



REPORT No.: SZ17070027W15

# FCC RF TEST REPORT

**APPLICANT** : dormakaba EAD GmbH

**PRODUCT NAME** : data collection terminal

**MODEL NAME** : 9600-K6 MRD 3G

**TRADE NAME** : Terminal 96 00

**BRAND NAME** : dormakaba

**FCC ID** : NVI-KT9600K6L3G

**STANDARD(S)** : 47 CFR Part 22 Subpart H  
47 CFR Part 24 Subpart E

**ISSUE DATE** : 2017-09-30

**SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.**

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| Change History |            |                   |
|----------------|------------|-------------------|
| Issue          | Date       | Reason for change |
| 1.0            | 2017-09-30 | First edition     |
|                |            |                   |

**TEST REPORT DECLARATION**

|                      |                                                                                  |
|----------------------|----------------------------------------------------------------------------------|
| Applicant            | dormakaba EAD GmbH                                                               |
| Applicant Address    | Albertistr. 3, 78056 Villingen-Schwenningen, Germany                             |
| Manufacturer         | In-Tech Electronics Ltd                                                          |
| Manufacturer Address | Unit A,13/F, Wing Tai Centre,12 Hing Yip Street, Kwun Tong<br>Kowloon, Hong Kong |
| Product Name         | data collection terminal                                                         |
| Model Name           | 9600-K6 MRD 3G                                                                   |
| Brand Name           | dormakaba                                                                        |
| HW Version           | 02                                                                               |
| SW Version           | V5                                                                               |
| Test Standards       | 47 CFR Part 22 Subpart H<br>47 CFR Part 24 Subpart E                             |
| Test Date            | 2017-09-01 to 2017-09-21                                                         |
| Test Result          | PASS                                                                             |

Tested by : Tu Ya'nan  
Tu Ya'nan (Test Engineer)

Approved by : Andy Yeh  
Andy Yeh (Technical Director)



## 1. GENERAL INFORMATION

### 1.1 EUT Description

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name .....         | data collection terminal                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Serial No. ....            | (n.a, marked #1 by test site)                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Frequency Range .....      | GSM 850MHz:<br>Tx: 824.20 - 848.80MHz (at intervals of 200kHz);<br>Rx: 869.20 - 893.80MHz (at intervals of 200kHz)<br>GSM 1900MHz:<br>Tx: 1850.20 - 1909.80MHz (at intervals of 200kHz);<br>Rx: 1930.20 - 1989.80MHz (at intervals of 200kHz)<br>WCDMA 850MHz<br>Tx: 826.4 - 846.6MHz (at intervals of 200kHz);<br>Rx: 871.4 - 891.6MHz (at intervals of 200kHz)<br>WCDMA 1900MHz<br>Tx: 1852.4 - 1907.6MHz (at intervals of 200kHz);<br>Rx: 1932.4 - 1987.6MHz (at intervals of 200kHz) |
| Modulation Type.....       | GPRS Mode with GMSK Modulation<br>EDGE Mode with 8PSK Modulation<br>HSDPA Mode with QPSK Modulation<br>HSUPA Mode with QPSK Modulation<br>HSPA+ Mode with QPSK Modulation                                                                                                                                                                                                                                                                                                                |
| Multislot Class.....       | GPRS: Multislot Class12; EGPRS: Multislot Class12                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Antenna Type .....         | PCB Antenna                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Emission Designators ..... | GPRS 850:247KGXW,GPRS 1900:250KGXW<br>EGPRS850:249KG7W, EGPRS1900:246KG7W,<br>WCDMA 850:4M15F9W ,WCDMA1900:4M17F9W                                                                                                                                                                                                                                                                                                                                                                       |

*Note 1:* The transmitter (Tx) frequency arrangement of the Cellular 850MHz band used by the EUT can be represented with the formula  $F(n)=824.2+0.2*(n-128)$ ,  $128 \leq n \leq 251$ ; the lowest, middle, highest channel numbers (ARFCHs) used and tested in this report are separately 128 (824.2MHz), 190 (836.6MHz) and 251 (848.8MHz).

*Note 2:* The transmitter (Tx) frequency arrangement of the PCS 1900MHz band used by the EUT can be represented with the formula  $F(n)=1850.2+0.2*(n-512)$ ,  $512 \leq n \leq 810$ ; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 512 (1850.2MHz), 661 (1880.0MHz) and 810 (1909.8MHz).

*Note 3:* The transmitter (Tx) frequency arrangement of the WCDMA 850MHz band used by the EUT can be represented with the formula  $F(n)=826.4+0.2*(n-4132)$ ,  $4132 \leq n \leq 4233$ ; the



lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 4132 (826.4MHz), 4175(835MHz) and 4233 (846.6MHz).

*Note 4:* The transmitter (Tx) frequency arrangement of the WCDMA 1900MHz band used by the EUT can be represented with the formula  $F(n)=1852.4+0.2*(n-9262)$ ,  $9262 \leq n \leq 9538$ ; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 9262 (1852.4MHz), 9400 (1880MHz) and 9538 (1907.6MHz).

*Note 5:* For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

## 1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 22 and Part 24 for the EUT FCC ID Certification:

| No. | Identity                            | Document Title                                                                |
|-----|-------------------------------------|-------------------------------------------------------------------------------|
| 1   | 47 CFR Part 2<br>(10-1-12 Edition)  | Frequency Allocations and Radio Treaty Matters; General Rules and Regulations |
| 2   | 47 CFR Part 22<br>(10-1-12 Edition) | Public Mobile Services                                                        |
| 3   | 47 CFR Part 24<br>(10-1-12 Edition) | Personal Communications Services                                              |

Test detailed items/section required by FCC rules and results are as below:

| No. | Section                         | Description                           | Result |
|-----|---------------------------------|---------------------------------------|--------|
| 1   | 2.1046                          | Conducted RF Output Power             | PASS   |
| 2   | 24.232(d)                       | Peak to average ratio                 | PASS   |
| 3   | 2.1049, 22.917, 24.238,         | 99% Occupied Bandwidth                | PASS   |
| 4   | 2.1055, 22.355, 24.235          | Frequency Stability                   | PASS   |
| 5   | 2.1051, 2.1057, 22.917, 24.238, | Conducted Out of Band Emissions       | PASS   |
| 6   | 2.1051, 2.1057, 22.917, 24.238  | Band Edge                             | PASS   |
| 7   | 22.913, 24.232                  | Transmitter Radiated Power (EIPR/ERP) | PASS   |
| 8   | 2.1053, 2.1057, 22.917, 24.238  | Radiated Out of Band Emissions        | PASS   |

NOTE: Measurement method according to TIA/EIA 603.D-2010



### 1.3 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

|                             |         |
|-----------------------------|---------|
| Temperature (°C):           | 15 - 35 |
| Relative Humidity (%):      | 30 -60  |
| Atmospheric Pressure (kPa): | 86-106  |

## 2. 47 CFR PART 2, PART 22H & 24E REQUIREMENTS

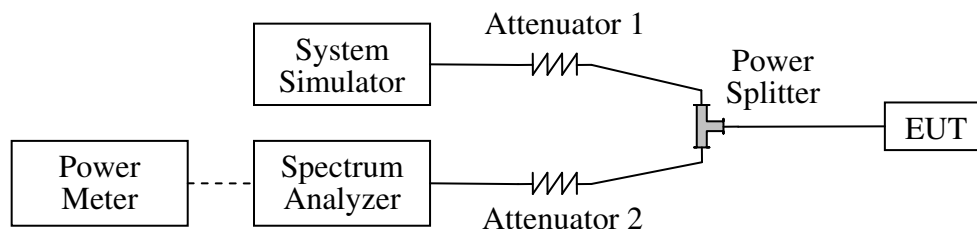
### 2.1 Conducted RF Output Power

#### 2.1.1 Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

#### 2.1.2 Test Description

Test Setup:



The EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

The Power Meter was just used for the Conducted RF Output Power test of WCDMA Model.



### 2.1.3 Test Results

Here the lowest, middle and highest channels are selected to perform testing to verify the conducted RF output power of the EUT.

GSM Model Test Verdict:

| Band             | Channel | Frequency<br>(MHz) | Measured<br>Output Power | Limit | Verdict |
|------------------|---------|--------------------|--------------------------|-------|---------|
|                  |         |                    | dBm                      | dBm   |         |
| GPRS<br>850MHz   | 128     | 824.2              | 32.51                    | 35    | PASS    |
|                  | 190     | 836.6              | 32.75                    |       | PASS    |
|                  | 251     | 848.8              | 32.89                    |       | PASS    |
| GPRS<br>1900MHz  | 512     | 1850.2             | 29.33                    | 32    | PASS    |
|                  | 661     | 1880.0             | 29.26                    |       | PASS    |
|                  | 810     | 1909.8             | 28.97                    |       | PASS    |
| EGPRS<br>850MHz  | 128     | 824.2              | 29.39                    | 35    | PASS    |
|                  | 190     | 836.6              | 29.36                    |       | PASS    |
|                  | 251     | 848.8              | 29.54                    |       | PASS    |
| EGPRS<br>1900MHz | 512     | 1850.2             | 28.36                    | 32    | PASS    |
|                  | 661     | 1880.0             | 28.44                    |       | PASS    |
|                  | 810     | 1909.8             | 28.21                    |       | PASS    |

Note 1: For the GPRS and EGPRS model, all the slots were tested and just the worst data was record in this report.

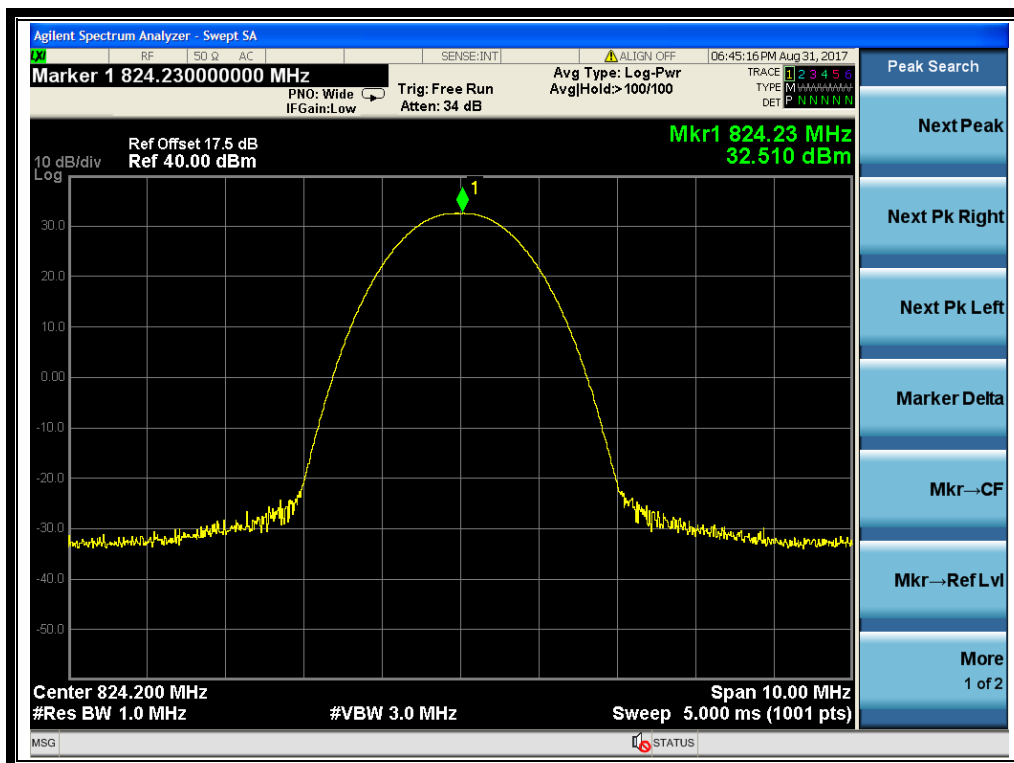


WCDMA Model Test Verdict:

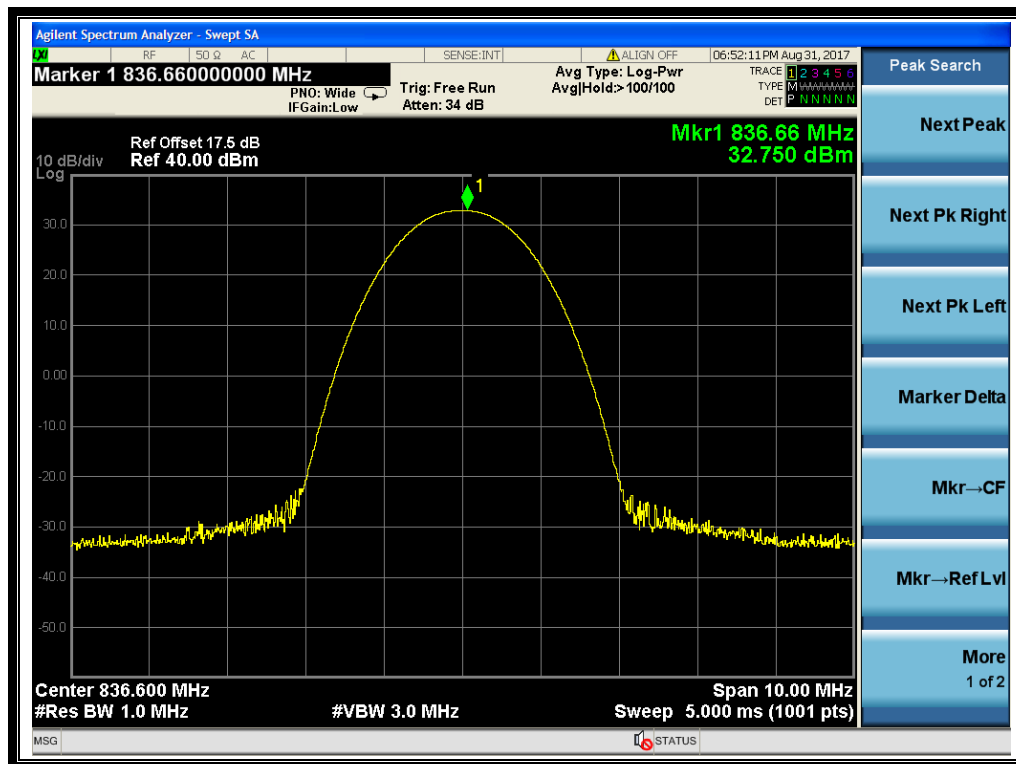
| Item  | band    | WCDMA 850 |       |       | WCDMA 1900 |       |       |
|-------|---------|-----------|-------|-------|------------|-------|-------|
|       | ARFCN   | 4132      | 4175  | 4233  | 9262       | 9400  | 9538  |
|       | subtest | dBm       |       |       | dBm        |       |       |
| HSDPA | 1       | 23.37     | 23.50 | 23.12 | 22.74      | 22.70 | 22.76 |
|       | 2       | 23.36     | 23.58 | 23.16 | 22.71      | 22.74 | 22.71 |
|       | 3       | 23.37     | 23.53 | 23.18 | 22.79      | 22.76 | 22.73 |
|       | 4       | 22.87     | 23.00 | 22.62 | 22.24      | 22.2  | 22.26 |
| HSUPA | 1       | 23.45     | 24.07 | 23.89 | 23.27      | 22.93 | 23.25 |
|       | 2       | 21.45     | 22.07 | 21.89 | 21.27      | 20.93 | 21.25 |
|       | 3       | 22.45     | 23.07 | 22.89 | 22.27      | 21.93 | 22.25 |
|       | 4       | 21.25     | 21.87 | 21.69 | 21.07      | 20.73 | 21.05 |
|       | 5       | 23.41     | 23.91 | 23.86 | 23.26      | 23.01 | 23.21 |
| HSPA+ | 1       | 23.08     | 23.63 | 24.05 | 22.98      | 22.72 | 22.72 |

Note: The Conducted RF Output Power test of WCDMA /HSDPA /HSUPA /HSPA+ was tested by power meter.

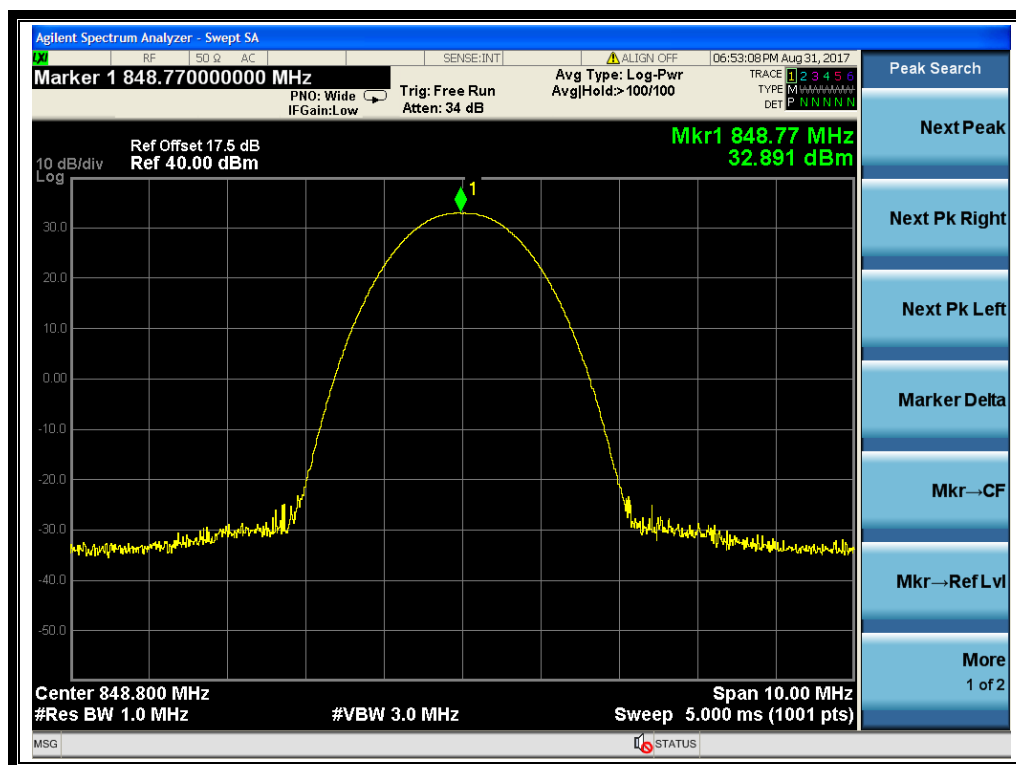
GSM Model Test Plots:



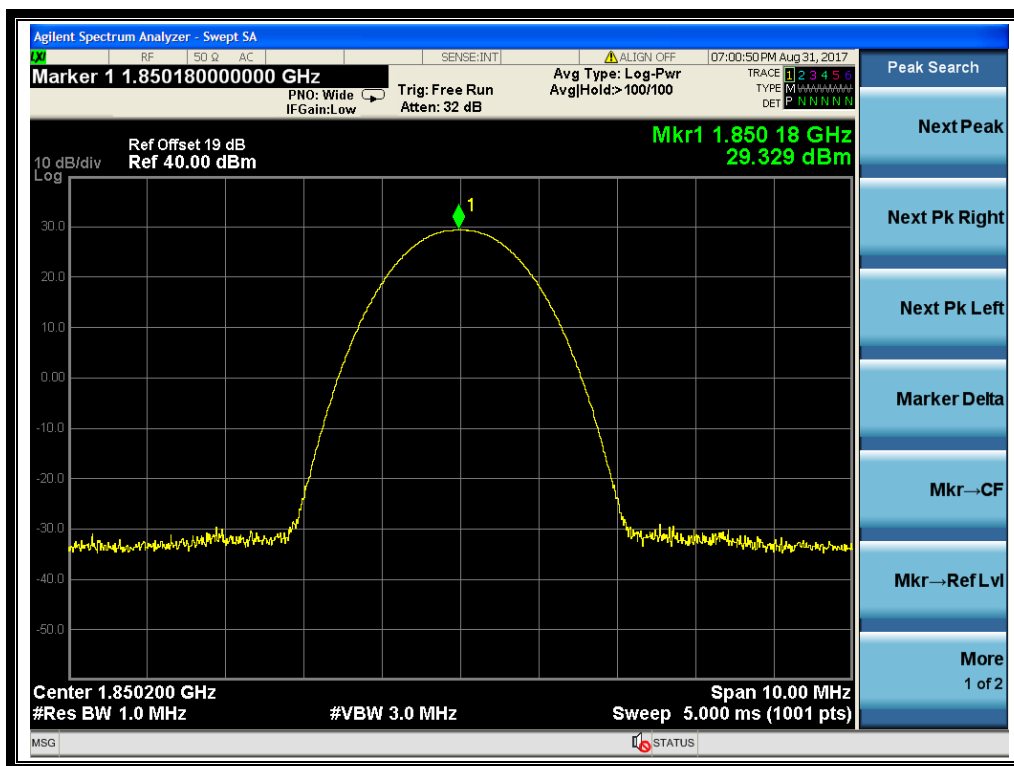
(GPRS 850MHz Channel = 128)



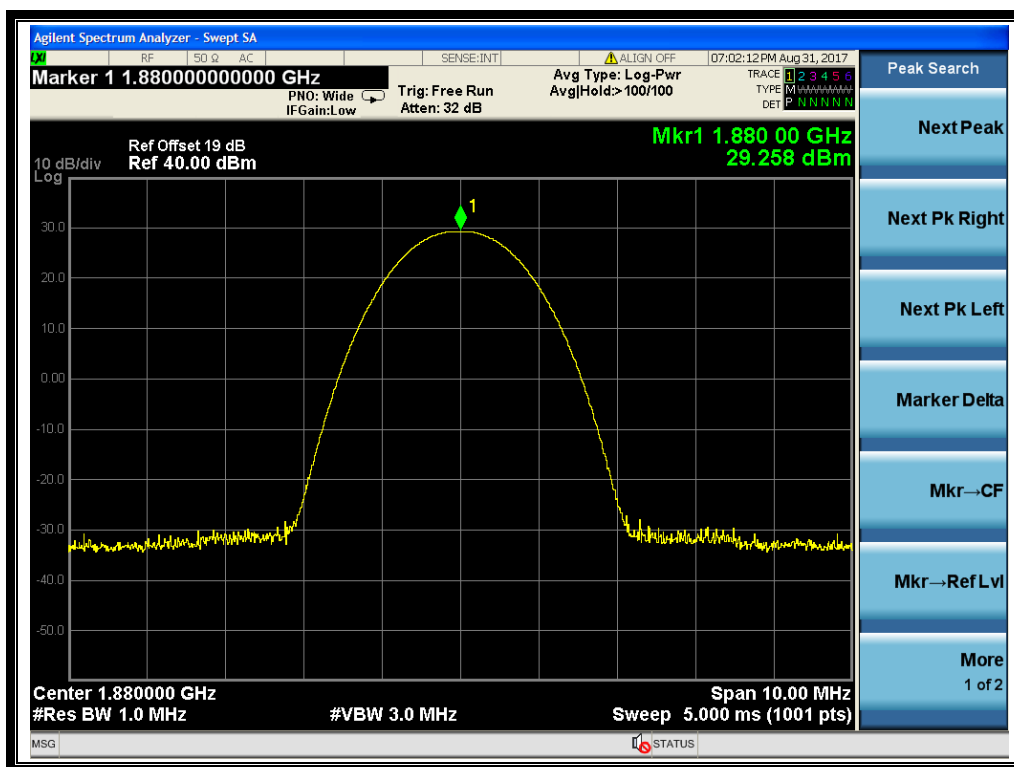
(GPRS 850MHz Channel = 190)



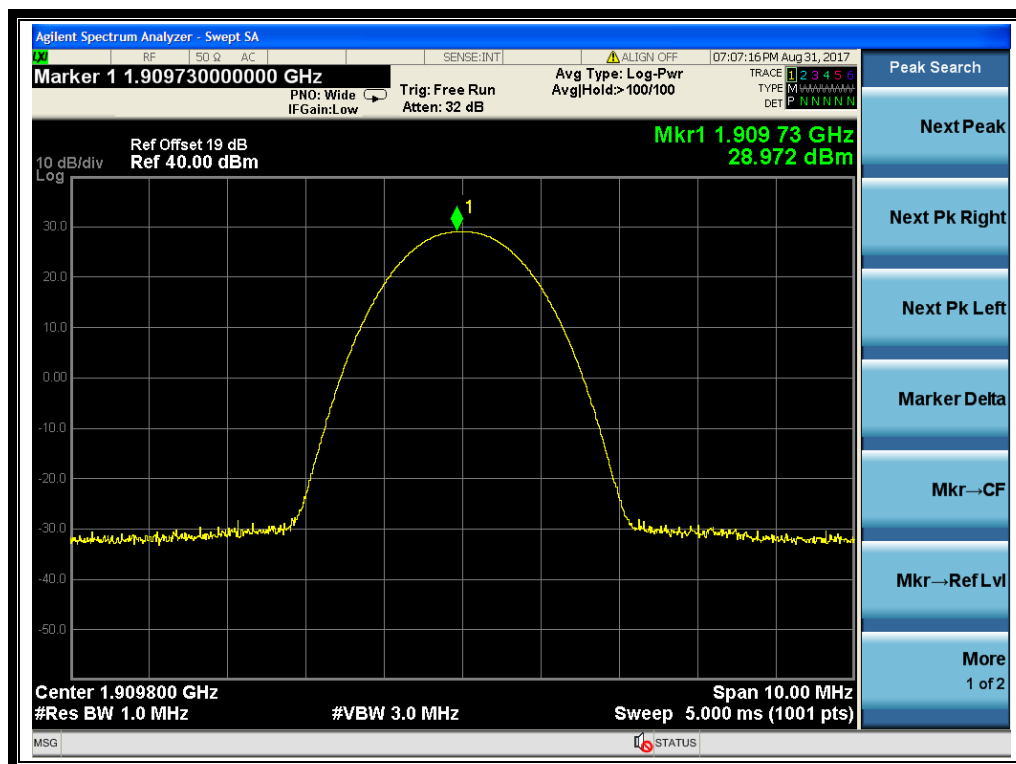
(GPRS 850MHz Channel = 251)



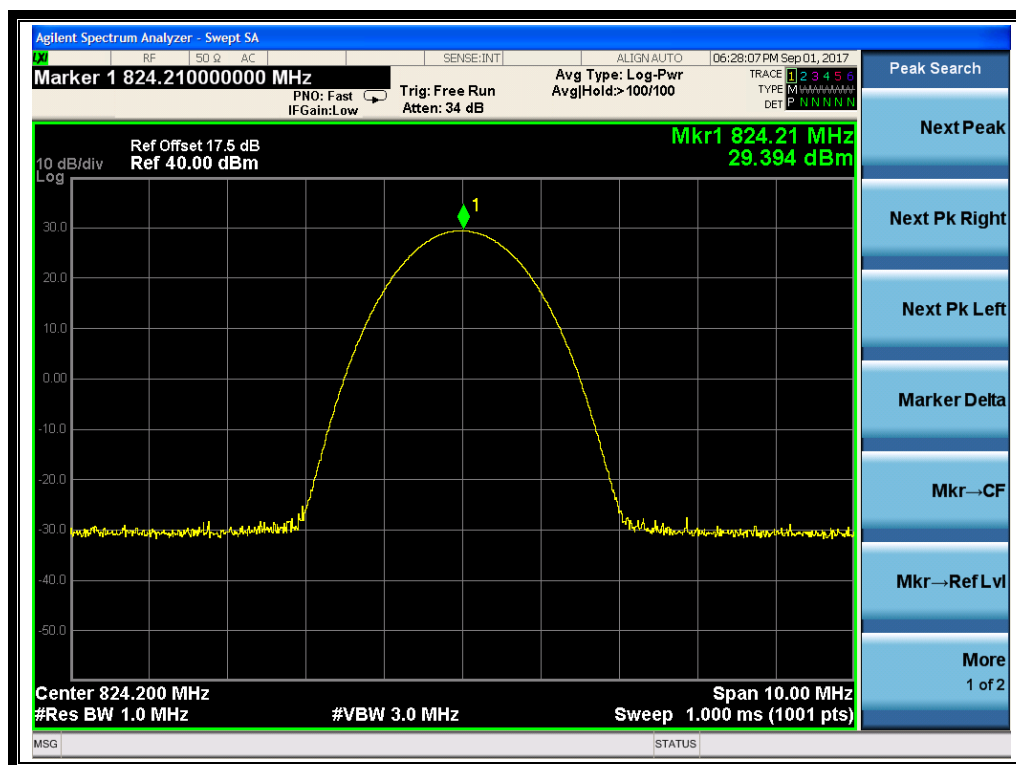
(GPRS 1900MHz Channel = 512)



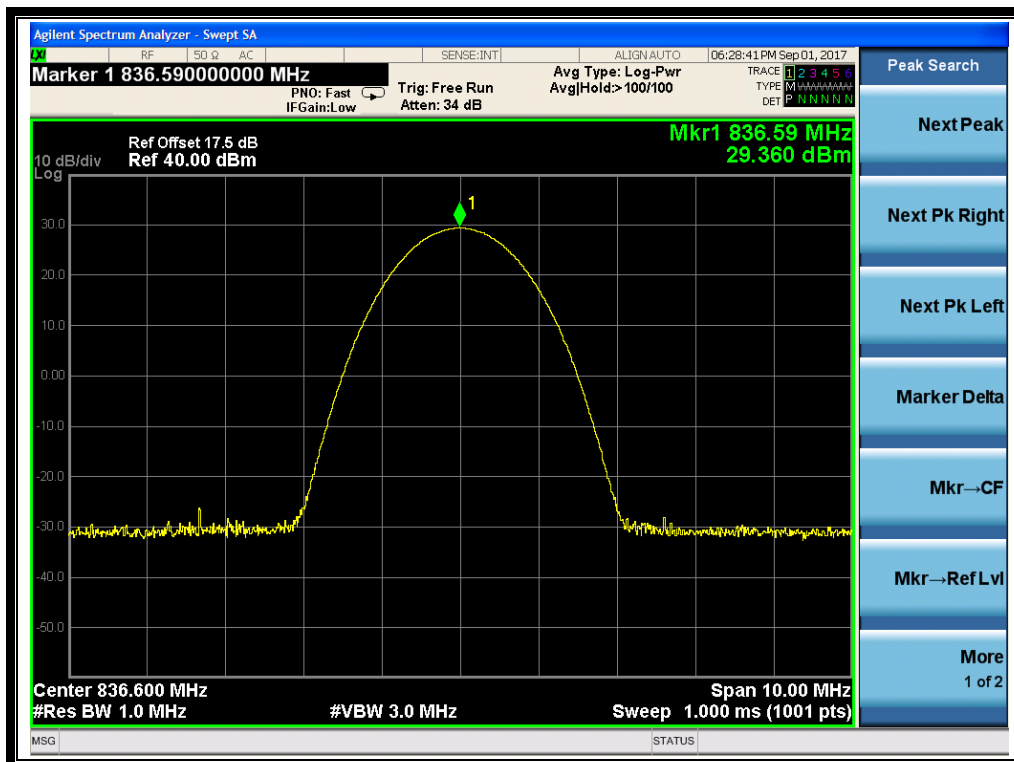
(GPRS 1900MHz Channel = 661)



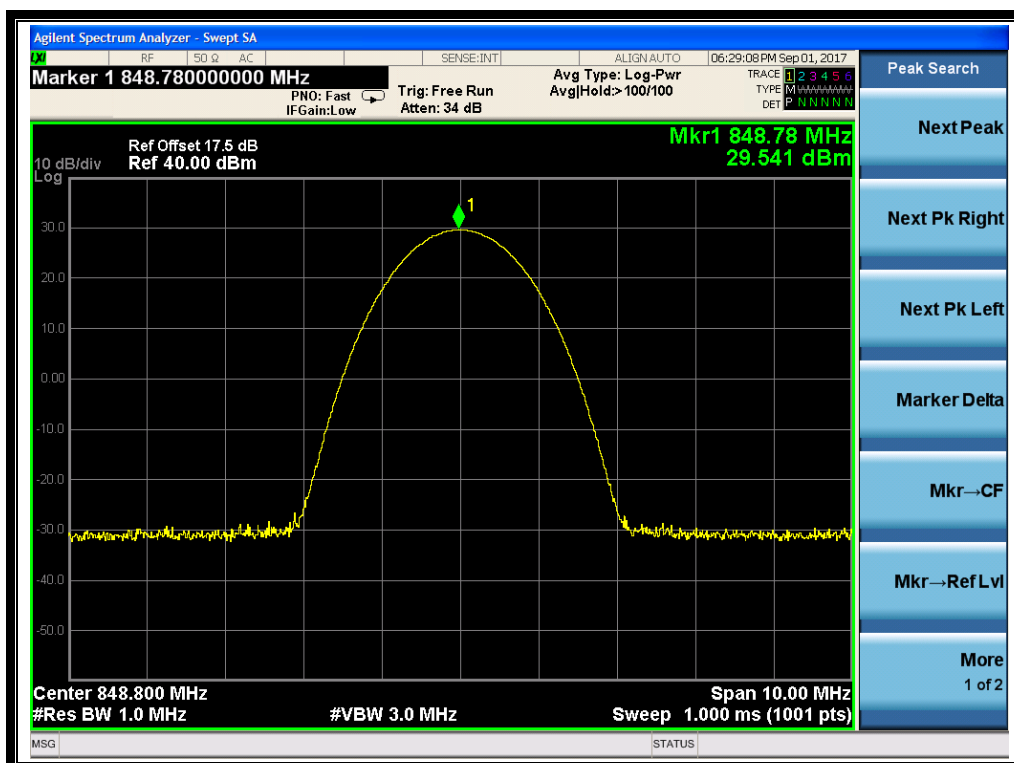
(GPRS 1900Hz Channel = 810)



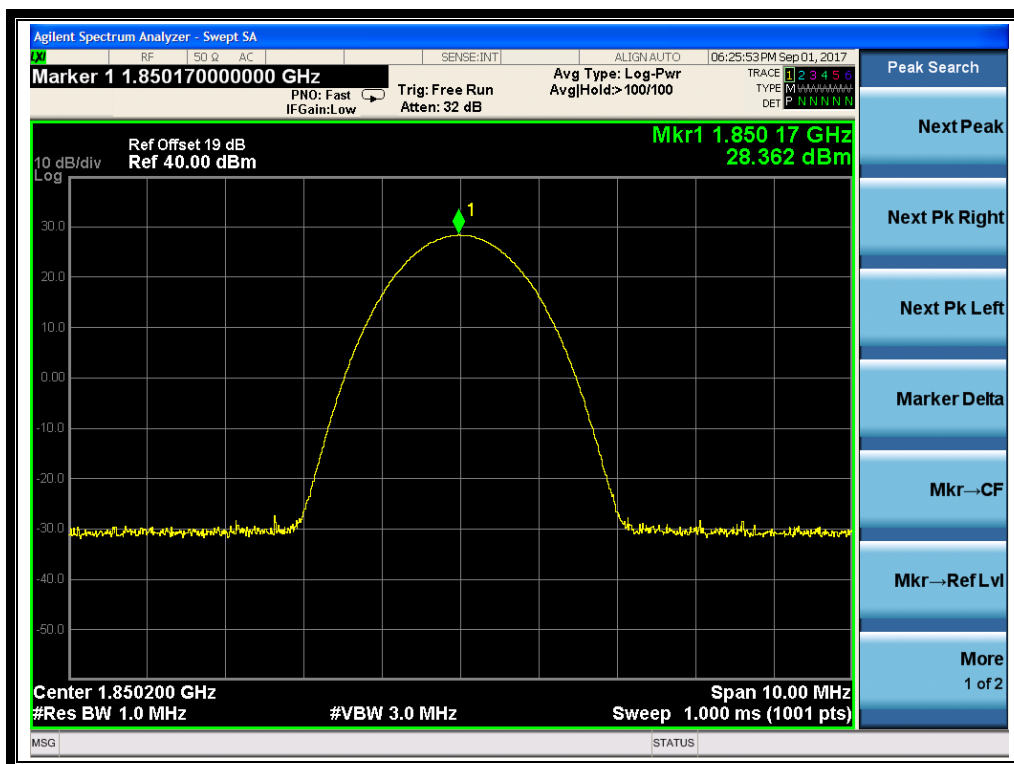
(EGPRS 850MHz Channel = 128)



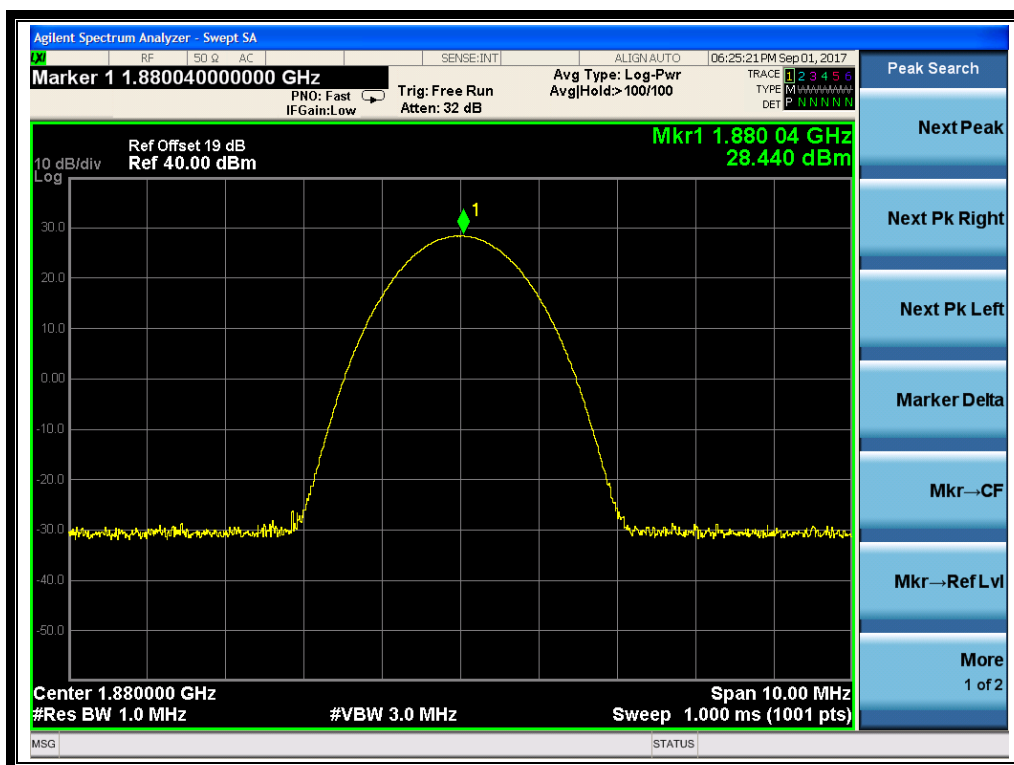
(EGPRS 850MHz Channel = 190)



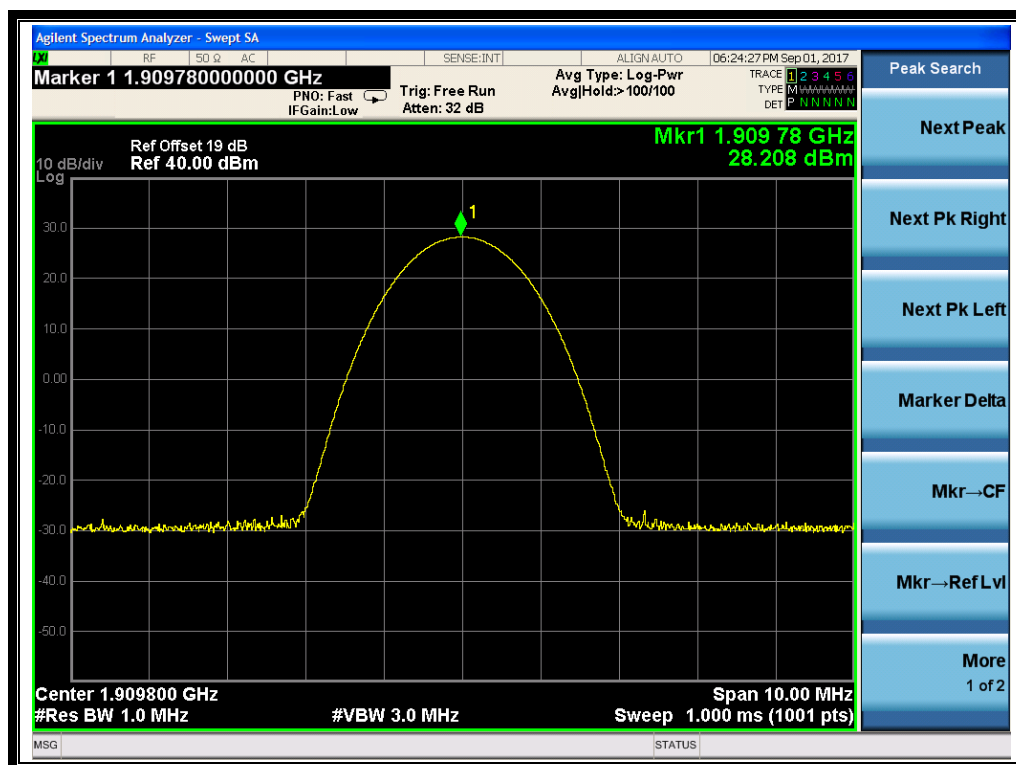
(EGPRS 850MHz Channel = 251)



(EGPRS 1900MHz Channel = 512)



(EGPRS 1900MHz Channel = 661)



(EGPRS 1900Hz Channel = 810)

## 2.2 Peak to Average Ratio

### 2.2.1 Definition

According to FCC section 2.1049 and FCC 24.232(d) the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### 2.2.2 Test Description

See section 2.1.2 of this report.

### 2.2.3 Test Verdict

Here the lowest, middle and highest channels are selected to perform testing to verify the peak-to-average ratio.

Test procedures:

A .For GSM/EGPRS operating mode:

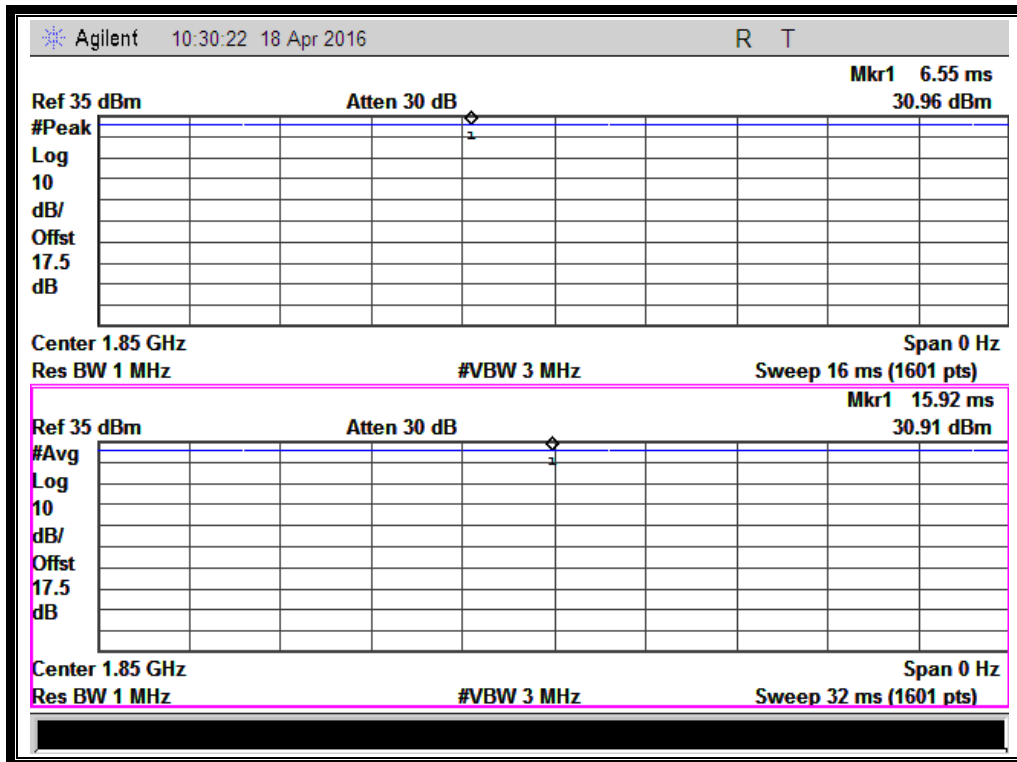
- Set RBW=1MHz, VBW=3MHz, peak detector in spectrum analyzer.
- Set EUT in maximum output power, and triggered the bust signal.
- Measured respectively the peak level and mean level, and the deviation was recorded as Peak to Average ratio.

B. For UMTS operating mode:

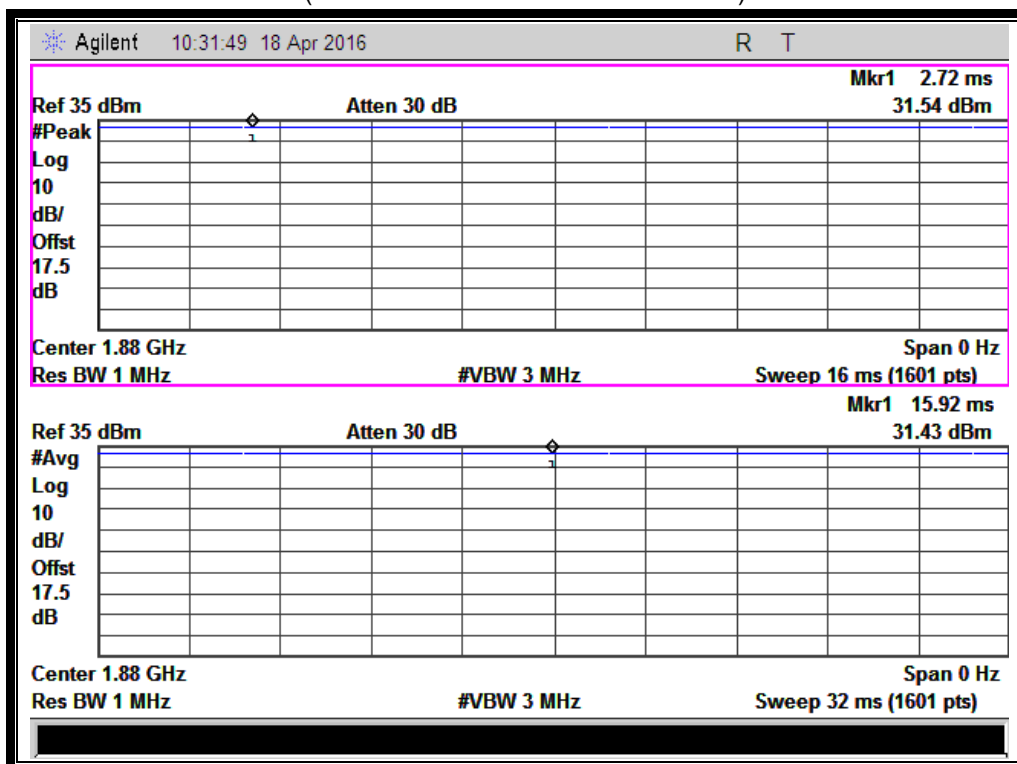
- Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
- The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1%.

Test Verdict:

| Band             | Channel | Frequency (MHz) | Peak to Average radio | Limit | Verdict |
|------------------|---------|-----------------|-----------------------|-------|---------|
|                  |         |                 | dB                    | dB    |         |
| GPRS<br>1900MHz  | 512     | 1850.2          | 0.05                  | 13    | PASS    |
|                  | 661     | 1880.0          | 0.11                  |       | PASS    |
|                  | 810     | 1909.8          | 0.12                  |       | PASS    |
| EGPRS<br>1900MHz | 512     | 1850.2          | 0.11                  | 13    | PASS    |
|                  | 661     | 1880.0          | 0.06                  |       | PASS    |
|                  | 810     | 1909.8          | 0.17                  |       | PASS    |
| HSUPA<br>1900MHz | 9262    | 1852.4          | 5.83                  | 13    | PASS    |
|                  | 9400    | 1880.0          | 8.42                  |       | PASS    |
|                  | 9538    | 1907.6          | 8.46                  |       | PASS    |



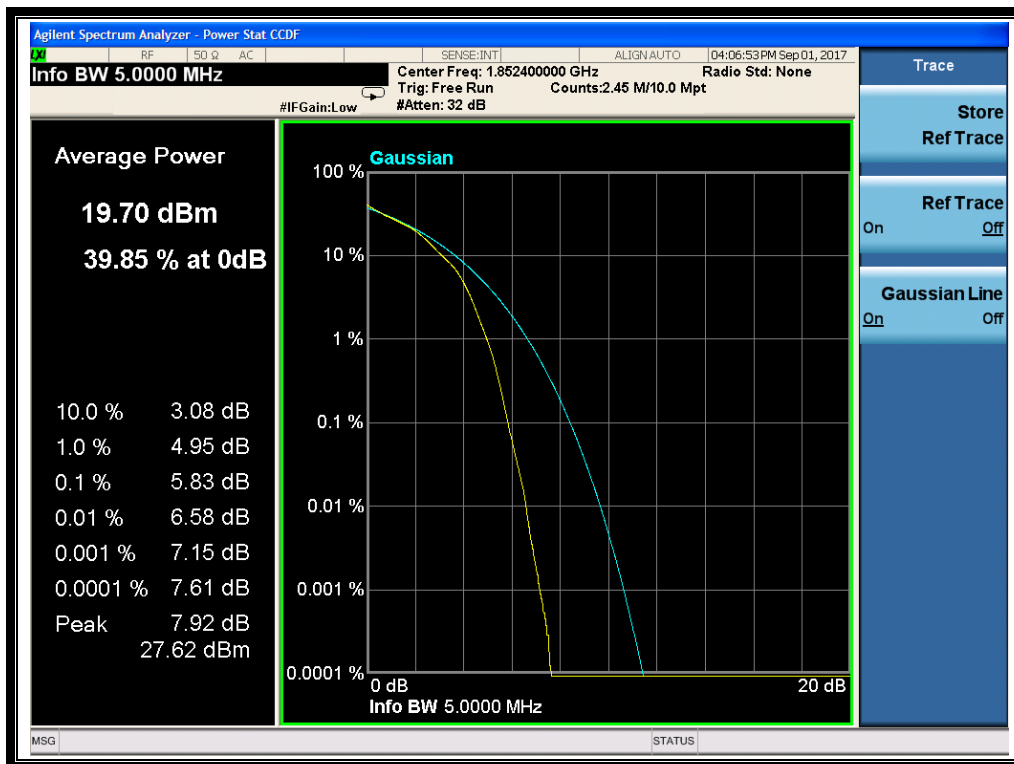
(GPRS 1900 MHz Channel = 512)



(GPRS 1900 MHz Channel = 661)



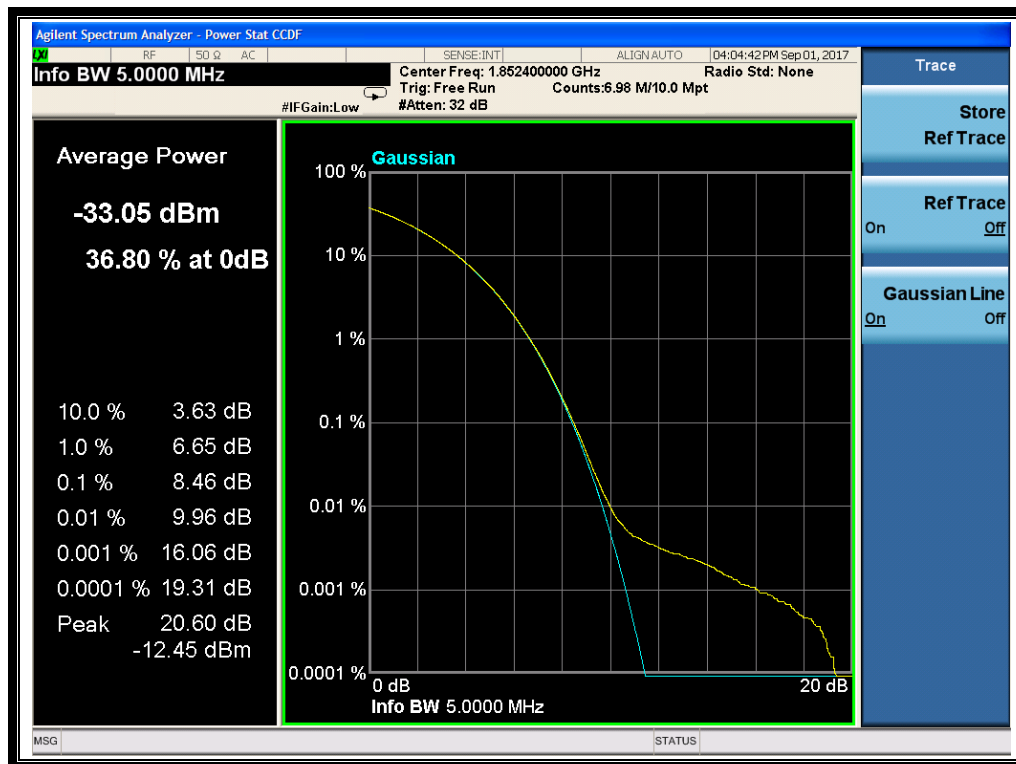




(WCDMA 1900MHz Channel = 9262)



(WCDMA 1900MHz Channel = 9400)



(WCDMA 1900MHz Channel = 9538)



## 2.3 99% Occupied Bandwidth

### 2.3.1 Definition

According to FCC section 2.1049 and FCC § 22.917 & 24.238, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. Occupied bandwidth is also known as the 99% emission bandwidth.

### 2.3.2 Test Description

See section 2.1.2 of this report.

### 2.3.3 Test Verdict

Here the lowest, middle and highest channels are selected to perform testing to verify the 99% occupied bandwidth.

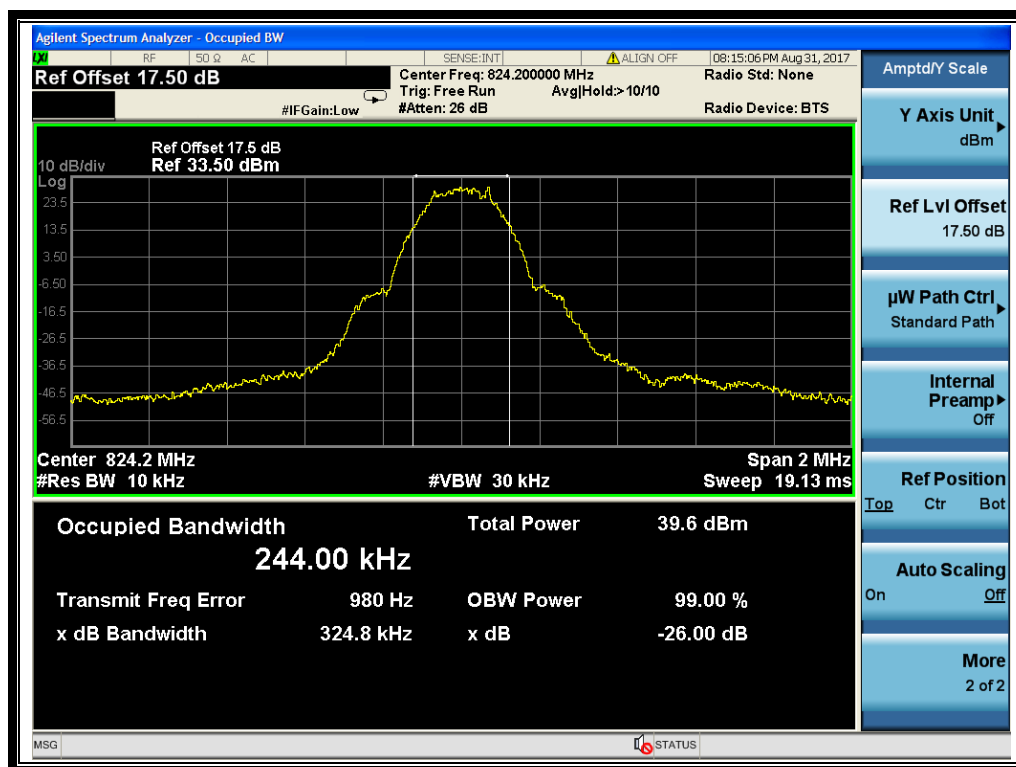
Test Verdict:

| Band          | Channel | Frequency (MHz) | 26dB bandwidth(MHz) | 99% Occupied Bandwidth (MHz) |
|---------------|---------|-----------------|---------------------|------------------------------|
| GPRS 850MHz   | 128     | 824.2           | 0.3248              | 0.2440                       |
|               | 190     | 836.6           | 0.3171              | 0.2410                       |
|               | 251     | 848.8           | 0.3175              | 0.2475                       |
| GPRS 1900MHz  | 512     | 1850.2          | 0.3139              | 0.2448                       |
|               | 661     | 1880.0          | 0.3163              | 0.2464                       |
|               | 810     | 1909.8          | 0.3174              | 0.2502                       |
| EGPRS 850MHz  | 128     | 824.2           | 0.3207              | 0.2456                       |
|               | 190     | 836.6           | 0.3134              | 0.2458                       |
|               | 251     | 848.8           | 0.3239              | 0.2493                       |
| EGPRS 1900MHz | 512     | 1850.2          | 0.3105              | 0.2448                       |
|               | 661     | 1880.0          | 0.3095              | 0.2419                       |
|               | 810     | 1909.8          | 0.3238              | 0.2449                       |
| HSDPA 850MHz  | 4132    | 826.4           | 4.624               | 4.1248                       |
|               | 4175    | 835.0           | 4.621               | 4.1337                       |
|               | 4233    | 846.6           | 4.627               | 4.1462                       |
| HSDPA 1900MHz | 9262    | 1852.4          | 4.612               | 4.1472                       |
|               | 9400    | 1880.0          | 4.618               | 4.1693                       |
|               | 9538    | 1907.6          | 4.620               | 4.1629                       |
| HSUPA 850MHz  | 4132    | 826.4           | 4.606               | 4.1276                       |
|               | 4175    | 835.0           | 4.617               | 4.1467                       |
|               | 4233    | 846.6           | 4.619               | 4.1428                       |

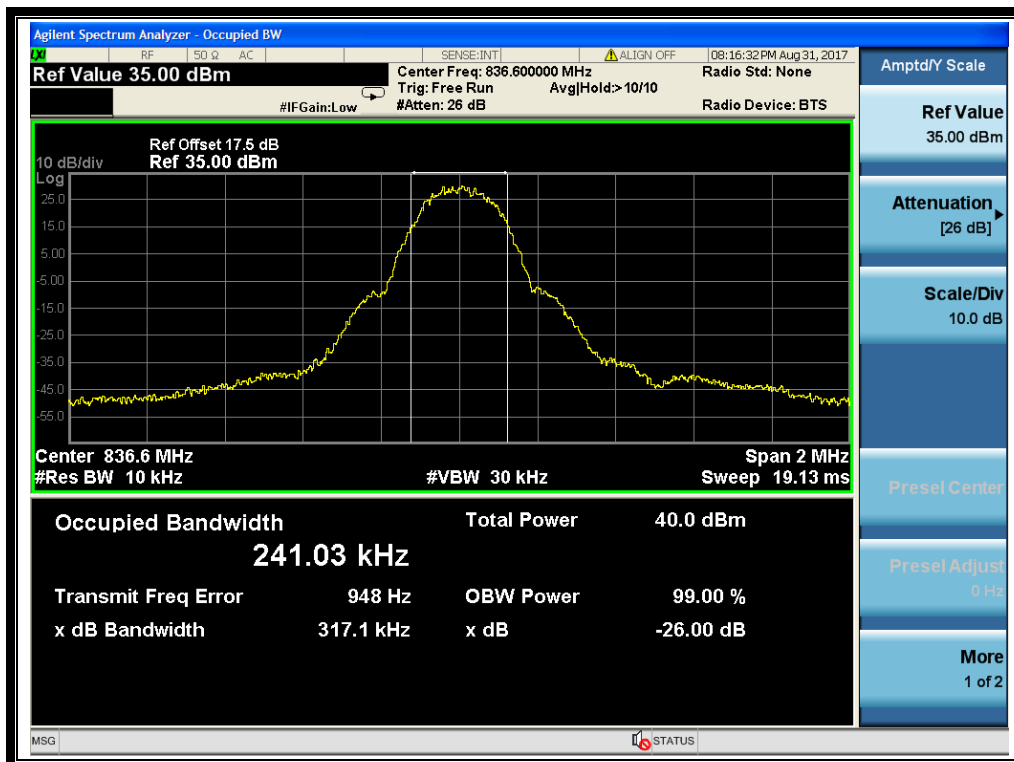


| Band          | Channel | Frequency (MHz) | 26dB bandwidth(MHz) | 99% Occupied Bandwidth (MHz) |
|---------------|---------|-----------------|---------------------|------------------------------|
| HSUPA 1900MHz | 9262    | 1852.4          | 4.600               | 4.1429                       |
|               | 9400    | 1880.0          | 4.604               | 4.1382                       |
|               | 9538    | 1907.6          | 4.619               | 4.1457                       |
| HSPA+ 850MHz  | 4132    | 826.4           | 4.631               | 4.1271                       |
|               | 4175    | 835.0           | 4.619               | 4.1545                       |
|               | 4233    | 846.6           | 4.629               | 4.1455                       |
| HSPA+ 1900MHz | 9262    | 1852.4          | 4.621               | 4.1414                       |
|               | 9400    | 1880.0          | 4.626               | 4.1449                       |
|               | 9538    | 1907.6          | 4.631               | 4.1522                       |

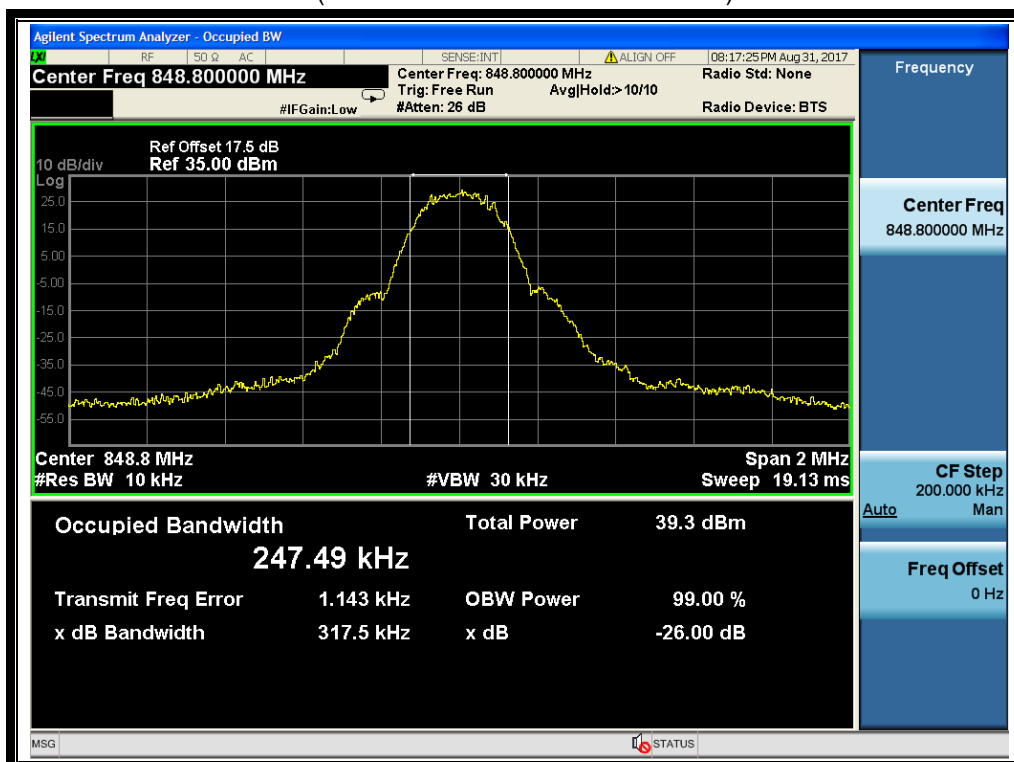
Test Plots:



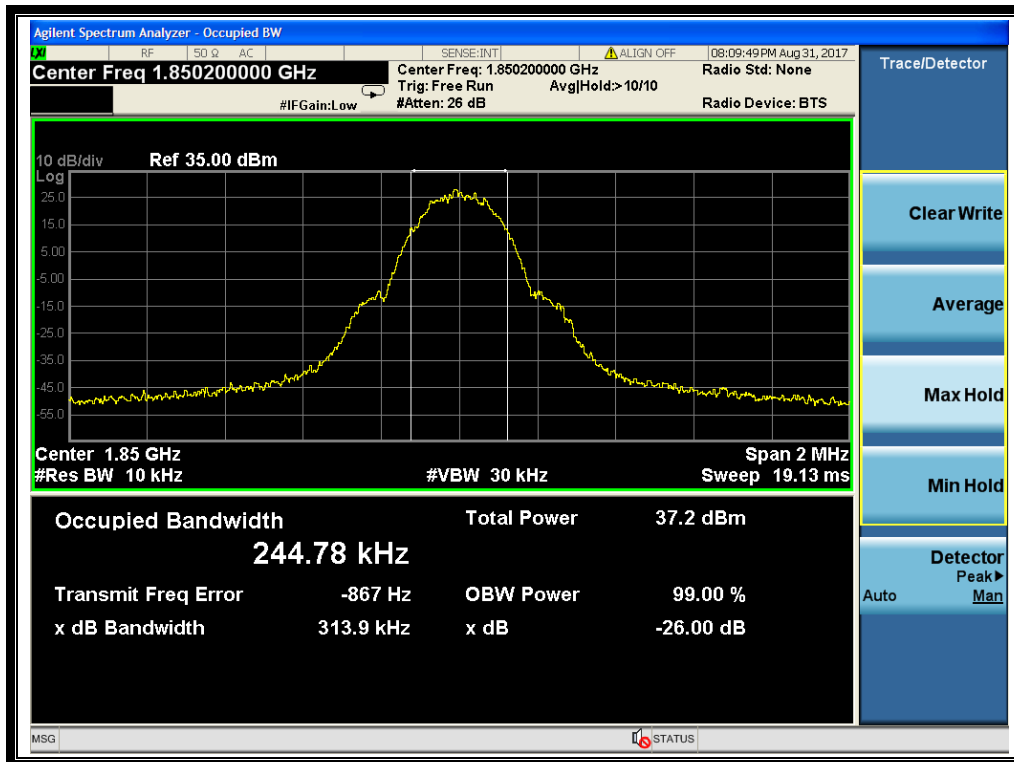
(GPRS 850MHz Channel = 128)



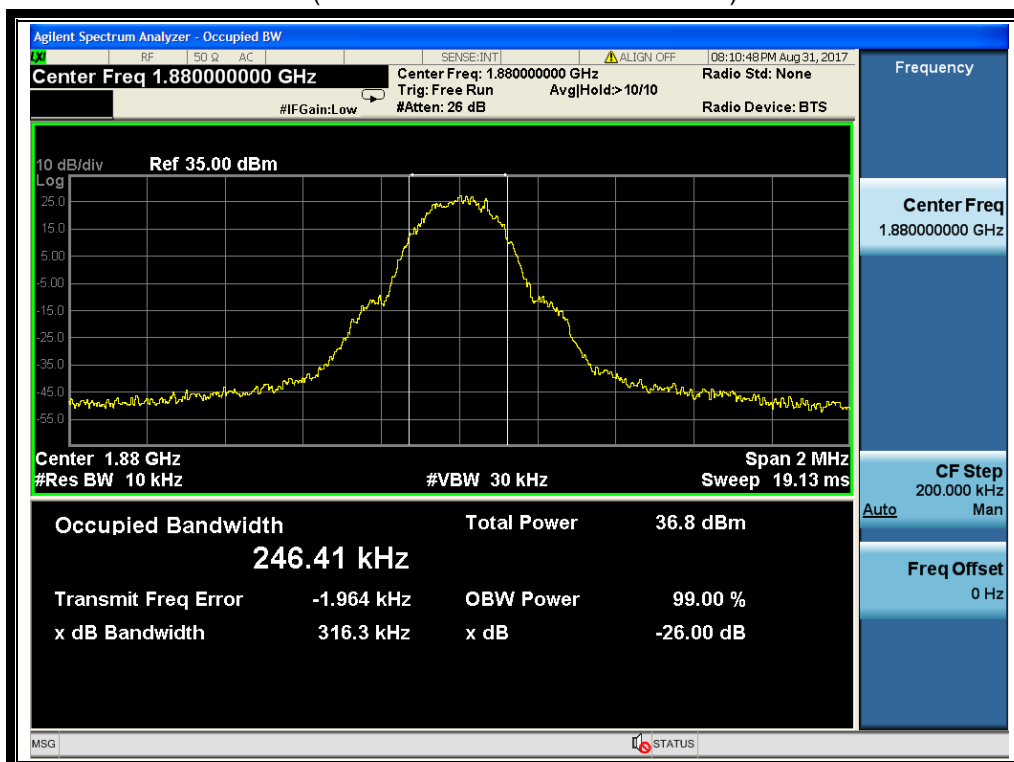
(GPRS 850MHz Channel = 190)



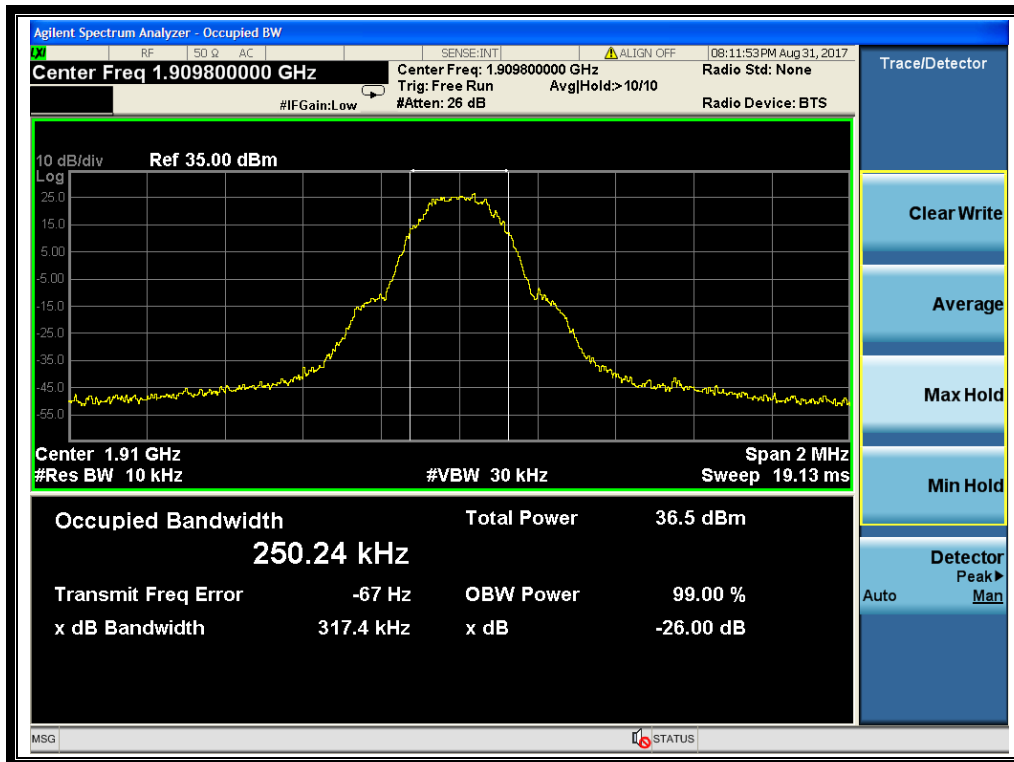
(GPRS 850MHz Channel = 251)



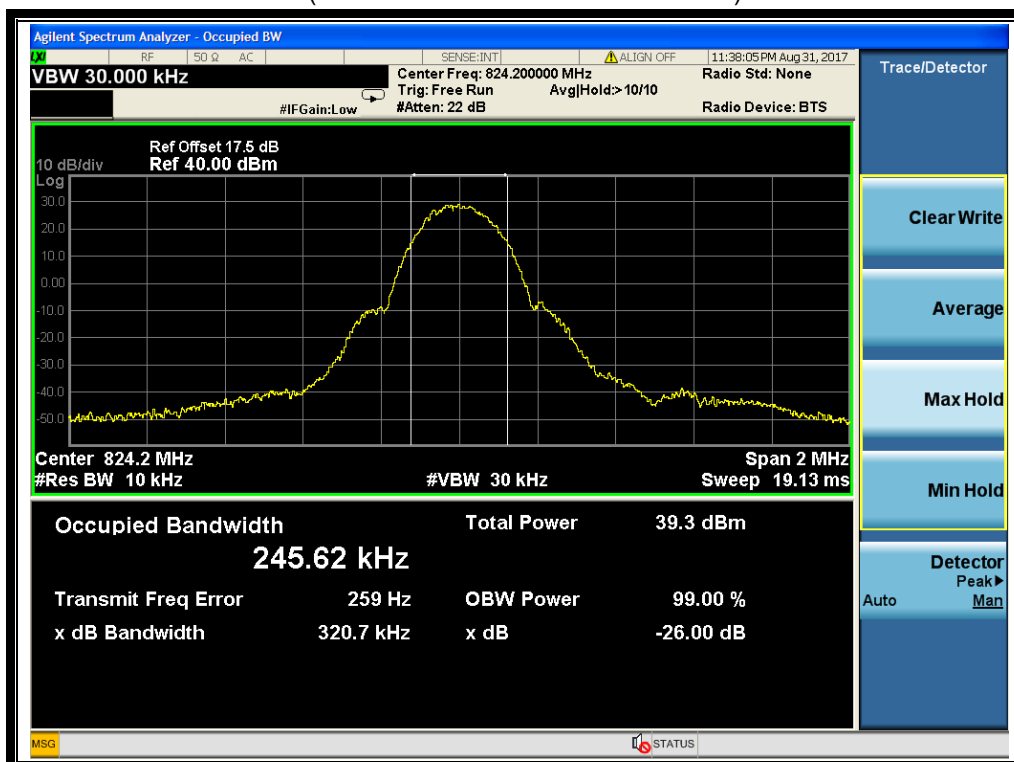
(GPRS1900MHz Channel = 512)



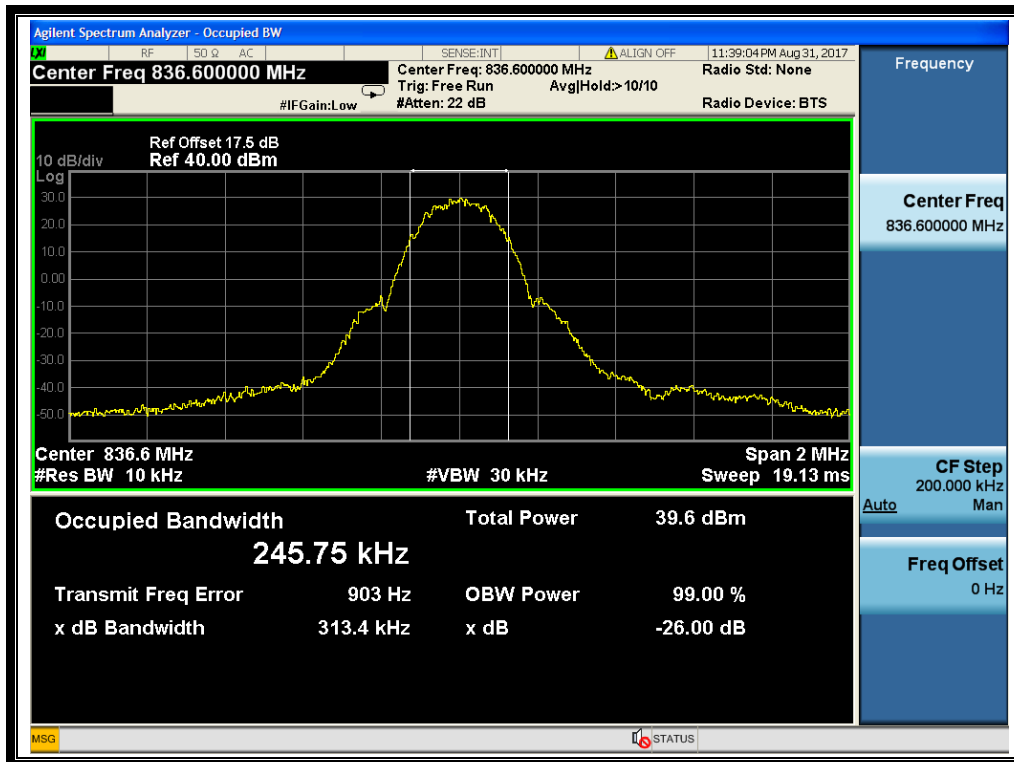
(GPRS1900MHz Channel = 661)



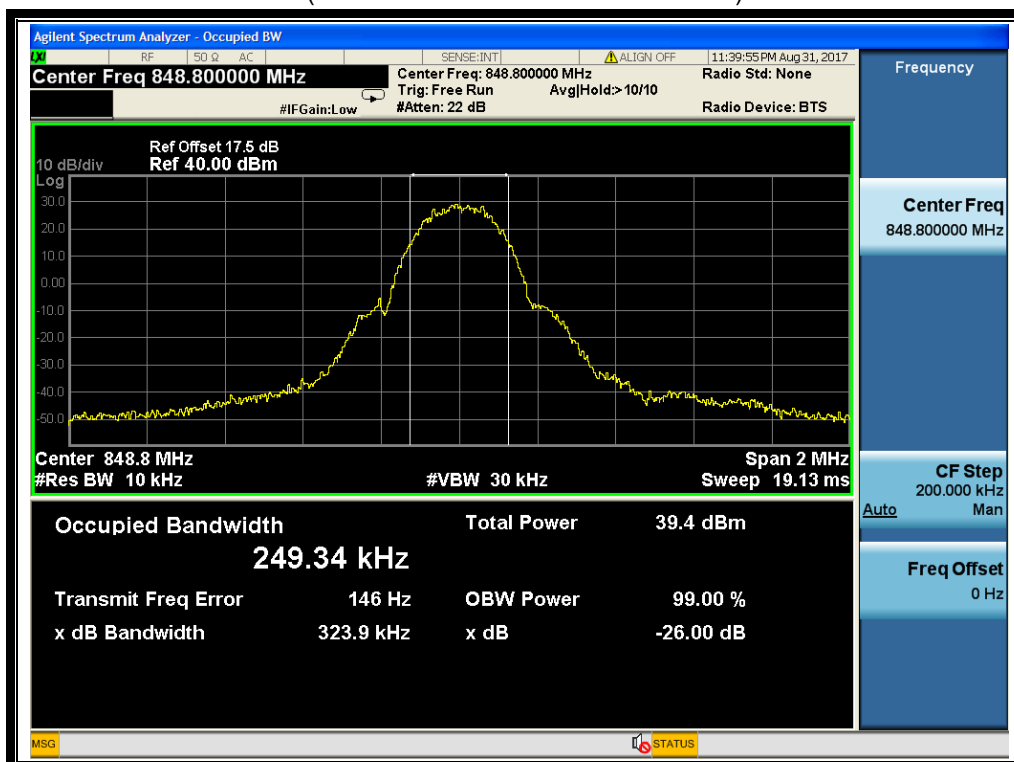
(GPRS 1900MHz Channel = 810)



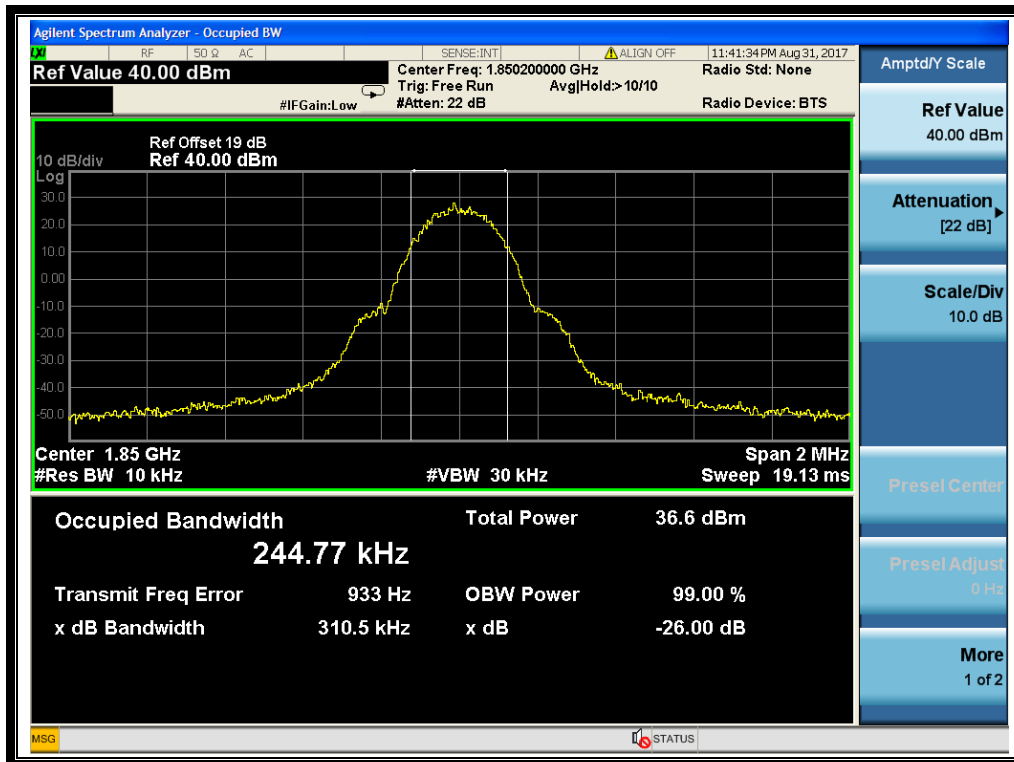
(EGPRS 850MHz Channel = 128)



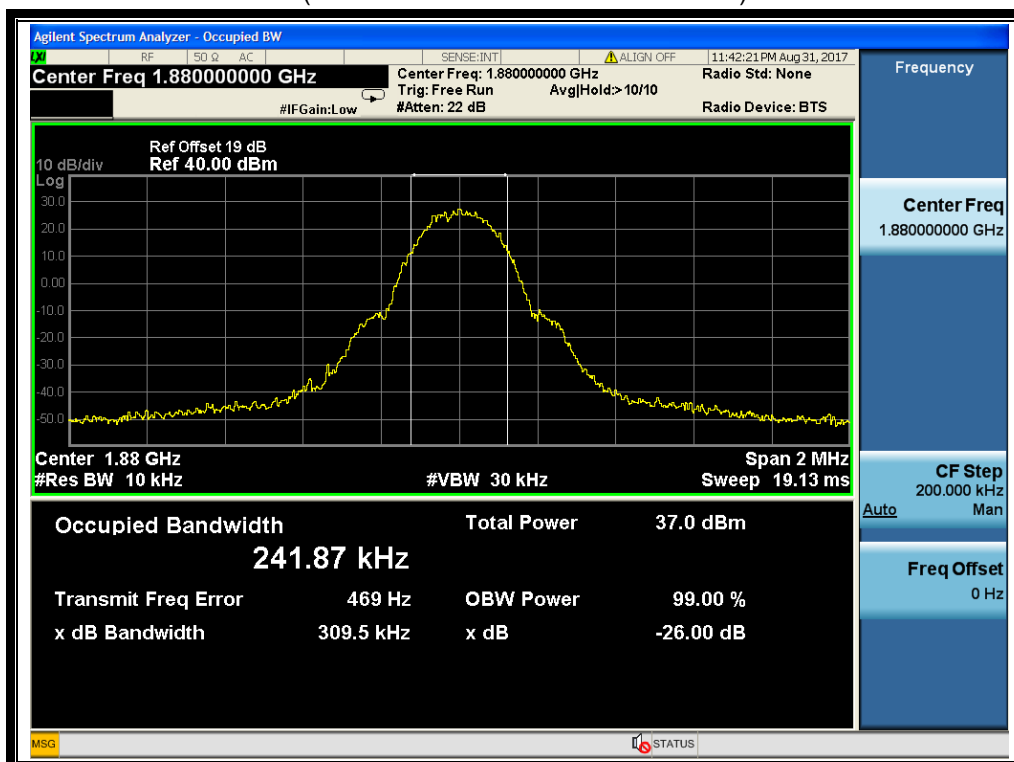
(EGPRS 850MHz Channel = 190)



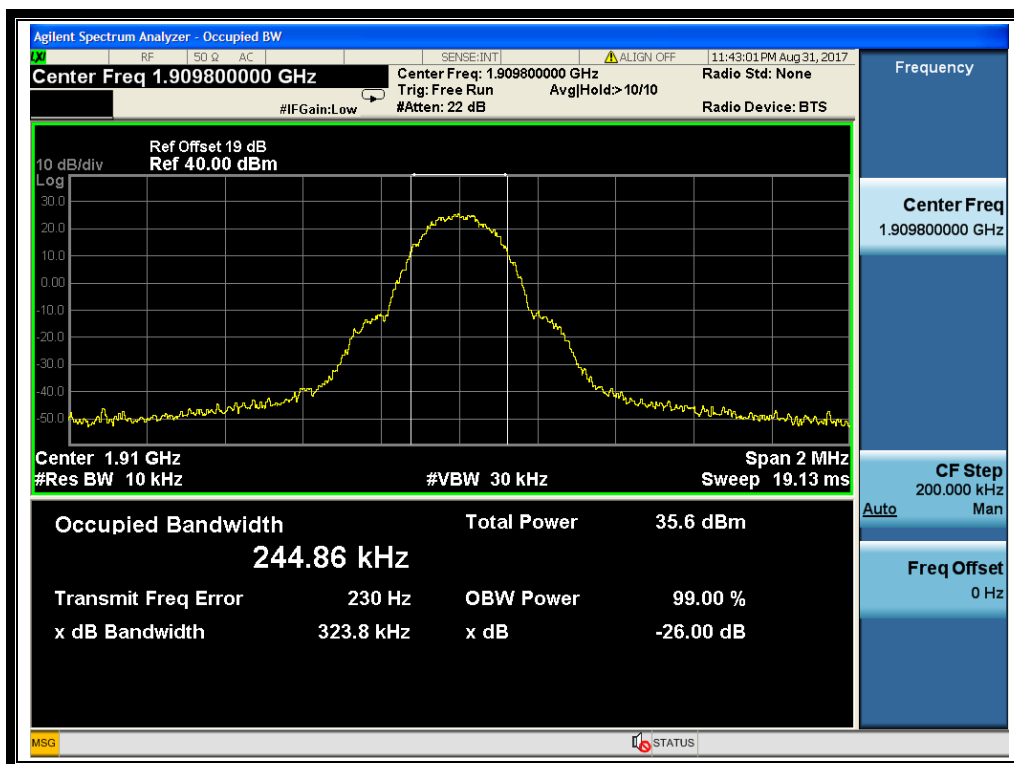
(EGPRS 850MHz Channel = 251)



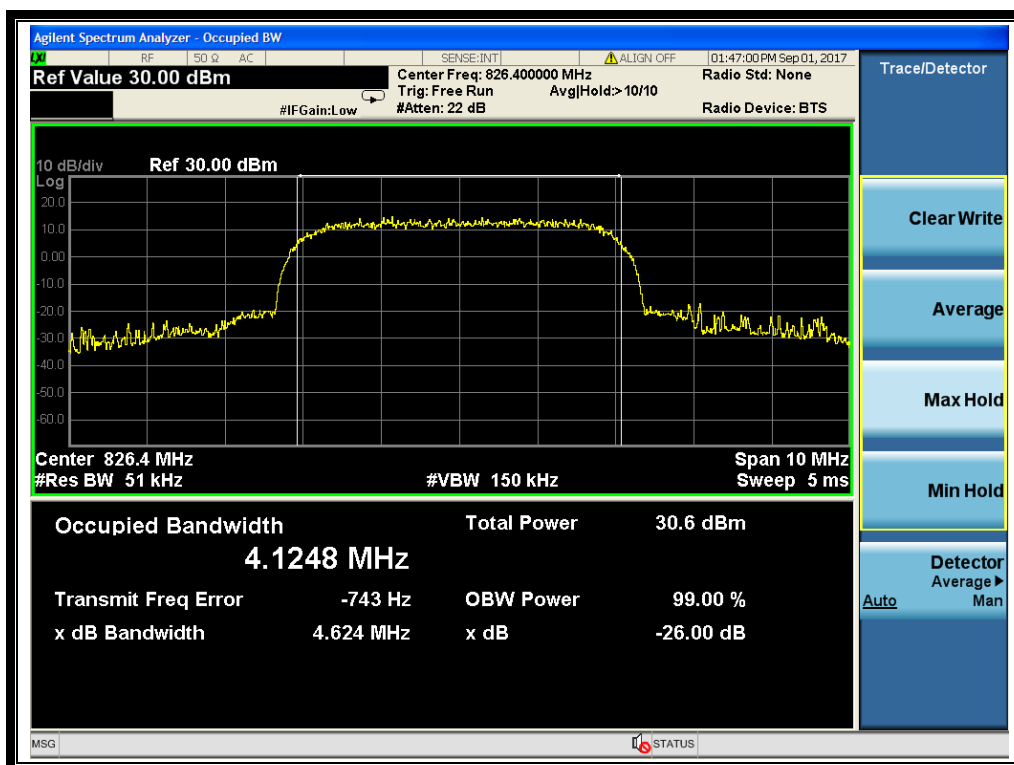
(EGPRS1900MHz Channel = 512)



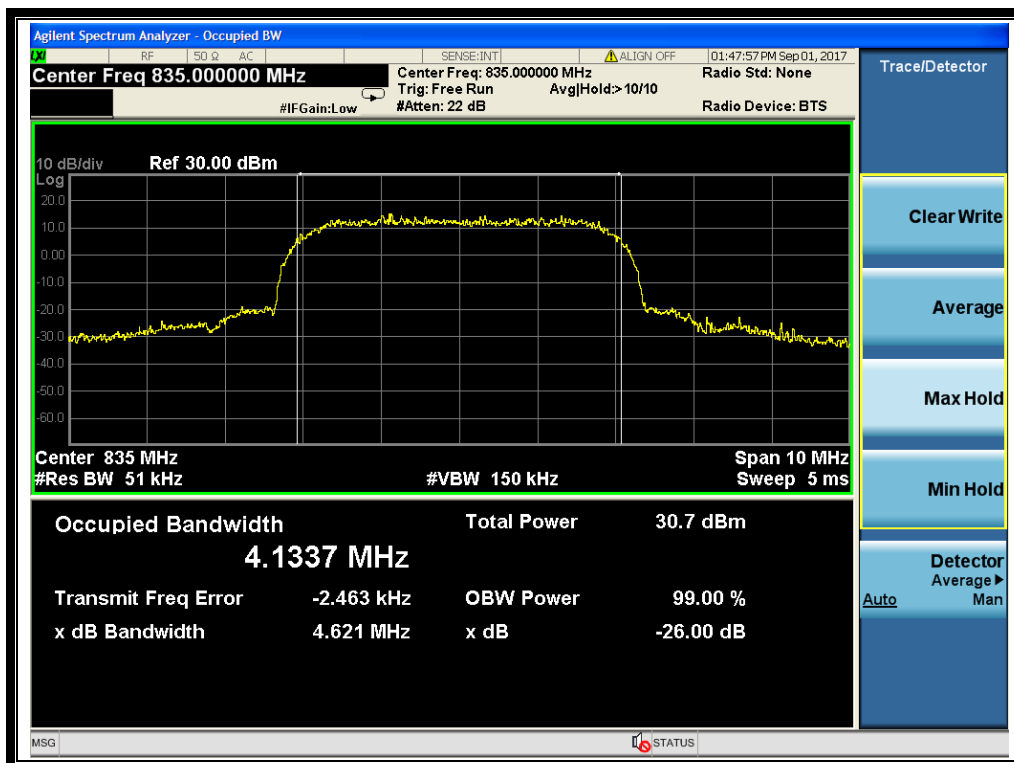
(EGPRS1900MHz Channel = 661)



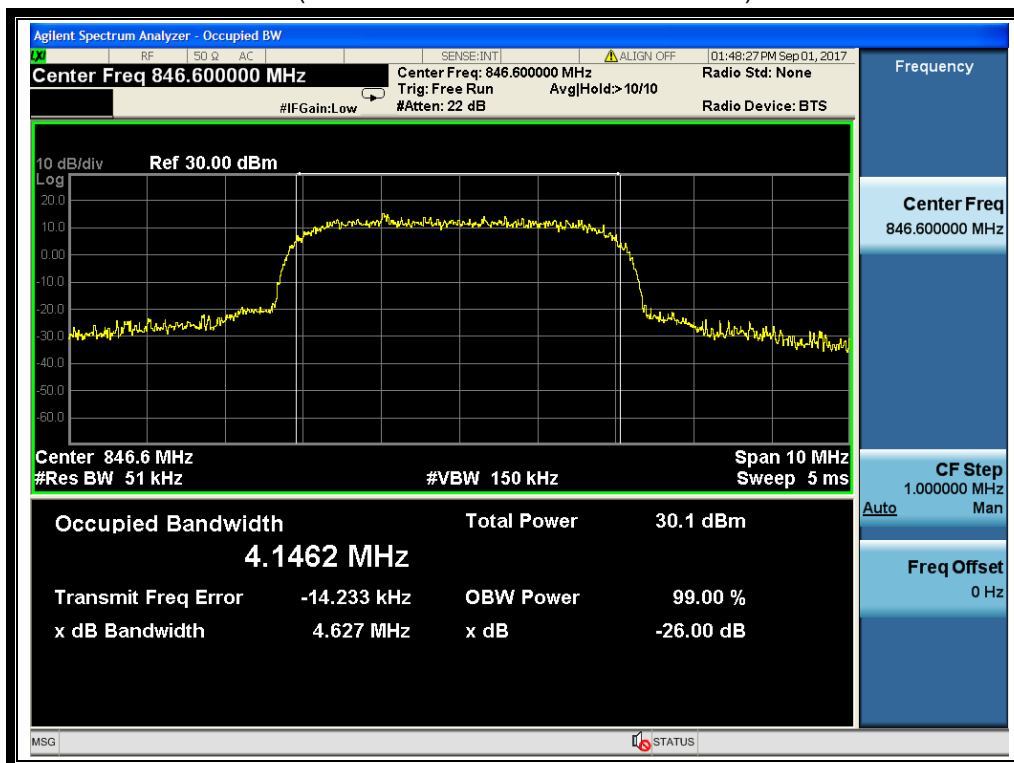
(EGPRS 1900MHz Channel = 810)



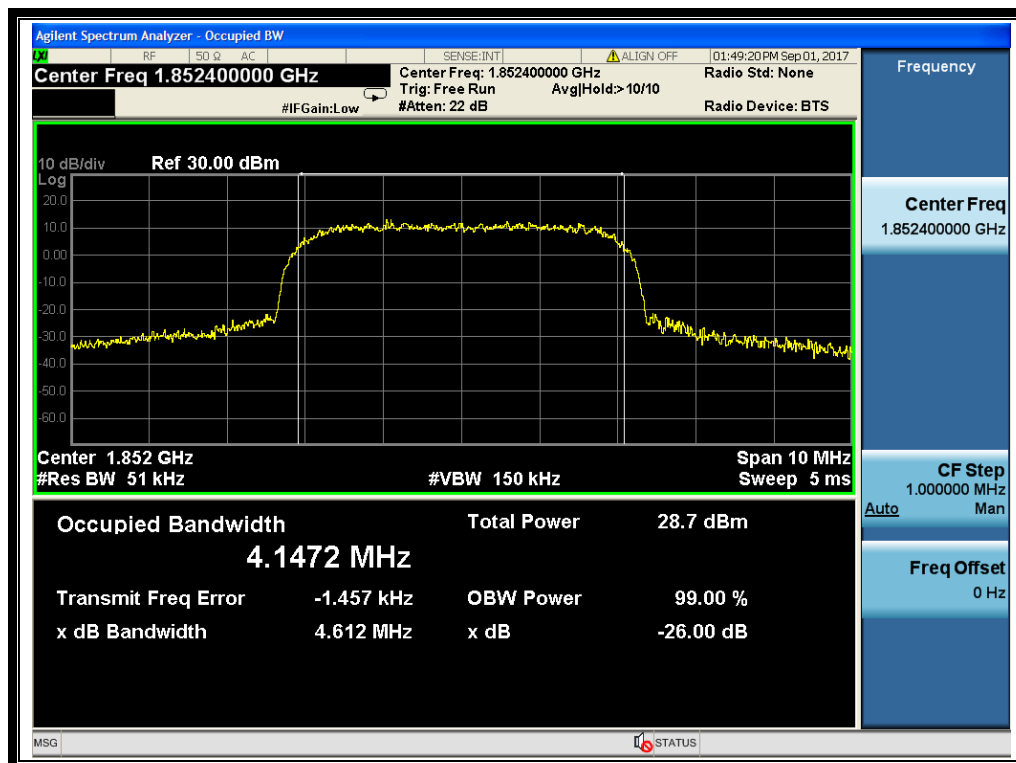
(HSDPA 850MHz Channel = 4132)



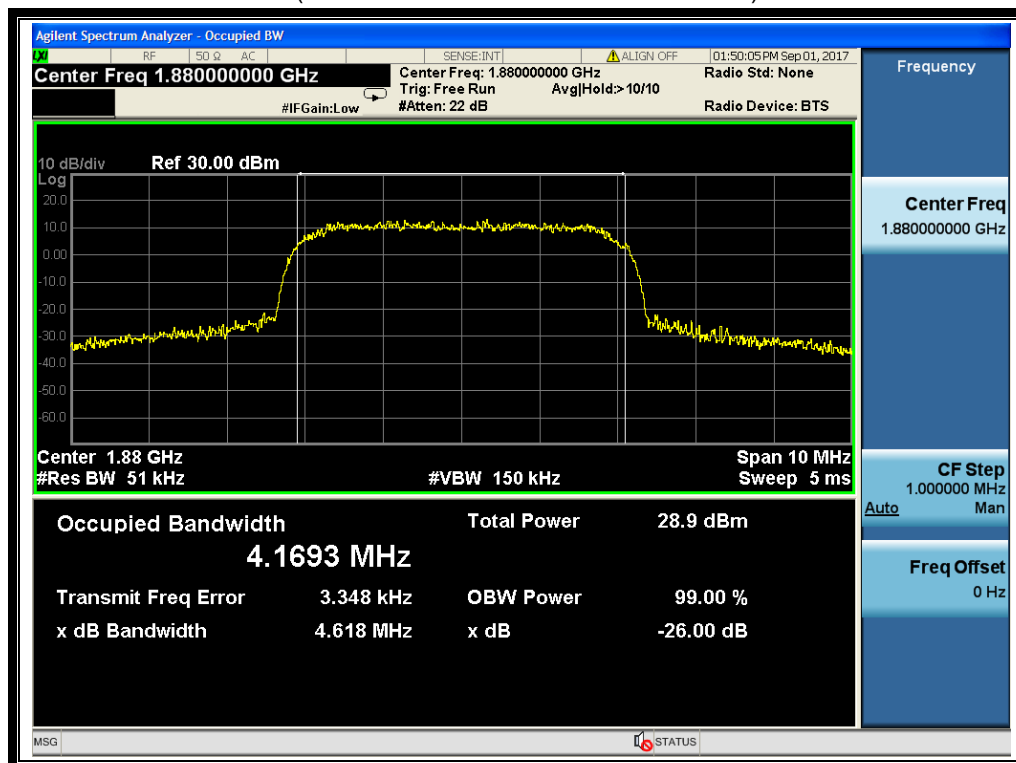
(HSDPA 850 MHz Channel = 4175)



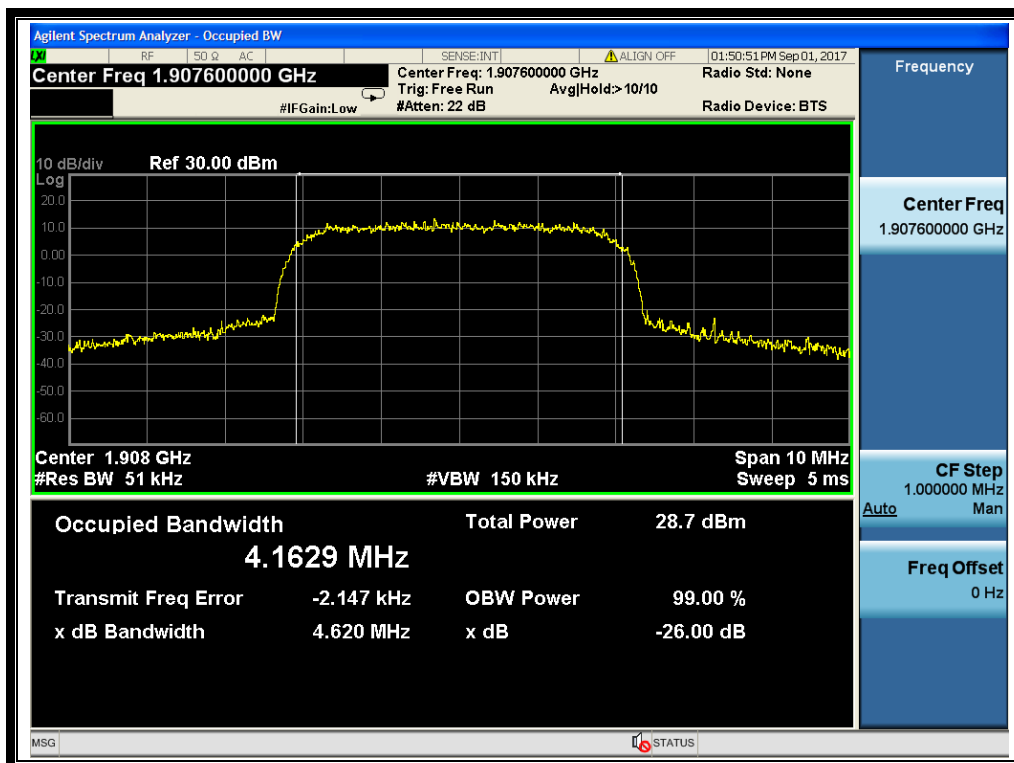
(HSDPA 850MHz Channel = 4233)



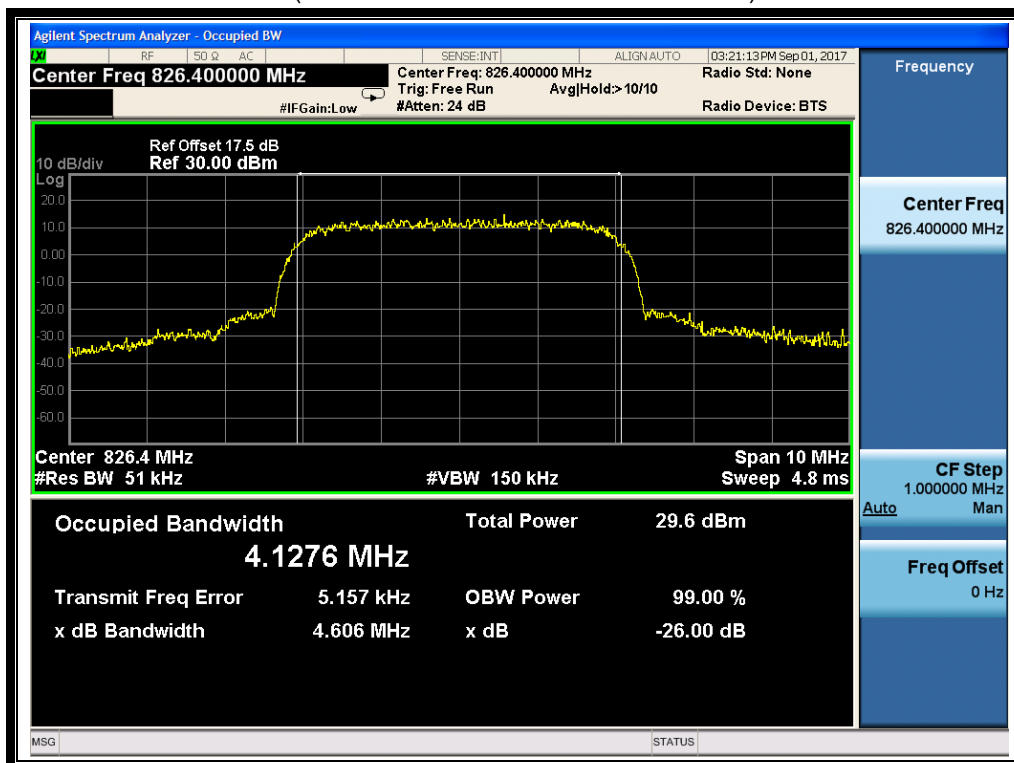
(HSDPA 1900MHz Channel = 9262)



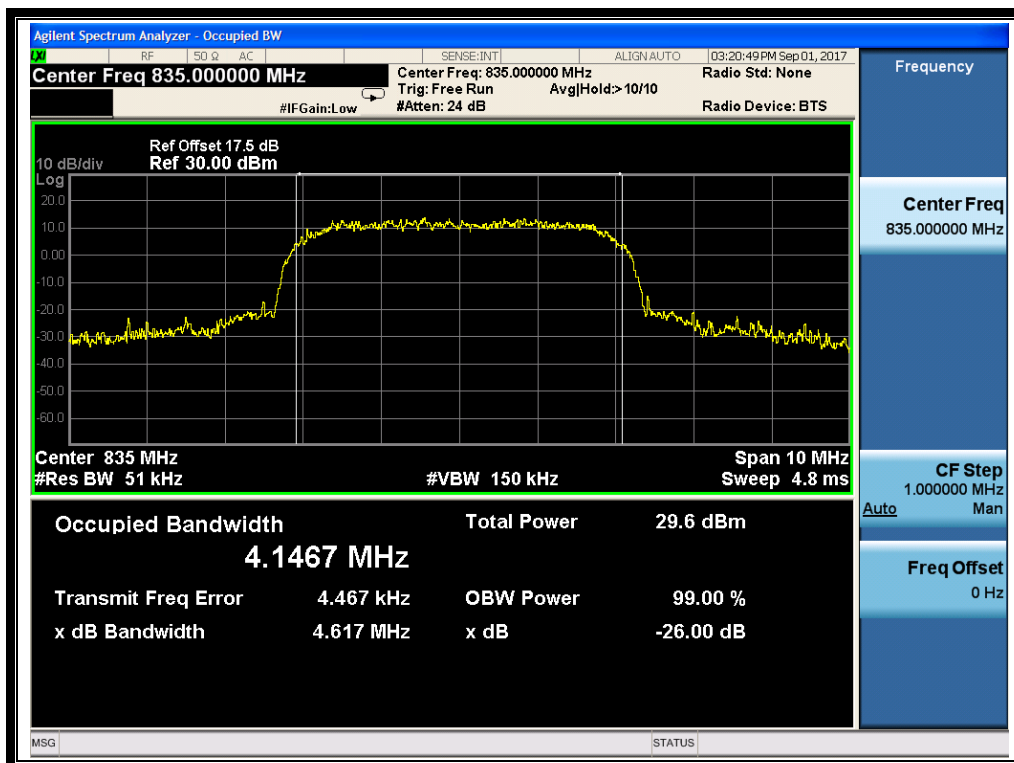
(HSDPA 1900 MHz Channel = 9400)



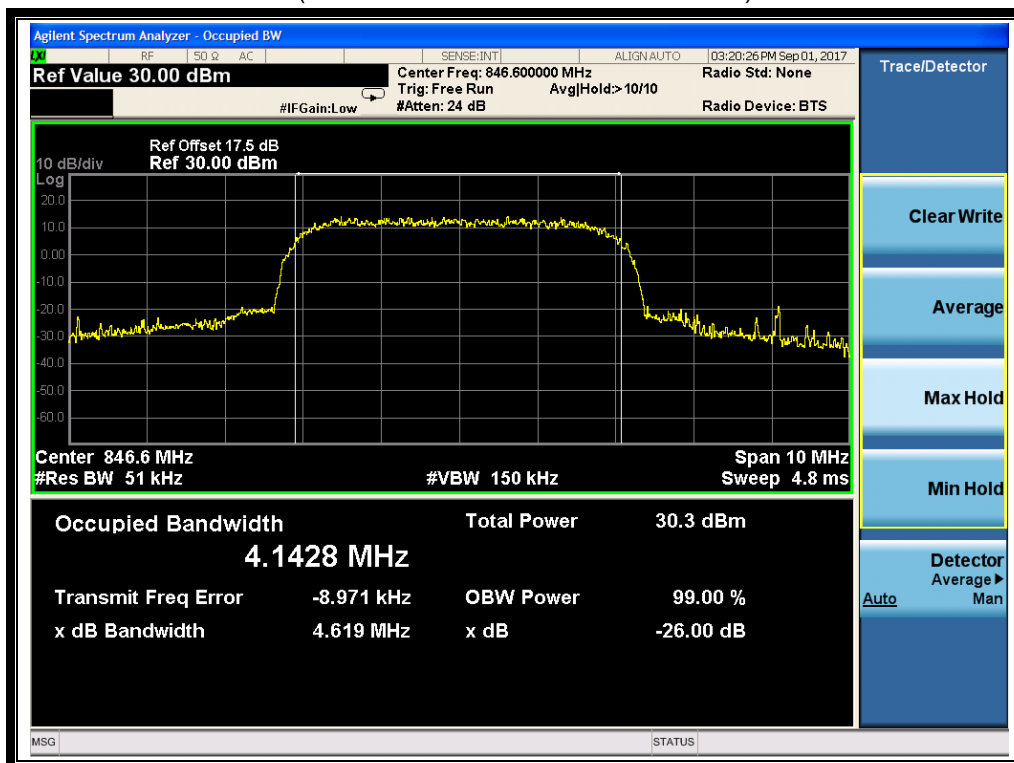
(HSDPA 1900MHz Channel = 9538)



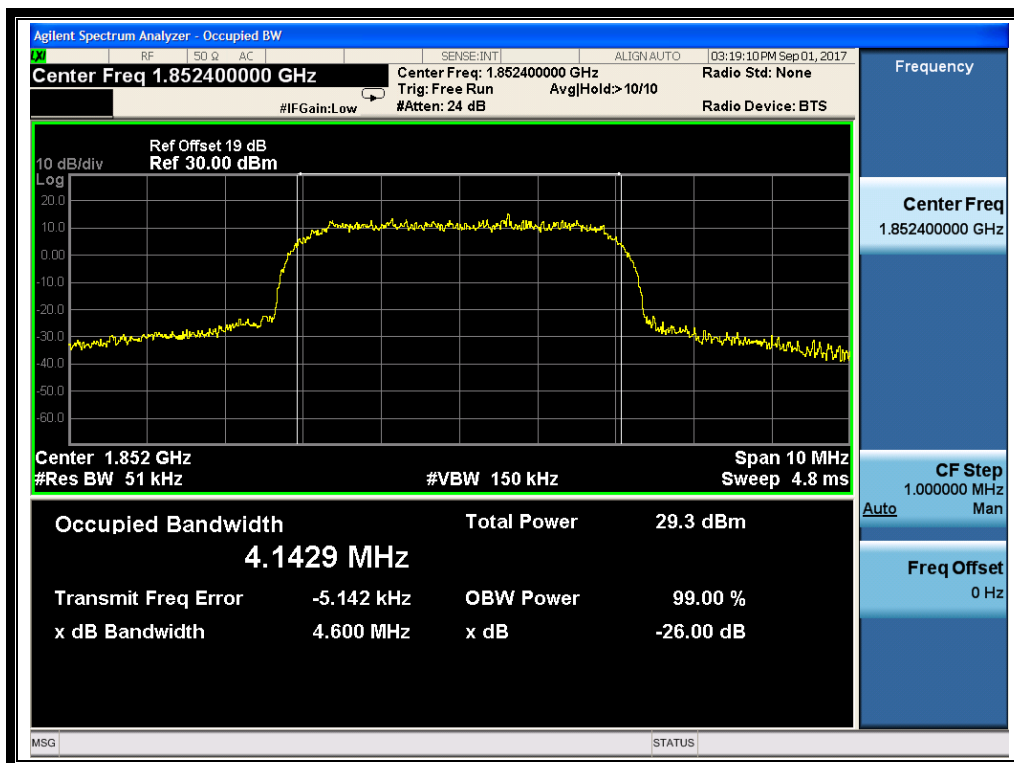
(HSUPA 850MHz Channel = 4132)



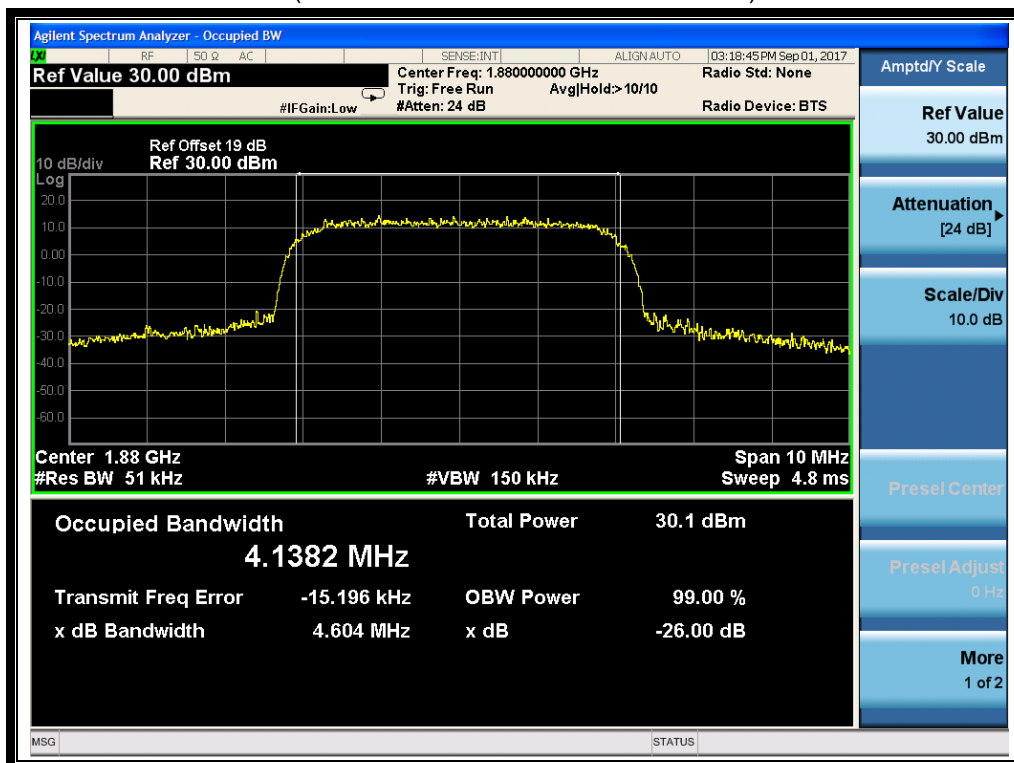
(HSUPA 850 MHz Channel = 4175)



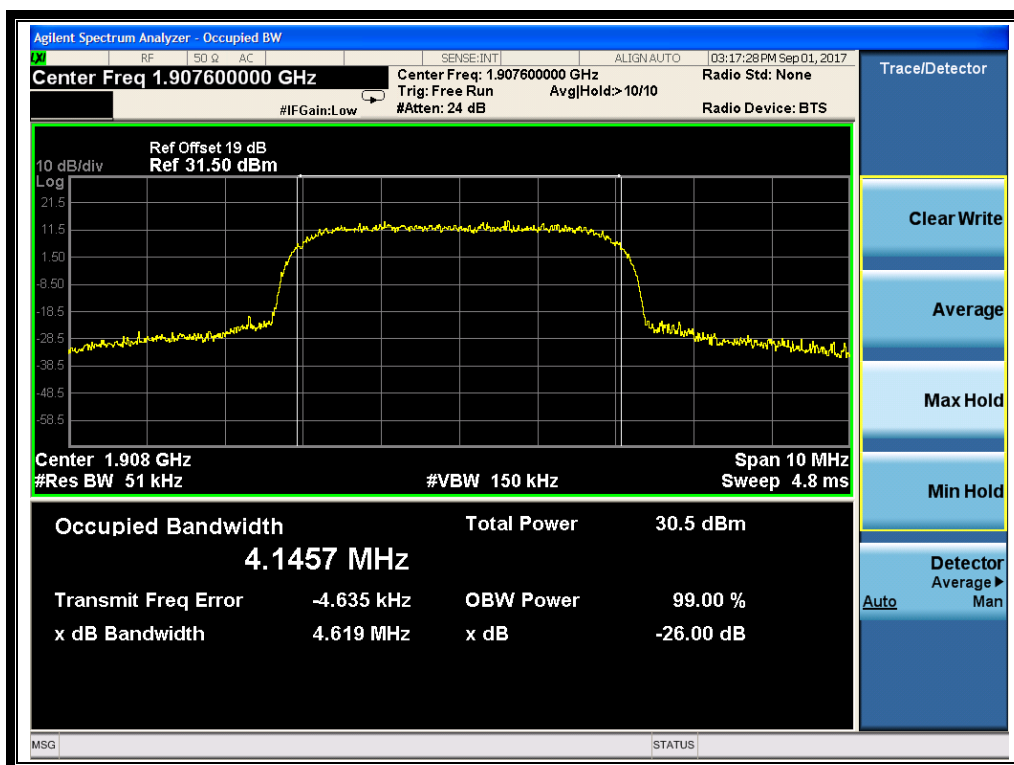
(HSUPA 850MHz Channel = 4233)



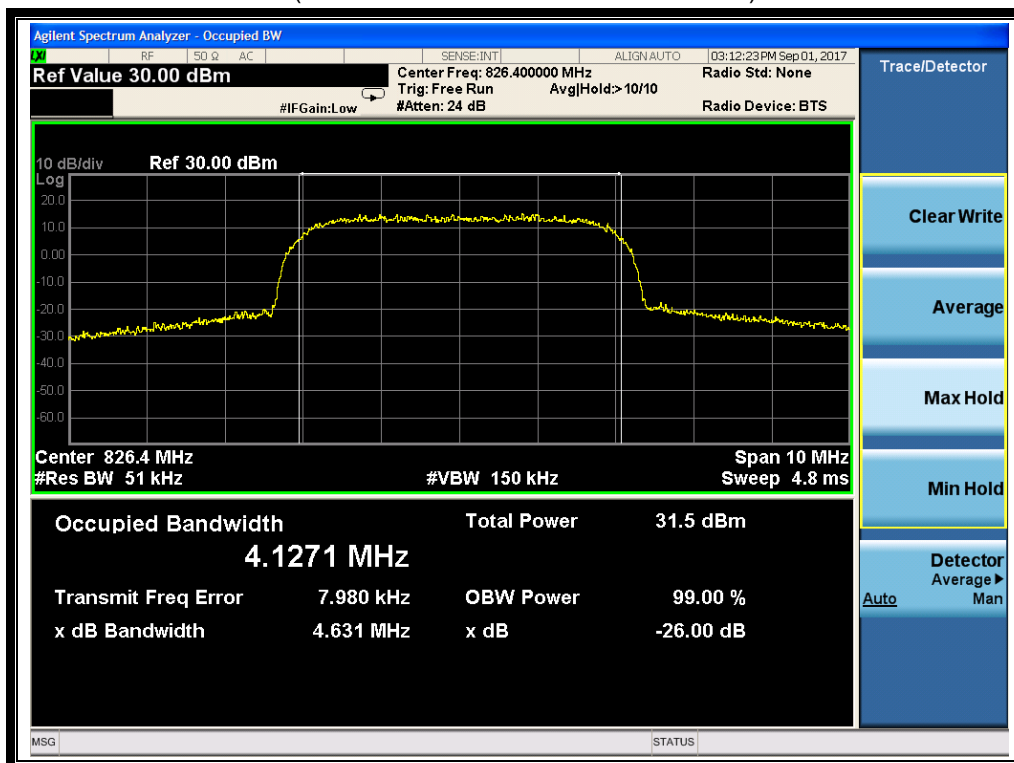
(HSUPA 1900MHz Channel = 9262)



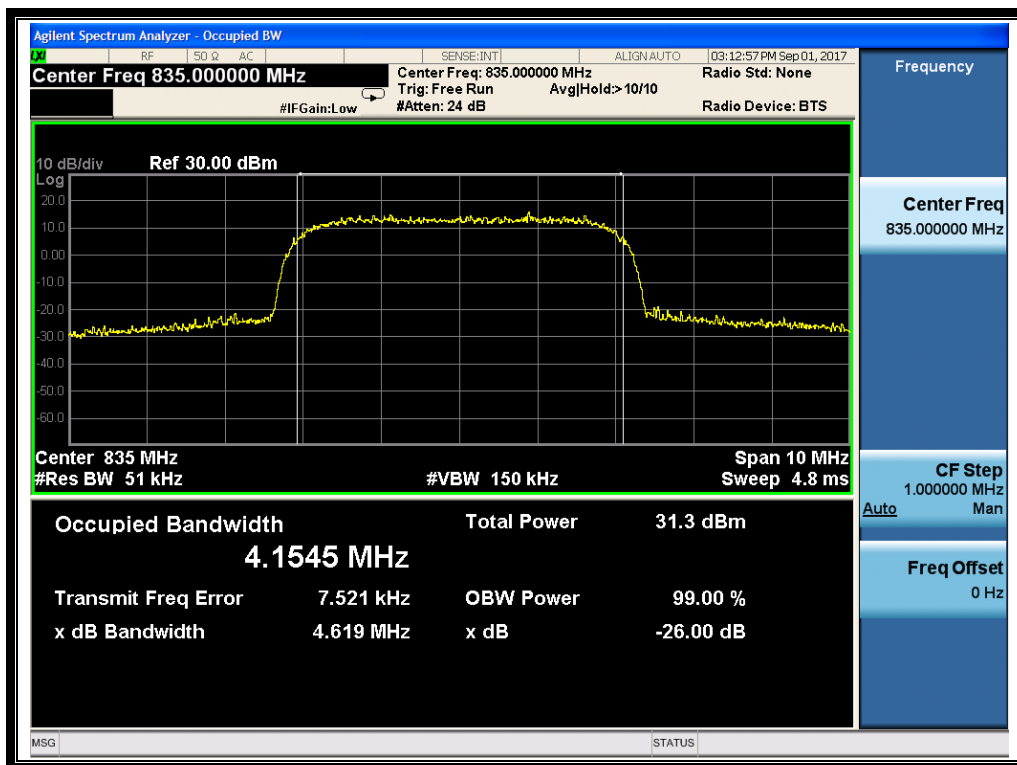
(HSUPA 1900 MHz Channel = 9400)



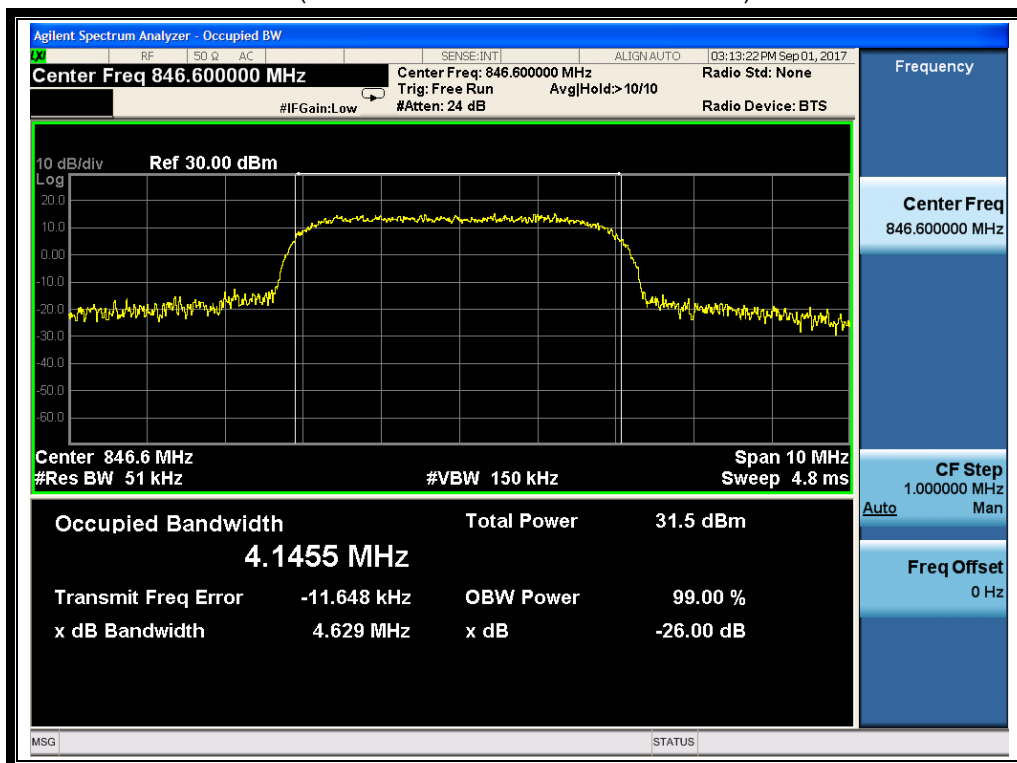
(HSUPA 1900MHz Channel = 9538)



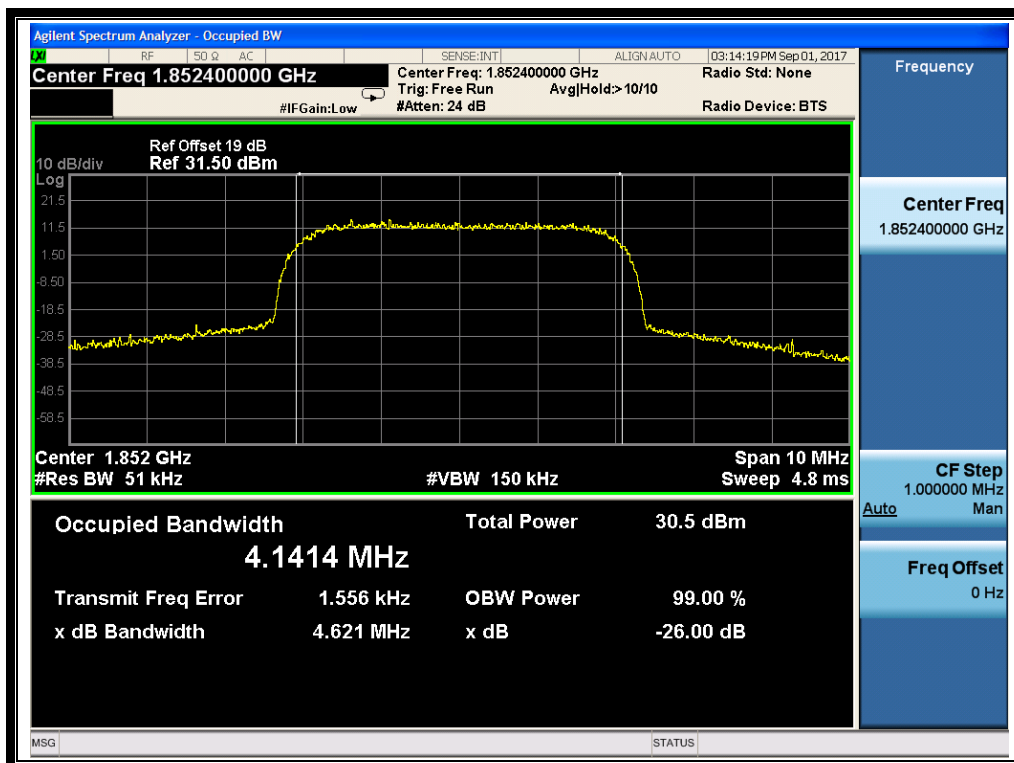
(HSPA+ 850MHz Channel = 4132)



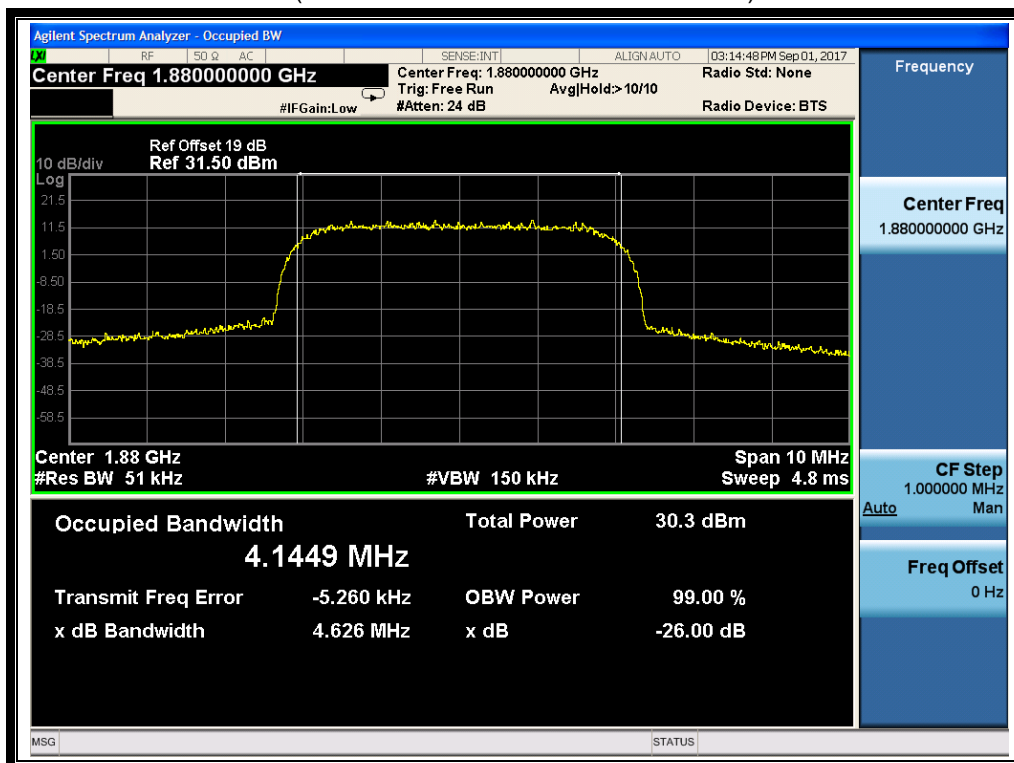
(HSPA+ 850 MHz Channel = 4175)



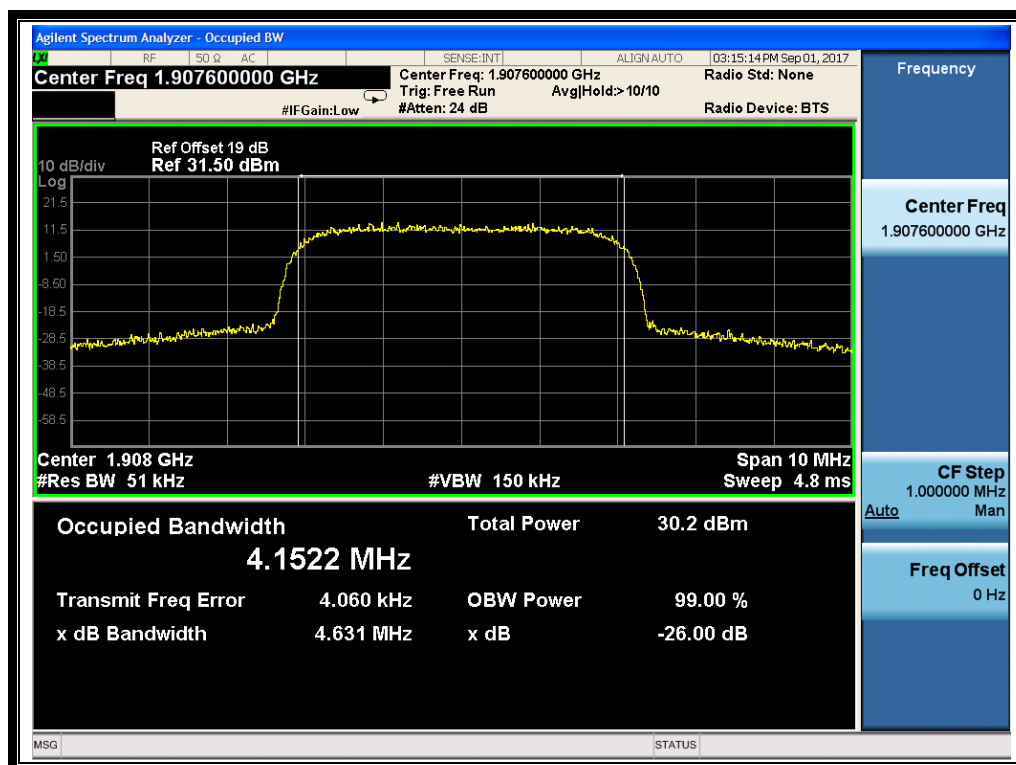
(HSPA+ 850MHz Channel = 4233)



(HSPA+ 1900MHz Channel = 9262)



(HSPA+ 1900 MHz Channel = 9400)



(HSPA+ 1900MHz Channel = 9538)

## 2.4 Frequency Stability

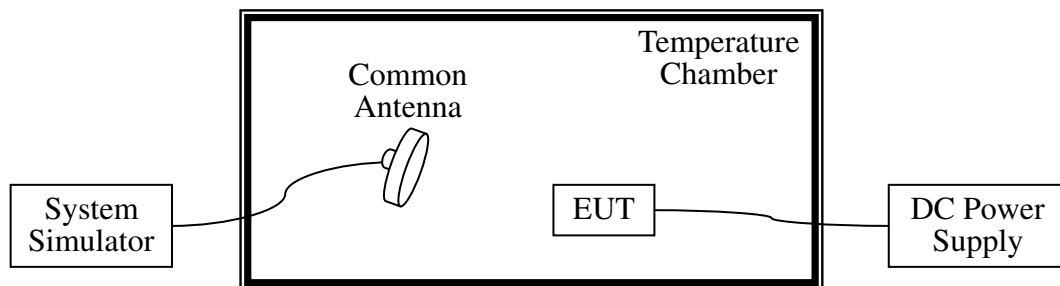
### 2.4.1 Requirement

According to FCC section 22.355 and FCC section 24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

- (a) The temperature is varied from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at intervals of not more than  $10^{\circ}\text{C}$ .
- (b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

### 2.4.2 Test Description

Test Setup:



The EUT, which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT is commanded by the System Simulator (SS) to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS via a Common Antenna.

### 2.4.3 Test Verdict

The nominal, highest and lowest extreme voltages are separately 48VDC, 57VDC and 44VDC, which are specified by the applicant; the normal temperature here used is 25°C. The frequency deviation limit of 850MHz band is  $\pm 2.5\text{ppm}$ , and 1900MHz is  $\pm 1\text{ppm}$ .

#### 1. GPRS 850MHz Band

| Test Conditions |                  | Frequency Deviation      |         |                          |         |                          |        | Verdict |
|-----------------|------------------|--------------------------|---------|--------------------------|---------|--------------------------|--------|---------|
| Power (VDC)     | Temperature (°C) | Channel = 128 (824.2MHz) |         | Channel = 190 (836.6MHz) |         | Channel = 251 (848.8MHz) |        |         |
|                 |                  | Hz                       | Limits  | Hz                       | Limits  | Hz                       | Limits |         |
| 48              | -20              | 8.38                     | ±2060.5 | 9.01                     | ±2091.5 | -8.66                    | ±2122  | PASS    |
|                 | -10              | -14.25                   |         | 7.89                     |         | 13.18                    |        |         |
|                 | 0                | -9.74                    |         | 7.97                     |         | -15.96                   |        |         |
|                 | +10              | 4.41                     |         | 12.09                    |         | 24.77                    |        |         |
|                 | +20              | -5.08                    |         | 5.11                     |         | 26.18                    |        |         |
|                 | +30              | 8.34                     |         | 11.43                    |         | -9.95                    |        |         |
|                 | +40              | 26.31                    |         | -0.89                    |         | 24.77                    |        |         |
|                 | +50              | -13.75                   |         | 1.24                     |         | 19.38                    |        |         |
|                 | +60              | -4.06                    |         | 11.31                    |         | -8.59                    |        |         |
| 44              | +25              | -14.25                   |         | 12.88                    |         | 13.18                    |        |         |
| 57              | +25              | -9.74                    |         | 15.11                    |         | -10.03                   |        |         |

#### 2. GPRS 1900MHz Band

| Test Conditions |                  | Frequency Deviation       |         |                           |         |                           |         | Verdict |
|-----------------|------------------|---------------------------|---------|---------------------------|---------|---------------------------|---------|---------|
| Power (VDC)     | Temperature (°C) | Channel = 512 (1850.2MHz) |         | Channel = 661 (1880.0MHz) |         | Channel = 810 (1909.8MHz) |         |         |
|                 |                  | Hz                        | Limits  | Hz                        | Limits  | Hz                        | Limits  |         |
| 48              | -20              | -16.07                    | ±1850.2 | 8.89                      | ±1880.0 | -11.8                     | ±1909.8 | PASS    |
|                 | -10              | 27.45                     |         | 18.68                     |         | 1.87                      |         |         |
|                 | 0                | -12.06                    |         | -17.66                    |         | 26.59                     |         |         |
|                 | +10              | -17.7                     |         | -16.29                    |         | 25                        |         |         |
|                 | +20              | -28.06                    |         | 32.88                     |         | -10.21                    |         |         |
|                 | +30              | 9.1                       |         | -10.64                    |         | 27.59                     |         |         |
|                 | +40              | -18.5                     |         | -16.25                    |         | 21.2                      |         |         |
|                 | +50              | 19.62                     |         | 12.08                     |         | -6.39                     |         |         |
|                 | +60              | 13.27                     |         | 19.22                     |         | 15.21                     |         |         |
| 44              | +25              | 31.48                     |         | -26.7                     |         | 1.87                      |         |         |
| 57              | +25              | -21.82                    |         | 8.69                      |         | 26.61                     |         |         |



### 3. EDGE 850MHz Band

| Test Conditions |                  | Frequency Deviation      |         |                          |         |                          |        | Verdict     |
|-----------------|------------------|--------------------------|---------|--------------------------|---------|--------------------------|--------|-------------|
| Power (VDC)     | Temperature (°C) | Channel = 128 (824.2MHz) |         | Channel = 190 (836.6MHz) |         | Channel = 251 (848.8MHz) |        |             |
|                 |                  | Hz                       | Limits  | Hz                       | Limits  | Hz                       | Limits |             |
| 48              | -20              | 10.68                    | ±2060.5 | -22.18                   | ±2091.5 | -2.58                    | ±2122  | <u>PASS</u> |
|                 | -10              | 26.45                    |         | 23.99                    |         | 19.46                    |        |             |
|                 | 0                | 27.34                    |         | 40.01                    |         | 13.46                    |        |             |
|                 | +10              | -12.71                   |         | -21.42                   |         | 0.32                     |        |             |
|                 | +20              | 21.48                    |         | 6.88                     |         | -13.51                   |        |             |
|                 | +30              | 6.37                     |         | 2.6                      |         | 29.63                    |        |             |
|                 | +40              | -10.9                    |         | 24.9                     |         | 12.46                    |        |             |
|                 | +50              | -17.41                   |         | 15.19                    |         | -13.51                   |        |             |
|                 | +60              | 32.14                    |         | 18.16                    |         | -1.58                    |        |             |
| 44              | +25              | -1.71                    |         | 22.76                    |         | 14.61                    |        |             |
| 57              | +25              | 8.46                     |         | 14.9                     |         | -38                      |        |             |

### 4. EDGE 1900MHz Band

| Test Conditions |                  | Frequency Deviation       |         |                           |         |                           |         | Verdict     |
|-----------------|------------------|---------------------------|---------|---------------------------|---------|---------------------------|---------|-------------|
| Power (VDC)     | Temperature (°C) | Channel = 512 (1850.2MHz) |         | Channel = 661 (1880.0MHz) |         | Channel = 810 (1909.8MHz) |         |             |
|                 |                  | Hz                        | Limits  | Hz                        | Limits  | Hz                        | Limits  |             |
| 48              | -20              | -13.42                    | ±1850.2 | 14.38                     | ±1880.0 | 3.36                      | ±1909.8 | <u>PASS</u> |
|                 | -10              | -10.91                    |         | -15.4                     |         | -25.65                    |         |             |
|                 | 0                | 12.63                     |         | 40.25                     |         | -4.13                     |         |             |
|                 | +10              | 4.63                      |         | -19.91                    |         | -21.55                    |         |             |
|                 | +20              | 34.56                     |         | -13.96                    |         | -24.48                    |         |             |
|                 | +30              | -27.48                    |         | 19.91                     |         | 11.71                     |         |             |
|                 | +40              | 18.84                     |         | 17.79                     |         | -3.55                     |         |             |
|                 | +50              | -17.37                    |         | 19.48                     |         | 34                        |         |             |
|                 | +60              | 26.09                     |         | -15.4                     |         | 0.8                       |         |             |
| 44              | +25              | -11.46                    |         | -14.56                    |         | 14.08                     |         |             |
| 57              | +25              | 7.08                      |         | -13.55                    |         | 32.36                     |         |             |



## 5. HSDPA 850MHz Band

| Test Conditions |                  | Frequency Deviation       |       |                         |         |                           |         | Verdict |
|-----------------|------------------|---------------------------|-------|-------------------------|---------|---------------------------|---------|---------|
| Power (VDC)     | Temperature (°C) | Channel = 4123 (826.4MHz) |       | Channel = 4175 (835MHz) |         | Channel = 4233 (846.6MHz) |         |         |
|                 |                  | Hz                        | Limit | Hz                      | Limit   | Hz                        | Limit   |         |
| 48              | -20              | 4.52                      | ±2066 | 7.56                    | ±2087.5 | 12.8                      | ±2116.5 | PASS    |
|                 | -10              | -4.52                     |       | 16.6                    |         | -8.72                     |         |         |
|                 | 0                | 19.43                     |       | 8.06                    |         | 6.54                      |         |         |
|                 | +10              | -32.34                    |       | -0.24                   |         | 9.43                      |         |         |
|                 | +20              | 4.52                      |       | -9.28                   |         | 7.58                      |         |         |
|                 | +30              | -4.52                     |       | 14.67                   |         | 4.97                      |         |         |
|                 | +40              | 20.42                     |       | -37.1                   |         | -22.3                     |         |         |
|                 | +50              | -29.84                    |       | 23.61                   |         | -7.89                     |         |         |
|                 | +60              | 23.57                     |       | 20.24                   |         | -18.78                    |         |         |
| 44              | +25              | 4.52                      |       | -40.56                  |         | -13.32                    |         |         |
| 57              | +25              | -14.87                    |       | 18.03                   |         | 10.28                     |         |         |

## 6. HSDPA 1900MHz Band

| Test Conditions |                  | Frequency Deviation        |         |                            |        |                            |         | Verdict |
|-----------------|------------------|----------------------------|---------|----------------------------|--------|----------------------------|---------|---------|
| Power (VDC)     | Temperature (°C) | Channel = 9262 (1852.4MHz) |         | Channel = 9400 (1880.0MHz) |        | Channel = 9538 (1907.6MHz) |         |         |
|                 |                  | Hz                         | Limits  | Hz                         | Limits | Hz                         | Limits  |         |
| 48              | -20              | 15.13                      | ±1852.4 | 20.88                      | ±1880  | 19.21                      | ±1907.6 | PASS    |
|                 | -10              | 18.94                      |         | -21.64                     |        | -13                        |         |         |
|                 | 0                | 27.67                      |         | -17.05                     |        | 2.27                       |         |         |
|                 | +10              | -20.6                      |         | -17.53                     |        | 4.72                       |         |         |
|                 | +20              | -17.89                     |         | -4.82                      |        | -11.6                      |         |         |
|                 | +30              | 17.97                      |         | -16.29                     |        | -7.08                      |         |         |
|                 | +40              | -9.32                      |         | 25.13                      |        | 4.27                       |         |         |
|                 | +50              | 10.4                       |         | -16.23                     |        | 4.72                       |         |         |
|                 | +60              | 25.07                      |         | -4.88                      |        | 28.47                      |         |         |
| 44              | +25              | 25.73                      |         | 4.27                       |        | 0.14                       |         |         |
| 57              | +25              | -11.13                     |         | 8.1                        |        | 20.96                      |         |         |



## 7. HSUPA 850MHz Band

| Test Conditions |                  | Frequency Deviation       |       |                         |         |                           |         | Verdict |
|-----------------|------------------|---------------------------|-------|-------------------------|---------|---------------------------|---------|---------|
| Power (VDC)     | Temperature (°C) | Channel = 4123 (826.4MHz) |       | Channel = 4175 (835MHz) |         | Channel = 4233 (846.6MHz) |         |         |
|                 |                  | Hz                        | Limit | Hz                      | Limit   | Hz                        | Limit   |         |
| 48              | -20              | 5.7                       | ±2066 | 30.64                   | ±2087.5 | -6.42                     | ±2116.5 | PASS    |
|                 | -10              | 1.02                      |       | 26.2                    |         | 6.03                      |         |         |
|                 | 0                | -6.74                     |       | 5.69                    |         | 6.38                      |         |         |
|                 | +10              | 14.39                     |       | 0.38                    |         | 20.19                     |         |         |
|                 | +20              | -3.75                     |       | -6.66                   |         | -8.88                     |         |         |
|                 | +30              | 21.53                     |       | 14.29                   |         | -5.42                     |         |         |
|                 | +40              | -2.37                     |       | -3.48                   |         | 5.93                      |         |         |
|                 | +50              | -13.84                    |       | 21.23                   |         | 7.52                      |         |         |
|                 | +60              | -7.9                      |       | 11.86                   |         | -1.57                     |         |         |
| 44              | +25              | 23.49                     |       | -9.01                   |         | 13.18                     |         |         |
| 57              | +25              | -18.77                    |       | 19.65                   |         | 3.54                      |         |         |

## 8. HSUPA 1900MHz Band

| Test Conditions |                  | Frequency Deviation        |         |                            |        |                            |         | Verdict |
|-----------------|------------------|----------------------------|---------|----------------------------|--------|----------------------------|---------|---------|
| Power (VDC)     | Temperature (°C) | Channel = 9262 (1852.4MHz) |         | Channel = 9400 (1880.0MHz) |        | Channel = 9538 (1907.6MHz) |         |         |
|                 |                  | Hz                         | Limits  | Hz                         | Limits | Hz                         | Limits  |         |
| 48              | -20              | 10.82                      | ±1852.4 | 9.32                       | ±1880  | 26.79                      | ±1907.6 | PASS    |
|                 | -10              | -21.31                     |         | 23.19                      |        | 22.35                      |         |         |
|                 | 0                | -15.77                     |         | 31.78                      |        | 1.84                       |         |         |
|                 | +10              | -4.42                      |         | -12.55                     |        | -3.47                      |         |         |
|                 | +20              | -3.97                      |         | -10.14                     |        | -10.51                     |         |         |
|                 | +30              | -10.62                     |         | 16.12                      |        | 10.44                      |         |         |
|                 | +40              | 20.27                      |         | -11.17                     |        | -7.33                      |         |         |
|                 | +50              | 5.65                       |         | 8.55                       |        | 17.38                      |         |         |
|                 | +60              | 19.78                      |         | 23.22                      |        | 8.01                       |         |         |
| 44              | +25              | -8.55                      |         | 23.88                      |        | -12.86                     |         |         |
| 57              | +25              | 1.07                       |         | -11.48                     |        | 26.79                      |         |         |



9. HSPA+ 850MHz Band

| Test Conditions |                  | Frequency Deviation       |       |                         |         |                           |         | Verdict |
|-----------------|------------------|---------------------------|-------|-------------------------|---------|---------------------------|---------|---------|
| Power (VDC)     | Temperature (°C) | Channel = 4123 (826.4MHz) |       | Channel = 4175 (835MHz) |         | Channel = 4233 (846.6MHz) |         |         |
|                 |                  | Hz                        | Limit | Hz                      | Limit   | Hz                        | Limit   |         |
| 48              | -20              | -7.28                     | ±2066 | 8.07                    | ±2087.5 | -0.12                     | ±2116.5 | PASS    |
|                 | -10              | 18.44                     |       | -19.35                  |         | -12.31                    |         |         |
|                 | 0                | 11.1                      |       | 17.32                   |         | -16.75                    |         |         |
|                 | +10              | -14.48                    |       | -5.81                   |         | -12.24                    |         |         |
|                 | +20              | 7.33                      |       | 18.91                   |         | 1.91                      |         |         |
|                 | +30              | -8.08                     |       | 17.32                   |         | -7.58                     |         |         |
|                 | +40              | 31.04                     |       | -17.81                  |         | 5.84                      |         |         |
|                 | +50              | 5.09                      |       | 19.91                   |         | 23.81                     |         |         |
|                 | +60              | -29.15                    |       | 13.52                   |         | -16.25                    |         |         |
| 44              | +25              | 26.26                     |       | -13.08                  |         | -6.56                     |         |         |
| 57              | +25              | -5.64                     |       | 7.83                    |         | 12.69                     |         |         |

10. HSPA+ 1900MHz Band

| Test Conditions |                  | Frequency Deviation        |         |                            |        |                            |         | Verdict |
|-----------------|------------------|----------------------------|---------|----------------------------|--------|----------------------------|---------|---------|
| Power (VDC)     | Temperature (°C) | Channel = 9262 (1852.4MHz) |         | Channel = 9400 (1880.0MHz) |        | Channel = 9538 (1907.6MHz) |         |         |
|                 |                  | Hz                         | Limits  | Hz                         | Limits | Hz                         | Limits  |         |
| 48              | -20              | 22.31                      | ±1852.4 | 11.46                      | ±1880  | -14.46                     | ±1907.6 | PASS    |
|                 | -10              | -13.71                     |         | 12.06                      |        | -4.05                      |         |         |
|                 | 0                | 16.5                       |         | 18.22                      |        | 46.14                      |         |         |
|                 | +10              | 8.73                       |         | -27.72                     |        | 2.6                        |         |         |
|                 | +20              | -18.9                      |         | -17.31                     |        | -3.04                      |         |         |
|                 | +30              | 4.63                       |         | 31.88                      |        | -13.46                     |         |         |
|                 | +40              | -5.64                      |         | -11.66                     |        | 23.79                      |         |         |
|                 | +50              | 12.99                      |         | -17.3                      |        | -3.84                      |         |         |
|                 | +60              | -27.76                     |         | 23.02                      |        | 34.28                      |         |         |
| 44              | +25              | 25.88                      |         | 4.57                       |        | 18.84                      |         |         |
| 57              | +25              | 14.36                      |         | -0.57                      |        | -21.3                      |         |         |



## 2.5 Conducted Out of Band Emissions

### 2.5.1 Requirement

According to FCC section 22.917(a) and FCC section 24.238(a) the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43+10*\log(P)$ dB. This calculated to be -13dBm.

### 2.5.2 Test Description

See section 2.1.2 of this report.

### 2.5.3 Test Result

The measurement frequency range is from 30MHz to the 10<sup>th</sup> harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

#### 1. Test Verdict:

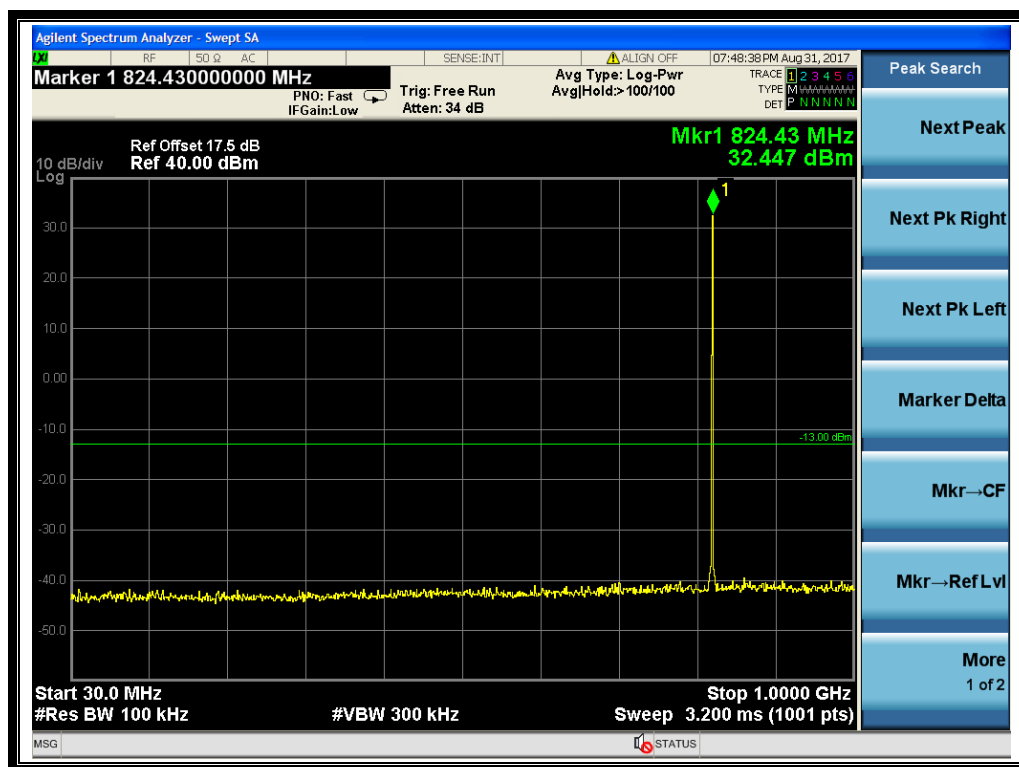
| Band          | Channel | Frequency (MHz) | Measured Max. Spurious Emission (dBm) | Refer to Plot   | Limit (dBm) | Verdict |
|---------------|---------|-----------------|---------------------------------------|-----------------|-------------|---------|
| GPRS 850MHz   | 128     | 824.2           | -21.62                                | Plot A1 to A1.1 | -13         | PASS    |
|               | 190     | 836.6           | -22.12                                | Plot A2 to A2.1 |             | PASS    |
|               | 251     | 848.8           | -22.17                                | Plot A3 to A3.1 |             | PASS    |
| GPRS 1900MHz  | 512     | 1850.2          | -22.34                                | Plot B1 to B1.1 | -13         | PASS    |
|               | 661     | 1880.0          | -22.36                                | Plot B2 to B2.1 |             | PASS    |
|               | 810     | 1909.8          | -22.14                                | Plot B3 to B3.1 |             | PASS    |
| EGPRS 850MHz  | 128     | 824.2           | -32.02                                | Plot E1 to E1.1 | -13         | PASS    |
|               | 190     | 836.6           | -31.02                                | Plot E2 to E2.1 |             | PASS    |
|               | 251     | 848.8           | -31.34                                | Plot E3 to E3.1 |             | PASS    |
| EGPRS 1900MHz | 512     | 1850.2          | -19.47                                | Plot F1 to F1.1 | -13         | PASS    |
|               | 661     | 1880.0          | -18.44                                | Plot F2 to F2.1 |             | PASS    |
|               | 810     | 1909.8          | -18.50                                | Plot F3 to F3.1 |             | PASS    |
| HSDPA 850MHz  | 4132    | 826.4           | < -25                                 | Plot I1 to I1.1 | -13         | PASS    |
|               | 4175    | 835.0           | < -25                                 | Plot I2 to I2.1 |             | PASS    |
|               | 4233    | 846.6           | < -25                                 | Plot I3 to I3.1 |             | PASS    |
| HSDPA 1900MHz | 9262    | 1852.4          | < -25                                 | Plot J1 to J1.1 | -13         | PASS    |
|               | 9400    | 1880.0          | < -25                                 | Plot J2 to J2.1 |             | PASS    |
|               | 9538    | 1907.6          | < -25                                 | Plot J3 to J3.1 |             | PASS    |
| HSUPA 850MHz  | 4132    | 826.4           | < -25                                 | Plot K1 to K1.1 | -13         | PASS    |
|               | 4175    | 835.0           | < -25                                 | Plot K2 to K2.1 |             | PASS    |
|               | 4233    | 846.6           | < -25                                 | Plot K3 to K3.1 |             | PASS    |



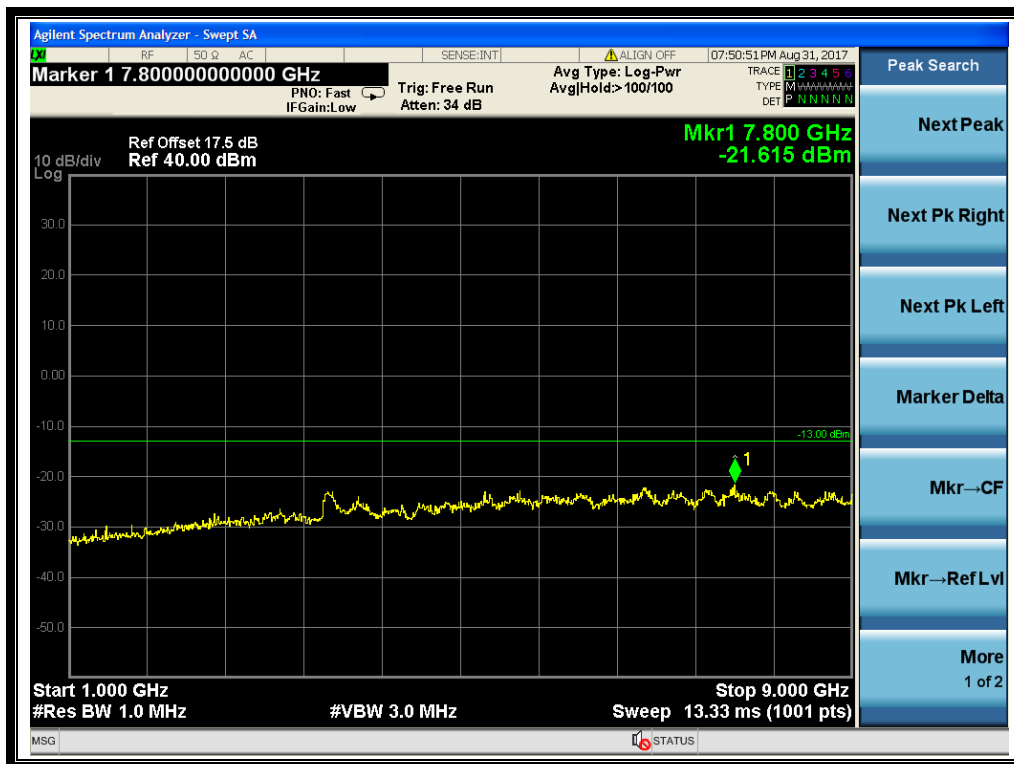
| Band             | Channel | Frequency (MHz) | Measured Max. Spurious Emission (dBm) | Refer to Plot   | Limit (dBm) | Verdict |
|------------------|---------|-----------------|---------------------------------------|-----------------|-------------|---------|
| HSUPA<br>1900MHz | 9262    | 1852.4          | < -25                                 | Plot L1 to L1.1 | -13         | PASS    |
|                  | 9400    | 1880.0          | < -25                                 | Plot L2 to L2.1 |             | PASS    |
|                  | 9538    | 1907.6          | < -25                                 | Plot L3 to L3.1 |             | PASS    |
| HSPA+<br>850MHz  | 4132    | 826.4           | < -25                                 | Plot M1 to M1.1 | -13         | PASS    |
|                  | 4175    | 835.0           | < -25                                 | Plot M2 to M2.1 |             | PASS    |
|                  | 4233    | 846.6           | < -25                                 | Plot M3 to M3.1 |             | PASS    |
| HSPA+<br>1900MHz | 9262    | 1852.4          | < -25                                 | Plot N1 to N1.1 | -13         | PASS    |
|                  | 9400    | 1880.0          | < -25                                 | Plot N2 to N2.1 |             | PASS    |
|                  | 9538    | 1907.6          | < -25                                 | Plot N3 to N3.1 |             | PASS    |

Test Plots for the Whole Measurement Frequency Range:

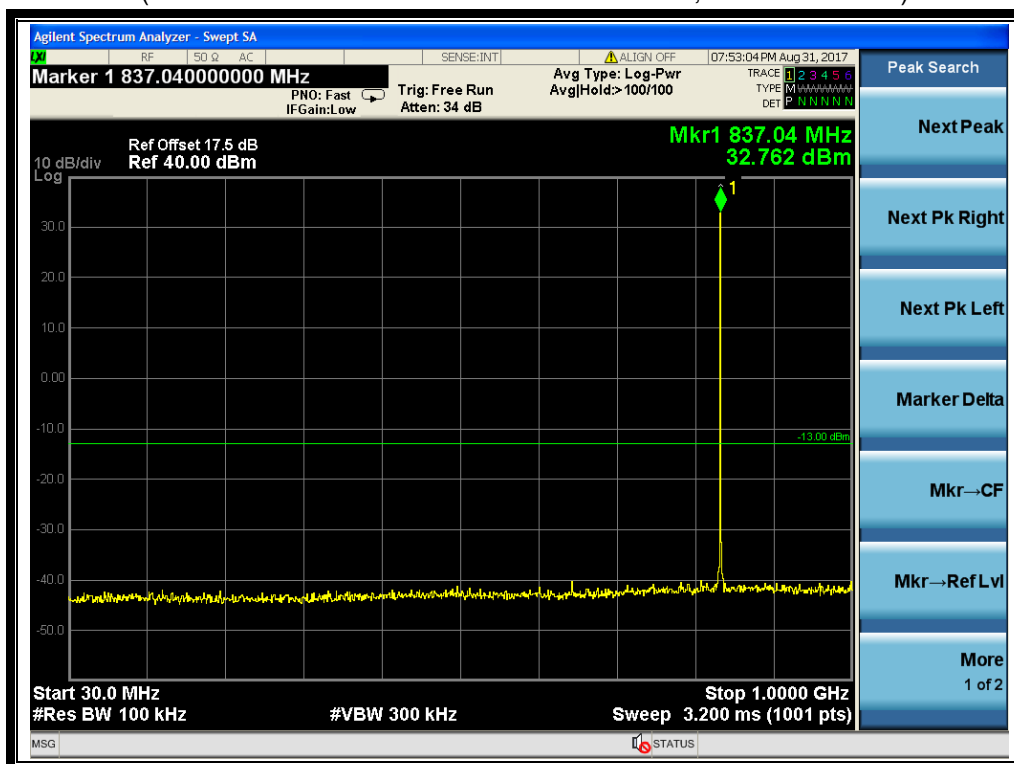
Note: the power of the EUT transmitting frequency should be ignored.



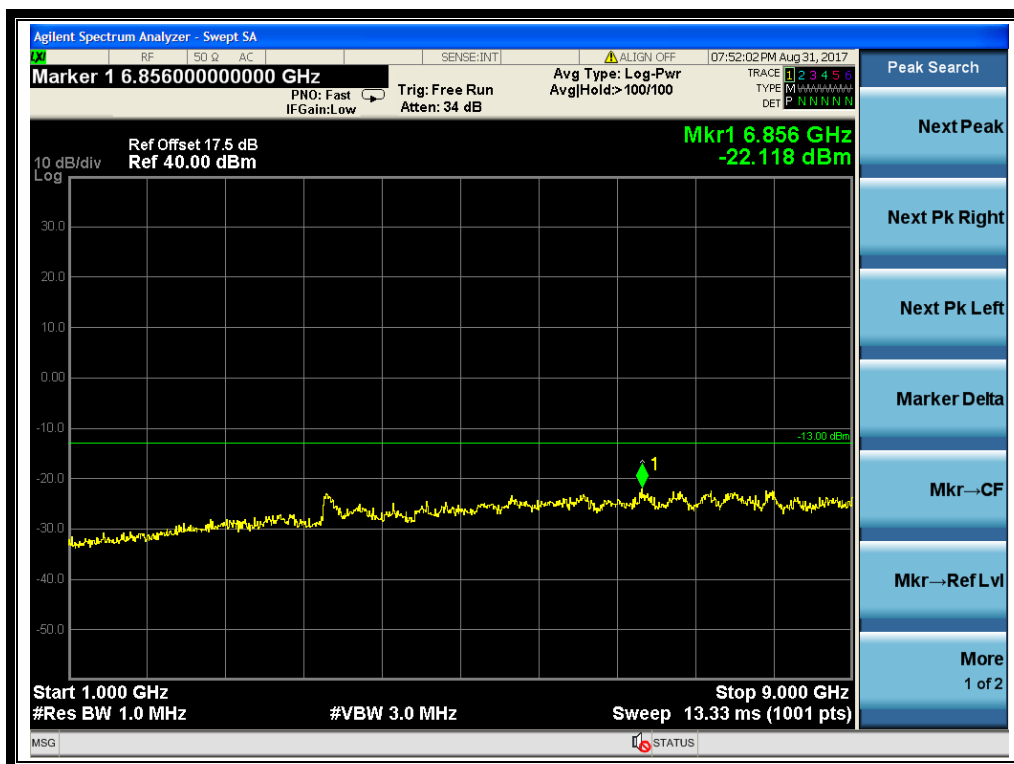
(Plot A1: GPRS 850MHz Channel = 128, 30MHz to 1GHz)



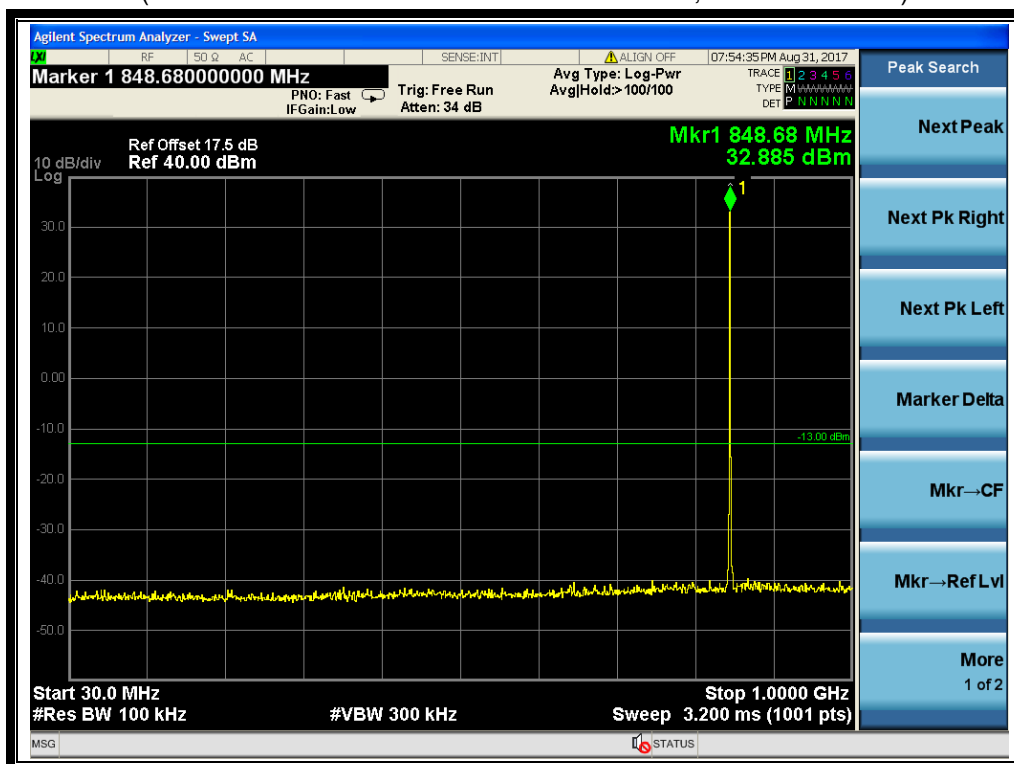
(Plot A1.1: GPRS 850MHz Channel = 128, 1GHz to 9GHz)



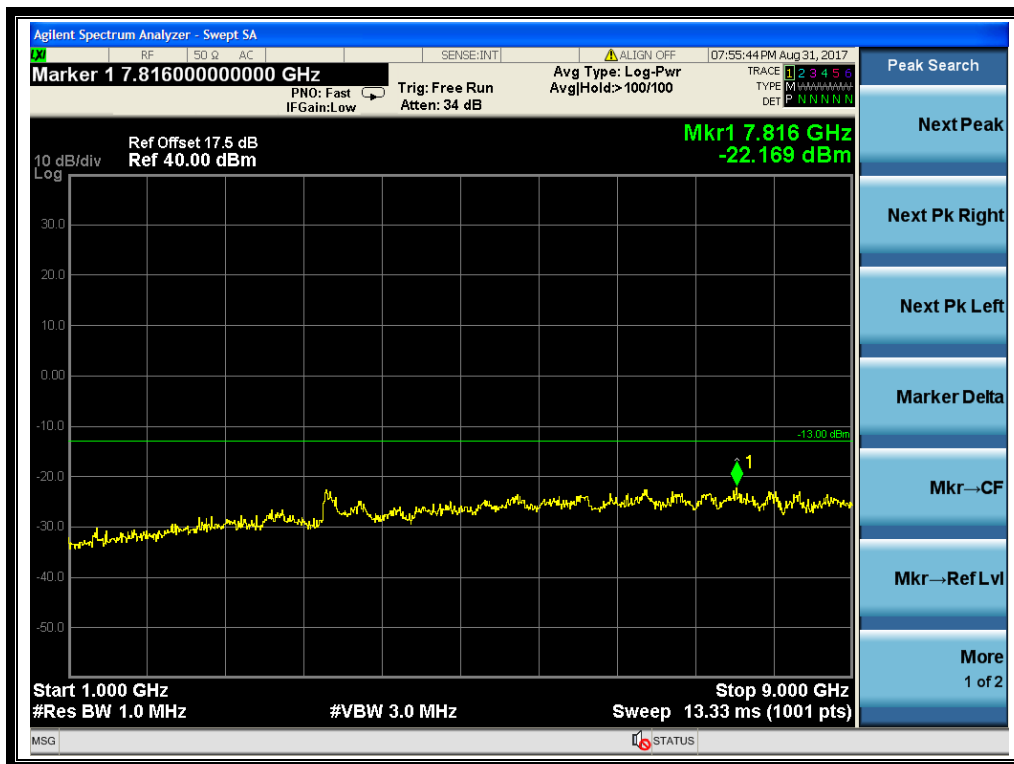
(Plot A2: GPRS 850MHz Channel = 190, 30MHz to 1GHz)



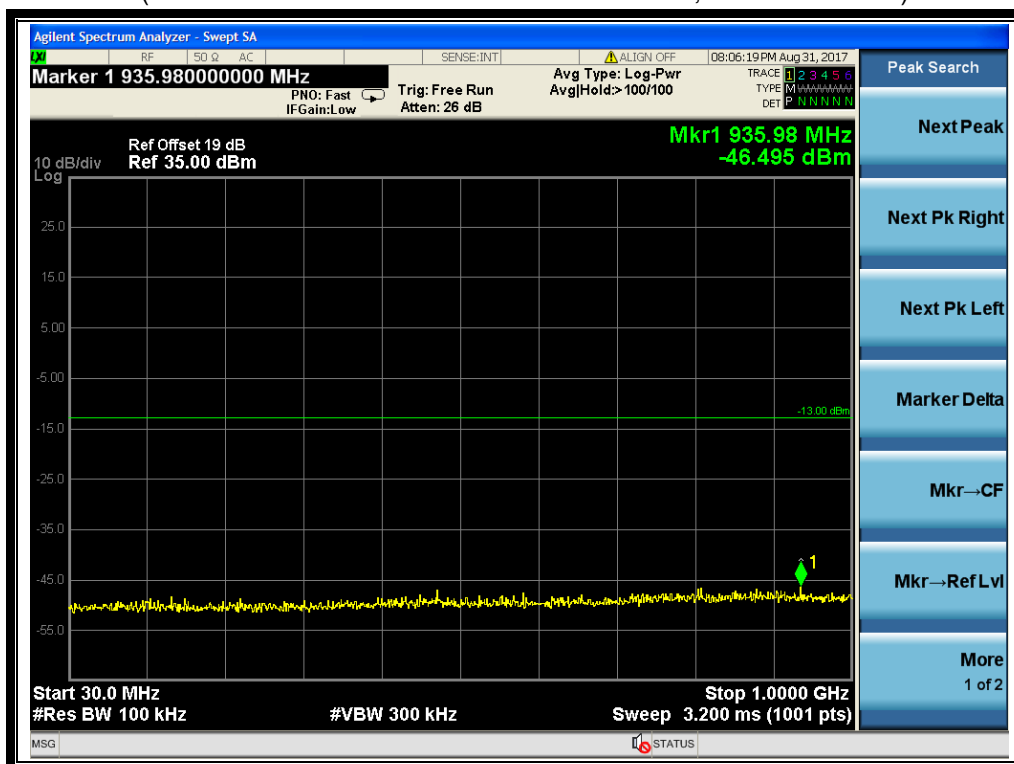
(Plot A2.1: GPRS 850MHz Channel = 190, 1GHz to 9GHz)



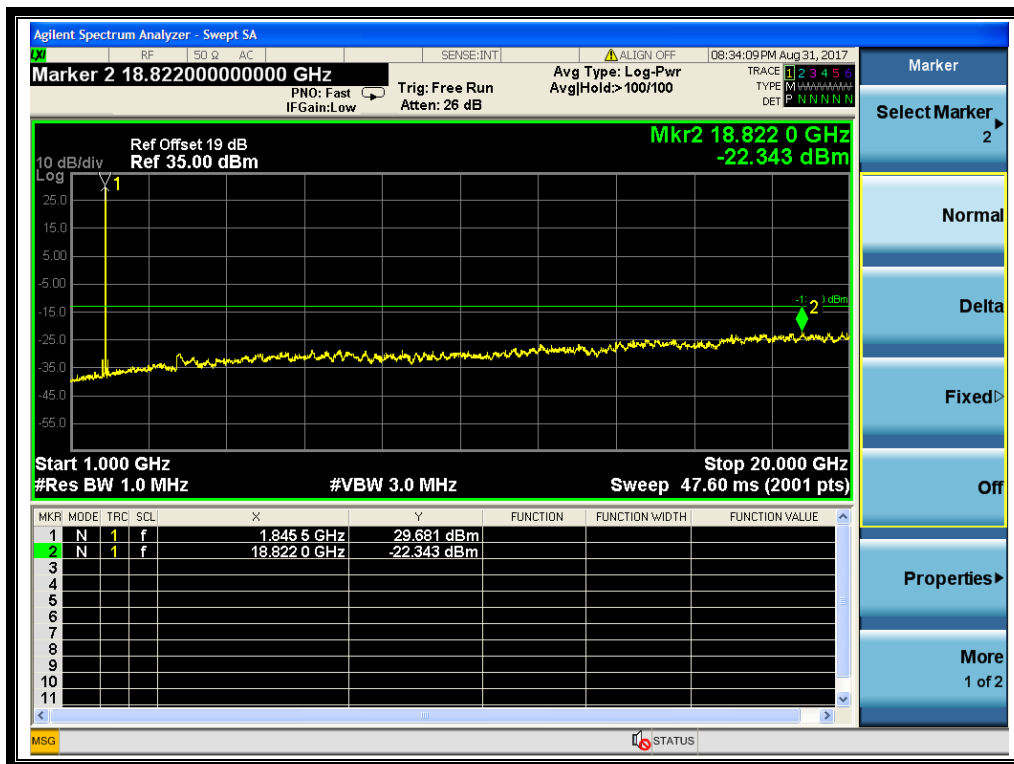
(Plot A3: GPRS 850MHz Channel = 251, 30MHz to 1GHz)



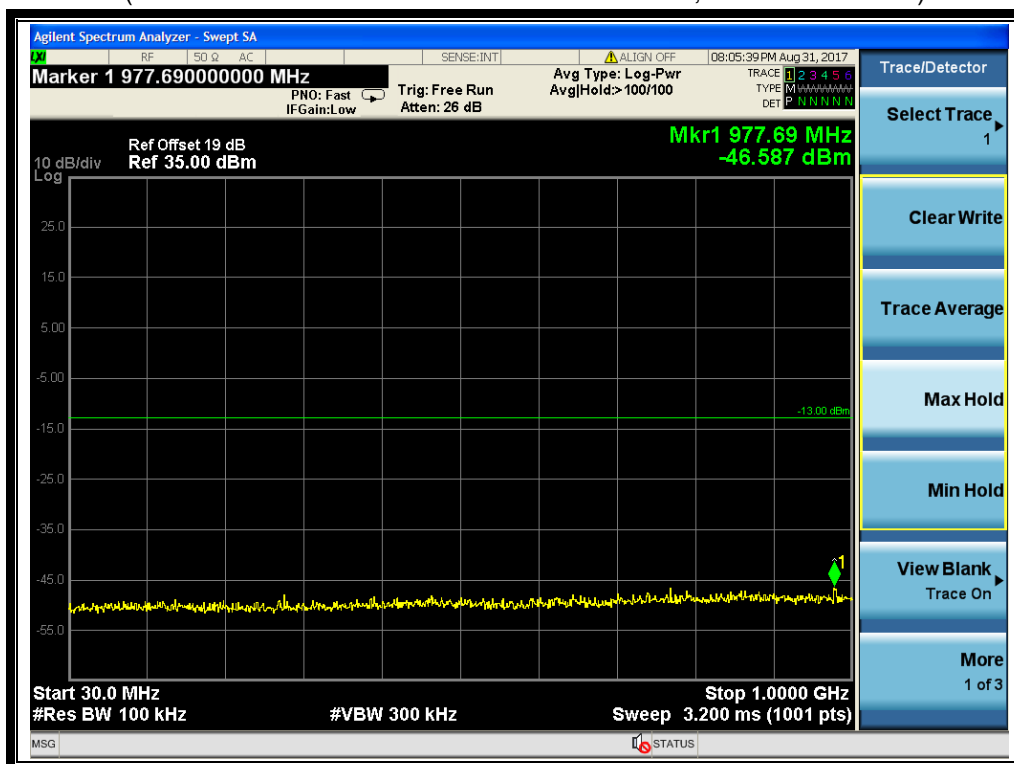
(Plot A3.1: GPRS 850MHz Channel = 251, 1GHz to 9GHz)



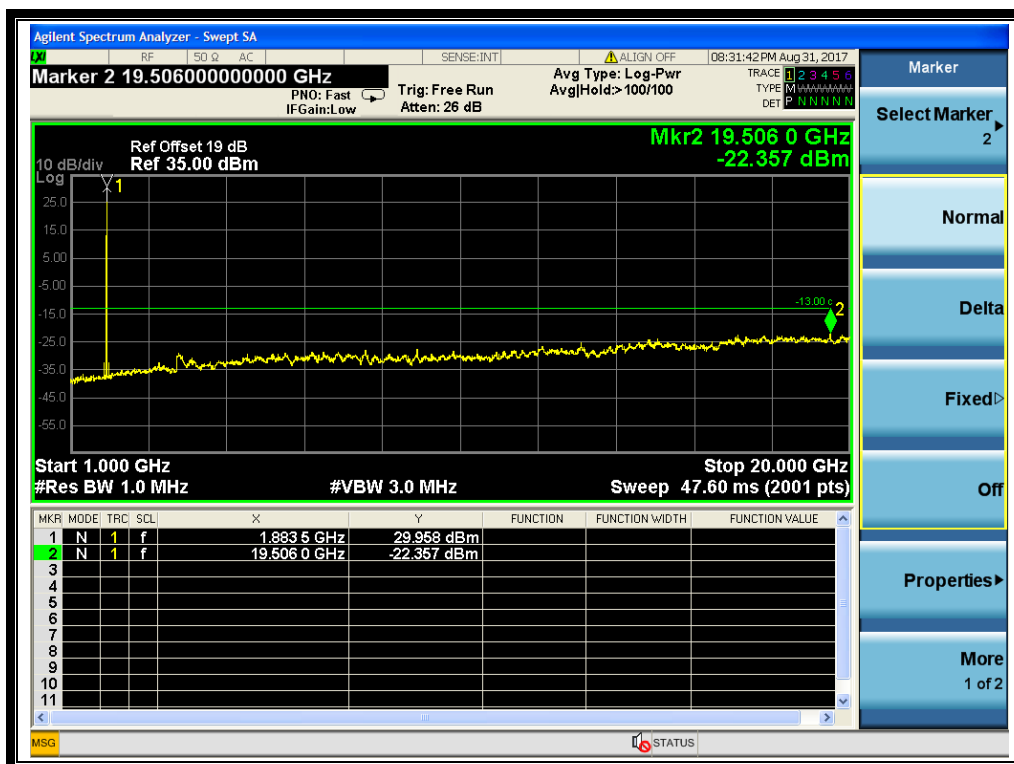
(Plot B1: GPRS 1900MHz Channel = 512, 30MHz to 1GHz)



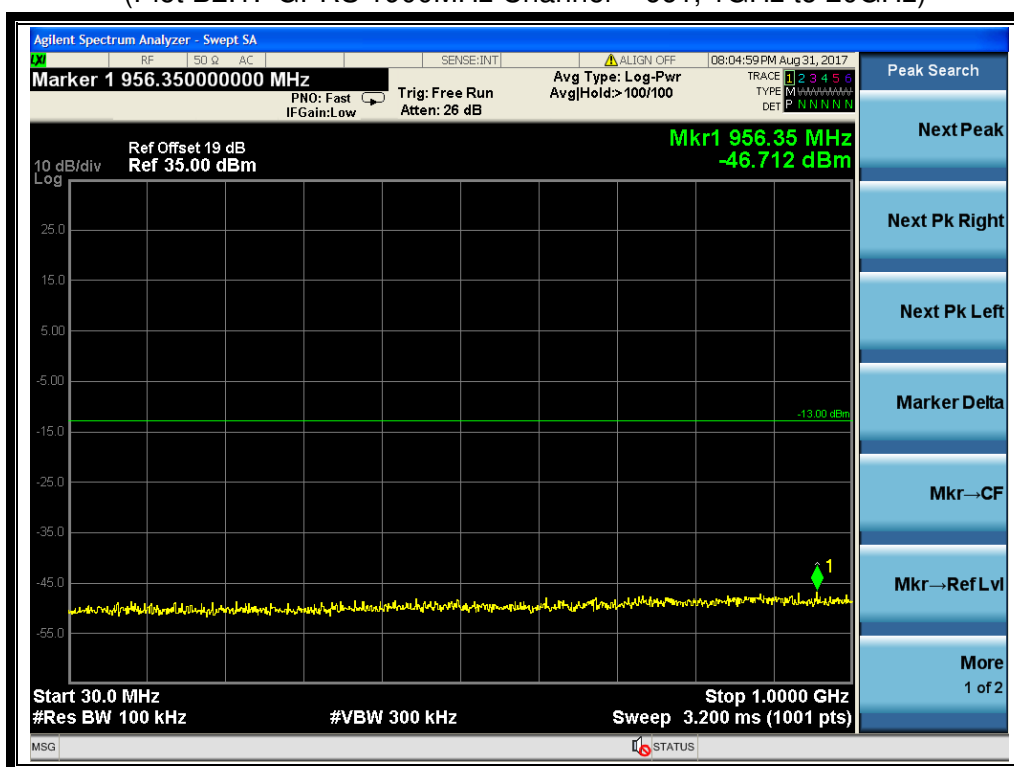
(Plot B1.1: GPRS 1900MHz Channel = 512, 1GHz to 20GHz)



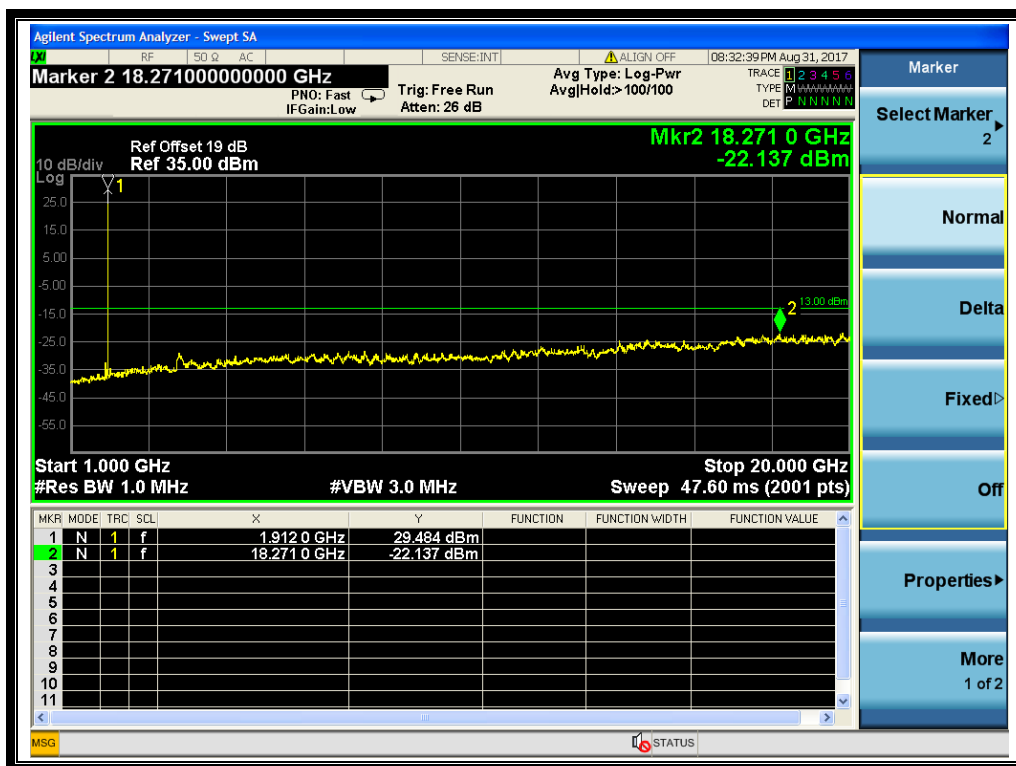
(Plot B2: GPRS 1900MHz Channel = 661, 30MHz to 1GHz)



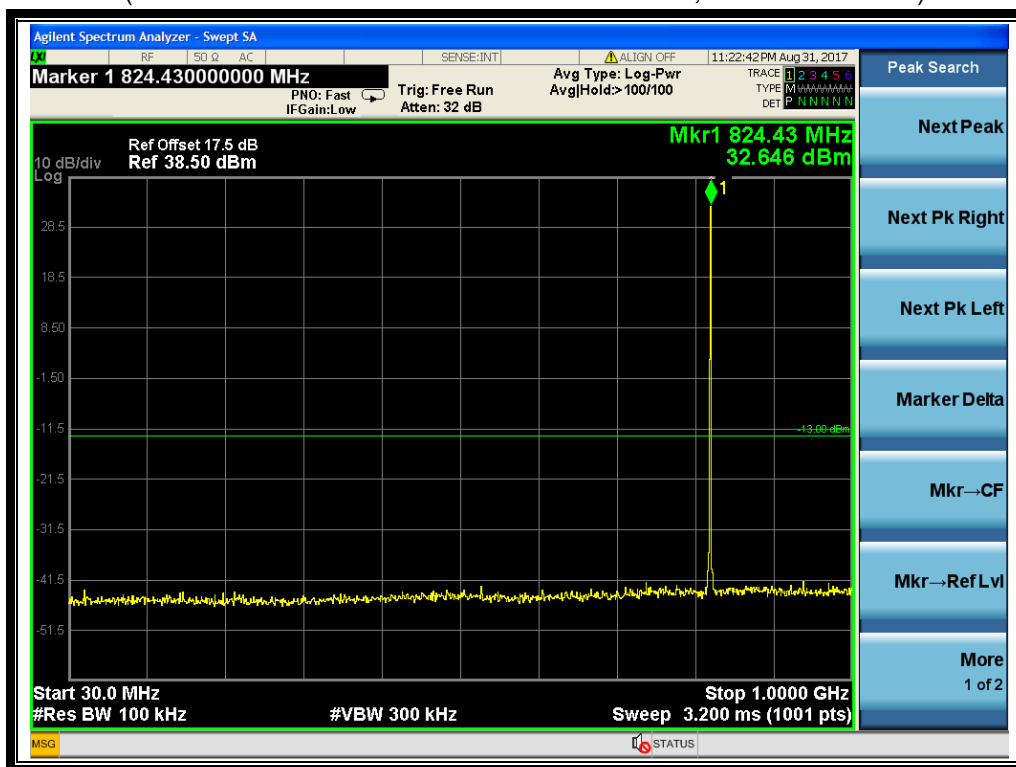
(Plot B2.1: GPRS 1900MHz Channel = 661, 1GHz to 20GHz)



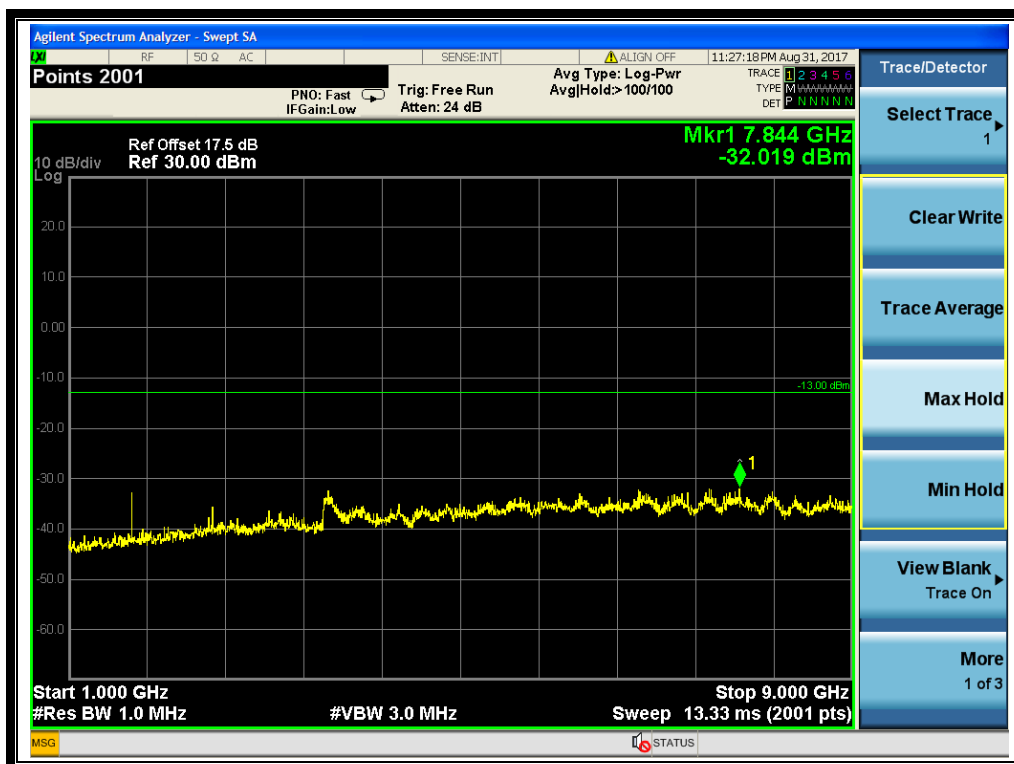
(Plot B3: GPRS 1900MHz Channel = 810, 30MHz to 1GHz)



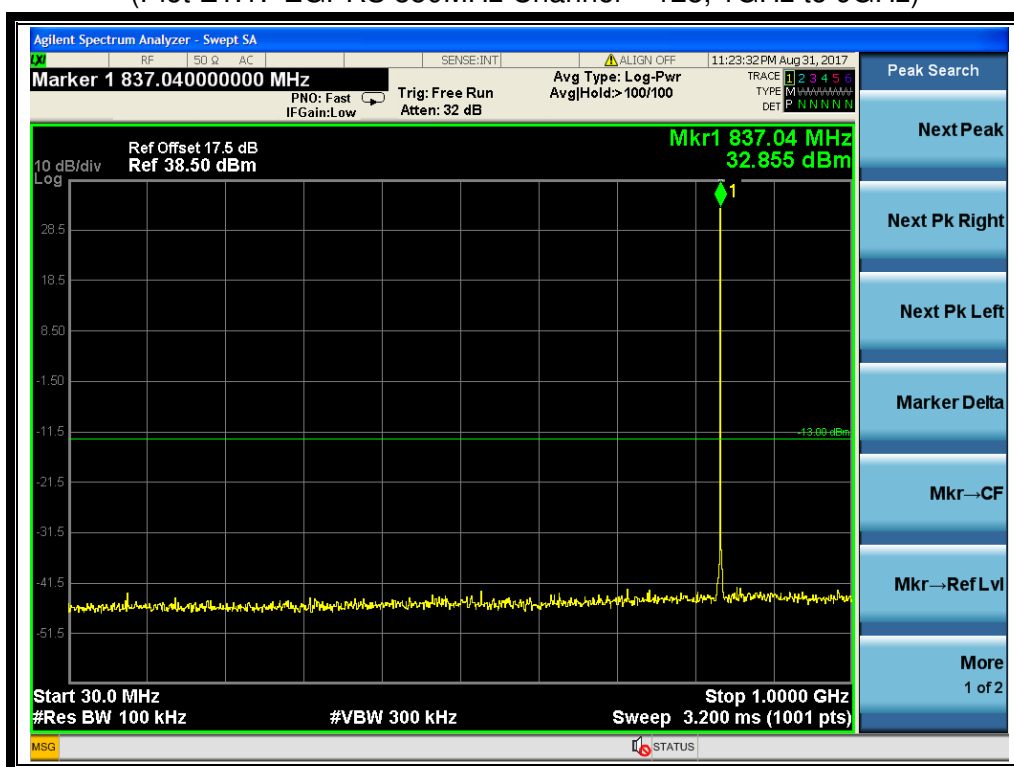
(Plot B3.1: GPRS 1900MHz Channel = 810, 1GHz to 20GHz)



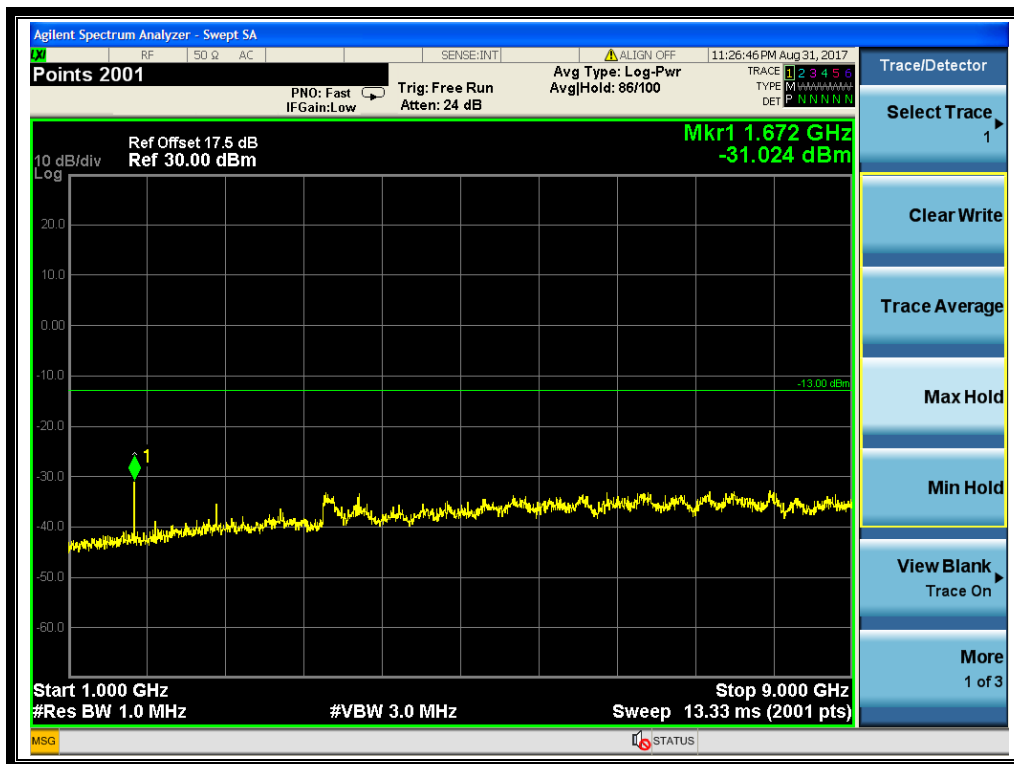
(Plot E1: EGPRS 850MHz Channel = 128, 30MHz to 1GHz)



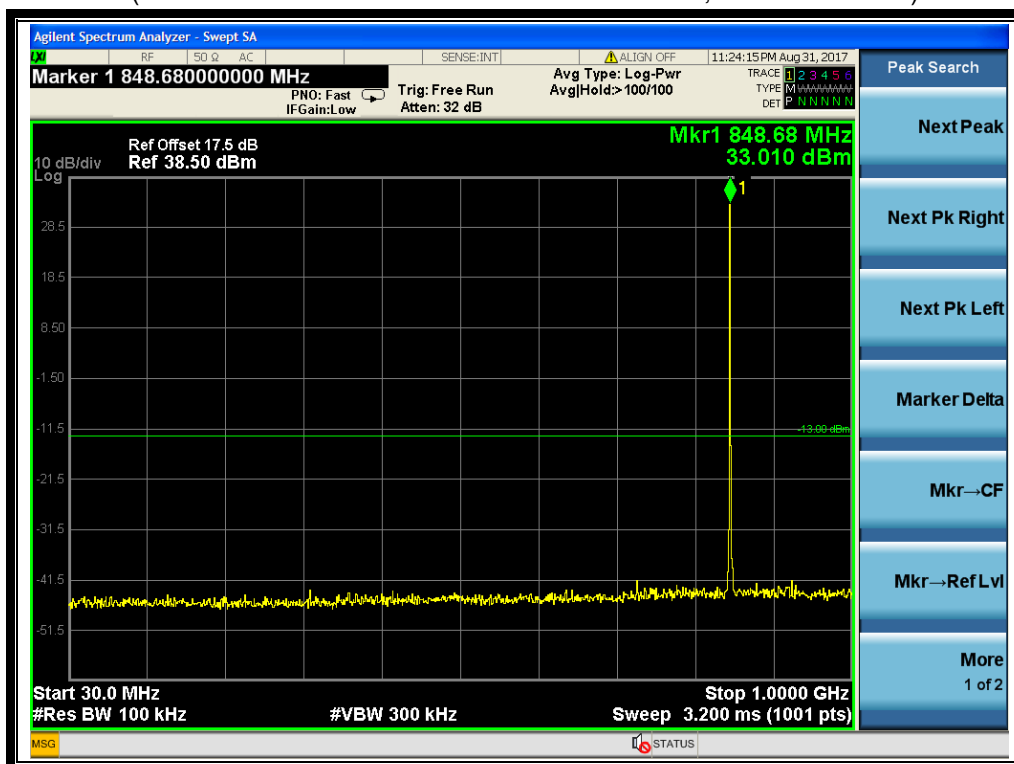
(Plot E1.1: EGPRS 850MHz Channel = 128, 1GHz to 9GHz)



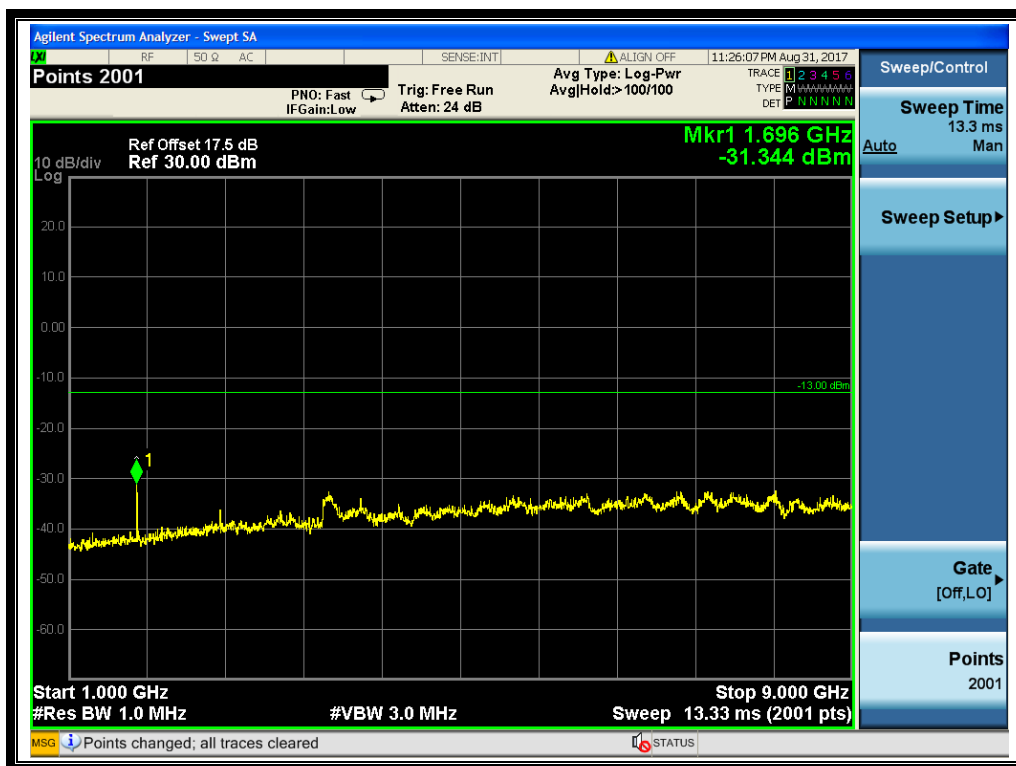
(Plot E2: EGPRS 850MHz Channel = 190, 30MHz to 1GHz)



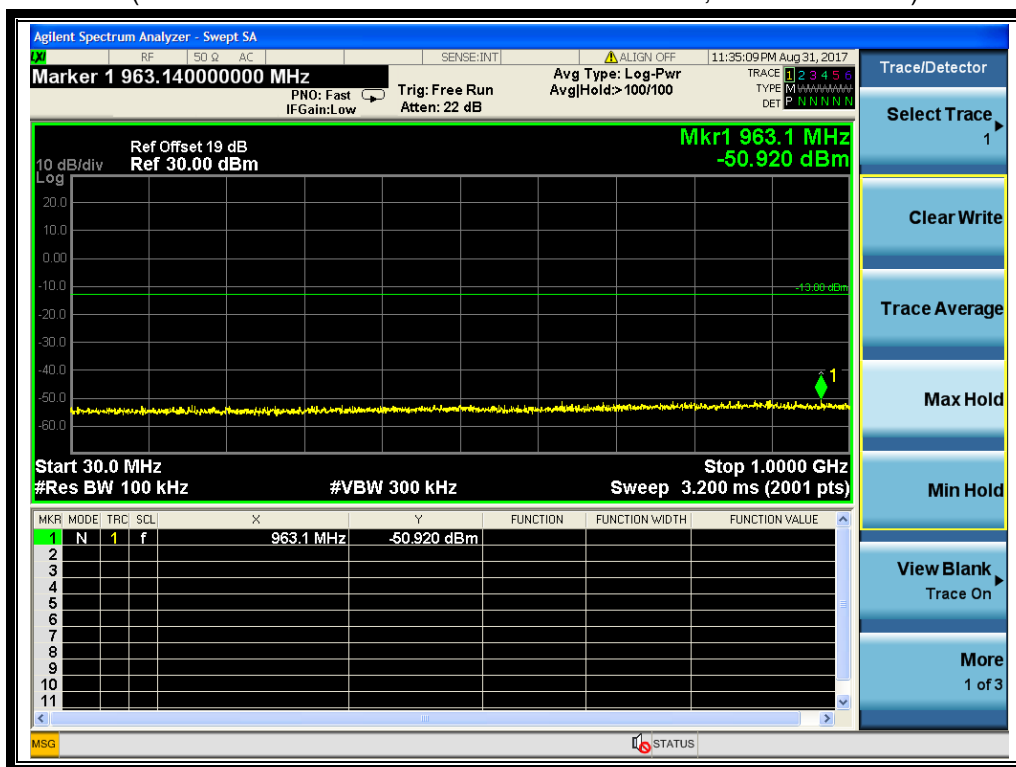
(Plot E2.1: EGPRS 850MHz Channel = 190, 1GHz to 9GHz)



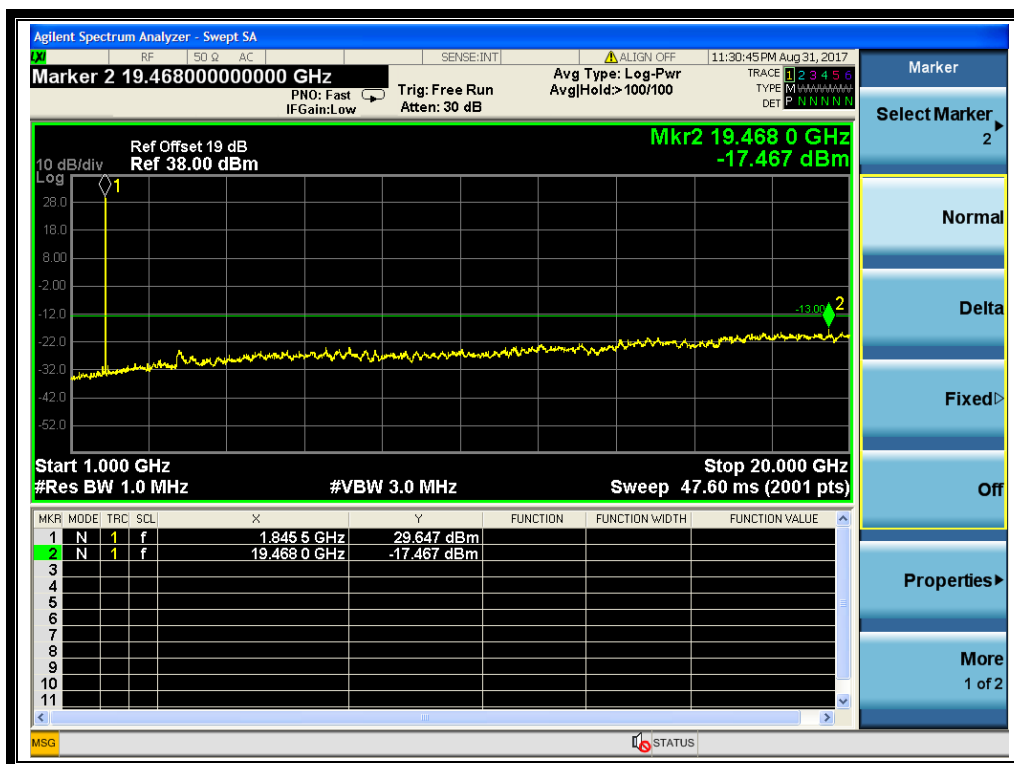
(Plot E3: EGPRS 850MHz Channel = 251, 30MHz to 1GHz)



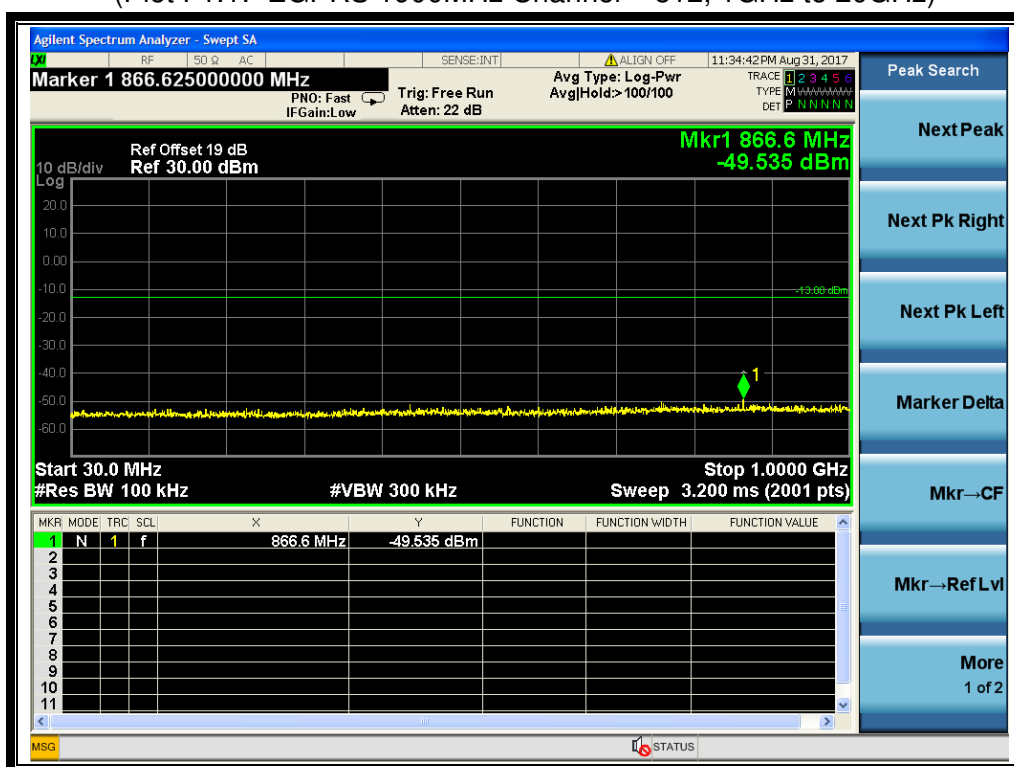
(Plot E3.1: EGPRS 850MHz Channel = 251, 1GHz to 9GHz)



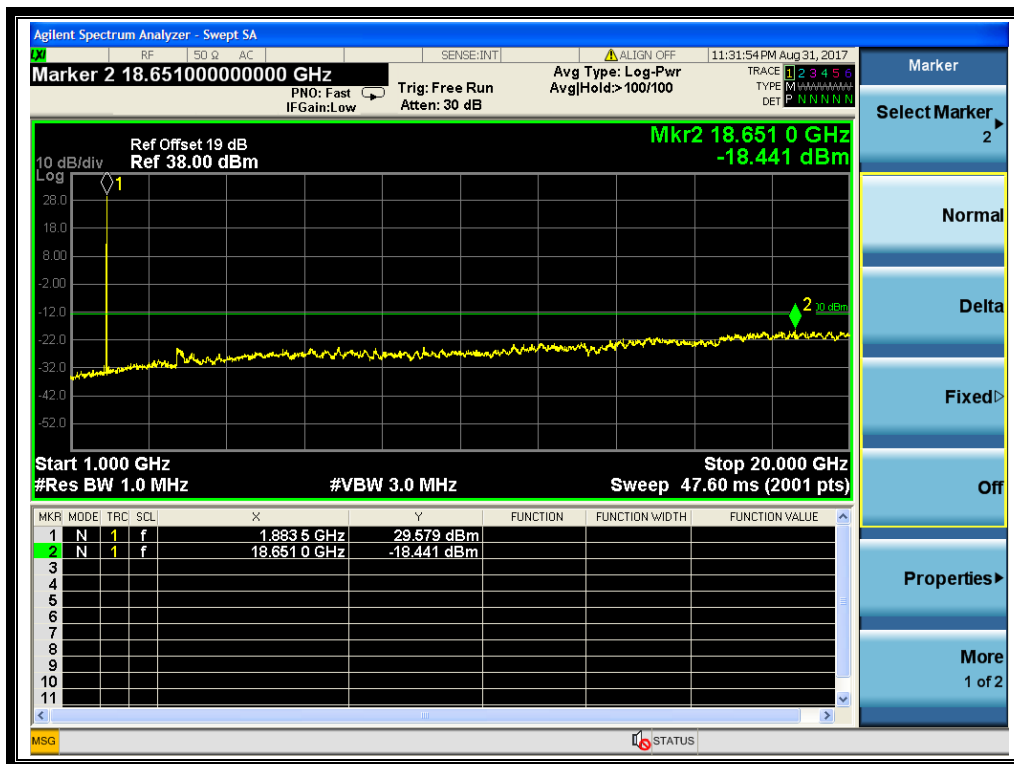
(Plot F1: EGPRS 1900MHz Channel = 512, 30MHz to 1GHz)



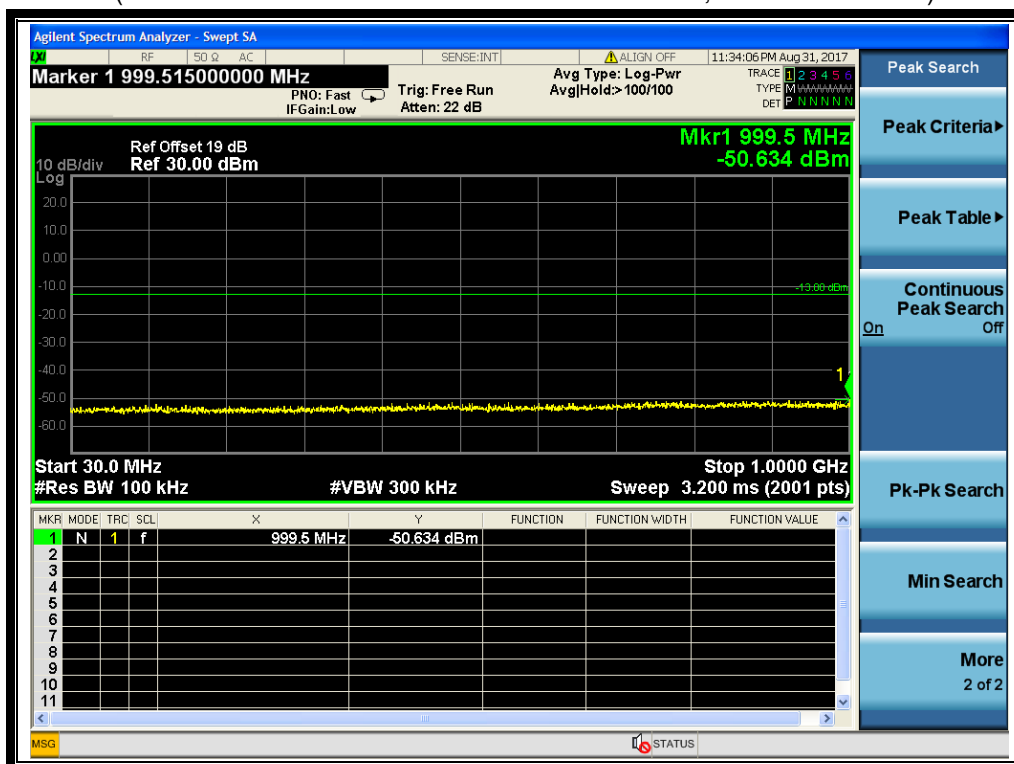
(Plot F1.1: EGPRS 1900MHz Channel = 512, 1GHz to 20GHz)



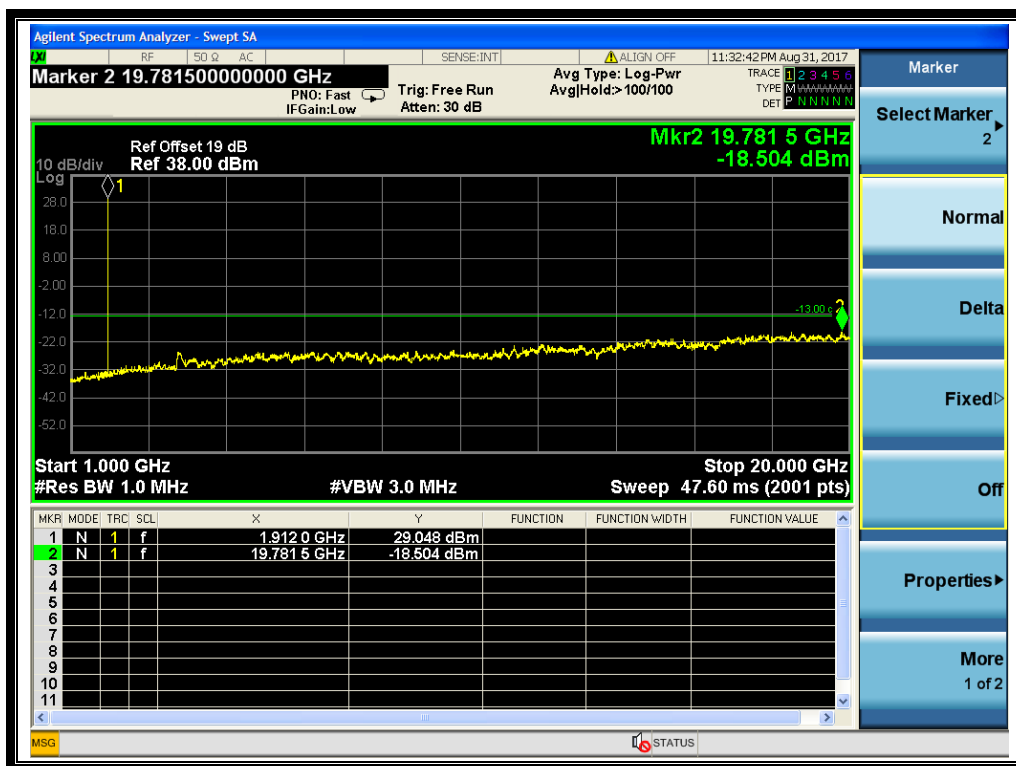
(Plot F2: EGPRS 1900MHz Channel = 661, 30MHz to 1GHz)



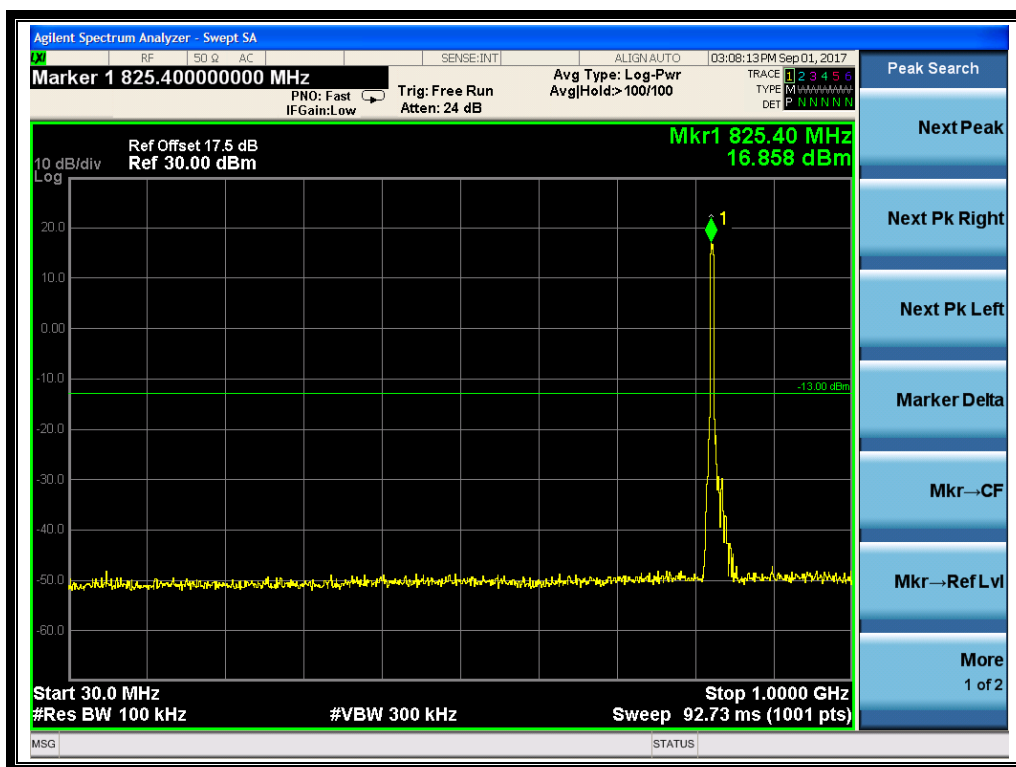
(Plot F2.1: EGPRS 1900MHz Channel = 661, 1GHz to 20GHz)



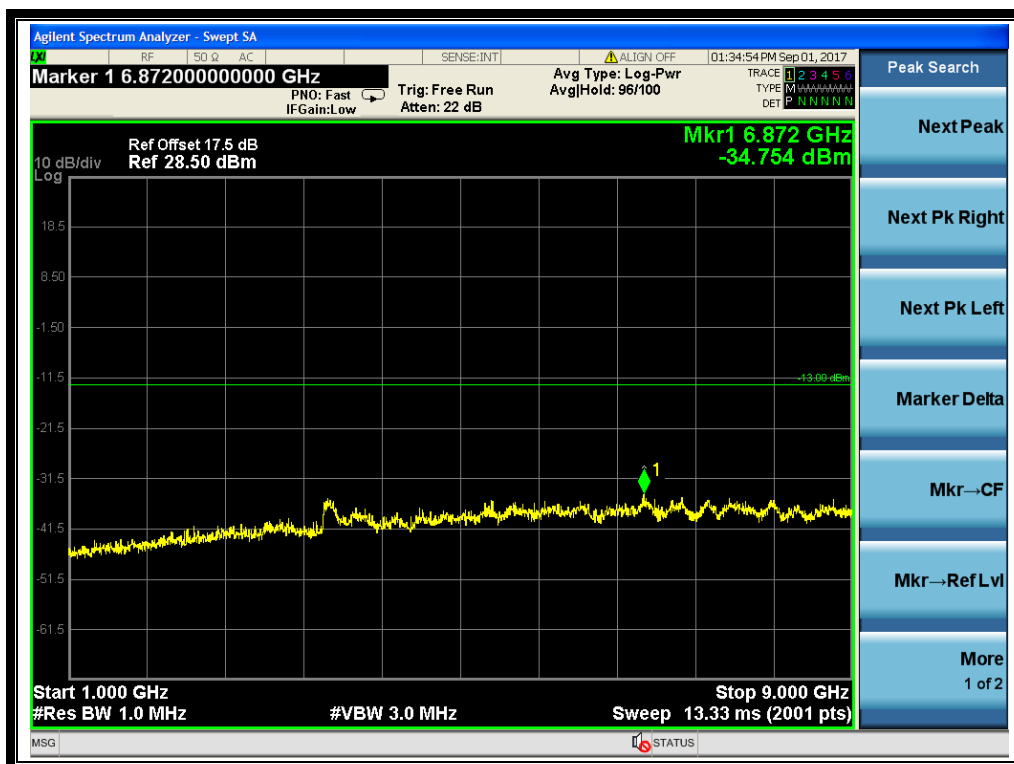
(Plot F3: EGPRS 1900MHz Channel = 810, 30MHz to 1GHz)



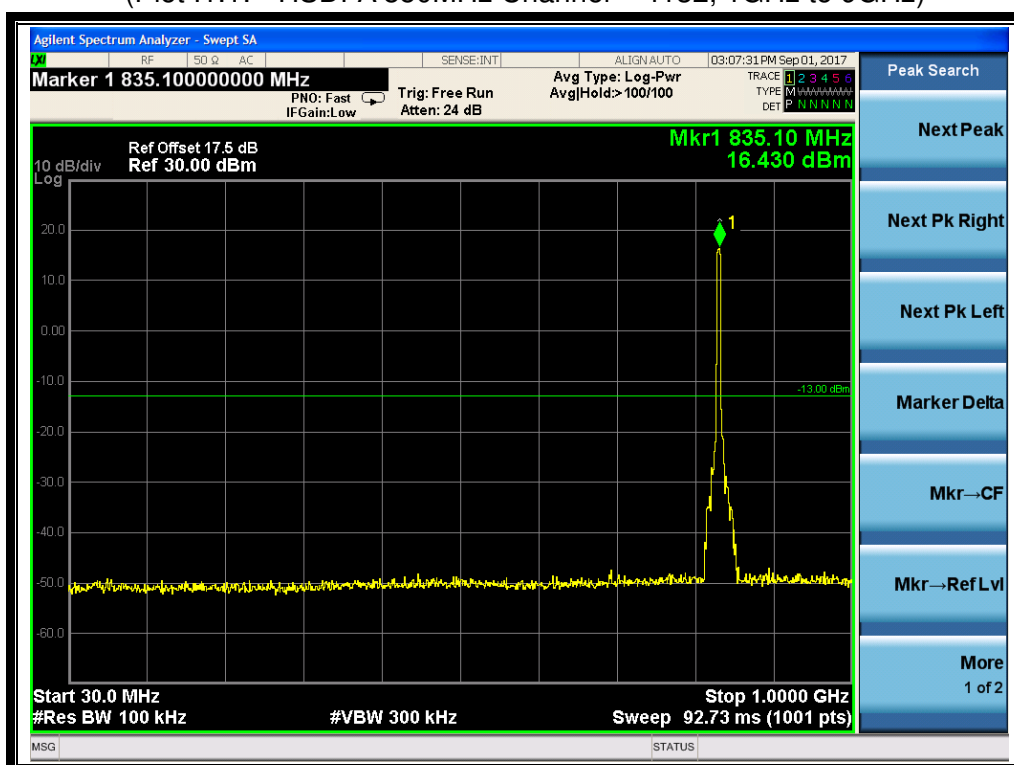
(Plot F3.1: EGPRS 1900MHz Channel = 810, 1GHz to 20GHz)



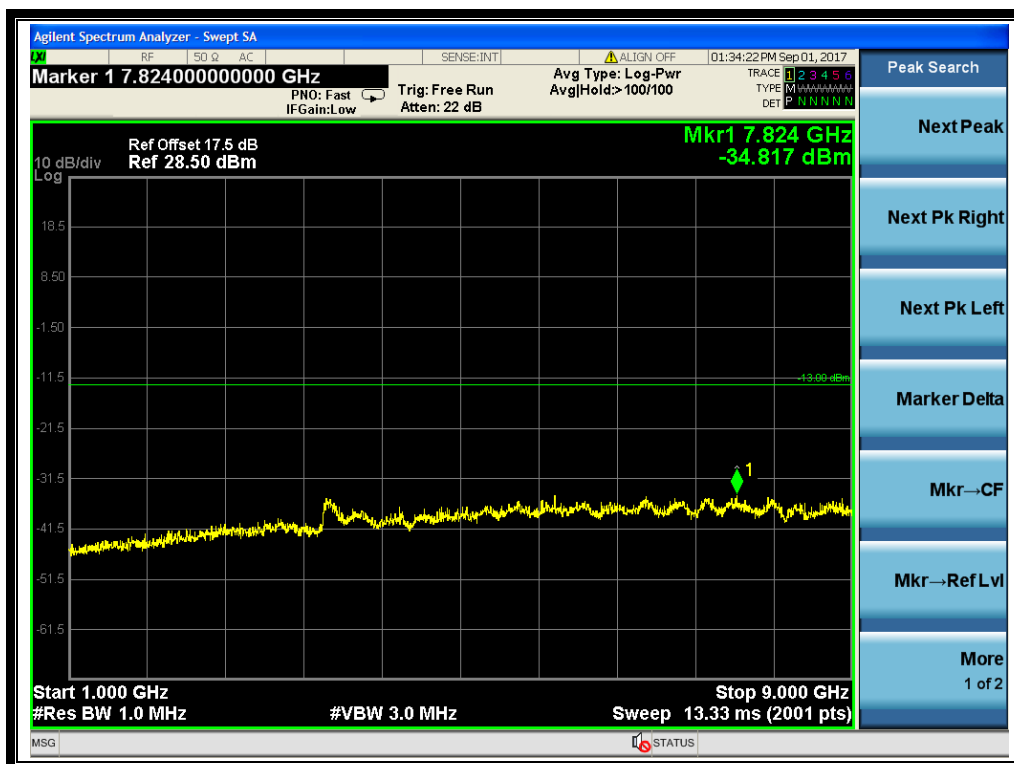
(Plot I1: HSDPA 850MHz Channel = 4132, 30MHz to 1GHz)



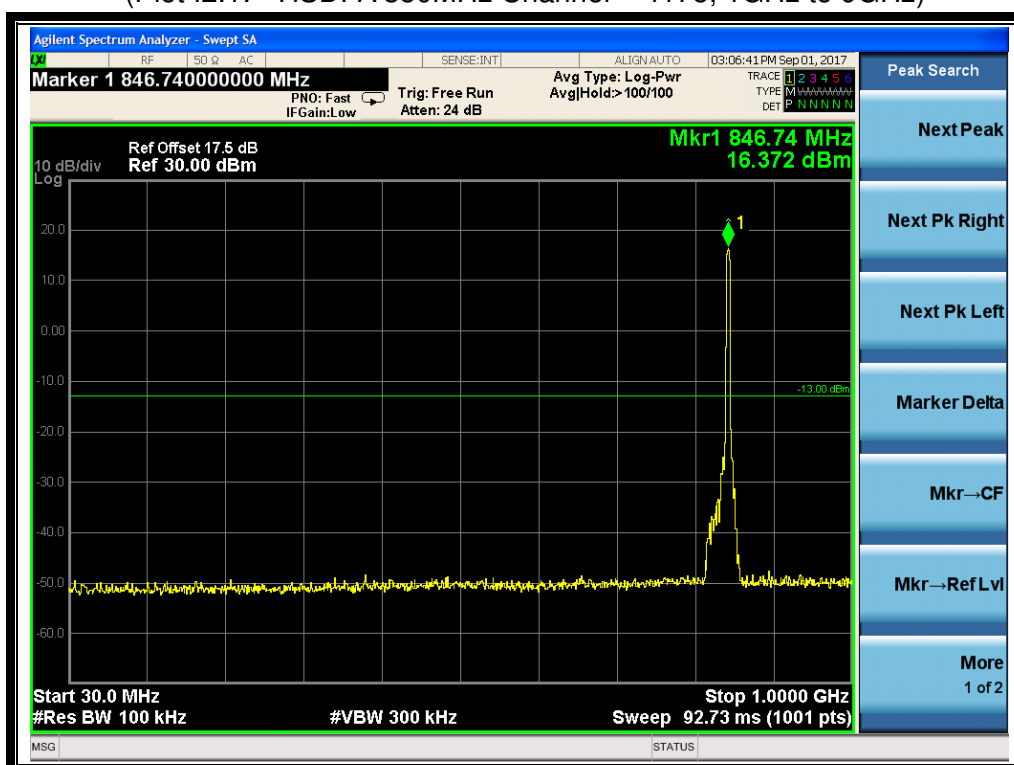
(Plot I1.1: HSDPA 850MHz Channel = 4132, 1GHz to 9GHz)



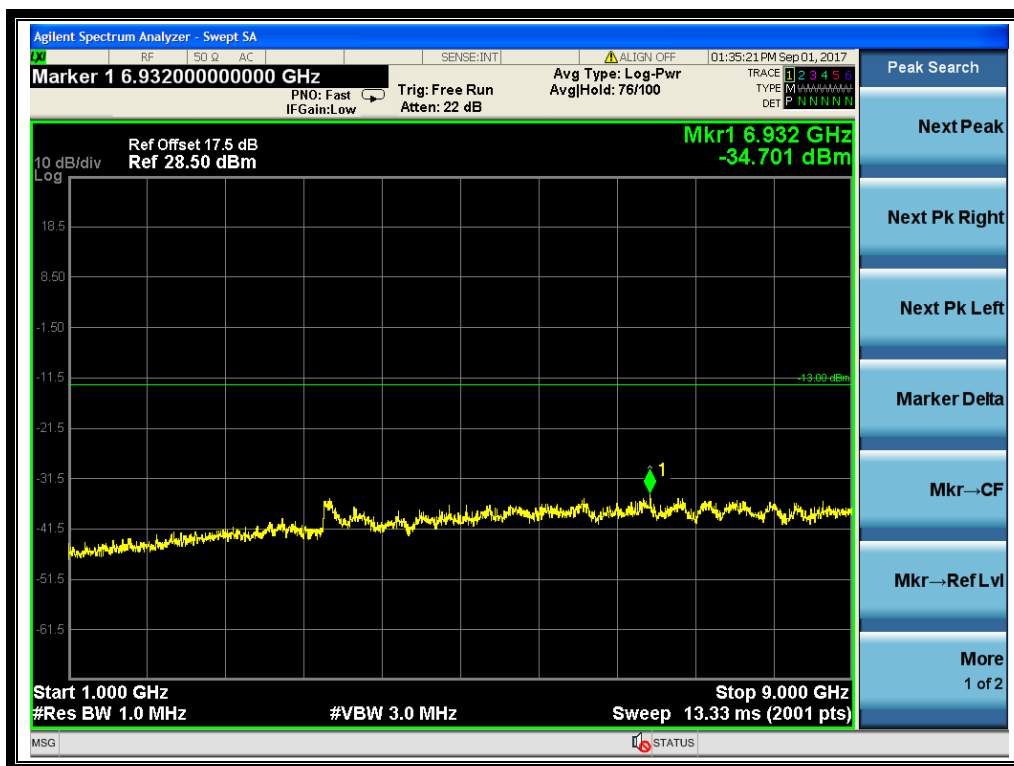
(Plot I2: HSDPA 850MHz Channel = 4175, 30MHz to 1GHz)



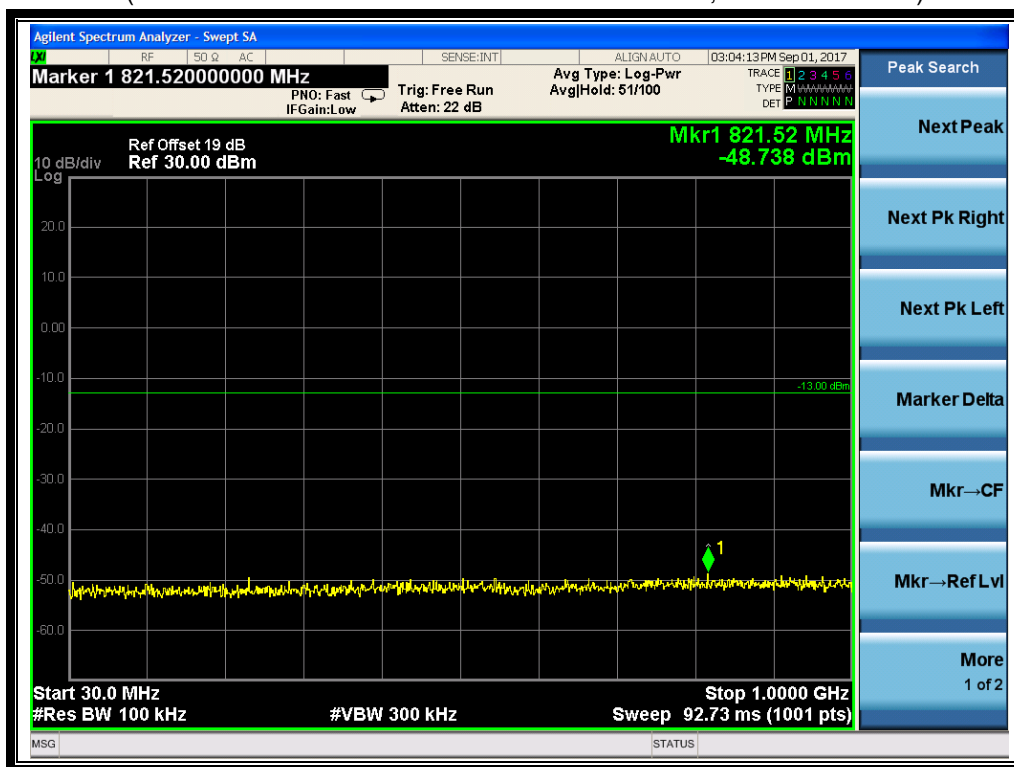
(Plot I2.1: HSDPA 850MHz Channel = 4175, 1GHz to 9GHz)



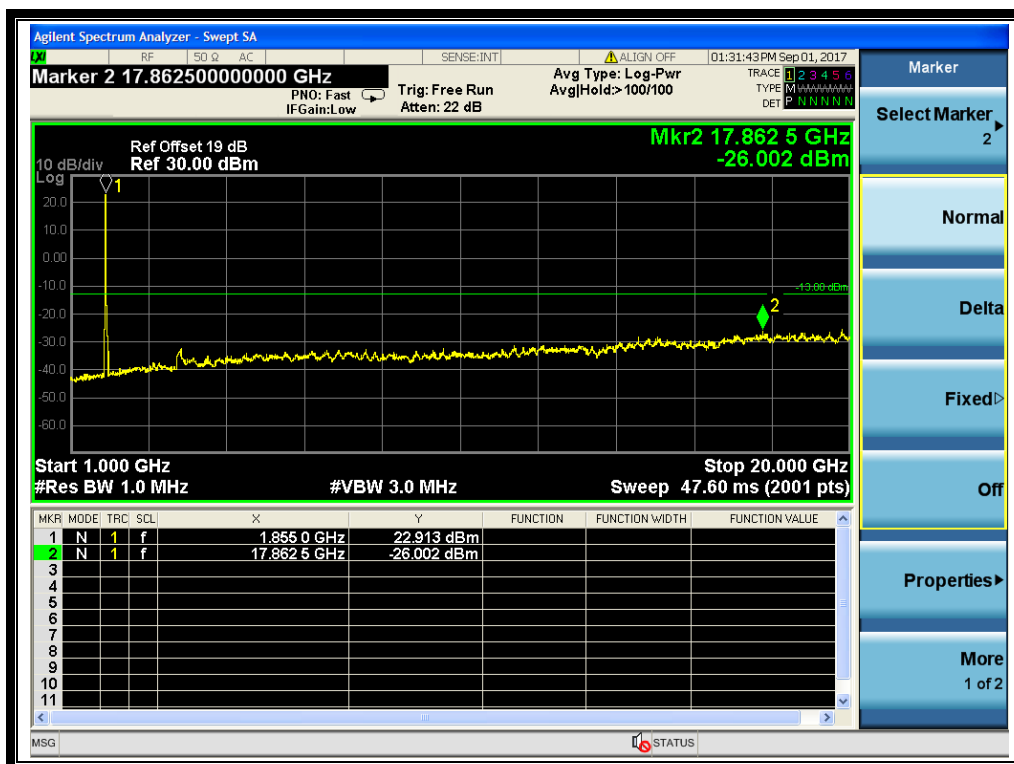
(Plot I3: HSDPA 850MHz Channel = 4233, 30MHz to 1GHz)



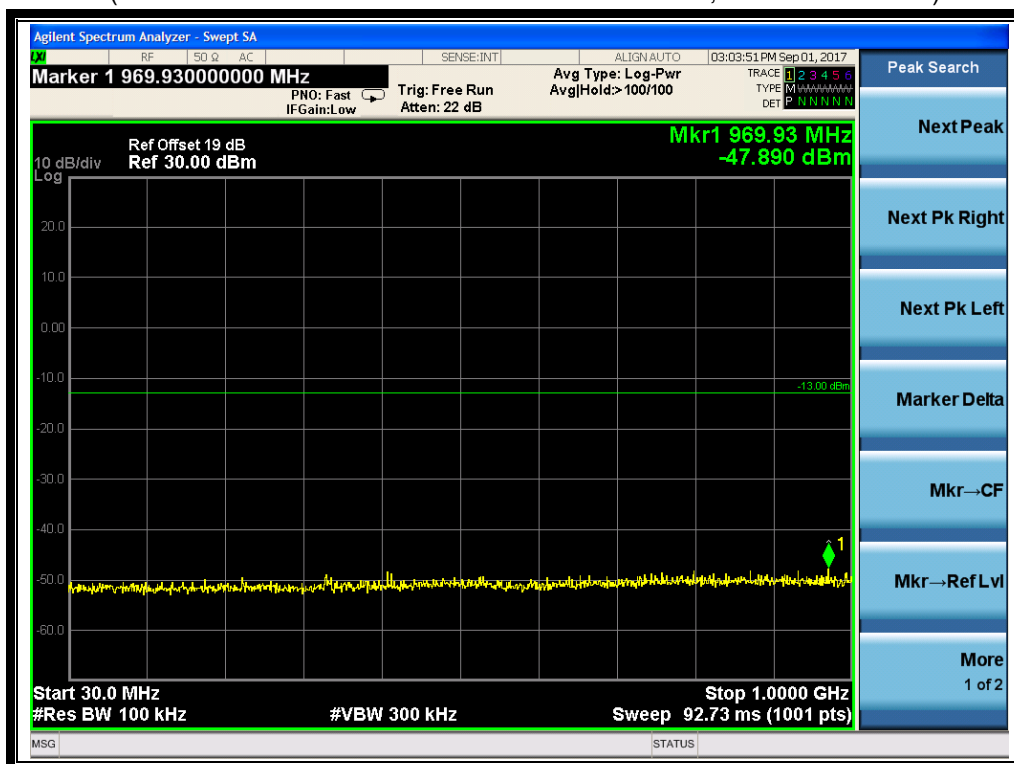
(Plot I3.1: HSDPA 850MHz Channel = 4233, 1GHz to 9GHz)



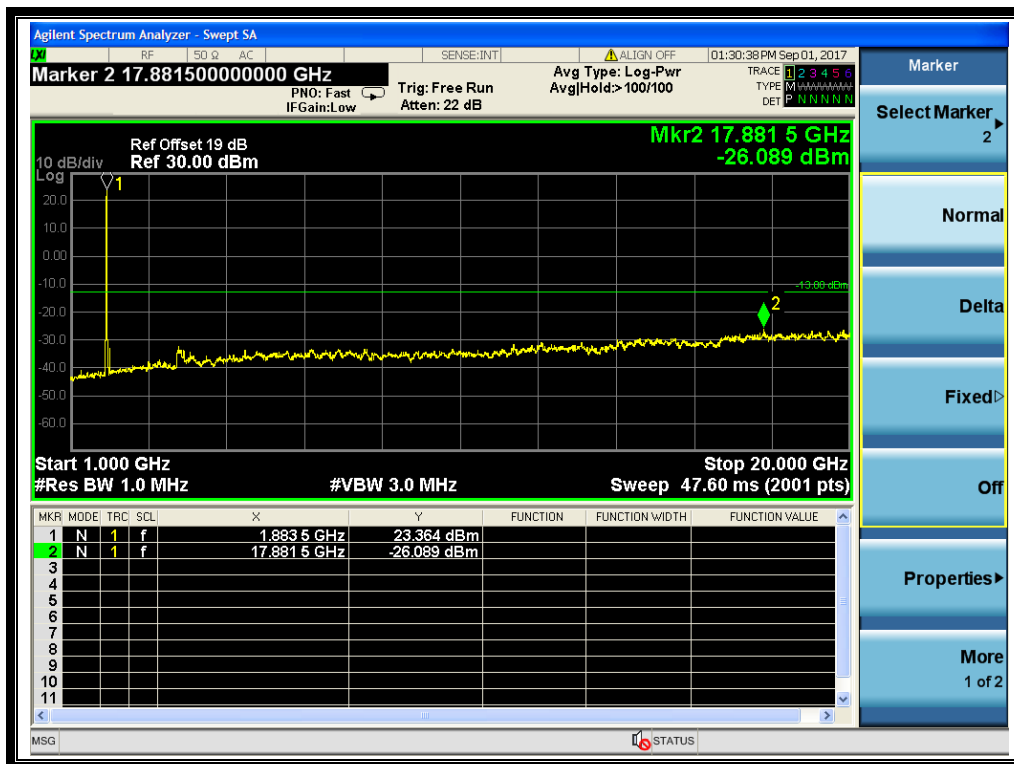
(Plot J1: HSDPA 1900MHz Channel = 9262, 30MHz to 1GHz)



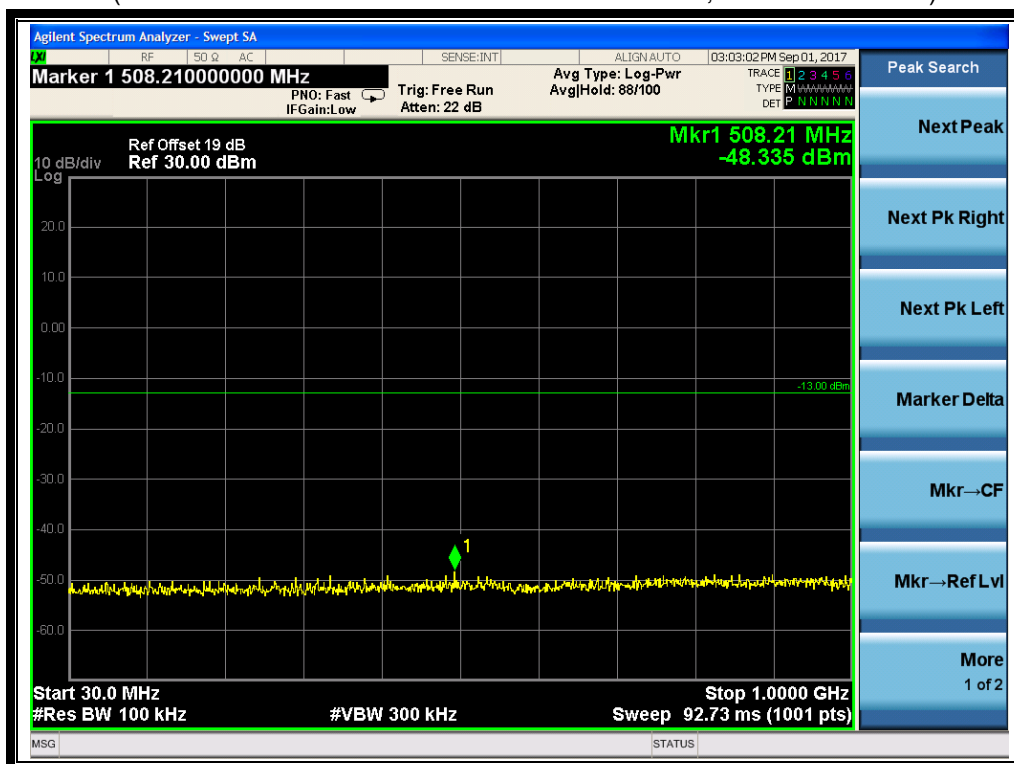
(Plot J1.1: HSDPA 1900MHz Channel = 9262, 1GHz to 20GHz)



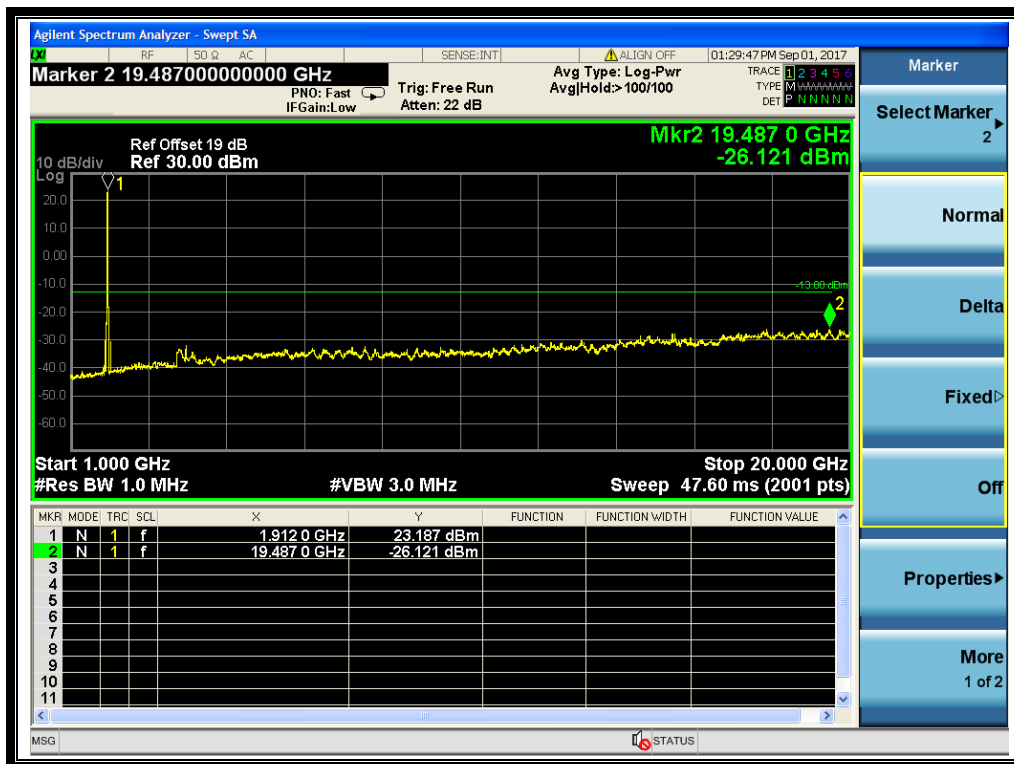
(Plot J2: HSDPA 1900MHz Channel = 9400, 30MHz to 1GHz)



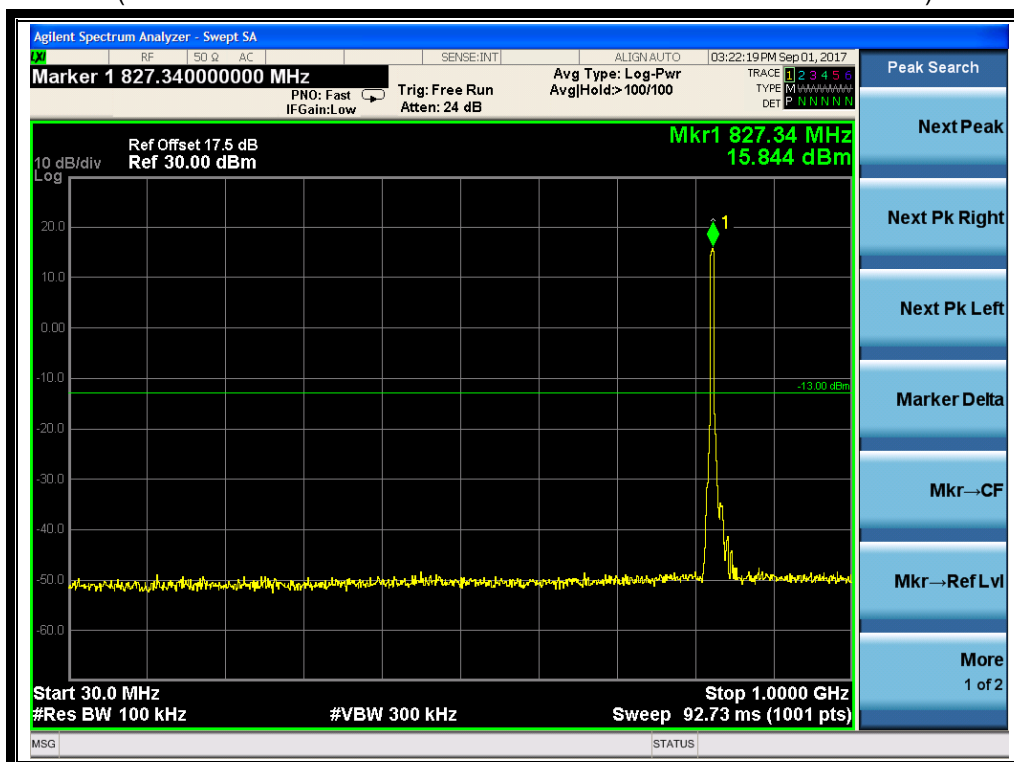
(Plot J2.1: HSDPA1900MHz Channel = 9400, 1GHz to 20GHz)



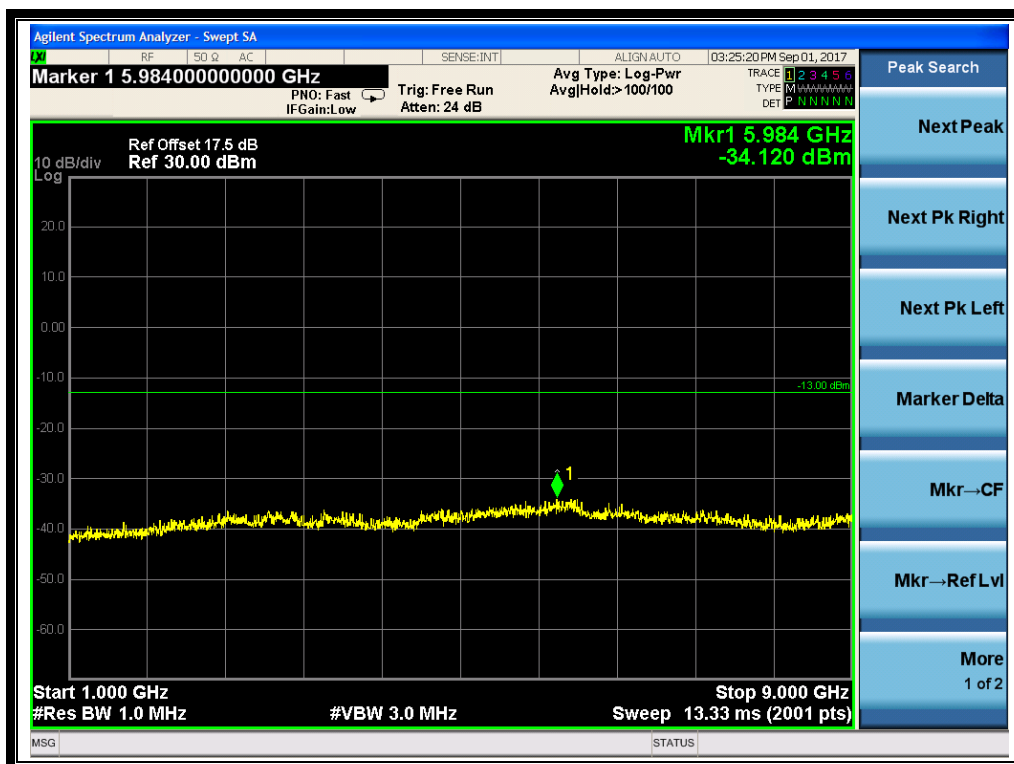
(Plot J3: HSDPA1900MHz Channel = 9538, 30MHz to 1GHz)



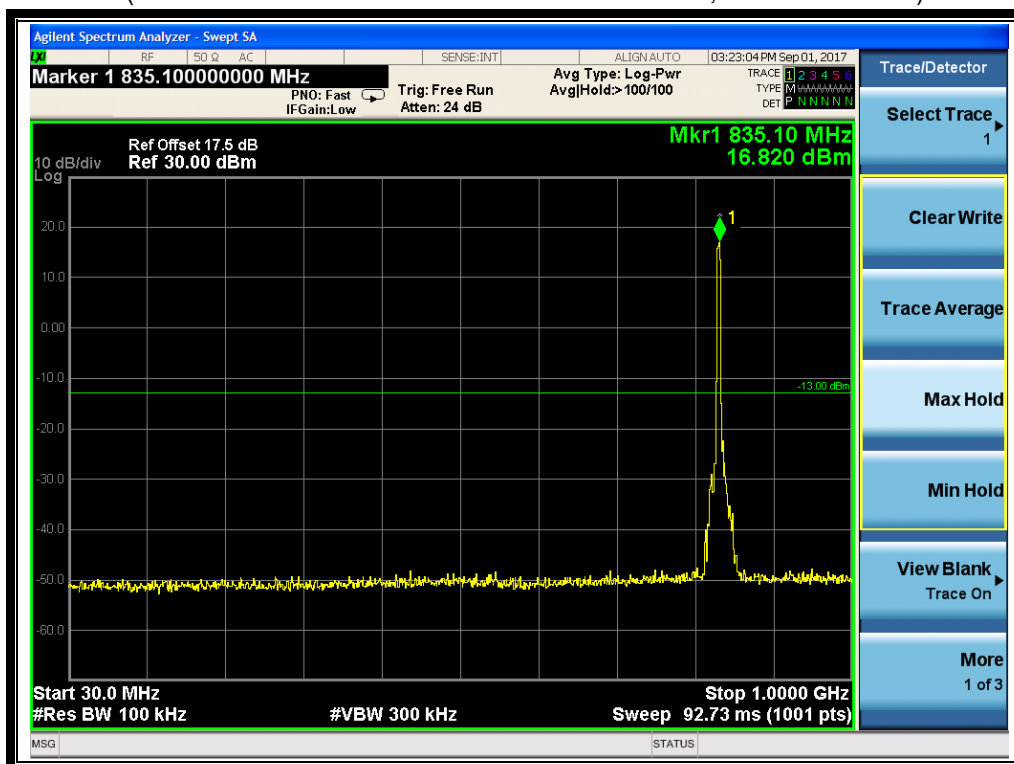
(Plot J3.1: HSDPA1900MHz Channel = 9538 1GHz to 20GHz)



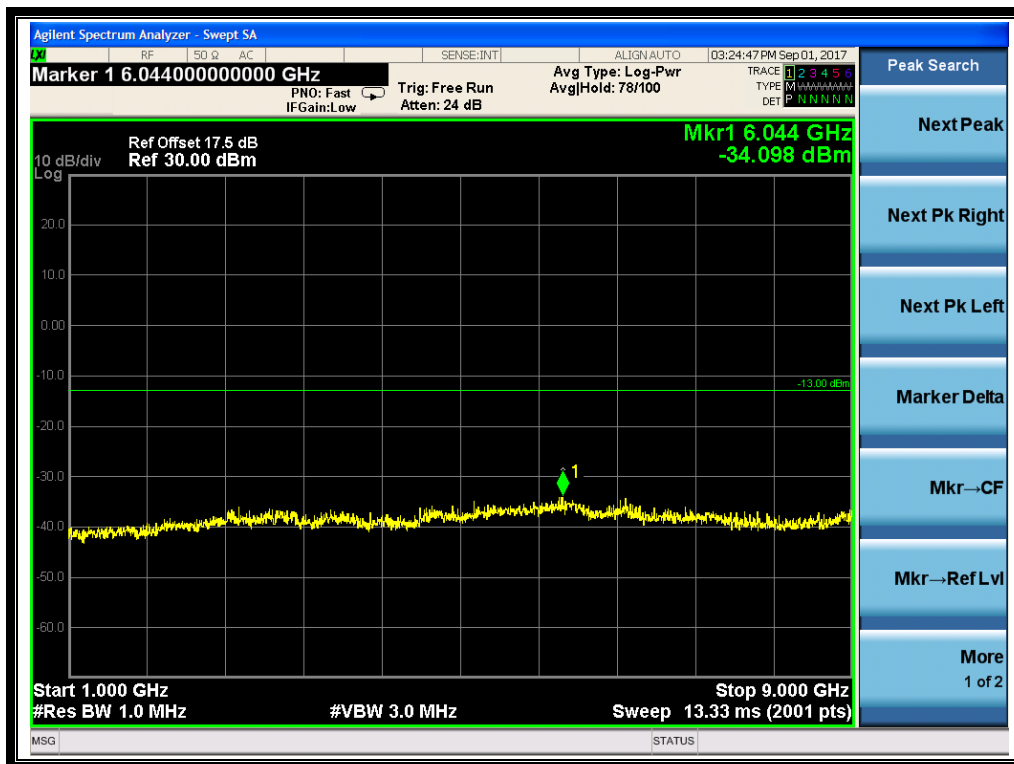
(Plot K1: HSUPA 850MHz Channel = 4132, 30MHz to 1GHz)



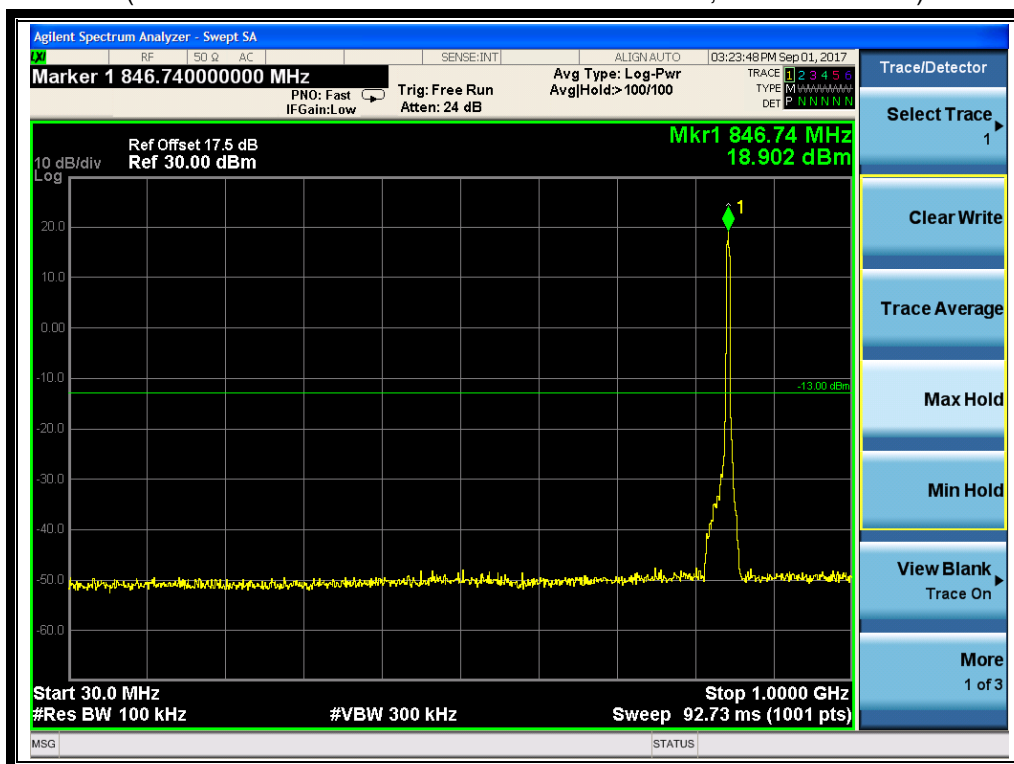
(Plot K1.1: HSUPA 850MHz Channel = 4132, 1GHz to 9GHz)



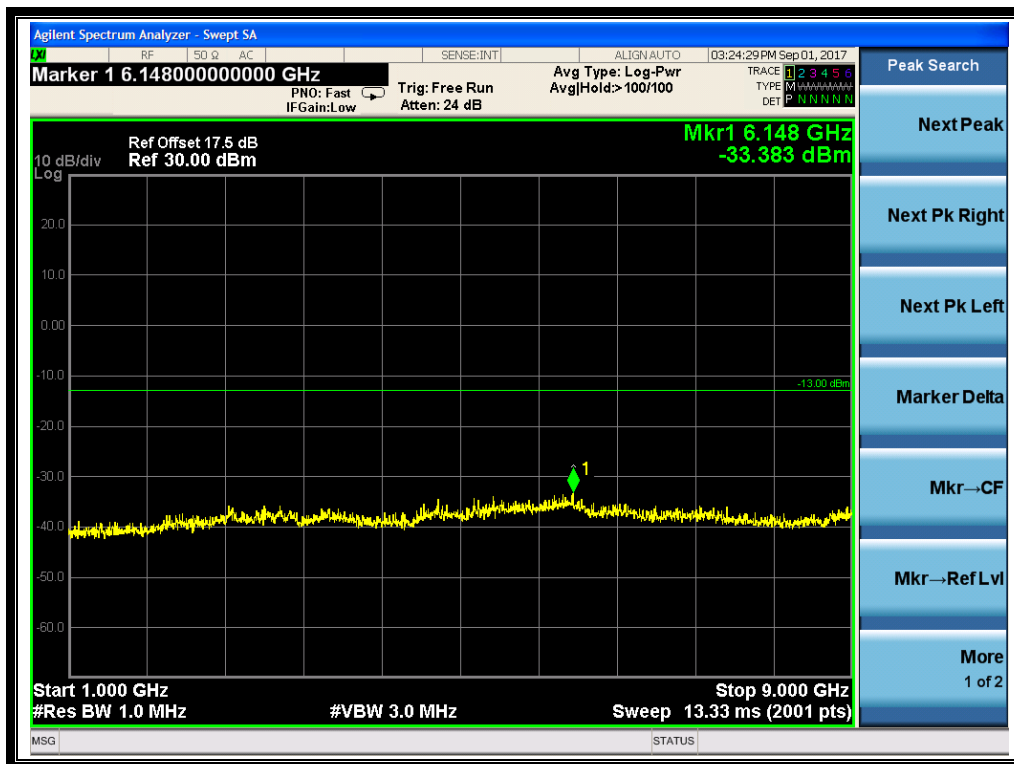
(Plot K2: HSUPA 850MHz Channel = 4175, 30MHz to 1GHz)



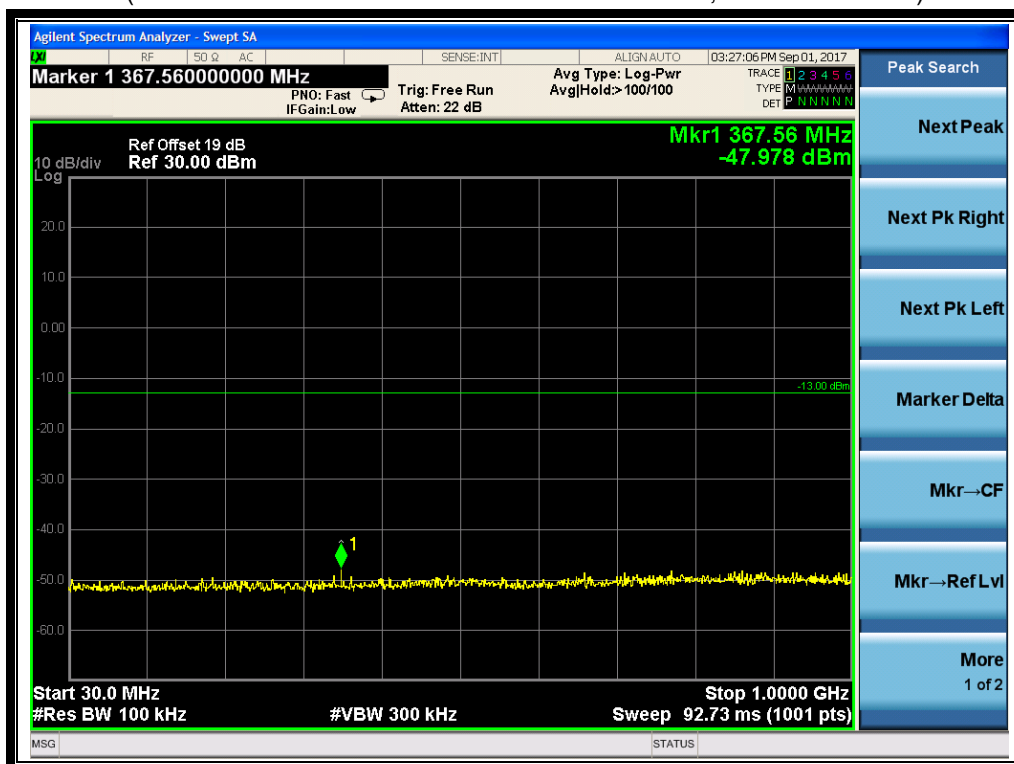
(Plot K2.1: HSUPA 850MHz Channel = 4175, 1GHz to 9GHz)



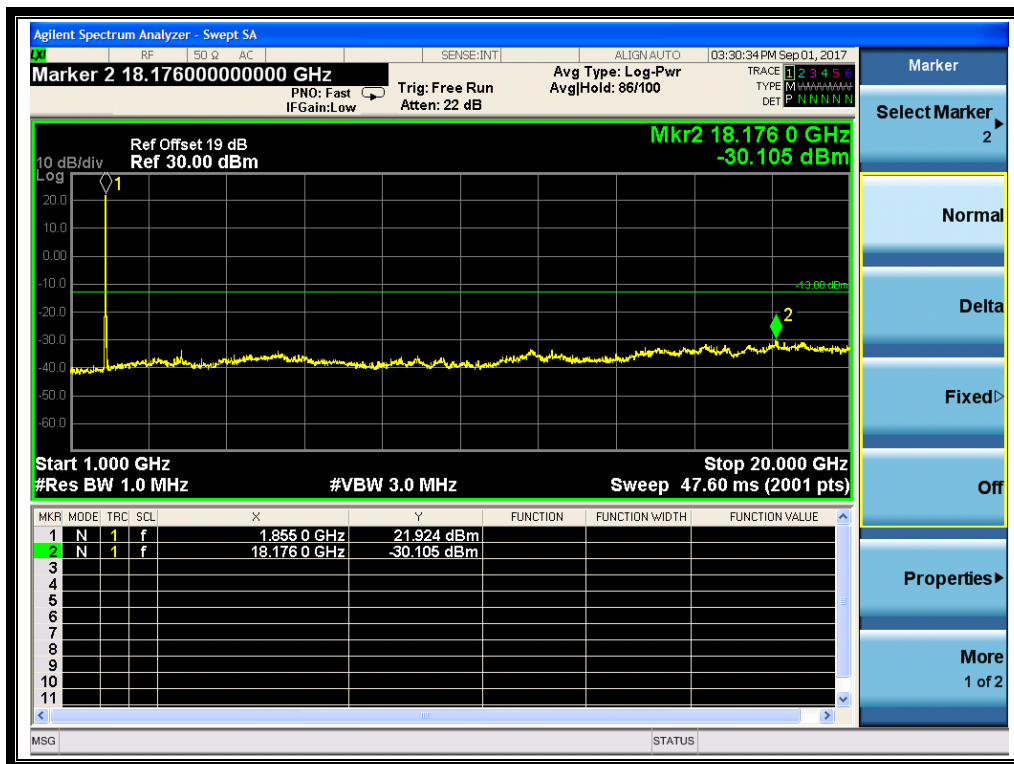
(Plot K3: HSUPA 850MHz Channel = 4233, 30MHz to 1GHz)



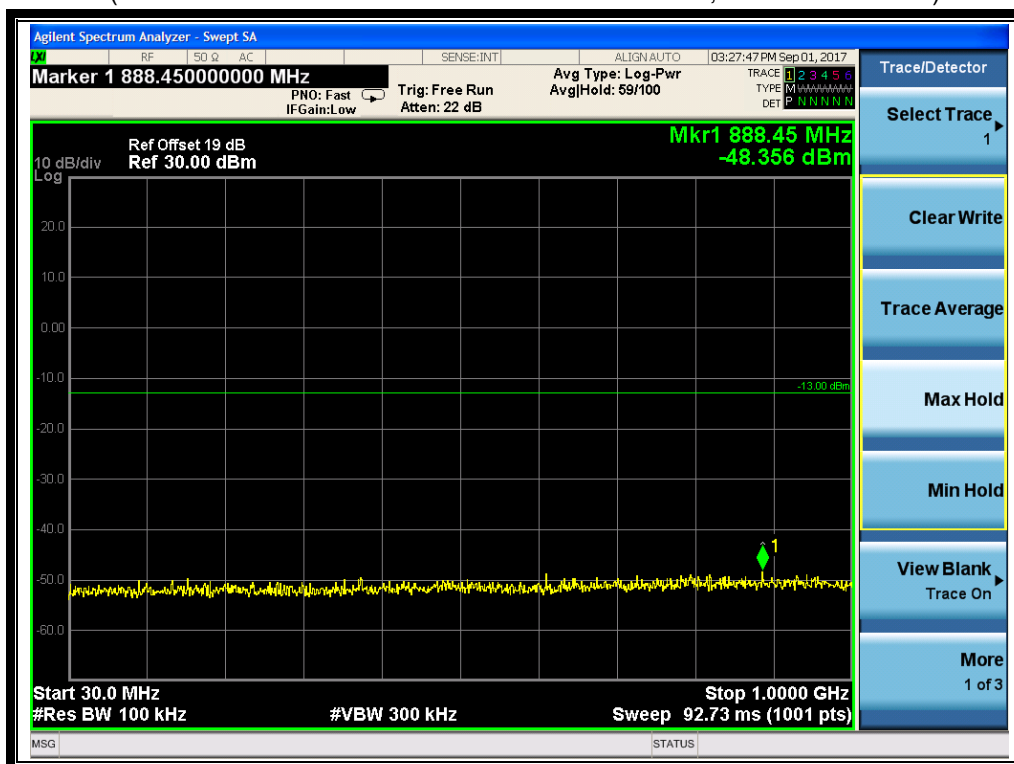
(Plot K3.1: HSUPA 850MHz Channel = 4233, 1GHz to 9GHz)



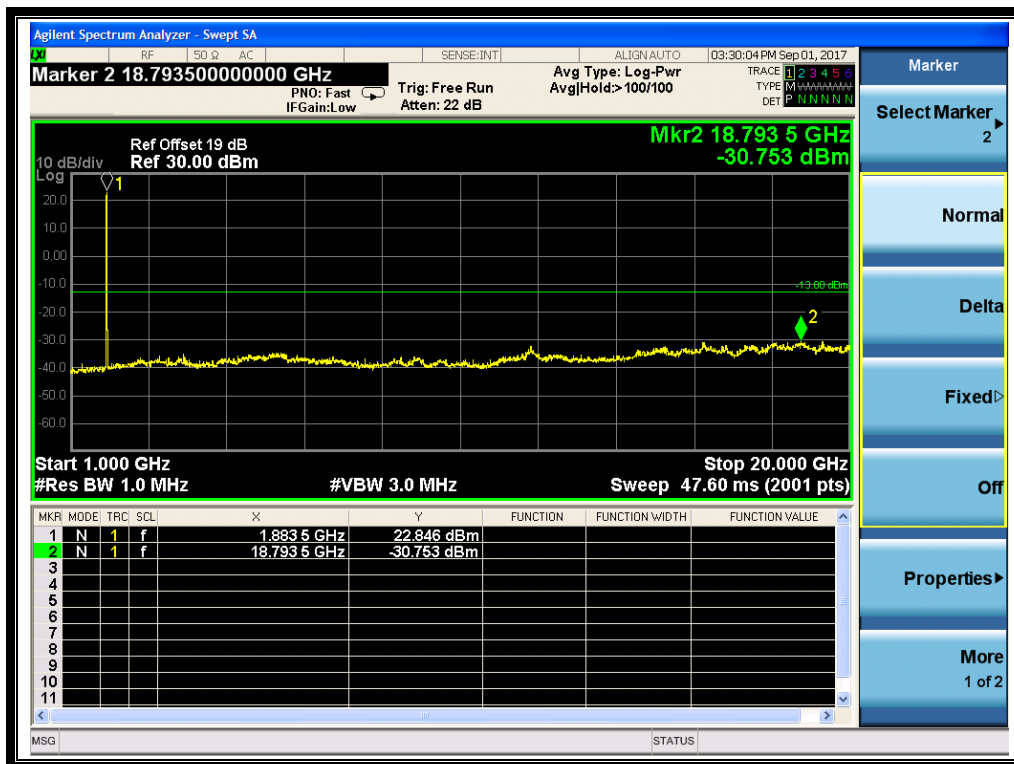
(Plot L1: HSUPA 1900MHz Channel = 9262, 30MHz to 1GHz)



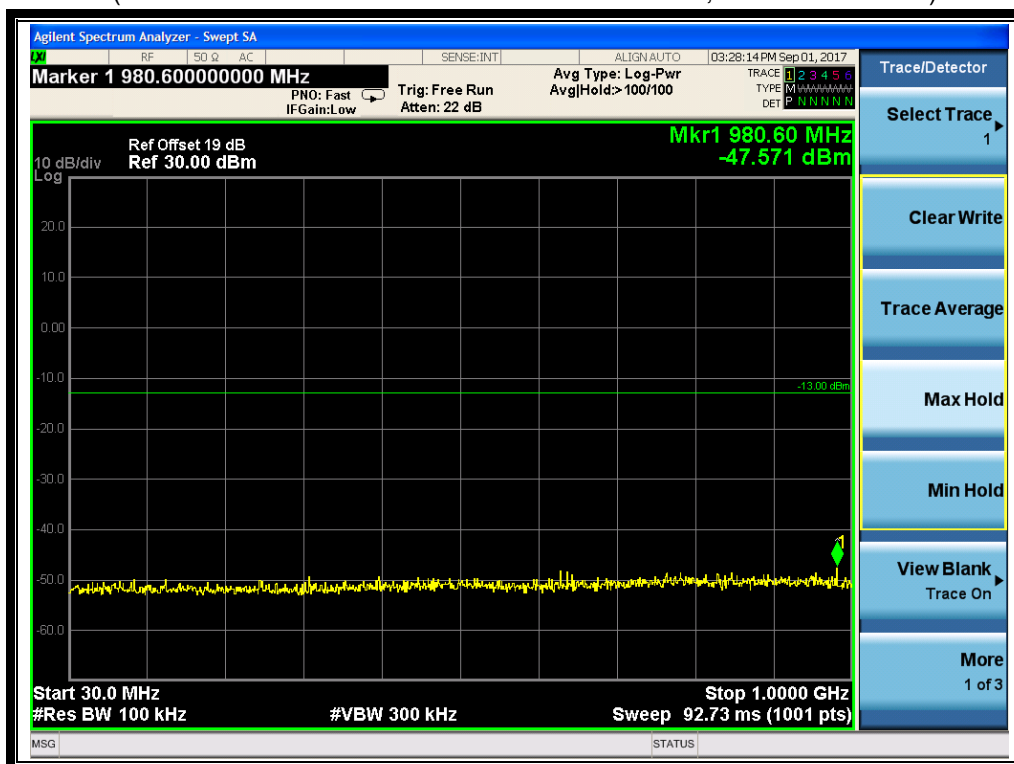
(Plot L1.1: HSUPA 1900MHz Channel = 9262, 1GHz to 20GHz)



(Plot L2: HSUPA 1900MHz Channel = 9400, 30MHz to 1GHz)



(Plot L2.1: HSUPA1900MHz Channel = 9400, 1GHz to 20GHz)



(Plot L3: HSUPA1900MHz Channel = 9538, 30MHz to 1GHz)