

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
FCC CFR Title 47 Part 15:2014
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

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the GTS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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2 Version

Version No.	Date	Description
00	December 19, 2014	Original

Prepared By:

Edward. Pan

Date:

December 19, 2014

Project Engineer

Check By:

Frank. Yan

Date:

December 19, 2014

Reviewer

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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 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 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 CDMA/CDMA EV-DO : 1.25MHz GSM: 200KHz	
Maximun RF Output Power	Downlink: 46.26dBm(For 40W); 43.25dBm(For 20W); 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 fully 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. Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China Tel: 0755-27798480 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 20W for Downlink path with Convection Cooling.

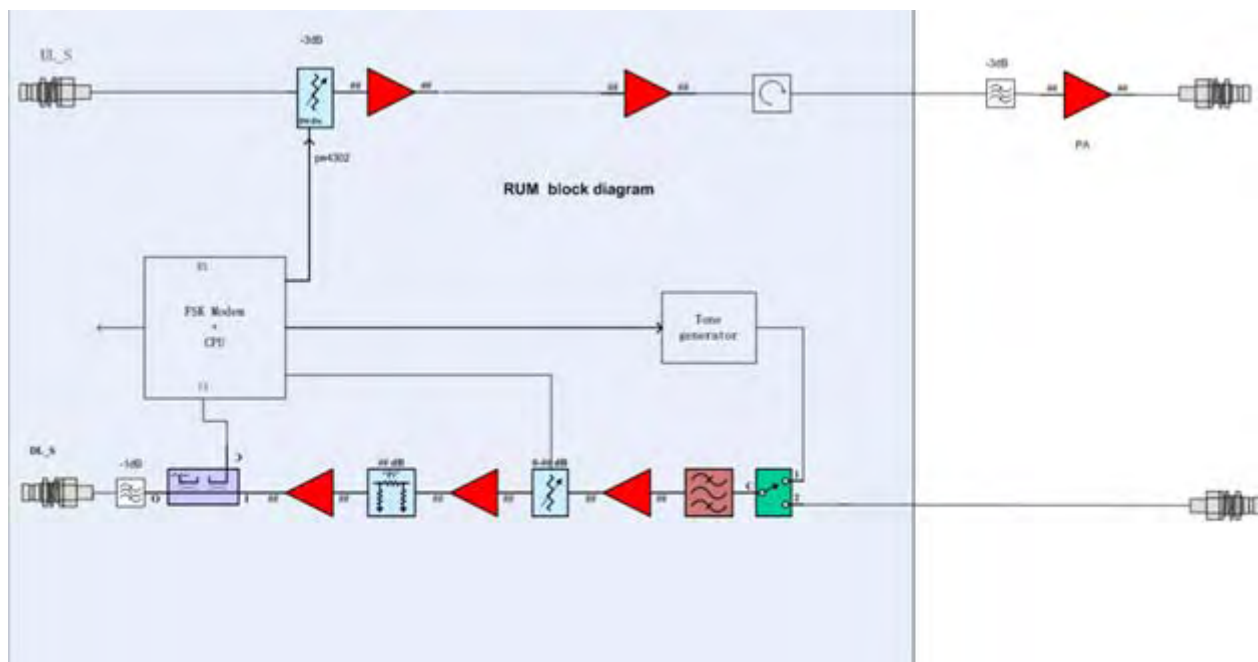
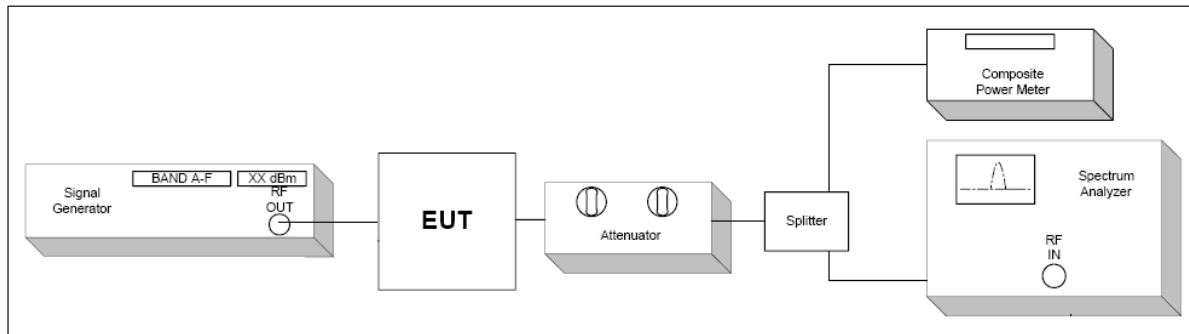


Figure 1: Remote Unit block diagram

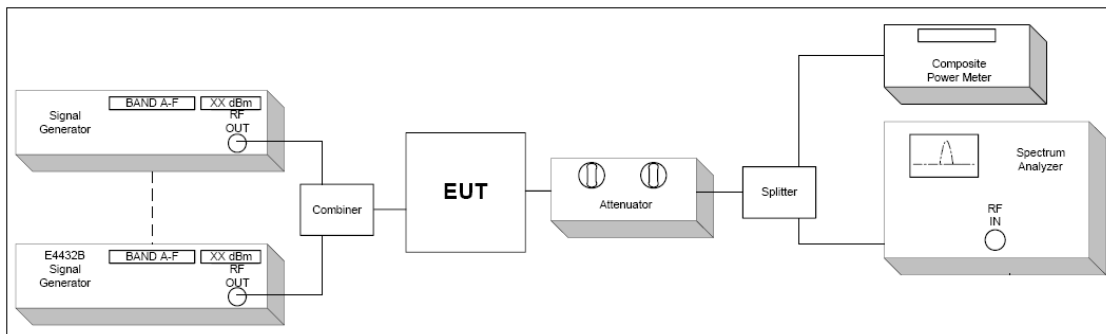
For details, refer to technical document and the user manual.

6.2 Configuration of Tested System

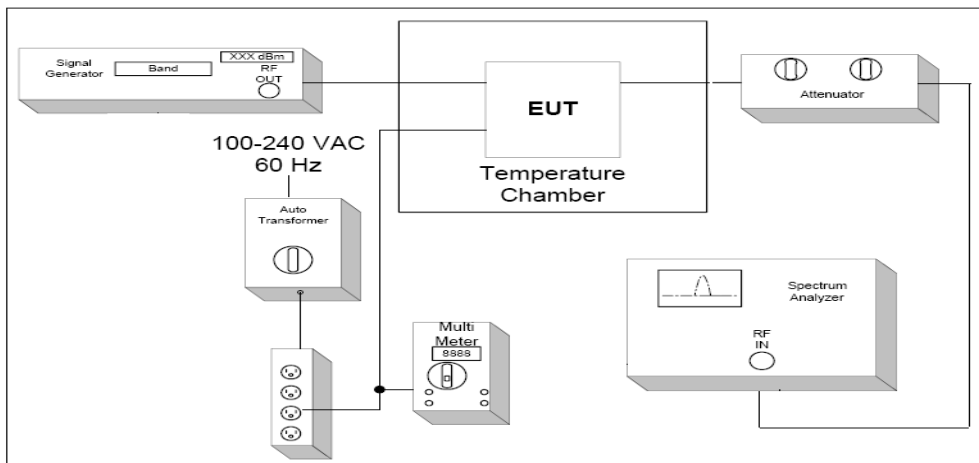
(A) RF Output Power, Occupied Bandwidth, Spurious Emissions at Antenna Terminal,
Band Edge, Test Set-UP



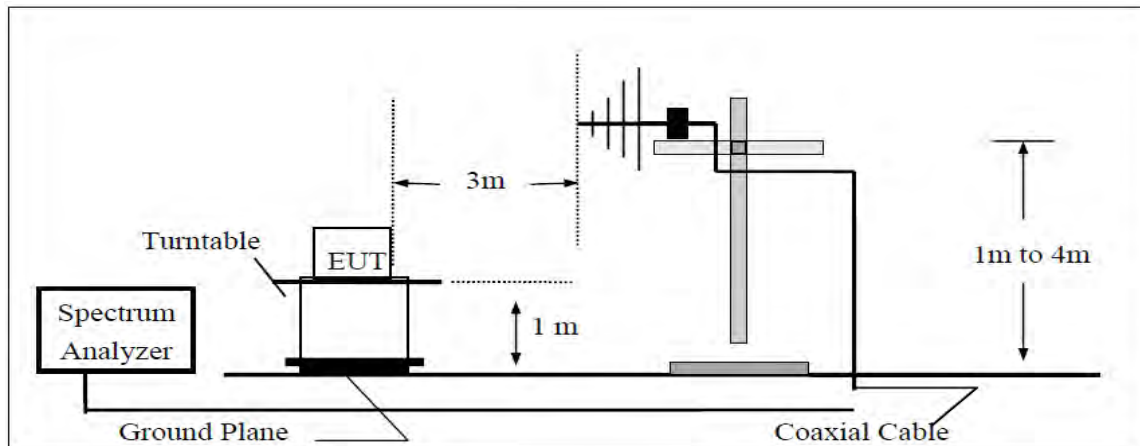
(B) Intermodulation Test Set-UP



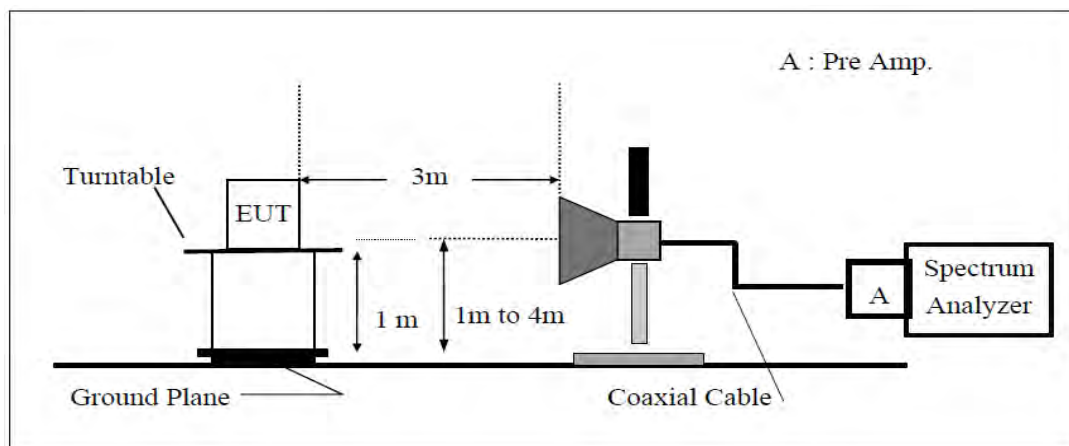
(C) Frequency stability Test Set-UP



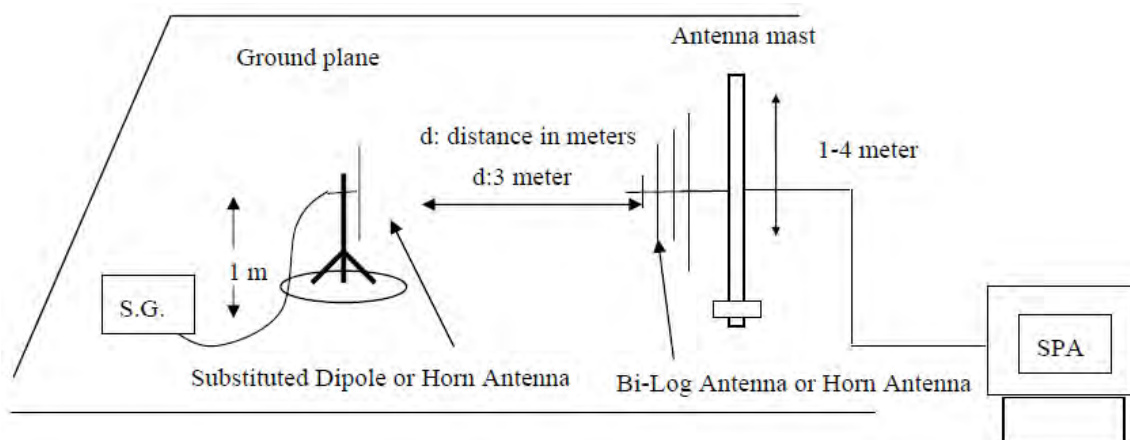
(D) Radiated Emission Test Set-Up, Frequency below 1000MHz



(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; (2). voltage is 120V AC.	
Extreme Test Conditions:	(1). Temperatures: -20°C to +55°C. (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 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 output 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 $\geq$ 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	65dB	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	58dB	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

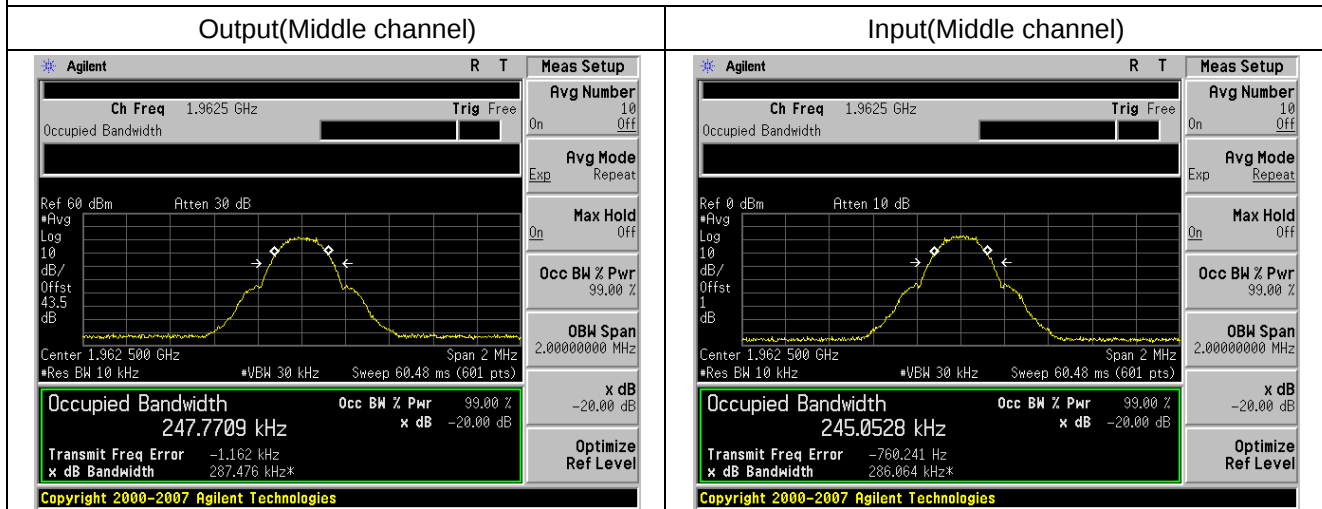
Remark:

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

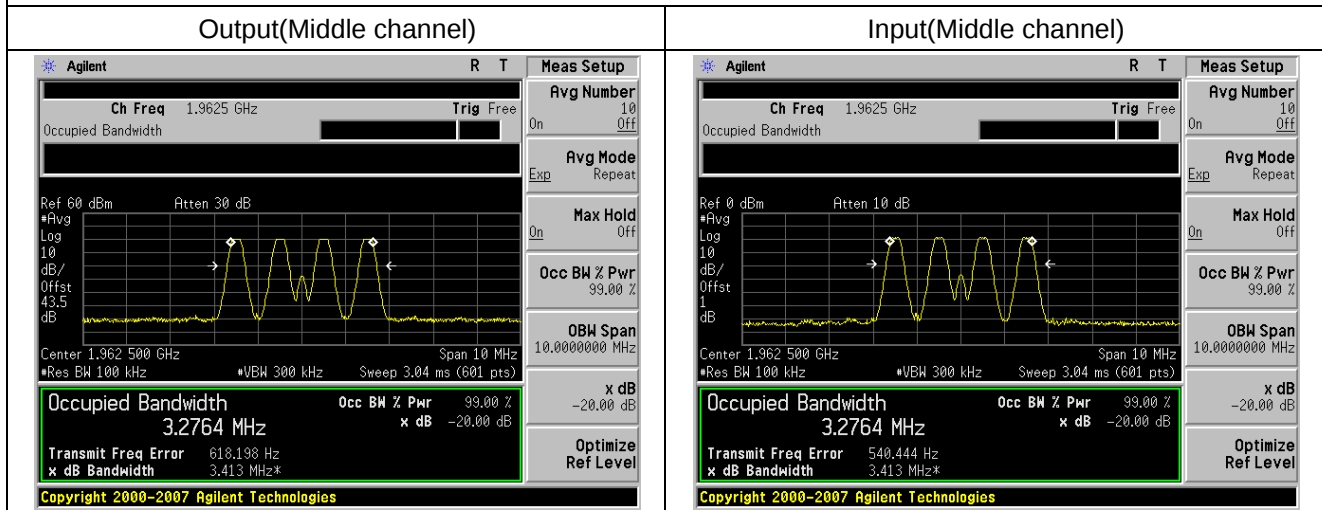
Downlink:

Input/output Bandwidth Comparison for GSM

1. Number of Carriers: Single carrier

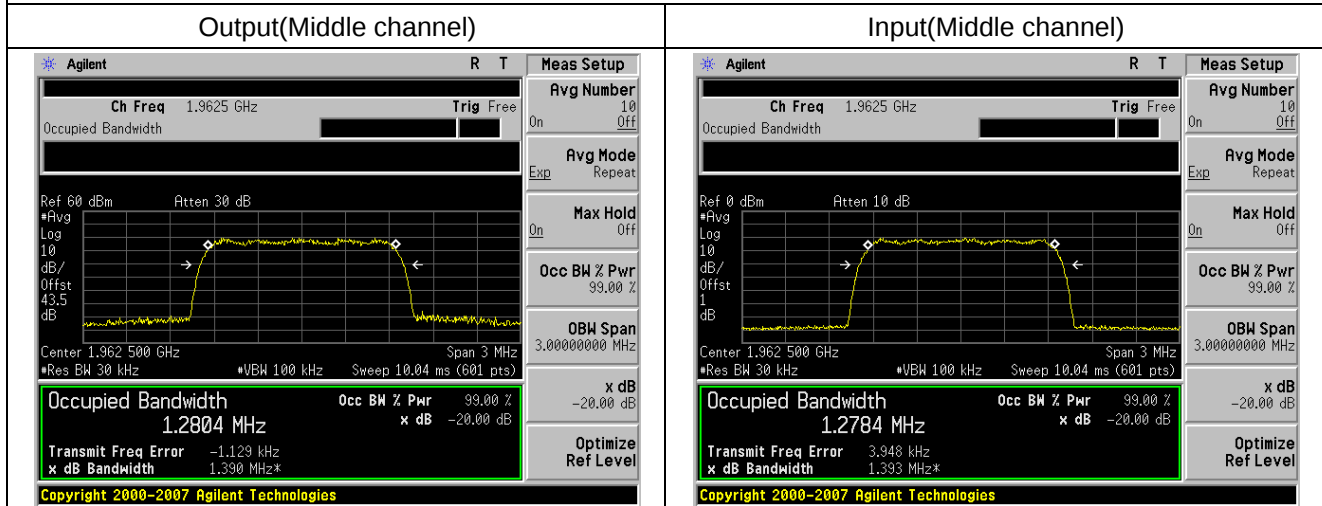


2. Number of Carriers: Four carriers

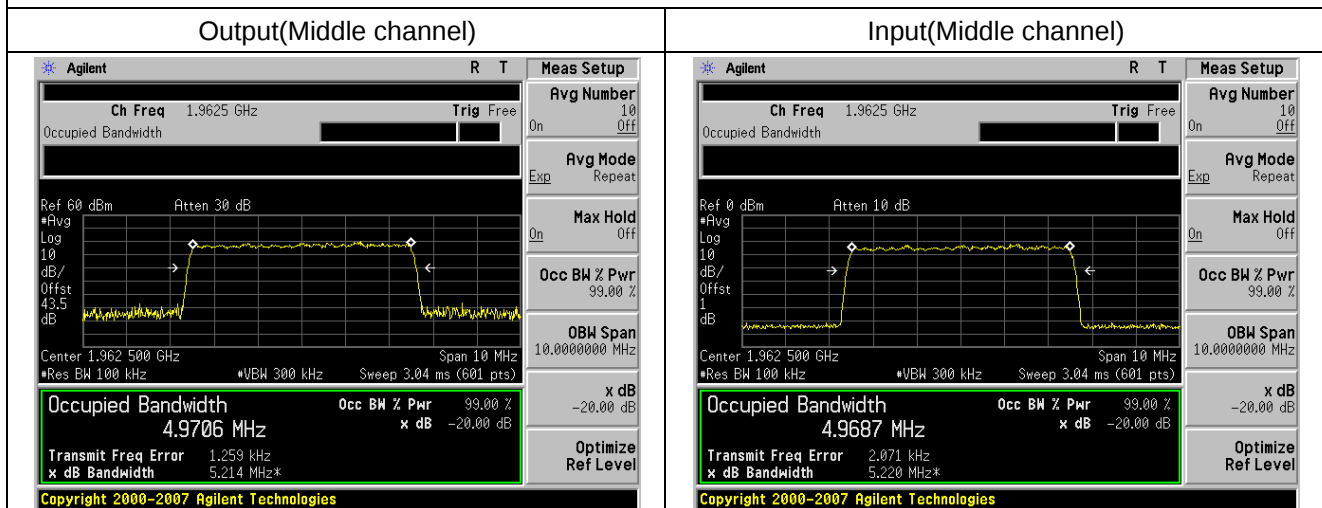


Input/output Bandwidth Comparison for CDMA

1. Number of Carriers: Single carrier

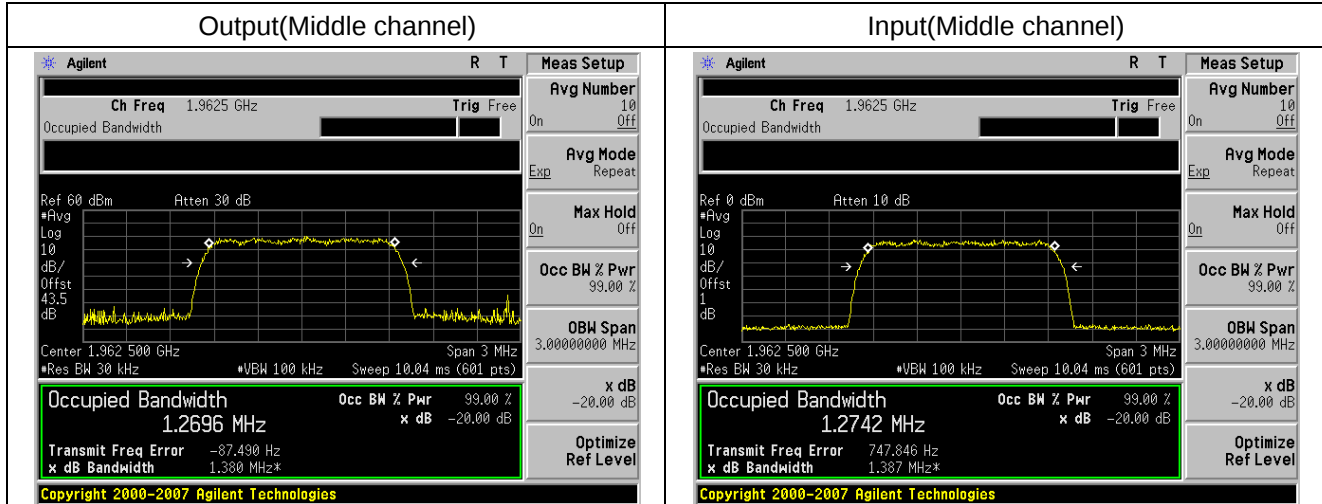


2. Number of Carriers: Four carriers

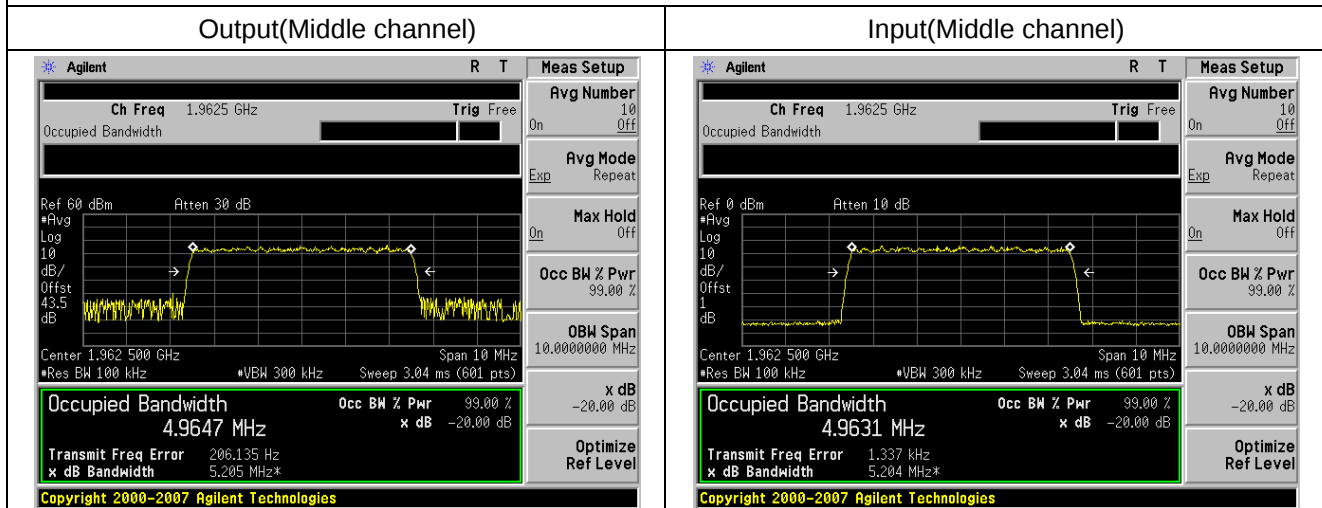


Input/output Bandwidth Comparison for CDMA EVDO

1. Number of Carriers: Single carrier

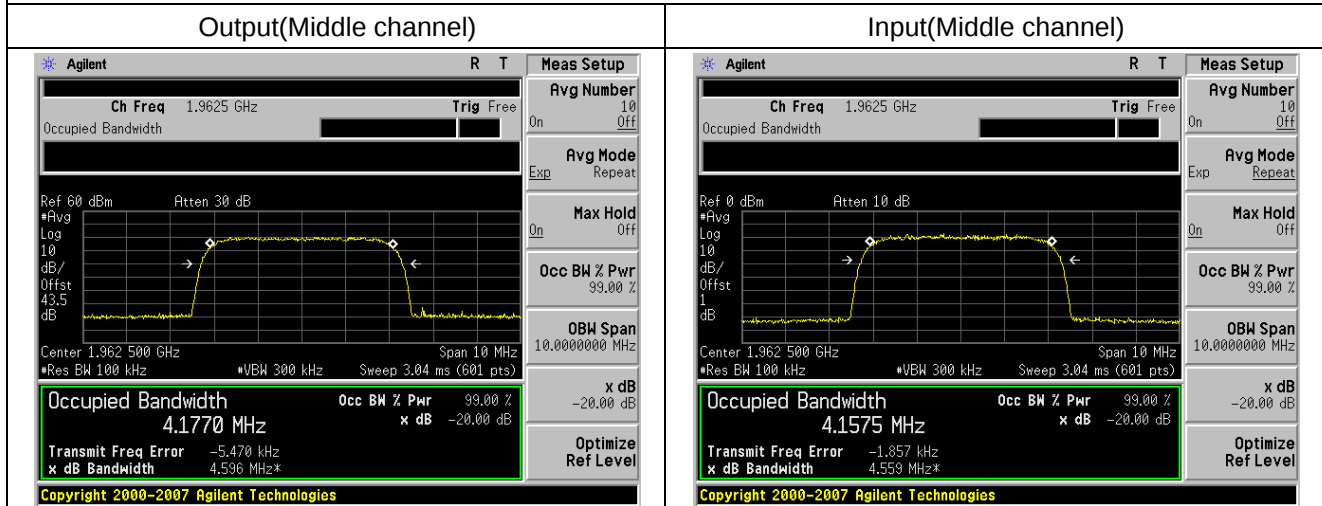


2. Number of Carriers: Four carriers

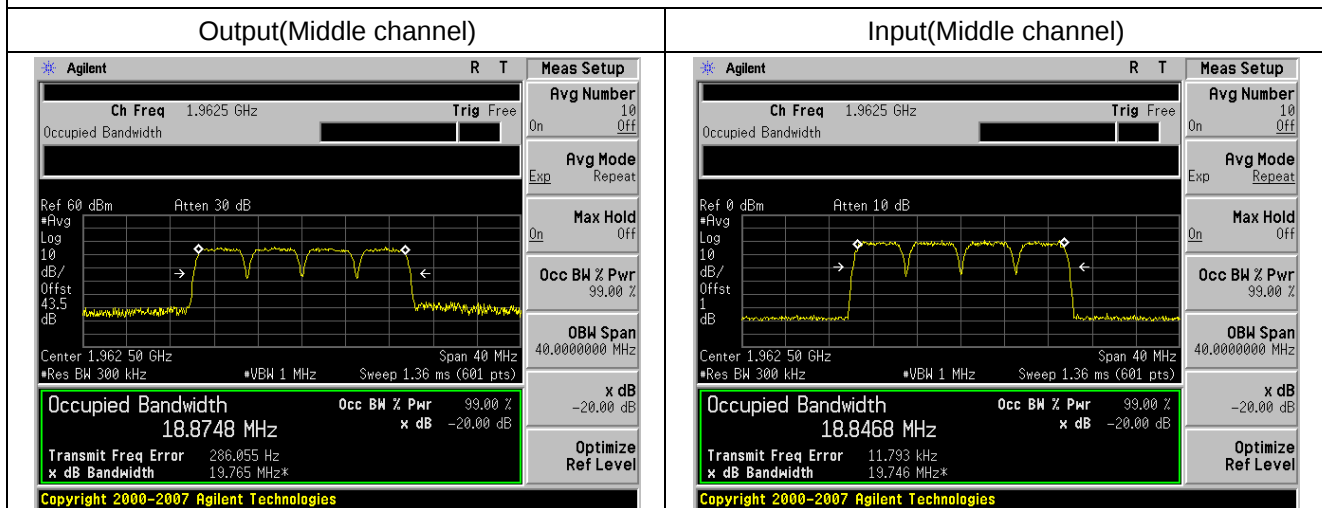


Input/output Bandwidth Comparison for WCDMA

1. Number of Carriers: Single carrier



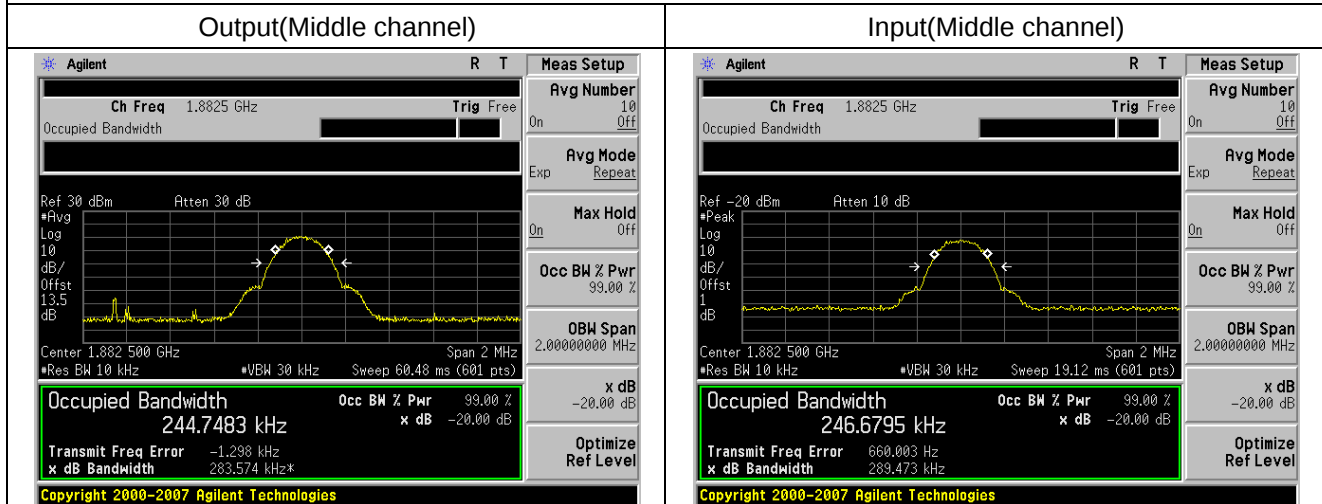
2. Number of Carriers: Four carriers



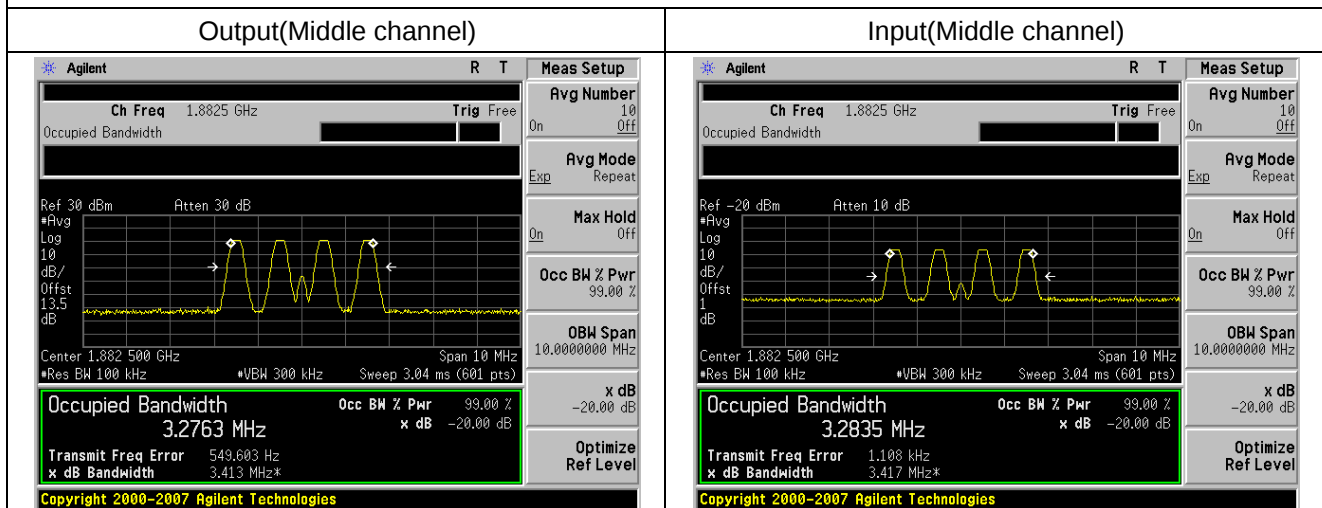
Uplink:

Input/output Bandwidth Comparison for GSM

1. Number of Carriers: Single carrier

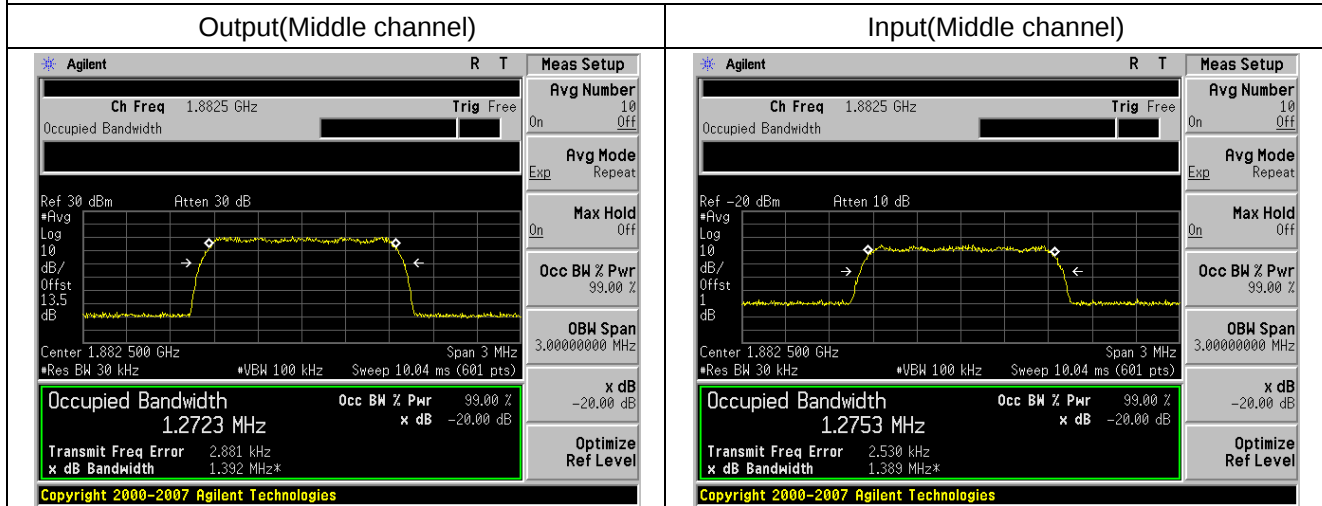


2. Number of Carriers: Four carriers

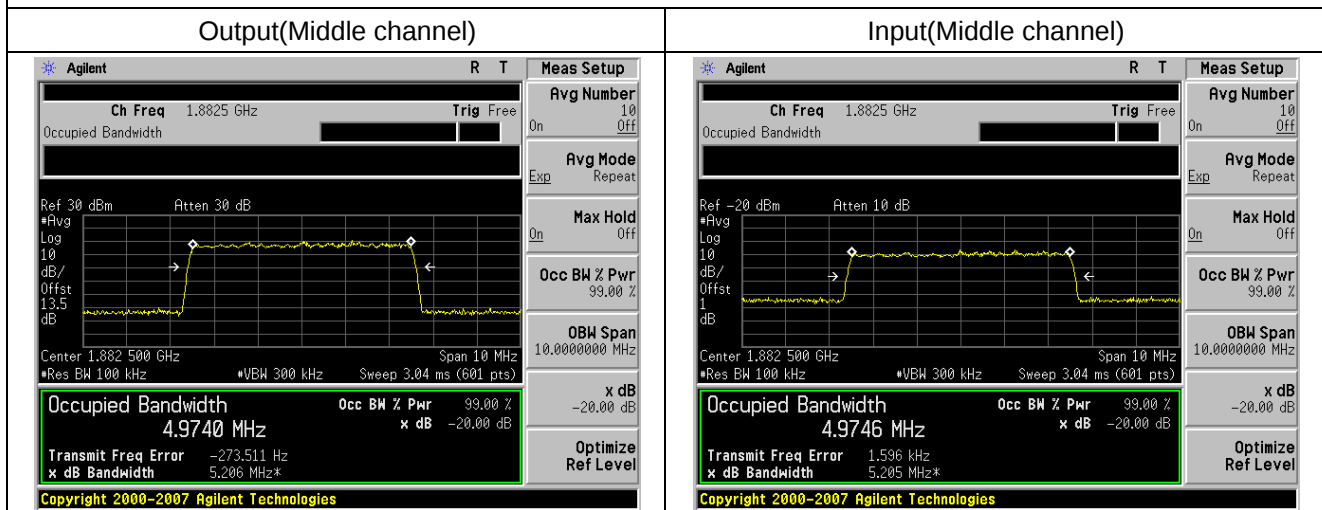


Input/output Bandwidth Comparison for CDMA

1. Number of Carriers: Single carrier

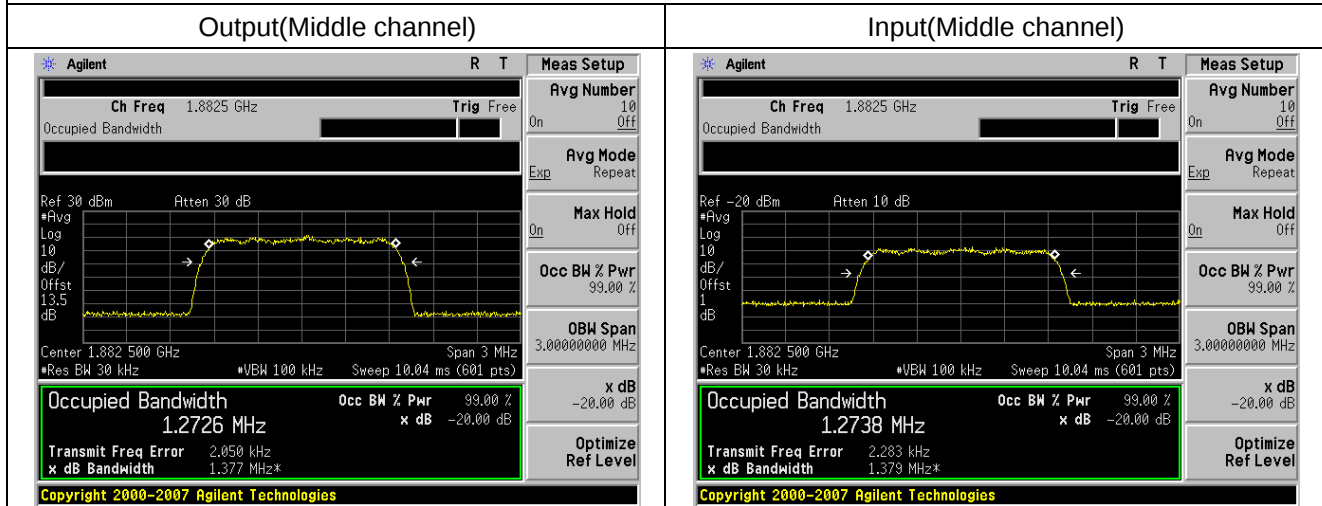


2. Number of Carriers: Four carriers

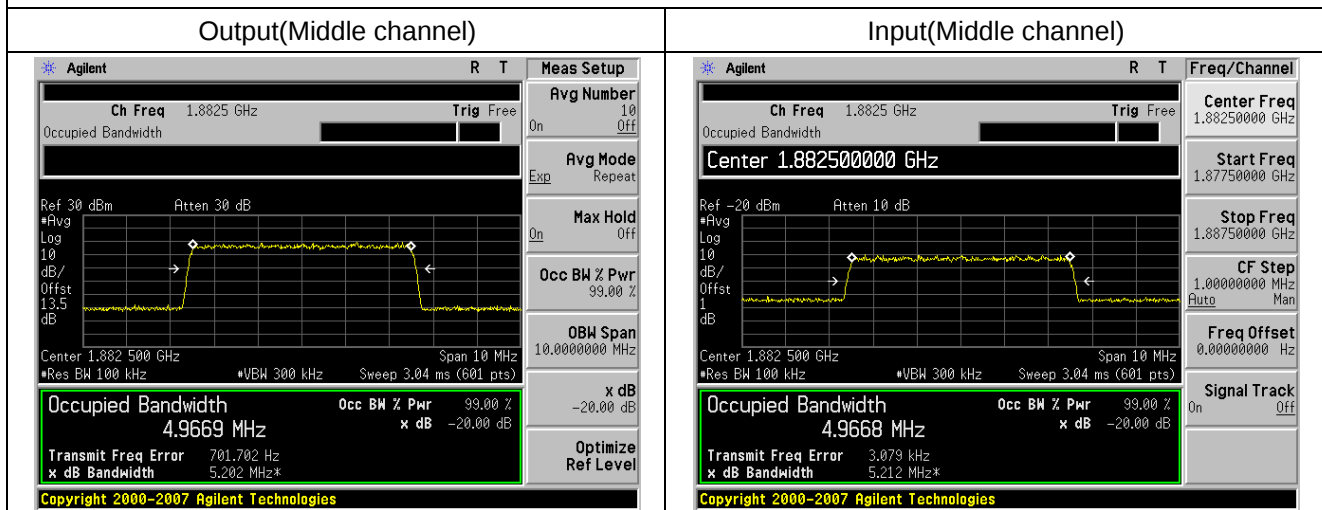


Input/output Bandwidth Comparison for EVDO

1. Number of Carriers: Single carrier

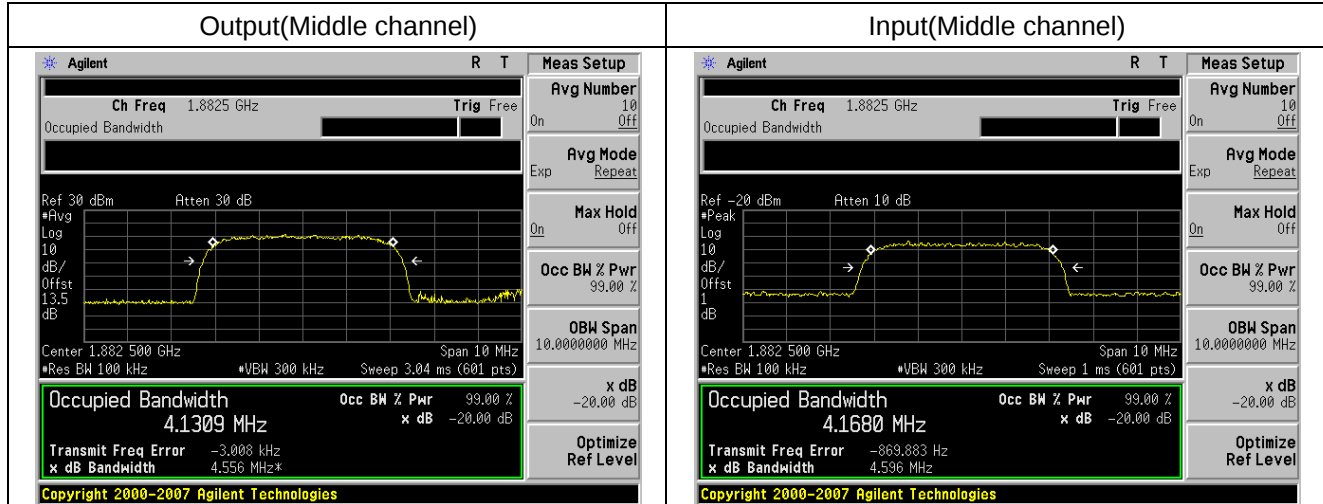


2. Number of Carriers: Four carriers

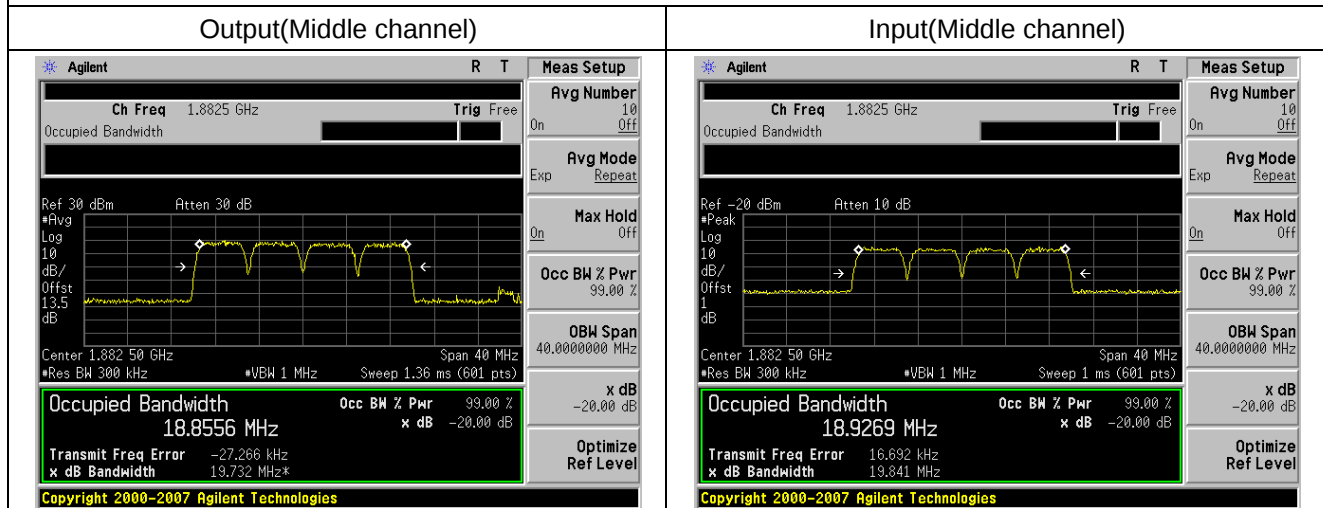


Input/output Bandwidth Comparison for WCDMA

1. Number of Carriers: Single carrier



2. Number of Carriers: Four carriers



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

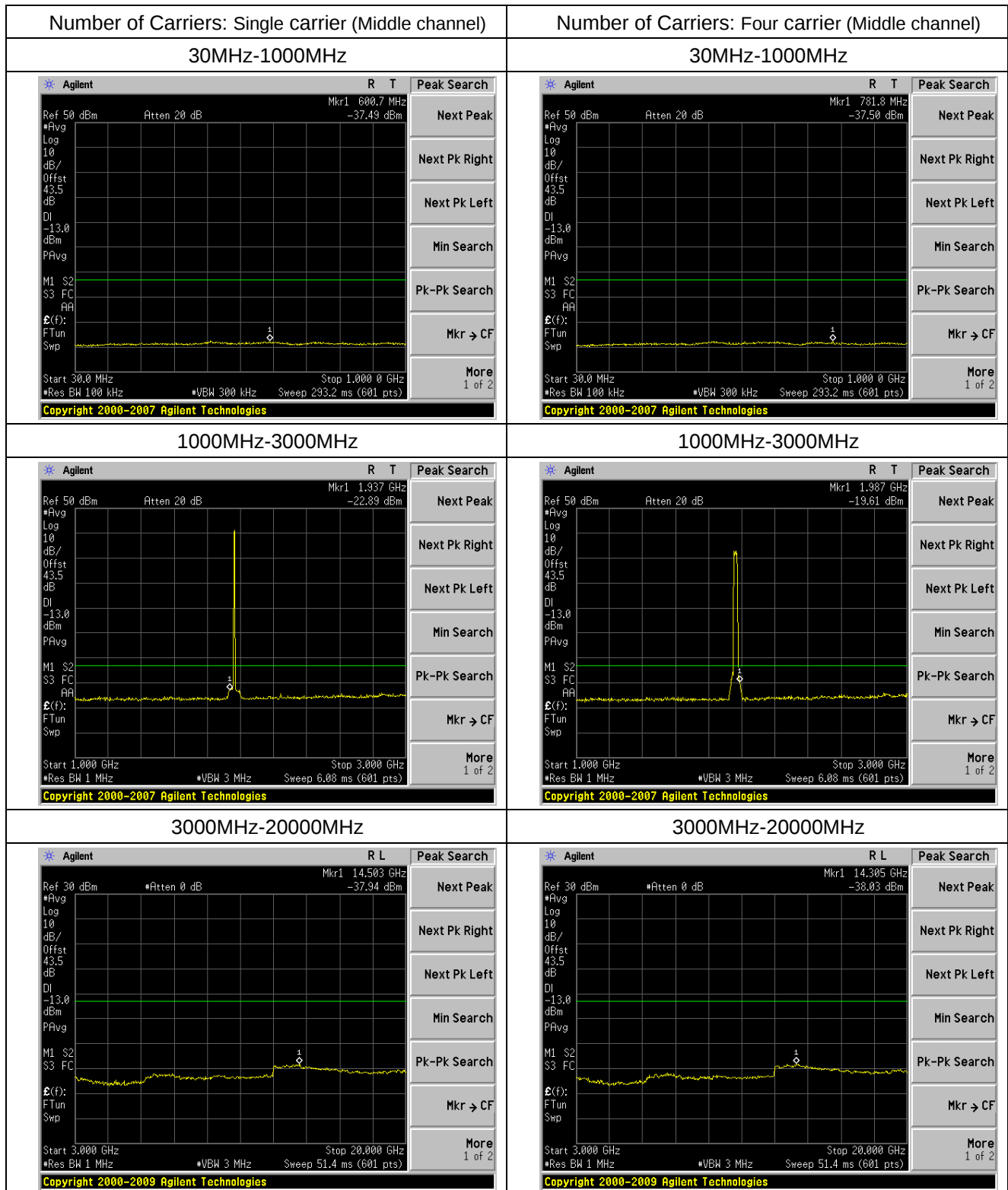
9.4.1 Spurious emission

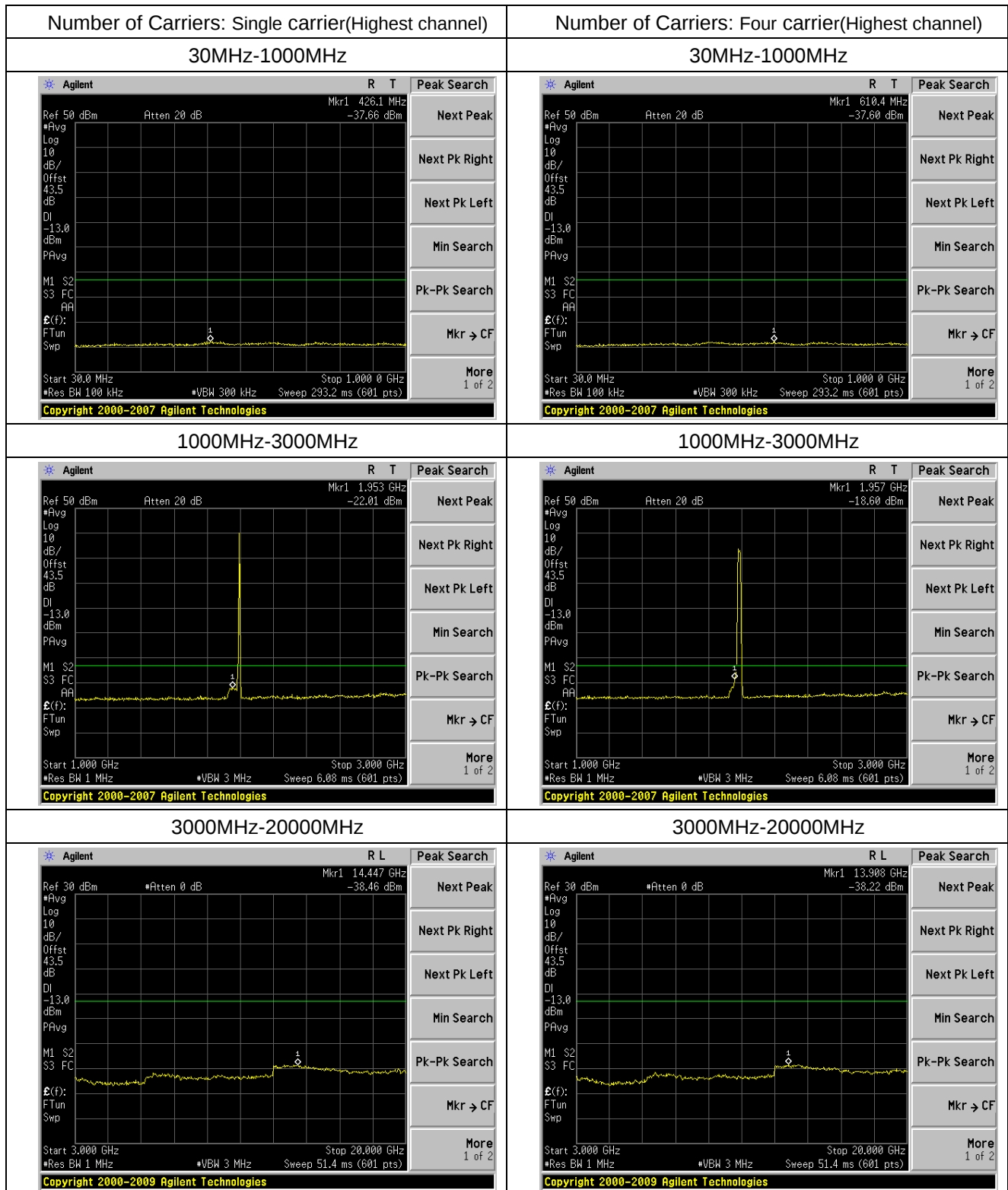
The lowest channel, middle channel and hightest channel were test and found the middle channel was the worst Case, so only this case was recorded in the report.

Downlink:

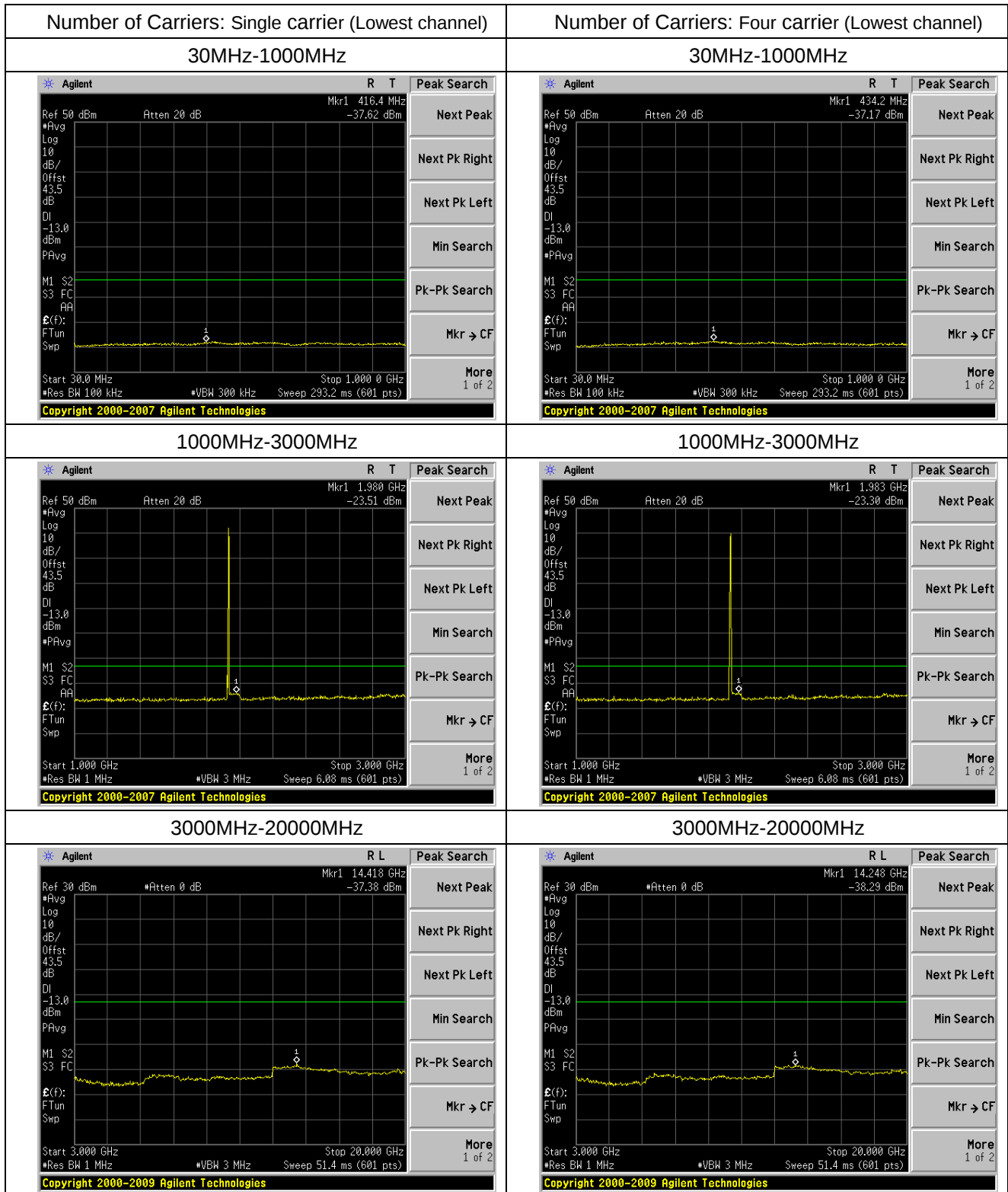
Spurious emission of WCDMA

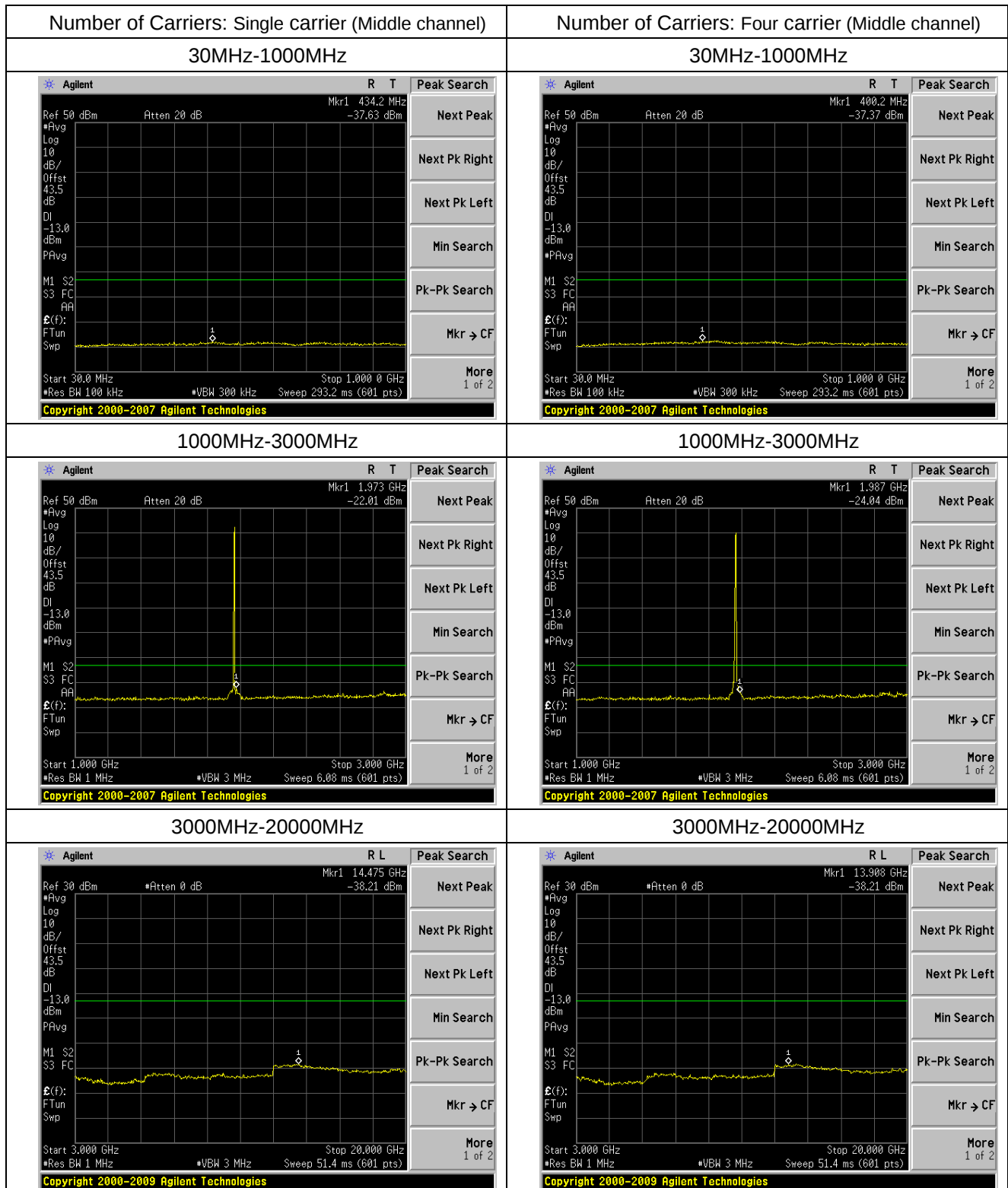
Number of Carriers: Single carrier (Lowest channel)	Number of Carriers: Four carrier (Lowest channel)
30MHz-1000MHz Copyright 2000-2007 Agilent Technologies	30MHz-1000MHz Copyright 2000-2007 Agilent Technologies
1000MHz-3000MHz Copyright 2000-2007 Agilent Technologies	1000MHz-3000MHz Copyright 2000-2007 Agilent Technologies
3000MHz-20000MHz Copyright 2000-2009 Agilent Technologies	3000MHz-20000MHz Copyright 2000-2009 Agilent Technologies

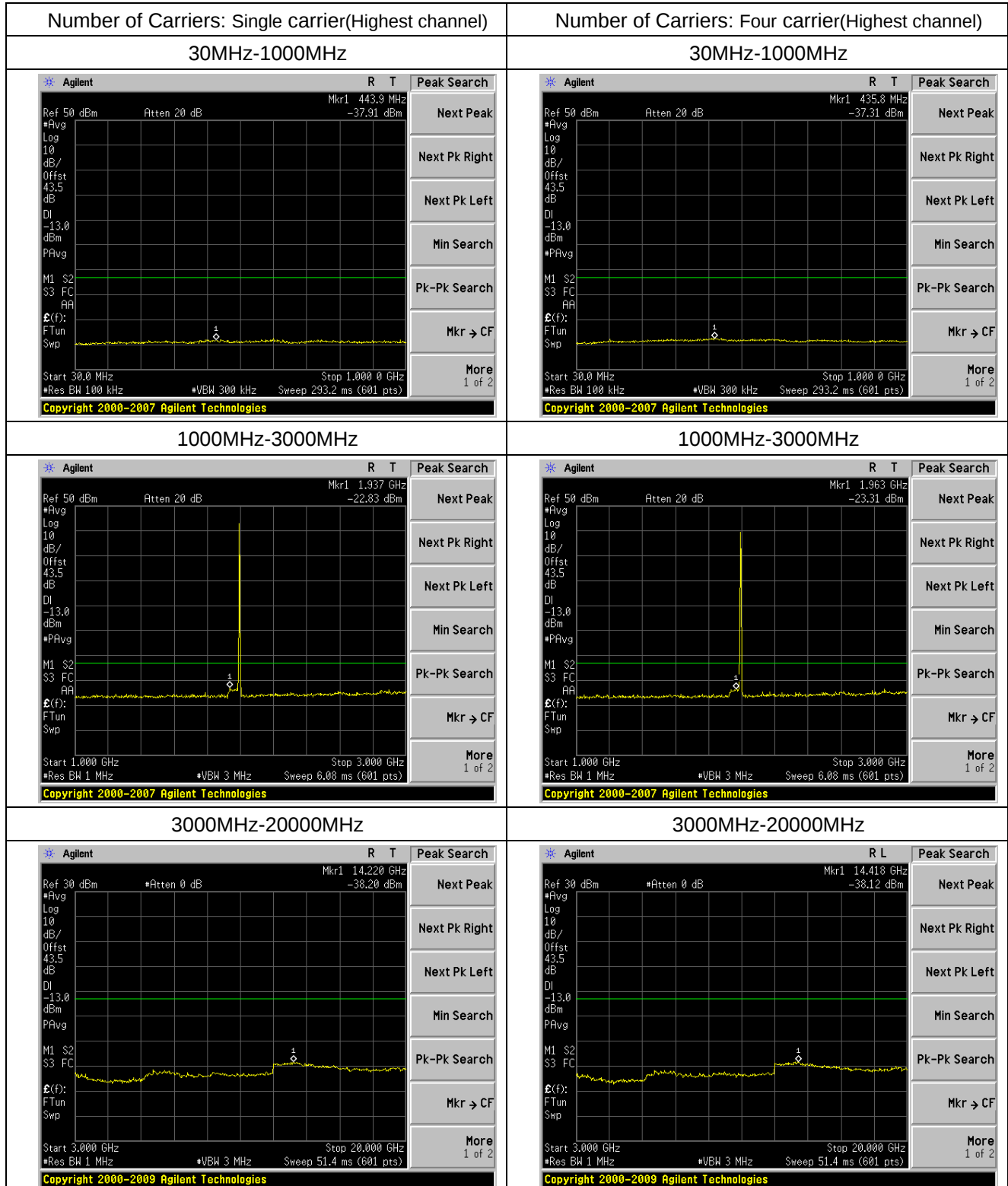




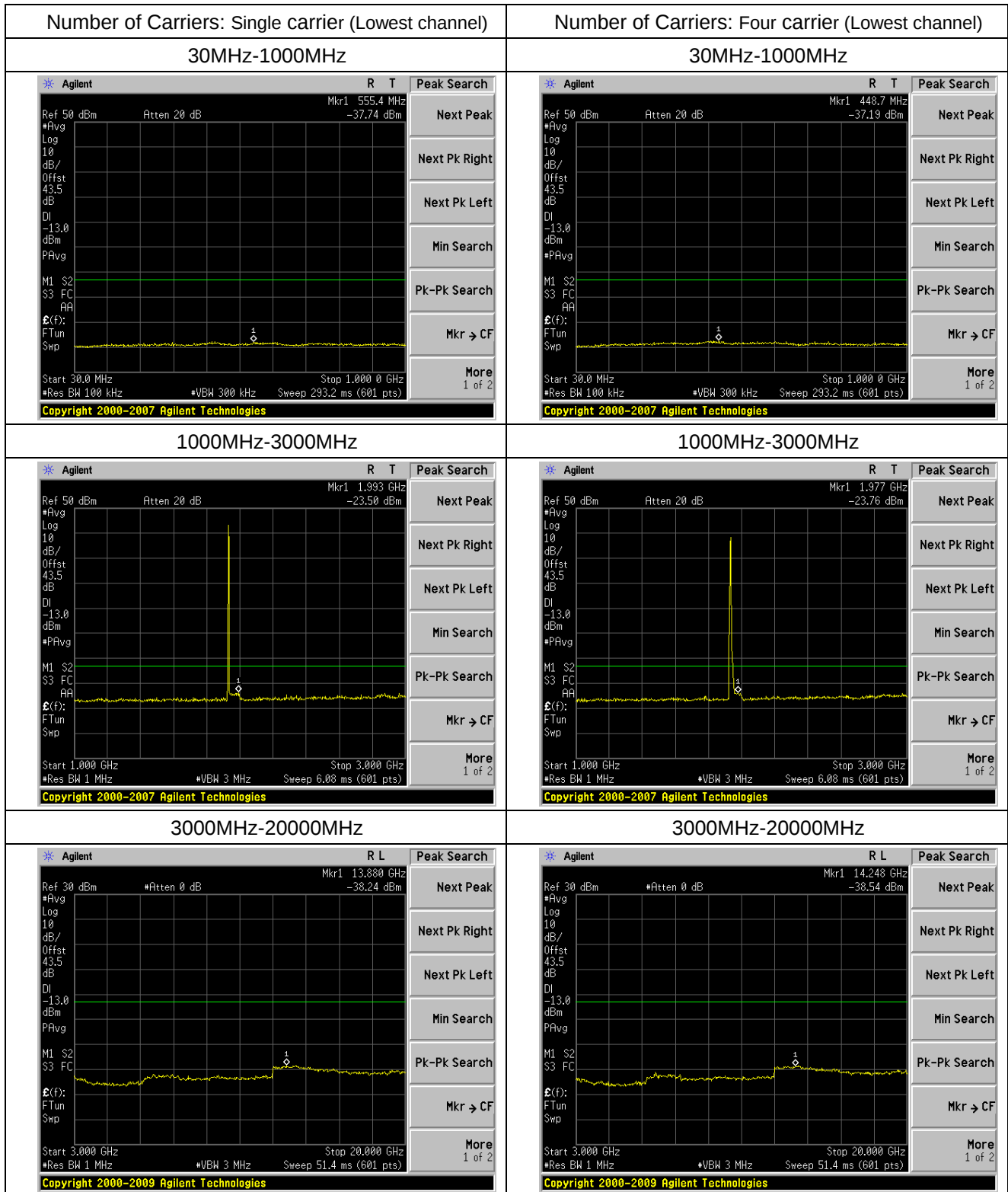
Spurious emission of CDMA

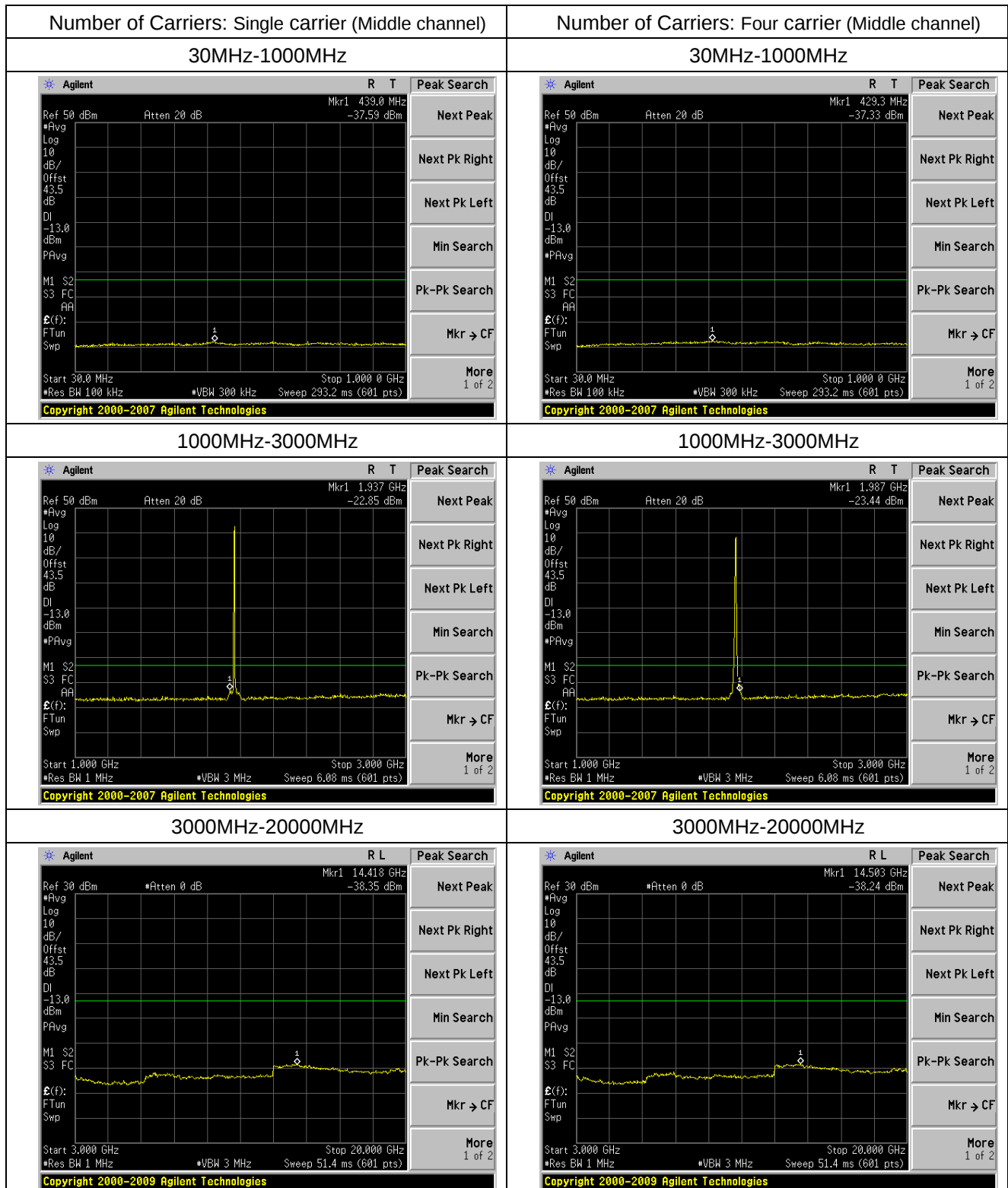


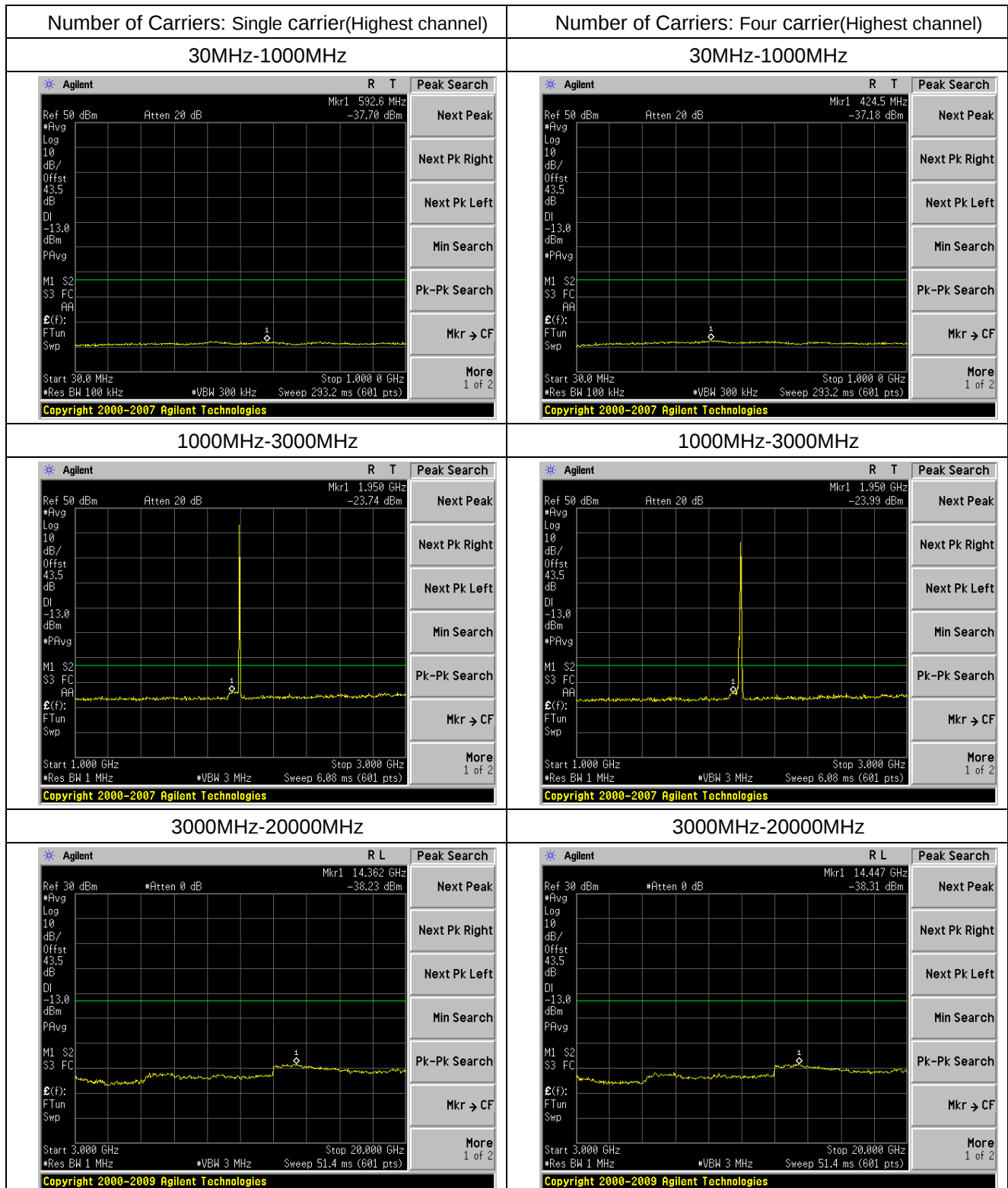




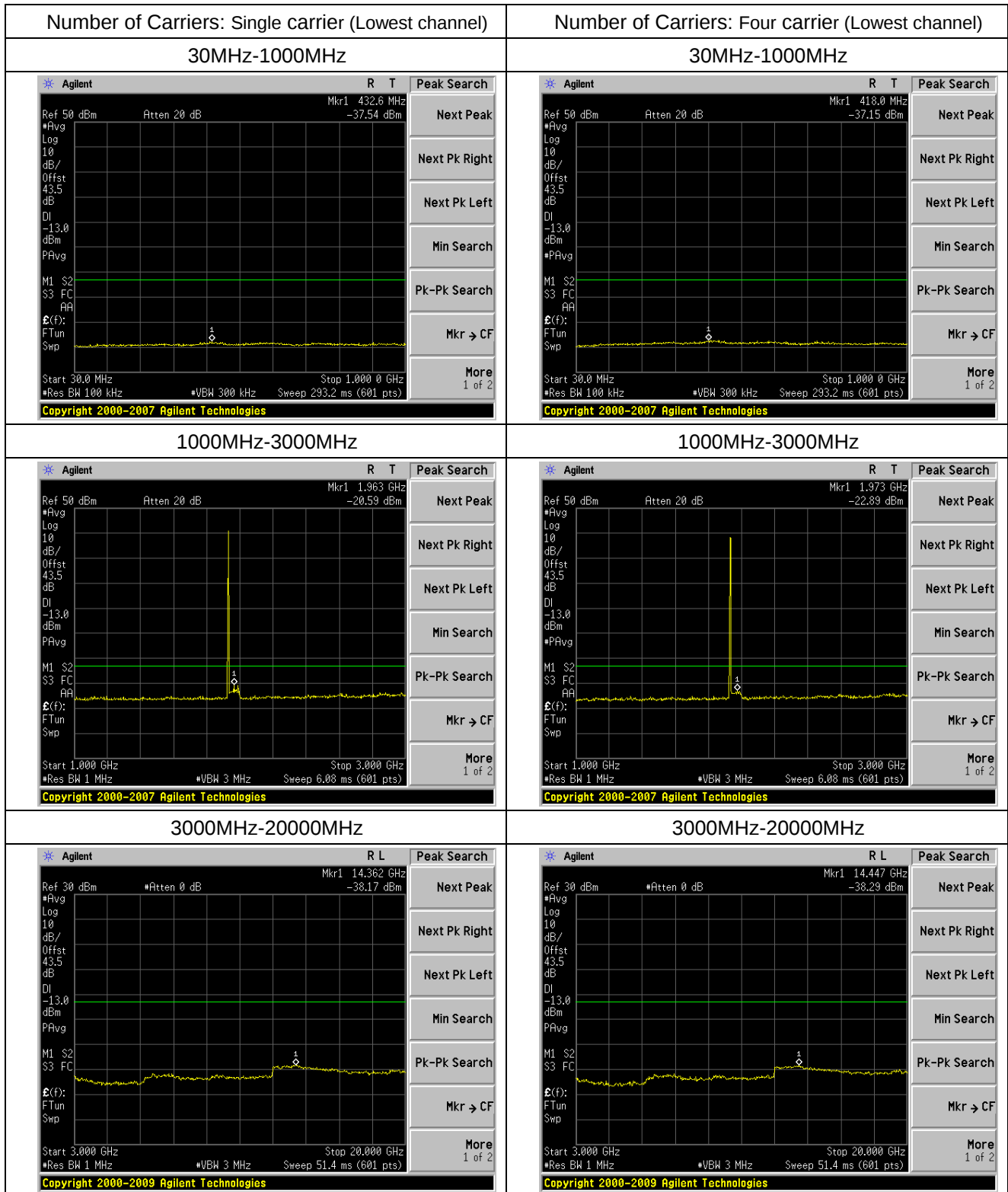
Spurious emission of CDMA EV-DO

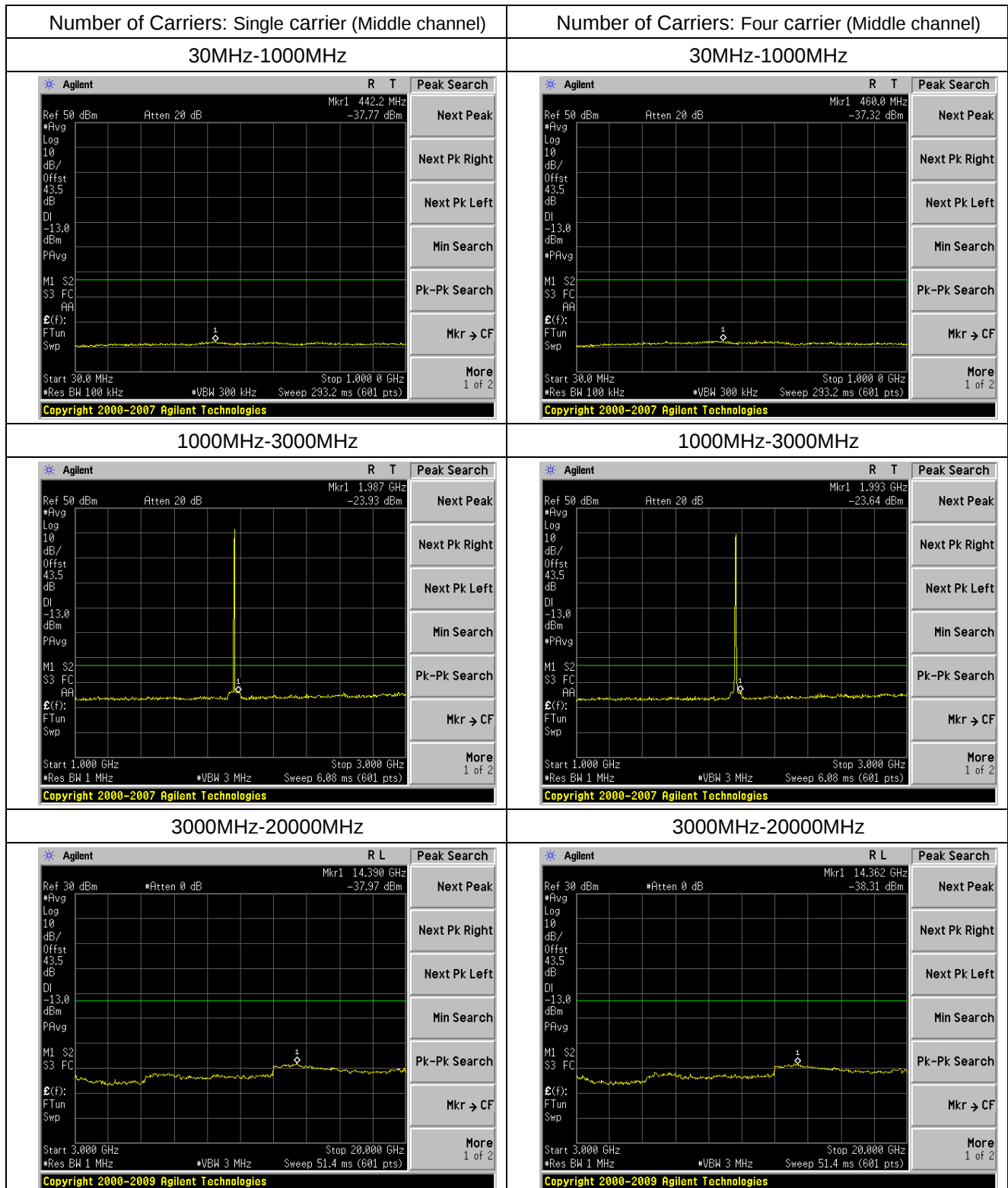


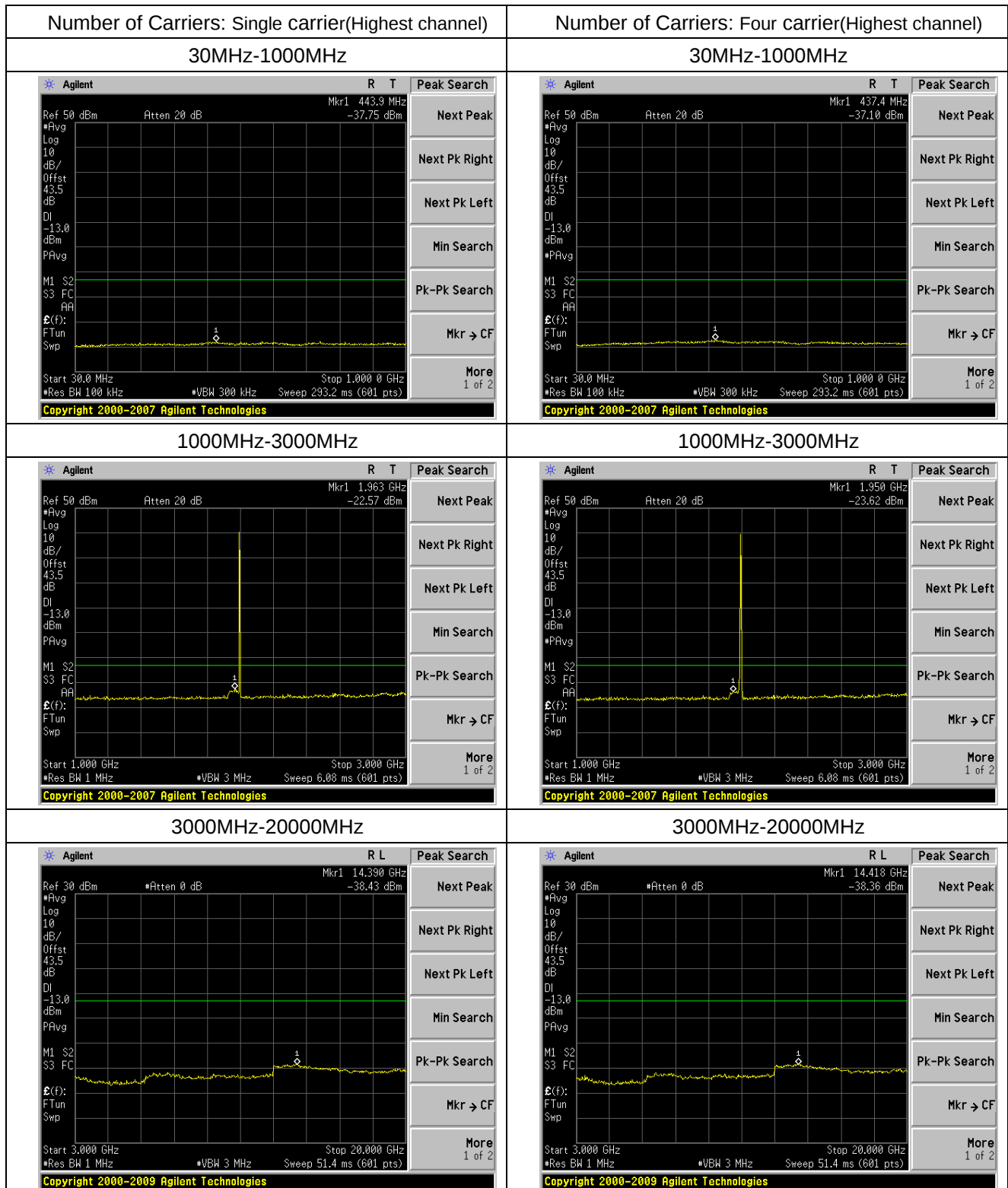




Spurious emission of GSM



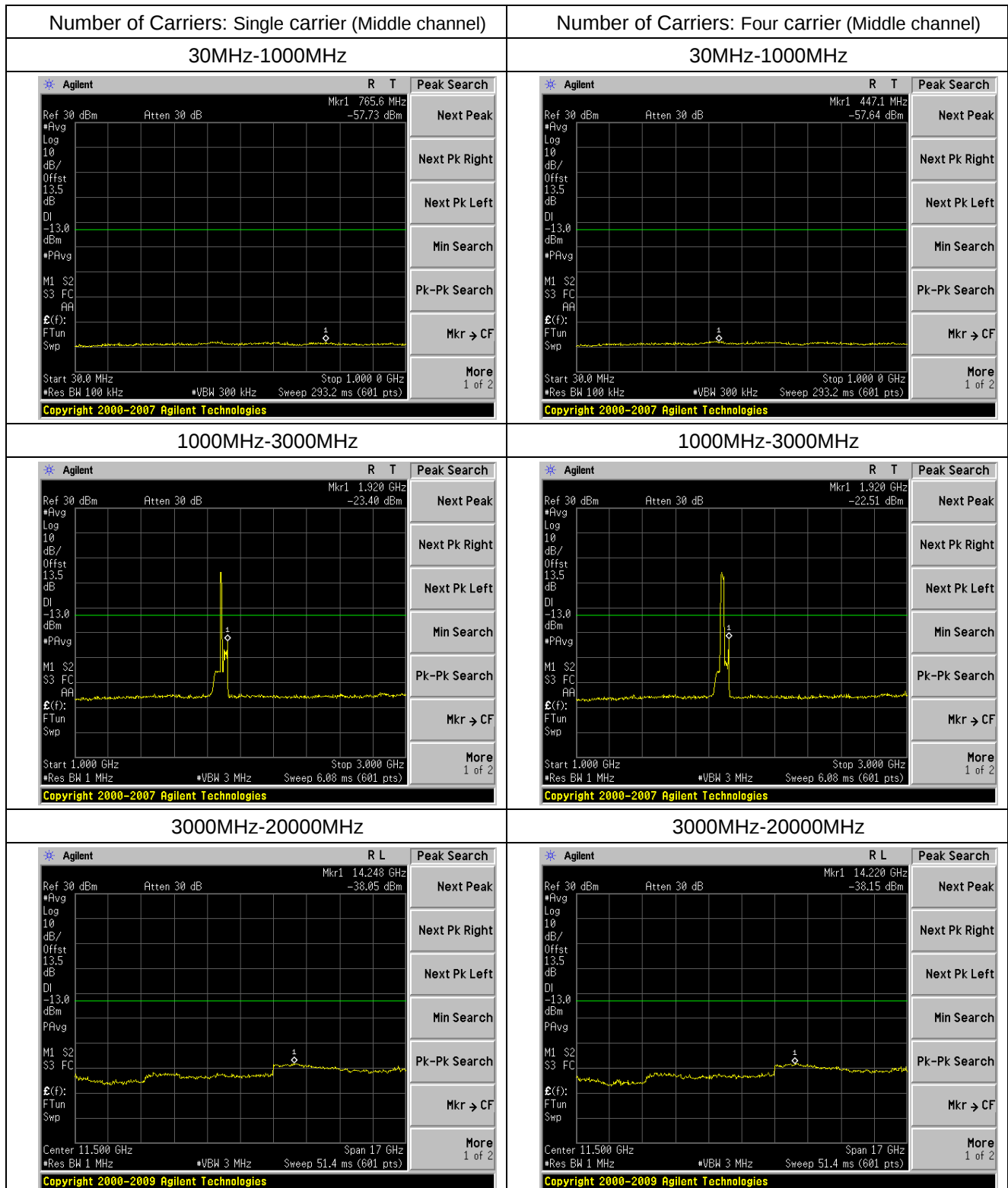


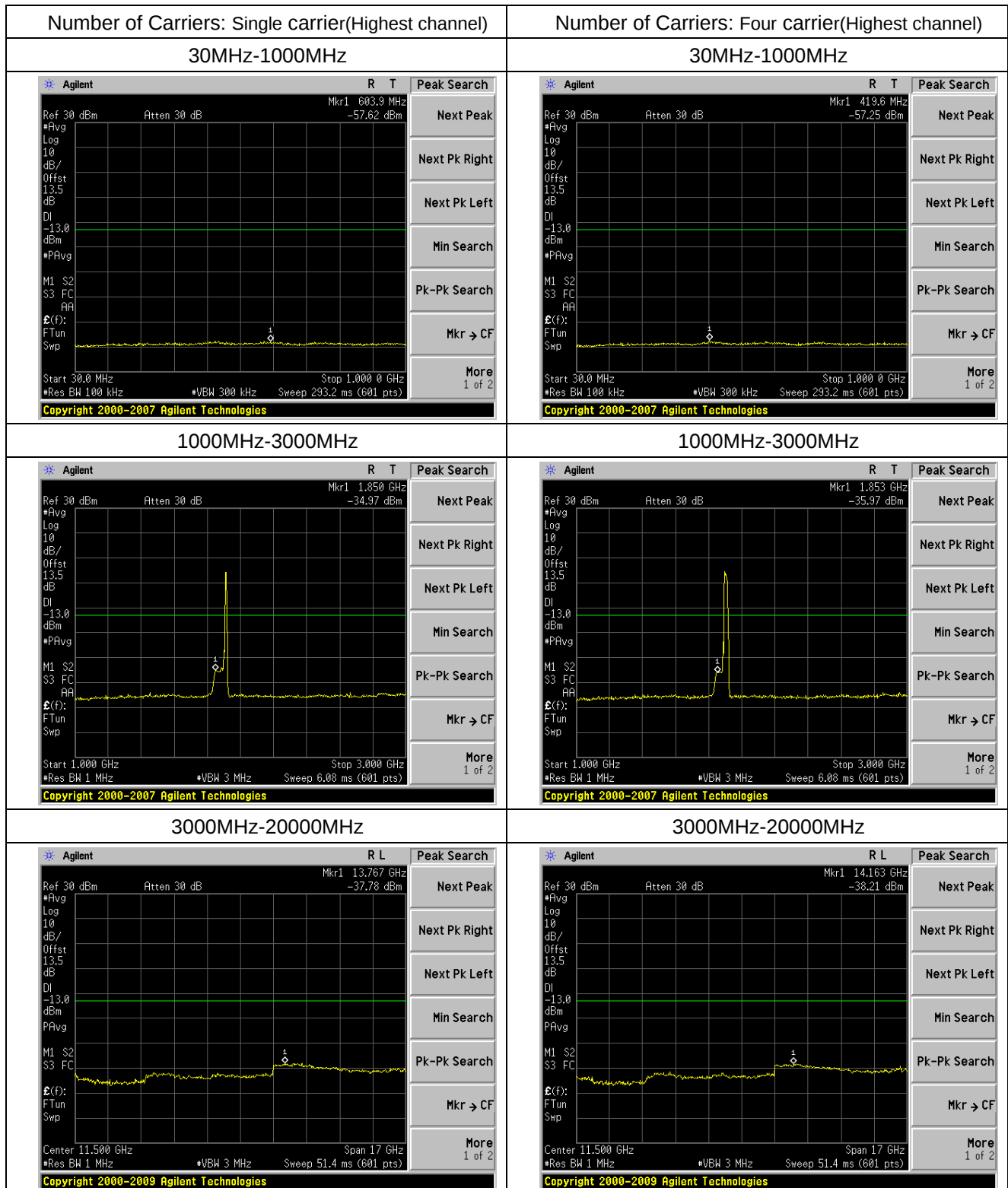


Uplink:

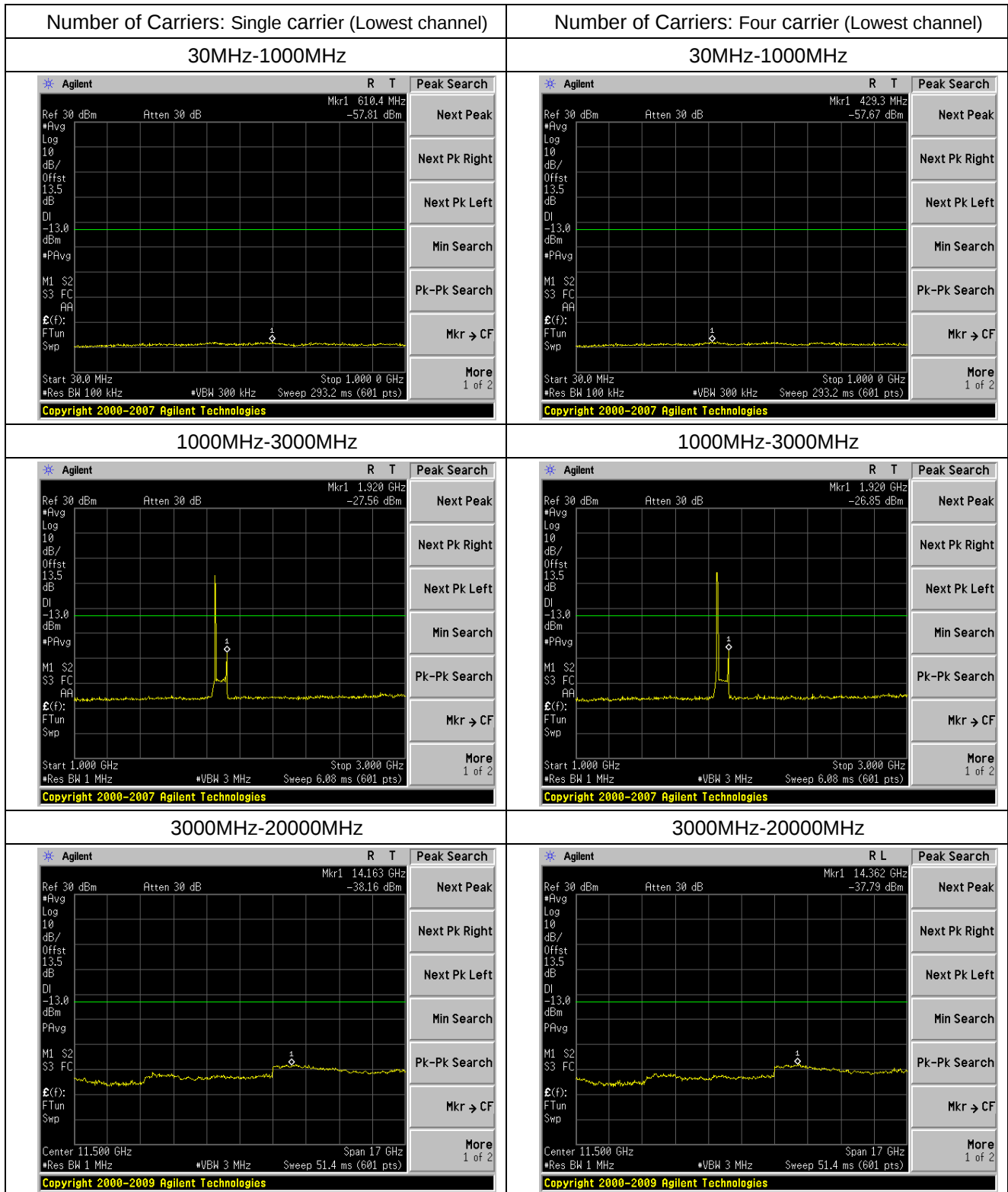
Spurious emission of WCDMA

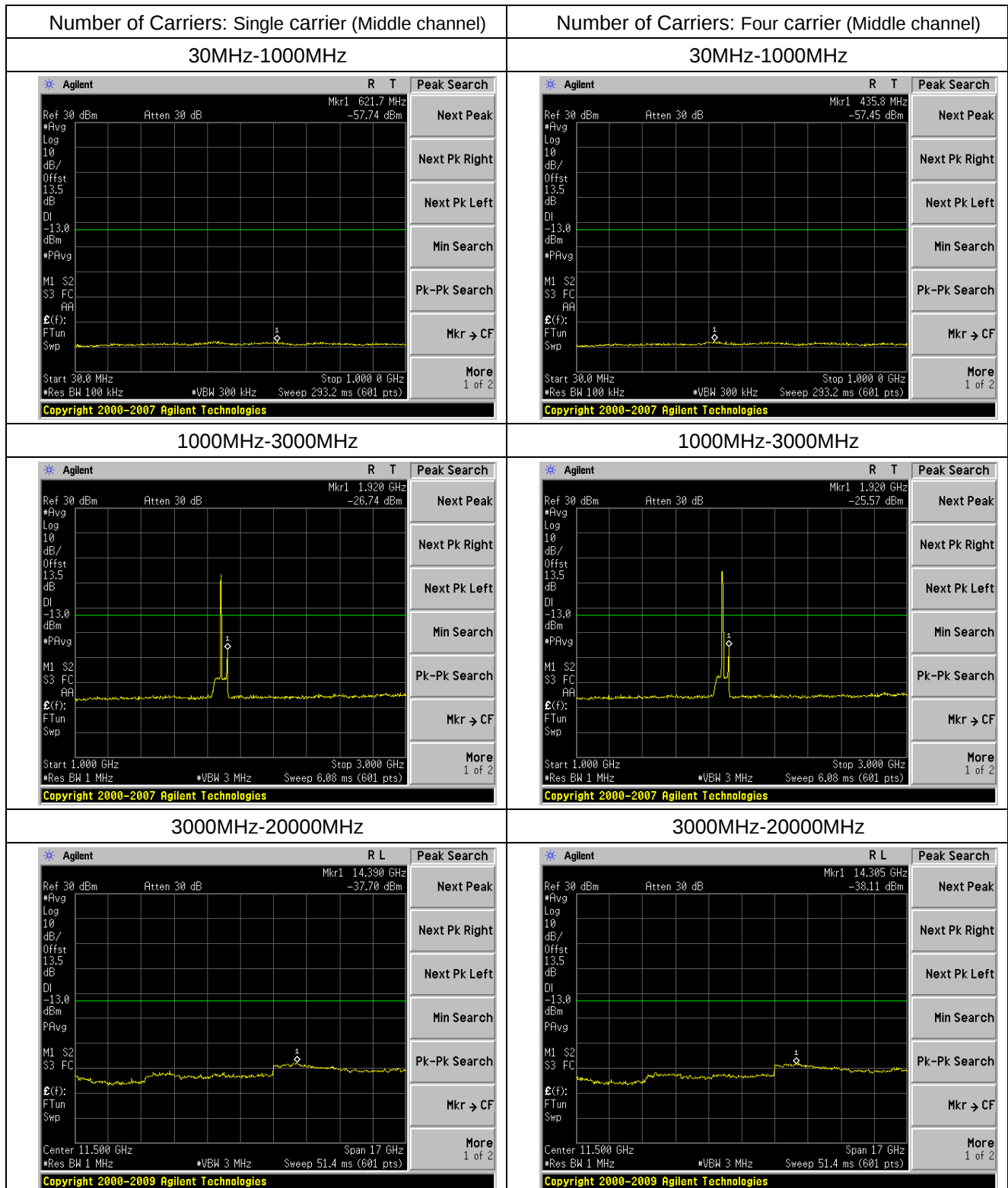
Number of Carriers: Single carrier (Lowest channel)	Number of Carriers: Four carrier (Lowest channel)
30MHz-1000MHz Copyright 2000-2007 Agilent Technologies	30MHz-1000MHz Copyright 2000-2007 Agilent Technologies
1000MHz-3000MHz Copyright 2000-2007 Agilent Technologies	1000MHz-3000MHz Copyright 2000-2007 Agilent Technologies
3000MHz-20000MHz Copyright 2000-2009 Agilent Technologies	3000MHz-20000MHz Copyright 2000-2009 Agilent Technologies

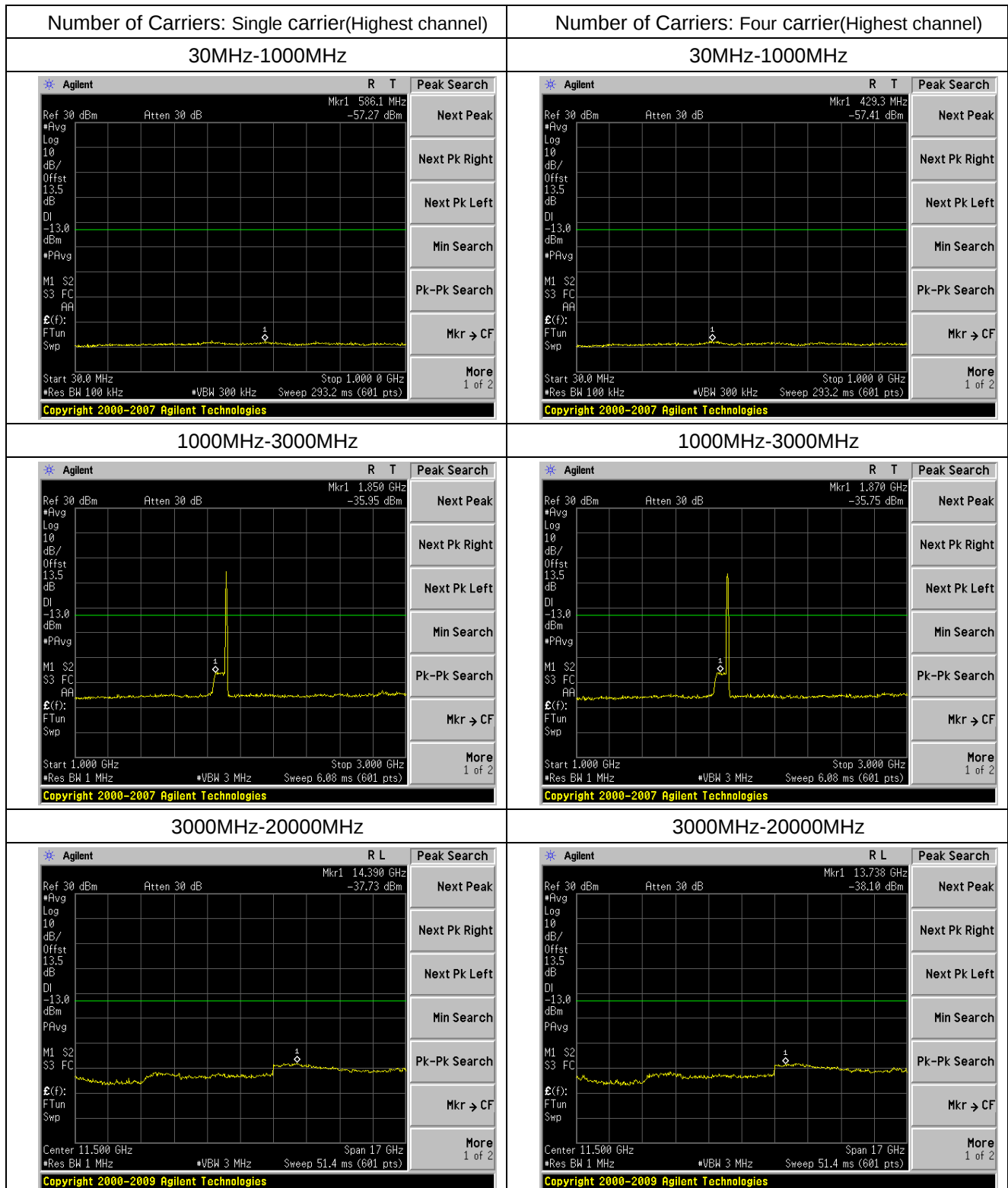




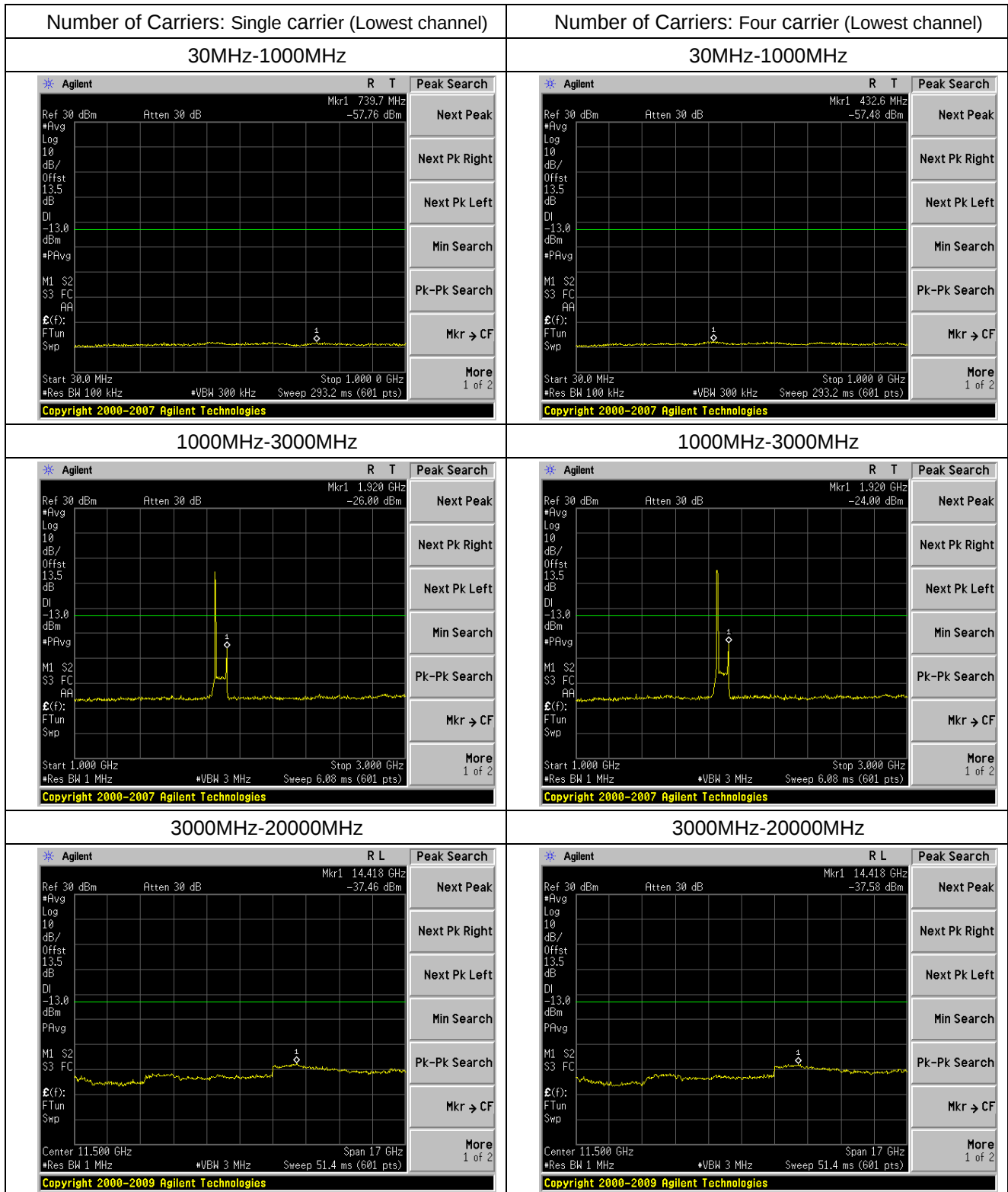
Spurious emission of CDMA

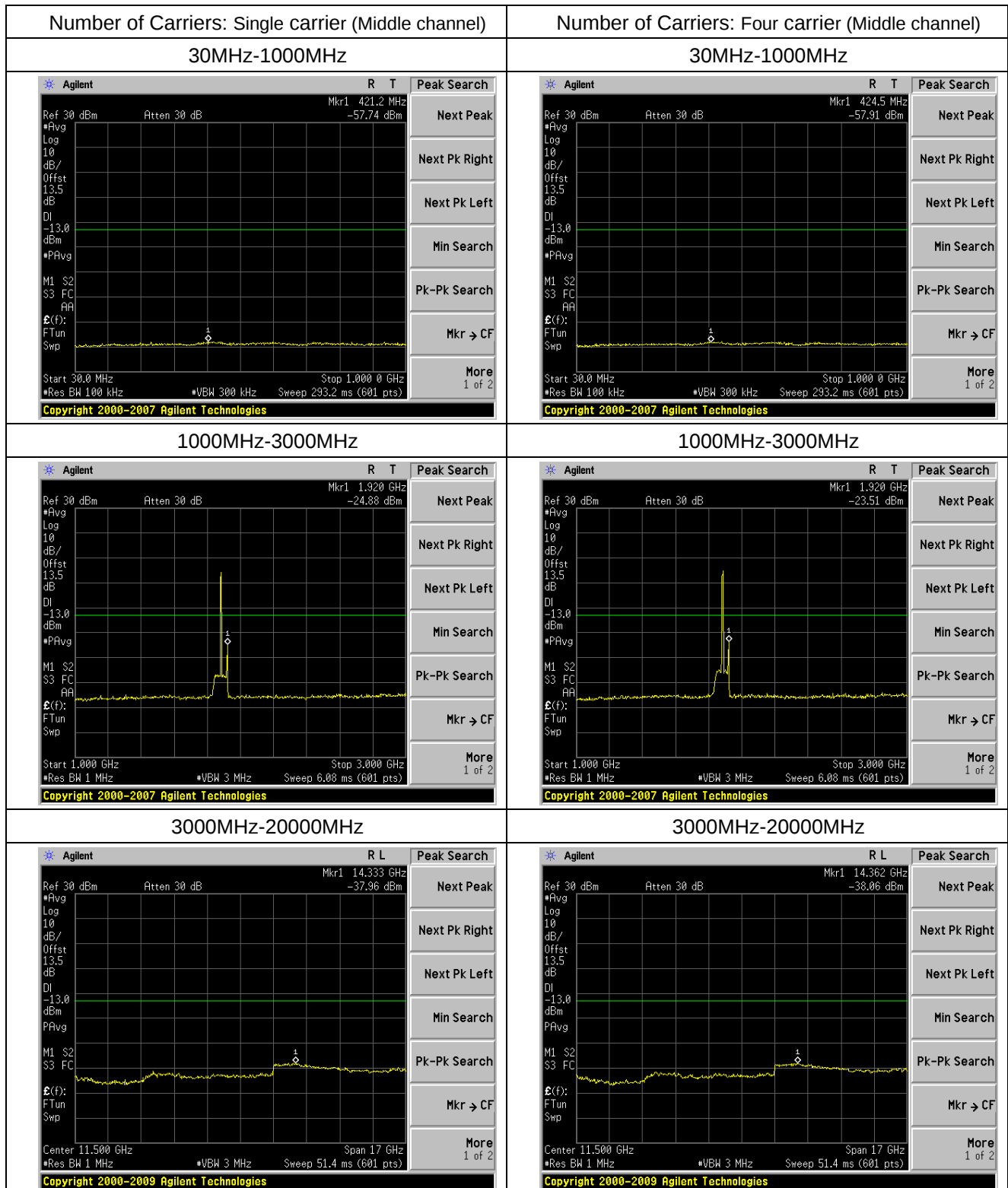


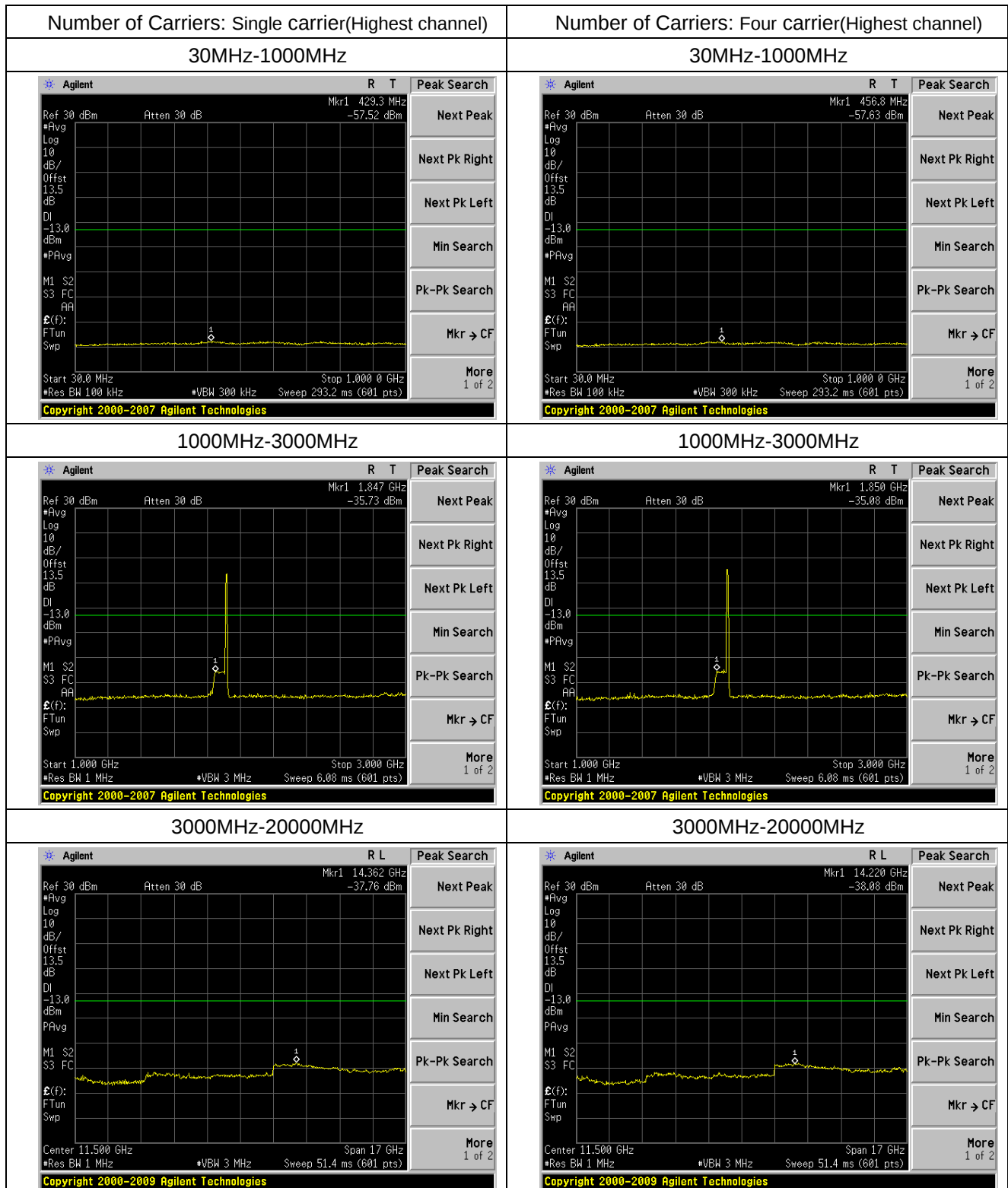




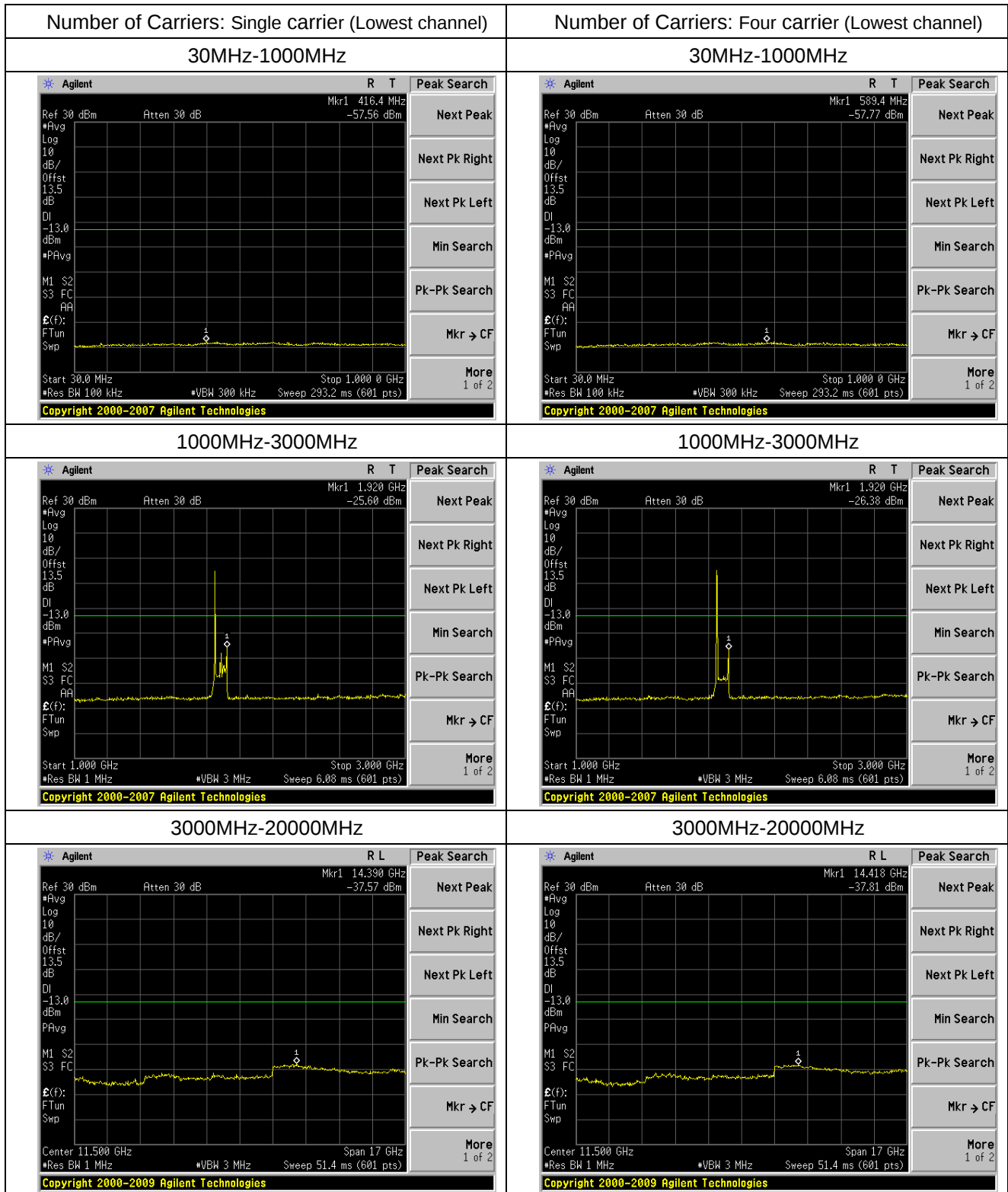
Spurious emission of CDMA EV-DO

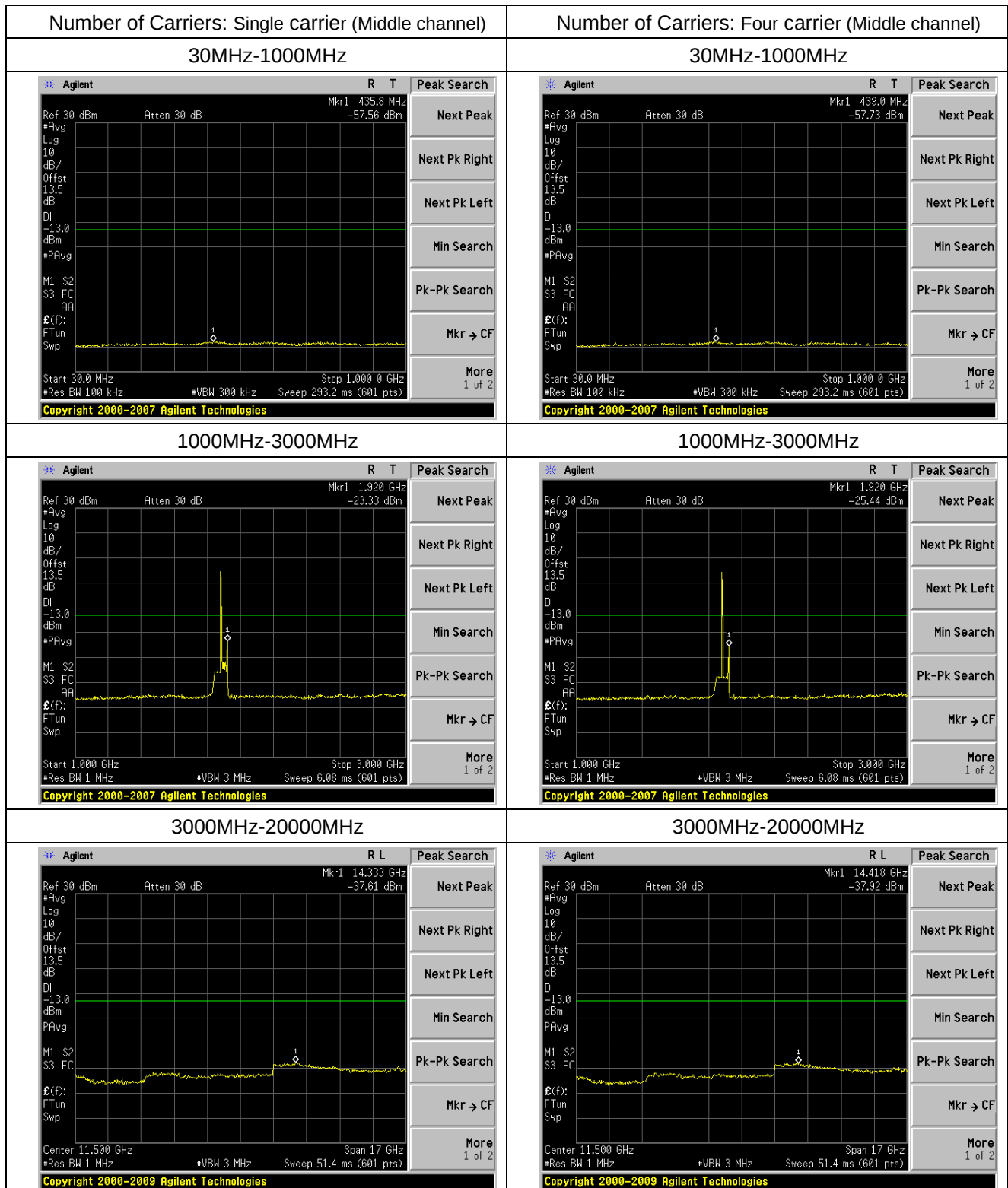


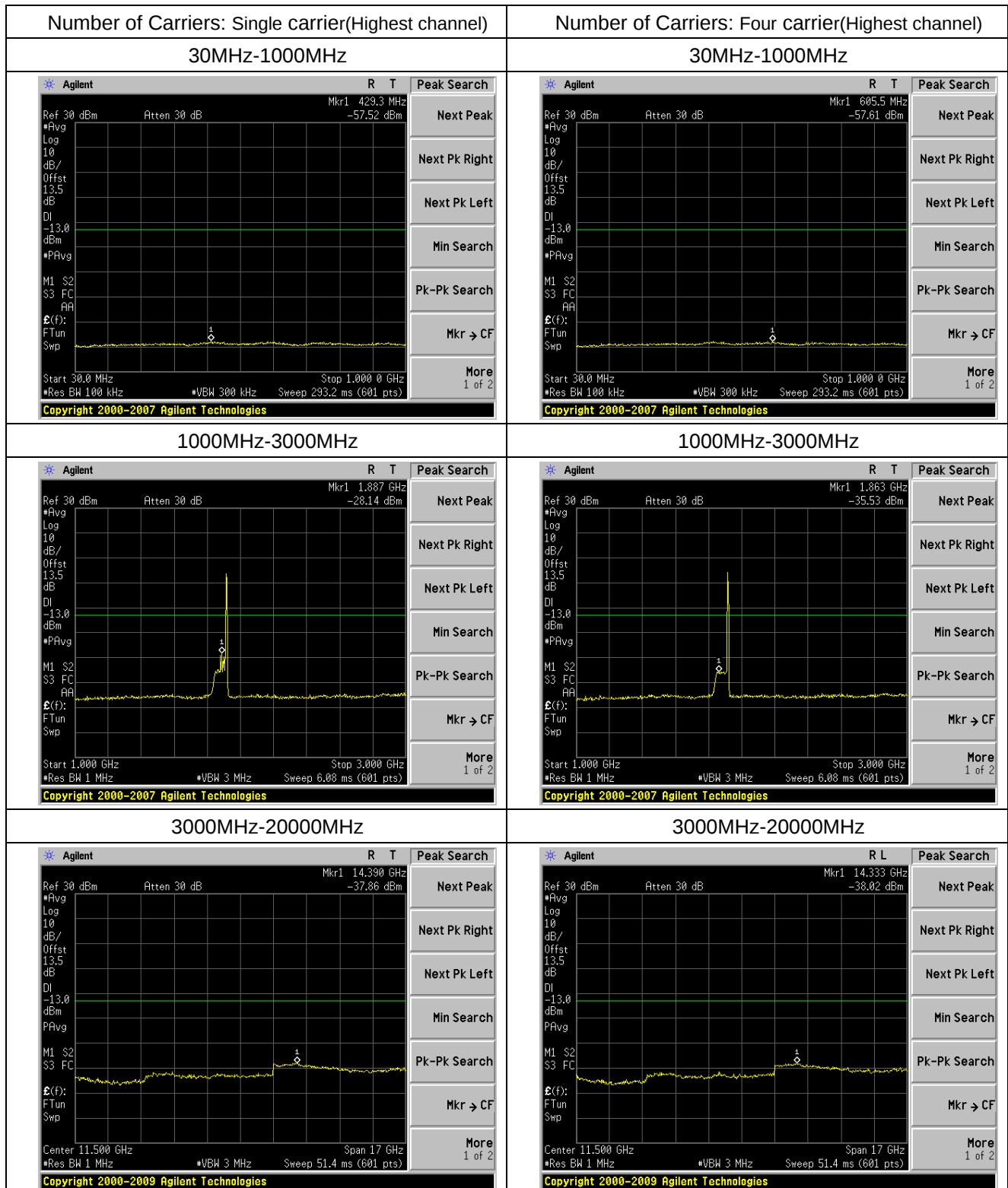




Spurious emission of GSM





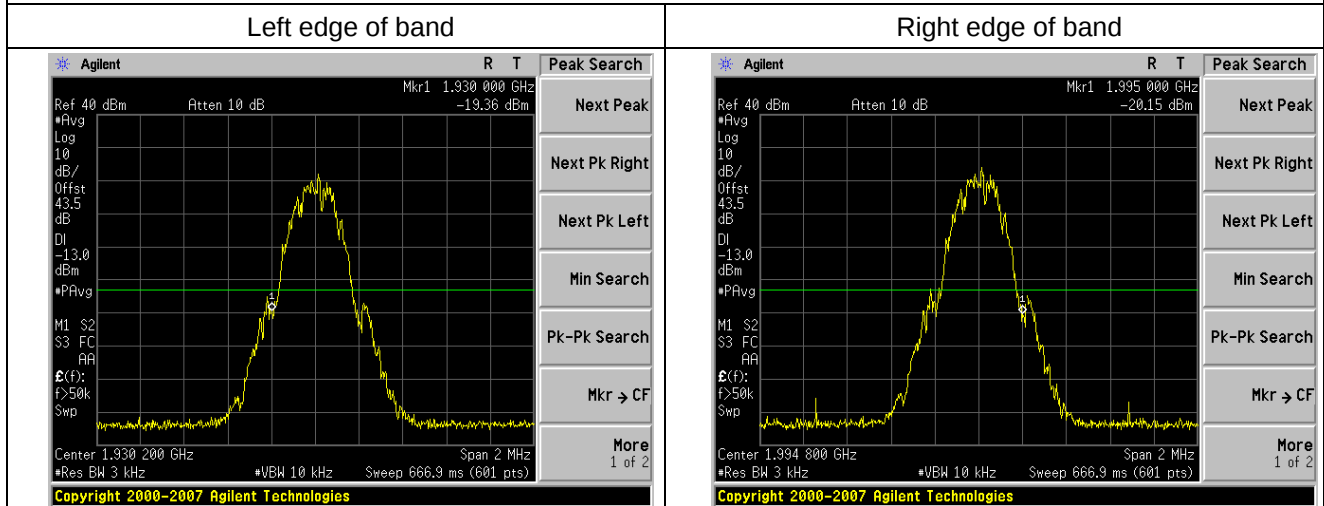


9.4.2 Band edge emission

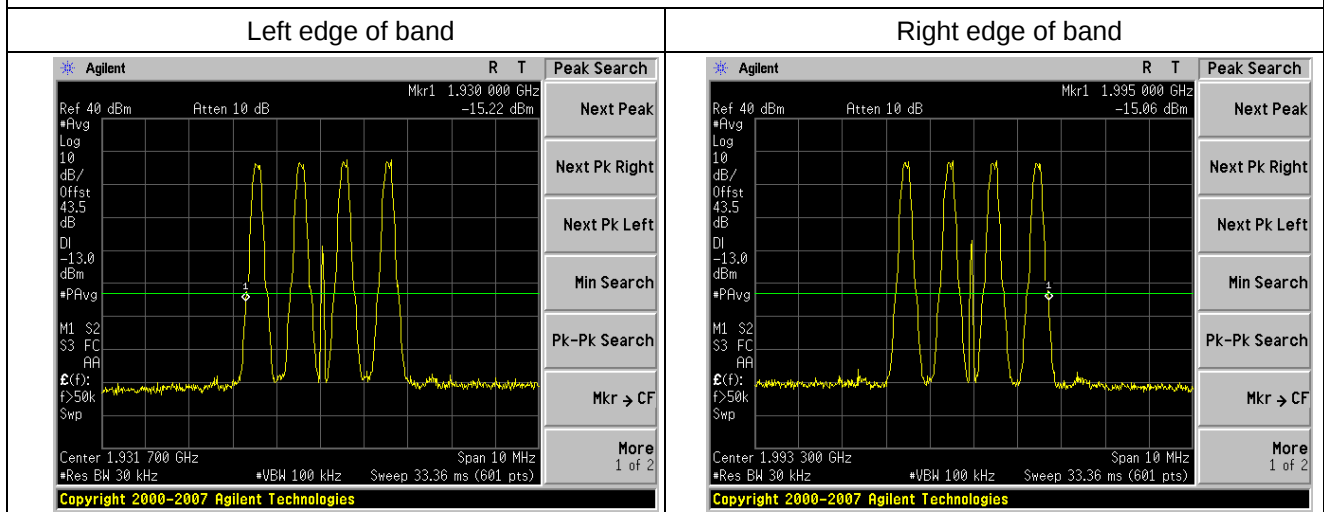
Downlink:

Band edge of GSM

1. Number of Carriers: Single carrier

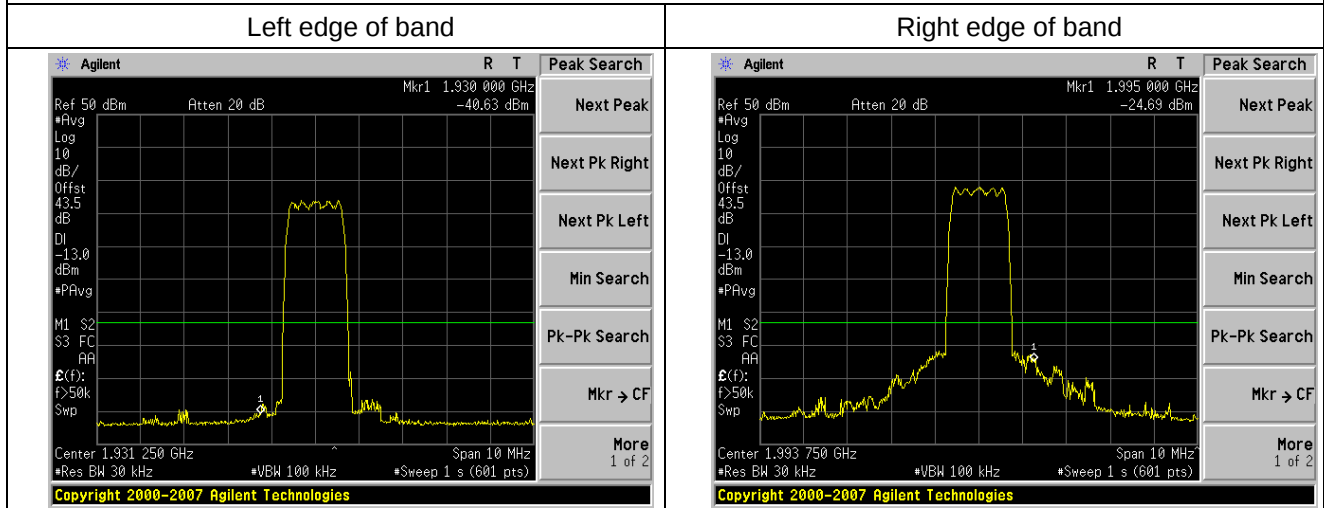


2. Number of Carriers: Four carriers

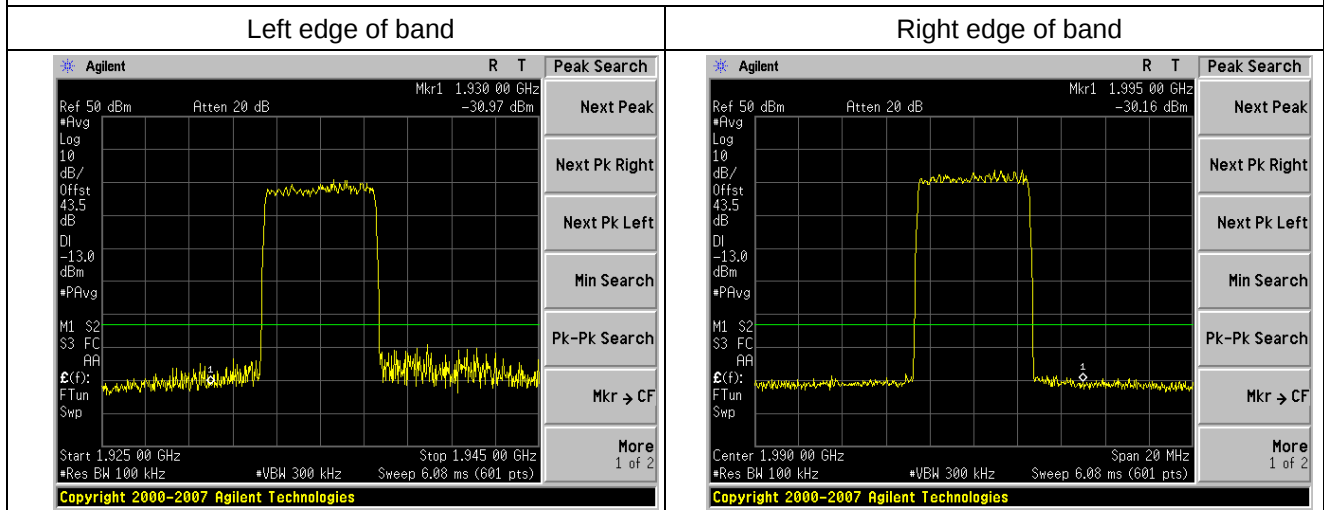


Band edge of CDMA

1. Number of Carriers: Single carrier

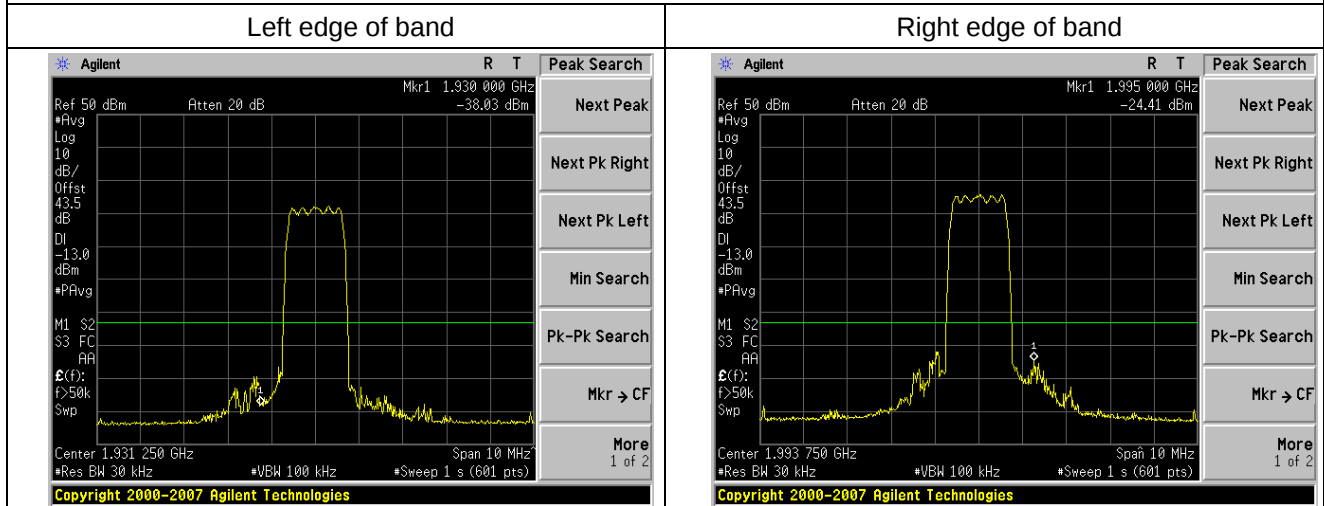


2. Number of Carriers: Four carriers

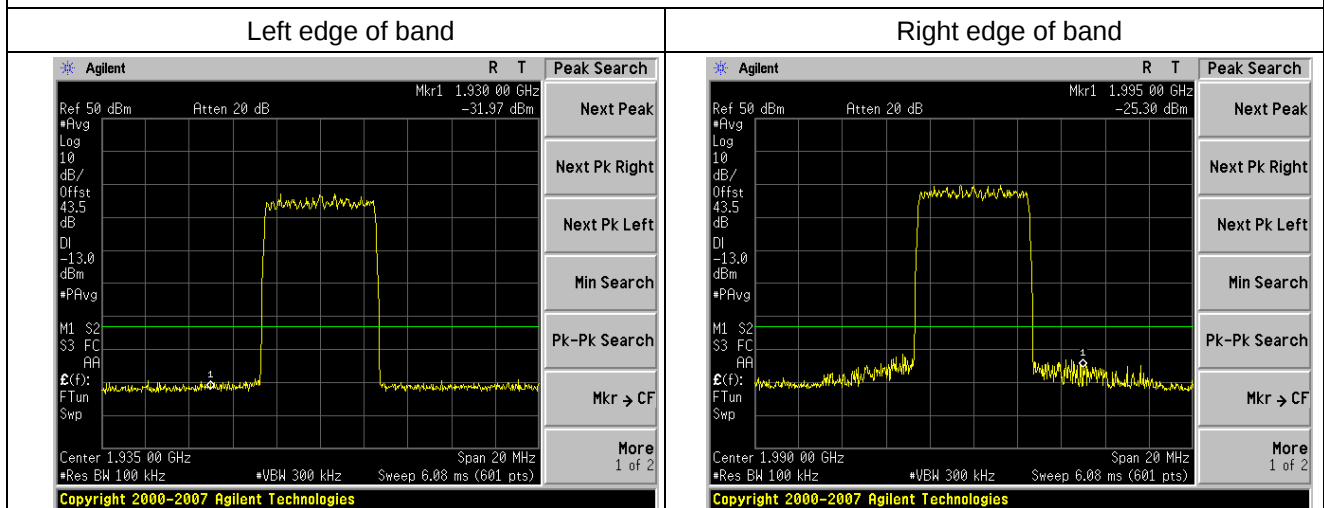


Band edge of EVDO

1. Number of Carriers: Single carrier

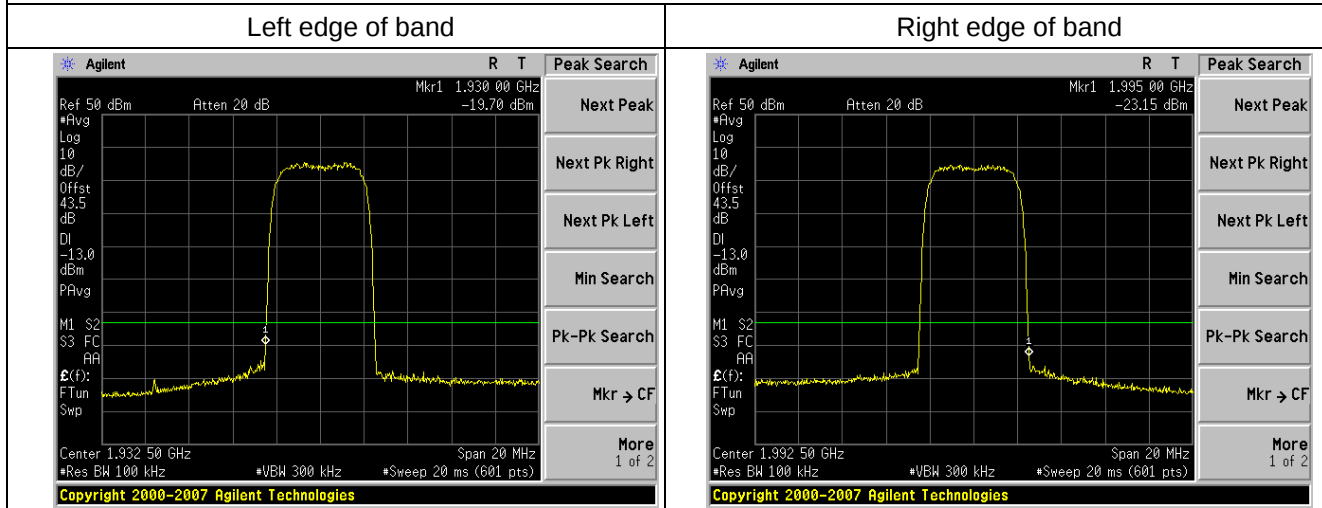


2. Number of Carriers: Four carriers

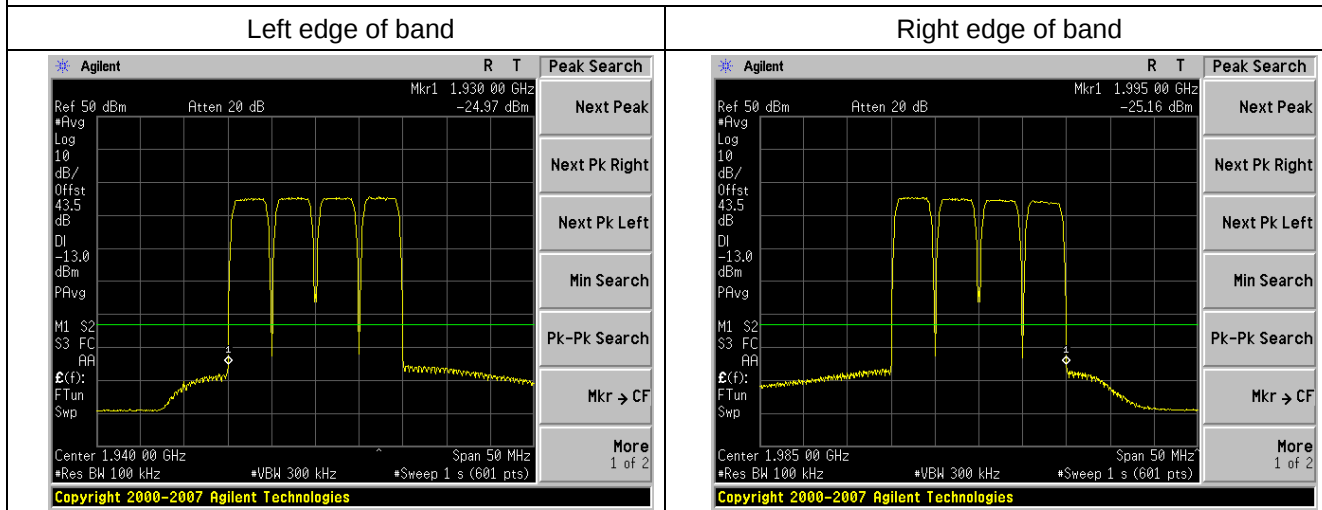


Band edge of WCDMA

1. Number of Carriers: Single carrier



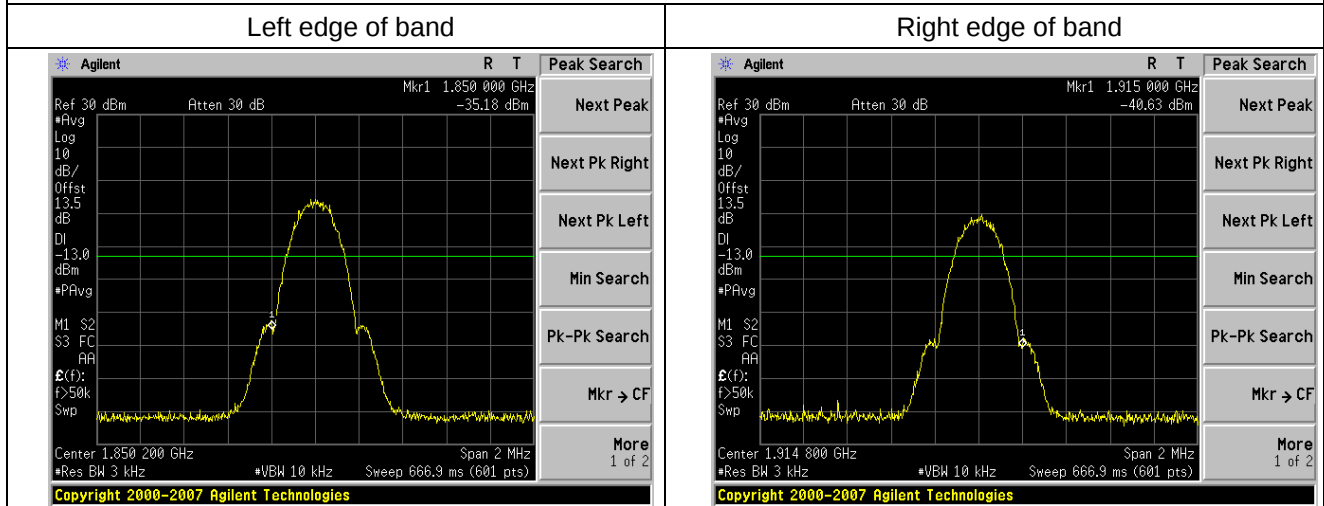
2. Number of Carriers: Four carriers



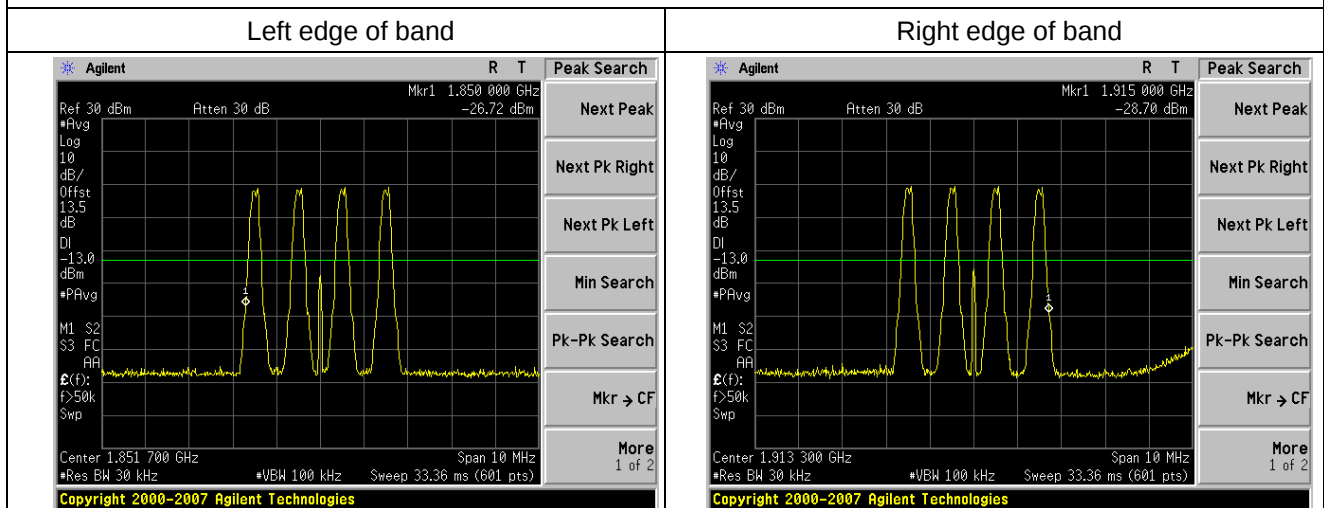
Uplink:

Band edge of GSM

1. Number of Carriers: Single carrier

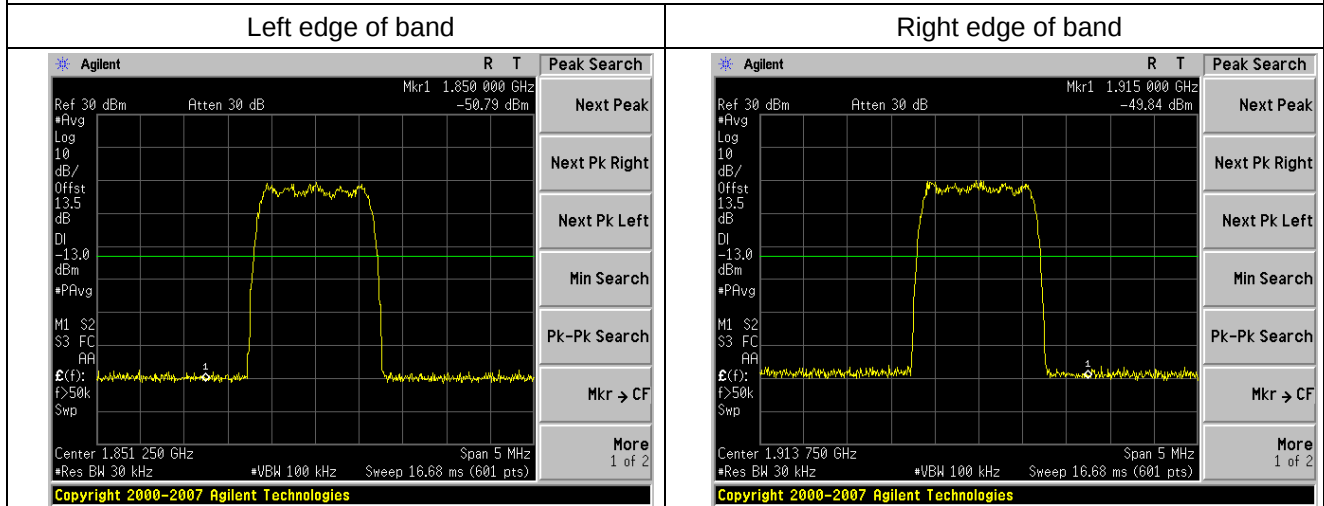


2. Number of Carriers: Four carriers

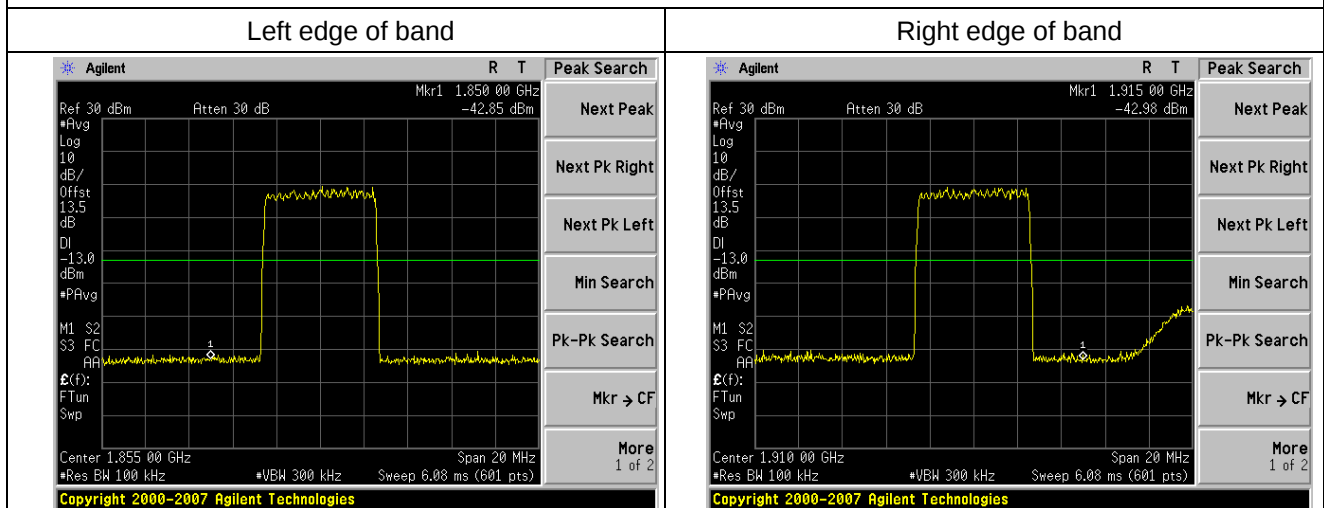


Band edge of CDMA

1. Number of Carriers: Single carrier

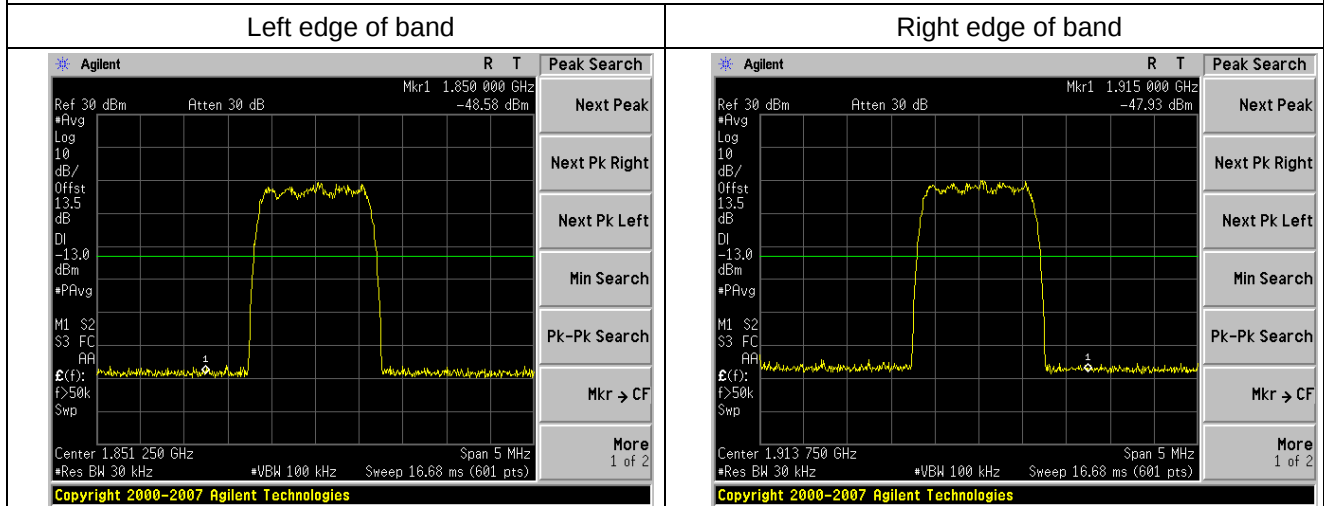


2. Number of Carriers: Four carriers

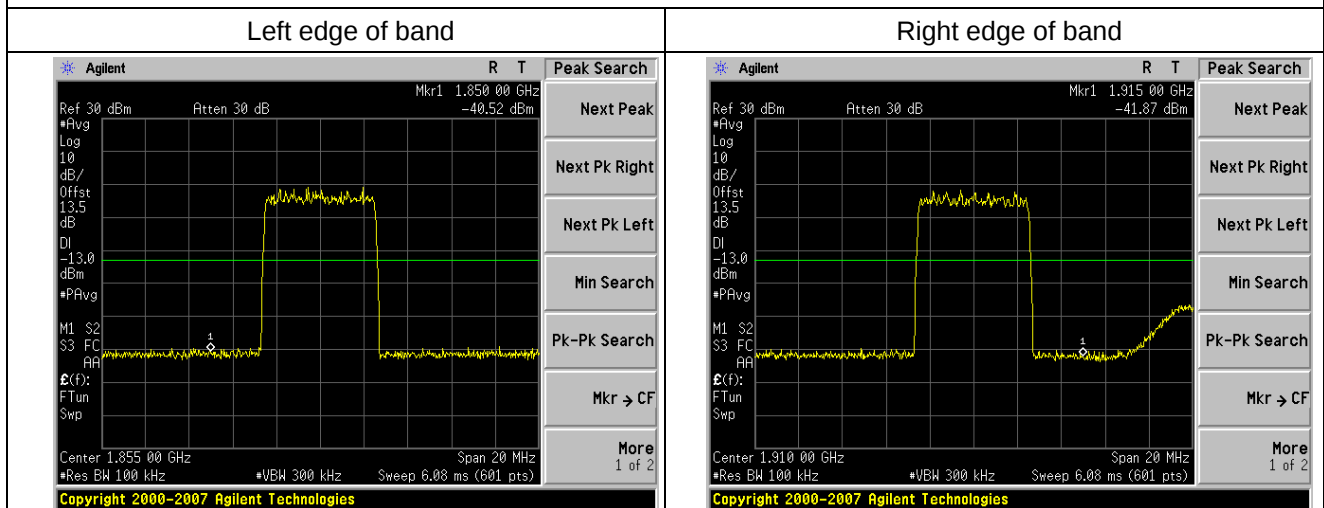


Band edge of EVDO

1. Number of Carriers: Single carrier

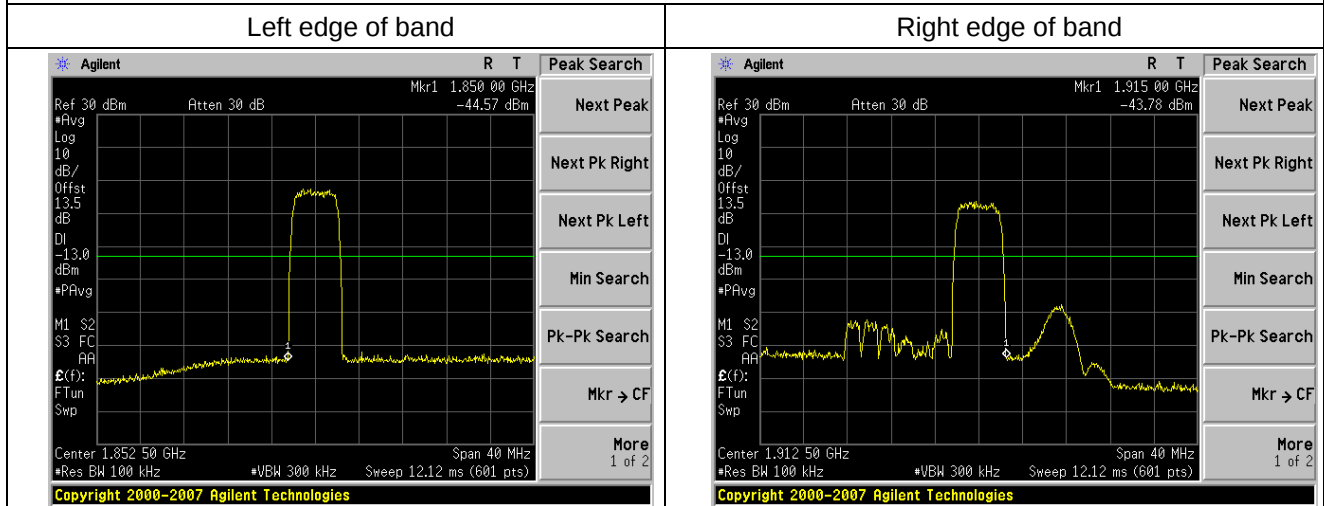


2. Number of Carriers: Four carriers

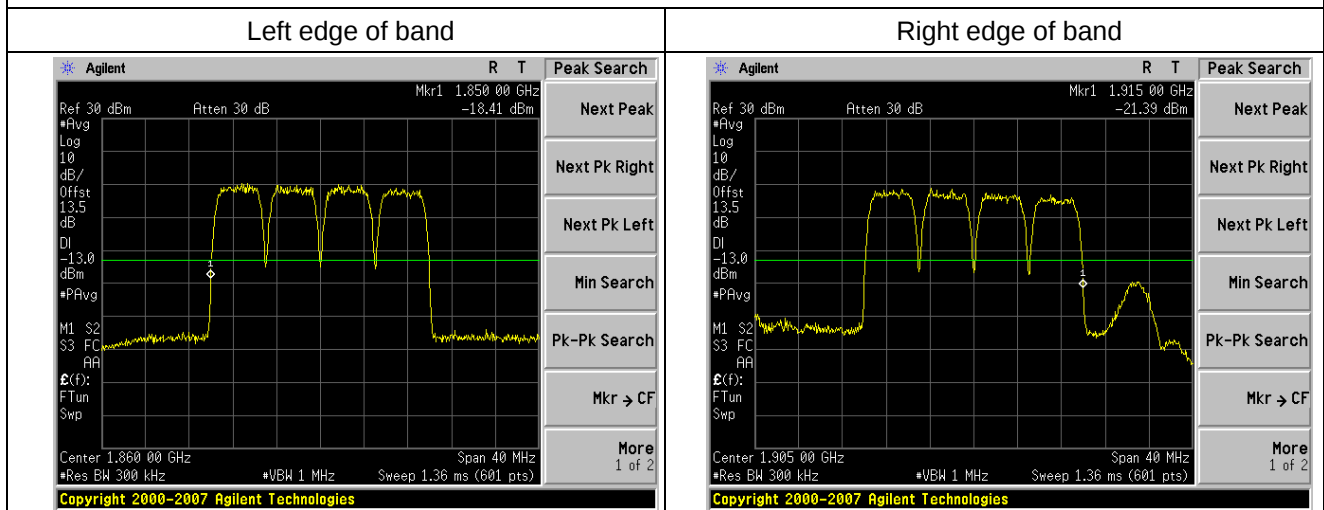


Band edge of WCDMA

1. Number of Carriers: Single carrier



2. Number of Carriers: Four carriers



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 $\geq$ RBW

Spurious emissions:

Below 1G: RBW=100kHz; Above 1G: RBW=1 MHz ; VBW $\geq$ RBW

10.4 Test Result

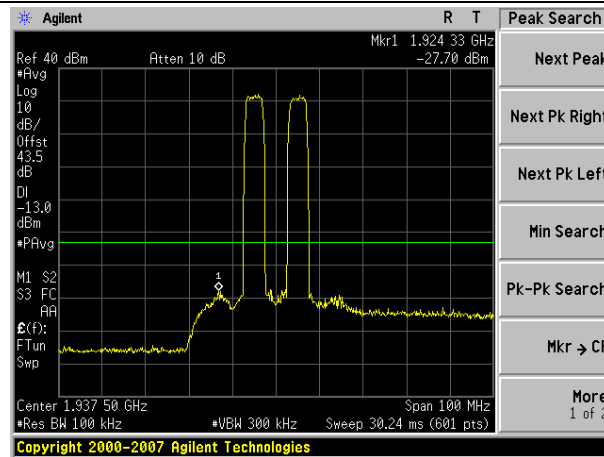
Passed.

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

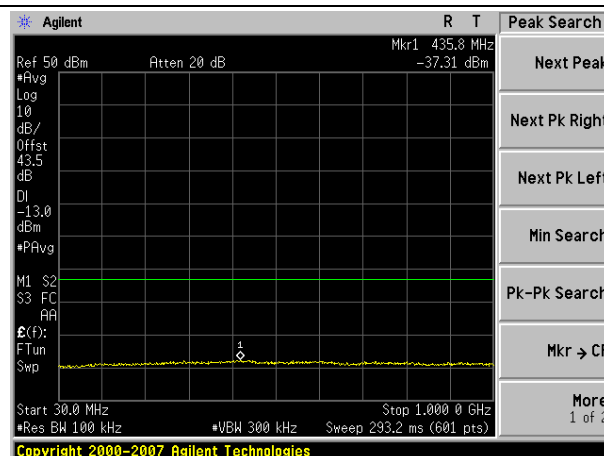
Downlink:

Intermodulation of WCDMA

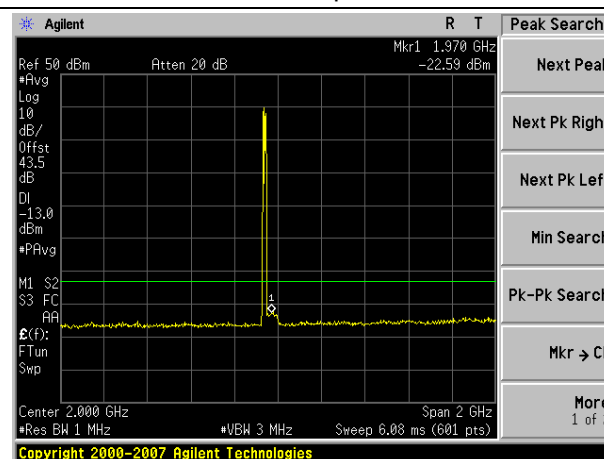
Intermodulation - Low part of band



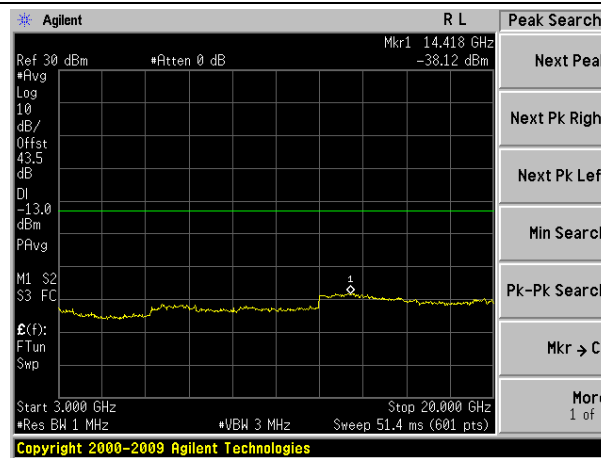
30MHz-1000MHz spurious emissions



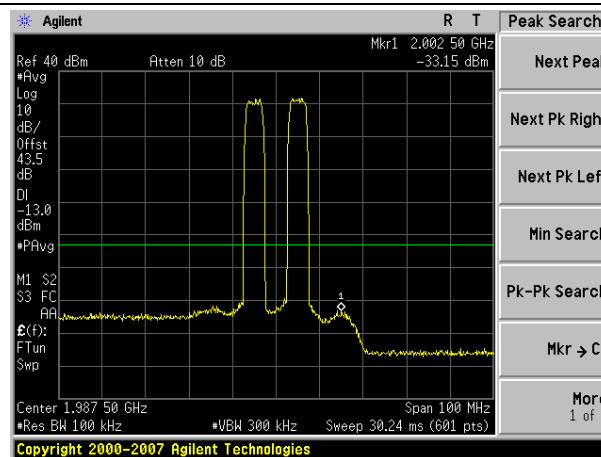
1000MHz-3000MHz spurious emissions



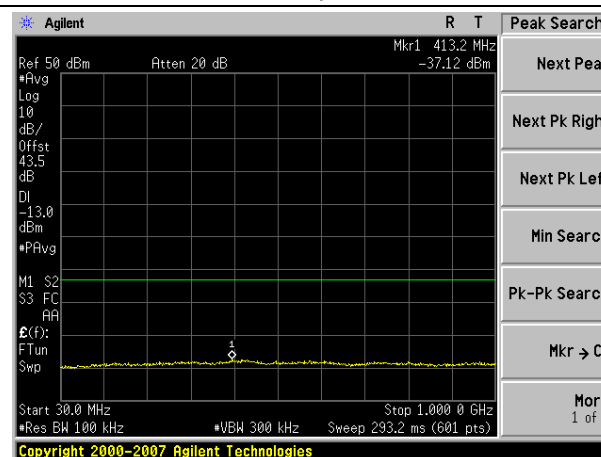
3000MHz-20000MHz spurious emissions



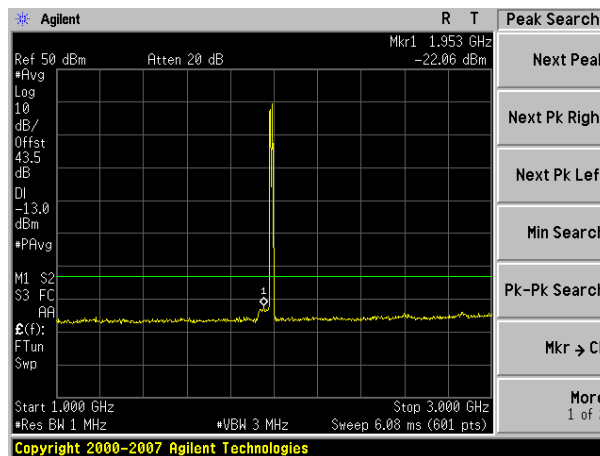
Intermodulation - High part of band



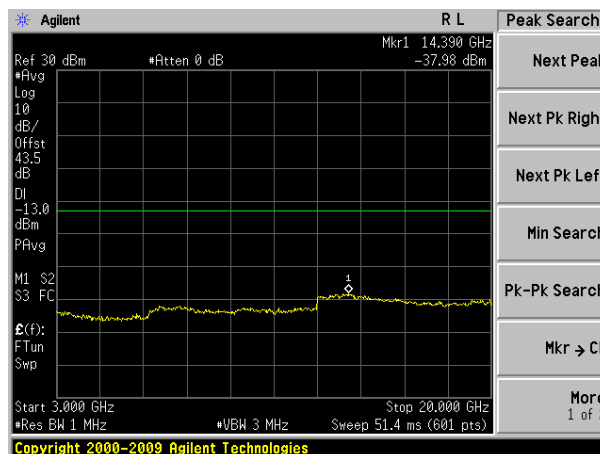
30MHz-1000MHz spurious emissions



1000MHz-3000MHz spurious emissions

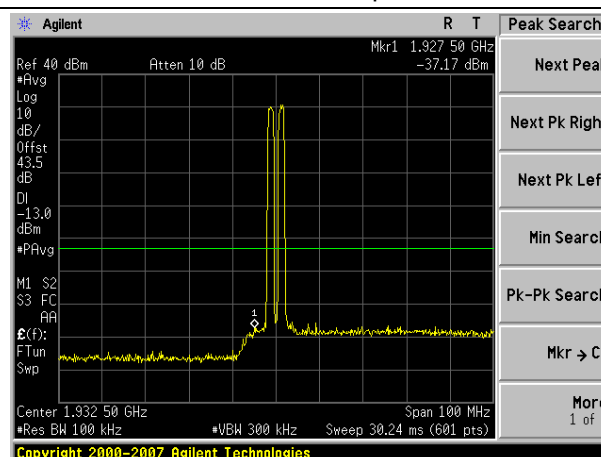


3000MHz-20000MHz spurious emissions

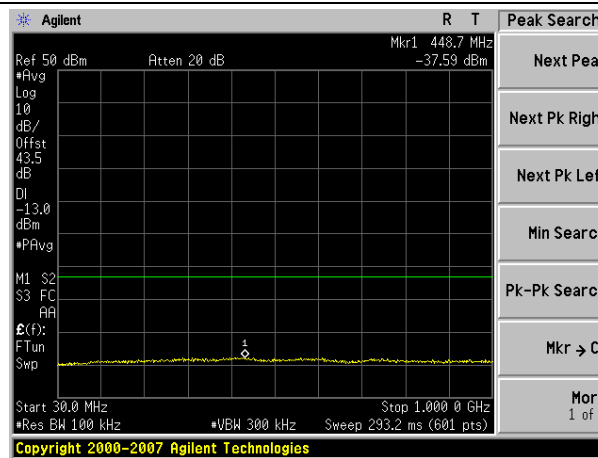


Intermodulation of CDMA

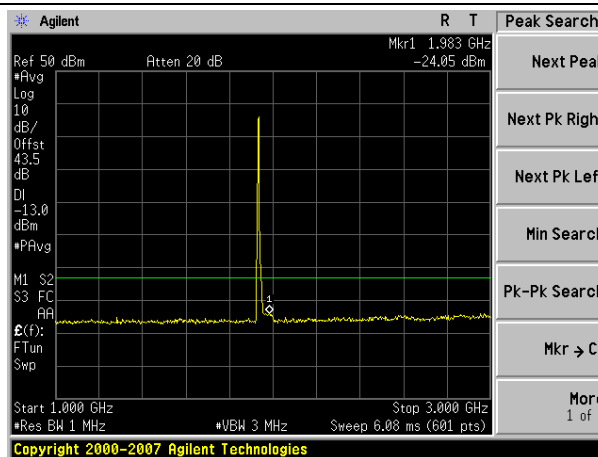
Intermodulation - Low part of band



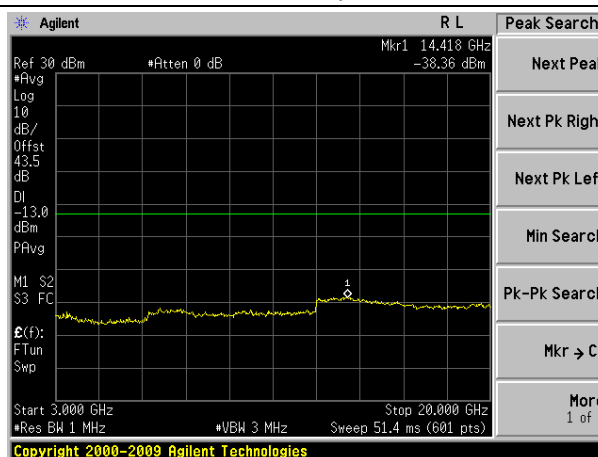
30MHz-1000MHz spurious emissions



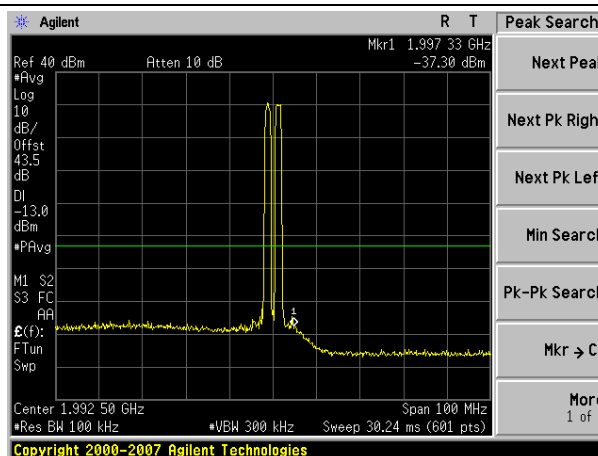
1000MHz-3000MHz spurious emissions



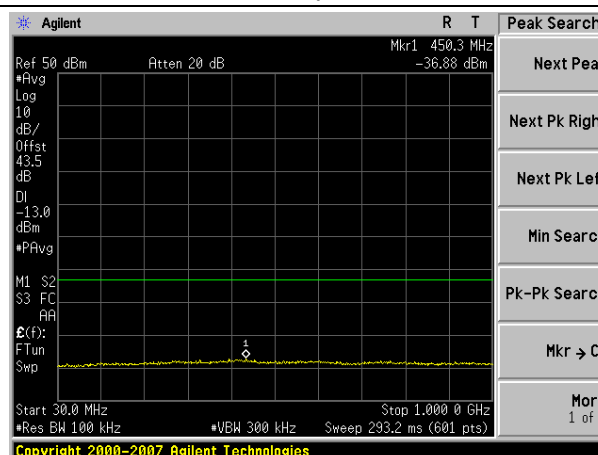
3000MHz-20000MHz spurious emissions



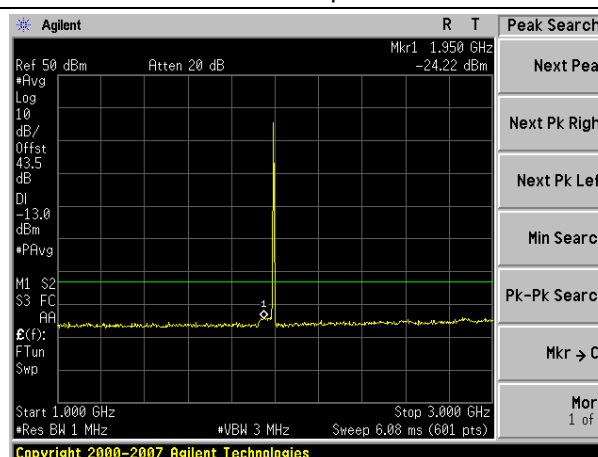
Intermodulation - High part of band



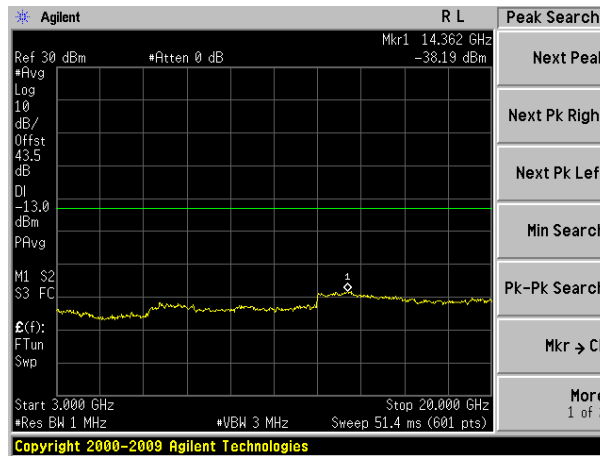
30MHz-1000MHz spurious emissions



1000MHz-3000MHz spurious emissions

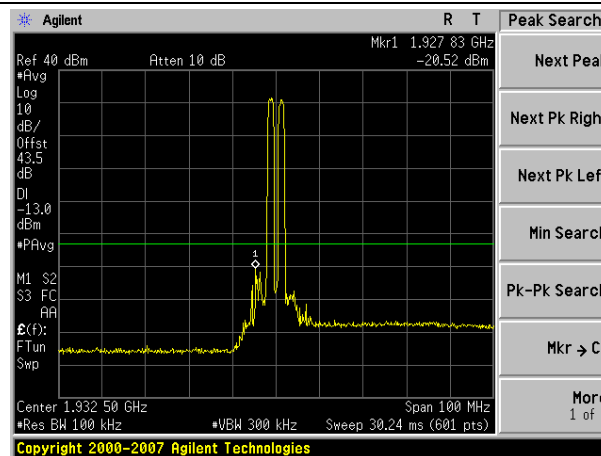


3000MHz-20000MHz spurious emissions

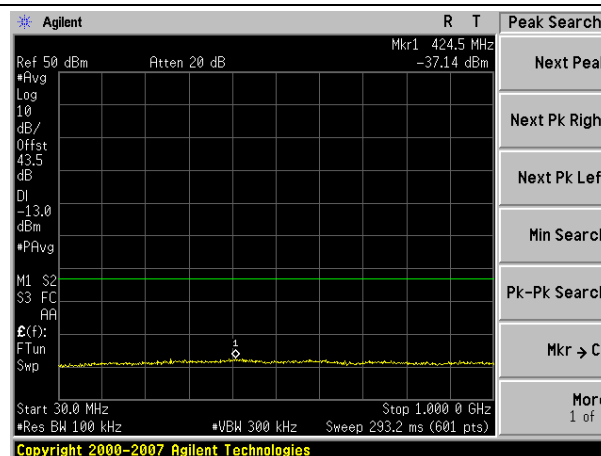


Intermodulation of CDMA EV-DO

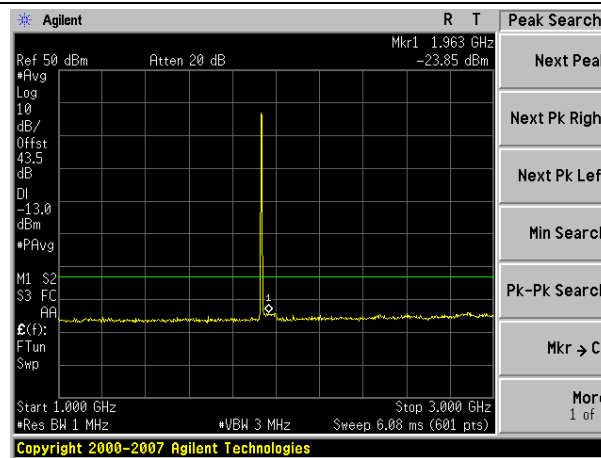
Intermodulation - Low part of band



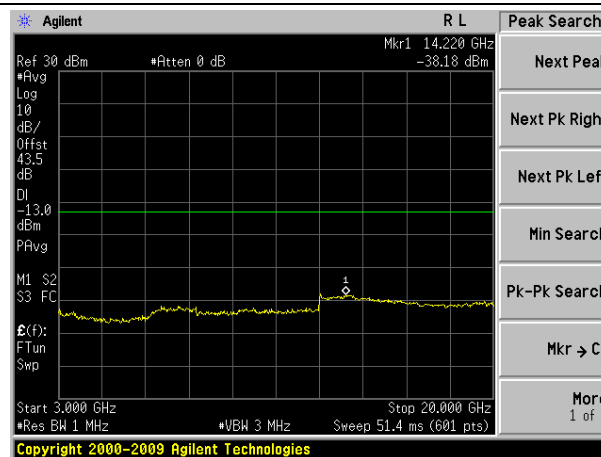
30MHz-1000MHz spurious emissions



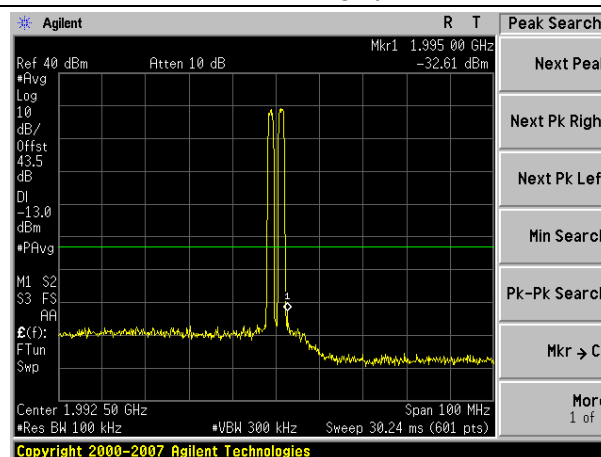
1000MHz-3000MHz spurious emissions



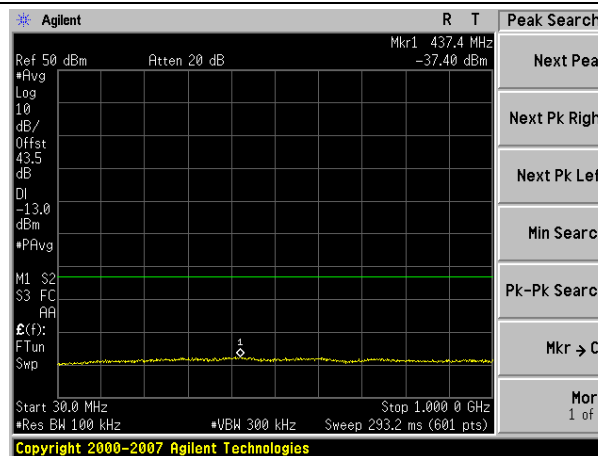
3000MHz-20000MHz spurious emissions



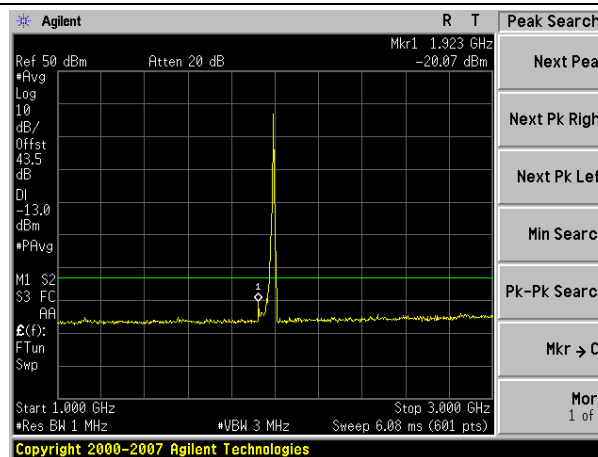
Intermodulation - High part of band



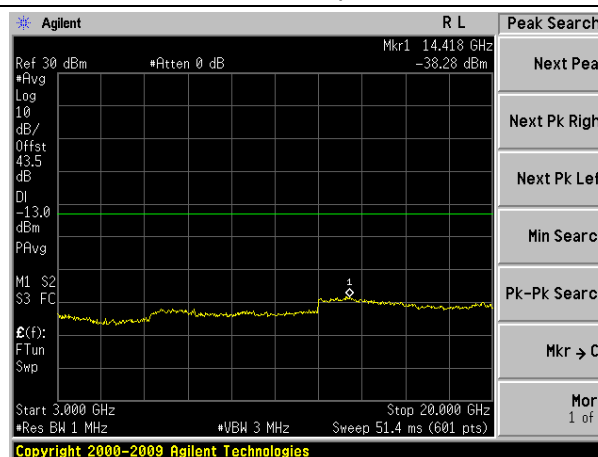
30MHz-1000MHz spurious emissions



1000MHz-3000MHz spurious emissions

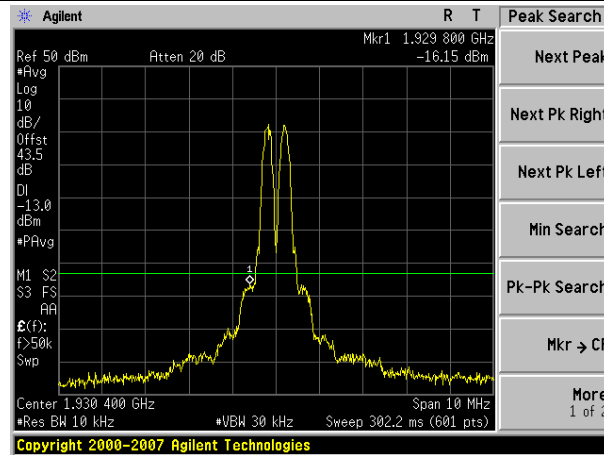


3000MHz-20000MHz spurious emissions

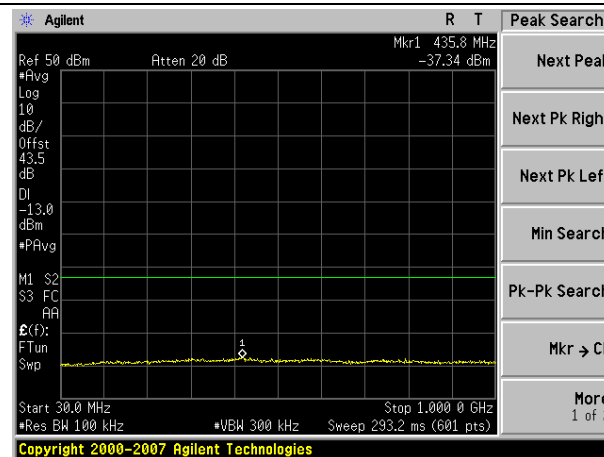


Intermodulation of GSM

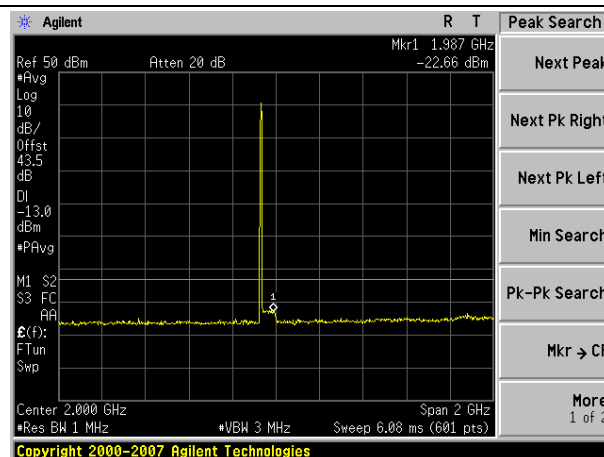
Intermodulation - Low part of band



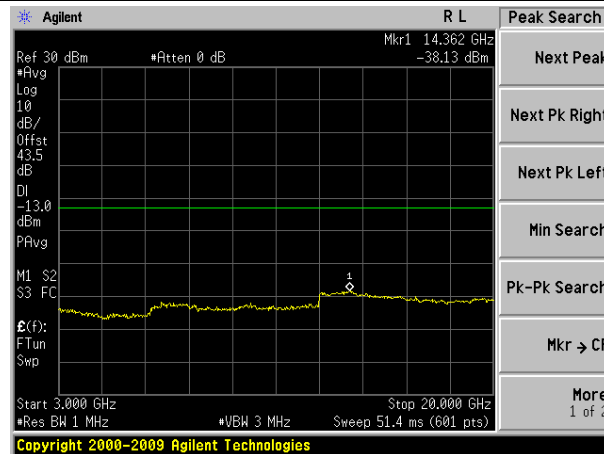
30MHz-1000MHz spurious emissions



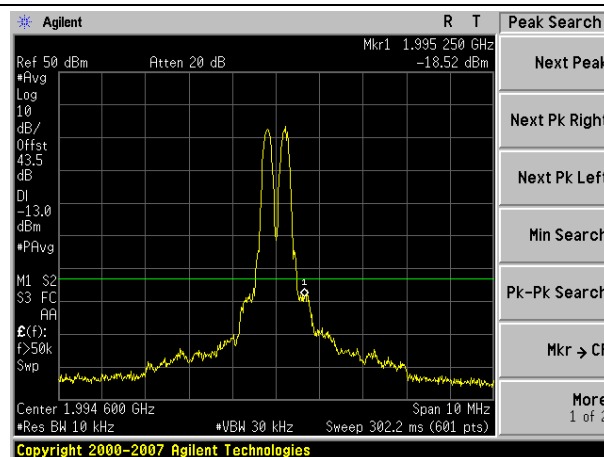
1000MHz-3000MHz spurious emissions



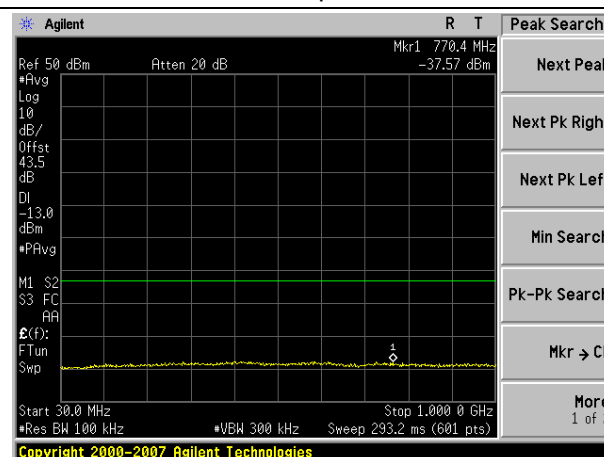
3000MHz-20000MHz spurious emissions



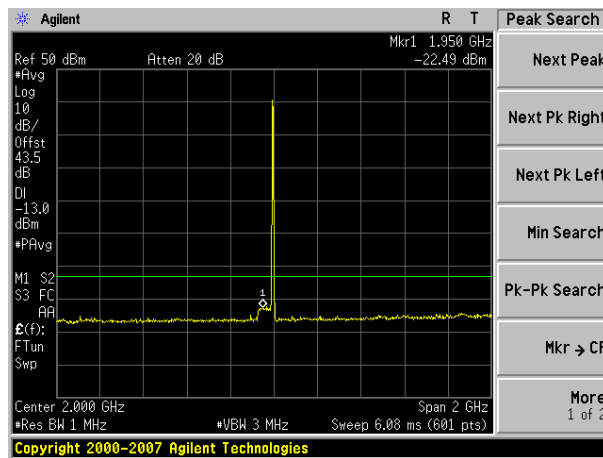
Intermodulation - High part of band



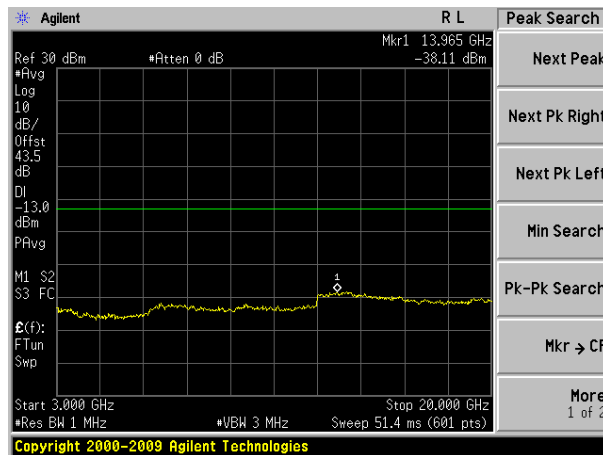
30MHz-1000MHz spurious emissions



1000MHz-3000MHz spurious emissions



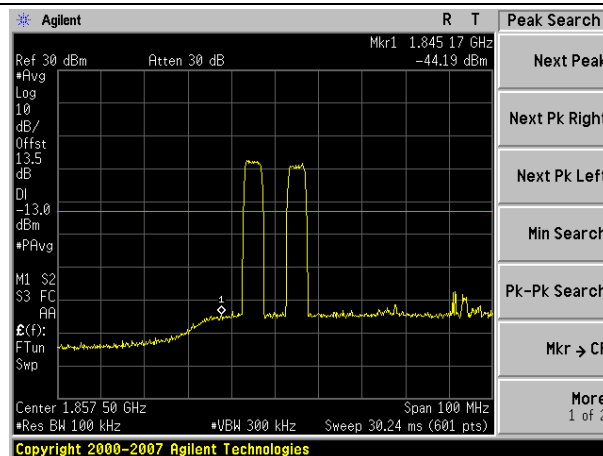
3000MHz-20000MHz spurious emissions



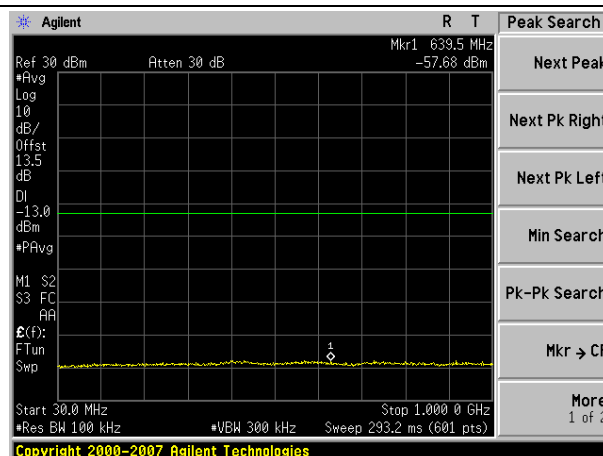
Uplink:

Intermodulation of WCDMA

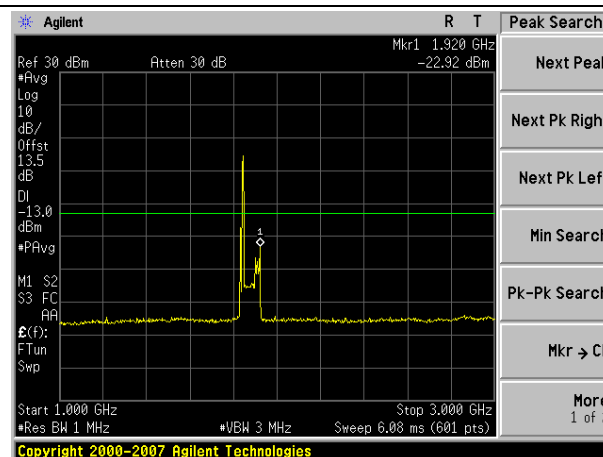
Intermodulation - Low part of band



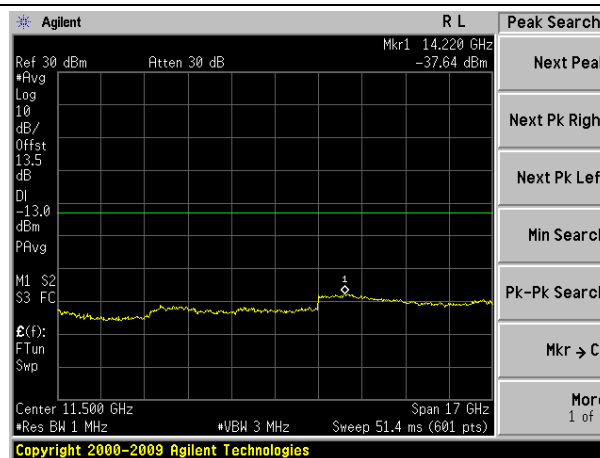
30MHz-1000MHz spurious emissions



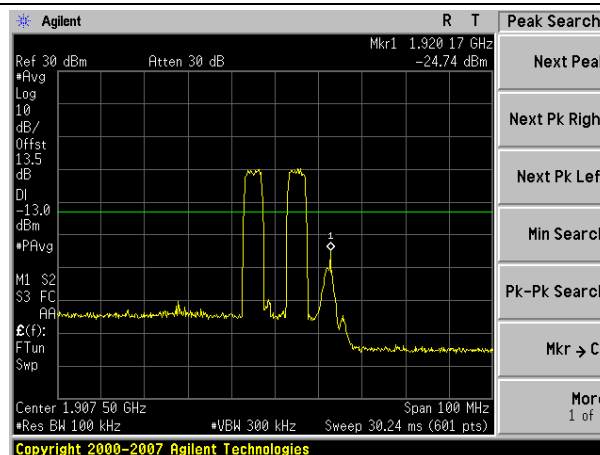
1000MHz-3000MHz spurious emissions



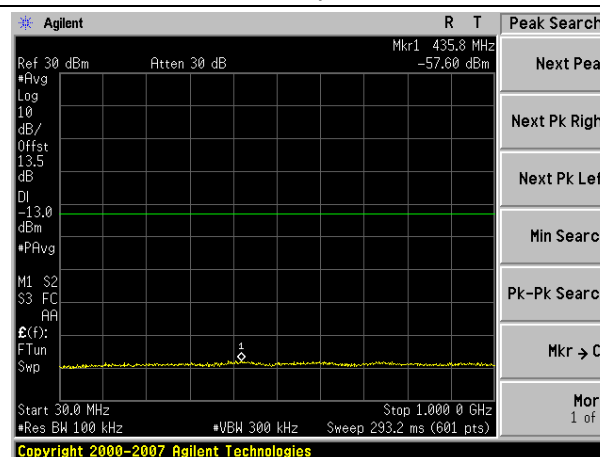
3000MHz-20000MHz spurious emissions



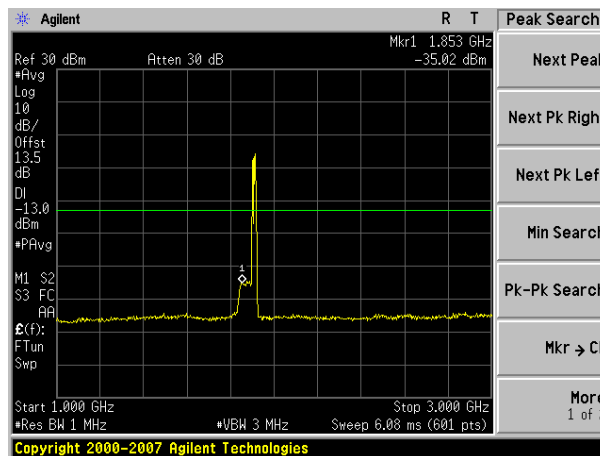
Intermodulation - High part of band



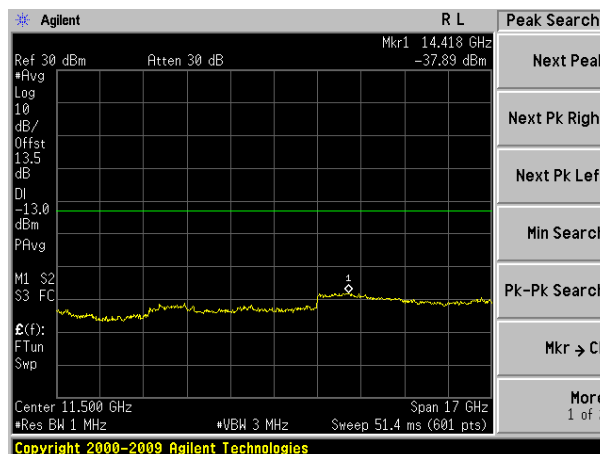
30MHz-1000MHz spurious emissions



1000MHz-3000MHz spurious emissions

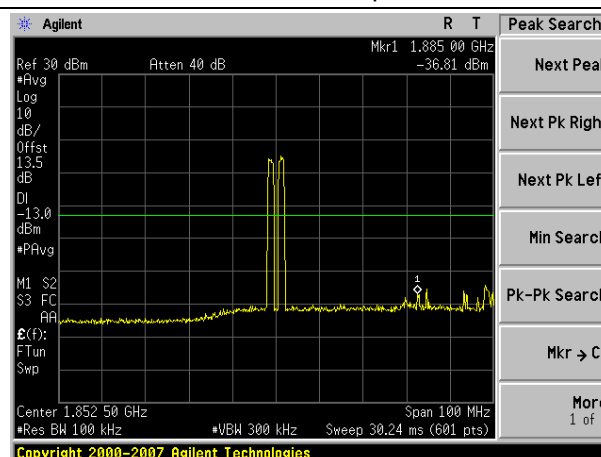


3000MHz-20000MHz spurious emissions

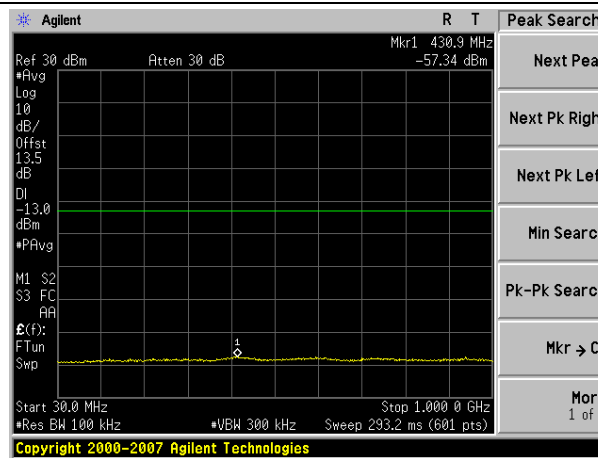


Intermodulation of CDMA

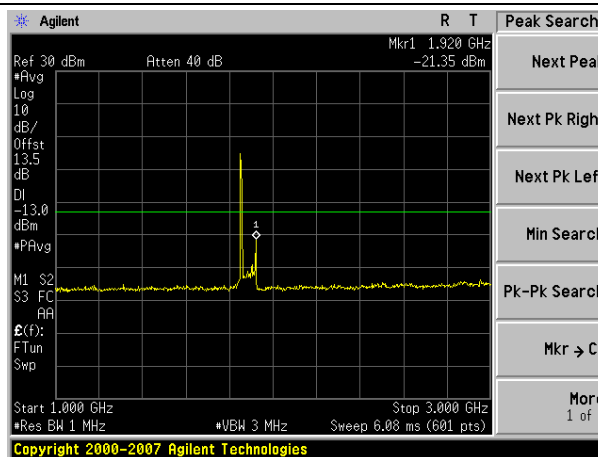
Intermodulation - Low part of band



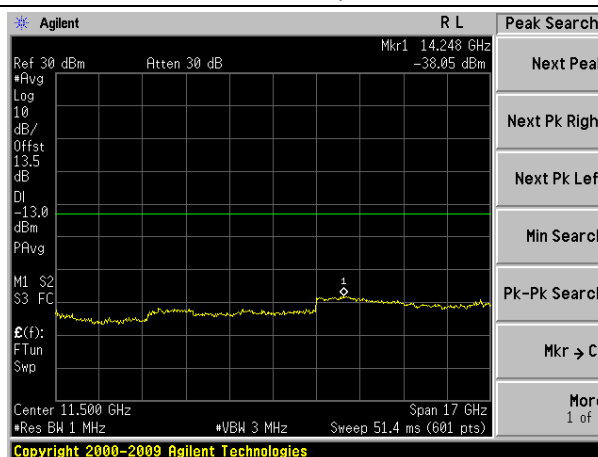
30MHz-1000MHz spurious emissions



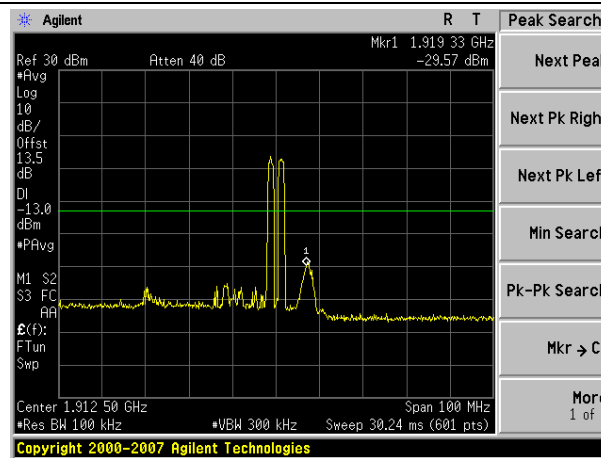
1000MHz-3000MHz spurious emissions



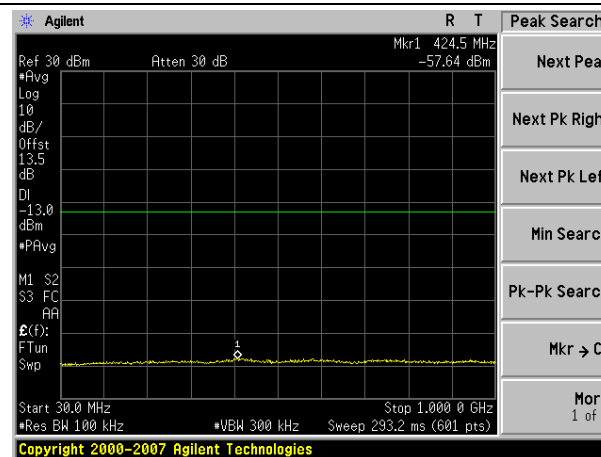
3000MHz-20000MHz spurious emissions



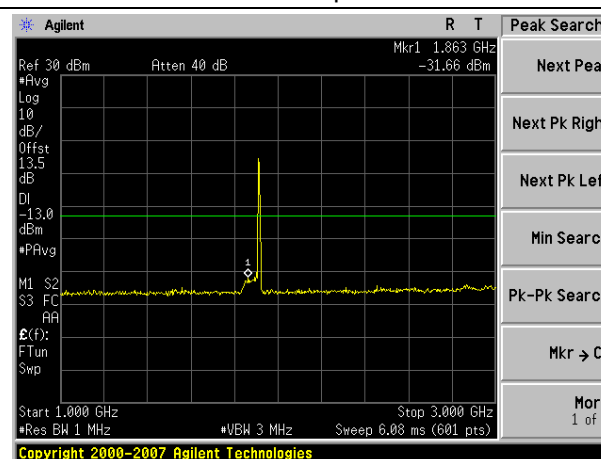
Intermodulation - High part of band



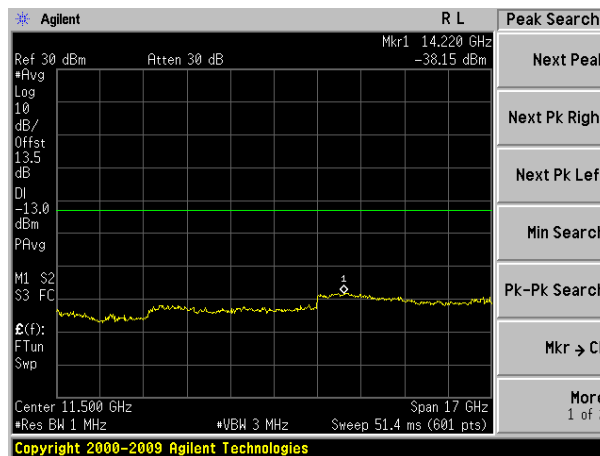
30MHz-1000MHz spurious emissions



1000MHz-3000MHz spurious emissions

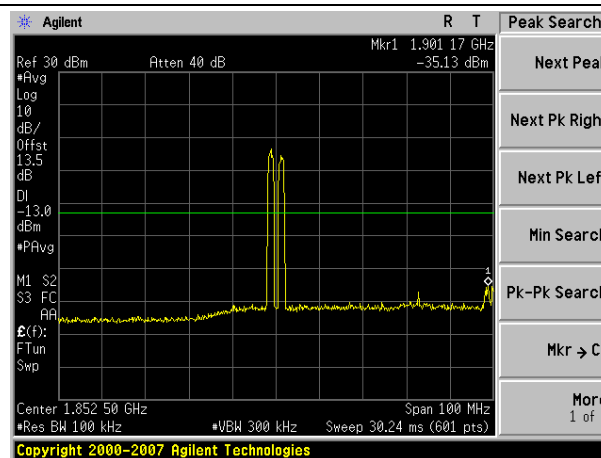


3000MHz-20000MHz spurious emissions

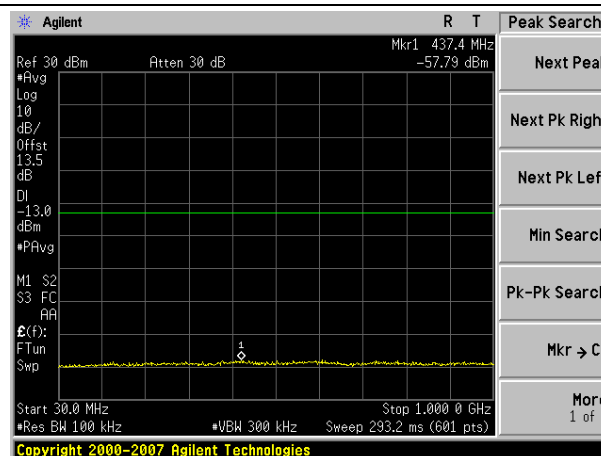


Intermodulation of CDMA EV-DO

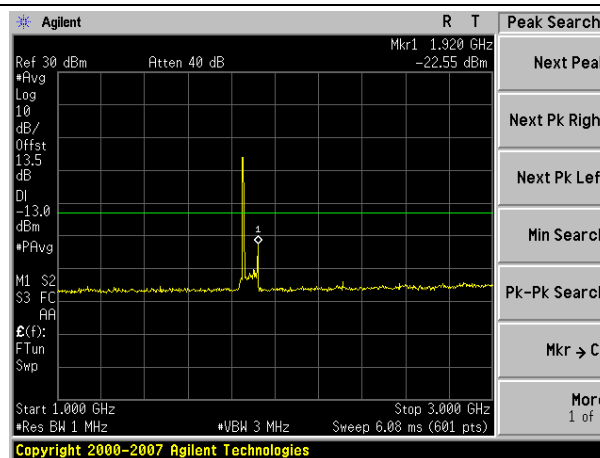
Intermodulation - Low part of band



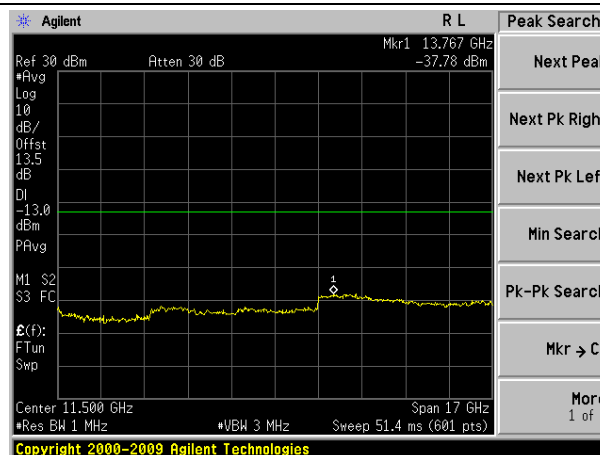
30MHz-1000MHz spurious emissions



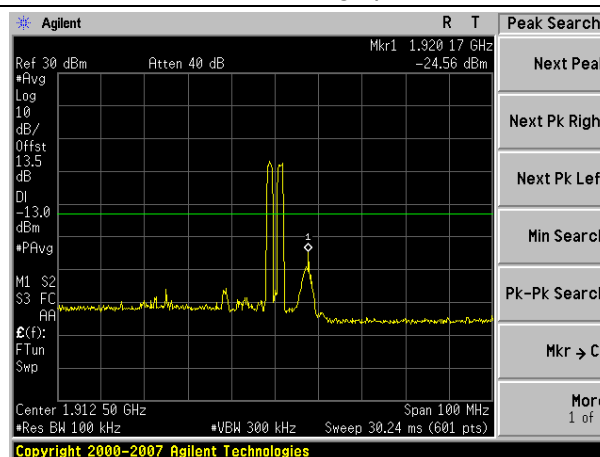
1000MHz-3000MHz spurious emissions



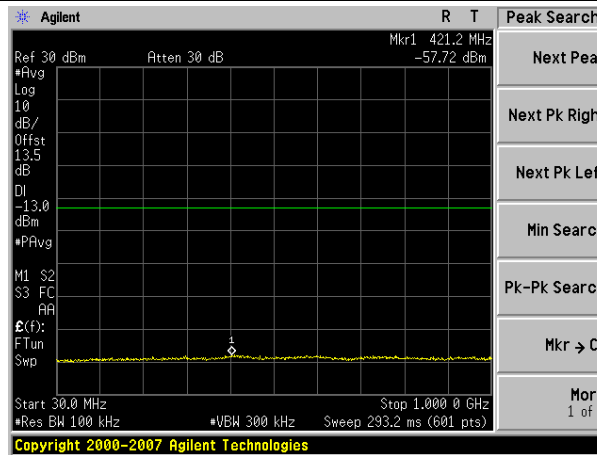
3000MHz-20000MHz spurious emissions



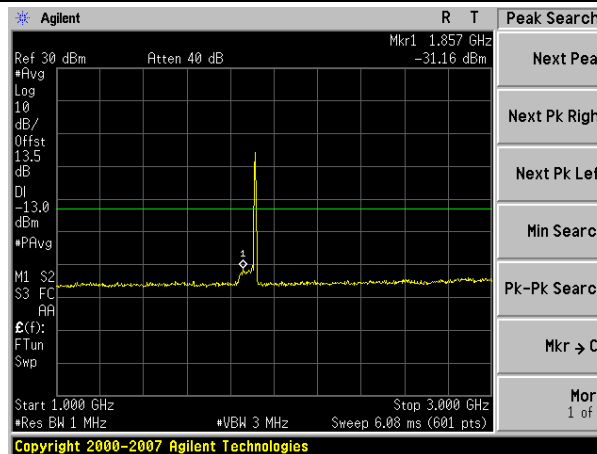
Intermodulation - High part of band



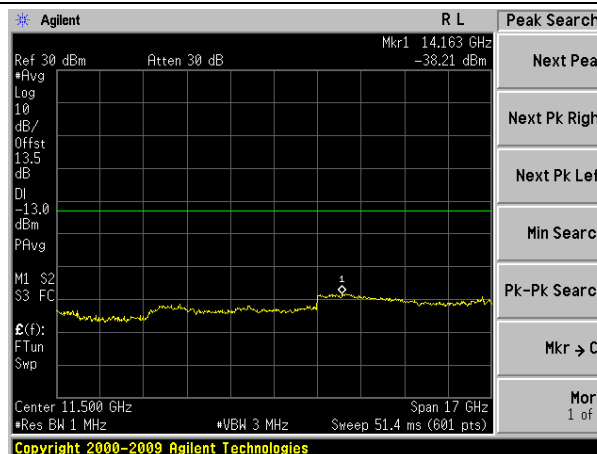
30MHz-1000MHz spurious emissions



1000MHz-3000MHz spurious emissions

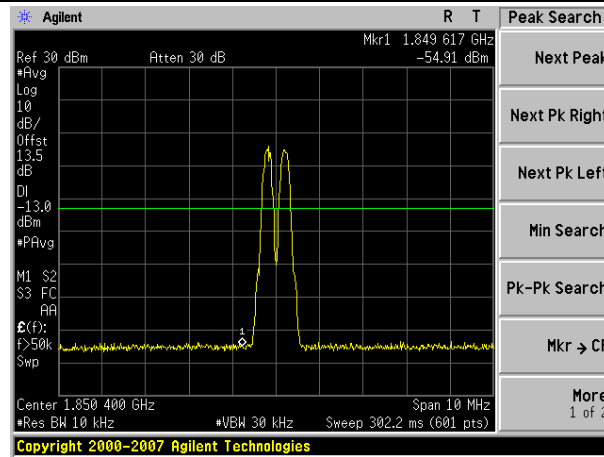


3000MHz-20000MHz spurious emissions

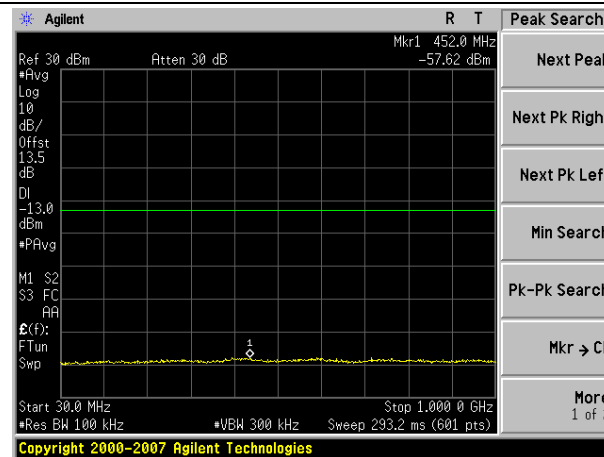


Intermodulation of GSM

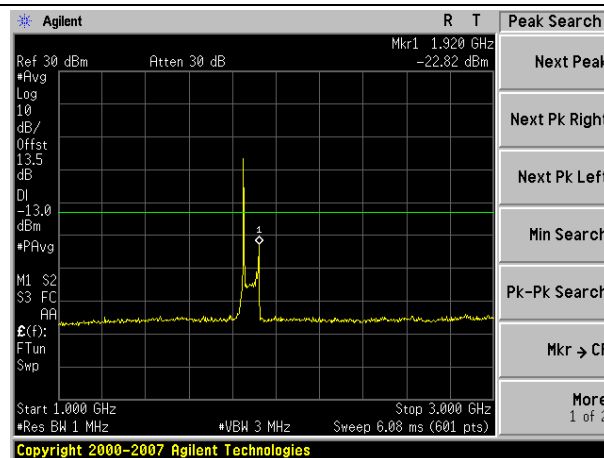
Intermodulation - Low part of band



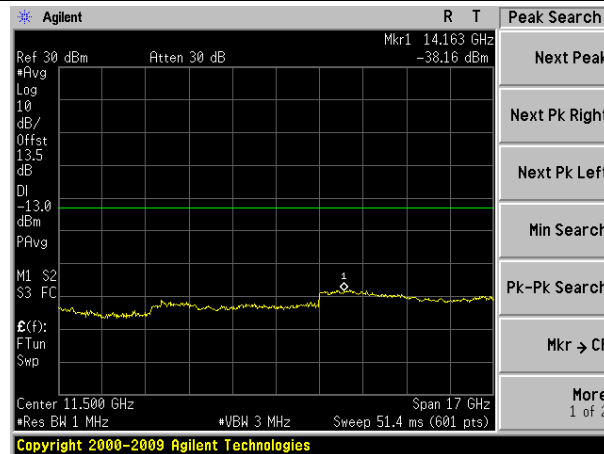
30MHz-1000MHz spurious emissions



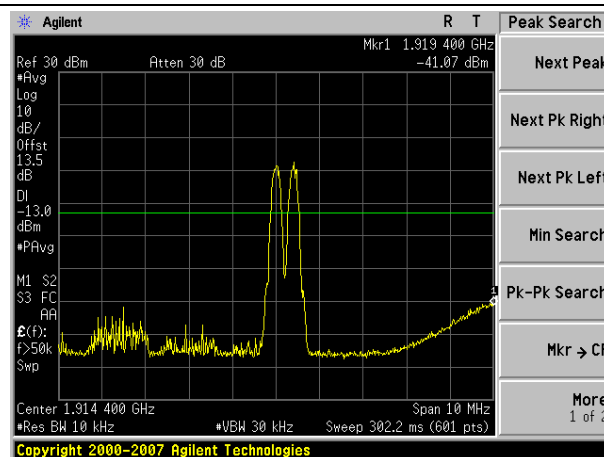
1000MHz-3000MHz spurious emissions



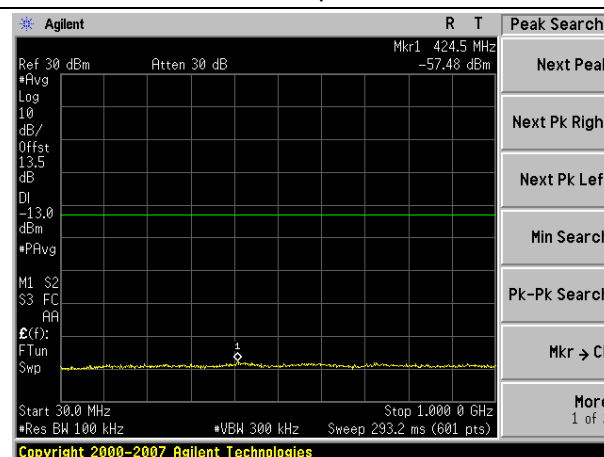
3000MHz-20000MHz spurious emissions



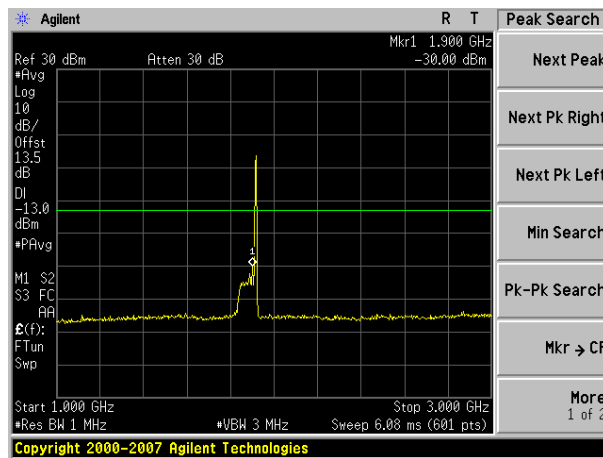
Intermodulation - High part of band



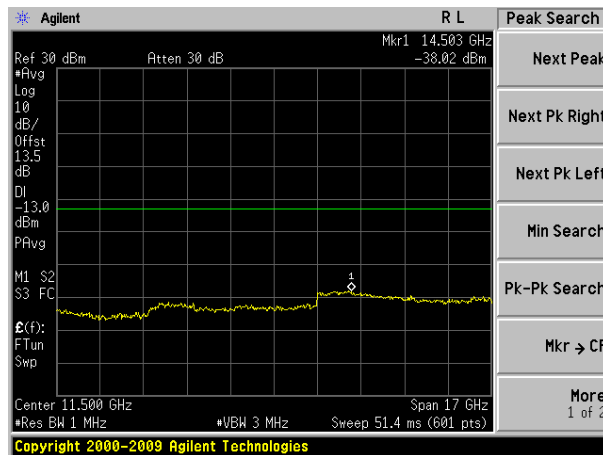
30MHz-1000MHz spurious emissions



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:
$$\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain(dBi)} - \text{Cable Loss (dB)}$$
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 ($h = 1 \dots 4$ 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:	Above 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 (°C)	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 (°C)	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.

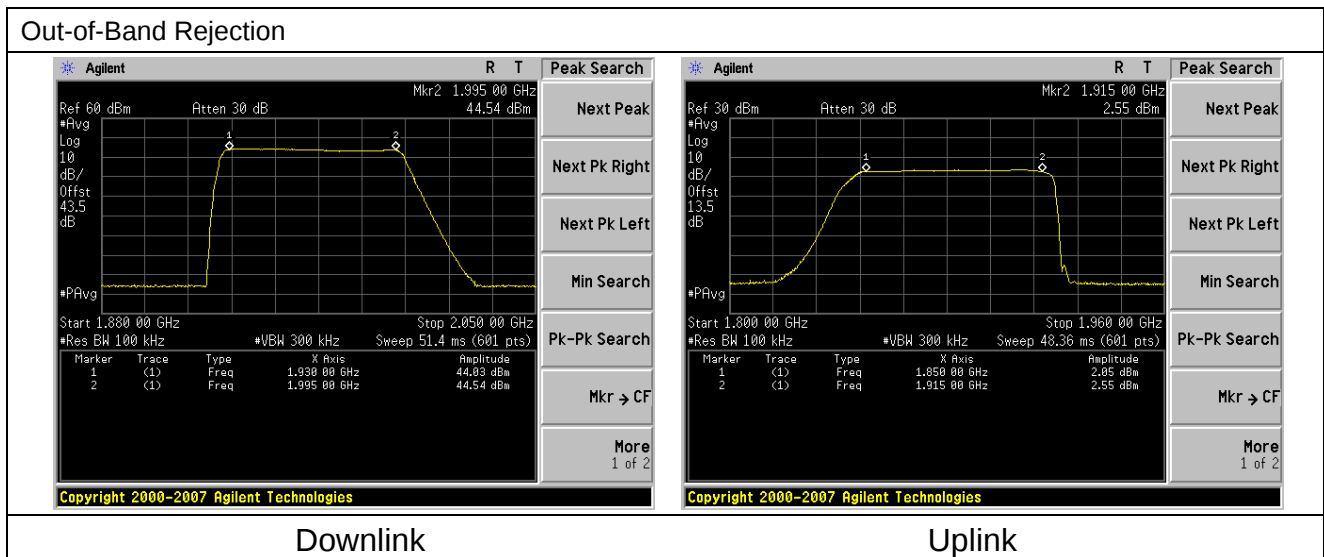
13.2 Test setup

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



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 1.The lower limit shall apply at the transition frequencies 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.

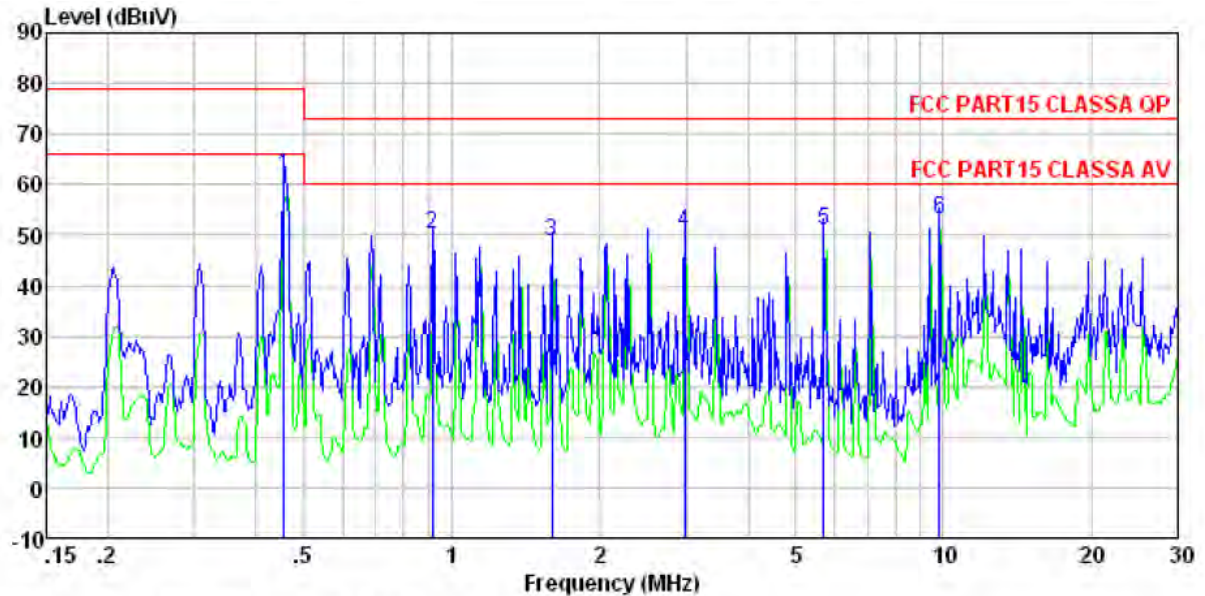
14.3 Test Procedure

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

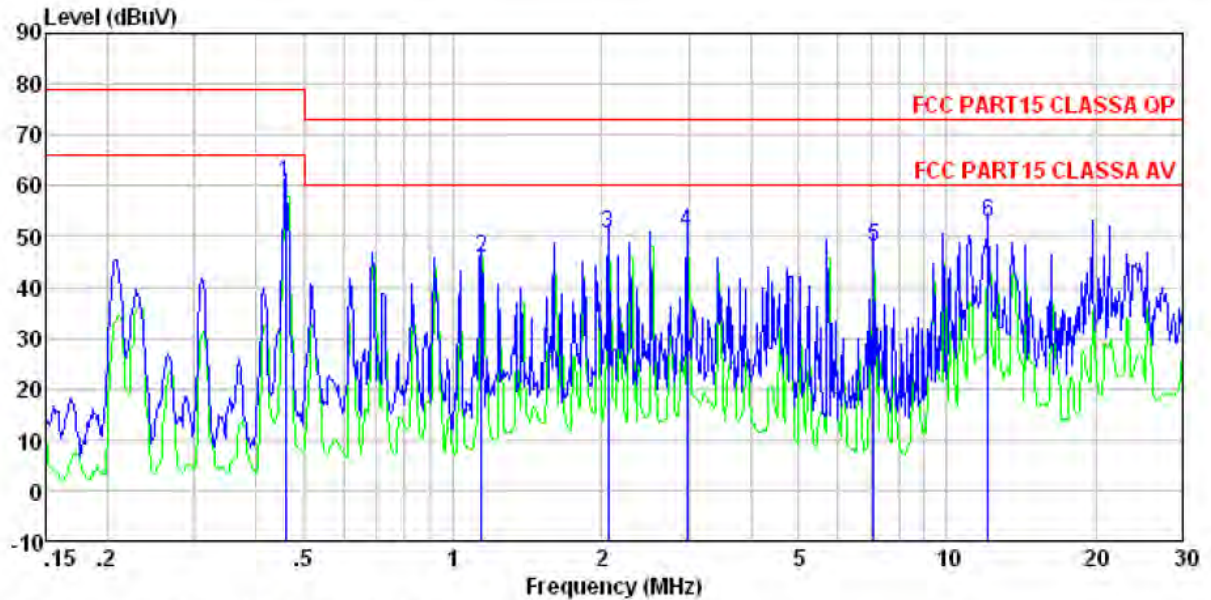
Job No. : 2188RF

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:

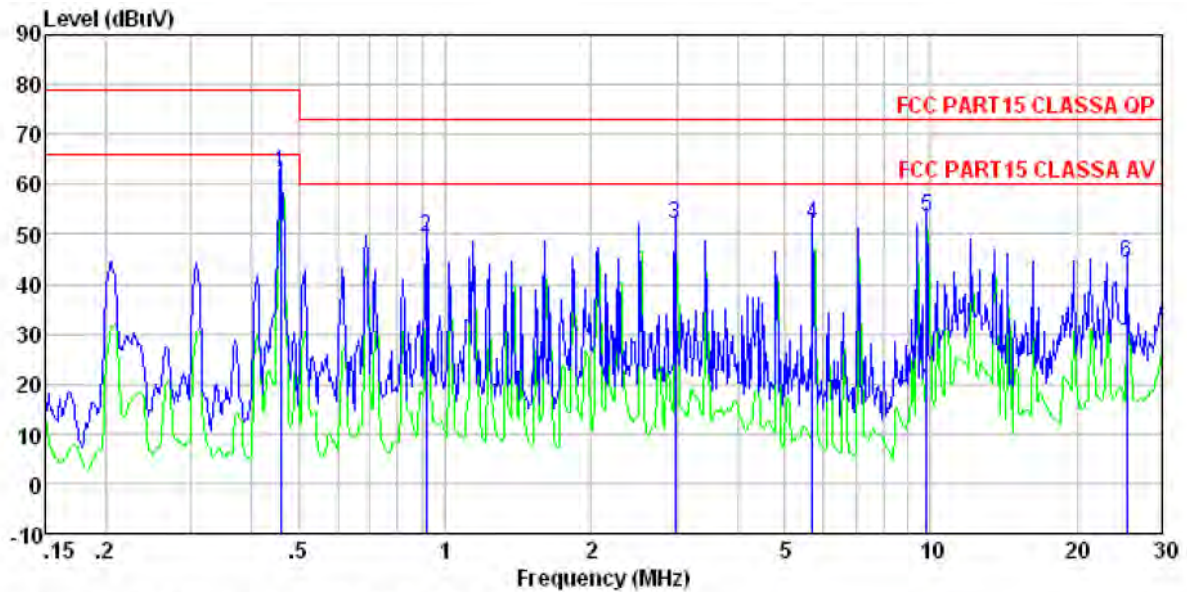


Condition : FCC PART15 CLASSA QP LISN-2013 NEUTRAL
 Job No. : 2188RF
 Test mode : Downlink mode
 Test Engineer: Edward

	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:

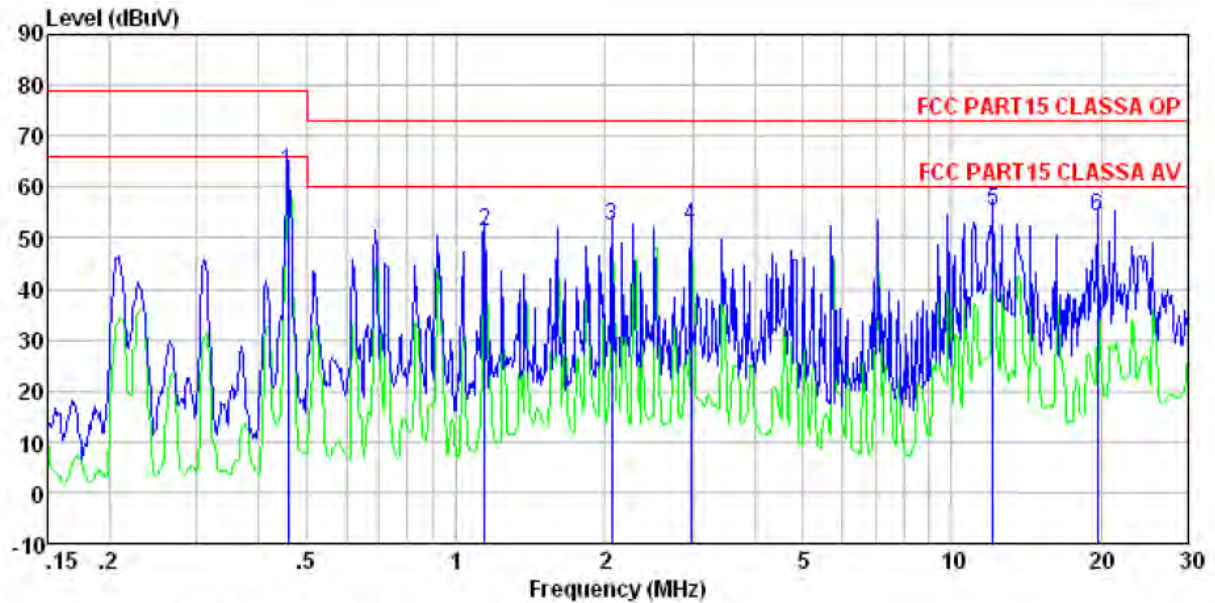
Line:



Condition : FCC PART15 CLASS A 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 CLASS A 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