FCC 47 CFR PART 22H, 24E, 27L AND 90S
CERTIFICATION TEST REPORT

FOR
CELLULAR PHONE WITH BLUETOOTH AND WLAN RADIOS

MODEL NUMBER: A1586

FCC ID: BCG-E2816A

REPORT NUMBER: 14U17673-E13, REVISION D

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Prepared for
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Revision History

Rev.	Issue Date	Revisions	Revised By
	07/29/14	Initial Issue	C. Pang
A	08/02/14	Address TCB's Questions	C. Pang
B	08/03/14	Address TCB's Questions	C. Pang
C	08/05/14	Address TCB's Questions on Section 5.2	M. Hua
D	08/27/14	Add CDMA2000 1xAdvance	C. Pang

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: CELLULAR PHONE WITH BLUETOOTH AND WLAN RADIOS

MODEL: A1586

SERIAL NUMBER: 920-5012-02(Conducted); C39MN06LG337 (Radiated)

DATE TESTED: APRIL 25 –AUGUST 02, 2014

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H, 24E, 27L and 90S	Pass

UL Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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.

Approved & Released For
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UL Verification Services Inc.

Tested By:

Mona Hua
Lab Engineer
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 2, Part 22, Part 24, Part 27, and Part 90.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☐ Chamber A	☒ Chamber D
☐ Chamber B	☒ Chamber E
☐ Chamber C	☒ Chamber F
	☐ Chamber G
	☐ Chamber H

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

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 EUT is a mobile phone with multimedia functions (music, application support, and video), Cellular GSM/GPRS/EGPRS/CDMA2000 1x RTT/1x Advance/ EVDO Rev.A/ EVDO Rev.B / WCDMA / HSPA+/DC-HSDPA/LTE FDD & Carrier Aggregation/TDD/TD-SCDMA radio, IEEE 802.11a / b/g/n/ac radio, Bluetooth radio and NFC. The rechargeable battery is not user accessible.

5.2. MAXIMUM OUTPUT POWER

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

5.2.1. LAT

GSM MODES

Part 22 850MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average)		ERP (Average)		EIRP (Average)	
		dBm	mW	dBm	mW	dBm	mW
824 - 849	GPRS	33.45	2213.1	28.35	683.9	30.50	1122.0
	EGPRS	29.00	794.3	23.98	250.0	26.13	410.2

Part 24 1900MHz Band					
Frequency range (MHz)	Modulation	Conducted (Average)		EIRP (Average)	
		dBm	mW	dBm	mW
1850-1910	GPRS	29.80	955.0	32.52	1786.5
	EGPRS	28.00	631.0	30.68	1169.5

WCDMA MODES

Part 22 850MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average)		ERP (Average)		EIRP (Average)	
		dBm	mW	dBm	mW	dBm	mW
824 – 849	REL 99	24.92	310.5	20.44	110.7	22.59	181.6
	HSDPA	24.00	251.2	19.51	89.3	21.66	146.6

Part 24 1900MHz Band					
Frequency range (MHz)	Modulation	Conducted (Average)		EIRP(Average)	
		dBm	mW	dBm	mW
1850 – 1910	REL 99	24.22	264.2	27.18	522.4
	HSDPA	23.25	211.3	26.33	429.5

Part 27 1700MHz Band					
Frequency range (MHz)	Modulation	Conducted (Average)		EIRP(Average)	
		dBm	mW	dBm	mW
1710 – 1755	REL 99	25.00	316.2	26.27	423.6
	HSDPA	24.00	251.2	25.57	360.6

CDMA2000 MODES

Part 22 850MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average)		ERP (Average)		EIRP (Average)	
		dBm	mW	dBm	mW	dBm	mW
824 – 849	CDMA 1xRTT	24.94	311.9	20.18	104.23	22.33	171.0
	CDMA EVDO A	24.85	305.5	19.95	98.86	22.10	162.2

Part 24 1900MHz Band					
Frequency range (MHz)	Modulation	Conducted (Average)		EIRP(Average)	
		dBm	mW	dBm	mW
1850 – 1910	CDMA 1xRTT	24.20	263.0	27.88	613.8
	CDMA EVDO A	24.25	266.1	27.93	620.9

Part 27 1700 MHz Band					
Frequency range (MHz)	Modulation	Conducted (Average)		EIRP(Average)	
		dBm	mW	dBm	mW
1710 – 1755	CDMA 1xRTT	24.88	307.6	26.17	414.0
	CDMA EVDO A	24.90	309.0	26.24	420.7

Part 90 800MHz SECONDARY BAND							
Frequency range (MHz)	Modulation	Conducted (Average)		ERP (Average)		EIRP (Average)	
		dBm	mW	dBm	mW	dBm	mW
817 - 824	CDMA 1xRTT	24.95	312.6	20.40	109.6	22.55	179.9
	CDMA EVDO A	25.00	316.2	20.42	110.2	22.57	180.7

Part 22 850MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average)		ERP (Average)		EIRP (Average)	
		dBm	mW	dBm	mW	dBm	mW
2 CARRIER MIN	CDMA EVDO B	21.70	147.9	17.58	57.3	19.73	94.0
2 CARRIER MAX	CDMA EVDO B	21.80	151.4	17.18	52.2	19.33	85.7
3 CARRIER MIN	CDMAEVDO B	21.64	145.9	17.11	51.4	19.26	84.3

5.2.2. UAT

GSM MODES

Part 22 850MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average)		ERP (Average)		EIRP (Average)	
		dBm	mW	dBm	mW	dBm	mW
824 - 849	GPRS	33.20	2089.3	25.20	331.1	27.35	543.3
	EGPRS	28.70	741.3	21.01	126.2	23.16	207.0

Part 241900MHz Band					
Frequency range (MHz)	Modulation	Conducted (Average)		EIRP(Average)	
		dBm	mW	dBm	mW
1850-1910	GPRS	29.88	972.7	28.02	633.9
	EGPRS	27.40	549.5	25.38	345.1

WCDMA MODES

Part 22 850MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average)		ERP (Average)		EIRP (Average)	
		dBm	mW	dBm	mW	dBm	mW
824 – 849	REL 99	24.70	295.1	15.83	38.3	17.98	62.8
	HSDPA	23.70	234.4	14.91	31.0	17.06	50.8

Part 24 1900MHz Band					
Frequency range (MHz)	Modulation	Conducted (Average)		EIRP(Average)	
		dBm	mW	dBm	mW
1850 – 1910	REL 99	23.25	211.3	21.83	152.4
	HSDPA	22.29	169.4	20.10	102.3

Part 27 1700MHz Band					
Frequency range (MHz)	Modulation	Conducted (Average)		EIRP(Average)	
		dBm	mW	dBm	mW
1710– 1755	REL 99	23.06	202.3	20.34	108.1
	HSDPA	22.10	162.2	19.32	85.5

CDMA2000 MODES

Part 22 850MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average)		ERP (Average)		EIRP (Average)	
		dBm	mW	dBm	mW	dBm	mW
824 – 849	CDMA 1xRTT	24.59	287.7	19.09	81.1	21.24	133.0
	CDMA EVDO A	24.52	283.1	18.16	65.5	20.31	107.4

Part 24 1900MHz Band					
Frequency range (MHz)	Modulation	Conducted (Average)		EIRP(Average)	
		dBm	mW	dBm	mW
1850 – 1910	CDMA 1xRTT	23.20	208.9	22.08	161.4
	CDMA EVDO A	23.19	208.4	22.12	162.9

Part 27 1700MHz Band					
Frequency range (MHz)	Modulation	Conducted (Average)		EIRP(Average)	
		dBm	mW	dBm	mW
1710 – 1755	CDMA 1xRTT	23.00	199.5	20.78	119.7
	CDMA EVDO A	23.10	204.2	20.82	120.8

Part 90 800MHz SECONDARY BAND							
Frequency range (MHz)	Modulation	Conducted (Average)		ERP (Average)		EIRP (Average)	
		dBm	mW	dBm	mW	dBm	mW
817 - 824	CDMA 1xRTT	24.60	288.4	18.02	63.4	20.17	104.0
	CDMA EVDO A	24.55	285.1	17.77	59.8	19.92	98.2

Part 22 850MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average)		ERP (Average)		EIRP (Average)	
		dBm	mW	dBm	mW	dBm	mW
2 CARRIER MIN	CDMA EVDO B	21.50	141.3	14.42	27.7	16.57	45.4
2 CARRIER MAX	CDMA EVDO B	21.09	128.5	14.03	25.3	16.18	41.5
3 CARRIER MIN	CDMAEVDO B	21.08	128.2	13.90	24.5	16.05	40.3

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a band gap type integral antenna for the following bands with a maximum peak gain as follow: LAT: Port A, UAT: Port B.

Frequency (MHz)	Gain (dBi) LAT	Gain (dBi) UAT
BC10, 817 - 824	-2.70	-5.19
Cell, 824 - 849	-2.32	-5.64
PCS, 1850 - 1910	2.90	-1.29
AWS, 1710 - 1754	1.22	-1.18

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was version 12A310 Baseband 0.26.01.

The EUT is linked with Agilent 8960, Anritsu MT8820C, and CMW500 Communication Test Sets.

5.5. WORST-CASE CONFIGURATION AND MODE

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

For the device, all tests were performed as below,
_Port A: Both conducted and radiated emissions measurement with all bands.
_Port B: All conducted emissions measurement and only ERP/EIRP radiated emissions on all bands.

X-position is the worst-case for all modes below:

- For Cellular and PCS band: 1xRTT (SO55)
- For Cellular and PCS band: CDMA2000 1xEV-DO Rev. A.
- For Cellular and PCS band: GPRS and EGPRS
- For Cellular and PCS band: UMTS, REL 99 and HSDPA

For the fundamental investigation, since the EUT is a portable device that has three orientations; an X, Y and Z orientations and the worst among X, Y, and Z with AC/DC adapter and headset have been investigated. The worst case was found to be at X-position (flatbed) without AC/DC adapter and headset for all cell and pcs bands

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List			
Description	Manufacturer	Model	Serial Number
AC Adapter	Dell	Latitude 3540	NA
DC Power Supply	Dell	H65NM130	426-03P6-A00
EUT AC Adapter	Apple	A1385	D292365COYADHLHC3

I/O CABLES (RF Conducted Test)

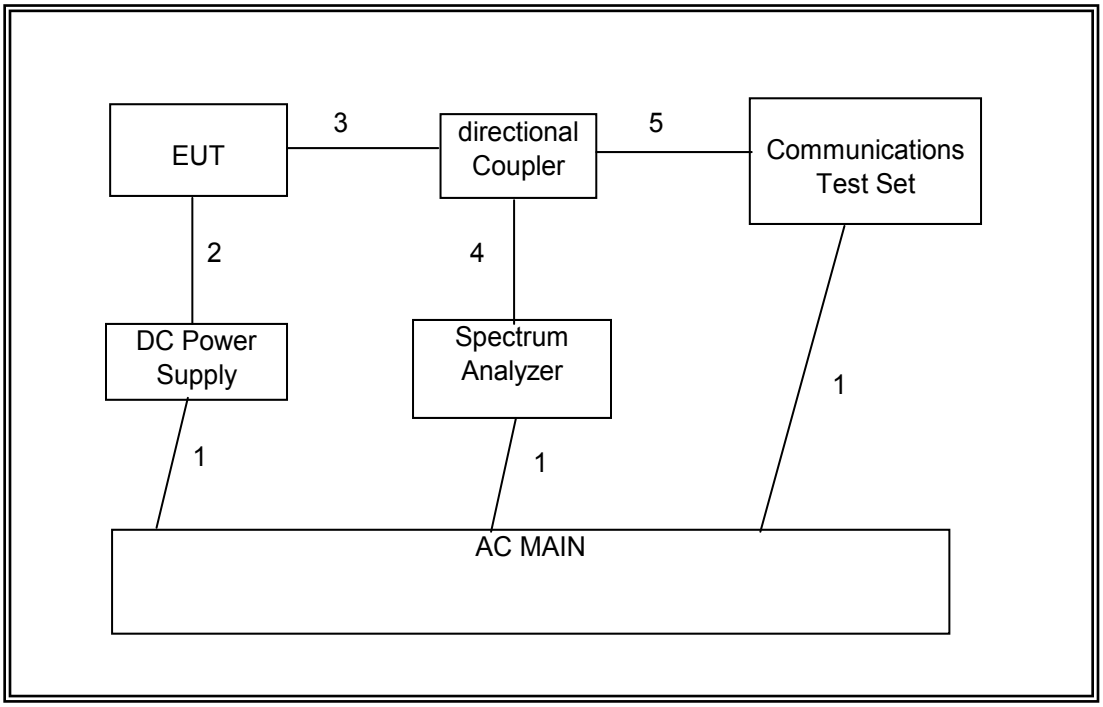
I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US 115V	Un-shielded	2m	N/A
2	DC	1	DC	Un-shielded	2m	N/A
3	RF In/Out	1	EUT	Un-shielded	1m	N/A
4	RF In/Out	1	Spectrum	Un-shielded	1m	N/A
5	RF In/Out	1	Communication Test Set	Un-shielded	None	N/A

I/O CABLES (RF Radiated Test)

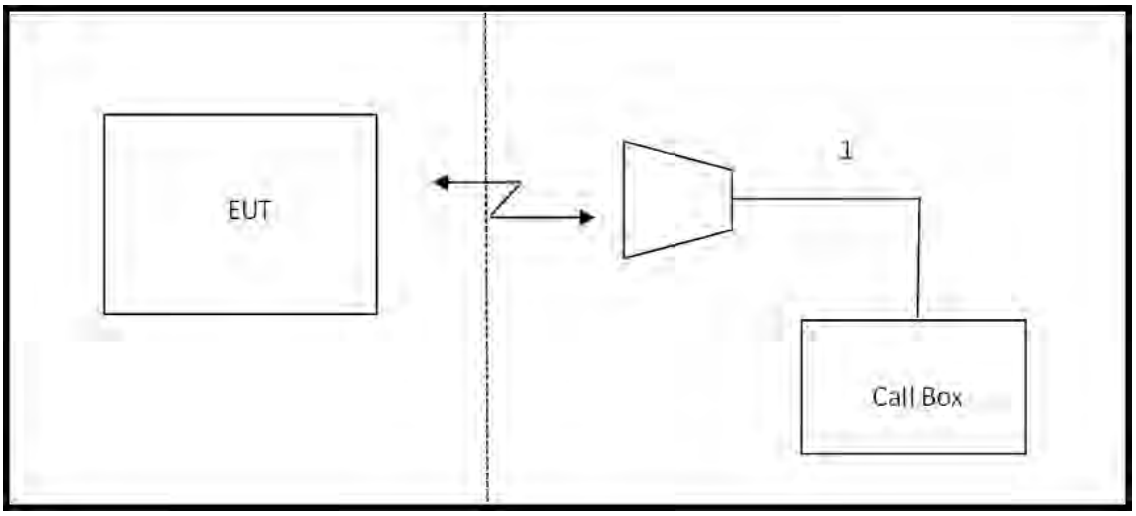
I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	RF In/Out	1	Antenna	Un-shielded	5m	NA

TEST SETUP

CONDUCTED SETUP



RADIATED SETUP



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**
Directional Coupler	Krytar	Directional Coupler	None	CNR
8960 series 10 wireless	Agilent	E5515E	F00362	09/11/14
Spectrum Analyzer, PXA,	Agilent	N9030A	F00129	06/25/15
Wideband Radio	R & S	CMW500	None	05/29/15
Temperature / Humidity	CSZ	ZPHS-8-3.5-SCT/WC	None	10/14/14
Signal Generator, 100KHz -	Agilent	8665B	F00124	03/12/15
Antenna, Tuned Dipole	ETS Lindgren	3121C DB4	C00993	01/23/15
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02686	CNR
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02688	CNR
HighPass Filter 1GHz	Micro-Tronics	HPM18129	None	CNR
Power Meter	Agilent	N1911A	F00022	04/09/15
Power Sensor	Agilent	E9323A	F00153	03/06/15
Antenna, Horn 1-18GHz	ETS Lindgren	3117	None	04/14/15
Antenna, Horn, 18 GHz	EMCO	3115	C00872	01/06/15
Amplifier, 1 to 18GHz	Miteq	AMF-5D-01001800-40-20P	F00394	11/27/14
Amplifier	Sonoma	310	F00008	05/28/15
Antenna, Biconolog, 30MHz-1	Sunol Sciences	JB3	F00027	05/05/15

7. RF POWER OUTPUT VERIFICATION

TEST PROCEDURE

The transmitter output was connected to the input terminal of Directional Coupler via calibrated coaxial cable. The output coupling terminal of the Directional Coupler was directly connected to a spectrum analyzer while the output through terminal connected to the communication test set via calibrated coaxial cable.
The output power was measured with the spectrum analyzer at the low, middle and high channel in each band.

- Set the spectrum analyzer span wide enough or greater than the modulated signal BW.
- Set a spectrum analyzer at peak detection mode with VBW ≥ RBW.≥ 26dB BW, typically 5MHz.
- Set a marker to point the corresponding peak value.

Using CMU200 Communication Test Set

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 >	CS 4 (GPRS) and MCS5-9 (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	

Using Agilent 8960A Communication Test Set

System Config:	GSM/GPRS Mobile Test E1968A	 A.06.31
Call Parms:	BCH ➔	Cell Band: GSM850/PCS
	TCH ➔	Traffic Band: GSM850/PCS Traffic Channel: 128/192/251 or 512/661/810 MS Tx Level: 0
	PDTCH ➔	Traffic Band: GSM850/PCS Traffic Channel: 128/192/251 512/661/810 MS Tx Level: 0 Coding Scheme: CS-4 (GPRS) Coding Scheme: MCS-5 to 9 (EGPRS) MultiSlot Config: 1up, 1 down (Assuming that the highest conducted power)
Control:	Active Cell ➔	GSM/GPRS

7.1. GPRS/EGPRS MODE

LAT Part 22/24

Mode	Ch.	f (MHz)	1 time slot		2 time slots	
			Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)
GPRS	128	824.2	33.30	33.27	31.50	31.30
	190	836.6	33.42	33.35	31.95	31.75
	251	848.8	**33.50**	**33.45**	32.00	31.80
EGPRS	128	824.2	**31.70**	**29.00**	31.65	28.91
	190	836.6	31.68	28.99	31.65	28.88
	251	848.8	31.65	28.98	31.63	28.87
GPRS	512	1850.2	29.80	29.70	29.50	29.37
	661	1880.0	**29.90**	**29.80**	29.40	29.27
	810	1909.8	29.80	29.70	29.60	29.40
EGPRS	512	1850.2	30.55	27.98	30.48	27.84
	661	1880.0	**30.67**	**28.00**	30.60	27.80
	810	1909.8	30.46	27.93	30.33	27.79

UAT Part 22/24

Mode	Ch.	f (MHz)	1 time slot		2 time slots	
			Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)
GPRS	128	824.2	**33.40**	**33.20**	32.50	32.20
	190	836.6	33.30	33.16	32.30	32.15
	251	848.8	33.30	33.10	32.20	32.00
EGPRS	128	824.2	31.46	28.67	31.40	28.57
	190	836.6	**31.50**	**28.70**	31.44	28.64
	251	848.8	31.45	28.69	31.40	28.62
GPRS	512	1850.2	**30.30**	**29.88**	29.00	28.73
	661	1880.0	30.10	29.80	29.05	28.75
	810	1909.8	29.80	29.63	29.10	28.80
EGPRS	512	1850.2	30.50	27.39	30.42	27.34
	661	1880.0	**30.60**	**27.40**	30.40	27.35
	810	1909.8	30.50	27.38	30.56	27.36

7.2. UMTS REL99

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
	βc	Not Applicable
	βd	Not Applicable
	βec	Not Applicable
	βc/βd	8/15
	βhs	Not Applicable
	βed	Not Applicable

RESULTS

7.2.1. LAT

Part 22 850MHz Band

Bands	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
				Peak	Average
UMTS850 (Band 5)	4132	4357	826.4	29.06	24.89
	4180	4405	836.0	28.98	**24.92**
	4230	4455	846.0	**29.09**	24.75

Part 24 1900MHz Band

Bands	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
				Peak	Average
UMTS1900 (Band 2)	9262	9662	1852.4	28.12	24.17
	9400	9800	1880.0	**28.21**	**24.22**
	9538	9938	1907.6	28.15	24.15

Part 27 1700MHz Band

Bands	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
				Peak	Average
UMTS1700 (Band 4)	1312	1537	1712.4	28.48	24.60
	1413	1638	1732.6	**29.18**	**25.00**
	1513	1738	1752.6	28.45	24.61

7.2.2. UAT

Part 22 850MHz Band

Bands	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
				Peak	Average
UMTS850 (Band 5)	4132	4357	826.4	28.56	24.68
	4180	4405	836.0	28.50	24.65
	4230	4455	846.0	**28.62**	**24.70**

Part 24 1900MHz Band

Bands	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
				Peak	Average
UMTS1900 (Band 2)	9262	9662	1852.4	26.30	23.20
	9400	9800	1880.0	26.41	23.17
	9538	9938	1907.6	**26.44**	**23.25**

Part 27 1700MHz Band

Bands	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
				Peak	Average
UMTS1700 (Band 4)	1312	1537	1712.4	26.48	22.96
	1413	1638	1732.6	26.50	**23.06**
	1513	1738	1752.6	**26.56**	23.00

7.3. HSDPA REL 5

The following 4 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121.

Summary of settings are illustrated below:

	Mode	Rel5 HSDPA			
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs =βhs/βc	30/15			

Result

7.3.1. LAT

Part 22 850MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS850 (Band 5)	1	4132	4357	826.4	28.04	23.84
		4180	4405	836.0	27.99	23.95
		4230	4455	846.0	28.05	23.87
	2	4132	4357	826.4	28.69	23.97
		4180	4405	836.0	28.66	23.98
		4230	4455	846.0	**29.10**	**24.00**
	3	4132	4357	826.4	28.83	23.90
		4180	4405	836.0	28.57	23.63
		4230	4455	846.0	28.94	23.48
	4	4132	4357	826.4	29.05	23.53
		4180	4405	836.0	29.09	23.55
		4230	4455	846.0	28.29	23.60

Part 24 1900MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS1900 (Band 2)	1	9262	9662	1852.4	26.96	23.21
		9400	9800	1880.0	27.26	23.18
		9538	9938	1907.6	27.34	23.20
	2	9262	9662	1852.4	**27.35**	**23.25**
		9400	9800	1880.0	27.30	23.23
		9538	9938	1907.6	27.31	22.91
	3	9262	9662	1852.4	27.26	22.26
		9400	9800	1880.0	27.31	22.78
		9538	9938	1907.6	27.32	22.42
	4	9262	9662	1852.4	27.25	22.75
		9400	9800	1880.0	27.30	22.79
		9538	9938	1907.6	27.28	22.44

Part 27 1700MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS1700 (Band 4)	1	1312	1537	1712.4	27.78	23.63
		1413	1638	1732.6	28.10	23.83
		1513	1738	1752.6	27.69	23.46
	2	1312	1537	1712.4	28.17	23.66
		1413	1638	1732.6	**28.20**	**24.00**
		1513	1738	1752.6	28.14	23.66
	3	1312	1537	1712.4	28.13	23.20
		1413	1638	1732.6	28.18	23.67
		1513	1738	1752.6	28.12	23.19
	4	1312	1537	1712.4	28.14	23.18
		1413	1638	1732.6	28.12	23.17
		1513	1738	1752.6	28.18	23.53

7.3.2. UAT

Part 22 850MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS850 (Band 5)	1	4132	4357	826.4	27.97	23.69
		4180	4405	836.0	27.74	23.60
		4230	4455	846.0	**28.20**	**23.70**
	2	4132	4357	826.4	27.78	23.25
		4180	4405	836.0	27.62	23.24
		4230	4455	846.0	27.96	23.42
	3	4132	4357	826.4	27.83	23.26
		4180	4405	836.0	27.49	23.12
		4230	4455	846.0	27.93	23.44
	4	4132	4357	826.4	27.79	23.26
		4180	4405	836.0	27.54	23.12
		4230	4455	846.0	27.80	23.30

Part 24 1900MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS1900 (Band 2)	1	9262	9662	1852.4	25.90	22.23
		9400	9800	1880.0	**25.99**	**22.29**
		9538	9938	1907.6	25.97	22.28
	2	9262	9662	1852.4	25.90	22.07
		9400	9800	1880.0	25.95	22.15
		9538	9938	1907.6	25.92	22.09
	3	9262	9662	1852.4	25.93	22.11
		9400	9800	1880.0	25.98	22.14
		9538	9938	1907.6	25.95	22.12
	4	9262	9662	1852.4	25.98	21.90
		9400	9800	1880.0	25.97	22.17
		9538	9938	1907.6	25.90	22.12

Part 27 1700MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS1700 (Band 4)	1	1312	1537	1712.4	26.90	22.00
		1413	1638	1732.6	27.20	21.88
		1513	1738	1752.6	**27.50**	**22.10**
	2	1312	1537	1712.4	27.30	21.63
		1413	1638	1732.6	27.40	21.66
		1513	1738	1752.6	27.22	21.71
	3	1312	1537	1712.4	26.42	21.52
		1413	1638	1732.6	27.09	21.64
		1513	1738	1752.6	27.10	21.64
	4	1312	1537	1712.4	26.60	21.61
		1413	1638	1732.6	26.58	21.63
		1513	1738	1752.6	26.80	21.65

7.4. HSPA REL 6 (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				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30/15	2/15	5/15
	βc/βd	11/15	6/15	15/9	2/15	-
	βhs	22/15	12/15	30/15	4/15	5/15
	βed	1309/225	94/75	47/15 47/15	56/75	47/15
HSDPA Specific Settings	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				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	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

7.4.1. LAT

Part 22 850MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS HSUPA 850MHz (Band 5)	1	4132	4357	826.4	27.99	23.74
		4180	4405	836.0	27.88	23.67
		4230	4455	846.0	28.10	23.65
	2	4132	4357	826.4	27.97	23.61
		4180	4405	836.0	27.93	23.69
		4230	4455	846.0	**28.11**	**23.75**
	3	4132	4357	826.4	28.00	23.73
		4180	4405	836.0	27.90	23.74
		4230	4455	846.0	28.08	23.51
	4	4132	4357	826.4	28.00	23.66
		4180	4405	836.0	27.95	23.50
		4230	4455	846.0	28.04	23.51
	5	4132	4357	826.4	27.98	23.74
		4180	4405	836.0	27.90	23.72
		4230	4455	846.0	27.90	23.74

Part 24 1900MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS HSUPA 1900MHz (Band 2)	1	9262	9662	1852.4	27.04	22.67
		9400	9800	1880.0	27.50	22.96
		9538	9938	1907.6	27.29	22.80
	2	9262	9662	1852.4	26.92	22.68
		9400	9800	1880.0	**27.51**	**23.03**
		9538	9938	1907.6	27.14	22.85
	3	9262	9662	1852.4	26.99	22.67
		9400	9800	1880.0	27.49	23.00
		9538	9938	1907.6	27.24	22.84
	4	9262	9662	1852.4	27.00	22.67
		9400	9800	1880.0	27.49	22.70
		9538	9938	1907.6	27.35	22.83
	5	9262	9662	1852.4	26.96	22.69
		9400	9800	1880.0	27.49	23.00
		9538	9938	1907.6	27.20	22.83

Part 27 1700MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS HSUPA 1700MHz (Band 4)	1	1312	1537	1712.4	27.78	23.48
		1413	1638	1732.6	27.80	23.81
		1513	1738	1752.6	27.72	23.60
	2	1312	1537	1712.4	27.75	23.55
		1413	1638	1732.6	**28.07**	**23.92**
		1513	1738	1752.6	27.78	23.54
	3	1312	1537	1712.4	27.87	23.53
		1413	1638	1732.6	28.00	23.62
		1513	1738	1752.6	27.76	23.60
	4	1312	1537	1712.4	27.72	23.56
		1413	1638	1732.6	27.80	23.58
		1513	1738	1752.6	27.71	23.48
	5	1312	1537	1712.4	27.71	23.56
		1413	1638	1732.6	27.80	23.60
		1513	1738	1752.6	27.74	23.60

7.4.2. UAT

Part 22 850MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS HSUPA 850MHz (Band 5)	1	4132	4357	826.4	27.75	23.66
		4180	4405	836.0	27.63	23.51
		4230	4455	846.0	27.71	23.65
	2	4132	4357	826.4	27.72	23.48
		4180	4405	836.0	27.73	23.61
		4230	4455	846.0	27.82	23.53
	3	4132	4357	826.4	27.83	23.56
		4180	4405	836.0	27.70	23.53
		4230	4455	846.0	27.75	23.57
	4	4132	4357	826.4	27.84	23.60
		4180	4405	836.0	27.56	23.52
		4230	4455	846.0	**27.90**	**23.68**
	5	4132	4357	826.4	27.70	23.67
		4180	4405	836.0	27.62	23.51
		4230	4455	846.0	27.73	23.59

Part 24 1900MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS HSUPA 1900MHz (Band 2)	1	9262	9662	1852.4	26.70	**22.28**
		9400	9800	1880.0	**26.91**	22.25
		9538	9938	1907.6	26.90	22.27
	2	9262	9662	1852.4	26.50	22.25
		9400	9800	1880.0	26.71	22.24
		9538	9938	1907.6	26.90	22.24
	3	9262	9662	1852.4	26.60	22.26
		9400	9800	1880.0	26.50	22.26
		9538	9938	1907.6	26.70	22.19
	4	9262	9662	1852.4	26.57	22.17
		9400	9800	1880.0	26.52	22.20
		9538	9938	1907.6	26.50	22.25
	5	9262	9662	1852.4	26.68	22.26
		9400	9800	1880.0	26.55	22.27
		9538	9938	1907.6	26.55	22.27

Part 27 1700MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS HSUPA 1700MHz (Band 4)	1	1312	1537	1712.4	26.37	22.00
		1413	1638	1732.6	26.43	21.98
		1513	1738	1752.6	**26.46**	**22.10**
	2	1312	1537	1712.4	26.40	22.06
		1413	1638	1732.6	26.42	22.09
		1513	1738	1752.6	26.44	21.90
	3	1312	1537	1712.4	26.33	22.09
		1413	1638	1732.6	26.37	22.08
		1513	1738	1752.6	26.32	22.00
	4	1312	1537	1712.4	26.32	21.95
		1413	1638	1732.6	26.41	21.98
		1513	1738	1752.6	26.32	21.95
	5	1312	1537	1712.4	26.39	22.09
		1413	1638	1732.6	26.36	22.08
		1513	1738	1752.6	26.29	22.02

7.5. DUAL CARRIER HSDPA

DC-HSDPA (Rel 8, CAT 24)

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

Table E.5.0: Levels for HSDPA connection setup

Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH _Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.		
Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

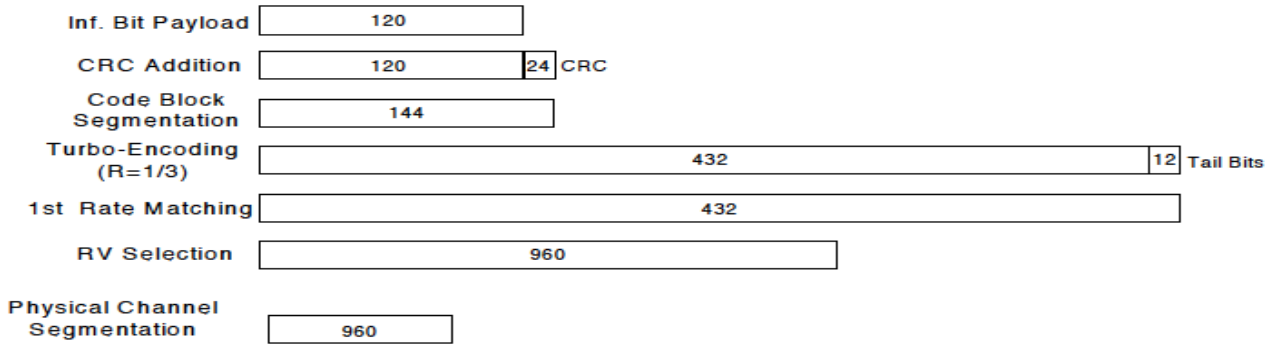


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 4 Sub-tests for HSDPA were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest 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			
	Power Control Algorithm	Algorithm2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = βhs/ βc	30/15			

RESULT

7.5.1. LAT

Part 22 850MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS850 (Band 5)	1	4132	4357	826.4	**28.40**	**23.75**
		4180	4405	836.0	28.36	23.72
		4230	4455	846.0	27.90	23.60
	2	4132	4357	826.4	28.22	23.73
		4180	4405	836.0	28.35	23.71
		4230	4455	846.0	27.65	23.61
	3	4132	4357	826.4	28.12	23.30
		4180	4405	836.0	28.10	23.25
		4230	4455	846.0	27.70	23.22
	4	4132	4357	826.4	28.00	23.28
		4180	4405	836.0	28.20	23.26
		4230	4455	846.0	28.16	23.23

Part 24 1900MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS1900 (Band 2)	1	9262	9662	1852.4	27.25	**23.10**
		9400	9800	1880.0	27.31	23.04
		9538	9938	1907.6	**27.81**	23.08
	2	9262	9662	1852.4	27.73	23.08
		9400	9800	1880.0	27.40	23.05
		9538	9938	1907.6	27.70	23.05
	3	9262	9662	1852.4	27.75	22.63
		9400	9800	1880.0	27.75	22.58
		9538	9938	1907.6	27.55	22.58
	4	9262	9662	1852.4	26.81	22.63
		9400	9800	1880.0	27.55	22.58
		9538	9938	1907.6	27.59	22.59

Part 27 1700MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS1700 (Band 4)	1	1312	1537	1712.4	28.20	23.76
		1413	1638	1732.6	28.40	23.75
		1513	1738	1752.6	27.82	23.74
	2	1312	1537	1712.4	28.29	**23.80**
		1413	1638	1732.6	**28.60**	23.76
		1513	1738	1752.6	27.92	23.75
	3	1312	1537	1712.4	28.40	23.37
		1413	1638	1732.6	28.20	23.30
		1513	1738	1752.6	27.31	23.30
	4	1312	1537	1712.4	28.12	23.38
		1413	1638	1732.6	28.38	23.29
		1513	1738	1752.6	27.45	23.27

7.5.2. UAT

Part 22 850MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS850 (Band 5)	1	4132	4357	826.4	27.21	23.33
		4180	4405	836.0	27.55	23.22
		4230	4455	846.0	27.63	23.14
	2	4132	4357	826.4	27.66	**23.35**
		4180	4405	836.0	**27.69**	23.23
		4230	4455	846.0	27.23	23.28
	3	4132	4357	826.4	27.23	22.85
		4180	4405	836.0	27.14	22.73
		4230	4455	846.0	27.42	22.79
	4	4132	4357	826.4	27.38	22.86
		4180	4405	836.0	27.02	22.77
		4230	4455	846.0	27.20	22.78

Part 24 1900MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS1900 (Band 2)	1	9262	9662	1852.4	26.19	21.88
		9400	9800	1880.0	26.70	22.01
		9538	9938	1907.6	26.36	21.85
	2	9262	9662	1852.4	**26.71**	21.96
		9400	9800	1880.0	26.63	**22.06**
		9538	9938	1907.6	26.35	21.88
	3	9262	9662	1852.4	26.01	21.45
		9400	9800	1880.0	26.44	21.54
		9538	9938	1907.6	26.31	21.42
	4	9262	9662	1852.4	26.01	21.42
		9400	9800	1880.0	26.21	21.54
		9538	9938	1907.6	26.15	21.45

Part 27 1700MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS1700 (Band 4)	1	1312	1537	1712.4	**26.05**	**21.67**
		1413	1638	1732.6	25.96	21.45
		1513	1738	1752.6	25.90	21.55
	2	1312	1537	1712.4	26.00	21.65
		1413	1638	1732.6	25.95	21.57
		1513	1738	1752.6	25.91	21.55
	3	1312	1537	1712.4	25.42	21.20
		1413	1638	1732.6	25.76	21.06
		1513	1738	1752.6	25.67	21.12
	4	1312	1537	1712.4	25.66	21.20
		1413	1638	1732.6	25.83	21.07
		1513	1738	1752.6	25.60	21.11

7.6. CDMA2000 1xRTT

Maximum output power is verified on the Low, Middle and High channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E for 1xRTT, section 3.1.2.3.4 of 3GPP2 C.S0033-0/TIA-866 for Rel. 0 and section 4.3.4 of 3GPP2 C.S0033-A for Rev. A

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

Application	Rev, License
CDMA2000 Mobile Test	B.15.18, L

- Protocol Rev > 6 (IS-2000-0)
- System ID: 7; NID: 65535, Reg. Ch. #.: 610 for Cell, 600 for PCS & 450 for AWS
- Radio Config (RC) > RC1 or RC3
- Service Option (SO) Setup > SO55 or SO32
- Traffic Data Rate > Full
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

RESULT

7.6.1. LAT

CDMA 1xRTT, BC0, CELL BAND

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)					
		CH 1013 - 824.7MHz		CH 384 - 836.52MHz		CH 777 - 848.31MHz	
		Peak	Average	Peak	Average	Peak	Average
RC1	2 (Loopback)	29.33	24.85	29.34	24.92	28.64	24.62
	55 (Loopback)	29.17	24.86	29.29	24.92	28.61	24.60
RC2	9 (Loopback)	29.32	24.87	29.33	24.90	28.62	24.61
	55 (Loopback)	29.33	24.86	**29.35**	**24.94**	28.60	24.61
RC3	2 (Loopback)	29.26	24.83	29.20	24.91	28.54	24.62
	55 (Loopback)	29.17	24.84	29.17	24.92	28.53	24.61
	32 (+ F-SCH)	29.34	24.84	29.34	24.91	28.62	24.61
	32 (+ SCH)	29.32	24.81	29.31	24.93	28.57	24.63
RC4	2 (Loopback)	29.26	24.82	29.23	24.91	28.51	24.60
	55 (Loopback)	29.25	24.84	29.13	24.90	28.58	24.60
	32 (+ F-SCH)	29.15	24.82	29.16	24.90	28.62	24.61
	32 (+ SCH)	29.32	24.81	29.34	24.93	28.57	24.62
RC5	9 (Loopback)	29.23	24.85	29.22	24.90	28.53	24.60
	55 (Loopback)	29.20	24.84	29.15	24.91	28.51	24.61
RC11	2 (Loopback)	29.27	24.86	29.25	24.93	28.57	24.64
	75 (Loopback)	29.25	24.87	29.24	24.90	28.55	24.65
	32 (+ F-SCH)	29.25	24.85	29.23	24.90	28.56	24.64
	32 (+ SCH)	29.24	24.82	29.25	24.89	28.61	24.62

CDMA2000 1xRTT BC1 PCS BAND

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)					
		CH 25 - 1851.25MHz		CH 600 - 1880MHz		CH 1175 - 1908.75MHz	
		Peak	Average	Peak	Average	Peak	Average
RC1	2 (Loopback)	28.99	24.01	29.14	24.04	28.81	24.17
	55 (Loopback)	28.95	24.02	29.23	24.03	28.82	24.18
RC2	9 (Loopback)	28.89	24.05	29.35	24.19	28.87	24.19
	55 (Loopback)	28.98	24.04	**29.37**	**24.20**	28.87	24.19
RC3	2 (Loopback)	28.45	24.03	28.80	24.14	28.57	24.19
	55 (Loopback)	28.57	24.03	28.67	24.15	28.60	24.17
	32 (+ F-SCH)	28.63	23.99	28.75	24.16	28.48	24.18
	32 (+ SCH)	28.68	24.05	28.75	24.17	28.55	24.18
RC4	2 (Loopback)	28.58	24.04	28.72	24.16	28.60	24.19
	55 (Loopback)	28.60	24.00	28.70	24.17	28.52	24.16
	32 (+ F-SCH)	28.71	24.05	28.76	24.18	28.69	24.18
	32 (+ SCH)	28.46	24.02	28.74	24.18	28.59	24.17
RC5	9 (Loopback)	28.60	24.05	28.87	24.15	28.54	24.17
	55 (Loopback)	28.63	24.03	28.65	24.17	28.50	24.17
RC11	2 (Loopback)	28.49	24.06	28.75	24.18	28.63	24.18
	75 (Loopback)	28.57	24.05	28.74	24.19	28.58	24.17
	32 (+ F-SCH)	28.57	24.06	28.70	24.19	28.45	24.17
	32 (+ SCH)	28.58	24.06	28.04	24.19	28.65	24.16

CDMA2000 1xRTT BC15 AWS BAND

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)					
		CH 25 - 1711.25MHz		CH 450 - 1732.5MHz		CH 875 - 1753.75MHz	
		Peak	Average	Peak	Average	Peak	Average
RC1	2 (Loopback)	29.40	24.82	29.65	24.77	29.13	24.81
	55 (Loopback)	29.38	24.82	**29.79**	24.78	29.12	**24.88**
RC2	9 (Loopback)	29.37	24.82	29.76	24.79	29.10	24.82
	55 (Loopback)	29.35	24.80	29.70	24.80	29.11	24.83
RC3	2 (Loopback)	29.30	24.80	29.29	24.78	29.07	24.81
	55 (Loopback)	29.28	24.80	29.30	24.77	29.07	24.81
	32 (+ F-SCH)	29.34	24.78	29.32	24.76	29.08	24.80
	32 (+ SCH)	29.33	24.76	29.31	24.77	29.05	24.75
RC4	2 (Loopback)	29.30	24.79	29.30	24.78	29.05	24.80
	55 (Loopback)	29.33	24.80	29.40	24.77	29.10	24.80
	32 (+ F-SCH)	29.31	24.77	29.30	24.76	29.07	24.77
	32 (+ SCH)	29.33	24.76	29.28	24.77	29.05	24.78
RC5	9 (Loopback)	29.31	24.79	29.49	24.77	29.11	24.80
	55 (Loopback)	29.32	24.81	29.33	24.76	29.09	24.84
RC11	2 (Loopback)	29.32	24.82	29.42	24.80	29.10	24.83
	75 (Loopback)	29.32	24.84	29.37	24.79	29.10	24.84
	32 (+ F-SCH)	29.34	24.82	29.39	24.80	29.10	24.84
	32 (+ SCH)	29.35	24.81	29.36	24.77	29.07	24.82

CDMA 1xRTT, BC10 SECONDARY 800

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)					
		CH 450 - 817.25MHz		CH 560 - 820MHz		CH 670 - 822.75MHz	
		Peak	Average	Peak	Average	Peak	Average
RC1	2 (Loopback)	29.52	24.83	29.77	24.93	29.75	24.92
	55 (Loopback)	29.49	24.86	29.81	24.93	**29.88**	**24.95**
RC2	9 (Loopback)	29.47	24.86	29.81	24.94	29.84	24.92
	55 (Loopback)	29.48	24.85	29.81	24.92	29.82	24.91
RC3	2 (Loopback)	29.33	24.82	29.64	24.90	29.81	24.90
	55 (Loopback)	29.32	24.82	29.62	24.90	29.72	24.91
	32 (+ F-SCH)	29.32	24.56	29.56	24.75	29.73	24.60
	32 (+ SCH)	29.40	24.75	29.67	24.84	29.56	24.83
RC4	2 (Loopback)	29.31	24.82	29.40	24.90	29.70	24.88
	55 (Loopback)	29.16	24.83	29.57	24.91	29.44	24.89
	32 (+ F-SCH)	29.27	24.75	29.58	24.85	29.60	24.85
	32 (+ SCH)	29.27	24.74	29.62	24.82	29.70	24.84
RC5	9 (Loopback)	29.19	24.82	29.55	24.90	29.62	24.90
	55 (Loopback)	29.55	24.76	29.75	24.84	29.85	24.85
RC11	2 (Loopback)	29.40	24.79	29.64	24.88	29.75	24.87
	75 (Loopback)	29.33	24.79	29.69	24.89	29.66	24.87
	32 (+ F-SCH)	29.35	24.81	29.56	24.89	29.70	24.87
	32 (+ SCH)	29.35	24.78	29.55	24.87	29.69	24.91

7.6.2. UAT

CDMA2000 1xRTT, BC0, CELL BAND

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)					
		CH 1013 - 824.7MHz		CH 384 - 836.52MHz		CH 777 - 848.31MHz	
		Peak	Average	Peak	Average	Peak	Average
RC1	2 (Loopback)	29.53	24.56	29.11	24.56	29.12	24.46
	55 (Loopback)	**29.56**	**24.59**	29.45	24.55	29.06	24.50
RC2	9 (Loopback)	29.50	24.56	29.52	24.55	29.12	24.50
	55 (Loopback)	29.46	24.58	29.51	24.54	29.12	24.47
RC3	2 (Loopback)	29.07	24.54	29.06	24.54	29.00	24.45
	55 (Loopback)	29.00	24.54	28.91	24.53	28.98	24.47
	32 (+ F-SCH)	29.17	24.51	29.05	24.50	29.03	24.45
	32 (+ SCH)	29.07	24.52	28.97	24.49	28.99	24.42
RC4	2 (Loopback)	29.08	24.54	29.00	24.51	28.94	24.45
	55 (Loopback)	29.13	24.54	28.90	24.51	29.04	24.46
	32 (+ F-SCH)	29.17	24.51	28.94	24.50	29.03	24.45
	32 (+ SCH)	29.26	24.54	28.85	24.53	29.06	24.44
RC5	9 (Loopback)	29.11	24.53	28.97	24.52	28.96	24.45
	55 (Loopback)	29.19	24.54	28.99	24.52	29.01	24.44
RC11	2 (Loopback)	29.26	24.58	28.87	24.53	29.01	24.48
	75 (Loopback)	29.23	24.57	29.01	24.55	29.08	24.47
	32 (+ F-SCH)	29.07	24.54	28.93	24.55	28.97	24.45
	32 (+ SCH)	29.18	24.58	28.87	24.54	29.05	24.45

CDMA2000 1xRTT BC1 PCS BAND

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)					
		CH 25 - 1851.25MHz		CH 600 - 1880MHz		CH 1175 - 1908.75MHz	
		Peak	Average	Peak	Average	Peak	Average
RC1	2 (Loopback)	28.34	23.18	28.36	23.08	27.93	23.02
	55 (Loopback)	28.10	23.10	**28.50**	**23.20**	27.98	23.08
RC2	9 (Loopback)	28.15	23.17	28.42	23.08	27.91	23.03
	55 (Loopback)	28.19	23.18	28.40	23.09	28.16	23.03
RC3	2 (Loopback)	27.79	23.17	28.16	23.07	28.03	23.01
	55 (Loopback)	27.92	23.17	28.18	23.06	27.91	23.00
	32 (+ F-SCH)	27.82	23.13	28.02	23.04	28.06	23.00
	32 (+ SCH)	27.87	23.11	27.89	23.03	28.03	23.02
RC4	2 (Loopback)	27.89	23.15	27.91	23.05	27.97	23.03
	55 (Loopback)	27.81	23.15	27.83	23.05	28.23	23.02
	32 (+ F-SCH)	27.92	23.19	27.94	23.04	28.08	23.08
	32 (+ SCH)	27.85	23.13	27.87	23.06	27.93	23.07
RC5	9 (Loopback)	27.88	23.15	27.85	23.05	27.99	23.01
	55 (Loopback)	27.75	23.16	27.72	23.07	28.04	23.02
RC11	2 (Loopback)	27.99	23.17	27.93	23.09	27.95	23.04
	75 (Loopback)	27.85	23.16	27.82	23.08	27.98	23.08
	32 (+ F-SCH)	27.85	23.16	27.81	23.07	28.02	23.03
	32 (+ SCH)	27.81	23.17	27.78	23.06	28.00	23.00

UAT BC15, 1xRTT AWS BAND

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)					
		CH 25 - 1711.25MHz		CH 450 - 1732.5MHz		CH 875 - 1753.75MHz	
		Peak	Average	Peak	Average	Peak	Average
RC1	2 (Loopback)	27.27	22.96	27.07	22.98	27.20	22.87
	55 (Loopback)	27.32	22.97	27.06	22.97	27.22	22.86
RC2	9 (Loopback)	27.33	22.98	27.23	22.99	27.30	22.87
	55 (Loopback)	27.29	22.99	**27.41**	**23.00**	27.20	22.88
RC3	2 (Loopback)	27.33	22.95	27.16	22.99	27.20	22.86
	55 (Loopback)	27.37	22.94	26.93	22.91	27.25	22.87
	32 (+ F-SCH)	27.29	22.96	26.94	22.95	27.25	22.84
	32 (+ SCH)	27.32	22.96	26.85	22.91	27.22	22.88
RC4	2 (Loopback)	27.38	22.97	26.91	22.98	27.22	22.87
	55 (Loopback)	27.31	22.95	27.13	22.90	27.23	22.85
	32 (+ F-SCH)	27.30	22.95	27.21	22.97	27.24	22.89
	32 (+ SCH)	27.31	22.93	27.20	22.87	27.22	22.85
RC5	9 (Loopback)	27.26	22.94	27.22	22.99	27.31	22.86
	55 (Loopback)	27.28	22.93	27.17	22.95	27.28	22.85
RC11	2 (Loopback)	27.25	22.95	27.17	22.90	27.17	22.91
	75 (Loopback)	27.28	22.97	27.25	22.84	27.21	22.87
	32 (+ F-SCH)	27.27	22.90	27.22	22.91	27.21	22.84
	32 (+ SCH)	27.26	22.99	27.23	22.96	27.20	22.87

UAT 1xRTT, BC10 SECONDARY 800

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)					
		CH 450 - 817.25MHz		CH 560 - 820MHz		CH 670 - 822.75MHz	
		Peak	Average	Peak	Average	Peak	Average
RC1	2 (Loopback)	29.36	24.59	29.36	24.54	29.35	24.53
	55 (Loopback)	**29.40**	**24.60**	29.35	24.55	29.33	24.52
RC2	9 (Loopback)	29.29	24.59	29.32	24.52	29.35	24.53
	55 (Loopback)	29.25	24.59	29.25	24.55	29.35	24.52
RC3	2 (Loopback)	29.18	24.57	29.21	24.52	29.06	24.51
	55 (Loopback)	29.21	24.56	29.08	24.51	29.08	24.53
	32 (+ F-SCH)	29.11	24.56	29.14	24.48	29.17	24.47
	32 (+ SCH)	29.17	24.56	29.05	24.49	29.16	24.48
RC4	2 (Loopback)	29.12	24.58	29.08	24.51	29.14	24.53
	55 (Loopback)	29.19	24.56	29.21	24.51	29.07	24.51
	32 (+ F-SCH)	29.17	24.55	29.02	24.50	29.11	24.50
	32 (+ SCH)	29.17	24.56	29.25	24.49	29.23	24.45
RC5	9 (Loopback)	29.14	24.57	29.10	24.52	29.06	24.51
	55 (Loopback)	29.24	24.57	29.12	24.53	29.07	24.52
RC11	2 (Loopback)	29.22	24.58	29.01	23.54	29.17	24.54
	75 (Loopback)	29.31	24.59	29.09	24.53	29.04	24.55
	32 (+ F-SCH)	29.13	24.59	29.09	24.54	29.08	24.52
	32 (+ SCH)	29.03	24.57	29.00	24.51	29.15	24.54

7.7. CDMA2000 1xEv-DO - Release 0 (Rel. 0)

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

EVDO Release 0 - RTAP

- Call Setup > Shift & Preset
- Call Control:
  - Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - Cell Power > -105.5 dBm/1.23 MHz
  - Channel > (Enter channel number)
  - Application Config > Enhanced Test Application Protocol > RTAP
  - RTAP Rate > 153.6 kbps
  - Rvs Power Ctrl > Active bits
  - 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:
  - Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - Cell Power > -105.5 dBm/1.23 MHz
  - Cell Band > (Select US Cellular or US PCS)
  - Channel > (Enter channel number)
  - Application Config > Enhanced Test Application Protocol > FTAP (default)
  - FTAP Rate > 307.2 kbps (2 Slot, QPSK)
  - Rvs Power Ctrl > Active bits
  - 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

7.7.1. LAT

CDMA2000 EVDO REV. 0 850MHz BAND

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	1013	824.70	29.30	24.70
		384	836.52	**29.35**	**24.80**
		777	848.31	29.23	24.56

CDMA2000 EVDO REV. 0 1900MHz BAND

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	25	1851.25	**28.88**	**24.20**
		600	1880.00	28.82	24.18
		1175	1908.75	28.60	24.15

CDMA2000 EVDO REV. 0 1700MHz BAND

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	25	1711.25	**29.65**	**24.85**
		450	1732.50	29.30	24.70
		875	1753.75	29.38	24.72

CDMA2000 EVDO REV. 0 800MHz SECONDARY BAND

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	450	817.25	29.12	24.92
		560	820.00	**29.20**	**24.95**
		670	822.75	29.05	24.90

7.7.2. UAT

CDMA2000 EVDO REV. 0 850MHz BAND

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	1013	824.70	28.90	**24.50**
		384	836.52	**29.00**	24.45
		777	848.31	28.88	24.33

CDMA2000 EVDO REV. 0 1900MHz BAND

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	25	1851.25	28.10	**23.16**
		600	1880.00	**28.60**	23.10
		1175	1908.75	28.50	23.07

CDMA2000 EVDO REV. 0 1700MHz BAND

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	25	1711.25	**28.15**	23.00
		450	1732.50	27.73	**23.03**
		875	1753.75	28.04	22.98

CDMA2000 EVDO REV. 0 800MHz SECONDARY BAND

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	450	817.25	28.88	24.40
		560	820.00	29.28	24.53
		670	822.75	**29.38**	**24.55**

7.8. CDMA2000 1xEv-DO - Revision A (Rev. A)

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

Application	Rev, License
1xEV-DO Terminal Test	A.09.13

EVDO Rev. 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: 00000000: 00000000: 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 Rev. 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: 00000000: 00000000: 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

7.8.1. LAT

CDMA2000 EVDO REV A 850MHz BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	1013	824.70	29.78	24.70
		384	836.52	**30.15**	**24.85**
		777	848.31	30.05	24.50

CDMA2000 EVDO REV A 1900MHz BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	25	1851.25	**29.10**	**24.25**
		600	1880.00	29.00	24.23
		1175	1908.75	29.07	24.24

CDMA2000 EVDO REV A 1700MHz BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	25	1711.25	**29.70**	**24.90**
		450	1732.50	29.40	24.70
		875	1753.75	29.50	24.75

CDMA2000 EVDO REV A 800MHz SECONDARY BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	450	817.25	29.00	24.90
		560	820.00	**29.50**	**25.00**
		670	822.75	29.03	24.99

7.8.2. UAT

CDMA2000 EVDO REV A 850MHz BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	1013	824.70	**29.10**	**24.52**
		384	836.52	29.05	24.51
		777	848.31	29.00	24.38

CDMA2000 EVDO REV A 1900MHz BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	25	1851.25	28.20	23.10
		600	1880.00	**28.73**	**23.19**
		1175	1908.75	28.70	23.08

CDMA2000 EVDO REV A 1700MHz BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	25	1711.25	28.05	22.91
		450	1732.50	**28.95**	**23.10**
		875	1753.75	27.68	23.03

CDMA2000 EVDO REV A 800MHz SECONDARY BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	450	817.25	28.94	24.45
		560	820.00	29.37	24.47
		670	822.75	**29.40**	**24.55**

7.9. CDMA2000 1xEV-DO - Revision B (Rev. B)

This procedure assumes the Rohde & Schwarz CMW 500 CDMA Rev. B Test Set has the following applications installed and with valid license.

Application	Rev, License
1xEV-DO Terminal Test	V.2.1.25

1xEV-DO Release B –

- CMW 500 Signal Generator > 1xEV-DO Taskbar Enable
- CMW 500 1xEV-DO Signaling Configuration Window >
- 1xEV-DO Signaling On Window:
  Under Access Network Control:
  Band Class: BC0: US Cellular
  RF Channel: 31
  1xEV-DP Power: -70dBm
  Release B

- 1xEV-DO Signaling Configuration Window

  Under RF Frequency Band / Channel: Enter Ch. Frequency
  - Under Carrier Configuration: RF Frequency

For Two Carriers: Low Channel (1013)

	RF Channel	RF Channel Offset
Carrier [0]	31	0
Carrier [1]	1013	982

- Under Carrier Configuration: RF Pilot

	Carrier Sector	Active on AN	Assigned to AT
Pilot [0]	C0/S0	✓	✓
	CA/S1	✓	✓

For Three Carriers: Low Channel (1013)

	RF Channel	RF Channel Offset
Carrier [0]	72	0
Carrier [1]	31	-41
Carrier [2]	1013	941

- Under Carrier Configuration: RF Pilot

	Carrier Sector	Active on AN	Assigned to AT
Pilot [0]	C0/S0	✓	✓
Pilot [1]	C1/S1	✓	✓
Pilot [2]	C2/S2	✓	✓

- Rvs Power Ctrl > All Up bits (to get the maximum power)

RESULTS

7.9.1. LAT

Two Carrier Min Separations

	Mode	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
Rev B	CDMA	1013+31	824.70+825.93	27.68	**21.70**
		384+425	836.52+837.75	**28.00**	21.68
		736+777	847.08+848.31	27.59	21.64

Two Carrier Max Separations

	Mode	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
Rev B	CDMA	1013+156	824.70+829.68	**27.02**	**21.80**
		384+550	836.52+841.50	26.73	21.77
		611+777	843.33+848.31	26.52	21.70

Three Carrier Min Separations

	Mode	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
Rev B	CDMA	1013+31+72	824.70+825.93+827.16	27.76	21.58
		384+425+466	836.52+837.75+838.98	**27.79**	**21.64**
		695+736+777	845.85+847.08+848.31	27.29	21.63

7.9.2. UAT

Two Carrier Min Separations

	Mode	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
Rev B	CDMA	1013+31	824.70+825.93	27.45	21.43
		384+425	836.52+837.75	**27.57**	**21.50**
		736+777	847.08+848.31	27.42	21.35

Two Carrier Max Separations

	Mode	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
Rev B	CDMA	1013+156	824.70+829.68	26.00	**21.09**
		384+550	836.52+841.50	**26.20**	21.06
		611+777	843.33+848.31	26.01	21.07

Three Carrier Min Separations

	Mode	Channel	f (MHz)	Conducted Output Power (dBm)	
				Peak	Average
Rev B	CDMA	1013+31+72	824.70+825.93+827.16	**27.20**	**21.08**
		384+425+466	836.52+837.75+838.98	27.00	21.07
		695+736+777	845.85+847.08+848.31	27.04	21.05

8. CONDUCTED TEST RESULTS

8.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

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 99% and -26dB bandwidths was also measured and recorded.

MODES TESTED

- GPRS and EGPRS
- UMTS, REL 99 and HSDPA
- CDMA2000, BC0, BC1, BC10 and BC15

RESULTS

GPRS MODE

Part 22 850MHz Band

Band	Mode	Channel	f (MHz)	99% BW (KHz)	-26dB BW (KHz)
CELL	GPRS	128	824.2	241.5855	302.775
		190	836.6	**244.7916**	309.177
		251	848.8	242.1406	317.601

Part 24 1900MHz Band

Band	Mode	Channel	f (MHz)	99% BW (KHz)	-26dB BW (KHz)
PCS	GPRS	512	1850.2	**248.3654**	311.895
		661	1880.0	243.4148	303.386
		810	1909.8	240.1423	317.543

EGPRS MODE

Part 22 850MHz Band

Band	Mode	Channel	f (MHz)	99% BW (KHz)	-26dB BW (KHz)
CELL	EGPRS	128	824.2	237.7438	273.793
		190	836.6	243.2110	298.127
		251	848.8	**250.7515**	301.061

Part 24 1900MHz Band

Band	Mode	Channel	f (MHz)	99% BW (KHz)	-26dB BW (KHz)
PCS	EGPRS	512	1850.2	247.2986	316.375
		661	1880.0	245.7541	301.565
		810	1909.8	**249.5788**	312.946

WCDMA PART 22, 24, AND 27

Band	Mode	DL Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
850MHz	UMTS Rel. 99	4357	826.40	4.1143	4.5880
		4408	836.00	4.1985	4.5900
		4458	846.60	4.1601	4.6090
1900MHz		9662	1852.40	4.1459	4.6150
		9800	1880.00	4.1662	4.5300
		9938	1907.60	4.2062	4.6370
1700MHz		1537	1712.40	4.1615	4.5800
		1638	1732.00	4.1641	4.5370
		1738	1752.60	4.1758	4.5730

WCDMA PART 22, 24, AND 27

Band	Mode	DL Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
850MHz	UMTS HSDPA	4357	826.40	4.1521	4.6080
		4408	836.00	**4.2295**	4.5460
		4458	846.60	4.1528	4.6100
1900MHz		9662	1852.40	4.1361	4.6110
		9800	1880.00	**4.1856**	4.5940
		9938	1907.60	4.1263	4.5630
1700MHz		1537	1712.40	4.0461	4.5780
		1638	1732.00	4.1163	4.6100
		1738	1752.60	**4.1564**	4.6220

CDMA2000 PART 22, 24, 27 AND 90

Band	Mode	Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
CELL	CDMA 2000 1xRTT	1013	824.70	1.2673	1.4040
		384	836.52	**1.3001**	1.4240
		777	848.31	1.2696	1.4030
PCS		25	1851.25	1.2405	1.4050
		600	1880.00	**1.2893**	1.3910
		1175	1908.75	1.2522	1.4020
AWS		25	1711.25	**1.2818**	1.3820
		450	1732.50	1.2358	1.4000
		875	1753.75	1.2542	1.3870
800 MHz Secondary		476	817.90	1.2760	1.3960
		580	820.50	**1.2961**	1.3910
		684	823.10	1.2515	1.3960

CDMA2000 PART 22, 24, 27 AND 90

Band	Mode	Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
CELL	CDMA 2000 EVDO Rev. A	1013	824.70	1.2652	1.4000
		384	836.52	**1.2804**	1.4230
		777	848.31	1.2719	1.3820
PCS		25	1851.25	1.2658	1.4130
		600	1880.00	**1.2877**	1.3940
		1175	1908.75	1.2650	1.4060
AWS		25	1711.25	**1.2803**	1.4190
		450	1732.50	1.2712	1.4020
		875	1753.75	1.2801	1.3890
800 MHz Secondary		476	817.90	1.2592	1.3750
		580	820.50	1.2729	1.3900
		684	823.10	**1.2847**	1.4060

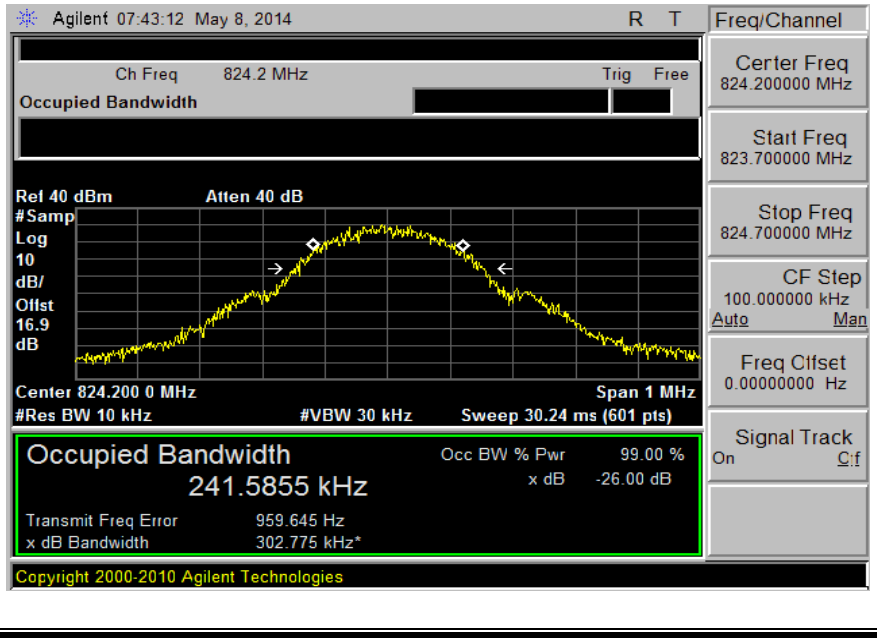
CDMA2000 REV B, PART 22

Band	Mode	Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
CELL	CDMA 2000 EVDO Rev. B	1013+31	824.70+825.93	2.3650	2.6060
		384+425	836.52+837.75	2.4508	2.5920
		736+777	847.08+848.31	**2.4862**	2.6300
		1013+156	824.70+829.68	**6.2275**	6.5640
		384+550	836.52+841.50	5.9486	6.3930
		611+777	843.33+848.31	6.0273	6.5010
		1013+31+72	824.70+825.93+827.16	3.6594	3.9760
		384+425+466	836.52+837.75+838.98	**3.6897**	3.8590
		695+736+777	845.85+847.08+848.31	3.6802	3.8860

8.1.1. GSM-GPRS

850MHz BAND

LOW CH



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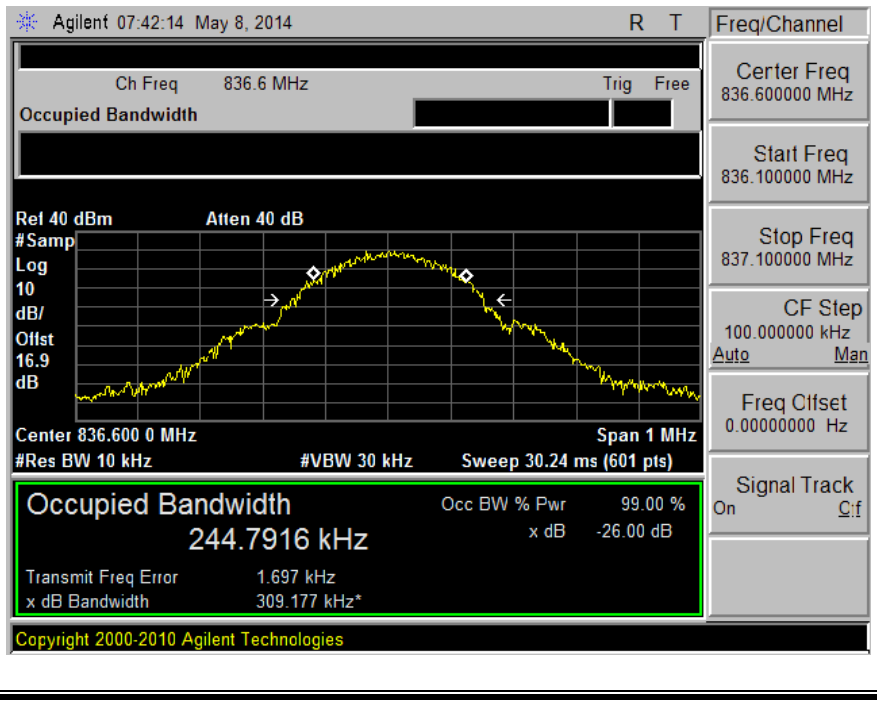

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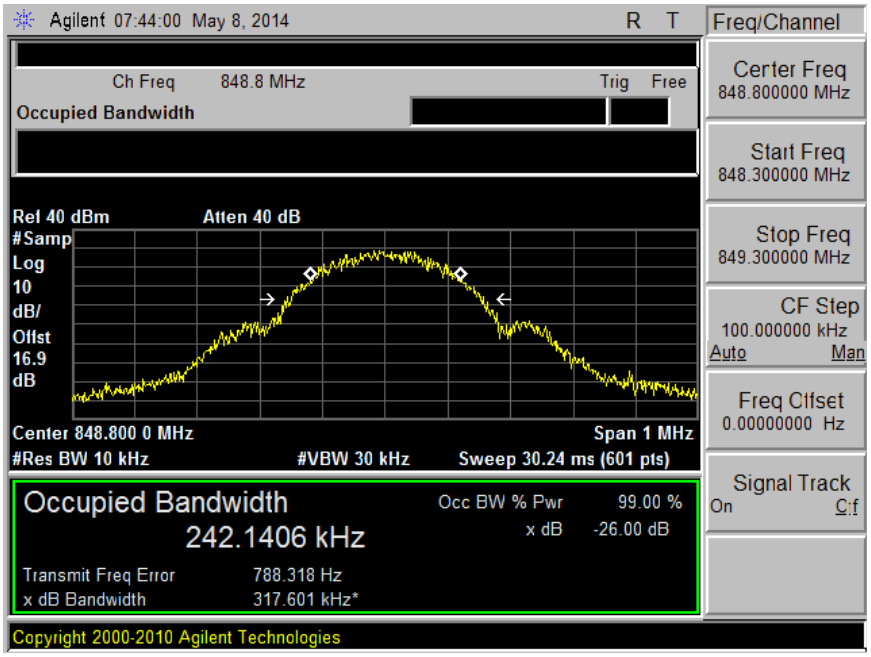
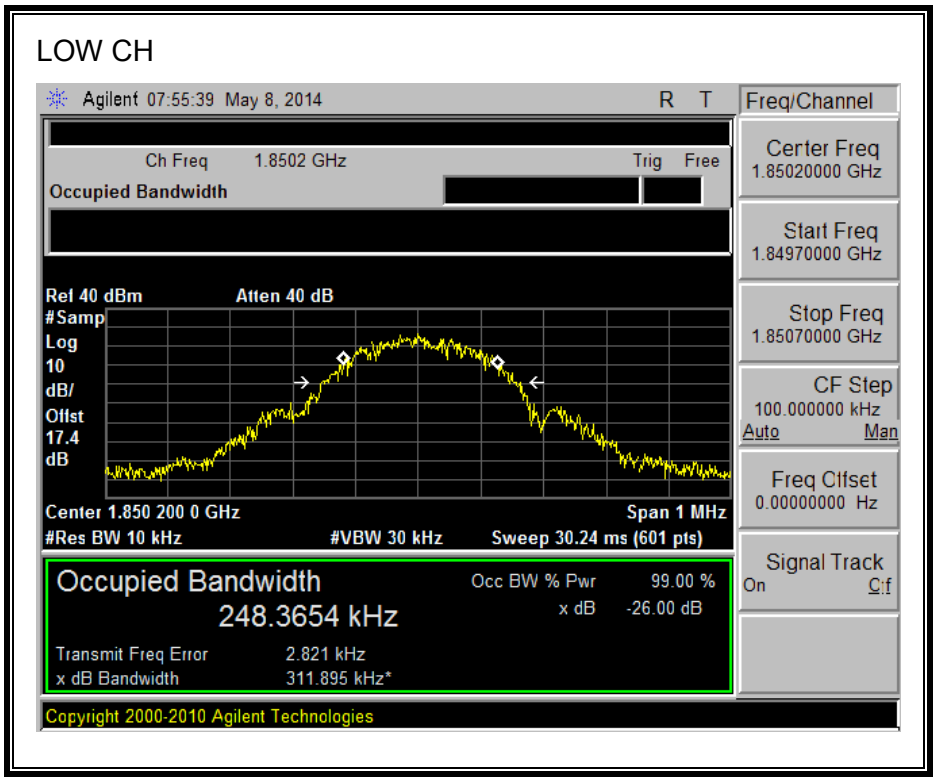


1900MHz BAND

LOW CH



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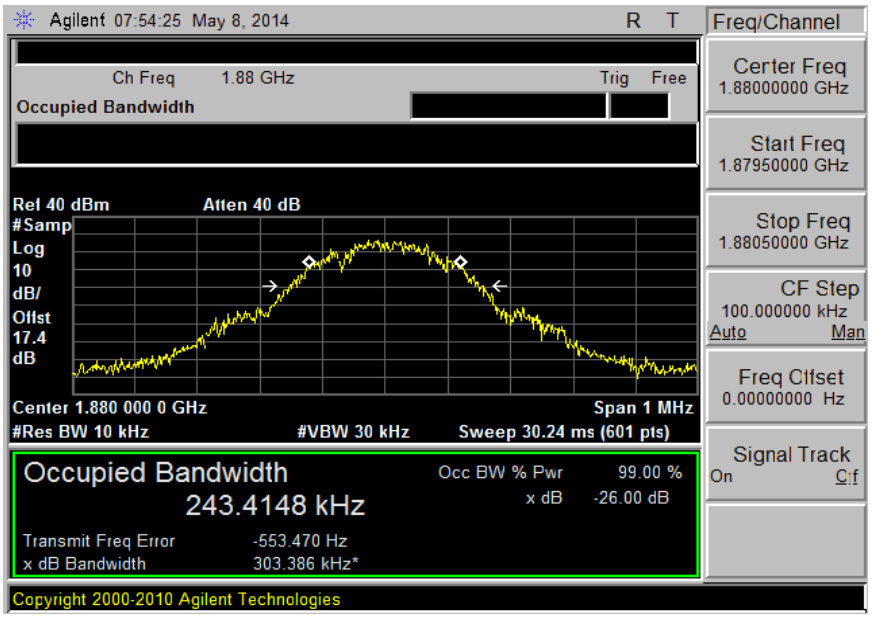

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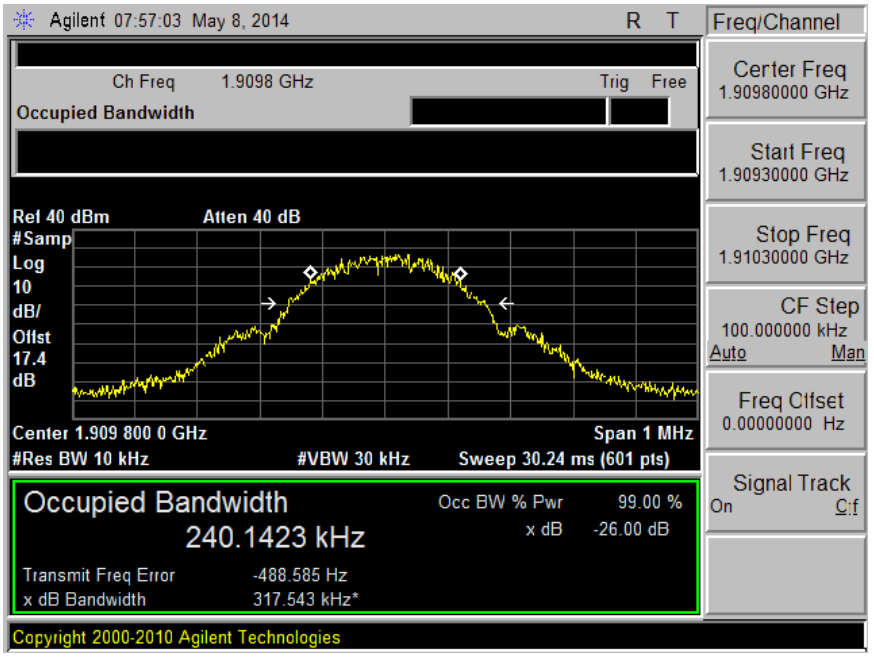

8.1.2. GSM-EGPRS

850MHz BAND

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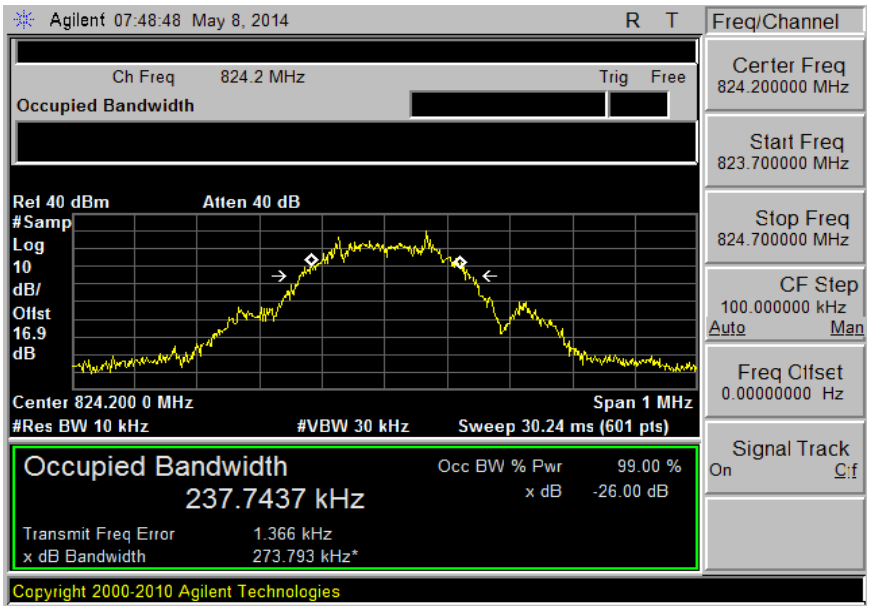

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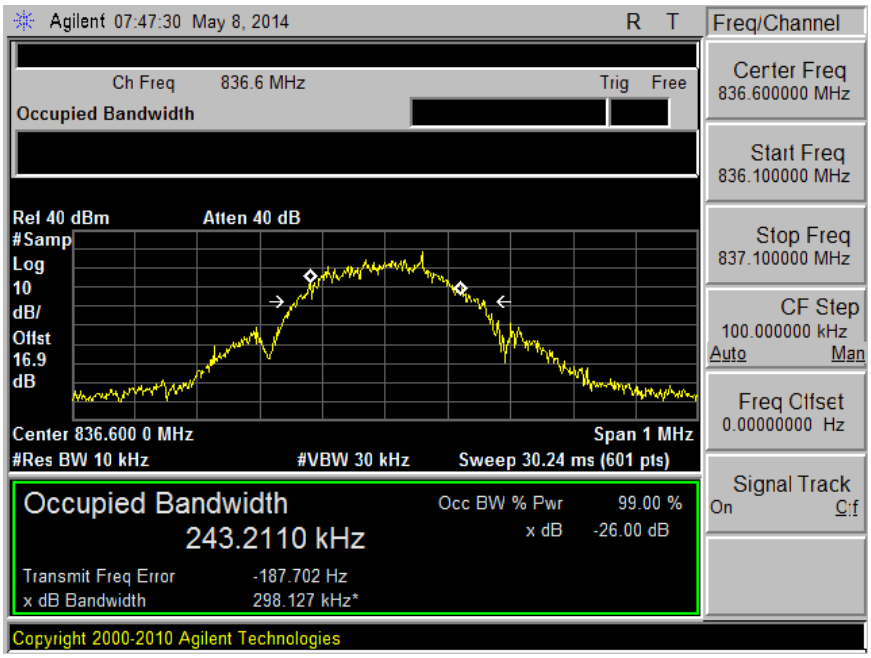

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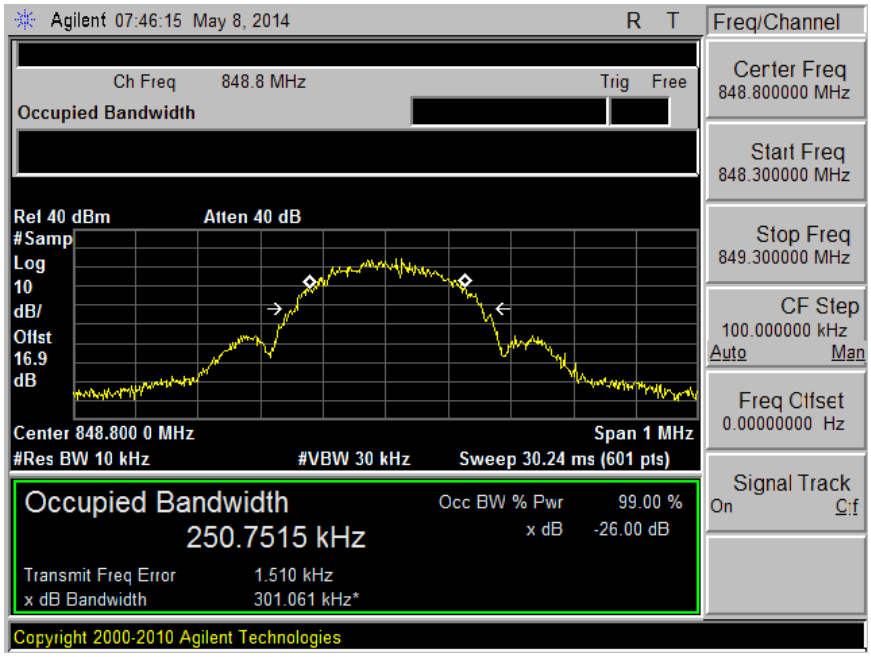
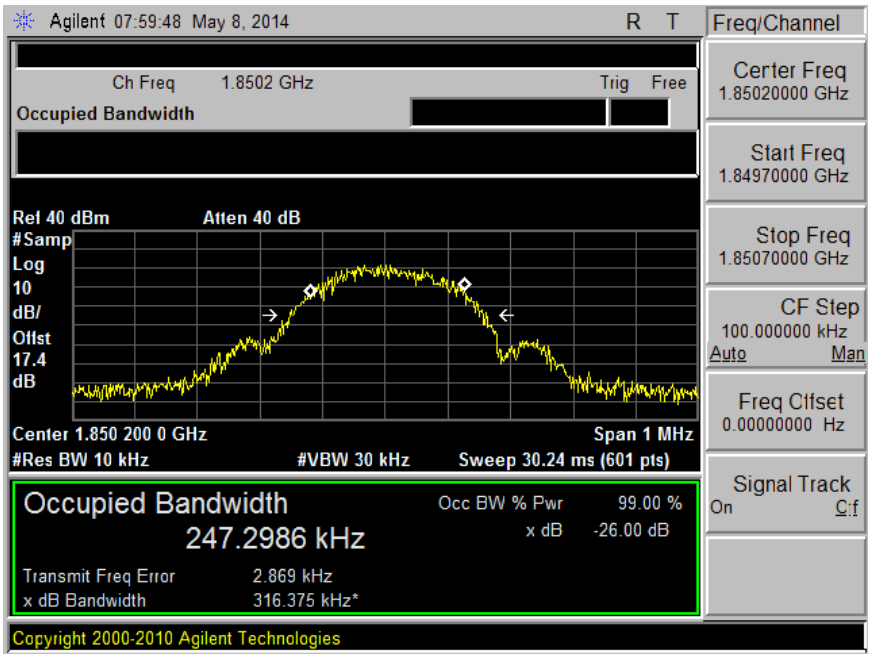


1900MHz BAND

LOW CH



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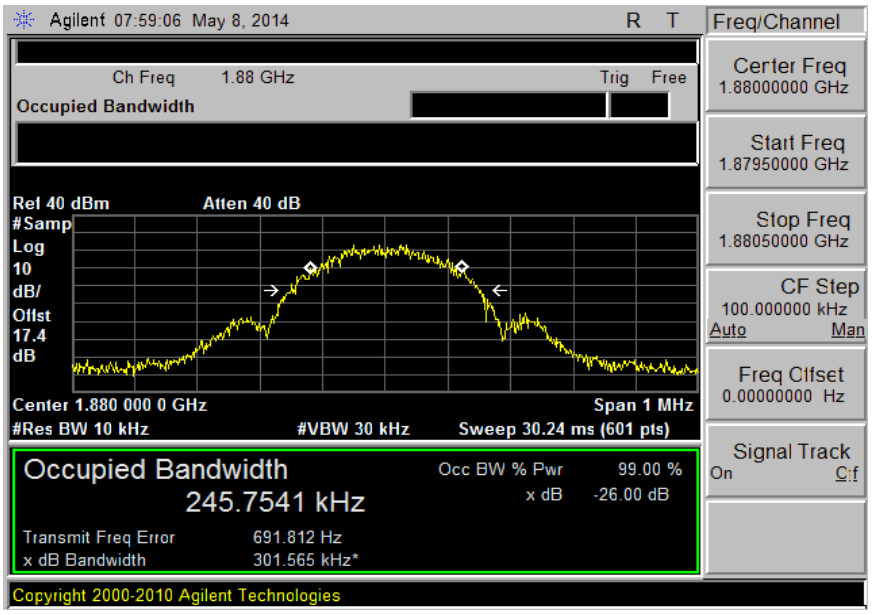

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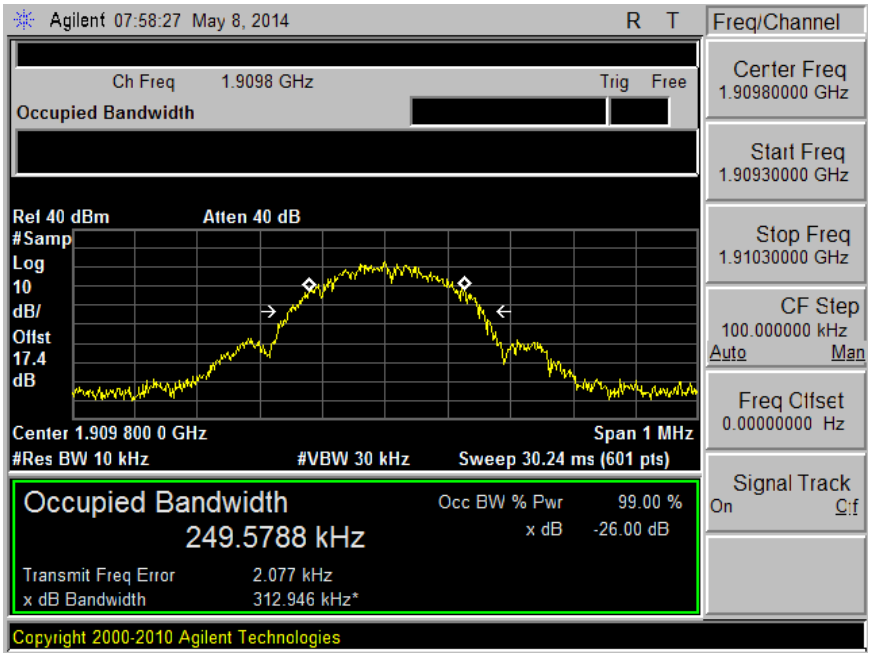
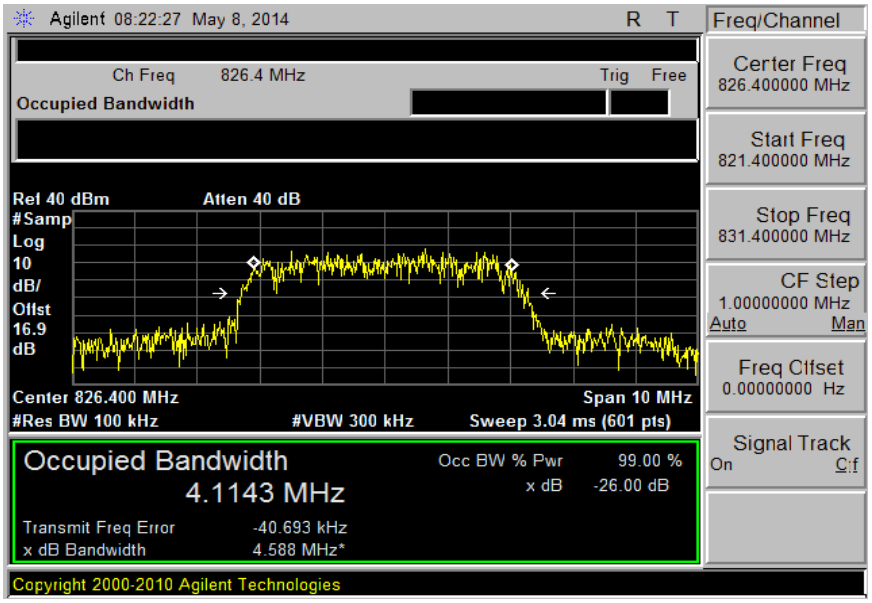


8.1.3. UMTS Rel. 99

850MHz BAND

LOW CH



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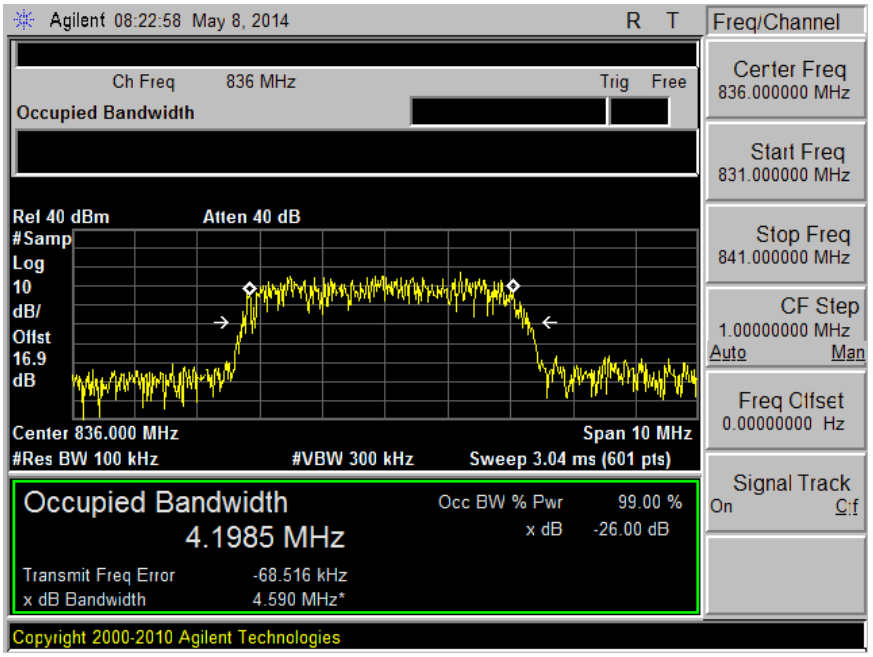

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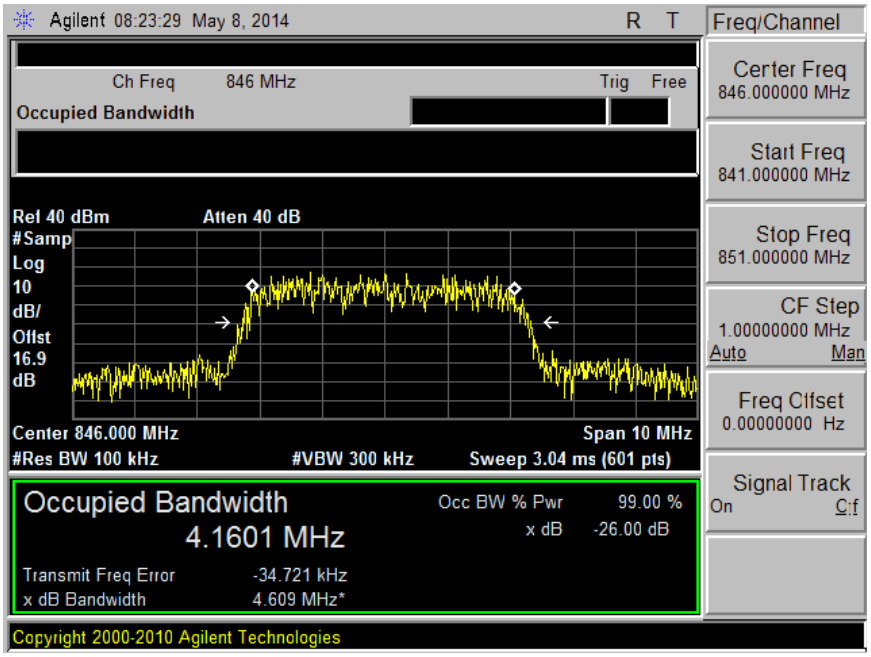
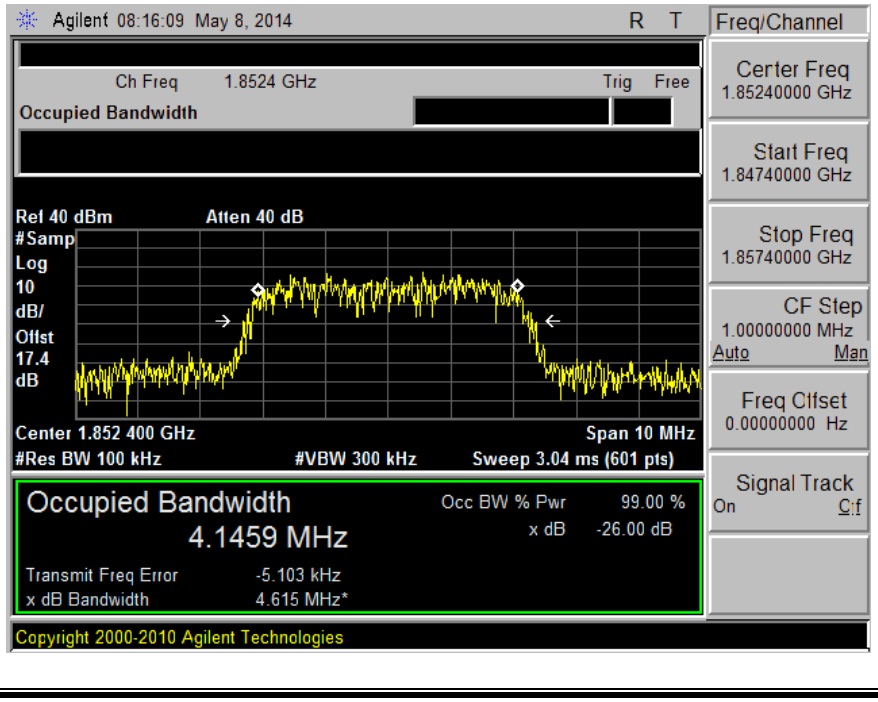


1900MHz BAND

LOW CH



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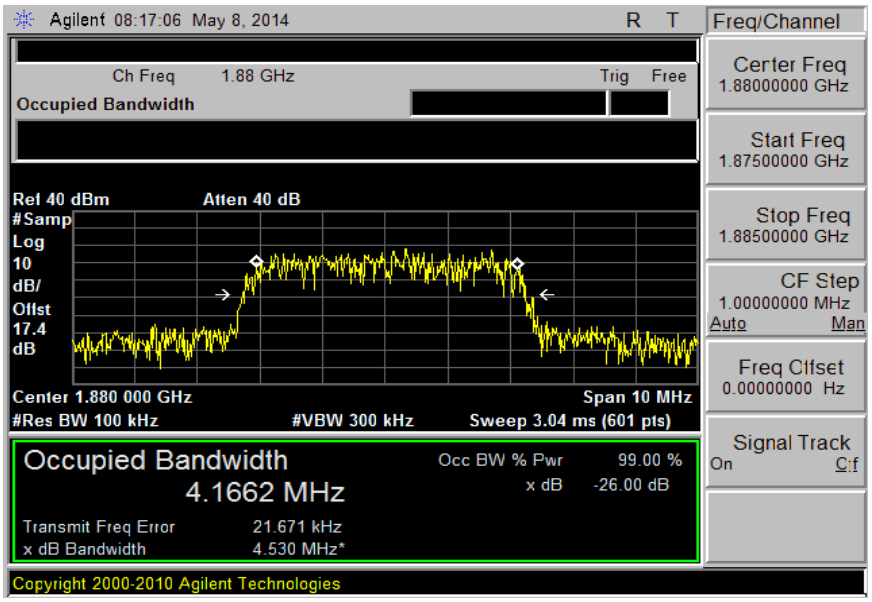

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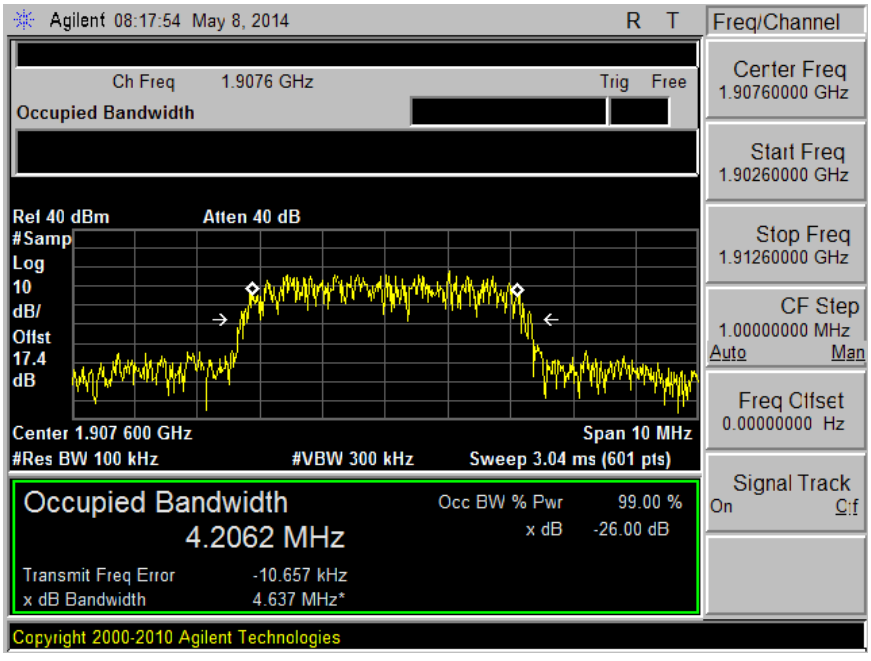
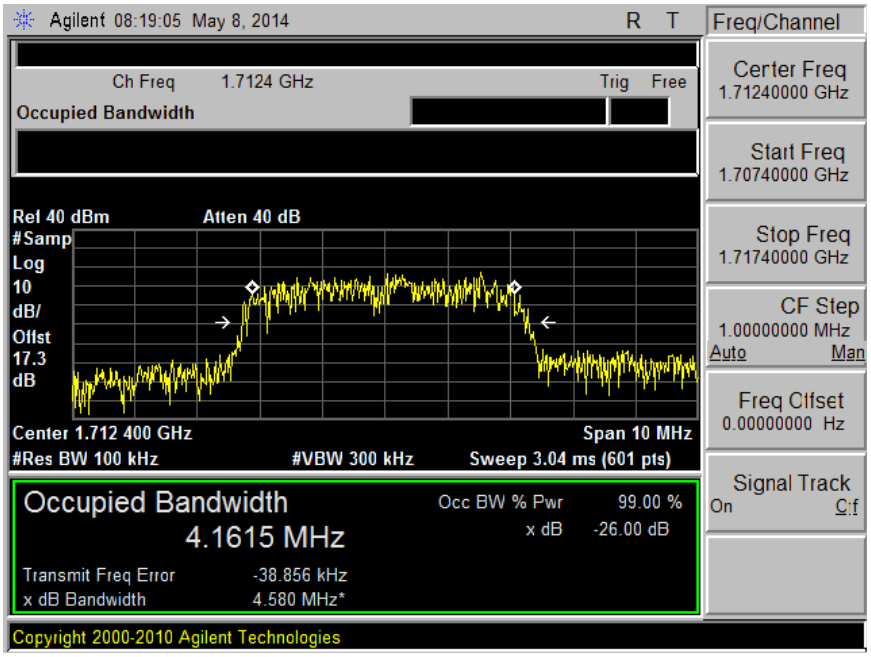


1700MHz BAND

LOW CH



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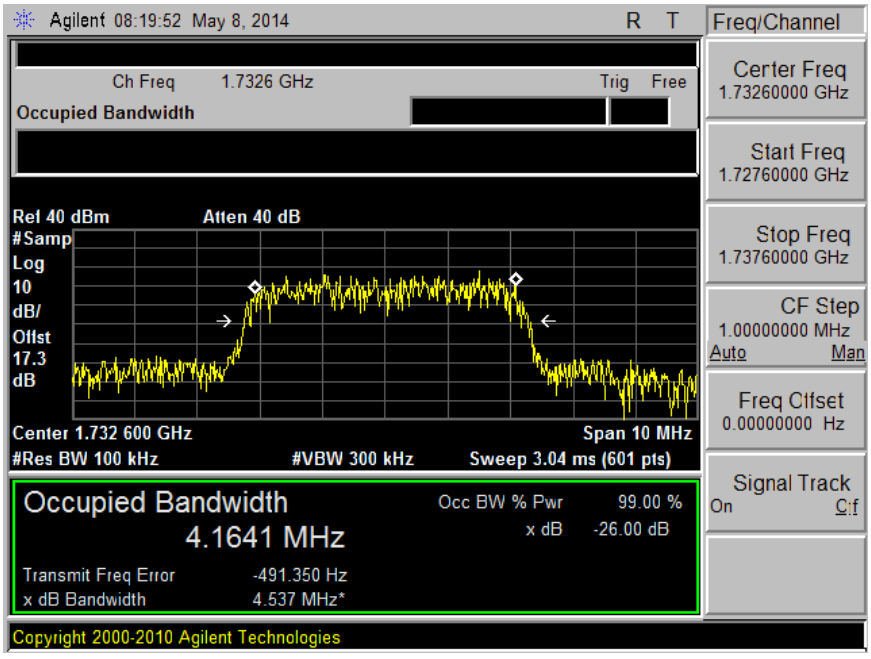

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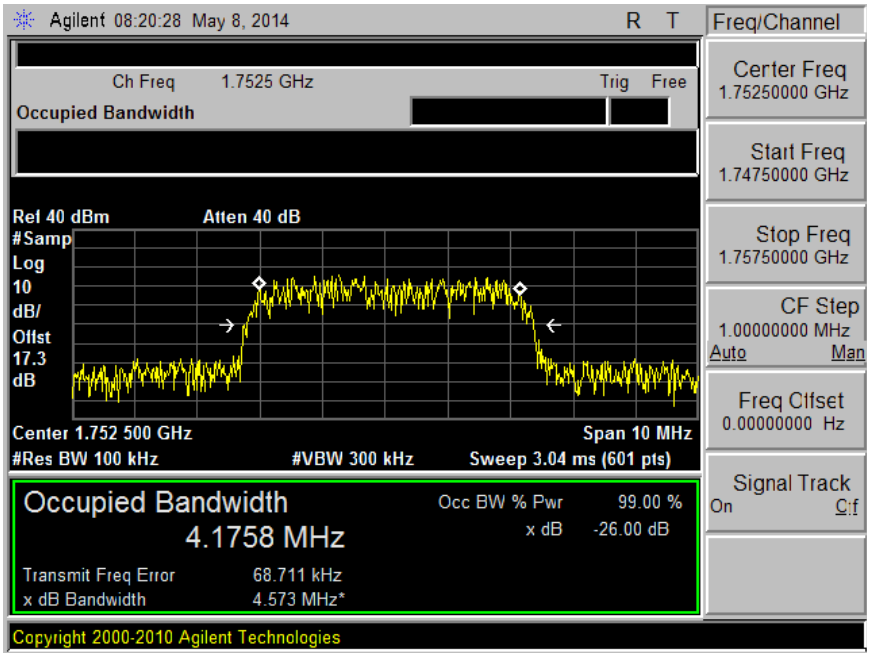
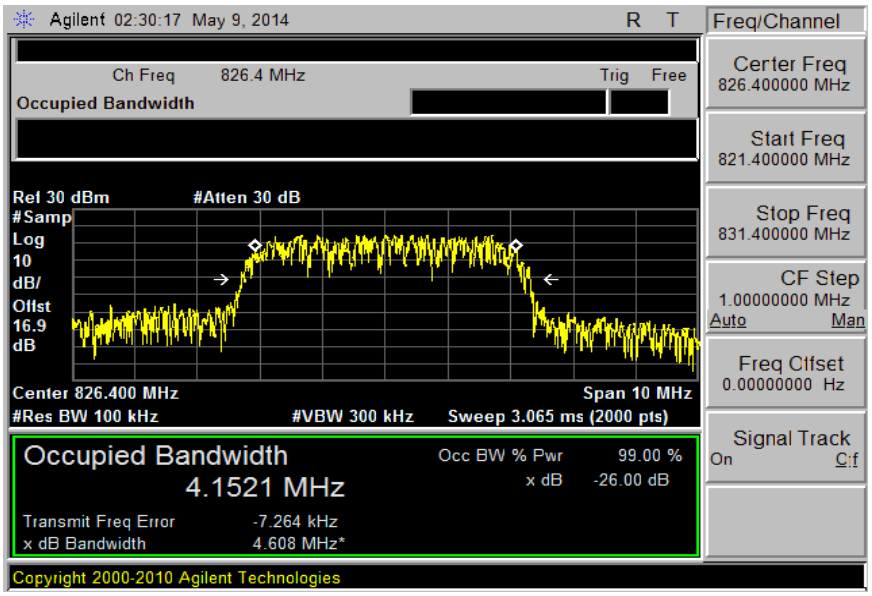


8.1.4. UMTS HSDPA

850MHz BAND

LOW CH



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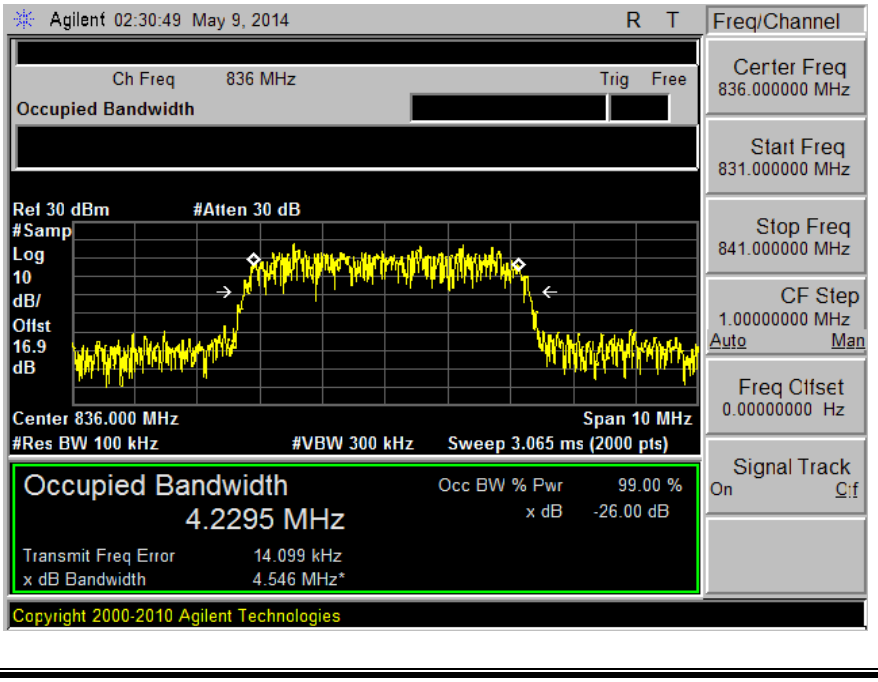

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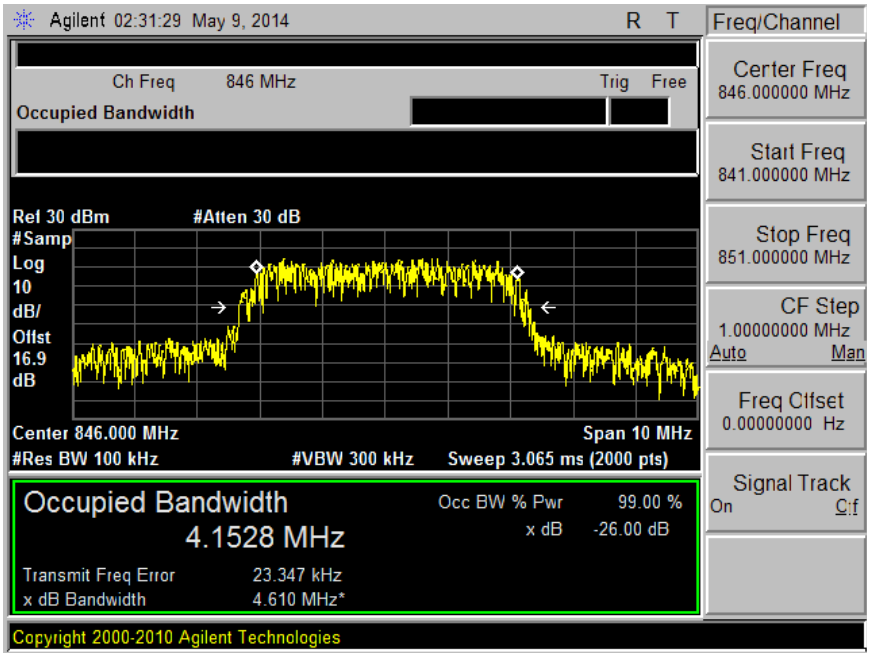
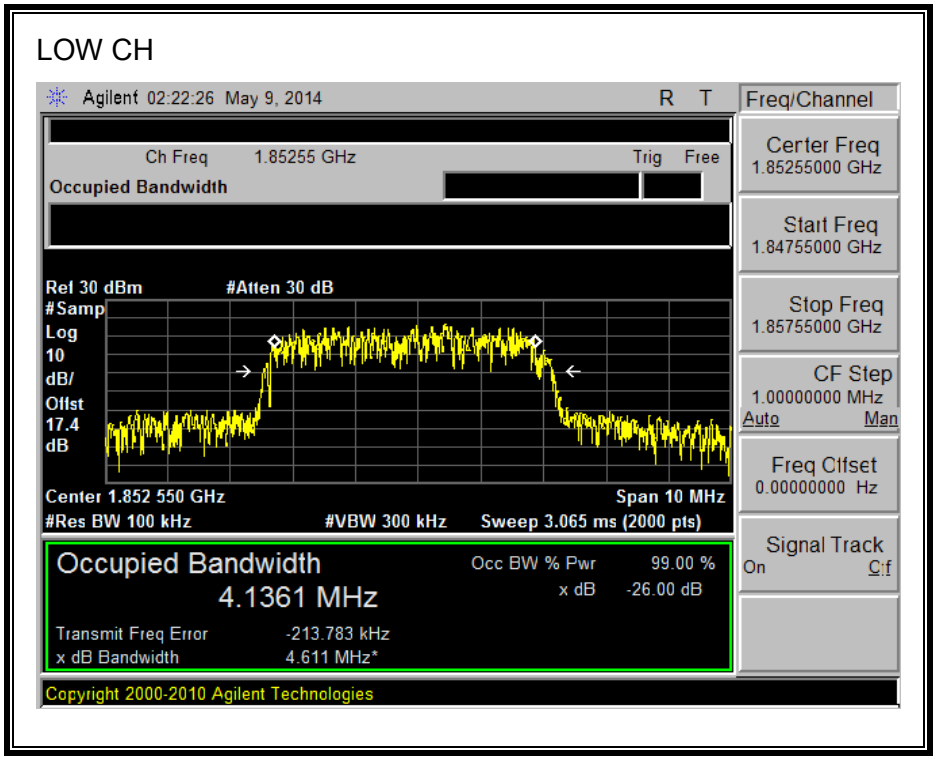
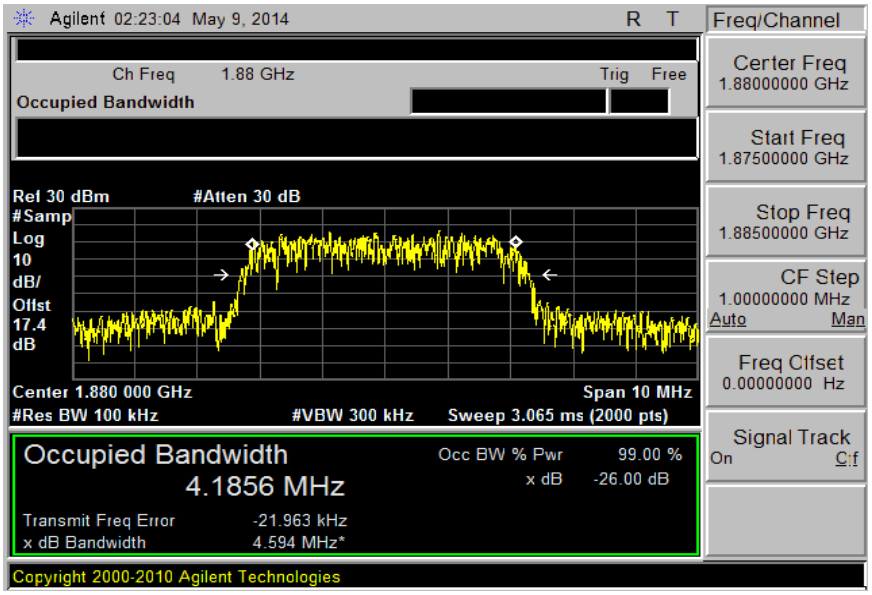


1900MHz BAND

LOW CH



MID CH



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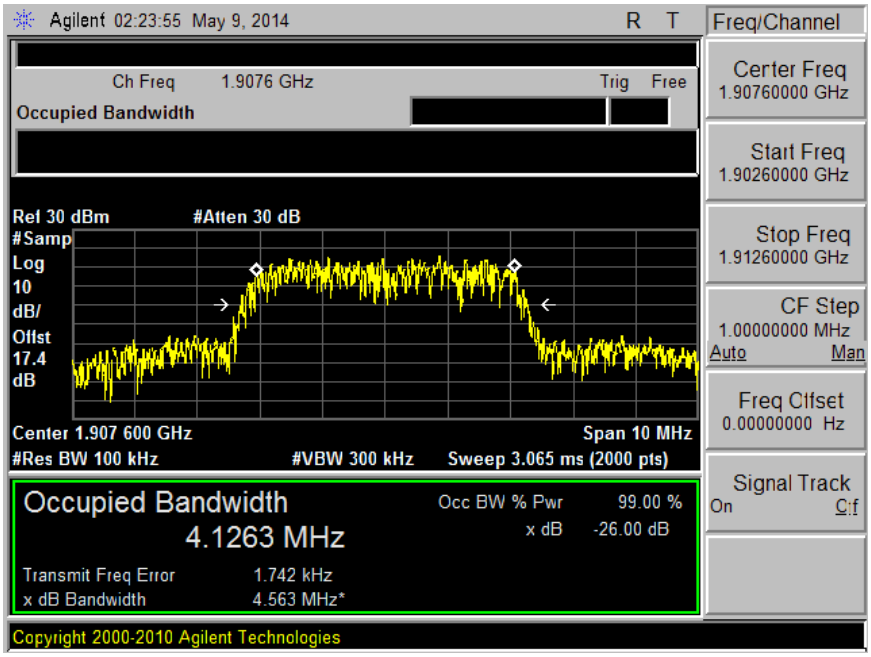
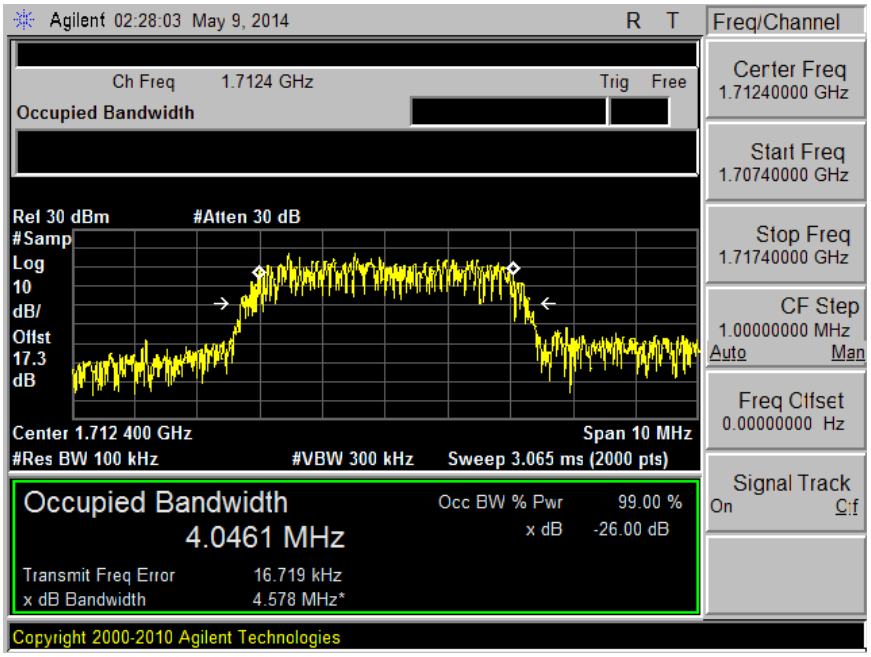


1700MHz BAND

LOW CH



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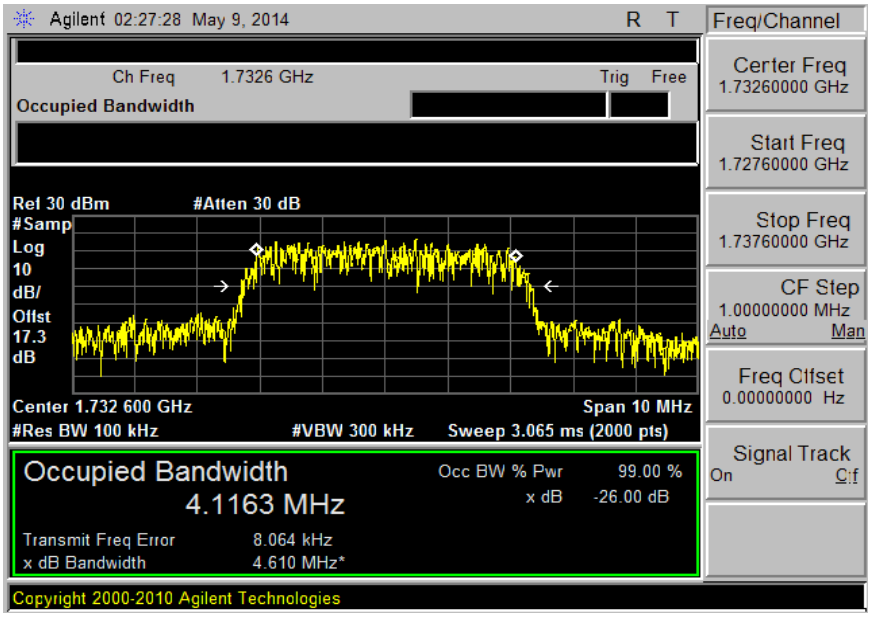

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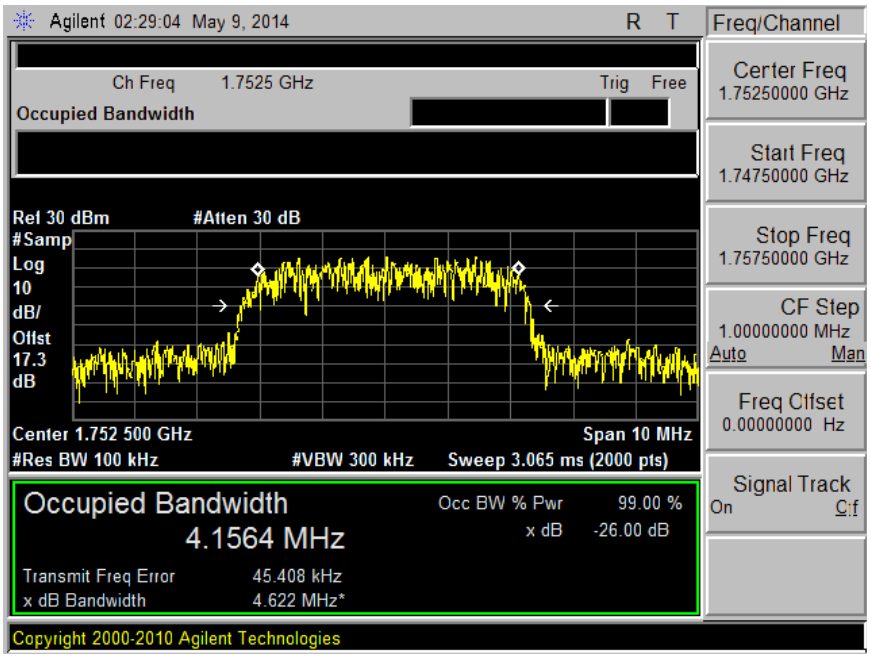
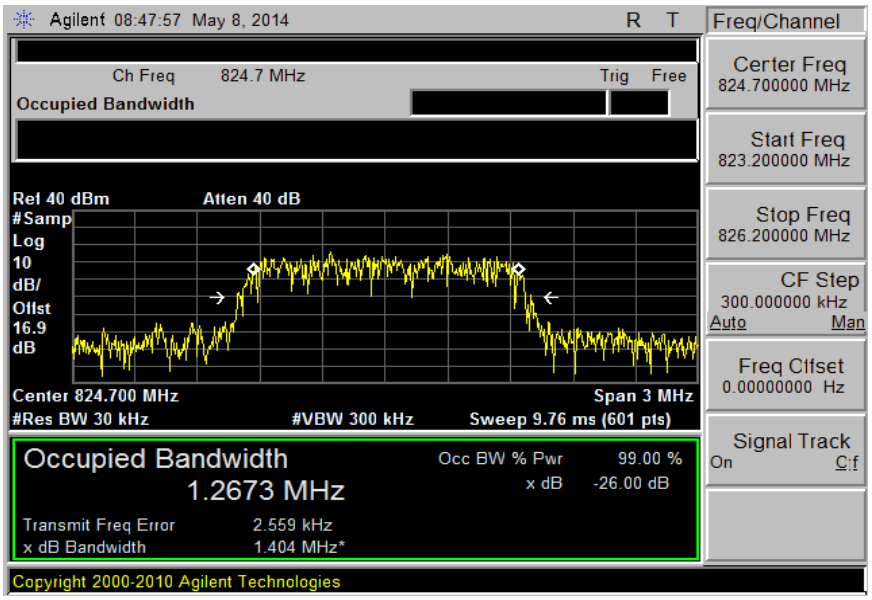


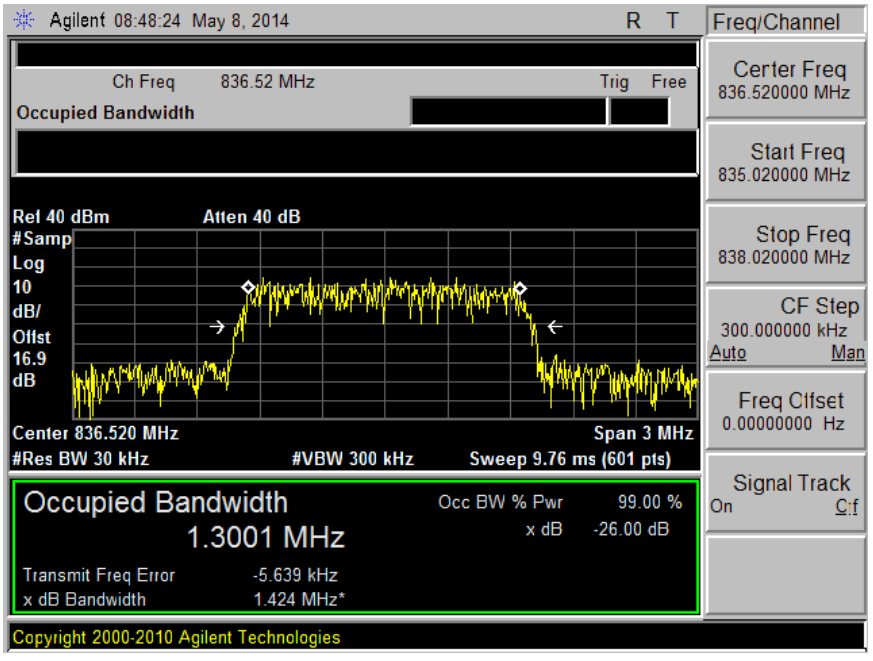
8.1.5. CDMA2000 1xRTT

850MHz BAND

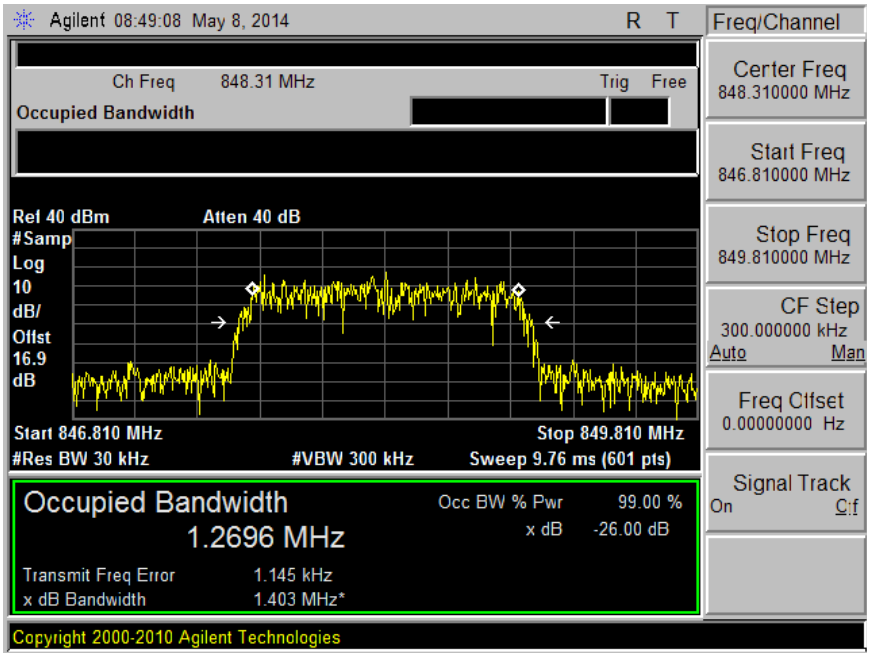
LOW CH



MID CH

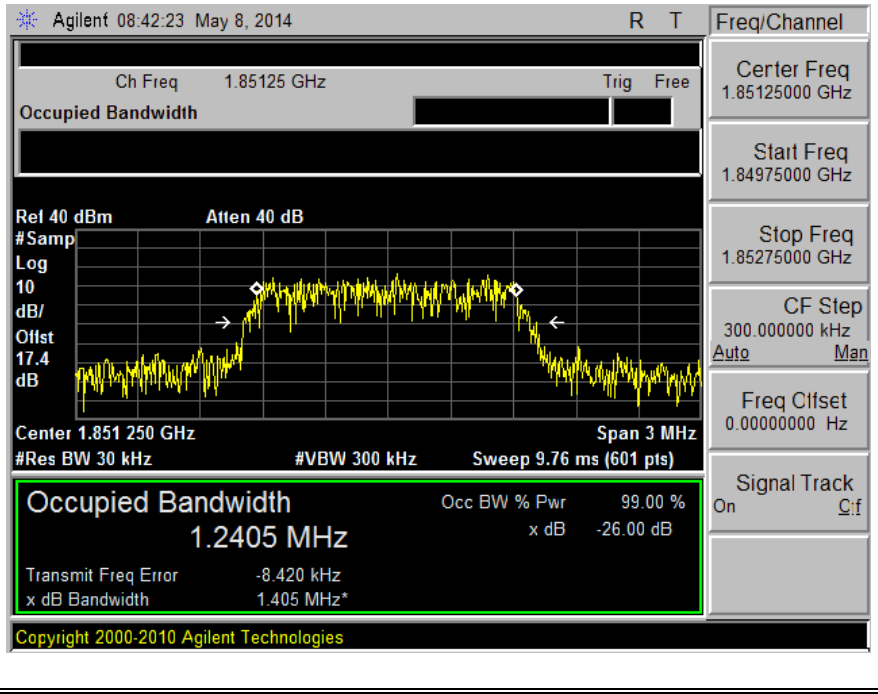


HIGH CH

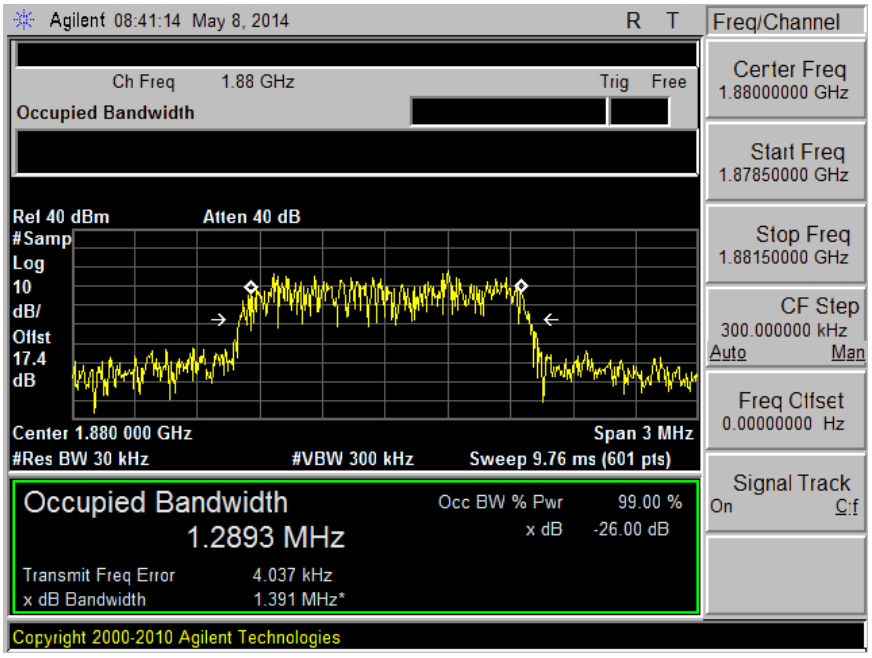


1900MHz BAND

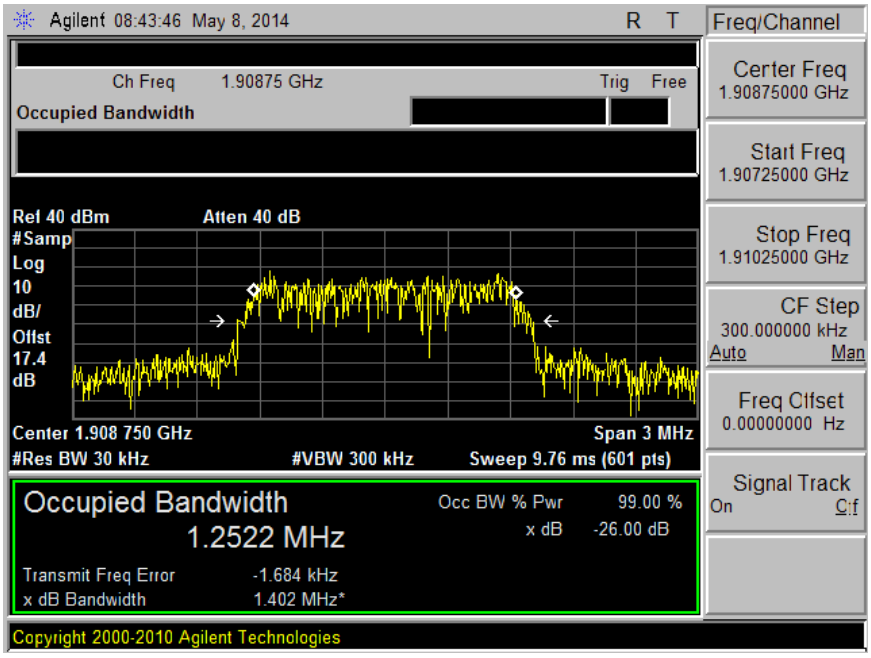
LOW CH



MID CH

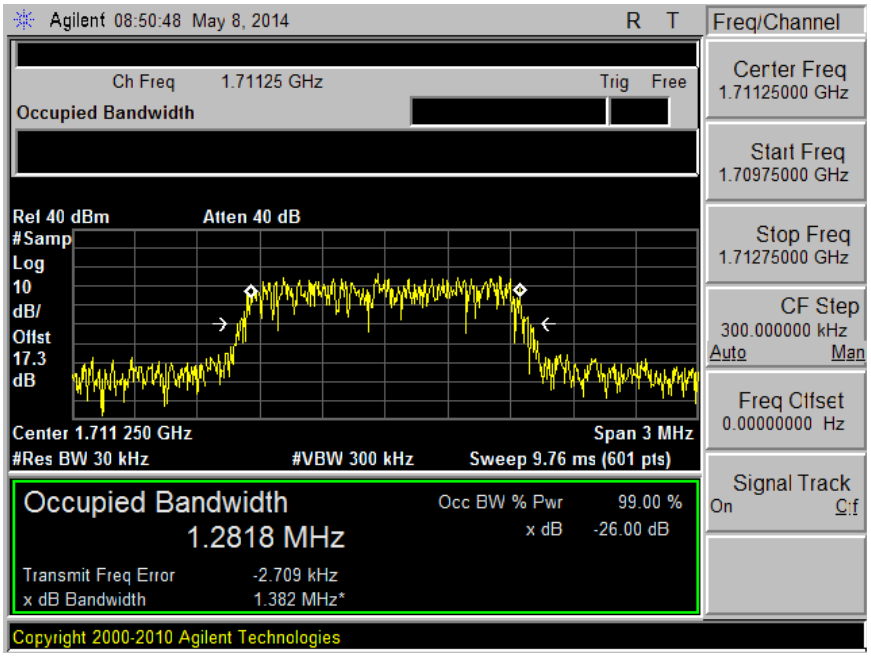


HIGH CH

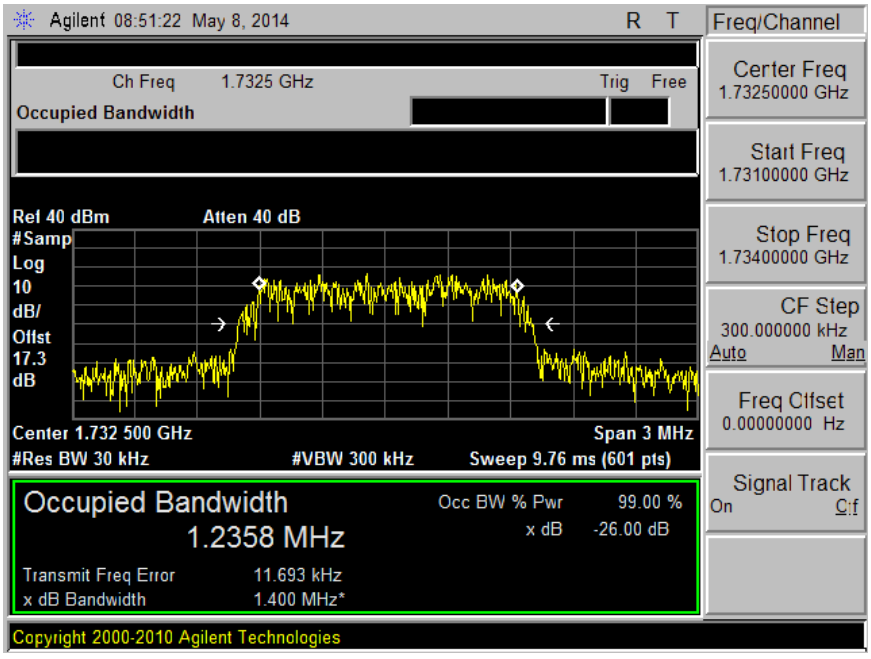


1700MHz BAND

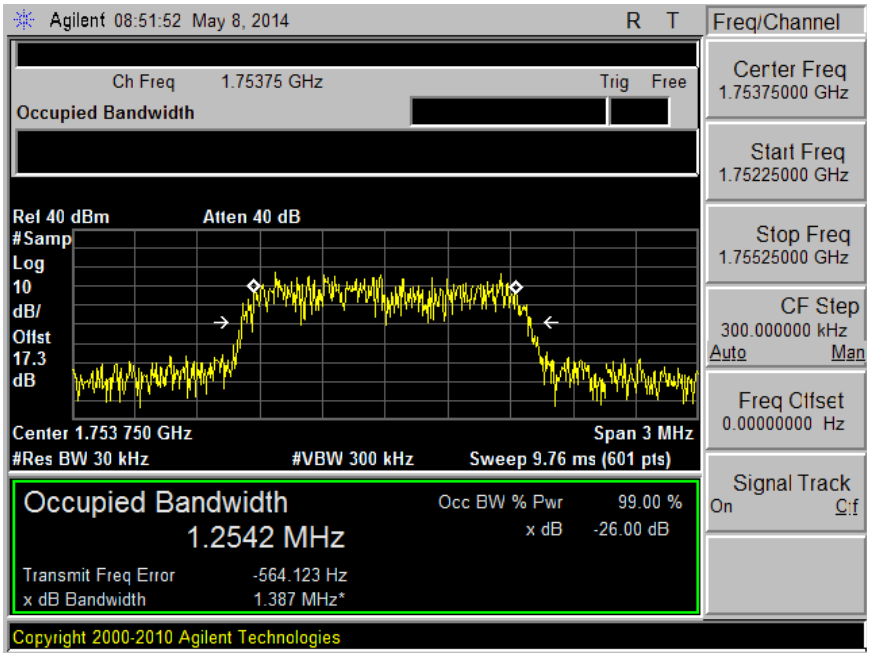
LOW CH



MID CH

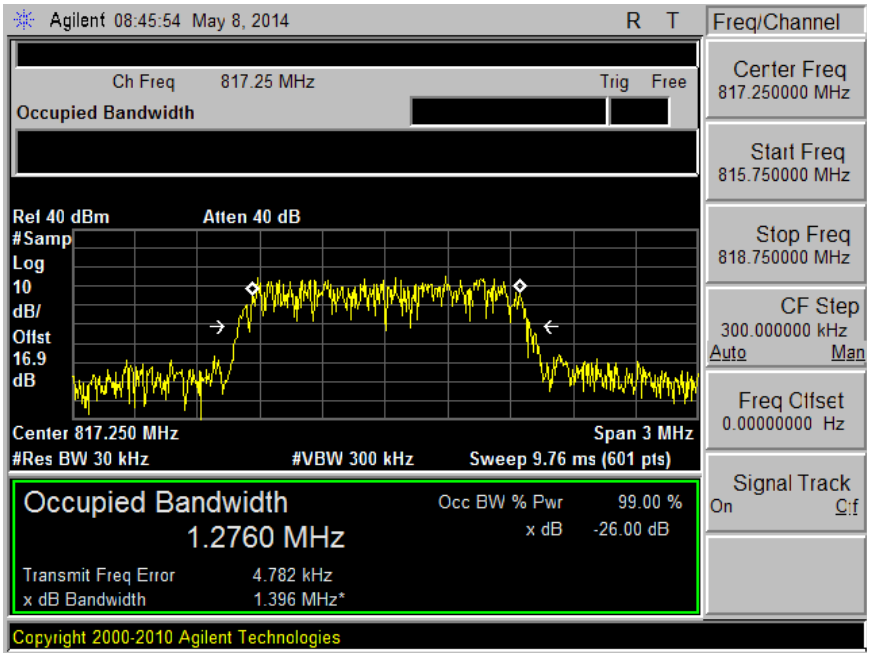


HIGH CH

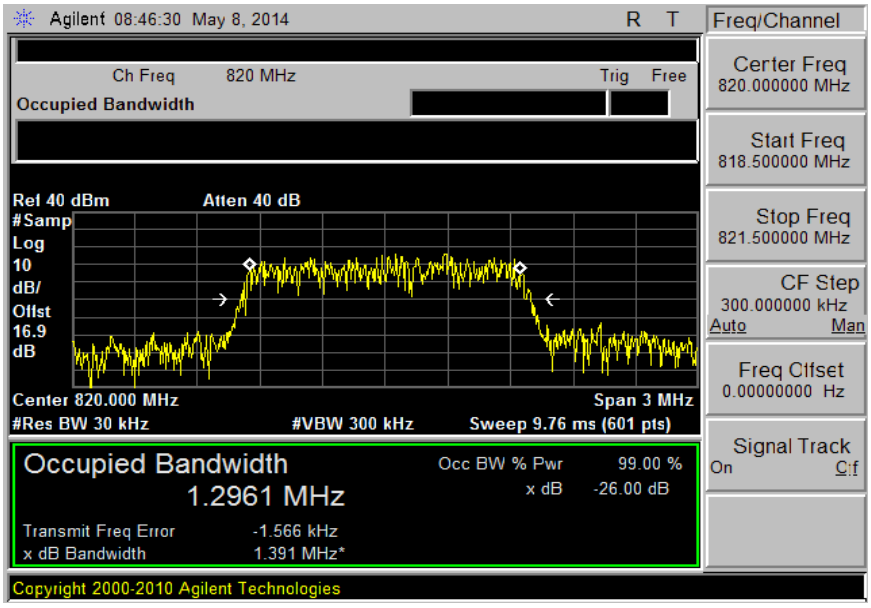


800MHz SECONDARY BAND

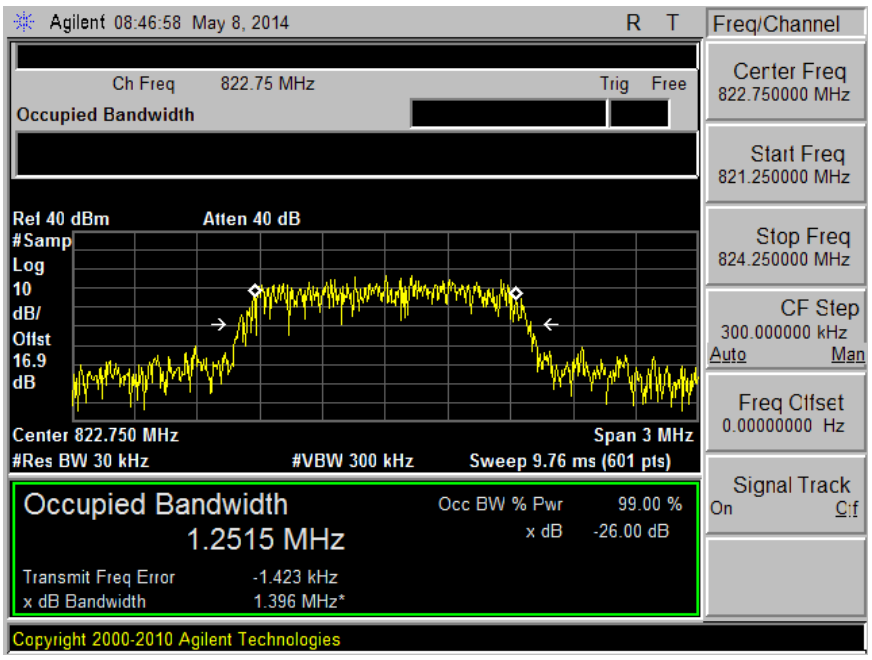
LOW CH



MID CH



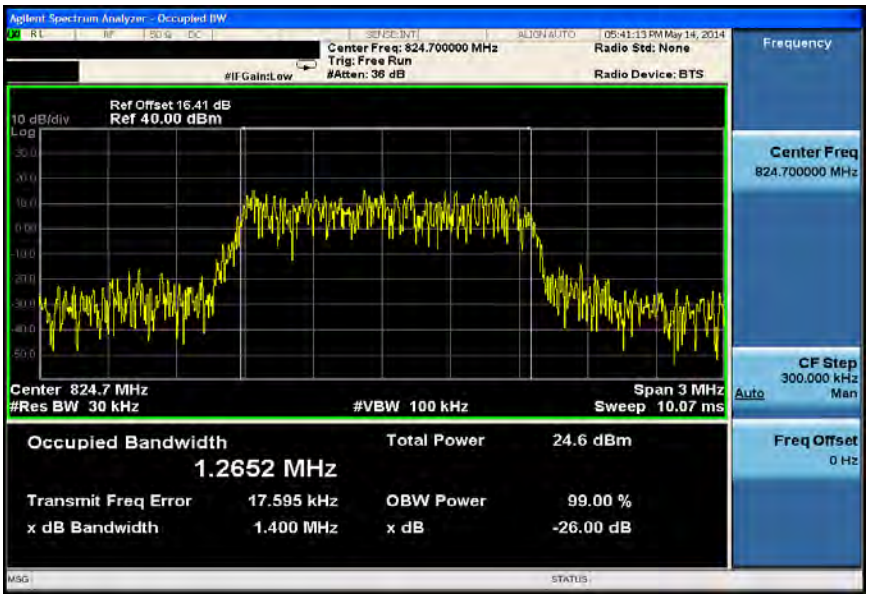
HIGH CH



8.1.6. CDMA2000 EVDO Rev. A

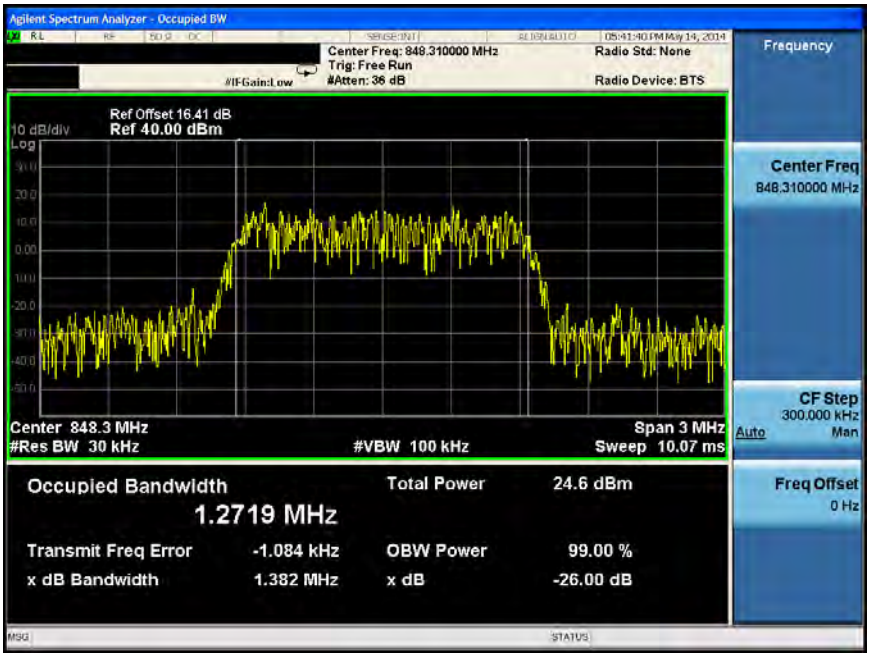
850MHz BAND

LOW CH



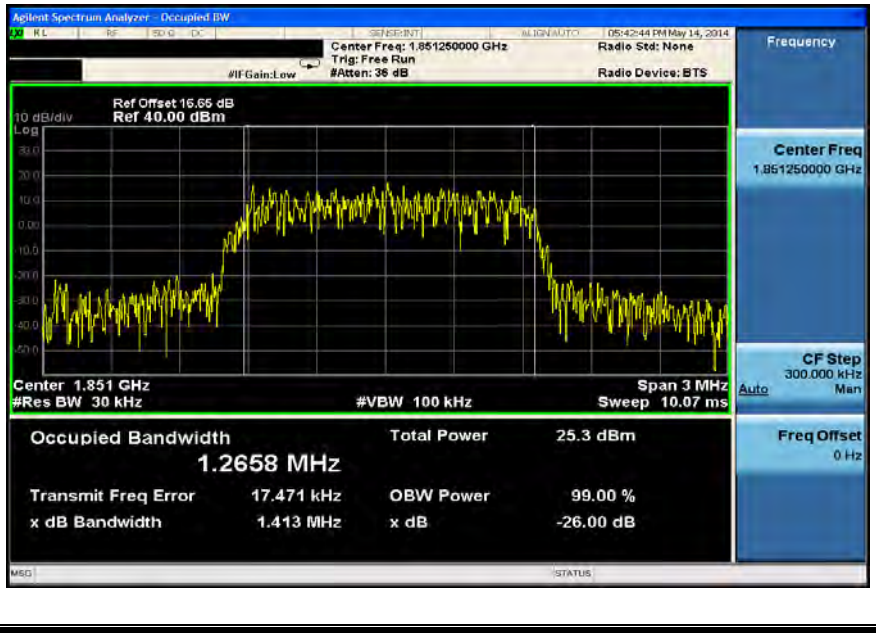
MID CH

HIGH CH



1900MHz BAND

LOW CH

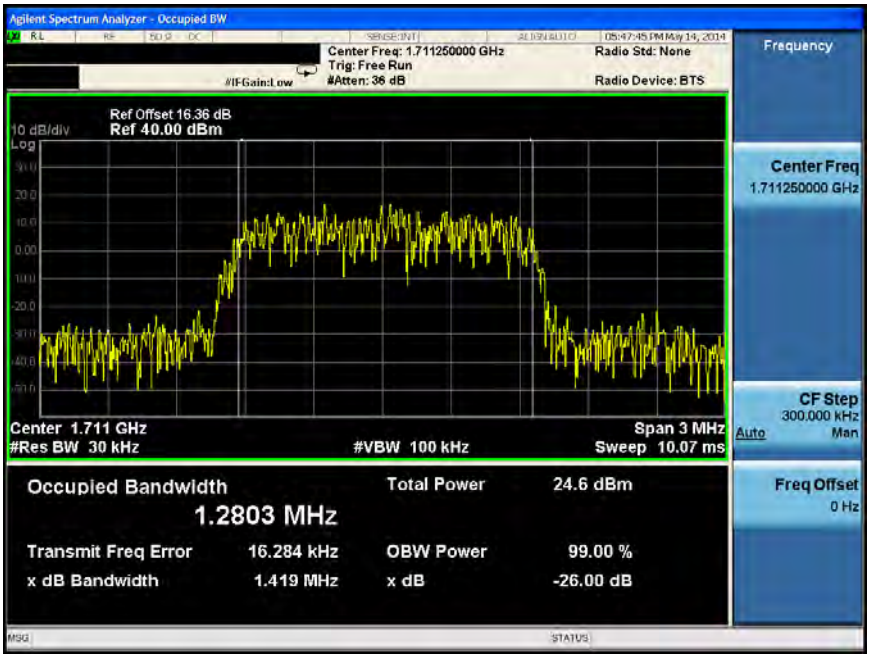


MID CH

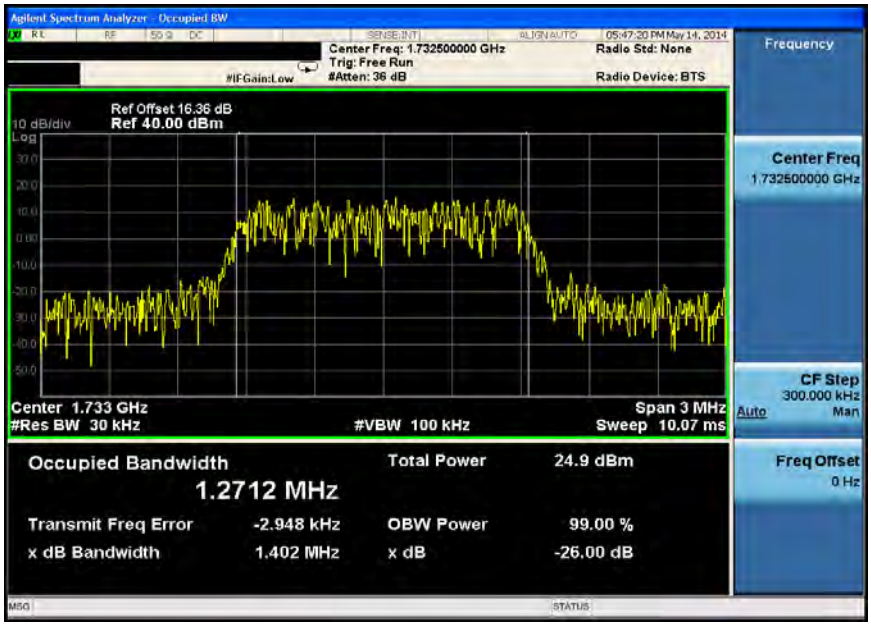
HIGH CH

1700MHz BAND

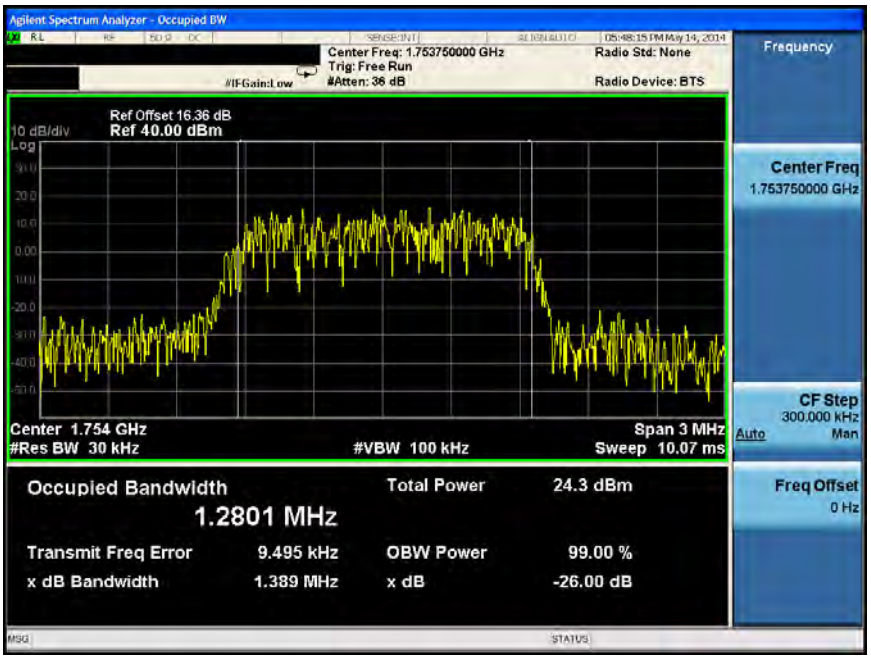
LOW CH



MID CH



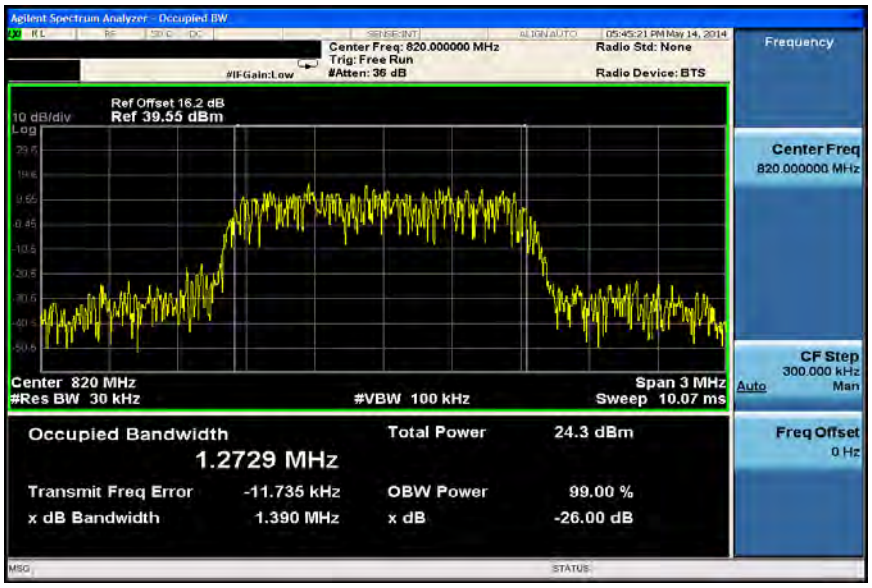
HIGH CH



800MHz SECONDARY BAND

LOW CH

MID CH

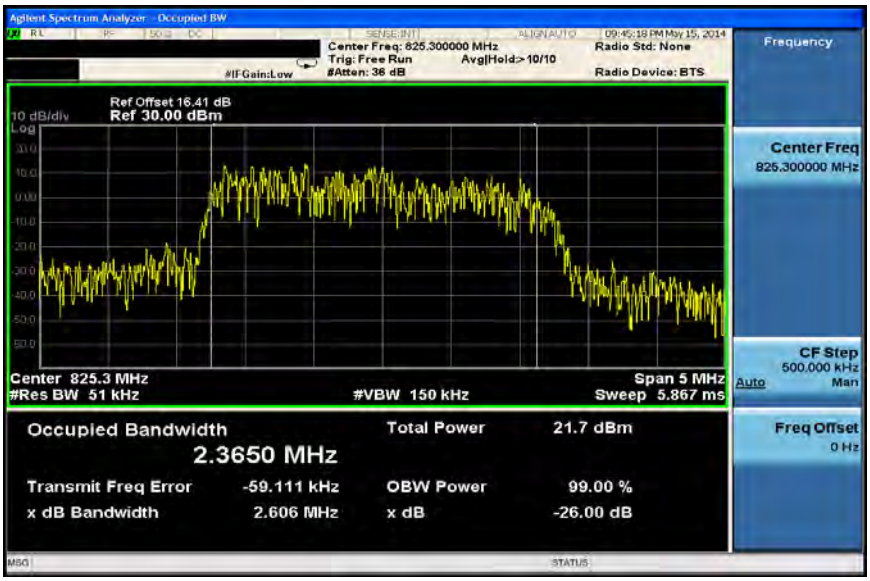


HIGH CH

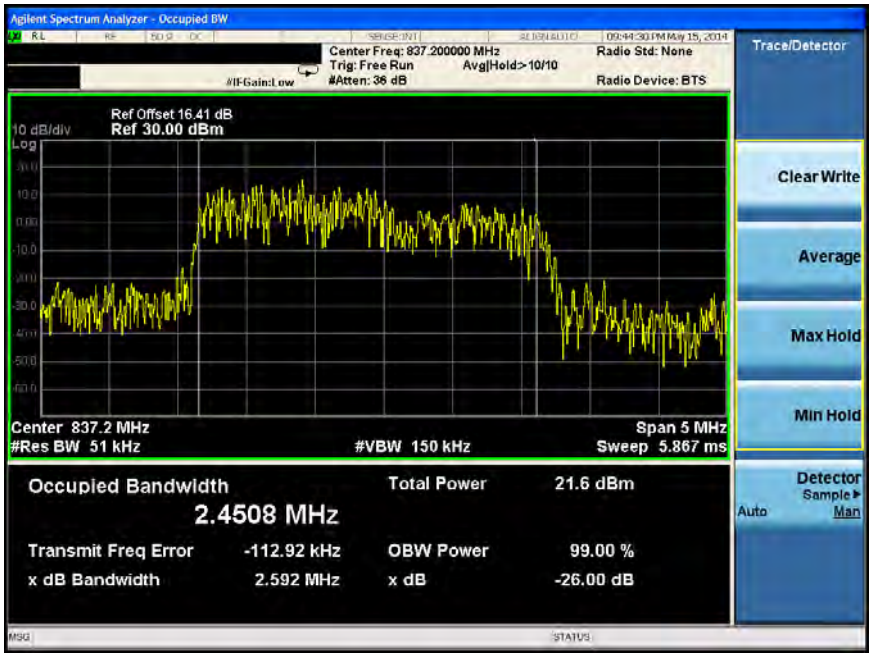
8.1.7. CDMA2000 EVDO Rev. B

2 CARRIER MIN

LOW CH



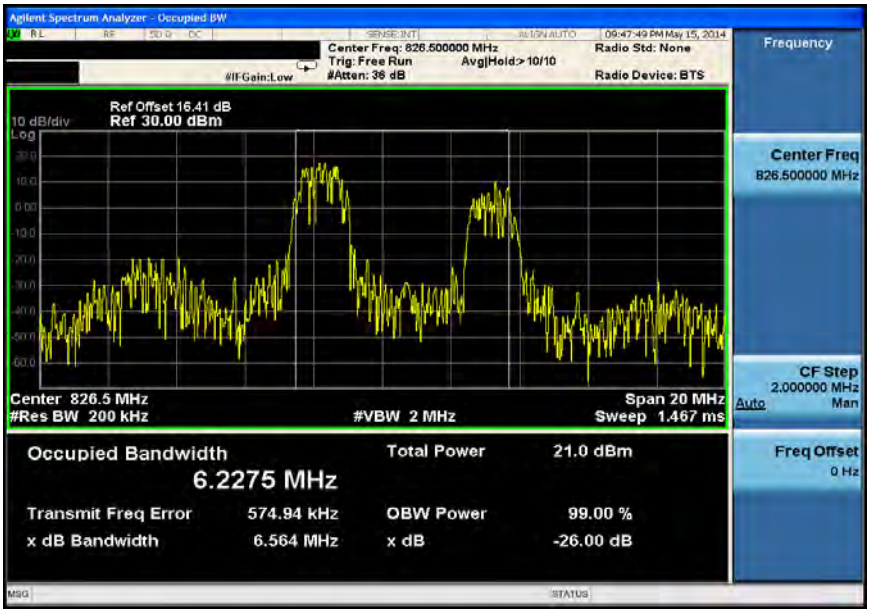
MID CH



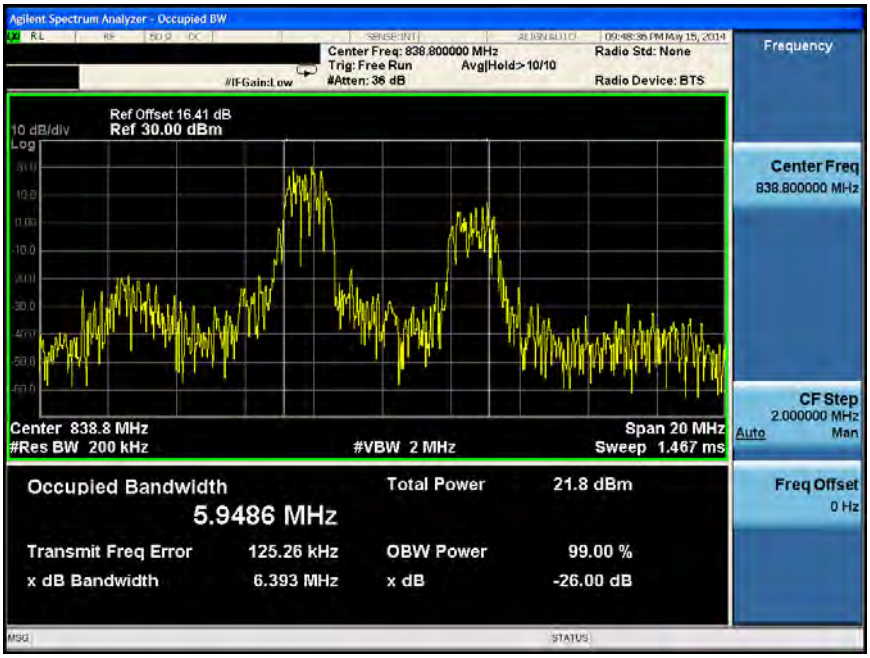
HIGH CH

2 CARRIER MAX

LOW CH



MID CH

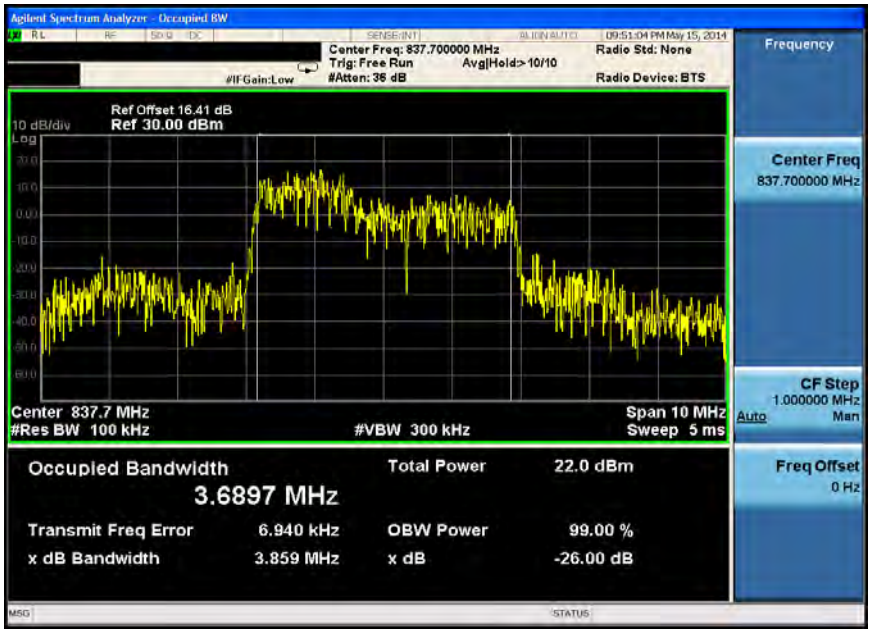


HIGH CH

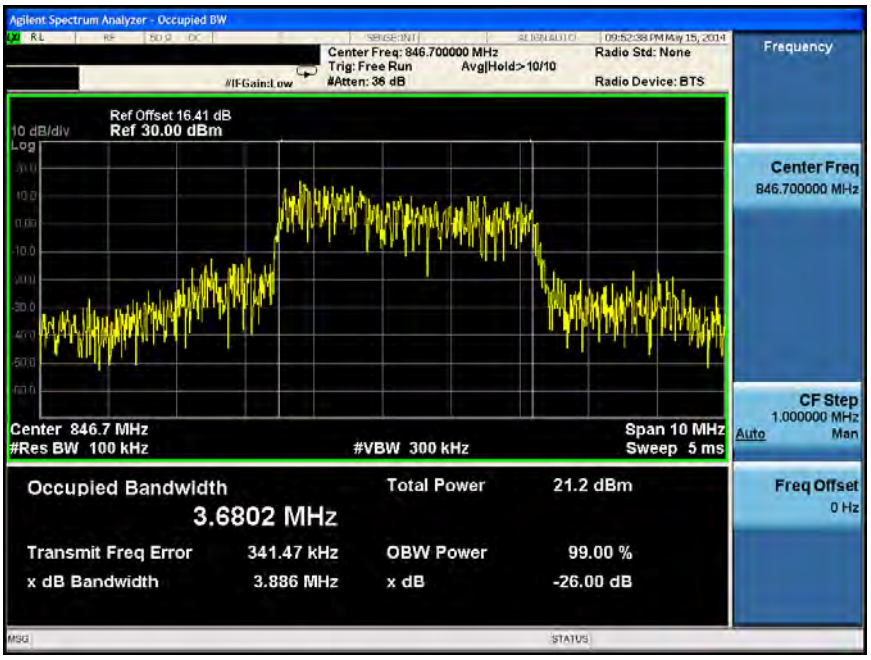
3 CARRIER MIN

LOW CH

MID CH



HIGH CH



8.2. BAND EDGE

RULE PART(S)

FCC: §22.359, 24.238 §27.53, § 90.691.

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.

On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

Compliance with the provisions of paragraphs above of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

RULE PART(S) for Emission Mask

FCC: §90.210, and §90.691

(a)(1)For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(a)(2)For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz. {NOTE: Use 100 kHz reference bandwidth

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, 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

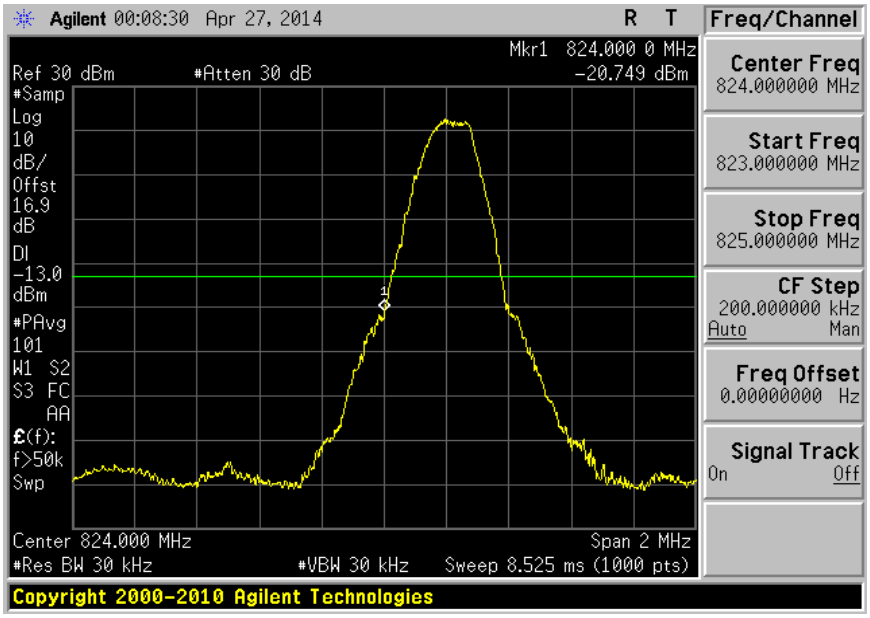
- GPRS and EGPRS
- UMTS, REL 99 and HSDPA
- CDMA2000, BC0, BC1, BC10 and BC15

RESULTS

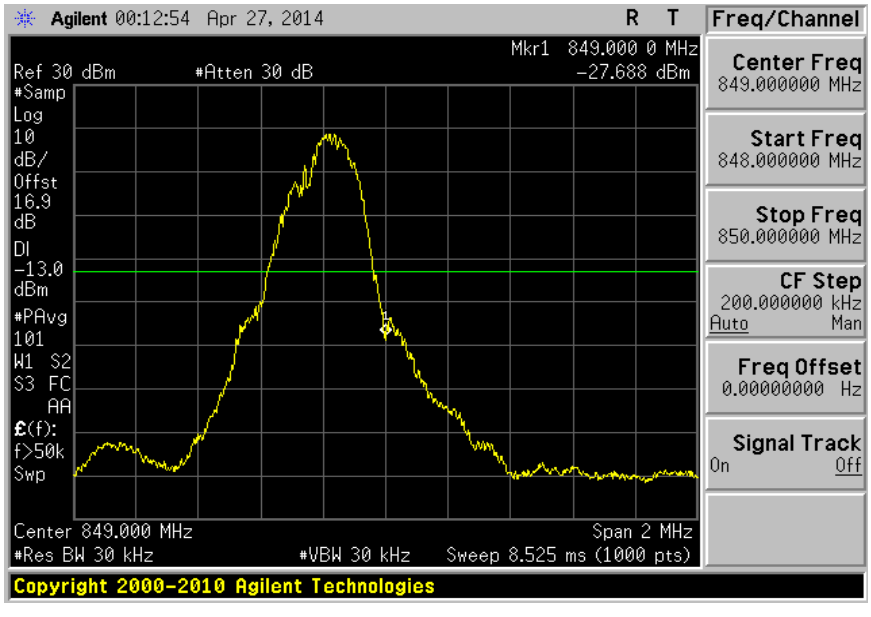
8.2.1. GSM-GPRS

850MHz BAND

LOW CH

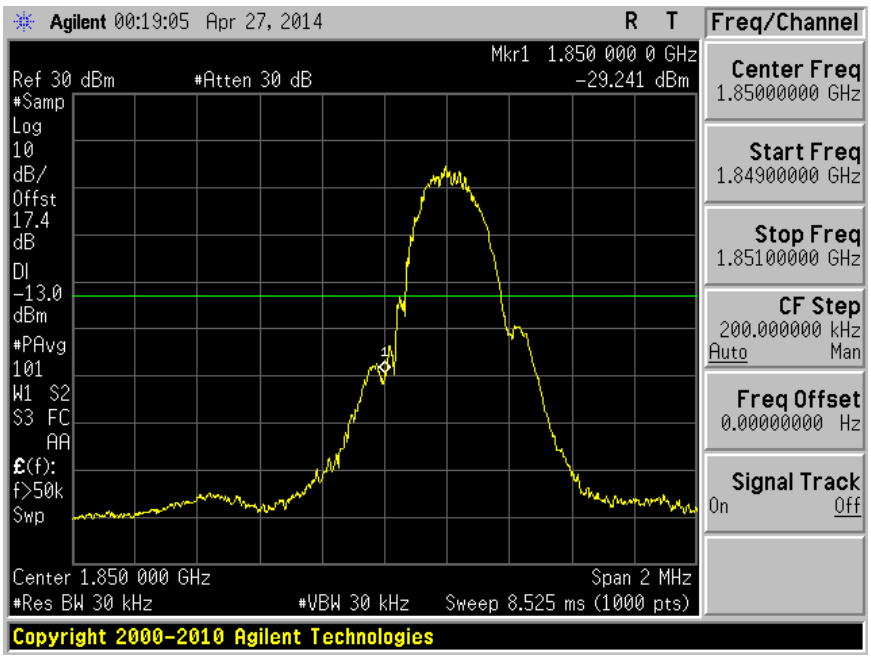


HIGH CH

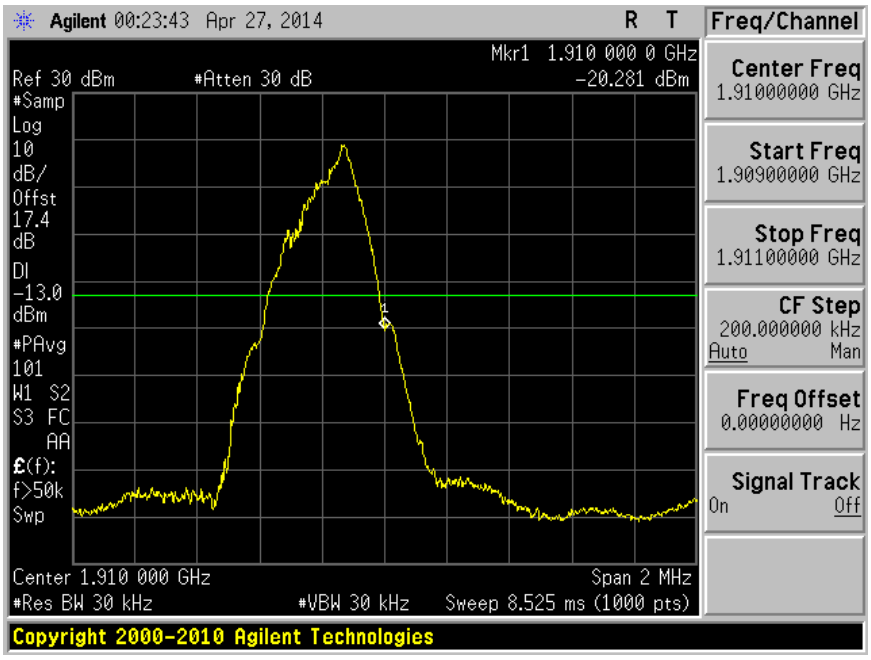


1900MHz BAND

LOW CH



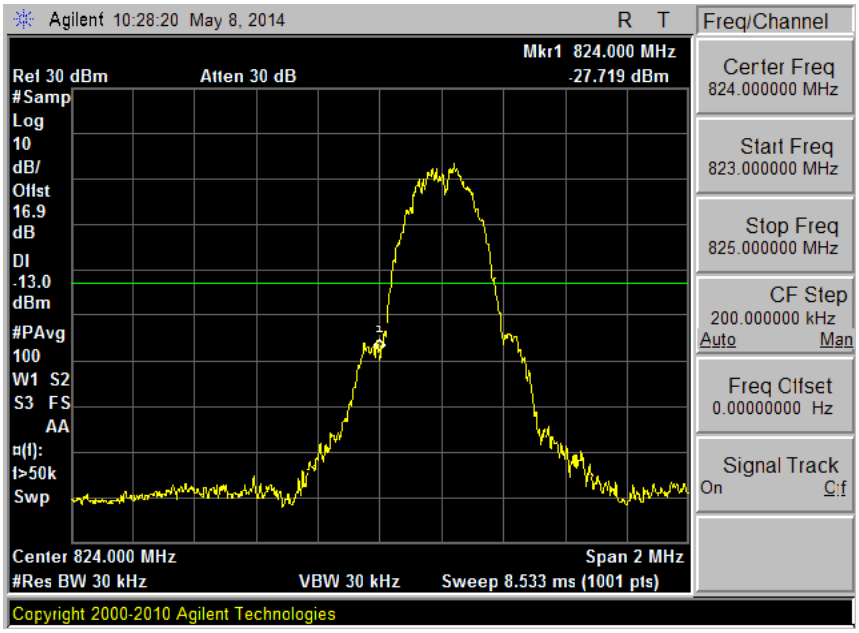
HIGH CH



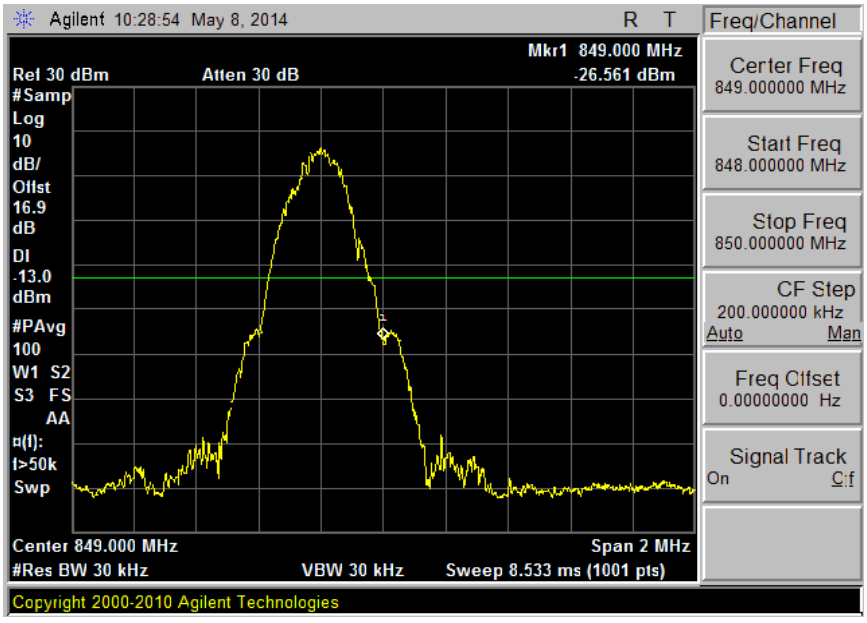
8.2.2. GSM-EGPRS

850MHz BAND

LOW CH

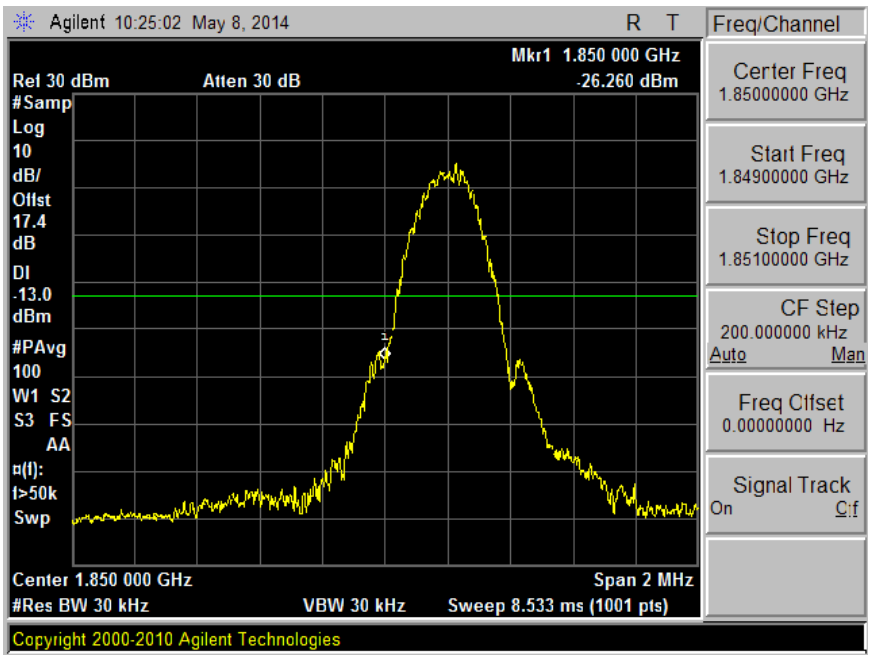


HIGH CH

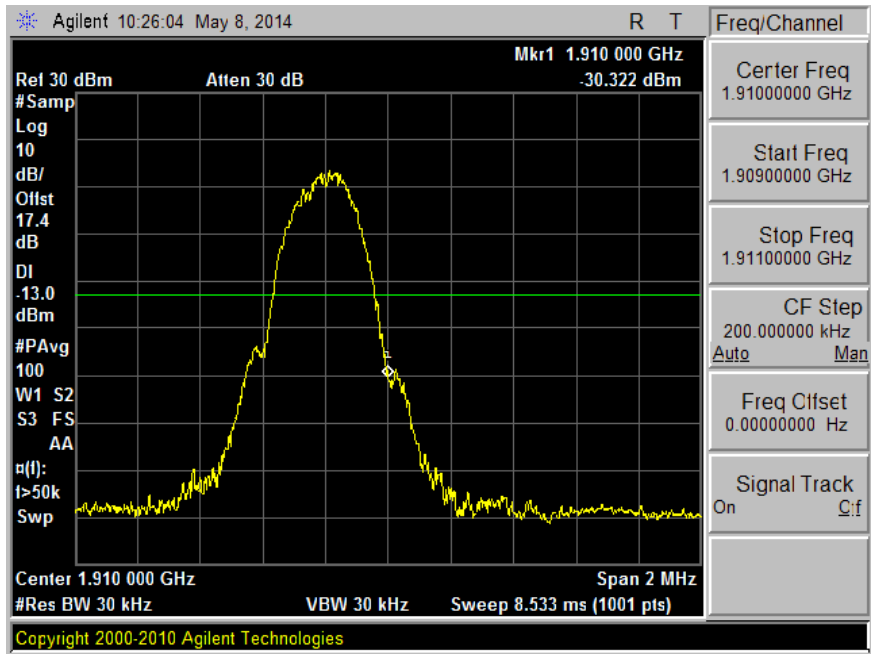


1900MHz BAND

LOW CH



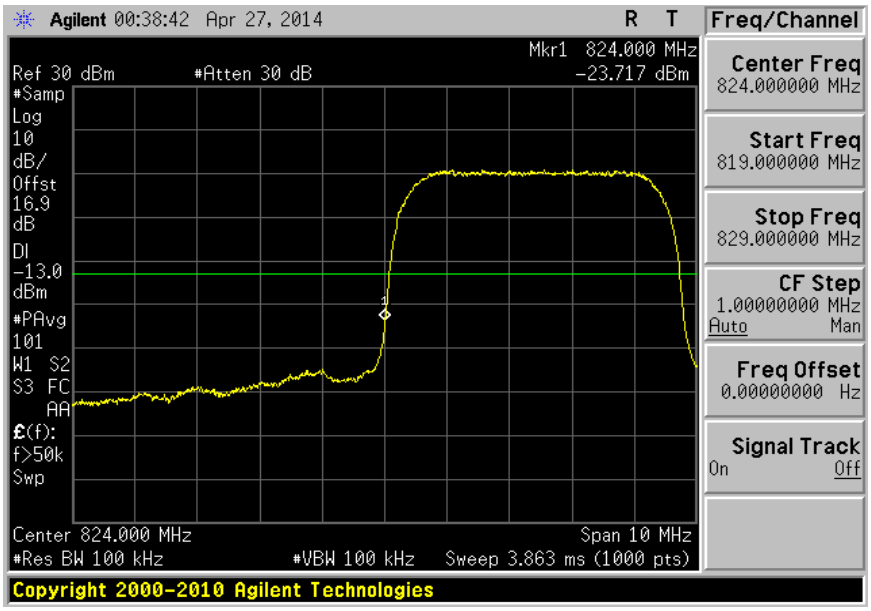
HIGH CH



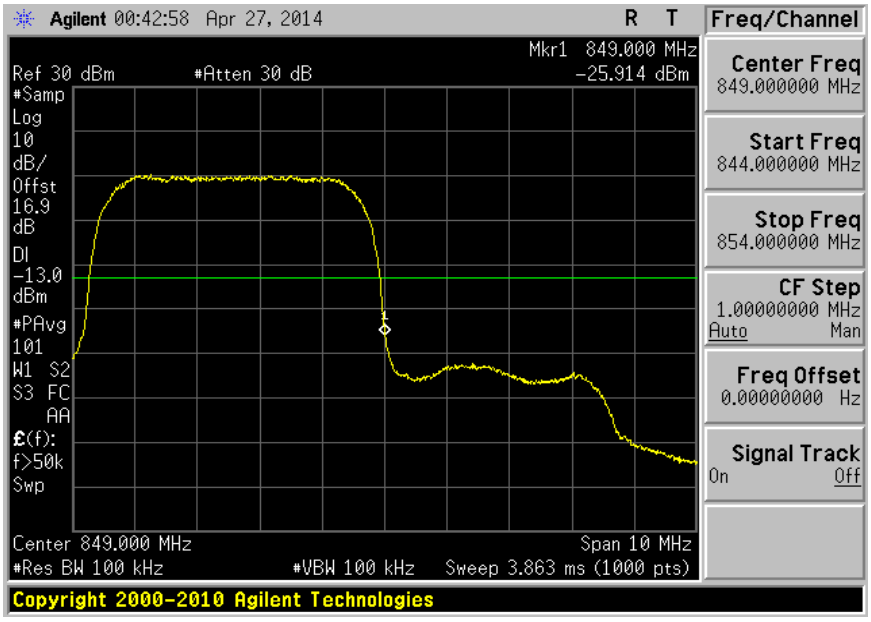
8.2.3. UMTS Rel. 99

850MHz BAND

LOW CH

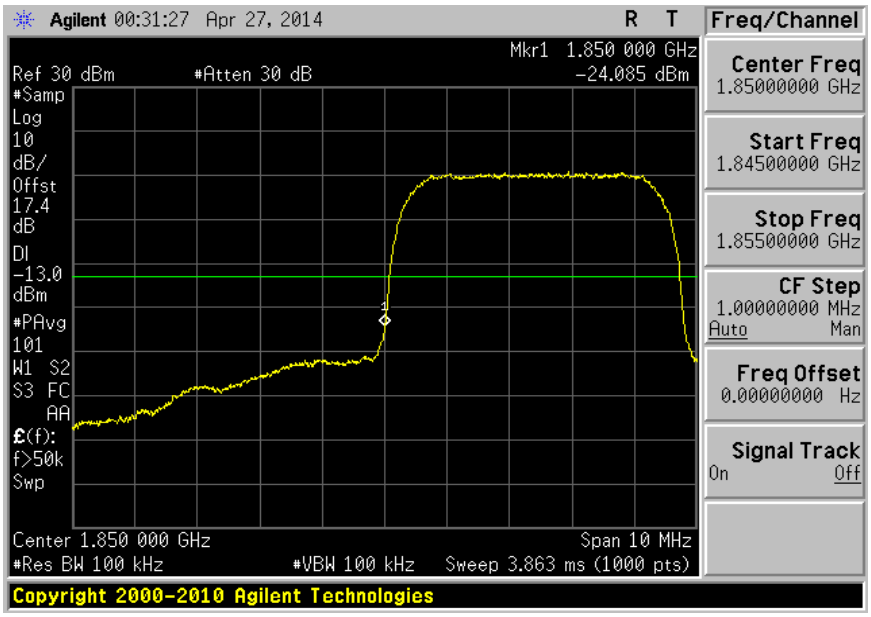


HIGH CH

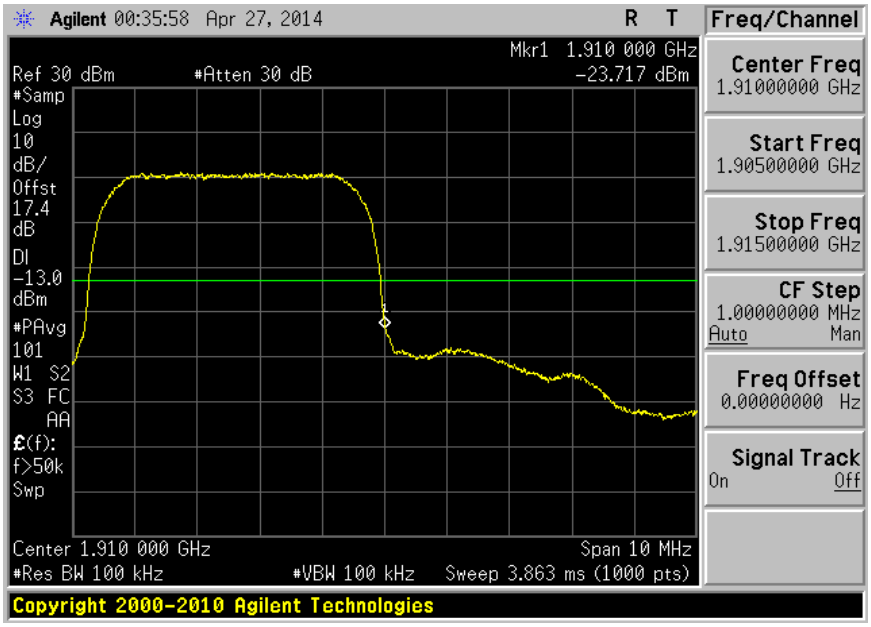


1900MHz BAND

LOW CH

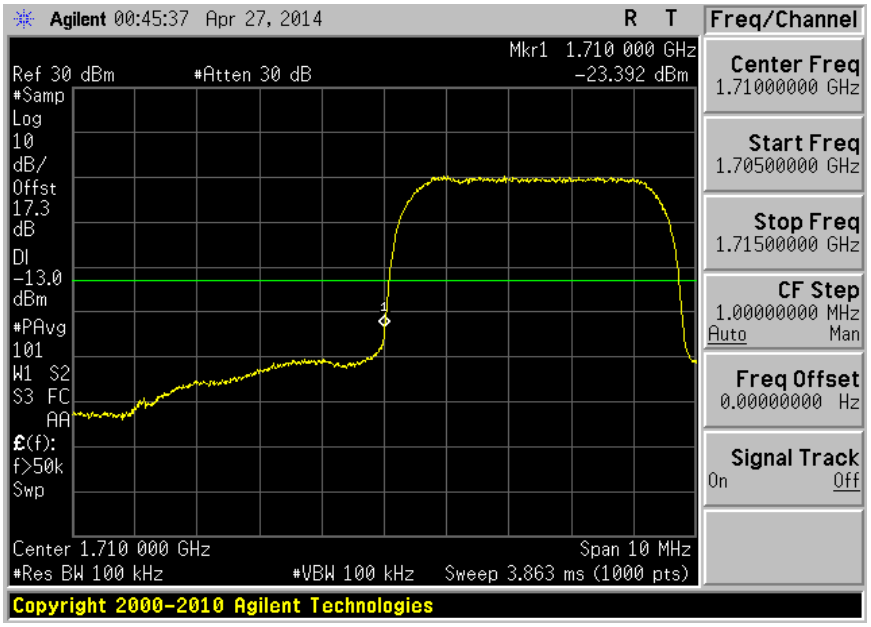


HIGH CH

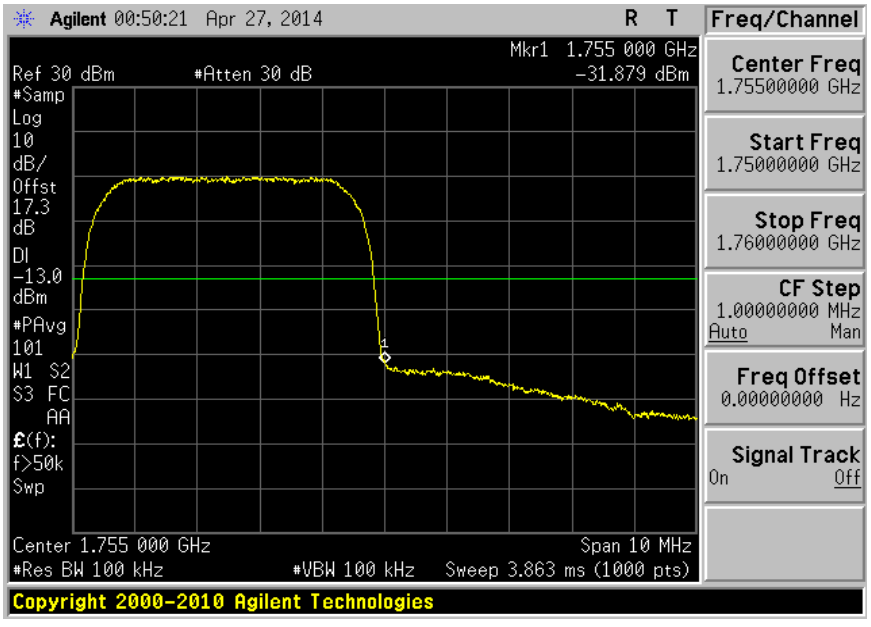


1700MHz BAND

LOW CH



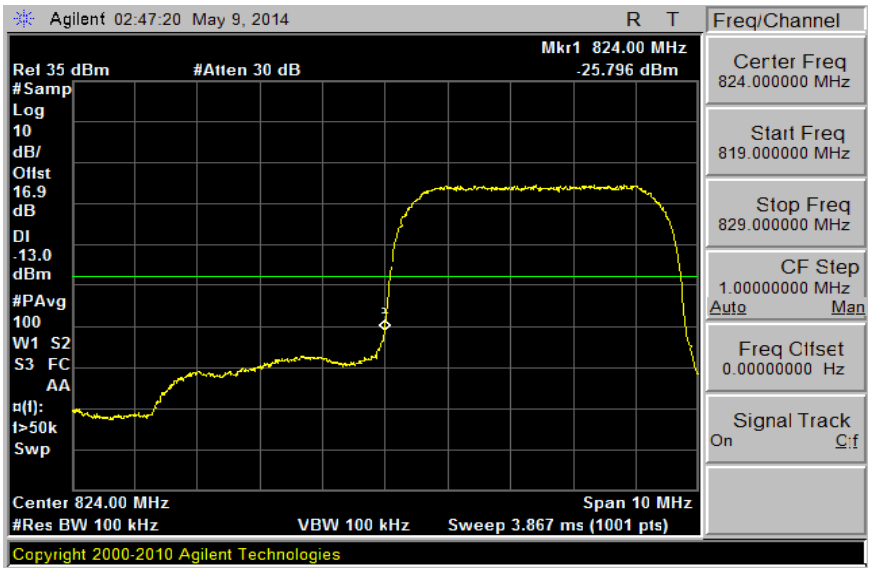
HIGH CH



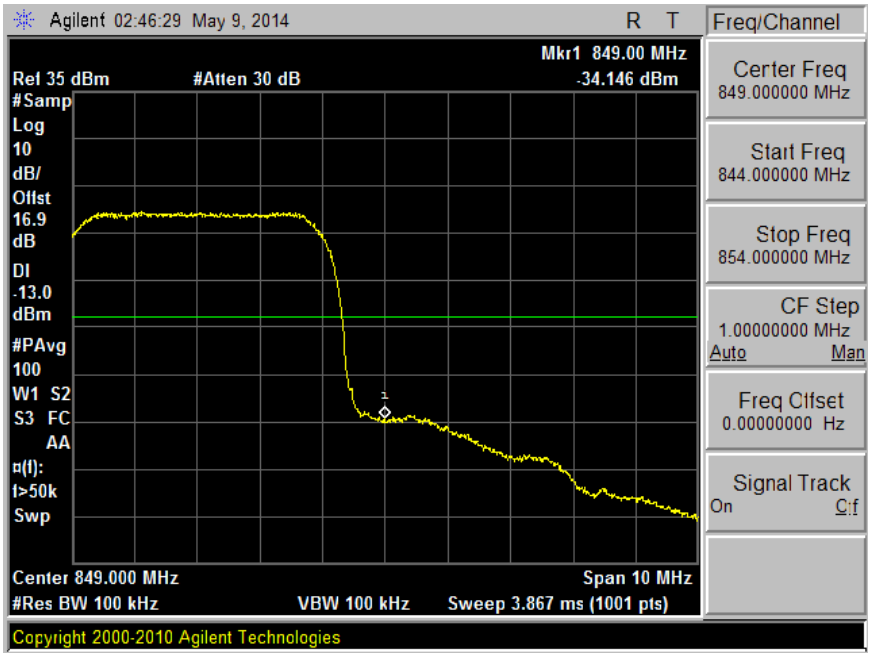
8.2.4. UMTS HSDPA

850MHz BAND

LOW CH

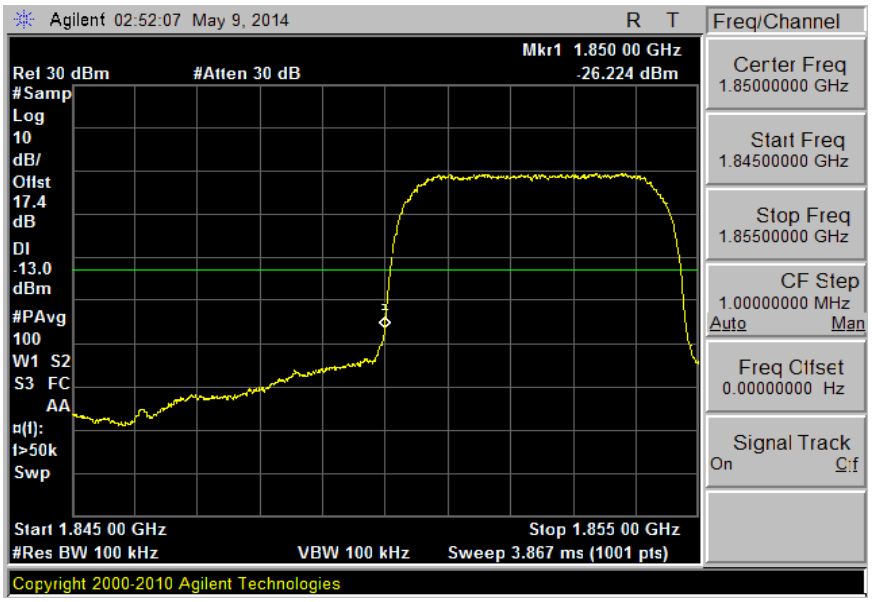


HIGH CH

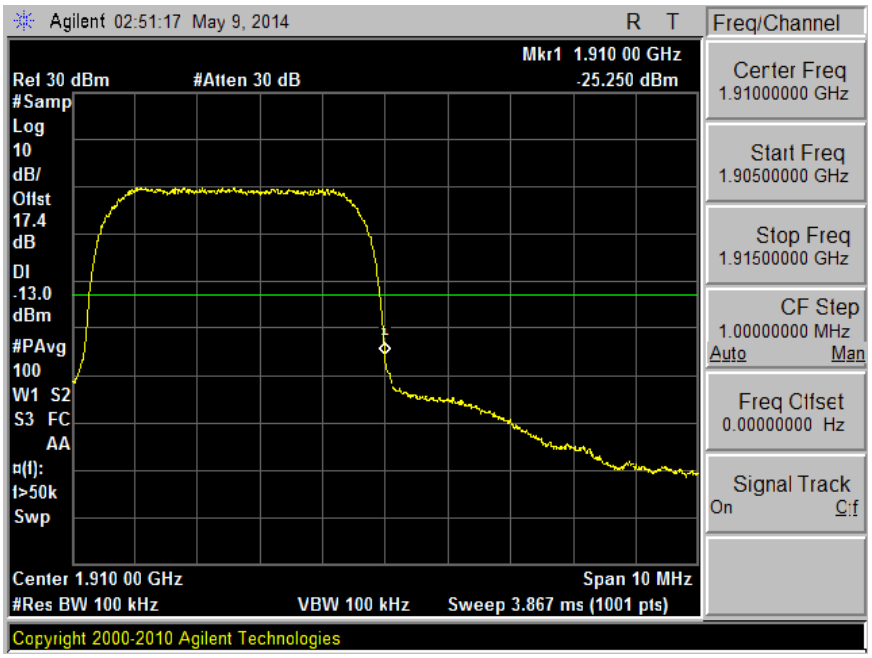


1900MHz BAND

LOW CH

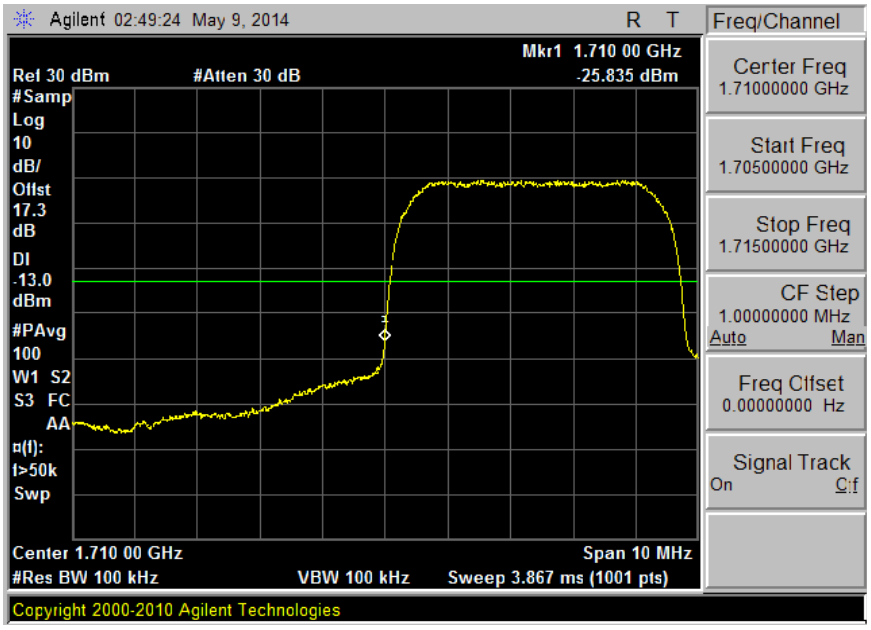


HIGH CH

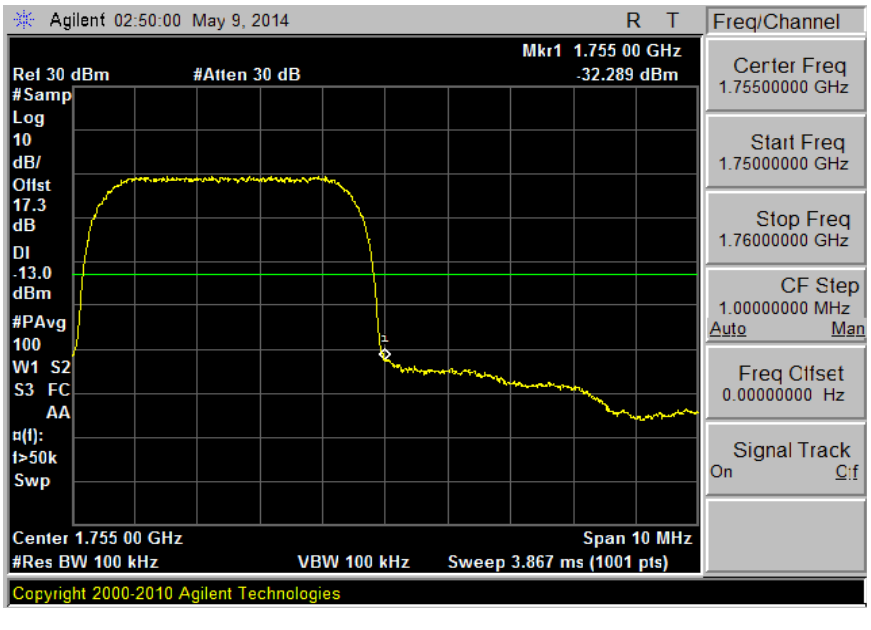


1700MHz BAND

LOW CH



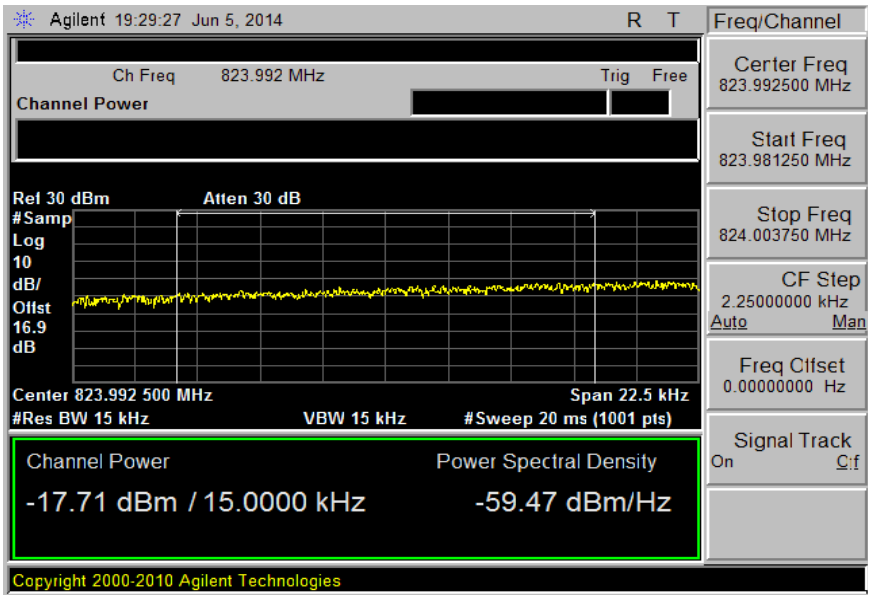
HIGH CH



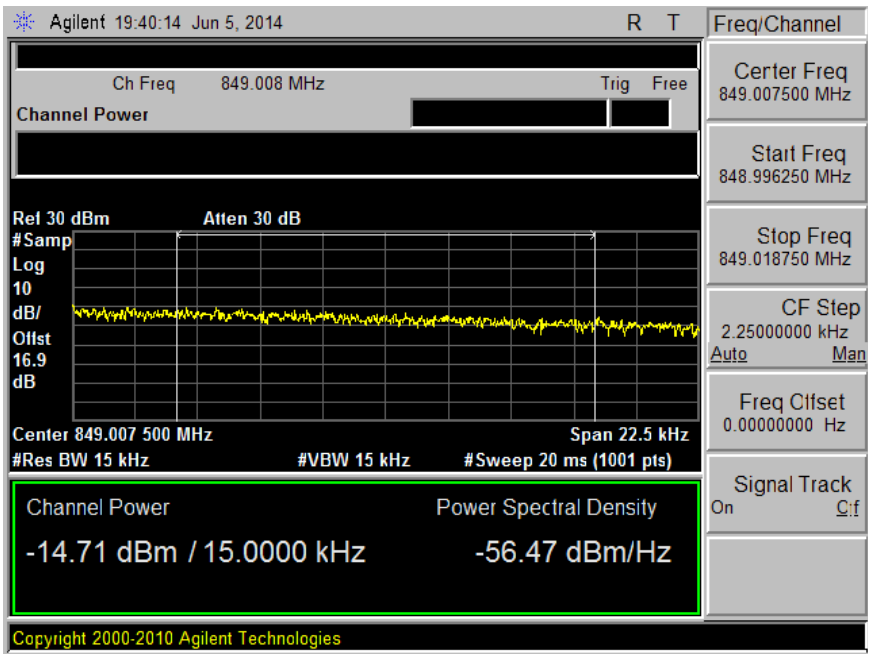
8.2.5. CDMA2000 1xRTT

850MHz BAND

LOW CH

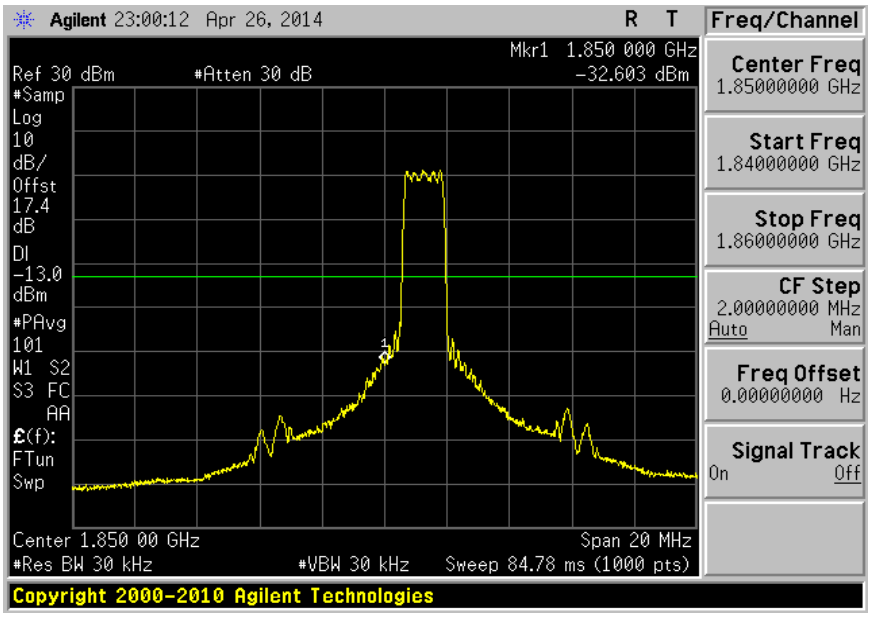


HIGH CH

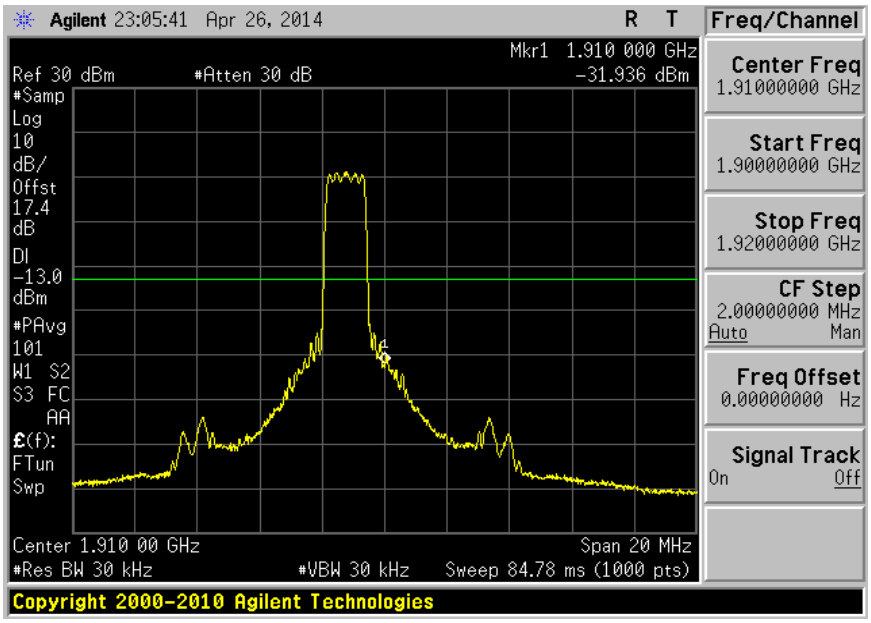


1900MHz BAND

LOW CH

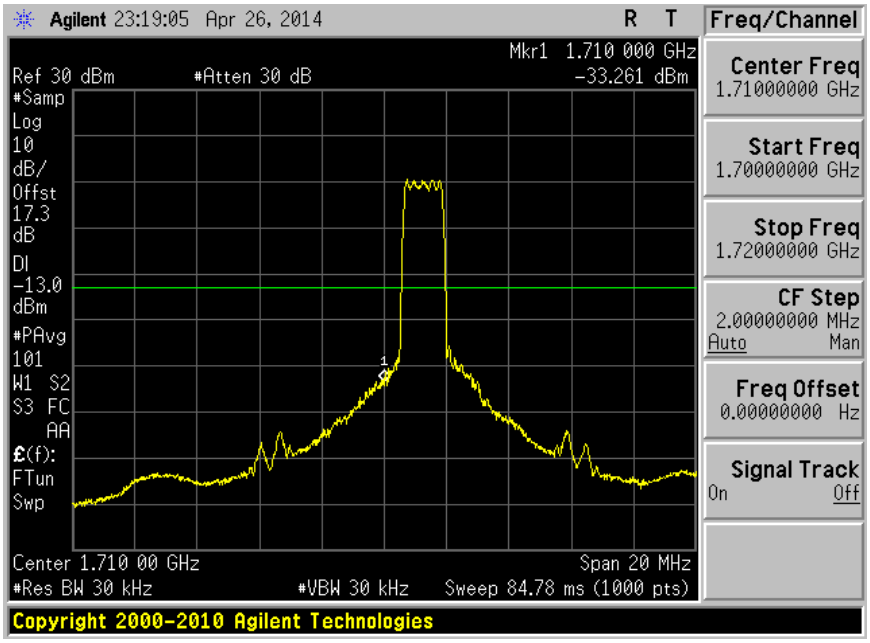


HIGH CH

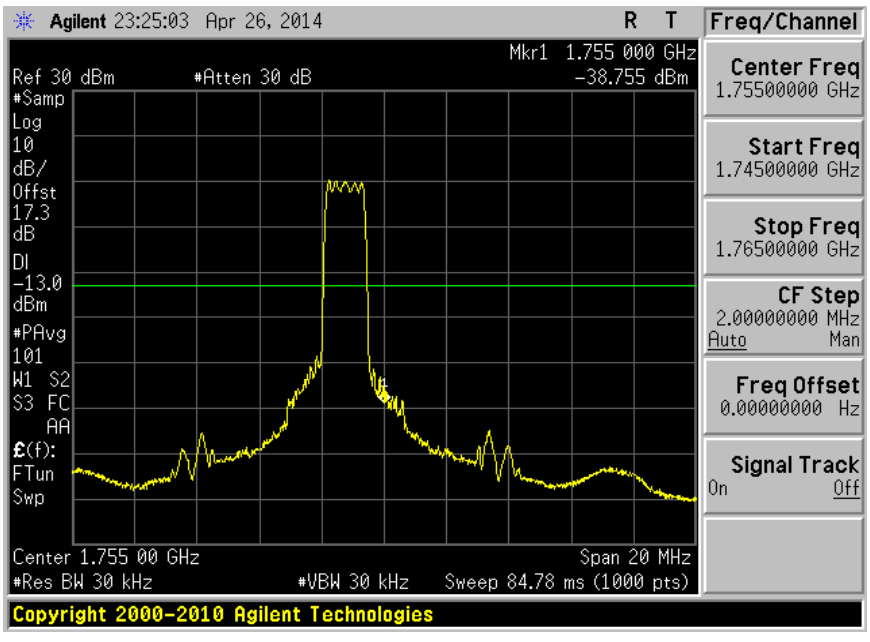


1700MHz BAND

LOW CH

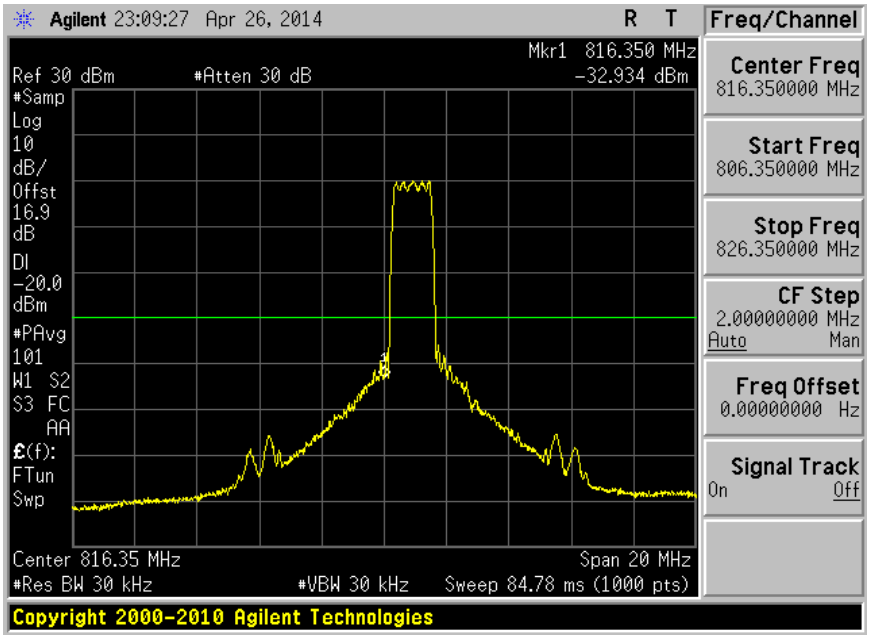


HIGH CH

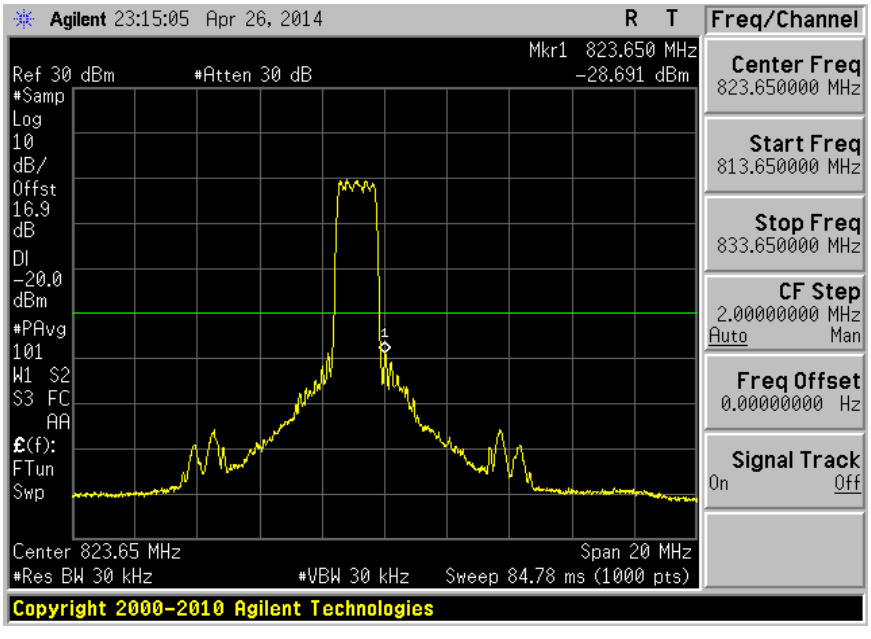


800MHz SECONDARY BAND

LOW CH

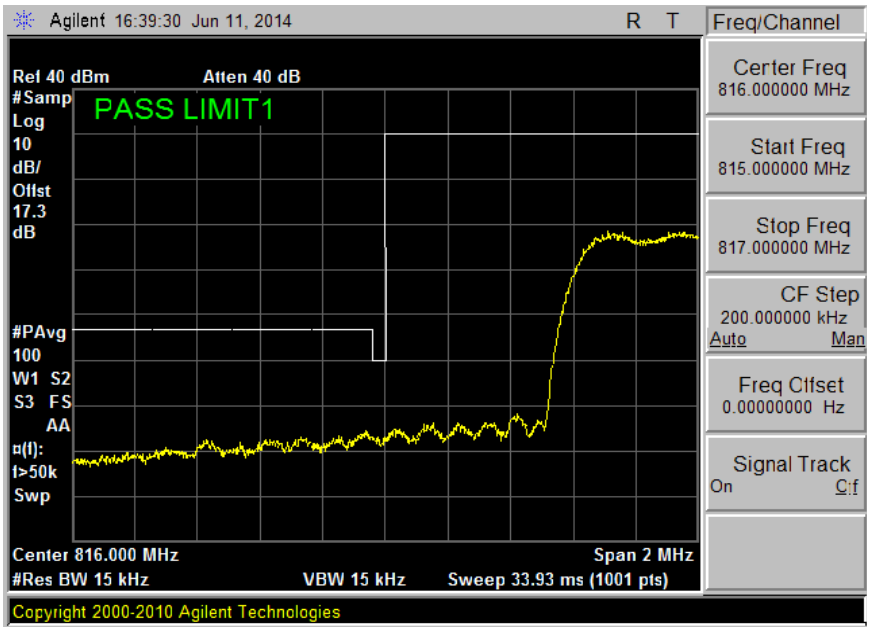


HIGH CH



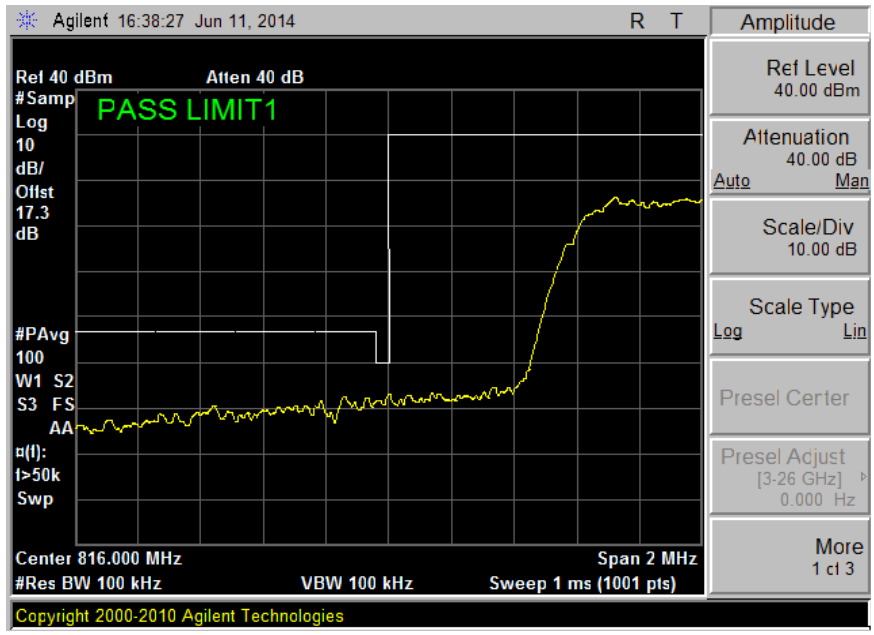
8.2.6. CDMA2000 1xRTT BC10 MASK

LOW CH



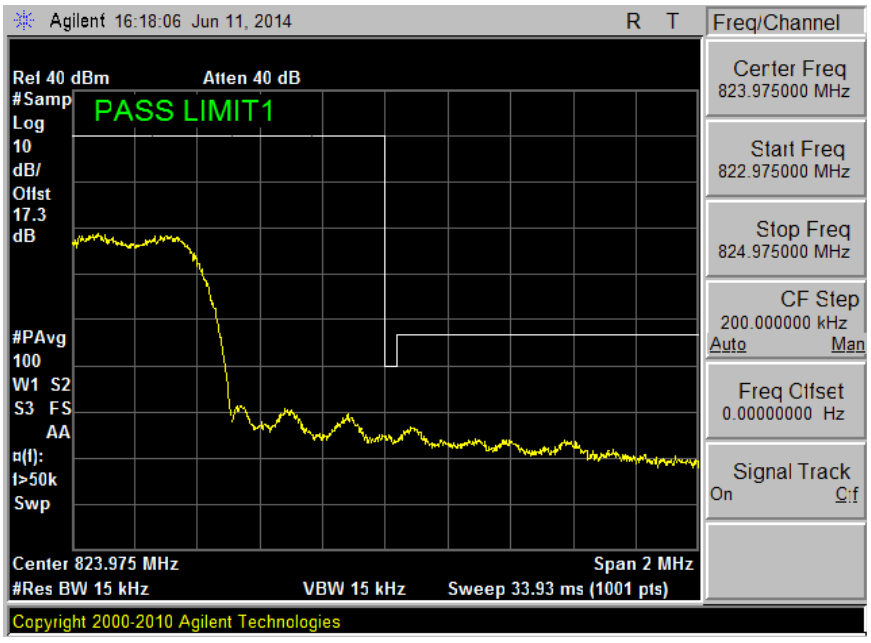
Note: RBW=1% of EBW

LOW CH



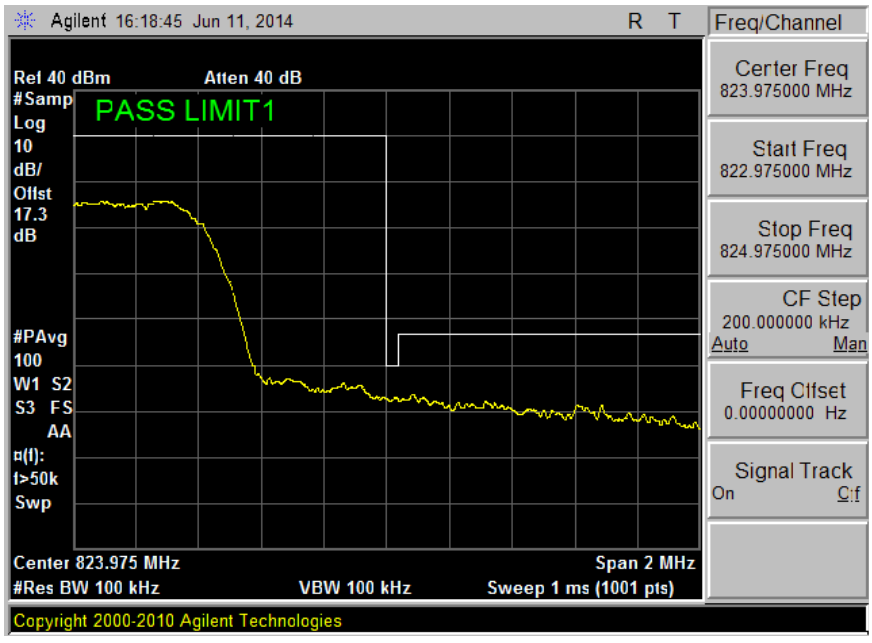
Note: RBW of 1% of 37.5KHz of outer channel frequency block

HIGH CH



Note: RBW=1% of EBW

HIGH CH

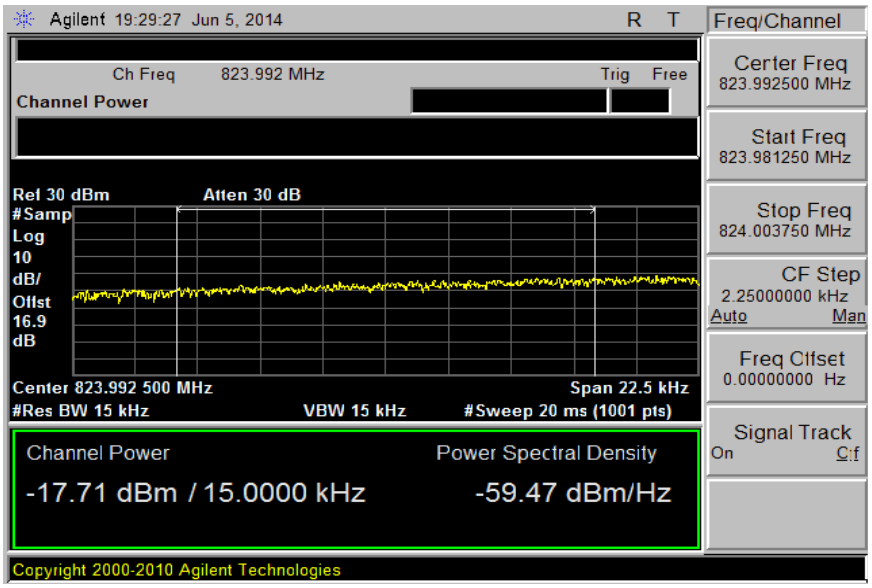


Note: RBW of 1% of 37.5KHz of outer channel frequency block

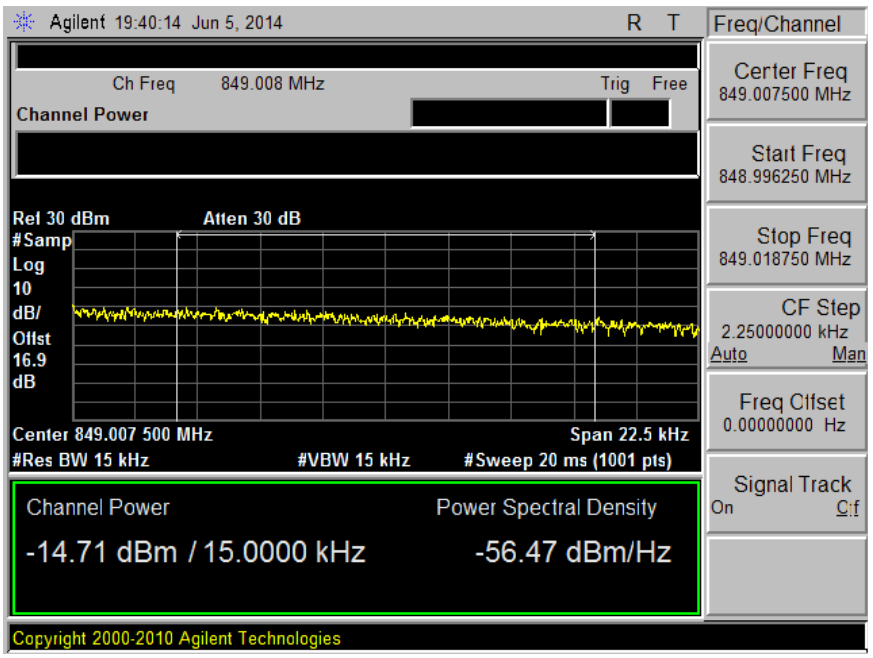
8.2.7. CDMA2000 EVDO Rev. A

850MHz BAND

LOW CH



HIGH CH



1900MHz BAND

LOW CH

HIGH CH

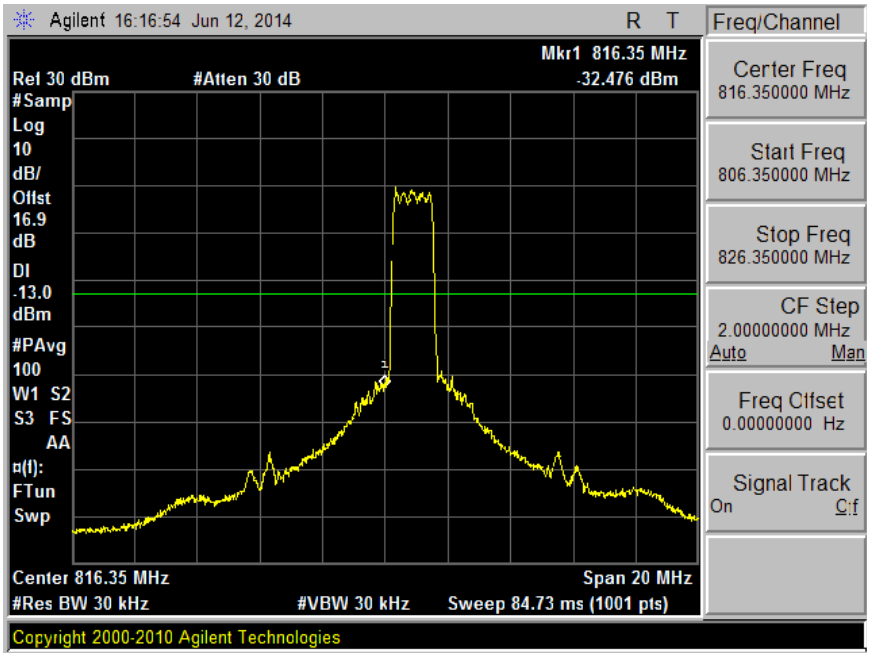
1700MHz BAND

LOW CH

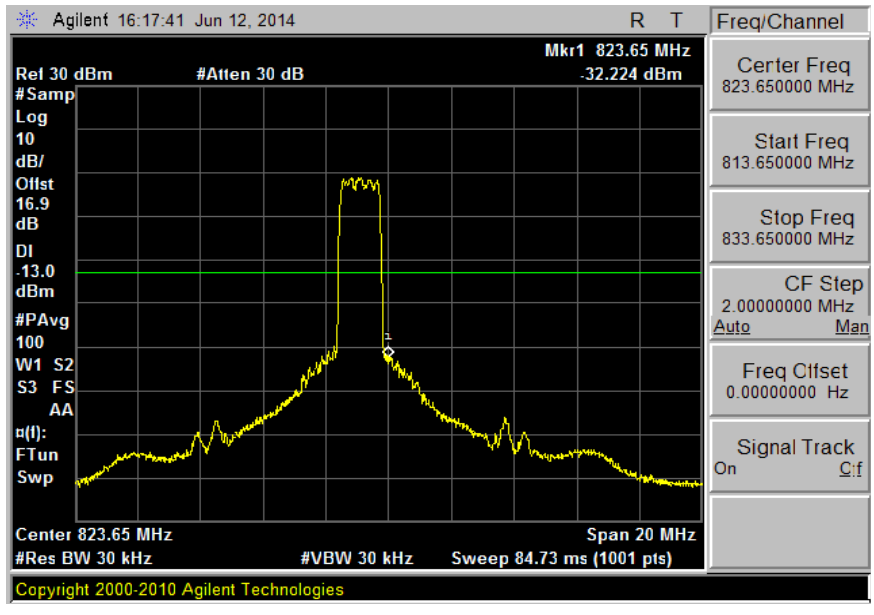
HIGH CH

800MHz SECONDARY BAND

LOW CH

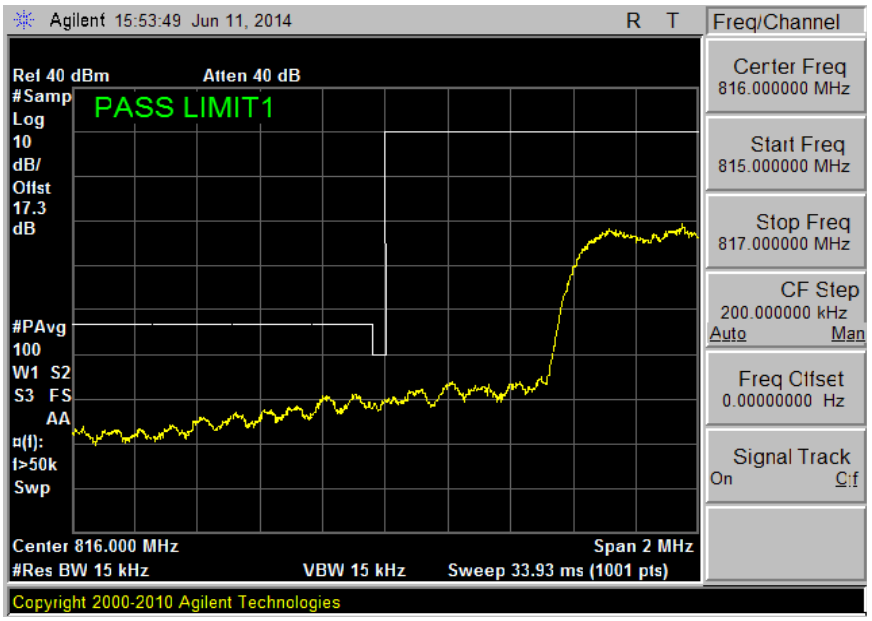


HIGH CH



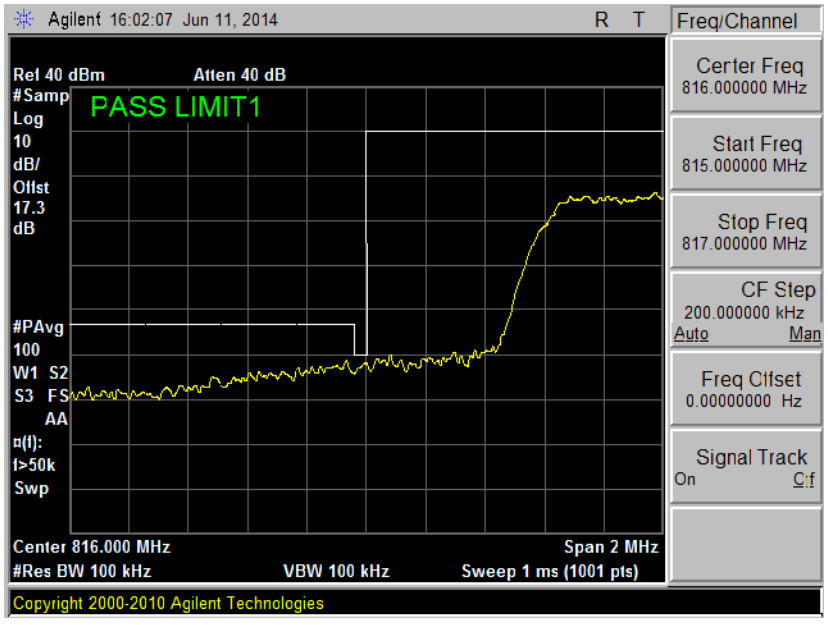
8.2.8. CDMA2000 EVDO REVA BC10 MASK

LOW CH



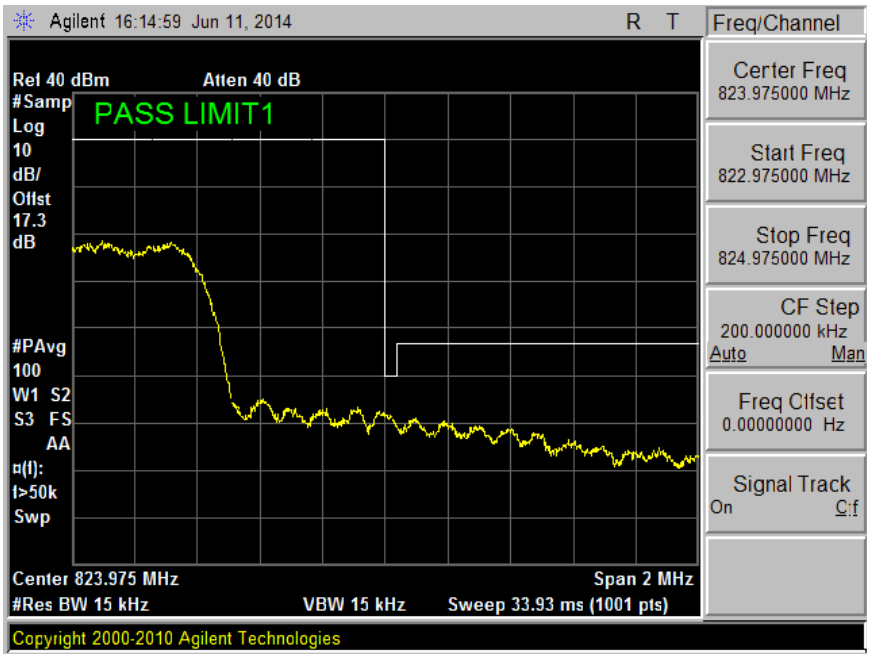
Note: RBW=1% of EBW

LOW CH



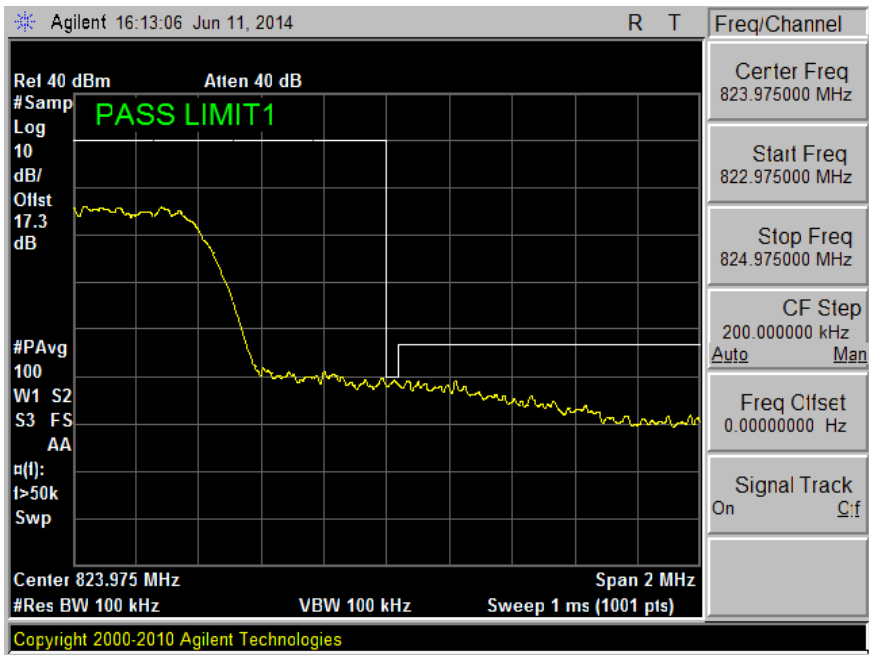
Note: RBW of 1% of 37.5KHz of outer channel frequency block

HIGH CH



Note: RBW=1% of EBW

HIGH CH



Note: RBW of 1% of 37.5KHz of outer channel frequency block

8.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238, §27.53 §90.691

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

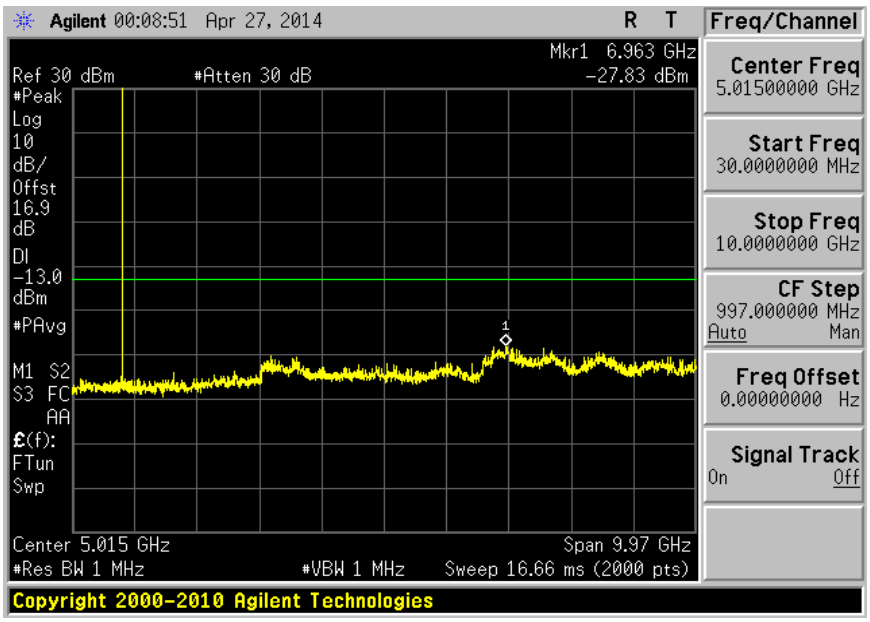
- GPRS and EGPRS
- UMTS, REL 99 and HSDPA
- CDMA2000, BC0, BC1 BC10 and BC15

RESULTS

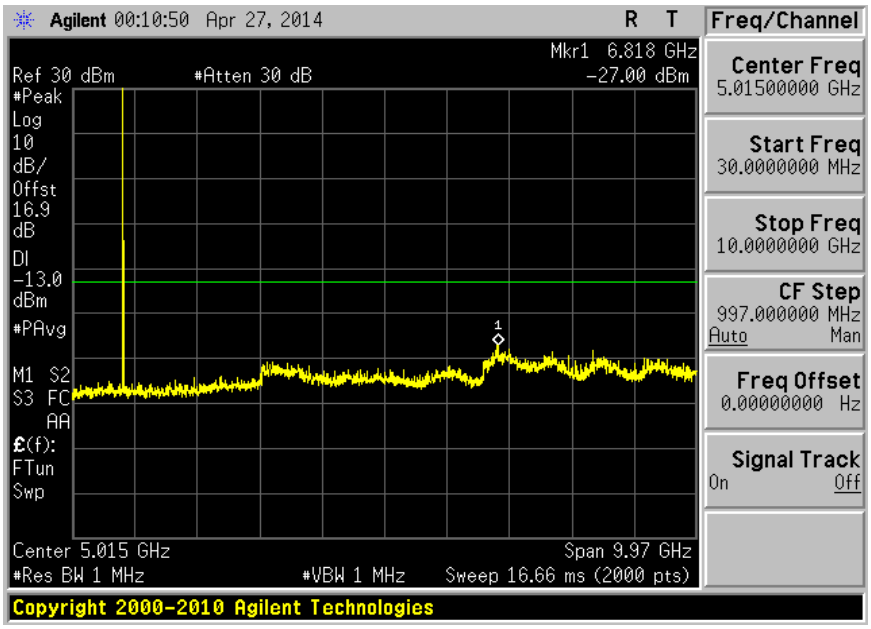
8.3.1. GSM-GPRS

850MHz BAND

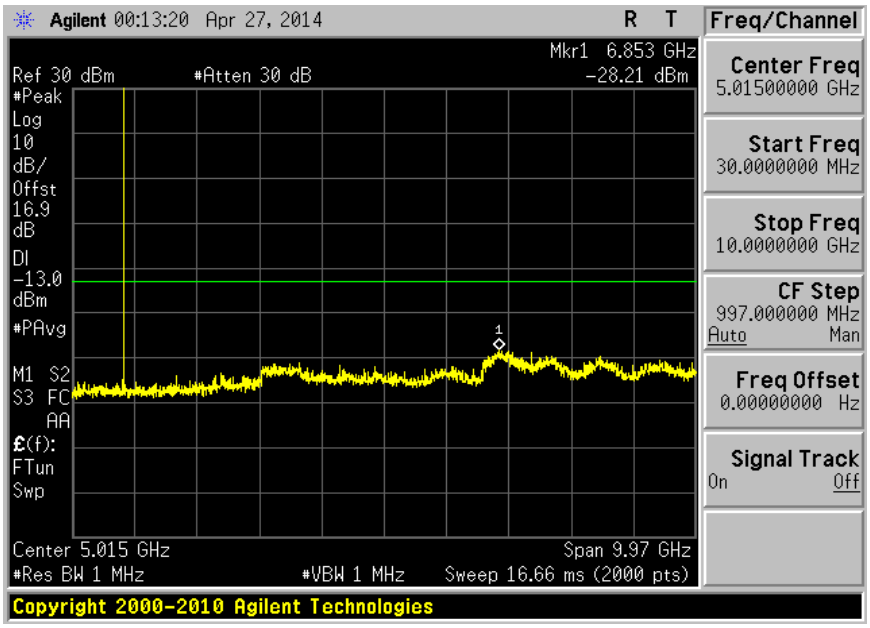
LOW CH



MID CH

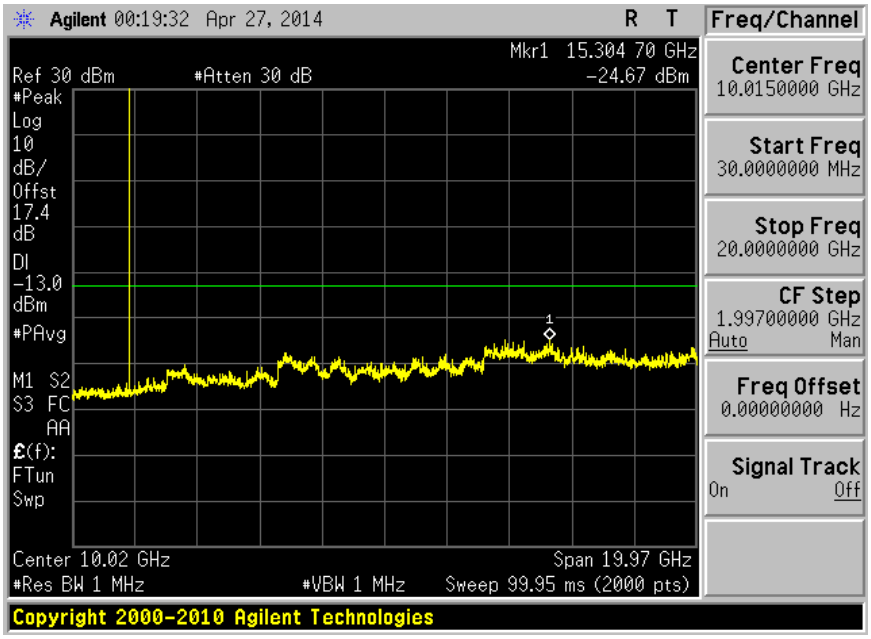


HIGH CH

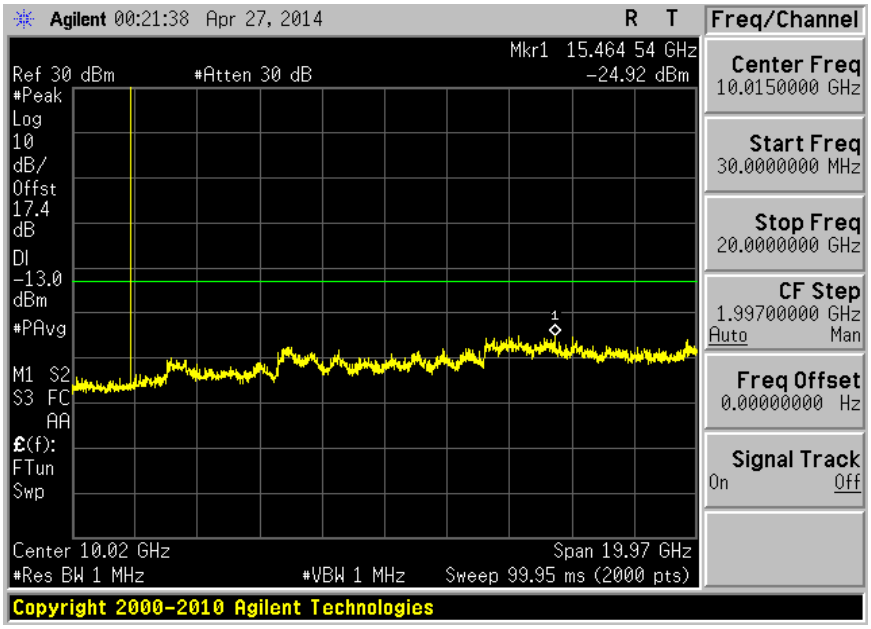


1900MHz BAND

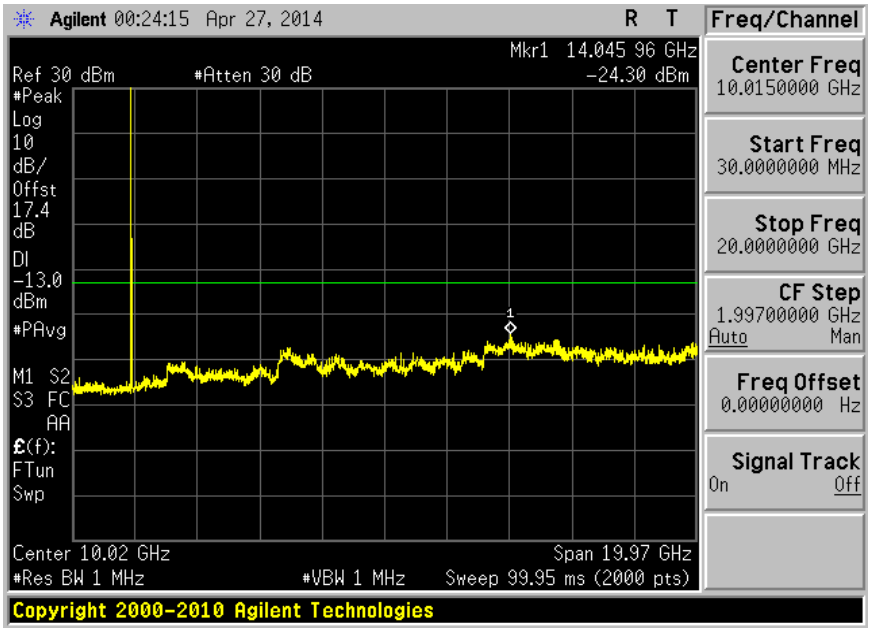
LOW CH



MID CH



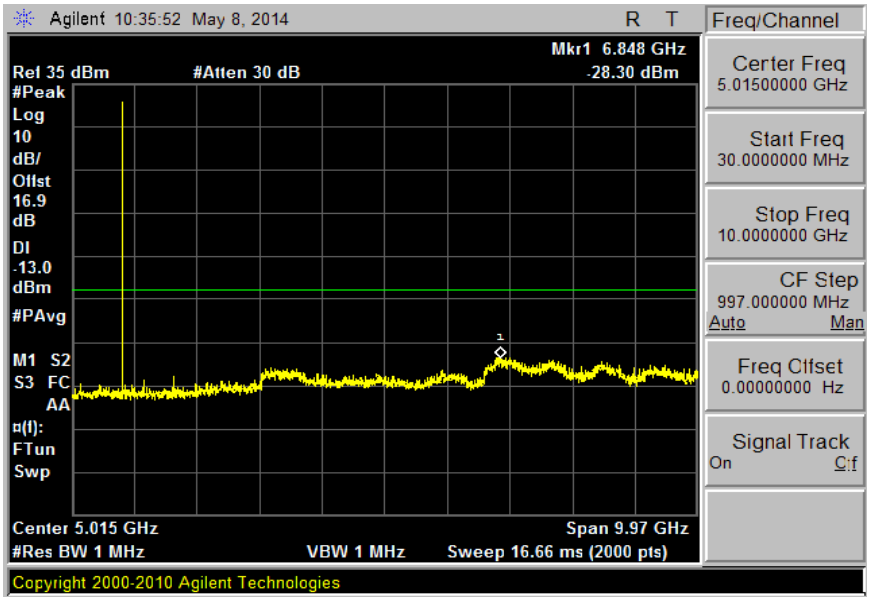
HIGH CH



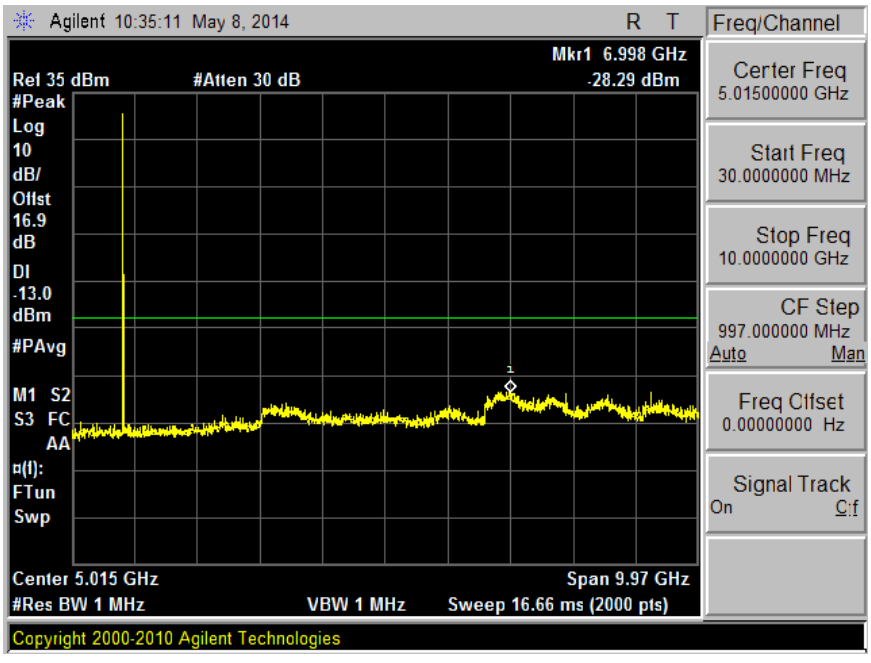
8.3.2. GSM-EGPRS

850MHz BAND

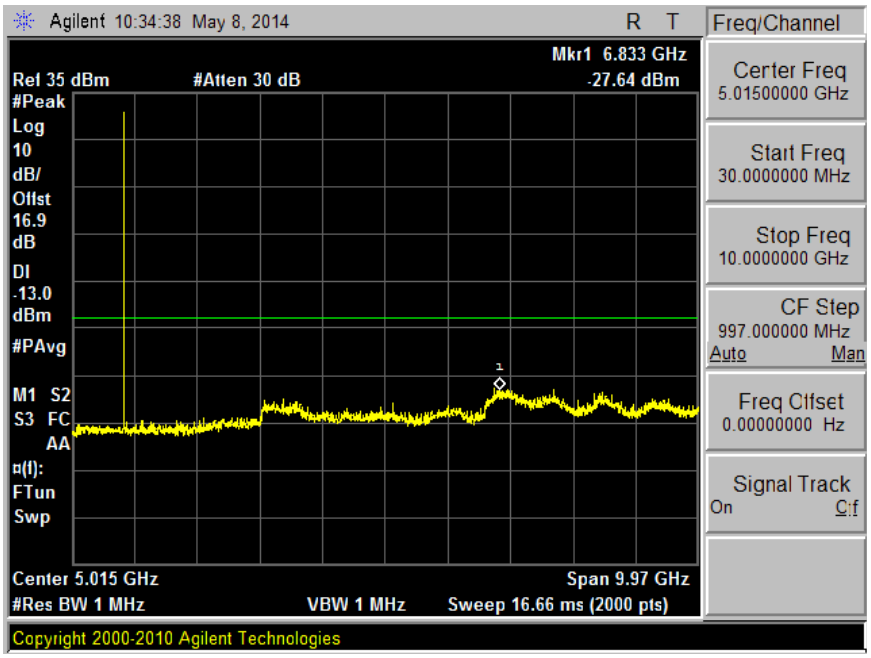
LOW CH



MID CH

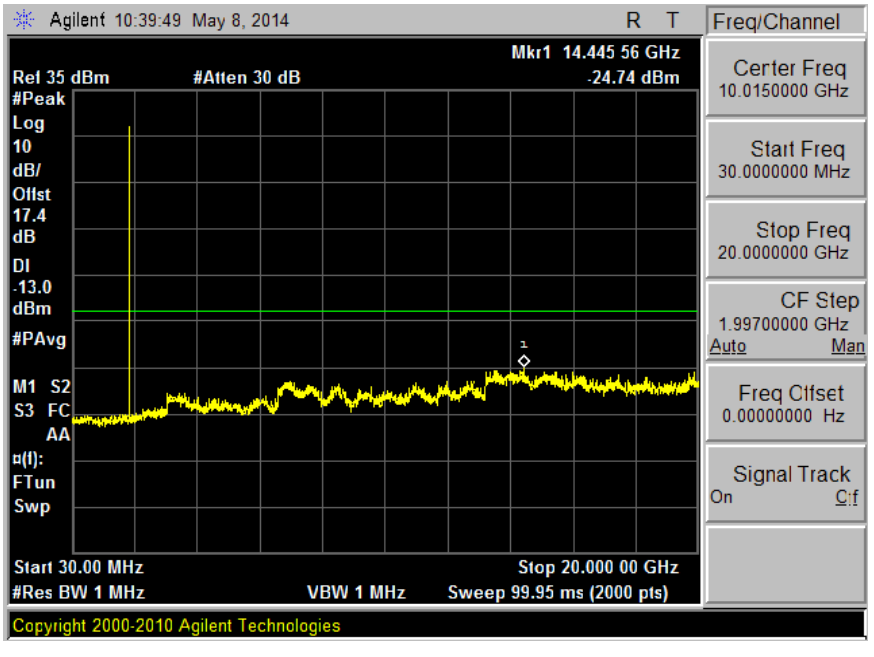


HIGH CH

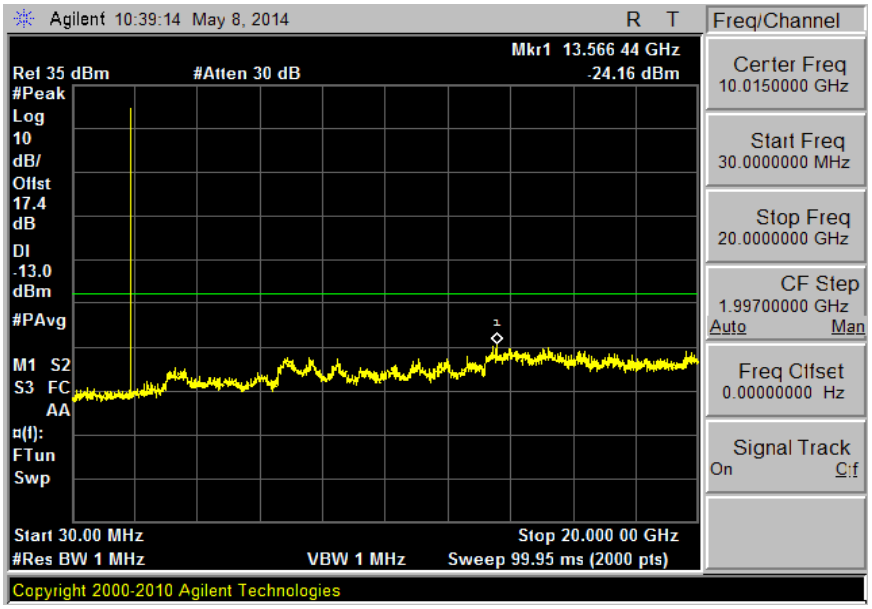


1900MHz BAND

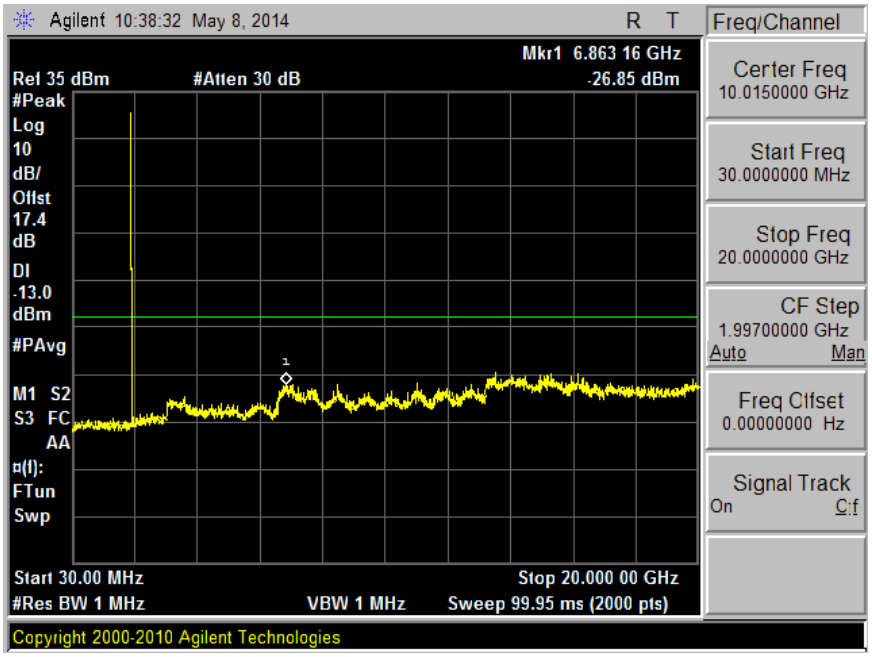
LOW CH



MID CH



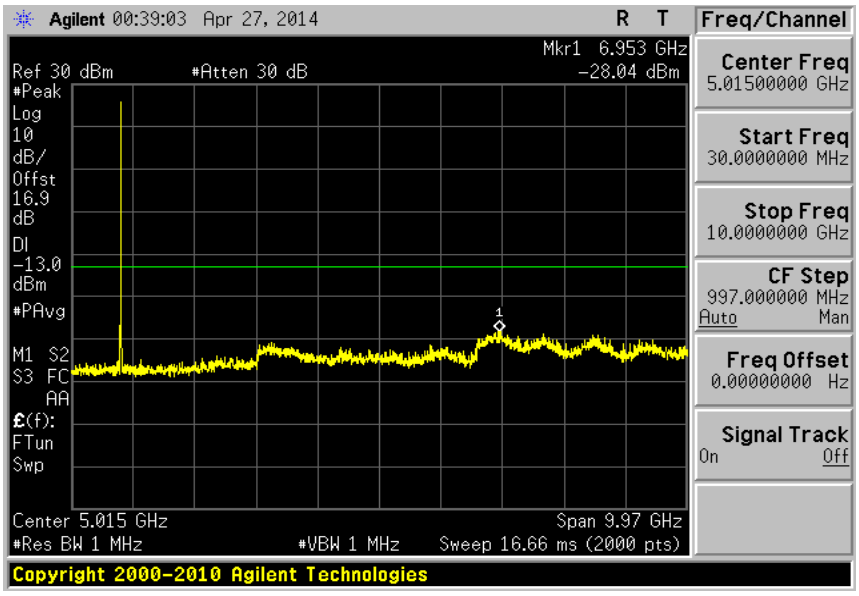
HIGH CH



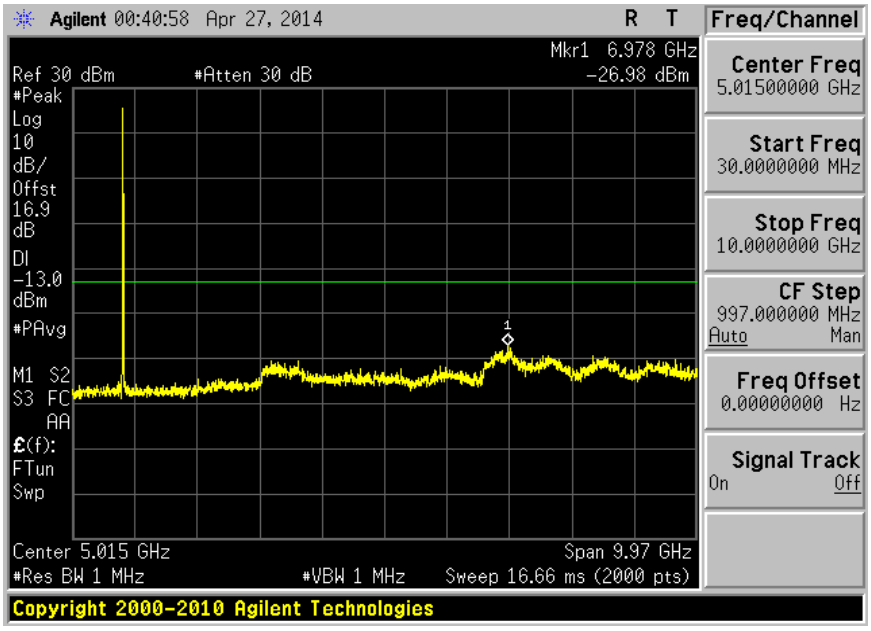
8.3.3. UMTS Rel. 99

850MHz BAND

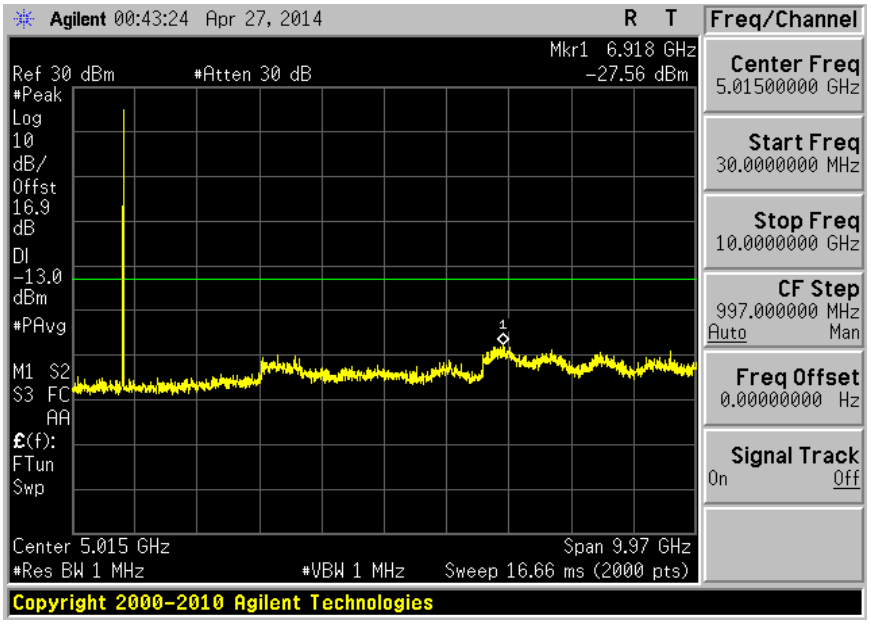
LOW CH



MID CH

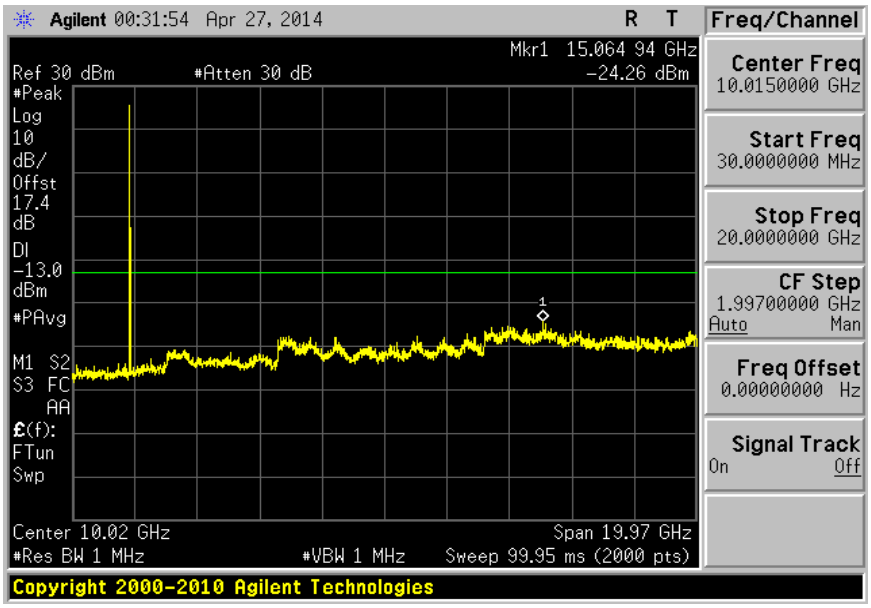


HIGH CH

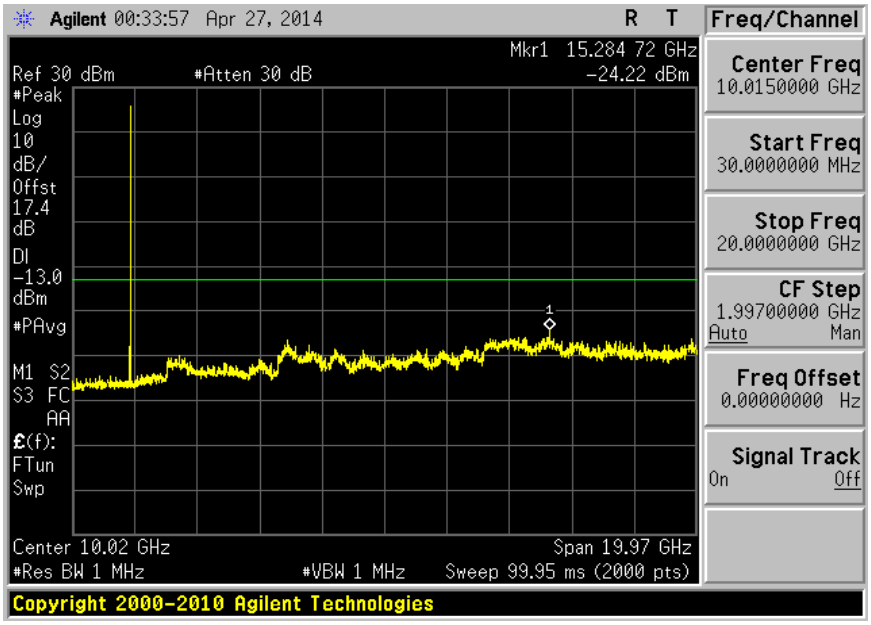


1900MHz BAND

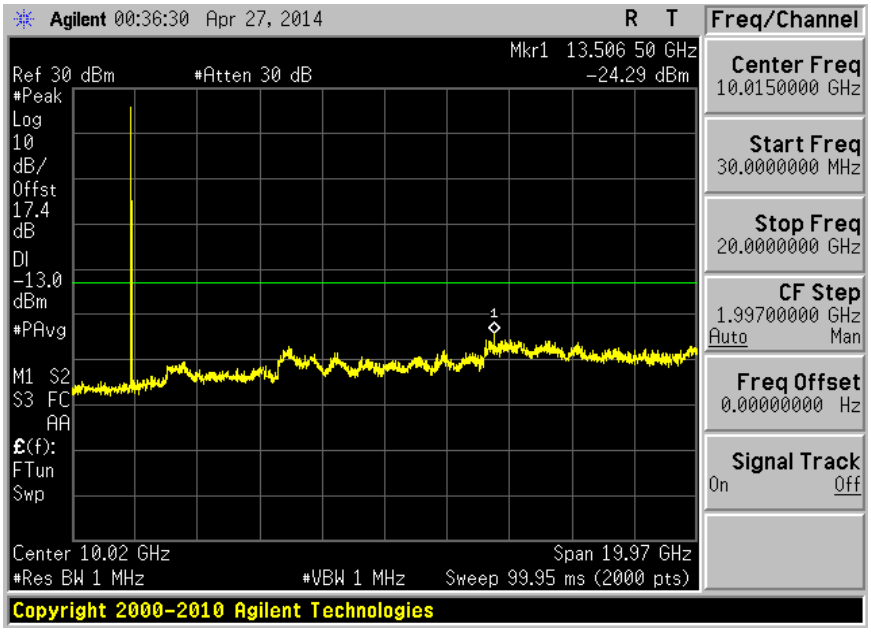
LOW CH



MID CH

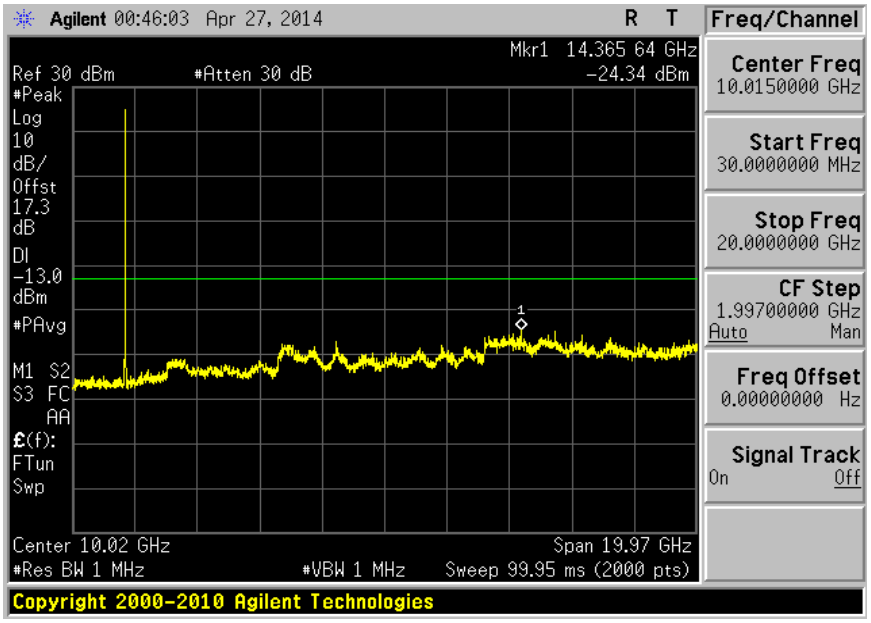


HIGH CH

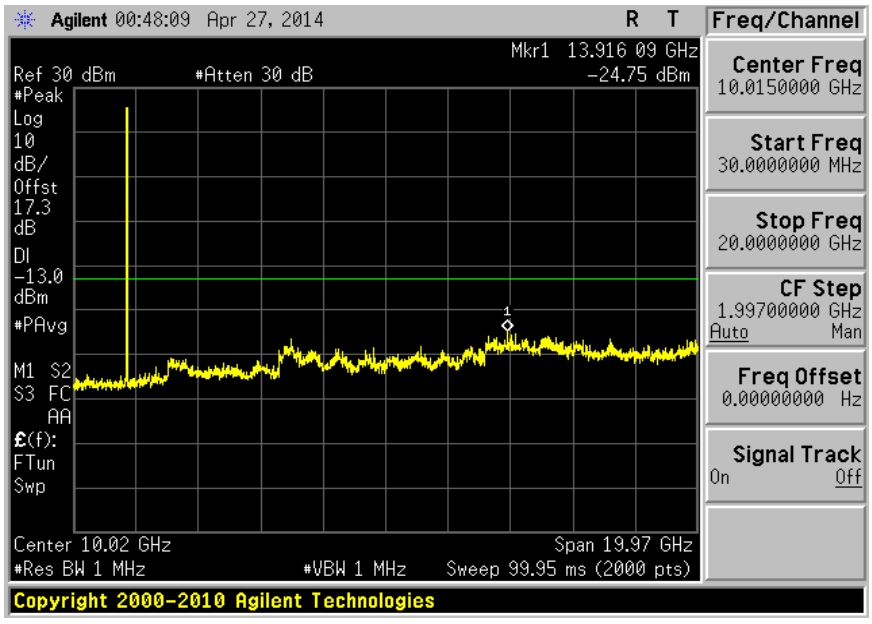


1700MHz BAND

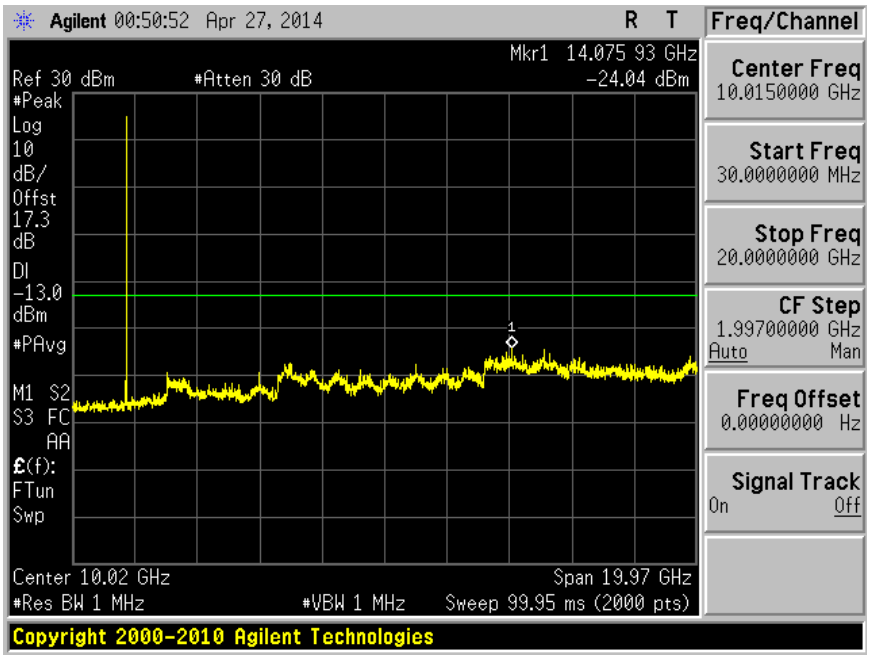
LOW CH



MID CH



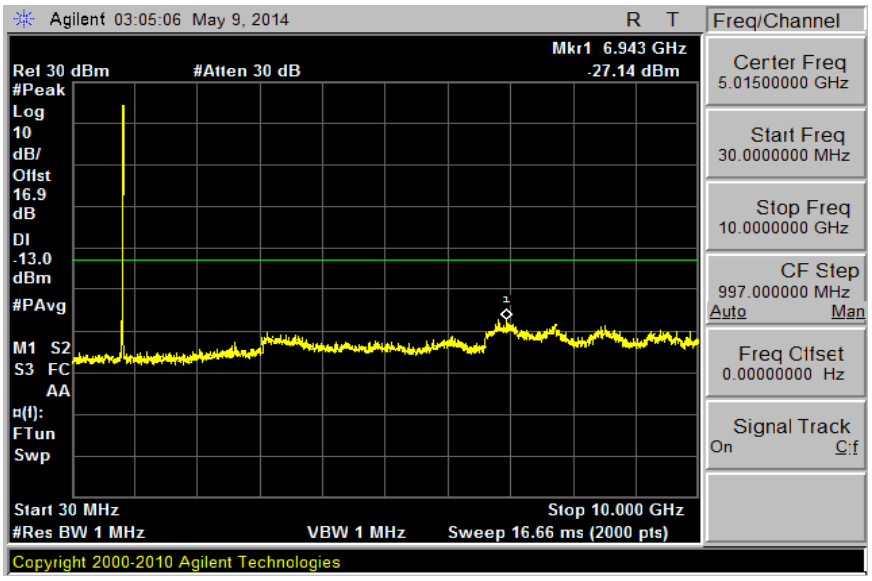
HIGH CH



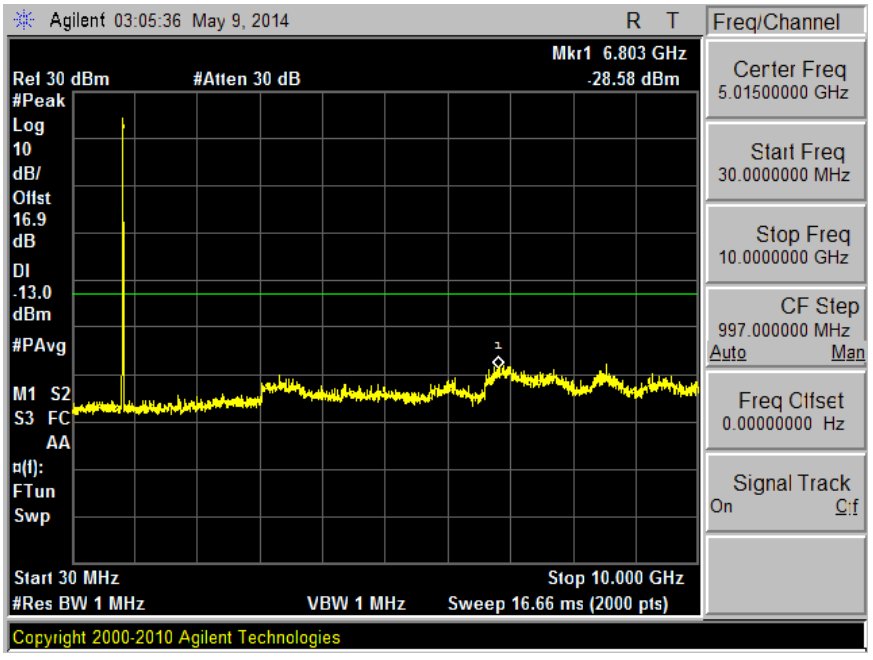
8.3.4. UMTS HSDPA

850MHz BAND

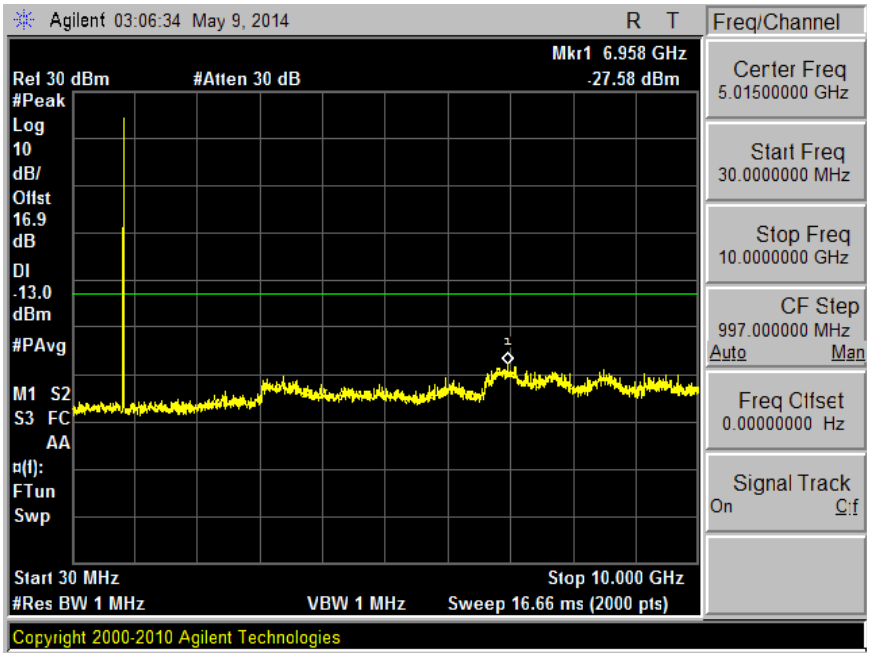
LOW CH



MID CH

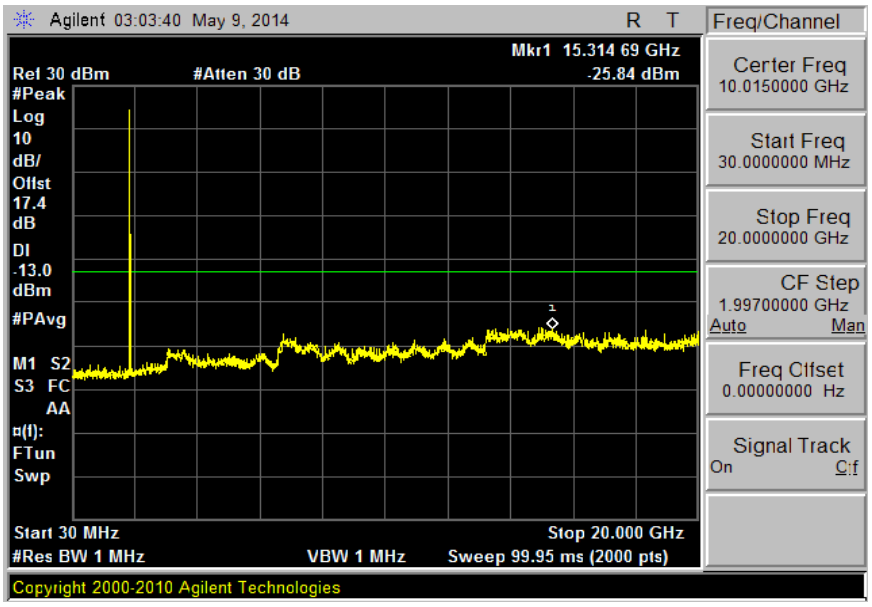


HIGH CH

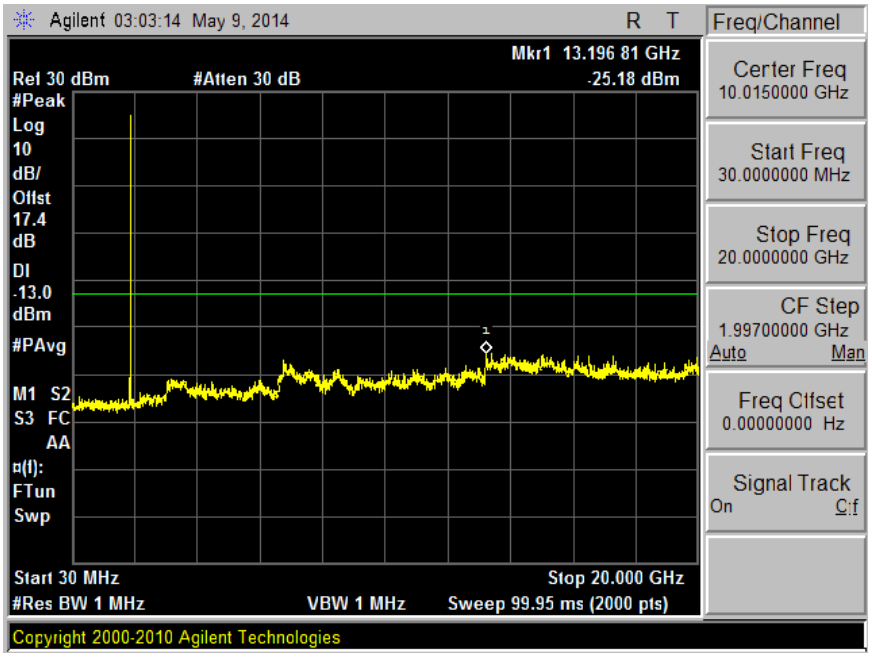


1900MHz BAND

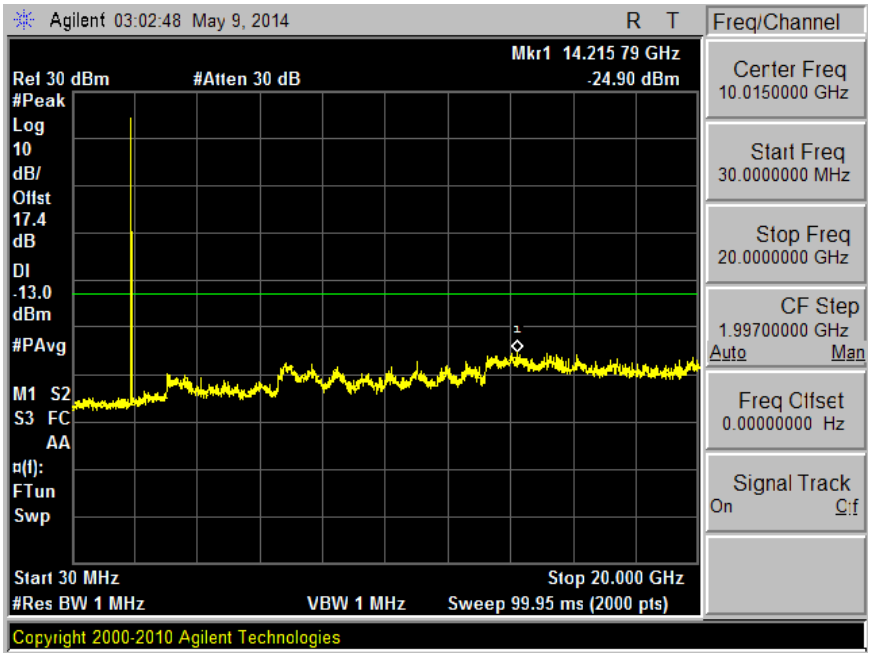
LOW CH



MID CH

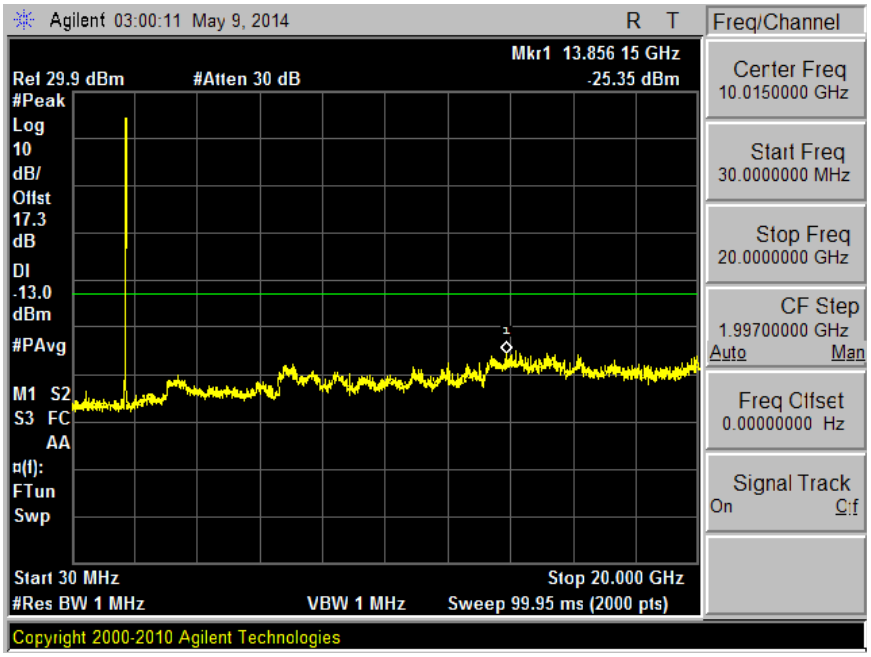


HIGH CH

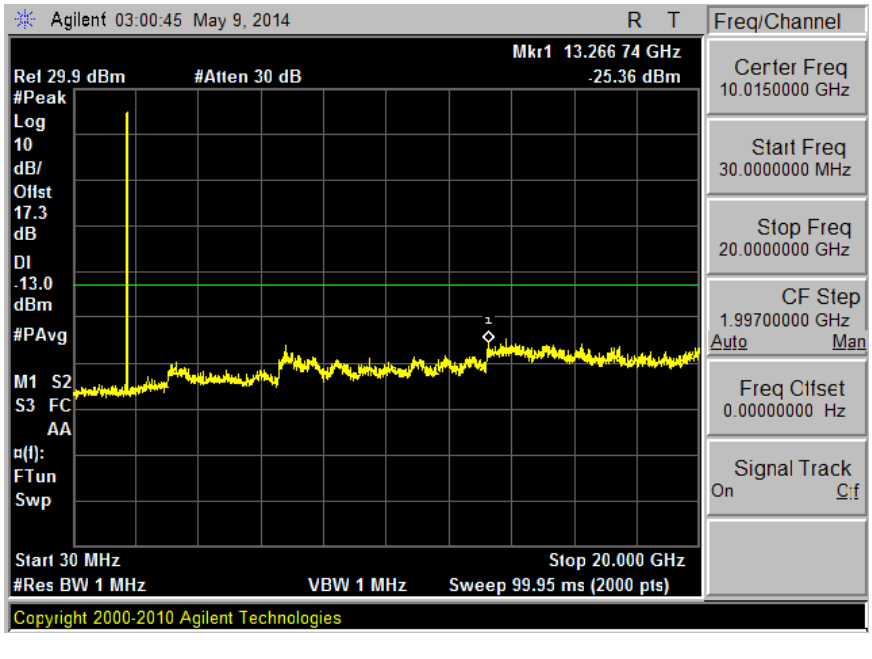


1700MHz BAND

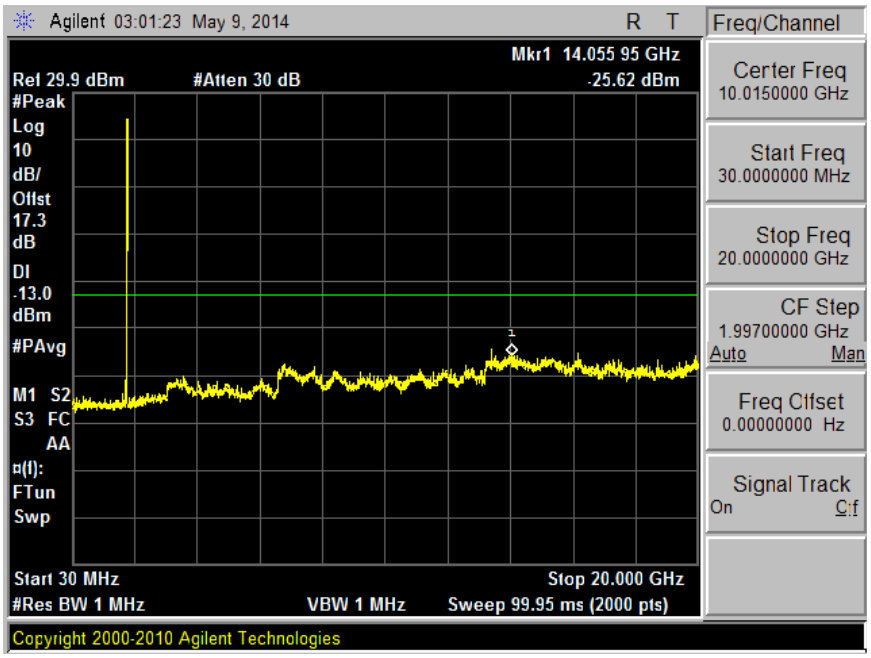
LOW CH



MID CH



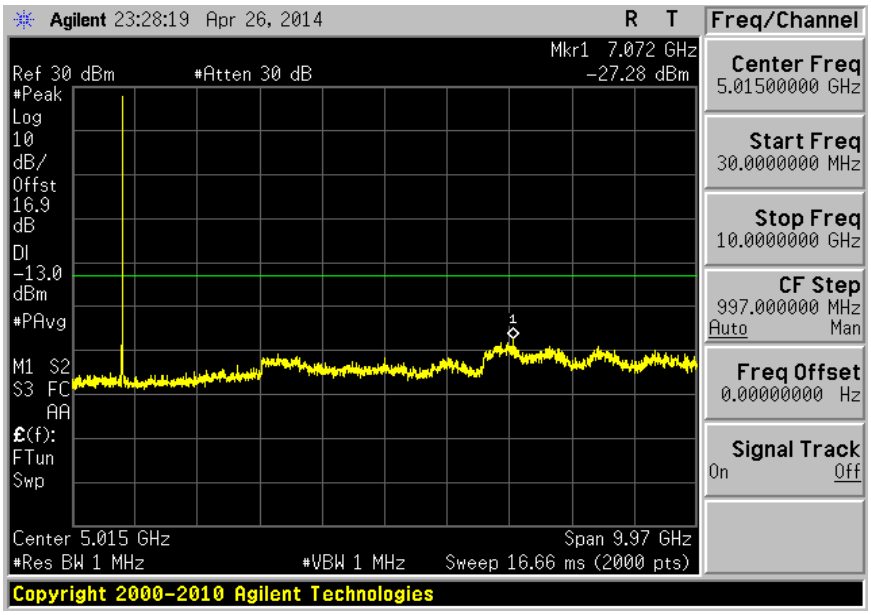
HIGH CH



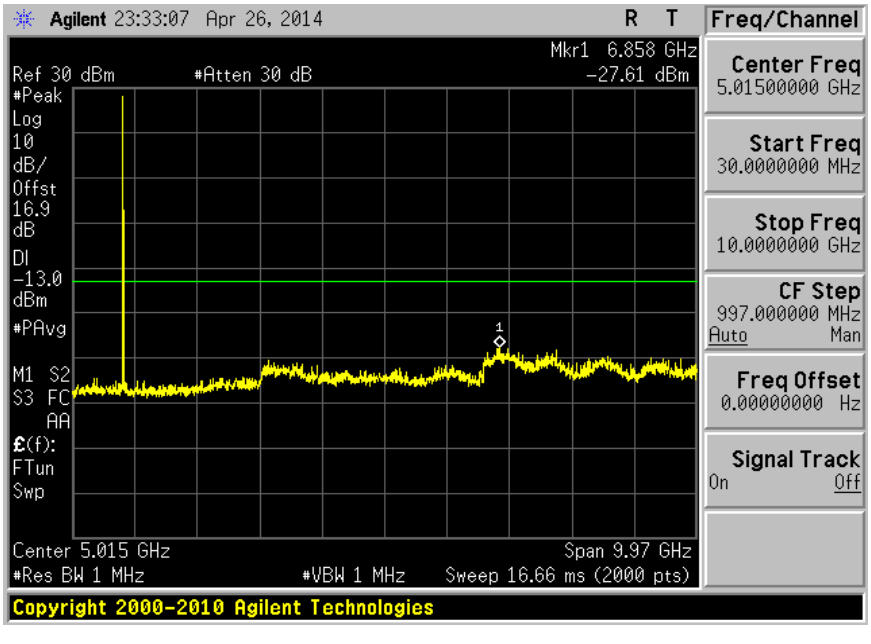
8.3.5. CDMA2000 1xRTT

850MHz BAND

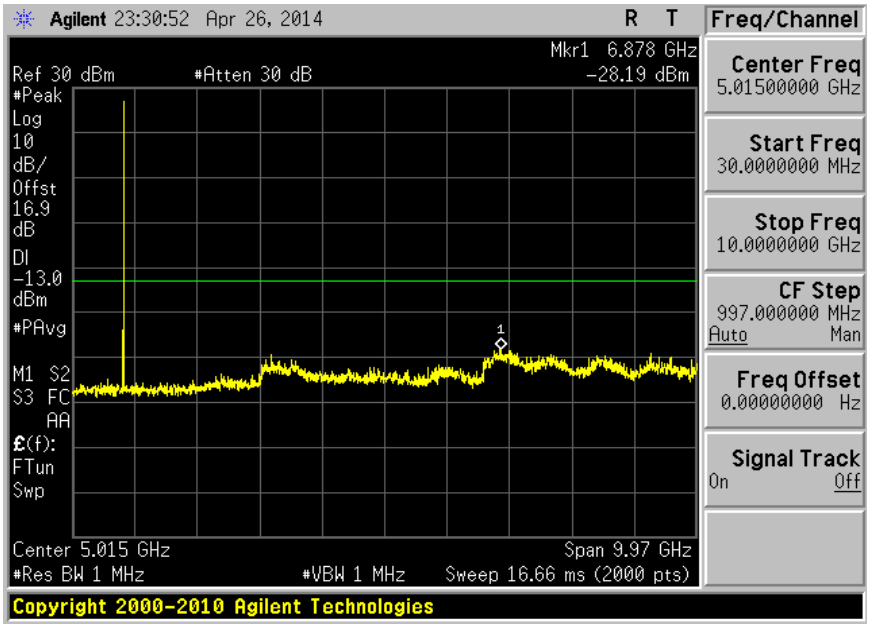
LOW CH



MID CH

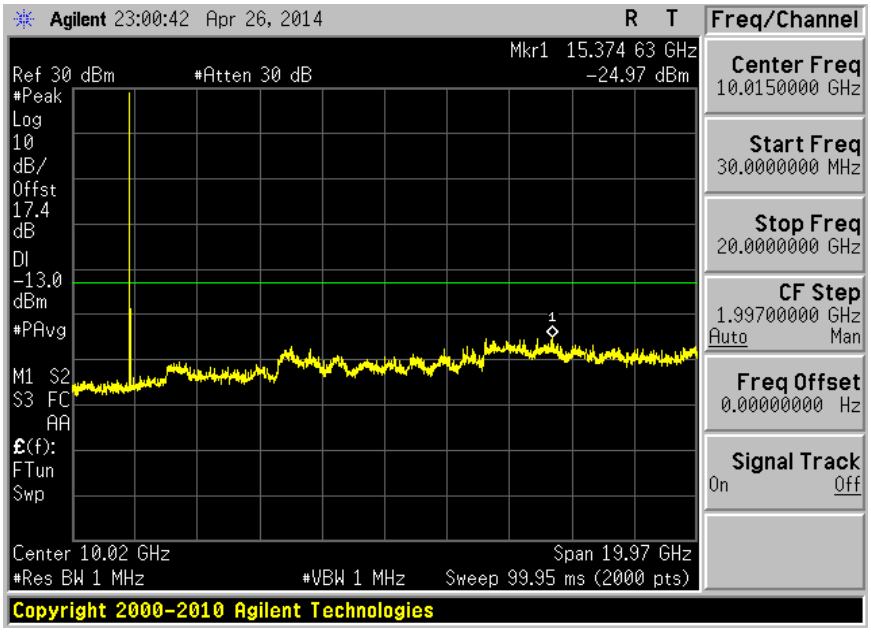


HIGH CH

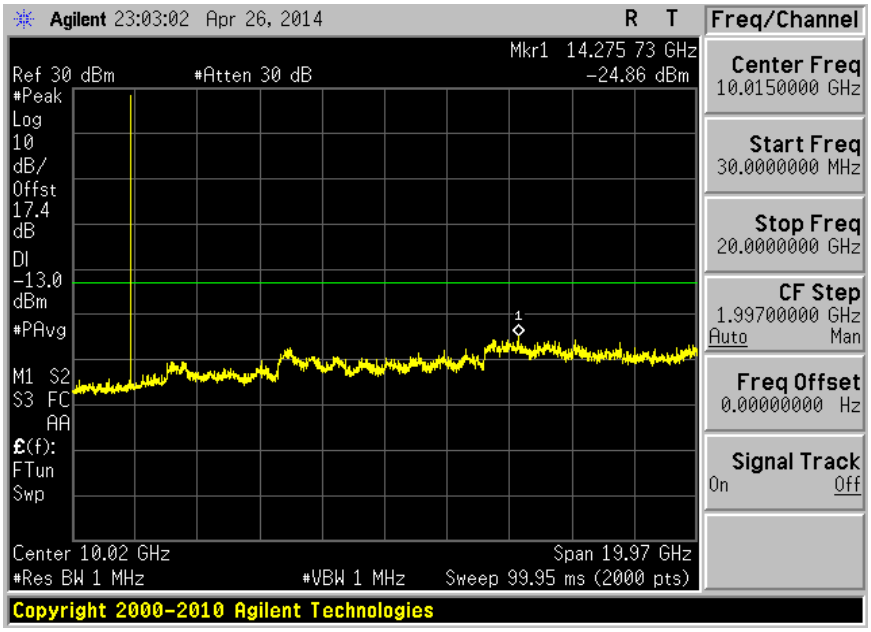


1900MHz BAND

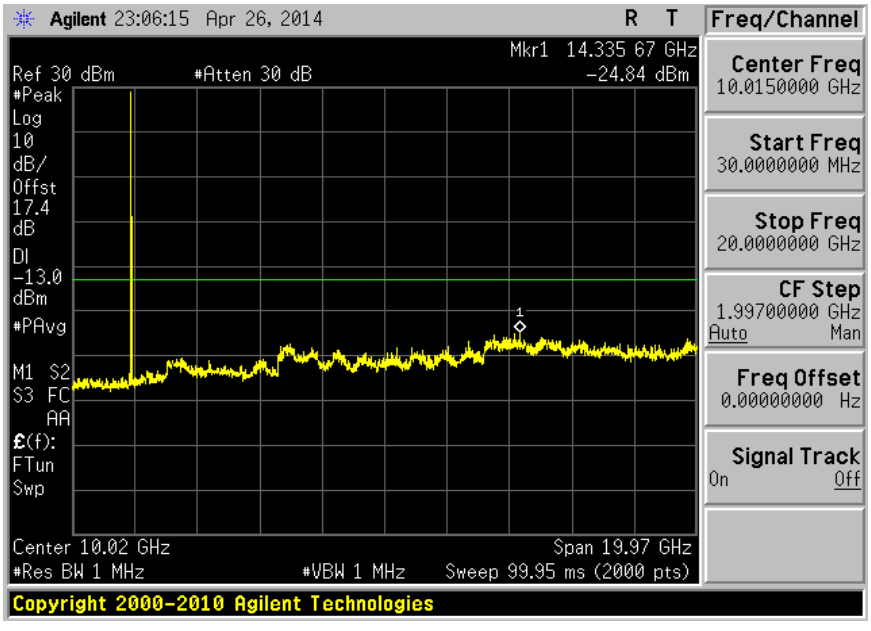
LOW CH



MID CH

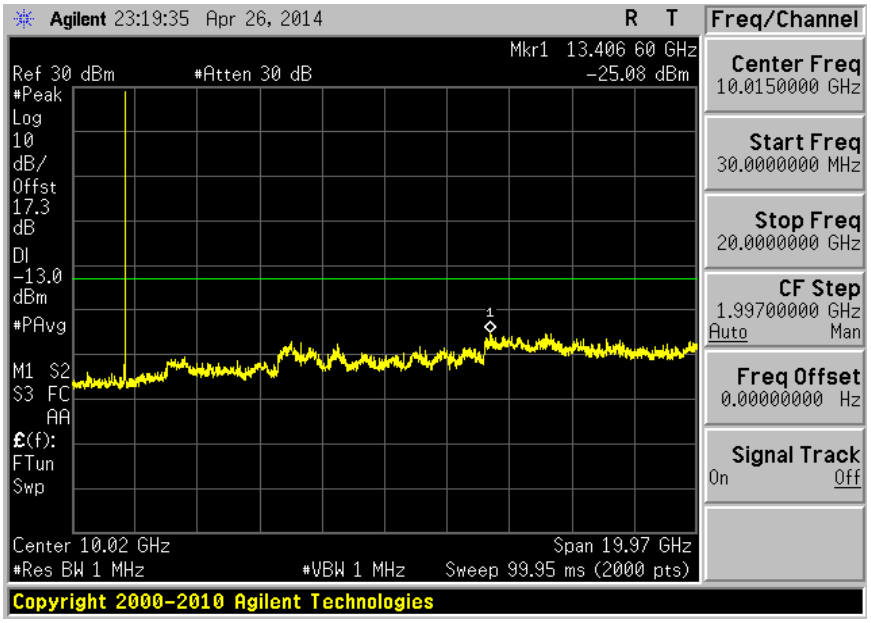


HIGH CH

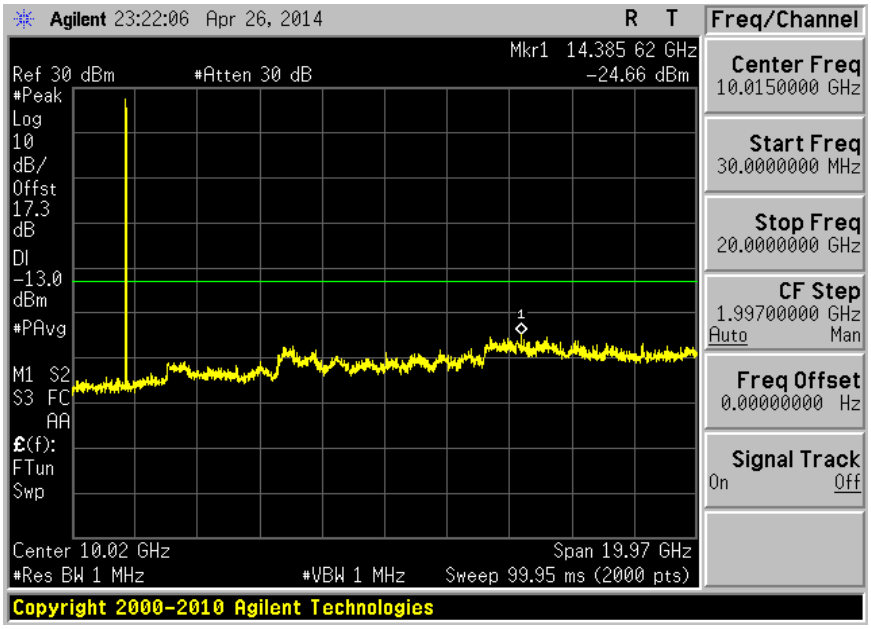


1700MHz BAND

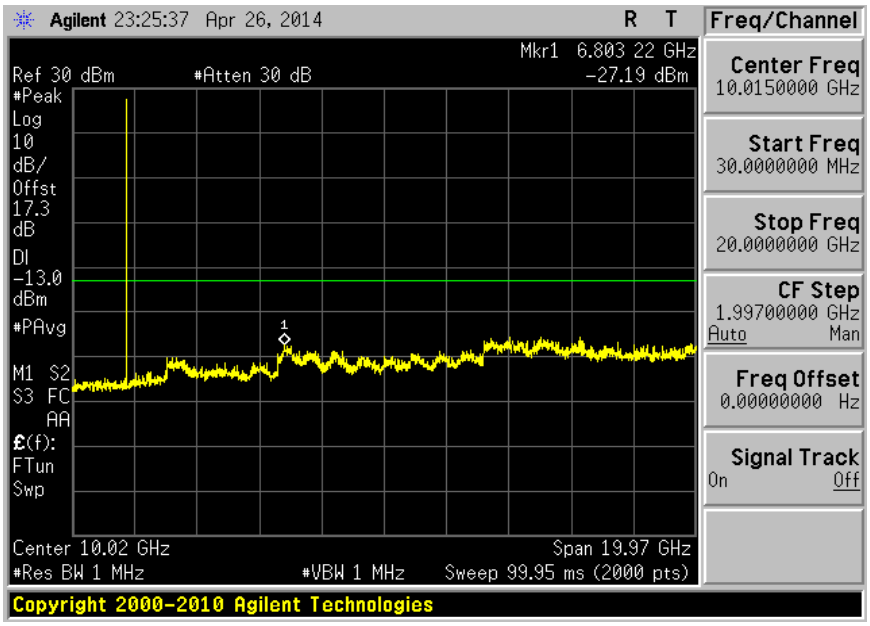
LOW CH



MID CH

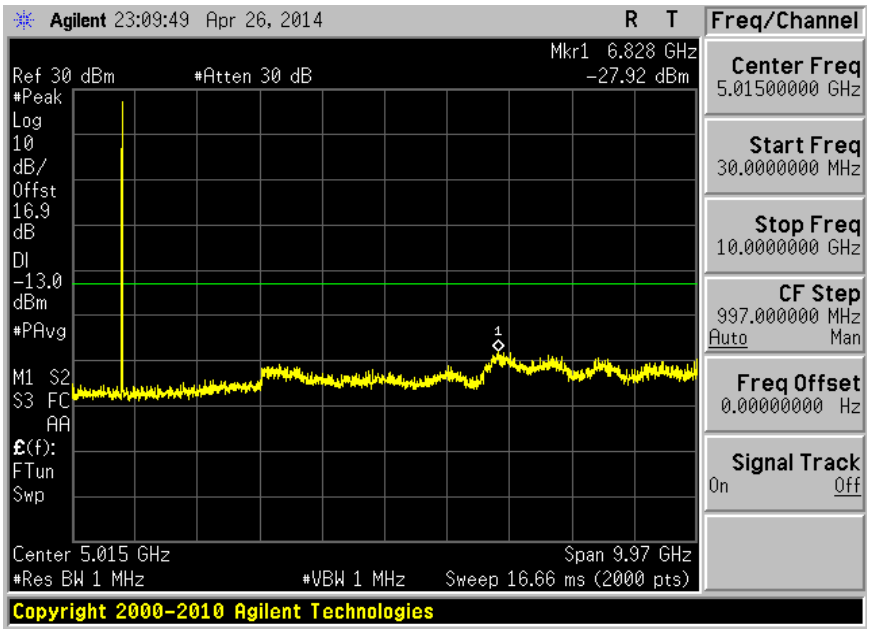


HIGH CH

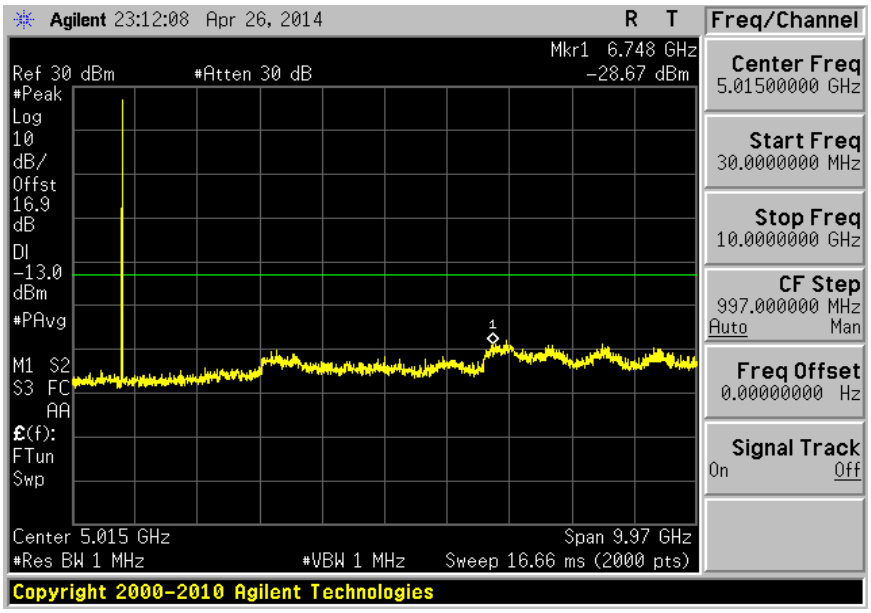


800MHz SECONDARY BAND

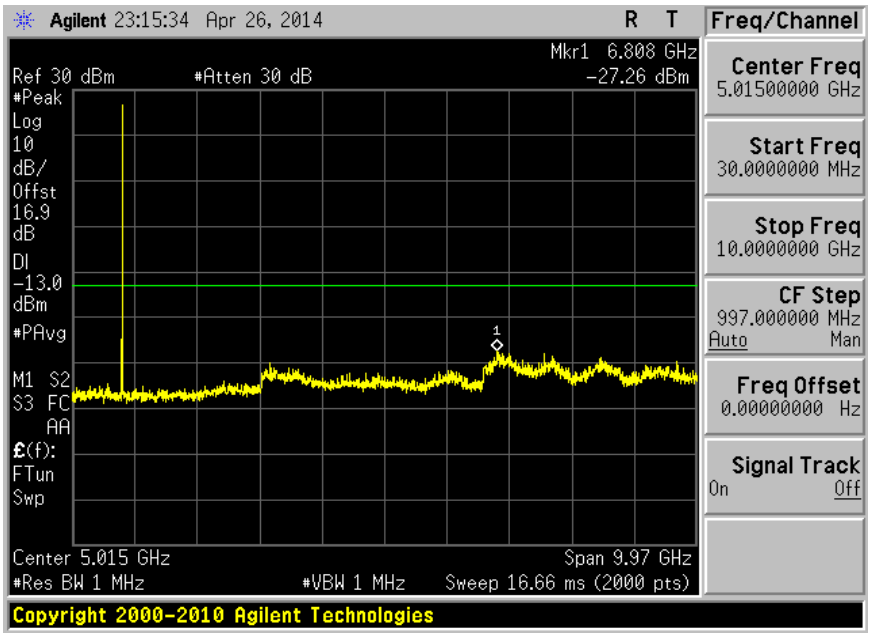
LOW CH



MID CH



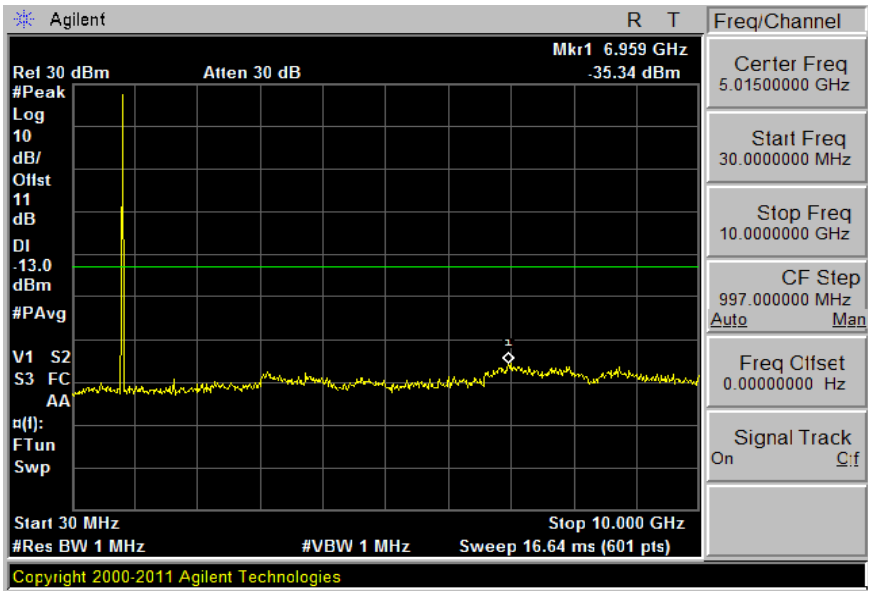
HIGH CH



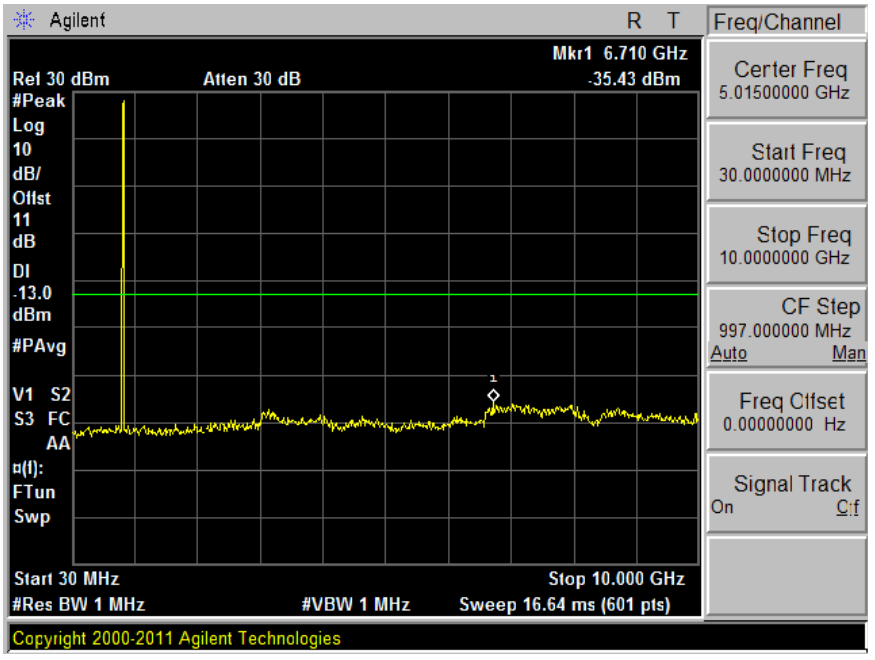
8.3.6. CDMA2000 EVDO Rev. A

850MHz BAND

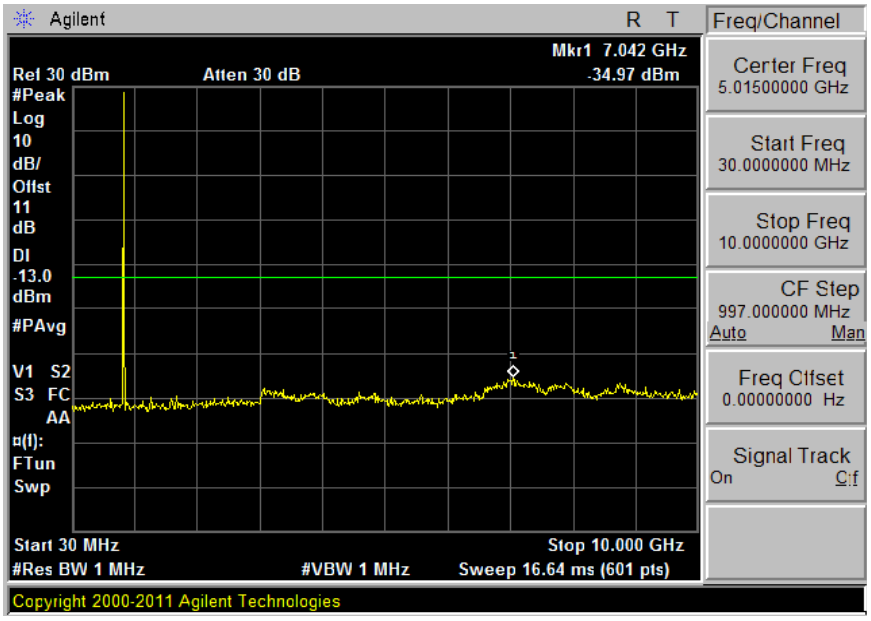
LOW CH



MID CH

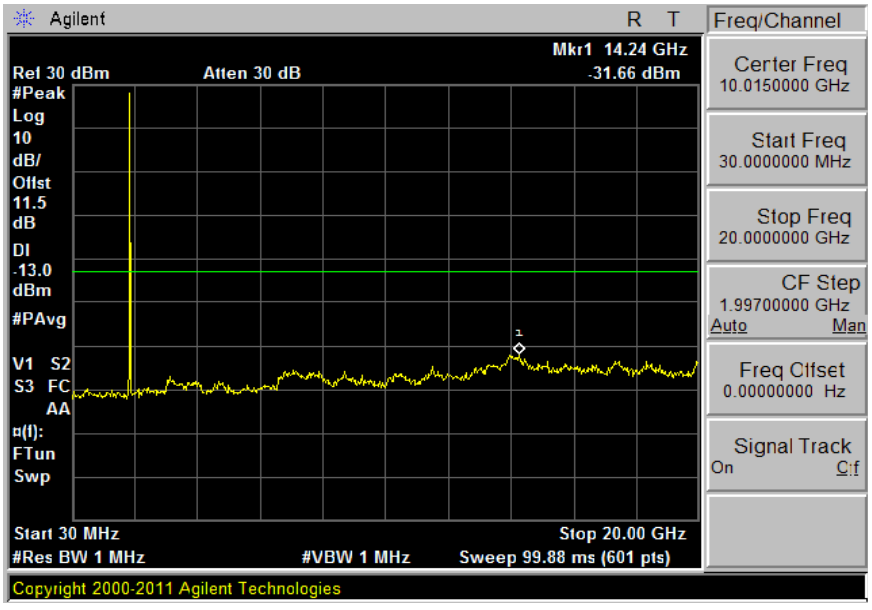


HIGH CH

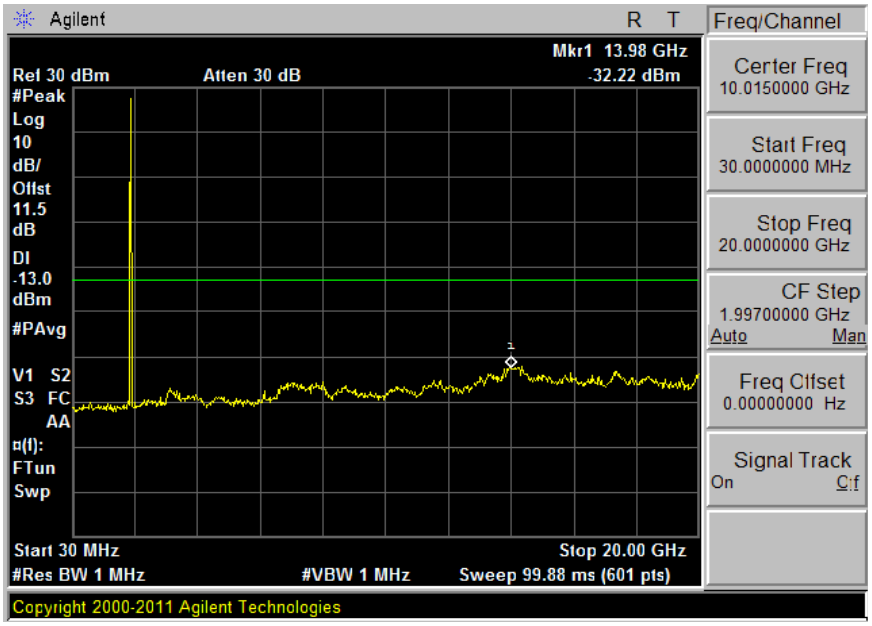


1900MHz BAND

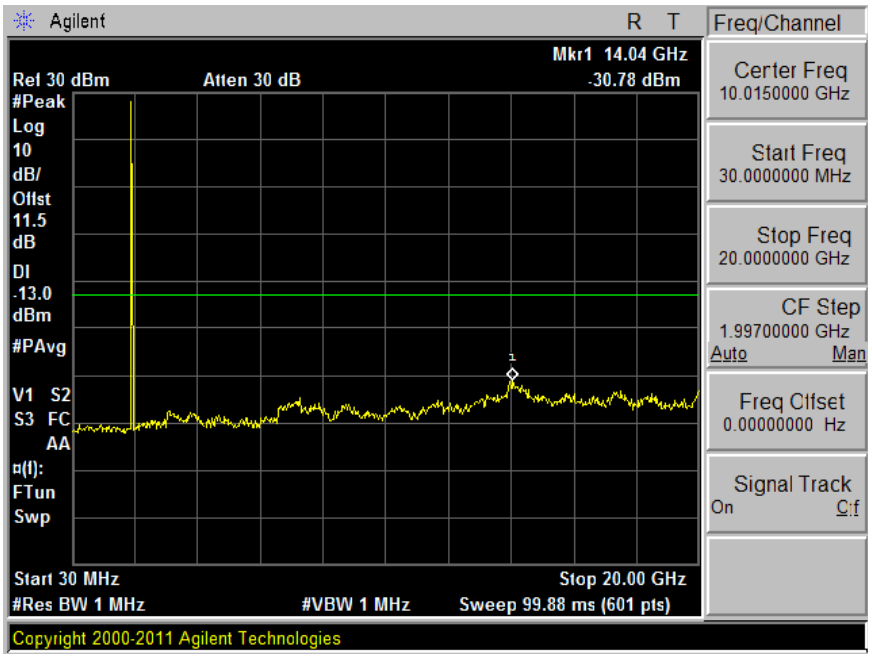
LOW CH



MID CH

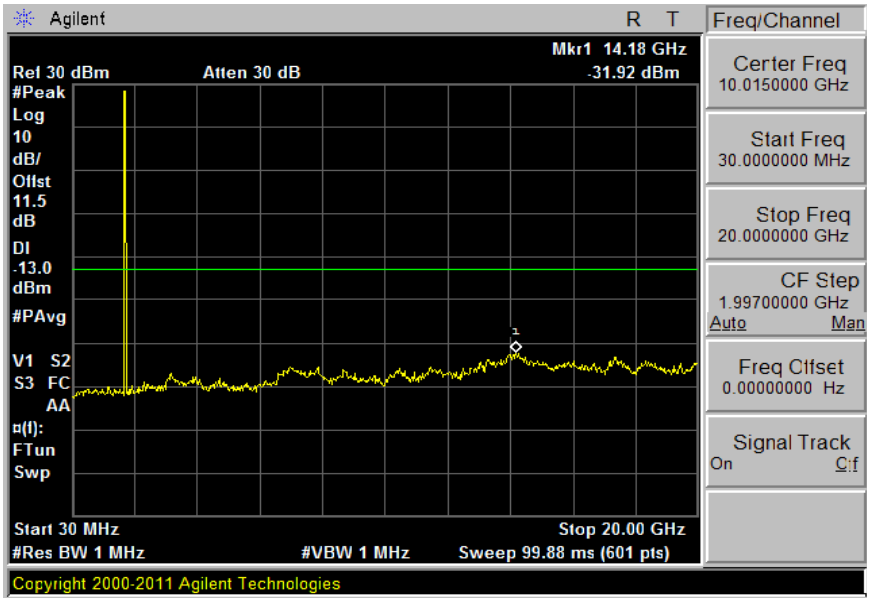


HIGH CH

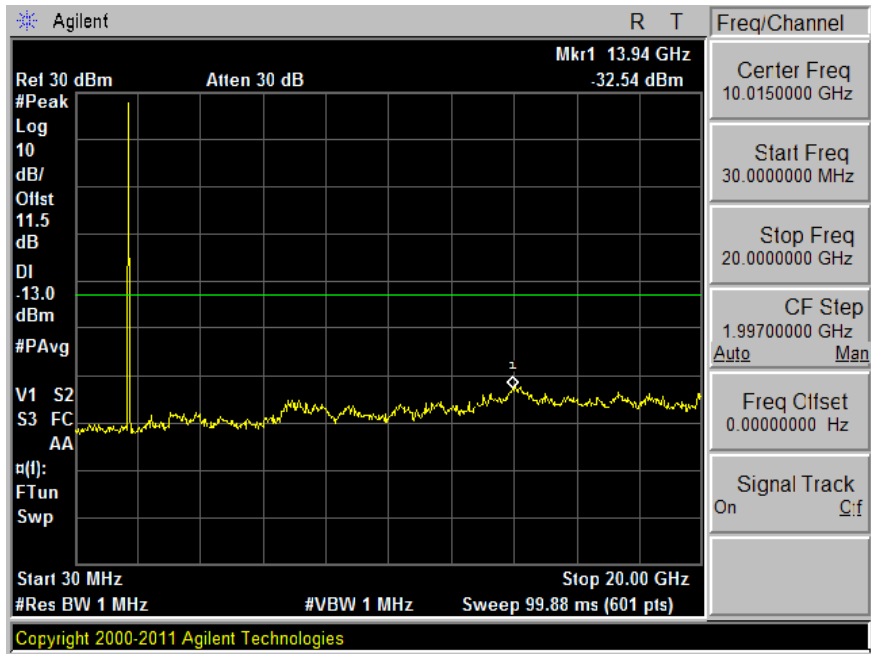


1700MHz BAND

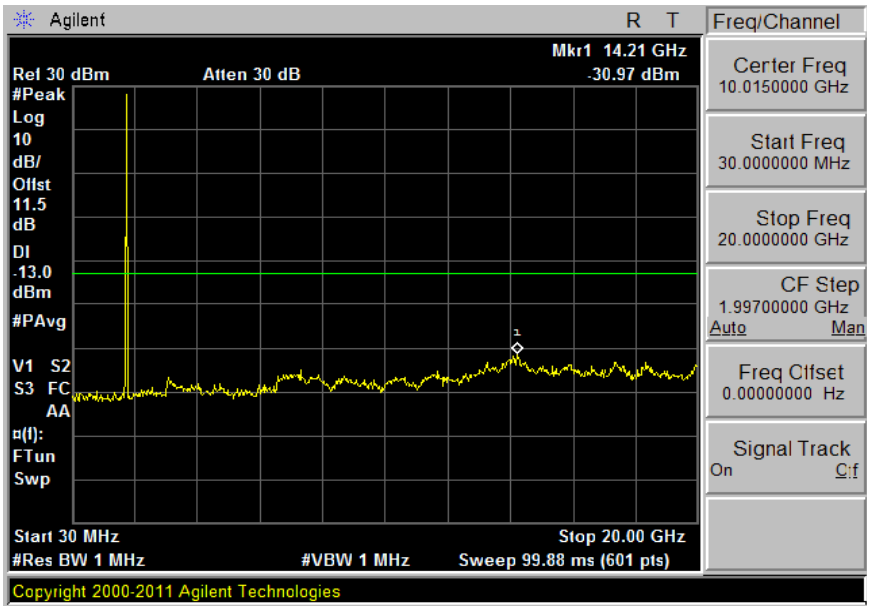
LOW CH



MID CH

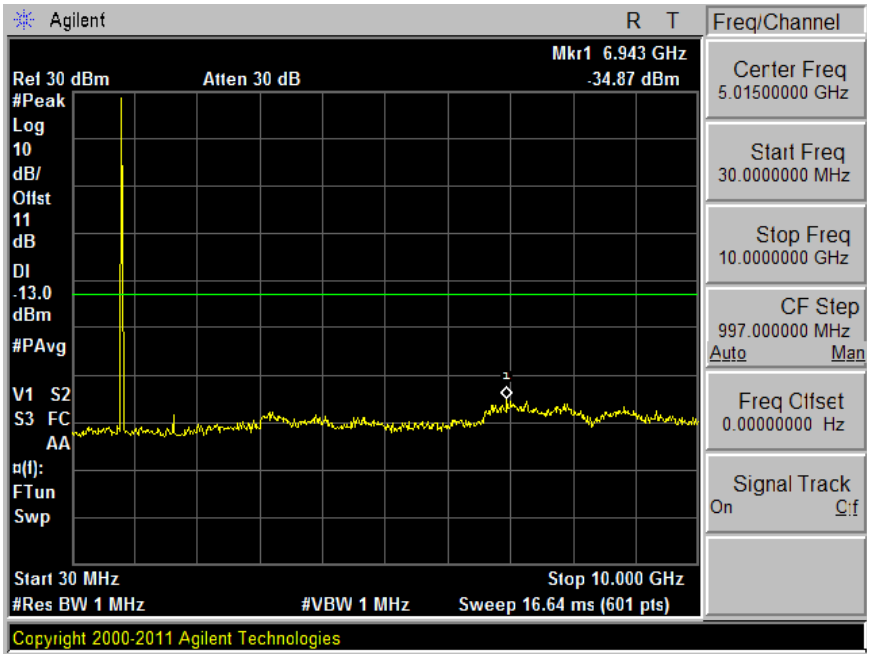


HIGH CH

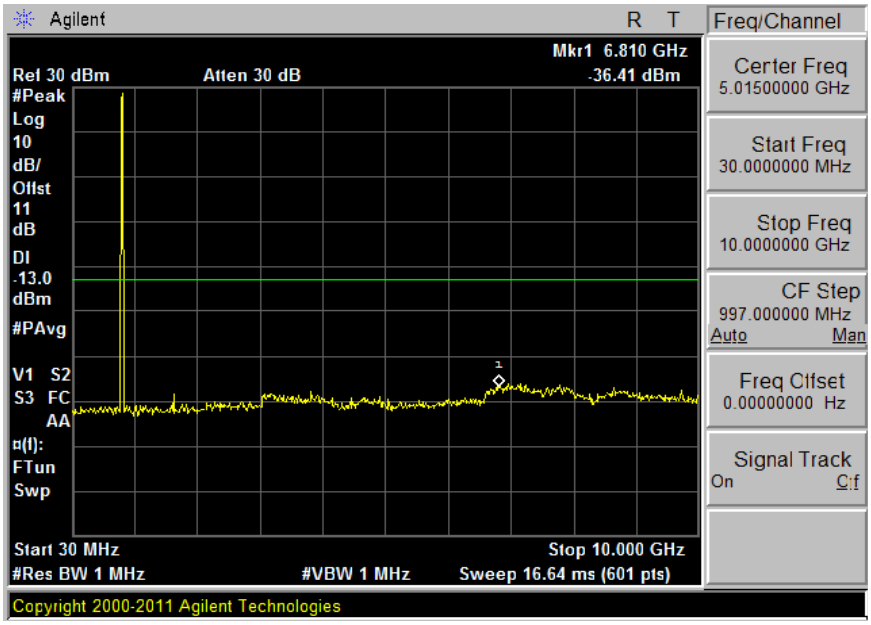


800MHz SECONDARY BAND

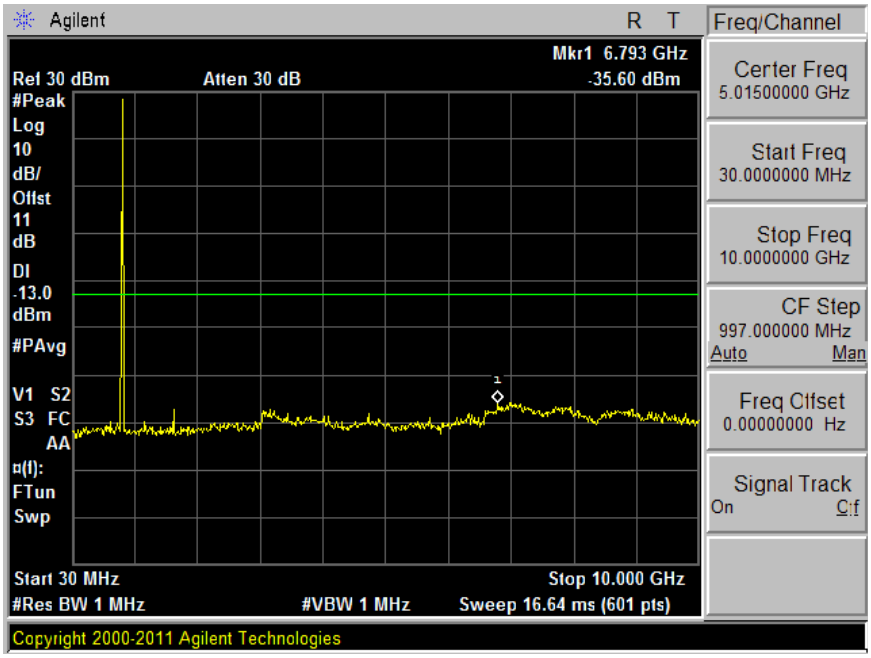
LOW CH



MID CH



HIGH CH



9. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54 and §90.213.

LIMITS

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

§24.235 & §27.54 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

§90.213 - The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = −30° to +50°C
- Voltage = (85% - 115%)

Frequency Stability vs Temperature:
The EUT is place inside a temperature chamber. The temperature is set to 20ºC 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 +50ºC is reached.

Frequency Stability vs Voltage:
The peak frequency error is recorded (worst-case).

MODES TESTED

- GPRS and EGPRS
- UMTS REL 99
- CDMA2000 1xRTT BC0, BC1, BC10 and BC15

RESULTS

See the following pages.

9.1. GSM

GRPS 850

Limit		824	849	Delta	Frequency Stability
Condition		F low	F high		
Temperature	Voltage	(MHz)	(MHz)	(Hz)	(ppm)
Normal (25C)	Normal	824.0253	848.9476		0.000
Extreme (50C)		824.0253	848.9476	25.6	0.031
Extreme (40C)		824.0253	848.9476	26.8	0.032
Extreme (30C)		824.0253	848.9476	27.3	0.033
Extreme (10C)		824.0253	848.9476	30.2	0.036
Extreme (0C)		824.0253	848.9476	32.6	0.039
Extreme (-10C)		824.0253	848.9476	30.9	0.037
Extreme (-20C)		824.0253	848.9476	29.4	0.035
Extreme (-30C)		824.0253	848.9476	26.2	0.031
25C	10%	824.0253	848.9476	29.2	0.035
	-10%	824.0253	848.9476	27.2	0.033
	End Point	824.0253	848.9476	28.6	0.034

EGRPS 850

Limit		824	849	Delta	Frequency Stability
Condition		F low	F high		
Temperature	Voltage	(MHz)	(MHz)	(Hz)	(ppm)
Normal (25C)	Normal	824.0299	848.9609		0.000
Extreme (50C)		824.0299	848.9609	26.7	0.032
Extreme (40C)		824.0299	848.9609	25.2	0.030
Extreme (30C)		824.0299	848.9609	24.5	0.029
Extreme (10C)		824.0299	848.9609	26.1	0.031
Extreme (0C)		824.0299	848.9609	29.3	0.035
Extreme (-10C)		824.0299	848.9609	32.7	0.039
Extreme (-20C)		824.0299	848.9609	30.2	0.036
Extreme (-30C)		824.0299	848.9609	25.8	0.031
25C	10%	824.0299	848.9609	30.4	0.036
	-10%	824.0299	848.9609	29.3	0.035
	End Point	824.0299	848.9609	29.6	0.035

GRPS 1900

Limit		1850	1910	Delta	Frequency Stability
Condition		F low	F high		
Temperature	Voltage	(MHz)	(MHz)	(Hz)	(ppm)
Normal (25C)	Normal	1850.0391	1909.9760		0.000
Extreme (50C)		1850.0392	1909.9761	54.8	0.029
Extreme (40C)		1850.0392	1909.9761	66.6	0.035
Extreme (30C)		1850.0392	1909.9761	64.8	0.034
Extreme (10C)		1850.0392	1909.9761	70.0	0.037
Extreme (0C)		1850.0392	1909.9761	69.3	0.037
Extreme (-10C)		1850.0392	1909.9761	73.6	0.039
Extreme (-20C)		1850.0392	1909.9761	74.2	0.039
Extreme (-30C)		1850.0392	1909.9761	72.0	0.038
25C	10%	1850.0392	1909.9761	51.3	0.027
	-10%	1850.0392	1909.9761	53.6	0.029
	End Point	1850.0392	1909.9761	53.2	0.028

EGRPS 1900

Limit		1850	1910	Delta	Frequency Stability
Condition		F low	F high		
Temperature	Voltage	(MHz)	(MHz)	(Hz)	(ppm)
Normal (25C)	Normal	1850.0351	1909.9614		0.000
Extreme (50C)		1850.0351	1909.9615	61.7	0.033
Extreme (40C)		1850.0351	1909.9615	63.2	0.034
Extreme (30C)		1850.0351	1909.9615	62.1	0.033
Extreme (10C)		1850.0352	1909.9615	72.3	0.038
Extreme (0C)		1850.0352	1909.9615	74.4	0.040
Extreme (-10C)		1850.0352	1909.9615	73.8	0.039
Extreme (-20C)		1850.0352	1909.9615	71.5	0.038
Extreme (-30C)		1850.0351	1909.9615	66.3	0.035
25C	10%	1850.0351	1909.9615	65.3	0.035
	-10%	1850.0351	1909.9615	68.7	0.037
	End Point	1850.0351	1909.9615	67.4	0.036

9.2. WCDMA

WCDMA REL99 BAND 2

Limit		1850	1910	Delta	Frequency Stability
Condition		F low	F high		
Temperature	Voltage	(MHz)	(MHz)	(Hz)	(ppm)
Normal (25C)	Normal	1850.1238	1909.8717		0.000
Extreme (50C)		1850.1238	1909.8718	4.8	0.003
Extreme (40C)		1850.1238	1909.8718	6.8	0.004
Extreme (30C)		1850.1238	1909.8718	4.5	0.002
Extreme (10C)		1850.1238	1909.8718	7.2	0.004
Extreme (0C)		1850.1238	1909.8718	7.7	0.004
Extreme (-10C)		1850.1238	1909.8718	6.6	0.004
Extreme (-20C)		1850.1238	1909.8718	4.7	0.003
Extreme (-30C)		1850.1238	1909.8717	3.9	0.002
25C	10%	1850.1238	1909.8718	4.7	0.003
	-10%	1850.1238	1909.8718	7.4	0.004
	End Point	1850.1238	1909.8718	5.6	0.003

WCDMA REL99 BAND 4

Limit		1710	1755	Delta	Frequency Stability
Condition		F low	F high		
Temperature	Voltage	(MHz)	(MHz)	(Hz)	(ppm)
Normal (25C)	Normal	1710.1156	1754.8782		0.000
Extreme (50C)		1710.1156	1754.8781	-7.2	-0.004
Extreme (40C)		1710.1156	1754.8782	5.7	0.003
Extreme (30C)		1710.1156	1754.8782	5.7	0.003
Extreme (10C)		1710.1156	1754.8782	3.8	0.002
Extreme (0C)		1710.1156	1754.8782	4.5	0.003
Extreme (-10C)		1710.1156	1754.8782	3.6	0.002
Extreme (-20C)		1710.1156	1754.8782	4.7	0.003
Extreme (-30C)		1710.1156	1754.8782	3.5	0.002
25C	10%	1710.1156	1754.8782	5.2	0.003
	-10%	1710.1156	1754.8782	5.0	0.003
	End Point	1710.1156	1754.8782	4.0	0.002

WCDMA REL99 BAND 5

Limit		824	849	Delta	Frequency Stability
Condition		F low	F high		
Temperature	Voltage	(MHz)	(MHz)	(Hz)	(ppm)
Normal (25C)	Normal	824.1206	848.8732		0.000
Extreme (50C)		824.1206	848.8732	2.2	0.003
Extreme (40C)		824.1206	848.8732	-1.3	-0.002
Extreme (30C)		824.1206	848.8732	-2.4	-0.003
Extreme (10C)		824.1206	848.8732	-4.5	-0.005
Extreme (0C)		824.1206	848.8732	-2.3	-0.003
Extreme (-10C)		824.1206	848.8732	-2.2	-0.003
Extreme (-20C)		824.1206	848.8732	-1.4	-0.002
Extreme (-30C)		824.1206	848.8732	-2.0	-0.002
25C	10%	824.1206	848.8732	-8.8	-0.011
	-10%	824.1206	848.8732	-1.7	-0.002
	End Point	824.1206	848.8732	-5.0	-0.006

9.3. CDMA

CDMA 1xRTT BC0

Limit		824	849	Delta	Frequency Stability
Condition		F low	F high		
Temperature	Voltage	(MHz)	(MHz)	(Hz)	(ppm)
Normal (25C)	Normal	824.0046	848.9985		0.000
Extreme (50C)		824.0046	848.9985	-5.5	-0.007
Extreme (40C)		824.0046	848.9985	-5.6	-0.007
Extreme (30C)		824.0046	848.9985	5.7	0.007
Extreme (10C)		824.0046	848.9985	3.2	0.004
Extreme (0C)		824.0046	848.9985	9.2	0.011
Extreme (-10C)		824.0046	848.9985	-9.7	-0.012
Extreme (-20C)		824.0046	848.9985	3.7	0.004
Extreme (-30C)		824.0046	848.9985	4.5	0.005
25C	10%	824.0046	848.9985	-4.5	-0.005
	-10%	824.0046	848.9985	-4.3	-0.005
	End Point	824.0046	848.9985	-3.0	-0.004

CDMA 1xRTT BC1

Limit		1850	1910	Delta	Frequency Stability
Condition		F low	F high		
Temperature	Voltage	(MHz)	(MHz)	(Hz)	(ppm)
Normal (25C)	Normal	1850.5533	1909.4513		0.000
Extreme (50C)		1850.5533	1909.4513	13.0	0.007
Extreme (40C)		1850.5533	1909.4513	12.1	0.006
Extreme (30C)		1850.5533	1909.4513	9.8	0.005
Extreme (10C)		1850.5533	1909.4513	10.7	0.006
Extreme (0C)		1850.5533	1909.4513	10.5	0.006
Extreme (-10C)		1850.5533	1909.4513	12.1	0.006
Extreme (-20C)		1850.5533	1909.4513	7.9	0.004
Extreme (-30C)		1850.5533	1909.4513	10.3	0.005
25C	10%	1850.5533	1909.4513	7.0	0.004
	-10%	1850.5533	1909.4513	10.2	0.005
	End Point	1850.5533	1909.4513	11.0	0.006

CDMA 1xRTT BC10

Limit		816.35	823.65	Delta	Frequency Stability
Condition		F low	F high		
Temperature	Voltage	(MHz)	(MHz)	(Hz)	(ppm)
Normal (25C)	Normal	816.5544	823.4479		0.000
Extreme (50C)		816.5544	823.4479	-5.6	-0.007
Extreme (40C)		816.5544	823.4479	-8.7	-0.011
Extreme (30C)		816.5544	823.4479	-4.6	-0.006
Extreme (10C)		816.5544	823.4479	-4.1	-0.005
Extreme (0C)		816.5544	823.4479	-5.7	-0.007
Extreme (-10C)		816.5544	823.4479	-10.3	-0.013
Extreme (-20C)		816.5544	823.4479	-8.8	-0.011
Extreme (-30C)		816.5544	823.4479	-2.5	-0.003
25C	10%	816.5544	823.4479	-3.7	-0.005
	-10%	816.5544	823.4479	6.7	0.008
	End Point	816.5544	823.4479	-4.0	-0.005

CDMA 1xRTT BC15

Limit		1710	1755	Delta	Frequency Stability
Condition		F low	F high		
Temperature	Voltage	(MHz)	(MHz)	(Hz)	(ppm)
Normal (25C)	Normal	1710.5515	1754.4510		0.000
Extreme (50C)		1710.5515	1754.4510	-7.5	-0.004
Extreme (40C)		1710.5515	1754.4510	-10.3	-0.006
Extreme (30C)		1710.5515	1754.4510	7.8	0.004
Extreme (10C)		1710.5515	1754.4510	5.5	0.003
Extreme (0C)		1710.5515	1754.4510	7.6	0.004
Extreme (-10C)		1710.5515	1754.4510	11.3	0.006
Extreme (-20C)		1710.5515	1754.4510	7.0	0.004
Extreme (-30C)		1710.5515	1754.4510	7.3	0.004
25C	10%	1710.5515	1754.4510	6.7	0.004
	-10%	1710.5515	1754.4510	6.2	0.004
	End Point	1710.5515	1754.4510	5.4	0.003

10. RADIATED TEST RESULTS

10.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27.50 and § 90.635

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.

§27.50(d) (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band are limited to 1 watt EIRP. Fixed stations operating in this band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in this band must employ a means for limiting power to the minimum necessary for successful communications

§ 90.635 Limitations on power and antenna height.

(a) The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table. These are maximum values, and applicants will be required to justify power levels and antenna heights requested.

(b) The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

Table—Equivalent Power and Antenna Heights for Base Stations in the 851–869 MHz and 935–940 MHz Bands Which Have a Requirement for a 32 km (20 mi) Service Area Radius

Antenna height (ATT) meters (feet)	Effective radiated power (watts)[1,2,4]
Above 1,372 (4,500)	65
Above 1,220 (4,000) to 1,372 (4,500)	70
Above 1,067 (3,500) to 1,220 (4,000)	75
Above 915 (3,000) to 1,067 (3,500)	100
Above 763 (2,500) to 915 (3,000)	140
Above 610 (2,000) to 763 (2,500)	200
Above 458 (1,500) to 610 (2,000)	350
Above 305 (1,000) to 458 (1,500)	600
Up to 305 (1,000)	31,000

1Power is given in terms of effective radiated power (ERP).

2Applicants in the Los Angeles, CA, area who demonstrate a need to serve both the downtown and fringe areas will be permitted to utilize an ERP of 1 kw at the following mountaintop sites: Santiago Park, Sierra Peak, Mount Lukens, and Mount Wilson.

3Stations with antennas below 305 m (1,000 ft) (AAT) will be restricted to a maximum power of 1 kw (ERP).

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17

KDB 971168 v02r01 RF Power output using broadband peak and average power meter method

MODES TESTED

- GPRS/EGPRS.
- UMTS, REL 99 and HSDPA
- CDMA2000, 1xRTT and EVDO, Rev A, BC0, BC1
- BC10, BC15

RESULTS

10.1.1.LAT

Part 22 850MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
CELL	GPRS	128	824.2	29.87	970.51
		190	836.6	30.12	1028.02
		251	848.8	30.50	1122.02
	EGPRS	128	824.2	25.10	323.59
		190	836.6	26.05	402.72
		251	848.8	26.13	410.20

Part 24 1900MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
PCS	GPRS	512	1850.2	31.98	1577.61
		661	1880.0	31.58	1438.80
		810	1909.8	32.52	1786.49
	EGPRS	512	1850.2	30.68	1169.50
		661	1880.0	30.28	1066.60
		810	1909.8	30.52	1127.20

Part 22 850MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
CELL	UMTS,REL 99	4357	826.4	22.45	175.79
		4405	836.0	22.59	181.55
		4455	846.0	22.48	177.01
	UMTS, HSDPA	4357	826.4	21.52	141.91
		4405	836.0	21.66	146.55
		4455	846.0	21.55	142.89

Part 24 1900MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
PCS	UMTS,REL 99	9662	1852.4	26.75	473.15
		9800	1880.0	27.18	522.40
		9938	1907.6	26.82	480.84
	UMTS, HSDPA	9662	1852.4	25.95	393.55
		9800	1880.0	26.33	429.54
		9938	1907.6	26.02	399.94

Part 27 1700MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
PCS	UMTS,REL 99	1537	1712.4	25.96	394.46
		1638	1732.6	25.52	356.45
		1738	1752.5	26.27	423.64
	UMTS, HSDPA	1537	1712.4	25.56	359.75
		1638	1732.6	24.82	303.39
		1738	1752.5	25.57	360.58

Part 22 850MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
CELL	BC 0, 1xRTT	1013	824.7	20.96	124.74
		384	836.5	21.62	145.21
		777	848.3	22.33	171.00
	BC 0, EVDO Rev A	1013	824.7	20.77	119.40
		384	836.5	22.10	162.18
		777	848.3	21.26	133.66

Part 24 1900MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
PCS	BC1, 1xRTT	25	1851.3	27.00	501.19
		600	1880.0	27.88	613.76
		1175	1908.8	26.96	496.59
	BC1, EVDO REV A	25	1851.3	27.61	576.77
		600	1880.0	27.93	620.87
		1175	1908.8	26.95	495.45

Part 27 1700MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
PCS	BC15, 1xRTT	25	1711.3	26.03	400.87
		450	1732.5	25.52	356.45
		875	1753.8	26.17	414.00
	BC15, EVDO, REV A	25	1711.3	25.30	338.84
		450	1732.5	26.24	420.73
		875	1753.8	25.87	386.37

Part 90 800MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
CELL	BC10, 1xRTT	476	817.9	22.03	159.59
		526	819.2	22.06	160.69
		684	823.1	22.55	179.89
	BC10, EVDO A	476	817.9	22.51	178.24
		526	819.2	22.45	175.79
		684	823.1	22.57	180.72

CDMA2000 REV B				
Mode	Channel	f (MHz)	EIRP (Average)	
			dBm	mW
EVDO Rev B Two Carriers Min.	1013+31	825.3	18.86	76.91
	384+425	837.2	19.09	81.10
	736+777	847.6	19.73	93.97
EVDO Rev B Two Carriers Max	1013+156	826.5	18.96	78.70
	384+550	838.8	18.99	79.25
	611+777	844.9	19.33	85.70
EVDO Rev B Three Carriers Min.	1013+31+72	825.9	18.91	77.80
	384+425+466	837.7	18.94	78.34
	695+736+777	846.7	19.26	84.33

10.1.2. UAT

Part 22 850MHz Band					
Band	Mode	Channel	f (MHz)	EIRP(Average)	
				dBm	mW
CELL	GPRS	128	824.2	27.30	537.03
		190	836.6	27.35	543.25
		251	848.8	25.83	382.82
	EGPRS	128	824.2	22.81	190.99
		190	836.6	23.16	207.01
		251	848.8	22.44	175.39

Part 24 1900MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
PCS	GPRS	512	1850.2	27.88	613.76
		661	1880.0	27.58	572.80
		810	1909.8	28.02	633.87
	EGPRS	512	1850.2	25.38	345.14
		661	1880.0	24.98	314.77
		810	1909.8	25.02	317.69

Part 22 850MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
CELL	UMTS,REL 99	4357	826.4	17.67	58.48
		4405	836.0	17.59	57.41
		4455	846.0	17.98	62.81
	UMTS, HSDPA	4357	826.4	16.75	47.32
		4405	836.0	16.67	46.45
		4455	846.0	17.06	50.82

Part 24 1900MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
PCS	UMTS,REL 99	9662	1852.4	21.30	134.90
		9800	1880.0	21.60	144.54
		9938	1907.6	21.83	152.41
	UMTS, HSDPA	9662	1852.4	20.03	100.69
		9800	1880.0	19.27	84.53
		9938	1907.6	20.10	102.33

Part 27 1700MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
PCS	UMTS,REL 99	1537	1712.4	20.11	102.57
		1638	1732.6	20.34	108.14
		1738	1752.5	20.04	100.93
	UMTS, HSDPA	1537	1712.4	19.19	82.99
		1638	1732.6	19.32	85.51
		1738	1752.5	19.23	83.75

Part 22 850MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
CELL	BC 0, 1xRTT	1013	824.7	20.58	114.29
		384	836.5	21.24	133.05
		777	848.3	20.92	123.59
	BC 0, EVDO Rev A	1013	824.7	20.31	107.40
		384	836.5	20.22	105.20
		777	848.3	20.23	105.44

Part 24 1900MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
PCS	BC1, 1xRTT	25	1851.3	20.69	117.22
		600	1880.0	21.24	133.05
		1175	1908.8	22.08	161.44
	BC1, EVDO REV A	25	1851.3	21.46	139.96
		600	1880.0	21.46	139.96
		1175	1908.8	22.12	162.93

Part 27 1700MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
PCS	BC15, 1xRTT	25	1711.3	20.78	119.67
		450	1732.5	19.97	99.31
		875	1753.8	19.74	94.19
	BC15, EVDO, REV A	25	1711.3	20.82	120.78
		450	1732.5	20.19	104.47
		875	1753.8	19.47	88.51

Part 90 800MHz Band					
Band	Mode	Channel	f (MHz)	EIRP (Average)	
				dBm	mW
CELL	BC10, 1xRTT	476	817.9	19.90	97.72
		526	819.2	20.04	100.93
		684	823.1	20.17	103.99
	BC10, EVDO A	476	817.9	19.65	92.26
		526	819.2	19.92	98.17
		684	823.1	19.89	97.50

CDMA2000 REV B				
Mode	Channel	f (MHz)	EIRP (Average)	
			dBm	mW
EVDO Rev B Two Carriers Min.	1013+31	825.3	16.15	41.21
	384+425	837.2	16.57	45.39
	736+777	847.6	16.39	43.55
EVDO Rev B Two Carriers Max	1013+156	826.5	15.84	38.37
	384+550	838.8	16.06	40.36
	611+777	844.9	16.18	41.50
EVDO Rev B Three Carriers Min.	1013+31+72	825.9	15.85	38.46
	384+425+466	837.7	15.87	38.64
	695+736+777	846.7	16.05	40.27

10.1.3. LAT

GPRS, 850MHz BAND 5

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/19/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: GPRS 850MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
824.20	22.87	V	0.6	0.0	22.25	24.40	38.45	40.60	-16.2	
824.20	28.34	H	0.6	0.0	27.72	29.87	38.45	40.60	-10.7	
Mid Ch										
836.60	22.57	V	0.6	0.0	21.95	24.10	38.45	40.60	-16.5	
836.60	28.59	H	0.6	0.0	27.97	30.12	38.45	40.60	-10.5	
High Ch										
848.80	21.58	V	0.6	0.0	20.96	23.11	38.45	40.60	-17.5	
848.80	28.97	H	0.6	0.0	28.35	30.50	38.45	40.60	-10.1	

Rev. 01.01.14

EGPRS, 850MHz BAND 5

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/19/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: EDGE 850MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
824.20	18.50	V	0.6	0.0	17.88	20.03	38.45	40.60	-20.6	
824.20	23.57	H	0.6	0.0	22.95	25.10	38.45	40.60	-15.5	
Mid Ch										
836.60	18.70	V	0.6	0.0	18.08	20.23	38.45	40.60	-20.4	
836.60	24.52	H	0.6	0.0	23.90	26.05	38.45	40.60	-14.5	
High Ch										
848.80	17.41	V	0.6	0.0	16.79	18.94	38.45	40.60	-21.7	
848.80	24.60	H	0.6	0.0	23.98	26.13	38.45	40.60	-14.5	

Rev. 10.24.13

GPRS, 1900MHz BAND 2

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/19/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: GPRS 1900MHz

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 8ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.851	16.5	V	0.98	7.88	23.43	33.0	-9.6	
1.851	25.1	H	0.98	7.88	31.98	33.0	-1.0	
Mid Ch								
1.880	15.9	V	0.98	7.86	22.80	33.0	-10.2	
1.880	24.7	H	0.98	7.86	31.58	33.0	-1.4	
High Ch								
1.910	16.6	V	0.98	7.84	23.41	33.0	-9.6	
1.910	25.7	H	0.98	7.84	32.52	33.0	-0.5	

Rev. 10.24.13

EGPRS, 1900MHz BAND 2

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/19/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: EDGE 1900MHz

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 8ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.851	14.3	V	0.98	7.88	21.16	33.0	-11.8	
1.851	23.8	H	0.98	7.88	30.68	33.0	-2.3	
Mid Ch								
1.880	13.1	V	0.98	7.86	19.97	33.0	-13.0	
1.880	23.4	H	0.98	7.86	30.28	33.0	-2.7	
High Ch								
1.910	12.5	V	0.98	7.84	19.31	33.0	-13.7	
1.910	23.7	H	0.98	7.84	30.52	33.0	-2.5	

Rev. 10.24.13

UMTS REL 99, 850MHz BAND 5

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 07/24/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: WCDMA Rel 99, 850MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
826.40	15.03	V	0.6	0.0	14.41	16.56	38.45	40.60	-24.0	
826.40	20.92	H	0.6	0.0	20.30	22.45	38.45	40.60	-18.1	
Mid Ch										
836.00	15.05	V	0.6	0.0	14.43	16.58	38.45	40.60	-24.0	
836.00	21.06	H	0.6	0.0	20.44	22.59	38.45	40.60	-18.0	
High Ch										
846.00	15.15	V	0.6	0.0	14.53	16.68	38.45	40.60	-23.9	
846.00	20.95	H	0.6	0.0	20.33	22.48	38.45	40.60	-18.1	

Rev. 10.24.13

UMTS HSDPA, 850MHz BAND 5

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 07/24/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: WCDMA HSDPA, 850MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
826.40	14.10	V	0.6	0.0	13.48	15.63	38.45	40.60	-25.0	
826.40	19.99	H	0.6	0.0	19.37	21.52	38.45	40.60	-19.1	
Mid Ch										
836.00	14.12	V	0.6	0.0	13.50	15.65	38.45	40.60	-24.9	
836.00	20.13	H	0.6	0.0	19.51	21.66	38.45	40.60	-18.9	
High Ch										
846.00	14.22	V	0.6	0.0	13.60	15.75	38.45	40.60	-24.8	
846.00	20.02	H	0.6	0.0	19.40	21.55	38.45	40.60	-19.0	

Rev. 10.24.13

UMTS REL 99, 1900MHz BAND 2

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/06/14
Test Engineer: R.Zheng
Configuration: EUT Only
Mode: WCDMA Rel 99, 1900MHz

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 8ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.852	19.1	V	0.98	7.88	26.00	33.0	-7.0	
1.852	19.9	H	0.98	7.88	26.75	33.0	-6.3	
Mid Ch								
1.880	18.1	V	0.98	7.86	25.01	33.0	-8.0	
1.880	20.3	H	0.98	7.86	27.18	33.0	-5.8	
High Ch								
1.908	19.0	V	0.98	7.84	25.86	33.0	-7.1	
1.908	20.0	H	0.98	7.84	26.82	33.0	-6.2	

Rev. 10.24.13

UMTS HSDPA, 1900MHz BAND 2

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/06/14
Test Engineer: R.Zheng
Configuration: EUT Only
Mode: WCDMA HSDPA, 1900MHz

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 8ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.852	18.3	V	0.98	7.88	25.20	33.0	-7.8	
1.852	19.1	H	0.98	7.88	25.95	33.0	-7.1	
Mid Ch								
1.880	17.4	V	0.98	7.86	24.25	33.0	-8.8	
1.880	19.5	H	0.98	7.86	26.33	33.0	-6.7	
High Ch								
1.908	18.2	V	0.98	7.84	25.06	33.0	-7.9	
1.908	19.2	H	0.98	7.84	26.02	33.0	-7.0	

Rev. 10.24.13

UMTS REL 99, 1700MHz BAND 4

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/06/14
Test Engineer: R.Zheng
Configuration: EUT Only
Mode: WCDMA Rel 99, 1700MHz

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 8ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.712	12.6	V	0.95	8.25	19.88	30.0	-10.1	
1.712	18.7	H	0.95	8.25	25.96	30.0	-4.0	
Mid Ch								
1.733	13.0	V	0.95	8.17	20.21	30.0	-9.8	
1.733	18.3	H	0.95	8.17	25.52	30.0	-4.5	
High Ch								
1.753	13.2	V	0.95	8.09	20.31	30.0	-9.7	
1.753	19.1	H	0.95	8.09	26.27	30.0	-3.7	

Rev. 10.24.13

UMTS HSDPA, 1700MHz BAND 4

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/06/14
Test Engineer: R.Zheng
Configuration: EUT Only
Mode: WCDMA HSDPA, 1700MHz

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 8ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.712	11.8	V	0.95	8.25	19.08	30.0	-10.9	
1.712	18.3	H	0.95	8.25	25.56	30.0	-4.4	
Mid Ch								
1.733	12.2	V	0.95	8.17	19.41	30.0	-10.6	
1.733	17.6	H	0.95	8.17	24.82	30.0	-5.2	
High Ch								
1.753	12.4	V	0.95	8.09	19.51	30.0	-10.5	
1.753	18.4	H	0.95	8.09	25.57	30.0	-4.4	

Rev. 10.24.13

CDMA2000 1xRTT, 850MHz BC0

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/09/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: CDMA 1XRTT, 850MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
824.70	13.38	V	0.6	0.0	12.76	14.91	38.45	40.60	-25.7	
824.70	19.43	H	0.6	0.0	18.81	20.96	38.45	40.60	-19.6	
Mid Ch										
836.52	14.00	V	0.6	0.0	13.38	15.53	38.45	40.60	-25.1	
836.52	20.09	H	0.6	0.0	19.47	21.62	38.45	40.60	-19.0	
High Ch										
848.31	13.30	V	0.6	0.0	12.68	14.83	38.45	40.60	-25.8	
848.31	20.80	H	0.6	0.0	20.18	22.33	38.45	40.60	-18.3	

Rev. 10.24.13

EVDO-Rev A, 850MHz BC0

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 07/01/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: CDMA Rev A 850MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
824.70	13.39	V	0.6	0.0	12.77	14.92	38.45	40.60	-25.7	
824.70	19.24	H	0.6	0.0	18.62	20.77	38.45	40.60	-19.8	
Mid Ch										
836.52	14.25	V	0.6	0.0	13.63	15.78	38.45	40.60	-24.8	
836.52	20.57	H	0.6	0.0	19.95	22.10	38.45	40.60	-18.5	
High Ch										
848.31	12.99	V	0.6	0.0	12.37	14.52	38.45	40.60	-26.1	
848.31	19.73	H	0.6	0.0	19.11	21.26	38.45	40.60	-19.3	

Rev. 06.18.14

CDMA2000 1xRTT, 1900MHz BC1

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/09/14
Test Engineer: M. Hua
Configuration: EUT Only Flatbed
Mode: CDMA 1XRTT 1900MHz

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 8ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.851	19.0	V	0.98	7.88	25.86	33.0	-7.1	
1.851	20.1	H	0.98	7.88	27.00	33.0	-6.0	
Mid Ch								
1.880	18.1	V	0.98	7.86	24.98	33.0	-8.0	
1.880	21.0	H	0.98	7.86	27.88	33.0	-5.1	
High Ch								
1.909	18.8	V	0.98	7.84	25.64	33.0	-7.4	
1.909	20.1	H	0.98	7.84	26.96	33.0	-6.0	

Rev. 10.24.13

EVDO-Rev A, 1900MHz BC1

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/09/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: CDMA Rev A, 1900MHz

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 8ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.851	5.6	V	0.98	7.88	12.51	33.0	-20.5	
1.851	20.7	H	0.98	7.88	27.61	33.0	-5.4	
Mid Ch								
1.880	4.3	V	0.98	7.86	11.13	33.0	-21.9	
1.880	21.1	H	0.98	7.86	27.93	33.0	-5.1	
High Ch								
1.909	-0.2	V	0.98	7.84	6.70	33.0	-26.3	
1.909	20.1	H	0.98	7.84	26.95	33.0	-6.1	

Rev. 10.24.13

CDMA2000 1xRTT, 1700MHz BC15

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/09/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: CDMA 1XRTT 1700MHz

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 8ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.711	16.4	V	0.95	8.25	23.71	30.0	-6.3	
1.711	18.7	H	0.95	8.25	26.03	30.0	-4.0	
Mid Ch								
1.733	16.5	V	0.95	8.17	23.76	30.0	-6.2	
1.733	18.3	H	0.95	8.17	25.52	30.0	-4.5	
High Ch								
1.754	17.0	V	0.95	8.09	24.15	30.0	-5.8	
1.754	19.0	H	0.95	8.09	26.17	30.0	-3.8	

Rev. 10.24.13

EVDO-Rev A, 1700MHz BC15

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/09/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: CDMA Rev A 1700MHz

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 8ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.711	9.3	V	0.95	8.25	16.60	30.0	-13.4	
1.711	18.0	H	0.95	8.25	25.30	30.0	-4.7	
Mid Ch								
1.733	10.1	V	0.95	8.17	17.35	30.0	-12.7	
1.733	19.0	H	0.95	8.17	26.24	30.0	-3.8	
High Ch								
1.754	10.2	V	0.95	8.09	17.31	30.0	-12.7	
1.754	18.7	H	0.95	8.09	25.87	30.0	-4.1	

Rev. 10.24.13

CDMA2000 1xRTT, 800MHz BC10

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/09/14
Test Engineer: M. Hua
Configuration: EUT Only Flatbed
Mode: CDMA 1XRTT 800MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
817.25	15.05	V	0.6	0.0	14.43	16.58	38.45	40.60	-24.0	
817.25	20.50	H	0.6	0.0	19.88	22.03	38.45	40.60	-18.6	
Mid Ch										
820.00	14.67	V	0.6	0.0	14.05	16.20	38.45	40.60	-24.4	
820.00	20.53	H	0.6	0.0	19.91	22.06	38.45	40.60	-18.5	
High Ch										
822.75	15.57	V	0.6	0.0	14.95	17.10	38.45	40.60	-23.5	
822.75	21.02	H	0.6	0.0	20.40	22.55	38.45	40.60	-18.0	

Rev. 10.24.13

EVDO-Rev A, 800MHz BC10

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 07/01/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: CDMA Rev A 800MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
817.25	14.28	V	0.6	0.0	13.66	15.81	38.45	40.60	-24.8	
817.25	20.98	H	0.6	0.0	20.36	22.51	38.45	40.60	-18.1	
Mid Ch										
820.00	14.90	V	0.6	0.0	14.28	16.43	38.45	40.60	-24.2	
820.00	20.92	H	0.6	0.0	20.30	22.45	38.45	40.60	-18.1	
High Ch										
822.75	15.04	V	0.6	0.0	14.42	16.57	38.45	40.60	-24.0	
822.75	21.04	H	0.6	0.0	20.42	22.57	38.45	40.60	-18.0	

Rev. 06.18.14

CDMA2000, REV B,

Two Carriers Min Separation.

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/23/14
Test Engineer: R.Z
Configuration: EUT only
Mode: CDMA Rev B Two Carriers Min Sep 850MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	Limit (dBm)	Margin EIRP (dB)	Notes
Low Ch									
824.7 + 825.93MHz	9.78	V	0.6	0.0	9.16	11.31	38.5	-27.1	
824.7 + 825.93MHz	17.33	H	0.6	0.0	16.71	18.86	38.5	-19.6	
Mid Ch									
836.52+837.75MHz	9.80	V	0.6	0.0	9.18	11.33	38.5	-27.1	
836.52+837.75MHz	17.56	H	0.6	0.0	16.94	19.09	38.5	-19.4	
High Ch									
847.08+848.31MHz	10.50	V	0.6	0.0	9.88	12.03	38.5	-26.4	
847.08+848.31MHz	18.20	H	0.6	0.0	17.58	19.73	38.5	-18.7	

Rev. 10.24.13

CDMA2000, REV B,

Two Carriers Max Separation

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company:
Project #: 14U17673
Date: 07/24/14
Test Engineer: R.Z
Configuration: EUT only
Mode: CDMA Rev B Two Carriers Max Sep 850MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	Limit (dBm)	Margin EIRP (dB)	Notes
Low Ch									
824.7 + 829.68MHz	9.98	V	0.6	0.0	9.36	11.51	38.5	-26.9	
824.7 + 829.68MHz	17.43	H	0.6	0.0	16.81	18.96	38.5	-19.5	
Mid Ch									
836.52+841.50MHz	10.00	V	0.6	0.0	9.38	11.53	38.5	-26.9	
836.52+841.50MHz	17.46	H	0.6	0.0	16.84	18.99	38.5	-19.5	
High Ch									
843.33+848.31MHz	10.20	V	0.6	0.0	9.58	11.73	38.5	-26.7	
843.33+848.31MHz	17.80	H	0.6	0.0	17.18	19.33	38.5	-19.1	

Rev. 10.24.13

CDMA2000, REV B,

Three Carriers Min Separation

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company:
Project #: 14U17673
Date: 07/24/14
Test Engineer: R.Z
Configuration: EUT only
Mode: CDMA Rev B Three Carriers Min Sep 850MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	Limit (dBm)	Margin EIRP (dB)	Notes
Low Ch									
824.7+825.93+827.16MHz	10.03	V	0.6	0.0	9.41	11.56	38.5	-26.9	
824.7+825.93+827.16MHz	17.38	H	0.6	0.0	16.76	18.91	38.5	-19.5	
Mid Ch									
836.52+837.75+838.98MHz	9.85	V	0.6	0.0	9.23	11.38	38.5	-27.1	
836.52+837.75+838.98MHz	17.41	H	0.6	0.0	16.79	18.94	38.5	-19.5	
High Ch									
845.85+847.08+848.31MHz	10.05	V	0.6	0.0	9.43	11.58	38.5	-26.9	
845.85+847.08+848.31MHz	17.73	H	0.6	0.0	17.11	19.26	38.5	-19.2	

Rev. 10.24.13

10.1.4. UAT

GPRS, 850MHz BAND 5

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/19/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: GSM 850MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
824.20	19.70	V	0.6	0.0	19.08	21.23	38.45	40.60	-19.4	
824.20	25.77	H	0.6	0.0	25.15	27.30	38.45	40.60	-13.3	
Mid Ch										
836.60	19.10	V	0.6	0.0	18.48	20.63	38.45	40.60	-20.0	
836.60	25.82	H	0.6	0.0	25.20	27.35	38.45	40.60	-13.2	
High Ch										
848.80	17.11	V	0.6	0.0	16.49	18.64	38.45	40.60	-22.0	
848.80	24.30	H	0.6	0.0	23.68	25.83	38.45	40.60	-14.8	

Rev. 10.24.13

EGPRS 850MHz BAND 5

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 6/19/2014
Test Engineer: M. Hua
Configuration: EUT Only
Mode: EDGE 850MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
824.20	15.41	V	0.6	0.0	14.79	16.94	38.45	40.60	-23.7	
824.20	21.28	H	0.6	0.0	20.66	22.81	38.45	40.60	-17.8	
Mid Ch										
836.60	14.81	V	0.6	0.0	14.19	16.34	38.45	40.60	-24.3	
836.60	21.63	H	0.6	0.0	21.01	23.16	38.45	40.60	-17.4	
High Ch										
848.80	14.22	V	0.6	0.0	13.60	15.75	38.45	40.60	-24.8	
848.80	20.91	H	0.6	0.0	20.29	22.44	38.45	40.60	-18.2	

Rev. 10.24.13

GPRS 1900MHz BAND 2

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 06/19/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: GPRS 1900MHz

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 8ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.850	17.9	V	1.0	7.88	24.83	33.0	-8.2	
1.850	21.0	H	1.0	7.88	27.88	33.0	-5.1	
Mid Ch								
1.880	17.1	V	1.0	7.86	23.97	33.0	-9.0	
1.880	20.7	H	1.0	7.86	27.58	33.0	-5.4	
High Ch								
1.910	18.3	V	1.0	7.84	25.11	33.0	-7.9	
1.910	21.2	H	1.0	7.84	28.02	33.0	-5.0	

Rev. 10.24.13

EGPRS 1900MHz BAND 2

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company: Apple
Project #: 14U17673
Date: 6/19/2014
Test Engineer: M. Hua
Configuration: EUT Only
Mode: EDGE 1900MHz

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 8ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.851	15.5	V	1.0	7.88	22.43	33.0	-10.6	
1.851	18.5	H	1.0	7.88	25.38	33.0	-7.6	
Mid Ch								
1.880	14.5	V	1.0	7.86	21.37	33.0	-11.6	
1.880	18.1	H	1.0	7.86	24.98	33.0	-8.0	
High Ch								
1.910	15.5	V	1.0	7.84	22.31	33.0	-10.7	
1.910	18.2	H	1.0	7.84	25.02	33.0	-8.0	

Rev. 10.24.13

UMTS REL 99, 850MHz BAND 5

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company: Apple
Project #: 14U17673
Date: 07/24/14
Test Engineer: F. Guarnero
Configuration: EUT Only
Mode: WCDMA Rel 99 850MHz

Test Equipment:
Receiving: Sunol T408, and Chamber E Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
826.40	9.22	V	0.6	0.0	8.60	10.75	38.45	40.60	-29.9	
826.40	16.14	H	0.6	0.0	15.52	17.67	38.45	40.60	-22.9	
Mid Ch										
836.00	8.25	V	0.6	0.0	7.63	9.78	38.45	40.60	-30.8	
836.00	16.06	H	0.6	0.0	15.44	17.59	38.45	40.60	-23.0	
High Ch										
846.00	9.16	V	0.6	0.0	8.54	10.69	38.45	40.60	-29.9	
846.00	16.45	H	0.6	0.0	15.83	17.98	38.45	40.60	-22.6	

Rev. 10.24.13

UMTS HSDPA, 850MHz BAND 5

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company: Apple
Project #: 14U17673
Date: 7/24/2014
Test Engineer: F. Guarnero
Configuration: EUT Only
Mode: WCDMA HSDPA 850MHz

Test Equipment:
Receiving: Sunol T408, and Chamber E Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
826.40	8.30	V	0.6	0.0	7.68	9.83	38.45	40.6	-30.8	
826.40	15.22	H	0.6	0.0	14.60	16.75	38.45	40.6	-23.8	
Mid Ch										
836.00	7.33	V	0.6	0.0	6.71	8.86	38.45	40.6	-31.7	
836.00	15.14	H	0.6	0.0	14.52	16.67	38.45	40.6	-23.9	
High Ch										
846.00	8.24	V	0.6	0.0	7.62	9.77	38.45	40.6	-30.8	
846.00	15.53	H	0.6	0.0	14.91	17.06	38.45	40.6	-23.5	

Rev. 10.24.13

UMTS REL 99, 1900MHz BAND 2

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company: Apple
Project #: 14U17673
Date: 06/10/14
Test Engineer: F. Guarnero
Configuration: EUT only
Mode: WCDMA Rel 99 1900MHz

Test Equipment:
Receiving: Horn T346 and Chamber E SMA Cables
Substitution: Horn T60 Substitution, 8ft SMA Cable Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.852	12.8	V	0.98	8.62	20.47	33.0	-12.5	
1.852	13.5	H	0.98	8.83	21.30	33.0	-11.7	
Mid Ch								
1.880	12.9	V	0.98	8.53	20.44	33.0	-12.6	
1.880	13.9	H	0.98	8.68	21.60	33.0	-11.4	
High Ch								
1.908	13.1	V	0.98	8.43	20.59	33.0	-12.4	
1.908	14.3	H	0.98	8.53	21.83	33.0	-11.2	

Rev. 10.24.13

UMTS HSDPA, 1900MHz BAND 2

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company: Apple
Project #: 14U17673
Date: 6/10/2014
Test Engineer: F. Guarnero
Configuration: EUT only
Mode: WCDMA HSDPA 1900MHz

Test Equipment:
Receiving: Horn T346 and Chamber E SMA Cables
Substitution: Horn T60 Substitution, 8ft SMA Cable Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.852	11.2	V	1.40	8.62	18.42	33.0	-14.6	
1.852	12.6	H	1.40	8.83	20.03	33.0	-13.0	
Mid Ch								
1.880	11.7	V	1.40	8.53	18.78	33.0	-14.2	
1.880	12.0	H	1.40	8.68	19.27	33.0	-13.7	
High Ch								
1.908	11.8	V	1.40	8.43	18.80	33.0	-14.2	
1.908	13.0	H	1.40	8.53	20.10	33.0	-12.9	

Rev. 10.24.13

UMTS REL 99, 1700MHz BAND 4

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company: Apple
Project #: 14U17673
Date: 06/10/14
Test Engineer: F. Guarnero
Configuration: EUT only
Mode: WCDMA Rel 99 1700MHz

Test Equipment:
Receiving: Horn T346 and Chamber E SMA Cables
Substitution: Horn T60 Substitution, 8ft SMA Cable Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.712	9.9	V	0.95	8.40	17.37	30.0	-12.6	
1.712	12.5	H	0.95	8.57	20.11	30.0	-9.9	
Mid Ch								
1.733	8.9	V	0.95	8.50	16.40	30.0	-13.6	
1.733	12.6	H	0.95	8.70	20.34	30.0	-9.7	
High Ch								
1.753	8.7	V	0.95	8.59	16.34	30.0	-13.7	
1.753	12.2	H	0.95	8.82	20.04	30.0	-10.0	

Rev. 10.24.13

UMTS HSDPA, 1700MHz BAND 4

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company: Apple
Project #: 14U17673
Date: 6/18/2014
Test Engineer: T. Chu
Configuration: EUT only
Mode: WCDMA HSDPA 1700MHz

Test Equipment:
Receiving: Horn T346 and Chamber E SMA Cables
Substitution: Horn T60 Substitution, 4ft SMA Cable Warehouse (S/N: 245182 003)

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin EIRP (dB)	Notes
Low Ch								
1.712	9.9	V	0.46	8.40	17.84	30.0	-12.2	
1.712	11.1	H	0.46	8.57	19.19	30.0	-10.8	
Mid Ch								
1.733	8.6	V	0.46	8.50	16.68	30.0	-13.3	
1.733	11.1	H	0.46	8.70	19.32	30.0	-10.7	
High Ch								
1.753	7.4	V	0.46	8.59	15.53	30.0	-14.5	
1.753	10.9	H	0.46	8.82	19.23	30.0	-10.8	

Rev. 10.24.13

CDMA2000 1xRTT, 850MHz BC0

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company: Apple
Project #: 14U17673
Date: 06/11/14
Test Engineer: T. Chu
Configuration: EUT only
Mode: CDMA 1XRTT, 850MHz

Test Equipment:
Receiving: Sunol T408, and Chamber E Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable Warehouse (S/N: 228076 003)

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
824.70	12.45	V	0.9	0.0	11.59	13.74	38.45	40.60	-26.9	
824.70	19.30	H	0.9	0.0	18.43	20.58	38.45	40.60	-20.0	
Mid Ch										
836.52	12.11	V	0.9	0.0	11.24	13.39	38.45	40.60	-27.2	
836.52	19.96	H	0.9	0.0	19.09	21.24	38.45	40.60	-19.4	
High Ch										
848.31	12.22	V	0.9	0.0	11.35	13.50	38.45	40.60	-27.1	
848.31	19.64	H	0.9	0.0	18.77	20.92	38.45	40.60	-19.7	

Rev. 10.24.13

EVDO-Rev A, 850MHz BC0

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 07/01/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: CDMA Rev A 850MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
824.70	8.82	V	0.6	0.0	8.20	10.35	38.45	40.60	-30.2	
824.70	18.78	H	0.6	0.0	18.16	20.31	38.45	40.60	-20.3	
Mid Ch										
836.52	9.67	V	0.6	0.0	9.05	11.20	38.45	40.60	-29.4	
836.52	18.69	H	0.6	0.0	18.07	20.22	38.45	40.60	-20.4	
High Ch										
848.31	8.33	V	0.6	0.0	7.71	9.86	38.45	40.60	-30.7	
848.31	18.70	H	0.6	0.0	18.08	20.23	38.45	40.60	-20.4	

Rev. 06.18.14

CDMA2000 1xRTT, 1900MHz BC1

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company: Apple
Project #: 14U17673
Date: 6/13/2014
Test Engineer: T. Chu
Configuration: EUT only
Mode: CDMA 1XRTT 1900MHz

Test Equipment:
Receiving: Horn T346 and Chamber E SMA Cables
Substitution: Horn T60 Substitution, 8ft SMA Cable Warehouse (S/N: 228076 003)

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.851	12.4	V	1.4	8.62	19.61	33.0	-13.4	
1.851	13.3	H	1.4	8.83	20.69	33.0	-12.3	
Mid Ch								
1.880	13.2	V	1.4	8.53	20.29	33.0	-12.7	
1.880	14.0	H	1.4	8.68	21.24	33.0	-11.8	
High Ch								
1.910	13.2	V	1.4	8.43	20.19	33.0	-12.8	
1.910	15.0	H	1.4	8.53	22.08	33.0	-10.9	

Rev. 10.24.13

EVDO-Rev A, 1900MHz BC1

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company: Apple
Project #: 14U17673
Date: 6/12/2014
Test Engineer: T. Chu
Configuration: EUT only
Mode: CDMA Rev A 1900MHz

Test Equipment:
Receiving: Horn T346 and Chamber E SMA Cables
Substitution: Horn T60 Substitution, 8ft SMA Cable Warehouse (S/N: 228076 003)

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.851	12.4	V	1.4	8.62	19.62	33.0	-13.4	
1.851	14.0	H	1.4	8.83	21.46	33.0	-11.5	
Mid Ch								
1.880	12.9	V	1.4	8.53	20.04	33.0	-13.0	
1.880	14.2	H	1.4	8.68	21.46	33.0	-11.5	
High Ch								
1.909	13.1	V	1.4	8.43	20.10	33.0	-12.9	
1.909	15.0	H	1.4	8.53	22.12	33.0	-10.9	

Rev. 10.24.13

CDMA2000 1xRTT, 1700MHz BC15

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company: Apple
Project #: 14U17673
Date: 6/13/2014
Test Engineer: T. Chu
Configuration: EUT only
Mode: CDMA 1XRTT, 1700MHz

Test Equipment:
Receiving: Horn T346 and Chamber E SMA Cables
Substitution: Horn T60 Substitution, 8ft SMA Cable Warehouse (S/N: 228076 003)

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.711	10.2	V	1.27	8.40	17.31	30.0	-12.7	
1.711	13.5	H	1.27	8.57	20.78	30.0	-9.2	
Mid Ch								
1.733	9.5	V	1.27	8.50	16.71	30.0	-13.3	
1.733	12.5	H	1.27	8.70	19.97	30.0	-10.0	
High Ch								
1.754	8.8	V	1.27	8.59	16.08	30.0	-13.9	
1.754	12.2	H	1.27	8.82	19.74	30.0	-10.3	

Rev. 10.24.13

EVDO-Rev A, 1700MHz BC15

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company: Apple
Project #: 14U17673
Date: 6/12/2014
Test Engineer: T. Chu
Configuration: EUT only
Mode: CDMA Rev A 1700MHz

Test Equipment:
Receiving: Horn T346 and Chamber E SMA Cables
Substitution: Horn T60 Substitution, 8ft SMA Cable Warehouse (S/N: 228076 003)

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1.711	11.0	V	1.27	8.40	18.16	30.0	-11.8	
1.711	13.5	H	1.27	8.57	20.82	30.0	-9.2	
Mid Ch								
1.733	10.6	V	1.27	8.50	17.81	30.0	-12.2	
1.733	12.8	H	1.27	8.70	20.19	30.0	-9.8	
High Ch								
1.754	8.9	V	1.27	8.59	16.20	30.0	-13.8	
1.754	11.9	H	1.27	8.82	19.47	30.0	-10.5	

Rev. 10.24.13

CDMA2000 1xRTT, 800MHz BC10

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company:	Apple
Project #:	14U17673
Date:	6/11/2014
Test Engineer:	T. Chu
Configuration:	EUT only
Mode:	CDMA 1XRTT, 800MHz

Test Equipment:
Receiving: Sunol T408, and Chamber E Cable
Substitution: Dipole S/N: 00022117,8ft SMA Cable Warehouse (S/N: 228076 003)

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
817.25	12.56	V	0.9	0.0	11.67	13.82	38.45	40.60	-26.8	
817.25	18.64	H	0.9	0.0	17.75	19.90	38.45	40.60	-20.7	
Mid Ch										
820.00	12.29	V	0.9	0.0	11.40	13.55	38.45	40.60	-27.0	
820.00	18.78	H	0.9	0.0	17.89	20.04	38.45	40.60	-20.6	
High Ch										
822.75	13.15	V	0.9	0.0	12.26	14.41	38.45	40.60	-26.2	
822.75	18.91	H	0.9	0.0	18.02	20.17	38.45	40.60	-20.4	

Rev. 10.24.13

EVDO-Rev A, 800MHz BC10

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 14U17673
Date: 07/01/14
Test Engineer: M. Hua
Configuration: EUT Only
Mode: CDMA Rev A 800MHz

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	ERP Limit (dBm)	EIRP Limit (dBm)	Margin (dB)	Notes
Low Ch										
817.25	7.86	V	0.6	0.0	7.24	9.39	38.45	40.60	-31.2	
817.25	18.12	H	0.6	0.0	17.50	19.65	38.45	40.60	-20.9	
Mid Ch										
820.00	8.23	V	0.6	0.0	7.61	9.76	38.45	40.60	-30.8	
820.00	18.39	H	0.6	0.0	17.77	19.92	38.45	40.60	-20.7	
High Ch										
822.75	8.20	V	0.6	0.0	7.58	9.73	38.45	40.60	-30.9	
822.75	18.36	H	0.6	0.0	17.74	19.89	38.45	40.60	-20.7	

Rev. 06.18.14

CDMA2000, REV B

Two Carriers Min Separation.

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company: Apple
Project #: 14U17673
Date: 07/24/14
Test Engineer: Tony Wang
Configuration: EUT only
Mode: CDMA Rev B Two Carriers Min Separation 850MHz

Test Equipment:
Receiving: Sunol T408, and Chamber E Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	Limit (dBm)	Margin EIRP (dB)	Notes
Low Ch									
824.7 + 825.93MHz	7.22	V	0.6	0.0	6.60	8.75	38.5	-29.7	
824.7 + 825.93MHz	14.62	H	0.6	0.0	14.00	16.15	38.5	-22.3	
Mid Ch									
836.52+837.75MHz	6.95	V	0.6	0.0	6.33	8.48	38.5	-30.0	
836.52+837.75MHz	15.04	H	0.6	0.0	14.42	16.57	38.5	-21.9	
High Ch									
847.08+848.31MHz	8.00	V	0.6	0.0	7.38	9.53	38.5	-28.9	
847.08+848.31MHz	14.86	H	0.6	0.0	14.24	16.39	38.5	-22.1	

Rev. 10.24.13

CDMA2000, REV B

Two Carriers Max Separation

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company:
Project #: 14U17673
Date: 07/24/14
Test Engineer: R.Z
Configuration: EUT only
Mode: CDMA Rev B Two Carrier Max Separation 850MHz

Test Equipment:
Receiving: Sunol T408, and Chamber E Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	Limit (dBm)	argin EIR (dB)	Notes
Low Ch									
824.7 + 829.68MHz	6.61	V	0.6	0.0	5.99	8.14	38.5	-30.3	
824.7 + 829.68MHz	14.31	H	0.6	0.0	13.69	15.84	38.5	-22.6	
Mid Ch									
836.52+841.50MHz	6.34	V	0.6	0.0	5.72	7.87	38.5	-30.6	
836.52+841.50MHz	14.53	H	0.6	0.0	13.91	16.06	38.5	-22.4	
High Ch									
843.33+848.31MHz	6.89	V	0.6	0.0	6.27	8.42	38.5	-30.0	
843.33+848.31MHz	14.65	H	0.6	0.0	14.03	16.18	38.5	-22.3	

Rev. 10.24.13

CDMA2000, REV B

Three Carriers Min Separation

High Frequency Substitution Measurement
UL Fremont Radiated Chamber E

Company:
Project #: 14U17673
Date: 07/24/14
Test Engineer: R.Z
Configuration: EUT only
Mode: CDMA Rev B Three Carrier Min Separation 850MHz

Test Equipment:
Receiving: Sunol T408, and Chamber E Cable
Substitution: Dipole S/N: 00022117, 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	EIRP (dBm)	Limit (dBm)	Margin EIRP (dB)	Notes
Low Ch									
824.7+825.93+827.16MHz	6.08	V	0.6	0.0	5.46	7.61	38.5	-30.8	
824.7+825.93+827.16MHz	14.32	H	0.6	0.0	13.70	15.85	38.5	-22.6	
Mid Ch									
836.52+837.75+838.98MHz	5.61	V	0.6	0.0	4.99	7.14	38.5	-31.3	
836.52+837.75+838.98MHz	14.34	H	0.6	0.0	13.72	15.87	38.5	-22.6	
High Ch									
845.85+847.08+848.31MHz	6.16	V	0.6	0.0	5.54	7.69	38.5	-30.8	
845.85+847.08+848.31MHz	14.52	H	0.6	0.0	13.90	16.05	38.5	-22.4	

Rev. 10.24.13