



FCC CFR47 PART 22H AND 24E
INDUSTRY CANADA RSS-132 ISSUE 2
INDUSTRY CANADA RSS-133 ISSUE 5

CERTIFICATION TEST REPORT

FOR

IPAD WITH 802.11 abgn BT EDR / LE / GSM / CDMA / WCDMA / LTE

MODEL NUMBER: A1403

FCC ID: BCGA1403

IC: 579C-A1403

REPORT NUMBER: 11U13938-5, Revision A

ISSUE DATE: FEBRUARY 2, 2012

Prepared for

APPLE

1 INFINITE LOOP

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Revision History

Issue		Revisions	Revised By
Rev.	Date		
---	12/12/11	Initial Issue	T. Chan
A	02/02/12	Removed ALL References of ERP in the report	A. Zaffar

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE
1 INFINITE LOOP
CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: IPad with 802.11abgn BT EDR / LE / GSM / CDMA / WCDMA /
LTE

MODEL: A1403

SERIAL NUMBER: PT654922, PT591374

DATE TESTED: SEPTEMBER 15 – DECEMBER 12, 2011

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22H AND 24E	Pass
IC RSS132 AND IC RSS133	Pass

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 2, FCC CFR 47 Part 22, FCC CFR Part 24, RSS-132 Issue 2, and RSS-133 Issue 5.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) +
Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The Apple iPad, is a tablet device with iPod functions (music application support and video), 802.11 a/b/b/n radio, Bluetooth radio function, and cellular using GSM 2G/3G/CDMA/LTE data functions. The rechargeable battery is not user accessible

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted and ERP / EIRP output powers as follows:

Peak Readings:

Part 22 Cellular Band					
Frequency range (MHz)	Modulation	Conducted		ERP	
		dBm	mW	dBm	mW
824.7 – 848.31	CDMA, 1xRTT	29.02	798.0	27.43	553.4
824.7 – 848.31	CDMA, EVDO, Rev A	29.50	891.3	27.54	567.5
824.2 – 848.8	GPRS	33.90	2454.7	32.73	1875.0
824.2 – 848.8	EGPRS	32.00	1584.9	31.79	1510.1
826.4 – 846	UMTS, Rel 99	28.02	633.9	26.63	460.3
826.4 – 846	UMTS, HSDPA	28.05	638.3	26.72	469.9

Part 24 PCS Band					
Frequency range (MHz)	Modulation	Conducted		EIRP	
		dBm	mW	dBm	mW
1851.25-1908.8	CDMA 1xRTT	28.05	638.3	29.26	843.3
1851.25-1908.8	CDMA EVDO Rev A	28.61	726.1	29.86	968.3
1850.2-1909.8	GPRS	32.00	1584.9	31.15	1303.2
1850.2-1909.8	EGPRS	31.20	1318.3	30.35	1083.9
1852.4-1907.6	UMTS, Rel 99	26.42	438.5	27.10	512.9
1852.4-1907.6	UMTS, HSDPA	26.87	486.4	27.38	547.0

5.3. SOFTWARE AND FIRMWARE

The test software used during testing was 9B87

The EUT is link to CMU200 and Anritsu MT8820C during test.

5.4. MAXIMUM ANTENNA GAIN

The radio utilizes a band IFA antenna for the 850MHz and 1900MHz bands with a maximum peak gain as table show below:

Modulation Bands	Antenna Gain (dBi)
GSM, Cell	-1.21
GSM, PCS	0.94
CDMA2000, Cell	-0.08
CDMA2000, PCS	2.22
UMTS, Cell	-0.59
UMTS, PCS	1.56

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel for RF radiated emissions below 1GHz test is channel with highest RF output power.

Based on the investigation results, the highest peak power and enhanced data rate is the worst-case scenario for all measurements.

Worst-case modes:

- CDMA2000, EVDO, Rev A
- GPRS (GMSK)
- EGPRS (8PSK)
- UMTS Rel 99 and HSDPA Sub 2

For the fundamental investigation, the EUT is investigated for vertical and horizontal antenna orientations. After the investigations the worst case was found to be at Z-position for cell band and Y-position for PCS.band.

5.6. DESCRIPTION OF TEST SETUP**RADIATED TESTS SUPPORT EQUIPMENT**

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	Manufacturer	Model	Serial Number
Earphone	Apple	N/A	N/A
AC Adapter	Apple	N/A	N/A

I/O CABLES (RF Conducted Test)

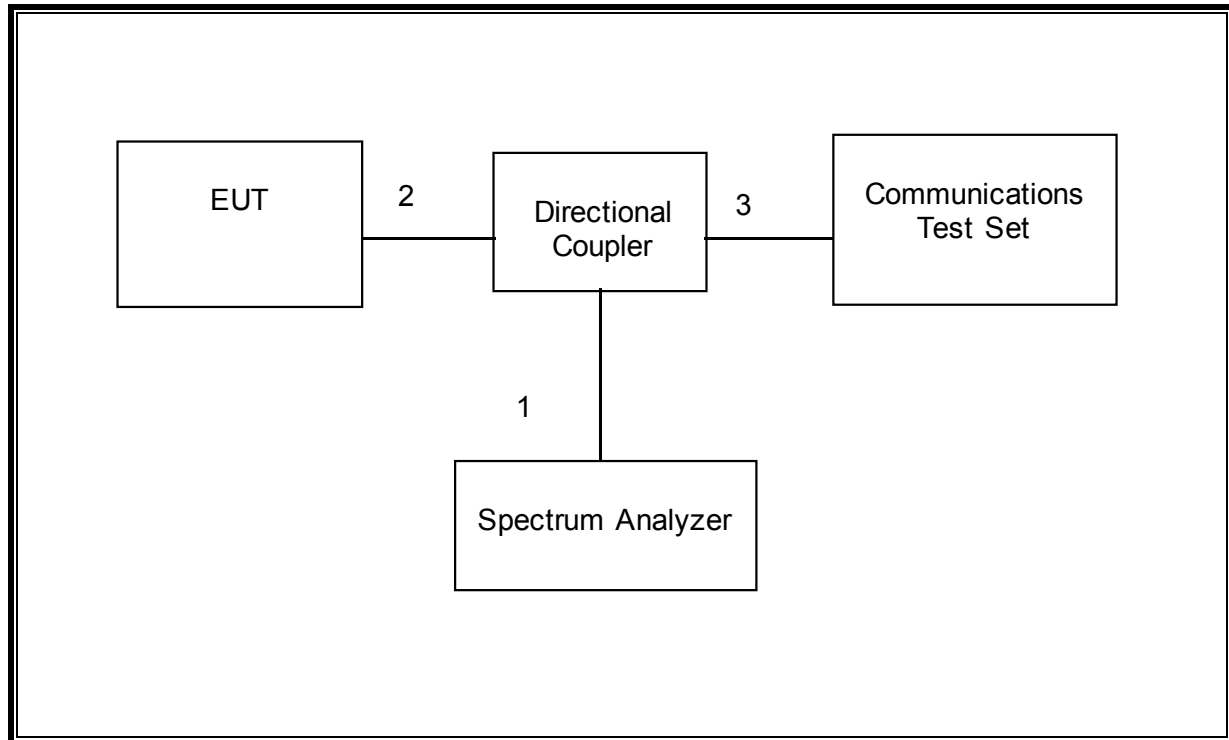
I/O CABLE LIST						
Cable No.	Port	# of Identica Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	3	AC	UN-SHELDED	2.0 m	N/A
2	DC	1	4 Pins Connector	UN-SHELDED	0.9 m	N/A
3	RF	1	SMA	SHELDED	0.6 m	N/A
4	RF	1	RF	SHELDED	0.1m	N/A

I/O CABLES (RF Radiated Test)

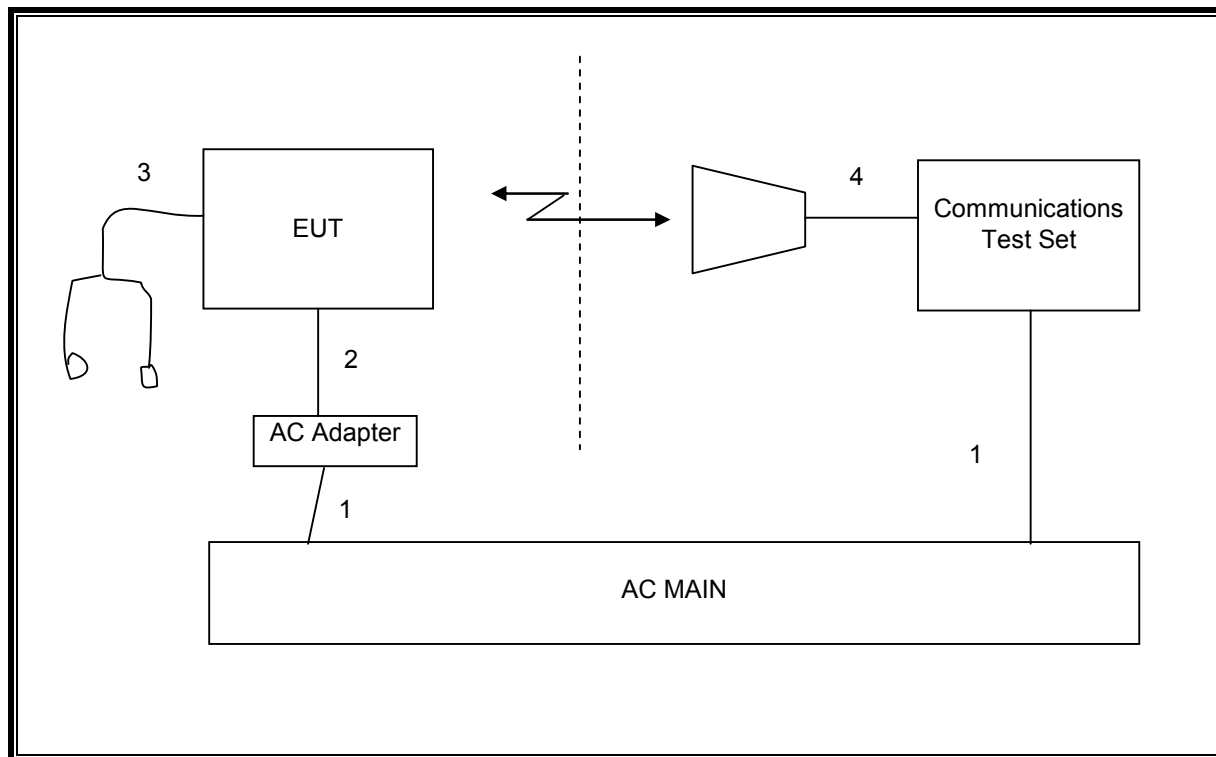
I/O CABLE LIST						
Cable No.	Port	# of Identic Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	3	AC	UN-SHELDED	1m	N/A
2	DC	1	4 Pins Connector	UN-SHELDED	1m	N/A
1	Audio	3	Earphone	UN-SHELDED	0.5m	N/A
2	RF In/Out	1	Horn Antenna	UN-SHELDED	2m	N/A

TEST SETUP

CONDUCTED SETUP DIAGRAM FOR TESTS



RADIATED SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/30/12
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	07/16/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	07/12/12
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/27/12
Radio Communication Analyzer	Anritsu	MT8820C	None	05/17/12
Communications Test Set	Agilent / HP	E5515C	C01086	09/17/12
Communication Test Set	R & S	CMU 200	C01131	06/24/12
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	10/20/12
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02689	CNR
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02687	CNR
Directional Coupler	RF-Lambda	RFDC5M06G15	NA	CNR
Sleeve Dipole 1730~2030 MHz	ETS	3126-1880	C01157	10/01/12
Signal Generator, 20 GHz	Agilent / HP	83732B	C00774	07/14/12
Antenna, Tuned Dipole 400~1000 MHz	ETS	3121C DB4	C00993	07/10/12

7. RF POWER OUTPUT VERIFICATION

7.1. RF POWER OUTPUT FOR 1xRTT

TEST PROCEDURE

This procedure assumes the Agilest 8960 Test Set has the following applications installed and with valid license.

<u>Application</u>	<u>Rev, License</u>
CDMA2000 Mobile Test	B.13.08, L

- Call Setup > Shift & Preset
- Cell Info > Cell Parameters > System ID (SID) > 18
 > Network ID (NID) > 65535
- Protocol Rev > 6 (IS-2000-0)
- Radio Config (RC) > Please see following table or details
- FCH Service Option (SO) Setup > Please see following table or details
- Traffic Data Rate > Full
- TDSO SCH Info > F-SCH Parameters > F-SCH Data Rate > 153.6 kbps
 > R-SCH Parameters > R-SCH Data Rate > 153.6 kbps
- Rvs Power Ctrl > Active bits
 - o Rvs Power Ctrl > All Up bits (Maximum TxPout)

RESULT

RF Power Output Results for 1XRTT

RF Power Output for 1xRTT - Cell Band							
Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)					
		Ch. 1013/824.7MHz		Ch. 384/836.52MHz		Ch. 777/848.31MHz	
		Average	Peak	Average	Peak	Average	Peak
RC1 (Fwd1, Rvs1)	2 (Loopback)	24.51	28.98	24.50	28.94	24.40	28.78
	55 (Loopback)	24.45	28.94	24.47	28.91	24.20	28.70
RC2 (Fwd2, Rvs2)	9 (Loopback)	24.50	28.91	24.50	29.02	24.40	28.69
	55 (Loopback)	24.47	28.92	24.50	28.73	24.43	28.65
RC3 (Fwd3, Rvs3)	2 (Loopback)	24.47	28.53	24.48	28.54	24.50	28.46
	55 (Loopback)	24.50	28.66	24.47	28.73	24.40	28.54
	32 (+ F-SCH)	24.47	28.57	24.49	28.58	24.41	28.51
	32 (+ SCH)	24.47	28.62	24.50	28.63	24.45	28.53
RC4 (Fwd4, Rvs3)	2 (Loopback)	24.48	28.61	24.50	28.63	24.45	28.34
	55 (Loopback)	24.50	28.55	24.49	28.55	24.47	28.48
	32 (+ F-SCH)	24.48	28.57	24.47	28.73	24.47	28.43
	32 (+ SCH)	24.49	28.52	24.48	28.52	24.50	28.52
RC5 (Fwd5, Rvs4)	9 (Loopback)	24.48	28.63	24.50	28.62	24.48	28.47
	55 (Loopback)	24.49	28.55	24.47	28.54	24.48	28.50

RF Power Output Results for 1XRTT

RF Power Output for 1xRTT - PCS Band							
Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)					
		Ch. 25/1851.25MHz		Ch. 600/1880MHz		Ch. 1175/1908.75 MHz	
		Average	Peak	Average	Peak	Average	Peak
RC1 (Fwd1, Rvs1)	2 (Loopback)	22.94	27.64	22.95	28.00	22.95	27.67
	55 (Loopback)	22.90	27.48	22.90	22.96	22.98	27.77
RC2 (Fwd2, Rvs2)	9 (Loopback)	23.00	27.89	23.00	28.05	22.95	27.85
	55 (Loopback)	22.95	27.78	22.97	27.94	22.96	27.47
RC3 (Fwd3, Rvs3)	2 (Loopback)	22.94	27.26	22.92	27.35	22.94	27.30
	55 (Loopback)	22.90	27.27	22.96	27.42	22.95	27.30
	32 (+ F-SCH)	22.90	27.23	22.97	27.48	22.89	27.38
	32 (+ SCH)	22.90	27.24	22.95	27.41	22.90	27.42
RC4 (Fwd4, Rvs3)	2 (Loopback)	22.97	27.29	22.96	27.33	22.95	27.23
	55 (Loopback)	22.96	27.31	22.97	27.46	22.97	27.38
	32 (+ F-SCH)	22.95	27.27	22.94	27.47	22.96	27.38
	32 (+ SCH)	22.93	27.18	22.94	27.53	22.96	27.38
RC5 (Fwd5, Rvs4)	9 (Loopback)	22.96	27.24	22.96	27.42	22.95	27.35
	55 (Loopback)	22.95	27.31	22.96	27.48	22.98	27.33

7.2. RF POWER OUTPUT FOR CDMA2000 1xEV-DO Release 0 (Rel. 0)

TEST PROCEDURE

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

<u>Application</u>	<u>Rev. License</u>
1xEV-DO Terminal Test	A.09.13

EVDO Release 0 - RTAP

- Call Setup > Shift & Preset
- Call Control:
 - o Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
 - o Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Params:
 - o Cell Power > -105.5 dBm/1.23 MHz
 - o Cell Band > (Select US Cellular or US PCS)
 - o Channel > (Enter channel number)
 - o Application Config > Enhanced Test Application Protocol > RTAP
 - o RTAP Rate > 153.6 kbps
 - o Rvs Power Ctrl > Active bits
 - o Protocol Rel > 0 (1xEV-DO)
- Press "Start Data Connection" when "Session Open" appear in "Active Cell"
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

EVDO Release 0 - FTAP

- Call Setup > Shift & Preset
- Call Control:
 - o Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
 - o Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Params:
 - o Cell Power > -105.5 dBm/1.23 MHz
 - o Cell Band > (Select US Cellular or US PCS)
 - o Channel > (Enter channel number)
 - o Application Config > Enhanced Test Application Protocol > FTAP (default)
 - o FTAP Rate > 307.2 kbps (2 Slot, QPSK)
 - o Rvs Power Ctrl > Active bits
 - o Protocol Rel > 0 (1xEV-DO)
- Press "Start Data Connection" when "Session Open" appear in "Active Cell"
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

RESULTS

Cell Band

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted power (dBm)	
				Peak	Average
307.2 kbps (2 slot, QPSK)	153.6 kbps	1013	824.70	29.05	24.50
		384	836.52	29.25	24.40
		777	848.31	29.10	24.48

PCS Band

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted power (dBm)	
				Peak	Average
307.2 kbps (2 slot, QPSK)	153.6 kbps	25	1851.25	27.98	22.90
		600	1880.00	28.30	23.00
		1175	1908.75	28.08	22.90

7.3. RF POWER OUTPUT FOR CDMA2000 1xEV-DO Revision A (Rev. A)

TEST PROCEDURE

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

<u>Application</u>	<u>Rev. License</u>
1xEV-DO Terminal Test	A.09.13

EVDO Release A – RETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > RETAP
- R-Data Pkt Size > 4096
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

EVDO Release A - FETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > FETAP
- F-Traffic Format > 4 (1024, 2, 128) Canonical (307.2k, QPSK)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

RESULTS

Cell Band

FETAP-Traffic Format	RETAP-Data Payload Size	Channel	f (MHz)	Conducted power (dBm)	
				Peak	Average
307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	1013	824.70	29.27	24.5
		384	836.52	29.50	24.4
		777	848.31	29.24	24.4

PCS Band

FETAP-Traffic Format	RETAP-Data Payload Size	Channel	f (MHz)	Conducted power (dBm)	
				Peak	Average
307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	25	1851.25	28.36	22.85
		600	1880.00	28.61	22.90
		1175	1908.75	28.29	22.90

7.4. RF POWER OUTPUT FOR GSM MODE

TEST PROCEDURE

GPRS/EGPRS

Function: Menu select > GSM Mobile Station > GSM 850/900/1800/1900
Press Connection control to choose the different menus
Press RESET > choose all to reset all settings
Connection Press Signal Off to turn off the signal and change settings
Network Support > GSM+GPRS or GSM+EGPRS
Main Service > Packet Data
Service selection > Test Mode A – Auto Slot Config. off
MS Signal Press Slot Config bottom on the right twice to select and change the number of time slots and power setting
 > Slot configuration > Uplink/Gamma
 > 33 dBm for GPRS 850/900
 > 27 dBm for EGPRS 850/900
 > 30 dBm for GPRS1800/1900
 > 26 dBm for EGPRS1800/1900
BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset > + 0 Hz
Mode > BCCH and TCH
BCCH Level > -85 dBm (May need to adjust if link is not stable)
BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]
Channel Type > Off
P0> 4 dB
Slot Config > Unchanged (if already set under MS Signal)
TCH > choose desired test channel
Hopping > Off
Main Timeslot > 3 (Default)
Network Coding Scheme > CS4 (GPRS) and MCS9 (EGPRS)
Bit Stream > 2E9-1PSR Bit Pattern
AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection Press Signal On to turn on the signal and change settings

J2 (6771)

GPRS for Cell and PCS Band

Mode	Ch.	f (MHz)	1 Time Slot		2 Time Slot	
			Peak	Average	Peak	Average
GPRS	128	824.2	33.90	33.30	32.70	32.40
	190	836.6	33.80	33.40	32.60	32.45
	251	848.8	33.70	33.45	32.60	32.40
GPRS	512	1850.2	30.80	30.70	27.90	27.80
	661	1880.0	30.80	30.70	28.00	27.80
	810	1909.8	31.00	31.00	28.20	28.00

EGPRS for Cell and PCS Band

Mode	Ch.	f (MHz)	1 time slot		2 time slot	
			Peak	Average	Peak	Average
EGPRS	128	824.2	32.00	29.00	31.90	28.90
	190	836.6	31.90	28.92	31.70	28.70
	251	848.8	31.80	28.80	31.70	28.70
EGPRS	512	1850.2	30.80	27.90	30.60	27.60
	661	1880.0	31.00	28.00	30.80	27.70
	810	1909.8	31.20	28.00	31.00	27.90

7.5. RF POWER OUTPUT FOR UMTS REL99

TEST PROCEDURE

The following summary of these settings are illustrated below:

	Mode	Rel99
	Subtest	-
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	HSDPA FRC	Not Applicable
	HSUPA Test	Not Applicable
	Power Control Algorithm	Algorithm2
	β_c	Not Applicable
	β_d	Not Applicable
	β_{ec}	Not Applicable
	β_c/β_d	8/15
	β_{hs}	Not Applicable
	β_{ed}	Not Applicable

RESULTS

Band	UL Ch	DL Ch	Frequency	Conducted output power (dBm)	
				Peak	Average
UMTS 850	4132	4357	826.4	27.80	24.90
	4180	4405	836.4	28.02	24.98
	4230	4455	846.6	27.95	24.80

Band	UL Ch	DL Ch	Frequency	Conducted output power (dBm)	
				Peak	Average
UMTS 1900	9262	9662	1852.4	26.30	22.8
	9400	9800	1880.0	26.42	23.00
	9538	9938	1907.6	26.21	22.8

7.6. RF POWER OUTPUT FOR UMTS Rel 6 HSDPA

TEST PROCEDURE

The following summary of these settings are illustrated below:

	Mode	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	HSUPA Test	Not Applicable			
	Power Control Algorithm	Algorithm 2			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_{ec}	-	-	-	-
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
HSDPA Specific Settings	β_{ed}	Not Applicable			
	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	$A_{hs} = \beta_{hs}/\beta_c$	30/15			

RESULT

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted output power (dBm)	
					Peak	Average
UMTS850 (Band V)	1	4132	4357	826.4	27.64	25.05
		4180	4405	836.0	27.53	24.97
		4230	4455	846.0	27.51	24.95
	2*	4132	4357	826.4	27.87	24.91
		4180	4405	836.0	27.85	24.92
		4230	4455	846.0	28.05	24.89
	3	4132	4357	826.4	27.93	24.43
		4180	4405	836.0	28.00	24.44
		4230	4455	846.0	27.83	24.49
	4	4132	4357	826.4	28.01	24.60
		4180	4405	836.0	27.97	24.50
		4230	4455	846.0	27.98	24.53
UMTS1900 (Band II)	1	9262	9662	1852.4	26.18	22.98
		9400	9800	1880.0	26.20	23.00
		9538	9938	1907.6	26.10	22.92
	2*	9262	9662	1852.4	26.47	22.91
		9400	9800	1880.0	26.67	22.98
		9538	9938	1907.6	26.87	22.93
	3	9262	9662	1852.4	26.64	22.42
		9400	9800	1880.0	26.56	22.50
		9538	9938	1907.6	26.47	22.51
	4	9262	9662	1852.4	26.46	22.63
		9400	9800	1880.0	26.50	22.54
		9538	9938	1907.6	26.35	22.52

7.7. RF POWER OUTPUT FOR UMTS DUAL CARRIER HSDPA**TEST PROCEDURE**

The following summary of these settings are illustrated below:

RESULT

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted output power (dBm)	
					Peak	Average
UMTS850 (Band V)	1	4132	4357	826.4	27.71	24.87
		4180	4405	836.0	27.73	24.85
		4230	4455	846.0	27.88	24.87
	2*	4132	4357	826.4	27.90	24.88
		4180	4405	836.0	27.98	24.80
		4230	4455	846.0	27.90	24.80
	3	4132	4357	826.4	27.71	24.43
		4180	4405	836.0	27.92	24.37
		4230	4455	846.0	27.96	24.35
	4	4132	4357	826.4	27.79	24.42
		4180	4405	836.0	27.83	24.36
		4230	4455	846.0	27.61	24.32
UMTS1900 (Band II)	1	9262	9662	1852.4	26.27	22.85
		9400	9800	1880.0	26.17	22.91
		9538	9938	1907.6	26.19	22.95
	2*	9262	9662	1852.4	26.25	22.87
		9400	9800	1880.0	26.30	22.92
		9538	9938	1907.6	26.17	22.94
	3	9262	9662	1852.4	25.98	22.48
		9400	9800	1880.0	26.16	22.56
		9538	9938	1907.6	26.24	22.45
	4	9262	9662	1852.4	26.26	22.45
		9400	9800	1880.0	26.17	22.55
		9538	9938	1907.6	26.04	22.58

7.8. RF POWER OUTPUT UMTS Rel 6 HSPA (HSDPA & HSUPA)

TEST PROCEDURE

The following summary of these settings are illustrated below:

	Mode	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	0
	β_{ec}	209/225	12/15	30/15	2/15	5/15
	β_c/β_d	11/15	6/15	15/9	2/15	-
	β_{hs}	22/15	12/15	30/15	4/15	5/15
HSDPA Specific Settings	β_{ed}	1309/225	94/75	47/15	56/75	47/15
	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
HSUPA Specific Settings	$A_{hs} = \beta_{hs}/\beta_c$	30/15				
	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	12
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	67
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18		E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27

RESULTS

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted output power (dBm)	
					Peak	Average
UMTS850 (Band V)	1	4132	4357	826.4	27.72	24.70
		4180	4405	836.0	27.87	24.50
		4230	4455	846.0	27.50	24.50
	2	4132	4357	826.4	27.92	23.00
		4180	4405	836.0	27.74	23.00
		4230	4455	846.0	27.40	23.00
	3	4132	4357	826.4	27.93	23.60
		4180	4405	836.0	27.95	23.70
		4230	4455	846.0	27.54	23.40
	4	4132	4357	826.4	27.70	23.40
		4180	4405	836.0	27.80	23.20
		4230	4455	846.0	27.46	23.30
UMTS1900 (Band II)	1	4132	4357	826.4	27.84	24.80
		4180	4405	836.0	27.96	24.90
		4230	4455	846.0	27.69	24.70
	2	9262	9662	1852.4	26.25	22.70
		9400	9800	1880.0	26.44	22.70
		9538	9938	1907.6	26.33	22.70
	3	9262	9662	1852.4	25.80	20.70
		9400	9800	1880.0	26.00	20.90
		9538	9938	1907.6	25.97	20.90
	4	9262	9662	1852.4	26.16	21.80
		9400	9800	1880.0	26.22	21.70
		9538	9938	1907.6	26.21	21.70
	5	9262	9662	1852.4	25.48	21.00
		9400	9800	1880.0	25.79	20.80
		9538	9938	1907.6	25.76	20.80
		9262	9662	1852.4	26.05	22.80
		9400	9800	1880.0	26.45	22.80
		9538	9938	1907.6	26.27	22.80

8. CONDUCTED TEST RESULTS

8.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

IC: RSS-132, 4.5; RSS-133, 6.5

LIMITS

For reporting purposes only

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

MODES TESTED

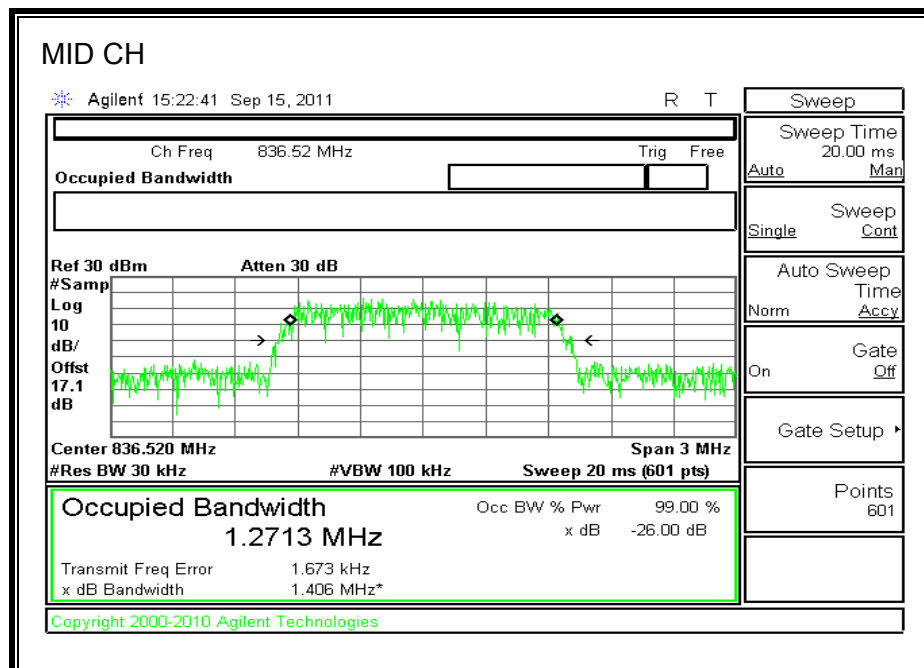
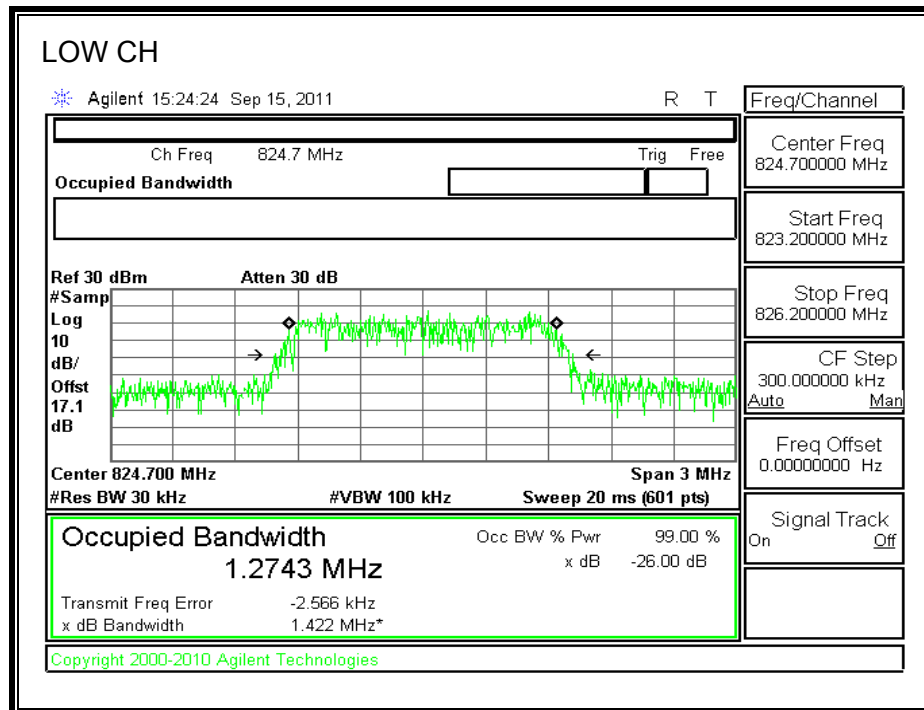
- CDMA2000 1xRTT and EVDO Rev A
- GPRS and EGPRS
- WCDMA REL. 99 and HSDPA

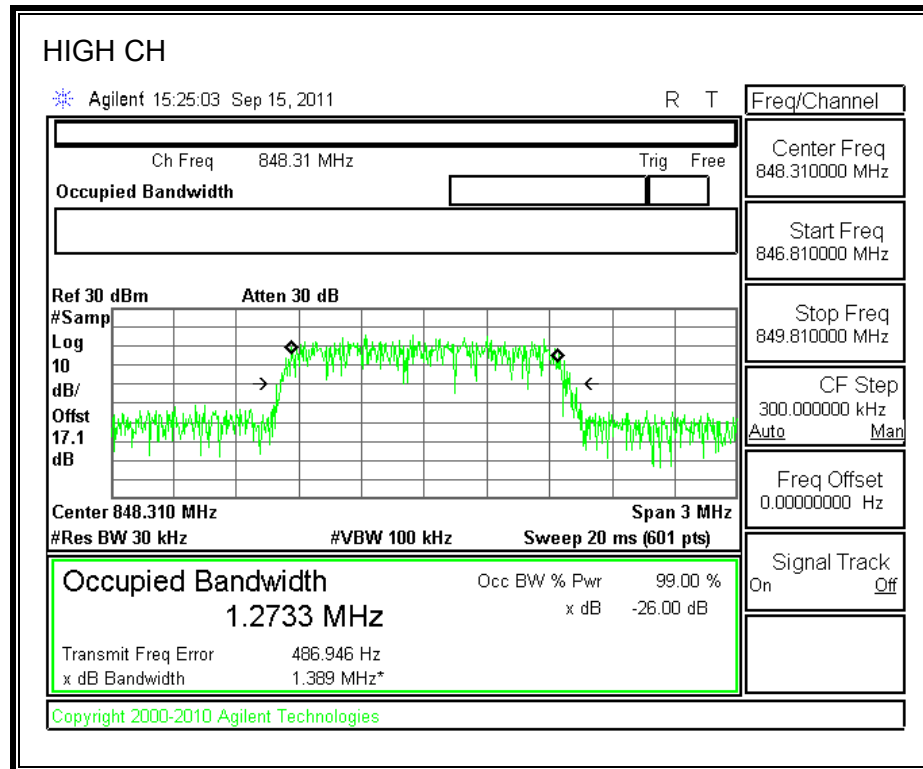
RESULTS

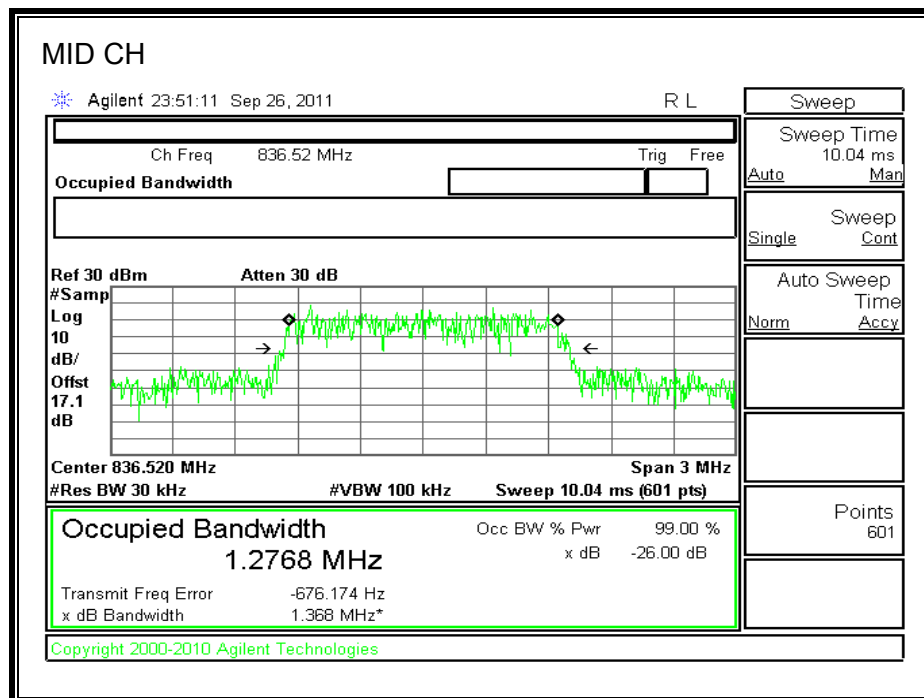
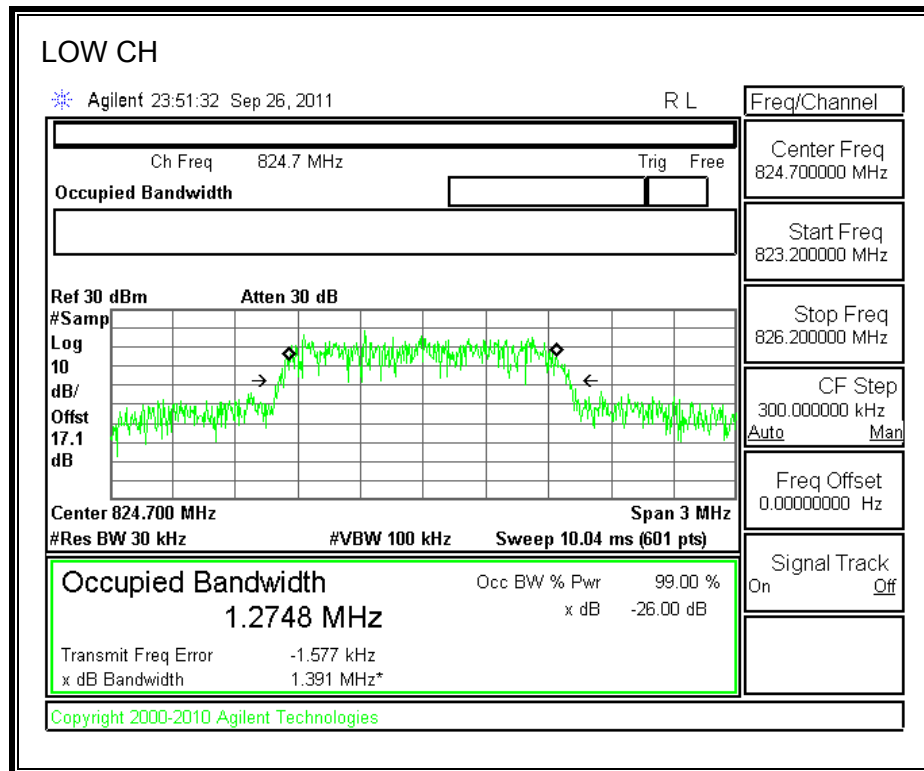
Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
Cellular	1xRTT	1013	824.70	1.2743	1.422
		384	836.52	1.2713	1.406
		777	848.31	1.2733	1.389
	CDMA2000 1xEV-DO (Rev. A)	1013	824.70	1.2748	1.391
		384	836.52	1.2768	1.368
		777	848.31	1.2701	1.382
PCS	1xRTT	25	1851.25	1.2729	1.382
		600	1880.0	1.2786	1.394
		1175	1908.75	1.2715	1.391
	CDMA2000 1xEV-DO (Rev. A)	25	1851.25	1.2701	1.405
		600	1880.0	1.2799	1.393
		1175	1908.75	1.2754	1.388

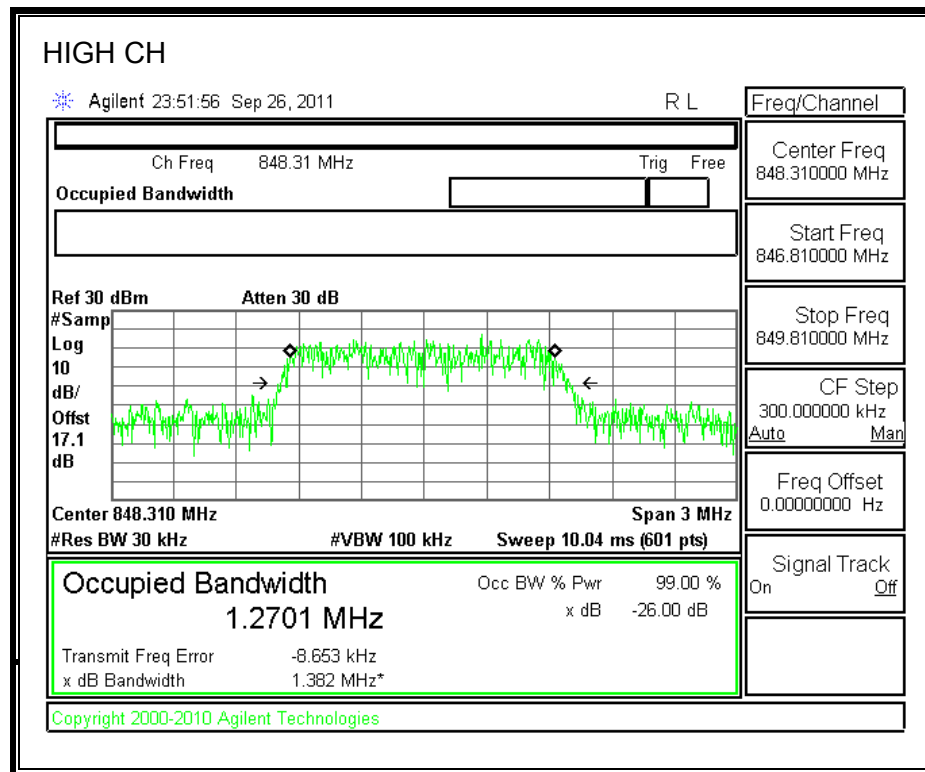
Band	Mode	Channel	f (MHz)	99% BW (kHz)	-26dB BW (kHz)
Cellular	GPRS	128	824.2	257.2885	295.715
		190	836.6	252.2616	307.293
		251	848.8	246.0308	308.962
	EGPRS	128	824.2	253.2588	295.913
		190	836.6	242.2123	296.333
		251	848.8	243.5620	302.364
PCS	GPRS	512	1850.2	245.2707	294.998
		661	1880.0	248.3553	310.644
		810	1909.8	243.0503	297.960
	EGPRS	512	1850.2	233.3366	285.755
		661	1880.0	242.2807	299.345
		810	1909.8	245.7117	290.210

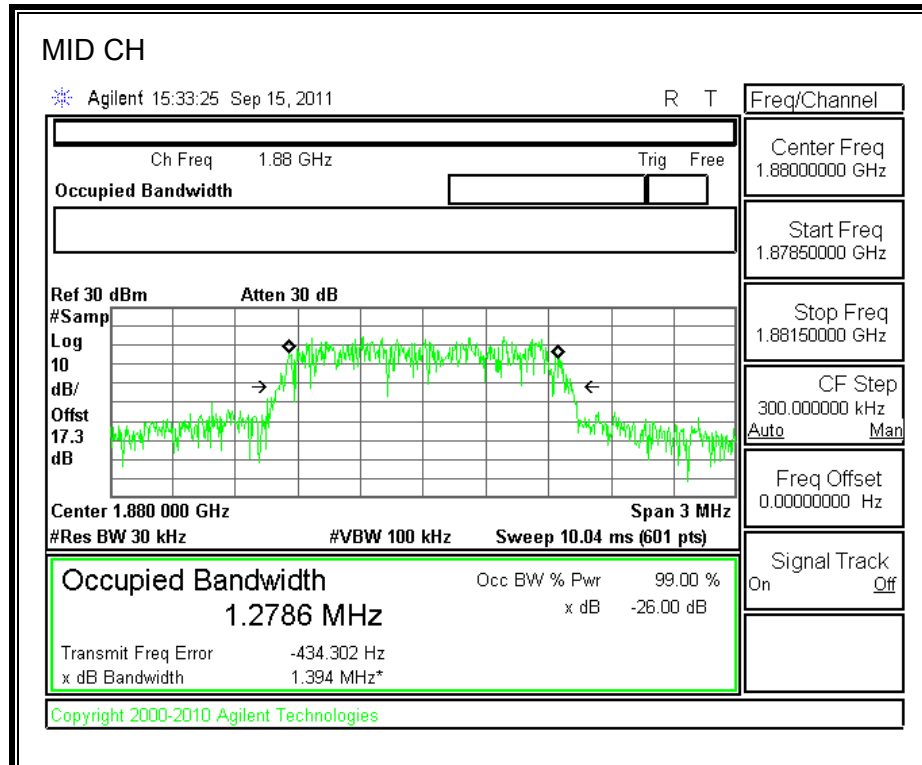
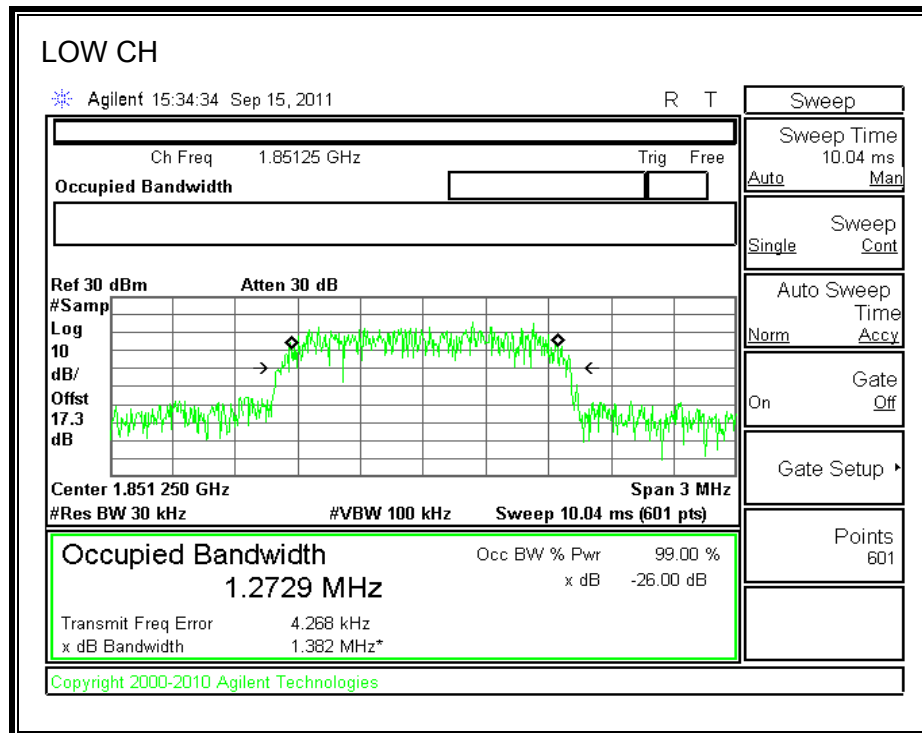
Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
Cell	WCDMA, REL 99	4357	826.4	4.1963	4.611
		4405	836.0	4.1714	4.566
		4455	846.0	4.1938	4.585
	HSDPA REL 6	4357	826.4	4.1412	4.571
		4405	836.0	4.1327	4.556
		4455	846.0	4.1113	4.534
PCS	WCDMA, REL 99	9662	1852.4	4.1990	4.601
		9800	1880.0	4.1513	4.574
		9938	1907.6	4.1432	4.564
	HSDPA REL 6	9662	1852.4	4.1747	4.575
		9800	1880.0	4.1765	4.567
		9938	1907.6	4.1528	4.419

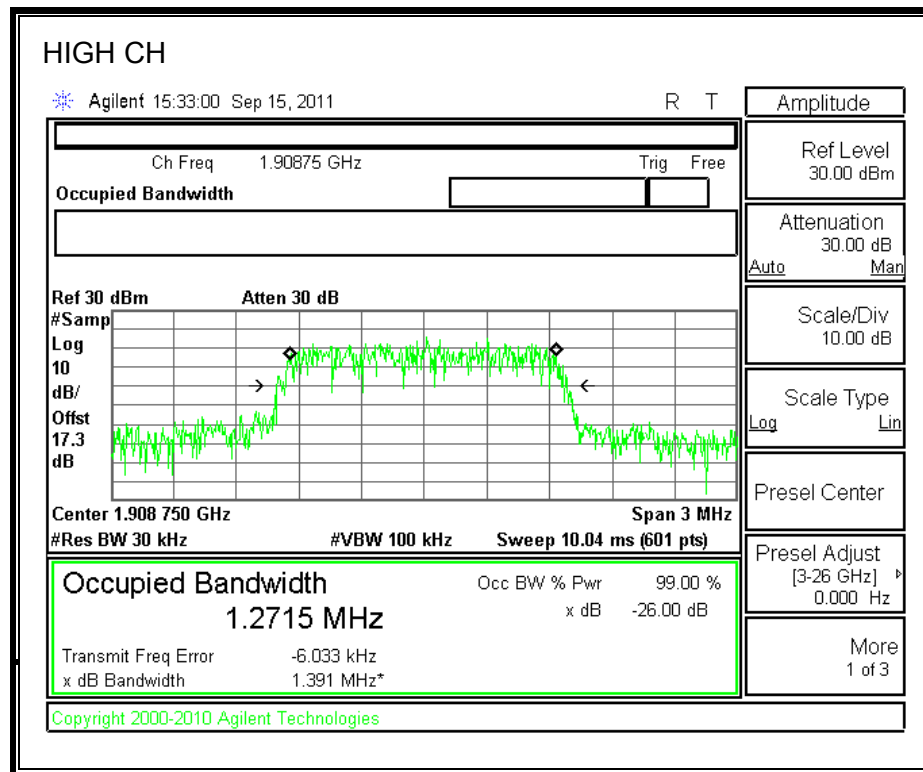
CDMA2000 1xRTT Mode (Cellular Band)**99% BANDWIDTH and 26dB**

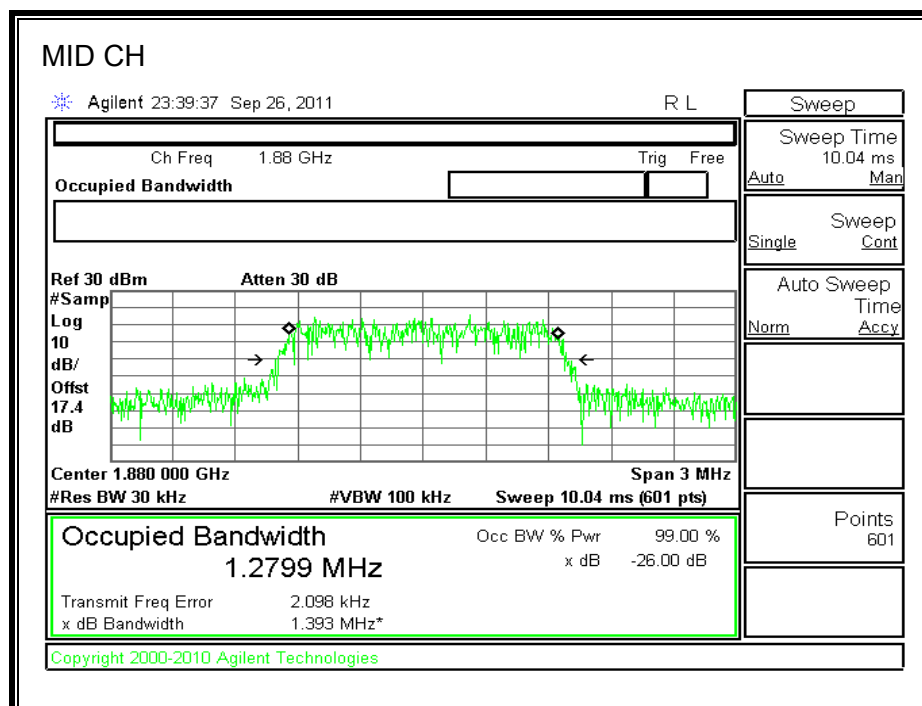
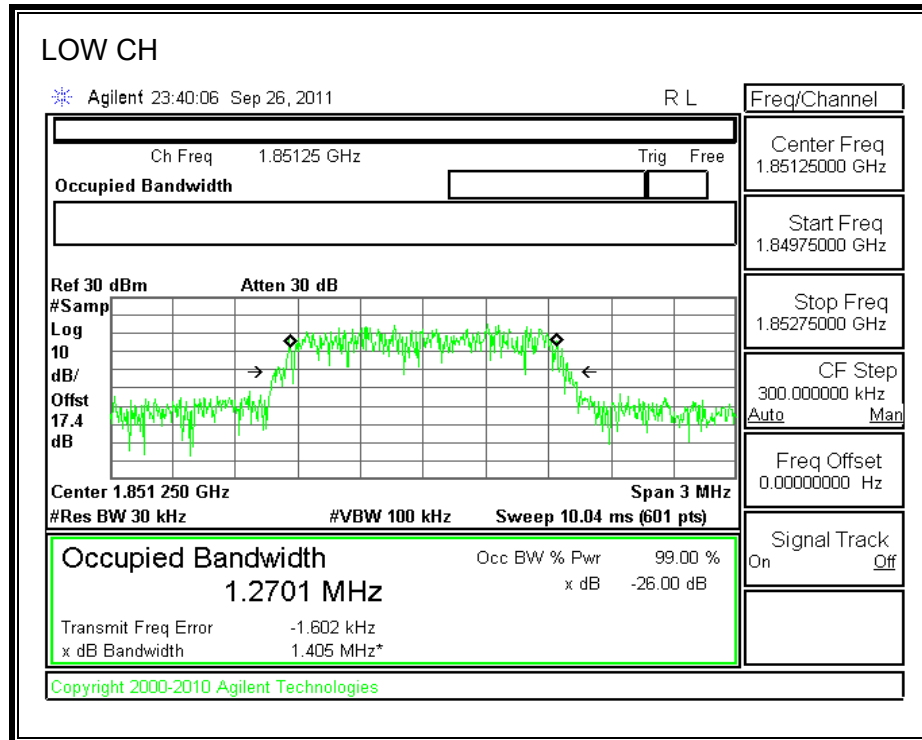


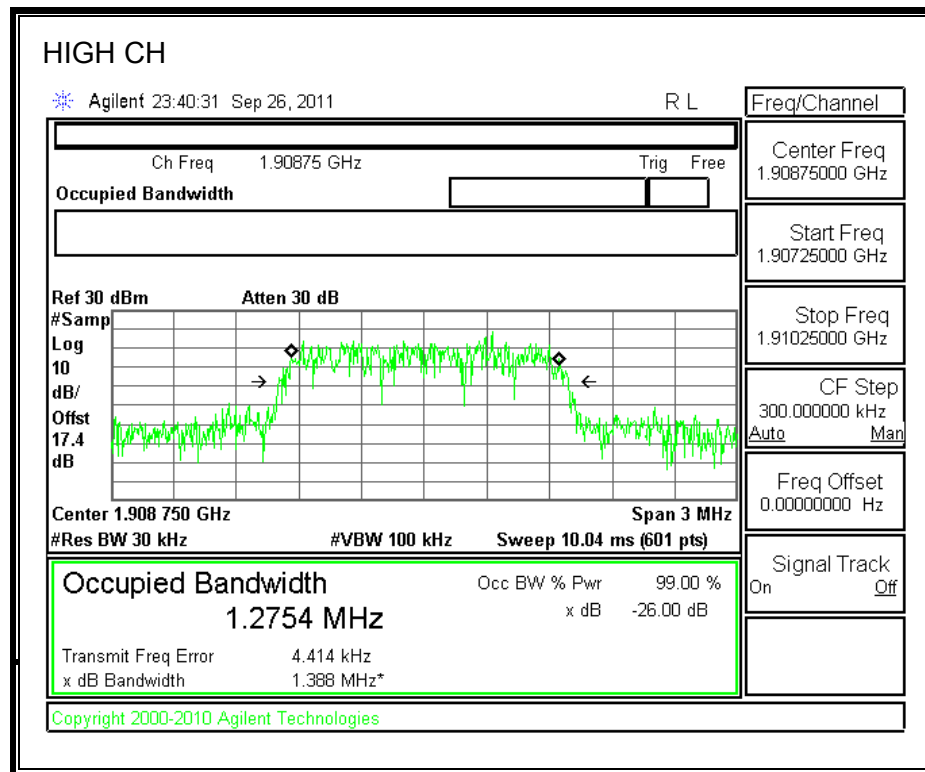
CDMA2000 1xEV-DO Revision A (Rev. A) Cellular Band



CDMA2000 1xRTT Mode (PCS Band)

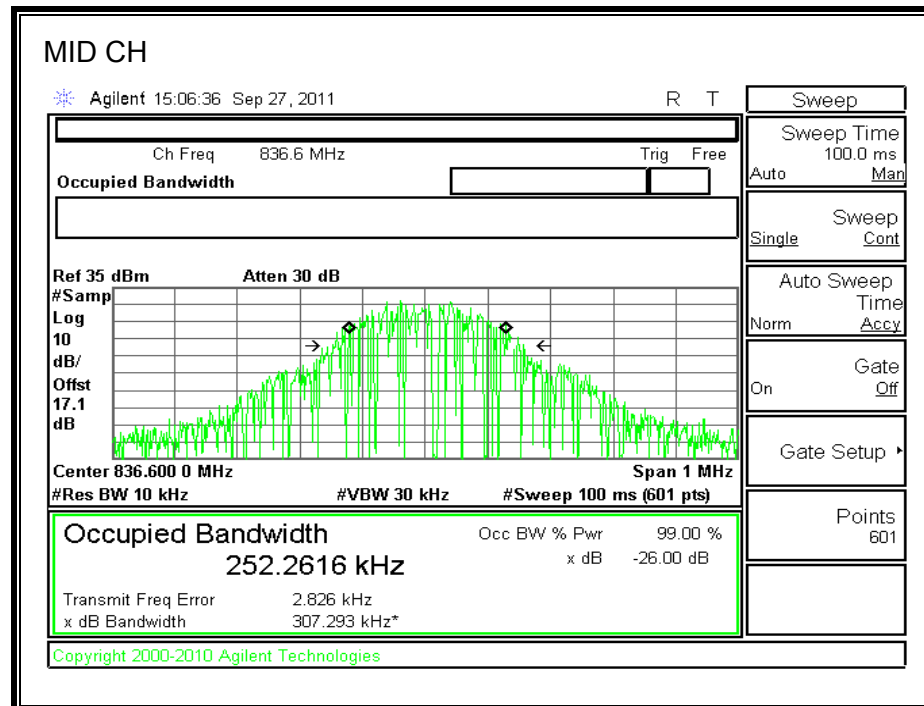
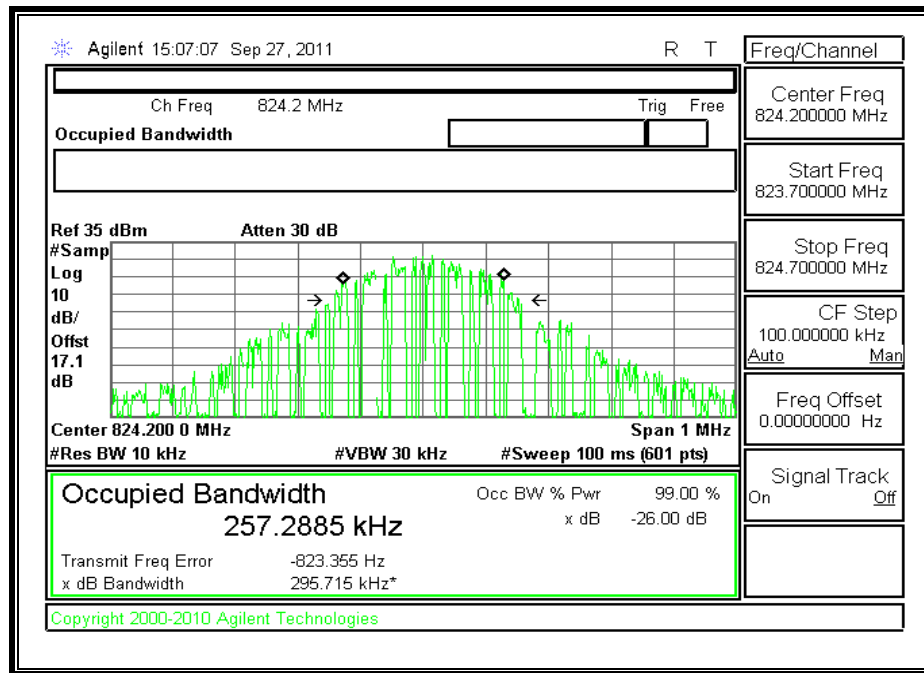


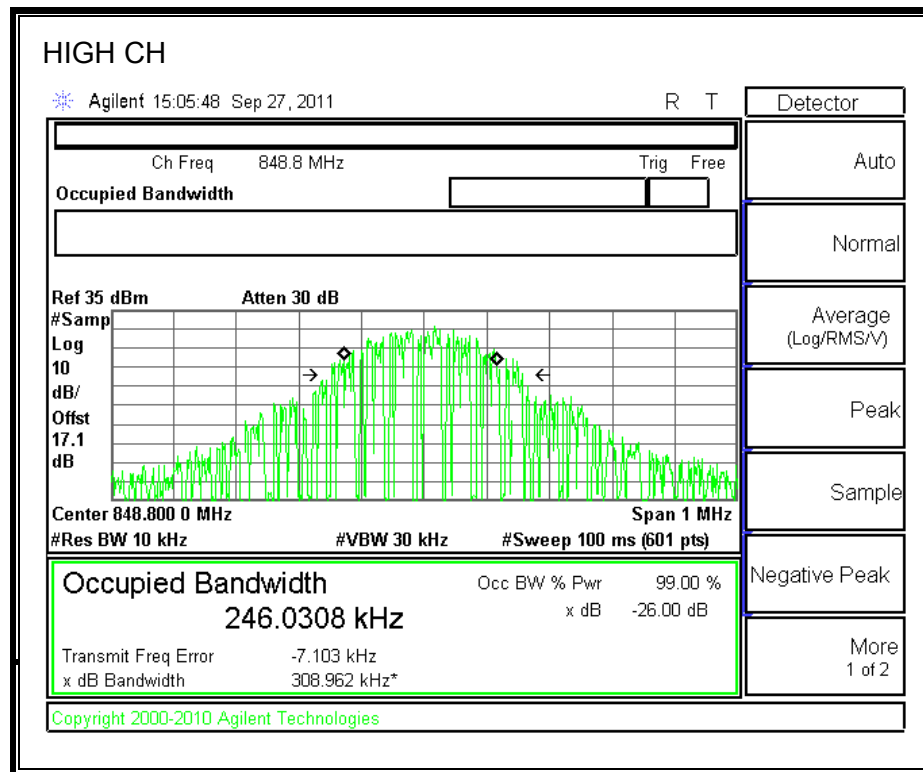
CDMA2000 1xEV-DO Revision A (Rev. A) Mode (PCS Band)

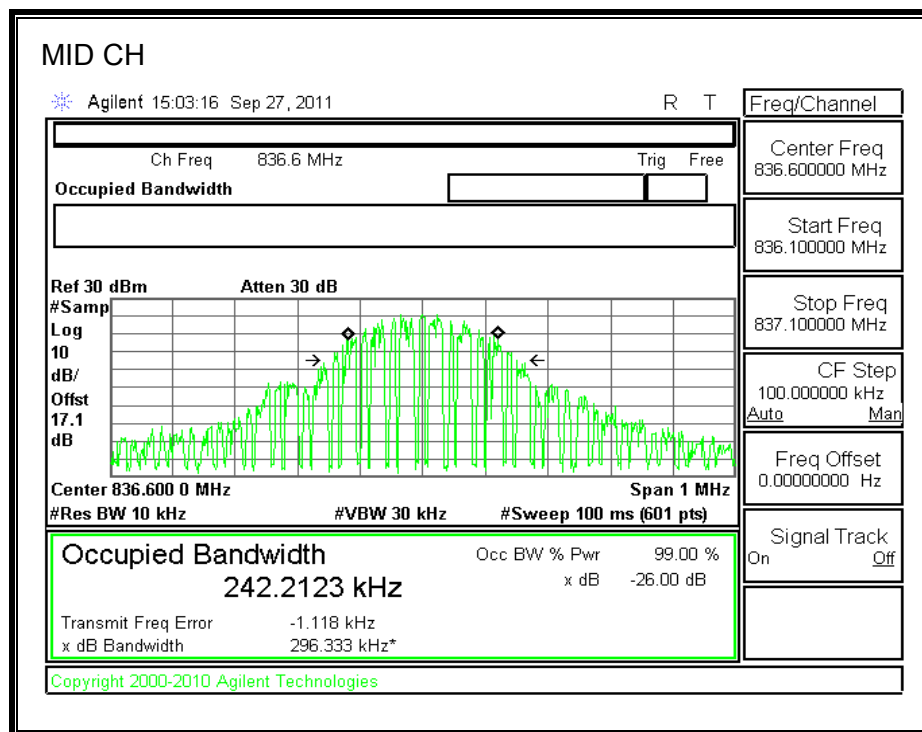
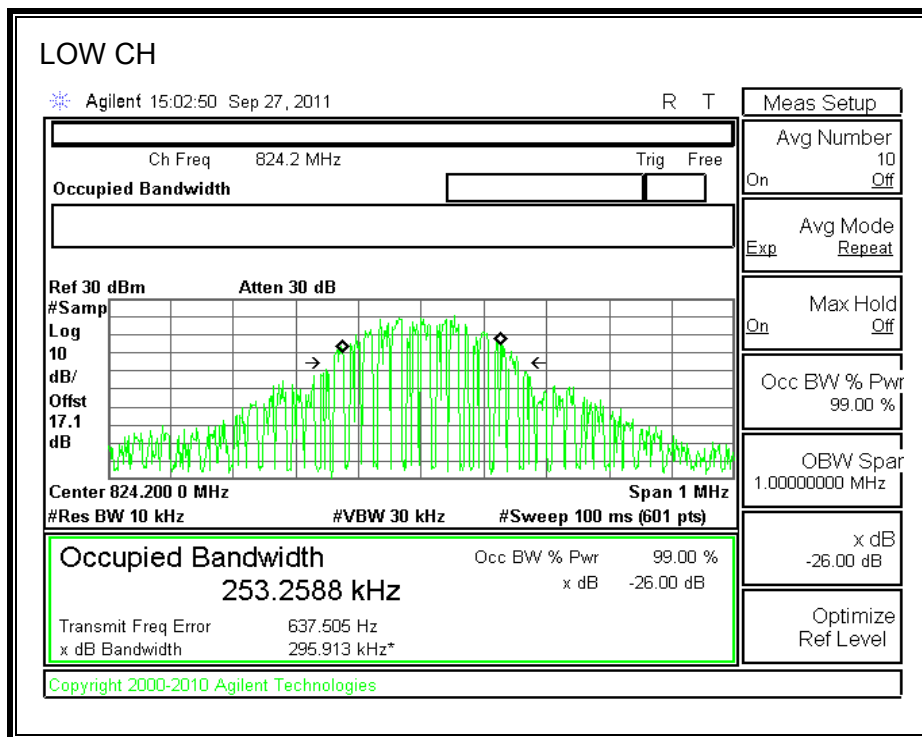


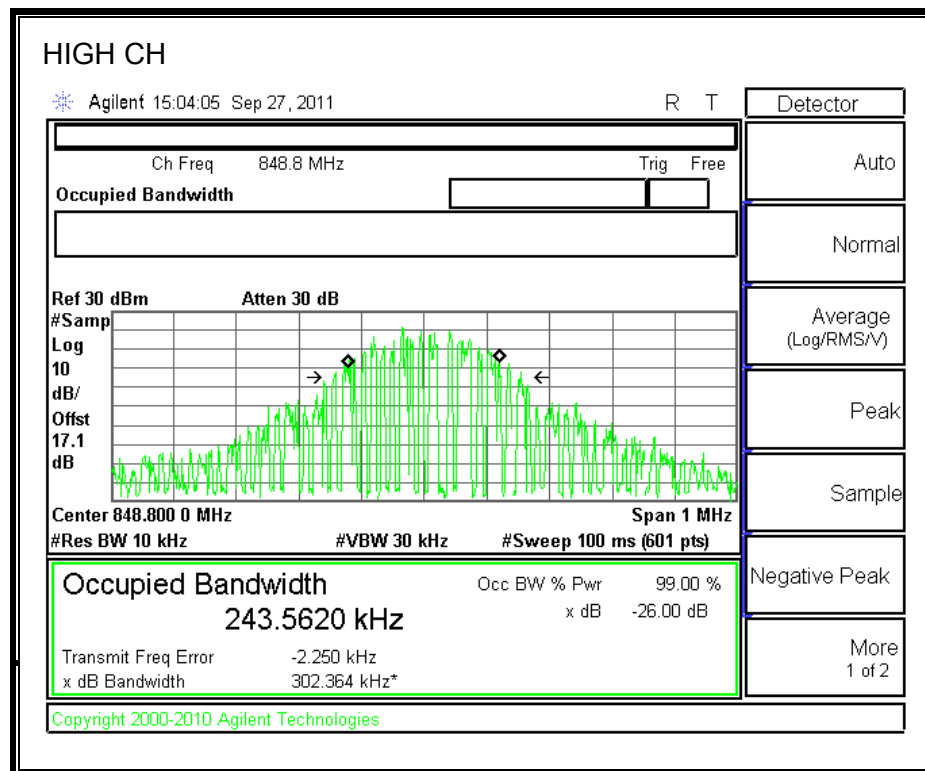
99% BANDWIDTH and 26dB

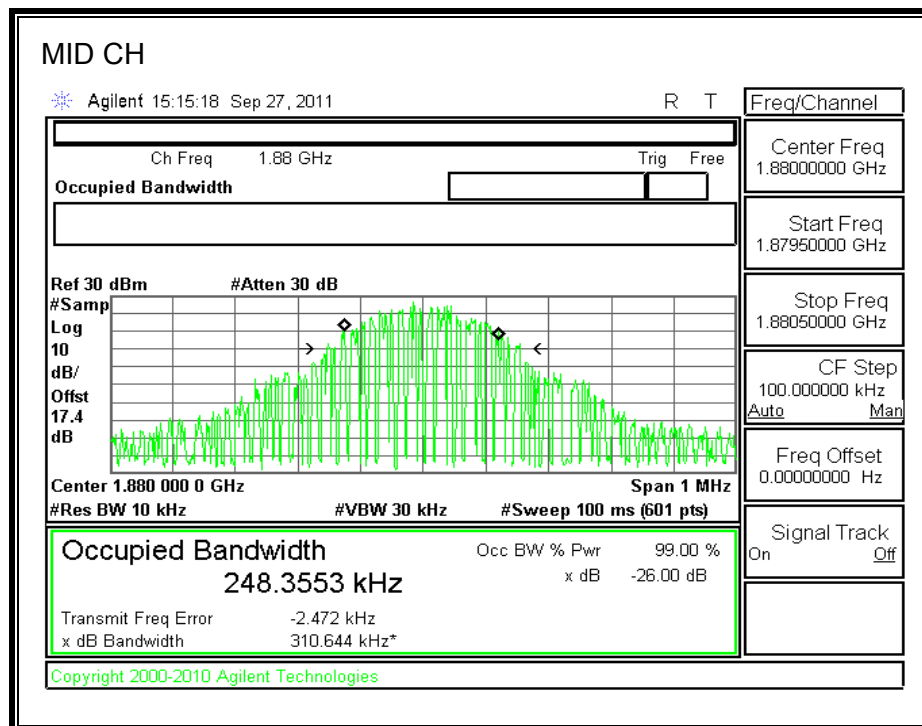
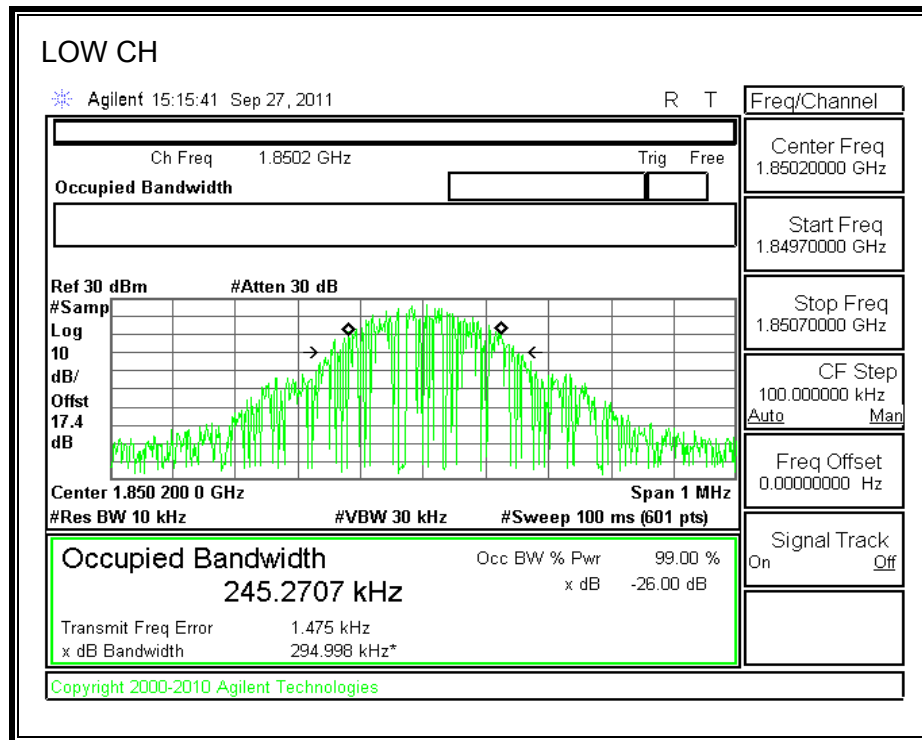
GPRS850 BAND

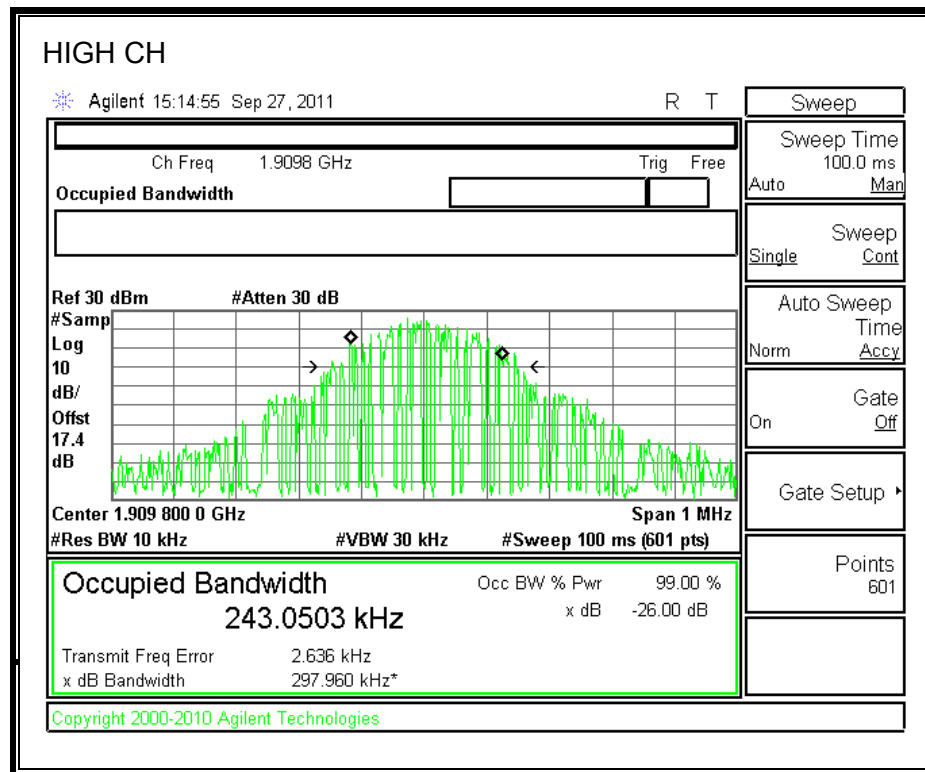


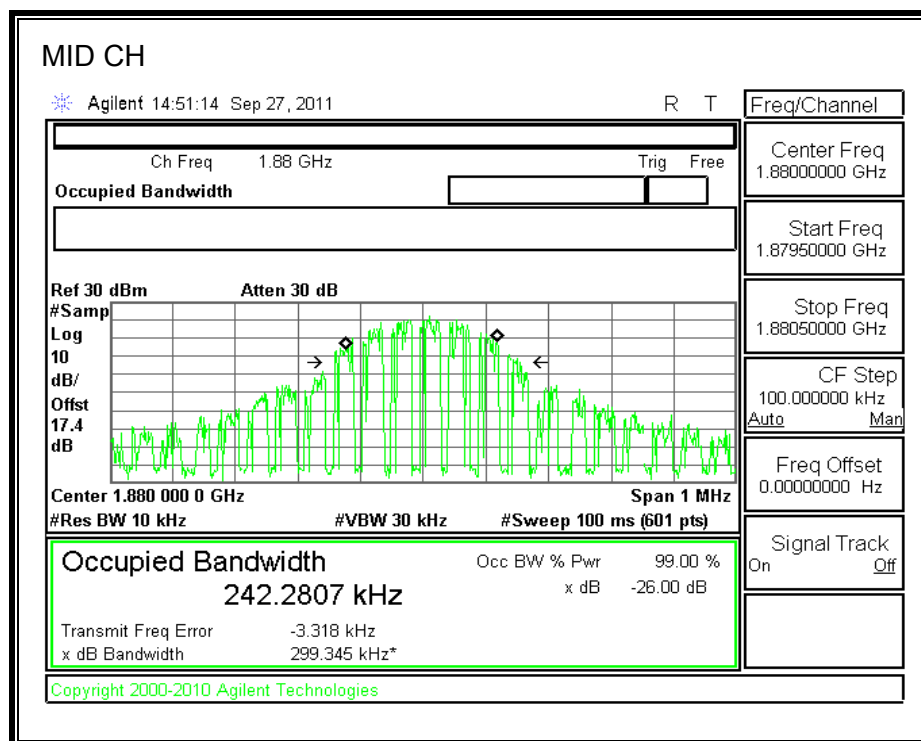
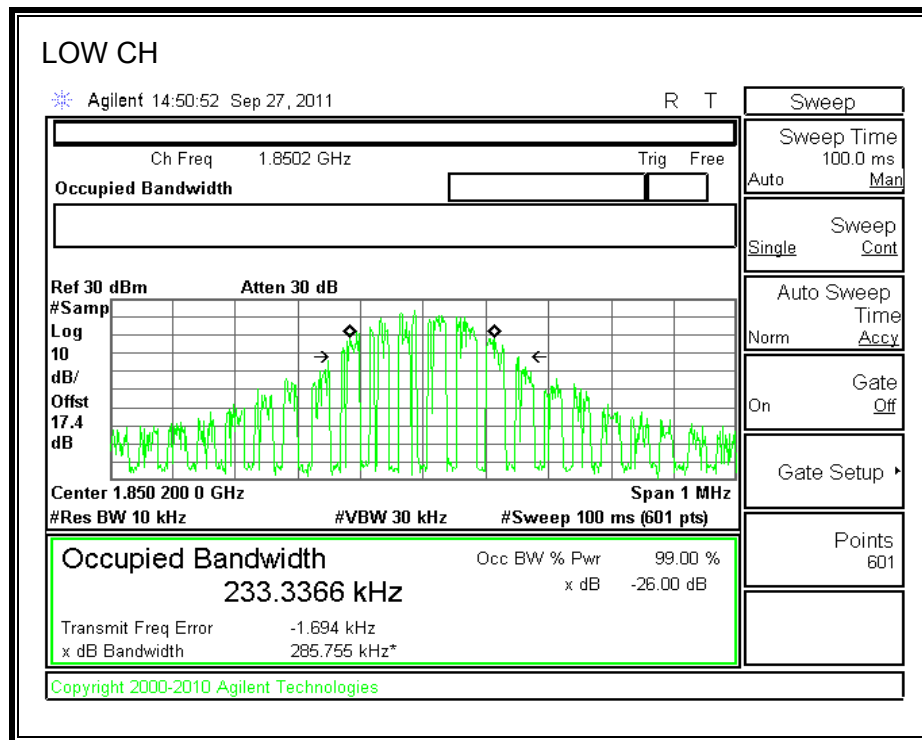


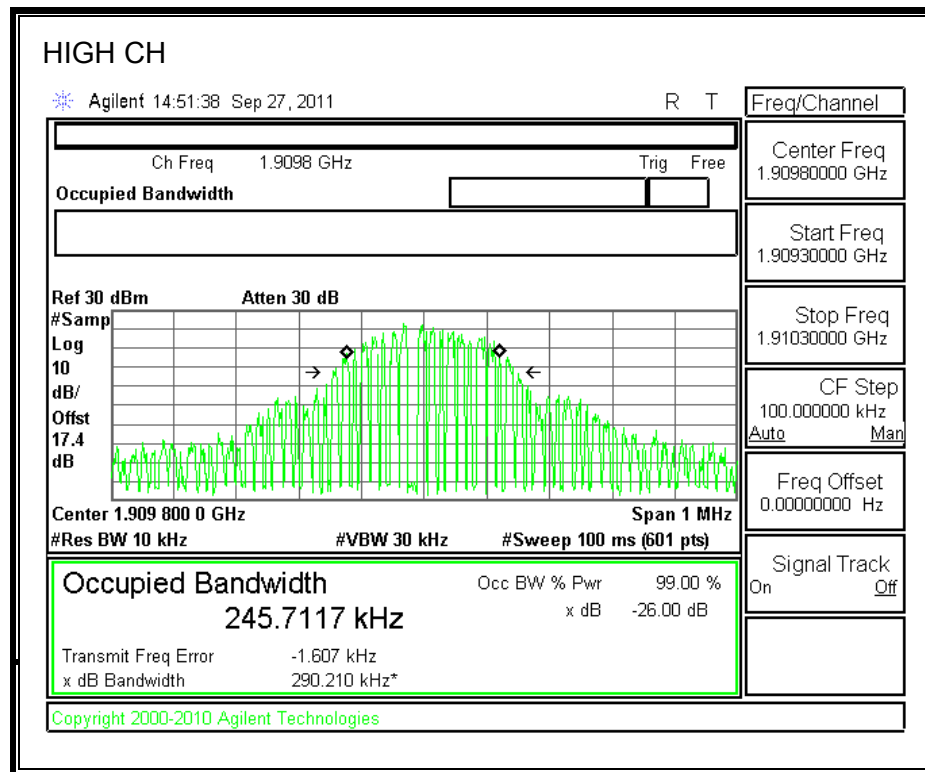
EGPRS850 BAND

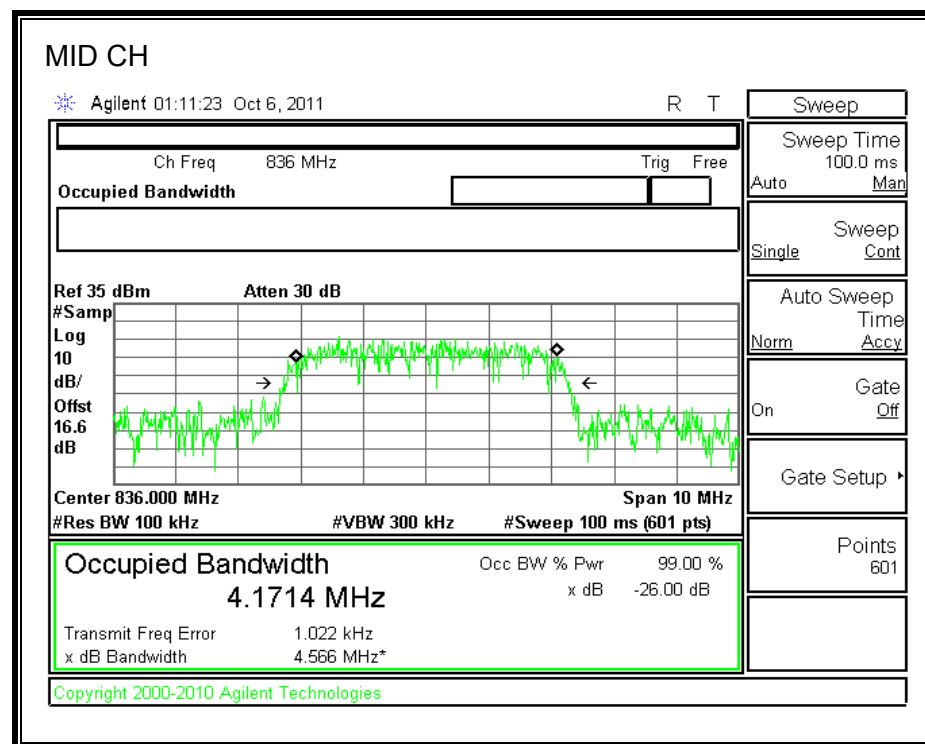
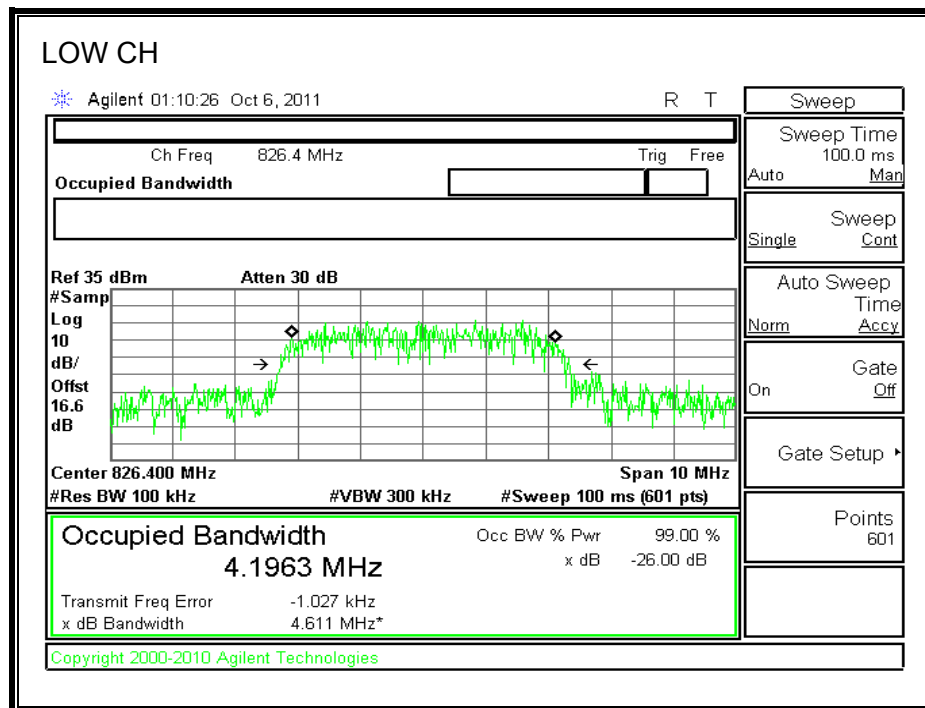


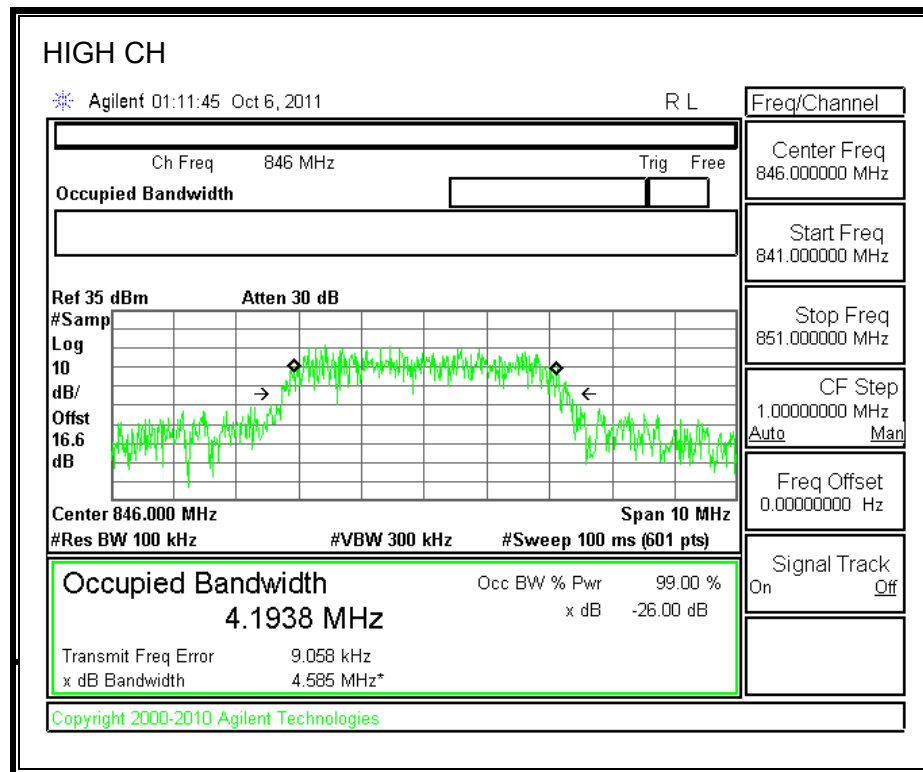
GPRS1900 BAND

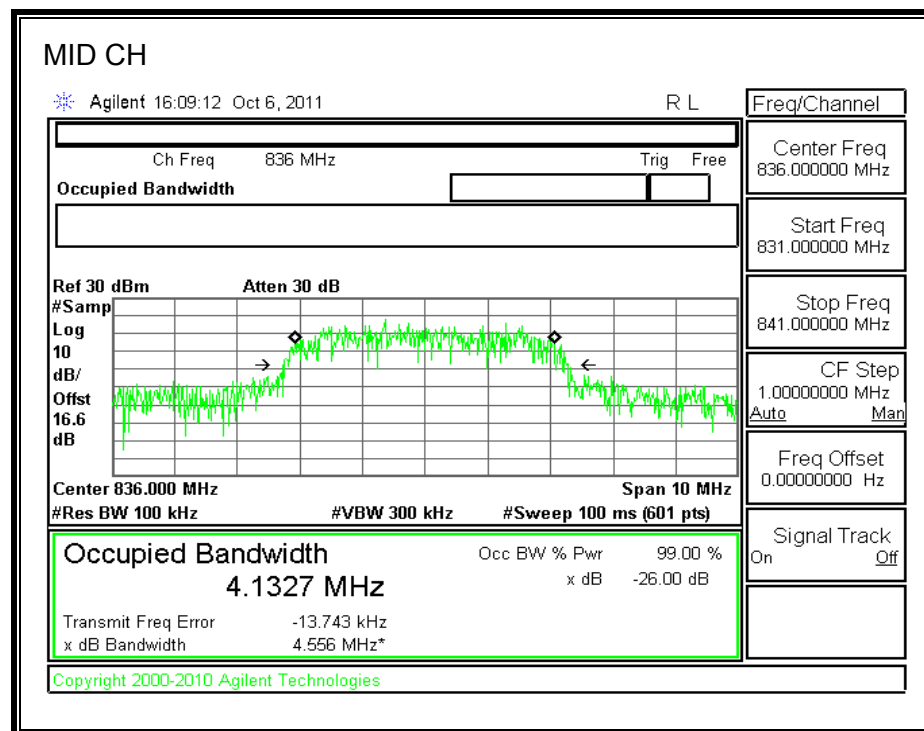
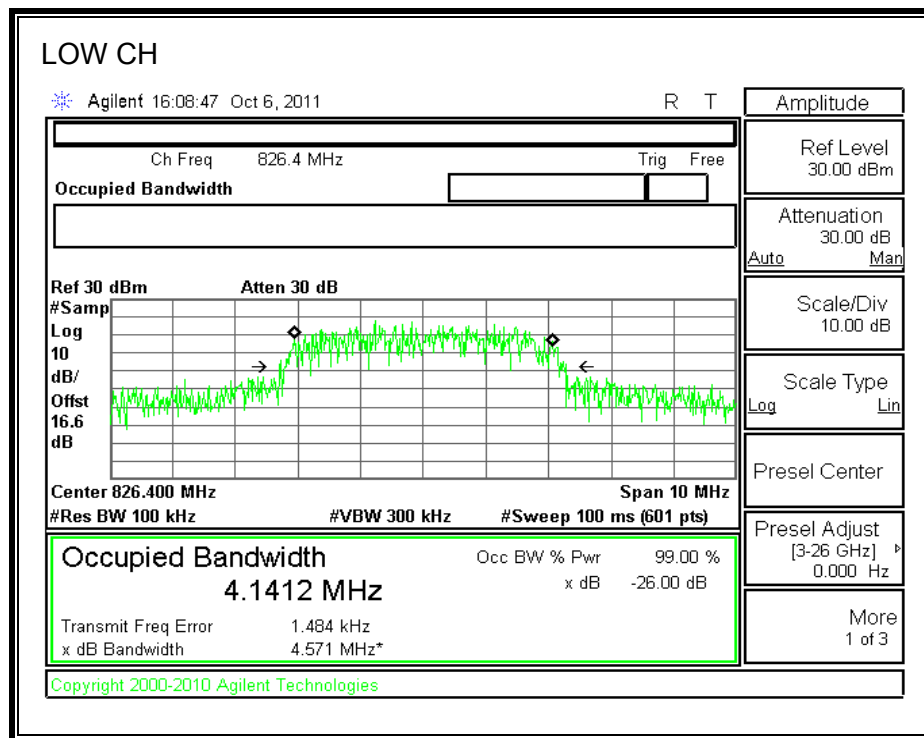


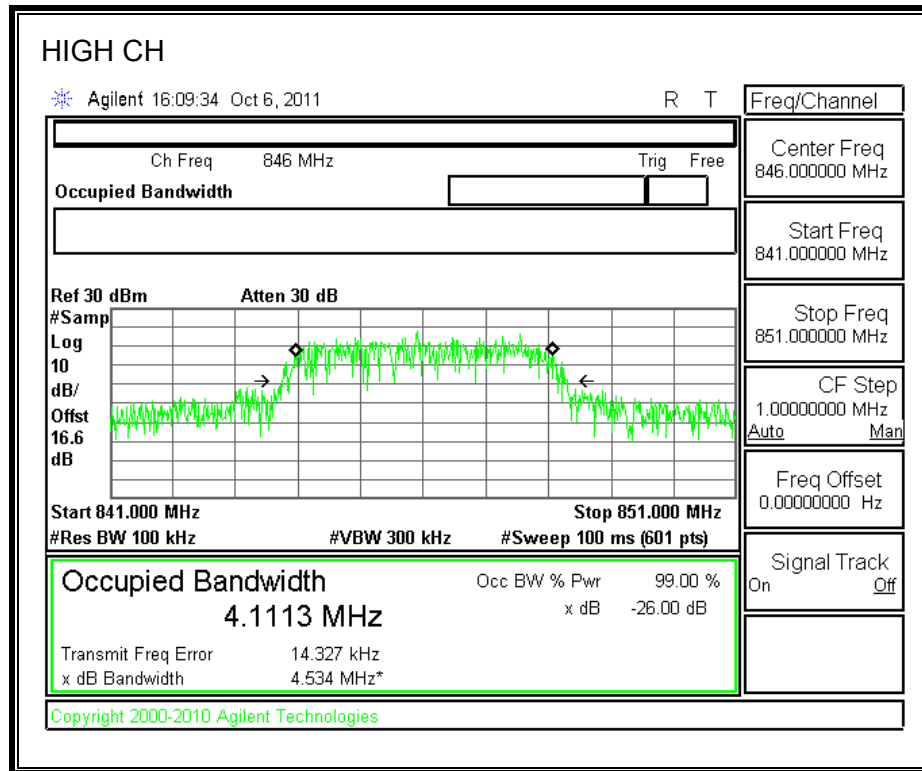
EGPRS1900 BAND

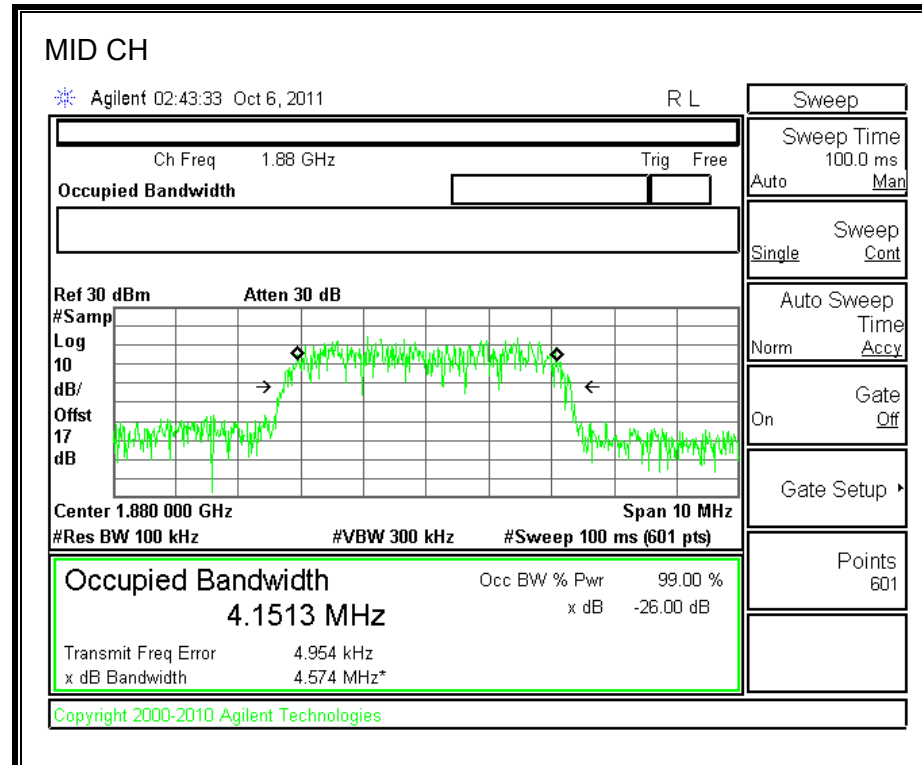
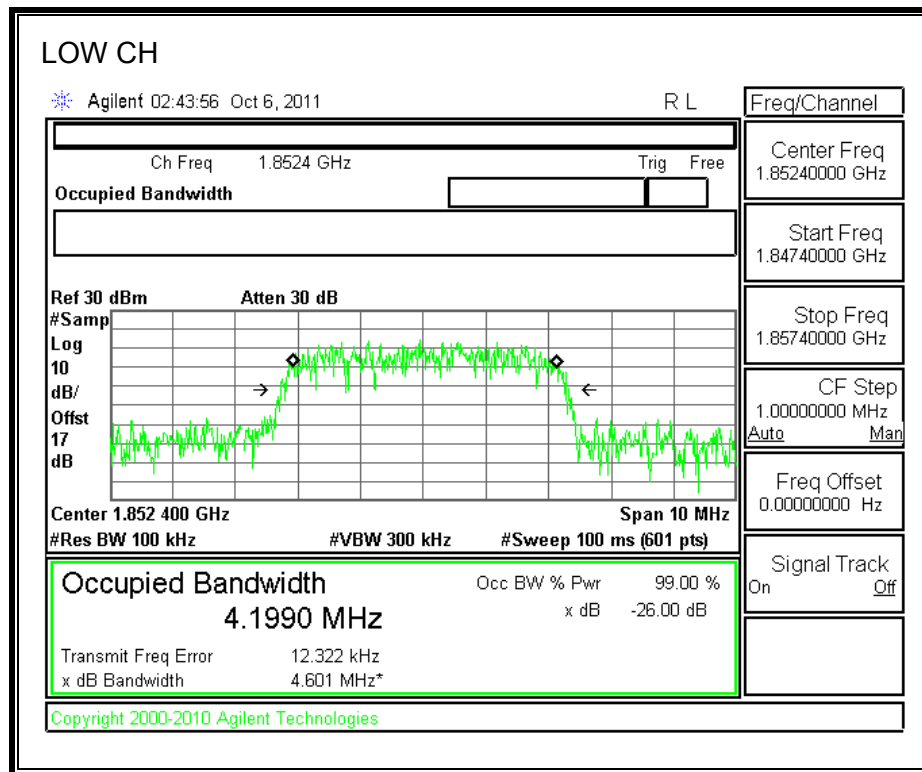


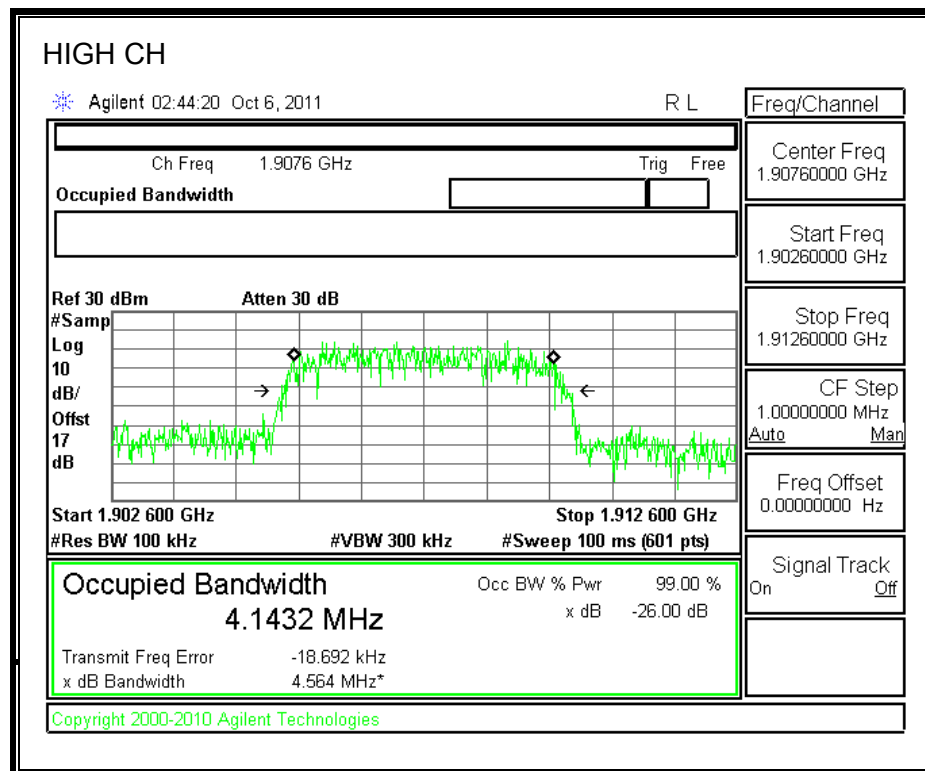
UMTS WCDMA Rel 99, Cell BAND

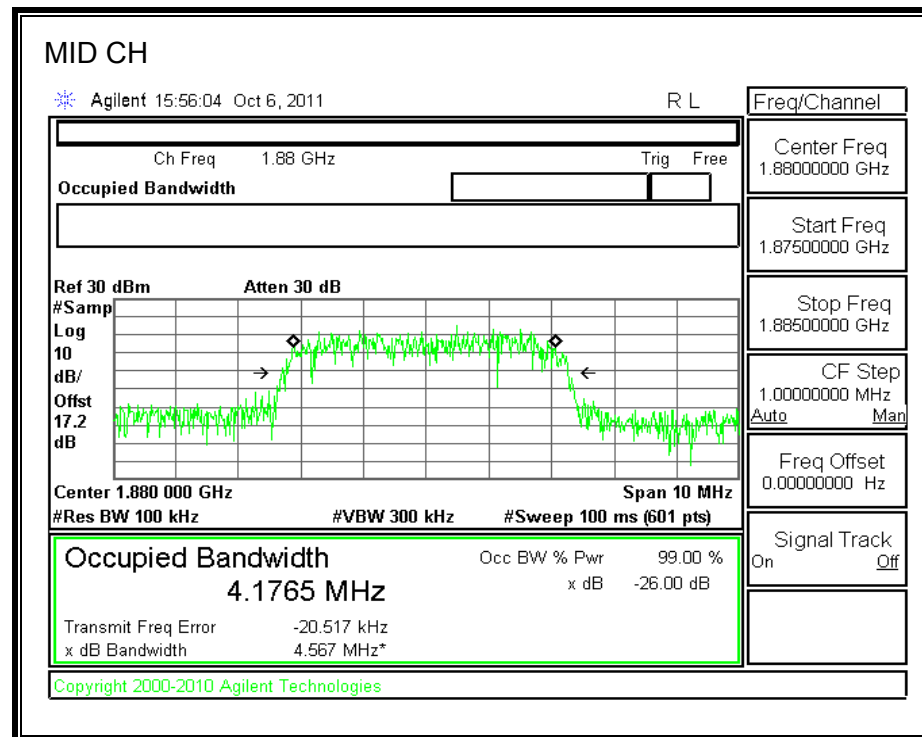
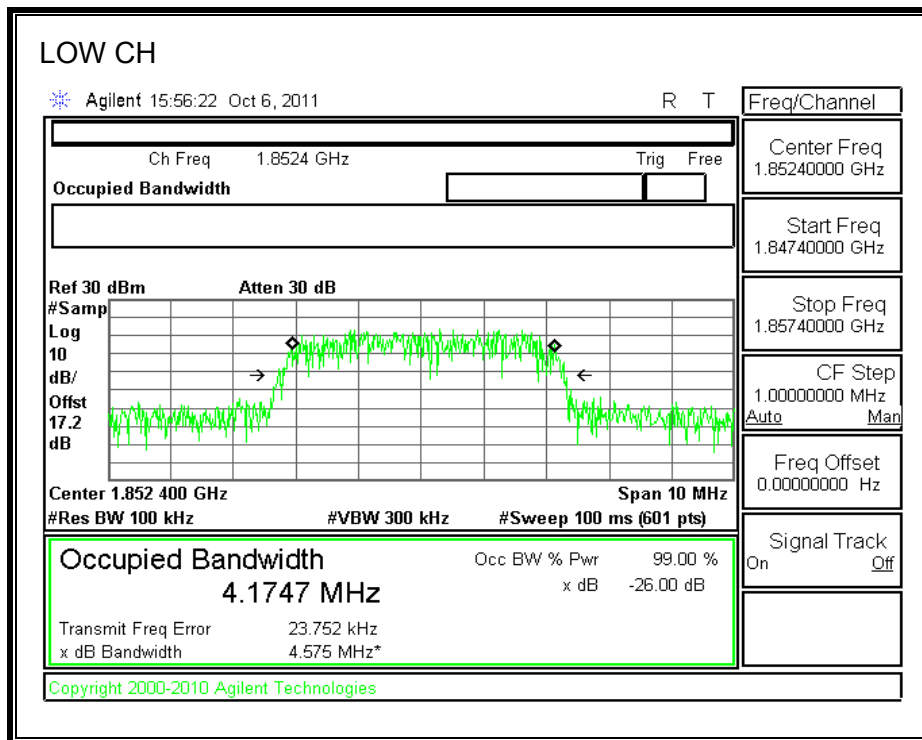


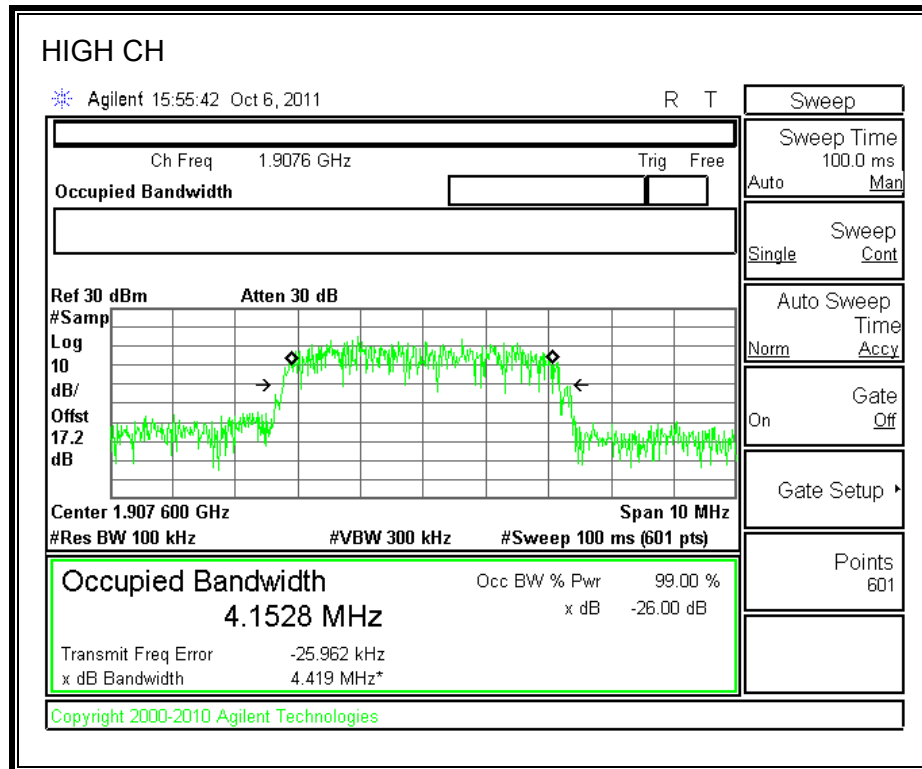
UMTS HSDPA Rel 6, Cell BAND



UMTS WCDMA REL 99. PCS Band



UMTS HSDPA Rel 6, PCS Band



8.2. BAND EDGE

RULE PART(S)

FCC: §22.359, 24.238
IC: RSS-132, 4.5; RSS-133, 6.5

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

TEST PROCEDURE

The transmitter output was connected to a Agilent 8960 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

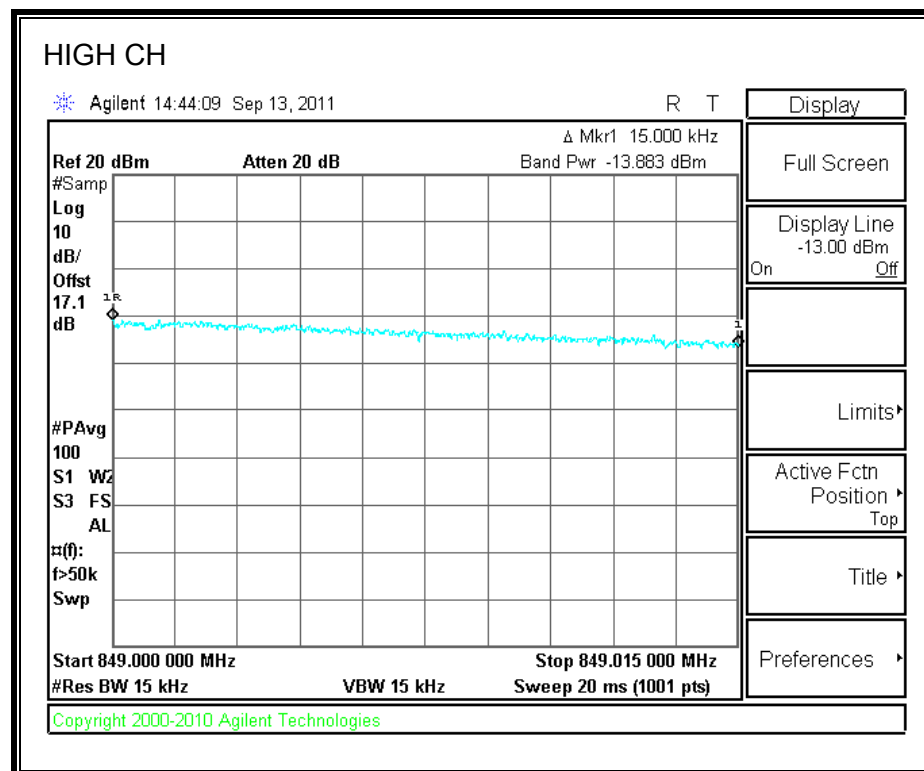
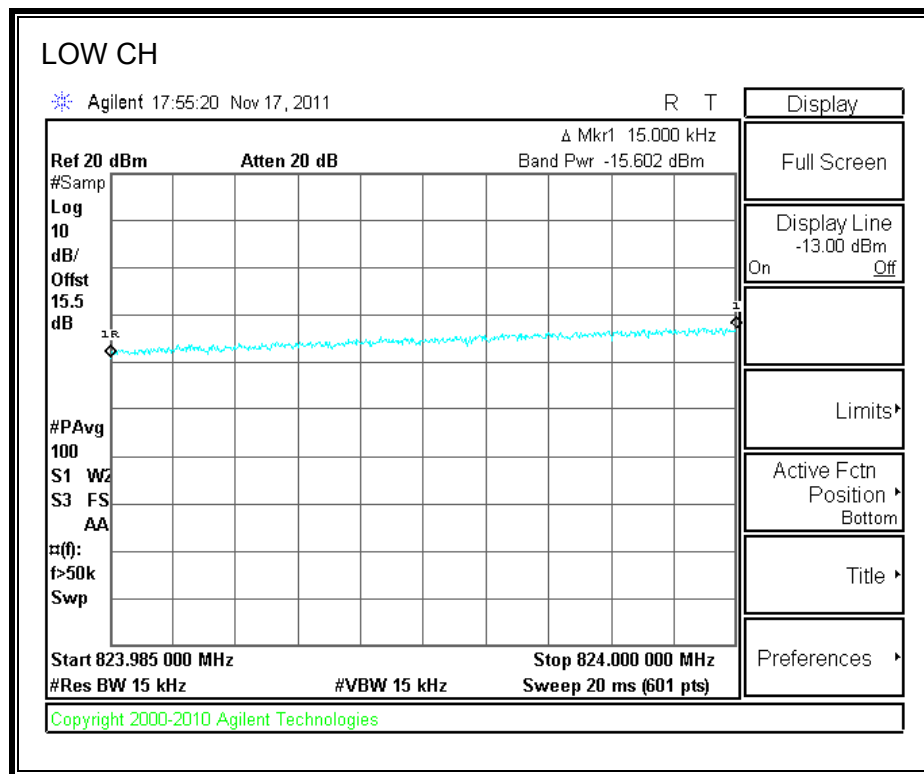
- Set the spectrum analyzer span to include the block edge frequency (824, 849, 1710, 1755, 1850, 1910MHz)
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13 dBm
- Set resolution bandwidth to at least 1% of emission bandwidth.

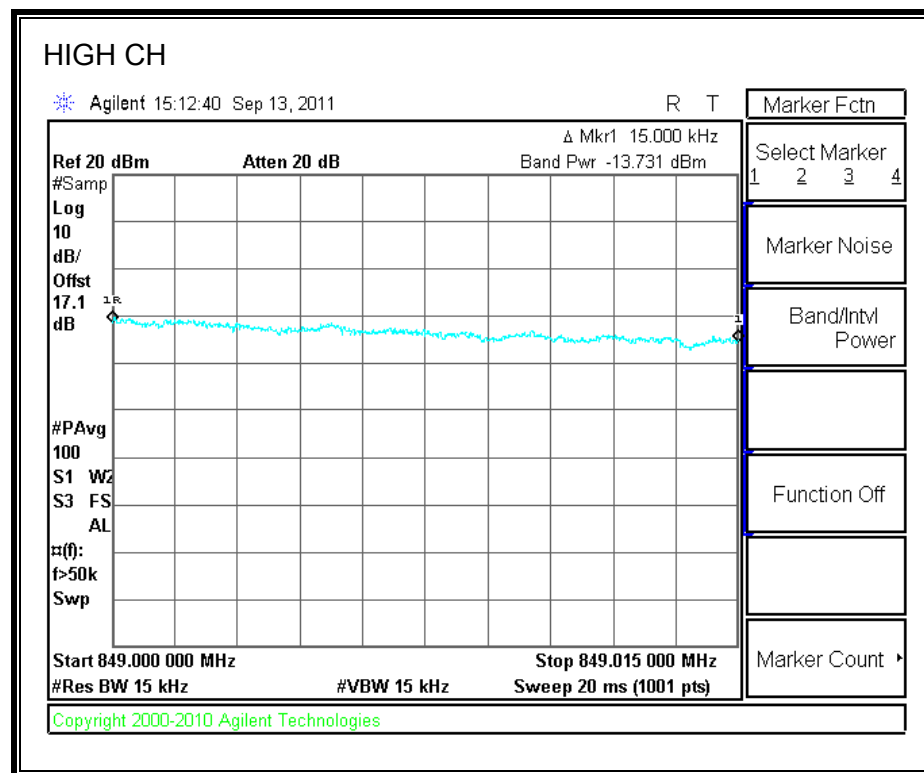
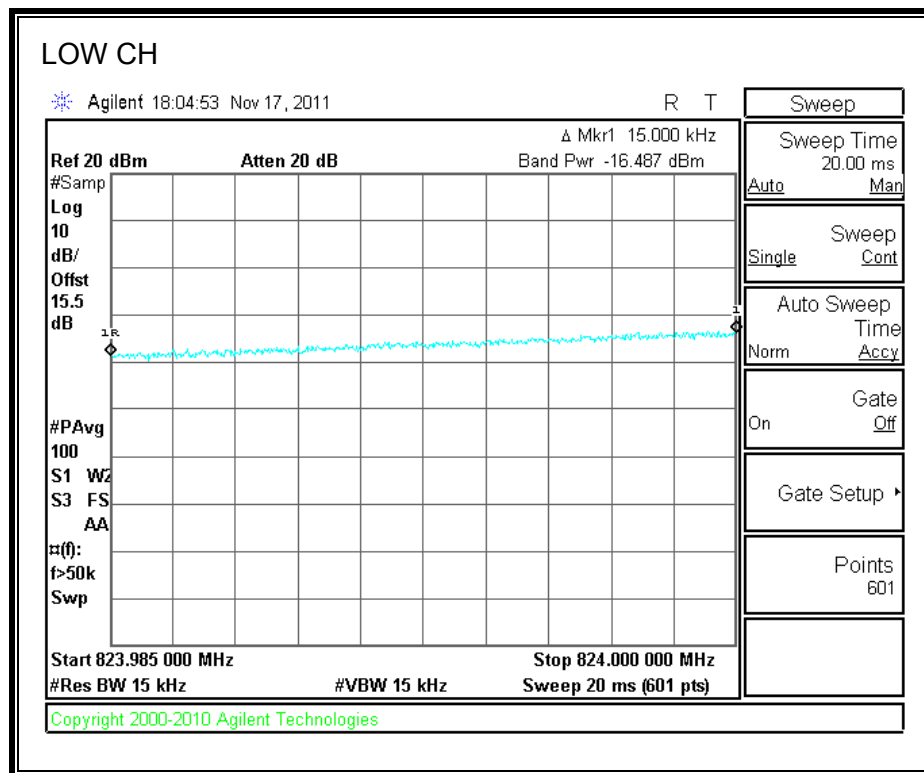
MODES TESTED

- CDMA2000 1xRTT and EVDO Rev A
- GPRS and EGPRS
- WCDMA REL. 99 and HSDPA

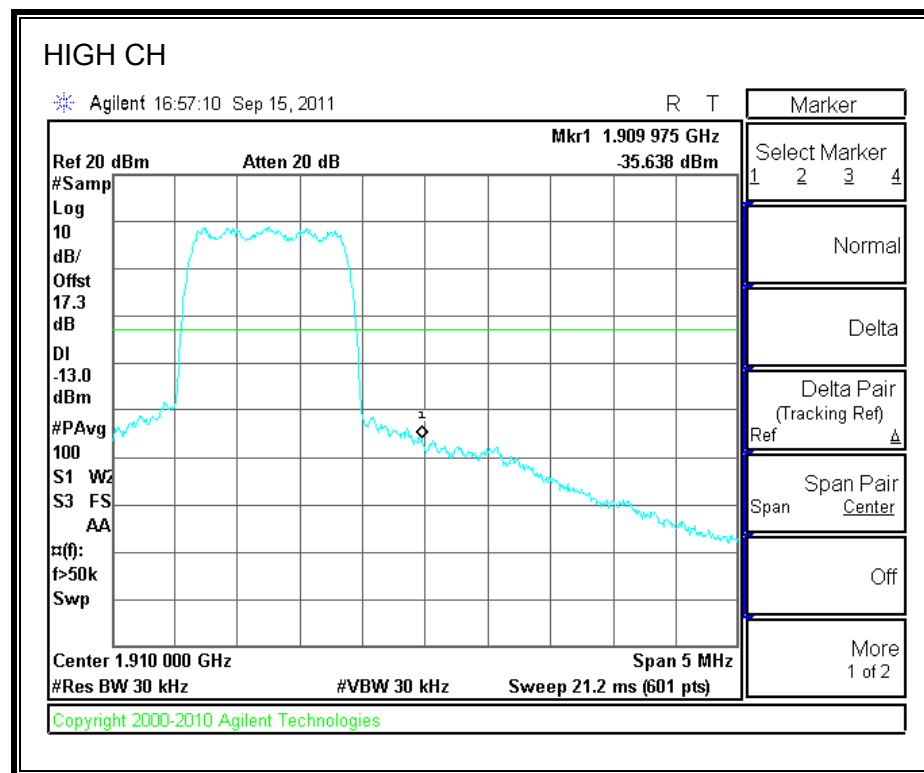
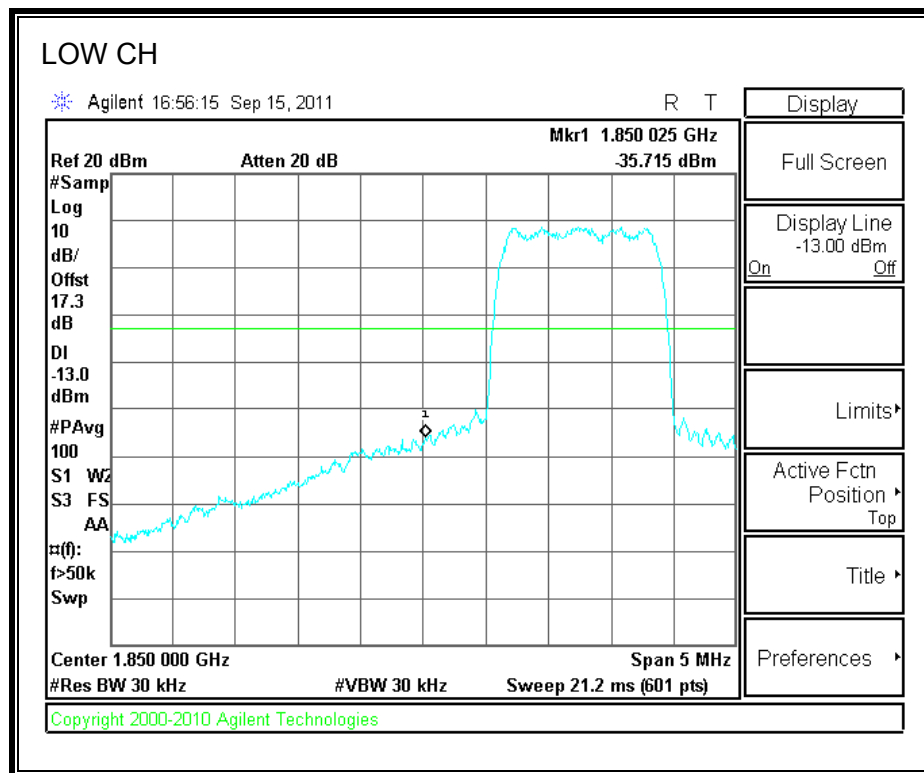
RESULTS

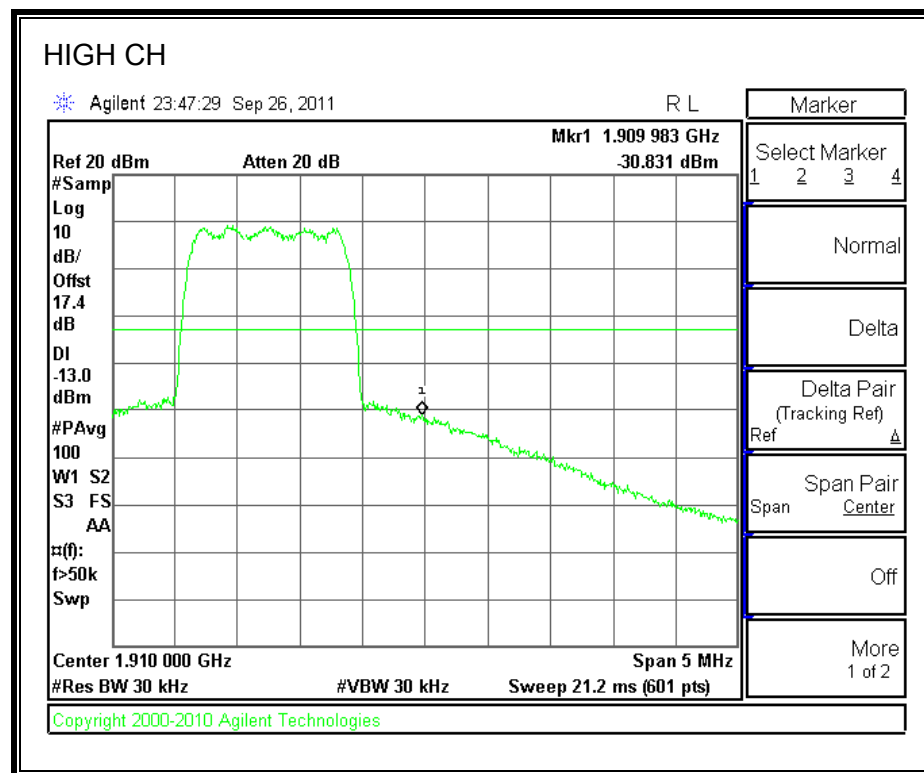
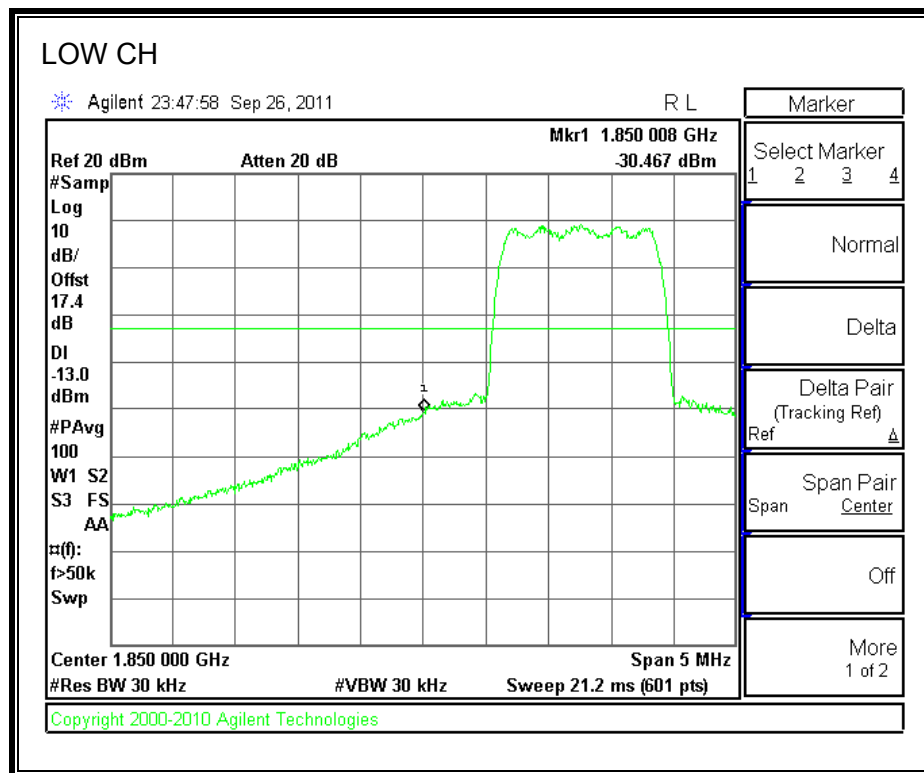
CDMA2000 1xRTT mode (Cellular Band)

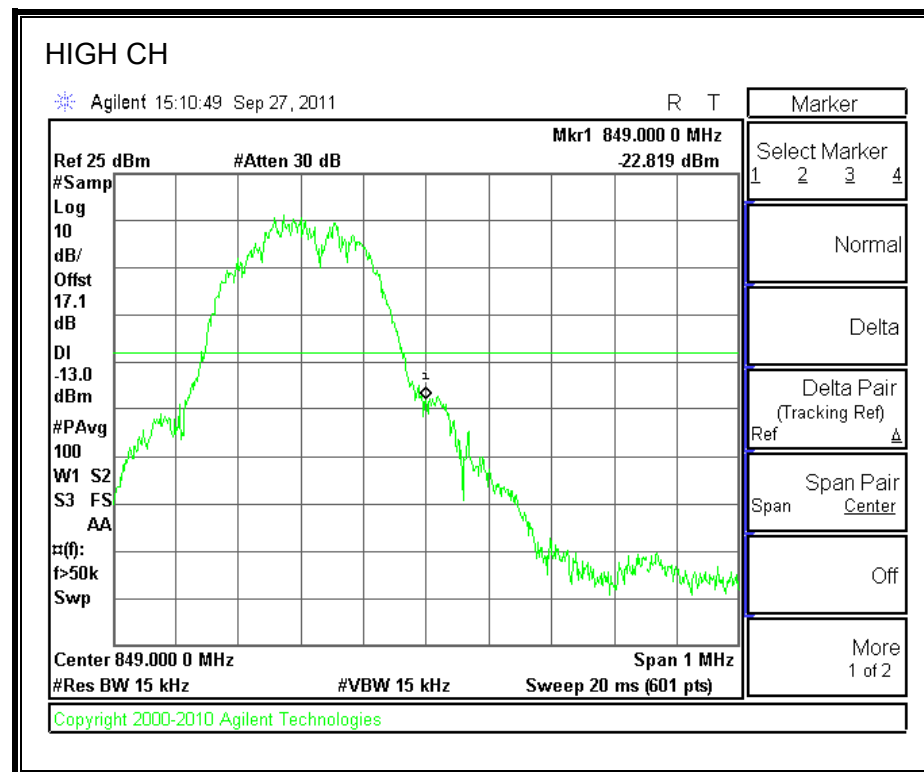
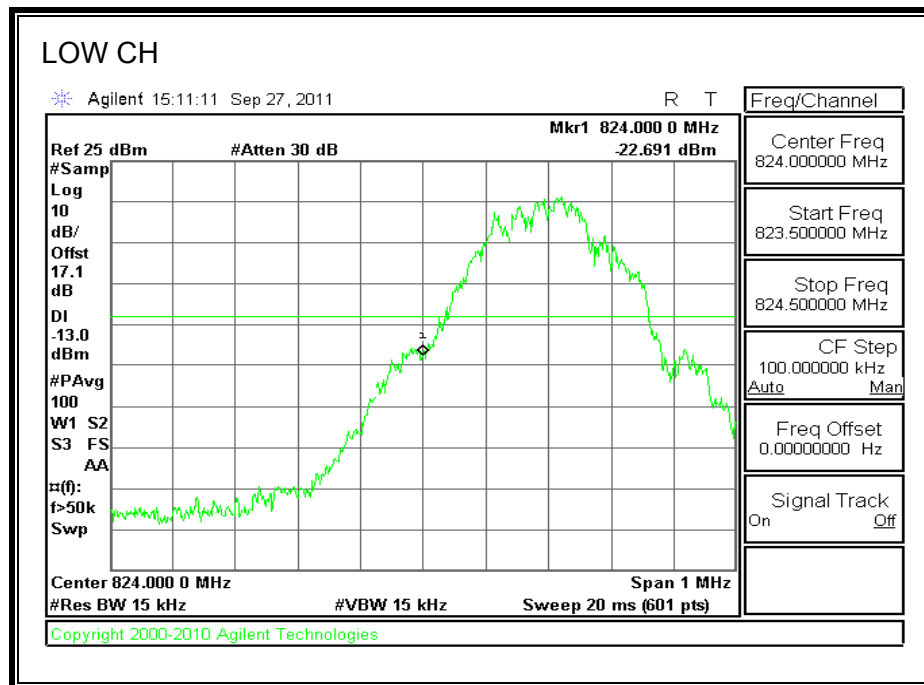


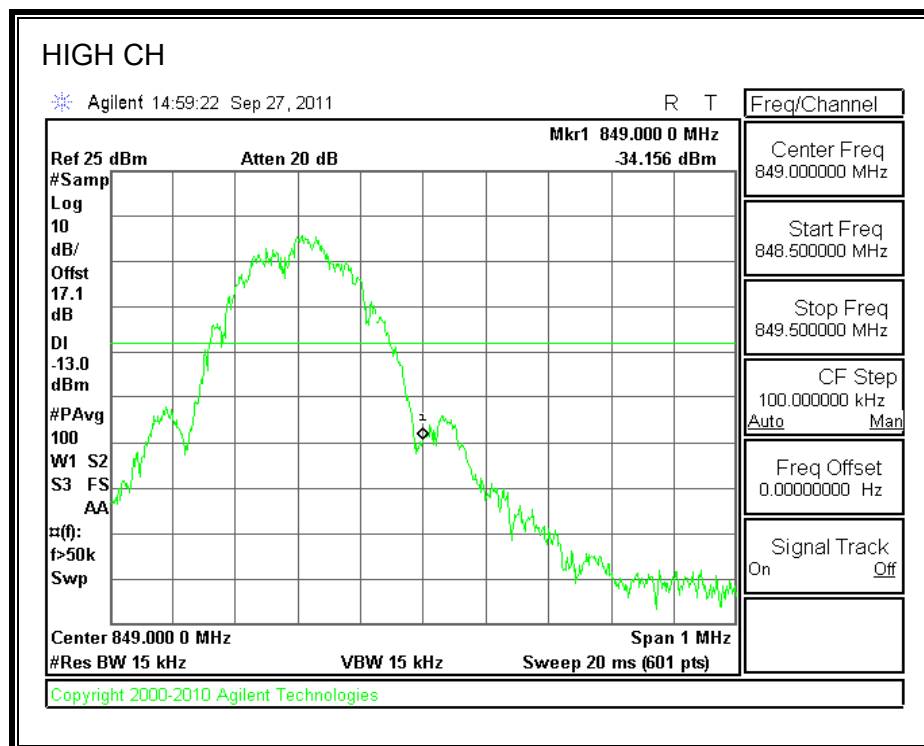
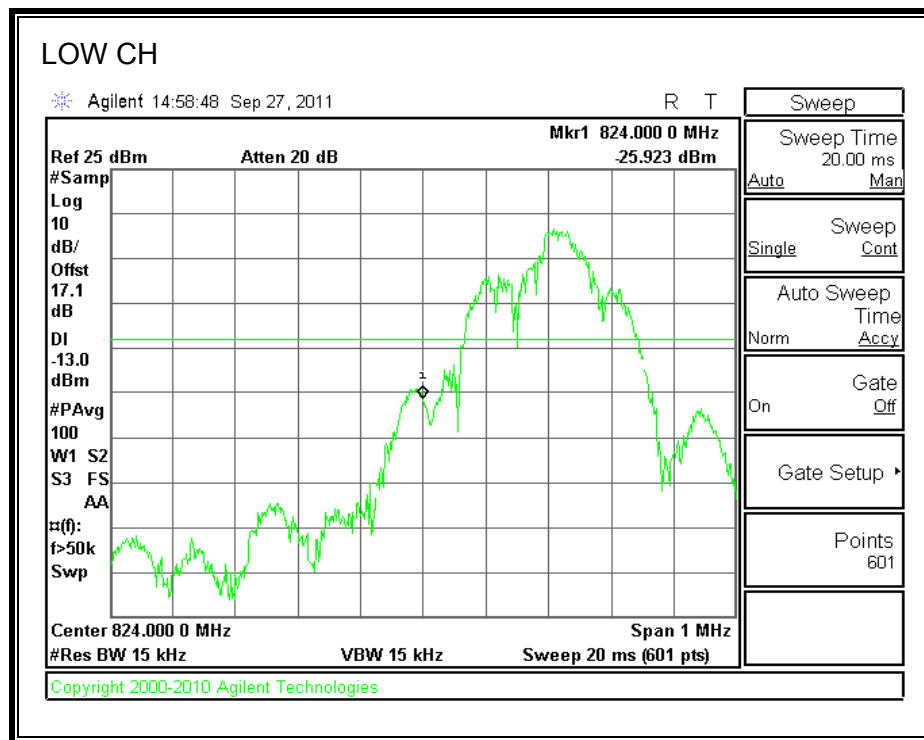
CDMA2000 EVDO Rev A mode (Cellular Band)

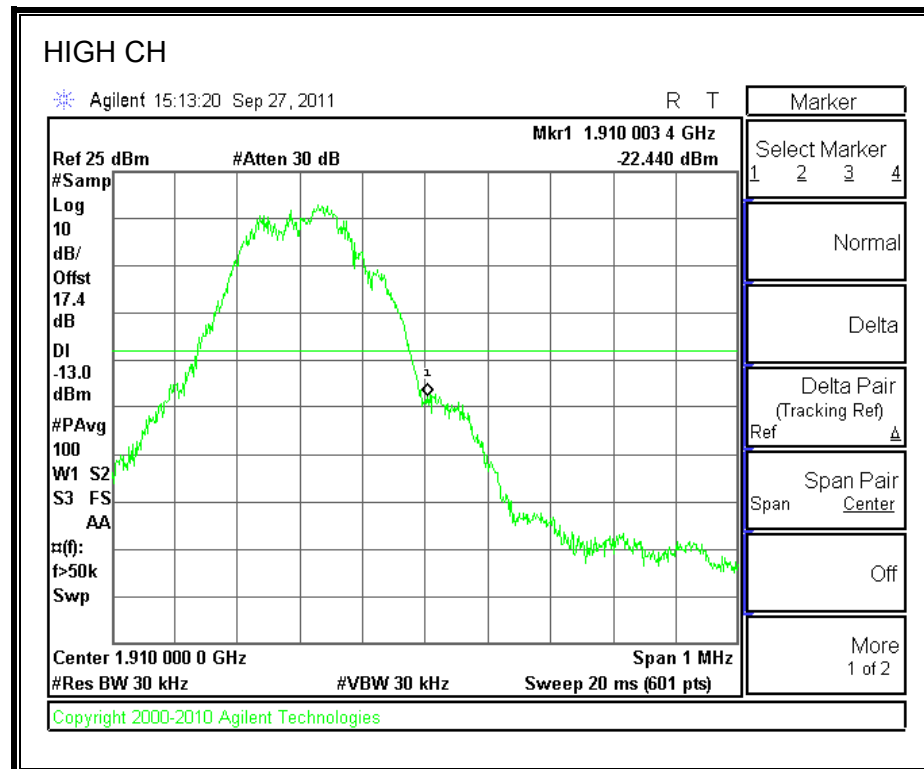
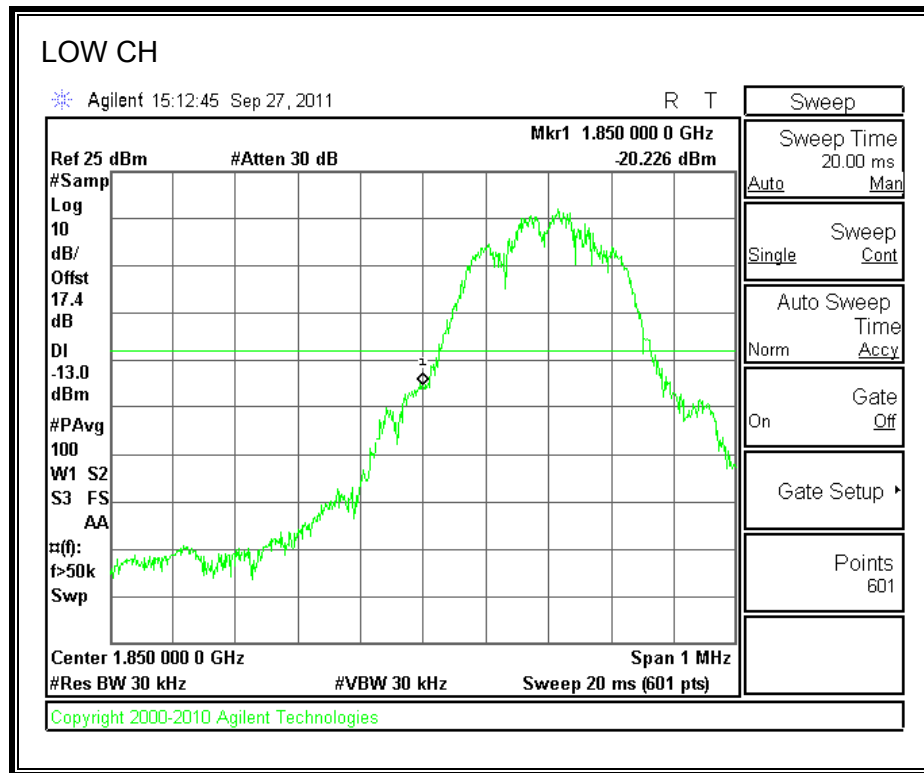
CDMA2000 1xRTT mode (PCS Band)

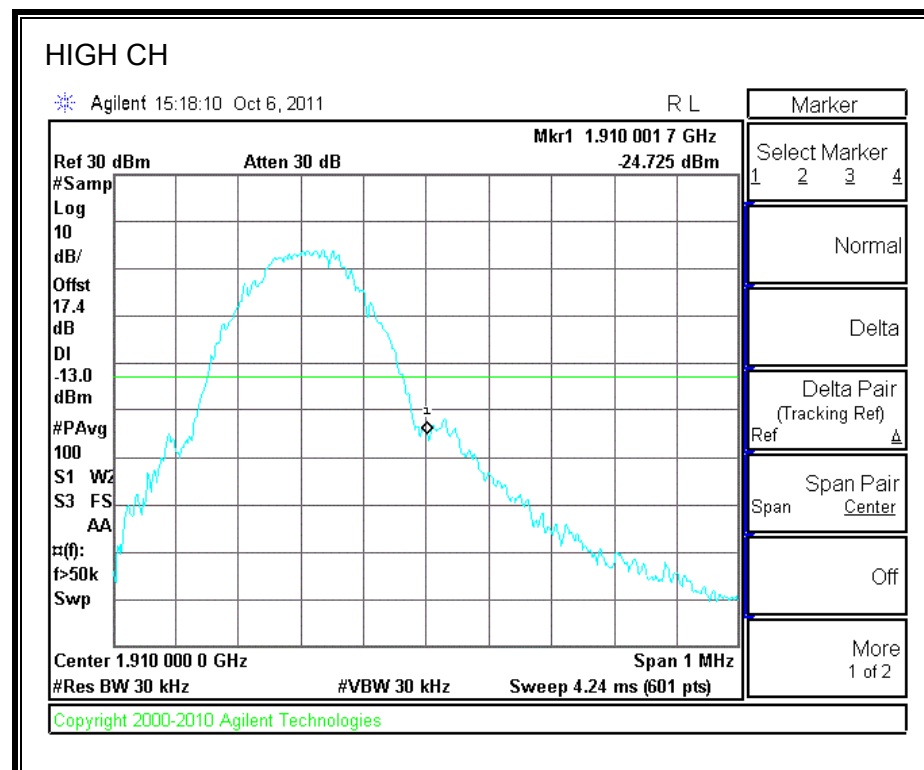
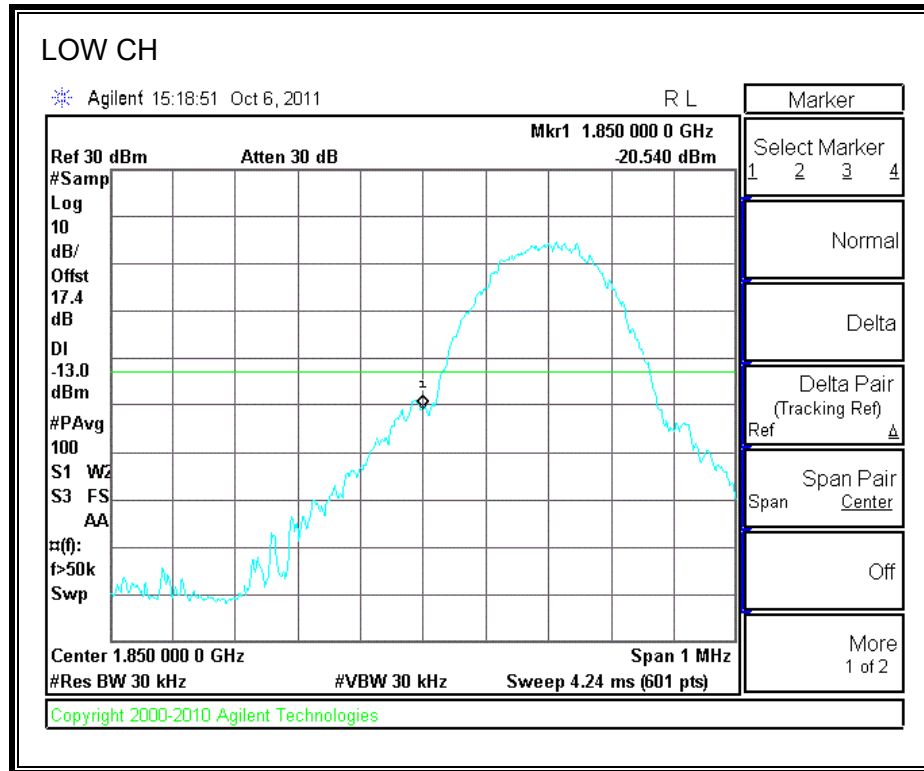


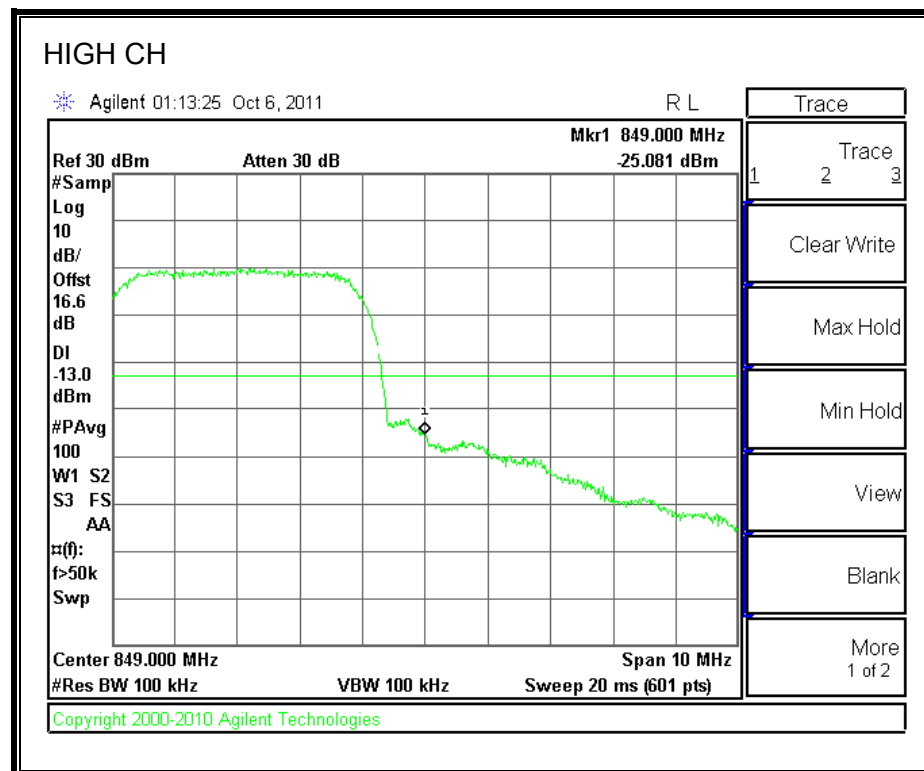
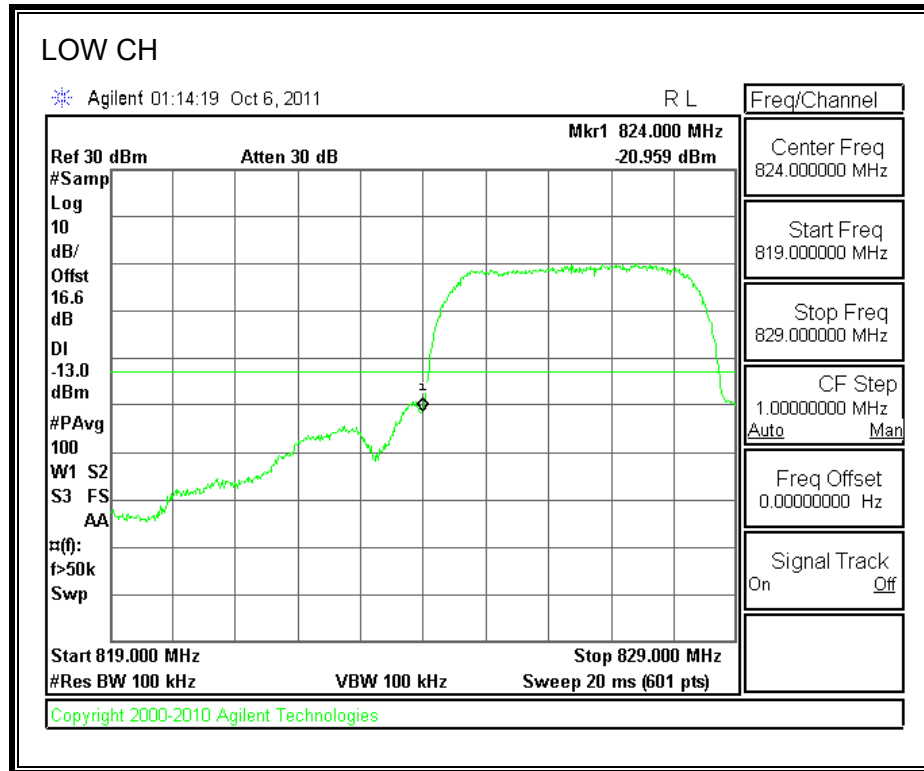
CDMA2000 EVDO Rev A mode (PCS Band)

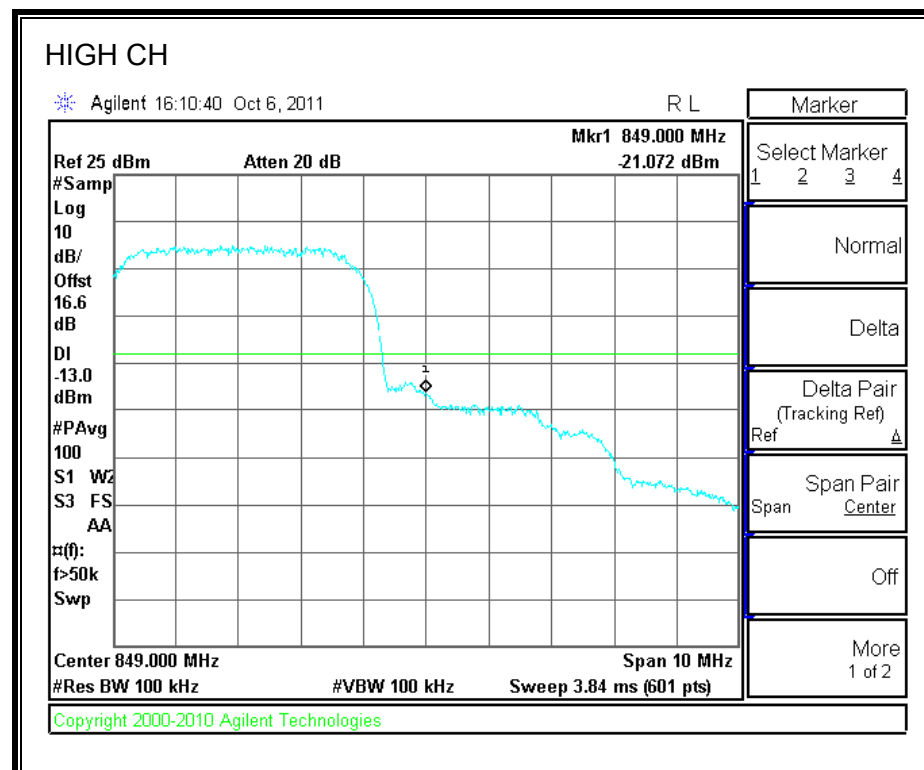
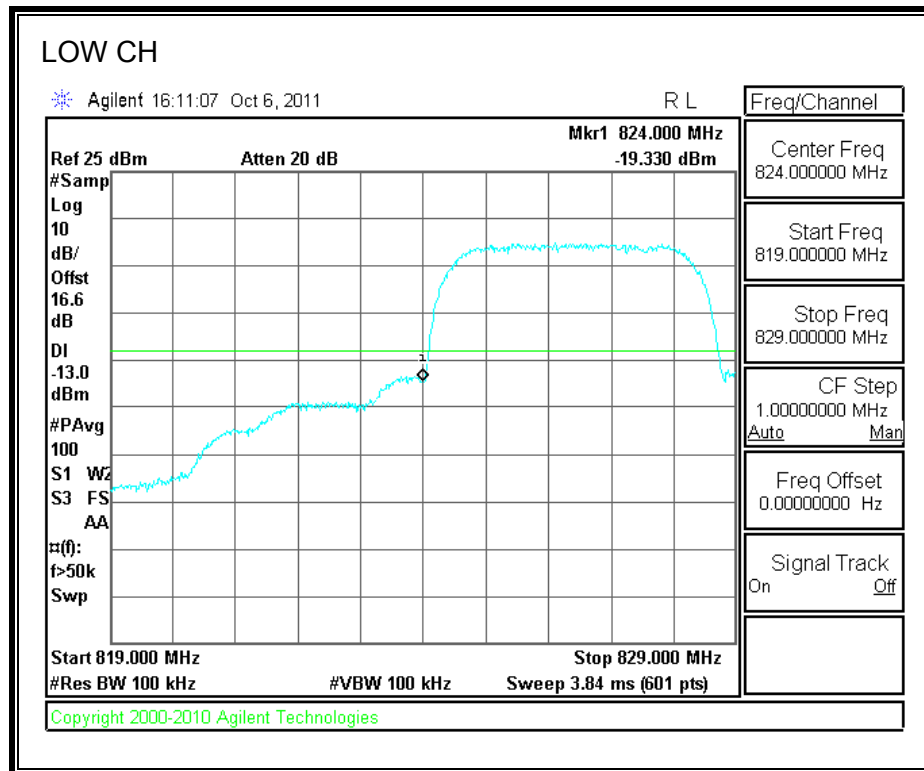
GPRS850 BAND

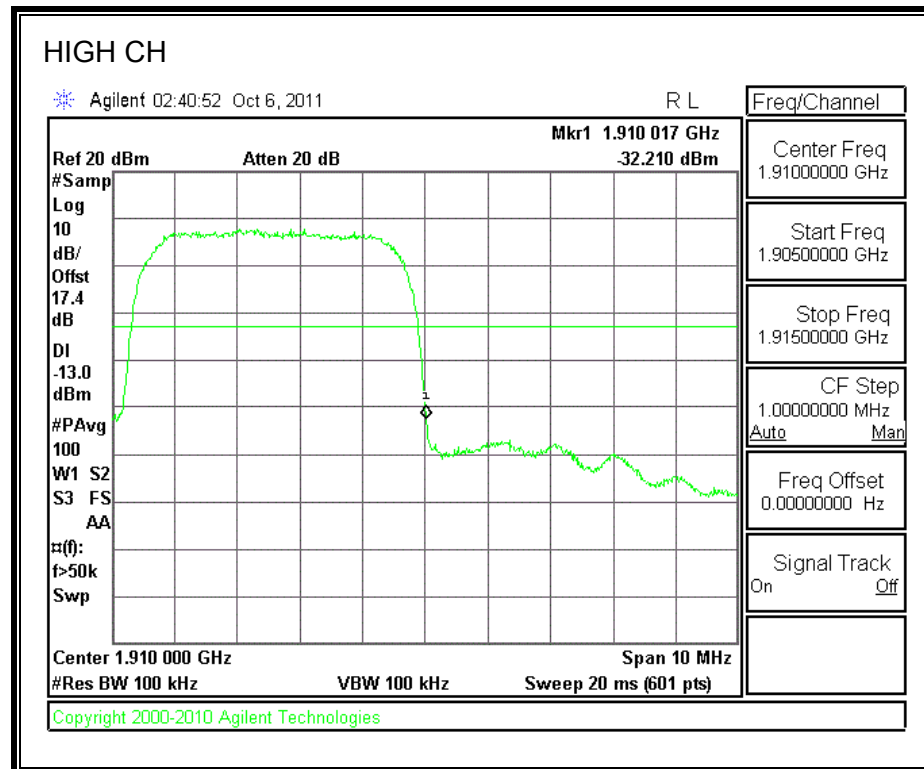
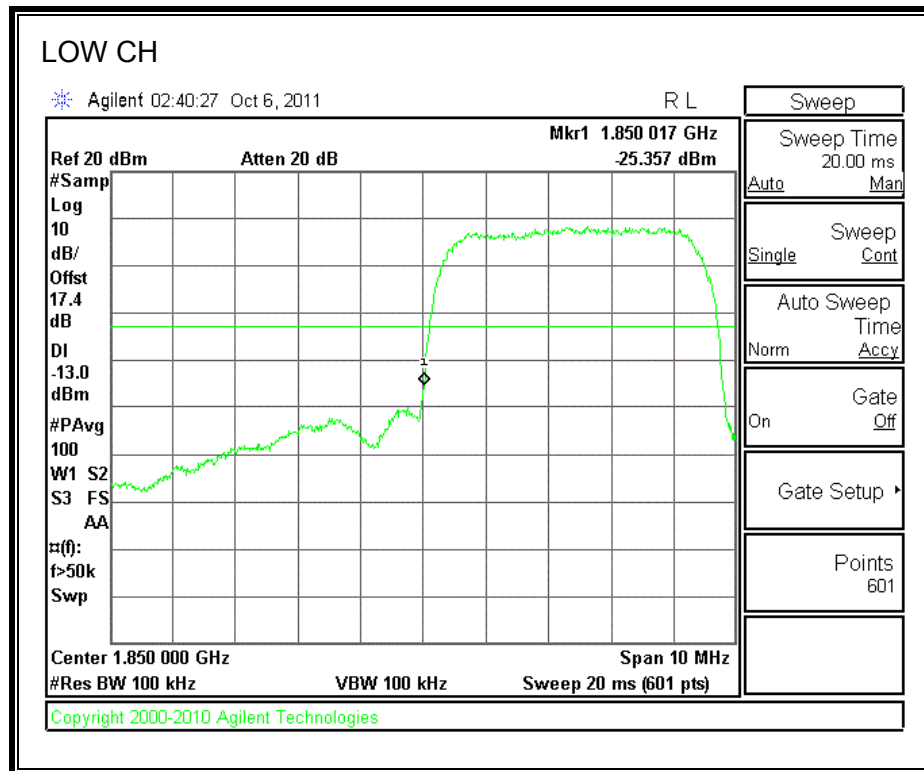
EGPRS850 BAND

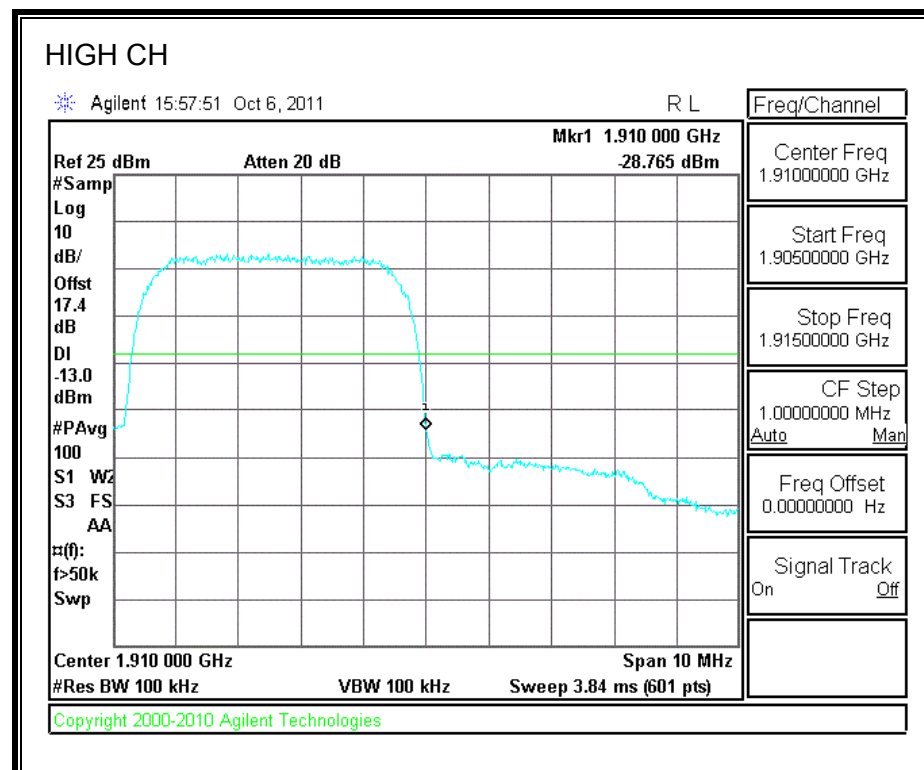
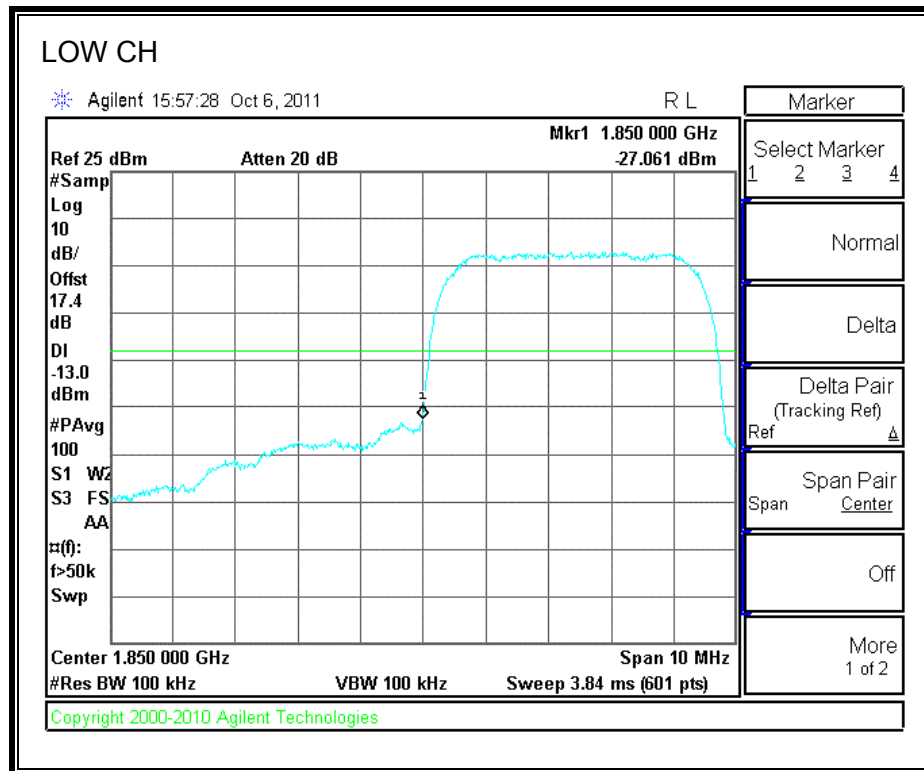
GPRS1900 BAND

EGPRS1900 BAND

UMTS WCDMA REL 99 CELL BAND

UMTS HSDPA REL 6 CELL BAND

UMTS WCDMA REL 99 PCS Band

UMTS HSDPA REL 6 PCS Band

8.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238
IC: RSS-132, 4.5; RSS-133, 6.5

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

TEST PROCEDURE

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

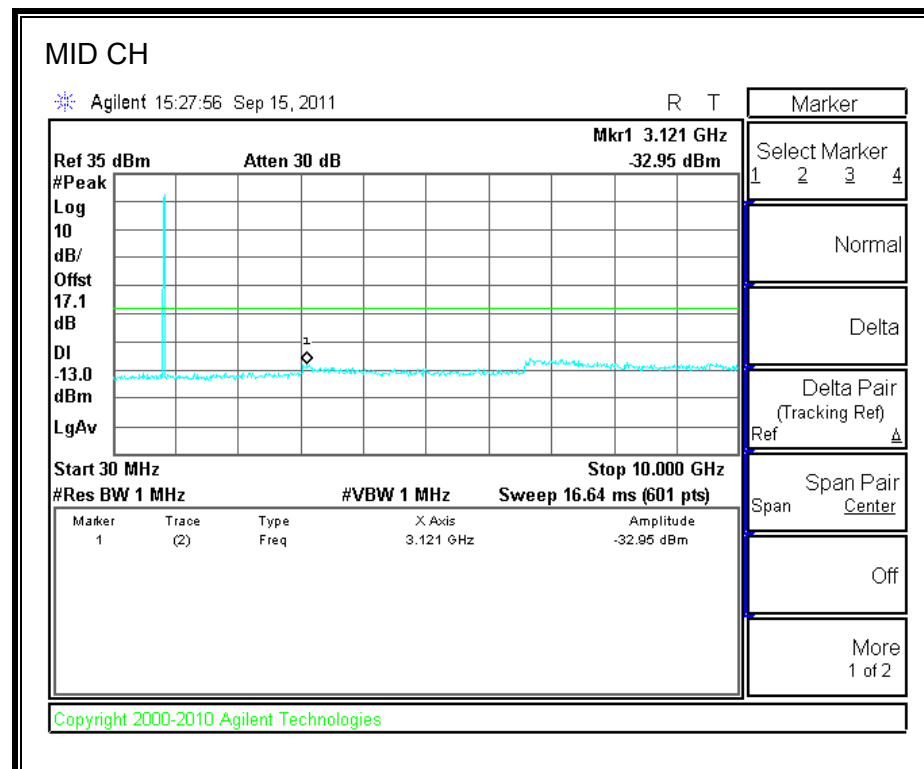
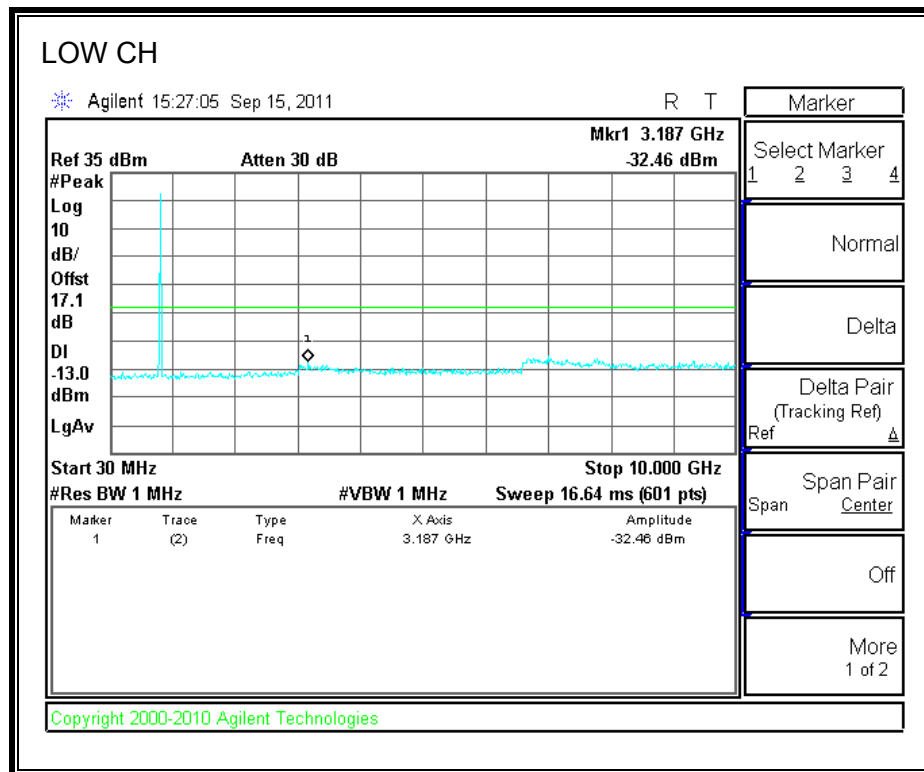
For each out of band emissions measurement:

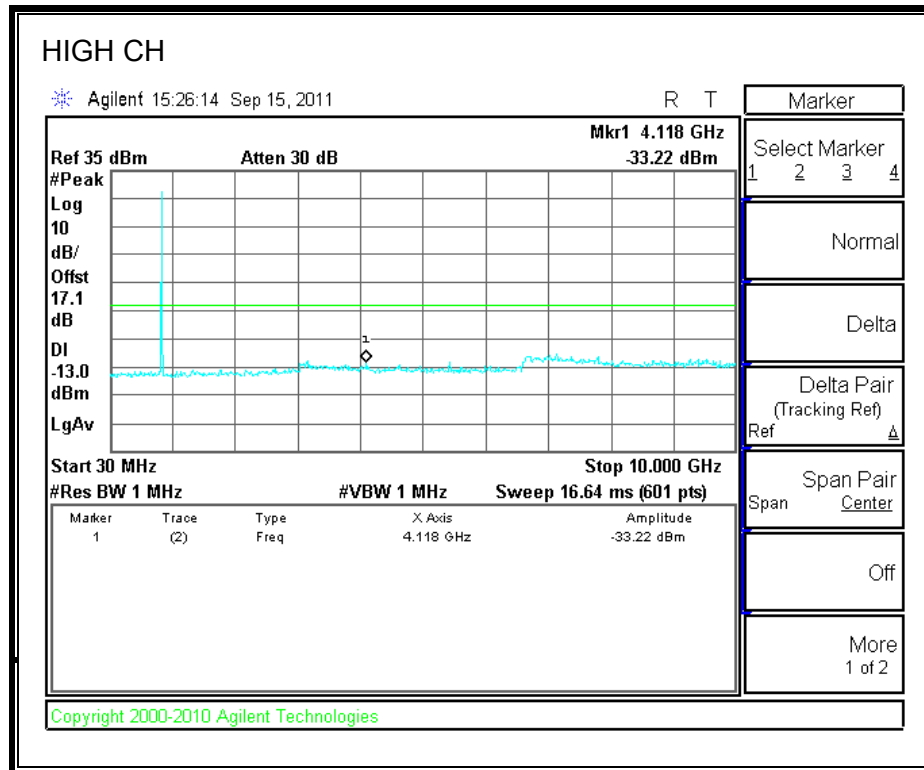
- Set display line at -13 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

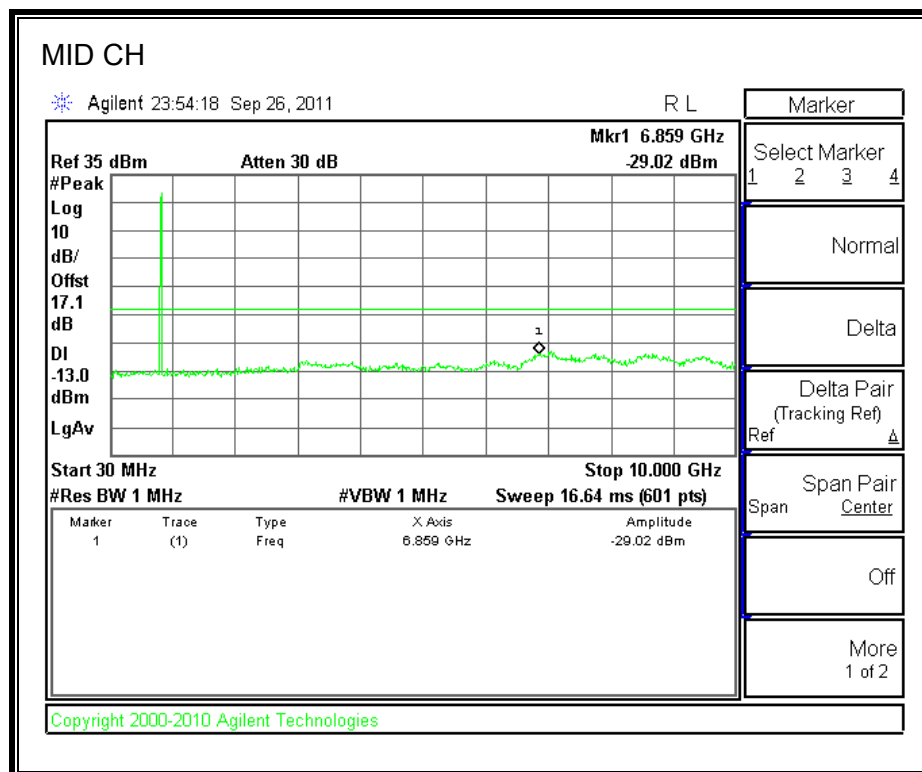
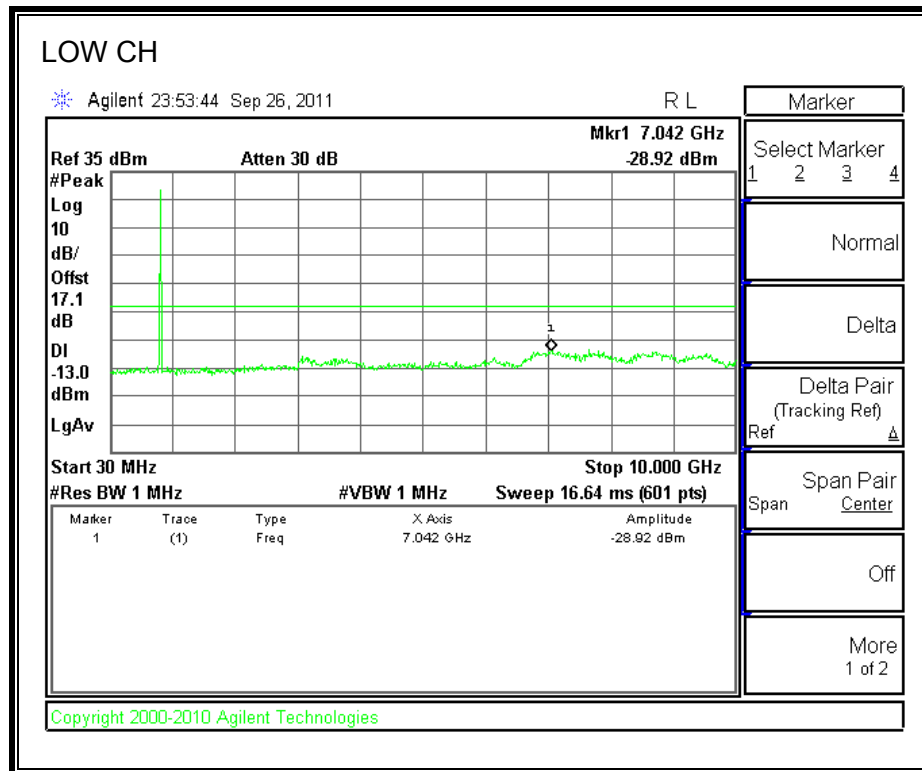
MODES TESTED

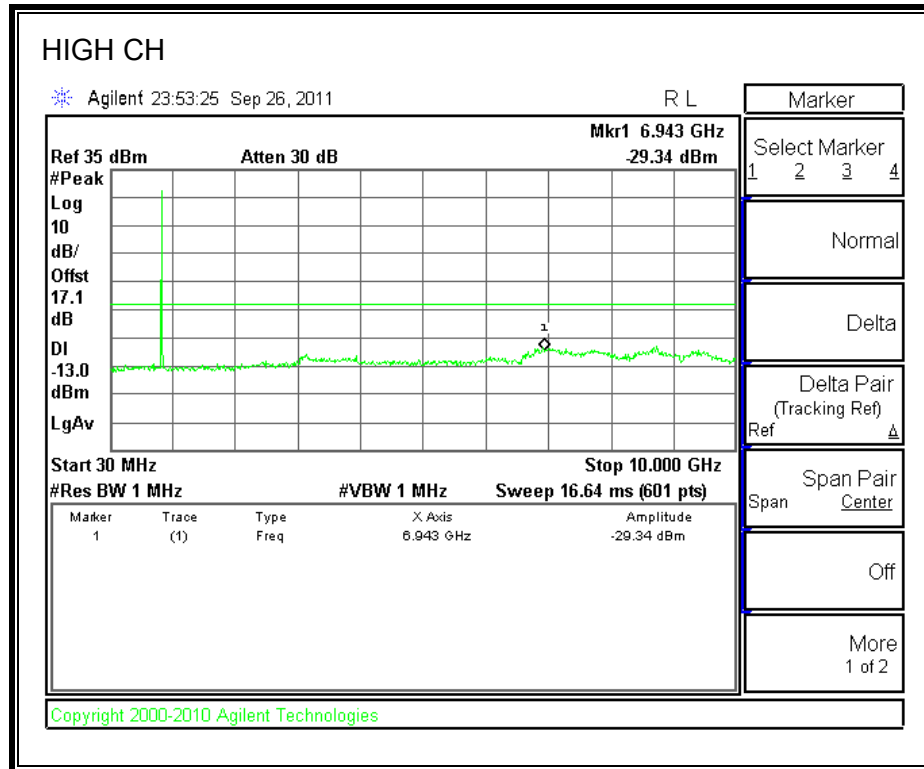
- CDMA2000, 1xRTT and EVDO Rev A
- GPRS and EGPRS
- WCDMA REL. 99 and HSDPA

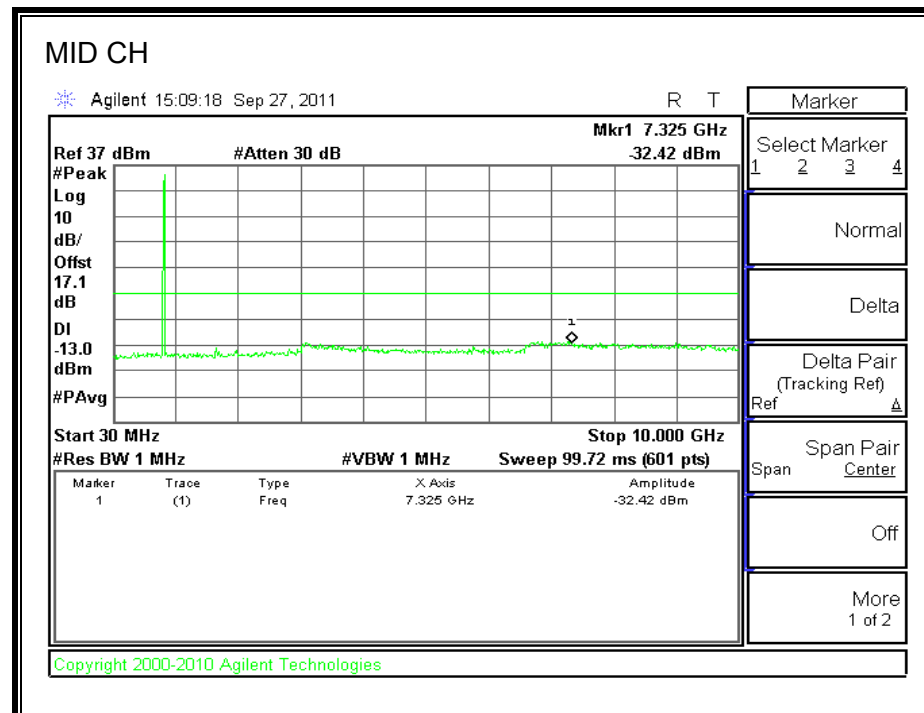
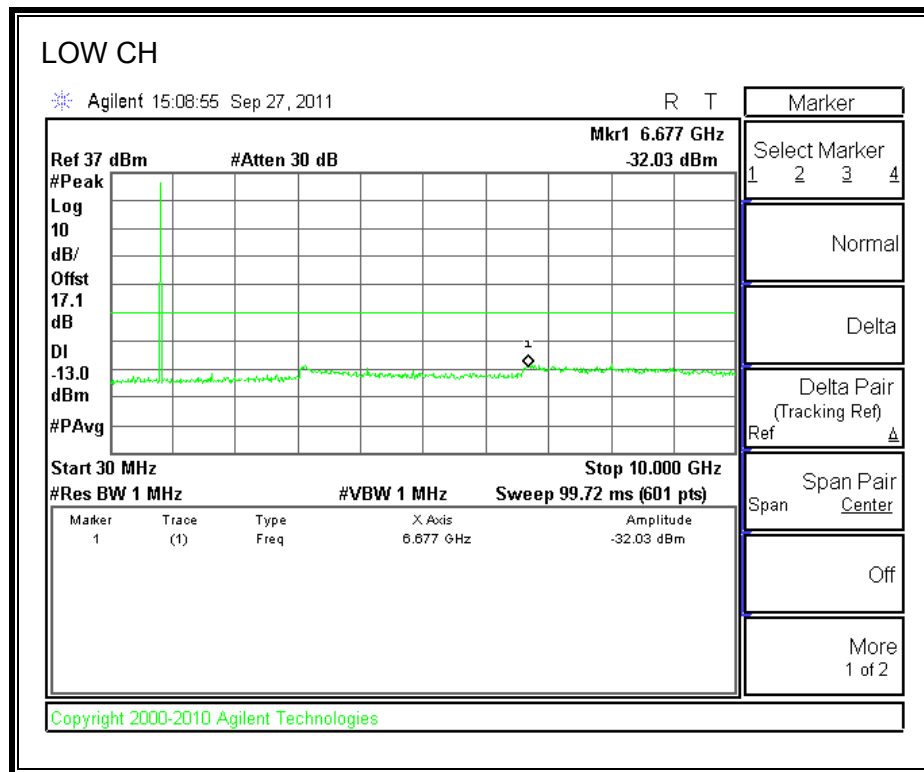
RESULTS

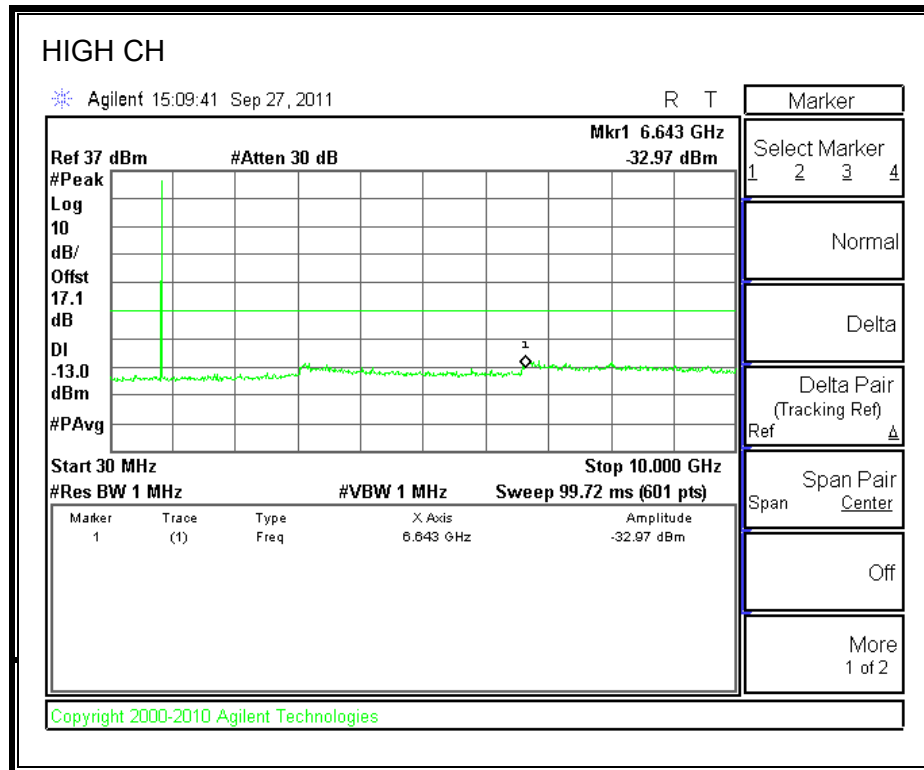
CDMA2000 CELL BAND, 1xRTT

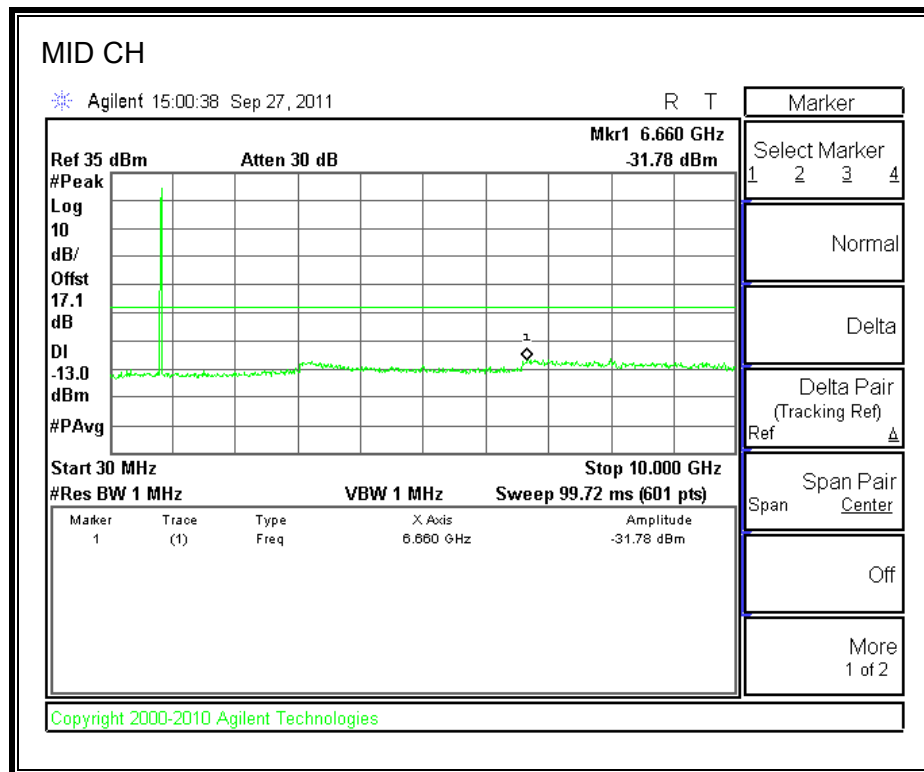
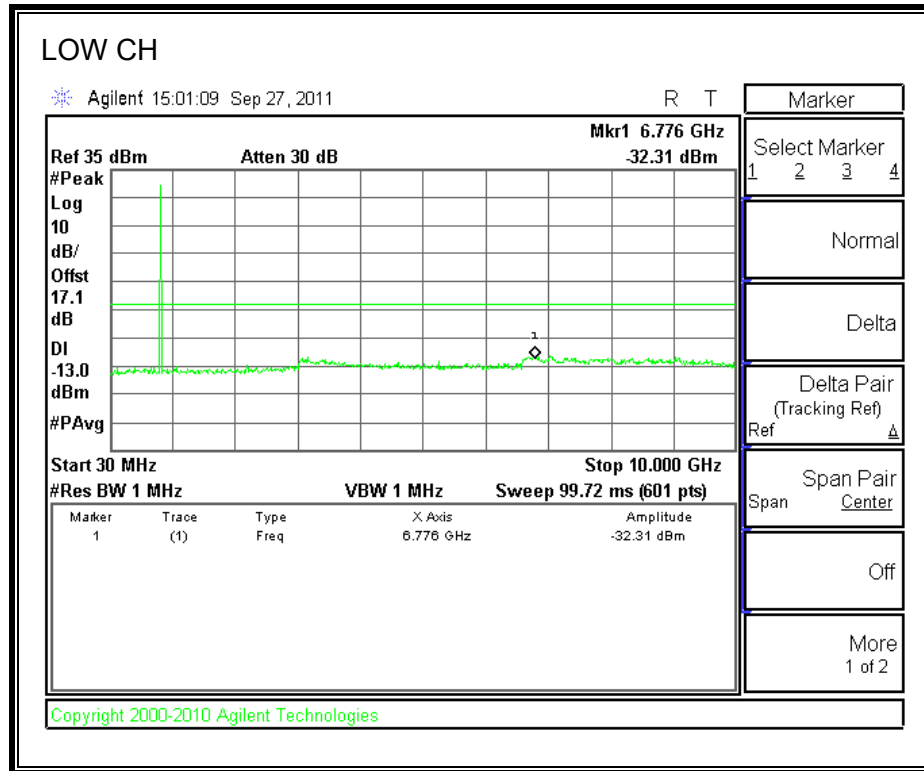


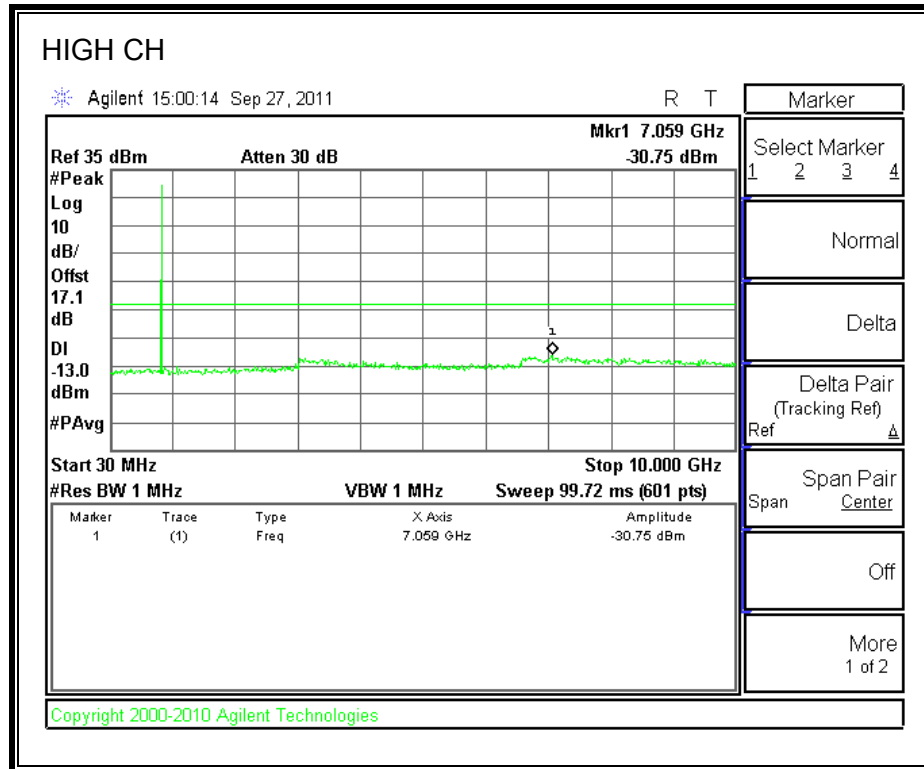
CDMA2000, Cell BAND, EVDO, Rev A

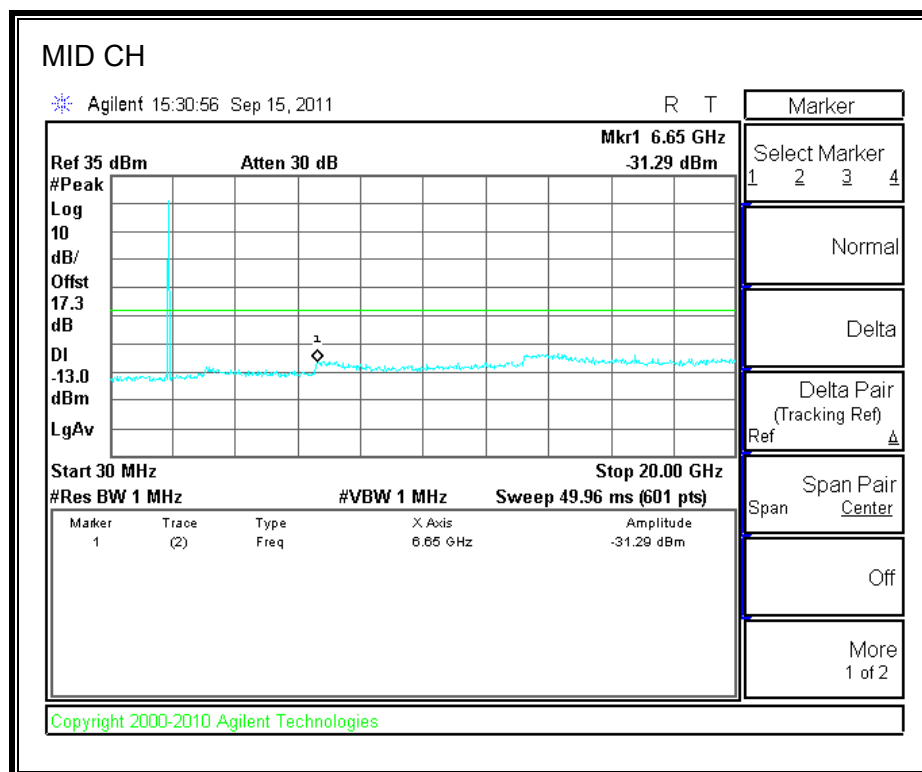
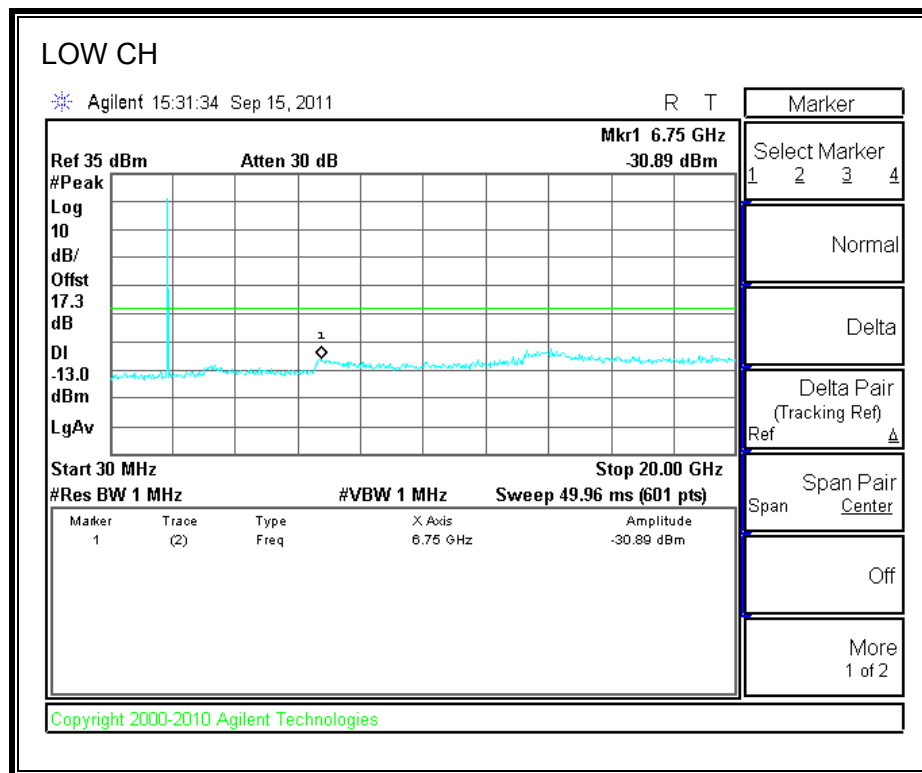


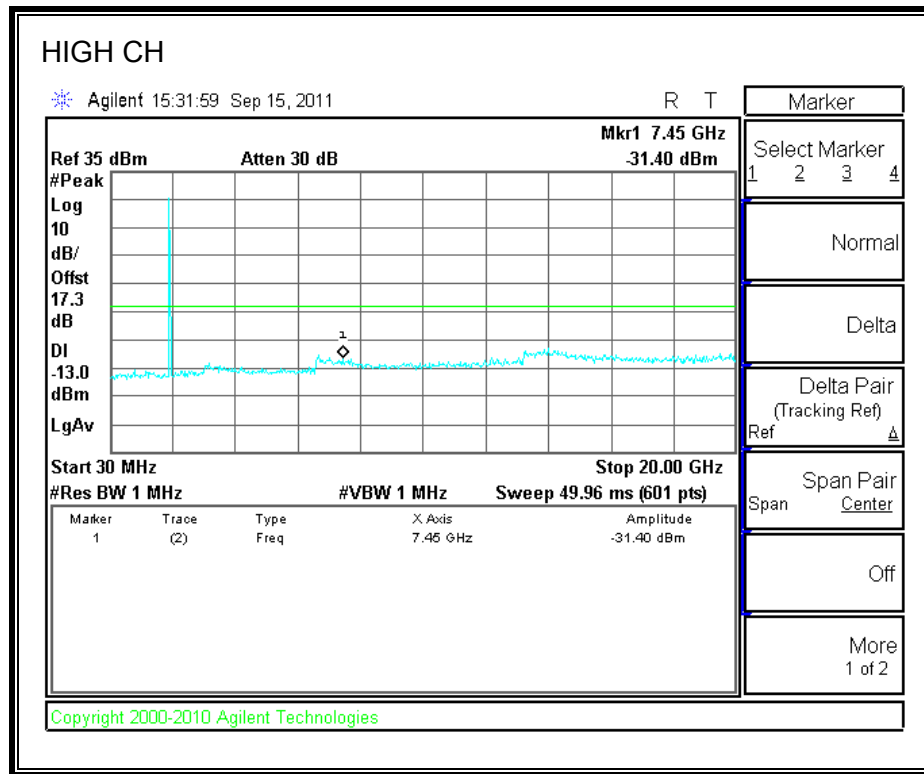
GPRS850 BAND

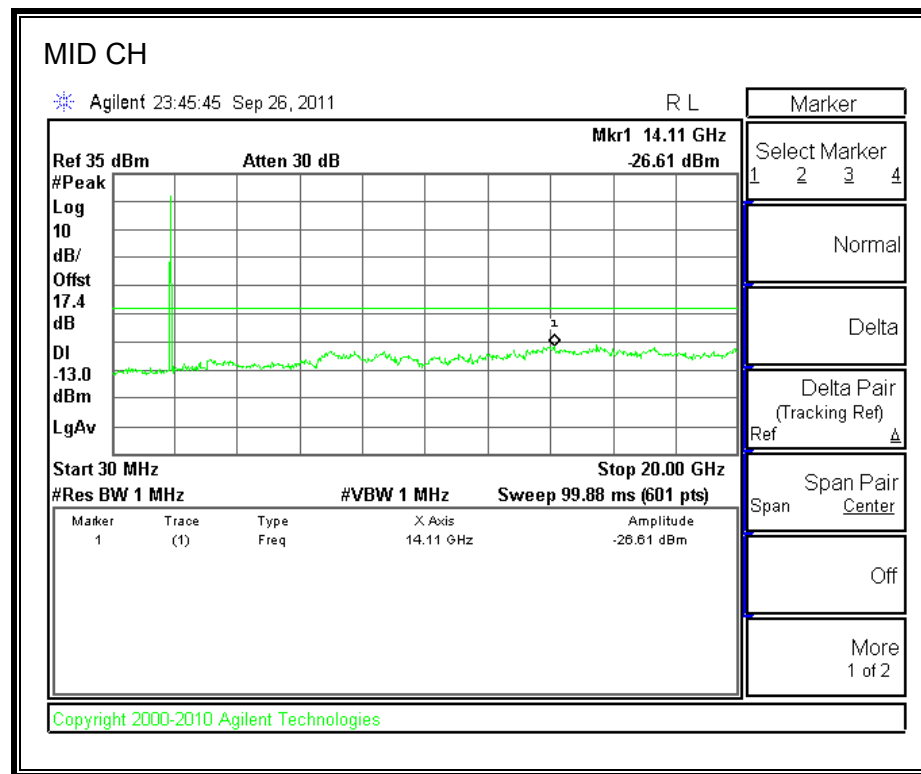
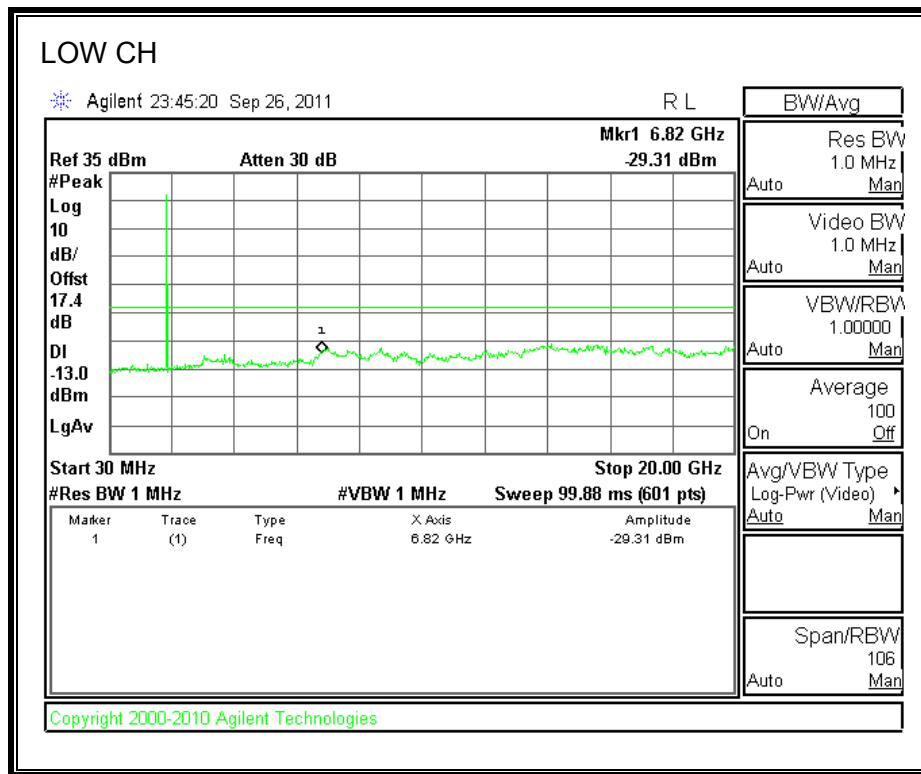


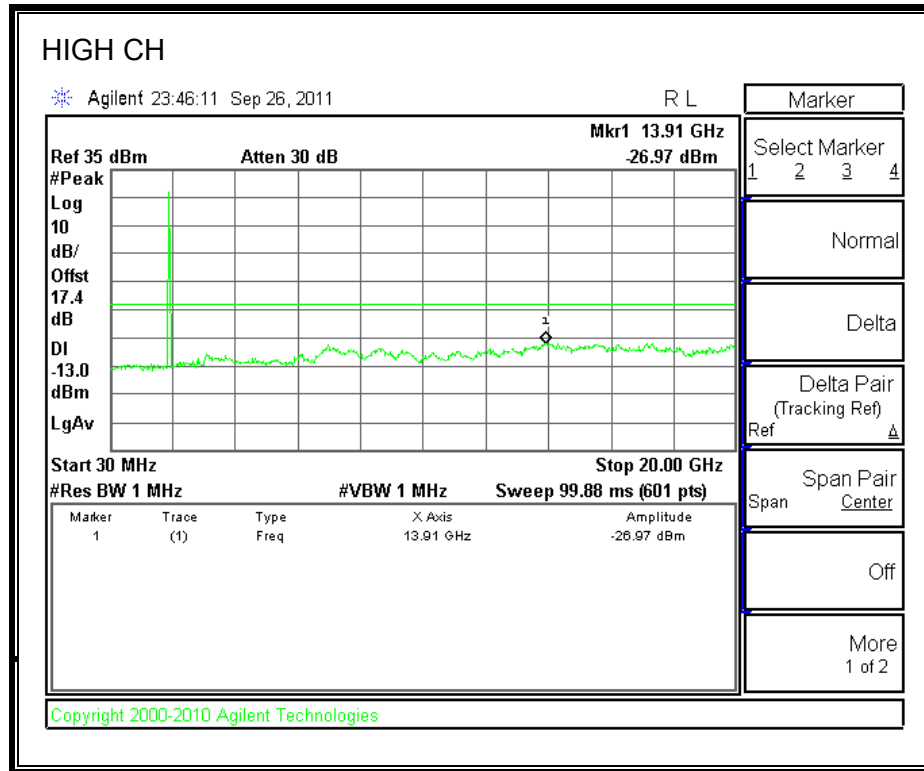
EGPRS850 BAND

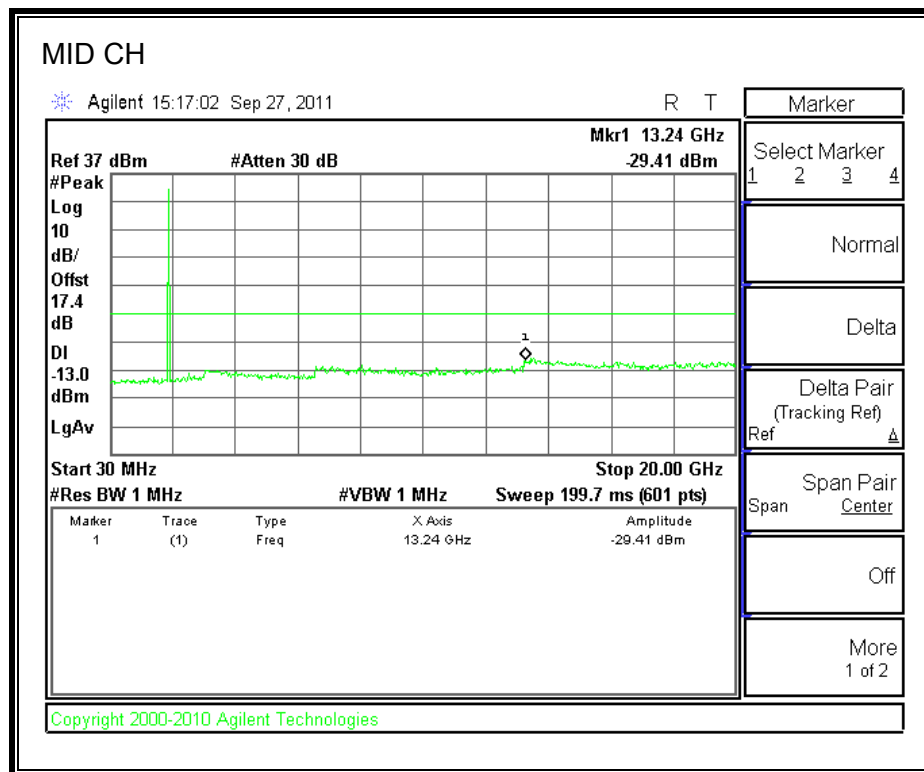
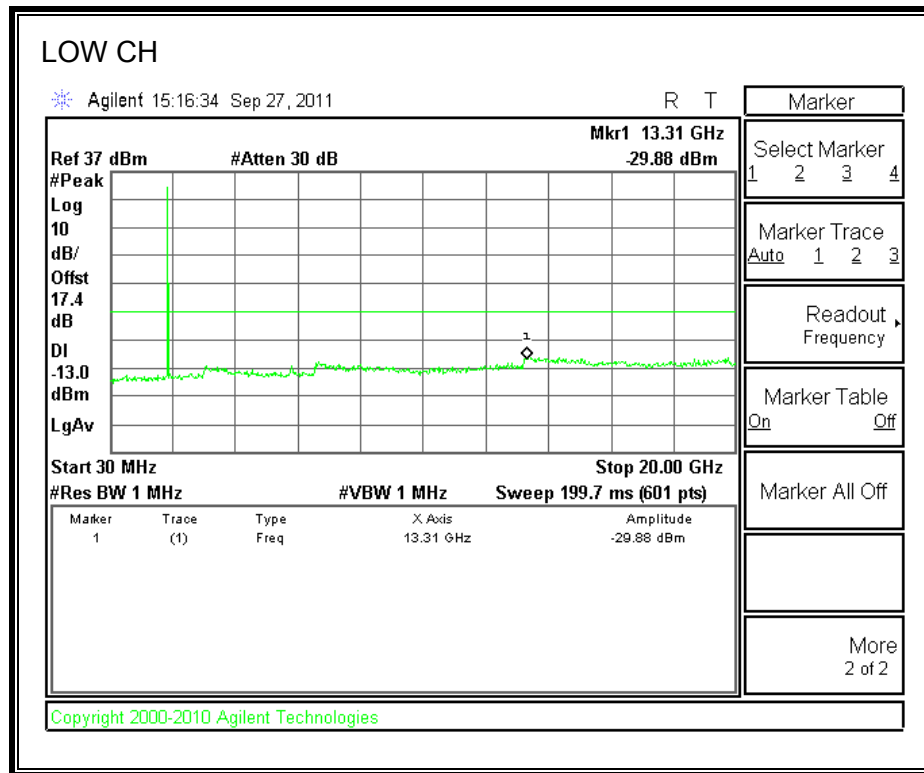


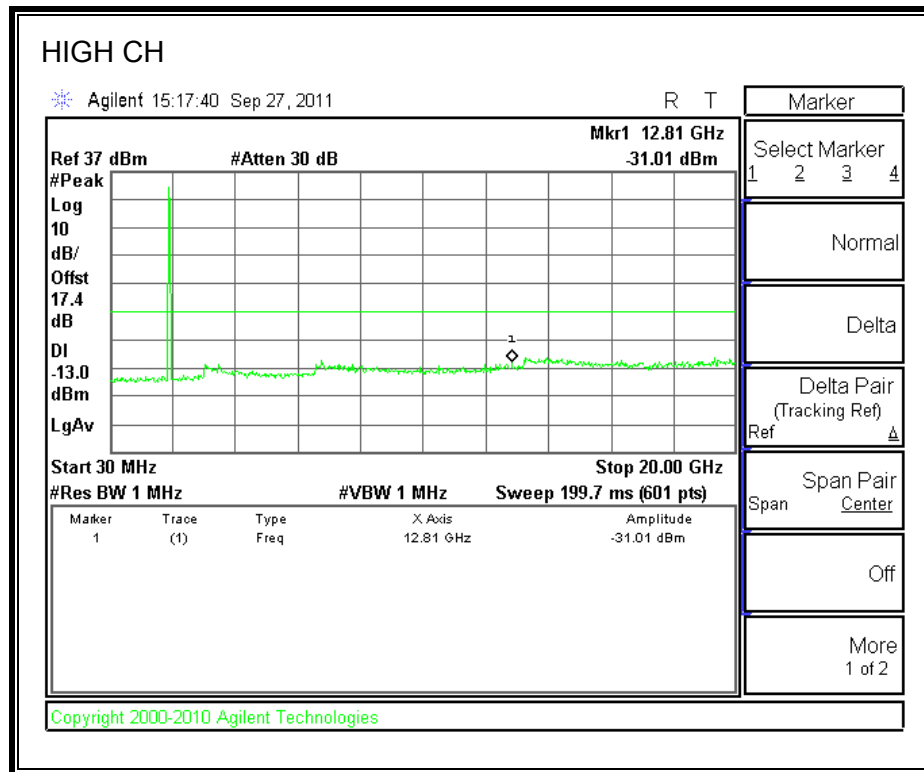
CDMA2000 PCS BAND, 1xRTT

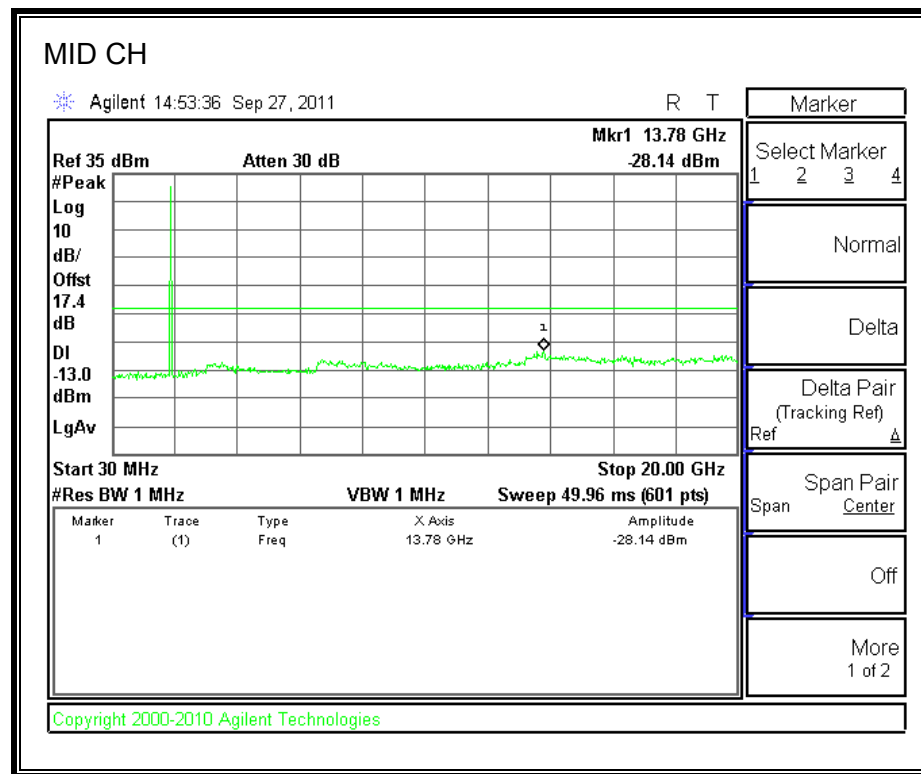
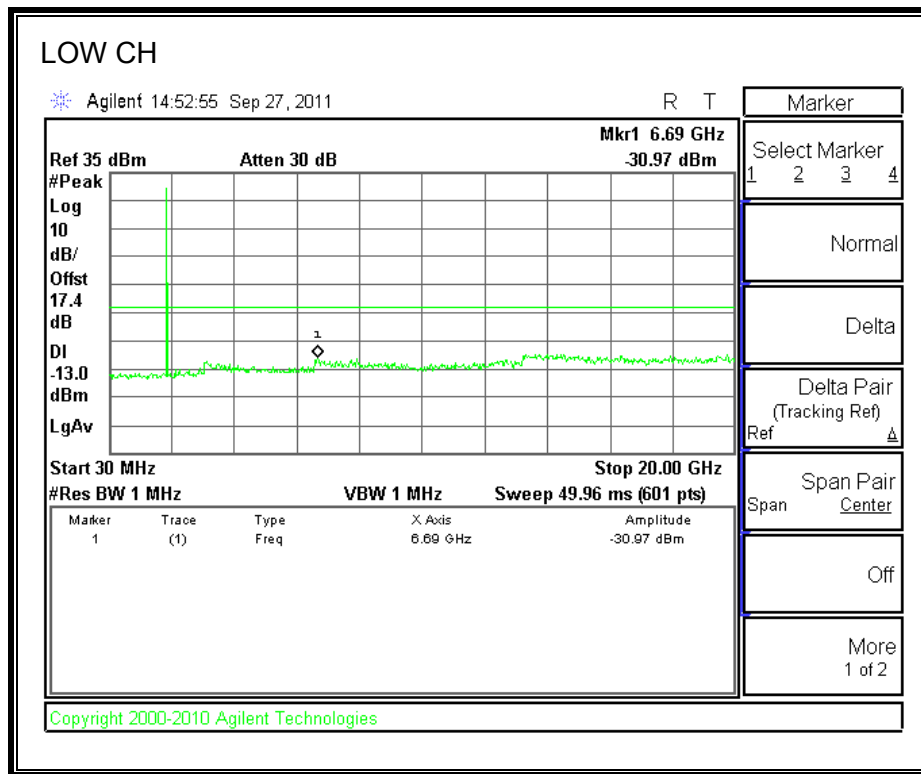


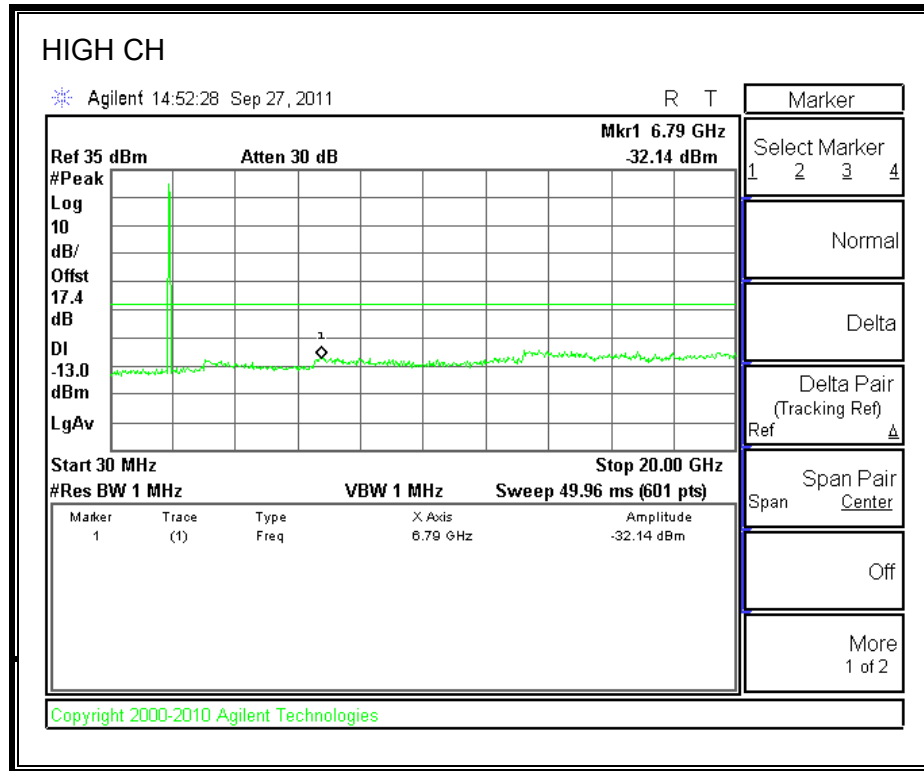
CDMA2000 PCS BAND, EVDO Rev A

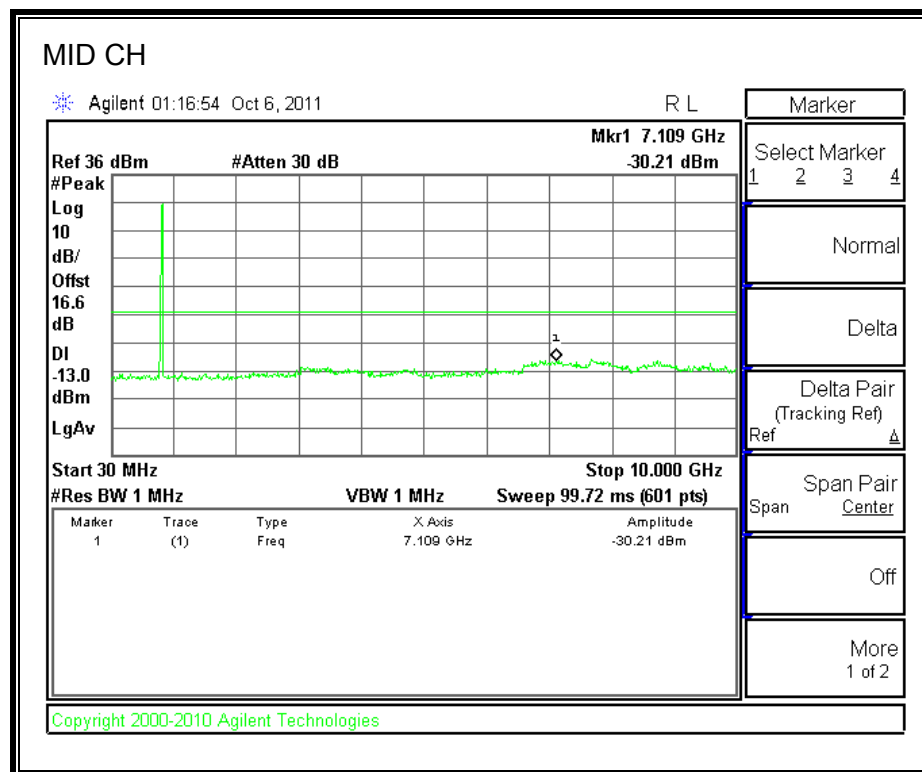
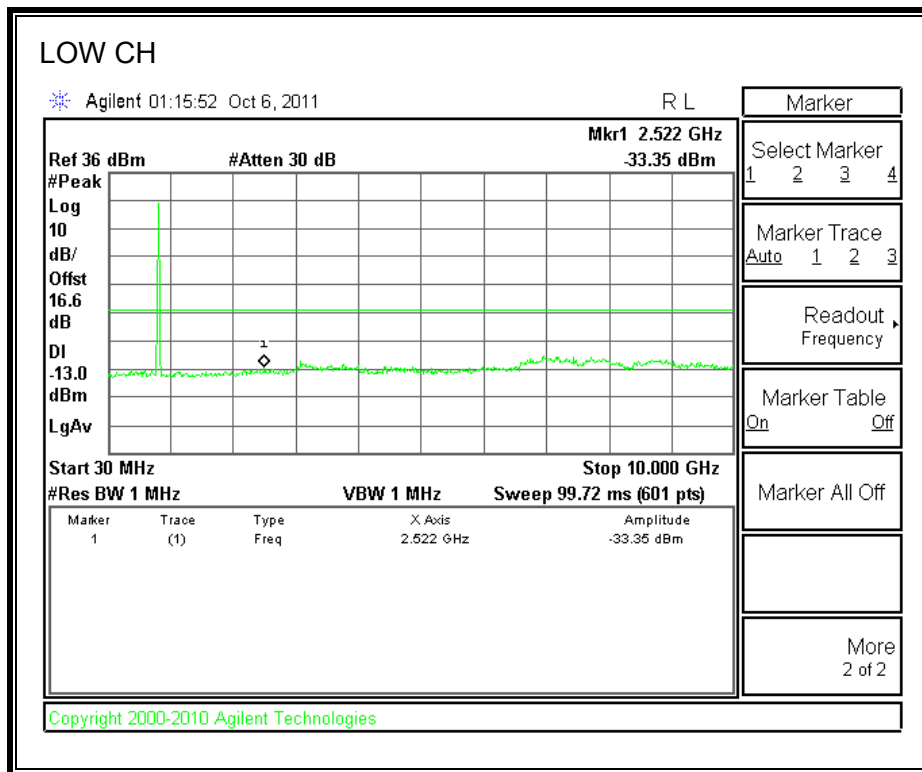


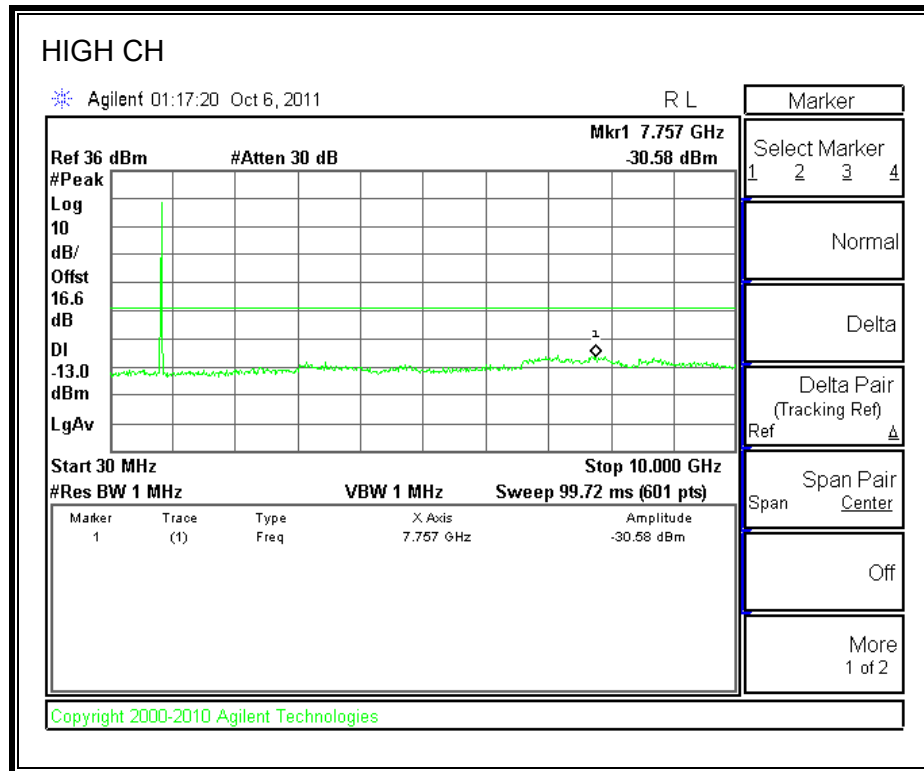
GPRS1900 BAND

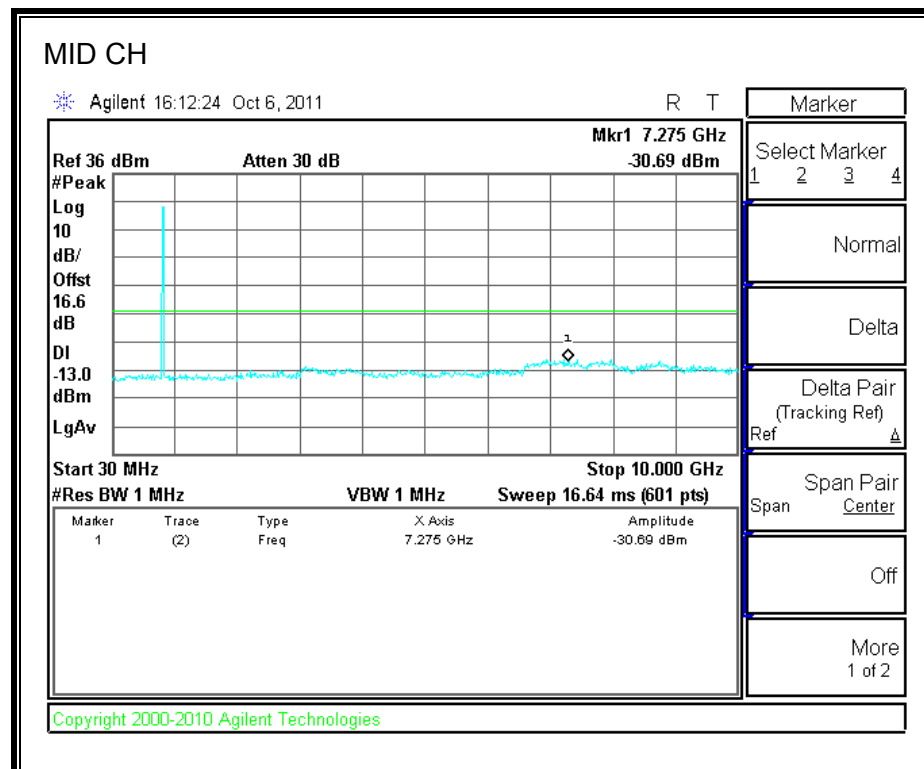
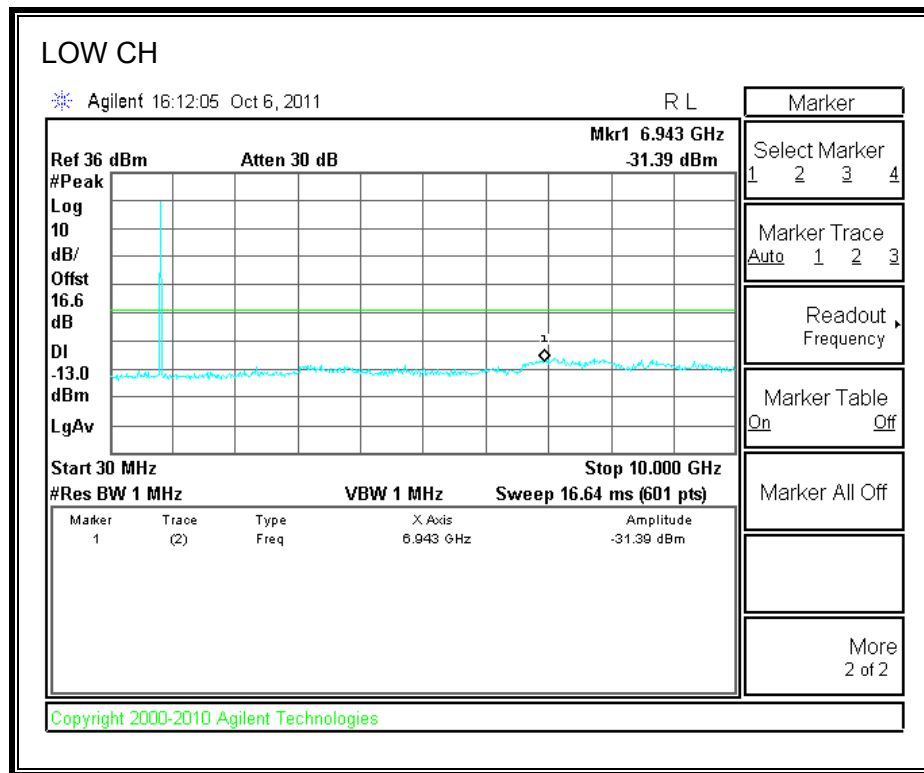


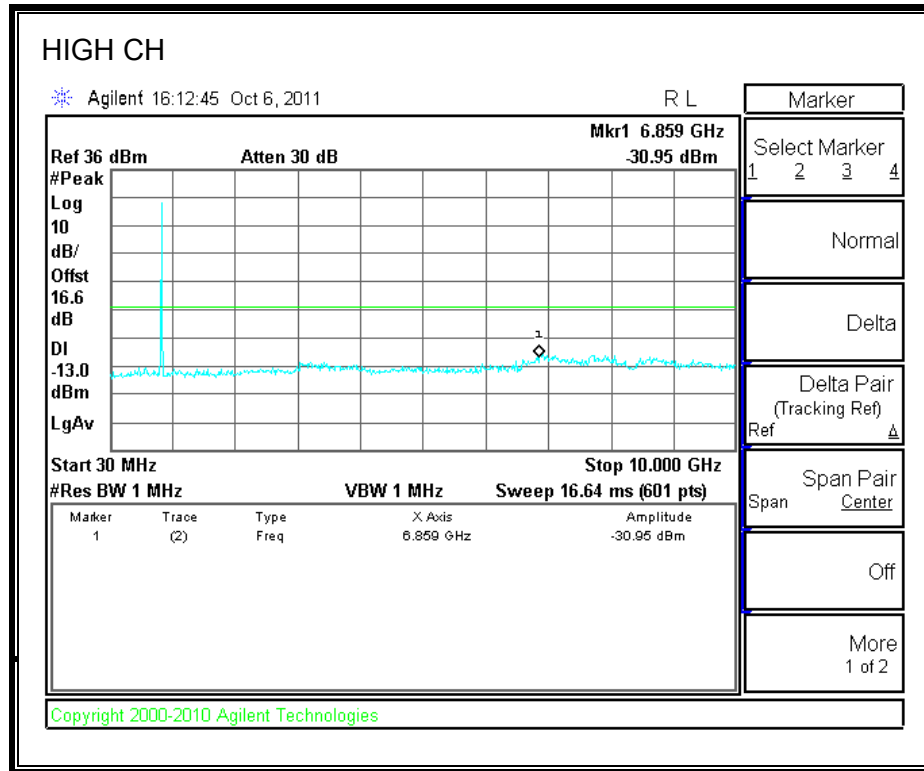
EGPRS1900 BAND

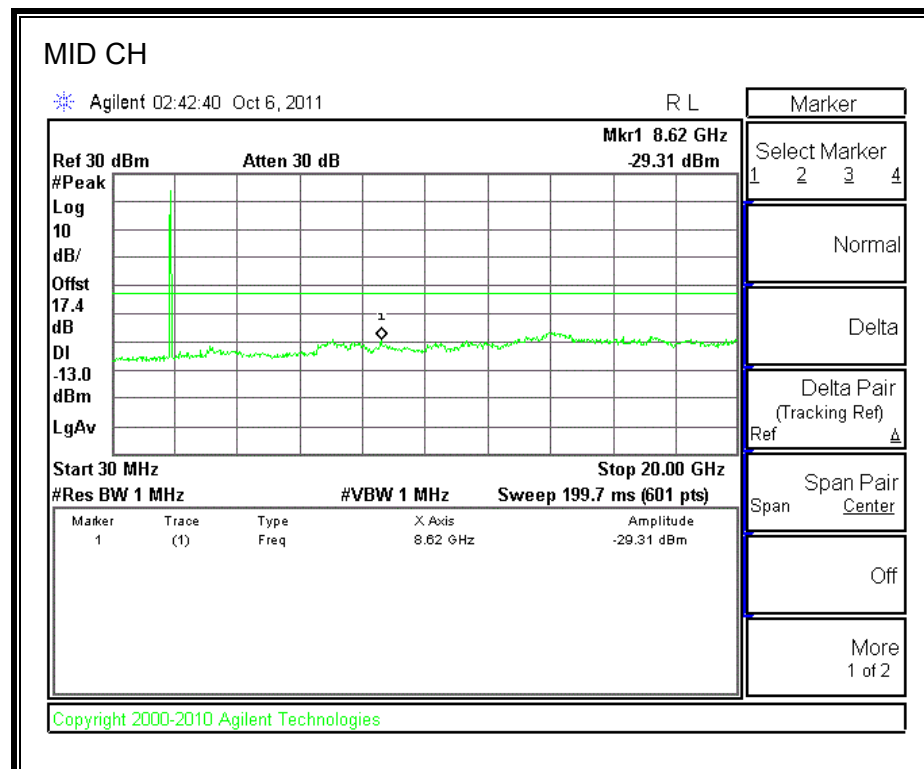
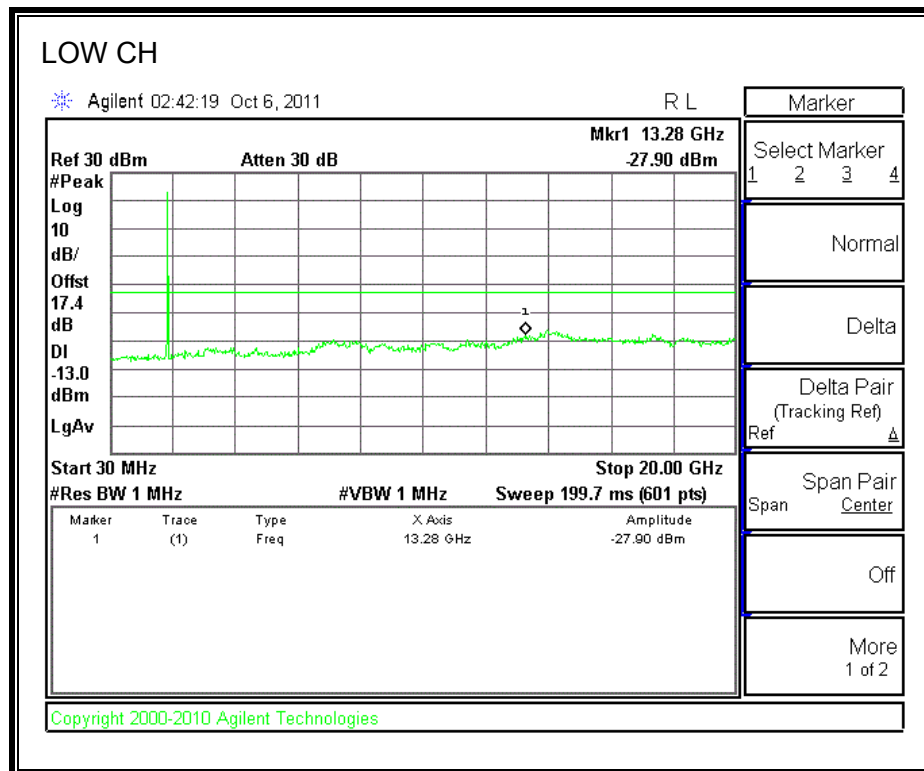


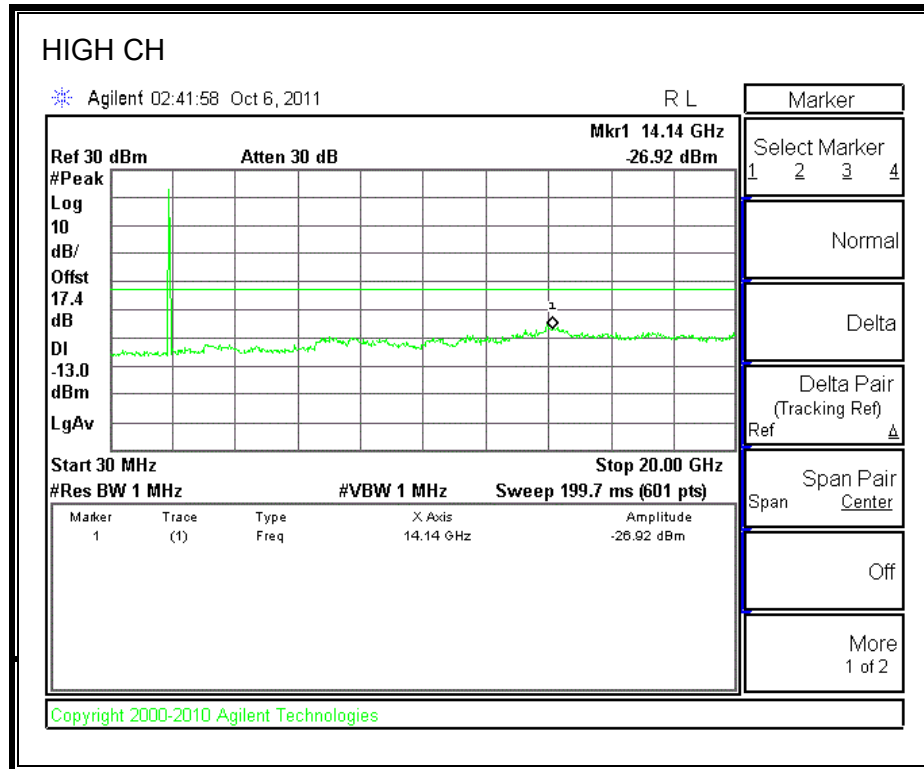
UMTS WCDMA REL 99, Cell Band

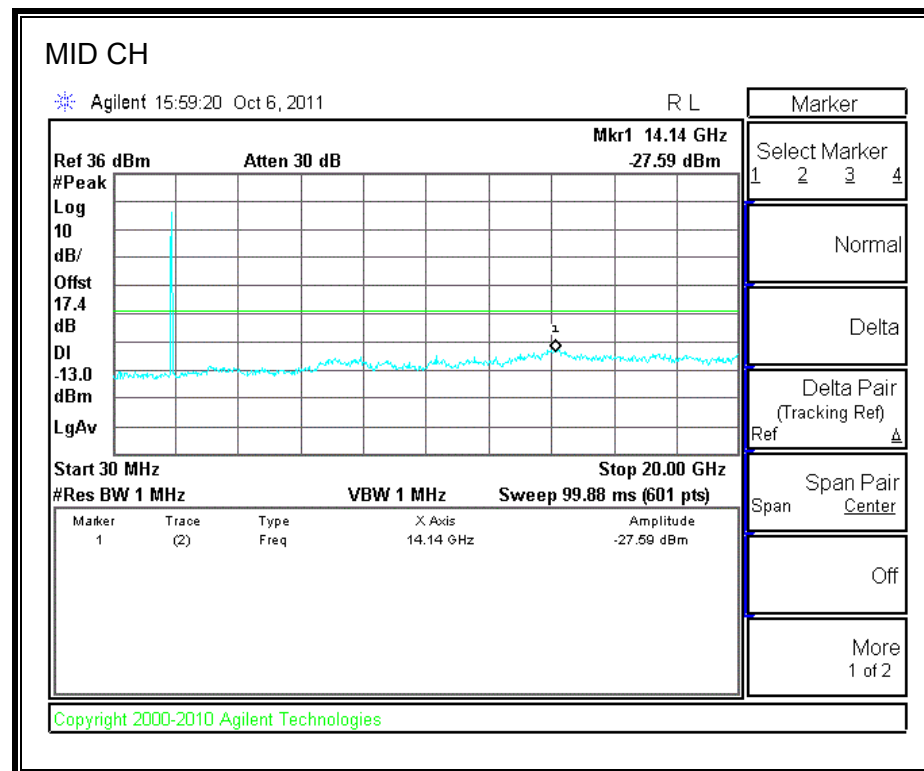
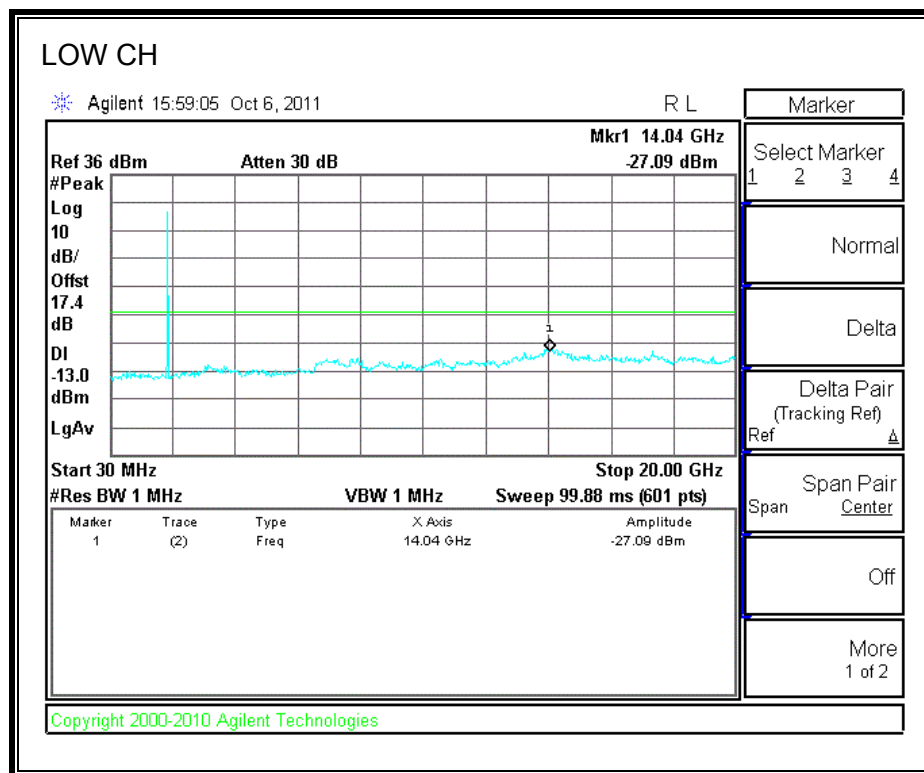


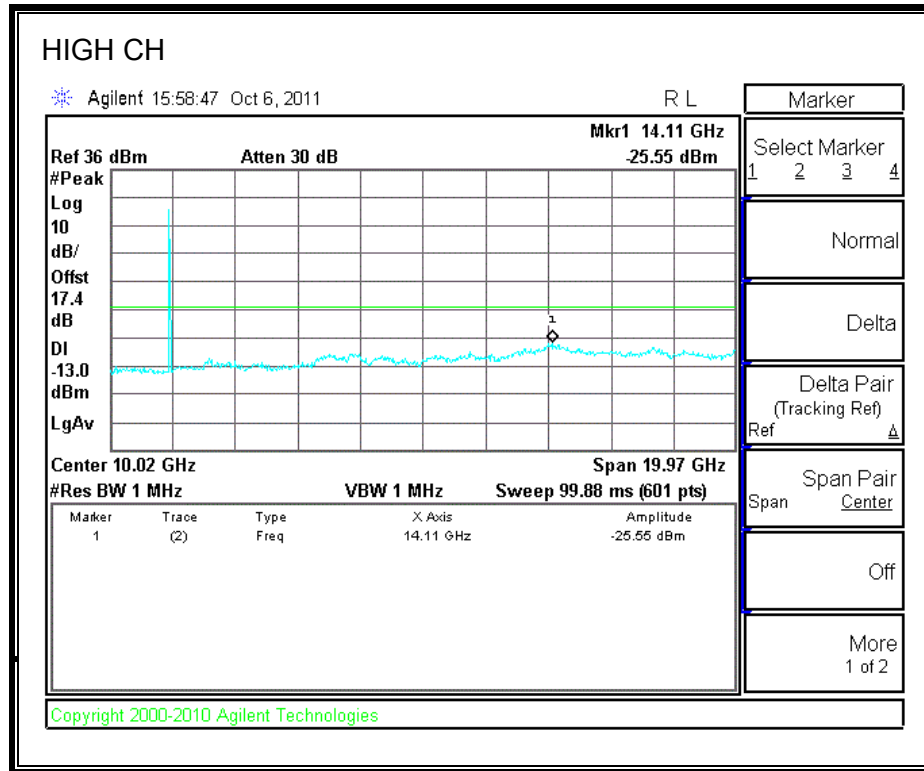
UMTS HSDPA Rel 6, Cell Band



UMTS WCDMA REL 99, PCS Band



UMTS HSDPA Rel 6, PCS Band

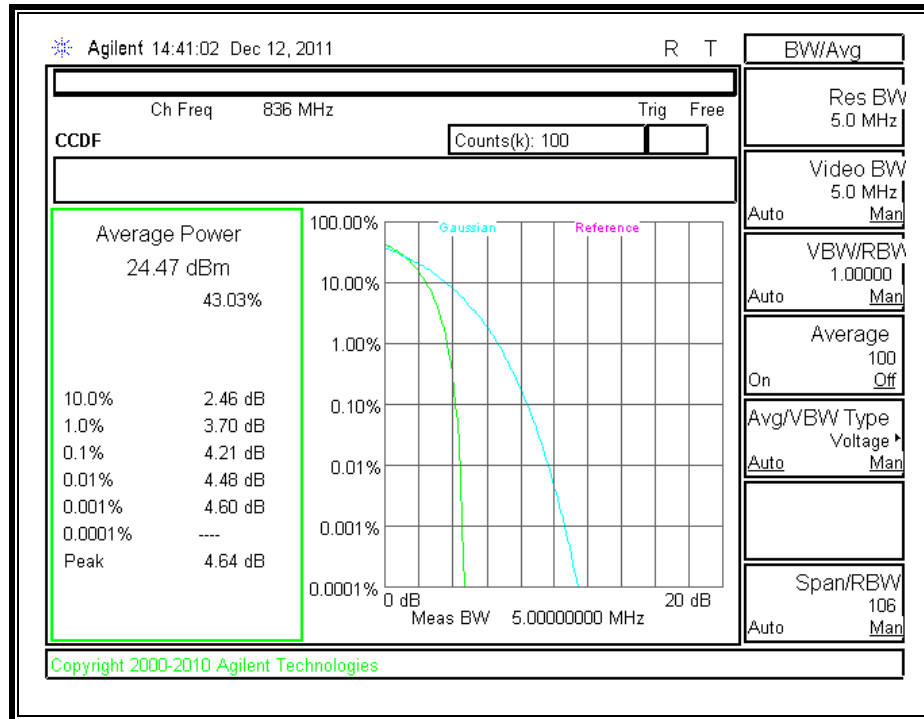
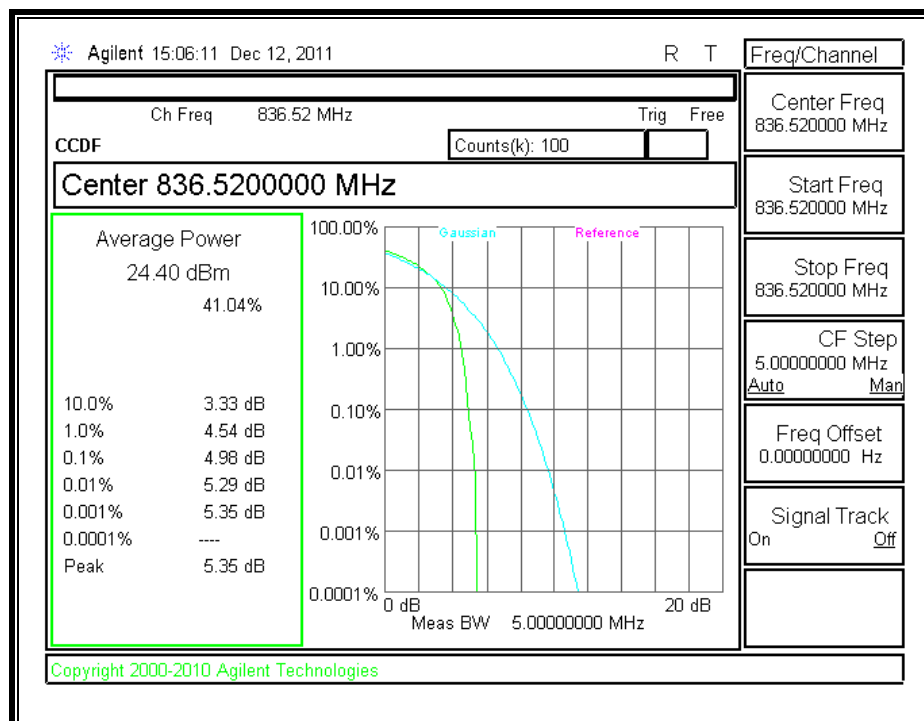


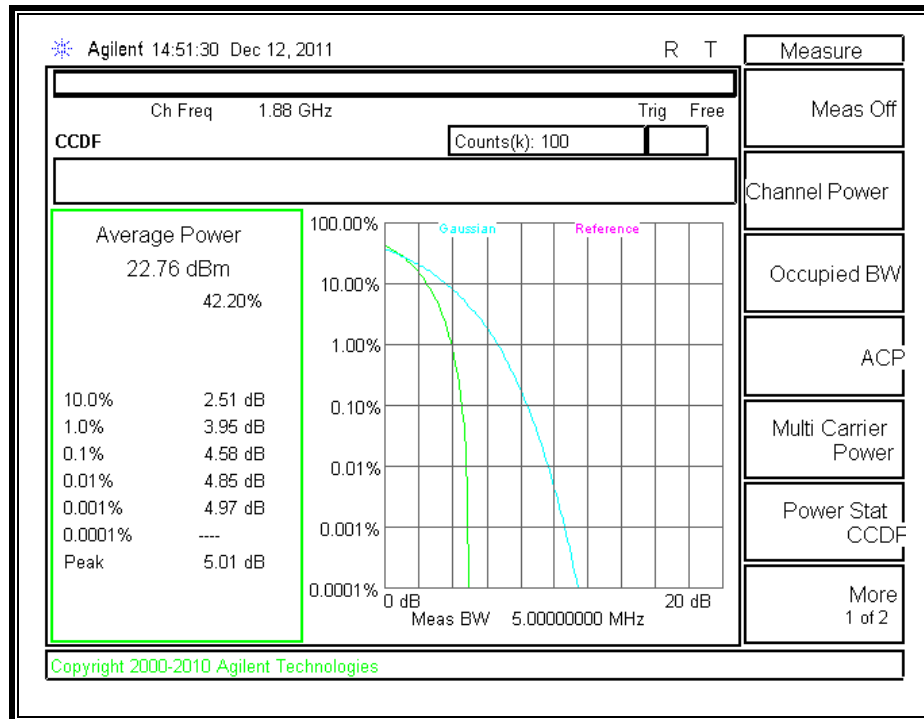
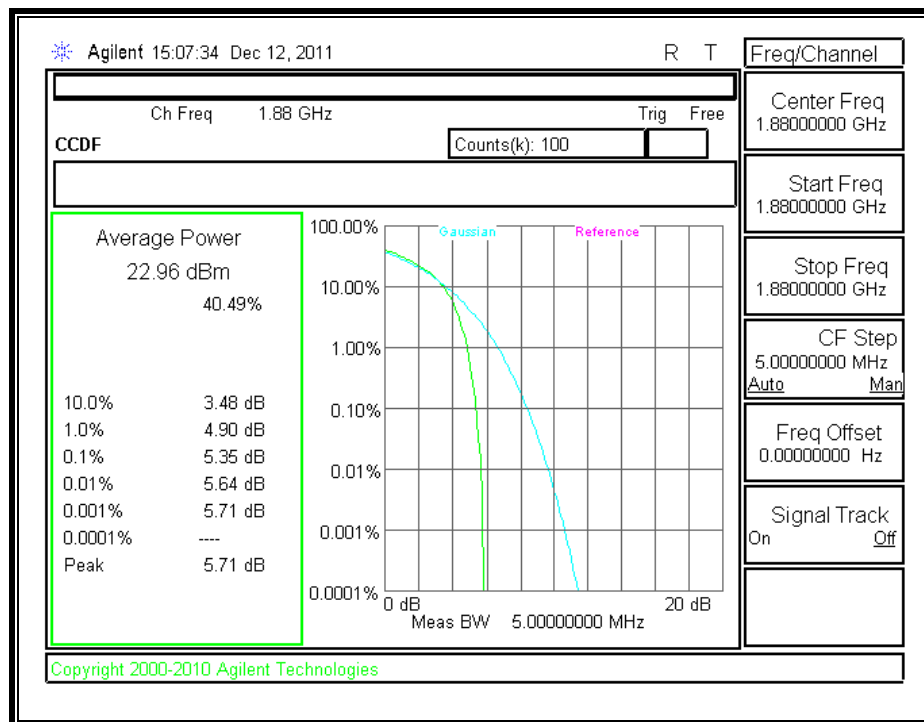
Peak-To-Average Ratio:

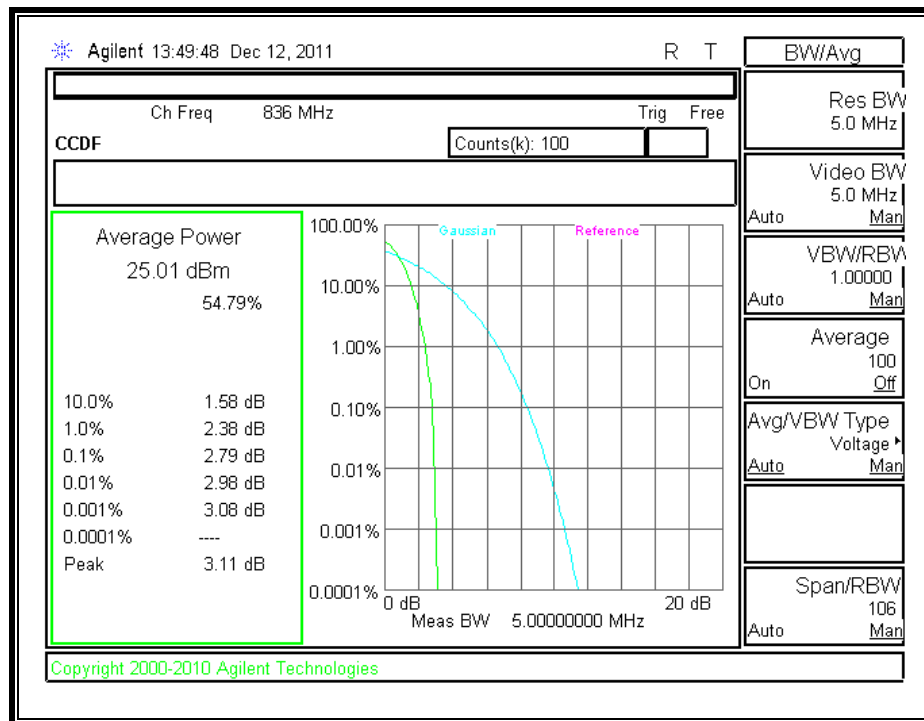
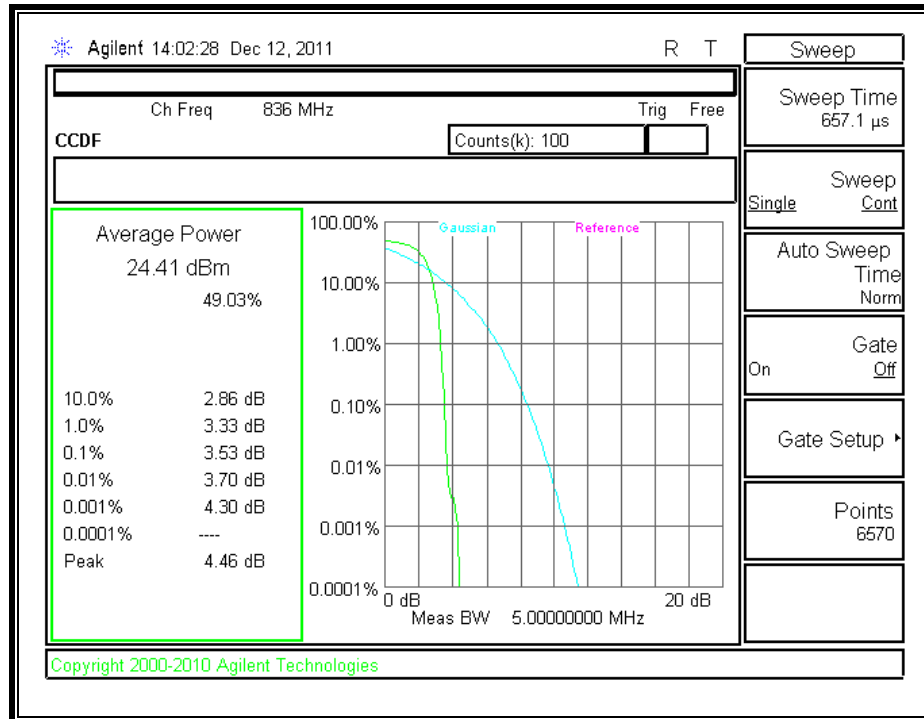
Mode	Channel Bandwidth (MHZ)	Modulation	f (MHz)	Conducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
CDMA2000, Cell	1.25	1xRTT	836	29.11	24.47	4.64
Mode	Channel Bandwidth (MHZ)	Ch. No.	f (MHz)	Conducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
CDMA2000, Cell	1.25	EVDO, Rev A	836	29.75	24.4	5.35
Mode	Channel Bandwidth (MHZ)	Ch. No.	f (MHz)	Conducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
CDMA2000, PCS	1.25	1xRTT	1880	27.77	22.76	5.01
Mode	Channel Bandwidth (MHZ)	Ch. No.	f (MHz)	Conducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
CDMA2000, PCS	1.25	EVDO, Rev A	1880	28.67	22.96	5.71
*Peak Reading = Average Reading + Peak-to-Average Ratio						

Peak-To-Average Ratio:

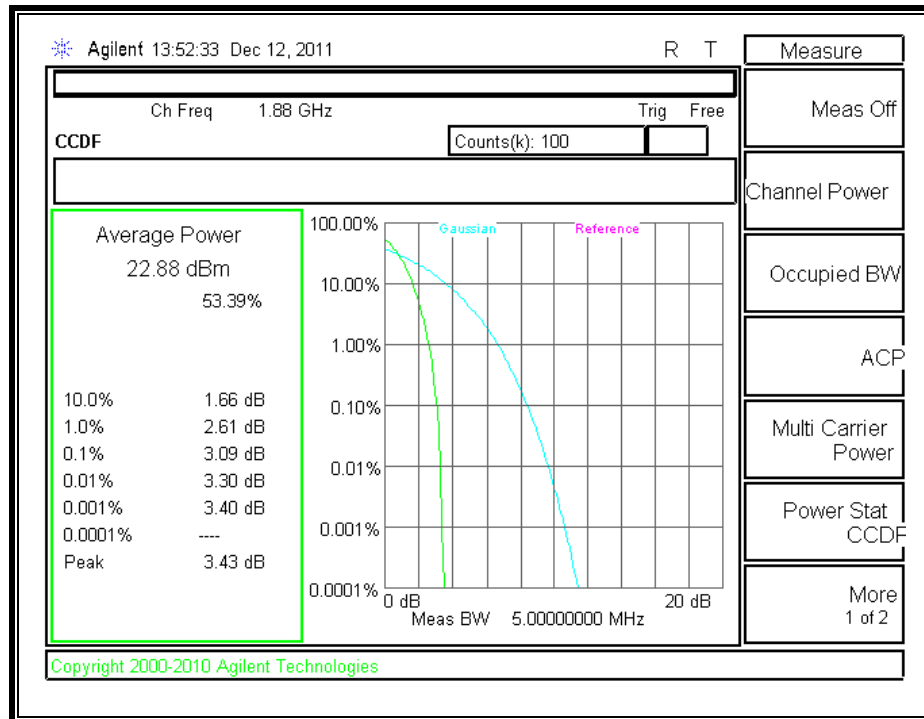
Mode	Channel Band-width (MHZ)	Modulation	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
WCDMA, Cell	4	Rel 99	836	28.12	25.01	3.11
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
WCDMA, Cell	4	HSDPA	836	28.87	24.41	4.46
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
WCDMA, PCS	4	Rel 99	1880	26.31	22.88	3.43
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
WCDMA, PCS	4	HSDPA	1880	27.59	22.85	4.74
*Peak Reading = Average Reading + Peak-to-Average Ratio						

CDMA2000, 1xRTT CELL**CDMA2000 EVDO Rev A, CELL**

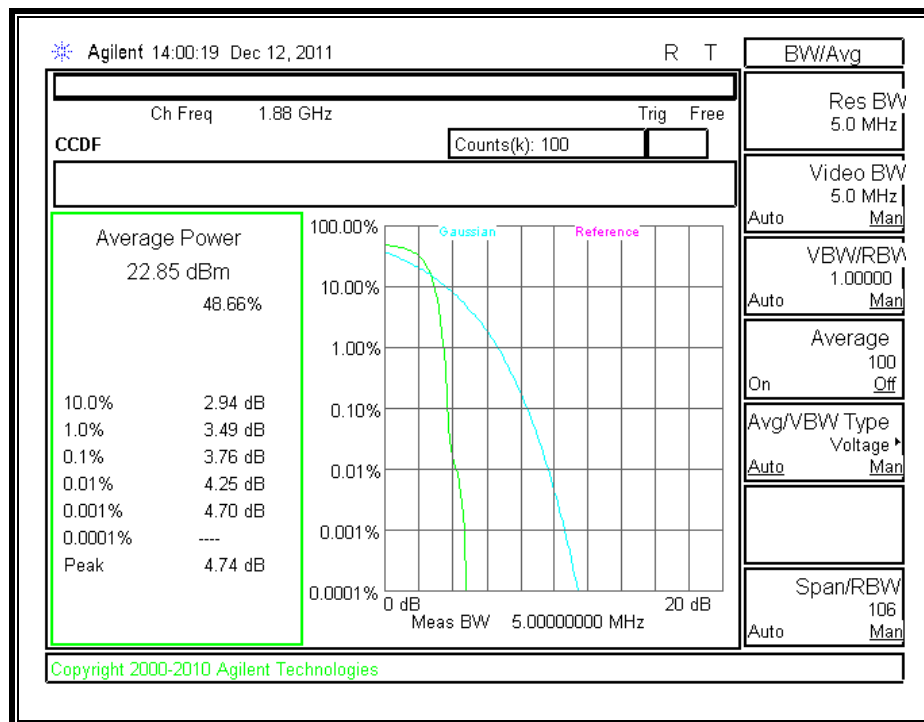
CDMA2000 1xRTT, PCS**CDMA2000 EVDO Rev A, PCS**

WCDMA CELL, REL 99**WCDMA CELL, HSDPA**

WCDMA PCS, REL 99



WCDMA PCS, HSDPA



8.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235
RSS132 & RSS133

LIMITS

§22.355 & RSS-132 4.3 - The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.

RSS-133 6.3 - The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST PROCEDURE

Use Agilent 8960 and CMW 500 with Frequency Error measurement capability.

- Temp. = -30° to $+50^{\circ}\text{C}$
- Voltage = 3.8 Vdc (85% - 115%)

Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to 20°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until $+50^{\circ}\text{C}$ is reached.

Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

MODES TESTED

- CDMA2000, EVDO Rev A
- GPRS and EGPRS
- UMTS, Rel 99 and HSDPA

RESULTS

See the following pages.

CELL, CDMA2000 EVDO Rev A – MID CHANNEL

Reference Frequency: Cellular Mid Channel 836.520000MHz @ 20°C Limit: to stay +/- 2.5 ppm = 2091.300 Hz				
DC Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.520038	-0.001	2.5
3.80	40	836.520043	-0.008	2.5
3.80	30	836.520048	-0.014	2.5
3.80	20	836.520037	0	2.5
3.80	10	836.520047	-0.013	2.5
3.80	0	836.520040	-0.003	2.5
3.80	-10	836.520045	-0.009	2.5
3.80	-20	836.520049	-0.014	2.5
3.80	-30	836.520042	-0.007	2.5

Reference Frequency: Cellular Mid Channel 836.520000MHz @ 20°C Limit: to stay +/- 2.5 ppm = 2091.300 Hz				
DC Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	836.520037	0	2.5
3.40	20	836.520040	-0.004	2.5
4.20	20	836.520040	-0.003	2.5
3.0V (End Point)	20	836.520040	-0.004	2.5

PCS, EVDO MODULATION – MID CHANNEL

Reference Frequency: Cellular Mid Channel 1880.000000MHz @ 20°C Limit: to stay +/- 2.5 ppm = 4700.000 Hz				
DC Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1880.000004	-0.001	2.5
3.80	40	1880.000003	-0.001	2.5
3.80	30	1880.000005	-0.001	2.5
3.80	20	1880.000002	0	2.5
3.80	10	1880.000003	-0.001	2.5
3.80	0	1880.000003	0.000	2.5
3.80	-10	1880.000003	0.000	2.5
3.80	-20	1880.000005	-0.001	2.5
3.80	-30	1879.999997	0.003	2.5

Reference Frequency: Cellular Mid Channel 836.600000MHz @ 20°C Limit: to stay +/- 2.5 ppm = 4700.000 Hz				
DC Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	1880.000002	0	2.5
3.40	20	1880.000003	0.000	2.5
4.20	20	1880.000003	0.000	2.5
3.0V (End Point)	20	1880.000002	0.000	2.5

CELL, GPRS MODULATION – MID CHANNEL

Reference Frequency: Cellular Mid Channel 836.600000MHz @ 20°C Limit: to stay +/- 2.5 ppm = 2091.500 Hz				
DC Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.600014	-0.001	2.5
3.80	40	836.600012	0.001	2.5
3.80	30	836.600020	-0.008	2.5
3.80	20	836.600013	0	2.5
3.80	10	836.600021	-0.010	2.5
3.80	0	836.600030	-0.020	2.5
3.80	-10	836.600041	-0.033	2.5
3.80	-20	836.600028	-0.018	2.5
3.80	-30	836.600018	-0.006	2.5

Reference Frequency: Cellular Mid Channel 836.600000MHz @ 20°C Limit: to stay +/- 2.5 ppm = 2091.500 Hz				
DC Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	836.600013	0	2.5
3.40	20	836.600014	-0.001	2.5
4.20	20	836.600008	0.006	2.5
3.0V (End Point)	20	836.600013	0.000	2.5

PCS, GPRS MODULATION – MID CHANNEL

Reference Frequency: PCS Mid Channel 1880.000059MHz @ 20°C Limit: within the authorized block or +/- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1880.000055	0.002	2.5
3.80	40	1880.000046	0.007	2.5
3.80	30	1880.000065	-0.003	2.5
3.80	20	1880.000059	0	2.5
3.80	10	1880.000075	-0.009	2.5
3.80	0	1880.000099	-0.021	2.5
3.80	-10	1880.000102	-0.023	2.5
3.80	-20	1880.000116	-0.030	2.5
3.80	-30	1880.000078	-0.010	2.5

Reference Frequency: PCS Mid Channel 1880.000059MHz @ 20°C Limit: within the authorized block or +/- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	1880.000059	0	2.5
3.40	20	1880.000055	0.002	2.5
4.20	20	1880.000054	0.003	2.5
3.0V (End Point)	20	1880.000420	-0.192	2.5

CELL, EGPRS MODULATION – MID CHANNEL

Reference Frequency: Cellular Mid Channel 836.599982Hz @ 20°C Limit: to stay +/- 2.5 ppm = 2091.500 Hz				
DC Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.599961	0.025	2.5
3.80	40	836.599961	0.025	2.5
3.80	30	836.599972	0.012	2.5
3.80	20	836.599982	0	2.5
3.80	10	836.599960	0.026	2.5
3.80	0	836.600017	-0.042	2.5
3.80	-10	836.600013	-0.037	2.5
3.80	-20	836.600019	-0.044	2.5
3.80	-30	836.600036	-0.065	2.5
Reference Frequency: Cellular Mid Channel 836.599982MHz @ 20°C Limit: to stay +/- 2.5 ppm = 2091.500 Hz				
DC Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	836.599982	0.000	2.5
3.40	20	836.599957	0.030	2.5
4.20	20	836.600006	-0.029	2.5
3.0 (end point voltage)	20	836.599964	0.022	2.5

PCS, EGPRS MODULATION – MID CHANNEL

Reference Frequency: PCS Mid Channel 1880.000042MHz @ 20°C Limit: within the authorized block or +/- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1880.000017	0.013	2.5
3.80	40	1880.000028	0.007	2.5
3.80	30	1880.000023	0.010	2.5
3.80	20	1880.000042	0	2.5
3.80	10	1880.000067	-0.013	2.5
3.80	0	1880.000800	-0.403	2.5
3.80	-10	1880.000096	-0.029	2.5
3.80	-20	1880.000119	-0.041	2.5
3.80	-30	1880.000016	0.014	2.5

Reference Frequency: PCS Mid Channel 1880.000042MHz @ 20°C Limit: within the authorized block or +/- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	1880.000042	0	2.5
3.40	20	1880.000029	0.007	2.5
4.20	20	1880.000064	-0.012	2.5
3.2V (End Point)	20	1880.000160	-0.063	2.5

CELL WCDMA – MID CHANNEL

Reference Frequency: Cellular Mid Channel 836.000000MHz @ 20°C				
Limit: to stay +/- 2.5 ppm = 2090.000 Hz				
DC Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.000006	-0.001	2.5
3.80	40	836.000007	-0.002	2.5
3.80	30	836.000007	-0.002	2.5
3.80	20	836.000005	0	2.5
3.80	10	836.000007	-0.002	2.5
3.80	0	836.000006	-0.001	2.5
3.80	-10	836.000006	-0.001	2.5
3.80	-20	836.000007	-0.002	2.5
3.80	-30	836.000008	-0.004	2.5

Reference Frequency: Cellular Mid Channel 836.520000MHz @ 20°C				
Limit: to stay +/- 2.5 ppm = 2090.000 Hz				
DC Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	836.000005	0	2.5
3.40	20	836.000013	-0.010	2.5
4.20	20	836.000008	-0.004	2.5
3.0V (End Point)	20	836.000013	-0.010	2.5

PCS, WCDMA – MID CHANNEL

Reference Frequency: Cellular Mid Channel 1880.000000MHz @ 20°C				
Limit: to stay +/- 2.5 ppm = 4700.000 Hz				
DC Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1880.000018	-0.004	2.5
3.80	40	1880.000010	0.001	2.5
3.80	30	1880.000010	0.001	2.5
3.80	20	1880.000011	0	2.5
3.80	10	1880.000008	0.002	2.5
3.80	0	1880.000011	0.000	2.5
3.80	-10	1880.000018	-0.004	2.5
3.80	-20	1879.999985	0.014	2.5
3.80	-30	1880.000013	-0.001	2.5

Reference Frequency: Cellular Mid Channel 836.520000MHz @ 20°C				
Limit: to stay +/- 2.5 ppm = 4700.000 Hz				
DC Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	1880.000011	0	2.5
3.40	20	1880.000005	0.003	2.5
4.20	20	1880.000005	0.003	2.5
3.0V (End Point)	20	1880.000004	0.004	2.5

9. RADIATED TEST RESULTS

9.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232
RSS132 & RSS133

LIMITS

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17

KDB 971168 D01 Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems.

MODES TESTED

- CDMA2000, 1xRTT and EVDO, Rev A
- GPRS and EGPRS
- WCDMA REL. 99 and HSDPA

RESULTS

PEAK:**CELLULAR BAND (ERP)**

Mode	Channel	f (MHz)	ERP	
			dBm	mW
CDMA 1xRTT	1013	824.70	27.22	527.23
	384	836.52	27.43	553.35
	777	848.31	26.66	463.45
CDMA EVDO Rev A	1013	824.70	27.53	566.24
	384	836.52	27.54	567.54
	777	848.31	27.11	514.04
GPRS	128	824.20	32.73	1874.99
	192	836.60	31.84	1527.57
	251	848.80	29.85	966.05
EGPRS	128	824.20	31.79	1510.08
	192	836.60	29.60	912.01
	251	848.80	28.90	776.25
WCDMA, Rel 99	4357	826.40	26.63	460.26
	4405	836.00	26.50	446.68
	4455	846.00	26.01	399.02
WCDMA, HSDPA	4357	826.40	26.72	469.89
	4405	836.00	26.45	441.57
	4455	846.00	26.10	407.38

PCS BAND (EIRP)

Mode	Channel	f (MHz)	EIRP	
			dBm	mW
CDMA 1xRTT	25	1851.25	28.83	763.84
	600	1880.00	29.26	843.33
	1175	1908.75	28.85	767.36
CDMA EVDO, REV A	25	1851.25	29.53	897.43
	600	1880.00	29.86	968.28
	1175	1908.75	29.38	866.96
GPRS	512	1850.20	31.15	1303.17
	661	1880.00	30.69	1172.20
	810	1909.80	30.63	1156.11
EGPRS	512	1850.20	30.35	1083.93
	661	1880.00	30.23	1054.39
	810	1909.80	29.66	924.70
WCDMA,REL 99	9626	1852.40	27.06	508.16
	9800	1880.00	27.10	512.86
	9938	1907.60	26.01	399.02
WCDMA, HSDPA	9662	1852.40	27.20	524.81
	9800	1880.00	27.38	547.02
	9938	1907.60	27.18	522.40

AVERAGE:**PCS BAND (EIRP)**

Mode	Channel	f (MHz)	EIRP	
			dBm	mW
CDMA 1xRTT	25	1851.25	24.68	293.76
	600	1880.00	24.90	309.03
	1175	1908.75	24.60	288.40
CDMA EVDO, REV A	25	1851.25	25.08	322.11
	600	1880.00	25.00	316.23
	1175	1908.75	24.90	309.03
GPRS	512	1850.20	30.81	1205.04
	661	1880.00	30.50	1122.02
	810	1909.80	30.40	1096.48
EGPRS	512	1850.20	28.20	660.69
	661	1880.00	28.15	653.13
	810	1909.80	28.10	645.65
WCDMA,REL 99	9626	1852.40	23.86	243.22
	9800	1880.00	23.96	248.89
	9938	1907.60	23.08	203.24
WCDMA, HSDPA	9662	1852.40	23.93	247.17
	9800	1880.00	23.78	238.78
	9938	1907.60	22.88	194.09

PEAK:

CDMA2000 CELL BAND, 1xRTT

High Frequency Substitution Measurement

Compliance Certification Services Chamber B

Company:

Project #:

Date:

Test Engineer:

Configuration:

Mode:

Apple

11U13938

11-09-11

Chin Pang

EUT and AC Adapter

TX, CELL BAND CDMA2000 1xRTT

Test Equipment:

Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)

Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.70	27.72	V	0.5	0.0	27.22	38.5	-11.2	
824.70	21.00	H	0.5	0.0	20.50	38.5	-17.9	
Mid Ch								
836.52	27.93	V	0.5	0.0	27.43	38.5	-11.0	
836.52	20.40	H	0.5	0.0	19.90	38.5	-18.6	
High Ch								
848.31	27.16	V	0.5	0.0	26.66	38.5	-11.8	
848.31	20.67	H	0.5	0.0	20.17	38.5	-18.3	

Rev. 3.17.11

CDMA2000 CELL BAND, EVDO, Rev A

High Frequency Substitution Measurement

Compliance Certification Services Chamber B

Company:

Project #:

Date:

Test Engineer:

Configuration:

Mode:

Apple

11U13938

11-09-11

Chin Pang

EUT and AC Adapter

TX, CELL BAND CDMA2000 EVDO Rev A

Test Equipment:

Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)

Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.70	28.03	V	0.5	0.0	27.53	38.5	-10.9	
824.70	21.60	H	0.5	0.0	21.10	38.5	-17.3	
Mid Ch								
836.52	28.04	V	0.5	0.0	27.54	38.5	-10.9	
836.52	20.55	H	0.5	0.0	20.05	38.5	-18.4	
High Ch								
848.31	27.61	V	0.5	0.0	27.11	38.5	-11.3	
848.31	21.53	H	0.5	0.0	21.03	38.5	-17.4	

Rev. 3.17.11

GPRS850 BAND

High Frequency Substitution Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		11-02-11						
Test Engineer:		Chin Pang						
Configuration:		EUT and AC Adapter						
Mode:		TX, CELL BAND GPRS						
Test Equipment:								
Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.20	33.23	V	0.5	0.0	32.73	38.5	-5.7	
824.20	23.80	H	0.5	0.0	23.30	38.5	-15.1	
Mid Ch								
836.60	32.34	V	0.5	0.0	31.84	38.5	-6.6	
836.60	22.05	H	0.5	0.0	21.55	38.5	-16.9	
High Ch								
848.80	30.35	V	0.5	0.0	29.85	38.5	-8.6	
848.80	23.27	H	0.5	0.0	22.77	38.5	-15.7	
Rev. 3.17.11								

ERP EGPRS850 BAND

High Frequency Substitution Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		10-19-11						
Test Engineer:		Chin Pang						
Configuration:		EUT and AC Adapter						
Mode:		TX, CELL BAND EGPRS						
Test Equipment:								
Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.20	32.29	V	0.5	0.0	31.79	38.5	-6.7	
824.20	27.64	H	0.5	0.0	27.14	38.5	-11.3	
Mid Ch								
836.60	30.10	V	0.5	0.0	29.60	38.5	-8.8	
836.60	27.87	H	0.5	0.0	27.37	38.5	-11.1	
High Ch								
848.80	29.40	V	0.5	0.0	28.90	38.5	-9.5	
848.80	27.45	H	0.5	0.0	26.95	38.5	-11.5	
Rev. 3.17.11								

ERP WCDMA REI 99, 850MHz BAND

High Frequency Substitution Measurement Compliance Certification Services Chamber B								
Company:	Apple							
Project #:	11U13938							
Date:	11-08-11							
Test Engineer:	Chin Pang							
Configuration:	EUT and AC Adapter							
Mode:	TX, CELL BAND WCDMA, Rei 99							
Test Equipment:								
Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.40	27.13	V	0.5	0.0	26.63	38.5	-11.8	
826.40	19.05	H	0.5	0.0	18.55	38.5	-19.9	
Mid Ch								
836.00	27.00	V	0.5	0.0	26.50	38.5	-11.9	
836.00	18.93	H	0.5	0.0	18.43	38.5	-20.0	
High Ch								
846.00	26.51	V	0.5	0.0	26.01	38.5	-12.4	
846.00	19.05	H	0.5	0.0	18.55	38.5	-19.9	
Rev. 3.17.11								

ERP WCDMA, HSDPA 850MHz BAND

High Frequency Substitution Measurement Compliance Certification Services Chamber B								
Company:	Apple							
Project #:	11U13938							
Date:	11-08-11							
Test Engineer:	Chin Pang							
Configuration:	EUT and AC Adapter							
Mode:	TX, CELL BAND WCDMA, HSDPA							
Test Equipment:								
Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.40	27.22	V	0.5	0.0	26.72	38.5	-11.7	
826.40	20.00	H	0.5	0.0	19.50	38.5	-18.9	
Mid Ch								
836.00	26.95	V	0.5	0.0	26.45	38.5	-12.0	
836.00	19.85	H	0.5	0.0	19.35	38.5	-19.1	
High Ch								
846.00	26.60	V	0.5	0.0	26.10	38.5	-12.3	
846.00	18.50	H	0.5	0.0	18.00	38.5	-20.4	
Rev. 3.17.11								

CDMA2000 PCS BAND, 1xRTT

High Frequency Fundamental Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		10-25-11						
Test Engineer:		Chin Pang						
Configuration:		EUT and AC Adapter						
Mode:		TX, PCS BAND CDMA2000, 1xRTT						
Test Equipment:								
Receiving: Horn T59, and Camber B SMA Cables								
Substitution: Horn T60 Substitution, 6ft SMA Cable (208947003) Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.851	21.4	V	0.85	8.26	28.83	33.0	-4.2	
1.851	10.9	H	0.85	8.26	18.27	33.0	-14.7	
Mid Ch								
1.880	21.8	V	0.85	8.30	29.26	33.0	-3.7	
1.880	11.1	H	0.85	8.30	18.59	33.0	-14.4	
High Ch								
1.909	21.4	V	0.85	8.35	28.85	33.0	-4.2	
1.909	12.2	H	0.85	8.35	19.74	33.0	-13.3	
Rev. 3.17.11								

CDMA2000 PCS BAND, EVDO, Rev A

High Frequency Fundamental Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		10-25-11						
Test Engineer:		Chin Pang						
Configuration:		EUT and AC Adapter						
Mode:		TX, PCS BAND CDMA2000 EVDO Rev A						
Test Equipment:								
Receiving: Horn T59, and Camber B SMA Cables								
Substitution: Horn T60 Substitution, 6ft SMA Cable (208947003) Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.851	22.1	V	0.85	8.26	29.53	33.0	-3.5	
1.851	12.3	H	0.85	8.26	19.67	33.0	-13.3	
Mid Ch								
1.880	22.4	V	0.85	8.30	29.86	33.0	-3.1	
1.880	14.9	H	0.85	8.30	22.39	33.0	-10.6	
High Ch								
1.909	21.9	V	0.85	8.35	29.38	33.0	-3.6	
1.909	15.3	H	0.85	8.35	22.75	33.0	-10.3	
Rev. 3.17.11								

EIRP GPRS1900 BAND

High Frequency Fundamental Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		10/19/11						
Test Engineer:		Chin Pang						
Configuration:		EUT and AC Adapter						
Mode:		TX, PCS BAND GPRS						
Test Equipment:								
Receiving: Horn T59, and Camber B SMA Cables								
Substitution: Horn T60 Substitution, 6ft SMA Cable (208947003) Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.850	23.7	V	0.85	8.26	31.15	33.0	-1.9	
1.850	12.4	H	0.85	8.26	19.81	33.0	-13.2	
1.880	23.2	V	0.85	8.30	30.69	33.0	-2.3	
1.880	14.3	H	0.85	8.30	21.75	33.0	-11.3	
1.910	23.1	V	0.85	8.35	30.63	33.0	-2.4	
1.910	13.8	H	0.85	8.35	21.30	33.0	-11.7	
Rev. 3.17.11								

EIRP EGPRS1900 BAND

High Frequency Fundamental Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		10/19/11						
Test Engineer:		Chin Pang						
Configuration:		EUT and AC Adapter						
Mode:		TX, PCS BAND EGPRS						
Test Equipment:								
Receiving: Horn T59, and Camber B SMA Cables								
Substitution: Horn T60 Substitution, 6ft SMA Cable (208947003) Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.850	22.9	V	0.85	8.26	30.35	33.0	-2.7	
1.850	13.4	H	0.85	8.26	20.81	33.0	-12.2	
1.880	22.8	V	0.85	8.30	30.23	33.0	-2.8	
1.880	14.5	H	0.85	8.30	21.93	33.0	-11.1	
1.910	22.2	V	0.85	8.35	29.66	33.0	-3.3	
1.910	13.6	H	0.85	8.35	21.10	33.0	-11.9	
Rev. 3.17.11								

EIRP WCDMA REL. 99 PCS BAND

High Frequency Fundamental Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		10-25-11						
Test Engineer:		Chin Pang						
Configuration:		EUT and AC Adapter						
Mode:		TX, PCS BAND WCDMA, Rel 99						
Test Equipment:								
Receiving: Horn T59, and Camber B SMA Cables								
Substitution: Horn T60 Substitution, 6ft SMA Cable (208947003) Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.852	19.9	V	0.85	8.01	27.06	33.0	-5.9	
1.852	11.8	H	0.85	8.01	18.98	33.0	-14.0	
Mid Ch								
1.880	19.8	V	0.85	8.13	27.10	33.0	-5.9	
1.880	11.1	H	0.85	8.13	18.38	33.0	-14.6	
High Ch								
1.908	18.7	V	0.85	8.13	26.01	33.0	-7.0	
1.908	13.7	H	0.85	8.13	20.99	33.0	-12.0	
Rev. 3.17.11								

EIRP WCDMA HSDPA, PCS BAND

High Frequency Fundamental Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		11-08-11						
Test Engineer:		Chin Pang						
Configuration:		EUT and AC Adapter						
Mode:		TX, PCS BAND WCDMA, HSDPA						
Test Equipment:								
Receiving: Horn T59, and Camber B SMA Cables								
Substitution: Horn T60 Substitution, 6ft SMA Cable (208947003) Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.852	20.0	V	0.85	8.01	27.20	33.0	-5.8	
1.852	13.5	H	0.85	8.01	20.66	33.0	-12.3	
Mid Ch								
1.880	20.1	V	0.85	8.13	27.38	33.0	-5.6	
1.880	13.5	H	0.85	8.13	20.78	33.0	-12.2	
High Ch								
1.908	19.9	V	0.85	8.13	27.18	33.0	-5.8	
1.908	13.4	H	0.85	8.13	20.63	33.0	-12.4	
Rev. 3.17.11								

AVERAGE:**CDMA2000 PCS BAND, 1xRTT**

High Frequency Fundamental Measurement

Compliance Certification Services Chamber B

Company:

Apple

Project #:

11U13938

Date:

10/25/11

Test Engineer:

Chin Pang

Configuration:

EUT and AC Adapter

Mode:

TX, PCS BAND CDMA2000, 1xRTT

Average

Test Equipment:

Receiving: Horn T59, and Camber B SMA Cables

Substitution: Horn T60 Substitution, 6ft SMA Cable (208947003) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.851	17.3	V	0.85	8.26	24.68	33.0	-8.3	
1.851	10.4	H	0.85	8.26	17.77	33.0	-15.2	
Mid Ch								
1.880	17.5	V	0.85	8.30	24.90	33.0	-8.1	
1.880	8.4	H	0.85	8.30	15.89	33.0	-17.1	
High Ch								
1.909	17.1	V	0.85	8.35	24.60	33.0	-8.4	
1.909	8.9	H	0.85	8.35	16.40	33.0	-16.6	

Rev. 3.17.11

CDMA2000 PCS BAND, EVDO, Rev A

High Frequency Fundamental Measurement

Compliance Certification Services Chamber B

Company:

Project #:

Date:

Test Engineer:

Configuration:

Mode:

Apple

11U13938

10/25/11

Chin Pang

EUT and AC Adapter

TX, PCS BAND CDMA2000 EVDO Rev A

Average

Test Equipment:

Receiving: Horn T59, and Camber B SMA Cables

Substitution: Horn T60 Substitution, 6ft SMA Cable (208947003) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.851	17.7	V	0.85	8.26	25.08	33.0	-7.9	
1.851	8.0	H	0.85	8.26	15.37	33.0	-17.6	
Mid Ch								
1.880	17.6	V	0.85	8.30	25.00	33.0	-8.0	
1.880	8.7	H	0.85	8.30	16.19	33.0	-16.8	
High Ch								
1.909	17.4	V	0.85	8.35	24.90	33.0	-8.1	
1.909	8.3	H	0.85	8.35	15.80	33.0	-17.2	

Rev. 3.17.11

EIRP GPRS1900 BAND

High Frequency Fundamental Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		10/19/11						
Test Engineer:		Chin Pang						
Configuration:		EUT and AC Adapter						
Mode:		TX, PCS BAND GPRS						
		Average						
Test Equipment:								
Receiving: Horn T59, and Camber B SMA Cables								
Substitution: Horn T60 Substitution, 6ft SMA Cable (208947003) Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.850	23.4	V	0.85	8.26	30.81	33.0	-2.2	
1.850	11.4	H	0.85	8.26	18.81	33.0	-14.2	
1.880	23.1	V	0.85	8.30	30.50	33.0	-2.5	
1.880	13.8	H	0.85	8.30	21.25	33.0	-11.8	
1.910	22.9	V	0.85	8.35	30.40	33.0	-2.6	
1.910	12.8	H	0.85	8.35	20.30	33.0	-12.7	
Rev. 3.17.11								

EIRP EGPRS1900 BAND

High Frequency Fundamental Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		10/19/11						
Test Engineer:		Chin Pang						
Configuration:		EUT and AC Adapter						
Mode:		TX, PCS BAND EGPRS						
		Average						
Test Equipment:								
Receiving: Horn T59, and Camber B SMA Cables								
Substitution: Horn T60 Substitution, 6ft SMA Cable (208947003) Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.850	20.8	V	0.85	8.26	28.20	33.0	-4.8	
1.850	12.4	H	0.85	8.26	19.81	33.0	-13.2	
1.880	20.7	V	0.85	8.30	28.15	33.0	-4.9	
1.880	13.8	H	0.85	8.30	21.25	33.0	-11.8	
1.910	20.6	V	0.85	8.35	28.10	33.0	-4.9	
1.910	12.6	H	0.85	8.35	20.10	33.0	-12.9	
Rev. 3.17.11								

EIRP WCDMA REL. 99 PCS BAND

High Frequency Fundamental Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		10/25/11						
Test Engineer:		Chin Pang						
Configuration:		EUT and AC Adapter						
Mode:		TX, PCS BAND WCDMA, Rel 99						
		Average						
Test Equipment:								
Receiving: Horn T59, and Camber B SMA Cables								
Substitution: Horn T60 Substitution, 6ft SMA Cable (208947003) Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.852	16.7	V	0.85	8.01	23.86	33.0	-9.1	
1.852	7.4	H	0.85	8.01	14.56	33.0	-18.4	
Mid Ch								
1.880	16.7	V	0.85	8.13	23.98	33.0	-9.0	
1.880	7.8	H	0.85	8.13	15.08	33.0	-17.9	
High Ch								
1.908	15.8	V	0.85	8.13	23.08	33.0	-9.9	
1.908	7.8	H	0.85	8.13	15.03	33.0	-18.0	
Rev. 3.17.11								

EIRP WCDMA HSDPA, PCS BAND

High Frequency Fundamental Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		11/08/11						
Test Engineer:		Chin Pang						
Configuration:		EUT and AC Adapter						
Mode:		TX, PCS BAND WCDMA, HSDPA						
		Average						
Test Equipment:								
Receiving: Horn T59, and Camber B SMA Cables								
Substitution: Horn T60 Substitution, 6ft SMA Cable (208947003) Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.852	16.8	V	0.85	8.01	23.93	33.0	-9.1	
1.852	7.1	H	0.85	8.01	14.26	33.0	-18.7	
Mid Ch								
1.880	16.5	V	0.85	8.13	23.78	33.0	-9.2	
1.880	7.3	H	0.85	8.13	14.58	33.0	-18.4	
High Ch								
1.908	15.6	V	0.85	8.13	22.88	33.0	-10.1	
1.908	7.2	H	0.85	8.13	14.48	33.0	-18.5	
Rev. 3.17.11								

9.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238

IC: RSS-132, 4.5; RSS-133, 6.5

LIMIT

§22.917 (e) and §24.238 (a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

MODES TESTED

- CDMA2000, 1xRTT and EVDO Rev A
- GPRS and EGPRS
- WCDMA REL. 99 and HSDPA

RESULTS

CDMA2000, CELL Band, 1xRTT

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		11-09-11							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, CELL BAND CDMA2000, 1xRTT							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 22			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (824.7MHz)									
1.649	-20.8	V	3.0	35.5	1.0	-55.3	-13.0	-42.3	
2.474	-17.6	V	3.0	35.4	1.0	-52.0	-13.0	-39.0	
1.649	-24.8	H	3.0	35.5	1.0	-59.3	-13.0	-46.3	
2.474	-19.9	H	3.0	35.4	1.0	-54.3	-13.0	-41.3	
Mid Ch, (836.52MHz)									
1.673	-17.9	V	3.0	35.5	1.0	-52.4	-13.0	-39.4	
2.510	-20.2	V	3.0	35.4	1.0	-54.6	-13.0	-41.6	
1.673	-23.5	H	3.0	35.5	1.0	-58.1	-13.0	-45.1	
2.510	-18.1	H	3.0	35.4	1.0	-52.5	-13.0	-39.5	
High Ch, (848.31MHz)									
1.697	-17.6	V	3.0	35.5	1.0	-52.1	-13.0	-39.1	
2.545	-19.5	V	3.0	35.4	1.0	-54.0	-13.0	-41.0	
1.697	-23.3	H	3.0	35.5	1.0	-57.8	-13.0	-44.8	
2.545	-21.9	H	3.0	35.4	1.0	-56.3	-13.0	-43.3	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

CDMA2000, CELL BAND, EVDO REV A

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		11-09-11							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, CELL BAND CDMA2000, EVDO Rev A							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 22			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch. (824.7MHz)									
1.649	-18.2	V	3.0	35.5	1.0	-52.7	-13.0	-39.7	
2.474	-15.3	V	3.0	35.4	1.0	-49.7	-13.0	-36.7	
1.649	-22.8	H	3.0	35.5	1.0	-57.3	-13.0	-44.3	
2.474	-18.2	H	3.0	35.4	1.0	-52.6	-13.0	-39.6	
Mid Ch. (836.52MHz)									
1.673	-16.6	V	3.0	35.5	1.0	-51.1	-13.0	-38.1	
2.510	-17.2	V	3.0	35.4	1.0	-51.6	-13.0	-38.6	
1.673	-21.5	H	3.0	35.5	1.0	-56.1	-13.0	-43.1	
2.510	-19.9	H	3.0	35.4	1.0	-54.3	-13.0	-41.3	
High Ch. (848.31MHz)									
1.697	-14.1	V	3.0	35.5	1.0	-48.6	-13.0	-35.6	
2.545	-16.0	V	3.0	35.4	1.0	-50.5	-13.0	-37.5	
1.697	-21.3	H	3.0	35.5	1.0	-55.8	-13.0	-42.8	
2.545	-18.1	H	3.0	35.4	1.0	-52.5	-13.0	-39.5	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

ERP GPRS850 BAND

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		11/02/11							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, CELL BAND GPRS							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 22			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (824.2MHz)									
1.648	-19.5	V	3.0	35.5	1.0	-54.0	-13.0	-41.0	
2.473	-13.5	V	3.0	35.4	1.0	-48.0	-13.0	-35.0	
1.648	-22.1	H	3.0	35.5	1.0	-56.6	-13.0	-43.6	
2.473	-14.2	H	3.0	35.4	1.0	-48.6	-13.0	-35.6	
Mid Ch, (836.6MHz)									
1.673	-19.9	V	3.0	35.5	1.0	-54.4	-13.0	-41.4	
2.510	-14.7	V	3.0	35.4	1.0	-49.1	-13.0	-36.1	
1.673	-23.5	H	3.0	35.5	1.0	-58.1	-13.0	-45.1	
2.510	-15.5	H	3.0	35.4	1.0	-50.0	-13.0	-37.0	
High Ch, (848.8MHz)									
1.698	-17.7	V	3.0	35.5	1.0	-52.2	-13.0	-39.2	
2.546	-15.8	V	3.0	35.4	1.0	-50.3	-13.0	-37.3	
4.244	-13.0	V	3.0	35.2	1.0	-47.3	-13.0	-34.3	
1.698	-20.3	H	3.0	35.5	1.0	-54.8	-13.0	-41.8	
2.546	-17.5	H	3.0	35.4	1.0	-51.9	-13.0	-38.9	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

ERP EGPRS850 BAND

Compliance Certification Services									
Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		10/19/11							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, CELL BAND EGPRS							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 22			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (824.2MHz)									
1.648	-23.2	V	3.0	35.5	1.0	-57.8	-13.0	-44.8	
2.473	-16.3	V	3.0	35.4	1.0	-50.7	-13.0	-37.7	
1.648	-24.3	H	3.0	35.5	1.0	-58.8	-13.0	-45.8	
2.473	-14.2	H	3.0	35.4	1.0	-48.6	-13.0	-35.6	
Mid Ch, (836.6MHz)									
1.673	-23.0	V	3.0	35.5	1.0	-57.5	-13.0	-44.5	
2.510	-16.4	V	3.0	35.4	1.0	-50.8	-13.0	-37.8	
1.673	-24.5	H	3.0	35.5	1.0	-59.1	-13.0	-46.1	
2.510	-16.9	H	3.0	35.4	1.0	-51.3	-13.0	-38.3	
High Ch, (848.8MHz)									
1.698	-22.6	V	3.0	35.5	1.0	-57.1	-13.0	-44.1	
2.546	-16.7	V	3.0	35.4	1.0	-51.2	-13.0	-38.2	
1.698	-22.5	H	3.0	35.5	1.0	-57.0	-13.0	-44.0	
2.546	-20.9	H	3.0	35.4	1.0	-55.3	-13.0	-42.3	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

ERP WCDMA Rel 99, CELL BAND

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		11-09-11							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, WCDMA 850, Rel 99							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 22			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch. (826.4MHz)									
1.653	-20.2	V	3.0	35.5	1.0	-54.7	-13.0	-41.7	
2.479	-18.8	V	3.0	35.4	1.0	-53.2	-13.0	-40.2	
1.653	-21.8	H	3.0	35.5	1.0	-56.4	-13.0	-43.4	
2.479	-21.7	H	3.0	35.4	1.0	-56.1	-13.0	-43.1	
Mid Ch. (836MHz)									
1.672	-22.7	V	3.0	35.5	1.0	-57.2	-13.0	-44.2	
2.508	-19.5	V	3.0	35.4	1.0	-53.9	-13.0	-40.9	
1.672	-22.5	H	3.0	35.5	1.0	-57.1	-13.0	-44.1	
2.508	-17.4	H	3.0	35.4	1.0	-51.8	-13.0	-38.8	
High Ch. (846MHz)									
1.692	-22.1	V	3.0	35.5	1.0	-56.6	-13.0	-43.6	
2.538	-19.9	V	3.0	35.4	1.0	-54.3	-13.0	-41.3	
1.692	-24.4	H	3.0	35.5	1.0	-58.9	-13.0	-45.9	
2.538	-22.1	H	3.0	35.4	1.0	-56.6	-13.0	-43.6	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

ERP HSDPA Rel 6, CELL BAND

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		11-09-11							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, WCDMA 850, HSDPA							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 22			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (826.4MHz)									
1.653	-19.8	V	3.0	35.5	1.0	-54.3	-13.0	-41.3	
2.479	-18.5	V	3.0	35.4	1.0	-52.9	-13.0	-39.9	
1.653	-24.7	H	3.0	35.5	1.0	-59.3	-13.0	-46.3	
2.479	-19.5	H	3.0	35.4	1.0	-53.9	-13.0	-40.9	
Mid Ch, (836MHz)									
1.672	-19.9	V	3.0	35.5	1.0	-54.4	-13.0	-41.4	
2.508	-19.8	V	3.0	35.4	1.0	-54.2	-13.0	-41.2	
1.672	-23.5	H	3.0	35.5	1.0	-58.1	-13.0	-45.1	
2.508	-20.1	H	3.0	35.4	1.0	-54.5	-13.0	-41.5	
High Ch, (846MHz)									
1.692	-21.2	V	3.0	35.5	1.0	-55.7	-13.0	-42.7	
2.538	-20.6	V	3.0	35.4	1.0	-55.0	-13.0	-42.0	
1.692	-24.4	H	3.0	35.5	1.0	-58.9	-13.0	-45.9	
2.538	-22.9	H	3.0	35.4	1.0	-57.4	-13.0	-44.4	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

EIRP GPRS1900 BAND

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		10/19/11							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, PCS BAND GPRS							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 24			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1850.2MHz)									
3.703	-7.4	V	3.0	35.4	1.0	-41.7	-13.0	-28.7	
5.555	-14.0	V	3.0	35.4	1.0	-48.4	-13.0	-35.4	
3.703	-11.7	H	3.0	35.4	1.0	-46.0	-13.0	-33.0	
5.555	-13.0	H	3.0	35.4	1.0	-47.4	-13.0	-34.4	
Mid Ch, (1880.0MHz)									
3.760	-7.7	V	3.0	35.3	1.0	-42.1	-13.0	-29.1	
5.640	-12.7	V	3.0	35.4	1.0	-47.1	-13.0	-34.1	
3.760	-11.8	H	3.0	35.3	1.0	-46.1	-13.0	-33.1	
5.640	-13.3	H	3.0	35.4	1.0	-47.8	-13.0	-34.8	
High Ch, (1909.8MHz)									
3.818	-9.2	V	3.0	35.3	1.0	-43.5	-13.0	-30.5	
5.726	-10.6	V	3.0	35.4	1.0	-45.1	-13.0	-32.1	
3.818	-11.3	H	3.0	35.3	1.0	-45.6	-13.0	-32.6	
5.726	-11.7	H	3.0	35.4	1.0	-46.1	-13.0	-33.1	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

EIRP EGPRS1900 BAND

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		10/19/11							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, PCS BAND EGPRS							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 24			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1850.2MHz)									
3.703	-10.9	V	3.0	35.4	1.0	-45.2	-13.0	-32.2	
5.555	-14.4	V	3.0	35.4	1.0	-48.8	-13.0	-35.8	
3.703	-12.7	H	3.0	35.4	1.0	-47.0	-13.0	-34.0	
5.555	-13.0	H	3.0	35.4	1.0	-47.4	-13.0	-34.4	
Mid Ch, (1880.0MHz)									
3.760	-17.2	V	3.0	35.3	1.0	-51.6	-13.0	-38.6	
5.640	-14.7	V	3.0	35.4	1.0	-49.1	-13.0	-36.1	
3.760	-15.5	H	3.0	35.3	1.0	-49.8	-13.0	-36.8	
5.640	-13.6	H	3.0	35.4	1.0	-48.1	-13.0	-35.1	
High Ch, (1909.8MHz)									
3.818	-15.8	V	3.0	35.3	1.0	-50.1	-13.0	-37.1	
5.726	-13.0	V	3.0	35.4	1.0	-47.5	-13.0	-34.5	
3.818	-16.3	H	3.0	35.3	1.0	-50.6	-13.0	-37.6	
5.726	-13.7	H	3.0	35.4	1.0	-48.1	-13.0	-35.1	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

EIRP WCDMA Rel 99, PCS BAND

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Project #: 11U13938
Date: 10/25/11
Test Engineer: Chin Pang
Configuration: EUT and AC Adapter
Mode: TX, PCS BAND WCDMA Rel 99

Chamber	Pre-amplifier	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1852.4MHz)									
3.705	-19.4	V	3.0	35.4	1.0	-53.7	-13.0	-40.7	
5.557	-17.3	V	3.0	35.4	1.0	-51.7	-13.0	-38.7	
3.705	-19.7	H	3.0	35.4	1.0	-54.0	-13.0	-41.0	
5.557	-16.3	H	3.0	35.4	1.0	-50.7	-13.0	-37.7	
Mid Ch, (1880.0MHz)									
3.760	-18.9	V	3.0	35.3	1.0	-53.3	-13.0	-40.3	
5.640	-17.7	V	3.0	35.4	1.0	-52.1	-13.0	-39.1	
3.760	-20.5	H	3.0	35.3	1.0	-54.8	-13.0	-41.8	
5.640	-16.2	H	3.0	35.4	1.0	-50.7	-13.0	-37.7	
High Ch, (1907.6MHz)									
3.818	-6.0	V	3.0	35.3	1.0	-40.3	-13.0	-27.3	
5.723	-16.9	V	3.0	35.4	1.0	-51.4	-13.0	-38.4	
3.818	-5.2	H	3.0	35.3	1.0	-39.6	-13.0	-26.6	
5.723	-15.7	H	3.0	35.4	1.0	-50.1	-13.0	-37.1	

Rev. 03.03.09

Note: No other emissions were detected above the system noise floor.

EIRP HSDPA Rel 6; PCS BAND

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		11-08-11							
Test Engineer:		Chin Pang							
Configuration:		EUT and AC Adapter							
Mode:		TX, PCS BAND WCDMA, HSDPA							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 24			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1852.4MHz)									
3.705	-16.3	V	3.0	35.4	1.0	-50.6	-13.0	-37.6	
5.557	-13.8	V	3.0	35.4	1.0	-48.2	-13.0	-35.2	
3.705	-18.2	H	3.0	35.4	1.0	-52.5	-13.0	-39.5	
5.557	-14.7	H	3.0	35.4	1.0	-49.1	-13.0	-36.1	
Mid Ch, (1880.0MHz)									
3.760	-15.7	V	3.0	35.3	1.0	-50.1	-13.0	-37.1	
5.640	-15.7	V	3.0	35.4	1.0	-50.1	-13.0	-37.1	
3.760	-17.0	H	3.0	35.3	1.0	-51.3	-13.0	-38.3	
5.640	-16.2	H	3.0	35.4	1.0	-50.7	-13.0	-37.7	
High Ch, (1907.6MHz)									
3.815	-6.6	V	3.0	35.3	1.0	-40.9	-13.0	-27.9	
5.723	-12.6	V	3.0	35.4	1.0	-47.1	-13.0	-34.1	
3.815	-11.3	H	3.0	35.3	1.0	-45.6	-13.0	-32.6	
5.723	-12.7	H	3.0	35.4	1.0	-47.1	-13.0	-34.1	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

9.3. RECEIVER SPURIOUS EMISSIONS

LIMIT

RSS-Gen 7.2.2

Spurious Emission Limits for Receivers:

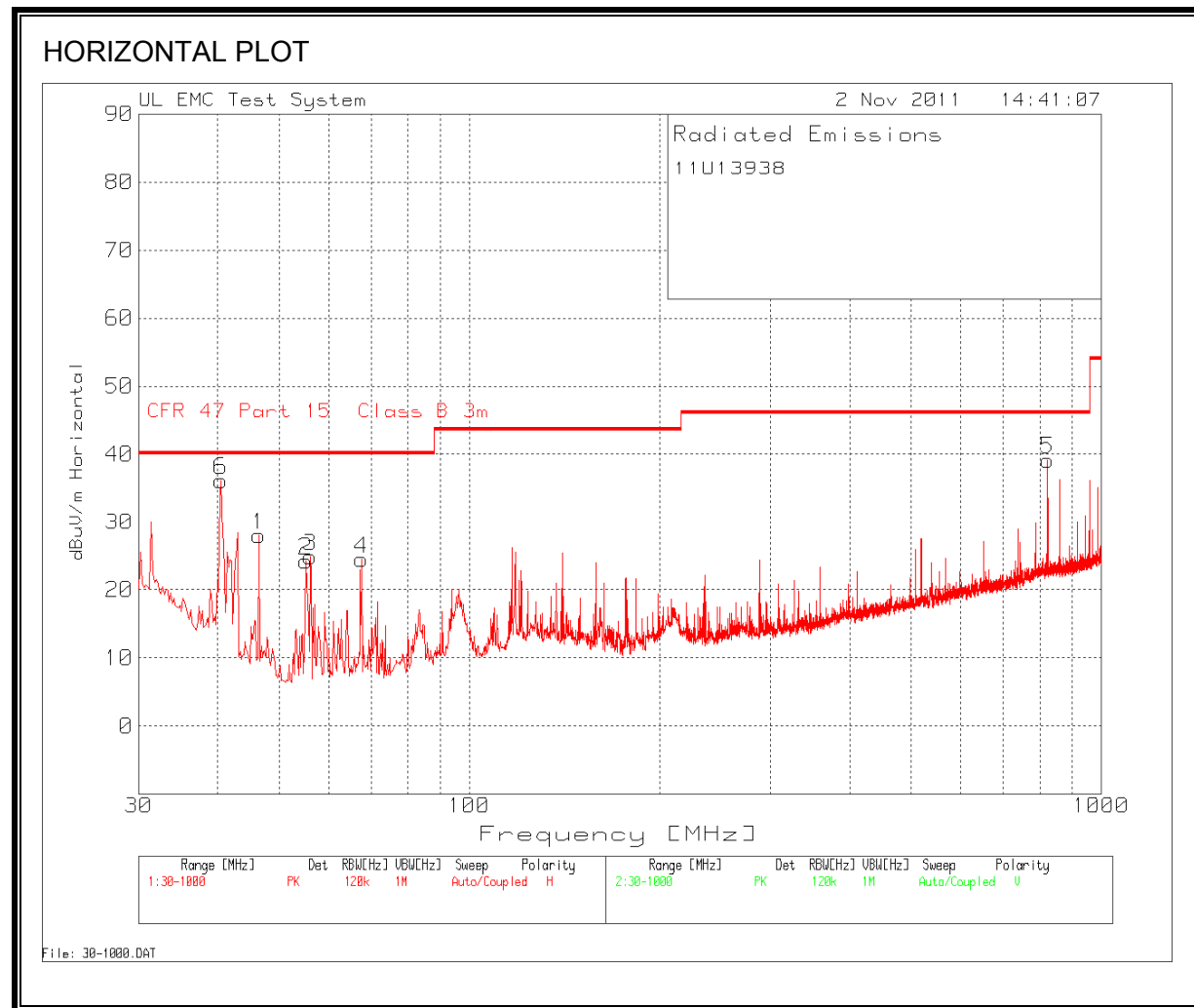
Spurious Frequency (MHz)	Field Strength (microvolts/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960	500

TEST PROCEDURE

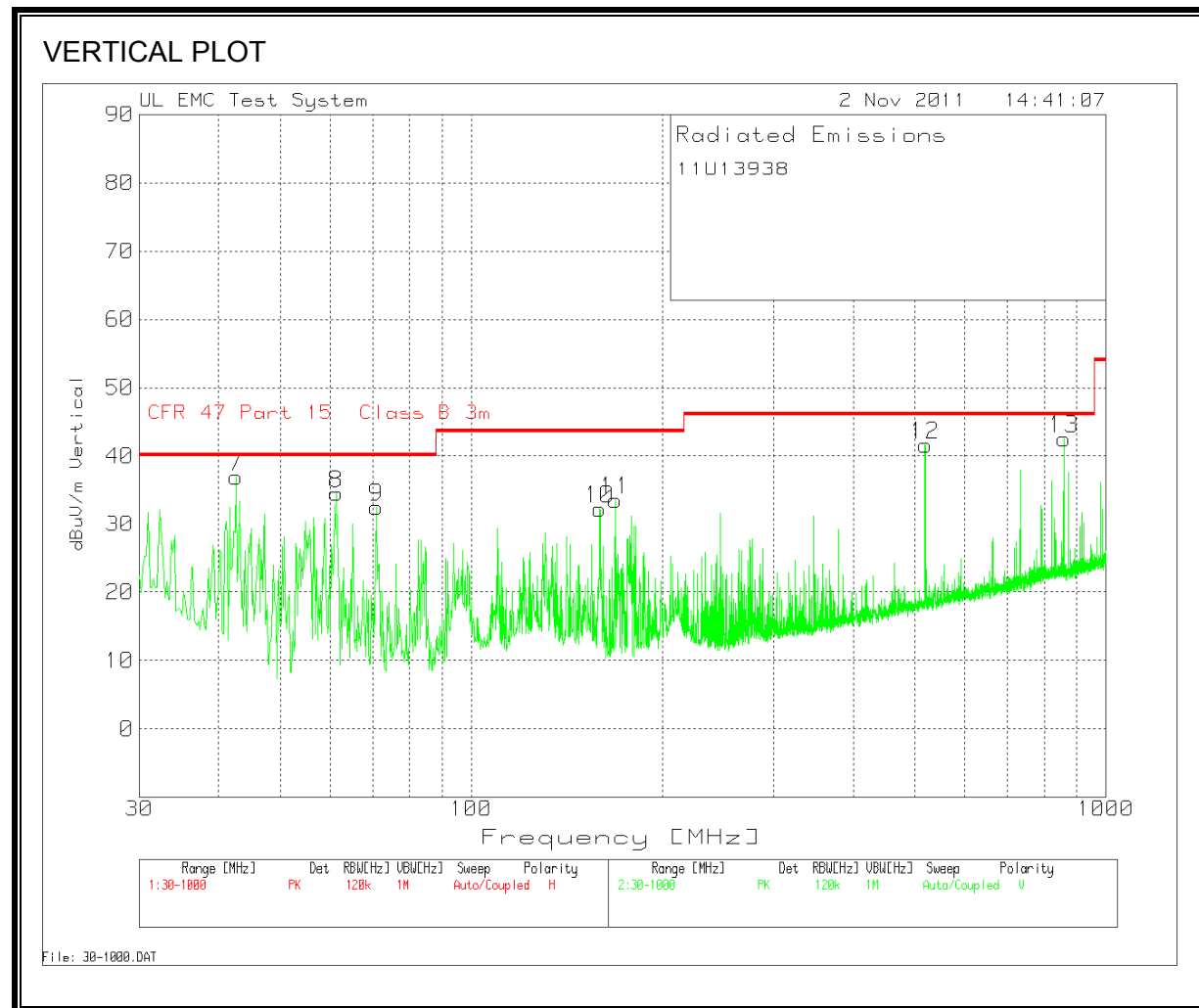
The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (local oscillator frequency, intermediate frequency or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tunable and local oscillator frequencies.

RESULTS

RECEIVER SPURIOUS EMISSIONS FOR 30 TO 1000 MHz, HORIZONTAL



RECEIVER SPURIOUS EMISSIONS FOR 30 TO 1000 MHz, VERTICAL



HORIZONTAL AND VERTICAL DATA

11U13938									
Range 1 30 - 1000MHz									
Frequency	Reading	Detector	Cable.loss	Amp gain	Ant Factors.	Corrected	15 Class B	Margin	Polarity
46.4768	46.32	PK	1	-29.4	10.1	28.02	40	-11.98	Horz
55.1998	44.62	PK	1.1	-29.4	7.9	24.22	40	-15.78	Horz
55.9752	45.21	PK	1.1	-29.4	7.9	24.81	40	-15.19	Horz
67.6059	44.41	PK	1.2	-29.4	8.2	24.41	40	-15.59	Horz
823.2134	42.82	PK	4	-28.8	21.1	39.12	46	-6.88	Horz
40.4676	50.85	PK	0.9	-29.4	13.8	36.15	40	-3.85	Horz
Range 2 30 - 1000MHz									
Frequency	Reading	Detector	Cable.loss	Amp gain	Ant Factors.	Corrected	15 Class B	Margin	Polarity
42.5999	52.9	PK	1	-29.4	12.5	37	40	-3	Vert
61.4029	54.84	PK	1.2	-29.4	7.9	34.54	40	-5.46	Vert
70.9013	52.49	PK	1.2	-29.4	8.2	32.49	40	-7.51	Vert
159.4884	48.73	PK	1.7	-29.1	10.9	32.23	43.5	-11.27	Vert
168.5991	50.47	PK	1.8	-29	10.3	33.57	43.5	-9.93	Vert
519.2646	50.77	PK	3.2	-29.4	17.1	41.67	46	-4.33	Vert
859.2686	45.85	PK	4.1	-28.7	21.3	42.55	46	-3.45	Vert

RECEIVER SPURIOUS EMISSIONS ABOVE 1000 MHz

Note: No emissions were detected above the system noise floor.

10. POWER LINE CONDUCTED EMISSION

LIMIT

RSS-Gen 7.2.2

Except when the requirements applicable to a given device state otherwise, for any licence-exempt radio communication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries.

Table 2 – AC Power Lines Conducted Emission Limits

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 [*]	56 to 46 [*]
0.5-5	56	46
5-30	60	50

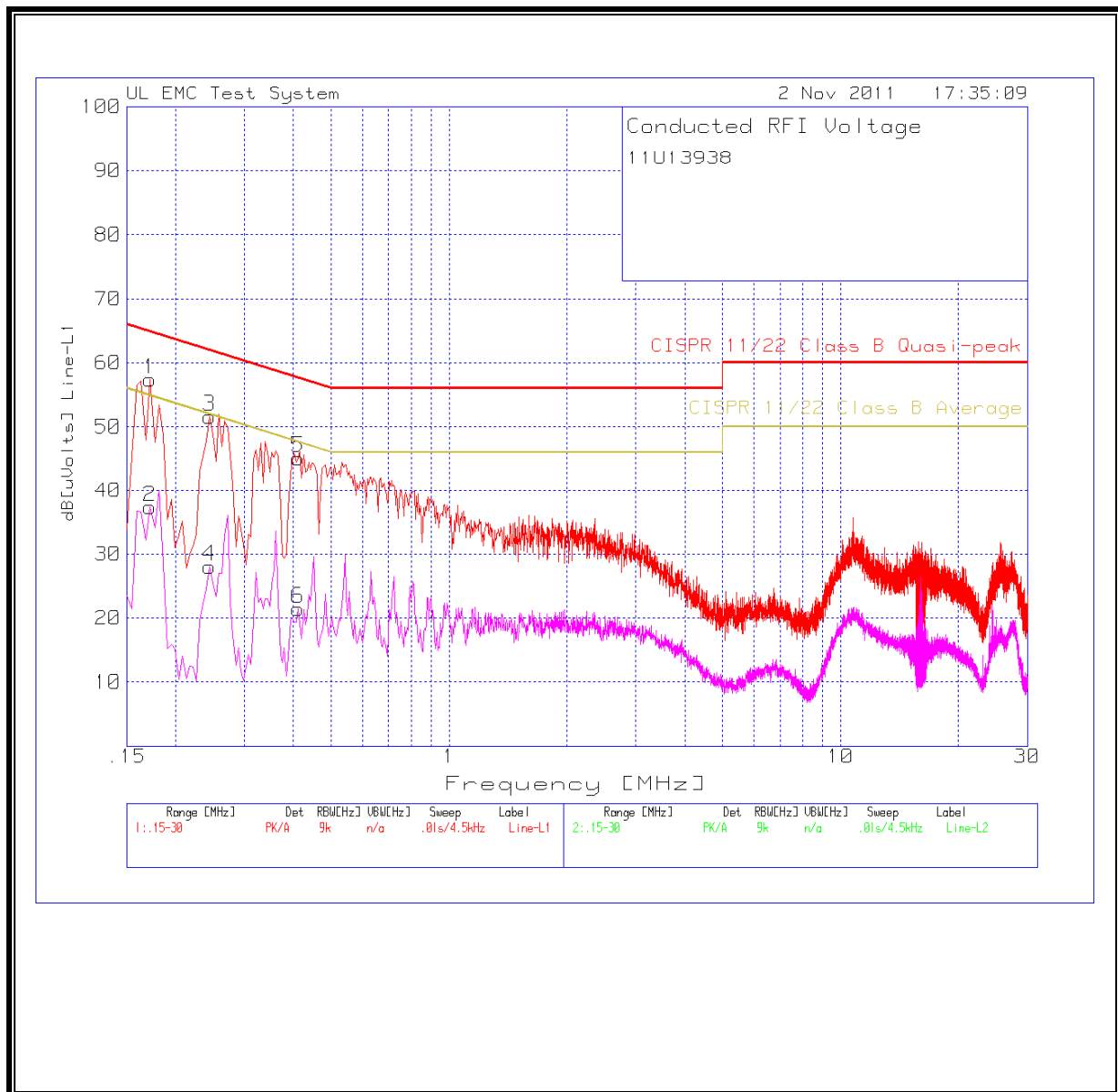
^{*} Decreases with the logarithm of the frequency.

RESULTS

6 WORST EMISSIONS

11U13938							
Line-L1 .15 - 30MHz							
Frequency	Reading	Detector	dB[uVolts]	Class B	Margin	Class B	Margin
0.1725	57.35	PK	57.35	64.8	-7.45	54.8	2.55
0.1725	37.4	Av	37.4	-	-	54.8	-17.4
0.2445	51.56	PK	51.56	61.9	-10.34	51.9	-0.34
0.2445	28.02	Av	28.02	-	-	51.9	-23.88
0.411	45.15	PK	45.15	57.6	-12.45	47.6	-2.45
0.411	21.38	Av	21.38	-	-	47.6	-26.22
Line-L2 .15 - 30MHz							
Frequency	Reading	Detector	dB[uVolts]	Class B	Margin	Class B	Margin
0.1635	57.13	PK	57.13	65.3	-8.17	55.3	1.83
0.1635	38.19	Av	38.19	-	-	55.3	-17.11
0.258	52.22	PK	52.22	61.5	-9.28	51.5	0.72
0.258	28.13	Av	28.13	-	-	51.5	-23.37
0.339	47.73	PK	47.73	59.2	-11.47	49.2	-1.47
0.339	24.06	Av	24.06	-	-	49.2	-25.14

LINE 1 RESULTS



LINE 2 RESULTS

