Report No.: GTSE14120218801

# FCC REPORT

| | |
|---|---|
| **Applicant:** | Bravo Tech (Shenzhen) Co. Ltd. |
| **Address of Applicant:** | No. 8 Building, The 3rd Zone, Tangtou Industrial Park Shiyan, Baoan District, Shenzhen, China |

**Equipment Under Test (EUT)**

| | |
|---|---|
| Product Name: | mBSC-C RU |
| Model No.: | mBSC1900-040-RUC11, mBSC1900-020-RUC11 |
| **FCC ID:** | WBKMBSC1900040RUC |
| **Applicable standards:** | FCC CFR Title 47 Part 2:2014<br>FCC CFR Title 47 Part 15:2014<br>FCC CFR Title 47 Part24 Subpart E:2014 |
| **Date of sample receipt:** | December 10, 2014 |
| **Date of Test:** | December 10-18, 2014 |
| **Date of report issued:** | December 19, 2014 |
| **Test Result :** | PASS * |

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

**Robinson Lo**
**Laboratory Manager**

## 2 Version

| Version No. | Date | Description |
|---|---|---|
| *00* | *December 19, 2014* | *Original* |
| | | |
| | | |
| | | |
| | | |

***Prepared By:*** Edward.Pan ***Date:*** *December 19, 2014*

***Project Engineer***

***Check By:*** Hank.Yan ***Date:*** *December 19, 2014*

***Reviewer***

# 3 Contents

Page

# 4 Test Summary

| Test Item | Test Description | Result |
|---|---|---|
| Maximum Permissible exposure(MPE) | § 1.1307(b)(1), § 2.1091 | PASS* (Please refer to MPE Report) |
| RF Output Power | § 2.1046; § 24.232(a) | PASS |
| Modulation Characteristics | § 2.1047 | N/A* |
| Passband Gain and Bandwidth | § 2.1049 § 24.238 | PASS |
| Spurious Emissions at Antenna Terminal | § 2.1051; § 24.238(a) | PASS |
| Intermodulation | § 2.1051; § 24.238(a) | PASS |
| Field Strength of Spurious Radiation | § 2.1053 § 24.238 (a) | PASS |
| Out of band emission, Band Edge | § 24.238 (a) | PASS |
| Frequency stability vs. temperature<br>Frequency stability vs. voltage | § 2.1055 § 24.235 | PASS |
| Out-of-Band Rejection | --- | PASS |
| AC Power Line Conducted Emission Test | § 15.207 | PASS |

Remark:

N/A*: Not application

# 5 General Information

## 5.1 Client Information

| | |
|---|---|
| Applicant: | Bravo Tech (Shenzhen) Co. Ltd. |
| Address of Applicant: | No. 8 Building, The 3rd Zone, Tangtou Industrial Park Shiyan, Baoan District, Shenzhen, China |
| Manufacturer: | Bravo Tech (Shenzhen) Co. Ltd. |
| Address of Manufacturer: | No. 8 Building, The 3rd Zone, Tangtou Industrial Park Shiyan, Baoan District, Shenzhen, China |
| Factory: | BTI Wireless(ShenZhen)Co.,Ltd. |
| Address of Factory: | No. 8 Building, The 3rd Zone, Tangtou Industrial Park Shiyan, Baoan District, Shenzhen, China |

## 5.2 General Description of EUT

| | | |
|---|---|---|
| Product Name: | mBSC-C RU | |
| Model No.: | mBSC1900-040-RUC11, mBSC1900-020-RUC11 | |
| Power supply: | Input: 100-240V AC, 50-60Hz ,5A Max<br>Normal test voltage: AC 120V/60Hz | |
| Operating Temperature: | -20℃ to + 55℃ | |
| Operating Humidity: | up to 95% | |
| **Technical Parameter:** | | |
| Frequency Range | Downlink | 1930MHz~1995MHz |
| | Uplink | 1850MHz~1915MHz |
| Operating Bandwidth | 65MHz | |
| Multiple Carrier Supported | 4 | |
| Channel Spacing(s) / Bandwidth(s) | WCDMA: 5MHz<br>CDMA/CDMA EV-DO : 1.25MHz<br>GSM: 200KHz | |
| Maximun RF Output Power | Downlink: 46.26dBm(For 40W); 43.25dBm(For 20W);<br>Uplink: 5.25dBm(For 40W); 5.22dBm(For 20W); | |
| Max Gain | Downlink: 64.87dB; Uplink: 57.81dB | |
| Type of modulation and Designator | WCDMA(F9W); CDMA/CDMA EV-DO(F9W); GSM(GXW) | |
| Antenna Type | External antenna (N female) | |
| Antenna Gain | Maximum permissible antenna gain is 16dBi. | |

## 5.3 Related Submittal(s) / Grant (s)

| | |
|---|---|
| Title 47 Part 2 | – General Requirements and Information for the Certification of Radio Apparatus |
| Title 47 Part 15 | – General Requirements and Information for the Certification of Radio Apparatus |
| Title 47 Part 24 | – Zone Enhancers for the Land Mobile Service |

## 5.4 Test Methodology

| | |
|---|---|
| Title 47 Part 2 | – General Requirements and Information for the Certification of Radio Apparatus |
| Title 47 Part 15 | – General Requirements and Information for the Certification of Radio Apparatus |
| Title 47 Part 24 | – Zone Enhancers for the Land Mobile Service |
| KDB | AMPLIFIER, BOOSTER, AND REPEATER REMINDER SHEET |

## 5.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● CNAS —Registration No.: CNAS L5775

CNAS has accredited Global United Technology Services Co., Ltd. to ISO/IEC 17025 General Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

● FCC —Registration No.: 600491

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 28, 2013.

● Industry Canada (IC)

The 3m Semi-anechoic chamber of China Certification & Inspection Services Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, June 26, 2013.

## 5.6 Test Location

| All tests were performed at: |
|---|
| Global United Technology Services Co., Ltd.<br>Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China<br>Tel: 0755-27798480<br>Fax: 0755-27798960 |

## 5.7 Test Instruments list

| Item | Test Equipment | Manufacturer | Model No. | Inventory No. | Cal.Date (dd-mm-yy) | Cal.Due date (dd-mm-yy) |
|---|---|---|---|---|---|---|
| 1 | 3m Semi- Anechoic Chamber | ZhongYu Electron | 9.2(L)*6.2(W)* 6.4(H) | GTS250 | Mar. 29 2013 | Mar. 28 2015 |
| 2 | Control Room | ZhongYu Electron | 6.2(L)*2.5(W)* 2.4(H) | GTS251 | N/A | N/A |
| 3 | EMI Test Receiver | Rohde & Schwarz | ESU26 | GTS203 | Jul. 01 2014 | Jun. 30, 2015 |
| 4 | BiConiLog Antenna | SCHWARZBECK MESS-ELEKTRONIK | VULB9163 | GTS214 | Feb. 23 2014 | Feb. 22 2015 |
| 5 | Double -ridged waveguide horn | SCHWARZBECK MESS-ELEKTRONIK | 9120D-829 | GTS208 | June 27 2014 | June 26 2015 |
| 6 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 7 | Coaxial Cable | GTS | N/A | GTS213 | Mar. 29 2014 | Mar. 28 2015 |
| 8 | Coaxial Cable | GTS | N/A | GTS211 | Mar. 29 2014 | Mar. 28 2015 |
| 9 | Coaxial cable | GTS | N/A | GTS210 | Mar. 29 2014 | Mar. 28 2015 |
| 10 | Coaxial Cable | GTS | N/A | GTS212 | Mar. 29 2014 | Mar. 28 2015 |
| 11 | Amplifier(100KHz-5GHz) | HP | 8347A | GTS204 | Jul. 01 2014 | Jun. 30, 2015 |
| 12 | Amplifier(2GHz-20GHz) | HP | 8349B | GTS206 | Jul. 01 2014 | Jun. 30, 2015 |
| 13 | Amplifier (18-26GHz) | Rohde & Schwarz | AFS33-18002 650-30-8P-44 | GTS218 | June 27 2014 | June 26 2015 |
| 14 | Shielding Room | ZhongYu Electron | 7.0(L)x3.0(W)x3.0(H) | GTS264 | Sep. 07 2013 | Sep. 06 2015 |
| 15 | EMI Test Receiver | Rohde & Schwarz | ESCS30 | GTS223 | Jul. 01 2014 | Jun. 30, 2015 |
| 16 | 10dB Pulse Limita | Rohde & Schwarz | N/A | GTS224 | Jul. 01 2014 | Jun. 30, 2015 |
| 17 | LISN | SCHWARZBECK MESS-ELEKTRONIK | NSLK 8127 | GTS226 | Jul. 01 2014 | Jun. 30, 2015 |
| 18 | Temp. Humidity/ Barometer | Oregon Scientific | BA-888 | GTS248 | May 10 2013 | May 09 2015 |
| 19 | Spectrum Analyzer | Agilent | E4440A | GTS 536 | Oct.21 2014 | Oct.20 2015 |
| 20 | Spectrum Analyzer | Agilent | E4445A | MY41000047 | Sept. 10 2013 | Sept. 01 2015 |
| 21 | Splitter | Agilent | 11636B | GTS237 | May 10 2013 | May 09 2015 |
| 22 | Signal Generator | Rohde & Schwarz | SML03 | GTS236 | May 10 2013 | May 09 2015 |
| 23 | Signal Generator | AEROFLEX | IFR3414 | 341300/019 | Sept. 10 2014 | Sept. 10 2015 |
| 24 | Power Meter | Giga-tronics | 8541C | 1831177 | Sept. 10 2014 | Sept. 10 2015 |
| 25 | Power Sensor | Giga-tronics | 80601A | 1831785 | Sept. 10 2014 | Sept. 10 2015 |
| 26 | Power Attenuator | BTI | 30dB/250W | 040706090 | Sept. 10 2014 | Sept. 10 2015 |
| 27 | Power Attenuator | BTI | 20dB | 040706089 | Sept. 10 2014 | Sept. 10 2015 |
| 28 | Power Attenuator | BTI | 10dB | 040706088 | Sept. 10 2014 | Sept. 10 2015 |
| 29 | Signal Generator | Agilent | E4438C | MY45093111 | Oct.21 2014 | Oct.20 2015 |
| 30 | Signal Generator | Agilent | 4432B | GB40051373 | May 10 2014 | May 09 2015 |

# 6 TEST CONFIGURATION AND CONDITIONS

## 6.1 EUT Configuration

This mBSC1900-040-RUC11 and mBSC1900-020-RUC11 is the Remote Unit on BTI CM system. This remote unit supports 1900MHz band with the air standard WCDMA, CDMA, CDMA EV-DO, and GSM. The unit consists of Duplexer, PA and CPU board. This product is designed to operate in an outdoor or indoor environment. The output power of the RUM at Antenna interface port is average 40W and 20Wfor Downlink path with Convection Cooling.

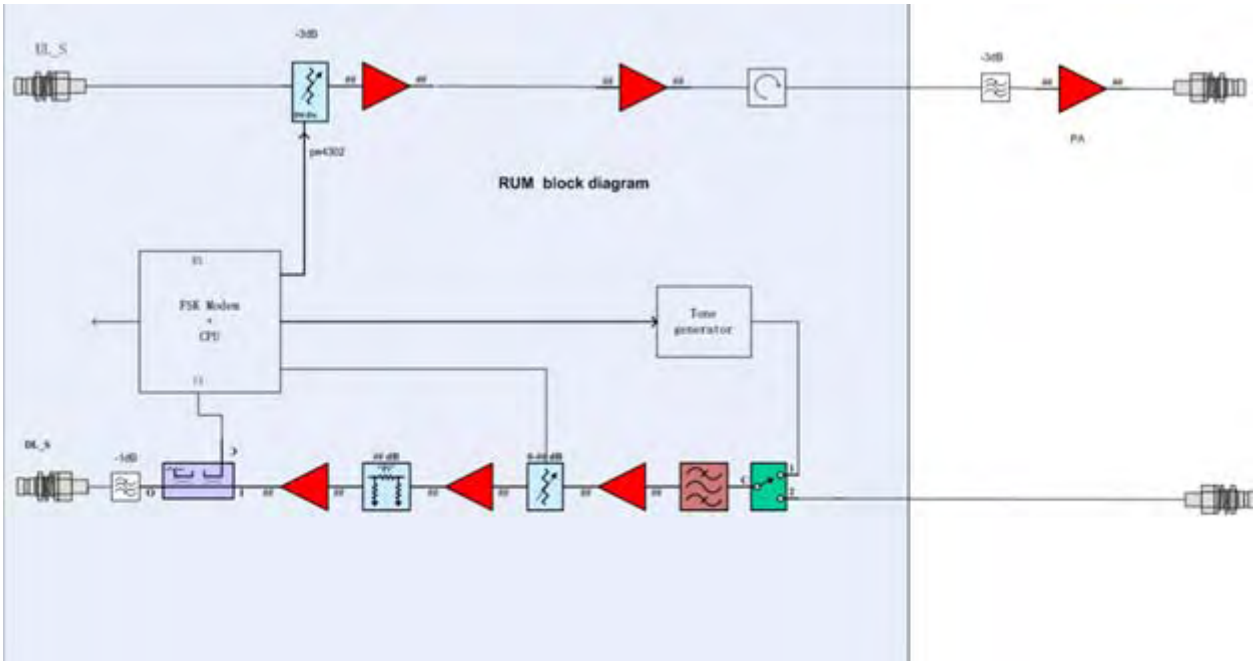
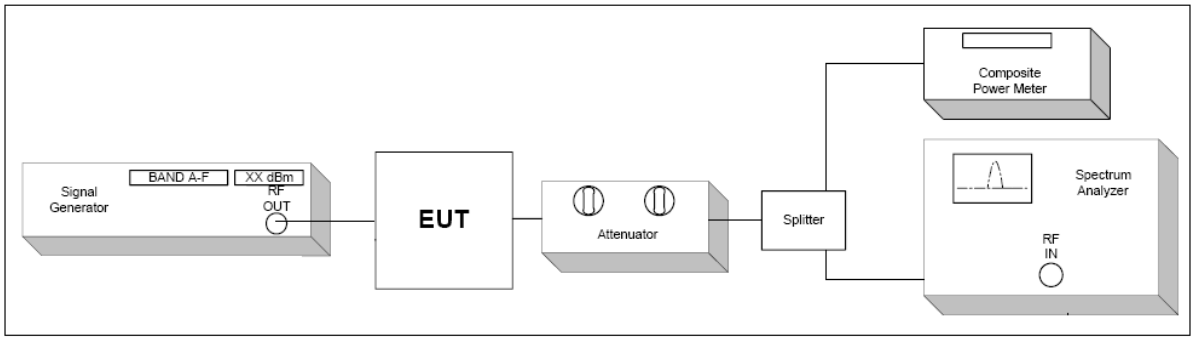



**Figure 1: Remote Unit block diagram**

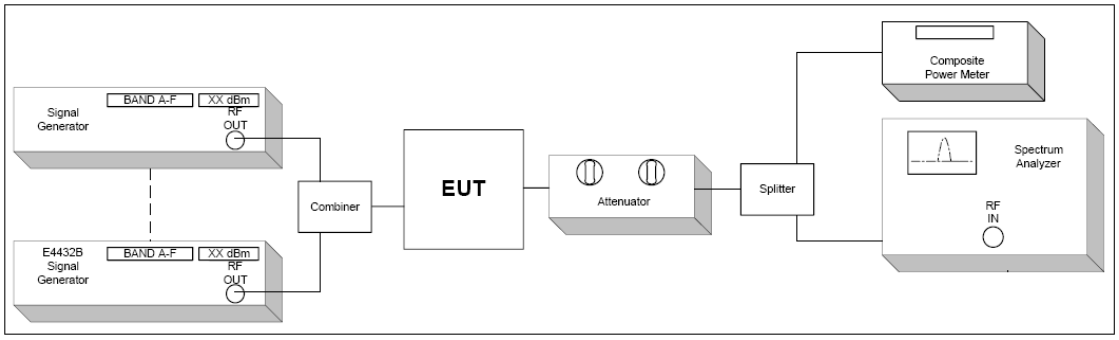
For details, refer to technical document and the user manual.

## 6.2 Configuration of Tested System

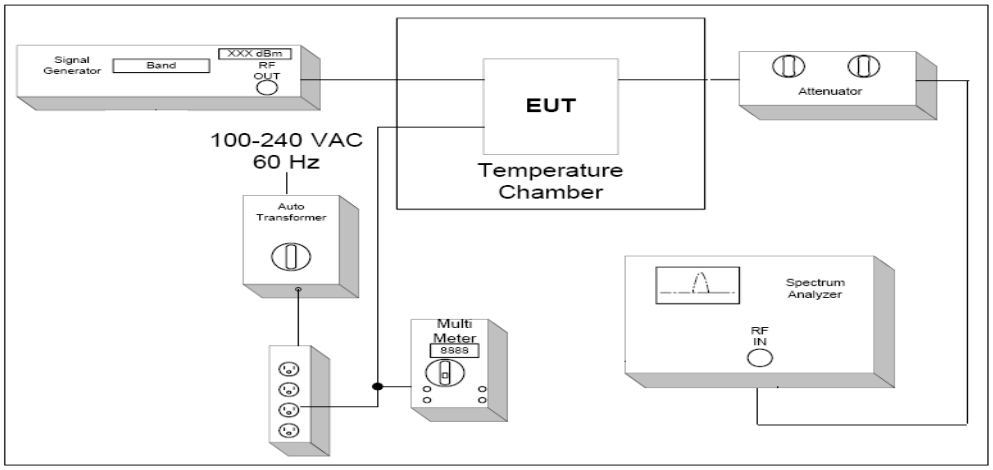
(A) RF Output Power, Occupied Bandwidth, Spurious Emissions at Antenna Terminal, Band Edge, Test Set-UP



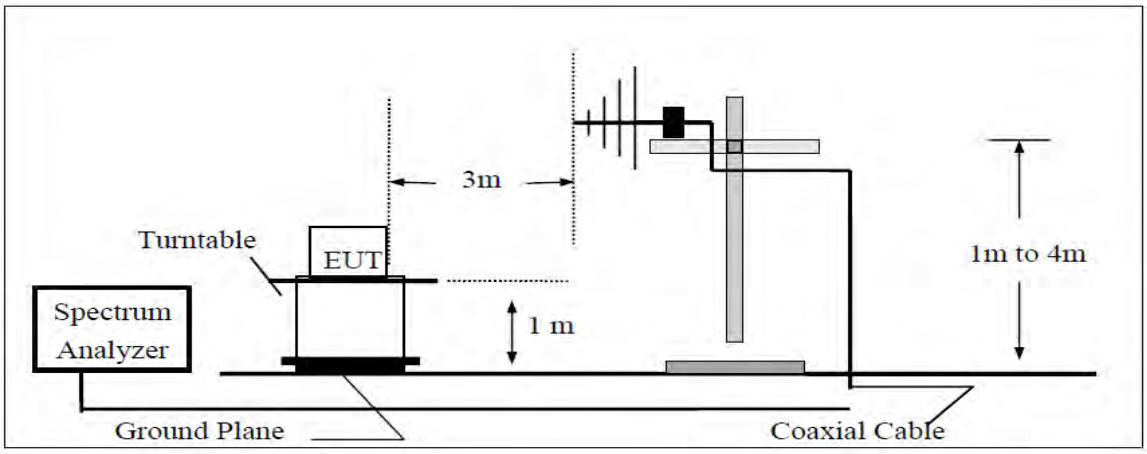

(B) Intermodulation Test Set-UP



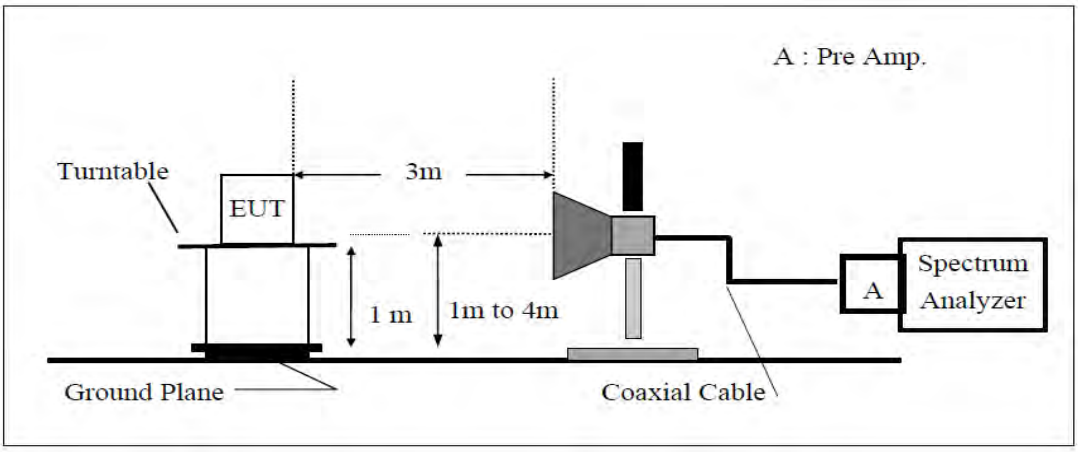

(C)Frequency stability Test Set-UP



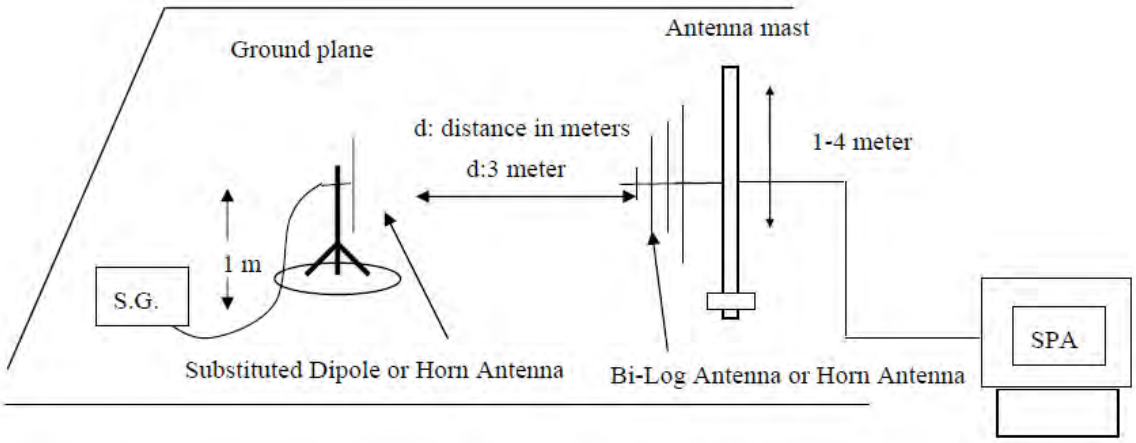
(D) Radiated Emission Test Set-Up, Frequency below 1000MHz




(E) Radiated Emission Test Set-UP Frequency over 1 GHz




(F) Substituted Method Test Set-UP



## 6.3 Test Environments

| Condition | Minimum value | Maximum value |
|---|---|---|
| Barometric pressure | 86 kPa | 106 kPa |
| Temperature | 15°C | 30°C |
| Relative Humidity | 20 % | 75 % |
| Power supply range | ±5% of rated voltages | |
| Normal Test Condition | (1).Temperature: +15 °C to +30 °C;<br>(2). voltage is 120V AC. | |
| Extreme Test Conditions: | (1). Temperatures: -20°C to +55°C.<br>(2). Voltages: 102V AC to 138V AC. | |

## 6.4 Test signal

1: Test signal WCDMA

Signal waveform according to Test Model 1 of standard specification 3GPP TS25.141. Signal modulated with a combination of PCCPCH, SCCPCH and Dedicated Physical Channels specified as test model 1 64 DPCH.

2: Test signal CDMA

Signal waveform according to 3GPP2 C.S0010-C

3: Test signal CDMA EV-DO

Signal waveform according to 3GPP2 C.S0032-B

4: Test signal GSM

Signal waveform according to clause 6.4 of standard specification 3GPP TS 151 010-1(2014-11)

5: Test signal CW

N/A

## 6.5 Test frequency selection

Downlink:

| Operating Mode(TX) | Channels No. / Multi- Carriers | Channels frequency (MHz) | | |
|---|---|---|---|---|
| | | Low Ch. | Mid Ch. | High Ch. |
| WCDMA | Single Carrier | 1932.40 | 1962.50 | 1992.60 |
| | Two Carriers | 1934.80 | 1962.50 | 1990.20 |
| | Three Carrier | 1937.20 | 1962.50 | 1987.80 |
| | Four Carrier | 1939.60 | 1962.50 | 1985.40 |
| CDMA | Single Carrier | 1931.25 | 1962.50 | 1993.75 |
| | Two Carriers | 1932.50 | 1962.50 | 1992.50 |
| | Three Carrier | 1933.75 | 1962.50 | 1991.25 |
| | Four Carrier | 1935.00 | 1962.50 | 1990.00 |
| CDMA EV-DO | Single Carrier | 1931.25 | 1962.50 | 1993.75 |
| | Two Carriers | 1932.50 | 1962.50 | 1992.50 |
| | Three Carrier | 1933.75 | 1962.50 | 1991.25 |
| | Four Carrier | 1935.00 | 1962.50 | 1990.00 |
| GSM | Single Carrier | 1930.20 | 1962.50 | 1994.80 |
| | Two Carriers | 1930.40 | 1962.50 | 1994.60 |
| | Three Carrier | 1930.60 | 1962.50 | 1994.40 |
| | Four Carrier | 1931.70 | 1962.50 | 1993.30 |

Uplink:

| Operating Mode(TX) | Channels No. / Multi- Carriers | Channels frequency (MHz) | | |
|---|---|---|---|---|
| | | Low Ch. | Mid Ch. | High Ch. |
| WCDMA | Single Carrier | 1852.40 | 1882.50 | 1912.60 |
| | Two Carriers | 1854.80 | 1882.50 | 1910.20 |
| | Three Carrier | 1857.20 | 1882.50 | 1907.80 |
| | Four Carrier | 1859.60 | 1882.50 | 1905.40 |
| CDMA | Single Carrier | 1851.25 | 1882.50 | 1913.75 |
| | Two Carriers | 1852.50 | 1882.50 | 1912.50 |
| | Three Carrier | 1853.75 | 1882.50 | 1911.25 |
| | Four Carrier | 1855.00 | 1882.50 | 1910.00 |
| CDMA EV-DO | Single Carrier | 1851.25 | 1882.50 | 1913.75 |
| | Two Carriers | 1852.50 | 1882.50 | 1912.50 |
| | Three Carrier | 1853.75 | 1882.50 | 1911.25 |
| | Four Carrier | 1855.00 | 1882.50 | 1910.00 |
| GSM | Single Carrier | 1850.20 | 1882.50 | 1914.80 |
| | Two Carriers | 1850.40 | 1882.50 | 1914.60 |
| | Three Carrier | 1850.60 | 1882.50 | 1914.40 |
| | Four Carrier | 1851.70 | 1882.50 | 1913.30 |

## 6.6 DESCRIPTION OF TEST MODES

| Test mode | Detail description of the test mode |
|---|---|
| Downlink | Downlink (Low channel; middle channel; high channel) |
| Uplink | Uplink (Low channel; middle channel; high channel) |
| Multi-carrier | Single Carrier; two carrier; three carrier; four carrier |
| Multi-bandwidth | WCDMA: 5MHz, CDMA / CDMA EV-DO: 1.25MHz<br>GSM: 200KHz |
| Modulation type | WCDMA/CDMA/CDMA EV-DO/GSM |

Remark:

1: The EUT was powered by 120VAC.

2: The EUT was configured for maximum gain and maximum ouput power. The input power was the maximum declared by the manufacturer.This is to ensure that the equipment is operating in the linear output range.

3: Signal generator was used to provide the input signals to the EUT. Tests were performed with WCDMA/CDMA/CDMA EV-DO/GSM signal input and multi-carrier signal mode input.

4: Pre-test all test modes as above, only the worst case and typical mode is list in report it.

# 7 RF POWER OUTPUT MEASUREMENT

## 7.1 Standard Applicable

According to FCC § 2.1046 and § 24.232(a).

## 7.2 Test setup

Please refer the section §6.2 Configuration of Tested System.

## 7.3 Measurement Procedure

1. The output from the EUT t signal shall be increased, antenna connector was connected to the power meter.

2. The level of RF input until the maximum output power per channel, declared by client, is reached.

3. The RF output power was measured at low, middle and high channel with WCDMA/CDMA/CDMA EV-DO/GSM signal.

## 7.4 Test Result

**40W**
Downlink:

| Test mode | Carrier Conf. | Channel | Average Power （dBm） | Average Power （W） | Result |
|---|---|---|---|---|---|
| WCDMA | Single Carrier | Low | 46.11 | 40.83 | Compliant |
| | | Middle | 46.26 | 42.27 | Compliant |
| | | High | 46.24 | 42.07 | Compliant |
| | Two Carrier | Low | 46.12 | 40.93 | Compliant |
| | | Middle | 46.15 | 41.21 | Compliant |
| | | High | 46.11 | 40.83 | Compliant |
| | Three Carrier | Low | 46.06 | 40.37 | Compliant |
| | | Middle | 46.10 | 40.74 | Compliant |
| | | High | 46.03 | 40.09 | Compliant |
| | Four Carrier | Low | 45.97 | 39.54 | Compliant |
| | | Middle | 45.98 | 39.63 | Compliant |
| | | High | 45.85 | 38.46 | Compliant |
| CDMA | Single Carrier | Low | 46.23 | 41.98 | Compliant |
| | | Middle | 46.25 | 42.17 | Compliant |
| | | High | 46.15 | 41.21 | Compliant |
| | Two Carrier | Low | 46.13 | 41.02 | Compliant |
| | | Middle | 46.17 | 41.40 | Compliant |
| | | High | 46.06 | 40.36 | Compliant |
| | Three Carrier | Low | 46.11 | 40.83 | Compliant |
| | | Middle | 46.15 | 41.21 | Compliant |
| | | High | 46.00 | 39.81 | Compliant |
| | Four Carrier | Low | 45.89 | 38.82 | Compliant |
| | | Middle | 45.92 | 39.08 | Compliant |
| | | High | 45.86 | 38.55 | Compliant |

| Test mode | Carrier Conf. | Channel | Average Power （dBm） | Average Power （W） | Result |
|---|---|---|---|---|---|
| CDMA EV-DO | Single Carrier | Low | 46.13 | 41.02 | Compliant |
| | | Middle | 46.11 | 40.83 | Compliant |
| | | High | 46.09 | 40.64 | Compliant |
| | Two Carrier | Low | 45.90 | 38.91 | Compliant |
| | | Middle | 45.99 | 39.72 | Compliant |
| | | High | 45.86 | 38.55 | Compliant |
| | Three Carrier | Low | 45.97 | 39.54 | Compliant |
| | | Middle | 46.00 | 39.81 | Compliant |
| | | High | 45.87 | 38.64 | Compliant |
| | Four Carrier | Low | 45.79 | 37.93 | Compliant |
| | | Middle | 45.83 | 38.28 | Compliant |
| | | High | 45.81 | 38.11 | Compliant |
| GSM | Single Carrier | Low | 46.24 | 42.07 | Compliant |
| | | Middle | 46.25 | 42.17 | Compliant |
| | | High | 46.21 | 41.78 | Compliant |
| | Two Carrier | Low | 46.19 | 41.59 | Compliant |
| | | Middle | 46.20 | 41.69 | Compliant |
| | | High | 46.13 | 41.02 | Compliant |
| | Three Carrier | Low | 46.05 | 40.27 | Compliant |
| | | Middle | 46.12 | 40.93 | Compliant |
| | | High | 46.02 | 39.99 | Compliant |
| | Four Carrier | Low | 45.99 | 39.72 | Compliant |
| | | Middle | 46.03 | 40.09 | Compliant |
| | | High | 45.89 | 38.82 | Compliant |

Uplink:

| Test mode | Carrier Conf. | Channel | Average Power （dBm） | Average Power （W） | Result |
|---|---|---|---|---|---|
| WCDMA | Single Carrier | Low | 5.13 | 0.0033 | Compliant |
| | | Middle | 5.25 | 0.0033 | Compliant |
| | | High | 5.14 | 0.0033 | Compliant |
| | Two Carrier | Low | 5.11 | 0.0032 | Compliant |
| | | Middle | 5.16 | 0.0033 | Compliant |
| | | High | 5.09 | 0.0032 | Compliant |
| | Three Carrier | Low | 5.08 | 0.0032 | Compliant |
| | | Middle | 5.09 | 0.0032 | Compliant |
| | | High | 5.01 | 0.0032 | Compliant |
| | Four Carrier | Low | 4.95 | 0.0031 | Compliant |
| | | Middle | 4.99 | 0.0032 | Compliant |
| | | High | 4.86 | 0.0031 | Compliant |
| CDMA | Single Carrier | Low | 5.15 | 0.0033 | Compliant |
| | | Middle | 5.24 | 0.0033 | Compliant |
| | | High | 5.21 | 0.0033 | Compliant |
| | Two Carrier | Low | 5.14 | 0.0033 | Compliant |
| | | Middle | 5.16 | 0.0033 | Compliant |
| | | High | 5.08 | 0.0032 | Compliant |
| | Three Carrier | Low | 5.11 | 0.0032 | Compliant |
| | | Middle | 5.12 | 0.0033 | Compliant |
| | | High | 5.05 | 0.0032 | Compliant |
| | Four Carrier | Low | 4.98 | 0.0031 | Compliant |
| | | Middle | 5.06 | 0.0032 | Compliant |
| | | High | 4.98 | 0.0031 | Compliant |

| Test mode | Carrier Conf. | Channel | Average Power （dBm） | Average Power （W） | Result |
|---|---|---|---|---|---|
| CDMA EV-DO | Single Carrier | Low | 5.08 | 0.0032 | Compliant |
| | | Middle | 5.12 | 0.0033 | Compliant |
| | | High | 5.06 | 0.0032 | Compliant |
| | Two Carrier | Low | 5.03 | 0.0032 | Compliant |
| | | Middle | 5.06 | 0.0032 | Compliant |
| | | High | 5.02 | 0.0032 | Compliant |
| | Three Carrier | Low | 4.99 | 0.0032 | Compliant |
| | | Middle | 5.00 | 0.0032 | Compliant |
| | | High | 4.98 | 0.0031 | Compliant |
| | Four Carrier | Low | 4.89 | 0.0031 | Compliant |
| | | Middle | 4.95 | 0.0031 | Compliant |
| | | High | 4.87 | 0.0031 | Compliant |
| GSM | Single Carrier | Low | 5.12 | 0.0033 | Compliant |
| | | Middle | 5.16 | 0.0033 | Compliant |
| | | High | 5.11 | 0.0032 | Compliant |
| | Two Carrier | Low | 5.08 | 0.0032 | Compliant |
| | | Middle | 5.10 | 0.0032 | Compliant |
| | | High | 5.06 | 0.0032 | Compliant |
| | Three Carrier | Low | 5.06 | 0.0032 | Compliant |
| | | Middle | 5.03 | 0.0032 | Compliant |
| | | High | 5.00 | 0.0032 | Compliant |
| | Four Carrier | Low | 4.98 | 0.0031 | Compliant |
| | | Middle | 5.01 | 0.0032 | Compliant |
| | | High | 4.92 | 0.0031 | Compliant |

**20W**
Downlink:

| Test mode | Carrier Conf. | Channel | Average Power （dBm） | Average Power （W） | Result |
|---|---|---|---|---|---|
| WCDMA | Single Carrier | Low | 43.23 | 21.04 | Compliant |
| | | Middle | 43.25 | 21.14 | Compliant |
| | | High | 43.12 | 20.51 | Compliant |
| | Two Carrier | Low | 43.15 | 20.65 | Compliant |
| | | Middle | 43.16 | 20.70 | Compliant |
| | | High | 43.06 | 20.23 | Compliant |
| | Three Carrier | Low | 43.11 | 20.46 | Compliant |
| | | Middle | 43.13 | 20.56 | Compliant |
| | | High | 43.02 | 20.05 | Compliant |
| | Four Carrier | Low | 42.98 | 19.86 | Compliant |
| | | Middle | 43.05 | 20.18 | Compliant |
| | | High | 42.97 | 19.82 | Compliant |
| CDMA | Single Carrier | Low | 43.16 | 20.70 | Compliant |
| | | Middle | 43.19 | 20.85 | Compliant |
| | | High | 43.08 | 20.32 | Compliant |
| | Two Carrier | Low | 43.12 | 20.51 | Compliant |
| | | Middle | 43.15 | 20.65 | Compliant |
| | | High | 43.05 | 20.18 | Compliant |
| | Three Carrier | Low | 42.98 | 19.86 | Compliant |
| | | Middle | 42.99 | 19.91 | Compliant |
| | | High | 42.91 | 19.54 | Compliant |
| | Four Carrier | Low | 42.91 | 19.54 | Compliant |
| | | Middle | 42.89 | 19.45 | Compliant |
| | | High | 42.82 | 19.14 | Compliant |

| Test mode | Carrier Conf. | Channel | Average Power （dBm） | Average Power （W） | Result |
|---|---|---|---|---|---|
| CDMA EV-DO | Single Carrier | Low | 43.16 | 20.70 | Compliant |
| | | Middle | 43.23 | 21.04 | Compliant |
| | | High | 43.13 | 20.56 | Compliant |
| | Two Carrier | Low | 43.09 | 20.37 | Compliant |
| | | Middle | 43.11 | 20.46 | Compliant |
| | | High | 43.05 | 20.18 | Compliant |
| | Three Carrier | Low | 42.97 | 19.82 | Compliant |
| | | Middle | 42.95 | 19.72 | Compliant |
| | | High | 42.89 | 19.45 | Compliant |
| | Four Carrier | Low | 42.85 | 19.28 | Compliant |
| | | Middle | 42.92 | 19.59 | Compliant |
| | | High | 42.79 | 19.01 | Compliant |
| GSM | Single Carrier | Low | 43.16 | 20.70 | Compliant |
| | | Middle | 43.21 | 20.94 | Compliant |
| | | High | 43.11 | 20.46 | Compliant |
| | Two Carrier | Low | 43.05 | 20.18 | Compliant |
| | | Middle | 43.13 | 20.56 | Compliant |
| | | High | 43.06 | 20.23 | Compliant |
| | Three Carrier | Low | 42.97 | 19.82 | Compliant |
| | | Middle | 43.03 | 20.09 | Compliant |
| | | High | 42.78 | 18.97 | Compliant |
| | Four Carrier | Low | 42.79 | 19.01 | Compliant |
| | | Middle | 42.88 | 19.41 | Compliant |
| | | High | 42.75 | 18.84 | Compliant |

Uplink:

| Test mode | Carrier Conf. | Channel | Average Power （dBm） | Average Power （W） | Result |
|---|---|---|---|---|---|
| WCDMA | Single Carrier | Low | 5.12 | 0.0033 | Compliant |
| | | Middle | 5.23 | 0.0033 | Compliant |
| | | High | 5.16 | 0.0033 | Compliant |
| | Two Carrier | Low | 5.09 | 0.0032 | Compliant |
| | | Middle | 5.11 | 0.0032 | Compliant |
| | | High | 5.03 | 0.0032 | Compliant |
| | Three Carrier | Low | 5.00 | 0.0032 | Compliant |
| | | Middle | 5.03 | 0.0032 | Compliant |
| | | High | 4.95 | 0.0031 | Compliant |
| | Four Carrier | Low | 4.88 | 0.0031 | Compliant |
| | | Middle | 4.91 | 0.0031 | Compliant |
| | | High | 4.86 | 0.0031 | Compliant |
| CDMA | Single Carrier | Low | 5.16 | 0.0033 | Compliant |
| | | Middle | 5.18 | 0.0033 | Compliant |
| | | High | 5.13 | 0.0033 | Compliant |
| | Two Carrier | Low | 5.08 | 0.0032 | Compliant |
| | | Middle | 5.12 | 0.0033 | Compliant |
| | | High | 5.08 | 0.0032 | Compliant |
| | Three Carrier | Low | 5.00 | 0.0032 | Compliant |
| | | Middle | 4.99 | 0.0032 | Compliant |
| | | High | 4.97 | 0.0031 | Compliant |
| | Four Carrier | Low | 4.89 | 0.0031 | Compliant |
| | | Middle | 4.93 | 0.0031 | Compliant |
| | | High | 4.78 | 0.0030 | Compliant |

| Test mode | Carrier Conf. | Channel | Average Power （dBm） | Average Power （W） | Result |
|---|---|---|---|---|---|
| CDMA EV-DO | Single Carrier | Low | 5.18 | 0.0033 | Compliant |
| | | Middle | 5.22 | 0.0033 | Compliant |
| | | High | 5.16 | 0.0033 | Compliant |
| | Two Carrier | Low | 5.13 | 0.0033 | Compliant |
| | | Middle | 5.16 | 0.0033 | Compliant |
| | | High | 5.09 | 0.0032 | Compliant |
| | Three Carrier | Low | 5.08 | 0.0032 | Compliant |
| | | Middle | 5.11 | 0.0032 | Compliant |
| | | High | 5.06 | 0.0032 | Compliant |
| | Four Carrier | Low | 4.98 | 0.0031 | Compliant |
| | | Middle | 5.03 | 0.0032 | Compliant |
| | | High | 4.99 | 0.0032 | Compliant |
| GSM | Single Carrier | Low | 5.21 | 0.0033 | Compliant |
| | | Middle | 5.26 | 0.0034 | Compliant |
| | | High | 5.16 | 0.0033 | Compliant |
| | Two Carrier | Low | 5.13 | 0.0033 | Compliant |
| | | Middle | 5.12 | 0.0033 | Compliant |
| | | High | 5.09 | 0.0032 | Compliant |
| | Three Carrier | Low | 5.07 | 0.0032 | Compliant |
| | | Middle | 5.01 | 0.0032 | Compliant |
| | | High | 4.95 | 0.0031 | Compliant |
| | Four Carrier | Low | 4.97 | 0.0031 | Compliant |
| | | Middle | 4.99 | 0.0032 | Compliant |
| | | High | 4.79 | 0.0030 | Compliant |

## 7.5 Peak to Average Ratio

Downlink:

| Test mode | Carrier Conf. | Peak to Average Ratio (dB) | | | Limit (dB) | Result |
|---|---|---|---|---|---|---|
| | | Low Ch. | Middle Ch. | High Ch. | | |
| WCDMA | Single Carrier | 4.44 | 4.47 | 4.33 | 13 | Compliant |
| | Two Carrier | 4.56 | 4.65 | 4.55 | 13 | Compliant |
| | Three Carrier | 4.51 | 4.46 | 4.53 | 13 | Compliant |
| | Four Carrier | 4.56 | 4.53 | 4.62 | 13 | Compliant |
| CDMA | Single Carrier | 6.32 | 6.35 | 6.43 | 13 | Compliant |
| | Two Carrier | 6.56 | 6.73 | 6.53 | 13 | Compliant |
| | Three Carrier | 6.71 | 6.59 | 6.68 | 13 | Compliant |
| | Four Carrier | 6.56 | 6.45 | 6.62 | 13 | Compliant |
| CDMA EV-DO | Single Carrier | 7.93 | 8.33 | 8.50 | 13 | Compliant |
| | Two Carrier | 8.21 | 8.46 | 8.56 | 13 | Compliant |
| | Three Carrier | 8.36 | 8.25 | 8.41 | 13 | Compliant |
| | Four Carrier | 8.25 | 8.41 | 8.34 | 13 | Compliant |
| GSM | Single Carrier | 0.56 | 0.65 | 0.58 | 13 | Compliant |
| | Two Carrier | 0.67 | 0.55 | 0.63 | 13 | Compliant |
| | Three Carrier | 0.72 | 0.75 | 0.72 | 13 | Compliant |
| | Four Carrier | 0.68 | 0.67 | 0.65 | 13 | Compliant |

Uplink:

| Test mode | Carrier Conf. | Peak to Average Ratio (dB) | | | Limit (dB) | Result |
|---|---|---|---|---|---|---|
| | | Low Ch. | Middle Ch. | High Ch. | | |
| WCDMA | Single Carrier | 4.35 | 4.62 | 4.43 | 13 | Compliant |
| | Two Carrier | 4.34 | 4.52 | 4.26 | 13 | Compliant |
| | Three Carrier | 4.55 | 4.65 | 4.56 | 13 | Compliant |
| | Four Carrier | 4.72 | 4.86 | 4.76 | 13 | Compliant |
| CDMA | Single Carrier | 6.77 | 6.43 | 6.53 | 13 | Compliant |
| | Two Carrier | 6.86 | 6.92 | 6.79 | 13 | Compliant |
| | Three Carrier | 6.88 | 6.96 | 6.87 | 13 | Compliant |
| | Four Carrier | 6.93 | 6.89 | 7.01 | 13 | Compliant |
| CDMA EV-DO | Single Carrier | 8.23 | 8.23 | 8.37 | 13 | Compliant |
| | Two Carrier | 8.52 | 8.46 | 8.42 | 13 | Compliant |
| | Three Carrier | 8.71 | 8.63 | 8.65 | 13 | Compliant |
| | Four Carrier | 8.69 | 8.57 | 8.48 | 13 | Compliant |
| GSM | Single Carrier | 0.63 | 0.77 | 0.93 | 13 | Compliant |
| | Two Carrier | 0.72 | 0.79 | 0.88 | 13 | Compliant |
| | Three Carrier | 0.82 | 0.85 | 0.93 | 13 | Compliant |
| | Four Carrier | 0.79 | 0.86 | 0.85 | 13 | Compliant |

# 8 PASSBAND GAIN AND BANDWIDTH

## 8.1 Standard Applicable

According to FCC § 2.1049

## 8.2 Test setup

Please refer the section §6.2 Configuration of Tested System.

## 8.3 Test Procedure

1. The EUT RF output port was connected to spectrum analyzer.

2. The level of RF input signal shall be increased, until the maximum output power per channel, declared by client, is reached.

3. The spectrum analyzer was setup to measure the Occupied Bandwidth (defined as the 99% Power Bandwidth).

4. The Occupied Bandwidth was measured at the input and output ports of the EUT at low, middle and high channel of each type of modulation and each type of carrier signal.

Spectrum analyzer settings:

Detector: RMS.

WCDMA: RBW= 100 kHz VBW≥RBW Sweep: Auto

CDMA/ CDMA EV-DO: RBW= 30 kHz VBW=100kHz Sweep: Auto

GSM: RBW= 1 kHz VBW=3kHz Sweep: Auto

## 8.4 Test Result

## Pass band Gain

Downlink:

| Test mode | Carrier Conf. | Channel | Pass band Gain (dB) | Nominal Gain (dB) | Result |
|---|---|---|---|---|---|
| WCDMA | Single Carrier | Low | 64.78 | 65dB | Compliant |
| | | Middle | 64.71 | | Compliant |
| | | High | 64.68 | | Compliant |
| | Two Carrier | Low | 64.85 | | Compliant |
| | | Middle | 64.78 | | Compliant |
| | | High | 64.58 | | Compliant |
| | Three Carrier | Low | 64.69 | | Compliant |
| | | Middle | 64.55 | | Compliant |
| | | High | 64.75 | | Compliant |
| | Four Carrier | Low | 64.61 | | Compliant |
| | | Middle | 64.53 | | Compliant |
| | | High | 64.63 | | Compliant |
| CDMA | Single Carrier | Low | 64.64 | | Compliant |
| | | Middle | 64.55 | | Compliant |
| | | High | 64.48 | | Compliant |
| | Two Carrier | Low | 64.75 | | Compliant |
| | | Middle | 64.52 | | Compliant |
| | | High | 64.49 | | Compliant |
| | Three Carrier | Low | 64.71 | | Compliant |
| | | Middle | 64.59 | | Compliant |
| | | High | 64.67 | | Compliant |
| | Four Carrier | Low | 64.53 | | Compliant |
| | | Middle | 64.78 | | Compliant |
| | | High | 64.46 | | Compliant |

| Test mode | Carrier Conf. | Channel | Pass band Gain (dB) | Nominal Gain (dB) | Result |
|---|---|---|---|---|---|
| CDMA EV-DO | Single Carrier | Low | 64.49 | 65dB | Compliant |
| | | Middle | 64.56 | | Compliant |
| | | High | 64.55 | | Compliant |
| | Two Carrier | Low | 64.75 | | Compliant |
| | | Middle | 64.63 | | Compliant |
| | | High | 64.71 | | Compliant |
| | Three Carrier | Low | 64.78 | | Compliant |
| | | Middle | 64.45 | | Compliant |
| | | High | 64.56 | | Compliant |
| | Four Carrier | Low | 64.68 | | Compliant |
| | | Middle | 64.74 | | Compliant |
| | | High | 64.55 | | Compliant |
| GSM | Single Carrier | Low | 64.58 | | Compliant |
| | | Middle | 64.65 | | Compliant |
| | | High | 64.52 | | Compliant |
| | Two Carrier | Low | 64.76 | | Compliant |
| | | Middle | 64.59 | | Compliant |
| | | High | 64.72 | | Compliant |
| | Three Carrier | Low | 64.59 | | Compliant |
| | | Middle | 64.68 | | Compliant |
| | | High | 64.73 | | Compliant |
| | Four Carrier | Low | 64.85 | | Compliant |
| | | Middle | 64.82 | | Compliant |
| | | High | 64.87 | | Compliant |

Uplink:

| Test mode | Carrier Conf. | Channel | Passband Gain (dB) | Nominal Gain (dB) | Result |
|---|---|---|---|---|---|
| WCDMA | Single Carrier | Low | 57.66 | 58dB | Compliant |
| | | Middle | 57.69 | | Compliant |
| | | High | 57.72 | | Compliant |
| | Two Carrier | Low | 57.59 | | Compliant |
| | | Middle | 57.68 | | Compliant |
| | | High | 57.65 | | Compliant |
| | Three Carrier | Low | 57.66 | | Compliant |
| | | Middle | 57.49 | | Compliant |
| | | High | 57.62 | | Compliant |
| | Four Carrier | Low | 57.81 | | Compliant |
| | | Middle | 57.62 | | Compliant |
| | | High | 57.63 | | Compliant |
| CDMA | Single Carrier | Low | 57.75 | | Compliant |
| | | Middle | 57.71 | | Compliant |
| | | High | 57.79 | | Compliant |
| | Two Carrier | Low | 57.74 | | Compliant |
| | | Middle | 57.65 | | Compliant |
| | | High | 57.58 | | Compliant |
| | Three Carrier | Low | 57.66 | | Compliant |
| | | Middle | 57.45 | | Compliant |
| | | High | 57.39 | | Compliant |
| | Four Carrier | Low | 57.52 | | Compliant |
| | | Middle | 57.51 | | Compliant |
| | | High | 57.35 | | Compliant |

| Test mode | Carrier Conf. | Channel | Pass band Gain (dB) | Nominal Gain (dB) | Result |
|---|---|---|---|---|---|
| CDMA EV-DO | Single Carrier | Low | 57.61 | 58dB | Compliant |
| | | Middle | 57.29 | | Compliant |
| | | High | 57.46 | | Compliant |
| | Two Carrier | Low | 57.44 | | Compliant |
| | | Middle | 57.38 | | Compliant |
| | | High | 57.49 | | Compliant |
| | Three Carrier | Low | 57.62 | | Compliant |
| | | Middle | 57.59 | | Compliant |
| | | High | 57.60 | | Compliant |
| | Four Carrier | Low | 57.45 | | Compliant |
| | | Middle | 57.68 | | Compliant |
| | | High | 57.48 | | Compliant |
| GSM | Single Carrier | Low | 57.42 | | Compliant |
| | | Middle | 57.39 | | Compliant |
| | | High | 57.52 | | Compliant |
| | Two Carrier | Low | 57.66 | | Compliant |
| | | Middle | 57.73 | | Compliant |
| | | High | 57.56 | | Compliant |
| | Three Carrier | Low | 57.56 | | Compliant |
| | | Middle | 57.48 | | Compliant |
| | | High | 57.44 | | Compliant |
| | Four Carrier | Low | 57.52 | | Compliant |
| | | Middle | 57.63 | | Compliant |
| | | High | 57.51 | | Compliant |

## Input/output Bandwidth Comparison

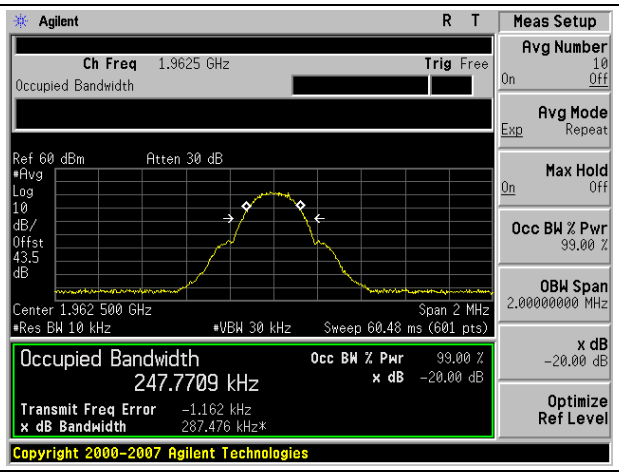
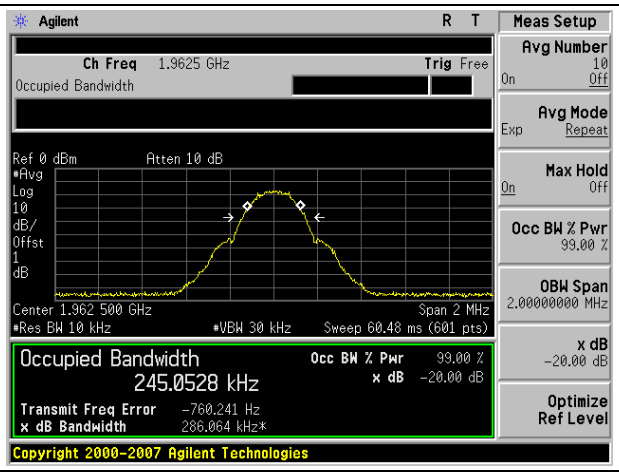
Remark:

only middle channel of comparison of input/output is list in the following pages.

Downlink:

**Input/output Bandwidth Comparison for GSM**

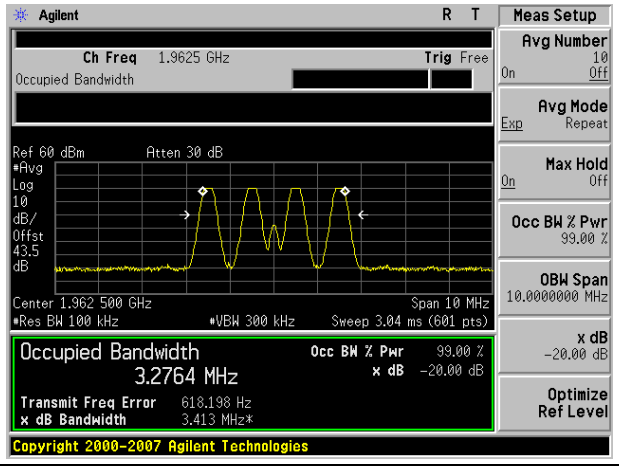
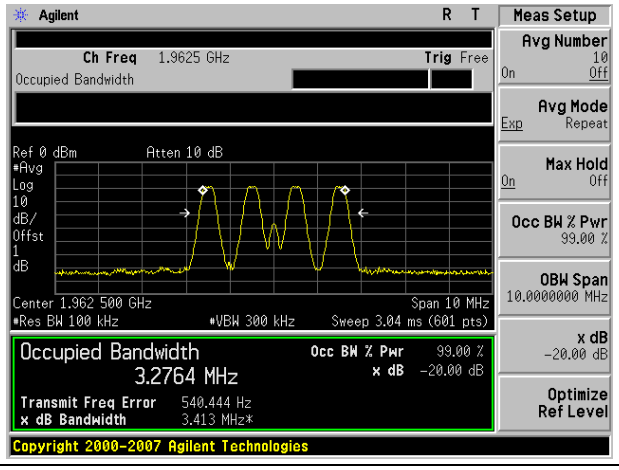
1. Number of Carriers: Single carrier

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |



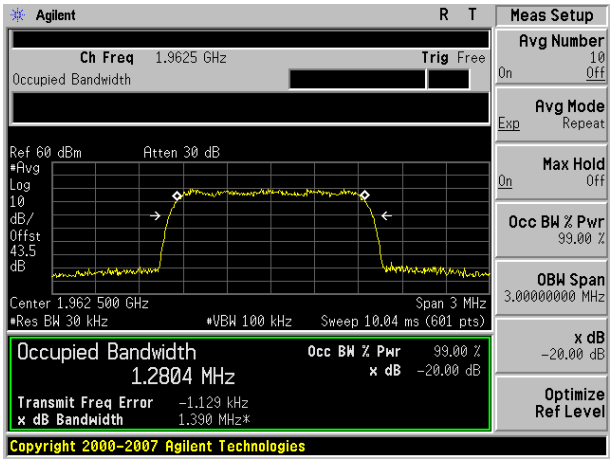
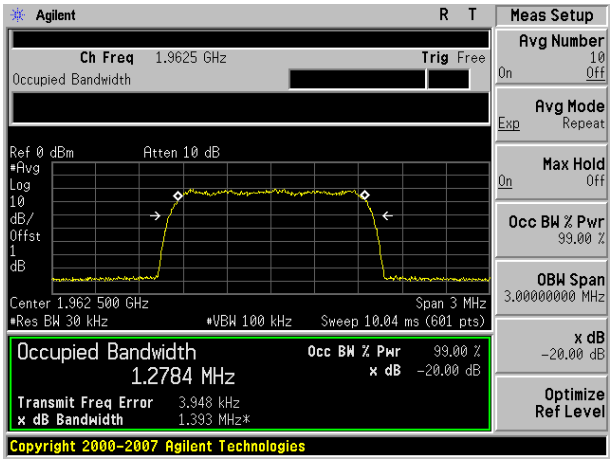


2. Number of Carriers: Four carriers

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |

**Input/output Bandwidth Comparison for CDMA**

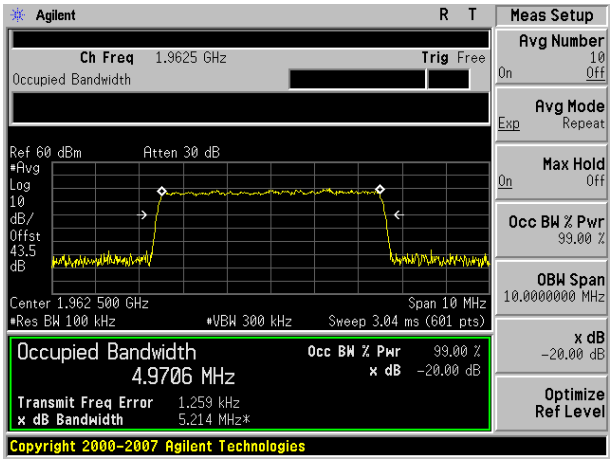
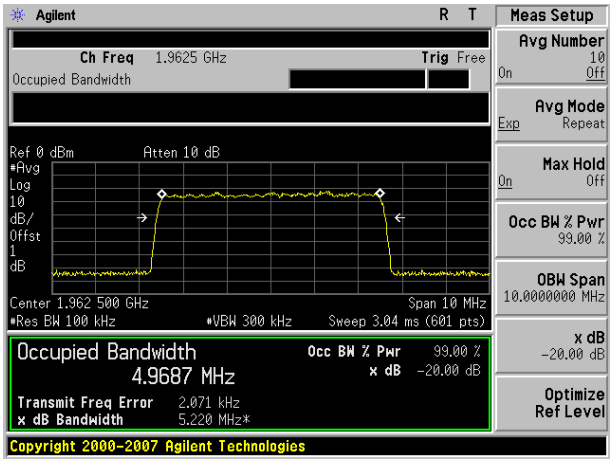
1. Number of Carriers: Single carrier

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |



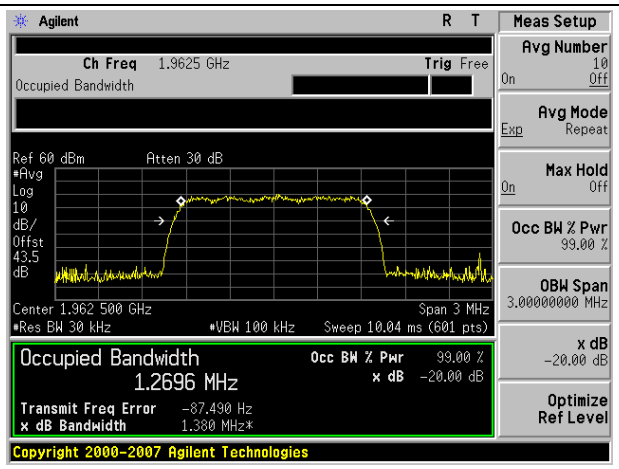
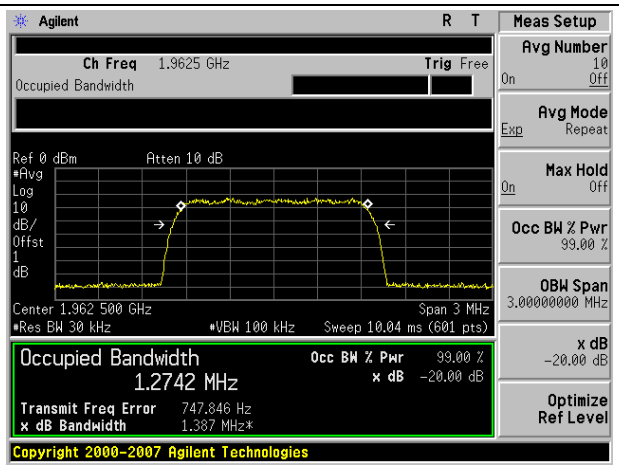


2. Number of Carriers: Four carriers

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |

**Input/output Bandwidth Comparison for CDMA EVDO**

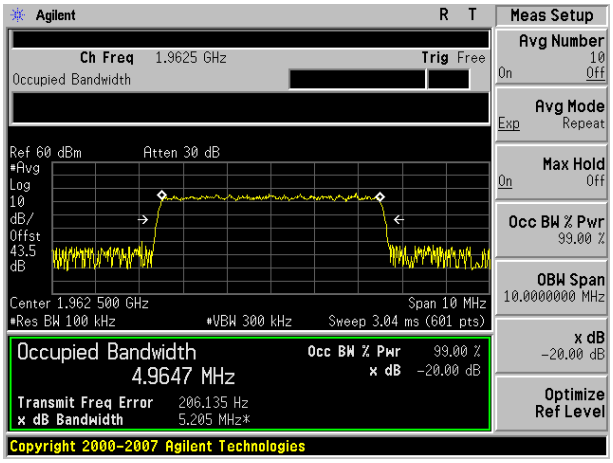
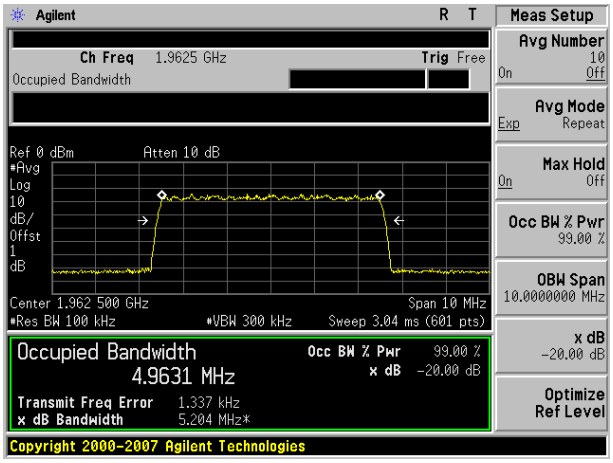
1. Number of Carriers: Single carrier

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |



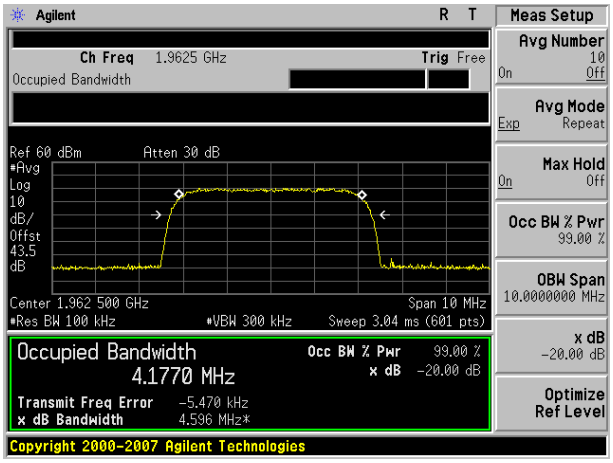
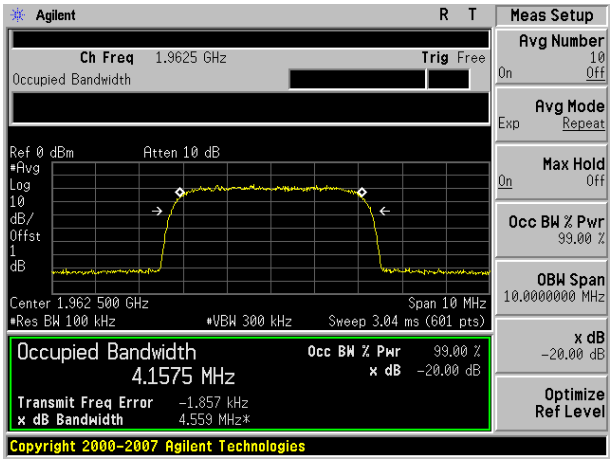


2. Number of Carriers: Four carriers

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |

**Input/output Bandwidth Comparison for WCDMA**

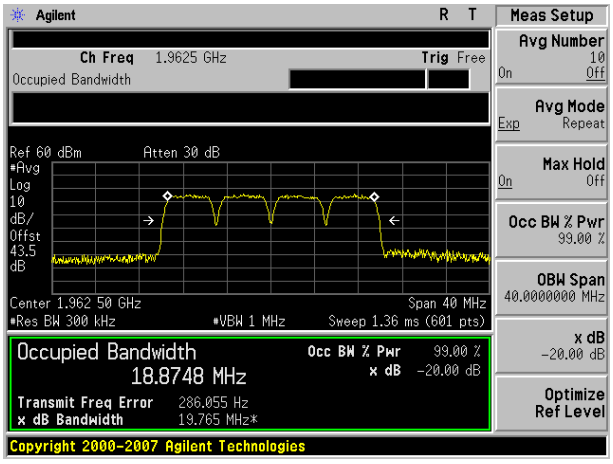
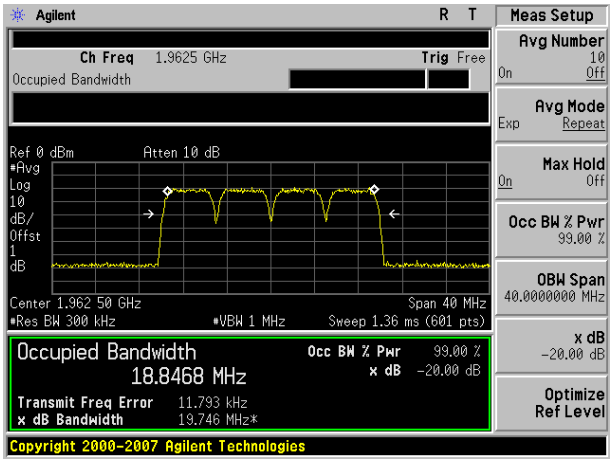
1. Number of Carriers: Single carrier

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |





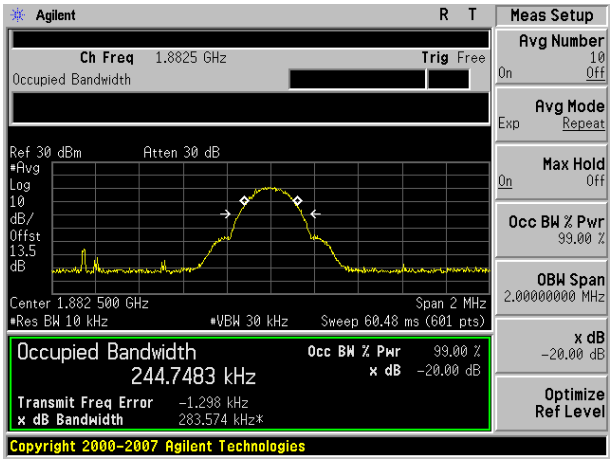
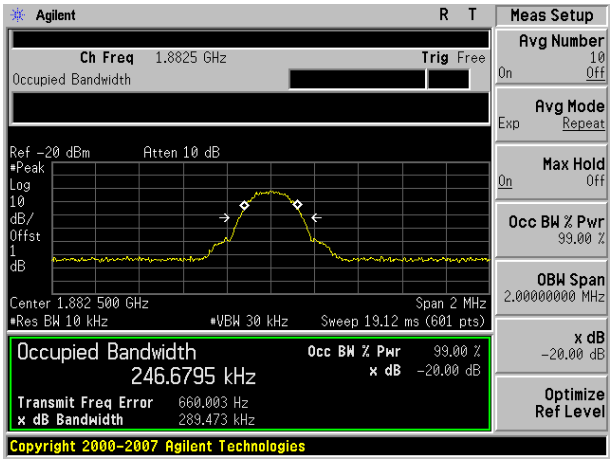
2. Number of Carriers: Four carriers

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |

Uplink:

**Input/output Bandwidth Comparison for GSM**

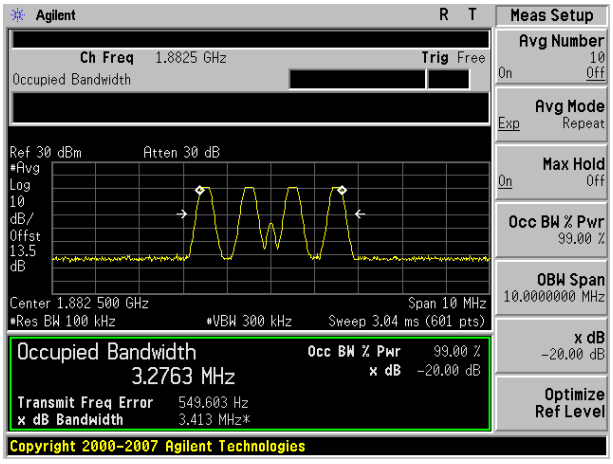
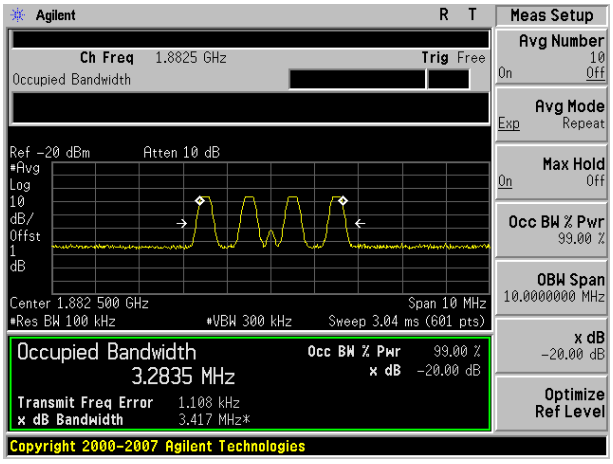
1. Number of Carriers: Single carrier

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |



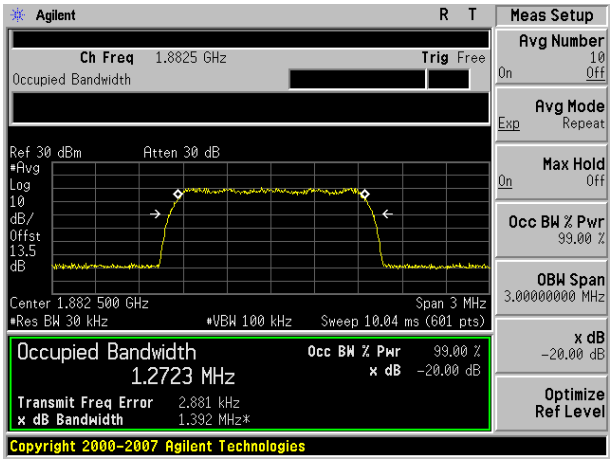
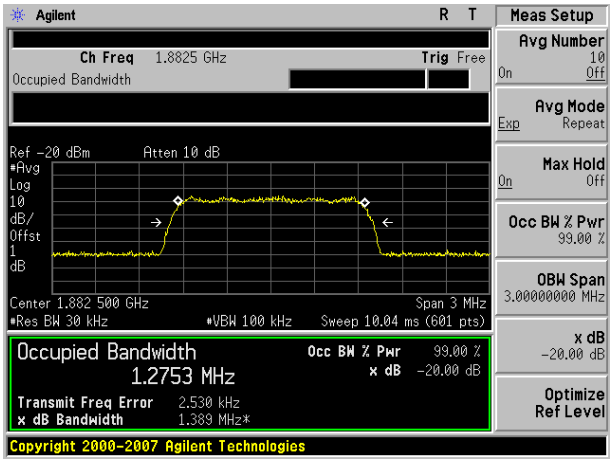


2. Number of Carriers: Four carriers

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |

**Input/output Bandwidth Comparison for CDMA**

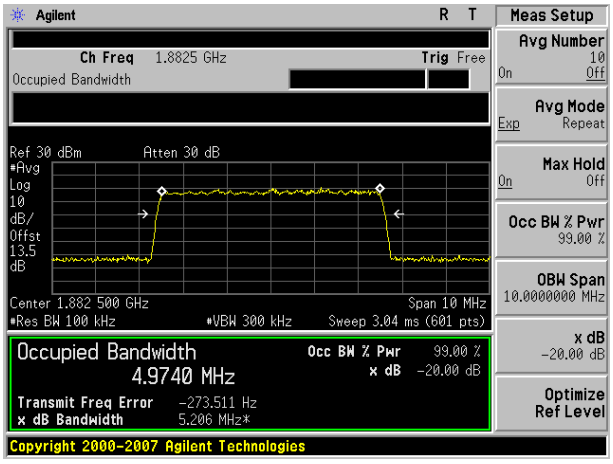
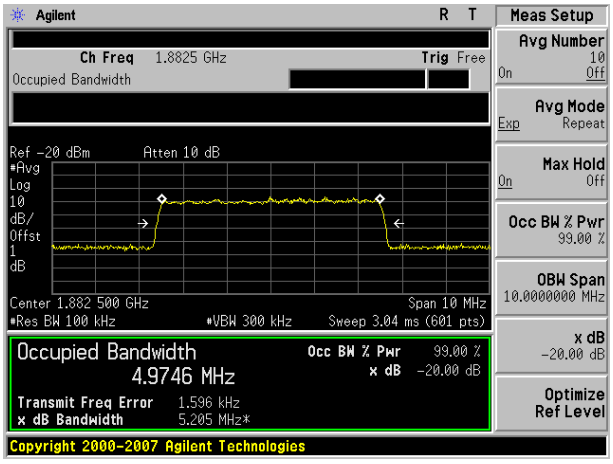
1. Number of Carriers: Single carrier

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |



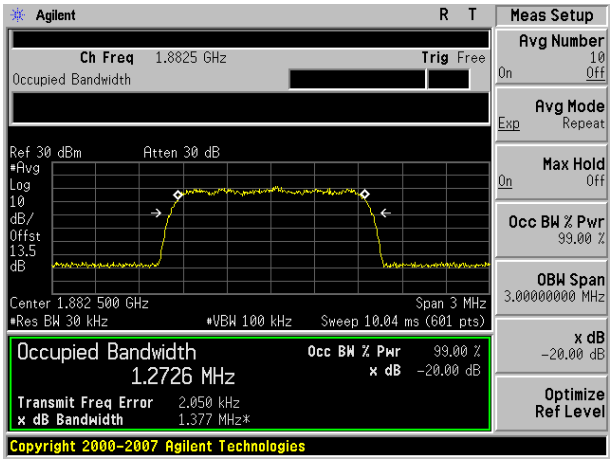
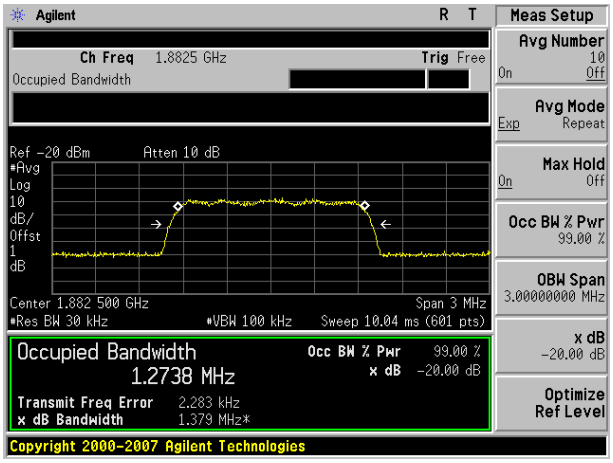


2. Number of Carriers: Four carriers

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |

**Input/output Bandwidth Comparison for EVDO**

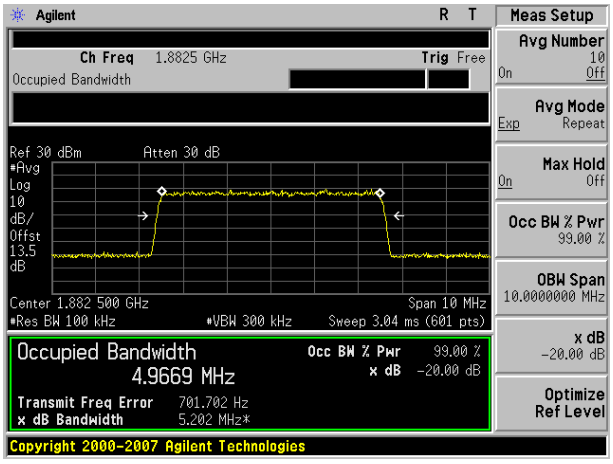
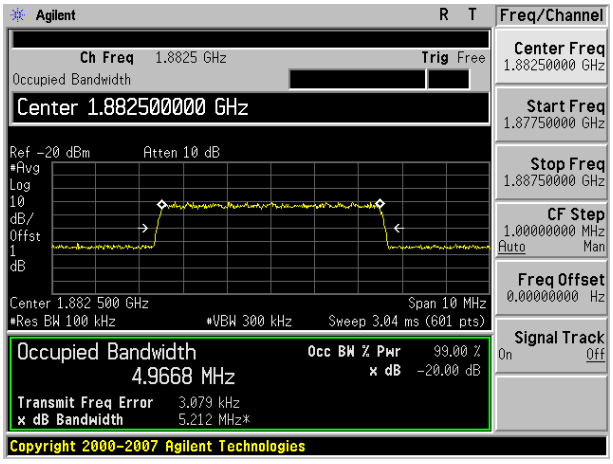
1. Number of Carriers: Single carrier

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |



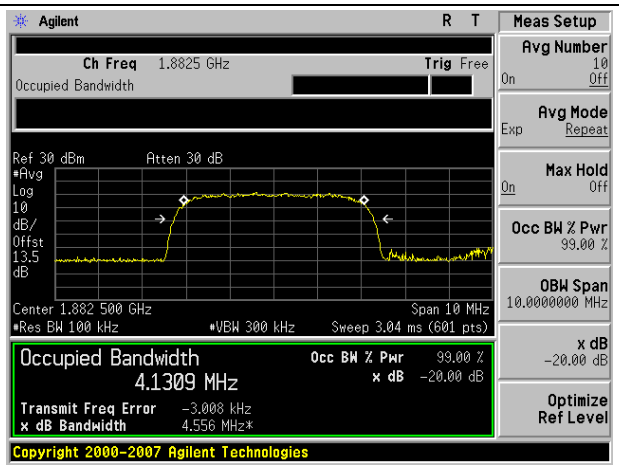
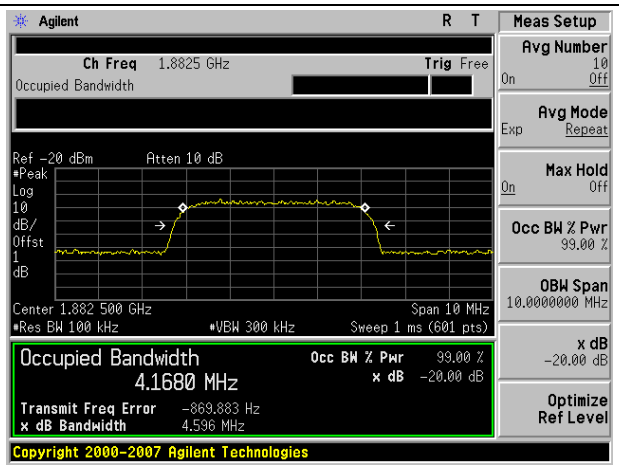


2. Number of Carriers: Four carriers

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |

**Input/output Bandwidth Comparison for WCDMA**

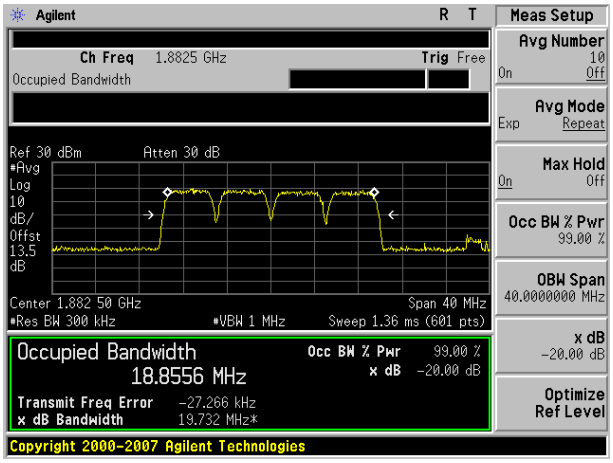
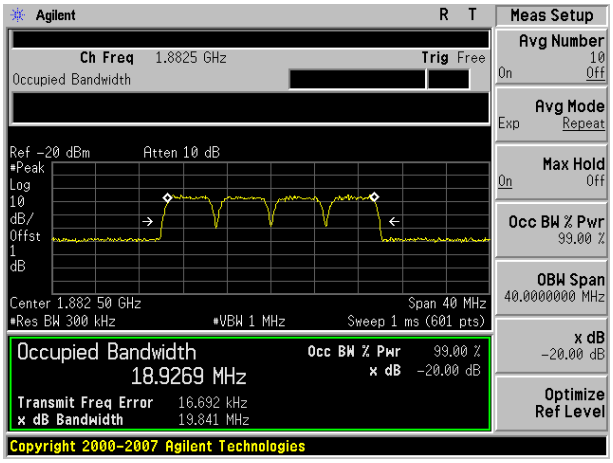
1. Number of Carriers: Single carrier

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |





2. Number of Carriers: Four carriers

| Output(Middle channel) | Input(Middle channel) |
|---|---|
|  |  |

# 9 OUT OF BAND EMISSION AT ANTENNA TERMINALS

## 9.1 Standard Applicable

According to FCC § 2.1051 and § 24.238(a)

## 9.2 Test setup

Please refer the section §6.2 Configuration of Tested System.

## 9.3 Measurement Procedure

The out of band emissions were measured directly from the EUT antenna output with a spectrum analyzer from 30 MHz to the 10th harmonic of the highest carrier frequency. Test signals used is WCDMA/CDMA/CDMA EV-DO/GSM. The different signals were input one at a time to the EUT. Tests was performed with WCDMA/CDMA/CDMA EV-DO/GSM signal input.

Band edge compliance is also demonstrated using a WCDMA/CDMA/CDMA EV-DO/GSM signal at the upper and lower limits of the band.

1. The EUT RF output port was connected to spectrum analyzer.
2. The level of RF input signal shall be increased, until the maximum output power per channel, declared by client, is reached.
3. The spurious emissions at antenna were measured at the RF output port of the EUT at middle channel of each type of modulation.

Spectrum analyzer settings:

Detector: RMS.

> 1 MHz from Band Edge

Below 1G: RBW=100kHz; Above 1G: RBW=1 MHz ; VBW≥ RBW

< 1 MHz from Band Edge

RBW=3 kHz; VBW≥ RBW

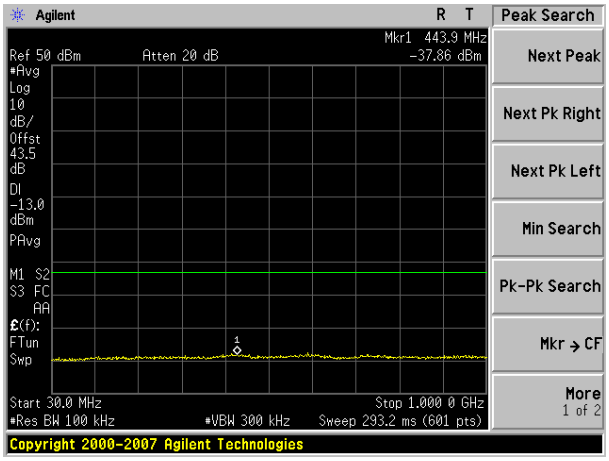
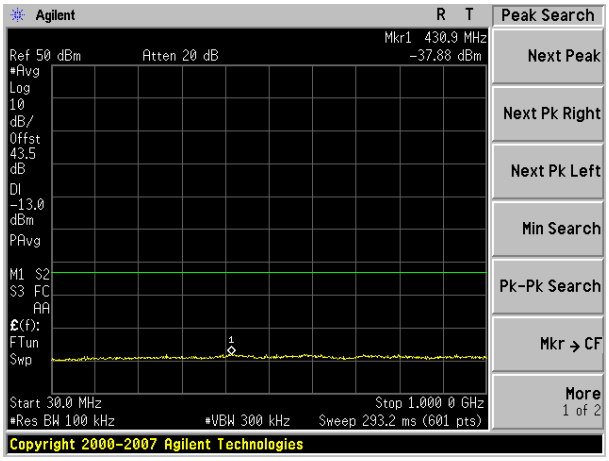
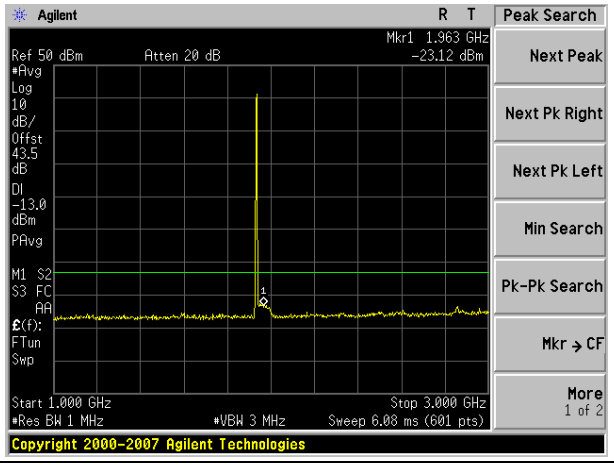
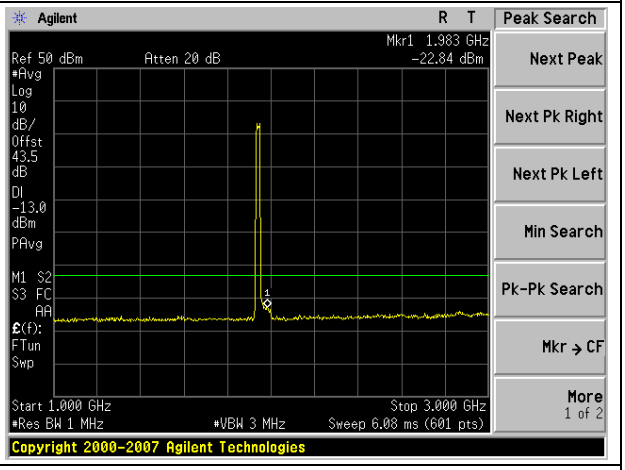
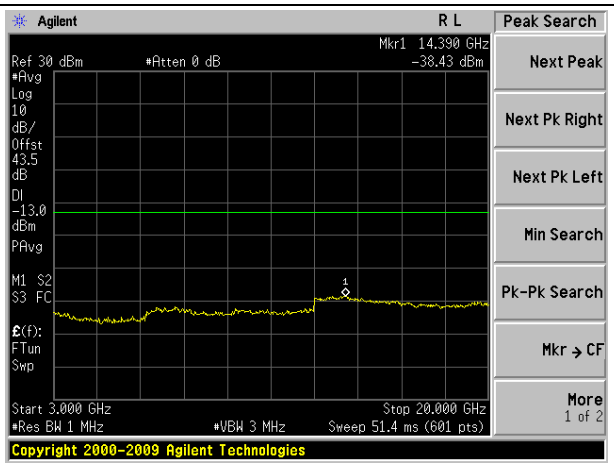
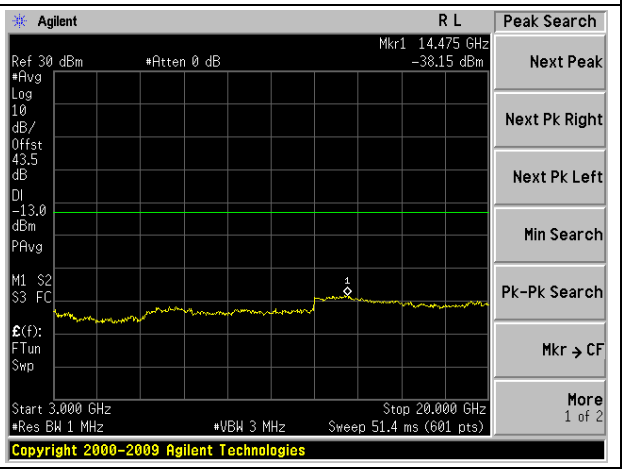
## 9.4 Measurement Result

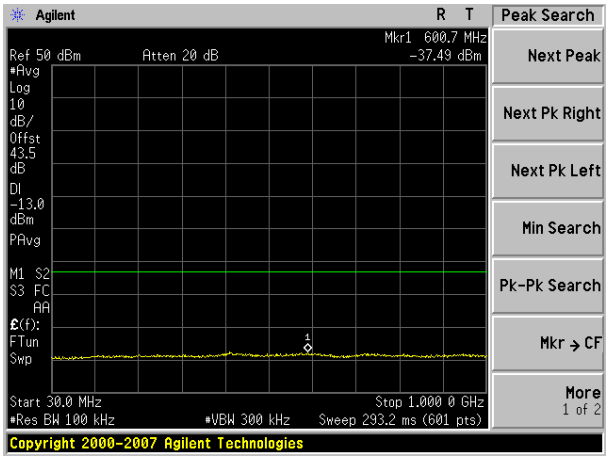
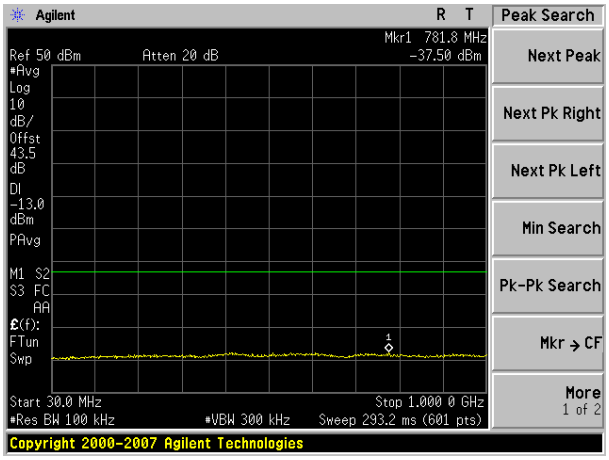
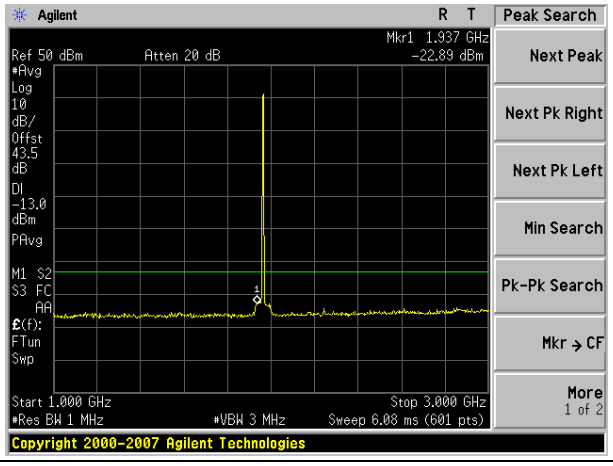
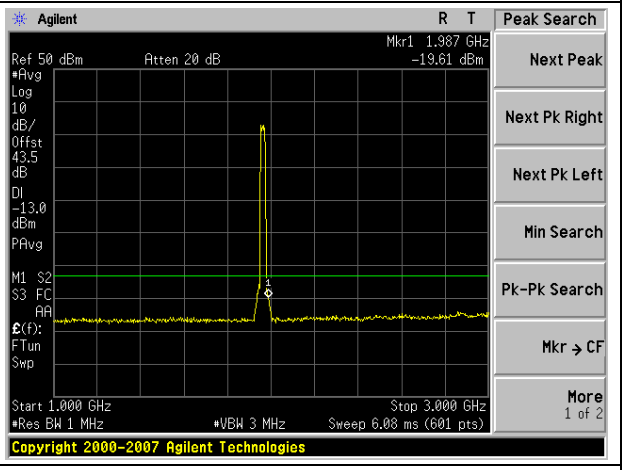
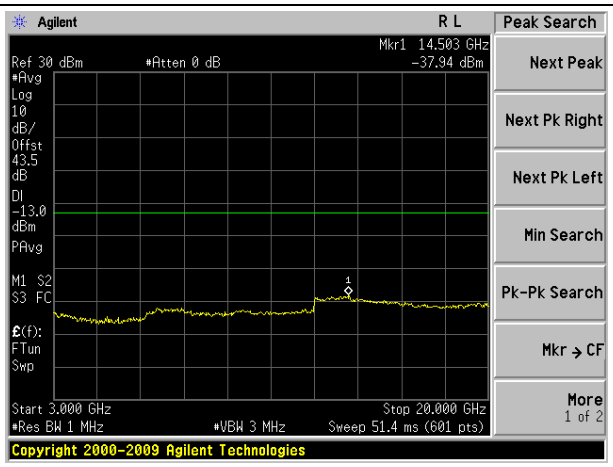
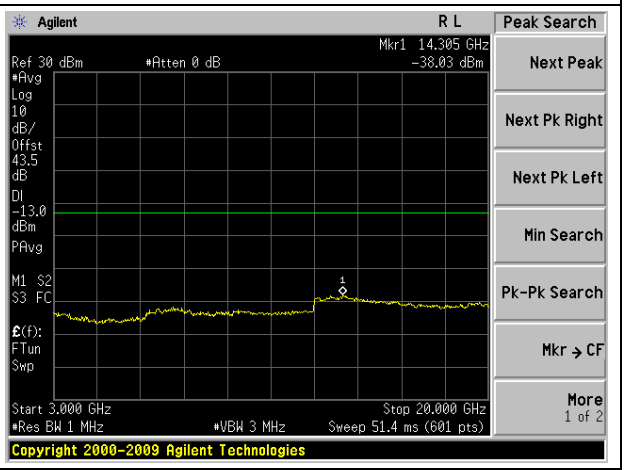
### 9.4.1 Spurious emission

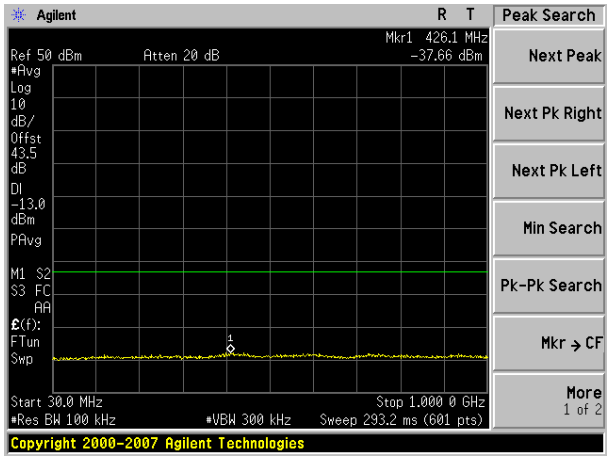
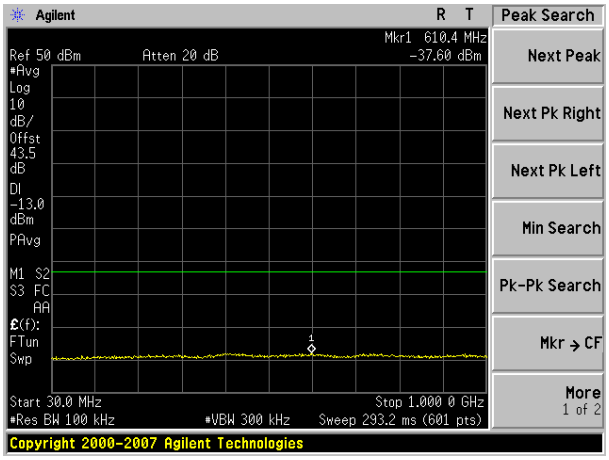
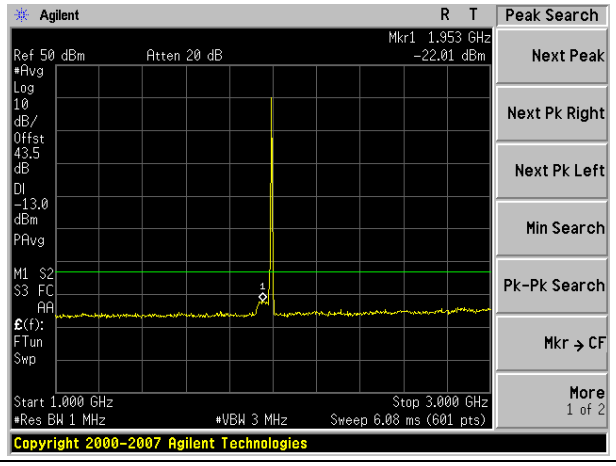
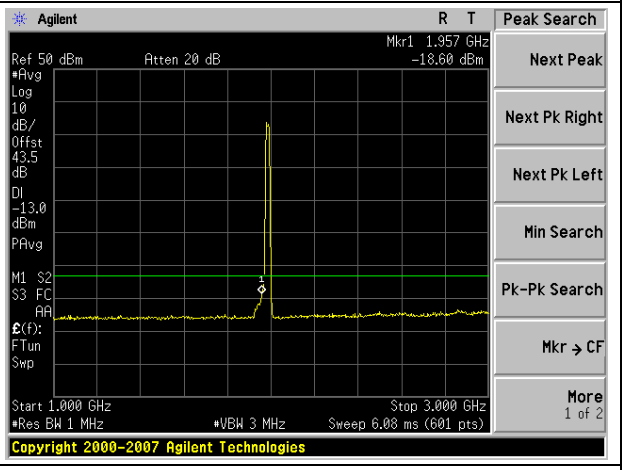
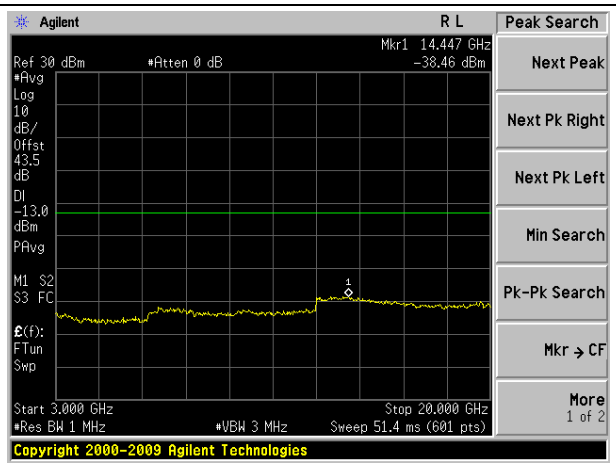
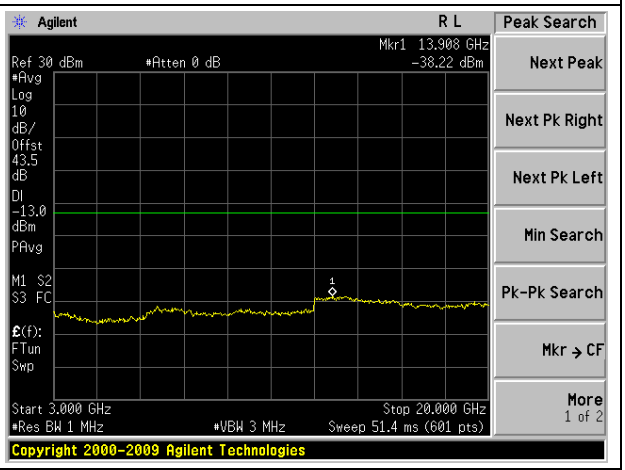
*The lowest channel, middle channel and hightest channel were test and found the middle channel was the worst Case, so only this case was recorded in the report.*

Downlink:

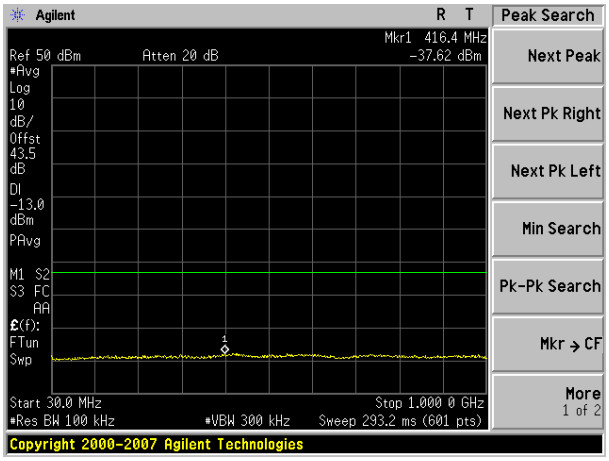
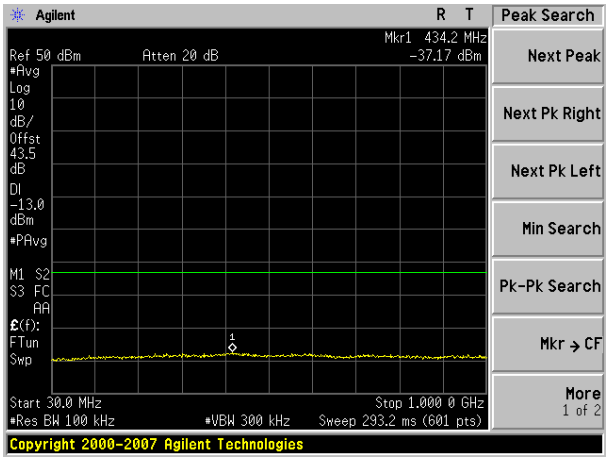
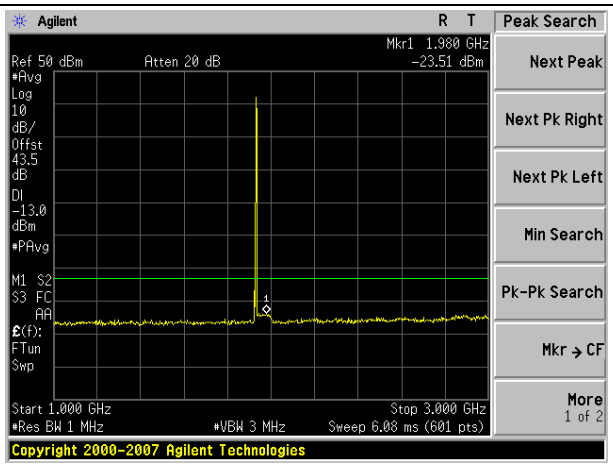
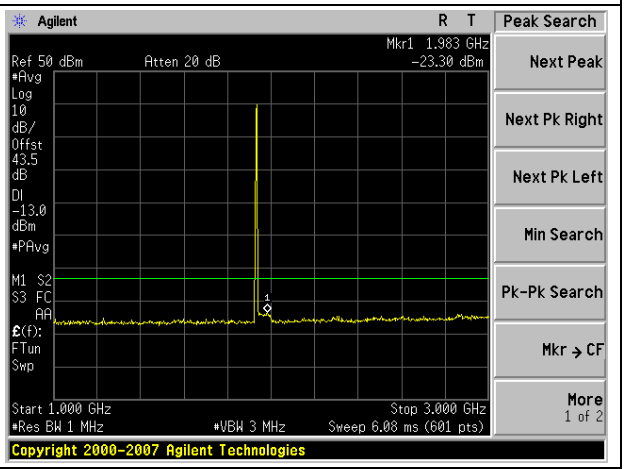
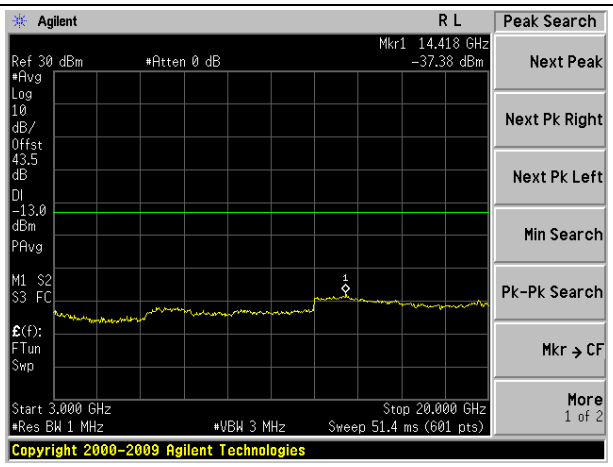
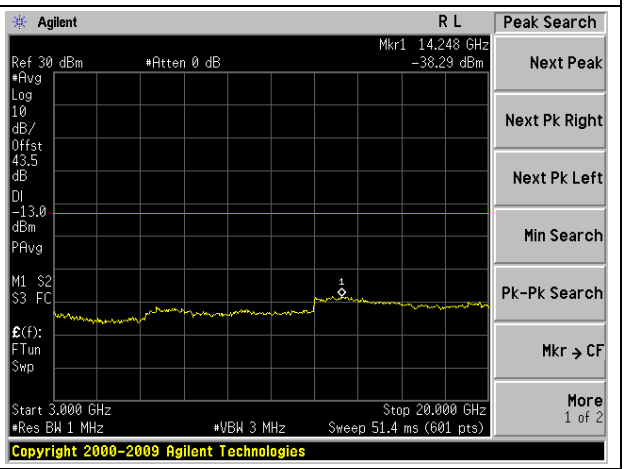
**Spurious emission of WCDMA**

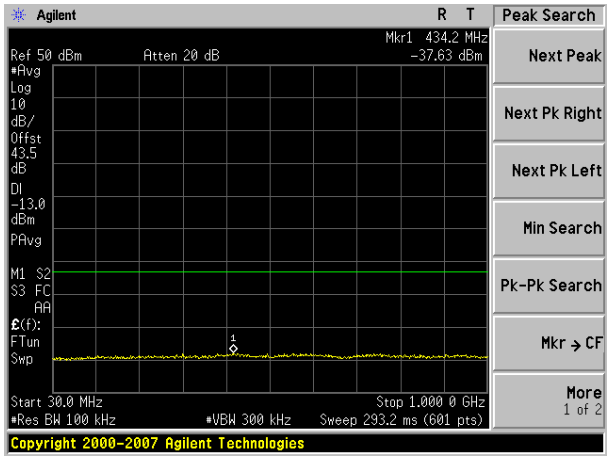
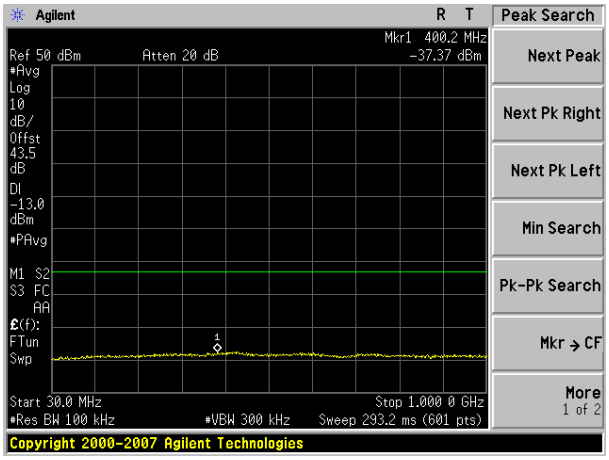
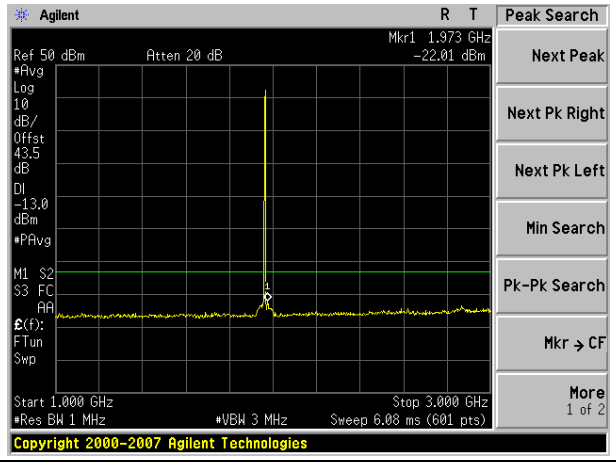
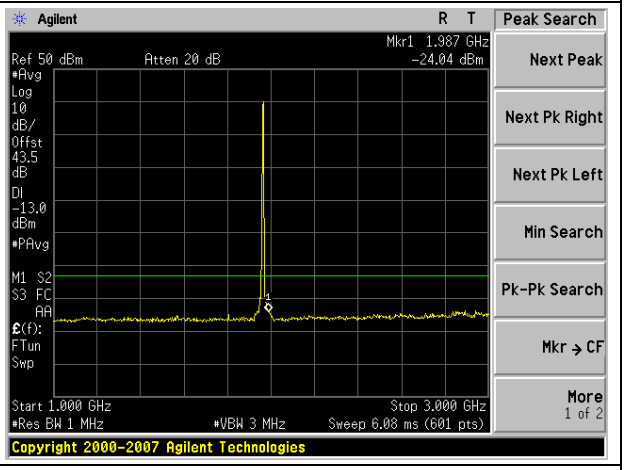
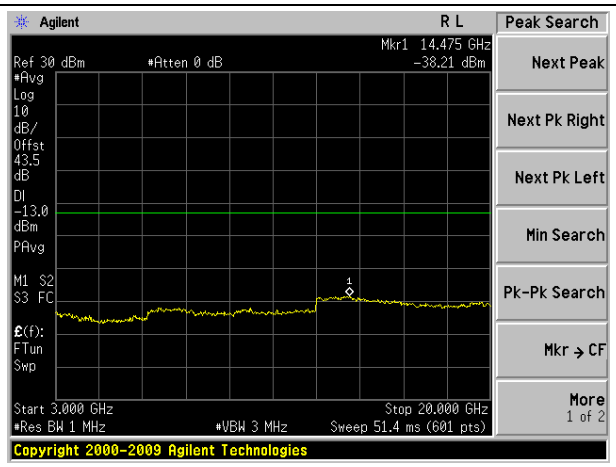
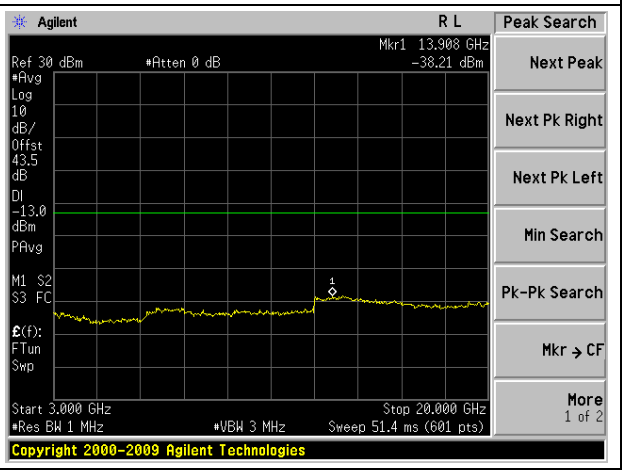
| Number of Carriers: Single carrier (Lowest channel) | Number of Carriers: Four carrier (Lowest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

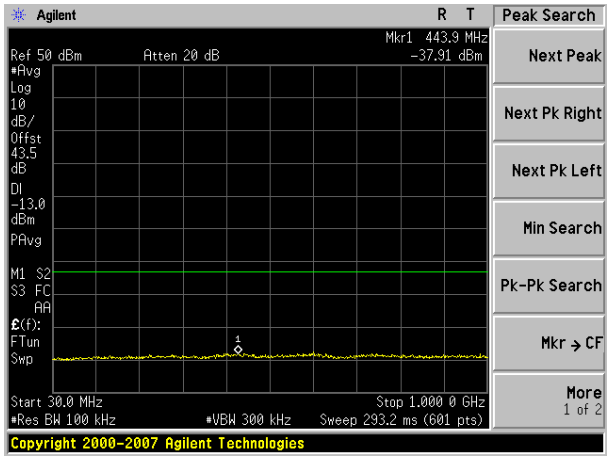
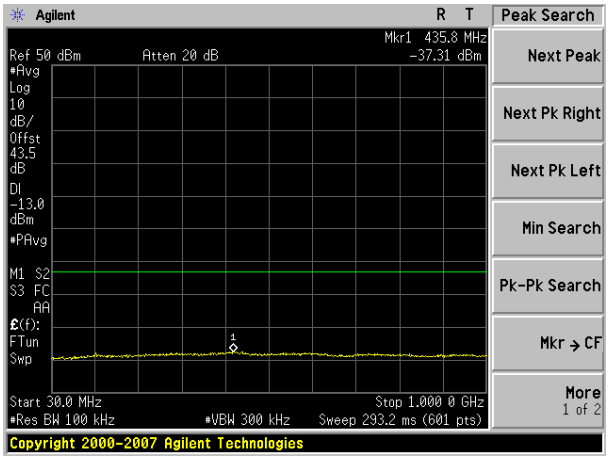
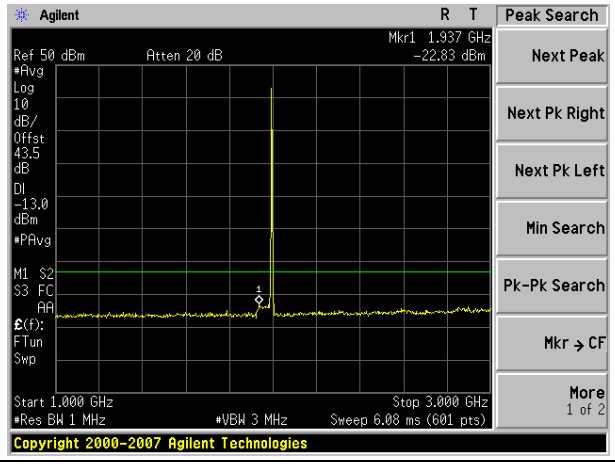
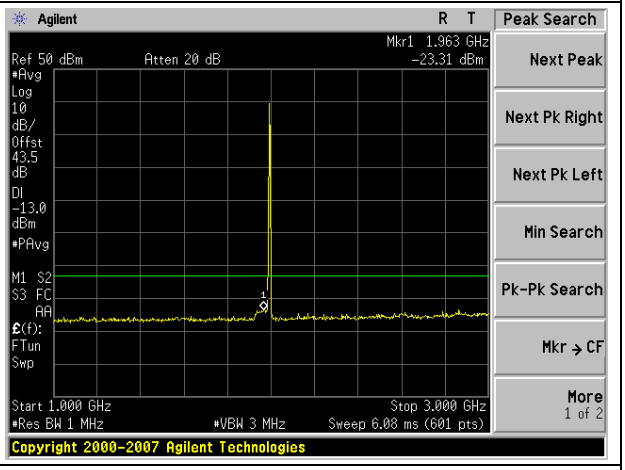
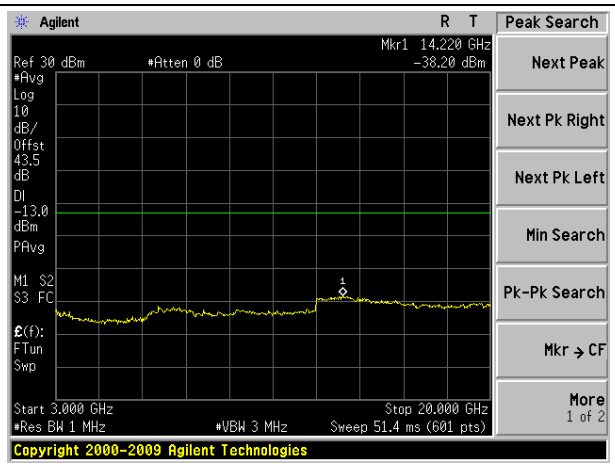
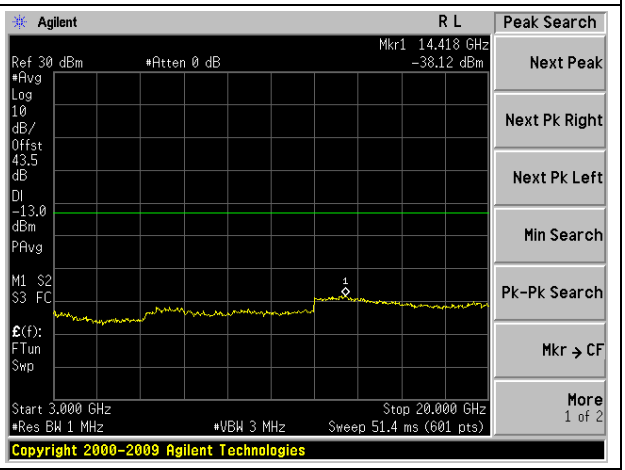
| Number of Carriers: Single carrier (Middle channel) | Number of Carriers: Four carrier (Middle channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

| Number of Carriers: Single carrier(Highest channel) | Number of Carriers: Four carrier(Highest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

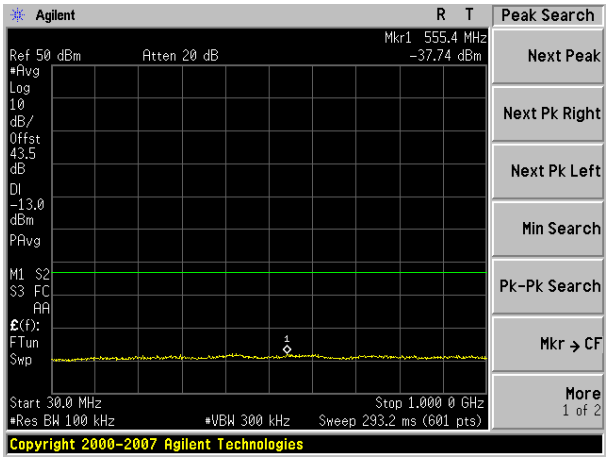
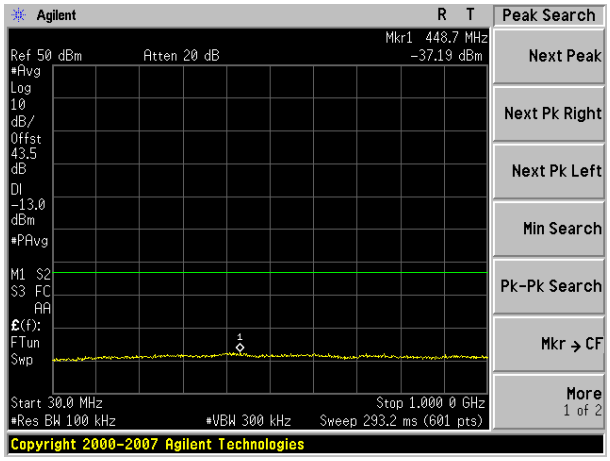
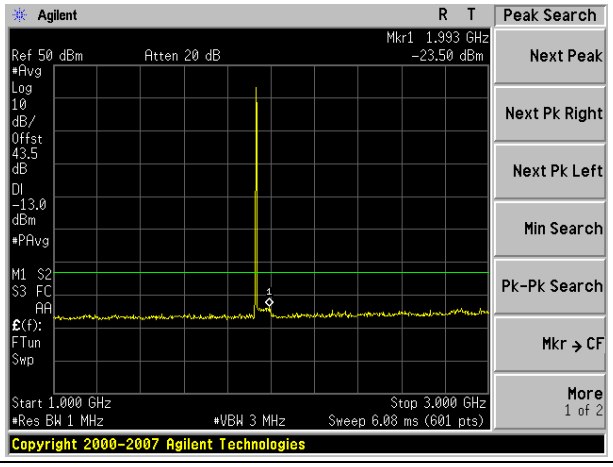
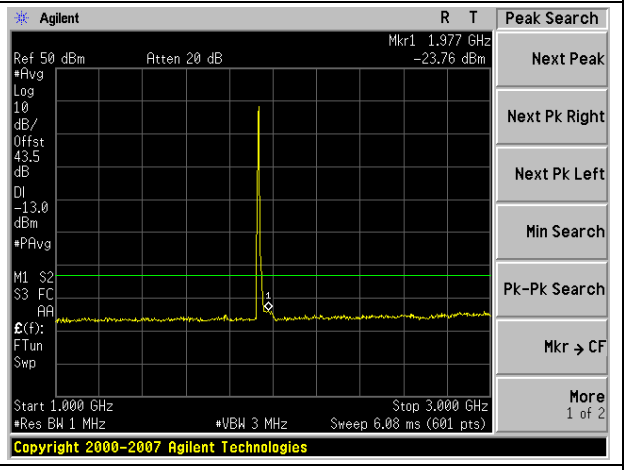
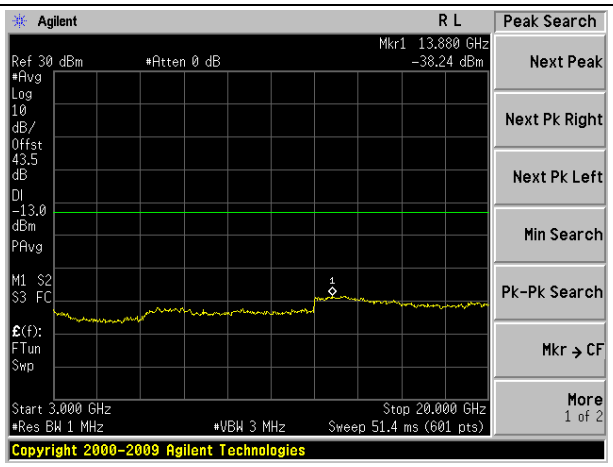
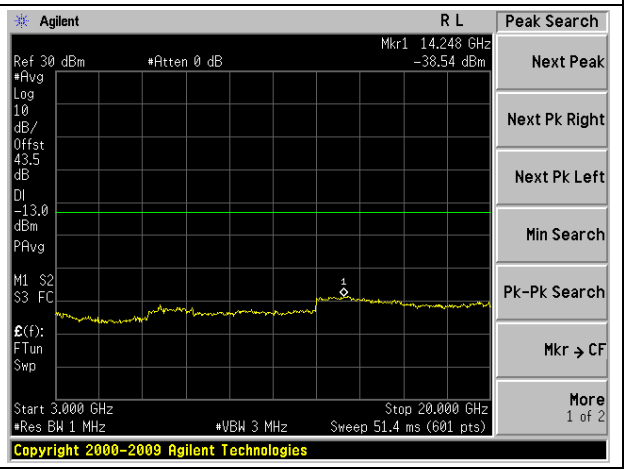
**Spurious emission of CDMA**

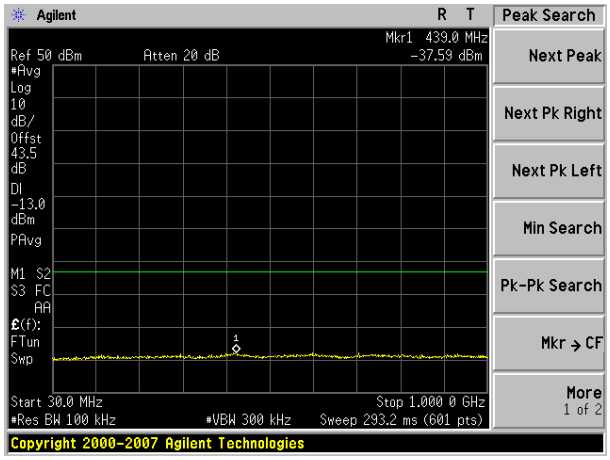
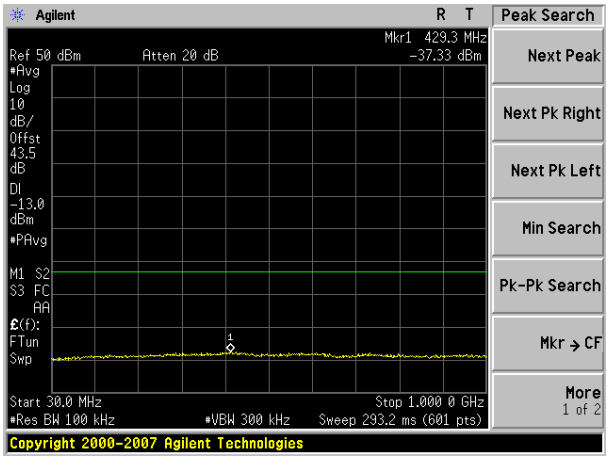
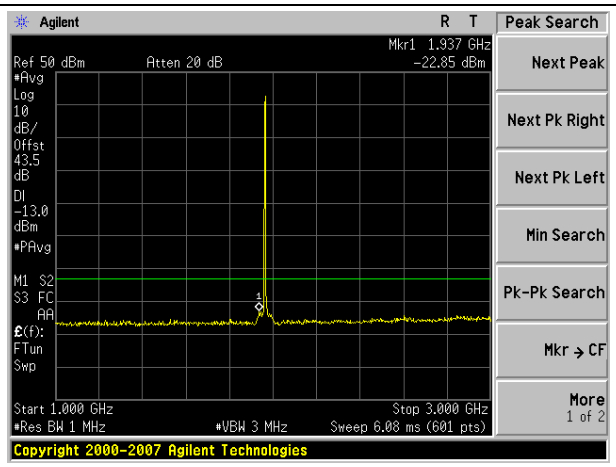
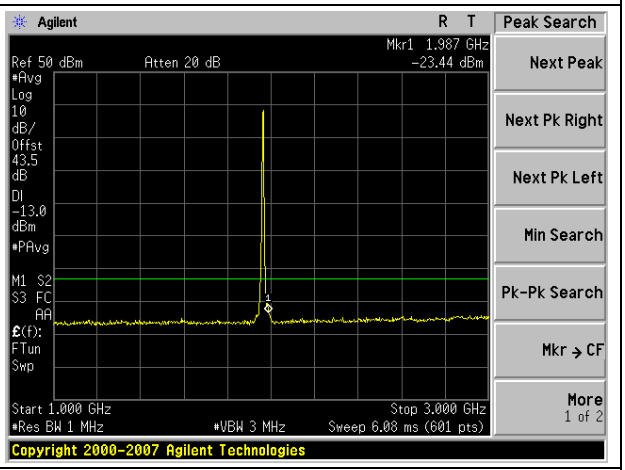
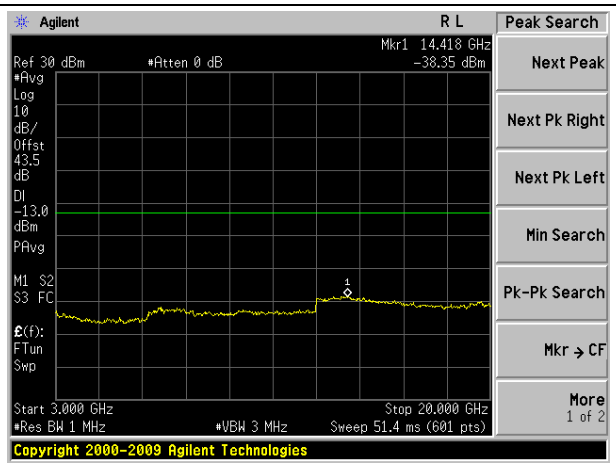
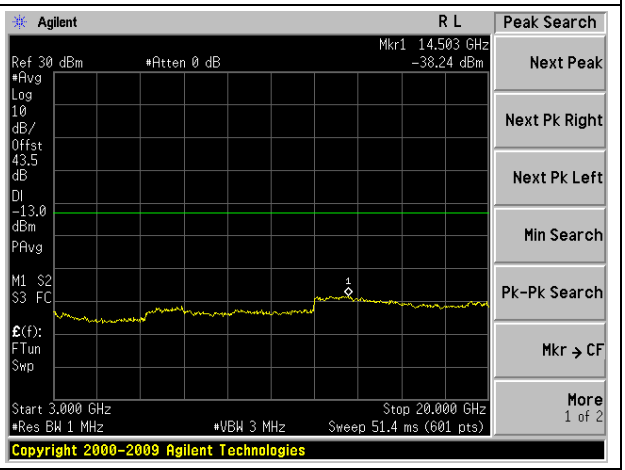
| Number of Carriers: Single carrier (Lowest channel) | Number of Carriers: Four carrier (Lowest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

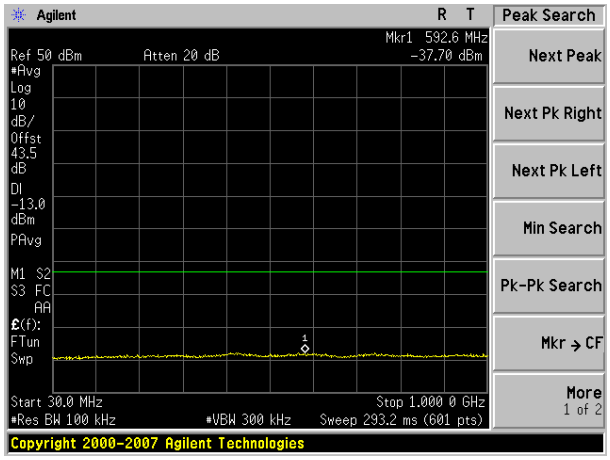
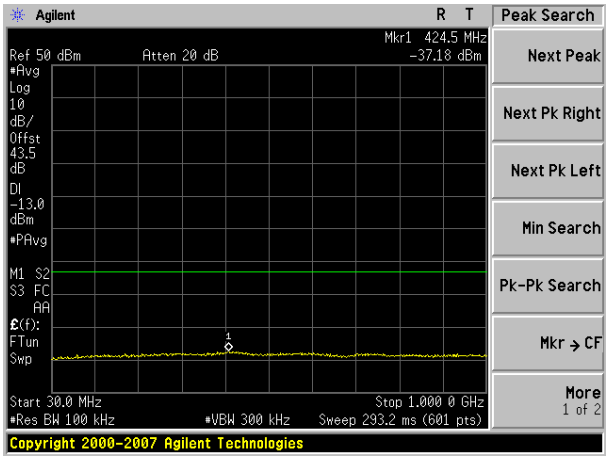
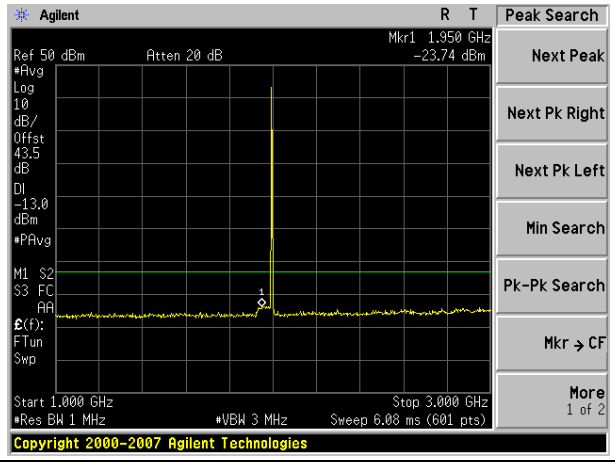
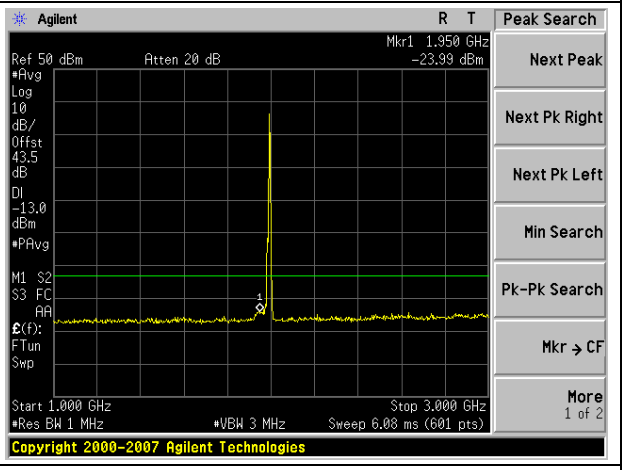
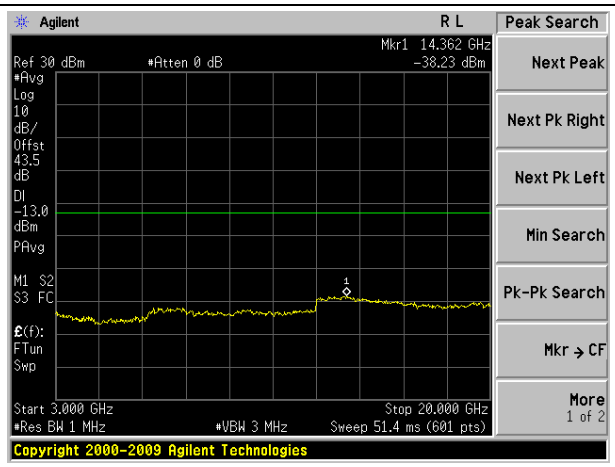
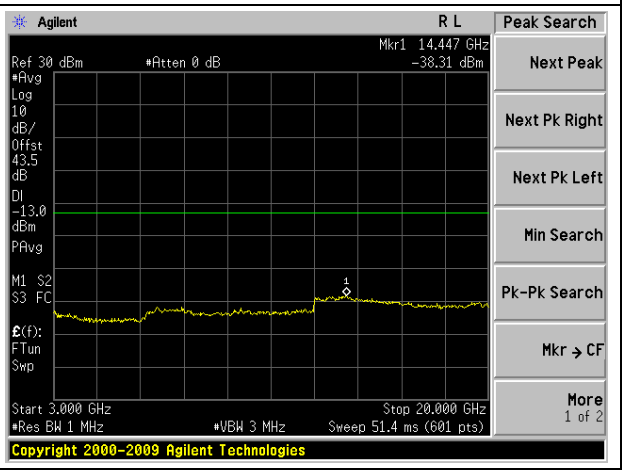
| Number of Carriers: Single carrier (Middle channel) | Number of Carriers: Four carrier (Middle channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

| Number of Carriers: Single carrier(Highest channel) | Number of Carriers: Four carrier(Highest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

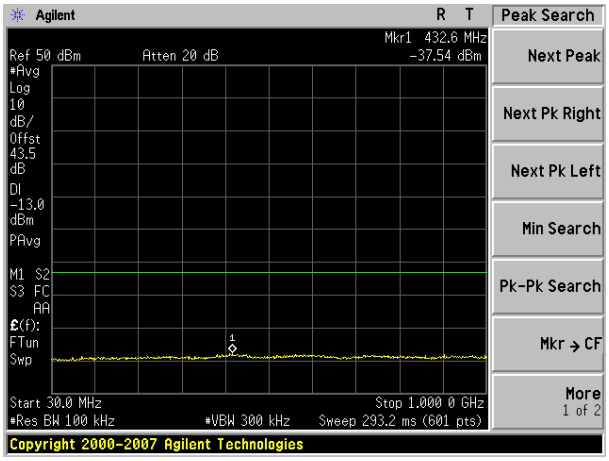
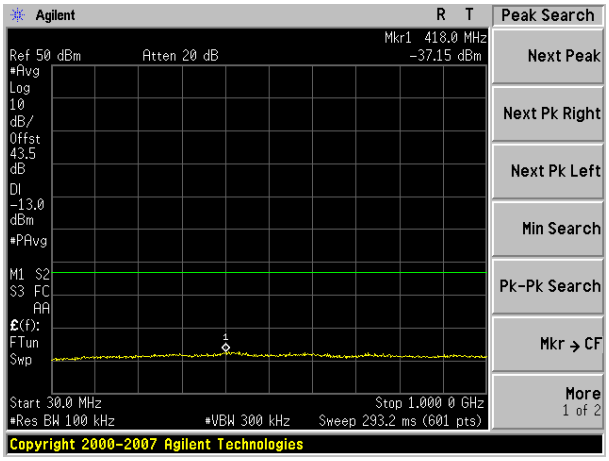
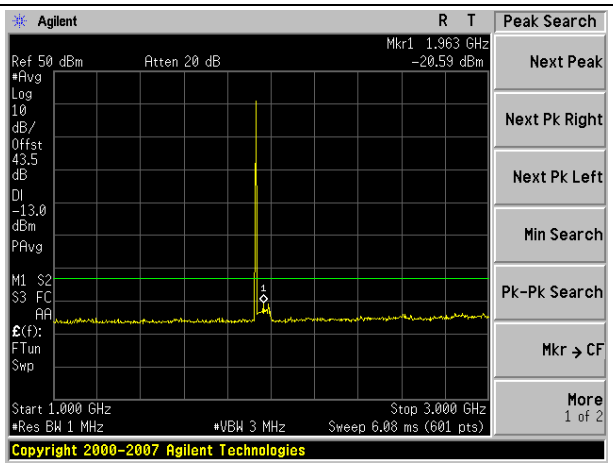
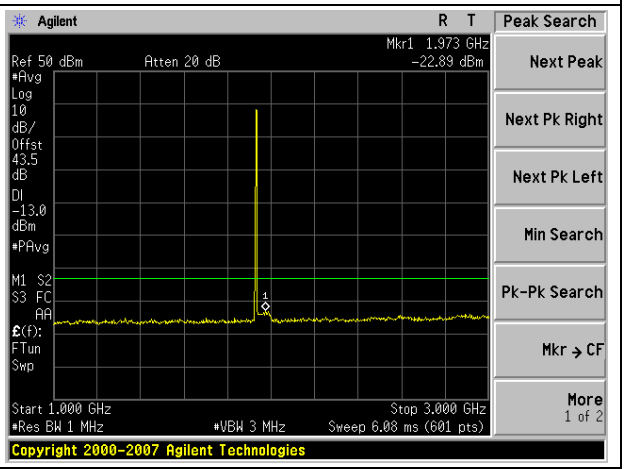
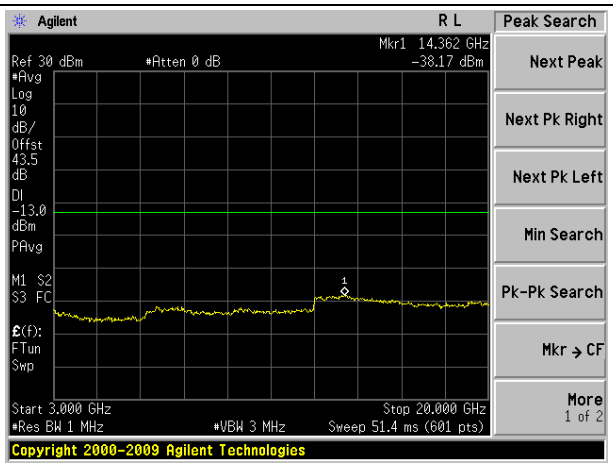
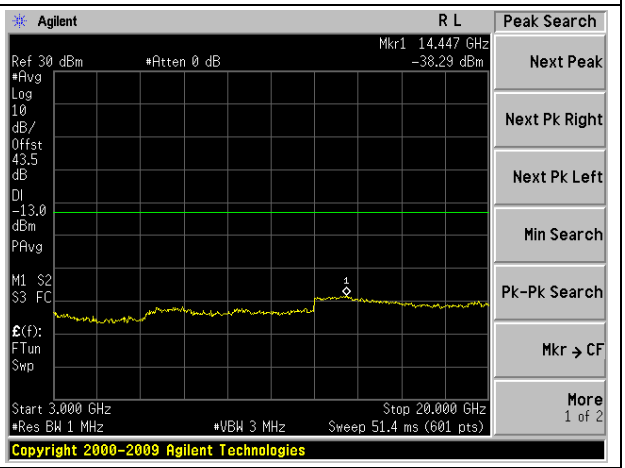
**Spurious emission of CDMA EV-DO**

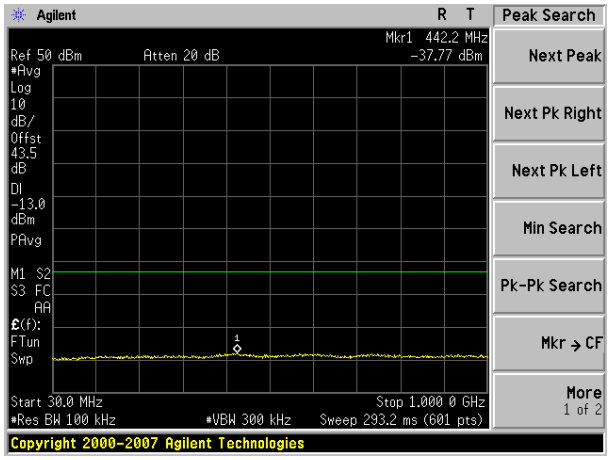
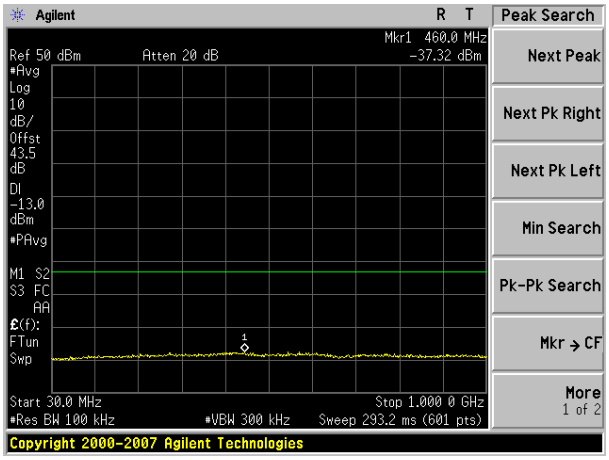
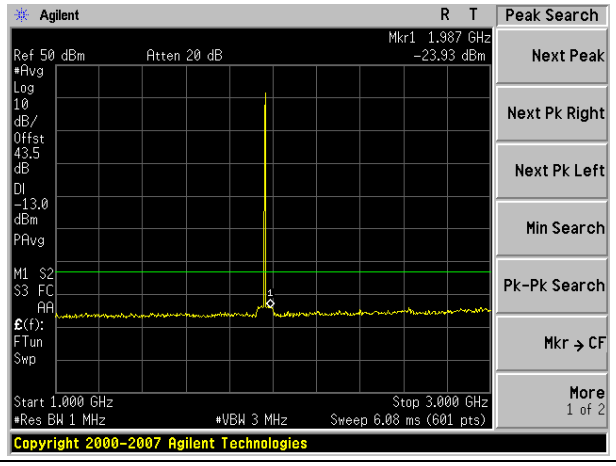
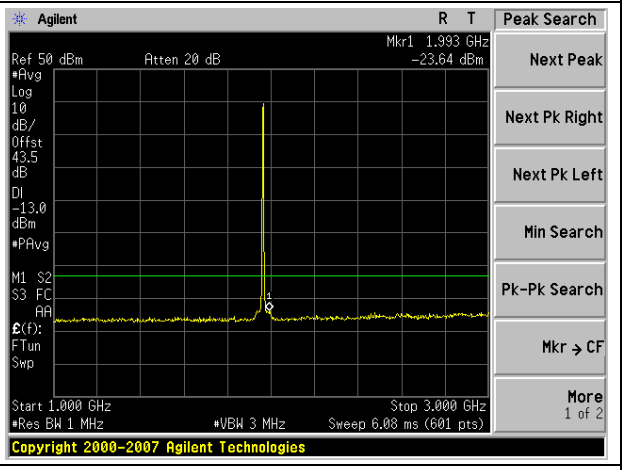
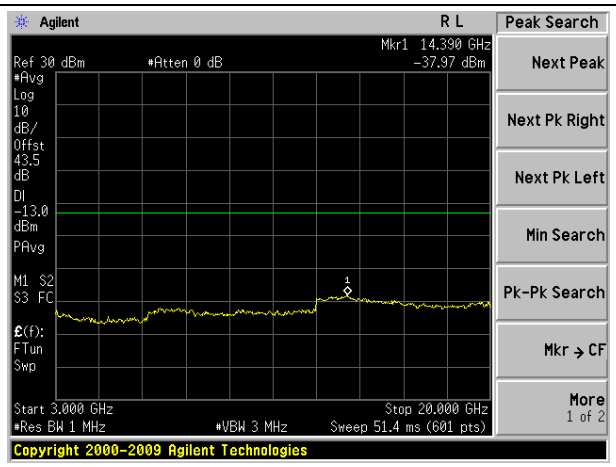
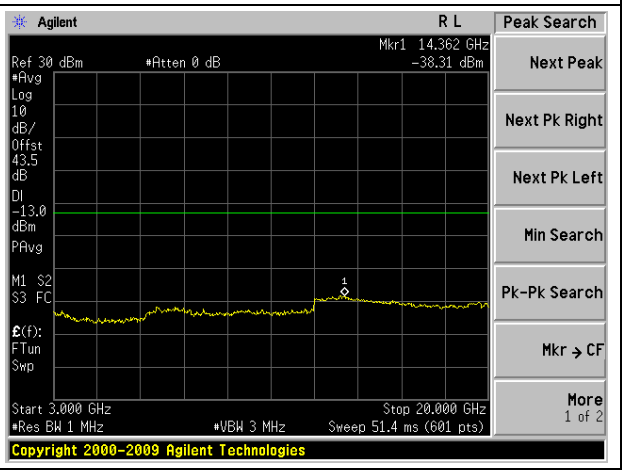
| Number of Carriers: Single carrier (Lowest channel) | Number of Carriers: Four carrier (Lowest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

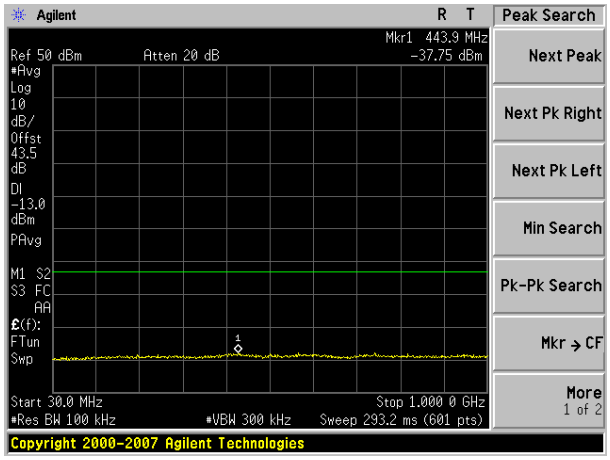
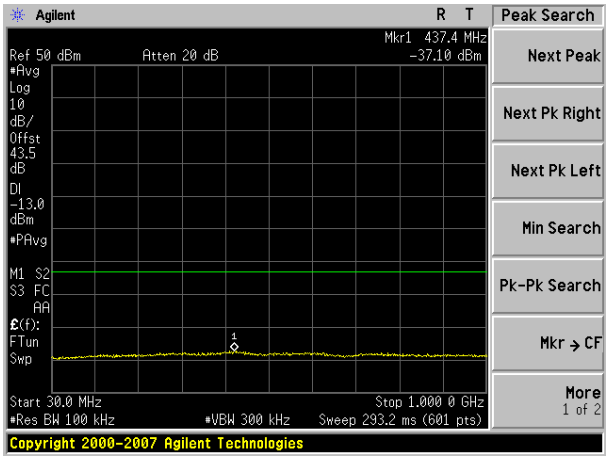
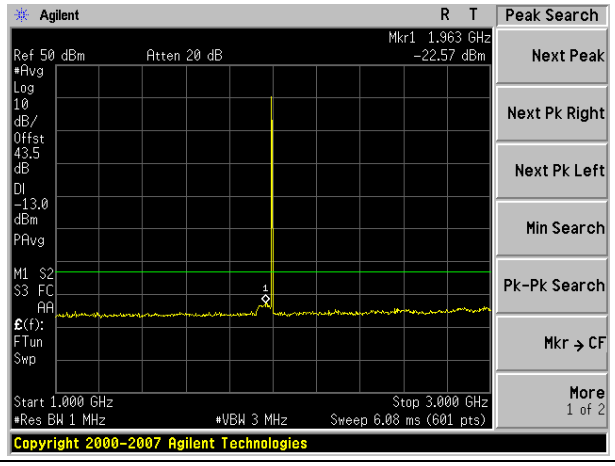
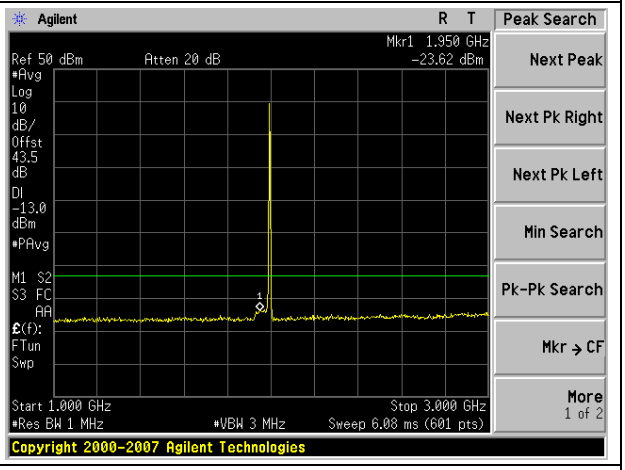
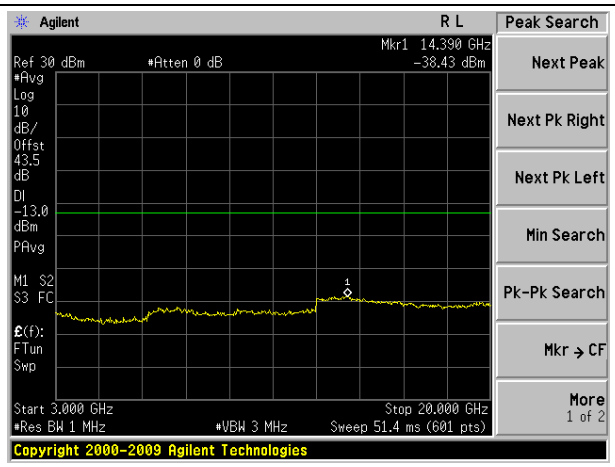
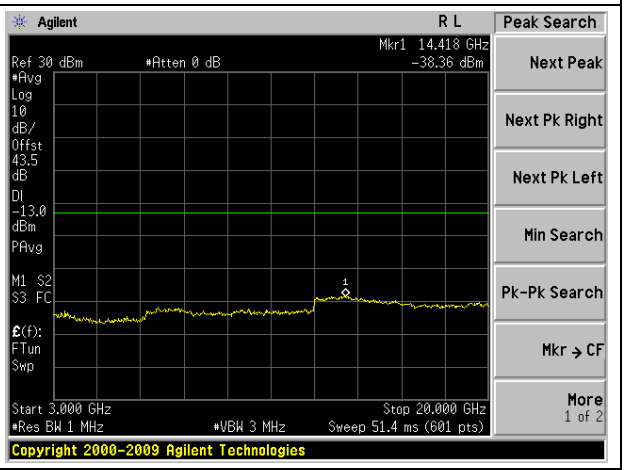
| Number of Carriers: Single carrier (Middle channel) | Number of Carriers: Four carrier (Middle channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

| Number of Carriers: Single carrier(Highest channel) | Number of Carriers: Four carrier(Highest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

**Spurious emission of GSM**

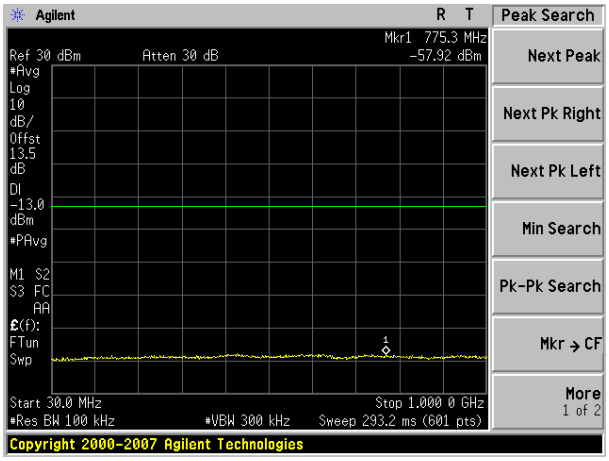
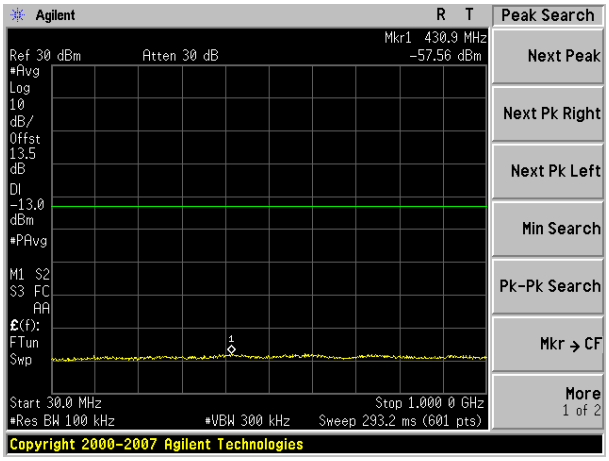
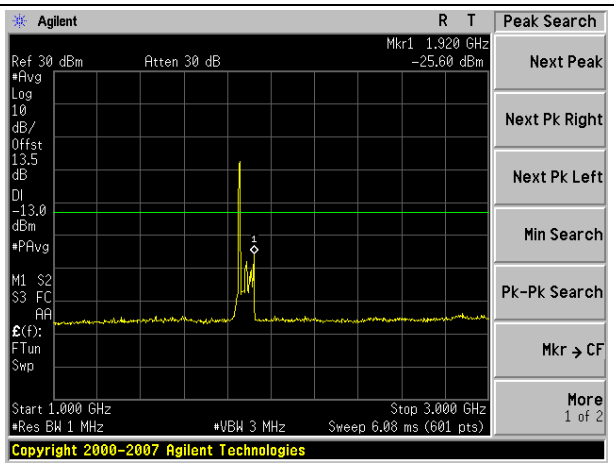
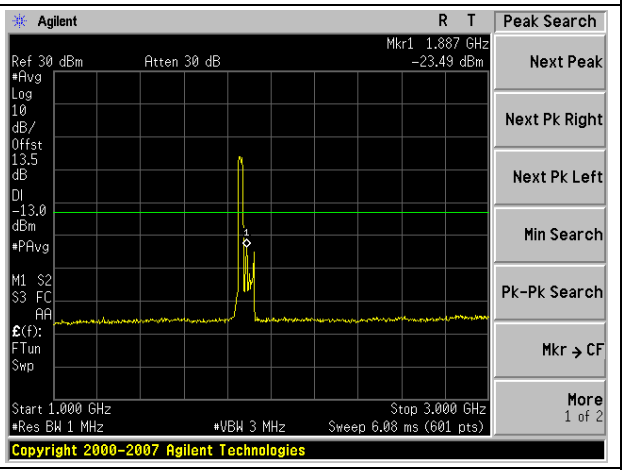
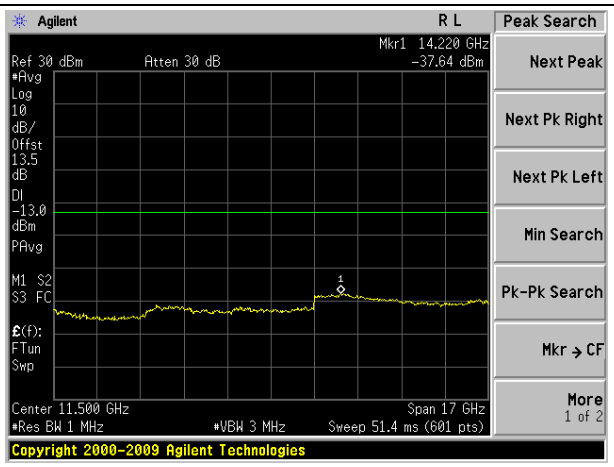
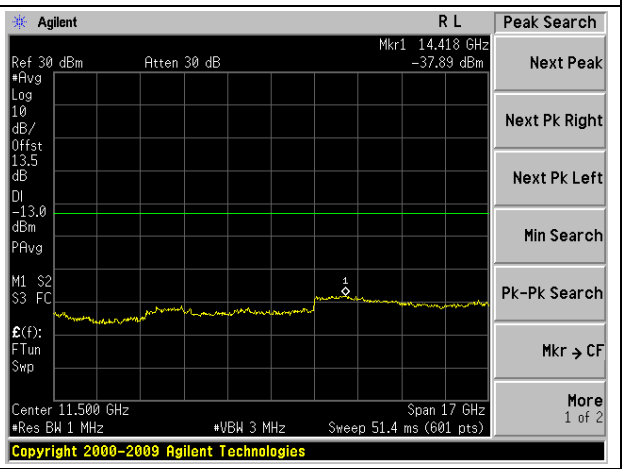
| Number of Carriers: Single carrier (Lowest channel) | Number of Carriers: Four carrier (Lowest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

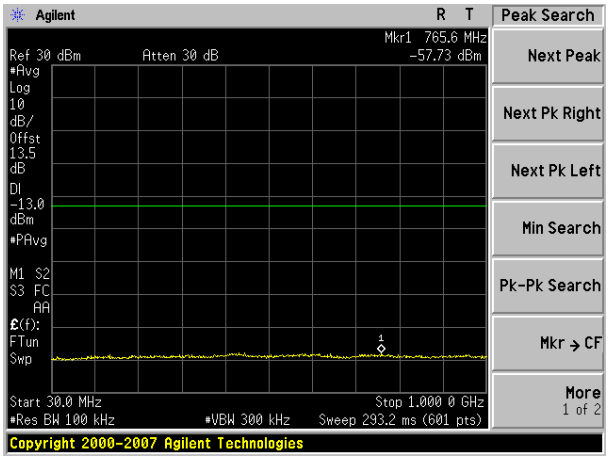
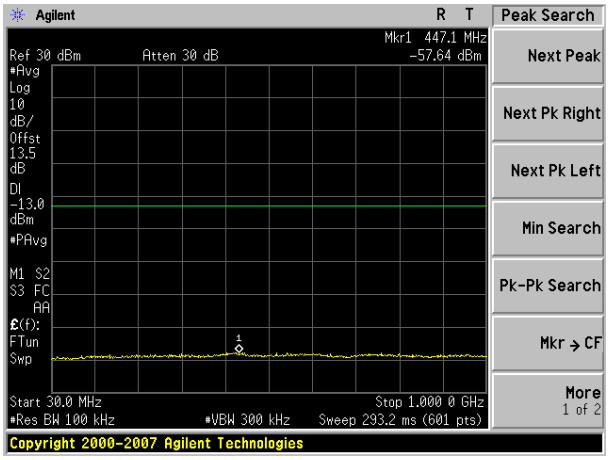
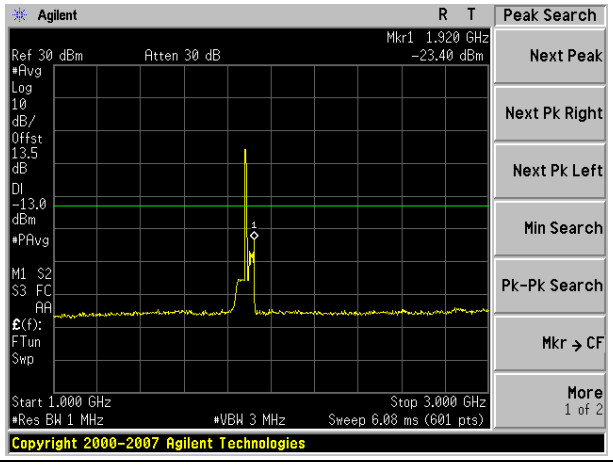
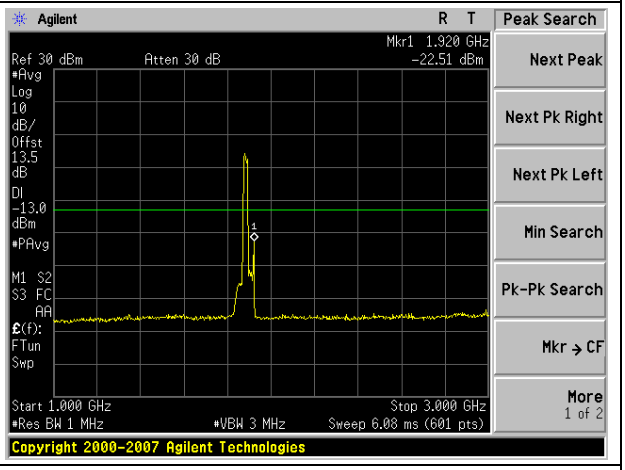
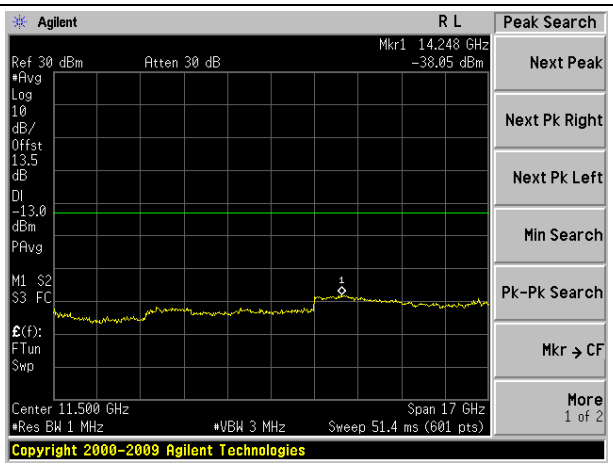
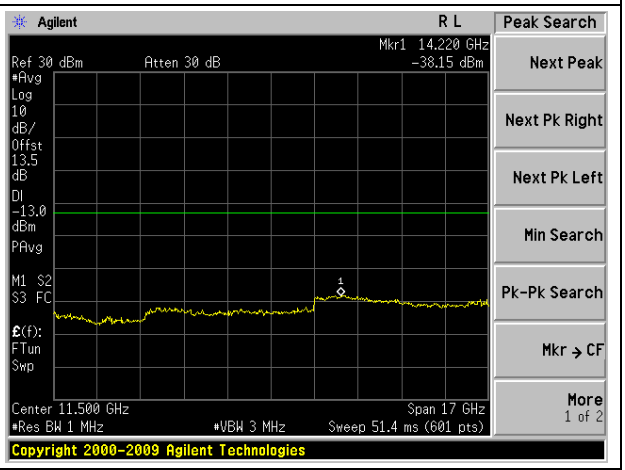
| Number of Carriers: Single carrier (Middle channel) | Number of Carriers: Four carrier (Middle channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

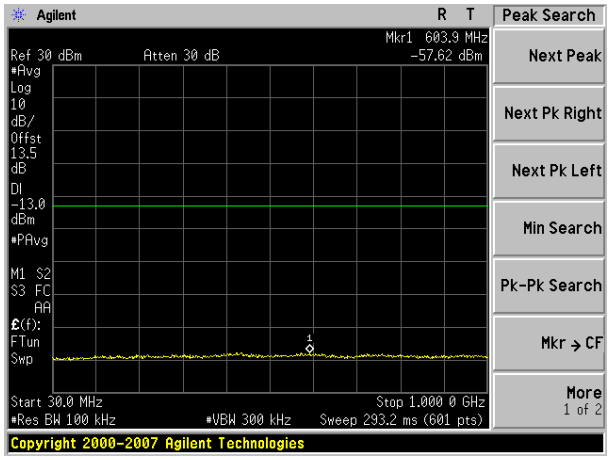
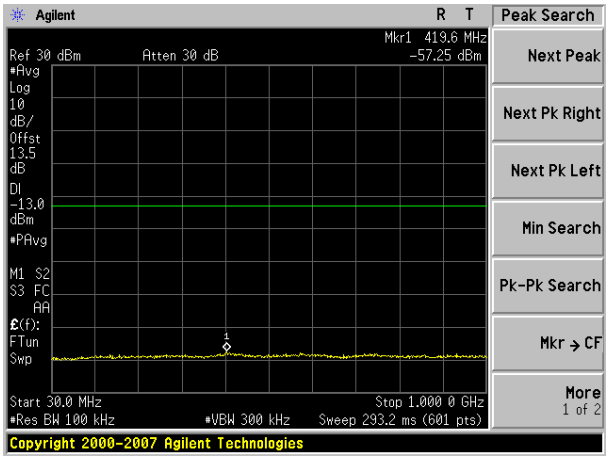
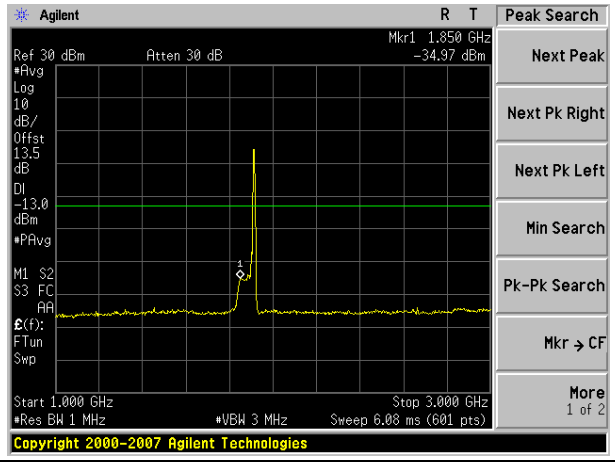
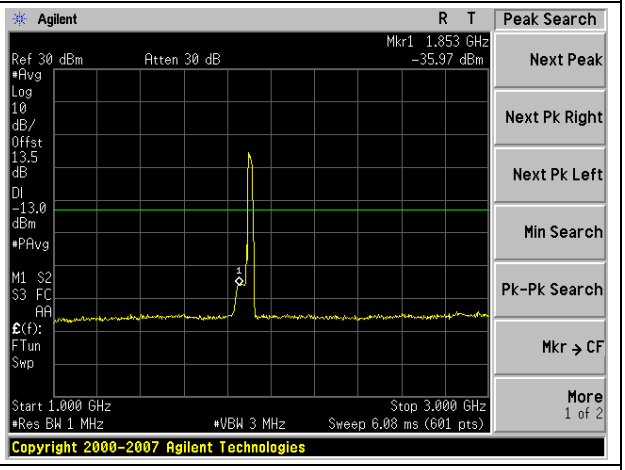
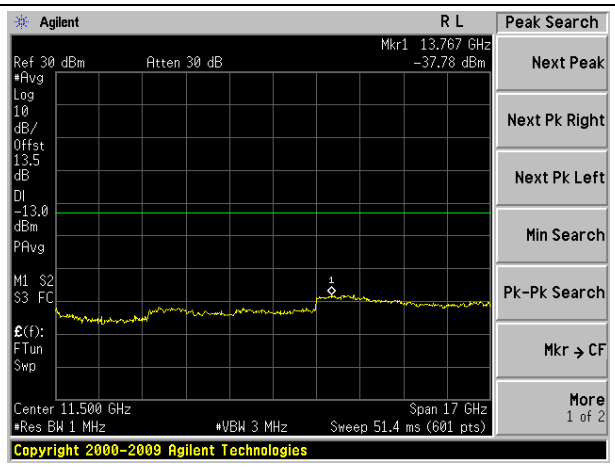
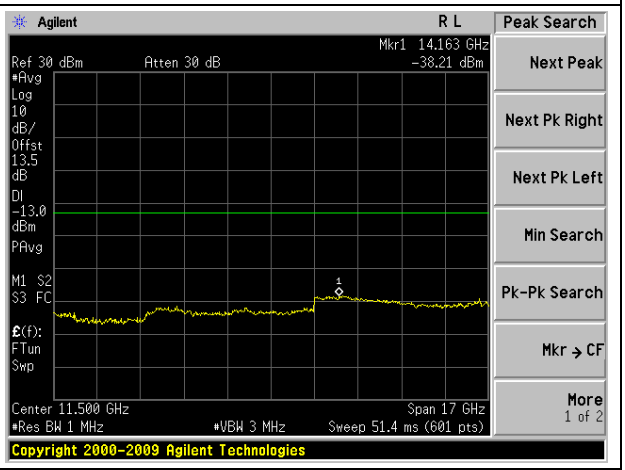
| Number of Carriers: Single carrier(Highest channel) | Number of Carriers: Four carrier(Highest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

Uplink:

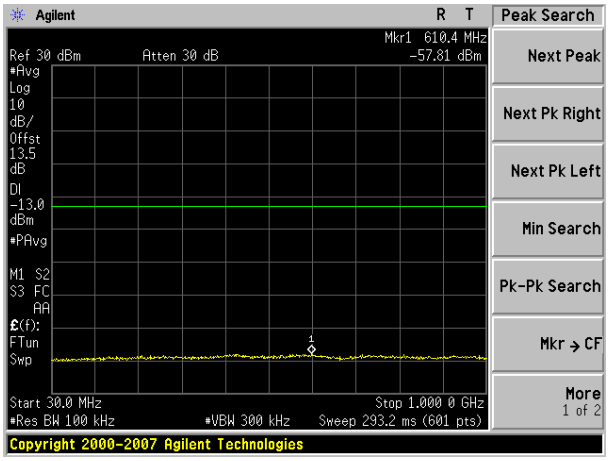
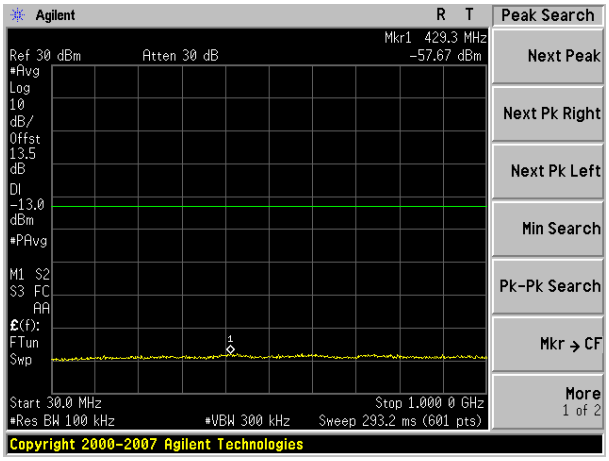
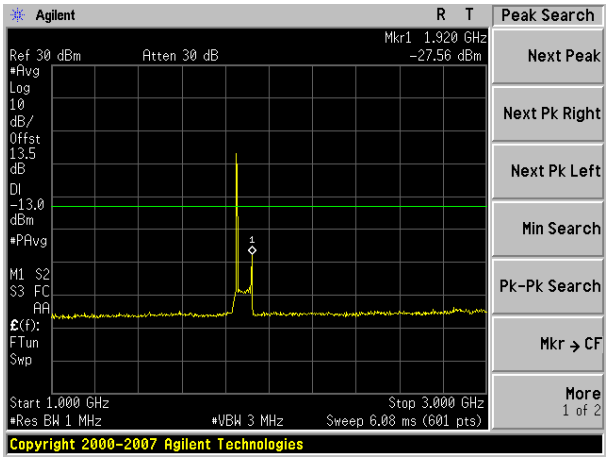
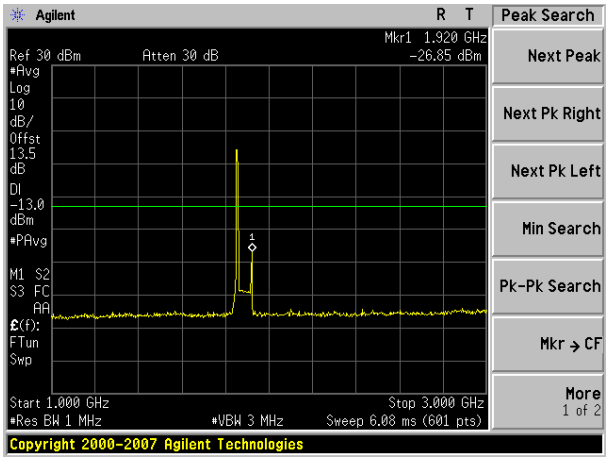
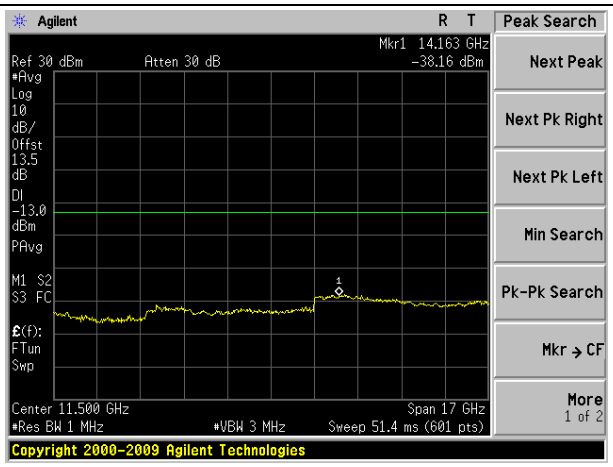
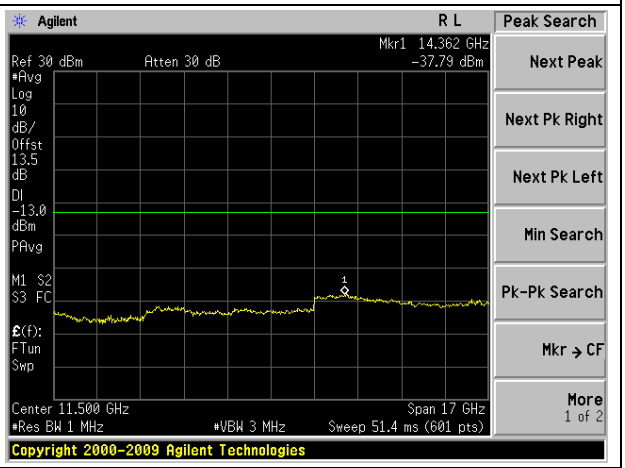
**Spurious emission of WCDMA**

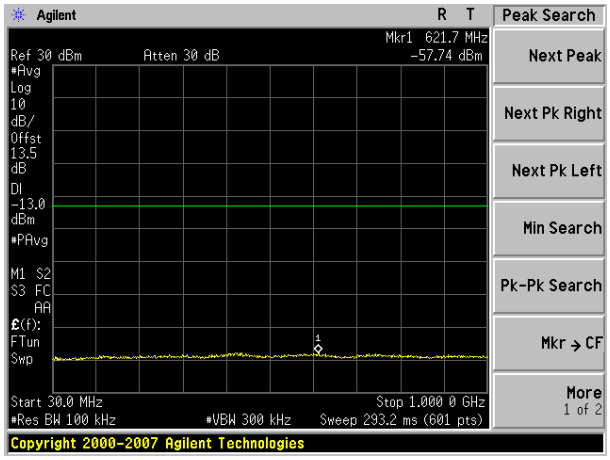
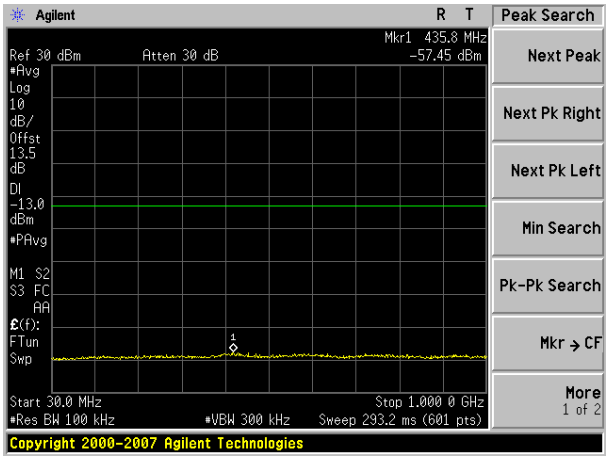
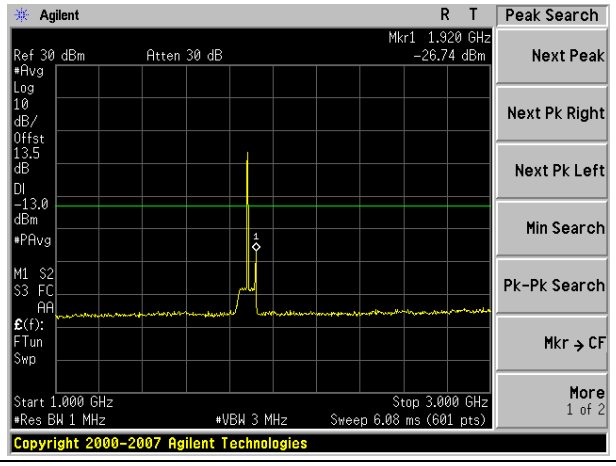
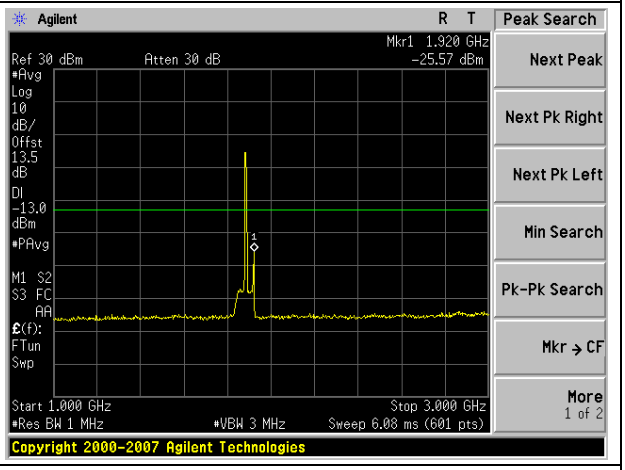
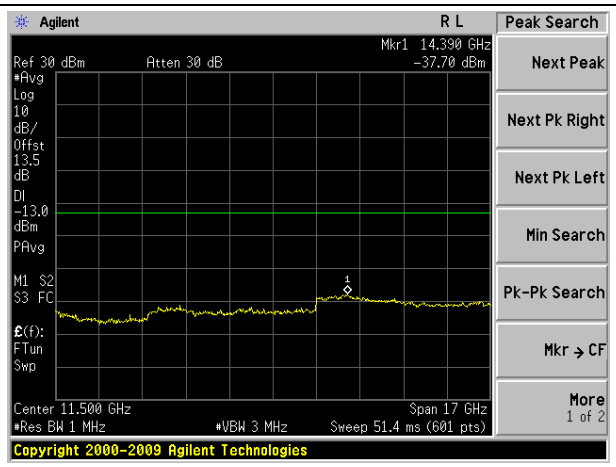
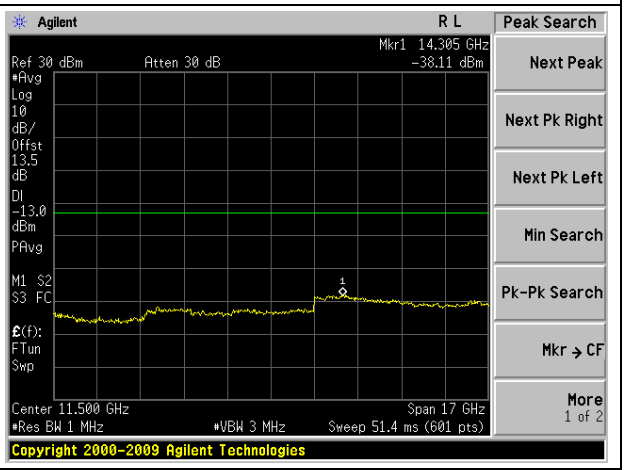
| Number of Carriers: Single carrier (Lowest channel) | Number of Carriers: Four carrier (Lowest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

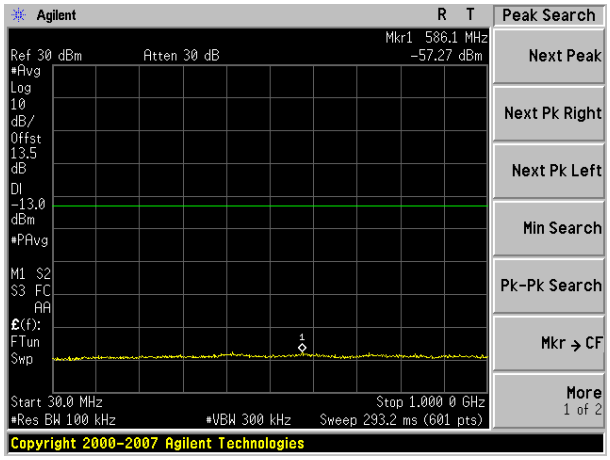
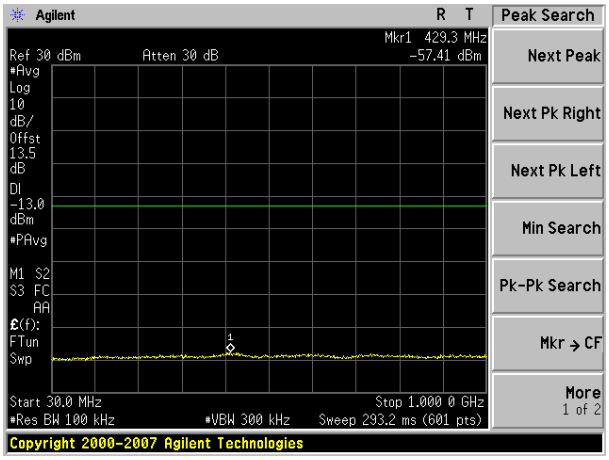
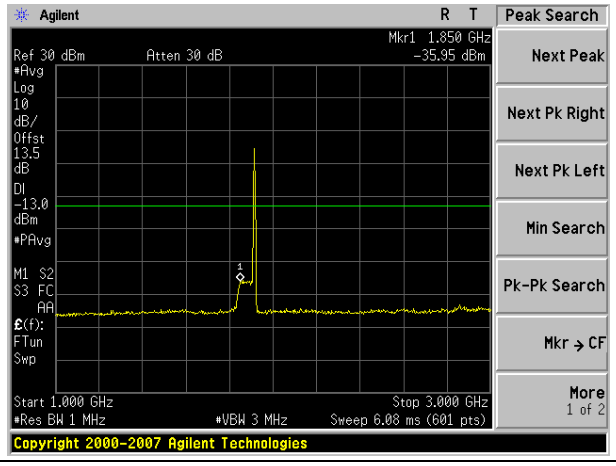
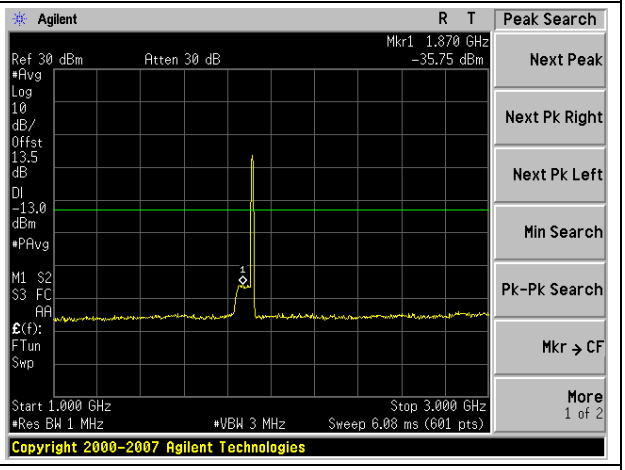
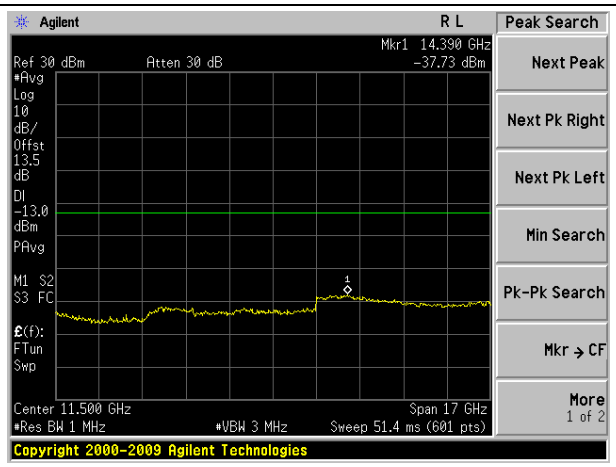
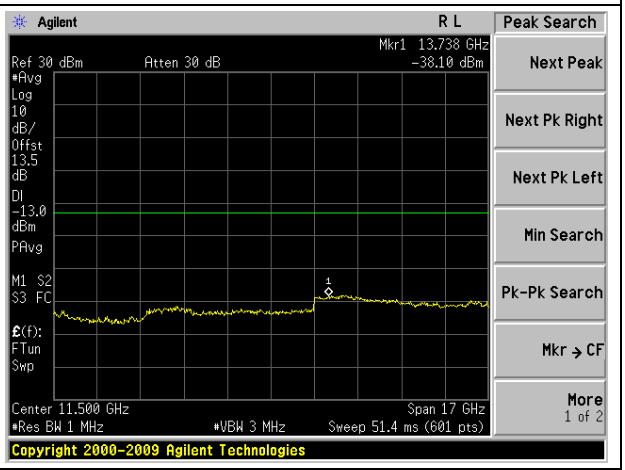
| Number of Carriers: Single carrier (Middle channel) | Number of Carriers: Four carrier (Middle channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

| Number of Carriers: Single carrier(Highest channel) | Number of Carriers: Four carrier(Highest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

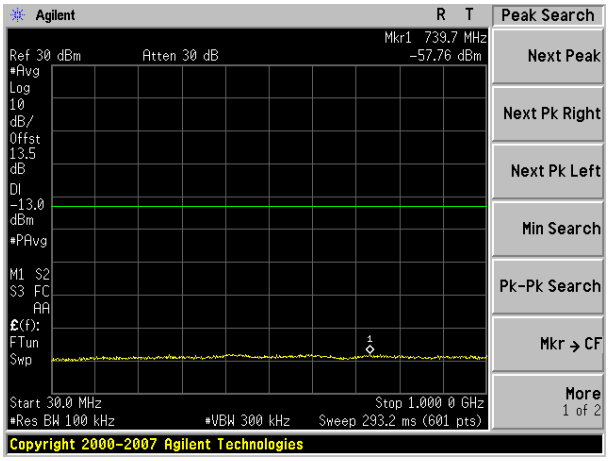
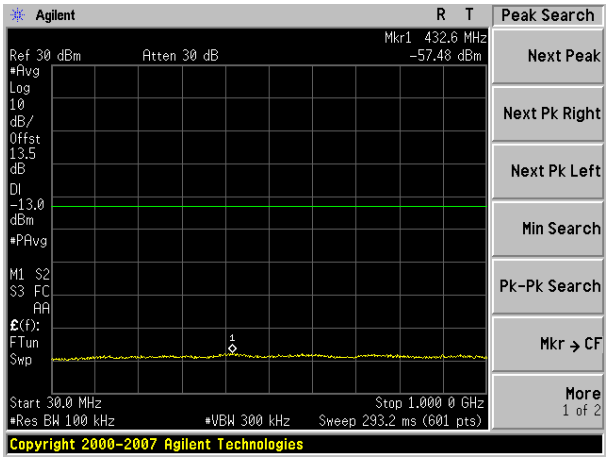
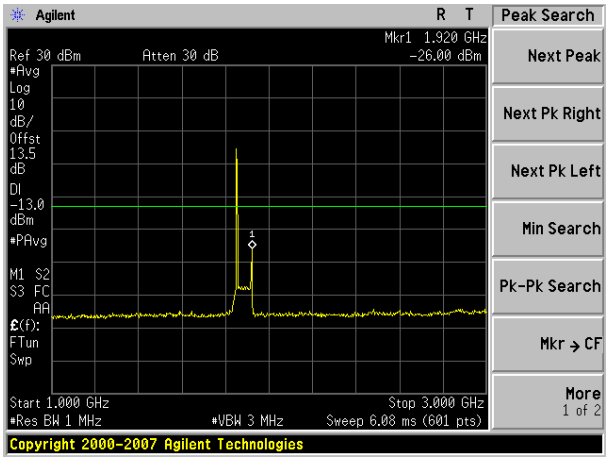
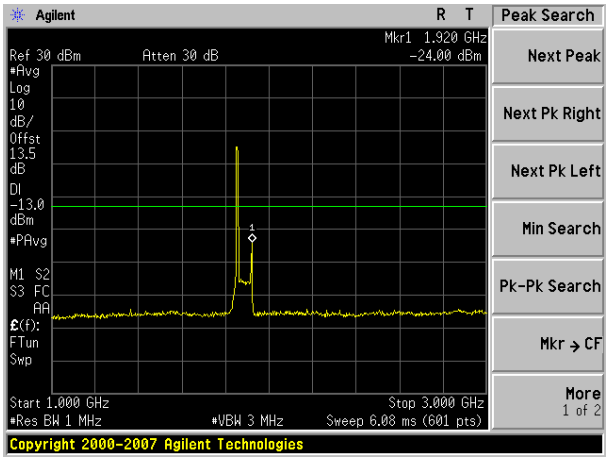
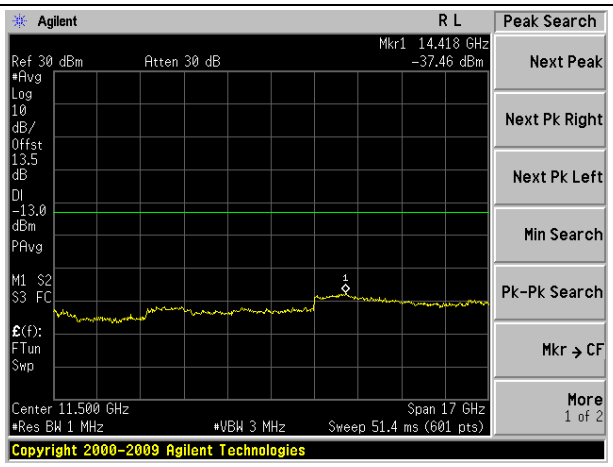
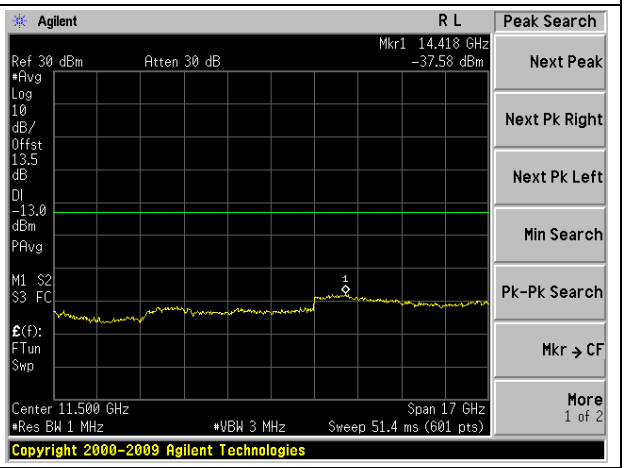
**Spurious emission of CDMA**

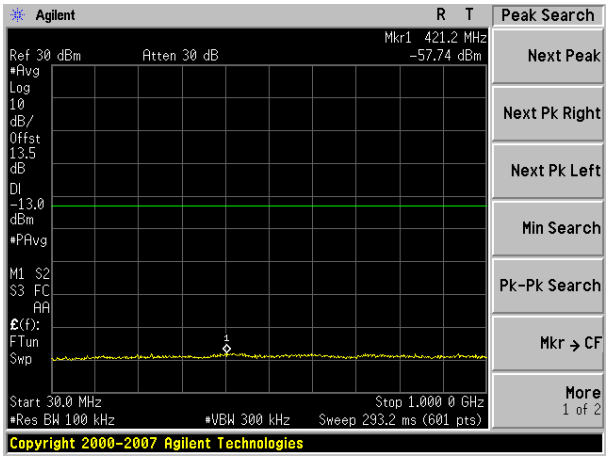
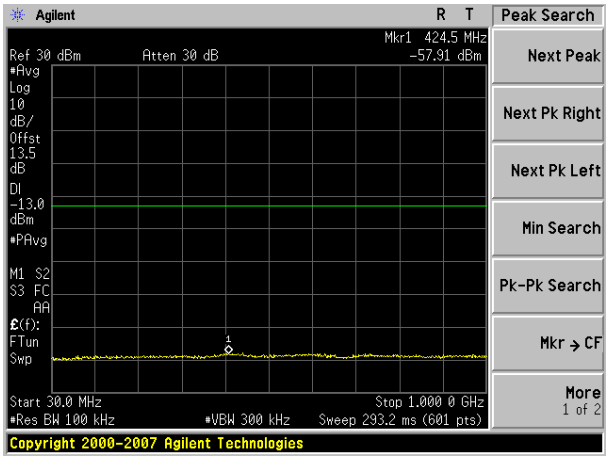
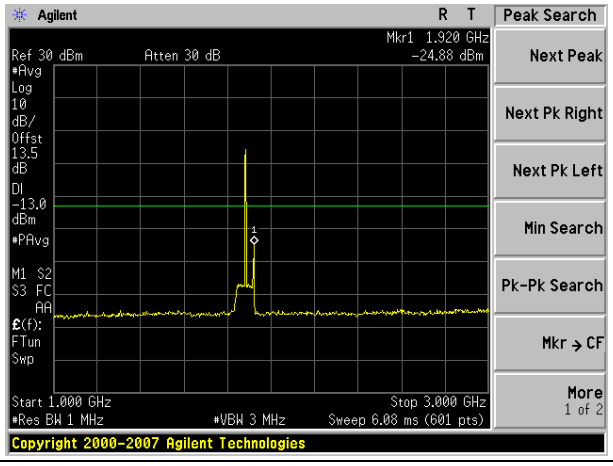
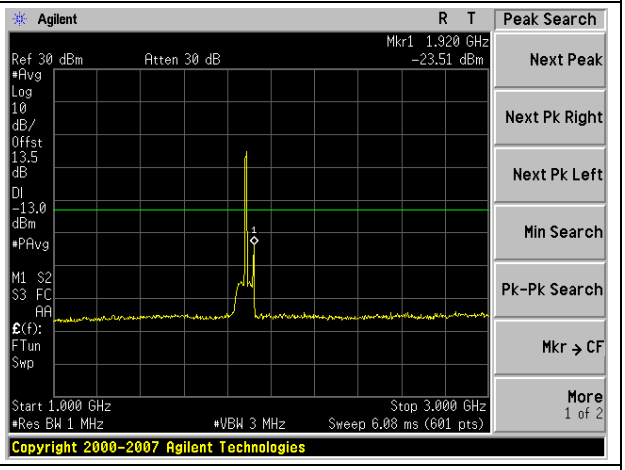
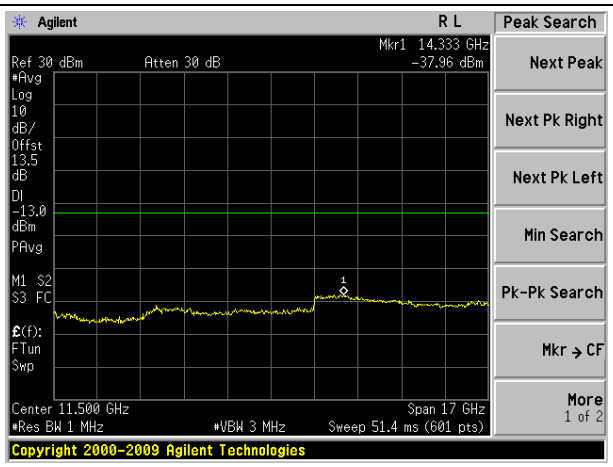
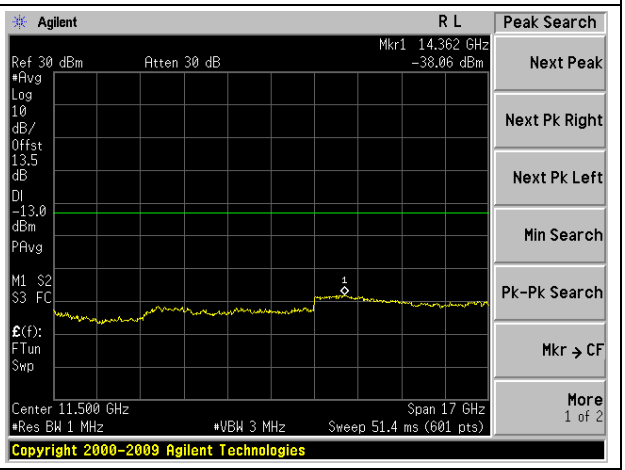
| Number of Carriers: Single carrier (Lowest channel) | Number of Carriers: Four carrier (Lowest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

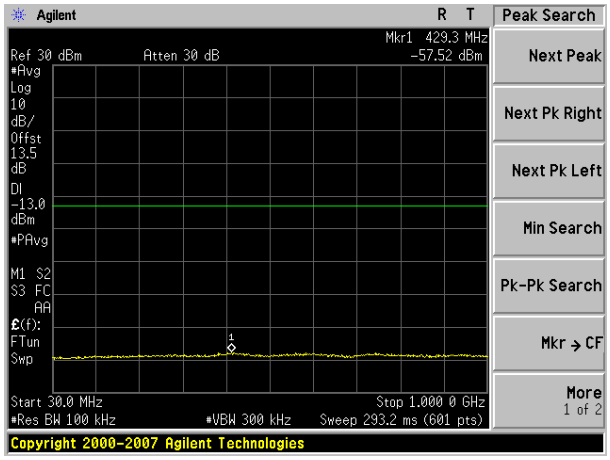
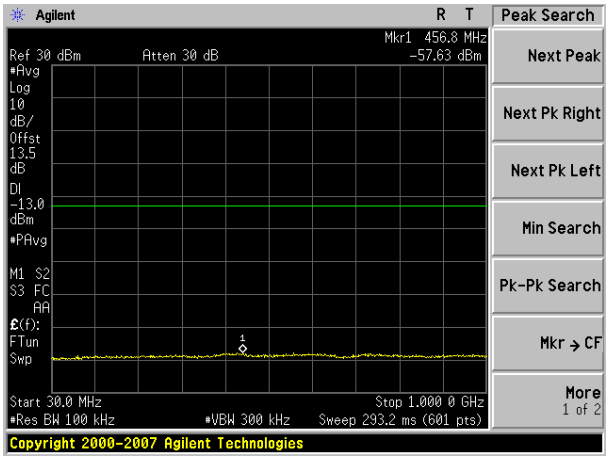
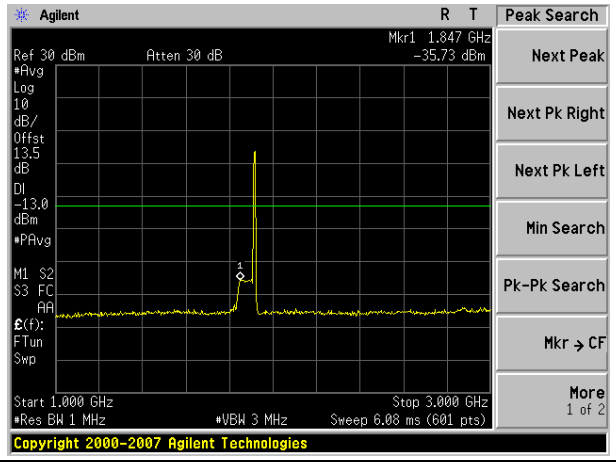
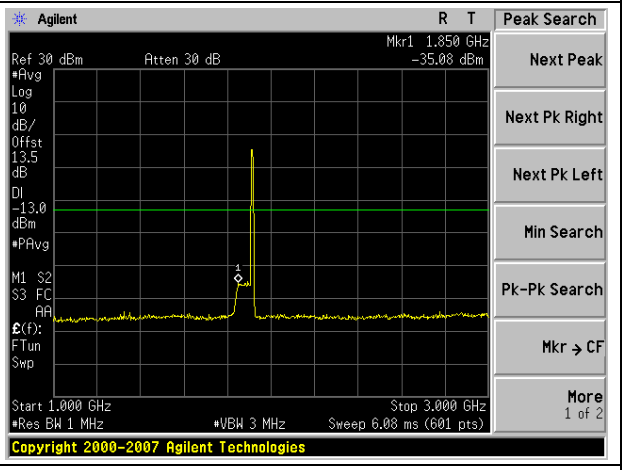
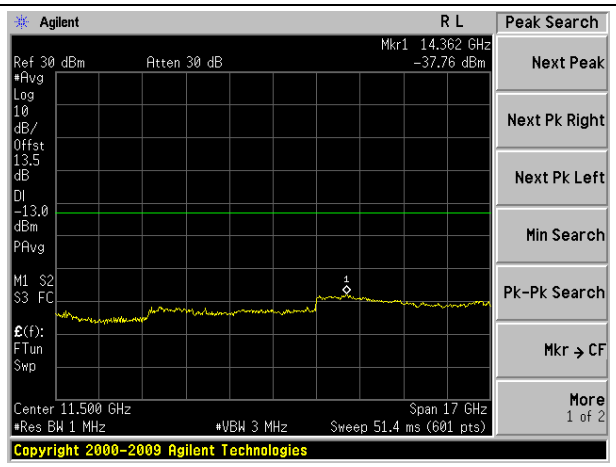
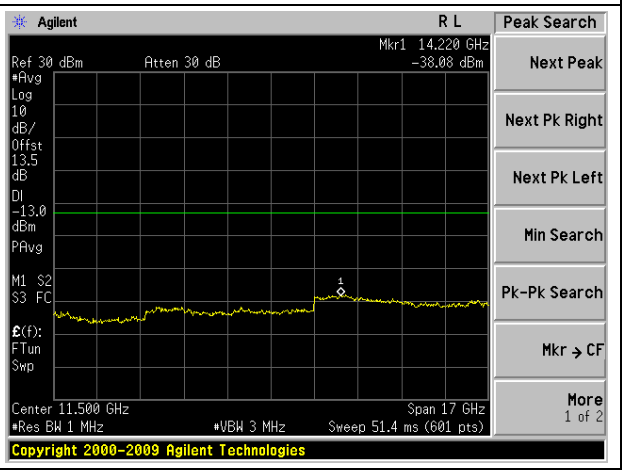
| Number of Carriers: Single carrier (Middle channel) | Number of Carriers: Four carrier (Middle channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

| Number of Carriers: Single carrier(Highest channel) | Number of Carriers: Four carrier(Highest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

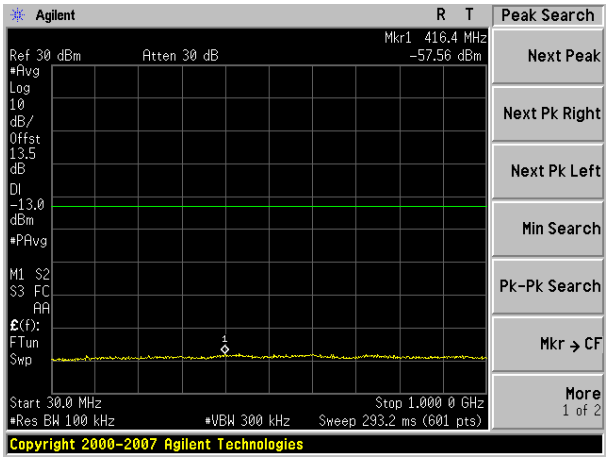
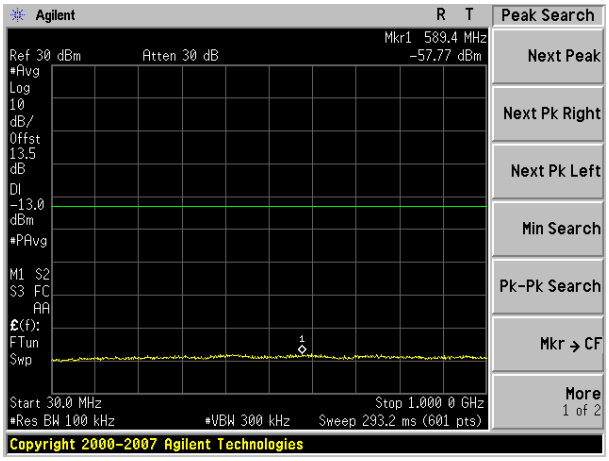
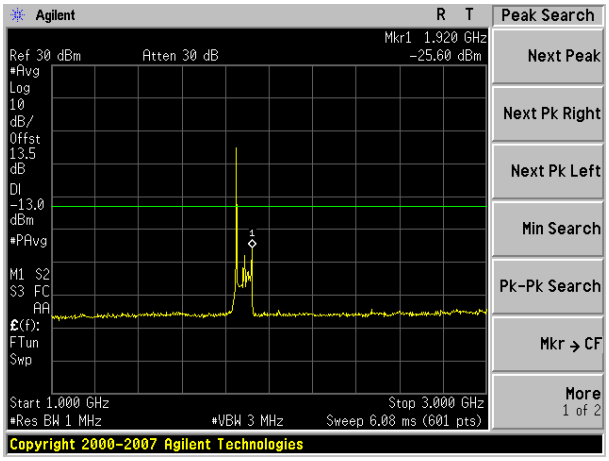
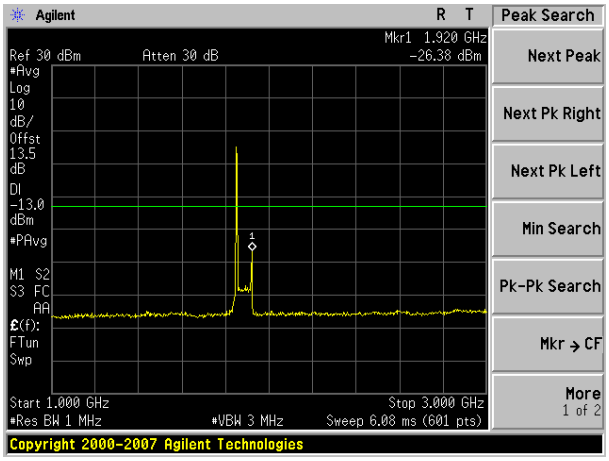
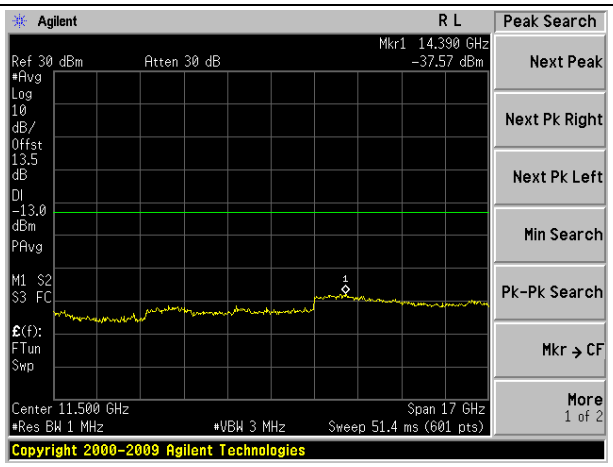
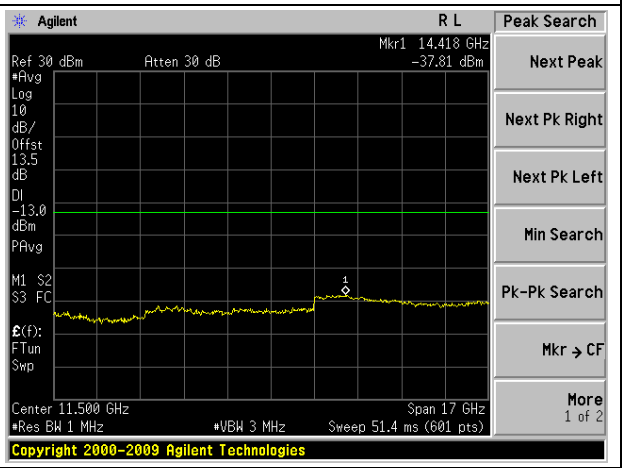
**Spurious emission of CDMA EV-DO**

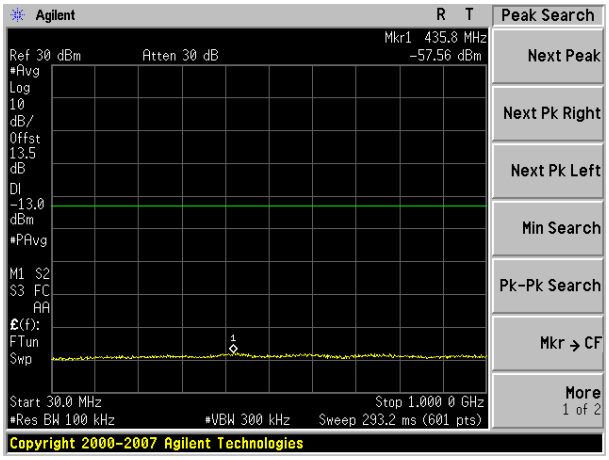
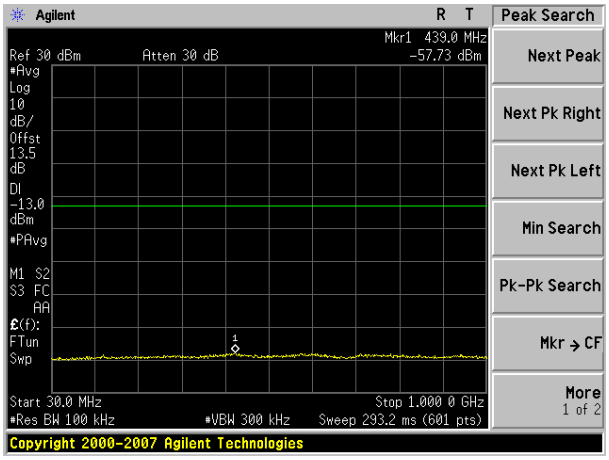
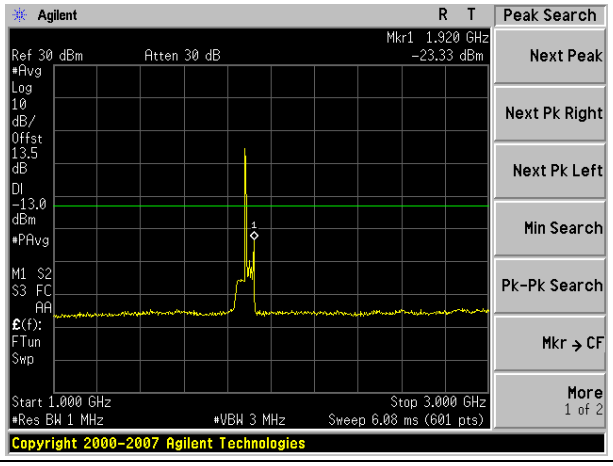
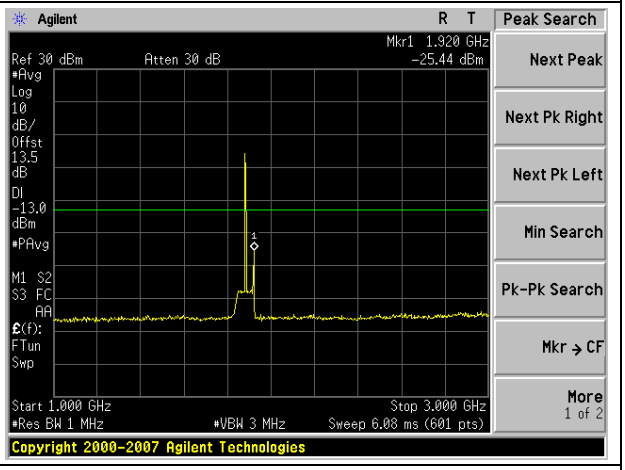
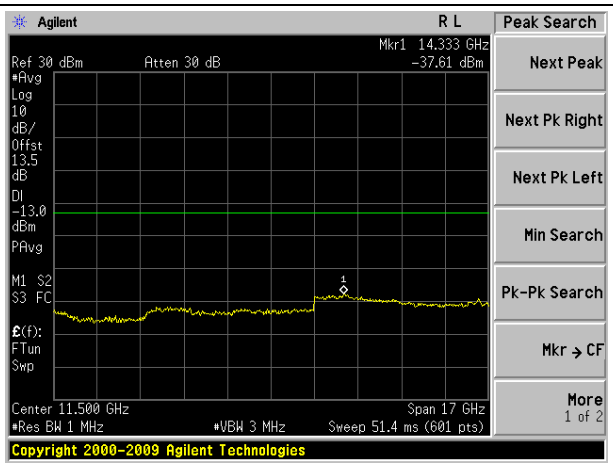
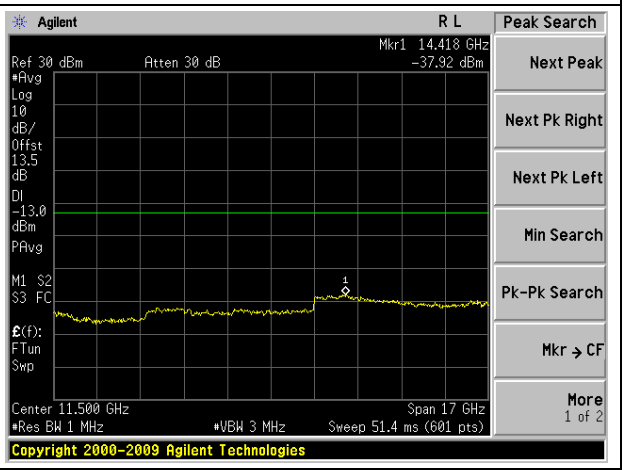
| Number of Carriers: Single carrier (Lowest channel) | Number of Carriers: Four carrier (Lowest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

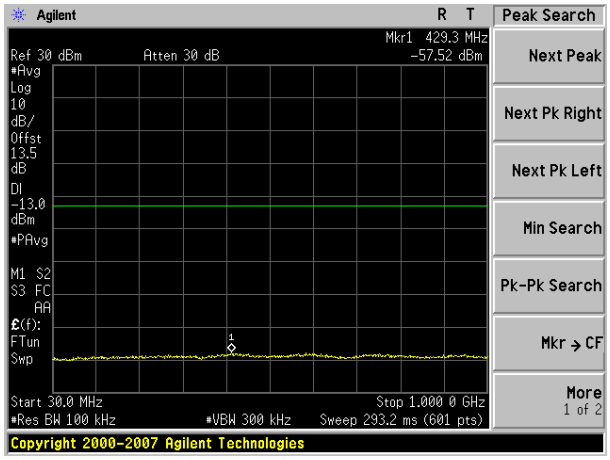
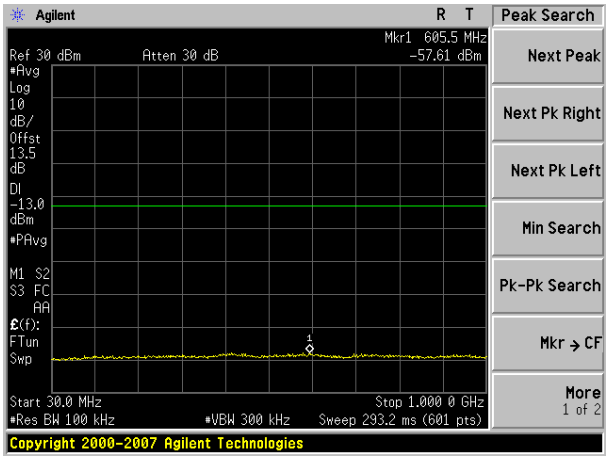
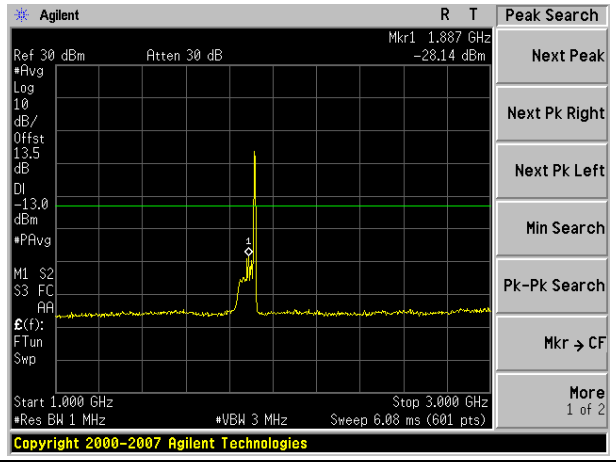
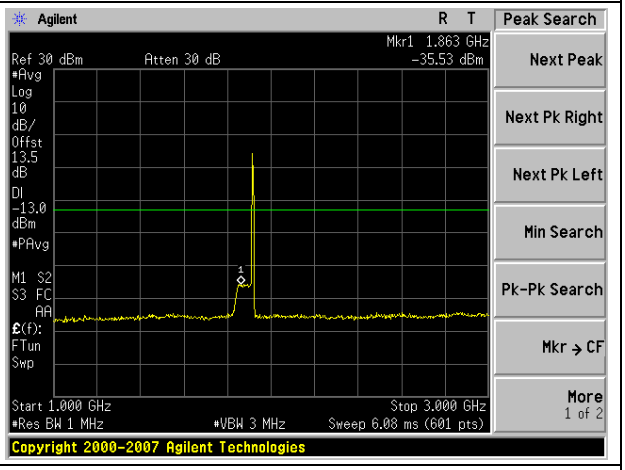
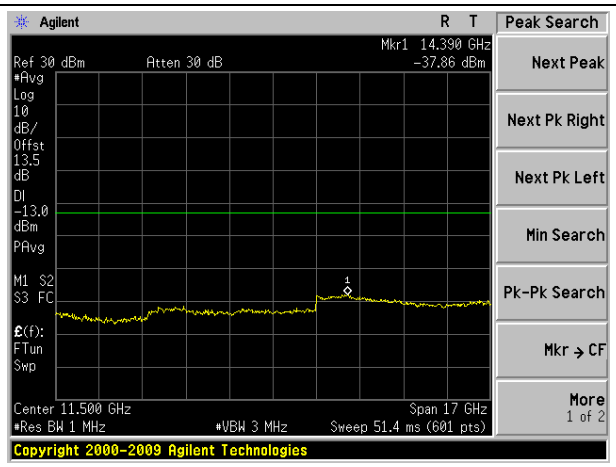
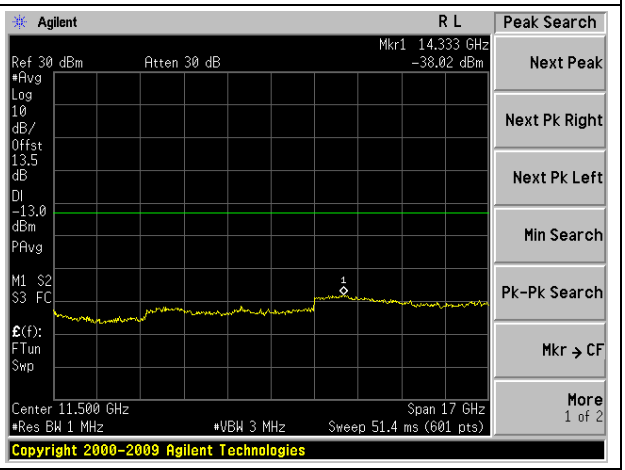
| Number of Carriers: Single carrier (Middle channel) | Number of Carriers: Four carrier (Middle channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

| Number of Carriers: Single carrier(Highest channel) | Number of Carriers: Four carrier(Highest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

**Spurious emission of GSM**

| Number of Carriers: Single carrier (Lowest channel) | Number of Carriers: Four carrier (Lowest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

| Number of Carriers: Single carrier (Middle channel) | Number of Carriers: Four carrier (Middle channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

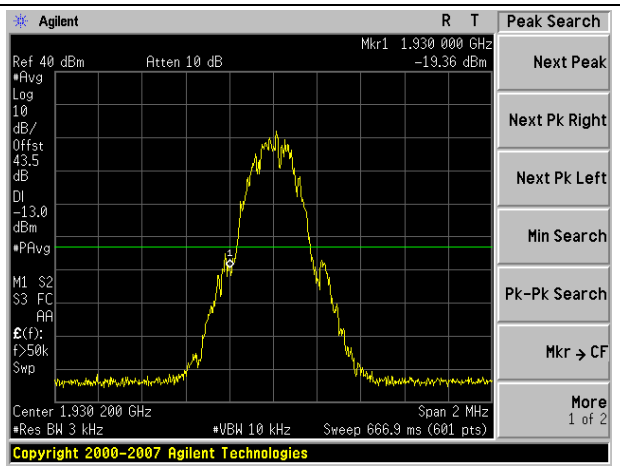
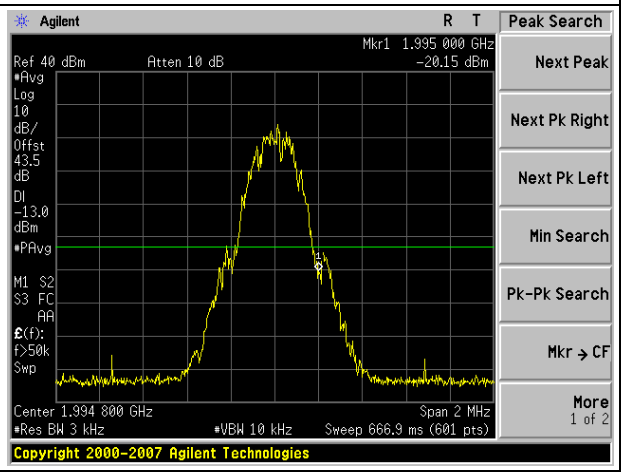
| Number of Carriers: Single carrier(Highest channel) | Number of Carriers: Four carrier(Highest channel) |
|---|---|
| 30MHz-1000MHz | 30MHz-1000MHz |
|  |  |
| 1000MHz-3000MHz | 1000MHz-3000MHz |
|  |  |
| 3000MHz-20000MHz | 3000MHz-20000MHz |
|  |  |

### 9.4.2 Band edge emission

Downlink:

**Band edge of GSM**

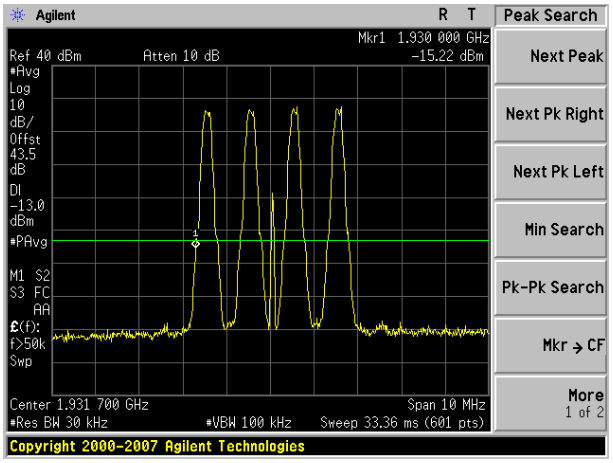
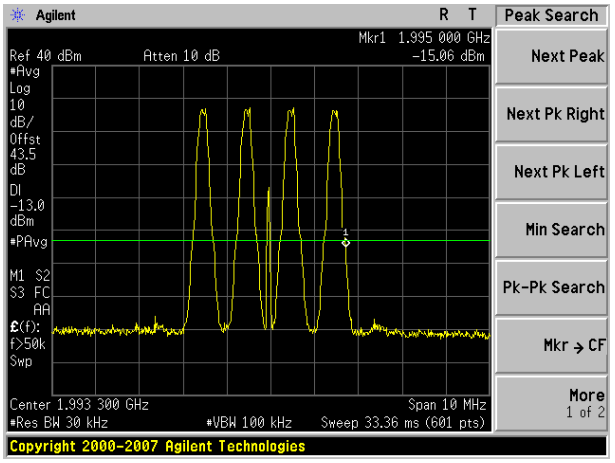
1. Number of Carriers: Single carrier

| Left edge of band | Right edge of band |
|---|---|
|  |  |



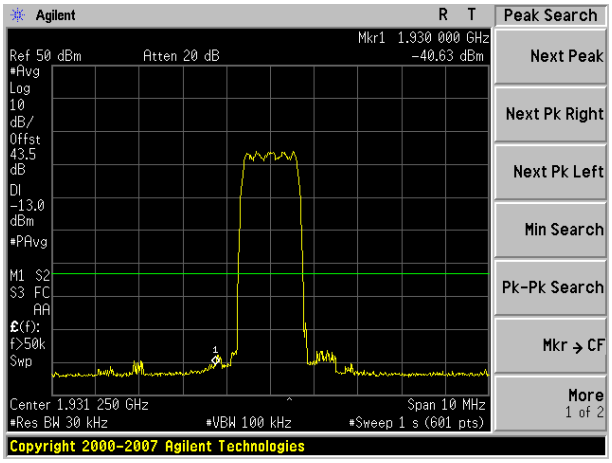
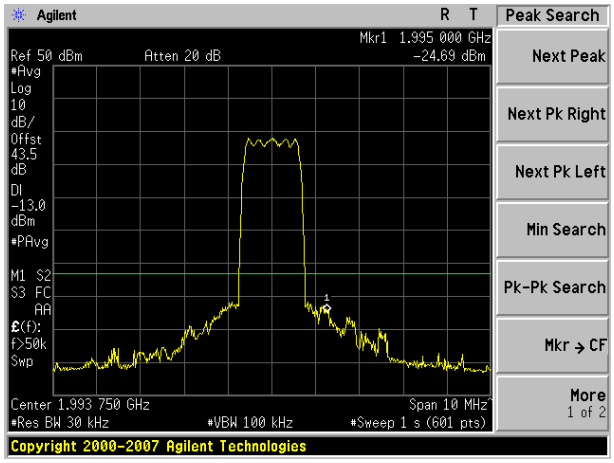


2. Number of Carriers: Four carriers

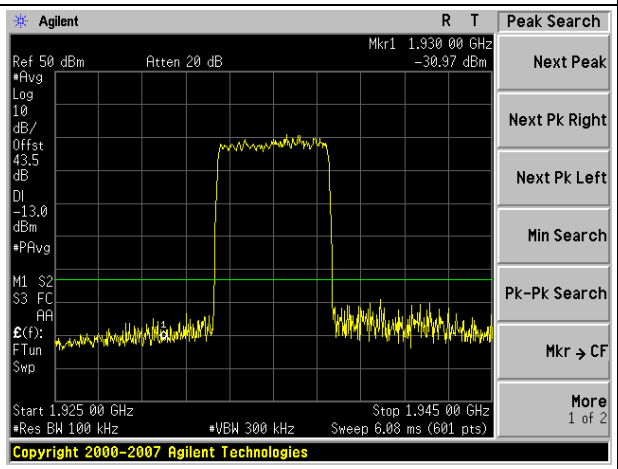
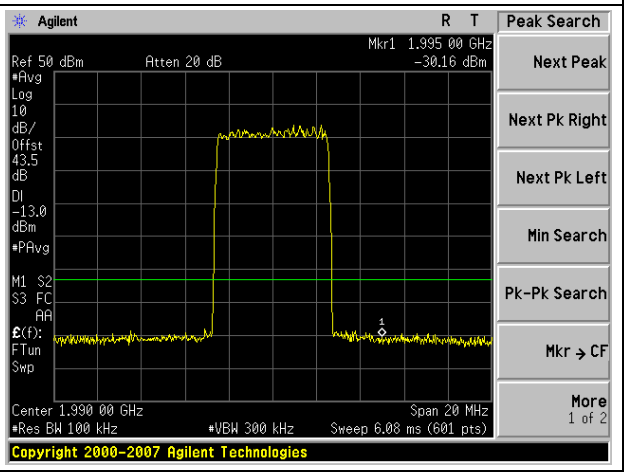
| Left edge of band | Right edge of band |
|---|---|
|  |  |

**Band edge of CDMA**

1. Number of Carriers: Single carrier

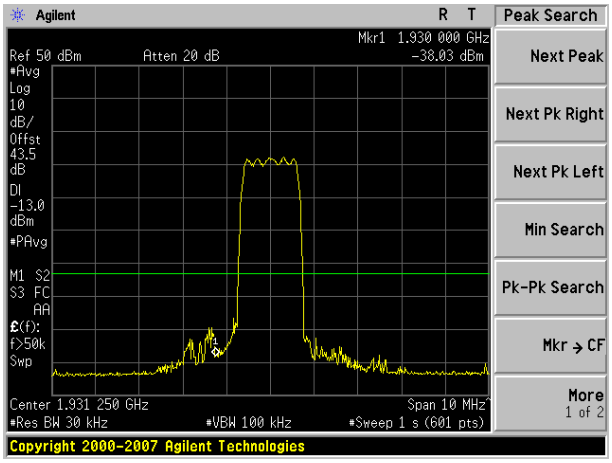
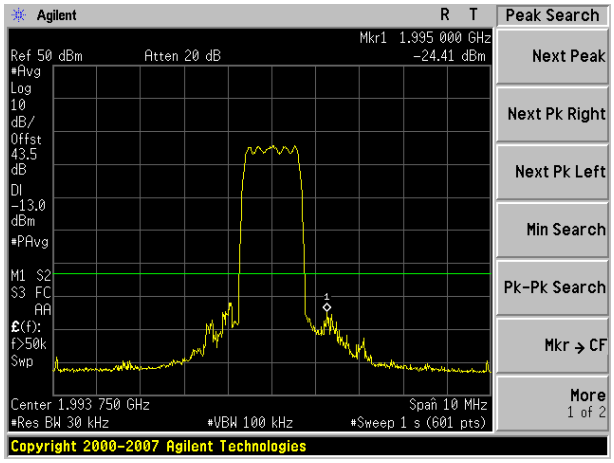
| Left edge of band | Right edge of band |
|---|---|
|  |  |

2. Number of Carriers: Four carriers

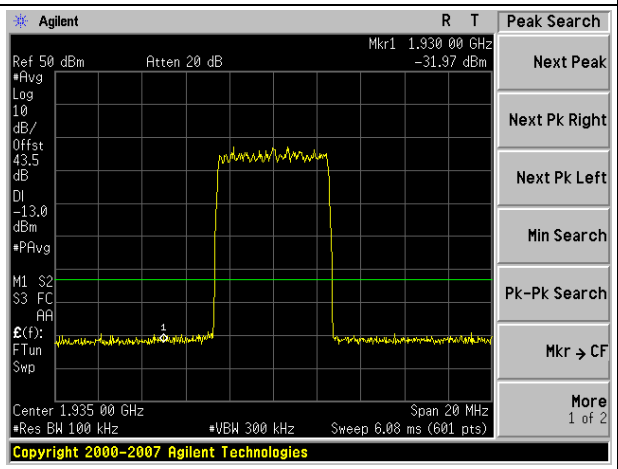
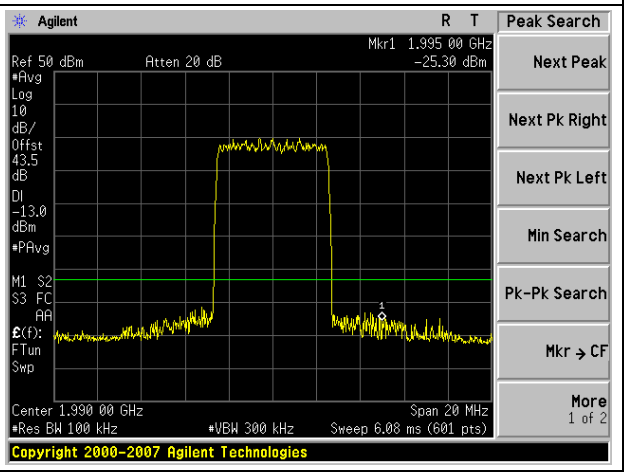
| Left edge of band | Right edge of band |
|---|---|
|  |  |

**Band edge of EVDO**

1. Number of Carriers: Single carrier

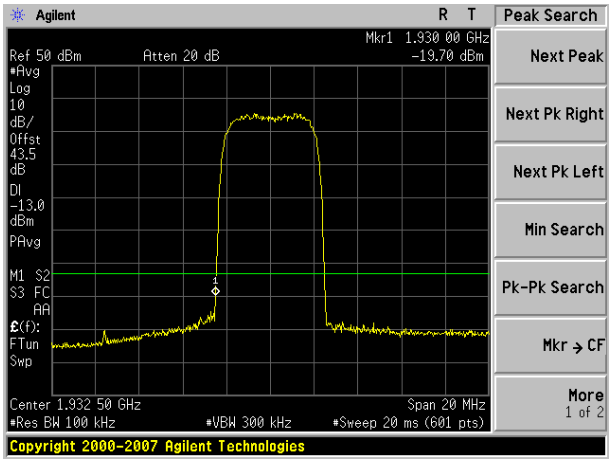
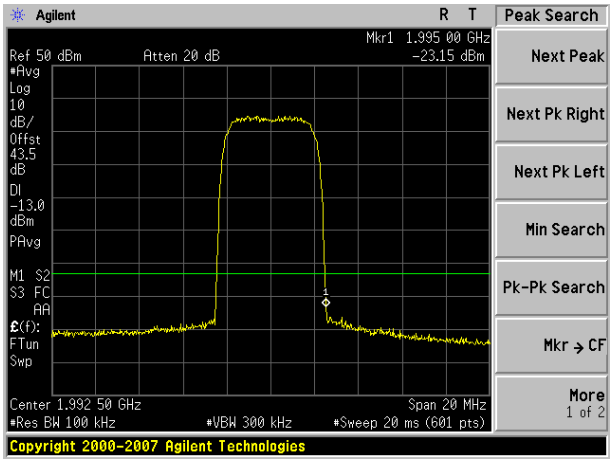
| Left edge of band | Right edge of band |
|---|---|
|  |  |

2. Number of Carriers: Four carriers

| Left edge of band | Right edge of band |
|---|---|
|  |  |

**Band edge of WCDMA**

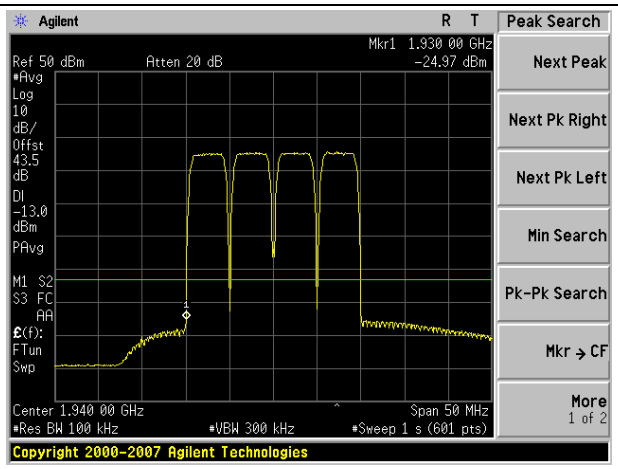
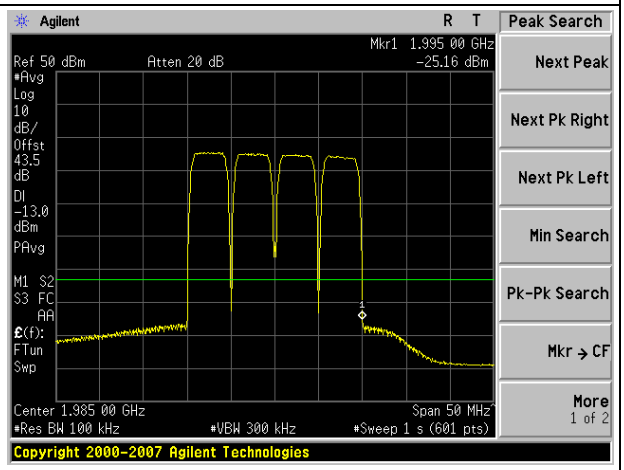
1. Number of Carriers: Single carrier

| Left edge of band | Right edge of band |
|---|---|
|  |  |



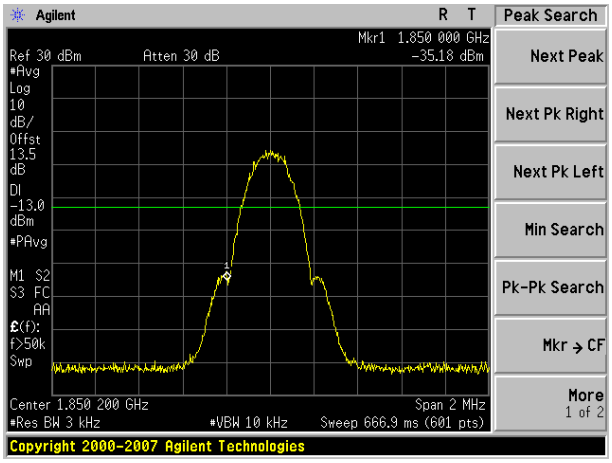
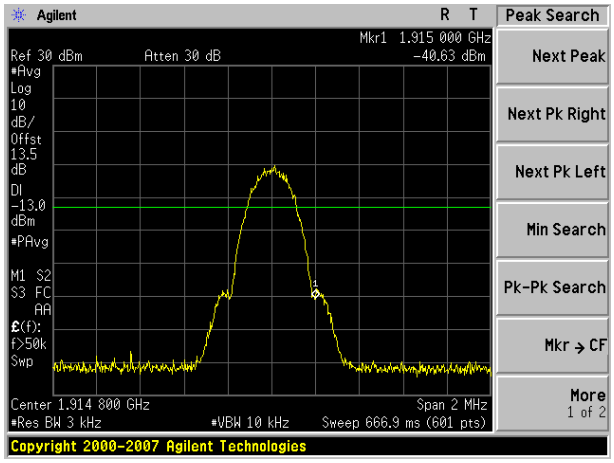
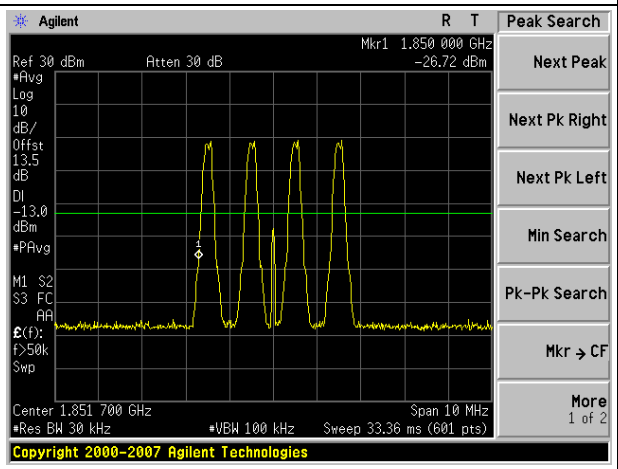
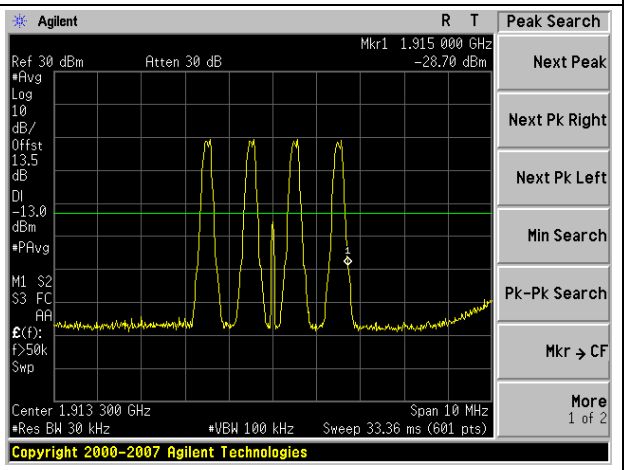


2. Number of Carriers: Four carriers

| Left edge of band | Right edge of band |
|---|---|
|  |  |

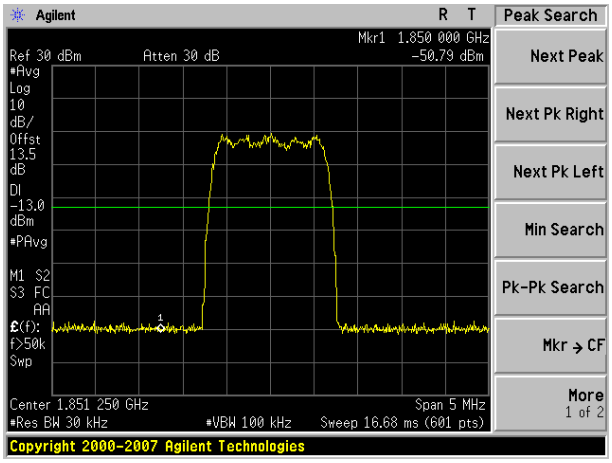
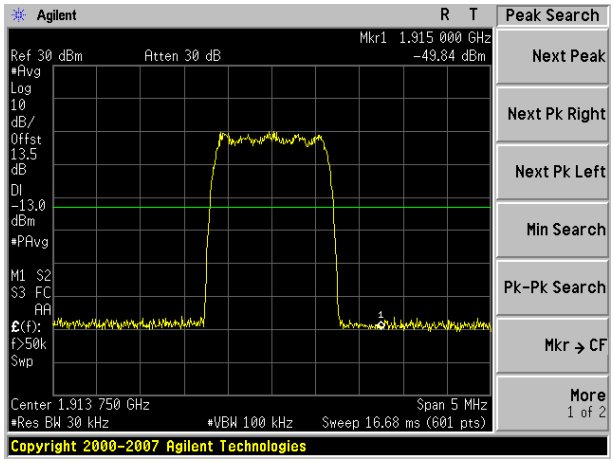
Uplink:

**Band edge of GSM**

| 1. Number of Carriers: Single carrier | |
|---|---|
| Left edge of band | Right edge of band |
|  |  |
| 2. Number of Carriers: Four carriers | |
| Left edge of band | Right edge of band |
|  |  |

**Band edge of CDMA**

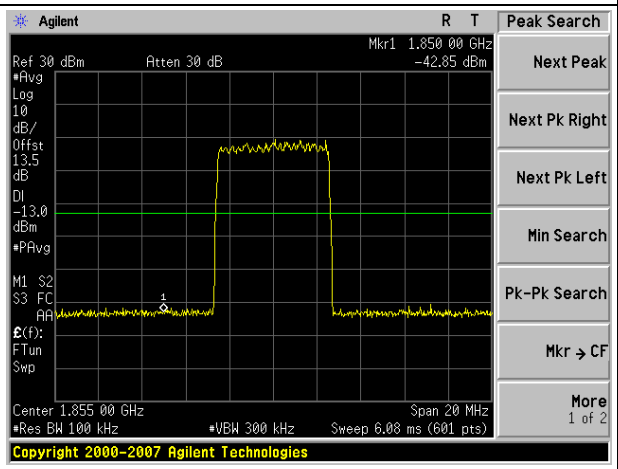
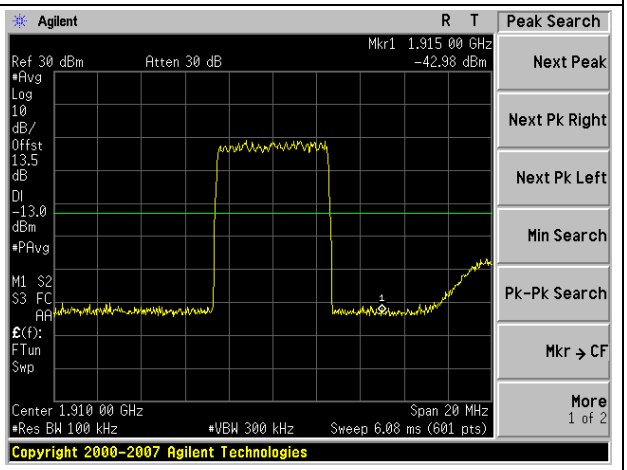
1. Number of Carriers: Single carrier

| Left edge of band | Right edge of band |
|---|---|
|  |  |



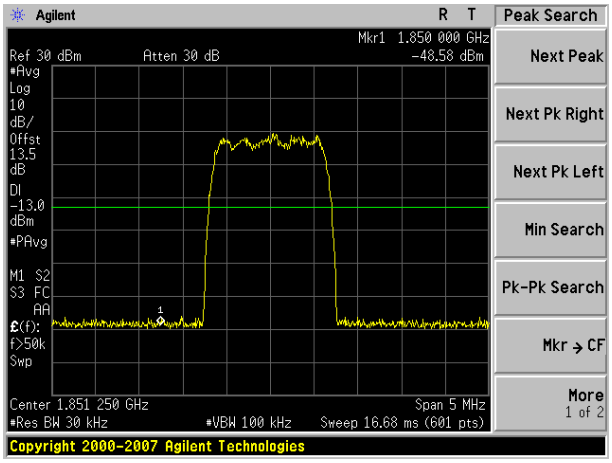
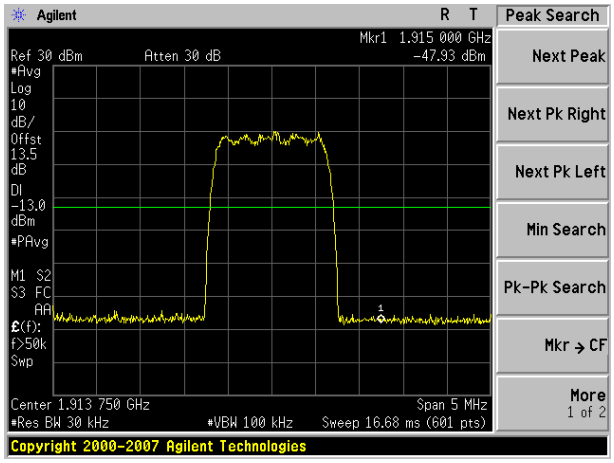


2. Number of Carriers: Four carriers

| Left edge of band | Right edge of band |
|---|---|
|  |  |

**Band edge of EVDO**

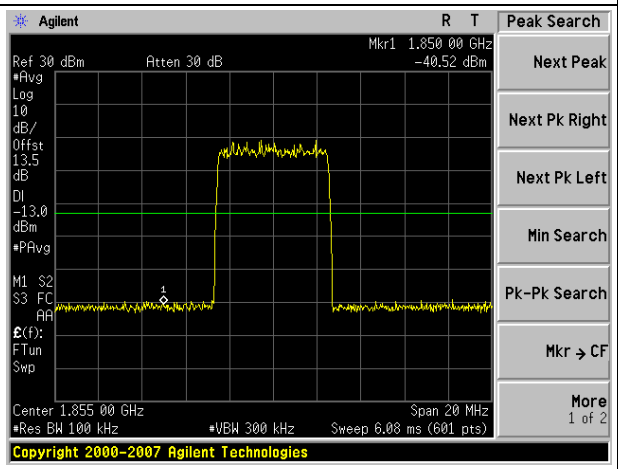
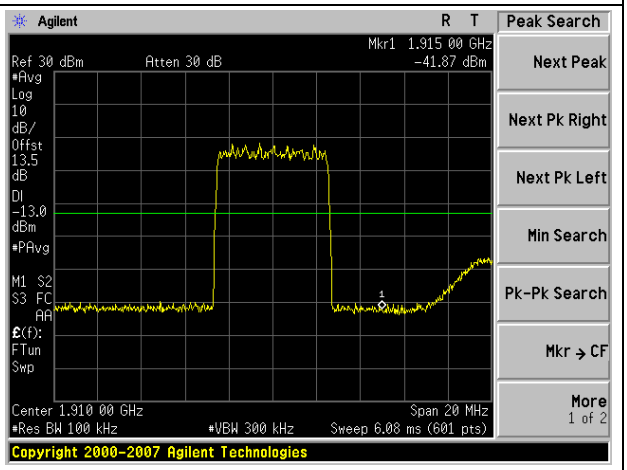
1. Number of Carriers: Single carrier

| Left edge of band | Right edge of band |
|---|---|
|  |  |



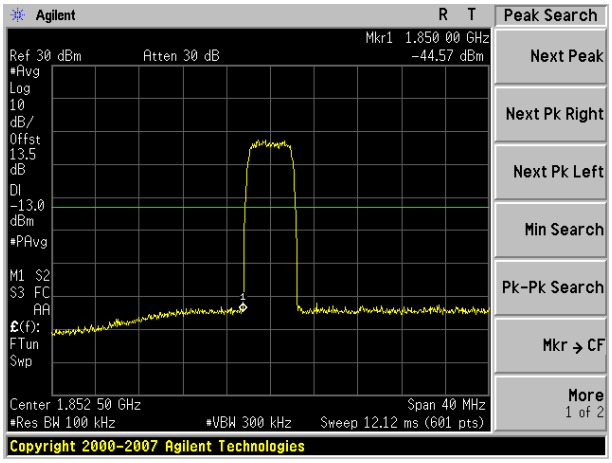
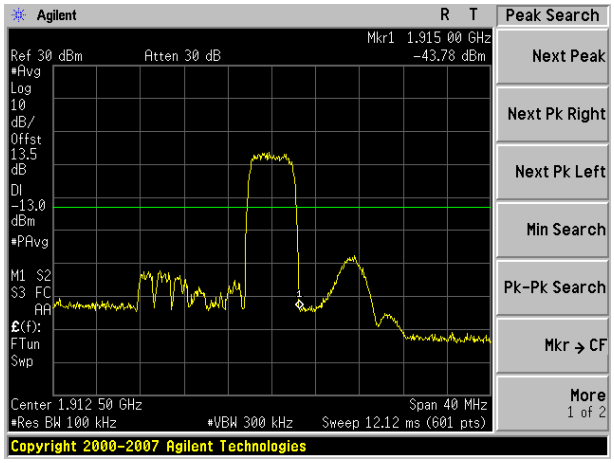


2. Number of Carriers: Four carriers

| Left edge of band | Right edge of band |
|---|---|
|  |  |

**Band edge of WCDMA**

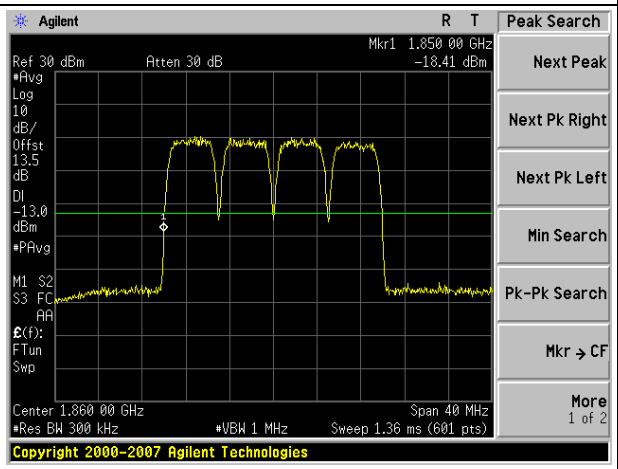
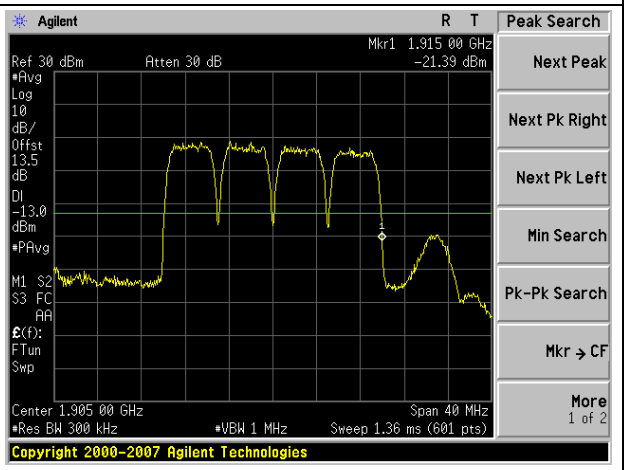
1. Number of Carriers: Single carrier

| Left edge of band | Right edge of band |
|---|---|
|  |  |





2. Number of Carriers: Four carriers

| Left edge of band | Right edge of band |
|---|---|
|  |  |

# 10 INTERMODULATION

## 10.1 Standard Applicable

According to FCC § 2.1051 and § 24.238(a).

## 10.2 Test setup

Please refer the section §6.2 Configuration of Tested System.

## 10.3 Measurement Procedure

1. The EUT RF output port was connected to spectrum analyzer. The EUT shall be set to maximum gain
   and maximum rated output power per channel.
2. Two continuous sinusoidal RF signals shall be fed to the input antenna port of the repeater using a combining device. The two channels near each other should be separated by at least one operating channel width.
3. The spurious emissions at antenna were measured at the RF output port of the EUT.
4. The modulation types tested is WCDMA/CDMA/CDMA EV-DO/GSM.

Spectrum analyzer settings:

Detector: RMS.

Intermodulation:

RBW=100 kHz; VBW≥ RBW

Spurious emissions:

Below 1G: RBW=100kHz;  Above 1G: RBW=1 MHz ; VBW≥ RBW

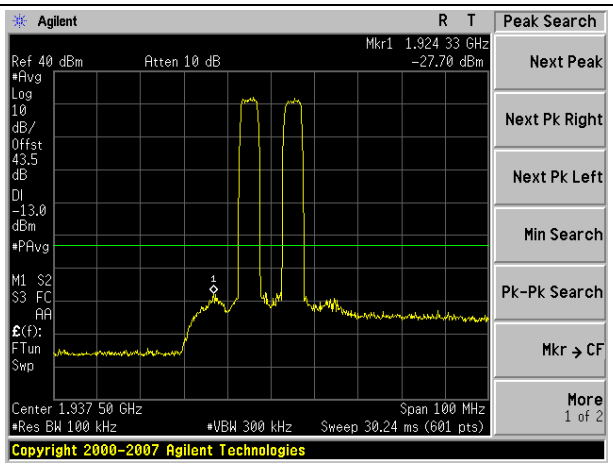
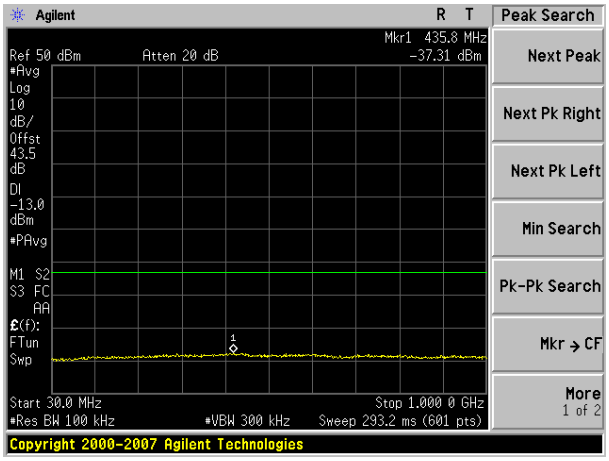
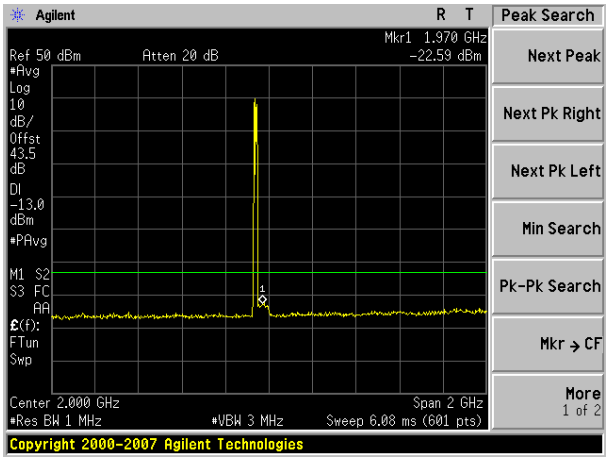
## 10.4 Test Result

**Passed.**

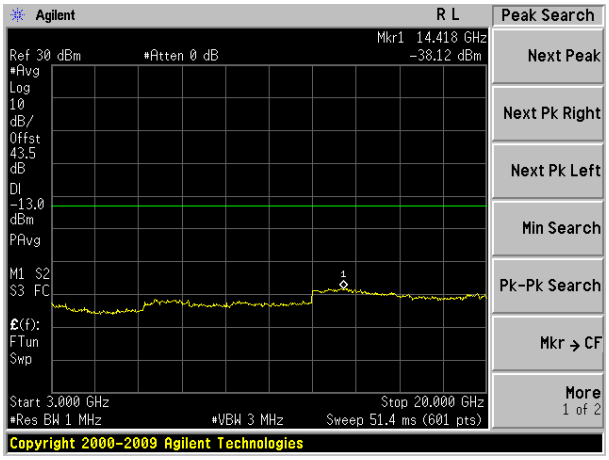
*remark： Single， Two， Three， Four Carrie mode all have been tested， only report worst case.*

Downlink:

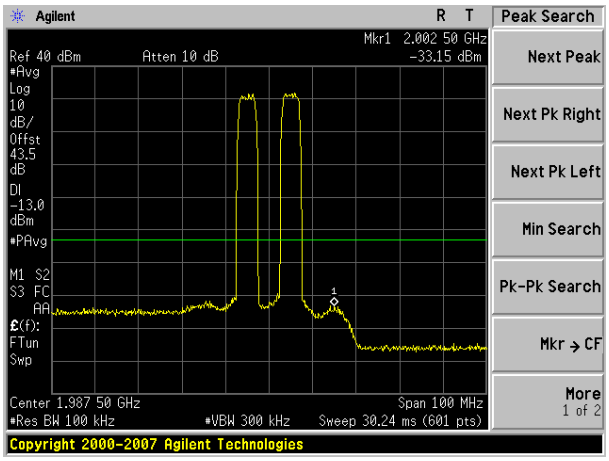
**Intermodulation of WCDMA**

| Intermodulation - Low part of band |
|---|
|  |
| 30MHz-1000MHz spurious emissions |
|  |
| 1000MHz-3000MHz spurious emissions |
|  |

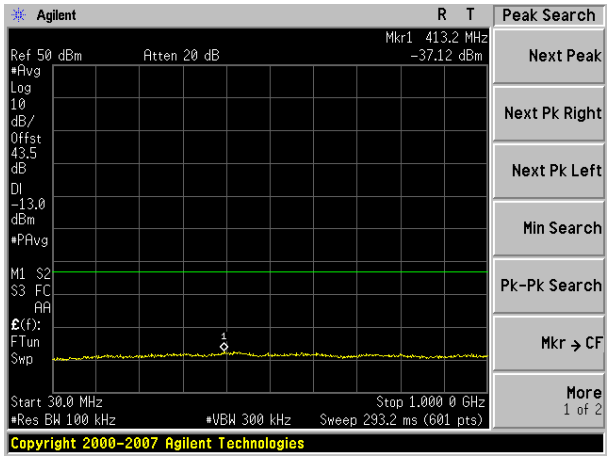
3000MHz-20000MHz spurious emissions



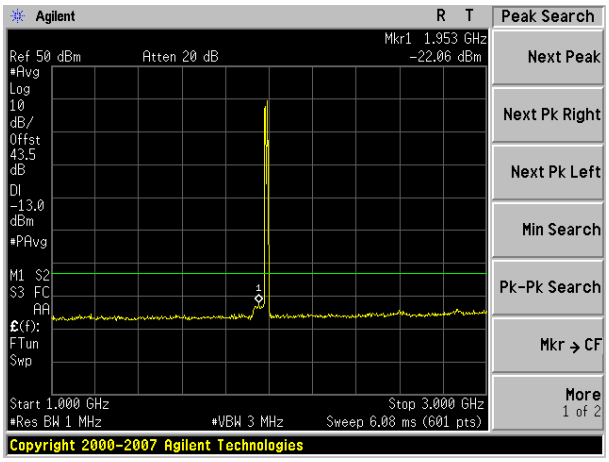

Intermodulation - High part of band



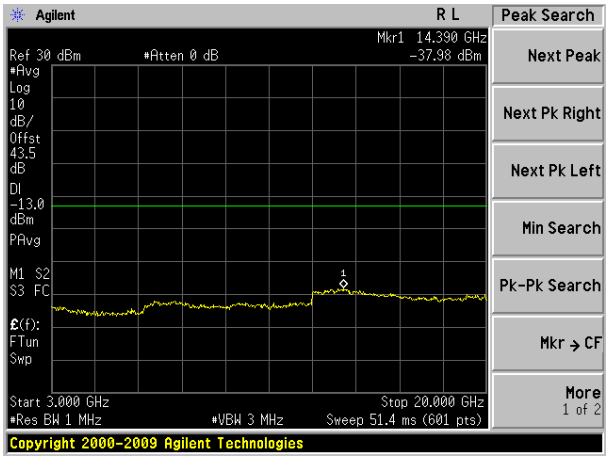

30MHz-1000MHz spurious emissions



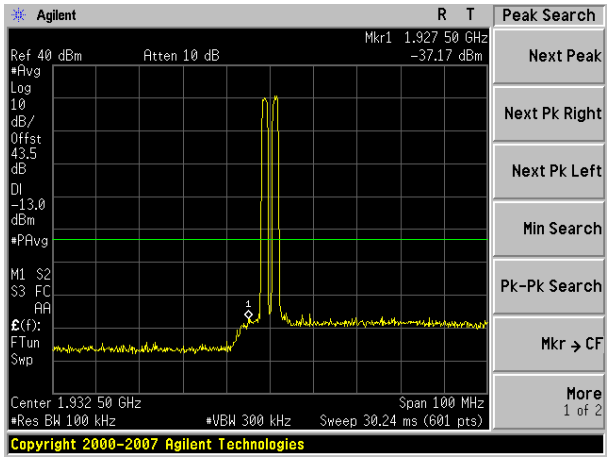
1000MHz-3000MHz spurious emissions



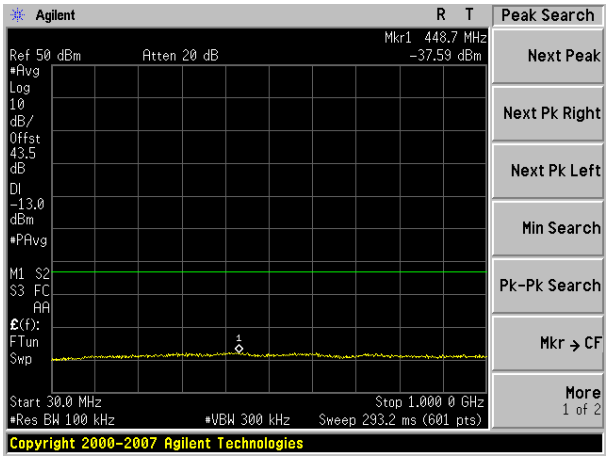

3000MHz-20000MHz spurious emissions



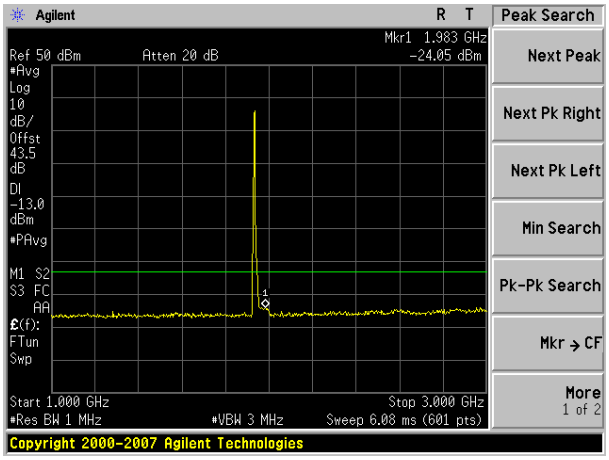

**Intermodulation of CDMA**

| Intermodulation - Low part of band |
|---|
|  |

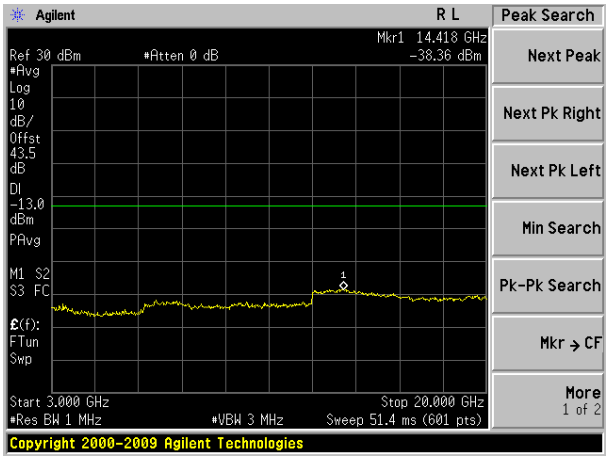
30MHz-1000MHz spurious emissions

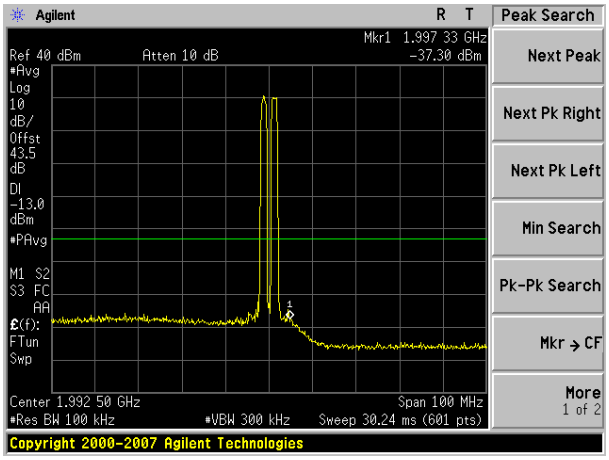
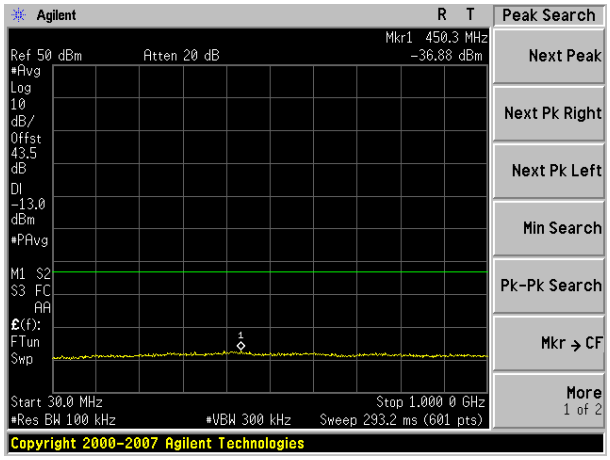
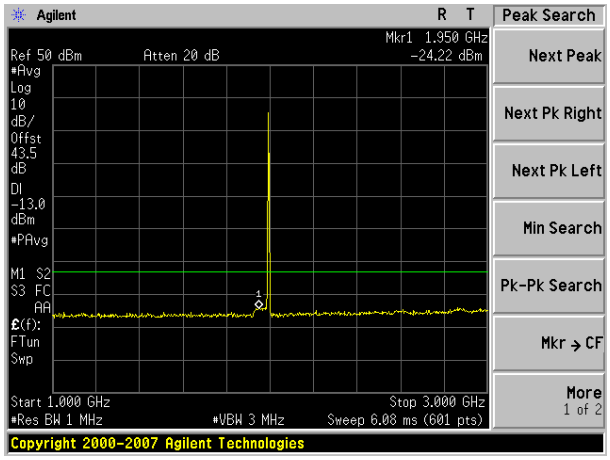



1000MHz-3000MHz spurious emissions

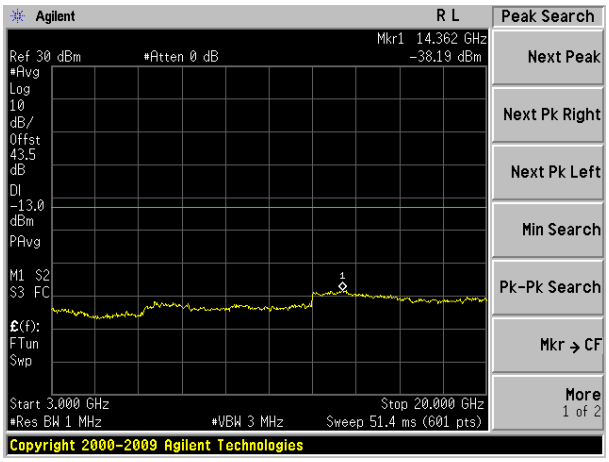



3000MHz-20000MHz spurious emissions

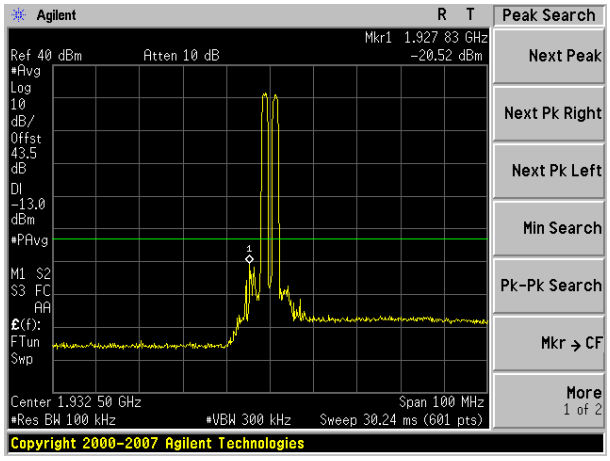
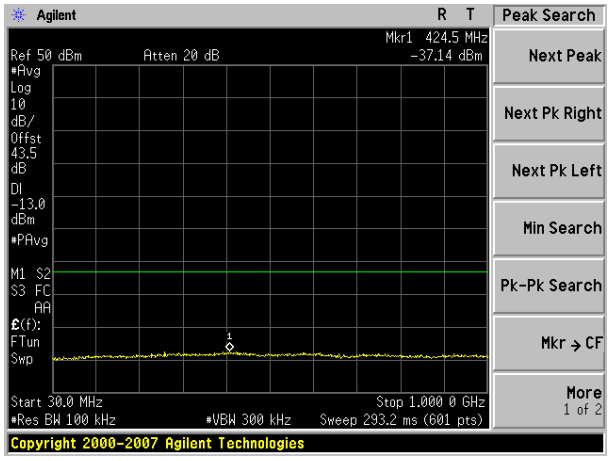


| Intermodulation - High part of band |
| --- |
|  |
| 30MHz-1000MHz spurious emissions |
|  |
| 1000MHz-3000MHz spurious emissions |
|  |

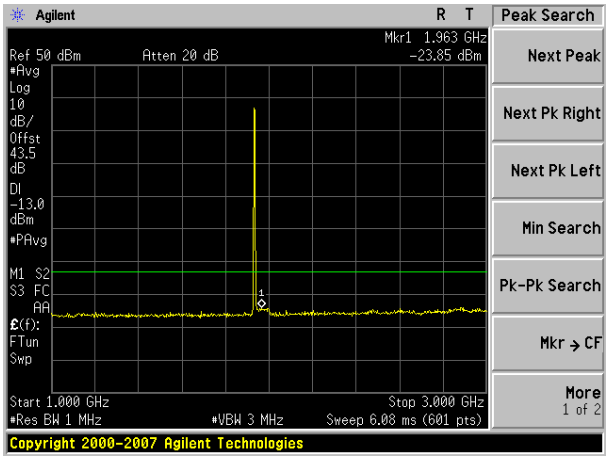
3000MHz-20000MHz spurious emissions



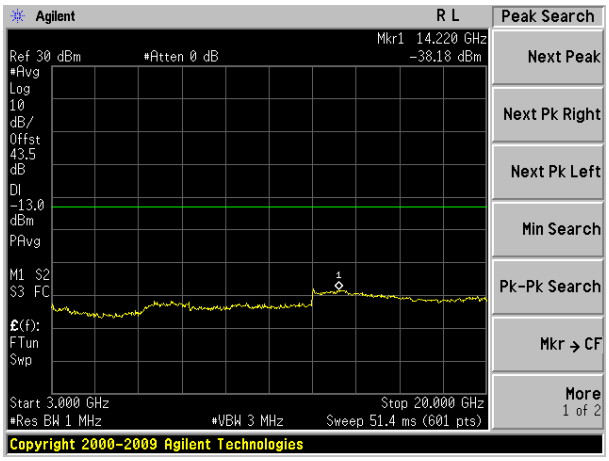

**Intermodulation of CDMA EV-DO**

| Intermodulation - Low part of band |
|---|
|  |
| 30MHz-1000MHz spurious emissions |
|  |

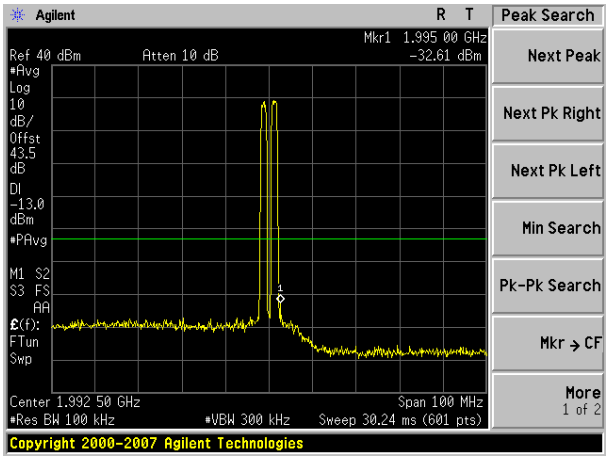
1000MHz-3000MHz spurious emissions



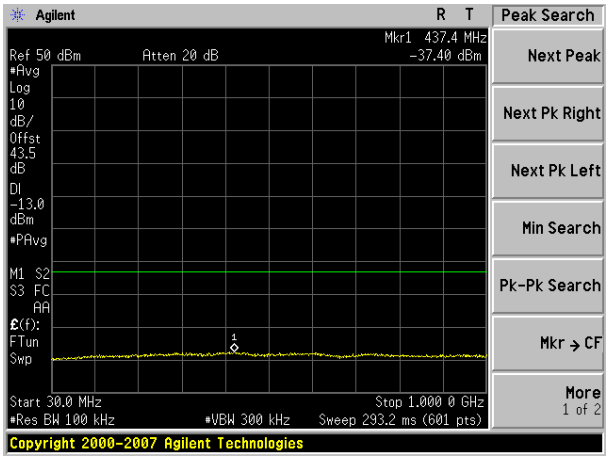

3000MHz-20000MHz spurious emissions



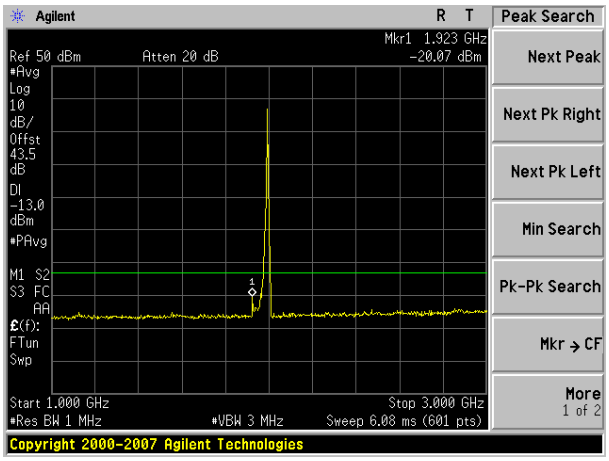

Intermodulation - High part of band



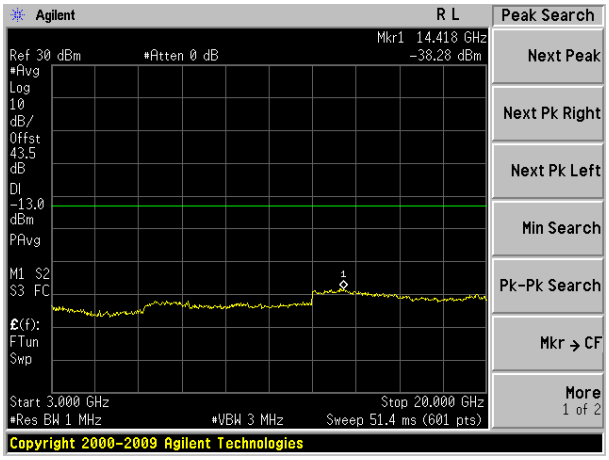
30MHz-1000MHz spurious emissions



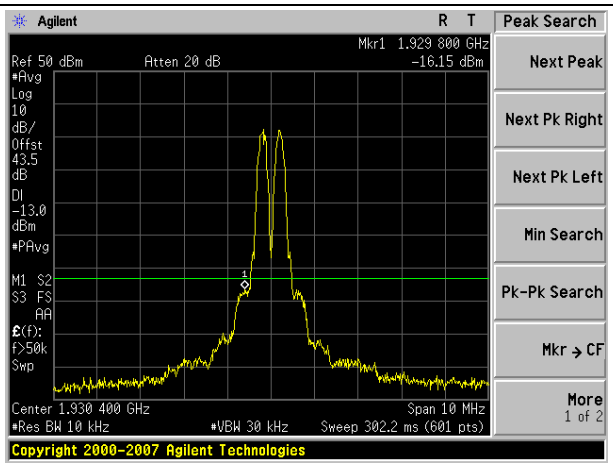
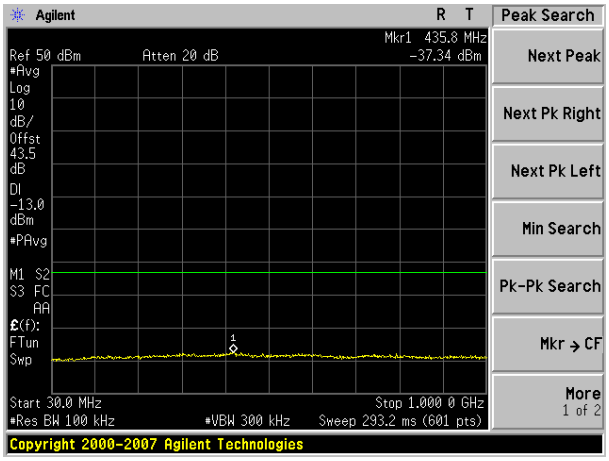
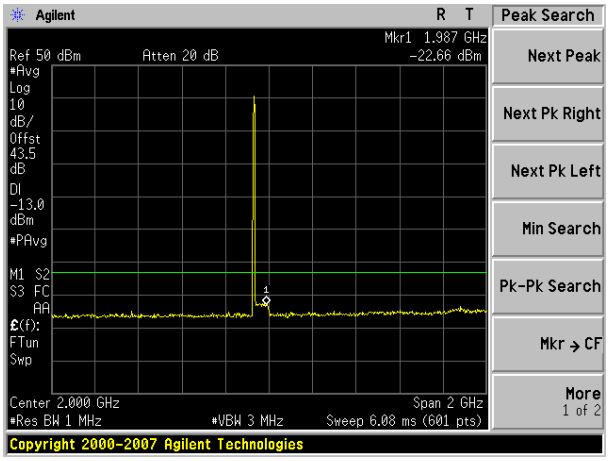

1000MHz-3000MHz spurious emissions



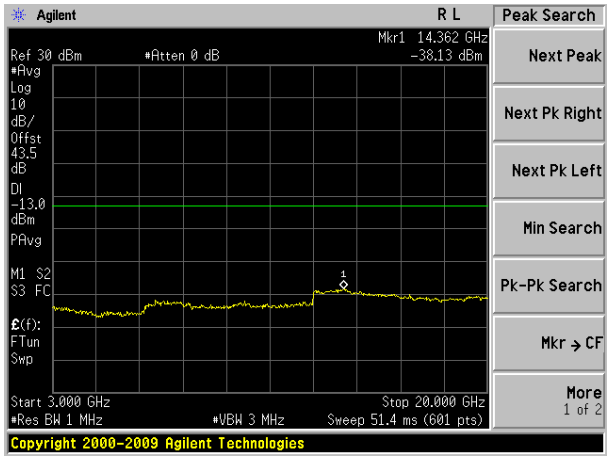

3000MHz-20000MHz spurious emissions



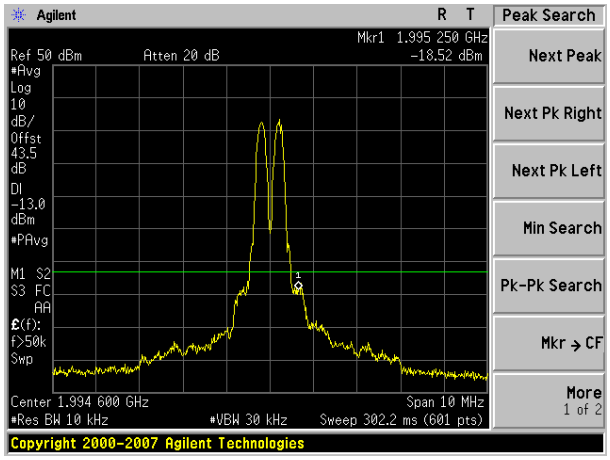
**Intermodulation of GSM**

| Intermodulation - Low part of band |
| --- |
|  |
| 30MHz-1000MHz spurious emissions |
|  |
| 1000MHz-3000MHz spurious emissions |
|  |

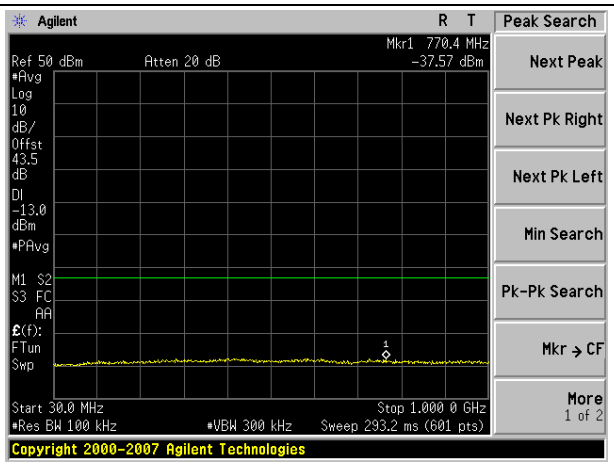
3000MHz-20000MHz spurious emissions



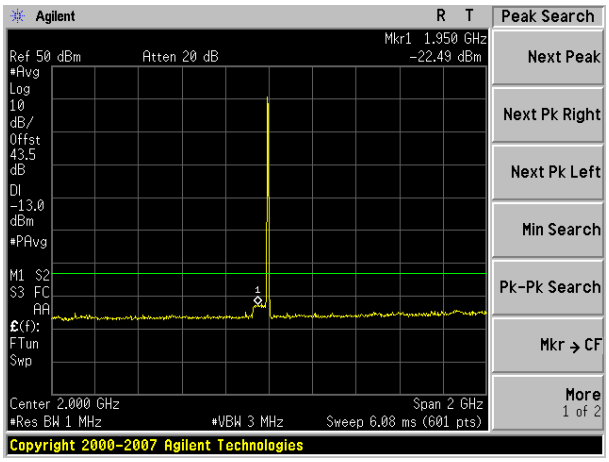

Intermodulation - High part of band



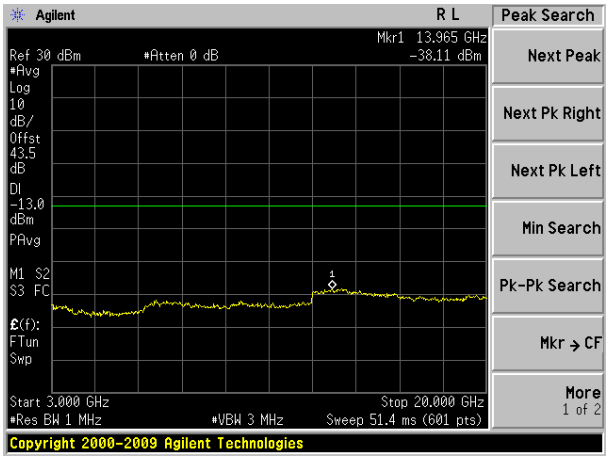

30MHz-1000MHz spurious emissions



1000MHz-3000MHz spurious emissions

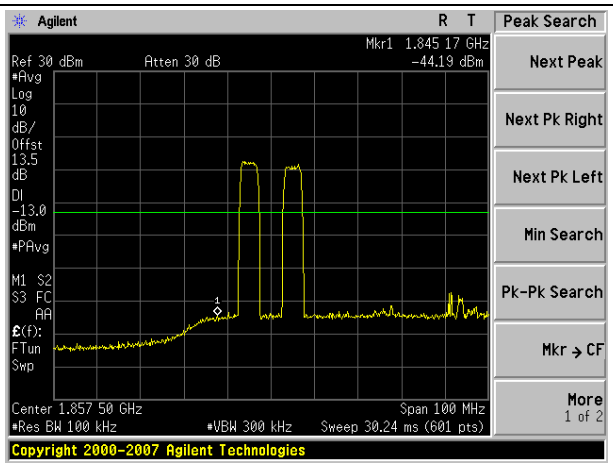
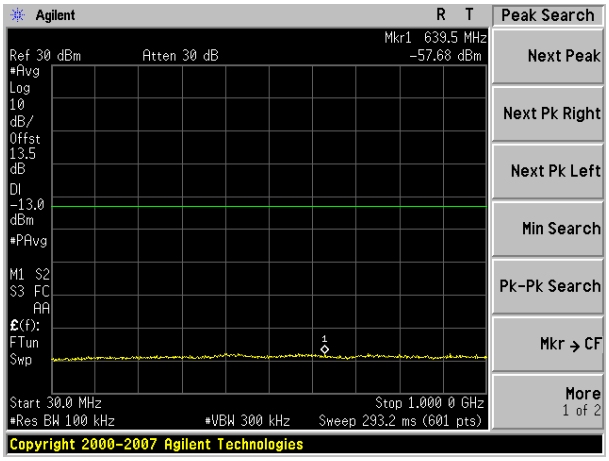
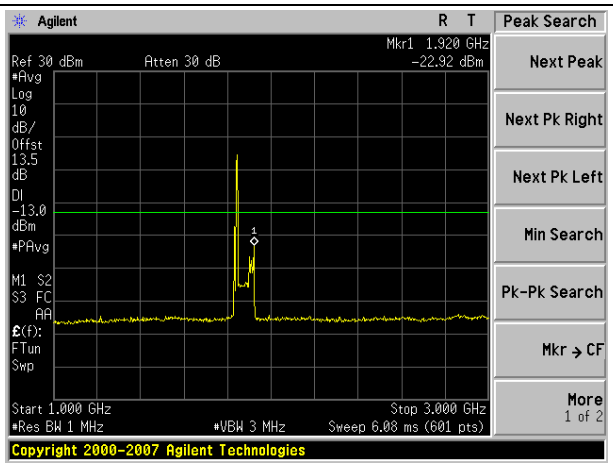



3000MHz-20000MHz spurious emissions

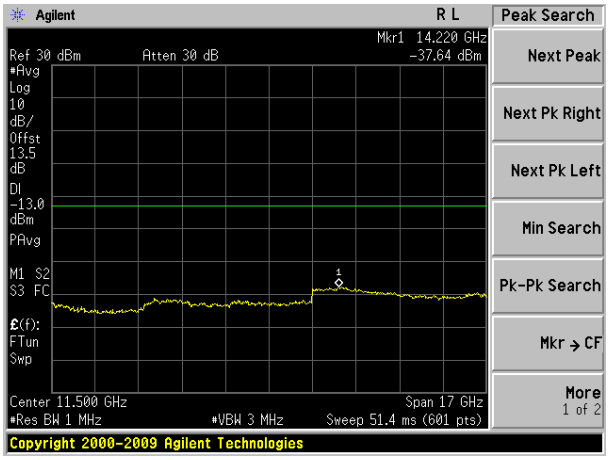


Uplink:

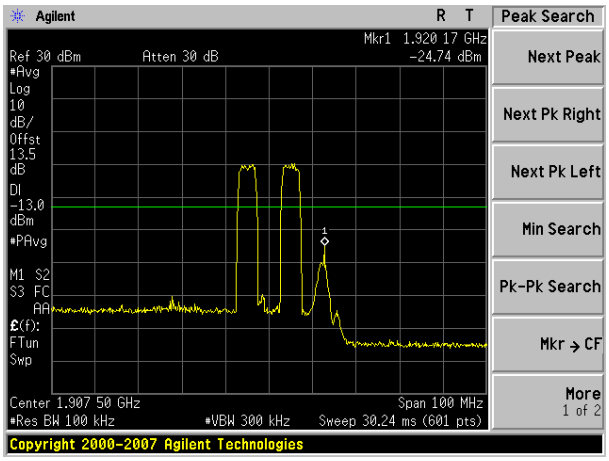
**Intermodulation of WCDMA**

| Intermodulation - Low part of band |
|---|
|  |
| 30MHz-1000MHz spurious emissions |
|  |
| 1000MHz-3000MHz spurious emissions |
|  |

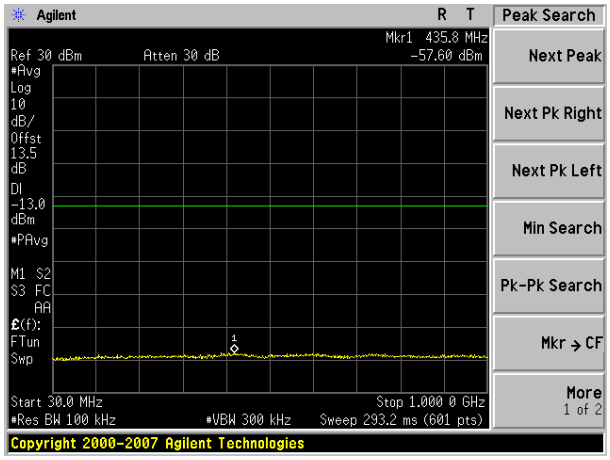
3000MHz-20000MHz spurious emissions



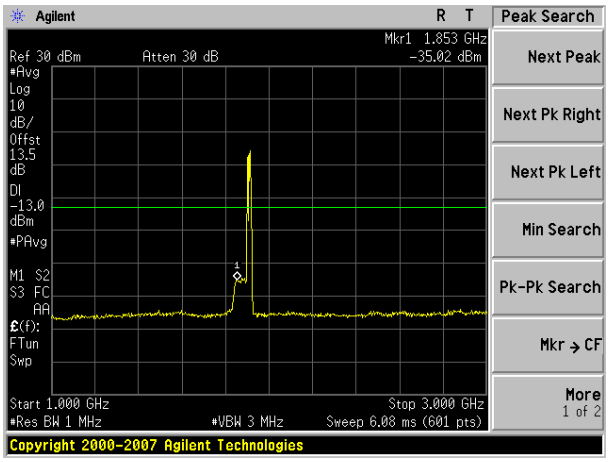

Intermodulation - High part of band



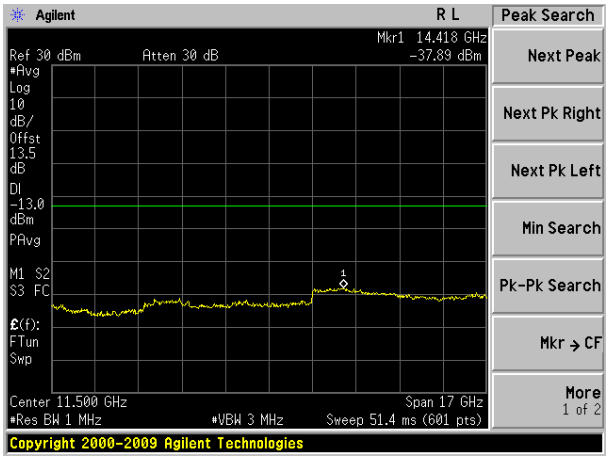

30MHz-1000MHz spurious emissions



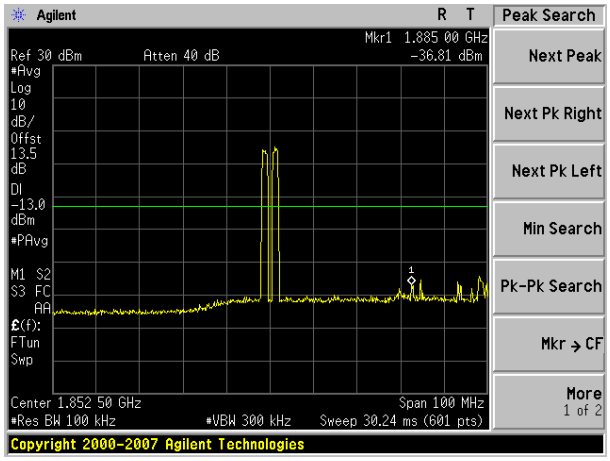
1000MHz-3000MHz spurious emissions



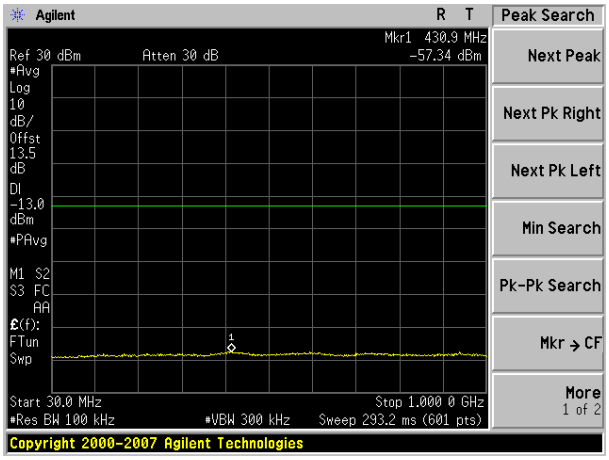

3000MHz-20000MHz spurious emissions



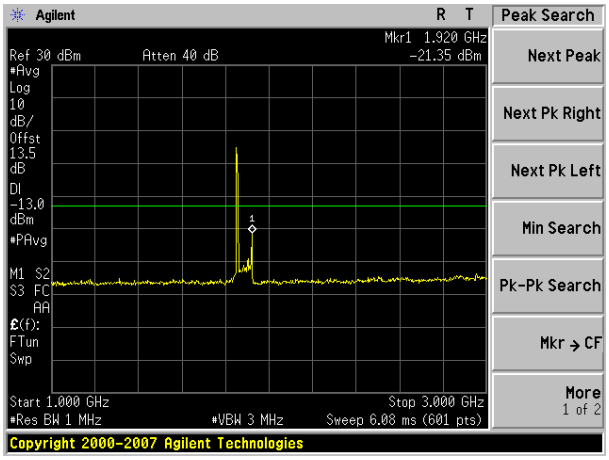

**Intermodulation of CDMA**

| Intermodulation - Low part of band |
|---|
|  |

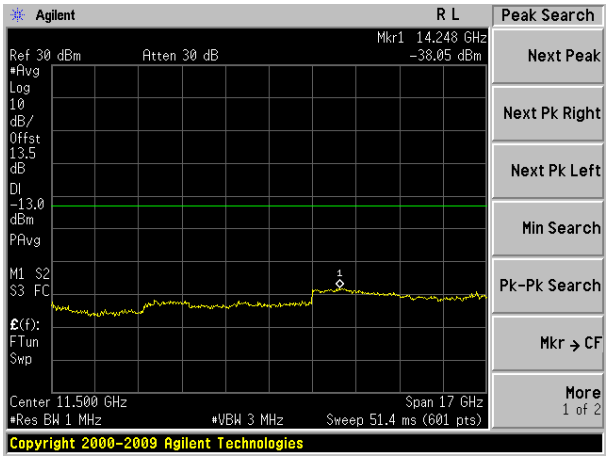
30MHz-1000MHz spurious emissions

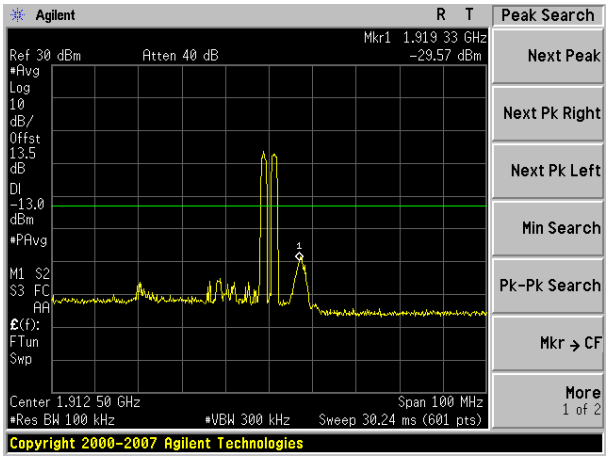
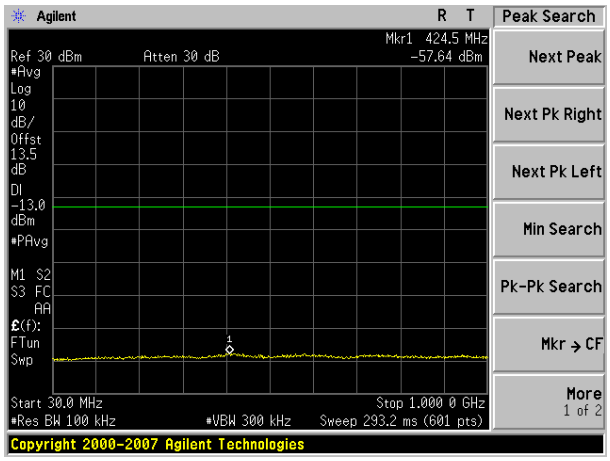
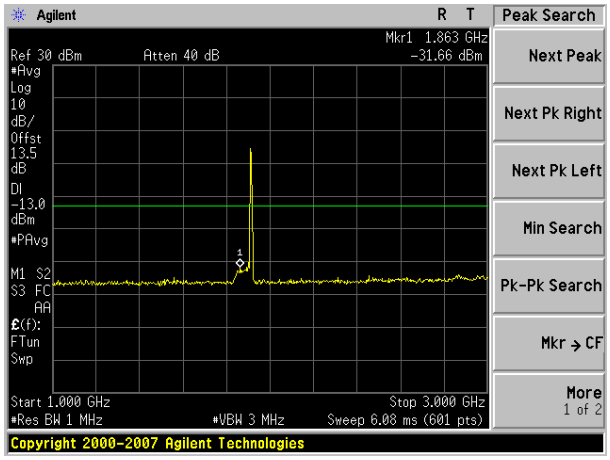



1000MHz-3000MHz spurious emissions

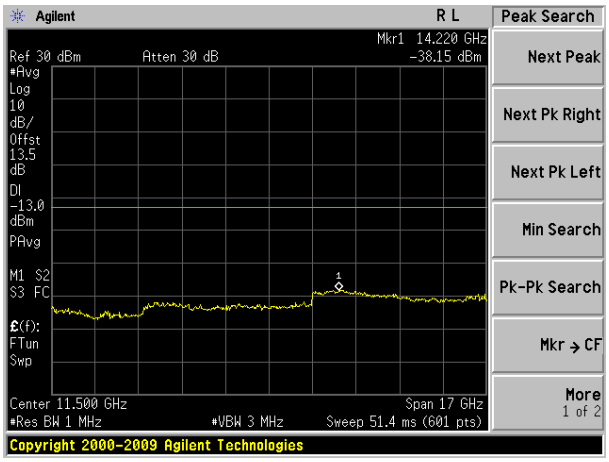



3000MHz-20000MHz spurious emissions

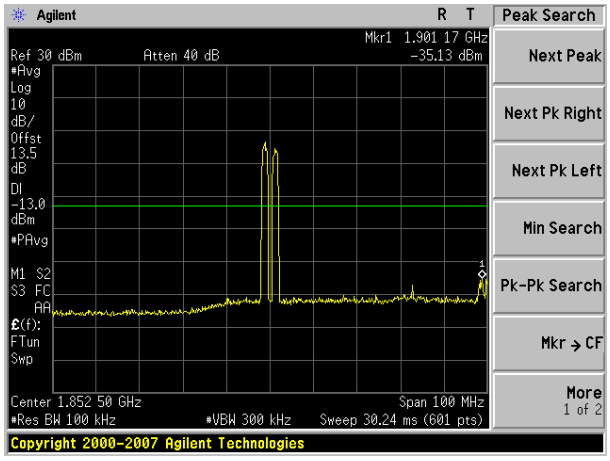
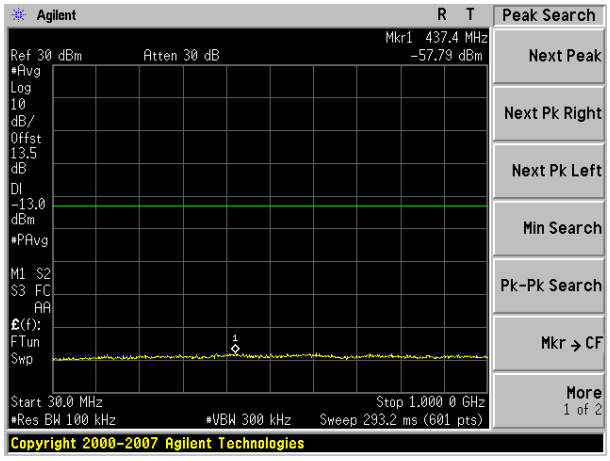


| Intermodulation - High part of band |
|---|
|  |
| 30MHz-1000MHz spurious emissions |
|  |
| 1000MHz-3000MHz spurious emissions |
|  |

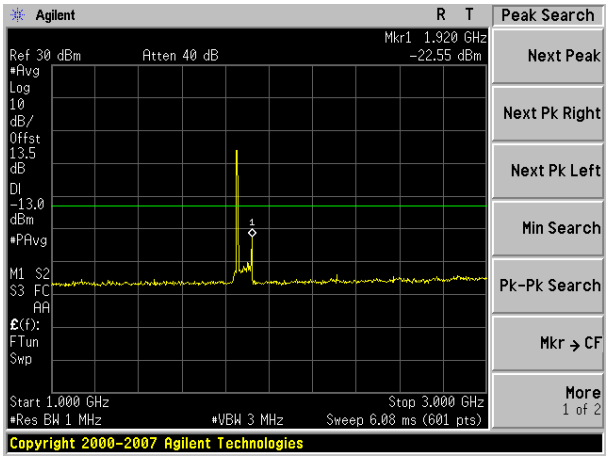
3000MHz-20000MHz spurious emissions



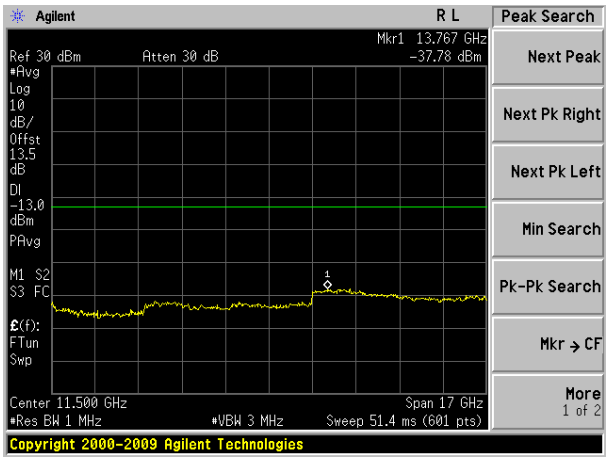

**Intermodulation of CDMA EV-DO**

| Intermodulation - Low part of band |
|---|
|  |
| 30MHz-1000MHz spurious emissions |
|  |

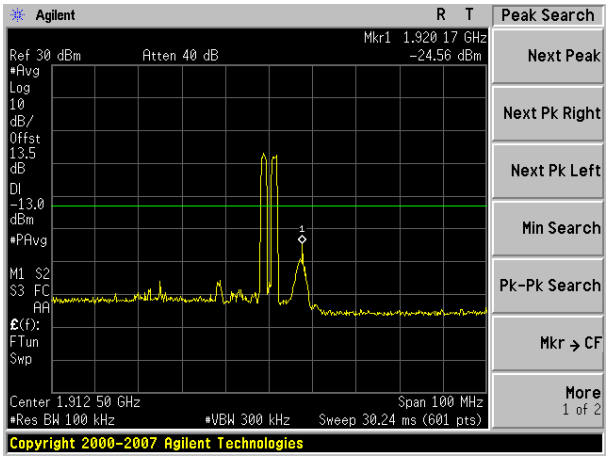
1000MHz-3000MHz spurious emissions



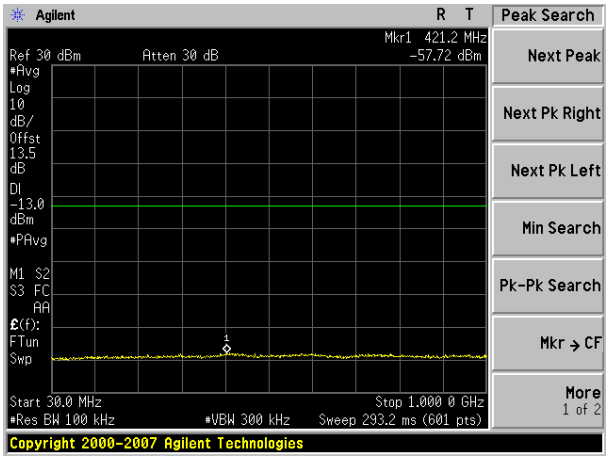

3000MHz-20000MHz spurious emissions



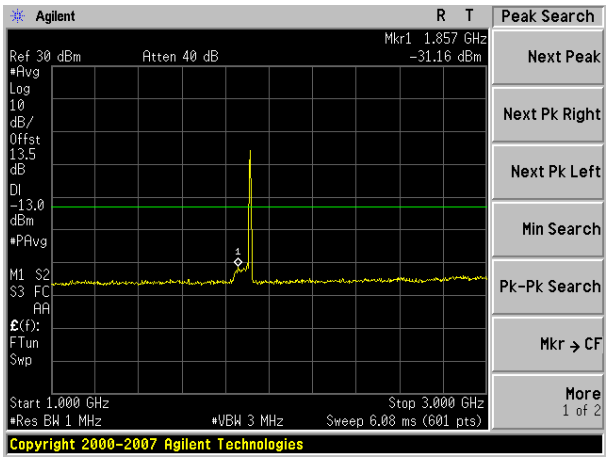

Intermodulation - High part of band



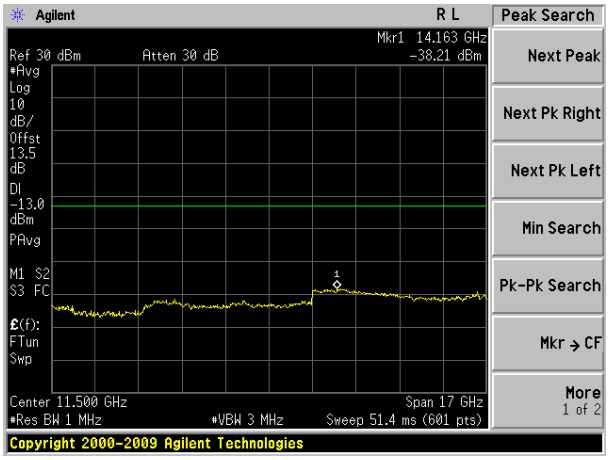
30MHz-1000MHz spurious emissions



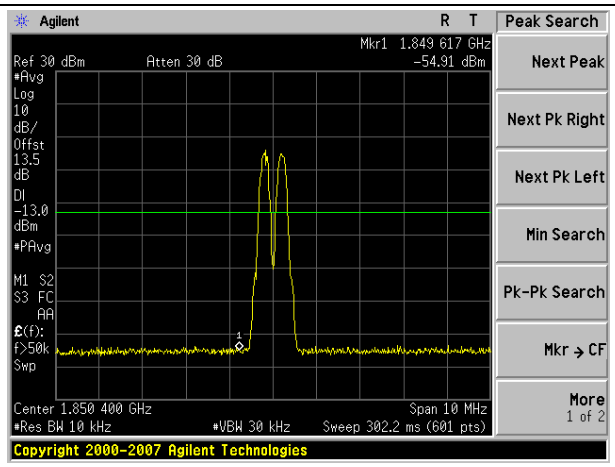
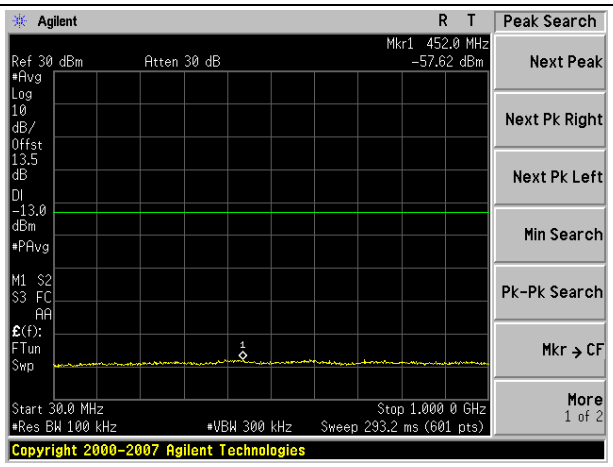
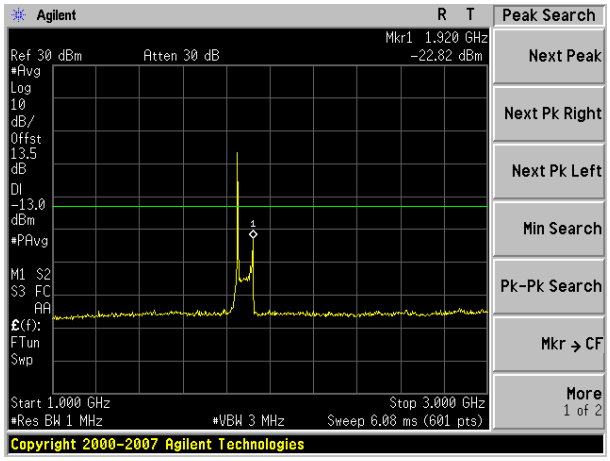

1000MHz-3000MHz spurious emissions



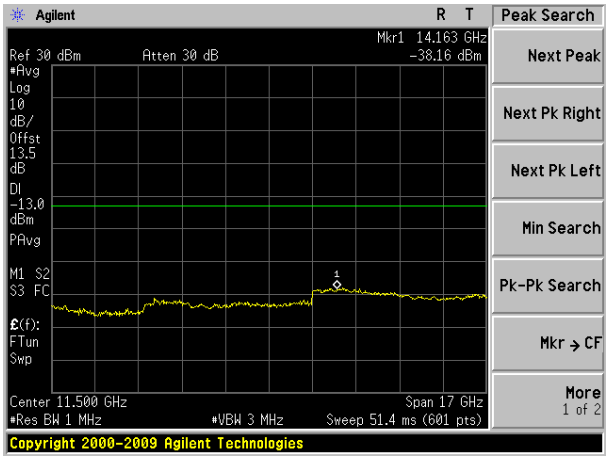

3000MHz-20000MHz spurious emissions



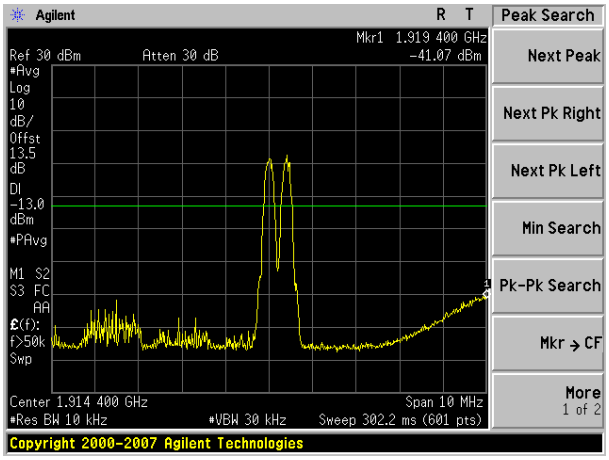
**Intermodulation of GSM**

| Intermodulation - Low part of band |
|---|
|  |
| 30MHz-1000MHz spurious emissions |
|  |
| 1000MHz-3000MHz spurious emissions |
|  |

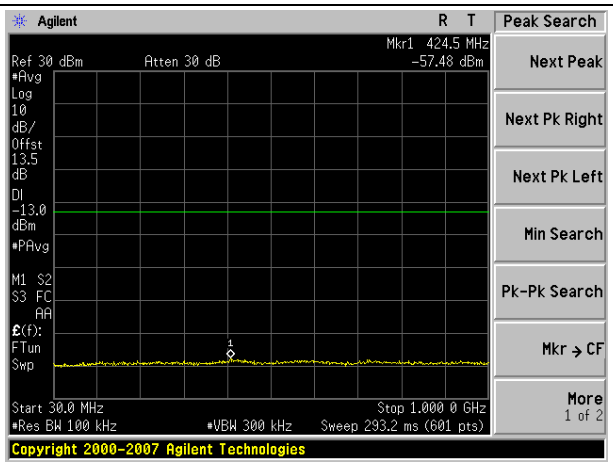
3000MHz-20000MHz spurious emissions



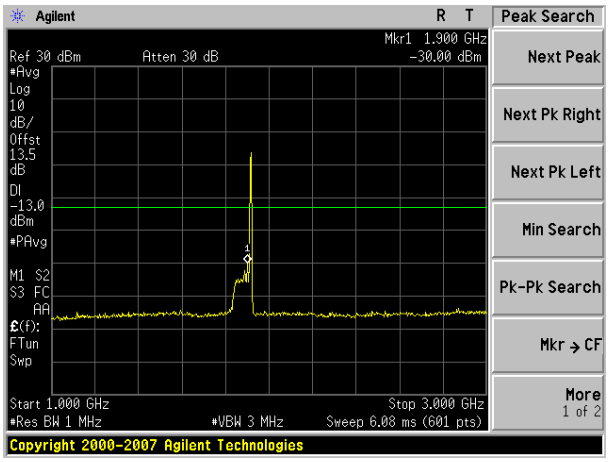

Intermodulation - High part of band



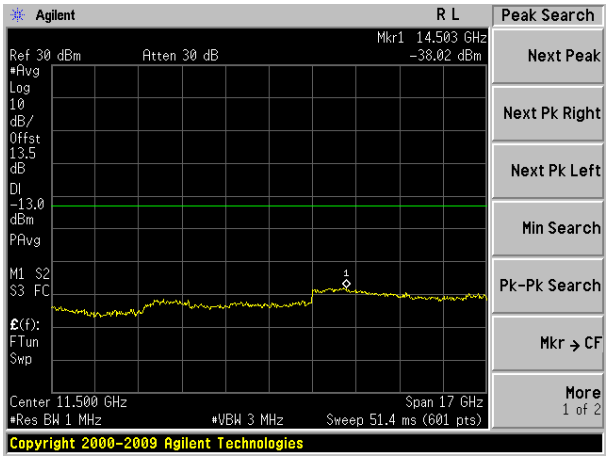

30MHz-1000MHz spurious emissions



1000MHz-3000MHz spurious emissions




3000MHz-20000MHz spurious emissions



# 11 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

## 11.1 Standard Applicable

According to FCC § 2.1053 and § 24.238(a).

## 11.2 EUT Setup (Block Diagram of Configuration)

Please refer the section §6.2 Configuration of Tested System.

## 11.3 Measurement Procedure

1. The EUT RF output port was connected to 50 ohm RF load.
2. The EUT input port was connected to signal generator and was setup to transmit maximum power.
3. The measurement antenna was placed at a distance of 3 meters from the EUT.
4. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from EUT.
5. The frequency range up to 10-th harmonic of each of the three fundamental frequencies (low, middle and high channels) was investigated. The worst case of emissions was reported.
6. For spurious emissions attenuation, the substitution method was used.
7. The EUT was substituted by a reference antenna (half-wave dipole – below 1 GHz, or Horn antenna – above 1 GHz), connected to a signal generator.
8. The signal generator output level was adjusted to obtain the same reading as from EUT. The EIRP at the spurious emissions frequency was calculated as follows:

   EIRP = S.G. output (dBm) + Antenna Gain(dBi) – Cable Loss (dB)
9. The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna is fed with a signal at the spurious frequency. The level of the signal is adjusted to repeat the previously measured level. The resulting eirp is the signal level fed to the reference antenna corrected for gain referenced to an isotropic dipole
10. From KDB (AMPLIFIER, BOOSTER, AND REPEATER REMINDER SHEET): Radiated spurs (enclosure) – Use of CW signal (low, mid. and high freq.) is acceptable rather than all modulations.
11. The maximum RFI field strength was determined during the measurement by rotating the turntable (±180 degrees) and varying the height of the receive antenna (h = 1 ... 4 m) as like defined in ANSI C63.4. A measurement receiver has been used with a RBW 120 kHz up to 1 GHz and 1 MHz above 1 GHz. Steps with during pre measurement was half the RBW.
12. Both, the Fully Anechoic Chamber (FAC) and the Semi Anechoic Chamber (SAC) fulfil the requirements of ANSI C63.4 and CISPR 16-1-4 with regards to NSA and SVSWR.

## 11.4 Measurement data

Downlink mode

| Test mode: | Below 1G | | Test channel: | Lowest channel |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 35.16 | Vertical | -42.76 | -13.00 | Pass |
| 82.65 | V | -40.12 | | |
| 240.47 | V | -43.75 | | |
| 541.27 | V | -41.74 | | |
| 653.31 | V | --- | | |
| 824.46 | V | --- | | |
| 46.75 | Horizontal | -47.33 | -13.00 | Pass |
| 188.53 | H | -48.45 | | |
| 242.55 | H | -46.84 | | |
| 438.12 | H | -42.57 | | |
| 724.36 | H | --- | | |
| 873.45 | H | --- | | |
| **Test mode:** | **Above 1G** | | **Test channel:** | **Lowest channel** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1264.00 | Vertical | -55.12 | -13.00 | Pass |
| 3457.00 | V | -56.35 | | |
| 5376.00 | V | -55.85 | | |
| 6927.00 | V | --- | | |
| 8369.00 | V | --- | | |
| 1835.00 | Horizontal | -57.75 | -13.00 | Pass |
| 3524.00 | H | -56.22 | | |
| 4865.00 | H | -56.45 | | |
| 7232.00 | H | --- | | |
| 8759.00 | H | --- | | |

| Test mode: | Below 1G | | Test channel: | Middle channel |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 42.65 | Vertical | -41.27 | -13.00 | Pass |
| 69.76 | V | -39.58 | | |
| 220.41 | V | -42.35 | | |
| 301.25 | V | -40.11 | | |
| 634.17 | V | --- | | |
| 789.89 | V | --- | | |
| 66.19 | Horizontal | -46.85 | -13.00 | Pass |
| 195.31 | H | -47.25 | | |
| 210.13 | H | -44.77 | | |
| 293.31 | H | -41.03 | | |
| 745.86 | H | --- | | |
| 918.69 | H | --- | | |
| **Test mode:** | **Above 1G** | | **Test channel:** | **Middle channel** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1759.00 | Vertical | -55.85 | -13.00 | Pass |
| 2865.00 | V | -56.81 | | |
| 4935.00 | V | -55.38 | | |
| 6378.00 | V | --- | | |
| 8467.00 | V | --- | | |
| 2185.00 | Horizontal | -57.86 | -13.00 | Pass |
| 3170.00 | H | -56.27 | | |
| 5137.00 | H | -56.14 | | |
| 6825.00 | H | --- | | |
| 8891.00 | H | --- | | |

| Test mode: | Below 1G | | Test channel: | Highest channel |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 36.16 | Vertical | -42.75 | -13.00 | Pass |
| 88.71 | V | -44.85 | | |
| 226.64 | V | -43.38 | | |
| 435.71 | V | -42.64 | | |
| 642.87 | V | --- | | |
| 736.74 | V | --- | | |
| 39.75 | Horizontal | -47.89 | -13.00 | Pass |
| 213.45 | H | -42.85 | | |
| 327.58 | H | -48.96 | | |
| 614.15 | H | -45.63 | | |
| 725.78 | H | --- | | |
| 926.45 | H | --- | | |
| **Test mode:** | **Above 1G** | | **Test channel:** | **Highest channel** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 2645.00 | Vertical | -55.85 | -13.00 | Pass |
| 3421.00 | V | -56.35 | | |
| 4752.00 | V | -55.12 | | |
| 6935.00 | V | --- | | |
| 8279.00 | V | --- | | |
| 1172.00 | Horizontal | -57.25 | -13.00 | Pass |
| 3427.00 | H | -56.38 | | |
| 5342.00 | H | -56.70 | | |
| 6285.00 | H | --- | | |
| 8762.00 | H | --- | | |

Remark:
1. Remark"---" means that the emission level is too low to be measured
2. 10GHz-20GHz: No substitution measurement has been performed, because there were no emissions detected during the pre measurement other than noise.

Uplink mode

| Test mode: | Below 1G | | Test channel: | Lowest channel |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 42.16 | Vertical | -41.24 | -13.00 | Pass |
| 80.23 | V | -41.82 | | |
| 134.21 | V | -46.45 | | |
| 247.52 | V | -43.85 | | |
| 542.45 | V | --- | | |
| 865.85 | V | --- | | |
| 36.42 | Horizontal | -49.33 | -13.00 | Pass |
| 127.85 | H | -48.39 | | |
| 201.72 | H | -45.82 | | |
| 468.85 | H | -49.86 | | |
| 765.85 | H | --- | | |
| 863.52 | H | --- | | |
| **Test mode:** | **Above 1G)** | | **Test channel:** | **Lowest channel** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1835.00 | Vertical | -57.85 | -13.00 | Pass |
| 3754.00 | V | -56.35 | | |
| 4675.00 | V | -56.43 | | |
| 7427.00 | V | --- | | |
| 8935.00 | V | --- | | |
| 1242.00 | Horizontal | -57.12 | -13.00 | Pass |
| 2638.00 | H | -57.47 | | |
| 4856.00 | H | -55.33 | | |
| 6849.00 | H | --- | | |
| 8125.00 | H | --- | | |

| Test mode: | Below 1G | | Test channel: | Middle channel |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 35.67 | Vertical | -41.52 | -13.00 | Pass |
| 68.42 | V | -43.56 | | |
| 137.41 | V | -40.38 | | |
| 217.58 | V | -41.57 | | |
| 613.84 | V | --- | | |
| 788.27 | V | --- | | |
| 60.45 | Horizontal | -46.53 | -13.00 | Pass |
| 157.24 | H | -47.55 | | |
| 197.58 | H | -46.29 | | |
| 267.13 | H | -45.26 | | |
| 772.47 | H | --- | | |
| 869.48 | H | --- | | |
| **Test mode:** | **Aabove 1G** | | **Test channel:** | **Middle channel** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 2475.00 | Vertical | -57.28 | -13.00 | Pass |
| 3754.00 | V | -56.75 | | |
| 5127.00 | V | -56.21 | | |
| 7239.00 | V | --- | | |
| 8714.00 | V | --- | | |
| 1638.00 | Horizontal | -57.24 | -13.00 | Pass |
| 2964.00 | H | -57.58 | | |
| 4825.00 | H | -55.83 | | |
| 6452.00 | H | --- | | |
| 8236.00 | H | --- | | |

| Test mode: | Below 1G | | Test channel: | Highest channel |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 33.64 | Vertical | -43.85 | -13.00 | Pass |
| 56.81 | V | -41.53 | | |
| 133.45 | V | -41.75 | | |
| 226.45 | V | -42.85 | | |
| 652.23 | V | --- | | |
| 836.52 | V | --- | | |
| 39.56 | Horizontal | -46.33 | -13.00 | Pass |
| 145.23 | H | -45.85 | | |
| 199.51 | H | -47.88 | | |
| 285.17 | H | -46.85 | | |
| 773.75 | H | --- | | |
| 857.85 | H | --- | | |
| **Test mode:** | **Above 1G** | | **Test channel:** | **Highest channel** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1565.00 | Vertical | -57.57 | -13.00 | Pass |
| 3654.00 | V | -56.65 | | |
| 4853.00 | V | -56.07 | | |
| 6964.00 | V | --- | | |
| 8534.00 | V | --- | | |
| 2428.00 | Horizontal | -57.17 | -13.00 | Pass |
| 4675.00 | H | -57.38 | | |
| 5924.00 | H | -55.25 | | |
| 7256.00 | H | --- | | |
| 8850.00 | H | --- | | |

Remark:
1. Remark"---" means that the emission level is too low to be measured
2. 10GHz-20GHz: No substitution measurement has been performed, because there were no emissions detected during the pre measurement other than noise.

# 12 FREQUENCY STABILITY

## 12.1 Standard Applicable

According to FCC § 2.1055 and § 24.235

## 12.2 Test setup

Please refer the section §6.2 Configuration of Tested System.

## 12.3 Test Procedure

1. The EUT was placed inside the temperature chamber.
2. The RF output port was connected to a spectrum analyzer.
3. The level of RF input signal shall be increased, until the maximum output power per channel, declared by client, is reached.
4. After the temperature stabilized for approximately 20 min, the transmitting frequency was measured by the spectrum analyzer and recorded.
5. At room temperature, the frequency was measured when EUT was powered with the nominal voltage and with 85% and 115% of the nominal voltage.

## 12.4 Test Result

**Passed.**

Downlink:

| WCDMA mode | | | | | |
|---|---|---|---|---|---|
| Reference Frequency: Middle channel=1962.5MHz | | | | | |
| Voltage with nominal Voltage | Power Supplied (VAC) | Temperature (℃) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| 100% | 120V | -40 | 12 | 0.0061 | Passed |
| 100% | | -30 | 10 | 0.0051 | Passed |
| 100% | | -20 | 7 | 0.0036 | Passed |
| 100% | | -10 | 3 | 0.0015 | Passed |
| 100% | | 0 | 2 | 0.0010 | Passed |
| 100% | | 10 | 6 | 0.0031 | Passed |
| 100% | | 20 | 9 | 0.0046 | Passed |
| 100% | | 30 | 12 | 0.0061 | Passed |
| 100% | | 40 | 11 | 0.0056 | Passed |
| 100% | | 50 | 13 | 0.0066 | Passed |
| 100% | | 55 | 13 | 0.0066 | Passed |
| 85% | 102V | 20 | 11 | 0.0056 | Passed |
| 115% | 138V | 20 | 9 | 0.0046 | Passed |

Remark: EUT is specified for outdoor use with temperature range of -40° to +55° C, and was tested with its range.

Uplink:

| WCDMAmode | | | | | |
|---|---|---|---|---|---|
| Reference Frequency: Middle channel=1882.5MHz | | | | | |
| Voltage with nominal Voltage | Power Supplied (VAC) | Temperature (℃) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| 100% | 120V | -40 | 12 | 0.0064 | Passed |
| 100% | | -30 | 9 | 0.0048 | Passed |
| 100% | | -20 | 7 | 0.0037 | Passed |
| 100% | | -10 | 5 | 0.0027 | Passed |
| 100% | | 0 | 1 | 0.0005 | Passed |
| 100% | | 10 | 7 | 0.0037 | Passed |
| 100% | | 20 | 9 | 0.0048 | Passed |
| 100% | | 30 | 11 | 0.0058 | Passed |
| 100% | | 40 | 12 | 0.0064 | Passed |
| 100% | | 50 | 11 | 0.0058 | Passed |
| 100% | | 55 | 13 | 0.0069 | Passed |
| 85% | 102V | 20 | 10 | 0.0053 | Passed |
| 115% | 138V | 20 | 7 | 0.0037 | Passed |

Remark: EUT is specified for outdoor use with temperature range of -40° to +55° C, and was tested with its range.

# 13 OUT-OF-BAND REJECTION

## 13.1 Standard Applicable

According to KDB (AMPLIFIER, BOOSTER, AND REPEATER REMINDER SHEET):

Out of Band Rejection – Test for rejection of out of band signals. Filter freq. response plots are acceptable.

## 13.2 Test setup

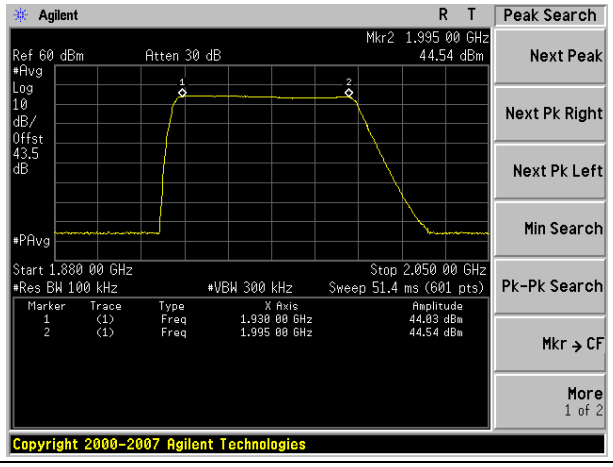
Please refer the section §6.2 Configuration of Tested System.

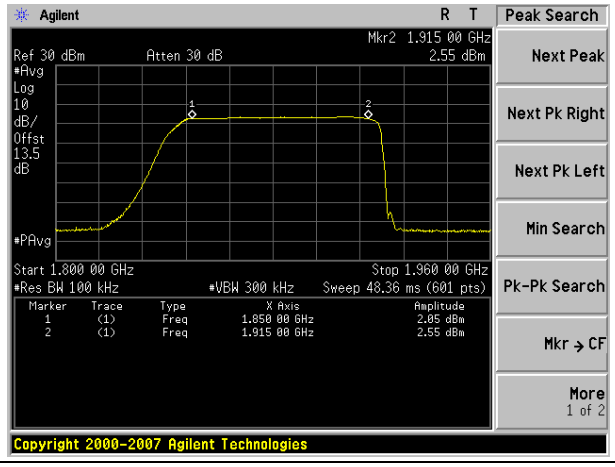
## 13.3 Test Procedure

1. The EUT RF output port was connected to spectrum analyzer.
2. The level of RF input signal shall be increased, until the maximum output power per channel, declared by client, is reached.
3. A continuous sinusoidal RF signal shall be fed successively at frequency offsets 100 MHz from the edges of the relevant MS or BTS transmit frequency band into the relevant input port of the repeater.
4. The RF output curve was recorded by spectrum analyzer.

## 13.4 Test Result

Out-of-Band Rejection




Downlink Uplink

# 14 AC POWER LINE CONDUCTED EMISSION TEST

## 14.1 Standard Applicable

According to FCC §15.207. The emission value for frequency within 150KHz to 30MHz shall not Exceed criteria of below chart.

| Frequency range (MHz) | Limits dB(uV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 79 | 66 |
| 0.50 to 30 | 73 | 60 |
| Note<br>1.The lower limit shall apply at the transition frequencies<br>2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz. | | |

## 14.2 Test setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2001.
2. The EUT was plug-in DC power adaptort and was placed on the center of the back edge on the test table. The peripherals like earphone was placed on the side of the EUT. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The Power adaptor was connected with 110VAC/60Hz power source.

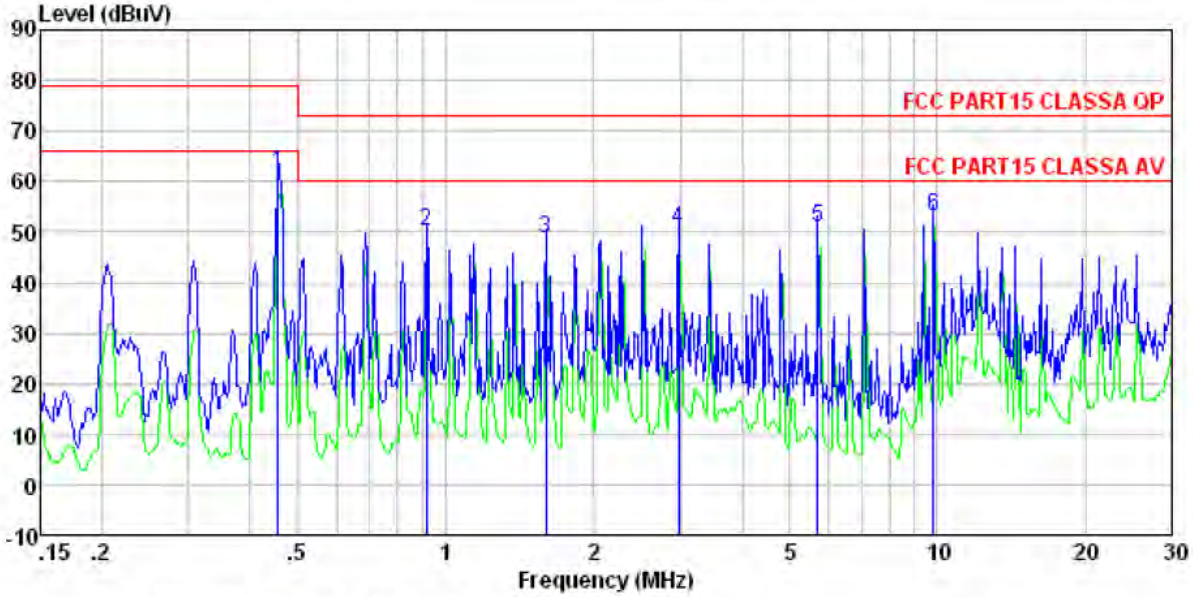
## 14.3 Test Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

## 14.4 Measurement Result

**Downlink:**

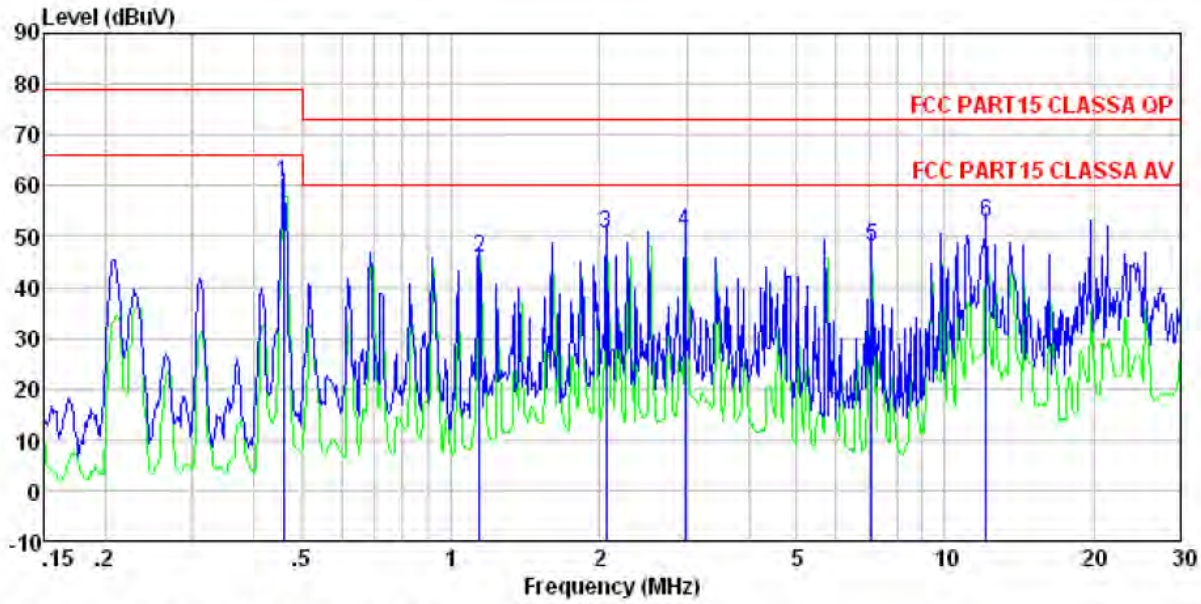
**Line:**




Condition : FCC PART15 CLASSA QP LISN-2013 LINE
Job No. : 2188RF
Test mode : Downlink mode
Test Engineer: Edward

| | Freq | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.456 | 61.34 | 0.12 | 0.11 | 61.57 | 79.00 | -17.43 | QP |
| 2 | 0.914 | 49.76 | 0.14 | 0.13 | 50.03 | 73.00 | -22.97 | QP |
| 3 | 1.602 | 48.31 | 0.12 | 0.14 | 48.57 | 73.00 | -24.43 | QP |
| 4 | 2.978 | 50.08 | 0.15 | 0.15 | 50.38 | 73.00 | -22.62 | QP |
| 5 | 5.713 | 50.62 | 0.22 | 0.15 | 50.99 | 73.00 | -22.01 | QP |
| 6 | 9.809 | 52.71 | 0.29 | 0.19 | 53.19 | 73.00 | -19.81 | QP |

**Neutral:**

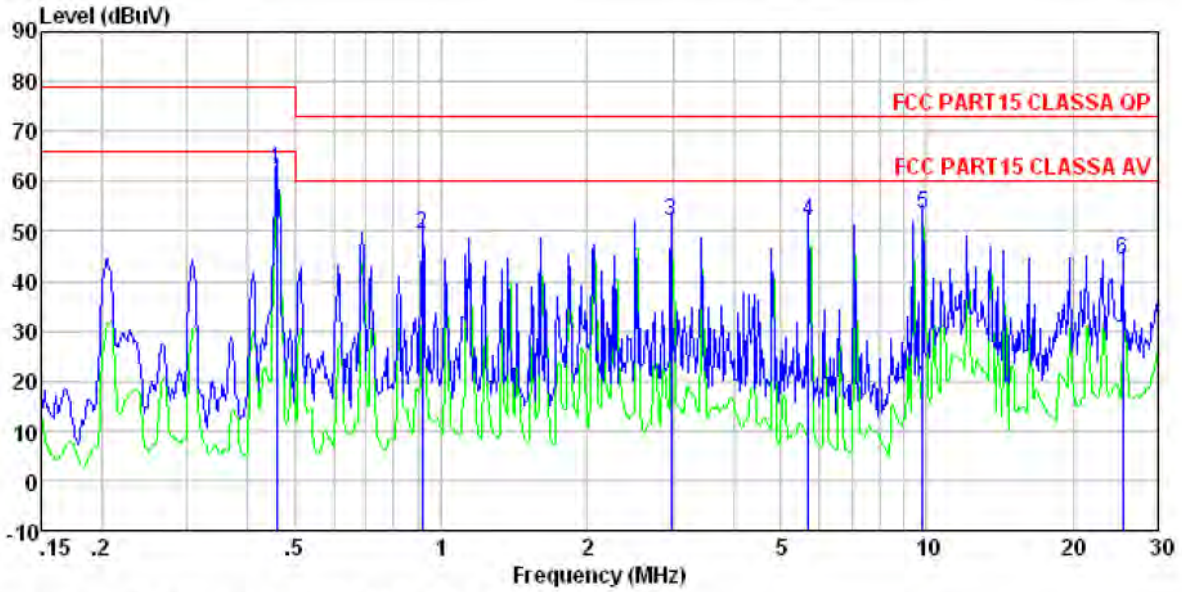



Condition : FCC PART15 CLASSA QP LISN-2013 NEUTRAL
Job No. : 2188RF
Test mode : Downlink mode
Test Engineer: Edward

| | Freq | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.459 | 60.15 | 0.06 | 0.11 | 60.32 | 79.00 | -18.68 | QP |
| 2 | 1.141 | 45.36 | 0.08 | 0.13 | 45.57 | 73.00 | -27.43 | QP |
| 3 | 2.066 | 50.25 | 0.09 | 0.15 | 50.49 | 73.00 | -22.51 | QP |
| 4 | 2.978 | 50.66 | 0.11 | 0.15 | 50.92 | 73.00 | -22.08 | QP |
| 5 | 7.100 | 47.55 | 0.18 | 0.17 | 47.90 | 73.00 | -25.10 | QP |
| 6 | 12.124 | 52.03 | 0.32 | 0.20 | 52.55 | 73.00 | -20.45 | QP |

**Uplink:**

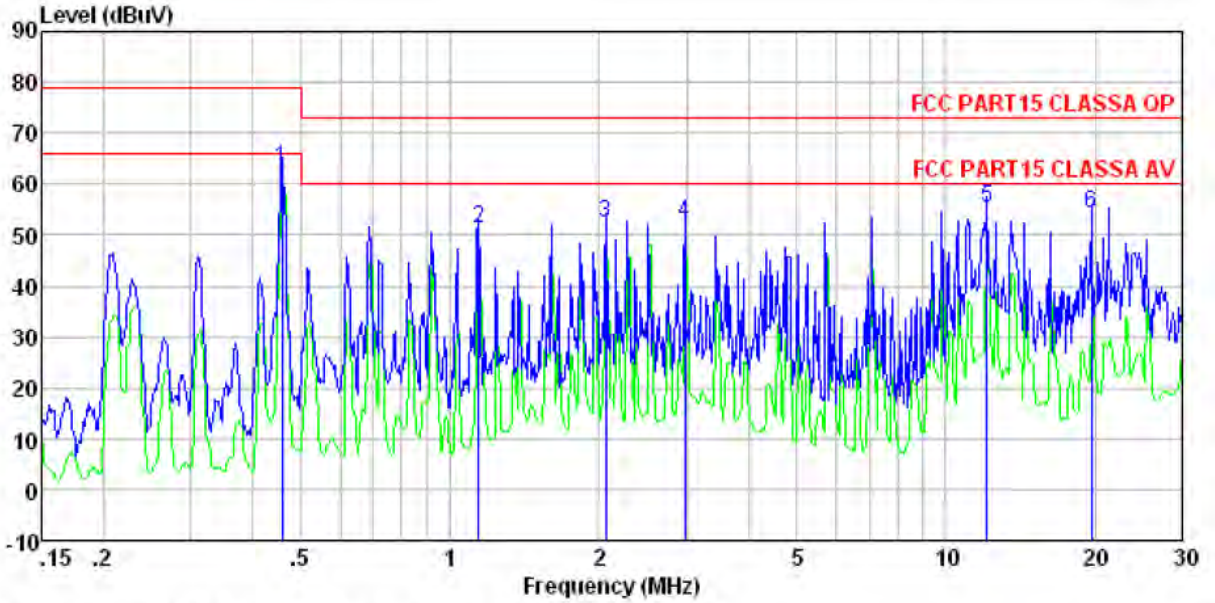
**Line:**




Condition : FCC PART15 CLASSA QP LISN-2013 LINE
Job No. : 2188RF
Test mode : Uplink mode
Test Engineer: Edward

| | Freq | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.459 | 62.17 | 0.12 | 0.11 | 62.40 | 79.00 | -16.60 | QP |
| 2 | 0.914 | 49.32 | 0.14 | 0.13 | 49.59 | 73.00 | -23.41 | QP |
| 3 | 2.978 | 51.59 | 0.15 | 0.15 | 51.89 | 73.00 | -21.11 | QP |
| 4 | 5.713 | 51.57 | 0.22 | 0.15 | 51.94 | 73.00 | -21.06 | QP |
| 5 | 9.809 | 52.98 | 0.29 | 0.19 | 53.46 | 73.00 | -19.54 | QP |
| 6 | 25.321 | 42.94 | 1.14 | 0.23 | 44.31 | 73.00 | -28.69 | QP |

**Neutral:**




Condition : FCC PART15 CLASSA QP LISN-2013 NEUTRAL
Job No. : 2188RF
Test mode : Uplink mode
Test Engineer: Edward

| | Freq | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.459 | 63.04 | 0.06 | 0.11 | 63.21 | 79.00 | -15.79 | QP |
| 2 | 1.141 | 50.87 | 0.08 | 0.13 | 51.08 | 73.00 | -21.92 | QP |
| 3 | 2.066 | 52.11 | 0.09 | 0.15 | 52.35 | 73.00 | -20.65 | QP |
| 4 | 2.978 | 52.16 | 0.11 | 0.15 | 52.42 | 73.00 | -20.58 | QP |
| 5 | 12.124 | 54.91 | 0.32 | 0.20 | 55.43 | 73.00 | -17.57 | QP |
| 6 | 19.635 | 53.37 | 0.51 | 0.22 | 54.10 | 73.00 | -18.90 | QP |