

# **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

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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

Page 2 of 118

## TABLE OF CONTENTS

1. AT	ESTATION OF TEST RESULTS	. 5
2. TES	ST METHODOLOGY	. 6
3. FA	CILITIES AND ACCREDITATION	. 6
4. CA	LIBRATION AND UNCERTAINTY	. 6
4.1.	MEASURING INSTRUMENT CALIBRATION	. 6
4.2.	SAMPLE CALCULATION	. 6
4.3.	MEASUREMENT UNCERTAINTY	. 7
5. EQ	JIPMENT UNDER TEST	. 8
5.1.	DESCRIPTION OF EUT	. 8
5.2.	MAXIMUM OUTPUT POWER	. 8
5.3.	DESCRIPTION OF AVAILABLE ANTENNAS	10
5.4.	SOFTWARE AND FIRMWARE	10
5.5.	WORST-CASE CONFIGURATION AND MODE	10
5.6.	DESCRIPTION OF TEST SETUP	11
6. TES	ST AND MEASUREMENT EQUIPMENT	13
7. RF	POWER OUTPUT VERIFICATION	14
7.1.	GSM	14
<i>7.1.</i> 7.1.	<i>GSM</i> 1. GPRS/EGPRS	<i>14</i> 15
<i>7.1.</i> 7.1. <i>7.2</i> .	GSM	14 15 16
7.1. 7.1. 7.2. 7.2. 7.2.	GSM         1. GPRS/EGPRS         CDMA200         1. 1xRTT         2. 1xEV-DO - Release 0 (REL 0)	<i>14</i> 15 <i>16</i> 16 20
7.1. 7.1. 7.2. 7.2. 7.2. 7.2.	GSM         1. GPRS/EGPRS         CDMA200         1. 1xRTT         2. 1xEV-DO - Release 0 (REL 0)         3. 1xEV-DO - Revision A (REV A)	<i>14</i> 15 <i>16</i> 16 20 22
7.1. 7.1. 7.2. 7.2. 7.2. 7.2. 7.3.	GSM         1. GPRS/EGPRS         CDMA200         1. 1xRTT         2. 1xEV-DO - Release 0 (REL 0)	<i>14</i> 15 <i>16</i> 16 20 22 <i>24</i>
7.1. 7.1. 7.2. 7.2. 7.2. 7.2. 7.2. 7.3. 7.3. 7.3	GSM         1. GPRS/EGPRS         CDMA200         1. 1xRTT         2. 1xEV-DO - Release 0 (REL 0)         3. 1xEV-DO - Revision A (REV A)         UMTS         1. UMTS REL99         2. HSDPA REL 5	<i>14</i> 15 16 20 22 <i>24</i> 24 26
7.1. 7.2. 7.2. 7.2. 7.2. 7.3. 7.3. 7.3. 7.3	GSM       1. GPRS/EGPRS         1. GPRS/EGPRS       1.         1. 1xRTT       1.         2. 1xEV-DO - Release 0 (REL 0)       2.         3. 1xEV-DO - Revision A (REV A)       2.         UMTS       2.         1. UMTS REL99       2.         2. HSDPA REL 5       2.         3. HSPA REL 6 (HSDPA & HSUPA)       2.	<i>14</i> 15 <i>16</i> 20 22 <i>24</i> 24 26 28
7.1. 7.1. 7.2. 7.2. 7.2. 7.2. 7.3. 7.3. 7.3. 7.3	GSM	14 15 16 20 22 24 24 26 28 31
7.1. 7.1. 7.2. 7.2. 7.2. 7.2. 7.3. 7.3. 7.3. 7.3	GSM         1. GPRS/EGPRS         CDMA200         1. 1xRTT         2. 1xEV-DO - Release 0 (REL 0)         3. 1xEV-DO - Revision A (REV A)         2. 1xEV-DO - Revision A (REV A)         3. 1xEV-DO - Revision A (REV A)         4. 000000000000000000000000000000000000	14 15 16 16 20 22 24 24 24 26 28 31 <b>34</b>
7.1. 7.1. 7.2. 7.2. 7.2. 7.2. 7.3. 7.3. 7.3. 7.3	GSM	14 15 16 20 22 24 24 26 28 31 <b>34</b> 34
7.1. 7.1. 7.2. 7.2. 7.2. 7.3. 7.3. 7.3. 7.3. 7.3	GSM	14 15 16 20 22 24 26 28 31 <b>34</b> 37 38
7.1. 7.1. 7.2. 7.2. 7.2. 7.3. 7.3. 7.3. 7.3. 7.3	GSM         1. GPRS/EGPRS         CDMA200         1. 1xRTT         2. 1xEV-DO - Release 0 (REL 0)         3. 1xEV-DO - Revision A (REV A)         UMTS         1. UMTS REL99         2. HSDPA REL 5         3. HSPA REL 6 (HSDPA & HSUPA)         DUAL CARRIER HSDPA         NDUCTED TEST RESULTS         OCCUPIED BANDWIDTH         1. GSM GPRS         2. GSM EGPRS         3. CDMA2000 1xRTT	14 15 16 20 22 24 24 26 28 31 <b>34</b> 37 38 39
7.1. 7.1. 7.2. 7.2. 7.2. 7.3. 7.3. 7.3. 7.3. 7.3	GSM         1. GPRS/EGPRS         CDMA200         1. 1xRTT         2. 1xEV-DO - Release 0 (REL 0)         3. 1xEV-DO - Revision A (REV A)         UMTS         1. UMTS REL99         2. HSDPA REL 5         3. HSPA REL 6 (HSDPA & HSUPA)         DUAL CARRIER HSDPA         NDUCTED TEST RESULTS         OCCUPIED BANDWIDTH         1. GSM GPRS         2. GSM EGPRS         3. CDMA2000 1xRTT         4. CDMA2000 EVDO REV A	14 15 16 22 24 26 28 31 <b>34</b> 37 38 39 41 43

Page 3 of 118

	A 1623	90-A1623
8.2. BA	AND EDGE	47
8.2.1.	GSM GPRS	-
8.2.2.	GSM EGPRS	
8.2.3.	CDMA2000 1xRTT	
8.2.4.	CDMA2000 1xRTT BC10 MASK	
8.2.5.	CDMA2000 EVDO REV A	
8.2.6.	CDMA2000 EVDO REV A BC10 MASK	
8.2.7.	UMTS Rel99	
8.2.8.	UMTS HSDPA	66
8.3. OL	JT OF BAND EMISSIONS	69
8.3.1.	GSM GPRS	71
8.3.2.	GSM EGPRS	72
8.3.3.	CDMA2000 1xRTT	
8.3.4.	CDMA2000 EVDO REV A	
8.3.5.	UMTS Rel99	
8.3.6.	UMTS HSDPA	77
	JENCY STABILITY	79
		79
9.1. GS	JENCY STABILITY	<b>79</b> 81
9.1. GS 9.2. CD	JENCY STABILITY	<b>79</b> 81 83
9.1. GS 9.2. CD 9.3. UN	JENCY STABILITY SM DMA2000 MTS	<b>79</b> 81 83 85
9.1. GS 9.2. CD 9.3. UN	JENCY STABILITY SM DMA2000	<b>79</b> 81 83 85
9.1. GS 9.2. CD 9.3. UN 10. PEAN	JENCY STABILITY SM DMA2000 MTS	<b>79</b> 81 83 85 <b>87</b>
9.1. GS 9.2. CE 9.3. UN 10. PEAN 11. RADI	JENCY STABILITY SM DMA2000 MTS  K-TO-AVERAGE RATIO IATED TEST RESULTS	79 81 83 85 87 87
9.1. GS 9.2. CD 9.3. UN 10. PEAH 11. RADI 11.1. H	JENCY STABILITY SM DMA2000 MTS K-TO-AVERAGE RATIO IATED TEST RESULTS FIELD STRENGTH OF SPURIOUS RADIATION	79 81 83 85 87 97 97
9.1. GS 9.2. CE 9.3. UN 10. PEAH 11. RADI 11.1. H 11.1.1.	JENCY STABILITY SM DMA2000 MTS K-TO-AVERAGE RATIO K-TO-AVERAGE RATIO FIELD STRENGTH OF SPURIOUS RADIATION GSM	
9.1. GS 9.2. CD 9.3. UN 10. PEAH 11. RADI 11.1. H	JENCY STABILITY	<b>79</b> 81 83 85 <b>87</b> <b>97</b> 97 99 103
9.1. GS 9.2. CD 9.3. UN 10. PEAH 11. RADI 11.1. H 11.1.1. 11.1.2. 11.1.3.	JENCY STABILITY	<b>79</b> <b>8</b> 1 <b>8</b> 3 <b>85</b> <b>87</b> <b>97</b> <b>97</b> <b>97</b> <b>9</b> 9 103 109

Page 4 of 118

## **1. ATTESTATION OF TEST RESULTS**

CFR 47 Part 22	1. 24E. 27L. AND 90S	Pass			
ST	ANDARD	TEST RESULTS			
APPLICABLE STANDARDS					
DATE TESTED:	OCTOBER 21, 2016 – FEBRUARY 10, 2	2017			
SERIAL NUMBER:	F9FSJ008HNCC				
MODEL:	A1823				
EUT DESCRIPTION:	TABLET DEVICE				
COMPANY NAME:	APPLE 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A				

CFR 47 Part 22H, 24E, 27L, AND 90SPassIC RSS-132 ISSUE 3, RSS-133 ISSUE 6, AND RSS-139 ISSUE 3Pass

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.

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Page 5 of 118

## 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 <u>http://ts.nist.gov/standards/scopes/2000650.htm</u>.

## 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

Page 6 of 118

## 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%.

Page 7 of 118

## 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:

RSS 132 850MHz	Band IC						
Frequency range	Modulation	Conducted (Average)	Antenna Gain	EIRP		Limit	Margin
(MHz)	Wooulation	(dBm)	(dBi)	dBm	mW	(dBm)	(dB)
824- 849	GPRS	33.50	0.43	33.93	2471.7	40.6	-6.7
024- 049	EGPRS	28.00	0.43	28.43	696.6	40.6	-12.2
Part 22 850MHz B	and FCC						
Frequency range	Modulation Conducted (A	Conducted (Average)	verage) Antenna Gain	ERP		Limit	Margin
(MHz)	Wouldtion	(dBm)	(dBi)	dBm	mW	(dBm)	(dB)
824-849	GPRS	33.50	0.43	31.78	1506.6	38.5	-6.7
024-049	EGPRS	28.00	0.43	26.28	424.6	38.5	-12.2
Part 24 / RSS 133	1900MHz Ban	<u>d</u>		-		-	-
Frequency range	ange Madulation Conducted (Average	Conducted (Average)	Antenna Gain	EIRP		Limit	Margin
(MHz)	Modulation	(dBm)	(dBi)	dBm	mW	(dBm)	(dB)
1850-1910	GPRS	29.00	2.35	31.35	1364.6	33.0	-1.7
1000-1910	EGPRS	27.00	2.35	29.35	861.0	33.0	-3.7

## GSM MODES

Page 8 of 118

## CDMA2000 MODES

Part 90 800MHz B	and FCC						
Frequency range	Modulation	Conducted (Average)	Antenna Gain	ERP		Limit	Margin
(MHz)	Modulatori	(dBm)	(dBi)	dBm	mW	(dBm)	(dB)
816-824	CDMA 1xRTT	25.40	0.20	23.45	221.3	50.0	-26.6
010-024	CDMA EVDO Rev A	25.49	0.20	23.54	225.9	50.0	-26.5
RSS 132 850MHz	Band IC						
Frequency range	Modulation	Conducted (Average)	Antenna Gain	EI	RP	Limit	Margin
(MHz)	MODUIAtion	(dBm)	(dBi)	dBm	mW	(dBm)	(dB)
004 040	CDMA 1xRTT	24.49	0.43	24.92	310.5	40.6	-15.7
824- 849	824- 849 CDMA EVDO-Rev A		0.43	24.93	311.2	40.6	-15.7
Part 22 850MHz B	and FCC				-	-	
Frequency range	Modulation	Conducted (Average)	Antenna Gain	Eł	RP	Limit	Margin
(MHz)	MODUIAtion	(dBm)	(dBi)	dBm	mW	(dBm)	(dB)
904 940	CDMA 1xRTT	24.49	0.43	22.77	189.2	38.5	-15.7
024- 049	824- 849 CDMA EVDO-Rev A		0.43	22.78	189.7	38.5	-15.7
Part 24 / RSS 133	1900MHz Band				÷	÷	
Frequency range	Modulation	Conducted (Average)	Antenna Gain	EIRP		Limit	Margin
(MHz)	MODUIAtion	(dBm)	(dBi)	dBm	mW	(dBm)	(dB)
1950 1010	CDMA 1xRTT	25.50	2.35	27.85	609.5	33.0	-5.2
1850-1910	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	EIRP		Limit (dBm)	Margin (dB)
		· · · ·	(dBi)	dBm	mW	、 <i>,</i>	. ,
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 B	and FCC						
Frequency range	Modulation	Conducted (Average)	Antenna Gain	El	RP	Limit	Margin
(MHz)	WOULIALION	(dBm)	(dBi)	dBm	mW	(dBm)	(dB)
824-849	REL 99	25.29	0.43	23.57	227.5	38.5	-14.9
024-049	HSDPA	24.50	0.43	22.78	189.7	38.5	-15.7
Part 24 / RSS 133	1900MHz Band						
Frequency range	Conduct	Conducted (Average)	Antenna Gain	EIRP		Limit	Margin
(MHz)	Modulation	(dBm)	(dBi)	dBm	mW	(dBm)	(dB)
1850-1910	REL 99	25.50	2.35	27.85	609.5	33.0	-5.2
1000-1910	HSDPA	24.50	2.35	26.85	484.2	33.0	-6.2
Part 27 / RSS 139	1700MHz Band						
Frequency range	Modulation	Conducted (Average)	Antenna Gain	EIRP		Limit	Margin
(MHz)	wooulation	(dBm)	(dBi)	dBm	mW	(dBm)	(dB)
1710-1755	REL 99	25.38	1.00	26.38	434.5	30.0	-3.6
1710-1755	HSDPA	24.50	1.00	25.50	354.8	30.0	-4.5

Page 9 of 118

## 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.

Page 10 of 118

## 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	Cable         Port         # of identical         Connector         Cable Type         Cable         Remarks							
1	RF In/Out	1	Antenna	Un-shielded	5m	NA		

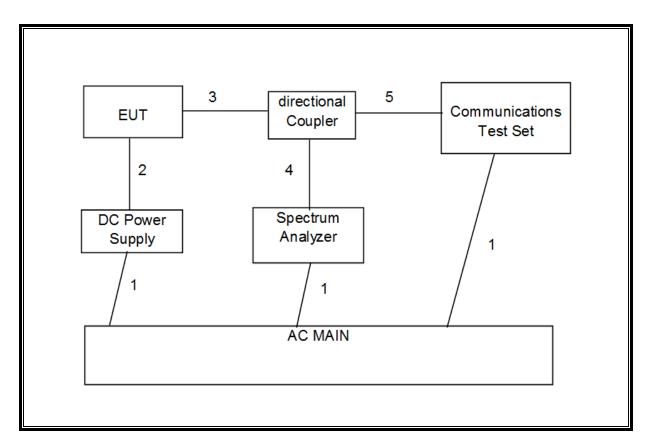
### I/O CABLES (RF Conducted Test)

	I/O Cable List								
Cable	Port	# of identical	Connector Type	Cable Type	Cable	Remarks			
No		ports			Length (m)				
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	<b>Communication Test Set</b>	Un-shielded	1m	N/A			

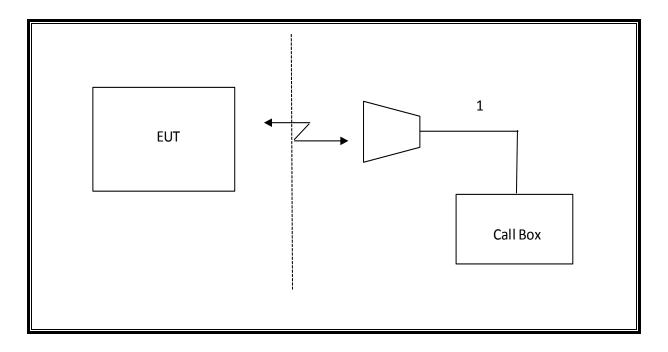
### TEST SETUP

Page 11 of 118

## CONDUCTED SETUP



### **RADIATED SETUP**



Page 12 of 118

## 6. TEST AND MEASUREMENT EQUIPMENT

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

	<b>TEST EQUIPMENT LIS</b>	т		
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	Т900	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	Т959	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

Page 13 of 118

## 7. RF POWER OUTPUT VERIFICATION

#### 7.1. GSM

## Using CMW500 Communication Test Set

#### Menu select > GSM Mobile Station > GSM 850/900/1800/1900 Function: 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

	onanner				
	Frequency Offset > Mode > BCCH Level > BCCH Channel >	+ 0 Hz BCCH and TCH -85 dBm (May need to adjust if link is not stable) choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]			
	Channel Type >	Off			
	P0> Slot Config > TCH > Hopping > Main Timeslot >	4 dB Unchanged (if already set under MS Signal) choose desired test channel Off 3 (Default)			
Network	Coding Scheme > Bit Stream >	CS 4 (GPRS) and MCS5-9 (EGPRS) 2E9-1PSR Bit Pattern			
AF/RF	Enter appropriate offse	ts for Ext. Att. Output and Ext. Att. Input			
Connection	Press Signal On to turn on the signal and change settings				

System Config:	GSM/GPRS M E1968A	obile Test A.06.31
Call Parms:	ВСН → ТСН →	Cell Band: GSM850/PCS 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			
			1 tin	ne slot	2 time	e slots
Mode	Ch.	f (MHz)	Peak (dBm)	Average (dBm)	Peak (dBm)	Average (dBm)
	128	824.2	33.6	33.5	32.5	32.5
GPRS	190	836.6	33.5	33.4	32.4	32.4
	251	848.8	33.5	33.3	32.4	32.3
	128	824.2	31.1	28.0	31.0	27.9
EGPRS	6 190	836.6	30.8	27.8	30.8	27.8
	251	848.8	31.0	27.8	30.8	27.8
	512	1850.2	29.3	28.9	29.0	28.8
GPRS	661	1880.0	29.4	29.0	29.0	28.9
	810	1909.8	29.2	28.7	28.9	28.7
	512	1850.2	29.8	26.9	29.7	26.8
EGPRS	661	1880.0	30.2	27.0	30.1	26.9
	810	1909.8	29.9	26.8	29.8	26.7

0/10/17 Г Т 205 Date

Page 15 of 118

## 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.

ApplicationRev. LicenseCDMA2000 Mobile TestB.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**

Page 16 of 118

ID:

50820 **Date:** 11/10/16

### 1xRTT, BC10, SECONDARY 800 BAND

Radio			Conducted Output Power (dBm)						
Configuration	(SO)	CH 450 - 817.25MHz		CH 560 - 820MHz		CH 670 - 822.75MHz			
(RC)	(00)	Peak	Average	Peak	Average	Peak	Average		
RC1	2 (Loopback)	30.18	25.36	30.21	25.39	30.20	25.37		
1101	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		
1102	55 (Loopback)	30.28	25.38	30.22	25.39	30.07	25.38		
	2 (Loopback)	30.25	25.37	30.13	25.37	30.09	25.36		
RC3	55 (Loopback)	30.29	25.39	30.13	25.37	30.08	25.37		
HC3	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		
	2 (Loopback)	30.26	25.36	30.13	25.36	30.05	25.31		
RC4	55 (Loopback)	30.27	25.39	30.14	25.37	30.05	25.32		
NC4	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		
HC5	55 (Loopback)	30.23	25.37	30.15	25.36	30.05	25.35		
	2 (Loopback)	30.10	25.39	30.20	25.36	30.09	25.33		
RC11	75 (Loopback)	30.26	25.37	30.17	25.34	30.08	25.33		
1011	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		

Page 17 of 118

**ID:** 50820 **Date:** 11/10/16

### 1xRTT, BC0, CELL BAND

Radio	Service Option	Conducted Output Power (dBm)					
Configuration	(SO)	CH 1013 - 824.7MHz		CH 384 - 836.52MHz		CH 777 - 848.31MHz	
(RC)	(88)	Peak	Average	Peak	Average	Peak	Average
RC1	2 (Loopback)	29.30	24.35	29.40	24.35	29.27	24.29
nor	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
1102	55 (Loopback)	29.05	24.28	29.40	24.32	29.30	24.28
	2 (Loopback)	29.07	24.32	29.38	24.35	29.12	24.30
RC3	55 (Loopback)	29.08	24.32	29.40	24.35	29.11	24.30
n03	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
	2 (Loopback)	29.07	24.32	29.37	24.34	29.15	24.30
RC4	55 (Loopback)	29.05	24.33	29.17	24.32	29.18	24.31
1104	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
1105	55 (Loopback)	29.05	24.32	29.06	24.32	29.06	24.33
	2 (Loopback)	29.40	24.45	29.40	24.43	29.30	24.38
RC11	75 (Loopback)	29.40	24.45	29.38	24.40	29.30	24.35
non	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	Comrise Ontion		Со	nducted Outp	out Power (dE	3m)	
Configuration	Service Option (SO)	CH 25 - 1851.25MHz		CH 600 - 1880MHz		CH 1175 - 1908.75MHz	
(RC)	(00)	Peak	Average	Peak	Average	Peak	Average
RC1	2 (Loopback)	29.65	25.47	29.68	25.47	29.50	25.34
nor	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
1102	55 (Loopback)	29.63	25.46	29.68	25.47	29.50	25.31
	2 (Loopback)	29.64	25.46	29.65	25.46	29.50	25.31
RC3	55 (Loopback)	29.62	25.44	29.65	25.46	29.51	25.30
n03	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
	2 (Loopback)	29.69	25.47	29.66	25.47	29.51	25.29
RC4	55 (Loopback)	29.62	25.46	29.62	25.48	29.50	25.30
NO4	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
no5	55 (Loopback)	29.66	25.44	29.63	25.42	29.51	25.30
	2 (Loopback)	29.63	25.49	29.66	24.51	29.53	25.33
RC11	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

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Page 19 of 118

## 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:

  - o Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - o Cell Power > -105.5 dBm/1.23 MHz
  - o Channel > (Enter channel number)
  - o Application Config > Enhanced Test Application Protocol > RTAP
  - o RTAP Rate > 153.6 kbps
  - o Rvs Power Ctrl > Active bits
  - o Protocol Rel > 0 (1xEV-DO)
- Press "Start Data Connection" when "Session Open" appear in "Active Cell"
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

#### EVDO Release 0 - FTAP

- Call Setup > Shift & Preset
- Call Control:

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

### RESULTS

Page 20 of 118

**ID:** 50820 **Date:** 11/10/16

#### EVDO REL 0 800MHz SECONDARY BAND

FTAP Rate	TAP Rate RTAP Rate C		f (MHz)	Conducted Output Power (dBm)		
FIAF hale	HIAF Hale	Channel	1 (IVII 12)	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)
		1013	824.70	29.50	24.37
307.2 Kbps (2 slot QPSK)	153.6 Kbps	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

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Page 21 of 118

## 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	<u>Rev, License</u>
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)

### > 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)

### > 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**

Page 22 of 118

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		450	817.25	30.41	25.49
channel is transmitted at	4096	560	820.00	30.26	25.35
all the slots		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		1013	824.70	29.60	24.48
channel is transmitted at	4096	384	836.52	29.70	24.50
all the slots		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		25	1851.25	30.30	25.44
channel is transmitted at	4096	600	1880.00	30.40	25.50
all the slots		1175	1908.75	30.10	25.29

Page 23 of 118

## 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	-		
	Loopback Mode	Test Mode 1		
	Rel99 RMC	12.2kbps RMC		
	HSDPA FRC	Not Applicable		
	HSUPA Test	Not Applicable		
WCDMA General	Power Control Algorithm	Algorithm2		
Settings	βc	Not Applicable		
Settings	βd	Not Applicable		
	βec	Not Applicable		
	βc/βd	8/15		
	βhs	Not Applicable		
	βed	Not Applicable		

## **RESULTS**

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Page 24 of 118

**ID:** 50820 **Date:** 11/10/16

#### Part 22 / RSS 132 850MHz Band

Band	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
UMTS Rel. 99	4132	4357	826.4	28.90	25.28
850MHz	4183	4408	836.6	28.92	25.27
000101112	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	9262	9662	1852.4	29.20	25.39
1900MHz	9400	9800	1880.0	29.30	25.50
1900101112	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	1312	1537	1712.4	29.10	25.21
1700MHz	1413	1638	1732.6	29.20	25.38
1700101112	1513	1738	1752.6	29.05	25.23

Page 25 of 118

## 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:

<u> </u>	Mode		Rel5 HS	DPA	
	Subtest	1	2	3	4
	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm 2			
WCDMA	βc	2/15	11/15	15/15	15/15
General Settings	βd	15/15	15/15	8/15	4/15
Settings	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
	D <sub>ACK</sub>	8			
	D <sub>NAK</sub>	8			
HSDPA	DCQI	8			
Specific	Ack-Nack repetition factor	3			
Settings	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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Page 26 of 118

**ID:** 50820 **Date:** 11/10/16

## Part 22 / RSS 132 850MHz Band

Band	Subtest	UL Channel	DL Channel	Frequency	Peak Power	Average Power
Dana	Sublest		DE Onamiei	(MHz)	(dBm)	(dBm)
		4132	4357	826.4	28.32	24.40
	1	4183	4408	836.6	28.36	24.50
		4233	4458	846.6	28.28	24.38
		4132	4357	826.4	28.11	24.40
	2	4183	4408	836.6	28.07	24.35
UMTS HSDPA		4233	4458	846.6	28.18	24.40
850MHz		4132	4357	826.4	28.15	24.00
	3	4183	4408	836.6	28.14	24.02
		4233	4458	846.6	28.23	24.10
		4132	4357	826.4	28.16	24.02
	4	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)
		9262	9662	1852.4	29.08	24.40
	1	9400	9800	1880.0	29.18	24.50
		9538	9938	1907.6	29.10	24.40
		9262	9662	1852.4	29.02	24.36
	2	9400	9800	1880.0	29.16	24.35
UMTS HSDPA		9538	9938	1907.6	29.13	24.39
1900MHz		9262	9662	1852.4	28.66	24.05
	3	9400	9800	1880.0	28.80	24.02
		9538	9938	1907.6	28.77	24.00
		9262	9662	1852.4	28.88	24.00
	4	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)
		1312	1537	1712.4	29.00	24.50
	1	1413	1638	1732.6	28.92	24.40
		1513	1738	1752.6	28.79	24.35
		1312	1537	1712.4	28.75	24.42
	2	1413	1638	1732.6	28.73	24.35
UMTS HSDPA		1513	1738	1752.6	28.61	24.41
1700MHz		1312	1537	1712.4	28.36	24.03
	3	1413	1638	1732.6	28.27	24.00
		1513	1738	1752.6	28.07	23.95
		1312	1537	1712.4	28.27	24.05
	4	1413	1638	1732.6	28.27	24.04
		1513	1738	1752.6	28.13	24.00

Page 27 of 118

## 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		5		
	Loopback Mode			Test Mode 1		, v		
	Rel99 RMC	12.2kbps RMC						
	HSDPA FRC	H-Set1						
	HSUPA Test		Н	ISUPA Loopba	ck			
	Power Control Algorithm			Algorithm2	HSUPA 4 C			
WCDMA	βς	11/15	6/15	15/15	2/15	15/15		
General	βd	15/15	15/15	9/15	15/15	0		
Settings	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		
	DACK			8				
	DNAK			8				
	DCQI	DCQI 8 -Nack repetition factor 3						
HSDPA	Ack-Nack repetition factor							
Specific	CQI Feedback (Table							
Settings	5.2B.4)			4ms	5			
	CQI Repetition Factor							
	(Table 5.2B.4)			2				
	Ahs = βhs/βc			30/15	•			
	D E-DPCCH	6	8	8		7		
	DHARQ	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							
HSUPA	Rate kbps	242.1	174.9	482.8		308.9		
Specific			CI 11					
Settings								
Settings								
			I PO 18 CI 71	E-TFCI 11				
	Reference E_TFCIs		I PO 23	E-TFCI PO				
			CI 75	4				
			I PO 26	E-TFCI 92				
			CI 81	E-TFCI PO				
			I PO 27	18				

## **RESULTS**

ID:	50820	Date:	11/10/16
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#### Part 22 / RSS 132 850MHz Band

Band	Subtest	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
		4132	4357	826.4	29.05	24.49
	1	4183	4408	836.6	29.03	24.40
		4233	4458	846.6	28.75	24.38
		4132	4357	826.4	28.91	22.50
	2	4183	4408	836.6	29.00	22.40
		4233	4458	846.6	28.74	22.00
UMTS HSUPA	3	4132	4357	826.4	28.98	23.50
850MHz		4183	4408	836.6	28.98	23.40
ODUVITIZ		4233	4458	846.6	28.90	23.45
		4132	4357	826.4	28.98	22.40
	4	4183	4408	836.6	28.96	22.45
		4233	4458	846.6	28.92	22.50
		4132	4357	826.4	28.97	24.40
	5	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 Outp	out Power (dBm)
					Peak	Average
		9262	9662	1852	29.12	24.48
	1	9400	9800	1880	29.07	24.45
		9538	9938	1908	29.04	24.43
		9262	9662	1852	27.85	22.50
	2	9400	9800	1880	28.05	22.60
		9538	9938	1908	27.86	22.70
UMTS HSUPA	3	9262	9662	1852	28.70	23.54
1900MHz (Band		9400	9800	1880	28.50	23.50
2)		9538	9938	1908	28.72	23.46
		9262	9662	1852	27.77	22.55
	4	9400	9800	1880	27.77	22.48
		9538	9938	1908	27.79	22.52
		9262	9662	1852	29.07	24.40
	5	9400	9800	1880	29.06	24.42
		9538	9938	1908	29.03	24.42

Page 29 of 118

#### Part 27 / RSS 139 1700MHz Band

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

Page 30 of 118

## 7.4. DUAL CARRIER HSDPA

### DC-HSDPA (Rel 8, CAT 24)

Р

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/lor	dB	-10
P-CCPCH and SCH_Ec/lor	dB	-12
PICH _Ec/lor	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/lor	dB	-5
OCNS_Ec/lor	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.

	Parameter	Unit	Value		
	Nominal Avg. Inf. Bit Rate	kbps	60		
	Inter-TTI Distance	TTI's	1		
	Number of HARQ Processes	Proces ses	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		
Inf. Bit Payload [ CRC Addition [ Code Block Segmentation [	Note 1:       The RMC is intended to be used for mode and both cells shall transmit parameters as listed in the table.         Note 2:       Maximum number of transmission retransmission is not allowed. The constellation version 0 shall be used         120       120         120       24 CRC         144       144	with identi is limited t redundar	ical o 1, i.e.,		
Turbo-Encoding (R=1/3)	432				12 Tail Bits
1st Rate Matching	432				
RV Selection	960				
hysical Channel Segmentation	960				
Figure (	C.8.19: Coding rate for Fixed reference	Channel	H-Set 12	(QPSK)	

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

### REPORT NO: 16U23814-E10V2 FCC ID: BCGA1823

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	
	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	Power Control Algorithm	Algorithm2				
WCDMA General	βc	2/15	12/15	15/15	15/15	
Settings	βd	15/15	15/15	8/15	4/15	
Settings	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	
	DACK	8				
	DNAK	8				
HSDPA	DCQI	8				
Specific	Ack-Nack Repetition factor	3				
Settings	CQI Feedback	4ms				
	CQI Repetition Factor	2				
	Ahs = $\beta$ hs/ $\beta$ c	30/15				

## RESULT

Page 32 of 118

**ID:** 50820 **Date:** 11/10/16

## Part 22 / RSS 132 850MHz Band

Band	Subtest	UL Channel	DL Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)
		4132	4357	826.4	28.25	24.20
	1	4183	4408	836.6	28.25	24.20
		4233	4458	846.6	28.30	24.22
		4132	4357	826.4	28.10	24.17
	2	4183	4408	836.6	28.06	24.19
UMTS HSDPA		4233	4458	846.6	28.15	24.20
850MHz		4132	4357	826.4	28.03	23.90
	3	4183	4408	836.6	28.08	23.89
		4233	4458	846.6	27.95	23.80
		4132	4357	826.4	28.01	23.89
	4	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)
		9262	9662	1852.4	29.05	24.08
	1	9400	9800	1880.0	29.15	24.20
		9538	9938	1907.6	29.12	24.00
		9262	9662	1852.4	29.08	24.05
	2	9400	9800	1880.0	29.10	24.18
UMTS HSDPA		9538	9938	1907.6	29.12	24.02
1900MHz		9262	9662	1852.4	28.61	23.92
	3	9400	9800	1880.0	28.88	23.95
		9538	9938	1907.6	28.59	23.90
		9262	9662	1852.4	28.80	23.93
	4	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)
		1312	1537	1712.4	28.60	24.45
	1	1413	1638	1732.6	28.70	24.40
		1513	1738	1752.6	28.50	24.38
		1312	1537	1712.4	28.60	24.40
	2	1413	1638	1732.6	28.55	24.43
UMTS HSDPA		1513	1738	1752.6	28.60	24.40
1700MHz		1312	1537	1712.4	28.04	24.00
	3	1413	1638	1732.6	28.26	24.03
		1513	1738	1752.6	27.89	24.10
		1312	1537	1712.4	28.09	24.02
	4	1413	1638	1732.6	28.25	24.00
		1513	1738	1752.6	28.15	23.95

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Page 33 of 118

## 8. CONDUCTED TEST RESULTS

## 8.1. OCCUPIED BANDWIDTH

## RULE PART(S)

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

## <u>LIMITS</u>

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.

Page 34 of 118

### 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	ECDDS	190	836.6	248.0737	312.463
PCS	EGPRS	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

Page 35 of 118

### 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

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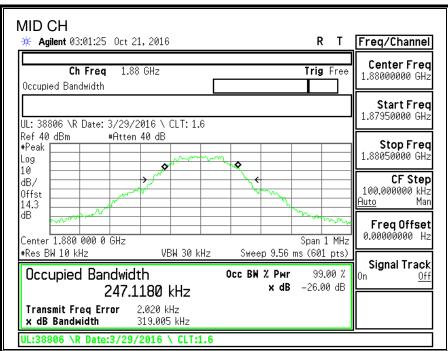
Page 36 of 118

# 8.1.1. GSM GPRS

### 850MHz BAND

MID CH	21, 2016		R	т	Freq/Channel
Ch Freq 836 Occupied Bandwidth	6.6 MHz		Trig	Free	Center Freq 836.600000 MHz
UL: 38806 \R Date: 3/29/	2016 \ CLT: 1.6		<u> </u>		Start Freq 836.100000 MHz
Ref 40 dBm #Atter #Peak Log 10	40 dB	<b>X</b>			<b>Stop Freq</b> 837.100000 MHz
dB/ Offst 13.6	→	· · · · · · · · · · · · · · · · · · ·	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		<b>CF Step</b> 100.000000 kHz <u>Auto</u> Man
dB Center 836.600 0 MHz #Res BW 10 kHz	VBW 30 kHz		ipan 1	MHz	Freq Offset 0.00000000 Hz
Occupied Bandwid		Occ BW % Pwr x dB -	99.0	0 %	Signal Track <sup>On <u>Off</u></sup>
x dB Bandwidth	-400.708 Hz 310.771 kHz				
UL:38806 \R Date:3/29	/2016 \ CLT:1.6				

### 1900MHz BAND



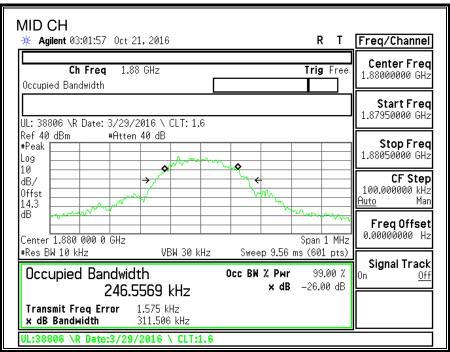
Page 37 of 118

# 8.1.2. GSM EGPRS

### 850MHz BAND

Ch Freq         836.6 MHz         Trig         Free           Occupied Bandwidth         Image: Start Freq         836.60000 MHz           UL: 38306 \R Date: 3/29/2016 \ CLT: 1.6         Start Freq           Ref 40 dBm         *Atten 40 dB           *Peak         Image: Start Freq           Log         Image: Start Freq           10         Image: Start Freq           dB/         Image: Start Freq           0ffst         Image: Start Freq           13.6         Image: Start Freq           13.6         Image: Start Freq           0         Image: Start Freq           0         Image: Start Freq           0         Image: Start Freq           13.6         Image: Start Freq           0         Image: Start Freq           10         Image: Start Freq           0         Image: Start Freq           13.6         Image: Start Freq           13.6         Image: Start Fre	MID CH	Freq/Channel
UL: 38306 \R Date: 3/29/2016 \ CLT: 1.6 Ref 40 dB *Atten		
#Peak         Stop Freq 837.100000 MHz           10 dB/ 0ffst 13.6 dB		
dB/ Offst 13.6 dB         CF Step 100.000000 kHz <u>Auto</u> Center 836.600 0 MHz         Span 1 MHz           *Res BW 10 kHz         VBW 30 kHz           Sweep 9.56 ms (601 pts)         Signal Track 0n           Occ BW % Pwr         99.00 % × dB           248.0737 kHz         × dB           Transmit Freg Error         2.847 kHz	Peak Log	
Center 836.600 0 MHz         Span 1 MHz           *Res BW 10 kHz         VBW 30 kHz         Sweep 9.56 ms (601 pts)           Occupied Bandwidth         Occ BW % Pwr         99.00 %           248.0737 kHz         × dB         -26.00 dB           Transmit Freg Error         2.847 kHz	dB/ →/ ←	100.000000 kHz
Occupied Bandwidth     Occ BW % Pwr     99.00 %     Signal Track       248.0737 kHz     × dB     -26.00 dB     0n     0ff       Transmit Freg Error     2.847 kHz	Center 836.600 0 MHz Span 1 MHz	
	Occupied Bandwidth Occ BH Z PHr 99.00 Z	
UL:38806 \R Date:3/29/2016 \ CLT:1.6	x dB Bandwidth 312.463 kHz	

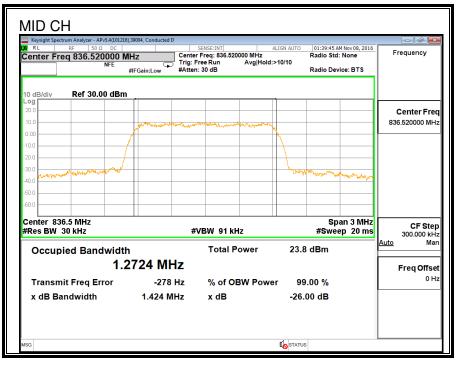
### 1900MHz BAND



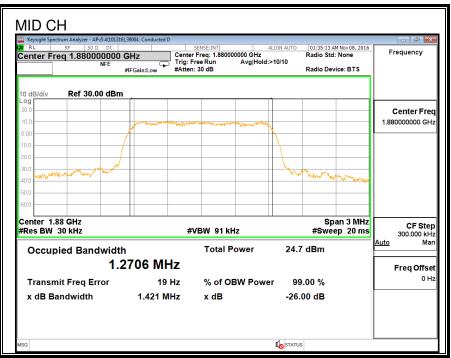
Page 38 of 118

# 8.1.3. CDMA2000 1xRTT

### 850MHz BAND



### 1900MHz BAND



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Page 39 of 118

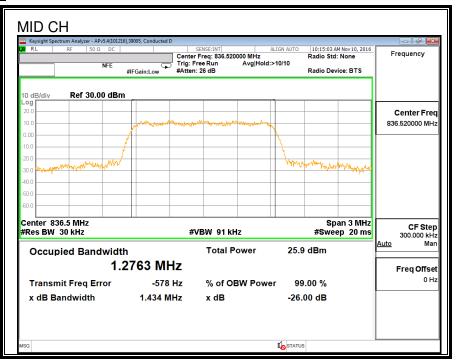
# 800MHz SECONDARY BAND

RL RF 50Ω Senter Freq 820.0000	00 MHz	SENSE:INT Center Freq: 820.000000 f Trig: Free Run Av	ALIGN AUTO MHz g Hold:>10/10	01:42:01 AM Nov 08, 2016 Radio Std: None	Frequency
N	FE #IFGain:Low	#Atten: 30 dB	g Hold:>10/10	Radio Device: BTS	
0 dB/div Ref 30.00	dBm				
20.0					Center Fre
10.0	Martin martin	and any particular and a second second	windown		820.000000 MH
10.0			\		
20.0					
10.0 Jahan Munan the	₩~_ <sup>₩/</sup>		marter	white the got a manufacture	
0.0					
50.0					
enter 820 MHz Res BW 30 kHz		#VBW 91 kHz		Span 3 MHz #Sweep 20 ms	CF Ste 300.000 kl
Occupied Bandw	vidth	Total Powe	er 24.6	dBm	Auto Ma
	1.2711 MH	z			Freq Offs
Transmit Freg Erro	r -503 H	Iz % of OBW	Power 99	.00 %	01
x dB Bandwidth	1.423 MH	lz xdB	-26.	00 dB	

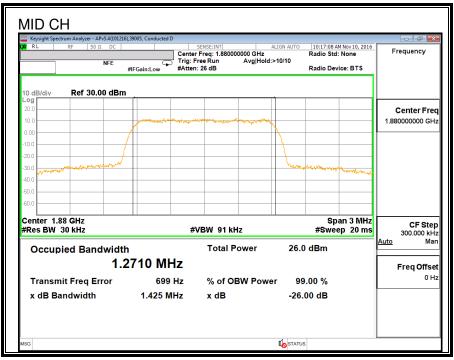
Page 40 of 118

# 8.1.4. CDMA2000 EVDO REV A

### 850MHz BAND

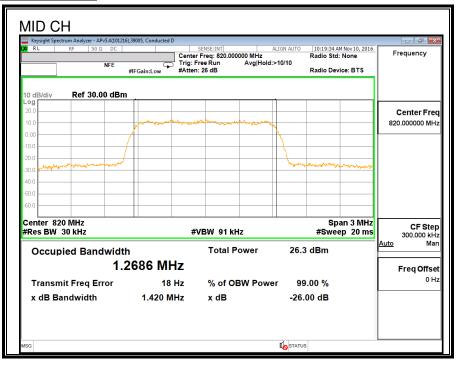


### 1900MHz BAND



Page 41 of 118

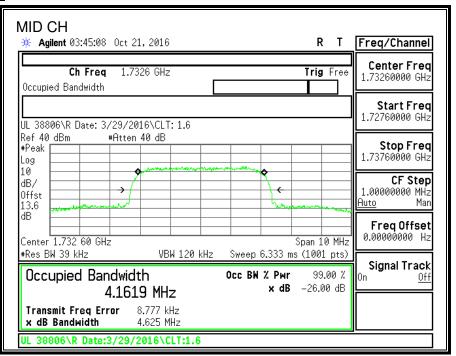
### 800MHz SECONDARY BAND



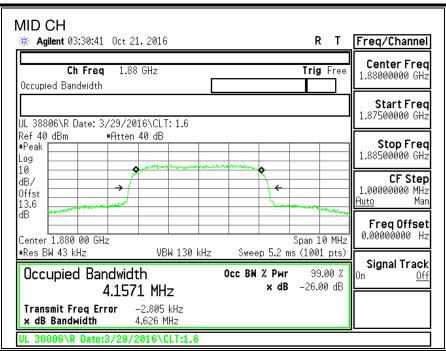
Page 42 of 118

## 8.1.5. UMTS Rel99

### 850MHz BAND



### 1900MHz BAND



Page 43 of 118

## 1700MHz BAND

MID CH * Agilent 03:57:18 Oct 21, 2016 R T	Freq/Channel
Ch Freq 836.6 MHz Trig Free Occupied Bandwidth	Center Freq 836.600000 MHz
UL 38806\R Date: 3/29/2016\CLT: 1.6	Start Freq 831.600000 MHz
Ref 40 dBm #Atten 40 dB #Peak Log	<b>Stop Freq</b> 841.600000 MHz
10 dB/ 0ffst 13.9 →	<b>CF Step</b> 1.00000000 MHz <u>Auto</u> Man
dB Center 836.60 MHz Span 10 MHz	Freq Offset 0.00000000 Hz
*Res BW 51 kHz         VBW 150 kHz         Sweep 3.733 ms (1001 pts)           Occupied Bandwidth         Occ BW % Pwr         99.00 %           4.1752 MHz         × dB         -26.00 dB	<b>Signal Track</b> On <u>Off</u>
4.1732     PIEZ       Transmit Freq Error     -131.266       x dB Bandwidth     4.622       MHz	
UL 38806\R Date:3/29/2016\CLT:1.6	

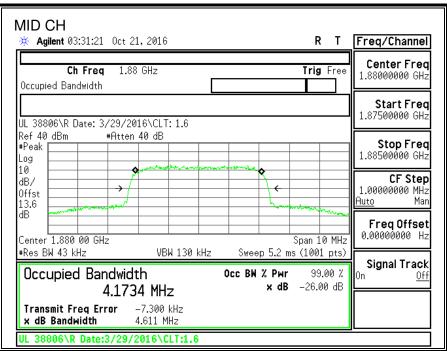
Page 44 of 118

# 8.1.6. UMTS HSDPA

### 850MHz BAND

MID CH * Agilent 03:45:53 Oct 21, 2016 R T [	Freq/Channel
Ch Freq 1.7326 GHz Trig Free Occupied Bandwidth	<b>Center Freq</b> 1.73260000 GHz
UL 38806\R Date: 3/29/2016\CLT: 1.6	<b>Start Freq</b> 1.72760000 GHz
Ref 40 dBm #Atten 40 dB #Peak	<b>Stop Freq</b> 1.73760000 GHz
dB/ Offst 13.6 → ← ←	<b>CF Step</b> 1.00000000 MHz <del><u>Auto</u>Man</del>
dB	FreqOffset 0.00000000 Hz
	Signal Track <sup>On <u>Off</u></sup>
Transmit Freq Error         14.824 kHz           x dB Bandwidth         4.622 MHz           UL 38806\R Date:3/29/2016\CLT:1.6	

### 1900MHz BAND



Page 45 of 118

## 1700MHz BAND

MID CH * Agilent 03:58:09 Oct 21, 2016 R T	Freg/Channel
Ch Freq 836.6 MHz Trig Free Occupied Bandwidth	Center Freq 836.600000 MHz
UL 38806\R Date: 3/29/2016\CLT: 1.6	Start Freq 831.600000 MHz
Ref 40 dBm #Atten 40 dB #Peak	<b>Stop Freq</b> 841.600000 MHz
10 dB/ 0ffst 13.9 ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	<b>CF Step</b> 1.0000000 MHz <u>Auto</u> Man
dB         Center 836.60 MHz         Span 10 MHz	FreqOffset 0.00000000 Hz
*Res BW 51 kHz         VBW 150 kHz         Sweep 3.733 ms (1001 pts)           Occupied Bandwidth         Occ BW % Pwr         99.00 %           4.1681 MHz         × dB         -26.00 dB	<b>Signal Track</b> On <u>Off</u>
Transmit Freq Error     712.855 Hz       x dB Bandwidth     4.628 MHz	
UL 38806\R Date:3/29/2016\CLT:1.6	

Page 46 of 118

# 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;
(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.

Page 47 of 118

# 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  $43 + 10 \log 10 p$  (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.

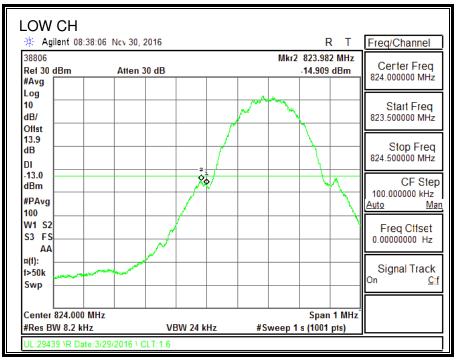
For each band edge measurement:

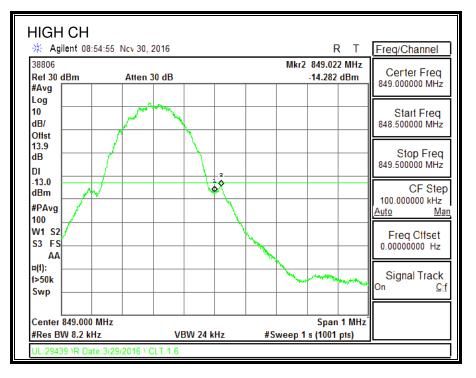
- Set the spectrum analyzer span to include the block edge frequency.
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13 dBm
- Set resolution bandwidth to at least 1% of emission bandwidth.

# **RESULTS**

# 8.2.1. GSM GPRS

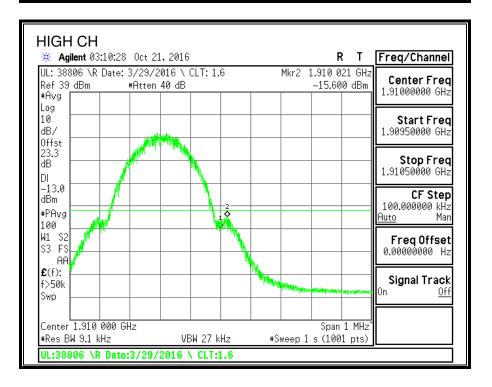
### 850MHz BAND





Page 49 of 118 UL VERIFICATION SERVICES INC. 47173 BENICIA STREET, FREMONT, CA 94538, USA This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

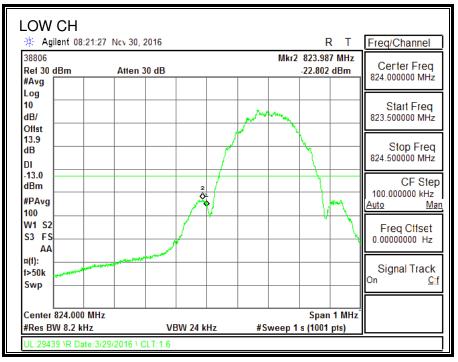
#### LOW CH Freq/Channel 🔆 Agilent 03:08:07 Oct 21, 2016 R Т UL: 38806 \R Date: 3/29/2016 \ CLT: 1.6 Mkr2 1.849 980 GHz **Center Freq** Ref 39 dBm #Atten 40 dB -15.453 dBm 1.85000000 GHz #Avg Log 10 Start Freq dB/ 1.84950000 GHz Offst (In Third) 23.3 Stop Freq dB 1.85050000 GHz DI -13.0 CF Step dBm 100.000000 kHz #PAvg $\dot{\mathbf{Q}}^{4}_{\phi}$ Man <u>Auto</u> 100 W1 S2 Freq Offset \$3 F\$ 0.00000000 Hz AA **£**(f): Signal Track f>50k Ûn Off Swp Center 1.850 000 GHz Span 1 MHz #Res BW 9.1 kHz VBW 27 kHz #Sweep 1 s (1001 pts) UL:38806 \R Date:3/29/2016 \ CLT:1.6

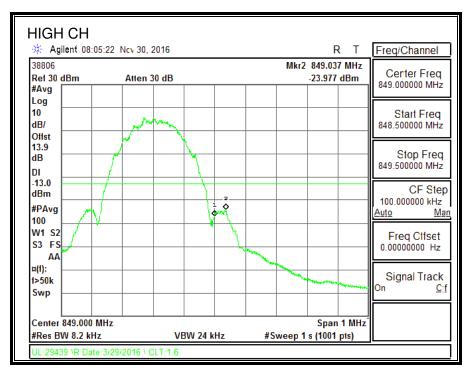


Page 50 of 118

# 8.2.2. GSM EGPRS

### 850MHz BAND

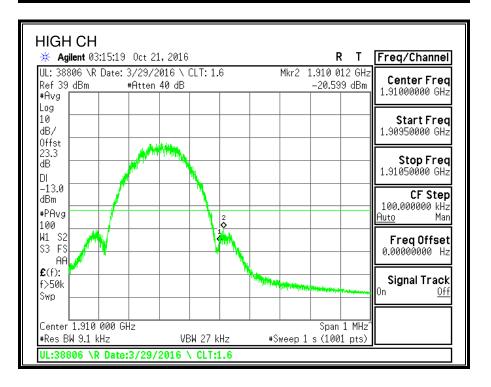




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Page 51 of 118

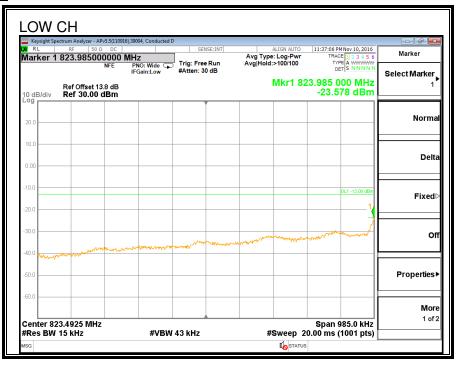
#### LOW CH Freq/Channel 🔆 Agilent 03:12:59 Oct 21, 2016 R Т UL: 38806 \R Date: 3/29/2016 \ CLT: 1.6 Mkr2 1.849 978 GHz **Center Freq** Ref 39 dBm #Atten 40 dB -21.461 dBm 1.85000000 GHz #Avg Log 10 Start Freq dB/ 1.84950000 GHz Offst u hay ya ha 23.3 Stop Freq dB 1.85050000 GHz DI -13.0 CF Step dBm 100.000000 kHz #PAvg Man <u>Auto</u> 2 0 100 W1 S2 Freq Offset \$3 F\$ 0.00000000 Hz AA **£**(f): Signal Track f>50k Ûn Off Swp Center 1.850 000 GHz Span 1 MHz #Res BW 9.1 kHz VBW 27 kHz #Sweep 1 s (1001 pts) UL:38806 \R Date:3/29/2016 \ CLT:1.6

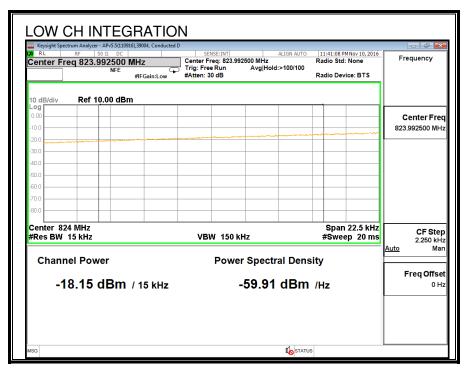


Page 52 of 118

# 8.2.3. CDMA2000 1xRTT

### 850MHz BAND

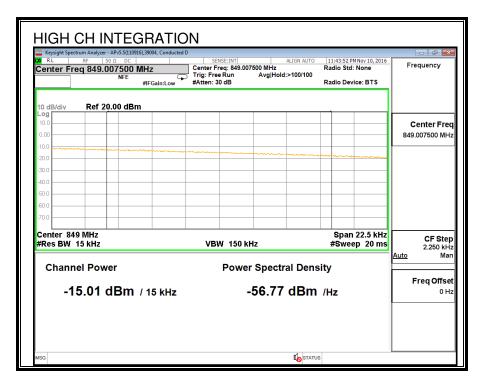




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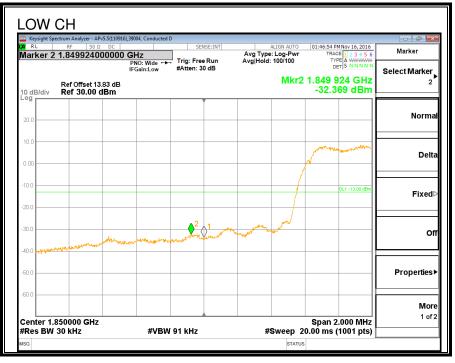
Page 53 of 118

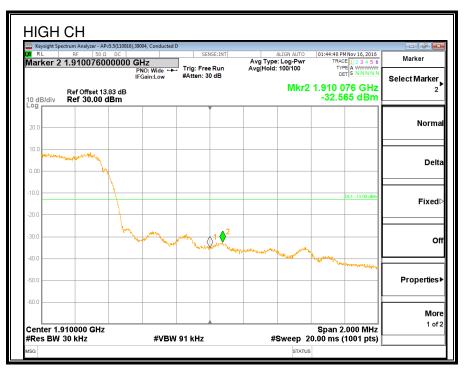
HIGH CH	.5(110916).39004. Conducted D			- 0
Marker 1 849.015000		ALIGN AUTO	11:42:43 PM Nov 10, 2016 TRACE 1 2 3 4 5 6	Marker
	IFE PNO: Wide Trig: Free IFGain:Low #Atten: 3	30 dB	DET S N N N N	Select Marker
Ref Offset 13.8 10 dB/div Ref 30.00 dl		Mkr1 84	49.015 000 MHz -19.903 dBm	1
20.0				Norma
10.0				Delt
-10.0			DL1 -13.00 dBm	Fixed
-30.0				o
-50.0			- man -	Properties
-60.0 Center 849.5075 MHz			Span 985.0 kHz	<b>Mor</b> 1 of
#Res BW 15 kHz	#VBW 43 kHz	#Sweep 2	20.00 ms (1001 pts)	



Page 54 of 118

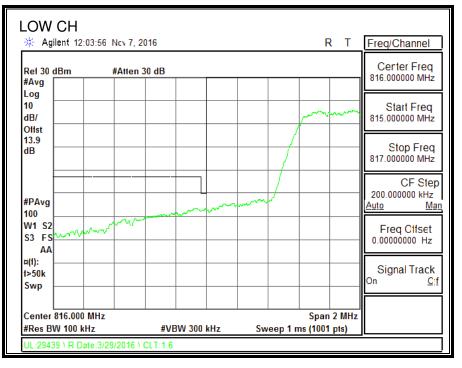
# 1900MHz BAND



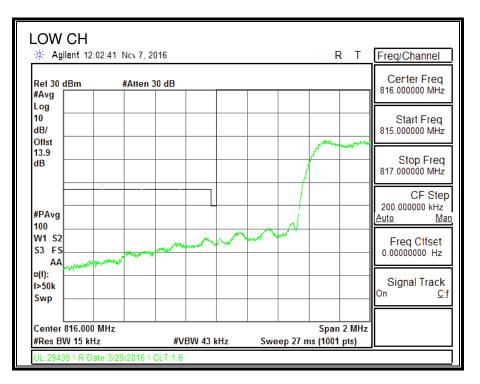


Page 55 of 118

# 8.2.4. CDMA2000 1xRTT BC10 MASK

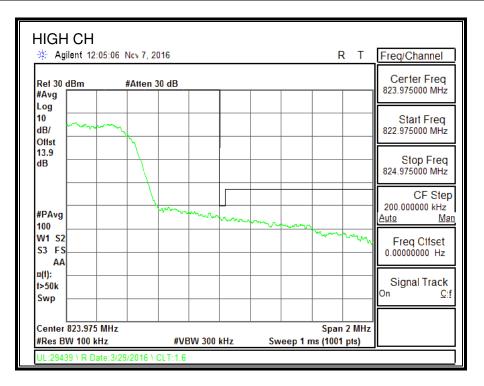


Note: RBW=1% of EBW

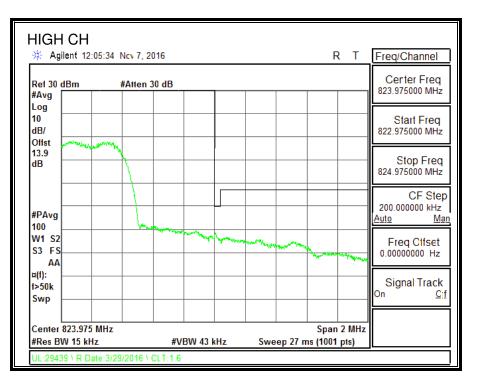


Note: RBW=1% of 37.5KHz of outer channel frequency block.

Page 56 of 118



Note: RBW=1% of EBW

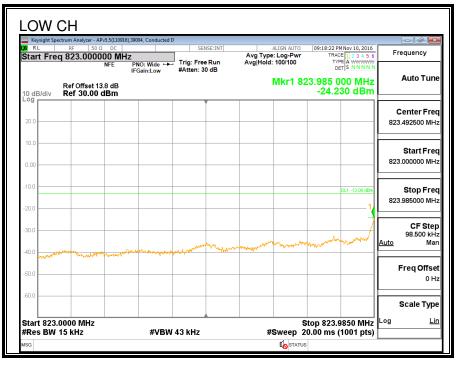


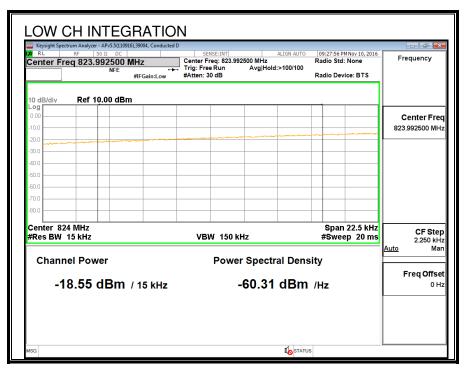
Note: RBW=1% of 37.5KHz of outer channel frequency block.

Page 57 of 118

## 8.2.5. CDMA2000 EVDO REV A

### 850MHz BAND

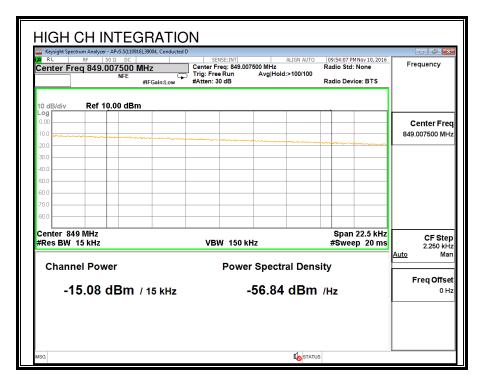




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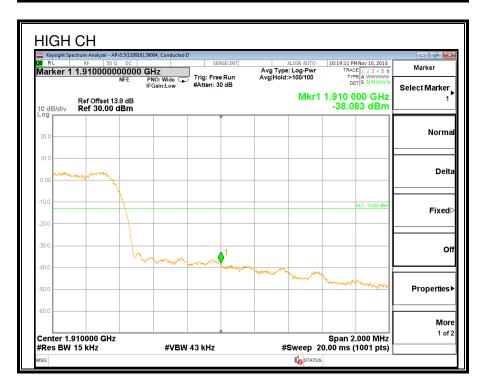
Page 58 of 118

	er - APv5.5(110916),39004, Co	nducted D			
W RL RF Marker 1 849.01	50 Ω DC 5000000 MHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	09:52:10 PM Nov 10, 2016 TRACE 1 2 3 4 5 6	Marker
	NFE PNO: W IFGain:L		Avg Hold:>100/100	DET S NNNN	Select Marker
	et 13.8 dB .00 dBm		Mkr1 84	9.015 000 MHz -20.168 dBm	1
20.0					Norma
0.00					Delt
-10.0				DL1 -13.00 dBm	Fixed
-30.0	and and the state of the state	and the second	Conner and man and a	and marked and	0
-50.0					Properties
-60.0	MHz			Span 985.0 kHz	Mor 1 of



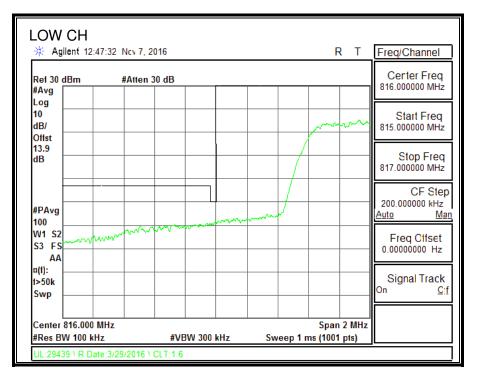
Page 59 of 118

### LOW CH Keysight Spec 0 RL RF 50Ω DC Marker 1 1.85000000000 GHz NFE PNC: Wide ↓ IFGain:Low 10:17:46 PM Nov 10, 2016 Marker TRACE 1 2 3 4 5 TYPE A WWWW DET S NNNN Avg Type: Log-Pwi Avg|Hold:>100/100 Trig: Free Run #Atten: 30 dB Select Marker Mkr1 1.850 000 GHz -35.458 dBm Ref Offset 13.8 dB Ref 30.00 dBm 10 dB/div Log Norma Delta יח ר Fixed Off Properties ▶ More 1 of 2 Center 1.850000 GHz #Res BW 15 kHz Span 2.000 MHz #Sweep 20.00 ms (1001 pts) #VBW 43 kHz 🕼 STATU

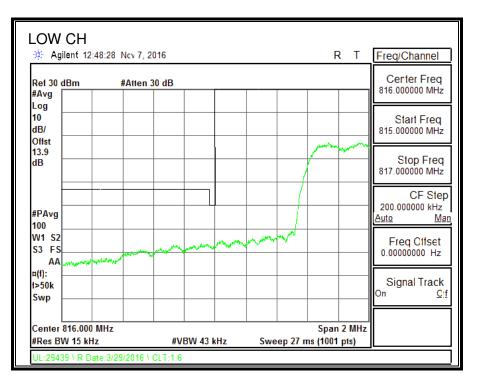


Page 60 of 118

# 8.2.6. CDMA2000 EVDO REV A BC10 MASK

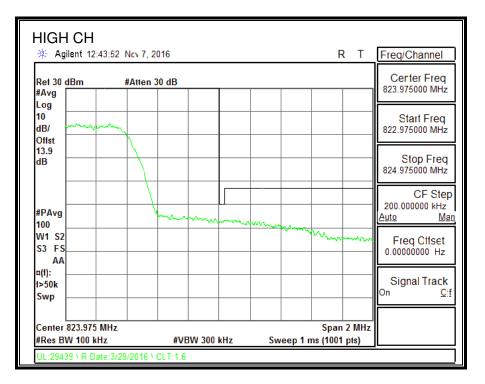


Note: RBW=1% of EBW

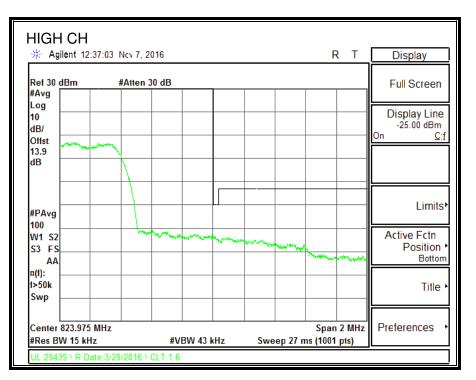


Note: RBW=1% of 37.5KHz of outer channel frequency block.

Page 61 of 118



Note: RBW=1% of EBW

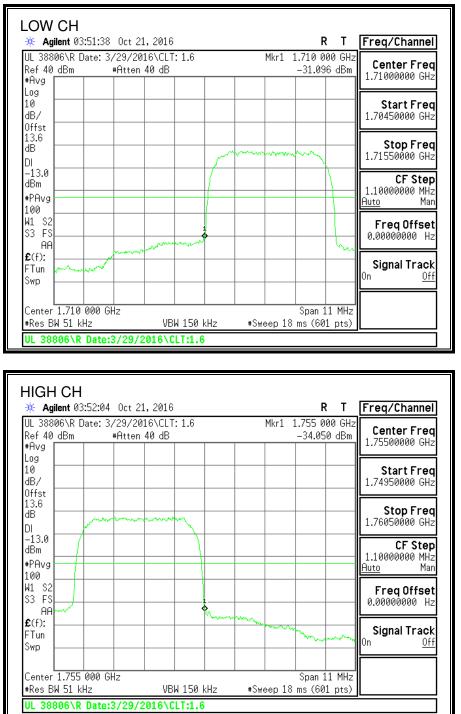


Note: RBW=1% of 37.5KHz of outer channel frequency block.

Page 62 of 118

# 8.2.7. UMTS Rel99

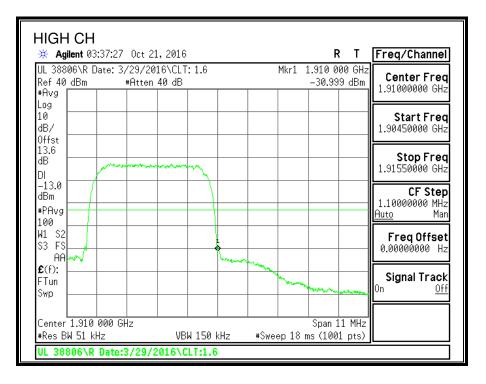
### 850MHz BAND



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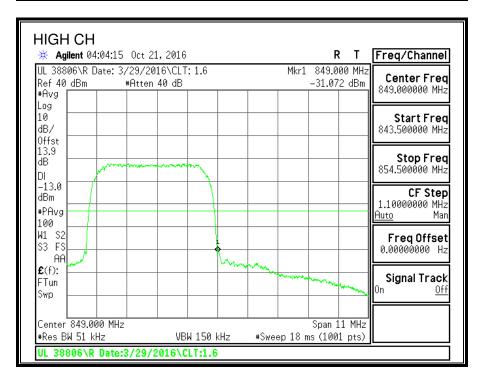
Page 63 of 118

#### LOW CH Freq/Channel 🔆 Agilent 03:37:01 Oct 21, 2016 R T UL 38806\R Date: 3/29/2016\CLT: 1.6 Mkr1 1.850 000 GHz **Center Freq** Ref 40 dBm -32.498 dBm #Atten 40 dB 1.85000000 GHz #Avg Log 10 Start Freq dB/ 1.84450000 GHz Offst 13.6 Stop Freq dB 1.85550000 GHz DI -13.0 CF Step dBm 1.10000000 MHz #PAvg Man <u>Auto</u> 100 W1 S2 Freq Offset \$3 F\$ 0.00000000 Hz AA **£**(f): Signal Track FTun Ûn <u>Off</u> Swp Center 1.850 000 GHz Span 11 MHz #Sweep 18 ms (1001 pts) #Res BW 51 kHz VBW 150 kHz UL 38806\R Date:3/29/2016\CLT:1.6



Page 64 of 118

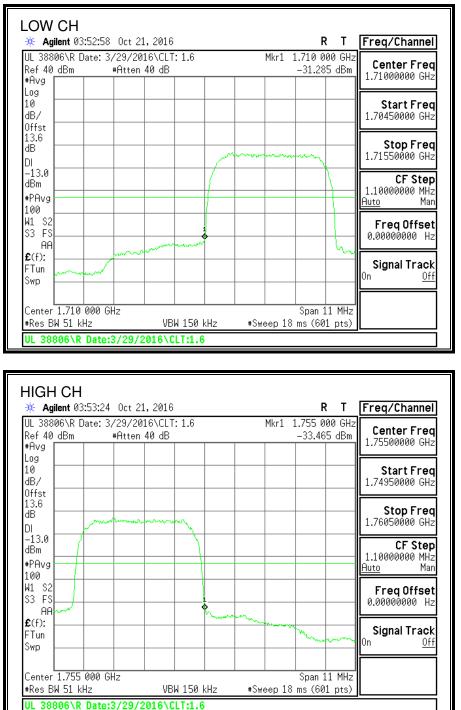
#### LOW CH Freq/Channel 🔆 Agilent 04:03:49 Oct 21, 2016 R T Mkr1 824.000 MHz UL 38806\R Date: 3/29/2016\CLT: 1.6 **Center Freq** Ref 40 dBm -32.172 dBm #Atten 40 dB 824.000000 MHz #Avg Log 10 Start Freq dB/ 818.500000 MHz Offst 13.9 Stop Freq dB 829.500000 MHz DI -13.0 CF Step dBm 1.10000000 MHz #PAvg Man <u>Auto</u> 100 W1 S2 Freq Offset \$3 F\$ 0.00000000 Hz AA **£**(f): Signal Track FTun Ûn <u>Off</u> Swp Center 824.000 MHz Span 11 MHz #Res BW 51 kHz VBW 150 kHz #Sweep 18 ms (1001 pts) UL 38806\R Date:3/29/2016\CLT:1.6



Page 65 of 118

# 8.2.8. UMTS HSDPA

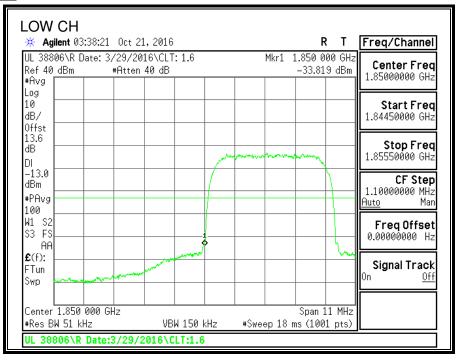
### 850MHz BAND



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Page 66 of 118

### 1900MHz BAND

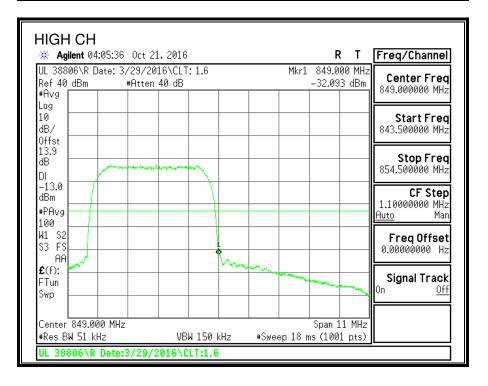


HIGH CH	
★ Agilent 03:38:48 Oct 21, 2016	Freq/Channel
UL 38806\R Date: 3/29/2016\CLT: 1.6 Mkr1 1.910 000 GHz Ref 40 dBm #Atten 40 dB -31.879 dBm #Avg	Center Freq 1.91000000 GHz
Log 10 dB/ Offst	<b>Start Freq</b> 1.90450000 GHz
13.6 dB DI	<b>Stop Freq</b> 1.91550000 GHz
-13.0 dBm #PAvg 100	<b>CF Step</b> 1.10000000 MHz <u>Auto</u> Man
W1 S2 S3 FS	Freq Offset 0.00000000 Hz
£(f):	<b>Signal Track</b> On <u>Off</u>
Center 1.910 000 GHz Span 11 MHz #Res BW 51 kHz VBW 150 kHz #Sweep 18 ms (1001 pts)	
UL 38806\R Date:3/29/2016\CLT:1.6	

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Page 67 of 118

#### LOW CH Freq/Channel 🔆 Agilent 04:05:09 Oct 21, 2016 R T UL 38806\R Date: 3/29/2016\CLT: 1.6 Mkr1 824.000 MHz **Center Freq** Ref 40 dBm -32.273 dBm #Atten 40 dB 824.000000 MHz #Avg Log 10 Start Freq dB/ 818.500000 MHz Offst 13.9 Stop Freq dB 829.500000 MHz DI -13.0 CF Step dBm 1.10000000 MHz #PAvg Man <u>Auto</u> 100 W1 S2 Freq Offset \$3 F\$ 0.00000000 Hz AA **£**(f): Signal Track FTun Ûn <u>Off</u> Swp Center 824.000 MHz Span 11 MHz #Res BW 51 kHz VBW 150 kHz #Sweep 18 ms (1001 pts) UL 38806\R Date:3/29/2016\CLT:1.6



Page 68 of 118

# 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

## <u>LIMITS</u>

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;
(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.

Page 69 of 118

## 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  $43 + 10 \log 10p$ (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  $43 + 10 \log 10 p$  (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:

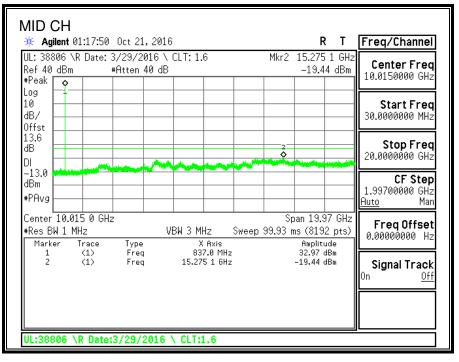
- Set display line at -13 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

# **RESULTS**

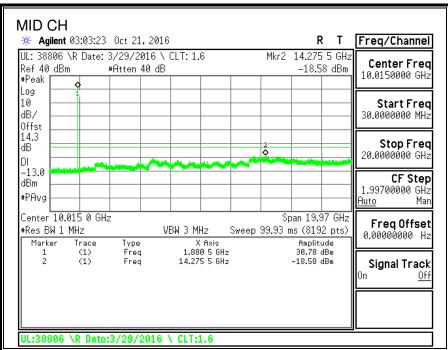
Page 70 of 118

## 8.3.1. GSM GPRS

### 850MHz BAND



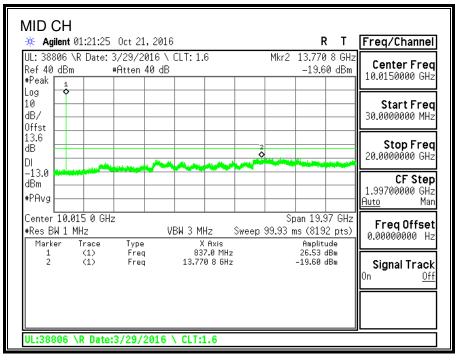
### 1900MHz BAND



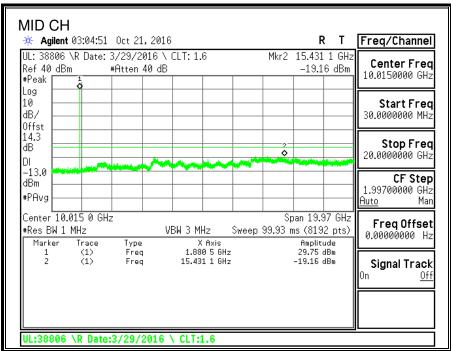
Page 71 of 118

## 8.3.2. GSM EGPRS

### 850MHz BAND



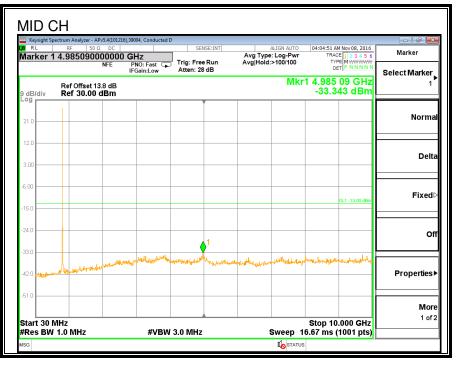
### 1900MHz BAND



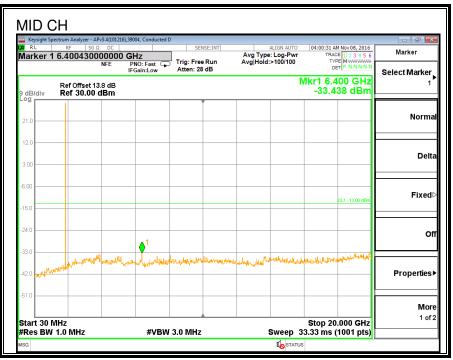
Page 72 of 118

## 8.3.3. CDMA2000 1xRTT

### 850MHz BAND

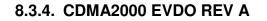


### 1900MHz BAND

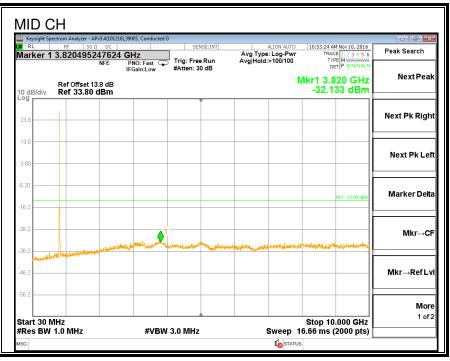


Page 73 of 118

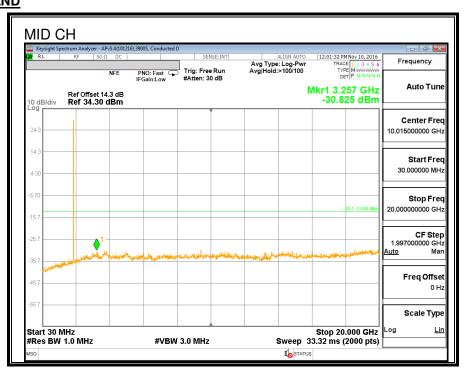
### MID CH Keysight Spec 04:08:44 AM Nov 08, 2016 Marker 1 8.913270000000 GHz NFE PR0: Fast Trig: Free Run IFGain:Low Atten: 28 dB Marker Avg Type: Log-Pwi Avg|Hold:>100/100 RACE TYPE MWWW DET P N N N Select Marker Mkr1 8.913 27 GHz -33.739 dBm Ref Offset 13.8 dB Ref 30.00 dBm dB/div Norma Delta 3 00 **Fixed** L1 -13.00 d Off Properties ▶ More 1 of 2 Stop 10.000 GHz Sweep 16.67 ms (1001 pts) Start 30 MHz #Res BW 1.0 MHz #VBW 3.0 MHz **I**STATUS



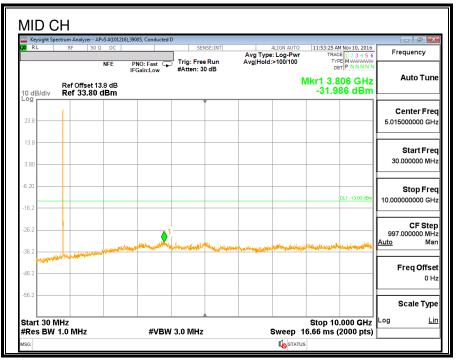




Page 74 of 118



## 800MHz SECONDARY BAND



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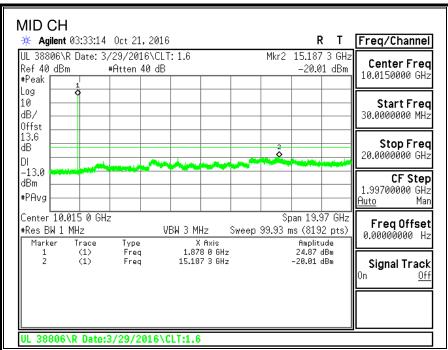
Page 75 of 118

## 8.3.5. UMTS Rel99

### 850MHz BAND

MID CH		RT	Freq/Channel
UL 38806\R Date: 3/29/2016\CLT: 1.6 Ref 40 dBm #Atten 40 dB #Peak 1		.3.892 7 GHz -19.60 dBm	Center Freq 10.0150000 GHz
Log 10 dB/ Offst			Start Freq 30.0000000 MHz
13.9 dB DI -13.0			<b>Stop Freq</b> 20.0000000 GHz
dBm PAvg			<b>CF Step</b> 1.99700000 GHz <u>Auto</u> Man
	z Sweep 99.93 ms Axis	n 19.97 GHz (8192 pts) Amplitude 25.56 dBm	Freq Offset 0.00000000 Hz
		19.60 dBm	<b>Signal Track</b> <sup>On <u>Off</u></sup>
UL 38806\R Date:3/29/2016\CLT:1.6			

## 1900MHz BAND

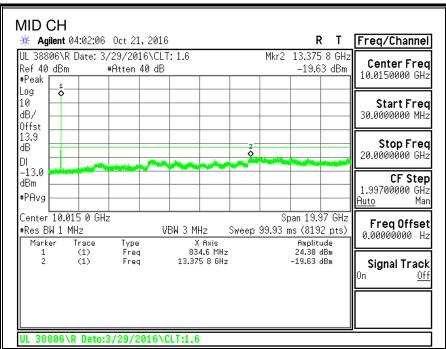


Page 76 of 118

🔆 Agilent 03:47:46	Oct 21, 201	.6	R		Freq/Channel
*Peak 1	/29/2016\Cl #Atten 40 dE		Mkr2 14.070 -19.72		Center Freq 10.0150000 GHz
-og L0 JB/ Dffst					Start Freq 30.0000000 MHz
IB JB			2 2	Nadau	<b>Stop Freq</b> 20.0000000 GHz
-13.0 damakan dBm #PAvg					<b>CF Step</b> 1.99700000 GHz <u>Auto</u> Man
Center 10.015 0 GH *Res BW 1 MHz Marker Trace		X Axis	Span 19.9 p 99.93 ms (8192 Amplitu	2 pts) de	FreqOffset 0.00000000 Hz
$     \begin{array}{ccc}       1 & (1) \\       2 & (1)     \end{array} $	Freq Freq	1.734 2 GHz 14.070 7 GHz	24.89 d -19.72 d	Bm	<b>Signal Track</b> <sup>On <u>Off</u></sup>

## 8.3.6. UMTS HSDPA

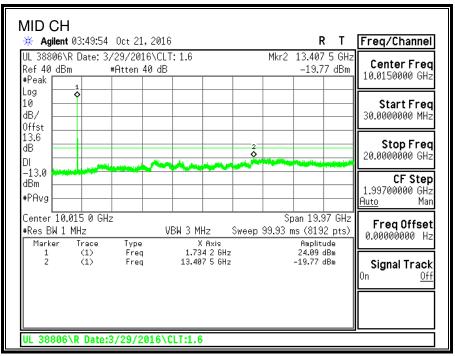
## 850MHz BAND



Page 77 of 118

UL 38806\R Date: 3/29/2016\CLT: 1.6       Mkr2 16.204 0 GHz         Ref 40 dBm       #Atten 40 dB       -19.72 dBm         *Peak       -1       -19.72 dBm         Log       -1       -10.0150000 GHz         10       -10.0150000 MHz       -10.0150000 GHz         0ffst       -10.0150000 GHz       -10.0000000 MHz         13.6       -2       -2         0B       -2       -2         0I       -13.0       -10.0150 GHz         *PAvg       -10.0150 GHz       Span 19.97 GHz         *Res BW 1 MHz       VBW 3 MHz       Sweep 99.93 ms (8192 pts)         Marker       Trace       Type         1       10       Freq         1.880 5 GHz       -19.72 dBm         1       Freq         1       Freq         1       Freq         1       Freq         1       Freq         1       Freq         2       (1)         1       Freq	<b>₩ Agilent</b> 03:35:17	' Oct 21, 201	6		F	۲۶	Freq/Channel
10         Start Freq 30.000000 MHz           0ffst 13.6         Start Freq 30.000000 MHz           01         2         Stop Freq 20.000000 GHz           01         2         Stop Freq 20.000000 GHz           01         30.000000 GHz           020         30.000000 GHz           01         30.000000 GHz           0.000000 GHz         4000           0.0000000 GHz         4000           0.0000000 GHz         4000           0.0000000 GHz         4000           0.00000000 Hz         500000000 Hz           1         10         Freq         1.880 5 GHz         24.04 dBm           1         10         Freq         1.6204 0 GHz         -19.72 dBm         Signal Track	Ref 40 dBm #Peak			M			
13.6         Stop Freq           DI         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13.0         -13	10 dB/						
Image: Second	13.6 dB DI				2		
#Res BW 1 MHz         VBW 3 MHz         Sweep 99.93 ms (8192 pts)         Freq Uffset           Marker         Trace         Type         X Axis         Amplitude           1         (1)         Freq         1.880 5 GHz         24.04 dBm           2         (1)         Freq         16.204 0 GHz         -19.72 dBm	dBm						1.99700000 GHz
2 (1) Freq 16.204 0 GHz -19.72 dBm Signal Track	#Res BW 1 MHz Marker Trace	Туре	X Axis	Sweep 99.	93 ms (819 Amplit	92 pts) ude	

## 1700MHz BAND



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Page 78 of 118

# 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  $\pm 2.5$  ppm for mobile stations and  $\pm 1.0$  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.

Page 79 of 118

## 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 20°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50°C is reached.

## Frequency Stability vs Voltage:

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

## **RESULTS**

See the following pages.

Page 80 of 118

## 9.1. GSM

ID:	39004	Date:	11/14/16

## **GPRS 850**

Limit		824	849			
Condition		F low @ -13dBm	F high @ -13dBm	Delta (Hz)	Frequency Stability	
Temperature	Voltage	(MHz)	(MHz)	(112)	(ppm)	
Normal (20C)		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)	Normal	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	
	15%	824.016600	848.982449	-8.77	-0.01	
20C	-15%	824.016600	848.982449	-8.92	-0.01	
	End Point	824.016600	848.982449	-8.55	-0.01	

## EGPRS 850

Limit		824	849			
Condition		F low @ -13dBm	F high @ -13dBm	Delta (Hz)	Frequency Stability	
Temperature	Voltage	(MHz)	(MHz)	(112)	(ppm)	
Normal (20C)		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)	Normal	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	
	15%	824.017873	848.982993	-7.85	-0.01	
20C	-15%	824.017873	848.982993	-7.62	-0.01	
	End Point	824.017873	848.982993	-8.12	-0.01	

Page 81 of 118

## GPRS 1900

Limit		1850	1910			
Condition		F low @ -13dBm	F high @ -13dBm	Delta (Hz)	Frequency Stability	
Temperature	Voltage	(MHz)	(MHz)	(112)	(ppm)	
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	
	15%	1850.0250	1909.9712	42.2	0.02	
20C	-15%	1850.0250	1909.9712	41.8	0.02	
	End Point	1850.0250	1909.9712	40.3	0.02	

## EGPRS 1900

Limit		1850	1910			
Condition		F low @ -13dBm	F high @ -13dBm	Delta (Hz)	Frequency Stability	
Temperature	Voltage	(MHz)	(MHz)	(112)	(ppm)	
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)	1	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	
	15%	1850.0233	1909.9710	44.1	0.02	
20C	-15%	1850.0233	1909.9710	43.3	0.02	
	End Point	1850.0233	1909.9710	43.5	0.02	

## 9.2. CDMA2000

4/16
1/

## CDMA 1xRTT BC0

Limit		824	849				
Condition		F low @ -13dBm	F high @ -13dBm	Delta (Hz)	Frequency Stability		
Temperature	Voltage	(MHz)	(MHz)	()	(ppm)		
Normal (20C)		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)	Normal	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		
	15%	824.0261	848.9845	2.1	0.00		
20C	-15%	824.0261	848.9845	1.7	0.00		
	End Point	824.0261	848.9845	2.0	0.00		

## CDMA 1x RTT BC1

Limit	Limit		1910			
Condition		F low @ -13dBm	F high @ -13dBm	Delta (Hz)	Frequency Stability	
Temperature	Voltage	(MHz)	(MHz)	()	(ppm)	
Normal (20C)		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)	Normal	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	
	15%	1850.5783	1909.4238	5.2	0.00	
20C	-15%	1850.5783	1909.4238	4.9	0.00	
	End Point	1850.5783	1909.4238	5.1	0.00	

Page 83 of 118

## CDMA 1xRTT BC10

Limit		816.35	823.65				
Condition		F low @ -13dBm	F high @ -13dBm	Delta (Hz)	Frequency Stability		
Temperature	Voltage	(MHz)	(MHz)	(112)	(ppm)		
Normal (20C)		816.5721	823.4367				
Extreme (50C)		816.5721	823.4367	-3.2	0.00		
Extreme (40C)	1	816.5721	823.4367	1.2	0.00		
Extreme (30C)	1	816.5721	823.4367	1.7	0.00		
Extreme (10C)	Normal	816.5721	823.4367	4.5	0.01		
Extreme (0C)	1	816.5721	823.4367	3.3	0.00		
Extreme (-10C)	1	816.5721	823.4367	2.5	0.00		
Extreme (-20C)	1	816.5721	823.4367	2.1	0.00		
Extreme (-30C)	1	816.5721	823.4367	1.1	0.00		
	15%	816.5721	823.4367	2.9	0.00		
20C	-15%	816.5721	823.4367	2.4	0.00		
	End Point	816.5721	823.4367	2.8	0.00		

Page 84 of 118

## 9.3. UMTS

ID:	39004	Date:	11/14/16

## UMTS REL99 BAND 5

Limit		824	849		
Conditio	on	F low @ -13dBm	F high @ -13dBm	Delta (Hz)	Frequency Stability
Temperature	Voltage	(MHz)	(MHz)	(112)	(ppm)
Normal (20C)		824.1542	848.2489		
Extreme (50C)		824.1542	848.2489	5.1	0.01
Extreme (40C)	1	824.1542	848.2489	2.9	0.00
Extreme (30C)		824.1542	848.2489	1.4	0.00
Extreme (10C)	Normal	824.1542	848.2489	7.2	0.01
Extreme (0C)	1	824.1542	848.2489	2.9	0.00
Extreme (-10C)		824.1542	848.2489	-1.2	0.00
Extreme (-20C)	1	824.1542	848.2489	-3.2	0.00
Extreme (-30C)	1	824.1542	848.2489	1.9	0.00
	15%	824.1542	848.2489	-1.3	0.00
20C	-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		
Conditio	n	F low @ -13dBm	F high @ -13dBm	Delta (Hz)	Frequency Stability
Temperature	Voltage	(MHz)	(MHz)	(112)	(ppm)
Normal (20C)		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)	Normal	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
	15%	1850.1583	1909.8477	20.2	0.01
20C	-15%	1850.1583	1909.8477	20.5	0.01
	End Point	1850.1583	1909.8477	21.1	0.01

Page 85 of 118

## UMTS REL99 BAND 4

Limit		1710	1755		
Conditio	n	F low @ -13dBm	F high @ -13dBm	Delta (Hz)	Frequency Stability
Temperature	Voltage	(MHz)	(MHz)	(112)	(ppm)
Normal (20C)		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)	Normal	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
	15%	1710.14958	1754.86082	2.41	0.00
20C	-15%	1710.14958	1754.86082	2.20	0.00
	End Point	1710.14958	1754.86082	2.36	0.00

Page 86 of 118

## 10. PEAK-TO-AVERAGE RATIO

In addition, when the transmitter power is measured in terms of average value, the peak-toaverage 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.

Page 87 of 118

Mada	Modulation	Conducted	Peak-to-Average	
Mode	wooulation	*Peak	Average	Ratio
	GPRS	33.36	33.28	0.08
GSM850	EGPRS	30.75	27.89	2.86
GSM1900	GPRS	29.05	28.91	0.14
G21011900	EGPRS	29.88	26.81	3.07
*Peak Reading = A	verage Reading + P	eak - to - Average	Ratio	

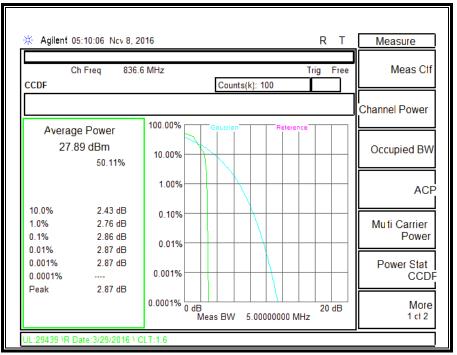
Mode	Modulation	Conducted	Power (dBm)	Peak-to-Average
woue	wouldtion	*Peak	Average	Ratio
CDMA2000	1xRTT	27.67	23.80	3.87
BC0	EVDO A	29.11	23.88	5.23
CDMA2000	1xRTT	29.65	25.15	4.50
BC1	EVDO A	29.54	24.09	5.45
CDMA2000	1xRTT	30.00	25.32	4.68
BC10	EVDO A	29.89	24.37	5.52
*Peak Reading = A	verage Reading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

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

Page 88 of 118

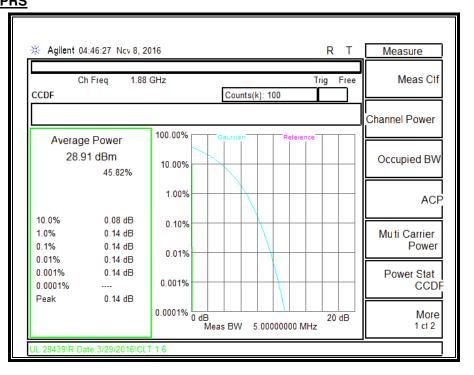
#### 🔆 Agilent 04:36:07 Nov 8, 2016 R T Measure 836.6 MHz Trig Free Meas Off Ch Freq Counts(k): 100 CCDF Channel Power 100.00% Average Power 33.28 dBm Occupied BW 10.00% 42.12% 1 00% ACP 10.0% 0.08 dB 0.10% 0.08 dB 1.0% Muti Carrier 0.1% 0.08 dB Power 0.01% 0.01% 0.08 dB 0.001% 0.08 dB Power Stat 0.001% 0.0001% CCDF ----0.08 dB Peak 0.0001% 0 dB Meas BW 5.00000000 MHz More 20 dB 1 c1 2 UL 29439\R Date:3/29/2016\CLT:1.6

## GSM850, EGPRS

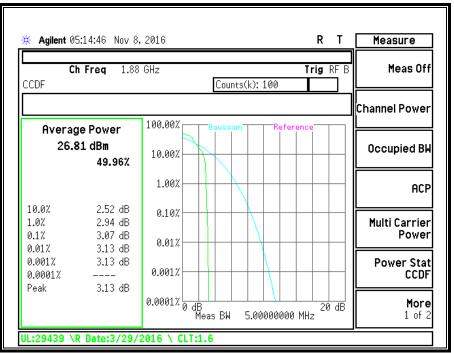


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Page 89 of 118



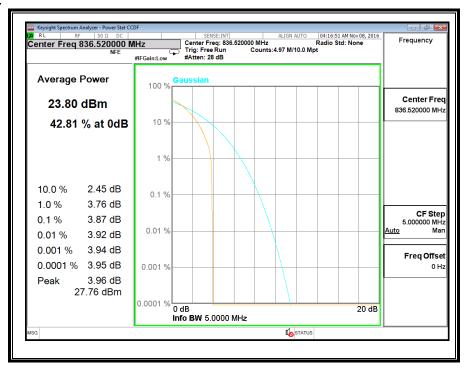
## GSM1900, EGPRS



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Page 90 of 118

## BC 0, 1xRTT



## BC 0, EVDO A

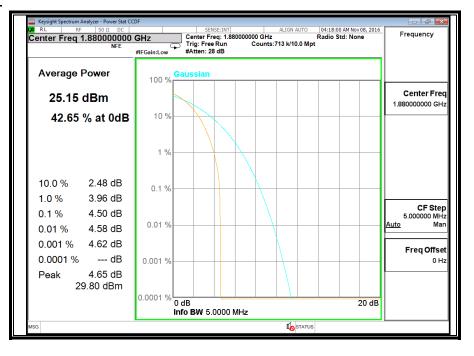


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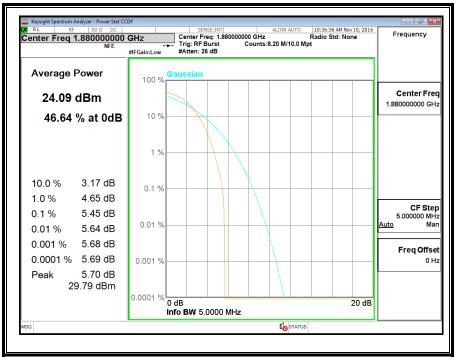
Page 91 of 118

## REPORT NO: 16U23814-E10V2 FCC ID: BCGA1823

## BC 1, 1xRTT



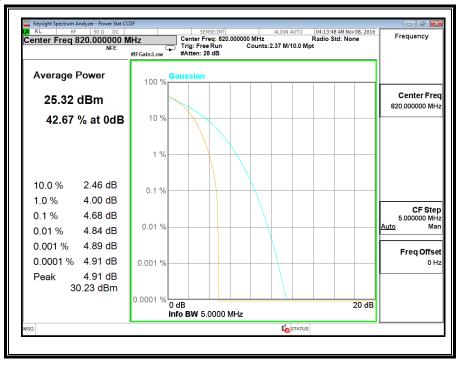
## BC 1, EVDO A



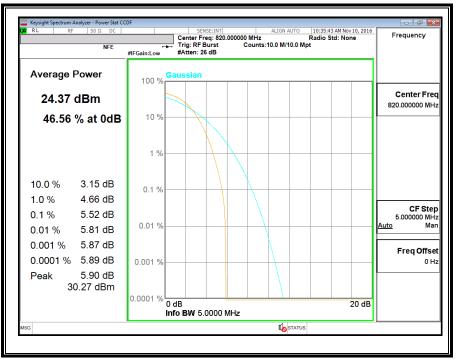
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Page 92 of 118

## BC10, 1xRTT

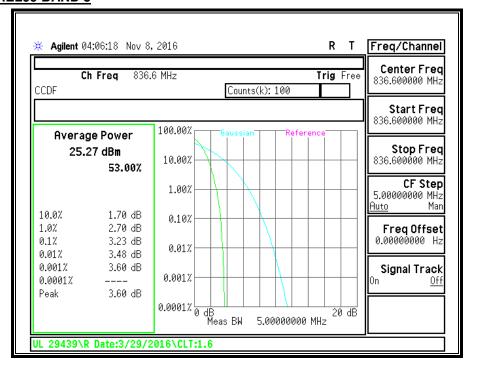


### BC10, EVDO A

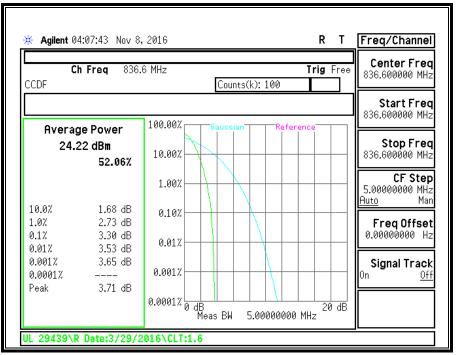


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Page 93 of 118

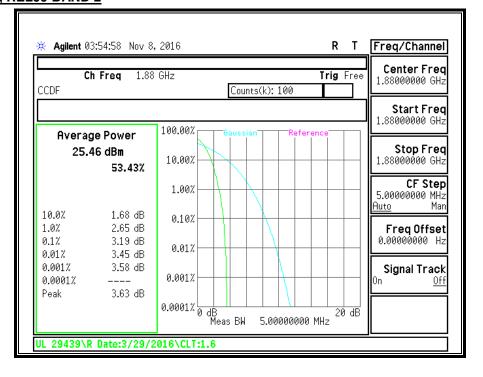


## UMTS 850, HSDPA BAND 5

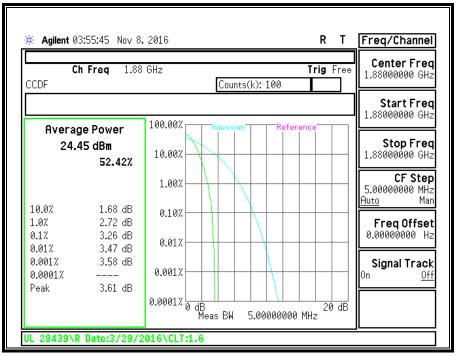


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Page 94 of 118

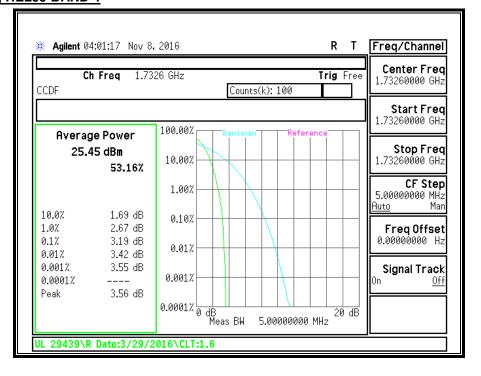


## UMTS 1900, HSDPA BAND 2

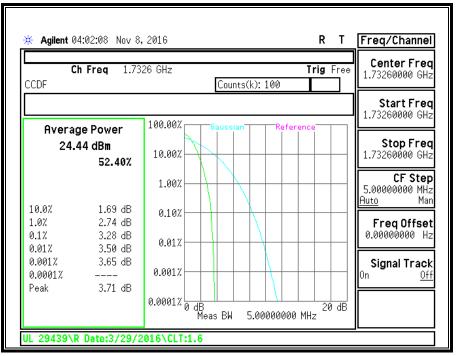


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Page 95 of 118



## UMTS 1700, HSDPA BAND 4



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Page 96 of 118

## 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

## <u>LIMIT</u>

§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.

Page 97 of 118

(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  $43 + 10 \log 10p$ (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  $43 + 10 \log 10 p$  (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**

Page 98 of 118

### DATE: FEBRUARY 10, 2017 IC: 579C-A1823

1

## 11.1.1. GSM

## GPRS, 850MHz BAND 5

ate: est Engine onfiguration lode:	eer: on:	16U23814 01/19/17 37290 EUT only GPRS 850MHz	r							
<u>Fest Equipr</u> Substitution	<u>ment:</u> n: Horn T59 Sub Chamb			ble Pre-amplifer		Filter			Limit	
3	3m Chamber F			Chamber F	- Fi	lter	-	Elf		<b>•</b>
Frequency	/ SA reading	Ant. Pol.	Distance	EIRP @ TX Ant End	Preamp	Attenuator	EIRP	Limit	Delta	Notes
(GHz)	(dBm)	(H/V)		(dBm)						
Low Channe										
1.65	-57.0	Н	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	
2 20	-70.5	Н	3.0	-22.3	34.7	1.0	-55.9	-13.0	-42.9	
3.30				-14.8	33.7	1.0	-47.5	-13.0	-34.5	
1.65	-58.2	V	3.0			ę				
1.65 2.47	-70.7	V	3.0	-26.0	34.1	1.0	-59.1	-13.0	-46.1	
1.65						1.0 1.0	-59.1 -56.7	-13.0 -13.0	-46.1 -43.7	
1.65 2.47 3.30	-70.7 -71.5	V	3.0	-26.0	34.1					
1.65 2.47 3.30 Mid Channel	-70.7 -71.5 (836.6MHz)	V V	3.0 3.0	-26.0 -23.0	34.1 34.7	1.0	-56.7	-13.0	-43.7	
1.65 2.47 3.30	-70.7 -71.5	V	3.0	-26.0	34.1					
1.65 2.47 3.30 Mid Channel 1.67	-70.7 -71.5 (836.6MHz) -68.2	V V H	3.0 3.0 3.0	-26.0 -23.0 -26.9	34.1 34.7 33.7	1.0	-56.7 -59.6	-13.0 -13.0	_43.7 _46.6	
1.65 2.47 3.30 Mid Channel 1.67 2.51 3.35 1.67	-70.7 -71.5 (836.6MHz) -68.2 -66.2 -69.1 -68.3	V V H H V	3.0 3.0 3.0 3.0 3.0 3.0 3.0	-26.0 -23.0 -26.9 -22.0 -20.7 -24.9	34.1 34.7 33.7 34.1 34.6 33.7	1.0 1.0 1.0 1.0 1.0	-56.7 -59.6 -55.1 -54.3 -57.6	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0	43.7 46.6 42.1 41.3 44.6	
1.65 2.47 3.30 Mid Channel 1.67 2.51 3.35 1.67 2.51	-70.7 -71.5 (836.6MHz) -68.2 -66.2 -69.1 -68.3 -63.7	V V H H V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-26.0 -23.0 -26.9 -22.0 -20.7 -24.9 -18.9	34.1 34.7 33.7 34.1 34.6 33.7 34.1	1.0 1.0 1.0 1.0 1.0 1.0	-56.7 -59.6 -55.1 -54.3 -57.6 -52.0	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0		
1.65 2.47 3.30 Mid Channel 1.67 2.51 3.35 1.67	-70.7 -71.5 (836.6MHz) -68.2 -66.2 -69.1 -68.3	V V H H V	3.0 3.0 3.0 3.0 3.0 3.0 3.0	-26.0 -23.0 -26.9 -22.0 -20.7 -24.9	34.1 34.7 33.7 34.1 34.6 33.7	1.0 1.0 1.0 1.0 1.0	-56.7 -59.6 -55.1 -54.3 -57.6	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0	43.7 46.6 42.1 41.3 44.6	
1.65 2.47 3.30 Mid Channel 1.67 2.51 3.35 1.67 2.51 3.35	-70.7 -71.5 (836.6MHz) -68.2 -66.2 -69.1 -68.3 -63.7 -70.0	V V H H V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-26.0 -23.0 -26.9 -22.0 -20.7 -24.9 -18.9	34.1 34.7 33.7 34.1 34.6 33.7 34.1	1.0 1.0 1.0 1.0 1.0 1.0	-56.7 -59.6 -55.1 -54.3 -57.6 -52.0	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0		
1.65 2.47 3.30 Mid Channel 1.67 2.51 3.35 1.67 2.51 3.35 High Channe	-70.7 -71.5 (836.6MHz) -68.2 -66.2 -69.1 -68.3 -63.7 -70.0 -4 (848.8MHz)	V V H H V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-26.0 -23.0 -26.9 -22.0 -20.7 -24.9 -18.9 -21.3	34.1 34.7 33.7 34.1 34.6 33.7 34.1 34.6	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-56.7 -59.6 -55.1 -54.3 -57.6 -52.0 -55.0	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	43.7 46.6 42.1 41.3 44.6 -39.0 42.0	
1.65 2.47 3.30 Mid Channel 1.67 2.51 3.35 1.67 2.51 3.35 High Channe 1.70	-70.7 -71.5 (836.6MHz) -68.2 -66.2 -69.1 -68.3 -63.7 -70.0 - (848.8MHz) -55.2	V V H H V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-26.0 -23.0 -26.9 -22.0 -20.7 -24.9 -18.9 -21.3 -13.7	34.1 34.7 33.7 34.1 34.6 33.7 34.1 34.6 33.7 34.1 34.6 33.7	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-56.7 -59.6 -55.1 -54.3 -57.6 -52.0 -55.0 -55.0	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	43.7 46.6 42.1 41.3 44.6 -39.0 42.0 -33.4	
1.65 2.47 3.30 Mid Channel 1.67 2.51 3.35 1.67 2.51 3.35 4.67 2.51 3.35	.70.7 .71.5 (836.6MHz) .68.2 .66.2 .69.1 .68.3 .63.7 .70.0 .68.8MHz) .55.2 .69.7	V V H H V V V H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-26.0 -23.0 -26.9 -22.0 -20.7 -24.9 -18.9 -18.9 -13.7 -13.7 -25.2	34.1 34.7 33.7 34.1 34.6 33.7 34.1 34.6 33.7 34.2	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-56.7 -59.6 -55.1 -54.3 -57.6 -52.0 -55.0 -55.0 -46.4 -58.4	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	43.7 46.6 42.1 41.3 44.6 -39.0 42.0 -33.4 45.4	
1.65 2.47 3.30 Mid Channel 1.67 2.51 3.35 1.67 2.51 3.35 High Channe 1.70 2.55 3.40	-70.7 -71.5 (836.6MHz) -68.2 -66.2 -69.1 -68.3 -63.7 -70.0 -68.3 -63.7 -70.0 -1 (848.8MHz) -55.2 -69.7 -69.7	V V H H V V V V H H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-26.0 -23.0 -26.9 -22.0 -20.7 -24.9 -18.9 -21.3 - -13.7 -25.2 -21.1	34.1 34.7 33.7 34.1 34.6 33.7 34.1 34.6 33.7 34.2 34.2 34.6	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-56.7 -59.6 -55.1 -54.3 -57.6 -52.0 -55.0 -55.0 -46.4 -58.4 -58.4 -54.7	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-43.7 -46.6 -42.1 -41.3 -44.6 -39.0 -42.0 -33.4 -45.4 -41.7	
1.65 2.47 3.30 Mid Channel 1.67 2.51 3.35 1.67 2.51 3.35 High Channe 1.70 2.55	.70.7 .71.5 (836.6MHz) .68.2 .66.2 .69.1 .68.3 .63.7 .70.0 .68.8MHz) .55.2 .69.7	V V H H V V V H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-26.0 -23.0 -26.9 -22.0 -20.7 -24.9 -18.9 -18.9 -13.7 -13.7 -25.2	34.1 34.7 33.7 34.1 34.6 33.7 34.1 34.6 33.7 34.2	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-56.7 -59.6 -55.1 -54.3 -57.6 -52.0 -55.0 -55.0 -46.4 -58.4	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	43.7 46.6 42.1 41.3 44.6 -39.0 42.0 -33.4 45.4	

Page 99 of 118

### 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	Н	3.0	-23.4	33.7	1.0	-56.1	-13.0	-43.1	
2.47	-68.6	Н	3.0	-24.5	34.1	1.0	-57.6	-13.0	-44.6	
3.30	-70.0	Н	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	Н	3.0	-28.7	33.7	1.0	-61.4	-13.0	-48.4	
2.51	-61.9	Н	3.0	-17.7	34.1	1.0	-50.8	-13.0	-37.8	
3.35	-70.9	Н	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 <b>.</b> 8	-13.0	-40.8	
High Channel	(848.8MHz)									
1.70	-57.0	Н	3.0	-15.5	33.7	1.0	-48.2	-13.0	-35.2	
2.55	-69.2	Н	3.0	-24.7	34.2	1.0	-57.9	-13.0	-44.9	
3.40	-69.7	Н	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	
									°·····	

Page 100 of 118

#### High Frequency Substitution Measurement UL Fremont Radiated Chamber

UL Fremont Radiated Chami

Company: Project #: Date: Test Engineer: Configuration: Mode:

GPRS 1900MHz

### Test Equipment:

Substitution: Horn T59 Substitution, and 8ft SMA Cable

16U23814

11/16/16

EUT only

37290

	Chamber	Pre-amplifer	Filter		Limit	
Γ	3m Chamber H 🚽	3m Chamber H 🗸	Filter 🗸	]	EIRP	-

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel	(1850.2MHz)									
3.70	-61.3	Н	3.0	-13.4	37.4	1.0	-49.8	-13.0	-36.8	
5.55	-65.4	Н	3.0	-14.5	36.7	1.0	-50.2	-13.0	-37.2	
7.40	-65.9	Н	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	Н	3.0	-13.2	37.4	1.0	-49.6	-13.0	-36.6	
5.64	-64.1	Н	3.0	-13.1	36.7	1.0	-48.8	-13.0	-35.8	
7.52	-65.7	Н	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	Н	3.0	-13.6	37.3	1.0	-49.9	-13.0	-36.9	
5.73	-65.5	Н	3.0	-14.3	36.7	1.0	-50.0	-13.0	-37.0	
7.54	-67.0	Η	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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Page 101 of 118

## **High Frequency Substitution Measurement**

**UL Fremont Radiated Chamber** 

### Company: Project #: Date: Test Engineer:

Configuration: Mode:

### Test Equipment:

Substitution: Horn T59 Substitution, and 8ft SMA Cable

16U23814

11/16/16

EUT only

EGPRS 1900MHz

37290

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	Н	3.0	-14.1	37.4	1.0	-50.5	-13.0	-37.5	
5.55	-64.8	Н	3.0	-13.9	36.7	1.0	-49.6	-13.0	-36.6	
7.40	-65.2	Н	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	Н	3.0	-13.4	37.4	1.0	-49.7	-13.0	-36.7	1
5.64	-64.0	Н	3.0	-12.9	36.7	1.0	-48.6	-13.0	-35.6	
7.52	-66.0	Н	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	Н	3.0	-14.8	37.3	1.0	-51.1	-13.0	-38.1	1
5.73	-65.5	Н	3.0	-14.3	36.7	1.0	-50.0	-13.0	-37.0	
7.54	-67.0	Н	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	
	ll					<u> </u>				

**UL VERIFICATION SERVICES INC.** FORM NO: CCSUP4701i 47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888 This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Page 102 of 118

## 11.1.2. CDMA2000

## CDMA2000 1xRTT, 850MHz BC0

			-	titution Meas ated Chamber						
ompany:										
roject #:		16U23814								
ate:		01/19/17								
est Engine		37290								
onfiguratio		EUT Only								
lode:		1xRTT 850MH	Ζ							
est Equipr ubstitutior	n: Horn T59 Su	ubstitution, a	and 8ft SMA ( Pre-an			14-17				
	Chamber		Pre-an	nplitter	Fi	lter		Lin	nit	
3m C	hamber F	-	3m Cham	ber F 🚽	Filter	•	Γ	EIRP	-	
	1		l			1				
_	SA reading	Ant Pol	Distance	EIRP @ TX Ant End	Preamp	Attenuator	EIRP	Limit	Delta	Notes
-requenc\	ontroughing	And I VI.	Distance		rioump	Automation	<b>E</b> 1131		Donta	110100
• •	(dBm)	(H/V)		(dBm)						
(GHz)	(dBm)	(H/V)		(dBm)						
(GHz)	(dBm) (824.7MHz) -65.5	<u>(H/V)</u> н	3.0	(dBm) -24.3	33.7	1.0	-57.0	-13.0	-44.0	
(GHz) ow Channe 1.65 2.47	-65.5 -70.3	H H	3.0	-24.3 -26.2	34.1	1.0	-59.3	-13.0	-46.3	
(GHz) ow Channel 1.65 2.47 3.30	-65.5 -70.3 -69.9	H H H	3.0 3.0	-24.3 -26.2 -21.7	34.1 34.7	1.0 1.0	-59.3 -55.3	-13.0 -13.0	-46.3 -42.3	
(GHz) ow Channel 1.65 2.47 3.30 1.65	(824.7MHz) -65.5 -70.3 -69.9 -66.2	H H H V	3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8	34.1 34.7 33.7	1.0 1.0 1.0	-59.3 -55.3 -55.5	-13.0 -13.0 -13.0	_46.3 _42.3 _42.5	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47	(824.7MHz) -65.5 -70.3 -69.9 -66.2 -69.1	H H H V V	3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4	34.1 34.7 33.7 34.1	1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5	-13.0 -13.0 -13.0 -13.0	-46.3 -42.3 -42.5 -44.5	
(GHz) ow Channel 1.65 2.47 3.30 1.65	(824.7MHz) -65.5 -70.3 -69.9 -66.2	H H H V	3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8	34.1 34.7 33.7	1.0 1.0 1.0	-59.3 -55.3 -55.5	-13.0 -13.0 -13.0	_46.3 _42.3 _42.5	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47 3.30	(824.7MHz) -65.5 -70.3 -69.9 -66.2 -69.1	H H H V V	3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4	34.1 34.7 33.7 34.1	1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5	-13.0 -13.0 -13.0 -13.0	-46.3 -42.3 -42.5 -44.5	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47 3.30 1.65 2.47 3.30	(824.7MHz) -65.5 -70.3 -69.9 -66.2 -69.1 -69.7 (836.52MHz) -68.3	H H V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4 -21.2 -27.0	34.1 34.7 33.7 34.1 34.7 34.7 33.7	1.0 1.0 1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5 -54.9 -59.7	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0	46.3 42.3 42.5 44.5 41.9 46.7	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47 3.30 id Channel 1.67 2.51	(824.7MHz) -65.5 -70.3 -69.9 -66.2 -69.1 -69.7 (836.52MHz) -68.3 -67.6	H H V V V H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4 -21.2 -27.0 -23.4	34.1 34.7 33.7 34.1 34.7 34.7 33.7 33.7 34.1	1.0 1.0 1.0 1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5 -54.9 -59.7 -59.7 -56.5	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	46.3 42.3 42.5 44.5 41.9 41.9 46.7 43.5	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47 3.30 lid Channel 1.67 2.51 3.35	(824.7MHz) .65.5 .70.3 .69.9 .66.2 .69.1 .69.7 (836.52MHz) .68.3 .67.6 .70.0	H H V V V H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4 -21.2 -27.0 -23.4 -21.6	34.1 34.7 33.7 34.1 34.7 33.7 34.1 34.6	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5 -54.9 -59.7 -59.7 -56.5 -55.2	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	46.3 42.3 42.5 44.5 41.9 	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47 3.30 lid Channel 1.67 2.51 3.35 1.67	(824.7MHz) -65.5 -70.3 -69.9 -66.2 -69.1 -69.7 (836.52MHz) -68.3 -67.6 -70.0 -69.2	H H H V V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4 -21.2 -27.0 -23.4 -21.6 -25.8	34.1 34.7 33.7 34.1 34.7 33.7 34.1 34.6 33.7	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5 -54.9 -59.7 -56.5 -55.2 -55.2 -58.5	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	46.3 42.3 42.5 44.5 41.9 	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47 3.30 lid Channel 1.67 2.51 3.35 1.67 2.51	(824.7MHz) -65.5 -70.3 -69.9 -66.2 -69.7 (836.52MHz) -68.3 -67.6 -70.0 -69.2 -69.1	H H V V V V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4 -21.2 -27.0 -23.4 -21.6 -25.8 -24.3	34.1 34.7 33.7 34.1 34.7 33.7 34.1 34.6 33.7 34.1	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5 -54.9 -59.7 -56.5 -55.2 -55.2 -58.5 -57.4	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	46.3 42.3 42.5 44.5 41.9 41.9 46.7 43.5 42.2 45.5 44.4	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47 3.30 lid Channel 1.67 2.51 3.35 1.67	(824.7MHz) -65.5 -70.3 -69.9 -66.2 -69.1 -69.7 (836.52MHz) -68.3 -67.6 -70.0 -69.2	H H H V V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4 -21.2 -27.0 -23.4 -21.6 -25.8	34.1 34.7 33.7 34.1 34.7 33.7 34.1 34.6 33.7	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5 -54.9 -59.7 -56.5 -55.2 -55.2 -58.5	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	46.3 42.3 42.5 44.5 44.5 41.9 	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47 3.30 lid Channel 1.67 2.51 3.35 1.67 2.51 3.35	(824.7MHz) -65.5 -70.3 -69.9 -66.2 -69.7 (836.52MHz) -68.3 -67.6 -70.0 -69.2 -69.1	H H V V V V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4 -21.2 -27.0 -23.4 -21.6 -25.8 -24.3	34.1 34.7 33.7 34.1 34.7 33.7 34.1 34.6 33.7 34.1	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5 -54.9 -59.7 -56.5 -55.2 -55.2 -58.5 -57.4	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	46.3 42.3 42.5 44.5 41.9 41.9 46.7 43.5 42.2 45.5 44.4	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47 3.30 lid Channel 1.67 2.51 3.35 1.67 2.51 3.35	(824.7MHz) -65.5 -70.3 -69.9 -66.2 -69.1 -69.7 (836.52MHz) -68.3 -67.6 -70.0 -69.2 -69.1 -69.9 -69.9	H H V V V V V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4 -21.2 -27.0 -23.4 -21.6 -25.8 -24.3	34.1 34.7 33.7 34.1 34.7 33.7 34.1 34.6 33.7 34.1	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5 -54.9 -59.7 -56.5 -55.2 -55.2 -58.5 -57.4	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	46.3 42.3 42.5 44.5 41.9 41.9 46.7 43.5 42.2 45.5 44.4	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47 3.30 lid Channel 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35	(824.7MHz)           -65.5           -70.3           -69.9           -66.2           -69.1           -68.3           -67.6           -70.0           -69.1           -69.2           -69.1           -69.1           -69.2           -69.1           -69.3           -69.4           -69.5	H H H V V V V V V V V V V H H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4 -21.2 -27.0 -23.4 -21.2 -23.4 -21.6 -25.8 -24.3 -21.2 -21.2 -21.2 -21.2	34.1 34.7 33.7 34.1 34.7 33.7 34.1 34.6 33.7 34.1 34.6 33.7 34.1 34.6	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5 -54.9 -59.7 -56.7 -55.2 -57.4 -54.9 -57.4 -54.9 -59.9 -59.9 -57.6	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	46.3 42.3 42.5 44.5 41.9 46.7 43.5 42.2 45.5 44.4 41.9 46.9 46.9 44.6	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47 3.30 lid Channel 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35 igh Channe 1.70 2.54 3.39	(824.7MHz) -65.5 -70.3 -69.9 -66.2 -69.1 -69.7 (836.52MHz) -68.3 -67.6 -70.0 -69.2 -69.1 -69.9 1 (848.31MHz) -68.9 -68.9 -69.0	H H H V V V V V V V H H H H H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4 -21.2 -27.0 -23.4 -21.2 -27.0 -23.4 -21.6 -25.8 -24.3 -21.2 -27.3 -24.5 -20.4	34.1 34.7 33.7 34.1 34.7 33.7 34.1 34.6 33.7 34.1 34.6 33.7 34.1 34.6	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5 -54.9 	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	46.3 42.3 42.5 44.5 41.9 46.7 43.5 42.2 45.5 42.2 45.5 44.4 41.9 46.9 44.6 41.0	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47 3.30 1.65 2.47 3.30 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35 1.70	(824.7MHz) .65.5 .70.3 .69.9 .66.2 .69.1 .69.7 (836.52MHz) .68.3 .67.6 .70.0 .69.2 .69.1 .69.9 I (848.31MHz) .68.8 .68.9 .69.0 .68.1	H H H V V V V V V V V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4 -21.2 -21.0 -23.4 -21.6 -25.8 -24.3 -21.6 -25.8 -24.3 -21.2 -27.3 -24.5 -20.4 -24.7	34.1 34.7 33.7 34.1 34.7 33.7 34.1 34.6 33.7 34.1 34.6 33.7 34.1 34.6 33.7 34.1 34.6 33.7	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5 -54.9 	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	46.3 42.3 42.5 44.5 44.5 41.9 46.7 43.5 42.2 45.5 42.2 45.5 44.4 41.9 46.9 44.6 41.0 44.3	
(GHz) ow Channel 1.65 2.47 3.30 1.65 2.47 3.30 lid Channel 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35 igh Channe 1.70 2.54 3.39	(824.7MHz) -65.5 -70.3 -69.9 -66.2 -69.1 -69.7 (836.52MHz) -68.3 -67.6 -70.0 -69.2 -69.1 -69.9 I (848.31MHz) -68.9 -68.9 -69.0	H H H V V V V V V V H H H H H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	-24.3 -26.2 -21.7 -22.8 -24.4 -21.2 -27.0 -23.4 -21.2 -27.0 -23.4 -21.6 -25.8 -24.3 -21.2 -27.3 -24.5 -20.4	34.1 34.7 33.7 34.1 34.7 33.7 34.1 34.6 33.7 34.1 34.6 33.7 34.1 34.6	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-59.3 -55.3 -55.5 -57.5 -54.9 	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	46.3 42.3 42.5 44.5 41.9 46.7 43.5 42.2 45.5 42.2 45.5 44.4 41.9 46.9 44.6 41.0	

Page 103 of 118

## REPORT NO: 16U23814-E10V2 FCC ID: BCGA1823 CDMA2000 EVDO Rev A, 850MHz BC0

### **High Frequency Substitution Measurement UL Fremont Radiated Chamber**

Company: Pr

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
<u> </u>				(ubiii)						
Low Channel	·j				00 <b>7</b>		50.0			
1.65	-67.2	H	3.0	-26.1	33.7	1.0	-58.8	-13.0	-45.8	
2.47	-70.4	Н	3.0	-26.3	34.1	1.0	-59.4	-13.0	-46.4	
3.30	-68.5	Н	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 (	926 52MU-1									
1.67	-68.1	Н	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	/9/9 21MU-)									
1.70	-69.1	Н	3.0	-27.6	33.7	1.0	-60.3	-13.0	-47.3	
2.54	-69.6	H	3.0	-21.0	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	-21.3	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	-23.5	34.6	1.0	-55.1	-13.0	-42.1	
3.33	-10.3	v	J.V	-21.J	J4.U	1.0	-JJ.1	-13.0	-42.1	

Rev. 03.19.15

Page 104 of 118

#### **High Frequency Substitution Measurement UL Fremont Radiated Chamber**

Company: Project #: Date: Test Engineer: Configuration: Mode:

11/17/16 37290 EUT only 1xRTT 1900MHz

16U23814

#### Test Equipment:

Substitution: Horn T59 Substitution, and 8ft SMA Cable

	Chamber	Pre-amplifer	Filter	Limit	1
ĺ	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	Н	3.0	-6.9	37.4	1.0	-43.3	-13.0	-30.3	
5.55	-58.8	Н	3.0	-7.9	36.7	1.0	-43.6	-13.0	-30.6	
7.41	-60.1	Н	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	Н	3.0	-8.2	37.4	1.0	-44.5	-13.0	-31.5	
5.64	-57.6	Н	3.0	-6.5	36.7	1.0	-42.2	-13.0	-29.2	
7.52	-60.0	Н	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	Н	3.0	-8.1	37.3	1.0	-44.4	-13.0	-31.4	
5.73	-59.8	Н	3.0	-8.6	36.7	1.0	-44.3	-13.0	-31.3	
7.64	-60.0	Н	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	
	-60.3	V	3.0	-6.6	35.8	1.0	-41.4	-13.0	-28.4	

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Page 105 of 118

				titution Measu ated Chamber						
Company: Project #: Date: Test Engine Configuratio Mode: <u>Test Equipm</u> Substitution	er: on:		and 8ft SMA (	Cable e-amplifer		Filter	ļ		Limit	
3n	n Chamber H	•	3m C	hamber H 🚽	Filte	r <u>-</u>		EIRP	-	
Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
	(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 3.0	-8.1 -9.4	36.7 36.0	1.0 1.0	-43.8	-13.0 -13.0	-30.8 -31.4	
7.41 3.70	-63.1 -57.2	V N	3.0	-9.4 -9.5	36.0	1.0	-44.4 -45.9	-13.0 -13.0	-31.4 -32.9	
5.55	-57.8	V	3.0	-5.5	36.7	1.0	-43.5	-13.0	-32.5	
7.41	-59.2	V	3.0	-5.7	36.0	1.0	-40.7	-13.0	-27.7	
Ild Channel	(4000MUL_)									
Mid Channel 3.76	(1880MHz) -57.3	Н	3.0	-9.3	37.4	1.0	-45.7	-13.0	-32.7	
5.64	-58.4	H	3.0	-3.3	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	- <mark>28.8</mark>	
ligh Channel	(1908.75MHz)									
	-57.4	Н	3.0	-9.4	37.3	1.0	-45.7	-13.0	-32.7	
3.82	-59.3	Н	3.0	-8.1	36.7	1.0	-43.8	-13.0	-30.8	
5.73		Н	3.0	-6.5	35.8	1.0	-41.3	-13.0	-28.3	
5.73 7.64	-60.5				37.3	1.0	-45.7	-13.0	-32.7	
5.73 7.64 3.82	-57.4	V	3.0	-9.5						
5.73 7.64			3.0 3.0 3.0	<u>-9.5</u> -8.3 -7.1	36.7 35.8	1.0 1.0	-44.0 -41.9	-13.0 -13.0	-31.0 -28.9	

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Page 106 of 118

## REPORT NO: 16U23814-E10V2 FCC ID: BCGA1823 CDMA2000 1xRTT, 800MHz BC10

#### **High Frequency Substitution Measurement UL Fremont Radiated Chamber**

Company: Pr Da

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	Н	3.0	-27.2	33.7	1.0	-59.9	-13.0	-46.9	
2.45	-69.5	Н	3.0	-25.4	34.1	1.0	-58.6	-13.0	-45.6	
3.27	-68.3	Н	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	Н	3.0	-25.5	33.7	1.0	-58.2	-13.0	-45.2	
2.46	-69.0	Н	3.0	-24.9	34.1	1.0	-58.0	-13.0	-45.0	
3.28	-69.6	Н	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	Н	3.0	-27.5	33.7	1.0	-60.2	-13.0	-47.2	
2.47	-67.7	Н	3.0	-23.6	34.1	1.0	-56.7	-13.0	-43.7	
3.29	-69.3	Н	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	
	ļļ			L		ļ				

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Page 107 of 118

## REPORT NO: 16U23814-E10V2 FCC ID: BCGA1823 CDMA2000 EVDO Rev A, 800MHz BC10

#### High Frequency Substitution Measurement UL Fremont Radiated Chamber

Company: Project #: Date: Test Engineer: Configuration: Mode:

16U23814 11/17/16 43574 EUT only

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 -	Ĩ	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	Н	3.0	-28.3	33.7	1.0	-61.0	-13.0	-48.0	
2.45	-69.8	Н	3.0	-25.7	34.1	1.0	-58.8	-13.0	-45.8	
3.27	-69.4	Н	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	- <b>55.8</b>	-13.0	-42.8	
Mid Channel (	820MHz)									
1.64	-67.3	Н	3.0	-26.2	33.7	1.0	-58.9	-13.0	-45.9	
2.46	-68.5	Н	3.0	-24.4	34.1	1.0	-57.5	-13.0	-44.5	
3.28	-69.5	Н	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	- <b>55.6</b>	-13.0	-42.6	
High Channel	(822.75MHz)									
1.65	-68.3	Н	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	Н	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	

Page 108 of 118

### DATE: FEBRUARY 10, 2017 IC: 579C-A1823

## 11.1.3. UMTS

## UMTS REL 99, 850MHz BAND 5

			-	stitution Meas ated Chambe						
Company:										
Project #:		16U23814								
ate:	(	01/19/17								
est Engine	er:	39005								
onfiguratio	on:	EUT only								
lode:	I	REL 99, 850M	Hz							
<u>est Equipn</u> ubstitution	<u>nent:</u> : Horn T59 Su	ıbstitution, a	and 8ft SMA (	Cable						
	Chambe	r	Pre	-amplifer		Filter			Limit	
3n	n Chamber H	-	3m Cł	hamber H 🚽	Filter	r -		EIRP		•
Frequency	SA reading	Ant. Pol.	Distance	EIRP @ TX Ant End	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance		Preamp	Attenuator	EIRP	Limit	Delta	Notes
(GHz) ow Channel	(dBm) (826.4MHz)	(H/V)		Ant End (dBm)						Notes
(GHz) ow Channel 1.65	(dBm) (826.4MHz) -68.1	(H/V) H	3.0	Ant End (dBm) -27.7	37.7	1.0	-64.4	-13.0	-51.4	Notes
(GHz) ow Channel 1.65 2.48	(dBm) (826.4MHz) -68.1 -68.9	(H/V) H H	3.0 3.0	Ant End (dBm) -27.7 -24.9	37.7 37.1	1.0 1.0	-64.4 -60.9	-13.0 -13.0	-51.4 -47.9	Notes
(GHz) ow Channel 1.65 2.48 3.31	(dBm) (826.4MHz) -68.1 -68.9 -70.0	(H/V) H H H	3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2	37.7 37.1 37.9	1.0 1.0 1.0	-64.4 -60.9 -59.1	-13.0 -13.0 -13.0	-51.4 -47.9 -46.1	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65	(dBm) (826.4MHz) -68.1 -68.9 -70.0 -69.0	(H/V) H H H V	3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3	37.7 37.1 37.9 37.7	1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1	-13.0 -13.0 -13.0 -13.0	-51.4 -47.9 -46.1 -52.1	Notes
(GHz) ow Channel 1.65 2.48 3.31	(dBm) (826.4MHz) -68.1 -68.9 -70.0	(H/V) H H H	3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2	37.7 37.1 37.9	1.0 1.0 1.0	-64.4 -60.9 -59.1	-13.0 -13.0 -13.0	-51.4 -47.9 -46.1	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65 2.48 3.31 3.31	(dBm) (826.4MHz) -68.1 -68.9 -70.0 -69.0 -69.0 -69.5 -70.9	(H/V) H H V V V	3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3 -25.4	37.7 37.1 37.9 37.7 37.1	1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1 -61.4	-13.0 -13.0 -13.0 -13.0 -13.0	-51.4 -47.9 -46.1 -52.1 -48.4	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65 2.48 3.31 id Channel	(dBm) (826.4MHz) -68.9 -70.0 -69.0 -69.5 -70.9 (836.6MHz)	(H/V) H H V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3 -25.4 -24.1	37.7 37.1 37.9 37.7 37.1 37.1 37.9	1.0 1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1 -61.4 -60.9	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-51.4 -47.9 -46.1 -52.1 -48.4 -47.9	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65 2.48 3.31 id Channel 1.67	(dBm) (826.4MHz) -68.1 -68.9 -70.0 -69.0 -69.5 -70.9 (836.6MHz) -70.2	(H/V) H H V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3 -25.4 -24.1 -29.7	37.7 37.1 37.9 37.7 37.1 37.9 37.9 37.8	1.0 1.0 1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1 -61.4 -60.9	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-51.4 47.9 46.1 -52.1 48.4 47.9	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65 2.48 3.31 id Channel 1.67 2.51	(dBm) (826.4MHz) -68.1 -68.9 -70.0 -69.0 -69.0 -69.5 -70.9 (836.6MHz) -70.2 -69.1	(H/V) H H V V V V H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3 -25.4 -24.1 -29.7 -29.7 -25.0	37.7 37.1 37.9 37.7 37.1 37.1 37.9 37.9 37.8 37.8 37.1	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1 -61.4 -60.9 -66.4 -61.0	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-51.4 47.9 46.1 -52.1 48.4 47.9 -53.4 48.0	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65 2.48 3.31 id Channel 1.67	(dBm) (826.4MHz) -68.1 -68.9 -70.0 -69.0 -69.5 -70.9 (836.6MHz) -70.2	(H/V) H H V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3 -25.4 -24.1 -29.7	37.7 37.1 37.9 37.7 37.1 37.9 37.9 37.8	1.0 1.0 1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1 -61.4 -60.9	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-51.4 47.9 46.1 -52.1 48.4 47.9	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65 2.48 3.31 id Channel 1.67 2.51 3.35 1.67 2.51	(dBm) (826.4MHz) -68.1 -68.9 -70.0 -69.5 -70.9 (836.6MHz) -70.2 -69.1 -70.5 -68.2 -70.1	(H/V) H H V V V V H H H V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3 -25.4 -24.1 -29.7 -29.7 -25.0 -22.7 -22.7 -27.4 -25.9	37.7 37.1 37.9 37.7 37.1 37.9 37.8 37.8 37.8 37.8 37.8 37.8 37.8 37.1	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1 -61.4 -60.9 -66.4 -61.0 -59.5 -64.2 -62.0	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-51.4 -47.9 -46.1 -52.1 -48.4 -47.9 -53.4 -48.0 -46.5 -51.2 -49.0	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65 2.48 3.31 id Channel 1.67 2.51 3.35 1.67	(dBm) (826.4MHz) -68.1 -68.9 -70.0 -69.5 -70.9 (836.6MHz) -70.2 -69.1 -70.5 -68.2	(H/V) H H V V V V H H H V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3 -25.4 -24.1 -29.7 -29.7 -25.0 -22.7 -27.4	37.7 37.1 37.9 37.7 37.1 37.1 37.9 37.8 37.1 37.8 37.8 37.8	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1 -61.4 -60.9 -66.4 -61.0 -59.5 -64.2	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-51.4 47.9 46.1 -52.1 48.4 47.9 -53.4 -53.4 48.0 46.5 -51.2	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65 2.48 3.31 1.65 2.48 3.31 1.67 2.51 3.35 1.67 2.51 3.35	(dBm) (826.4MHz) -68.1 -68.9 -70.0 -69.0 -69.0 -69.5 -70.9 (836.6MHz) -70.2 -69.1 -70.5 -68.2 -70.1 -69.8	(H/V) H H V V V V H H H V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3 -25.4 -24.1 -29.7 -29.7 -25.0 -22.7 -22.7 -27.4 -25.9	37.7 37.1 37.9 37.7 37.1 37.9 37.8 37.8 37.8 37.8 37.8 37.8 37.8 37.1	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1 -61.4 -60.9 -66.4 -61.0 -59.5 -64.2 -62.0	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-51.4 -47.9 -46.1 -52.1 -48.4 -47.9 -53.4 -48.0 -46.5 -51.2 -49.0	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65 2.48 3.31 1.65 2.48 3.31 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35	(dBm) (826.4MHz) -68.1 -68.9 -70.0 -69.0 -69.0 -69.5 -70.9 (836.6MHz) -70.2 -69.1 -70.5 -68.1 -70.5 -68.2 -70.1 -69.8 (846.6MHz)	(H/V) H H V V V V H H H V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3 -25.4 -24.1 -29.7 -25.0 -22.7 -27.4 -25.9 -22.9	37.7 37.1 37.9 37.7 37.1 37.9 37.8 37.8 37.1 37.8 37.8 37.8 37.8 37.8 37.8 37.8 37.8	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1 -61.4 -60.9 -66.4 -61.0 -59.5 -64.2 -62.0 -59.7	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-51.4 47.9 -46.1 -52.1 -48.4 47.9 -53.4 -48.0 -46.5 -51.2 -49.0 -46.7	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65 2.48 3.31 1.65 2.48 3.31 1.67 2.51 3.35 1.67 2.51 3.35	(dBm) (826.4MHz) -68.1 -68.9 -70.0 -69.0 -69.0 -69.5 -70.9 (836.6MHz) -70.2 -69.1 -70.5 -68.2 -70.1 -69.8	(H/V) H H V V V V H H H V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3 -25.4 -24.1 -29.7 -29.7 -25.0 -22.7 -22.7 -27.4 -25.9	37.7 37.1 37.9 37.7 37.1 37.9 37.8 37.8 37.8 37.8 37.8 37.8 37.8 37.1	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1 -61.4 -60.9 -66.4 -61.0 -59.5 -64.2 -62.0	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-51.4 -47.9 -46.1 -52.1 -48.4 -47.9 -53.4 -48.0 -46.5 -51.2 -49.0	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65 2.48 3.31 id Channel 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35	(dBm) (826.4MHz) -68.1 -68.9 -70.0 -69.0 -69.5 -70.9 (836.6MHz) -70.2 -69.1 -70.2 -69.1 -70.5 -68.2 -70.1 -69.8 (846.6MHz) -70.2	(H/V) H H V V V V V V V V V V H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3 -25.4 -24.1 -29.7 -25.0 -22.7 -27.4 -25.9 -22.9 -22.9 -22.9	37.7 37.1 37.9 37.7 37.1 37.9 37.8 37.8 37.8 37.8 37.8 37.8 37.8 37.8	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1 -61.4 -60.9 -66.4 -61.0 -59.5 -64.2 -62.0 -59.7 -66.3	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-51.4 -47.9 -46.1 -52.1 -48.4 -47.9 -53.4 -48.0 -46.5 -51.2 -49.0 -46.7 -53.3	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65 2.48 3.31 lid Channel 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35	(dBm) (826.4MHz) -68.1 -68.9 -70.0 -69.0 -69.5 -70.9 (836.6MHz) -70.2 -69.1 -70.2 -69.1 -70.1 -68.2 -70.1 -69.8 (846.6MHz) -70.2 -69.0	(H/V) H H V V V V V V H H H H V V V V V V V V V V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3 -25.4 -24.1 -29.7 -25.0 -22.7 -27.4 -25.9 -22.9 -22.9 -22.9	37.7 37.1 37.9 37.7 37.1 37.9 37.8 37.8 37.8 37.8 37.8 37.8 37.8 37.8	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1 -61.4 -60.9 -66.4 -61.0 -59.5 -64.2 -62.0 -59.7 -66.3 -60.8	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-51.4 -47.9 -46.1 -52.1 -48.4 -47.9 -53.4 -48.0 -46.5 -51.2 -49.0 -46.7 -53.3 -47.8	Notes
(GHz) ow Channel 1.65 2.48 3.31 1.65 2.48 3.31 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35 1.67 2.51 3.35	(dBm) (826.4MHz) -68.9 -70.0 -69.0 -69.5 -70.9 (836.6MHz) -70.2 -69.1 -70.5 -68.2 -70.1 -69.8 (846.6MHz) -70.2 -69.0 -70.5	(H/V) H H V V V V V V H H H H H H H H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -27.7 -24.9 -22.2 -28.3 -25.4 -24.1 -25.4 -24.1 -25.9 -22.7 -25.0 -22.7 -25.9 -22.9 -22.9 -29.5 -24.6 -22.7	37.7 37.1 37.9 37.7 37.1 37.9 37.8 37.8 37.8 37.1 37.8 37.8 37.8 37.8 37.8 37.8 37.8 37.8	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	-64.4 -60.9 -59.1 -65.1 -61.4 -60.9 -66.4 -61.0 -59.5 -64.2 -62.0 -59.7 -66.3 -60.8 -59.5	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-51.4 47.9 46.1 -52.1 48.4 47.9 -53.4 48.0 46.5 -51.2 49.0 46.7 -53.3 47.8 46.5	Notes

Page 109 of 118

## REPORT NO: 16U23814-E10V2 FCC ID: BCGA1823 UMTS HSDPA, 850MHz BAND 5

### **High Frequency Substitution Measurement** UL Fremont Radiated Chamber

Company: Project #: Date:

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

Test Equipment:

Substitution: Horn T59 Substitution, and 8ft SMA Cable

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

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel	(826.4MHz)									
1.65	-67.8	Н	3.0	-26.6	33.7	1.0	-59.3	-13.0	-46.3	
2.48	-68.9	Н	3.0	-24.7	34.1	1.0	-57.8	-13.0	-44.8	
3.31	-68.0	Н	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	Н	3.0	-27.6	33.7	1.0	-60.3	-13.0	-47.3	
2.51	-68.1	Н	3.0	-23.9	34.1	1.0	-57.0	-13.0	-44.0	
3.35	-69.4	Н	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	Н	3.0	-28.4	33.7	1.0	-61.1	-13.0	-48.1	
2.54	-69.0	Н	3.0	-24.6	34.1	1.0	-57.7	-13.0	-44.7	
3.39	-70.5	Н	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	

**UL VERIFICATION SERVICES INC.** FORM NO: CCSUP4701i 47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888 This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Page 110 of 118

## UMTS REL 99, 1900MHz BAND 2

				titution Meas ated Chambe						
Company: Project #:		16U23814								
Date:		11/16/16								
Fest Engine		39005								
Configuratio		EUT only								
/lode:		REL 99, 1900	ЛНz							
Test Equipn	nent:									
	: Horn T59 Su	ubstitution, a	and 8ft SMA (	Cable						
	Chambe	r	Pre	-amplifer		Filter			Limit	
3m	n Chamber H	-	3m Ch	amber H 🚽	Filter	-		EIRP	-	
				EIRP @ TX						
-					_					
Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
(GHz) ow Channel	(dBm) (1852.4MHz)	(H/V)		Ant End (dBm)	· ·					Notes
(GHz) ow Channel 3.70	(dBm) (1852.4MHz) -60.5	(H/V) Н	3.0	Ant End (dBm)	37.4	1.0	-49.0	-13.0	-36.0	Notes
(GHz) ow Channel 3.70 5.56	(dBm) (1852.4MHz) -60.5 -62.4	(H/V) н н	3.0 3.0	Ant End (dBm) -12.6 -11.4	37.4 36.7	1.0 1.0	-49.0 -47.1	-13.0 -13.0		Notes
(GHz) ow Channel 3.70 5.56 7.41	(dBm) (1852.4MHz) -60.5 -62.4 -64.4	(H/V) H H H	3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6	37.4 36.7 36.0	1.0 1.0 1.0	-49.0 -47.1 -45.6	-13.0 -13.0 -13.0	-36.0 -34.1 -32.6	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -61.3	(H/V) H H H V	3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7	37.4 36.7 36.0 37.4	1.0 1.0 1.0 1.0 1.0	-49.0 -47.1 -45.6 -50.1	-13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -61.3 -63.5	(H/V) H H H	3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5	37.4 36.7 36.0	1.0 1.0 1.0	-49.0 -47.1 -45.6	-13.0 -13.0 -13.0	-36.0 -34.1 -32.6	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56 7.41	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -61.3 -63.5 -65.4	(H/V) H H V V V	3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7	37.4 36.7 36.0 37.4 36.7	1.0 1.0 1.0 1.0 1.0 1.0	-49.0 -47.1 -45.6 -50.1 -48.2	-13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2	Notes
(GHz) .ow Channel 3.70 5.56 7.41 3.70 5.56 7.41 41d Channel	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -61.3 -63.5 -65.4 (1880MHz)	(H/V) H H V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5 -11.9	37.4 36.7 36.0 37.4 36.7 36.0	1.0 1.0 1.0 1.0 1.0 1.0	49.0 47.1 45.6 -50.1 48.2 46.9	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2 -33.9	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56 7.41 id Channel 3.76	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -61.3 -63.5 -65.4 (1880MHz) -61.3	(H/V) H H V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5 -11.9 -13.3	37.4 36.7 36.0 37.4 36.7 36.0 37.4	1.0 1.0 1.0 1.0 1.0 1.0 1.0	-49.0 -47.1 -45.6 -50.1 -48.2 -46.9 -49.7	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2 -33.9 -36.7	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56 7.41 10 10 10 10 10 10 10 10 10 10 10 10 10	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -61.3 -63.5 -65.4 (1880MHz) -61.3 -64.3	(H/V) H H V V V V H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5 -11.9 -13.3 -13.2	37.4 36.7 36.0 37.4 36.7 36.0 37.4 36.7	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	49.0 47.1 45.6 -50.1 48.2 46.9 49.7 48.9	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2 -33.9 -36.7 -35.9	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56 7.41 Mid Channel 3.76 5.64 7.52	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -61.3 -63.5 -65.4 (1880MHz) -61.3 -64.3 -64.3 -64.1	(H/V) H H V V V V H H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5 -11.9 -13.3 -13.2 -10.2	37.4 36.7 36.0 37.4 36.7 36.0 37.4 36.7 35.9	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	49.0 47.1 45.6 -50.1 48.2 46.9 49.7 48.9 45.1	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2 -33.9 -36.7 -35.9 -32.1	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56 7.41 id Channel 3.76 5.64	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -61.3 -63.5 -65.4 (1880MHz) -61.3 -64.3	(H/V) H H V V V V H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5 -11.9 -13.3 -13.2	37.4 36.7 36.0 37.4 36.7 36.0 37.4 36.7	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	49.0 47.1 45.6 -50.1 48.2 46.9 49.7 48.9	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2 -33.9 -36.7 -35.9	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56 7.41 11d Channel 3.76 5.64 7.52 3.76	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -64.4 -61.3 -63.5 -65.4 (1880MHz) -61.3 -64.1 -64.1 -61.3	(H/V) H H V V V V H H H V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5 -13.7 -12.5 -11.9 -13.3 -13.2 -10.2 -13.5	37.4 36.7 36.0 37.4 36.0 37.4 36.0 37.4 36.7 35.9 37.4	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	49.0 47.1 45.6 -50.1 48.2 46.9 49.7 48.9 45.1 49.9	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2 -33.9 -36.7 -36.9 -32.1 -36.9	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56 7.41 lid Channel 3.76 5.64 7.52 3.76 5.64 7.52	(dBm) (1852.4MHz) -60.5 -62.4 -61.3 -61.3 -63.5 -65.4 (1880MHz) -61.3 -64.3 -64.1 -61.3 -64.1 -61.3 -63.3 -65.0	(H/V) H H V V V V H H H V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5 -11.9 -13.3 -13.2 -13.2 -10.2 -13.5 -12.1	37.4 36.7 36.0 37.4 36.7 36.0 37.4 36.7 35.9 37.4 36.7	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	49.0 47.1 45.6 -50.1 48.2 46.9 	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2 -33.9 -36.7 -35.9 -32.1 -36.9 -34.9	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56 7.41 1d Channel 3.76 5.64 7.52 3.76 5.64 7.52	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -64.4 -61.3 -63.5 -65.4 (1880MHz) -61.3 -64.1 -61.3 -64.1 -61.3 -64.1 -61.3 -63.3 -65.0 (1907.6MHz)	(H/V) H H V V V V V V V V V V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5 -13.7 -12.5 -11.9 -13.3 -13.2 -10.2 -13.5 -12.1 -11.4	37.4 36.7 36.0 37.4 36.7 36.0 37.4 36.7 35.9 37.4 36.7 35.9 37.4 36.7 35.9	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	49.0 47.1 45.6 -50.1 48.2 46.9 49.7 48.9 45.1 49.9 45.1 49.9 47.9 46.3	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2 -33.9 -36.7 -35.9 -32.1 -36.9 -34.9 -33.3	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56 7.41 lid Channel 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -61.3 -63.5 -65.4 (1880MHz) -61.3 -64.3 -64.3 -64.3 -64.3 -64.3 -65.0 (1907.6MHz) -61.3	(H/V) H H V V V V V V V V V V V V H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5 -11.9 -13.3 -13.2 -13.2 -10.2 -13.5 -12.1 -11.4 -13.3	37.4 36.7 36.0 37.4 36.7 36.0 37.4 36.7 35.9 37.4 36.7 35.9 37.4 36.7 35.9	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	49.0 47.1 45.6 50.1 48.2 46.9 49.7 48.9 45.1 49.9 47.9 46.3 49.6	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2 -33.9 -36.7 -35.9 -32.1 -36.9 -34.9 -33.3 -36.6	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56 7.41 lid Channel 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -61.3 -63.5 -65.4 (1880MHz) -61.3 -64.3 -64.1 -61.3 -63.3 -65.0 (1907.6MHz) -61.3 -61.3 -64.3	(H/V) H H V V V V V V V V V V H H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5 -11.9 -13.3 -13.2 -10.2 -13.5 -12.1 -13.5 -12.1 -11.4 -13.3 -13.0	37.4 36.7 36.0 37.4 36.7 36.0 37.4 36.7 35.9 37.4 36.7 35.9 37.4 35.9 37.4 36.7 35.9	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	49.0 47.1 45.6 50.1 50.1 48.2 46.9 49.7 48.9 45.1 49.9 45.1 49.9 45.3 49.9 46.3	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2 -33.9 -36.7 -35.9 -32.1 -36.9 -34.9 -34.9 -33.3 -36.6 -35.7	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56 7.41 Aid Channel 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 7.52 7.52 7.52	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -61.3 -63.5 -65.4 (1880MHz) -61.3 -64.3 -64.1 -64.3 -63.3 -65.0 (1907.6MHz) -61.3 -64.3 -64.3 -64.3 -63.9	(H/V) H H V V V V V V H H H H H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5 -11.9 -13.3 -13.2 -10.2 -13.5 -12.1 -11.4 -11.4 -13.3 -13.0 -9.9	37.4 36.7 36.0 37.4 36.7 36.0 37.4 36.7 35.9 37.4 36.7 35.9 37.3 36.7 35.8	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	49.0 47.1 45.6 50.1 48.2 46.9 49.7 48.9 45.1 49.9 45.1 49.9 45.1 49.9 45.1 49.9 45.1 49.9 45.1 49.9 45.1 47.6 3 47.6 48.2 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 47.9 45.7 47.9 45.7 47.9 45.7 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2 -33.9 -36.7 -35.9 -32.1 -36.9 -34.9 -33.3 -36.6 -35.7 -31.8	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56 7.41 1d Channel 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.56 7.41 3.82 5.72 7.63 3.82	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -64.3 -63.5 -65.4 (1880MHz) -61.3 -64.1 -61.3 -64.1 -61.3 -64.1 -61.3 -63.3 -65.0 (1907.6MHz) -61.3 -63.9 -61.4	(H/V) H H V V V V V V V V V V V V V	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5 -13.7 -12.5 -11.9 -13.3 -13.2 -10.2 -13.5 -12.1 -11.4 -13.3 -13.0 -9.9 -13.4	37.4 36.7 36.0 37.4 36.7 36.0 37.4 36.7 35.9 37.4 36.7 35.9 37.3 36.7 35.9 37.3 36.7 35.9	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	49.0 47.1 45.6 50.1 48.2 46.9 49.7 48.9 45.1 49.9 47.9 45.1 49.9 47.9 46.3 46.3	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2 -33.9 -36.7 -35.9 -32.1 -36.9 -32.1 -36.9 -34.9 -33.3 -36.6 -35.7 -31.8 -36.7	Notes
(GHz) ow Channel 3.70 5.56 7.41 3.70 5.56 7.41 Mid Channel 3.76 5.64 7.52 3.76 5.64 7.52 3.76 5.64 7.52 4igh Channel 3.82 5.72 7.63	(dBm) (1852.4MHz) -60.5 -62.4 -64.4 -61.3 -63.5 -65.4 (1880MHz) -61.3 -64.3 -64.3 -64.1 -61.3 -63.3 -65.0 (1907.6MHz) -61.3 -64.3 -64.3 -63.9	(H/V) H H V V V V V V H H H H H H	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Ant End (dBm) -12.6 -11.4 -10.6 -13.7 -12.5 -11.9 -13.3 -13.2 -10.2 -13.5 -12.1 -11.4 -11.4 -13.3 -13.0 -9.9	37.4 36.7 36.0 37.4 36.7 36.0 37.4 36.7 35.9 37.4 36.7 35.9 37.3 36.7 35.8	1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	49.0 47.1 45.6 50.1 48.2 46.9 49.7 48.9 45.1 49.9 45.1 49.9 45.1 49.9 45.1 49.9 45.1 49.9 45.1 49.9 45.1 47.6 3 47.6 48.2 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 48.9 45.7 47.9 45.7 47.9 45.7 47.9 45.7 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.9 47.	-13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0 -13.0	-36.0 -34.1 -32.6 -37.1 -35.2 -33.9 -36.7 -35.9 -32.1 -36.9 -34.9 -33.3 -36.6 -35.7 -31.8	Notes

UL VERIFICATION SERVICES INC. 47173 BENICIA STREET, FREMONT, CA 94538, USA This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. FORM NO: CCSUP4701i TEL: (510) 771-1000 FAX: (510) 661-0888 TEL: (510) 771-1000 FAX: (510) 661-0888 TEL: (510) 771-1000 FAX: (510) 661-0888 FORM NO: CCSUP4701i

Page 111 of 118

## REPORT NO: 16U23814-E10V2 FCC ID: BCGA1823 UMTS HSDPA, 1900MHz BAND 2

				titution Meas ated Chambe						
Company: Project #: Date: Test Engin Configurat Mode:	ieer: ion:	16U23814 11/16/16 39005 EUT only HSDPA 1900M	IHz							
Test Equip		1 - da - d		N-1-1-						
Substitutio	n: Horn T59 Su	ibstitution, a	IND 8TT SMA C	Jable	_					
	Chamb	ber	Pi	re-amplifer		Filter			Limit	
Γ	3m Chamber H	+ ۲	3m (	Chamber H	. Filte	er	-	EIRP		•
-	y SA reading		Distance	EIRP @ TX Ant End	Preamp	Attenuator	EIRP	Limit	Delta	Notes
(GHz)	(dBm) el (1852.4MHz)	(H/V)		(dBm)						
3.70	-60.8	Н	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	Н	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 Channe	I (1880MHz)									
3.76	-61.1	Н	3.0	-13.1	37.4	1.0	-49.5	-13.0	-36.5	
	-64.4	Η	3.0	-13.3	36.7	1.0	-49.0	-13.0	-36.0	
5.64	-64.1	H	3.0	-10.3	35.9	1.0	-45.2	-13.0	-32.2	
5.64 7.52	-61.5	V	3.0 3.0	-13.7	37.4	1.0	-50.1	-13.0	-37.1	
5.64 7.52 3.76			3.0	-11.7	36.7	1.0	-47.4	-13.0 -13.0	-34.4 -33.7	
5.64 7.52 3.76 5.64	-62.9	V		11 9		10				
5.64 7.52 3.76		V V	3.0	-11.8	35.9	1.0	-46.7	-13.0	-0011	
5.64 7.52 3.76 5.64 7.52	-62.9			-11.8	35.9	1.0	-46.7	-13.0	-0011	
5.64 7.52 3.76 5.64 7.52 High Chann 3.82	-62.9 -65.4 el (1907.6MHz) -61.4	V H	3.0	-13.4	37.3	1.0	-49.7	-13.0	-36.7	
5.64 7.52 3.76 5.64 7.52 High Channe 3.82 5.72	-62.9 -65.4 el (1907.6MHz) -61.4 -64.6	V H H	3.0 3.0 3.0	-13.4 -13.4	37.3 36.7	1.0 1.0	-49.7 -49.1	-13.0 -13.0	-36.7 -36.1	
5.64 7.52 3.76 5.64 7.52 High Chann 3.82 5.72 7.63	-62.9 -65.4 el (1907.6MHz) -61.4 -64.6 -63.8	V H H H	3.0 3.0 3.0 3.0 3.0	-13.4 -13.4 -9.9	37.3 36.7 35.8	1.0 1.0 1.0	-49.7 -49.1 -44.7	-13.0 -13.0 -13.0	-36.7 -36.1 -31.7	
5.64 7.52 3.76 5.64 7.52 High Chann 3.82 5.72 7.63 3.82	-62.9 -65.4 el (1907.6MHz) -61.4 -64.6 -63.8 -61.4	V H H H V	3.0 3.0 3.0 3.0 3.0 3.0	-13.4 -13.4 -9.9 -13.4	37.3 36.7 35.8 37.3	1.0 1.0 1.0 1.0	<u>49.7</u> <u>49.1</u> <u>44.7</u> <u>49.7</u>	-13.0 -13.0 -13.0 -13.0	-36.7 -36.1 -31.7 -36.7	
5.64 7.52 3.76 5.64 7.52 High Chann 3.82 5.72 7.63	-62.9 -65.4 el (1907.6MHz) -61.4 -64.6 -63.8	V H H H	3.0 3.0 3.0 3.0 3.0	-13.4 -13.4 -9.9	37.3 36.7 35.8	1.0 1.0 1.0	-49.7 -49.1 -44.7	-13.0 -13.0 -13.0	-36.7 -36.1 -31.7	

Page 112 of 118 **UL VERIFICATION SERVICES INC.** 

## REPORT NO: 16U23814-E10V2 FCC ID: BCGA1823 UMTS REL 99, 1700MHz BAND 4

#### High Frequency Substitution Measurement UL Fremont Radiated Chamber

Company: Project #: Date: Test Engineer: Configuration: Mode:

16U23814 11/16/16 39005 EUT only 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	Н	3.0	-10.5	37.7	1.0	-47.2	-13.0	-34.2	
5.14	-57.0	Н	3.0	-6.7	36.8	1.0	-42.6	-13.0	-29.6	
6.85	-57.5	Н	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	Н	3.0	-10.4	37.7	1.0	-47.1	-13.0	-34.1	
5.20	-57.3	Н	3.0	-6.9	36.8	1.0	-42.7	-13.0	-29.7	
6.93	-58.0	Η	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	Н	3.0	-9.8	37.6	1.0	-46.4	-13.0	-33.4	
5.26	-57.6	Н	3.0	-7.1	36.8	1.0	-42.9	-13.0	-29.9	
7.01	-58.0	Η	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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Page 113 of 118

## REPORT NO: 16U23814-E10V2 FCC ID: BCGA1823 UMTS HSDPA, 1700MHz BAND 4

#### High Frequency Substitution Measurement UL Fremont Radiated Chamber

Company: Project #: Date: Test Engineer: Configuration: Mode:

16U23814 11/16/16 39005 EUT only

39005 EUT only HSDPA 1700MHz

### Test Equipment:

Substitution: Horn T59 Substitution, and 8ft SMA Cable

	Chamber		Pre-amplifer	Filter		Limit	
3	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	Н	3.0	-10.6	37.7	1.0	-47.3	-13.0	-34.3	
5.14	-57.0	Н	3.0	-6.7	36.8	1.0	-42.6	-13.0	-29.6	
6.85	-58.0	Н	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	Н	3.0	-10.8	37.7	1.0	-47.5	-13.0	-34.5	
5.20	-57.3	Н	3.0	-6.9	36.8	1.0	-42.7	-13.0	-29.7	
6.93	-58.3	Н	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	Н	3.0	-10.0	37.6	1.0	-46.6	-13.0	-33.6	
5.26	-57.8	Н	3.0	-7.4	36.8	1.0	-43.2	-13.0	-30.2	
7.01	-58.5	Н	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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Page 114 of 118