CERTIFICATION TEST REPORT

Report Number. : 16U23814-E10V2

Applicant	:	APPLE, INC 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A
Model	:	A1823
FCC ID	:	BCGA1823
IC	:	579C-A1823
EUT Description	:	TABLET DEVICE
Test Standard(s)	:	FCC CFR47 PART 22H, 24E, 27L, AND 90S IC RSS-132 ISSUE 3, RSS-133 ISSUE 6 AND RSS-139 ISSUE 3

Date Of Issue:
February 10, 2017

Prepared by:
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	01/30/2017	Initial Revision	Chin Pang
V2	02/10/2017	Revised report to address TCB's questions	Tina Chu

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: TABLET DEVICE

MODEL: A1823

SERIAL NUMBER: F9FSJ008HNCC

DATE TESTED: OCTOBER 21, 2016 – FEBRUARY 10, 2017

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 22H, 24E, 27L, AND 90S	Pass
IC RSS-132 ISSUE 3, RSS-133 ISSUE 6, AND RSS-139 ISSUE 3	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
UL Verification Services Inc. By:

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SENIOR ENGINEER
UL VERIFICATION SERVICES INC.

Prepared By:

MONA HUA
WISE LAB ENGINEER
UL VERIFICATION SERVICES INC.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-D, FCC CFR 47 Part 2, FCC CFR 47 Part 22, FCC CFR Part 24, FCC Part 27, FCC Part 90 and FCC KDB 971168 D01 v02r02. RSS-132 Issue 3, RSS-133 Issue 6 and RSS-139 Issue 3 and ANSI C63.26:2015.

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. 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 (IC:2324B-1)	☐ Chamber D (IC:2324B-4)
☐ Chamber B (IC:2324B-2)	☐ Chamber E (IC:2324B-5)
☐ Chamber C (IC:2324B-3)	☒ Chamber F (IC:2324B-6)
	☐ Chamber G (IC:2324B-7)
	☒ Chamber H (IC:2324B-8)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313.

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, 9KHz to 0.15 MHz	3.84 dB
Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Radiated Disturbance,1000 to 18000 MHz	4.32 dB
Radiated Disturbance,18000 to 26000 MHz	4.45 dB
Radiated Disturbance,26000 to 40000 MHz	5.24 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

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

5.2. MAXIMUM OUTPUT POWER

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015/ TIA / EIA 603-D Clause 2.2.17
KDB 971168 Section 5.6

ERP/EIRP = PMeas + GT − LC

where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas = measured transmitter output power or PSD, in dBm or dBW;
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

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

GSM MODES

RSS 132 850MHz Band IC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
824- 849	GPRS	33.50	0.43	33.93	2471.7	40.6	-6.7
	EGPRS	28.00	0.43	28.43	696.6	40.6	-12.2
Part 22 850MHz Band FCC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	ERP		Limit (dBm)	Margin (dB)
				dBm	mW		
824-849	GPRS	33.50	0.43	31.78	1506.6	38.5	-6.7
	EGPRS	28.00	0.43	26.28	424.6	38.5	-12.2
Part 24 / RSS 133 1900MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
1850-1910	GPRS	29.00	2.35	31.35	1364.6	33.0	-1.7
	EGPRS	27.00	2.35	29.35	861.0	33.0	-3.7

CDMA2000 MODES

Part 90 800MHz Band FCC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	ERP		Limit (dBm)	Margin (dB)
				dBm	mW		
816-824	CDMA 1xRTT	25.40	0.20	23.45	221.3	50.0	-26.6
	CDMA EVDO Rev A	25.49	0.20	23.54	225.9	50.0	-26.5
RSS 132 850MHz Band IC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
824- 849	CDMA 1xRTT	24.49	0.43	24.92	310.5	40.6	-15.7
	CDMA EVDO-Rev A	24.50	0.43	24.93	311.2	40.6	-15.7
Part 22 850MHz Band FCC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	ERP		Limit (dBm)	Margin (dB)
				dBm	mW		
824- 849	CDMA 1xRTT	24.49	0.43	22.77	189.2	38.5	-15.7
	CDMA EVDO-Rev A	24.50	0.43	22.78	189.7	38.5	-15.7
Part 24 / RSS 133 1900MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
1850-1910	CDMA 1xRTT	25.50	2.35	27.85	609.5	33.0	-5.2
	CDMA EVDO Rev A	25.50	2.35	27.85	609.5	33.0	-5.2

UMTS MODE

RSS 132 850MHz Band IC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
824- 849	REL 99	25.29	0.43	25.72	373.3	40.6	-14.9
	HSDPA	24.50	0.43	24.93	311.2	40.6	-15.7
Part 22 850MHz Band FCC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	ERP		Limit (dBm)	Margin (dB)
				dBm	mW		
824-849	REL 99	25.29	0.43	23.57	227.5	38.5	-14.9
	HSDPA	24.50	0.43	22.78	189.7	38.5	-15.7
Part 24 / RSS 133 1900MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
1850-1910	REL 99	25.50	2.35	27.85	609.5	33.0	-5.2
	HSDPA	24.50	2.35	26.85	484.2	33.0	-6.2
Part 27 / RSS 139 1700MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
1710-1755	REL 99	25.38	1.00	26.38	434.5	30.0	-3.6
	HSDPA	24.50	1.00	25.50	354.8	30.0	-4.5

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency (MHz)	Antenna Gain (dBi)
816 – 824 (FCC)	0.20
824 - 849	0.43
1850 - 1910	2.35
1710 - 1755	1.00

5.4. SOFTWARE AND FIRMWARE

The EUT software installed during testing was 14E232 and baseband firmware 5.48.00.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case is EUT on the highest power. Based on Peak Power measurement investigations, the following modes should be considered as worst-case scenario for all other measurements.

Worst-case modes:
- GSM GPRS
- GSM EGPRS
- CDMA 2000 1xRTT
- CDMA 2000 EVDO REV. A
- UMTS REL 99
- UMTS HSDPA

The fundamental of the EUT was investigated in three orthogonal orientations X/Y/Z, it was determined that Flatbed (X) orientation was worst-case orientation for 800MHz secondary, cell and PCS bands without AC/DC adapter and headset.

Conducted investigation was done from 10 MHz to 30 MHz; no emission was found.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List			
Description	**Manufacturer**	**Model**	**Serial Number**
AC/DC adapter	HP	HSTNN-DA40	WDWR7OBAR9AKS8
Laptop	HP	HP ProBook 450 G2	CND5367Z97
DC power supply	Sorensen	XT 20-3	1318A00530

I/O CABLES (RF Radiated Test)

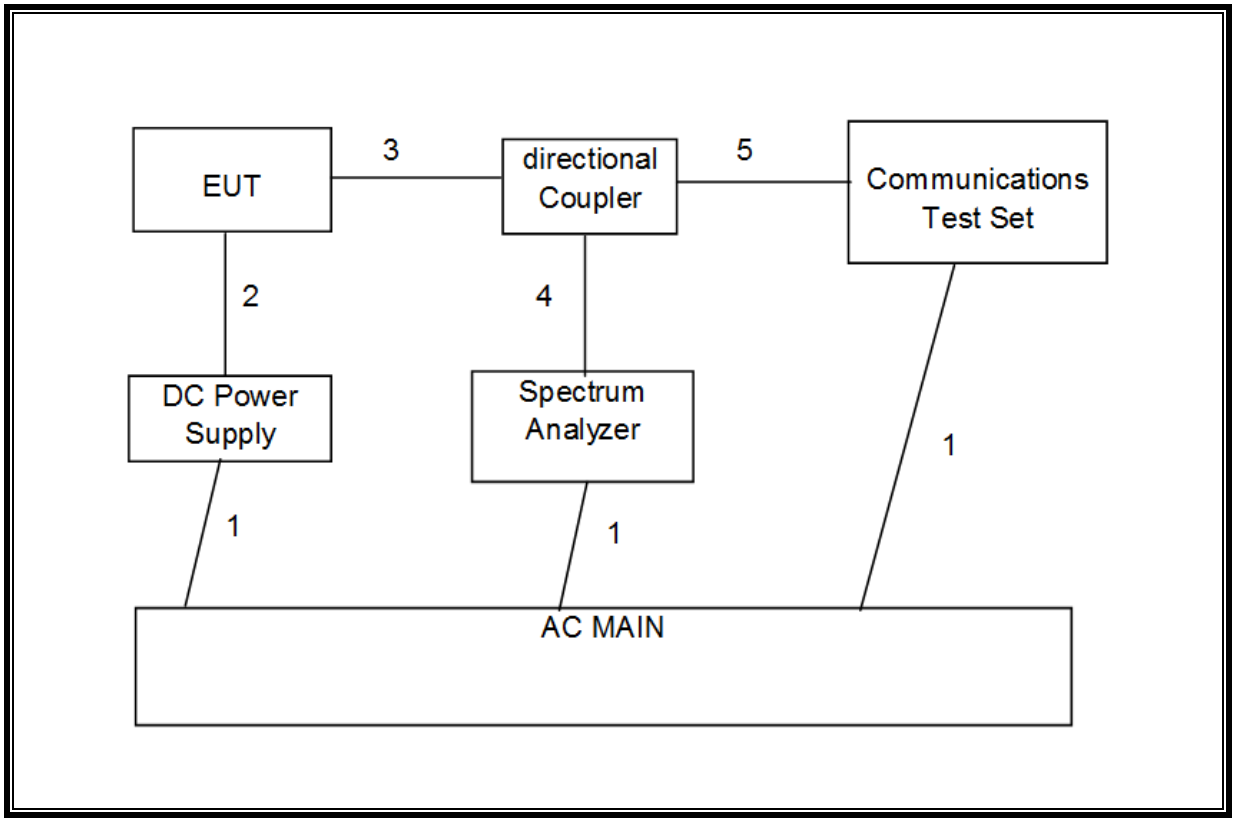
I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	RF In/Out	1	Antenna	Un-shielded	5m	NA

I/O CABLES (RF Conducted Test)

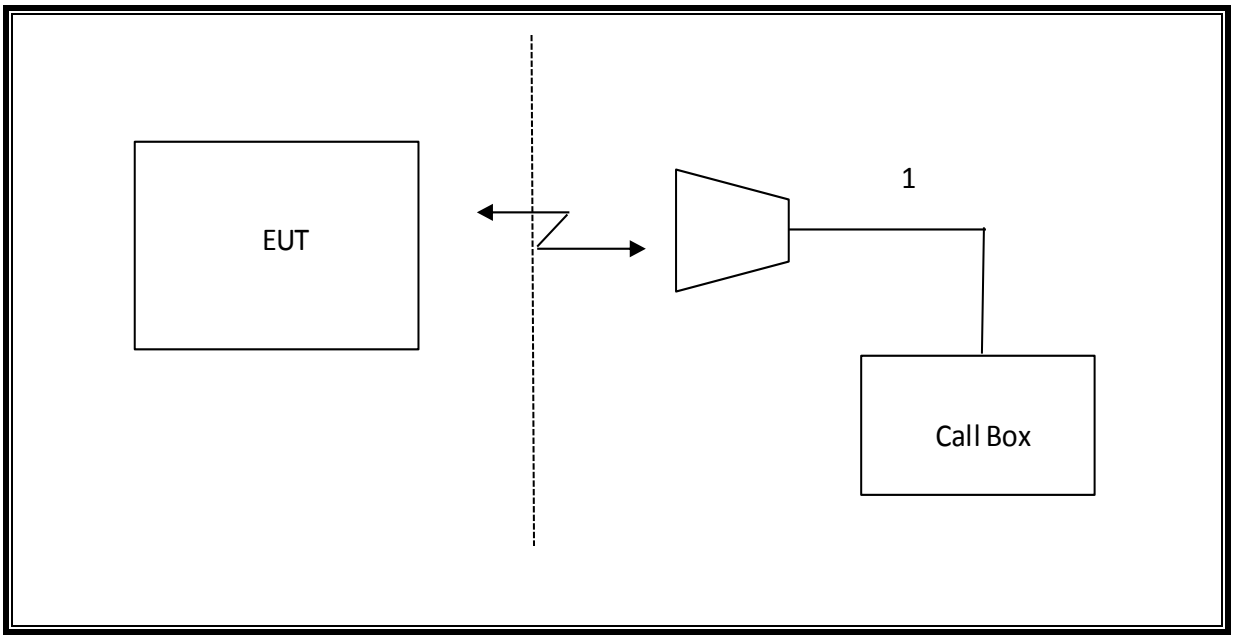
I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	US 115V	Un-shielded	2m	N/A
2	DC	1	DC	Un-shielded	1.4m	N/A
3	RF In/Out	1	EUT	Un-shielded	0.4m	N/A
4	RF In/Out	1	Barrel	N/A	N/A	N/A
5	RF In/Out	1	Communication Test Set	Un-shielded	1m	N/A

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**
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T863	04/26/2017
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T900	05/3/2017
Amplifier, 1 to 18GHz, 35dB	Amplical	AMP1G18-35	T1569	09/15/2017
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T835	06/18/2017
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T906	02/03/2017
Directional Coupler	KRYTAR	152610	T1537	04/11/2017
Power Meter, P-series single channel	Keysight	N1912A	T1245	05/03/2017
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight	N1921A	T1226	05/18/2017
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight	N1921A	T750	10/17/2017
Directional Coupler	KRYTAR	152610	T1536	04/11/2017
Filter, HPF 3.0GHz	MICROTRONICS	HPM17543	T487	01/26/2017
Filter, HPF 1.2GHz	Micro-Tronics	WHKX1.2/15G-6ST	T1182	05/31/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	T1466	03/09/2017
Communication Analyzer	Keysight	E5515C	T211	11/16/2017
Communication Analyzer	Keysight	E5515C	T213	03/01/2017
Wideband Communication Test Set, Call Box	Rohde & Schwarz GmbH & Co. KG	CMW500	T959	07/09/2017
Wideband Communication Test Set, Call Box	Rohde & Schwarz GmbH & Co. KG	CMW500	T971	08/05/2017
Chamber, Environmental	Cincinnati Sub Zero	ZPHS-8-3.5-SCT/WC	T1154	03/12/2017
Wideband Communication Test Set, Call Box	Rohde & Schwarz	CMW500	T260	07/20/2017
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	T447	06/16/2017
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Keysight	8449B	T402	07/05/2017
Antenna, Horn 1-18GHz	Emco	3115	T59	11/18/2017

7. RF POWER OUTPUT VERIFICATION

7.1. GSM

Using CMW500 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

7.1.1. GPRS/EGPRS

ID:	295	**Date:**	2/10/17

Mode	Ch.	f (MHz)	1 time slot		2 time slots	
			Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)
GPRS	128	824.2	**33.6**	**33.5**	32.5	32.5
	190	836.6	33.5	33.4	32.4	32.4
	251	848.8	33.5	33.3	32.4	32.3
EGPRS	128	824.2	**31.1**	**28.0**	31.0	27.9
	190	836.6	30.8	27.8	30.8	27.8
	251	848.8	31.0	27.8	30.8	27.8
GPRS	512	1850.2	29.3	28.9	29.0	28.8
	661	1880.0	**29.4**	**29.0**	29.0	28.9
	810	1909.8	29.2	28.7	28.9	28.7
EGPRS	512	1850.2	29.8	26.9	29.7	26.8
	661	1880.0	**30.2**	**27.0**	30.1	26.9
	810	1909.8	29.9	26.8	29.8	26.7

7.2. CDMA200

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

7.2.1. 1xRTT

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: 18; 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

ID:	50820	Date:	11/10/16

1xRTT, BC10, SECONDARY 800 BAND

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)	30.18	25.36	30.21	25.39	30.20	25.37
	55 (Loopback)	30.17	25.29	30.20	25.39	30.19	25.38
RC2	9 (Loopback)	**30.30**	**25.40**	30.21	25.37	30.09	25.37
	55 (Loopback)	30.28	25.38	30.22	25.39	30.07	25.38
RC3	2 (Loopback)	30.25	25.37	30.13	25.37	30.09	25.36
	55 (Loopback)	30.29	25.39	30.13	25.37	30.08	25.37
	32 (+ F-SCH)	29.96	25.29	29.95	25.31	29.82	25.38
	32 (+ SCH)	29.97	25.30	29.93	25.31	29.82	25.37
RC4	2 (Loopback)	30.26	25.36	30.13	25.36	30.05	25.31
	55 (Loopback)	30.27	25.39	30.14	25.37	30.05	25.32
	32 (+ F-SCH)	29.96	25.29	29.93	25.29	29.83	25.31
	32 (+ SCH)	29.95	25.34	29.94	25.30	29.84	25.36
RC5	9 (Loopback)	30.22	25.36	30.13	25.35	30.04	25.34
	55 (Loopback)	30.23	25.37	30.15	25.36	30.05	25.35
RC11	2 (Loopback)	30.10	25.39	30.20	25.36	30.09	25.33
	75 (Loopback)	30.26	25.37	30.17	25.34	30.08	25.33
	32 (+ F-SCH)	30.00	25.33	30.10	25.33	30.08	25.36
	32 (+ SCH)	30.02	25.33	30.08	25.34	30.07	25.34

ID:	50820	Date:	11/10/16

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)	29.30	24.35	29.40	24.35	29.27	24.29
	55 (Loopback)	29.28	24.28	29.45	24.38	29.29	24.27
RC2	9 (Loopback)	29.40	24.32	**29.52**	**24.49**	29.31	24.26
	55 (Loopback)	29.05	24.28	29.40	24.32	29.30	24.28
RC3	2 (Loopback)	29.07	24.32	29.38	24.35	29.12	24.30
	55 (Loopback)	29.08	24.32	29.40	24.35	29.11	24.30
	32 (+ F-SCH)	29.45	24.39	29.37	24.40	29.42	24.40
	32 (+ SCH)	29.43	24.38	29.40	24.41	29.40	24.41
RC4	2 (Loopback)	29.07	24.32	29.37	24.34	29.15	24.30
	55 (Loopback)	29.05	24.33	29.17	24.32	29.18	24.31
	32 (+ F-SCH)	29.40	24.42	29.37	24.41	29.35	24.43
	32 (+ SCH)	29.30	24.42	29.30	24.47	29.37	24.40
RC5	9 (Loopback)	29.06	24.31	29.07	24.33	29.08	24.31
	55 (Loopback)	29.05	24.32	29.06	24.32	29.06	24.33
RC11	2 (Loopback)	29.40	24.45	29.40	24.43	29.30	24.38
	75 (Loopback)	29.40	24.45	29.38	24.40	29.30	24.35
	32 (+ F-SCH)	29.50	24.39	29.40	24.41	29.42	24.39
	32 (+ SCH)	29.41	24.40	29.35	24.44	29.43	24.40

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)	29.65	25.47	29.68	25.47	29.50	25.34
	55 (Loopback)	29.63	25.49	29.66	25.46	29.49	25.32
RC2	9 (Loopback)	**29.70**	**25.50**	29.69	25.48	29.52	25.32
	55 (Loopback)	29.63	25.46	29.68	25.47	29.50	25.31
RC3	2 (Loopback)	29.64	25.46	29.65	25.46	29.50	25.31
	55 (Loopback)	29.62	25.44	29.65	25.46	29.51	25.30
	32 (+ F-SCH)	29.69	25.47	29.67	25.44	29.49	25.29
	32 (+ SCH)	29.67	25.45	29.55	25.21	29.47	25.32
RC4	2 (Loopback)	29.69	25.47	29.66	25.47	29.51	25.29
	55 (Loopback)	29.62	25.46	29.62	25.48	29.50	25.30
	32 (+ F-SCH)	29.67	25.44	29.65	25.47	29.43	25.30
	32 (+ SCH)	29.62	25.47	29.68	25.44	29.48	25.31
RC5	9 (Loopback)	29.68	25.46	29.59	25.48	29.49	25.30
	55 (Loopback)	29.66	25.44	29.63	25.42	29.51	25.30
RC11	2 (Loopback)	29.63	25.49	29.66	24.51	29.53	25.33
	75 (Loopback)	29.65	25.47	29.59	25.49	29.48	25.31
	32 (+ F-SCH)	29.65	25.47	29.58	25.47	29.48	25.32
	32 (+ SCH)	29.58	25.20	29.60	25.43	29.50	25.31

7.2.2. 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

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EVDO REL 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	**30.27**	**25.40**
		560	820.00	30.22	25.30
		670	822.75	30.05	25.29

EVDO REL 0 850MHz BAND

FTAP Rate	RTAP Rate	Channel	Frequency (MHz)	Peak Conducted Power (dBm)	Average Conducted Power (dBm)
307.2 Kbps (2 slot QPSK)	153.6 Kbps	1013	824.70	29.50	24.37
		384	836.52	**29.78**	**24.38**
		777	848.31	29.60	24.35

EVDO REL 0 1900MHz BAND

FTAP Rate	RTAP Rate	Channel	Frequency (MHz)	Peak Conducted Power (dBm)	Average Conducted Power (dBm)
307.2 Kbps (2 slot QPSK)	153.6 Kbps	25.00	1851.25	30.23	25.37
		600.00	1880.00	**30.30**	**25.40**
		1175.00	1908.75	30.25	25.24

7.2.3. 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

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EVDO REV A 800MHz SECONDARY BAND

FETAP Traffic Format	RETAP Data Payload Size	Channel	Frequency (MHz)	Peak Conducted Power (dBm)	Average Conducted Power (dBm)
307.2k, QPSK / ACK channel is transmitted at all the slots	4096	450	817.25	**30.41**	**25.49**
		560	820.00	30.26	25.35
		670	822.75	30.30	25.45

EVDO REV A 850MHz BAND

FETAP Traffic Format	RETAP Data Payload Size	Channel	Frequency (MHz)	Peak Conducted Power (dBm)	Average Conducted Power (dBm)
307.2k, QPSK / ACK channel is transmitted at all the slots	4096	1013	824.70	29.60	24.48
		384	836.52	**29.70**	**24.50**
		777	848.31	29.60	24.47

EVDO REV A 1900MHz BAND

FETAP Traffic Format	RETAP Data Payload Size	Channel	Frequency (MHz)	Peak Conducted Power (dBm)	Average Conducted Power (dBm)
307.2k, QPSK / ACK channel is transmitted at all the slots	4096	25	1851.25	30.30	25.44
		600	1880.00	**30.40**	**25.50**
		1175	1908.75	30.10	25.29

7.3. UMTS

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.

7.3.1. 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

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Part 22 / RSS 132 850MHz Band

Band	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
UMTS Rel. 99 850MHz	4132	4357	826.4	28.90	25.28
	4183	4408	836.6	28.92	25.27
	4233	4458	846.6	**28.94**	**25.29**

Part 24 / RSS 133 1900MHz Band

Band	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
UMTS Rel. 99 1900MHz	9262	9662	1852.4	29.20	25.39
	9400	9800	1880.0	**29.30**	**25.50**
	9538	9938	1907.6	29.05	25.31

Part 27 / RSS 139 1700MHz Band

Band	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
UMTS Rel. 99 1700MHz	1312	1537	1712.4	29.10	25.21
	1413	1638	1732.6	**29.20**	**25.38**
	1513	1738	1752.6	29.05	25.23

7.3.2. 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	11/15	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

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Part 22 / RSS 132 850MHz Band

Band	Subtest	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
UMTS HSDPA 850MHz	1	4132	4357	826.4	28.32	24.40
		4183	4408	836.6	**28.36**	**24.50**
		4233	4458	846.6	28.28	24.38
	2	4132	4357	826.4	28.11	24.40
		4183	4408	836.6	28.07	24.35
		4233	4458	846.6	28.18	24.40
	3	4132	4357	826.4	28.15	24.00
		4183	4408	836.6	28.14	24.02
		4233	4458	846.6	28.23	24.10
	4	4132	4357	826.4	28.16	24.02
		4183	4408	836.6	28.17	24.00
		4233	4458	846.6	28.20	24.05

Part 24 / RSS 133 1900MHz Band

Band	Subtest	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
UMTS HSDPA 1900MHz	1	9262	9662	1852.4	29.08	24.40
		9400	9800	1880.0	**29.18**	**24.50**
		9538	9938	1907.6	29.10	24.40
	2	9262	9662	1852.4	29.02	24.36
		9400	9800	1880.0	29.16	24.35
		9538	9938	1907.6	29.13	24.39
	3	9262	9662	1852.4	28.66	24.05
		9400	9800	1880.0	28.80	24.02
		9538	9938	1907.6	28.77	24.00
	4	9262	9662	1852.4	28.88	24.00
		9400	9800	1880.0	28.86	24.10
		9538	9938	1907.6	28.81	24.10

Part 27 / RSS 139 1700MHz Band

Band	Subtest	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
UMTS HSDPA 1700MHz	1	1312	1537	1712.4	**29.00**	**24.50**
		1413	1638	1732.6	28.92	24.40
		1513	1738	1752.6	28.79	24.35
	2	1312	1537	1712.4	28.75	24.42
		1413	1638	1732.6	28.73	24.35
		1513	1738	1752.6	28.61	24.41
	3	1312	1537	1712.4	28.36	24.03
		1413	1638	1732.6	28.27	24.00
		1513	1738	1752.6	28.07	23.95
	4	1312	1537	1712.4	28.27	24.05
		1413	1638	1732.6	28.27	24.04
		1513	1738	1752.6	28.13	24.00

7.3.3. HSPA REL 6 (HSDPA & HSUPA)

EST 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	15/1
	βhs	22/15	12/15	30/15	4/15	5/15
	βed	1309/225	94/75	47/15	56/75	47/15
	CM (dB)	1	3	2	3	1
	MPR (dB)	0	2	1	2	0
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

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Part 22 / RSS 132 850MHz Band

Band	Subtest	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
UMTS HSUPA 850MHz	1	4132	4357	826.4	**29.05**	**24.49**
		4183	4408	836.6	29.03	24.40
		4233	4458	846.6	28.75	24.38
	2	4132	4357	826.4	28.91	22.50
		4183	4408	836.6	29.00	22.40
		4233	4458	846.6	28.74	22.00
	3	4132	4357	826.4	28.98	23.50
		4183	4408	836.6	28.98	23.40
		4233	4458	846.6	28.90	23.45
	4	4132	4357	826.4	28.98	22.40
		4183	4408	836.6	28.96	22.45
		4233	4458	846.6	28.92	22.50
	5	4132	4357	826.4	28.97	24.40
		4183	4408	836.6	28.94	24.35
		4233	4458	846.6	28.92	24.45

Part 24 / RSS 133 1900MHz Band

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted Output Power (dBm)	
					Peak	Average
UMTS HSUPA 1900MHz (Band 2)	1	9262	9662	1852	**29.12**	**24.48**
		9400	9800	1880	29.07	24.45
		9538	9938	1908	29.04	24.43
	2	9262	9662	1852	27.85	22.50
		9400	9800	1880	28.05	22.60
		9538	9938	1908	27.86	22.70
	3	9262	9662	1852	28.70	23.54
		9400	9800	1880	28.50	23.50
		9538	9938	1908	28.72	23.46
	4	9262	9662	1852	27.77	22.55
		9400	9800	1880	27.77	22.48
		9538	9938	1908	27.79	22.52
	5	9262	9662	1852	29.07	24.40
		9400	9800	1880	29.06	24.42
		9538	9938	1908	29.03	24.42

Part 27 / RSS 139 1700MHz Band

Band	Subtest	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
UMTS HSUPA 1700MHz	1	1312	1537	1712.4	28.97	24.40
		1413	1638	1732.6	28.95	24.42
		1513	1738	1752.6	**29.00**	**24.48**
	2	1312	1537	1712.4	28.67	22.30
		1413	1638	1732.6	28.51	22.40
		1513	1738	1752.6	28.28	22.50
	3	1312	1537	1712.4	28.80	23.40
		1413	1638	1732.6	28.70	23.27
		1513	1738	1752.6	28.85	23.30
	4	1312	1537	1712.4	28.02	22.30
		1413	1638	1732.6	28.08	22.40
		1513	1738	1752.6	28.00	22.45
	5	1312	1537	1712.4	28.94	24.40
		1413	1638	1732.6	28.95	24.30
		1513	1738	1752.6	28.95	24.33

7.4. 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.		

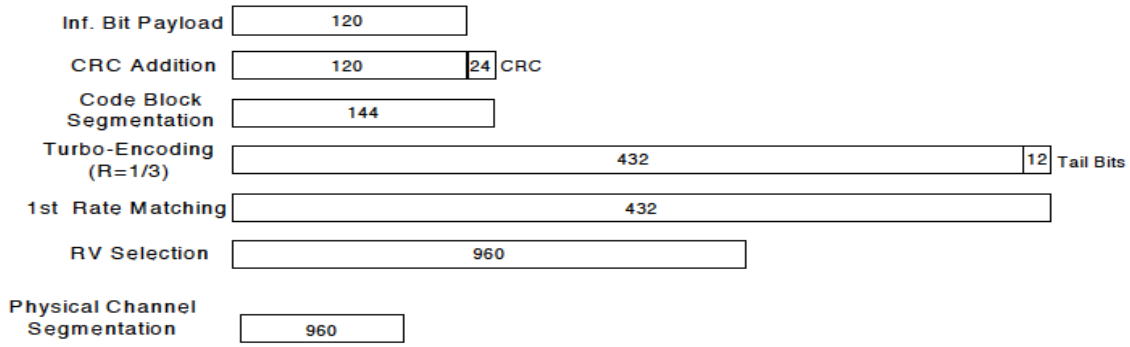

Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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

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Part 22 / RSS 132 850MHz Band

Band	Subtest	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
UMTS HSDPA 850MHz	1	4132	4357	826.4	28.25	24.20
		4183	4408	836.6	28.25	24.20
		4233	4458	846.6	**28.30**	**24.22**
	2	4132	4357	826.4	28.10	24.17
		4183	4408	836.6	28.06	24.19
		4233	4458	846.6	28.15	24.20
	3	4132	4357	826.4	28.03	23.90
		4183	4408	836.6	28.08	23.89
		4233	4458	846.6	27.95	23.80
	4	4132	4357	826.4	28.01	23.89
		4183	4408	836.6	28.02	23.90
		4233	4458	846.6	27.99	23.88

Part 24 / RSS 133 1900MHz Band

Band	Subtest	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
UMTS HSDPA 1900MHz	1	9262	9662	1852.4	29.05	24.08
		9400	9800	1880.0	**29.15**	**24.20**
		9538	9938	1907.6	29.12	24.00
	2	9262	9662	1852.4	29.08	24.05
		9400	9800	1880.0	29.10	24.18
		9538	9938	1907.6	29.12	24.02
	3	9262	9662	1852.4	28.61	23.92
		9400	9800	1880.0	28.88	23.95
		9538	9938	1907.6	28.59	23.90
	4	9262	9662	1852.4	28.80	23.93
		9400	9800	1880.0	28.71	23.89
		9538	9938	1907.6	28.60	23.94

Part 27 / RSS 139 1700MHz Band

Band	Subtest	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
UMTS HSDPA 1700MHz	1	1312	1537	1712.4	28.60	**24.45**
		1413	1638	1732.6	**28.70**	24.40
		1513	1738	1752.6	28.50	24.38
	2	1312	1537	1712.4	28.60	24.40
		1413	1638	1732.6	28.55	24.43
		1513	1738	1752.6	28.60	24.40
	3	1312	1537	1712.4	28.04	24.00
		1413	1638	1732.6	28.26	24.03
		1513	1738	1752.6	27.89	24.10
	4	1312	1537	1712.4	28.09	24.02
		1413	1638	1732.6	28.25	24.00
		1513	1738	1752.6	28.15	23.95

8. CONDUCTED TEST RESULTS

8.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049
IC: RSS132; RSS133§6.5; RSS139§6.5

LIMITS

For reporting purposes only

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the middle channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

RESULTS

There is no limit required and power is the same for low, middle and high channel; therefore, only middle channel was tested.

GSM GPRS MODE PART 22 AND 24 / RSS 132 AND 133

Band	Mode	Channel	f(MHz)	99% BW (KHz)	-26dB BW (KHz)
CELL	GPRS	190	836.6	239.9875	310.771
PCS		661	1880	247.1180	319.005

GSM EGPRS MODE PART 22 AND 24 / RSS 132 AND 133

Band	Mode	Channel	f(MHz)	99% BW (KHz)	-26dB BW (KHz)
CELL	EGPRS	190	836.6	248.0737	312.463
PCS		661	1880	246.5569	311.506

CDMA2000 1xRTT MODE PART 22, 24 AND 90 / RSS 132, 133 AND 139

Band	Mode	Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
CELL	CDMA 2000 1xRTT	384	836.5	1.2724	1.424
PCS		600	1880	1.2706	1.421
800MHz Secondary		560	820	1.2711	1.423

CDMA2000 EVDO Rev A MODE PART 22, 24 AND 90 / RSS 132, 133 AND 139

Band	Mode	Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
CELL	CDMA 2000 EVDO Rev. A	384	836.5	1.2763	1.434
PCS		600	1880	1.2710	1.425
800MHz Secondary		560	820	1.2686	1.420

UMTS REL 99 MODE PART 22, 24, AND 27 / RSS 132, 133 AND 139

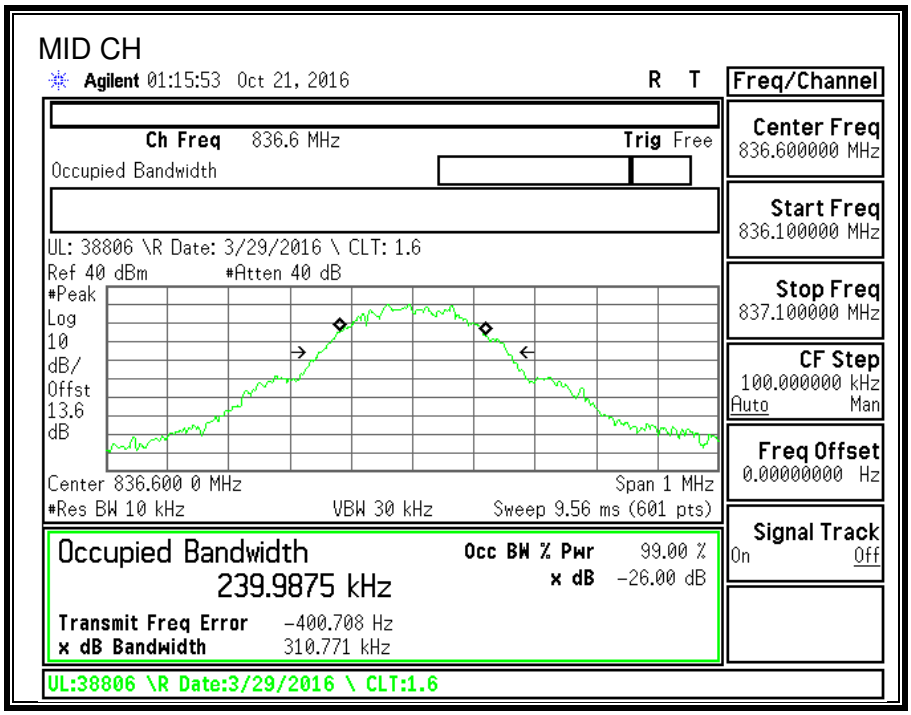
Band	Mode	DL Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
850MHz	UMTS Rel. 99	1638	1732.6	4.1619	4.625
1900MHz		9800	1880	4.1571	4.626
1700MHz		4408	836.6	4.1752	4.622

UMTS HSDPA MODE PART 22, 24 AND 27 / RSS 132, 133 AND 139

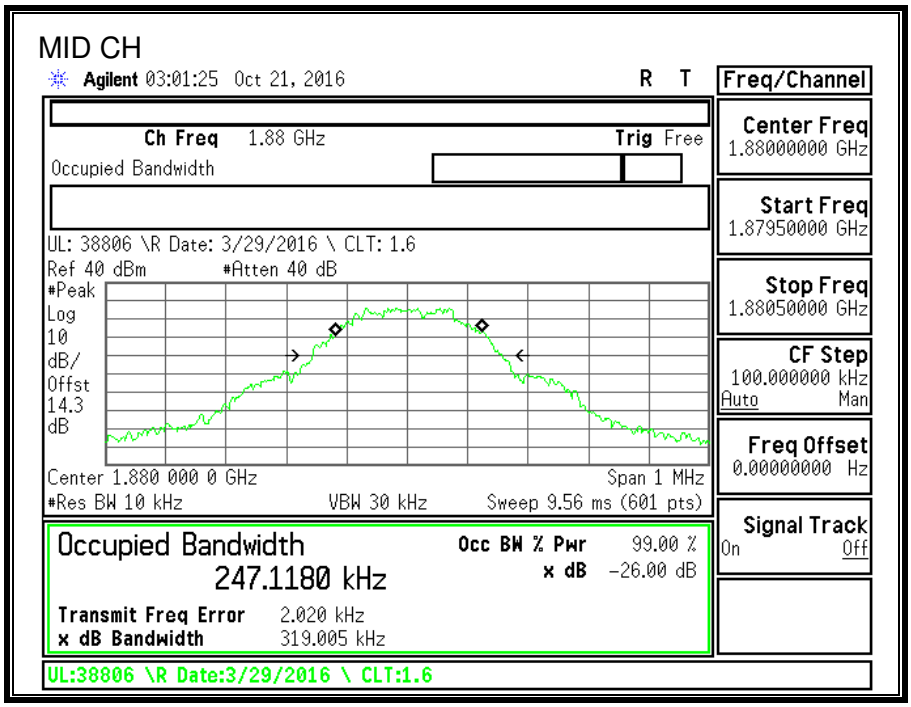
Band	Mode	DL Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
850MHz	UMTS HSDPA	1638	1732.6	4.1712	4.622
1900MHz		9800	1880	4.1734	4.611
1700MHz		4408	836.6	4.1681	4.628

8.1.1. GSM GPRS

850MHz BAND

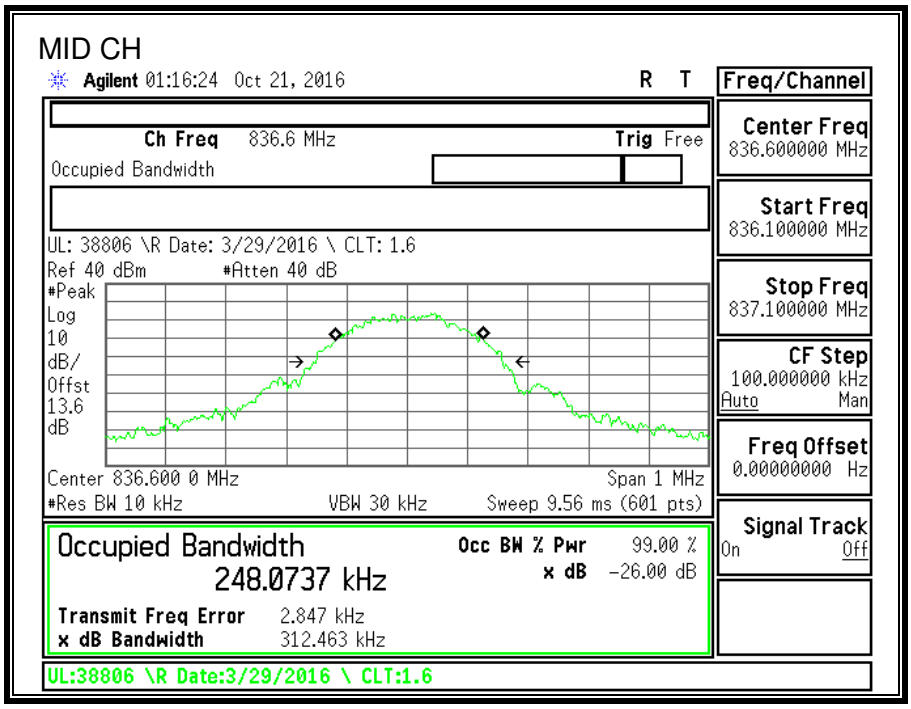


1900MHz BAND

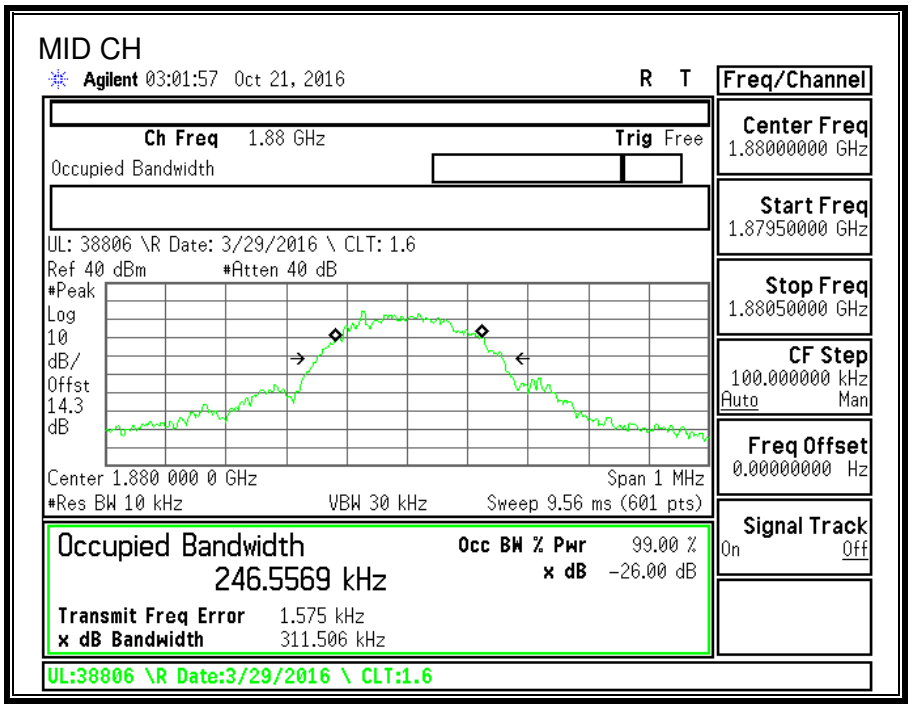


8.1.2. GSM EGPRS

850MHz BAND

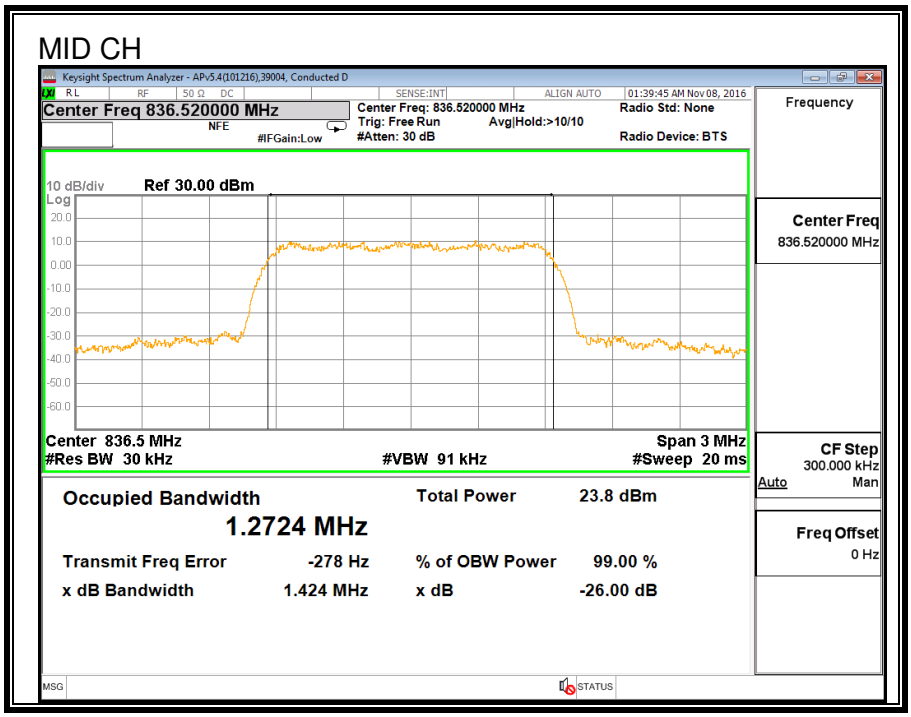


1900MHz BAND

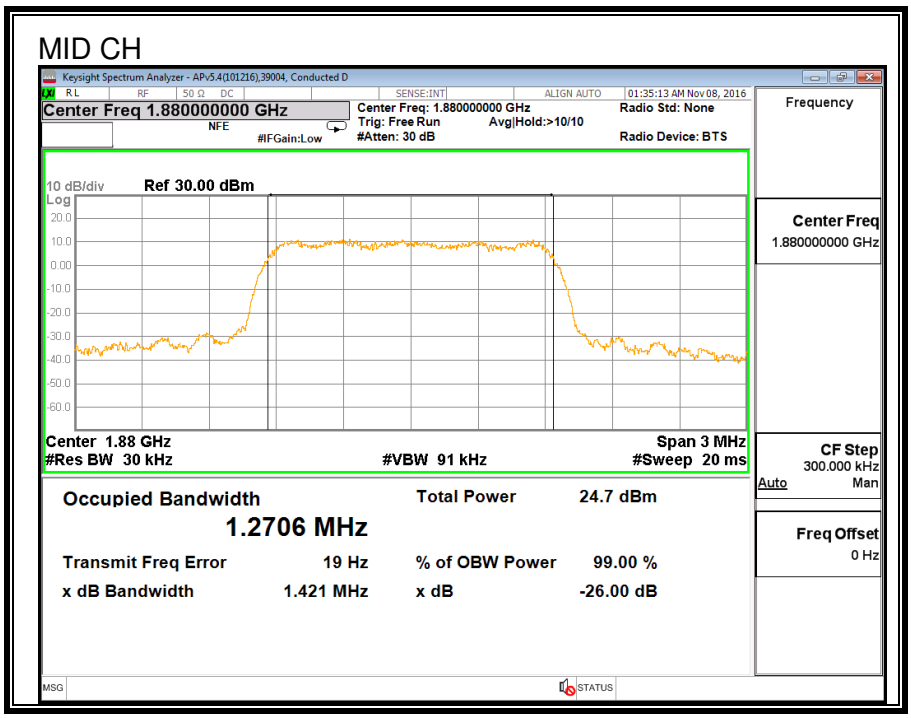


8.1.3. CDMA2000 1xRTT

850MHz BAND

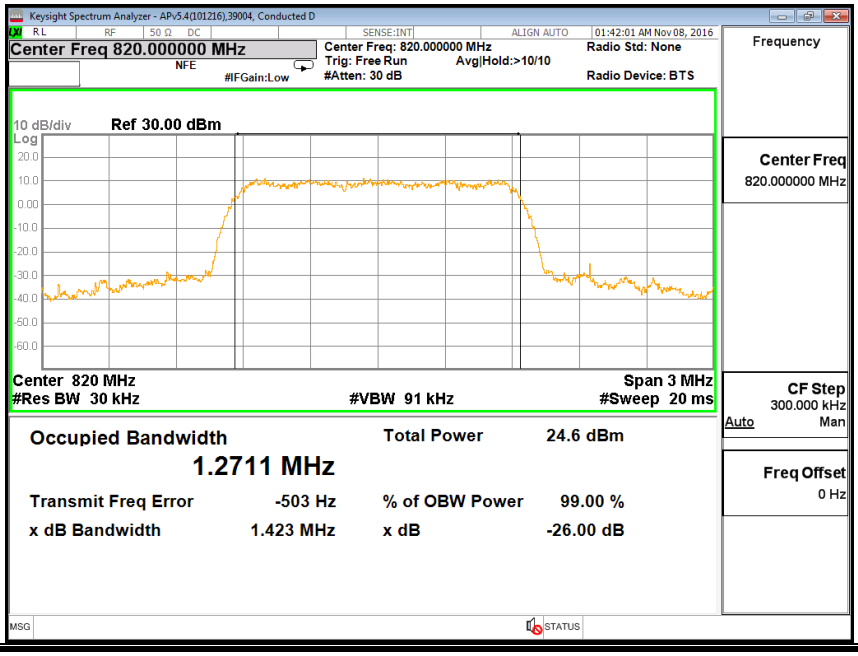


1900MHz BAND



800MHz SECONDARY BAND

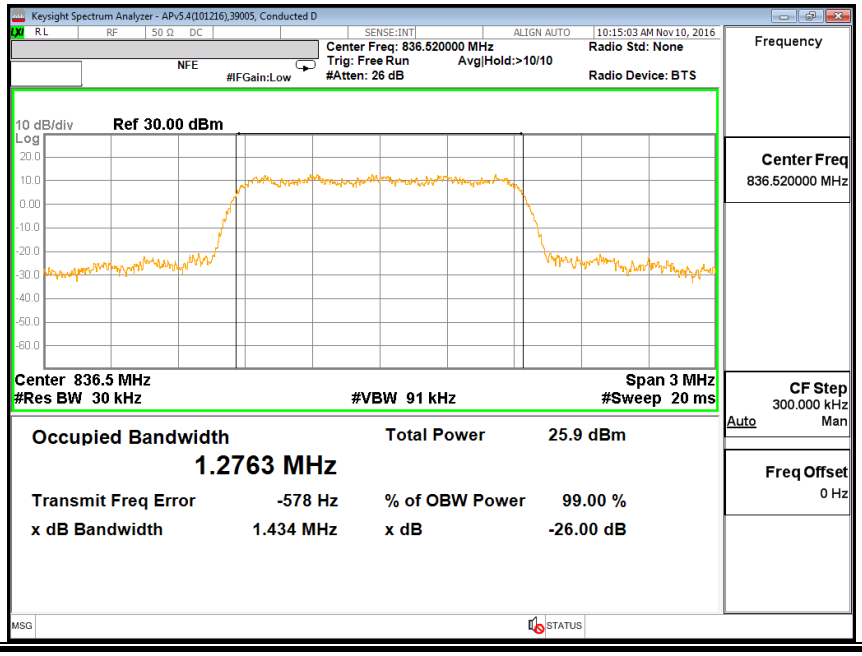
MID CH



8.1.4. CDMA2000 EVDO REV A

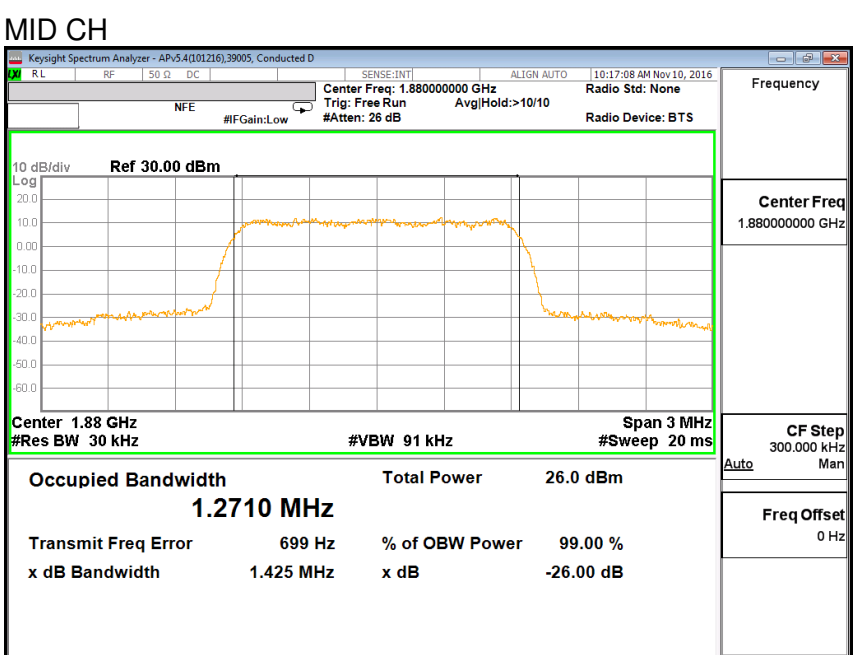
850MHz BAND

MID CH



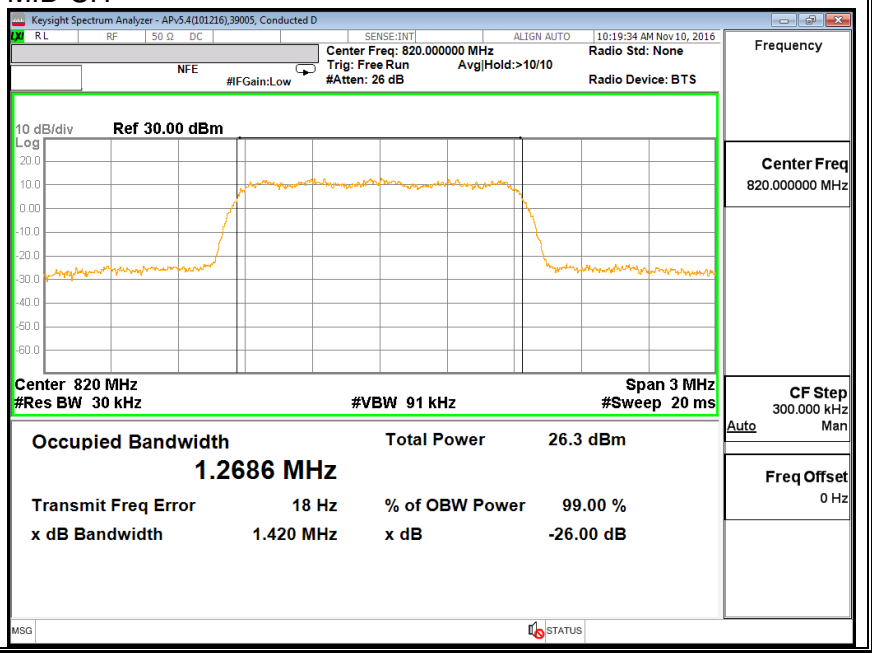
1900MHz BAND

MID CH



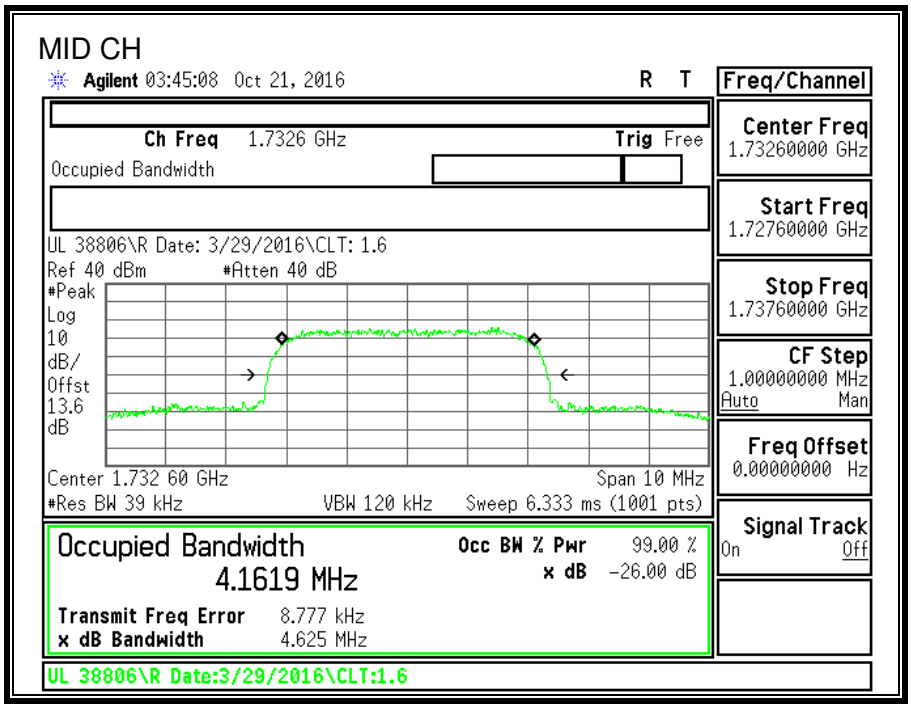
800MHz SECONDARY BAND

MID CH

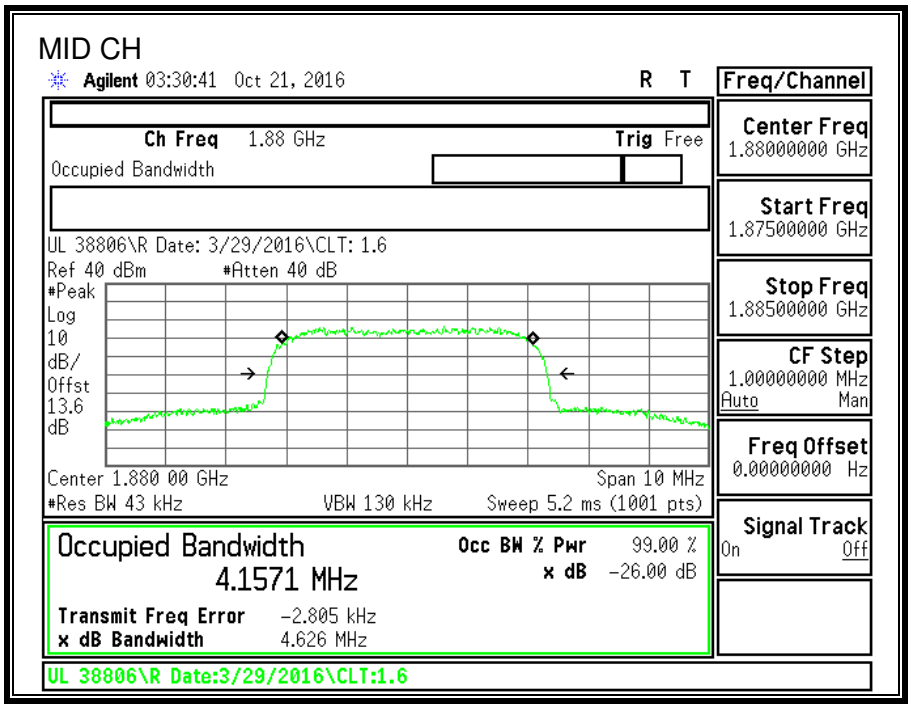


8.1.5. UMTS Rel99

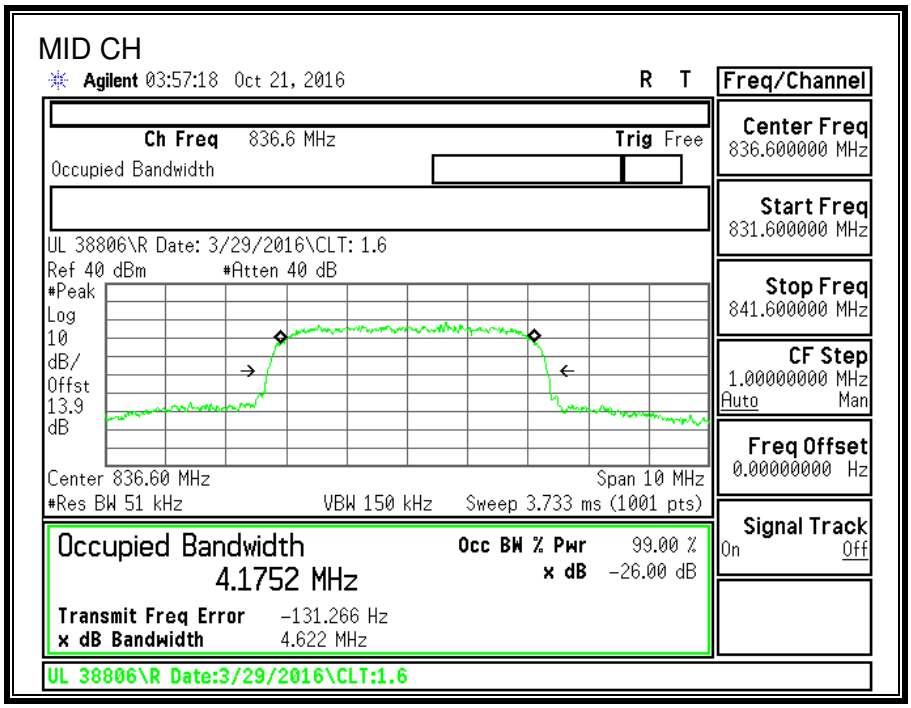
850MHz BAND



1900MHz BAND

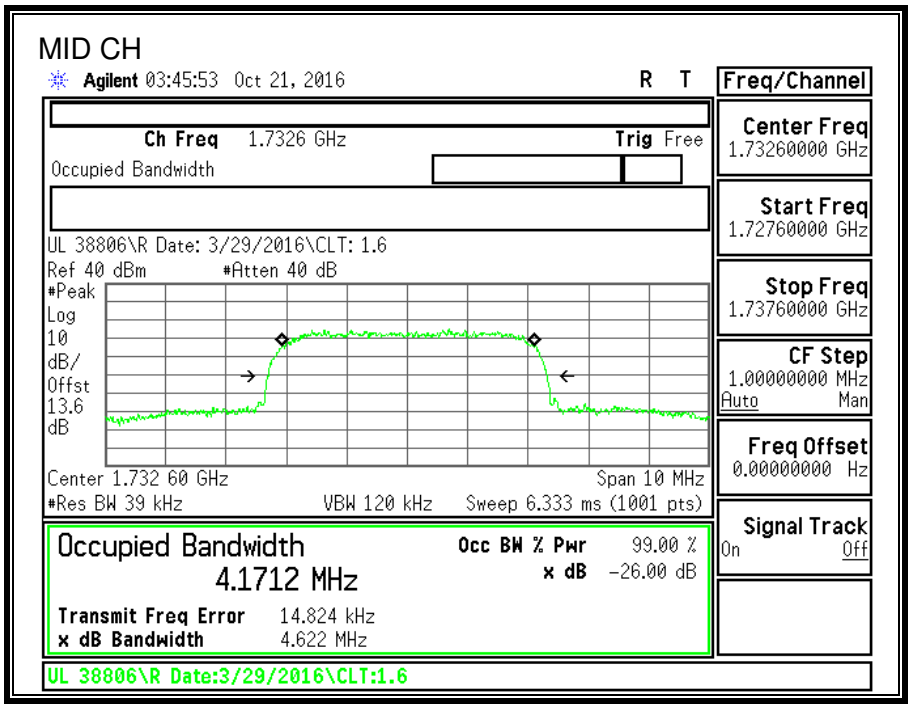


1700MHz BAND

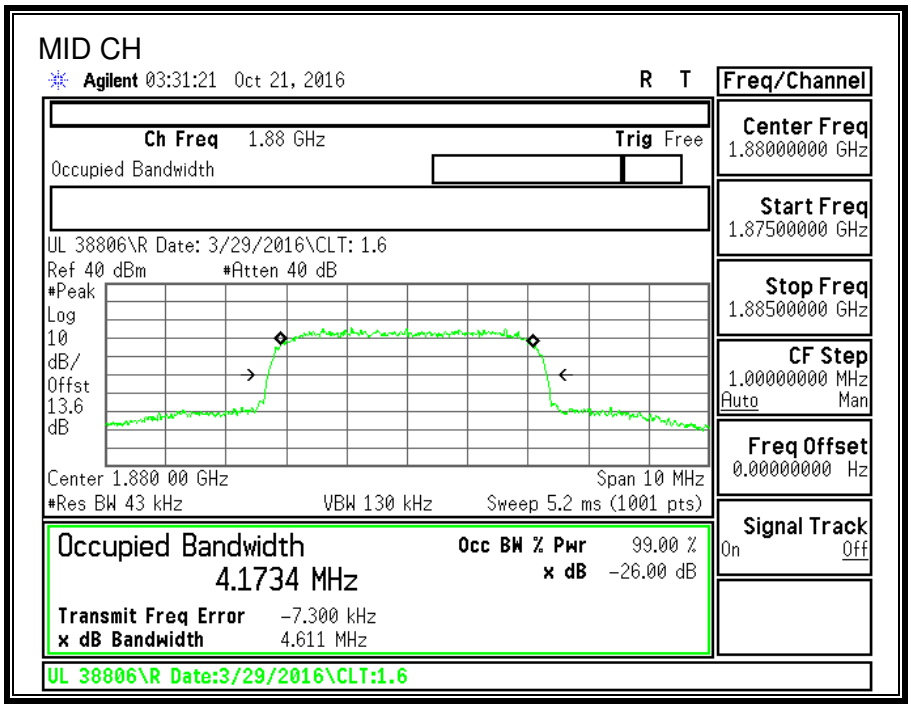


8.1.6. UMTS HSDPA

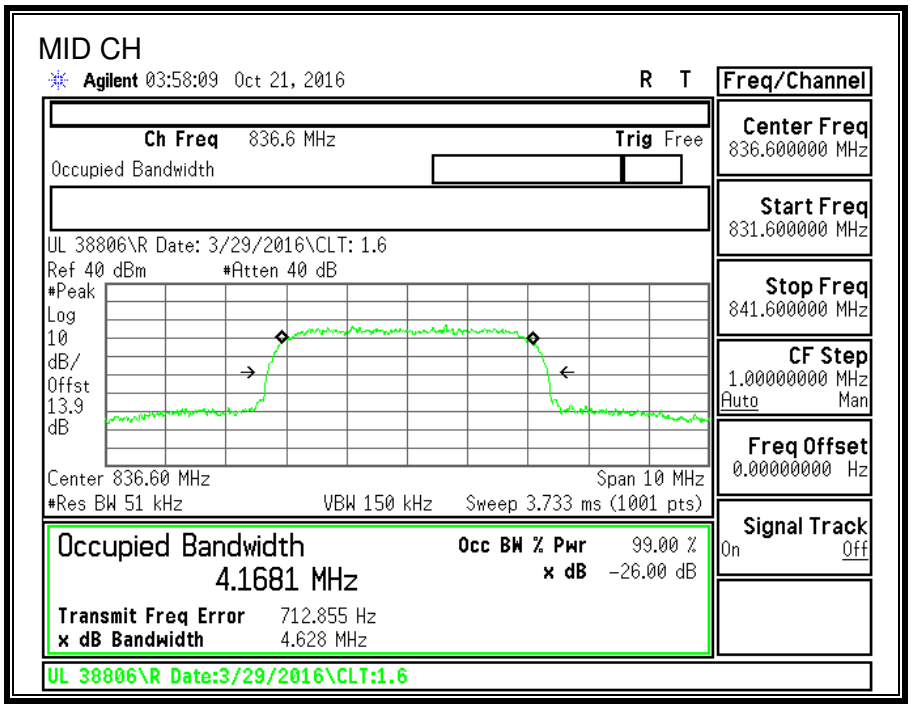
850MHz BAND



1900MHz BAND



1700MHz BAND



8.2. BAND EDGE

RULE PART(S)

FCC: §2.1051, §22. 359, §22.917, §24.238 and §90.691
IC: RSS132§5.5; RSS133§6.5 and RSS139§6.6

LIMITS

FCC: §22.359, §22.917, §24.238
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.

FCC: §27.53
(c) 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;
(1) On any frequency outside the 746-758 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;
(2) 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;
(4) 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;
(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) 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;
(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

FCC: §90.691 Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(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.

(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.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

RSS132§5.5
Mobile and base station equipment shall comply with the limits in (i) and (ii) below.
In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p (watts).
After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least43 + 10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

RSS133§6.5
Equipment shall comply with the limits in (i) and (ii) below.

(i)In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts).

(ii)After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

RSS139§6.6

(i)In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block,Footnote2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least43 + 10 log10 p (watts) dB.

(ii)After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB.

TEST PROCEDURE

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

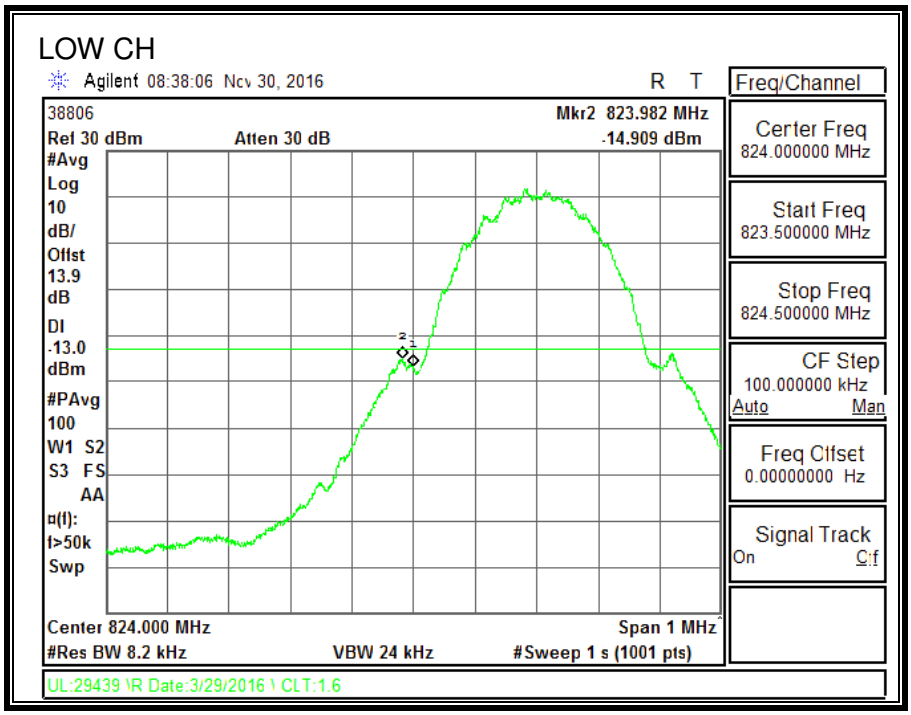
- Set the spectrum analyzer span to include the block edge frequency.
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13 dBm
- Set resolution bandwidth to at least 1% of emission bandwidth.

RESULTS

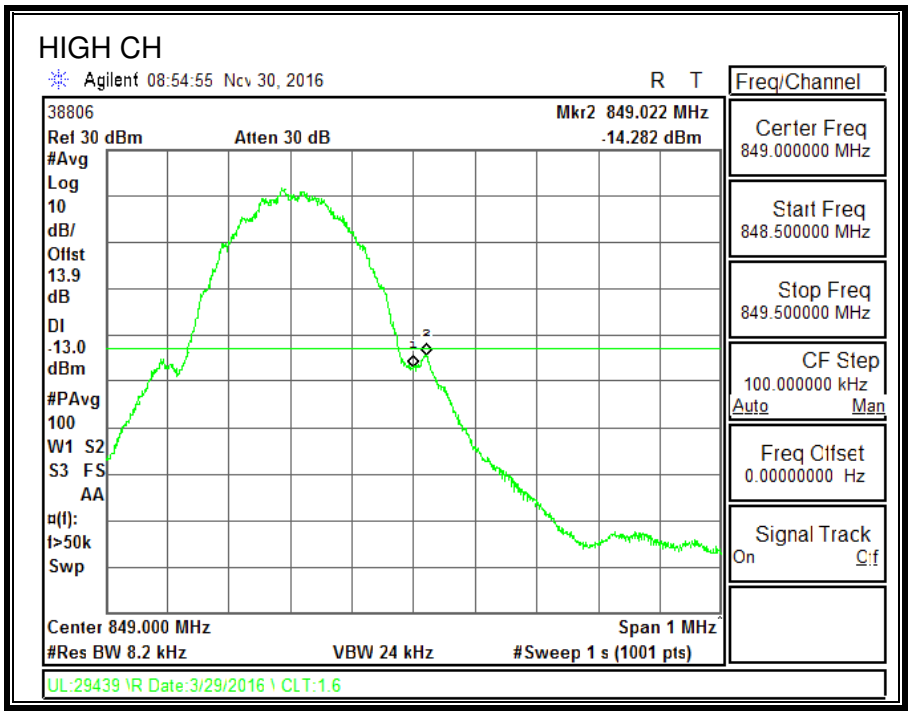
8.2.1. GSM GPRS

850MHz BAND

LOW CH

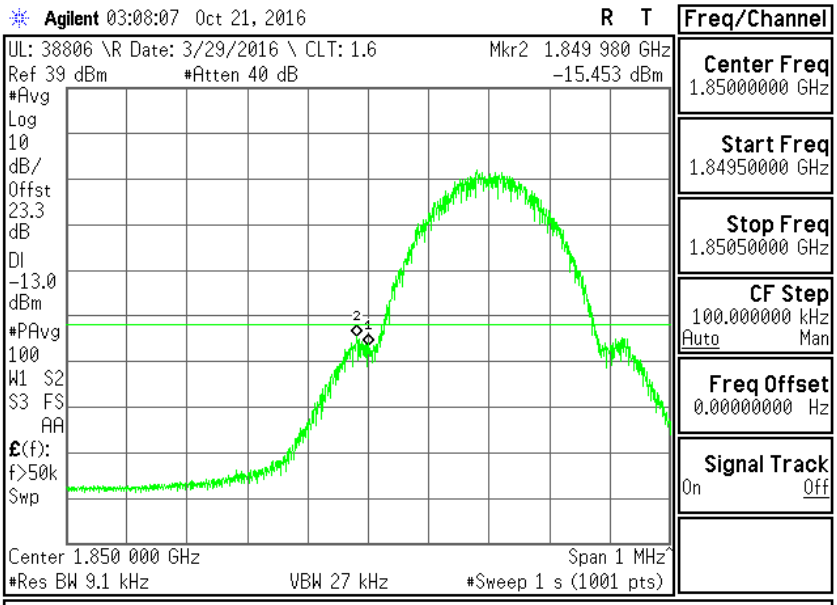


HIGH CH

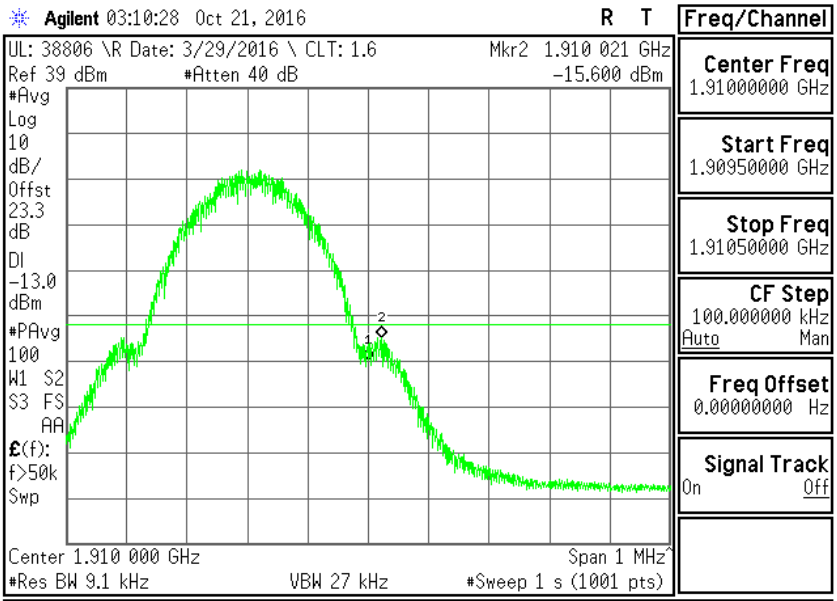


1900MHz BAND

LOW CH



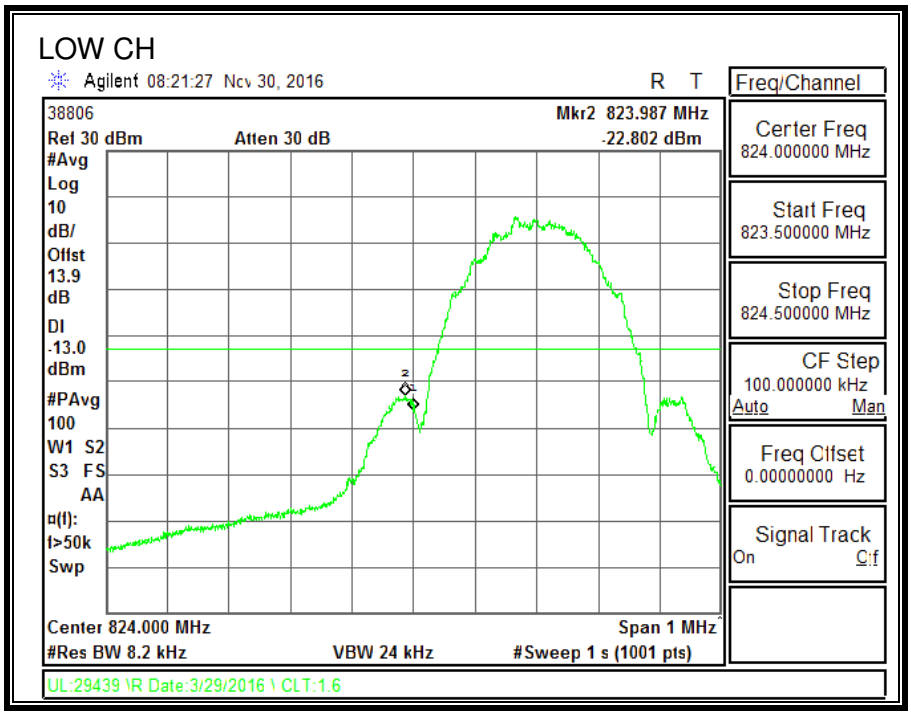
HIGH CH



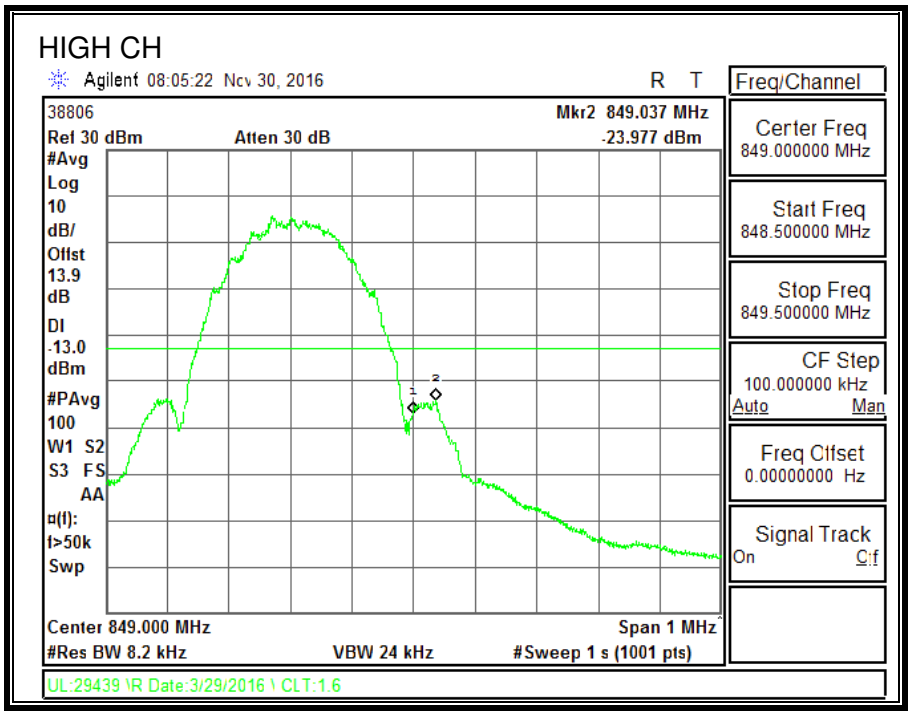
8.2.2. GSM EGPRS

850MHz BAND

LOW CH

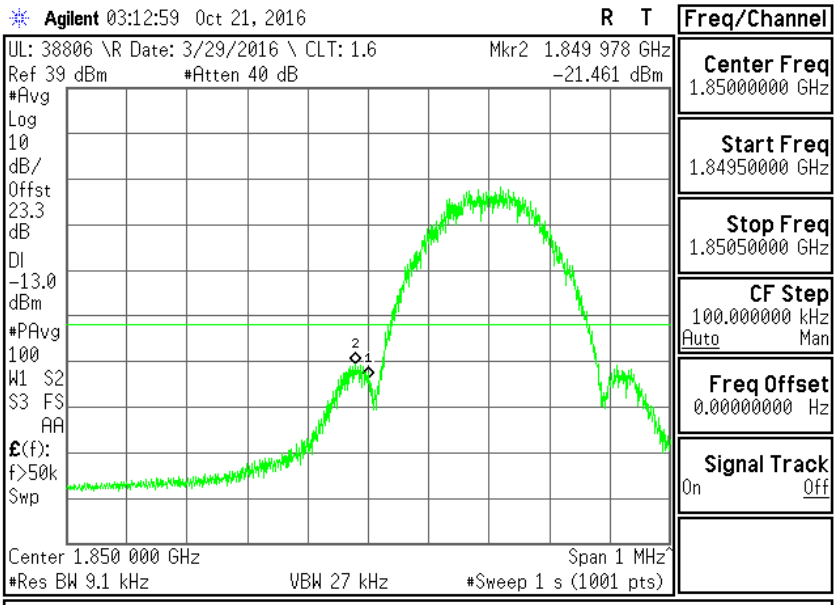


HIGH CH

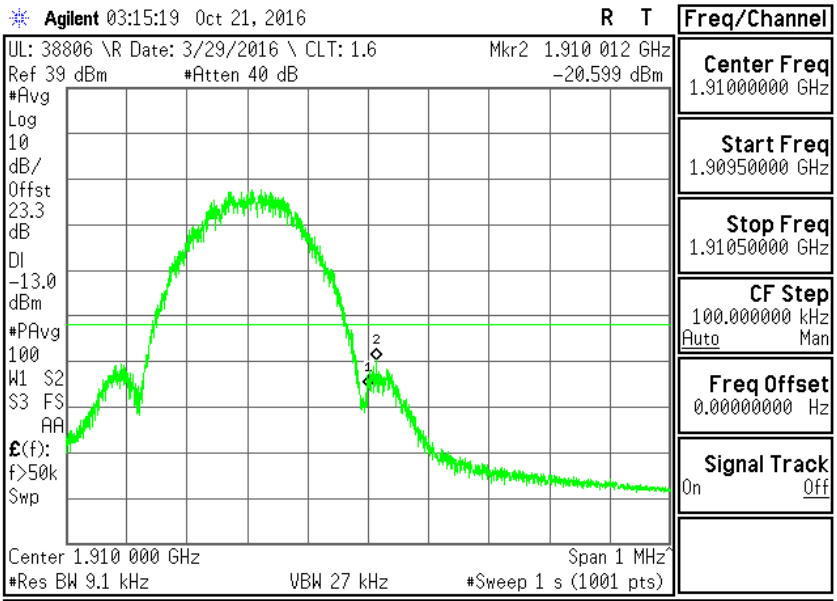


1900MHz BAND

LOW CH



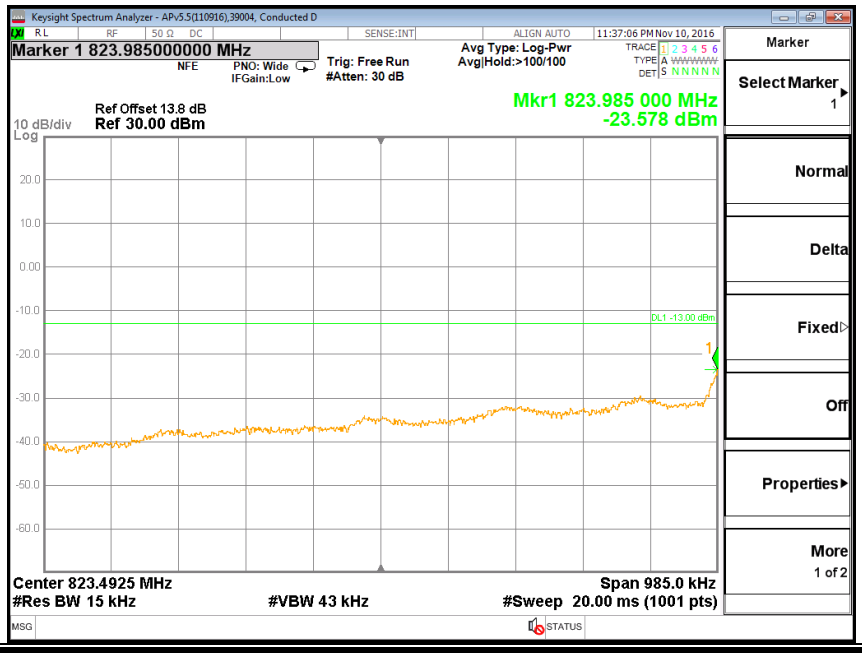
HIGH CH



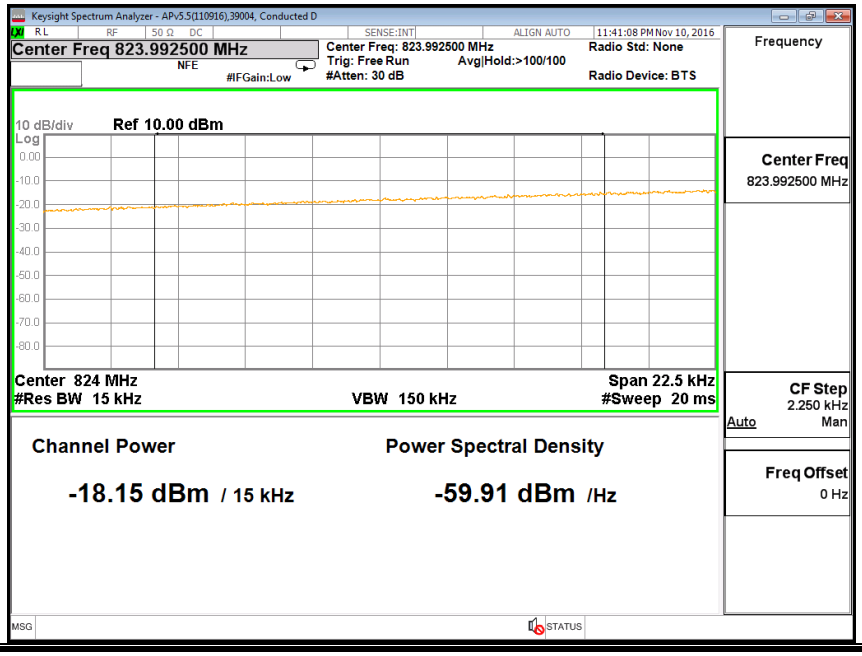
8.2.3. CDMA2000 1xRTT

850MHz BAND

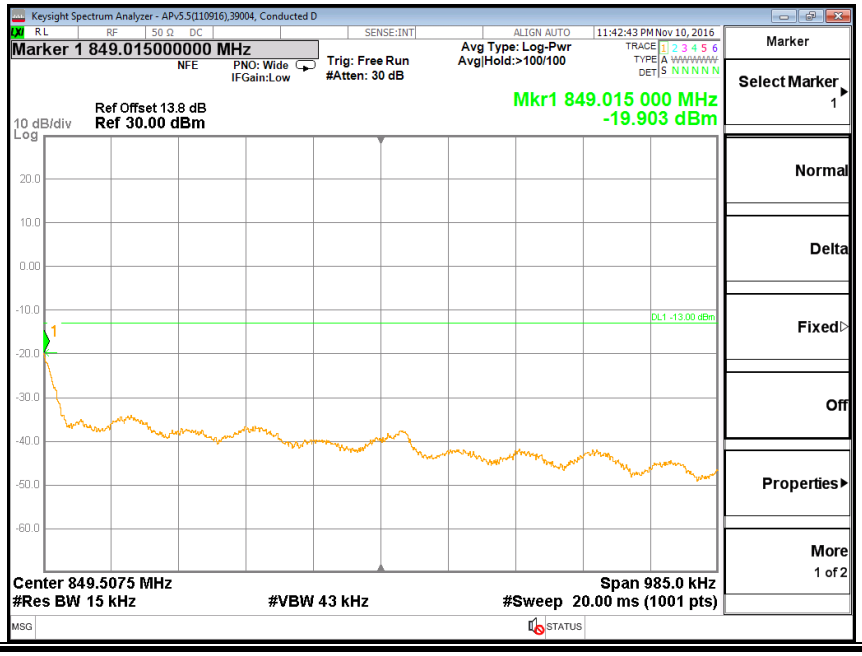
LOW CH



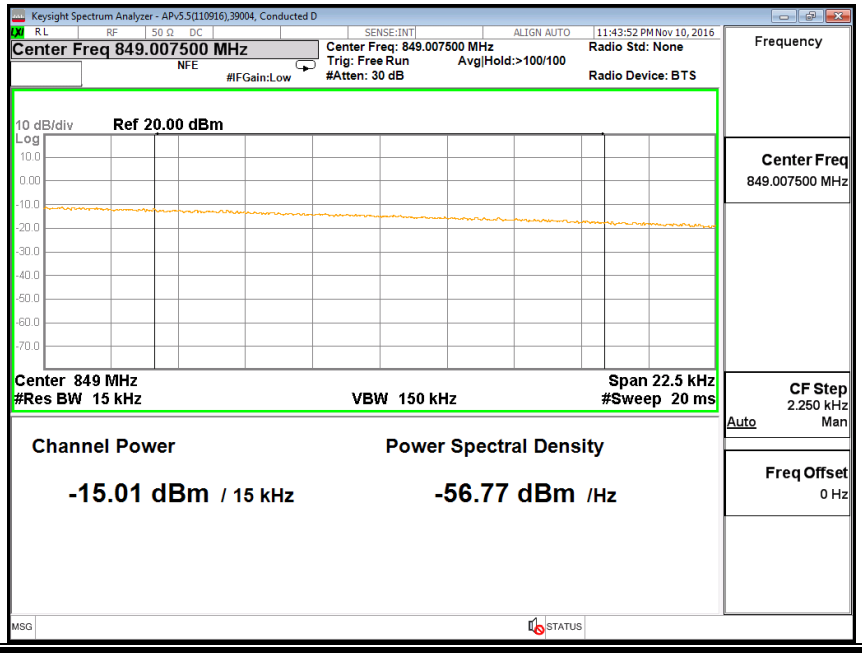
LOW CH INTEGRATION



HIGH CH

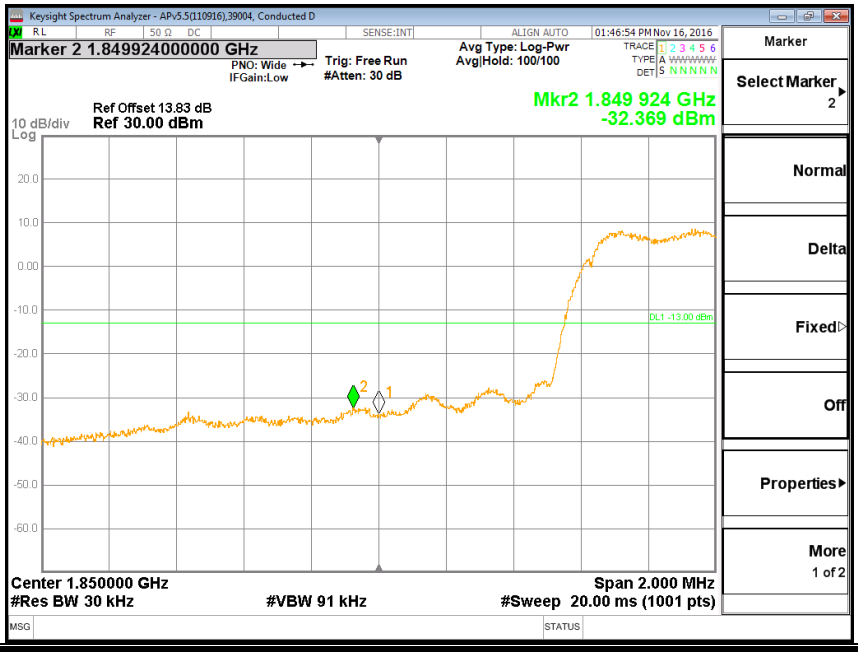


HIGH CH INTEGRATION

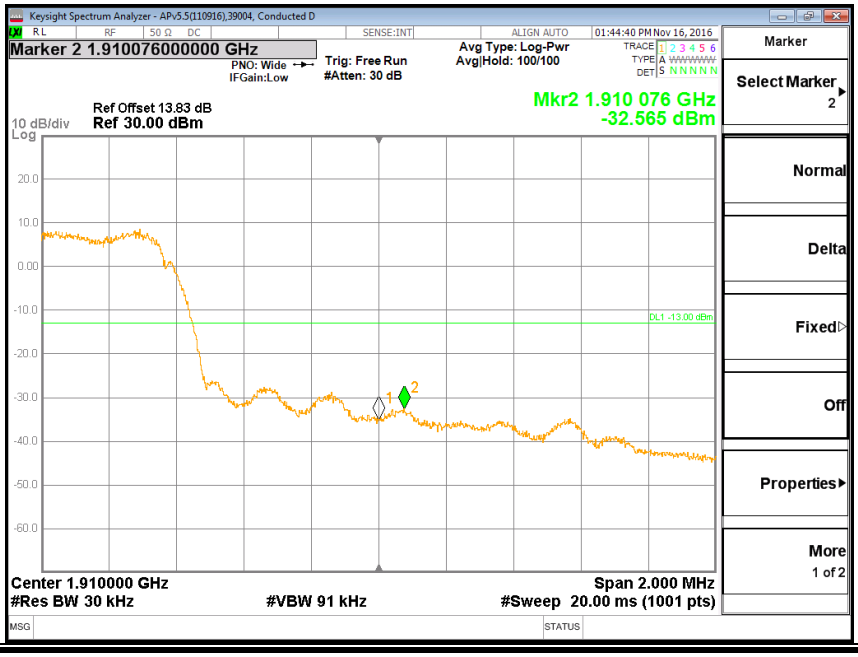


1900MHz BAND

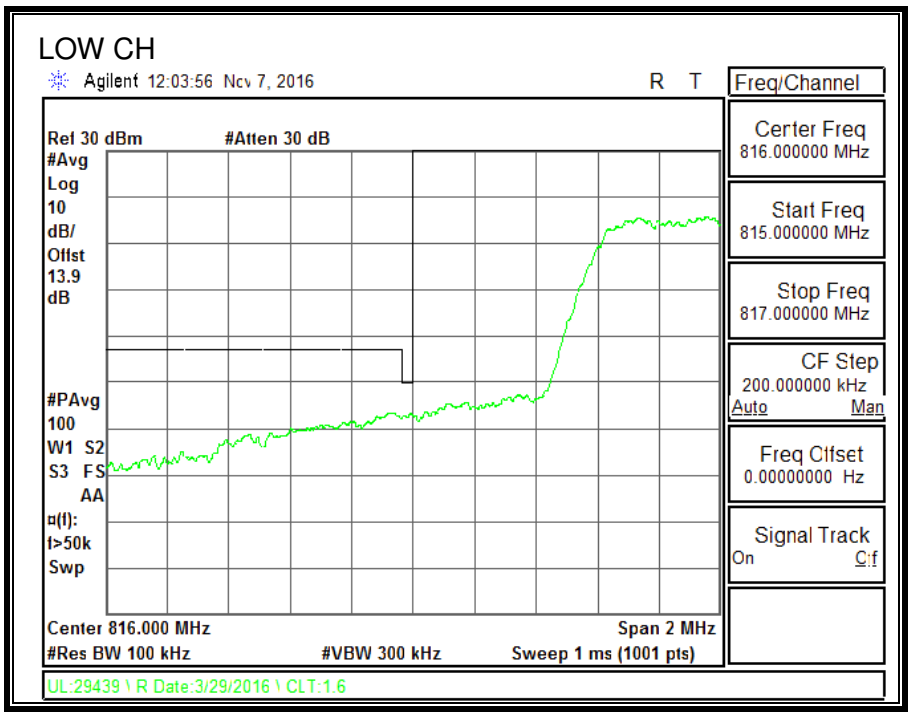
LOW CH



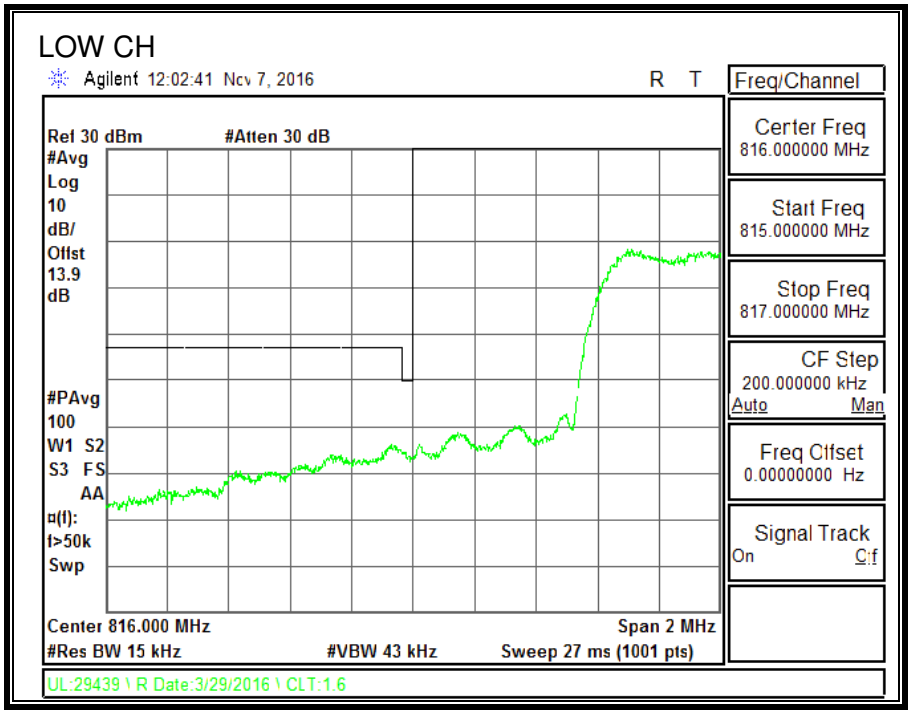
HIGH CH



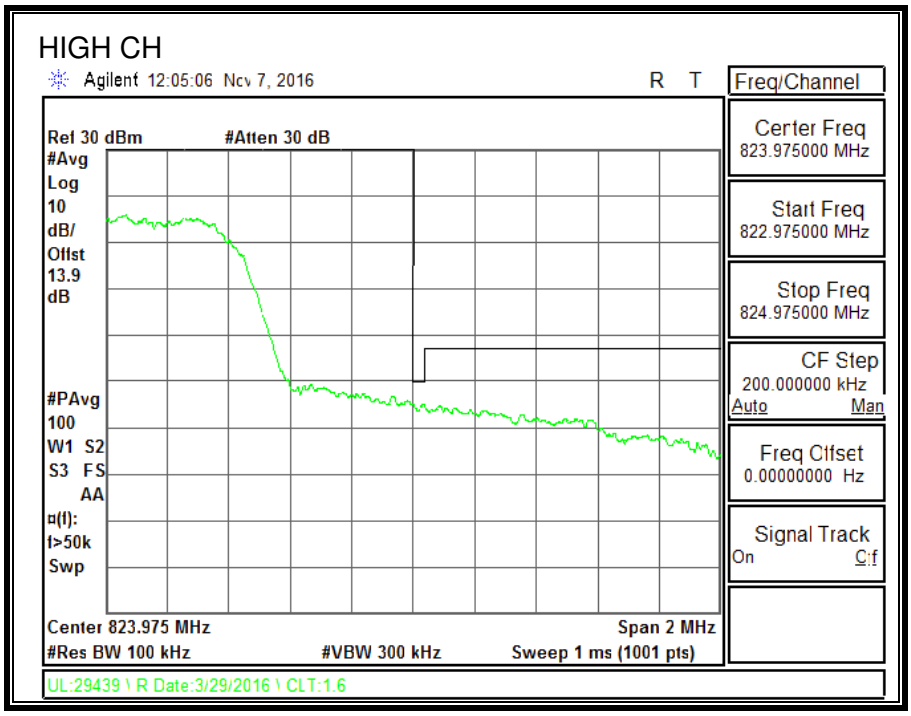
8.2.4. CDMA2000 1xRTT BC10 MASK



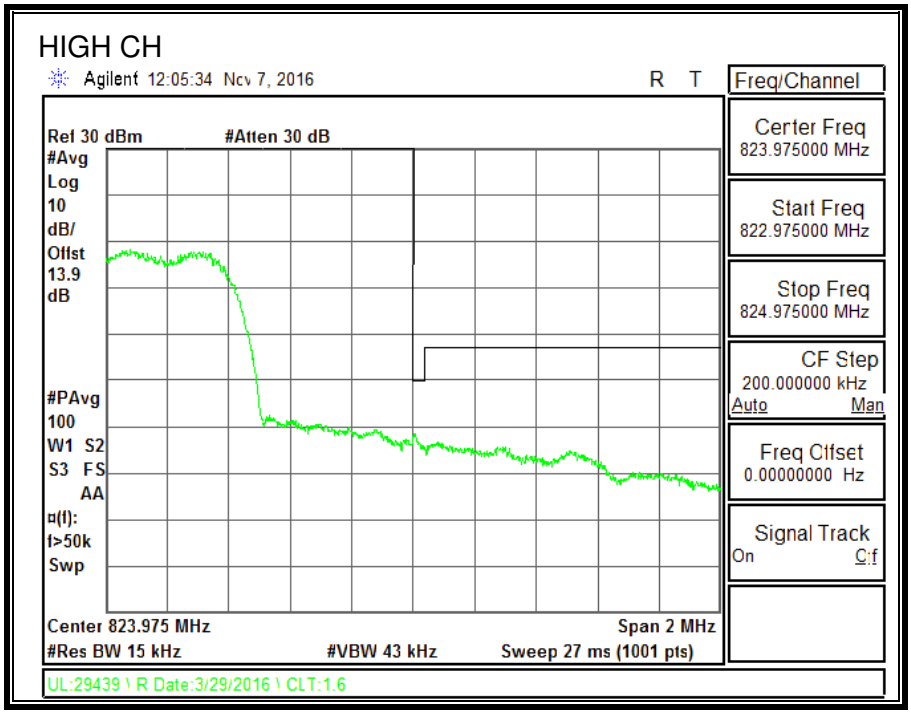
Note: RBW=1% of EBW



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



Note: RBW=1% of EBW

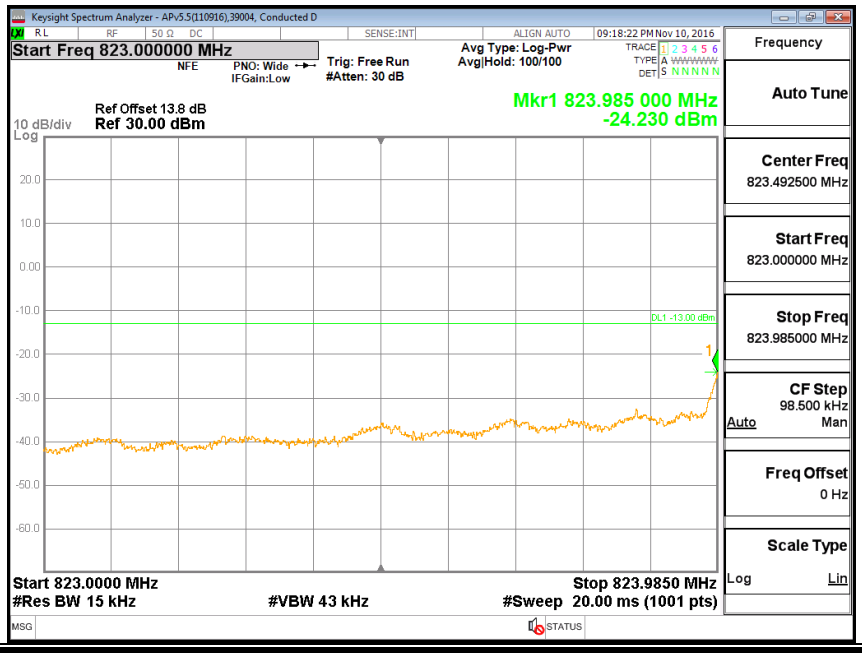


Note: RBW=1% of 37.5KHz of outer channel frequency block.

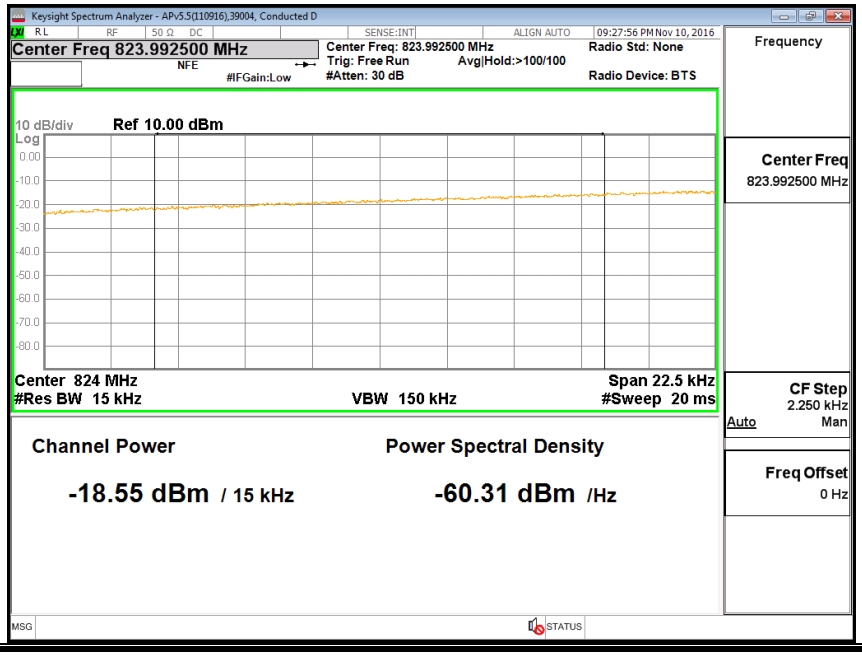
8.2.5. CDMA2000 EVDO REV A

850MHz BAND

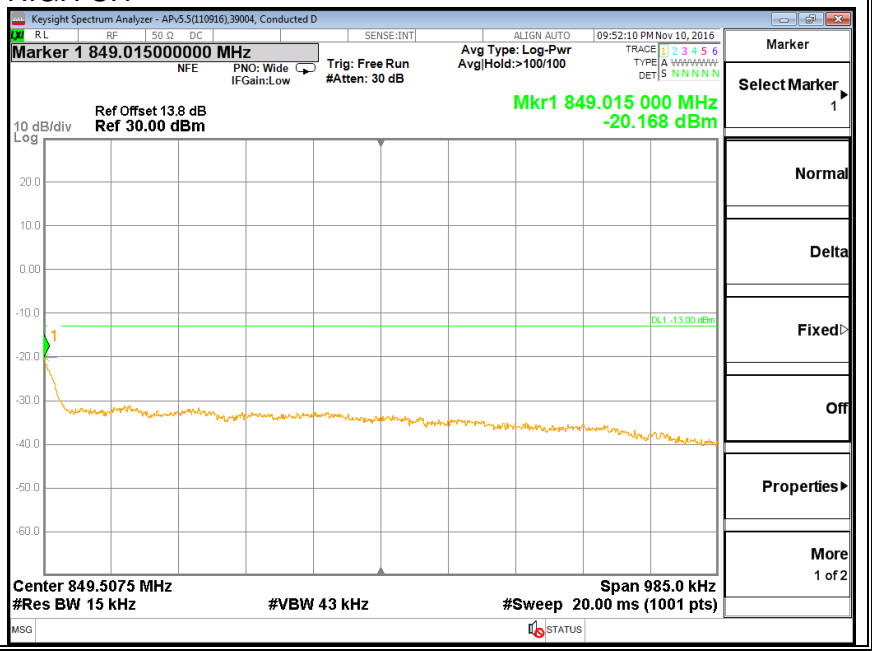
LOW CH



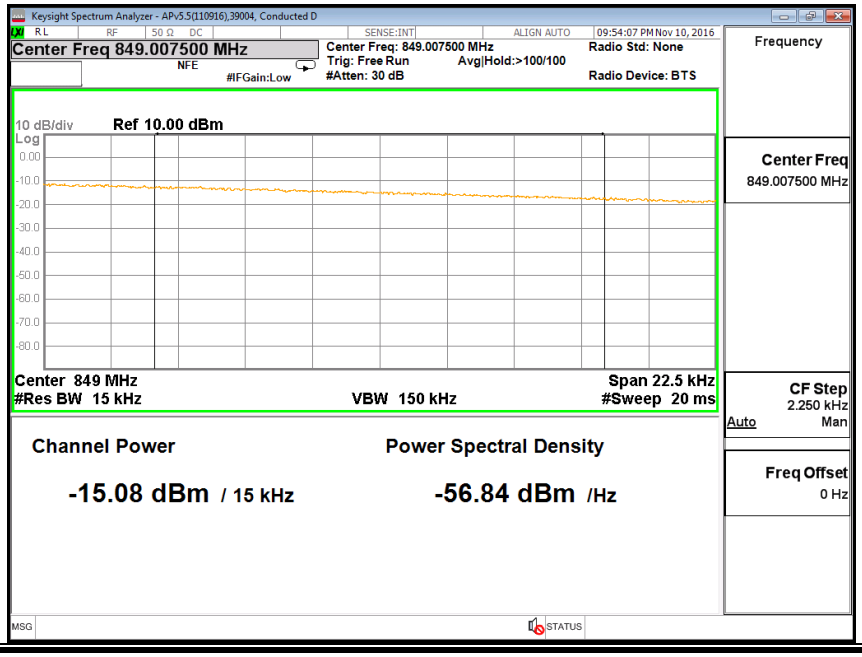
LOW CH INTEGRATION



HIGH CH

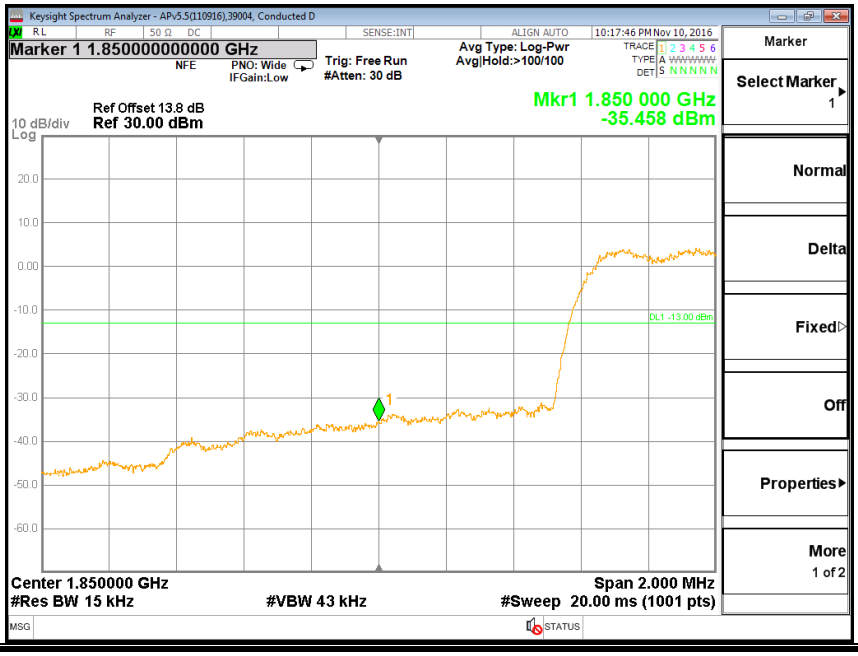


HIGH CH INTEGRATION

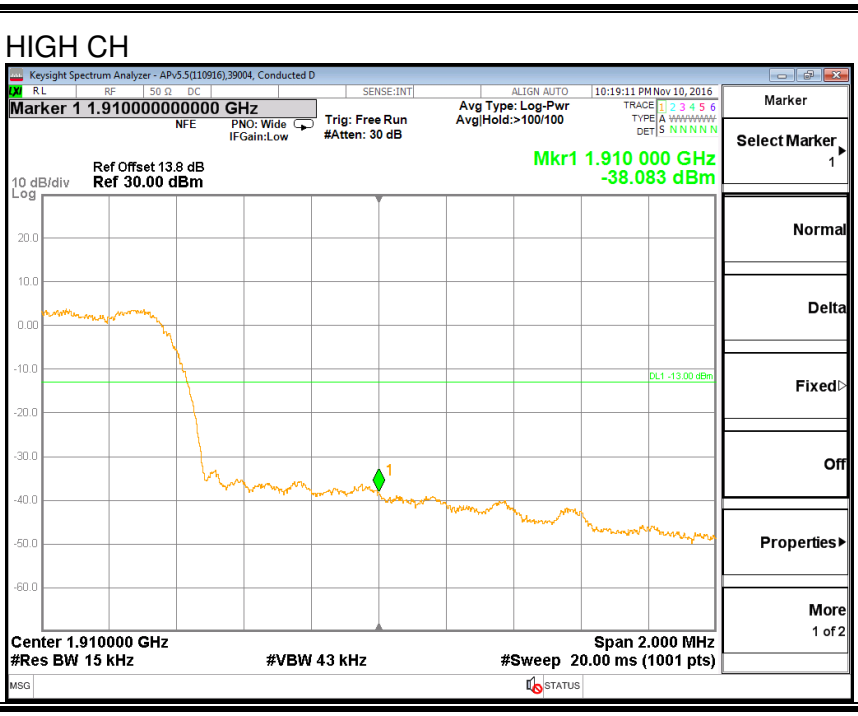


1900MHz BAND

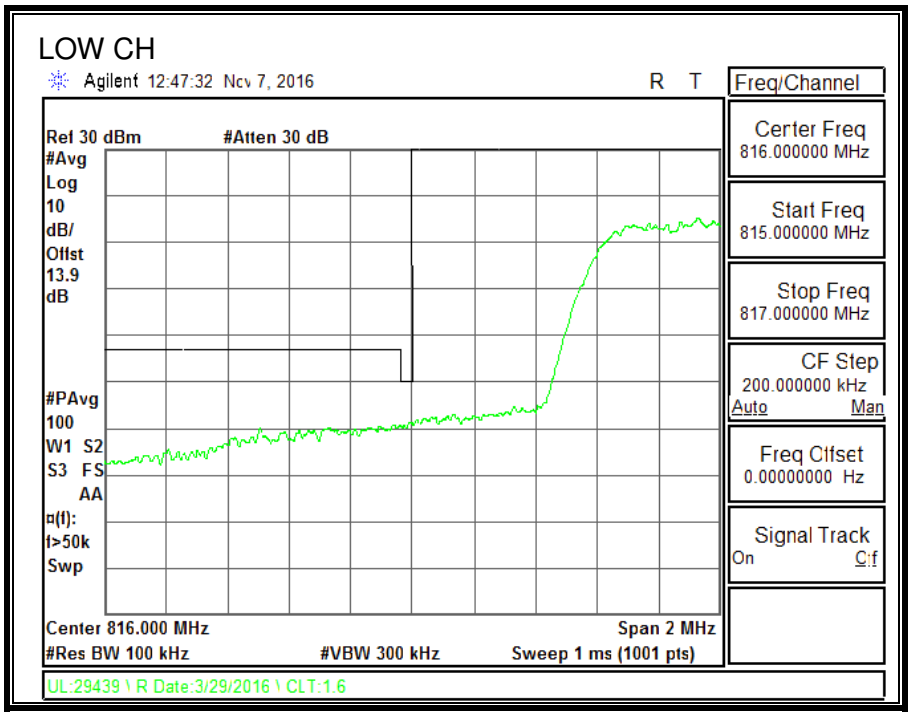
LOW CH



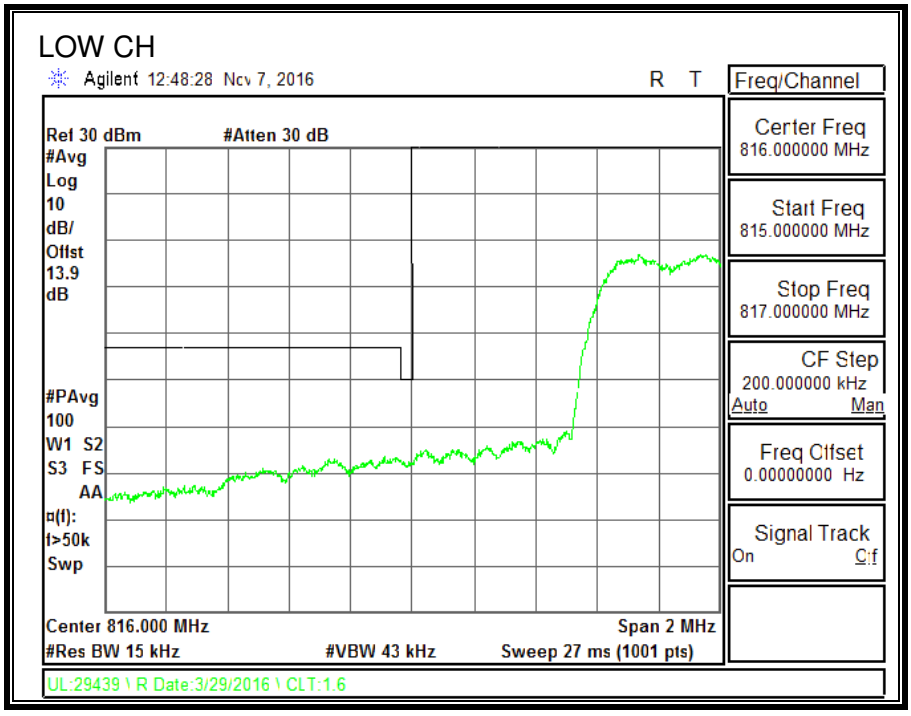
HIGH CH



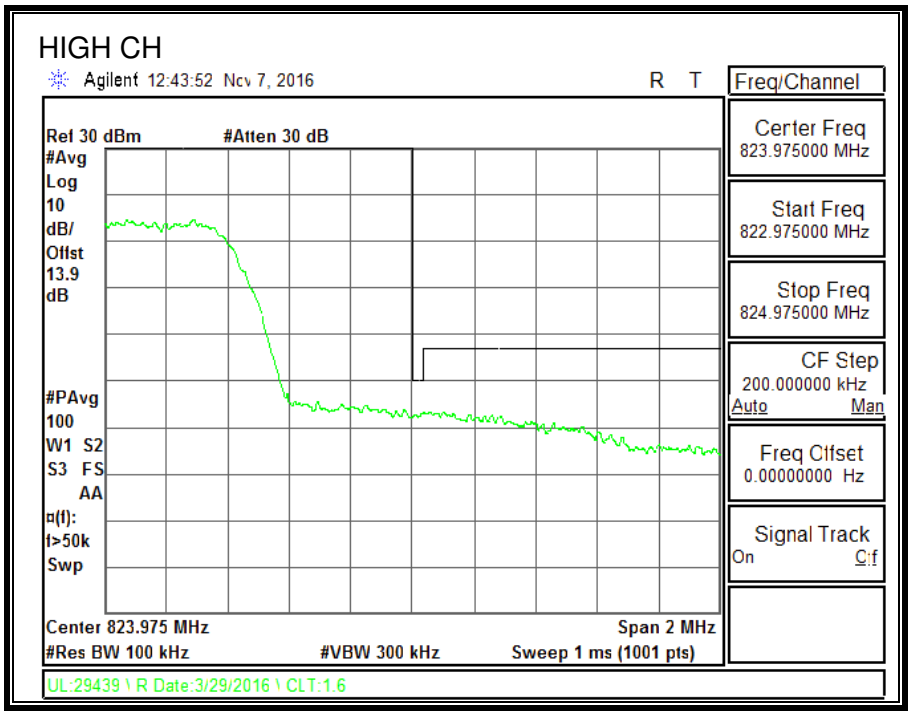
8.2.6. CDMA2000 EVDO REV A BC10 MASK



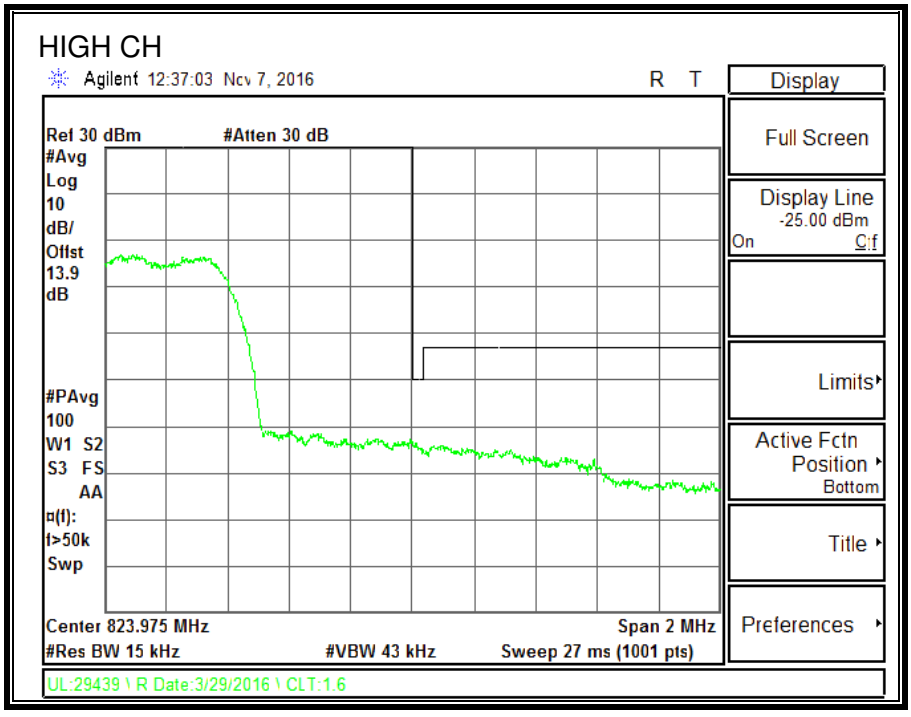
Note: RBW=1% of EBW



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



Note: RBW=1% of EBW

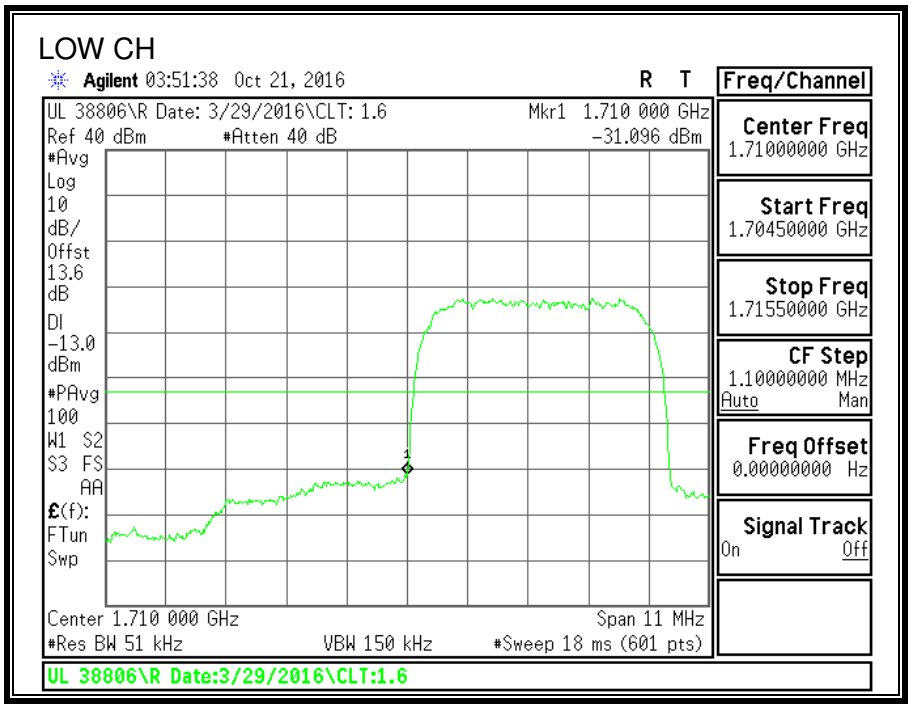


Note: RBW=1% of 37.5KHz of outer channel frequency block.

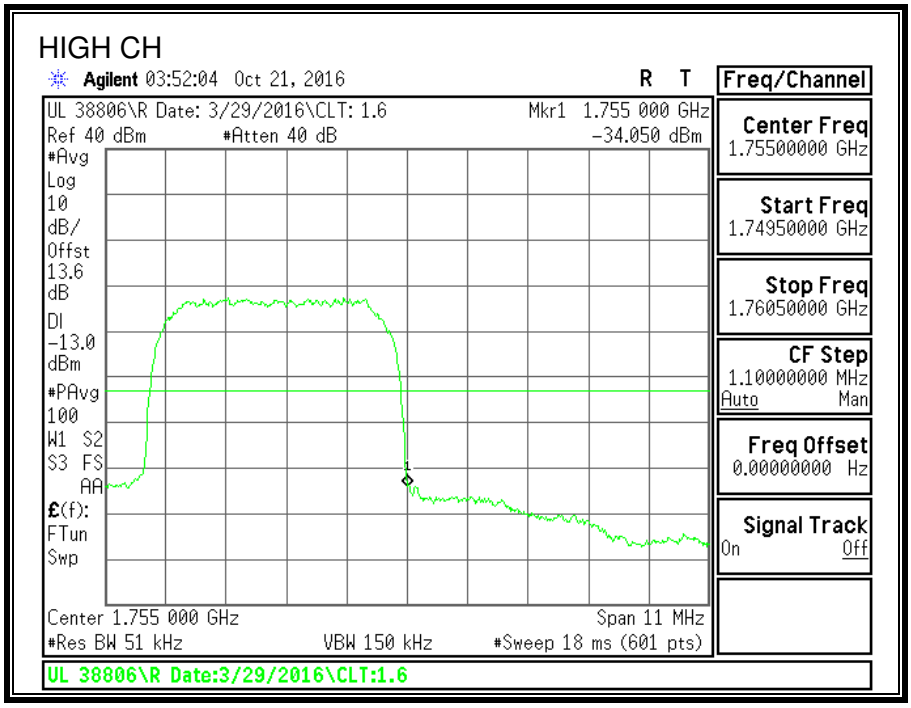
8.2.7. UMTS Rel99

850MHz BAND

LOW CH

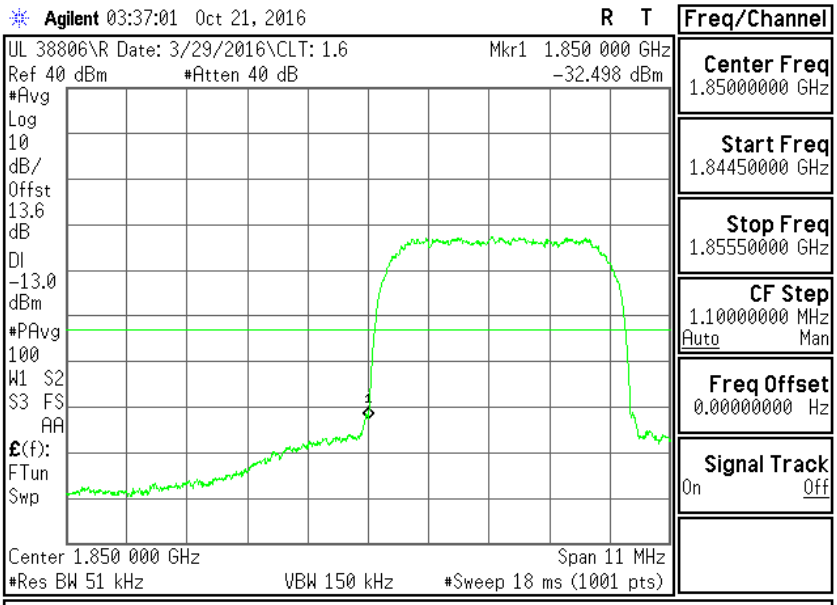


HIGH CH

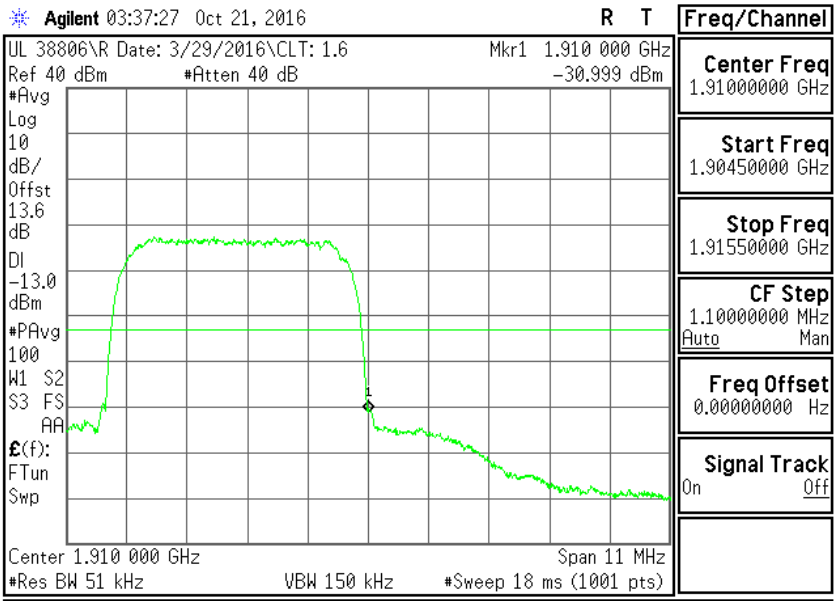


1900MHz BAND

LOW CH

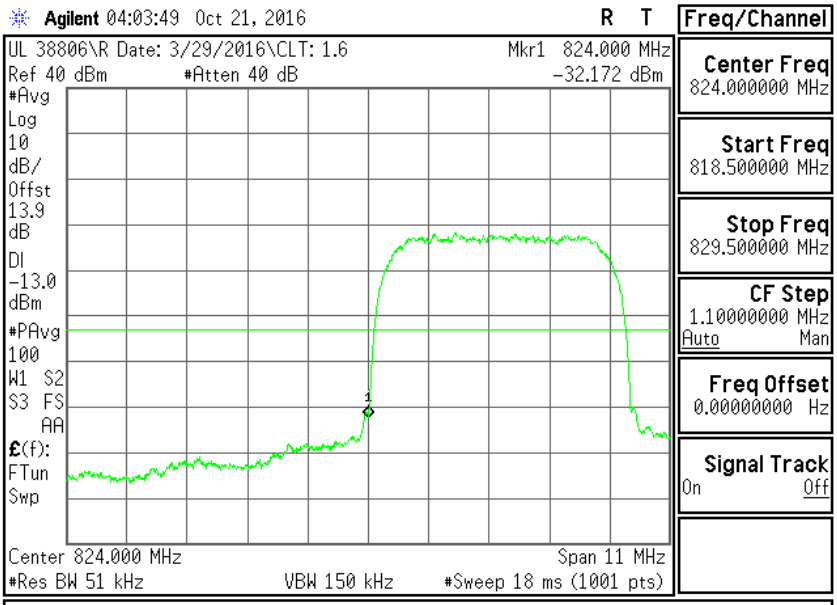


HIGH CH

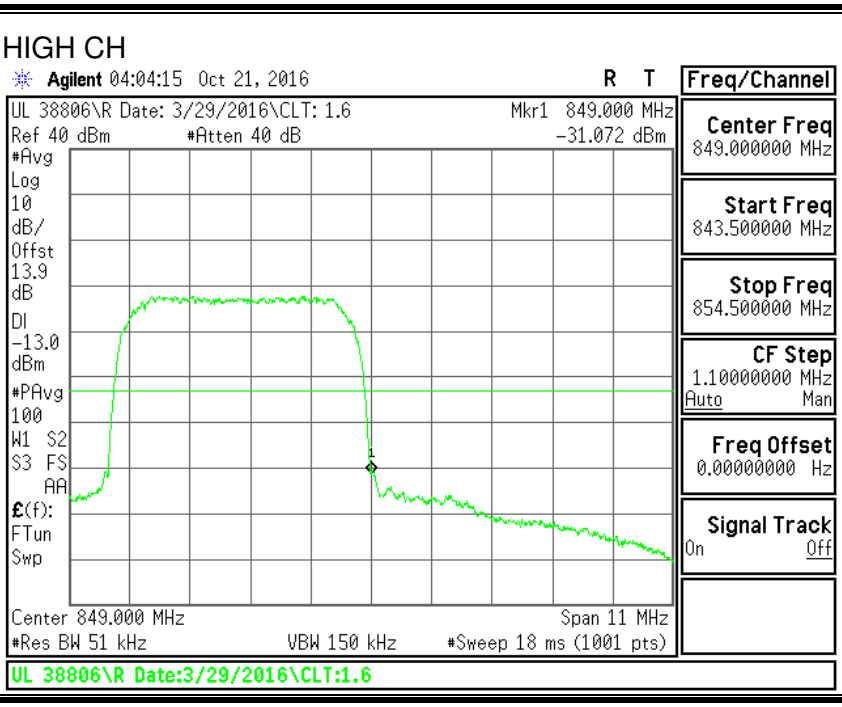


1700MHz BAND

LOW CH



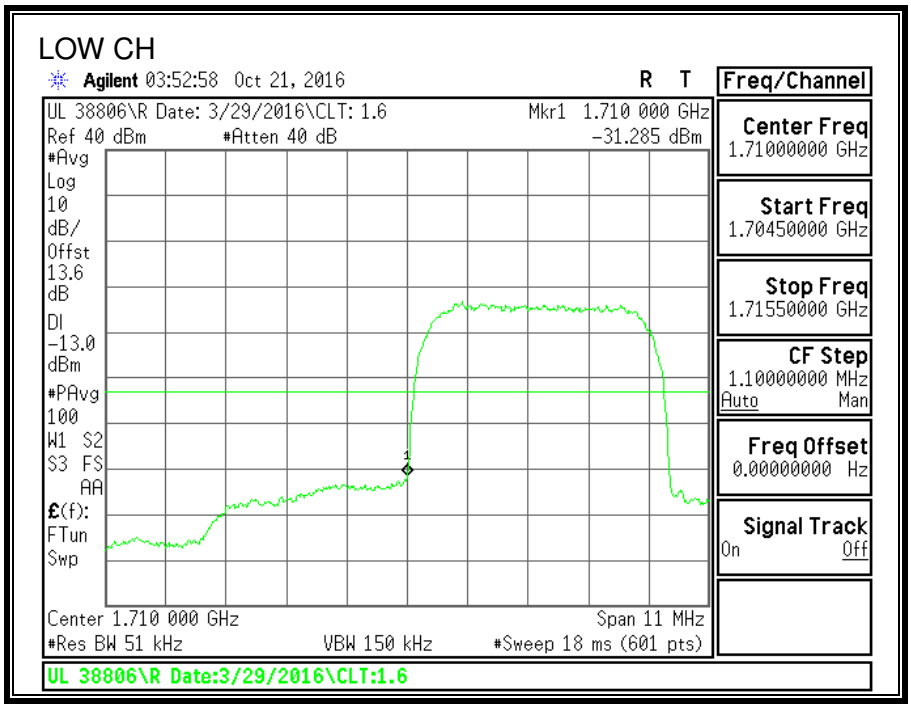
HIGH CH



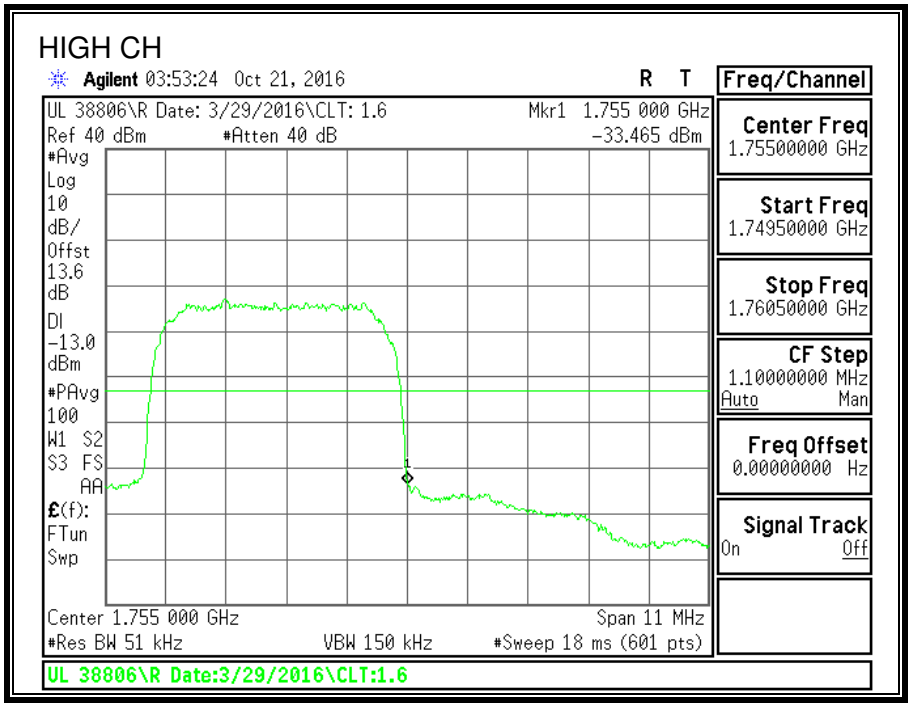
8.2.8. UMTS HSDPA

850MHz BAND

LOW CH

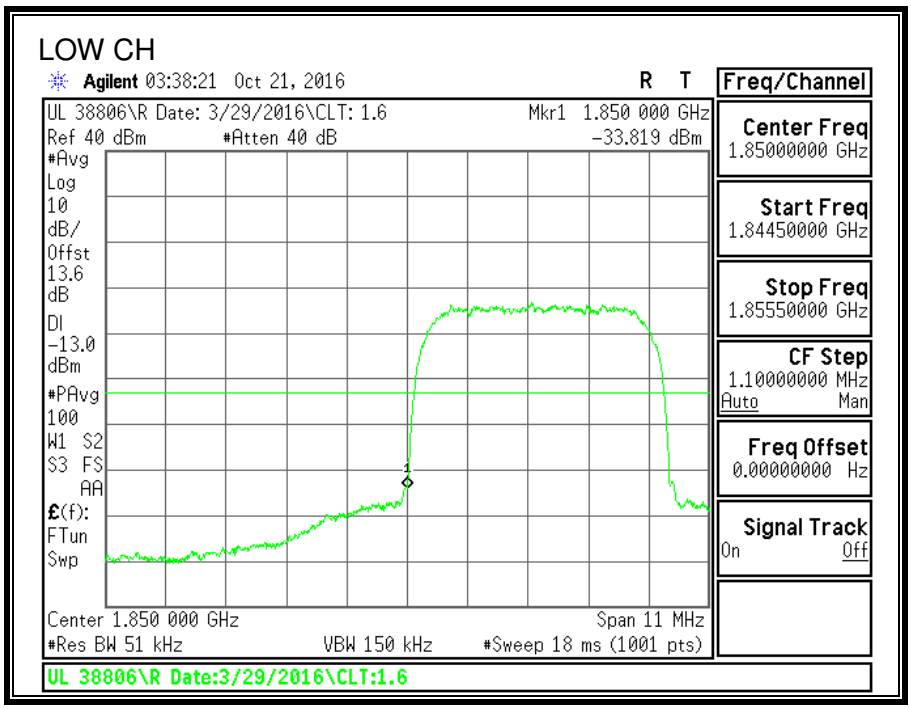


HIGH CH

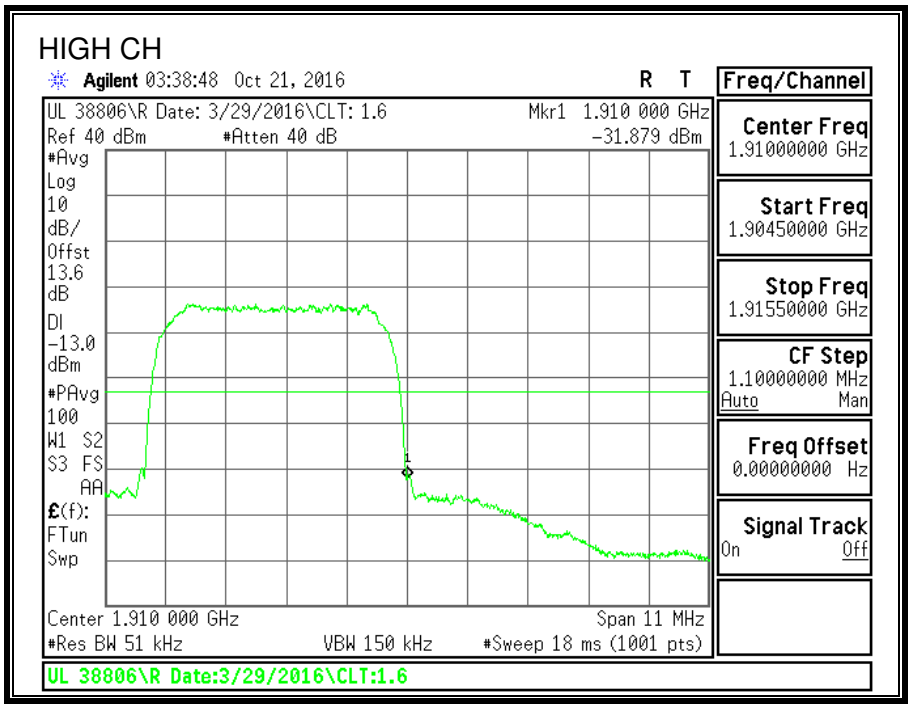


1900MHz BAND

LOW CH

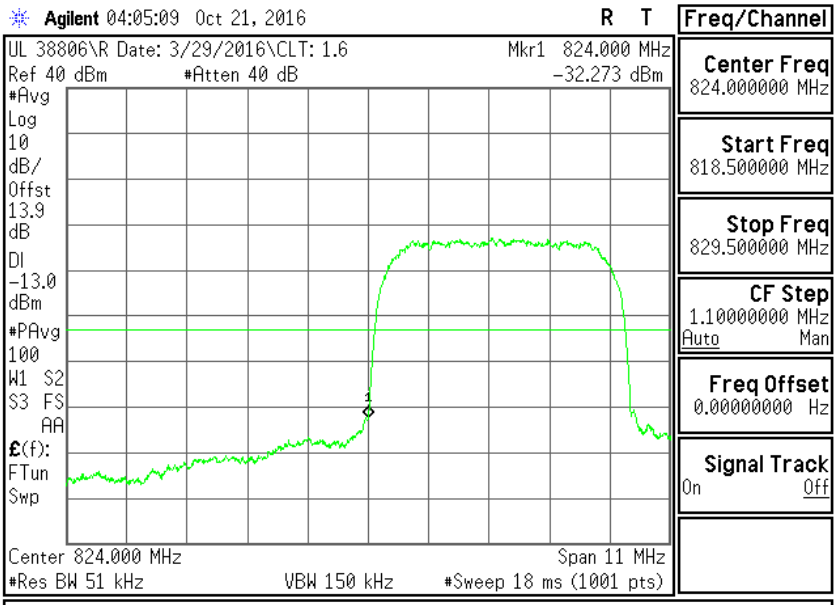


HIGH CH

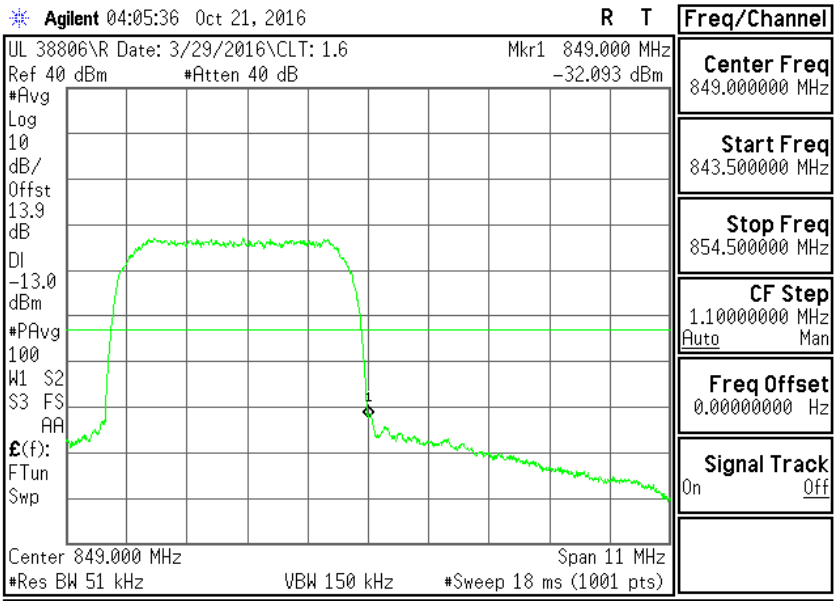


1700MHz BAND

LOW CH



HIGH CH



8.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22. 359, §22.917, §24.238 and §90.691
IC: RSS132§5.5; RSS133§6.5 and RSS139§6.6

LIMITS

FCC: §22.359, §22.917, §24.238
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.

FCC: §27.53
(c) 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;
(1) On any frequency outside the 746-758 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;
(2) 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;
(4) 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;
(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) 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;
(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

FCC §90.691 Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(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.

(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.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

RSS132§5.5
Mobile and base station equipment shall comply with the limits in (i) and (ii) below.
In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p (watts).
After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least43 + 10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

RSS133§6.5
Equipment shall comply with the limits in (i) and (ii) below.

(i)In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts).

(ii)After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

RSS139§6.6

(i)In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block,Footnote2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least43 + 10 log10 p (watts) dB.

(ii)After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) 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.

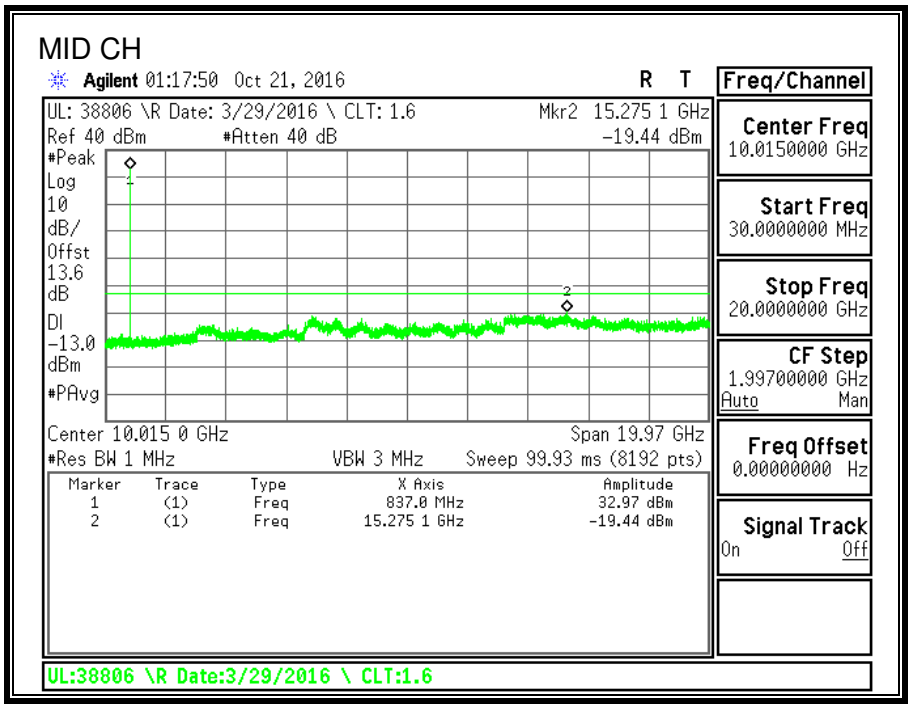
For each out of band emissions measurement:

- 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.

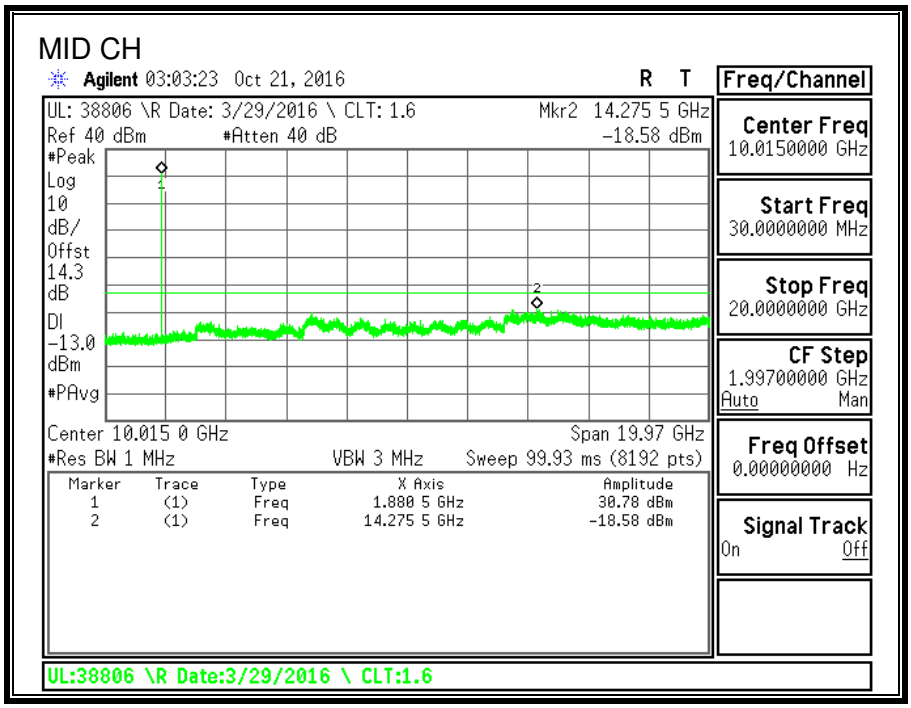
RESULTS

8.3.1. GSM GPRS

850MHz BAND

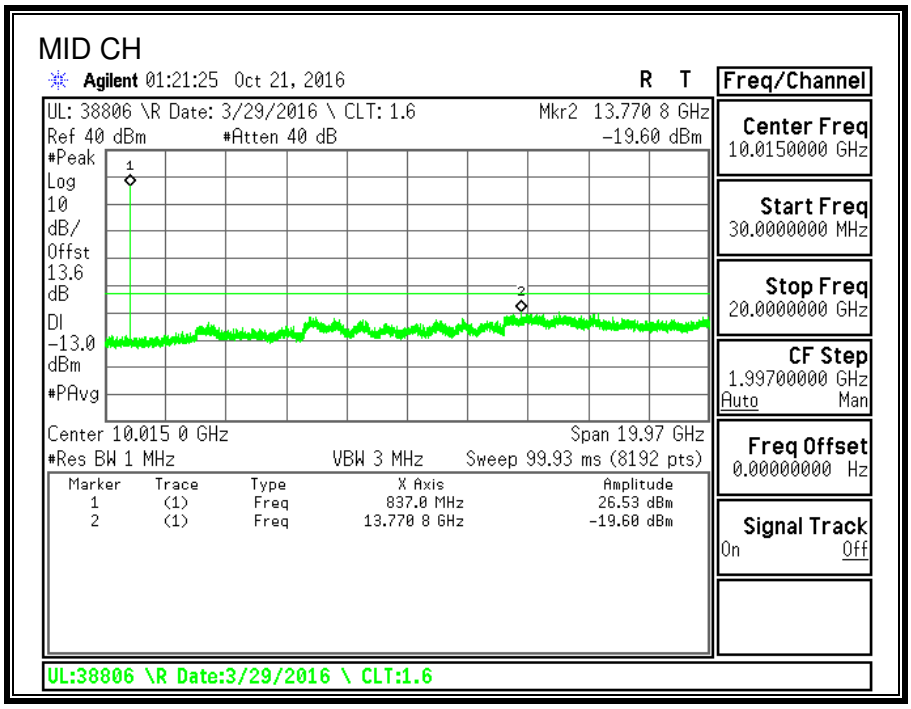


1900MHz BAND

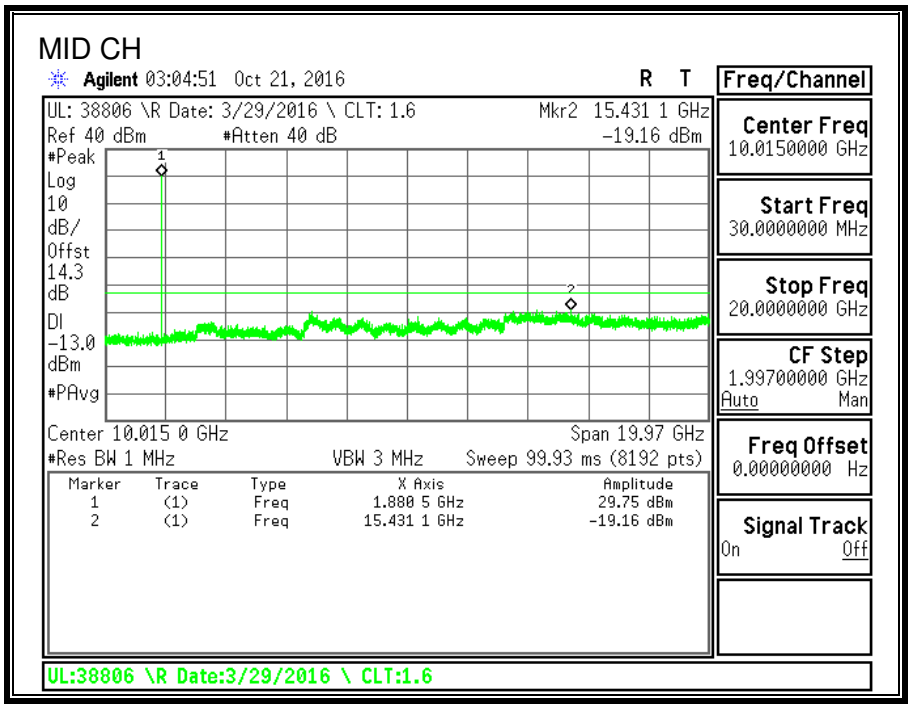


8.3.2. GSM EGPRS

850MHz BAND

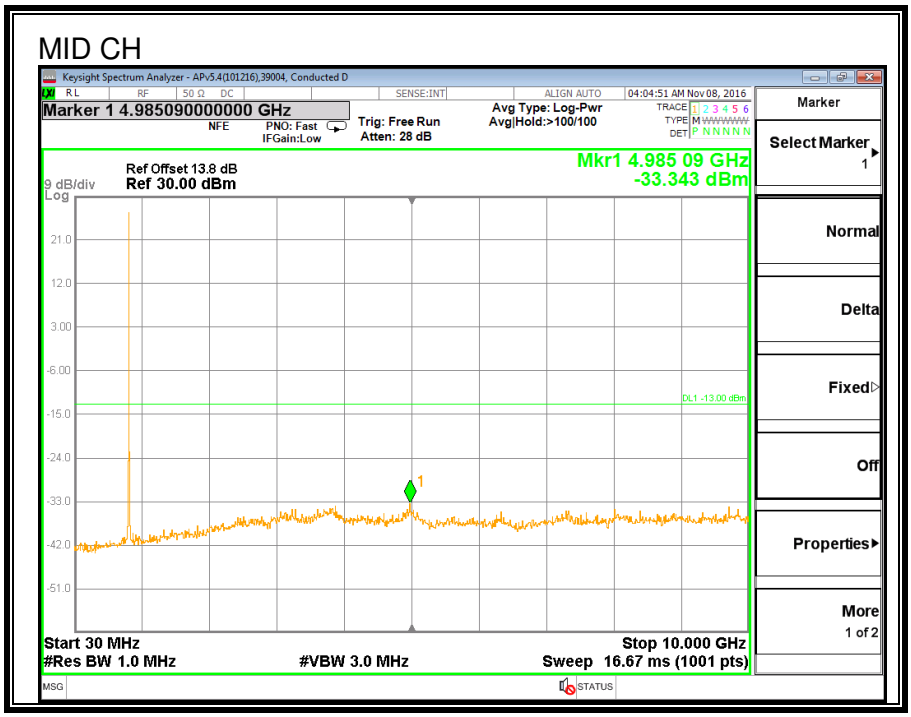


1900MHz BAND

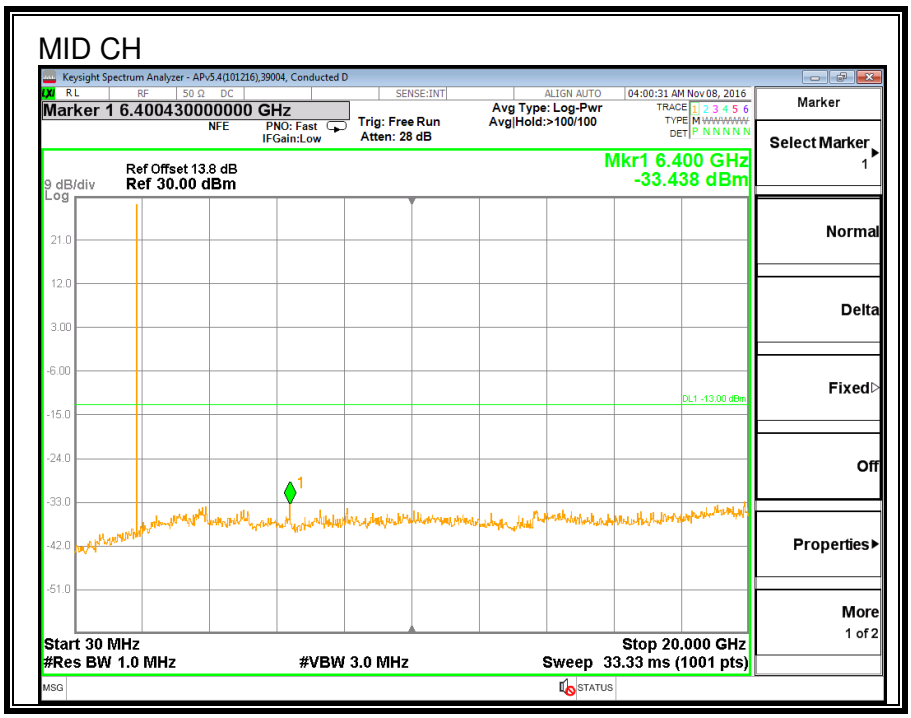


8.3.3. CDMA2000 1xRTT

850MHz BAND

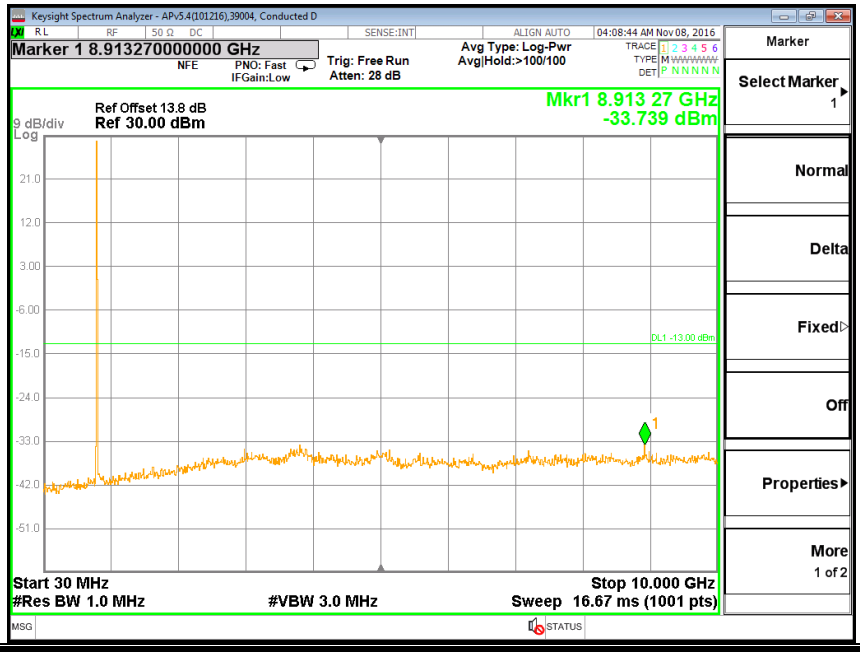


1900MHz BAND



800MHz SECONDARY BAND

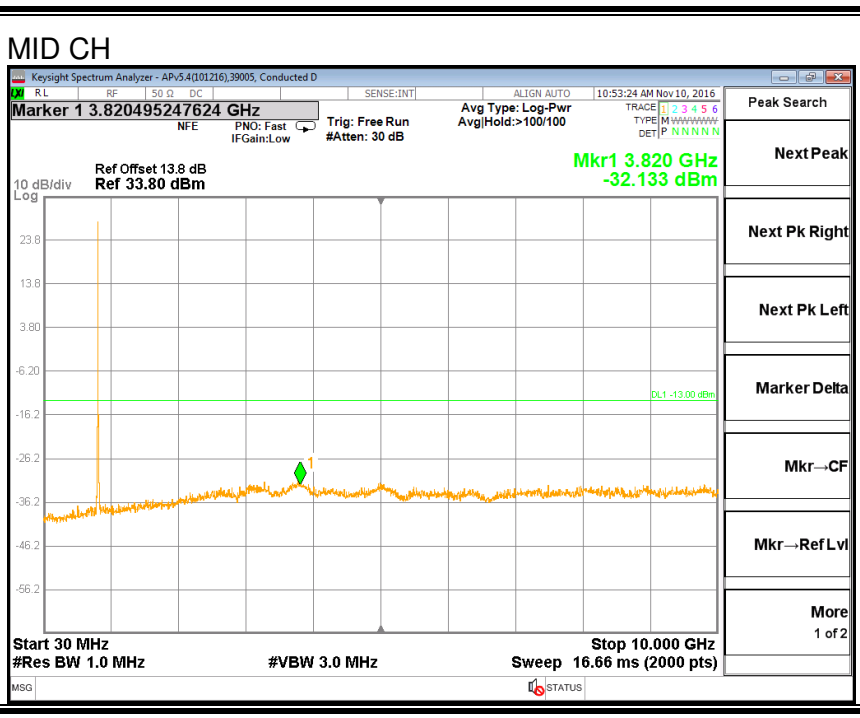
MID CH



8.3.4. CDMA2000 EVDO REV A

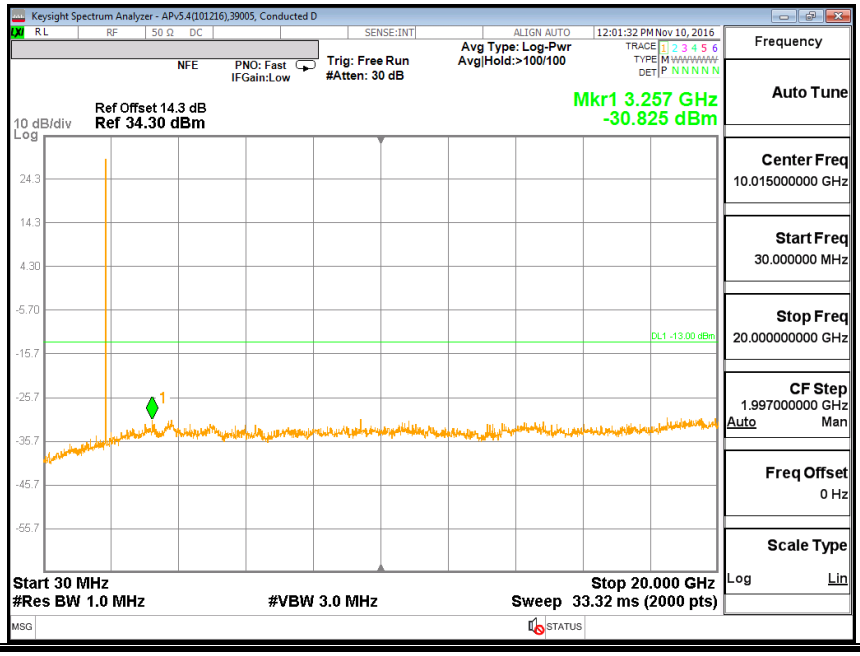
850MHz BAND

MID CH



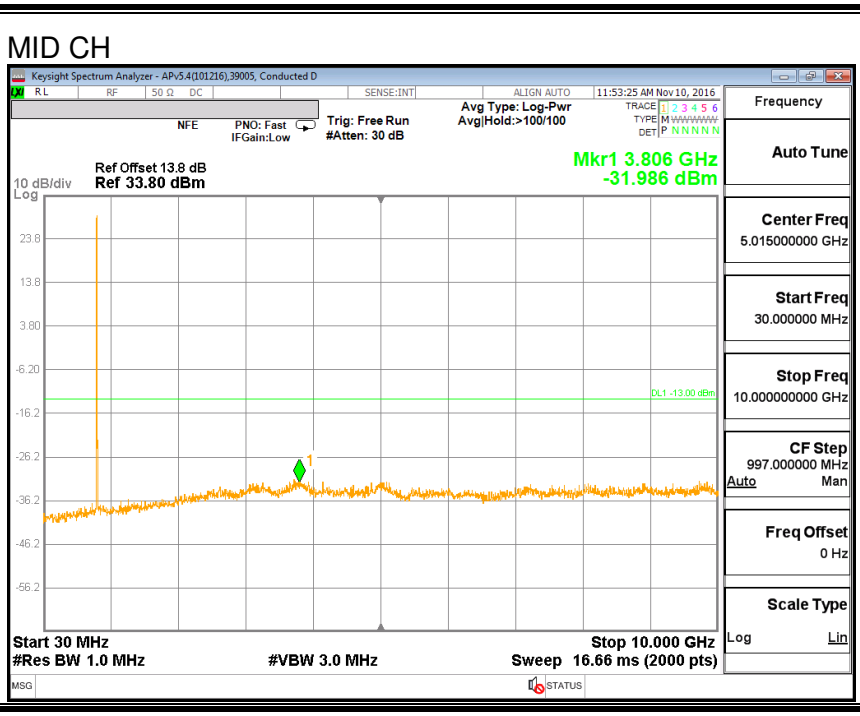
1900MHz BAND

MID CH



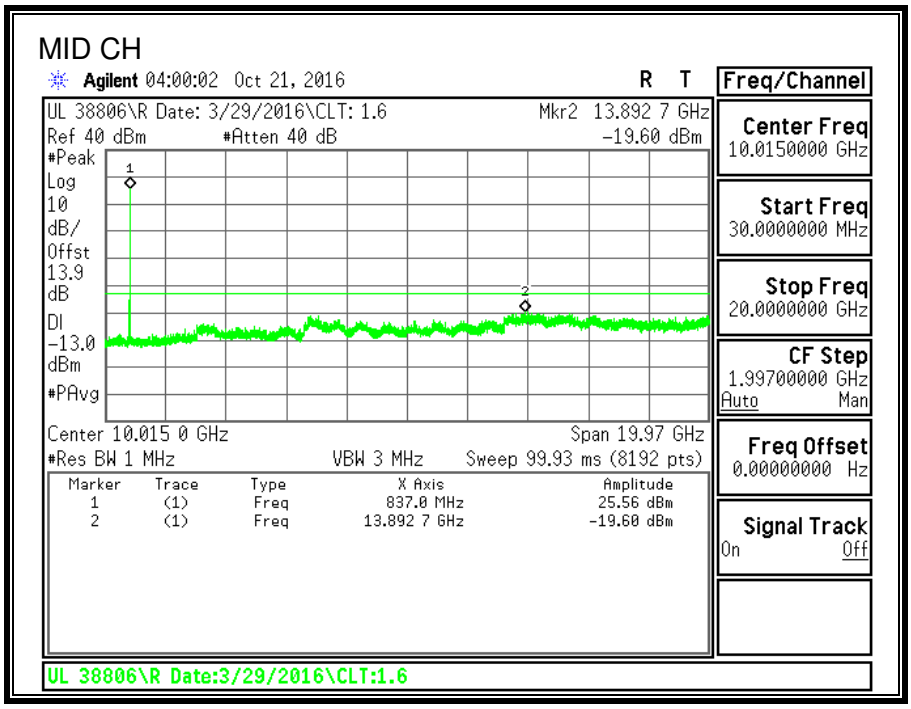
800MHz SECONDARY BAND

MID CH

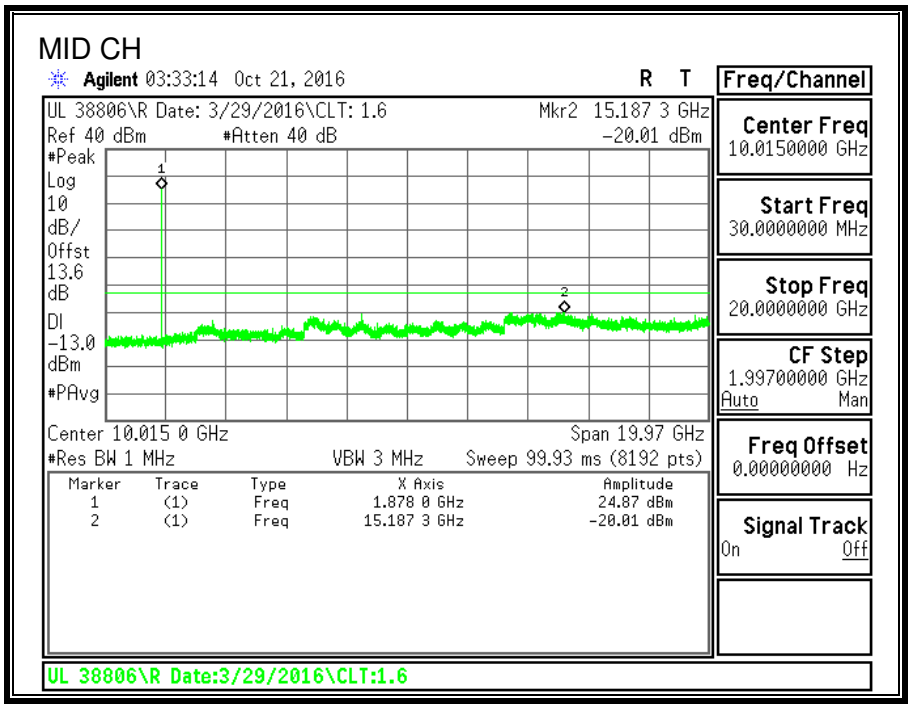


8.3.5. UMTS Rel99

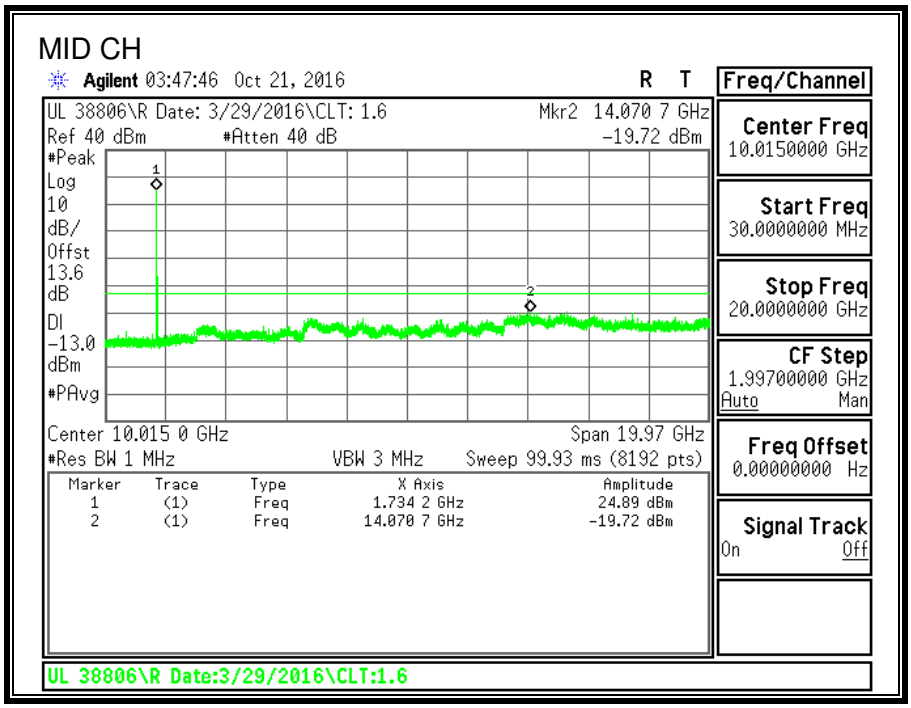
850MHz BAND



1900MHz BAND

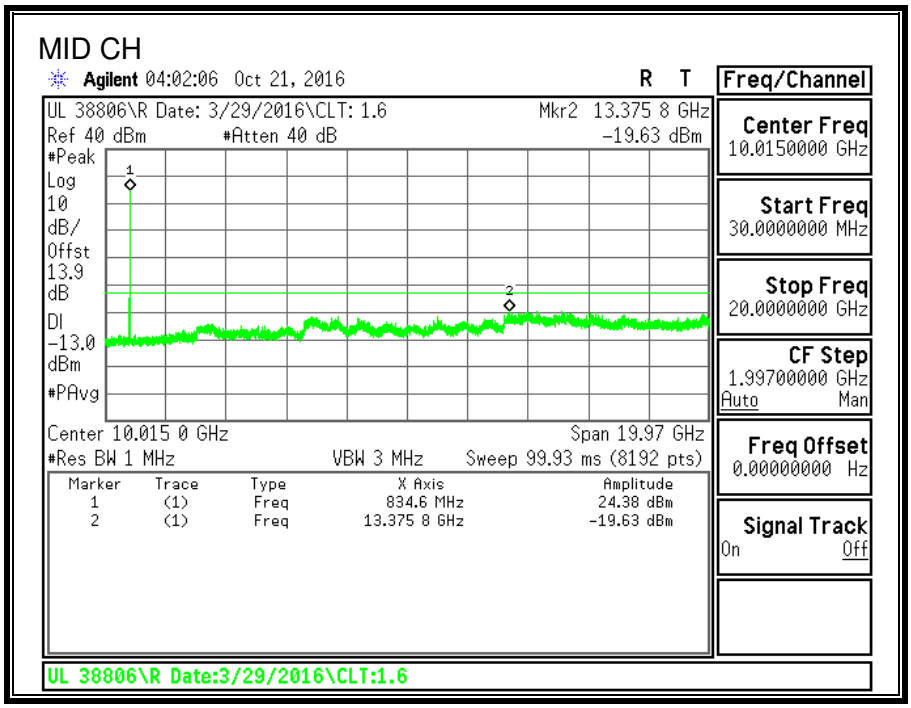


1700MHz BAND

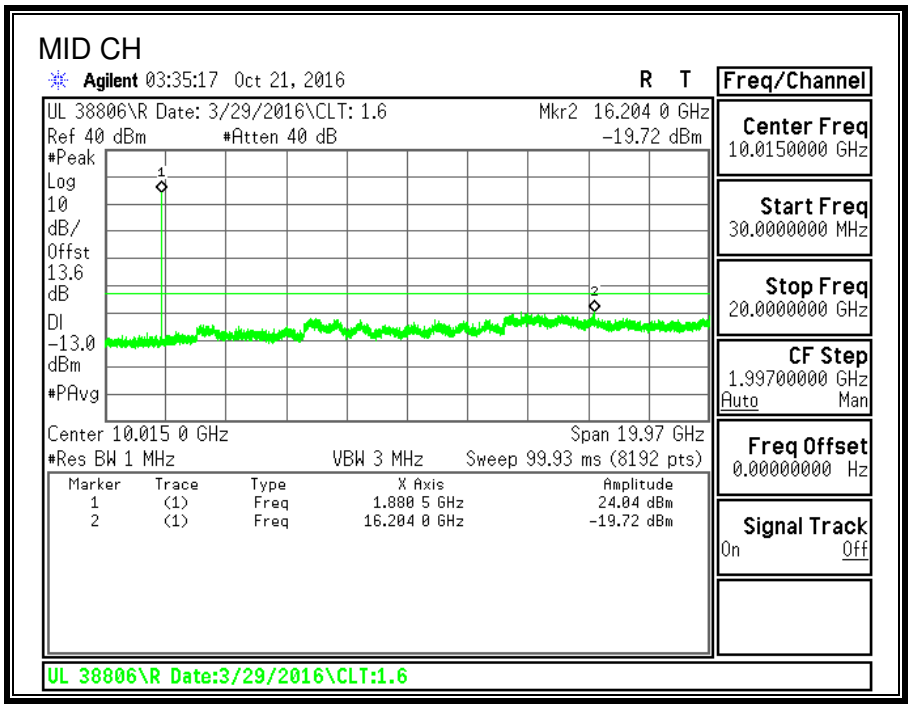


8.3.6. UMTS HSDPA

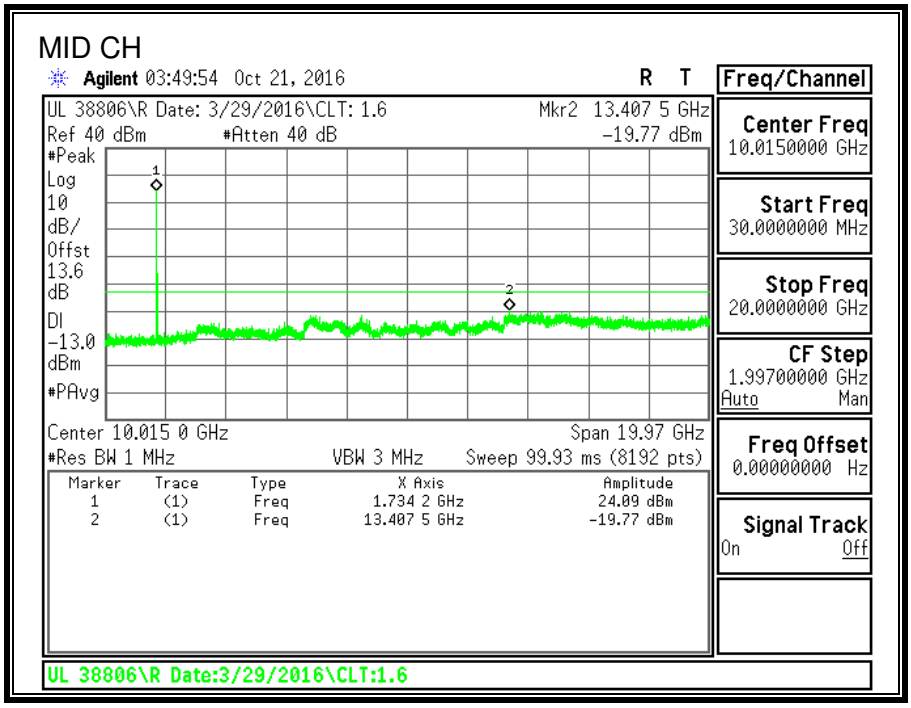
850MHz BAND



1900MHz BAND



1700MHz BAND



9. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54 and §90.213
IC: RSS132§5.3; RSS133§6.3 and RSS139§6.4

LIMITS

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

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

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

RSS132§5.3
The carrier frequency shall not depart from the reference frequency in excess of ±2.5 SRSP for mobile stations and±1.5 ppm for base stations.
In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the occupied bandwidth stays within each of the sub-bands (see Section 5.1) when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS133§6.3
The carrier frequency shall not depart from the reference frequency, in excess of ±2.5 ppm for mobile stations and±1.0 ppm for base stations.
In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS139§6.4
The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

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

  Low voltage, 3.23VDC, Normal, 3.8VDC and High voltage, 4.37VDC.
  End Voltage, 3.2VDC.

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).

RESULTS

See the following pages.

9.1. GSM

ID:	39004	Date:	11/14/16

GPRS 850

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	824.016609	848.982458		
Extreme (50C)		824.016617	848.982466	7.82	0.01
Extreme (40C)		824.016615	848.982464	5.89	0.01
Extreme (30C)		824.016613	848.982462	3.74	0.00
Extreme (10C)		824.016600	848.982449	-8.56	-0.01
Extreme (0C)		824.016613	848.982462	4.36	0.01
Extreme (-10C)		824.016611	848.982460	1.77	0.00
Extreme (-20C)		824.016605	848.982454	-4.33	-0.01
Extreme (-30C)		824.016601	848.982450	-7.56	-0.01
20C	15%	824.016600	848.982449	-8.77	-0.01
	-15%	824.016600	848.982449	-8.92	-0.01
	End Point	824.016600	848.982449	-8.55	-0.01

EGPRS 850

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	824.017881	848.983001		
Extreme (50C)		824.017890	848.983010	8.50	0.01
Extreme (40C)		824.017887	848.983007	6.32	0.01
Extreme (30C)		824.017886	848.983006	5.32	0.01
Extreme (10C)		824.017874	848.982994	-7.41	-0.01
Extreme (0C)		824.017884	848.983004	3.22	0.00
Extreme (-10C)		824.017886	848.983006	5.16	0.01
Extreme (-20C)		824.017888	848.983008	6.52	0.01
Extreme (-30C)		824.017890	848.983010	8.54	0.01
20C	15%	824.017873	848.982993	-7.85	-0.01
	-15%	824.017873	848.982993	-7.62	-0.01
	End Point	824.017873	848.982993	-8.12	-0.01

GPRS 1900

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)		1850.0250	1909.9711		
Extreme (50C)		1850.0250	1909.9712	46.1	0.02
Extreme (40C)		1850.0250	1909.9712	46.0	0.02
Extreme (30C)		1850.0250	1909.9712	44.4	0.02
Extreme (10C)	Normal	1850.0250	1909.9712	41.3	0.02
Extreme (0C)		1850.0250	1909.9712	47.2	0.03
Extreme (-10C)		1850.0250	1909.9712	50.2	0.03
Extreme (-20C)		1850.0250	1909.9712	67.5	0.04
Extreme (-30C)		1850.0250	1909.9712	47.5	0.03
20C	15%	1850.0250	1909.9712	42.2	0.02
	-15%	1850.0250	1909.9712	41.8	0.02
	End Point	1850.0250	1909.9712	40.3	0.02

EGPRS 1900

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)		1850.0232	1909.9709		
Extreme (50C)		1850.0233	1909.9710	45.6	0.02
Extreme (40C)		1850.0233	1909.9710	52.1	0.03
Extreme (30C)		1850.0233	1909.9710	46.7	0.02
Extreme (10C)	Normal	1850.0233	1909.9710	44.6	0.02
Extreme (0C)		1850.0233	1909.9710	43.1	0.02
Extreme (-10C)		1850.0233	1909.9710	40.4	0.02
Extreme (-20C)		1850.0233	1909.9710	38.3	0.02
Extreme (-30C)		1850.0233	1909.9710	43.6	0.02
20C	15%	1850.0233	1909.9710	44.1	0.02
	-15%	1850.0233	1909.9710	43.3	0.02
	End Point	1850.0233	1909.9710	43.5	0.02

9.2. CDMA2000

ID:	39004	Date:	11/14/16

CDMA 1xRTT BC0

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	824.0261	848.9845		
Extreme (50C)		824.0261	848.9845	-0.4	0.00
Extreme (40C)		824.0261	848.9845	0.2	0.00
Extreme (30C)		824.0261	848.9845	-1.7	0.00
Extreme (10C)		824.0261	848.9845	-8.7	-0.01
Extreme (0C)		824.0261	848.9845	-6.3	-0.01
Extreme (-10C)		824.0261	848.9845	-4.1	0.00
Extreme (-20C)		824.0261	848.9845	-2.3	0.00
Extreme (-30C)		824.0261	848.9845	2.9	0.00
20C	15%	824.0261	848.9845	2.1	0.00
	-15%	824.0261	848.9845	1.7	0.00
	End Point	824.0261	848.9845	2.0	0.00

CDMA 1x RTT BC1

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.5783	1909.4238		
Extreme (50C)		1850.5783	1909.4238	3.6	0.00
Extreme (40C)		1850.5783	1909.4238	6.7	0.00
Extreme (30C)		1850.5783	1909.4238	5.7	0.00
Extreme (10C)		1850.5783	1909.4238	7.8	0.00
Extreme (0C)		1850.5783	1909.4238	6.2	0.00
Extreme (-10C)		1850.5783	1909.4238	5.7	0.00
Extreme (-20C)		1850.5783	1909.4238	5.1	0.00
Extreme (-30C)		1850.5783	1909.4238	4.0	0.00
20C	15%	1850.5783	1909.4238	5.2	0.00
	-15%	1850.5783	1909.4238	4.9	0.00
	End Point	1850.5783	1909.4238	5.1	0.00

CDMA 1xRTT BC10

Limit		816.35	823.65	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	816.5721	823.4367		
Extreme (50C)		816.5721	823.4367	-3.2	0.00
Extreme (40C)		816.5721	823.4367	1.2	0.00
Extreme (30C)		816.5721	823.4367	1.7	0.00
Extreme (10C)		816.5721	823.4367	4.5	0.01
Extreme (0C)		816.5721	823.4367	3.3	0.00
Extreme (-10C)		816.5721	823.4367	2.5	0.00
Extreme (-20C)		816.5721	823.4367	2.1	0.00
Extreme (-30C)		816.5721	823.4367	1.1	0.00
20C	15%	816.5721	823.4367	2.9	0.00
	-15%	816.5721	823.4367	2.4	0.00
	End Point	816.5721	823.4367	2.8	0.00

9.3. UMTS

ID:	39004	Date:	11/14/16

UMTS REL99 BAND 5

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	824.1542	848.2489		
Extreme (50C)		824.1542	848.2489	5.1	0.01
Extreme (40C)		824.1542	848.2489	2.9	0.00
Extreme (30C)		824.1542	848.2489	1.4	0.00
Extreme (10C)		824.1542	848.2489	7.2	0.01
Extreme (0C)		824.1542	848.2489	2.9	0.00
Extreme (-10C)		824.1542	848.2489	-1.2	0.00
Extreme (-20C)		824.1542	848.2489	-3.2	0.00
Extreme (-30C)		824.1542	848.2489	1.9	0.00
20C	15%	824.1542	848.2489	-1.3	0.00
	-15%	824.1542	848.2489	-1.6	0.00
	End Point	824.1542	848.2489	-1.3	0.00

UMTS REL99 BAND 2

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.1583	1909.8477		
Extreme (50C)		1850.1583	1909.8477	10.3	0.01
Extreme (40C)		1850.1583	1909.8477	4.5	0.00
Extreme (30C)		1850.1583	1909.8477	6.8	0.00
Extreme (10C)		1850.1583	1909.8477	18.5	0.01
Extreme (0C)		1850.1583	1909.8477	10.2	0.01
Extreme (-10C)		1850.1583	1909.8477	8.8	0.00
Extreme (-20C)		1850.1583	1909.8477	7.6	0.00
Extreme (-30C)		1850.1583	1909.8477	6.4	0.00
20C	15%	1850.1583	1909.8477	20.2	0.01
	-15%	1850.1583	1909.8477	20.5	0.01
	End Point	1850.1583	1909.8477	21.1	0.01

UMTS REL99 BAND 4

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1710.14958	1754.86082		
Extreme (50C)		1710.14960	1754.86084	25.16	0.01
Extreme (40C)		1710.14960	1754.86084	22.61	0.01
Extreme (30C)		1710.14959	1754.86083	14.87	0.01
Extreme (10C)		1710.14956	1754.86080	-17.77	-0.01
Extreme (0C)		1710.14956	1754.86080	-15.56	-0.01
Extreme (-10C)		1710.14957	1754.86081	-10.20	-0.01
Extreme (-20C)		1710.14957	1754.86081	-8.44	0.00
Extreme (-30C)		1710.14959	1754.86083	9.71	0.01
20C	15%	1710.14958	1754.86082	2.41	0.00
	-15%	1710.14958	1754.86082	2.20	0.00
	End Point	1710.14958	1754.86082	2.36	0.00

10. PEAK-TO-AVERAGE RATIO

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.

RESULTS

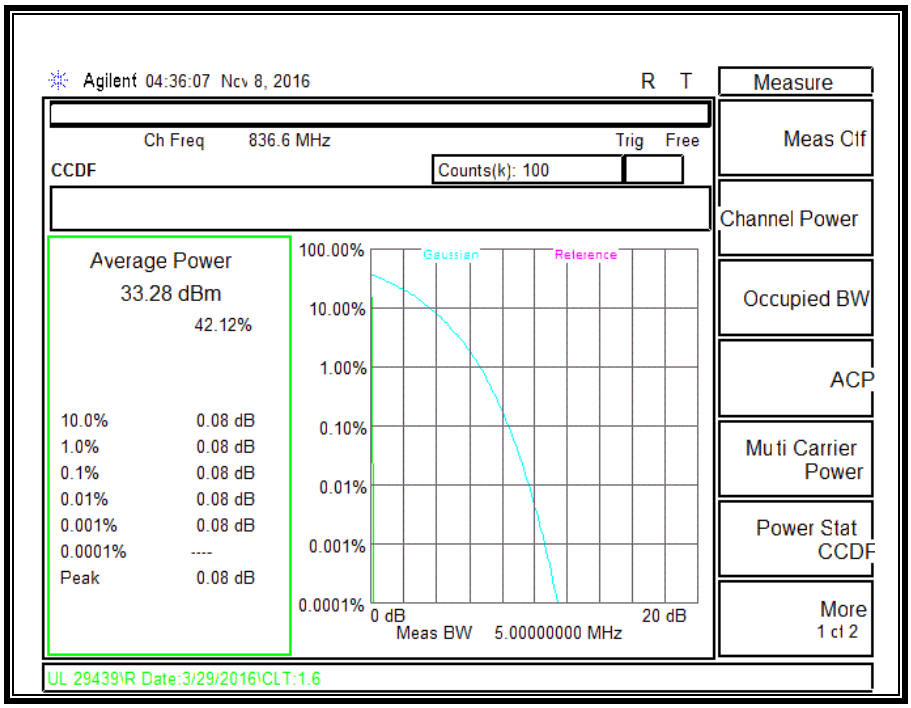
The results from all CCDF plots are passed with 13dB peak-to-average ratio criteria.

Mode	Modulation	Conducted Power (dBm)		Peak-to-Average Ratio
		*Peak	Average	
GSM850	GPRS	33.36	33.28	0.08
	EGPRS	30.75	27.89	2.86
GSM1900	GPRS	29.05	28.91	0.14
	EGPRS	29.88	26.81	3.07
*Peak Reading = Average Reading + Peak - to - Average Ratio				

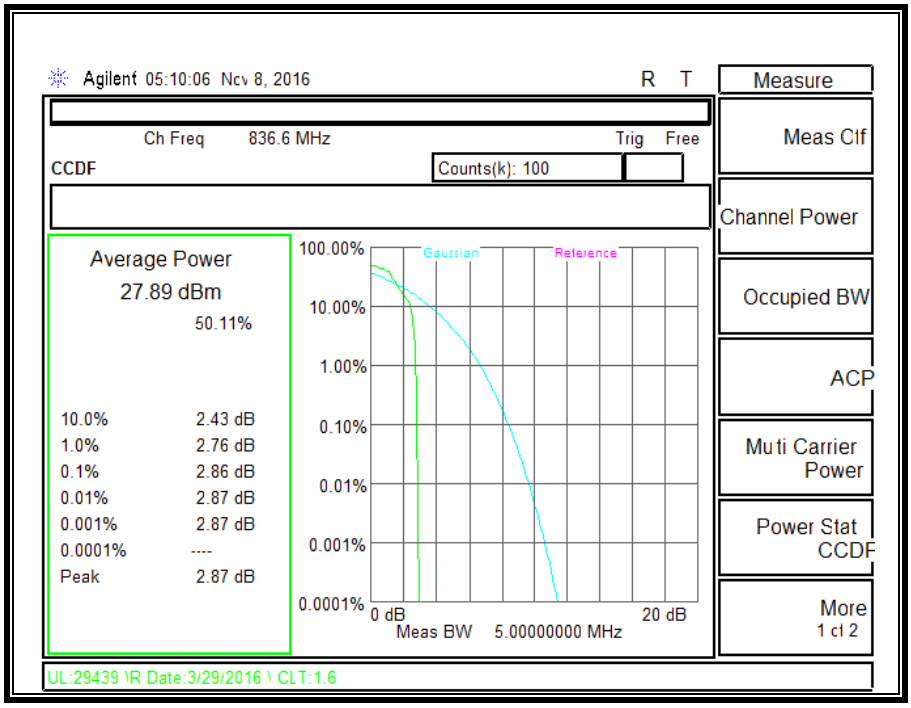
Mode	Modulation	Conducted Power (dBm)		Peak-to-Average Ratio
		*Peak	Average	
CDMA2000 BC0	1xRTT	27.67	23.80	3.87
	EVDO A	29.11	23.88	5.23
CDMA2000 BC1	1xRTT	29.65	25.15	4.50
	EVDO A	29.54	24.09	5.45
CDMA2000 BC10	1xRTT	30.00	25.32	4.68
	EVDO A	29.89	24.37	5.52
*Peak Reading = Average Reading + Peak - to - Average Ratio				

Mode	Modulation	Conducted Power (dBm)		Peak-to-Average Ratio
		*Peak	Average	
UMTS Band 5	REL99	28.50	25.27	3.23
	HSDPA	27.52	24.22	3.30
UMTS Band 2	REL99	28.65	25.46	3.19
	HSDPA	27.71	24.45	3.26
UMTS Band 4	REL99	28.64	25.45	3.19
	HSDPA	27.72	24.44	3.28
*Peak Reading = Average Reading + Peak - to - Average Ratio				

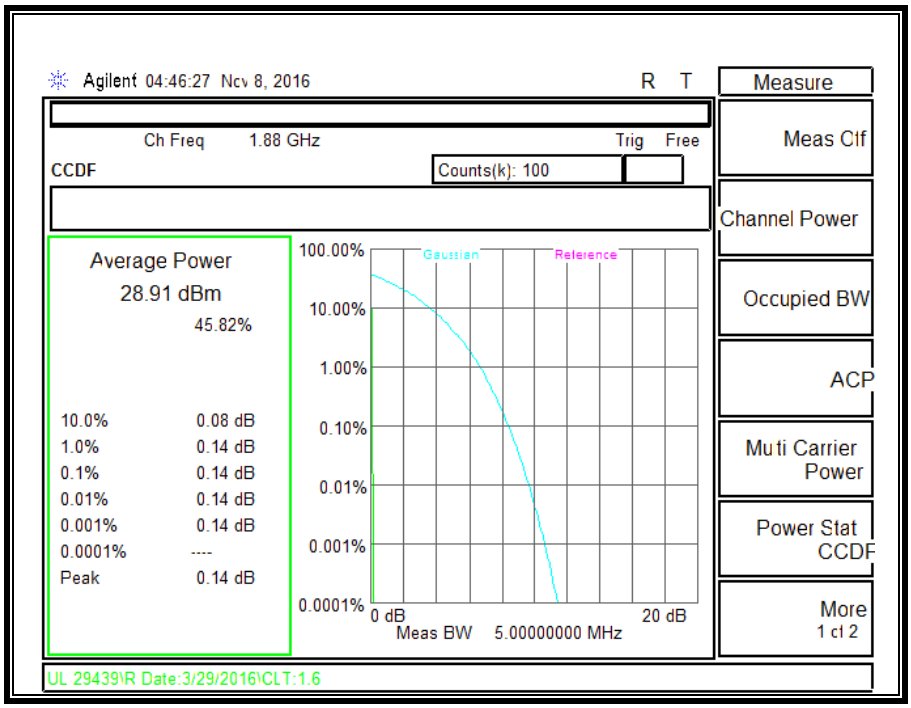
GSM850, GPRS



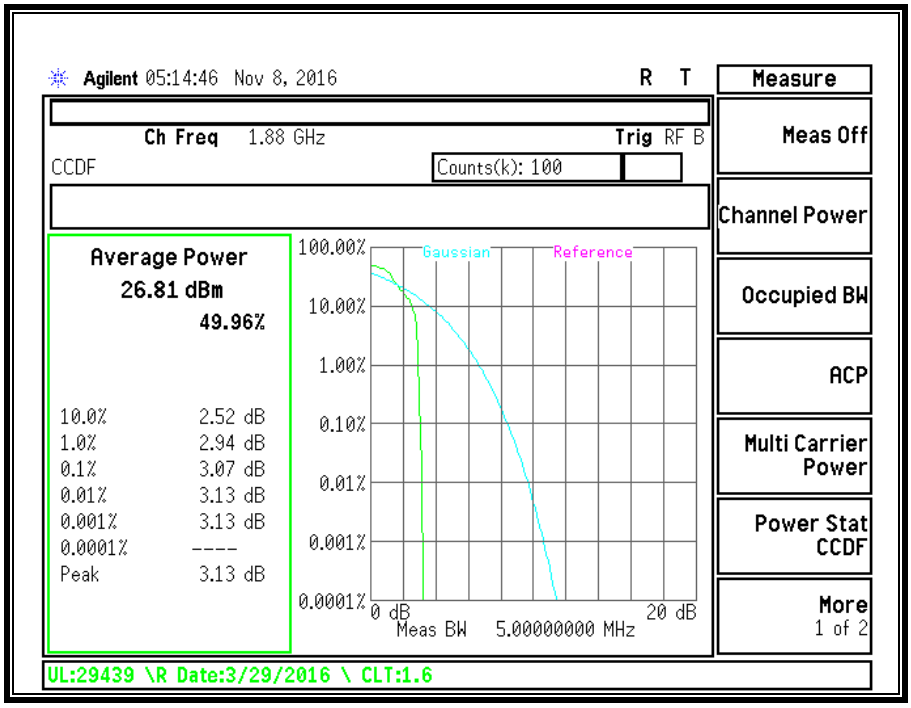
GSM850, EGPRS



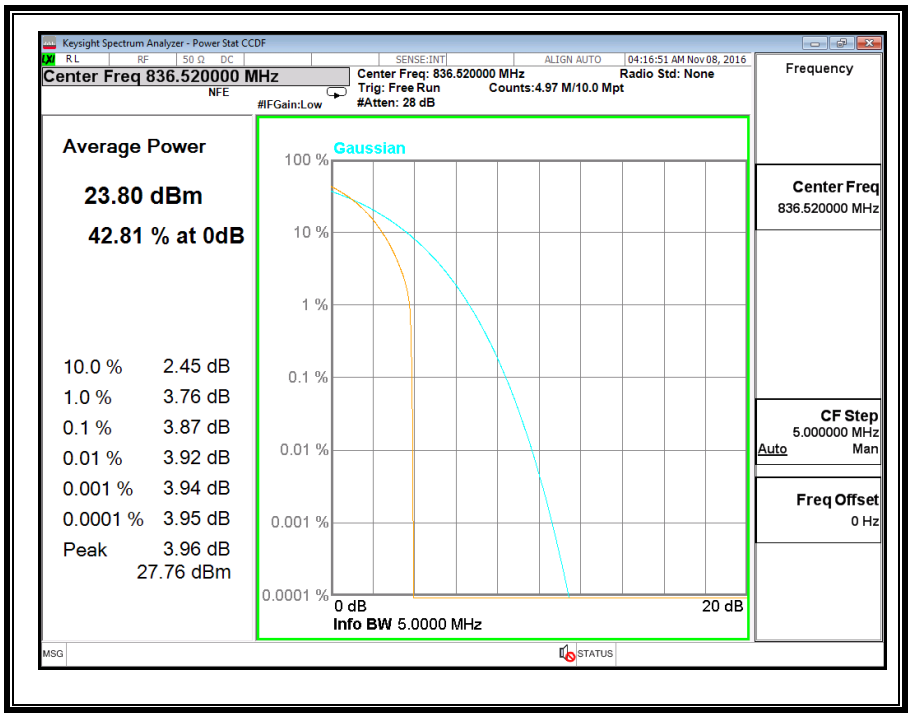
GSM1900, GPRS



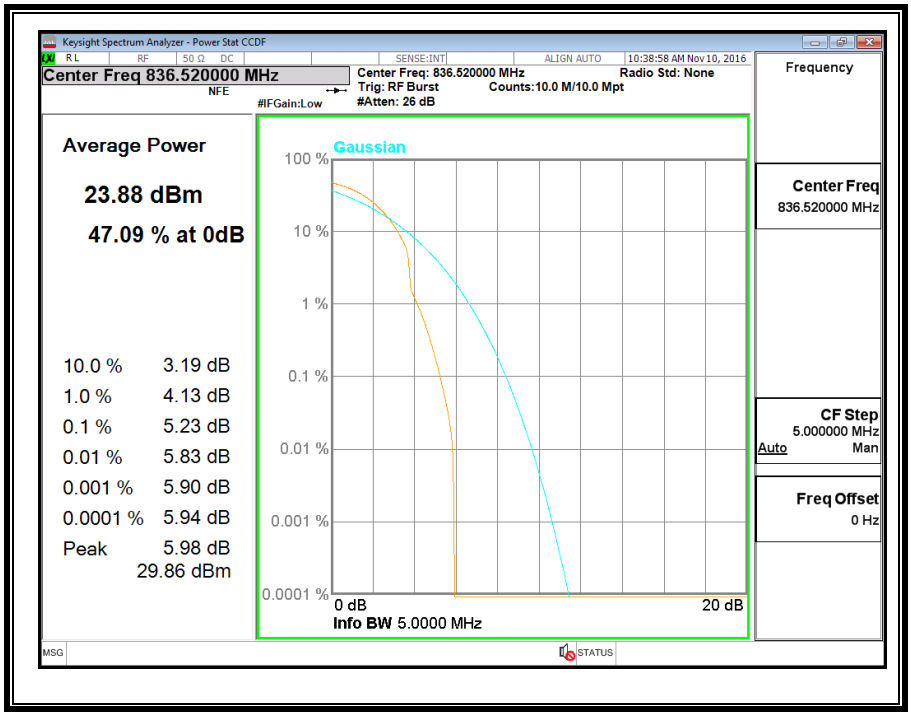
GSM1900, EGPRS



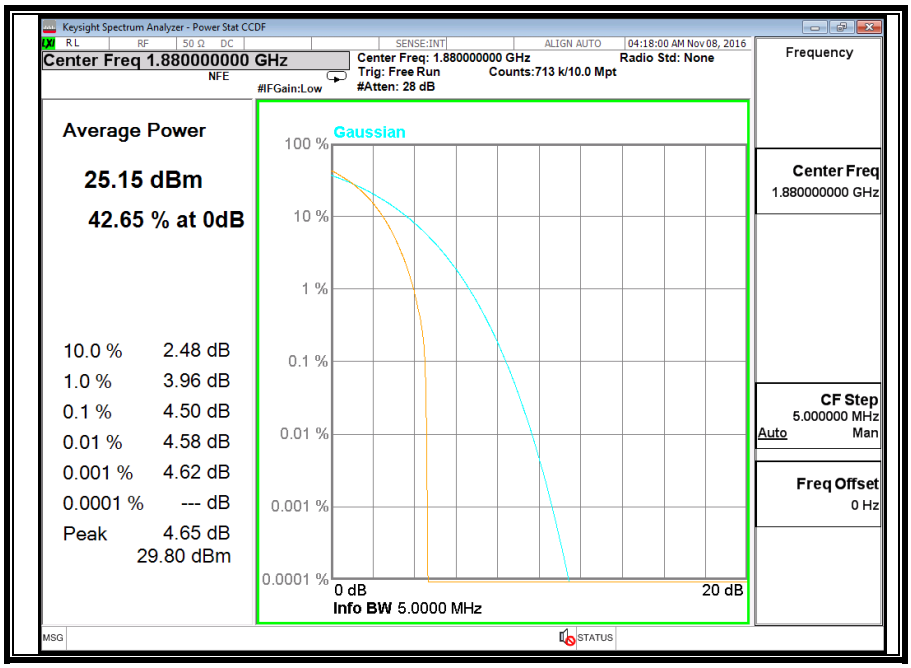
BC 0, 1xRTT



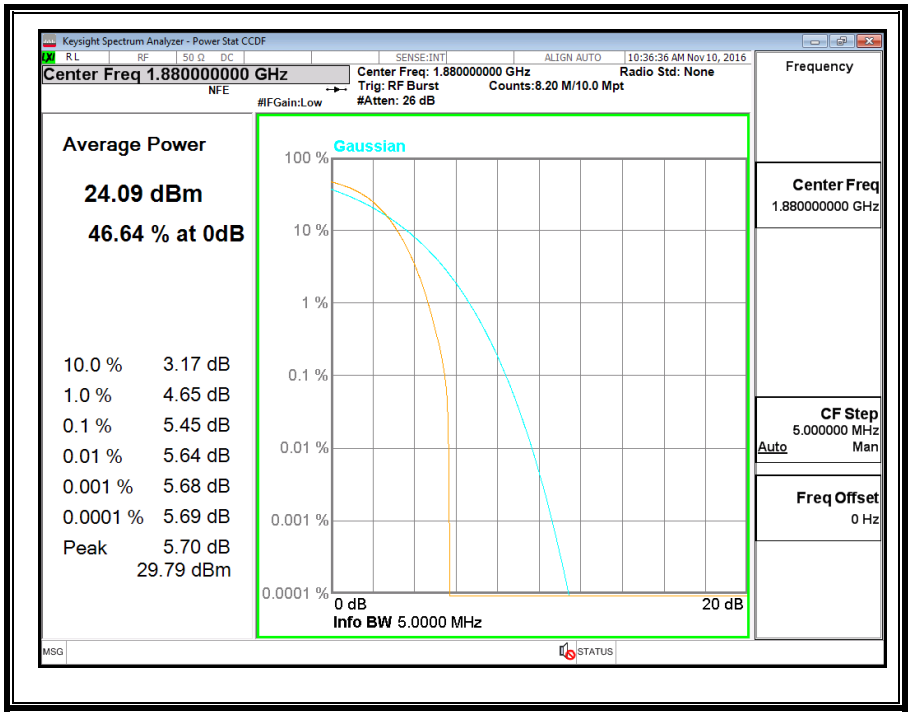
BC 0, EVDO A



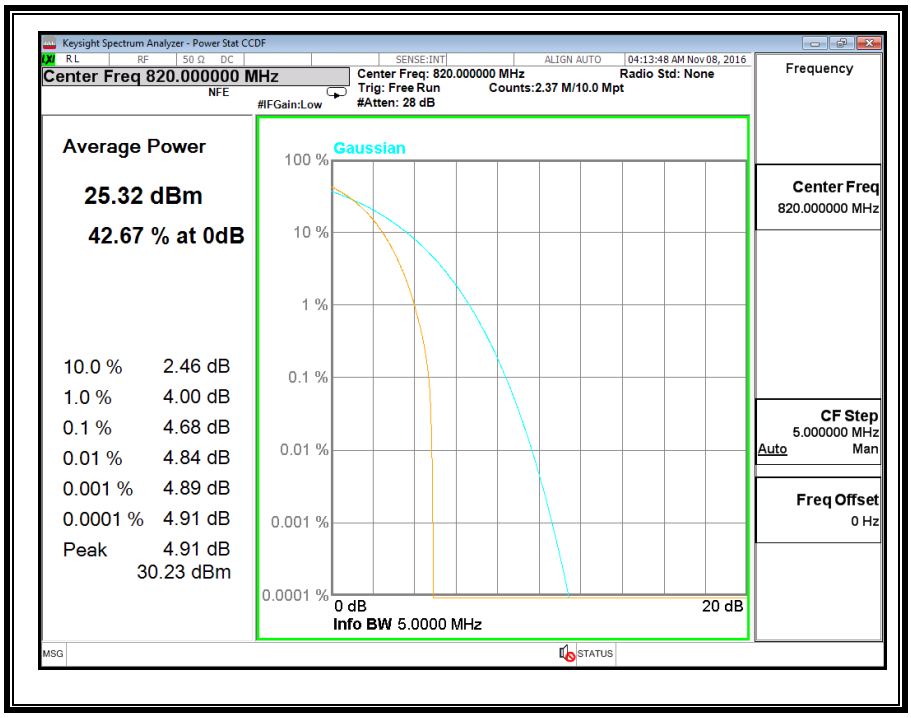
BC 1, 1xRTT



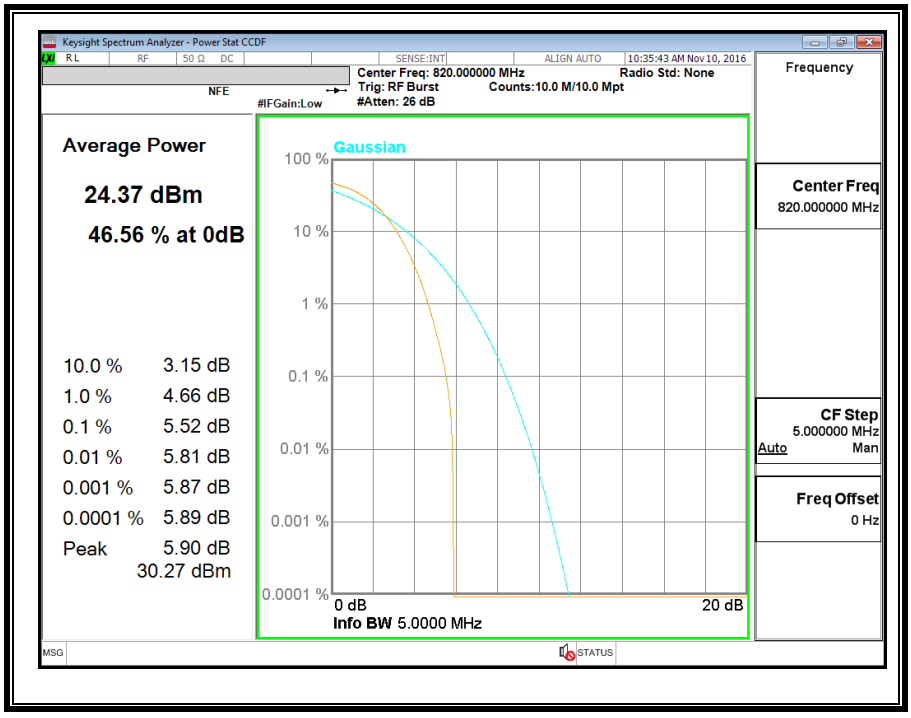
BC 1, EVDO A



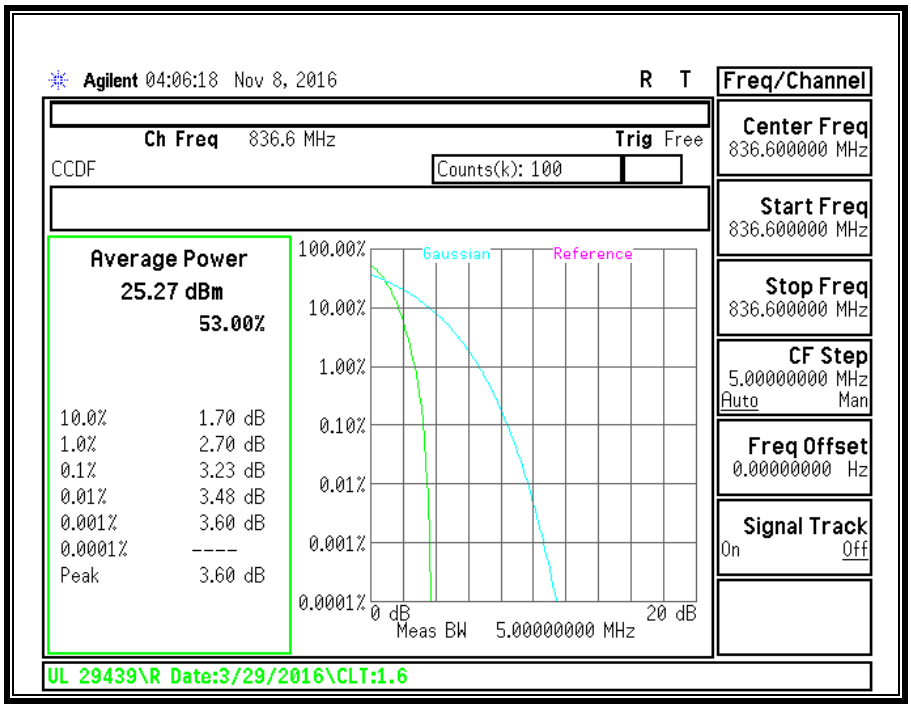
BC10, 1xRTT



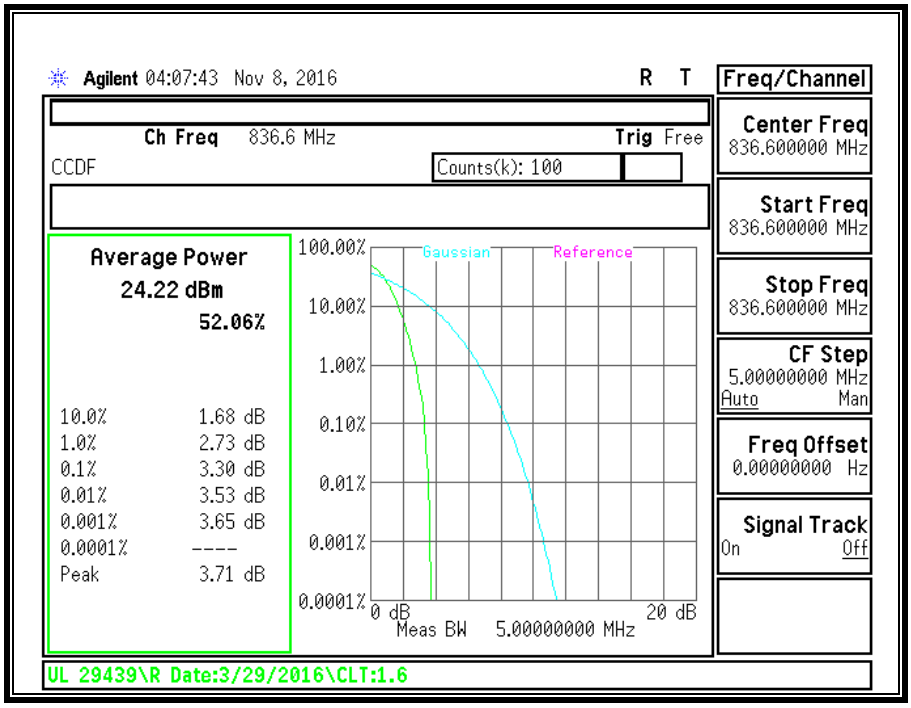
BC10, EVDO A



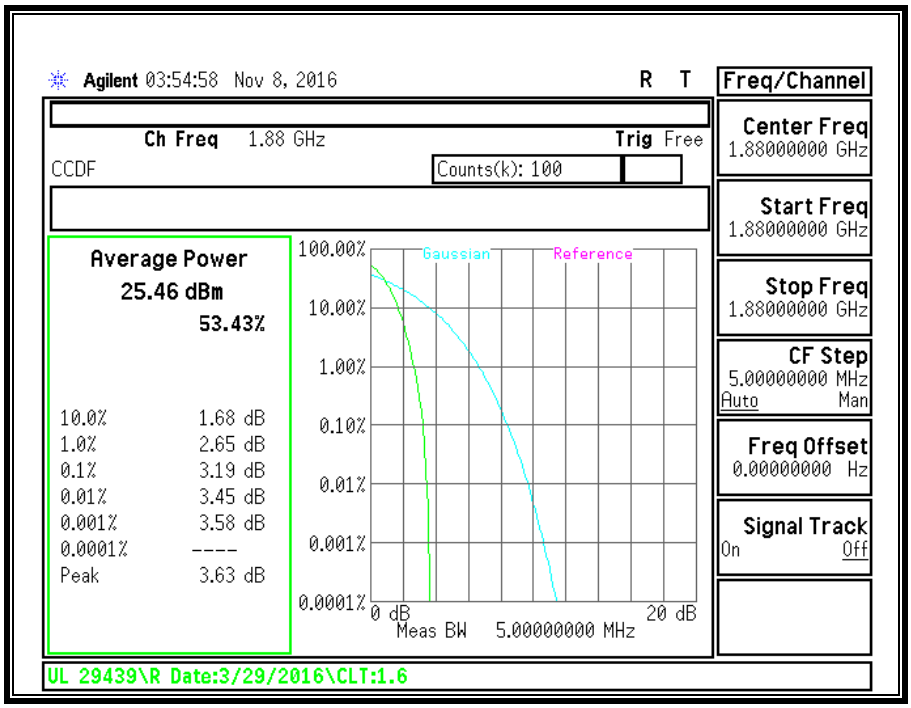
UMTS 850, REL99 BAND 5



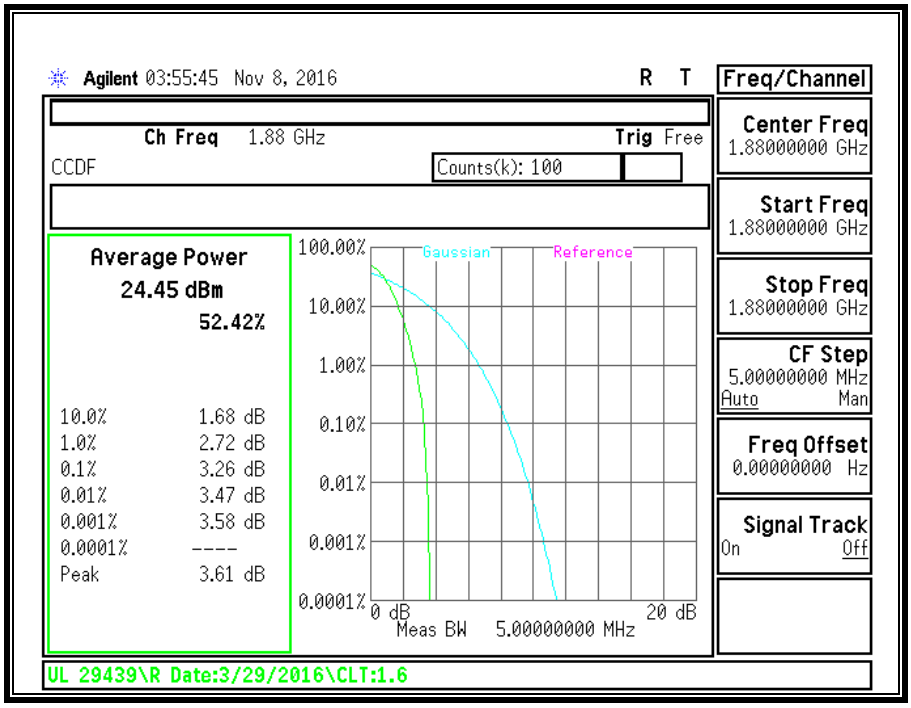
UMTS 850, HSDPA BAND 5



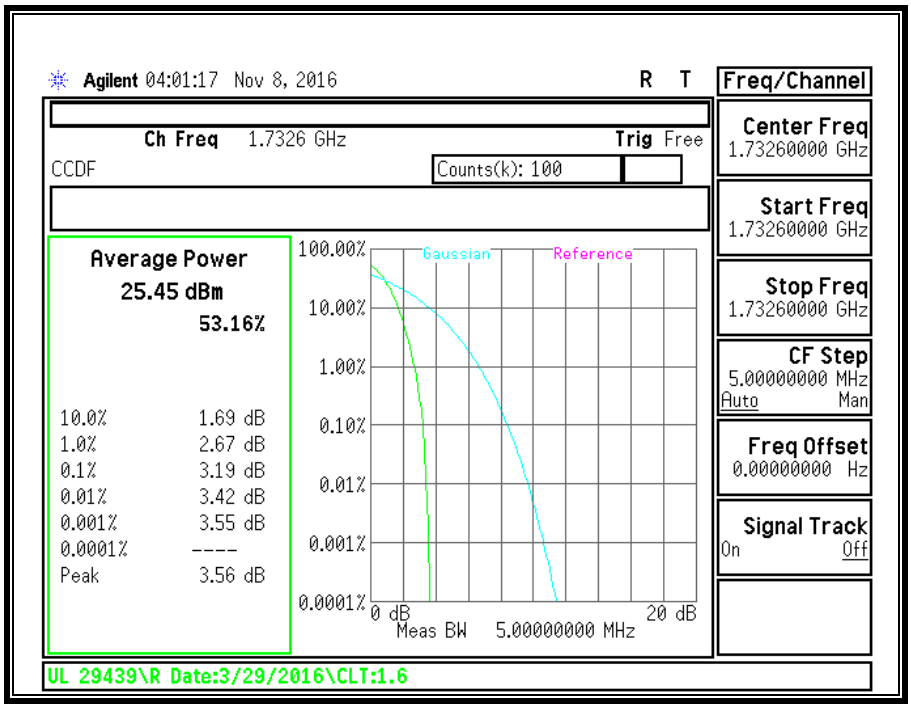
UMTS 1900, REL99 BAND 2



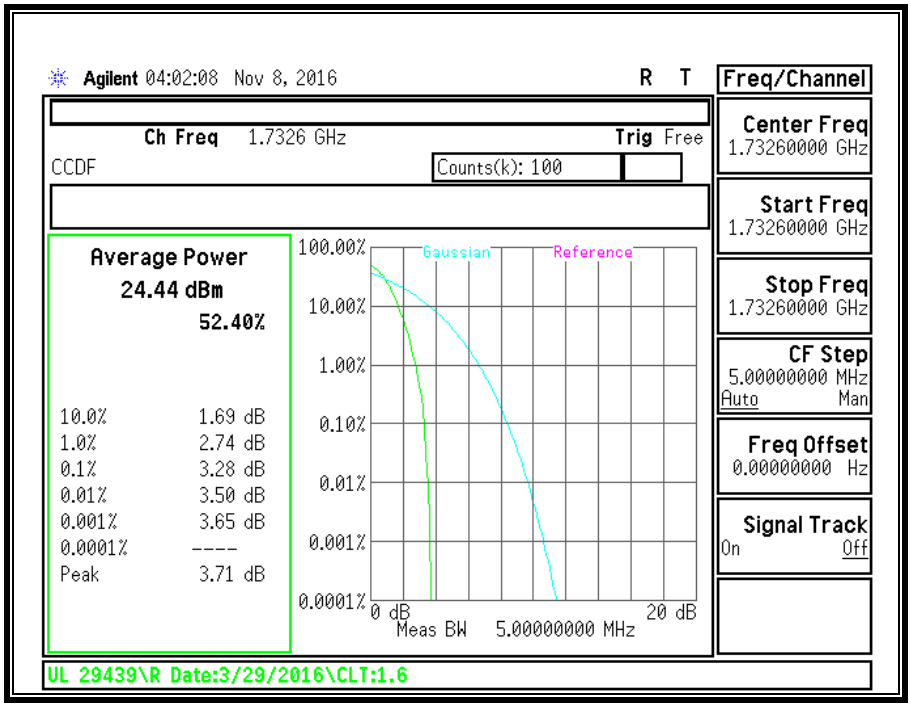
UMTS 1900, HSDPA BAND 2



UMTS 1700, REL99 BAND 4



UMTS 1700, HSDPA BAND 4



11. RADIATED TEST RESULTS

11.1. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53 and §90.691.
IC: RSS132§5.5; RSS133§6.5 and RSS139§6.6

LIMIT

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

§27.53 (h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB

§90.691 Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(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.

(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.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

RSS132§5.5
Mobile and base station equipment shall comply with the limits in (i) and (ii) below.
In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p (watts).
After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least43 + 10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

RSS133§6.5
Equipment shall comply with the limits in (i) and (ii) below.

(i)In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts).

(ii)After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

RSS139§6.6

(i)In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block,Footnote2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least43 + 10 log10 p (watts) dB.

(ii)After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB.

TEST PROCEDURE

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

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

MODES TESTED

- GPRS/EGPRS
- UMTS, REL 99 and HSDPA
- CDMA2000, 1xRTT and EVDO, Rev A

RESULTS

11.1.1. GSM

GPRS, 850MHz BAND 5

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 01/19/17
Test Engineer: 37290
Configuration: EUT only
Mode: GPRS 850MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber F	3m Chamber F	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (824.2MHz)										
1.65	-57.0	H	3.0	-15.8	33.7	1.0	-48.6	-13.0	-35.6	
2.47	-68.9	H	3.0	-24.8	34.1	1.0	-57.9	-13.0	-44.9	
3.30	-70.5	H	3.0	-22.3	34.7	1.0	-55.9	-13.0	-42.9	
1.65	-58.2	V	3.0	-14.8	33.7	1.0	-47.5	-13.0	-34.5	
2.47	-70.7	V	3.0	-26.0	34.1	1.0	-59.1	-13.0	-46.1	
3.30	-71.5	V	3.0	-23.0	34.7	1.0	-56.7	-13.0	-43.7	
Mid Channel (836.6MHz)										
1.67	-68.2	H	3.0	-26.9	33.7	1.0	-59.6	-13.0	-46.6	
2.51	-66.2	H	3.0	-22.0	34.1	1.0	-55.1	-13.0	-42.1	
3.35	-69.1	H	3.0	-20.7	34.6	1.0	-54.3	-13.0	-41.3	
1.67	-68.3	V	3.0	-24.9	33.7	1.0	-57.6	-13.0	-44.6	
2.51	-63.7	V	3.0	-18.9	34.1	1.0	-52.0	-13.0	-39.0	
3.35	-70.0	V	3.0	-21.3	34.6	1.0	-55.0	-13.0	-42.0	
High Channel (848.8MHz)										
1.70	-55.2	H	3.0	-13.7	33.7	1.0	-46.4	-13.0	-33.4	
2.55	-69.7	H	3.0	-25.2	34.2	1.0	-58.4	-13.0	-45.4	
3.40	-69.7	H	3.0	-21.1	34.6	1.0	-54.7	-13.0	-41.7	
1.70	-58.0	V	3.0	-14.6	33.7	1.0	-47.2	-13.0	-34.2	
2.55	-70.2	V	3.0	-25.2	34.2	1.0	-58.3	-13.0	-45.3	
3.40	-70.2	V	3.0	-21.4	34.6	1.0	-55.0	-13.0	-42.0	

Rev. 03.19.15

EGPRS, 850MHz BAND 5

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 01/19/17
Test Engineer: 37290
Configuration: EUT only
Mode: EGPRS 850MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber F	3m Chamber F	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (824.2MHz)										
1.65	-64.6	H	3.0	-23.4	33.7	1.0	-56.1	-13.0	-43.1	
2.47	-68.6	H	3.0	-24.5	34.1	1.0	-57.6	-13.0	-44.6	
3.30	-70.0	H	3.0	-21.8	34.7	1.0	-55.4	-13.0	-42.4	
1.65	-66.5	V	3.0	-23.1	33.7	1.0	-55.8	-13.0	-42.8	
2.47	-69.5	V	3.0	-24.8	34.1	1.0	-57.9	-13.0	-44.9	
3.30	-69.8	V	3.0	-21.3	34.7	1.0	-55.0	-13.0	-42.0	
Mid Channel (836.6MHz)										
1.67	-70.0	H	3.0	-28.7	33.7	1.0	-61.4	-13.0	-48.4	
2.51	-61.9	H	3.0	-17.7	34.1	1.0	-50.8	-13.0	-37.8	
3.35	-70.9	H	3.0	-22.5	34.6	1.0	-56.1	-13.0	-43.1	
1.67	-69.5	V	3.0	-26.1	33.7	1.0	-58.8	-13.0	-45.8	
2.51	-62.1	V	3.0	-17.3	34.1	1.0	-50.4	-13.0	-37.4	
3.35	-68.8	V	3.0	-20.1	34.6	1.0	-53.8	-13.0	-40.8	
High Channel (848.8MHz)										
1.70	-57.0	H	3.0	-15.5	33.7	1.0	-48.2	-13.0	-35.2	
2.55	-69.2	H	3.0	-24.7	34.2	1.0	-57.9	-13.0	-44.9	
3.40	-69.7	H	3.0	-21.1	34.6	1.0	-54.7	-13.0	-41.7	
1.70	-56.6	V	3.0	-13.2	33.7	1.0	-45.8	-13.0	-32.8	
2.55	-70.3	V	3.0	-25.3	34.2	1.0	-58.4	-13.0	-45.4	
3.40	-70.4	V	3.0	-21.6	34.6	1.0	-55.2	-13.0	-42.2	

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GPRS, 1900MHz BAND 2

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 11/16/16
Test Engineer: 37290
Configuration: EUT only
Mode: GPRS 1900MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (1850.2MHz)										
3.70	-61.3	H	3.0	-13.4	37.4	1.0	-49.8	-13.0	-36.8	
5.55	-65.4	H	3.0	-14.5	36.7	1.0	-50.2	-13.0	-37.2	
7.40	-65.9	H	3.0	-12.2	36.0	1.0	-47.2	-13.0	-34.2	
3.70	-60.5	V	3.0	-12.8	37.4	1.0	-49.2	-13.0	-36.2	
5.55	-64.9	V	3.0	-13.9	36.7	1.0	-49.6	-13.0	-36.6	
7.40	-67.0	V	3.0	-13.5	36.0	1.0	-48.5	-13.0	-35.5	
Mid Channel (1880.0)										
3.76	-61.2	H	3.0	-13.2	37.4	1.0	-49.6	-13.0	-36.6	
5.64	-64.1	H	3.0	-13.1	36.7	1.0	-48.8	-13.0	-35.8	
7.52	-65.7	H	3.0	-11.9	35.9	1.0	-46.8	-13.0	-33.8	
3.76	-61.5	V	3.0	-13.7	37.4	1.0	-50.0	-13.0	-37.0	
5.64	-63.7	V	3.0	-12.5	36.7	1.0	-48.3	-13.0	-35.3	
7.52	-65.5	V	3.0	-11.9	35.9	1.0	-46.8	-13.0	-33.8	
High Channel (1909.8MHz)										
3.82	-61.6	H	3.0	-13.6	37.3	1.0	-49.9	-13.0	-36.9	
5.73	-65.5	H	3.0	-14.3	36.7	1.0	-50.0	-13.0	-37.0	
7.54	-67.0	H	3.0	-13.1	35.9	1.0	-48.0	-13.0	-35.0	
3.82	-62.9	V	3.0	-15.0	37.3	1.0	-51.2	-13.0	-38.2	
5.73	-65.1	V	3.0	-13.8	36.7	1.0	-49.5	-13.0	-36.5	
7.54	-66.2	V	3.0	-12.6	35.9	1.0	-47.5	-13.0	-34.5	

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EGPRS, 1900MHz BAND 2

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 11/16/16
Test Engineer: 37290
Configuration: EUT only
Mode: EGPRS 1900MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (1850.2MHz)										
3.70	-62.0	H	3.0	-14.1	37.4	1.0	-50.5	-13.0	-37.5	
5.55	-64.8	H	3.0	-13.9	36.7	1.0	-49.6	-13.0	-36.6	
7.40	-65.2	H	3.0	-11.5	36.0	1.0	-46.5	-13.0	-33.5	
3.70	-62.0	V	3.0	-14.3	37.4	1.0	-50.7	-13.0	-37.7	
5.55	-64.5	V	3.0	-13.5	36.7	1.0	-49.2	-13.0	-36.2	
7.40	-64.4	V	3.0	-10.9	36.0	1.0	-45.9	-13.0	-32.9	
Mid Channel (1880.0)										
3.76	-61.3	H	3.0	-13.4	37.4	1.0	-49.7	-13.0	-36.7	
5.64	-64.0	H	3.0	-12.9	36.7	1.0	-48.6	-13.0	-35.6	
7.52	-66.0	H	3.0	-12.2	35.9	1.0	-47.1	-13.0	-34.1	
3.76	-61.2	V	3.0	-13.4	37.4	1.0	-49.7	-13.0	-36.7	
5.64	-63.7	V	3.0	-12.5	36.7	1.0	-48.3	-13.0	-35.3	
7.52	-66.6	V	3.0	-13.0	35.9	1.0	-47.9	-13.0	-34.9	
High Channel (1909.8MHz)										
3.82	-62.8	H	3.0	-14.8	37.3	1.0	-51.1	-13.0	-38.1	
5.73	-65.5	H	3.0	-14.3	36.7	1.0	-50.0	-13.0	-37.0	
7.54	-67.0	H	3.0	-13.1	35.9	1.0	-48.0	-13.0	-35.0	
3.82	-62.0	V	3.0	-14.1	37.3	1.0	-50.4	-13.0	-37.4	
5.73	-64.1	V	3.0	-12.8	36.7	1.0	-48.5	-13.0	-35.5	
7.54	-65.8	V	3.0	-12.2	35.9	1.0	-47.1	-13.0	-34.1	

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11.1.2. CDMA2000

CDMA2000 1xRTT, 850MHz BC0

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 01/19/17
Test Engineer: 37290
Configuration: EUT Only
Mode: 1xRTT 850MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber F	3m Chamber F	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (824.7MHz)										
1.65	-65.5	H	3.0	-24.3	33.7	1.0	-57.0	-13.0	-44.0	
2.47	-70.3	H	3.0	-26.2	34.1	1.0	-59.3	-13.0	-46.3	
3.30	-69.9	H	3.0	-21.7	34.7	1.0	-55.3	-13.0	-42.3	
1.65	-66.2	V	3.0	-22.8	33.7	1.0	-55.5	-13.0	-42.5	
2.47	-69.1	V	3.0	-24.4	34.1	1.0	-57.5	-13.0	-44.5	
3.30	-69.7	V	3.0	-21.2	34.7	1.0	-54.9	-13.0	-41.9	
Mid Channel (836.52MHz)										
1.67	-68.3	H	3.0	-27.0	33.7	1.0	-59.7	-13.0	-46.7	
2.51	-67.6	H	3.0	-23.4	34.1	1.0	-56.5	-13.0	-43.5	
3.35	-70.0	H	3.0	-21.6	34.6	1.0	-55.2	-13.0	-42.2	
1.67	-69.2	V	3.0	-25.8	33.7	1.0	-58.5	-13.0	-45.5	
2.51	-69.1	V	3.0	-24.3	34.1	1.0	-57.4	-13.0	-44.4	
3.35	-69.9	V	3.0	-21.2	34.6	1.0	-54.9	-13.0	-41.9	
High Channel (848.31MHz)										
1.70	-68.8	H	3.0	-27.3	33.7	1.0	-59.9	-13.0	-46.9	
2.54	-68.9	H	3.0	-24.5	34.1	1.0	-57.6	-13.0	-44.6	
3.39	-69.0	H	3.0	-20.4	34.6	1.0	-54.0	-13.0	-41.0	
1.70	-68.1	V	3.0	-24.7	33.7	1.0	-57.3	-13.0	-44.3	
2.54	-70.1	V	3.0	-25.1	34.1	1.0	-58.3	-13.0	-45.3	
3.39	-69.9	V	3.0	-21.1	34.6	1.0	-54.7	-13.0	-41.7	

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CDMA2000 EVDO Rev A, 850MHz BC0

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 11/17/16
Test Engineer: 37290
Configuration: EUT only
Mode: EVDO, Rev A 850MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber F	3m Chamber F	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (824.7MHz)										
1.65	-67.2	H	3.0	-26.1	33.7	1.0	-58.8	-13.0	-45.8	
2.47	-70.4	H	3.0	-26.3	34.1	1.0	-59.4	-13.0	-46.4	
3.30	-68.5	H	3.0	-20.3	34.7	1.0	-53.9	-13.0	-40.9	
1.65	-68.6	V	3.0	-25.2	33.7	1.0	-57.9	-13.0	-44.9	
2.47	-70.4	V	3.0	-25.7	34.1	1.0	-58.8	-13.0	-45.8	
3.30	-70.5	V	3.0	-22.0	34.7	1.0	-55.7	-13.0	-42.7	
Mid Channel (836.52MHz)										
1.67	-68.1	H	3.0	-26.8	33.7	1.0	-59.5	-13.0	-46.5	
2.51	-68.8	H	3.0	-24.6	34.1	1.0	-57.7	-13.0	-44.7	
3.35	-70.5	H	3.0	-22.1	34.6	1.0	-55.7	-13.0	-42.7	
1.67	-69.2	V	3.0	-25.8	33.7	1.0	-58.5	-13.0	-45.5	
2.51	-69.8	V	3.0	-24.9	34.1	1.0	-58.0	-13.0	-45.0	
3.35	-70.4	V	3.0	-21.7	34.6	1.0	-55.4	-13.0	-42.4	
High Channel (848.31MHz)										
1.70	-69.1	H	3.0	-27.6	33.7	1.0	-60.3	-13.0	-47.3	
2.54	-69.6	H	3.0	-25.2	34.1	1.0	-58.3	-13.0	-45.3	
3.39	-69.9	H	3.0	-21.3	34.6	1.0	-54.9	-13.0	-41.9	
1.70	-68.7	V	3.0	-25.3	33.7	1.0	-57.9	-13.0	-44.9	
2.54	-70.5	V	3.0	-25.5	34.1	1.0	-58.6	-13.0	-45.6	
3.39	-70.3	V	3.0	-21.5	34.6	1.0	-55.1	-13.0	-42.1	

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CDMA2000 1xRTT, 1900MHz BC1

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 11/17/16
Test Engineer: 37290
Configuration: EUT only
Mode: 1xRTT 1900MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (1851.25MHz)										
3.70	-54.8	H	3.0	-6.9	37.4	1.0	-43.3	-13.0	-30.3	
5.55	-58.8	H	3.0	-7.9	36.7	1.0	-43.6	-13.0	-30.6	
7.41	-60.1	H	3.0	-6.4	36.0	1.0	-41.4	-13.0	-28.4	
3.70	-55.3	V	3.0	-7.7	37.4	1.0	-44.1	-13.0	-31.1	
5.55	-58.5	V	3.0	-7.5	36.7	1.0	-43.2	-13.0	-30.2	
7.41	-58.8	V	3.0	-5.3	36.0	1.0	-40.3	-13.0	-27.3	
Mid Channel (1880MHz)										
3.76	-56.2	H	3.0	-8.2	37.4	1.0	-44.5	-13.0	-31.5	
5.64	-57.6	H	3.0	-6.5	36.7	1.0	-42.2	-13.0	-29.2	
7.52	-60.0	H	3.0	-6.1	35.9	1.0	-41.1	-13.0	-28.1	
3.76	-55.6	V	3.0	-7.8	37.4	1.0	-44.1	-13.0	-31.1	
5.64	-59.5	V	3.0	-8.3	36.7	1.0	-44.0	-13.0	-31.0	
7.52	-60.4	V	3.0	-6.8	35.9	1.0	-41.7	-13.0	-28.7	
High Channel (1908.75MHz)										
3.82	-56.1	H	3.0	-8.1	37.3	1.0	-44.4	-13.0	-31.4	
5.73	-59.8	H	3.0	-8.6	36.7	1.0	-44.3	-13.0	-31.3	
7.64	-60.0	H	3.0	-6.0	35.8	1.0	-40.8	-13.0	-27.8	
3.82	-55.7	V	3.0	-7.8	37.3	1.0	-44.0	-13.0	-31.0	
5.73	-58.9	V	3.0	-7.6	36.7	1.0	-43.3	-13.0	-30.3	
7.64	-60.3	V	3.0	-6.6	35.8	1.0	-41.4	-13.0	-28.4	

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CDMA2000 EVDO Rev A, 1900MHz BC1

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 12/07/16
Test Engineer: 43574
Configuration: EUT only
Mode: Rev A 1900MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (1851.25MHz)										
3.76	-57.8	H	3.0	-9.8	37.4	1.0	-46.2	-13.0	-33.2	
5.55	-59.0	H	3.0	-8.1	36.7	1.0	-43.8	-13.0	-30.8	
7.41	-63.1	H	3.0	-9.4	36.0	1.0	-44.4	-13.0	-31.4	
3.70	-57.2	V	3.0	-9.5	37.4	1.0	-45.9	-13.0	-32.9	
5.55	-57.8	V	3.0	-6.8	36.7	1.0	-42.5	-13.0	-29.5	
7.41	-59.2	V	3.0	-5.7	36.0	1.0	-40.7	-13.0	-27.7	
Mid Channel (1880MHz)										
3.76	-57.3	H	3.0	-9.3	37.4	1.0	-45.7	-13.0	-32.7	
5.64	-58.4	H	3.0	-7.3	36.7	1.0	-43.0	-13.0	-30.0	
7.52	-58.7	H	3.0	-4.9	35.9	1.0	-39.8	-13.0	-26.8	
3.76	-57.4	V	3.0	-9.6	37.4	1.0	-45.9	-13.0	-32.9	
5.64	-60.3	V	3.0	-9.1	36.7	1.0	-44.9	-13.0	-31.9	
7.52	-60.5	V	3.0	-6.9	35.9	1.0	-41.8	-13.0	-28.8	
High Channel (1908.75MHz)										
3.82	-57.4	H	3.0	-9.4	37.3	1.0	-45.7	-13.0	-32.7	
5.73	-59.3	H	3.0	-8.1	36.7	1.0	-43.8	-13.0	-30.8	
7.64	-60.5	H	3.0	-6.5	35.8	1.0	-41.3	-13.0	-28.3	
3.82	-57.4	V	3.0	-9.5	37.3	1.0	-45.7	-13.0	-32.7	
5.73	-59.6	V	3.0	-8.3	36.7	1.0	-44.0	-13.0	-31.0	
7.64	-60.8	V	3.0	-7.1	35.8	1.0	-41.9	-13.0	-28.9	

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CDMA2000 1xRTT, 800MHz BC10

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 11/17/16
Test Engineer: 43574
Configuration: EUT only
Mode: 1xRTT 800MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber F	3m Chamber F	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (817.25MHz)										
1.63	-68.2	H	3.0	-27.2	33.7	1.0	-59.9	-13.0	-46.9	
2.45	-69.5	H	3.0	-25.4	34.1	1.0	-58.6	-13.0	-45.6	
3.27	-68.3	H	3.0	-20.2	34.7	1.0	-53.8	-13.0	-40.8	
1.63	-67.8	V	3.0	-24.4	33.7	1.0	-57.1	-13.0	-44.1	
2.45	-70.1	V	3.0	-25.4	34.1	1.0	-58.5	-13.0	-45.5	
3.27	-69.4	V	3.0	-21.0	34.7	1.0	-54.7	-13.0	-41.7	
Mid Channel (820MHz)										
1.64	-66.6	H	3.0	-25.5	33.7	1.0	-58.2	-13.0	-45.2	
2.46	-69.0	H	3.0	-24.9	34.1	1.0	-58.0	-13.0	-45.0	
3.28	-69.6	H	3.0	-21.5	34.7	1.0	-55.1	-13.0	-42.1	
1.64	-67.1	V	3.0	-23.7	33.7	1.0	-56.4	-13.0	-43.4	
2.46	-69.1	V	3.0	-24.4	34.1	1.0	-57.5	-13.0	-44.5	
3.28	-70.2	V	3.0	-21.8	34.7	1.0	-55.4	-13.0	-42.4	
High Channel (822.75MHz)										
1.65	-68.7	H	3.0	-27.5	33.7	1.0	-60.2	-13.0	-47.2	
2.47	-67.7	H	3.0	-23.6	34.1	1.0	-56.7	-13.0	-43.7	
3.29	-69.3	H	3.0	-21.1	34.7	1.0	-54.8	-13.0	-41.8	
1.65	-68.0	V	3.0	-24.6	33.7	1.0	-57.3	-13.0	-44.3	
2.47	-70.0	V	3.0	-25.3	34.1	1.0	-58.4	-13.0	-45.4	
3.29	-70.4	V	3.0	-21.9	34.7	1.0	-55.6	-13.0	-42.6	

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CDMA2000 EVDO Rev A, 800MHz BC10

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 11/17/16
Test Engineer: 43574
Configuration: EUT only
Mode: EVDO, Rev A, 800MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber F	3m Chamber F	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (817.25MHz)										
1.63	-69.3	H	3.0	-28.3	33.7	1.0	-61.0	-13.0	-48.0	
2.45	-69.8	H	3.0	-25.7	34.1	1.0	-58.8	-13.0	-45.8	
3.27	-69.4	H	3.0	-21.3	34.7	1.0	-55.0	-13.0	-42.0	
1.63	-68.5	V	3.0	-25.1	33.7	1.0	-57.8	-13.0	-44.8	
2.45	-70.9	V	3.0	-26.1	34.1	1.0	-59.3	-13.0	-46.3	
3.27	-70.6	V	3.0	-22.2	34.7	1.0	-55.8	-13.0	-42.8	
Mid Channel (820MHz)										
1.64	-67.3	H	3.0	-26.2	33.7	1.0	-58.9	-13.0	-45.9	
2.46	-68.5	H	3.0	-24.4	34.1	1.0	-57.5	-13.0	-44.5	
3.28	-69.5	H	3.0	-21.3	34.7	1.0	-55.0	-13.0	-42.0	
1.64	-68.4	V	3.0	-25.0	33.7	1.0	-57.7	-13.0	-44.7	
2.46	-70.2	V	3.0	-25.5	34.1	1.0	-58.6	-13.0	-45.6	
3.28	-70.4	V	3.0	-22.0	34.7	1.0	-55.6	-13.0	-42.6	
High Channel (822.75MHz)										
1.65	-68.3	H	3.0	-27.1	33.7	1.0	-59.9	-13.0	-46.9	
2.47	-68.3	H	3.0	-24.2	34.1	1.0	-57.3	-13.0	-44.3	
3.29	-69.5	H	3.0	-21.3	34.7	1.0	-55.0	-13.0	-42.0	
1.65	-68.8	V	3.0	-25.4	33.7	1.0	-58.1	-13.0	-45.1	
2.47	-71.0	V	3.0	-26.3	34.1	1.0	-59.4	-13.0	-46.4	
3.29	-69.9	V	3.0	-21.4	34.7	1.0	-55.1	-13.0	-42.1	

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11.1.3. UMTS

UMTS REL 99, 850MHz BAND 5

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 01/19/17
Test Engineer: 39005
Configuration: EUT only
Mode: REL 99, 850MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (826.4MHz)										
1.65	-68.1	H	3.0	-27.7	37.7	1.0	-64.4	-13.0	-51.4	
2.48	-68.9	H	3.0	-24.9	37.1	1.0	-60.9	-13.0	-47.9	
3.31	-70.0	H	3.0	-22.2	37.9	1.0	-59.1	-13.0	-46.1	
1.65	-69.0	V	3.0	-28.3	37.7	1.0	-65.1	-13.0	-52.1	
2.48	-69.5	V	3.0	-25.4	37.1	1.0	-61.4	-13.0	-48.4	
3.31	-70.9	V	3.0	-24.1	37.9	1.0	-60.9	-13.0	-47.9	
Mid Channel (836.6MHz)										
1.67	-70.2	H	3.0	-29.7	37.8	1.0	-66.4	-13.0	-53.4	
2.51	-69.1	H	3.0	-25.0	37.1	1.0	-61.0	-13.0	-48.0	
3.35	-70.5	H	3.0	-22.7	37.8	1.0	-59.5	-13.0	-46.5	
1.67	-68.2	V	3.0	-27.4	37.8	1.0	-64.2	-13.0	-51.2	
2.51	-70.1	V	3.0	-25.9	37.1	1.0	-62.0	-13.0	-49.0	
3.35	-69.8	V	3.0	-22.9	37.8	1.0	-59.7	-13.0	-46.7	
High Channel (846.6MHz)										
1.69	-70.2	H	3.0	-29.5	37.8	1.0	-66.3	-13.0	-53.3	
2.54	-69.0	H	3.0	-24.6	37.2	1.0	-60.8	-13.0	-47.8	
3.39	-70.5	H	3.0	-22.7	37.8	1.0	-59.5	-13.0	-46.5	
1.69	-69.8	V	3.0	-28.9	37.8	1.0	-65.6	-13.0	-52.6	
2.54	-69.6	V	3.0	-25.3	37.2	1.0	-61.4	-13.0	-48.4	
3.39	-68.4	V	3.0	-21.4	37.8	1.0	-58.2	-13.0	-45.2	

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UMTS HSDPA, 850MHz BAND 5

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 01/19/17
Test Engineer: 39005
Configuration: EUT only
Mode: HSDPA 850MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber F	3m Chamber F	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (826.4MHz)										
1.65	-67.8	H	3.0	-26.6	33.7	1.0	-59.3	-13.0	-46.3	
2.48	-68.9	H	3.0	-24.7	34.1	1.0	-57.8	-13.0	-44.8	
3.31	-68.0	H	3.0	-19.8	34.7	1.0	-53.4	-13.0	-40.4	
1.65	-67.7	V	3.0	-24.3	33.7	1.0	-57.0	-13.0	-44.0	
2.48	-67.8	V	3.0	-23.0	34.1	1.0	-56.1	-13.0	-43.1	
3.31	-70.8	V	3.0	-22.2	34.7	1.0	-55.9	-13.0	-42.9	
Mid Channel (836.6MHz)										
1.67	-68.9	H	3.0	-27.6	33.7	1.0	-60.3	-13.0	-47.3	
2.51	-68.1	H	3.0	-23.9	34.1	1.0	-57.0	-13.0	-44.0	
3.35	-69.4	H	3.0	-21.0	34.6	1.0	-54.6	-13.0	-41.6	
1.67	-69.7	V	3.0	-26.3	33.7	1.0	-59.0	-13.0	-46.0	
2.51	-70.0	V	3.0	-25.2	34.1	1.0	-58.3	-13.0	-45.3	
3.35	-69.2	V	3.0	-20.6	34.6	1.0	-54.2	-13.0	-41.2	
High Channel (846.6MHz)										
1.69	-69.9	H	3.0	-28.4	33.7	1.0	-61.1	-13.0	-48.1	
2.54	-69.0	H	3.0	-24.6	34.1	1.0	-57.7	-13.0	-44.7	
3.39	-70.5	H	3.0	-21.9	34.6	1.0	-55.5	-13.0	-42.5	
1.69	-70.0	V	3.0	-26.6	33.7	1.0	-59.3	-13.0	-46.3	
2.54	-69.2	V	3.0	-24.2	34.1	1.0	-57.4	-13.0	-44.4	
3.39	-69.7	V	3.0	-20.9	34.6	1.0	-54.5	-13.0	-41.5	

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UMTS REL 99, 1900MHz BAND 2

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 11/16/16
Test Engineer: 39005
Configuration: EUT only
Mode: REL 99, 1900MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (1852.4MHz)										
3.70	-60.5	H	3.0	-12.6	37.4	1.0	-49.0	-13.0	-36.0	
5.56	-62.4	H	3.0	-11.4	36.7	1.0	-47.1	-13.0	-34.1	
7.41	-64.4	H	3.0	-10.6	36.0	1.0	-45.6	-13.0	-32.6	
3.70	-61.3	V	3.0	-13.7	37.4	1.0	-50.1	-13.0	-37.1	
5.56	-63.5	V	3.0	-12.5	36.7	1.0	-48.2	-13.0	-35.2	
7.41	-65.4	V	3.0	-11.9	36.0	1.0	-46.9	-13.0	-33.9	
Mid Channel (1880MHz)										
3.76	-61.3	H	3.0	-13.3	37.4	1.0	-49.7	-13.0	-36.7	
5.64	-64.3	H	3.0	-13.2	36.7	1.0	-48.9	-13.0	-35.9	
7.52	-64.1	H	3.0	-10.2	35.9	1.0	-45.1	-13.0	-32.1	
3.76	-61.3	V	3.0	-13.5	37.4	1.0	-49.9	-13.0	-36.9	
5.64	-63.3	V	3.0	-12.1	36.7	1.0	-47.9	-13.0	-34.9	
7.52	-65.0	V	3.0	-11.4	35.9	1.0	-46.3	-13.0	-33.3	
High Channel (1907.6MHz)										
3.82	-61.3	H	3.0	-13.3	37.3	1.0	-49.6	-13.0	-36.6	
5.72	-64.3	H	3.0	-13.0	36.7	1.0	-48.7	-13.0	-35.7	
7.63	-63.9	H	3.0	-9.9	35.8	1.0	-44.8	-13.0	-31.8	
3.82	-61.4	V	3.0	-13.4	37.3	1.0	-49.7	-13.0	-36.7	
5.72	-63.5	V	3.0	-12.2	36.7	1.0	-47.9	-13.0	-34.9	
7.63	-64.8	V	3.0	-11.1	35.8	1.0	-45.9	-13.0	-32.9	

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UMTS HSDPA, 1900MHz BAND 2

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 11/16/16
Test Engineer: 39005
Configuration: EUT only
Mode: HSDPA 1900MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (1852.4MHz)										
3.70	-60.8	H	3.0	-12.9	37.4	1.0	-49.3	-13.0	-36.3	
5.56	-62.2	H	3.0	-11.3	36.7	1.0	-47.0	-13.0	-34.0	
7.41	-64.5	H	3.0	-10.8	36.0	1.0	-45.8	-13.0	-32.8	
3.70	-61.4	V	3.0	-13.7	37.4	1.0	-50.2	-13.0	-37.2	
5.56	-63.5	V	3.0	-12.5	36.7	1.0	-48.2	-13.0	-35.2	
7.41	-65.4	V	3.0	-11.9	36.0	1.0	-46.9	-13.0	-33.9	
Mid Channel (1880MHz)										
3.76	-61.1	H	3.0	-13.1	37.4	1.0	-49.5	-13.0	-36.5	
5.64	-64.4	H	3.0	-13.3	36.7	1.0	-49.0	-13.0	-36.0	
7.52	-64.1	H	3.0	-10.3	35.9	1.0	-45.2	-13.0	-32.2	
3.76	-61.5	V	3.0	-13.7	37.4	1.0	-50.1	-13.0	-37.1	
5.64	-62.9	V	3.0	-11.7	36.7	1.0	-47.4	-13.0	-34.4	
7.52	-65.4	V	3.0	-11.8	35.9	1.0	-46.7	-13.0	-33.7	
High Channel (1907.6MHz)										
3.82	-61.4	H	3.0	-13.4	37.3	1.0	-49.7	-13.0	-36.7	
5.72	-64.6	H	3.0	-13.4	36.7	1.0	-49.1	-13.0	-36.1	
7.63	-63.8	H	3.0	-9.9	35.8	1.0	-44.7	-13.0	-31.7	
3.82	-61.4	V	3.0	-13.4	37.3	1.0	-49.7	-13.0	-36.7	
5.72	-63.6	V	3.0	-12.3	36.7	1.0	-48.0	-13.0	-35.0	
7.63	-64.9	V	3.0	-11.2	35.8	1.0	-46.0	-13.0	-33.0	

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UMTS REL 99, 1700MHz BAND 4

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 11/16/16
Test Engineer: 39005
Configuration: EUT only
Mode: REL 99, 1700MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (1712.4MHz)										
3.42	-58.3	H	3.0	-10.5	37.7	1.0	-47.2	-13.0	-34.2	
5.14	-57.0	H	3.0	-6.7	36.8	1.0	-42.6	-13.0	-29.6	
6.85	-57.5	H	3.0	-4.4	36.4	1.0	-39.9	-13.0	-26.9	
3.42	-57.6	V	3.0	-10.6	37.7	1.0	-47.3	-13.0	-34.3	
5.14	-57.0	V	3.0	-6.6	36.8	1.0	-42.4	-13.0	-29.4	
6.85	-58.8	V	3.0	-6.0	36.4	1.0	-41.4	-13.0	-28.4	
Mid Channel (1732.6MHz)										
3.47	-58.3	H	3.0	-10.4	37.7	1.0	-47.1	-13.0	-34.1	
5.20	-57.3	H	3.0	-6.9	36.8	1.0	-42.7	-13.0	-29.7	
6.93	-58.0	H	3.0	-4.9	36.4	1.0	-40.3	-13.0	-27.3	
3.47	-58.2	V	3.0	-11.0	37.7	1.0	-47.7	-13.0	-34.7	
5.20	-57.3	V	3.0	-6.7	36.8	1.0	-42.6	-13.0	-29.6	
6.93	-57.8	V	3.0	-4.8	36.4	1.0	-40.2	-13.0	-27.2	
High Channel (1752.6MHz)										
3.51	-57.7	H	3.0	-9.8	37.6	1.0	-46.4	-13.0	-33.4	
5.26	-57.6	H	3.0	-7.1	36.8	1.0	-42.9	-13.0	-29.9	
7.01	-58.0	H	3.0	-4.7	36.4	1.0	-40.1	-13.0	-27.1	
3.51	-57.2	V	3.0	-9.9	37.6	1.0	-46.6	-13.0	-33.6	
5.26	-58.0	V	3.0	-7.4	36.8	1.0	-43.2	-13.0	-30.2	
7.01	-58.0	V	3.0	-4.9	36.4	1.0	-40.3	-13.0	-27.3	

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UMTS HSDPA, 1700MHz BAND 4

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23814
Date: 11/16/16
Test Engineer: 39005
Configuration: EUT only
Mode: HSDPA 1700MHz

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	EIRP

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (1712.4MHz)										
3.42	-58.4	H	3.0	-10.6	37.7	1.0	-47.3	-13.0	-34.3	
5.14	-57.0	H	3.0	-6.7	36.8	1.0	-42.6	-13.0	-29.6	
6.85	-58.0	H	3.0	-4.9	36.4	1.0	-40.3	-13.0	-27.3	
3.42	-58.3	V	3.0	-11.2	37.7	1.0	-48.0	-13.0	-35.0	
5.14	-58.1	V	3.0	-7.7	36.8	1.0	-43.6	-13.0	-30.6	
6.85	-59.0	V	3.0	-6.1	36.4	1.0	-41.5	-13.0	-28.5	
Mid Channel (1732.6MHz)										
3.47	-58.7	H	3.0	-10.8	37.7	1.0	-47.5	-13.0	-34.5	
5.20	-57.3	H	3.0	-6.9	36.8	1.0	-42.7	-13.0	-29.7	
6.93	-58.3	H	3.0	-5.2	36.4	1.0	-40.6	-13.0	-27.6	
3.47	-58.3	V	3.0	-11.1	37.7	1.0	-47.8	-13.0	-34.8	
5.20	-57.5	V	3.0	-6.9	36.8	1.0	-42.7	-13.0	-29.7	
6.93	-58.1	V	3.0	-5.2	36.4	1.0	-40.6	-13.0	-27.6	
High Channel (1752.6MHz)										
3.51	-57.9	H	3.0	-10.0	37.6	1.0	-46.6	-13.0	-33.6	
5.26	-57.8	H	3.0	-7.4	36.8	1.0	-43.2	-13.0	-30.2	
7.01	-58.5	H	3.0	-5.2	36.4	1.0	-40.6	-13.0	-27.6	
3.51	-57.6	V	3.0	-10.3	37.6	1.0	-46.9	-13.0	-33.9	
5.26	-58.6	V	3.0	-7.9	36.8	1.0	-43.8	-13.0	-30.8	
7.01	-58.3	V	3.0	-5.3	36.4	1.0	-40.6	-13.0	-27.6	

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