CERTIFICATION TEST REPORT

Report Number. : 11708541-E7V3

Applicant	:	APPLE, INC. 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A.
Model	:	A1863, A1907
FCC ID	:	BCG-E3159A
IC	:	579C-E3159A
EUT Description	:	SMARTPHONE
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:
August 10, 2017

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP TESTING
NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	7/27/2017	Initial Review	--
V2	7/28/2017	Updated Section 5.3 and Section 7	Anthony Cerezo
V3	8/10/2017	Address TCB Requests	Mengistu Mekuria

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: SMARTPHONE

MODEL: A1863, A1907

SERIAL NUMBER: C7CTW01UJ8V9

DATE TESTED: March 29, 2017 – July 27, 2017

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

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

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

Approved & Released For
UL Verification Services Inc. By:

CHIN PANG
SENIOR ENGINNER
UL VERIFICATION SERVICES INC.

Prepared By:

TINA CHU
TEST ENGINEER
UL VERIFICATION SERVICES INC.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with 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, KDB 971168 D02 v01. 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: 22541-1)
☐ Chamber B (IC:2324B-2)	☒ Chamber E (IC: 22541-2)
☐ Chamber C (IC:2324B-3)	☒ Chamber F (IC: 22541-3)
	☒ Chamber G (IC: 22541-4)
	☐ Chamber H (IC: 22541-5)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Radiated Disturbance,1000 to 18000 MHz	4.32 dB
Radiated Disturbance,18000 to 26000 MHz	4.45 dB
Radiated Disturbance,26000 to 40000 MHz	5.24 dB
Occupied Channel Bandwidth	±0.39 %
Temperature	±0.9 °C
Supply voltages	±0.45 %
Time	±0.02 %

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The Equipment Under Test is a mobile phone with GSM, GPRS, EGPRS, UMTS, LTE, TD-SCDMA and CDMA technologies. It also supports IEEE 802.11a/b/g/n/ac, Bluetooth®, GPS and NFC. The device has a built-in inductive charging receiver which is not user accessible. The rechargeable battery is not user accessible.

5.2. DIFFERENCE IN MODEL NUMBER

Model A1863 and A1907 are identical. Two model numbers are allocated for marketing and logistic purpose only.

5.3. MAXIMUM OUTPUT POWER

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015
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.2

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.

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted and ERP/EIRP output powers as follows:

5.3.1. LAT 1

GSM MODES

RSS 132 850MHz Band IC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
824- 849	GPRS	33.30	-1.78	31.52	1419.1	40.6	-9.1
	EGPRS	28.00	-1.78	26.22	418.8	40.6	-14.4
Part 22 850MHz Band FCC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	ERP		Limit (dBm)	Margin (dB)
				dBm	mW		
824-849	GPRS	33.30	-1.78	29.37	865.0	38.5	-9.1
	EGPRS	28.00	-1.78	24.07	255.3	38.5	-14.4
Part 24 / RSS 133 1900MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
1850-1910	GPRS	31.30	-1.64	29.66	924.7	33.0	-3.3
	EGPRS	27.00	-1.64	25.36	343.6	33.0	-7.6

CDMA2000 MODES

Part 90 800MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	ERP		Limit (dBm)	Margin (dB)
				dBm	mW		
816-824	CDMA 1xRTT	24.80	-2.51	20.14	103.3	50.0	-29.9
	CDMA EVDO Rev A	24.80	-2.51	20.14	103.3	50.0	-29.9
RSS 132 850MHz Band IC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
824- 849	CDMA 1xRTT	24.80	-1.78	23.02	200.4	40.6	-17.6
	CDMA EVDO-Rev A	24.80	-1.78	23.02	200.4	40.6	-17.6
Part 22 850MHz Band FCC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	ERP		Limit (dBm)	Margin (dB)
				dBm	mW		
824- 849	CDMA 1xRTT	24.80	-1.78	20.87	122.2	38.5	-17.6
	CDMA EVDO-Rev A	24.80	-1.78	20.87	122.2	38.5	-17.6
Part 24 / RSS 133 1900MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
1850-1910	CDMA 1xRTT	25.00	-1.64	23.36	216.8	33.0	-9.6
	CDMA EVDO Rev A	25.00	-1.64	23.36	216.8	33.0	-9.6

UMTS MODE

RSS 132 850MHz Band IC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
824- 849	REL 99	24.80	-1.78	23.02	200.4	40.6	-17.6
	HSDPA	24.70	-1.78	22.92	195.9	40.6	-17.7
Part 22 850MHz Band FCC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	ERP		Limit (dBm)	Margin (dB)
				dBm	mW		
824-849	REL 99	24.80	-1.78	20.87	122.2	38.5	-17.6
	HSDPA	24.70	-1.78	20.77	119.4	38.5	-17.7
Part 24 / RSS 133 1900MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
1850-1910	REL 99	25.00	-1.64	23.36	216.8	33.0	-9.6
	HSDPA	24.90	-1.64	23.26	211.8	33.0	-9.7
Part 27 / RSS 139 1700MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
1710-1755	REL 99	25.30	-3.54	21.76	150.0	30.0	-8.2
	HSDPA	25.20	-3.54	21.66	146.6	30.0	-8.3

5.3.2. UAT 1

GSM MODES

RSS 132 850MHz Band IC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
824- 849	GPRS	30.80	-2.26	28.54	714.5	40.6	-12.1
	EGPRS	25.50	-2.26	23.24	210.9	40.6	-17.4
Part 22 850MHz Band FCC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	ERP		Limit (dBm)	Margin (dB)
				dBm	mW		
824-849	GPRS	30.80	-2.26	26.39	435.5	38.5	-12.1
	EGPRS	25.50	-2.26	21.09	128.5	38.5	-17.4
Part 24 / RSS 133 1900MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
1850-1910	GPRS	26.80	1.90	28.70	741.3	33.0	-4.3
	EGPRS	24.50	1.90	26.40	436.5	33.0	-6.6

CDMA2000 MODES

Part 90 800MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	ERP		Limit (dBm)	Margin (dB)
				dBm	mW		
816-824	CDMA 1xRTT	23.30	-3.46	17.69	58.7	50.0	-32.3
	CDMA EVDO Rev A	23.30	-3.46	17.69	58.7	50.0	-32.3
RSS 132 850MHz Band IC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
824- 849	CDMA 1xRTT	23.30	-2.26	21.04	127.1	40.6	-19.6
	CDMA EVDO-Rev A	23.30	-2.26	21.04	127.1	40.6	-19.6
Part 22 850MHz Band FCC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	ERP		Limit (dBm)	Margin (dB)
				dBm	mW		
824- 849	CDMA 1xRTT	23.30	-2.26	18.89	77.4	38.5	-19.6
	CDMA EVDO-Rev A	23.30	-2.26	18.89	77.4	38.5	-19.6
Part 24 / RSS 133 1900MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
1850-1910	CDMA 1xRTT	19.30	1.90	21.20	131.8	33.0	-11.8
	CDMA EVDO Rev A	19.30	1.90	21.20	131.8	33.0	-11.8

UMTS MODE

RSS 132 850MHz Band IC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
824- 849	REL 99	23.80	-2.26	21.54	142.6	40.6	-19.1
	HSDPA	23.70	-2.26	21.44	139.3	40.6	-19.2
Part 22 850MHz Band FCC							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	ERP		Limit (dBm)	Margin (dB)
				dBm	mW		
824-849	REL 99	23.80	-2.26	19.39	86.9	38.5	-19.1
	HSDPA	23.70	-2.26	19.29	84.9	38.5	-19.2
Part 24 / RSS 133 1900MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
1850-1910	REL 99	19.30	1.78	21.08	128.2	33.0	-11.9
	HSDPA	19.20	1.78	20.98	125.3	33.0	-12.0
Part 27 / RSS 139 1700MHz Band							
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
1710-1755	REL 99	18.80	2.37	21.17	130.9	30.0	-8.8
	HSDPA	18.70	2.37	21.07	127.9	30.0	-8.9

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version 00.32.00.

5.5. MAXIMUM ANTENNA GAIN

Frequency (MHz)	LAT 1 Antenna Gain (dBi)	UAT 1 Antenna Gain (dBi)
816 - 824	-2.51	-3.46
824 - 849	-1.78	-2.26
1850 - 1910	-1.64	1.90
1710 - 1755	-3.54	2.37

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case is EUT on the highest power. Based on Average 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

CDMA BC10 band is supported in USA only.

The EUT was investigated in three orthogonal orientations X/Y/Z on both LAT 1 and UAT 1 antennas. It was determined that Y (Landscape) orientation was the worst-case orientation for all bands on LAT 1 antenna without AC/DC adapter, headphones, or laptop.
X(Flatbed) orientation for all bands on UAT 1 antenna without AC/DC adapter, headphones, or laptop.

Radiated spurious emissions were investigated below 30MHz, 30MHz-1GHz and above 1GHz. There were no emissions found on below 30MHz and 30MHz-1GHz.

For simultaneous transmission of multiple channels in the 2.4GHz and Cellular bands, tests were conducted for various configurations having the highest power, least separation in frequencies and widest operation bandwidths. No noticeable new emission was found.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List			
Description	**Manufacturer**	**Model**	**Serial Number**
AC/DC adapter	HP	HNSTNN-DA40	WDWR7OBAR9AKS8
Laptop	HP	HP ProBook 450 G2	CND5367Z97

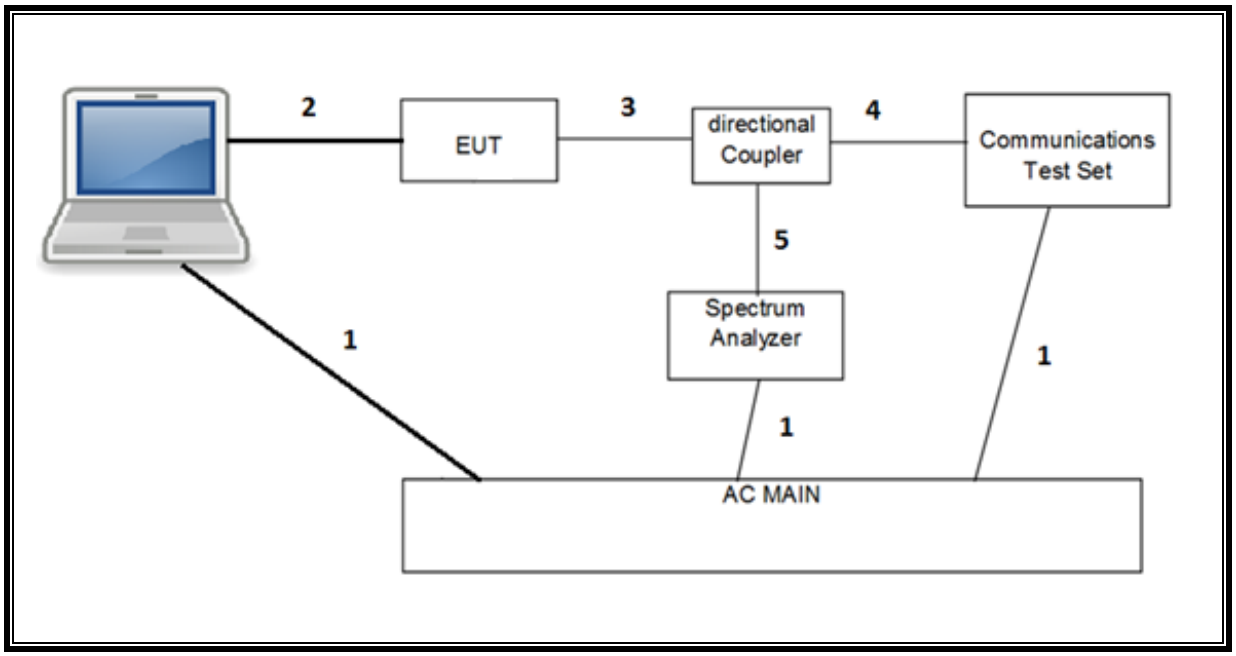
I/O CABLES (RF Conducted Test)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	US 115V	Un-shielded	2.0m	N/A
2	USB	1	DC	Un-shielded	1.0m	N/A
3	RF In/Out	1	EUT	Un-shielded	0.6m	N/A
4	RF In/Out	1	Communication Test Set	Un-shielded	1.2m	N/A
5	RF In/Out	1	Barrel	N/A	N/A	N/A

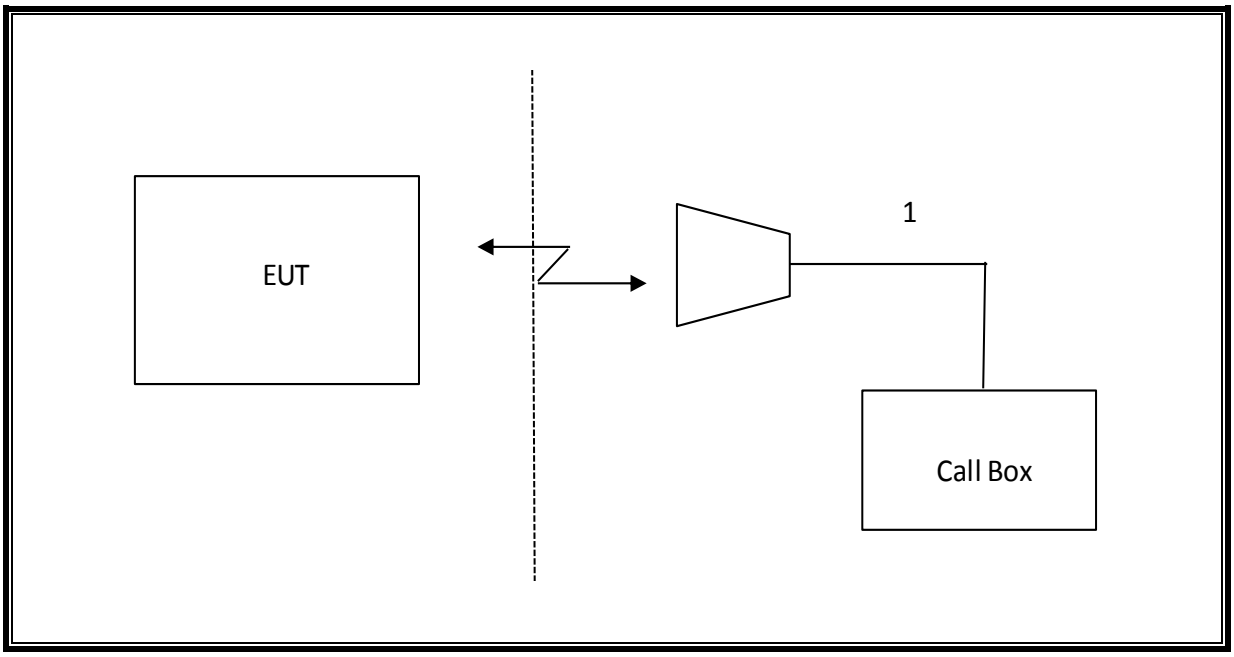
I/O CABLES (RF Radiated Test)

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

CONDUCTED SETUP



RADIATED SETUP



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T300	11/10/17
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T426	9/23/2017
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T243	10/11/2017
*Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T285	6/20/2017
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1613	9/23/2017
*Antenna, Horn 1-18GHz	ETS Lindgren	3117	T120	4/5/2017
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T120	5/4/2018
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB1	T122	1/31/2018
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T742	11/29/2017
*Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T173	6/17/2017
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T341	10/25/2017
Spectrum Analyzer, PXA, 3Hz to 50GHz w/Ext. Mixer	Keysight	N9030A	T342	2/23/2018
Spectrum Analyzer, PSA 3Hz to 44GHz	Keysight	E4446A	T123	10/20/2017
*Directional Coupler	KRYTAR	152610	T1537	4/11/2017
Directional Coupler	KRYTAR	152610	T1537	4/24/2018
Wireless Communications Test Set, 8960 Series 10	Agilent	E5515C	T213	2/21/2018
Filter, HPF 3.0GHz	MICROTRONICS	HPM17543	T487	1/28/2018
*Filter, HPF 1.2GHz	Micro-Tronics	WHKX1.2/15G-6ST	T1182	5/31/2017
Filter, HPF 1.2GHz	Micro-Tronics	WHKX1.2/15G-6ST	T1182	6/1/2018
*Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	T1210	6/30/2017
*Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T959	7/09/2017
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T971	8/05/2017
Chamber, Environmental	Cincinnati Sub Zero	ZPHS-8-3.5-SCT/WC	T754	9/10/2017
Antenna, Horn 1-18GHz	Emco	3115	T59	11/18/2017
Amplifier, 26.5GHz to 40GHz	Miteq	NSP 4000 SP2	T88	4/29/2018
*Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Keysight	8449B	T404	7/5/2017
*Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	T447	6/16/2017
Antenna, Horn 26.5GHz to 40GHz	ARA	MWH-2640	T90	8/19/2017
Spectrum Analyzer	Keysight	8564E	T106	9/7/2017
Antenna, Active Loop 9KHz to 30MHz	EMCO	6502	T1616	12/12/2017

NOTE: Equipment that calibrated during the testing period was set for test after the calibration.
*Testing is completed before equipment expiration date.

7. RF POWER OUTPUT VERIFICATION

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted output powers as follows:

7.1. GSM

Using CMW500 Communication Test Set

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

Press **Connection control** to choose the different menus
Press **RESET** > choose all to reset all settings

Connection	Press **Signal Off** to turn off the signal and change settings Network Support > GSM+GPRS or GSM+EGPRS Main Service > Packet Data Service selection > Test Mode A – Auto Slot Config. off	
MS Signal	Press Slot Config bottom on the right twice to select and change the number of time slots and power setting	
	> Slot configuration	> Uplink/Gamma > 33 dBm for GPRS 850/900 > 27 dBm for EGPRS 850/900 > 30 dBm for GPRS1800/1900 > 26 dBm for EGPRS1800/1900
BS Signal	Enter the same channel number for TCH channel (test channel) and BCCH channel	
	Frequency Offset >	+ 0 Hz
	Mode >	BCCH and TCH
	BCCH Level >	-85 dBm (May need to adjust if link is not stable)
	BCCH Channel >	choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]
	Channel Type >	Off
	P0>	4 dB
	Slot Config >	Unchanged (if already set under MS Signal)
	TCH >	choose desired test channel
	Hopping >	Off
	Main Timeslot >	3 (Default)
Network	Coding Scheme >	CS 4 (GPRS) and MCS5-9 (EGPRS)
	Bit Stream >	2E9-1PSR Bit Pattern
AF/RF	Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input	
Connection	Press **Signal On** to turn on the signal and change settings	

Using Agilent 8960A Communication Test Set

System Config: GSM/GPRS Mobile Test
E1968A A.06.31

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

RESULT

7.1.1. GPRS/EGPRS

LAT 1

ID:	50820	**Date:**	4/29/17

Band	Mode	Ch.	f (MHz)	1 time slot	2 time slots
				Average (dBm)	Average (dBm)
850	GPRS	128	824.2	**33.3**	32.3
		190	836.6	33.3	31.8
		251	848.8	32.8	31.8
	EGPRS	128	824.2	**28.0**	26.8
		190	836.6	27.9	27.0
		251	848.8	27.9	27.0
1900	GPRS	512	1850.2	**31.3**	30.3
		661	1880.0	31.0	30.0
		810	1909.8	31.2	30.1
	EGPRS	512	1850.2	**27.0**	25.8
		661	1880.0	26.9	26.0
		810	1909.8	26.8	25.7

UAT 1

ID:	50820	Date:	5/1/17

Band	Mode	Ch.	f (MHz)	1 time slot	2 time slots
				Average (dBm)	Average (dBm)
850	GPRS	128	824.2	**30.8**	29.8
		190	836.6	30.6	29.6
		251	848.8	30.4	29.4
	EGPRS	128	824.2	**25.5**	24.5
		190	836.6	25.4	24.4
		251	848.8	25.4	24.4
1900	GPRS	512	1850.2	26.5	23.8
		661	1880.0	26.5	23.5
		810	1909.8	**26.8**	23.5
	EGPRS	512	1850.2	24.2	23.1
		661	1880.0	24.2	23.3
		810	1909.8	**24.5**	23.5

7.2. CDMA200

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

7.2.1. 1xRTT

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

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

- Protocol Rev > 6 (IS-2000-0)
- System ID: 18; NID: 65535, Reg. Ch. #.: 610 for Cell, 600 for PCS & 450 for AWS
- Radio Config (RC) > RC1 or RC3
- Service Option (SO) Setup > SO55 or SO32
- Traffic Data Rate > Full
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

RESULT

LAT 1

ID:	40813	Date:	5/1/17

1xRTT, BC10, SECONDARY 800

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)		
		CH 450 - 817.25MHz	CH 560 - 820MHz	CH 670 - 822.75MHz
		Average	Average	Average
RC1	2 (Loopback)	24.8	24.7	24.6
	55 (Loopback)	24.8	24.8	24.7
RC2	9 (Loopback)	**24.8**	24.8	24.7
	55 (Loopback)	24.8	24.8	24.7
RC3	2 (Loopback)	24.7	24.8	24.7
	55 (Loopback)	24.8	24.7	24.7
	32 (+ F-SCH)	24.8	24.7	24.7
	32 (+ SCH)	24.7	24.7	24.7
RC4	2 (Loopback)	24.8	24.7	24.7
	55 (Loopback)	24.7	24.7	24.7
	32 (+ F-SCH)	24.8	24.7	24.7
	32 (+ SCH)	24.8	24.7	24.7
RC5	9 (Loopback)	24.8	24.7	24.7
	55 (Loopback)	24.8	24.7	24.7
RC11	2 (Loopback)	24.7	24.7	24.7
	75 (Loopback)	24.7	24.7	24.7
	32 (+ F-SCH)	24.7	24.7	24.7
	32 (+ SCH)	24.8	24.7	24.7

1xRTT, BC0, CELL BAND

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)		
		CH 1013 - 824.7MHz	CH 384 - 836.52MHz	CH 777 - 848.31MHz
		Average	Average	Average
RC1	2 (Loopback)	24.7	24.6	24.7
	55 (Loopback)	24.7	24.6	24.7
RC2	9 (Loopback)	**24.8**	24.6	24.7
	55 (Loopback)	24.7	24.6	24.7
RC3	2 (Loopback)	24.7	24.6	24.7
	55 (Loopback)	24.7	24.6	24.7
	32 (+ F-SCH)	24.7	24.6	24.7
	32 (+ SCH)	24.7	24.6	24.7
RC4	2 (Loopback)	24.7	24.6	24.7
	55 (Loopback)	24.7	24.6	24.7
	32 (+ F-SCH)	24.7	24.6	24.7
	32 (+ SCH)	24.7	24.6	24.7
RC5	9 (Loopback)	24.7	24.6	24.6
	55 (Loopback)	24.7	24.6	24.7
RC11	2 (Loopback)	24.7	24.6	24.7
	75 (Loopback)	24.6	24.6	24.7
	32 (+ F-SCH)	24.7	24.6	24.7
	32 (+ SCH)	24.7	24.6	24.7

1xRTT, BC1, PCS BAND

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)		
		CH 25 - 1851.25MHz	CH 600 - 1880MHz	CH 1175 - 1908.75MHz
		Average	Average	Average
RC1	2 (Loopback)	24.9	24.7	24.8
	55 (Loopback)	24.9	24.8	24.9
RC2	9 (Loopback)	**25.0**	24.6	24.8
	55 (Loopback)	25.0	24.7	24.8
RC3	2 (Loopback)	24.9	24.7	24.9
	55 (Loopback)	24.9	24.7	24.8
	32 (+ F-SCH)	24.9	24.8	24.8
	32 (+ SCH)	24.9	24.7	24.8
RC4	2 (Loopback)	24.9	24.8	24.8
	55 (Loopback)	24.9	24.8	24.8
	32 (+ F-SCH)	24.9	24.7	24.8
	32 (+ SCH)	24.9	24.7	24.8
RC5	9 (Loopback)	24.9	24.8	24.8
	55 (Loopback)	24.9	24.8	24.8
RC11	2 (Loopback)	24.9	24.7	24.8
	75 (Loopback)	24.9	24.8	24.8
	32 (+ F-SCH)	24.9	24.7	24.8
	32 (+ SCH)	24.9	24.8	24.8

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ID:	50820	Date:	5/1/17

1xRTT, BC10, SECONDARY 800

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)		
		CH 450 - 817.25MHz	CH 560 - 820MHz	CH 670 - 822.75MHz
		Average	Average	Average
RC1	2 (Loopback)	23.3	23.3	23.1
	55 (Loopback)	23.3	23.3	23.1
RC2	9 (Loopback)	**23.3**	23.2	23.1
	55 (Loopback)	23.2	23.2	23.2
RC3	2 (Loopback)	23.3	23.2	23.1
	55 (Loopback)	23.1	23.1	23.1
	32 (+ F-SCH)	23.2	23.2	22.7
	32 (+ SCH)	23.3	23.1	23.1
RC4	2 (Loopback)	23.2	23.3	23.2
	55 (Loopback)	23.3	23.3	23.2
	32 (+ F-SCH)	23.3	23.3	23.2
	32 (+ SCH)	23.3	23.0	23.1
RC5	9 (Loopback)	23.3	23.0	23.2
	55 (Loopback)	23.2	23.0	23.1
RC11	2 (Loopback)	23.2	23.1	23.1
	75 (Loopback)	23.2	23.2	23.3
	32 (+ F-SCH)	23.2	23.1	23.2
	32 (+ SCH)	23.0	23.2	23.2

1xRTT, BC0, CELL BAND

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)		
		CH 1013 - 824.7MHz	CH 384 - 836.52MHz	CH 777 - 848.31MHz
		Average	Average	Average
RC1	2 (Loopback)	23.2	23.2	23.1
	55 (Loopback)	23.2	23.2	23.1
RC2	9 (Loopback)	23.1	**23.3**	23.1
	55 (Loopback)	23.1	23.1	23.2
RC3	2 (Loopback)	23.1	23.2	23.2
	55 (Loopback)	23.1	23.2	23.2
	32 (+ F-SCH)	23.1	23.2	23.1
	32 (+ SCH)	23.2	23.1	23.1
RC4	2 (Loopback)	23.2	23.3	23.1
	55 (Loopback)	23.1	23.3	23.1
	32 (+ F-SCH)	23.1	23.2	23.2
	32 (+ SCH)	23.1	23.2	23.1
RC5	9 (Loopback)	23.2	23.2	23.1
	55 (Loopback)	23.2	23.2	23.1
RC11	2 (Loopback)	23.3	23.1	23.1
	75 (Loopback)	23.2	23.2	23.1
	32 (+ F-SCH)	23.2	23.3	23.1
	32 (+ SCH)	23.2	23.2	23.3

1xRTT, BC1, PCS BAND

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)		
		CH 25 - 1851.25MHz	CH 600 - 1880MHz	CH 1175 - 1908.75MHz
		Average	Average	Average
RC1	2 (Loopback)	19.1	19.1	19.2
	55 (Loopback)	19.2	19.1	19.1
RC2	9 (Loopback)	19.2	19.1	**19.3**
	55 (Loopback)	19.1	19.1	19.2
RC3	2 (Loopback)	19.1	19.1	19.2
	55 (Loopback)	19.2	19.1	19.3
	32 (+ F-SCH)	19.1	19.1	19.2
	32 (+ SCH)	19.1	19.1	19.2
RC4	2 (Loopback)	19.1	19.2	19.2
	55 (Loopback)	19.1	19.1	19.2
	32 (+ F-SCH)	19.2	19.3	19.2
	32 (+ SCH)	19.1	19.1	19.2
RC5	9 (Loopback)	19.2	19.1	19.1
	55 (Loopback)	19.1	19.1	19.2
RC11	2 (Loopback)	19.1	19.1	19.3
	75 (Loopback)	19.2	19.1	19.3
	32 (+ F-SCH)	19.1	19.2	19.2
	32 (+ SCH)	19.2	19.2	19.2

7.2.2. 1xEV-DO - Release 0 (REL 0)

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

EVDO Release 0 - RTAP

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

EVDO Release 0 - FTAP

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

RESULTS

LAT 1

ID:	50820	Date:	5/2/17

EVDO REL 0 800MHz SECONDARY BAND

FTAP Rate	RTAP Rate	Channel	Frequency (MHz)	Conducted Output Power (dBm)
				Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	450	817.25	24.7
		560	820.00	**24.7**
		670	822.75	24.6

EVDO REL 0 850MHz BAND

FTAP Rate	RTAP Rate	Channel	Frequency (MHz)	Conducted Output Power (dBm)
				Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	1013	824.70	24.5
		384	836.52	24.4
		777	848.31	**24.7**

EVDO REL 0 1900MHz BAND

FTAP Rate	RTAP Rate	Channel	Frequency (MHz)	Conducted Output Power (dBm)
				Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	25	1851.25	**24.9**
		600	1880.00	24.8
		1175	1908.75	24.8

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ID:	50820	Date:	5/1/17

EVDO REL 0 800MHz SECONDARY BAND

FTAP Rate	RTAP Rate	Channel	Frequency (MHz)	Conducted Output Power (dBm)
				Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	450	817.25	23.2
		560	820.00	23.1
		670	822.75	**23.2**

EVDO REL 0 850MHz BAND

FTAP Rate	RTAP Rate	Channel	Frequency (MHz)	Conducted Output Power (dBm)
				Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	1013	824.70	23.1
		384	836.52	23.1
		777	848.31	**23.2**

EVDO REL 0 1900MHz BAND

FTAP Rate	RTAP Rate	Channel	Frequency (MHz)	Conducted Output Power (dBm)
				Average
307.2 kbps (2 Slot QPSK)	153.6 kbps	25	1851.25	18.8
		600	1880.00	19.0
		1175	1908.75	**19.2**

7.2.3. 1xEV-DO - Revision A (REV A)

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

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

EVDO Rev. A – RETAP

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

EVDO Rev. A - FETAP

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

RESULTS

LAT 1

ID:	50820	Date:	5/2/17

EVDO REV A 800MHz SECONDARY BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	Frequency (MHz)	Conducted Output Power (dBm)
				Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	450	817.25	24.6
		560	820.00	**24.8**
		670	822.75	24.6

EVDO REV A 850MHz BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	Frequency (MHz)	Conducted Output Power (dBm)
				Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	1013	824.70	24.7
		384	836.52	**24.8**
		777	848.31	24.6

EVDO REV A 1900MHz BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	Frequency (MHz)	Conducted Output Power (dBm)
				Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	25	1851.25	**25.0**
		600	1880.00	24.9
		1175	1908.75	24.9

UAT 1

ID:	50820	Date:	5/1/17

EVDO REV A 800MHz SECONDARY BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	Frequency (MHz)	Conducted Output Power (dBm)
				Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	450	817.25	23.2
		560	820.00	23.2
		670	822.75	**23.3**

EVDO REV A 850MHz BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	Frequency (MHz)	Conducted Output Power (dBm)
				Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	1013	824.70	**23.3**
		384	836.52	23.2
		777	848.31	23.0

EVDO REV A 1900MHz BAND

FETAP - Traffic Format	RETAP - Data Payload Size	Channel	Frequency (MHz)	Conducted Output Power (dBm)
				Average
307.2k QPSK/ ACK channel is transmitted at all the slots	4096	25	1851.25	**19.3**
		600	1880.00	19.3
		1175	1908.75	19.2

7.3. UMTS

TEST PROCEDURE

The transmitter output was connected to the input terminal of Directional Coupler via calibrated coaxial cable. The output coupling terminal of the Directional Coupler was directly connected to a spectrum analyzer while the output through terminal connected to the communication test set via calibrated coaxial cable.

The output power was measured with the spectrum analyzer at the low, middle and high channel in each band.

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

7.3.1. UMTS REL99

The following summary of these settings are illustrated below:

	Mode	Rel99
	Subtest	-
WCDMA General Settings	Loopback Mode	Test Mode 2
	Rel99 RMC	12.2kbps RMC
	HSDPA FRC	Not Applicable
	HSUPA Test	Not Applicable
	Power Control Algorithm	Algorithm2
	βc	Not Applicable
	βd	Not Applicable
	βec	Not Applicable
	βc/βd	8/15
	βhs	Not Applicable
	βed	Not Applicable

RESULTS

LAT 1

ID:	50820	Date:	4/29/17

Band	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
				Average
UMTS Rel. 99 850MHz	4132	4357	826.4	**24.8**
	4183	4408	836.6	24.7
	4233	4458	846.6	24.7

Band	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
				Average
UMTS Rel. 99 1900MHz	9262	9662	1852.4	**25.0**
	9400	9800	1880.0	24.8
	9538	9938	1907.6	25.0

Band	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
				Average
UMTS Rel. 99 1700MHz	1312	1537	1712.4	**25.3**
	1413	1638	1732.6	25.2
	1513	1738	1752.6	25.2

UAT 1

ID:	50820	Date:	5/1/17

Band	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
				Average
UMTS Rel. 99 850MHz	4132	4357	826.4	23.7
	4183	4408	836.6	23.7
	4233	4458	846.6	**23.8**

Band	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
				Average
UMTS Rel. 99 1900MHz	9262	9662	1852.4	19.2
	9400	9800	1880.0	19.2
	9538	9938	1907.6	**19.3**

Band	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
				Average
UMTS Rel. 99 1700MHz	1312	1537	1712.4	**18.8**
	1413	1638	1732.6	18.7
	1513	1738	1752.6	18.7

7.3.2. HSDPA REL 5

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121.

Summary of settings are illustrated below:

	Mode	Rel5 HSDPA			
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	11/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	11/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs =βhs/βc	30/15			

RESULT

LAT 1

ID:	50820	Date:	4/29/17

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSDPA 850MHz	1	4132	4357	826.4	24.6
		4183	4408	836.6	24.6
		4233	4458	846.6	**24.7**
	2	4132	4357	826.4	24.6
		4183	4408	836.6	24.5
		4233	4458	846.6	24.6
	3	4132	4357	826.4	24.1
		4183	4408	836.6	24.1
		4233	4458	846.6	24.2
	4	4132	4357	826.4	24.1
		4183	4408	836.6	24.1
		4233	4458	846.6	24.2

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSDPA 1900MHz	1	9262	9662	1852.4	**24.9**
		9400	9800	1880.0	24.7
		9538	9938	1907.6	24.8
	2	9262	9662	1852.4	24.8
		9400	9800	1880.0	24.7
		9538	9938	1907.6	24.8
	3	9262	9662	1852.4	24.4
		9400	9800	1880.0	24.4
		9538	9938	1907.6	24.4
	4	9262	9662	1852.4	24.3
		9400	9800	1880.0	24.3
		9538	9938	1907.6	24.4

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSDPA 1700MHz	1	1312	1537	1712.4	**25.2**
		1413	1638	1732.6	25.2
		1513	1738	1752.6	25.2
	2	1312	1537	1712.4	25.2
		1413	1638	1732.6	25.1
		1513	1738	1752.6	25.1
	3	1312	1537	1712.4	24.6
		1413	1638	1732.6	24.6
		1513	1738	1752.6	24.7
	4	1312	1537	1712.4	24.6
		1413	1638	1732.6	24.6
		1513	1738	1752.6	24.7

UAT 1

ID:	50820	Date:	5/1/17

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSDPA 850MHz	1	4132	4357	826.4	23.6
		4183	4408	836.6	23.6
		4233	4458	846.6	**23.7**
	2	4132	4357	826.4	23.4
		4183	4408	836.6	23.1
		4233	4458	846.6	23.6
	3	4132	4357	826.4	23.2
		4183	4408	836.6	23.1
		4233	4458	846.6	23.2
	4	4132	4357	826.4	23.1
		4183	4408	836.6	23.0
		4233	4458	846.6	23.2

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSDPA 1900MHz	1	9262	9662	1852.4	19.1
		9400	9800	1880.0	19.2
		9538	9938	1907.6	**19.2**
	2	9262	9662	1852.4	19.1
		9400	9800	1880.0	19.0
		9538	9938	1907.6	19.0
	3	9262	9662	1852.4	18.7
		9400	9800	1880.0	18.6
		9538	9938	1907.6	18.6
	4	9262	9662	1852.4	18.5
		9400	9800	1880.0	18.6
		9538	9938	1907.6	18.6

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSDPA 1700MHz	1	1312	1537	1712.4	**18.7**
		1413	1638	1732.6	18.4
		1513	1738	1752.6	18.5
	2	1312	1537	1712.4	18.6
		1413	1638	1732.6	18.4
		1513	1738	1752.6	18.5
	3	1312	1537	1712.4	18.1
		1413	1638	1732.6	17.8
		1513	1738	1752.6	18.1
	4	1312	1537	1712.4	18.0
		1413	1638	1732.6	17.9
		1513	1738	1752.6	18.2

7.3.3. HSPA REL 6 (HSDPA & HSUPA)

TEST PROCEDURE

The following summary of these settings are illustrated below:

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

RESULTS

LAT 1

ID:	50820	Date:	4/29/17

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSUPA 850MHz	1	4132	4357	826.4	**24.6**
		4183	4408	836.6	24.5
		4233	4458	846.6	24.5
	2	4132	4357	826.4	22.6
		4183	4408	836.6	22.6
		4233	4458	846.6	22.5
	3	4132	4357	826.4	23.6
		4183	4408	836.6	23.6
		4233	4458	846.6	23.4
	4	4132	4357	826.4	22.6
		4183	4408	836.6	22.6
		4233	4458	846.6	22.5
	5	4132	4357	826.4	24.6
		4183	4408	836.6	24.5
		4233	4458	846.6	24.3

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSUPA 1900MHz	1	9262	9662	1852.4	**24.8**
		9400	9800	1880.0	24.7
		9538	9938	1907.6	24.8
	2	9262	9662	1852.4	22.7
		9400	9800	1880.0	22.8
		9538	9938	1907.6	22.6
	3	9262	9662	1852.4	23.7
		9400	9800	1880.0	23.5
		9538	9938	1907.6	23.6
	4	9262	9662	1852.4	22.8
		9400	9800	1880.0	22.6
		9538	9938	1907.6	22.7
	5	9262	9662	1852.4	24.7
		9400	9800	1880.0	24.7
		9538	9938	1907.6	24.7

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSUPA 1700MHz	1	1312	1537	1712.4	**25.1**
		1413	1638	1732.6	25.1
		1513	1738	1752.6	25.1
	2	1312	1537	1712.4	23.1
		1413	1638	1732.6	23.0
		1513	1738	1752.6	23.1
	3	1312	1537	1712.4	24.0
		1413	1638	1732.6	23.9
		1513	1738	1752.6	23.9
	4	1312	1537	1712.4	23.1
		1413	1638	1732.6	23.1
		1513	1738	1752.6	23.0
	5	1312	1537	1712.4	25.1
		1413	1638	1732.6	24.9
		1513	1738	1752.6	24.9

UAT 1

ID:	50820	Date:	5/1/20017

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSUPA 850MHz	1	4132	4357	826.4	23.6
		4183	4408	836.6	23.5
		4233	4458	846.6	**23.6**
	2	4132	4357	826.4	21.5
		4183	4408	836.6	21.4
		4233	4458	846.6	21.6
	3	4132	4357	826.4	22.4
		4183	4408	836.6	22.4
		4233	4458	846.6	22.6
	4	4132	4357	826.4	21.6
		4183	4408	836.6	21.5
		4233	4458	846.6	21.6
	5	4132	4357	826.4	23.4
		4183	4408	836.6	23.3
		4233	4458	846.6	23.6

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSUPA 1900MHz	1	9262	9662	1852.4	18.9
		9400	9800	1880.0	19.0
		9538	9938	1907.6	**19.1**
	2	9262	9662	1852.4	16.8
		9400	9800	1880.0	16.9
		9538	9938	1907.6	17.0
	3	9262	9662	1852.4	18.0
		9400	9800	1880.0	17.9
		9538	9938	1907.6	18.0
	4	9262	9662	1852.4	16.9
		9400	9800	1880.0	17.0
		9538	9938	1907.6	17.1
	5	9262	9662	1852.4	19.1
		9400	9800	1880.0	19.0
		9538	9938	1907.6	19.0

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSUPA 1700MHz	1	1312	1537	1712.4	**18.6**
		1413	1638	1732.6	18.5
		1513	1738	1752.6	18.5
	2	1312	1537	1712.4	16.3
		1413	1638	1732.6	16.1
		1513	1738	1752.6	16.3
	3	1312	1537	1712.4	17.2
		1413	1638	1732.6	17.1
		1513	1738	1752.6	17.1
	4	1312	1537	1712.4	16.6
		1413	1638	1732.6	16.4
		1513	1738	1752.6	16.5
	5	1312	1537	1712.4	18.3
		1413	1638	1732.6	18.5
		1513	1738	1752.6	18.5

7.3.4. DUAL CARRIER HSDPA

DC-HSDPA (Rel 8, CAT 24)

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:
Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

Table E.5.0: Levels for HSDPA connection setup

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

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

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

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

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

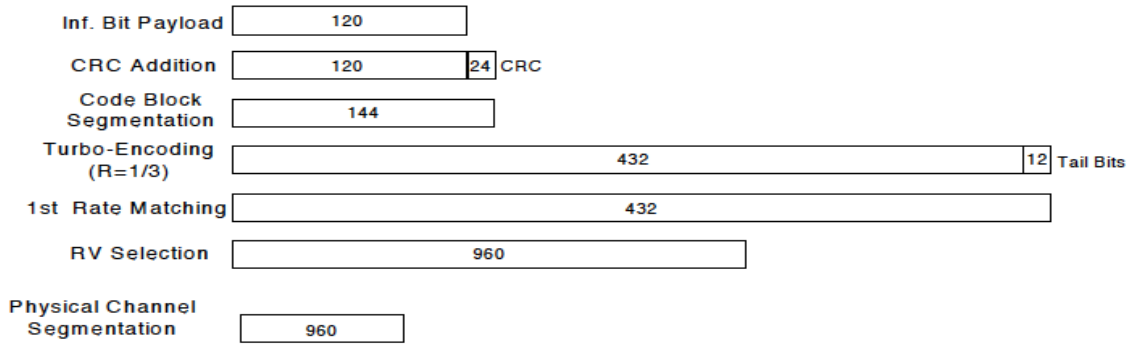


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 4 Sub-tests for HSDPA were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

	Mode	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = βhs/ βc	30/15			

RESULT

LAT 1

ID:	50820	Date:	5/2/17

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSDPA 850MHz	1	4132	4357	826.4	24.5
		4183	4408	836.6	**24.6**
		4233	4458	846.6	24.5
	2	4132	4357	826.4	24.5
		4183	4408	836.6	24.6
		4233	4458	846.6	24.6
	3	4132	4357	826.4	24.1
		4183	4408	836.6	24.0
		4233	4458	846.6	24.0
	4	4132	4357	826.4	24.1
		4183	4408	836.6	24.1
		4233	4458	846.6	24.2

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSDPA 1900MHz	1	9262	9662	1852.4	**24.8**
		9400	9800	1880.0	24.5
		9538	9938	1907.6	24.6
	2	9262	9662	1852.4	24.7
		9400	9800	1880.0	24.6
		9538	9938	1907.6	24.6
	3	9262	9662	1852.4	24.3
		9400	9800	1880.0	24.3
		9538	9938	1907.6	24.2
	4	9262	9662	1852.4	24.3
		9400	9800	1880.0	24.1
		9538	9938	1907.6	24.2

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSDPA 1700MHz	1	1312	1537	1712.4	**25.0**
		1413	1638	1732.6	24.9
		1513	1738	1752.6	24.9
	2	1312	1537	1712.4	24.8
		1413	1638	1732.6	24.9
		1513	1738	1752.6	24.9
	3	1312	1537	1712.4	24.5
		1413	1638	1732.6	24.4
		1513	1738	1752.6	24.4
	4	1312	1537	1712.4	24.5
		1413	1638	1732.6	24.4
		1513	1738	1752.6	24.4

UAT 1

ID:	50820	Date:	5/1/17

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSDPA 850MHz	1	4132	4357	826.4	23.4
		4183	4408	836.6	23.3
		4233	4458	846.6	**23.5**
	2	4132	4357	826.4	23.4
		4183	4408	836.6	23.3
		4233	4458	846.6	23.4
	3	4132	4357	826.4	23.0
		4183	4408	836.6	23.0
		4233	4458	846.6	22.9
	4	4132	4357	826.4	22.9
		4183	4408	836.6	23.0
		4233	4458	846.6	22.9

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSDPA 1900MHz	1	9262	9662	1852.4	19.0
		9400	9800	1880.0	**19.1**
		9538	9938	1907.6	19.0
	2	9262	9662	1852.4	19.1
		9400	9800	1880.0	19.0
		9538	9938	1907.6	19.0
	3	9262	9662	1852.4	18.6
		9400	9800	1880.0	18.3
		9538	9938	1907.6	18.6
	4	9262	9662	1852.4	18.5
		9400	9800	1880.0	18.6
		9538	9938	1907.6	18.5

Band	Subtest	UL Ch	DL Ch	Frequency (MHz)	Conducted Output Power (dBm)
					Average
UMTS HSDPA 1700MHz	1	1312	1537	1712.4	**18.5**
		1413	1638	1732.6	18.4
		1513	1738	1752.6	18.4
	2	1312	1537	1712.4	18.4
		1413	1638	1732.6	18.4
		1513	1738	1752.6	18.4
	3	1312	1537	1712.4	18.0
		1413	1638	1732.6	17.8
		1513	1738	1752.6	18.0
	4	1312	1537	1712.4	17.8
		1413	1638	1732.6	17.9
		1513	1738	1752.6	18.0

8. CONDUCTED TEST RESULTS

8.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049
IC: RSS132; RSS133§2.3; RSS139

LIMITS

For reporting purposes only

TEST PROCEDURE

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

RESULTS

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

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

Band	Mode	Channel	f(MHz)	99% BW (KHz)	-26dB BW (KHz)
CELL	GPRS	190	836.6	243.76	315.4
PCS		661	1880	246.84	316.2

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

Band	Mode	Channel	f(MHz)	99% BW (KHz)	-26dB BW (KHz)
CELL	EGPRS	190	836.6	246.81	300.9
PCS		661	1880	243.54	318.0

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

Band	Mode	Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
CELL	CDMA 2000 1xRTT	384	836.5	1.2796	1.425
PCS		600	1880	1.2795	1.430
800MHz Secondary		560	820	1.2760	1.425

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

Band	Mode	Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
CELL	CDMA 2000 EVDO Rev. A	384	836.5	1.2876	1.449
PCS		600	1880	1.2733	1.425
800MHz Secondary		560	820	1.2806	1.438

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

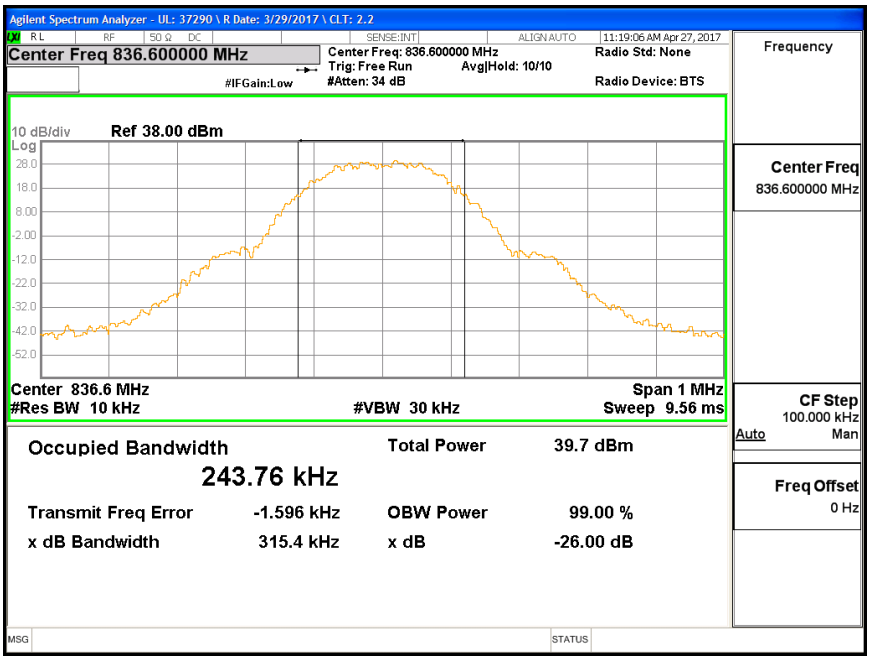
Band	Mode	DL Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
850MHz	UMTS Rel. 99	4408	836.6	4.1175	4.683
1900MHz		9800	1880	4.1219	4.703
1700MHz		1638	1732.6	4.1431	4.661

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

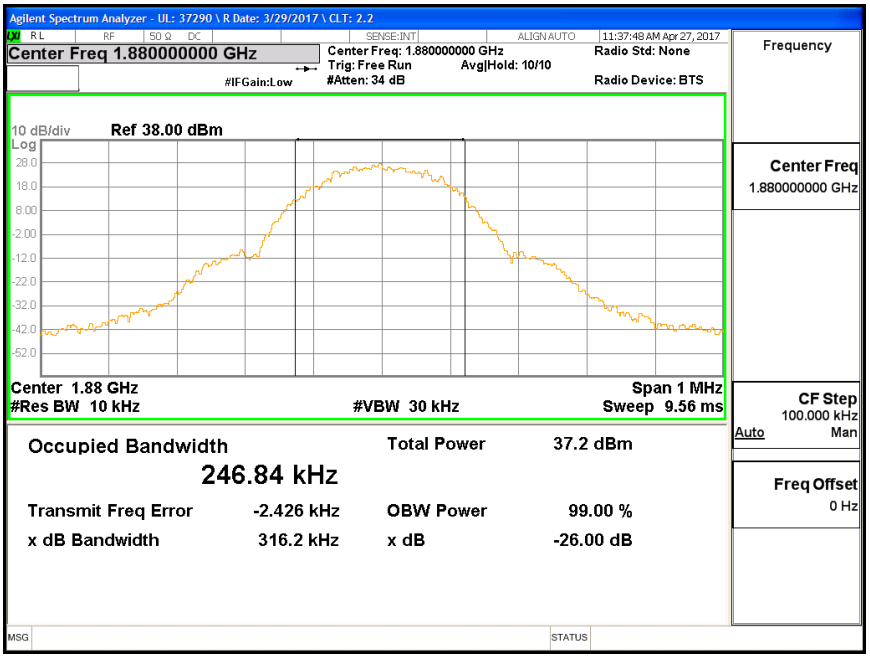
Band	Mode	DL Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
850MHz	UMTS HSDPA	4408	836.6	4.1295	4.687
1900MHz		9800	1880	4.1383	4.663
1700MHz		1638	1732.6	4.1813	4.660

8.1.1. GSM GPRS

850MHz BAND, MID CH

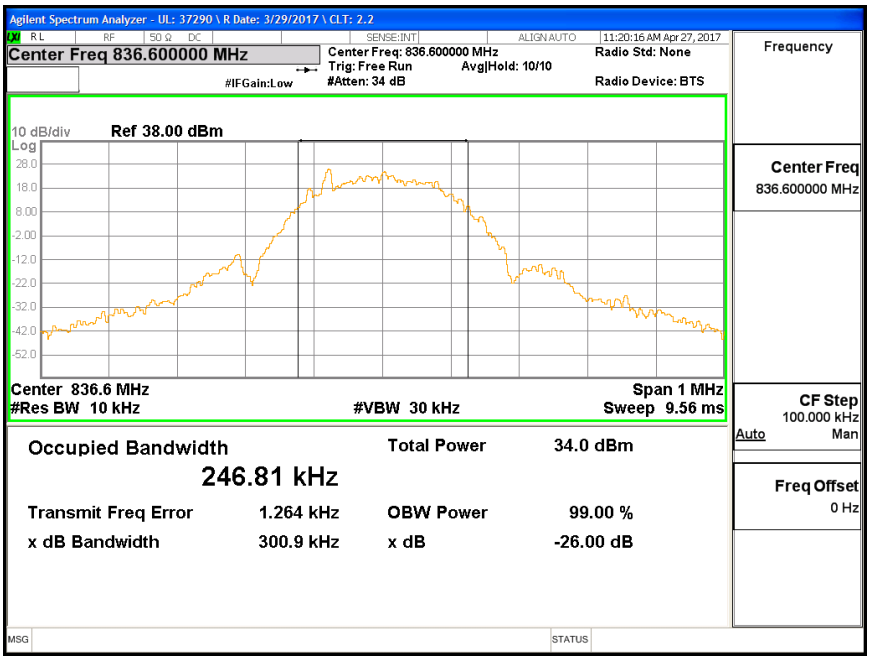


1900MHz BAND, MID CH

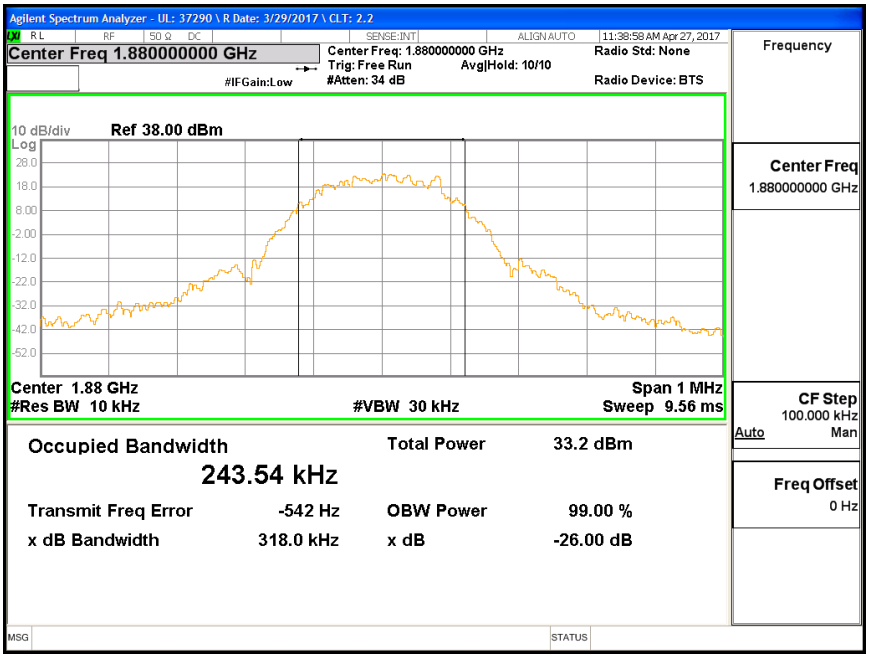


8.1.2. GSM EGPRS

850MHz BAND, MID CH

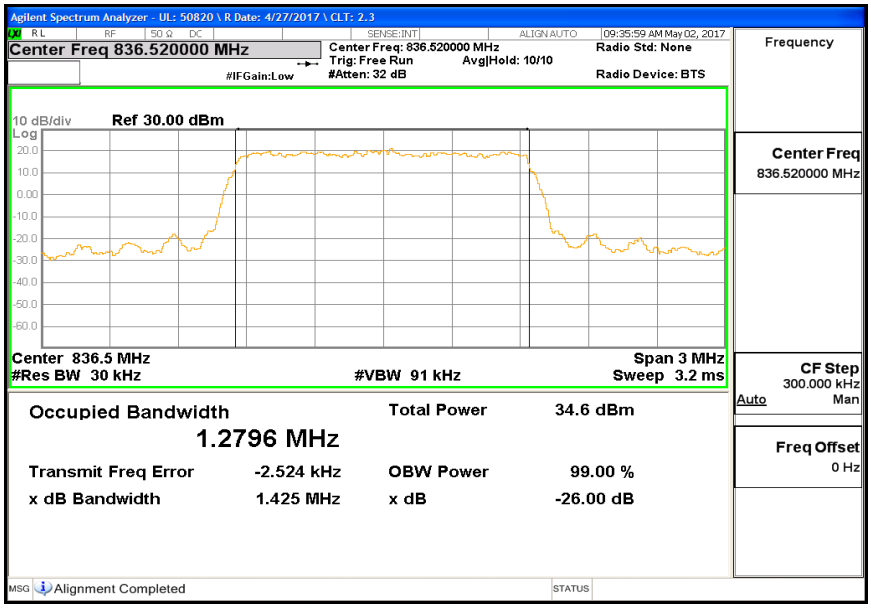


1900MHz BAND, MID CH

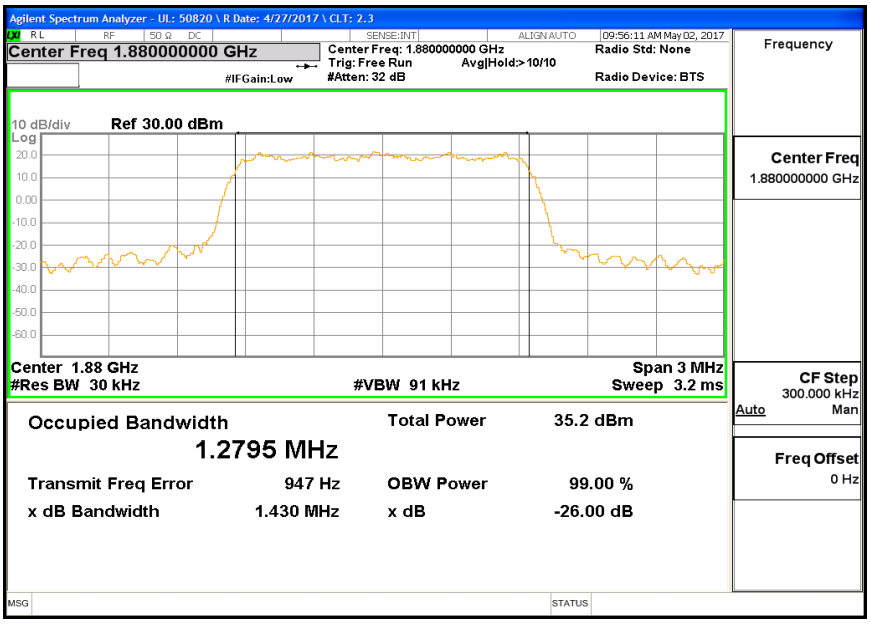


8.1.3. CDMA2000 1xRTT

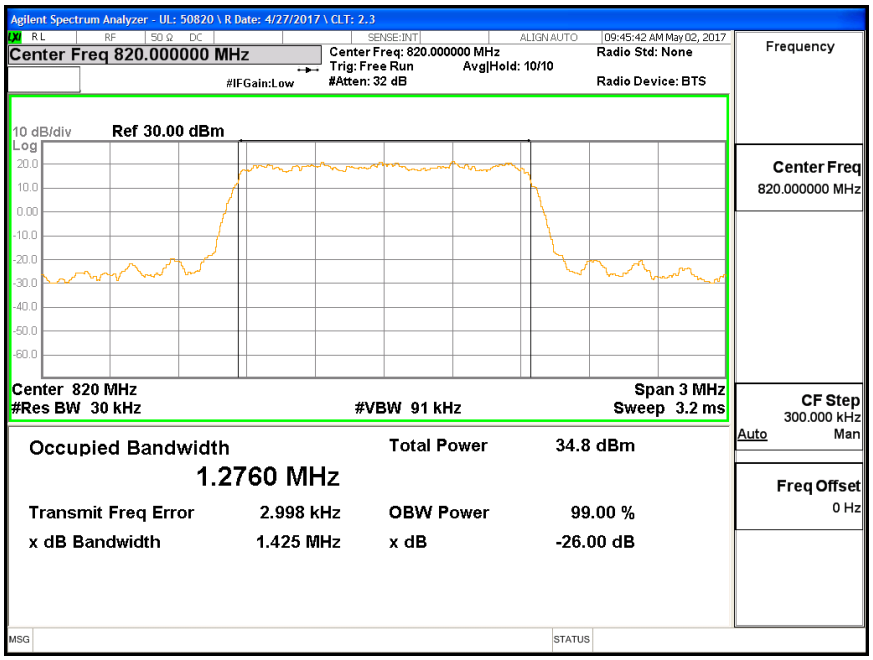
850MHz BAND, MID CH



1900MHz BAND, MID CH

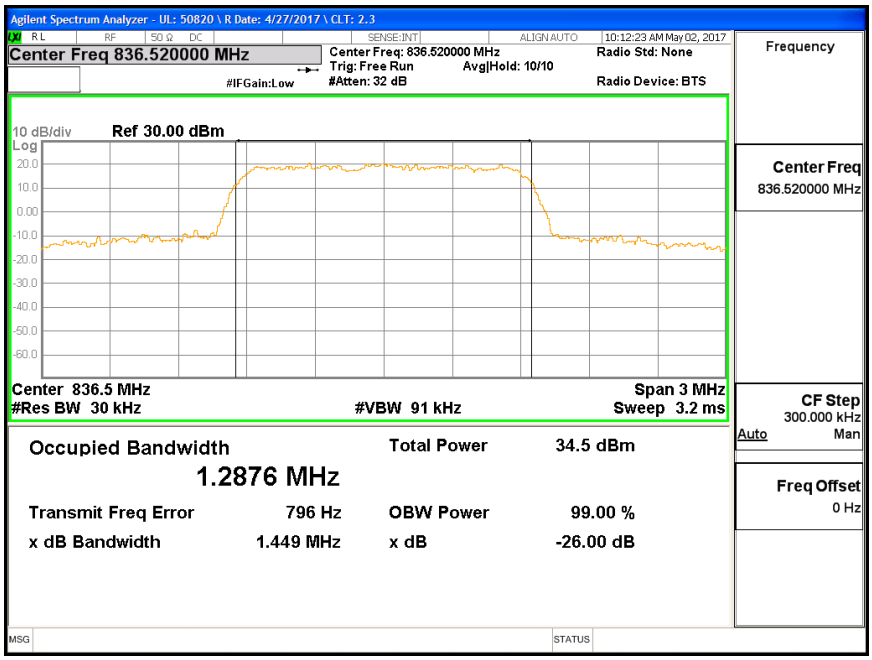


800MHz SECONDARY BAND, MID CH

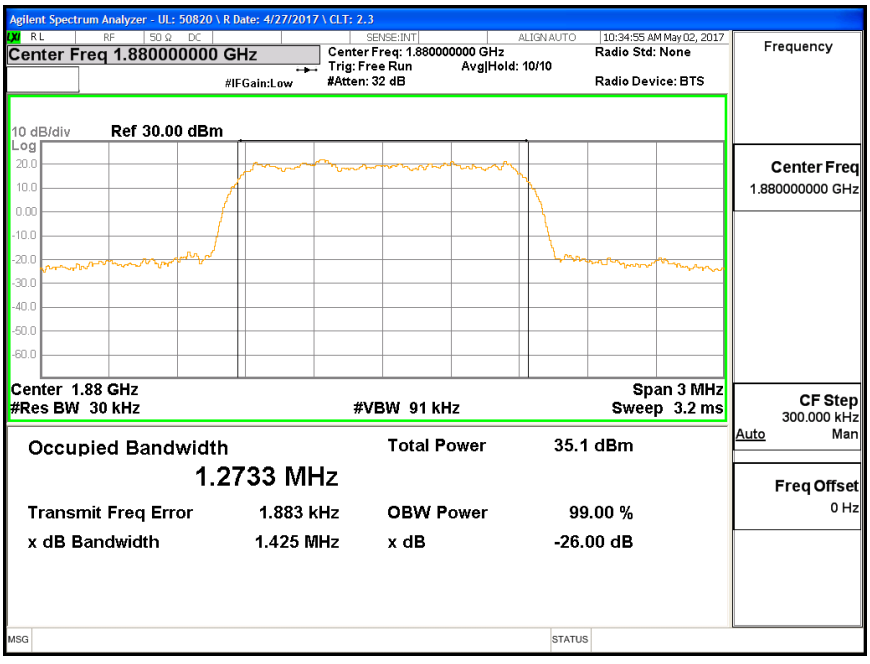


8.1.4. CDMA2000 EVDO Rev. A

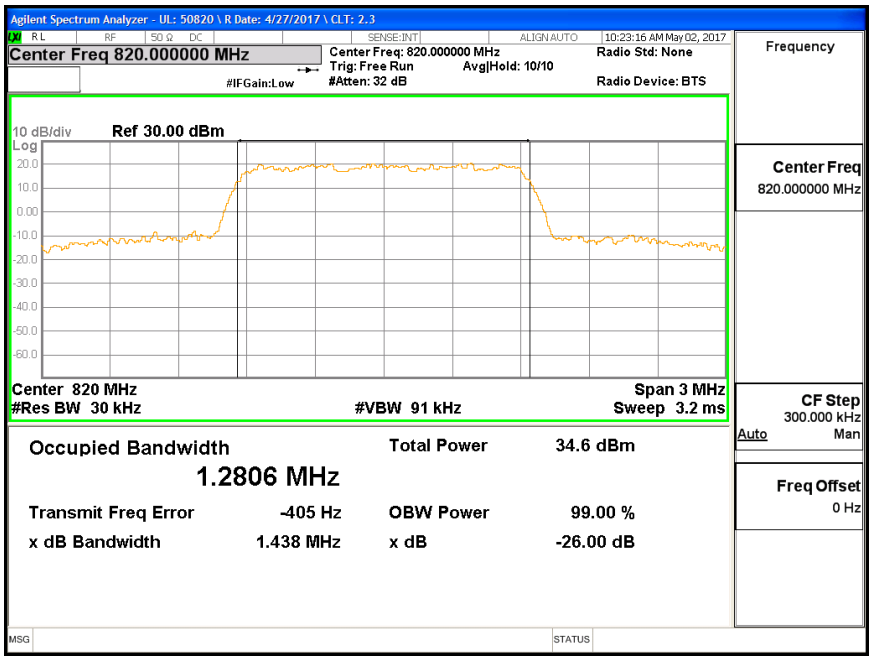
850MHz BAND, MID CH



1900MHz BAND, MID CH

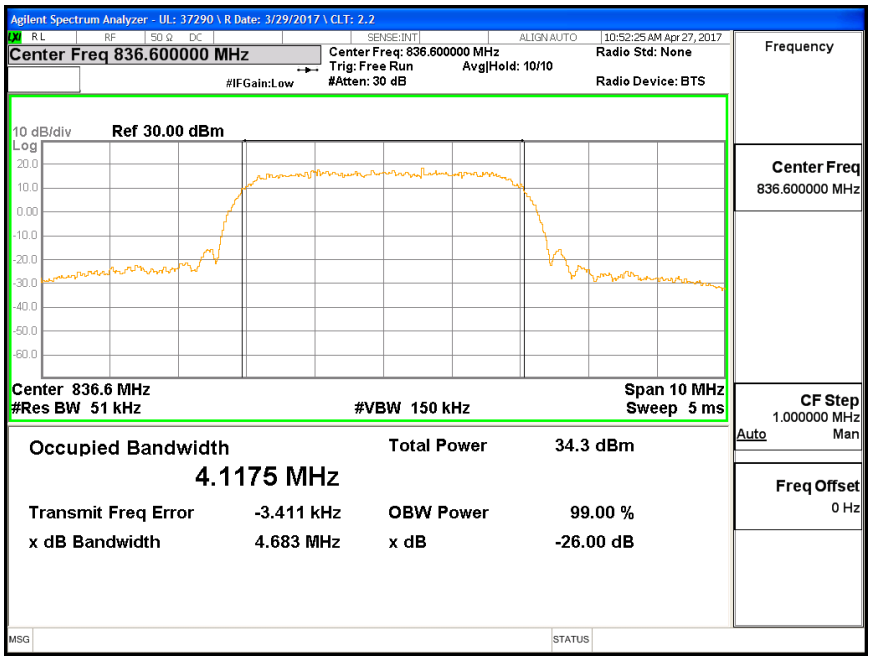


800MHz SECONDARY BAND, MID CH

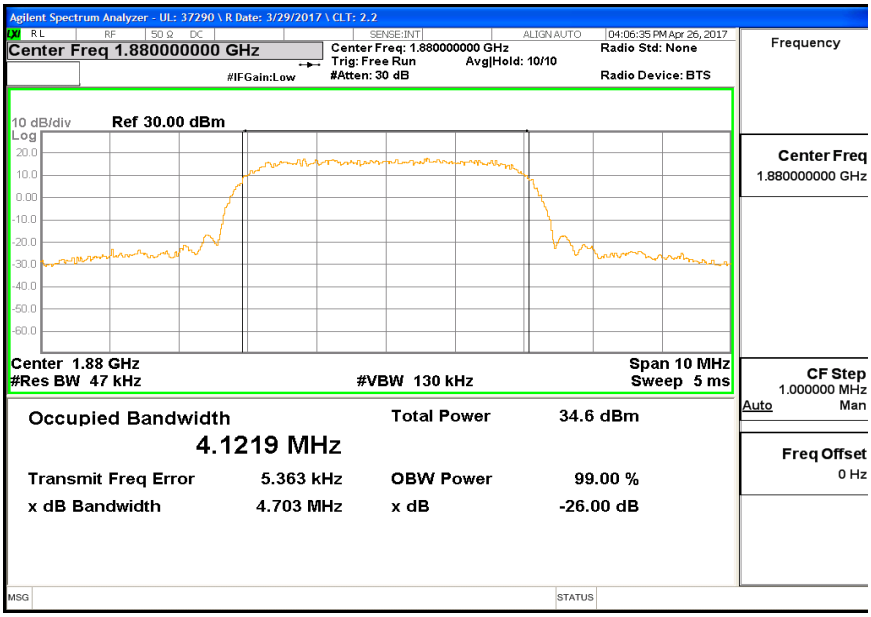


8.1.5. UMTS REL 99

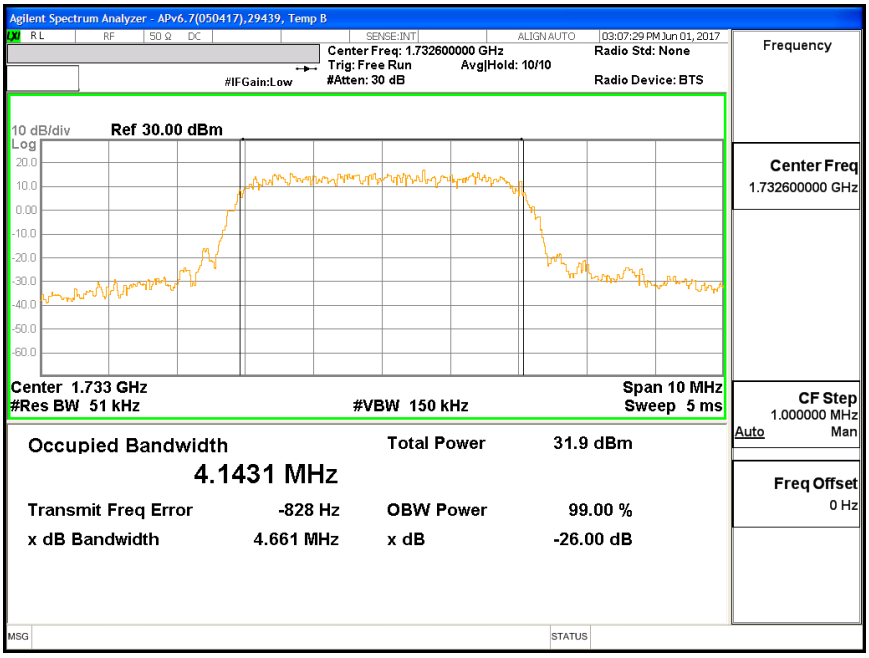
850MHz BAND, MID CH



1900MHz BAND, MID CH

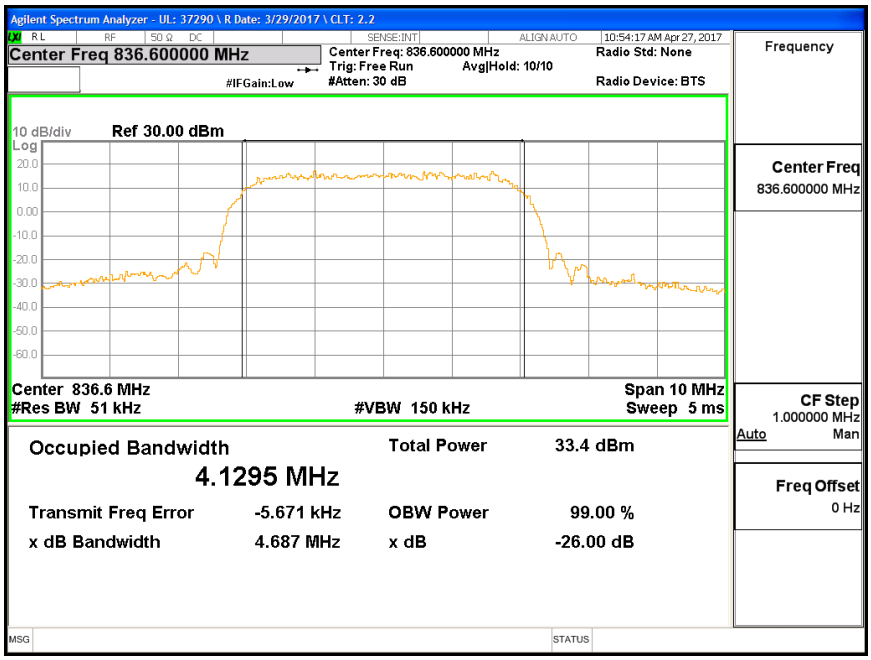


1700MHz BAND, MID CH

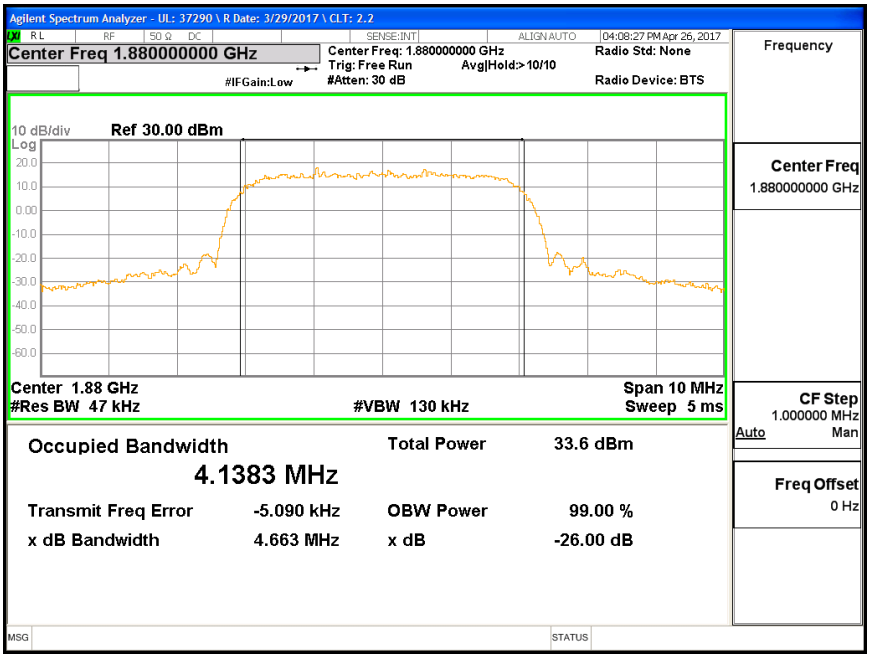


8.1.6. UMTS HSDPA

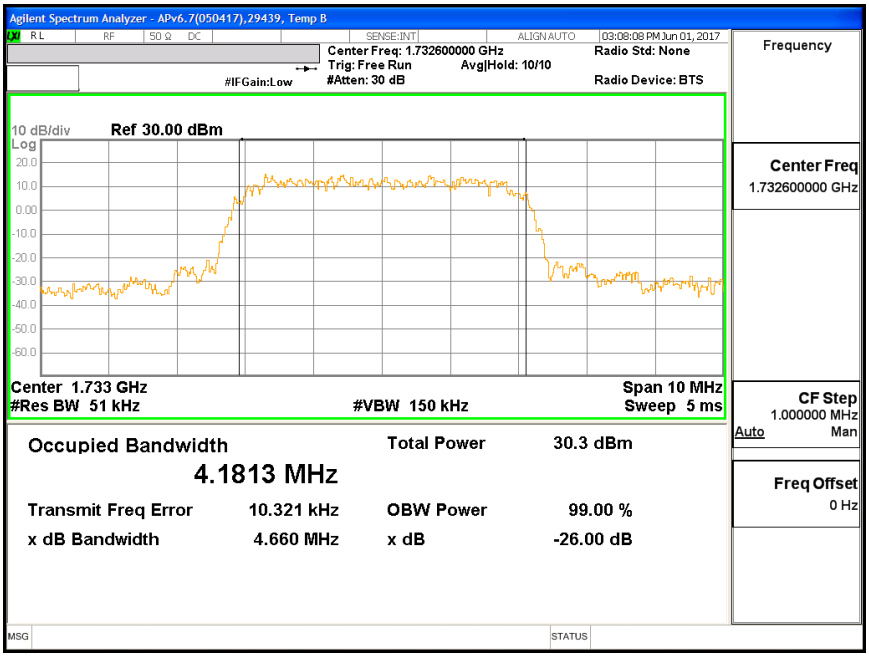
850MHz BAND, MID CH



1900MHz BAND, MID CH



1700MHz BAND, MID CH



8.2. BAND EDGE

RULE PART(S)

FCC: §2.1051, §22.917, §24.238, §27.53 and §90.691
IC: RSS132§5.5; RSS133§6.5 and RSS139§6.6

LIMITS

FCC: §22.917, §24.238, §27.53
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: §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.

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

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

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

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

RSS139§6.6

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

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

TEST PROCEDURE

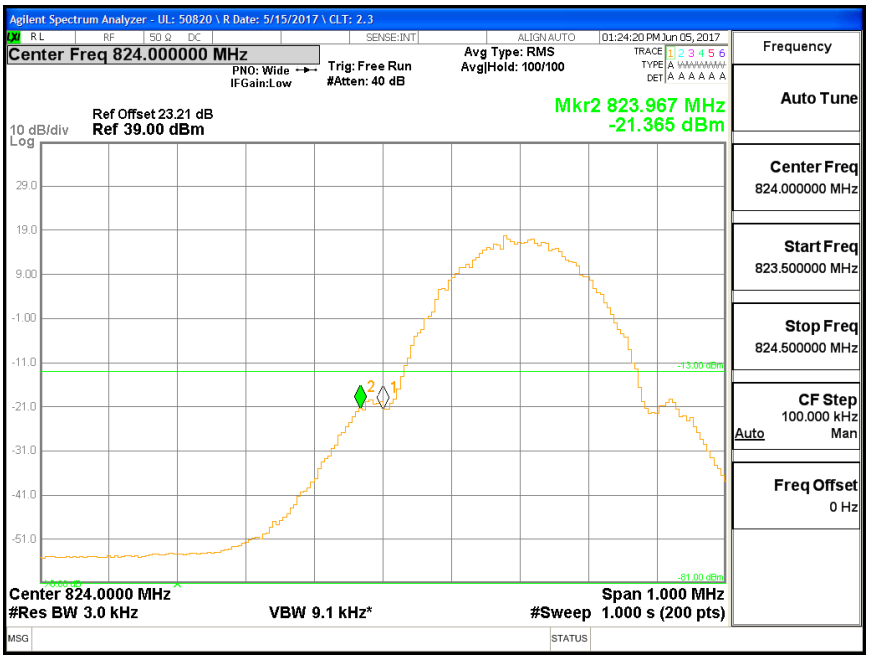
The transmitter output was connected to a Agilent 8960 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.
For each band edge measurement:

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

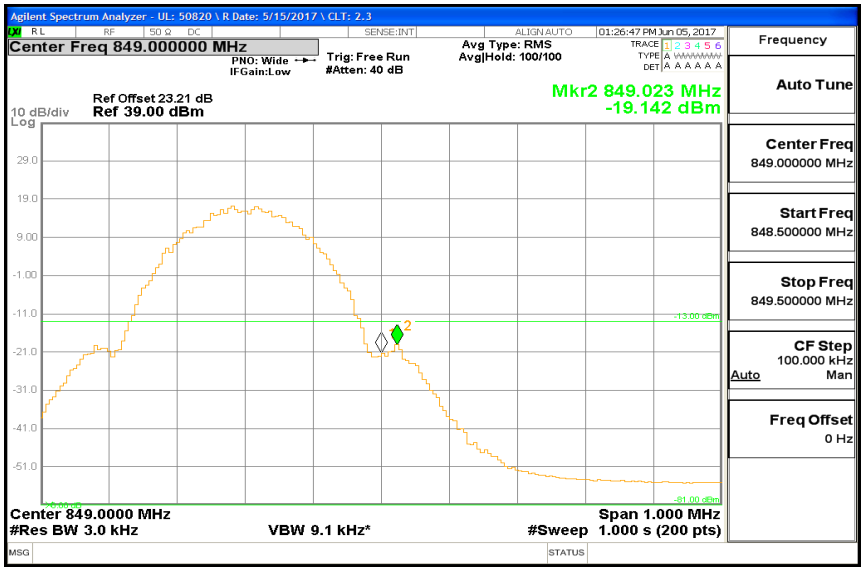
RESULTS

8.2.1. GSM-GPRS

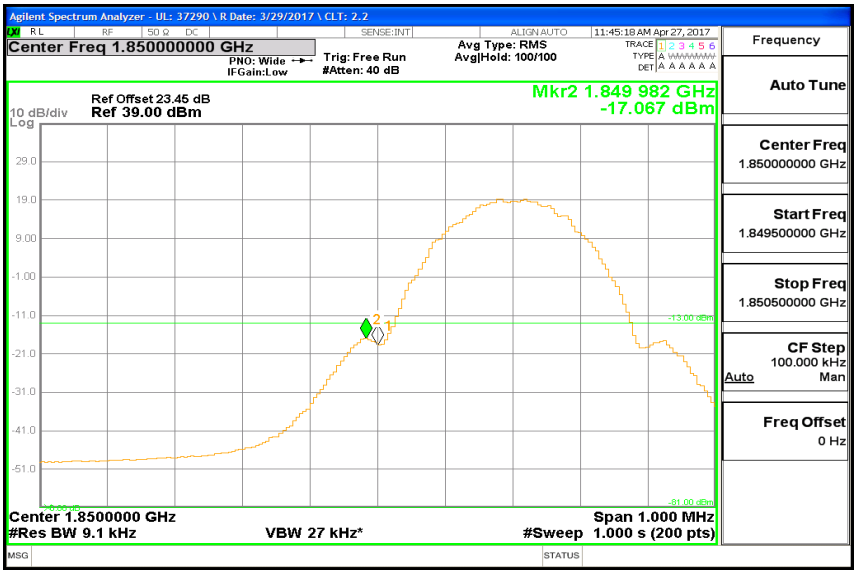
850MHz BAND, LOW CH



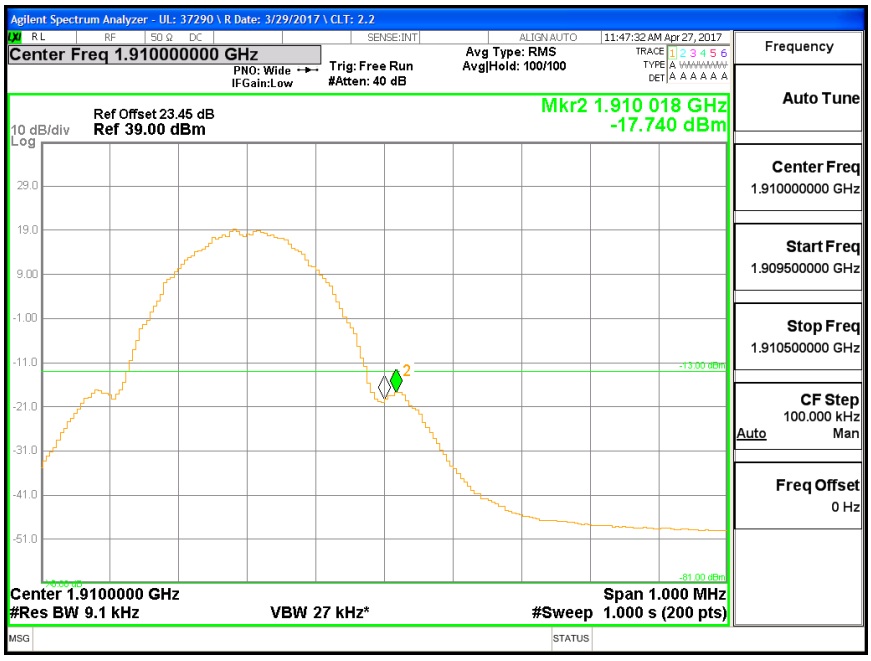
850MHz BAND, HIGH CH



1900MHz BAND, LOW CH

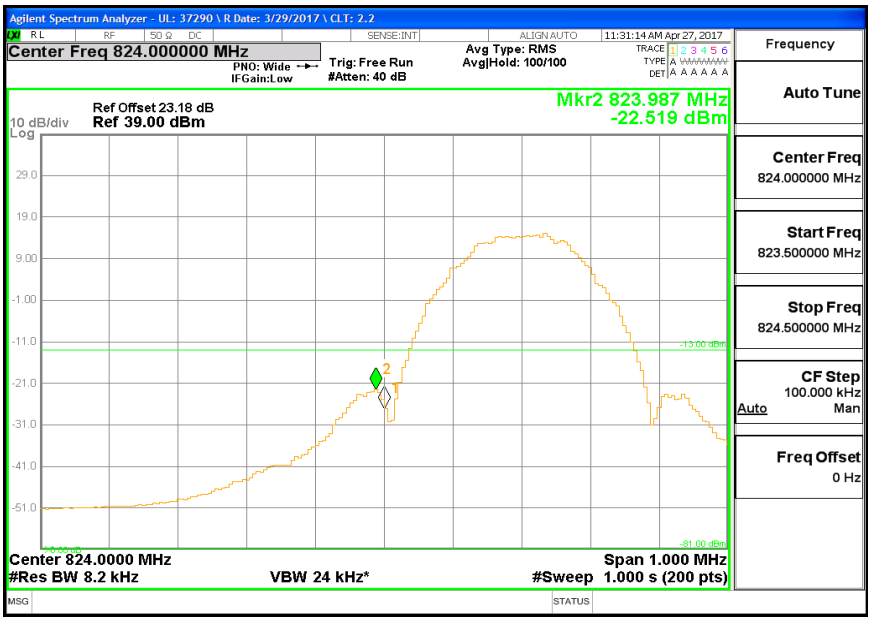


1900MHz BAND, HIGH CH

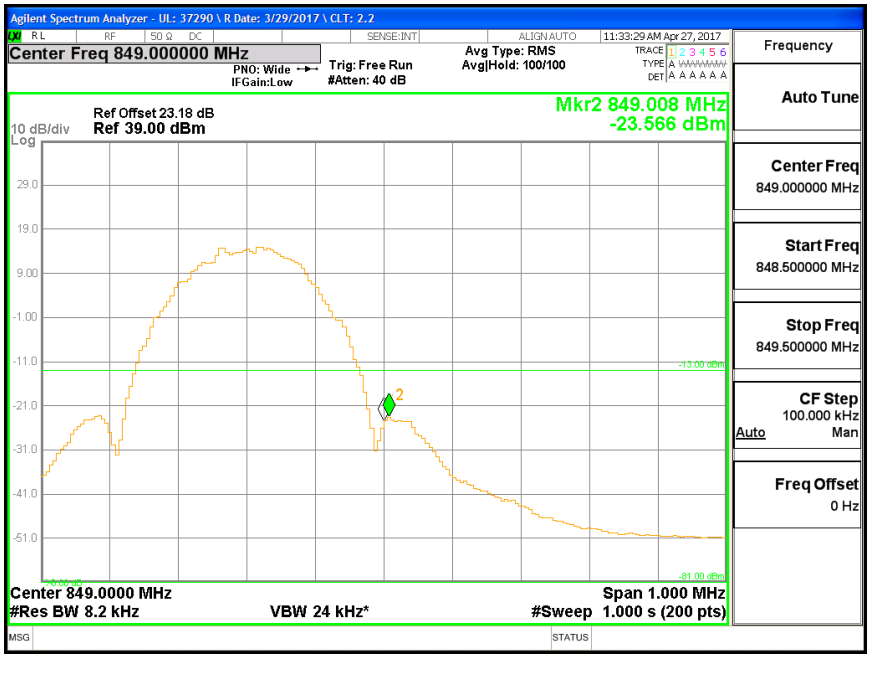


8.2.2. GSM-EGPRS

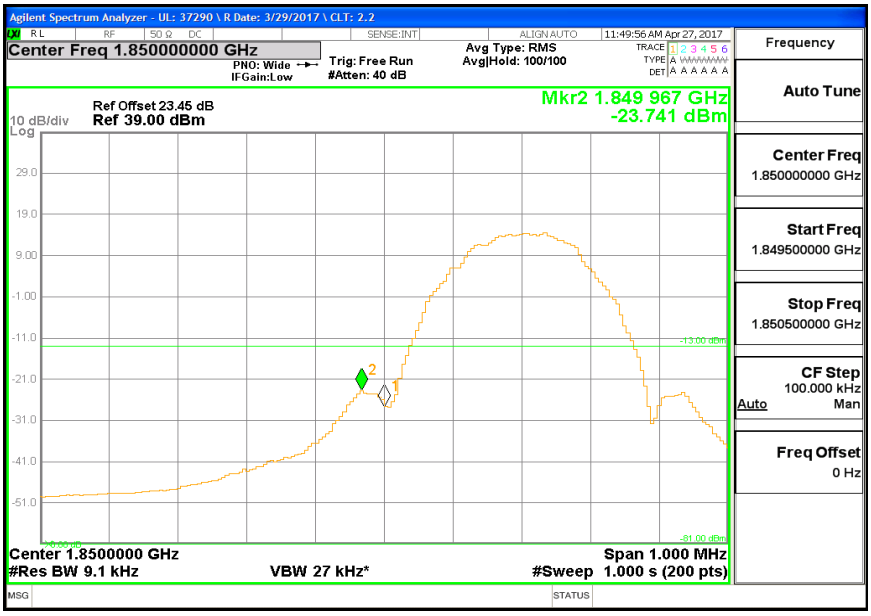
850MHz BAND, LOW CH



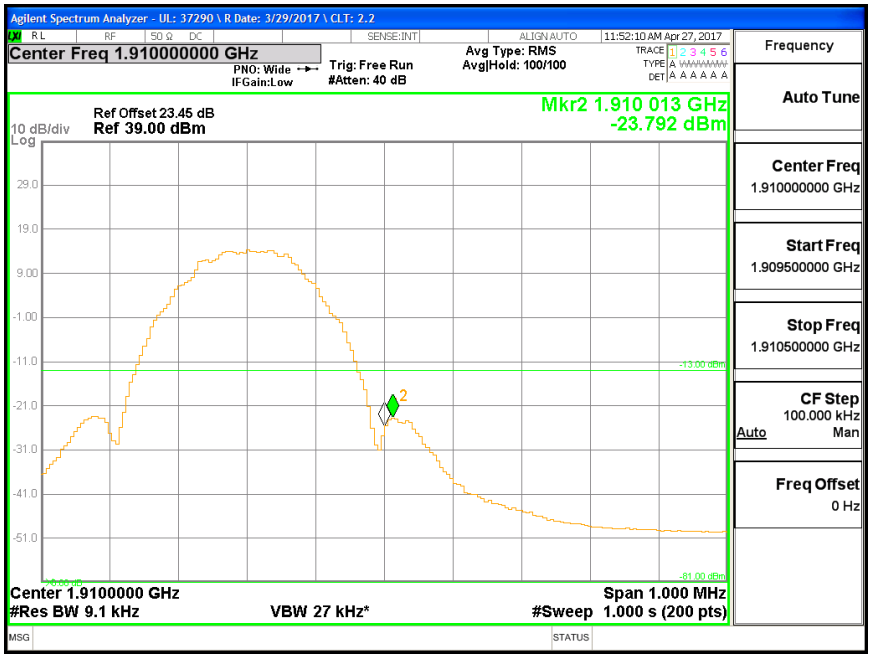
850MHz BAND, HIGH CH



1900MHz BAND, LOW CH

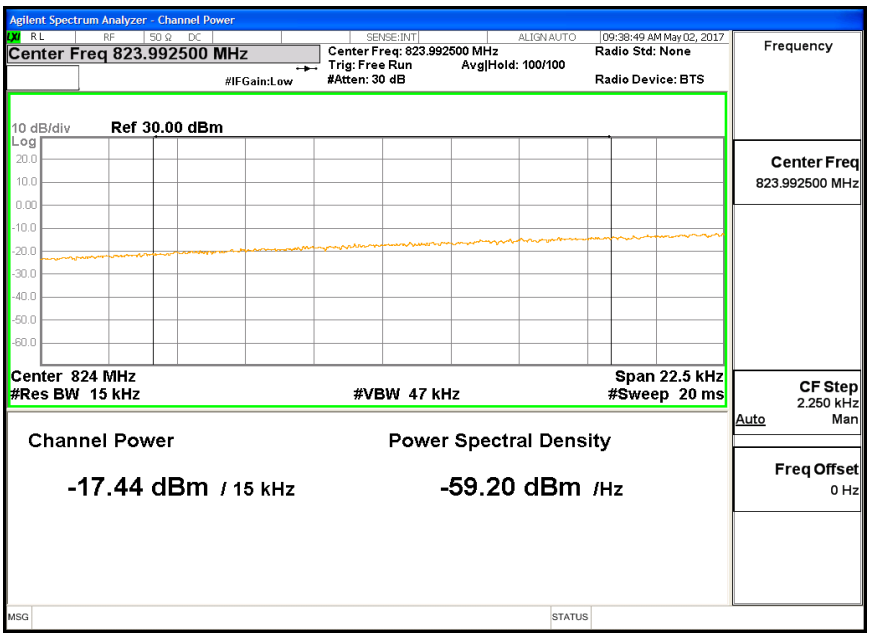


1900MHz BAND, HIGH CH

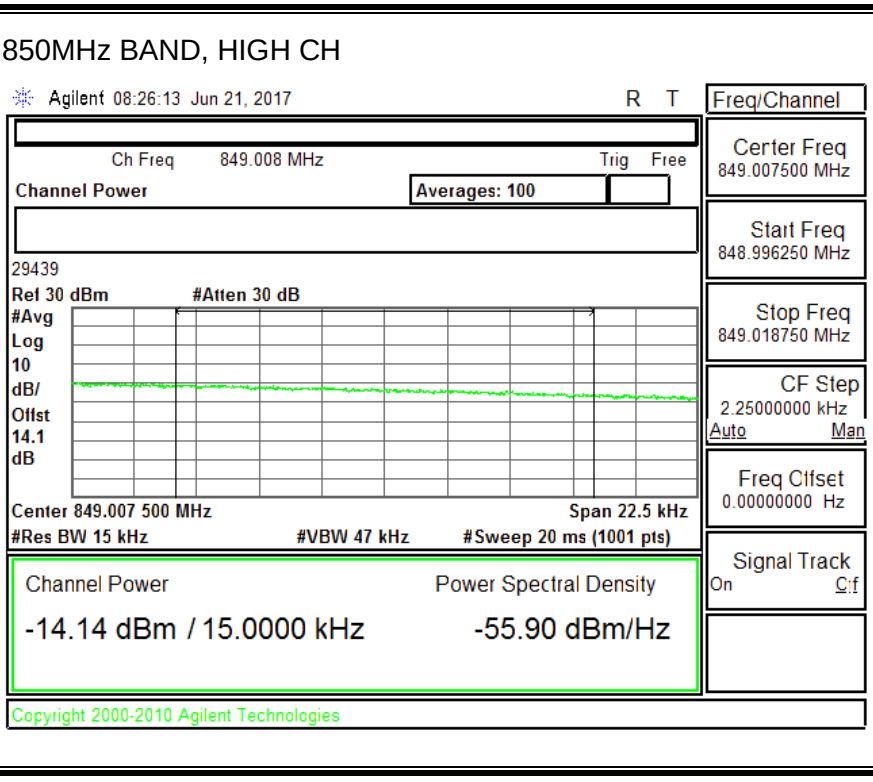


8.2.3. CDMA2000 1xRTT

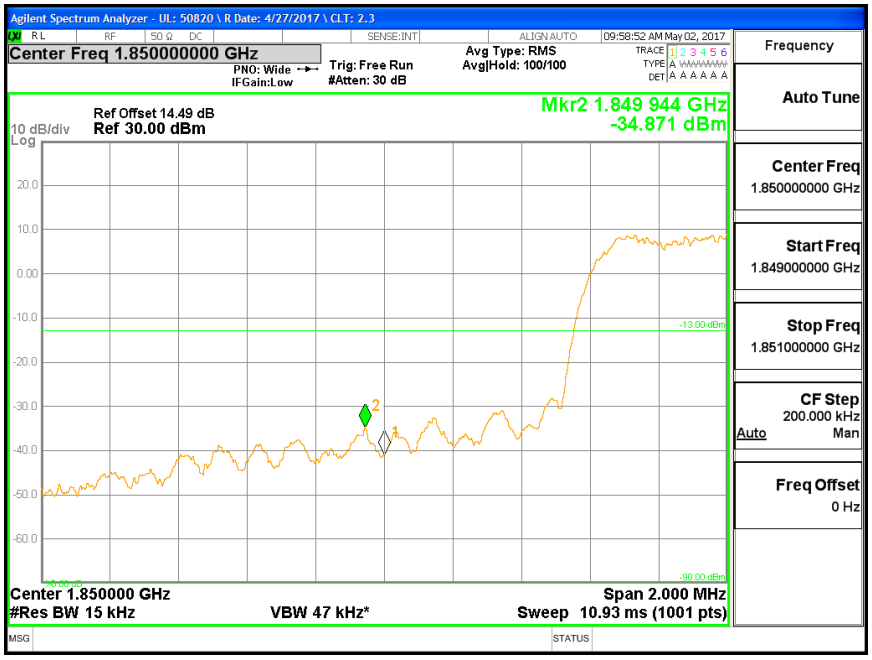
850MHz BAND, LOW CH



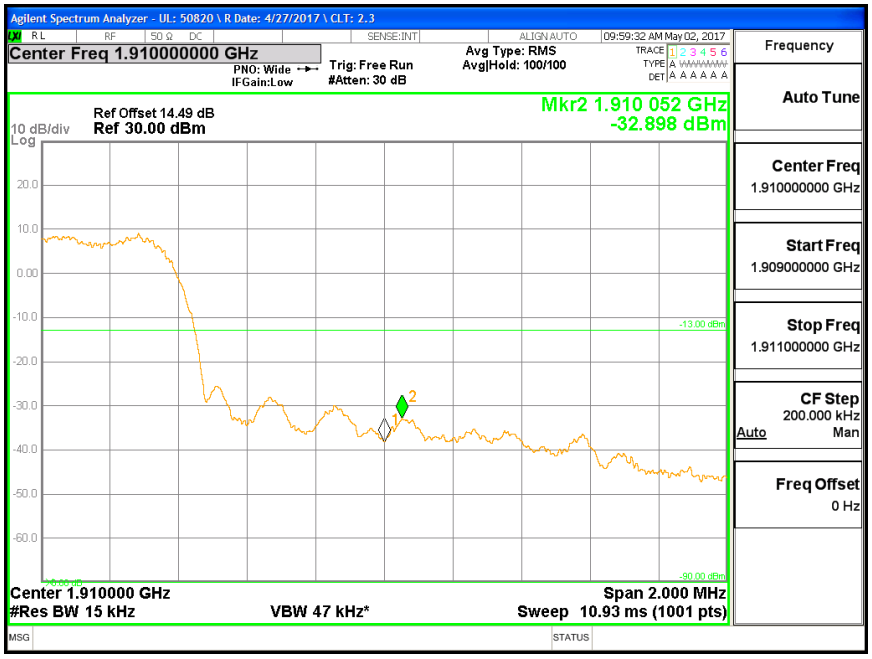
850MHz BAND, HIGH CH



1900MHz BAND, LOW CH

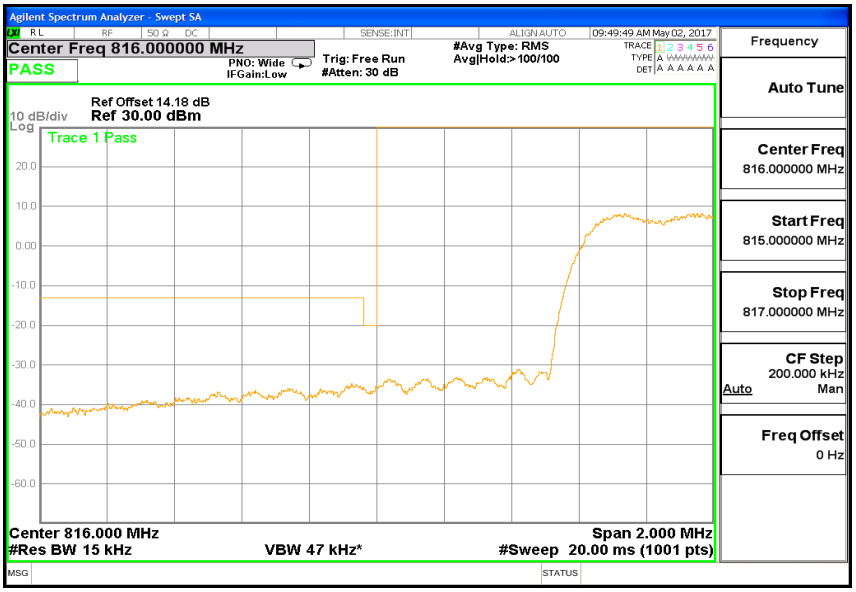


1900MHz BAND, HIGH CH



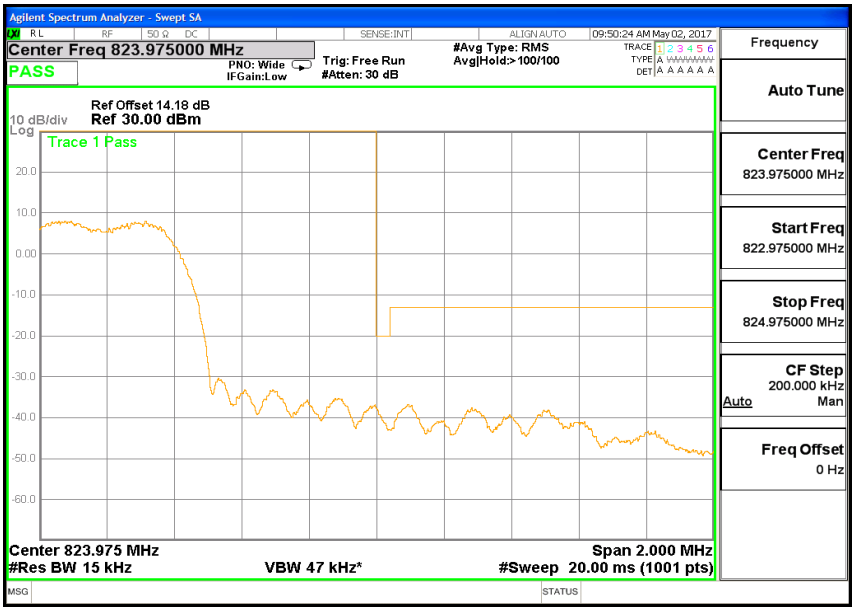
8.2.4. CDMA2000 1xRTT BC10 MASK

LOW CH



Note: RBW=1% of EBW

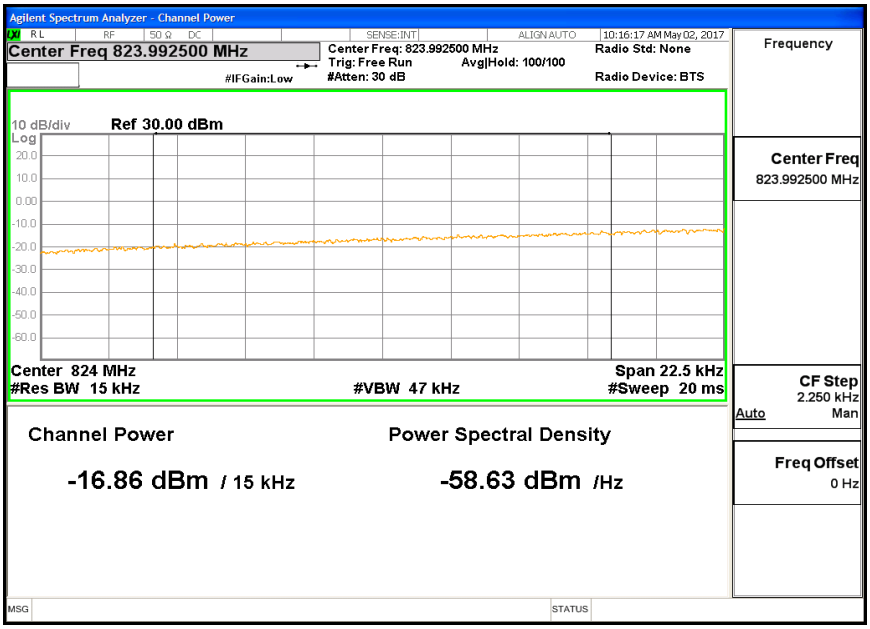
HIGH CH



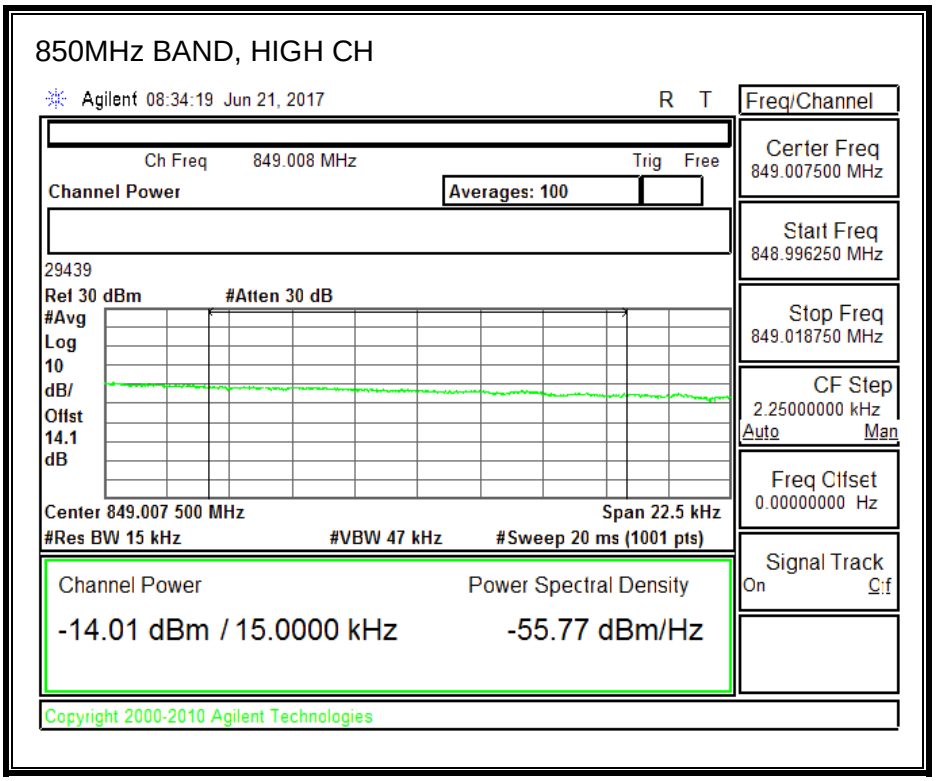
Note: RBW=1% of EBW

8.2.5. CDMA2000 EVDO REV A

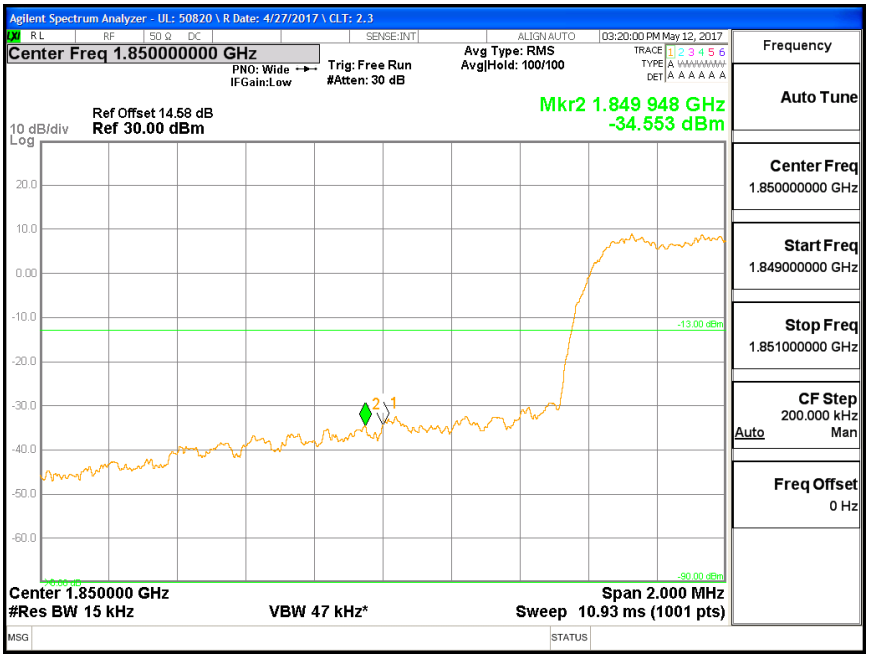
850MHz BAND, LOW CH



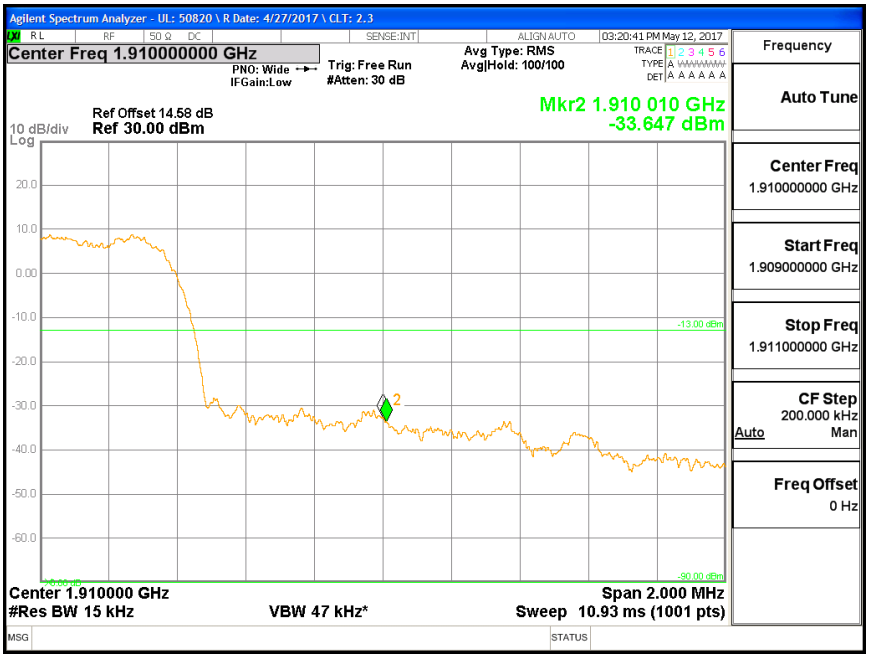
850MHz BAND, HIGH CH



1900MHz BAND, LOW CH

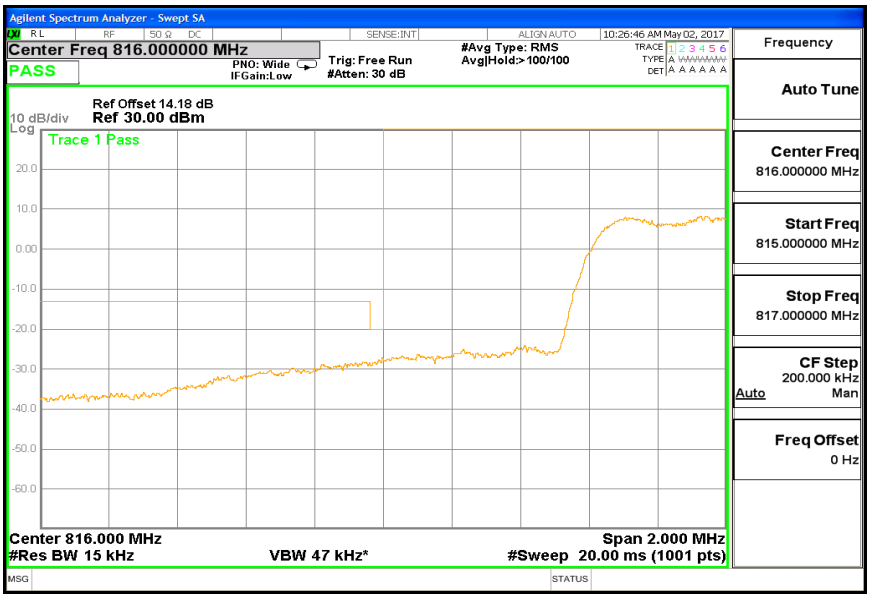


1900MHz BAND, HIGH CH



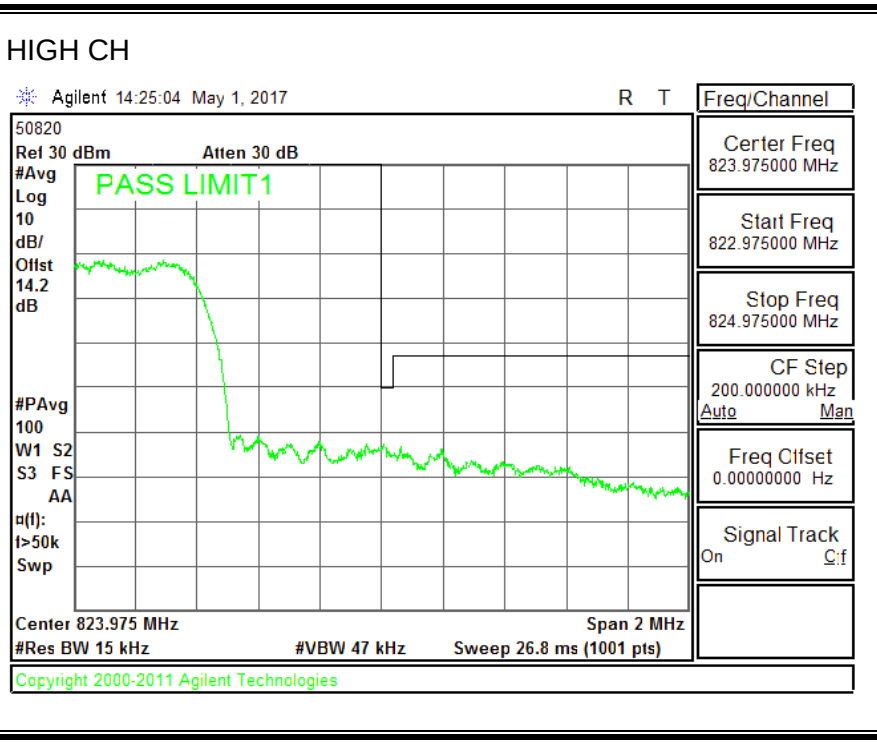
8.2.6. CDMA2000 EVDO REV A BC10 MASK

LOW CH



Note: RBW=1% of EBW

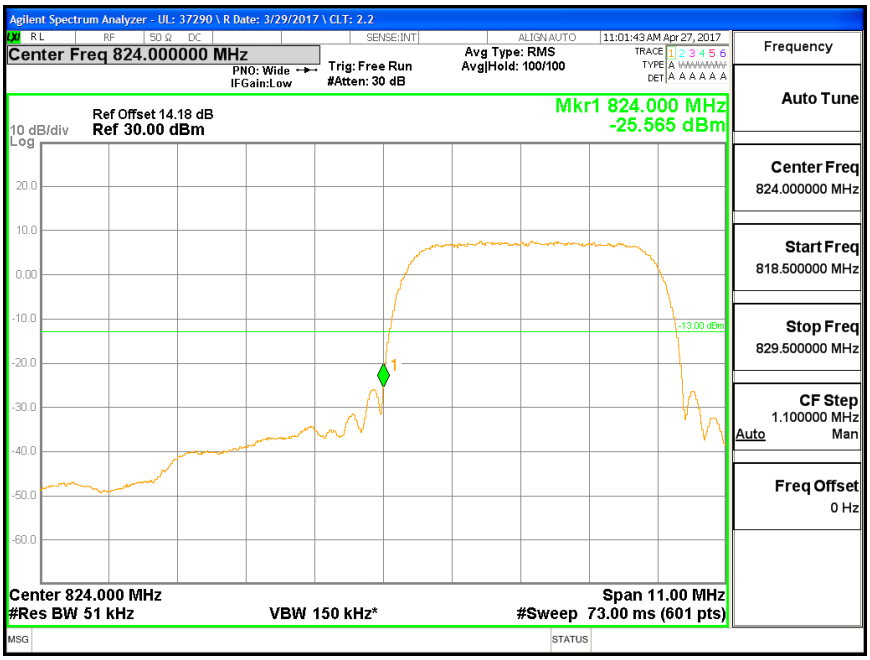
HIGH CH



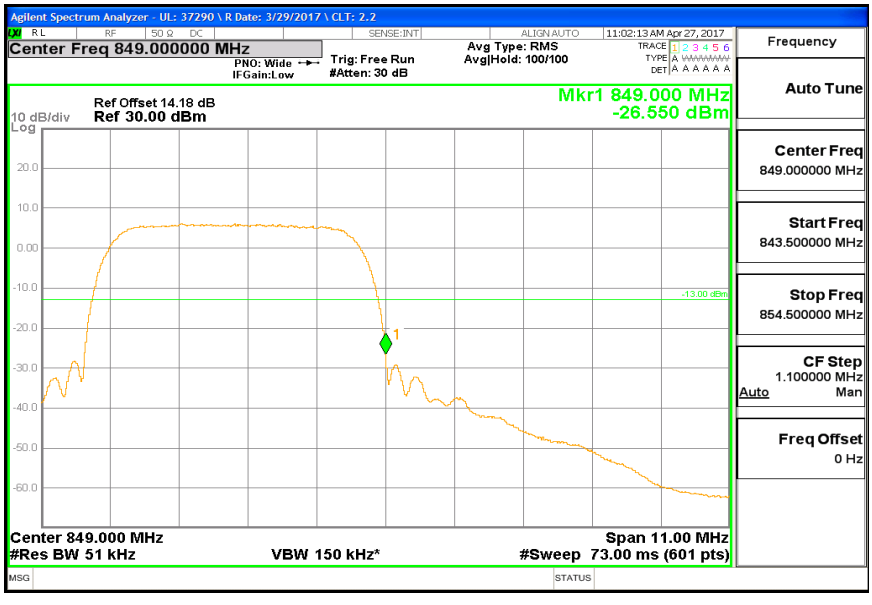
Note: RBW=1% of EBW

8.2.7. UMTS REL 99

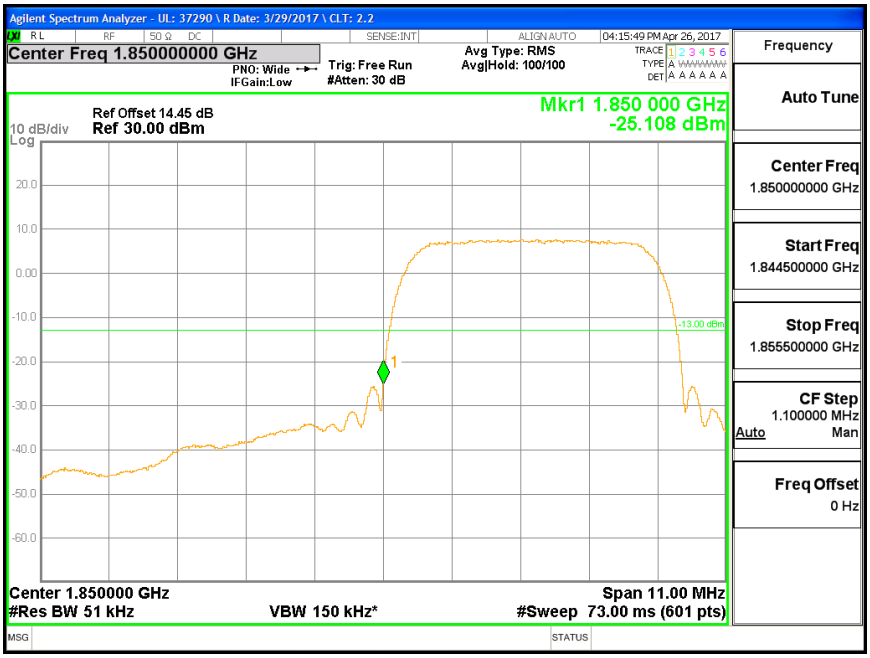
850MHz BAND, LOW CH



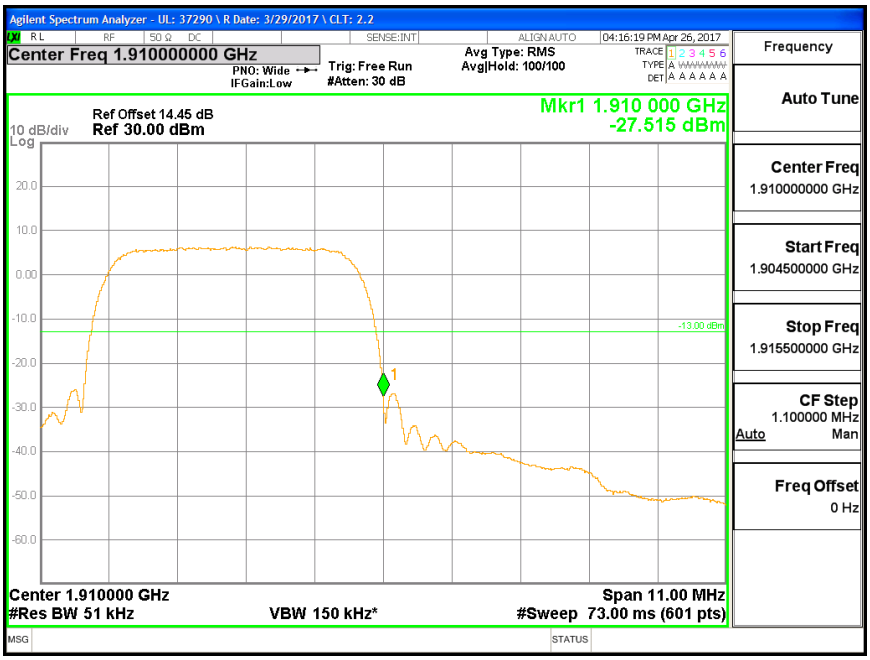
850MHz BAND, HIGH CH



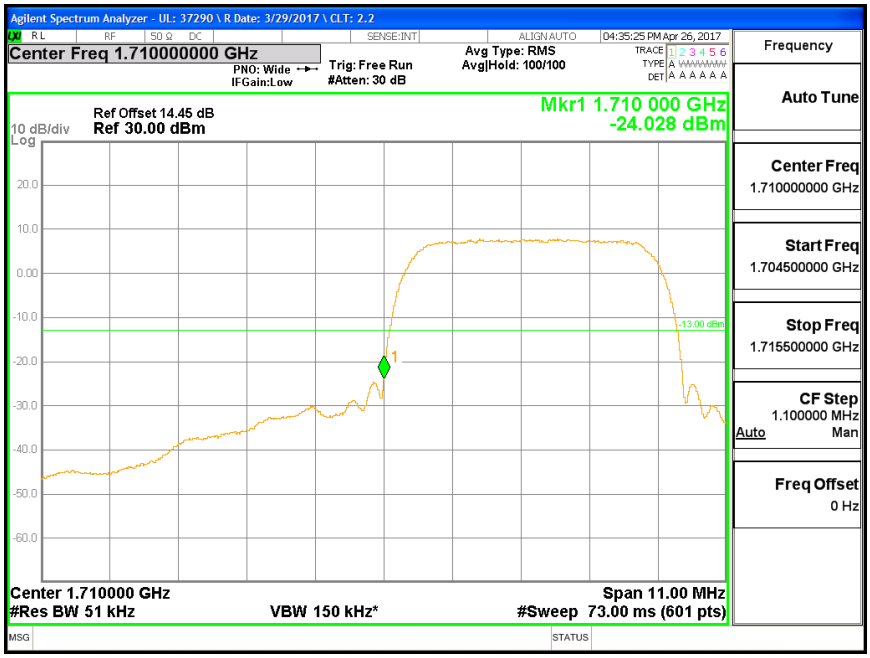
1900MHz BAND, LOW CH



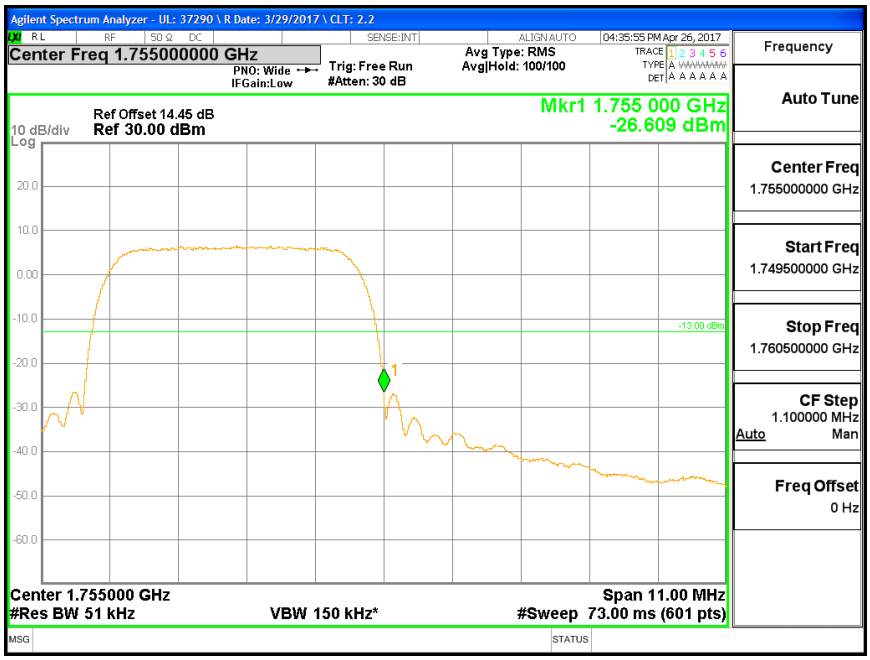
1900MHz BAND, HIGH CH



1700MHz BAND, LOW CH

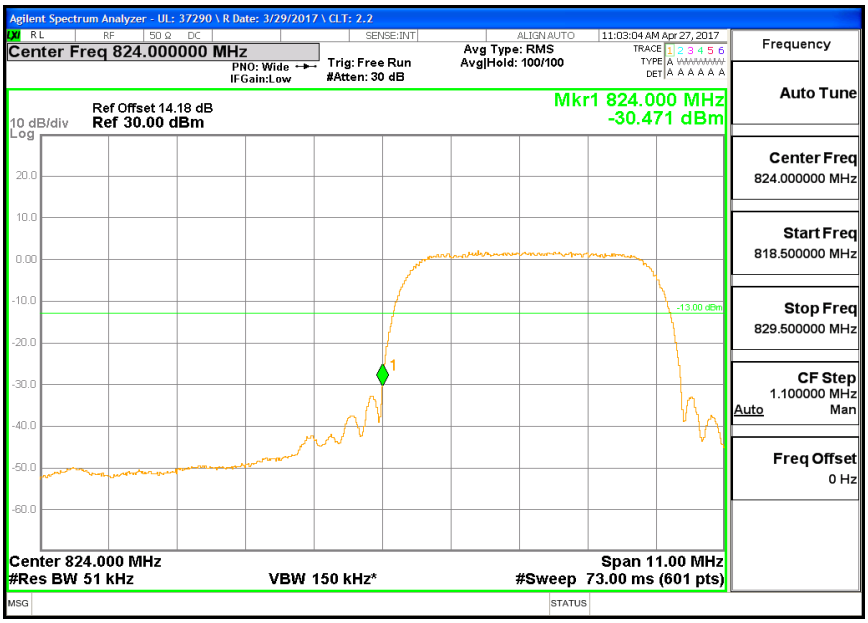


1700MHz BAND, HIGH CH

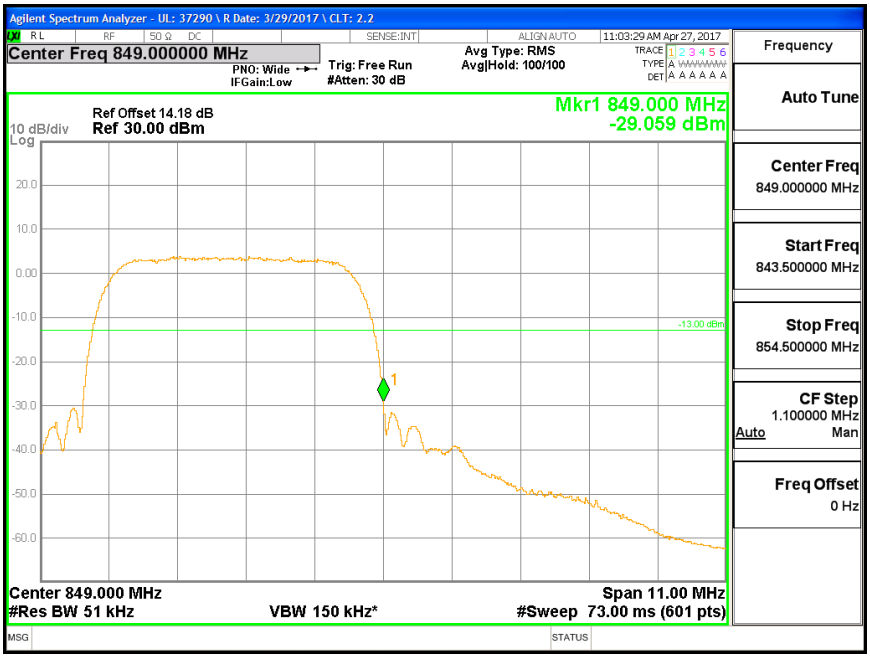


8.2.8. UMTS HSDPA

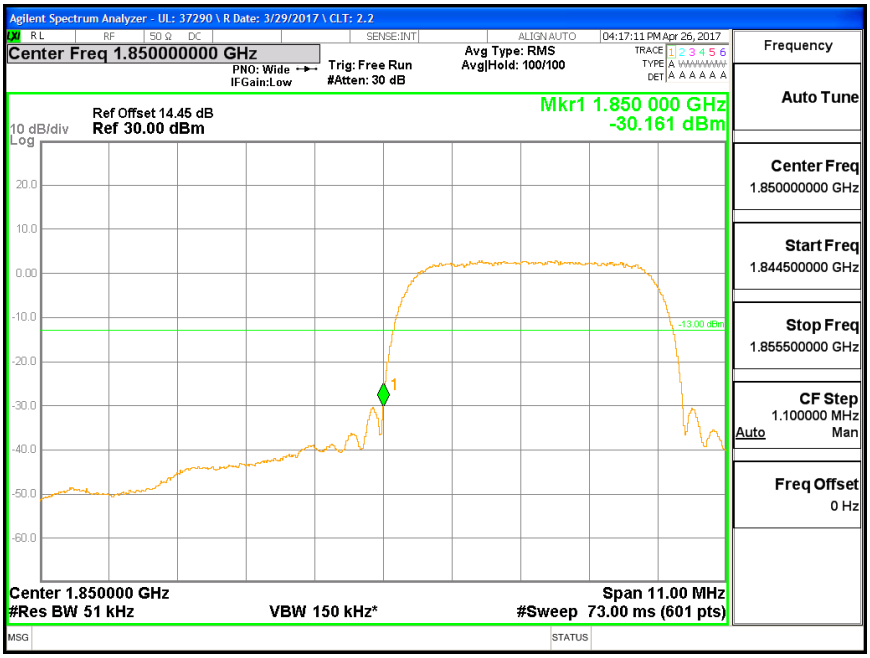
850MHz BAND, LOW CH



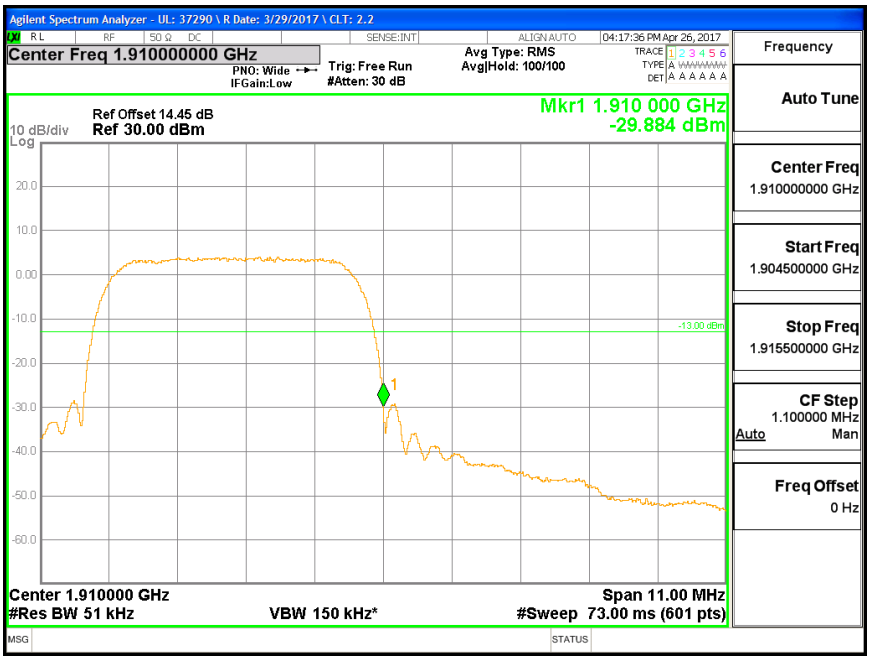
850MHz BAND, HIGH CH



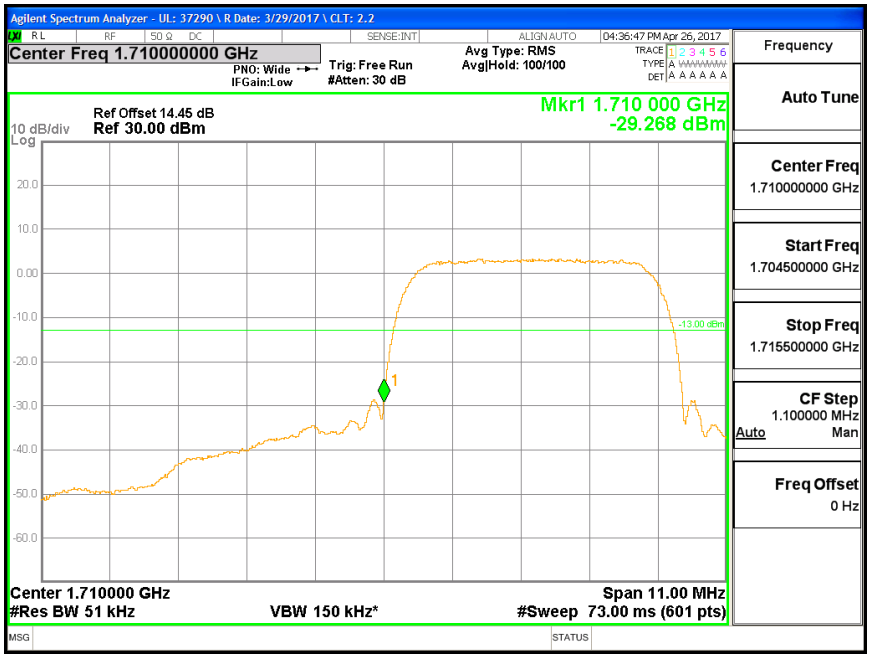
1900MHz BAND, LOW CH



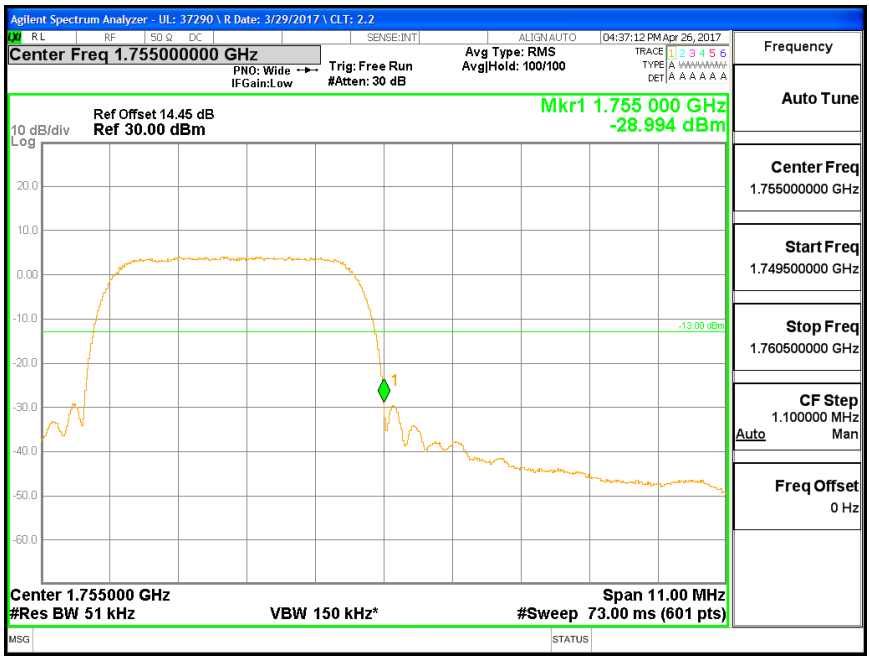
1900MHz BAND, HIGH CH



1700MHz BAND, LOW CH



1700MHz BAND, HIGH CH



8.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.917, §24.238, §27.53 and §90.691
IC: RSS132§5.5; RSS133§6.5 and RSS139§6.6

LIMITS

FCC: §22.917, §24.238, §27.53
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: §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.

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

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

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

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

RSS139§6.6

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

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

TEST PROCEDURE

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

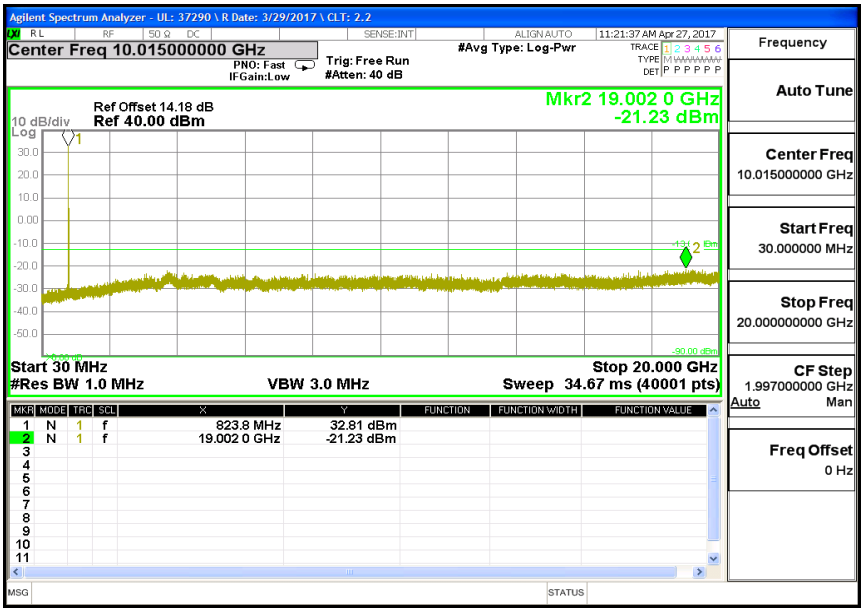
For each out of band emissions measurement:

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

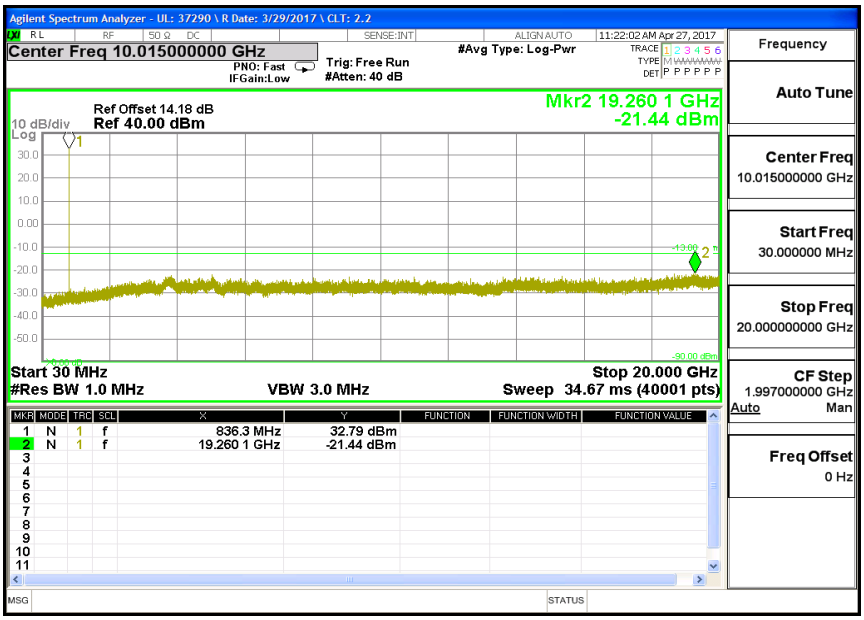
RESULTS

8.3.1. GSM-GPRS

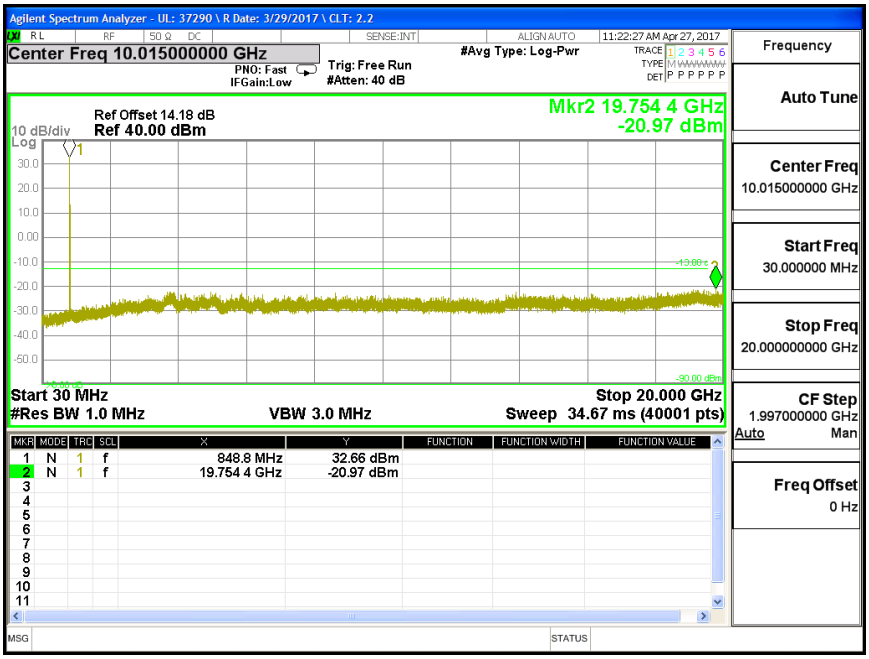
850MHz BAND, LOW CH



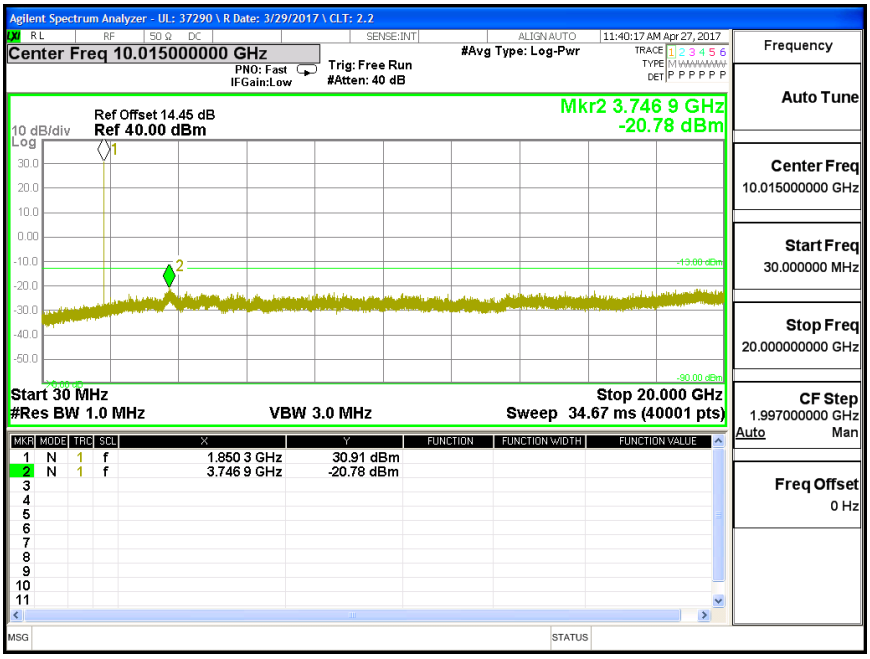
850MHz BAND, MID CH



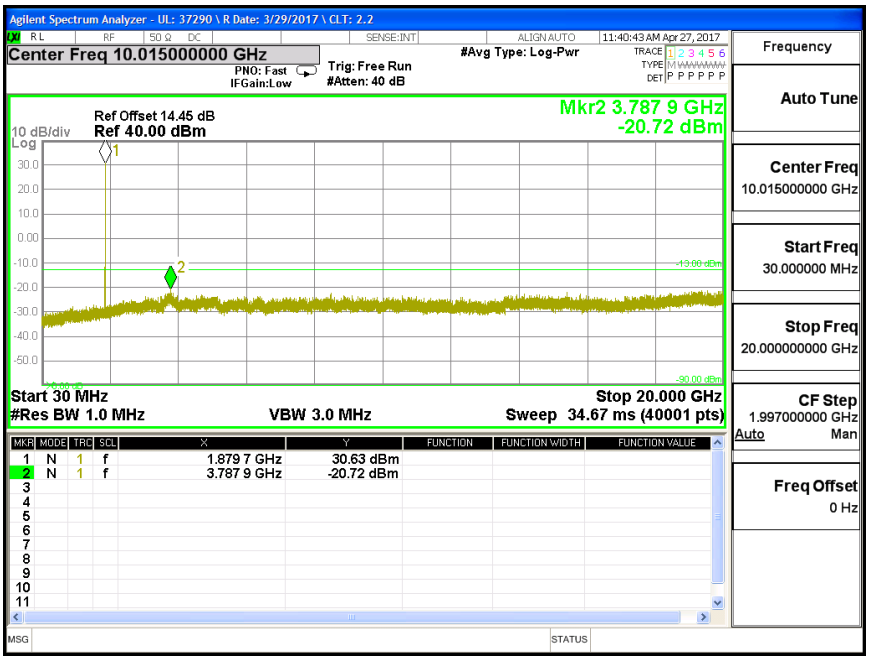
850MHz BAND, HIGH CH



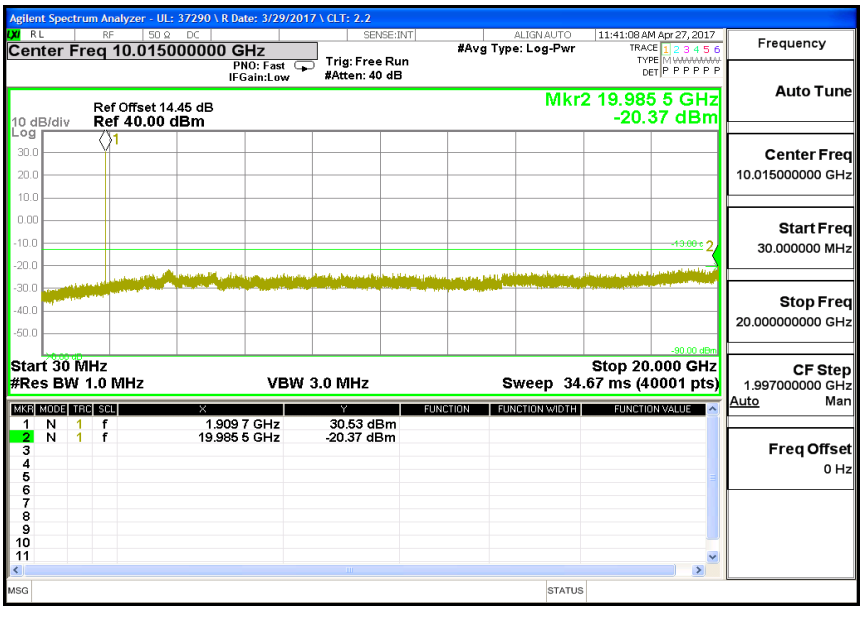
1900MHz BAND , LOW CH



1900MHz BAND , MID CH

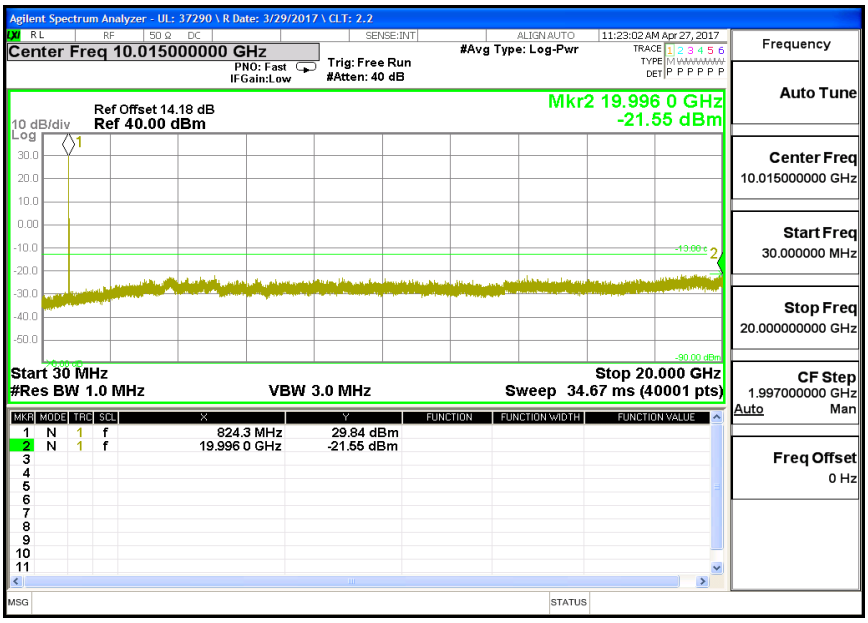


1900MHz BAND , HIGH CH

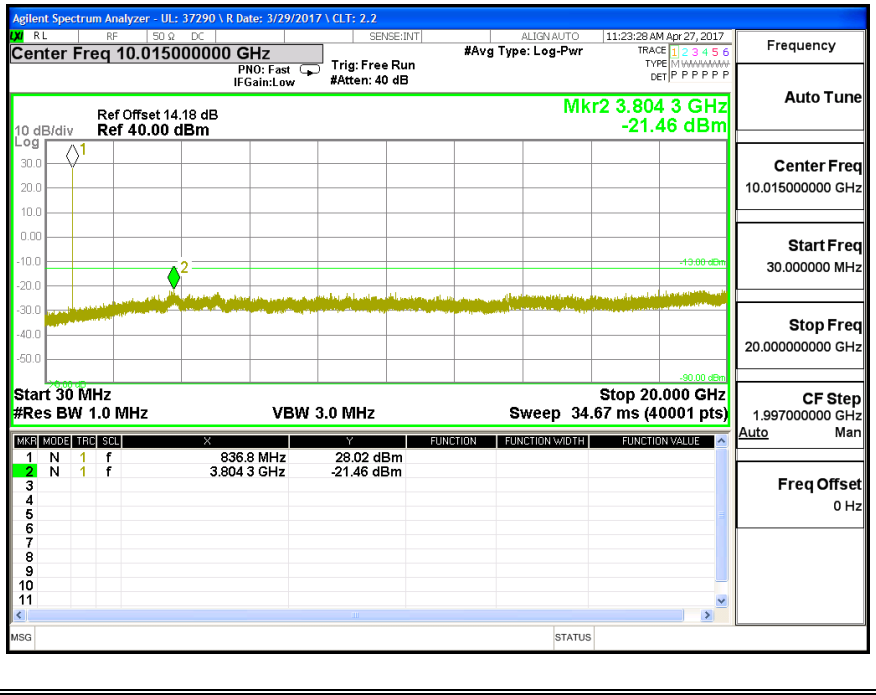


8.3.2. GSM-EGPRS

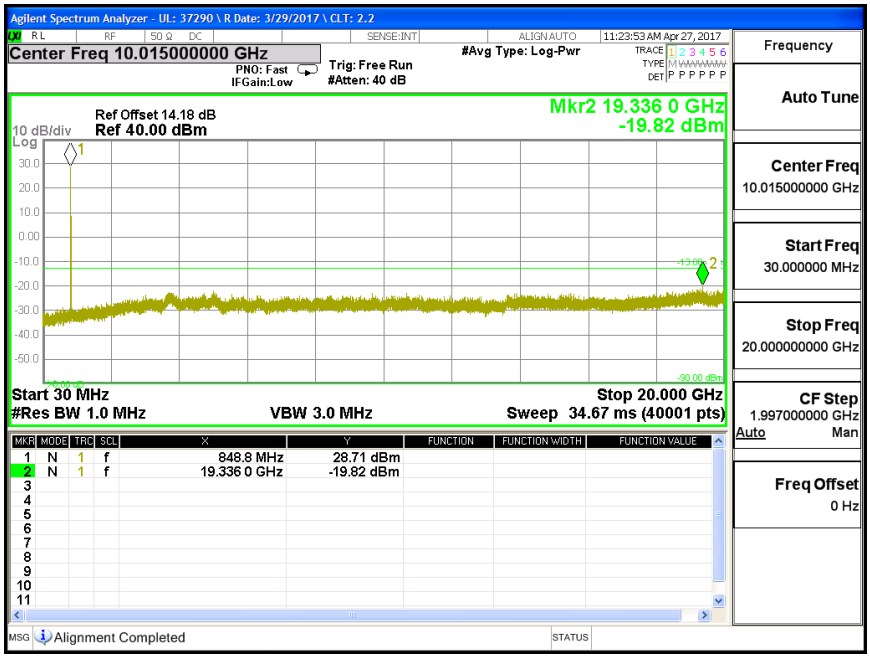
850MHz BAND, LOW CH



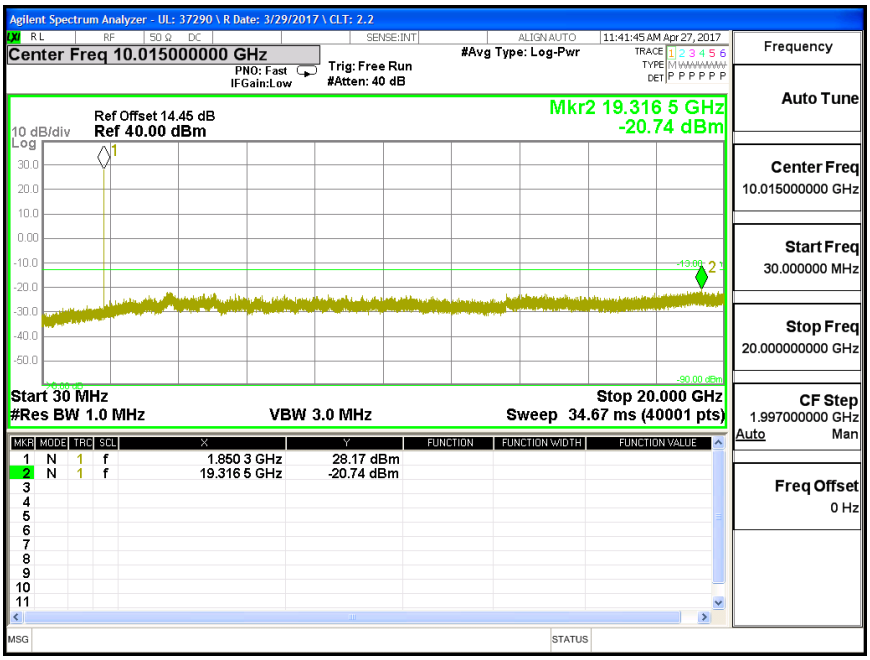
850MHz BAND, MID CH



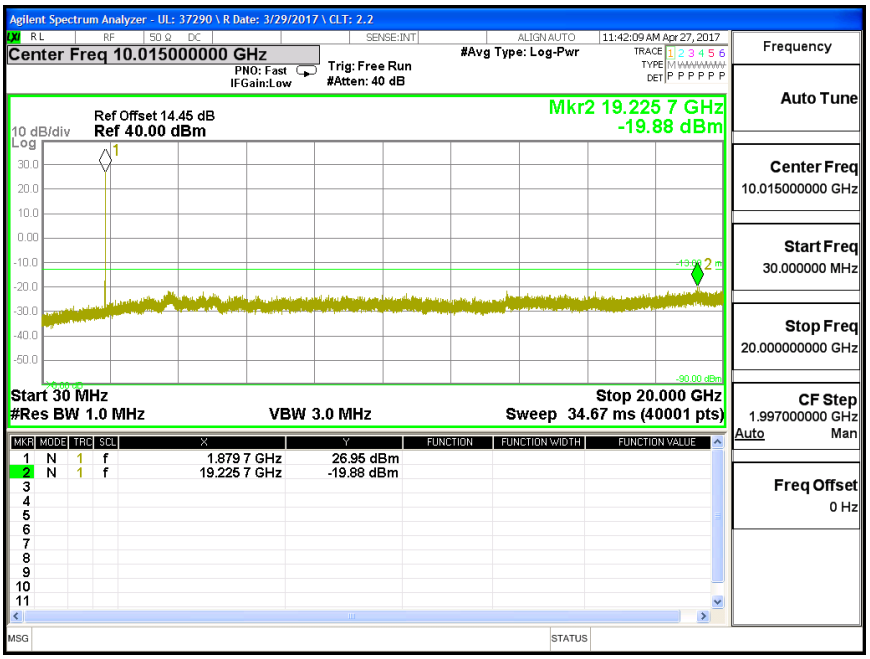
850MHz BAND, HIGH CH



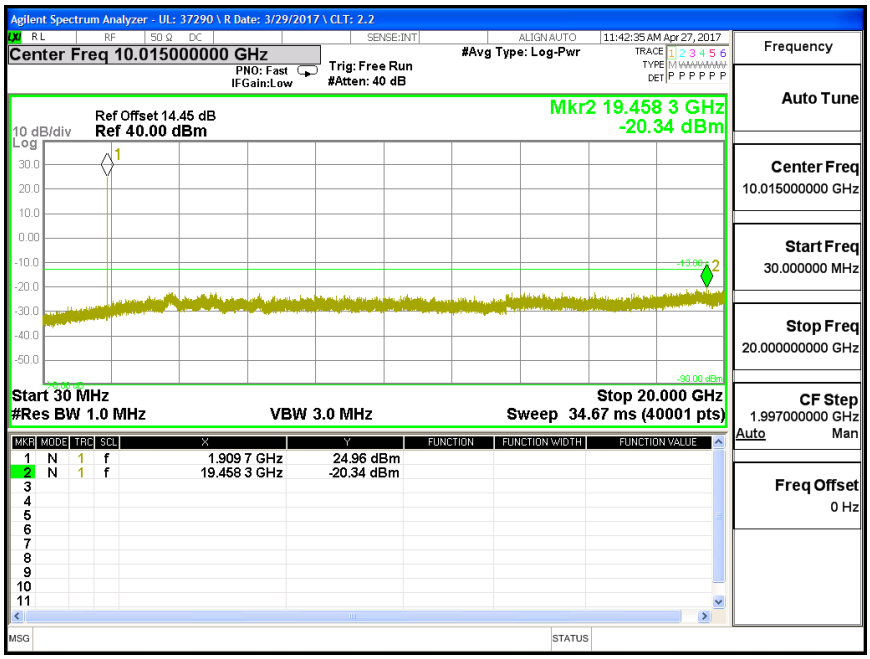
1900MHz BAND, LOW CH



1900MHz BAND, MID CH

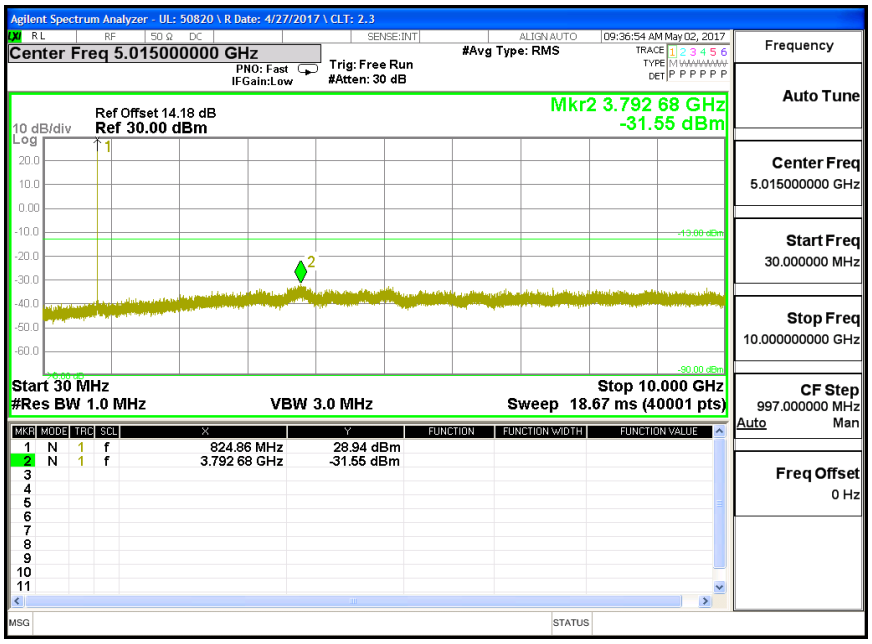


1900MHz BAND, HIGH CH

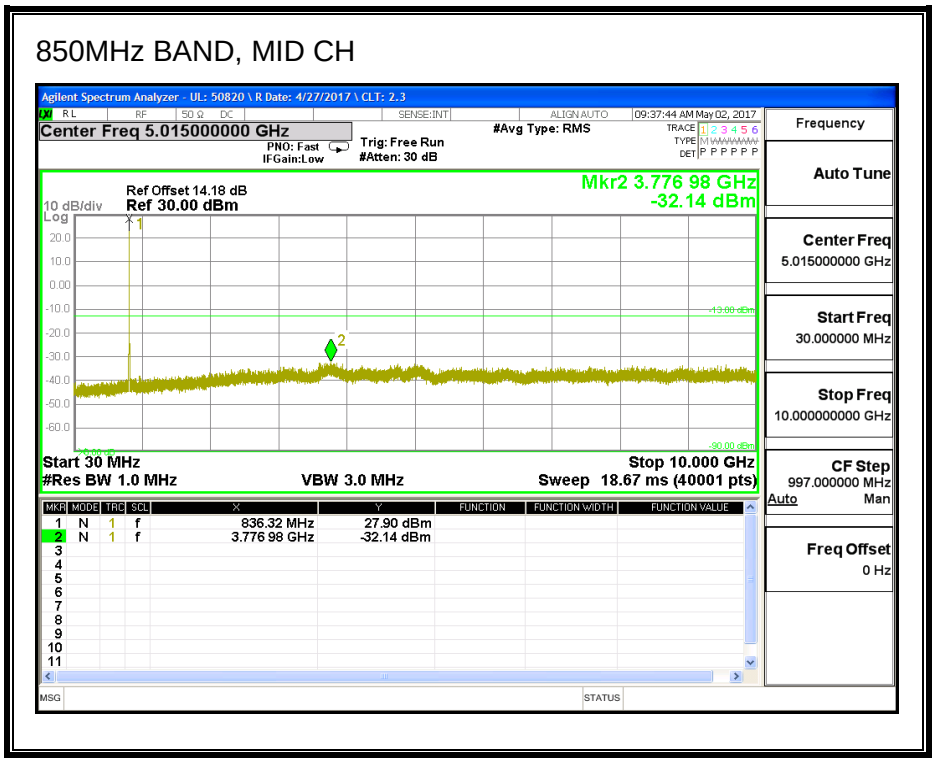


8.3.3. CDMA2000 1xRTT

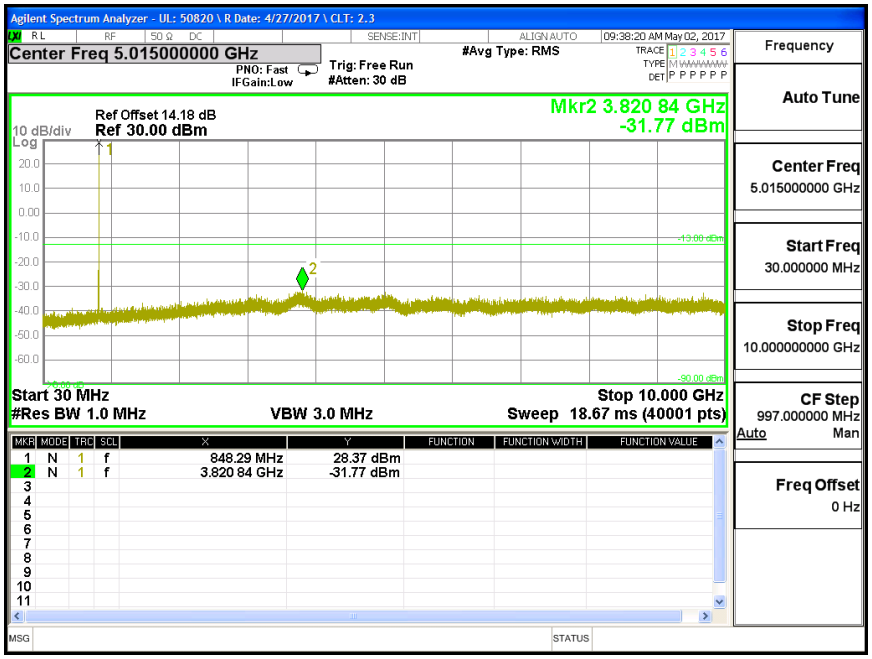
850MHz BAND, LOW CH



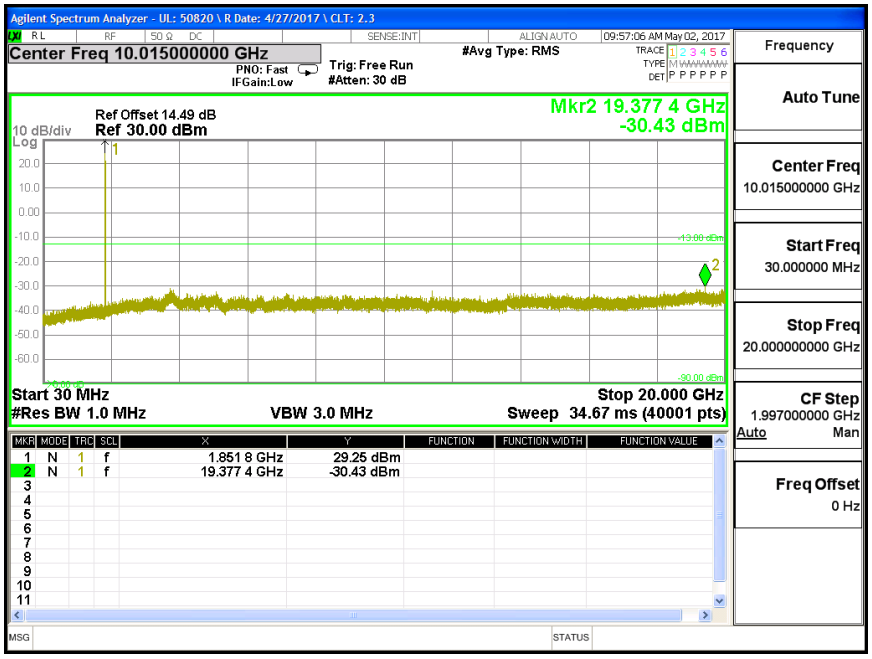
850MHz BAND, MID CH



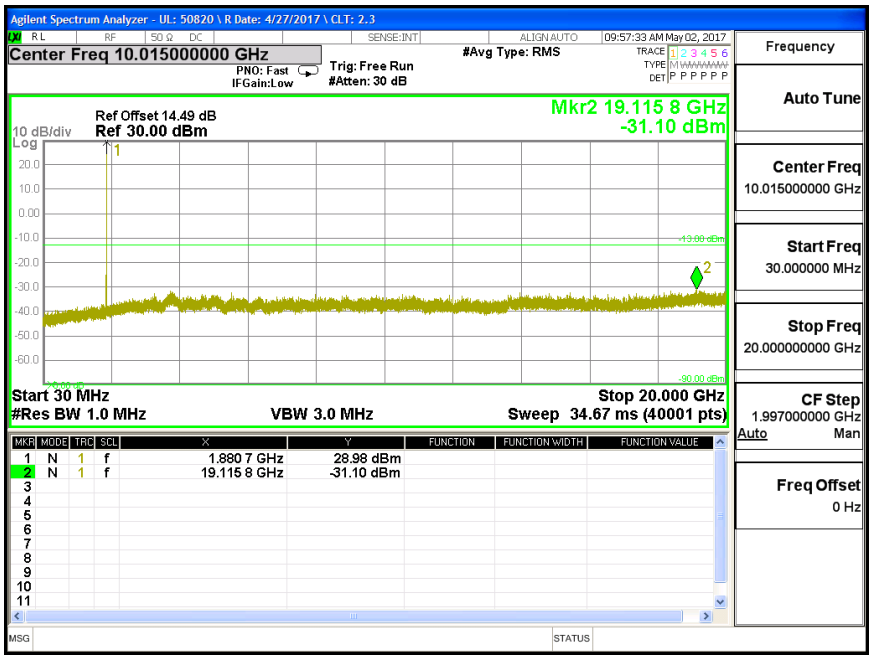
850MHz BAND, HIGH CH



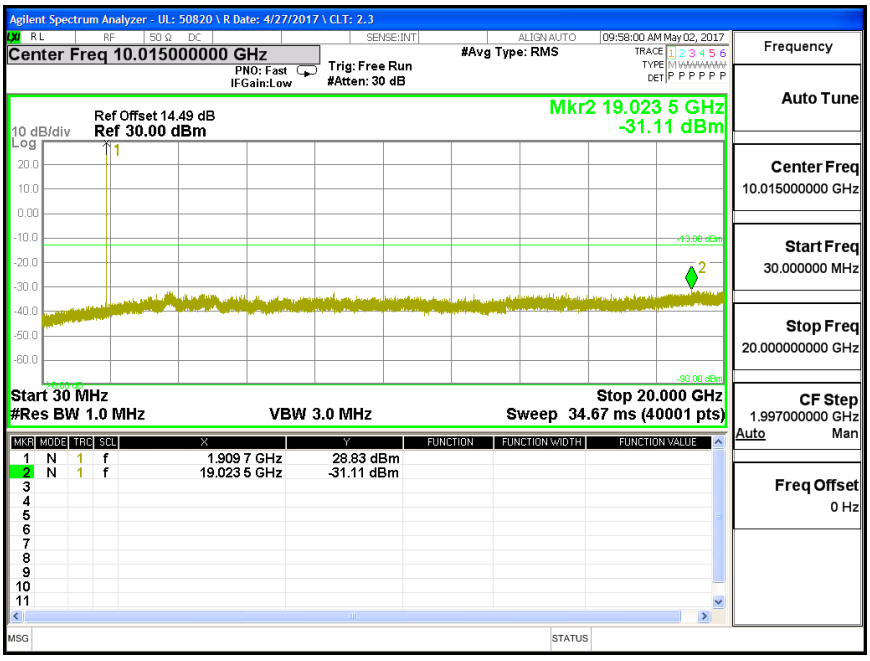
1900MHz BAND, LOW CH



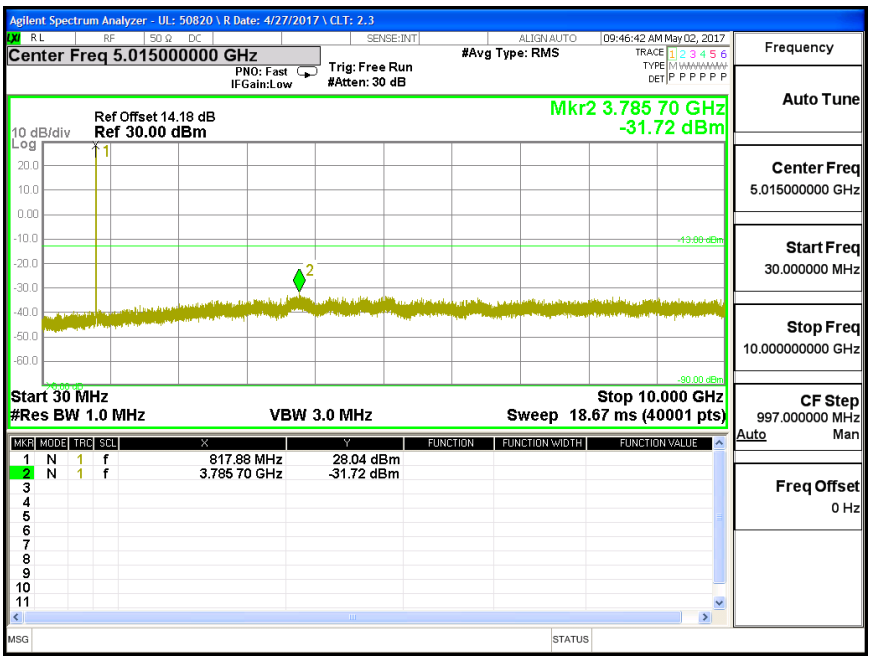
1900MHz BAND, MID CH



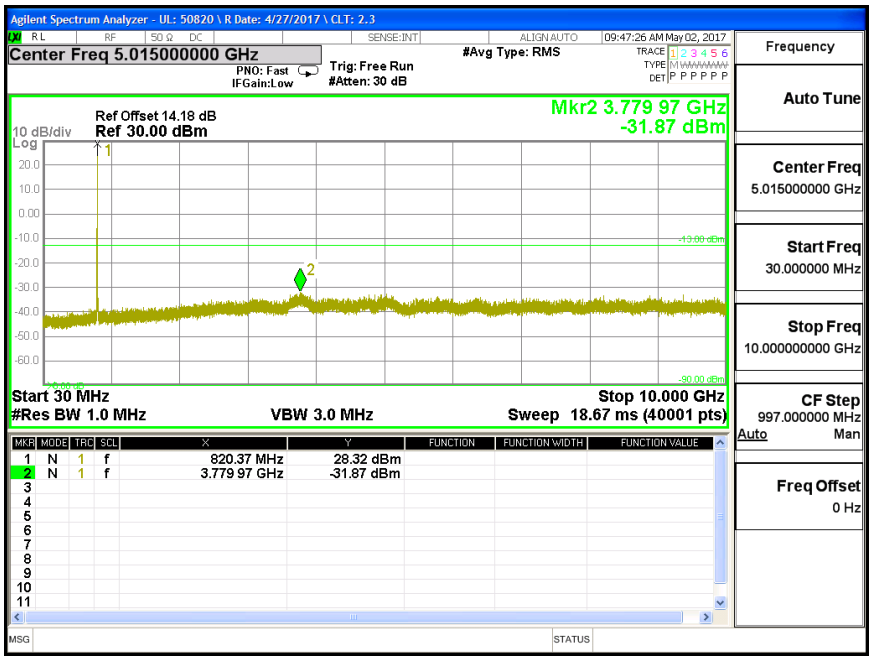
1900MHz BAND, HIGH CH



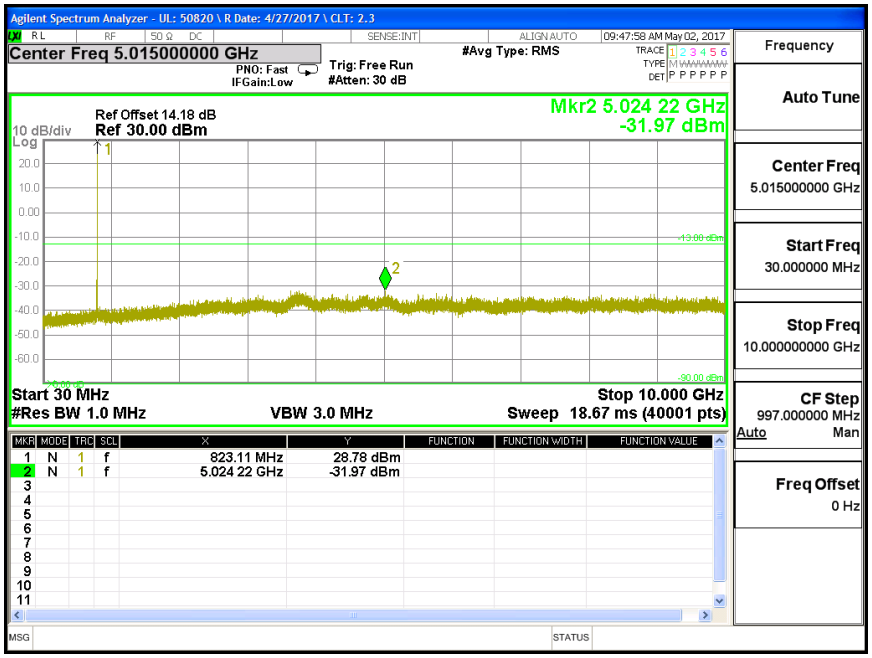
800MHz SECONDARY BAND, LOW CH



800MHz SECONDARY BAND, MID CH

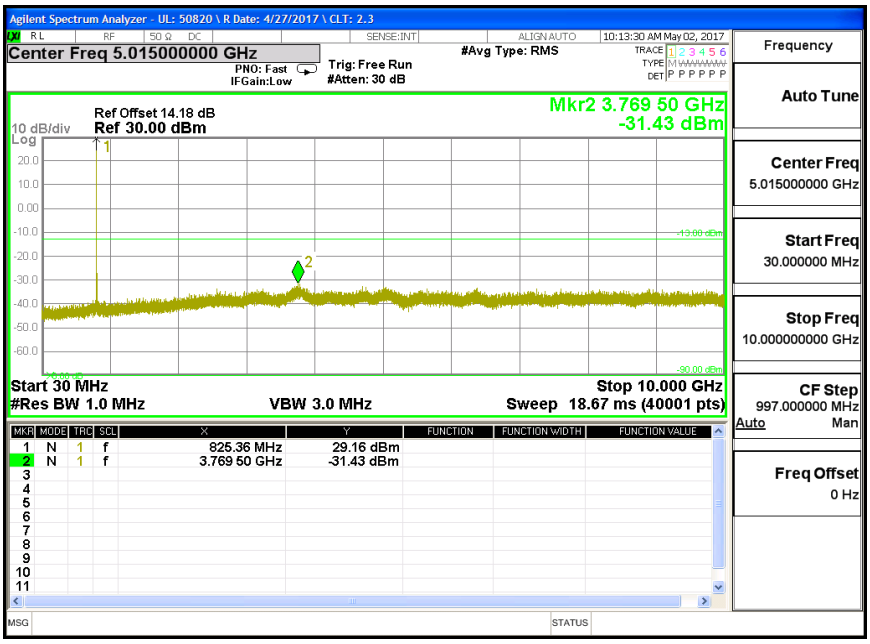


800MHz SECONDARY BAND, HIGH CH

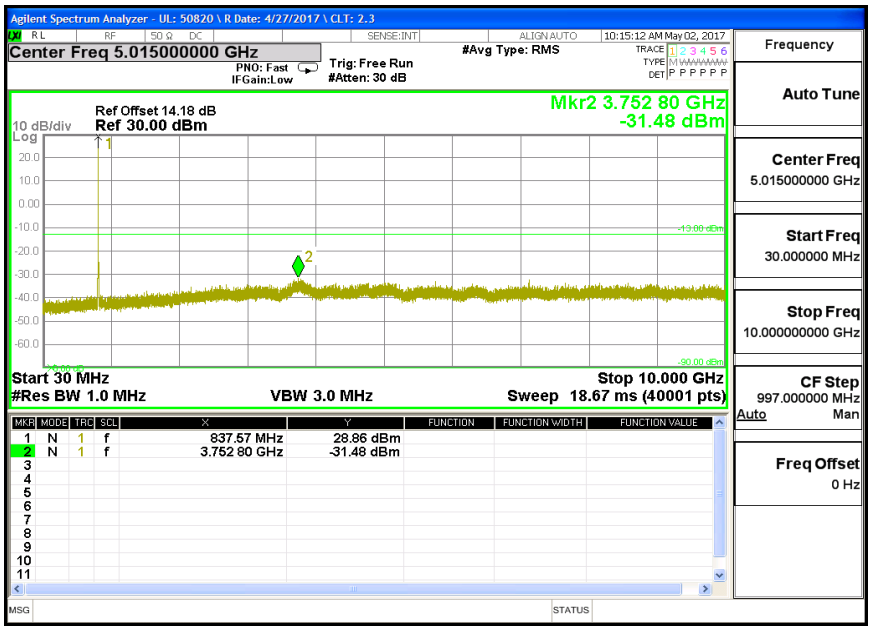


8.3.4. CDMA2000 EVDO REV A

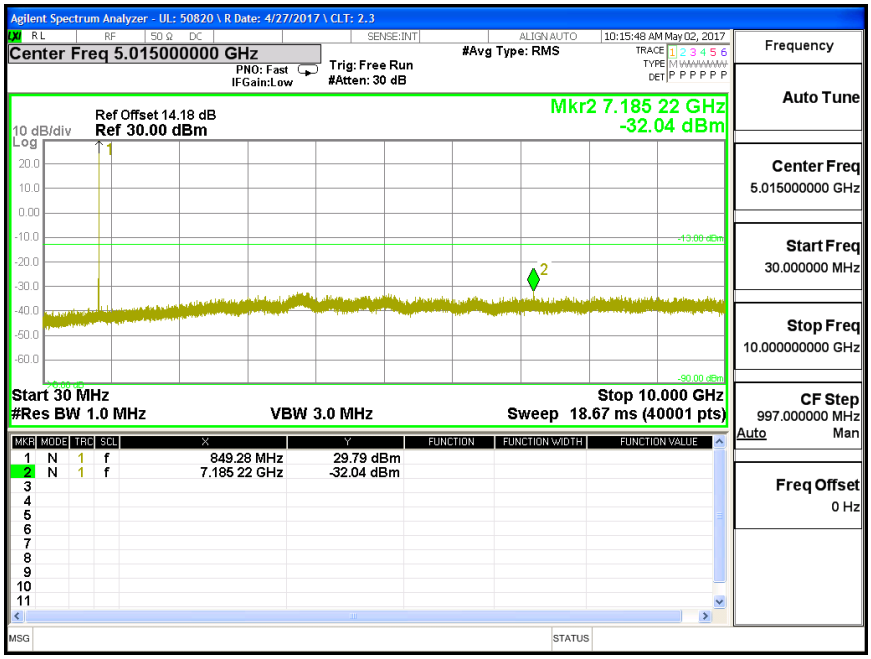
850MHz BAND, LOW CH



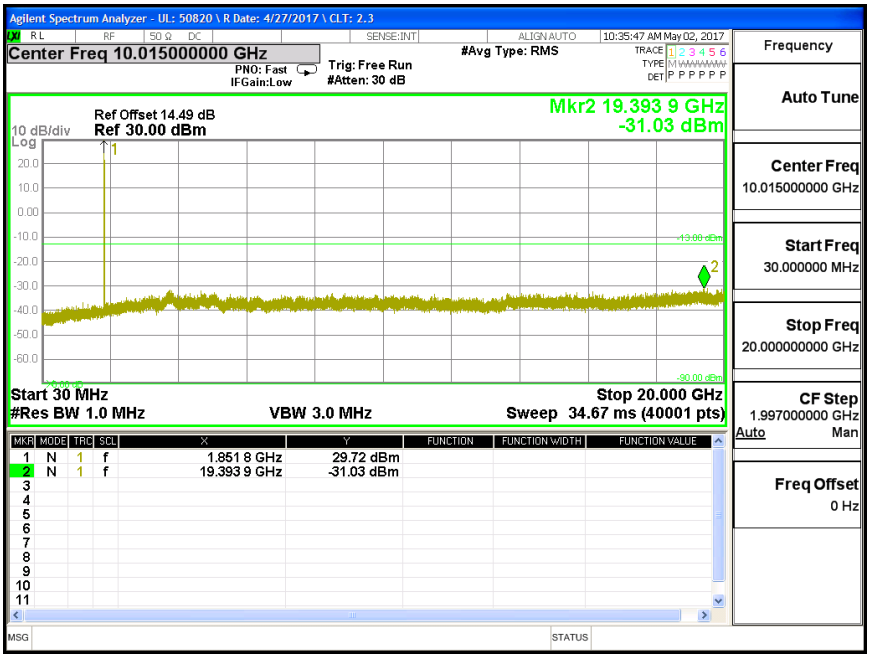
850MHz BAND, MID CH



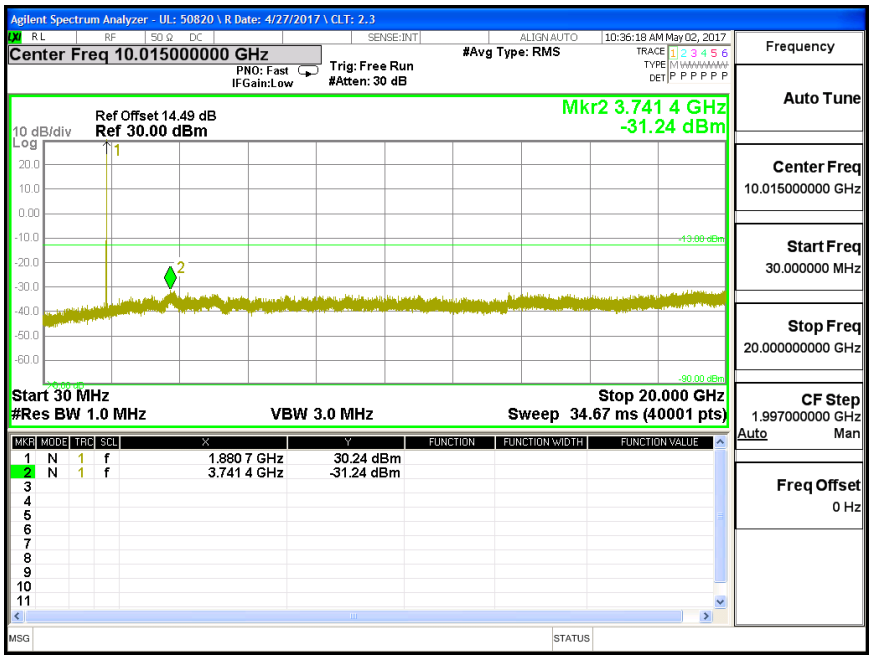
850MHz BAND, HIGH CH



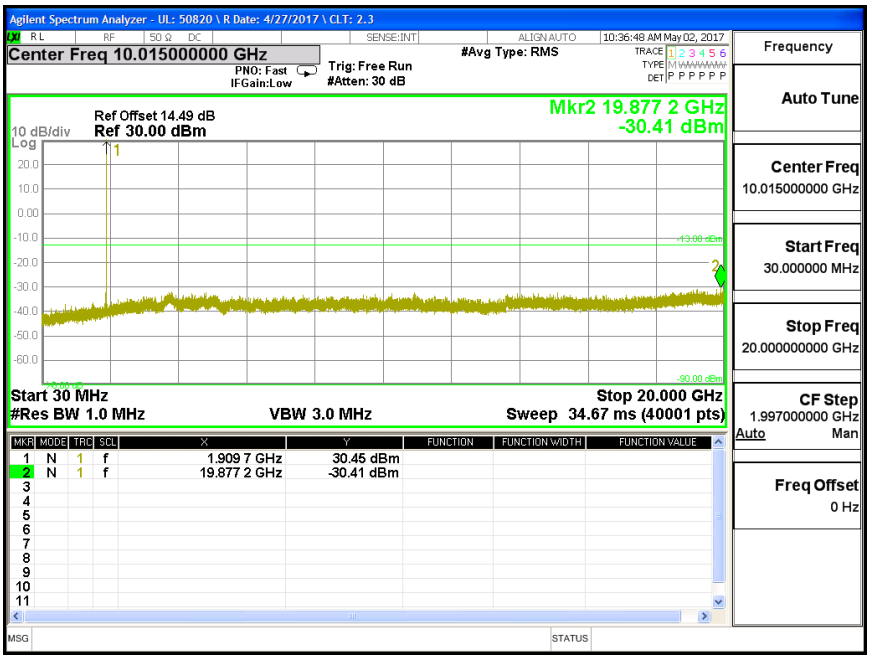
1900MHz BAND, LOW CH



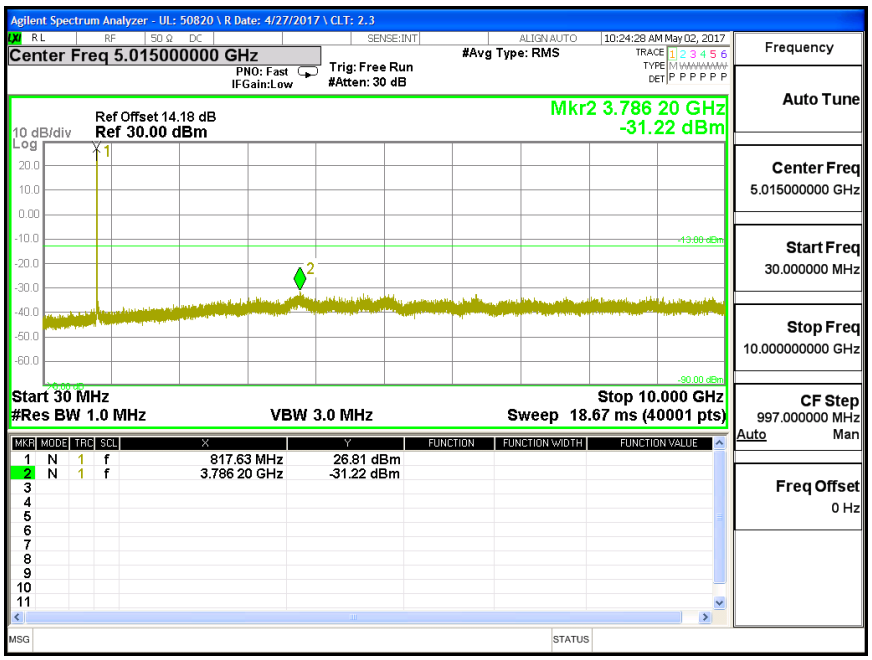
1900MHz BAND, MID CH



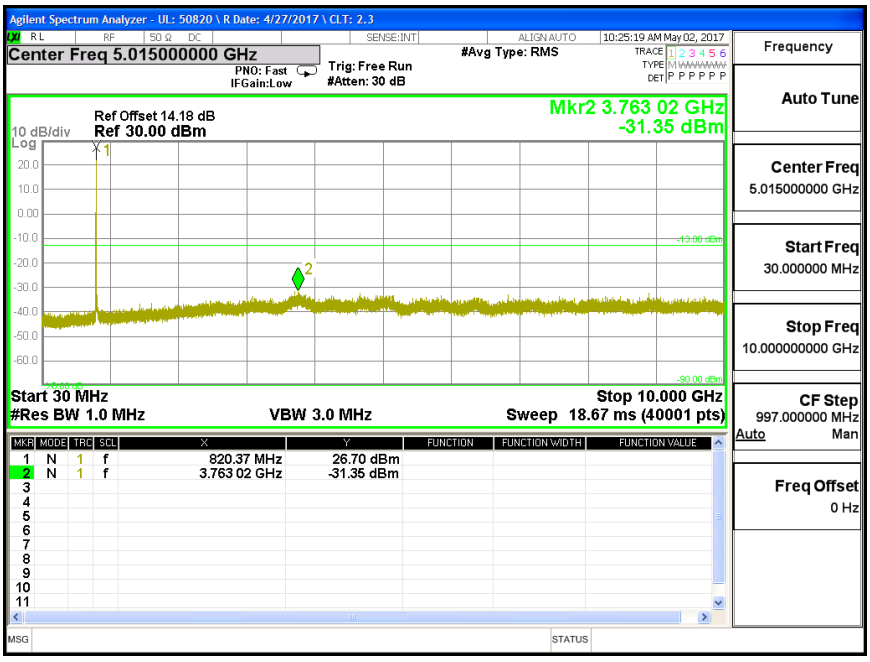
1900MHz BAND, HIGH CH



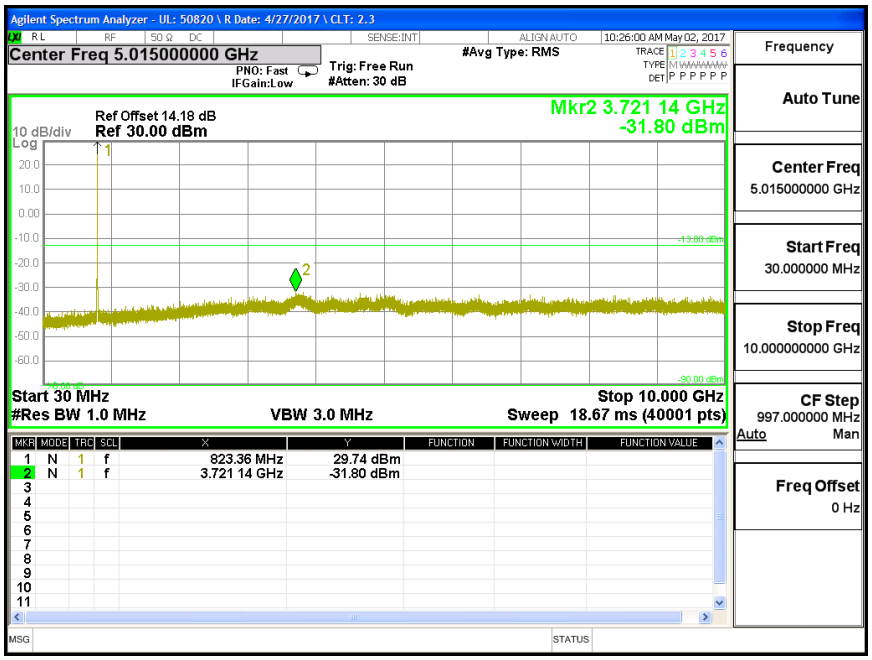
800MHz SECONDARY BAND, LOW CH



800MHz SECONDARY BAND, MID CH

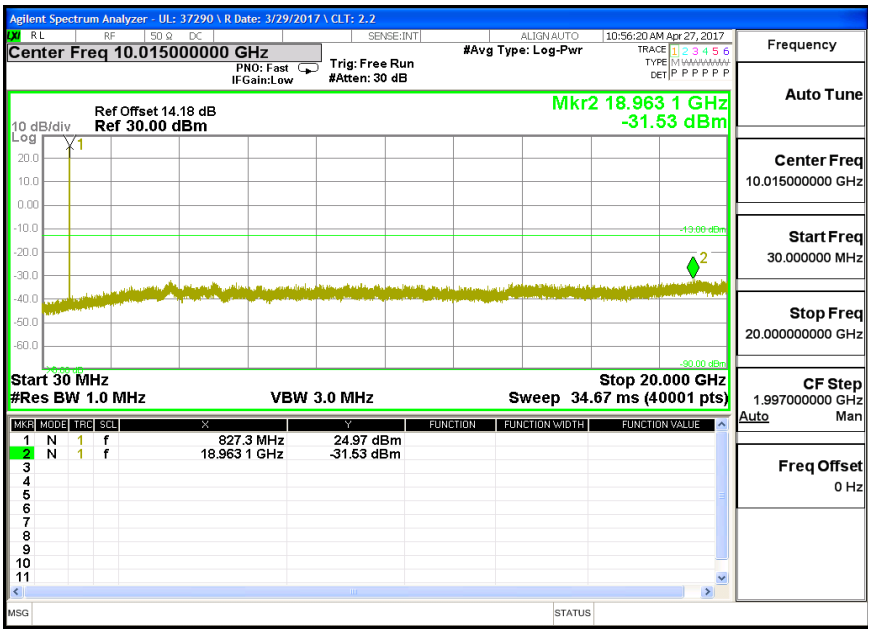


800MHz SECONDARY BAND, HIGH CH

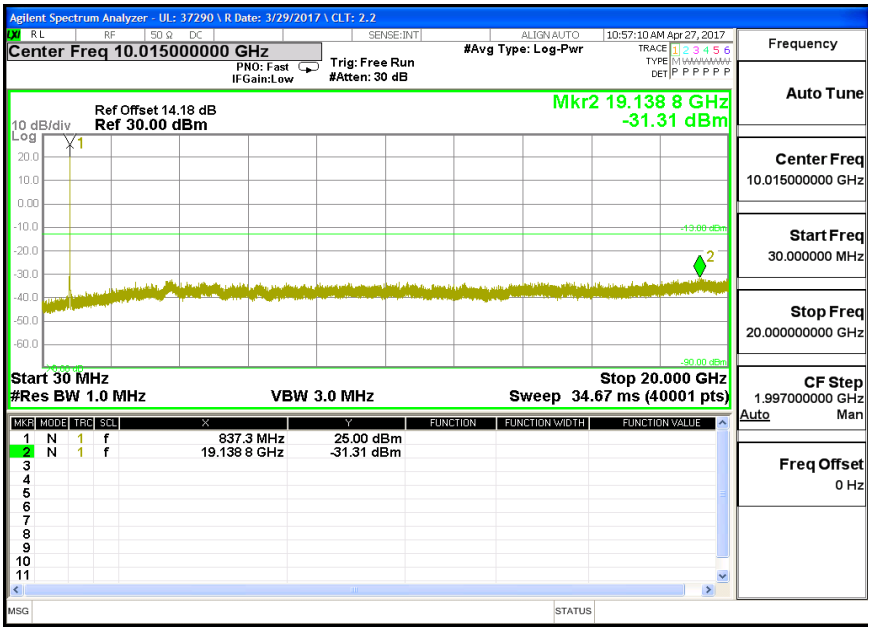


8.3.5. UMTS REL 99

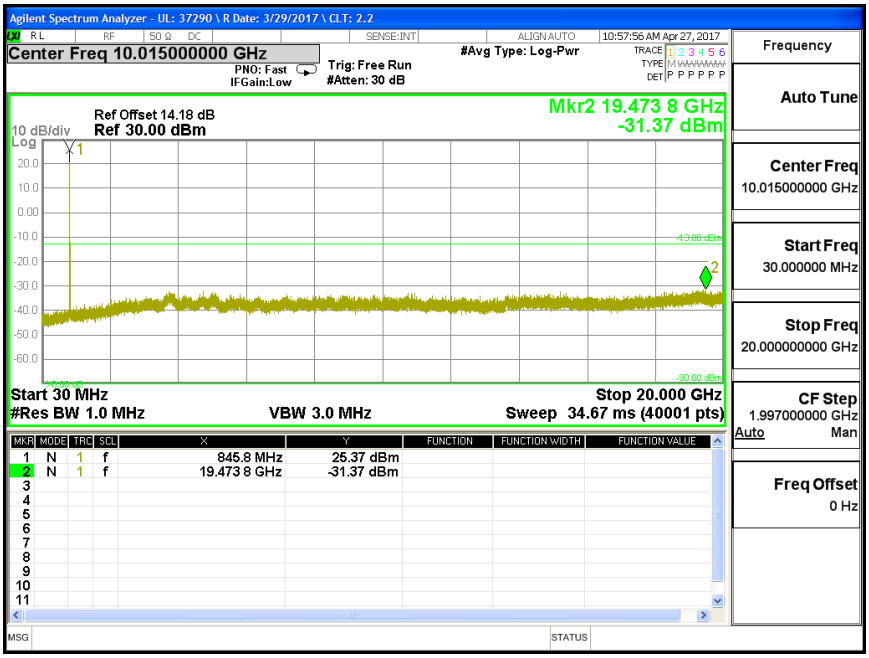
850MHz BAND, LOW CH



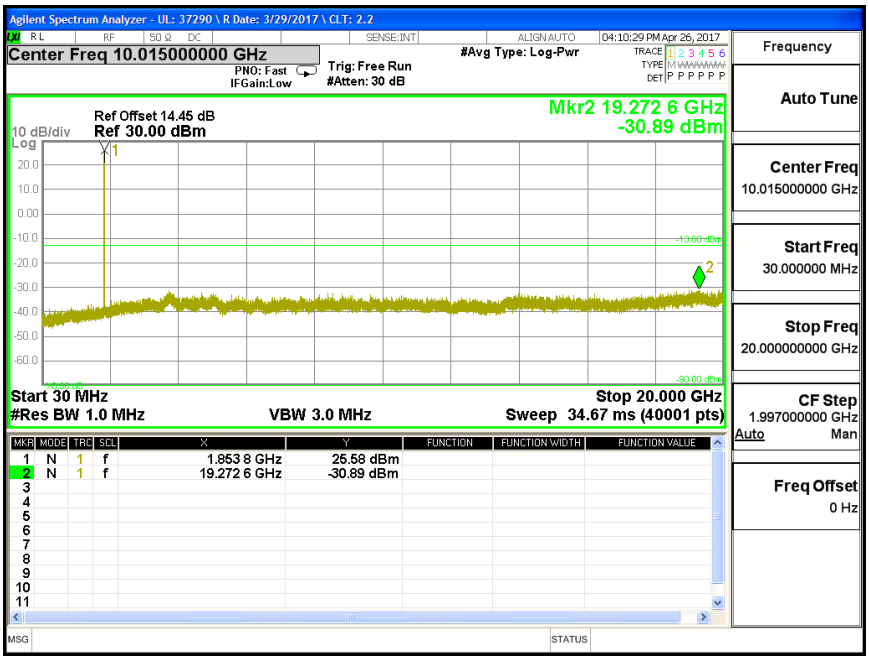
850MHz BAND, MID CH



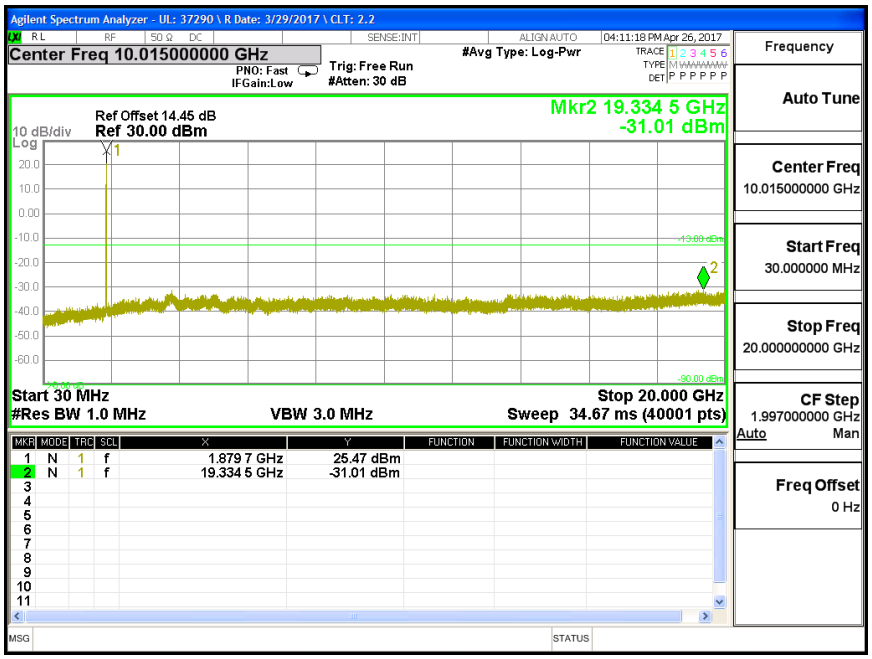
850MHz BAND, HIGH CH



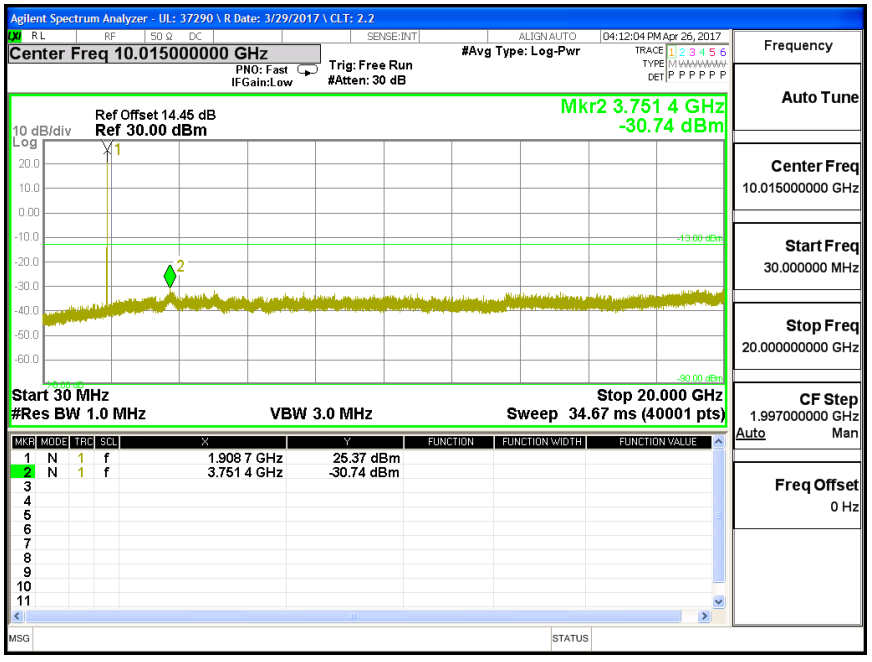
1900MHz BAND, LOW CH



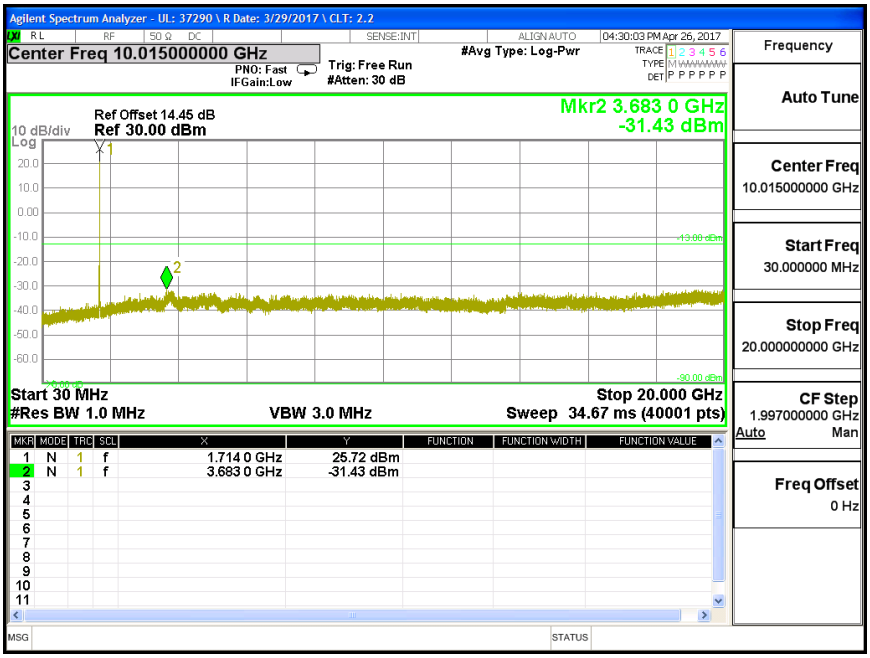
1900MHz BAND, MID CH



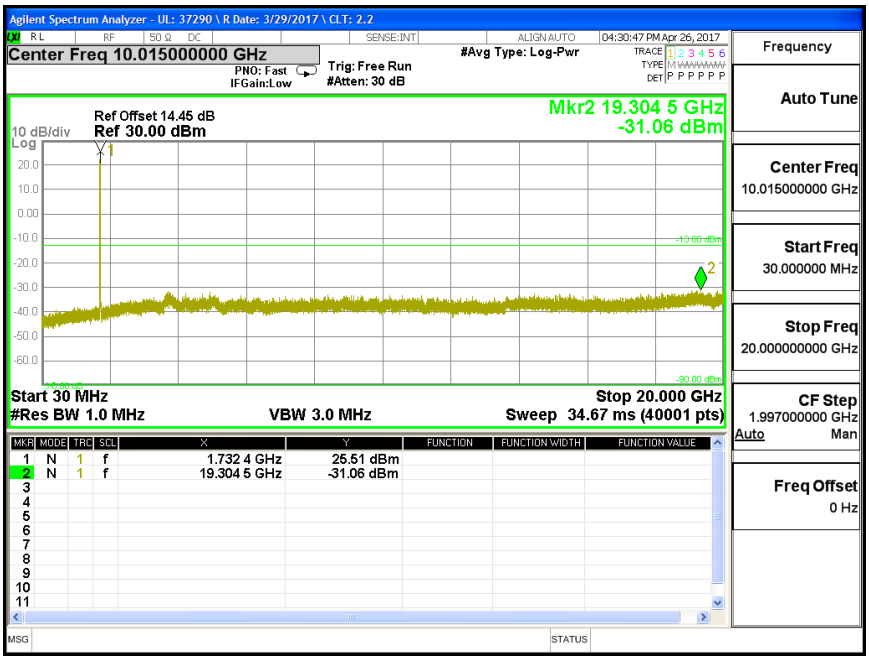
1900MHz BAND, HIGH CH



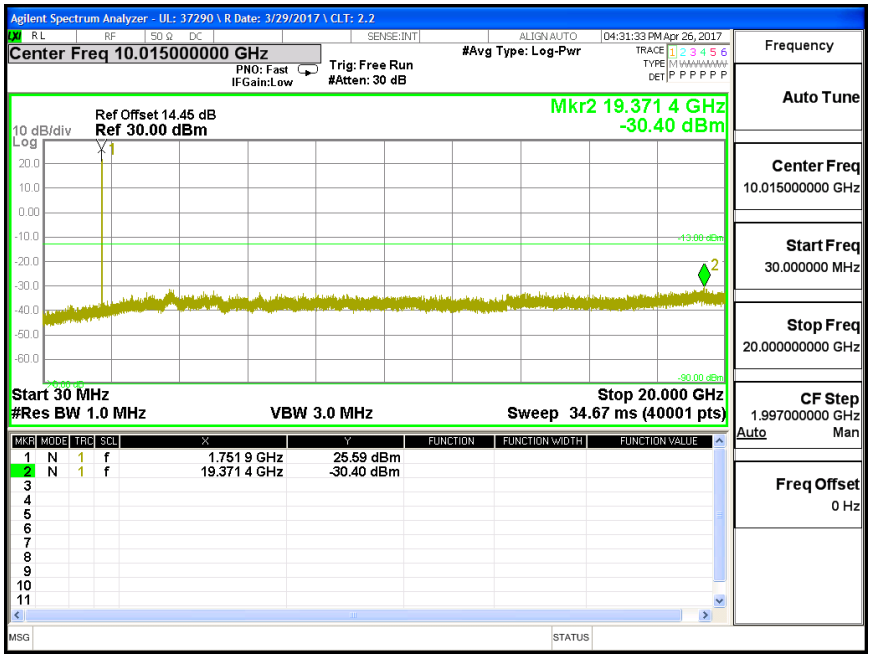
1700MHz BAND, LOW CH



1700MHz BAND, MID CH

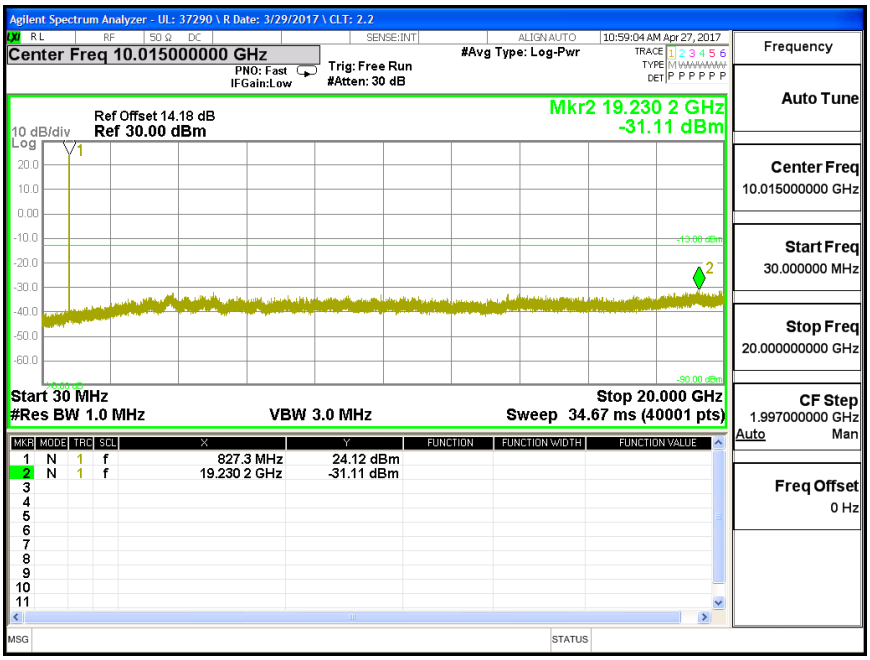


1700MHz BAND, HIGH CH

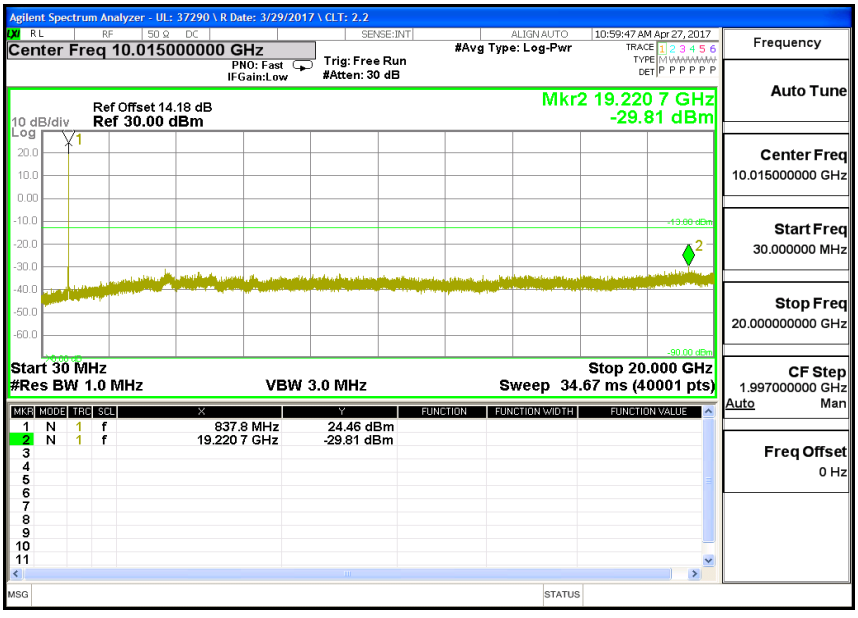


8.3.6. UMTS HSDPA

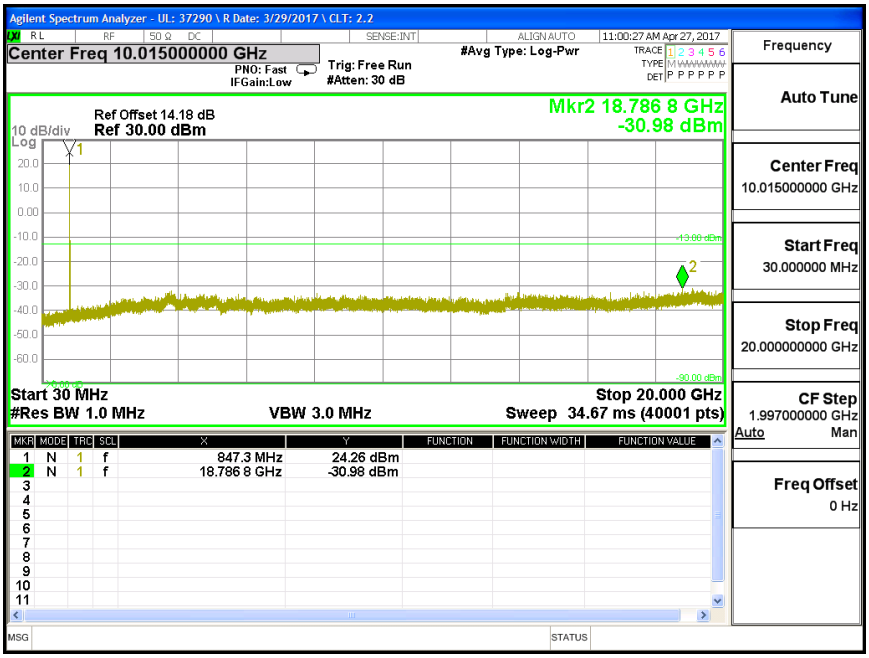
850MHz BAND, LOW CH



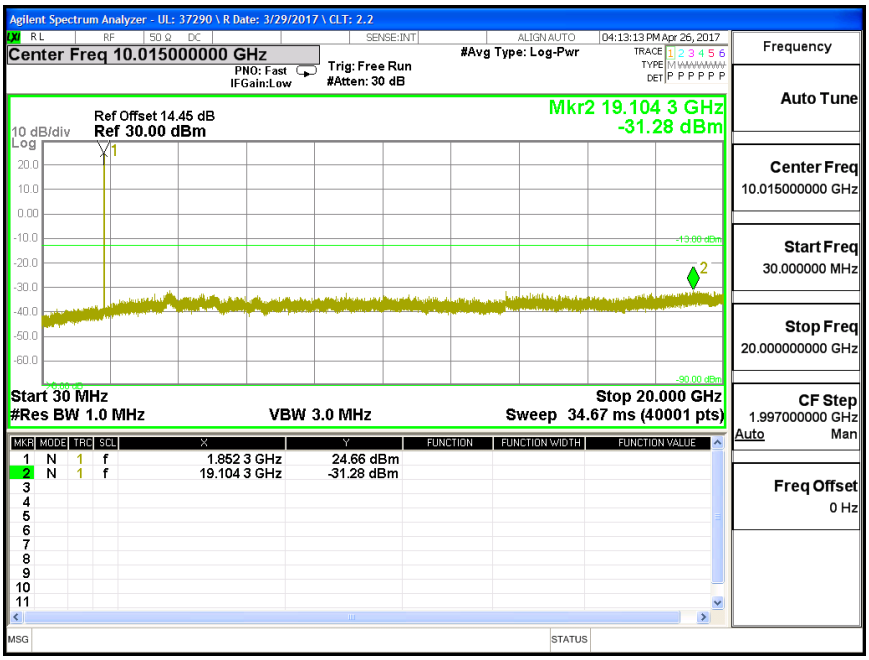
850MHz BAND, MID CH



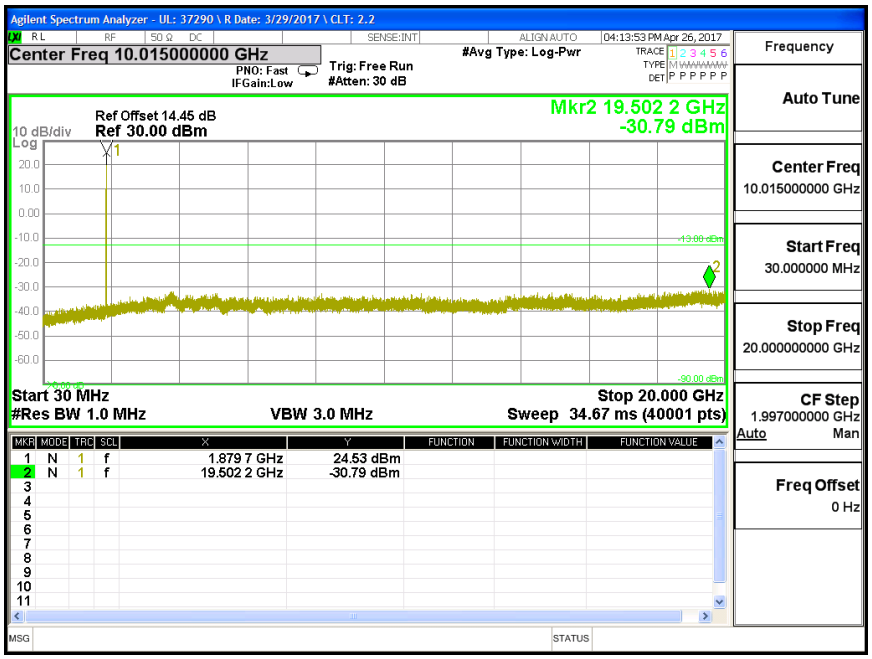
850MHz BAND, HIGH CH



1900MHz BAND, LOW CH



1900MHz BAND, MID CH



1900MHz BAND, HIGH CH