Clear RF, LLC

ADDENDUM TO TEST REPORT 94772-7B

ClearRF 15db Dual-Band Direct Connect Cellular Amplifier
Model: WRE2710

Tested To The Following Standards:

FCC Part 20, Section 20.21

Report No.: 94772-7C

Date of issue: May 19, 2014

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Clear RF, LLC
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Spokane Valley, WA 99216

Representative: Pete Wilhite

REPORT PREPARED BY:

Joyce Walker
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 94772

DATE OF EQUIPMENT RECEIPT: September 30, 2013
DATE(S) OF TESTING: September 30 – December 9, 2013
March 18, 2014

Revision History

Original: Testing of ClearRF 15dB Dual-Band Direct Connect Cellular Amplifier, WRE2710 to FCC Part 20, Section 20.21
Addendum A: To replace data in section FCC Part 20.21(e)(8)(i)(B) / 7.2, Bidirectional Capability D Power Limit. Due to a gain change, the manufacturer has changed the EUT model name from ClearRF 25dB Dual-Band Direct Connect Cellular Amplifier, WRE2710 to ClearRF 15dB Dual-Band Direct Connect Cellular Amplifier, WRE2710.
Addendum B: Adding data to include coverage for both fixed and mobile operation. Data has been replaced in sections 20.21(e)(8)(i)(A**)** / 7.7, 20.21(e)(8)(i)(B) / 7.2 and 20.21(e)(8)(i)(C) / 7.9.
Addendum C: Made a modification to the test conditions in 20.21(e)(8)(i)(B) / 7.2.

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.

Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information

Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.00.14
Immunity	5.00.07

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A	US0060	SL2-IN-E-1146R	3082D-1	90473	A-0147
Brea D	US0060	SL2-IN-E-1146R	3082D-2	100638	A-0147

SUMMARY OF RESULTS

Standard / Specification: FCC Part 20

Description	Test Procedure/Method	Results
Noise Limit - Transmit off	FCC Part 20.21(e)(8)(i)(A) / 7.7	Pass
Bidirectional Capability D Power Limit	FCC Part 20.21(e)(8)(i)(B) / 7.2	Pass
Booster Gain Limits	FCC Part 20.21(e)(8)(i)(C) / 7.9	Pass
Out of Band Emission Limits	FCC Part 20.21(e)(8)(i)(E) / 7.5	Pass
Intermodulation Limits	FCC 20.21(e)(8)(i)(F) / 7.4	Pass
Uplink Inactivity	FCC 20.21(e)(8)(i)(I) / 7.8	Pass
Anti-Oscillation	FCC 20.21(e)(8)(ii)(A) / 7.11	Pass

Conditions During Testing

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

ClearRF 15dB Dual-Band Direct Connect Cellular Amplifier
Manu: Clear RF, LLC
Model: WRE2710
Serial: 001

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Power Supply
Manu: DPX
Model: GFP101U-1210
Serial: None

ESG Vector Signal Generator
Manu: Agilent
Model: E4433B
Serial: US40052164

ESG Vector Signal Generator
Manu: Agilent
Model: E4438C
Serial: MY42082260

Solid State Amplifier
Manu: Cromlech
Model: AR178238-30
Serial: N1Q4800-1013

HF Pre Amplifier
Manu: HP
Model: 830174A
Serial: 3123A00281

RF Amplifier
Manu: Amplifier Research
Model: AR25S1G4A
Serial: 0325937

FCC PART 20

This report contains EMC test results under United States Federal Communications Commission (FCC) Part 20 §20.21, requirements for Provider-Specific Consumer Signal Boosters.

FCC 20.21(e)(8)(i)(A) Noise Limit

Test Conditions / Setup

Test Location: CKC Laboratories • 110 Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **Clear RF, LLC**
Specification: **20.21(e)(8)(i)(A)(1) Noise Limit**
20.21(e)(8)(i)(A)(2)(i) Maximum Noise Limit: Fixed
20.21(e)(8)(i)(A)(2)(ii) Maximum Noise Limit: Mobile

20.21(e)(8)(i)(H) Transmit Power Off Limit., Transmit Power Off timing.

Work Order #:	**94772**	Date:	10/4/2013
Test Type:	**Conducted Emissions**	Time:	14:40:48
Equipment:	**ClearRF 25db dual-band direct connect cellular amplifier**	Sequence#:	1
Manufacturer:	Clear RF, LLC	Tested By:	E. Wong
Model:	WRE2710		110V 60Hz
S/N:	001		

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03430	Attenuator	75A-10-12	9/5/2013	9/5/2015
T3	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
ClearRF 25db dual-band direct connect cellular amplifier*	Clear RF, LLC	WRE2710	001

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	DPX	GFP101U-1210	NA
HF Pre Amplifier	HP	830174A	3123A00281
Solid State Amplifier	Comtech	AR178238-30	N1Q4800-1013
ESG Vector Signal Generator	Agilent	E4433B	US40052164

Test Conditions / Notes:

The EUT is placed on the test bench. The Donor port of the Machine to Machine booster is intended to be connected to an antenna and the server port is intended to be connected directly to the antenna port of a cellular modem or cellular handset.

CMRS band.
UL: 824-849MHz, 1850-1915MHz
DL: 869-894MHz, 1930-1995MHz

Evaluation performed at the both Donor and Server antenna port.

The booster operates in the following frequency band.
UL: 824-849, 1850-1910 MHz
DL: 869-894, 1930-1990 MHz

Evaluation performed in accordance with 7.7 of the FCC Document 935210 DO3 Wideband Consumer Signal Booster Measurement Guidance DR04-41516.

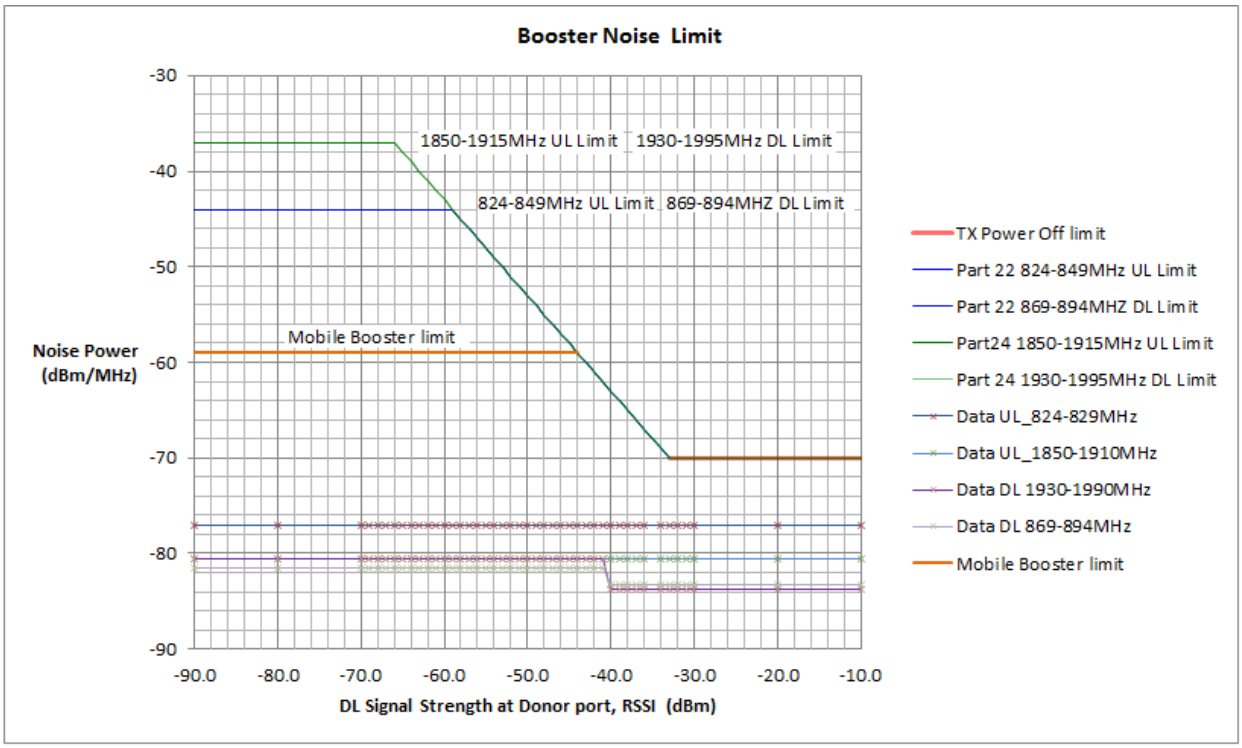
MSCL (in this case the insertion loss of the cable connecting the Server port to the Antenna port of modem/cellphone) as measured: 824-849MHz = 1.2dB, 1850-1910 = 2.5dB.

Due to the low gain nature of the design, the maximum noise power never exceeds the power off limit. The yellow trace is max hold. This number is recorded and plotted against the injected DL power (RSSI).At RSSI of -40 dBm, the device goes into by pass mode.

Since the noise power in the uplink and downlink path was below the noise limit of -70dBm/MHs, it is consider meeting the Variable uplink noise limit without further testing.

UL measurement , Firmware version : Original
DL measurement , Firmware version : Original

Test environment conditions: 24°C, 30% Relative Humidity:100kPa


Booster Noise Limit
-30
-40
-50
-60
-70
-80
-90
Noise Power (dBm/MHz)
1850-1915MHz UL Limit
1930-1995MHz DL Limit
824-849MHz UL Limit
869-894MHZ DL Limit
Mobile Booster limit
-90.0
-80.0
-70.0
-60.0
-50.0
-40.0
-30.0
-20.0
-10.0
DL Signal Strength at Donor port, RSSI (dBm)
TX Power Off limit
Part 22 824-849MHz UL Limit
Part 22 869-894MHZ DL Limit
Part24 1850-1915MHz UL Limit
Part 24 1930-1995MHz DL Limit
Data UL_824-829MHz
Data UL_1850-1910MHz
Data DL 1930-1990MHz
Data DL 869-894MHz
Mobile Booster limit

Summary

Booster Noise limit:

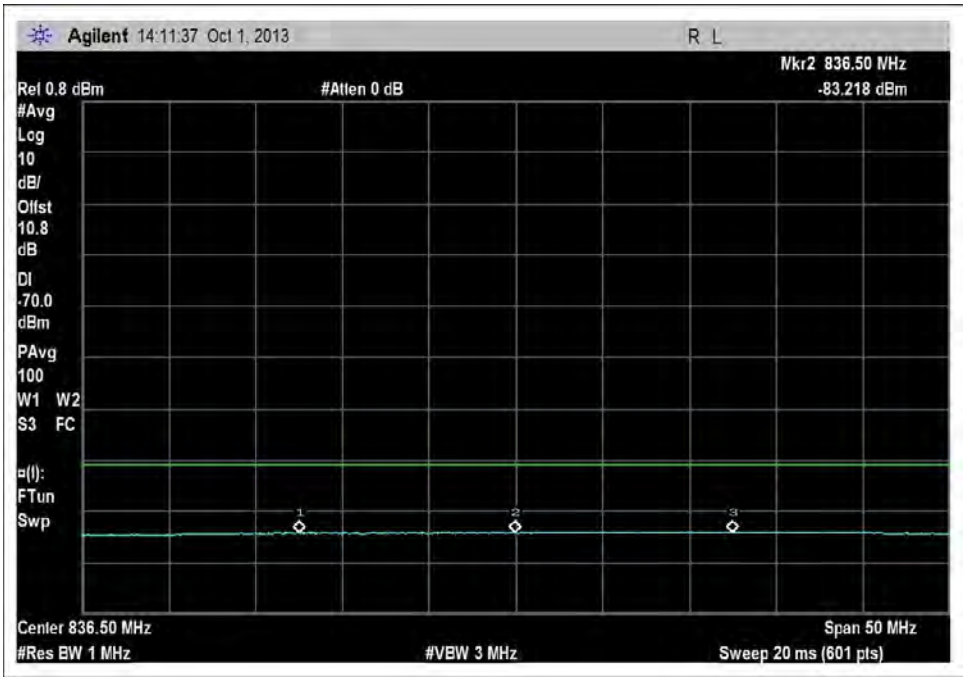
As demonstrated in the Booster Noise limit plot, the measured noise power is under the Maximum noise power limit for Fixed and Mobile operation, hence meeting the requirement for both Fixed and Mobile.

Booster Noise Timing:

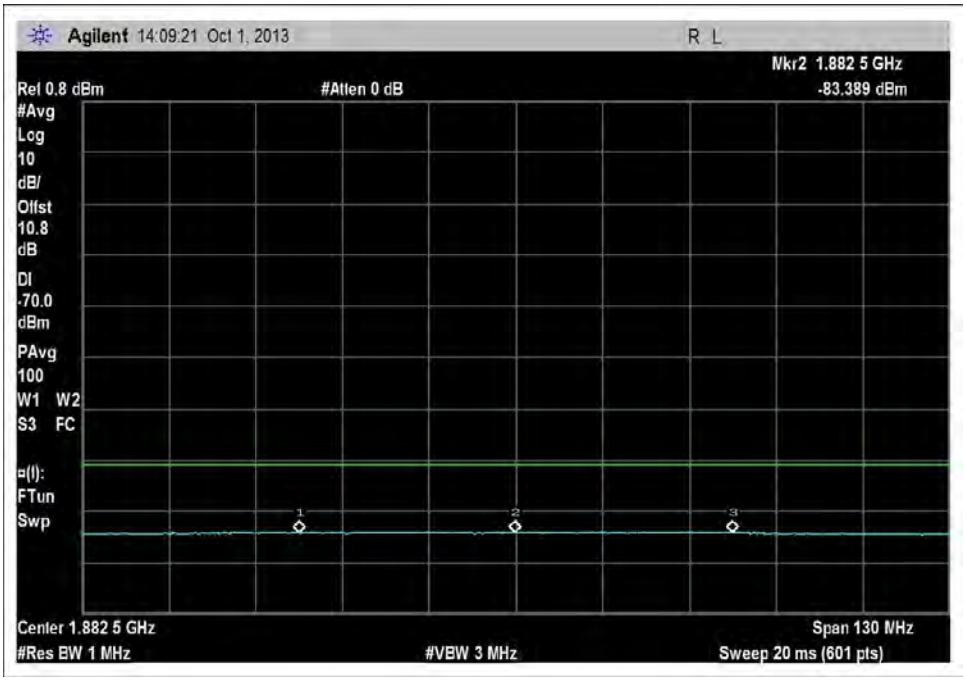
Freq	Fixed limit	Mobile limit	Measured Noise Timing	Result
824-849MHz	3 sec	1 sec	NA	Pass
1850-1915MHz	3 sec	1 sec	NA	Pass

Since the noise power in the uplink and downlink path was below the noise limit of -70dBm/MHs, it is consider meeting the Variable uplink noise limit without further testing.

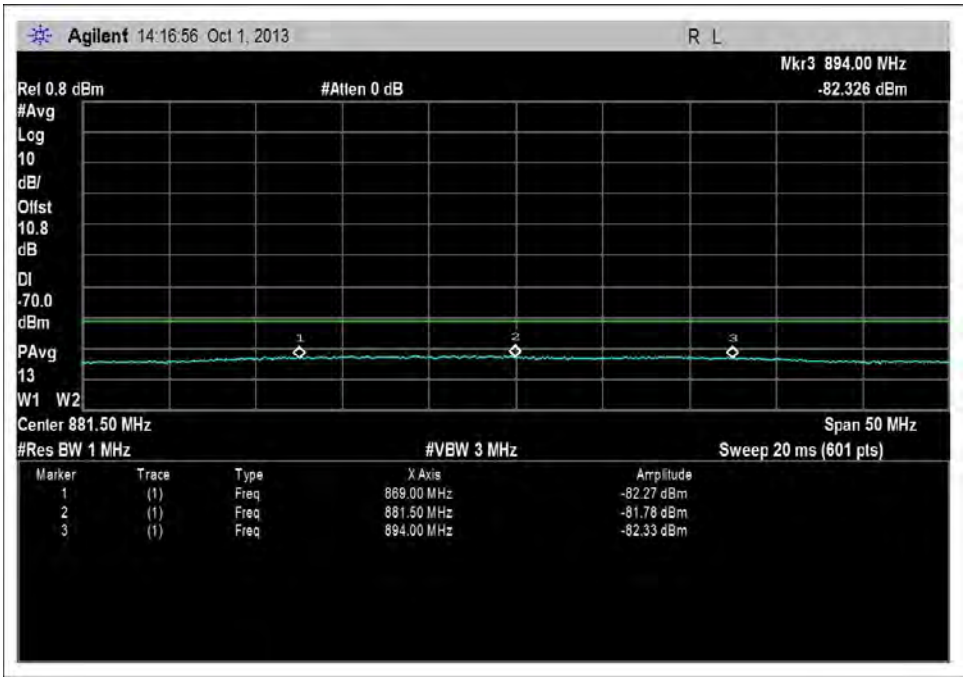
Test Data



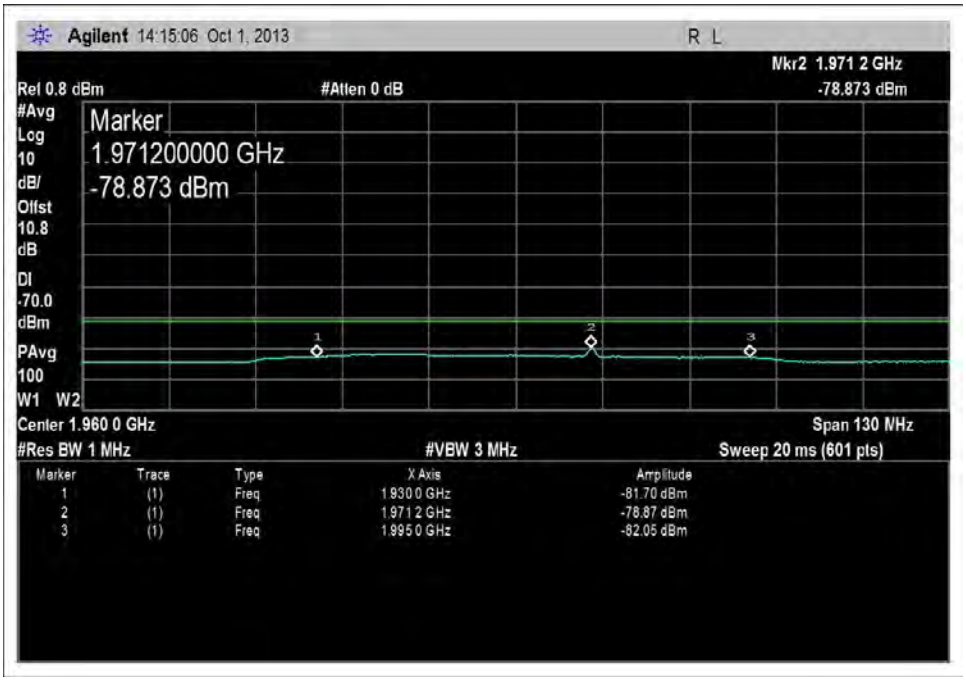
Noise Power Off Limit 824 - 849MHz UL, in accordance with § 7.7



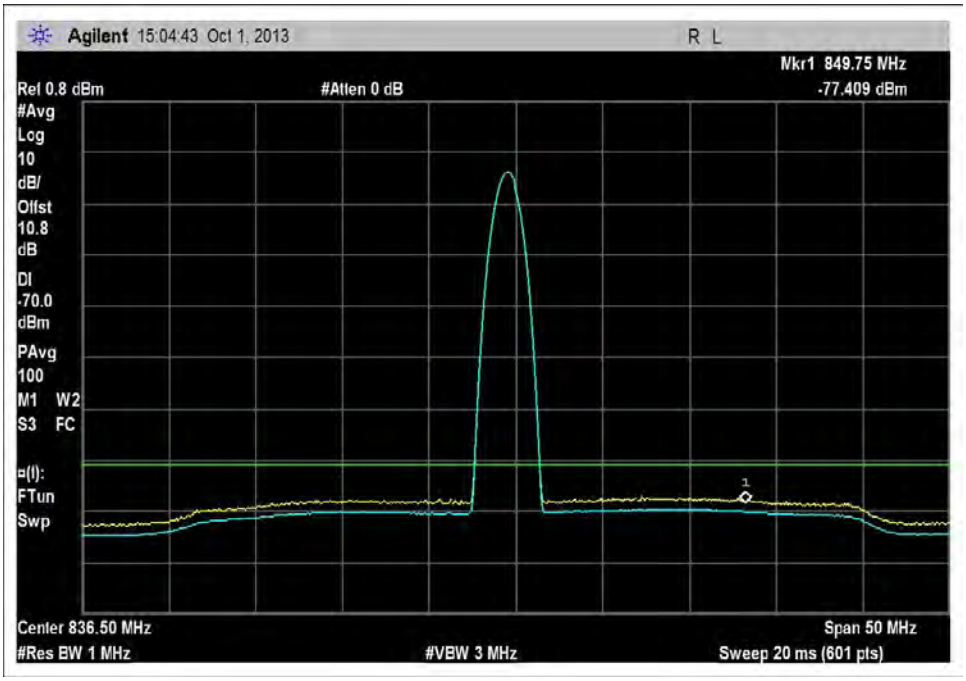
Noise Power Off Limit 1850 - 1910MHz UL, in accordance with § 7.7



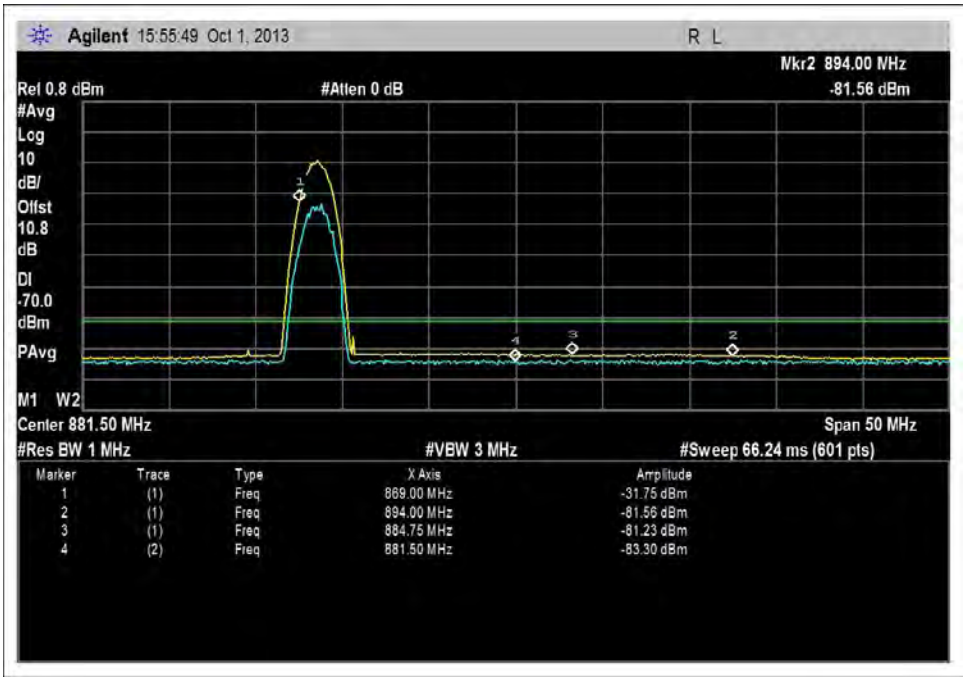
Noise Power Off Limit 869 - 894MHz DL, in accordance with § 7.7



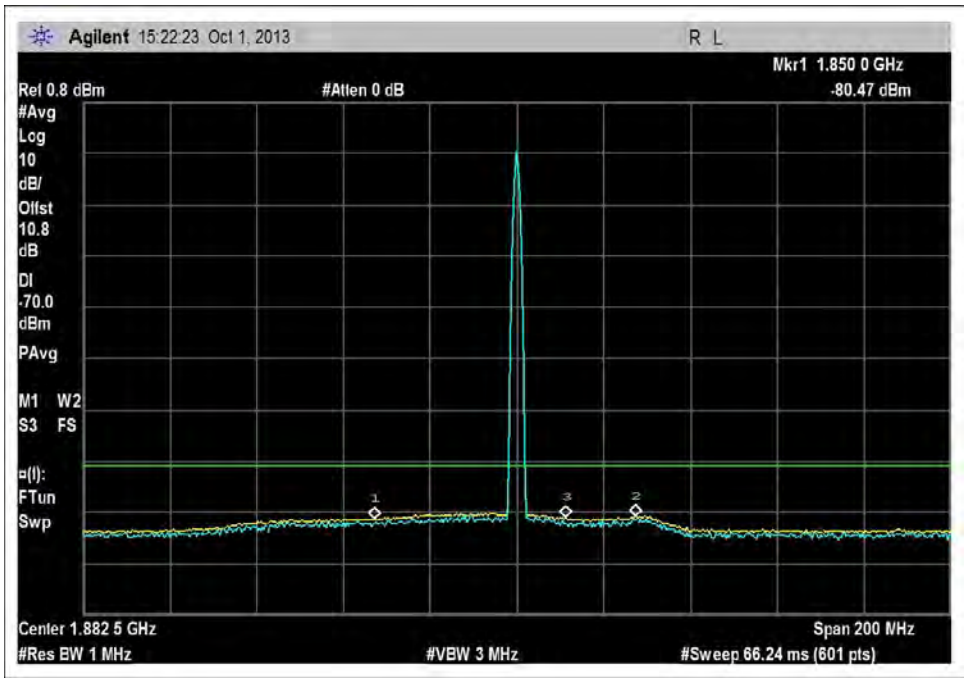
Noise Power Off Limit 1930 - 1995MHz DL, in accordance with § 7.7



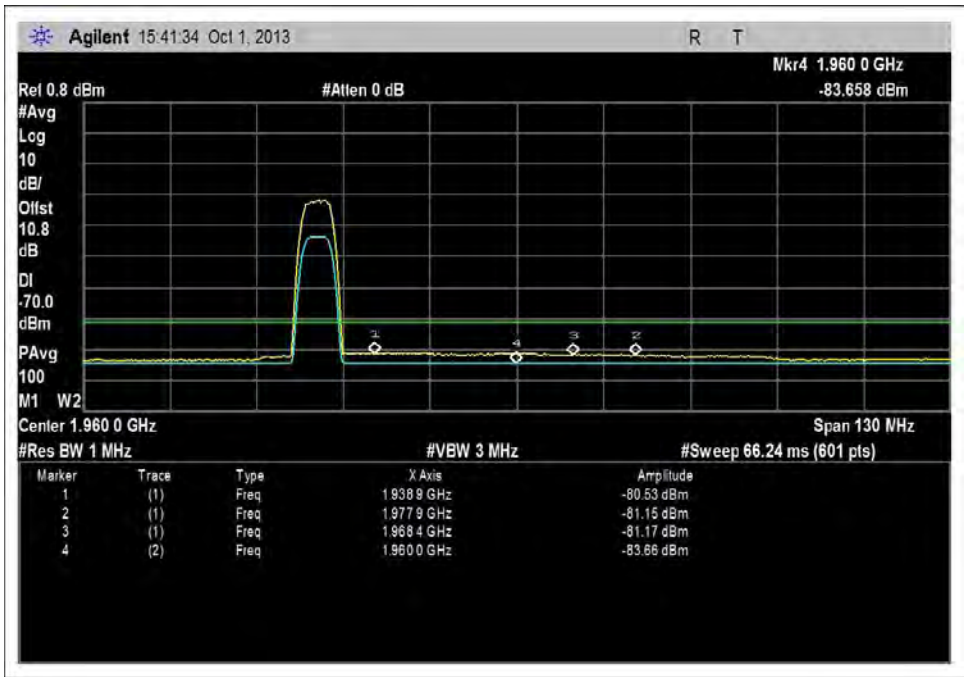
Noise Limit Variable 824 - 849MHz RSSI, in accordance with § 7.7.8



Noise Limit Variable 869 - 894MHz RSSI, in accordance with § 7.7.8

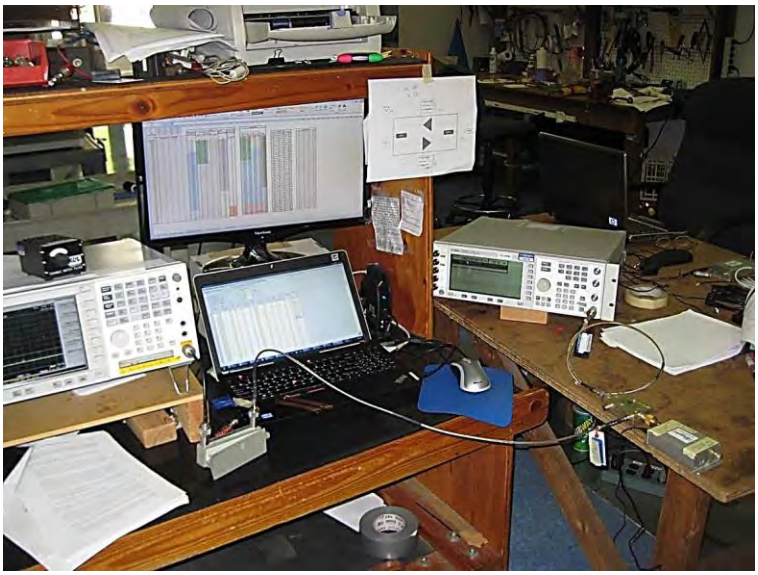


Noise Limit Variable 1850 - 1910MHz RSSI, in accordance with § 7.7.8

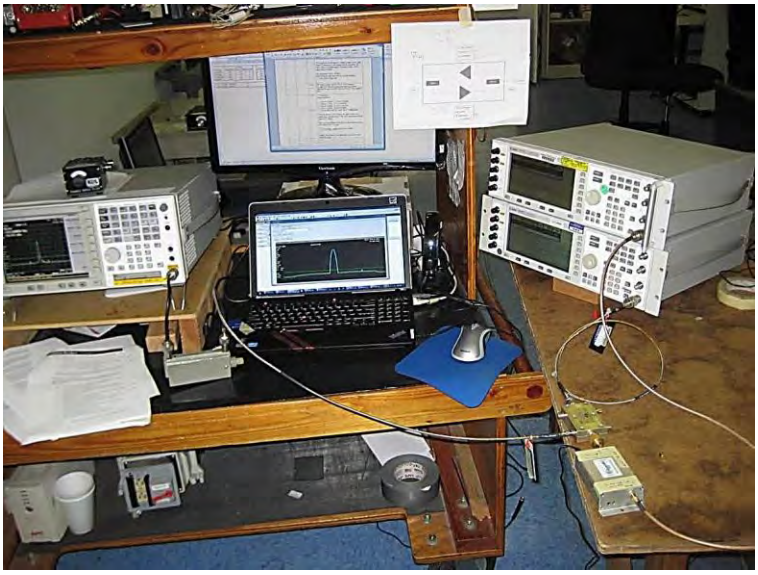


Noise Limit Variable 1930 - 1990MHz RSSI, in accordance with § 7.7.8

Test Setup Photos



Test Setup, Noise Limit - UL



Test Setup, Noise Limit - DL

FCC 20.21(e)(8)(i)(B) Bidirectional Capability Power Limit

Test Conditions / Setup

Test Location: CKC Laboratories • 110 Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **Clear RF, LLC**
Specification: **20.21(e)(8)(i)(B) Bidirectional Capability.**
20.21(e)(8)(i)(C)(2)
20.21(e)(8)(i)(D) Power Limit.

Work Order #: **94772** Date: 3/18/14
Test Type: **Conducted Emissions** Time: 20:06
Equipment: **ClearRF 25db dual-band direct connect cellular amplifier** Sequence#: 2
Manufacturer: Clear RF, LLC Tested By: E. Wong
Model: WRE2710 110V 60Hz
S/N: 001

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03430	Attenuator	75A-10-12	9/5/2013	9/5/2015
T3	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
ClearRF 25db dual-band direct connect cellular amplifier*	Clear RF, LLC	WRE2710	001

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	DPX	GFP101U-1210	NA
High Power Amplifier	Ophir	5016	1043
ESG Vector Signal Generator	Agilent	E4438C	MY42082260

Test Conditions / Notes:

The EUT is placed on the test bench. The Donor port of the Machine to Machine booster is intended to be connected to an antenna and the server port is intended to be connected directly to the antenna port of a cellular modem or cellular handset.

CMRS band.
UL: 824-849MHz, 1850-1915MHz
DL: 869-894MHz, 1930-1995MHz

Evaluation performed at the both Donor and Server antenna port.

The booster operates in the following frequency band.
UL: 824-849, 1850-1910 MHz
DL: 869-894, 1930-1990 MHz

Evaluation performed IAW 7.2, 7.3 of the FCC Document 935210 DO3 Signal Booster Measurement V02 date March 06, 2014.

Antenna Cable Loss is calculated from Insertion loss property of RG 58 , with cable length of 3.5 meter. 1.47 dB, 2.44dB

TX freq and RF input power at the Donor and Server port.

Firmware version: v2.0.2. with the following modification

1. Downlink gain set to 15dB
2. Uplink gain set to 12dB
3. Output power set back to original before all the OOBE test errors

Test environment conditions: 24°C, 30% relative humidity:100kPa

Result

Pre AGC

	Pulse GSM				4.1 MHz AWGN		
Frequency	**Input(dBm)**	**Output (dBm)**	**Gain (dB)**		**Input(dBm)**	**Output (dBm)**	**Gain(dB)**
UL 1850-1910	-3.1	7.9	11.0		-12.2	-1.1	11.1
UL 824-849	-3.9	7.8	11.7		-11.3	0.4	11.7
DL 1930-1990	-45.9	-31.3	14.6		-54.0	-38.7	15.3
DL 869-894	-45.7	-30.3	15.4		-53.8	-40.1	13.7
0							Limit
UL gain vs DL gain 1850/1930		**-3.6**			**-4.2**		9.0
UL gain vs DL gain 824/894		**-3.7**			**-2.0**		9.0

Pulse GSM

Frequency	**Output Power**	**Ant Gain**	**Cable Loss**	**EIRP(dBm)**	**Limit(dBm)**
UL 1850-1910	7.9	2.1	2.44	7.5	Max30
UL 824-849	7.8	2.1	1.47	**8.4**	Max30
DL 1930-1990	-31.3	2.1	2.44	**-31.6**	Max17
DL 869-894	-30.3	2.1	1.47	**-29.7**	Max17
4.1MHz AWGN					
Frequency	**Output Power**	**Ant Gain**	**Cable Loss**	**EIRP(dBm)**	**Limit(dBm)**
UL 1850-1910	-1.1	2.1	2.44	**-1.4**	Max30
UL 824-849	0.4	2.1	1.47	**1.0**	Max30
DL 1930-1990	-38.7	2.1	2.44	**-39.0**	Max17
DL 869-894	-40.1	2.1	1.47	**-39.5**	Max17

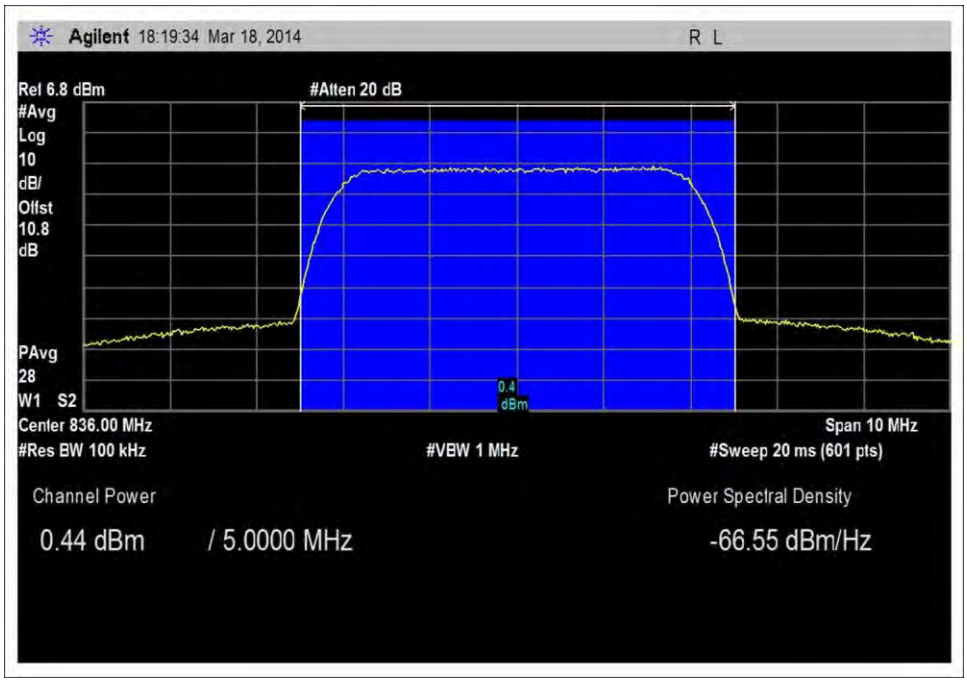
Summary:
Power limits meets requirement, the measured Uplink Downlink Gain meets the gain limit 20.21(e)(8)(i)(C)(2) 64.9dB (824-849MHz) , 72dB (1850-1910MHz), 15dB (Mobile Direct connect). Note in operation, the Downlink (Server port) is directly connected to the antenna port of user equipment and never to an antenna.

Above AGC (Max Transmitter input level section 5.5)

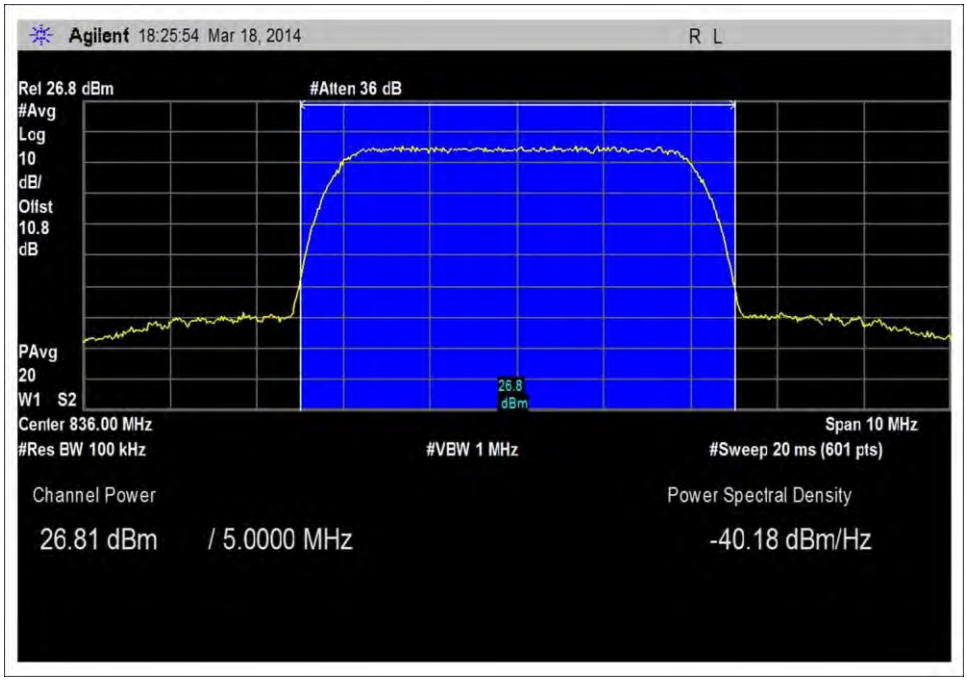
	Pulse GSM				4.1 MHz AWGN		
Frequency	**Input(dBm)**	**Output (dBm)**	**Gain (dB)**		**Input(dBm)**	**Output (dBm)**	**Gain(dB)**
UL 1850-1910	27.0	24.8	-2.2		27.0	25.9	-1.1
UL 824-849	27.0	26.5	-0.5		27.0	26.8	-0.2
DL 1930-1990	-20.0	-20.9	-0.9		-20.0	-22.9	-2.9
DL 869-894	-20.0	-20.3	-0.3		-20.0	-20.7	-0.7
							limit
UL gain vs DL gain 1850/1930		**-1.3**				**1.8**	9.0
UL gain vs DL gain 824/894		**-0.2**				**0.5**	9.0

Pulse GSM

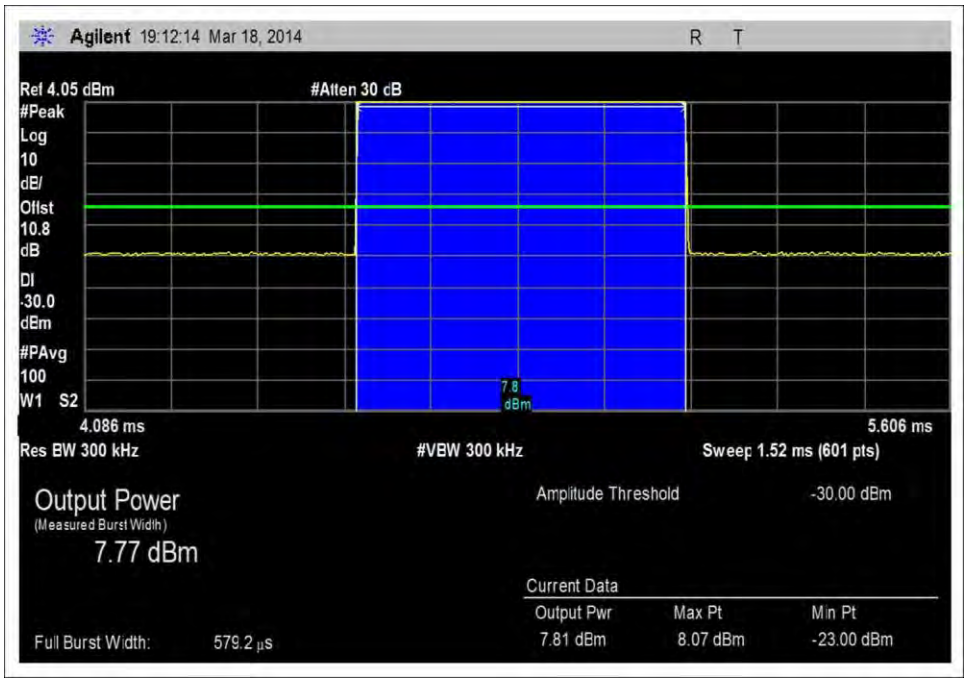
Frequency	**Output Power**	**Ant Gain**	**Cable Loss**		**EIRP(dBm)**	**Limit(dBm)**
UL 1850-1910	24.8	2.1	2.44		24.5	Min17/Max30
UL 824-849	26.5	2.1	1.47		27.1	Min17/ Max30
DL 1930-1990	-20.9	2.1	2.44		-21.2	Max17
DL 869-894	-20.3	2.1	1.47		-19.7	Max17
4.1MHz AWGN						
Frequency	**Output Power**	**Ant Gain**	**Cable Loss**		**EIRP(dBm)**	**Limit(dBm)**
UL 1850-1910	25.9	2.1	2.44		**25.5**	Min17/Max30
UL 824-849	26.8	2.1	1.47		**27.4**	Min17/ Max30
DL 1930-1990	-22.9	2.1	2.44		**-23.2**	Max17
DL 869-894	-20.7	2.1	1.47		**-20.1**	Max17



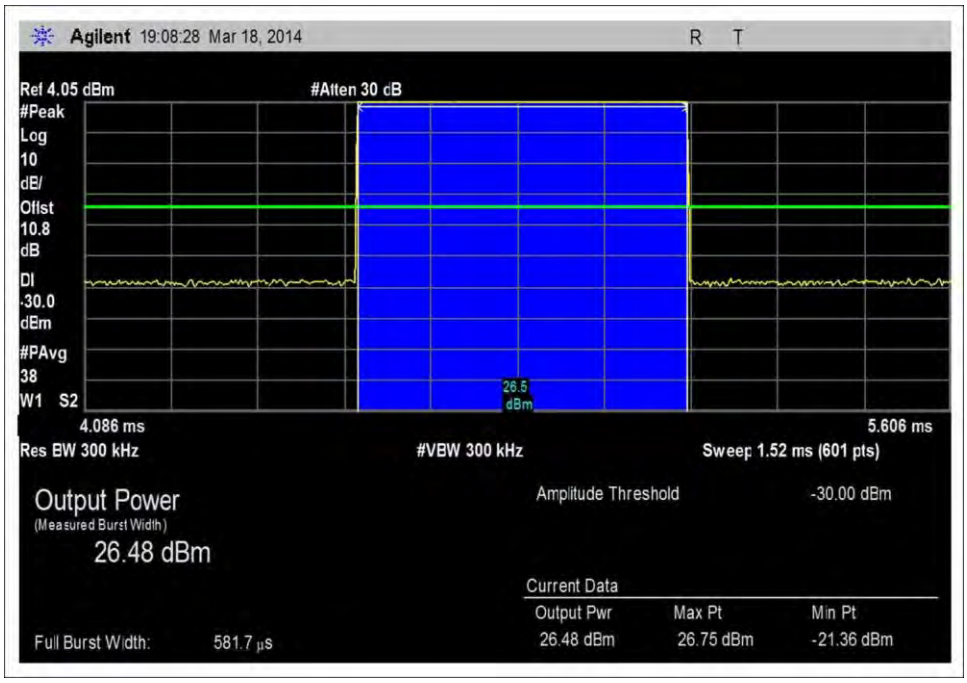
7.2_Max power_UL_836MHz_AWGN



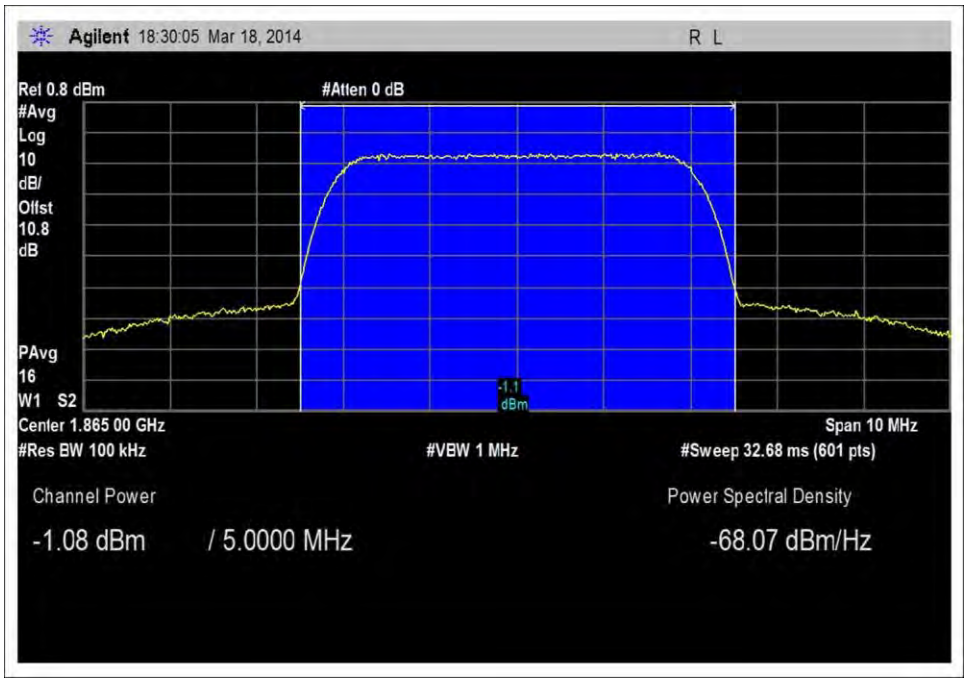
7.2_Max power_UL_836MHz_AWGN_RFin=27dBm



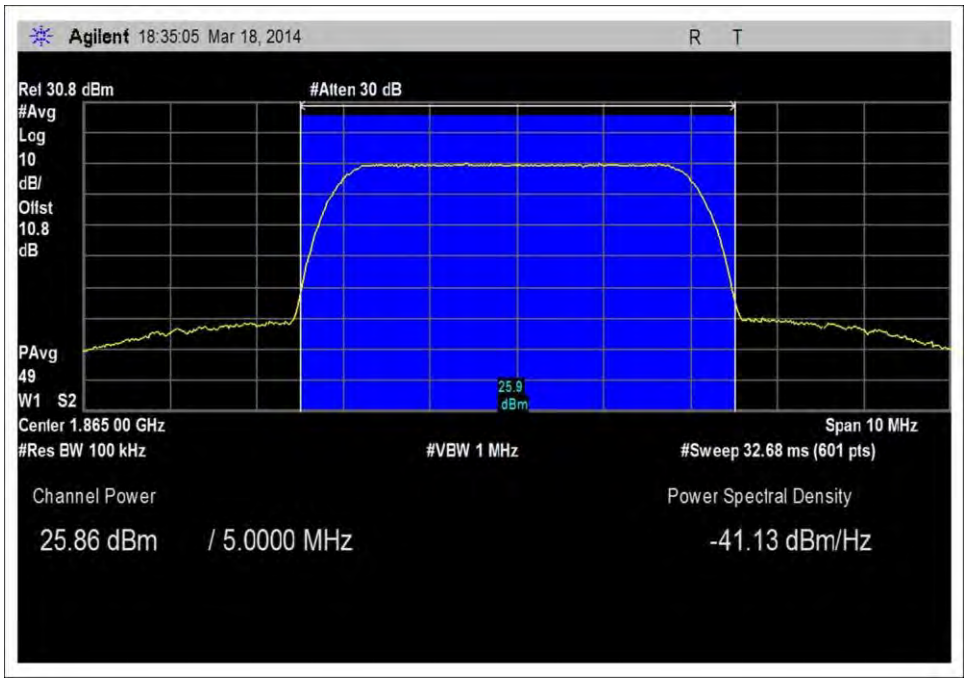
7.2_Max power_UL_836MHz_GSM



7.2_Max power_UL_836MHz_GSM_Rfin=27dBm



7.2_Max power_UL_1865MHz_AWGN



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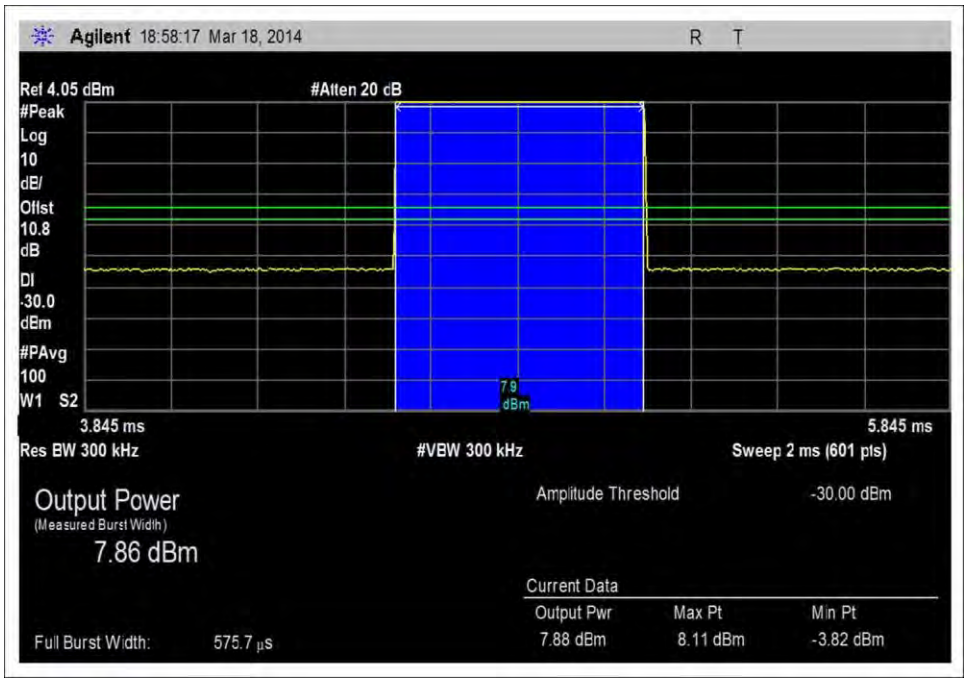

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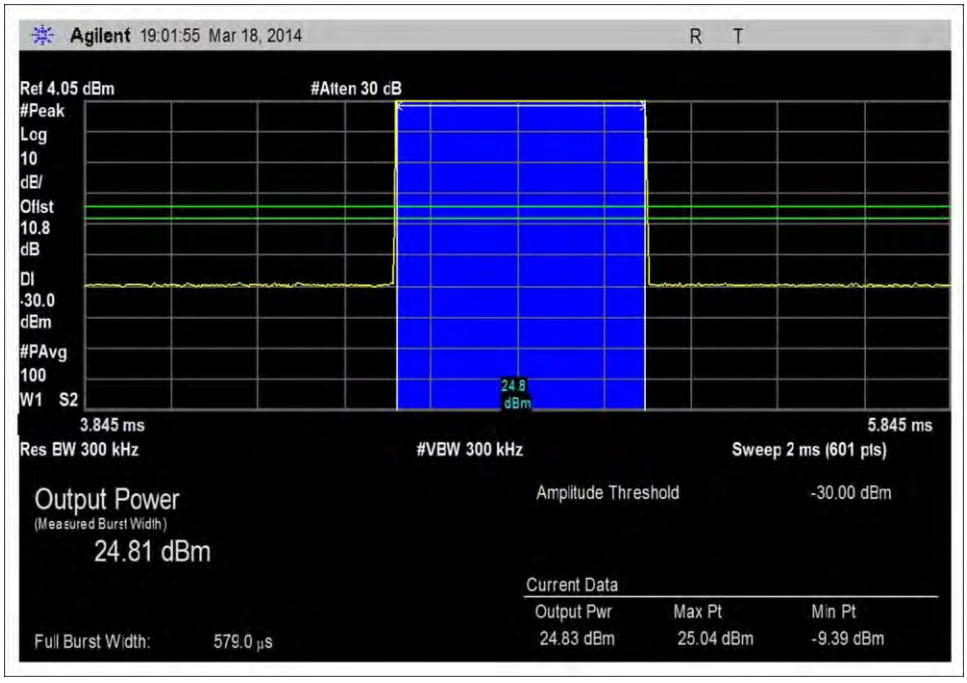

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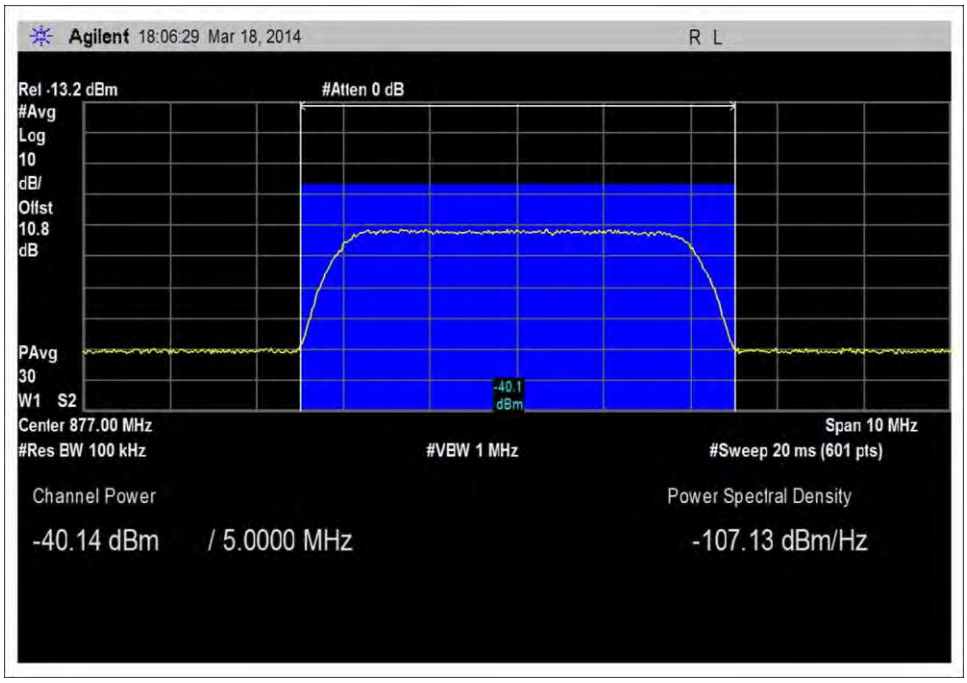
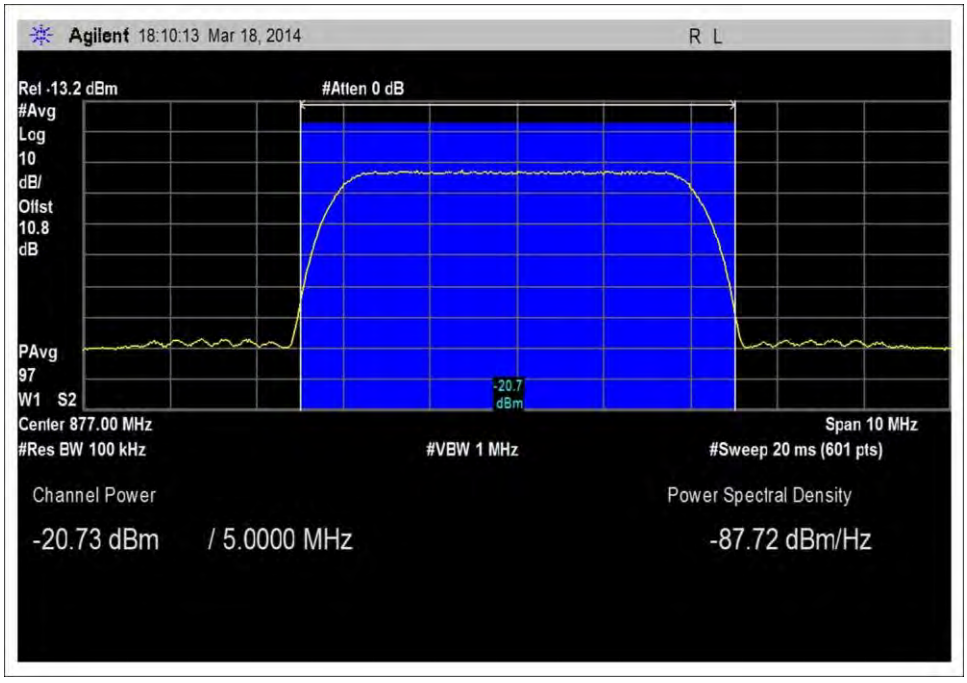
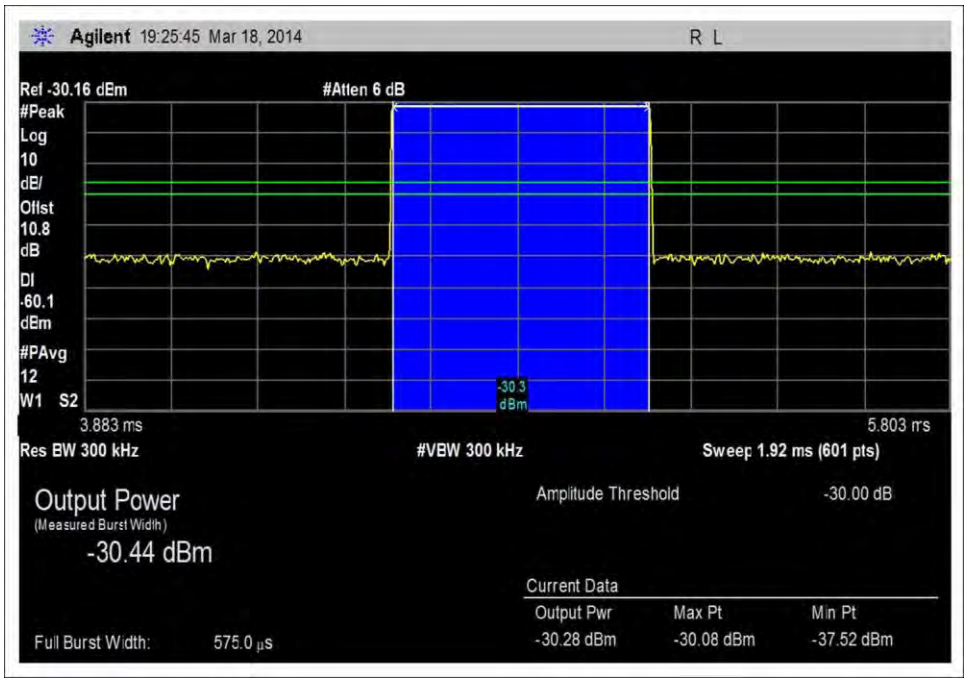


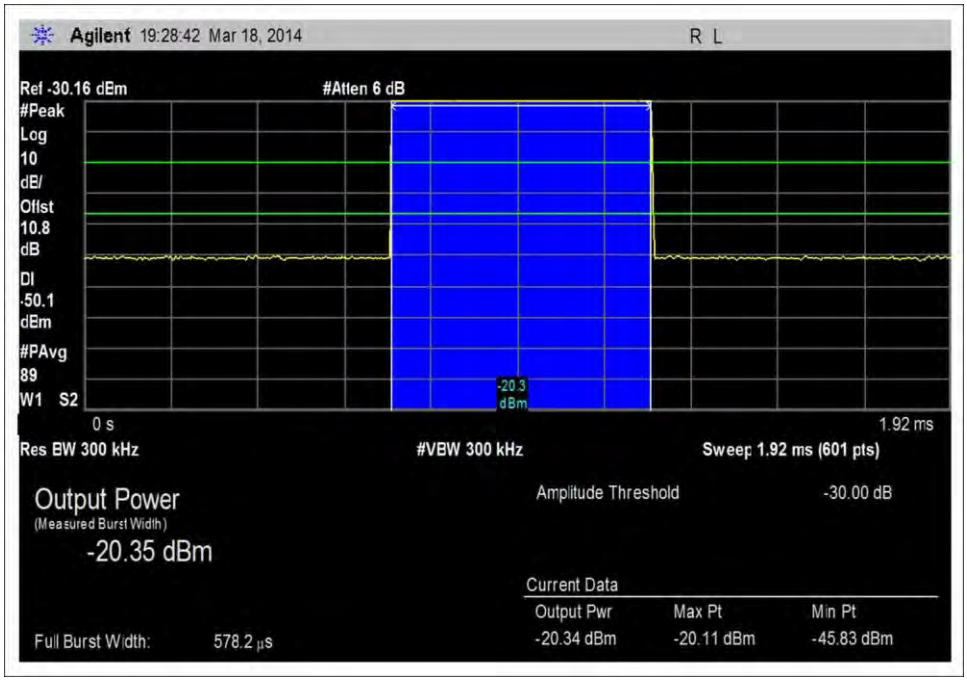
7.2_Max power_DL_877MHz_AWGN



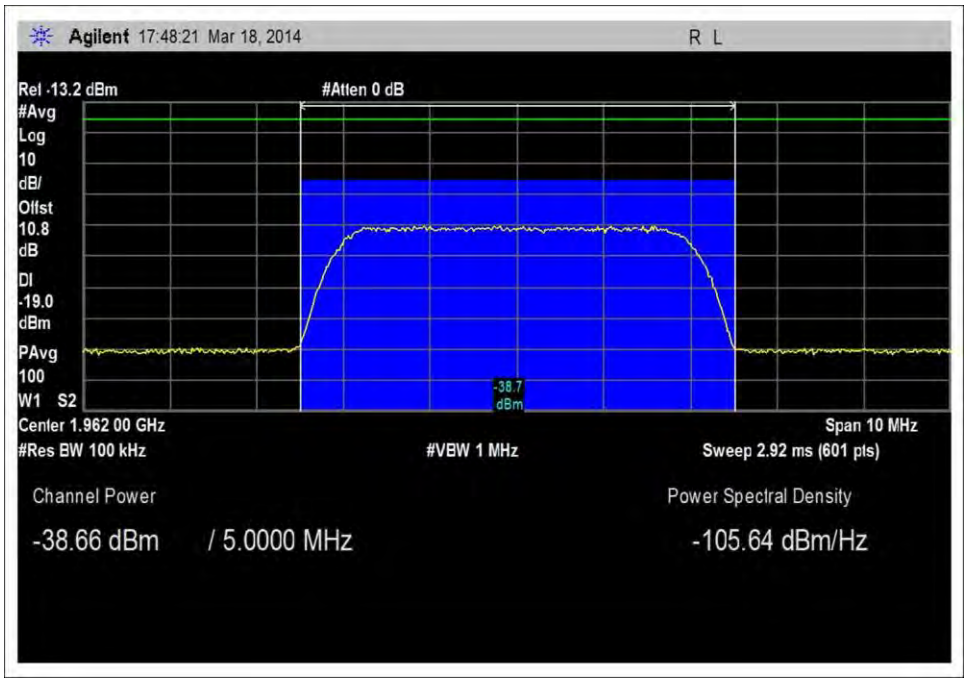
7.2_Max power_DL_877MHz_AWGN_RFin=-20dBm



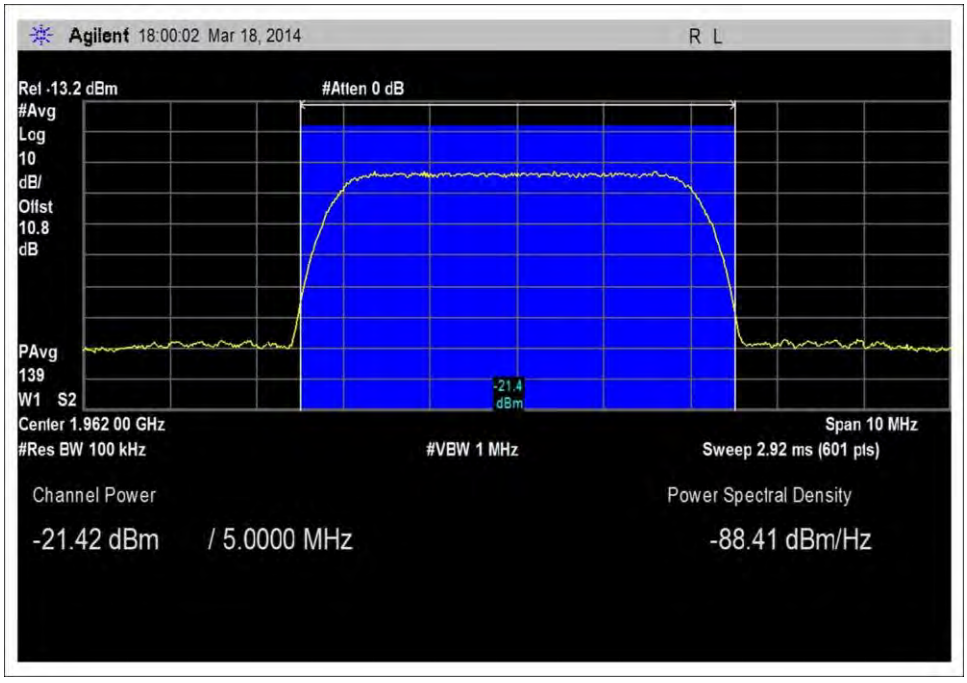
7.2_Max power_DL_877MHz_GSM



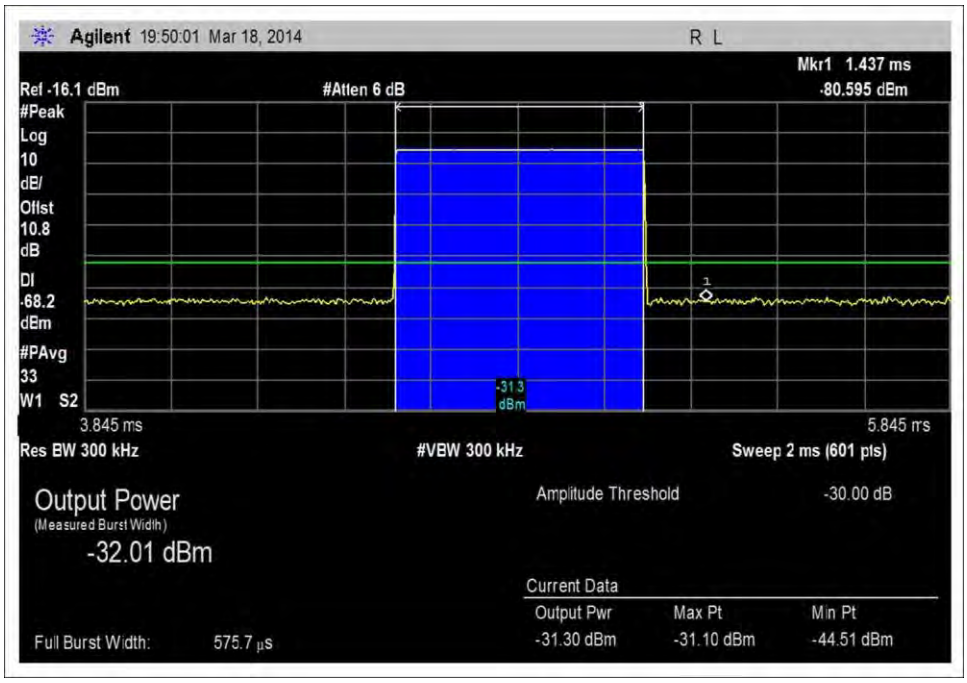
7.2_Max power_DL_877MHz_GSM_RFin=-20dBm



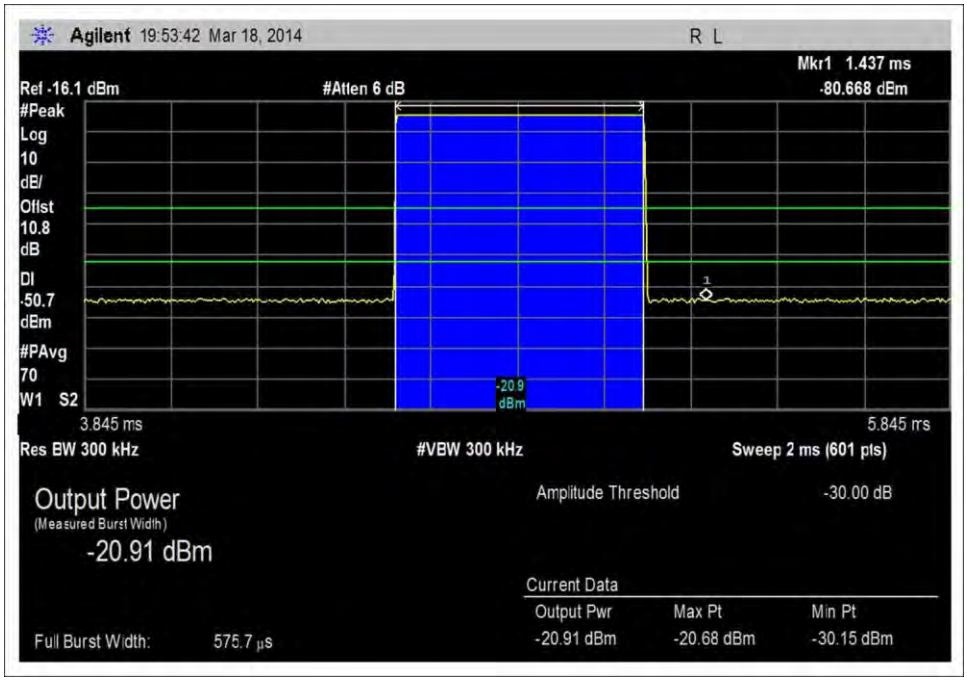
7.2_Max power_DL_1962MHz_AWGN



7.2_Max power_DL_1962MHz_AWGN_RFin=-20dBm

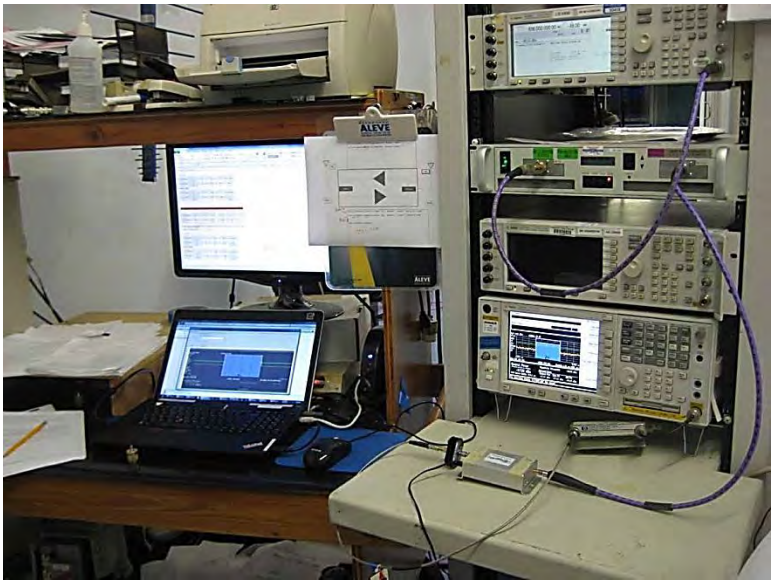


7.2_Max power_DL_1962MHz_GSM



7.2_Max power_DL_1962MHz_GSM_RFin=-20dBm

Test Setup Photos



FCC 20.21(e)(8)(i)(C) Booster Gain Limit

Test Data Sheets

Test Location: CKC Laboratories • 110 Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **Clear RF, LLC**
Specification: **20.21(e)(8)(i)(C)(2)(i) Booster Gain Limits : Fixed**
20.21(e)(8)(i)(C)(2)(ii) Booster Gain Limits : Mobile, Direct connect.
20.21(e)(8)(i)(H) Transmit Power Off UL Gain Limit., Transmit Power Off UL Gain timing.

Work Order #: **94772** Date: 10/4/2013
Test Type: **Conducted Emissions** Time: 14:40:48
Equipment: **ClearRF 25db dual-band direct connect cellular amplifier** Sequence#: 1
Manufacturer: Clear RF, LLC Tested By: E. Wong
Model: WRE2710 110V 60Hz
S/N: 001

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03430	Attenuator	75A-10-12	9/5/2013	9/5/2015
T3	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
ClearRF 25db dual-band direct connect cellular amplifier*	Clear RF, LLC	WRE2710	001

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	DPX	GFP101U-1210	NA
HF Pre Amplifier	HP	830174A	3123A00281
Solid State Amplifier	Comtech	AR178238-30	N1Q4800-1013
ESG Vector Signal Generator	Agilent	E4438C	MY42082260
ESG Vector Signal Generator	Agilent	E4433B	US40052164

Test Conditions / Notes:

The EUT is placed on the test bench. The Donor port of the Machine to Machine booster is intended to be connected to an antenna and the server port is intended to be connected directly to the antenna port of a cellular modem or cellular handset.

CMRS band.
UL: 824-849MHz, 1850-1915MHz
DL: 869-894MHz, 1930-1995MHz

Evaluation performed at the both Donor and Server antenna port.

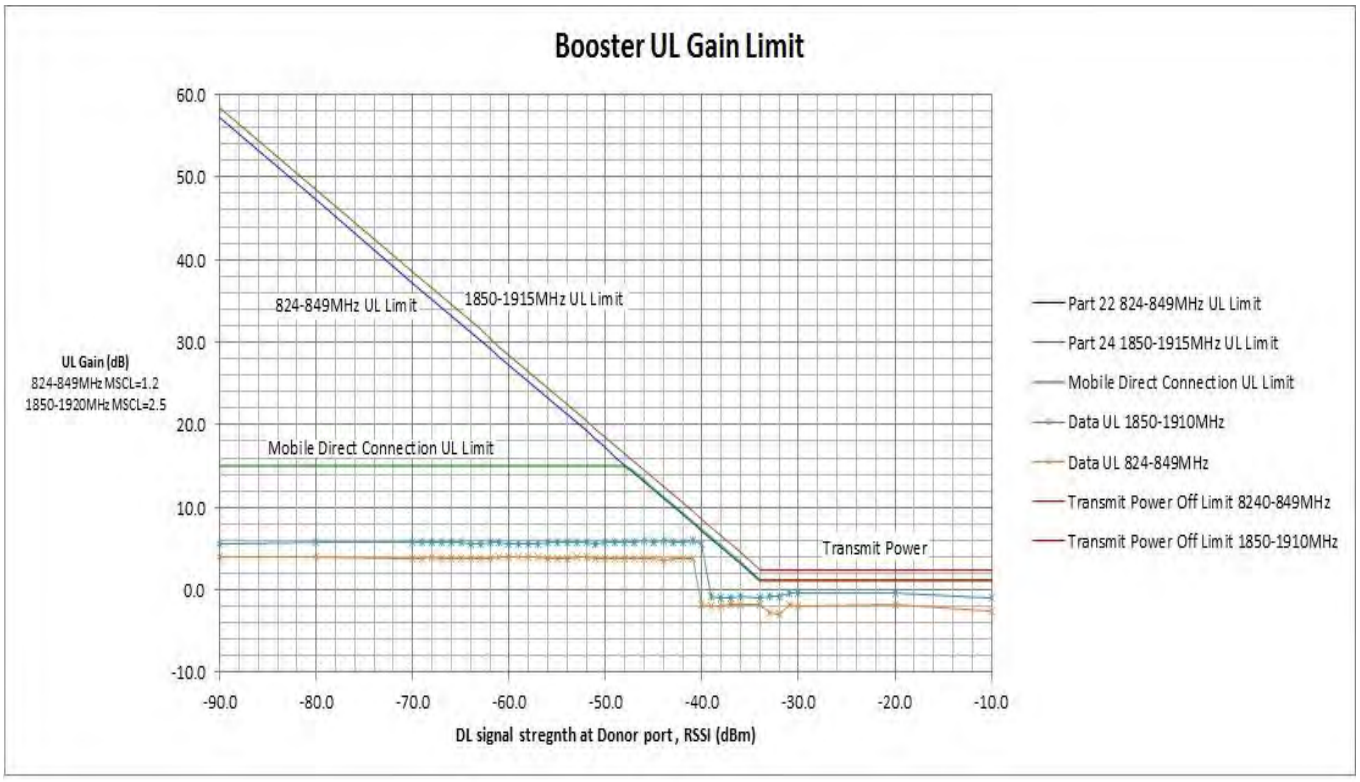
The booster operates in the following frequency band.
UL: 824-849, 1850-1910 MHz
DL: 869-894, 1930-1990 MHz

Evaluation performed in accordance with 7.9 of the FCC Document 935210 DO3 Wideband Consumer Signal Booster Measurement Guidance DR04-41516.

Due to the low gain nature of the design, the maximum noise power never exceeds the power off limit. The yellow trace is max hold. This number is recorded and plotted against the injected DL power (RSSI).At RSSI of -40 dBm, the device shouts down and go into by pass mode.

UL measurement , Firmware version : Original

Test environment conditions: 24°C, 30% Relative Humidity:100kPa

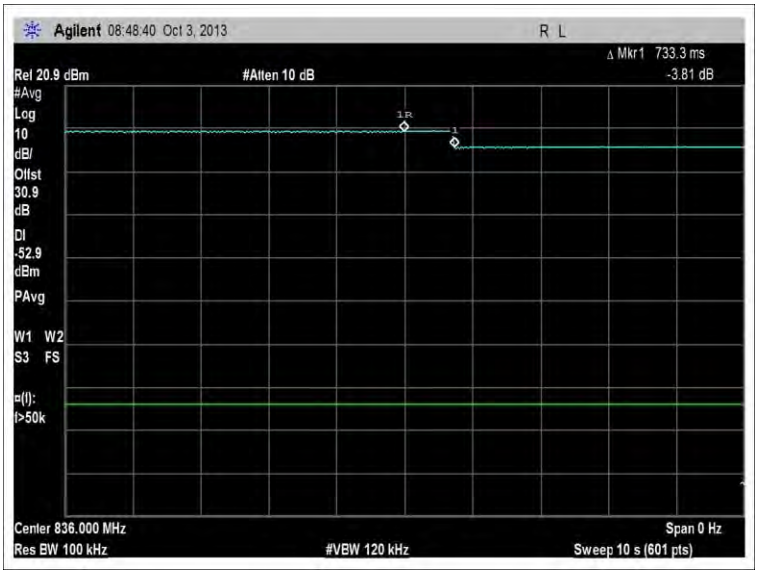


Summary: As presented in the Booster UL gain plot, the booster UL gain is under the limit for 20.21(e)(8)(i)(C)(2)(i) Booster Gain Limits : Fixed and 20.21(e)(8)(i)(C)(2)(ii) Booster Gain Limits: Mobile, Direct connect. Hence meeting the requirement for Fixed and mobile operation.

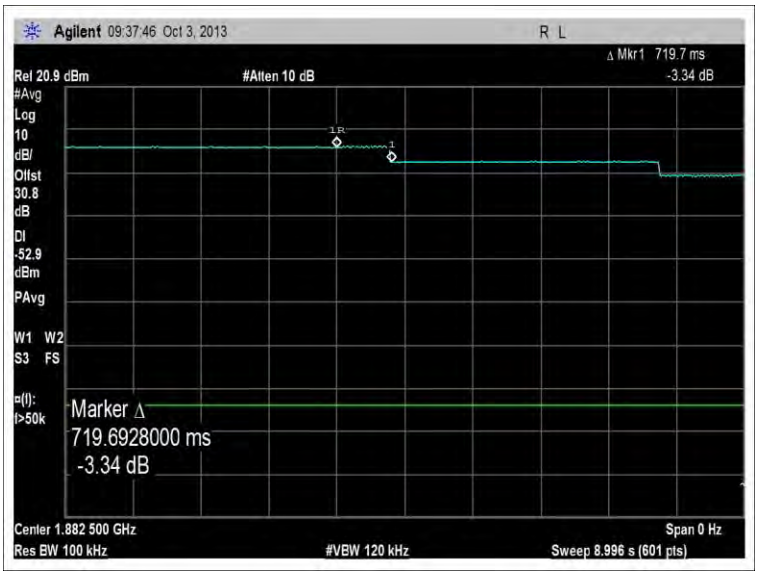
Booster Gain Timing, as presented in the timing plots.

Freq	Fixed limit	Mobile limit	Measured Gain Timing	Result
824-849MHz	3 sec	1 sec	0.733	Pass
1850-1915MHz	3 sec	1 sec	0.720	Pass

Test Data

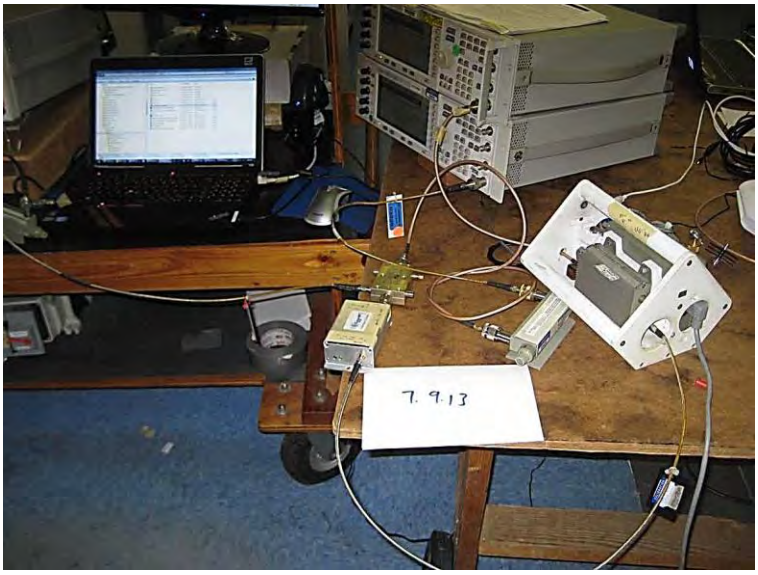


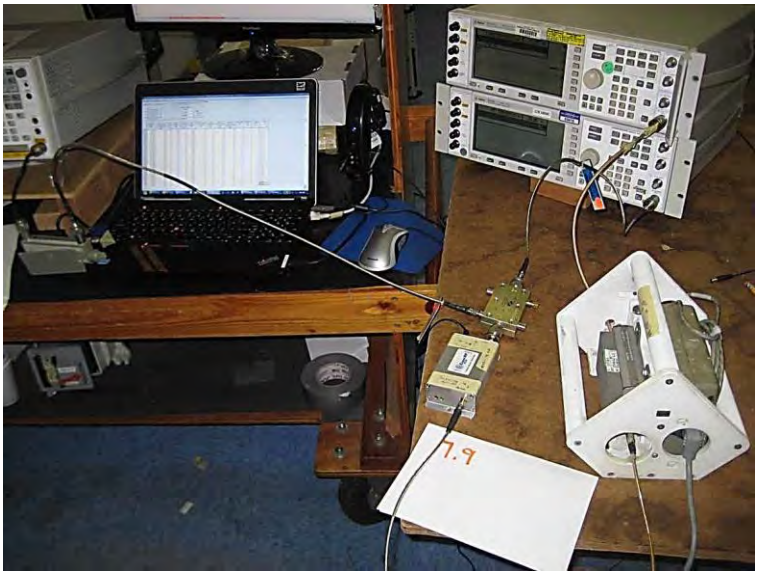
824 - 849MHz



1850 - 1910MHz

Test Setup Photos





FCC 20.21(e)(8)(i)(E) Out of Band Emission Limits

Test Conditions / Setup

Test Location: CKC Laboratories • 110 Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **Clear RF, LLC**
Specification: **20.21(e)(8)(i)(E) Out of Band Emission**
Work Order #: **94772** Date: 12/02/2013
Test Type: **Conducted Emissions** Time: 14:40:48
Equipment: **ClearRF 15dB Dual-Band Direct Connect Cellular Amplifier** Sequence#: 1
Manufacturer: Clear RF, LLC Tested By: Stu Yamamoto
Model: WRE2710 110V 60Hz
S/N: 001

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03430	Attenuator	75A-10-12	9/5/2013	9/5/2015
T3	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
ClearRF 15dB Dual-Band Direct Connect Cellular Amplifier*	Clear RF, LLC	WRE2710	001

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	DPX	GFP101U-1210	NA
RF Amplifier	Amplifier Research	AR25S1G4A	0325937
ESG Vector Signal Generator	Agilent	E4433B	US40052164

Test Conditions / Notes:

The EUT is placed on the test bench. The Donor port of the Machine to Machine booster is intended to be connected to an antenna and the server port is intended to be connected directly to the antenna port of a cellular modem or cellular handset.

CMRS band.
UL: 824-849MHz, 1850-1915MHz
DL: 869-894MHz, 1930-1995MHz

Evaluation performed at the both Donor and Server antenna port.

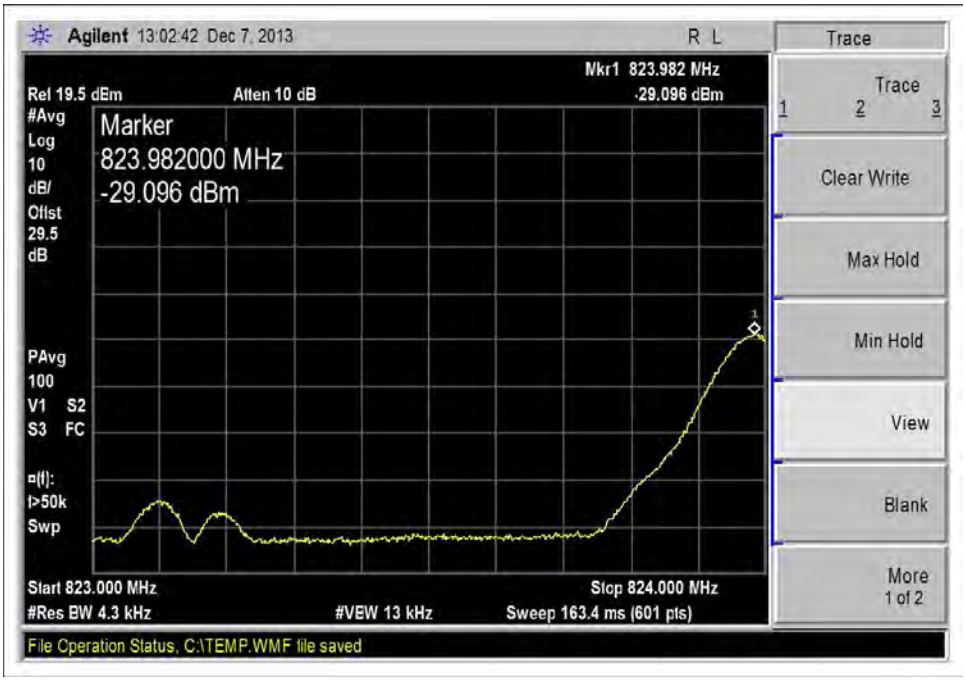
The booster operates in the following frequency band.
UL: 824-849, 1850-1910 MHz
DL: 869-894, 1930-1990 MHz

Evaluation performed in accordance with 7.5 of the FCC Document 935210 DO3 Wideband Consumer Signal Booster Measurement Guidance DR04-41516. Note that below 1 GHz the span was set wider than 100kHz, however this span is sufficient to demonstrate compliance within100kHz outside the band edges.
Note that the Device was not tested at -20dBm in the down link direction as the device would go into bypass mode at -64dBm of DL power. (10/5/13). Additional DL OBE plot was capture 1dB prior to Shut down.

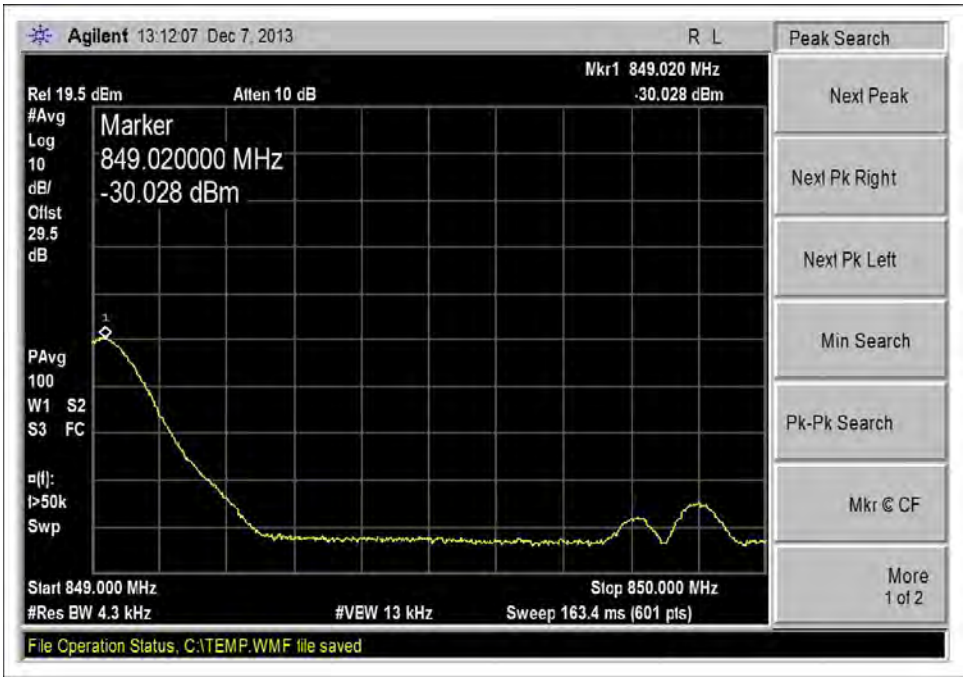
UL measurement , Firmware version : 1.0.17
DL measurement , Firmware version : 1.0.17

Test environment conditions: 24°C, 30% Relative Humidity:100kPa

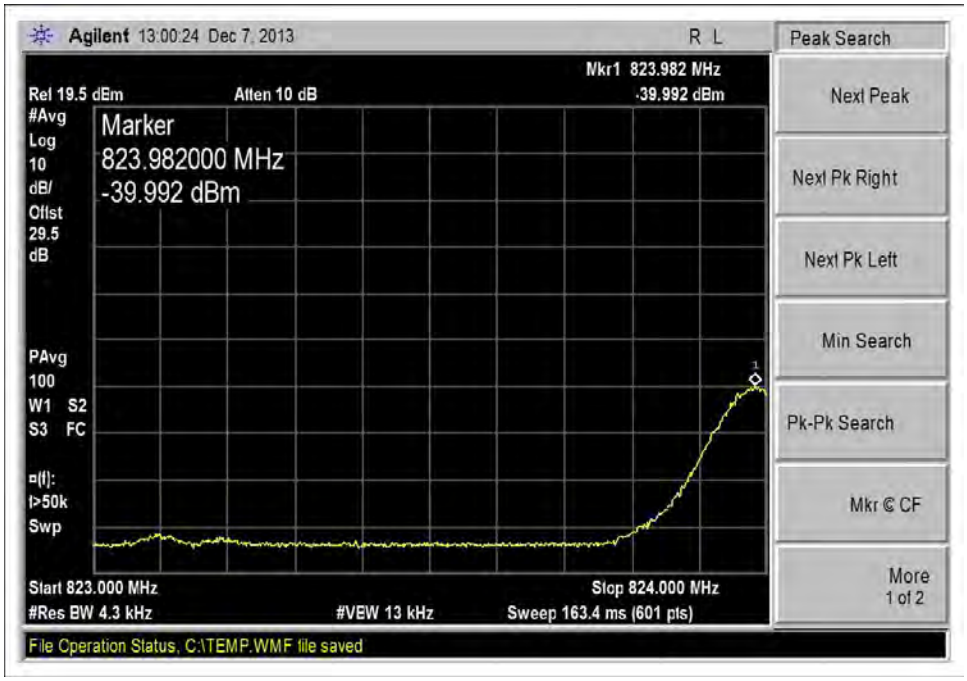
Test Data



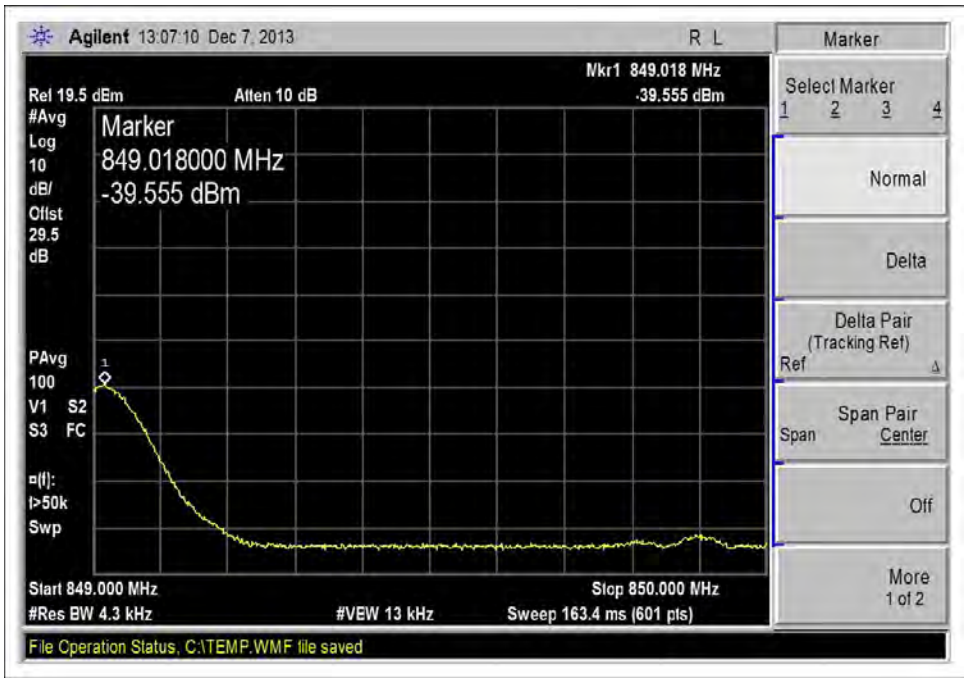
824 - 849MHz _ L _ UL GSM, +27dBm



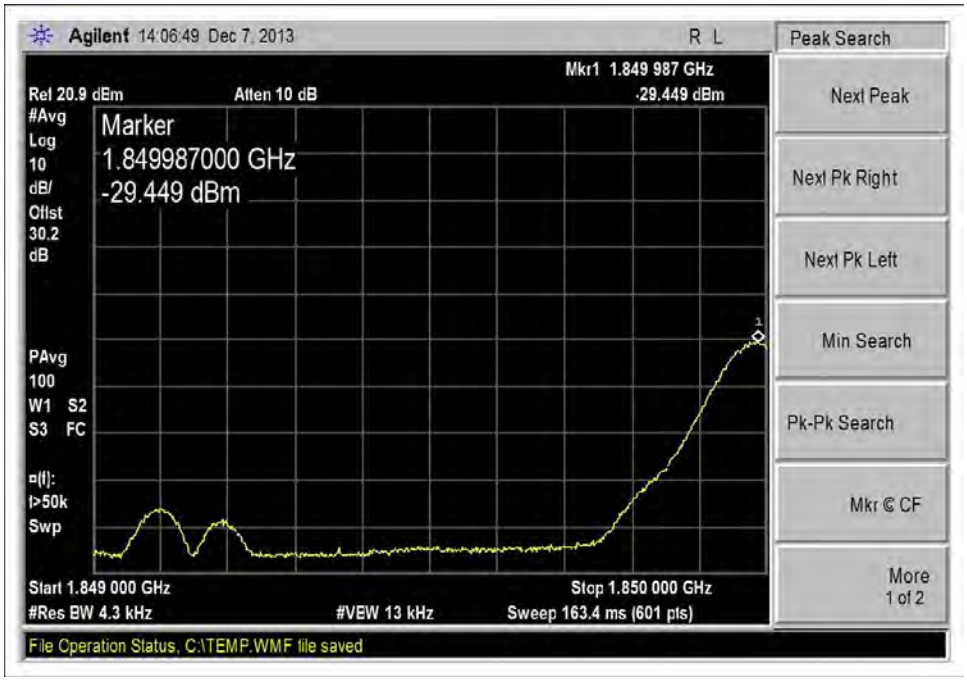
824 - 849MHz _ H _ UL GSM, +27dBm



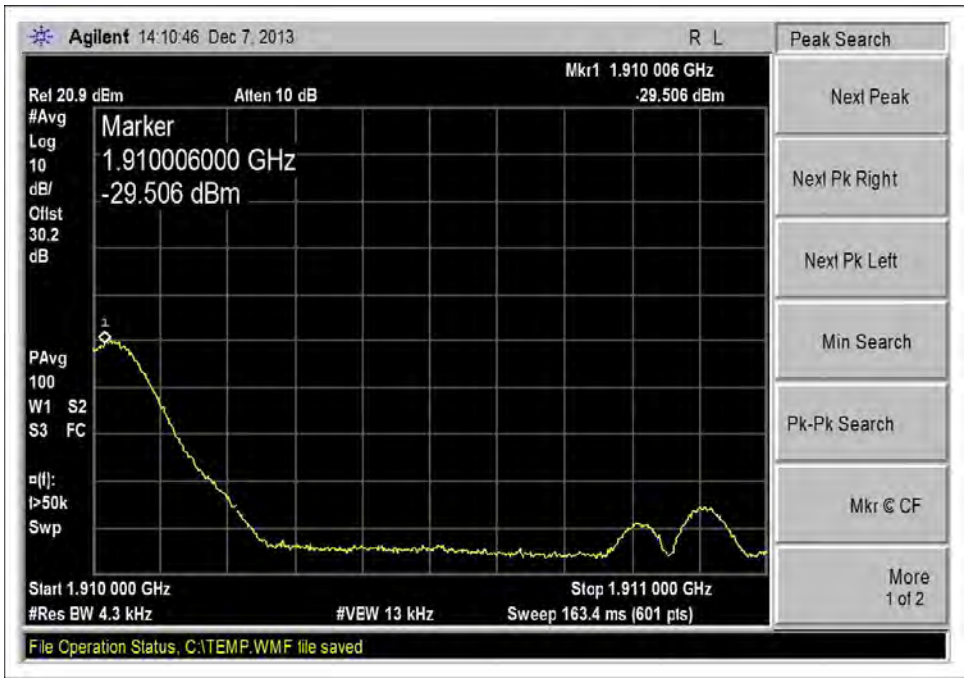
824 - 849MHz_ L _UL GSM, Prior to AGC



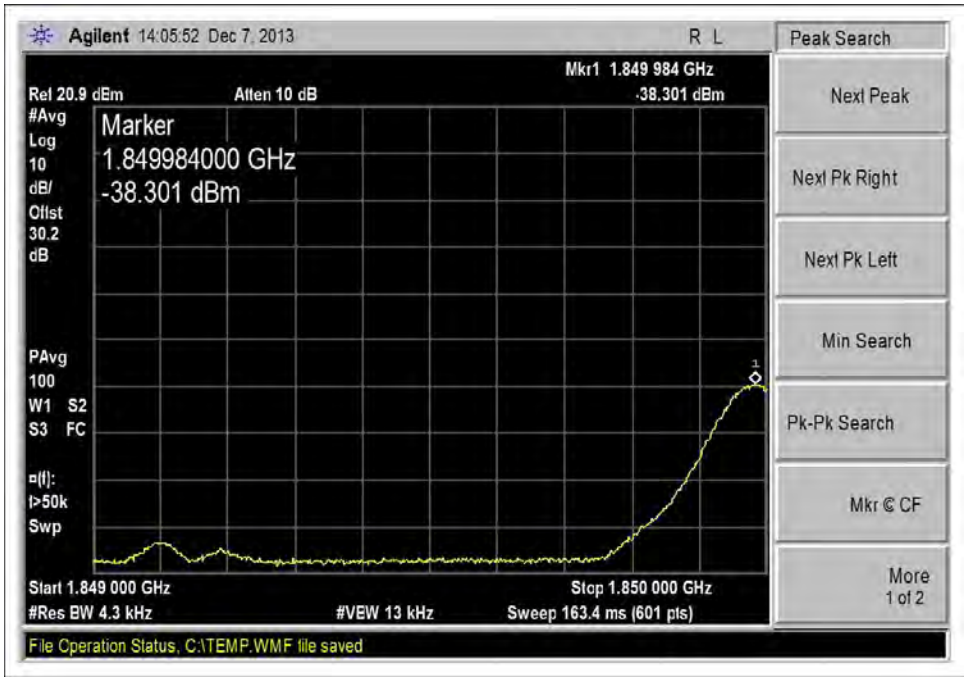
824 - 849MHz_ L _UL GSM, Prior to AGC



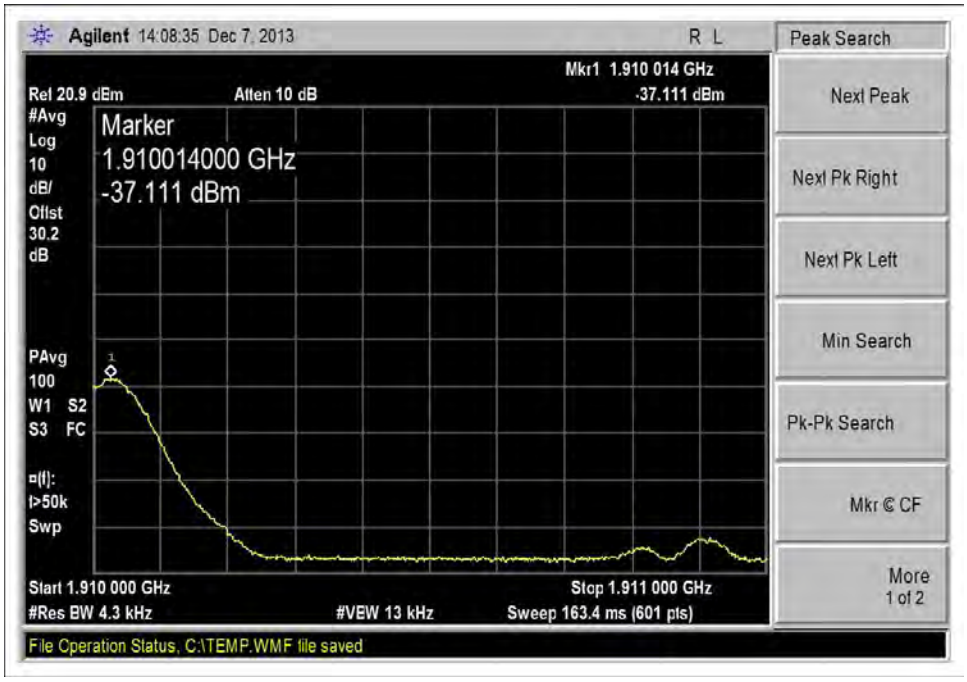
1850 - 1910MHz _ L _ UL GSM, +27dBm



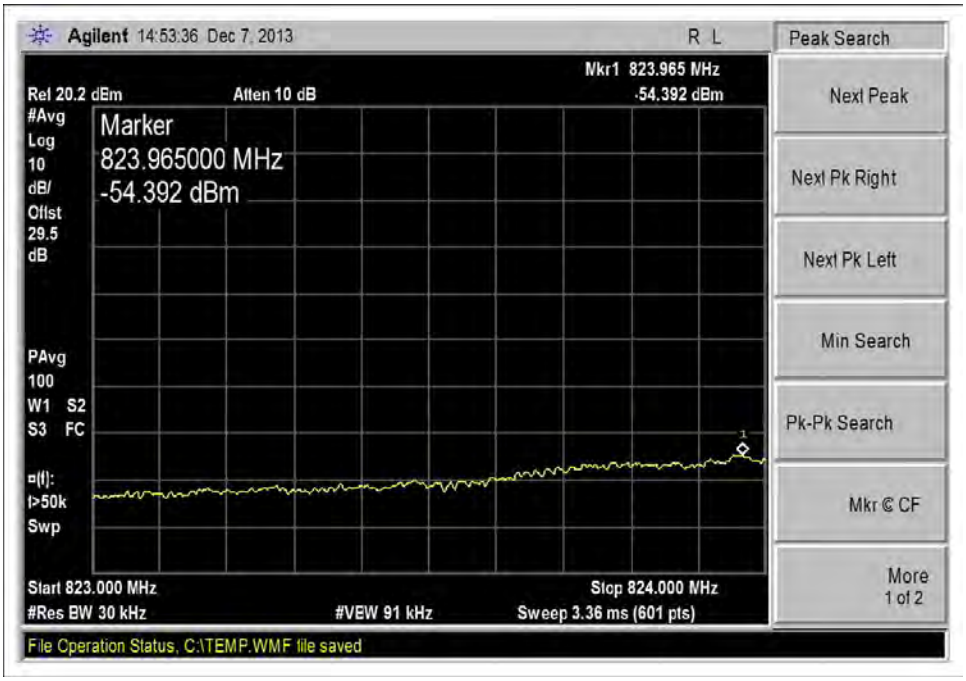
1850 - 1910MHz _ H _ UL GSM, +27dBm



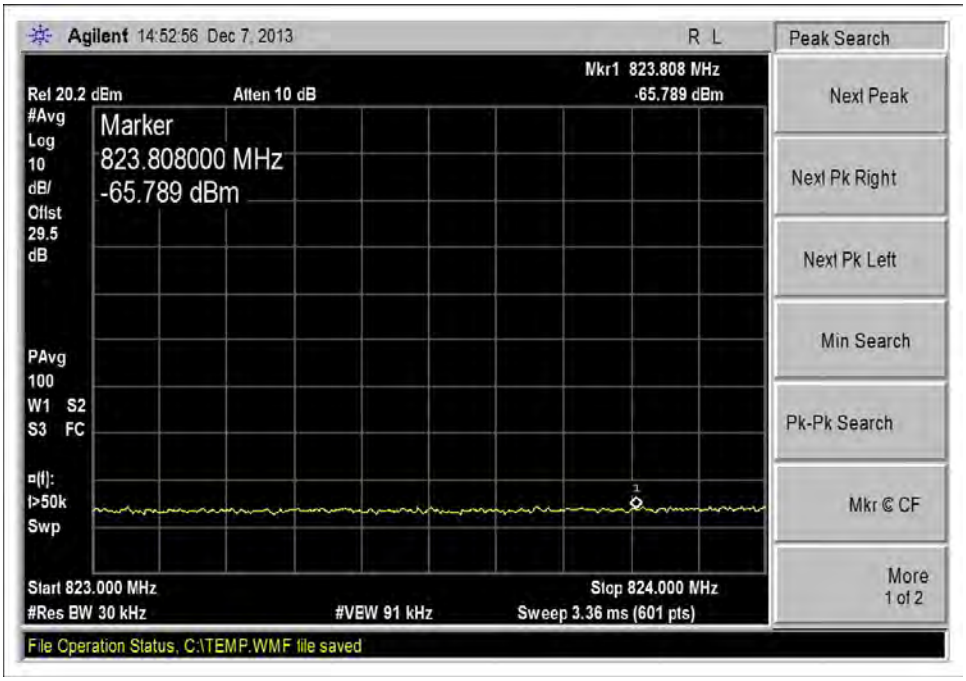
1850 - 1910MHz _ L _ UL GSM, Prior to AGC



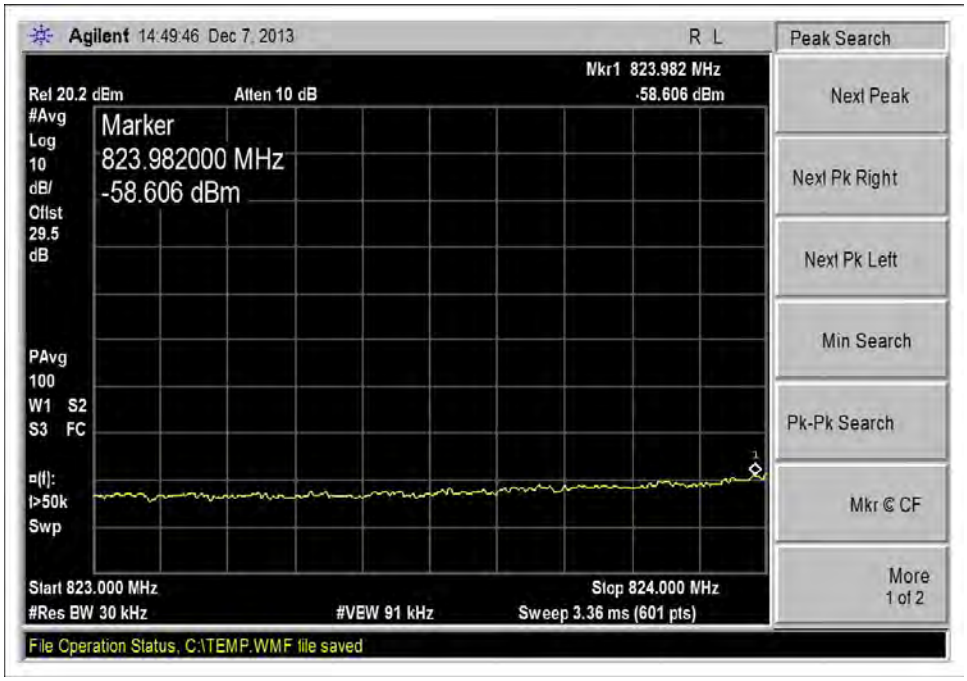
1850 - 1910MHz _ H _ UL GSM, Prior to AGC



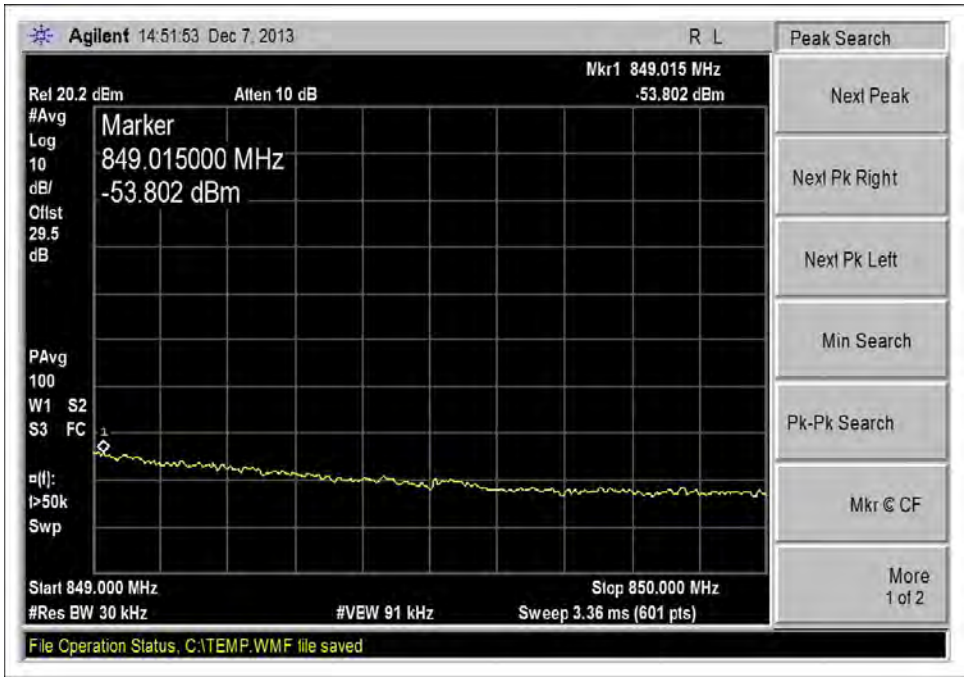
824 - 835MHz _ L _ UL CDMA, +27dBm



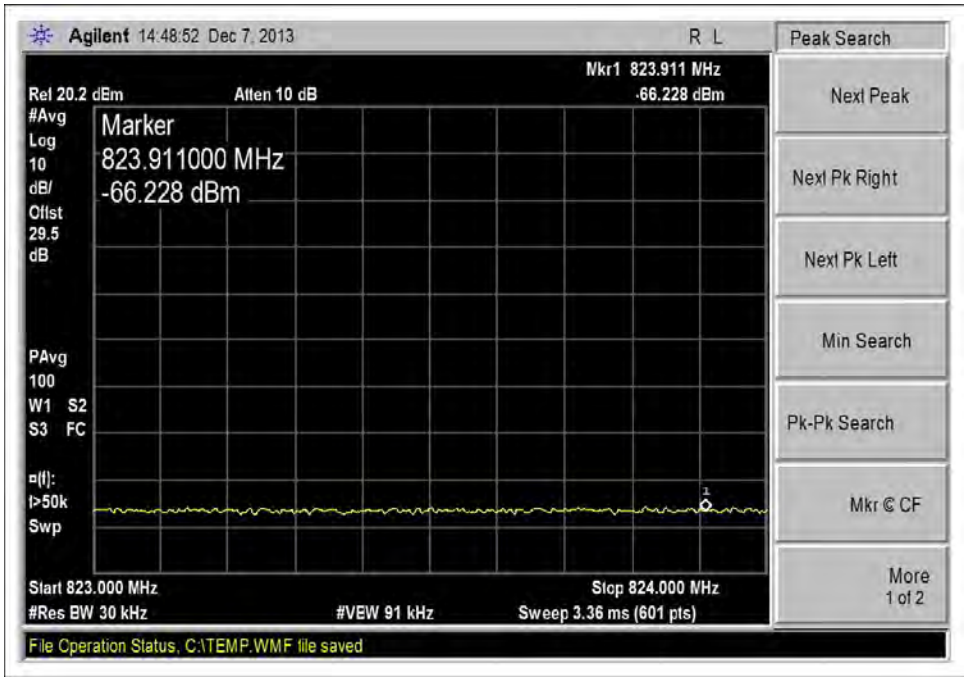
824 - 835MHz _ L _ UL CDMA, Prior to AGC



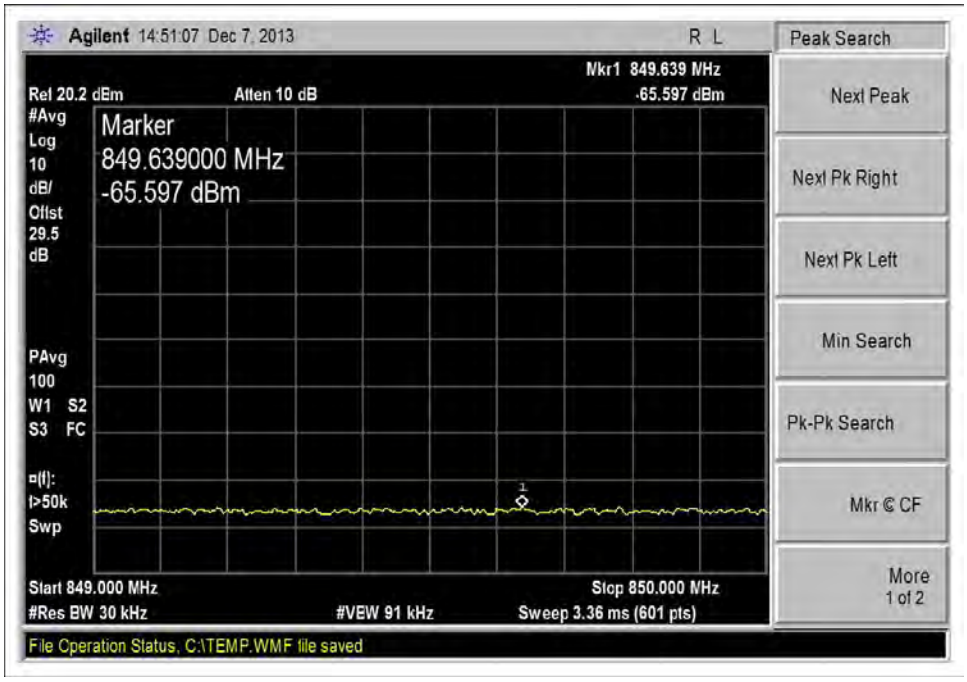
824 - 849MHz _ L _ UL CDMA, +27dBm



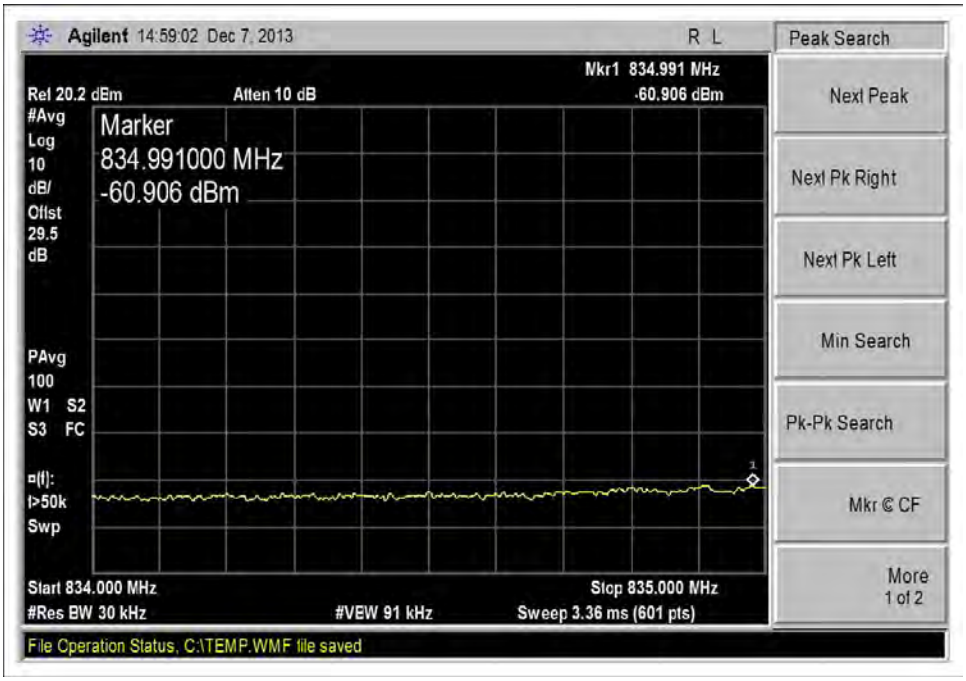
824 - 849MHz _ H _ UL CDMA, +27dBm



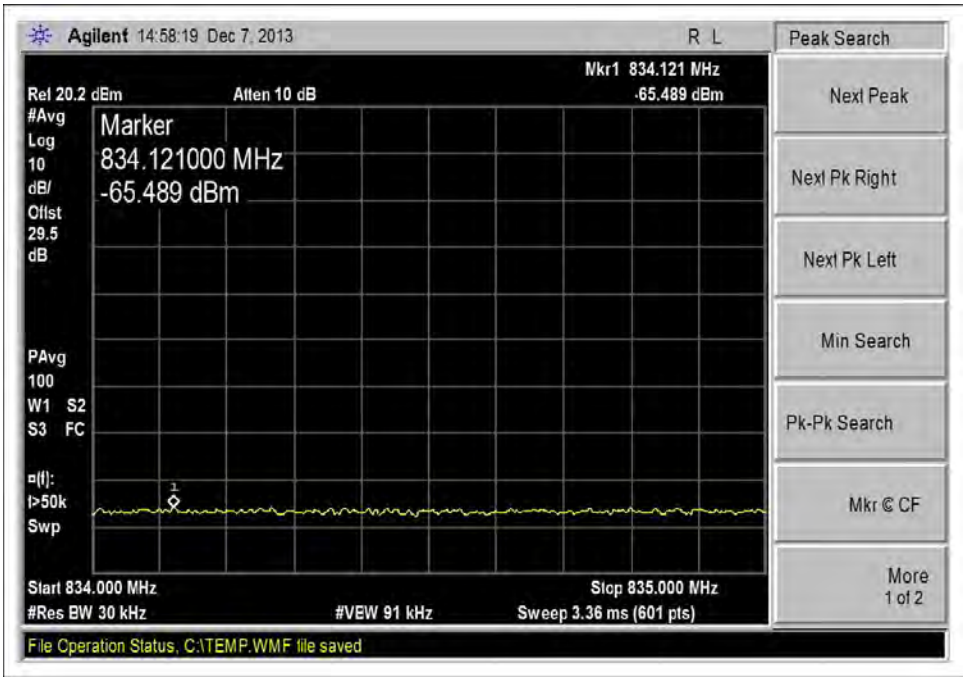
824 - 849MHz _ L _ UL CDMA, Prior to AGC



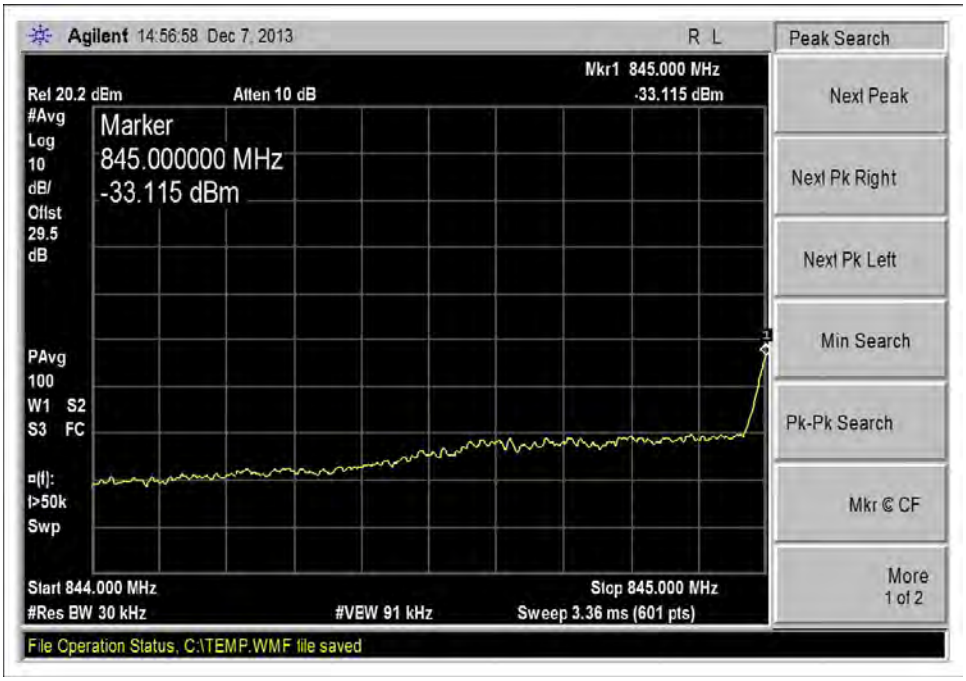
824 - 849MHz _ H _ UL CDMA, Prior to AGC



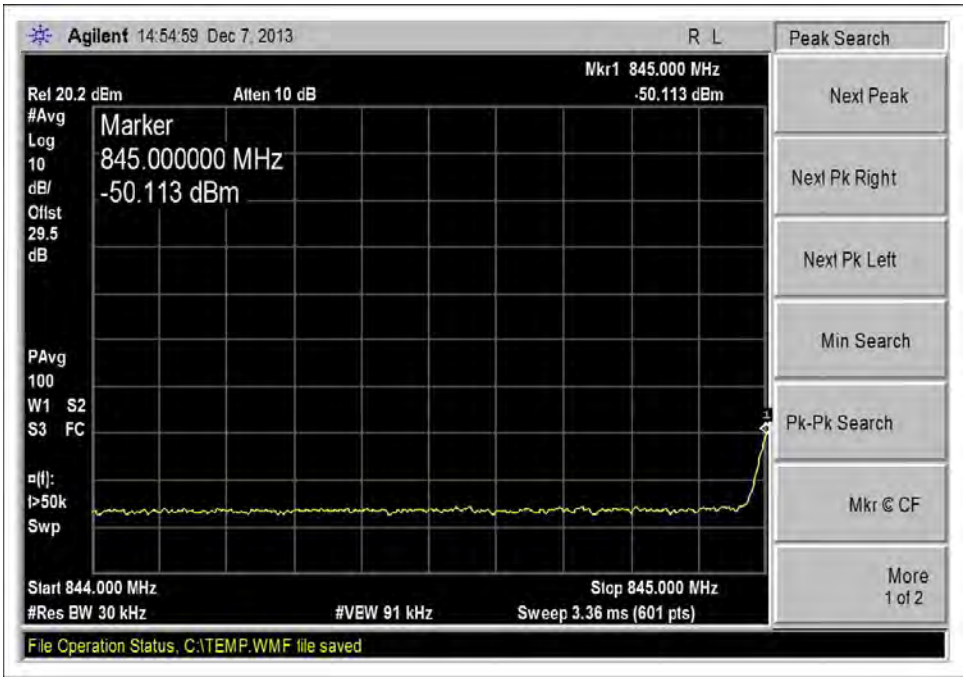
835 - 845MHz _ L _ UL CDMA, +27dBm



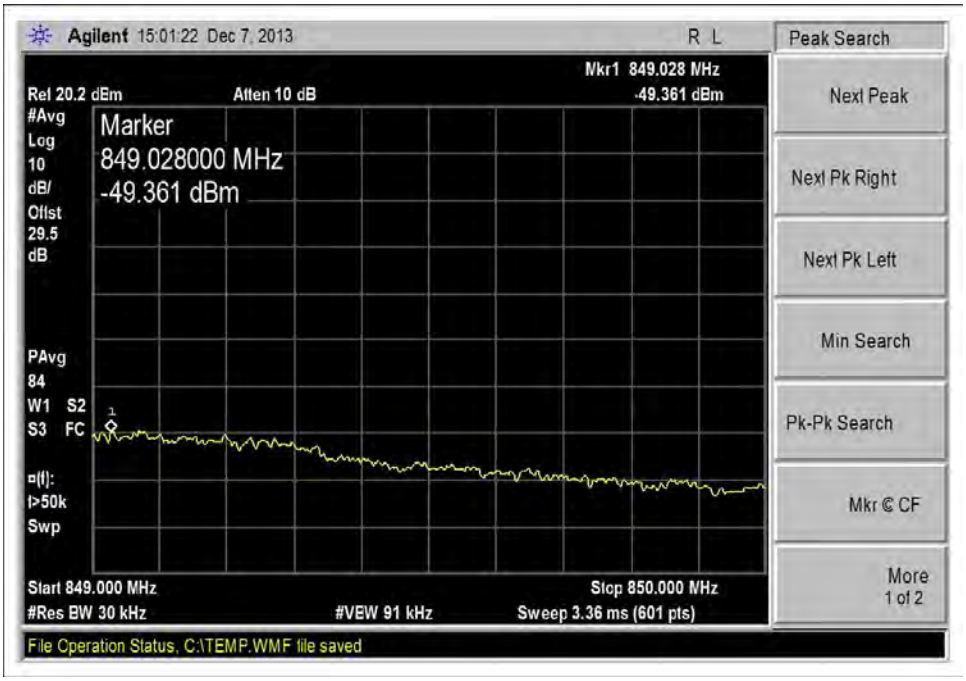
835 - 845MHz _ L _ UL CDMA, Prior to AGC



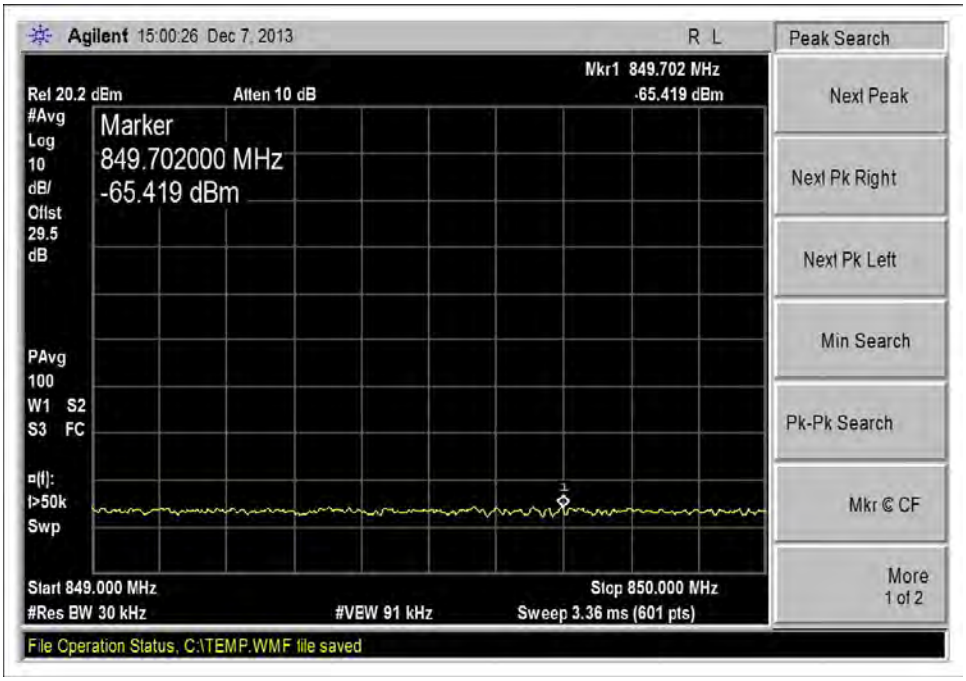
845 - 846.5MHz _ L _ UL CDMA, +27dBm



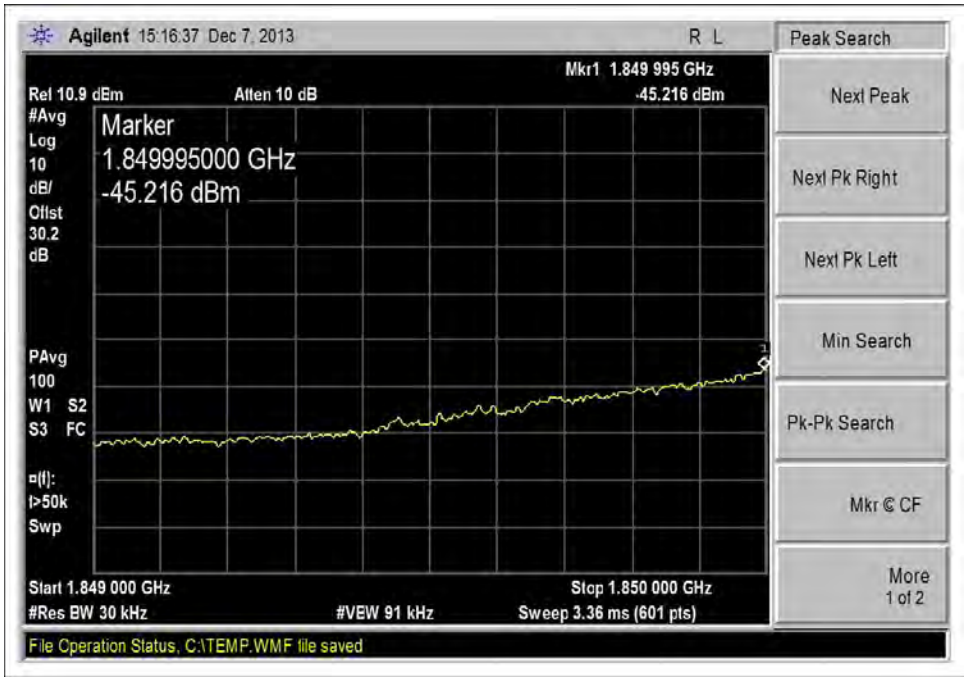
845 - 846.5MHz _ L _ UL CDMA, Prior to AGC



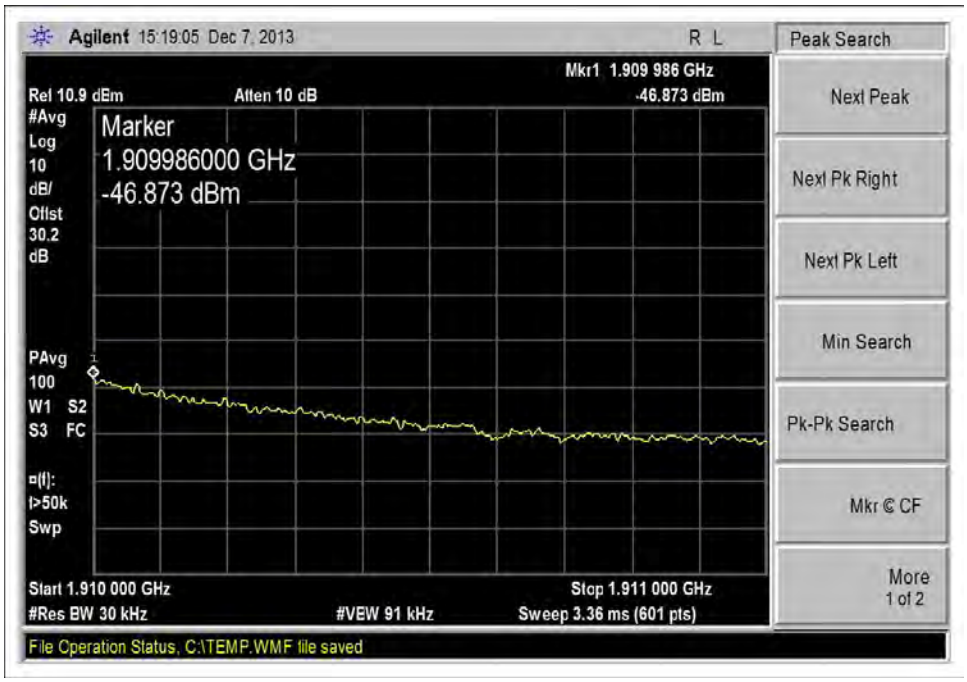
846.5 - 849MHz _ L _ UL CDMA, +27dBm



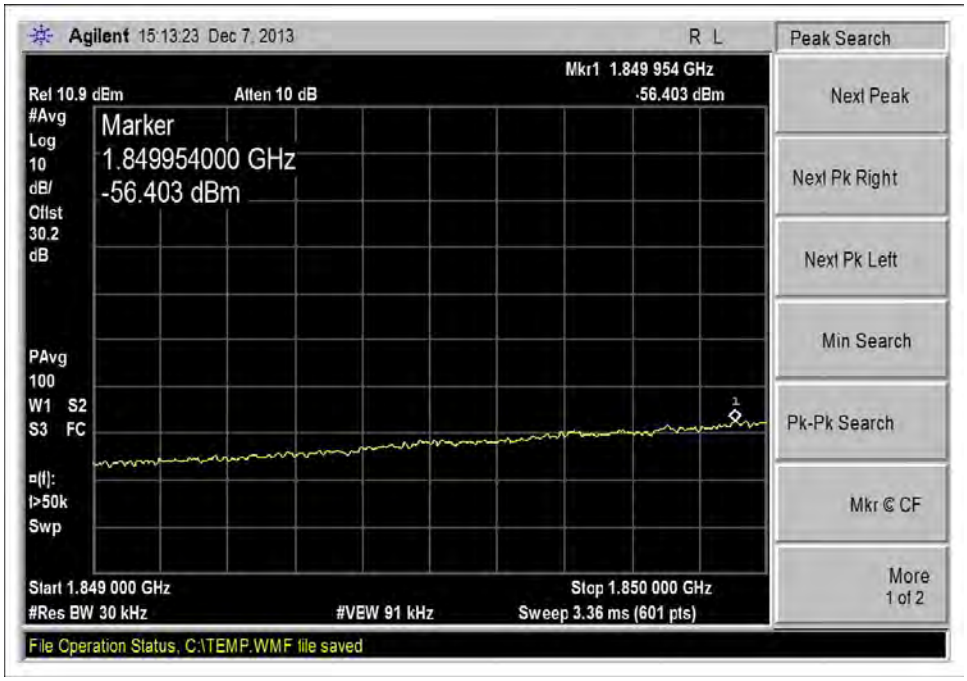
846.5 - 849MHz _ L _ UL CDMA, Prior to AGC



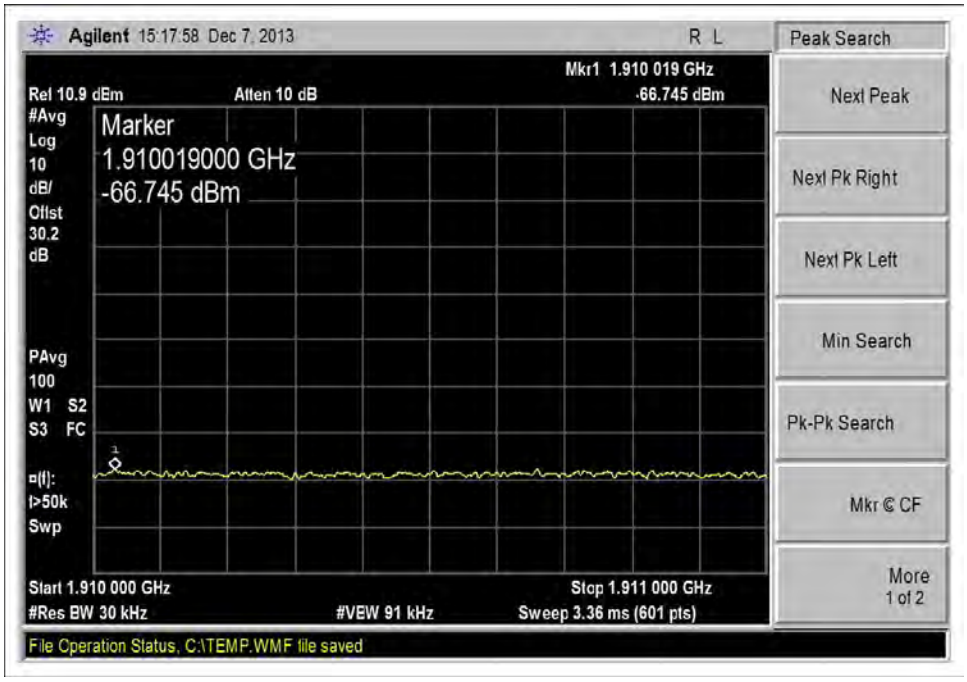
1850 - 1910MHz _ L _ UL CDMA, +27dBm



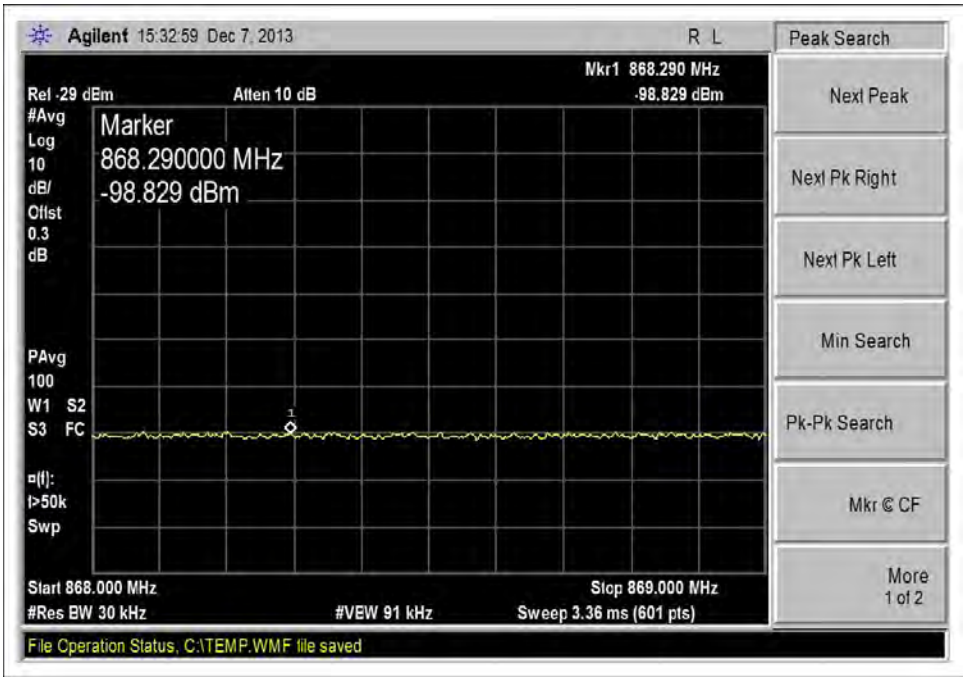
1850 - 1910MHz _ H _ UL CDMA, +27dBm



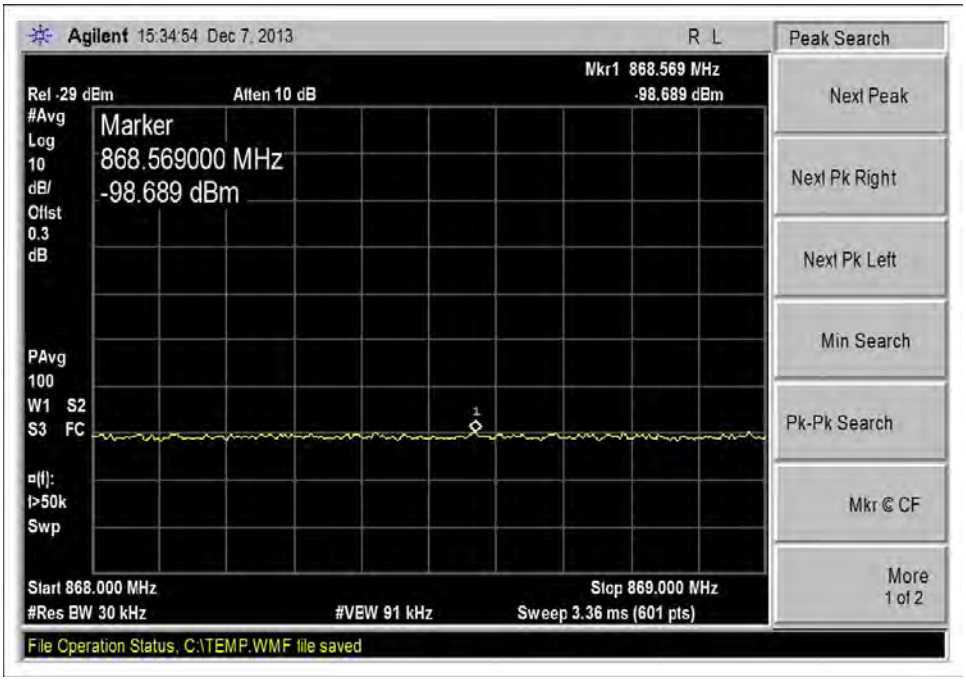
1850 - 1910MHz _ L _ UL CDMA, Prior to AGC



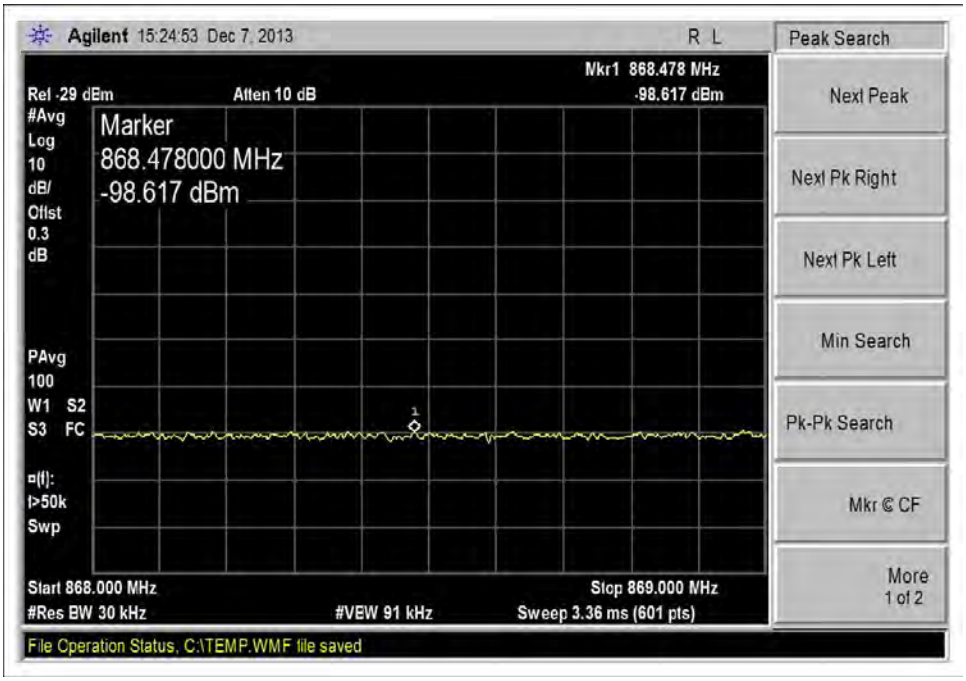
1850 - 1910MHz _ H _ UL CDMA, Prior to AGC



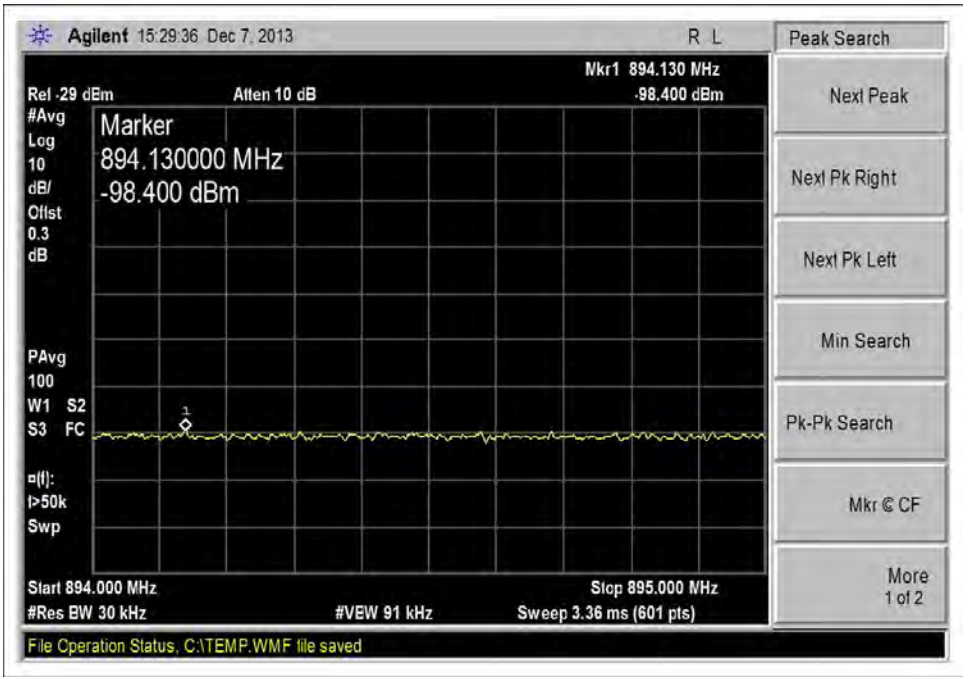
869 - 880MHz _ L _ DL CDMA, Prior to AGC



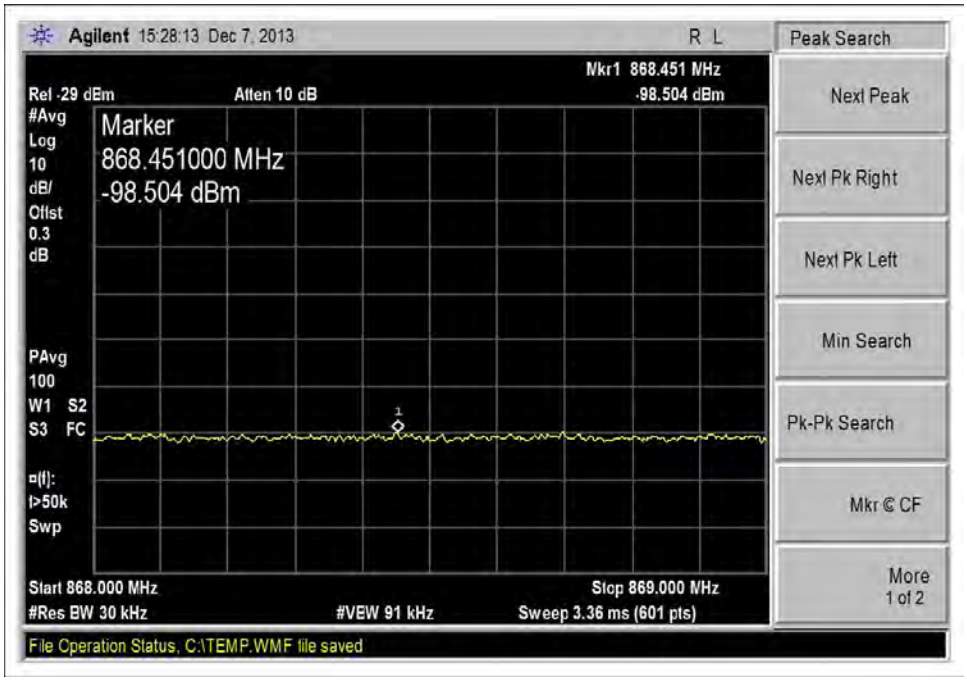
869 - 880MHz _ L _ DL CDMA, Prior Shut Off



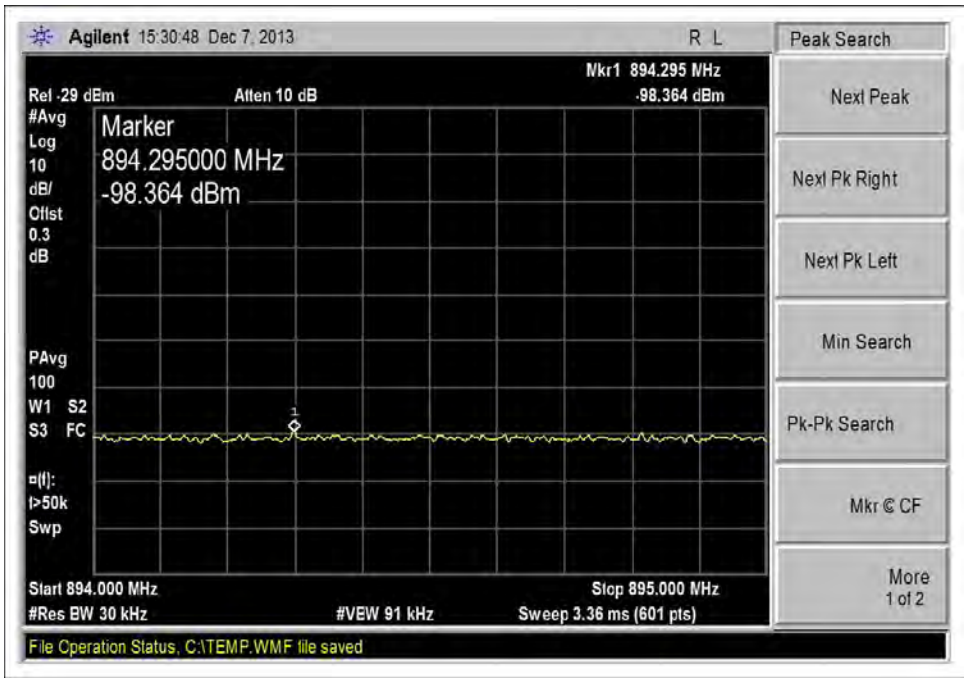
869 - 894MHz _ L _ DL CDMA, Prior to AGC



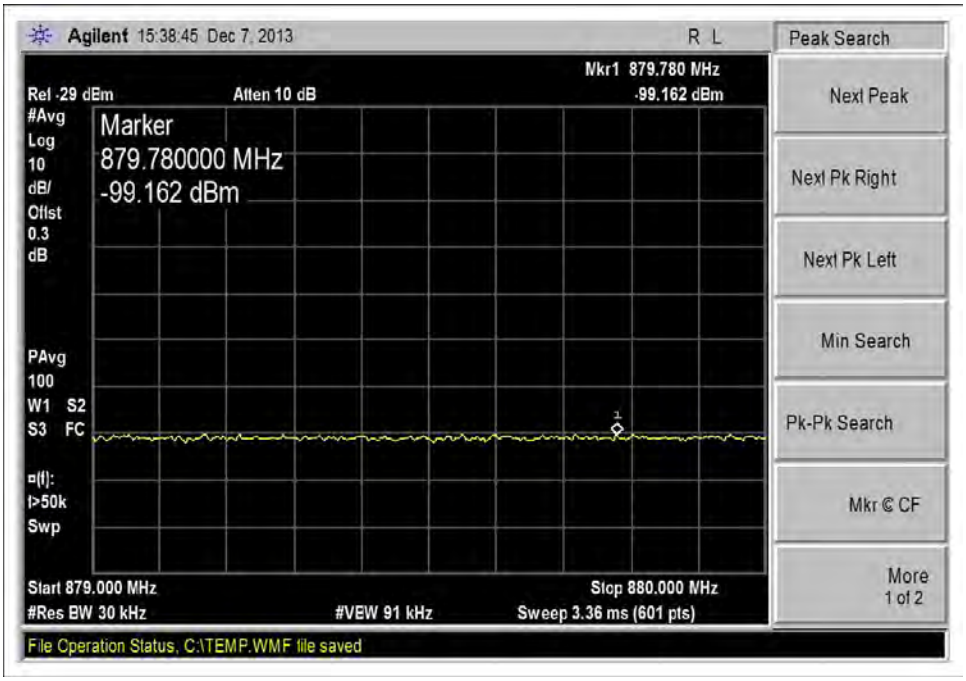
869 - 894MHz _ H _ DL CDMA, Prior to AGC



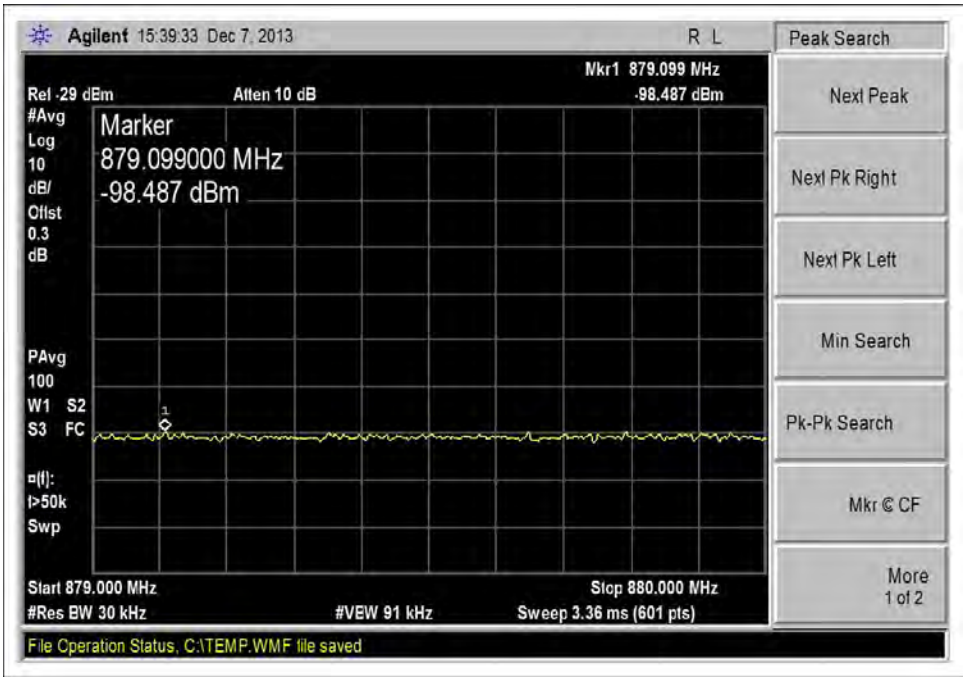
869 - 894MHz _ L _ DL CDMA, Prior Shut Off



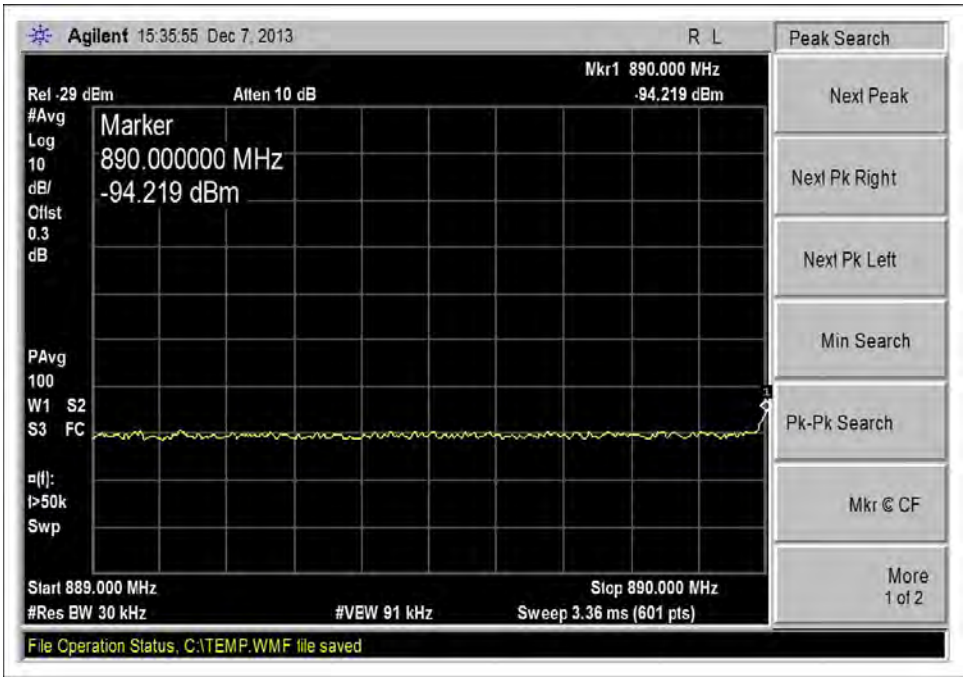
869 - 894MHz _ L _ DL CDMA, Prior Shut Off



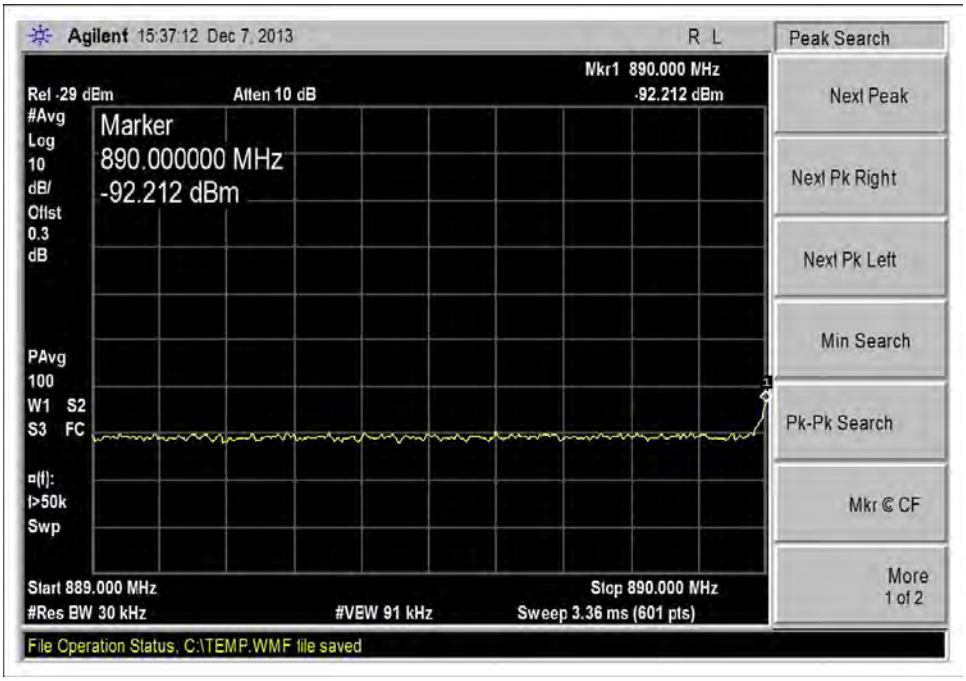
880 - 890MHz _ L _ DL CDMA, Prior to AGC



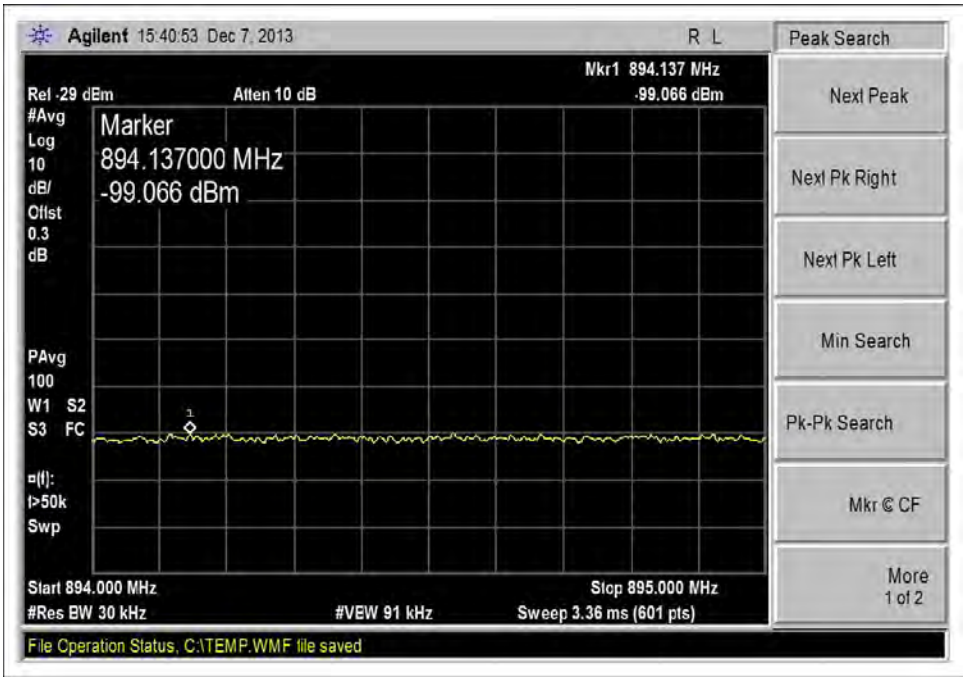
880 - 890MHz _ L _ DL CDMA, Prior Shut Off



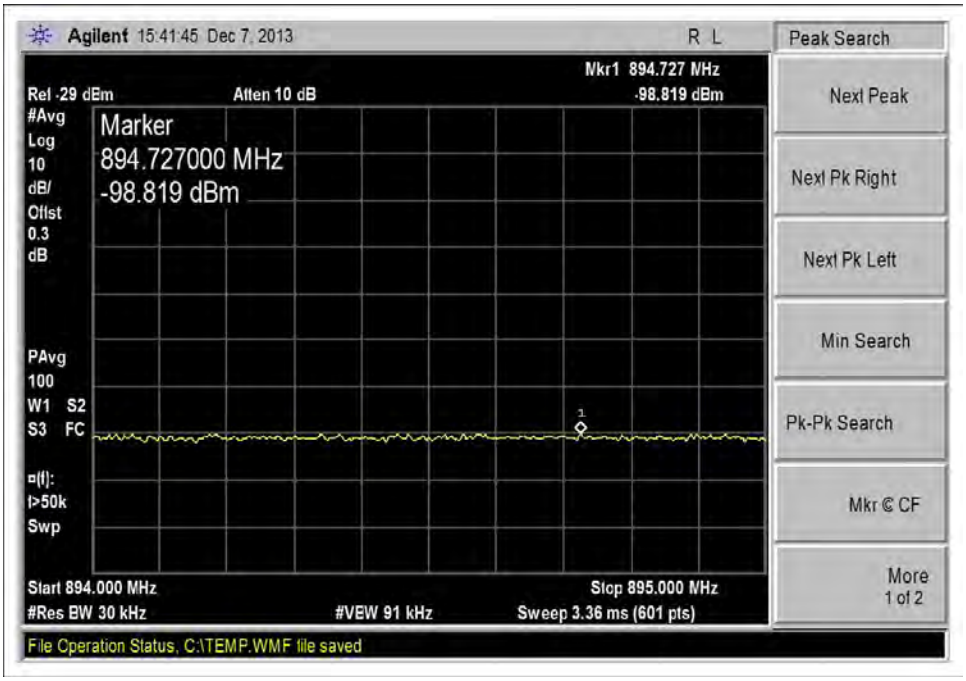
890 - 891.5MHz _ L _ DL CDMA, Prior to AGC



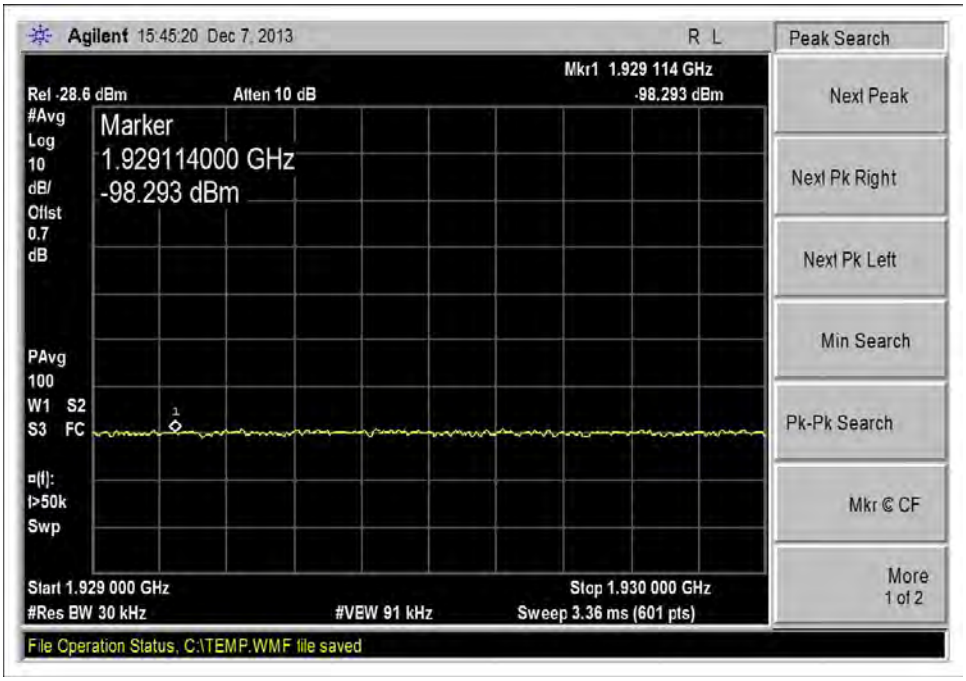
890 - 891.5MHz _ L _ DL CDMA, Prior Shut Off



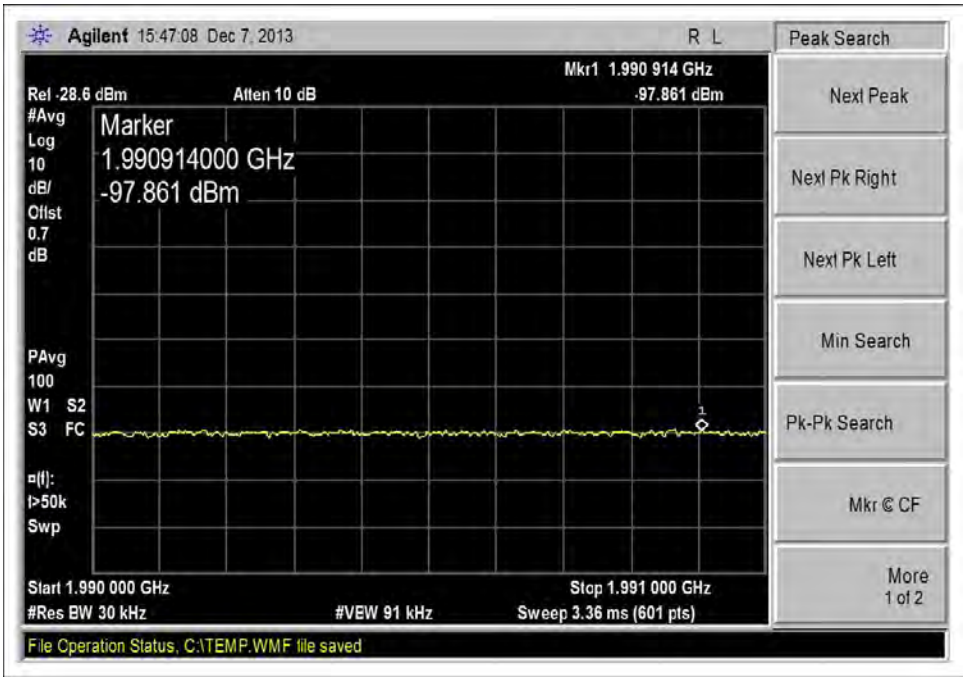
891.5 - 894MHz _ H _ DL CDMA, Prior to AGC



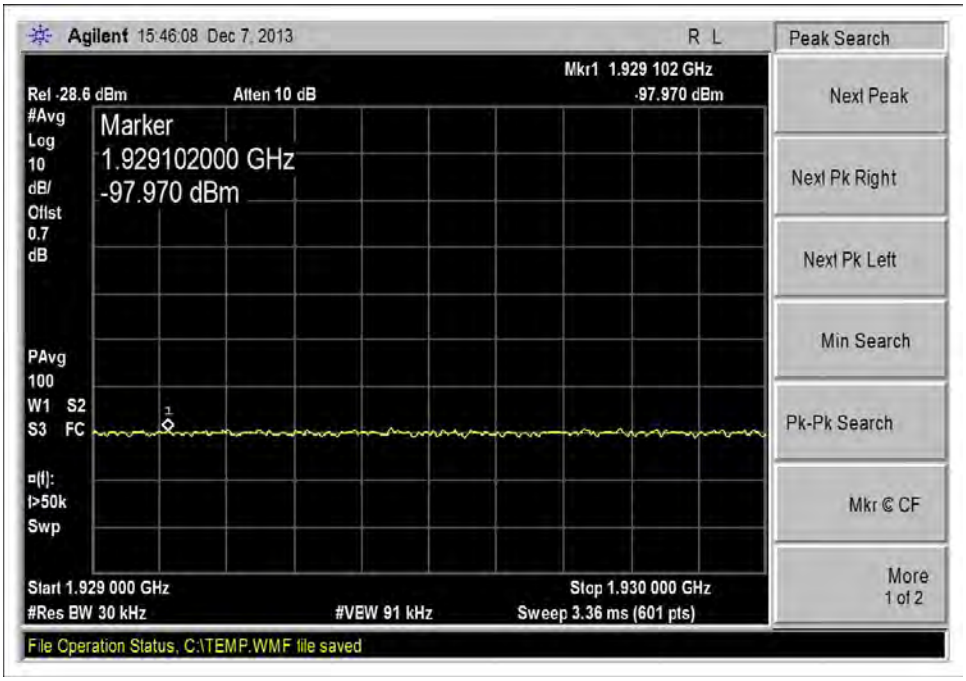
891.5 - 894MHz _ H _ DL CDMA, Prior Shut Off



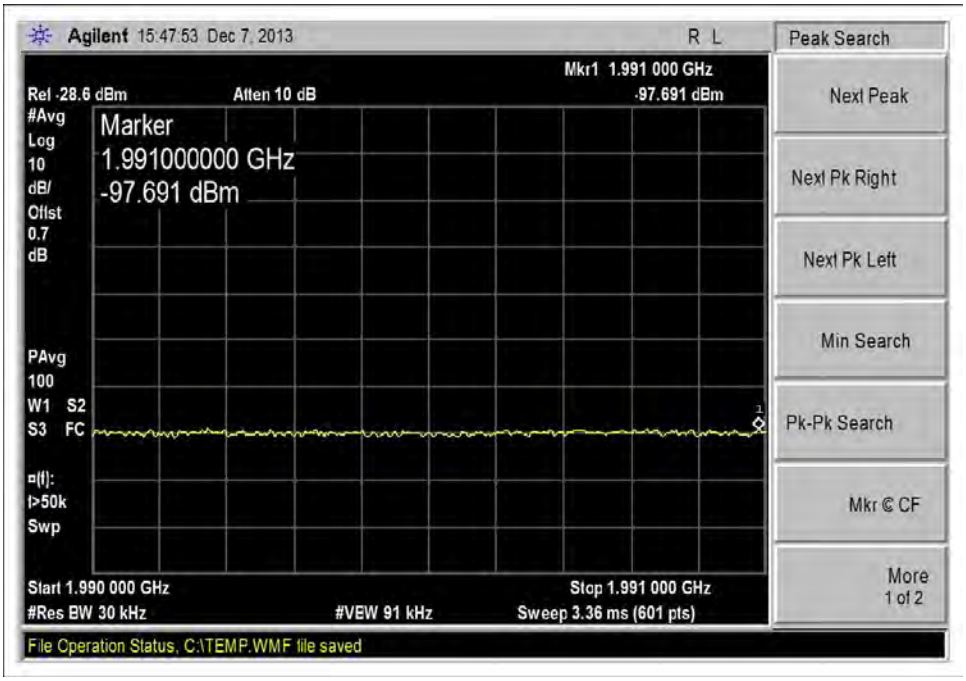
1930 - 1990MHz _ L _ DL CDMA, Prior to AGC



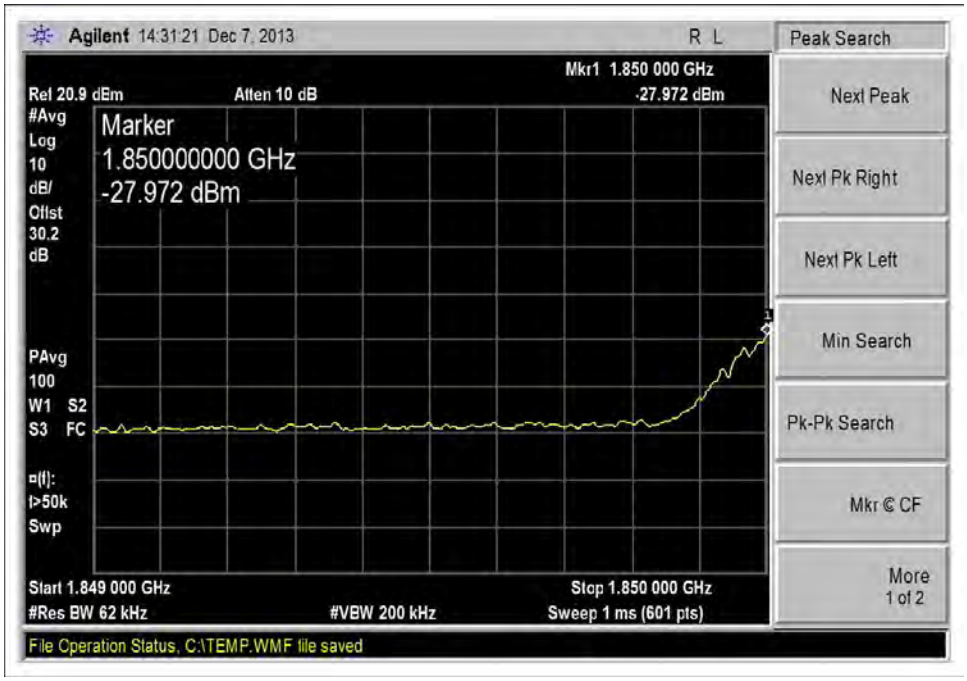
1930 - 1990MHz _ H _ DL CDMA, Prior to AGC



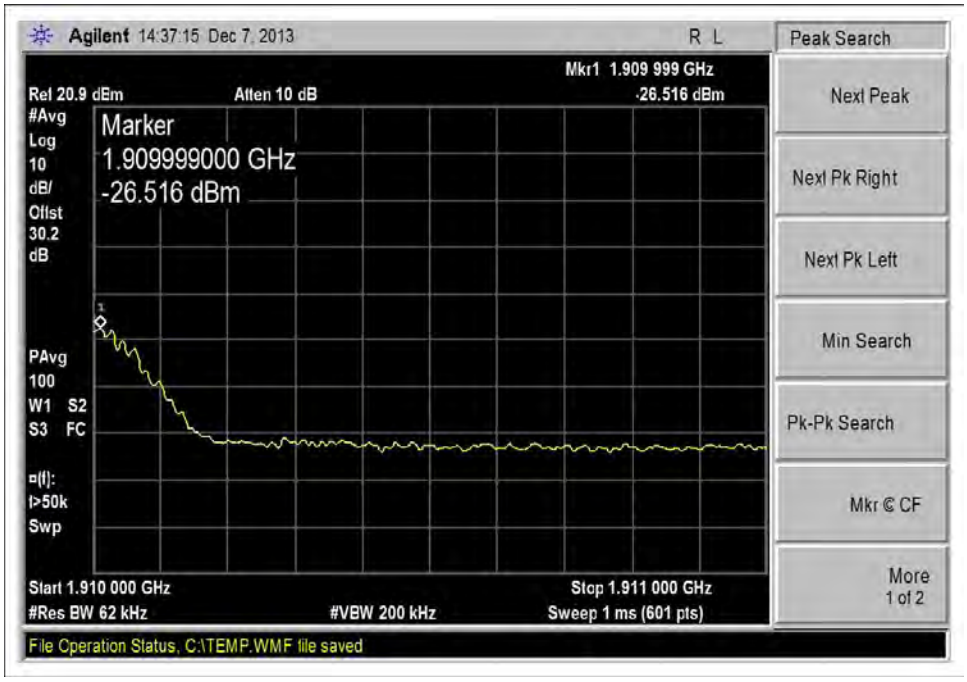
1930 - 1990MHz _ L _ DL CDMA, Prior Shut Off



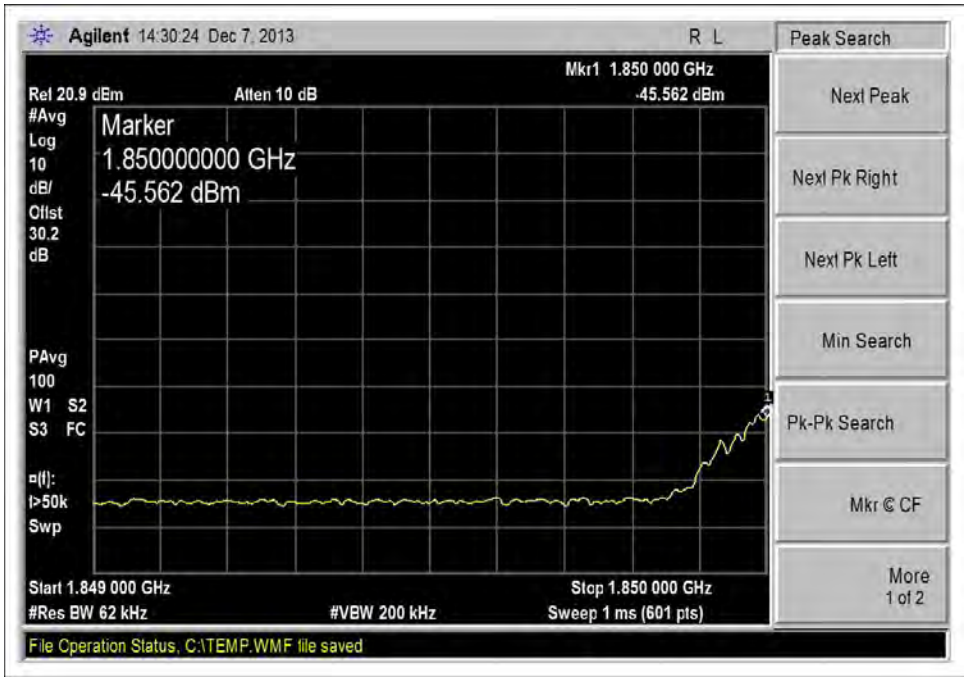
1930 - 1990MHz _ H _ DL CDMA, Prior Shut Off



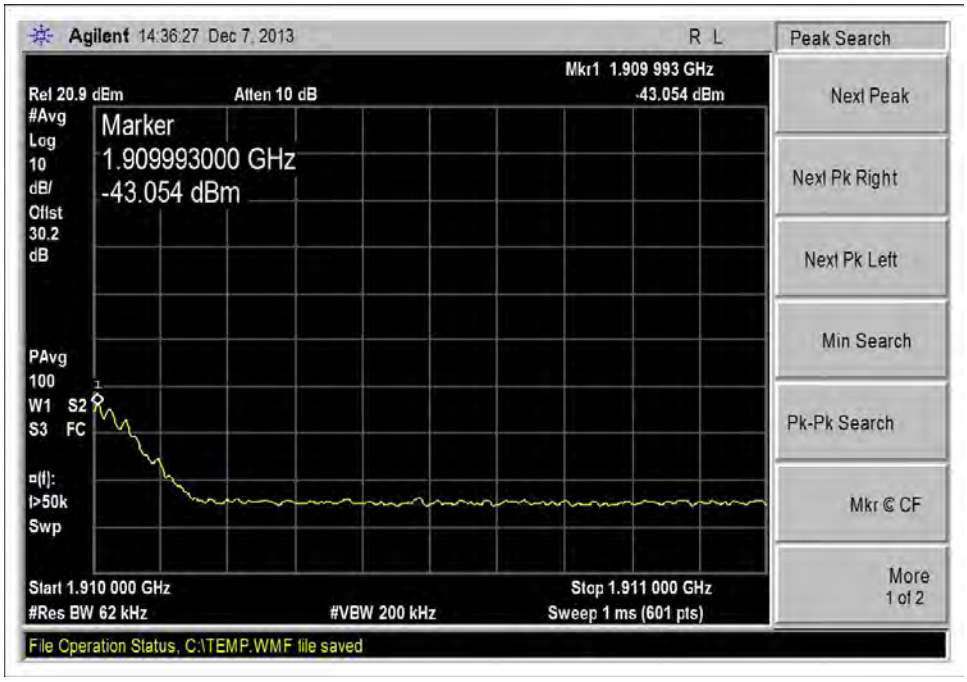
1850 - 1910MHz _ L _ UL CDMA, +27dBm



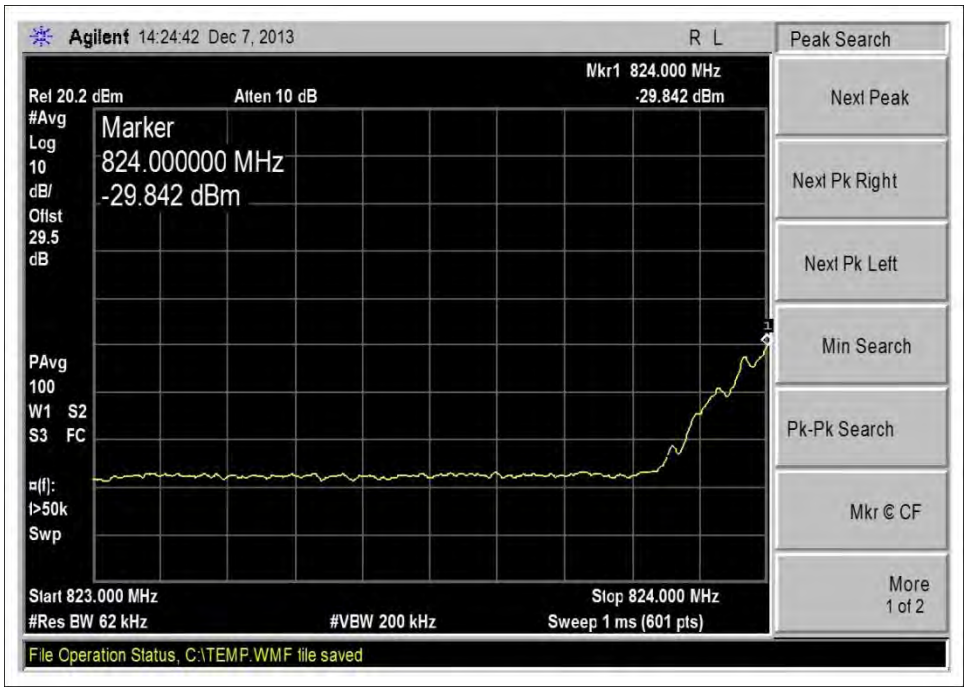
1850 - 1910MHz _ H _ UL CDMA, +27dBm



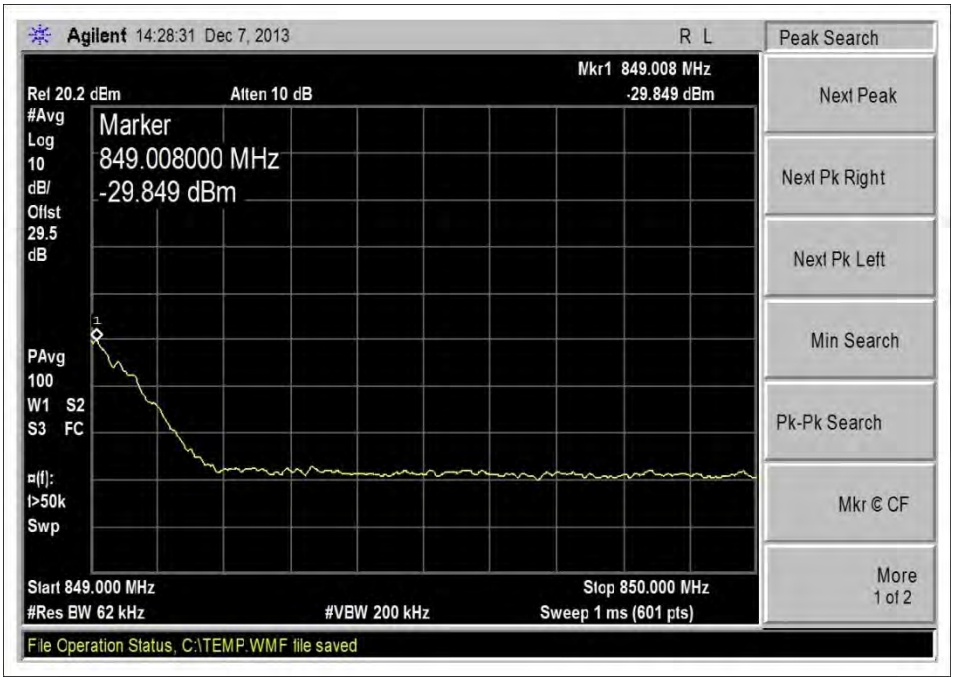
1850 - 1910MHz _ L _ UL CDMA, Prior to AGC



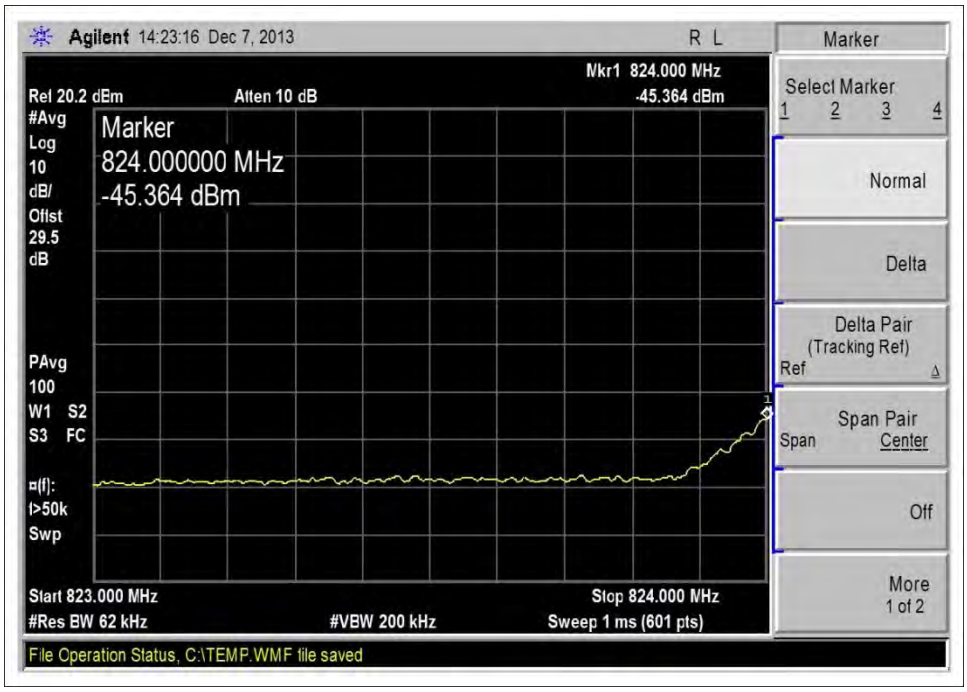
1850 - 1910MHz _ H _ UL CDMA, Prior to AGC



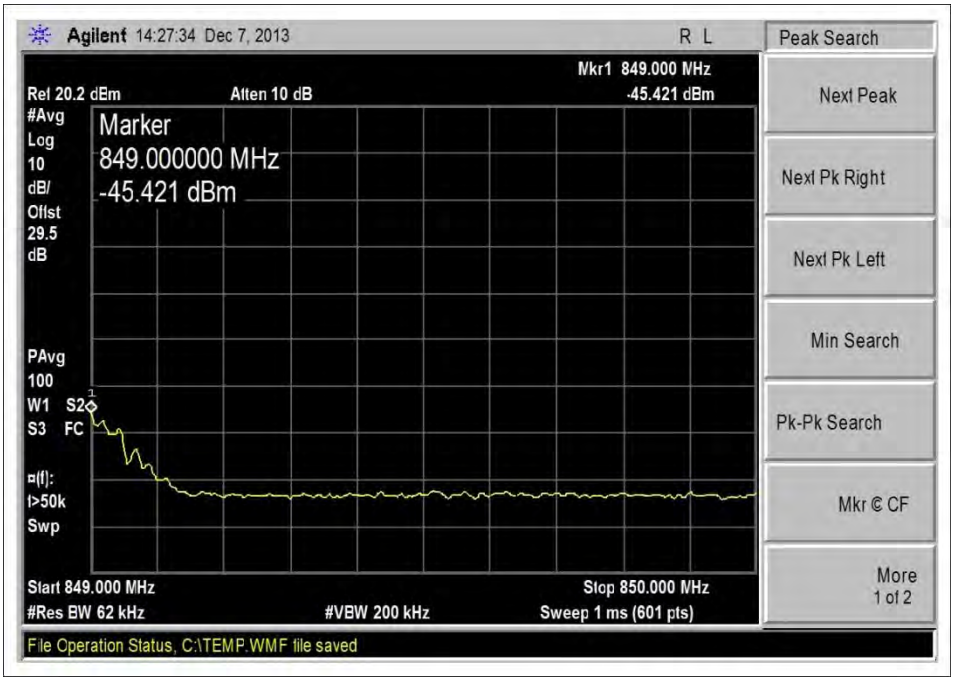
824 - 849MHz _ L _ LTE, +27dBm



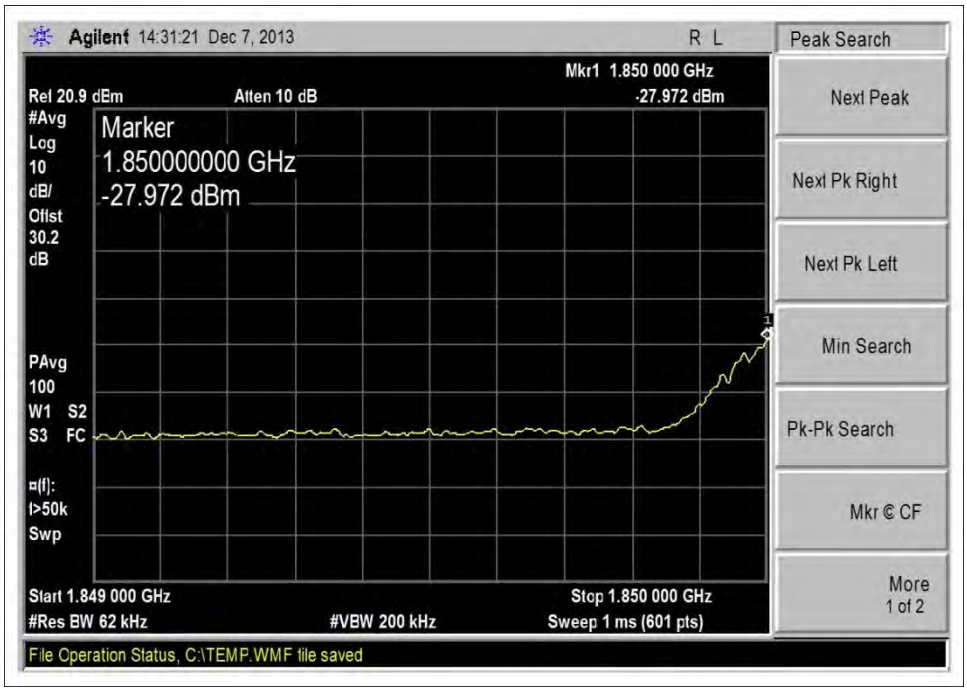
824 - 849MHz _ H _ LTE, +27dBm



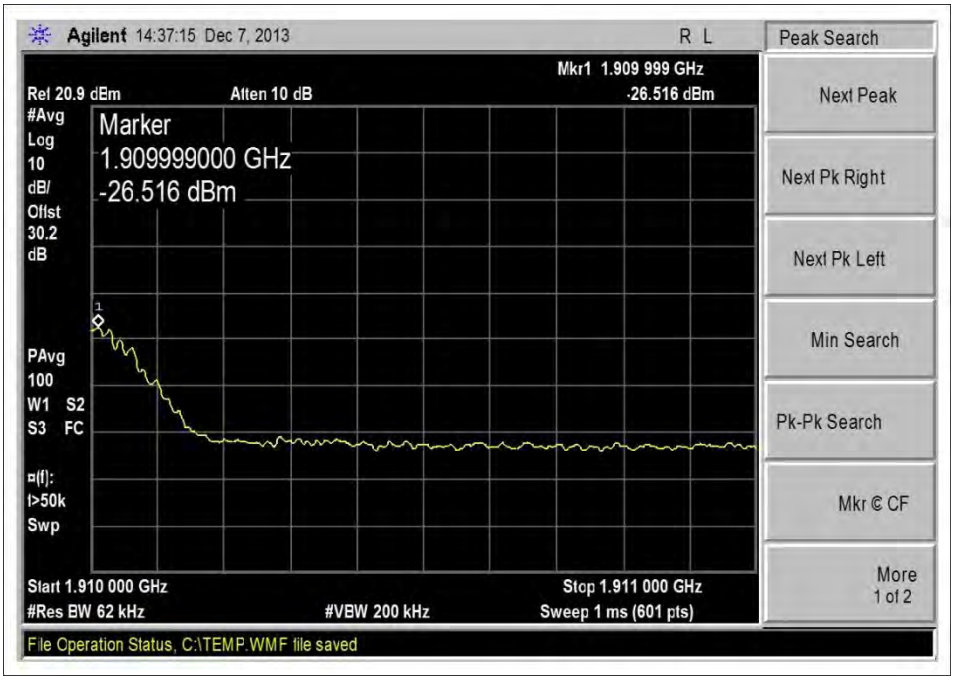
824 - 849MHz _ L _ LTE, Prior to AGC



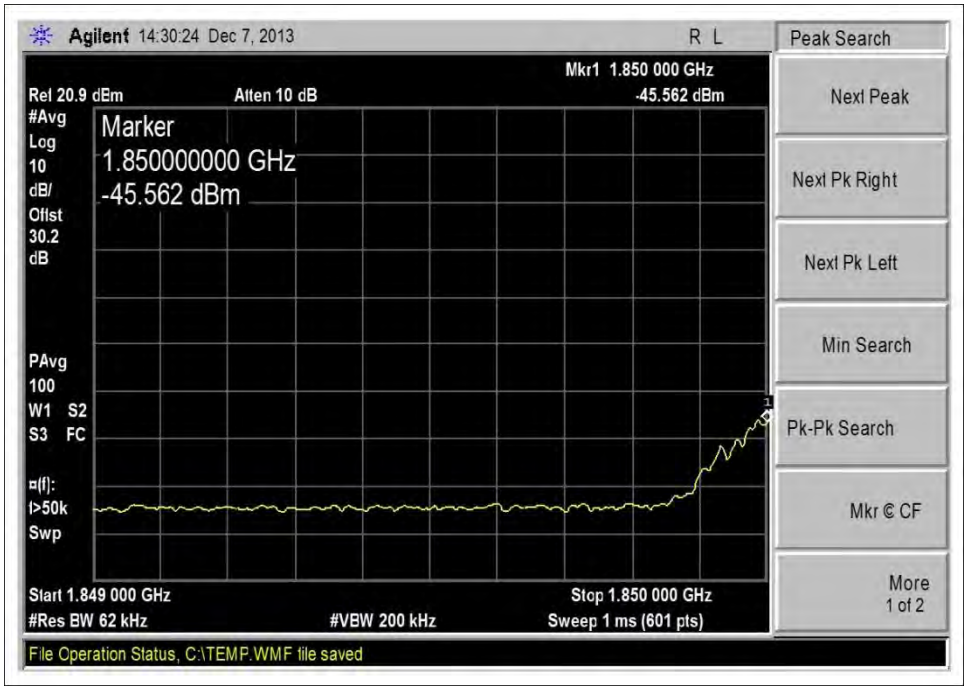
824 - 849MHz _ H _ LTE, Prior to AGC



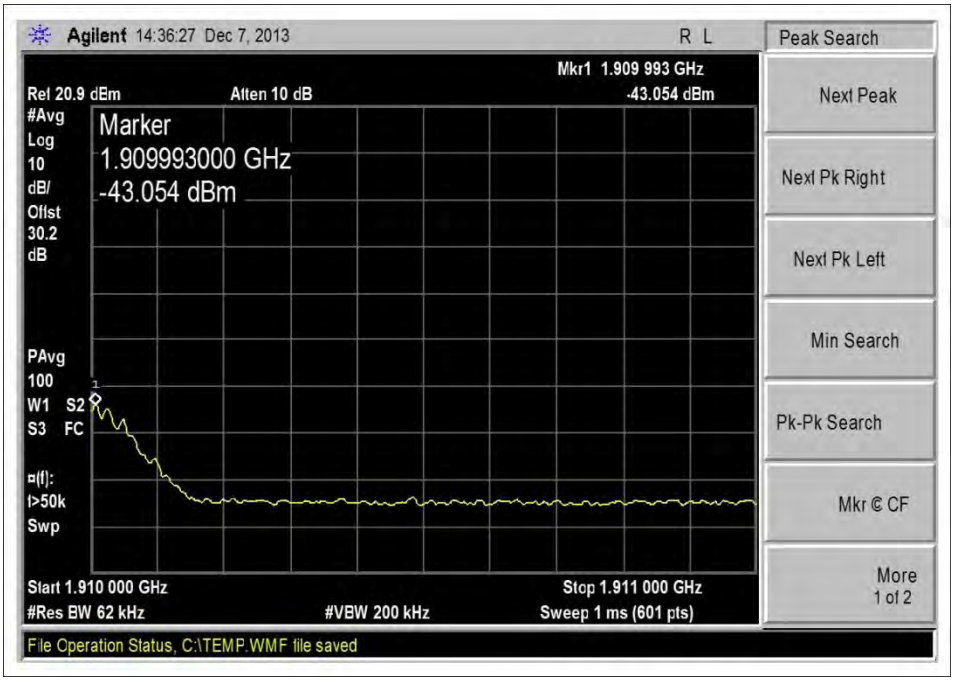
1850 - 1910MHz _ L _ LTE, +27dBm



1850 - 1910MHz _ H _ LTE, +27dBm



1850 - 1910MHz _ L _ LTE, Prior to AGC



1850 - 1910MHz _ H _ LTE, Prior to AGC

Test Setup Photos

FCC 20.21(e)(8)(i)(F) Intermodulation Limits

Test Conditions / Setup

Test Location: CKC Laboratories • 110 Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **Clear RF, LLC**
Specification: **20.21(e)(8)(i)(F) Intermodulation Limit.**
Work Order #: **94772** Date: 10/4/2013
Test Type: **Conducted Emissions** Time: 14:40:48
Equipment: **ClearRF 15dB Dual-Band Direct Connect Cellular Amplifier** Sequence#: 1
Manufacturer: Clear RF, LLC Tested By: E. Wong
Model: WRE2710 110V 60Hz
S/N: 001

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03430	Attenuator	75A-10-12	9/5/2013	9/5/2015
T3	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
ClearRF 15dB Dual-Band Direct Connect Cellular Amplifier*	Clear RF, LLC	WRE2710	001

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	DPX	GFP101U-1210	NA
HF Pre Amplifier	HP	830174A	3123A00281
Solid State Amplifier	Cromlech	AR178238-30	N1Q4800-1013
ESG Vector Signal Generator	Agilent	E4438C	MY42082260
ESG Vector Signal Generator	Agilent	E4433B	US40052164

Test Conditions / Notes:

The EUT is placed on the test bench. The Donor port of the Machine to Machine booster is intended to be connected to an antenna and the server port is intended to be connected directly to the antenna port of a cellular modem or cellular handset.

CMRS band.
UL: 824-849MHz, 1850-1915MHz
DL: 869-894MHz, 1930-1995MHz

Evaluation performed at the both Donor and Server antenna port.

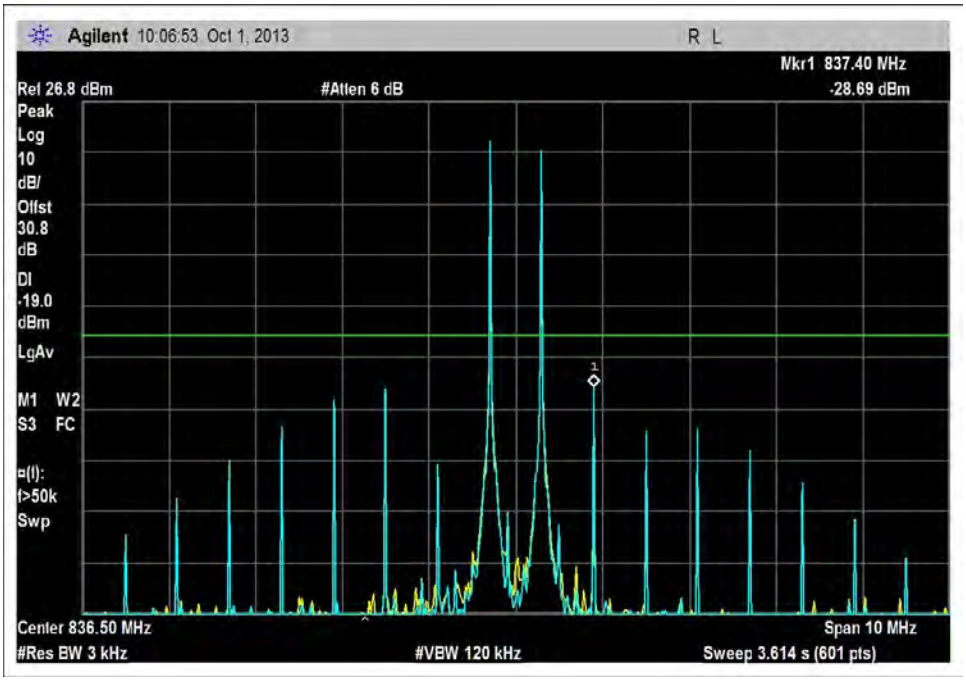
The booster operates in the following frequency band.
UL: 824-849, 1850-1910 MHz
DL: 869-894, 1930-1990 MHz

Evaluation performed in accordance with 7.4 of the FCC Document 935210 DO3 Wideband Consumer Signal Booster Measurement Guidance DR04-41516

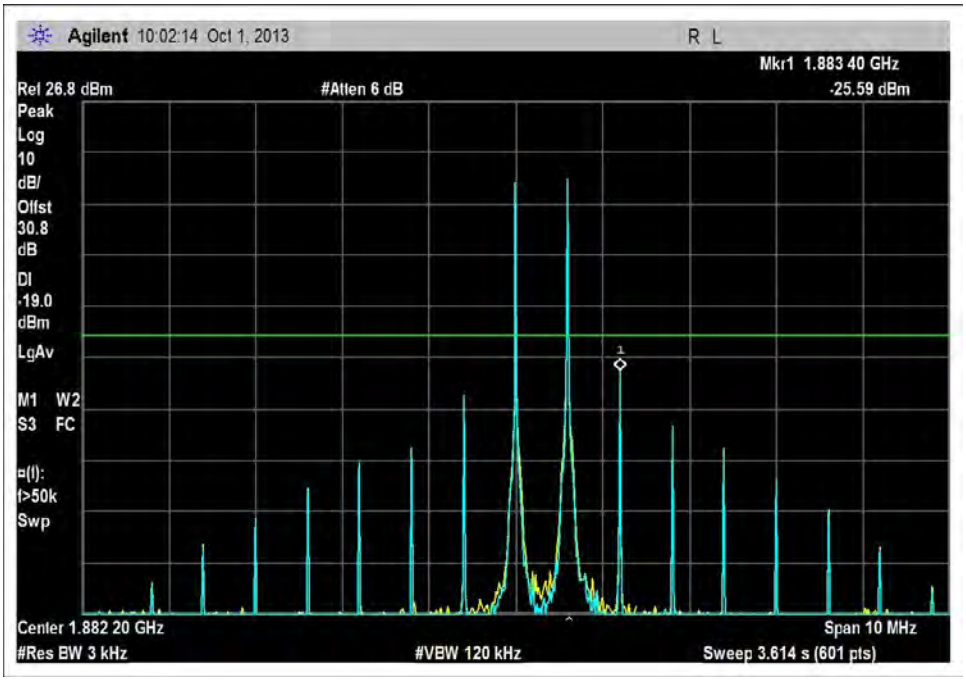
UL measurement , Firmware version : Original
DL measurement , Firmware version : Original

TX freq and RF input power at the Donor and Server port.
Test environment conditions: 24°C, 30% Relative Humidity:100kPa

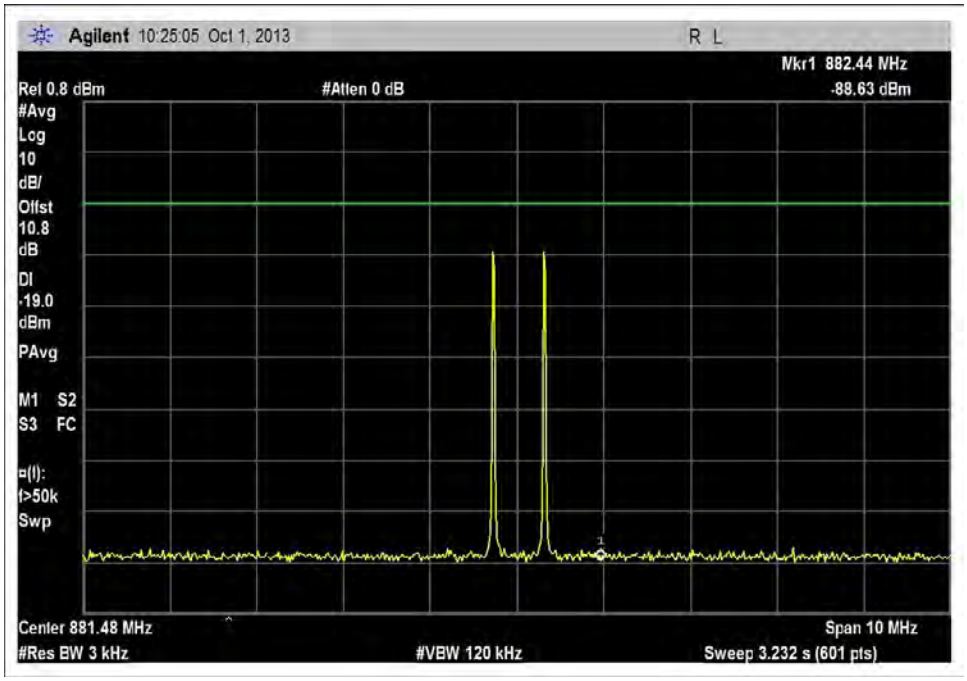
Test Plots



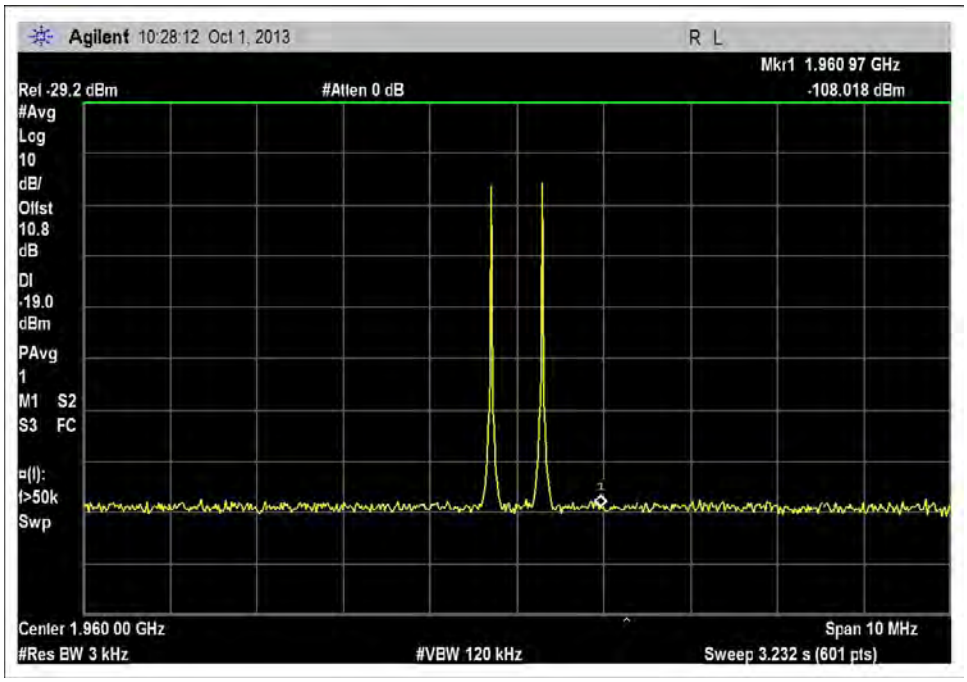
824 - 849MHz, UL



1850 - 1910MHz, UL

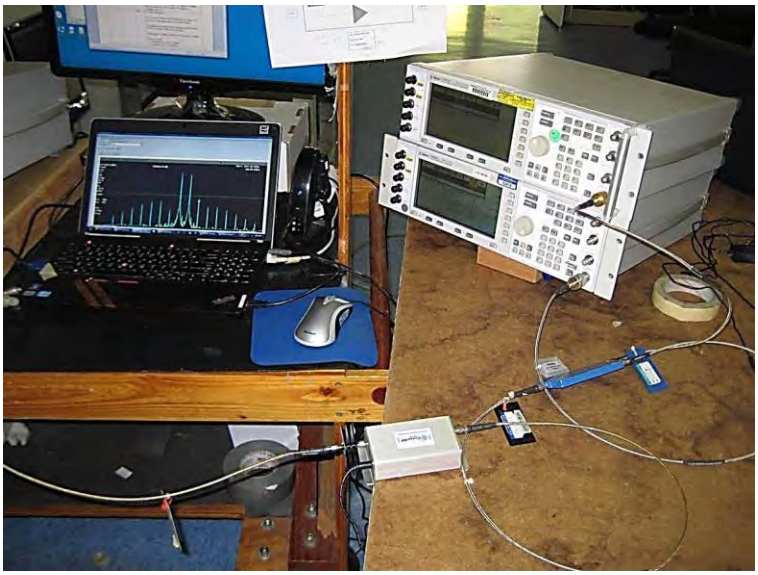


869 - 894MHz, DL



1930 - 1990MHz, DL

Test Setup Photos



FCC 20.21(e)(8)(i)(I) Uplink Inactivity

Test Conditions / Setup

Test Location: CKC Laboratories • 110 Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **Clear RF, LLC**
Specification: **20.21(e)(8)(i)(I) Uplink Inactivity**

Work Order #: **94772** Date: 10/4/2013
Test Type: **Conducted Emissions** Time: 14:40:48
Equipment: **ClearRF 15dB Dual-Band Direct Connect Cellular Amplifier** Sequence#: 1
Manufacturer: Clear RF, LLC Tested By: E. Wong
Model: WRE2710 110V 60Hz
S/N: 001

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03430	Attenuator	75A-10-12	9/5/2013	9/5/2015
T3	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
ClearRF 15dB Dual-Band Direct Connect Cellular Amplifier*	Clear RF, LLC	WRE2710	001

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	DPX	GFP101U-1210	NA
HF Pre Amplifier	HP	830174A	3123A00281
Solid State Amplifier	Comtech	AR178238-30	N1Q4800-1013
ESG Vector Signal Generator	Agilent	E4433B	US40052164

Test Conditions / Notes:

The EUT is placed on the test bench. The Donor port of the Machine to Machine booster is intended to be connected to an antenna and the server port is intended to be connected directly to the antenna port of a cellular modem or cellular handset.

CMRS band.
UL: 824-849MHz, 1850-1915MHz
DL: 869-894MHz, 1930-1995MHz

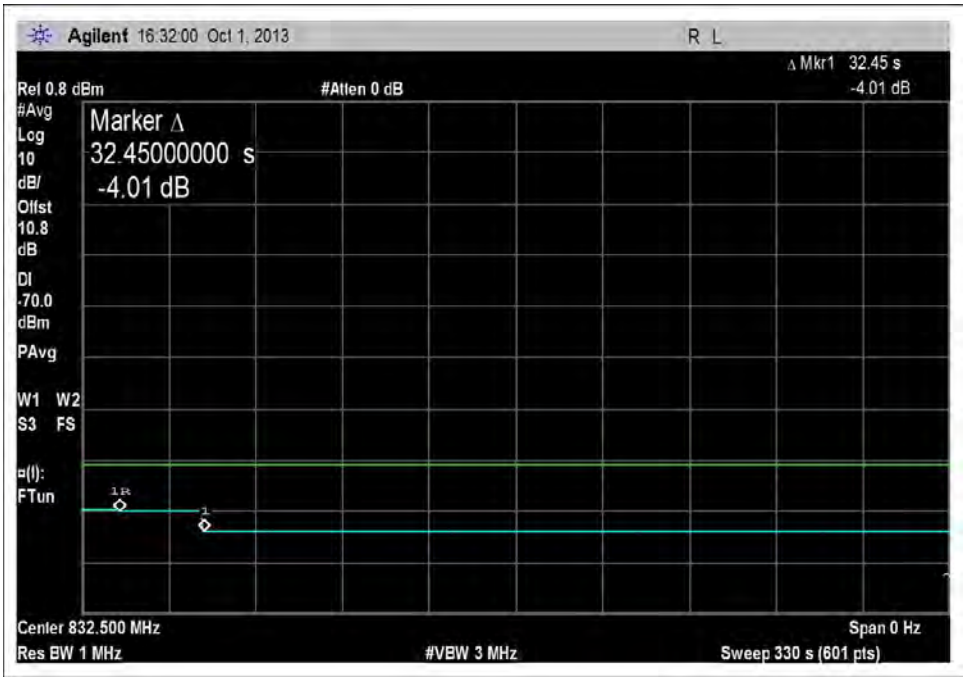
Evaluation performed at the both Donor and Server antenna port.

The booster operates in the following frequency band.
UL: 824-849, 1850-1910 MHz
DL: 869-894, 1930-1990 MHz

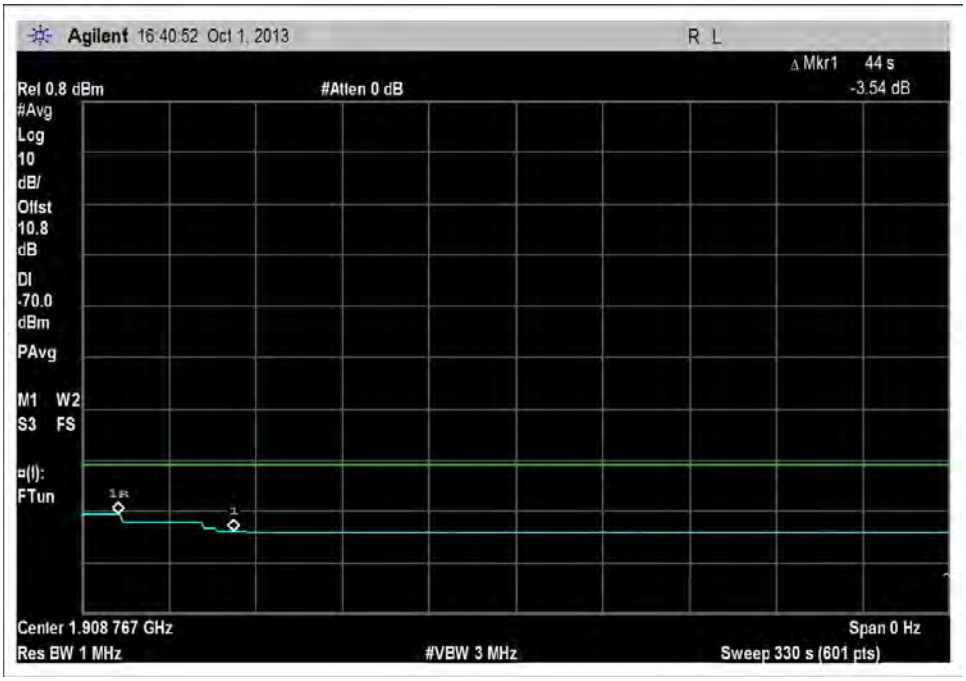
Evaluation performed in accordance with7.8 of the FCC Document 935210 DO3 Wideband Consumer Signal Booster Measurement Guidance DR04-41516.
UL measurement , Firmware version : Original

Test environment conditions: 24°C, 30% Relative Humidity:100kPa

Test Data



824 - 849MHz, UL



1850 - 1910MHz, UL

Test Setup Photos

Test Setup, 50ohm

FCC 20.21(e)(8)(ii)(A) Anti Oscillation

Test Conditions / Setup

Test Location: CKC Laboratories • 110 Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **Clear RF, LLC**
Specification: **20.21(e)(i)(I)(ii)(A) Anti Oscillation.**
Work Order #: **94772** Date: 10/4/2013
Test Type: **Conducted Emissions** Time: 14:40:48
Equipment: **ClearRF 15dB Dual-Band Direct Connect Cellular Amplifier** Sequence#: 1
Manufacturer: Clear RF, LLC Tested By: E. Wong
Model: WRE2710 110V 60Hz
S/N: 001

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03430	Attenuator	75A-10-12	9/5/2013	9/5/2015
T3	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
ClearRF 15dB Dual-Band Direct Connect Cellular Amplifier*	Clear RF, LLC	WRE2710	001

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	DPX	GFP101U-1210	NA
HF Pre Amplifier	HP	830174A	3123A00281
Solid State Amplifier	Comtech	AR178238-30	N1Q4800-1013
ESG Vector Signal Generator	Agilent	E4433B	US40052164

Test Conditions / Notes:

The EUT is placed on the test bench. The Donor port of the Machine to Machine booster is intended to be connected to an antenna and the server port is intended to be connected directly to the antenna port of a cellular modem or cellular handset.

CMRS band.
UL: 824-849MHz, 1850-1915MHz
DL: 869-894MHz, 1930-1995MHz

Evaluation performed at the both Donor and Server antenna port.

The booster operates in the following frequency band.
UL: 824-849, 1850-1910 MHz
DL: 869-894, 1930-1990 MHz

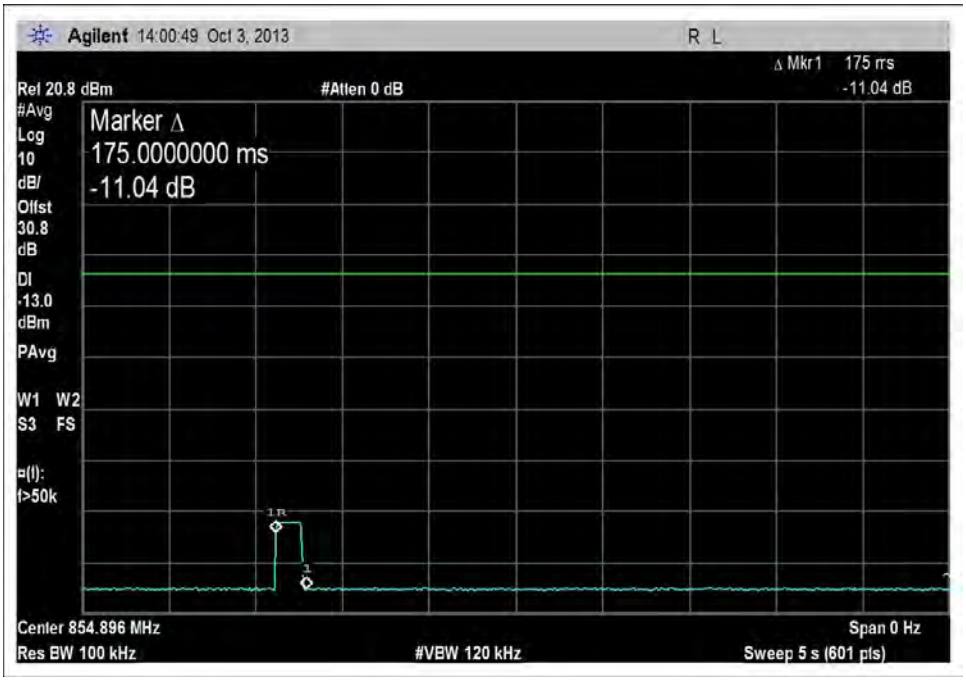
Evaluation performed in accordance wtih 7.11 of the FCC Document 935210 DO3 Wideband Consumer Signal Booster Measurement Guidance DR04-41516. Actual test performed and presented data slightly deviates from the test procedure and expectation due to the nature of proprietary Anti Oscillation technique implemented.

UL measurement , Firmware version : 1.0.16
DL measurement , Firmware version : 1.0.16

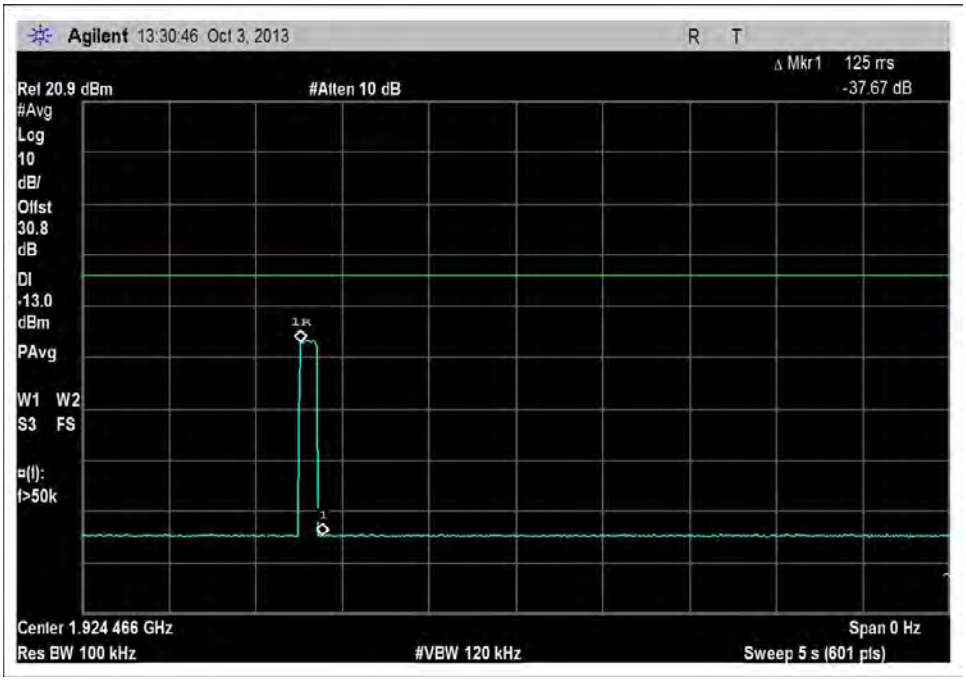
Test environment conditions: 24°C, 30% Relative Humidity:100kPa

Two plots were captured for show compliance in each Operational band. The first plot capture the time from detection to shut down. The second plot captures the time interval before restarts. The product is design to enter permanent fault state required user intervention for restarts.

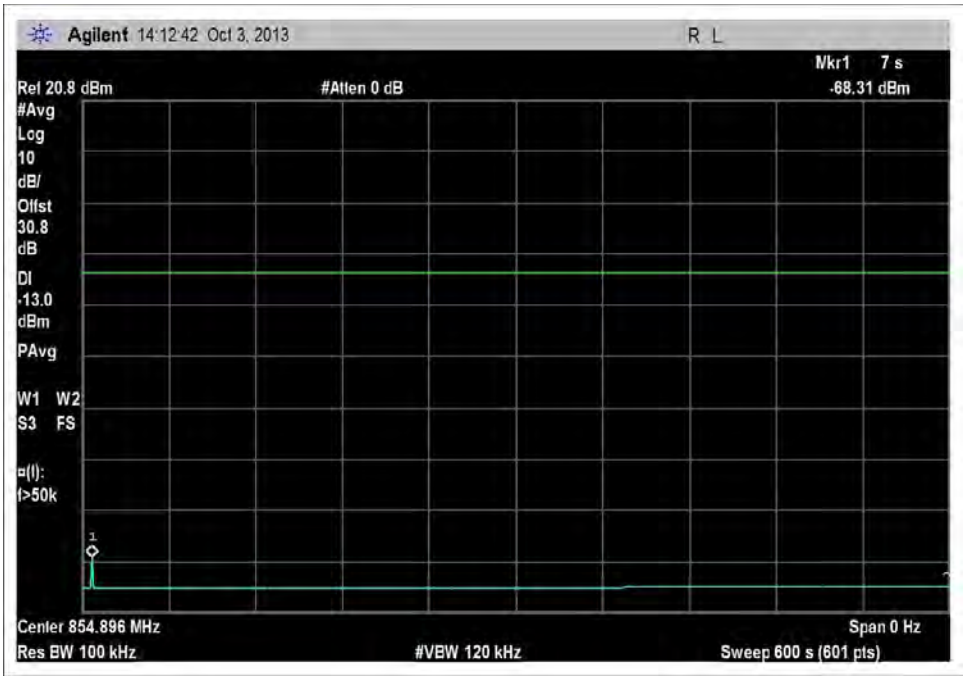
Test Data



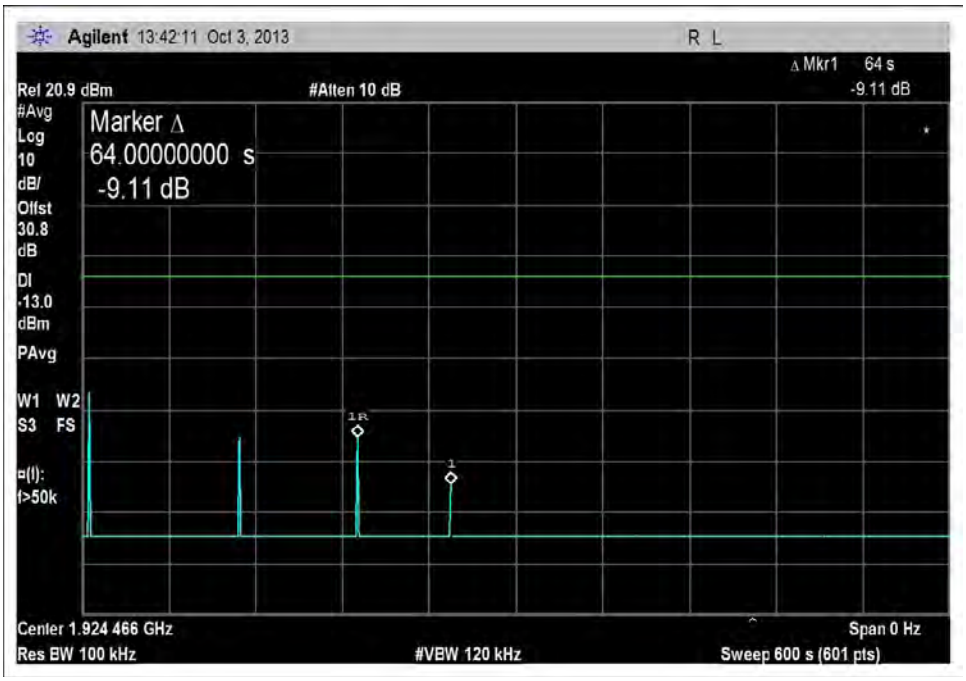
824 - 849MHz, UL



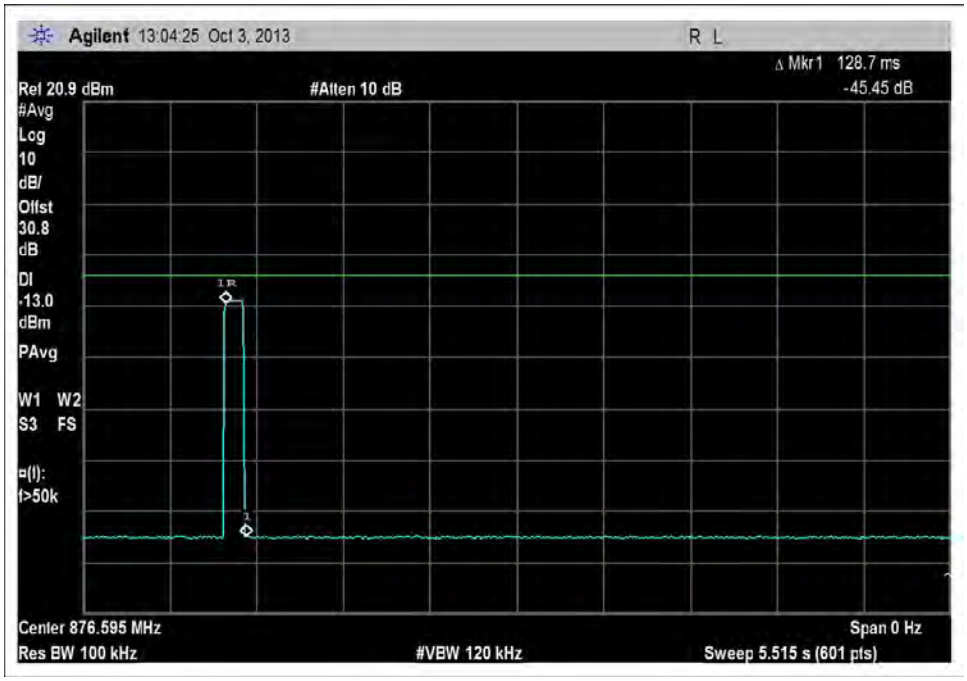
1850 - 1910MHz, UL



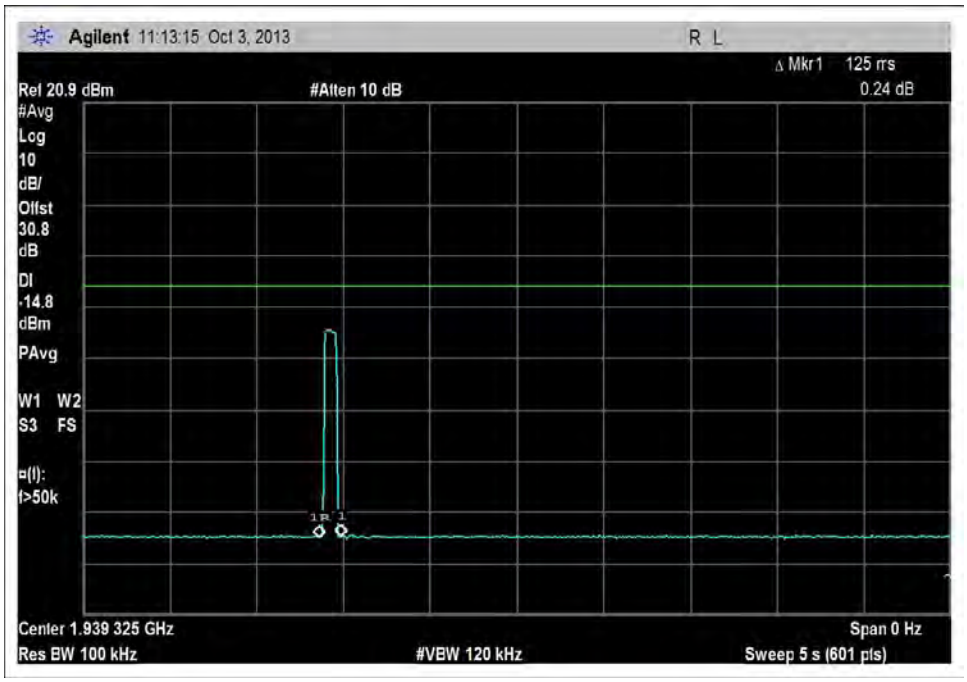
824 - 849MHz, UL - Reset Time



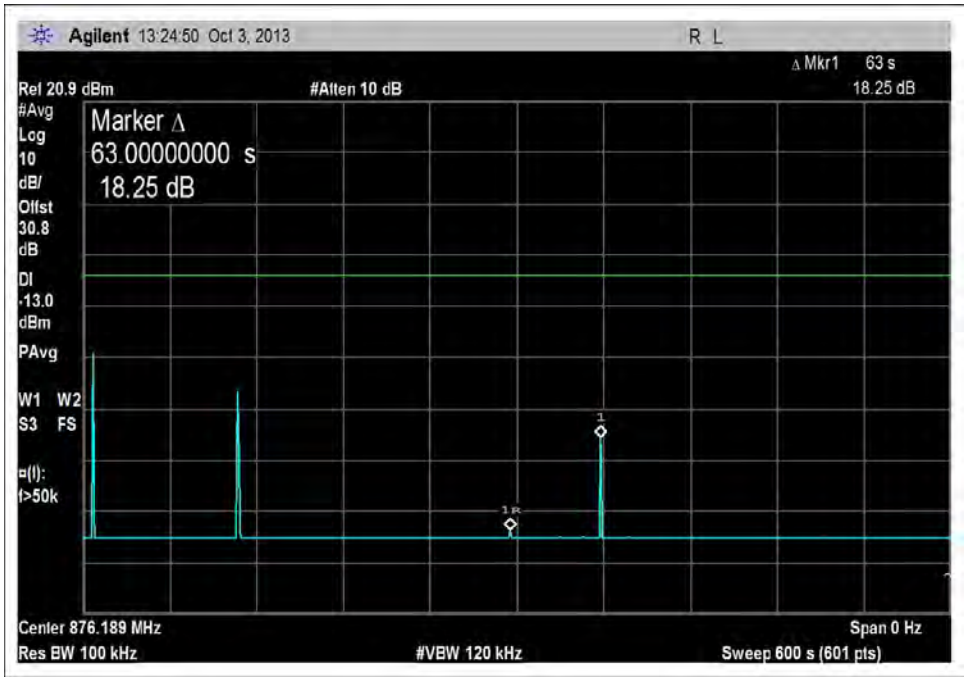
1850 - 1910MHz, UL - Reset Time



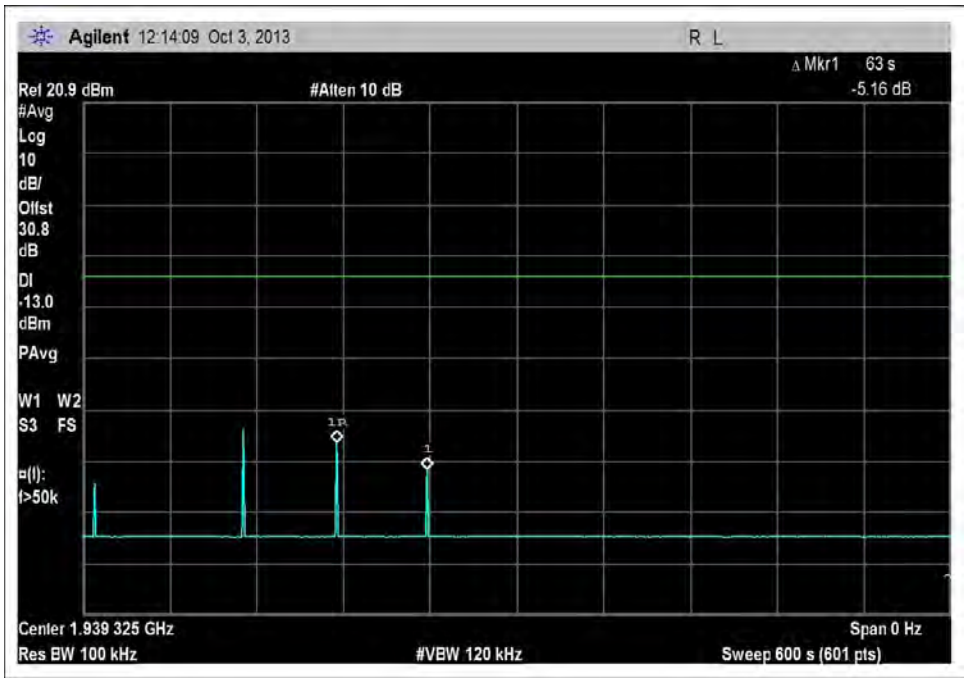
869 - 894MHz, DL



1930 - 1990MHz, DL



869 - 894MHz, DL - Reset Time



1930 - 1990MHz, DL - Rest Time

Test Setup Photos