Electromagnetic Compatibility
Test Report

Test Report No: AVR 080811
Issued on: August 08, 2011

Product Name:
Remote Unit 2308

Tested According to
FCC 47 CFR, Part 24

Tests Performed for
Alvarion Ltd.
21A Habarzel street,P.O.Box 13139 Ramat Hachayal 61131 Tel Aviv, Israel
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ACCREDITED
Electrical Testing
Cert # 1633.01

Test Personnel

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QualiTech EMC Laboratory

Test Report details:

Issued on: 08.08.2011

Assessment information:

This report contains an assessment of the EUT against Electromagnetic Compatibility based upon tests carried out on the samples submitted. The results contained in this report relate only to the items tested. Manufactured products will not necessarily give identical results due to production and measurement tolerances. QualiTech, EMC Lab does not assume responsibility for any conclusion and generalization drawn from the test results with regards to other specimens or samples of type of the equipment represented by test item.

The EUT was set up and exercised using the configuration, modes of operation and arrangements defined in this report only.

Modifications:

Modifications made to the EUT

None.

Modifications made to the Test Standard

None.

Summary of Compliance Status

Test Spec. Clause	Test Case	Remarks
§24.232 (c) & §2.1046	RF Power Output, Conducted	**Pass**
§24.235 & §2.1055	Frequency Stability	**Pass**
§24.238 & §2.1049	Occupied Bandwidth	**Pass**
§24.238 & §2.1053	Out of Band Emissions - radiated	**Pass**
§24.238 & §2.1051	Out of Band Emissions and Inter-modulation – Conducted	**Pass**
§24.238	Block Edge Emissions and Inter-modulation - conducted	**Pass**

Table of Contents

1. General Description

Description of the EUT system/test Item:

Product name: Remote Unit 2308

Model: 2308

EUT Description:

The Remote Unit 2308 resides in the customer's location (home, hotel-room, etc.). The purpose of the Remote Unit 2308 is taking the RF signals that propagated via the cables, convert it to the native wireless frequency and transmit it to the air inside the customer's location. The Remote Unit 2308 connects to the cable outlet and receives power from the electrical grid. The Remote Unit 2308 contains a miniature inverse UDC for frequency conversion, a transmitter and an antenna. The Remote Unit 2308 comes in two power ratings:

- 0 dBm
- 15 dBm

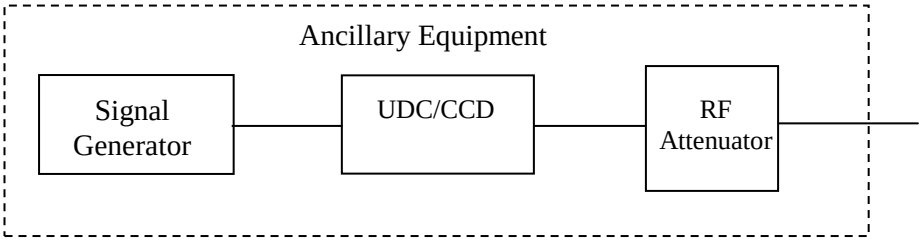
Bands and Modulations:

Mode	Direction	Modulation	Frequency Band	Maximum Output Power
GSM	Downlink	GMSK	1930 - 1990 MHz	15.0 dBm
EDGE	Downlink	8PSK		15.0 dBm
CDMA 2000	Downlink	CDMA 2000		15.0 dBm
CDMA 2000-1xEVDO	Downlink	CDMA 2000-1xEVDO		15.0 dBm

Mode	Direction	Modulation	Frequency Band	Maximum Output Power
GSM	Downlink	GMSK	869 - 894 MHz	15.0 dBm
EDGE	Downlink	8PSK		15.0 dBm
CDMA 2000	Downlink	CDMA 2000		15.0 dBm
CDMA 2000-1xEVDO	Downlink	CDMA 2000-1xEVDO		15.0 dBm

Ancillary Equipment

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational features to the EUT.
The system was configured in a typical fashion, as it would be normally used. However, the ancillary equipment can influence the test results.



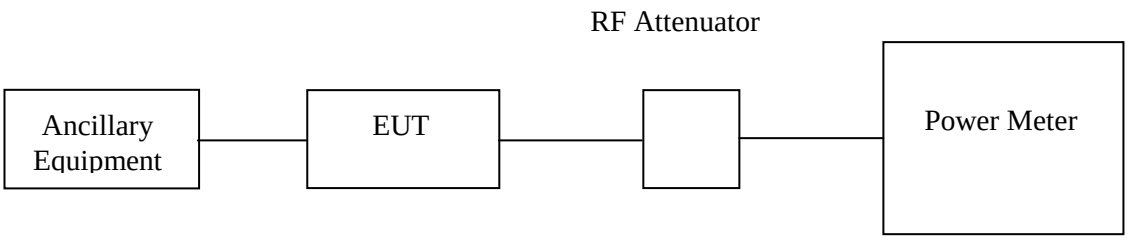
2. Method of Measurements

2.1. Conducted RF Power Output Measurements:

The ancillary equipment is configured to generate continuous signals with PRBS data modulation.

The transmitter output was connected to the Peak Power Meter via an RF attenuator, and the output power of the EUT was adjusted to be 15dBm as this was the maximum expected output power for all frequencies and modulations including system tolerance.
EIRP Emission [dBm] = Measured [dBm] - Cable Loss [dB] + Substitution Antenna Gain [dBi]
ERP can be calculated from EIRP by subtracting 2.1dBi

Test Setup # 2.1



2.2. Radiated Out of Band Emissions Measurements:

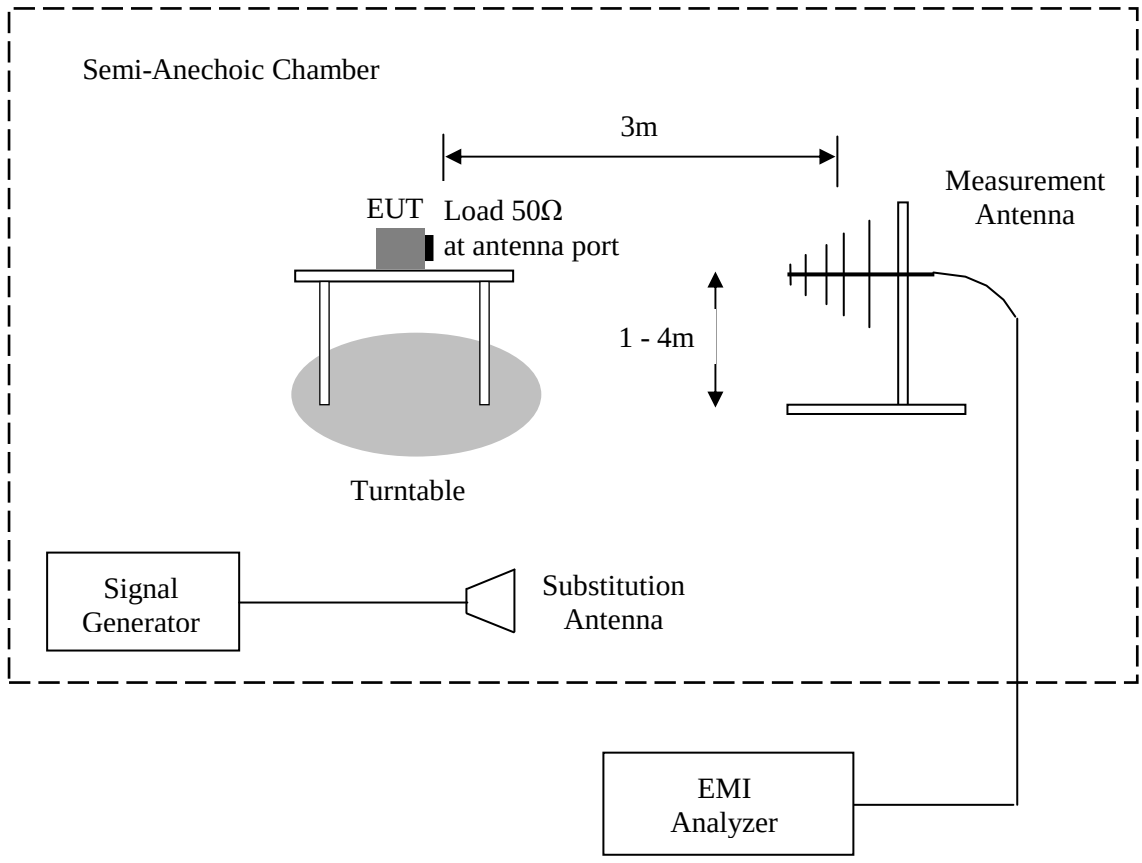
The ancillary equipment was configured to generate CW signals, and the output power of the EUT is adjusted to be 15dBm.

The antenna output was terminated with 50 Ω load and measurements made to detect spurious emissions that may radiate directly from the cabinet, control circuit, power leads under normal conditions of installation and operation.

The spectrum was investigated from 30MHz to the 10th harmonic of the highest frequency generated within the EUT, which is the transmitted carrier that can be as high as 1990MHz. For each spurious frequency, the antenna mast was raised and lowered from 1 to 4 meters and the turntable is rotated 360degrees to obtain a maximum reading on the spectrum analyzer. The maximum reading was recorded. The amplitude of spurious emissions which are attenuated more than 20dB below the permissible value need not be reported. Radiated emissions measurements are made at the upper, mid, and lower carrier frequencies of the 850/1900 bands.

After all spurious emissions were recorded; the antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The EUT was replaced with a substitution antenna with a known gain, fed by a signal generator, in accordance to TIA/EIA 603. With the signal generator tuned to a particular spurious frequency, the antenna mast was raised and lowered from 1 to 4 meters to obtain a maximum reading on the spectrum analyzer. The signal source level was adjusted to repeat the previously measured level. The power readings in dBm should be corrected for the cable loss, and compared to the §24.238 limits.

EIRP Peak Power [dBm] = Measured [dBm] - Cable Loss [dB] + Substitution Antenna Gain [dBi]
ERP can be calculated from EIRP by subtracting 2.1dBi.



2.3. Conducted Spurious Emissions at antenna terminal Measurements:

The ancillary equipment was configured to generate continuous signals with PRBS data modulation, and the output power of the EUT was adjusted to be 15dBm.

The transmitter output was connected to the input of the Spectrum analyzer through an attenuator. The external attenuators and cable loss were added to the reading.

For spurious emissions measurement, the spectrum from the lowest radio frequency generated in the equipment up to the 10^{th} harmonic of the carrier frequency, rounded to 20GHz was investigated with the transmitter set to the lowest, middle and highest channel frequencies.

For Block Edge measurements in 1MHz bands immediately outside and adjacent to the frequency block, conducted emissions were measured using a RBW of at least 1% of the occupied BW.

For inter-modulation measurements, two modulated signals were combined and injected at the EUT input. Both signals were set to be equal at maximum drive level (15dBm at the output). The signals were chosen and spaced so that will potentially produce both in-band and out-of-band 3^{rd} order inter-modulation products.

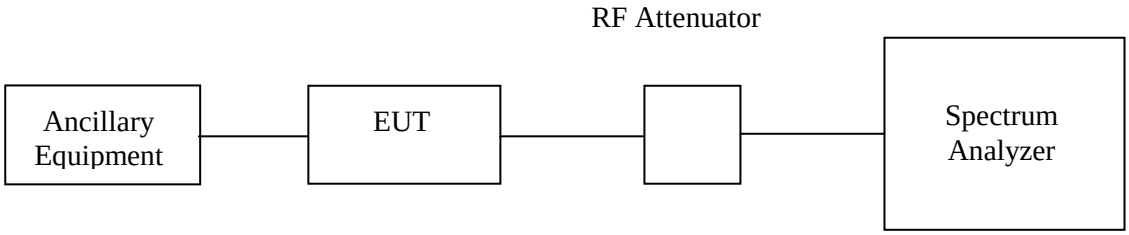
The spectrum analyzer was set to 30 kHz RBW and 300 kHz VBW. One carrier was set at the band edge and the other spaced 200 kHz for GSM and Edge and 1.25MHz for IDMA & 1xEVDO.

	f_1 [MHz]	f_2 [MHz]	Potential 3^{rd} Order IM	
			In-band [MHz]	Out-of-band [MHz]
CDMA	1930.7	1931.95	1929.45	1933.2
CDMA	1989.8	1930.4	1990.55	1986.8
GSM & EDGE	1930.2	1930.4	1930	1930.6
GSM & EDGE	1989.8	1989.6	1930	1989.4

2.4. Occupied BW Measurements:

The transmitter output was connected to the input of the Spectrum analyzer through an attenuator.
The ancillary equipment was configured to generate continuous signals with PRBS data modulation, and the output power of the EUT was adjusted to be 15dBm. The modulated spectrum of the output was measured and compared to the input modulated spectrum.

The RBW was set to be at least 1% of the Emission BW. Peak detector was used to capture the emission. The Occupied BW between -26dBc points and also the 99% power BW were measured using the built in Occupied BW Measurements function.



2.5. Frequency stability measurements:

2.5.1 Frequency Stability with Voltage Variation:

The EUT **was** placed in an environmental chamber and allowed to stabilize at +20°C for at least 15 minutes. The spectrum analyzer and signal generator is phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. With the voltage input to the EUT set to 85% of nominal voltage, the transmitter carrier output frequency was measured in 1 minute intervals for a period of 5 minutes. This procedure was repeated at 115% of nominal voltage.

2.5.2 Frequency Stability with Temperature Variation:

The input voltage to the EUT was set to nominal voltage and the temperature of the environmental chamber was varied in 10 degree steps through the range -20°C to +50°C. The transmitter carrier output frequency was measured within 1 minute after powering up, at intervals of 1 minute thereafter, until 10 minutes have elapsed (or until sufficient measurements is obtained to indicate clearly that the frequency has stabilized, whichever time period is greater).

3. Test Facility & Uncertainty of Measurement

3.1. Accreditation/ Registration reference:

- *A2LA Certificate Number: 1633.01*

3.2. Test Facility description

The tests were performed at the EMC Laboratory, QualiTech Division, ECI Telecom Group

Address: 30, Hasivim St., Petah Tikva, Israel.
Tel: 972-3-926-8443

3m Anechoic Chamber:

The 3m-screened chamber is used in two configurations: the semi-anechoic configuration for Radiated Emission measurements and the full-anechoic configuration for Radiated Immunity tests.

Semi Anechoic Configuration:

Measurement distance	3m
Chamber dimensions	9.5m x 6.5m x 5.2m
Antenna height	1 - 4m
Shielding Effectiveness	Magnetic field ≥80dB at 15 kHz ≥90dB at 100 kHz Electric field >120dB from 1MHz to 1GHz >110dB from 1GHz to 10GHz
Absorbing material	Ferrite tiles on the walls and ceiling Frankonia hybrid absorbing material in selected positions on the walls
Normalized Site Attenuation measured at 5 positions	±3.49dB, 30MHz to 1GHz
Transmission Loss measured at 5 positions, at 1.5m height	±3dB, 1GHz to 18GHz

Full-Anechoic Configuration:

Measurement distance	3m
Chamber dimensions	7m x 4m x 3m
Antenna height	1.55m at Horizontal & Vertical polarizations
Shielding Effectiveness	Magnetic field ≥80dB at 15 kHz ≥90dB at 100 kHz Electric field >120dB from 1MHz to 1GHz >110dB from 1GHz to 10GHz
Absorbing material	Ferrite tiles on the walls and ceiling Frankonia hybrid absorbing material in selected positions on the walls and floor
Field Uniformity to EN61000-4-3	±3dB 80MHz to 18GHz

4. FCC 47 CFR, Part 24 Report of Measurements and examinations

4.1. RF Power Output, Conducted Measurements

Reference document:	**47 CFR §24.232 (c) & §2.1046**		
Limit:	Mobile/portable stations are limited to 2 watts EIRP peak power		
Test setup:	See sec 2.1	**Pass**	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	-	

Test results:

The output power was adjusted to be 15dBm as this is the maximum expected output power for all frequencies and modulations including system tolerances.

EIRP Peak Power [dBm] = Measured [dBm] - Cable Loss [dB] + Substitution Antenna Gain [dBi]
ERP can be calculated from EIRP by subtracting 2.1dBi.
Prediction for part 24 (max antenna gain for mobile operations)
Maximum conducted peak power:15 dBm
Highest admissible antenna gain for 1900 MHz mobile operation (@20cm) where no routine evaluation is required according § 2.1091(c) and § 24.232 for P= 2W EIRP
G=10log2000mW[EIRP]-15dBm =18.010 dBi

In order to meet OET Bulletin 65 requirements the highest admissible antenna gain for 1900 MHz band is 17 dBi

4.2. Frequency stability

Reference document:	**47 CFR §24.235 & §2.1055**		
Test Requirements:	The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.		
Test setup:	See Sec. 2.5	**Pass**	
Method of testing:	Conducted		
Operating conditions:	Under normal and extremes test conditions		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	-	

Test results

AFC Frequency error vs. Voltage

Voltage [Vdc]	Frequency Error [Hz]	Frequency Error [%]	Frequency Error [ppm]	Limit [ppm]	Test Result
Carrier frequency at 22°C (115 VAC): 1960 MHz					
93.5-138	No Frequency Error observed				Pass

AFC Frequency error vs. Temperature

Temperature [°C]	Frequency Error [Hz]	Frequency Error [%]	Frequency Error [ppm]	Limit [ppm]	Margin [ppm]
Carrier frequency at 22°C (115 VAC): 1960 MHz					
-20	-30	-0.00000153	-0.015	2.5	-2.485
-10	-50	-0.00000255	-0.026	2.5	-2.474
0	-25	-0.00000128	-0.013	2.5	-2.487
10	25	0.00000128	0.013	2.5	-2.487
20	25	0.00000128	0.013	2.5	-2.487
30	50	0.00000255	0.026	2.5	-2.474
40	50	0.00000255	0.026	2.5	-2.474
50	50	0.00000255	0.026	2.5	-2.474

4.3. Occupied Bandwidth

Reference document:	**47 CFR §24.238 & §2.1049**		
Test Requirements:	The occupied bandwidth that is the frequency bandwidth outside of which all emission are attenuated at least 26 dB below the transmitter power (99% power per §2.1049).		
Test setup:	See sec 2.4	**Pass**	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 3kHz/30kHz, VBW: 3kHz/300kHz		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.3.1 to Plot 4.3.24	

Test results:

Modulation: CDMA 2000

Channel	Frequency [MHz]	-26dBc Occupied Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]	Reference
Low	1930.7	1377	1241	Plot 4.3.1
Middle	1960	1384	1246	Plot 4.3.5
High	1989.3	1376	1236	Plot 4.3.9

*****§24.238(b) requires a measurement RBW of at least 1% of the -26dBc Occupied Bandwidth**.** From these results, a RBW of 30 kHz was used.

Modulation: CDMA 2000-1xEVDO

Channel	Frequency [MHz]	-26dBc Occupied Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]	Reference
Low	1930.7	1373	1236	Plot 4.3.2
Middle	1960	1378	1244	Plot 4.3.6
High	1989.3	1372	1228	Plot 4.3.10

*****§24.238(b) requires a measurement RBW of at least 1% of the -26dBc Occupied Bandwidth**.** From these results, a RBW of 30 kHz was used.

Modulation: GSM –GMSK

Channel	Frequency [MHz]	-26dBc Occupied Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]	Reference
Low	1930.2	323.7	249.4	Plot 4.3.3
Middle	1960	316.4	247.5	Plot 4.3.7
High	1989.8	314.7	242.8	Plot 4.3.11

*****§24.238(b) requires a measurement RBW of at least 1% of the -26dBc Occupied Bandwidth**.** From these results, a RBW of 3 kHz was used.

Modulation: EDGE -8PSK

Channel	Frequency [MHz]	-26dBc Occupied Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]	Reference
Low	1930.2	314.9	246.3	Plot 4.3.4
Middle	1960	314.0	242.9	Plot 4.3.8
High	1989.8	321.1	248.4	Plot 4.3.12

*****§24.238(b) requires a measurement RBW of at least 1% of the -26dBc Occupied Bandwidth**.** From these results, a RBW of 3 kHz was used**.**

Input

Modulation: CDMA 2000

Channel	Frequency [MHz]	-26dBc Occupied Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]	Reference
Low	973.0	1380	12442	Plot 4.3.13
Middle	1003.0	1392	12562	Plot 4.3.17
High	1018.0	1373	1249	Plot 4.3.21

*****§24.238(b) requires a measurement RBW of at least 1% of the -26dBc Occupied Bandwidth**.** From these results, a RBW of 30 kHz was used.

Modulation: CDMA 2000-1xEVDO

Channel	Frequency [MHz]	-26dBc Occupied Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]	Reference
Low	973.0	1383	1250	Plot 4.3.14
Middle	1003.0	1378	1242	Plot 4.3.18
High	1018.0	1380	1240	Plot 4.3.22

*****§24.238(b) requires a measurement RBW of at least 1% of the -26dBc Occupied Bandwidth**.** From these results, a RBW of 30 kHz was used.

Modulation: GSM –GMSK

Channel	Frequency [MHz]	-26dBc Occupied Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]	Reference
Low	972.6	320.0	246.4	Plot 4.3.15
Middle	1002.0	321.78	246.4	Plot 4.3.19
High	1017.0	320.0	248.2	Plot 4.3.23

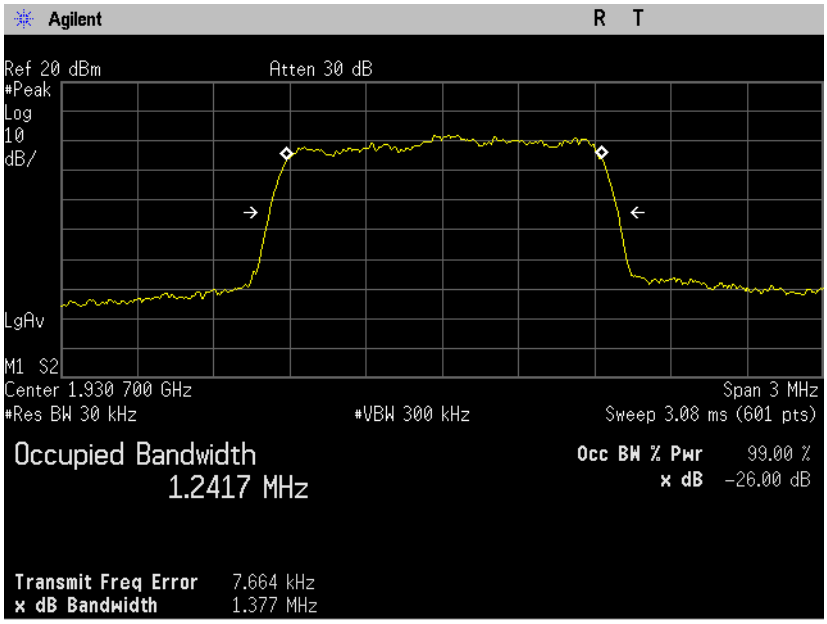
*****§24.238(b) requires a measurement RBW of at least 1% of the -26dBc Occupied Bandwidth**.** From these results, a RBW of 3 kHz was used.

Modulation: EDGE -8PSK

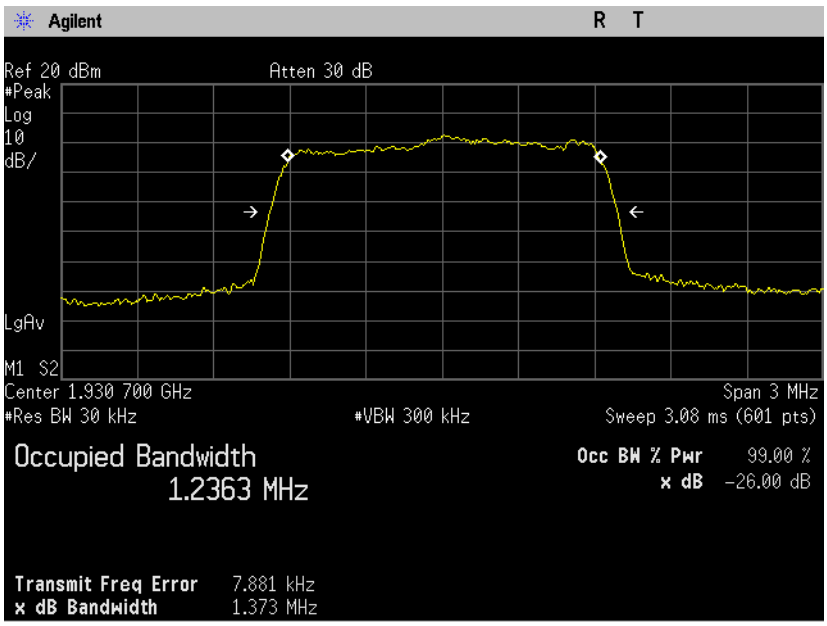
Channel	Frequency [MHz]	-26dBc Occupied Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]	Reference
Low	972.6	309.8	242.4	Plot 4.3.16
Middle	1002.0	321.6	246.1	Plot 4.3.20
High	1017.0	307.6	241.9	Plot 4.3.24

*****§24.238(b) requires a measurement RBW of at least 1% of the -26dBc Occupied Bandwidth**.** From these results, a RBW of 3 kHz was used**.**

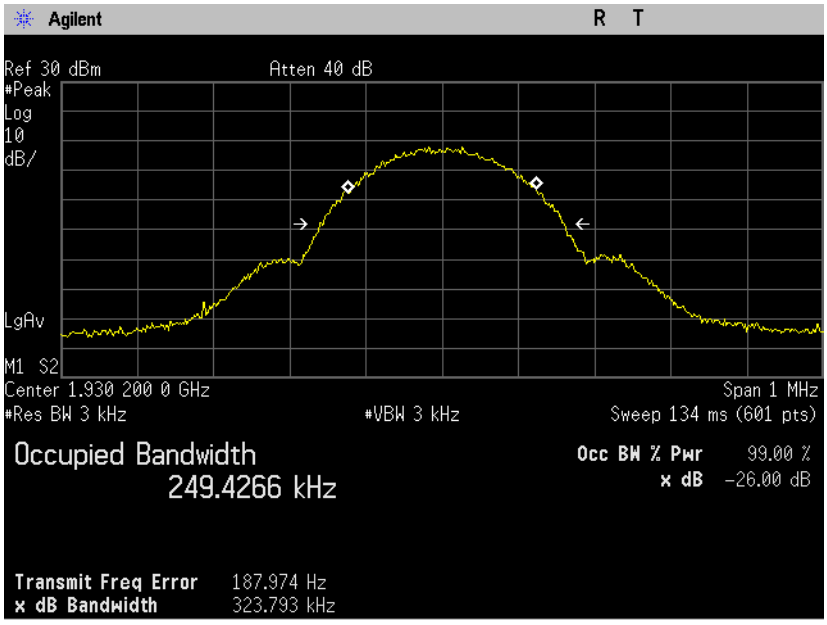
Lower Frequency
Modulation: CDMA 2000
Plot 4.3.1



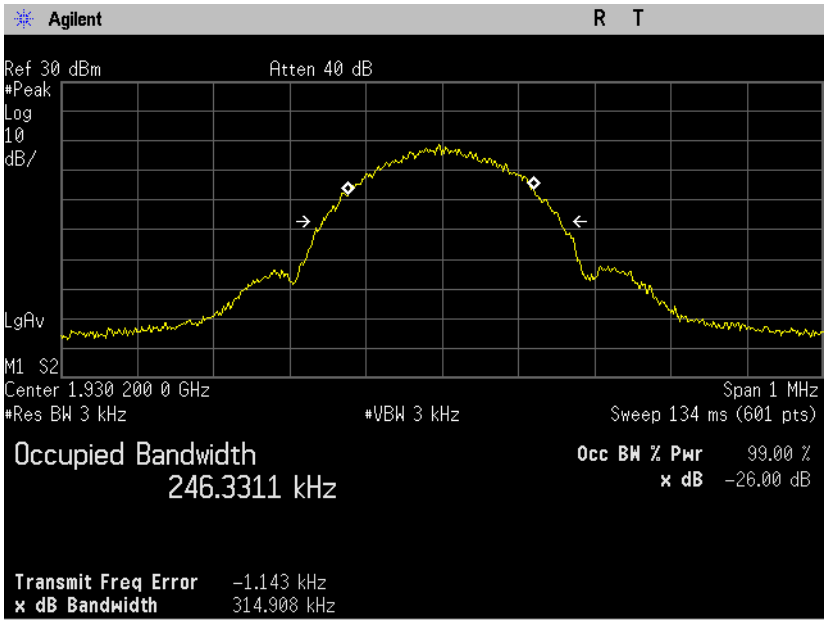
Modulation: CDMA 2000 1xEVDO
Plot 4.3.2



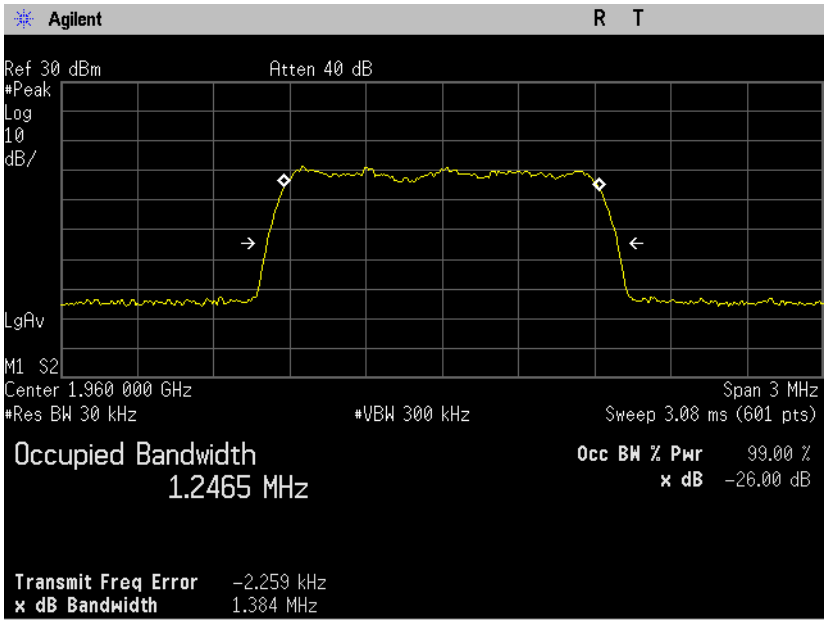
Modulation: GSM –GMSK
Plot 4.3.3



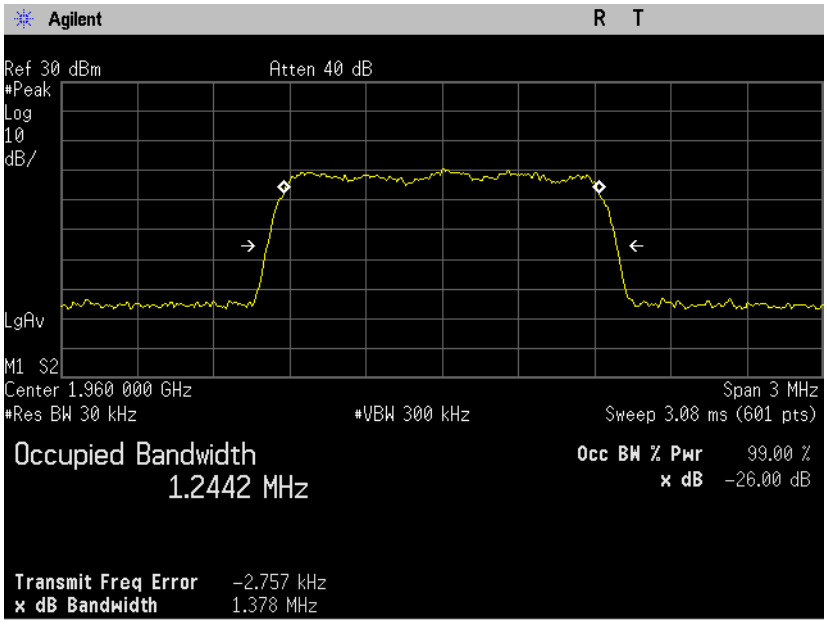
Modulation: EDGE-8PSK
Plot 4.3.4



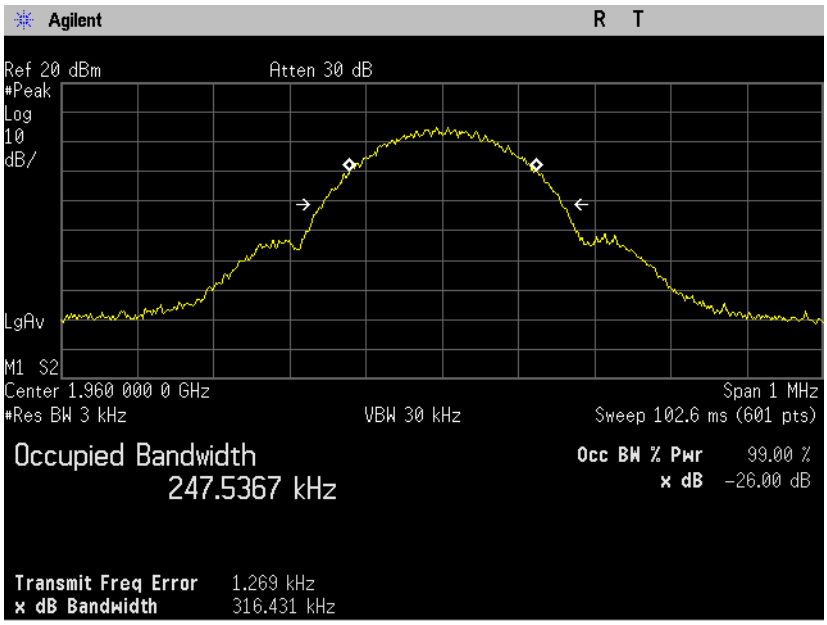
Middle Frequency
Modulation: CDMA 2000
Plot 4.3.5



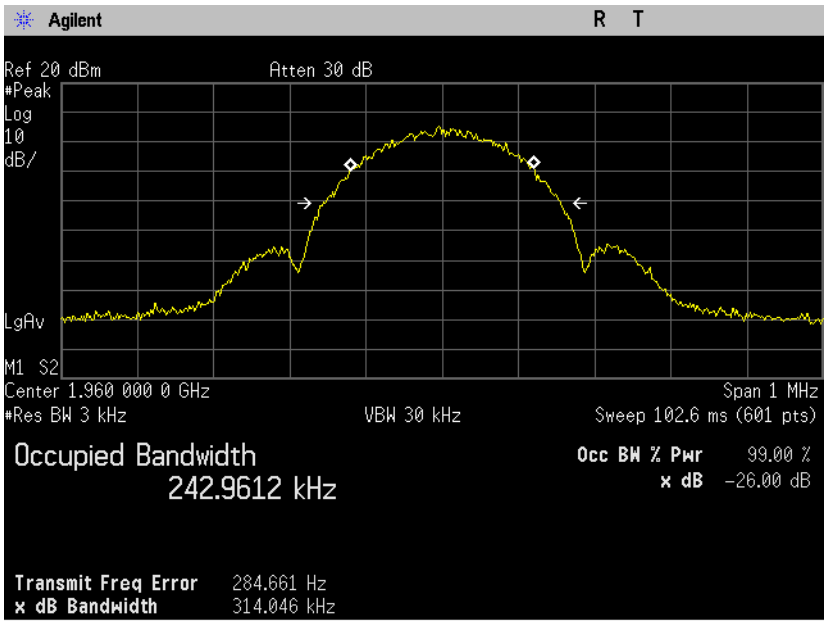
Modulation: CDMA 2000 1xEVDO
Plot 4.3.6



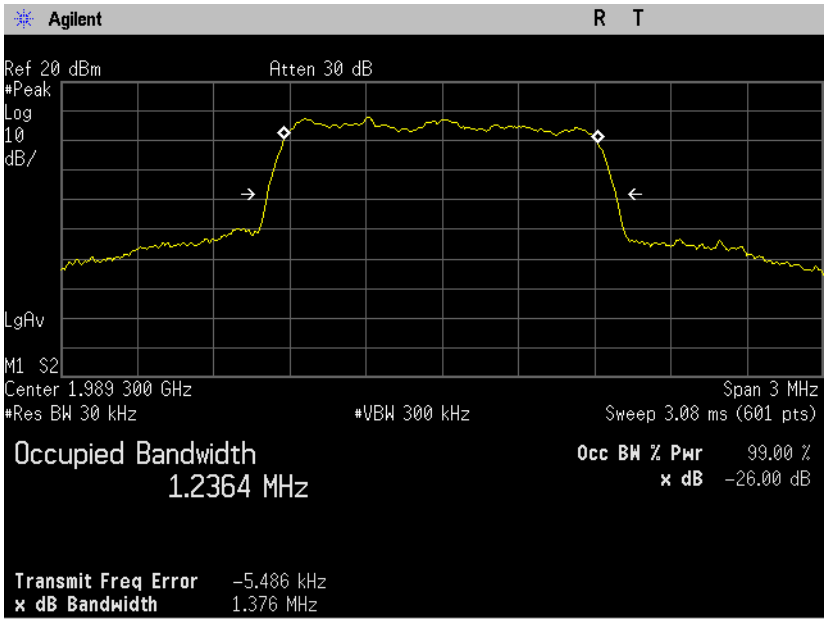
Modulation: GSM –GMSK
Plot 4.3.7



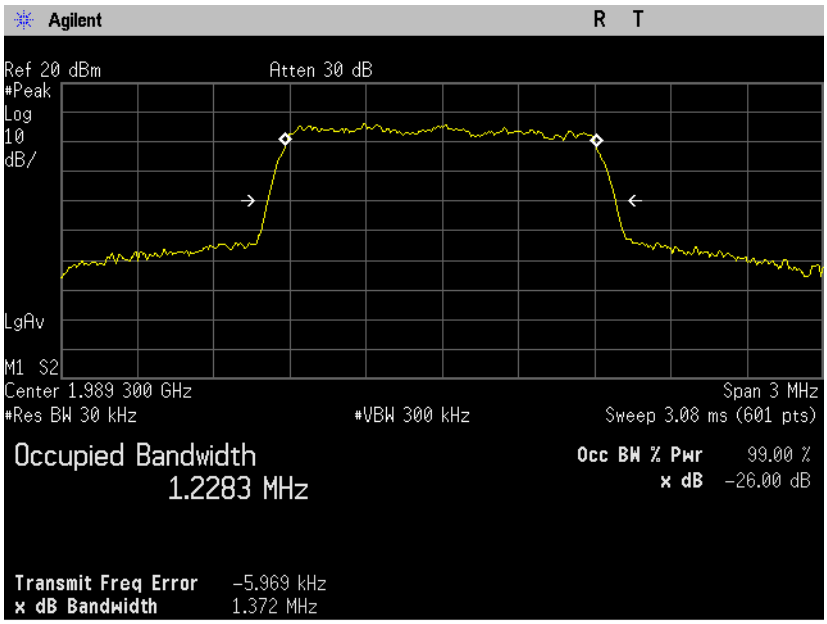
Modulation: EDGE-8PSK
Plot 4.3.8



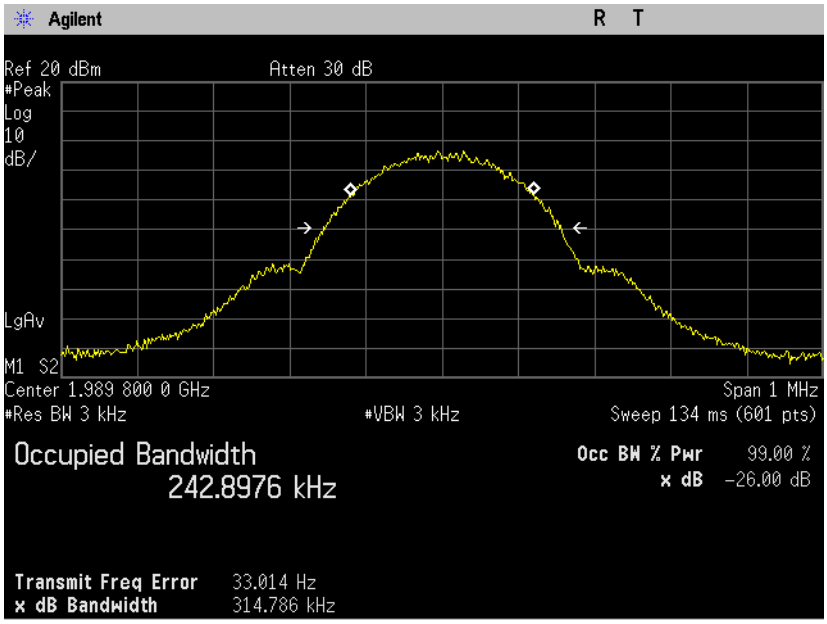
Upper Frequency
Modulation: CDMA 2000
Plot 4.3.9



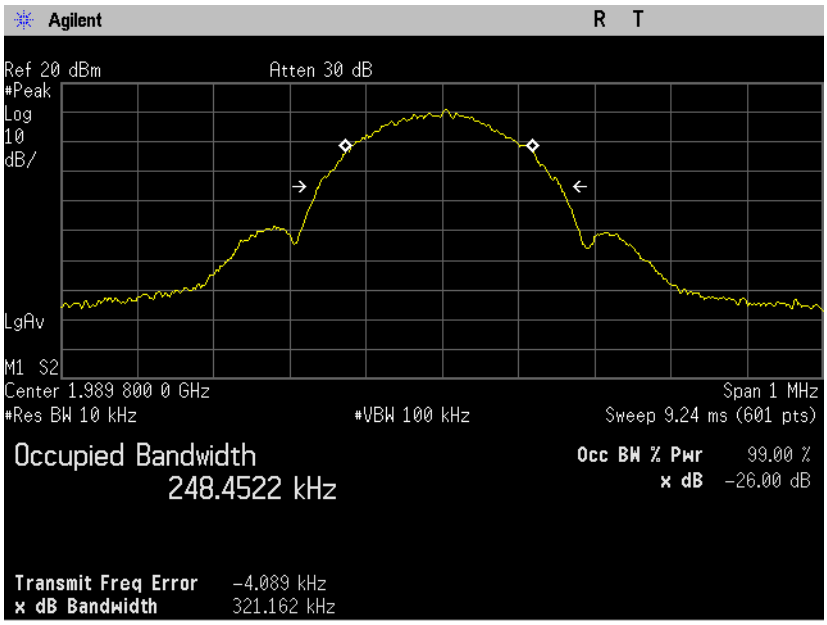
Modulation: CDMA 2000-1xEVDO
Plot 4.3.10



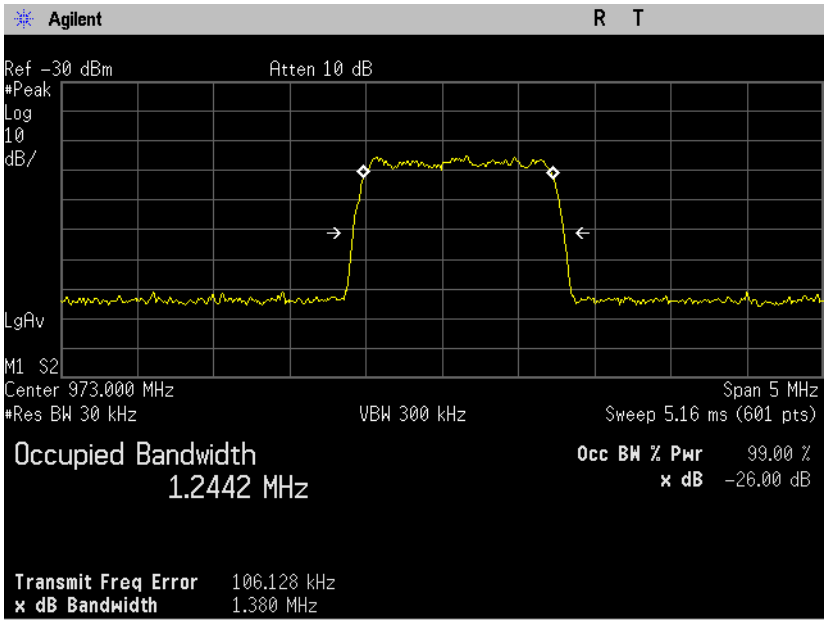
Modulation: GSM-GMSK
Plot 4.3.11



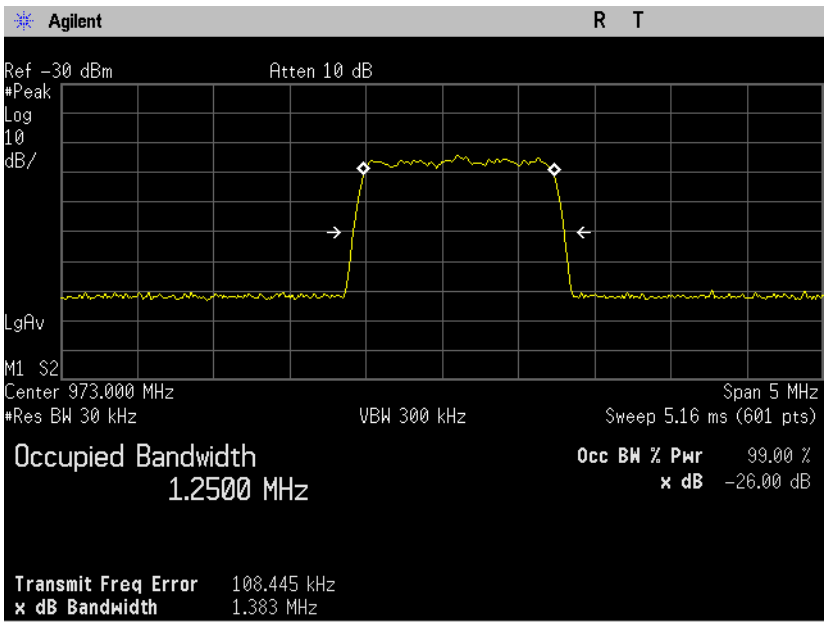
Modulation: EDGE-8PSK
Plot 4.3.12



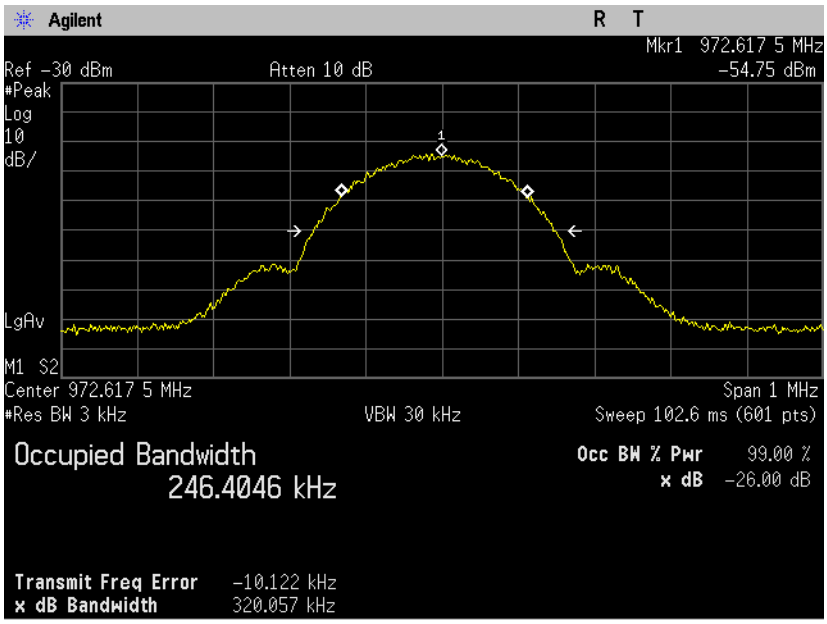
INPUT
Lower Frequency
Modulation: CDMA 2000
Plot 4.3.13



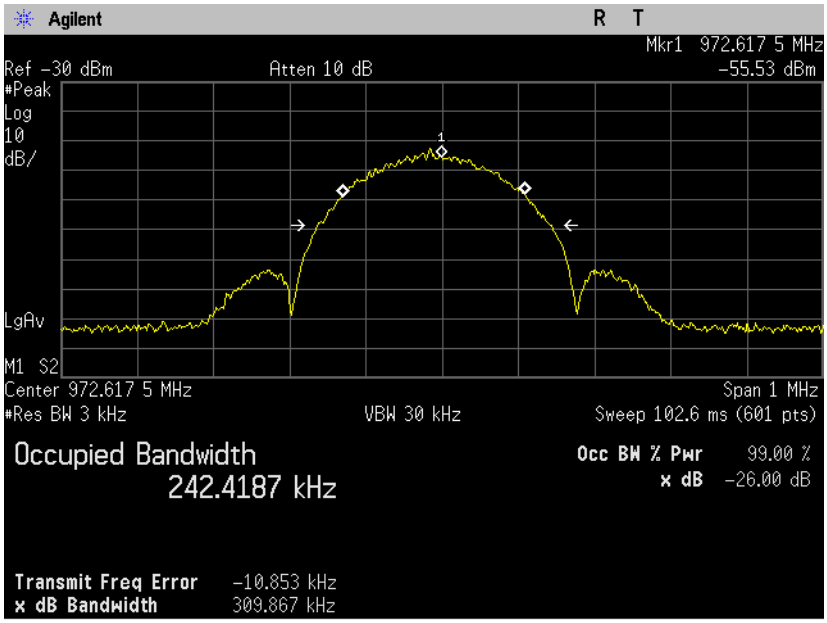
Modulation: CDMA 2000 1xEVDO
Plot 4.3.14



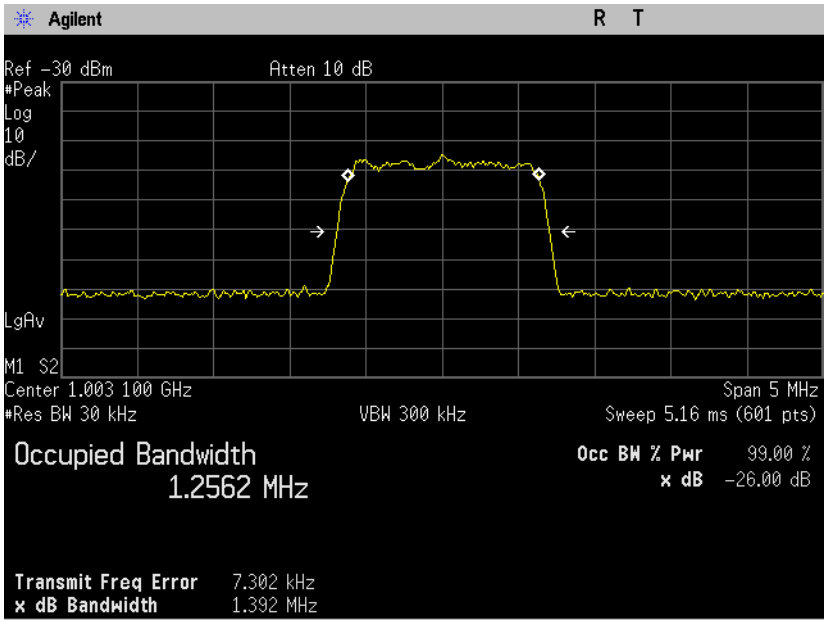
Modulation: GSM –GMSK
Plot 4.3.15



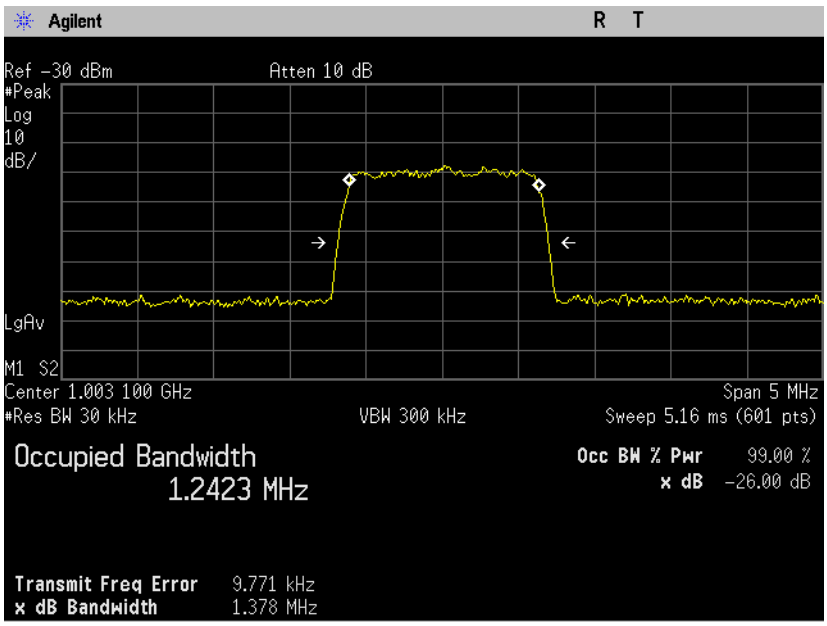
Modulation: EDGE-8PSK
Plot 4.3.16



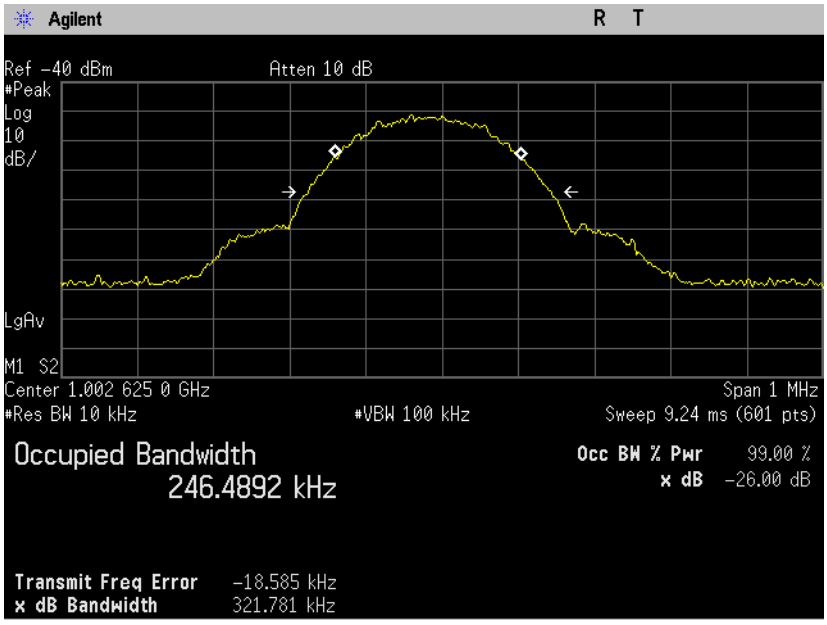
Middle Frequency
Modulation: CDMA 2000
Plot 4.3.17



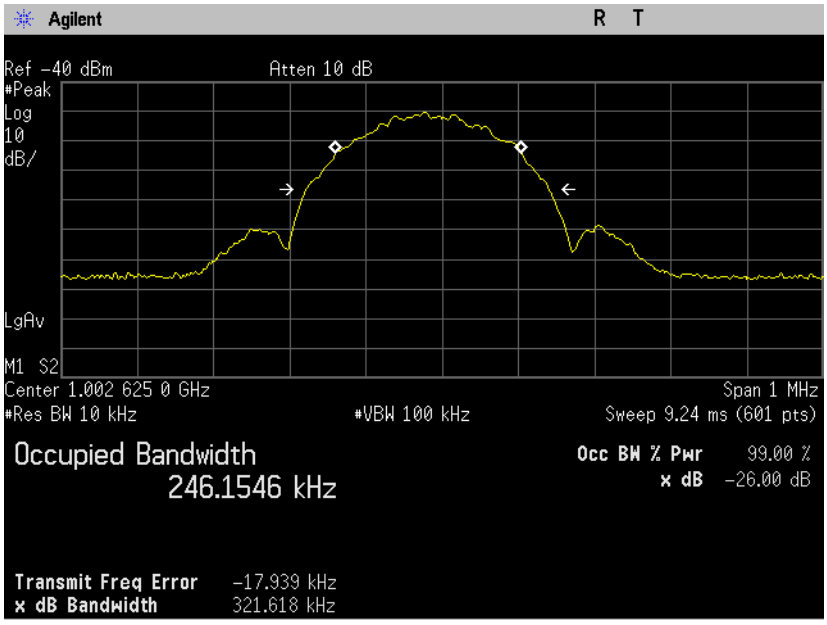
Modulation: CDMA 2000-1xEVDO
Plot 4.3.18



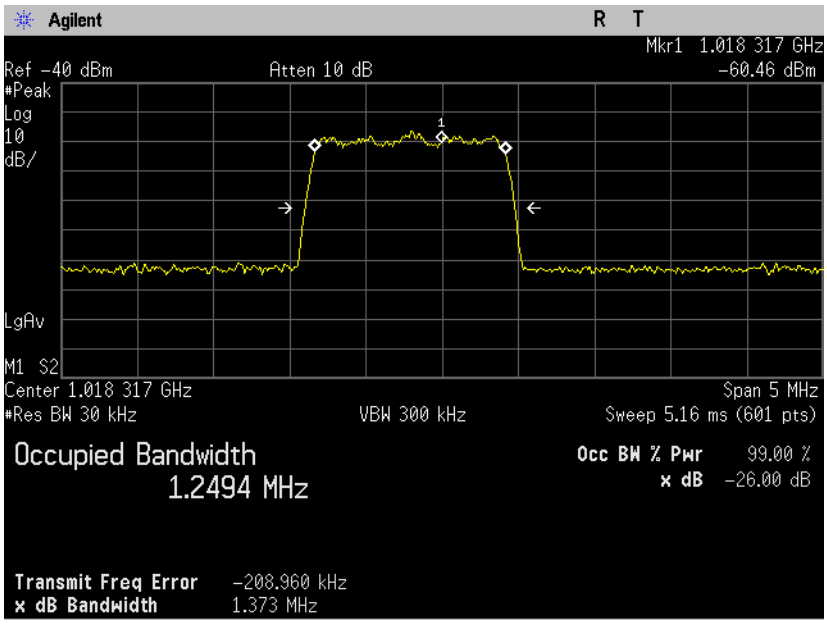
Modulation: GSM-GMSK
Plot 4.3.19



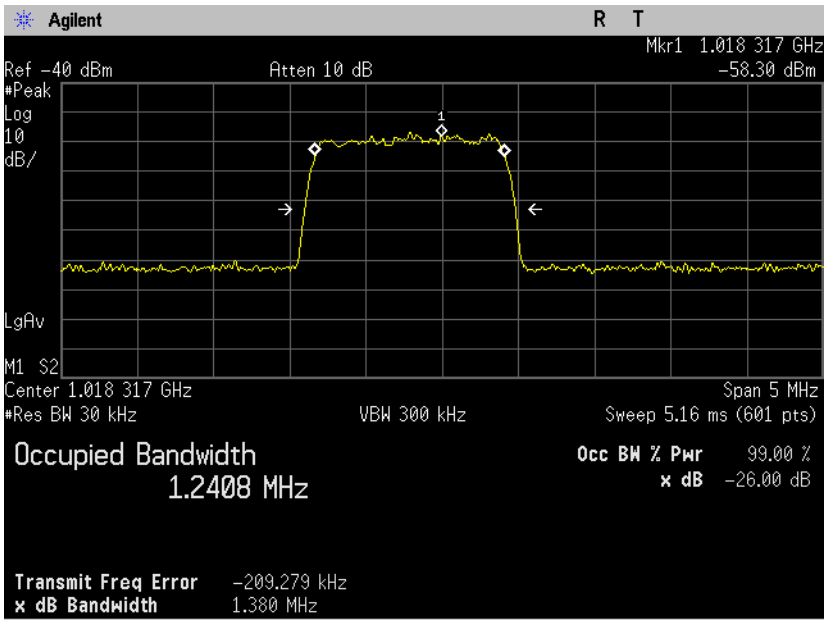
Modulation: EDGE-8PSK
Plot 4.3.20



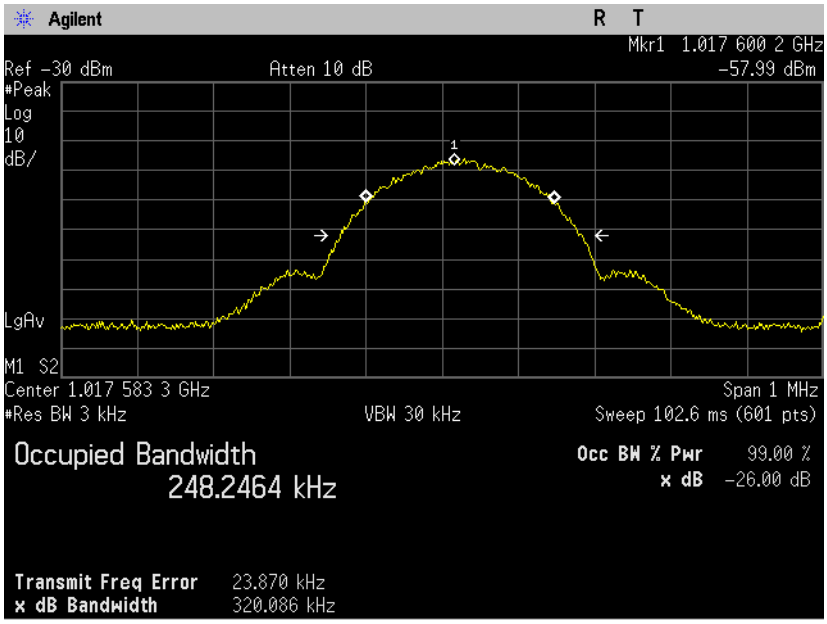
Upper Frequency
Modulation: CDMA 2000
Plot 4.3.21



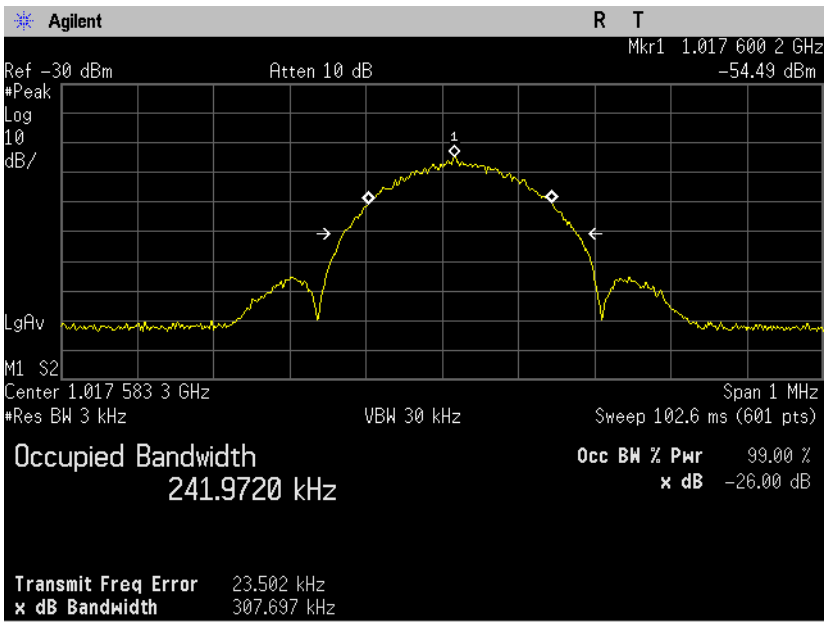
Modulation: CDMA 2000 1xEVDO
Plot 4.3.22



Modulation: GSM –GMSK
Plot 4.3.23



Modulation: EDGE-8PSK
Plot 4.3.24



4.4. Out of Band Emissions, Radiated Measurements

Reference document:	**47 CFR §24.238 & §2.1053**		
Test Requirements:	The power of any emission outside of the authorized operating frequency block shall be attenuated below the transmitting power (P, in Watts) by a factor of at least 43+10log(P) dB*.		
Test setup:	See Sec. 2.2	**Pass**	
Method of testing:	Radiated, CW Signal		
Operating conditions:	Under normal test conditions		
S.A. Settings:	f <1GHz: RBW: 120kHz,VBW**:** 1MHz f >1GHz: RBW: 1MHz, VBW**:** 3MHz		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plots Appendix A	

*It translates to a limit of –13dBm

Test results:

All measurements were done in horizontal and vertical polarizations; the table below shows the worst case.

Frequency [MHz]	Radiated Emission Level [dBµV/m]	Radiated Emission Level* EIRP [dBm]	Limit [dBm]	Margin [dB]	Result
PCS 1900 Low 1930.2 MHz					
49.5	39.21	-61.1	-13	-48.06	Pass
1300	46.21	-53.6	-13	-40.57	Pass
1600	45.42	-52.8	-13	-39.80	Pass
2127.56	47.37	-53.0	-13	-39.98	Pass
3860.4	48.47	-49.8	-13	-36.82	Pass
5790.6	49.67	-49.6	-13	-36.56	Pass
PCS 1900 Middle 1960MHz					
53.7	38.53	-61.7	-13	-48.74	Pass
1300	44.32	-55.5	-13	-42.46	Pass
1600	44.66	-53.6	-13	-40.56	Pass
2146.3	46.91	-53.4	-13	-40.44	Pass
3920	47.82	-50.5	-13	-37.47	Pass
5880	65.37	-33.9	-13	-20.86	Pass
7840	49.51	-45.7	-13	-32.67	Pass
PCS 1900 High 1989.8 MHz					
51	37.79	-62.5	-13	-49.48	Pass
1300	44.56	-55.2	-13	-42.22	Pass
1600	43.69	-54.5	-13	-41.53	Pass
2172.567	49.83	-50.5	-13	-37.52	Pass
5.969	52.45	-47.6	-13	-34.56	Pass
8.562	49.3	-46.2	-13	-33.21	Pass

Radiated Emission [dBm] = Measured [dBm] - Cable Loss [dB] + Substitution Antenna Gain [dBi],
ERP can be calculated from EIRP by subtracting 2.1dBi.

4.5. Out of Band Emissions and Inter-modulation– Conducted Measurements

Reference document:	**47 CFR §24.238 & §2.1051**		
Test Requirements:	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log (P) dB*.		
Test setup:	See sec 2.3	**Pass**	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW:1 MHz, VBW**:** 1 MHz		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.5.1- Plot 4.5.36	

*It translates to a limit of –13dBm

Test results:

Modulation: CDMA 2000

Frequency [MHz]	Emission Level* [dBm]	Limit [dBm]	Reference	Actual Attenuation [dBc]	Margin [dB]	Result
1930.7 & 1931.950	15.0					Carrier
All Spurious at least 20 dB blow the limit		-13	Plot 4.5.1- Plot 4.5.3	>28dBc	>20dB	Pass
1960	15.0					Carrier
All Spurious at least 210 dB blow the limit		-13	Plot4.5.13- Plot 4.5.15	>28dBc	>20dB	Pass
1989.3 & 1988.05	15.0					Carrier
All Spurious at least 20 dB blow the limit		-13	Plot 4.5.25- Plot 4.5.27	>28dBc	>20dB	Pass

***** Spurious Emission [dBm] = Measured [dBm] - Attenuations [dB]

Modulation: CDMA 2000 1xEVDO

Frequency [MHz]	Emission Level* [dBm]	Limit [dBm]	Reference	Actual Attenuation [dBc]	Margin [dB]	Result
1930.7 & 1931.950	15.0					Carrier
All Spurious at least 20 dB blow the limit		-13	Plot 4.5.4- Plot 4.5.6	>28dBc	>20dB	Pass
1960	15.0					Carrier
All Spurious at least 20 dB blow the limit		-13	Plot 4.5.16- Plot 4.5.18	>28dBc	>20dB	Pass
1989.3 & 1988.05	15.0					Carrier
All Spurious at least 20 dB blow the limit		-13	Plot 4.5.28- Plot 4.5.30	>28dBc	>20dB	Pass

***** Spurious Emission [dBm] = Measured [dBm] - Attenuations [dB]

Modulation: GSM –GMSK

Frequency [MHz]	Emission Level* [dBm]	Limit [dBm]	Reference	Actual Attenuation [dBc]	Margin [dB]	Result
1930.2 & 1930.4	15.0					Carrier
All Spurious at least 20 dB blow the limit		-13	Plot 4.5.7- Plot 4.5.9	>28dBc	>20dB	Pass
1960	15.0					Carrier
All Spurious at least 20 dB blow the limit		-13	Plot 4.5.19- Plot 4.5.21	>28dBc	>20dB	Pass
1989.8 & 1989.6	15.0					Carrier
All Spurious at least 20 dB blow the limit		-13	Plot 4.5.31- Plot 4.5.33	>28dBc	>20dB	Pass

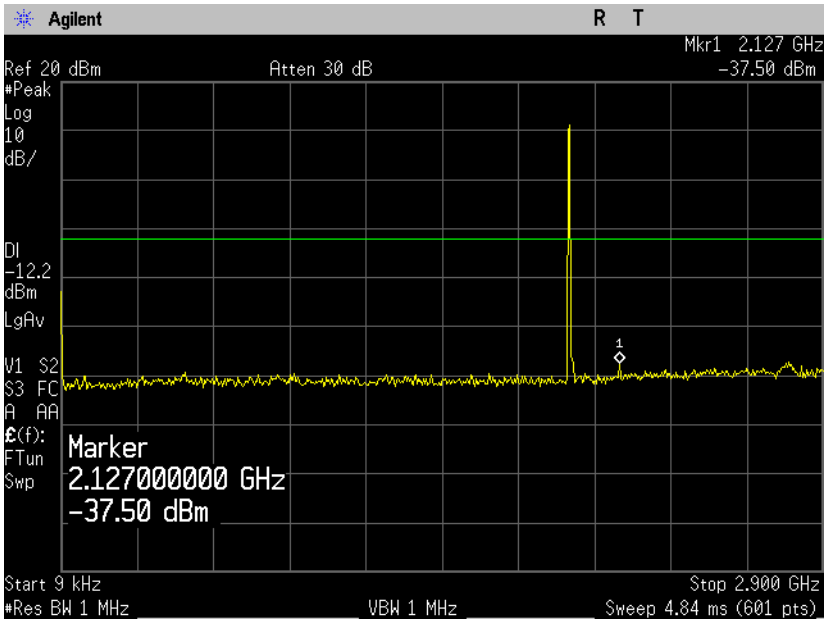
***** Spurious Emission [dBm] = Measured [dBm] - Attenuations [dB]

Modulation: EDGE-8PSK

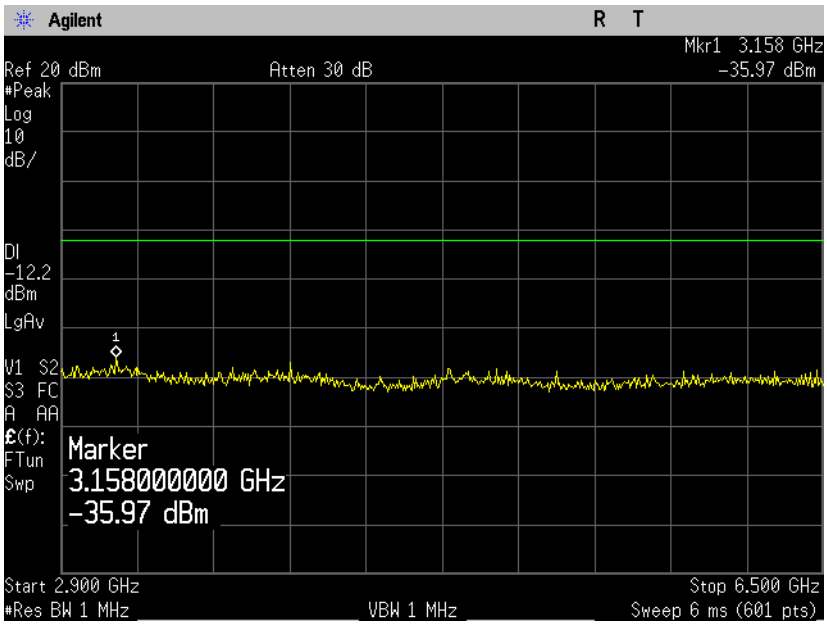
Frequency [MHz]	Emission Level* [dBm]	Limit [dBm]	Reference	Actual Attenuation [dBc]	Margin [dB]	Result
1930.2 & 1930.4	15.0					Carrier
All Spurious at least 20 dB blow the limit		-13	Plot 4.5.10- Plot 4.5.12	>28dBc	>20dB	Pass
1960	15.0					Carrier
All Spurious at least 20 dB blow the limit		-13	Plot 4.5.22- Plot 4.5.24	>28dBc	>20dB	Pass
1989.8 & 1989.6	15.0					Carrier
All Spurious at least 20 dB blow the limit		-13	Plot 4.5.34- Plot 4.5.36	>28dBc	>20dB	Pass

***** Spurious Emission [dBm] = Measured [dBm] - Attenuations [dB]

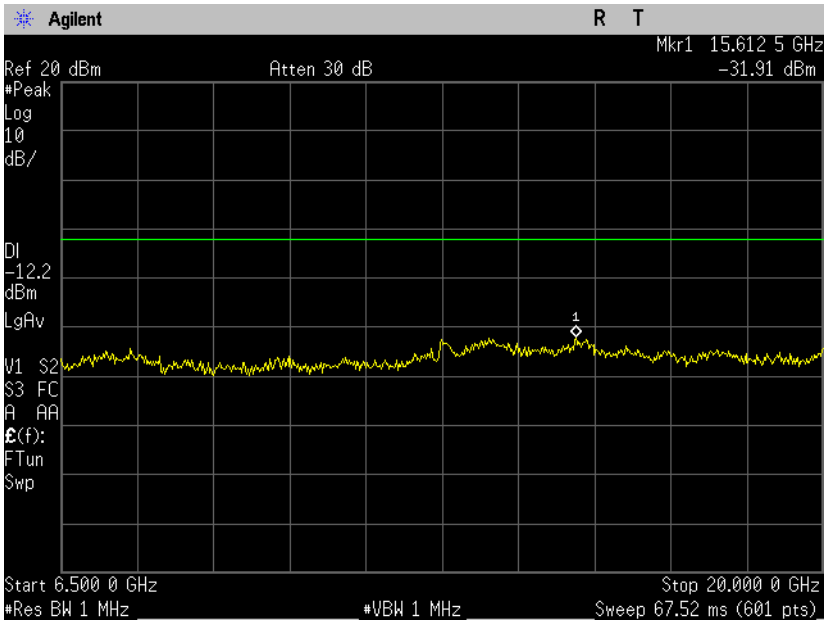
Lower frequency
Modulation: CDMA 2000
Plot 4.5.1



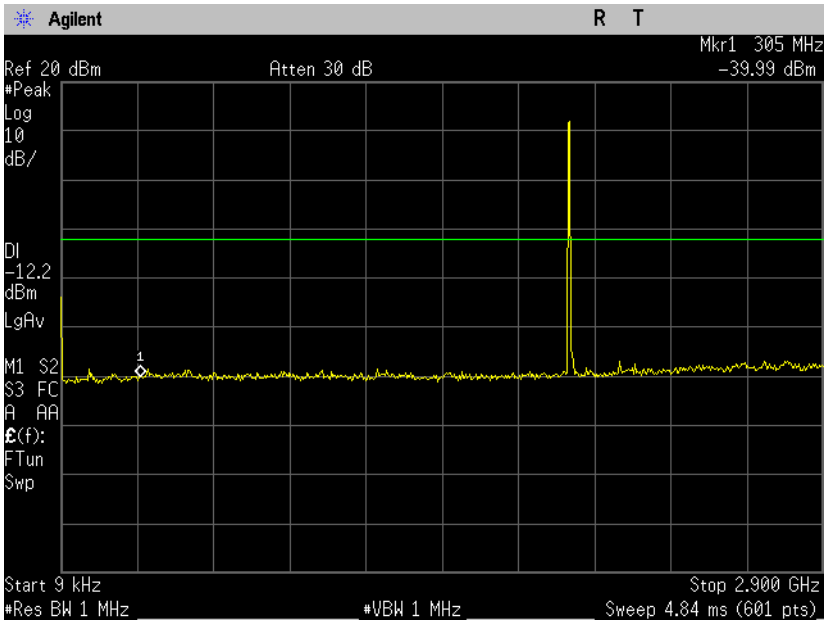
Plot 4.5.2



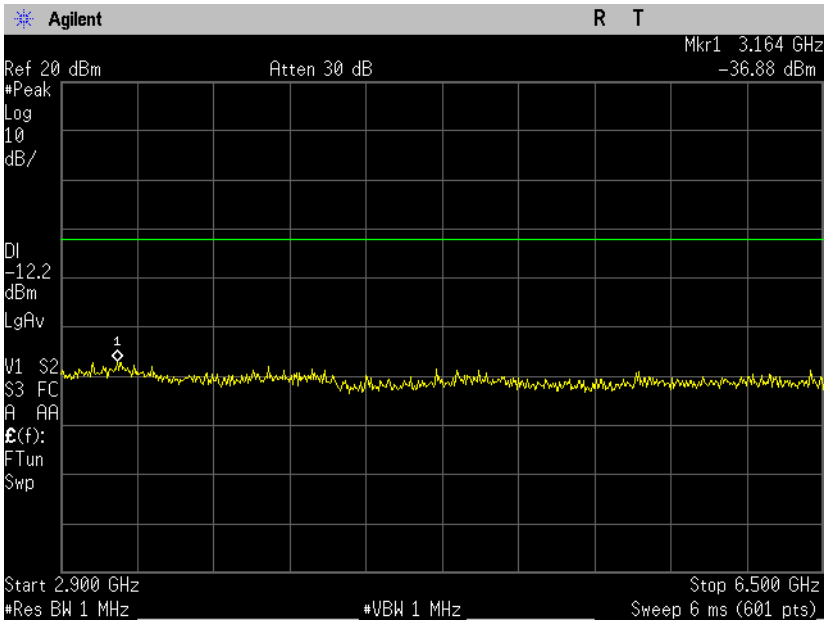
Plot 4.5.3



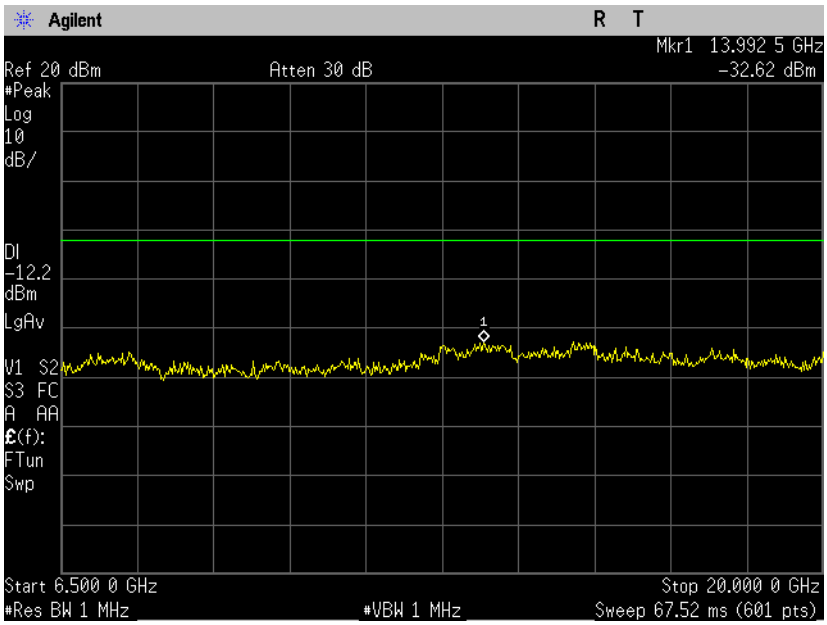
Modulation: CDMA 2000 1xEVDO
Plot 4.5.4



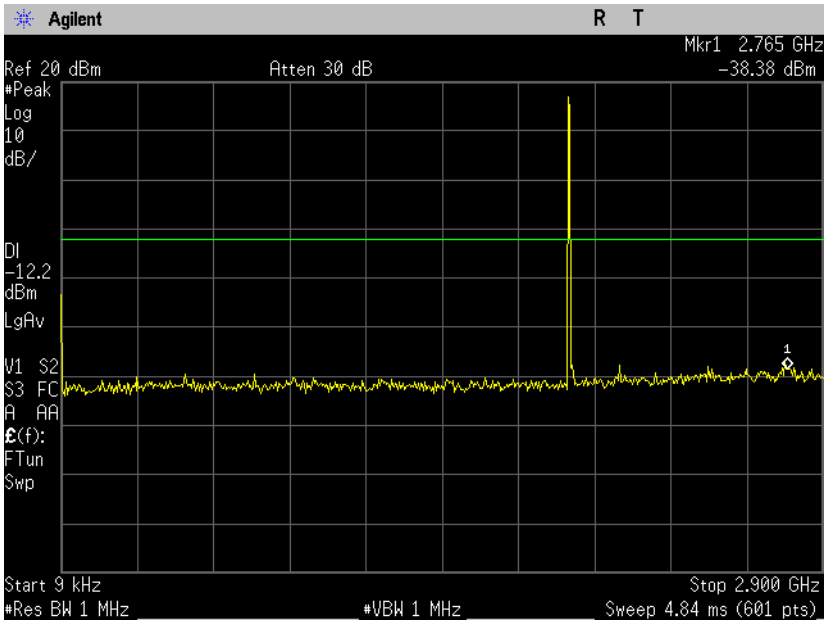
Plot 4.5.5



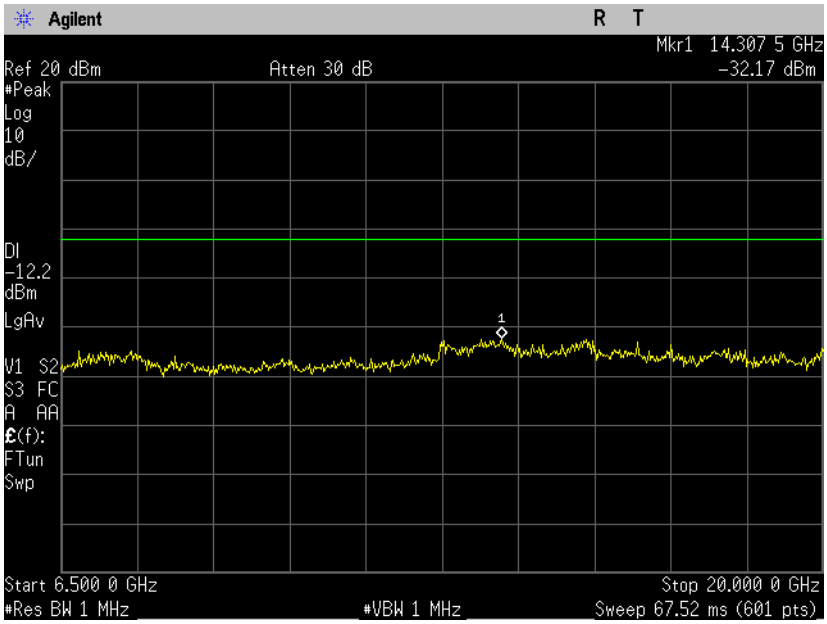
Plot 4.5.6



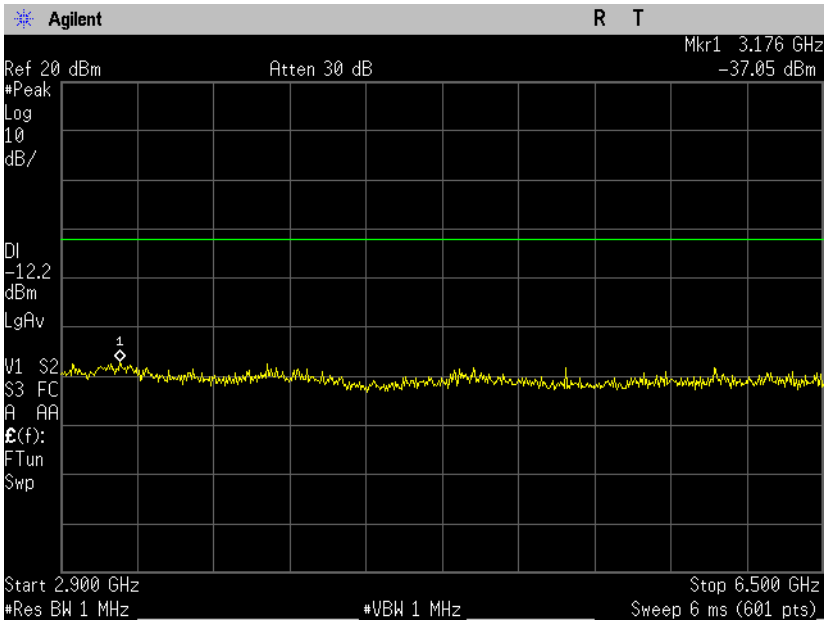
Modulation: GSM –GMSK
Plot 4.5.7



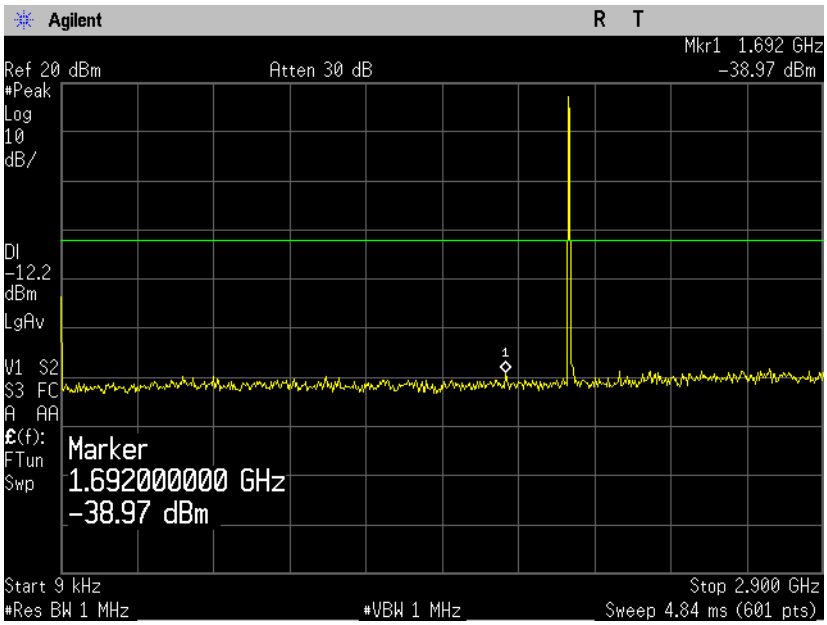
Plot 4.5.8



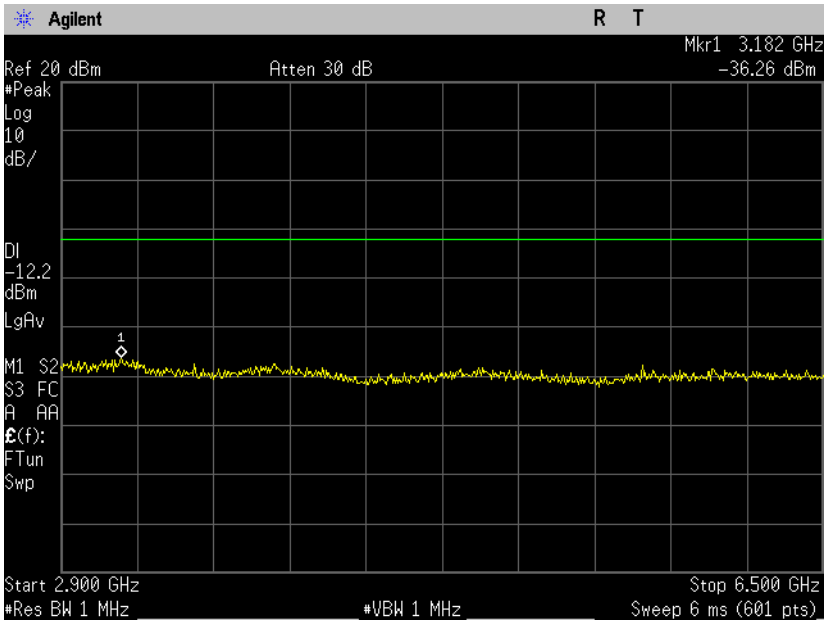
Plot 4.5.9



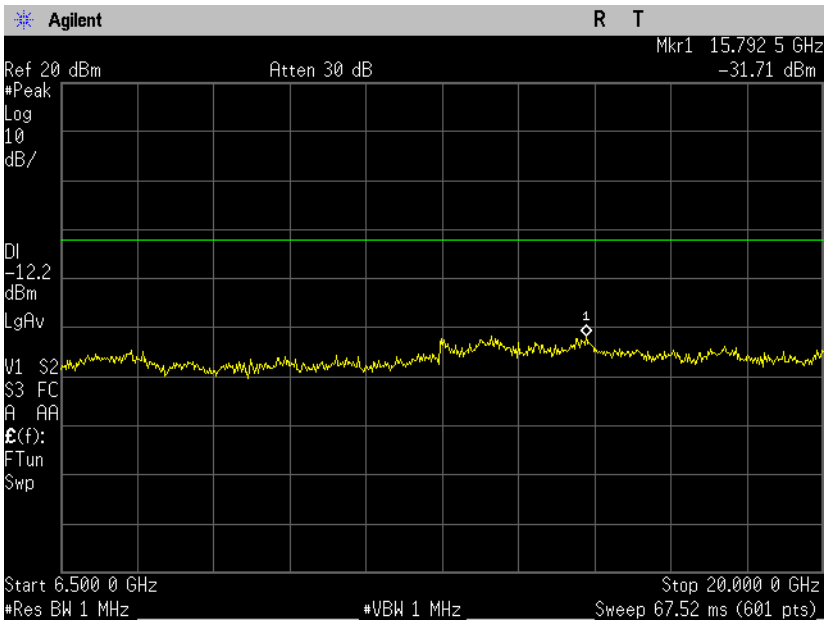
Modulation: EDGE-8PSK
Plot 4.5.10



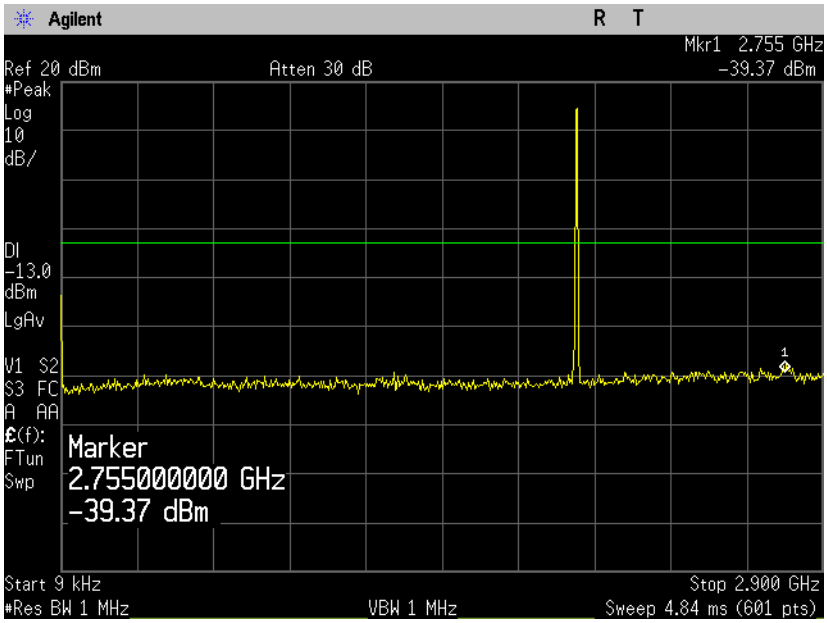
Plot 4.5.11



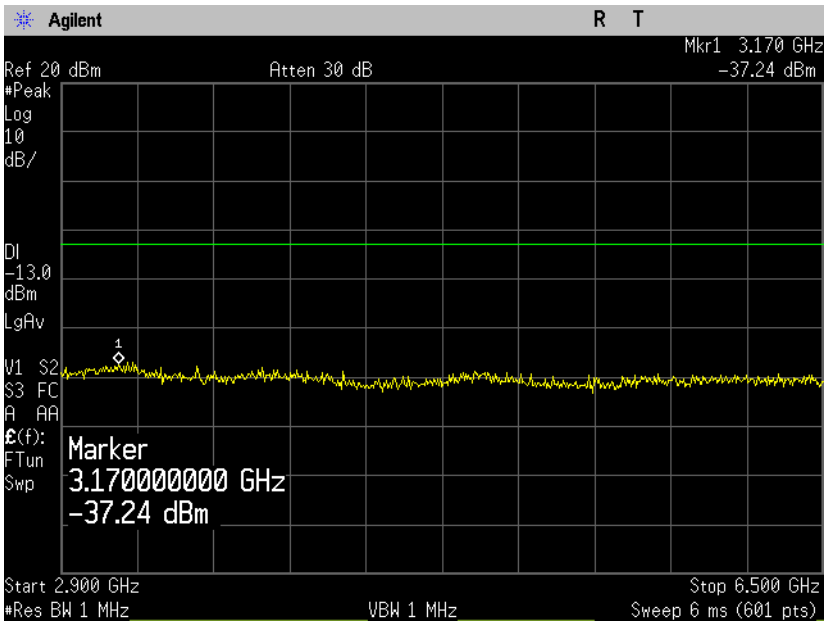
Plot 4.5.12



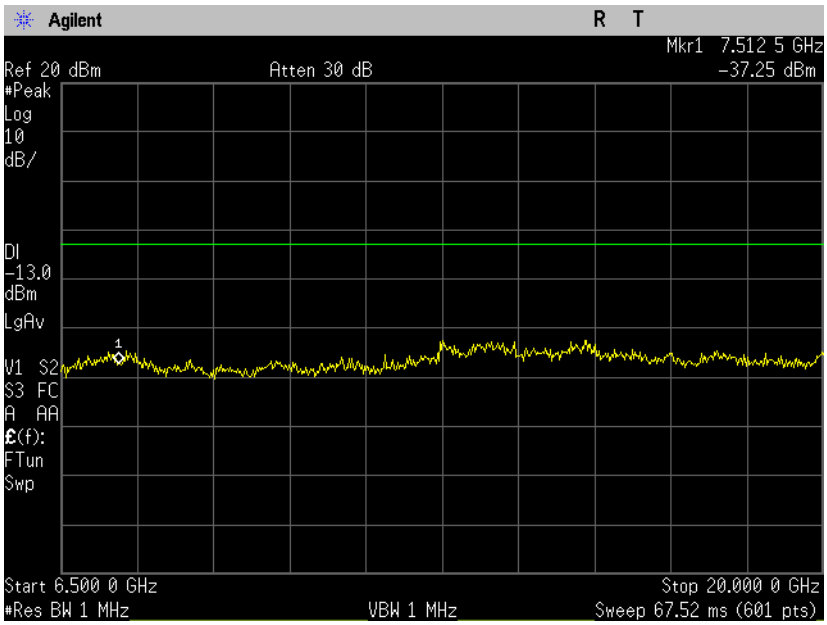
Middle Frequency
Modulation: CDMA 2000
Plot 4.5.13



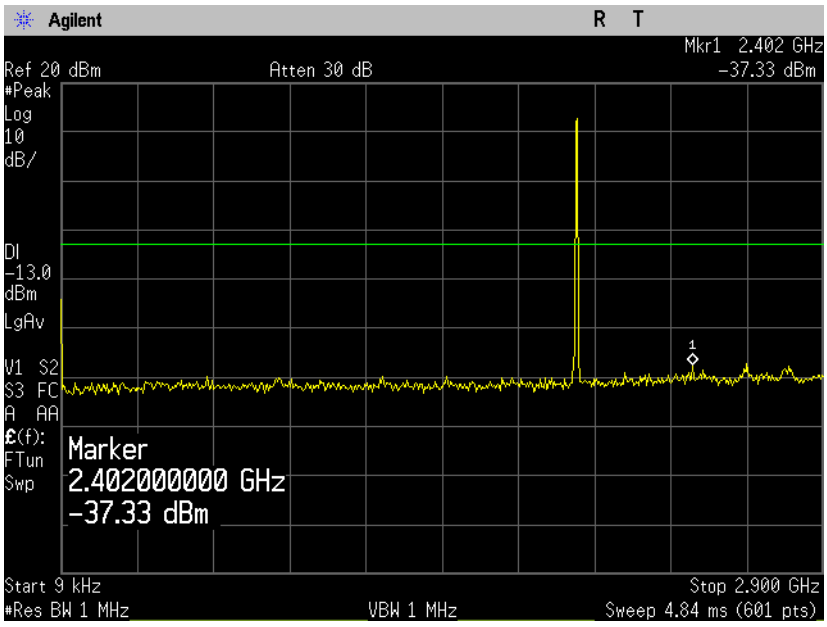
Plot 4.5.14



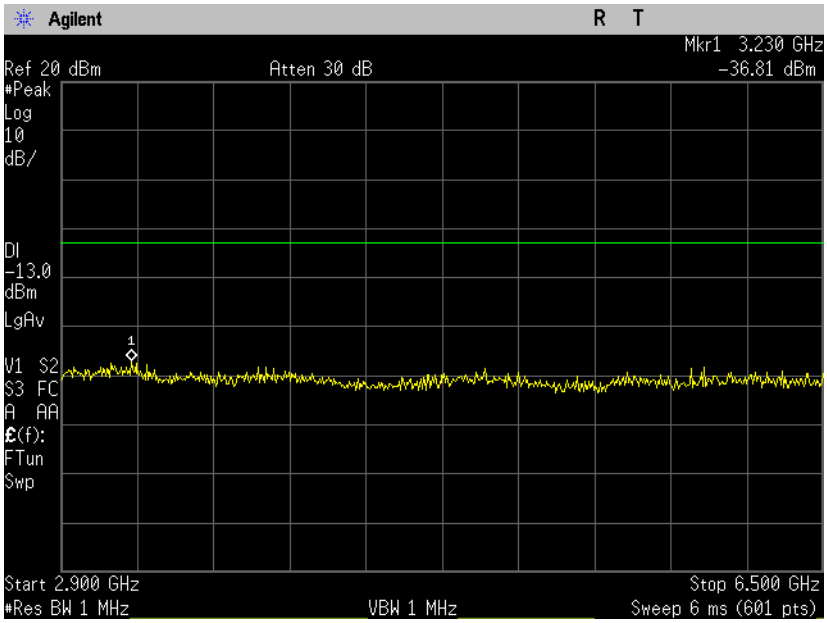
Plot 4.5.15



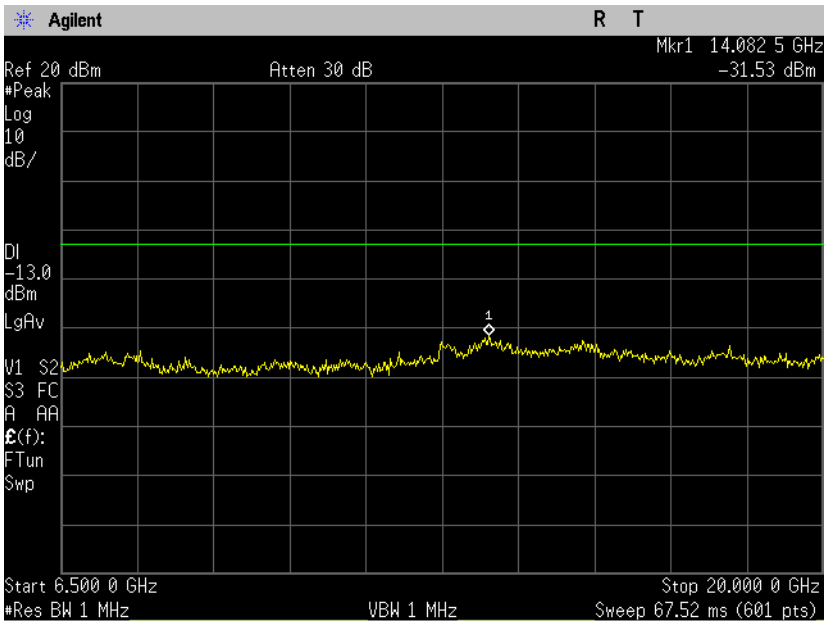
Modulation: CDMA 2000 1xEVDO
Plot 4.5.16



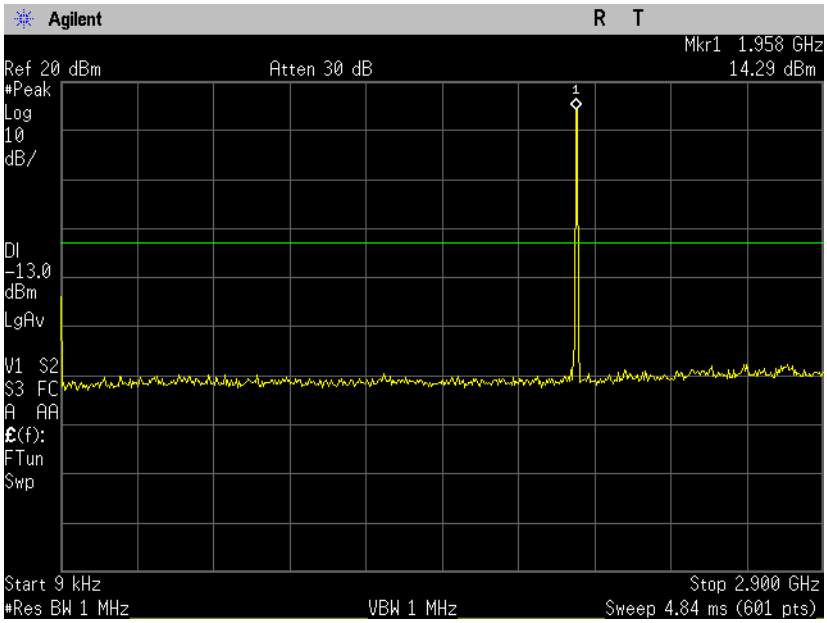
Plot 4.5.17



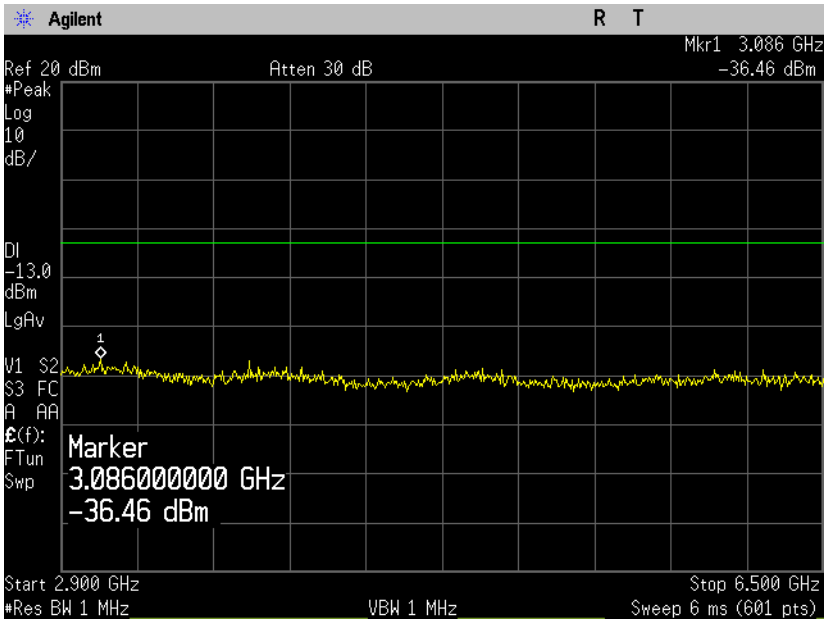
Plot 4.5.18



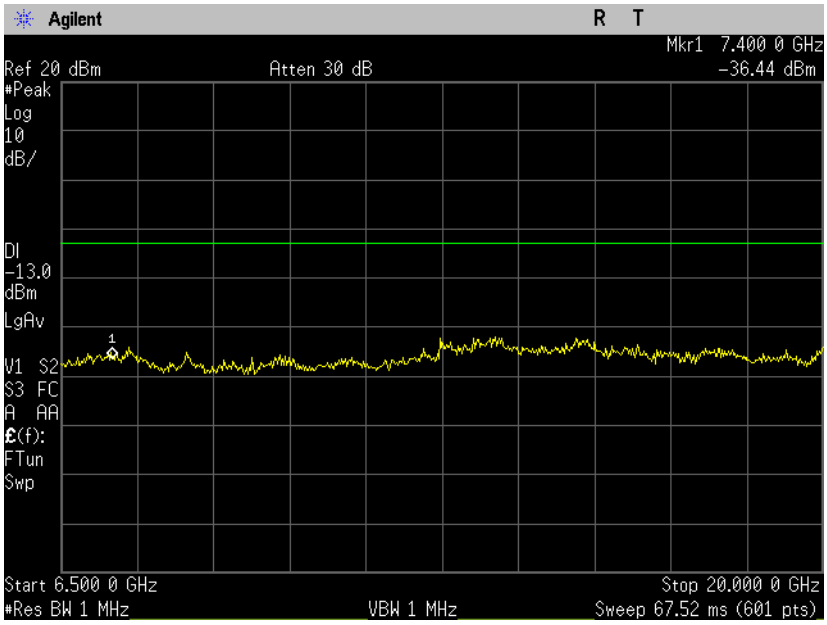
Modulation: GSM –GMSK
Plot 4.5.19



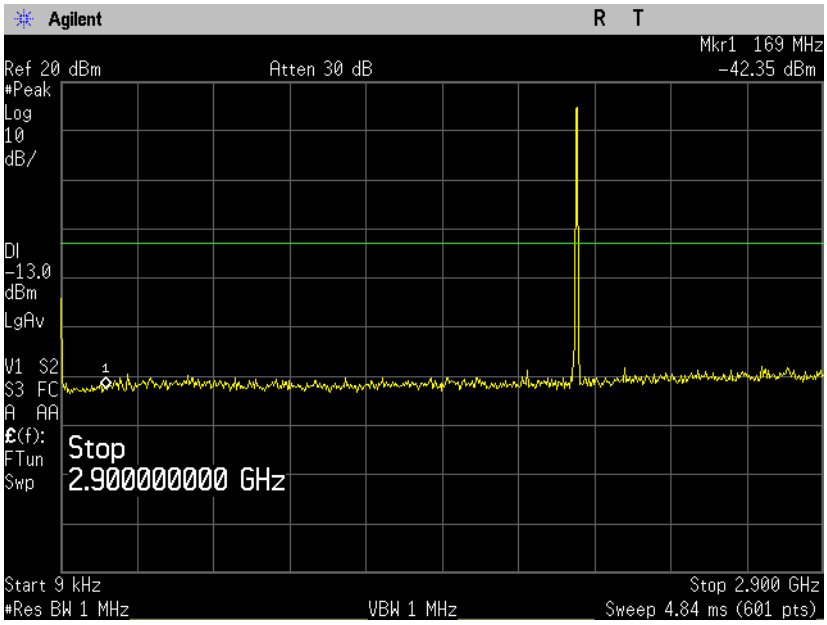
Plot 4.5.20



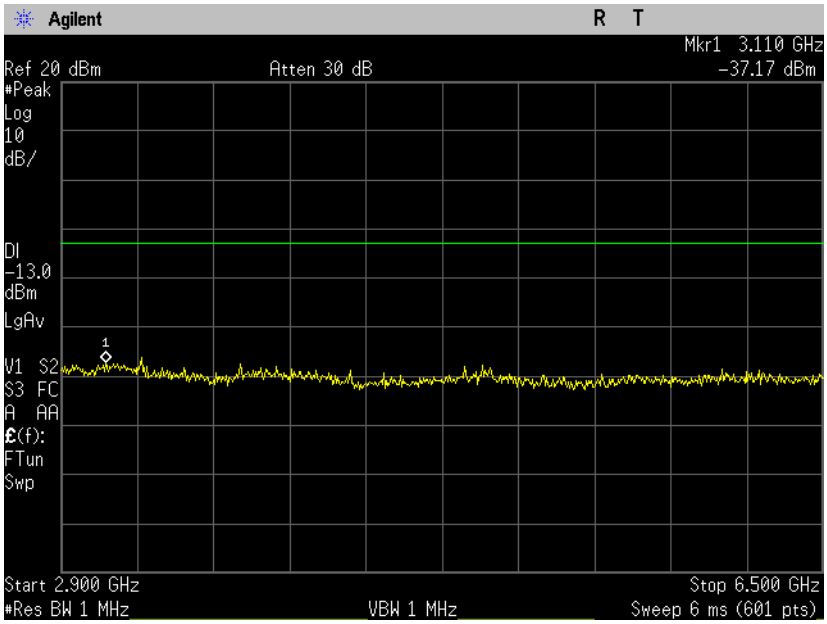
Plot 4.5.21



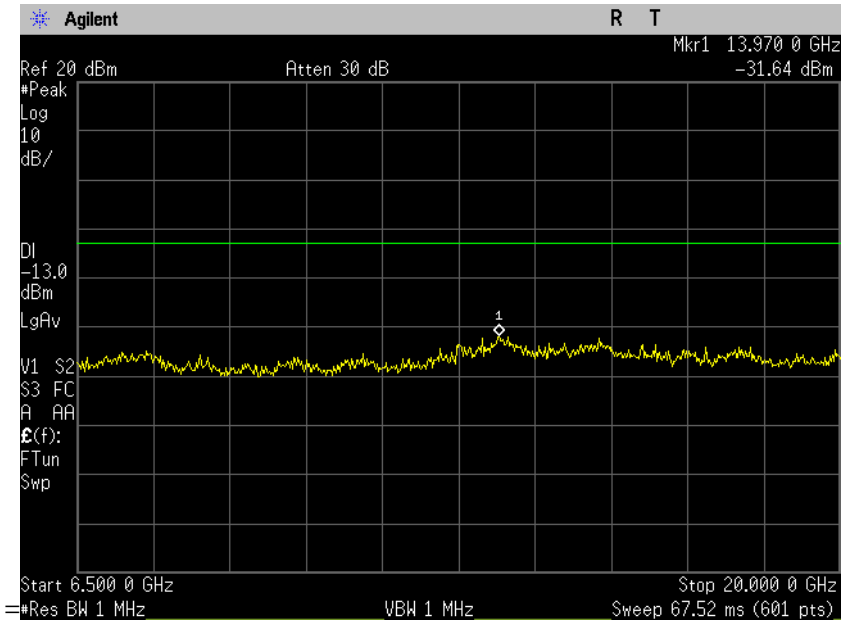
Modulation: EDGE-8PSK
Plot 4.5.22



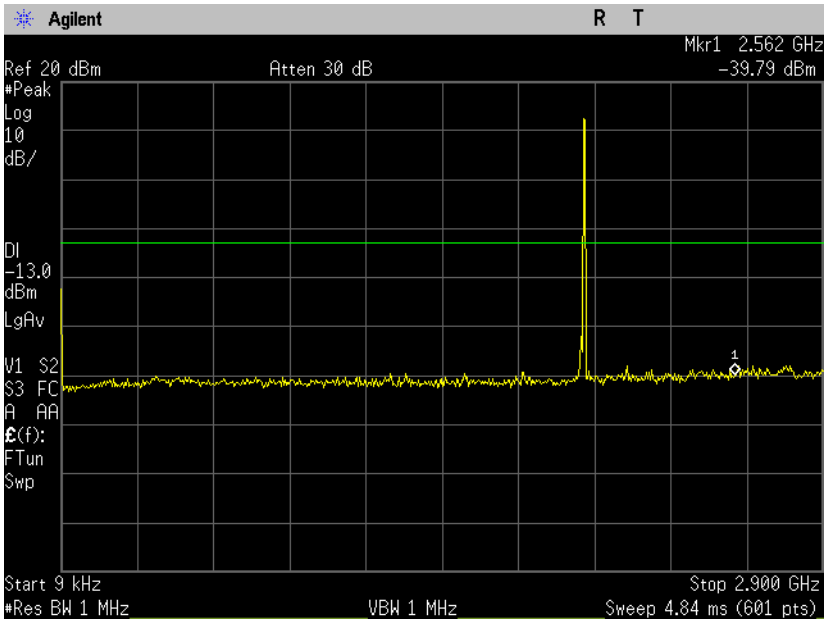
Plot 4.5.23



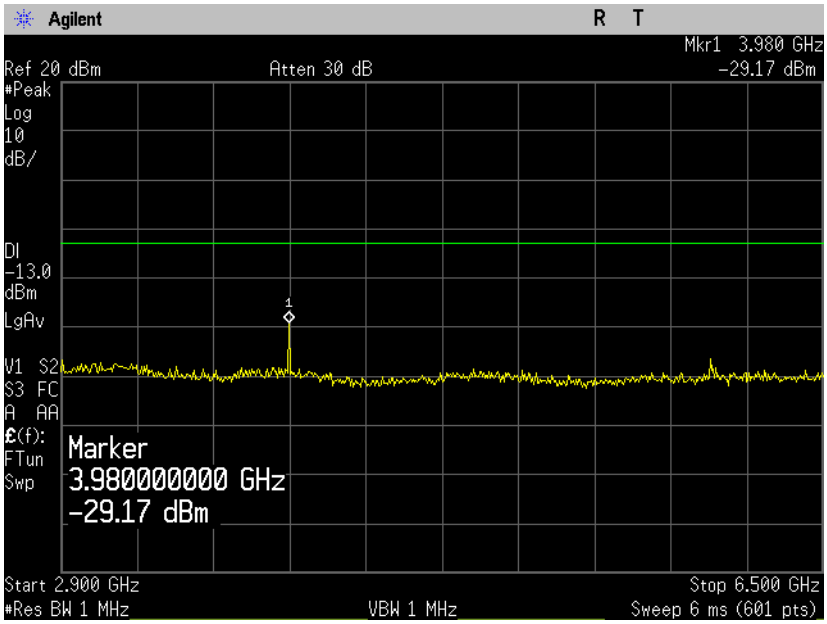
Plot 4.5.24



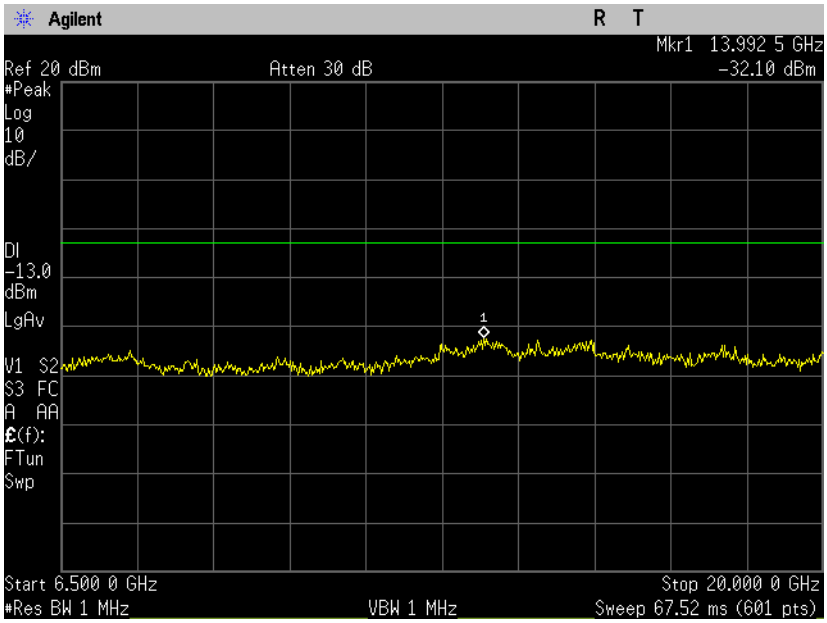
Upper Frequency
Modulation: CDMA 2000
Plot 4.5.25



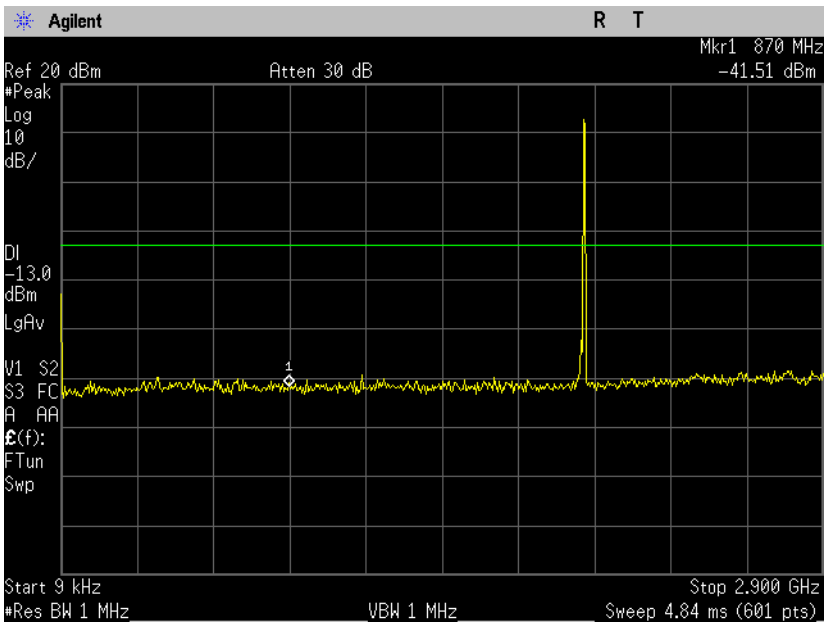
Plot 4.5.26



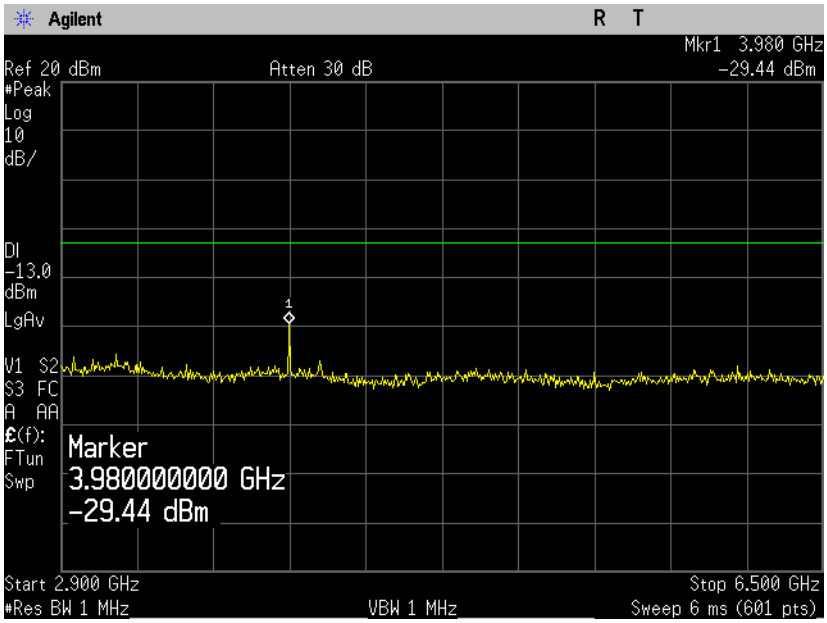
Plot 4.5.27



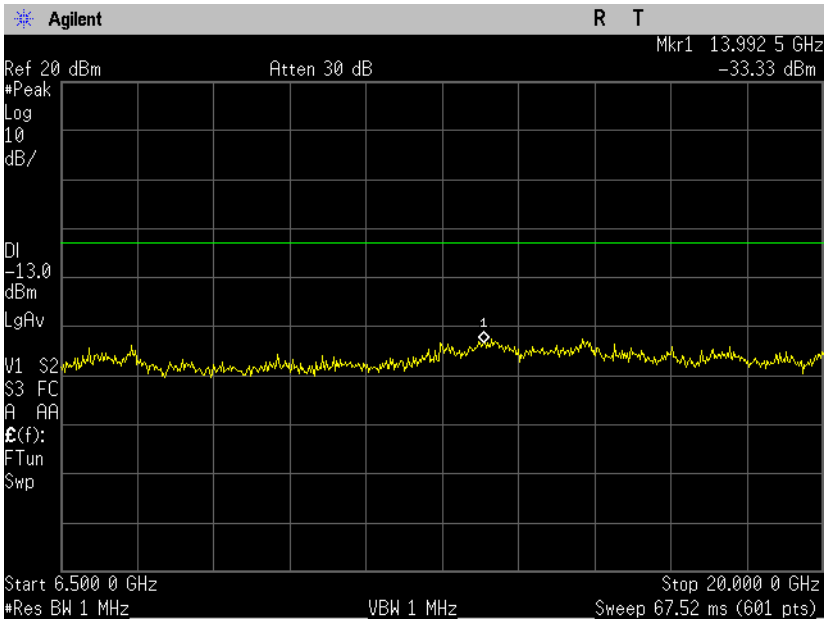
Modulation: CDMA 2000 1xEVDO
Plot 4.5.28



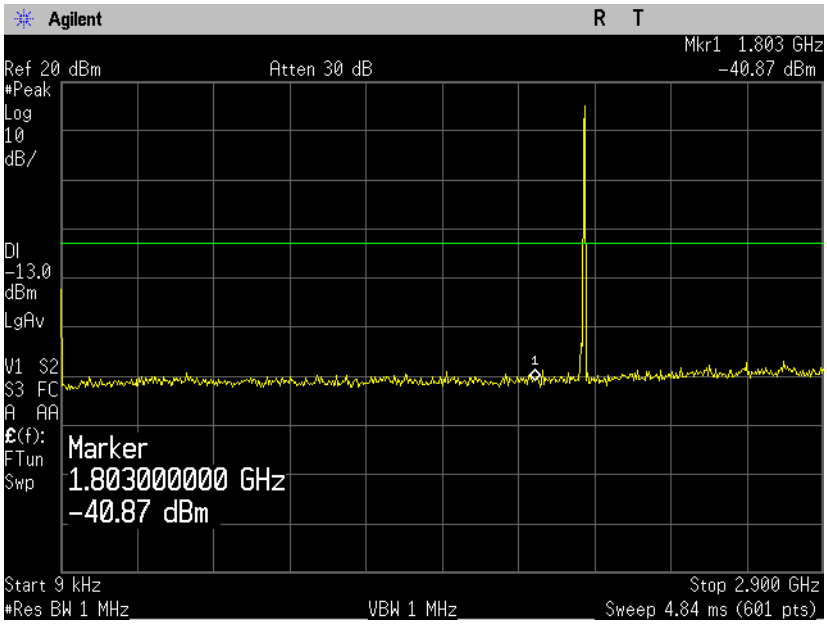
Plot 4.5.29



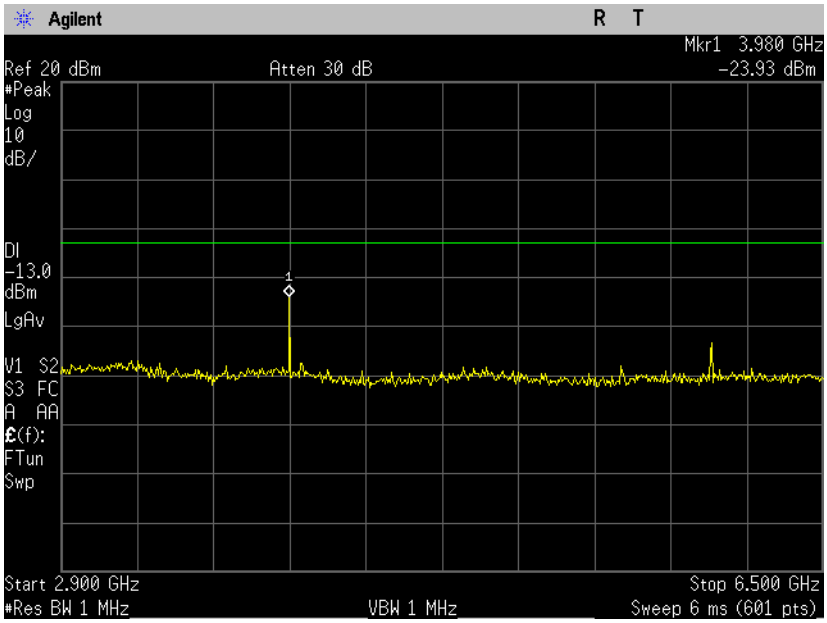
Plot 4.5.30



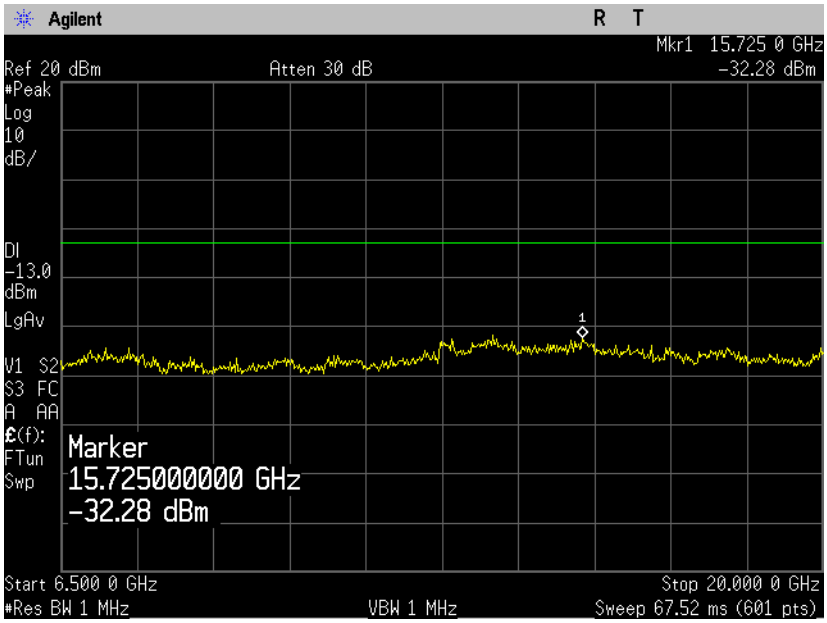
Modulation: GSM –GMSK
Plot 4.5.31



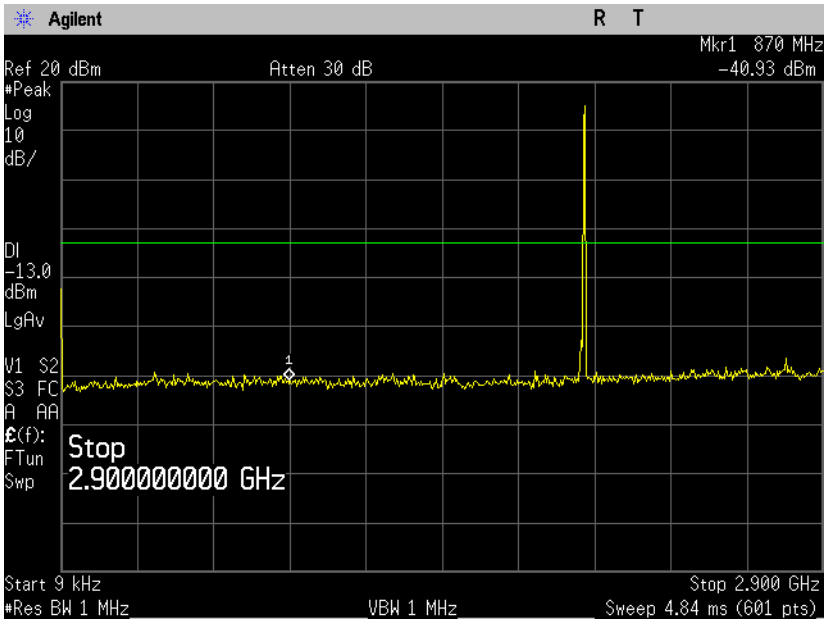
Plot 4.5.32



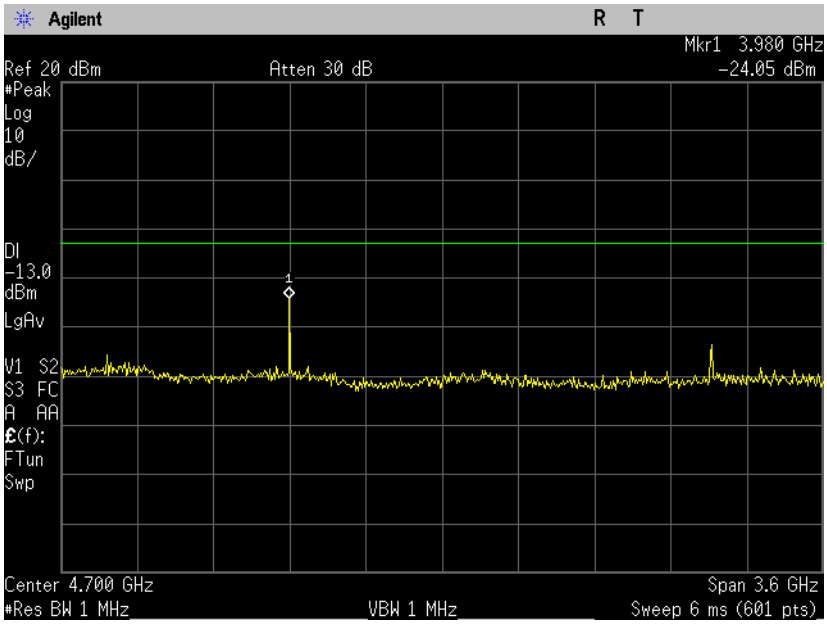
Plot 4.5.33



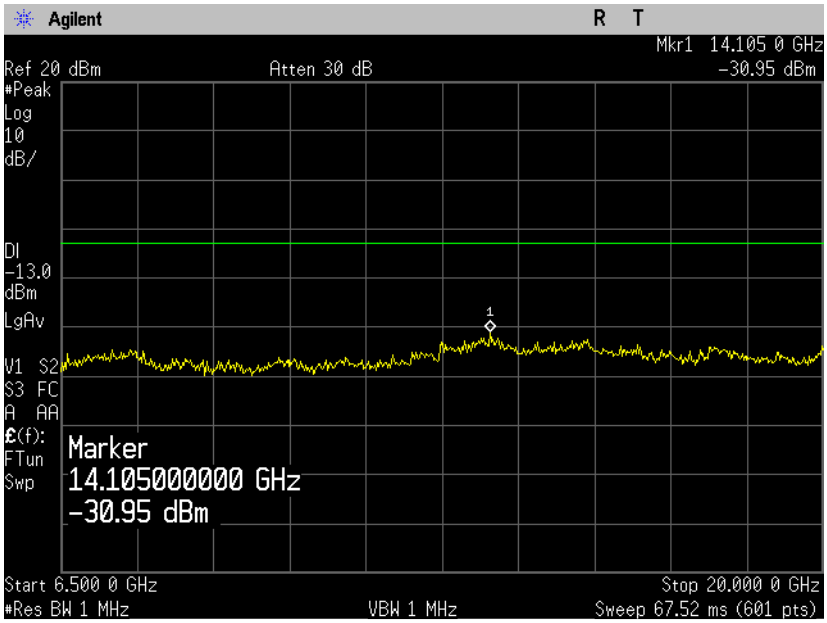
Modulation: EDGE-8PSK
Plot 4.5.34



Plot 4.5.35



Plot 4.5.36



4.6. Block Edge Emissions and Inter-Modulation, Conducted Measurements

Reference document:	**47 CFR §24.238**		
Test Requirements:	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log (P) dB*. In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 1% of the EBW may be employed.		
Test setup:	See sec 2.3	**Pass**	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 30kHz, VBW**:** 300kHz		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.6.1 - Plot 4.6.16	

*It translates to a limit of –13dBm

Test results:

Modulation: CDMA 2000

Frequency [MHz]	Emission Level* [dBm]	Limit [dBm]	Reference	Actual Attenuation [dBc]	Margin [dB]	Result
1930.7 & 1931.950	15.0					Carrier
1930	-32.10	-13	4.6.2	47.1	-19.1	pass
All other Spurious levels at least 20 dB blow the limit						Pass
1989.3 & 1988.05	15.0					Carrier
1990	-24.77	-13	4.6.10	39.77	-11.77	Pass
All other Spurious levels at least 20 dB blow the limit						Pass

***** Spurious Emission [dBm] = Measured [dBm] - Attenuations [dB]

Modulation: CDMA 2000 1xEVDO

Frequency [MHz]	Emission Level* [dBm]	Limit [dBm]	Reference	Actual Attenuation [dBc]	Margin [dB]	Result
1930.7 & 1931.950	15.0					Carrier
1930	-33.71	-13	Plot 4.6.4	48.71	-20.71	pass
All Other Spurious at least 20 dB blow the limit						Pass
1989.3 & 1988.05	15.0					Carrier
1990	-23.67	-13	Plot 4.6.12	38.67	-10.67	Pass
All Spurious at least 20 dB blow the limit						Pass

***** Spurious Emission [dBm] = Measured [dBm] - Attenuations [dB]

Modulation: GSM –GMSK

Frequency [MHz]	Emission Level* [dBm]	Limit [dBm]	Reference	Actual Attenuation [dBc]	Margin [dB]	Result
1930.2 & 1930.4	15.0					Carrier
1930	-22.27	-13	Plot 4.6.6	37.27	-9.27	pass
All Other Spurious at least 10 dB blow the limit						Pass
1989.8 & 1989.6	15.0					Carrier
1990	-20.6	-13	Plot 4.6.14	35.6	-7.6	Pass
All Spurious at least 20 dB blow the limit						Pass

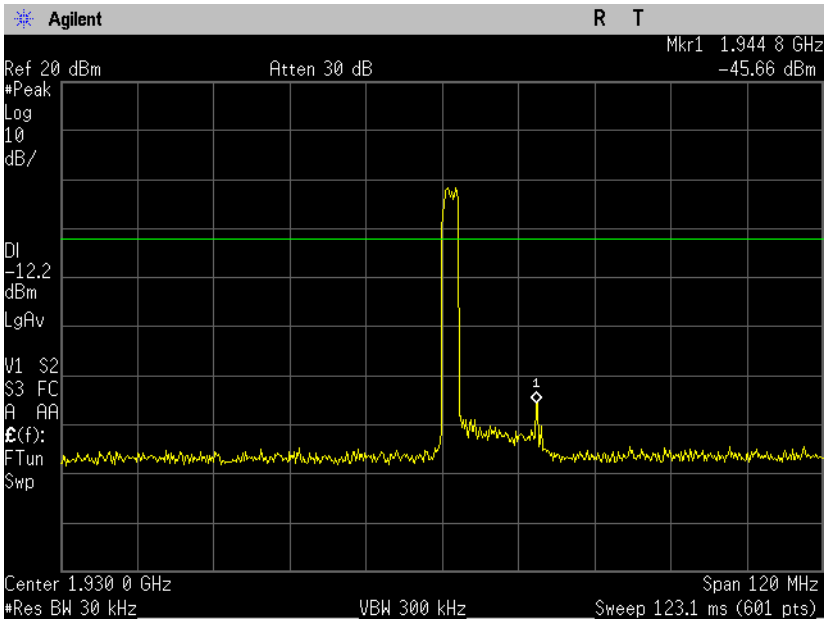
***** Spurious Emission [dBm] = Measured [dBm] - Attenuations [dB]

Modulation: EDGE-8PSK

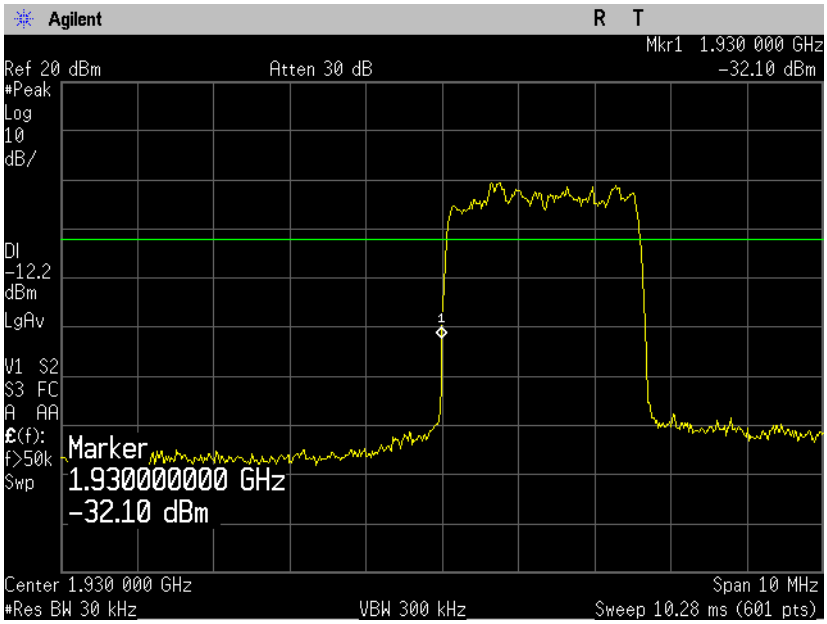
Frequency [MHz]	Emission Level* [dBm]	Limit [dBm]	Reference	Actual Attenuation [dBc]	Margin [dB]	Result
1930.2 & 1930.4	15.0					Carrier
1930	-26.20	-13	Plot 4.6.8	41.2	-13.2	pass
All Other Spurious at least 20 dB blow the limit						Pass
1989.8 & 1989.6	15.0					Carrier
1990	-26.88	-13	Plot 4.6.16	41.88	-13.88	Pass
All Spurious at least 20 dB blow the limit						Pass

***** Spurious Emission [dBm] = Measured [dBm] - Attenuations [dB]

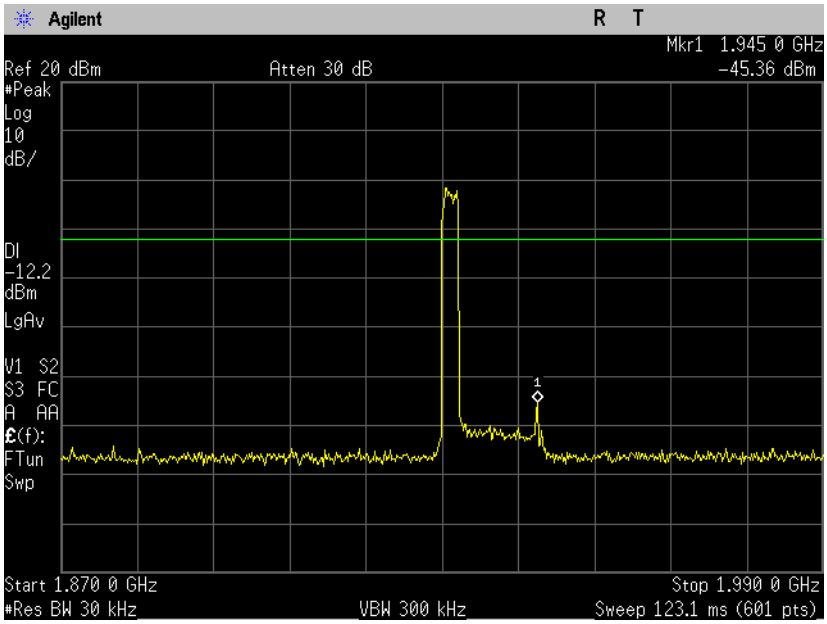
Lower frequency
Modulation: CDMA 2000
Plot 4.6.1



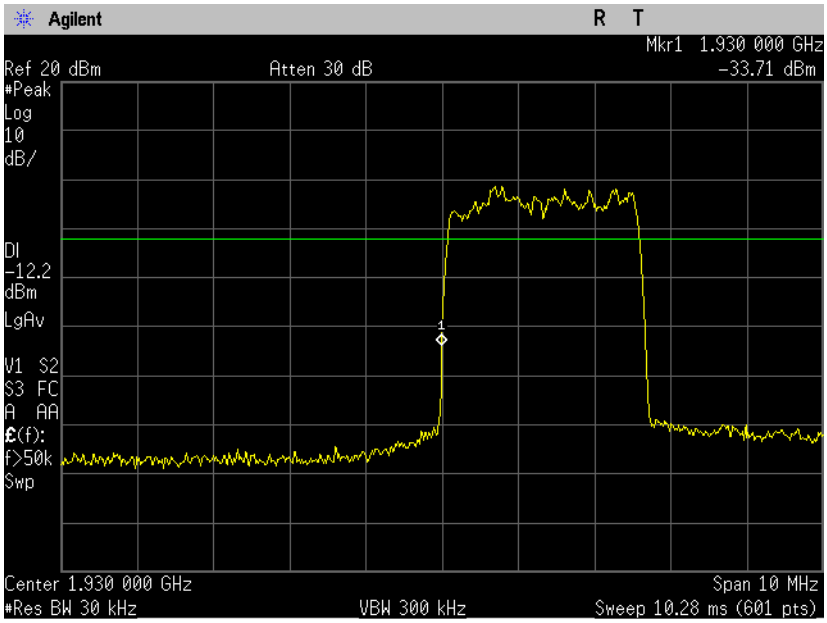
Plot 4.6.2



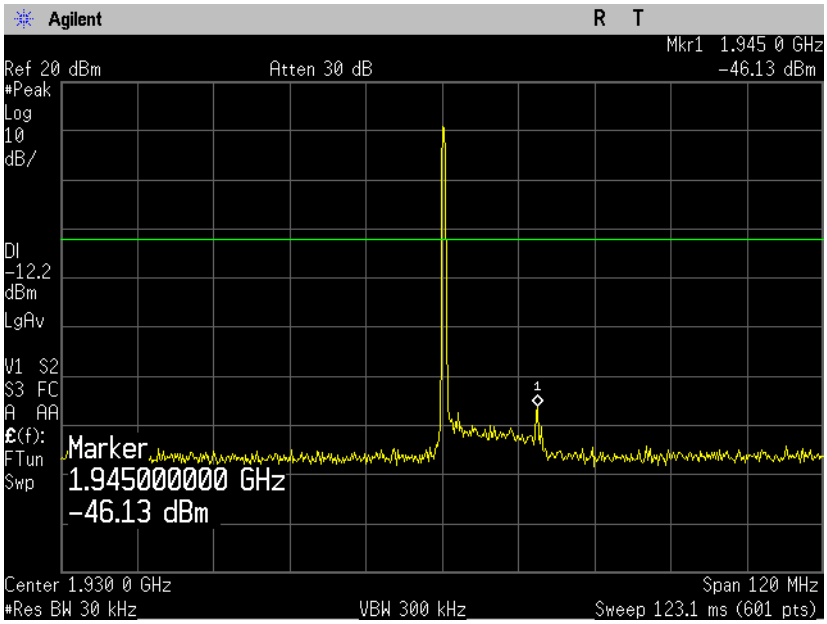
Modulation: CDMA 2000 1xEVDO
Plot 4.6.3



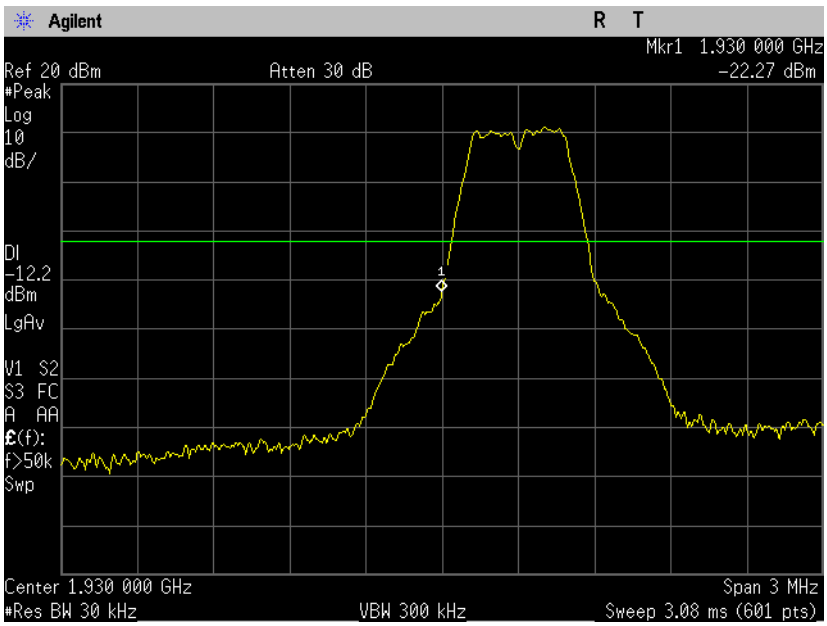
Plot 4.6.4



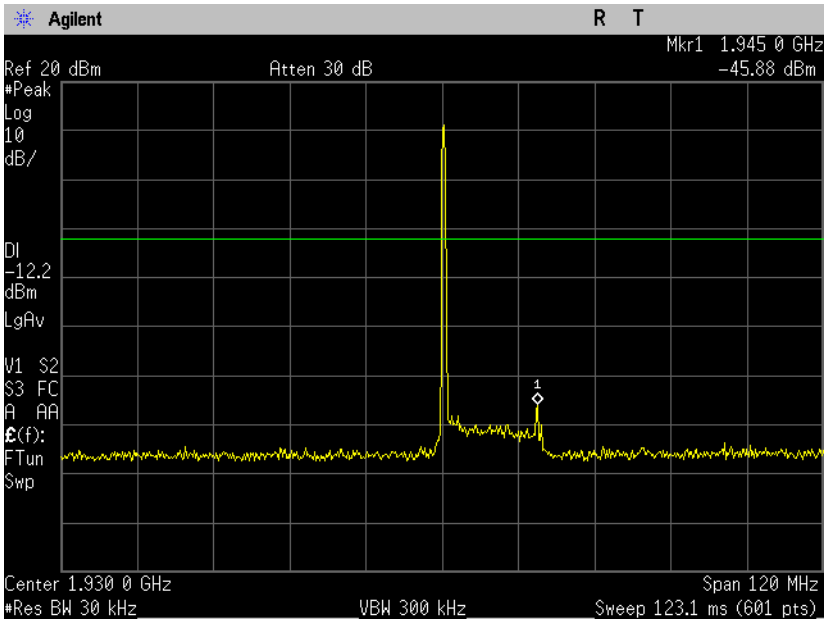
Modulation: GSM –GMSK
Plot 4.6.5



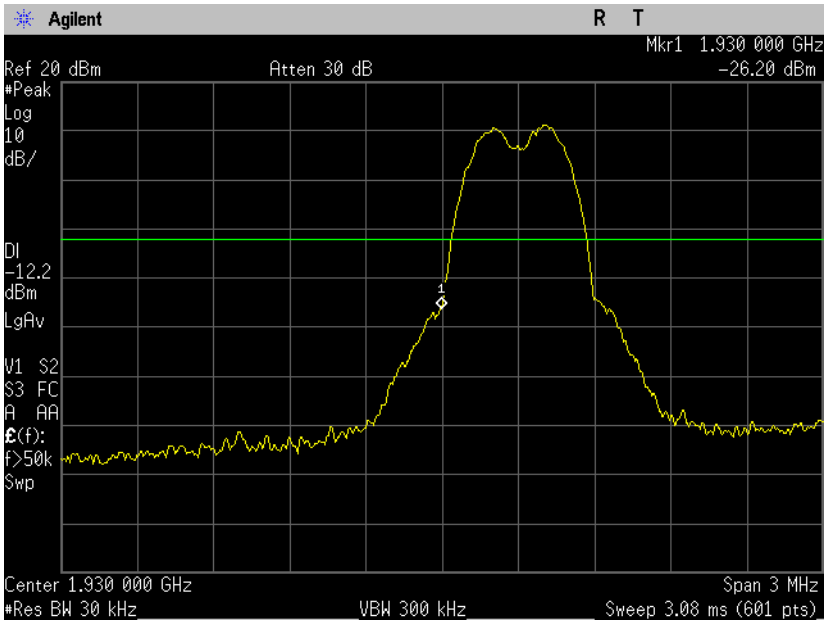
Plot 4.6.6



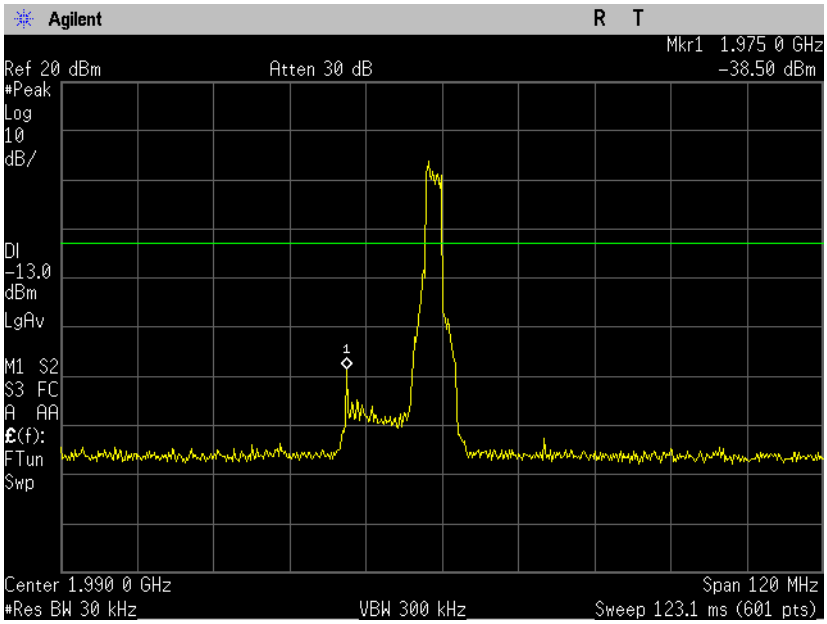
Modulation: EDGE-8PSK
Plot 4.6.7



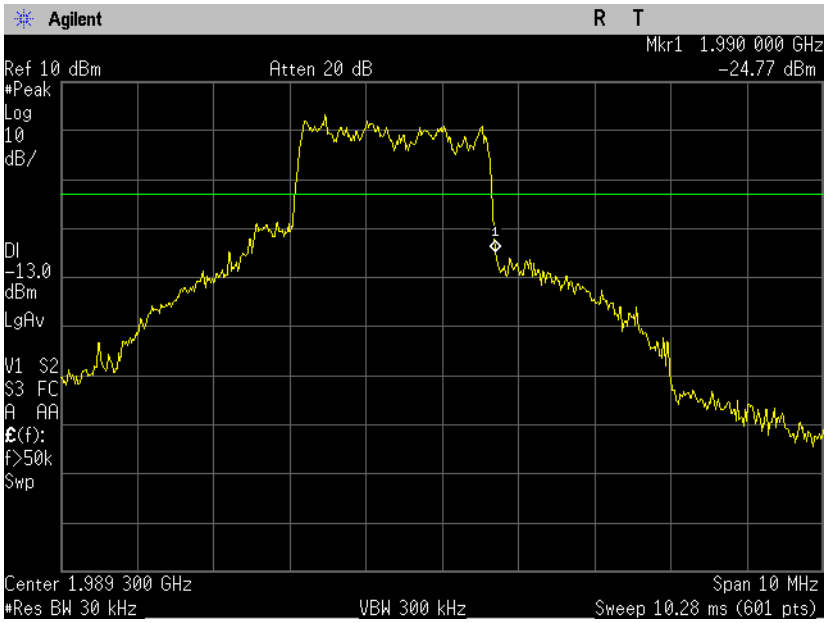
Plot 4.6.8



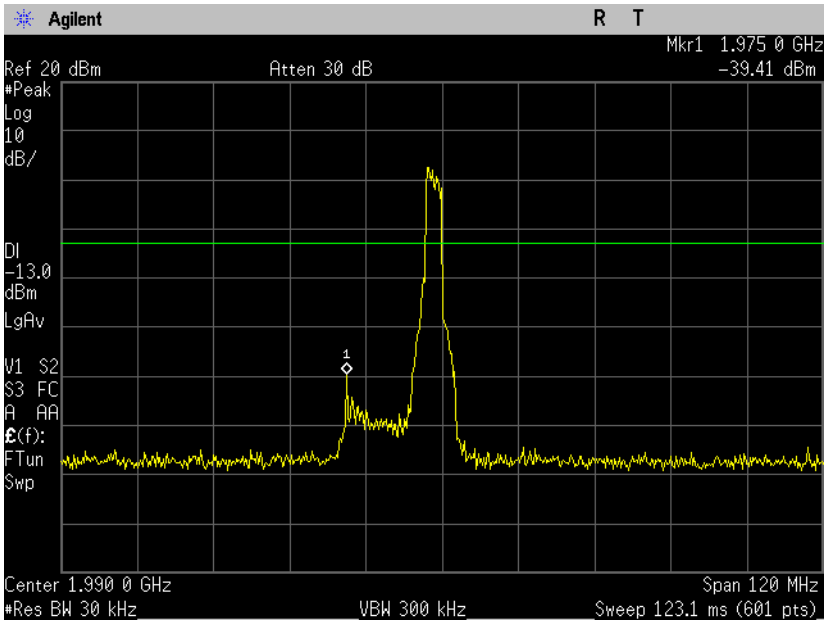
Upper Frequency
Modulation: CDMA 2000
Plot 4.6.9



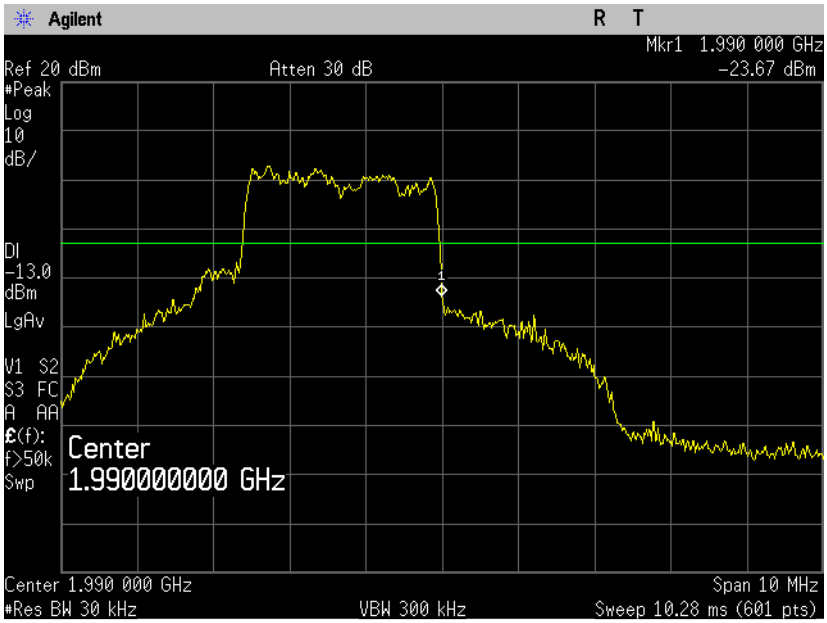
Plot 4.6.10



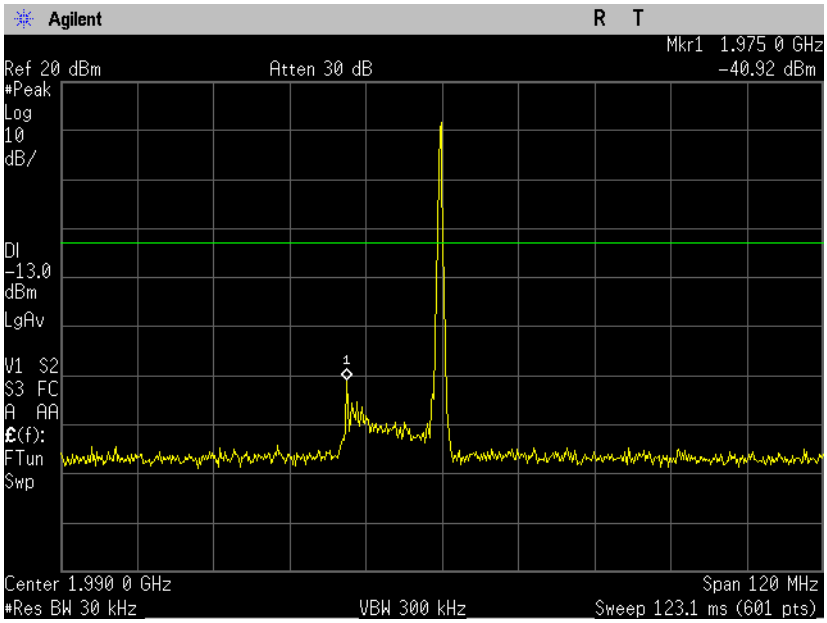
Modulation: CDMA 2000 1xEVDO
Plot 4.6.11



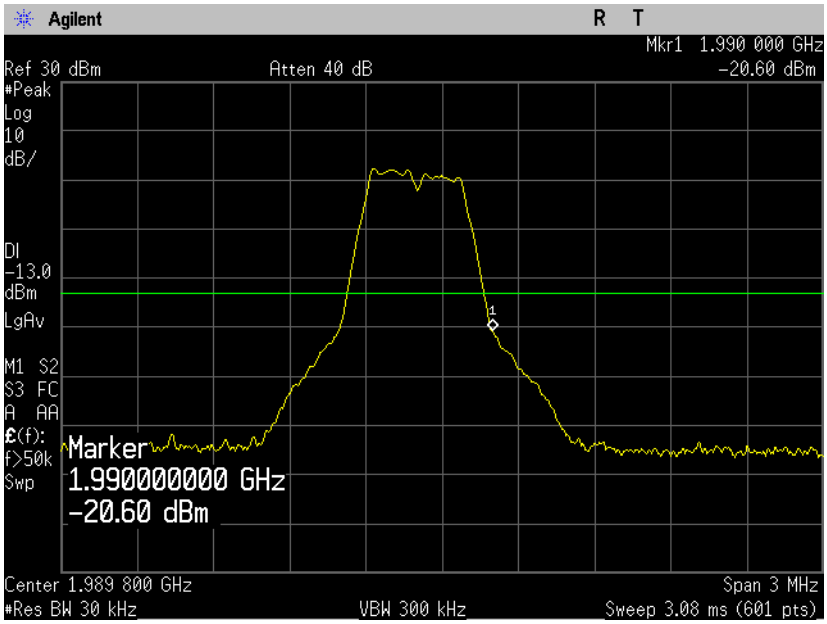
Plot 4.6.12



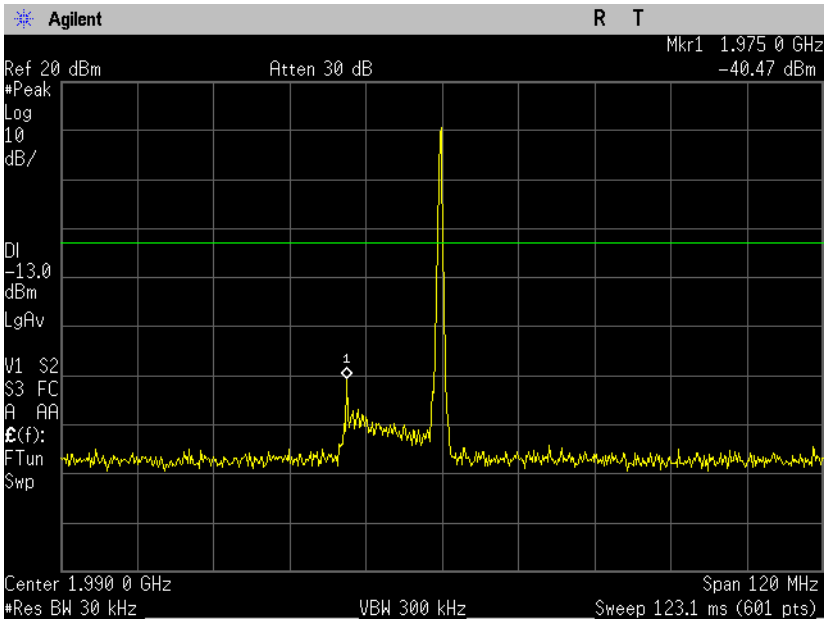
Modulation: GSM –GMSK
Plot 4.6.13



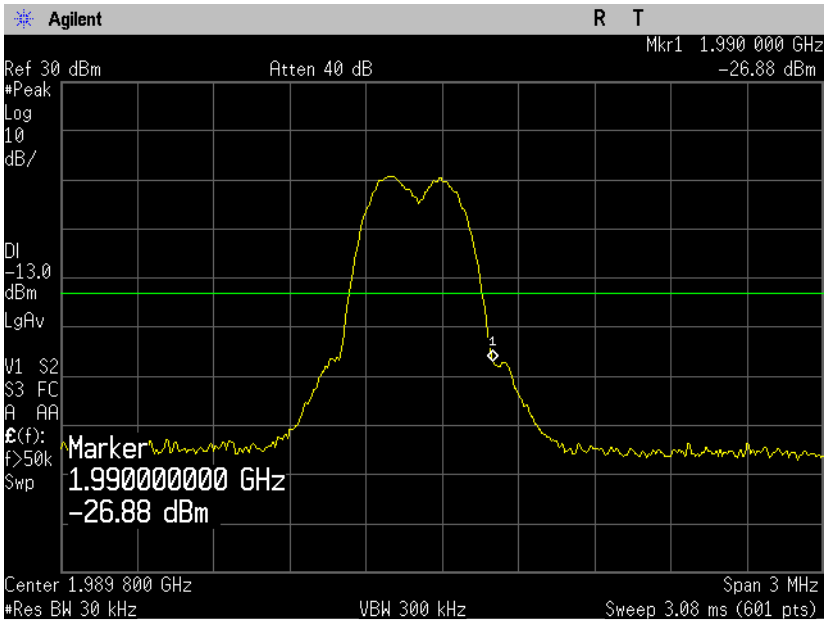
Plot 4.6.14



Modulation: EDGE-8PSK
Plot 4.6.15



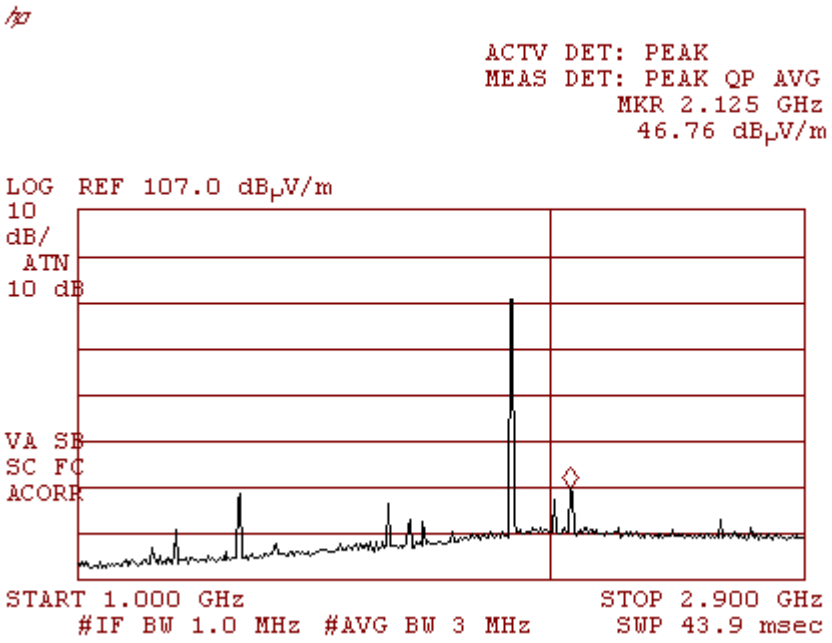
Plot 4.6.16



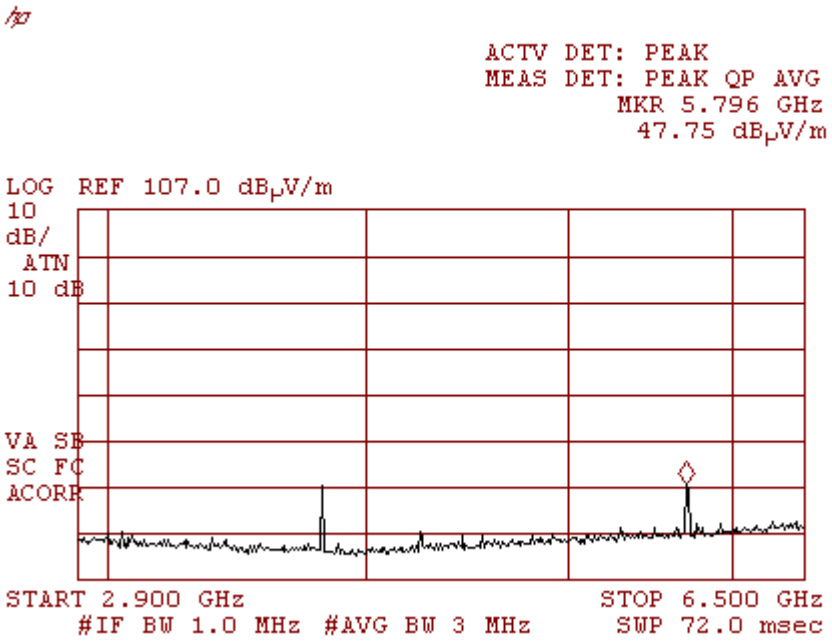
5. Appendix

Appendix A: Spurious emissions test plots PCS 1900 & 1930.2MHz

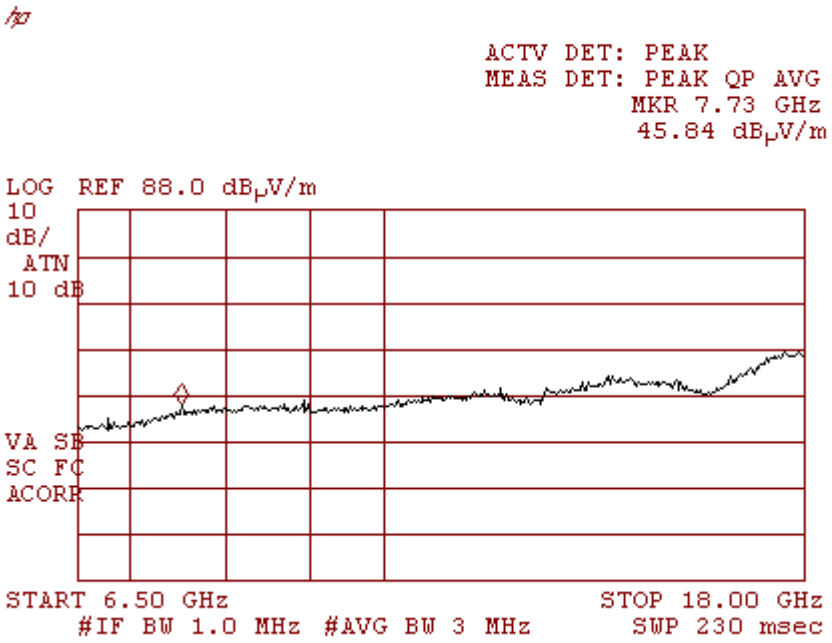
Lowest frequency
Horizontal & Vertical Polarization
Plot 1



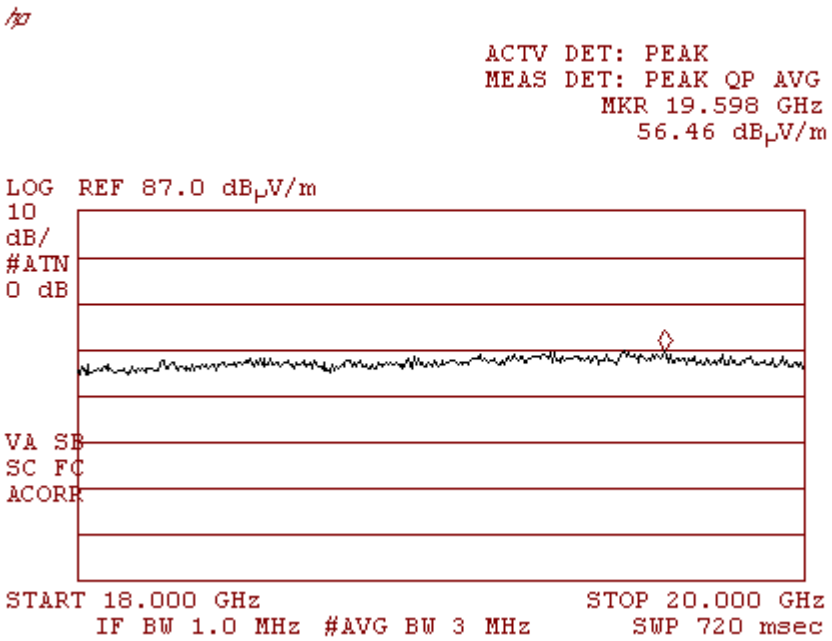
Horizontal & Vertical Polarization
Plot 2



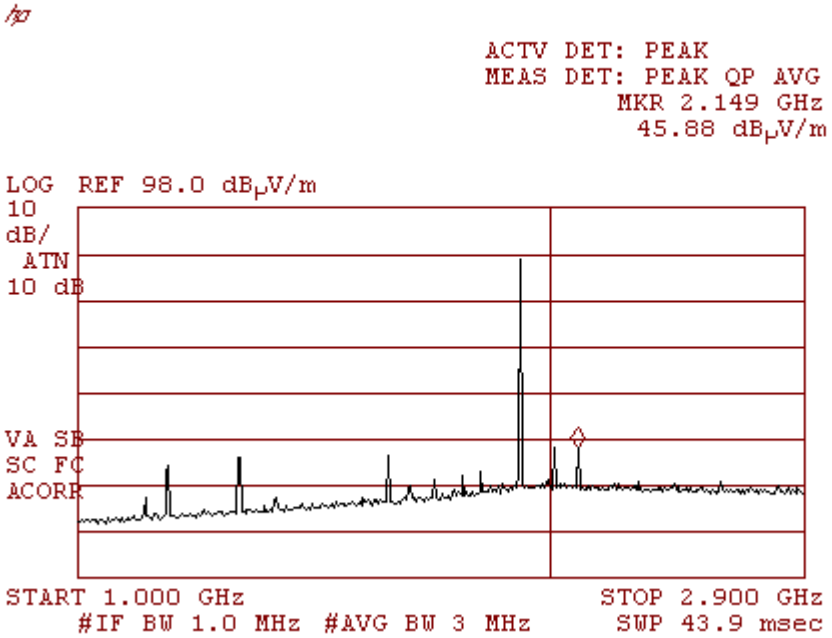
Horizontal & Vertical Polarization
Plot 3



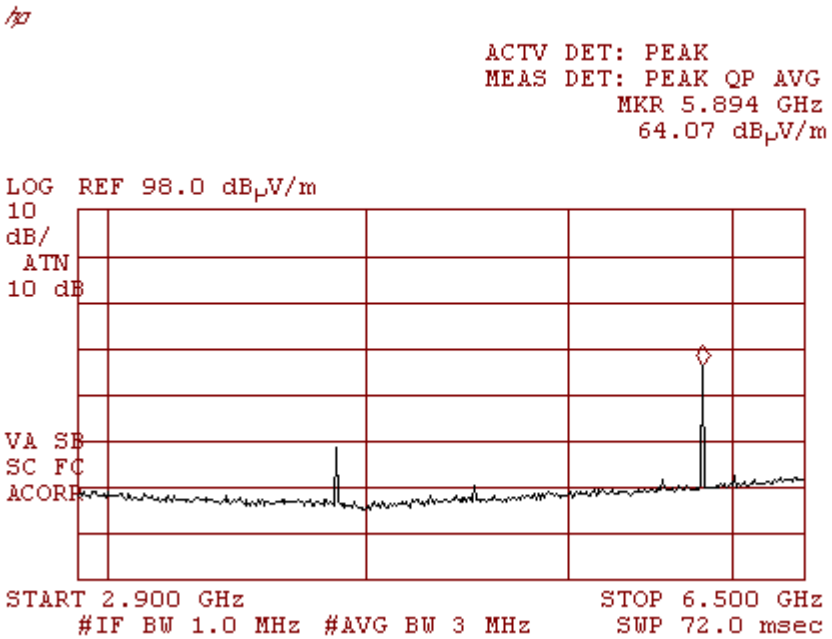
Horizontal & Vertical Polarization
Plot 4



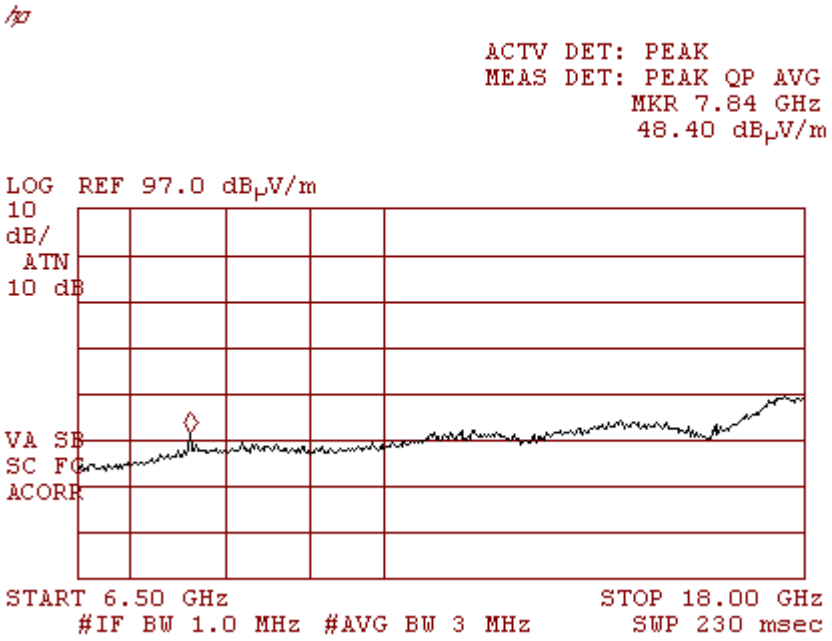
Middle frequency
1960 MHz
Horizontal & Vertical Polarization
Plot 5



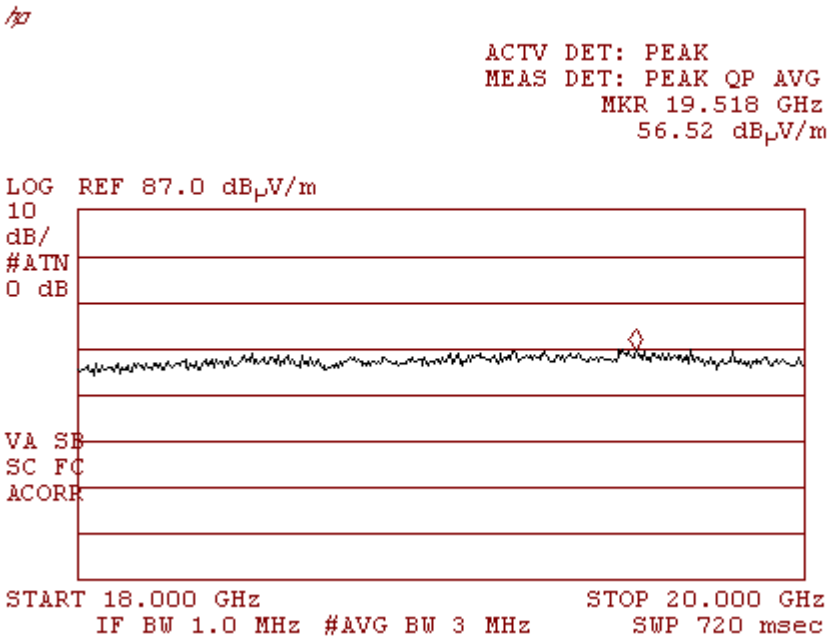
Horizontal & Vertical Polarization
Plot 6



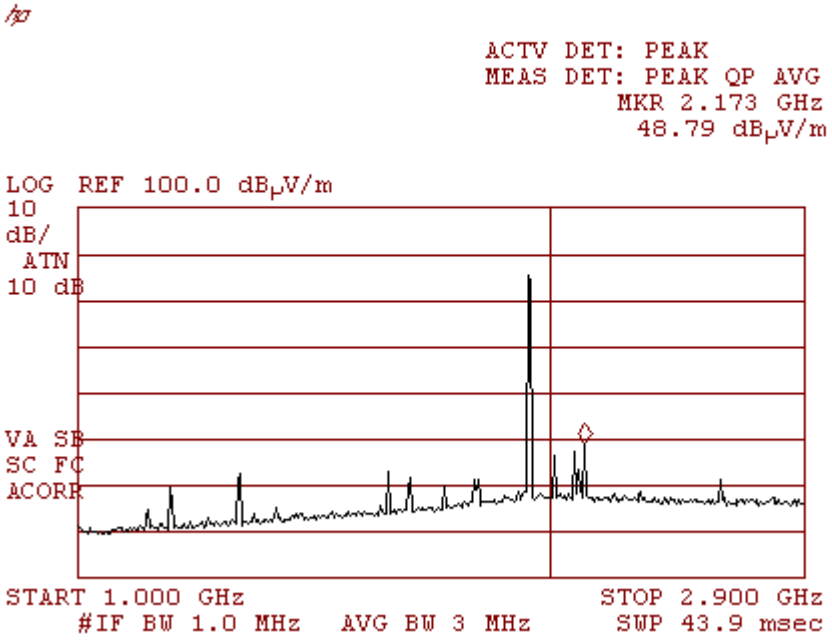
Horizontal & Vertical Polarization
Plot 7



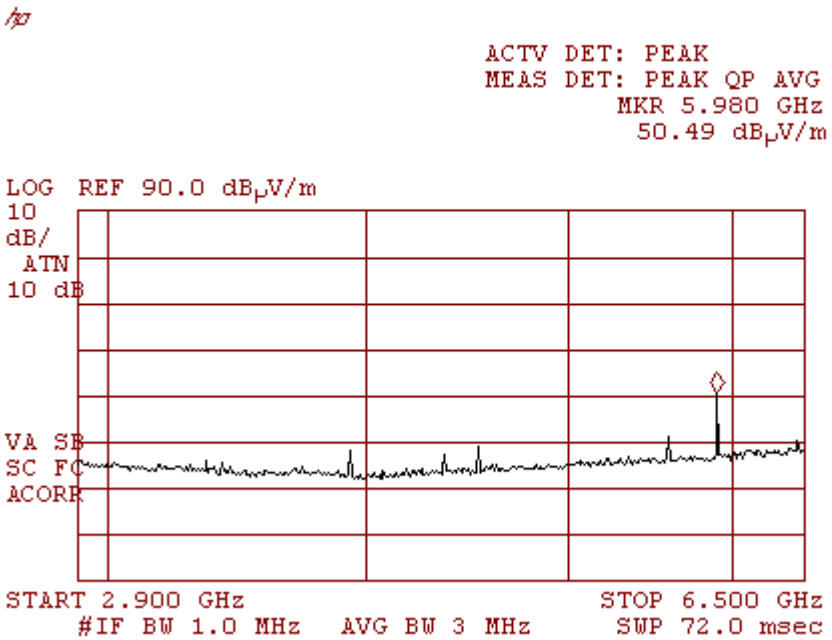
Horizontal & Vertical Polarization
Plot 8



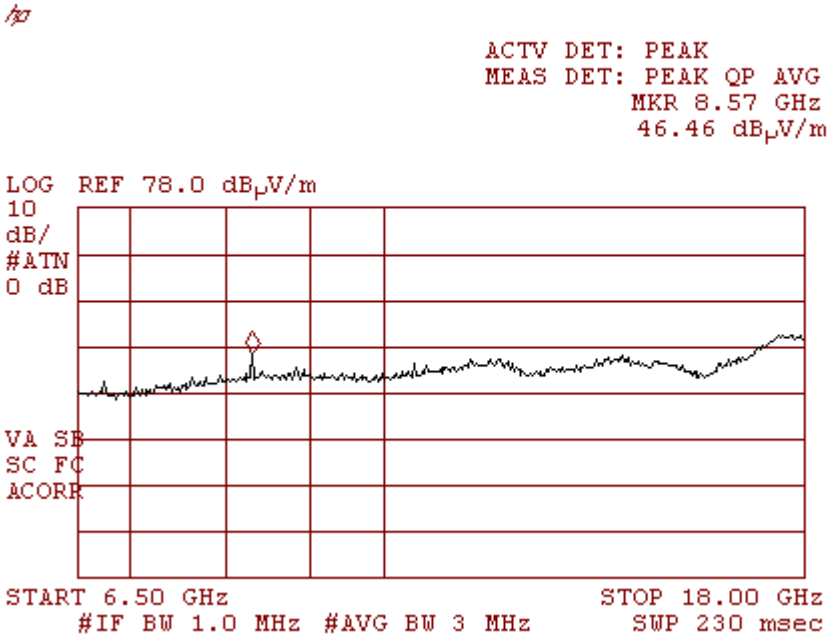
Upper frequency
1989.8 MHz, CW
Horizontal & Vertical Polarization
Plot 9



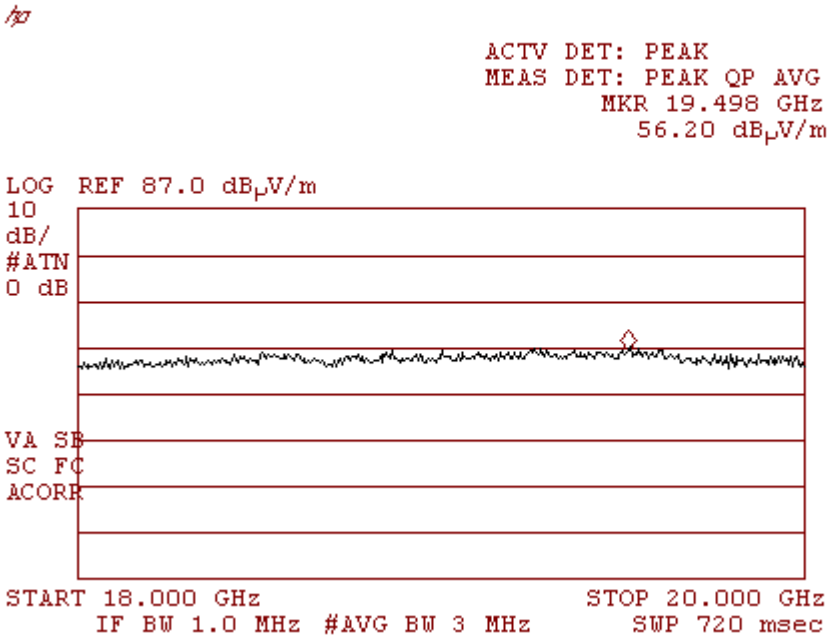
Horizontal & Vertical Polarization
Plot 10



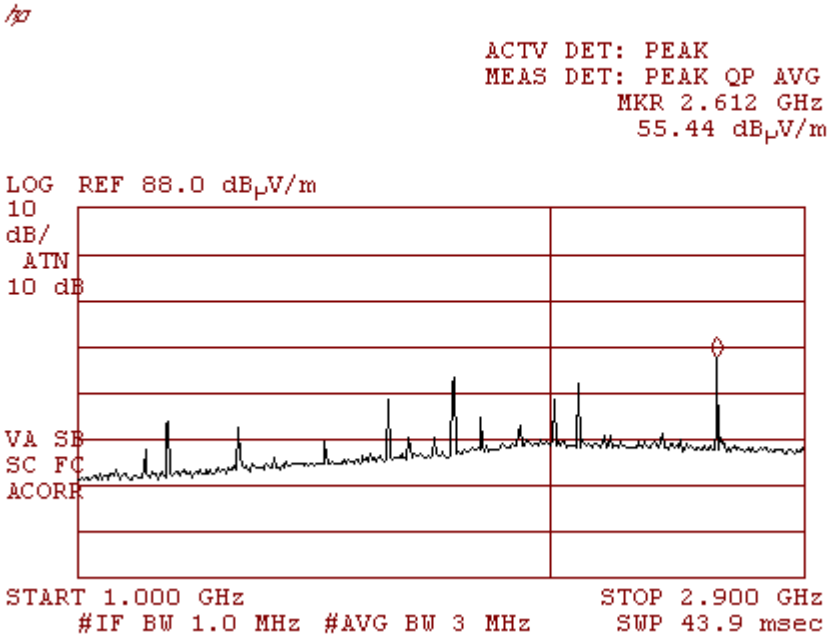
Horizontal & Vertical Polarization
Plot 11



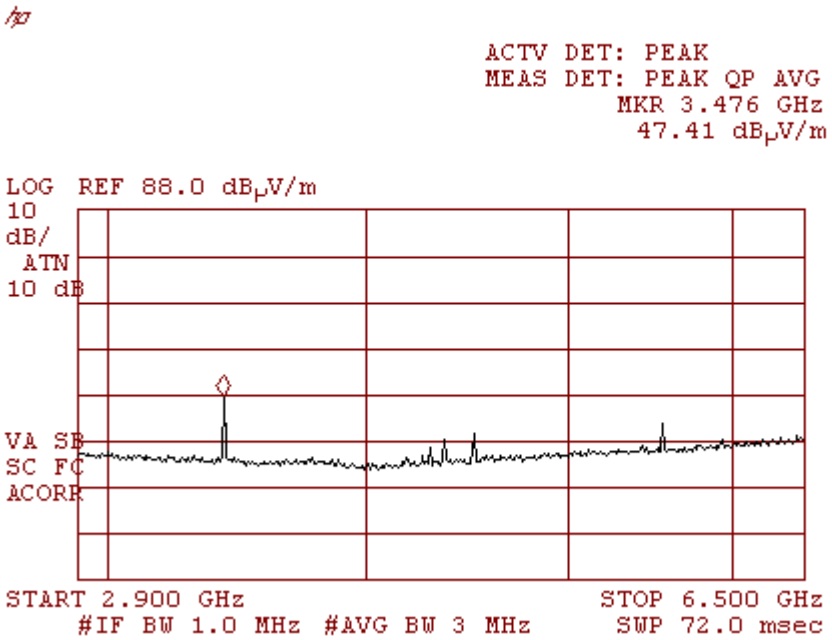
Plot 12



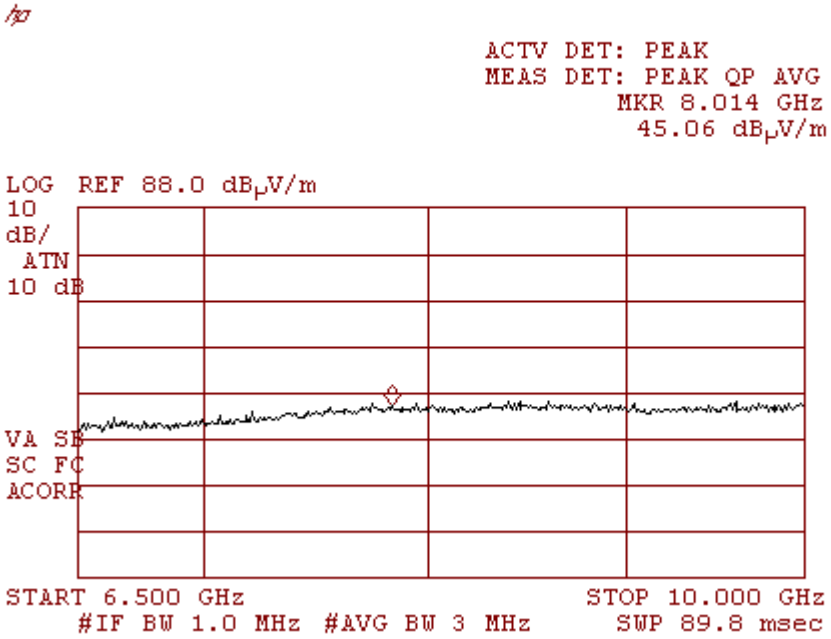
GSM 850
Lowest frequency 869.2 MHz
Horizontal & Vertical Polarization
Plot 13



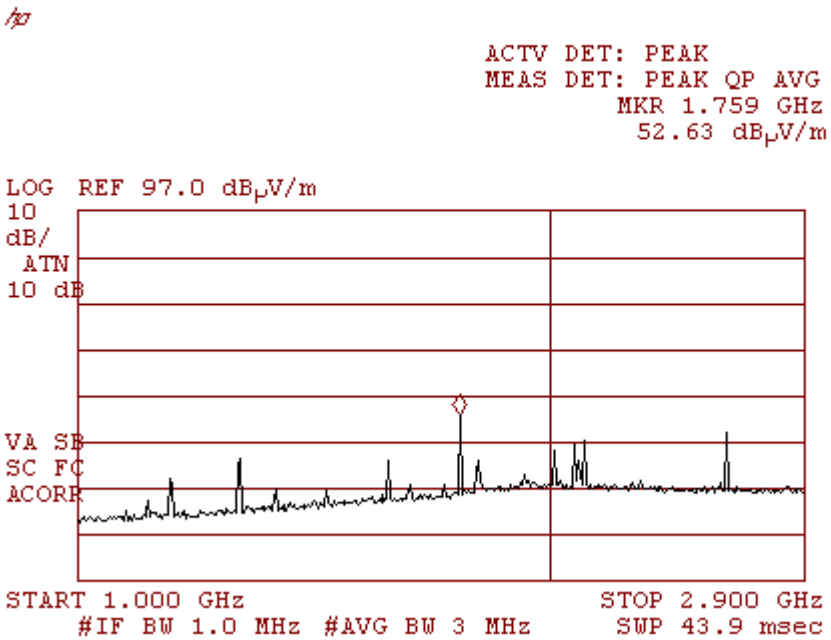
Horizontal & Vertical Polarization
Plot 14



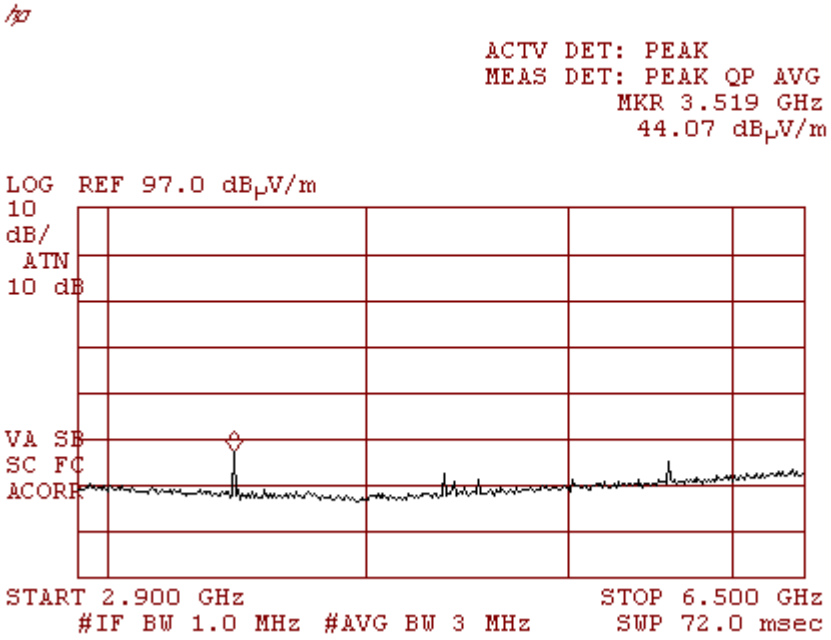
Horizontal & Vertical Polarization
Plot 15



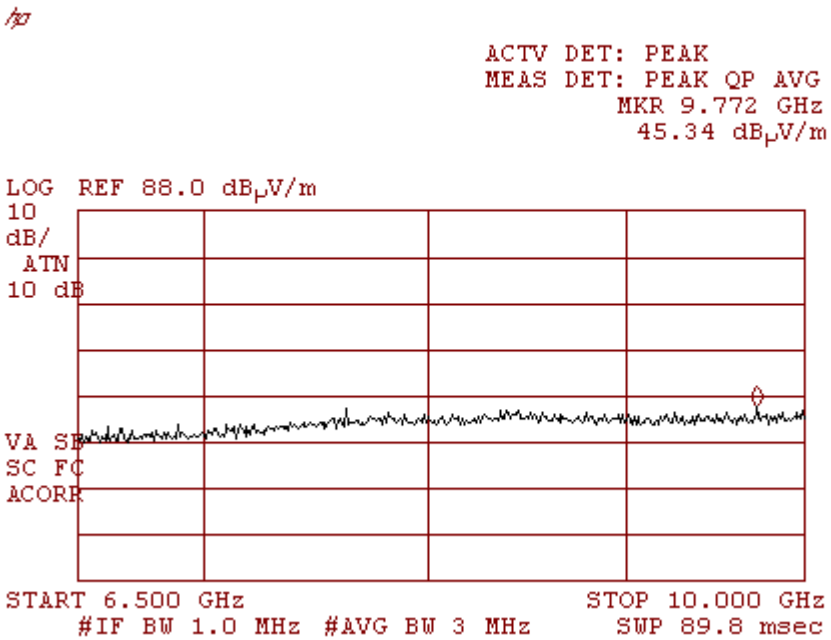
Middle frequency
880 MHz
Horizontal & Vertical Polarization
Plot 16



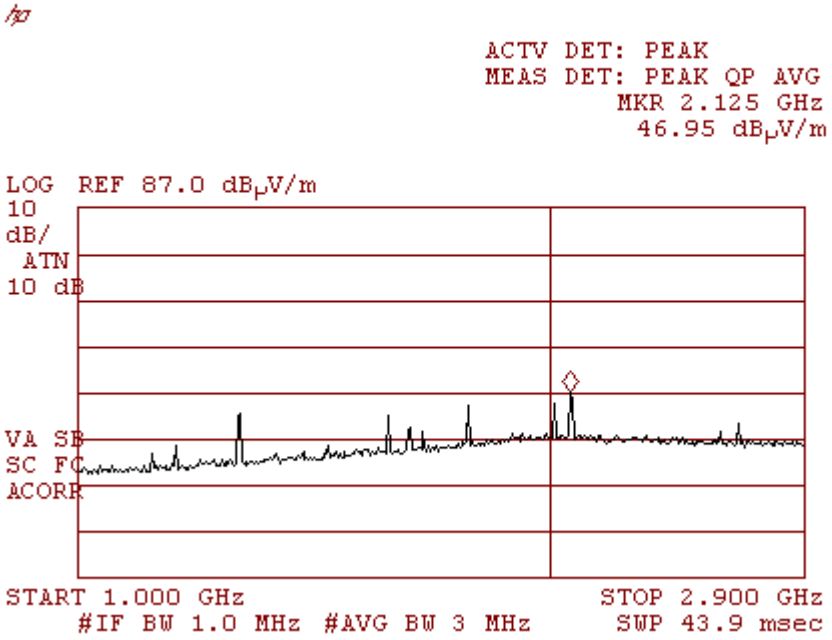
Horizontal & Vertical Polarization
Plot 17



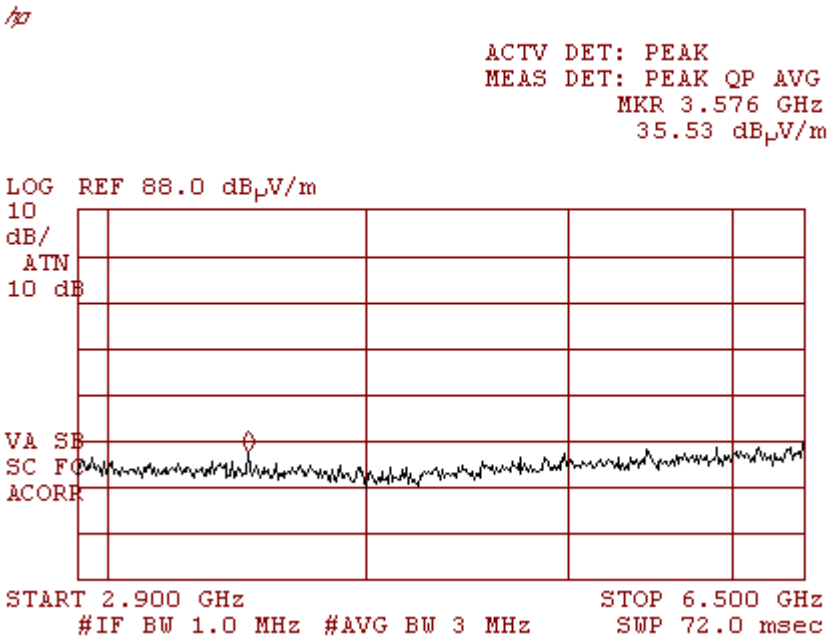
Horizontal & Vertical Polarization
Plot 18



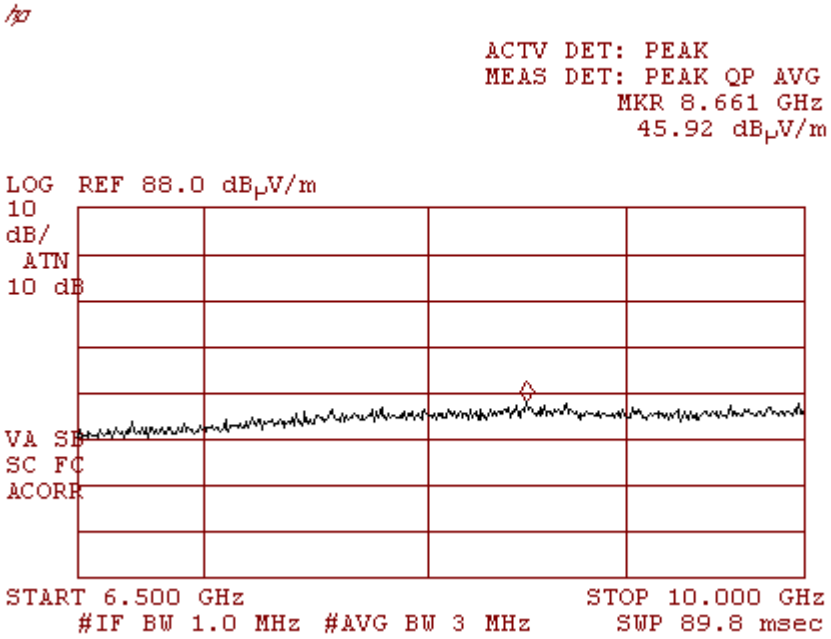
Highest frequency 893.8 MHz
Horizontal & Vertical Polarization
Plot 19



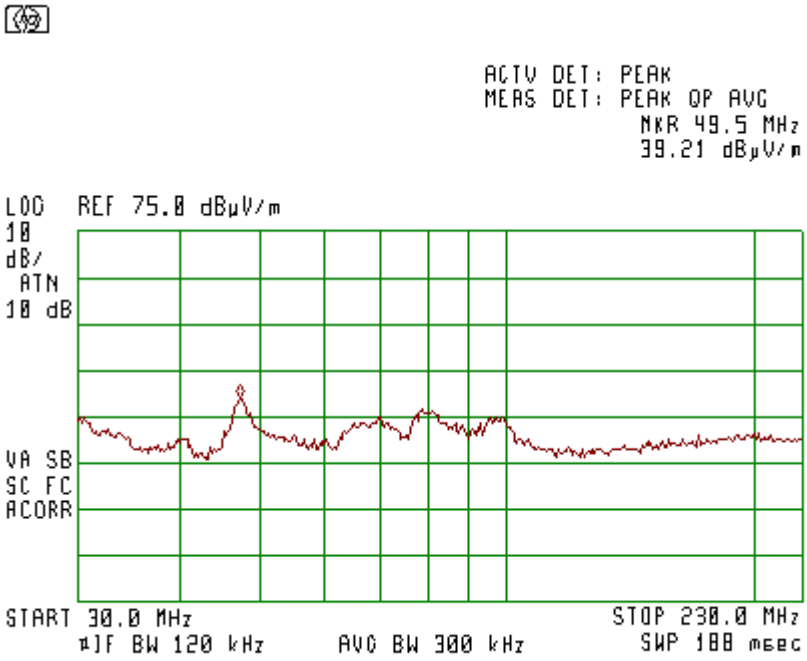
Horizontal & Vertical Polarization
Plot 20



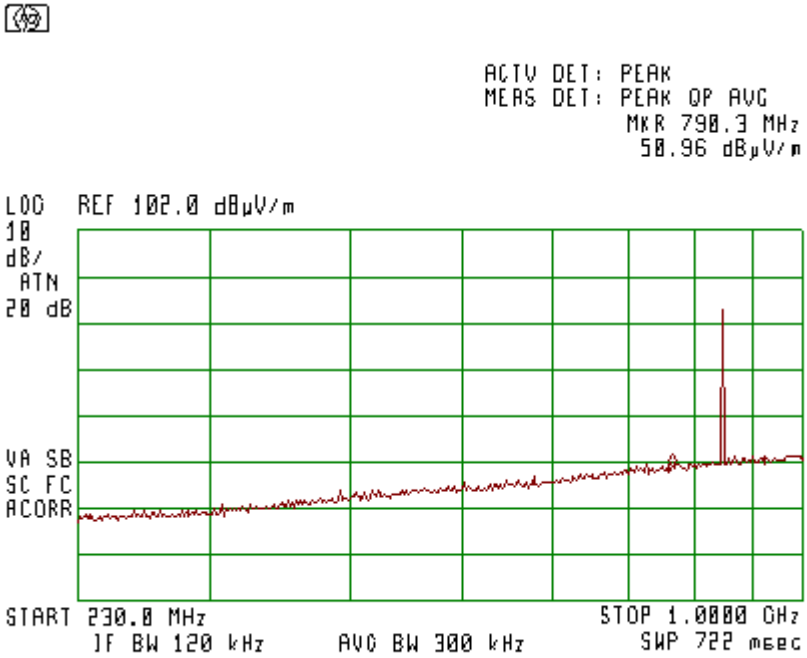
Horizontal & Vertical Polarization
Plot 21



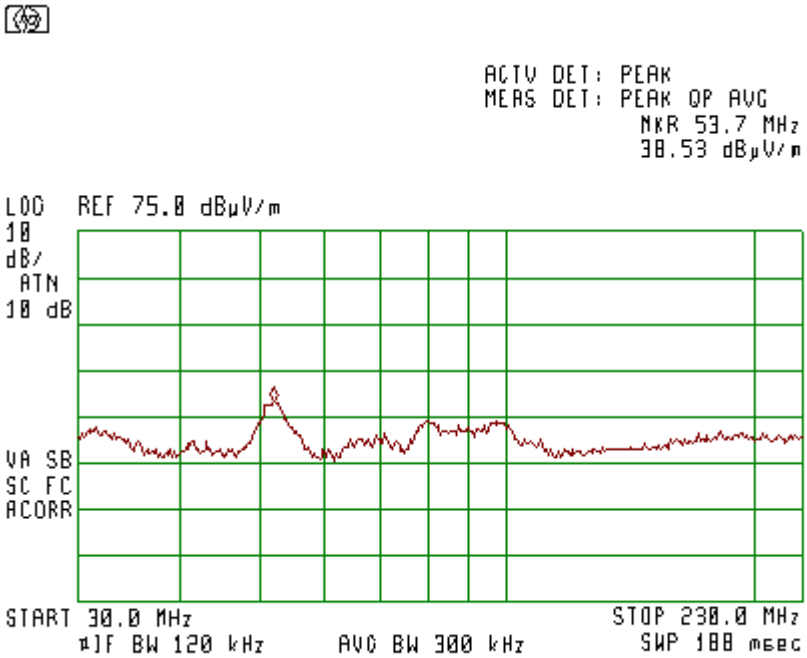
Lowest frequency
Worst case of all frequency Bands
Vertical & Horizontal Polarization
Plot 22



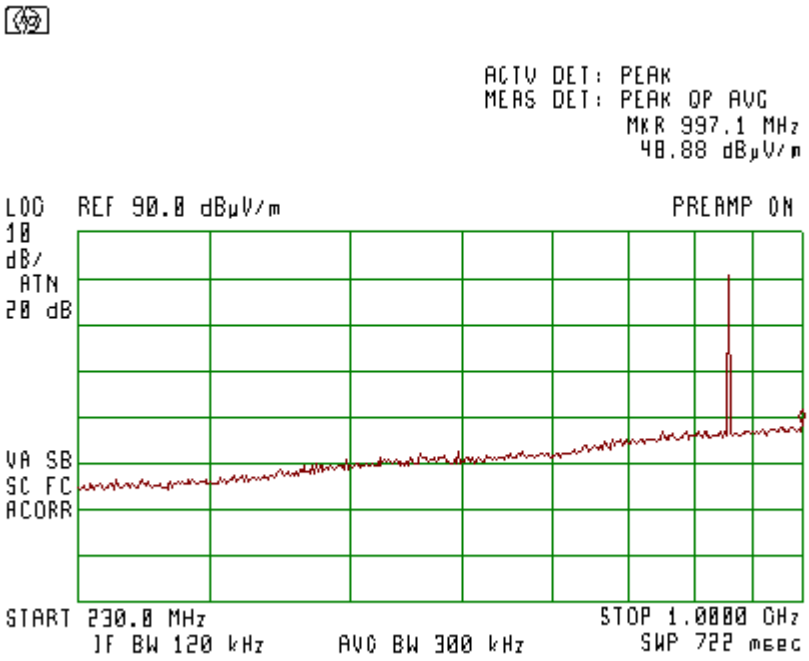
Plot 23



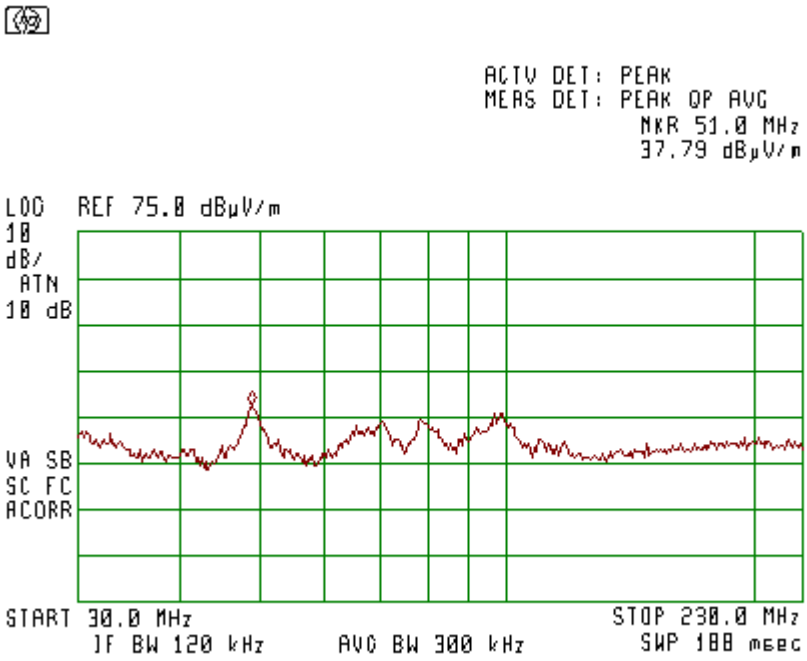
Middle Frequency
Plot 24



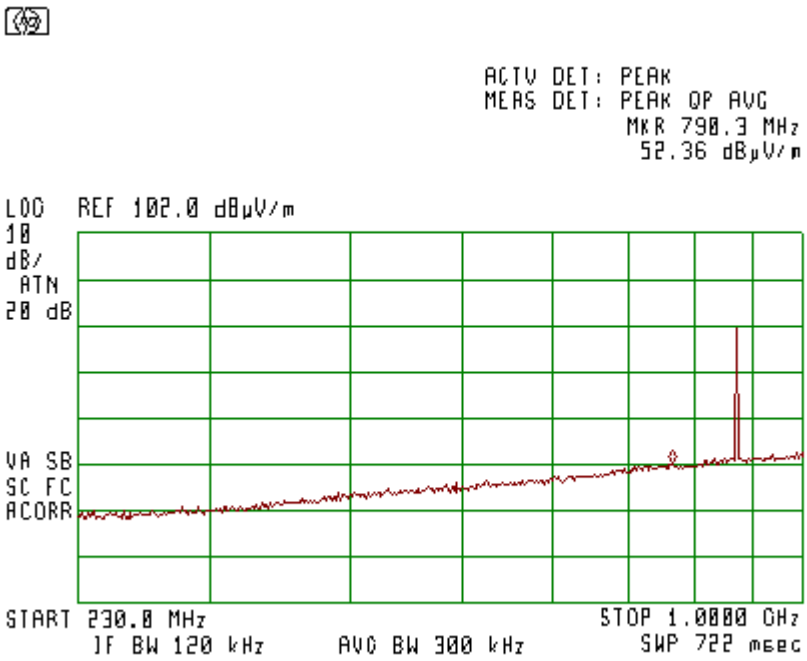
Plot 25



Highest Frequency
Horizontal Polarization
Plot 26



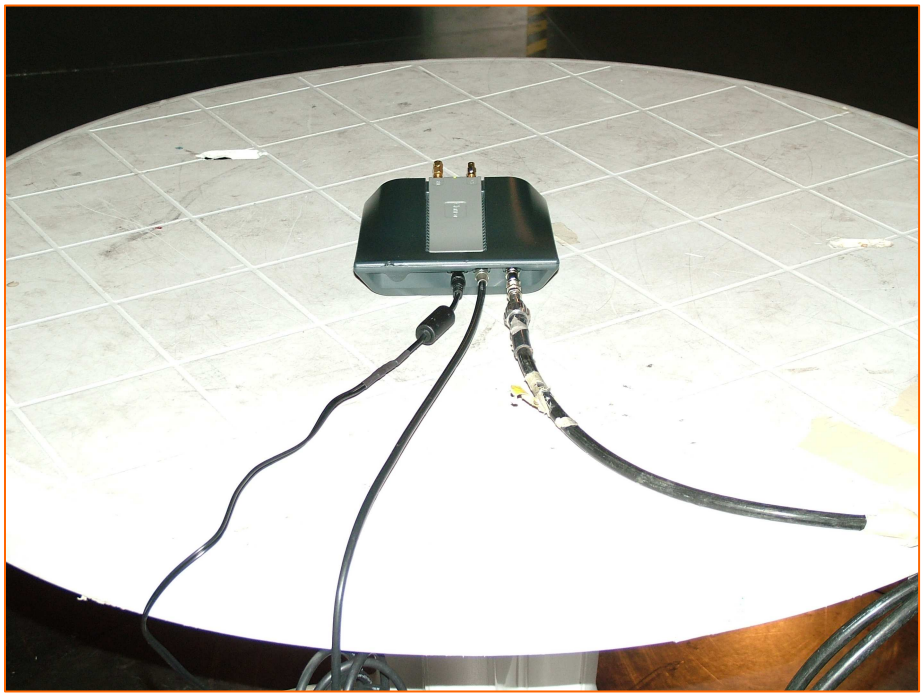
Vertical Polarization
Plot 27



Appendix B: Test Photographs

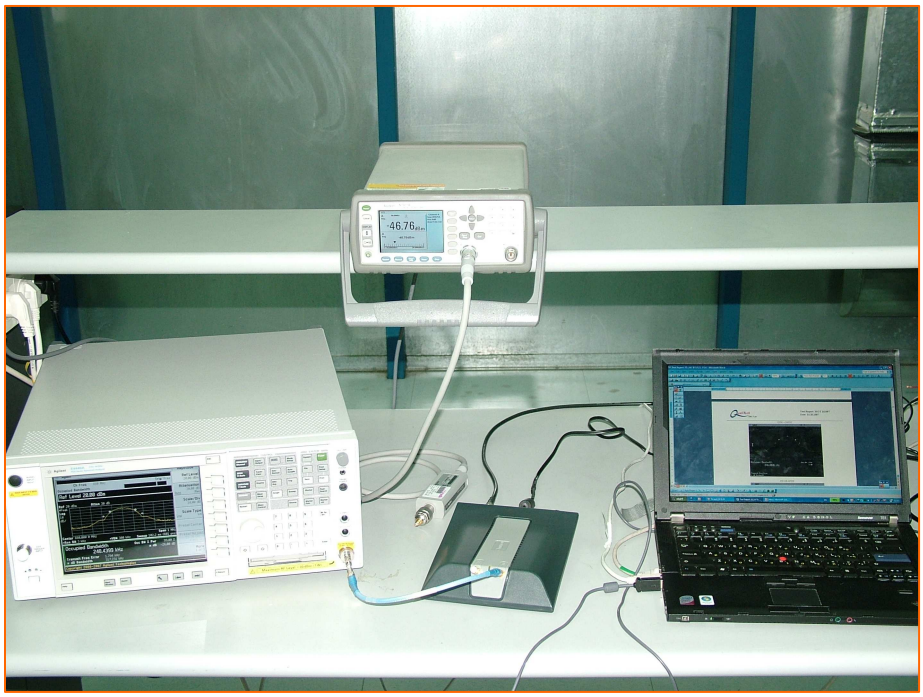
Radiated Measurements
Photograph 1

Photograph 2

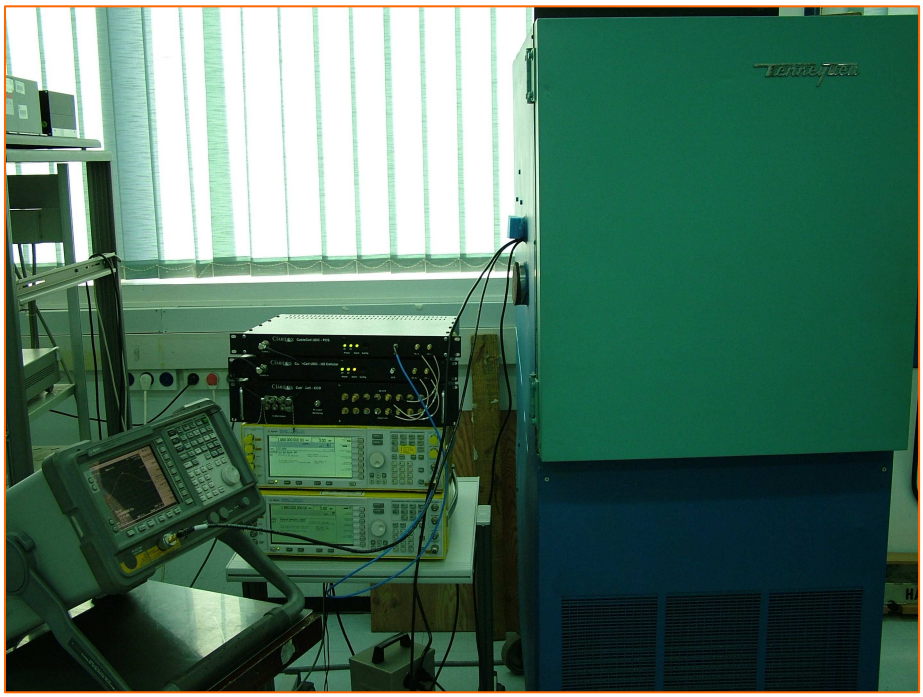


Photograph 3

Conducted measurements
Photograph 4

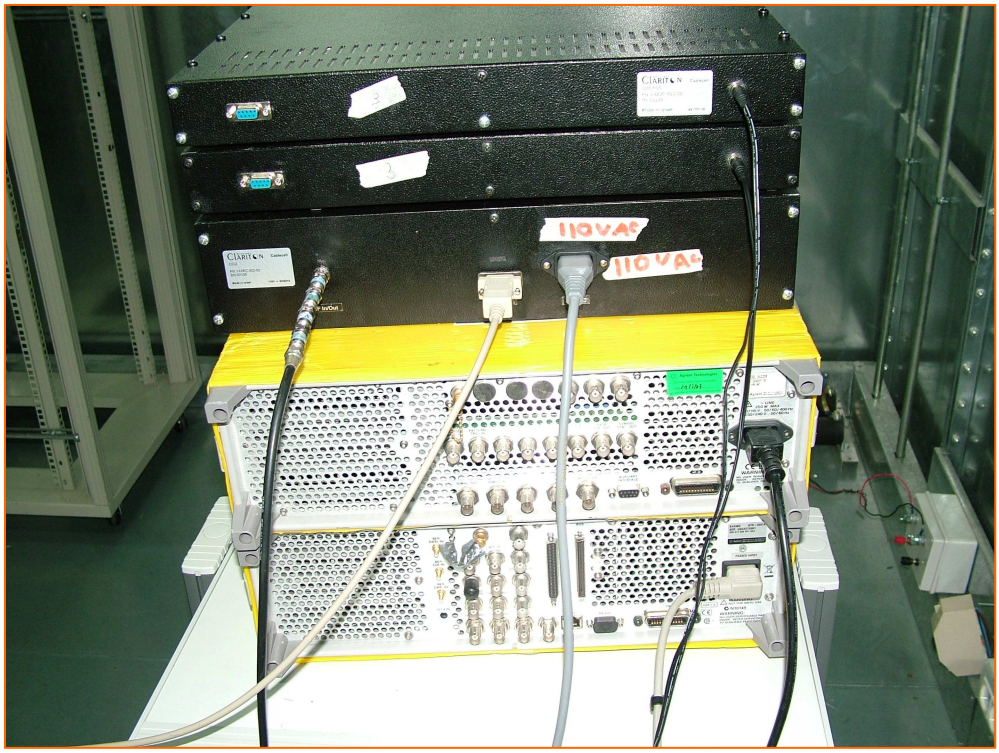


Frequency Stability measurement
Photograph 5



Frequency Stability measurement
Photograph 6

Appendix C: Auxiliary Equipment



Appendix D: List of Measuring Equipment used:

Equipment	Manufacturer/ Model	Serial Number	Due date
CISPR16 EMI Receiver	HP8546A	3710A00392	30.06.2012
Spectrum Analyzer 9kHz ÷ 22 GHz	HP 8593EM	3536A00131	30.06.2012
Spectrum Analyzer 100 Hz ÷ 26.5 GHz	Agilent E7405A	US41160436	30.06.2012
LNA Amplifier 1 GHz ÷ 18 GHz	AMP – 5D-010180-30-10P-GW	618653	01.01.2012
Dual Ridged Guide Ant.1-18 GHz	EMCO 3115	9602-4677	01.01.2012
Signal generator	Agilent E4432B	GB40051138	25.07.2012
Signal generator	Agilent E4438C	GB39430233	30.07.2012
Antenna 18 GHz ÷ 26.5 GHz	Alpha Industry 861A/599	505	01.01.2012
Turn table	HD100	100/693	-
Antenna Mast	HD 100	100/693	-
Biconical 20 –200 MHz	Schwarzbeck VHBB9124	9124/0255	30.06.2012
Log-Periodic 200 – 1000 MHz	Schwarzbeck VUSLP9111	VUSLP9111184	30.06.2012
Pre-Amplifier	MiTeq, AMF-5F-18002650-30-10P	945372	01.01.2012
LISN	Fischer 50/250-25-2	-	30.06.2012
Transient Limiter	HP11947A	-	30.06.2012
Notch Filter	Micro-Tronics BRM50702-05	0001	01.01.2012
Antenna 15G-40 GHz	Schwarzbeck BBHA 9170	BBHA9170214	01.01.2012
High pass Filter	Wainwright WHK 1.2/15G-10EF	3	30.06.2012
High pass Filter	Wainwright WHK2.4/18G-10EF	1	30.06.2012
Oven	Tenneg Ten	10.158-5	30.06.2012
LISN	Fischer 50/250-25-2	-	30.06.2012
Transient Limiter	HP11947A	-	30.06.2012

Appendix E: Accreditation Certificate

ilac-MRA

The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

QUALITECH (ECI TELECOM)

Petach-Tikva, ISRAEL

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 22nd day of March 2011.

President & CEO
For the Accreditation Council
Certificate Number 1633.01
Valid to September 30, 2012

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

End of the Test Report