Antenna.....                 | 62        |
| 4.3 Calculation of MPE at 20 cm .....           | 64        |
| <b>5. Test equipment list .....</b>             | <b>65</b> |

## 1. General description of EUT

### 1.1 Applicant

- Company name : OPISYS Incorporated
- Address : 590 West Central Ave Unit E, Brea CA 92821, United States
- Contact person : Nara Lee
- Phone/Fax : 1-714-990-6247/1-714-990-6243

### 1.2 Manufacturer

- Company name : Ace Technology Corp.
- Address : 24BL 5L, 451-4, Nonhyeon-dong, Namdong-gu, Incheon, 405-849, Korea
- Phone / Fax : 82-32-458-1382/82-32-458-1646

### 1.3 Basic description of EUT

- Product name : Dual Band Repeater
- Model name : USHR-0819H
- Frequency : PCS 1900 / Downlink : 1 930 MHz – 1 990 MHz  
PCS 1900 / Uplink : 1 850 MHz – 1 910 MHz  
Cellular 800 / Downlink : 869 MHz – 894 MHz  
Cellular 800 / Uplink : 824 MHz – 849 MHz
- Output power : Downlink : 17 dBm / Uplink : 20 dBm
- Modulation method : GSM, EDGE, CDMA, WCDMA
- FCC Rule Part(s) : FCC CFR47 Part 22H/24E
- IC Rule Part(s) : IC RSS-131 Issue2
- FCC classification : PCB / PCS Licensed Transmitter
- IC classification : Zone Enhancers for the Land Mobile Service
- Test duration : September 10, 2012 to October 08, 2012
- Date of issue : October 08, 2012
- Place of test : Head office  
824, B104, Anyang Megavalley, 799, Gwanyang-dong,  
Dongan-gu, Anyang-si, Gyeonggi-do, Korea, 483-060  
Open area test site  
80, Jeil-ri, Yangji-myun, Cheoin-gu, Yongin-si, Gyeonggi-do,  
Korea, 449-825  
(FCC Registration Number : 337229)  
(IC Submission Number : 143881)  
(KCC Designation Number : KR0027)

## 1.4 Electrical specification

| Item                |           | Specifications         |                 | Note                                                                 |
|---------------------|-----------|------------------------|-----------------|----------------------------------------------------------------------|
| Frequency Range     | Down Link | 1 930 ~ 1 990 MHz      |                 | PCS1900<br>BW: 60 MHz                                                |
|                     | Up Link   | 1 850 ~ 1 910 MHz      |                 |                                                                      |
|                     | Down Link | 869 ~ 894 MHz          |                 | Cellular800<br>BW: 25 MHz                                            |
|                     | Up Link   | 824 ~ 849 MHz          |                 |                                                                      |
| Modulation Type     |           | GSM, EDGE, CDMA, WCDMA |                 |                                                                      |
| Input Power         |           | -45 dBm max            |                 |                                                                      |
| Output Power        | Down Link | +17 dBm                |                 | PCS1900                                                              |
|                     | Up Link   | +20 dBm                |                 |                                                                      |
|                     | Down Link | +17 dBm                |                 | Cellular800                                                          |
|                     | Up Link   | +20 dBm                |                 |                                                                      |
| Gain                | Down Link | 75 dB (±1.0 dB)        |                 | PCS1900,<br>Average Gain on 60 MHz BW                                |
|                     | Up Link   | 75 dB (±1.0 dB)        |                 |                                                                      |
|                     | Down Link | 75 dB (±1.0 dB)        |                 | Cellular800,<br>Average Gain on 25 MHz BW                            |
|                     | Up Link   | 75 dB (±1.0 dB)        |                 |                                                                      |
| Gain Control Range  |           | 25 dB                  |                 | could be changed Dip switch or GUI                                   |
| Ripple              |           | < 6.5 dB               |                 | PCS1900                                                              |
|                     |           | < 4.5 dB               |                 | Cellular800                                                          |
| Noise Figure        |           | < 6 dB typical         |                 | PCS1900 Uplink Max Gain                                              |
|                     |           | < 5 dB typical         |                 | Cellular800 Uplink Max Gain                                          |
| Propagation Delay   |           | 5 μs max               |                 | PCS1900/ Cellular800                                                 |
| VSWR                |           | ≤ 1.8 : 1              |                 | PCS1900/ Cellular800                                                 |
| ALC Level           | Down Link | +17 dBm (±1 dB)        |                 | PCS1900/ Cellular800                                                 |
|                     | Up Link   | +20 dBm (±1 dB)        |                 | PCS1900/ Cellular800                                                 |
| Shutdown Level      | Down Link | +19 dBm (±1 dB)        |                 | PCS1900/ Cellular800                                                 |
|                     | Up Link   | +22 dBm (±1 dB)        |                 | PCS1900/ Cellular800                                                 |
| Spectrum Mask       |           | ±750 KHz               | -45 dBc/30 kHz  | Note1. Downlink CDMA 9CH Signal<br>Note2. Uplink CDMA Reverse Signal |
|                     |           | ±1.98 MHz              | -50 dBc/30 kHz  |                                                                      |
| Spurious            |           | 9 ~ 150 kHz            | -13 dBm/30 kHz  |                                                                      |
|                     |           | 150 kHz ~ 30 MHz       | -13 dBm/30 kHz  |                                                                      |
|                     |           | 30 MHz ~ 1 GHz         | -13 dBm/30 kHz  |                                                                      |
|                     |           | 1 GHz ~ 12.75 GHz      | -13 dBm/30 kHz  |                                                                      |
|                     |           |                        |                 |                                                                      |
| Frequency Stability |           | ≤ ±0.01 ppm            |                 | PCS1900/ Cellular800                                                 |
| GUI Interface       |           | RS-232C                |                 |                                                                      |
| Alarm & Status      | Display   | PWR                    | Normal : Green, | Power turn off : Off                                                 |
|                     |           | Cellular               | Normal : Green, | Shutdown : Off,   Checking SD : Red                                  |
|                     |           | PCS                    | Normal : Green, | Shutdown : Off,   Checking SD : Red                                  |
| Power Consumption   |           | 5.6 Vdc / 1.7 A        |                 |                                                                      |
| Input Voltage       |           | DC 5.6 Vdc / 2.5 A     |                 | AC/DC Adapter                                                        |
| RF Connector        |           | N-type Female          |                 |                                                                      |

**1.5 Mechanical specification**

| Item                   | Specifications          | Note |
|------------------------|-------------------------|------|
| Dimensions (L × W × H) | 151 mm x 191 mm x 35 mm | -    |
| Weight                 | 2 Kg                    | -    |

**1.6 Environmental specification**

| Item        | Specifications | Note     |
|-------------|----------------|----------|
| Temperature | -30 °C ~ 55 °C | -        |
| Humidity    | 10 % ~ 95 %    | Relative |

## 2. General information of test

### 2.1 Standard for measurement methods

| Applied Standard : FCC CFR47 Part 22H and 24E<br>IC RSS-131 Issue 2 July 2003 |     |                                       |        |
|-------------------------------------------------------------------------------|-----|---------------------------------------|--------|
| FCC                                                                           | IC  | Description of Test                   | Result |
| Part 2.1046                                                                   | 6.2 | RF power output                       | Pass   |
| Part 2.1049                                                                   | 6.1 | Occupied bandwidth                    | Pass   |
| Part 2.1051                                                                   | 6.4 | Unwanted emission at antenna terminal | Pass   |
| Part 2.1053                                                                   | 6.4 | Field strength of spurious emission   | Pass   |
| -                                                                             | 6.1 | Amplifier gain and bandwidth          | Pass   |

### 2.2 Description of EUT modification

During the test, there was no mechanical or circuitry modification to improve RF and spurious characteristic, and any RF and spurious suppression device(s) was not added against the device tested.

### 2.3 Test configuration

#### • Type of peripheral equipment used

| Description   | Model Name | Serial No. | Manufacturer | FCC ID        | IC Number       |
|---------------|------------|------------|--------------|---------------|-----------------|
| EUT           | USHR-0819H | 0004       | OPISYS       | Q4EUSHR-0819L | 8605A-USHR0819L |
| AC/DC Adapter | ADS-18C-06 | N/A        | HONOR        | -             | -               |

#### • Type of cable used

| Device from      | Device to         | Type of Cable | Length |
|------------------|-------------------|---------------|--------|
| Signal Generator | EUT               | BNC           | 1 m    |
| EUT              | Spectrum Analyzer | BNC           | 1 m    |

### 3. Measurement data

#### 3.1 RF power output

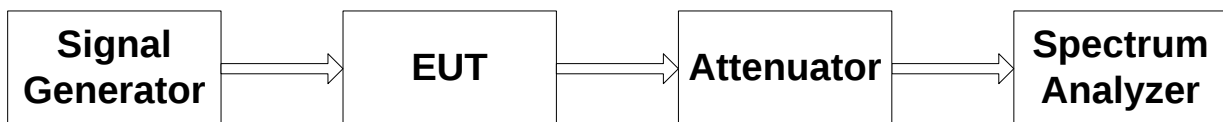
##### 3.1.1 Specification

- FCC Rules Part 2 Section 2.1046
- FCC Rules Part 22 Subpart H, Section 22.913
- FCC Rules Part 24 Subpart E, Section 24.232
- IC Rules RSS-131 Issue 2 July 2003, Section 6.2

##### 3.1.2 Measurement method

- ANSI/TIA-603-D-2010, Section 2.2.1

##### 3.1.3 Set-Up



##### 3.1.4 Test equipment list

| Equipment         | Model Name | Manufacturer        |
|-------------------|------------|---------------------|
| EUT               | USHR-0819H | OPISYS Incorporated |
| Signal Generator  | E4437B     | Agilent             |
| Spectrum Analyzer | N9020A     | Agilent             |
| Attenuator        | 66-30-33   | Weinschel           |

##### 3.1.5 Test condition

- Test place: Shield Room
- Test environment: 25 °C, 48 % R.H.

### 3.1.6 Test result : EDGE

| Band         | Link      | Frequency [MHz] | Input Power [dBm] | Output Power [dBm] | System Gain [dB] |
|--------------|-----------|-----------------|-------------------|--------------------|------------------|
| Cellular 800 | Up Link   | 824.20          | -54.40            | +20.01             | 74.41            |
|              |           | 836.60          | -54.90            | +20.00             | 74.90            |
|              |           | 848.80          | -52.40            | +20.03             | 72.43            |
|              | Down Link | 869.20          | -57.92            | +17.00             | 74.92            |
|              |           | 881.60          | -58.12            | +17.02             | 75.14            |
|              |           | 893.80          | -57.10            | +17.00             | 74.10            |
| PCS 1900     | Up Link   | 1 850.20        | -52.43            | +20.04             | 72.47            |
|              |           | 1 880.00        | -55.01            | +20.02             | 75.03            |
|              |           | 1 909.80        | -50.82            | +20.03             | 70.85            |
|              | Down Link | 1 930.20        | -54.71            | +16.98             | 71.69            |
|              |           | 1 960.00        | -54.93            | +17.01             | 71.94            |
|              |           | 1 989.80        | -51.20            | +17.00             | 68.20            |

### 3.1.7 Test result : GSM

| Band         | Link      | Frequency [MHz] | Input Power [dBm] | Output Power [dBm] | System Gain [dB] |
|--------------|-----------|-----------------|-------------------|--------------------|------------------|
| Cellular 800 | Up Link   | 824.20          | -54.43            | +20.00             | 74.43            |
|              |           | 836.60          | -54.91            | +20.04             | 74.95            |
|              |           | 848.80          | -52.43            | +20.01             | 72.44            |
|              | Down Link | 869.20          | -57.72            | +17.00             | 74.72            |
|              |           | 881.60          | -58.10            | +16.96             | 75.06            |
|              |           | 893.80          | -57.12            | +16.98             | 74.10            |
| PCS 1900     | Up Link   | 1 850.20        | -52.41            | +19.98             | 72.39            |
|              |           | 1 880.00        | -55.01            | +20.00             | 75.01            |
|              |           | 1 909.80        | -50.83            | +20.00             | 70.83            |
|              | Down Link | 1 930.20        | -54.72            | +17.00             | 71.72            |
|              |           | 1 960.00        | -54.93            | +17.01             | 71.94            |
|              |           | 1 989.80        | -51.22            | +17.00             | 68.22            |

### 3.1.8 Test result : CDMA

| Band         | Link      | Frequency [MHz] | Input Power [dBm] | Output Power [dBm] | System Gain [dB] |
|--------------|-----------|-----------------|-------------------|--------------------|------------------|
| Cellular 800 | Up Link   | 824.80          | -54.51            | +20.00             | 74.51            |
|              |           | 836.52          | -54.98            | +20.01             | 74.99            |
|              |           | 848.20          | -53.04            | +19.99             | 73.03            |
|              | Down Link | 869.80          | -58.23            | +17.00             | 75.23            |
|              |           | 881.52          | -57.98            | +17.00             | 74.98            |
|              |           | 893.20          | -57.11            | +17.01             | 74.12            |
| PCS 1900     | Up Link   | 1 850.80        | -52.70            | +20.01             | 72.71            |
|              |           | 1 880.00        | -54.92            | +19.97             | 74.89            |
|              |           | 1 909.20        | -50.70            | +20.00             | 70.70            |
|              | Down Link | 1 930.80        | -54.78            | +17.01             | 71.79            |
|              |           | 1 960.00        | -56.93            | +17.01             | 73.94            |
|              |           | 1 989.20        | -53.22            | +17.00             | 70.22            |

### 3.1.9 Test result : WCDMA

| Band         | Link      | Frequency [MHz] | Input Power [dBm] | Output Power [dBm] | System Gain [dB] |
|--------------|-----------|-----------------|-------------------|--------------------|------------------|
| Cellular 800 | Up Link   | 826.40          | -54.81            | +20.00             | 74.81            |
|              |           | 836.40          | -55.12            | +20.00             | 75.12            |
|              |           | 846.60          | -54.31            | +20.01             | 74.32            |
|              | Down Link | 871.40          | -58.11            | +17.00             | 75.11            |
|              |           | 881.40          | -58.10            | +17.00             | 75.10            |
|              |           | 891.60          | -56.91            | +17.00             | 73.91            |
| PCS 1900     | Up Link   | 1 852.40        | -53.10            | +20.00             | 73.10            |
|              |           | 1 880.00        | -54.82            | +20.01             | 74.83            |
|              |           | 1 907.60        | -51.01            | +20.01             | 71.02            |
|              | Down Link | 1 932.40        | -55.12            | +16.99             | 72.11            |
|              |           | 1 960.00        | -55.14            | +17.00             | 72.14            |
|              |           | 1 987.60        | -52.03            | +17.00             | 69.03            |

## 3.2 Occupied bandwidth

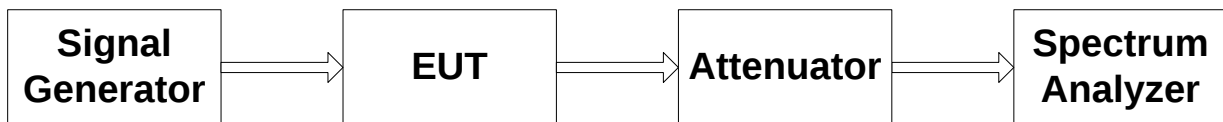
### 3.2.1 Specification

- FCC Rules Part 2 Section 2.1049
- FCC Rules Part 22 Subpart H, Section 22.917
- FCC Rules Part 24 Subpart E, Section 24.238
- IC Rules RSS-131 Issue 2 July 2003, Section 6.3

### 3.2.2 Measurement method

- ANSI/TIA-603-D-2010, Section 2.2.11

### 3.2.3 Set-Up



### 3.2.4 Test equipment list

| Equipment         | Model Name | Manufacturer        |
|-------------------|------------|---------------------|
| EUT               | USHR-0819H | OPISYS Incorporated |
| Signal Generator  | E4437B     | Agilent             |
| Spectrum Analyzer | N9020A     | Agilent             |
| Attenuator        | 66-30-33   | Weinschel           |

### 3.2.5 Test condition

- Test place: Shield Room
- Test environment: 25 °C, 48 % R.H.

### 3.2.6 Test result : EDGE

| Band         | Link      | Frequency [MHz] | Input OBW [kHz] | Output OBW [kHz] | 26 dB Bandwidth [kHz] |
|--------------|-----------|-----------------|-----------------|------------------|-----------------------|
| Cellular 800 | Up Link   | 824.20          | 243.13          | 248.84           | 315.50                |
|              |           | 836.60          | 243.26          | 249.12           | 320.60                |
|              |           | 848.80          | 242.87          | 248.47           | 315.50                |
|              | Down Link | 869.20          | 240.21          | 245.01           | 319.40                |
|              |           | 881.60          | 239.88          | 244.54           | 310.00                |
|              |           | 893.80          | 240.41          | 245.99           | 315.30                |
| PCS 1900     | Up Link   | 1 850.20        | 242.87          | 246.10           | 315.30                |
|              |           | 1 880.00        | 243.41          | 247.66           | 312.70                |
|              |           | 1 909.80        | 243.12          | 245.19           | 309.80                |
|              | Down Link | 1 930.20        | 240.31          | 244.06           | 312.70                |
|              |           | 1 960.00        | 240.11          | 244.97           | 319.30                |
|              |           | 1 989.80        | 240.39          | 244.04           | 309.80                |

### 3.2.7 Test result : GSM

| Band         | Link      | Frequency [MHz] | Input OBW [kHz] | Output OBW [kHz] | 26 dB Bandwidth [kHz] |
|--------------|-----------|-----------------|-----------------|------------------|-----------------------|
| Cellular 800 | Up Link   | 824.20          | 250.11          | 247.93           | 318.70                |
|              |           | 836.60          | 250.11          | 249.28           | 315.00                |
|              |           | 848.80          | 250.11          | 246.37           | 318.40                |
|              | Down Link | 869.20          | 247.00          | 248.02           | 317.10                |
|              |           | 881.60          | 247.23          | 247.64           | 318.30                |
|              |           | 893.80          | 247.37          | 248.46           | 316.60                |
| PCS 1900     | Up Link   | 1 850.20        | 250.00          | 247.87           | 322.70                |
|              |           | 1 880.00        | 250.12          | 250.00           | 319.40                |
|              |           | 1 909.80        | 250.33          | 248.89           | 314.90                |
|              | Down Link | 1 930.20        | 247.33          | 247.92           | 312.30                |
|              |           | 1 960.00        | 247.26          | 247.71           | 314.70                |
|              |           | 1 989.80        | 247.07          | 247.04           | 316.80                |

### 3.2.8 Test result : CDMA

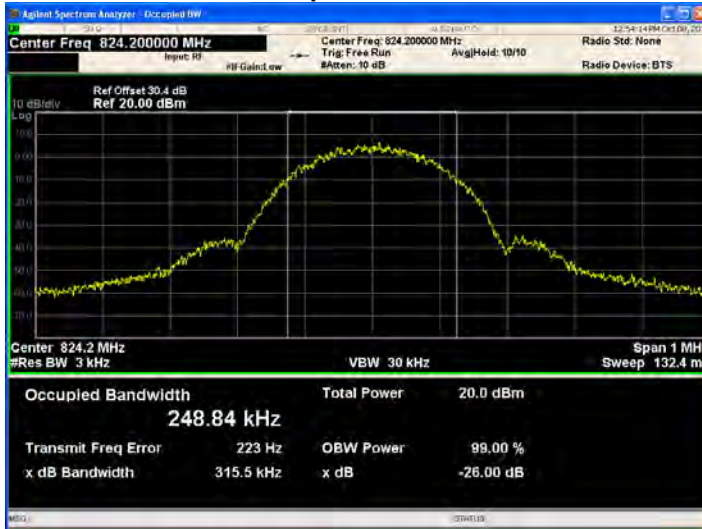
| Band         | Link      | Frequency [MHz] | Input OBW [MHz] | Output OBW [MHz] | 26 dB Bandwidth [MHz] |
|--------------|-----------|-----------------|-----------------|------------------|-----------------------|
| Cellular 800 | Up Link   | 824.80          | 1.258           | 1.259            | 1.414                 |
|              |           | 836.52          | 1.258           | 1.262            | 1.403                 |
|              |           | 848.20          | 1.258           | 1.260            | 1.401                 |
|              | Down Link | 869.80          | 1.260           | 1.263            | 1.390                 |
|              |           | 881.52          | 1.260           | 1.266            | 1.402                 |
|              |           | 893.20          | 1.260           | 1.265            | 1.405                 |
| PCS 1900     | Up Link   | 1 850.80        | 1.258           | 1.265            | 1.398                 |
|              |           | 1 880.00        | 1.258           | 1.261            | 1.400                 |
|              |           | 1 909.20        | 1.258           | 1.258            | 1.394                 |
|              | Down Link | 1 930.80        | 1.260           | 1.263            | 1.404                 |
|              |           | 1 960.00        | 1.260           | 1.261            | 1.405                 |
|              |           | 1 989.20        | 1.260           | 1.259            | 1.412                 |

### 3.2.9 Test result : WCDMA

| Band         | Link      | Frequency [MHz] | Input OBW [MHz] | Output OBW [MHz] | 26 dB Bandwidth [MHz] |
|--------------|-----------|-----------------|-----------------|------------------|-----------------------|
| Cellular 800 | Up Link   | 826.40          | 4.123           | 4.148            | 4.674                 |
|              |           | 836.40          | 4.123           | 4.170            | 4.676                 |
|              |           | 846.60          | 4.123           | 4.121            | 4.658                 |
|              | Down Link | 871.40          | 4.145           | 4.145            | 4.628                 |
|              |           | 881.40          | 4.145           | 4.159            | 4.673                 |
|              |           | 891.60          | 4.145           | 4.160            | 4.655                 |
| PCS 1900     | Up Link   | 1 852.40        | 4.123           | 4.154            | 4.641                 |
|              |           | 1 880.00        | 4.123           | 4.153            | 4.643                 |
|              |           | 1 907.60        | 4.123           | 4.122            | 4.667                 |
|              | Down Link | 1 932.40        | 4.145           | 4.159            | 4.685                 |
|              |           | 1 960.00        | 4.145           | 4.141            | 4.645                 |
|              |           | 1 987.60        | 4.145           | 4.155            | 4.655                 |

### 3.2.10 Plots of 26 dB bandwidth and 99% bandwidth

#### • EDGE / Cellular 800 / Up Link / 824.20 MHz



#### Input Signal

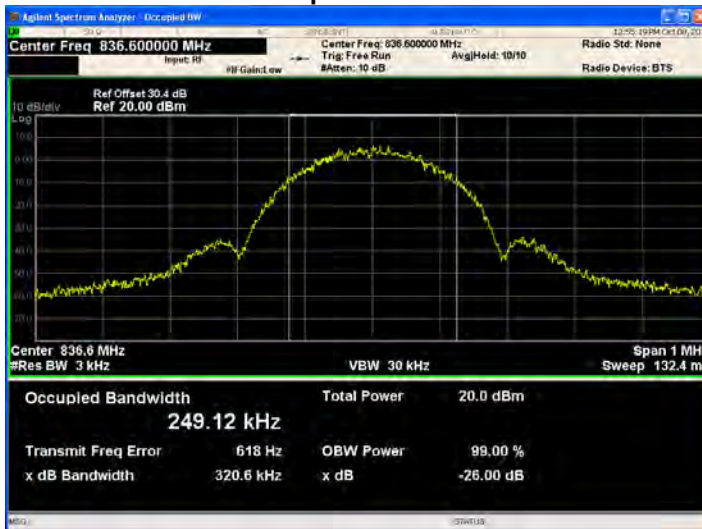
99 % Bandwidth : 243.13 kHz  
26 dB Bandwidth : 315.20 kHz  
RF Power : -54.40 dBm

#### Output Signal

99 % Bandwidth : 248.84 kHz  
26 dB Bandwidth : 315.50 kHz  
RF Power : +20.01 dBm

#### System Gain : 74.41 dB

#### • EDGE / Cellular 800 / Up Link / 836.60 MHz



#### Input Signal

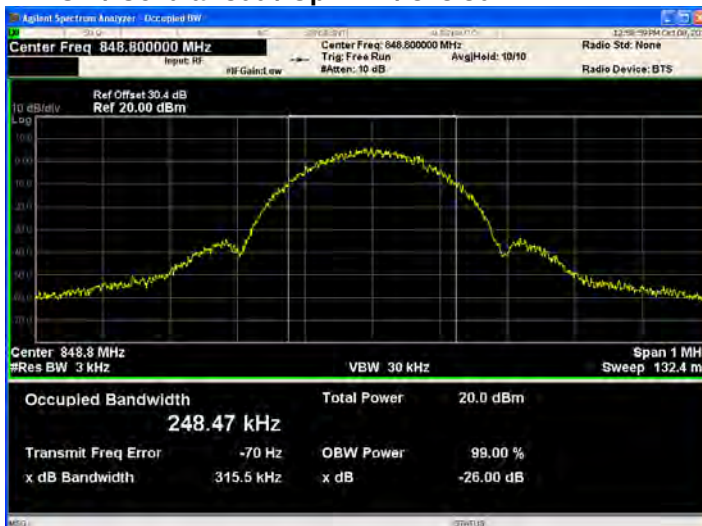
99 % Bandwidth : 243.26 kHz  
26 dB Bandwidth : 315.20 kHz  
RF Power : -54.90 dBm

#### Output Signal

99 % Bandwidth : 249.12 kHz  
26 dB Bandwidth : 320.60 kHz  
RF Power : +20.00 dBm

#### System Gain : 74.90 dB

#### • EDGE / Cellular 800 / Up Link / 848.80 MHz



#### Input Signal

99 % Bandwidth : 242.87 kHz  
26 dB Bandwidth : 315.20 kHz  
RF Power : -52.40 dBm

#### Output Signal

99 % Bandwidth : 248.47 kHz  
26 dB Bandwidth : 315.50 kHz  
RF Power : +20.03 dBm

#### System Gain : 72.43 dB

• **EDGE / Cellular 800 / Down Link / 869.20 MHz**



Input Signal

99 % Bandwidth : 240.21 kHz  
26 dB Bandwidth : 313.10 kHz  
RF Power : -57.92 dBm

Output Signal

99 % Bandwidth : 245.01 kHz  
26 dB Bandwidth : 319.40 kHz  
RF Power : +17.00 dBm

System Gain : 74.92 dB

• **EDGE / Cellular 800 / Down Link / 881.60 MHz**



Input Signal

99 % Bandwidth : 239.88 kHz  
26 dB Bandwidth : 313.40 kHz  
RF Power : -58.12 dBm

Output Signal

99 % Bandwidth : 244.54 kHz  
26 dB Bandwidth : 310.00 kHz  
RF Power : +17.02 dBm

System Gain : 75.14 dB

• **EDGE / Cellular 800 / Down Link / 893.80 MHz**



Input Signal

99 % Bandwidth : 240.41 kHz  
26 dB Bandwidth : 313.00 kHz  
RF Power : -57.10 dBm

Output Signal

99 % Bandwidth : 247.02 kHz  
26 dB Bandwidth : 313.40 kHz  
RF Power : +17.00 dBm

System Gain : 74.10 dB

• **EDGE / PCS 1900 / Up Link / 1 850.20 MHz**



Input Signal

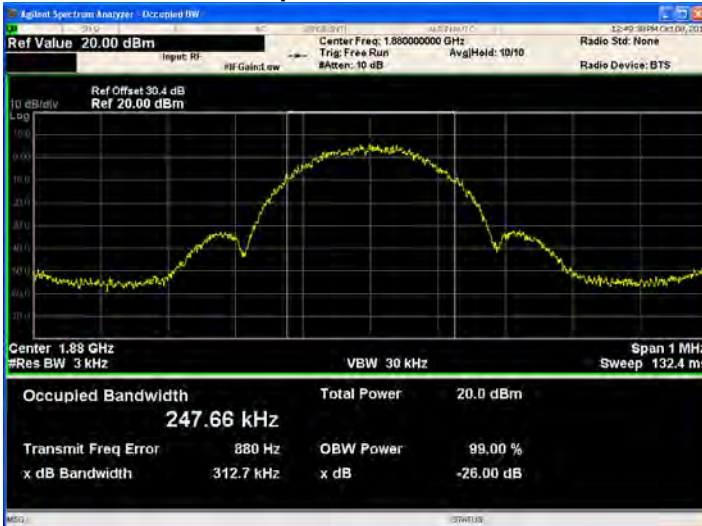
99 % Bandwidth : 242.87 kHz  
26 dB Bandwidth : 310.10 kHz  
RF Power : -52.43 Bm

Output Signal

99 % Bandwidth : 246.10 kHz  
26 dB Bandwidth : 315.30 kHz  
RF Power : +20.04 dBm

System Gain : 72.47 dB

• **EDGE / PCS 1900 / Up Link / 1 880.00 MHz**



Input Signal

99 % Bandwidth : 243.41 kHz  
26 dB Bandwidth : 310.40 kHz  
RF Power : -55.01 dBm

Output Signal

99 % Bandwidth : 247.66 kHz  
26 dB Bandwidth : 312.70 kHz  
RF Power : +20.02 dBm

System Gain : 75.03 dB

• **EDGE / PCS 1900 / Up Link / 1 909.80 MHz**



Input Signal

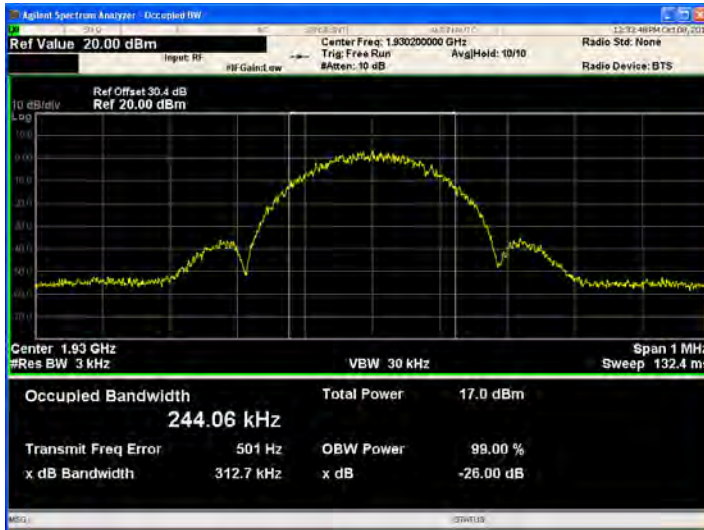
99 % Bandwidth : 243.12 kHz  
26 dB Bandwidth : 310.00 kHz  
RF Power : -50.82 dBm

Output Signal

99 % Bandwidth : 245.19 kHz  
26 dB Bandwidth : 309.80 kHz  
RF Power : +20.03 dBm

System Gain : 70.85 dB

• **EDGE / PCS 1900 / Down Link / 1 930.20 MHz**



Input Signal

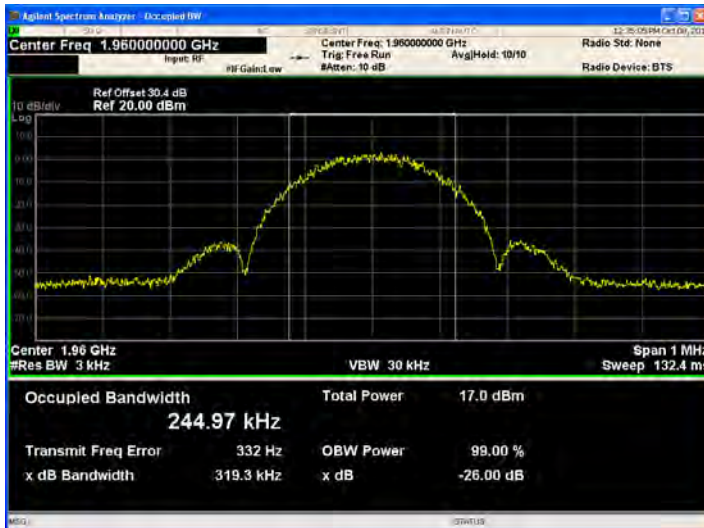
99 % Bandwidth : 240.31 kHz  
26 dB Bandwidth : 310.10 kHz  
RF Power : -54.71 dBm

Output Signal

99 % Bandwidth : 244.06 kHz  
26 dB Bandwidth : 312.70 kHz  
RF Power : +16.98 dBm

System Gain : 71.69 dB

• **EDGE / PCS 1900 / Down Link / 1 960.00 MHz**



Input Signal

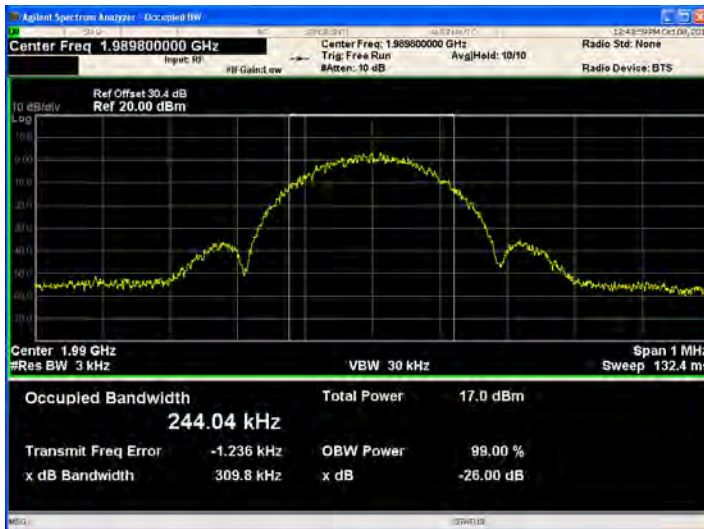
99 % Bandwidth : 240.11 kHz  
26 dB Bandwidth : 309.90 kHz  
RF Power : -54.93 dBm

Output Signal

99 % Bandwidth : 244.97 kHz  
26 dB Bandwidth : 319.30 kHz  
RF Power : +17.01 dBm

System Gain : 71.94 dB

• **EDGE / PCS 1900 / Down Link / 1 989.80 MHz**



Input Signal

99 % Bandwidth : 240.39 kHz  
26 dB Bandwidth : 310.40 kHz  
RF Power : -51.20 dBm

Output Signal

99 % Bandwidth : 244.04 kHz  
26 dB Bandwidth : 309.80 kHz  
RF Power : +17.00 dBm

System Gain : 68.20 dB

• GSM / Cellular 800 / Up Link / 824.20 MHz



Input Signal

99 % Bandwidth : 250.11 kHz  
26 dB Bandwidth : 315.20 kHz  
RF Power : -54.43 dBm

Output Signal

99 % Bandwidth : 247.93 kHz  
26 dB Bandwidth : 318.70 kHz  
RF Power : +20.00 dBm

System Gain : 74.43 dB

• GSM / Cellular 800 / Up Link / 836.60 MHz



Input Signal

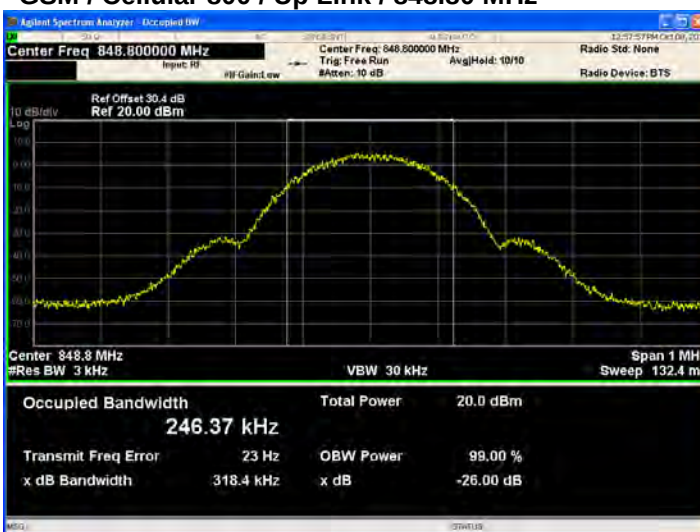
99 % Bandwidth : 250.11 kHz  
26 dB Bandwidth : 315.20 kHz  
RF Power : -54.91 dBm

Output Signal

99 % Bandwidth : 249.28 kHz  
26 dB Bandwidth : 315.00 kHz  
RF Power : +20.04 dBm

System Gain : 74.95 dB

• GSM / Cellular 800 / Up Link / 848.80 MHz



Input Signal

99 % Bandwidth : 250.11 kHz  
26 dB Bandwidth : 315.20 kHz  
RF Power : -52.43 dBm

Output Signal

99 % Bandwidth : 246.37 kHz  
26 dB Bandwidth : 318.40 kHz  
RF Power : +20.01 dBm

System Gain : 72.44 dB

• GSM / Cellular 800 / Down Link / 869.20 MHz



Input Signal

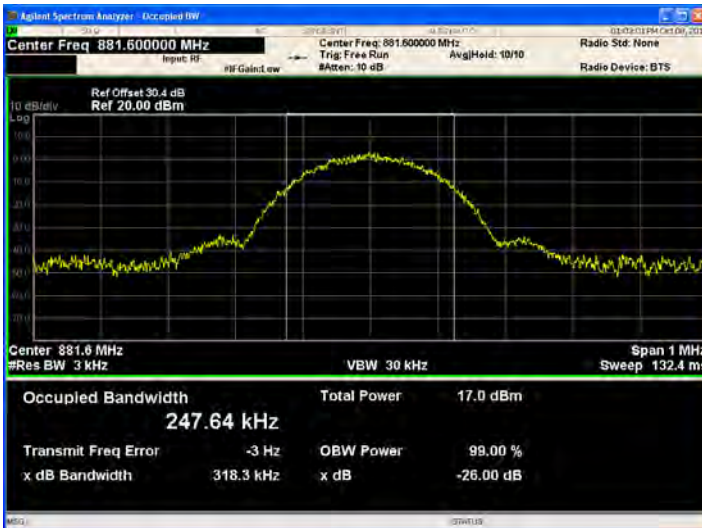
99 % Bandwidth : 247.00 kHz  
26 dB Bandwidth : 313.60 kHz  
RF Power : -57.72 dBm

Output Signal

99 % Bandwidth : 248.02 kHz  
26 dB Bandwidth : 317.10 kHz  
RF Power : +17.00 dBm

System Gain : 74.72 dB

• GSM / Cellular 800 / Down Link / 881.60 MHz



Input Signal

99 % Bandwidth : 247.23 kHz  
26 dB Bandwidth : 313.70 kHz  
RF Power : -58.10 dBm

Output Signal

99 % Bandwidth : 247.64 kHz  
26 dB Bandwidth : 318.30 kHz  
RF Power : +16.96 dBm

System Gain : 75.06 dB

• GSM / Cellular 800 / Down Link / 893.80 MHz



Input Signal

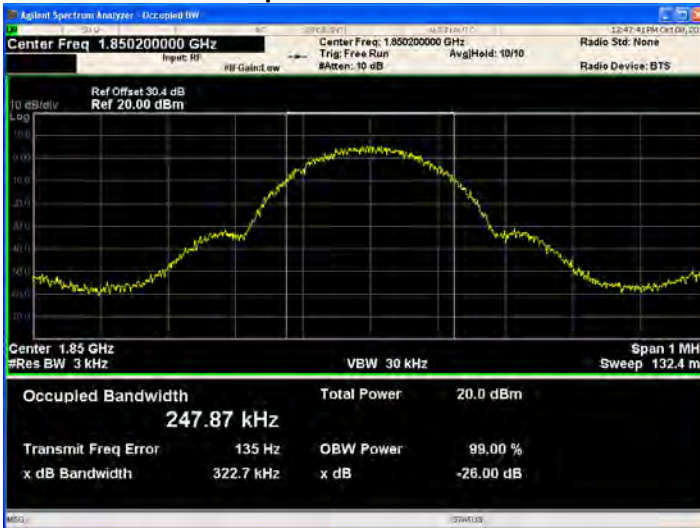
99 % Bandwidth : 247.37 kHz  
26 dB Bandwidth : 313.90 kHz  
RF Power : -57.12 dBm

Output Signal

99 % Bandwidth : 248.46 kHz  
26 dB Bandwidth : 316.60 kHz  
RF Power : +16.98 dBm

System Gain : 74.10 dB

• GSM / PCS 1900 / Up Link / 1 850.20 MHz



Input Signal

99 % Bandwidth : 250.00 kHz  
26 dB Bandwidth : 310.20 kHz  
RF Power : -52.41 dBm

Output Signal

99 % Bandwidth : 247.87 kHz  
26 dB Bandwidth : 322.70 kHz  
RF Power : +19.98 dBm

System Gain : 72.39 dB

• GSM / PCS 1900 / Up Link / 1 880.00 MHz



Input Signal

99 % Bandwidth : 250.12 kHz  
26 dB Bandwidth : 310.00 kHz  
RF Power : -55.01 dBm

Output Signal

99 % Bandwidth : 250.00 kHz  
26 dB Bandwidth : 319.40 kHz  
RF Power : +20.00 dBm

System Gain : 75.01 dB

• GSM / PCS 1900 / Up Link / 1 909.80 MHz



Input Signal

99 % Bandwidth : 250.33 kHz  
26 dB Bandwidth : 310.30 kHz  
RF Power : -50.83 dBm

Output Signal

99 % Bandwidth : 248.89 kHz  
26 dB Bandwidth : 314.90 kHz  
RF Power : +20.00 dBm

System Gain : 70.83 dB

• GSM / PCS 1900 / Down Link / 1 930.20 MHz



Input Signal

99 % Bandwidth : 247.33 kHz  
26 dB Bandwidth : 311.20 kHz  
RF Power : -54.72 dBm

Output Signal

99 % Bandwidth : 247.92 kHz  
26 dB Bandwidth : 312.30 kHz  
RF Power : +17.00 dBm

System Gain : 71.72 dB

• GSM / PCS 1900 / Down Link / 1 960.00 MHz



Input Signal

99 % Bandwidth : 247.26 kHz  
26 dB Bandwidth : 311.40 kHz  
RF Power : -54.93 dBm

Output Signal

99 % Bandwidth : 247.71 kHz  
26 dB Bandwidth : 314.70 kHz  
RF Power : +17.01 dBm

System Gain : 71.94 dB

• GSM / PCS 1900 / Down Link / 1 989.80 MHz



Input Signal

99 % Bandwidth : 247.07 kHz  
26 dB Bandwidth : 311.30 kHz  
RF Power : -51.22 dBm

Output Signal

99 % Bandwidth : 247.04 kHz  
26 dB Bandwidth : 316.80 kHz  
RF Power : +17.00 dBm

System Gain : 68.22 dB

• CDMA / Cellular 800 / Up Link / 824.80 MHz



Input Signal

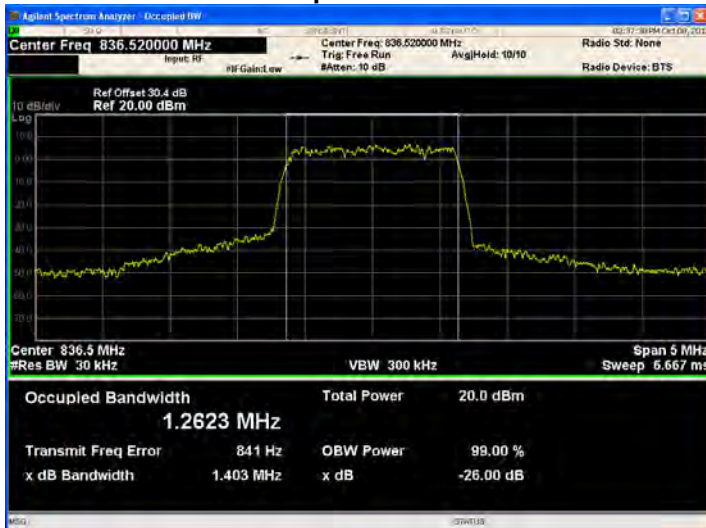
99 % Bandwidth : 1.258 MHz  
26 dB Bandwidth : 1.400 MHz  
RF Power : -54.51 dBm

Output Signal

99 % Bandwidth : 1.259 MHz  
26 dB Bandwidth : 1.414 MHz  
RF Power : +20.00 dBm

System Gain : 74.51 dB

• CDMA / Cellular 800 / Up Link / 836.52 MHz



Input Signal

99 % Bandwidth : 1.258 MHz  
26 dB Bandwidth : 1.400 MHz  
RF Power : -54.98 dBm

Output Signal

99 % Bandwidth : 1.262 MHz  
26 dB Bandwidth : 1.403 MHz  
RF Power : +20.01 dBm

System Gain : 74.99 dB

• CDMA / Cellular 800 / Up Link / 848.20 MHz



Input Signal

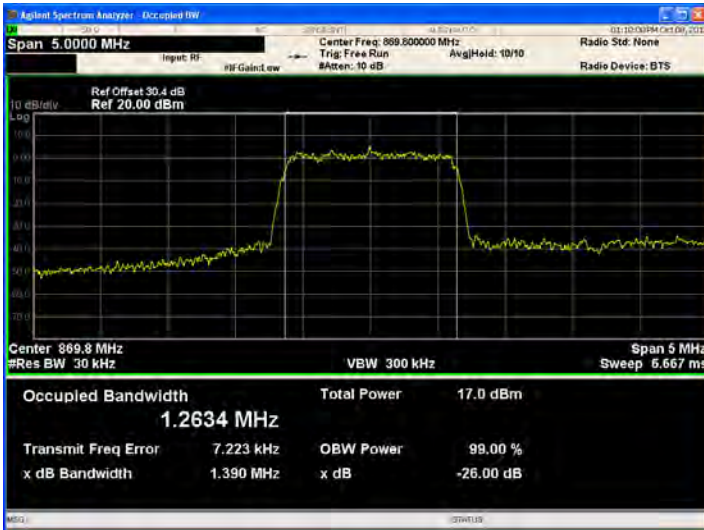
99 % Bandwidth : 1.258 MHz  
26 dB Bandwidth : 1.400 MHz  
RF Power : -53.04 dBm

Output Signal

99 % Bandwidth : 1.260 MHz  
26 dB Bandwidth : 1.401 MHz  
RF Power : +19.99 dBm

System Gain : 73.03 dB

• CDMA / Cellular 800 / Down Link / 869.80 MHz



Input Signal

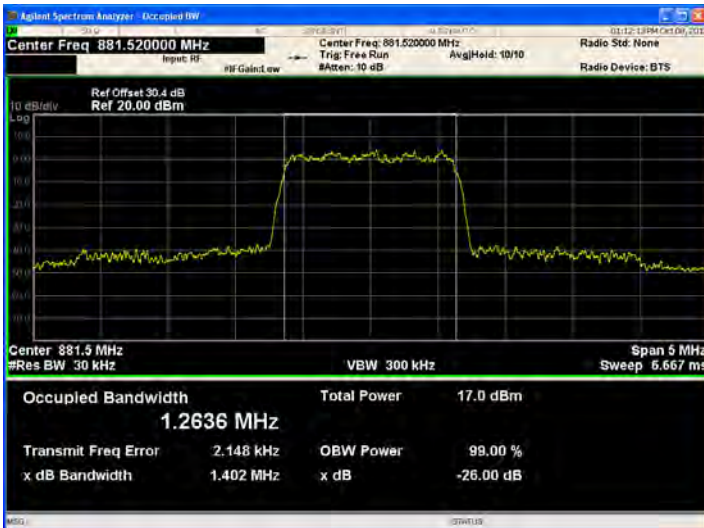
99 % Bandwidth : 1.260 MHz  
26 dB Bandwidth : 1.400 MHz  
RF Power : -58.23 dBm

Output Signal

99 % Bandwidth : 1.263 MHz  
26 dB Bandwidth : 1.390 MHz  
RF Power : +17.00 dBm

System Gain : 75.23 dB

• CDMA / Cellular 800 / Down Link / 881.52 MHz



Input Signal

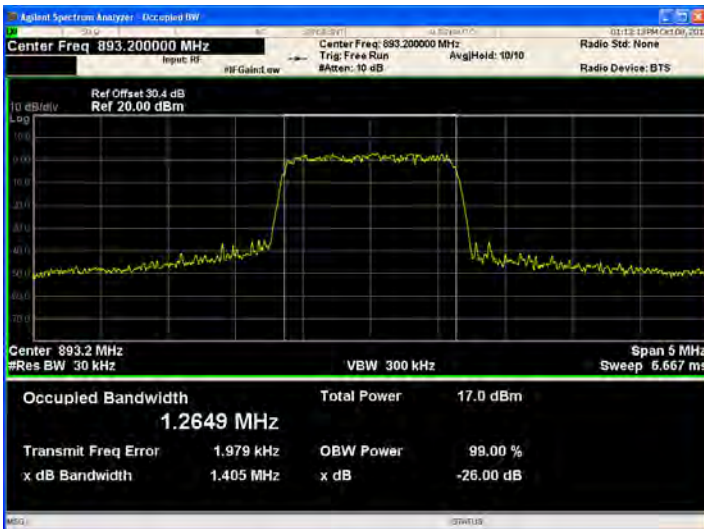
99 % Bandwidth : 1.260 MHz  
26 dB Bandwidth : 1.400 MHz  
RF Power : -57.98 dBm

Output Signal

99 % Bandwidth : 1.266 MHz  
26 dB Bandwidth : 1.402 MHz  
RF Power : +17.00 dBm

System Gain : 74.98 dB

• CDMA / Cellular 800 / Down Link / 893.20 MHz



Input Signal

99 % Bandwidth : 1.260 MHz  
26 dB Bandwidth : 1.400 MHz  
RF Power : -57.11 dBm

Output Signal

99 % Bandwidth : 1.265 MHz  
26 dB Bandwidth : 1.405 MHz  
RF Power : +17.01 dBm

System Gain : 74.12 dB

• CDMA / PCS 1900 / Up Link / 1 850.80 MHz



Input Signal

99 % Bandwidth : 1.258 MHz  
26 dB Bandwidth : 1.400 MHz  
RF Power : -52.70 dBm

Output Signal

99 % Bandwidth : 1.265 MHz  
26 dB Bandwidth : 1.398 MHz  
RF Power : +20.01 dBm

System Gain : 72.71 dB

• CDMA / PCS 1900 / Up Link / 1 880.00 MHz



Input Signal

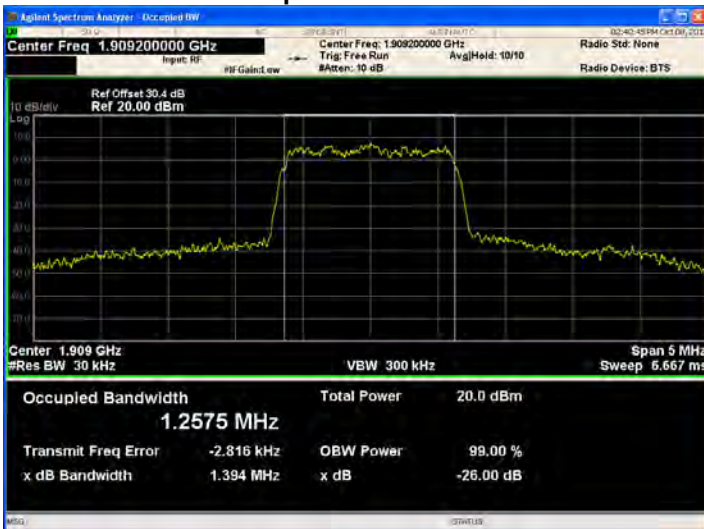
99 % Bandwidth : 1.258 MHz  
26 dB Bandwidth : 1.400 MHz  
RF Power : -54.92 dBm

Output Signal

99 % Bandwidth : 1.261 MHz  
26 dB Bandwidth : 1.400 MHz  
RF Power : +19.97 dBm

System Gain : 74.89 dB

• CDMA / PCS 1900 / Up Link / 1 909.20 MHz



Input Signal

99 % Bandwidth : 1.258 MHz  
26 dB Bandwidth : 1.400 MHz  
RF Power : -50.70 dBm

Output Signal

99 % Bandwidth : 1.258 MHz  
26 dB Bandwidth : 1.394 MHz  
RF Power : +20.00 dBm

System Gain : 70.70 dB

• CDMA / PCS 1900 / Down Link / 1 930.80 MHz



Input Signal

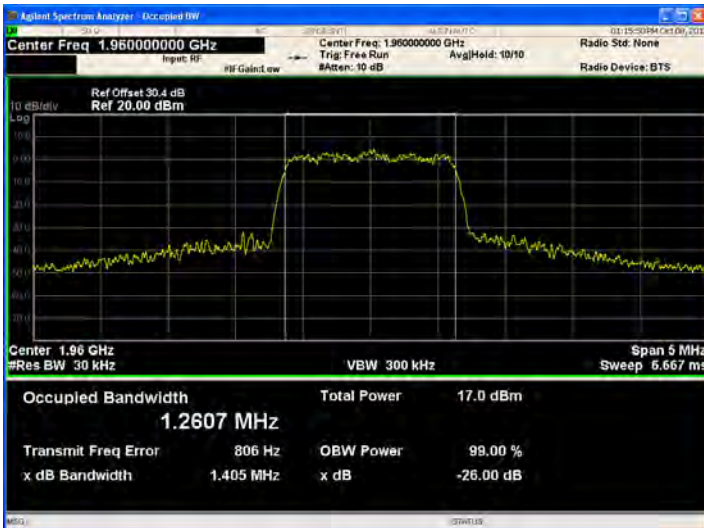
99 % Bandwidth : 1.260 MHz  
26 dB Bandwidth : 1.400 MHz  
RF Power : -54.78 dBm

Output Signal

99 % Bandwidth : 1.263 MHz  
26 dB Bandwidth : 1.404 MHz  
RF Power : +17.01 dBm

System Gain : 71.79 dB

• CDMA / PCS 1900 / Down Link / 1 960.00 MHz



Input Signal

99 % Bandwidth : 1.260 MHz  
26 dB Bandwidth : 1.400 MHz  
RF Power : -56.93 dBm

Output Signal

99 % Bandwidth : 1.261 MHz  
26 dB Bandwidth : 1.405 MHz  
RF Power : +17.01 dBm

System Gain : 73.94 dB

• CDMA / PCS 1900 / Down Link / 1 989.82 MHz



Input Signal

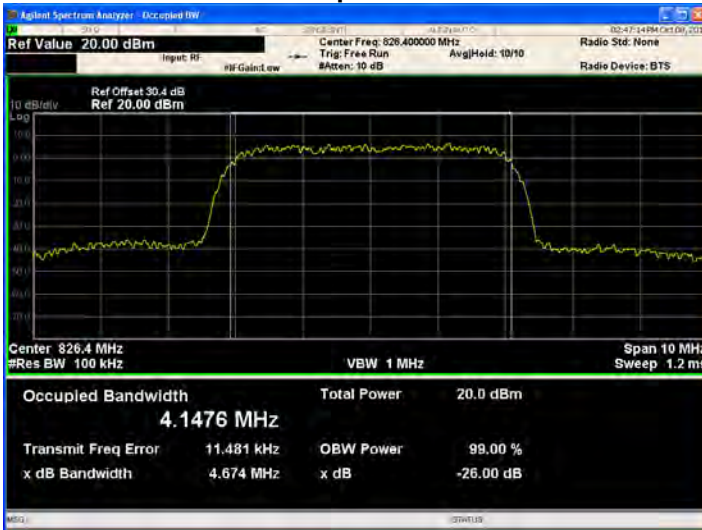
99 % Bandwidth : 1.260 MHz  
26 dB Bandwidth : 1.400 MHz  
RF Power : -53.22 dBm

Output Signal

99 % Bandwidth : 1.259 MHz  
26 dB Bandwidth : 1.412 MHz  
RF Power : +17.00 dBm

System Gain : 70.22 dB

• WCDMA / Cellular 800 / Up Link / 826.40 MHz



Input Signal

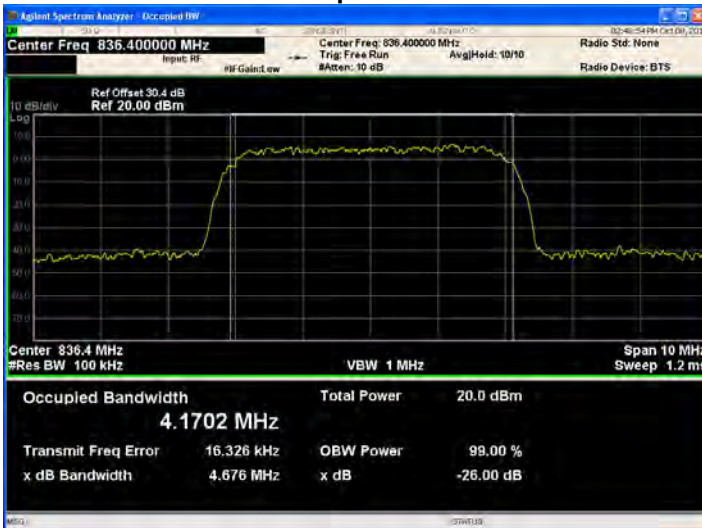
99 % Bandwidth : 4.123 MHz  
26 dB Bandwidth : 4.650 MHz  
RF Power : -54.81 dBm

Output Signal

99 % Bandwidth : 4.148 MHz  
26 dB Bandwidth : 4.674 MHz  
RF Power : +20.00 dBm

System Gain : 74.81 dB

• WCDMA / Cellular 800 / Up Link / 836.40 MHz



Input Signal

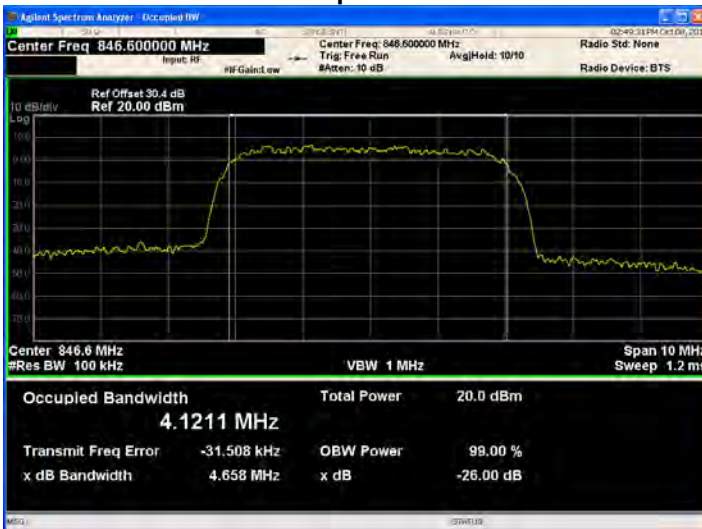
99 % Bandwidth : 4.123 MHz  
26 dB Bandwidth : 4.650 MHz  
RF Power : -55.12 dBm

Output Signal

99 % Bandwidth : 4.170 MHz  
26 dB Bandwidth : 4.676 MHz  
RF Power : +20.00 dBm

System Gain : 75.12 dB

• WCDMA / Cellular 800 / Up Link / 846.60 MHz



Input Signal

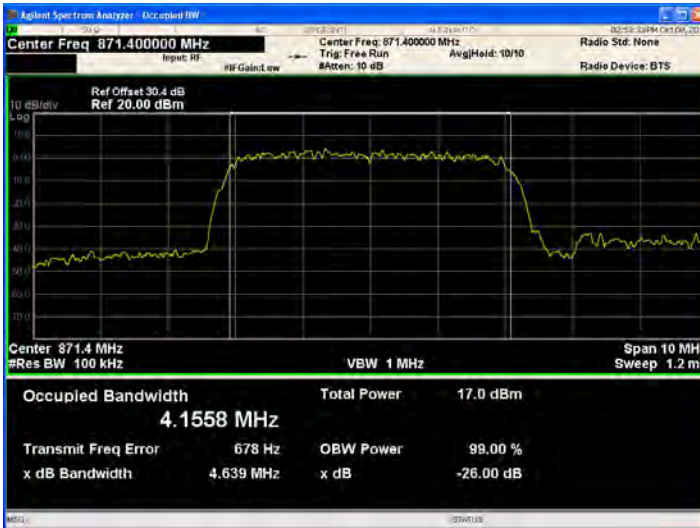
99 % Bandwidth : 4.123 MHz  
26 dB Bandwidth : 4.650 MHz  
RF Power : -54.31 dBm

Output Signal

99 % Bandwidth : 4.121 MHz  
26 dB Bandwidth : 4.658 MHz  
RF Power : +20.01 dBm

System Gain : 74.32 dB

• WCDMA / Cellular 800 / Down Link / 871.40 MHz



Input Signal

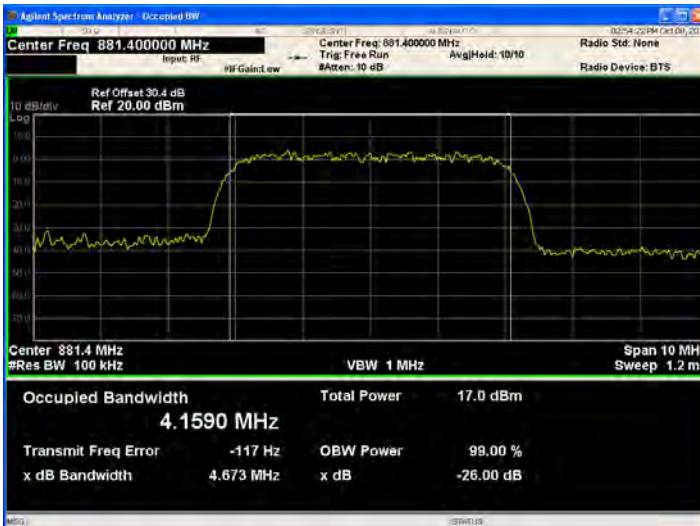
99 % Bandwidth : 4.145 MHz  
26 dB Bandwidth : 4.650 MHz  
RF Power : -58.11 dBm

Output Signal

99 % Bandwidth : 4.145 MHz  
26 dB Bandwidth : 4.628 MHz  
RF Power : +17.00 dBm

System Gain : 75.11 dB

• WCDMA / Cellular 800 / Down Link / 881.40 MHz



Input Signal

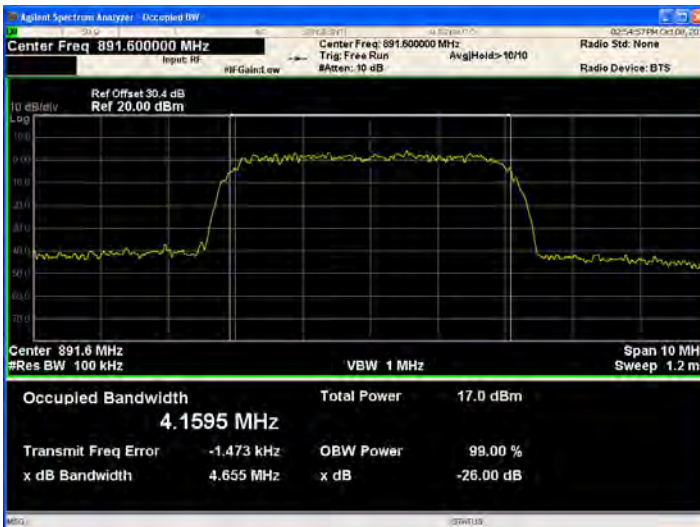
99 % Bandwidth : 4.145 MHz  
26 dB Bandwidth : 4.650 MHz  
RF Power : -58.10 dBm

Output Signal

99 % Bandwidth : 4.159 MHz  
26 dB Bandwidth : 4.673 MHz  
RF Power : +17.00 dBm

System Gain : 75.10 dB

• WCDMA / Cellular 800 / Down Link / 891.60 MHz



Input Signal

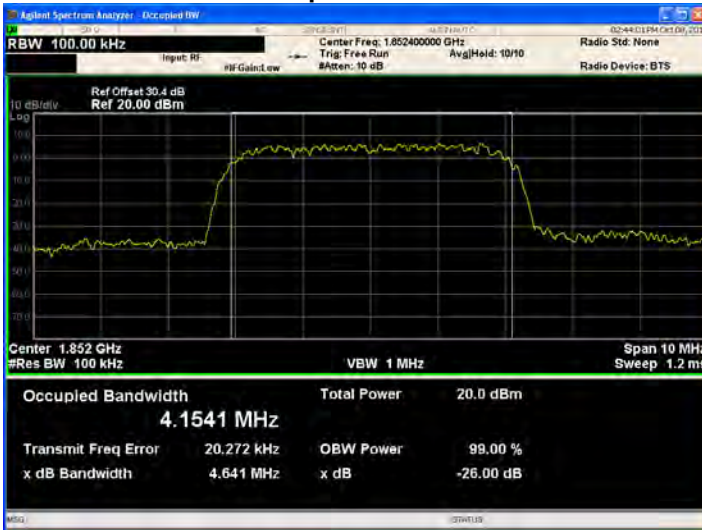
99 % Bandwidth : 4.145 MHz  
26 dB Bandwidth : 4.650 MHz  
RF Power : -56.91 dBm

Output Signal

99 % Bandwidth : 4.160 MHz  
26 dB Bandwidth : 4.655 MHz  
RF Power : +17.00 dBm

System Gain : 73.91 dB

• WCDMA / PCS 1900 / Up Link / 1 852.40 MHz



Input Signal

99 % Bandwidth : 4.123 MHz  
26 dB Bandwidth : 4.650 MHz  
RF Power : -53.10 dBm

Output Signal

99 % Bandwidth : 4.154 MHz  
26 dB Bandwidth : 4.641 MHz  
RF Power : +20.00 dBm

System Gain : 73.10 dB

• WCDMA / PCS 1900 / Up Link / 1 880.00 MHz



Input Signal

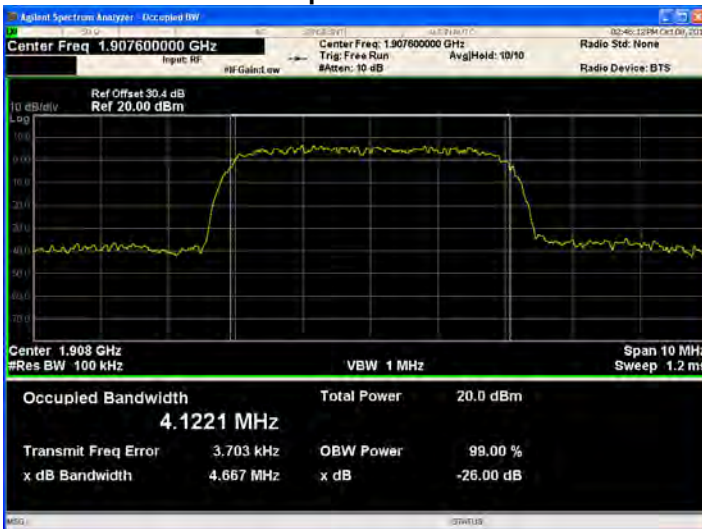
99 % Bandwidth : 4.123 MHz  
26 dB Bandwidth : 4.650 MHz  
RF Power : -54.82 dBm

Output Signal

99 % Bandwidth : 4.153 MHz  
26 dB Bandwidth : 4.643 MHz  
RF Power : +20.01 dBm

System Gain : 74.83 dB

• WCDMA / PCS 1900 / Up Link / 1 907.60 MHz



Input Signal

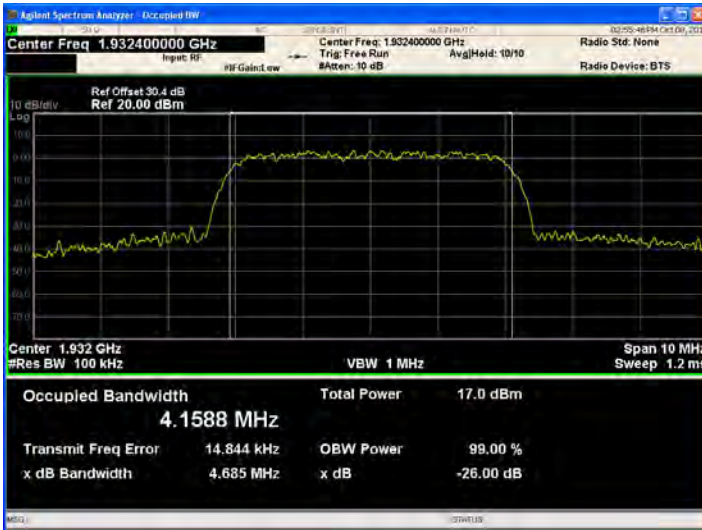
99 % Bandwidth : 4.123 MHz  
26 dB Bandwidth : 4.650 MHz  
RF Power : -51.01 dBm

Output Signal

99 % Bandwidth : 4.122 MHz  
26 dB Bandwidth : 4.667 MHz  
RF Power : +20.01 dBm

System Gain : 71.02 dB

• WCDMA / PCS 1900 / Down Link / 1 932.40 MHz



Input Signal

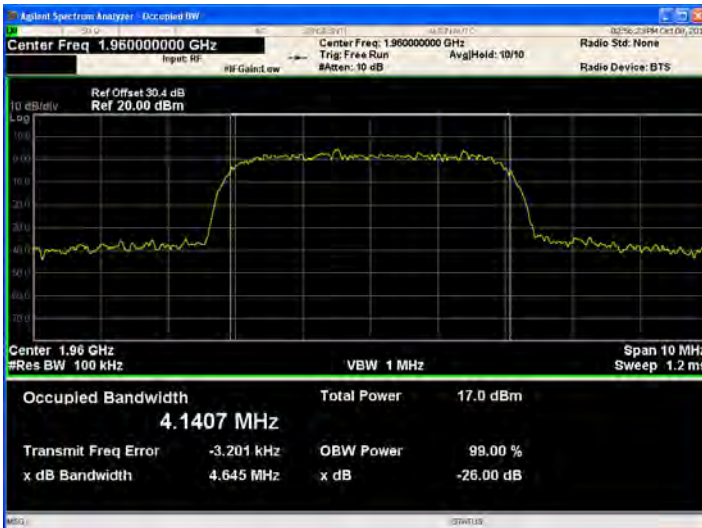
99 % Bandwidth : 4.145 MHz  
26 dB Bandwidth : 4.650 MHz  
RF Power : -55.12 dBm

Output Signal

99 % Bandwidth : 4.159 MHz  
26 dB Bandwidth : 4.685 MHz  
RF Power : +16.99 dBm

System Gain : 72.11 dB

• WCDMA / PCS 1900 / Down Link / 1 960.00 MHz



Input Signal

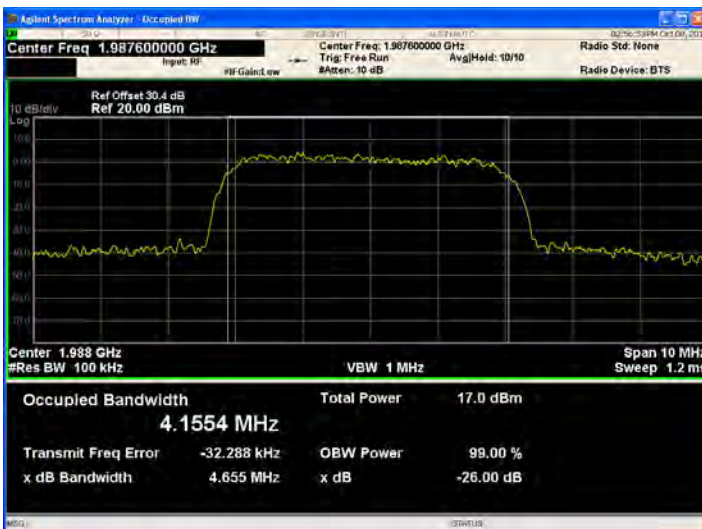
99 % Bandwidth : 4.145 MHz  
26 dB Bandwidth : 4.650 MHz  
RF Power : -55.14 dBm

Output Signal

99 % Bandwidth : 4.141 MHz  
26 dB Bandwidth : 4.645 MHz  
RF Power : +17.00 dBm

System Gain : 72.14 dB

• WCDMA / PCS 1900 / Down Link / 1 987.60 MHz



Input Signal

99 % Bandwidth : 4.145 MHz  
26 dB Bandwidth : 4.650 MHz  
RF Power : -52.03 dBm

Output Signal

99 % Bandwidth : 4.155 MHz  
26 dB Bandwidth : 4.655 MHz  
RF Power : +17.00 dBm

System Gain : 69.03 dB

### 3.3 Unwanted emission of antenna terminals

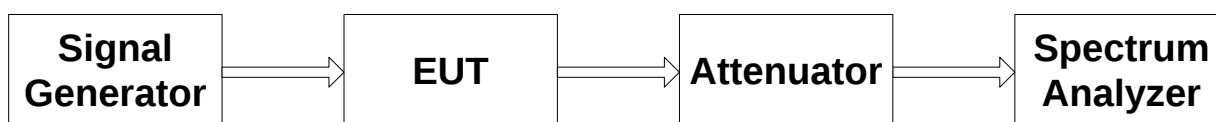
#### 3.3.1 Specification

- FCC Rules Part 2 Section 2.1051
- FCC Rules Part 22 Subpart H, Section 22.917
- FCC Rules Part 24 Subpart E, Section 24.238
- IC Rules RSS-131 Issue 2 July 2003, Section 6.4

#### 3.3.2 Measurement method

- ANSI/TIA-603-D-2010, Section 2.2.11

#### 3.3.3 Set-Up



#### 3.3.4 Test equipment list

| Equipment         | Model Name | Manufacturer        |
|-------------------|------------|---------------------|
| EUT               | USHR-0819H | OPISYS Incorporated |
| Signal Generator  | E4437B     | Agilent             |
| Signal Generator  | E4432B     | Agilent             |
| Spectrum Analyzer | N9020A     | Agilent             |
| Attenuator        | 66-30-33   | Weinschel           |

#### 3.3.5 Test condition

- Test place: Shield Room
- Test environment: 25 °C, 48 % R.H.

### 3.3.6 Test result : Spurious emissions

| Band         | Link      | Frequency [MHz] | 30 MHz to 1 GHz [dBm] | 1 GHz to 26.5 GHz [dBm] | Limit [dBm] |
|--------------|-----------|-----------------|-----------------------|-------------------------|-------------|
| Cellular 800 | Up Link   | 836.60          | >-33.00               | >-33.00                 | -13.00      |
|              | Down Link | 881.60          | >-33.00               | >-33.00                 |             |
| PCS 1900     | Up Link   | 1 880.00        | >-33.00               | >-33.00                 |             |
|              | Down Link | 1 960.00        | >-33.00               | -31.18                  |             |

※ This emissions level is below 20 dB to limit.

### 3.3.7 Test result : Intermodulation emissions

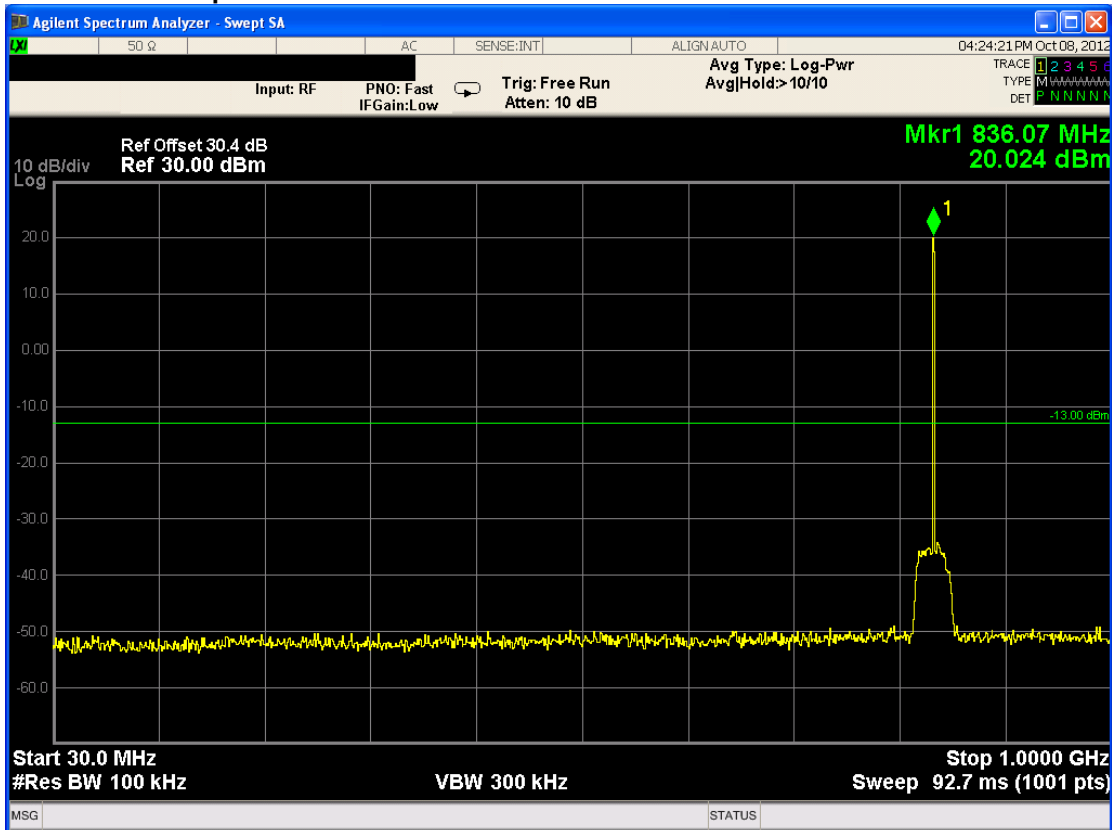
| Band         | Link      | Frequency 1 [MHz] | Frequency 2 [MHz] | IMD Emission [dBm] | Limit [dBm] |
|--------------|-----------|-------------------|-------------------|--------------------|-------------|
| Cellular 800 | Up Link   | 824.20            | 825.20            | -15.78             | -13.00      |
|              |           | 836.60            | 837.60            | -17.43             |             |
|              |           | 847.80            | 848.80            | -21.64             |             |
|              | Down Link | 869.20            | 870.20            | -24.19             |             |
|              |           | 881.00            | 882.00            | -23.05             |             |
|              |           | 892.80            | 893.80            | -26.93             |             |
| PCS 1900     | Up Link   | 1 850.20          | 1 851.20          | -16.25             | -13.00      |
|              |           | 1 879.00          | 1 880.00          | -14.06             |             |
|              |           | 1 908.80          | 1 909.80          | -23.02             |             |
|              | Down Link | 1 930.20          | 1 931.20          | -20.89             |             |
|              |           | 1 959.00          | 1 960.00          | -19.02             |             |
|              |           | 1 988.80          | 1 989.80          | -26.31             |             |

### 3.3.8 Test result : Band edge emissions

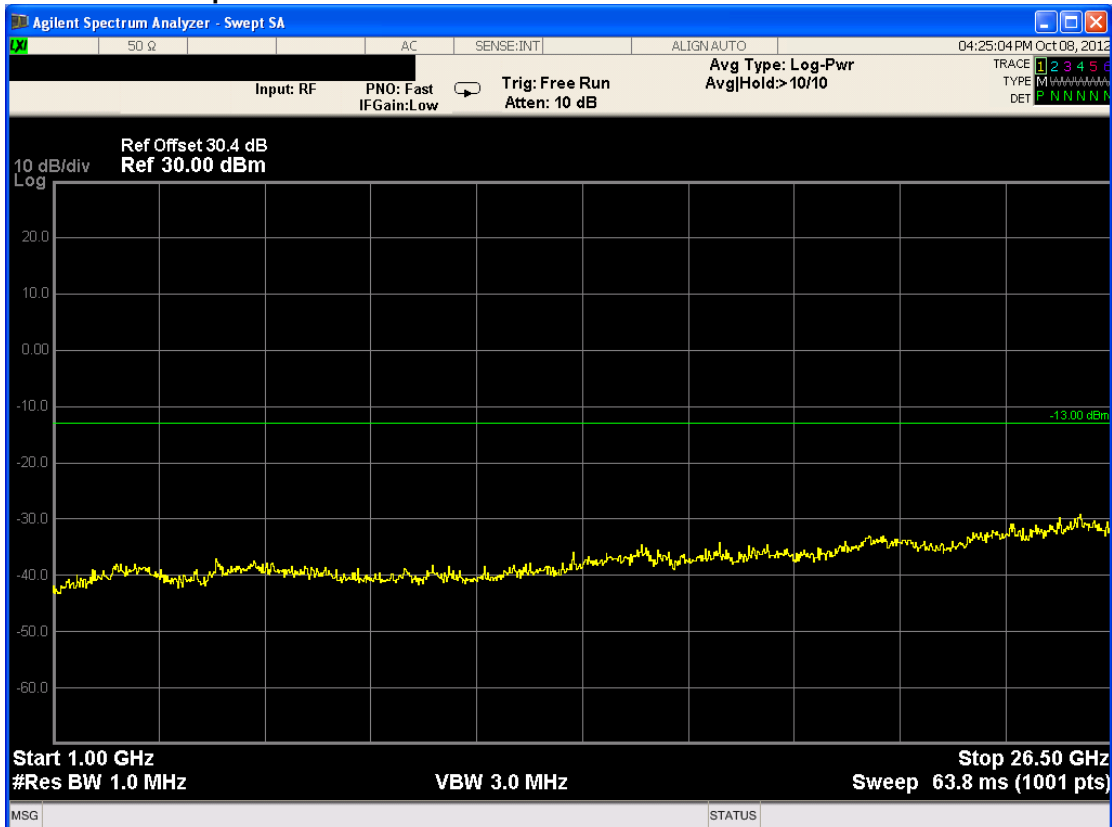
| Band         | Link      | Frequency [MHz] | Frequency [MHz] | Band edge emission [dBm] | System Gain [dB] |
|--------------|-----------|-----------------|-----------------|--------------------------|------------------|
| Cellular 800 | Up Link   | EDGE            | 824.20          | -38.66                   | -13.00           |
|              |           |                 | 848.80          | -37.98                   |                  |
|              |           | GSM             | 824.20          | -35.07                   |                  |
|              |           |                 | 848.80          | -35.67                   |                  |
|              |           | CDMA            | 824.80          | -31.37                   |                  |
|              |           |                 | 848.20          | -41.38                   |                  |
|              |           | WCDMA           | 826.40          | -31.17                   |                  |
|              |           |                 | 846.60          | -34.79                   |                  |
|              | Down Link | EDGE            | 869.20          | -39.41                   |                  |
|              |           |                 | 893.80          | -39.77                   |                  |
|              |           | GSM             | 869.20          | -38.11                   |                  |
|              |           |                 | 893.80          | -37.80                   |                  |
|              |           | CDMA            | 869.80          | -42.62                   |                  |
|              |           |                 | 893.20          | -45.64                   |                  |
|              |           | WCDMA           | 871.40          | -36.26                   |                  |
|              |           |                 | 891.60          | -36.03                   |                  |
| PCS 1900     | Up Link   | EDGE            | 1 850.20        | -35.26                   | -13.00           |
|              |           |                 | 1 909.80        | -36.95                   |                  |
|              |           | GSM             | 1 850.20        | -35.75                   |                  |
|              |           |                 | 1 909.80        | -36.07                   |                  |
|              |           | CDMA            | 1 850.80        | -38.01                   |                  |
|              |           |                 | 1 909.20        | -35.77                   |                  |
|              |           | WCDMA           | 1 852.40        | -33.76                   |                  |
|              |           |                 | 1907.60         | -32.73                   |                  |
|              | Down Link | EDGE            | 1 930.20        | -39.54                   |                  |
|              |           |                 | 1 989.80        | -39.60                   |                  |
|              |           | GSM             | 1 930.20        | -38.63                   |                  |
|              |           |                 | 1 989.80        | -39.02                   |                  |
|              |           | CDMA            | 1 930.80        | -36.17                   |                  |
|              |           |                 | 1 989.20        | -37.36                   |                  |
|              |           | WCDMA           | 1 932.40        | -35.31                   |                  |
|              |           |                 | 1 987.60        | -36.11                   |                  |

### 3.3.9 Plots of spurious emissions

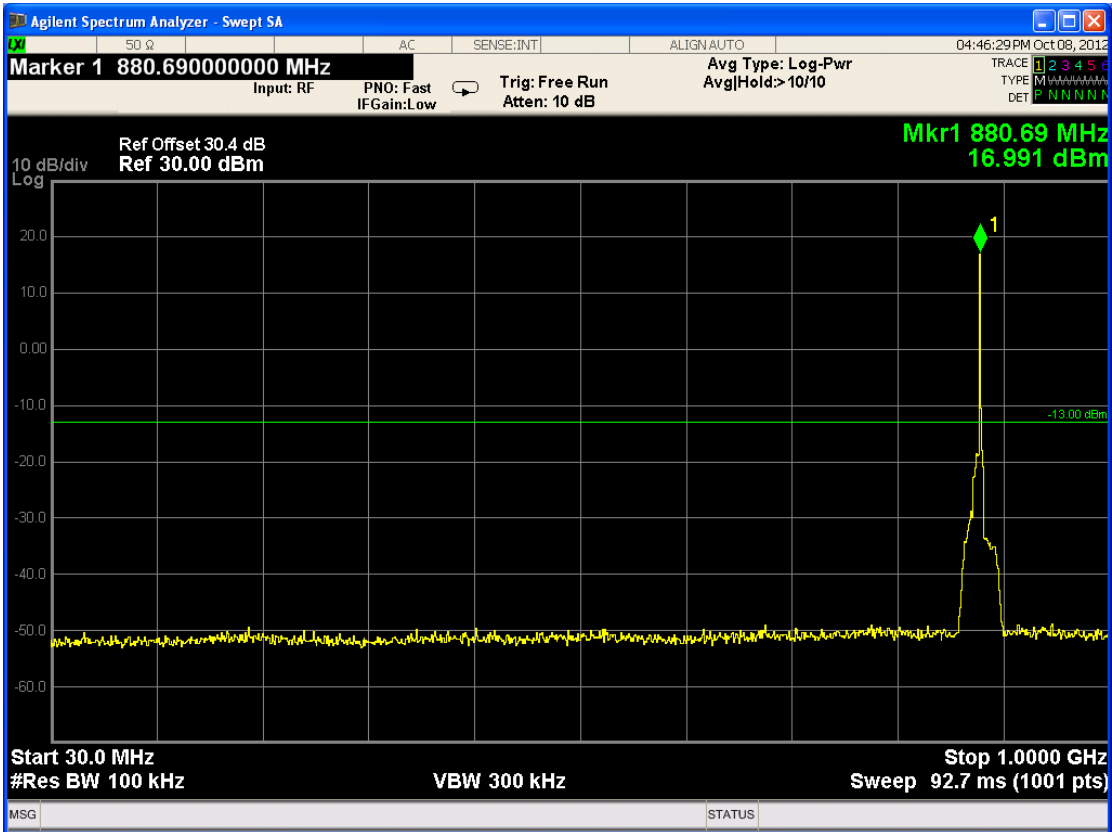
#### • Cellular 800 / Up Link / 836.60 MHz / 30 MHz to 1 GHz



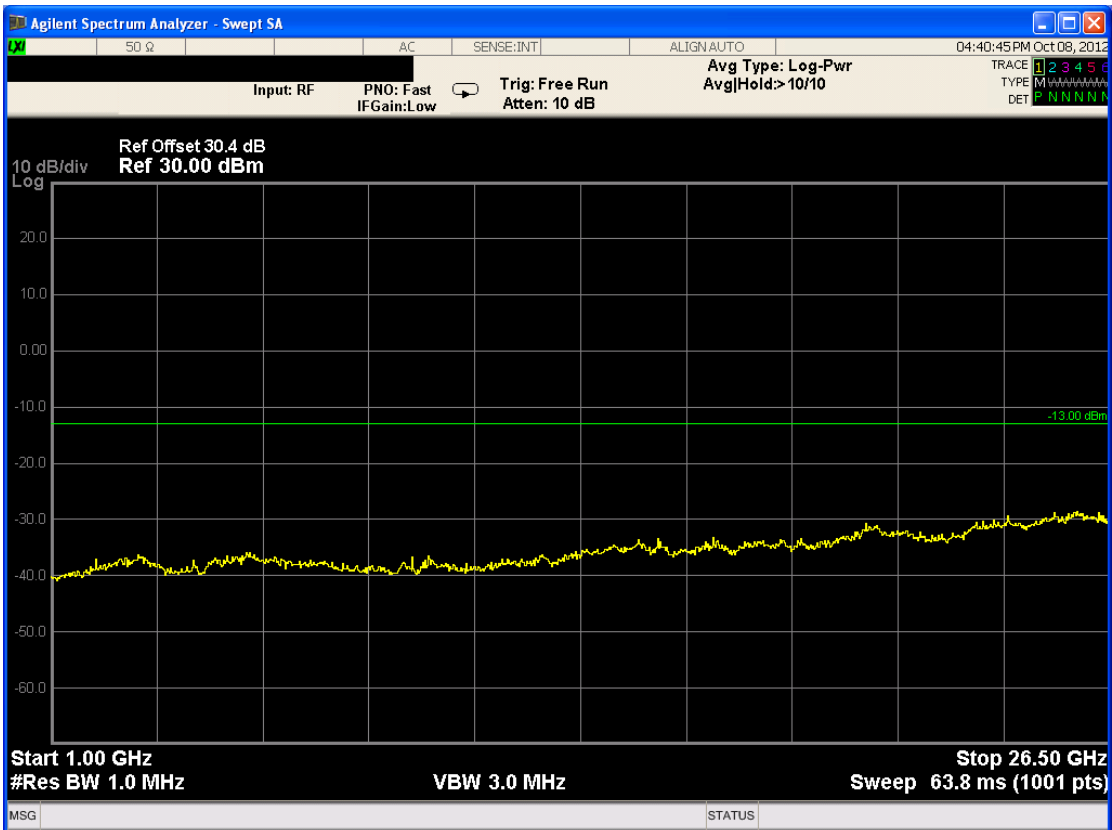
#### • Cellular 800 / Up Link / 836.60 MHz / 1 GHz to 26.5 GHz



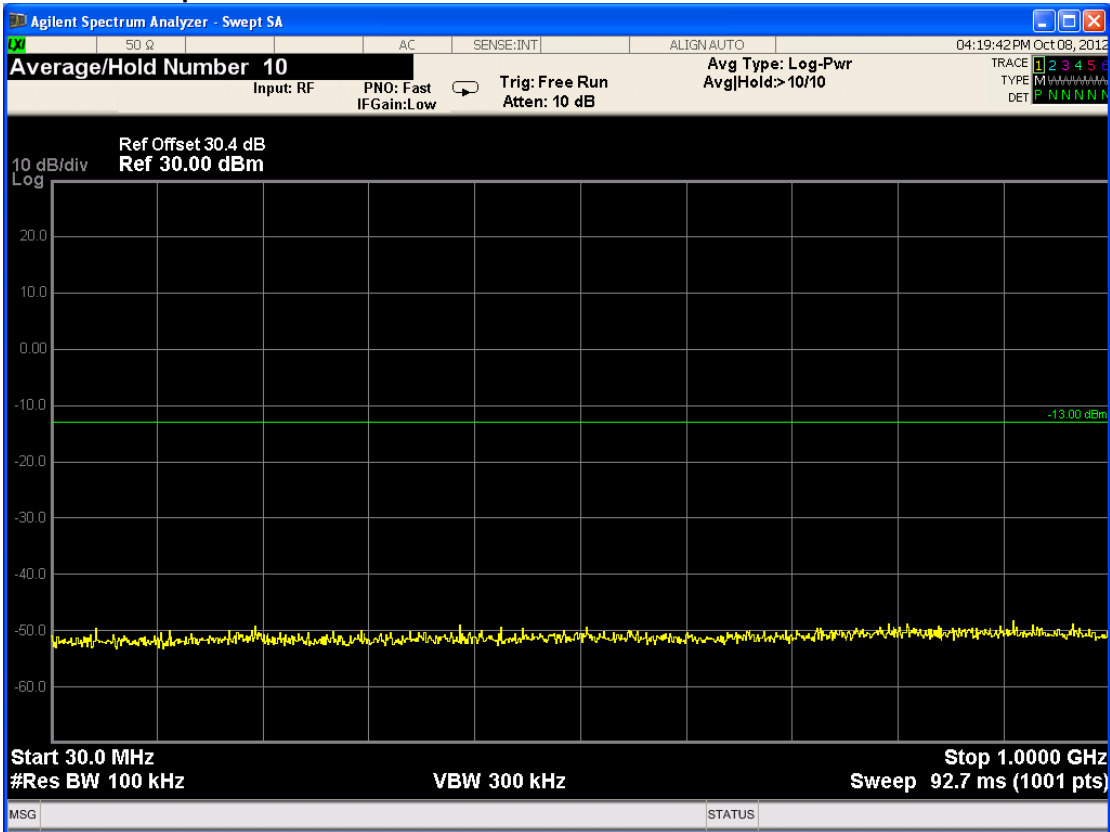
• Cellular 800 / Down Link / 881.60 MHz / 30 MHz to 1 GHz



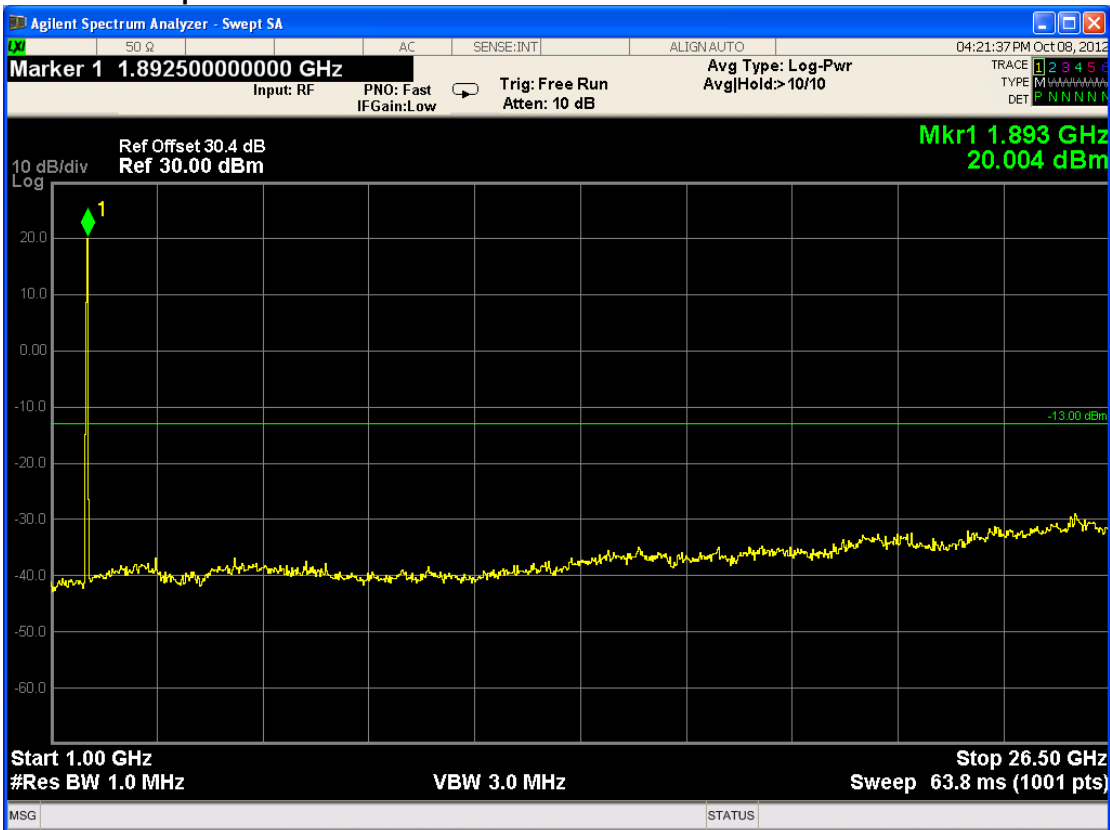
• Cellular 800 / Down Link / 881.60 MHz / 1 GHz to 26.5 GHz



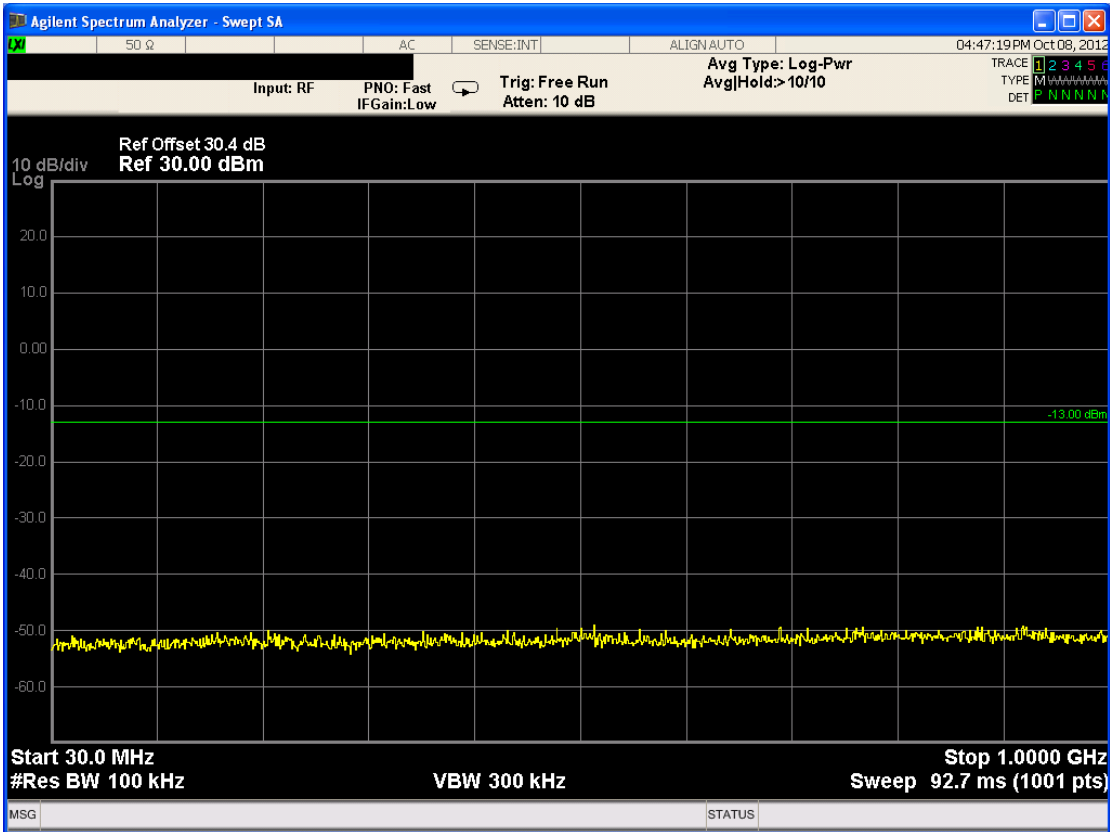
• PCS 1900 / Up Link / 1 880.00 MHz / 30 MHz to 1 GHz



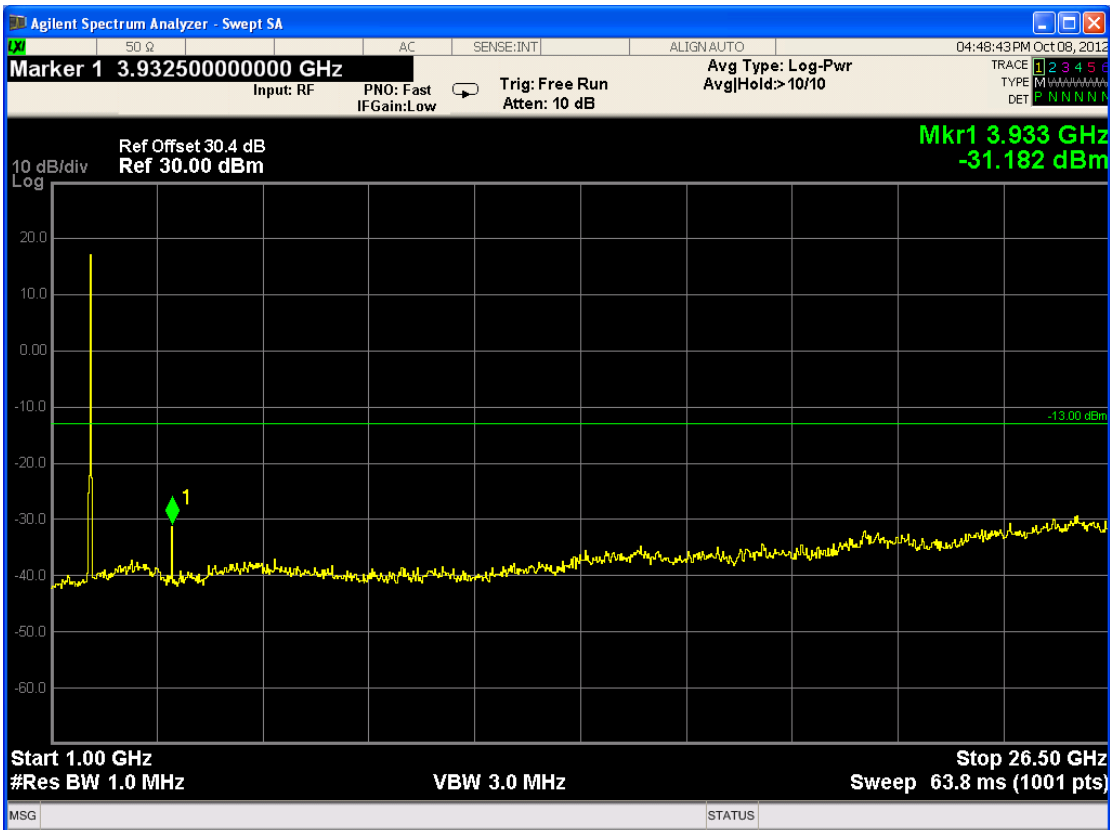
• PCS 1900 / Up Link / 1 880.00 MHz / 1 GHz to 26.5 GHz



• PCS 1900 / Down Link / 1 960.00 MHz / 30 MHz to 1 GHz

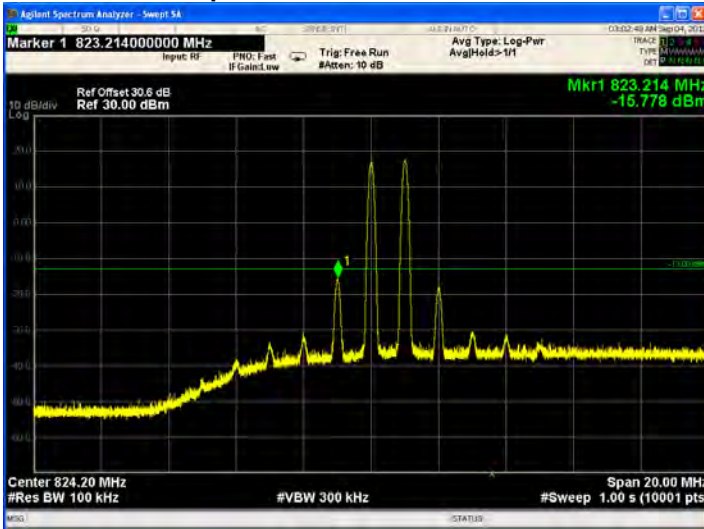


• PCS 1900 / Down Link / 1960.00 MHz / 1 GHz to 26.5 GHz



### 3.3.10 Plots of intermodulation emissions

#### • Cellular 800 / Up Link / Low



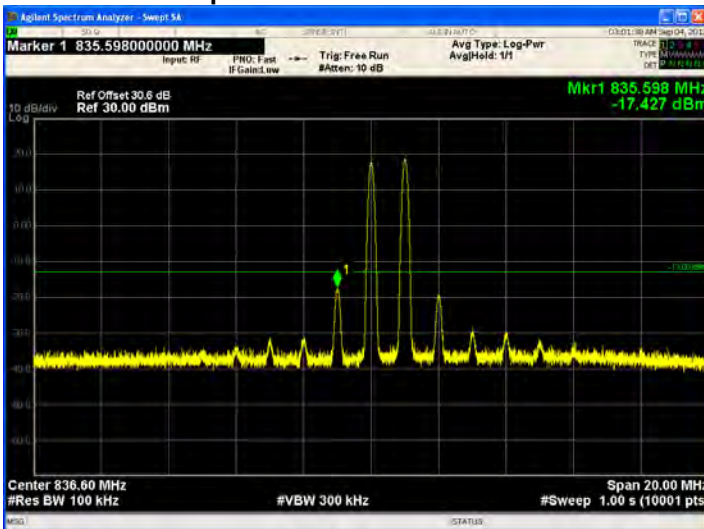
#### Input Signal

1<sup>st</sup> : 824.20 MHz  
2<sup>nd</sup> : 825.20 MHz

#### Intermodulation Emission

Lower IMD : -15.778 dBm  
Upper IMD : -18.163 dBm

#### • Cellular 800 / Up Link / Middle



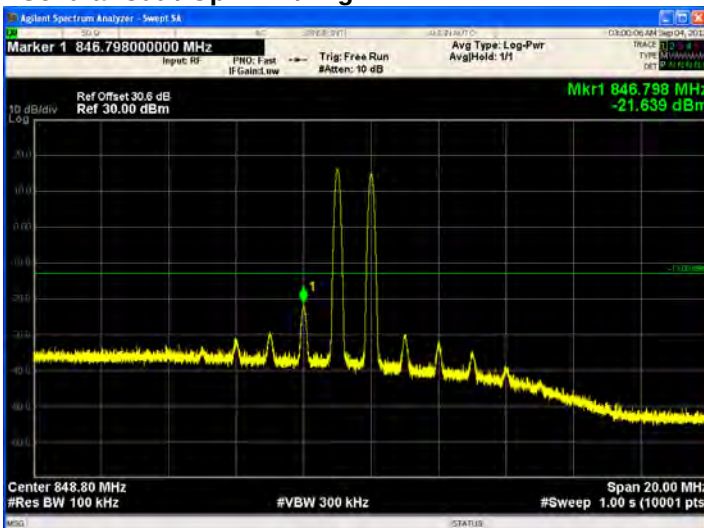
#### Input Signal

1<sup>st</sup> : 836.60 MHz  
2<sup>nd</sup> : 837.60 MHz

#### Intermodulation Emission

Lower IMD : -17.427 dBm  
Upper IMD : -19.613 dBm

#### • Cellular 800 / Up Link / High



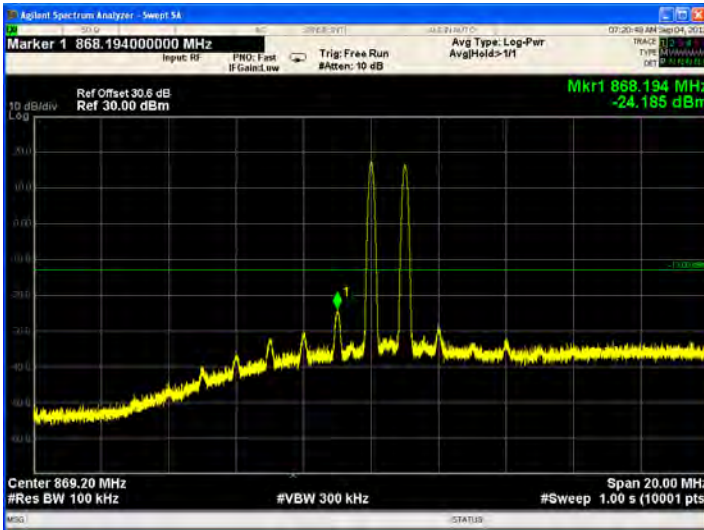
#### Input Signal

1<sup>st</sup> : 847.80 MHz  
2<sup>nd</sup> : 848.80 MHz

#### Intermodulation Emission

Lower IMD : -21.639 dBm  
Upper IMD : -29.966 dBm

• Cellular 800 / Down Link / Low



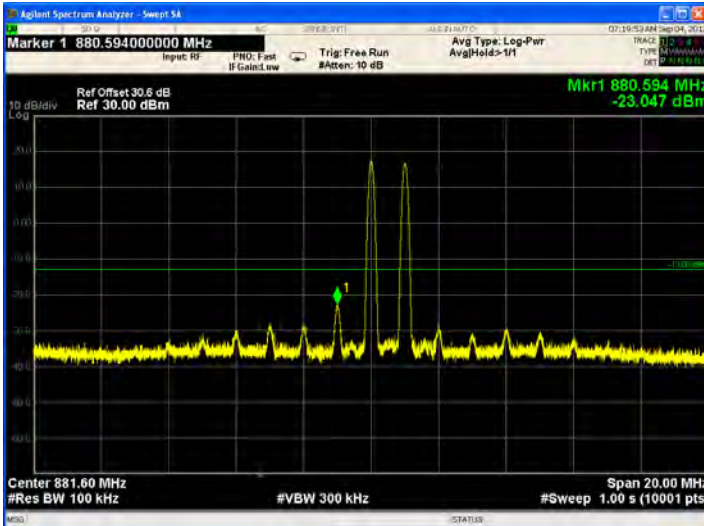
Input Signal

1<sup>st</sup> : 869.20 MHz  
2<sup>nd</sup> : 870.20 MHz

Intermodulation Emission

Lower IMD : -24.194 dBm  
Upper IMD : -28.312 dBm

• Cellular 800 / Down Link / Middle



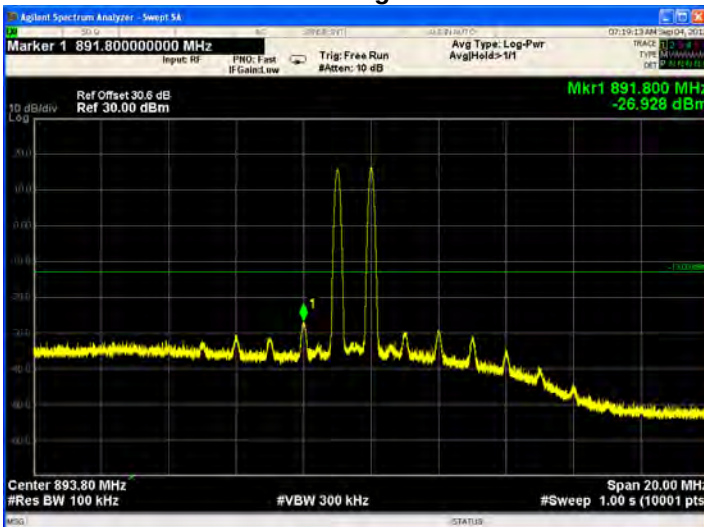
Input Signal

1<sup>st</sup> : 881.00 MHz  
2<sup>nd</sup> : 882.00 MHz

Intermodulation Emission

Lower IMD : -23.047 dBm  
Upper IMD : -28.493 dBm

• Cellular 800 / Down Link / High



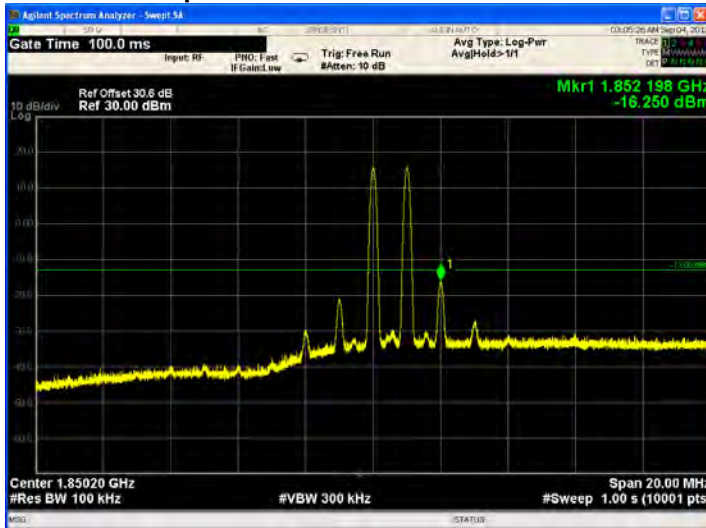
Input Signal

1<sup>st</sup> : 892.80 MHz  
2<sup>nd</sup> : 893.80 MHz

Intermodulation Emission

Lower IMD : -26.928 dBm  
Upper IMD : -29.123 dBm

• PCS 1900 / Up Link / Low



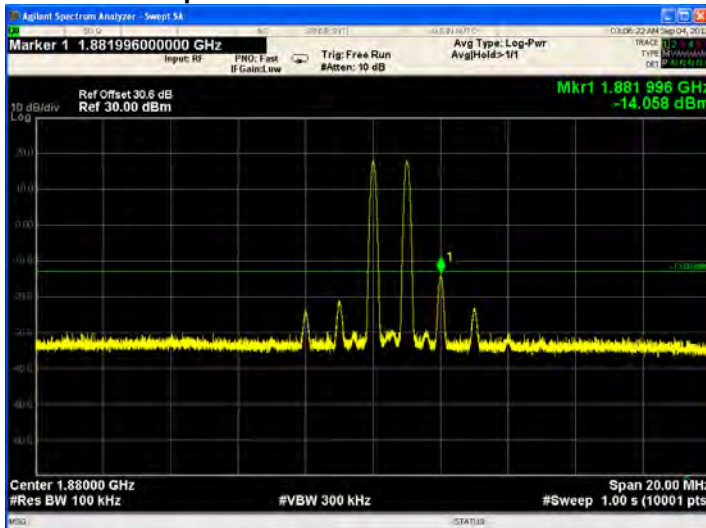
Input Signal

1<sup>st</sup> : 1850.20 MHz  
2<sup>nd</sup> : 1851.20 MHz

Intermodulation Emission

Lower IMD : -21.416 dBm  
Upper IMD : -16.250 dBm

• PCS 1900 / Up Link / Middle



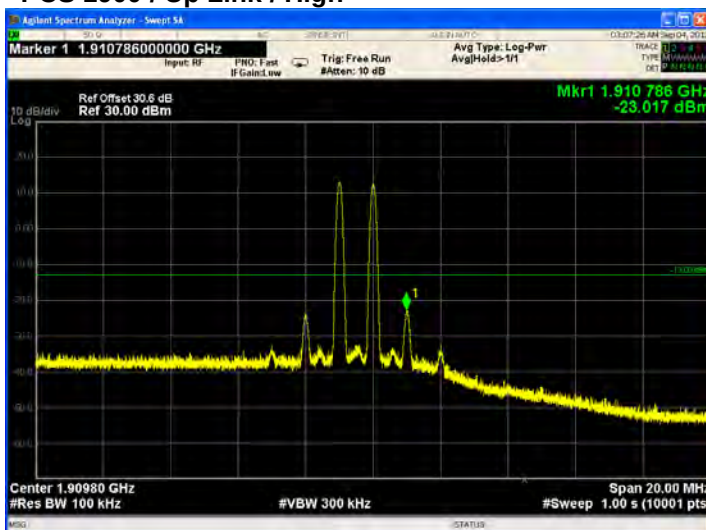
Input Signal

1<sup>st</sup> : 1879.00 MHz  
2<sup>nd</sup> : 1880.00 MHz

Intermodulation Emission

Lower IMD : -22.331 dBm  
Upper IMD : -14.058 dBm

• PCS 1900 / Up Link / High



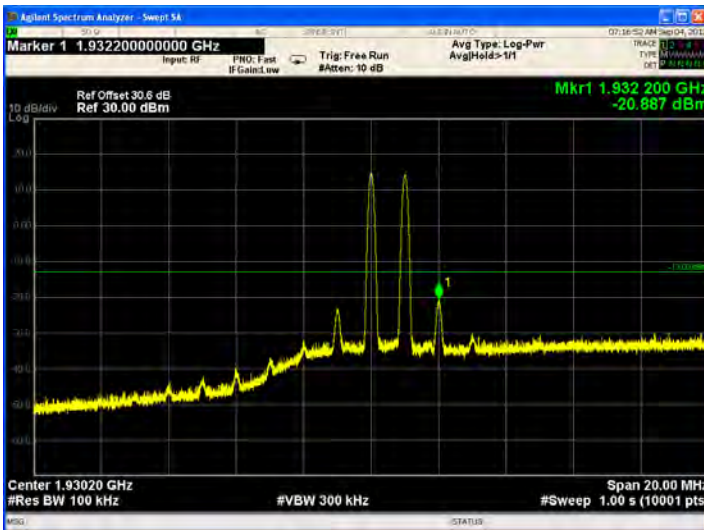
Input Signal

1<sup>st</sup> : 1908.80 MHz  
2<sup>nd</sup> : 1909.80 MHz

Intermodulation Emission

Lower IMD : -25.126 dBm  
Upper IMD : -23.017 dBm

• PCS 1900 / Down Link / Low



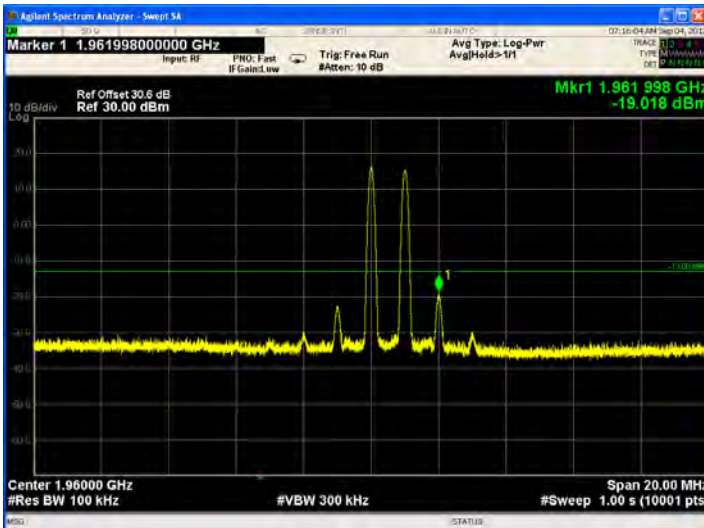
Input Signal

1<sup>st</sup> : 1930.20 MHz  
2<sup>nd</sup> : 1931.20 MHz

Intermodulation Emission

Lower IMD : -23.978 dBm  
Upper IMD : -20.887 dBm

• PCS 1900 / Down Link / Middle



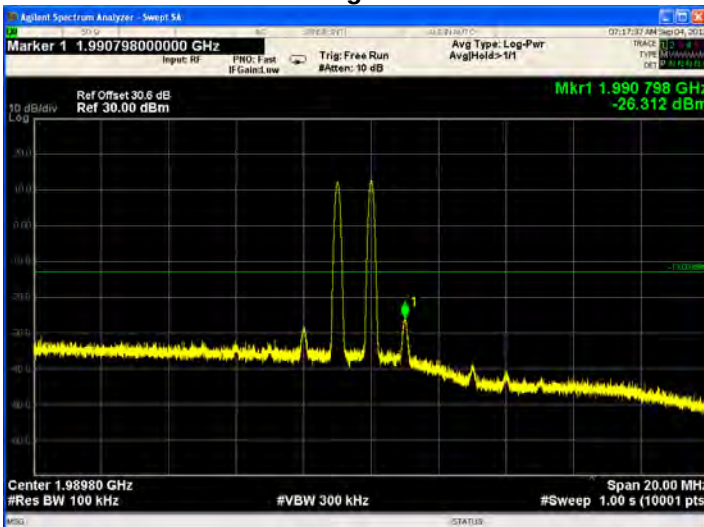
Input Signal

1<sup>st</sup> : 1959.00 MHz  
2<sup>nd</sup> : 1960.00 MHz

Intermodulation Emission

Lower IMD : -23.510 dBm  
Upper IMD : -19.018 dBm

• PCS 1900 / Down Link / High



Input Signal

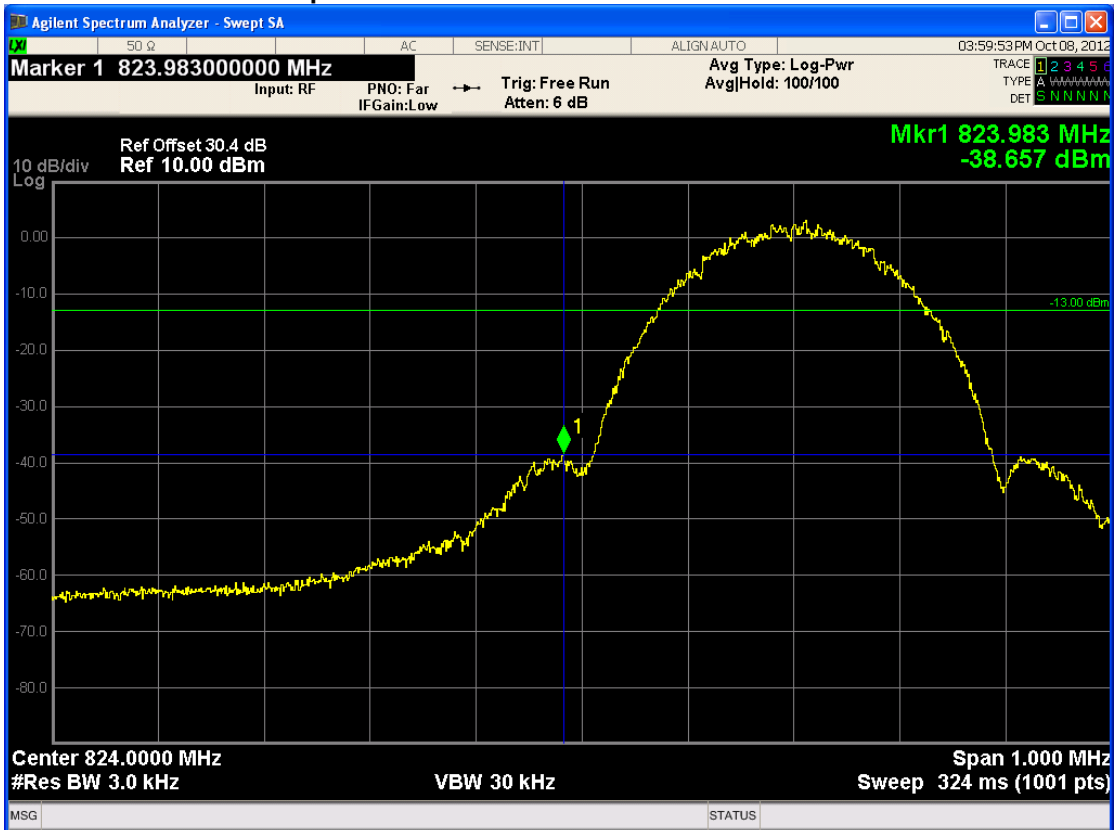
1<sup>st</sup> : 1988.80 MHz  
2<sup>nd</sup> : 1989.80 MHz

Intermodulation Emission

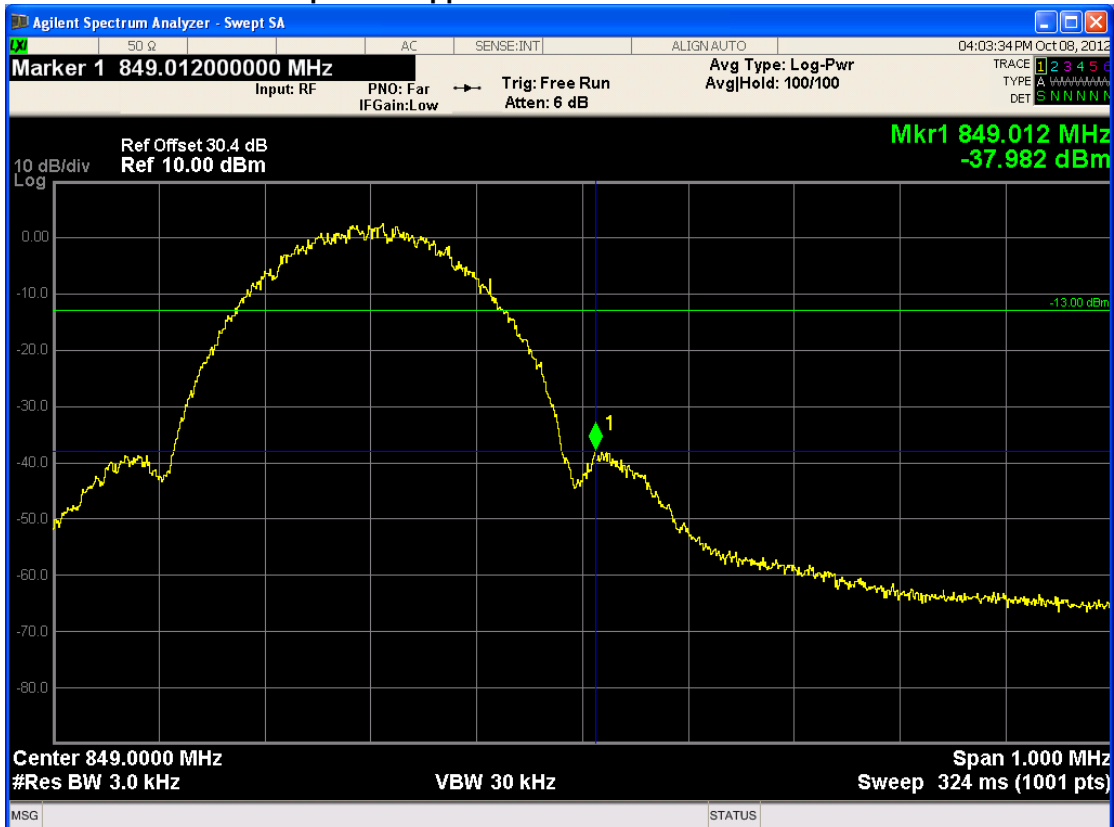
Lower IMD : -29.034 dBm  
Upper IMD : -26.312 dBm

### 3.3.11 Plots of band edge emissions

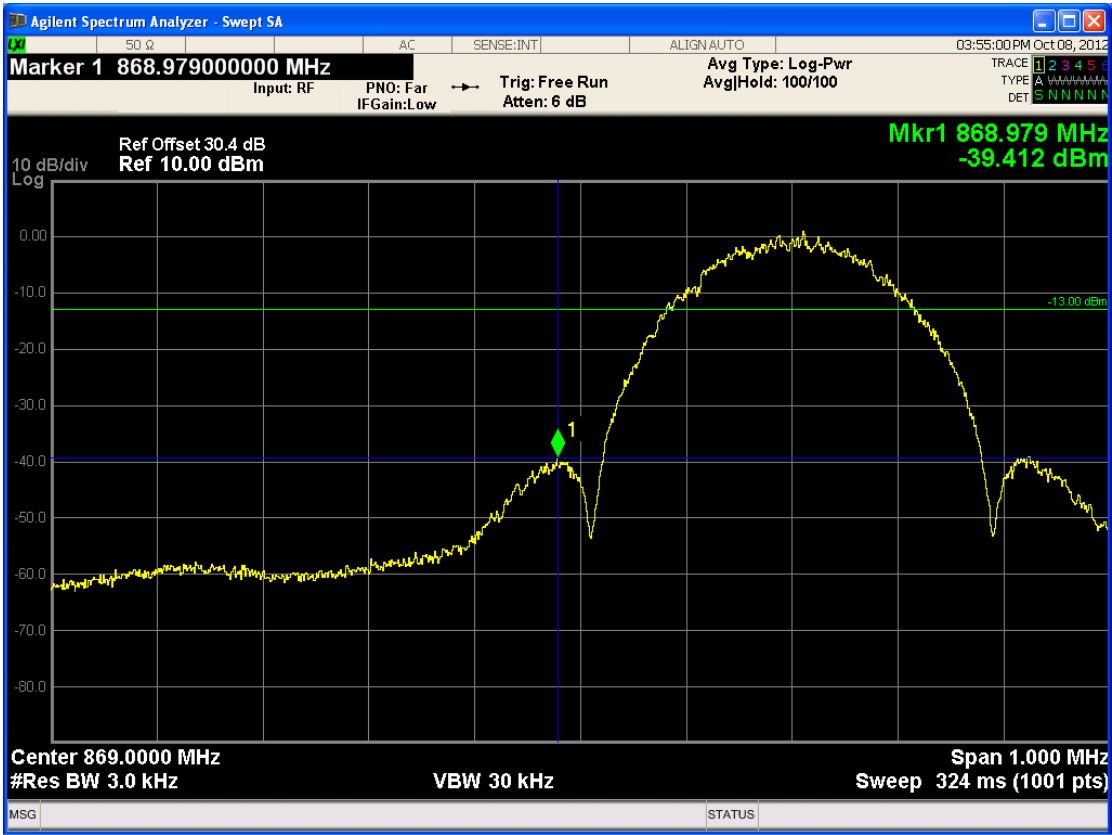
#### • EDGE / Cellular 800 / Up Link / Lower Side / 824.20 MHz



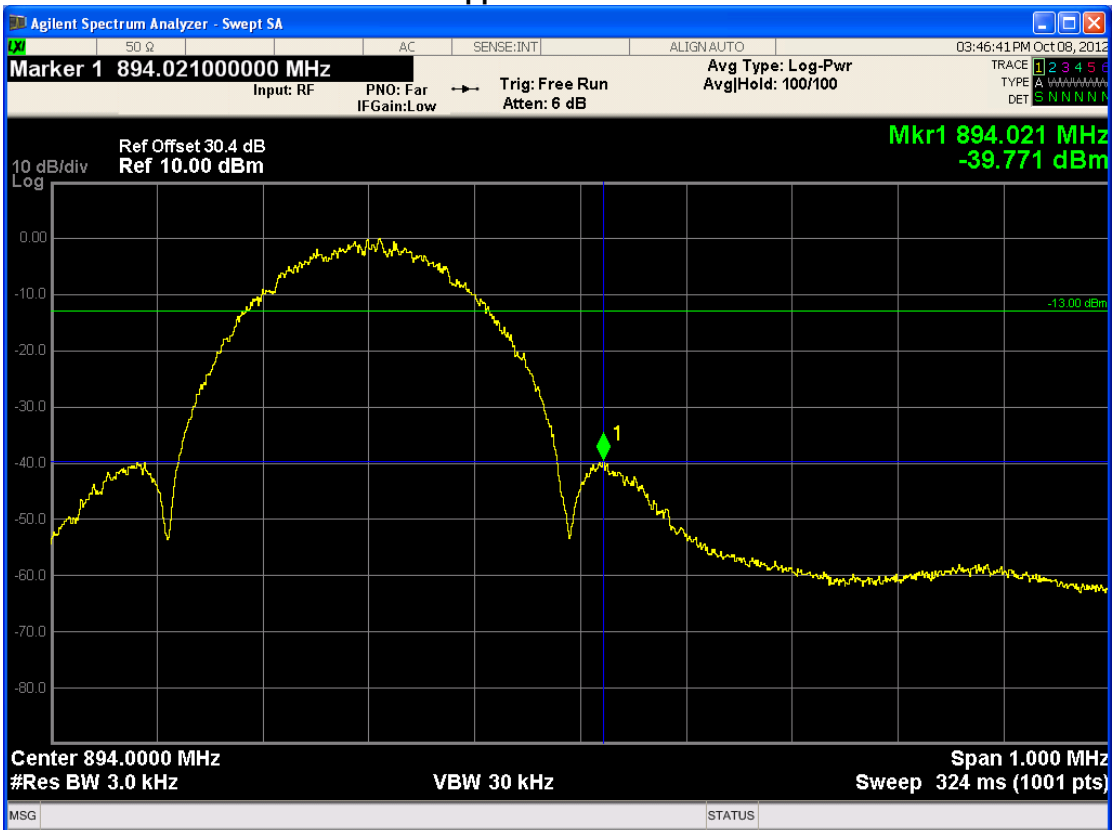
#### • EDGE / Cellular 800 / Up Link / Upper Side / 848.80 MHz



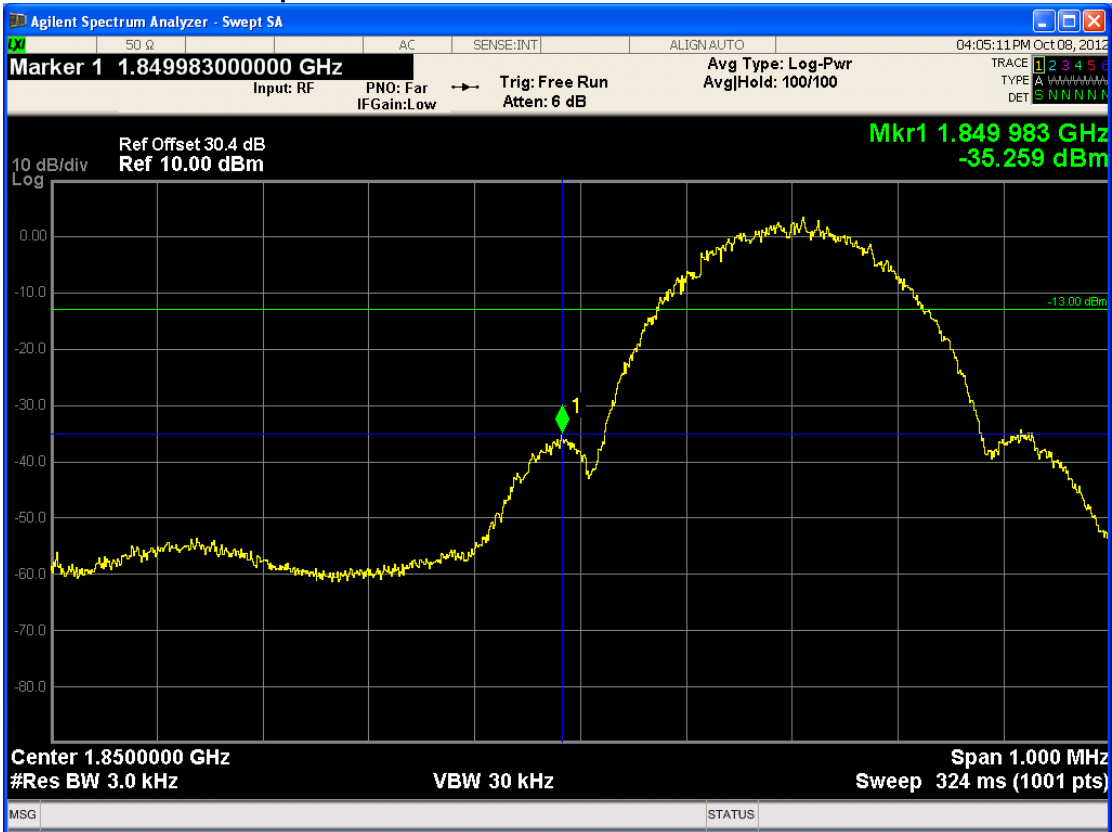
• **EDGE / Cellular 800 / Down Link / Lower Side / 869.20 MHz**



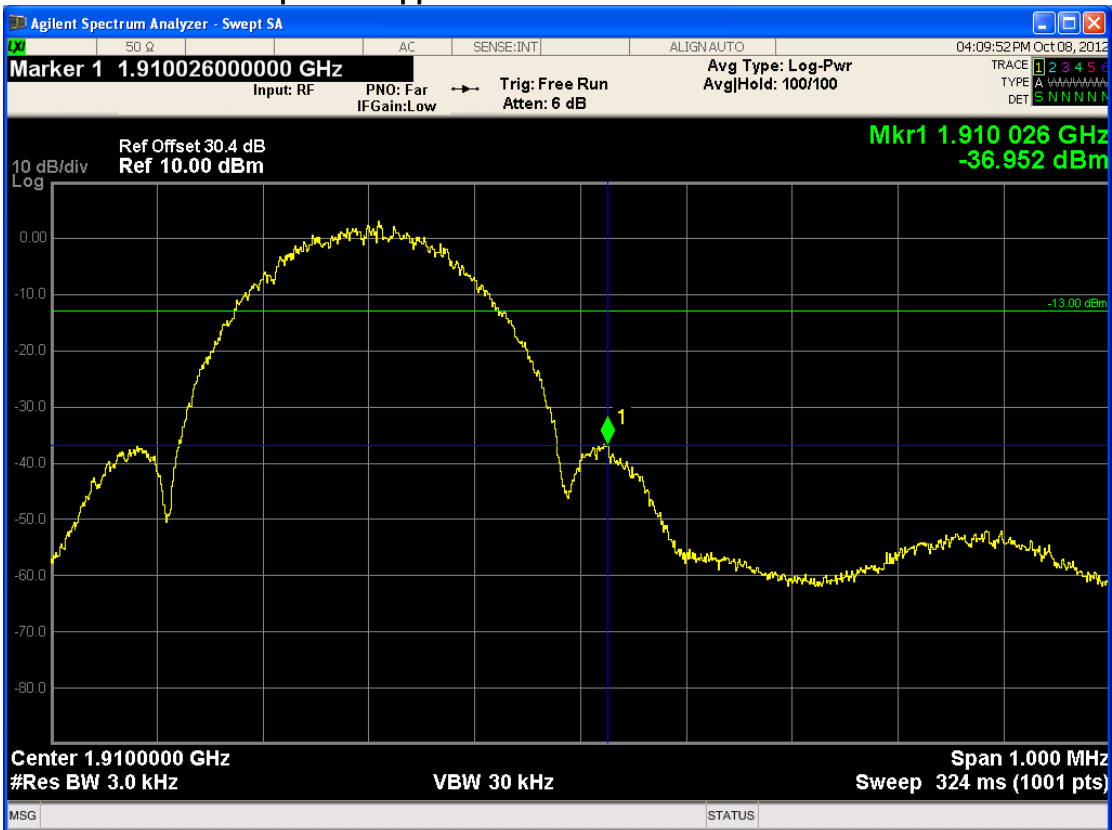
• **EDGE / Cellular 800 / Down Link / Upper Side / 893.80 MHz**



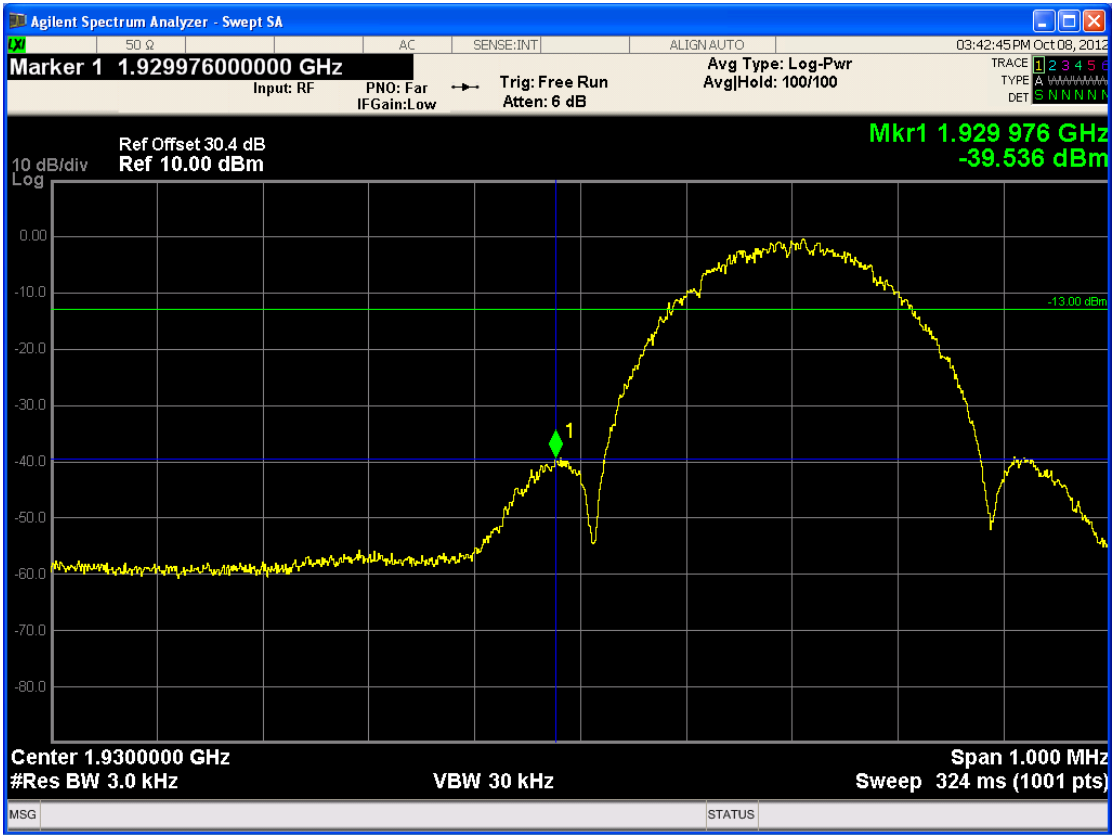
• **EDGE / PCS 1900 / Up Link / Lower Side / 1 850.20 MHz**



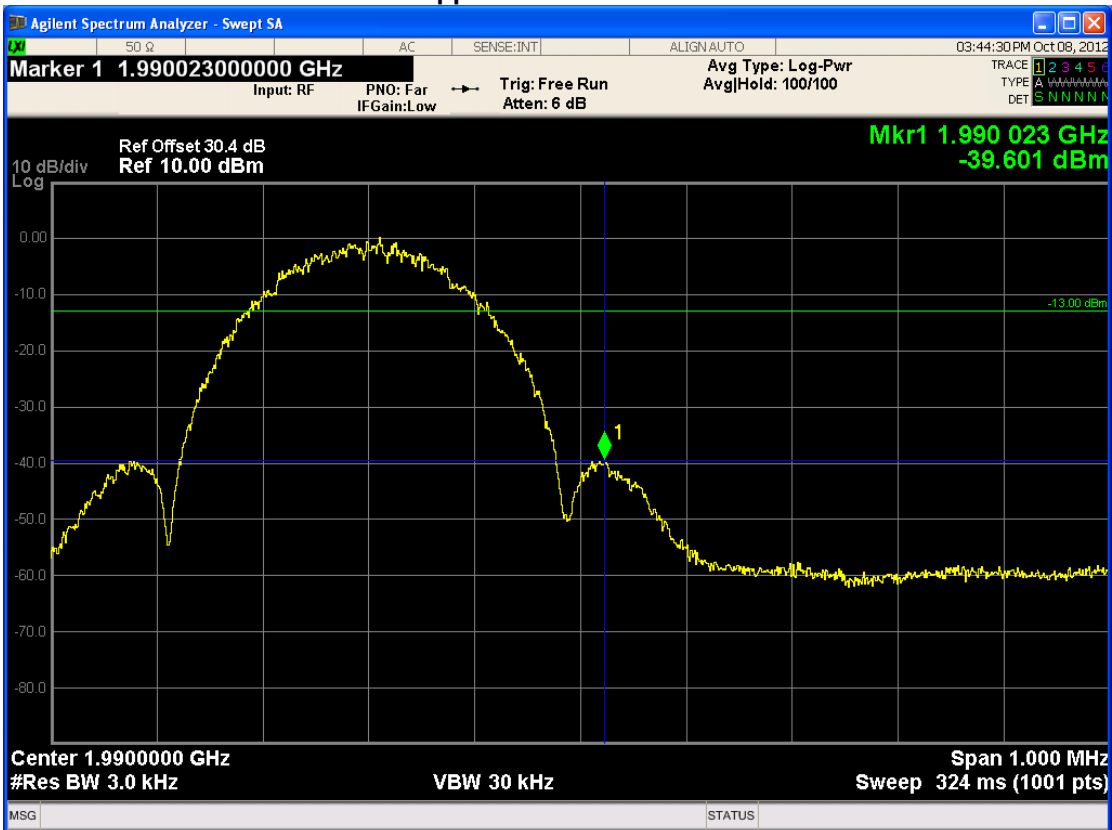
• **EDGE / PCS 1900 / Up Link / Upper Side / 1 909.80 MHz**



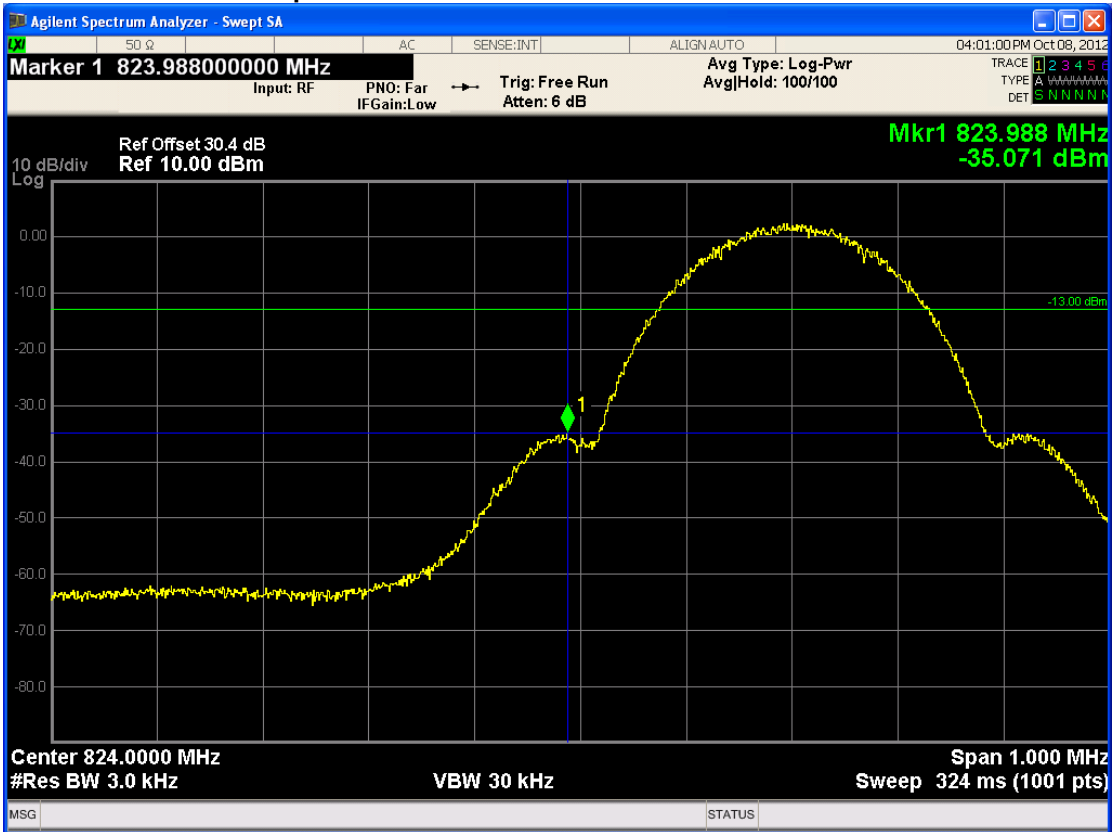
• EDGE / PCS 1900 / Down Link / Lower Side / 1 930.20 MHz



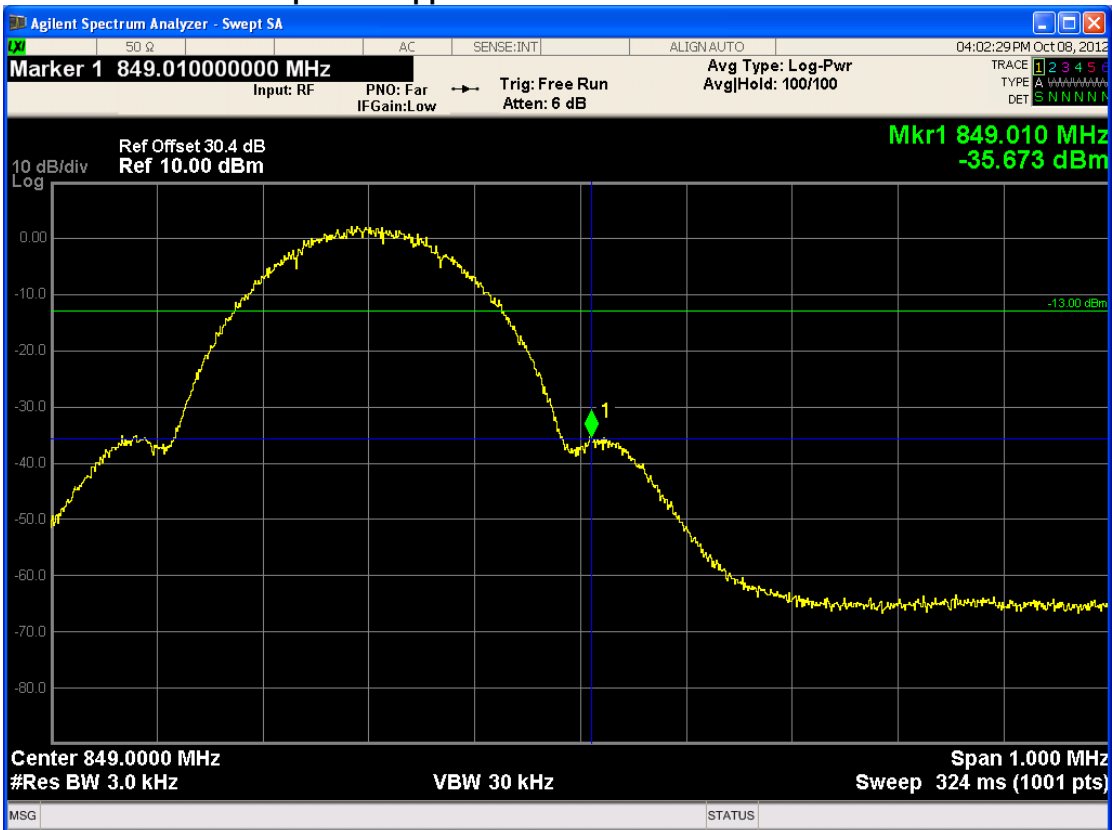
• EDGE / PCS 1900 / Down Link / Upper Side / 1 989.80 MHz



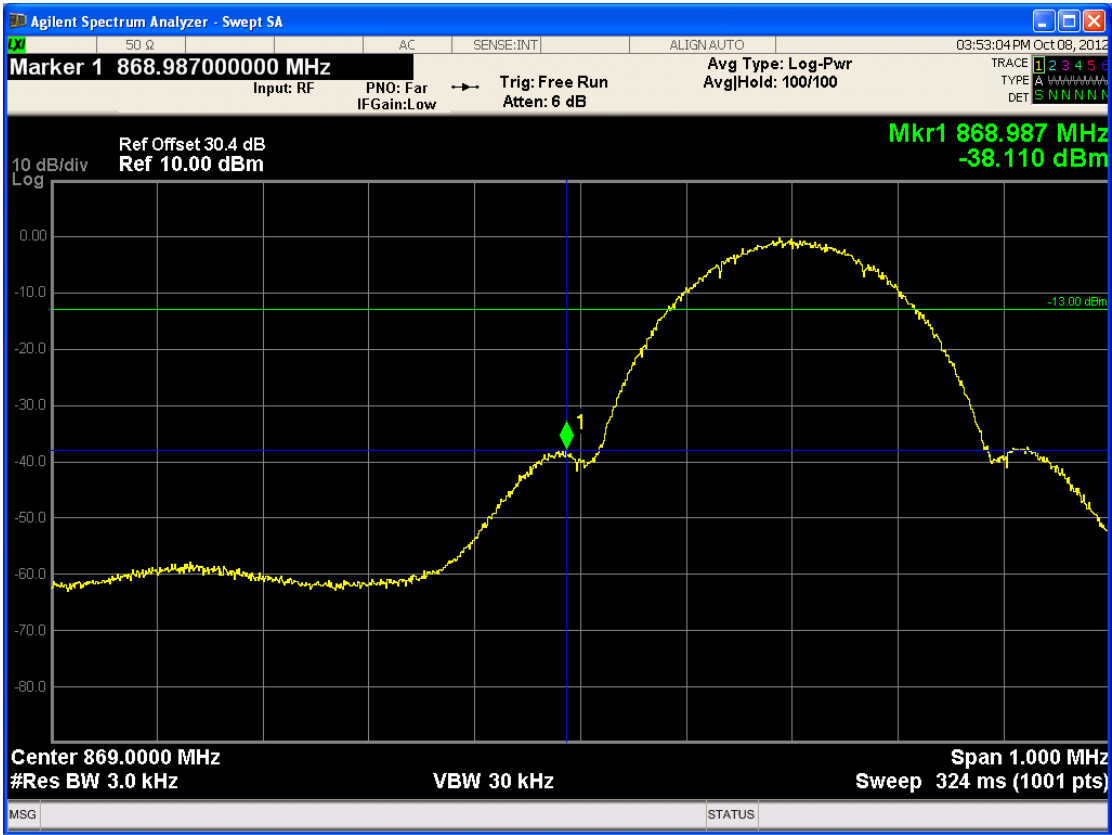
• GSM / Cellular 800 / Up Link / Lower Side / 824.20 MHz



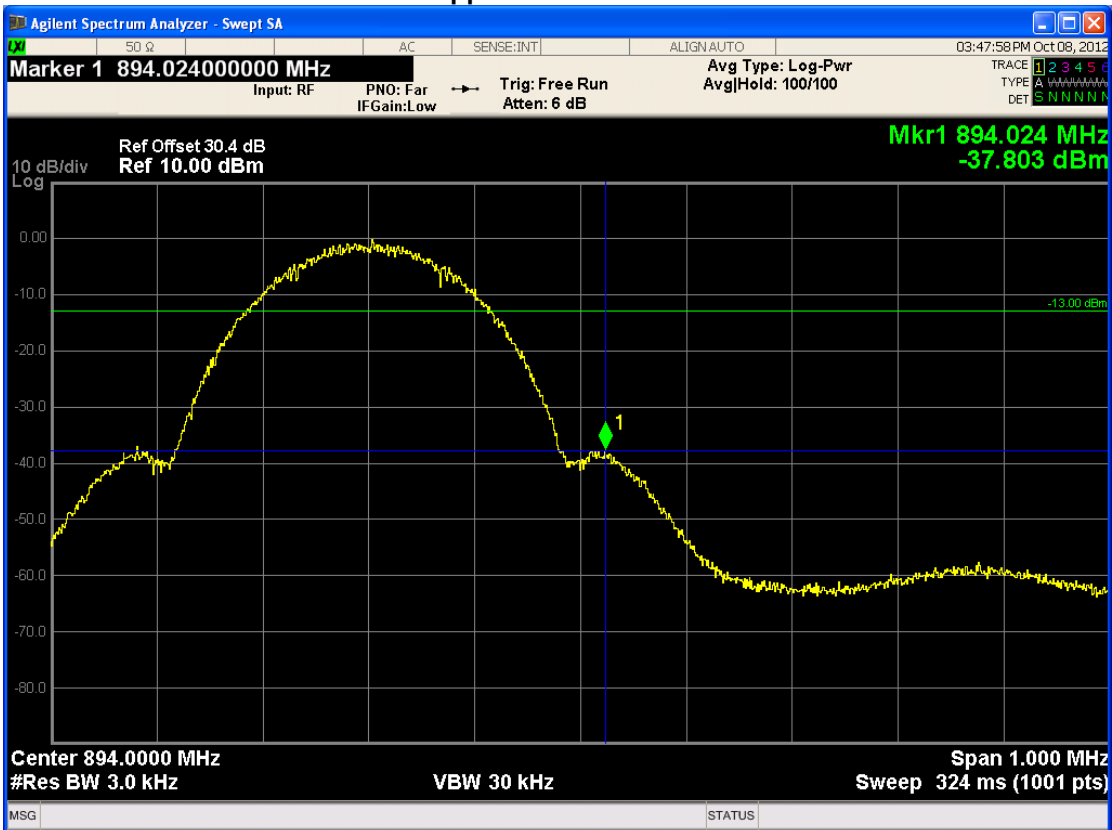
• GSM / Cellular 800 / Up Link / Upper Side / 848.80 MHz



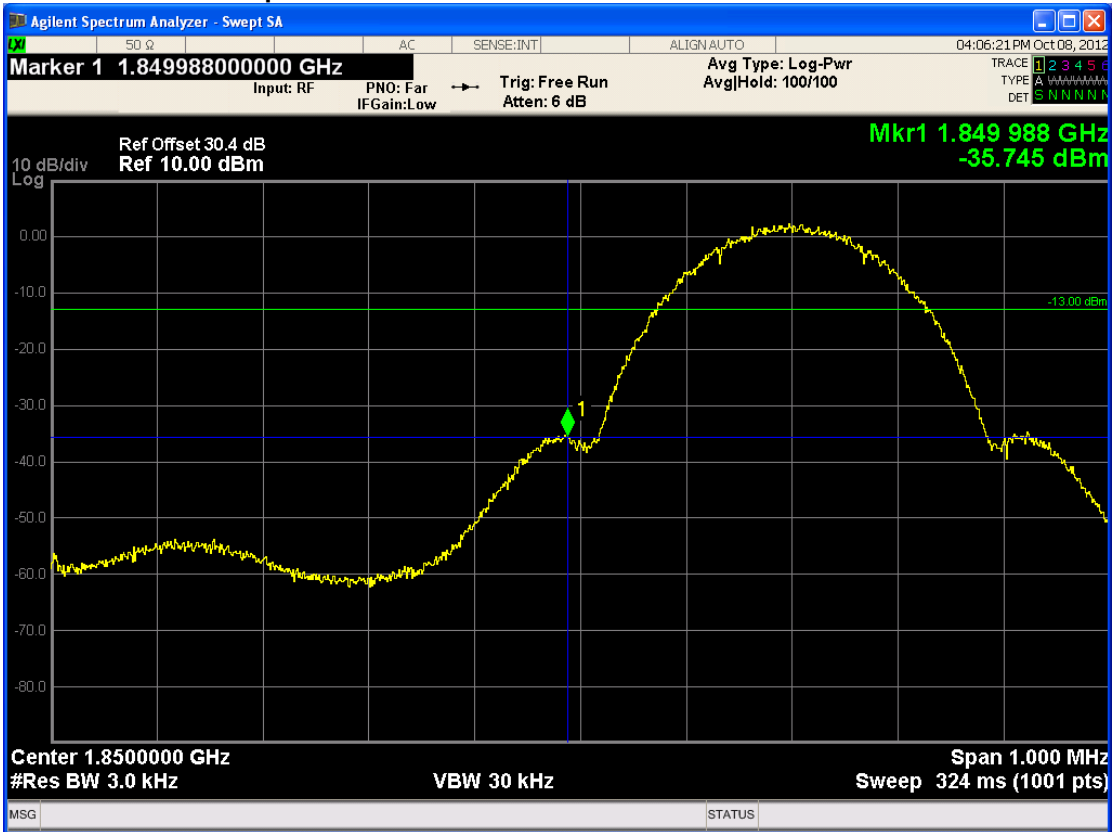
• GSM / Cellular 800 / Down Link / Lower Side / 869.20 MHz



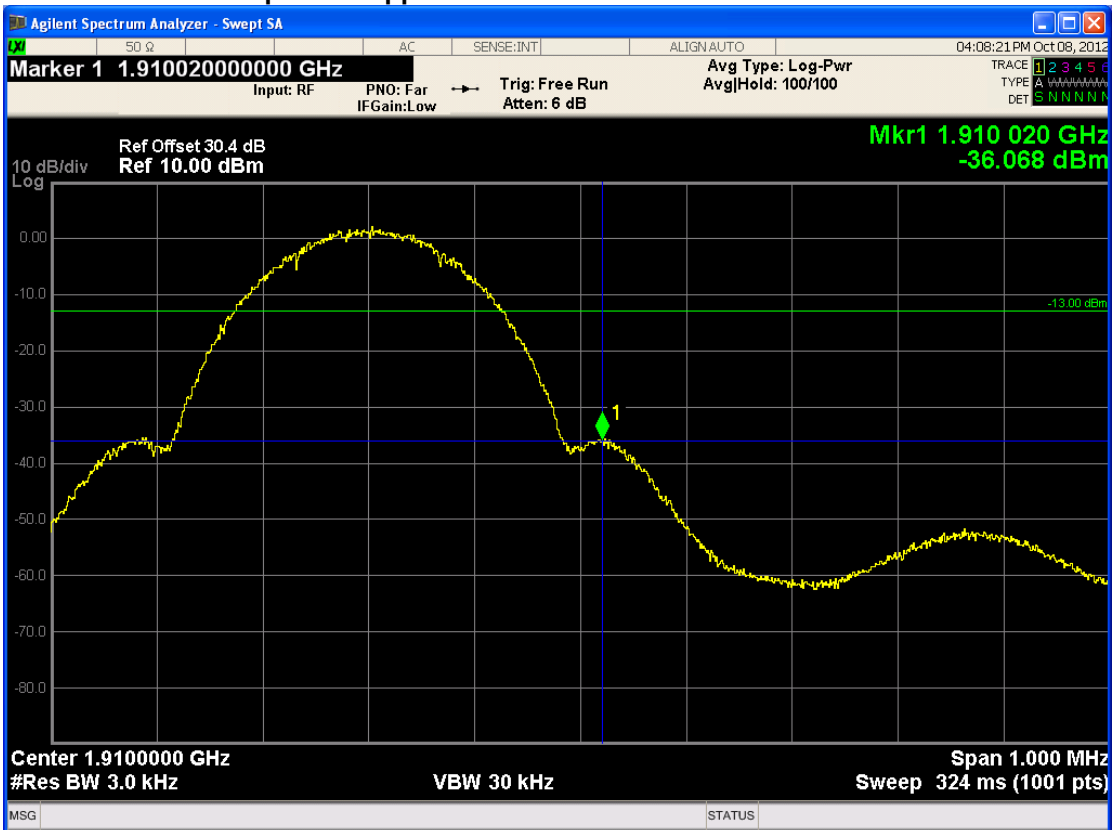
• GSM / Cellular 800 / Down Link / Upper Side / 893.80 MHz



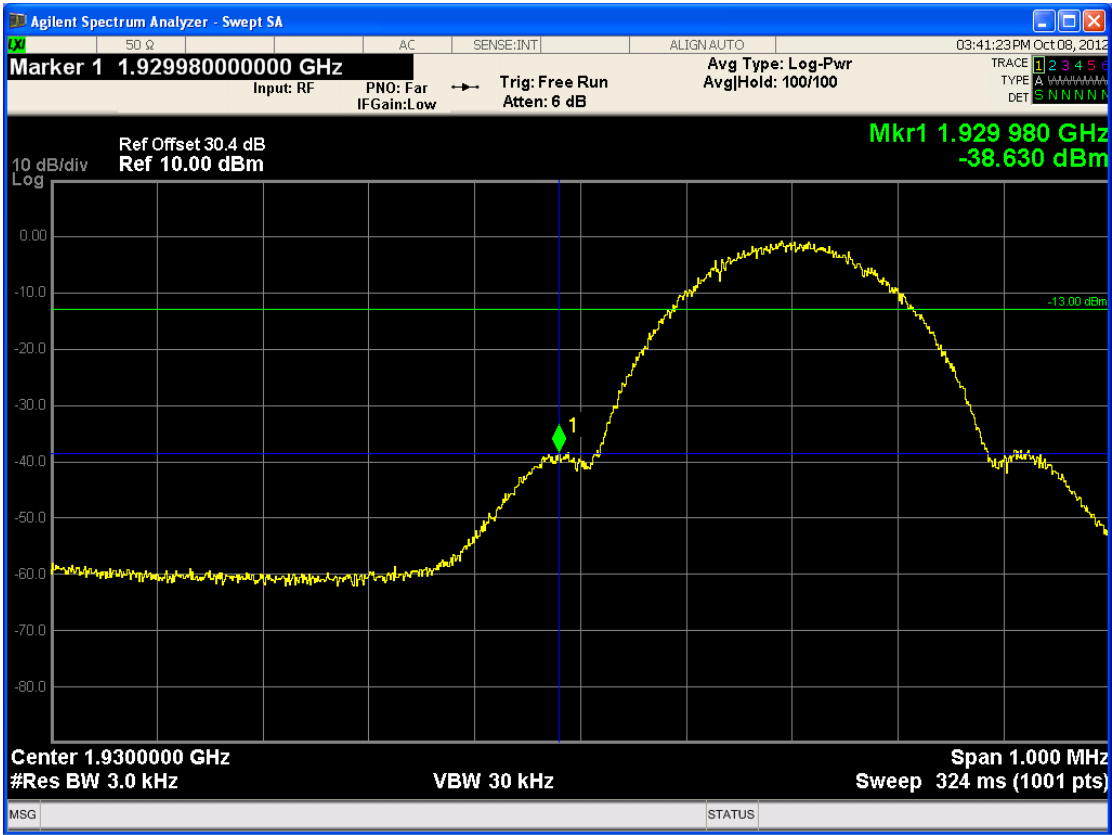
• GSM / PCS 1900 / Up Link / Lower Side / 1 850.20 MHz



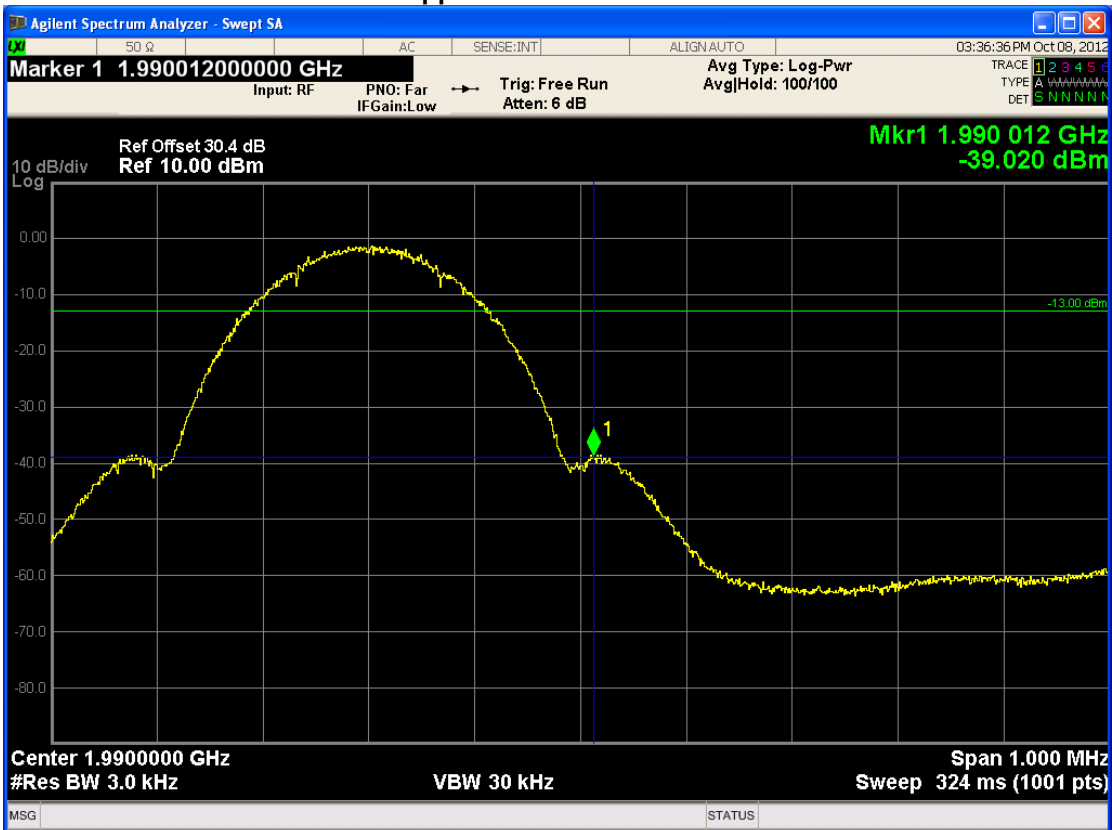
• GSM / PCS 1900 / Up Link / Upper Side / 1 909.80 MHz



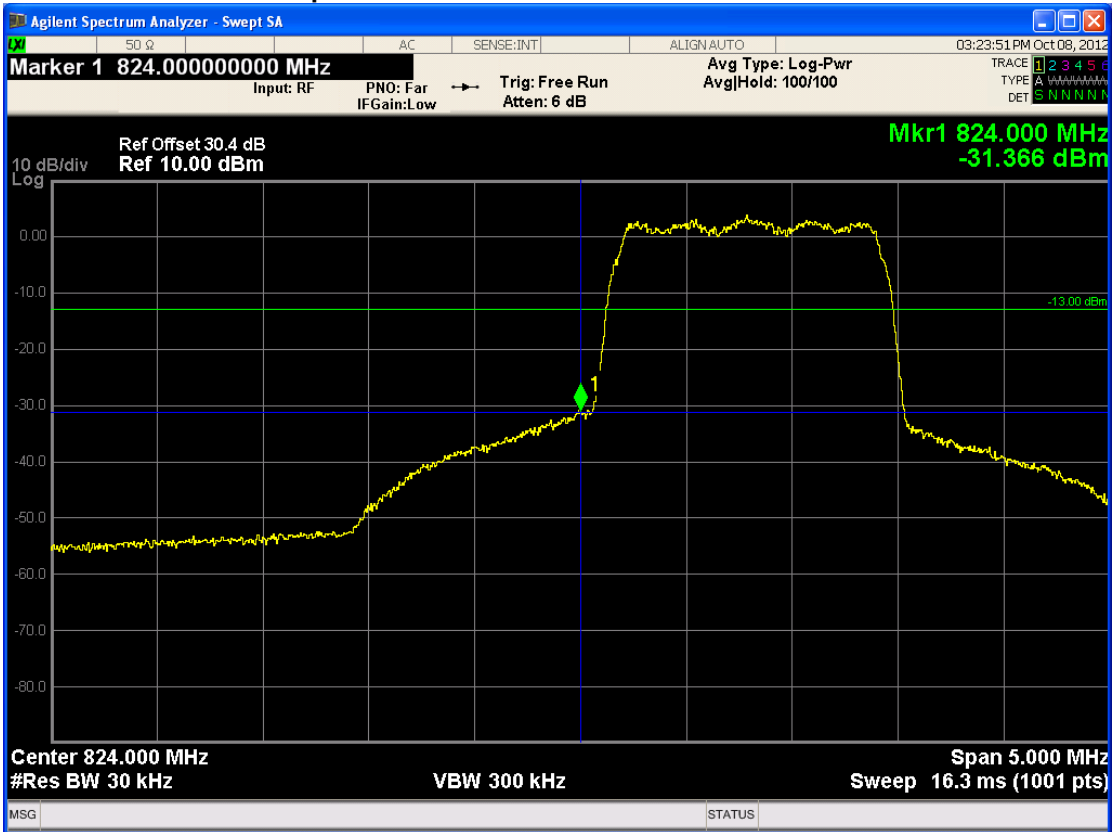
• GSM / PCS 1900 / Down Link / Lower Side / 1 930.20 MHz



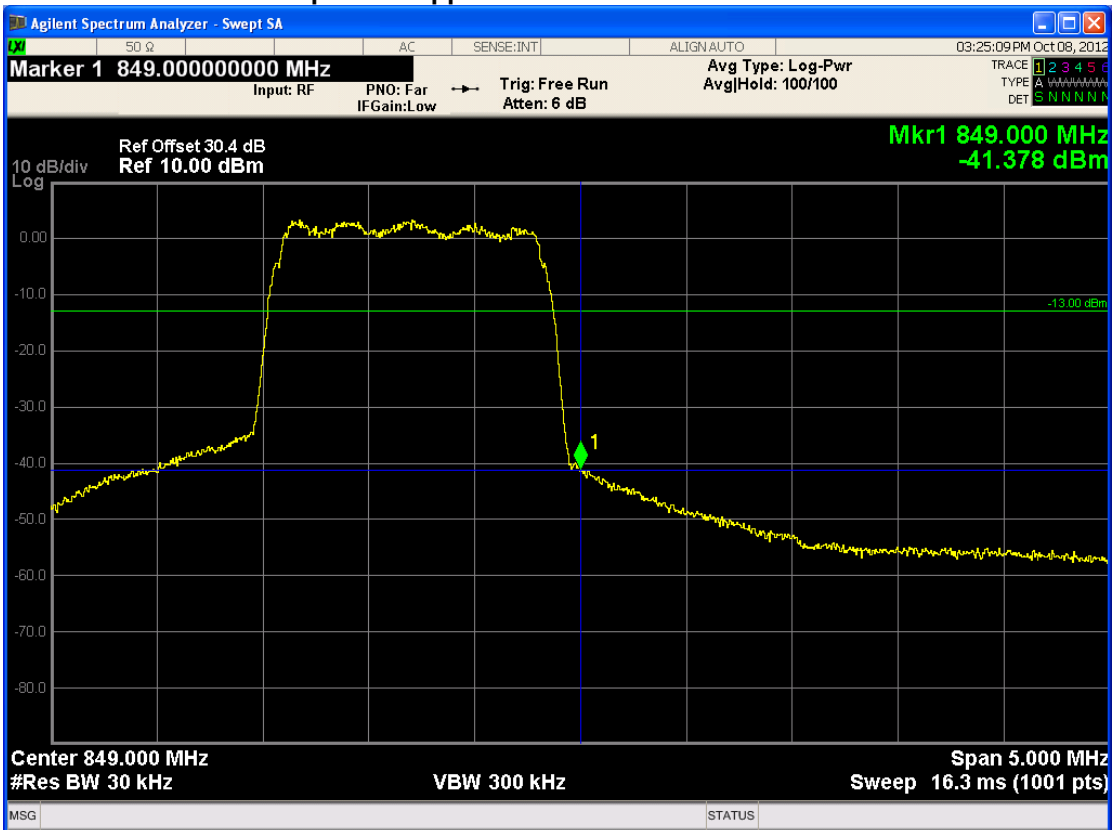
• GSM / PCS 1900 / Down Link / Upper Side / 1 989.80 MHz



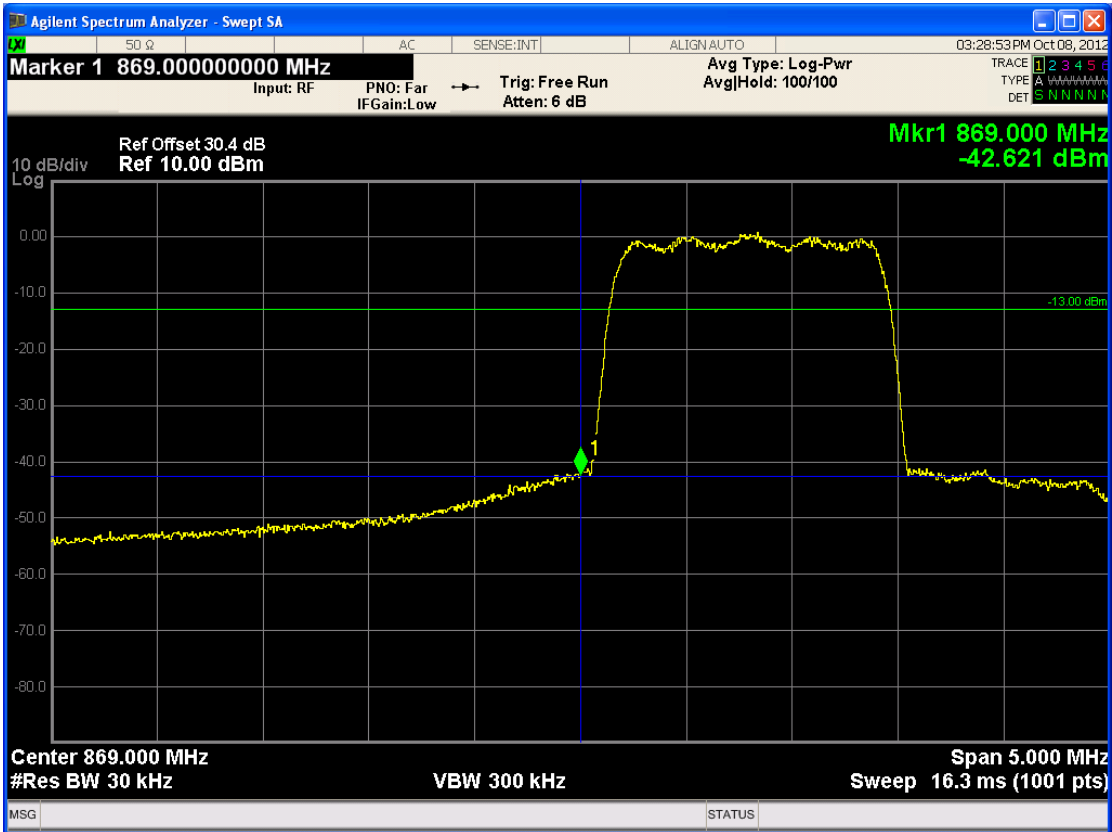
• CDMA / Cellular 800 / Up Link / Lower Side / 824.80 MHz



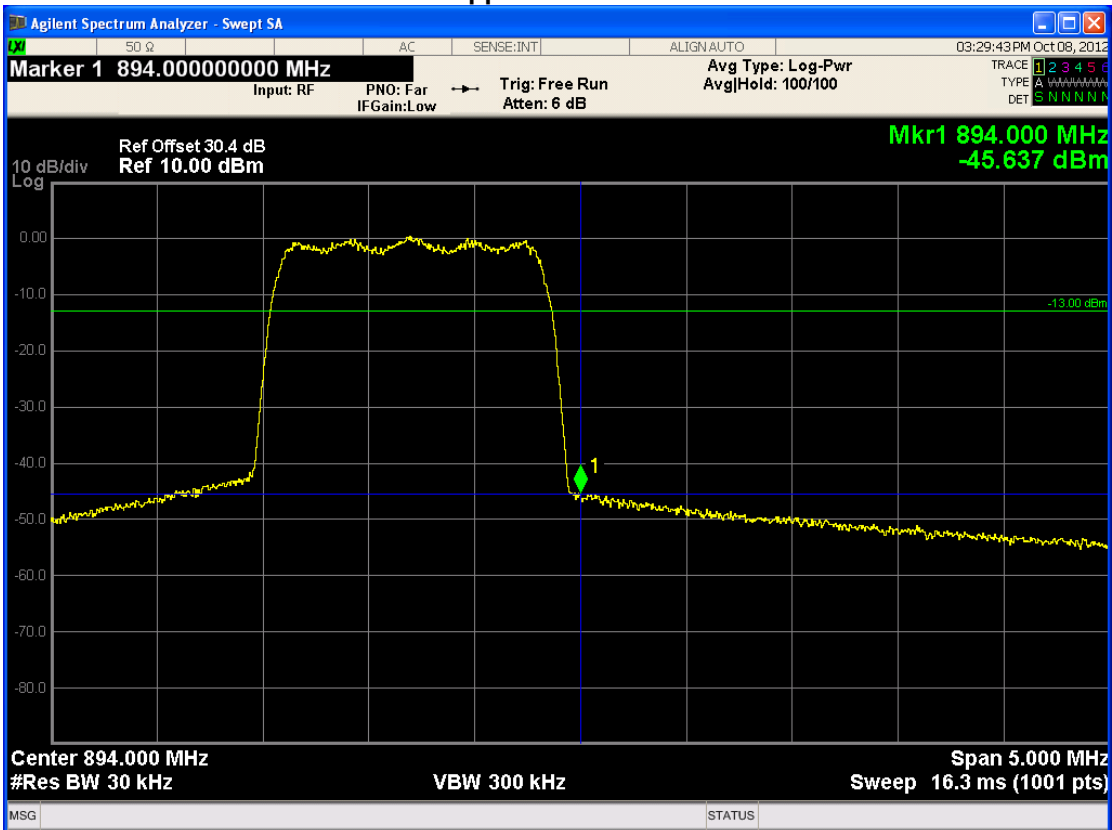
• CDMA / Cellular 800 / Up Link / Upper Side / 848.20 MHz



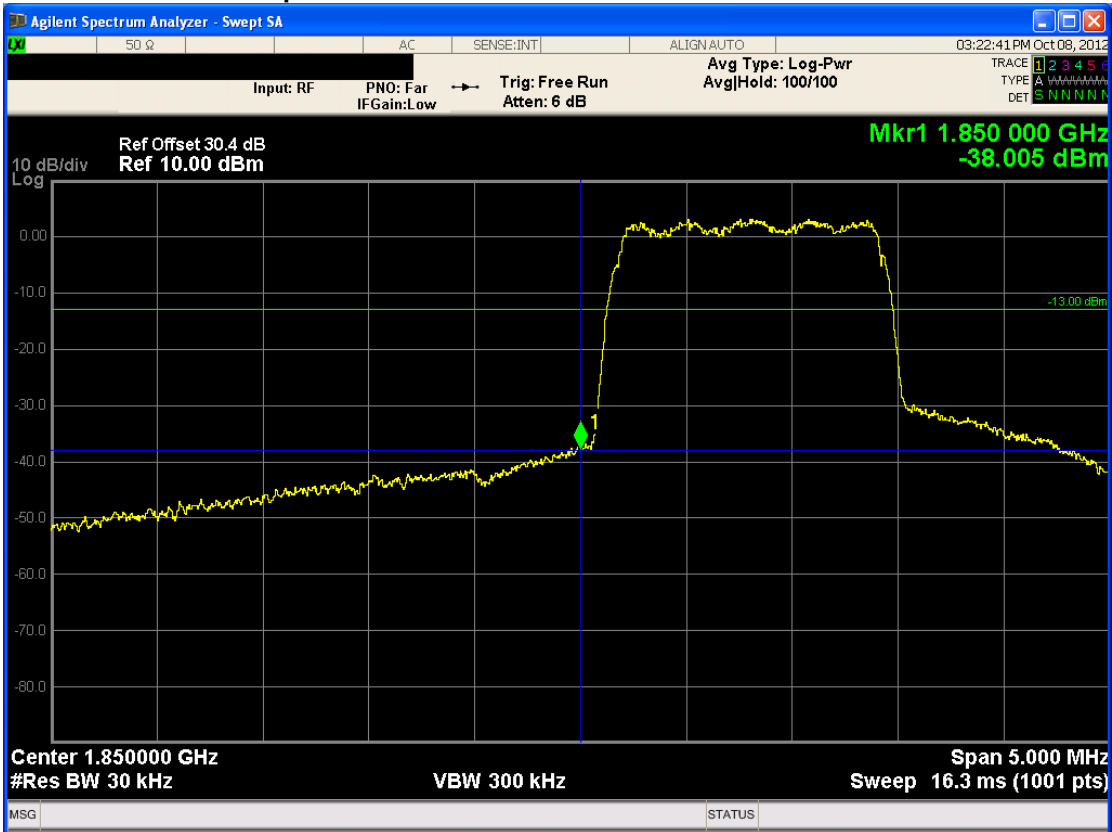
• CDMA / Cellular 800 / Down Link / Lower Side / 869.80 MHz



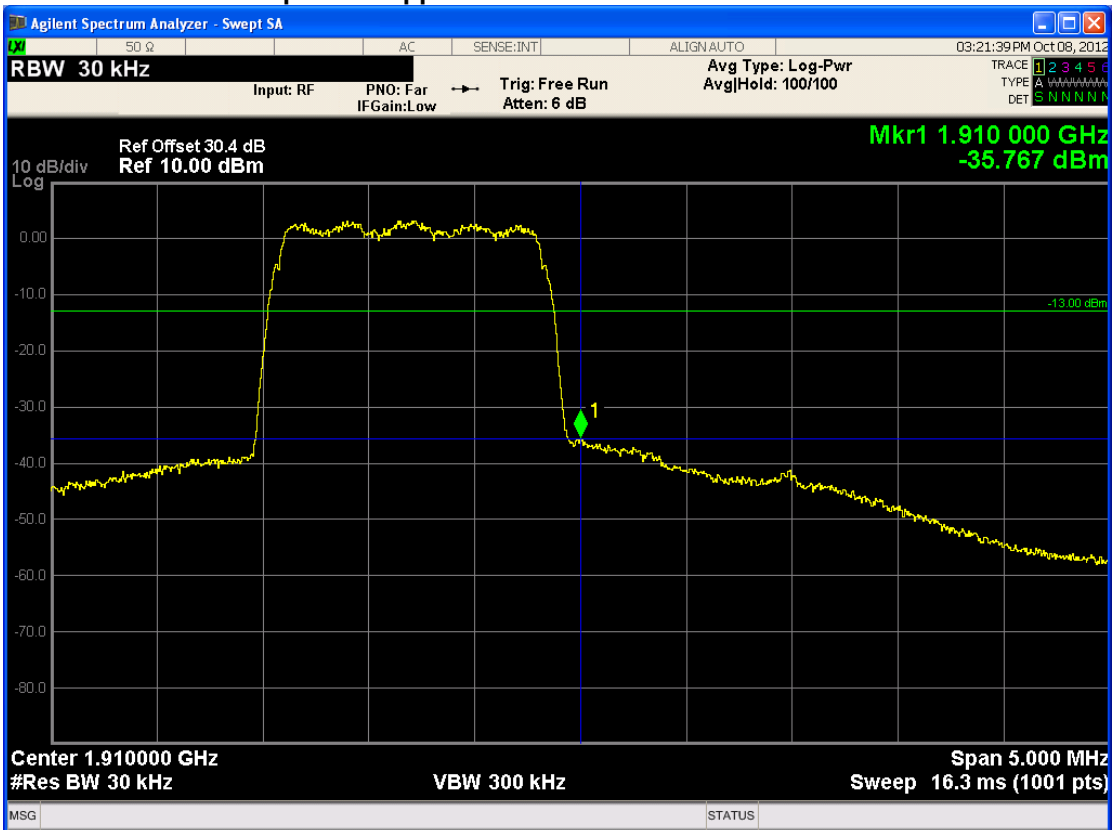
• CDMA / Cellular 800 / Down Link / Upper Side / 893.20 MHz



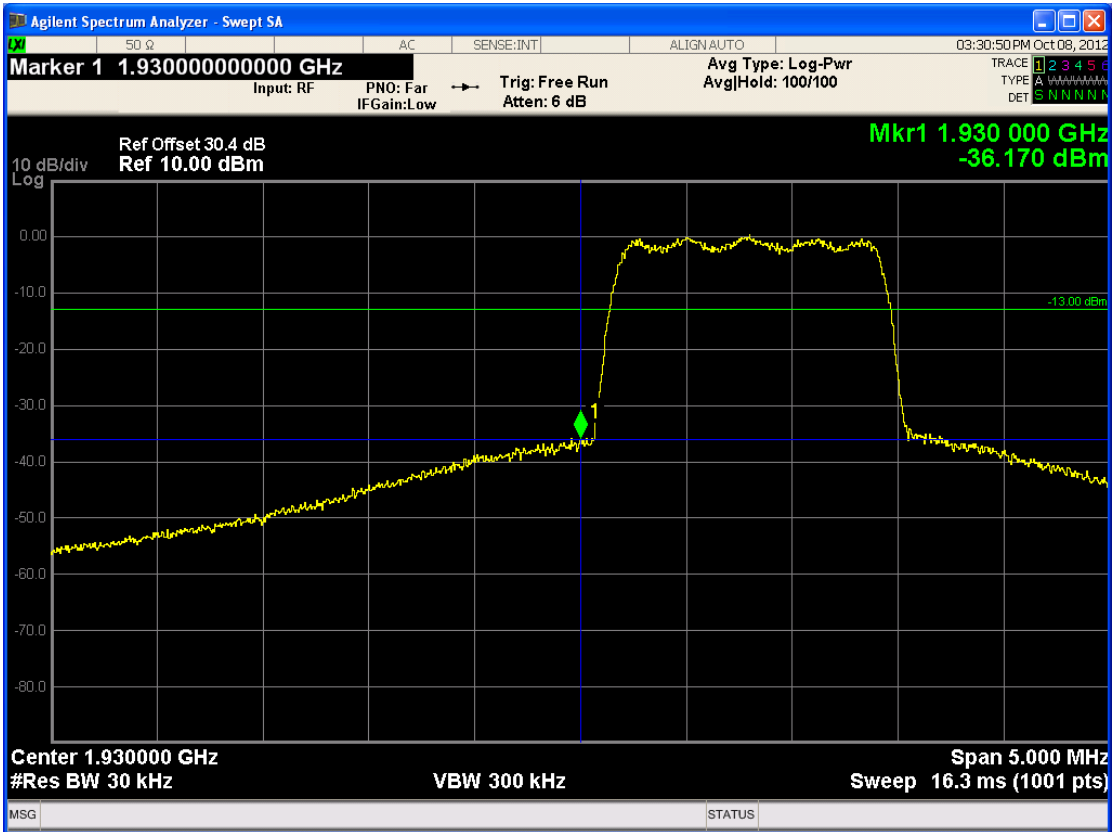
• CDMA / PCS 1900 / Up Link / Lower Side / 1 850.80 MHz



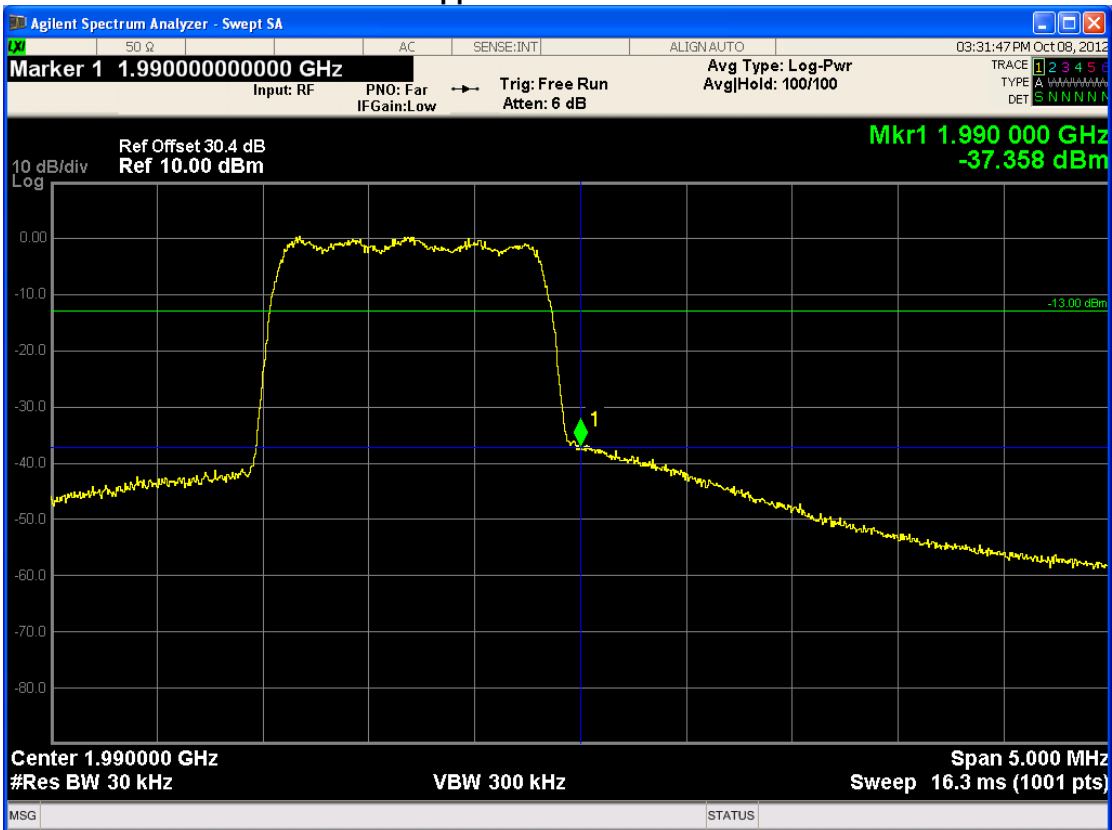
• CDMA / PCS 1900 / Up Link / Upper Side / 1 909.20 MHz



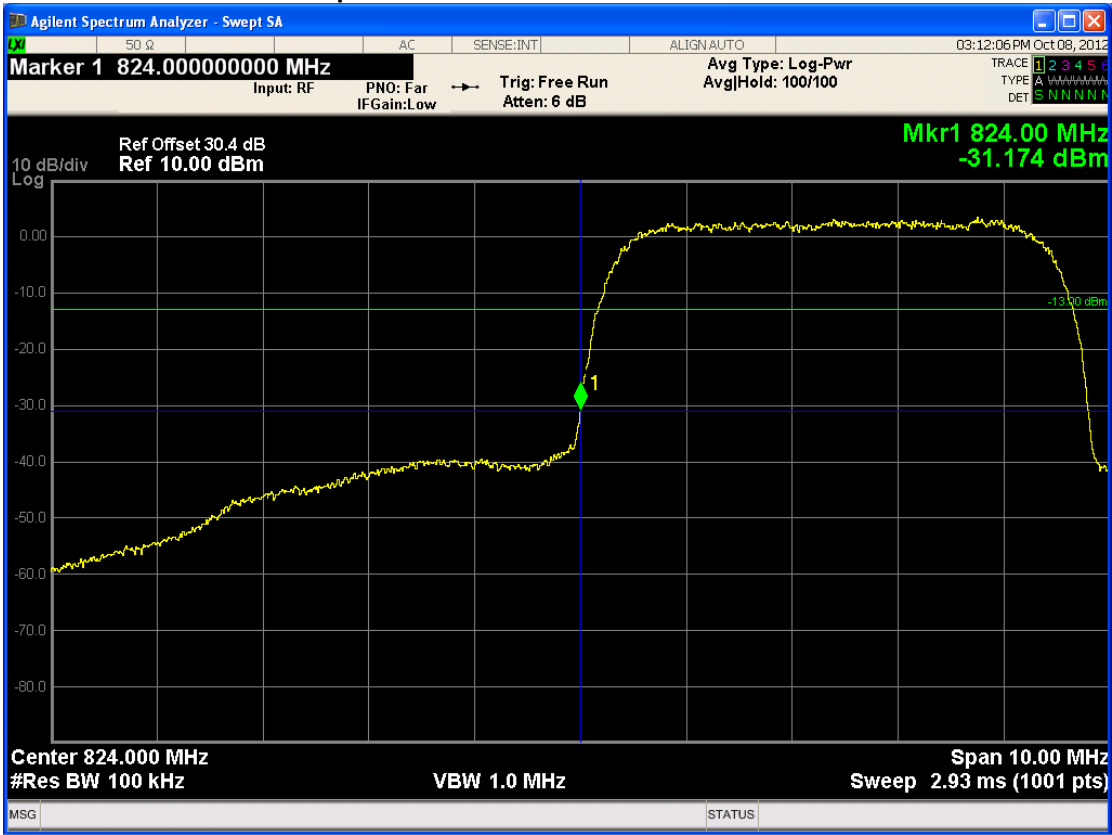
• CDMA / PCS 1900 / Down Link / Lower Side / 1 930.80 MHz



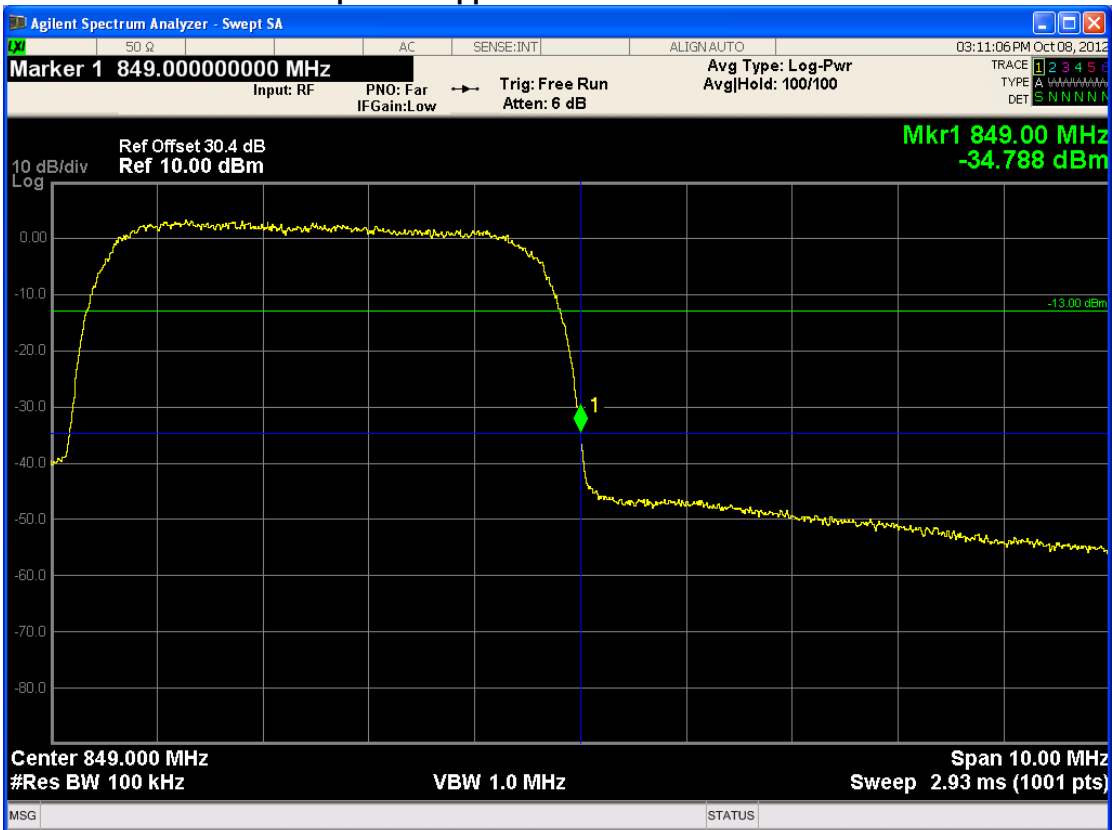
• CDMA / PCS 1900 / Down Link / Upper Side / 1 989.20 MHz



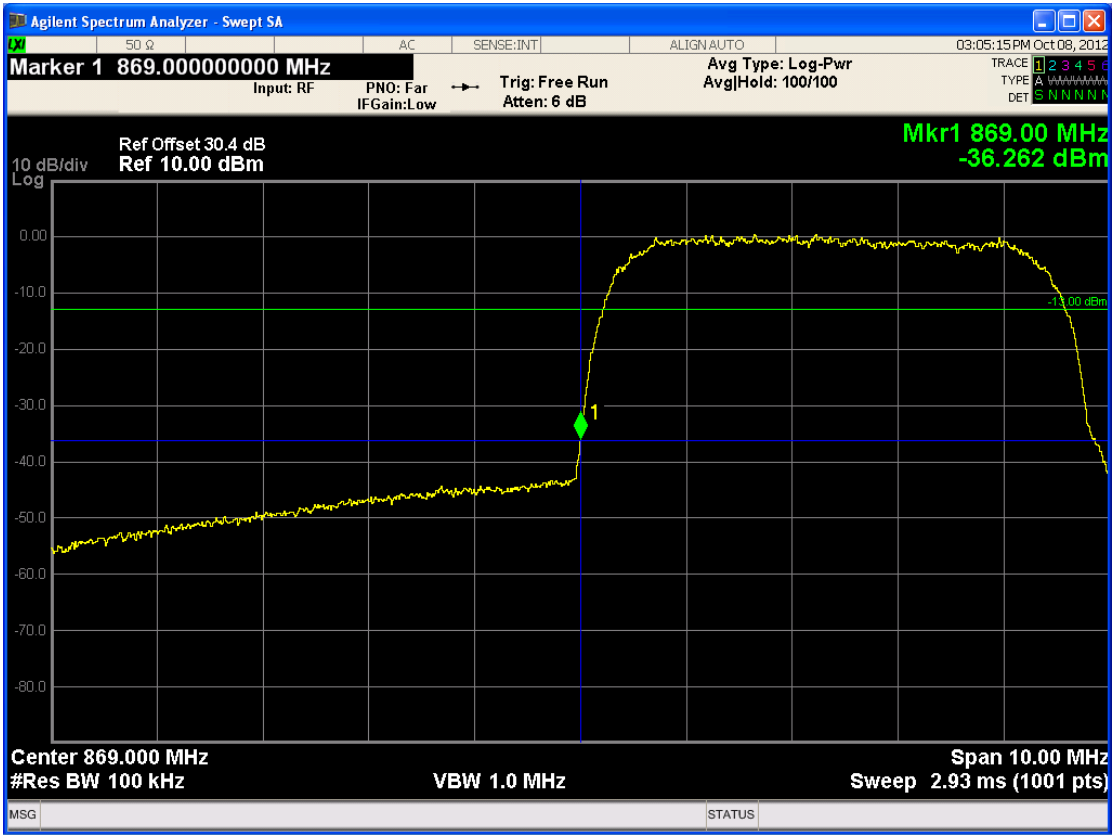
• WCDMA / Cellular 800 / Up Link / Lower Side / 826.40 MHz



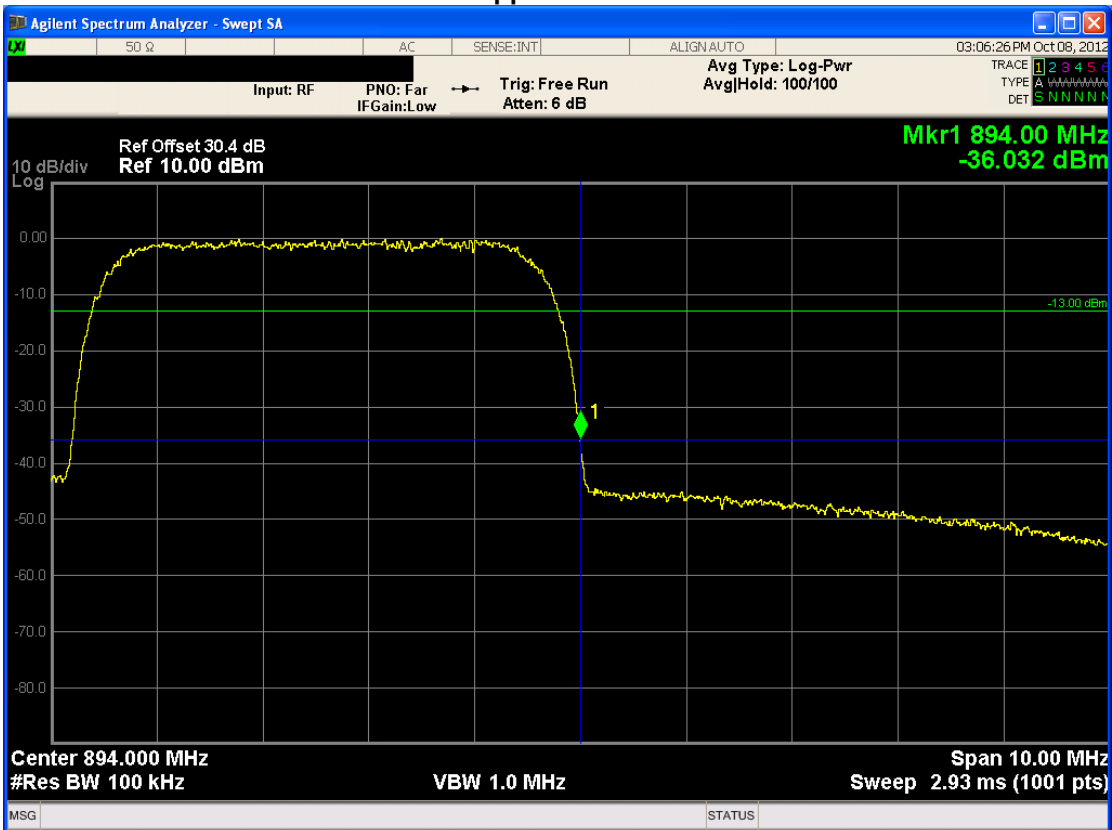
• WCDMA / Cellular 800 / Up Link / Upper Side / 846.60 MHz



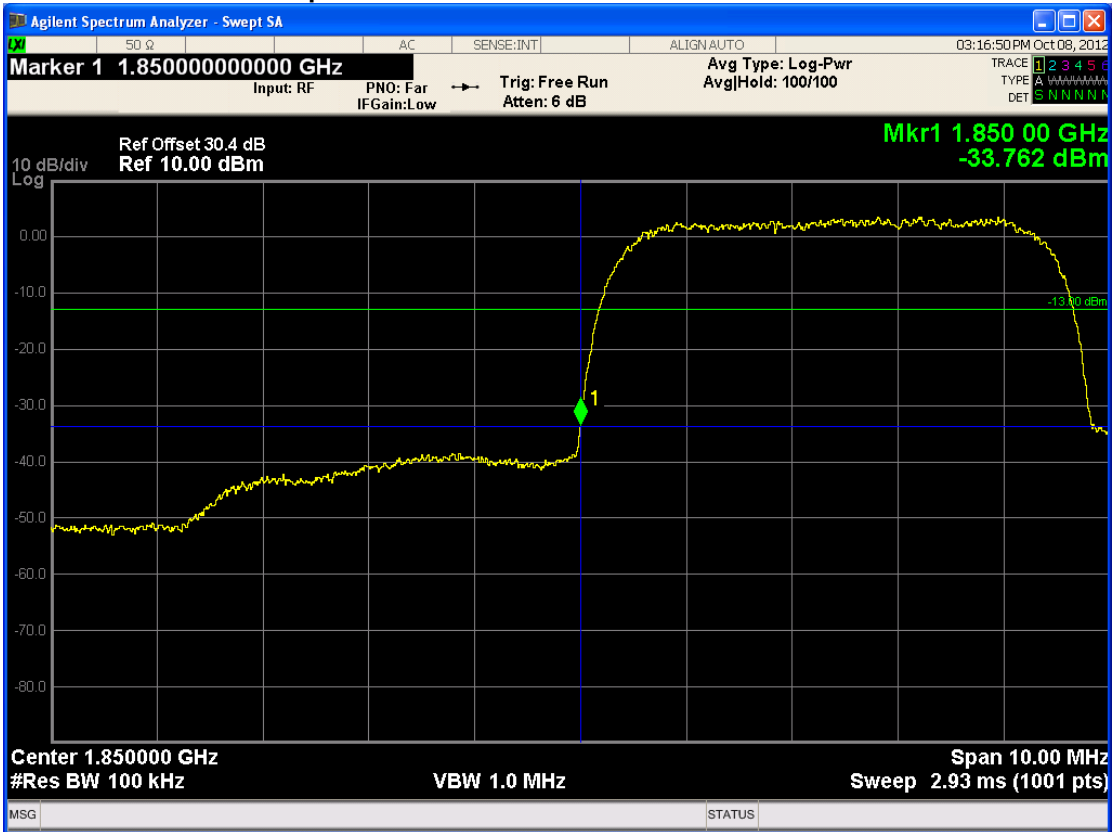
• WCDMA / Cellular 800 / Down Link / Lower Side / 871.40 MHz



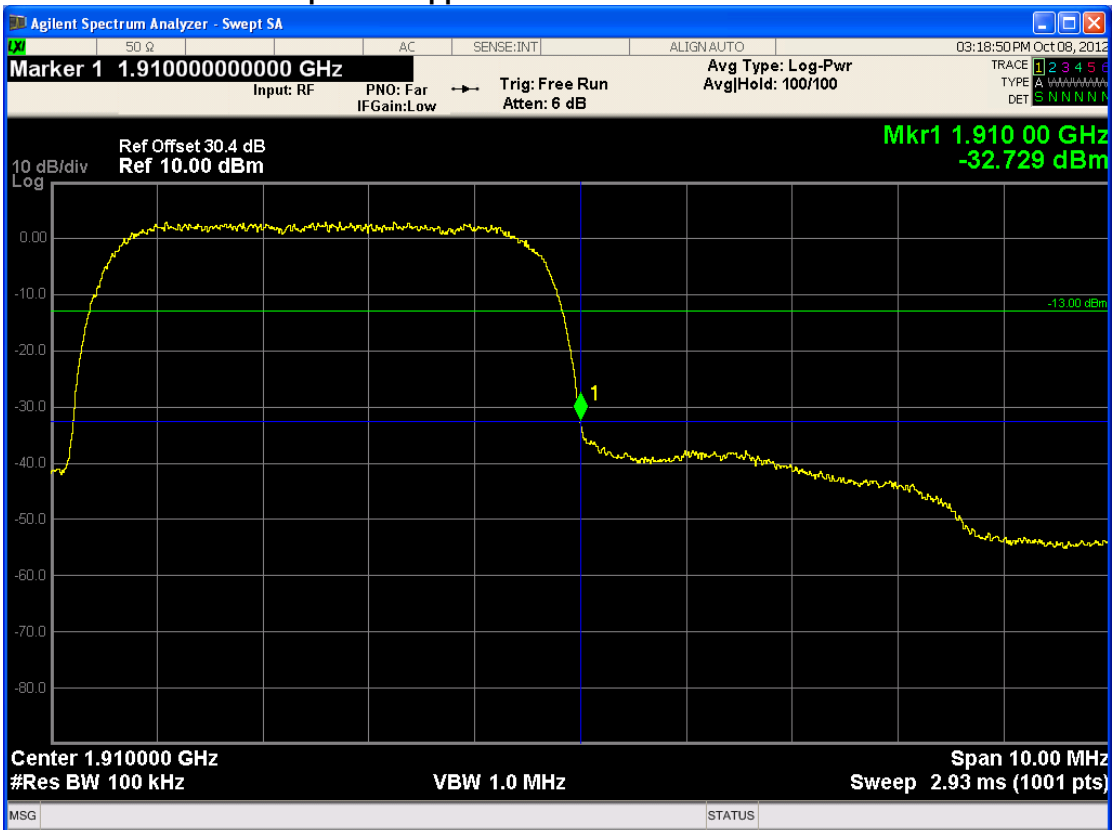
• WCDMA / Cellular 800 / Down Link / Upper Side / 891.60 MHz



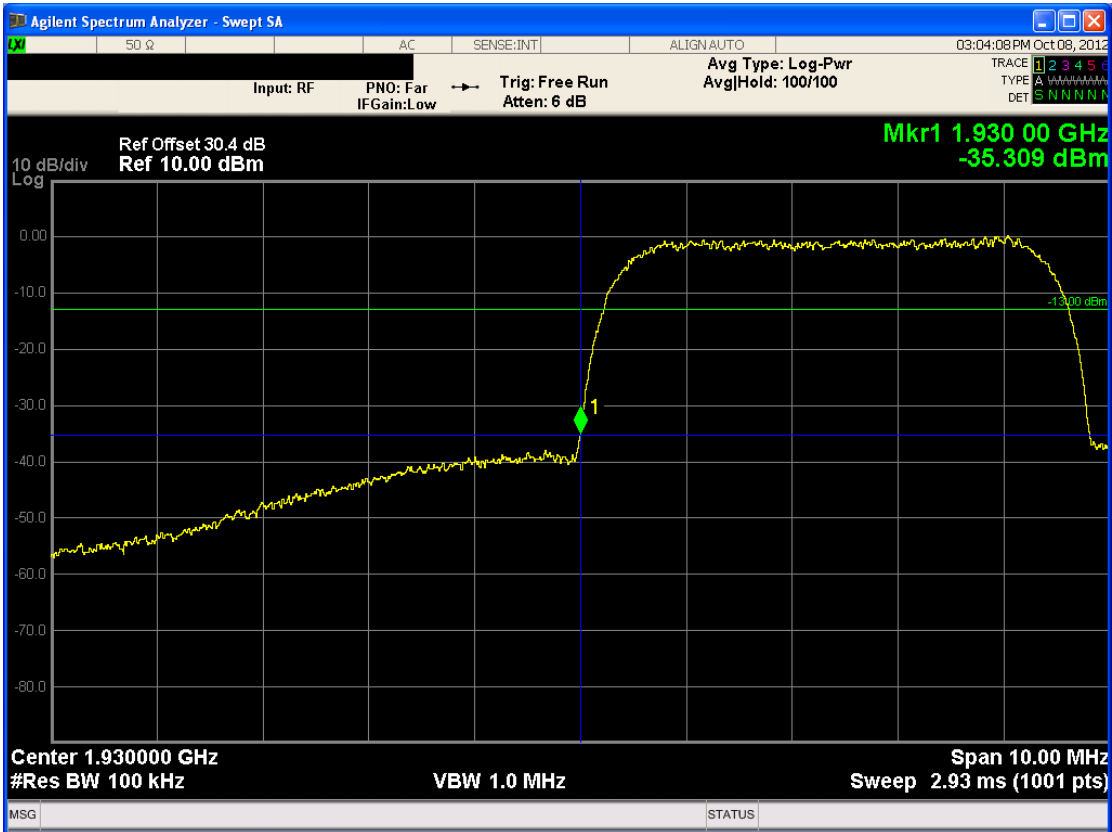
• WCDMA / PCS 1900 / Up Link / Lower Side / 1 852.40 MHz



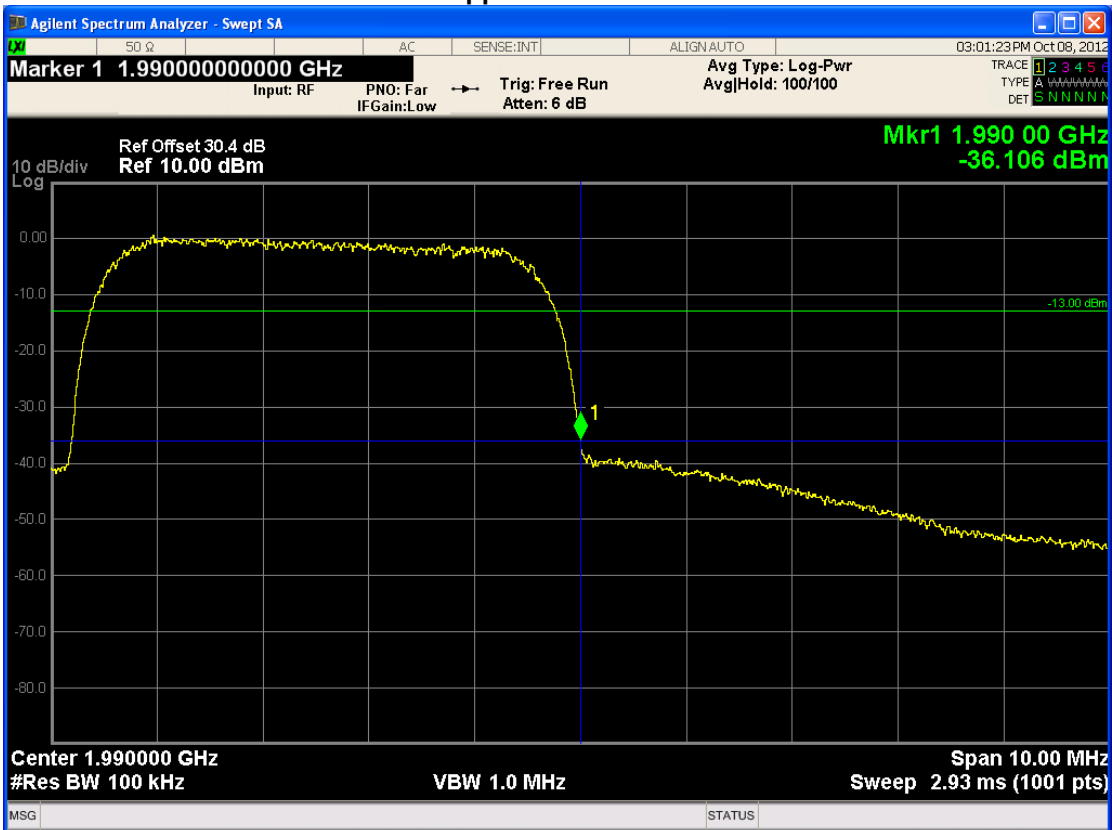
• WCDMA / PCS 1900 / Up Link / Upper Side / 1 907.60 MHz



• WCDMA / PCS 1900 / Down Link / Lower Side / 1 932.40 MHz



• WCDMA / PCS 1900 / Down Link / Upper Side / 1 987.60 MHz



### 3.4 Field strength of spurious emission

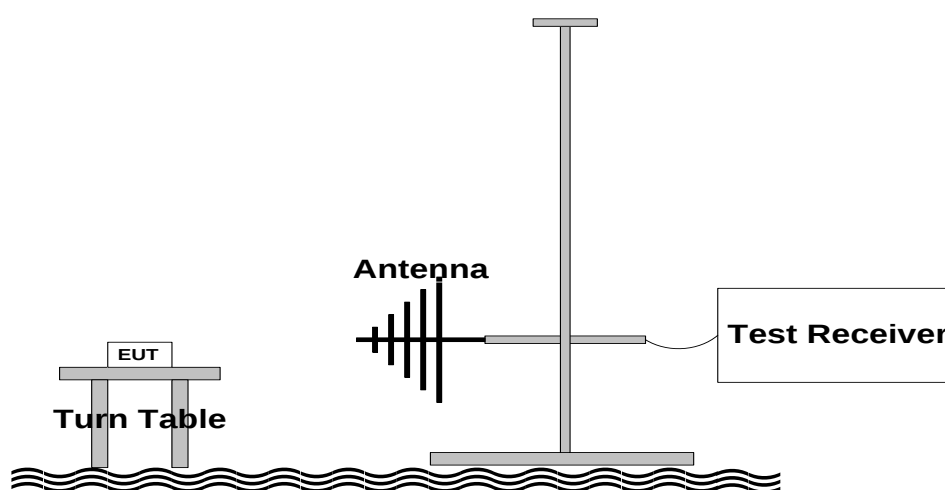
#### 3.4.1 Specification

- FCC Rules Part 2 Section 2.1053
- FCC Rules Part 22 Subpart H, Section 22.917
- FCC Rules Part 24 Subpart E, Section 24.238
- IC Rules RSS-131 Issue 2 July 2003, Section 6.4

#### 3.4.2 Measurement method

- ANSI/TIA-603-D-2010, Section 2.2.12

#### 3.4.3 Set-Up



#### 3.4.4 Test equipment list

| Equipment            | Model Name | Manufacturer        |
|----------------------|------------|---------------------|
| EUT                  | USHR-0819H | OPISYS Incorporated |
| Signal Generator     | E4437B     | Agilent             |
| Spectrum Analyzer    | N9020A     | Agilent             |
| Bi-conical Antenna   | VHA9103    | Schwarzbeck         |
| Log Periodic Antenna | VULP9118A  | Schwarzbeck         |
| Horn Antenna         | BBHA-9120D | Schwarzbeck         |
| Pre-Amplifier        | SCU-01     | R&S                 |
| Pre-Amplifier        | ESMI-Z7    | R&S                 |

#### 3.4.5 Test condition

- Test place: Shield Room
- Test environment: 26 °C, 52 % R.H.

### 3.4.6 Test result

| Frequency<br>[MHz]                    | Reading<br>[dBuV] | Generator<br>Level<br>[dBm] | Antenna<br>polarity<br>[H/V] | Antenna<br>gain<br>[dBd] | Cable loss<br>[dB] | Level<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|---------------------------------------|-------------------|-----------------------------|------------------------------|--------------------------|--------------------|----------------|----------------|----------------|
| Cellular 800 / Up Link / 836.60 MHz   |                   |                             |                              |                          |                    |                |                |                |
| -                                     | -                 | -                           | -                            | -                        | -                  | -              | -13.00         | -              |
| Cellular 800 / Down Link / 881.60 MHz |                   |                             |                              |                          |                    |                |                |                |
| -                                     | -                 | -                           | -                            | -                        | -                  | -              | -13.00         | -              |
| PCS 1900 / Up Link / 1 880 MHz        |                   |                             |                              |                          |                    |                |                |                |
| -                                     | -                 | -                           | -                            | -                        | -                  | -              | -13.00         | -              |
| PCS 1900 / Down Link / 1 896 MHz      |                   |                             |                              |                          |                    |                |                |                |
| -                                     | -                 | -                           | -                            | -                        | -                  | -              | -13.00         | -              |
|                                       |                   |                             |                              |                          |                    |                |                |                |

※All emissions are under the noise floor level.

### 3.5 Amplifier gain and bandwidth

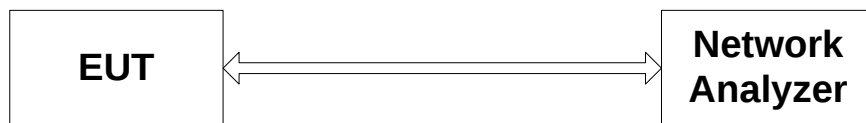
#### 3.5.1 Specification

- IC Rules RSS-131 Issue 2 July 2003, Section 6.1

#### 3.5.2 Measurement method

- IC Rules RSS-131 Issue 2 July 2003, Section 4.2

#### 3.5.3 Set-Up



#### 3.5.4 Test equipment list

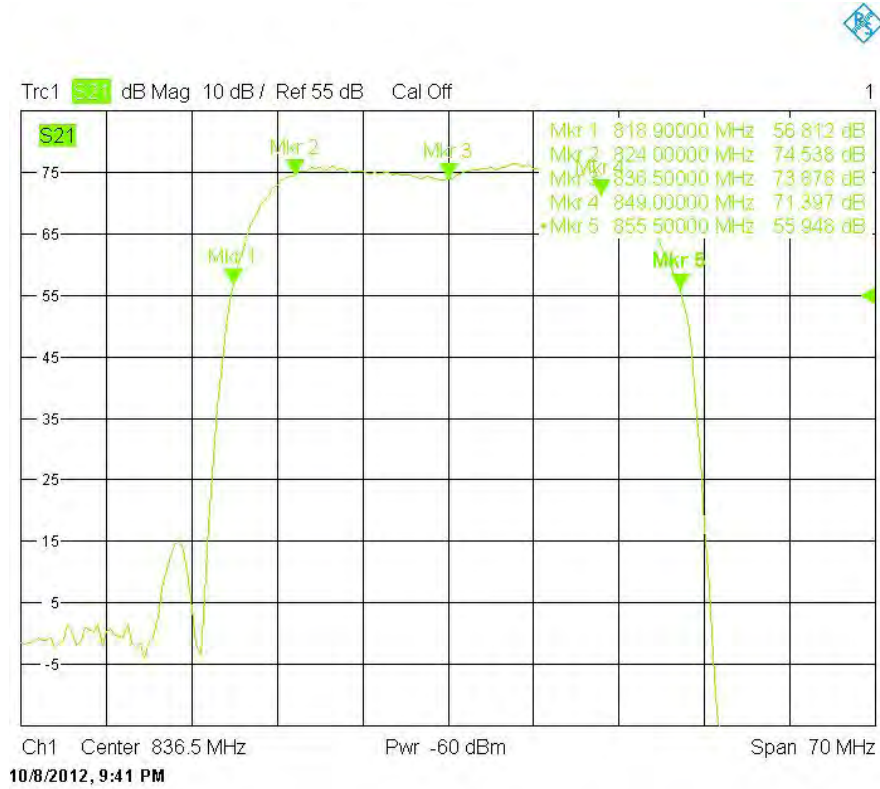
| Equipment        | Model Name | Manufacturer        |
|------------------|------------|---------------------|
| EUT              | USHR-0819H | OPISYS Incorporated |
| Network Analyzer | ZVA 24     | R&S                 |

#### 3.5.5 Test condition

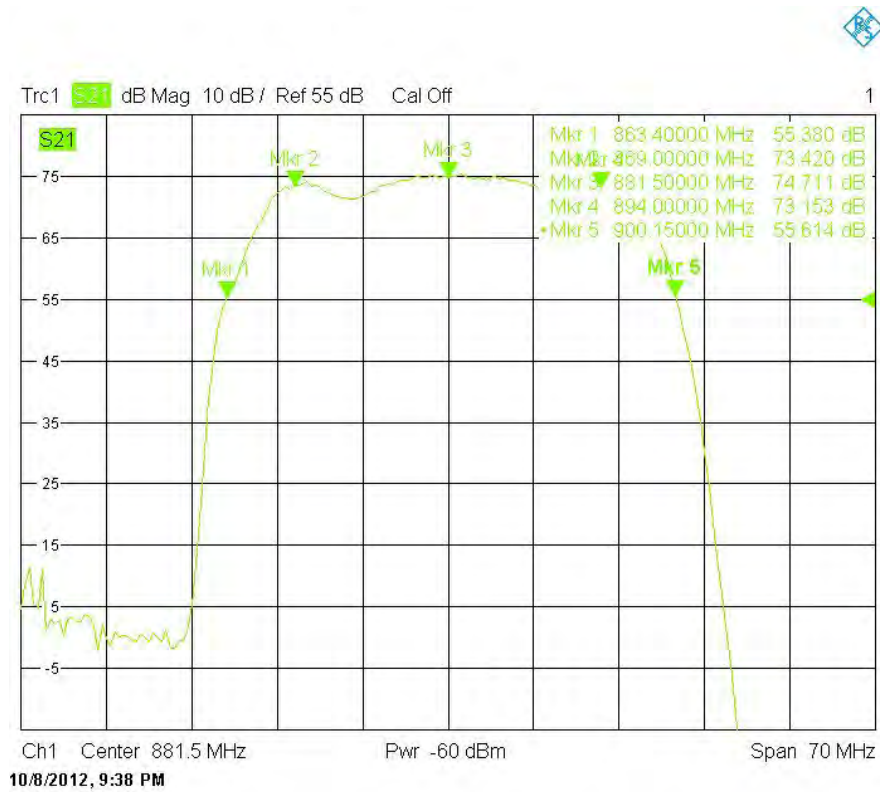
- Test place: Shield Room
- Test environment: 25 °C, 48 % R.H.

### 3.5.6 Plots of band gain

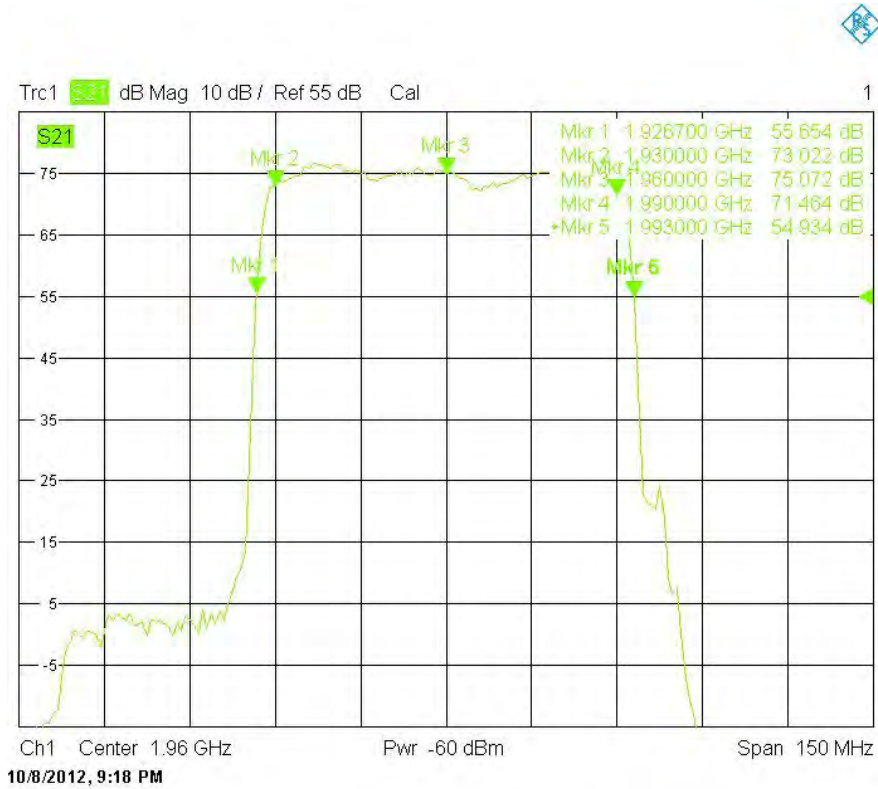
#### • Cellular 800 / Up Link



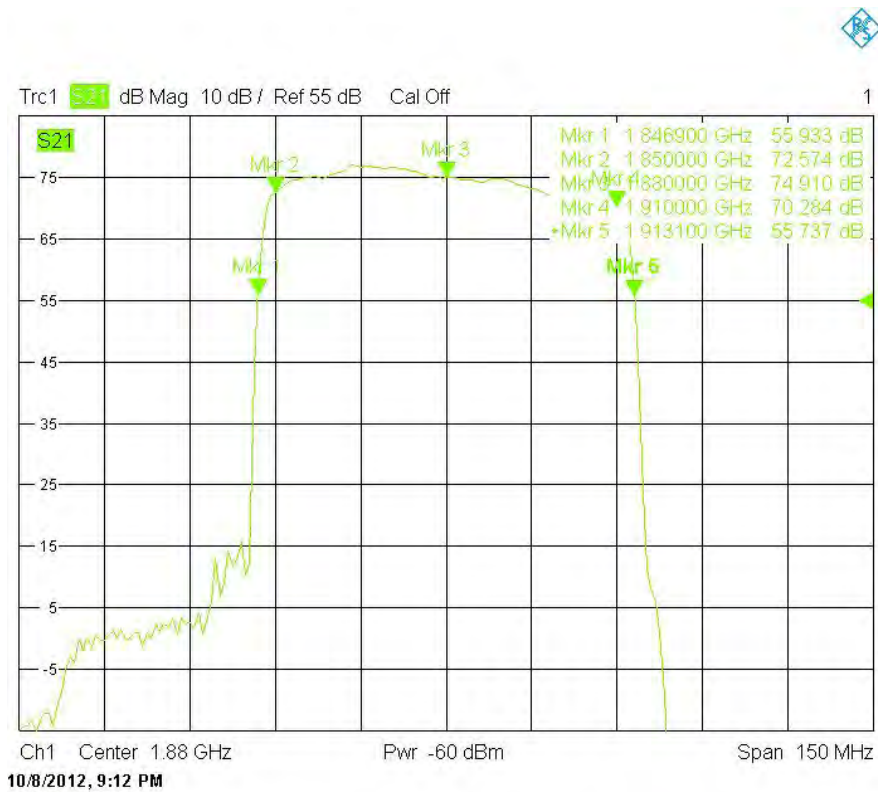
#### • Cellular 800 / Down Link



• PCS 1900 / Up Link



• PCS 1900 / Down Link



## 5. Test equipment list

The listing below denotes the test equipment for the test(s).

| No. | Equipment            | Model       | Manufacturer | Serial Number | Calibration Due date |
|-----|----------------------|-------------|--------------|---------------|----------------------|
| 1   | Spectrum Analyzer    | N9020A      | Agilent      | MY48010456    | 03/10/13             |
| 2   | Signal Generator     | E4437B      | Agilent      | US39260917    | 02/10/13             |
| 3   | Signal Generator     | E4432B      | Agilent      | GB38450504    | 04/18/13             |
| 4   | Network Analyzer     | ZVA24       | R&S          | 100126        | 02/10/13             |
| 5   | Attenuator           | 66-30-34    | Weinschel    | CB0744        | 03/26/13             |
| 6   | Biconical Antenna    | VHA9103     | Schwarzbeck  | 2217          | 11/29/12             |
| 7   | Log-Periodic Antenna | VULP9118A   | Schwarzbeck  | 382           | 11/29/12             |
| 8   | Horn Antenna         | BBHA 9120 D | Schwarzbeck  | 395           | 08/13/13             |
| 9   | Pre-Amplifier        | SCU-01      | R&S          | 383521        | 09/28/13             |
| 10  | Pre-Amplifier        | ESMI-Z7     | R&S          | N/A           | 12/30/12             |
| 11  | Turn Table           | N/A         | Daeil EMC    | N/A           | N/A                  |
| 12  | Antenna Mast         | EAM4.5      | Daeil EMC    | N/A           | N/A                  |
| 13  | Controller           | DE200       | Daeil EMC    | AAA69813111   | N/A                  |