Cellphone-Mate, Inc.

TEST REPORT FOR

Consumer Booster with WiFi
Model: Force 7

Tested to The Following Standard:

FCC Part 20.21

Report No.: 98759-17

Date of issue: January 17, 2017

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

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:

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REPORT PREPARED BY:

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CKC Laboratories, Inc.
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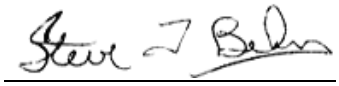
Project Number: 98759

DATE OF EQUIPMENT RECEIPT: November 11, 2016
DATE(S) OF TESTING: November 11, 2016 – December 22, 2016

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.
1120 Fulton Place
Fremont, CA 94539

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.02
EMITest Immunity	5.03.02

Site Registration & Accreditation Information

SITE FILE REGISTRATION NUMBERS

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Fremont, CA	US0082	SL2-IN-E-1148R	3082B-1	US1023	A-0149

SUMMARY OF RESULTS

Standard / Specification: FCC Part 20.21

KDB 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04, Feb 12, 2016		FCC Part Section Correlation		Mods	Results
Guidance Sec #	**Guidance Description**	**FCC Sec #**	**FCC Rule Description**		
7.1 a) - k)	Authorized Frequency Band Verification Test	20.21(e)(3)	Frequency Bands	NA	Pass
7.2.2 a) - k)	Maximum Power Measurement Procedure	2.1046/20.21(e)(8)(i)(D)	Power Limit	NA	Pass
7.3 a) - d)	Maximum Booster Gain Computation	20.21(e)(8)(i)(B)	Bidirectional Capabilities	NA	Pass
7.4 a) - n)	Intermodulation Product	20.21(e)(8)(i)(F)	Intermodulation Limit	NA	Pass
7.5 a) - n)	Out of Band Emissions	20.21(e)(8)(i)(E)	Out of Band Emission	NA	Pass
7.6 a) - e)	Conducted Spurious Emission	2.1051/22/24/27	Spurious emission	NA	Pass
7.7.1 a) - g) 7.7.1 h) - n) 7.7.2 a) - g)	Noise Limit Procedure Variable Noise Variable Noise Timing	20.21(e)(8)(i)(A)(2)(i) 20.21(e)(8)(i)(A)(1) 20.21(e)(8)(i)(H)	Noise Limits Transmit Power Off Mode	NA	Pass
7.8 a) - l)	Uplink inactivity	20.21(e)(8)(i)(I)	Uplink Inactivity	NA	Pass

NA = Not Applicable

Standard / Specification: FCC Part 20.21 - continued

KDB 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04, Feb 12, 2016		FCC Part Section Correlation		Mods	Results
Guidance Sec #	**Guidance Description**	**FCC Sec #**	**FCC Rule Description**		
7.9.1 a) - l) 7.9.2 a) - f)	Variable Booster Gain Variable Uplink Gain Timing	20.21(e)(8)(i)(C) (1), (2)(i) 20.21(e)(8)(i)(H)	Booster Gain Transmit Power Off Mode	NA	Pass
7.10.a) - j)	Occupied Band Width	2.1049/22/24/27	Occupied Band Width	NA	Pass
7.11.2 a) - r) 7.11.3 a) - h) 7.11.4 a) - h) (alternate to 7.11.3)	Anti-Oscillation	20.21(e)(8)(ii)(A)	Anti-Oscillation	NA	Pass
7.12a) - f)	Radiated Spurious Emission	2.1053/ 22/24/27	Spurious Emission	NA	Pass
7.13 a) - c)	Spectrum Block Filter[2]	NA	NA	NA	NA1

NA = Not Applicable
NA1 = Not applicable because the EUT does not employ spectrum block filtering.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

During testing numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 6

Equipment Tested:

Device	Manufacturer	Model #	S/N
Consumer Booster with WiFi	Cellphone-Mate, Inc.	Force 7	01
AC/DC Power Adapter	Cellphone-Mate, Inc.	HKA09019047-6D	Y90D861581000092
HDTV Antenna	Cellphone mate DBA Surecall	SC305H	None

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Sony	PCG-6C2L	CXSM507BRD01-D480
AC/DC Adapter	Sony	PCGA-AC16V	1477749530023127

Configuration 7

Equipment Tested:

Device	Manufacturer	Model #	S/N
Consumer Booster with WiFi	Cellphone-Mate, Inc.	Force 7	01
AC/DC Power Adapter	Cellphone-Mate, Inc.	ATS090-P190	None
HDTV Antenna	Cellphone mate DBA Surecall	SC305H	None

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Sony	PCG-6C2L	CXSM507BRD01-D480
AC/DC Adapter	Sony	PCGA-AC16V	1477749530023127

FCC PART 20.21

7.1 Authorized Frequency Band Verification

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**7.1 Authorized Frequency Band Verification**		
Work Order #:	**98759**	Date:	11/11/2016
Test Type:	**Conducted Emissions**	Time:	10:44:49 AM
Tested By:	**Daniel Bertran**	Sequence#:	1
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 6			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 6			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed CMRS Wideband Consumer Booster with a Wi-Fi Router and TV amplifier installed. The CMRS DL signal and the Wi-Fi Signal are combined at the diplexer and transmit via the indoor antenna.
The Consumer booster UL and DL power and gain parameters are initially measured with Wi-Fi transmitting at mid channel using sequentially 802.11b, g, n20 and n40 signal. Since no significant change in measured power was observed, all other parameters are obtained with Wi-Fi transmitting at Mid channel, 802.11b.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is type RP-TNC connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.1 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016
Firmware: V2.2
Test environment conditions: Temperature: 23°C, 40% Relative Humidity and Pressure: 101.4 kPa

Test Equipment:

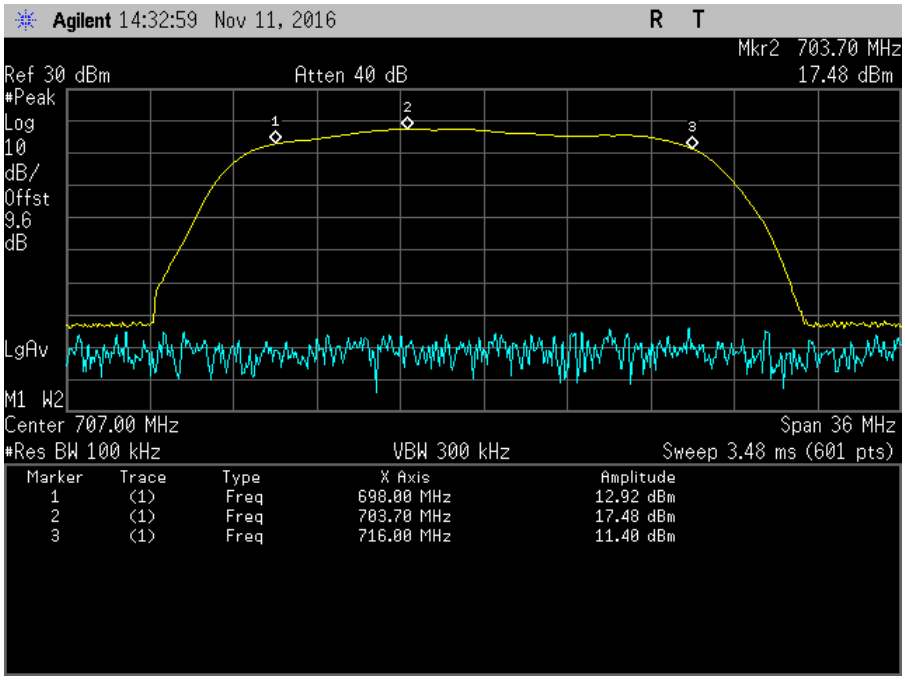
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03418	Signal Generator	E4438C	7/30/2015	7/30/2017
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017
	ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP06898	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP05411	Attenuator	54A-10	1/18/2016	1/18/2018
	AN02660	Spectrum Analyzer	E4446A	5/31/2016	5/31/2018

Summary of Results

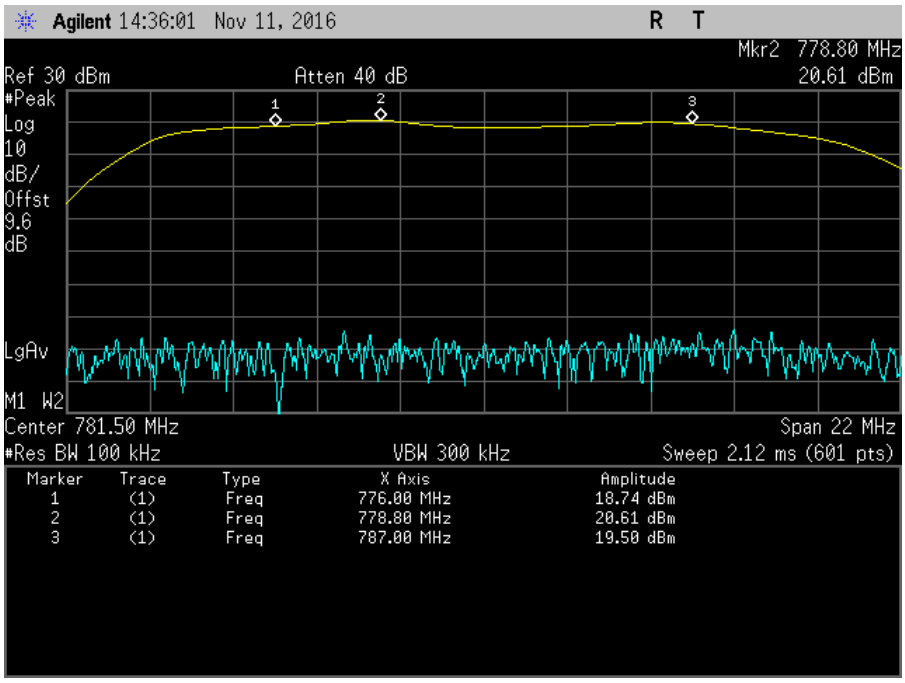
Pass: The plots below show the device only operates on the CMRS frequency bands authorized for use by the NPS.

Plots

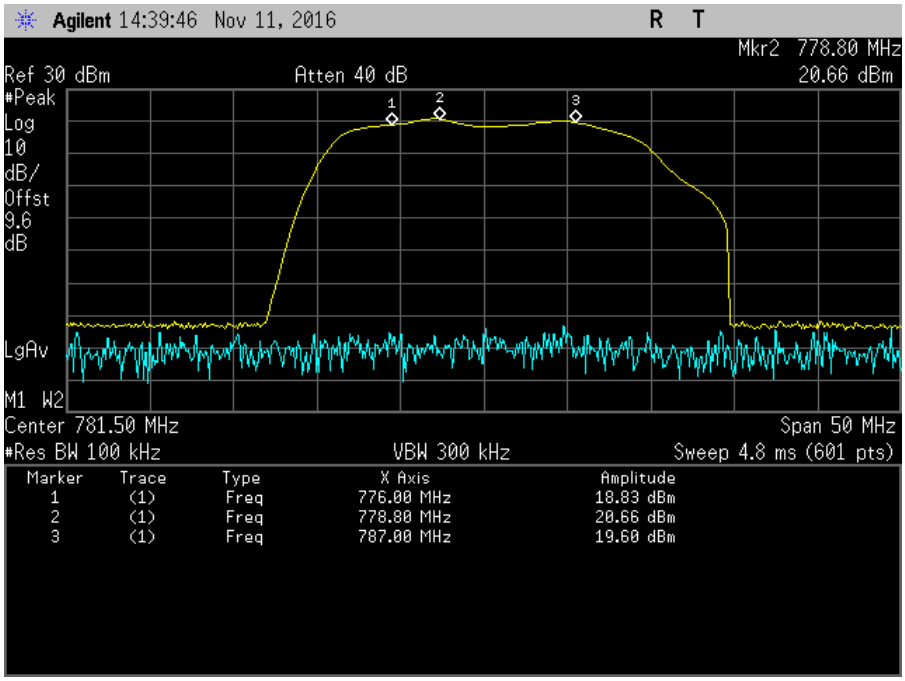
UL



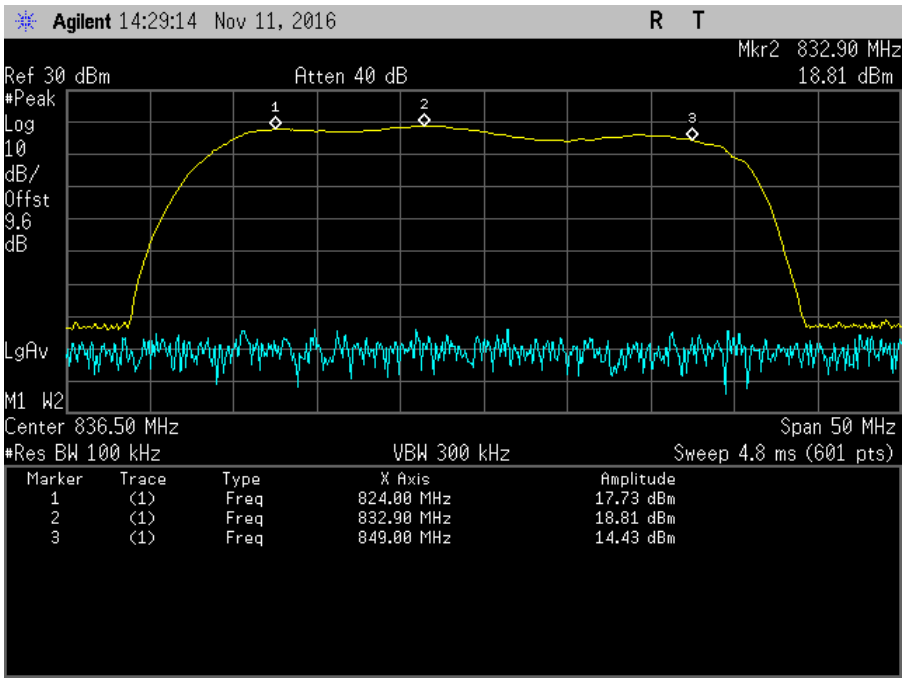
7.1_Band Verify_UL_698-716MHz



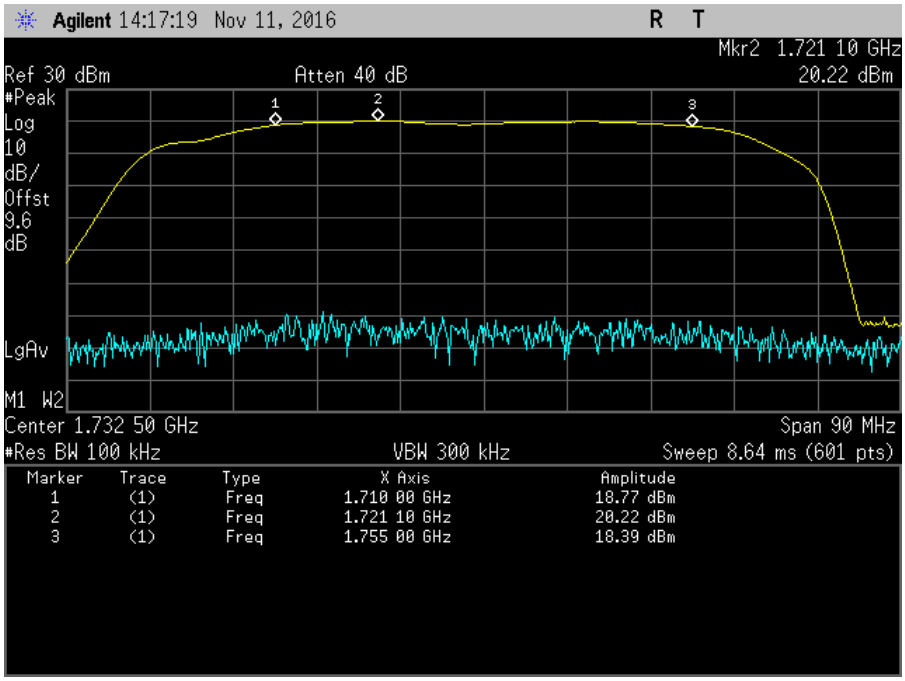
7.1_Band Verify_UL_776-787MHz



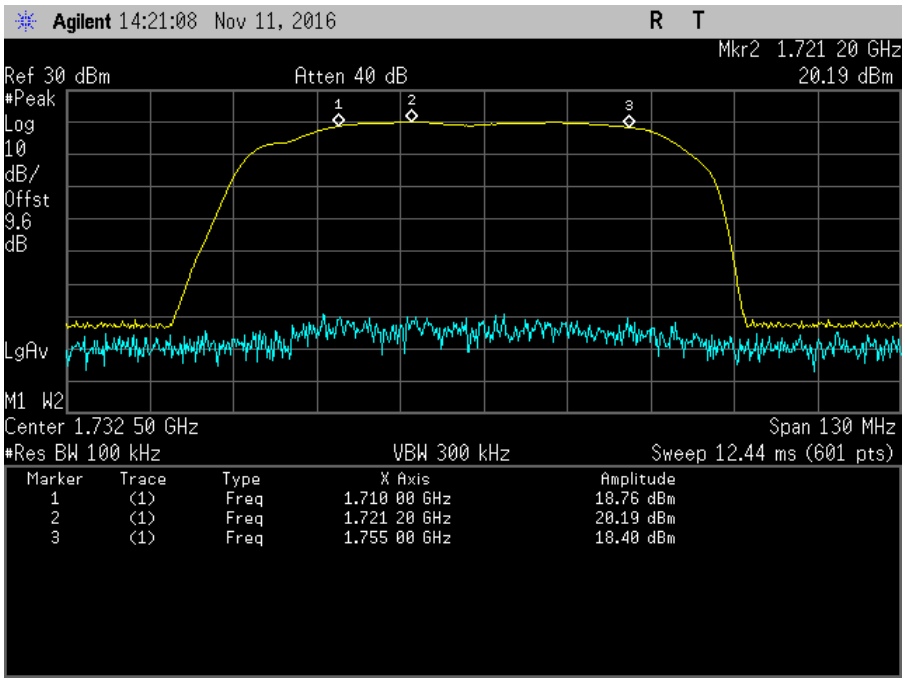
7.1_Band Verify_UL_776-787MHz_Zoom



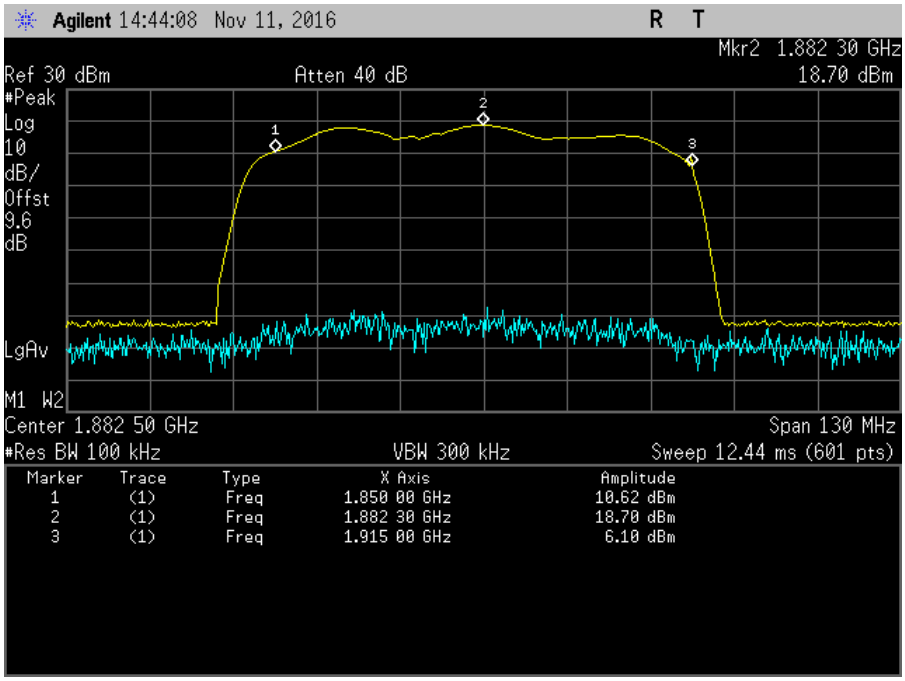
7.1_Band Verify_UL_824-849MHz



7.1_Band Verify_UL_1710-1755MHz

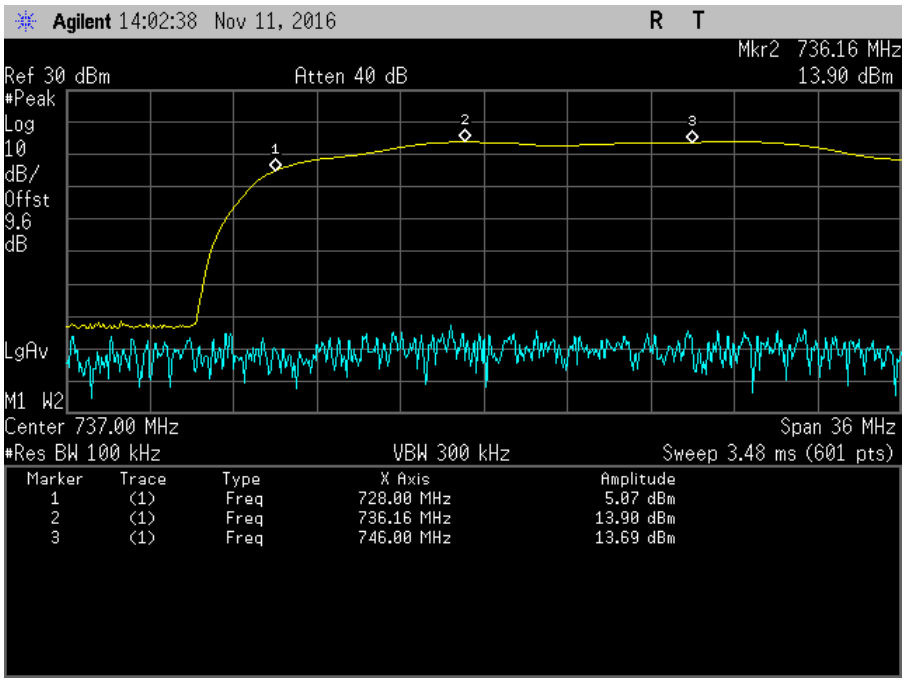


7.1_Band Verify_UL_1710-1755MHz_Zoom

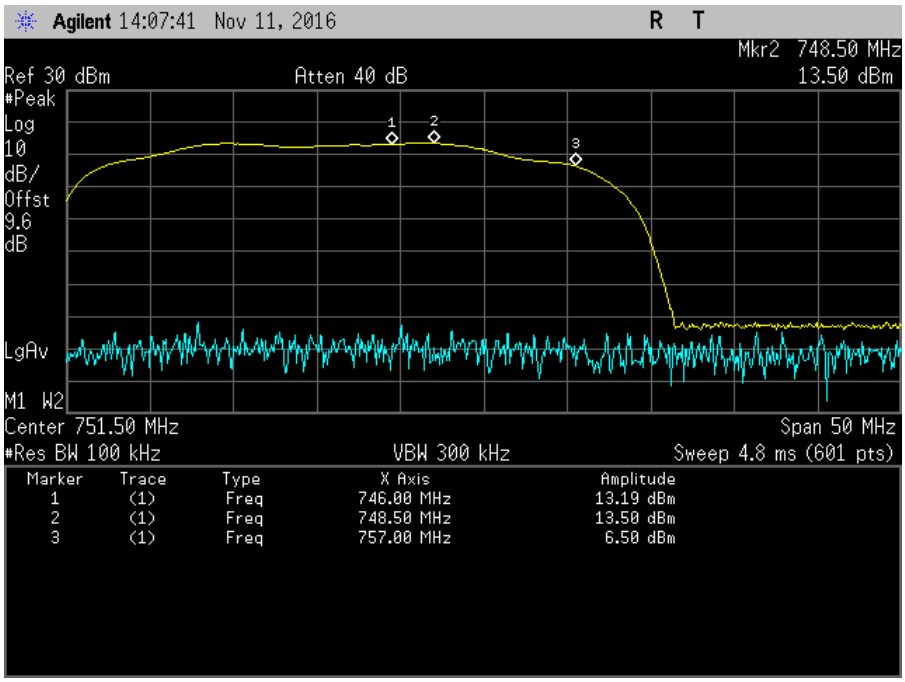


7.1_Band Verify_UL_1850-1915MHz

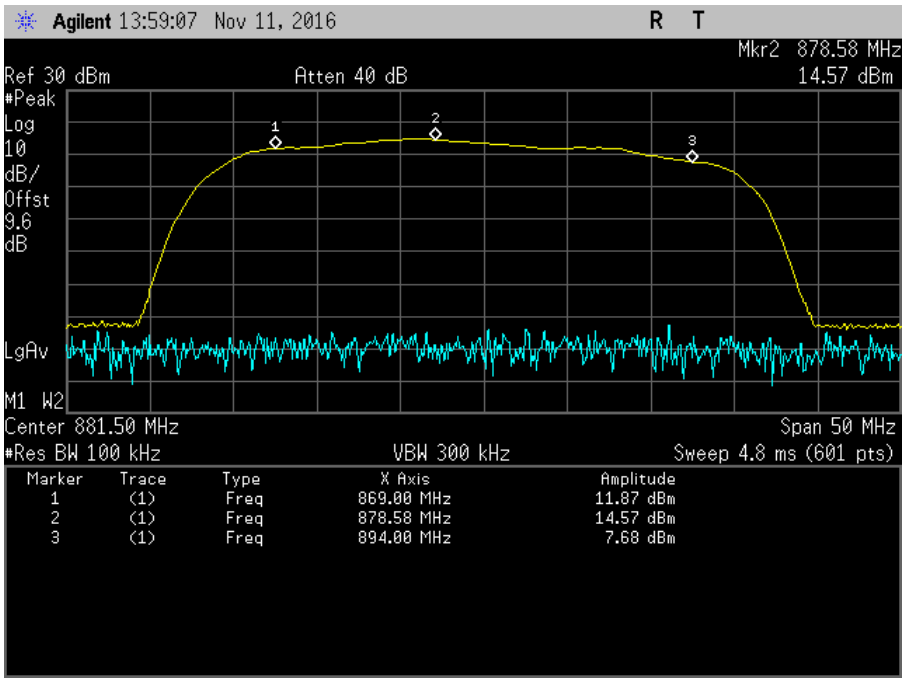
DL



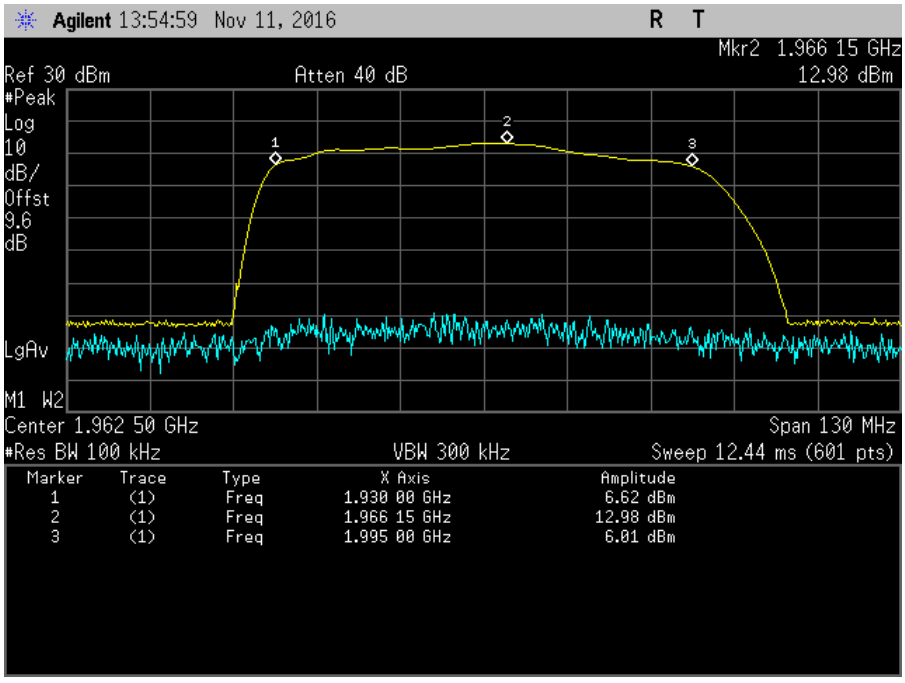
7.1_Band Verify_DL_728-746MHz



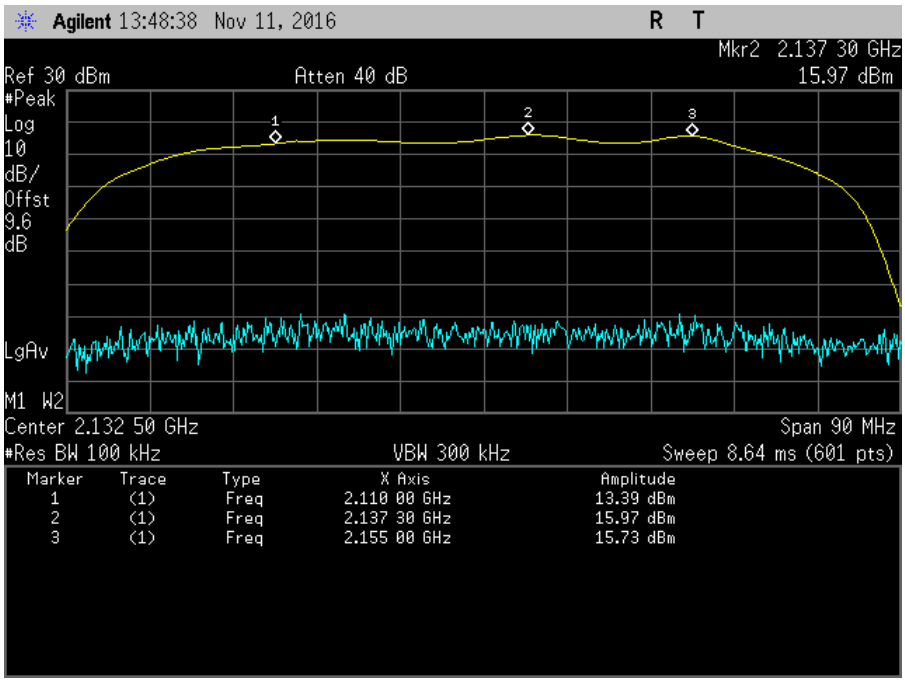
7.1_Band Verify_DL_746-757MHz



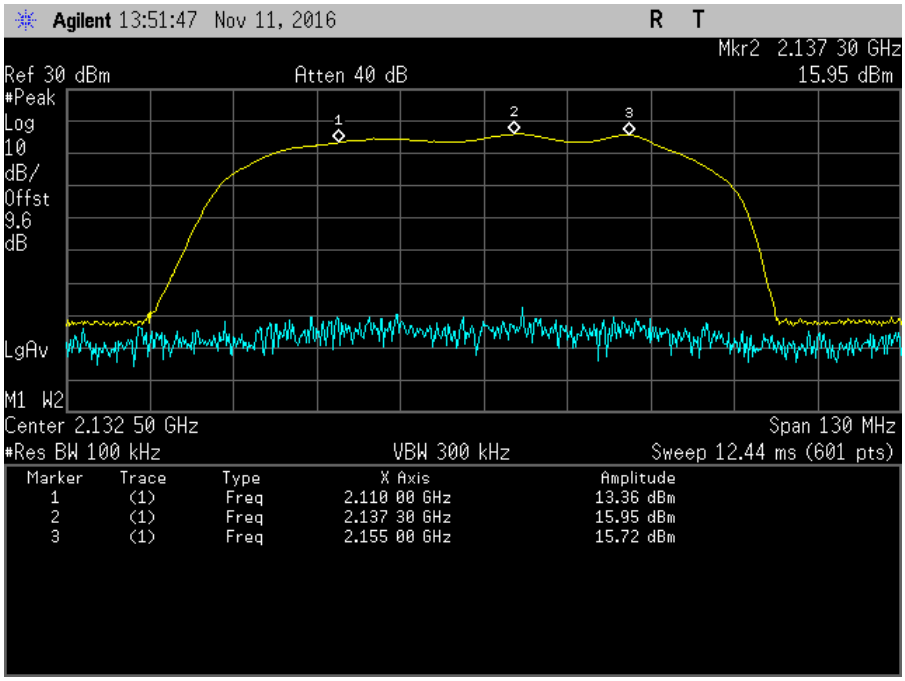
7.1_Band Verify_DL_869-894MHz



7.1_Band Verify_DL_1930-1995MHz



7.1_Band Verify_DL_2110-2155MHz



7.1_Band Verify_DL_2110-2155MHz_Zoom

7.2 Maximum Power

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**7.2 Maximum Power Measurement**		
	7.3 Maximum Booster Gain		
Work Order #:	**98759**	Date:	11/11/2016
Test Type:	**Conducted Emissions**	Time:	11:50:50 AM
Tested By:	**Daniel Bertran**	Sequence#:	1
Software:	EMITest 5.03.03		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 6			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 6			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed CMRS Wideband Consumer Booster with a Wi-Fi Router and TV amplifier installed. The CMRS DL signal and the Wi-Fi Signal are combined at the diplexer and transmit via the indoor antenna.
The Consumer booster UL and DL power and gain parameters are initially measured with Wi-Fi transmitting at mid channel using sequentially 802.11b, g, n20 and n40 signal. Since no significant change in measured power was observed, all other parameters are obtained with Wi-Fi transmitting at Mid channel, 802.11b.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is type RP-TNC connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.

Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.2 and 7.3 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016
Firmware: V2.2
Test environment conditions: Temperature: 23.1°C, 42% Relative Humidity and Pressure: 101.2 kPa

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03418	Signal Generator	E4438C	7/30/2015	7/30/2017
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017
	ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP06898	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP05411	Attenuator	54A-10	1/18/2016	1/18/2018
	AN02660	Spectrum Analyzer	E4446A	5/31/2016	5/31/2018

Summary of Results

Pass: as summarized in table below, measured EIRP, Gain and UL/DL gain ratio are within limits.

	Pre AGC			Pre AGC		
	Pulse GSM			4.1 MHz AWGN		
Frequency (MHz)	Input (dBm)	Output (dBm)	*Gain (dB)	Input (dBm)	Output (dBm)	*Gain (dB)
UL1710-1755	-46.5	21.5	68.0	-47.0	20.9	67.9
UL1850-1915	-46.7	20.4	67.1	-46.9	20.8	67.7
UL824-894	-44.0	19.7	63.7	-43.4	20.2	63.6
UL 698-716	-40.9	20.7	61.6	-40.5	20.8	61.3
UL776-787	-41.9	20.8	62.7	-40.4	20.3	60.7
DL2110-2155	-50.8	16.9	67.7	-49.4	16.4	65.8
DL1930-1995	-50.9	16.8	67.7	-49.3	16.0	65.3
DL869-894	-45.6	16.8	62.4	-44.9	16.8	61.7
DL:728-746	-46.1	16.2	62.3	-45.3	16.6	61.9
DL 746-757	-45.1	16.3	61.4	-45.0	16.0	61.0

*Fixed Booster maximum gain shall not exceed 6.5 dB + 20 Log10 (Frequency), where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.

Pulse GSM					Conducted	Conducted and EIRP
Frequency (MHz)	Output Power (dBm)	Ant Gain (dBi)	Cable Loss (dB)	EIRP (dBm)	Limit Min (dBm)	Limit Max (dBm)
UL1710-1755	21.5	10	2.68	28.8	17	30
UL1850-1915	20.4	10	2.83	27.6	17	30
UL824-894	19.7	10	2.12	27.6	17	30
UL 698-716	20.7	10	2.05	28.7	17	30
UL776-787	20.8	10	2.05	28.8	17	30
DL2110-2155	16.9	6	6.54	16.4	NA	17
DL1930-1995	16.8	6	6.17	16.6	NA	17
DL869-894	16.8	3	4.41	15.4	NA	17
DL:728-746	16.2	3	4.22	15.0	NA	17
DL 746-757	16.3	3	4.22	15.0	NA	17

NA = Not Applicable

4.1MHz AWGN					Conducted	Conducted and EIRP
Frequency (MHz)	Output Power (dBm)	Ant Gain (dBi)	Cable Loss (dB)	EIRP (dBm)	Limit Min (dBm)	Limit Max (dBm)
UL1710-1755	20.9	10	2.68	28.2	17	30
UL1850-1915	20.8	10	2.83	28.0	17	30
UL824-894	20.2	10	2.12	28.0	17	30
UL 698-716	20.8	10	2.05	28.7	17	30
UL776-787	20.3	10	2.05	28.3	17	30
DL2110-2155	16.4	6	6.54	15.8	NA	17
DL1930-1995	16.0	6	6.17	15.8	NA	17
DL869-894	16.8	3	4.41	15.4	NA	17
DL:728-746	16.6	3	4.22	15.3	NA	17
DL 746-757	16.0	3	4.22	14.8	NA	17

NA = Not Applicable

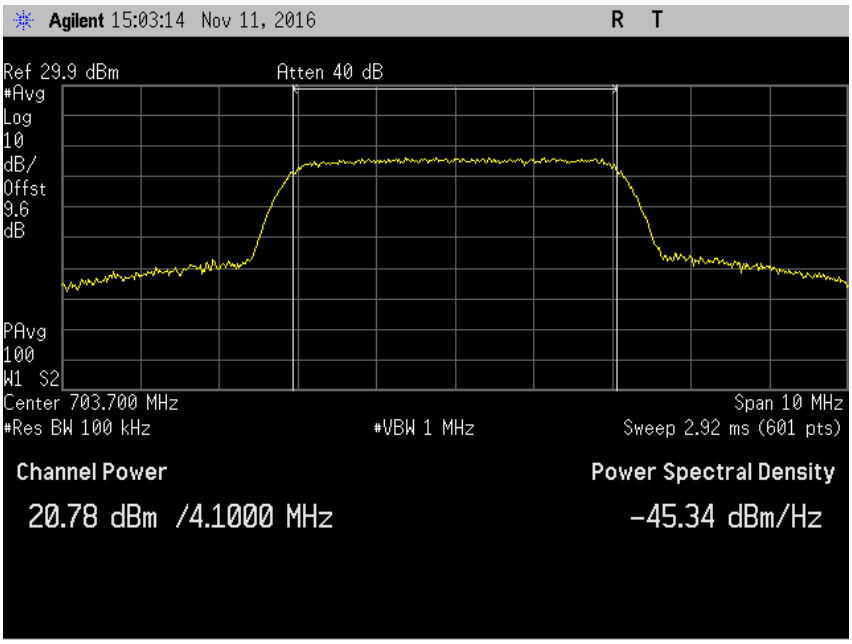
Section 5.5 power						
	Pulse GSM			4.1 MHz AWGN		
Frequency (MHz)	Input (dBm)	Output (dBm)	Gain (dB)	Input (dBm)	Output (dBm)	Gain (dB)
UL1710-1755	0.0	21.8	21.8	0.0	21.1	21.1
UL1850-1915	0.0	20.9	20.9	0.0	22.0	22.0
UL824-894	0.0	19.9	19.9	0.0	20.5	20.5
UL 698-716	0.0	20.6	20.6	0.0	21.1	21.1
UL776-787	0.0	20.3	20.3	0.0	20.3	20.3
DL2110-2155	-41.2	16.6	57.8	-41.7	16.1	57.8
DL1930-1995	-38.2	16.3	54.5	-39.2	15.0	54.2
DL869-894	-34.1	16.5	50.6	-34.1	16.6	50.7
DL:728-746	-36.9	16.0	52.9	-36.9	15.7	52.6
DL 746-757	-37.9	14.8	52.7	-38.9	13.6	52.5

Note: The booster went into Transmitter off mode at Max input power of -20dBm (DL). Results presented on the above table are at 1 dB below the Transmit off RF input level. This table it is for reference only.

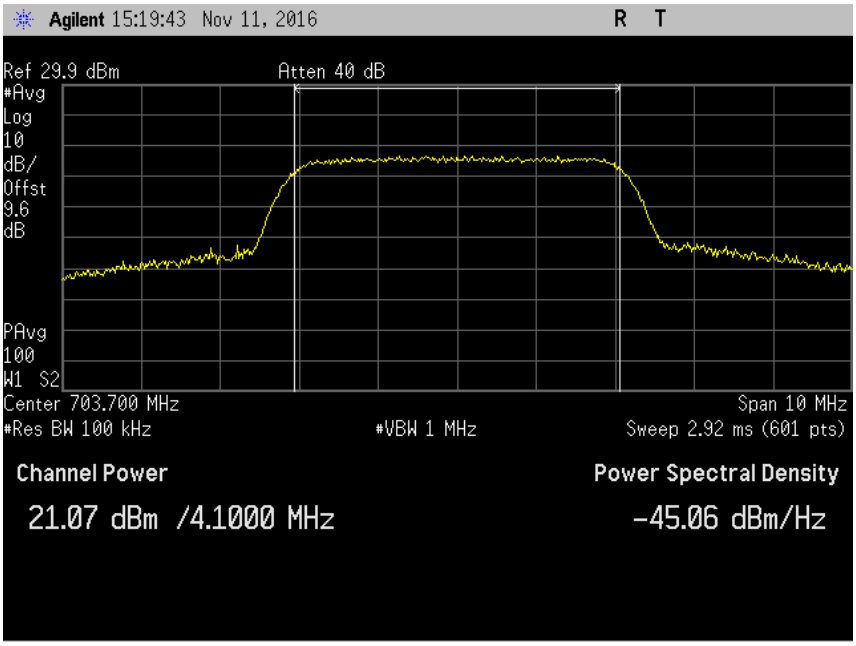
	Pulse GSM	4.1MHz AWGN	Limit (dB)
UL gain vs DL gain 1710/2110	0.9	0.6	9.0
UL gain vs DL gain 1850/1930	1.9	1.8	9.0
UL gain vs DL gain 824/869	1.2	1.2	9.0
UL gain vs DL gain 776/728	-0.3	-0.8	9.0
UL gain vs DL gain 776/746	0.1	-1.1	9.0

Plots

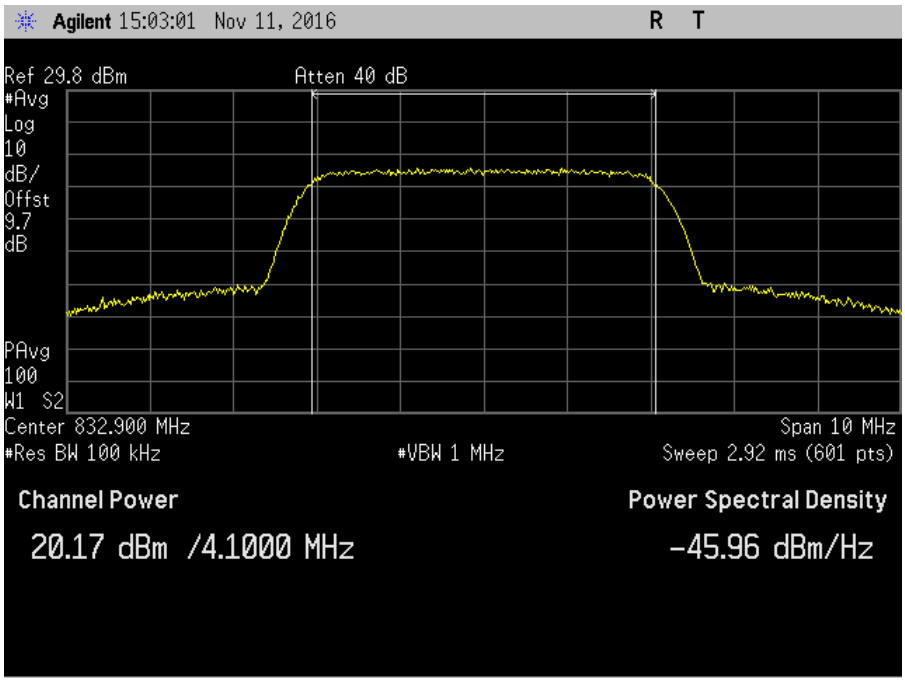
AWGN, UL



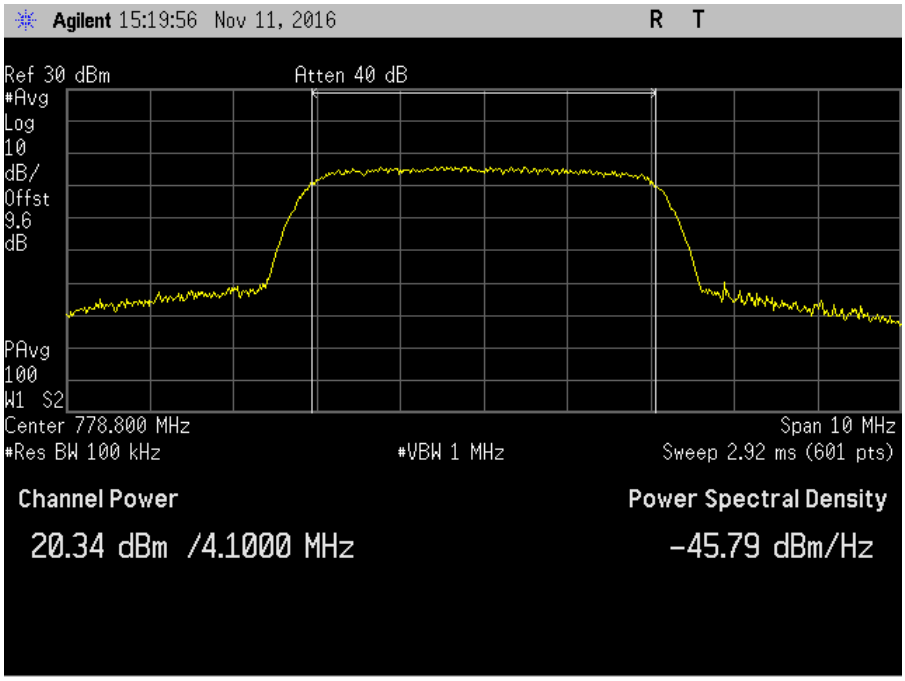
7.2_Power_UL_698-716MHz_AWGN



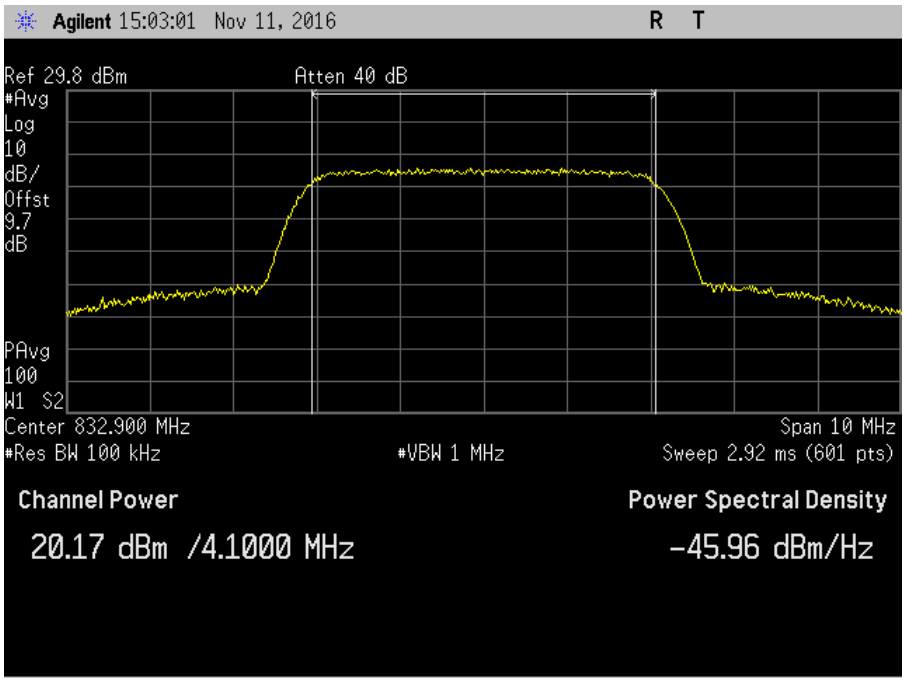
7.2_Power_UL_698-716MHz_AWGN_Max



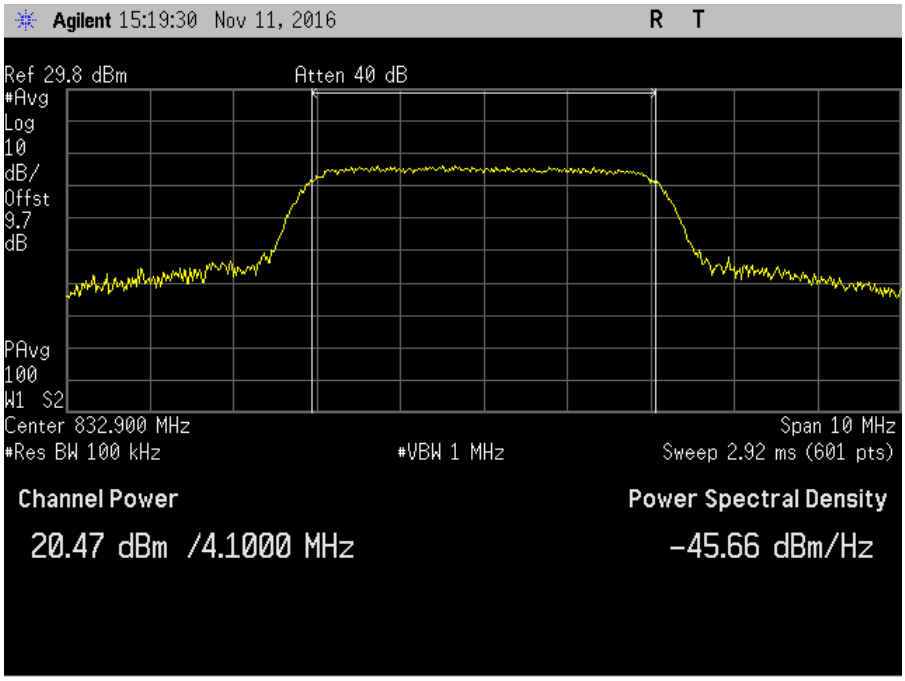
7.2_Power_UL_776-787MHz_AWGN



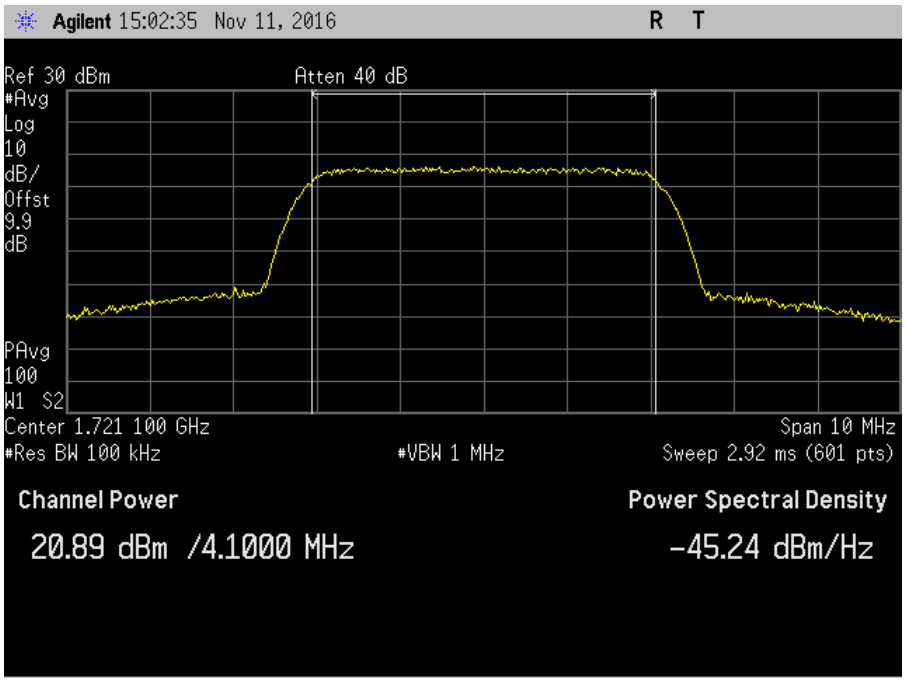
7.2_Power_UL_776-787MHz_AWGN_Max



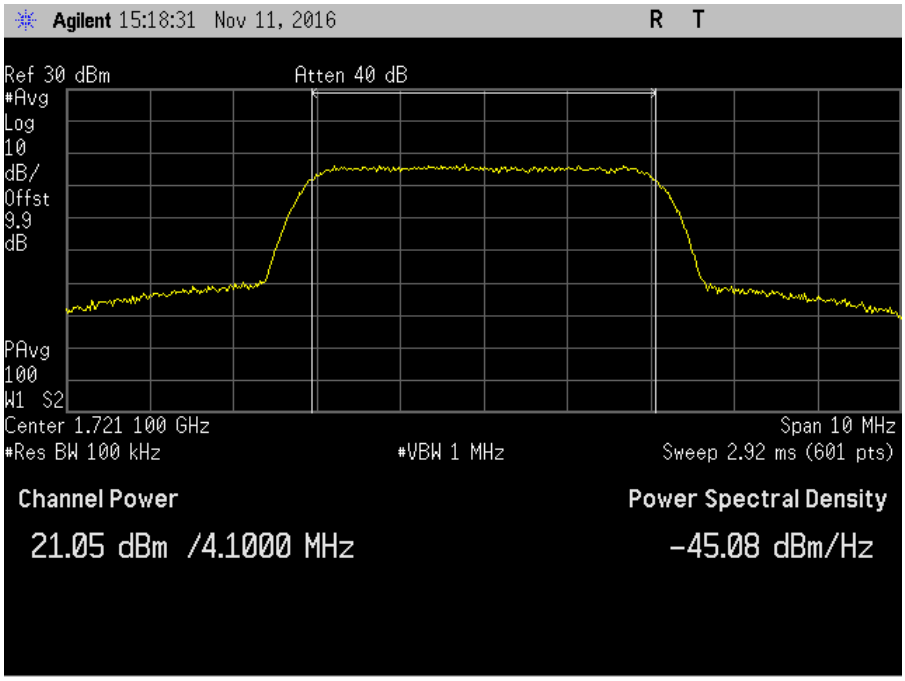
7.2_Power_UL_824-849MHz_AWGN



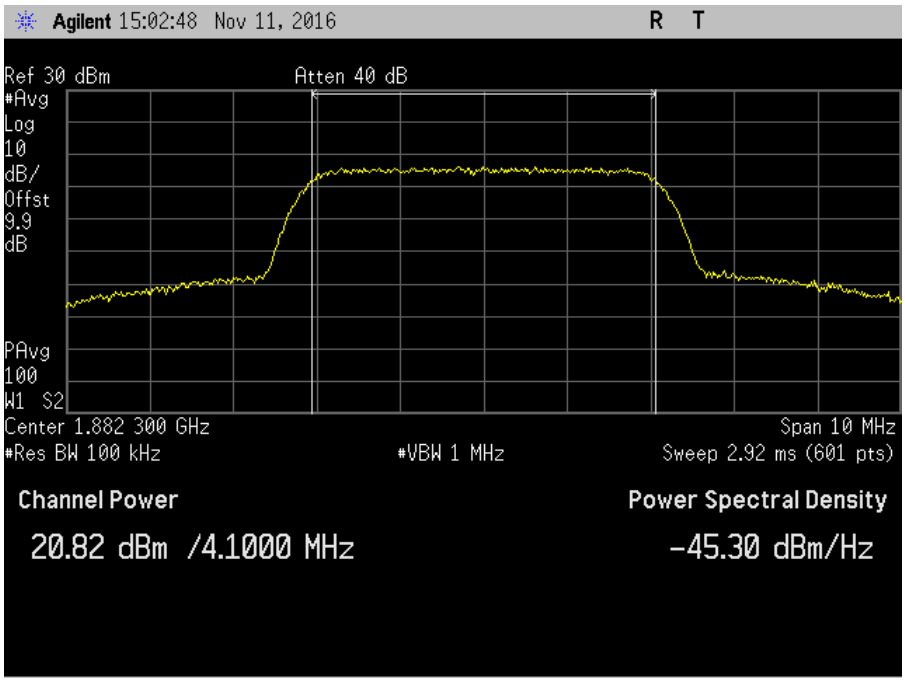
7.2_Power_UL_824-849MHz_AWGN_Max



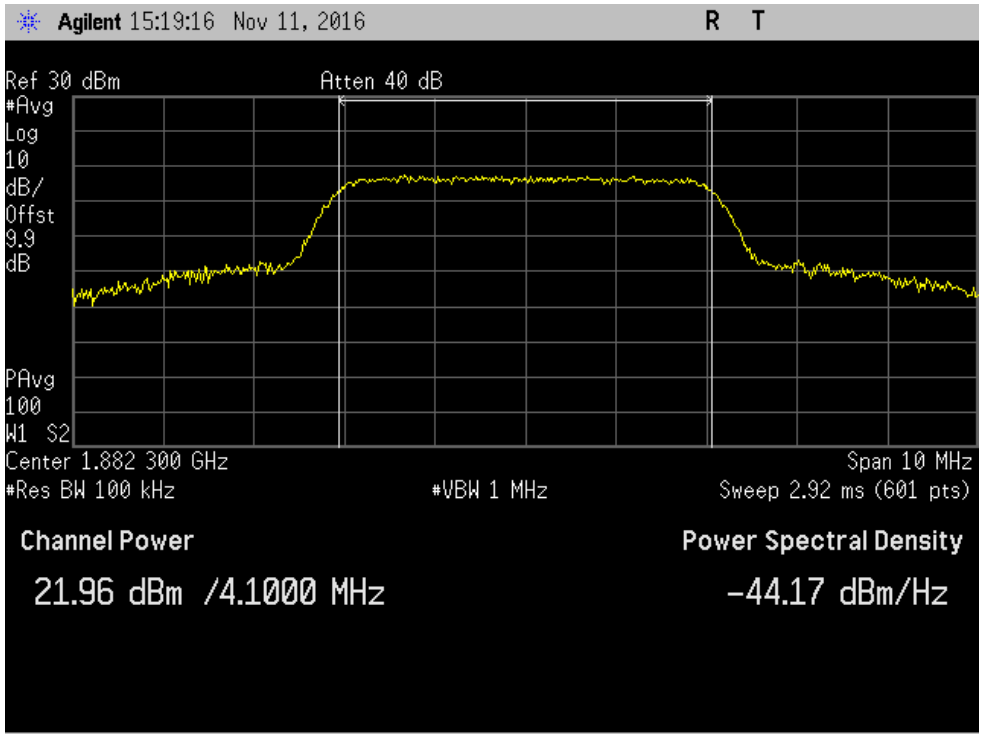
7.2_Power_UL_1710-1755MHz_AWGN



7.2_Power_UL_1710-1755MHz_AWGN_Max

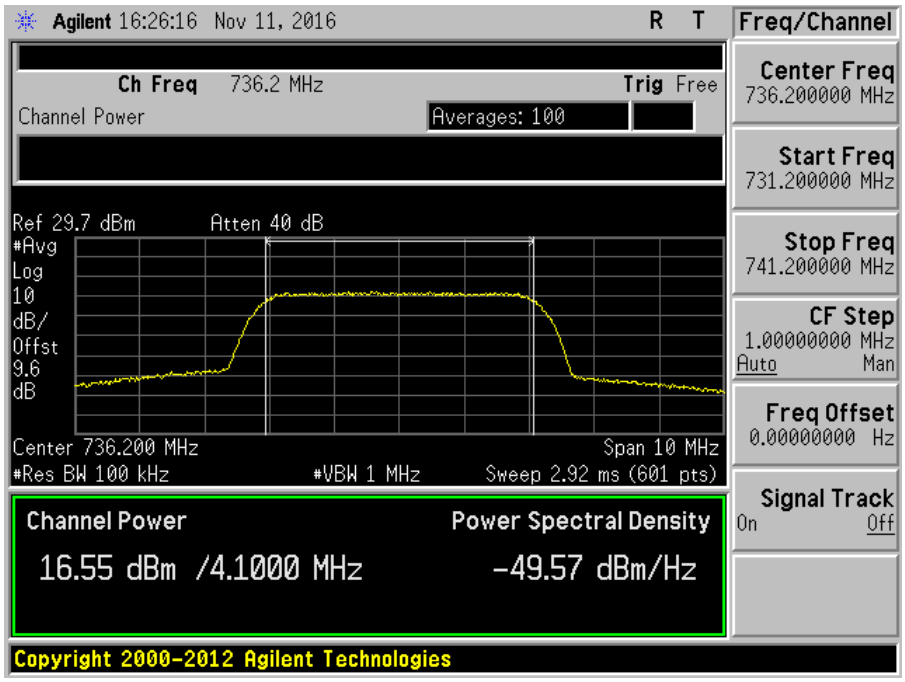


7.2_Power_UL_1850-1915MHz_AWGN

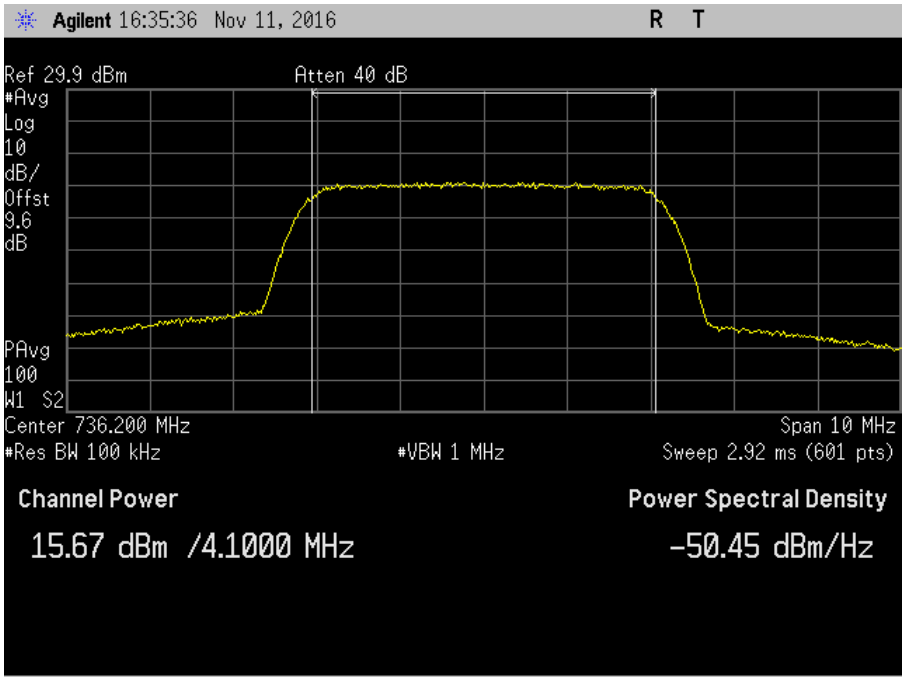


7.2_Power_UL_1850-1915MHz_AWGN_Max

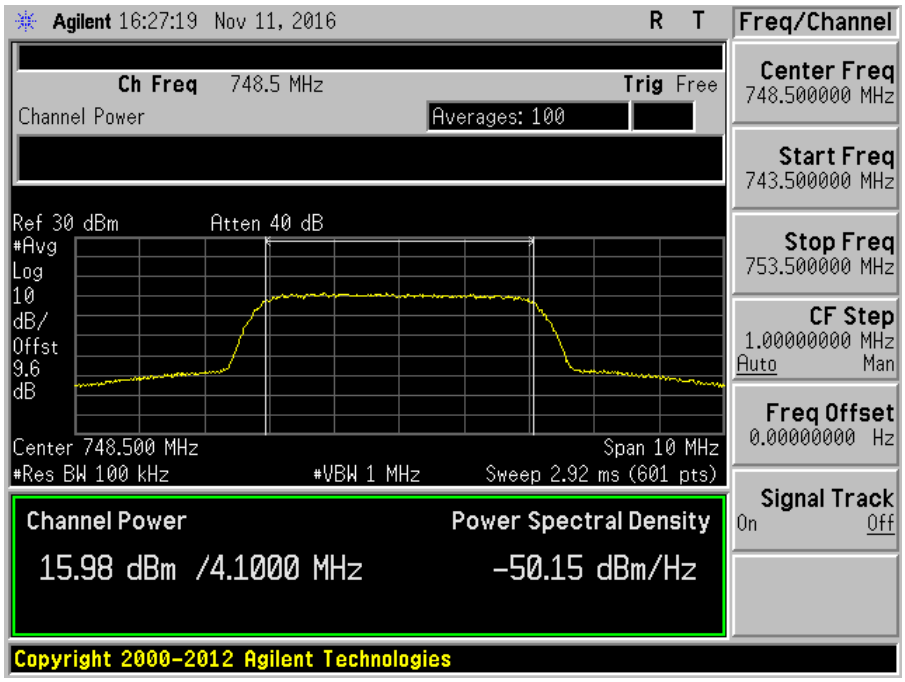
AWGN, DL



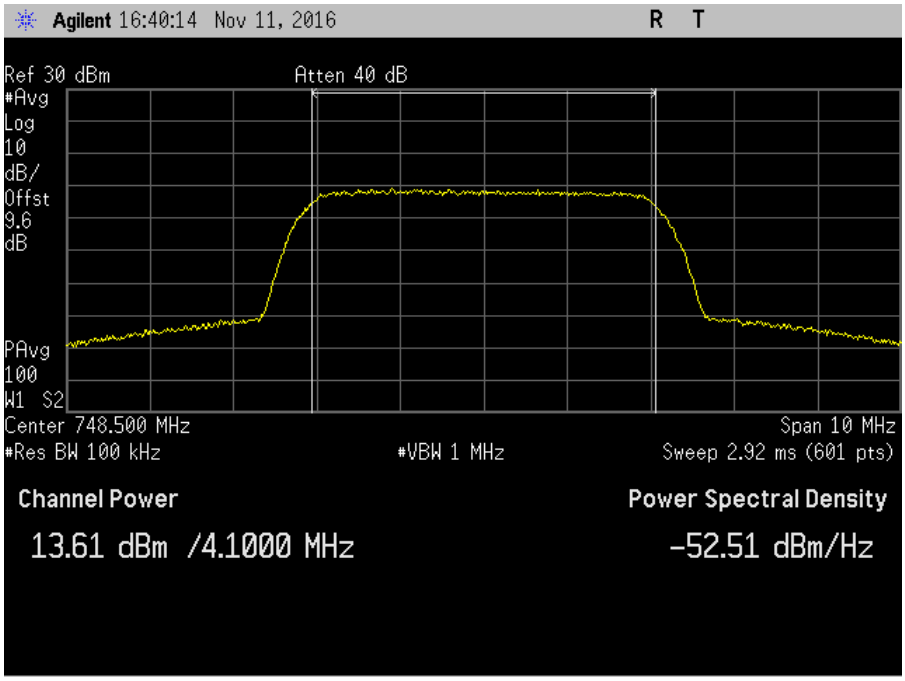
7.2_Power_DL_728-746MHz_AWGN



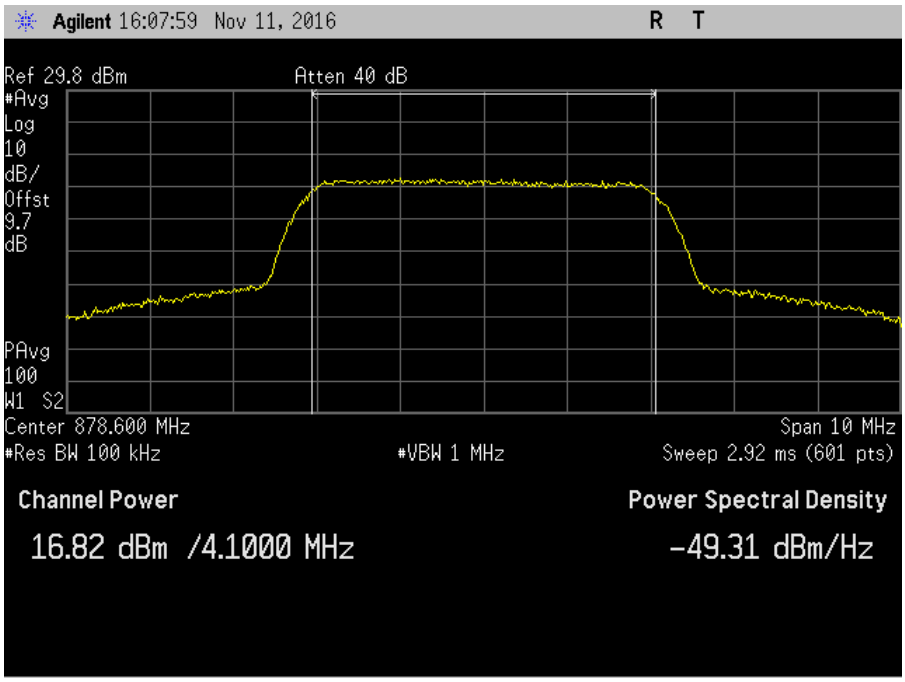
7.2_Power_DL_728-746MHz_AWGN_Max



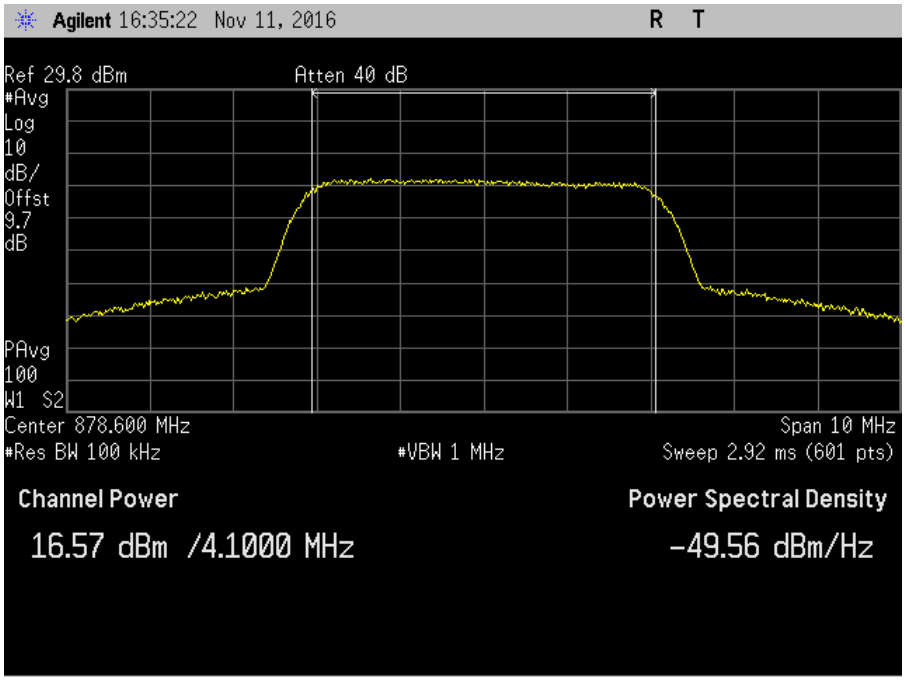
7.2_Power_DL_746-757MHz_AWGN



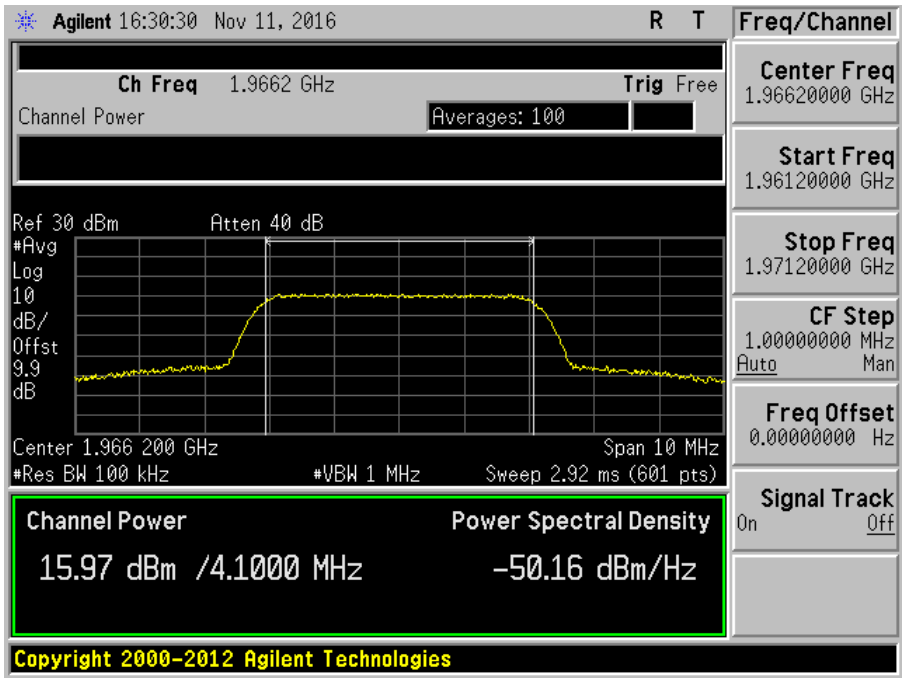
7.2_Power_DL_746-757MHz_AWGN_Max



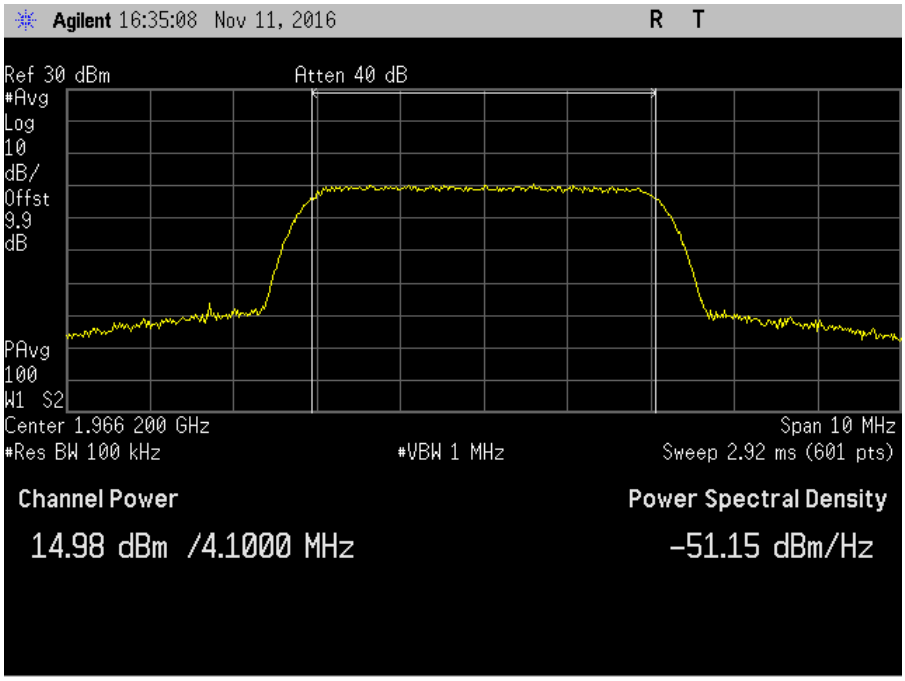
7.2_Power_DL_869-894MHz_AWGN



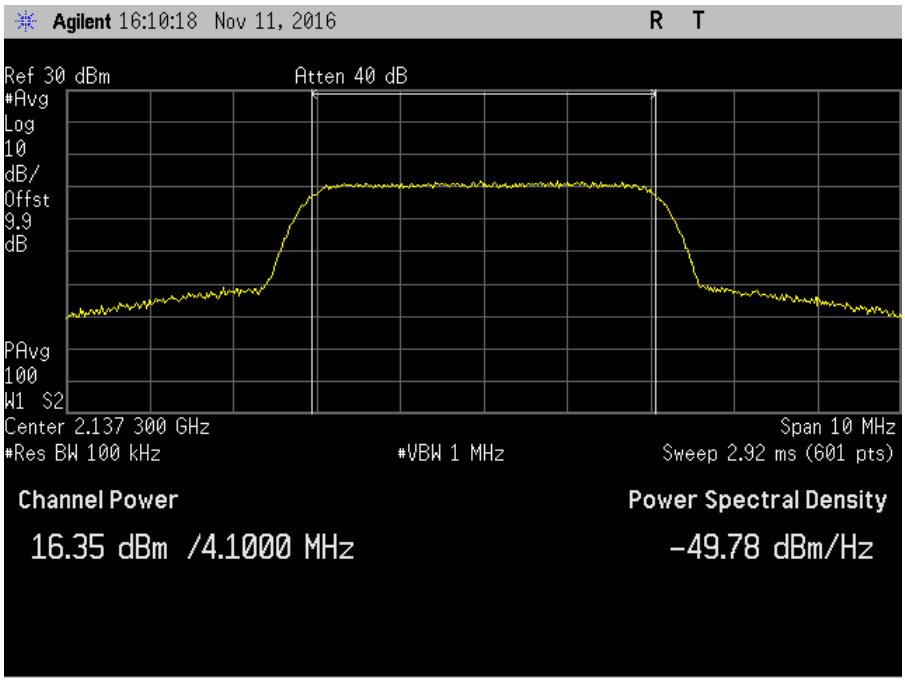
7.2_Power_DL_869-894MHz_AWGN_Max



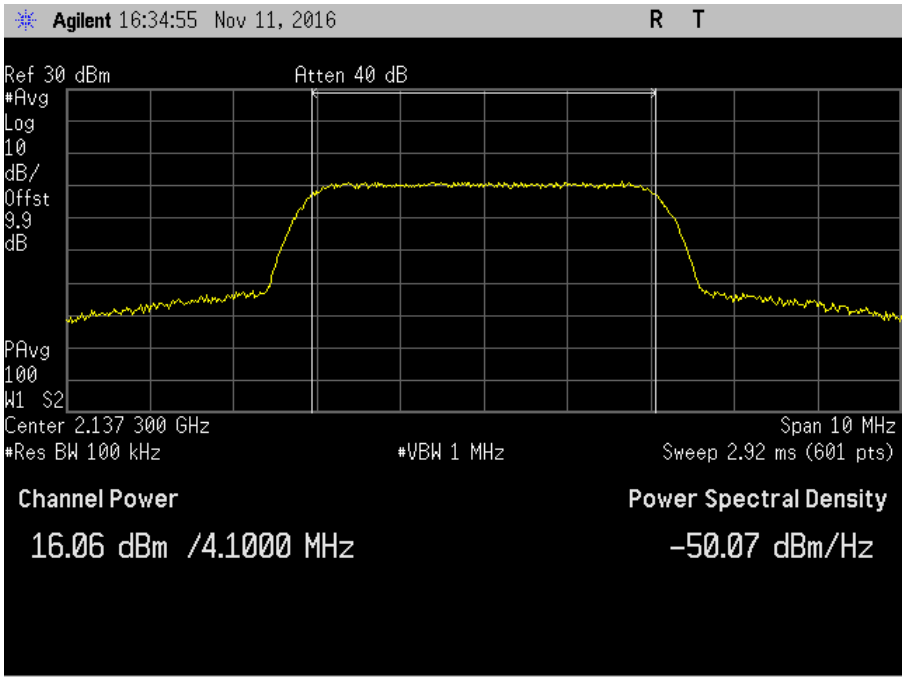
7.2_Power_DL_1930-1995MHz_AWGN



7.2_Power_DL_1930-1995MHz_AWGN_Max

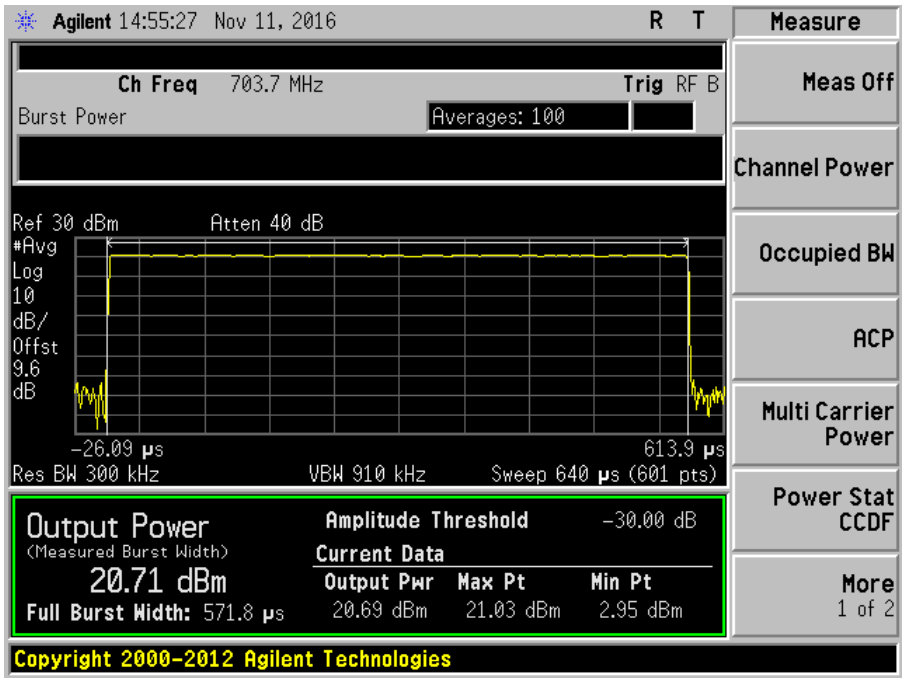


7.2_Power_DL_2110-2155MHz_AWGN

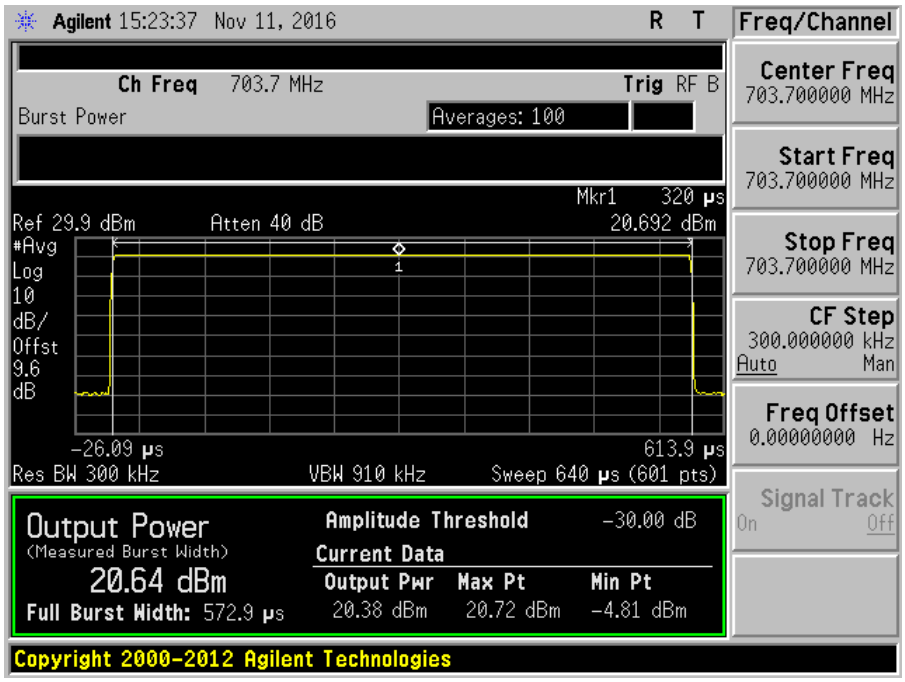


7.2_Power_DL_2110-2155MHz_AWGN_Max

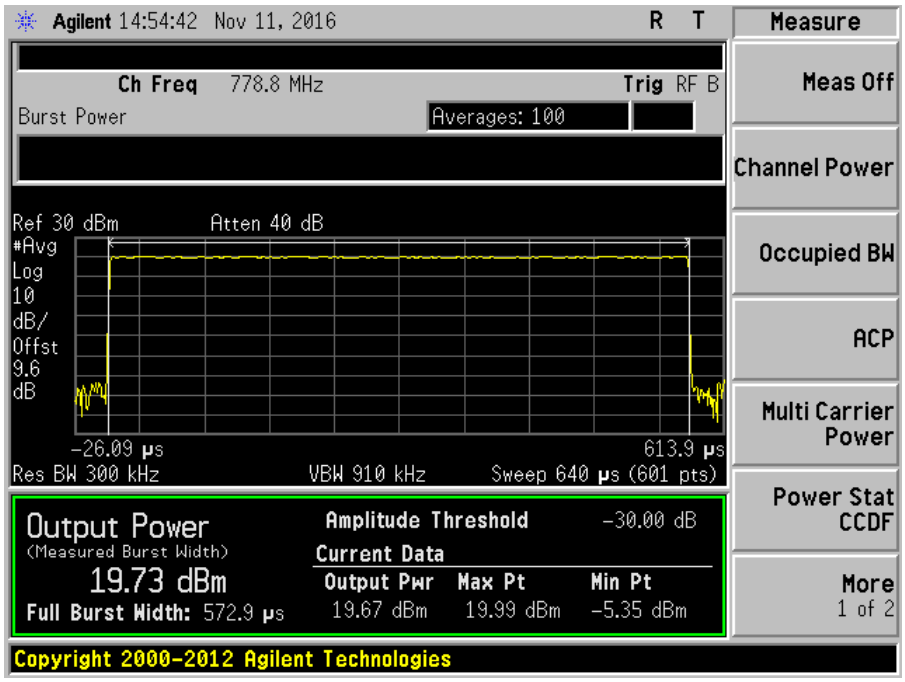
GSM, UL



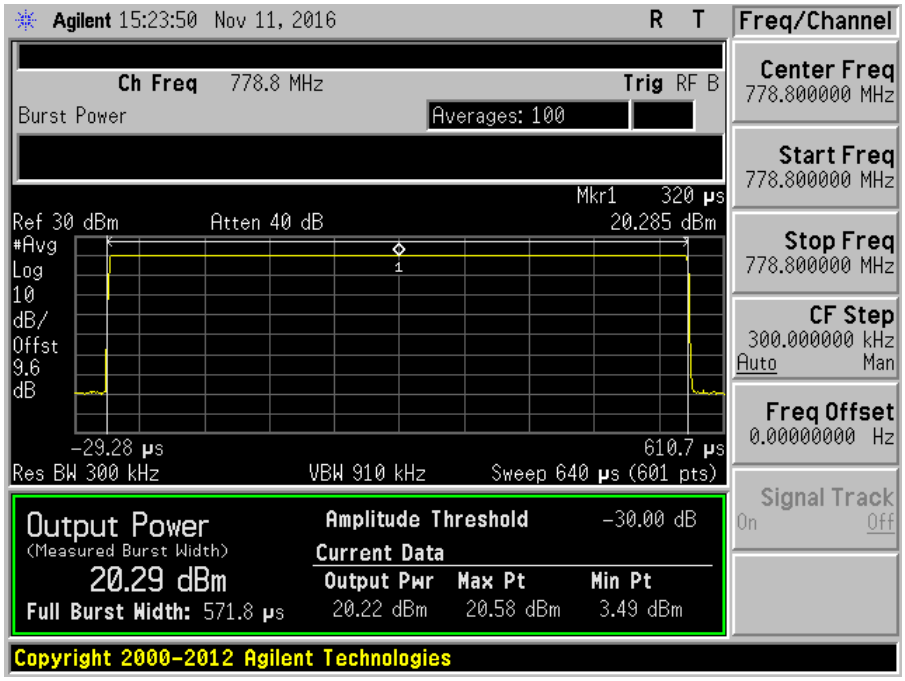
7.2_Power_UL_698-716MHz_GSM



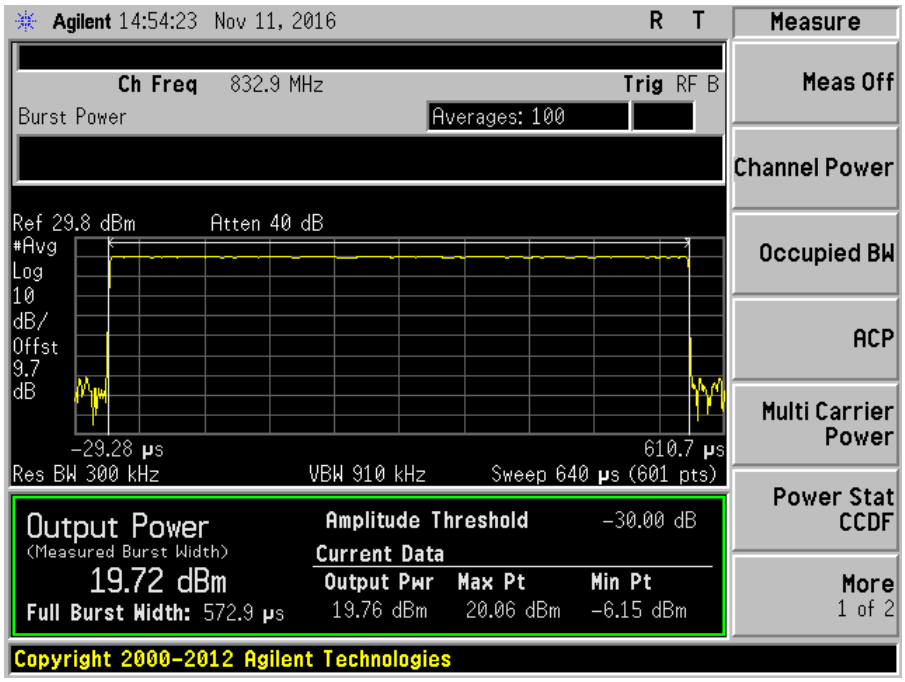
7.2_Power_UL_698-716MHz_GSM_Max



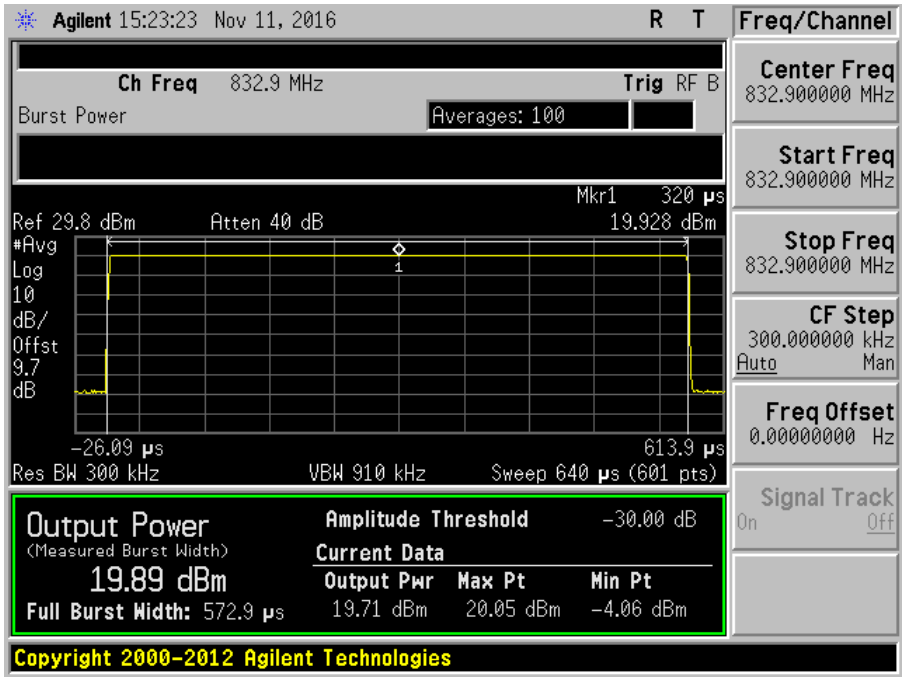
7.2_Power_UL_776-787MHz_GSM



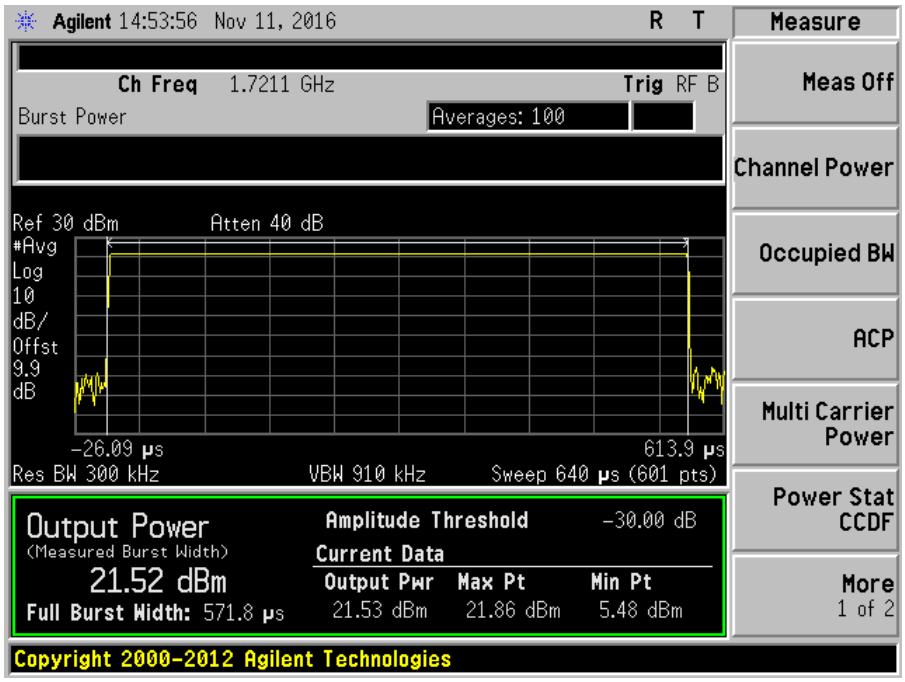
7.2_Power_UL_776-787MHz_GSM_Max



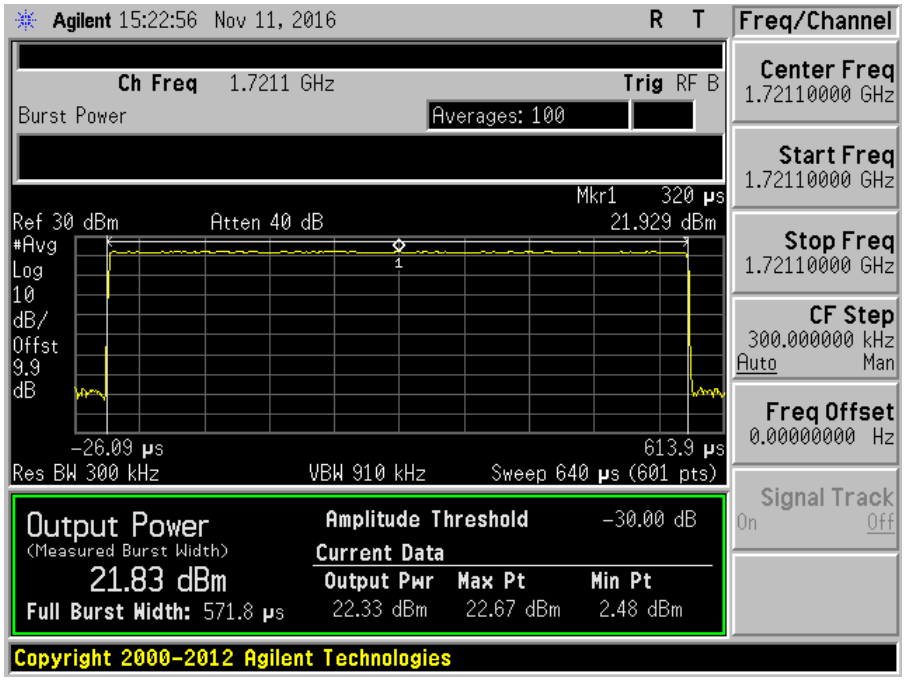
7.2_Power_UL_824-849MHz_GSM



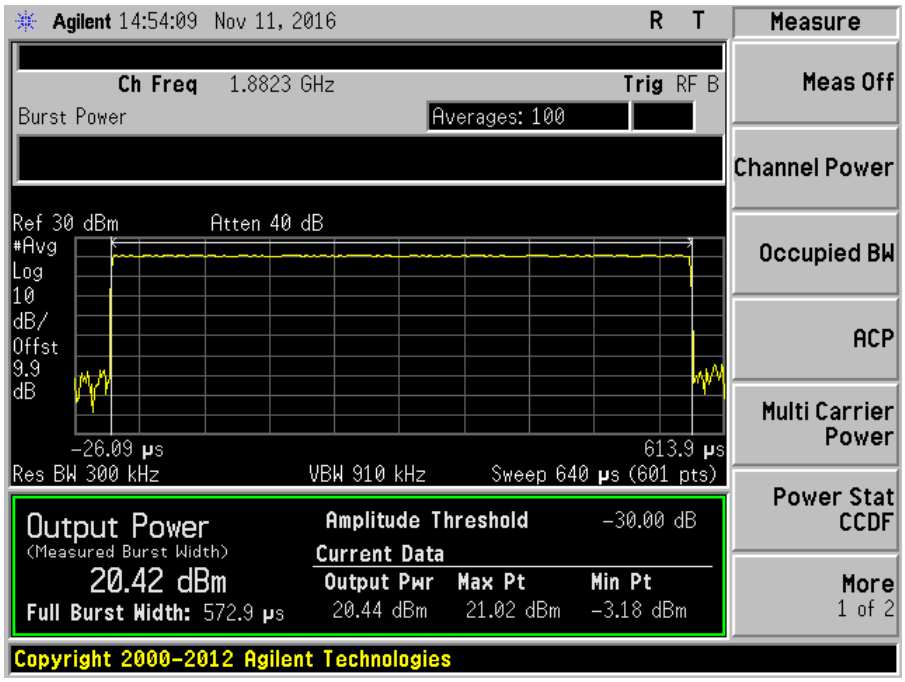
7.2_Power_UL_824-849MHz_GSM_Max



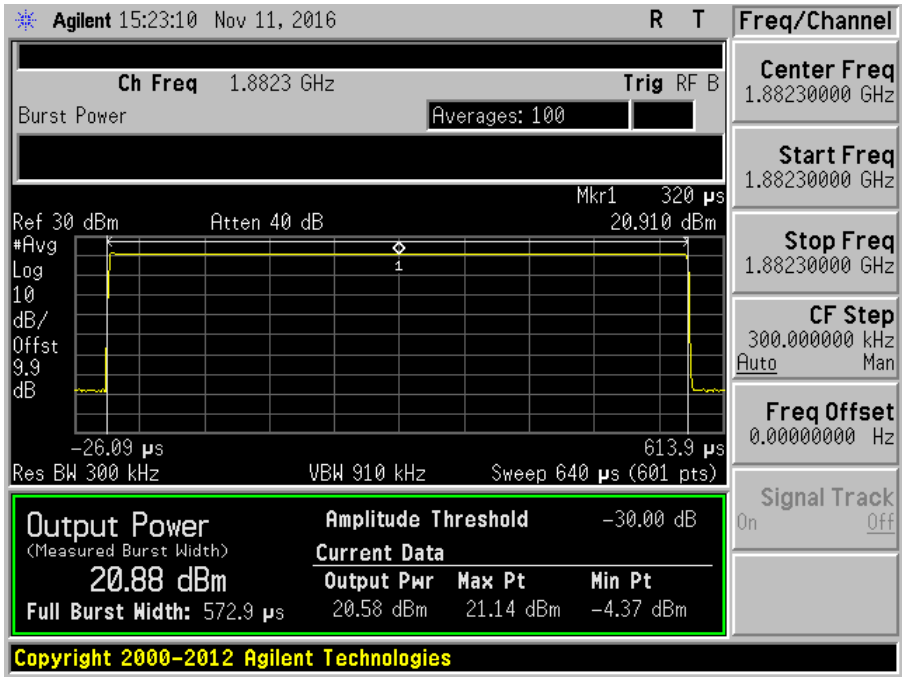
7.2_Power_UL_1710-1755MHz_GSM



7.2_Power_UL_1710-1755MHz_GSM_Max

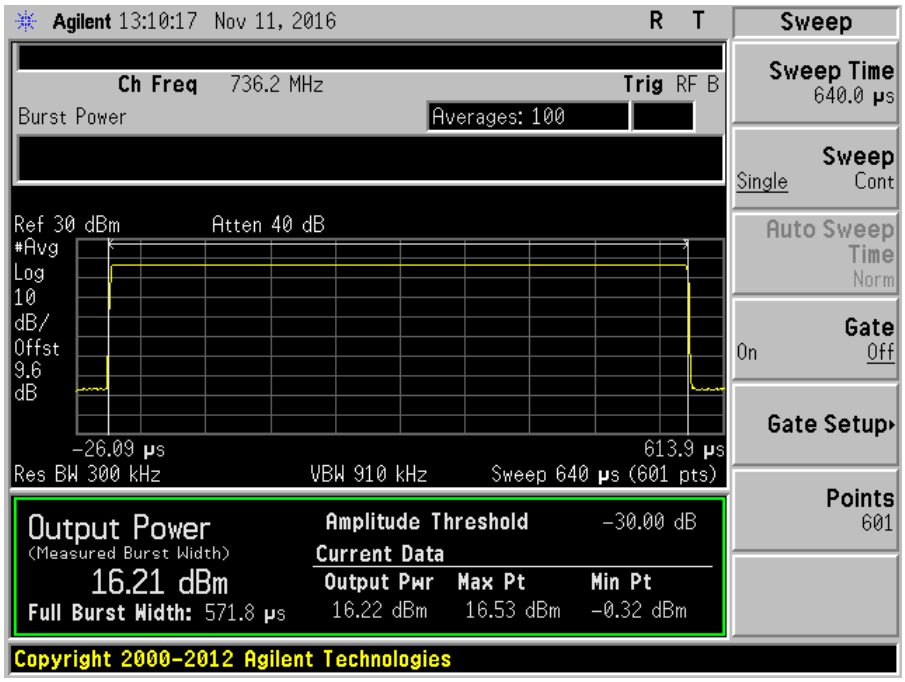


7.2_Power_UL_1850-1915MHz_GSM

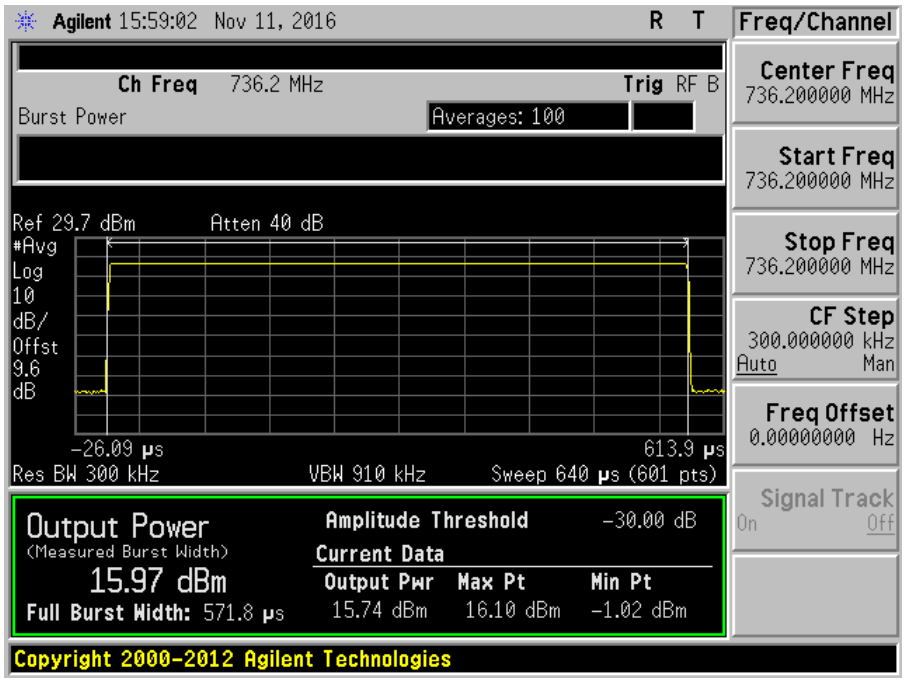


7.2_Power_UL_1850-1915MHz_GSM_Max

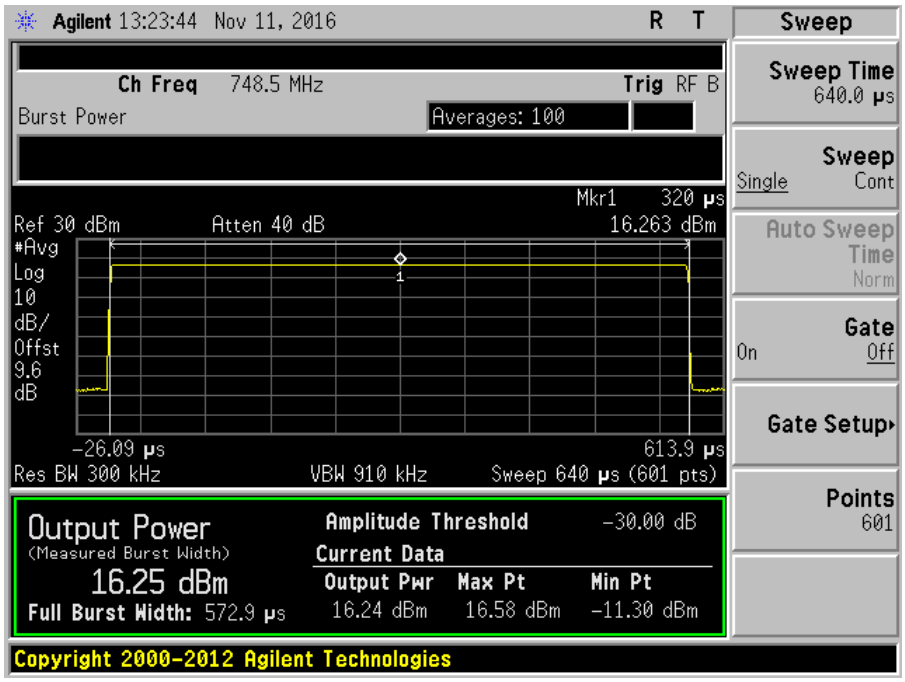
GSM, DL



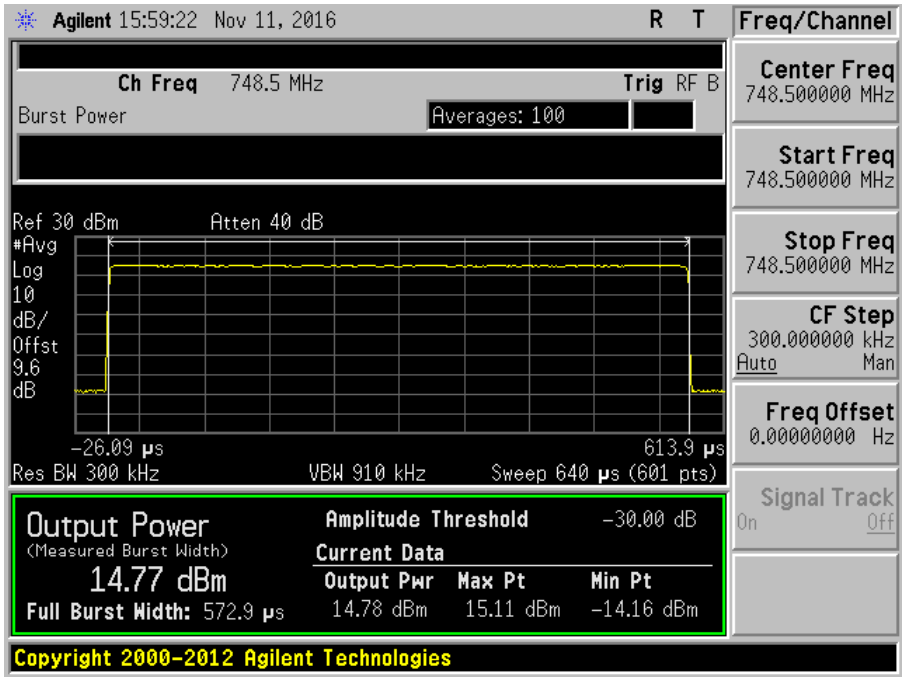
7.2_Power_DL_728-746MHz_GSM



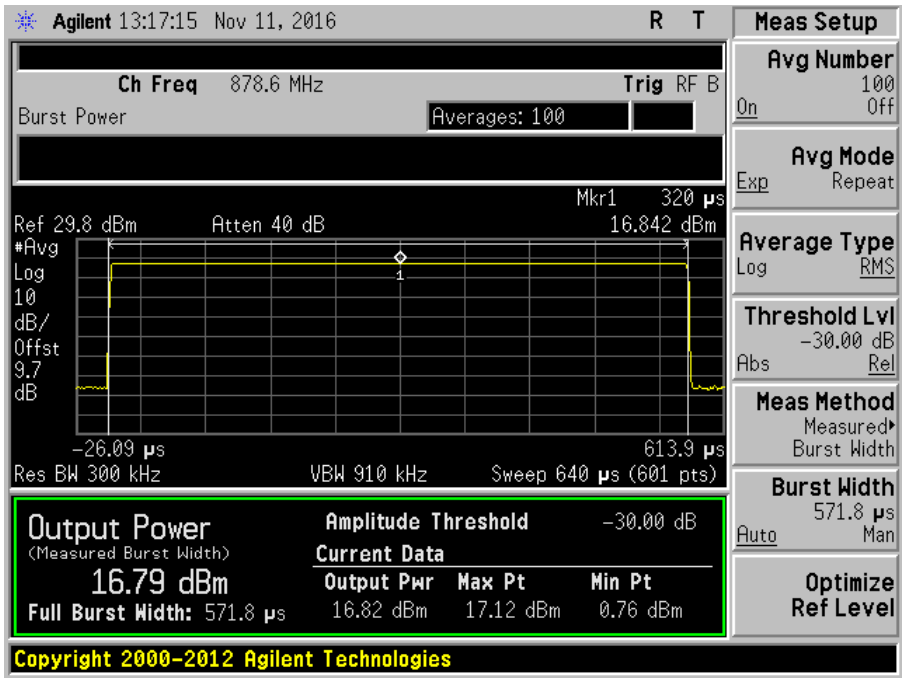
7.2_Power_DL_728-746MHz_GSM_Max



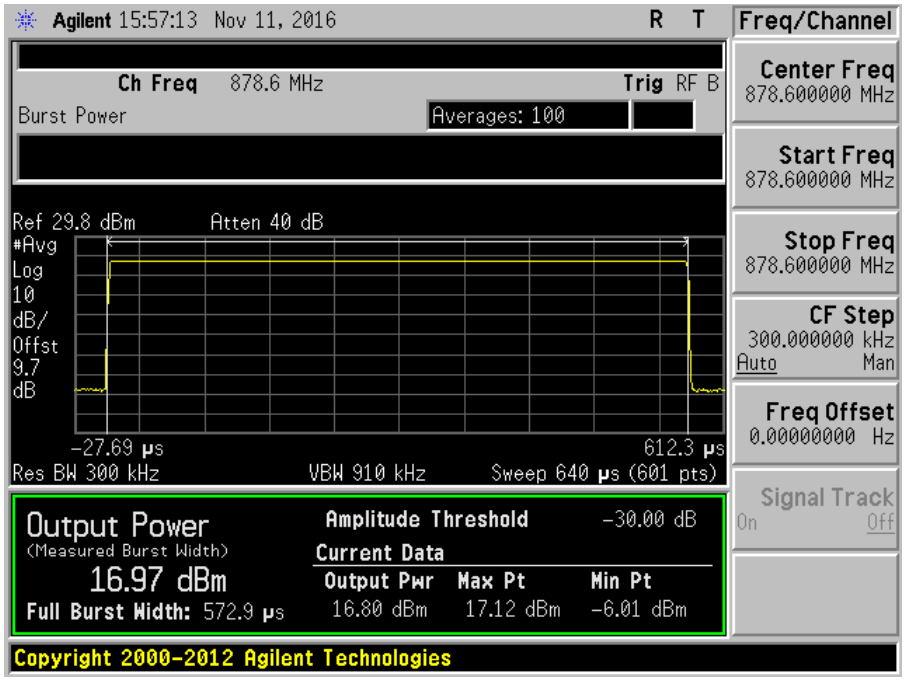
7.2_Power_DL_746-757MHz_GSM



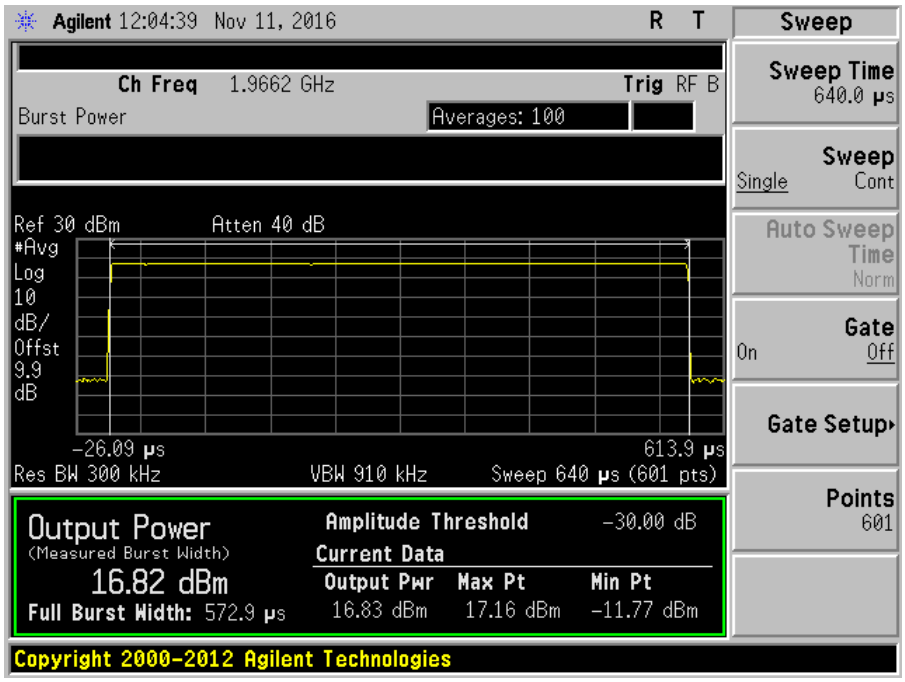
7.2_Power_DL_746-757MHz_GSM_Max



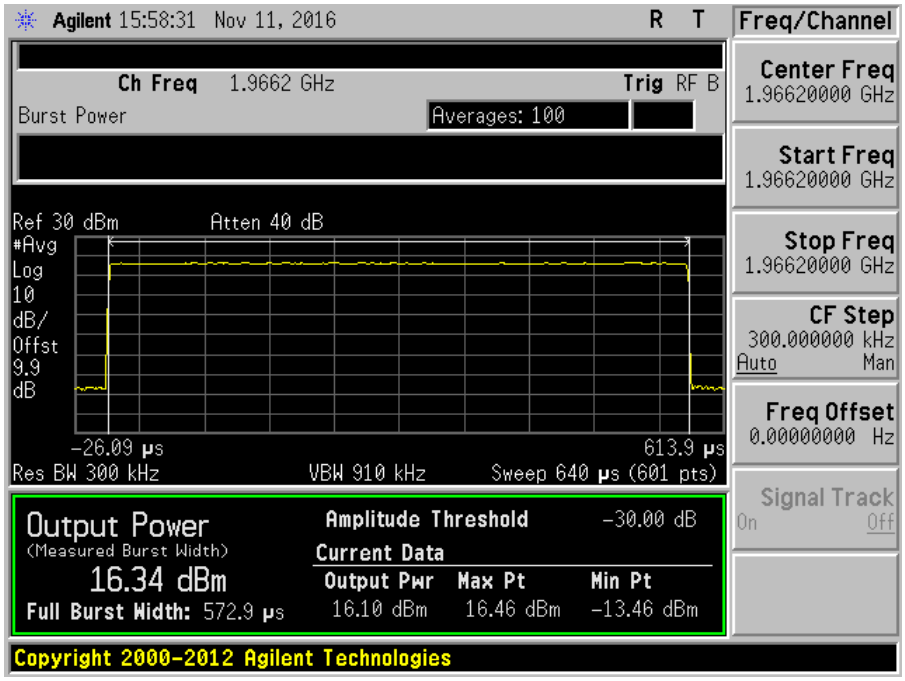
7.2_Power_DL_869-894MHz_GSM



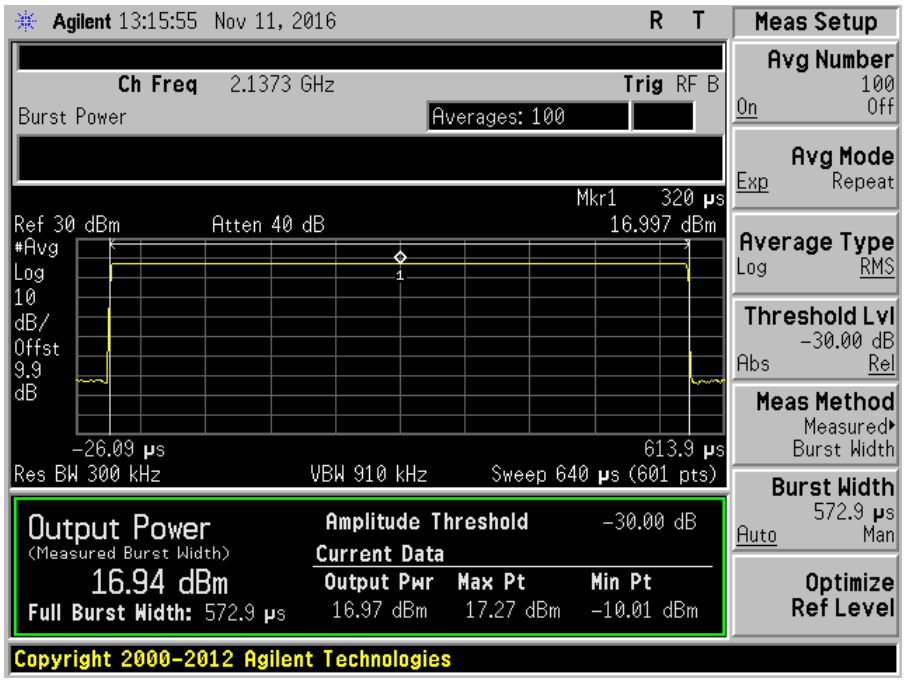
7.2_Power_DL_869-894MHz_GSM_Max



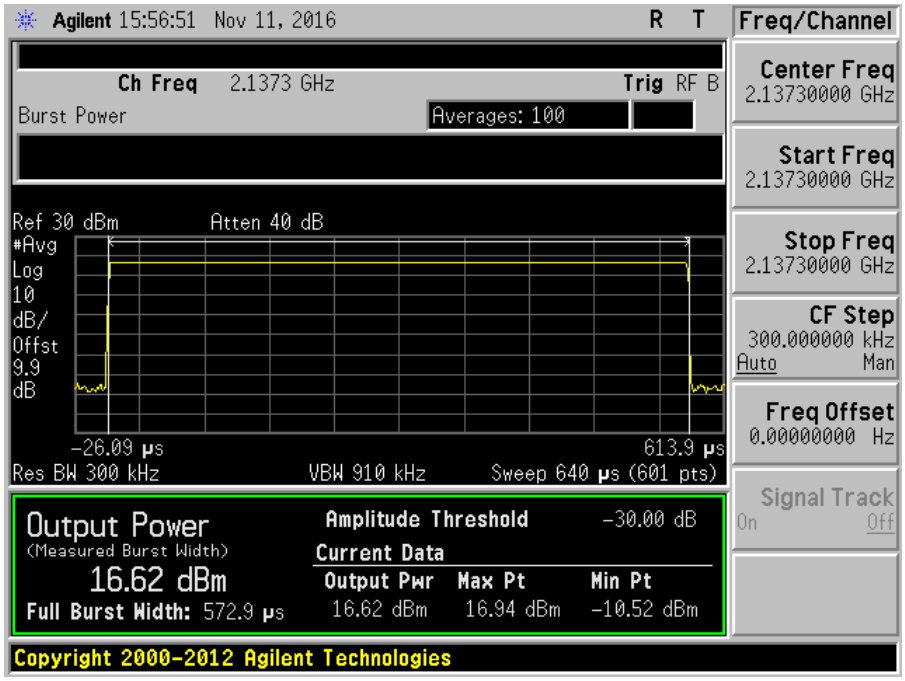
7.2_Power_DL_1930-1995MHz_GSM



7.2_Power_DL_1930-1995MHz_GSM_Max



7.2_Power_DL_2110-2155MHz_GSM



7.2_Power_DL_2110-2155MHz_GSM_Max

7.4 Intermodulation Product

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**7.4 Intermodulation Product**		
Work Order #:	**98759**	Date:	11/15/2016
Test Type:	**Conducted Emissions**	Time:	8:37:49 AM
Tested By:	**Daniel Bertran**	Sequence#:	1
Software:	EMITest 5.03.03		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 6			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 6			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed CMRS Wideband Consumer Booster with a Wi-Fi Router and TV amplifier installed. The CMRS DL signal and the Wi-Fi Signal are combined at the diplexer and transmit via the indoor antenna.
The Consumer booster UL and DL power and gain parameters are initially measured with Wi-Fi transmitting at mid channel using sequentially 802.11b, g, n20 and n40 signal. Since no significant change in measured power was observed, all other parameters are obtained with Wi-Fi transmitting at Mid channel, 802.11b.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is type RP-TNC connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.

Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.4 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016
Firmware: V2.2
Test environment conditions: Temperature: 24°C, 60% Relative Humidity and Pressure: 101.5 kPa

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03418	Signal Generator	E4438C	7/30/2015	7/30/2017
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017
	ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP06898	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP05411	Attenuator	54A-10	1/18/2016	1/18/2018
	AN02660	Spectrum Analyzer	E4446A	5/31/2016	5/31/2018

Summary of Results

Pass: As shown on the plots, all intermodulation products are measured below -19dbm limit.

Inter Modulation Product			
Freq (MHz)	**Pre AGC (dBm)**	**Limit (dBm)**	**Results**
UL 1710-1755	-27.9	-19	Pass
UL 1850-1915	-34.5	-19	Pass
UL 824-894	-27.2	-19	Pass
UL 698-716	-29.9	-19	Pass
UL 776-787	-44.0	-19	Pass
DL 2110-2155	-34.5	-19	Pass
DL 1930-1995	-55.7	-19	Pass
DL 869-894	-29.6	-19	Pass
DL 728-746	-39.9	-19	Pass
DL 746-757	-33.4	-19	Pass

Note: The EUT maintains compliance with the intermodulation limit at input power of AGC+10dB

- Additional Intermodulation products proposed by FCC were measured after raising a KDB inquiry.
- As shown below, measurements are within limit.

  - **PreAGC**

Booster	Wi-Fi	Freq F1	Amp F1	Freq F2	Amp F2	Freq F3	Amp F3	Freq F4	Amp F4
Freq	L M H	2f1-f2	2f1-f2	(2f1+f2)*	2f1+f2	2f2-f1	2f2-f1	2f2+f1	2f2+f1
(MHz)	(MHz)	(MHz)	(dBm)	(MHz)	(dBm)	(MHz)	(dBm)	(MHz)	(dBm)
728	2412	956	-72.35	3868	-70.85	4096	-70.56	5552	-71.8
746	2412	920	-72.27	3904	-70.01	4078	-70.84	5570	-71.13
757	2412	898	-57.9	3926	-70.44	4067	-71.18	5581	-71.41
869	2412	674	-72.55	4150	-71.51	3955	-70.72	5693	-70.31
894	2412	624	-72.33	4200	-71.11	3930	-70.7	5718	-70.52
1930	2412	1448	-71.46	6272	-70.14	2894	-69.96	6754	-67.85
1995	2412	1578	-72.22	6402	-70.47	2829	-70.68	6819	-67.92
2110	2412	1808	-72.55	6632	-68.8	2714	-70.72	6934	-66.74
2155	2412	1898	-71.96	6722	-68.94	2669	-70.82	6979	-66.75
728	2437	981	-72.73	3893	-70.91	4146	-71.17	5602	-70.92
746	2437	945	-72.11	3929	-70.86	4128	-70.65	5620	-70.15
757	2437	923	-72.85	3951	-70.18	4117	-71.56	5631	-71.38
869	2437	699	-72.69	4175	-71.93	4005	-71.22	5743	-70.89
894	2437	649	-72.2	4225	-72	3980	-71.05	5768	-71.22
1930	2437	1423	-72.68	6297	-70.24	2944	-71.55	6804	-67.49
1995	2437	1553	-72.3	6427	-71.36	2879	-71	6869	-66.81
2110	2437	1783	-72.43	6657	-67.96	2764	-71.72	6984	-67.4
2155	2437	1873	-71.59	6747	-67.58	2719	-70.45	7029	-66.24
728	2462	1006	-72.61	3918	-70.81	4196	-71.69	5652	-70.25
746	2462	970	-73.13	3954	-70.18	4178	-71.17	5670	-71.41
757	2462	948	-73.19	3976	-71.19	4167	-71.12	5681	-71.86
869	2462	724	-59.45	4200	-71.91	4055	-71.34	5793	-70.28
894	2462	674	-72.67	4250	-71.75	4030	-71.13	5818	-71.41
1930	2462	1398	-72.48	6322	-69.34	2994	-70.49	6854	-67.2
1995	2462	1528	-72.41	6452	-71.68	2929	-70.88	6919	-66.88
2110	2462	1758	-71.89	6682	-68.54	2814	-70.28	7034	-65.61

- **PreAGC**

Booster	Wi-Fi	Freq F5	Amp F5	Freq F6	Amp F6	Freq F7	Amp F7	Freq F8	Amp F8
Freq	L M H	3f1-2f2	3f1-2f2	3f1+2f2	3f1+2f2	3f2-2f1	3f2-2f1	3f2+2f1	3f2+2f1
(MHz)	(MHz)	(MHz)	(dBm)	(MHz)	(dBm)	(MHz)	(dBm)	(MHz)	(dBm)
728	2412	2640	-71.29	7008	-67.58	5780	-71.6	8692	-66.8
746	2412	2586	-69.79	7062	-66.88	5744	-70.25	8728	-67.6
757	2412	2553	-67.68	7095	-67	5722	-70.88	8750	-66.6
869	2412	2217	-70.5	7431	-68.1	5498	-71.65	8974	-69.2
894	2412	2142	-47.83	7506	-67.42	5448	-71.54	9024	-68.6
1930	2412	966	-71.81	10614	-68.67	3376	-70.49	11096	-67.7
1995	2412	1161	-71.28	10809	-69.03	3246	-69.35	11226	-67.5
2110	2412	1506	-72.07	11154	-67.33	3016	-70.51	11456	-69.1
2155	2412	1641	-70.4	11289	-68.17	2926	-69.3	11546	-69.1
728	2437	2690	-69.4	7058	-66.59	5855	-71.51	8767	-68.2
746	2437	2636	-71.66	7112	-66.85	5819	-71.19	8803	-69
757	2437	2603	-62.35	7145	-67.03	5797	-70.13	8825	-69
869	2437	2267	-70.61	7481	-67.74	5573	-71.47	9049	-69.7
894	2437	2192	-71.7	7556	-66.92	5523	-71.51	9099	-69.4
1930	2437	916	-72.32	10664	-69.51	3451	-70.78	11171	-68
1995	2437	1111	-72.86	10859	-68.31	3321	-69.77	11301	-68.1
2110	2437	1456	-72.66	11204	-67.19	3091	-69.93	11531	-68.9
2155	2437	1591	-71.64	11339	-68.64	3001	-70.47	11621	-68.8
728	2462	2740	-70.71	7108	-66.74	5930	-70.92	8842	-68.8
746	2462	2686	-70.5	7162	-67.06	5894	-71.17	8878	-69.1
757	2462	2653	-71.3	7195	-67.61	5872	-70.97	8900	-69.3
869	2462	2317	-69.18	7531	-67.25	5648	-71.1	9124	-68.2
894	2462	2242	-67.28	7606	-67.97	5598	-70.91	9174	-68.1
1930	2462	866	-54.29	10714	-69.8	3526	-69.89	11246	-67.3
1995	2462	1061	-72.85	10909	-68.89	3396	-70.84	11376	-68.5
2110	2462	1406	-72.07	11254	-66.86	3166	-69.12	11606	-69.6

- **PreAGC**

Booster	Wi-Fi	Margin	Margin	Margin	Margin	Margin	Margin	Margin	Margin
Freq	L M H	F1	F2	F3	F4	F5	F6	F7	F8
(MHz)	(MHz)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
728	2412	53.4	51.9	51.6	52.8	52.3	48.6	52.6	47.81
746	2412	53.3	51	51.8	52.1	50.8	47.9	51.3	48.55
757	2412	38.9	51.4	52.2	52.4	48.7	48	51.9	47.57
869	2412	53.6	52.5	51.7	51.3	51.5	49.1	52.7	50.18
894	2412	53.3	52.1	51.7	51.5	28.8	48.4	52.5	49.64
1930	2412	52.5	51.1	51	48.9	52.8	49.7	51.5	48.66
1995	2412	53.2	51.5	51.7	48.9	52.3	50	50.4	48.47
2110	2412	53.6	49.8	51.7	47.7	53.1	48.3	51.5	50.07
2155	2412	53	49.9	51.8	47.8	51.4	49.2	50.3	50.14
728	2437	53.7	51.9	52.2	51.9	50.4	47.6	52.5	49.15
746	2437	53.1	51.9	51.7	51.2	52.7	47.9	52.2	50
757	2437	53.9	51.2	52.6	52.4	43.4	48	51.1	49.98
869	2437	53.7	52.9	52.2	51.9	51.6	48.7	52.5	50.65
894	2437	53.2	53	52.1	52.2	52.7	47.9	52.5	50.43
1930	2437	53.7	51.2	52.6	48.5	53.3	50.5	51.8	49.04
1995	2437	53.3	52.4	52	47.8	53.9	49.3	50.8	49.1
2110	2437	53.4	49	52.7	48.4	53.7	48.2	50.9	49.94
2155	2437	52.6	48.6	51.5	47.2	52.6	49.6	51.5	49.76
728	2462	53.6	51.8	52.7	51.3	51.7	47.7	51.9	49.83
746	2462	54.1	51.2	52.2	52.4	51.5	48.1	52.2	50.08
757	2462	54.2	52.2	52.1	52.9	52.3	48.6	52	50.25
869	2462	40.5	52.9	52.3	51.3	50.2	48.3	52.1	49.19
894	2462	53.7	52.8	52.1	52.4	48.3	49	51.9	49.12
1930	2462	53.5	50.3	51.5	48.2	35.3	50.8	50.9	48.33
1995	2462	53.4	52.7	51.9	47.9	53.9	49.9	51.8	49.45
2110	2462	52.9	49.5	51.3	46.6	53.1	47.9	50.1	50.64

- **AGC+10dB**

Booster	Wi-Fi	Freq F1	Amp F1	Freq F2	Amp F2	Freq F3	Amp F3	Freq F4	Amp F4
Freq	L M H	2f1-f2	2f1-f2	(2f1+f2)*	2f1+f2	2f2-f1	2f2-f1	2f2+f1	2f2+f1
(MHz)	(MHz)	(MHz)	(dBm)	(MHz)	(dBm)	(MHz)	(dBm)	(MHz)	(dBm)
728	2412	956	-72.9	3868	-70.29	4096	-71.49	5552	-70.91
746	2412	920	-72.74	3904	-70.96	4078	-71.15	5570	-71.44
757	2412	898	-58.5	3926	-70.18	4067	-70.17	5581	-71.57
869	2412	674	-72.51	4150	-71.24	3955	-70.26	5693	-71.39
894	2412	624	-71.58	4200	-71.6	3930	-69.54	5718	-71.46
1930	2412	1448	-72.02	6272	-70.3	2894	-70.13	6754	-68.23
1995	2412	1578	-72.12	6402	-71.15	2829	-71.23	6819	-66.73
2110	2412	1808	-71.99	6632	-69.39	2714	-70.74	6934	-67.04
2155	2412	1898	-72.08	6722	-67.98	2669	-70.52	6979	-67.9
728	2437	981	-72.65	3893	-70.37	4146	-71.41	5602	-70.71
746	2437	945	-72.23	3929	-70.53	4128	-70.65	5620	-71.54
757	2437	923	-72.9	3951	-70.43	4117	-71.48	5631	-70.58
869	2437	699	-72.62	4175	-70.35	4005	-71.07	5743	-70.24
894	2437	649	-71.79	4225	-71.7	3980	-71.71	5768	-70.57
1930	2437	1423	-71.65	6297	-71.08	2944	-70.83	6804	-67.23
1995	2437	1553	-72.22	6427	-70.79	2879	-70.63	6869	-67.26
2110	2437	1783	-72.3	6657	-68.42	2764	-70.77	6984	-66.88
2155	2437	1873	-71.91	6747	-68.35	2719	-70	7029	-66.39
728	2462	1006	-72.54	3918	-70.66	4196	-71.52	5652	-71.42
746	2462	970	-73.02	3954	-70.92	4178	-71.11	5670	-71.13
757	2462	948	-72.73	3976	-71.01	4167	-72.09	5681	-69.99
869	2462	724	-60.24	4200	-72.05	4055	-70.71	5793	-71.3
894	2462	674	-72.3	4250	-71.72	4030	-71.02	5818	-71.12
1930	2462	1398	-72.07	6322	-70.25	2994	-71.33	6854	-66.02
1995	2462	1528	-71.99	6452	-71.06	2929	-70.87	6919	-67.03
2110	2462	1758	-71.79	6682	-67.9	2814	-71.75	7034	-66.76

- **AGC+10dB**

Booster Freq (MHz)	Wi-Fi L M H (MHz)	Freq F5 3f1-2f2 (MHz)	Amp F5 3f1-2f2 (dBm)	Freq F6 3f1+2f2 (MHz)	Amp F6 3f1+2f2 (dBm)	Freq F7 3f2-2f1 (MHz)	Amp F7 3f2-2f1 (dBm)	Freq F8 3f2+2f1 (MHz)	Amp F8 3f2+2f1 (dBm)
728	2412	2640	-71.17	7008	-66.73	5780	-70.75	8692	-67.1
746	2412	2586	-70.24	7062	-66.05	5744	-70.36	8728	-67.7
757	2412	2553	-67.89	7095	-66.2	5722	-71.02	8750	-67.5
869	2412	2217	-71.2	7431	-66.25	5498	-70.8	8974	-69.4
894	2412	2142	-46.75	7506	-67.46	5448	-71.45	9024	-69
1930	2412	966	-72.73	10614	-69.33	3376	-70.25	11096	-67.6
1995	2412	1161	-71.76	10809	-68.58	3246	-69.1	11226	-67.4
2110	2412	1506	-72.54	11154	-66.65	3016	-70.76	11456	-68.2
2155	2412	1641	-72.44	11289	-68.1	2926	-71.36	11546	-68.8
728	2437	2690	-70.73	7058	-66.61	5855	-70.96	8767	-68.4
746	2437	2636	-70.89	7112	-67.22	5819	-70.75	8803	-68.4
757	2437	2603	-62.47	7145	-66.29	5797	-70.01	8825	-68.7
869	2437	2267	-70.26	7481	-66.9	5573	-71.13	9049	-69.5
894	2437	2192	-70.79	7556	-67.77	5523	-71.47	9099	-68.5
1930	2437	916	-72.27	10664	-69.43	3451	-70.15	11171	-67
1995	2437	1111	-72.96	10859	-68.43	3321	-69.48	11301	-68.6
2110	2437	1456	-71.38	11204	-67.65	3091	-67.97	11531	-68.9
2155	2437	1591	-72.26	11339	-67.81	3001	-70.93	11621	-69.2
728	2462	2740	-70.96	7108	-66.93	5930	-71.51	8842	-68.9
746	2462	2686	-70.83	7162	-66.4	5894	-71.42	8878	-68.1
757	2462	2653	-71.32	7195	-67.68	5872	-71	8900	-68.2
869	2462	2317	-68.81	7531	-67.36	5648	-71.31	9124	-69
894	2462	2242	-67.84	7606	-67.43	5598	-71.17	9174	-68
1930	2462	866	-55.65	10714	-68.73	3526	-70.86	11246	-67.2
1995	2462	1061	-71.93	10909	-68.3	3396	-70.09	11376	-68.7
2110	2462	1406	-72.31	11254	-66.24	3166	-69.2	11606	-68.9
728	2412	2640	-71.17	7008	-66.73	5780	-70.75	8692	-67.1

- **AGC+10dB**

Booster	Wi-Fi	Margin	Margin	Margin	Margin	Margin	Margin	Margin	Margin
Freq	L M H	F1	F2	F3	F4	F5	F6	F7	F8
(MHz)	(MHz)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
728	2412	53.9	51.3	52.5	51.9	52.2	47.7	51.8	48.07
746	2412	53.7	52	52.2	52.4	51.2	47.1	51.4	48.67
757	2412	39.5	51.2	51.2	52.6	48.9	47.2	52	48.45
869	2412	53.5	52.2	51.3	52.4	52.2	47.3	51.8	50.43
894	2412	52.6	52.6	50.5	52.5	27.8	48.5	52.5	49.99
1930	2412	53	51.3	51.1	49.2	53.7	50.3	51.3	48.6
1995	2412	53.1	52.2	52.2	47.7	52.8	49.6	50.1	48.35
2110	2412	53	50.4	51.7	48	53.5	47.7	51.8	49.2
2155	2412	53.1	49	51.5	48.9	53.4	49.1	52.4	49.83
728	2437	53.7	51.4	52.4	51.7	51.7	47.6	52	49.39
746	2437	53.2	51.5	51.7	52.5	51.9	48.2	51.8	49.4
757	2437	53.9	51.4	52.5	51.6	43.5	47.3	51	49.74
869	2437	53.6	51.4	52.1	51.2	51.3	47.9	52.1	50.5
894	2437	52.8	52.7	52.7	51.6	51.8	48.8	52.5	49.47
1930	2437	52.7	52.1	51.8	48.2	53.3	50.4	51.2	48.04
1995	2437	53.2	51.8	51.6	48.3	54	49.4	50.5	49.6
2110	2437	53.3	49.4	51.8	47.9	52.4	48.7	49	49.93
2155	2437	52.9	49.4	51	47.4	53.3	48.8	51.9	50.24
728	2462	53.5	51.7	52.5	52.4	52	47.9	52.5	49.92
746	2462	54	51.9	52.1	52.1	51.8	47.4	52.4	49.14
757	2462	53.7	52	53.1	51	52.3	48.7	52	49.2
869	2462	41.2	53.1	51.7	52.3	49.8	48.4	52.3	50.01
894	2462	53.3	52.7	52	52.1	48.8	48.4	52.2	48.95
1930	2462	53.1	51.3	52.3	47	36.7	49.7	51.9	48.21
1995	2462	53	52.1	51.9	48	52.9	49.3	51.1	49.7
2110	2462	52.8	48.9	52.8	47.8	53.3	47.2	50.2	49.88

***(2f1+f2)** Frequencies proposed by FCC (listed below) has been corrected. Formulas shown below take into account column D instead of C.

Frequency list provided by FCC

			3rd				5th			
	f1	f2	2f1-f2	2f1+f2	f2-f1	2f2+f1	3f1-2f2	3f1+2f2	3f2-2f1	3f2+2f1
	2412	2155	2669	7493	1898	6722	2926	11546	1641	11289
	2412	2110	2714	7538	1808	6632	3016	11456	1506	11154
	2437	2155	2719	7593	1873	6747	3001	11621	1591	11339
	2437	2110	2764	7638	1783	6657	3091	11531	1456	11204
	2462	2155	2769	7693	1848	6772	3076	11696	1541	11389
	2462	2110	2814	7738	1758	6682	3166	11606	1406	11254
	2412	1995	2829	7653	1578	6402	3246	11226	1161	10809
	2437	1995	2879	7753	1553	6427	3321	11301	1111	10859
	2412	1930	2894	7718	1448	6272	3876	11096	966	10614
	2462	1995	2929	7853	1528	6452	3396	11376	1061	10909
	2437	1930	2944	7818	1423	6297	3451	11171	916	10664
	2462	1930	2994	7918	1398	6322	3526	11246	866	10714
	2412	894	3930	8754	624	4200	5448	9024	2142	7506
	2412	869	3955	8779	674	4150	5498	8974	2217	7431
	2437	894	3980	8854	649	4225	5523	9099	2192	7556
	2437	869	4005	8879	699	4175	5573	9049	2267	7481
	2462	894	4030	8954	674	4250	5598	9174	2242	7606
	2462	869	4055	8979	724	4200	5648	9124	2317	7531
	2412	757	4067	8881	898	3926	5722	8750	2553	7095
	2412	746	4078	8902	920	3904	5744	8728	2586	7062
	2412	746	4078	8902	920	3904	5744	8728	2586	7062
	2412	728	4096	8920	956	3868	5780	8692	2640	7008
	2437	757	4117	8991	923	3951	5797	8825	2603	7145
	2437	746	4128	9002	945	3929	5819	8803	2636	7112
	2437	746	4128	9002	945	3929	5819	8803	2636	7112
	2437	728	4146	9020	981	3893	5855	8767	2690	7058
	2462	757	4167	9091	948	3976	5872	8900	2653	7195
	2462	746	4178	9102	970	3954	5894	8878	2686	7162
	2462	746	4178	9102	970	3954	5894	8878	2686	7162
	2462	728	4196	9120	1006	3918	5930	8842	2740	7108

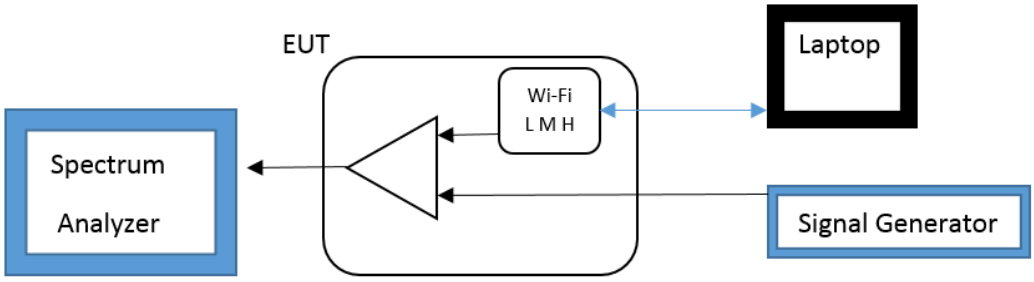
Formulas proposed by FCC

		3rd		
f1	f2	2f1-f2	2f1+f2	2f2-f1
2412	2155	=ABS(2*B3-C3)	=ABS(2*B3+D3)	=ABS(2*C3-B3)
2412	2110	=ABS(2*B4-C4)	=ABS(2*B4+D4)	=ABS(2*C4-B4)
2437	2155	=ABS(2*B5-C5)	=ABS(2*B5+D5)	=ABS(2*C5-B5)
2437	2110	=ABS(2*B6-C6)	=ABS(2*B6+D6)	=ABS(2*C6-B6)
2462	2155	=ABS(2*B7-C7)	=ABS(2*B7+D7)	=ABS(2*C7-B7)
2462	2110	=ABS(2*B8-C8)	=ABS(2*B8+D8)	=ABS(2*C8-B8)
2412	1995	=ABS(2*B9-C9)	=ABS(2*B9+D9)	=ABS(2*C9-B9)
2437	1995	=ABS(2*B10-C10)	=ABS(2*B10+D10)	=ABS(2*C10-B10)
2412	1930	=ABS(2*B11-C11)	=ABS(2*B11+D11)	=ABS(2*C11-B11)
2462	1995	=ABS(2*B12-C12)	=ABS(2*B12+D12)	=ABS(2*C12-B12)
2437	1930	=ABS(2*B13-C13)	=ABS(2*B13+D13)	=ABS(2*C13-B13)
2462	1930	=ABS(2*B14-C14)	=ABS(2*B14+D14)	=ABS(2*C14-B14)
2412	894	=ABS(2*B15-C15)	=ABS(2*B15+D15)	=ABS(2*C15-B15)
2412	869	=ABS(2*B16-C16)	=ABS(2*B16+D16)	=ABS(2*C16-B16)
2437	894	=ABS(2*B17-C17)	=ABS(2*B17+D17)	=ABS(2*C17-B17)
2437	869	=ABS(2*B18-C18)	=ABS(2*B18+D18)	=ABS(2*C18-B18)
2462	894	=ABS(2*B19-C19)	=ABS(2*B19+D19)	=ABS(2*C19-B19)
2462	869	=ABS(2*B20-C20)	=ABS(2*B20+D20)	=ABS(2*C20-B20)
2412	757	=ABS(2*B21-C21)	=ABS(2*B21+D21)	=ABS(2*C21-B21)
2412	746	=ABS(2*B22-C22)	=ABS(2*B22+D22)	=ABS(2*C22-B22)
2412	746	=ABS(2*B23-C23)	=ABS(2*B23+D23)	=ABS(2*C23-B23)
2412	728	=ABS(2*B24-C24)	=ABS(2*B24+D24)	=ABS(2*C24-B24)
2437	757	=ABS(2*B25-C25)	=ABS(2*B25+D25)	=ABS(2*C25-B25)
2437	746	=ABS(2*B26-C26)	=ABS(2*B26+D26)	=ABS(2*C26-B26)
2437	746	=ABS(2*B27-C27)	=ABS(2*B27+D27)	=ABS(2*C27-B27)
2437	728	=ABS(2*B28-C28)	=ABS(2*B28+D28)	=ABS(2*C28-B28)
2462	757	=ABS(2*B29-C29)	=ABS(2*B29+D29)	=ABS(2*C29-B29)
2462	746	=ABS(2*B30-C30)	=ABS(2*B30+D30)	=ABS(2*C30-B30)
2462	746	=ABS(2*B31-C31)	=ABS(2*B31+D31)	=ABS(2*C31-B31)
2462	728	=ABS(2*B32-C32)	=ABS(2*B32+D32)	=ABS(2*C32-B32)

Test procedure for additional intermodulation product testing

Similar test procedure to 7.4 was used to demonstrate compliance to the additional intermodulation products specified by FCC after a KDB inquiry for a fixed wideband consumer signal booster with Wi-Fi and HDTV built in. Shown below are the main differences:

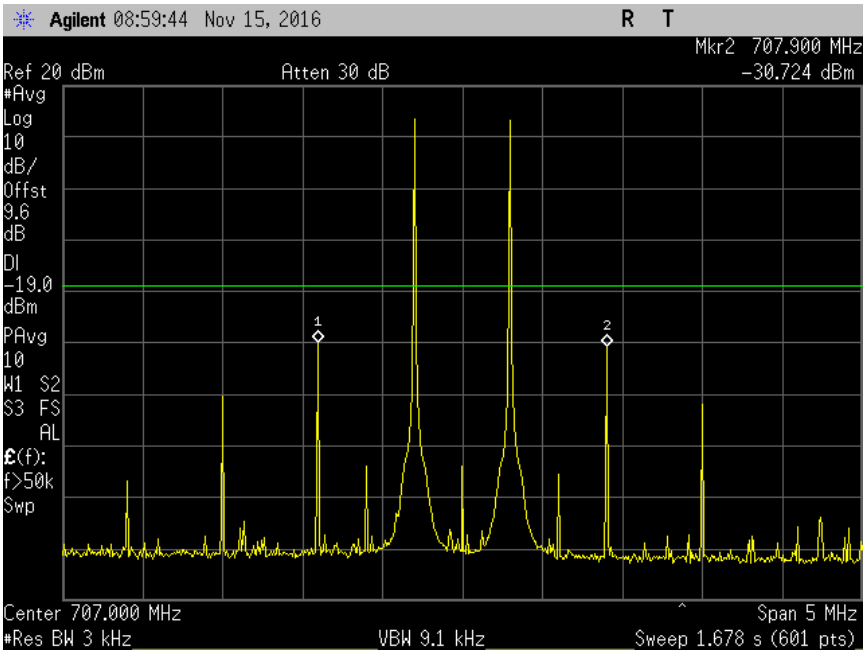
- Spectrum analyzer is set to the frequency listed on the above table.
- EUT and test equipment are connected as shown in the next figure.



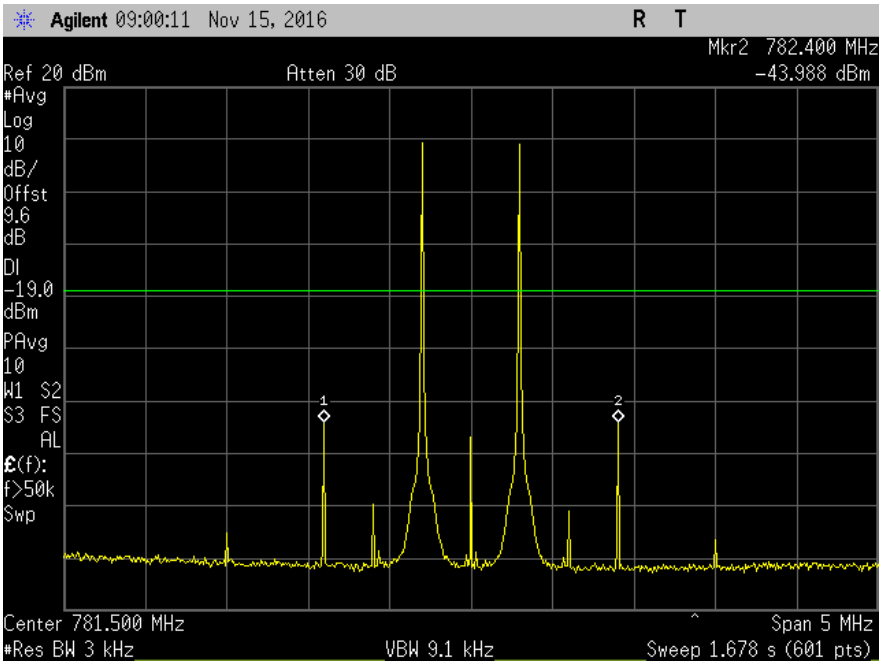
- Laptop is used to select low, medium and high channel and to adjust the worst settings obtained on report 98759-15 for testing the Wi-Fi portion of the EUT (15.247).
- Signal generator amplitude level is set just before the EUT begins AGC.
- Maximum intermodulation product amplitude level observed is recorded for each frequency listed on the above table.
- Test is repeated with AGC+10dB.

Plots

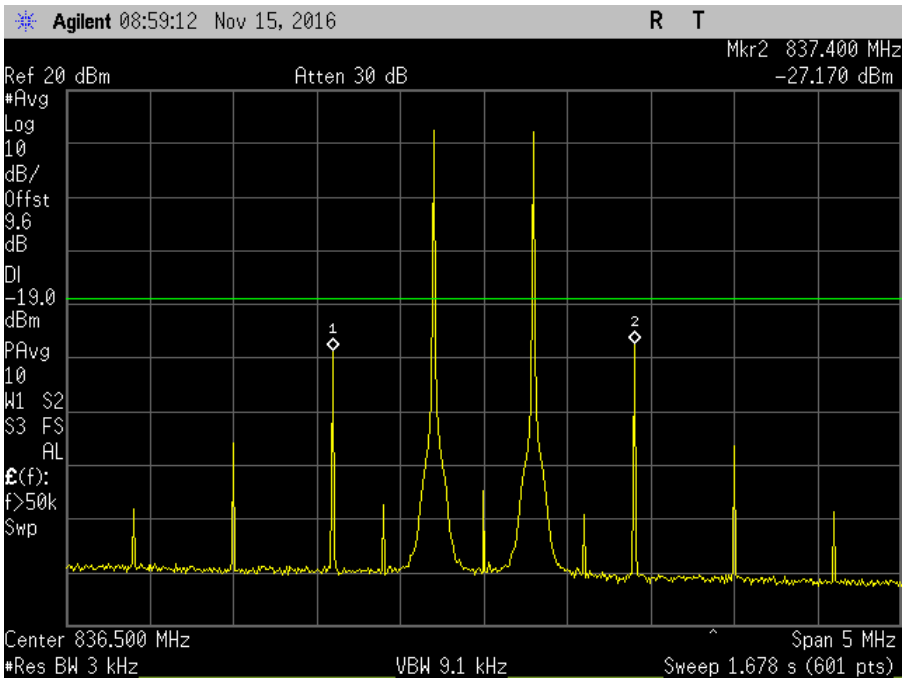
UL



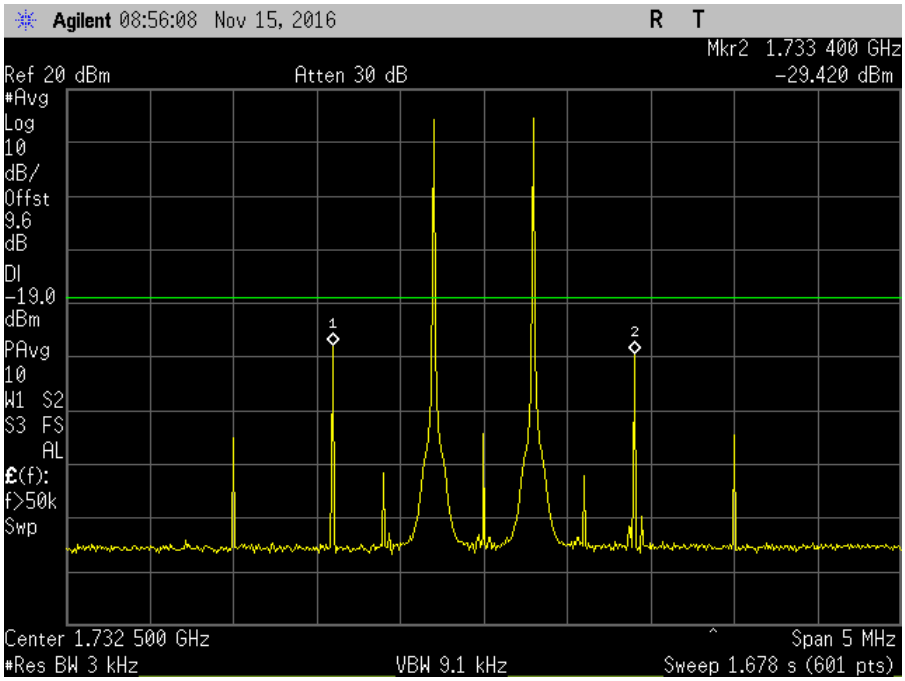
7.4_Intermod_UL_698-716MHz



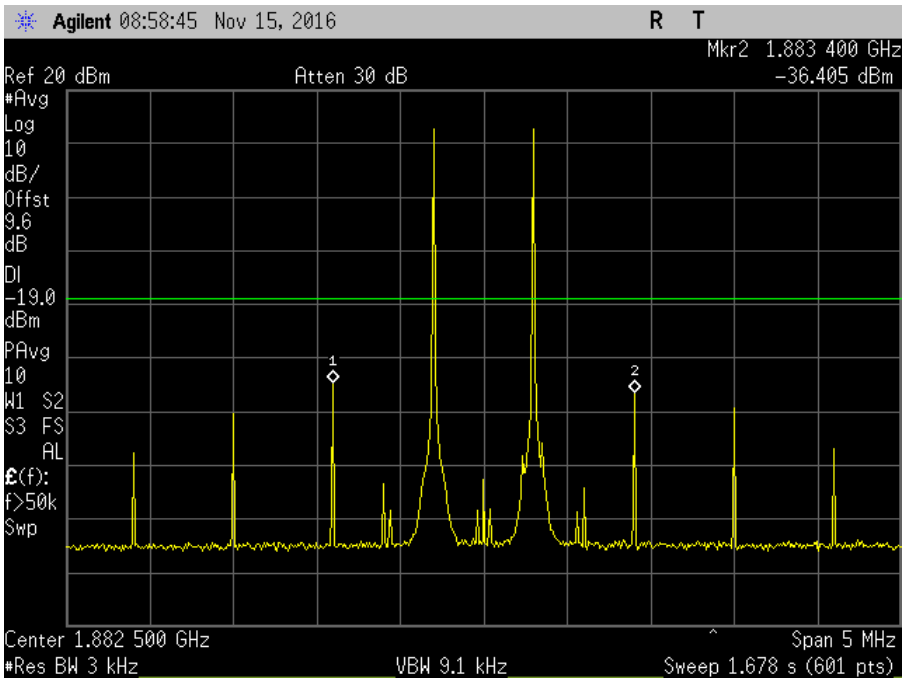
7.4_Intermod_UL_776-787MHz



7.4_Intermod_UL_824-849MHz

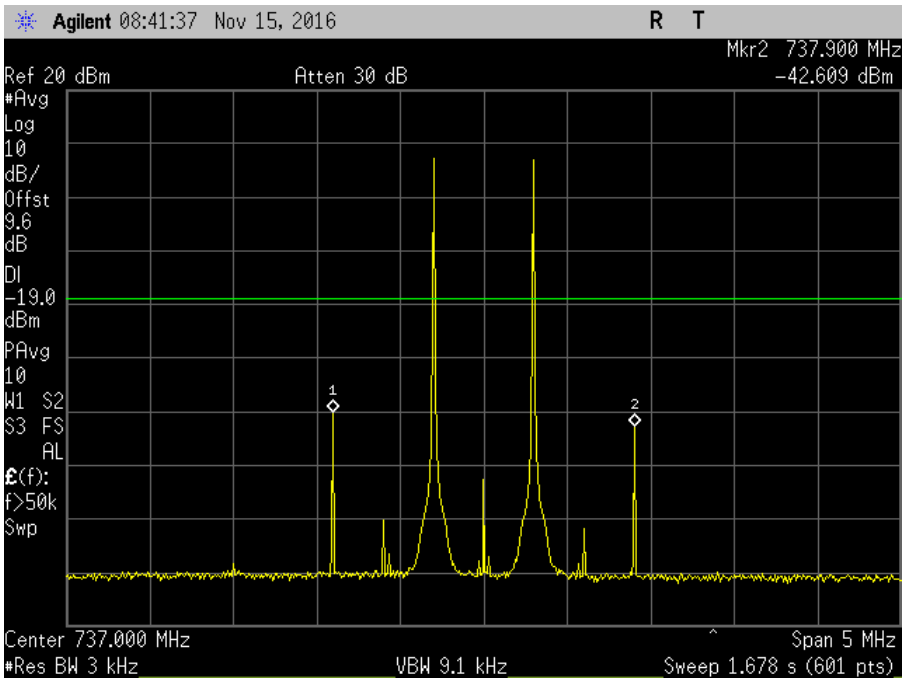


7.4_Intermod_UL_1710-1755MHz

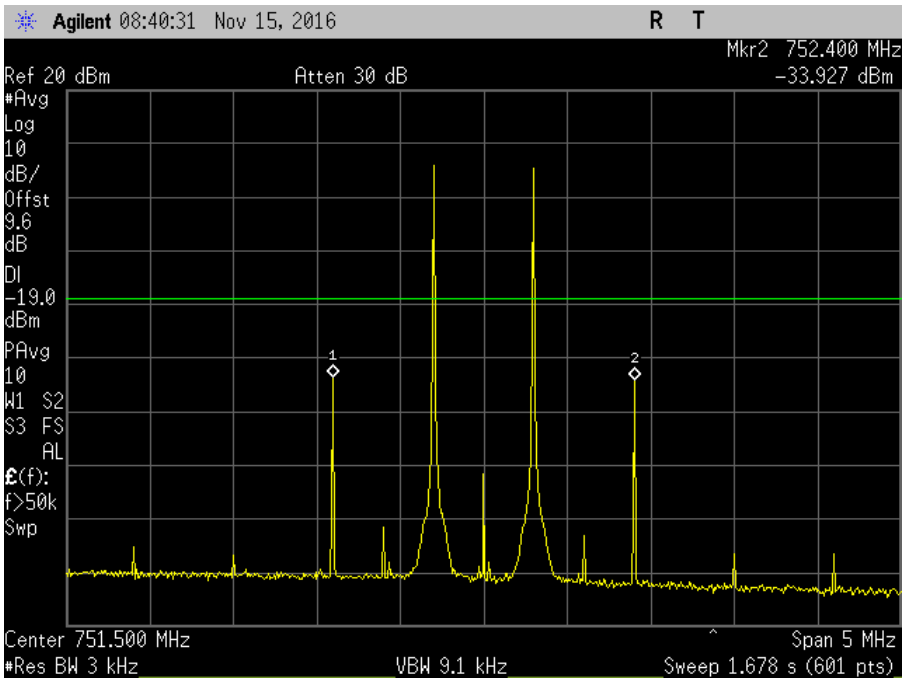


7.4_Intermod_UL_1850-1915MHz

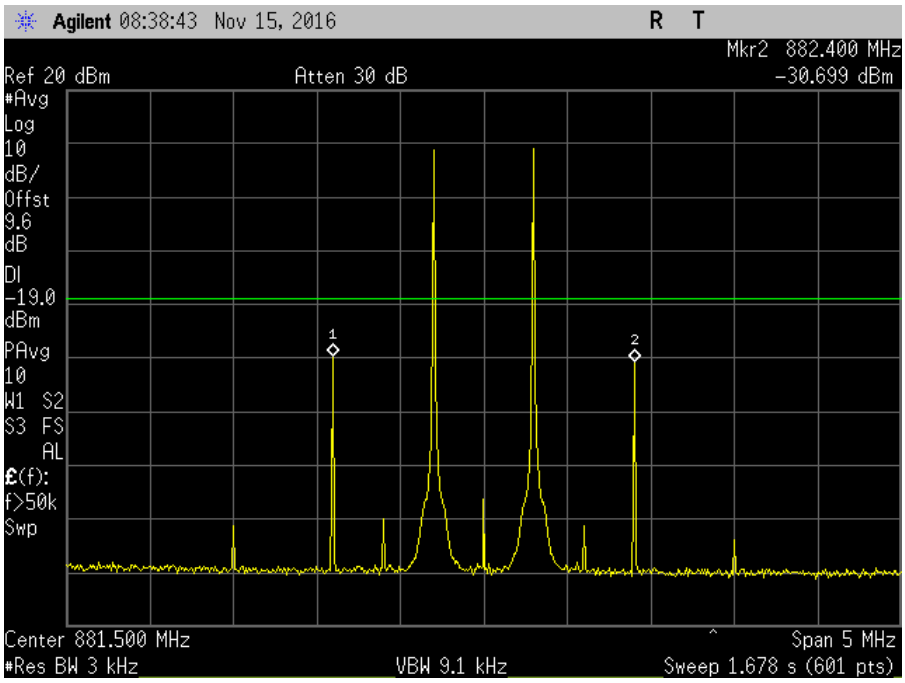
DL



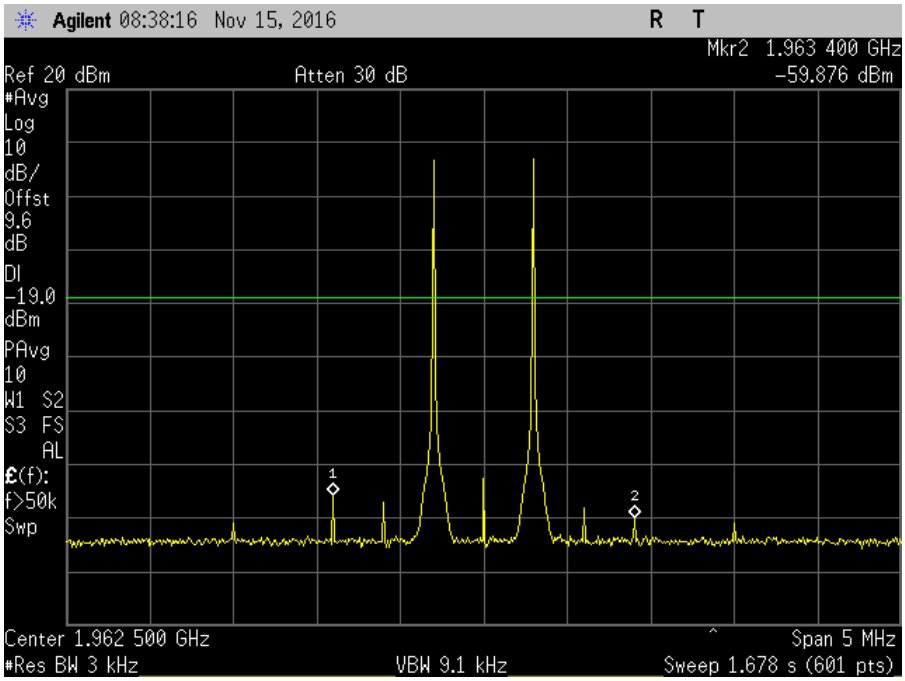
7.4_Intermod_DL_728-746MHz



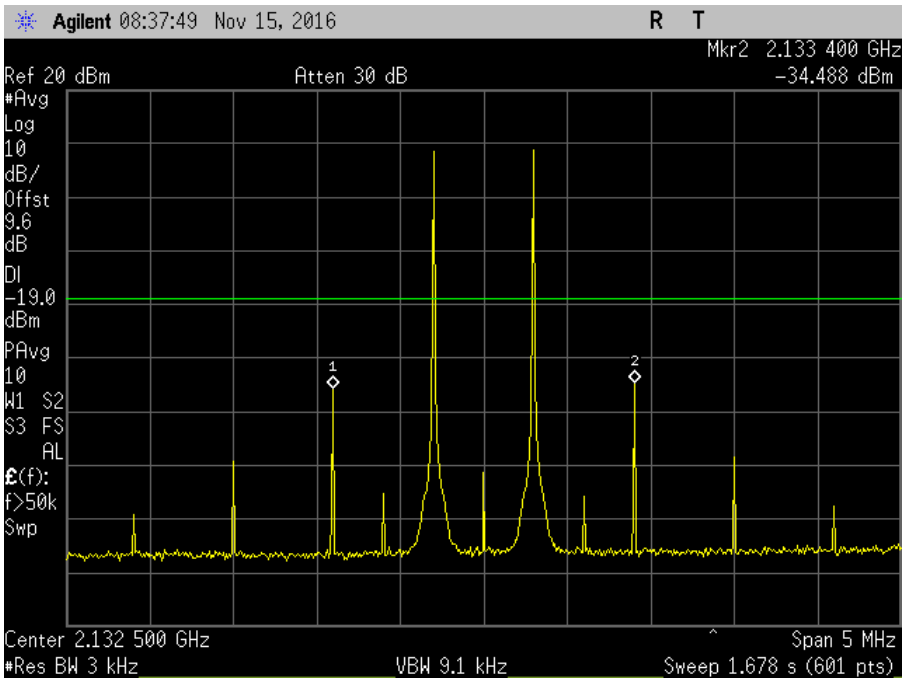
7.4_Intermod_DL_746-757MHz



7.4_Intermod_DL_869-894MHz



7.4_Intermod_DL_1930-1995MHz



7.4_Intermod_DL_2110-2155MHz

7.5 Out of Band Emissions

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**7.5 Out-of-band Emissions**		
Work Order #:	**98759**	Date:	11/15/2016
Test Type:	**Conducted Emissions**	Time:	9:17:40 AM
Tested By:	**Daniel Bertran**	Sequence#:	1
Software:	EMITest 5.03.03		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 6			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 6			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed CMRS Wideband Consumer Booster with a Wi-Fi Router and TV amplifier installed. The CMRS DL signal and the Wi-Fi Signal are combined at the diplexer and transmit via the indoor antenna.
The Consumer booster UL and DL power and gain parameters are initially measured with Wi-Fi transmitting at mid channel using sequentially 802.11b, g, n20 and n40 signal. Since no significant change in measured power was observed, all other parameters are obtained with Wi-Fi transmitting at Mid channel, 802.11b.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is type RP-TNC connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.

Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.5 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016
Firmware: V2.2
Test environment conditions: Temperature: 24°C, 60% Relative Humidity and Pressure: 101.5 kPa
Additional plots taken at 1dB before EUT shuts down and before reaching the maximum input level indicated in section 5.5 of above document.
- Maximum uplink transmitter test levels for fixed wideband consumer signal booster: +0 dBm
- The maximum downlink input level for all device types is −20 dBm

Lower RBW was used as applicable per rule part, in addition integration power function of the Spectrum Analyzers' Adjacent Channel Power tool was used to show compliance in instances where accuracy can be

improved by integrating power measured in smaller RBW and linearly summed into standard bandwidth.

Used for testing the alternative test modulation types:
- CDMA (alternative 1.25 MHz AWGN*)
- LTE 5 MHz (alternative 4.1 MHz AWGN*)

*AWGN test signal, the bandwidth was measured 99% occupied bandwidth.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03418	Signal Generator	E4438C	7/30/2015	7/30/2017
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017
	ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP06898	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP05411	Attenuator	54A-10	1/18/2016	1/18/2018
	AN02660	Spectrum Analyzer	E4446A	5/31/2016	5/31/2018

Summary of Results

Pass: As indicated in plots below, all OBE are under the limit of -19dBm.

GSM

Low

Out of Band Emission			
Freq (MHz)	Pre AGC	Limit (dBm)	Results
UL1710-1755	-21.1	-19.0	Pass
UL1850-1915	-21.4	-19.0	Pass
UL824-849	-23.3	-19.0	Pass
UL 698-716	-24.2	-19.0	Pass
UL776-787	-24.7	-19.0	Pass
DL2110-2155	-23.7	-19.0	Pass
DL1930-1995	-27.8	-19.0	Pass
DL869-894	-28.2	-19.0	Pass
DL:728-746	-33.3	-19.0	Pass
DL 746-757	-27.4	-19.0	Pass

High

Out of Band Emission			
Freq (MHz)	Pre AGC	Limit (dBm)	Results
UL1710-1755	-22.1	-19.0	Pass
UL1850-1915	-24.5	-19.0	Pass
UL824-849	-25.6	-19.0	Pass
UL 698-716	-25.6	-19.0	Pass
UL776-787	-23.2	-19.0	Pass
DL2110-2155	-25.0	-19.0	Pass
DL1930-1995	-30.2	-19.0	Pass
DL869-894	-28.8	-19.0	Pass
DL:728-746	-24.3	-19.0	Pass
DL 746-757	-29.5	-19.0	Pass

CDMA

Low

Out of Band Emission			
Freq (MHz)	Pre AGC	Limit (dBm)	Results
UL1710-1755	-32.3	-19.0	Pass
UL1850-1915	-20.1	-19.0	Pass
UL824-849	-24.6	-19.0	Pass
UL 698-716	-34.8	-19.0	Pass
UL776-787	-44.3	-19.0	Pass
DL2110-2155	-36.3	-19.0	Pass
DL1930-1995	-41.8	-19.0	Pass
DL869-894	-37.1	-19.0	Pass
DL:728-746	-53.4	-19.0	Pass
DL 746-757	-48.3	-19.0	Pass

High

Out of Band Emission			
Freq (MHz)	Pre AGC	Limit (dBm)	Results
UL1710-1755	-23.7	-19.0	Pass
UL1850-1915	-22.3	-19.0	Pass
UL824-849	-30.2	-19.0	Pass
UL 698-716	-36.9	-19.0	Pass
UL776-787	-43.4	-19.0	Pass
DL2110-2155	-32.5	-19.0	Pass
DL1930-1995	-39.6	-19.0	Pass
DL869-894	-35.6	-19.0	Pass
DL:728-746	-40.6	-19.0	Pass
DL 746-757	-46.6	-19.0	Pass

LTE

Low

Out of Band Emission			
Freq (MHz)	Pre AGC	Limit (dBm)	Results
UL1710-1755	-29.7	-19.0	Pass
UL1850-1915	-19.9	-19.0	Pass
UL824-849	-24.3	-19.0	Pass
UL 698-716	-25.6	-19.0	Pass
UL776-787	-27.5	-19.0	Pass
DL2110-2155	-22.6	-19.0	Pass
DL1930-1995	-36.9	-19.0	Pass
DL869-894	-34.1	-19.0	Pass
DL:728-746	-35.3	-19.0	Pass
DL 746-757	-33.1	-19.0	Pass

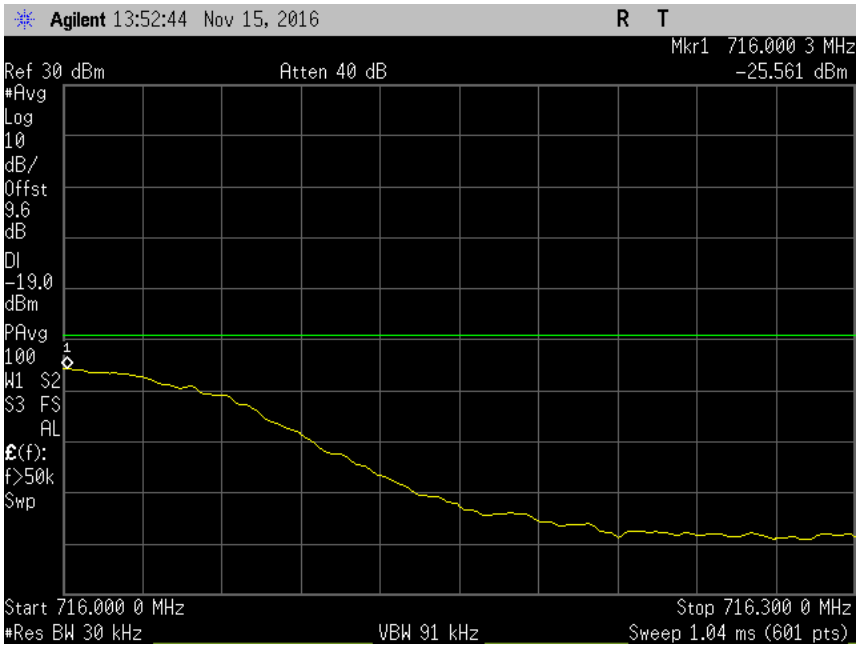
High

Out of Band Emission			
Freq (MHz)	Pre AGC	Limit (dBm)	Results
UL1710-1755	-24.3	-19.0	Pass
UL1850-1915	-19.6	-19.0	Pass
UL824-849	-28.5	-19.0	Pass
UL 698-716	-29.7	-19.0	Pass
UL776-787	-28.6	-19.0	Pass
DL2110-2155	-22.8	-19.0	Pass
DL1930-1995	-37.7	-19.0	Pass
DL869-894	-33.6	-19.0	Pass
DL:728-746	-27.1	-19.0	Pass
DL 746-757	-34.3	-19.0	Pass

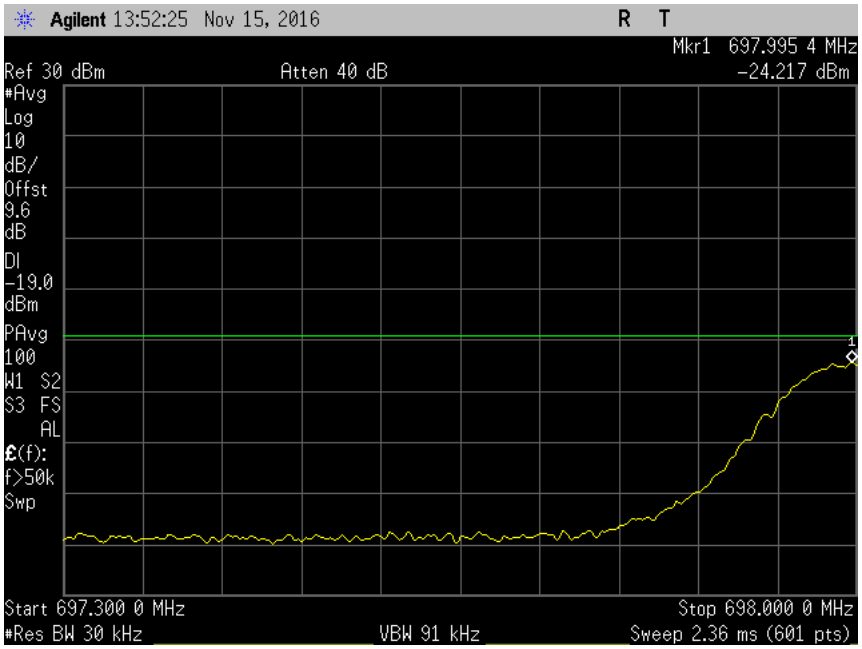
Note: The EUT also maintains compliance with the out-of-band emissions limit at input power indicated in section 5.5.

Plots

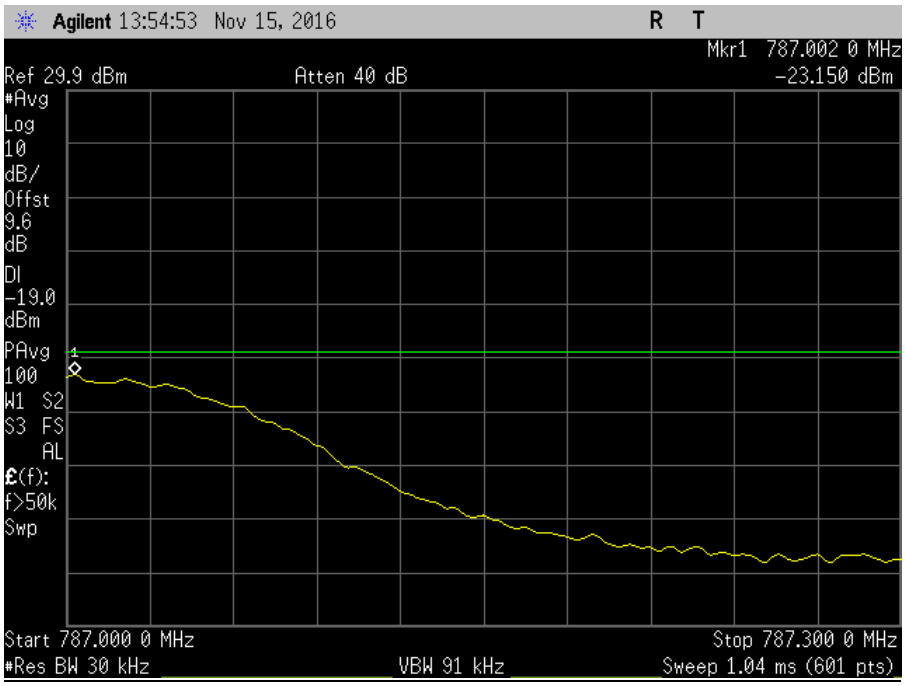
GSM, UL



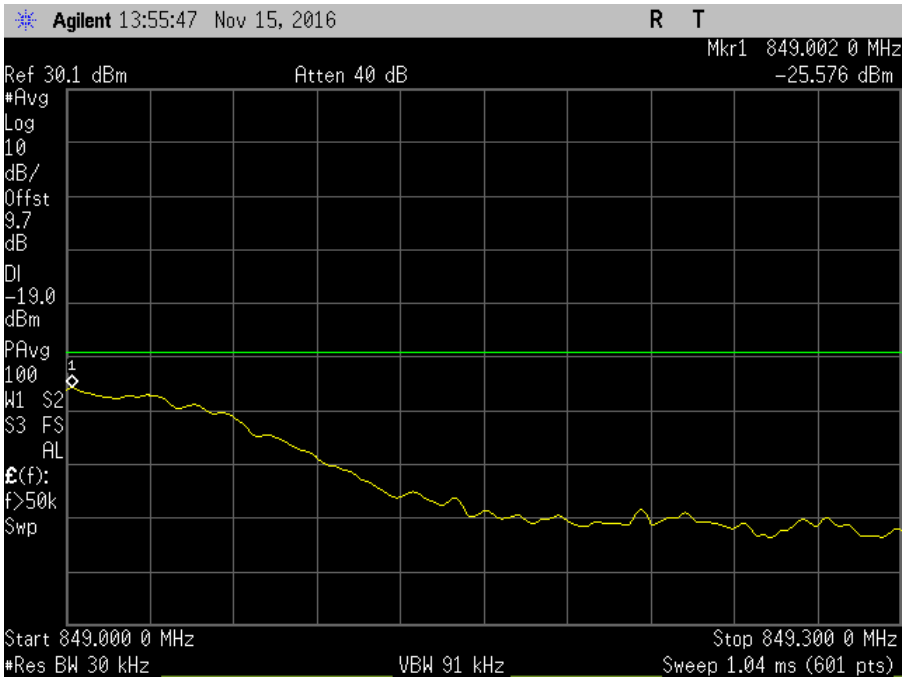
7.5_OBE_UL_698-716MHz_H_PreAGC_GSM



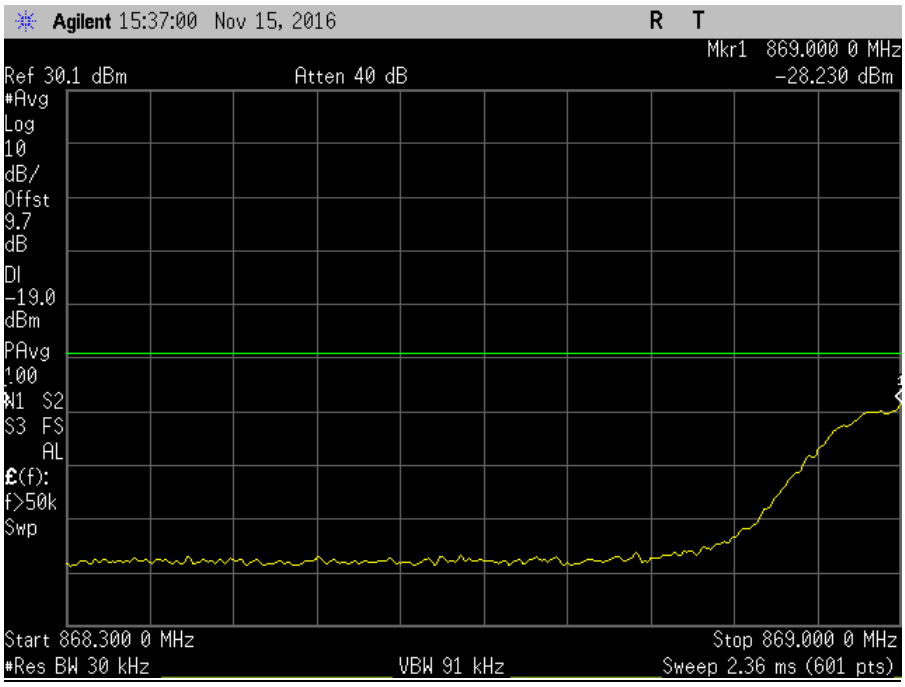
7.5_OBE_UL_698-716MHz_L_PreAGC_GSM



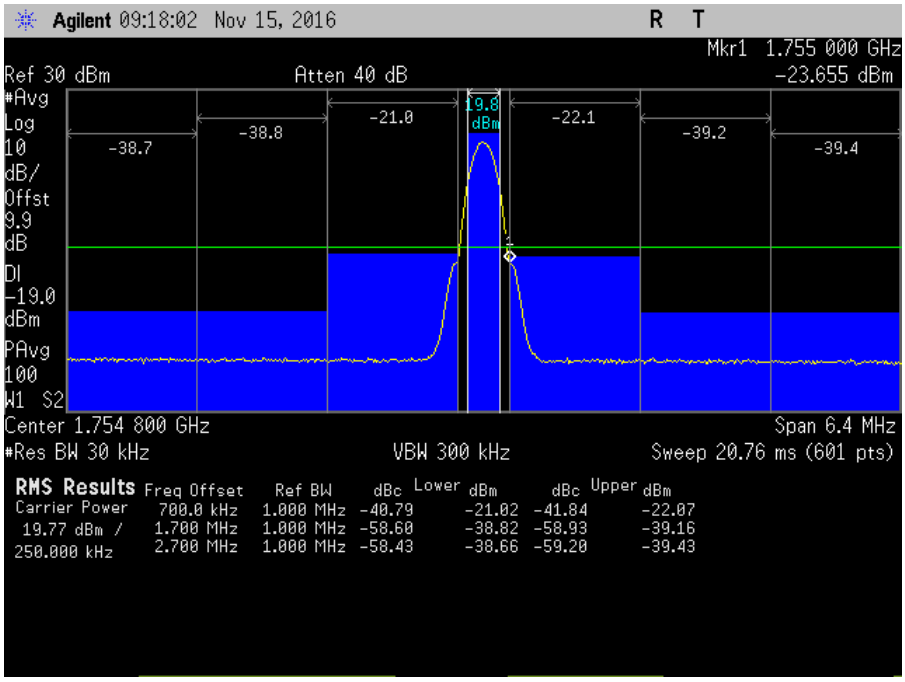
7.5_OBE_UL_776-787MHz_H_PreAGC_GSM



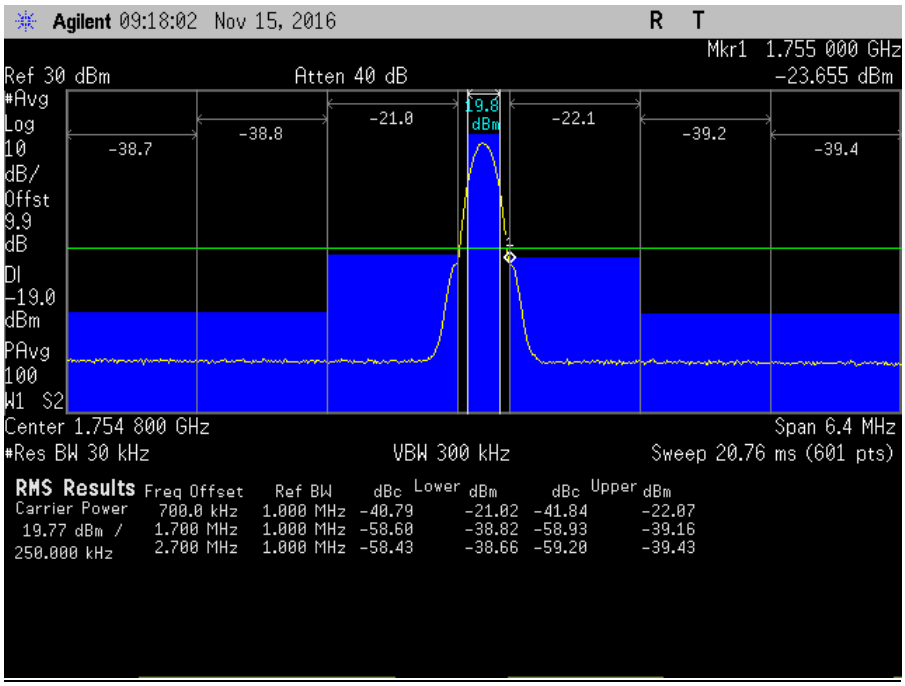
7.5_OBE_UL_776-787MHz_L_PreAGC_GSM



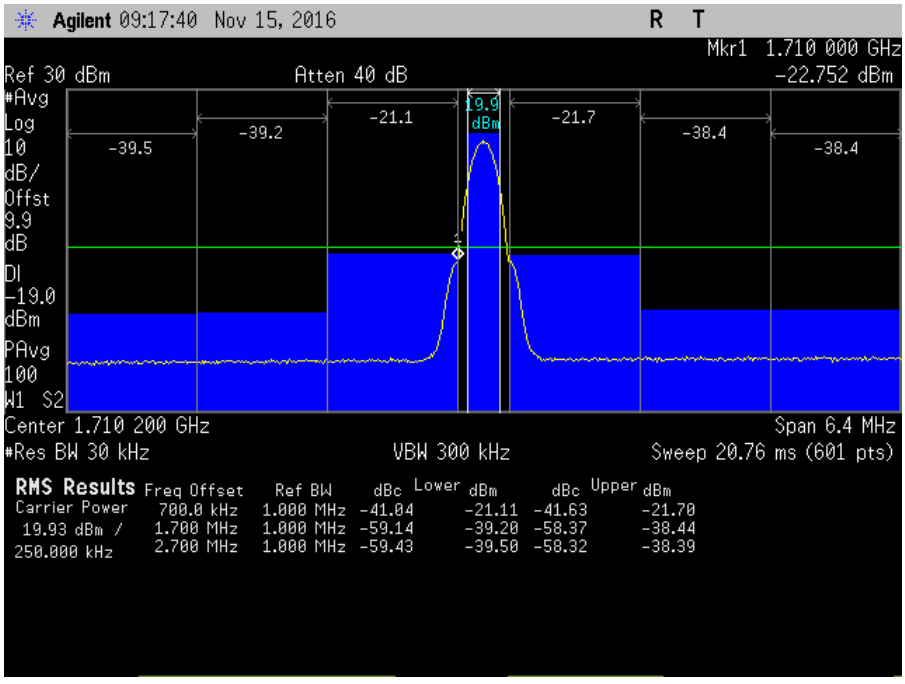
7.5_OBE_UL_824-849MHz_H_PreAGC_GSM



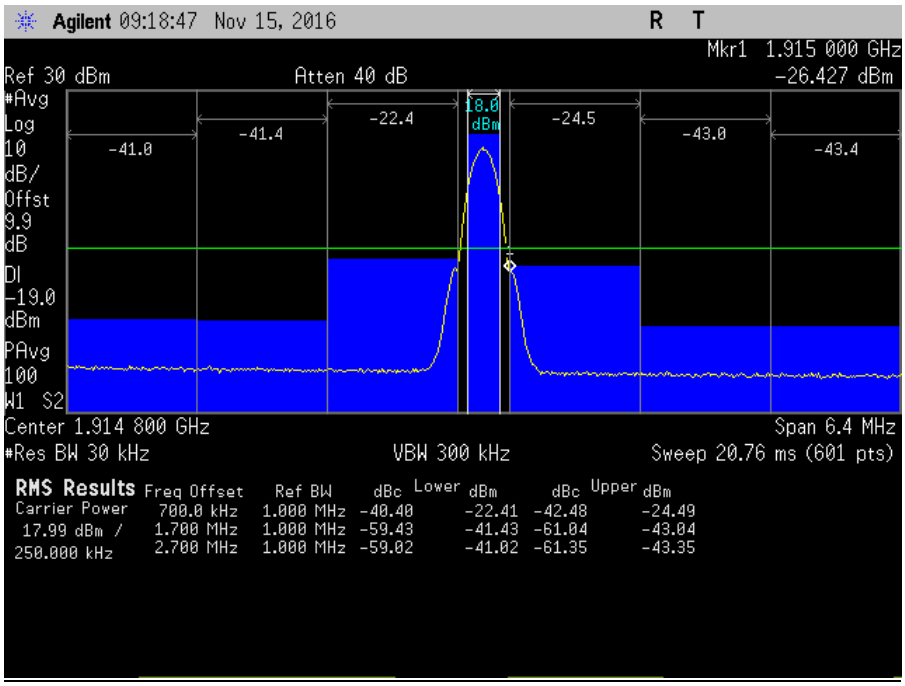
7.5_OBE_UL_824-849MHz_L_PreAGC_GSM



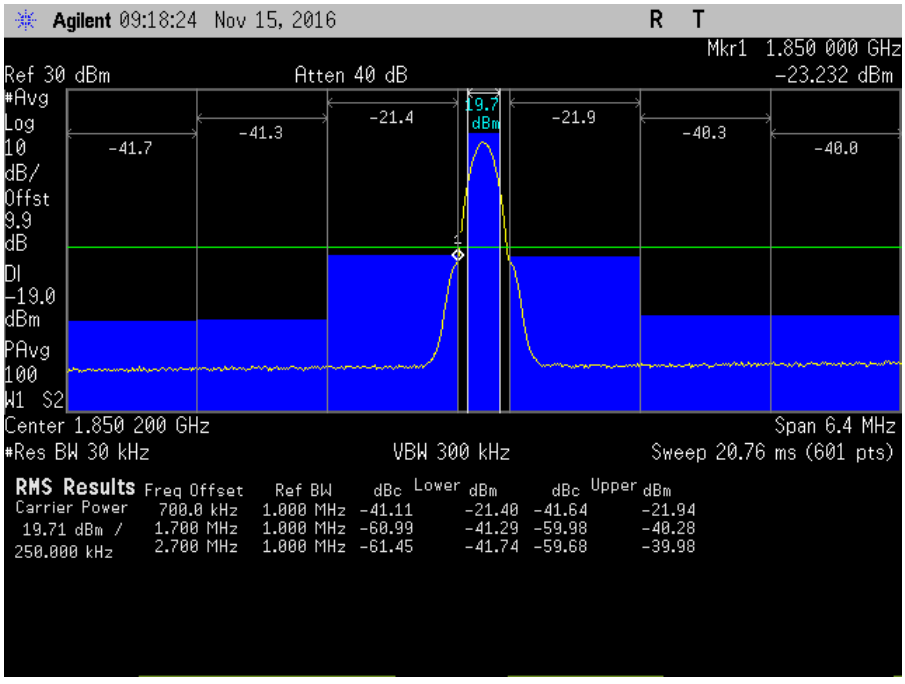
7.5_OBE_UL_1710-1755MHz_H_PreAGC_GSM



7.5_OBE_UL_1710-1755MHz_L_PreAGC_GSM

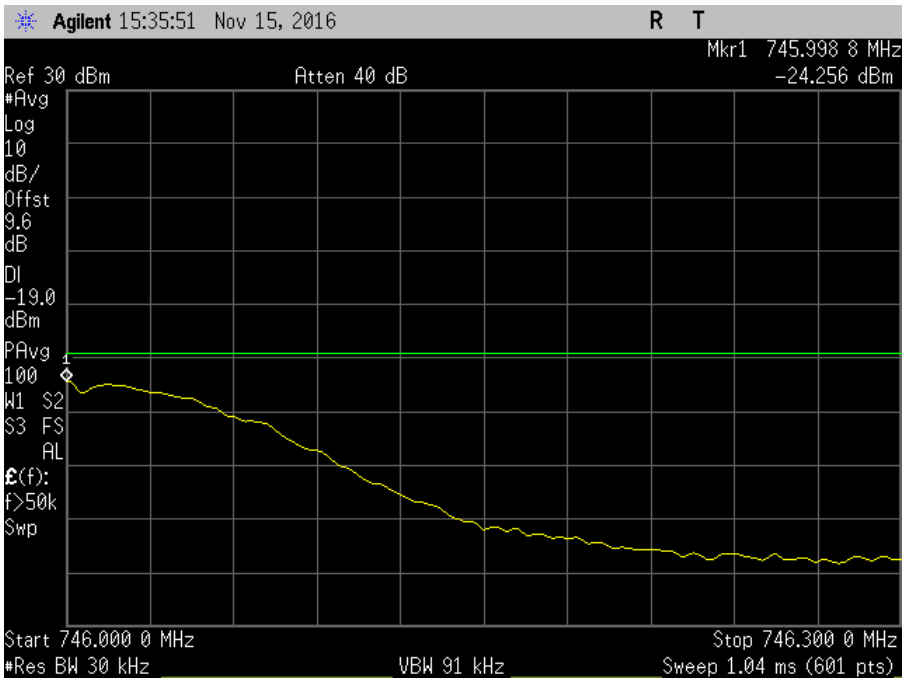


7.5_OBE_UL_1850-1915MHz_H_PreAGC_GSM

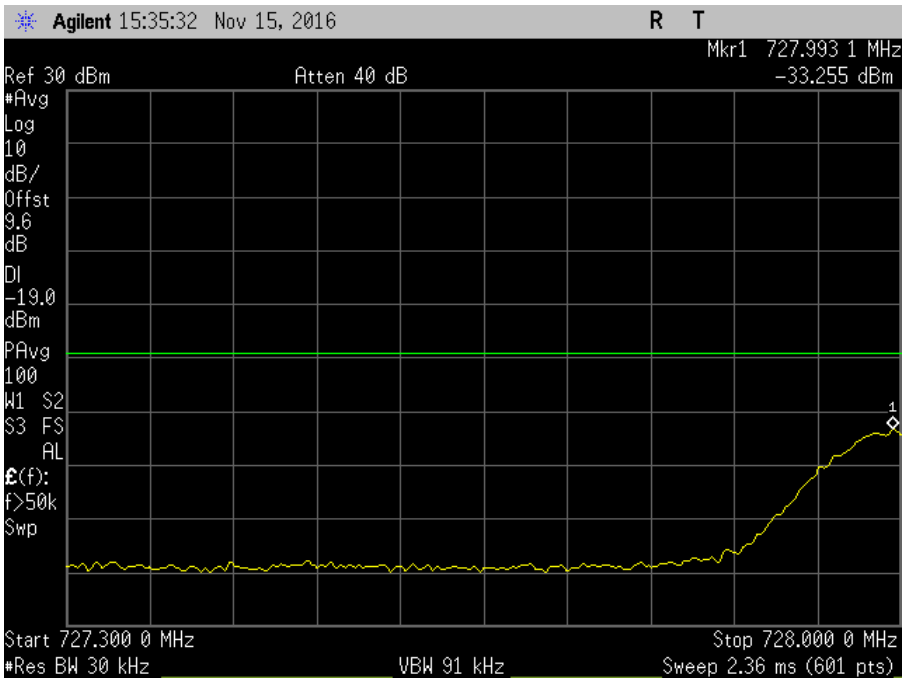


7.5_OBE_UL_1850-1915MHz_L_PreAGC_GSM

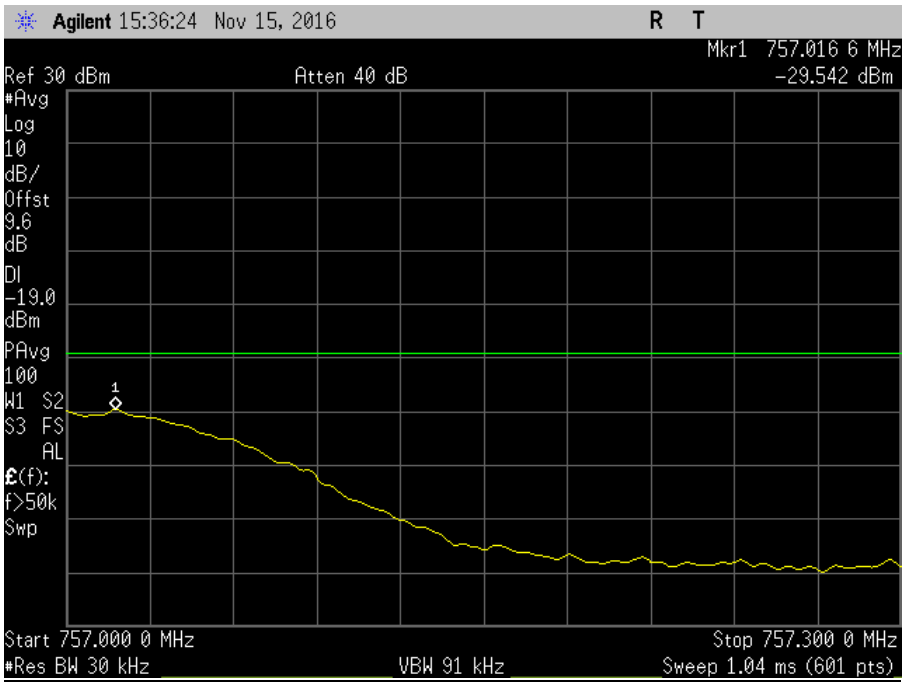
GSM, DL



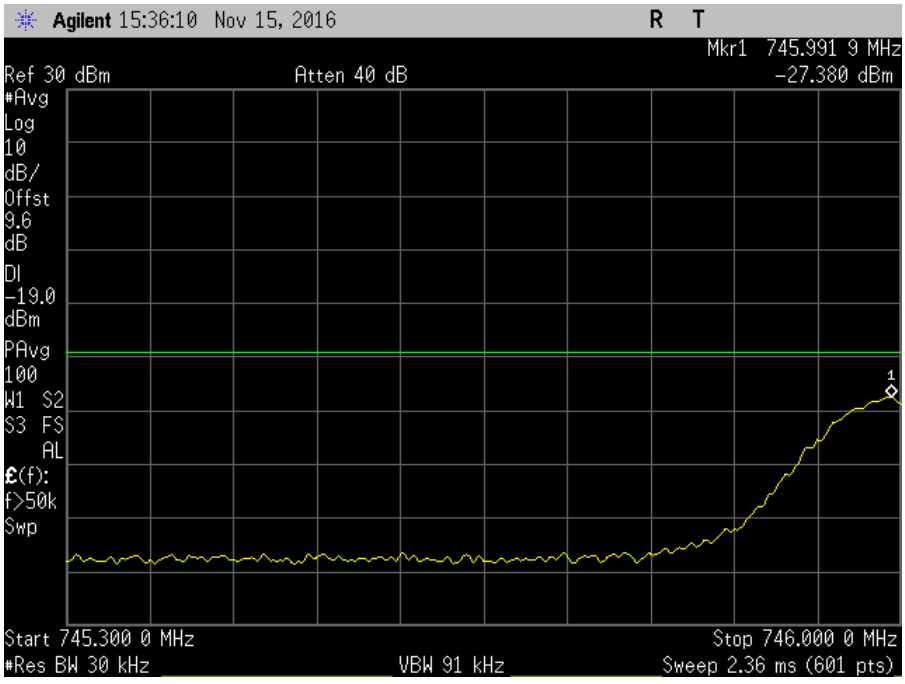
7.5_OBE_DL_728-746MHz_H_PreAGC_GSM



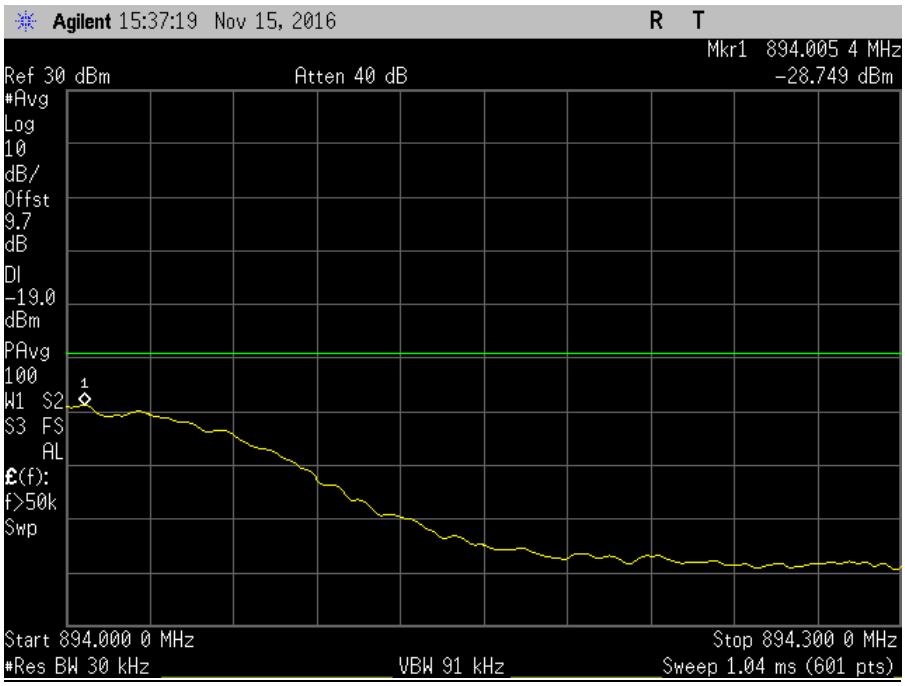
7.5_OBE_DL_728-746MHz_L_PreAGC_GSM



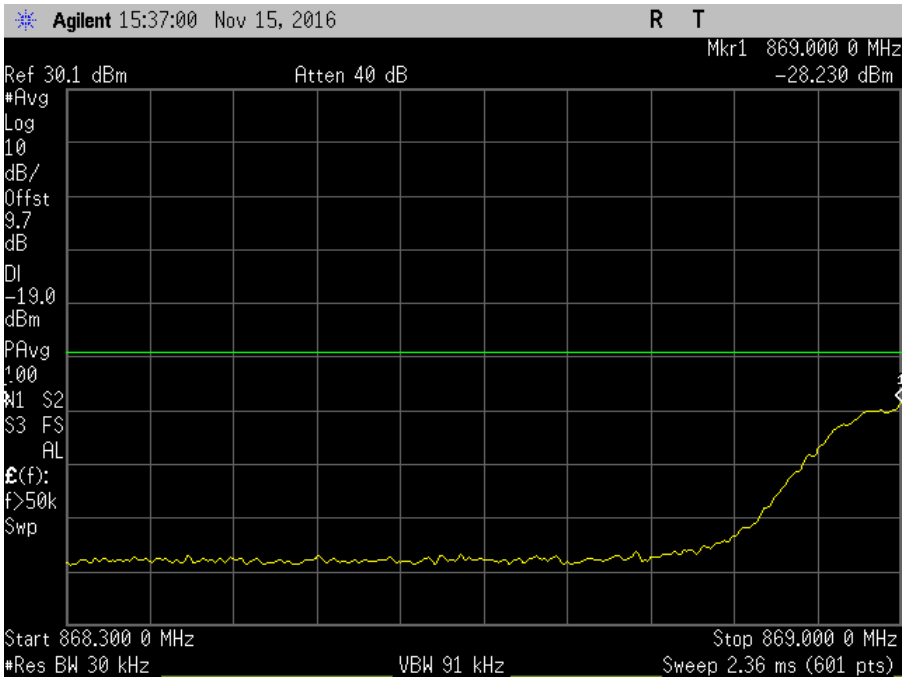
7.5_OBE_DL_746-757MHz_H_PreAGC_GSM



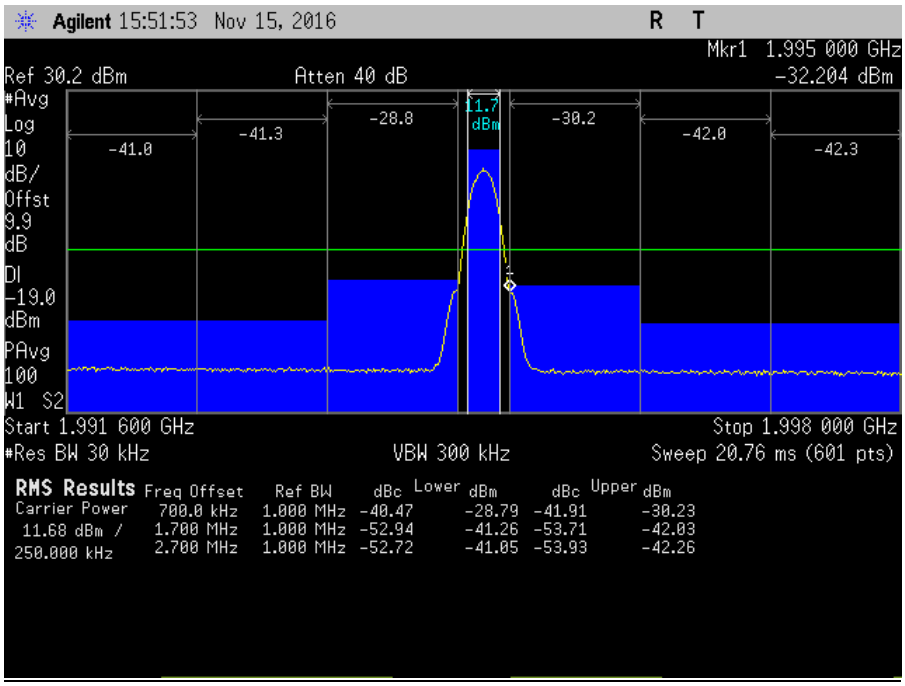
7.5_OBE_DL_746-757MHz_L_PreAGC_GSM



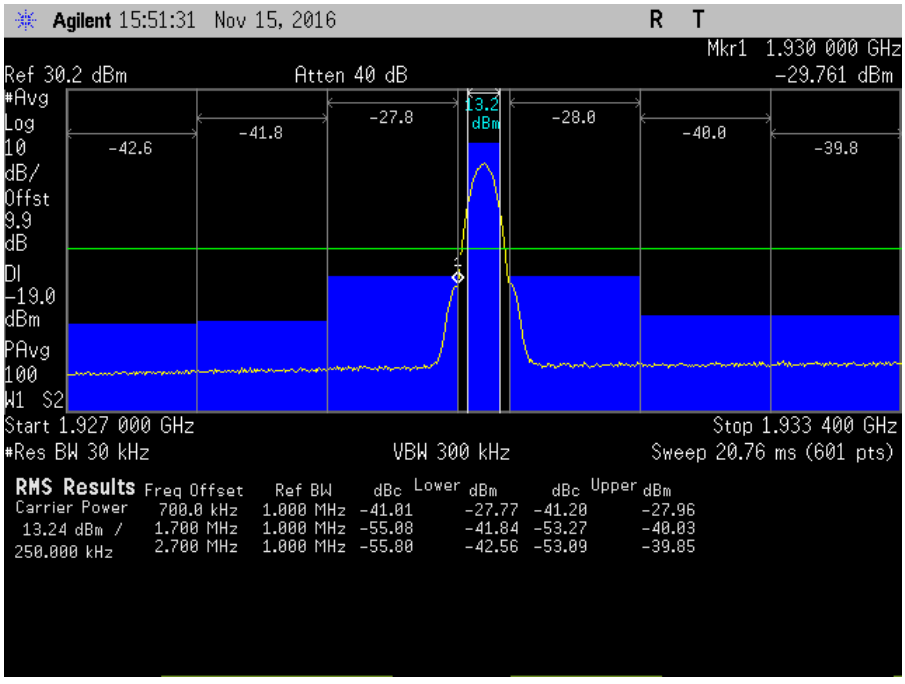
7.5_OBE_DL_869-894MHz_H_PreAGC_GSM



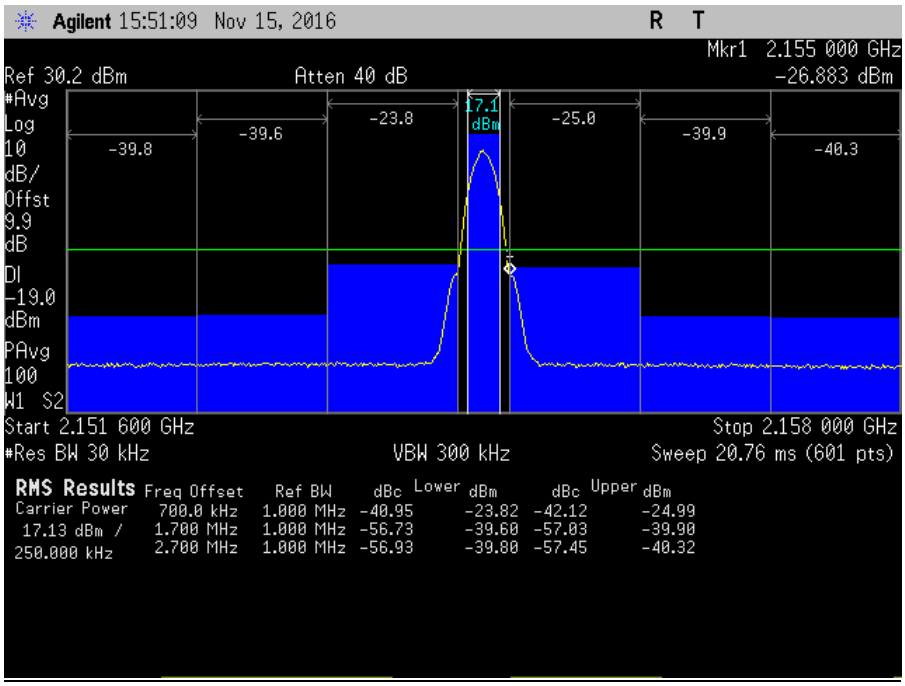
7.5_OBE_DL_869-894MHz_L_PreAGC_GSM



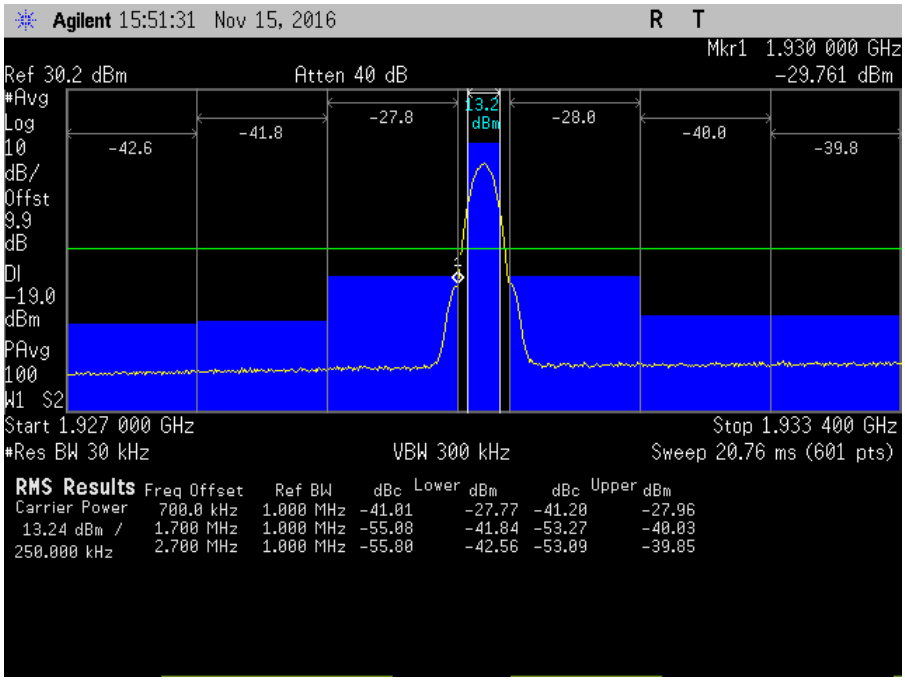
7.5_OBE_DL_1930-1995MHz_H_PreAGC_GSM



7.5_OBE_DL_1930-1995MHz_L_PreAGC_GSM

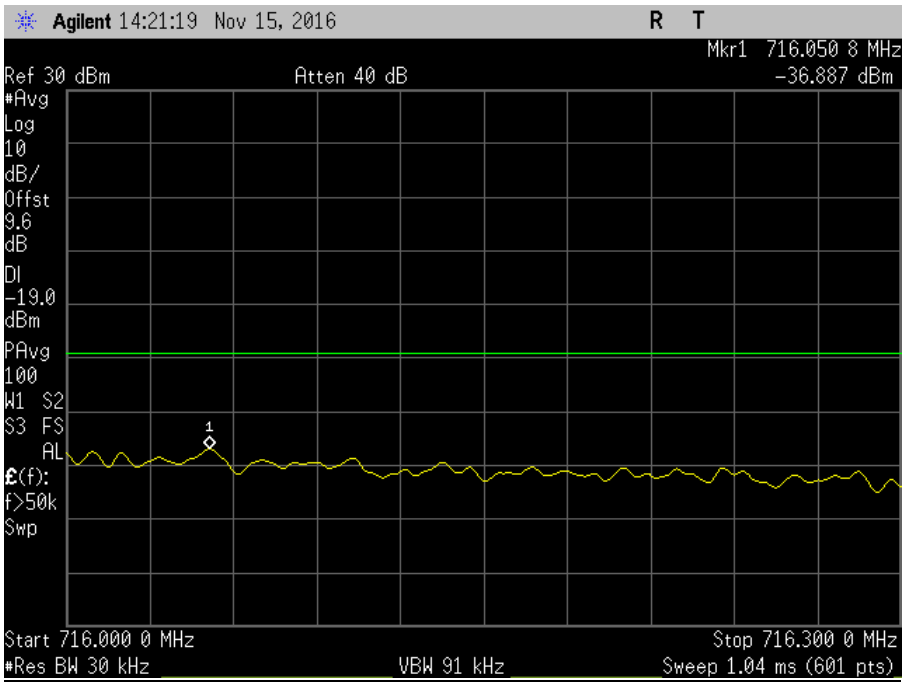


7.5_OBE_DL_2110-2155MHz_H_PreAGC_GSM

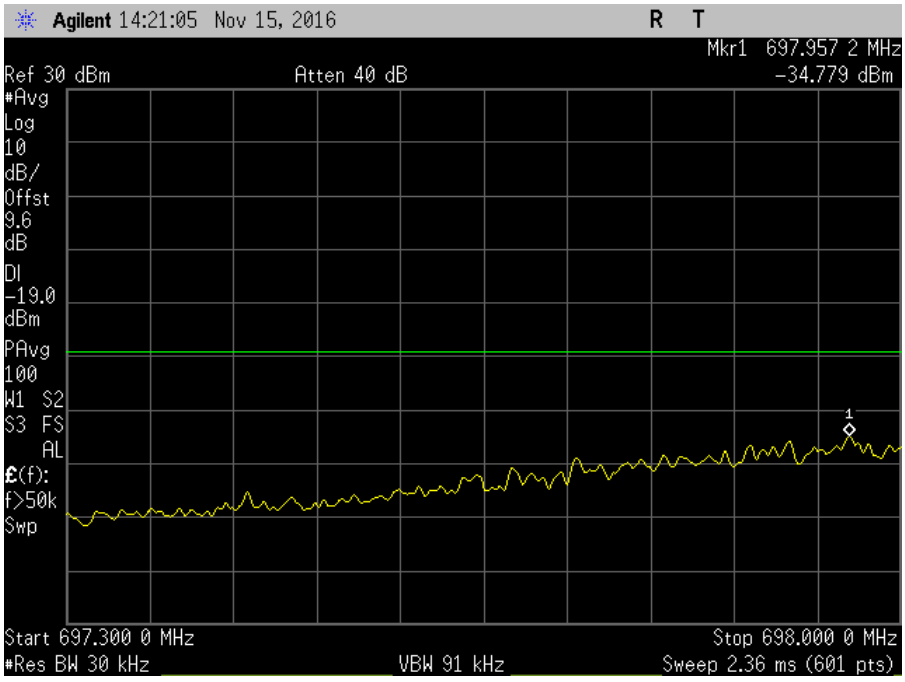


7.5_OBE_DL_2110-2155MHz_L_PreAGC_GSM

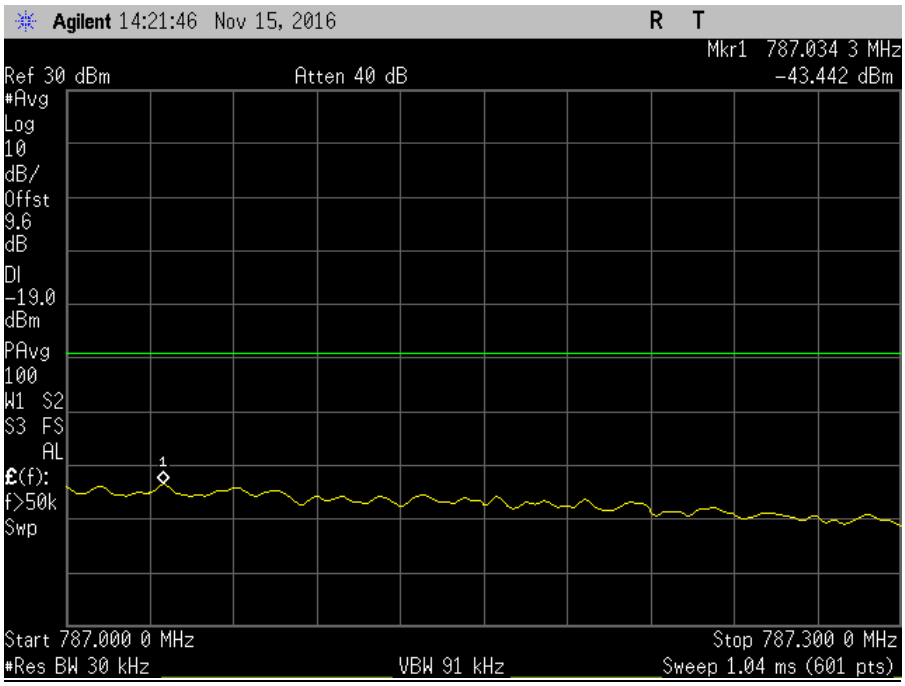
CDMA, UL



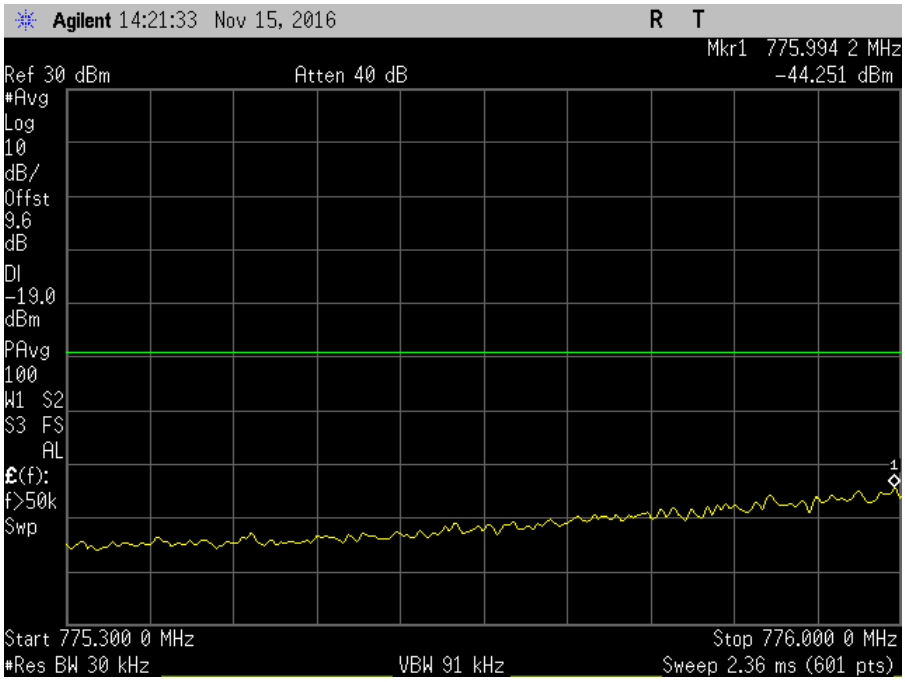
7.5_OBE_UL_698-716MHz_H_PreAGC_CDMA



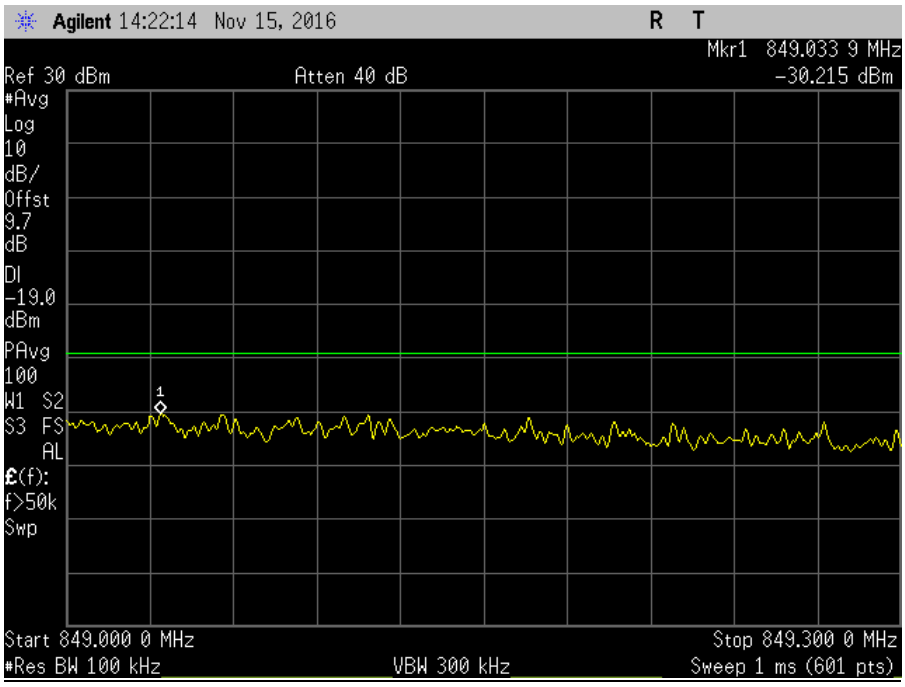
7.5_OBE_UL_698-716MHz_L_PreAGC_CDMA



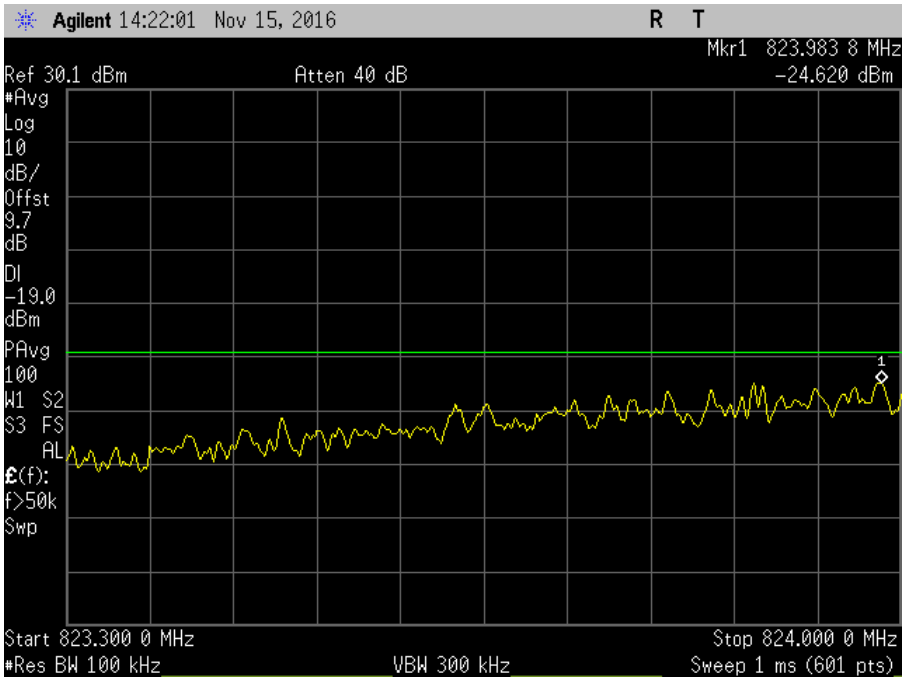
7.5_OBE_UL_776-787MHz_H_PreAGC_CDMA



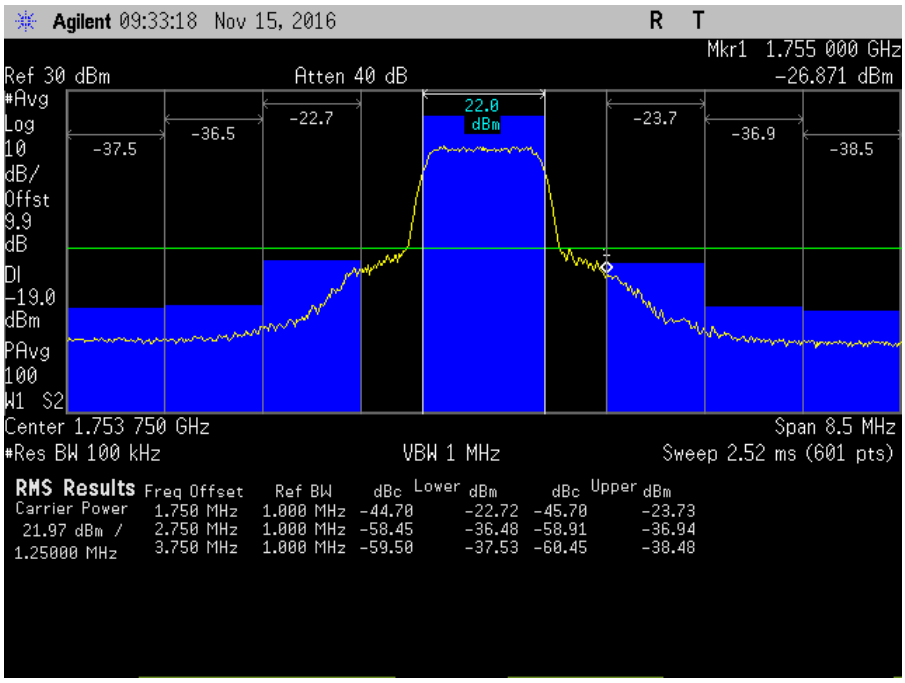
7.5_OBE_UL_776-787MHz_L_PreAGC_CDMA



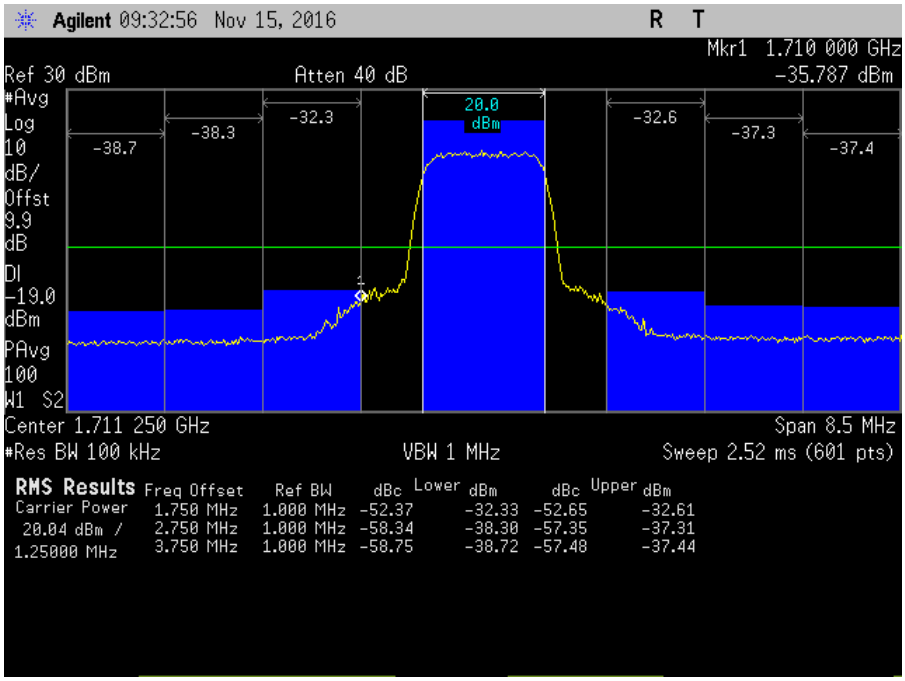
7.5_OBE_UL_824-849MHz_H_PreAGC_CDMA



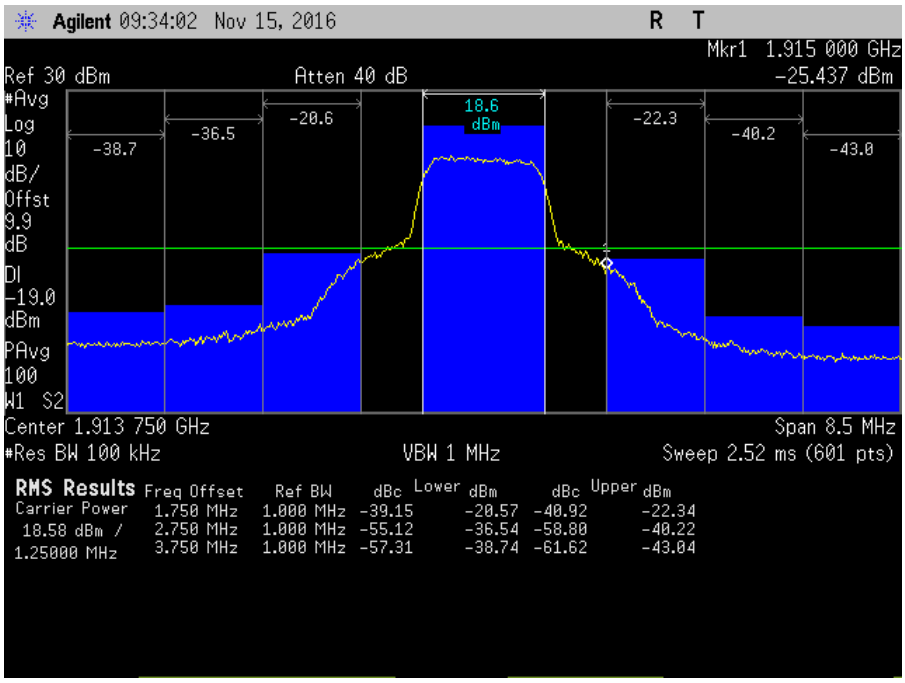
7.5_OBE_UL_824-849MHz_L_PreAGC_CDMA



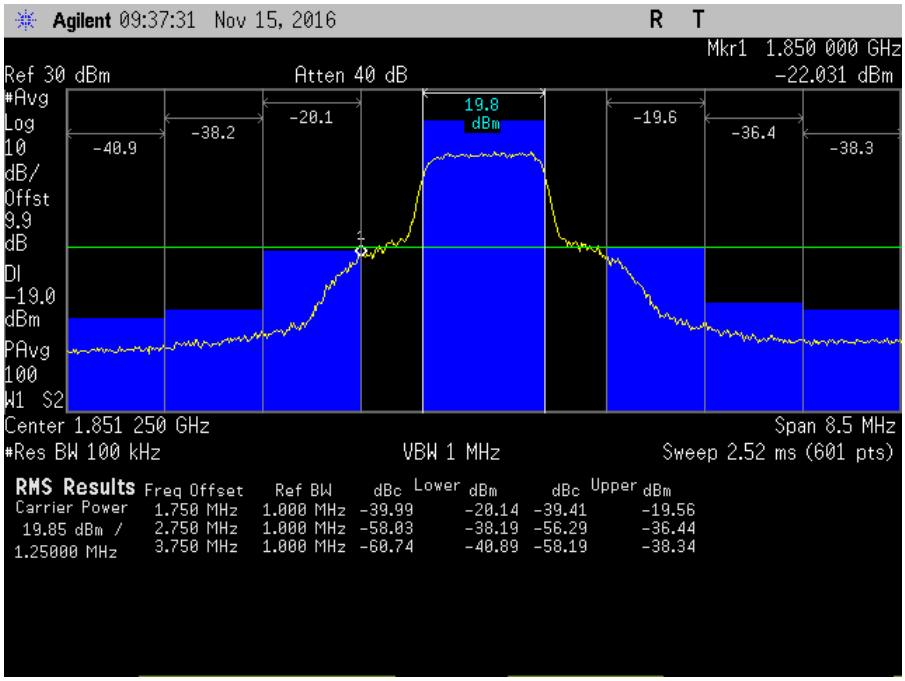
7.5_OBE_UL_1710-1755MHz_H_PreAGC_CDMA



7.5_OBE_UL_1710-1755MHz_L_PreAGC_CDMA

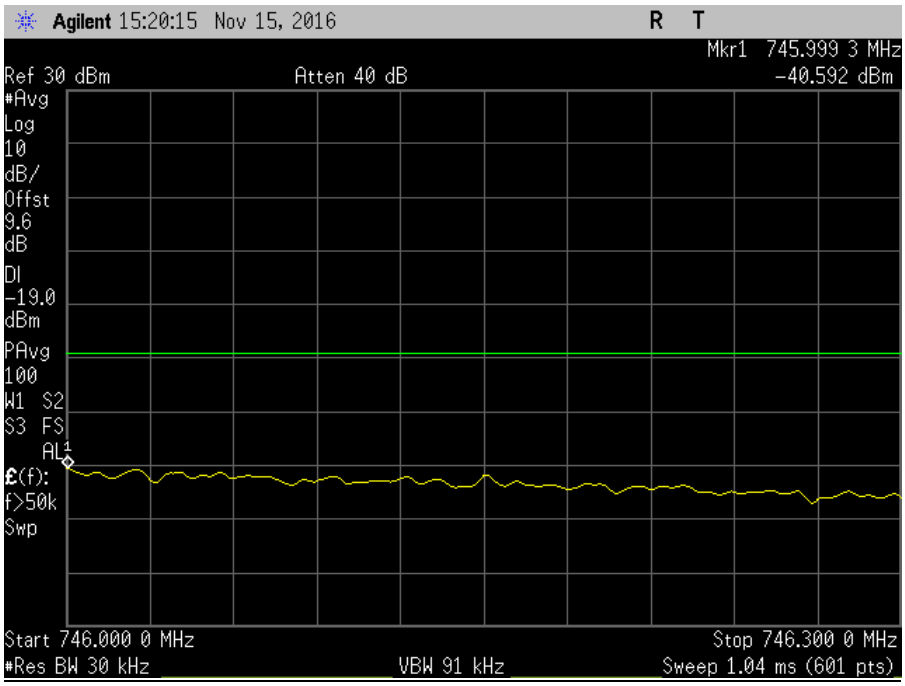


7.5_OBE_UL_1850-1915MHz_H_PreAGC_CDMA

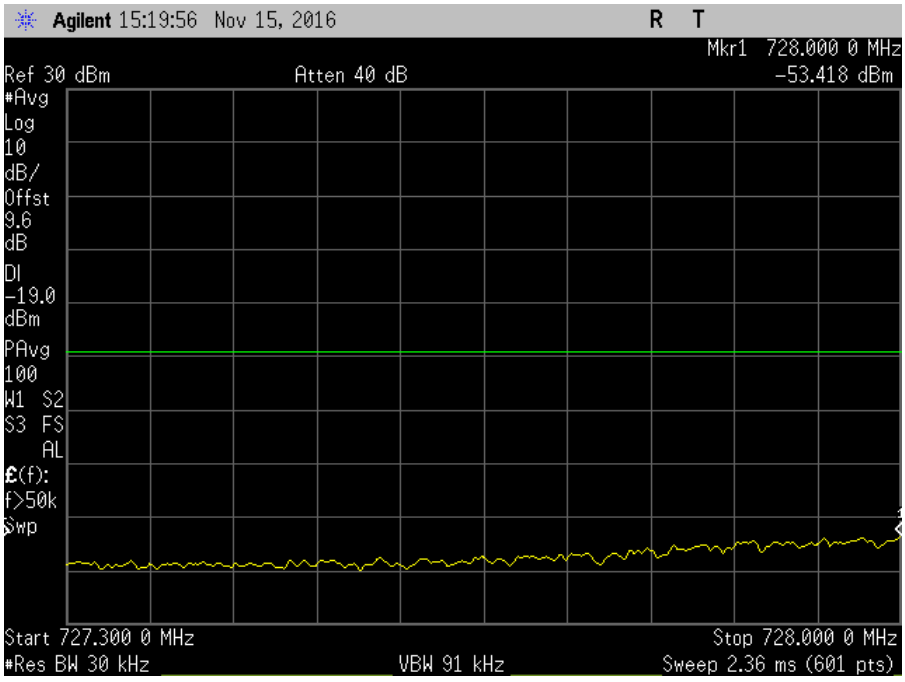


7.5_OBE_UL_1850-1915MHz_L_PreAGC_CDMA

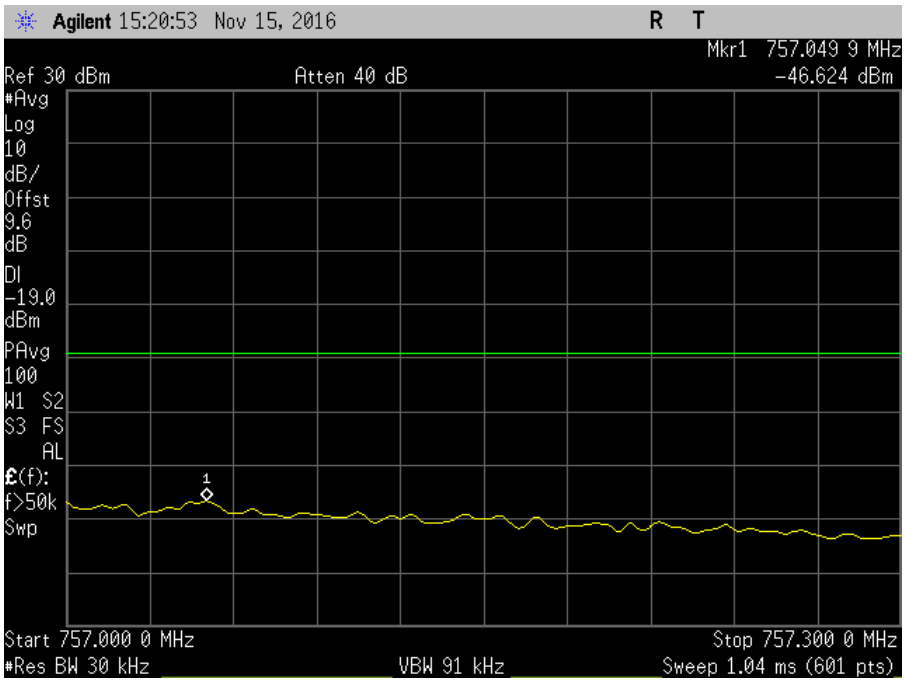
CDMA, DL



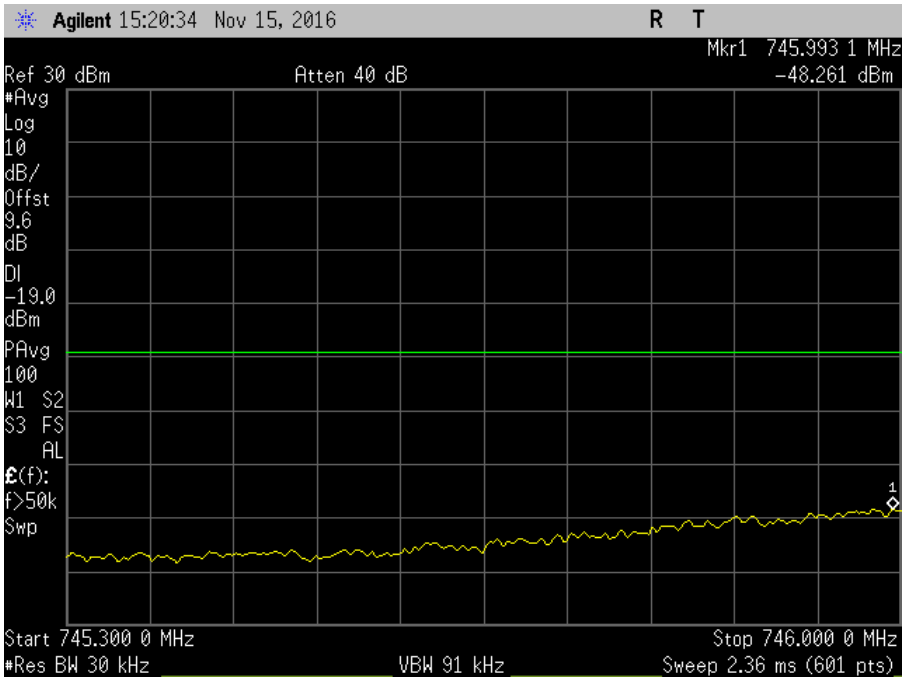
7.5_OBE_DL_728-746MHz_H_PreAGC_CDMA



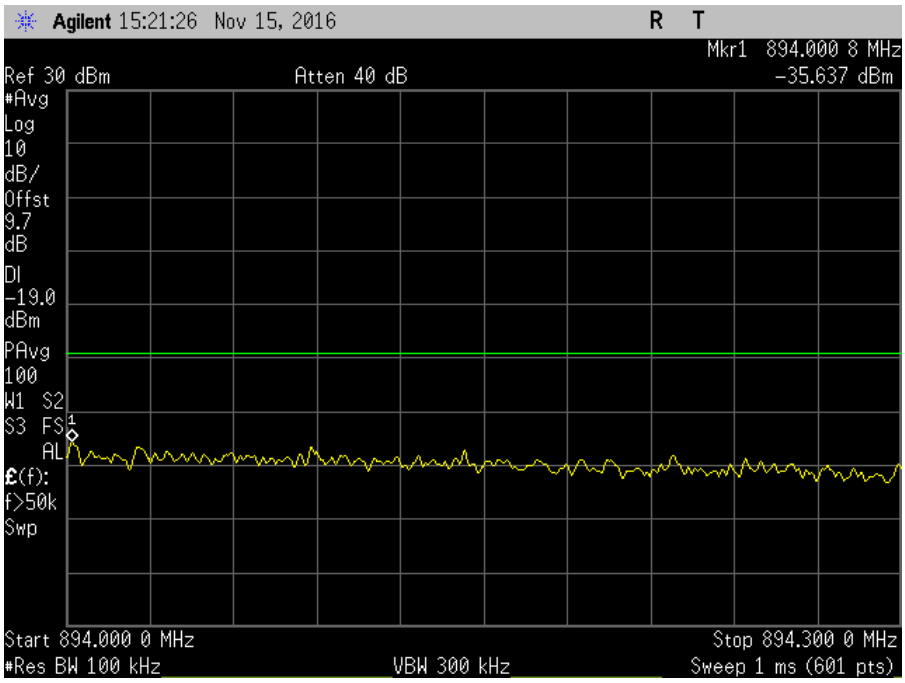
7.5_OBE_DL_728-746MHz_L_PreAGC_CDMA



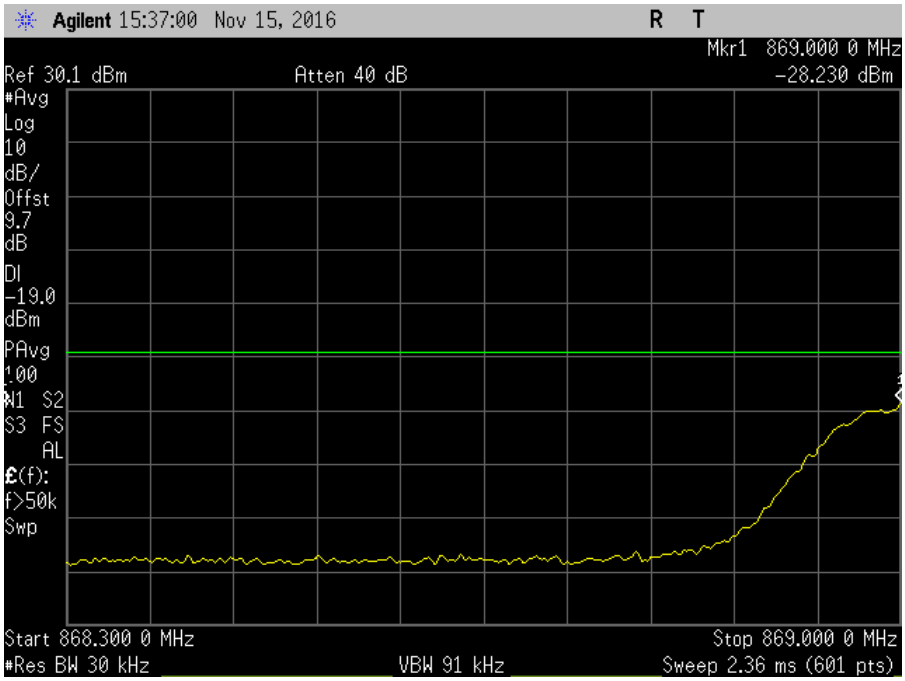
7.5_OBE_DL_746-757MHz_H_PreAGC_CDMA



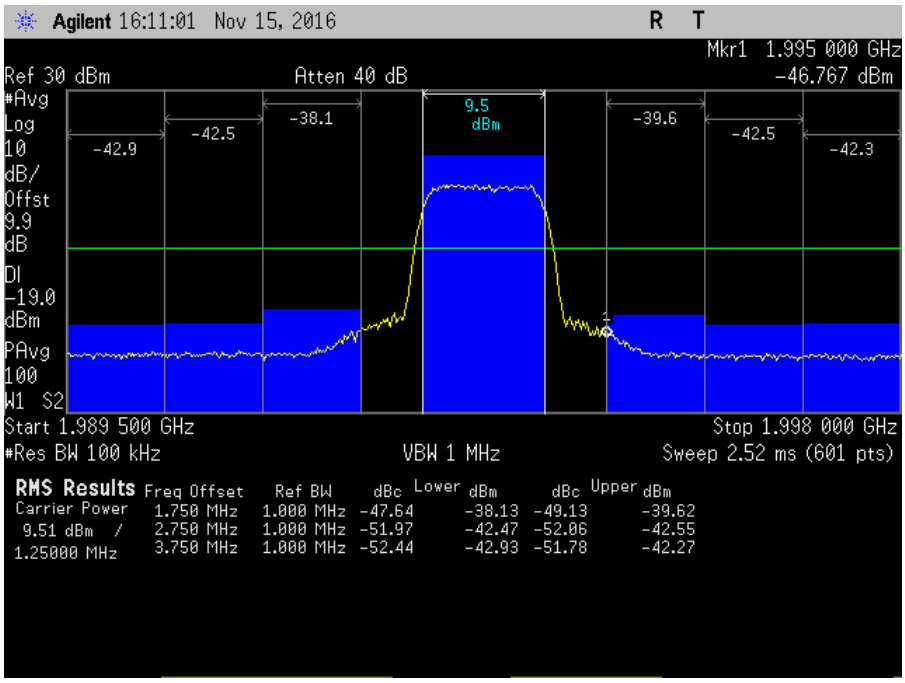
7.5_OBE_DL_746-757MHz_L_PreAGC_CDMA



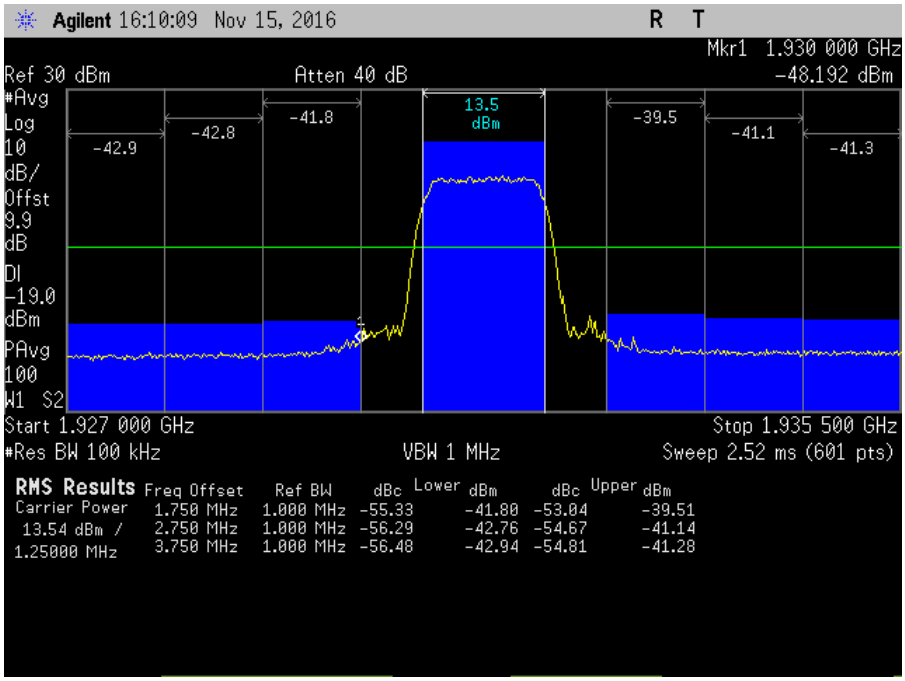
7.5_OBE_DL_869-894MHz_H_PreAGC_CDMA



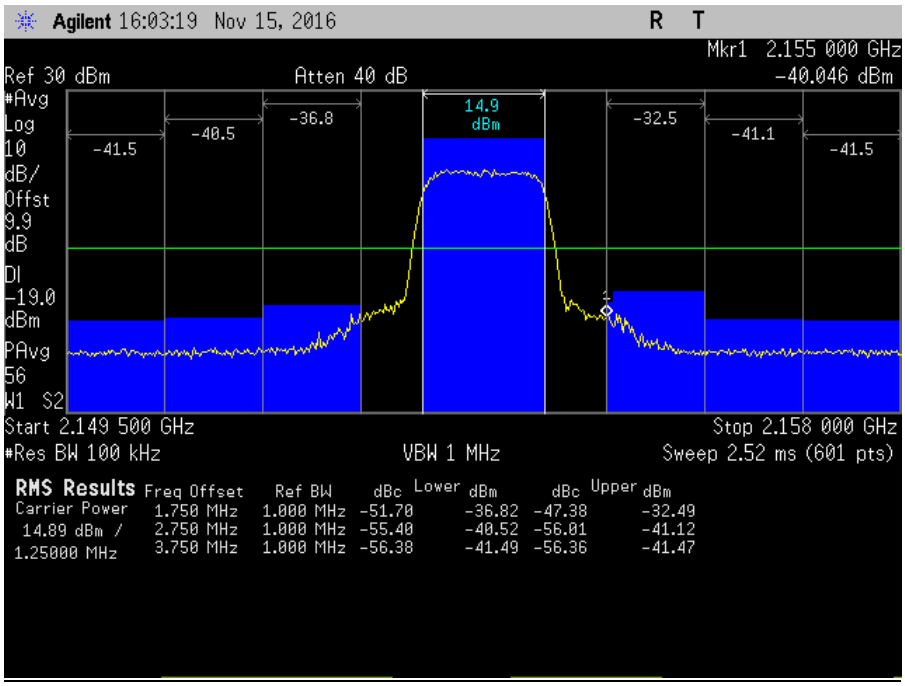
7.5_OBE_DL_869-894MHz_L_PreAGC_CDMA



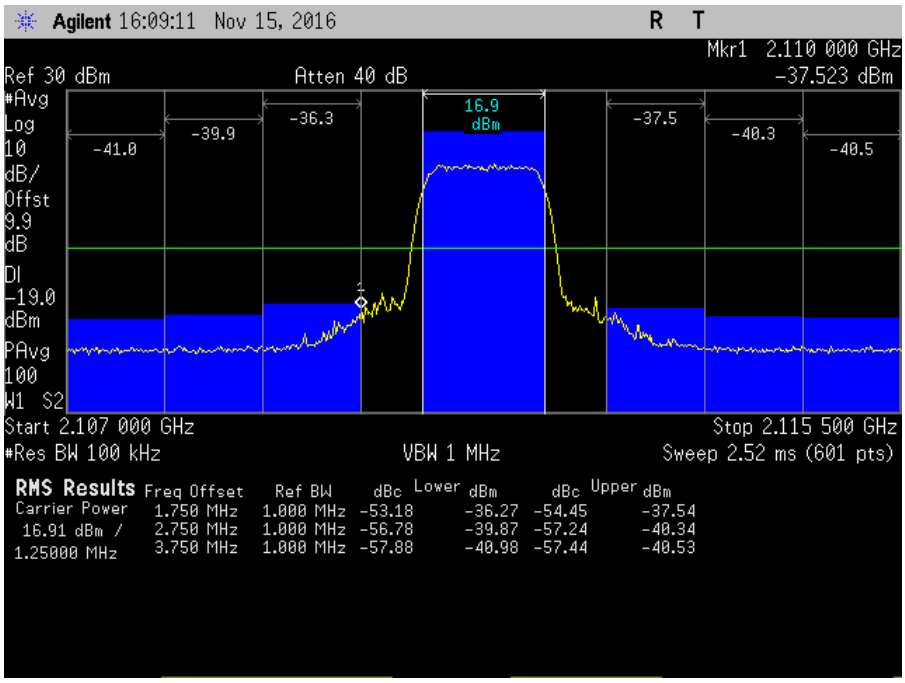
7.5_OBE_DL_1930-1995MHz_H_PreAGC_CDMA



7.5_OBE_DL_1930-1995MHz_L_PreAGC_CDMA

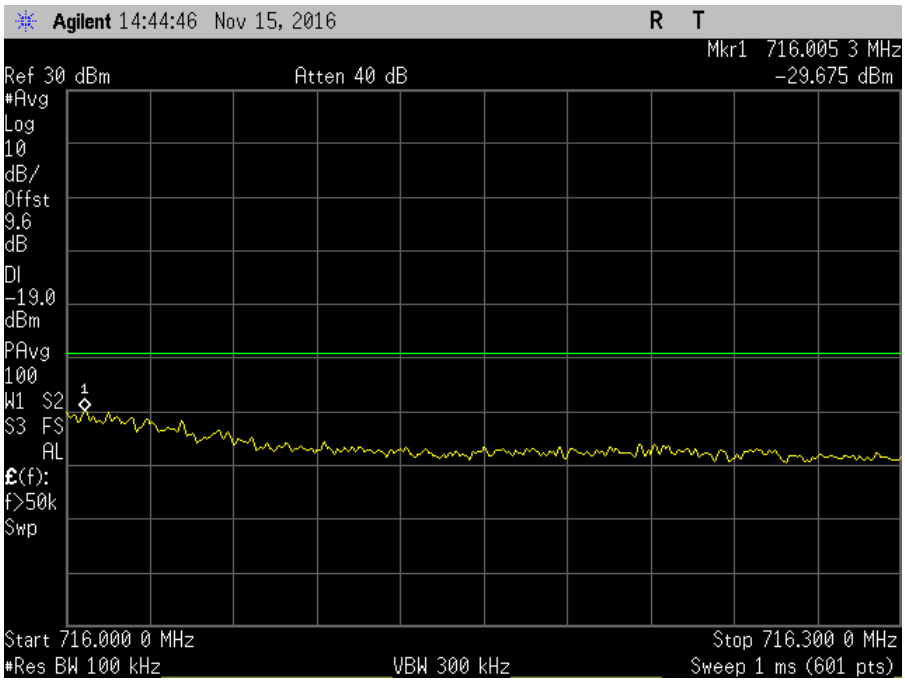


7.5_OBE_DL_2110-2155MHz_H_PreAGC_CDMA

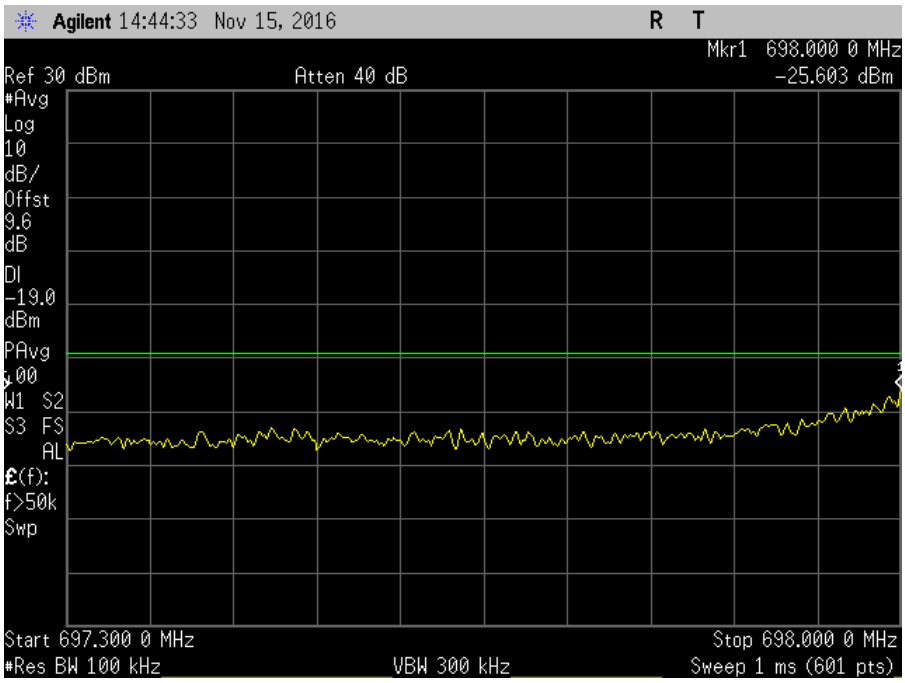


7.5_OBE_DL_2110-2155MHz_L_PreAGC_CDMA

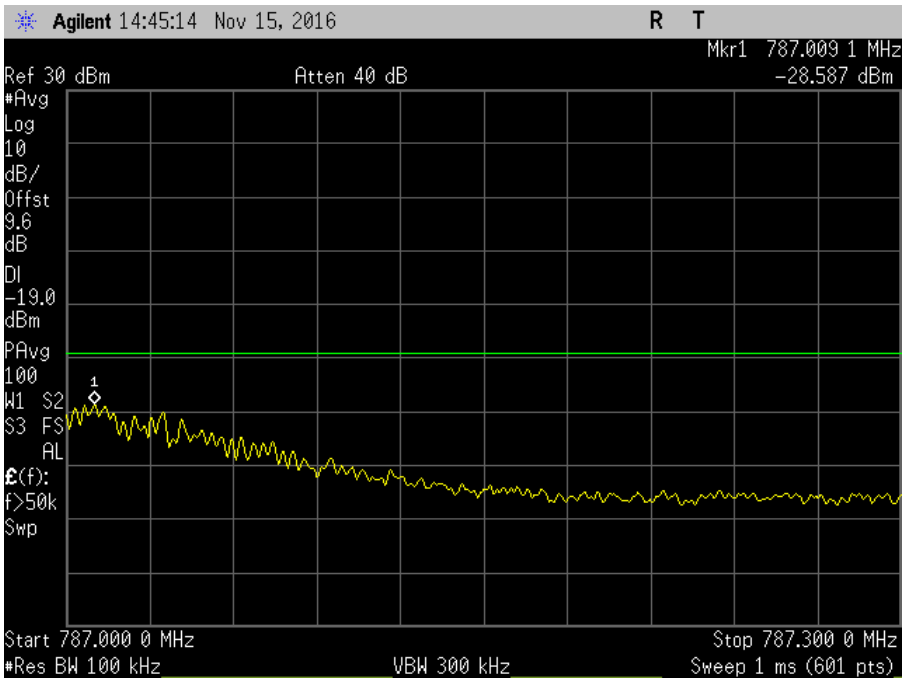
LTE, UL



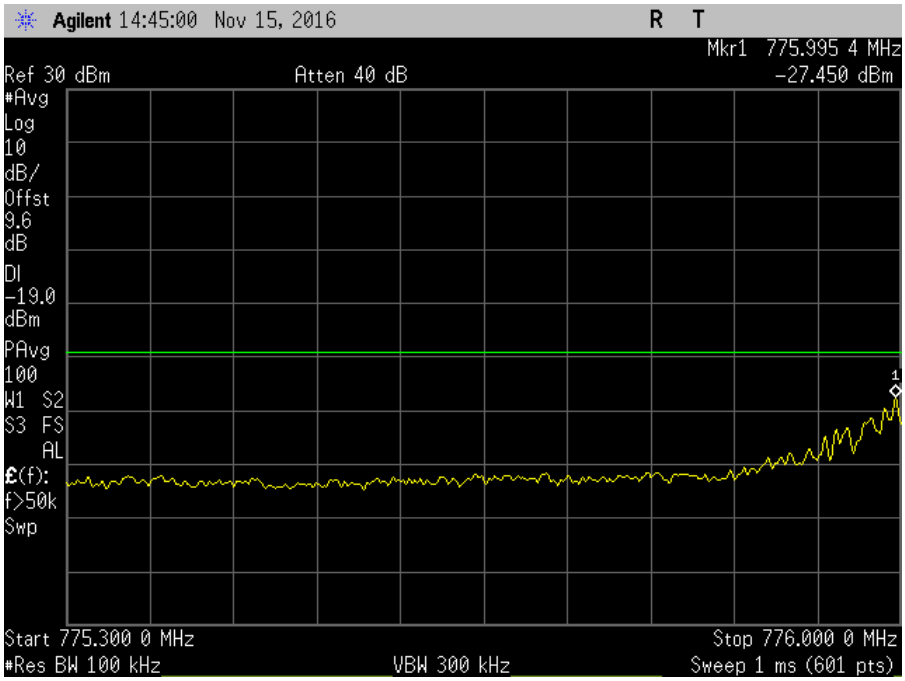
7.5_OBE_UL_698-716MHz_H_PreAGC_LTE



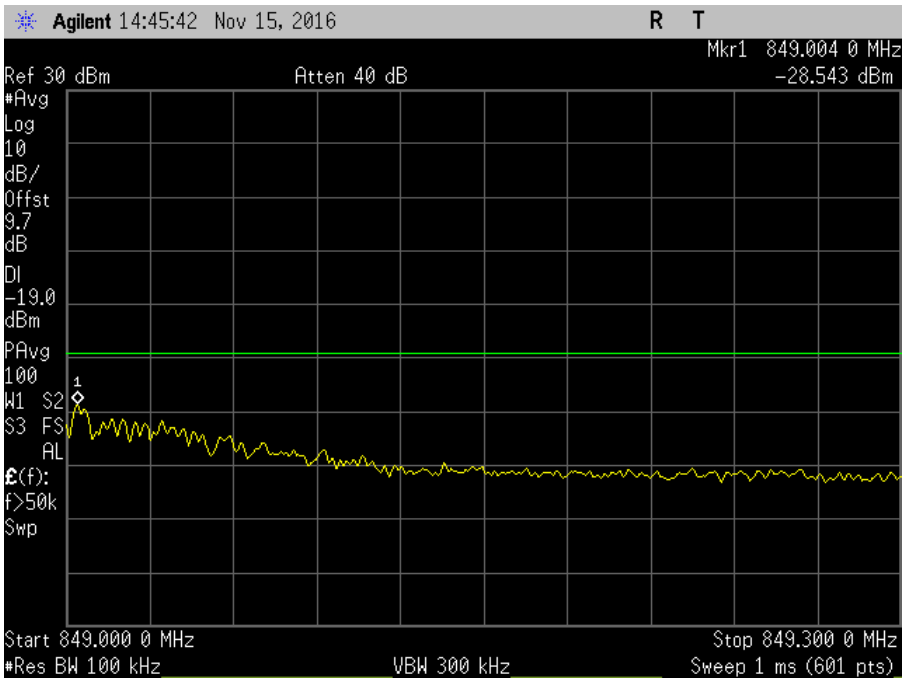
7.5_OBE_UL_698-716MHz_L_PreAGC_LTE



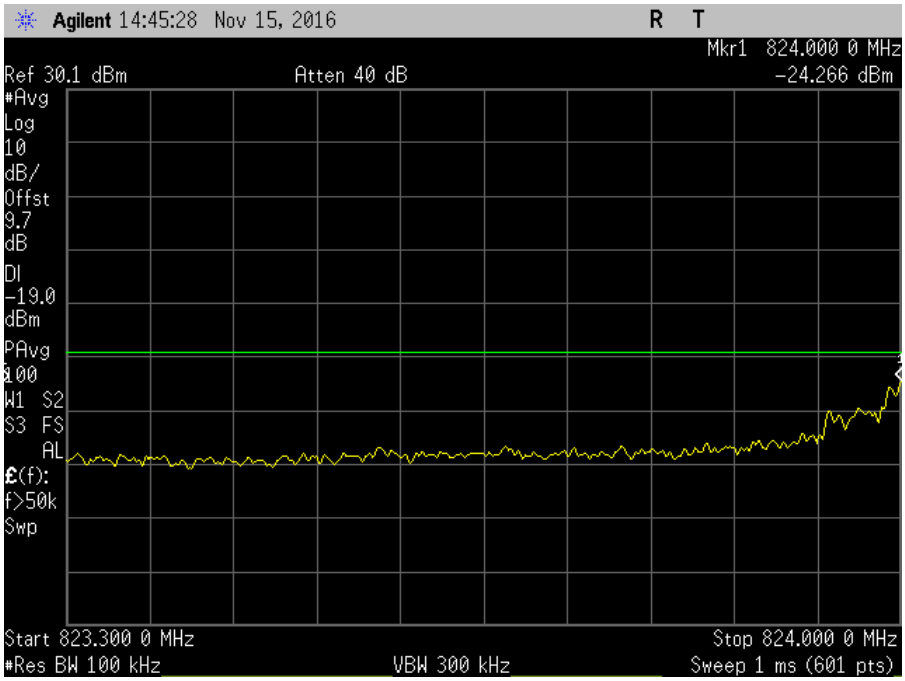
7.5_OBE_UL_776-787MHz_H_PreAGC_LTE



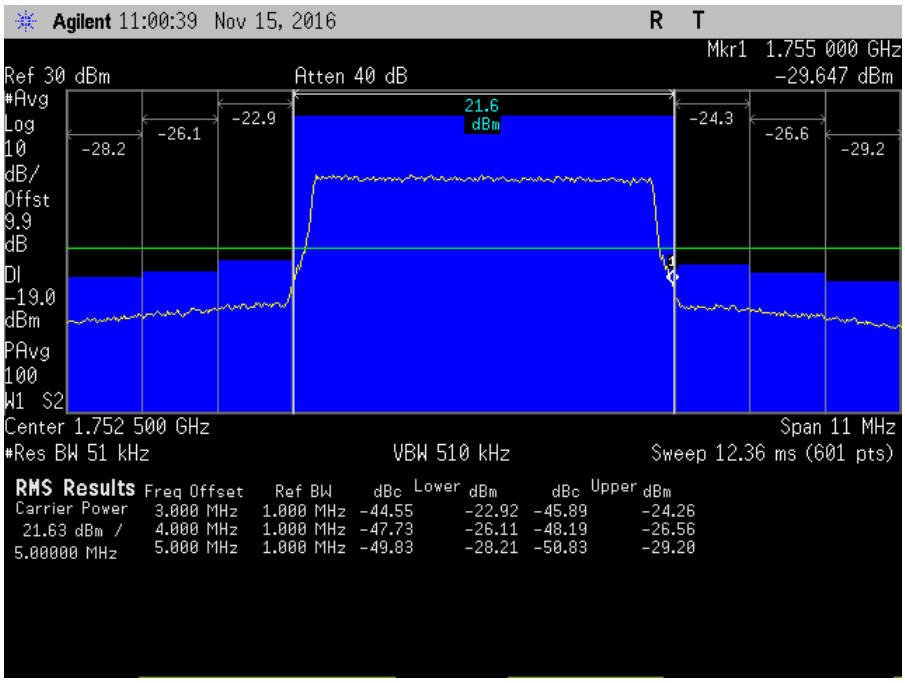
7.5_OBE_UL_776-787MHz_L_PreAGC_LTE



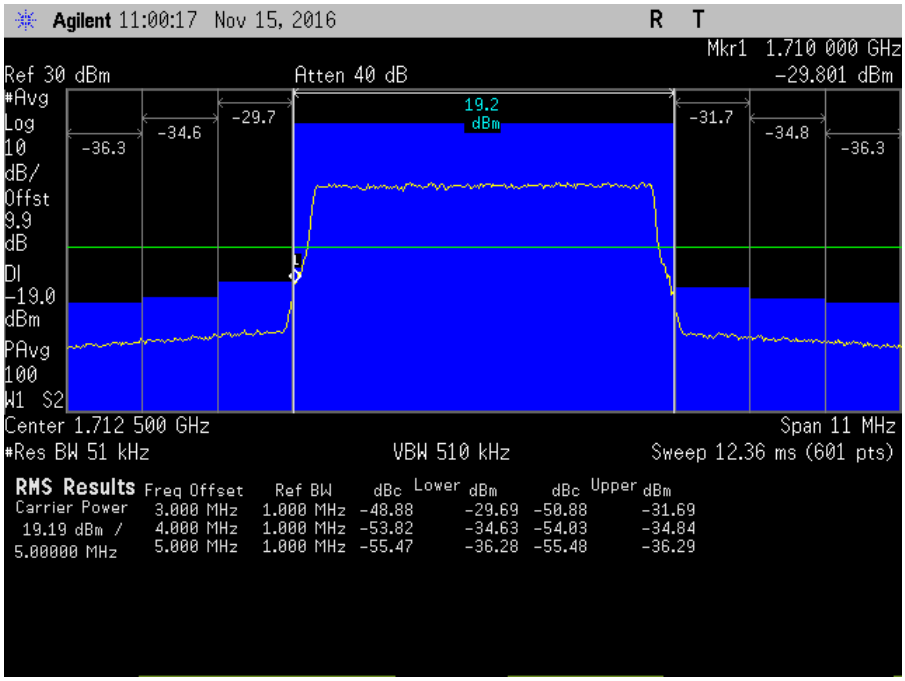
7.5_OBE_UL_824-849MHz_H_PreAGC_LTE



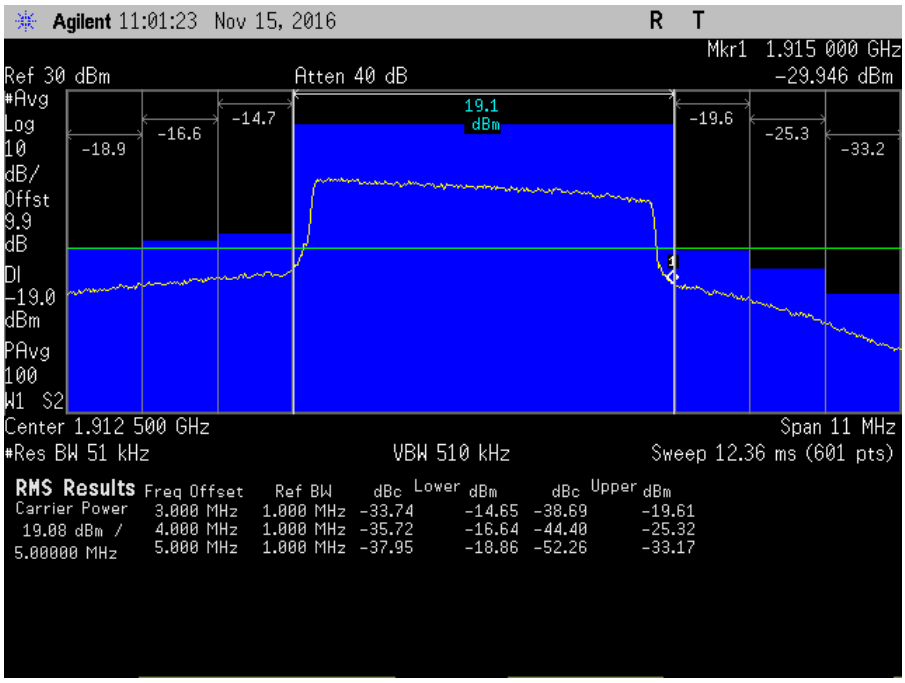
7.5_OBE_UL_824-849MHz_L_PreAGC_LTE



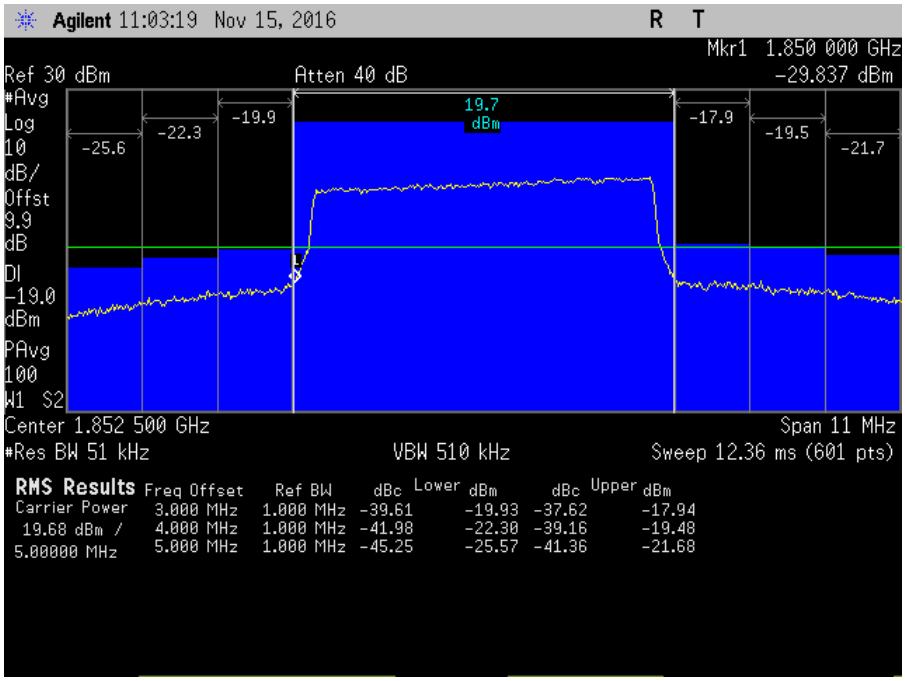
7.5_OBE_UL_1710-1755MHz_H_PreAGC_LTE



7.5_OBE_UL_1710-1755MHz_L_PreAGC_LTE

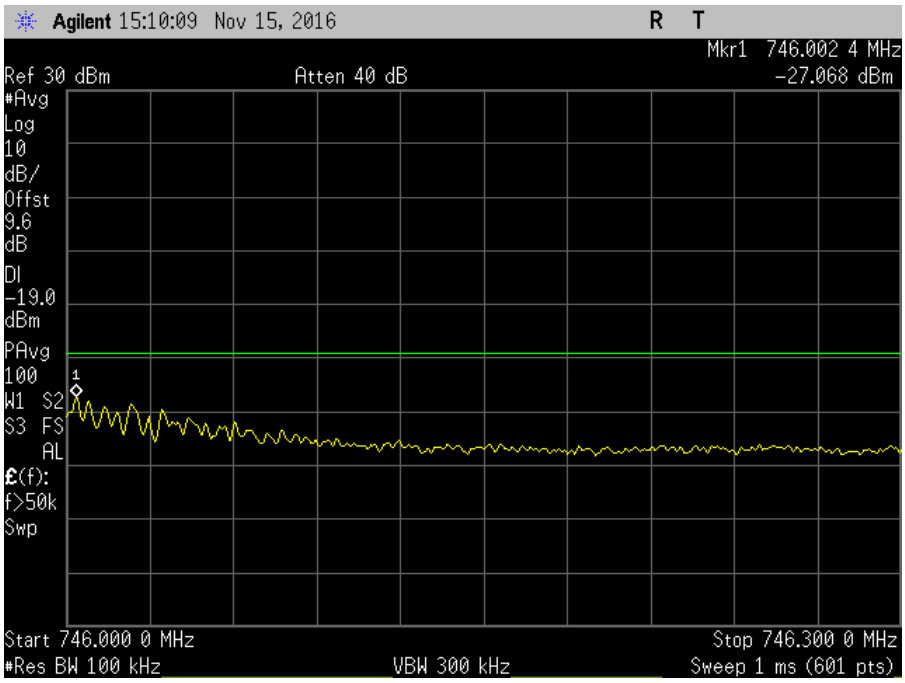


7.5_OBE_UL_1850-1915MHz_H_PreAGC_LTE

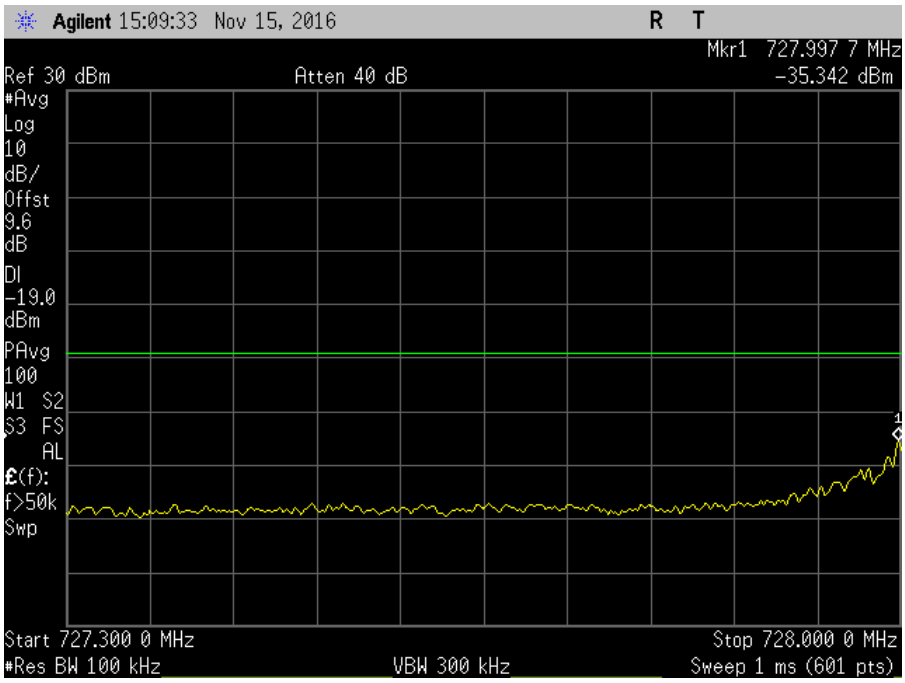


7.5_OBE_UL_1850-1915MHz_L_PreAGC_LTE

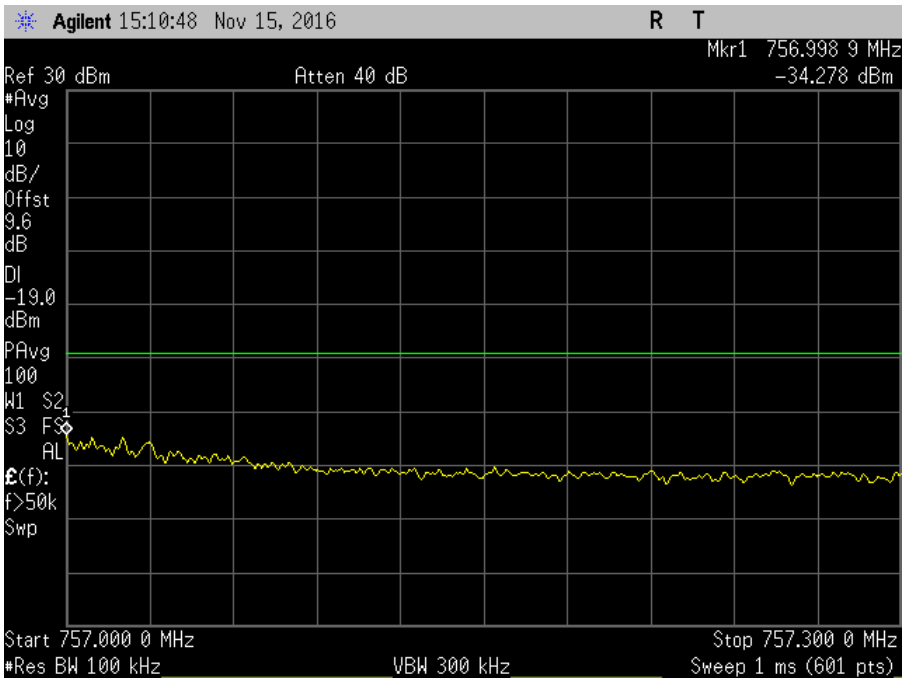
LTE, DL



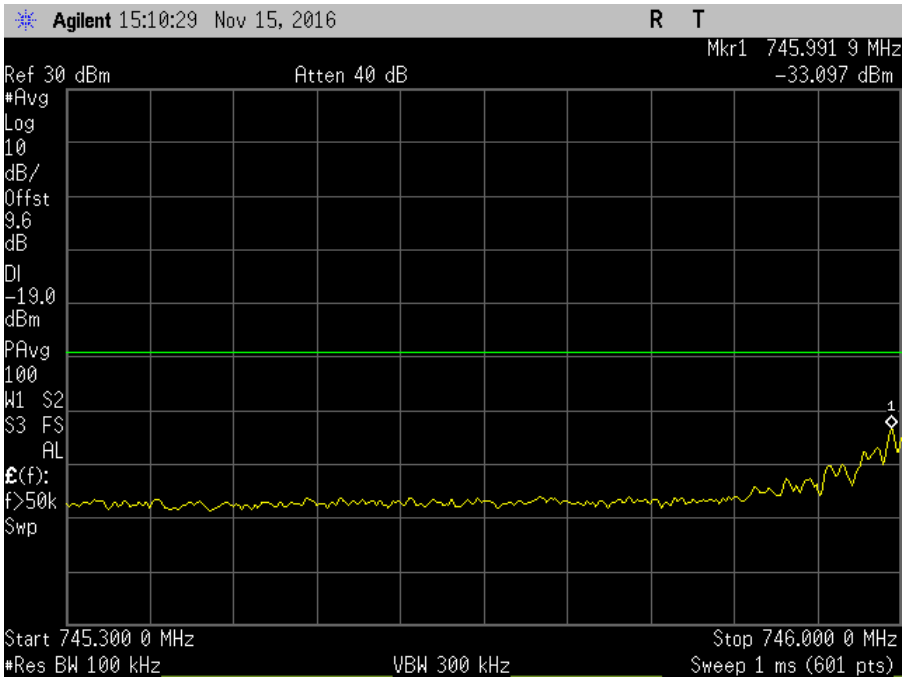
7.5_OBE_DL_728-746MHz_H_PreAGC_LTE



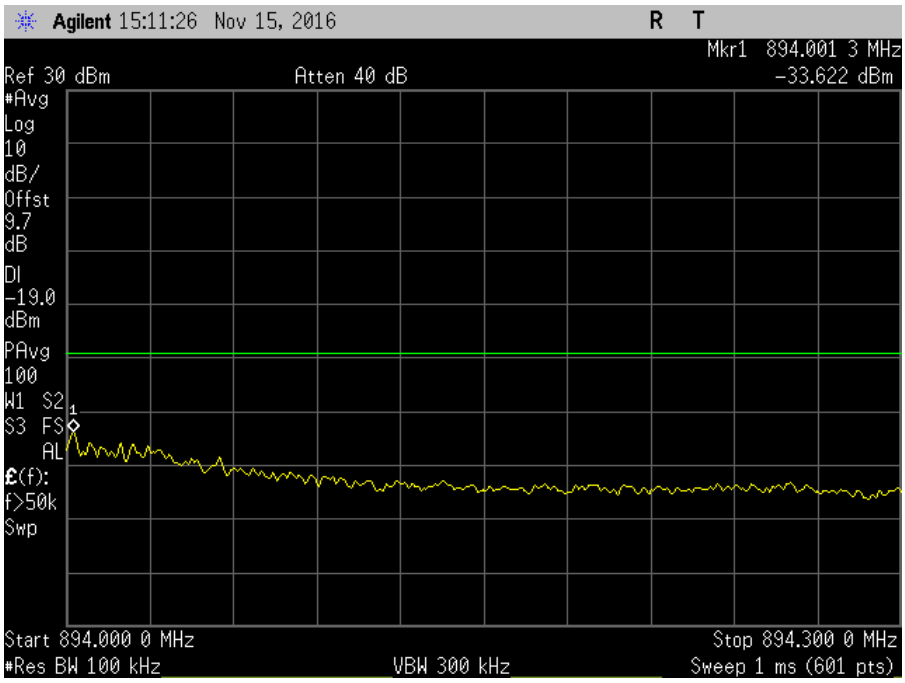
7.5_OBE_DL_728-746MHz_L_PreAGC_LTE



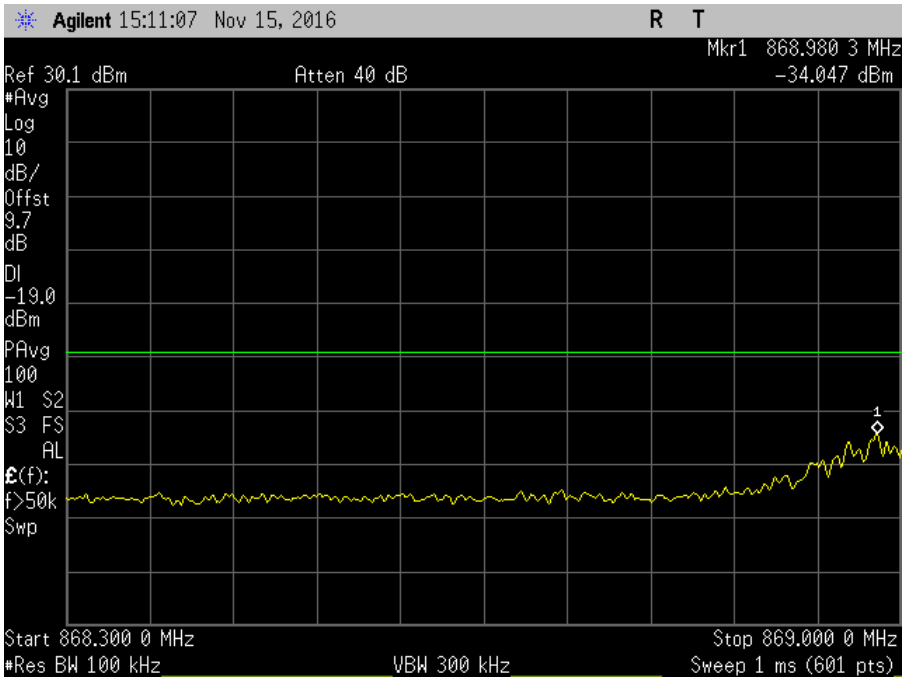
7.5_OBE_DL_746-757MHz_H_PreAGC_LTE



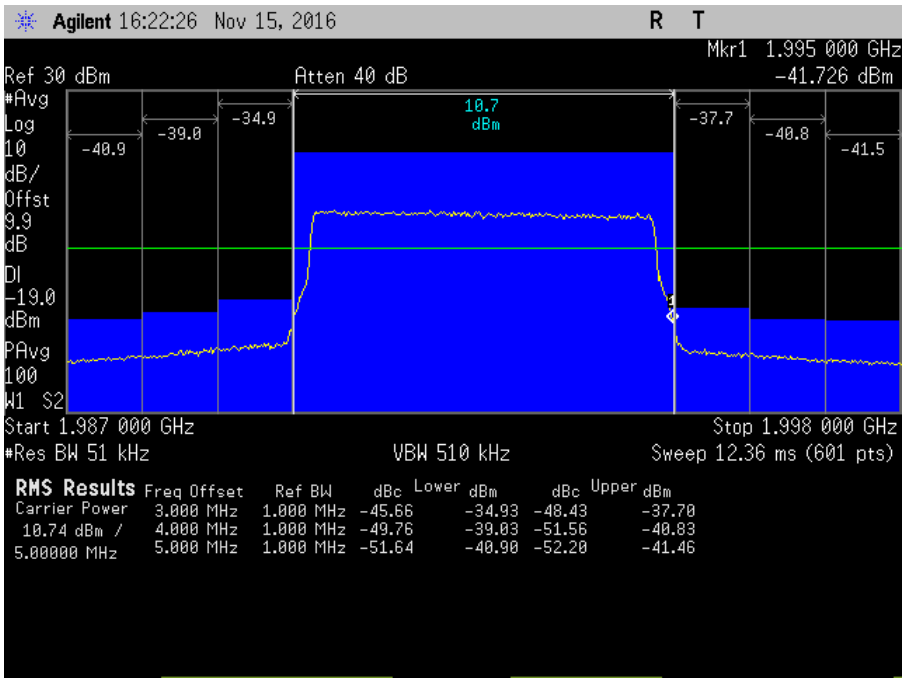
7.5_OBE_DL_746-757MHz_L_PreAGC_LTE



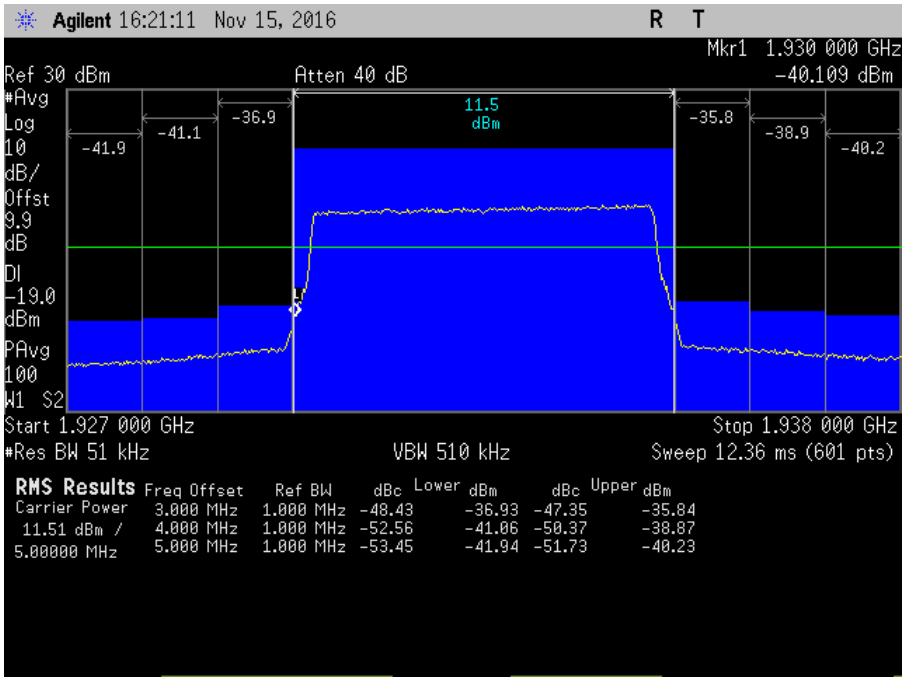
7.5_OBE_DL_869-894MHz_H_PreAGC_LTE



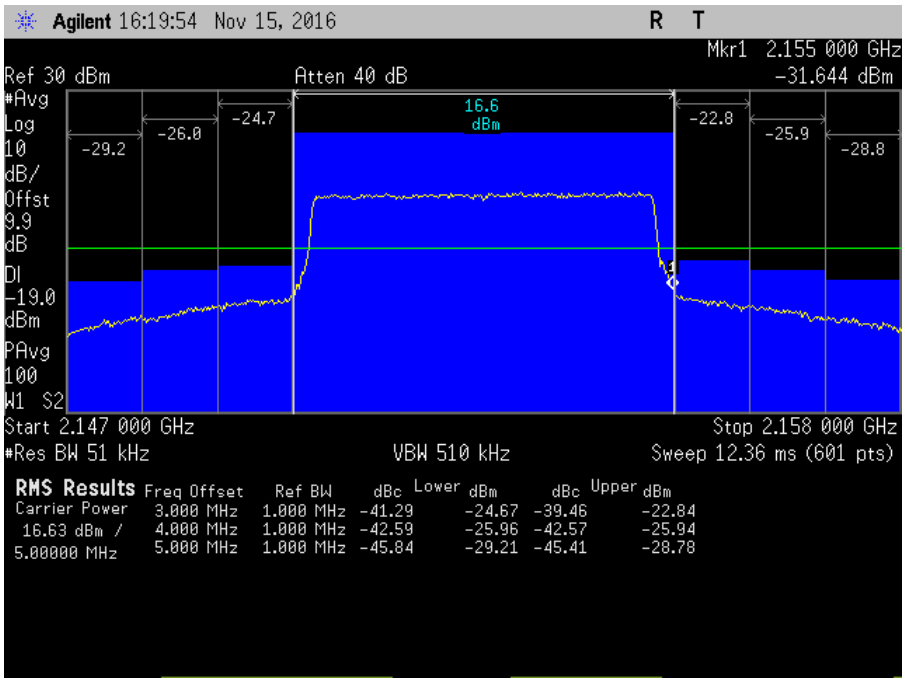
7.5_OBE_DL_869-894MHz_L_PreAGC_LTE



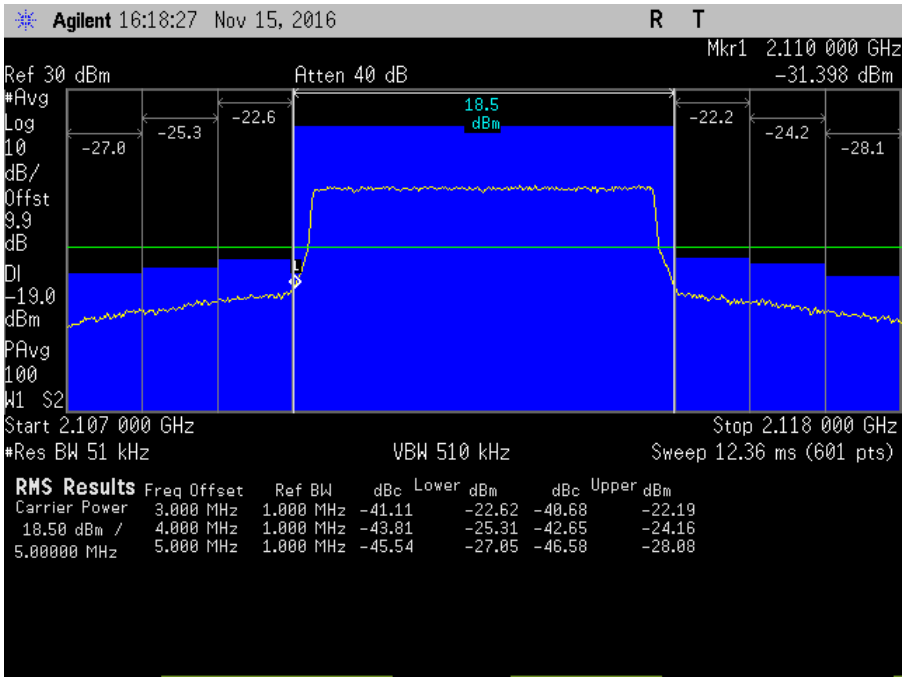
7.5_OBE_DL_1930-1995MHz_H_PreAGC_LTE



7.5_OBE_DL_1930-1995MHz_L_PreAGC_LTE



7.5_OBE_DL_2110-2155MHz_H_PreAGC_LTE



7.5_OBE_DL_2110-2155MHz_L_PreAGC_LTE

7.6 Conducted Spurious Emissions

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**7.6 Conducted Spurious Emissions / 47 CFR §2.1051 Spurious Emissions at Antenna Terminals**		
Work Order #:	**98759**	Date:	11/16/2016
Test Type:	**Conducted Emissions**	Time:	9:20:44 AM
Tested By:	**Daniel Bertran**	Sequence#:	1
Software:	EMITest 5.03.03		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 6			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 6			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed CMRS Wideband Consumer Booster with a Wi-Fi Router and TV amplifier installed. The CMRS DL signal and the Wi-Fi Signal are combined at the diplexer and transmit via the indoor antenna.
The Consumer booster UL and DL power and gain parameters are initially measured with Wi-Fi transmitting at mid channel using sequentially 802.11b, g, n20 and n40 signal. Since no significant change in measured power was observed, all other parameters are obtained with Wi-Fi transmitting at Mid channel, 802.11b.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is type RP-TNC connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.

Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.6 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016.
Firmware: V2.2
Test environment conditions: Temperature: 24°C, 60% Relative Humidity and Pressure:101.5 kPa
Frequency range of measurement = 9kHz- 22GHz.
9 kHz - 150 kHz -> RBW= 200Hz VBW= 200Hz
150 kHz - 30 MHz -> RBW= 9kHz VBW= 9kHz
30 MHz - 1000MHz -> RBW*= 1MHz VBW= 3MHz
1000 MHz - 22000MHz ->RBW= 1MHz VBW= 3MHz

*Note: As specified on 7.6 Conducted spurious emissions test procedure of 935210 D03 Signal Booster Measurements v04, for frequencies below 1 GHz, an RBW of 1 MHz may be used in a preliminary measurement. If non-compliant emissions are detected, a final measurement shall be made with a 100 kHz RBW. Additionally, a peak detector may also be used for the preliminary measurement. If non-compliant emissions are detected, then a final measurement of these emissions shall be made with the power averaging (RMS) detector.

27.53 (f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03418	Signal Generator	E4438C	7/30/2015	7/30/2017
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017
	ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP06898	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP05411	Attenuator	54A-10	1/18/2016	1/18/2018
	AN02660	Spectrum Analyzer	E4446A	5/31/2016	5/31/2018

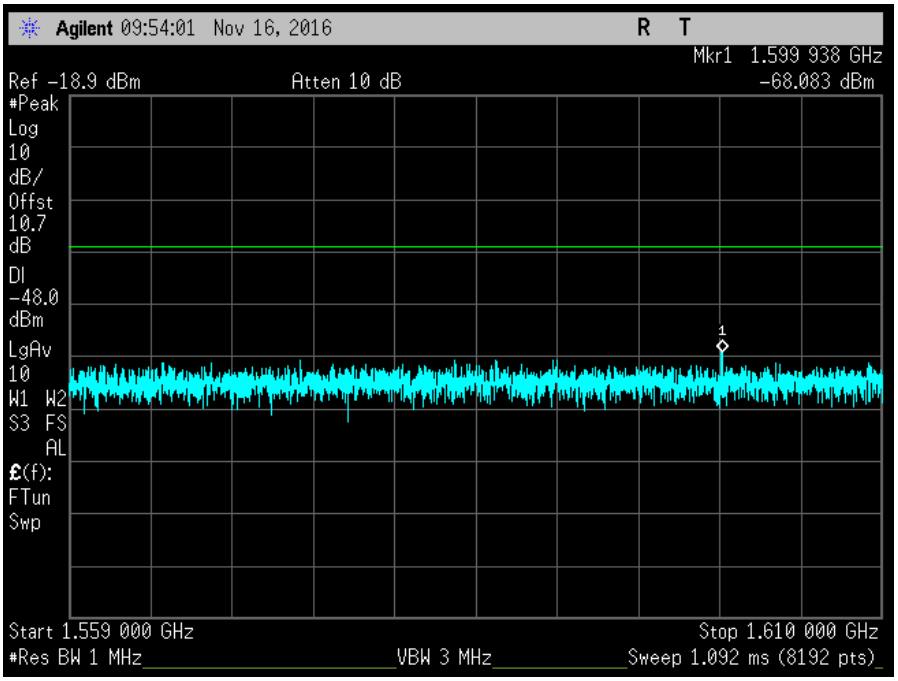
Summary of Results

Pass: As summarized in plots below, the conducted spurious emissions are within limits.

9 KHz-30 MHz

No Conducted Spurious Emissions were found within 20dB of the limit.

Per section 27.53 (f), the 1559-1610 band was also investigated and found emission within limits using applied correction (see calculation below).



Limit Line Calculation					
Frequency	Antenna Gain	Cable Loss	Limit line EIRP	Limit line EIRP	Limit line EIRP corrected
(MHz)	(dBi)	(dB)	(dBW/MHz)	(dBm)	(dBm)
UL 776-787	-10.0	2.05	-70.0	-40	-48.0

LIMIT LINE FOR SPURIOUS CONDUCTED EMISSION

REQUIRED ATTENUATION = 43+10 LOG P DB

Limit line (dBuV) = V_{dBuv} - Attenuation

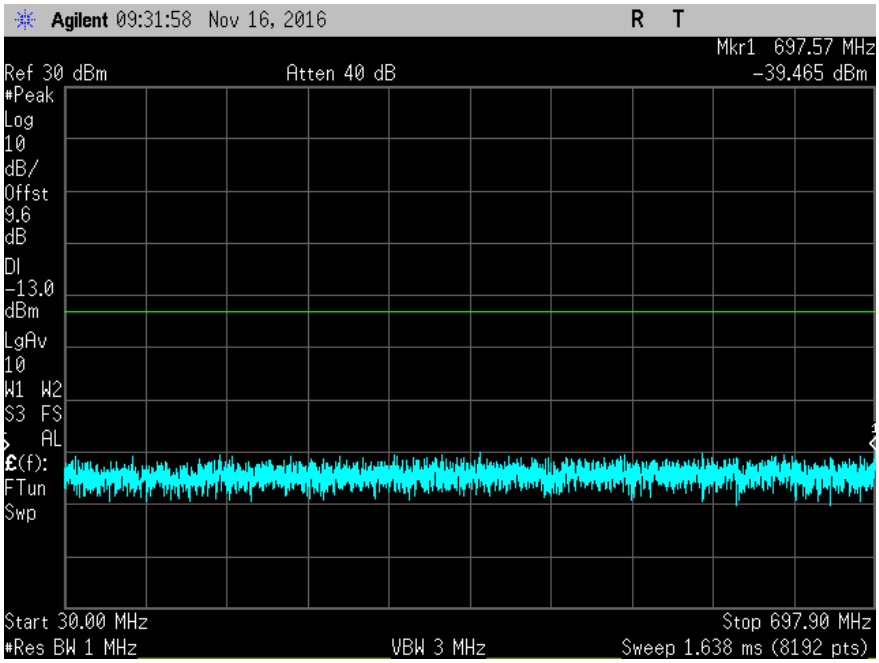
$$V_{dBuV} = 20 \operatorname{Log} \frac{V}{1 \times 10^{-6}}$$
$$= 20\left(\operatorname{Log} V - \operatorname{Log} 1 \times 10^{-6}\right)$$
$$= 20 \operatorname{Log} V - 20 \operatorname{Log} 1 \times 10^{-6}$$
$$= 20 \operatorname{Log} V - 20(-6)$$
$$= 20 \operatorname{Log} V + 120$$

$$\text{Attenuation} = 43 + 10 \operatorname{Log} P$$
$$= 43 + 10 \operatorname{Log} \frac{V^2}{R}$$
$$= 43 + 10\left(\operatorname{Log} V^2 - \operatorname{Log} R\right)$$
$$= 43 + 10\left(2 \operatorname{Log} V - \operatorname{Log} R\right)$$
$$= 43 + 20 \operatorname{Log} V - 10 \operatorname{Log} R$$

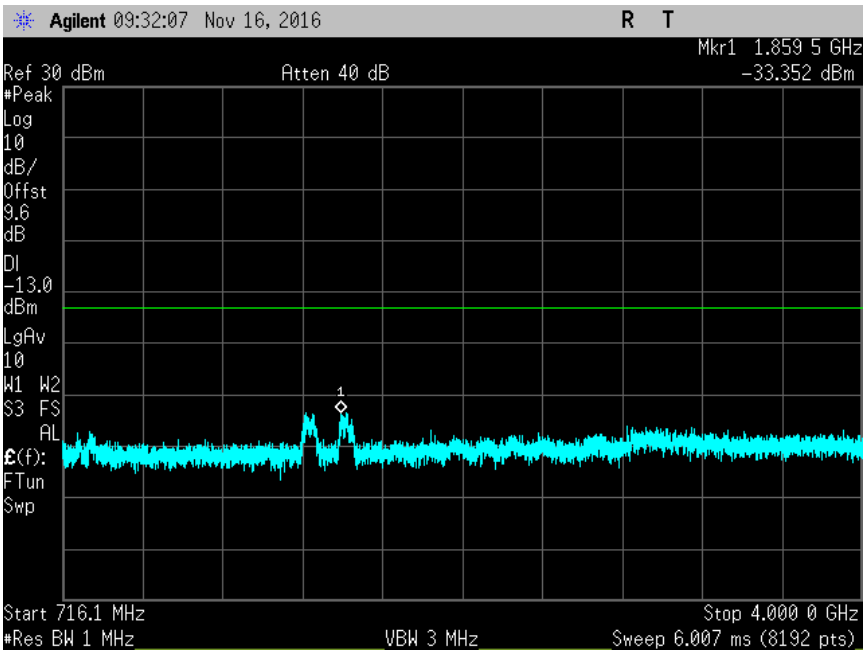
Limit line = V_{dBuv} - Attenuation
= 20 Log V + 120 – (43 + 20 Log V – 10Log R)
= 20 Log V + 120 – 43 – 20 Log V + 10Log R
= 20 Log V + 120 – 43 – 20 Log V + 10Log R
= 120 – 43 + 10 Log 50 Note : R = 50 Ω
= 120 –43 + 16.897
= 94 dBuV at any power level

Plots

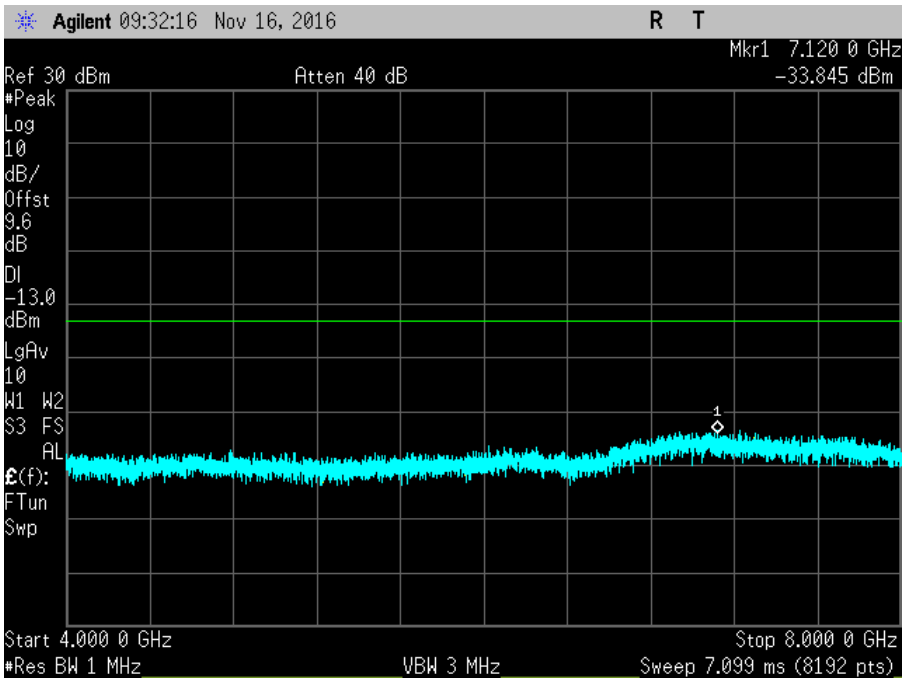
UL



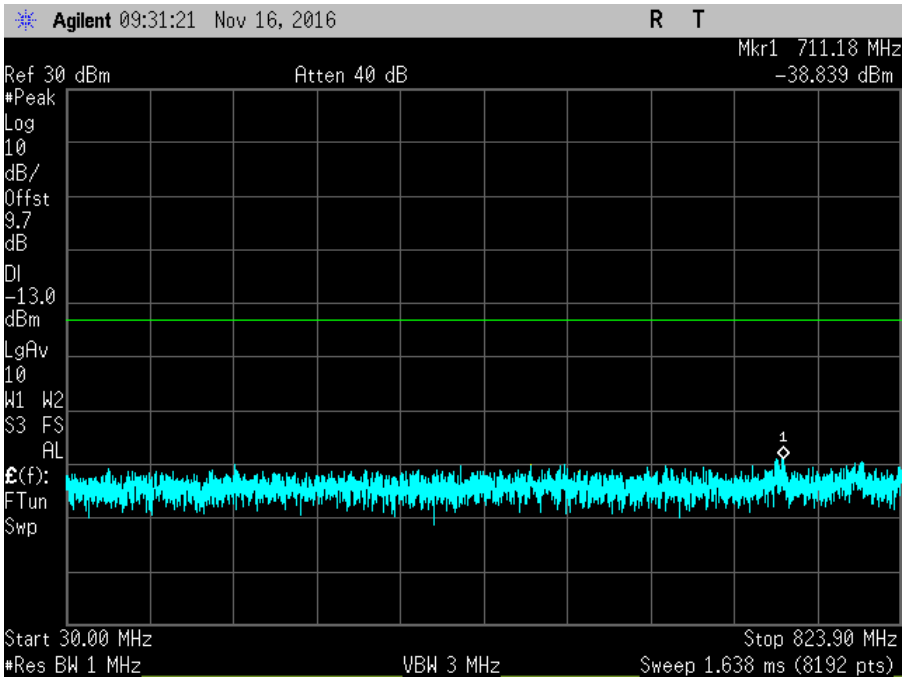
7.6_CSE_UL_698-716MHz_L



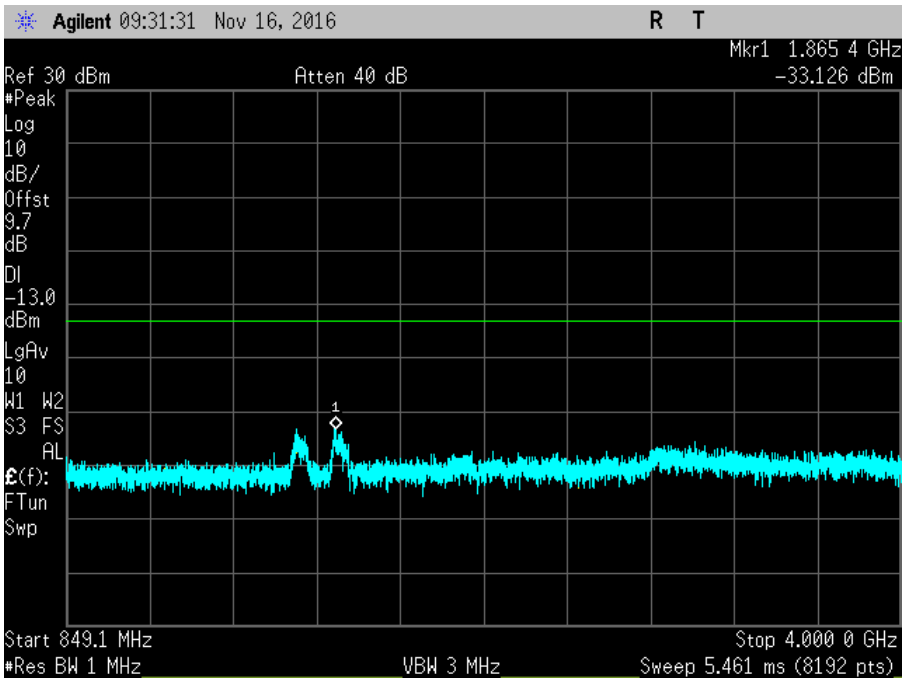
7.6_CSE_UL_698-716MHz_R1



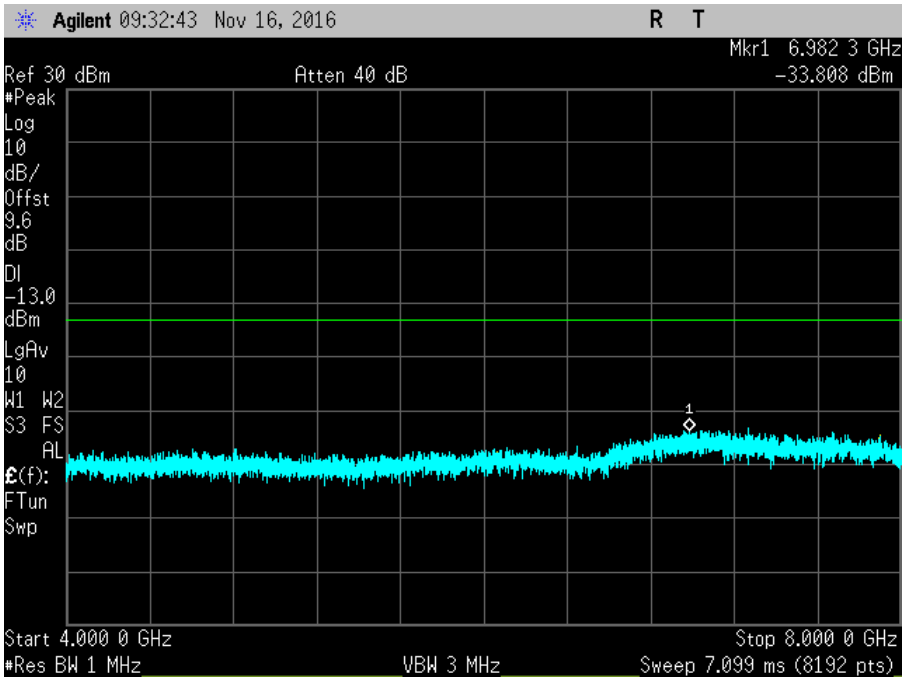
7.6_CSE_UL_698-716MHz_R2



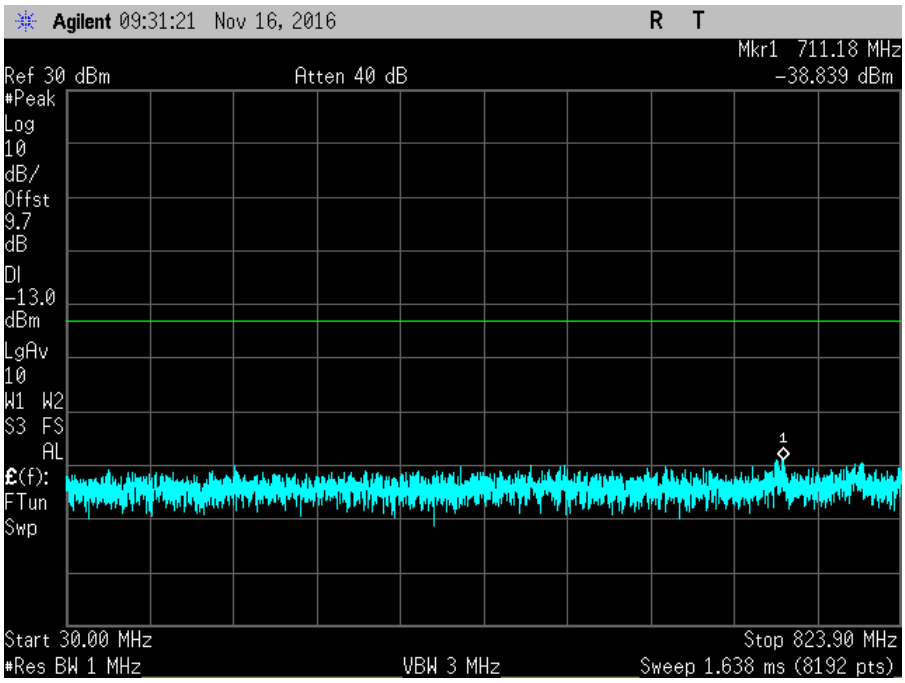
7.6_CSE_UL_824-849MHz_L



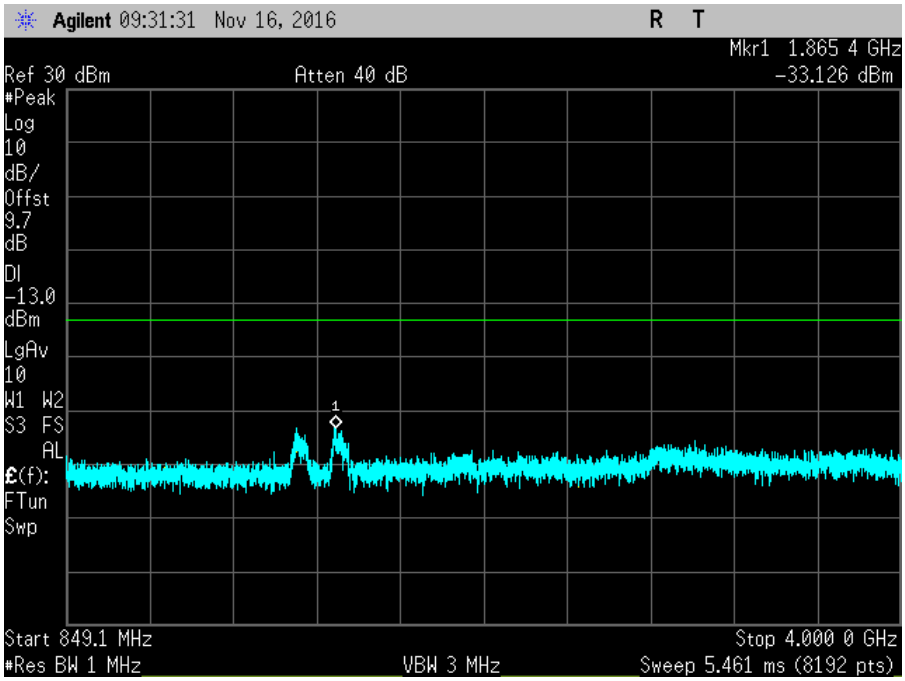
7.6_CSE_UL_776-787MHz_R1



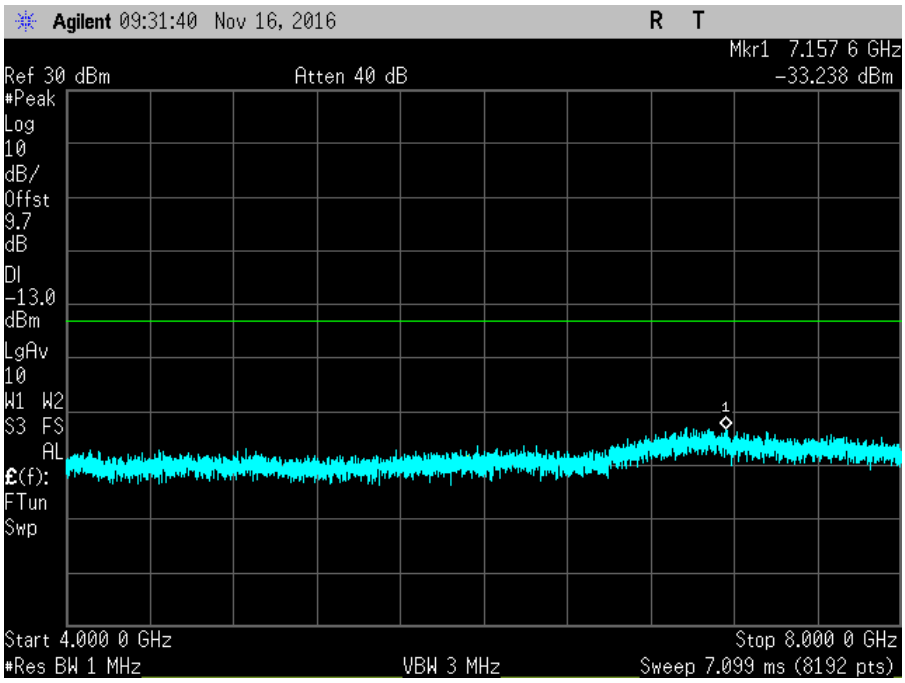
7.6_CSE_UL_776-787MHz_R2



7.6_CSE_UL_824-849MHz_L



7.6_CSE_UL_824-849MHz_R1



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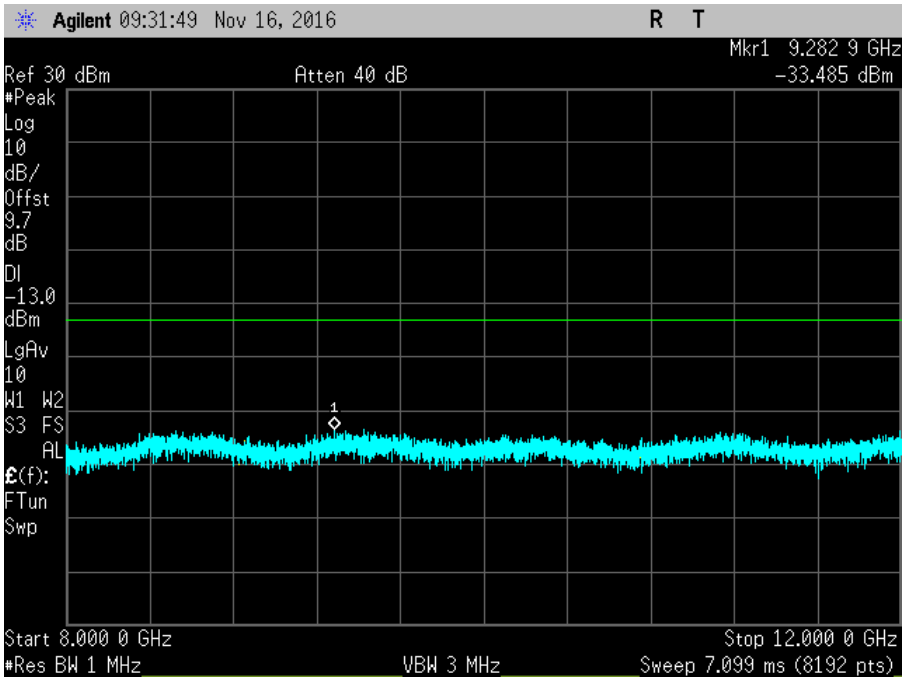
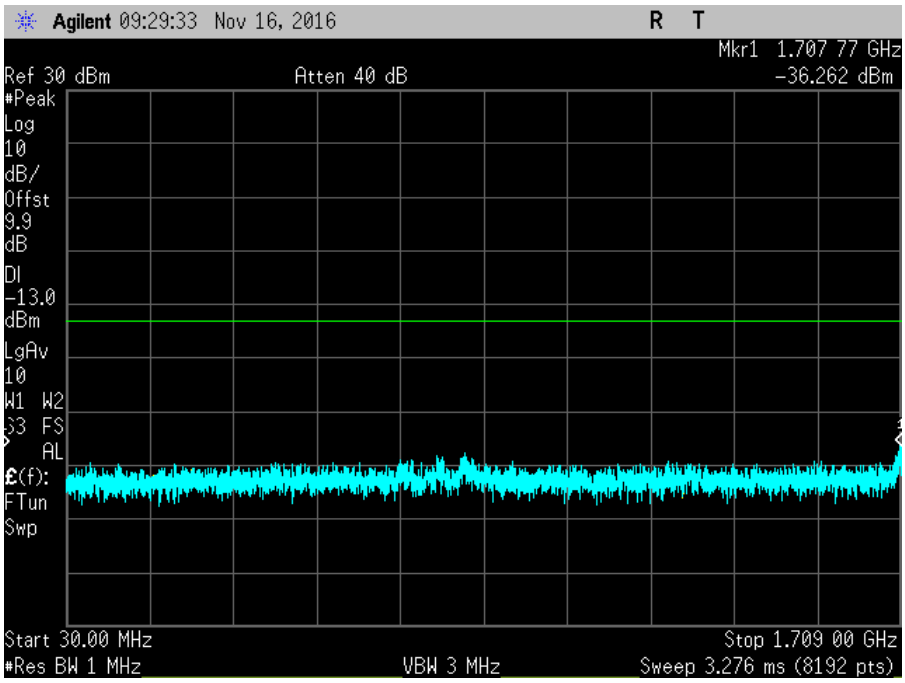
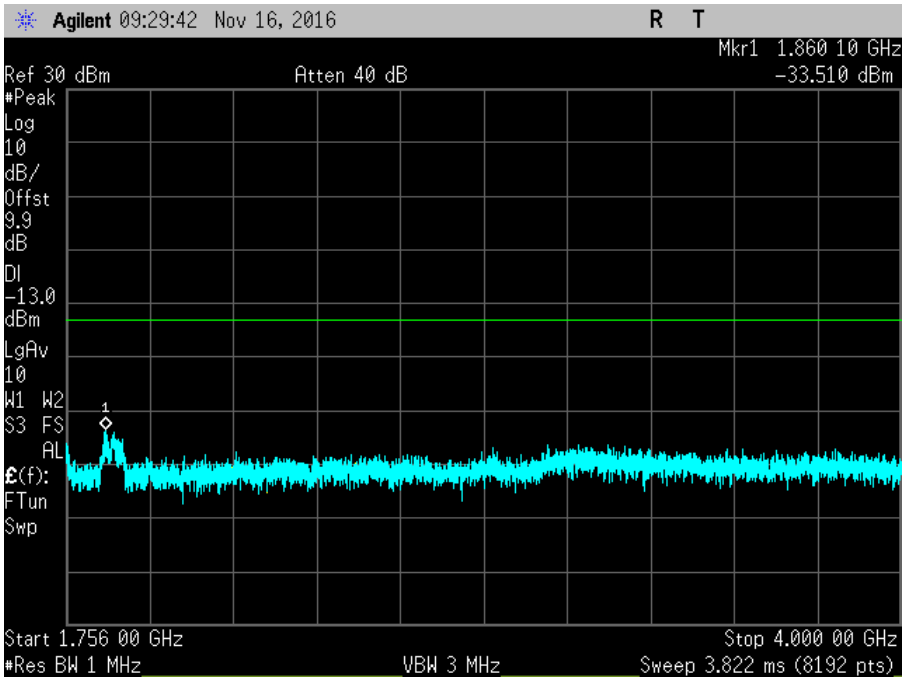


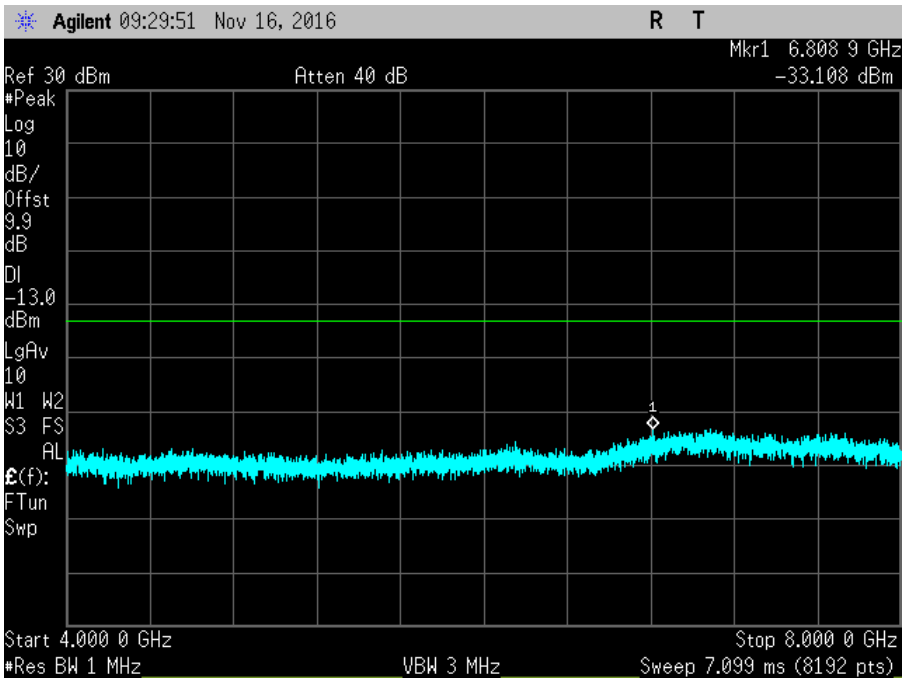
7.6_CSE_UL_824-849MHz_R3



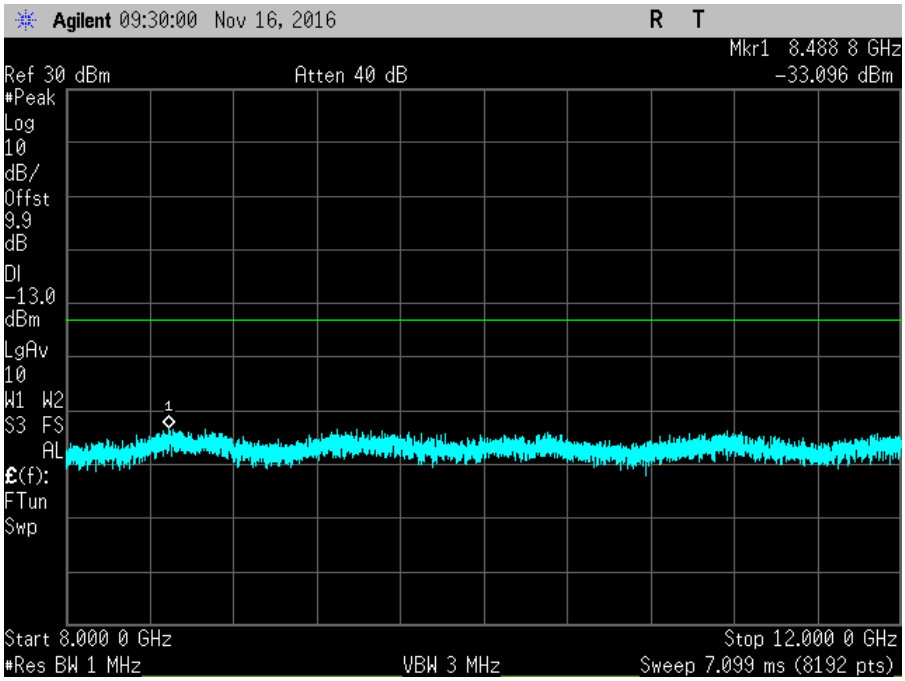
7.6_CSE_UL_1710-1755MHz_L



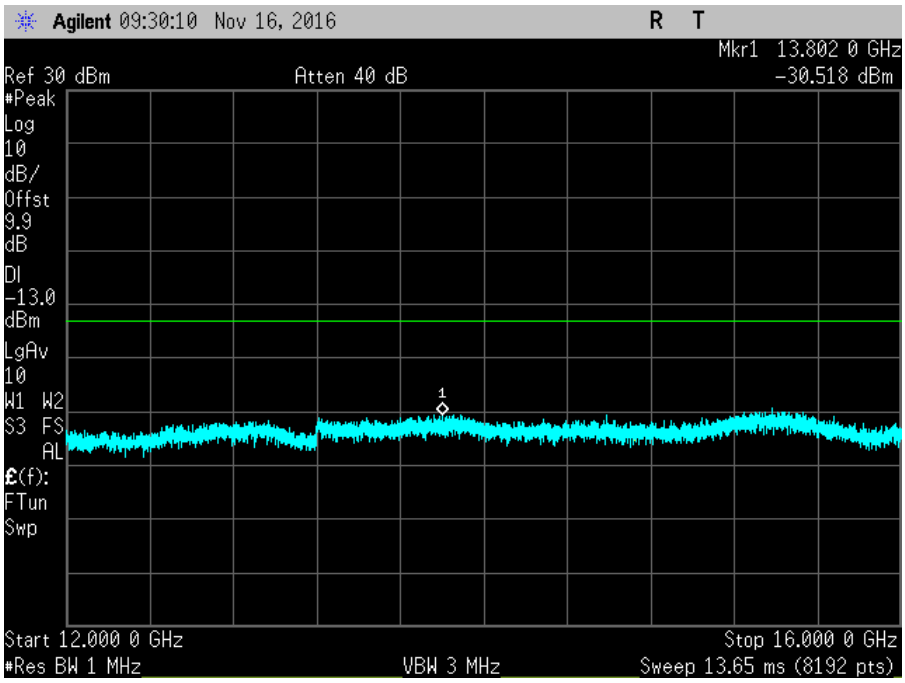
7.6_CSE_UL_1710-1755MHz_R1



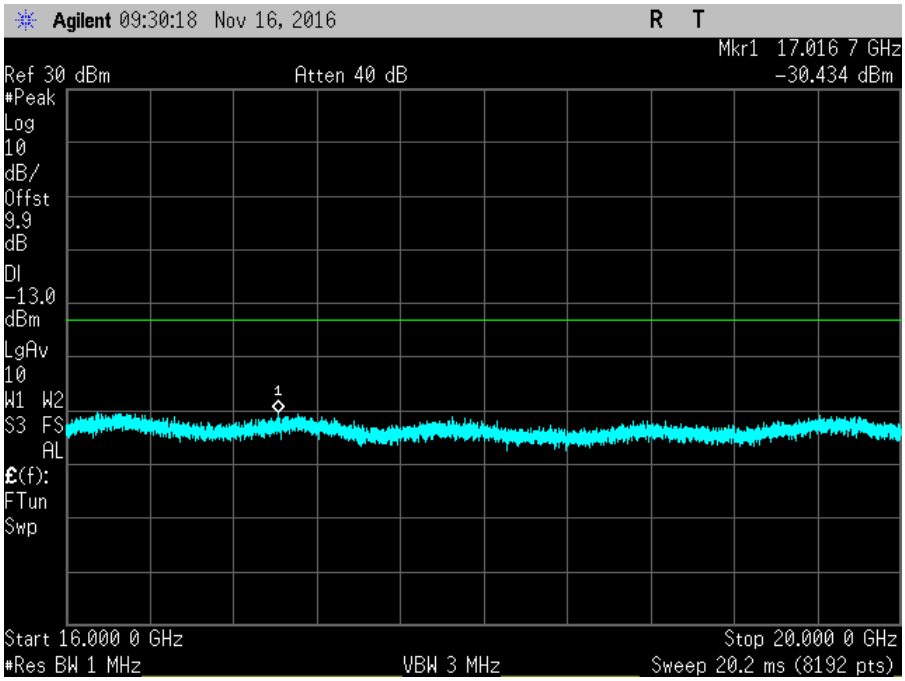
7.6_CSE_UL_1710-1755MHz_R2



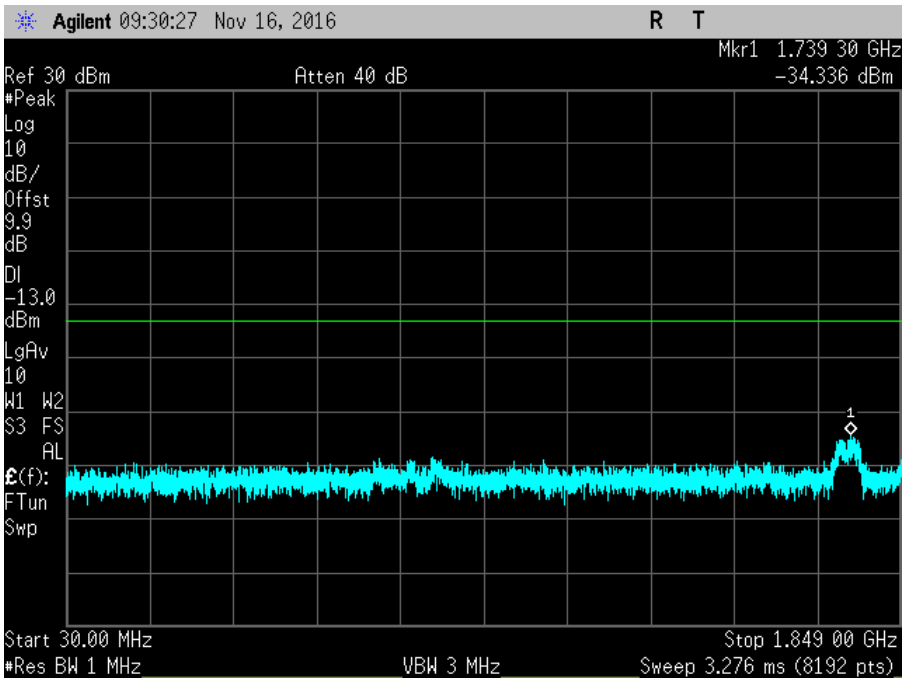
7.6_CSE_UL_1710-1755MHz_R3



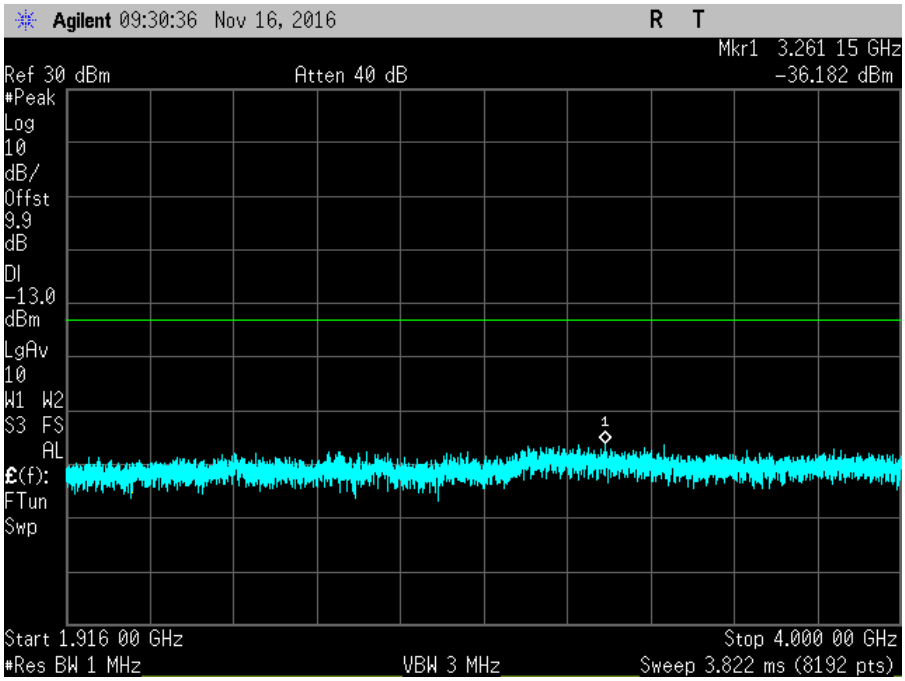
7.6_CSE_UL_1710-1755MHz_R4



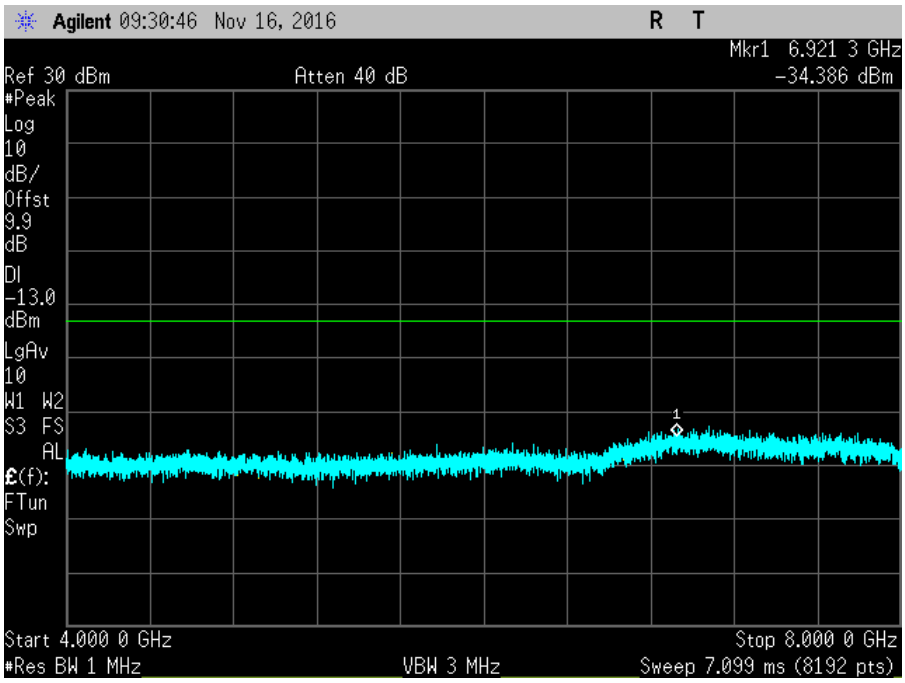
7.6_CSE_UL_1710-1755MHz_R5



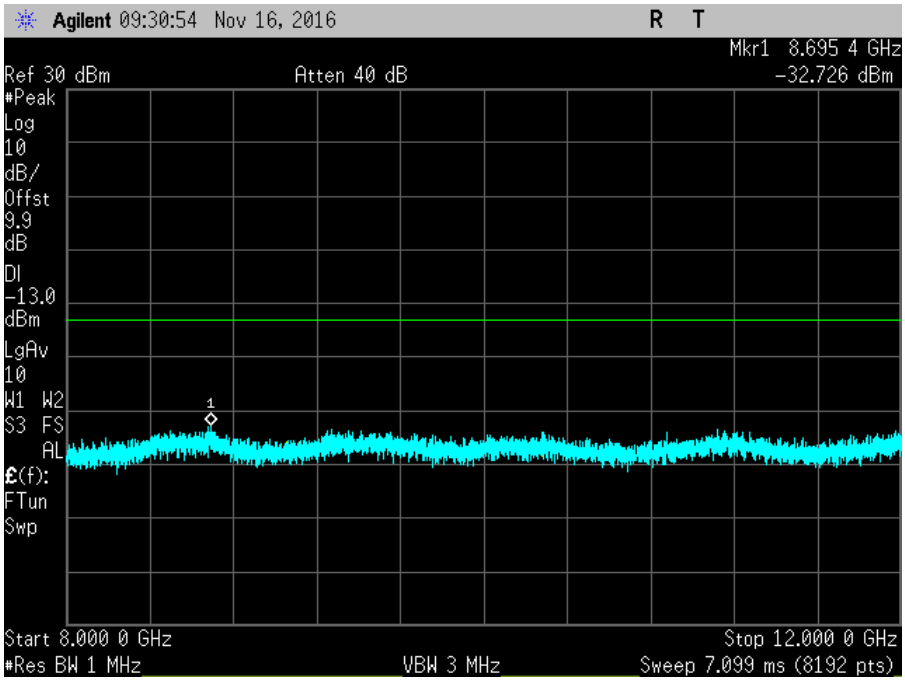
7.6_CSE_UL_1850-1915MHz_L1



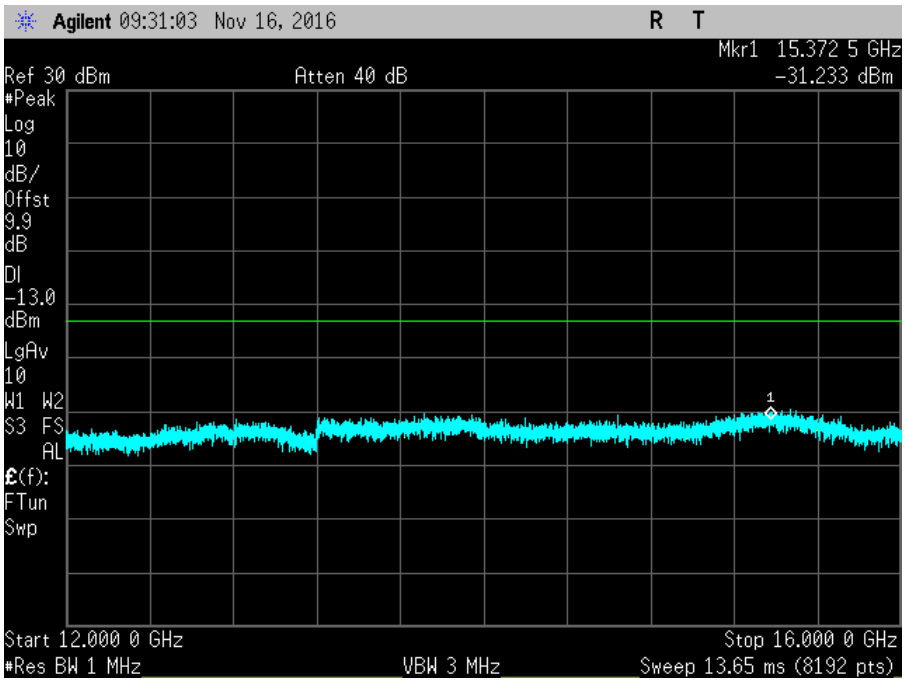
7.6_CSE_UL_1850-1915MHz_R1



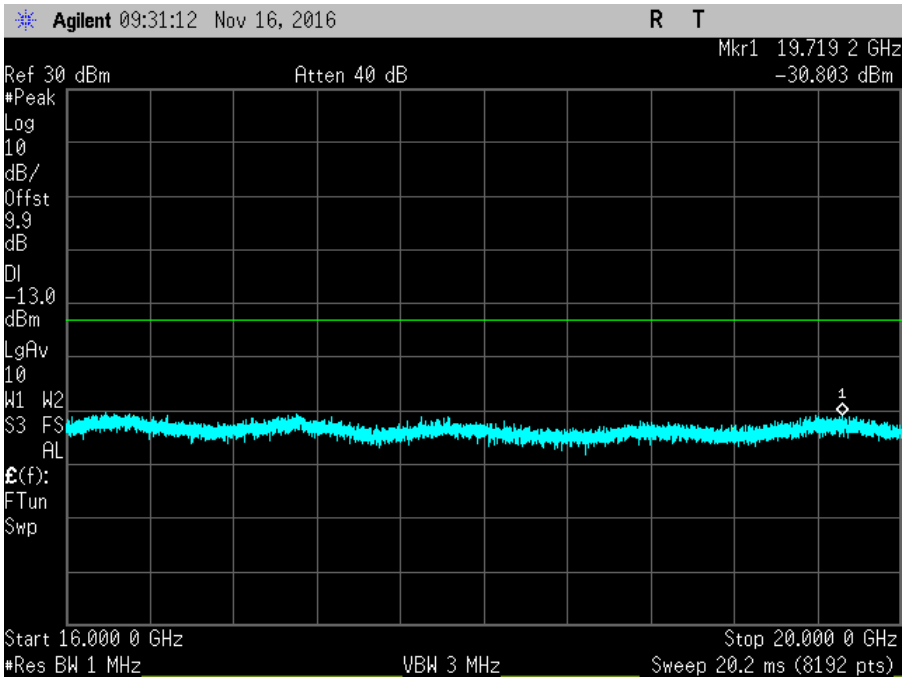
7.6_CSE_UL_1850-1915MHz_R2



7.6_CSE_UL_1850-1915MHz_R3

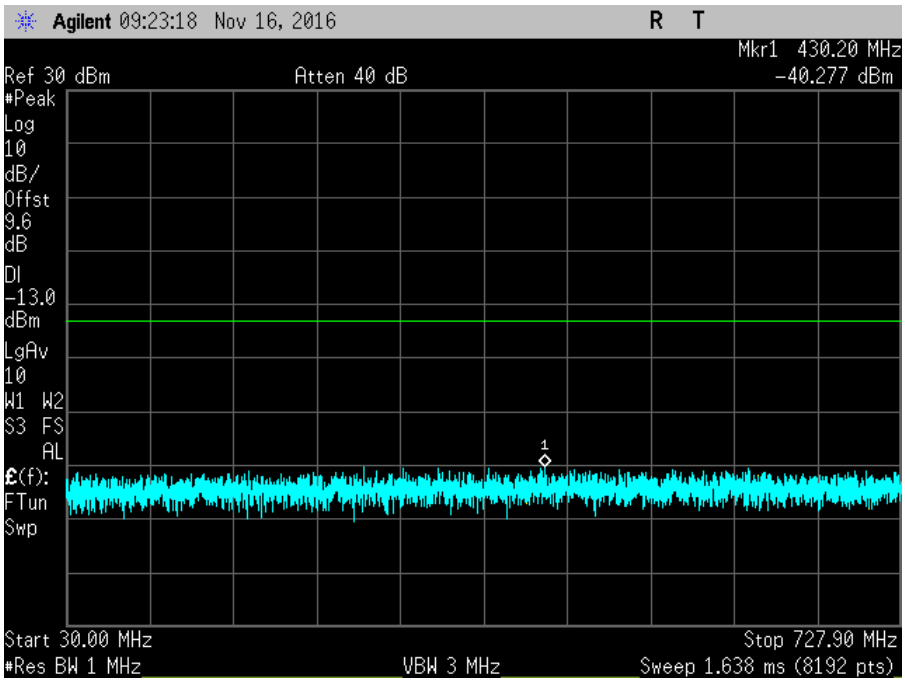


7.6_CSE_UL_1850-1915MHz_R4

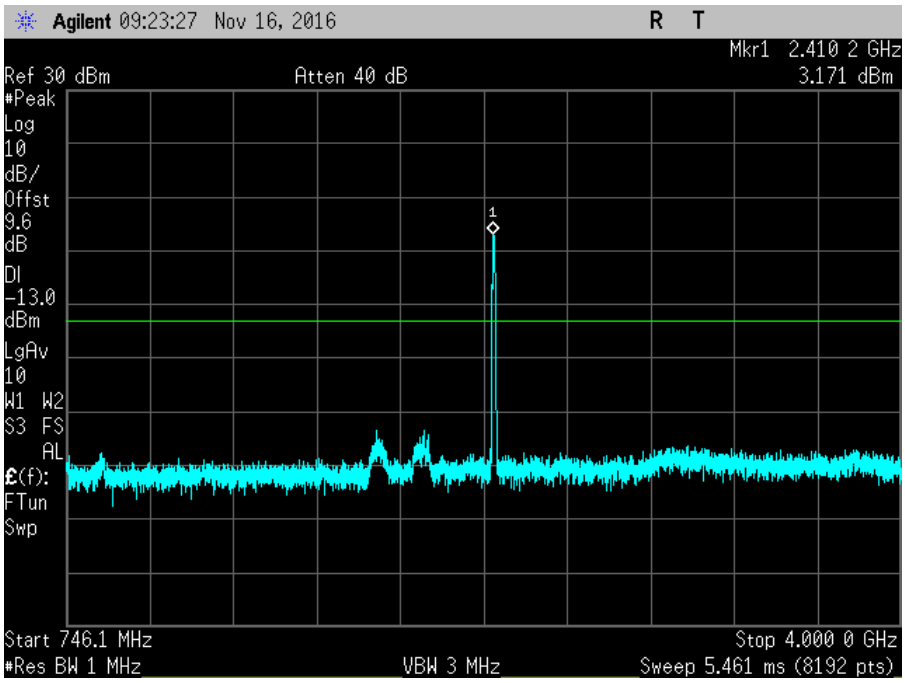


7.6_CSE_UL_1850-1915MHz_R5

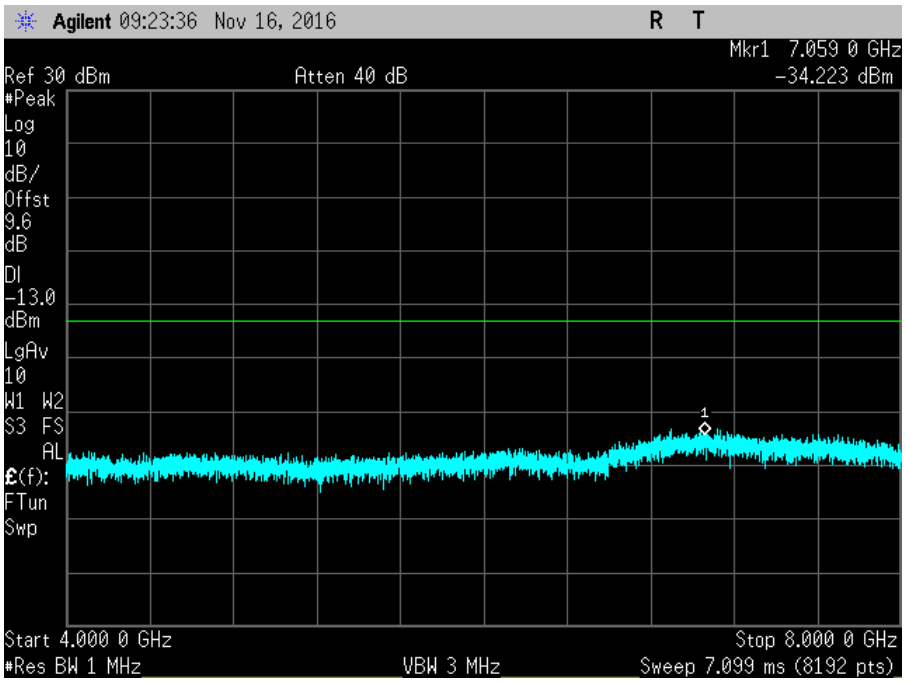
DL



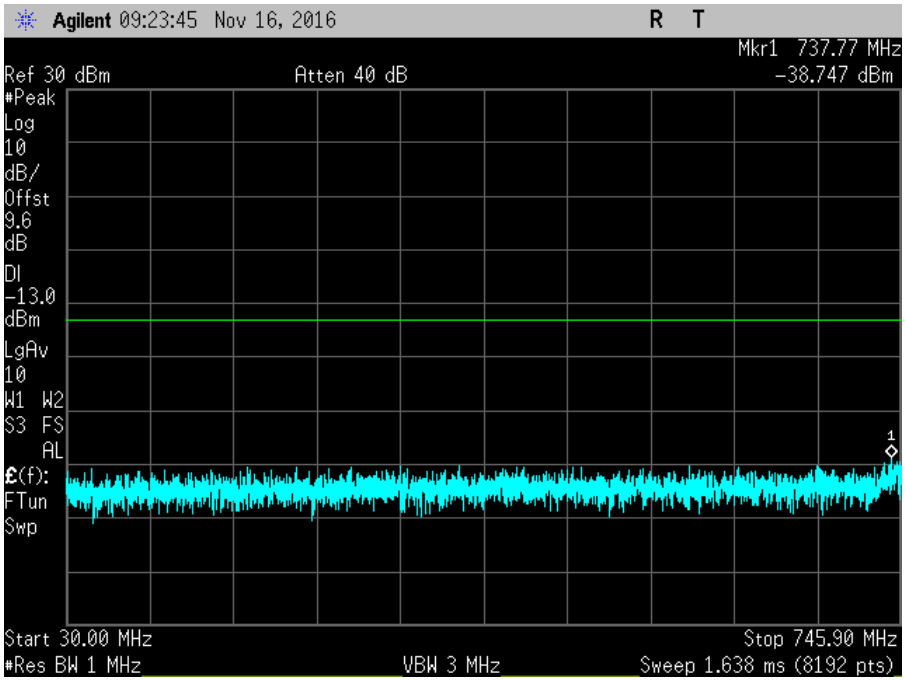
7.6_CSE_DL_728-746MHz_L



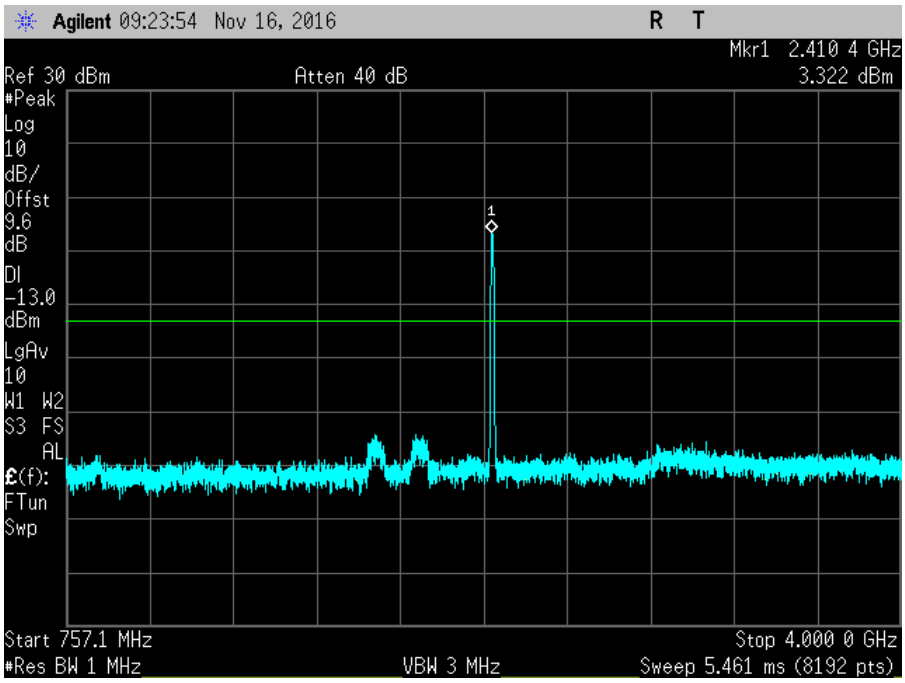
7.6_CSE_DL_728-746MHz_R1



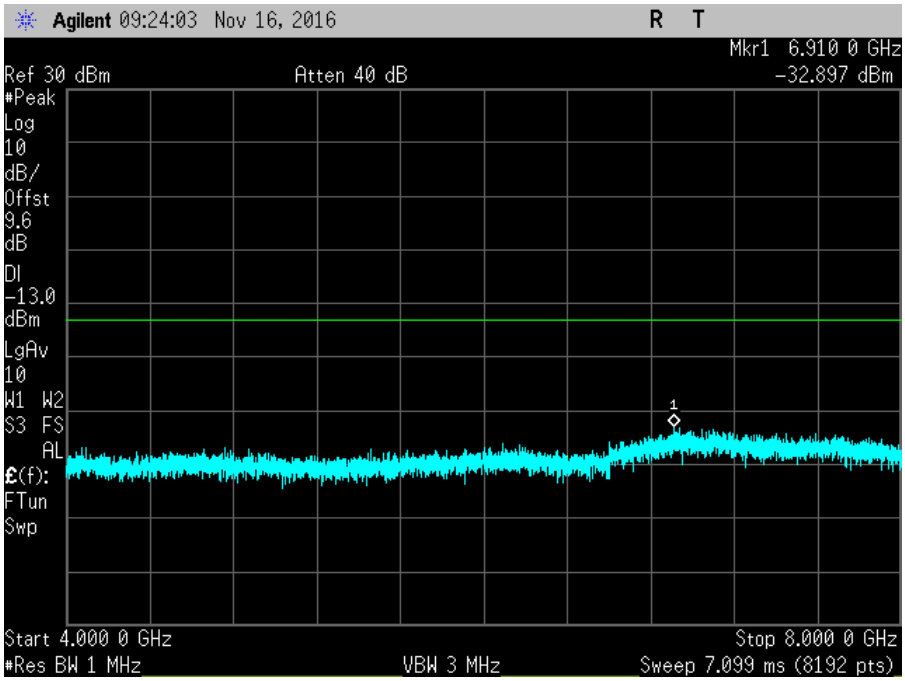
7.6_CSE_DL_728-746MHz_R2



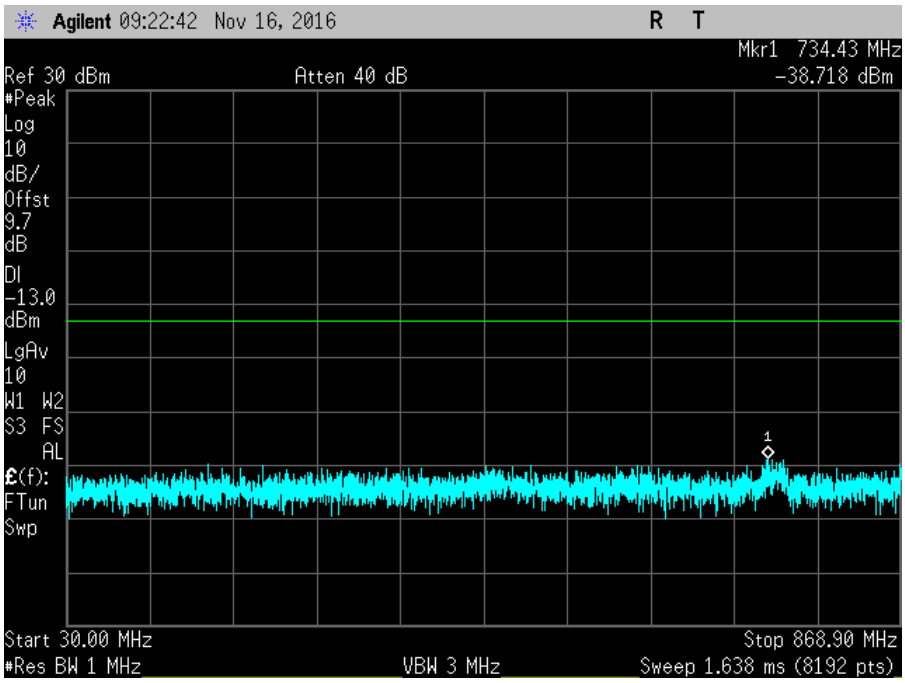
7.6_CSE_DL_746-757MHz_R3



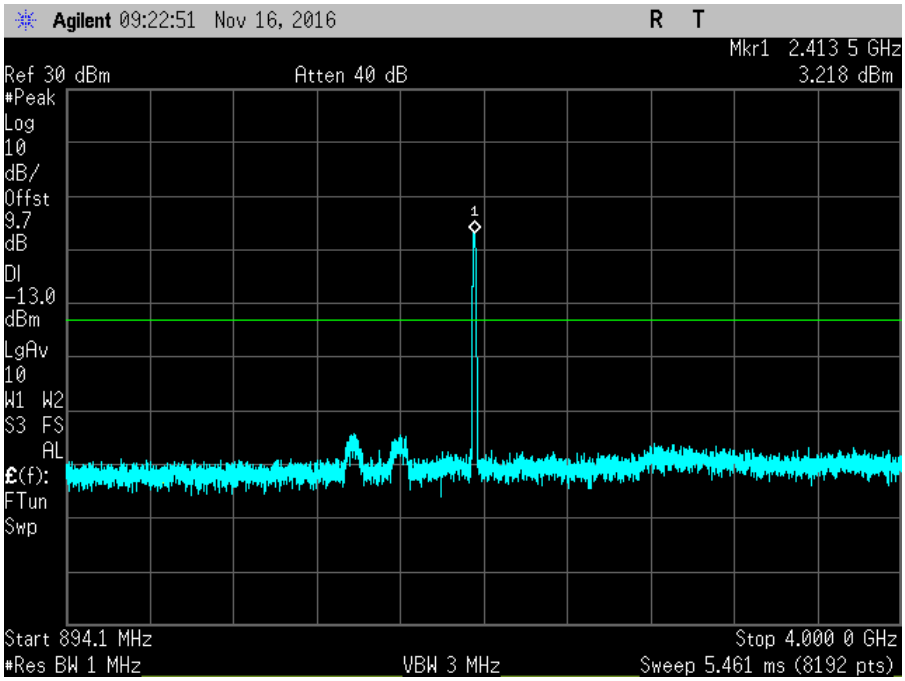
7.6_CSE_DL_746-757MHz_R4



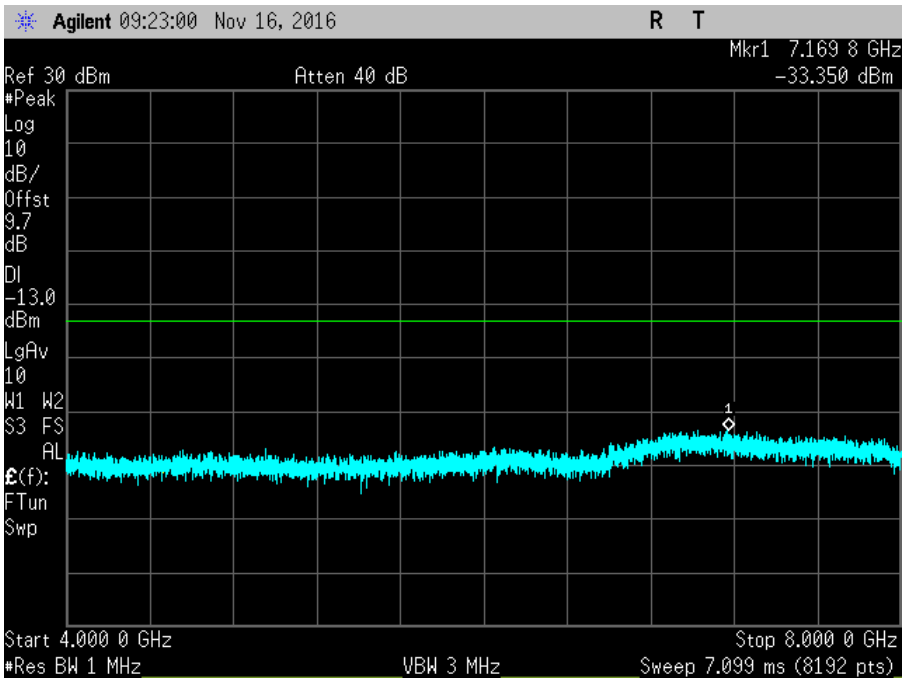
7.6_CSE_DL_746-757MHz_R5



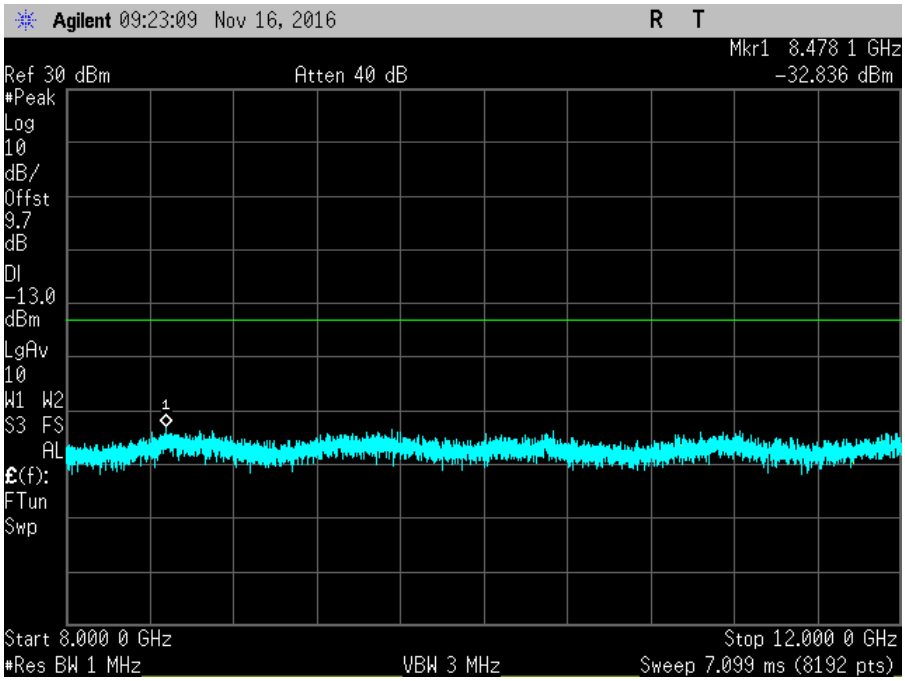
7.6_CSE_DL_869-894MHz_L



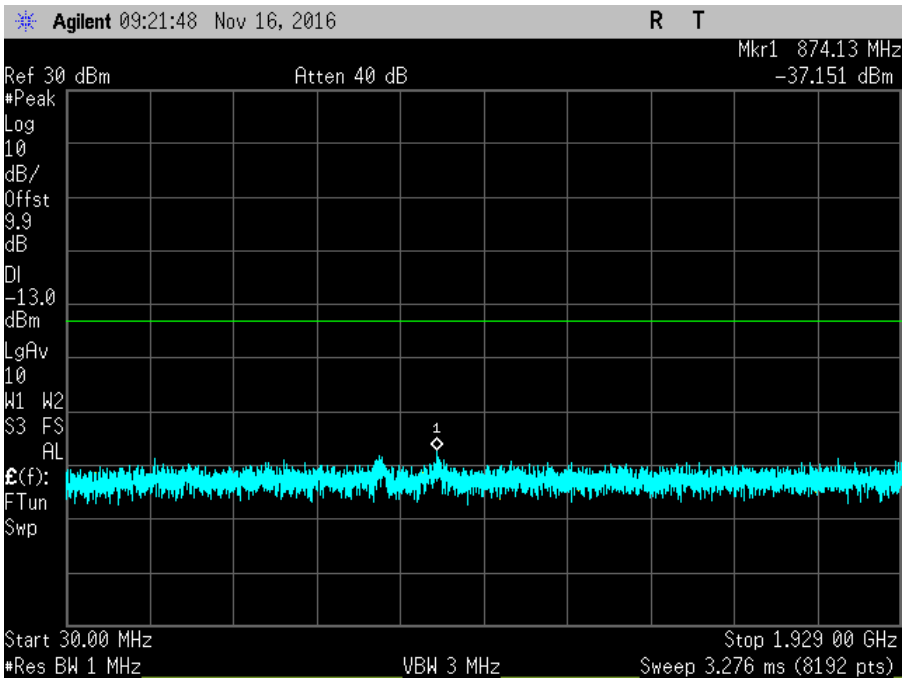
7.6_CSE_DL_869-894MHz_R1



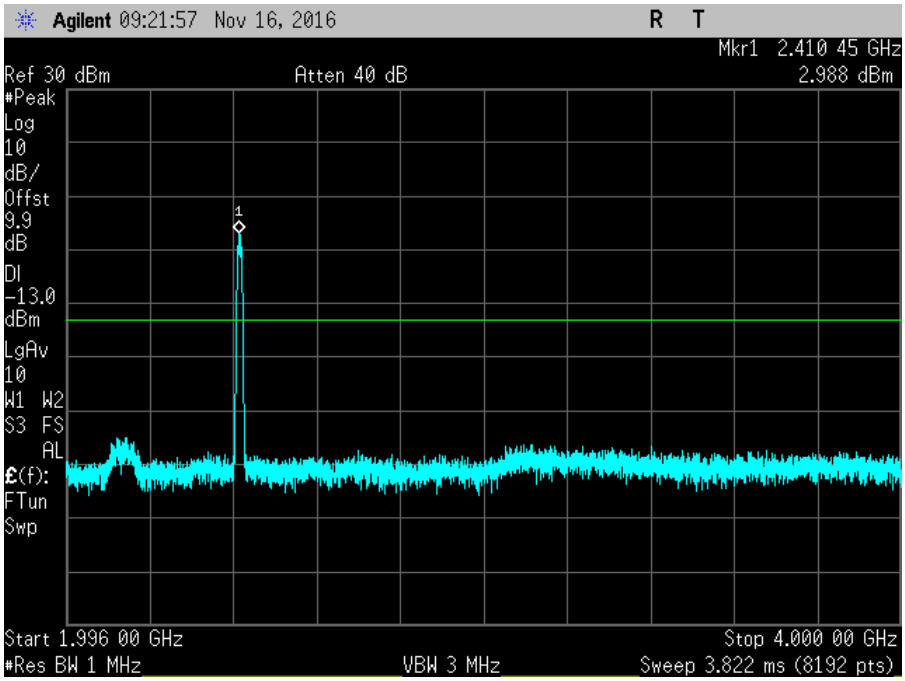
7.6_CSE_DL_869-894MHz_R2



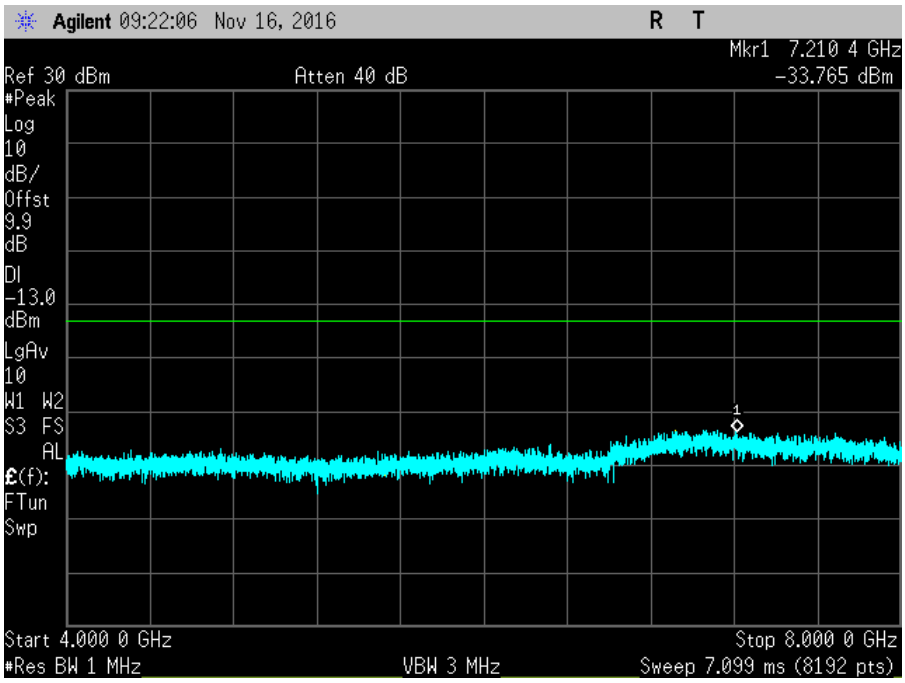
7.6_CSE_DL_869-894MHz_R3



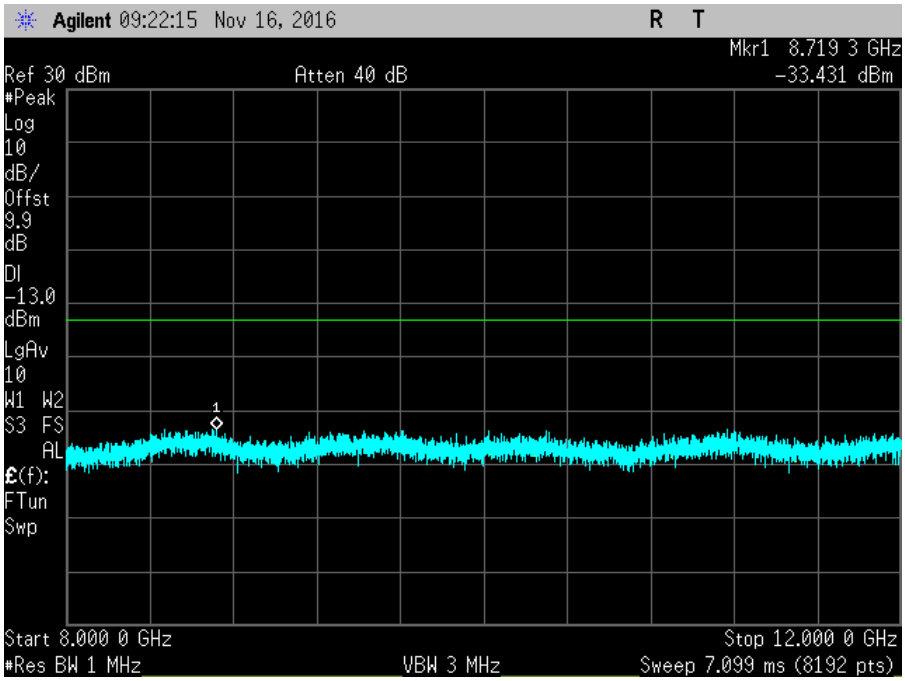
7.6_CSE_DL_1930-1995MHz_L



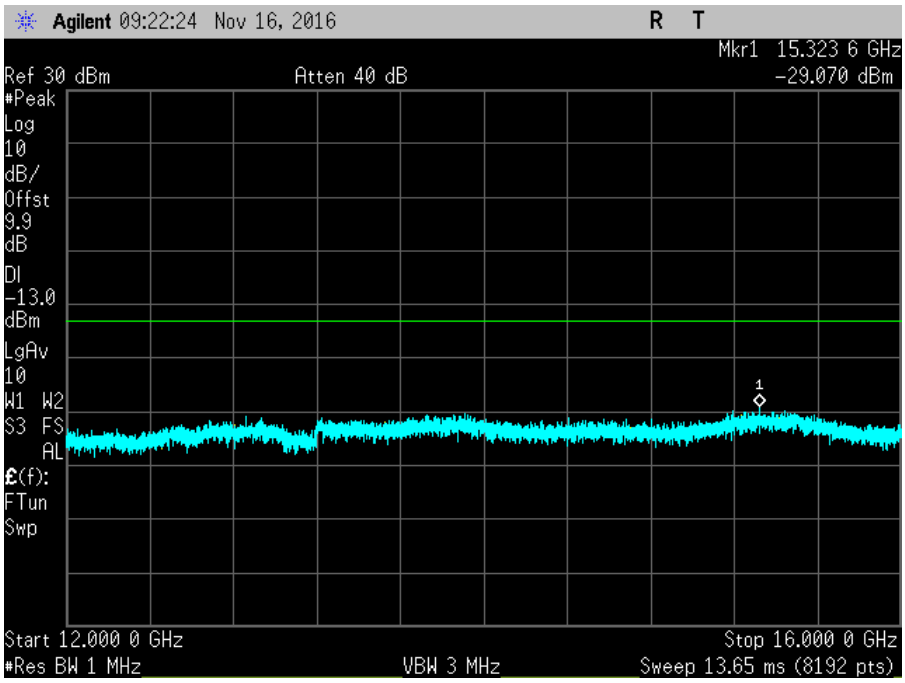
7.6_CSE_DL_1930-1995MHz_R1



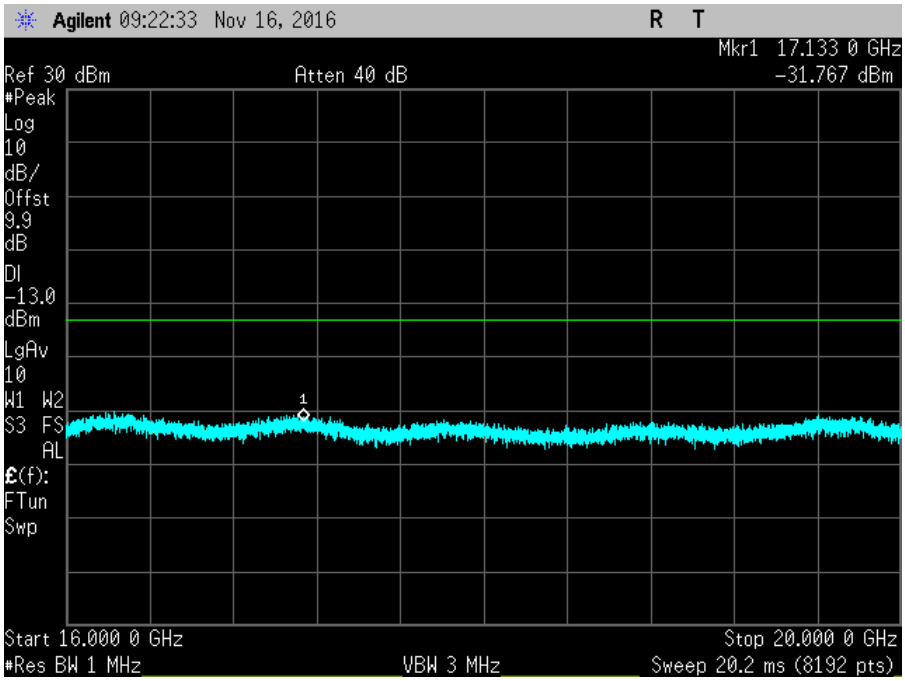
7.6_CSE_DL_1930-1995MHz_R2



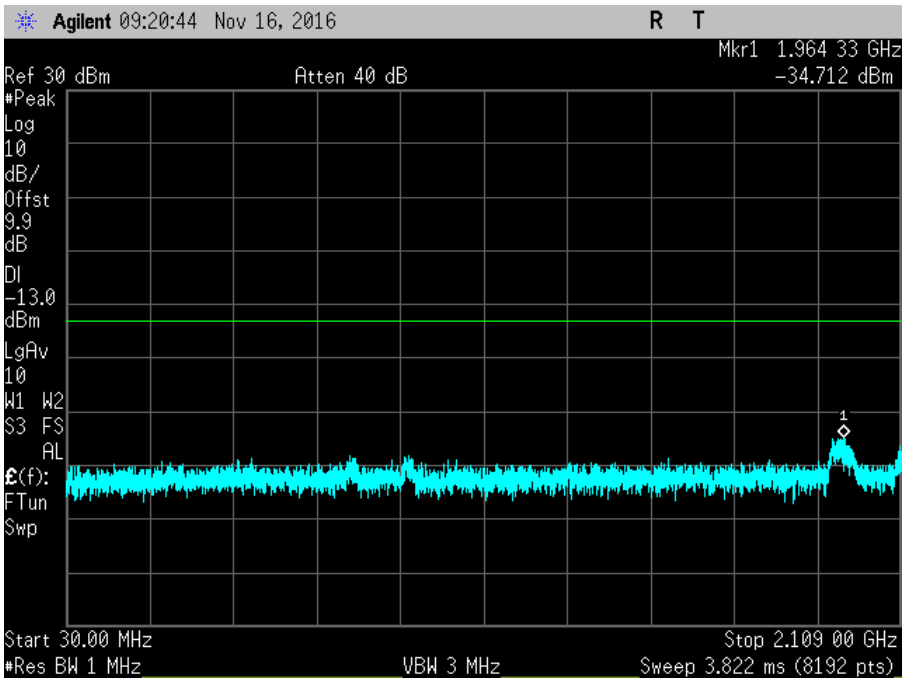
7.6_CSE_DL_1930-1995MHz_R3



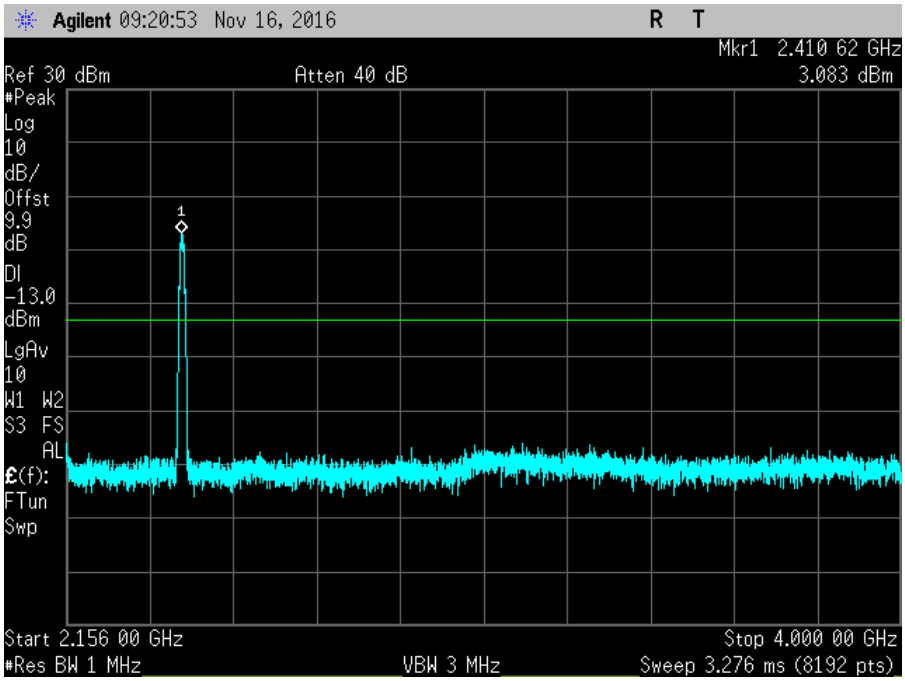
7.6_CSE_DL_1930-1995MHz_R4



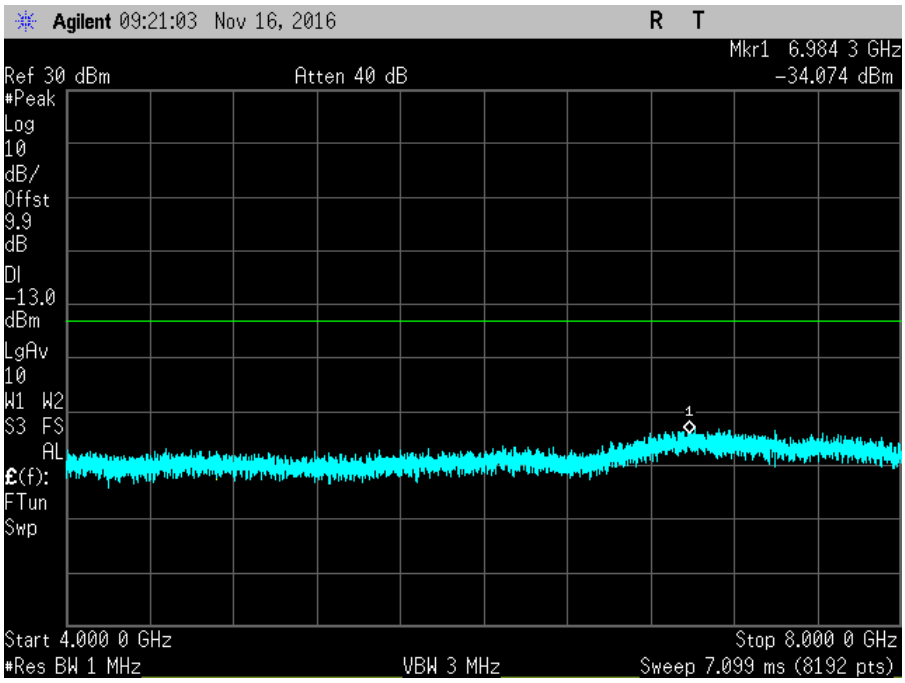
7.6_CSE_DL_1930-1995MHz_R5



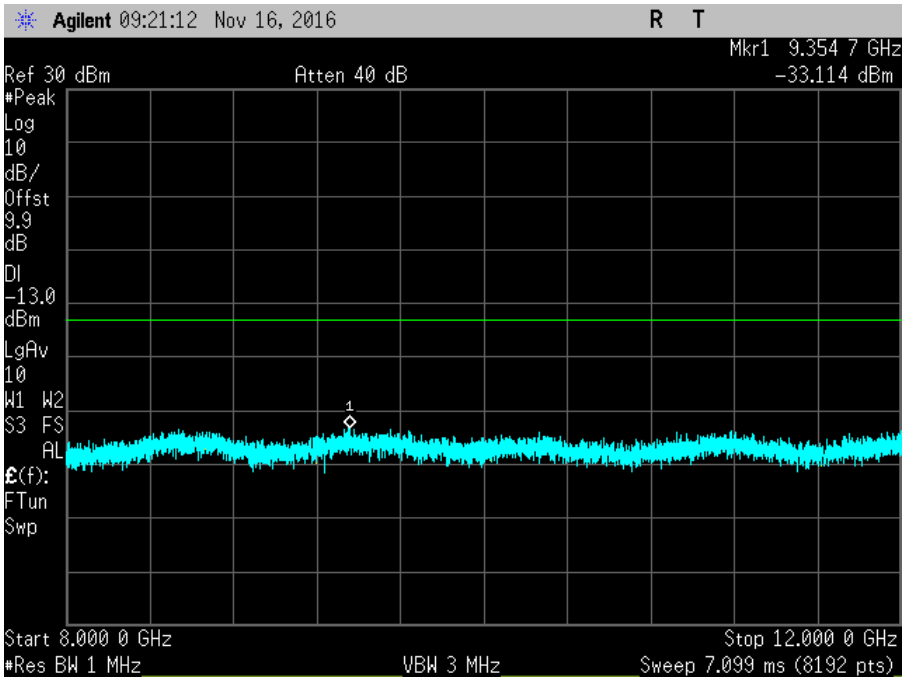
7.6_CSE_DL_2110-2155MHz_L



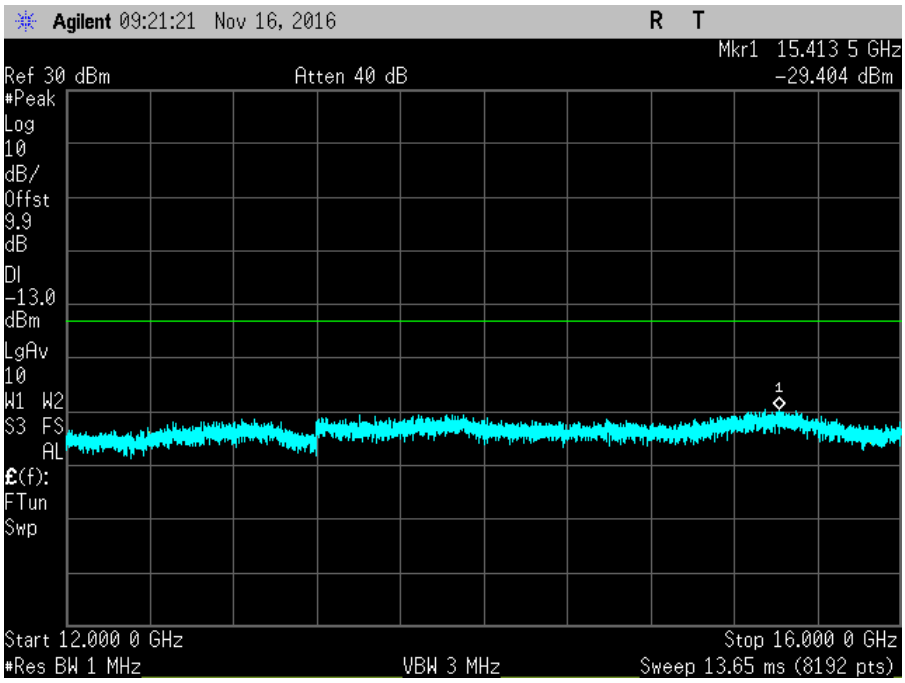
7.6_CSE_DL_2110-2155MHz_R1



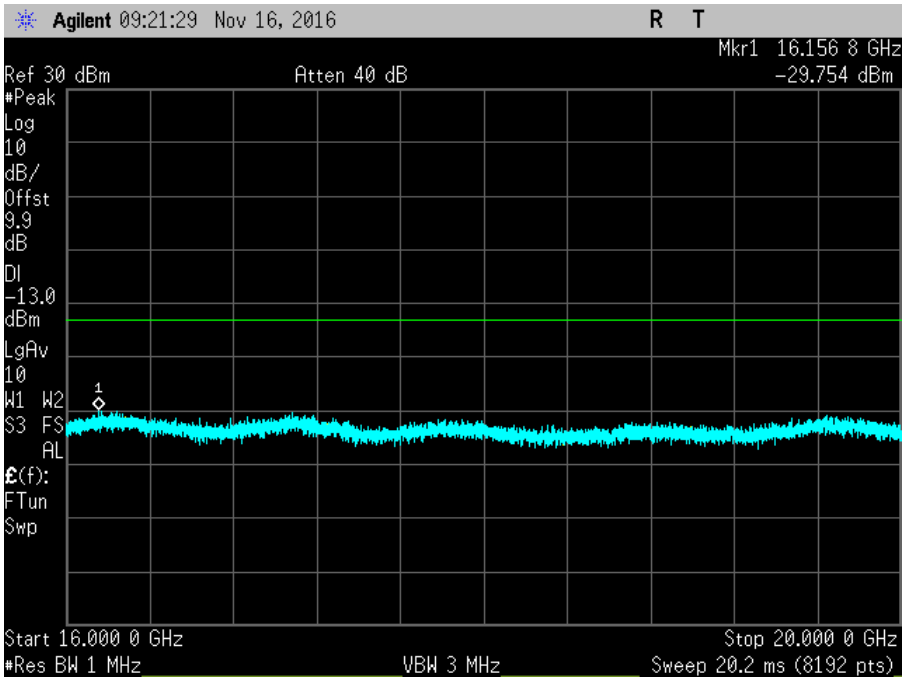
7.6_CSE_DL_2110-2155MHz_R2



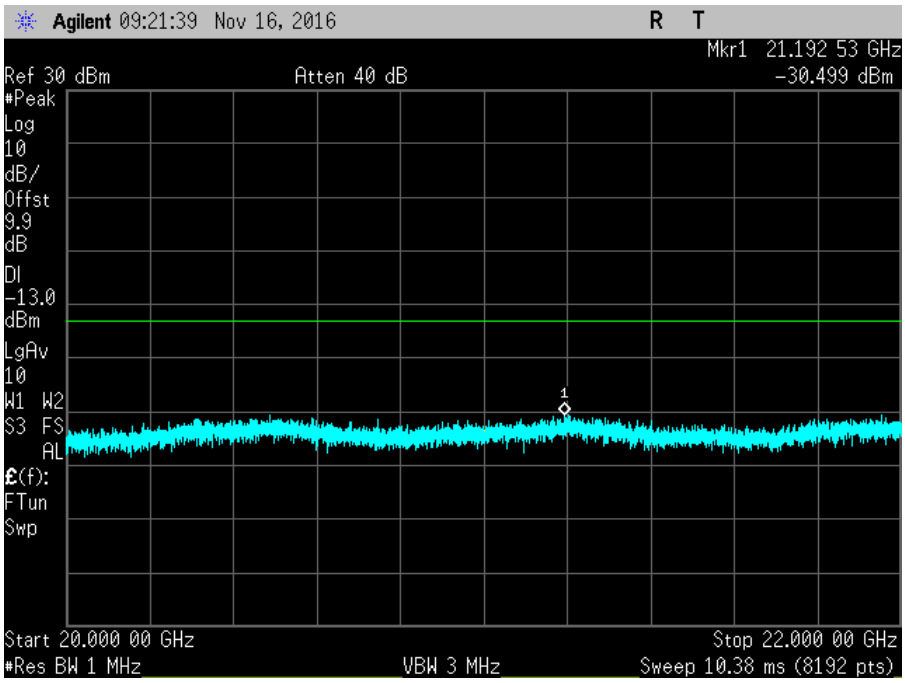
7.6_CSE_DL_2110-2155MHz_R3



7.6_CSE_DL_2110-2155MHz_R4



7.6_CSE_DL_2110-2155MHz_R5



7.6_CSE_DL_2110-2155MHz_R6

7.7 Noise limit

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**7.7 Noise Limit (Maximum Transmitter Noise Power Level / Variable UL Noise Timing)**		
Work Order #:	**98759**	Date:	11/16/2016
Test Type:	**Conducted Emissions**	Time:	10:14:58 AM
Tested By:	**Daniel Bertran**	Sequence#:	1
Software:	EMITest 5.03.03		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 6			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 6			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed CMRS Wideband Consumer Booster with a Wi-Fi Router and TV amplifier installed. The CMRS DL signal and the Wi-Fi Signal are combined at the diplexer and transmit via the indoor antenna.
The Consumer booster UL and DL power and gain parameters are initially measured with Wi-Fi transmitting at mid channel using sequentially 802.11b, g, n20 and n40 signal. Since no significant change in measured power was observed, all other parameters are obtained with Wi-Fi transmitting at Mid channel, 802.11b.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is type RP-TNC connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.

Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.7 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016
Firmware: V2.2
Test environment conditions: Temperature: 24°C, 60% Relative Humidity and Pressure: 101.5 kPa
Note:
7.7.1 Maximum Transmitter Noise Power Level
Per figure 3, input port was terminated with 50 Ohm Pasternack load (MN: PE6187 and SN: 1443).
Input donor port was terminated with 50 Ohm Pasternack load via a 75/50 Ohm impedance matching pad.
7.7.2 Variable UL Noise Timing
Per figure 4, server port was terminated with 50 Ohm Pasternack load (MN: PE6187 and SN: 1443).

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03418	Signal Generator	E4438C	7/30/2015	7/30/2017
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017
	ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP06898	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP05411	Attenuator	54A-10	1/18/2016	1/18/2018
	AN02660	Spectrum Analyzer	E4446A	5/31/2016	5/31/2018

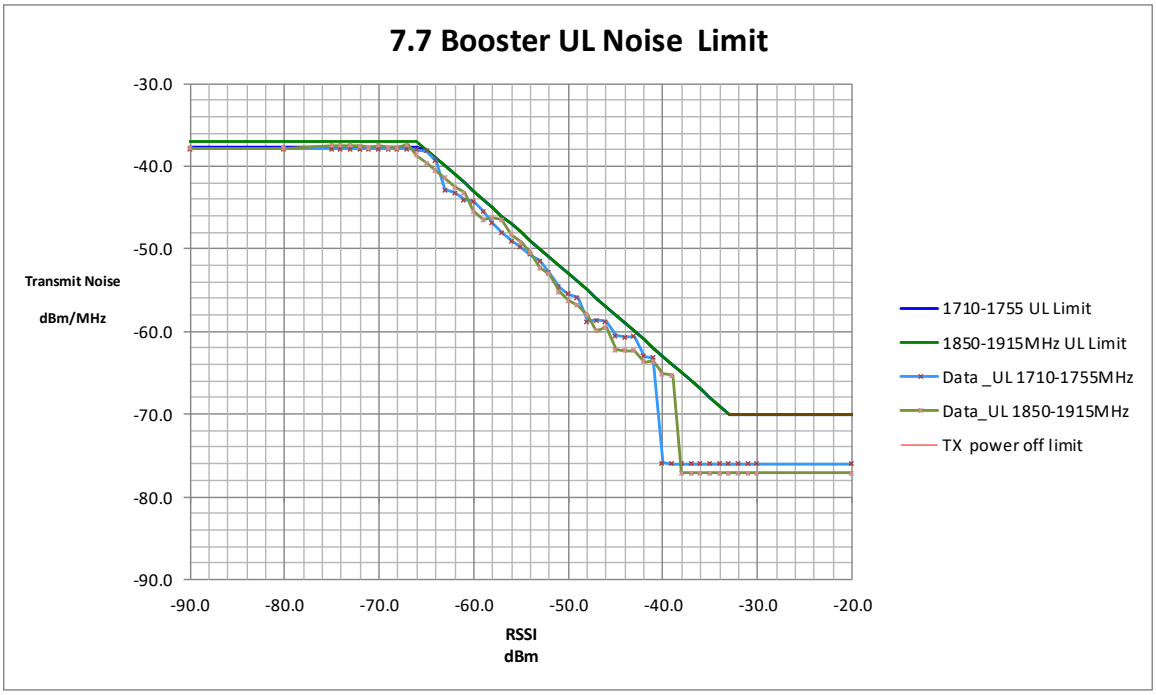
Summary of Results

7.7.1 Maximum transmitter noise power level

- 7.7.1 a-g: Maximum transmitter noise with 50-ohm shielded load

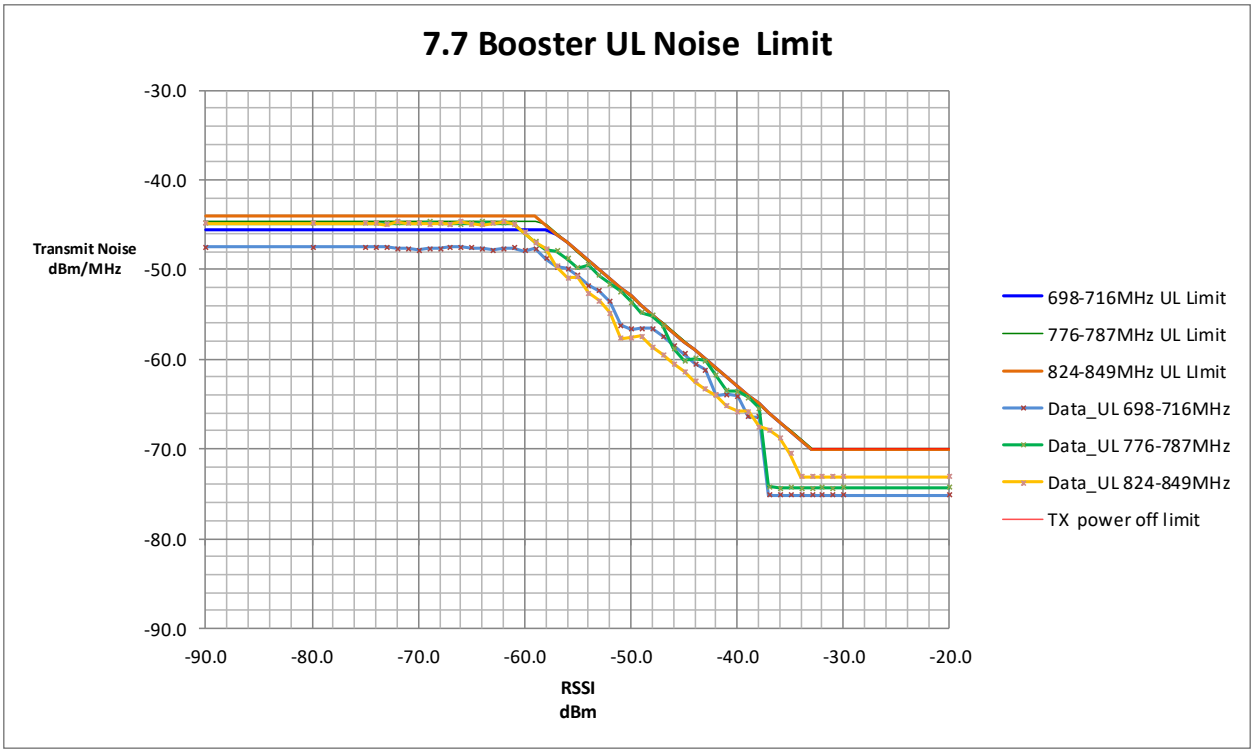
Maximum Noise Power			
Freq	**Measured**	**Limit**	**Margin**
MHz	**dBm./MHz**	**dBm/MHz**	
UL 1710-1755	-38.8	-37.7	-1.1
UL 1850-1915	-37.7	-37.0	-0.7
UL 824-849	-45.0	-44.1	-0.9
UL 698-716	-48.1	-45.5	-2.6
UL 776-787	-46.3	-44.6	-1.7
DL 2110-2155	-39.0	-37.7	-1.3
DL 1930-1995	-39.0	-37.0	-2.0
DL 869-894	-44.7	-44.1	-0.6
DL 728-746	-46.5	-45.5	-1.0
DL 746-757	-45.6	-44.6	-1.0

- 7.7.1 h-n: Maximum transmitter noise when varying the DL signal generator output level with a 4.1MHz AWGN signal



1710.0 - 1755.0 MHz					
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-75.0	-37.9		-37.7		-0.2
-69.0	-37.9		-37.7		-0.2
-65.0	-38.2	-38.0			-0.2
-64.0	-39.4	-39.0			-0.4
-60.0	-44.2	-43.0			-1.2
-43.0	-60.6	-60.0			-0.6
-32.0	-76.0			-70	-6.0

1850.0 - 1915.0 MHz					
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-75.0	-37.5		-37.0		-0.5
-67.0	-37.4		-37.0		-0.4
-61.0	-43.2	-42.0			-1.2
-57.0	-46.5	-46.0			-0.5
-55.0	-49.2	-48.0			-1.2
-39.0	-65.3	-64.0			-1.3
-32.0	-77.1			-70	-7.1



824.0 - 849.0 MHz					
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-72.0	-44.7		-44.1		-0.6
-62.0	-44.7		-44.1		-0.6
-58.0	-47.7	-45.0			-2.7
-55.0	-50.8	-48.0			-2.8
-39.0	-65.8	-64.0			-1.8
-36.0	-68.7	-67.0			-1.7
-32.0	-73.1			-70	-3.1

698.0 - 716.0 MHz					
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-67.0	-47.5		-45.5		-2.0
-66.0	-47.5		-45.5		-2.0
-47.0	-57.4	-56.0			-1.4
-45.0	-59.4	-58.0			-1.4
-43.0	-61.2	-60.0			-1.2
-40.0	-64.1	-63.0			-1.1
-32.0	-75.2			-70	-5.2

776.0 -787.0 MHz					
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-74.0	-44.8		-44.6		-0.2
-64.0	-44.7		-44.6		-0.1
-48.0	-55.1	-55.0			-0.1
-47.0	-56.2	-56.0			-0.2
-43.0	-60.2	-60.0			-0.2
-39.0	-64.3	-64.0			-0.3
-32.0	-74.3			-70	-4.3

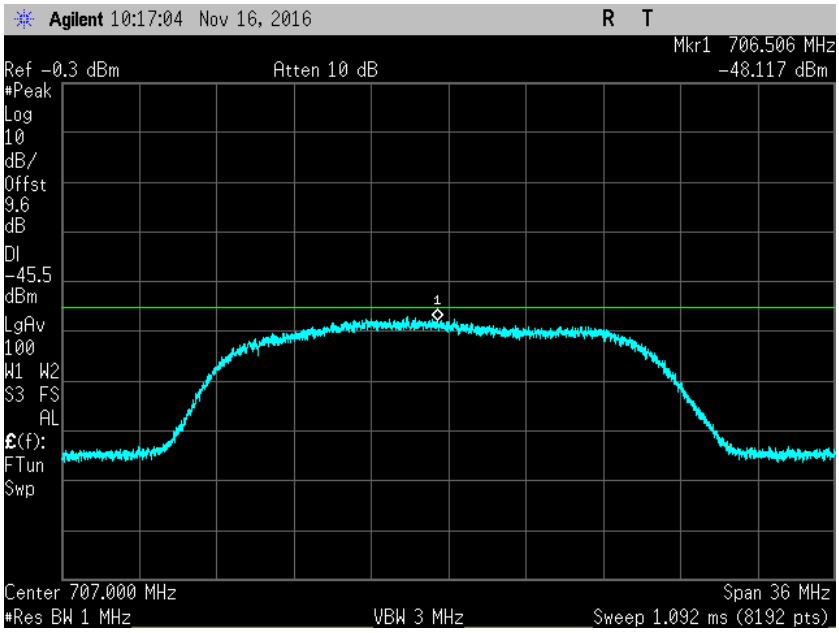
7.7.2 Variable uplink noise timing

Uplink Noise timing		
Frequency	Measured	Limit
MHz	Sec	sec
UL1710-1755	0.7	3
UL1850-1915	0.8	3
UL824-849	0.7	3
UL 698-716	0.8	3
UL776-787	0.7	3

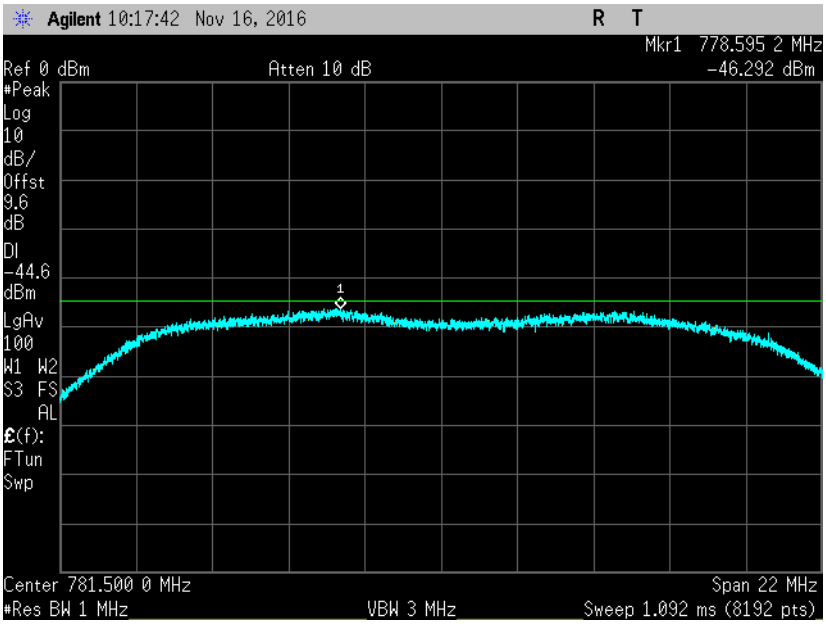
7.7.1 Maximum Transmitter Noise Power Level

Plots

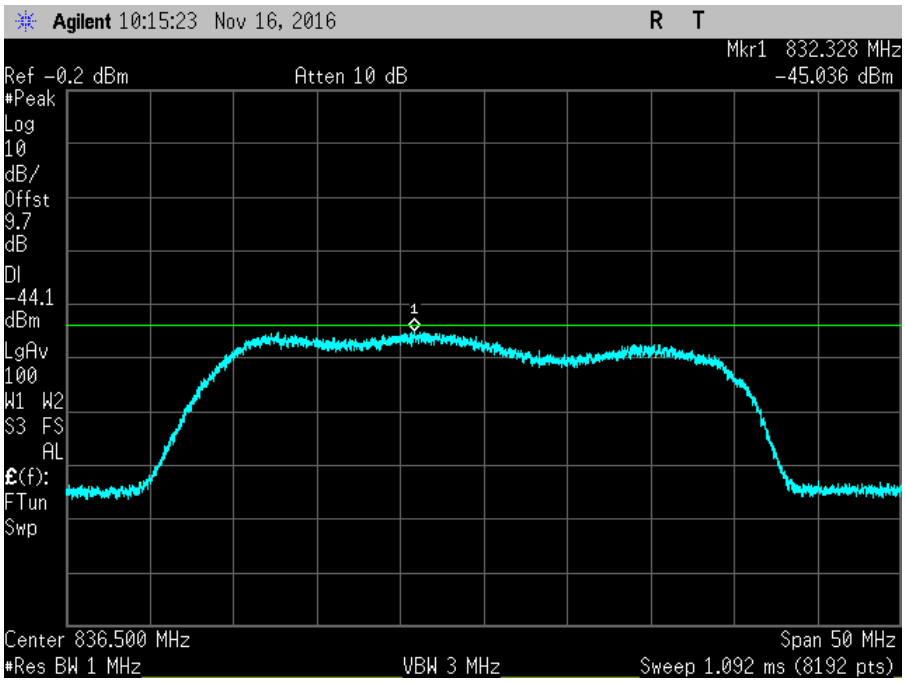
a – g Noise 50



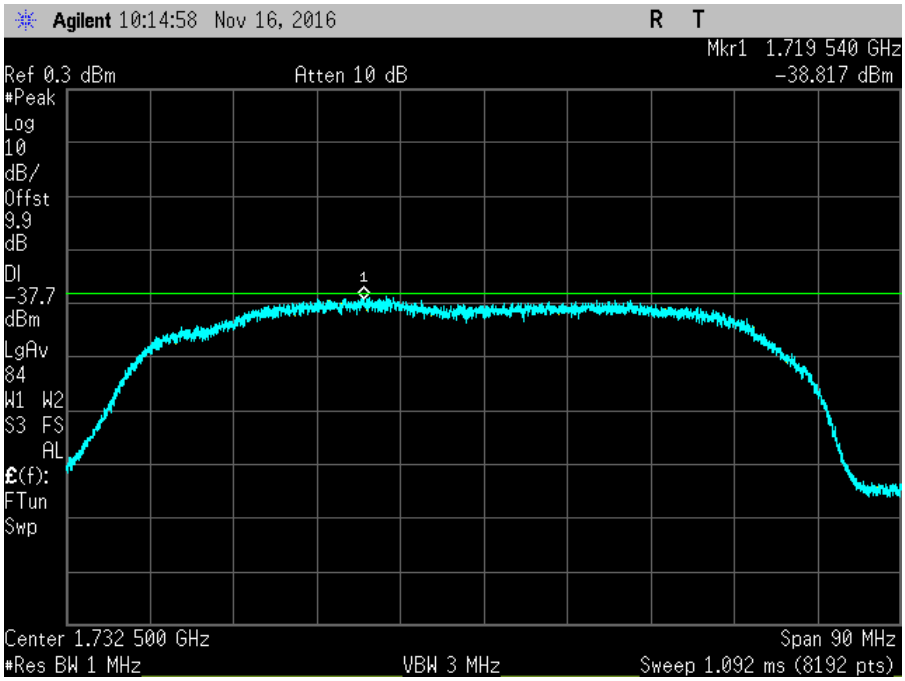
7.7.1_Noise_UL_698-716MHz



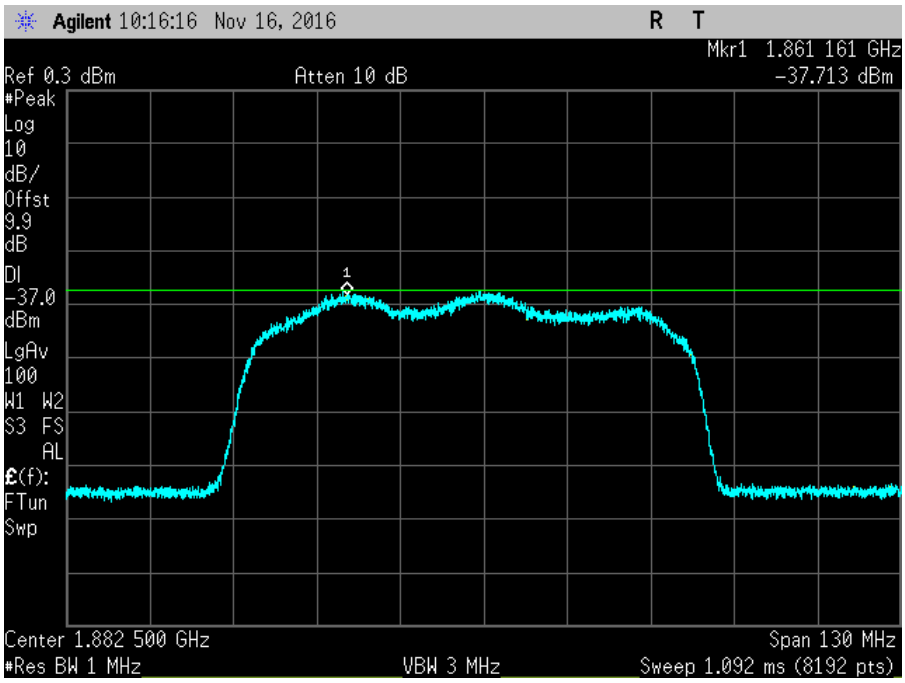
7.7.1_Noise_UL_776-787MHz



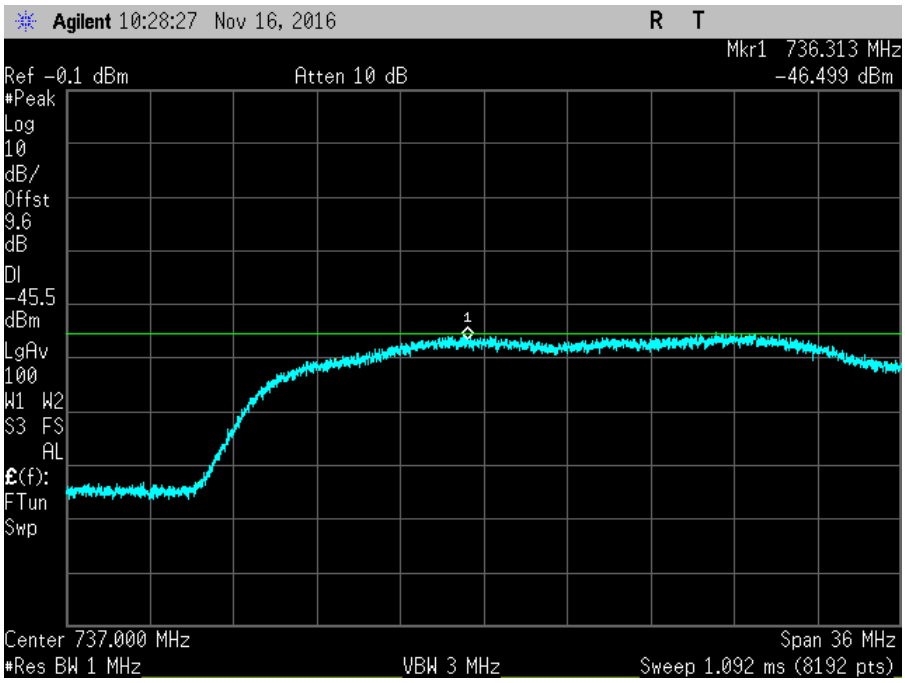
7.7.1_Noise_UL_824-849MHz



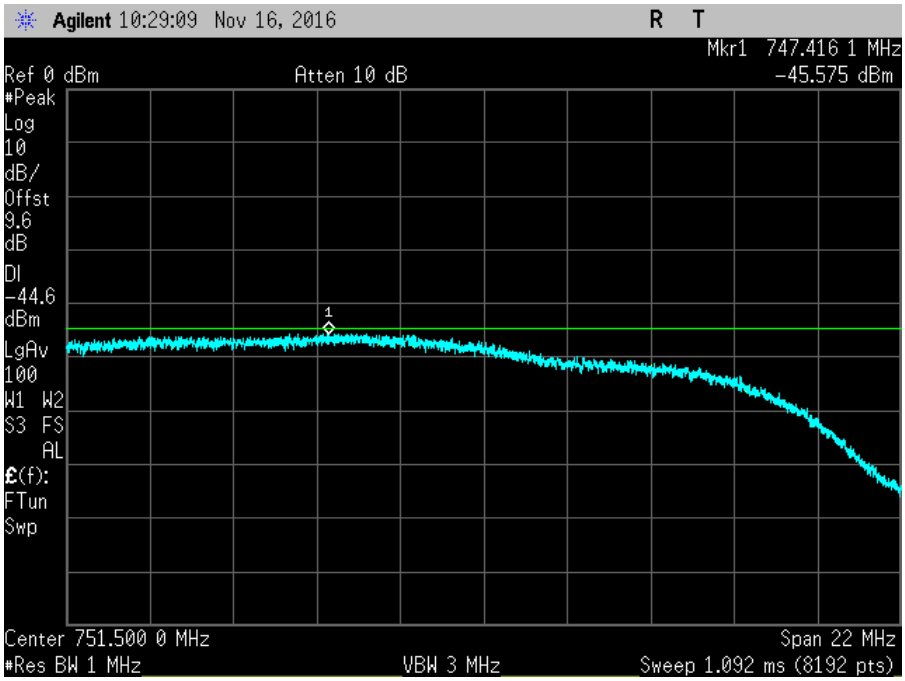
7.7.1_Noise_UL_1710-1755MHz



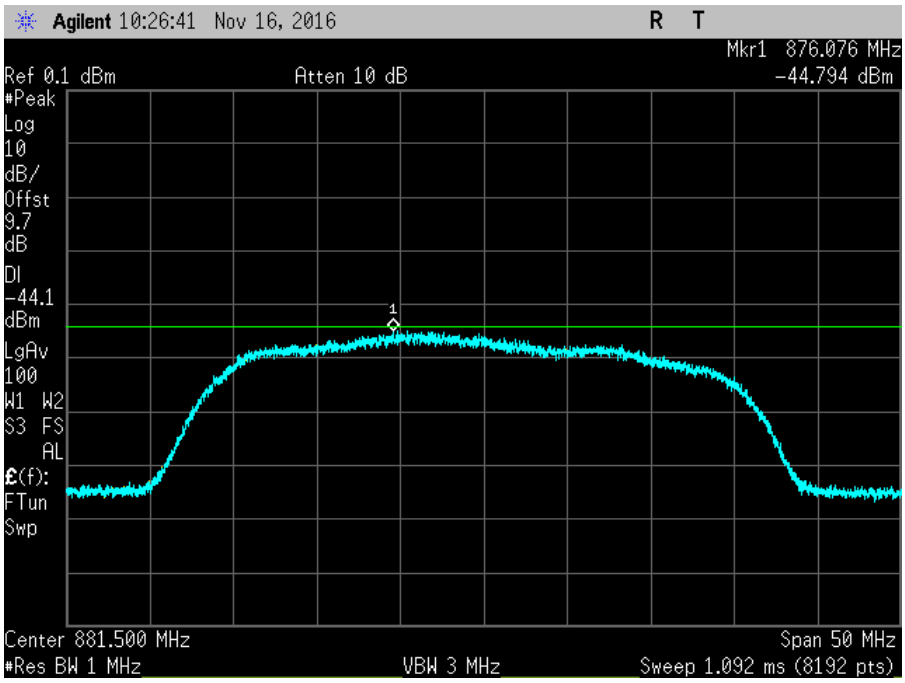
7.7.1_Noise_UL_1850-1915MHz



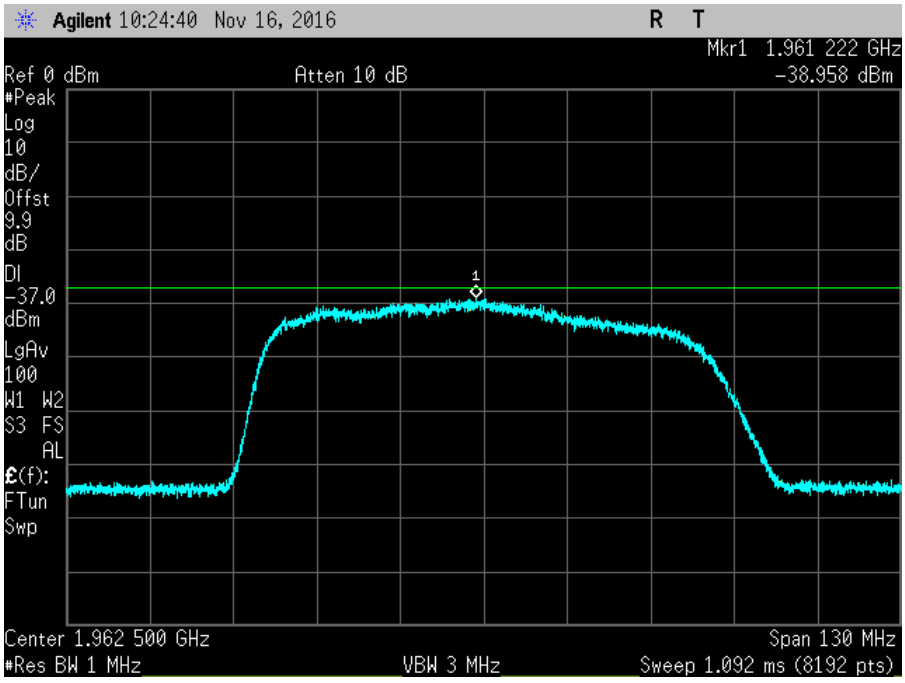
7.7.1_Noise_DL_728-746MHz



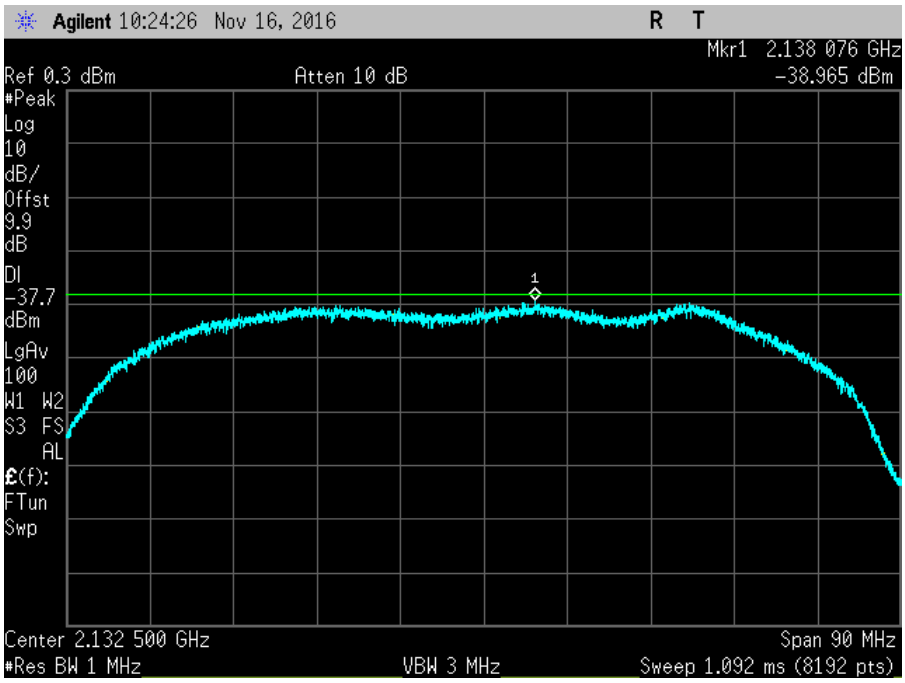
7.7.1_Noise_DL_746-757MHz



7.7.1_Noise_DL_869-894MHz



7.7.1_Noise_DL_1930-1995MHz



7.7.1_Noise_DL_2110-2155MHz

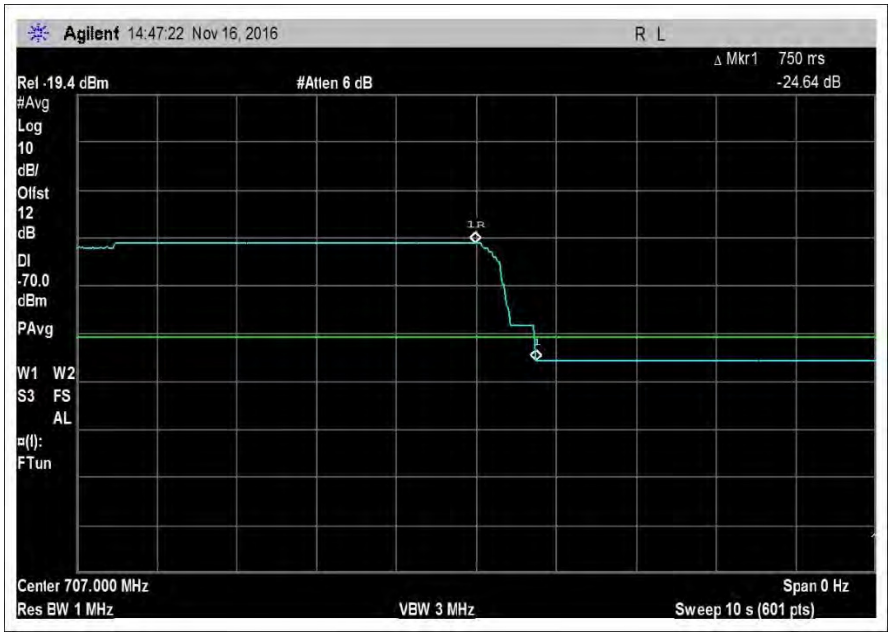
h – n Tx Noise

Note: For this subsection, see summary of results of 7.7.
7.7.1 h-n: Maximum transmitter noise when varying the DL signal generator output level with a 4.1MHz AWGN signal.

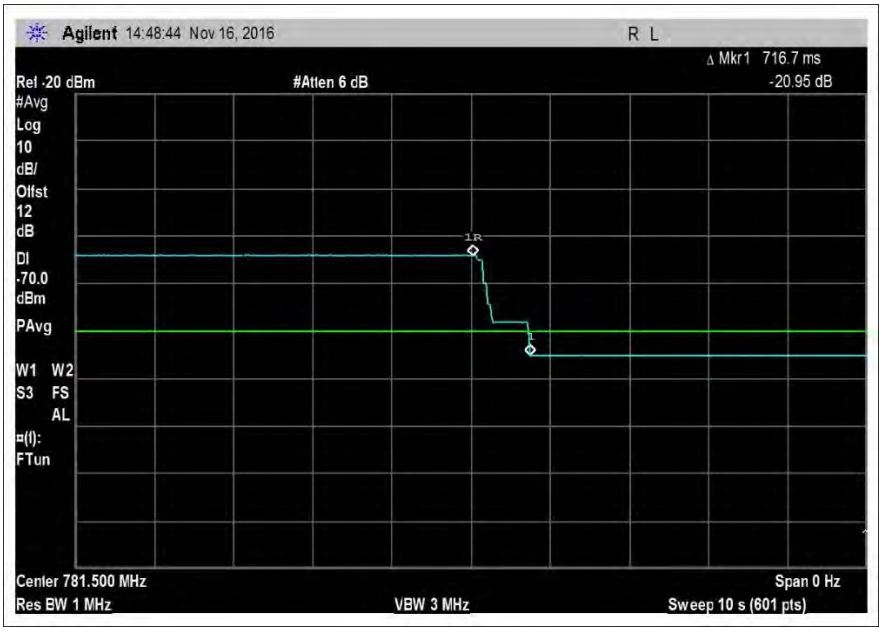
7.7.2 Variable UL Noise Timing

Plots

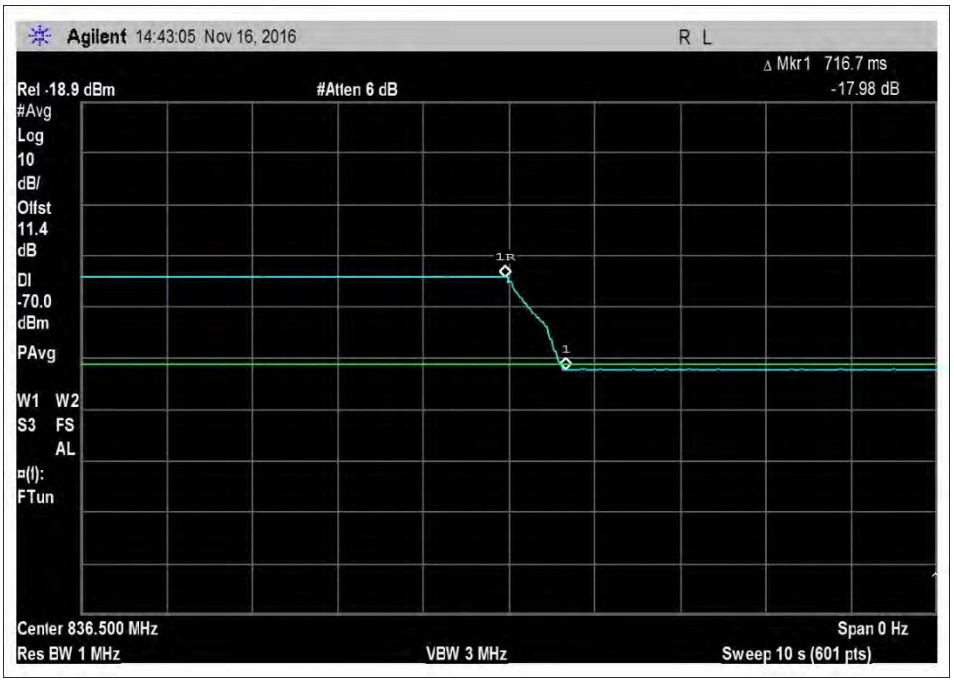
a – g Timing



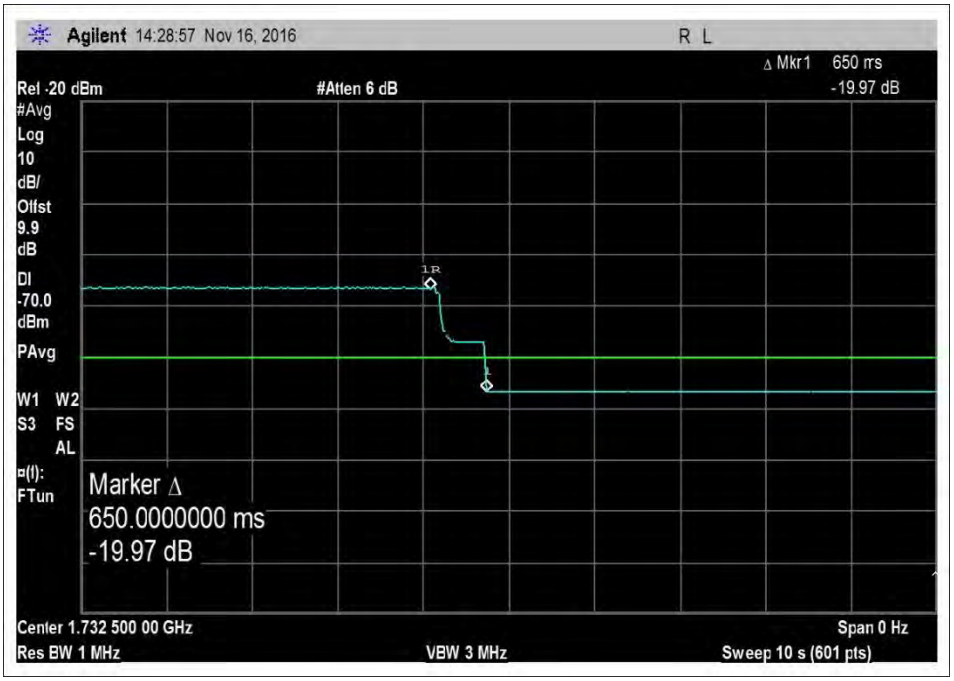
7.7_VarNoise_UL_698-716MHz



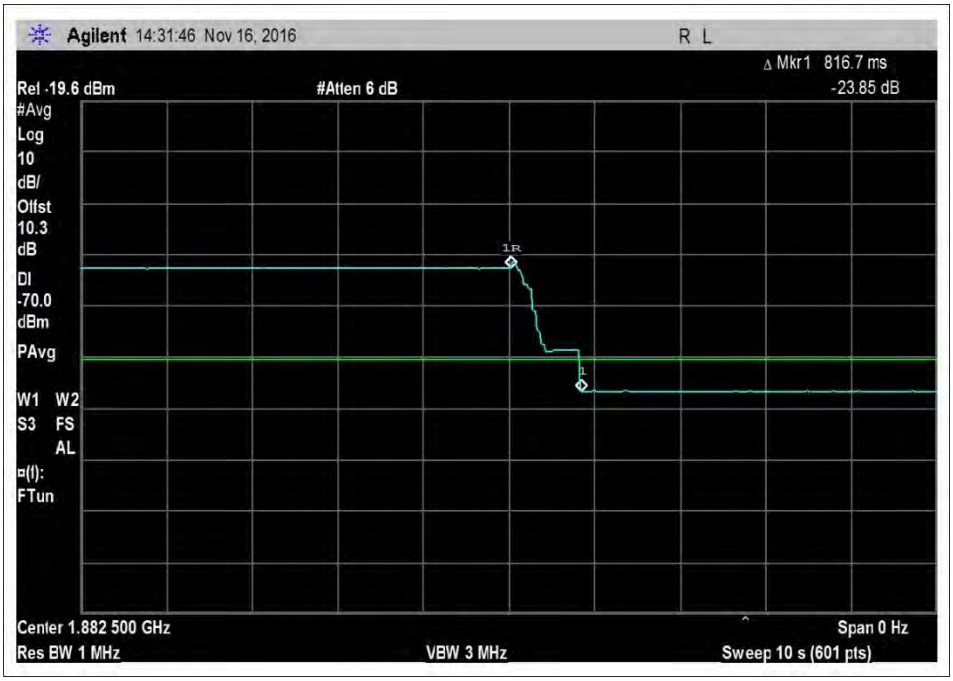
7.7_VarNoise_UL_776-787MHz



7.7_VarNoise_UL_824-849MHz



7.7_VarNoise_UL_1710-1755MHz



7.7_VarNoise_UL_1850-1915MHz

7.8 Uplink Inactivity

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**7.8 Uplink Inactivity**		
Work Order #:	**98759**	Date:	11/16/2016
Test Type:	**Conducted Emissions**	Time:	10:44:49 AM
Tested By:	**Daniel Bertran**	Sequence#:	1
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 6			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 6			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed CMRS Wideband Consumer Booster with a Wi-Fi Router and TV amplifier installed. The CMRS DL signal and the Wi-Fi Signal are combined at the diplexer and transmit via the indoor antenna.
The Consumer booster UL and DL power and gain parameters are initially measured with Wi-Fi transmitting at mid channel using sequentially 802.11b, g, n20 and n40 signal. Since no significant change in measured power was observed, all other parameters are obtained with Wi-Fi transmitting at Mid channel, 802.11b.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is type RP-TNC connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.8 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016
Firmware: V2.2
Test environment conditions: Temperature: 24°C, 60% Relative Humidity and Pressure: 101.5 kPa

Test Equipment:

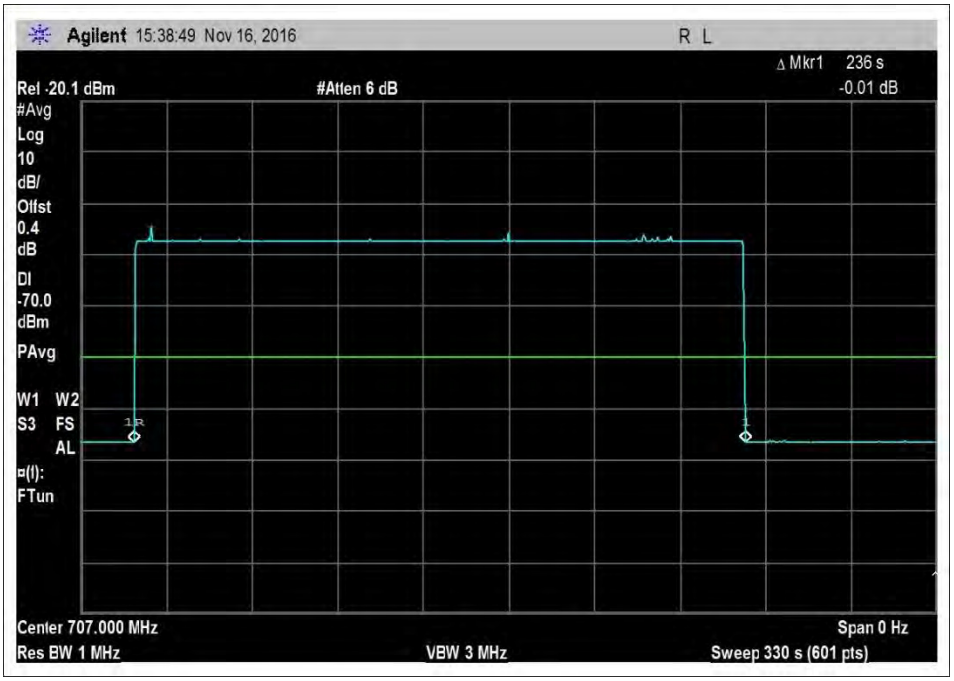
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03418	Signal Generator	E4438C	7/30/2015	7/30/2017
	ANP06898	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP05411	Attenuator	54A-10	1/18/2016	1/18/2018
	AN02660	Spectrum Analyzer	E4446A	5/31/2016	5/31/2018

Summary of Results

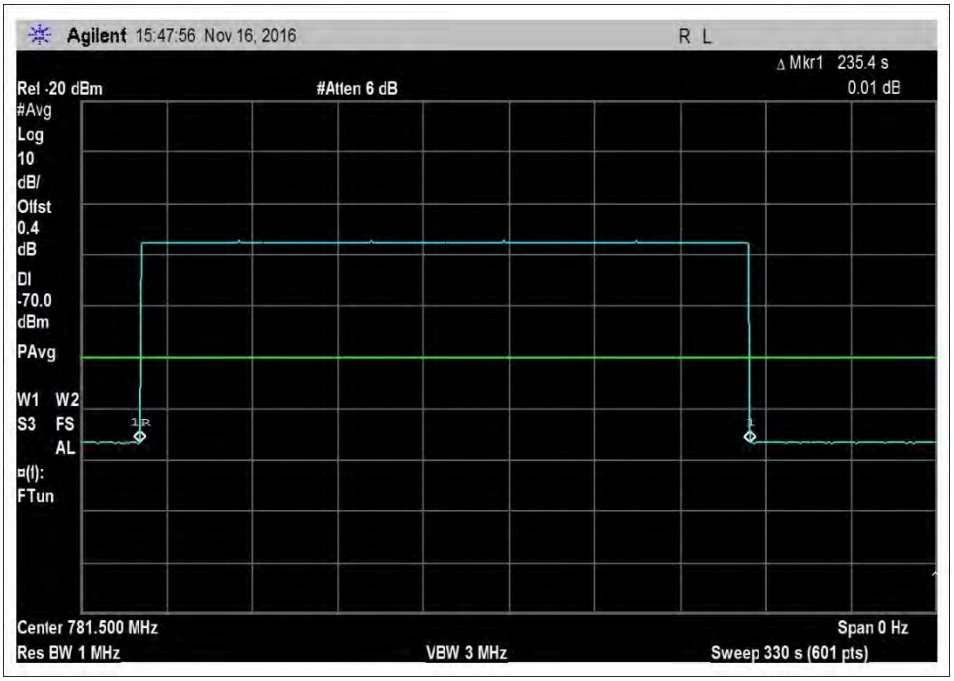
Pass: As demonstrated, when the booster is not serving an active device connection after 5 minutes the uplink noise power does not exceed -70dBm/MHz.

Uplink Inactivity		
Freq	**Measured**	**Limit**
MHz	**Min**	**Min**
UL1710-1755	3.8	5.0
UL1850-1915	3.8	5.0
UL824-849	3.8	5.0
UL 698-716	3.9	5.0
UL776-787	3.9	5.0

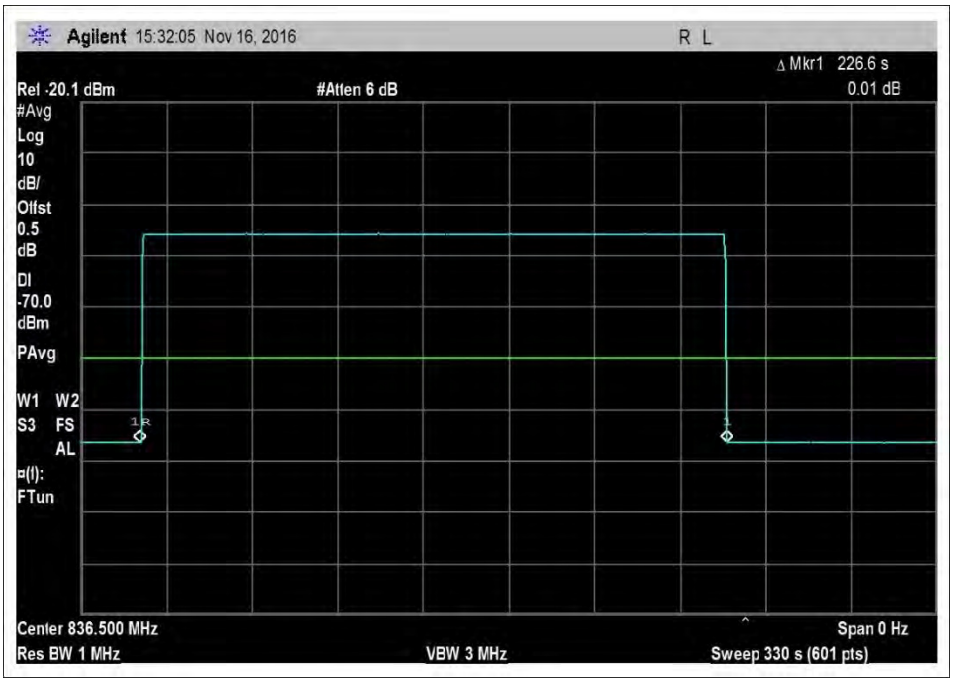
Plots



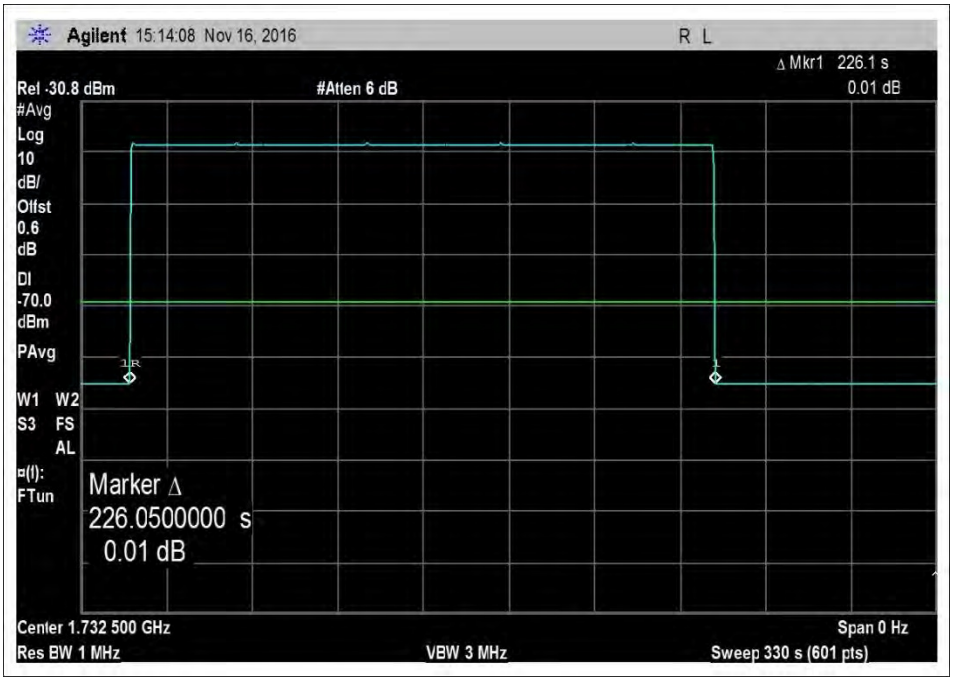
7.8_Inactivity_UL_698-707MHz



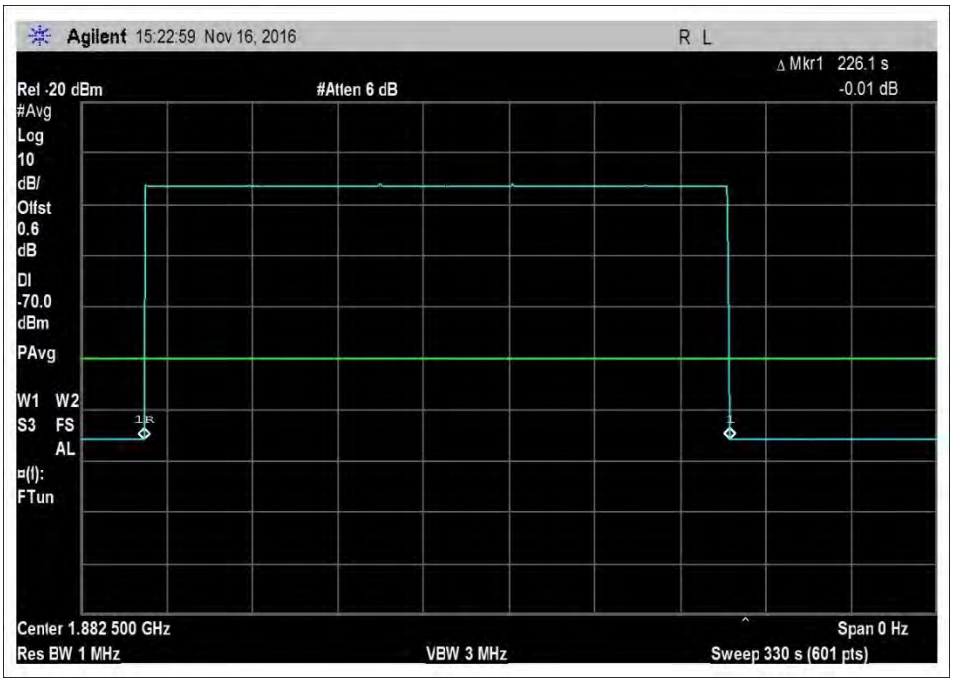
7.8_Inactivity_UL_776-787MHz



7.8_Inactivity_UL_824-849MHz



7.8_Inactivity_UL_1710-1755MHz



7.8_Inactivity_UL_1850-1915MHz

7.9 Booster Gain Limit

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**7.9 Variable Booster gain(Max Gain / Variable Uplink Gain Timing)**		
Work Order #:	**98759**	Date:	11/17/2016
Test Type:	**Conducted Emissions**	Time:	8:00:00 AM
Tested By:	**Daniel Bertran**	Sequence#:	1
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 6			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 6			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed CMRS Wideband Consumer Booster with a Wi-Fi Router and TV amplifier installed. The CMRS DL signal and the Wi-Fi Signal are combined at the diplexer and transmit via the indoor antenna.
The Consumer booster UL and DL power and gain parameters are initially measured with Wi-Fi transmitting at mid channel using sequentially 802.11b, g, n20 and n40 signal. Since no significant change in measured power was observed, all other parameters are obtained with Wi-Fi transmitting at Mid channel, 802.11b.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is type RP-TNC connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.9 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016
Firmware: V2.2
Test environment conditions: Temperature: 24.3°C, 52% Relative Humidity and Pressure: 101.9 kPa
Note:
Used MSCL provided by the manufacturer's antenna kitting.

Mobile station coupling loss (MSCL): *the minimum coupling loss (in dB) between the wireless device and the input (server) port of the consumer booster. MSCL must be calculated or measured for each band of operation and provided in compliance test reports. MSCL includes the path loss from the wireless device, and the booster's server antenna gain and cable loss. The wireless device is assumed to be an isotropic (0 dBi) antenna reference. Minimum standoff distances from inside wireless devices to the booster's server antenna must be reasonable and specified by the manufacturer in customer provided installation manuals.*

L P = 20logf + 20logd – 27.5

Where:

L P = basic free space path loss,
f = Center frequency,
d = 2 meters.

MSCL

Frequency (MHz)	MSCL (dB)
1850-1915	46.97
824-849	41.21
698-716	39.52
779-787	40.52
1710-1755	45.90

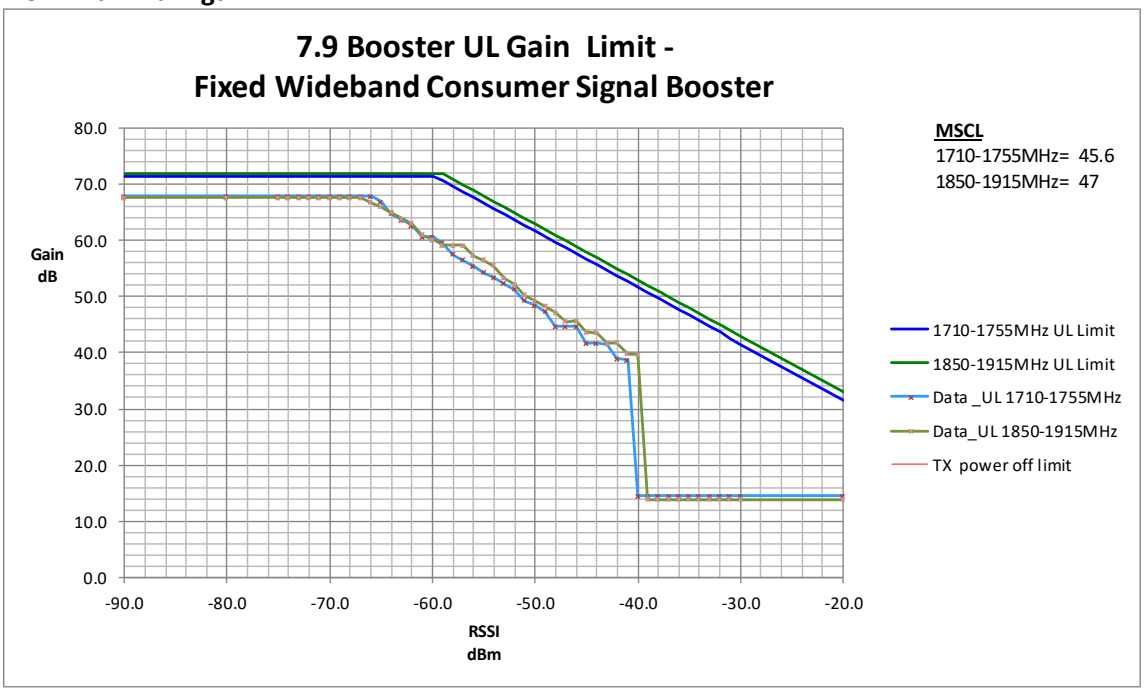
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03418	Signal Generator	E4438C	7/30/2015	7/30/2017
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017
	ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP06898	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP05411	Attenuator	54A-10	1/18/2016	1/18/2018
	AN02660	Spectrum Analyzer	E4446A	5/31/2016	5/31/2018
	ANC00087	Combiner	44000	01/07/2016	01/07/2018
	ANC00082	RF Coupler	722-10-1.500V	8/26/2015	8/26/2017
	ANP06899	Cable	32022-29094K-29094K-72TC	12/30/2015	12/30/2017

Summary of Results

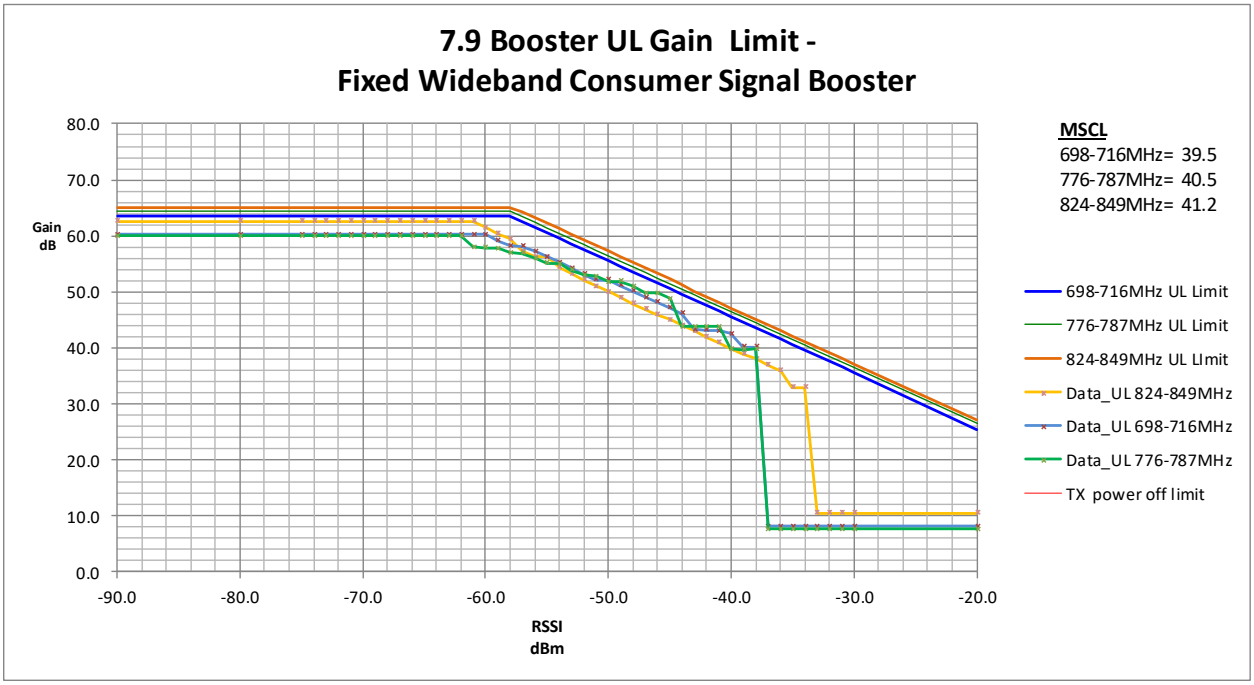
Pass: As demonstrated, computed gains are within the gain limit. All maximum variable uplink gain timings are within 3 second limit.

7.9.1 Maximum gain



1850.0 - 1915.0 MHz							
				Limit			Margin
RSSI (dBm)	Input (dBm)	Measured Output (dBm)	Measured Gain (dBm)	RSSI Dependent	Fixed Booster Limit	TX off	
-73.0	-51.5	16.1	67.6		72.0		-4.4
-65.0	-51.5	14.4	65.9		72.0		-6.1
-57.0	-51.5	7.6	59.1	70.0			-10.9
-56.0	-51.5	5.7	57.2	69.0			-11.8
-55.0	-51.5	5.0	56.5	68.0			-11.5
-54.0	-51.5	4.0	55.5	67.0			-11.5

1710.0 --1755.0 MHz							
				Limit			Margin
RSSI (dBm)	Input (dBm)	Measured Output (dBm)	Measured Gain (dBm)	RSSI Dependent	Fixed Booster Limit	TX off	
-73.0	-52	15.8	67.8		71.3		-3.5
-67.0	-52	15.8	67.8		71.3		-3.5
-59.0	-52	7.5	59.5	70.6			-11.1
-58.0	-52	5.5	57.5	69.6			-12.1
-57.0	-52	4.5	56.5	68.6			-12.1
-56.0	-52	3.4	55.4	67.6			-12.2



824.0 - 849.0 MHz							
				Limit			Margin
RSSI (dBm)	Input (dBm)	Measured Output (dBm)	Measured Gain (dBm)	RSSI Dependent	Fixed Booster Limit	TX off	
-73.0	-47.8	14.8	62.6		64.9		-2.3
-67.0	-47.8	14.8	62.6		64.9		-2.3
-57.0	-47.8	9.5	57.3	64.2			-6.9
-56.0	-47.8	8.5	56.3	63.2			-6.9
-54.0	-47.8	6.6	54.4	61.2			-6.8
-53.0	-47.8	5.5	53.3	60.2			-6.9

698.0 - 716.0 MHz							
				Limit			Margin
RSSI (dBm)	Input (dBm)	Measured Output (dBm)	Measured Gain (dBm)	RSSI Dependent	Fixed Booster Limit	TX off	
-71.0	-45.4	14.9	60.3		63.5		-3.2
-64.0	-45.4	14.9	60.3		63.5		-3.2
-48.0	-45.4	4.8	50.2	53.5			-3.3
-46.0	-45.4	2.8	48.2	51.5			-3.3
-44.0	-45.4	0.8	46.2	49.5			-3.3
-40.0	-45.4	-2.8	42.6	45.5			-2.9

776.0 - 787.0 MHz							
				Limit			Margin
RSSI (dBm)	Input (dBm)	Measured Output (dBm)	Measured Gain (dBm)	RSSI Dependent	Fixed Booster Limit	TX off	
-70.0	-45.0	15.0	60.0		64.4		-4.4
-62.0	-45.0	15.0	60.0		64.4		-4.4
-49.0	-45.0	6.9	51.9	55.5			-3.6
-48.0	-45.0	6.0	51.0	54.5			-3.5
-46.0	-45.0	4.8	49.8	52.5			-2.7
-45.0	-45.0	3.8	48.8	51.5			-2.7

7.9.2 Variable uplink gain timing

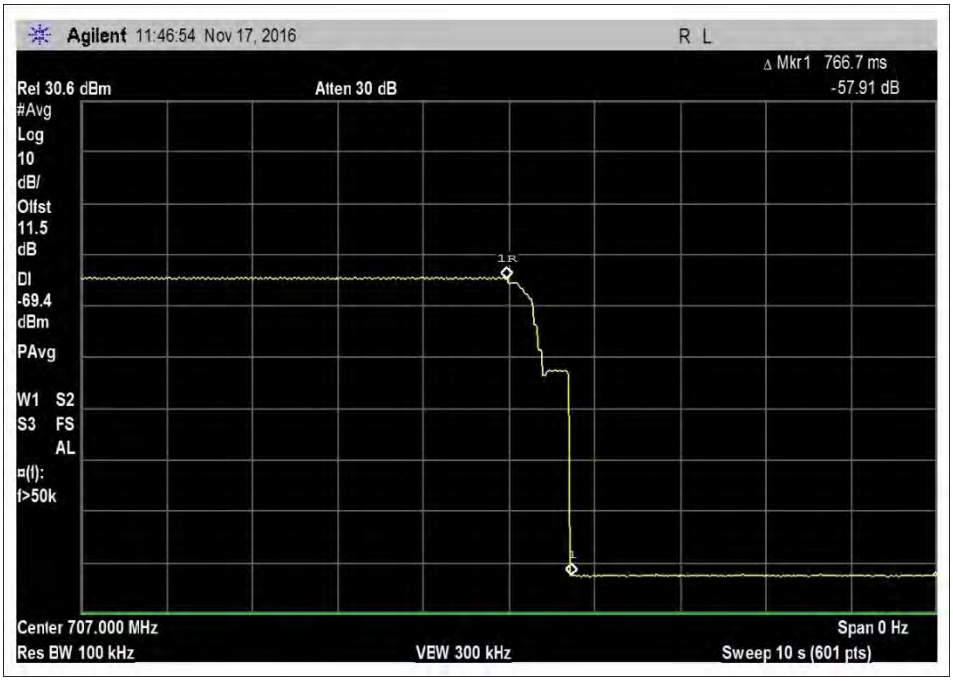
Uplink Gain Timing		
Frequency (MHz)	**Measured (Sec)**	**Limit (Sec)**
UL 1710-1755	0.7	3
UL 1850-1915	1	3
UL 824-849	0.7	3
UL 698-716	0.8	3
UL 776-787	0.7	3

7.9.1 Maximum Gain

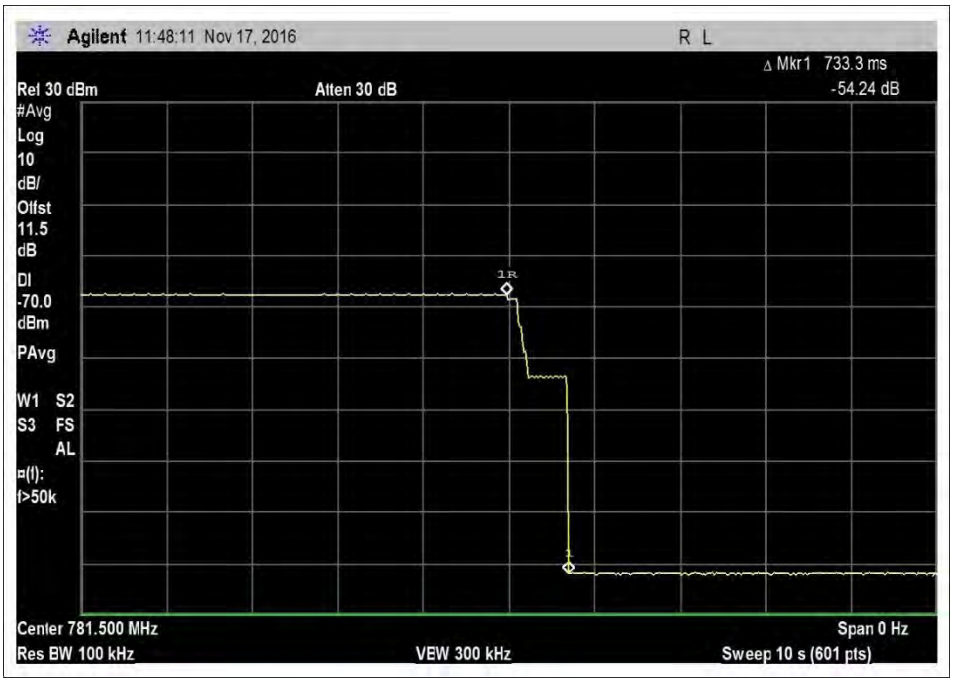
For this subsection, see summary of results of 7.9
7.9.1 Maximum gain

7.9.2 Variable uplink Gain Timing

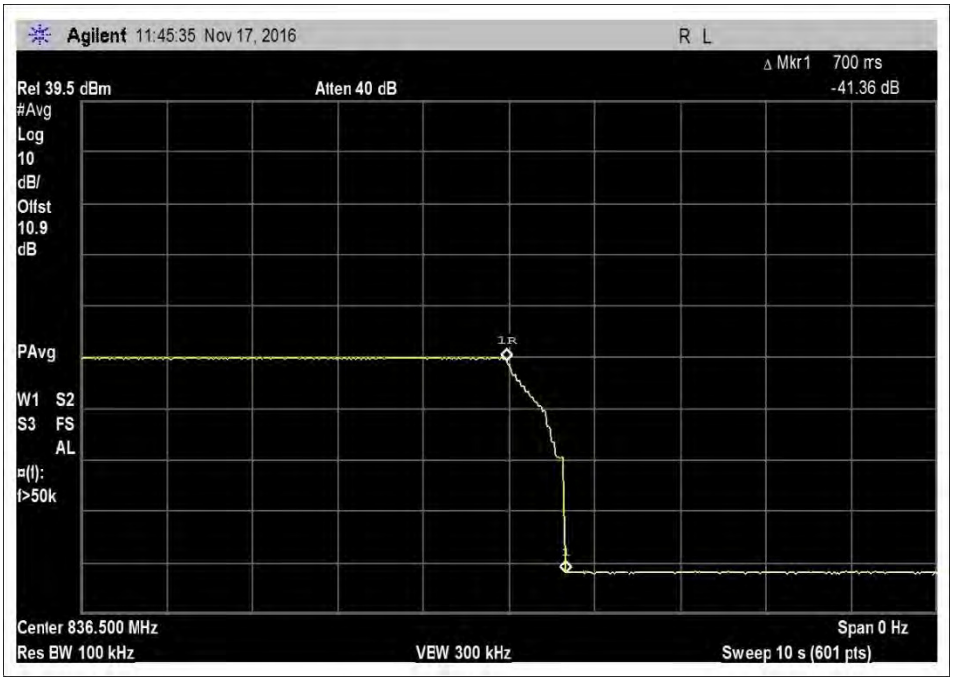
Plots



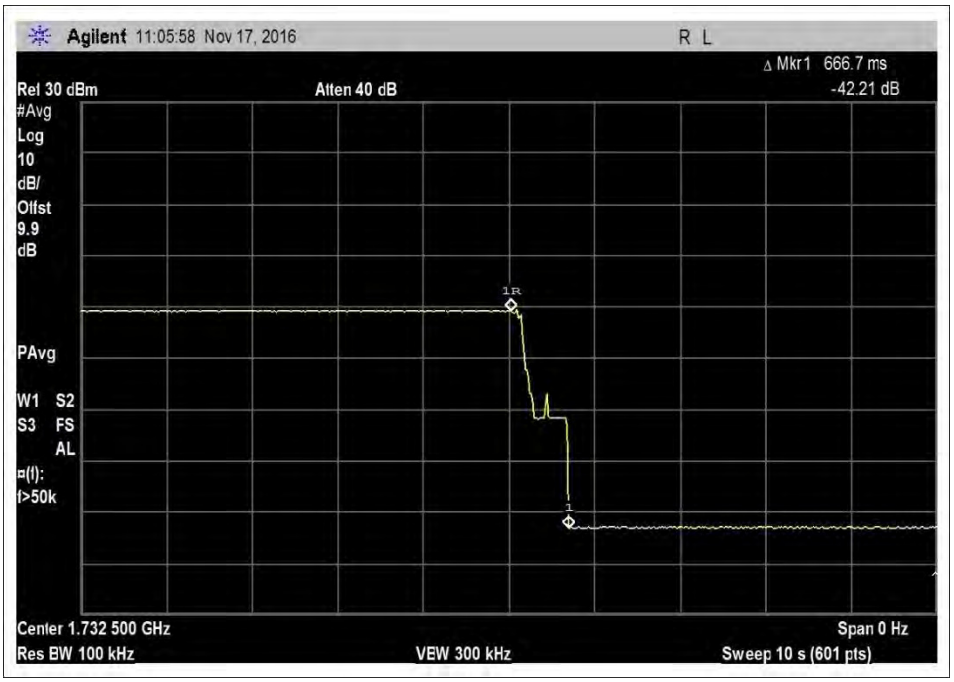
7.9.2_VarULGainTiming_UL_698-716MHz



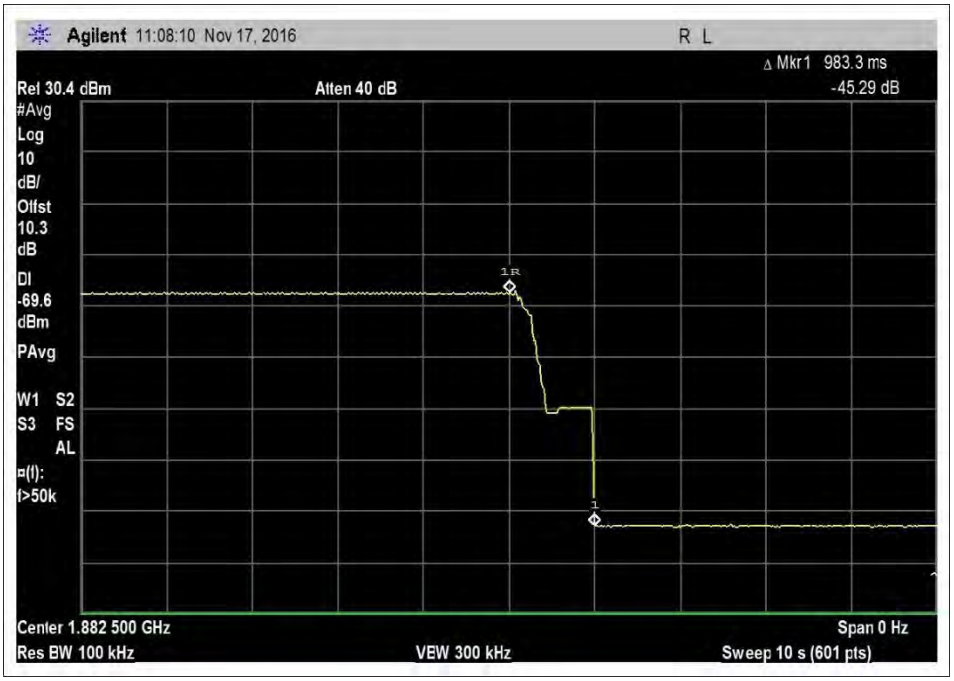
7.9.2_VarULGainTiming_UL_776-787MHz



7.9.2_VarULGainTiming_UL_824-849MHz



7.9.2_VarULGainTiming_UL_1710-1755MHz



7.9.2_VarULGainTiming_UL_1850-1915MHz

7.10 Occupied Band Width

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**7.10 Occupied Band Width / 47 CFR §2.1049 Occupied Band Width**		
Work Order #:	**98759**	Date:	11/17/2016
Test Type:	**Conducted Emissions**	Time:	13:10:16 PM
Tested By:	**Daniel Bertran**	Sequence#:	1
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 6			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 6			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed CMRS Wideband Consumer Booster with a Wi-Fi Router and TV amplifier installed. The CMRS DL signal and the Wi-Fi Signal are combined at the diplexer and transmit via the indoor antenna.
The Consumer booster UL and DL power and gain parameters are initially measured with Wi-Fi transmitting at mid channel using sequentially 802.11b, g, n20 and n40 signal. Since no significant change in measured power was observed, all other parameters are obtained with Wi-Fi transmitting at Mid channel, 802.11b.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is type RP-TNC connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.10 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016.
Firmware: V2.2
Test environment conditions: Temperature: 24.3°C, 52% Relative Humidity and Pressure: 101.9 kPa

Test Equipment:

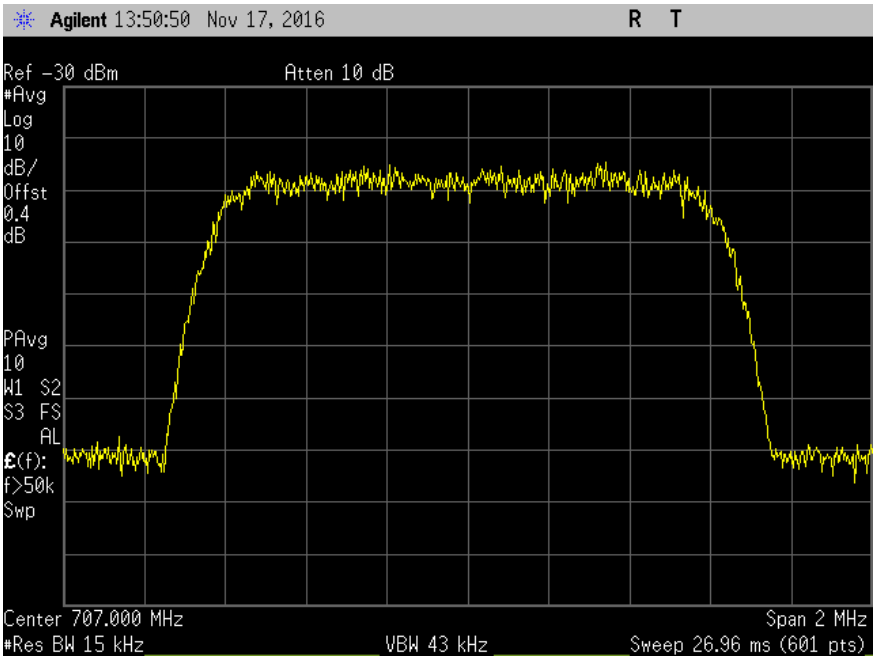
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03418	Signal Generator	E4438C	7/30/2015	7/30/2017
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017
	ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP06898	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP05411	Attenuator	54A-10	1/18/2016	1/18/2018
	AN02660	Spectrum Analyzer	E4446A	5/31/2016	5/31/2018

Summary of Results

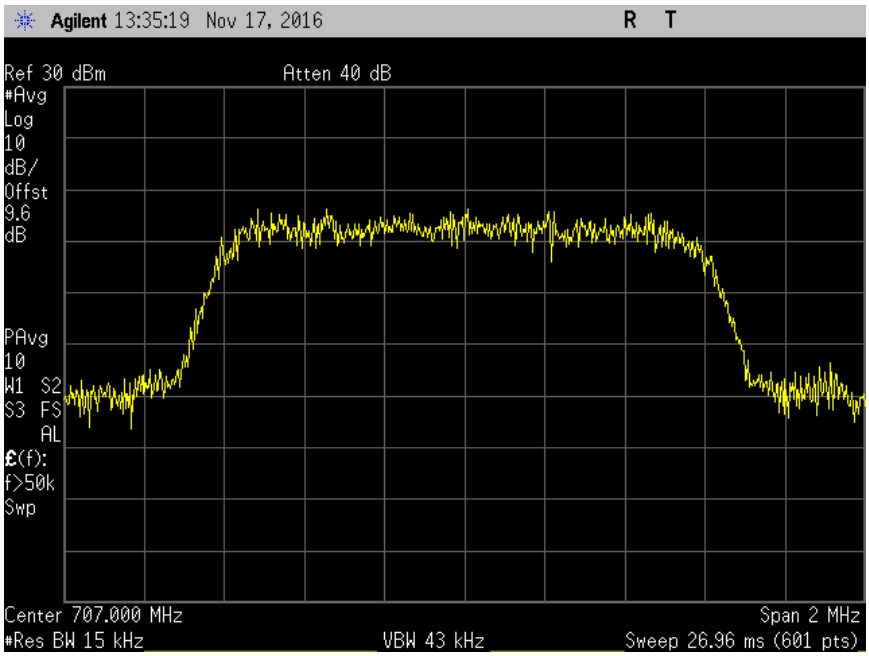
Pass: As summarized in plots below, the uniformity of the output signal relative to the input signal are practically identical. Therefore, the comparison is within limits.

Plots

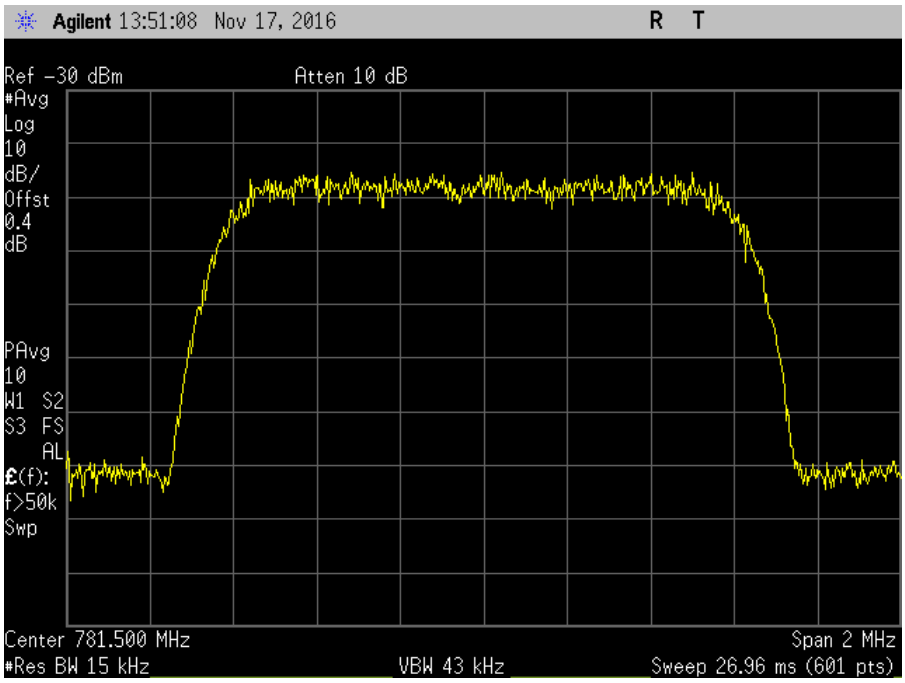
CDMA, UL



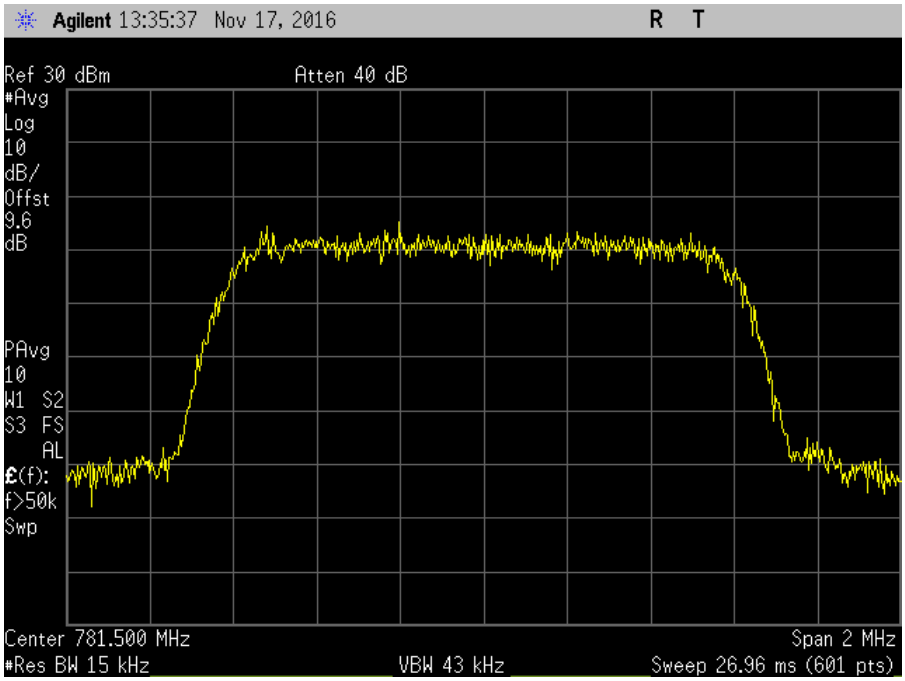
7.10_OBW_UL_698-716MHz_CDMA_In



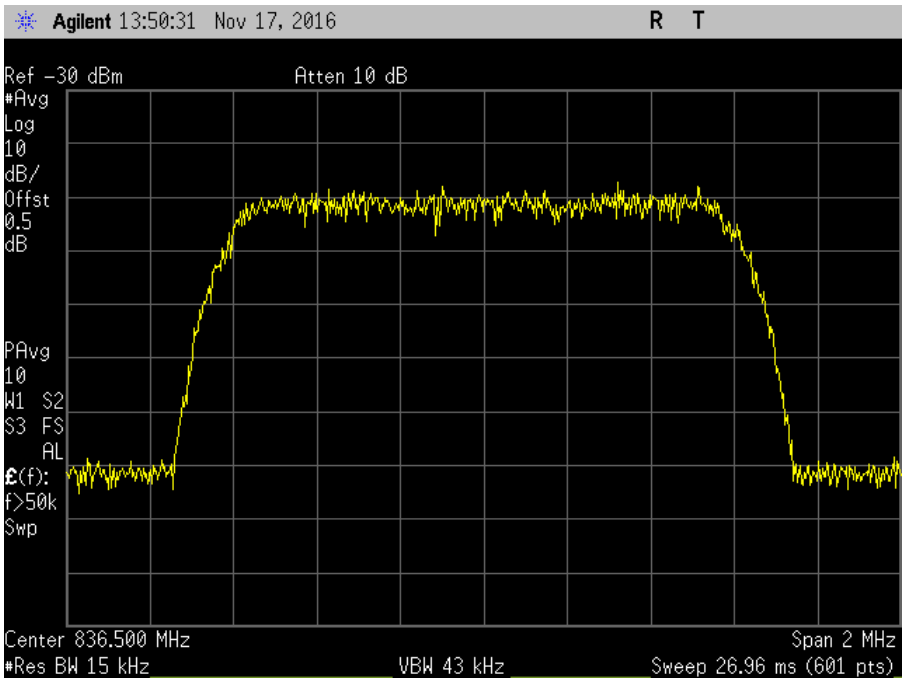
7.10_OBW_UL_698-716MHz_CDMA_Out



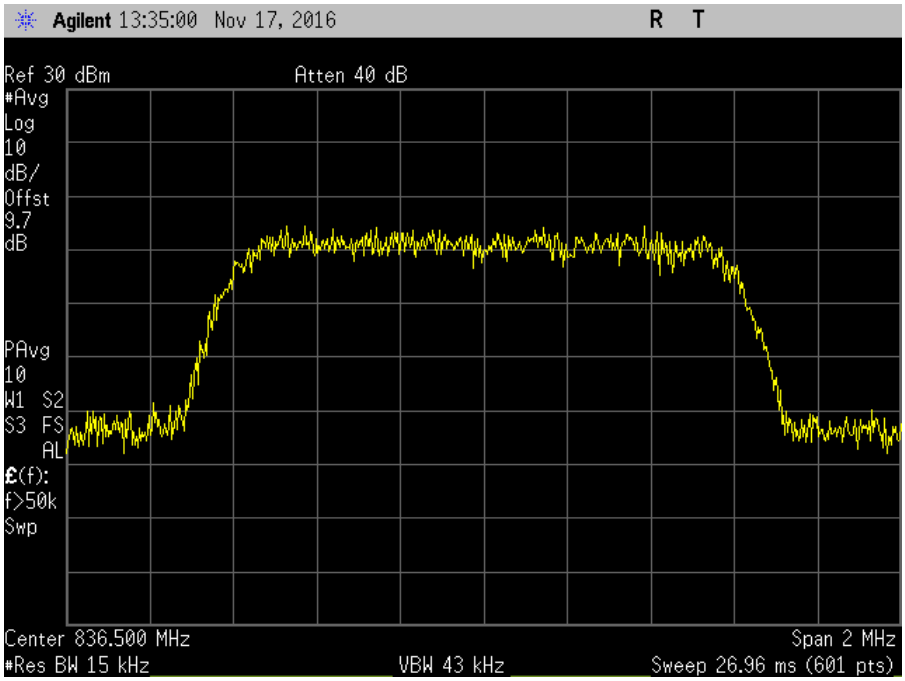
7.10_OBW_UL_776-787MHz_CDMA_In



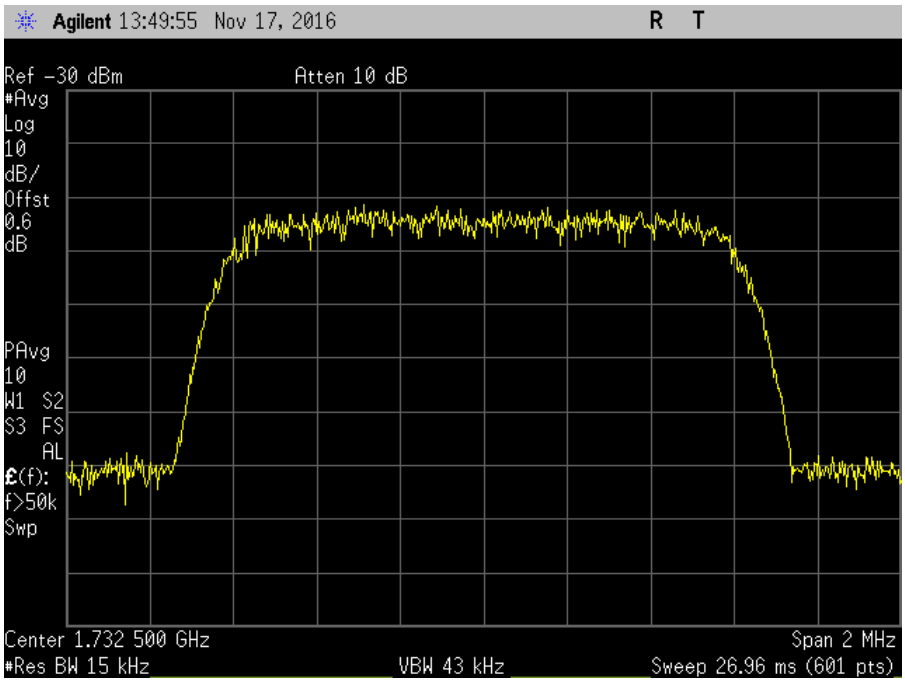
7.10_OBW_UL_776-787MHz_CDMA_Out



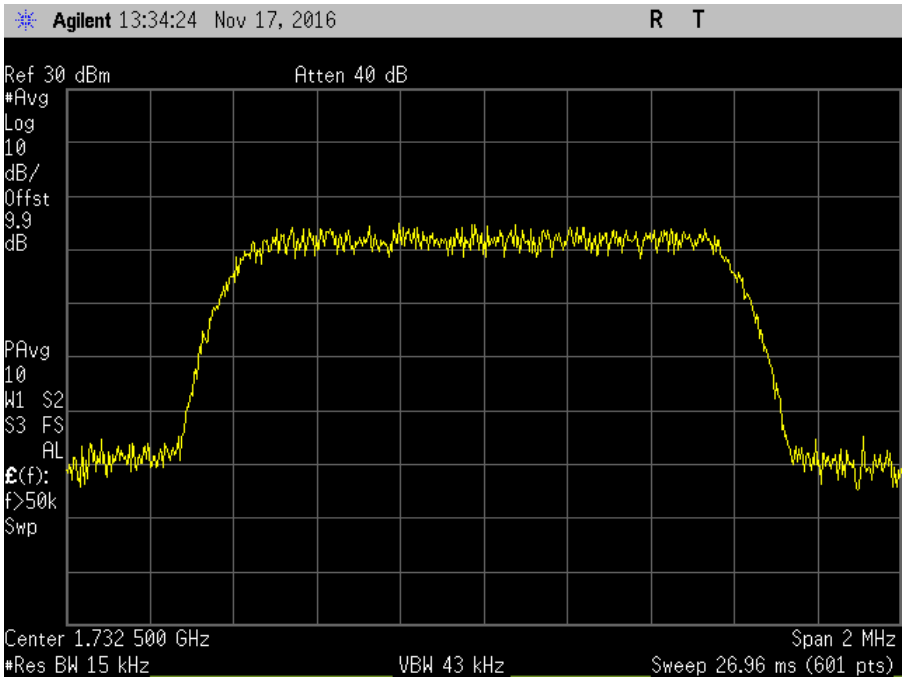
7.10_OBW_UL_824-849MHz_CDMA_In



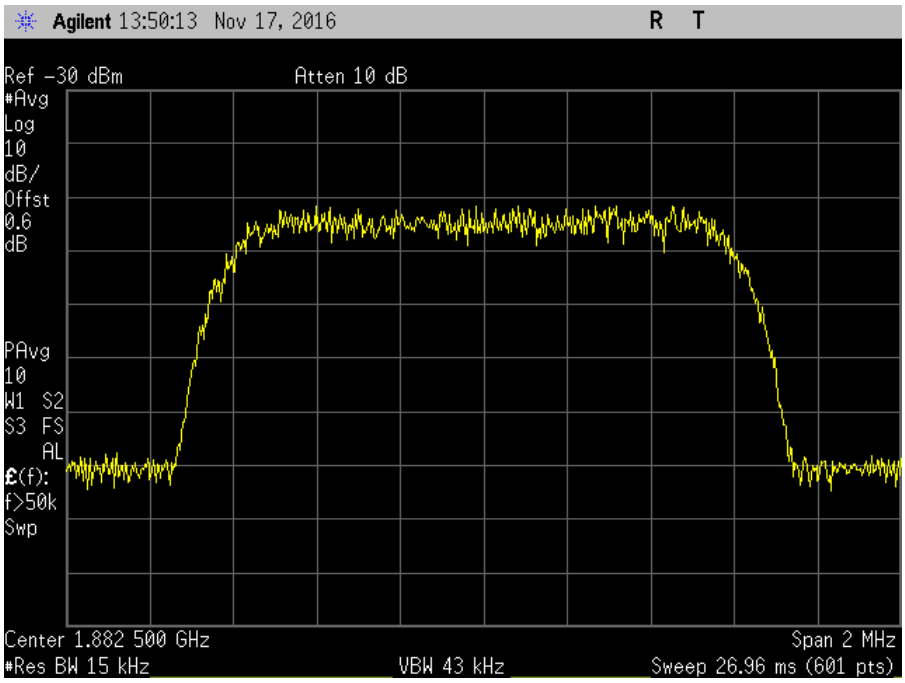
7.10_OBW_UL_824-849MHz_CDMA_Out



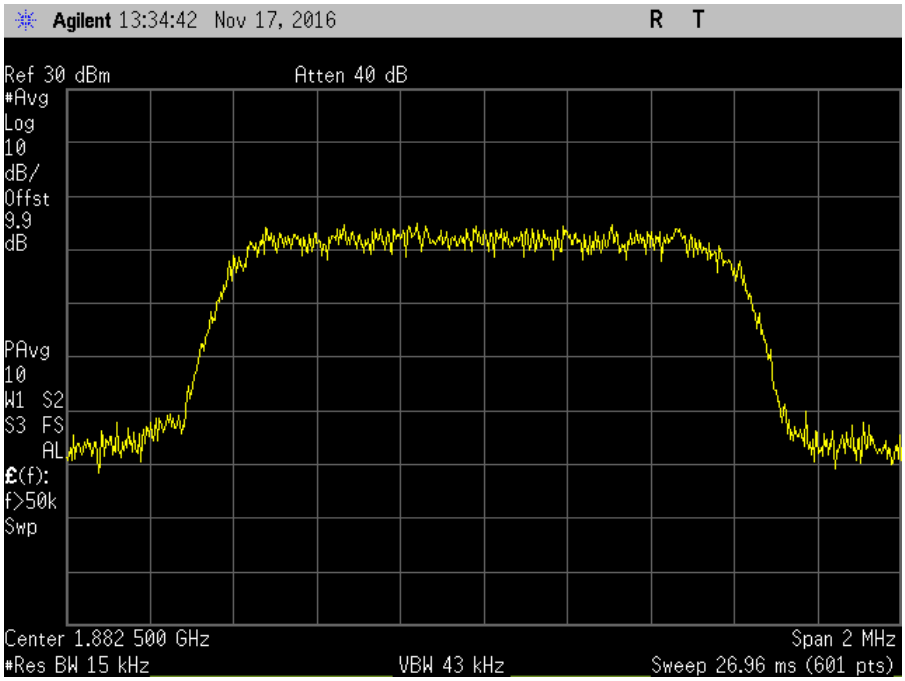
7.10_OBW_UL_1710-1755MHz_CDMA_In



7.10_OBW_UL_1710-1755MHz_CDMA_Out

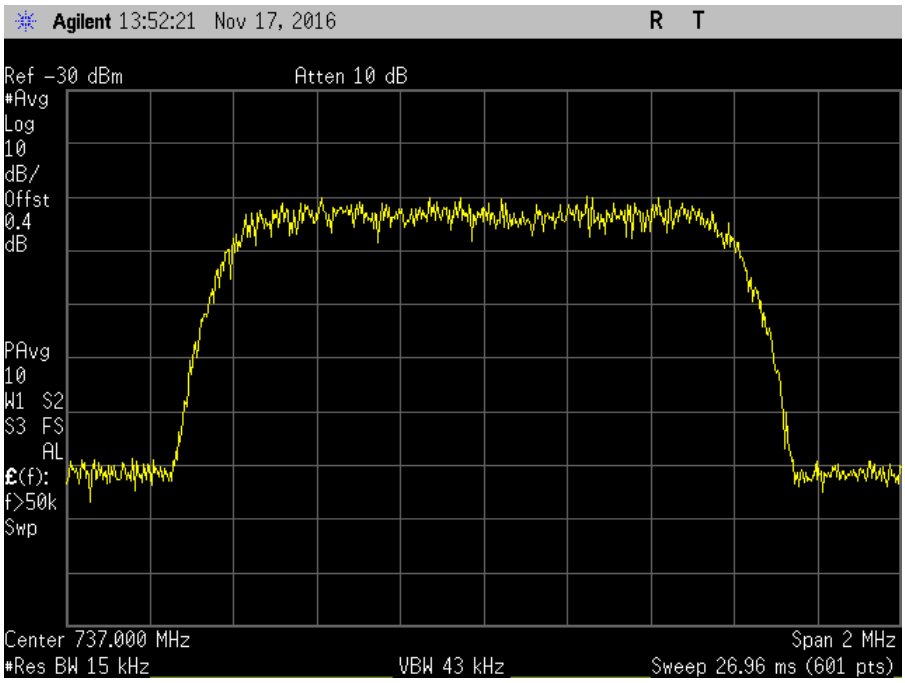


7.10_OBW_UL_1850-1915MHz_CDMA_In

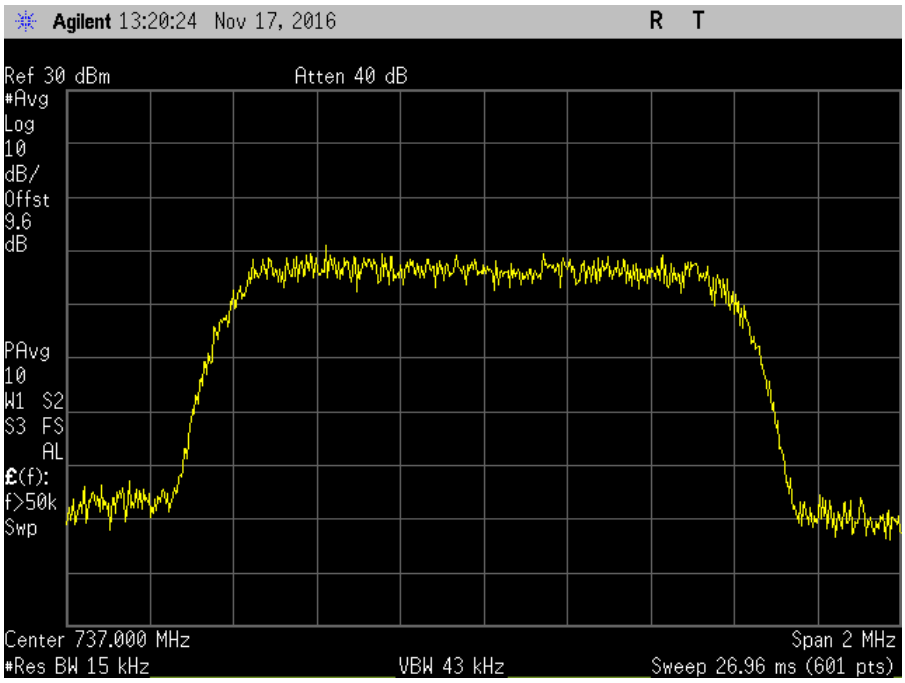


7.10_OBW_UL_1850-1915MHz_CDMA_Out

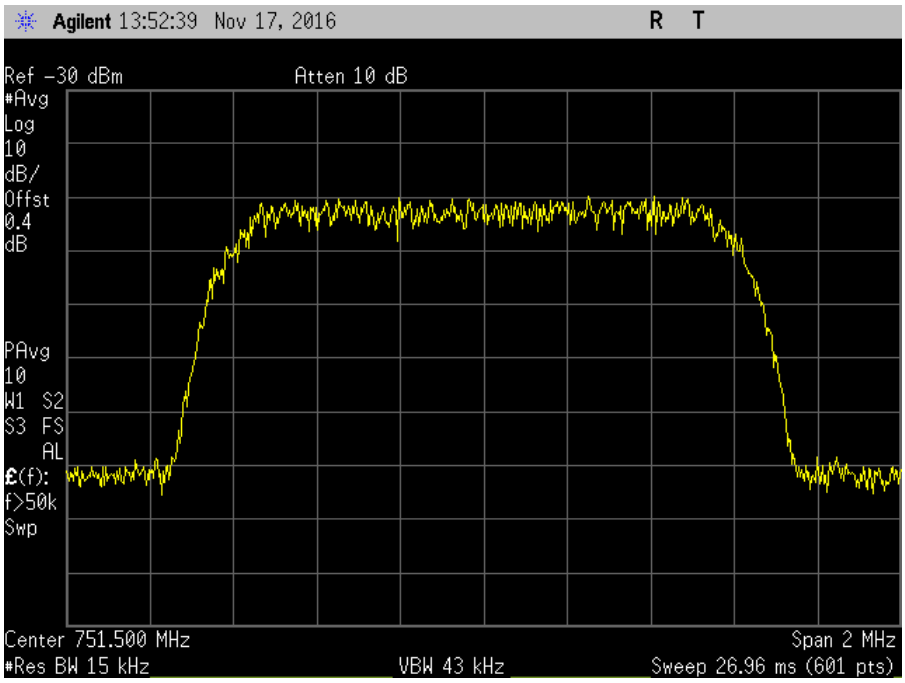
CDMA, DL



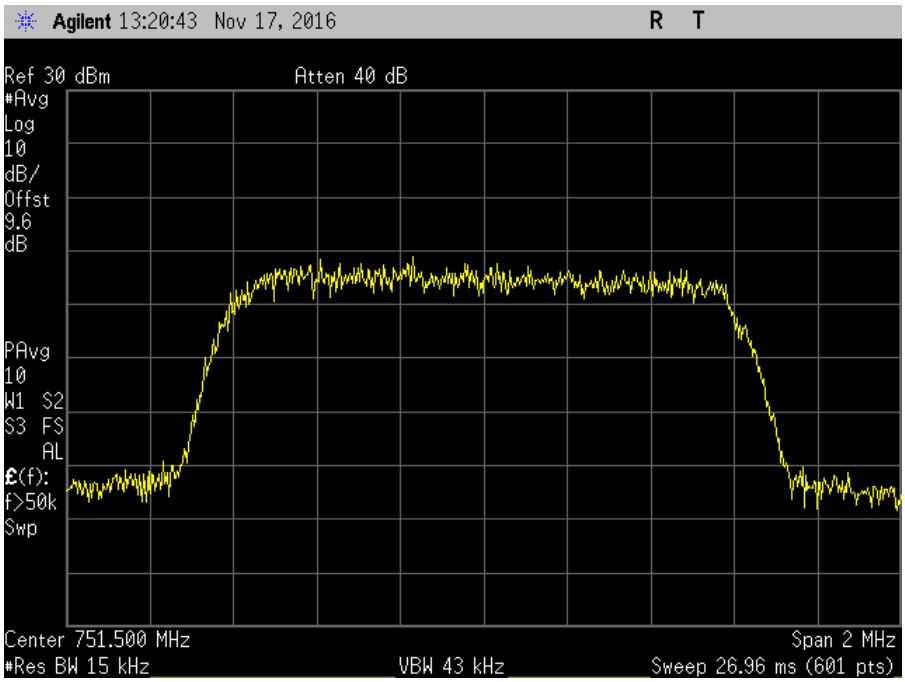
7.10_OBW_DL_728-746MHz_CDMA_In



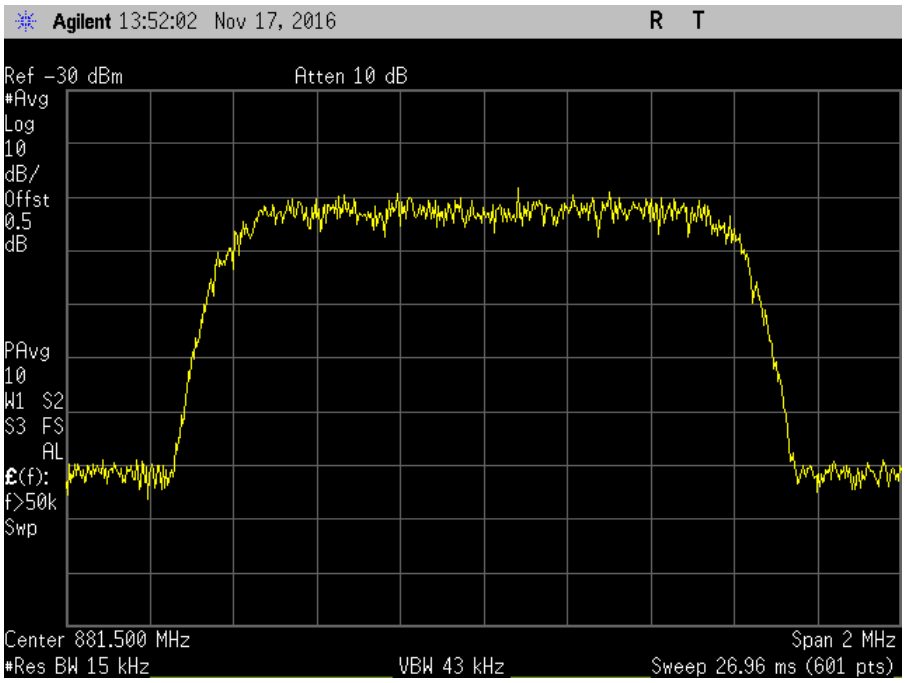
7.10_OBW_DL_728-746MHz_CDMA_Out



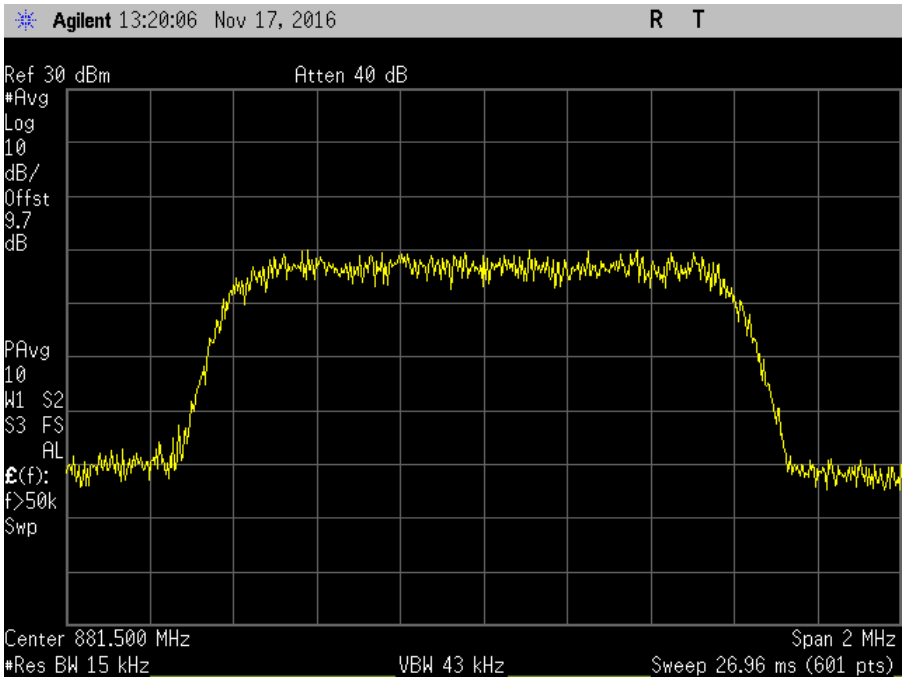
7.10_OBW_DL_746-757MHz_CDMA_In



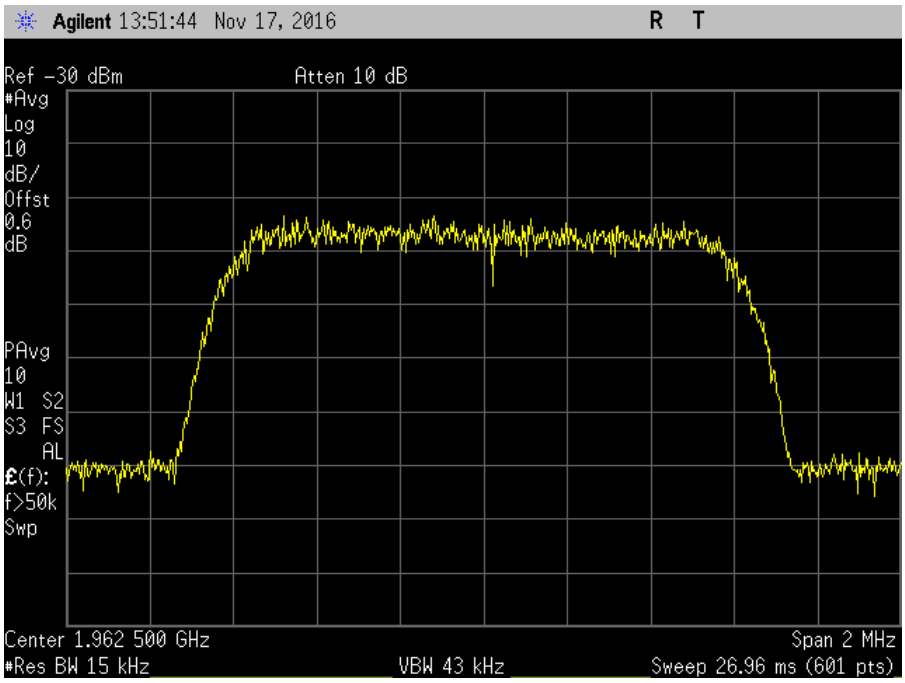
7.10_OBW_DL_746-757MHz_CDMA_Out



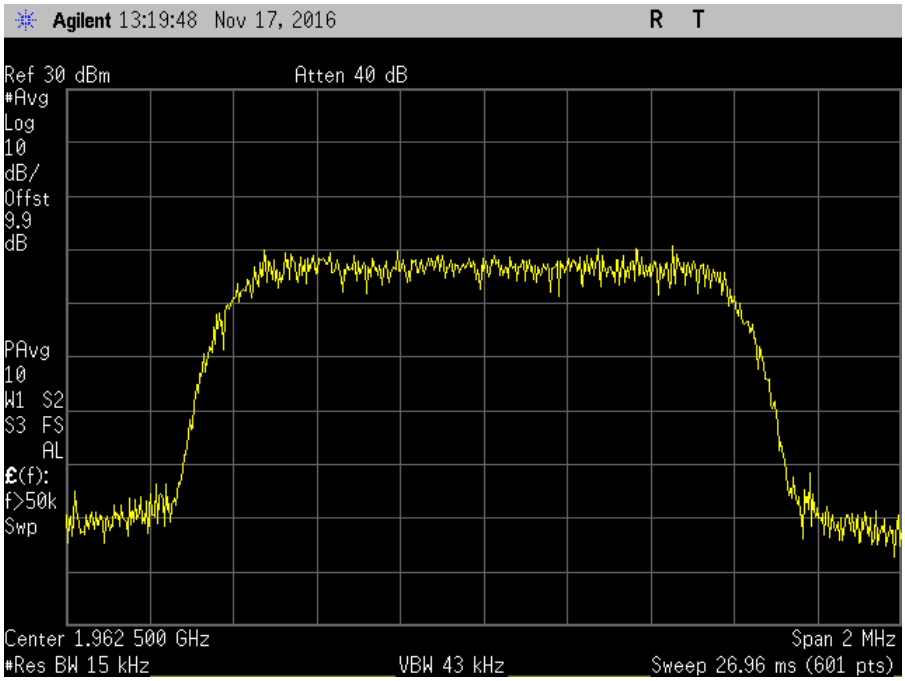
7.10_OBW_DL_869-894MHz_CDMA_In



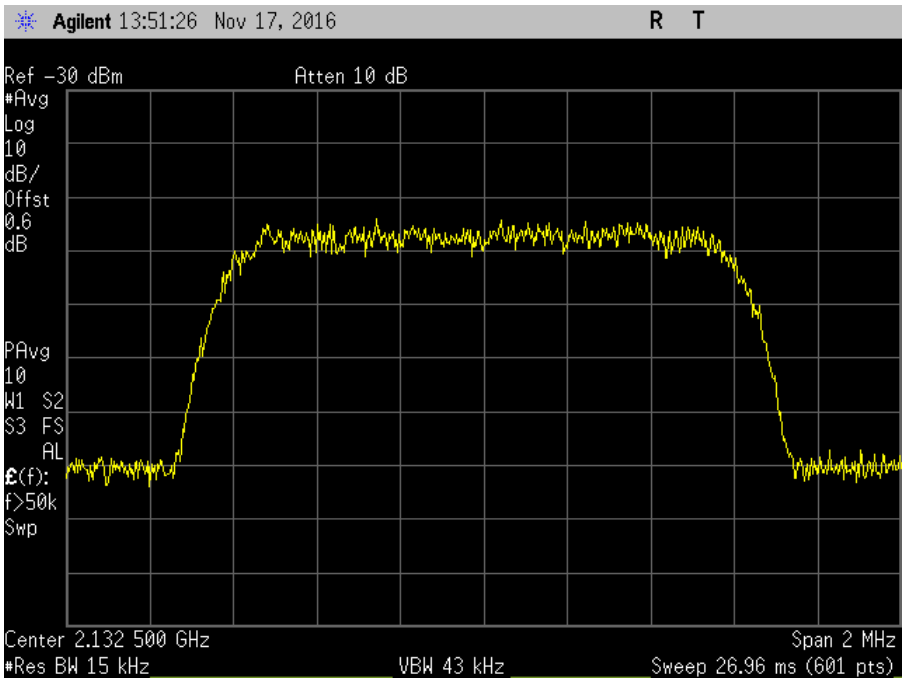
7.10_OBW_DL_869-894MHz_CDMA_Out



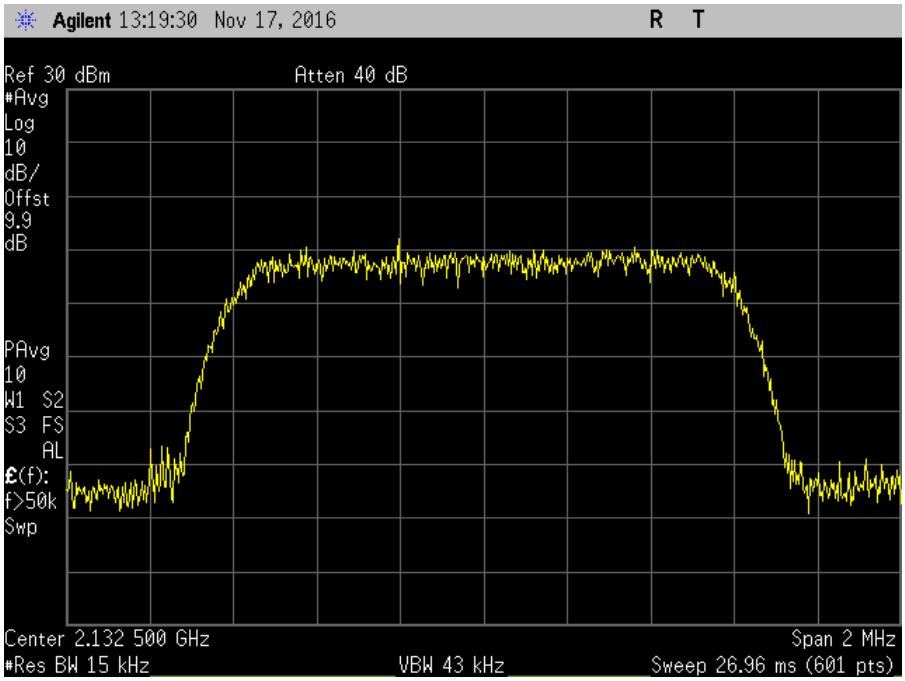
7.10_OBW_DL_1930-1995MHz_CDMA_In



7.10_OBW_DL_1930-1995MHz_CDMA_Out

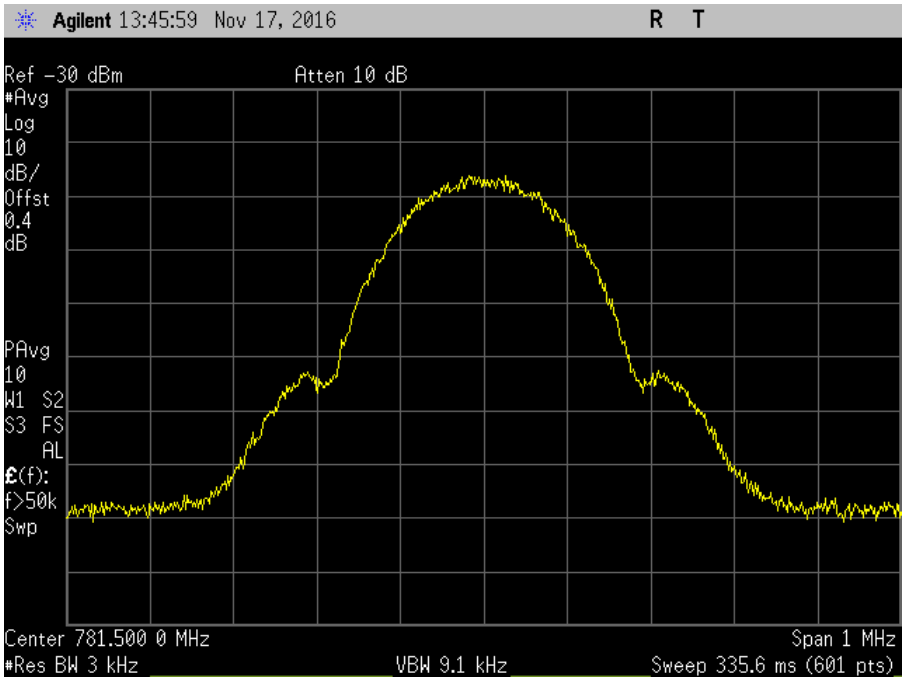


7.10_OBW_DL_2110-2155MHz_CDMA_In

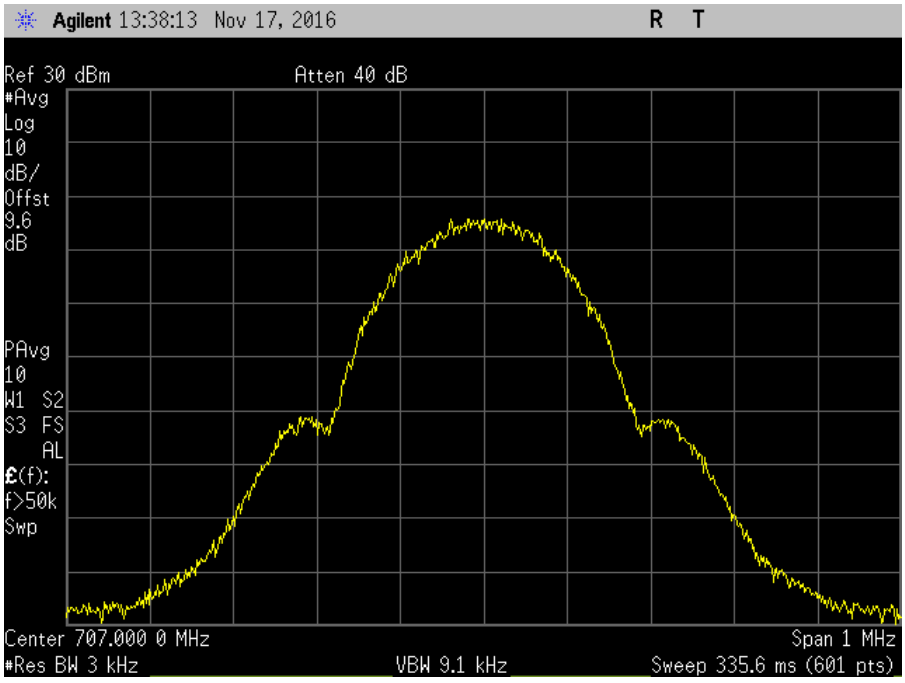


7.10_OBW_DL_2110-2155MHz_CDMA_Out

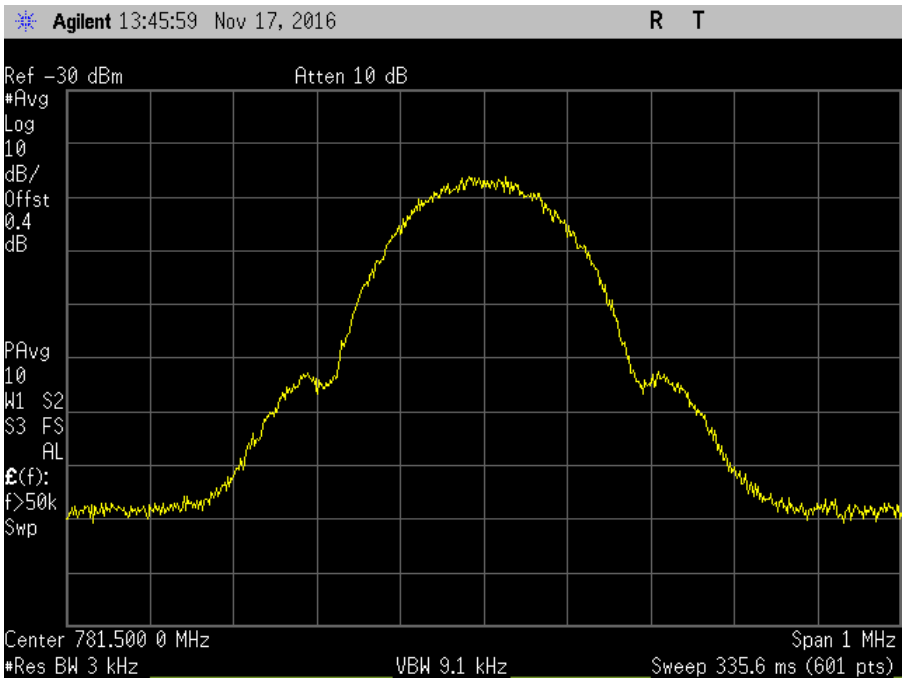
GSM, UL



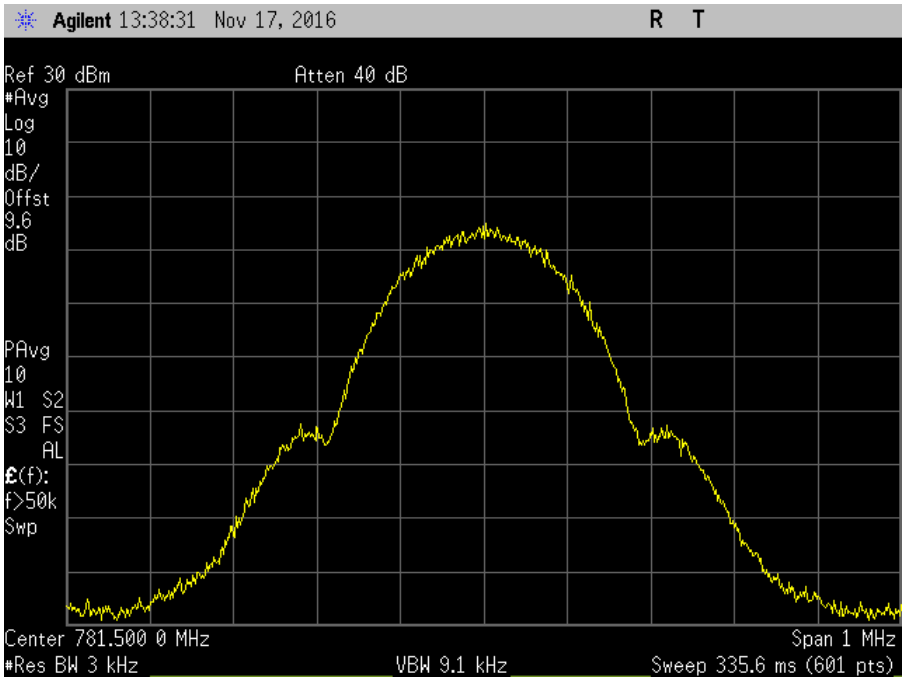
7.10_OBW_UL_698-716MHz_GSM_In



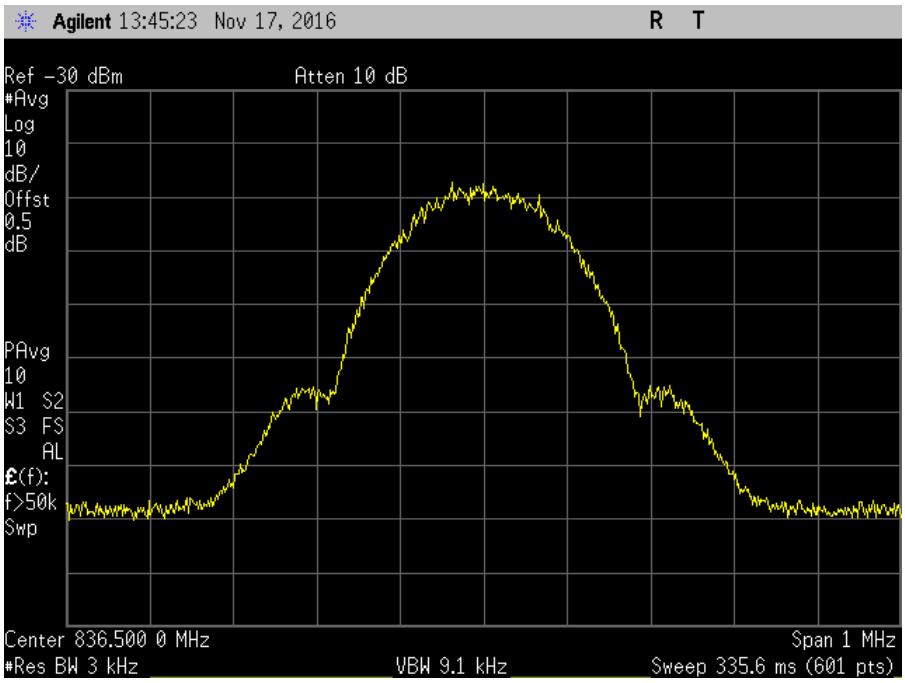
7.10_OBW_UL_698-716MHz_GSM_Out



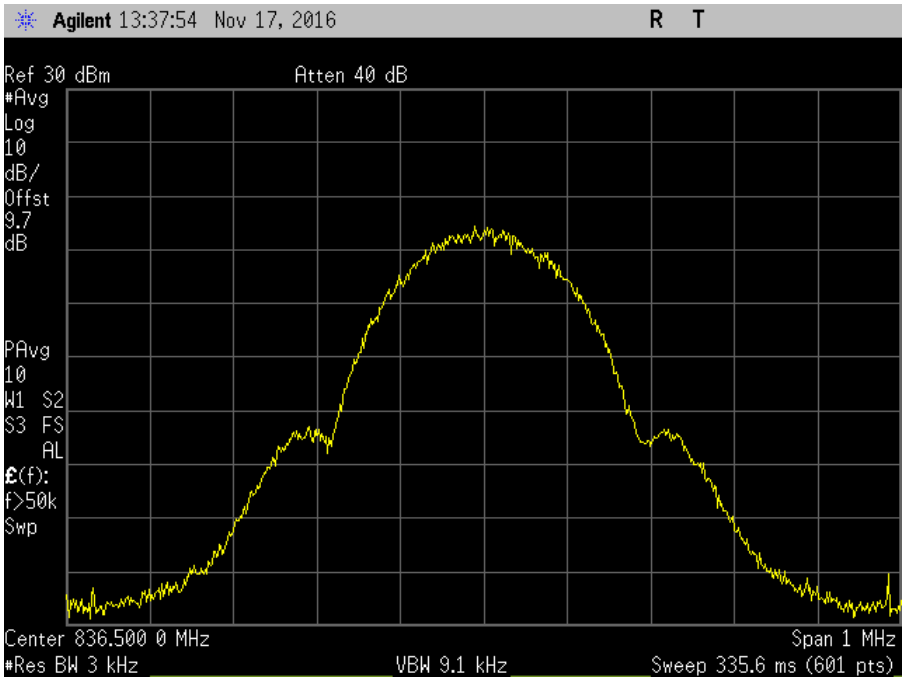
7.10_OBW_UL_776-787MHz_GSM_In



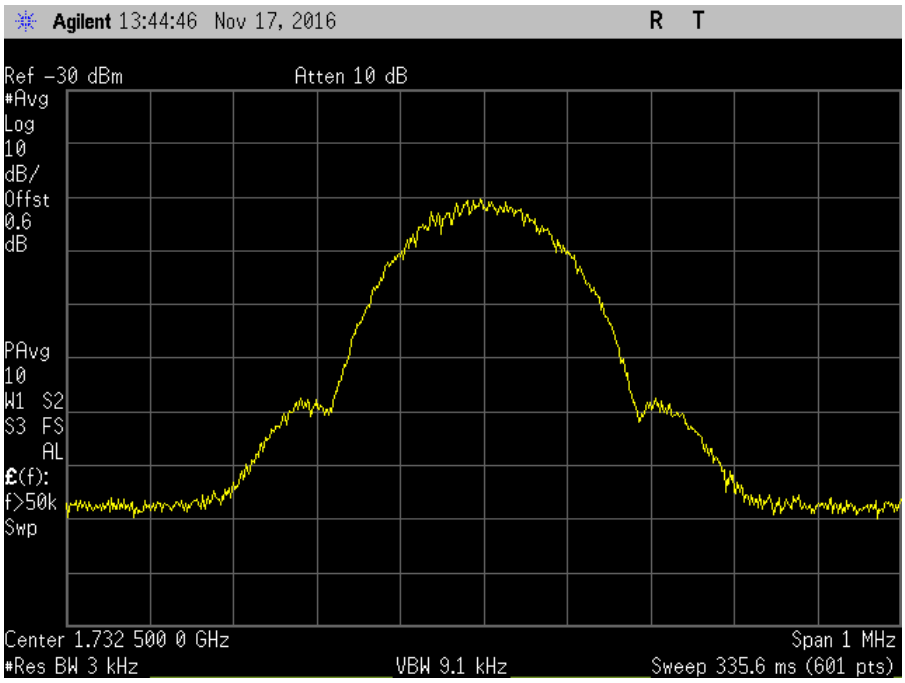
7.10_OBW_UL_776-787MHz_GSM_Out



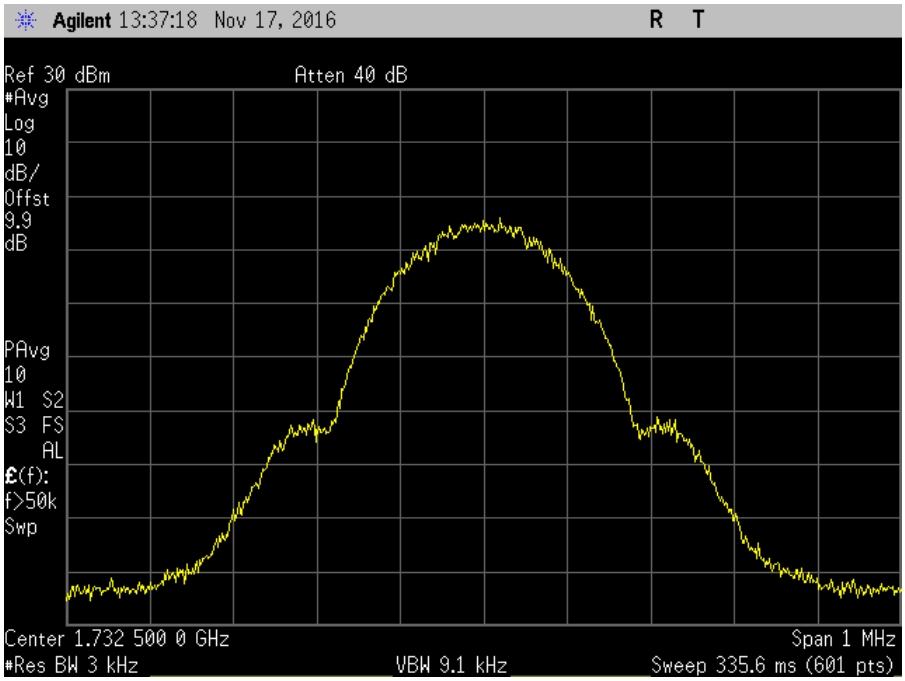
7.10_OBW_UL_824-849MHz_GSM_In



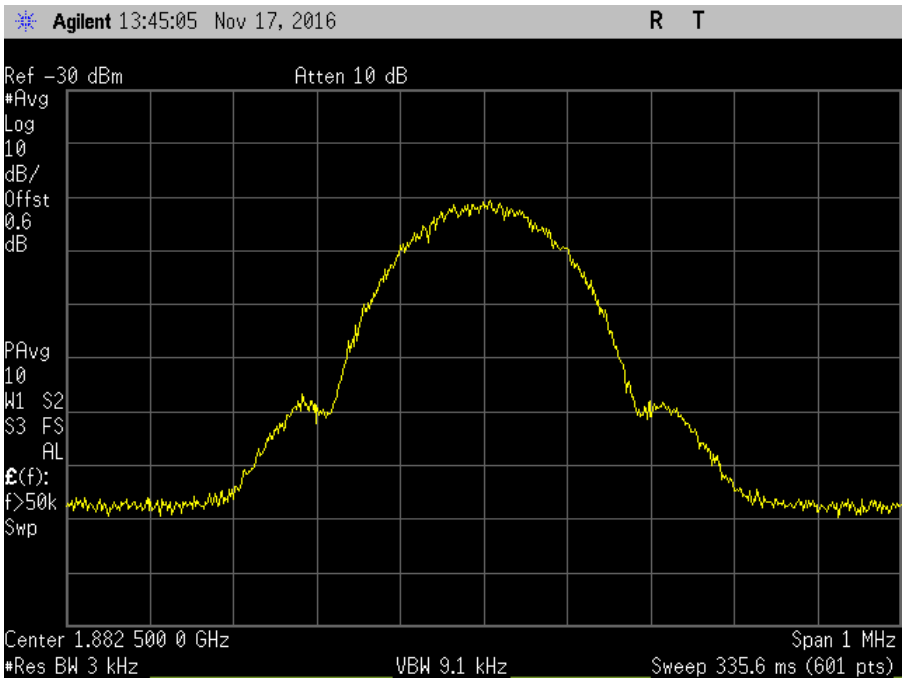
7.10_OBW_UL_824-849MHz_GSM_Out



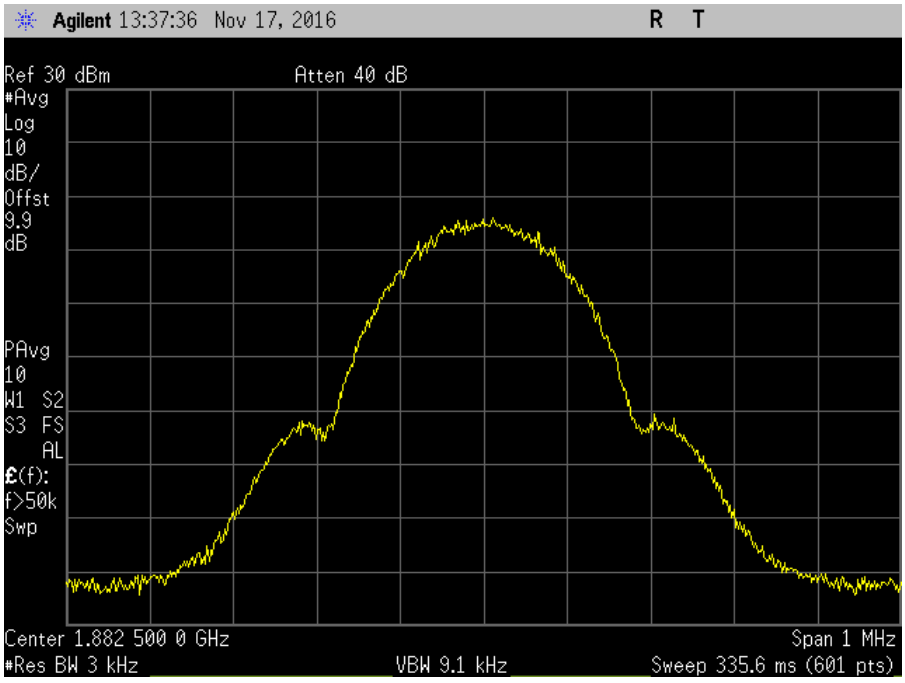
7.10_OBW_UL_1710-1755MHz_GSM_In



7.10_OBW_UL_1710-1755MHz_GSM_Out

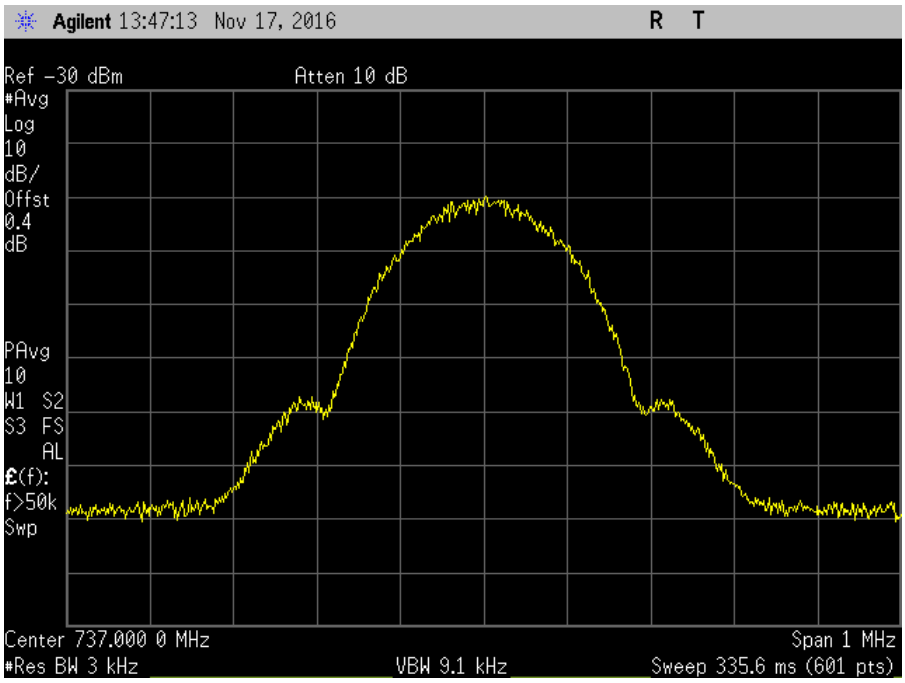


7.10_OBW_UL_1850-1915MHz_GSM_In

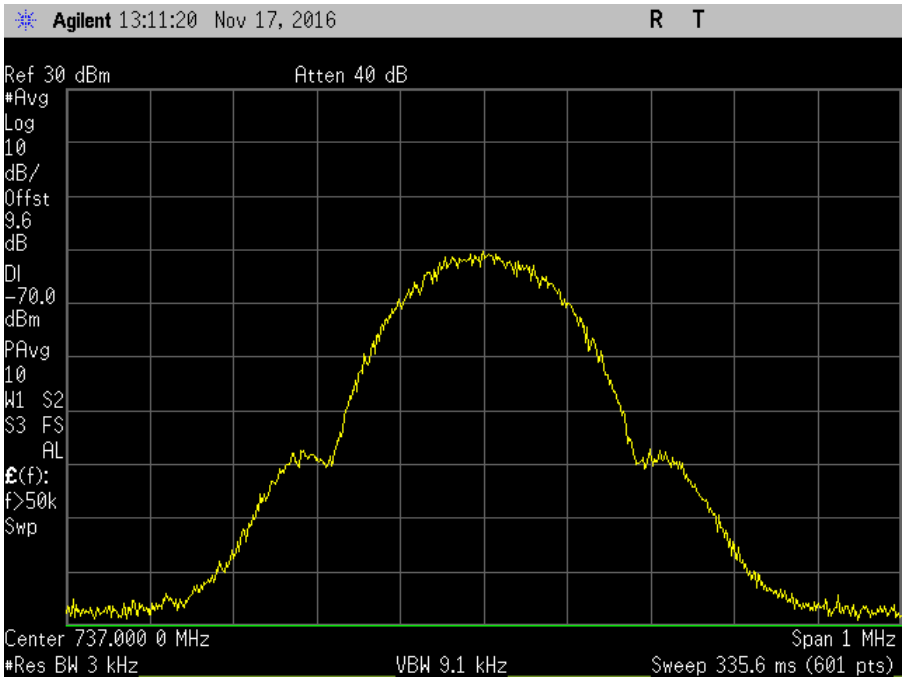


7.10_OBW_UL_1850-1915MHz_GSM_Out

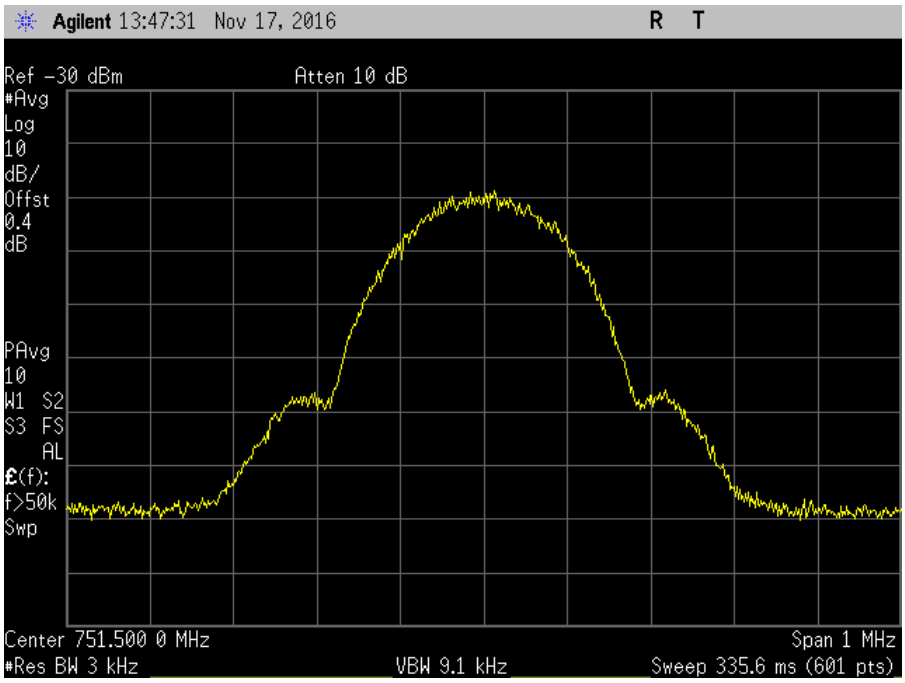
GSM, DL



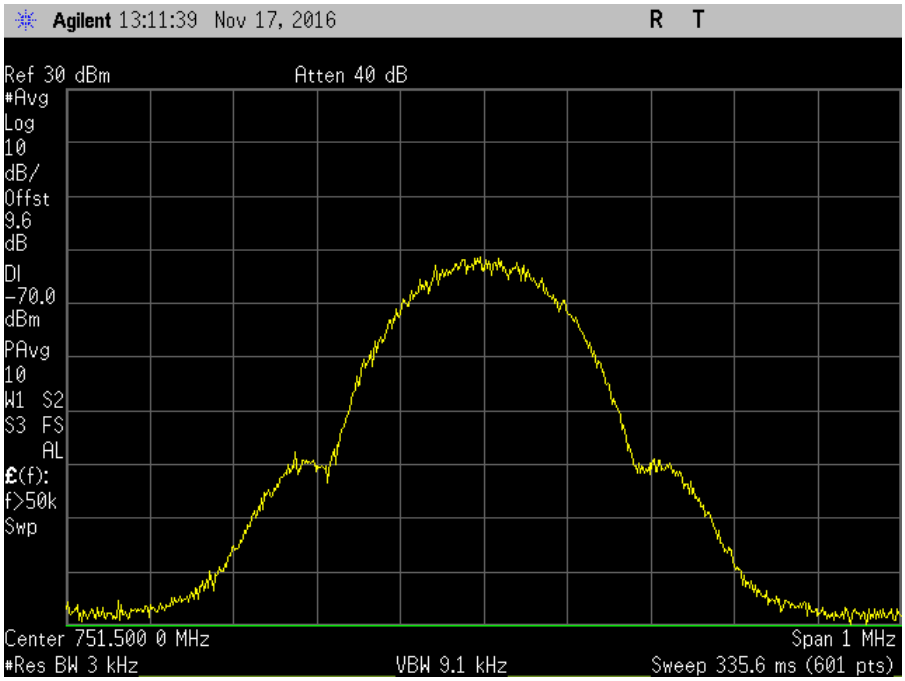
7.10_OBW_DL_728-746MHz_GSM_In



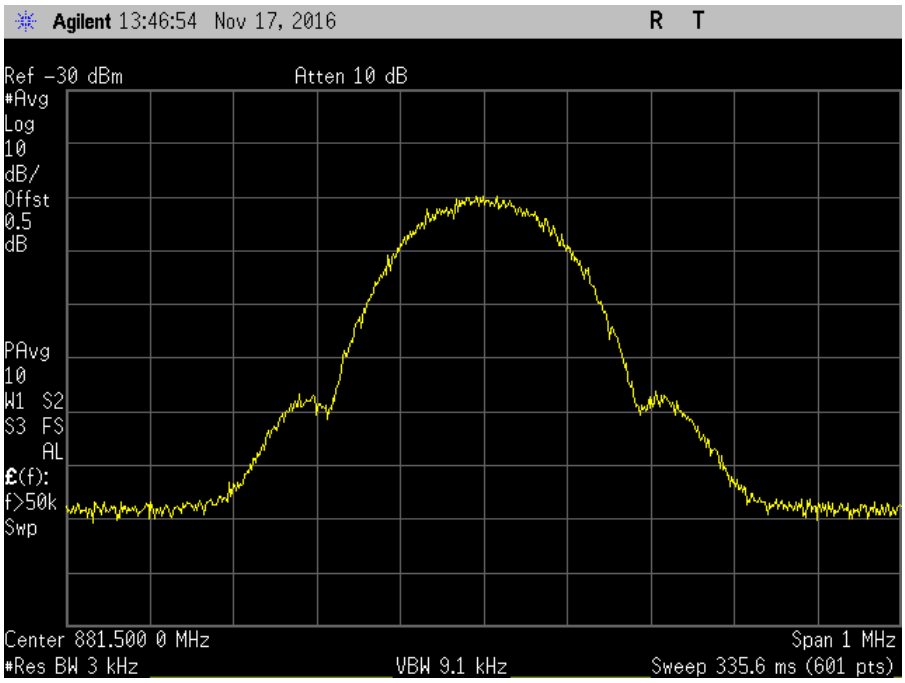
7.10_OBW_DL_728-746MHz_GSM_Out



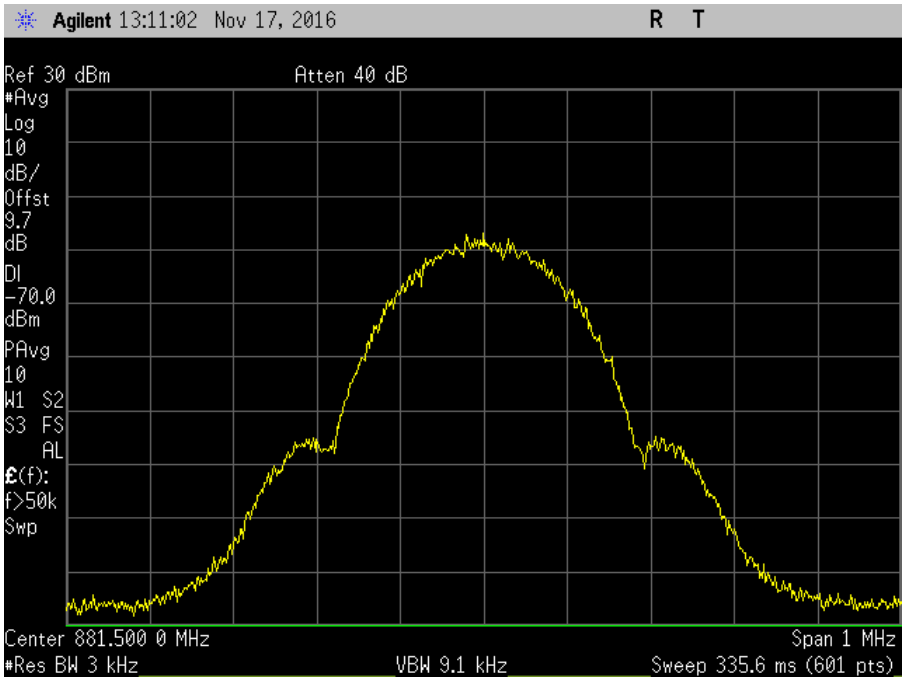
7.10_OBW_DL_746-757MHz_GSM_In



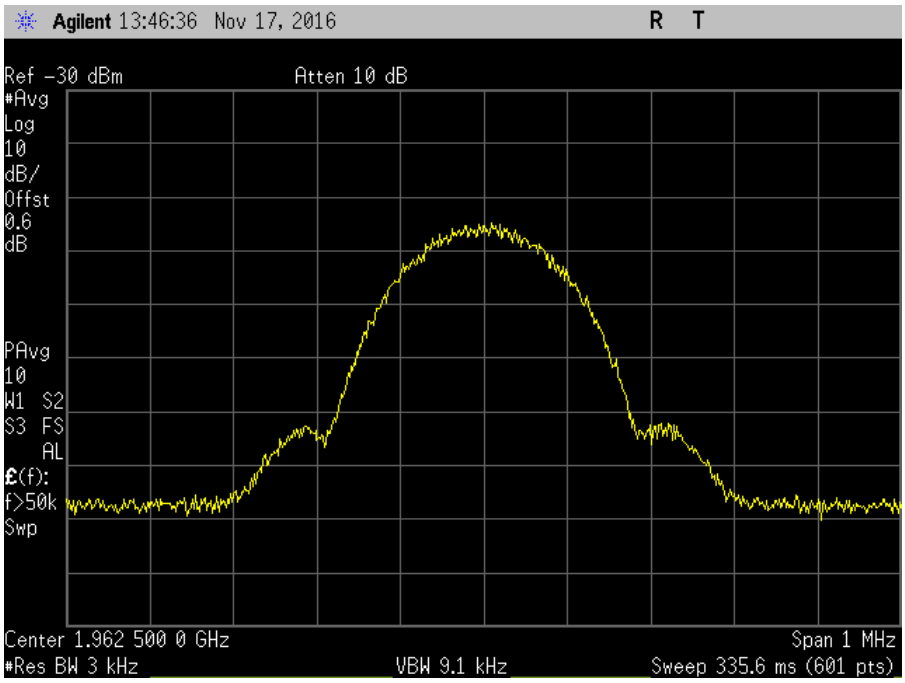
7.10_OBW_DL_746-757MHz_GSM_Out



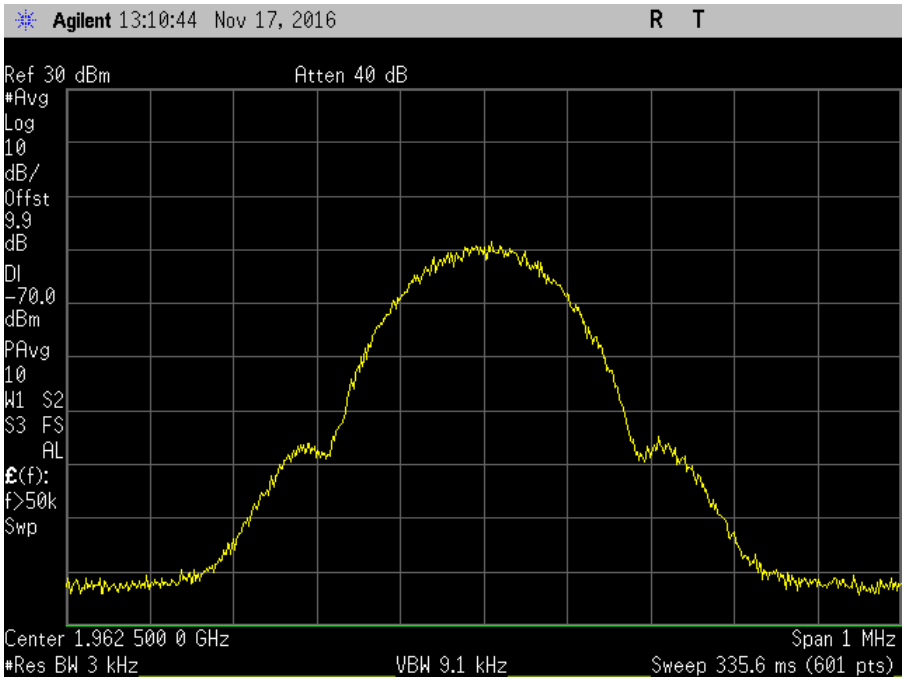
7.10_OBW_DL_869-894MHz_GSM_In



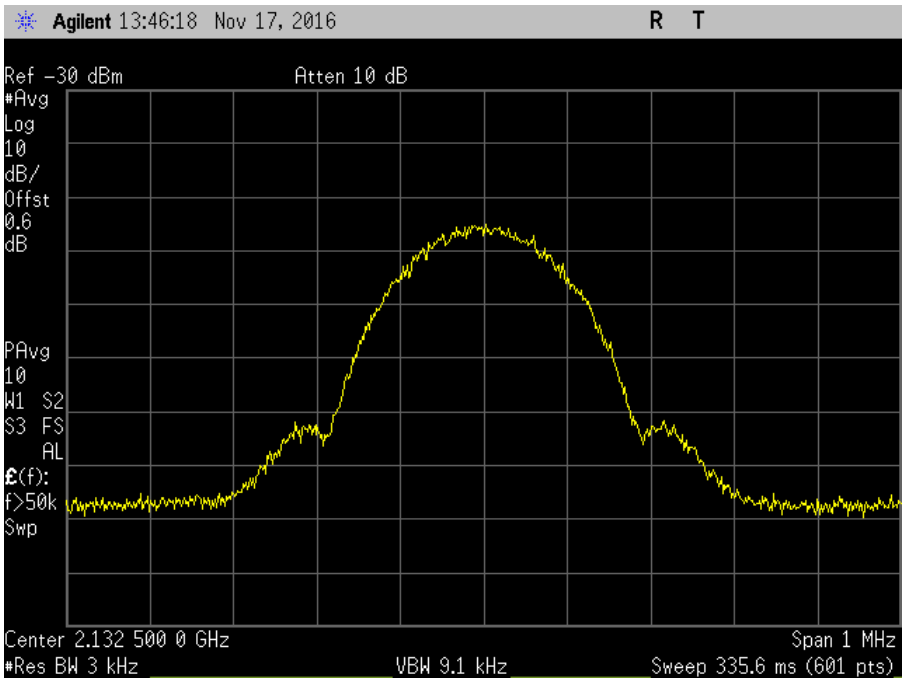
7.10_OBW_DL_869-894MHz_GSM_Out



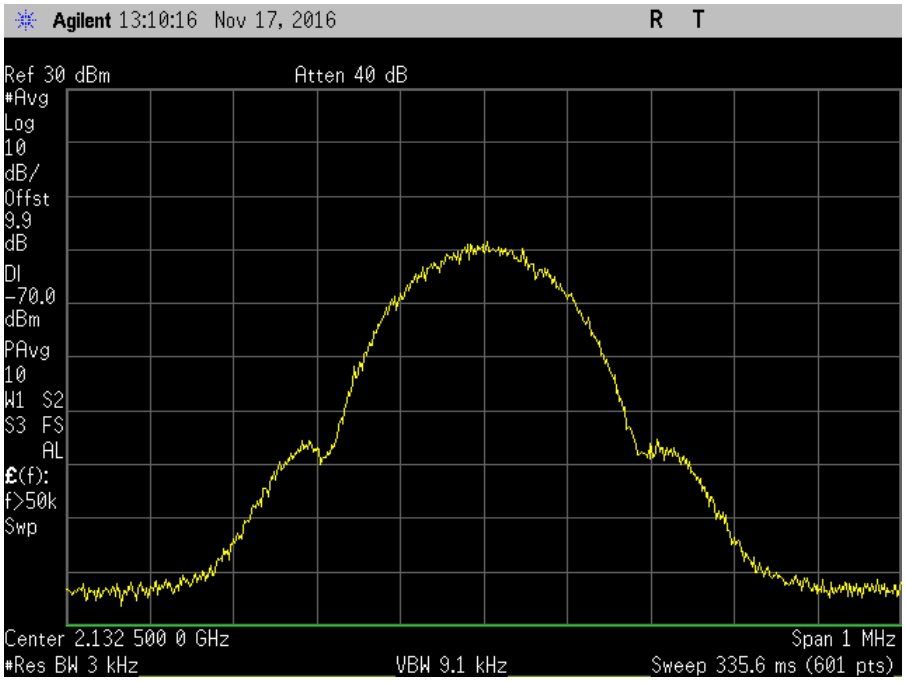
7.10_OBW_DL_1930-1995MHz_GSM_In



7.10_OBW_DL_1930-1995MHz_GSM_Out

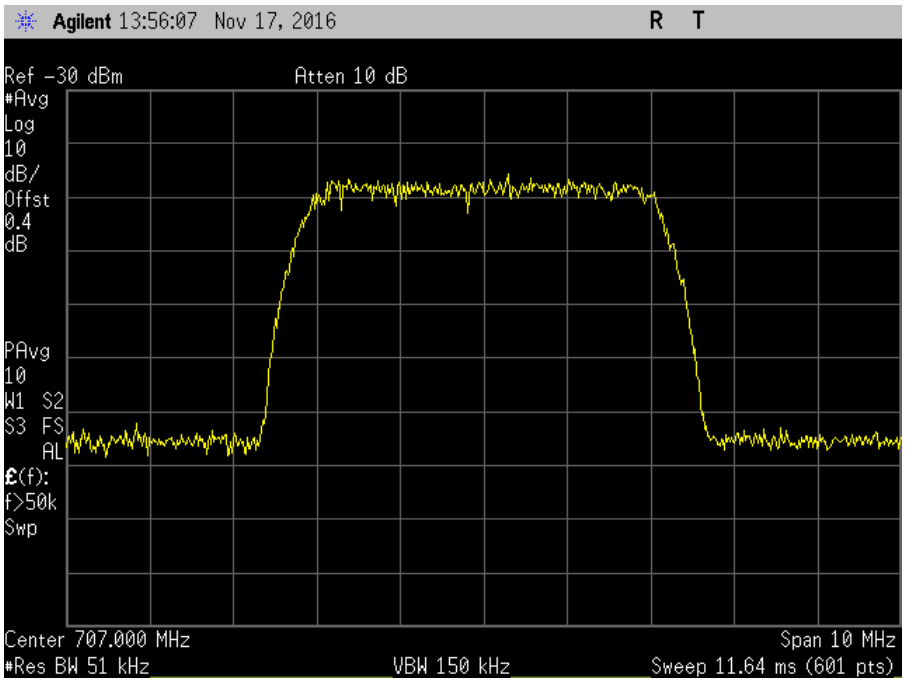


7.10_OBW_DL_2110-2155MHz_GSM_In

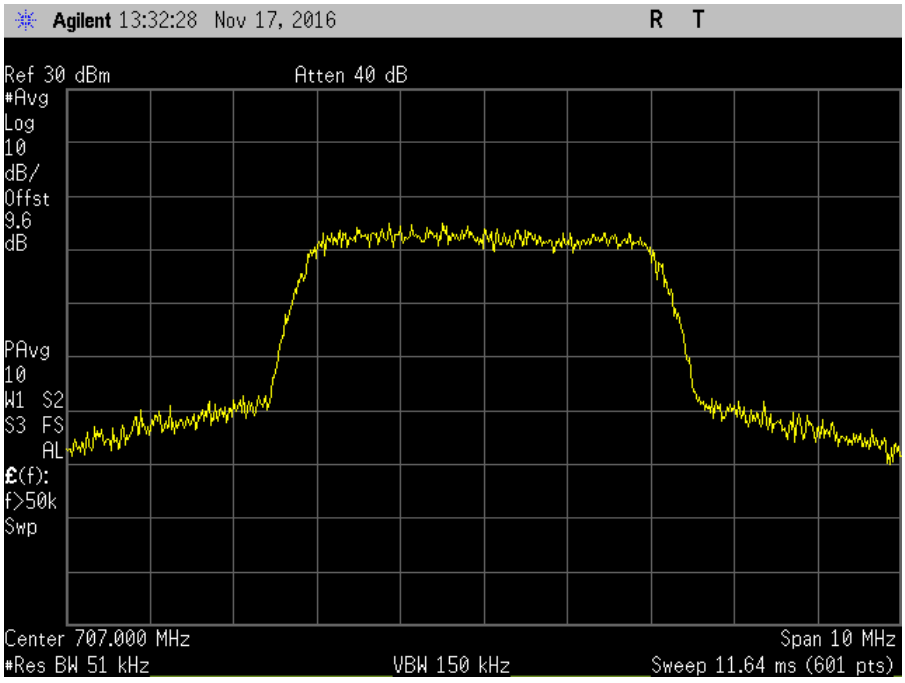


7.10_OBW_DL_2110-2155MHz_GSM_Out

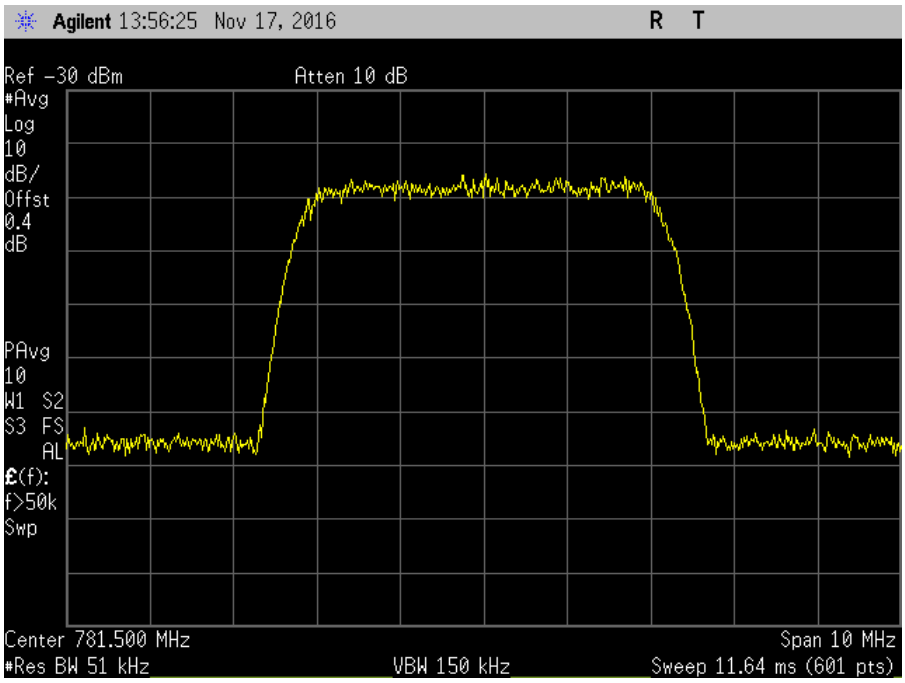
WCDMA, UL



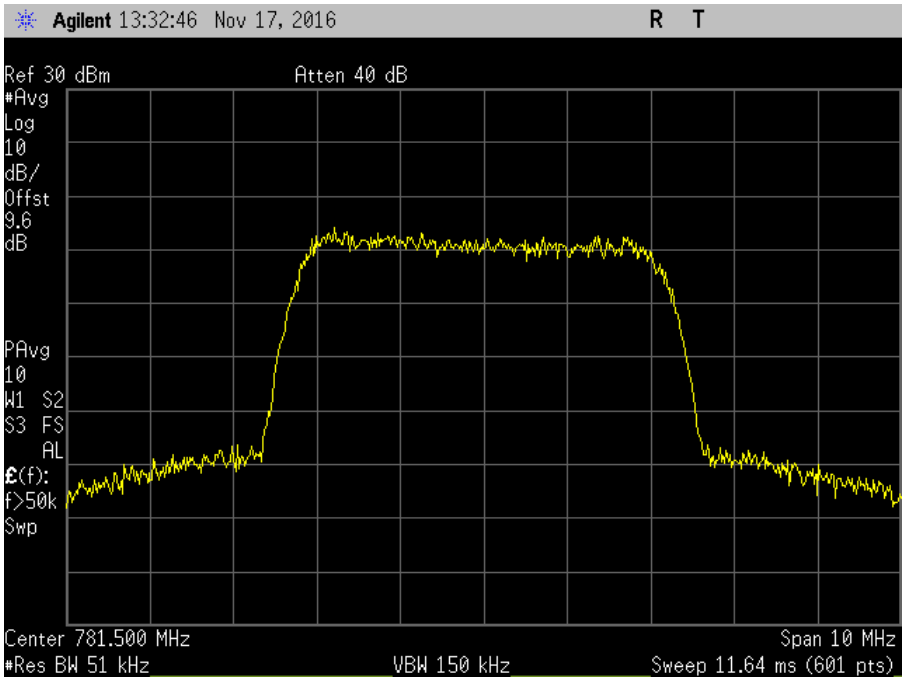
7.10_OBW_UL_698-716MHz_WCDMA_In



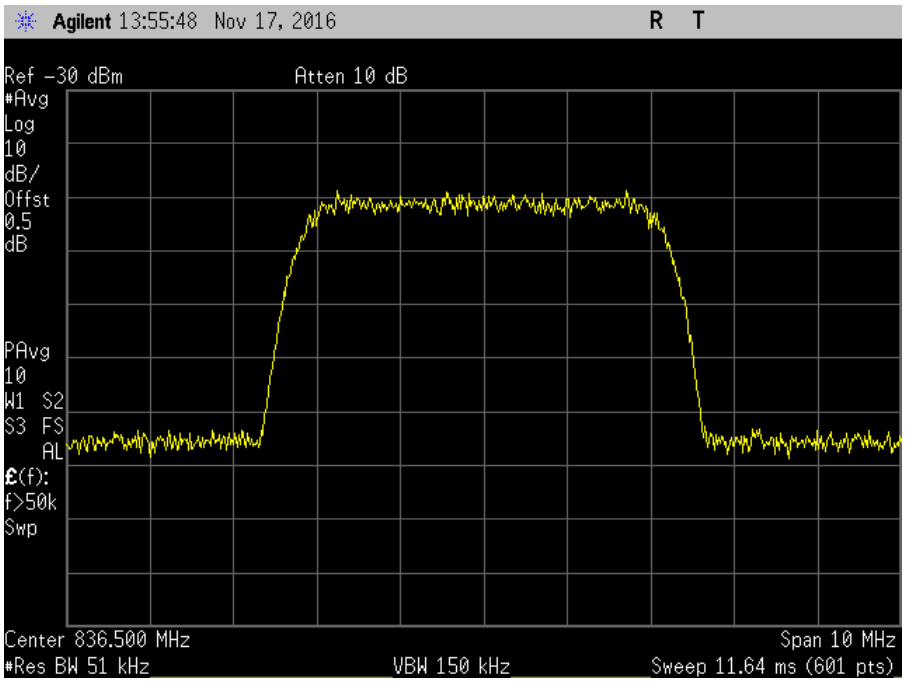
7.10_OBW_UL_698-716MHz_WCDMA_Out



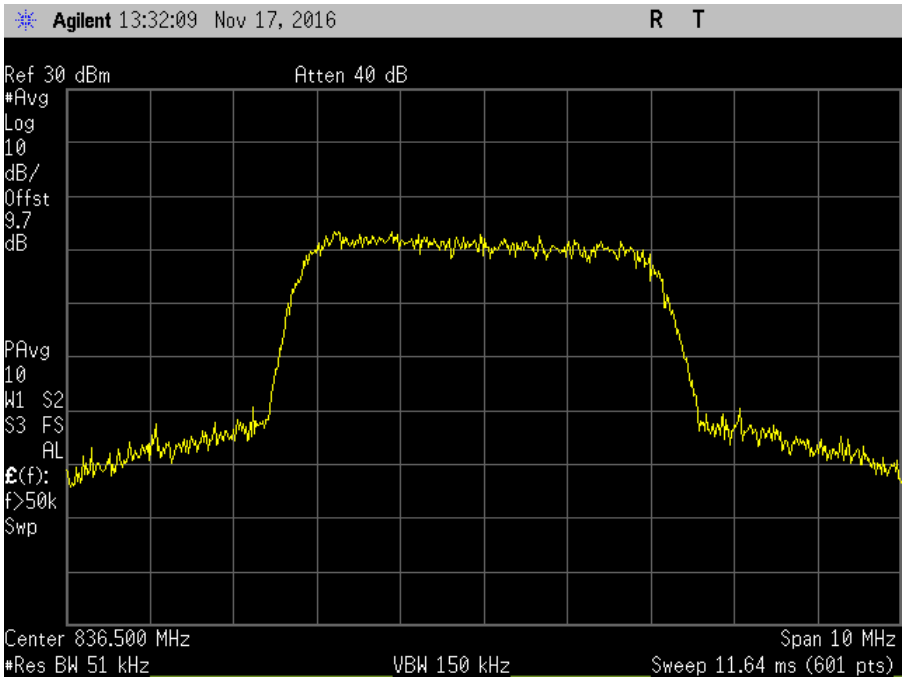
7.10_OBW_UL_776-787MHz_WCDMA_In



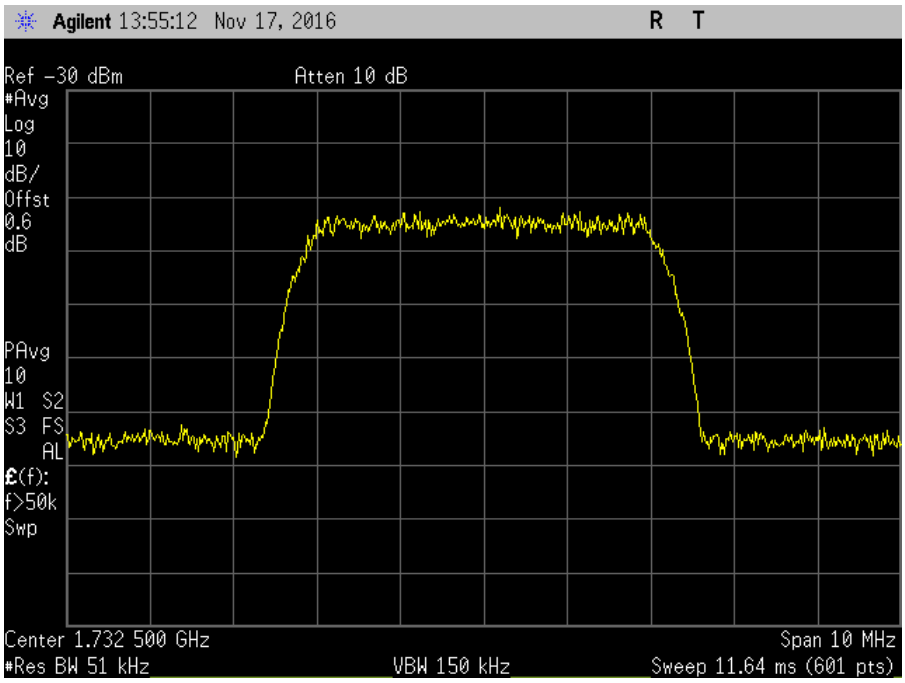
7.10_OBW_UL_776-787MHz_WCDMA_Out



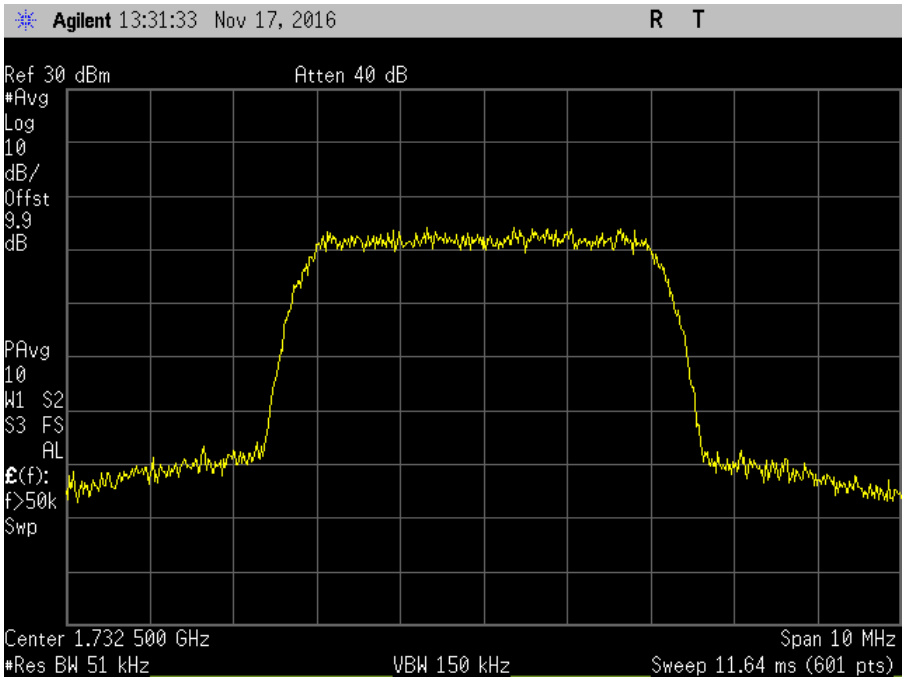
7.10_OBW_UL_824-849MHz_WCDMA_In



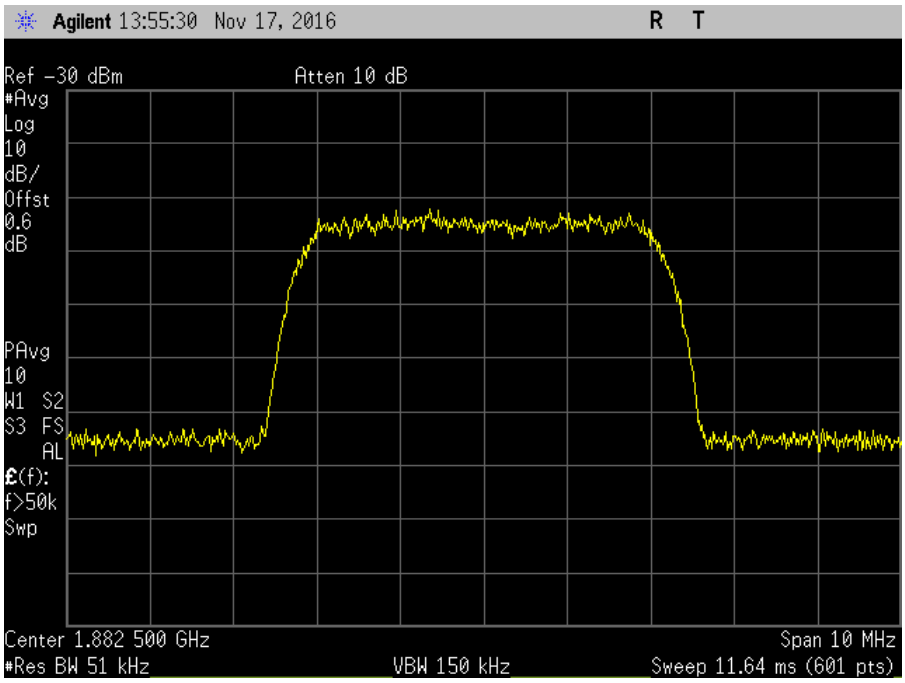
7.10_OBW_UL_824-849MHz_WCDMA_Out



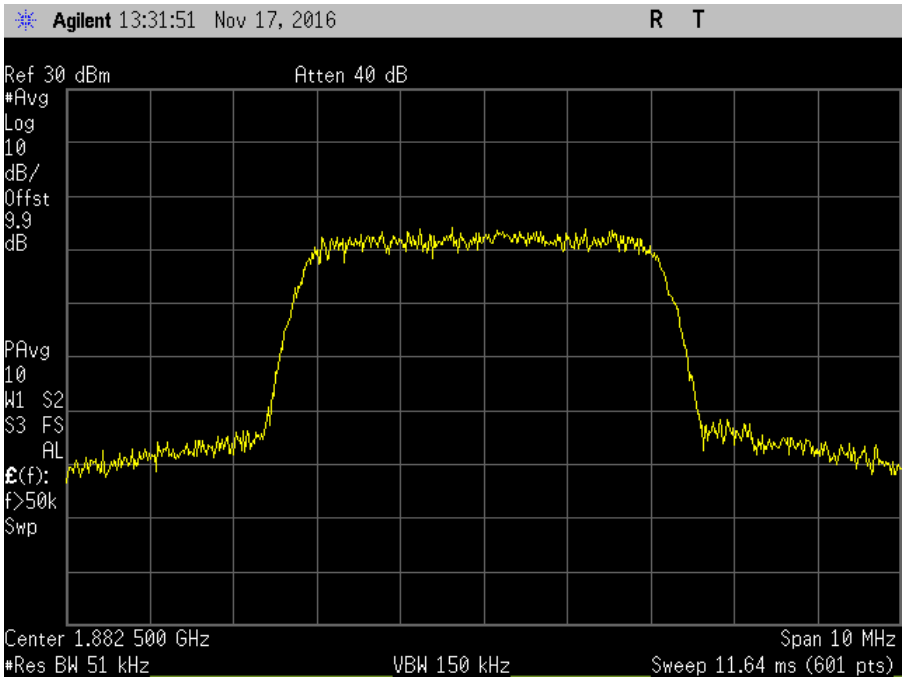
7.10_OBW_UL_1710-1755MHz_WCDMA_In



7.10_OBW_UL_1710-1755MHz_WCDMA_Out

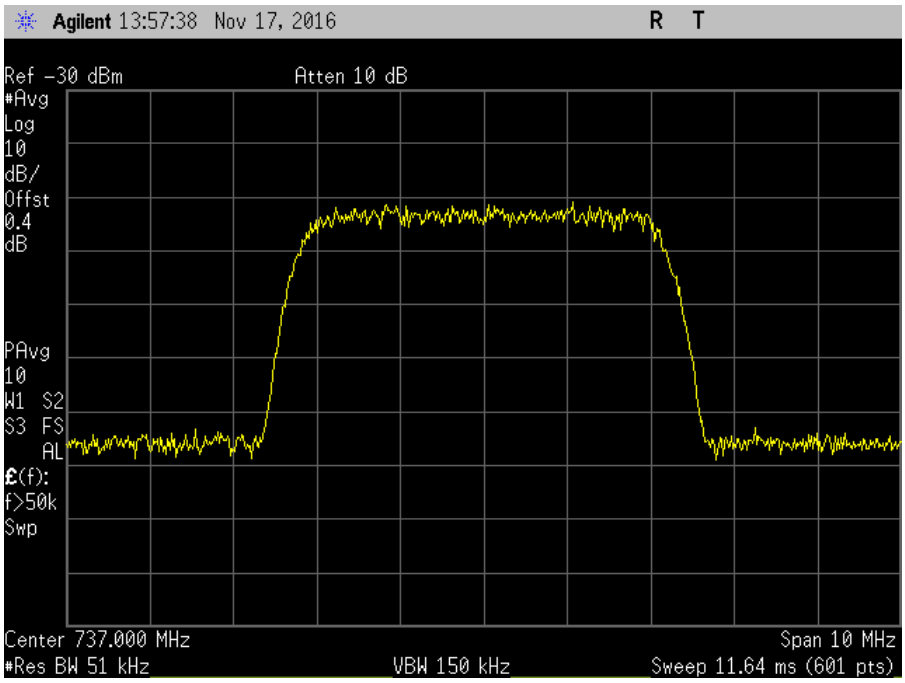


7.10_OBW_UL_1850-1915MHz_WCDMA_In

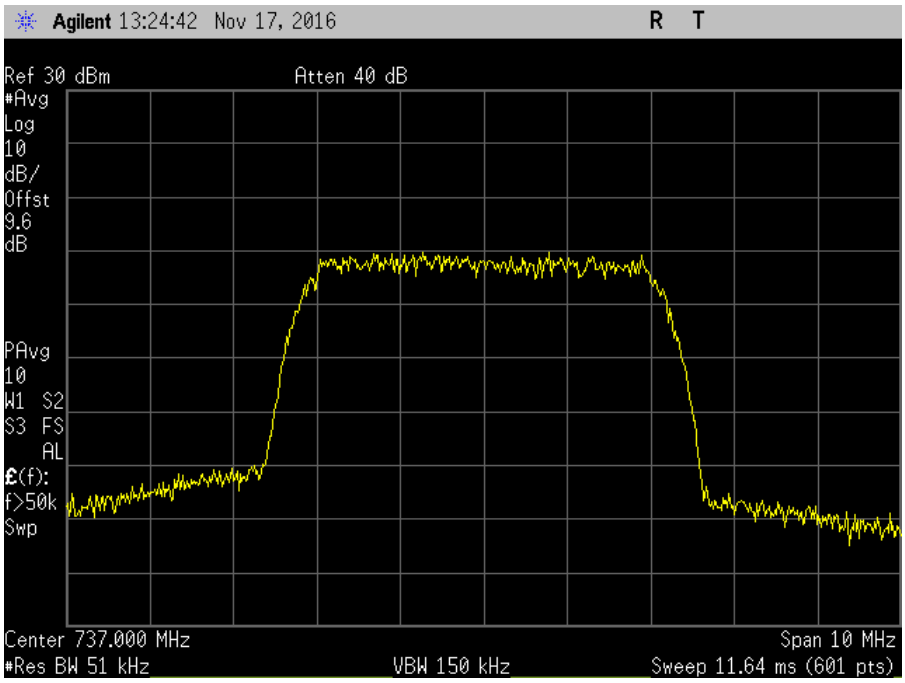


7.10_OBW_UL_1850-1915MHz_WCDMA_Out

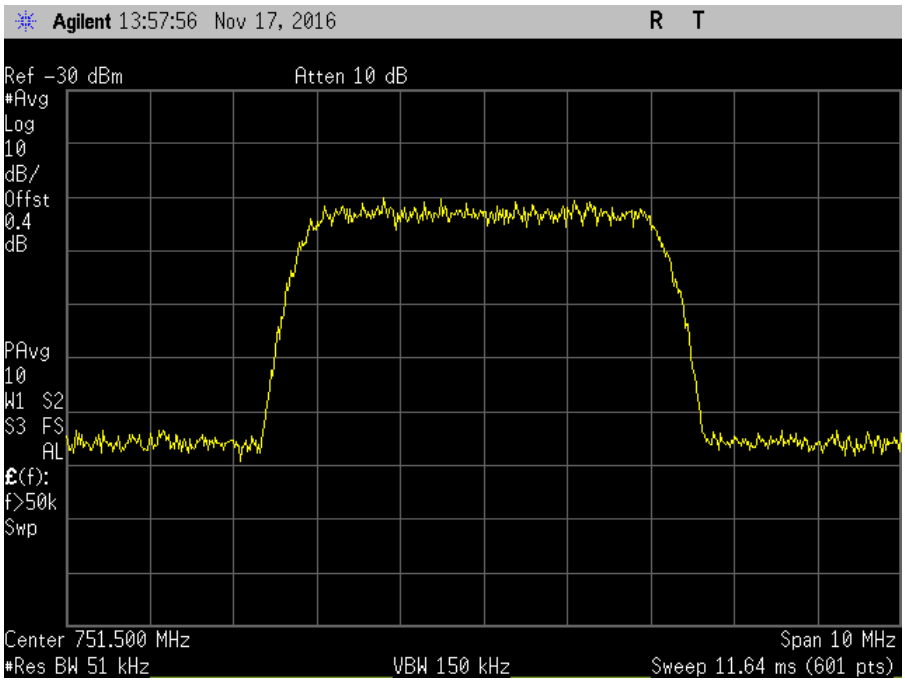
WCDMA, DL



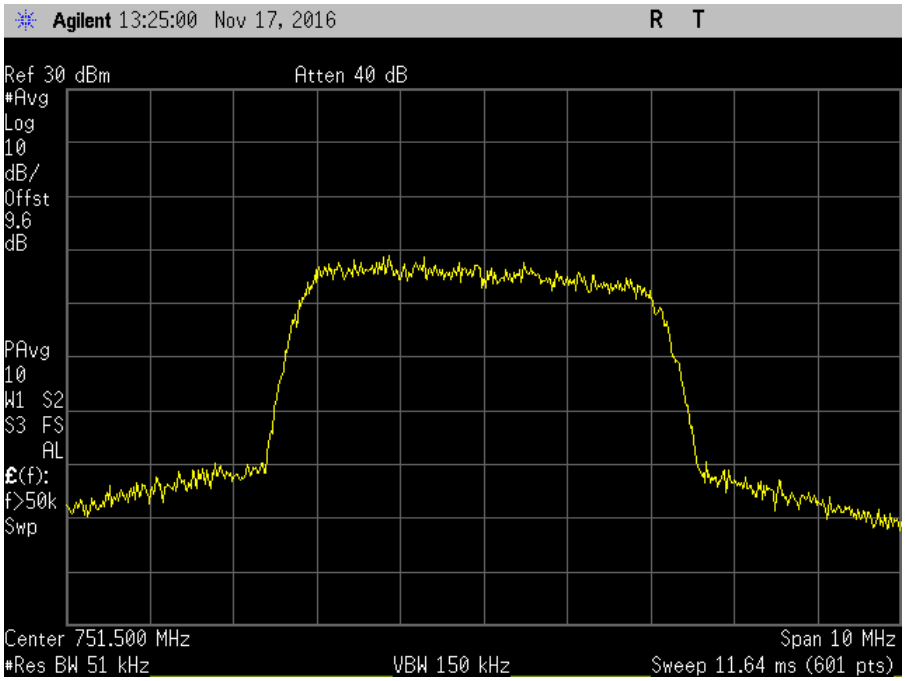
7.10_OBW_DL_728-746MHz_WCDMA_In



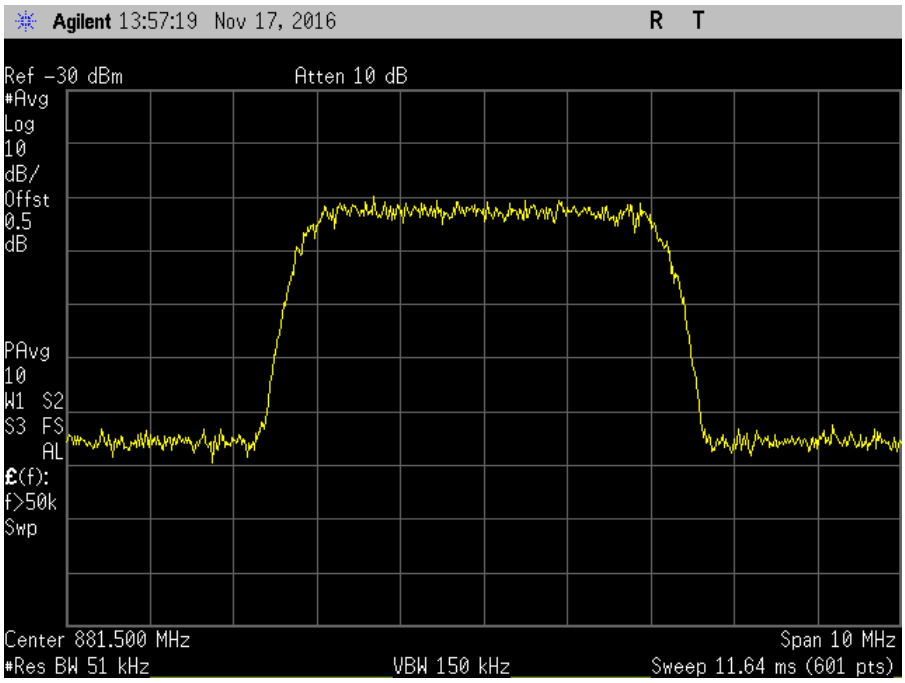
7.10_OBW_DL_728-746MHz_WCDMA_Out



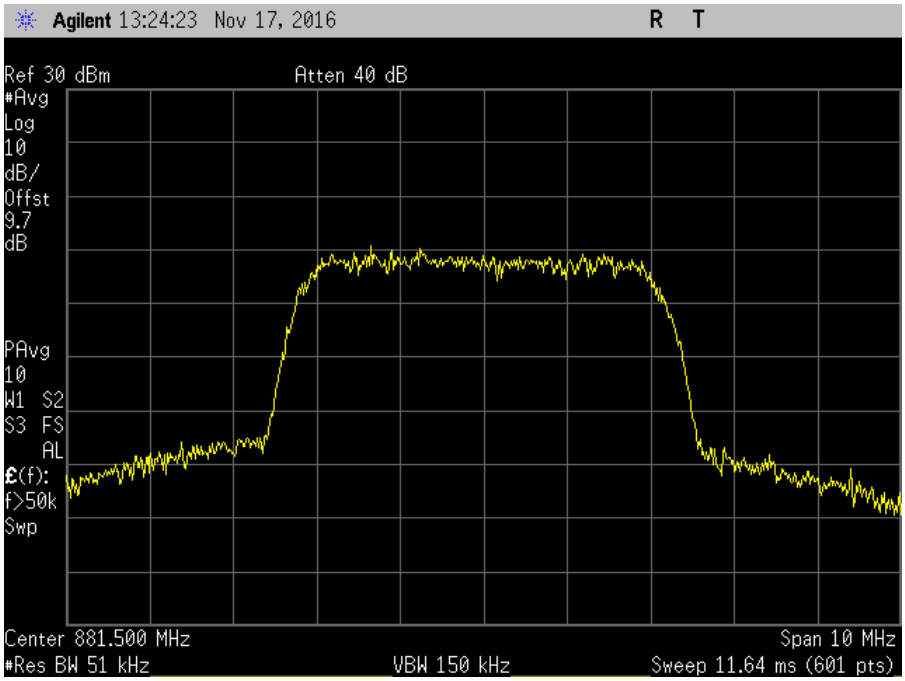
7.10_OBW_DL_746-757MHz_WCDMA_In



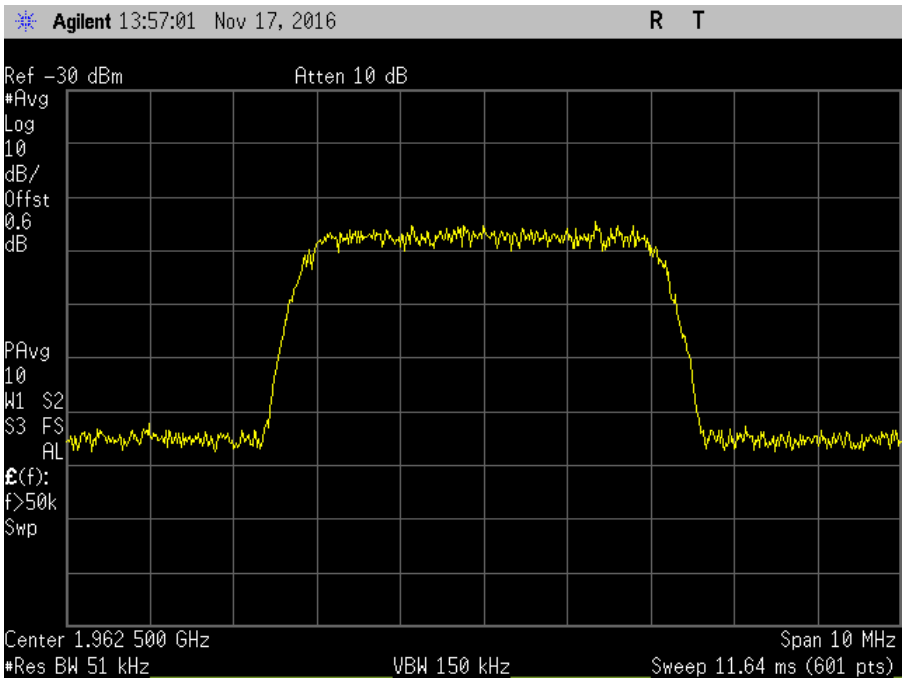
7.10_OBW_DL_746-757MHz_WCDMA_Out



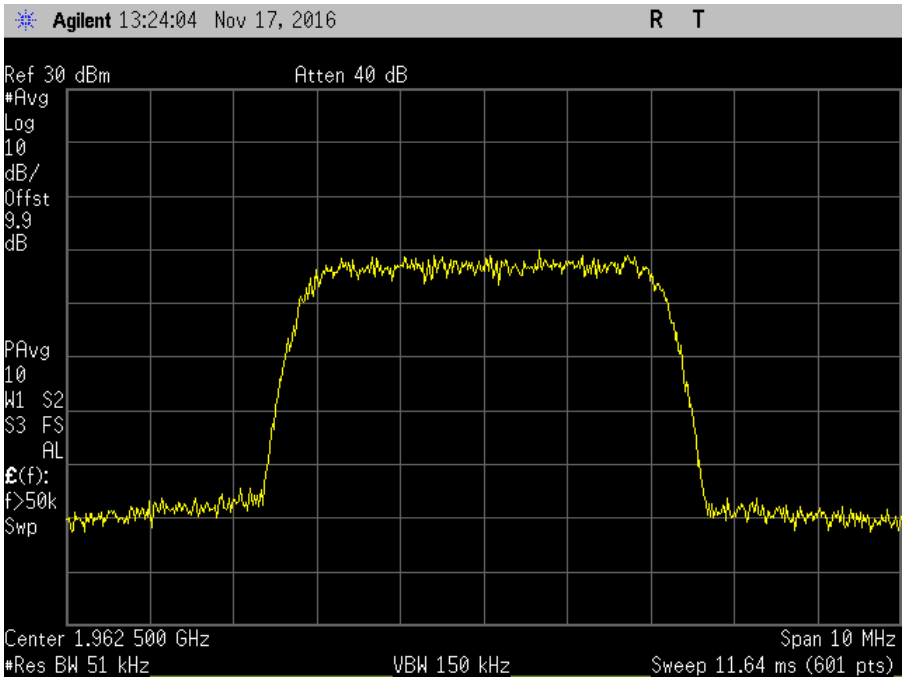
7.10_OBW_DL_869-894MHz_WCDMA_In



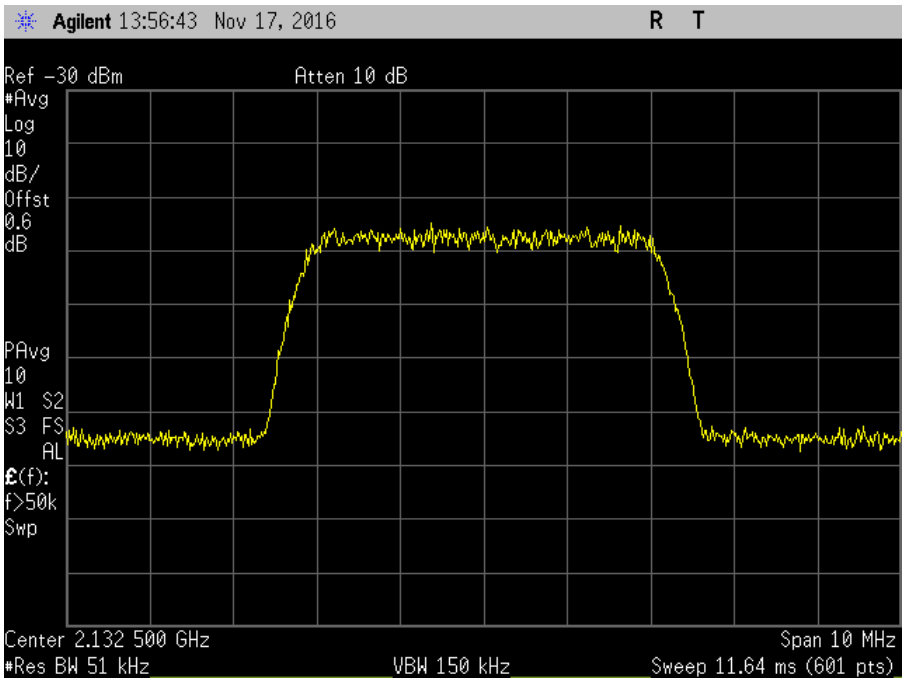
7.10_OBW_DL_869-894MHz_WCDMA_Out



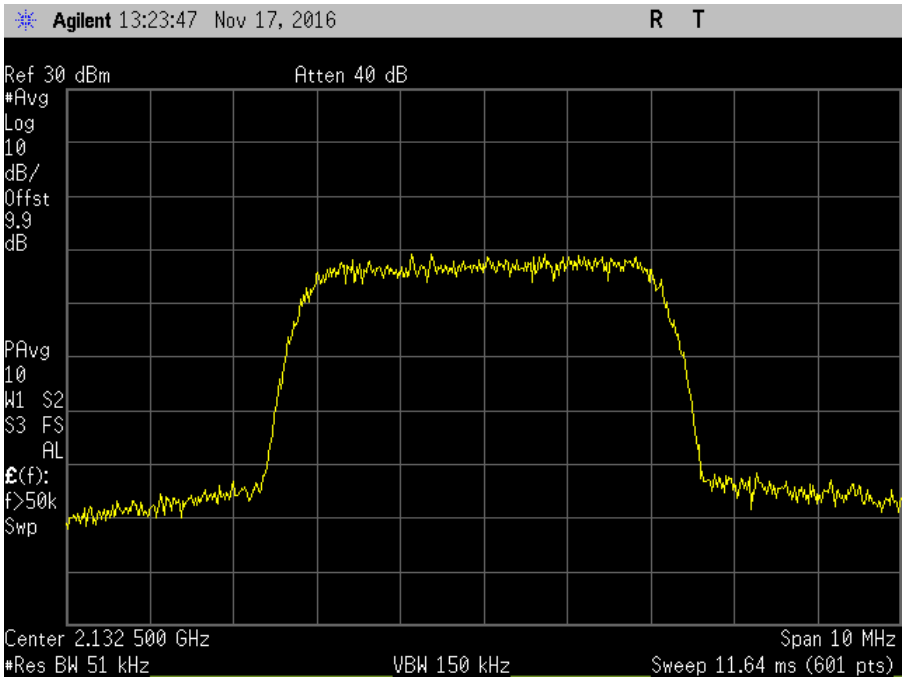
7.10_OBW_DL_1930-1995MHz_WCDMA_In



7.10_OBW_DL_1930-1995MHz_WCDMA_Out



7.10_OBW_DL_2110-2155MHz_WCDMA_In



7.10_OBW_DL_2110-2155MHz_WCDMA_Out

7.11 Oscillation Detection

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**7.11 Anti-Oscillation (Oscillation Restarts / Oscillation mitigation or shutdown)**		
Work Order #:	**98759**	Date:	11/17/2016
Test Type:	**Conducted Emissions**	Time:	14:51:24 PM
Tested By:	**Daniel Bertran**	Sequence#:	1
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 6			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 6			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed CMRS Wideband Consumer Booster with a Wi-Fi Router and TV amplifier installed. The CMRS DL signal and the Wi-Fi Signal are combined at the diplexer and transmit via the indoor antenna.
The Consumer booster UL and DL power and gain parameters are initially measured with Wi-Fi transmitting at mid channel using sequentially 802.11b, g, n20 and n40 signal. Since no significant change in measured power was observed, all other parameters are obtained with Wi-Fi transmitting at Mid channel, 802.11b.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is type RP-TNC connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.11 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016
Firmware: V2.2
Test environment conditions: Temperature: 24.3°C, 52% Relative Humidity and Pressure: 101.9 kPa

Note: UL1850-1915MHz -AWGNL+5:
- AWGNL denotes a 4.1MHz AWGN signal (99% occupied bandwidth) tuned to the frequency of 2.5 MHz above the lower edge of the operating band 1850-1915MHz
- +5 denotes a variable attenuator adjusted such that the insertion loss for center of band under test (isolation) between the booster's donor and server ports is 5 dB greater than the maximum gain, as recorded in the maximum gain test procedure, for the band under test.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP06898	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	AN02660	Spectrum Analyzer	E4446A	5/31/2016	5/31/2018
	ANP06902	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017
	AN03412	Band Pass Filter	PE8705	8/12/2015	8/12/2017
	AN03413	Band Pass Filter	PE8706	8/12/2015	8/12/2017
	AN03414	Band Pass Filter	PE8707	8/12/2015	8/12/2017
	AN03415	Band Pass Filter	PE8708	8/12/2015	8/12/2017
	AN03447	Band Pass Filter	PE8710	8/12/2015	8/12/2017
	AN03448	Band Pass Filter	PE8711	8/12/2015	8/12/2017
	AN03446	Band Pass Filter	4FV50-707/H18-O/O	1/04/2016	1/04/2018
	AN03467	Band Pass Filter	4FV50-731/H30-O/O	1/04/2016	1/04/2018
	AN03468	Band Pass Filter	4CS10-781.5/E12.2-O/O	1/04/2016	1/04/2018
	AN03469	Band Pass Filter	4CS10-751.5/E12-O/O	1/04/2016	1/04/2018
	AN02475	1 dB step Attenuator	8494B	6/29/2015	6/29/2017
	AN03429	10dB step Attenuator	8496B	8/27/2015	8/27/2017
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017
	ANP05411	Attenuator	54A-10	1/18/2016	1/18/2018
	ANC00082	RF Coupler	722-10-1.500V	8/26/2015	8/26/2017
	ANC00087	Combiner	44000	1/07/2016	1/07/2018

Summary of Results

Pass: All oscillations detections and mitigations occur within 0.3 seconds in uplink bands, within 1 second in the downlink bands and the noise level is below the -70dBm/MHz limit.

7.11.2 Oscillation restart tests

Oscillation detection				Time Between restart		Number of restart	
Freq	Measured	Limit	Peak Level	Measured	Limit	Measured	Limit
MHz	Sec	Sec	dBm	Sec	At least sec		
UL1710-1755	0.18	0.30	31.1	66	60	3	5
UL1850-1915	0.17	0.30	27	67	60	3	5
UL824-894	0.17	0.30	29.7	64	60	3	5
UL 698-716	0.16	0.30	27.9	64	60	3	5
UL776-787	0.17	0.30	30.4	63	60	3	5
DL2110-2155	0.13	1.00	23.1	66	60	3	5
DL1930-1995	0.13	1.00	23.4	67	60	3	5
DL869-894	0.16	1.00	24.3	64	60	3	5
DL:728-746	0.34	1.00	27.9	64	60	3	5
DL 746-757	0.15	1.00	28.7	64	60	3	5

The booster continues to mitigate at least 1 minute before restarting. The plots demonstrate after 3 restarts (the limit is 5 restart), the booster does not resume operation until manually reset.

7.11.3 Test procedure for measuring oscillation mitigation or shutdown

	UL 1710-1755	UL1850-1915	UL 824-894	UL 698-716	UL 776-787	
Max Gain Isolation	Pk-Pk Difference	Pk-Pk Difference	Pk-Pk Difference	Pk-Pk Difference	Pk-Pk Difference	Limit
dB	dB	dB	dB	dB	dB	dB
+5dB	10.3	11.6	7.7	8.6	10.0	12.0
+4dB	11.4	(12.9)*	8.7	10.4	10.5	12.0
+3dB	(12.3)*	(15)*	10.6	(12)*	11.7	12.0
+2dB	(15.1)*	(18.1)*	11.7	(13.9)*	(12.9)*	12.0
+1dB	(17.1)*	(21.6)*	(13.9)*	(17.5)*	(14.5)*	12.0
0dB	(21.6)*	(29.5)*	(14.8)*	(22.7)*	(16.9)*	12.0
-1dB	(26.1)*	(74.3)*	(18.2)*	**	(20.4)*	12.0
-2dB	(62)*	(78.1)*	(28.6)*	**	(28.4)*	12.0
-3dB	**	**	**	**	**	12.0
-4dB	**	**	**	**	**	12.0
-5dB	**	**	**	**	**	12.0

	DL 2110-2155	DL 1930-1995	DL 869-894	DL 728-746	DL 746-775	
Max Gain Isolation	Pk-Pk Difference	Pk-Pk Difference	Pk-Pk Difference	Pk-Pk Difference	Pk-Pk Difference	Limit
dB	dB	dB	dB	dB	dB	dB
+5dB	9.9	9.0	9.4	8.3	6.2	12.0
+4dB	11.0	10.6	9.9	8.9	8.0	12.0
+3dB	11.8	11.7	11.2	9.8	10.9	12.0
+2dB	(13.5)*	(13.4)*	(12.8)*	11.0	(12.3)*	12.0
+1dB	(14.3)*	(15.1)*	(14.6)*	(12.2)*	(13.7)*	12.0
0dB	(15.8)*	(18.3)*	(18.4)*	(14.6)*	(15.5)*	12.0
-1dB	(19)*	(22)*	(23.3)*	(18.8)*	(18.8)*	12.0
-2dB	(24.9)*	(28.9)*	(45)*	(24.4)*	(25.5)*	12.0
-3dB	(47.4)*	**	**	**	**	12.0
-4dB	**	**	**	**	**	12.0
-5dB	**	**	**	**	**	12.0

Note:

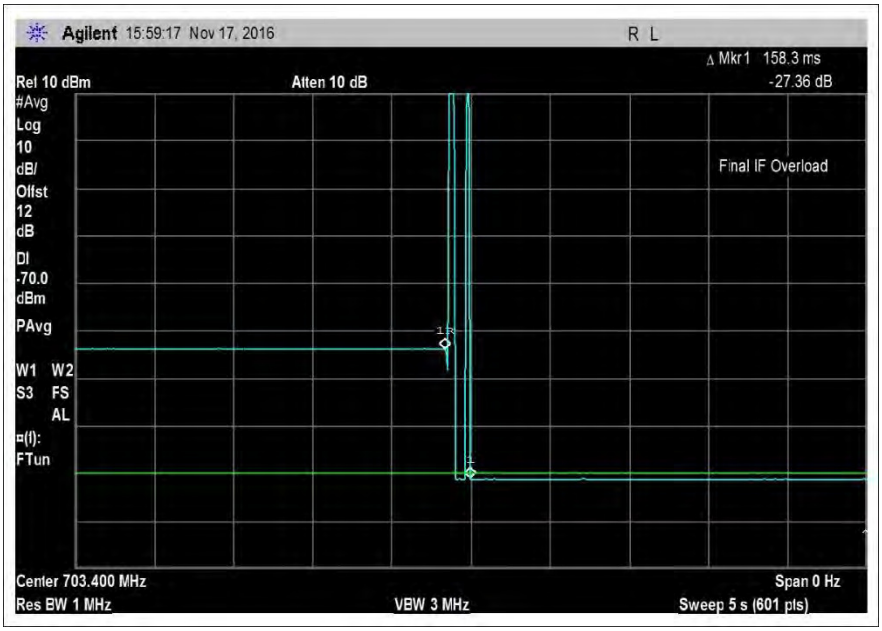
* The measured difference exceeds the limit for a period of less than 300 second before device mitigates and shuts down. The maximum recorded time prior to shutdown was 50 seconds for the Uplink bands and 55 seconds for the Downlink bands.

** The device shuts down immediately.

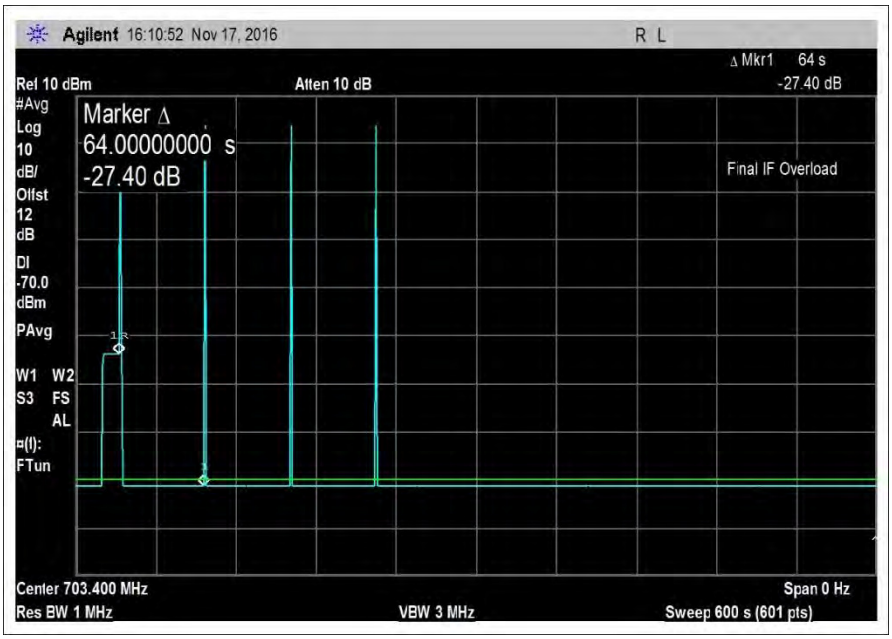
7.11.2 Oscillation Restart Tests

Plots

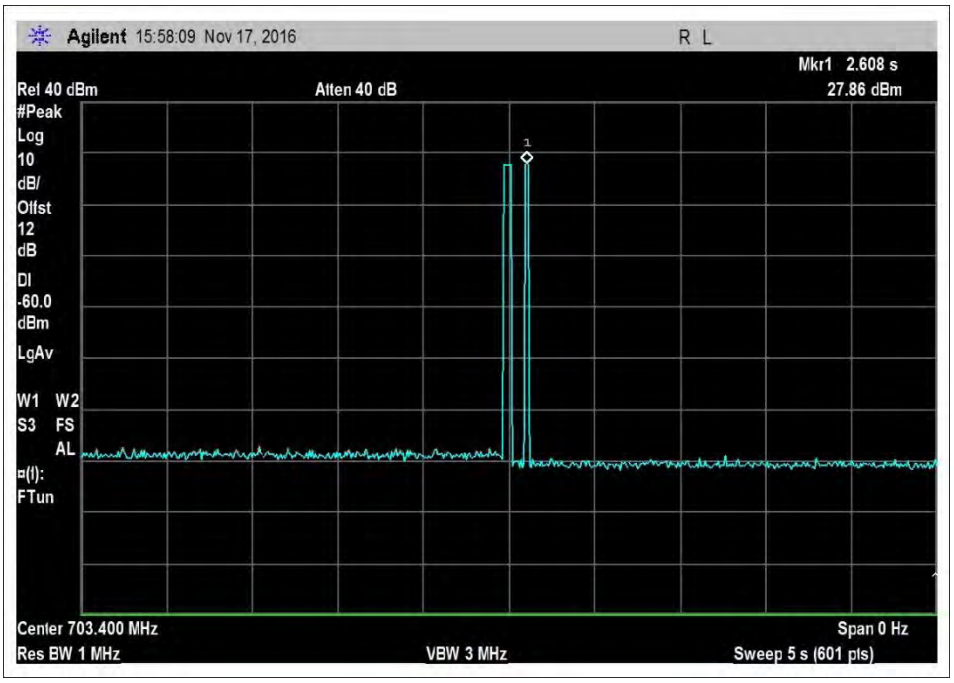
UL



7.11_osc_UL-698-716MHz



7.11_osc_UL-698-716MHz-600sec



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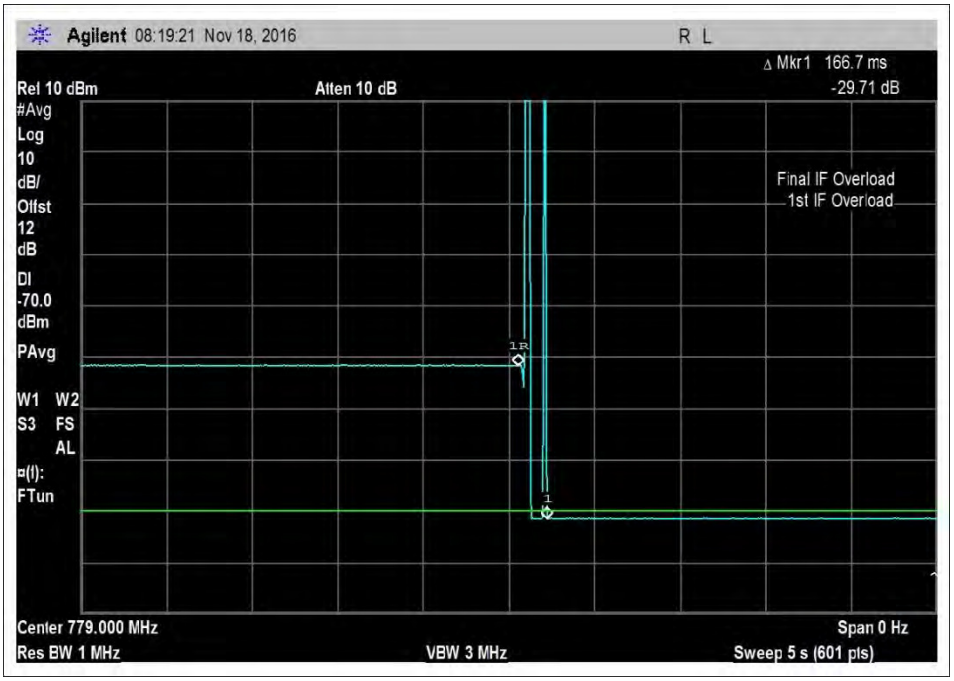
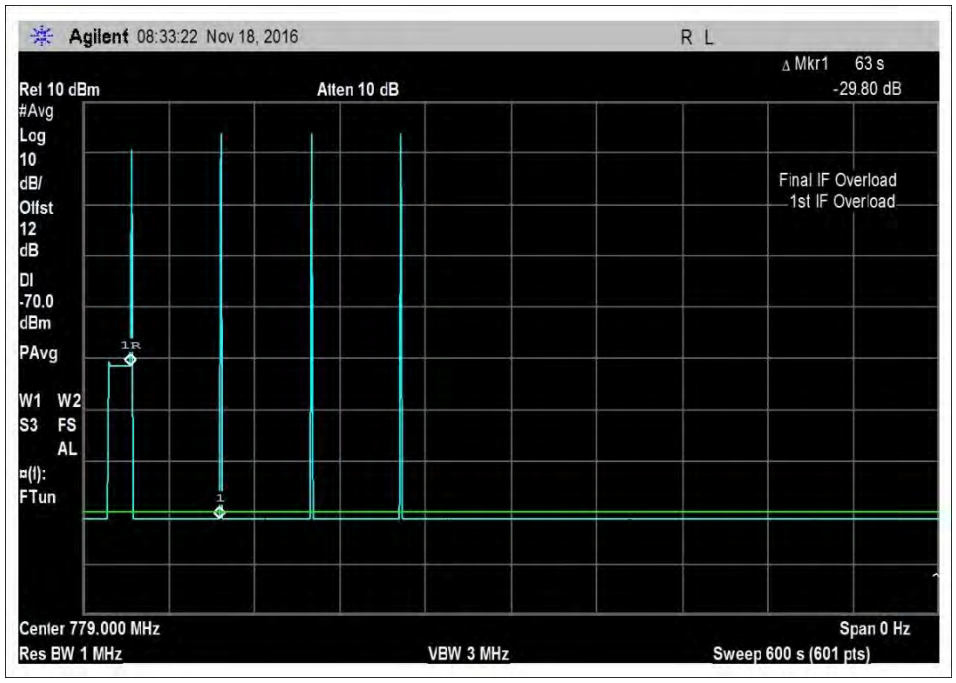


7.11_osc_UL-776-787MHz



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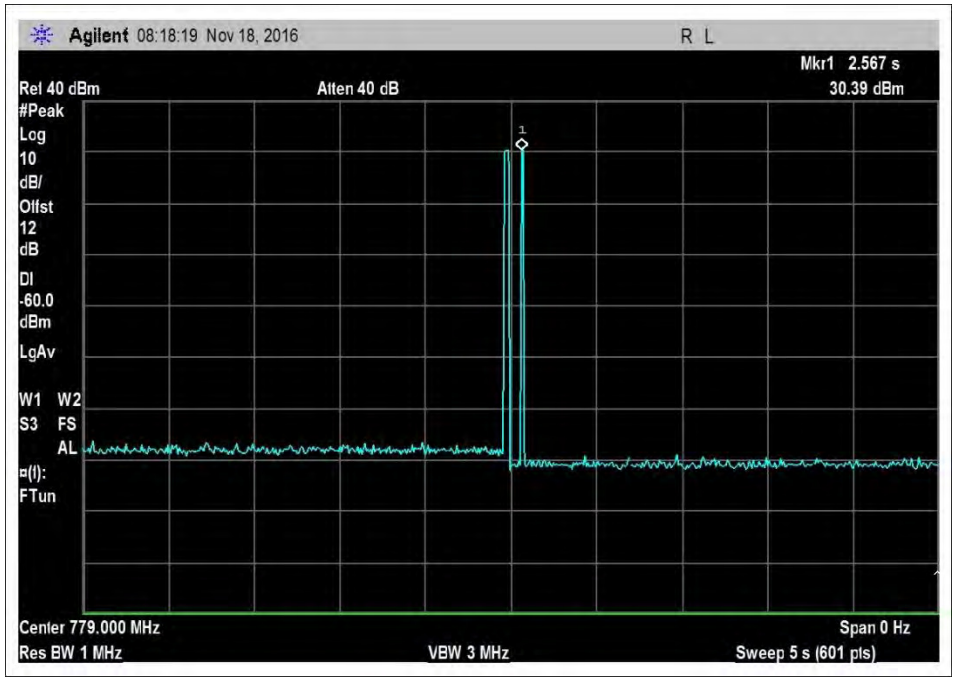

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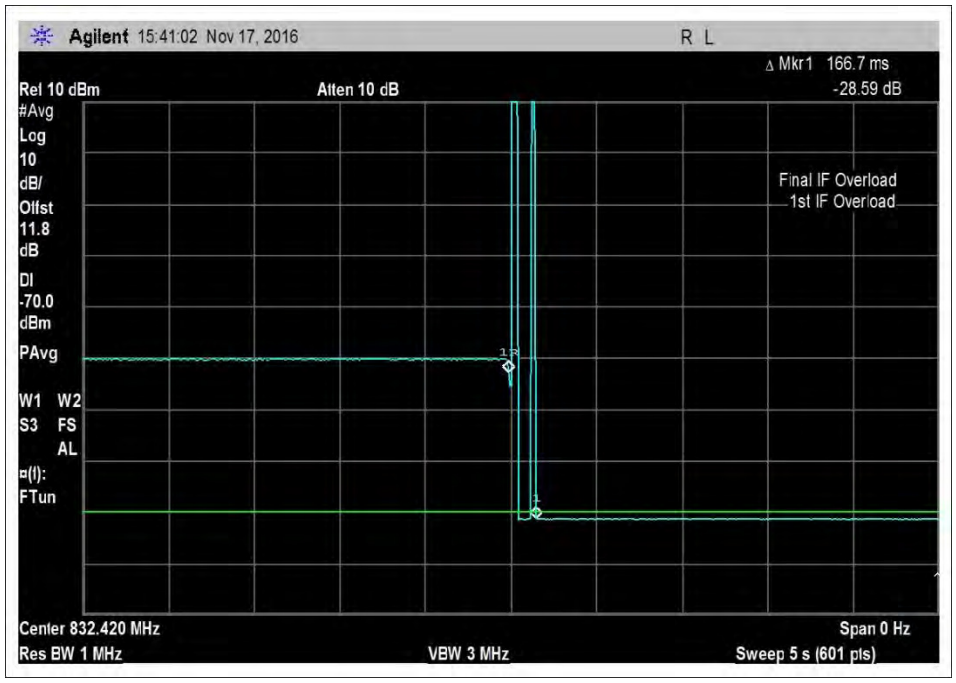
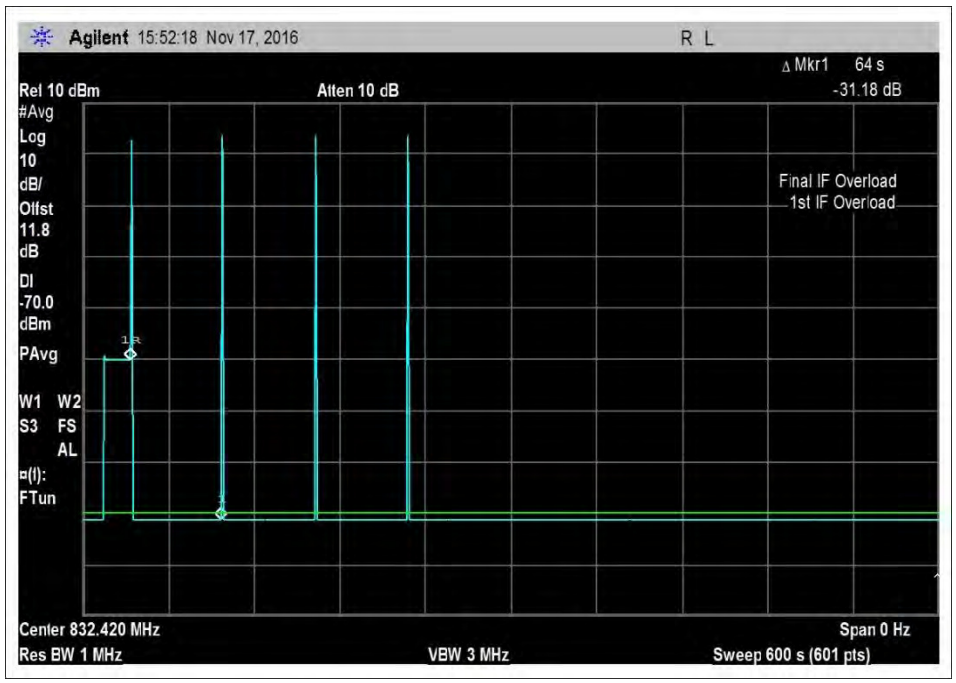


7.11_osc_UL-824-849MHz



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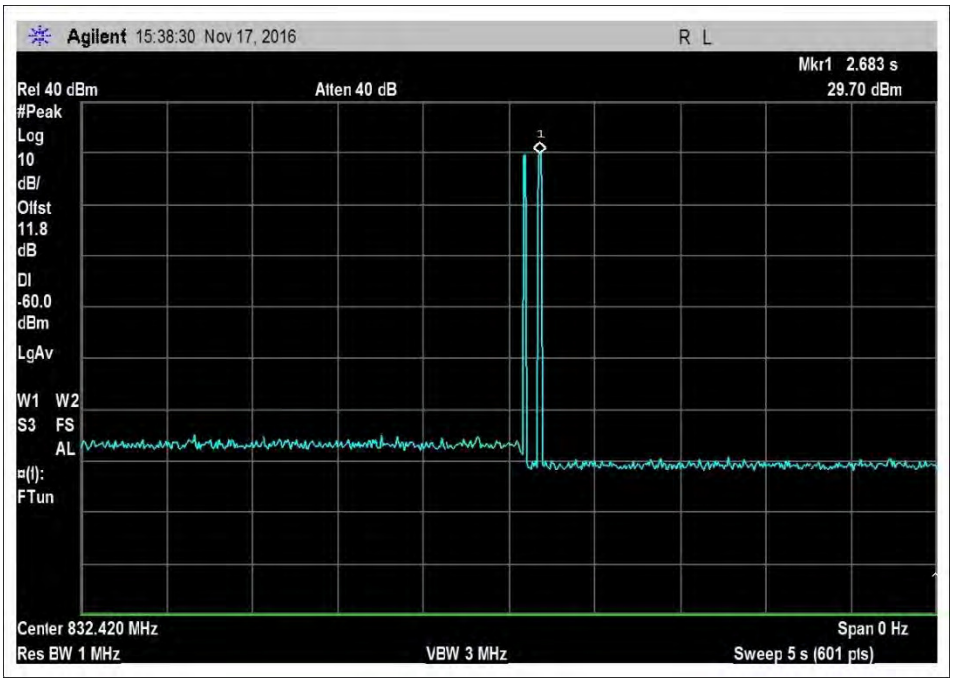

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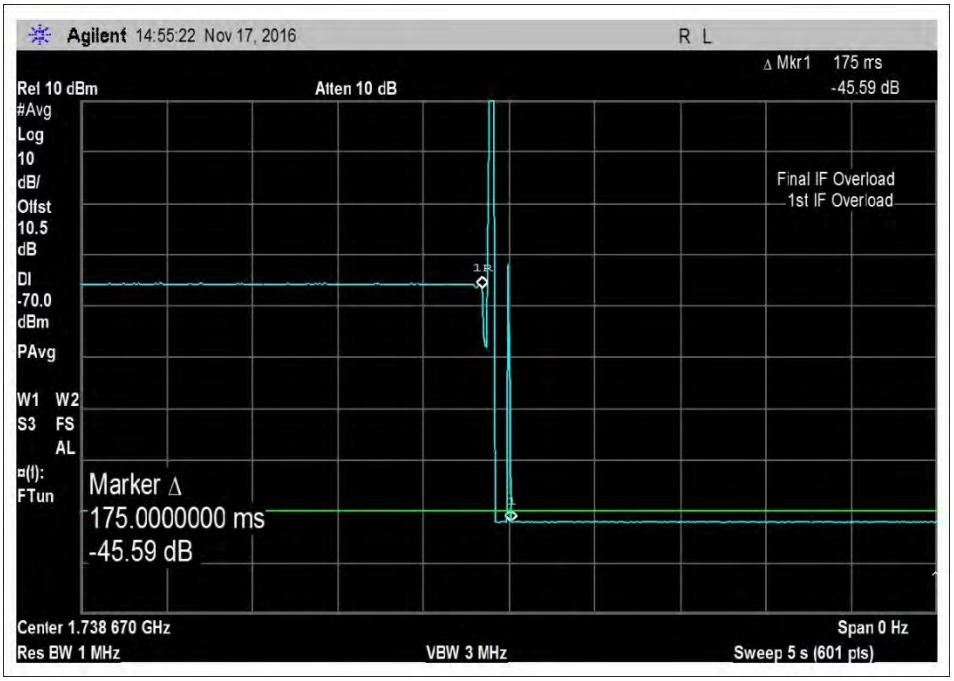
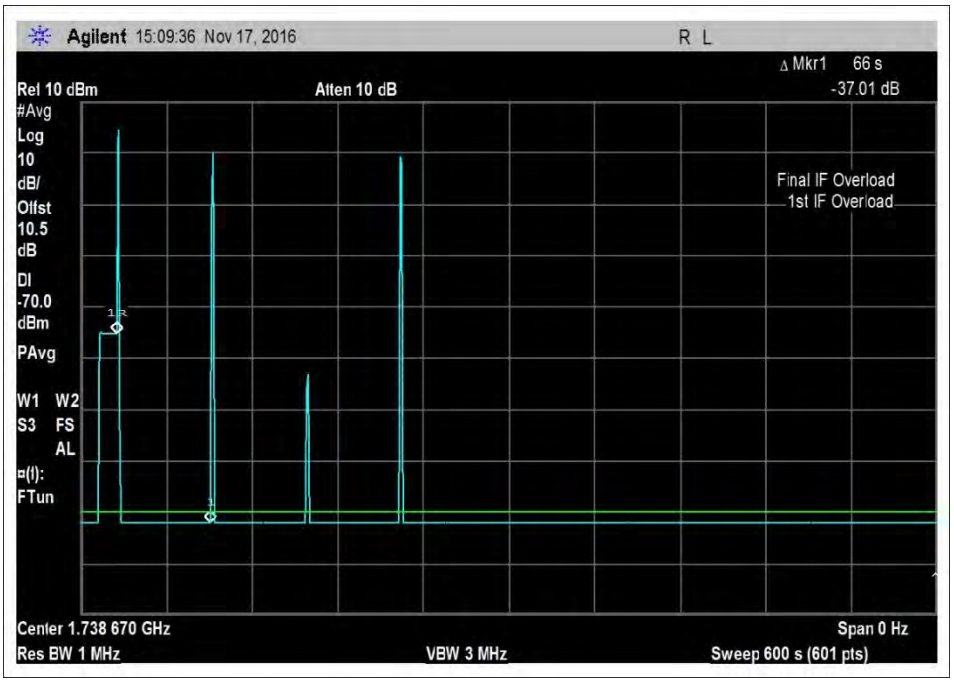
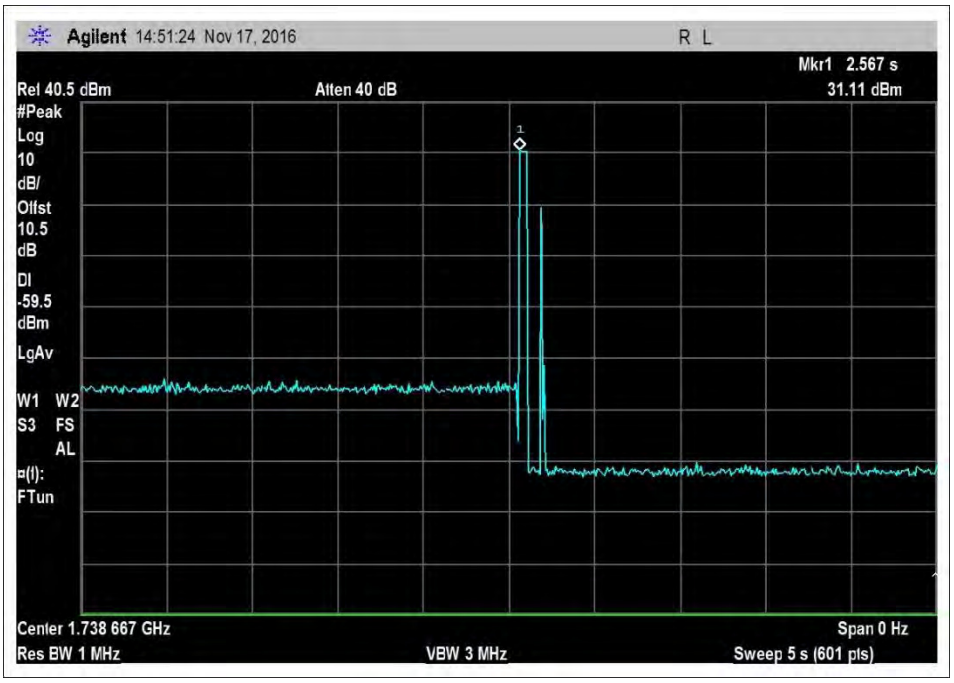


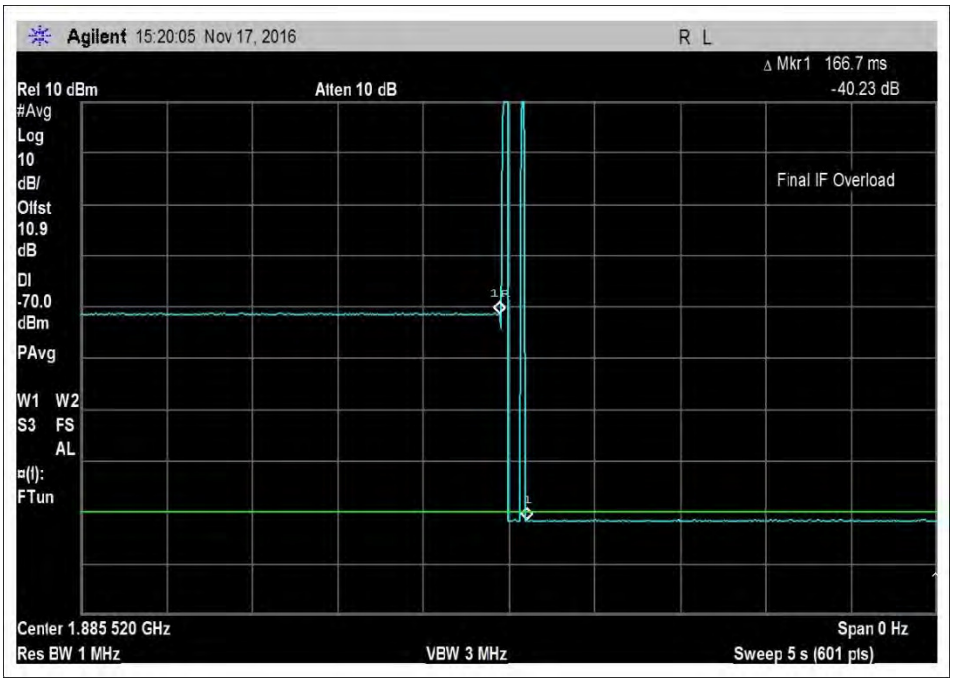
7.11_osc_UL-1710-1755MHz



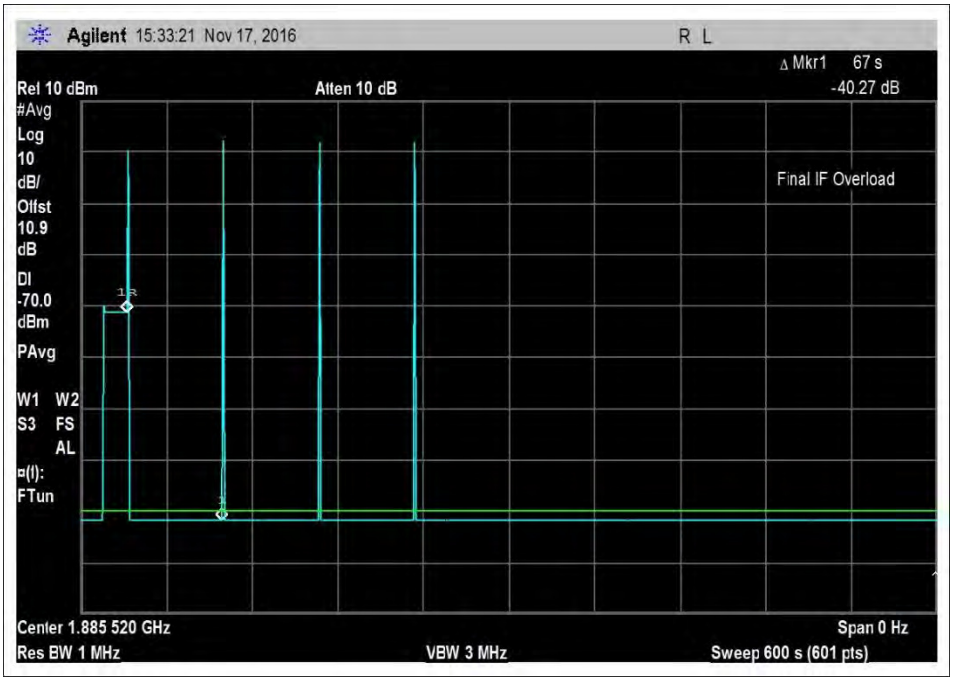
7.11_osc_UL-1710-1755MHz-600sec



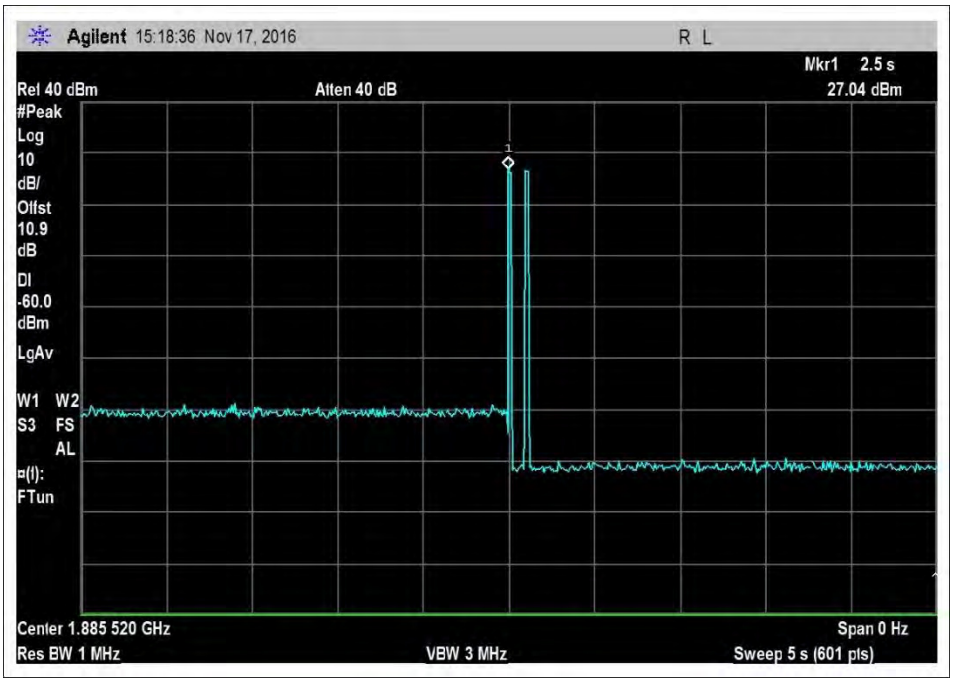
7.11_osc_UL-1710-1755MHz-Pk



7.11_osc_UL-1850-1915MHz

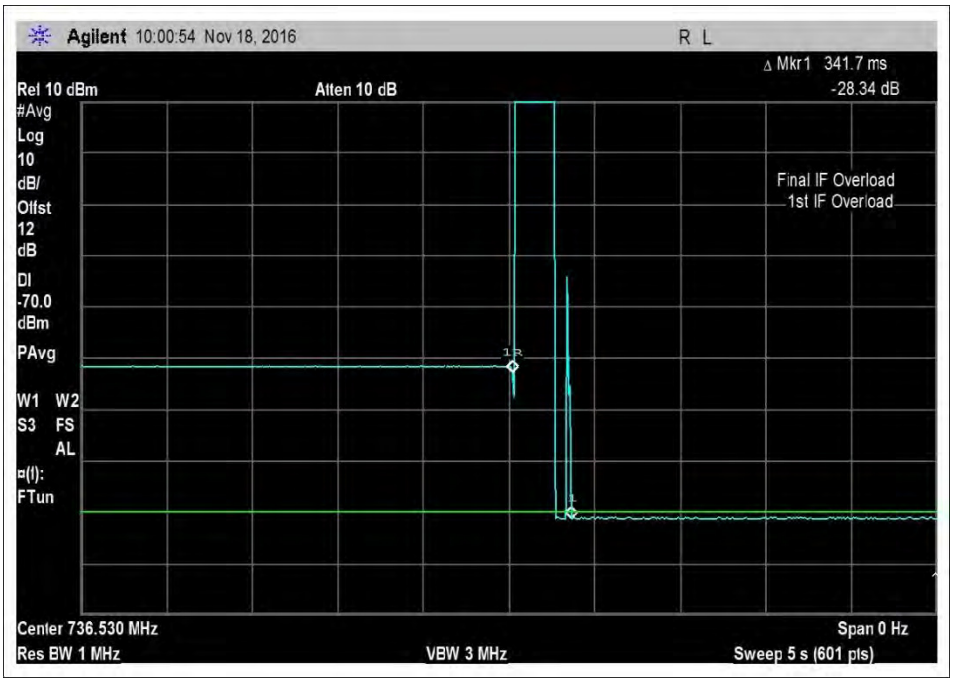


7.11_osc_UL-1850-1915MHz_600sec

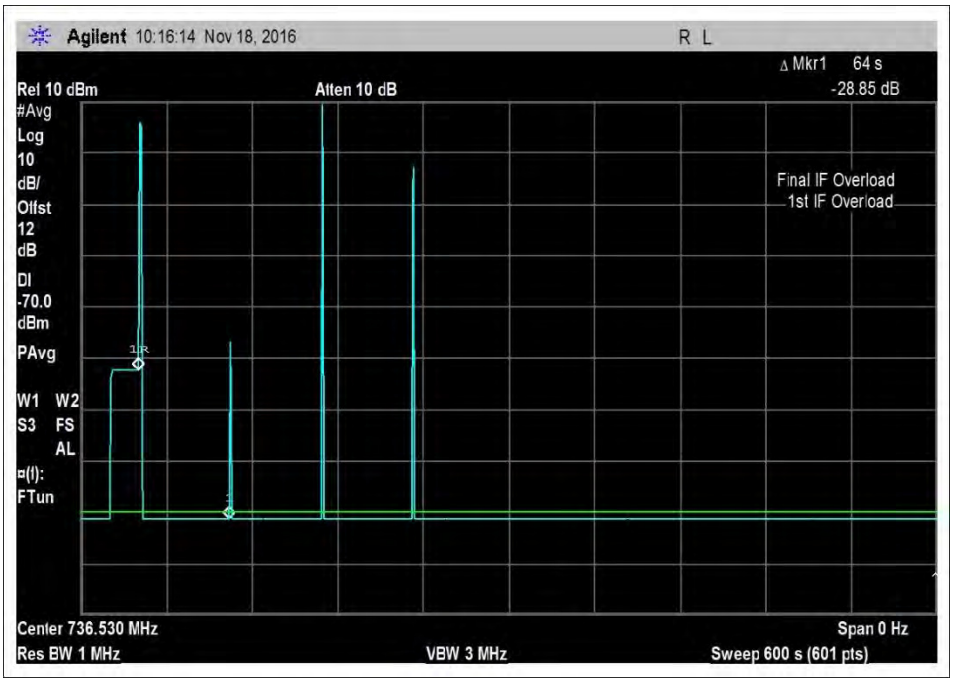


7.11_osc_UL-1850-1915MHz-Pk

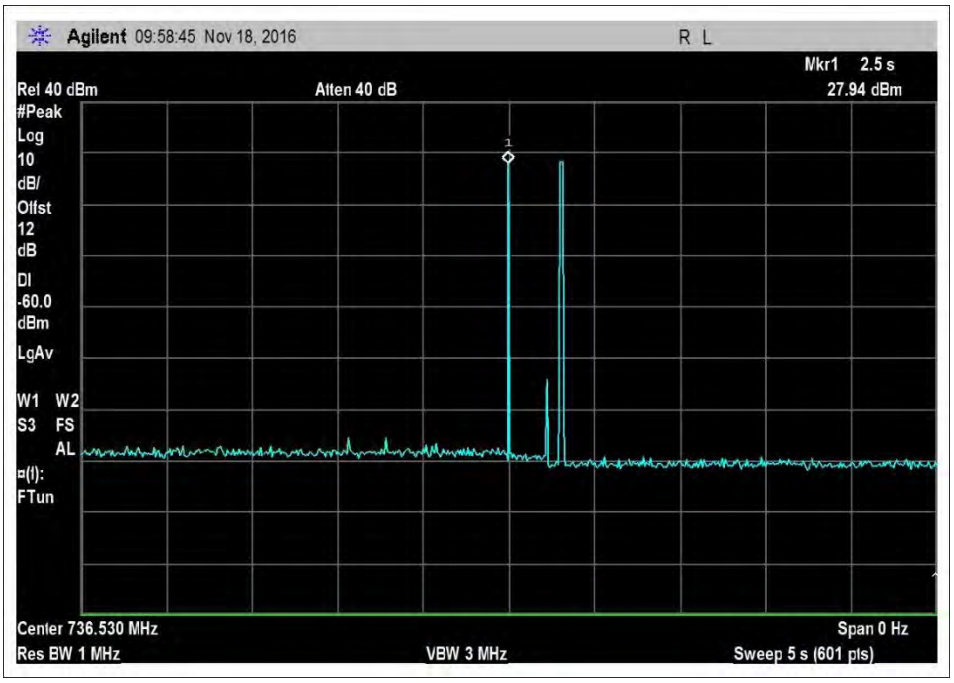
DL



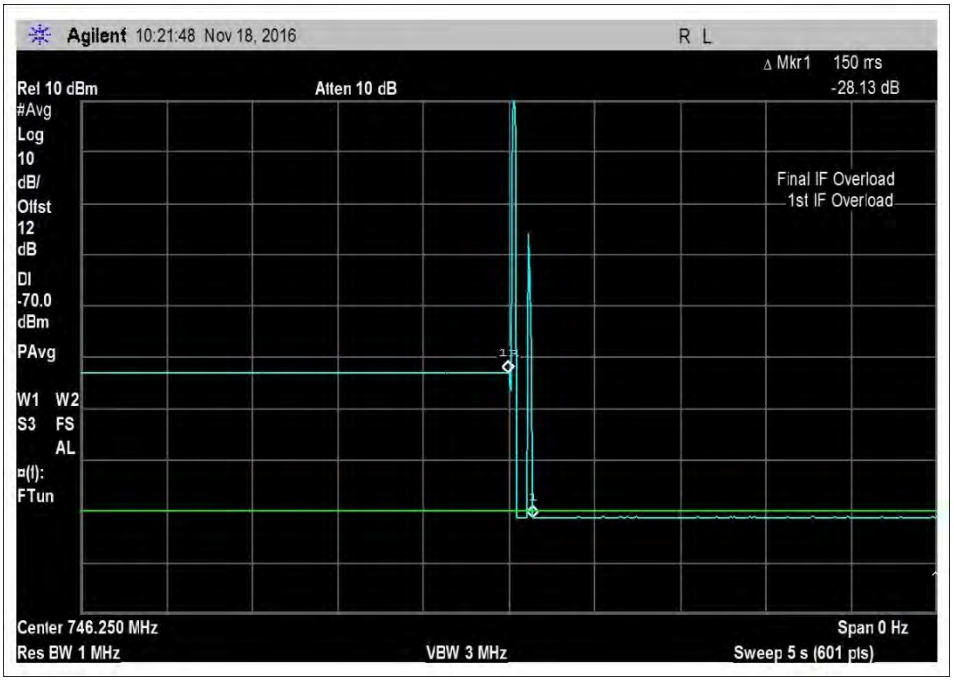
7.11_osc_DL-728-746MHz



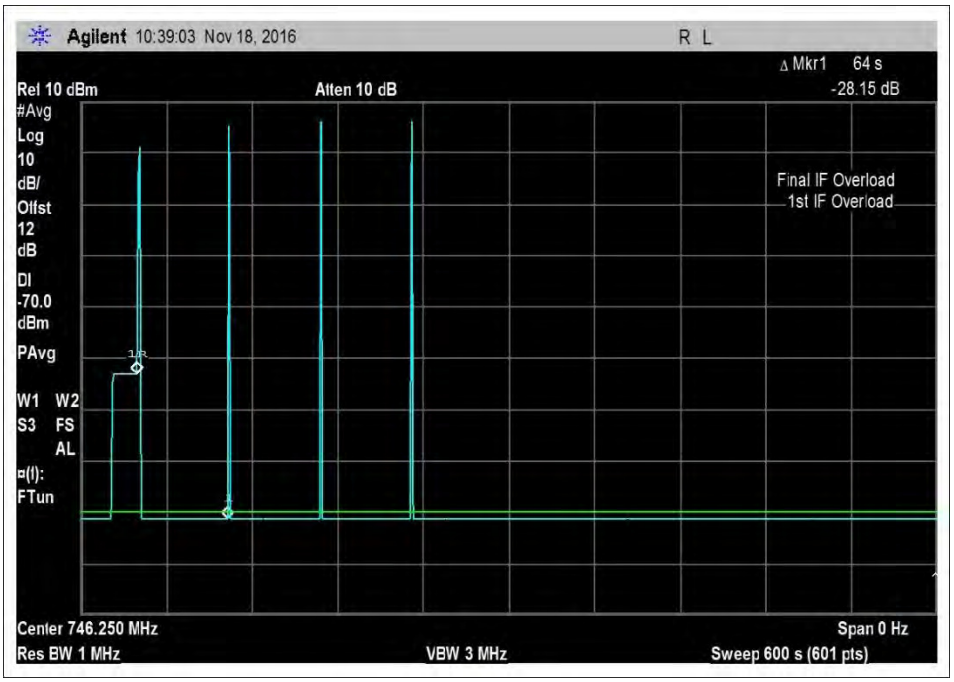
7.11_osc_DL-728-746MHz-600sec



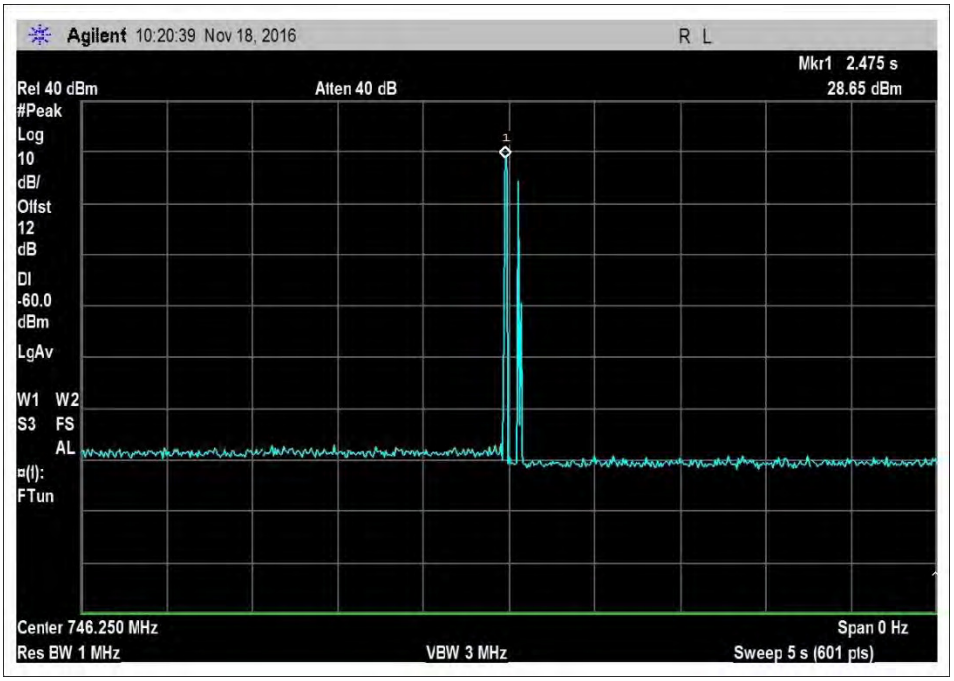
7.11_osc_DL-728-746MHz-Pk



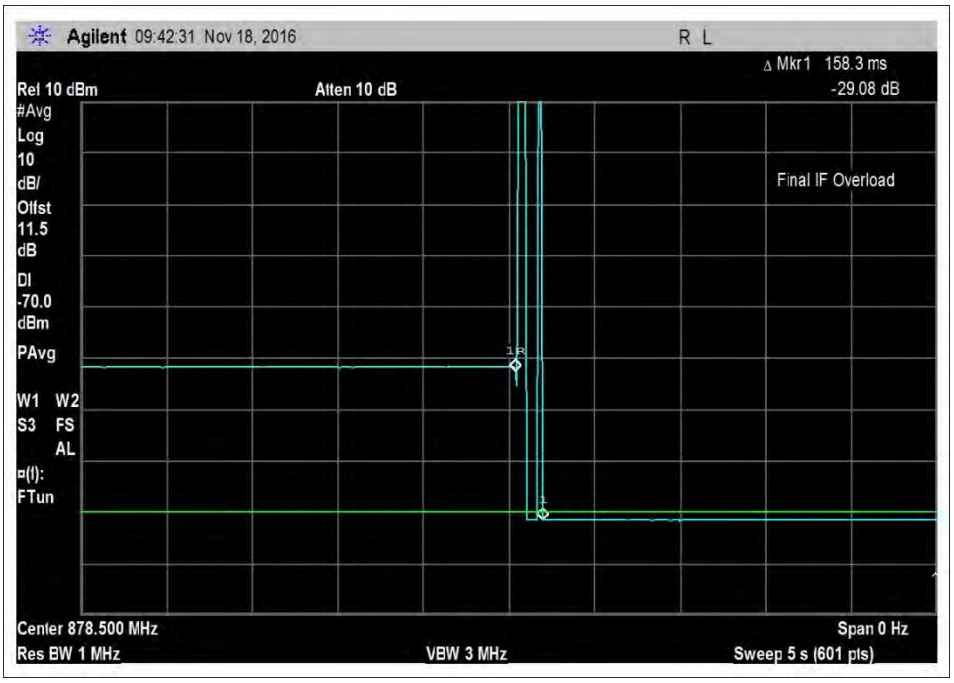
7.11_osc_DL-746-757MHz



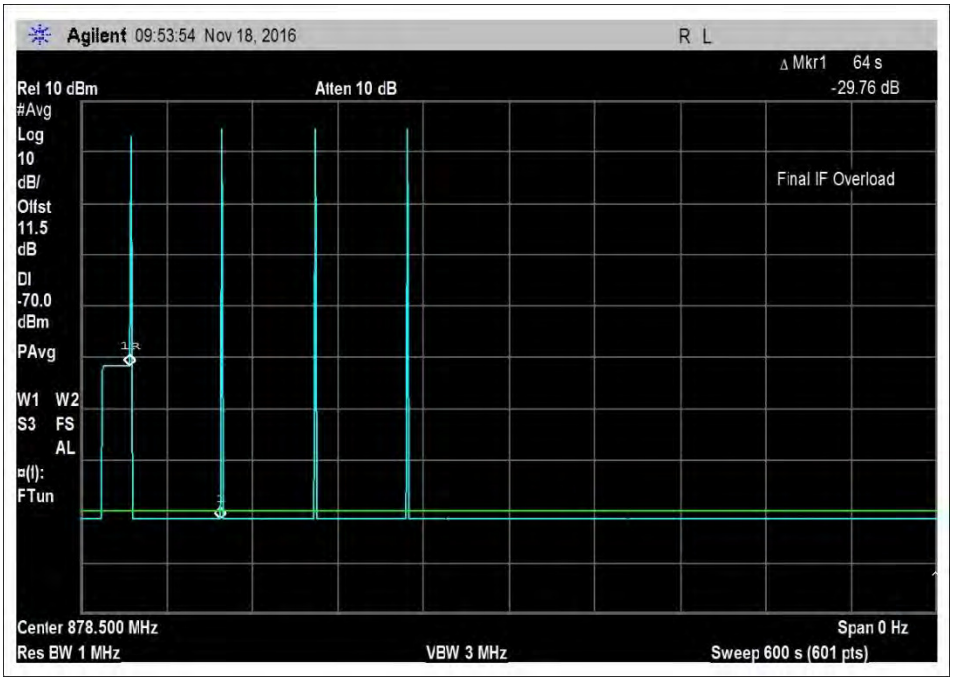
7.11_osc_DL-746-757MHz-600



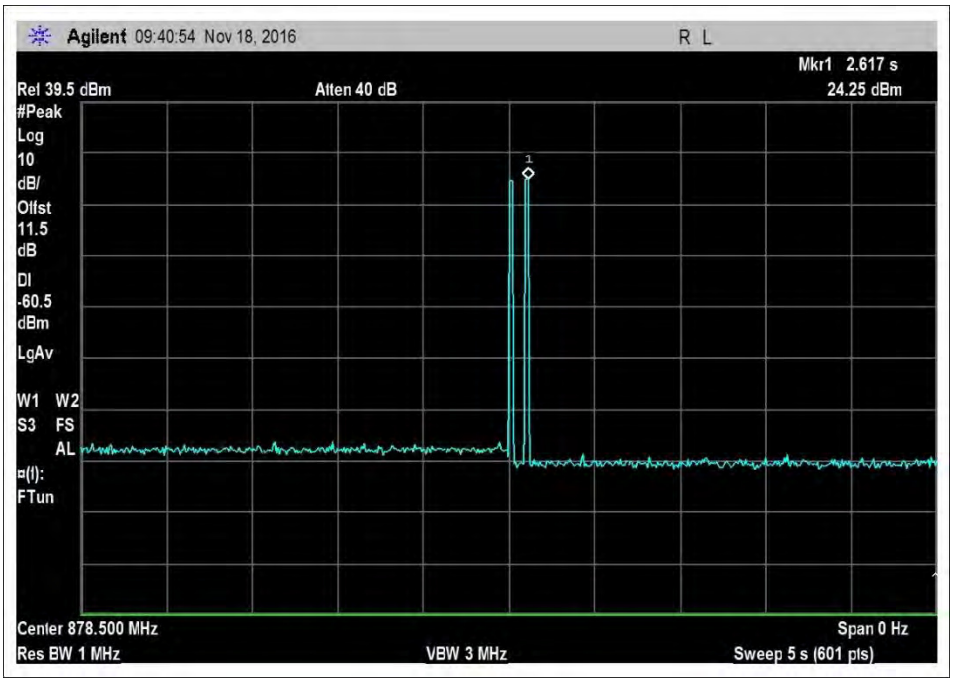
7.11_osc_DL-746-757MHz-Pk



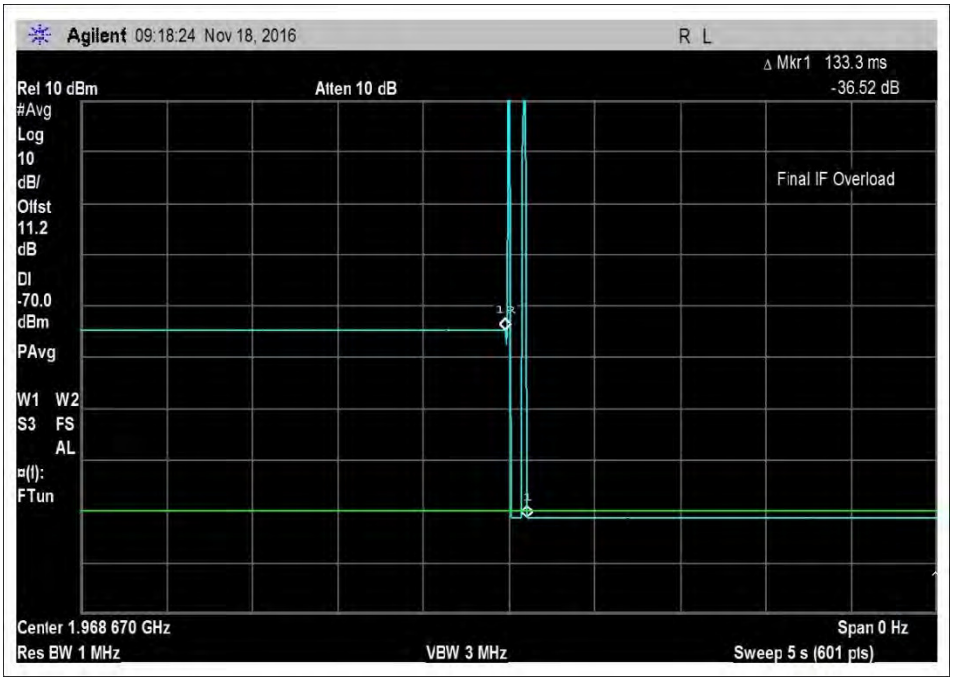
7.11_osc_DL-869-894MHz



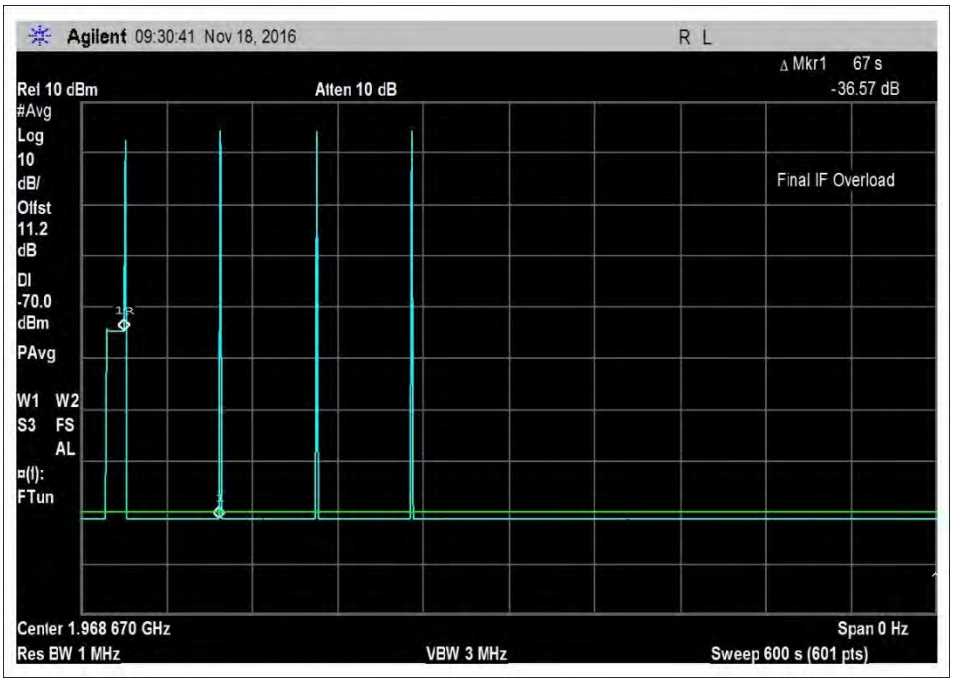
7.11_osc_DL-869-894MHz-600



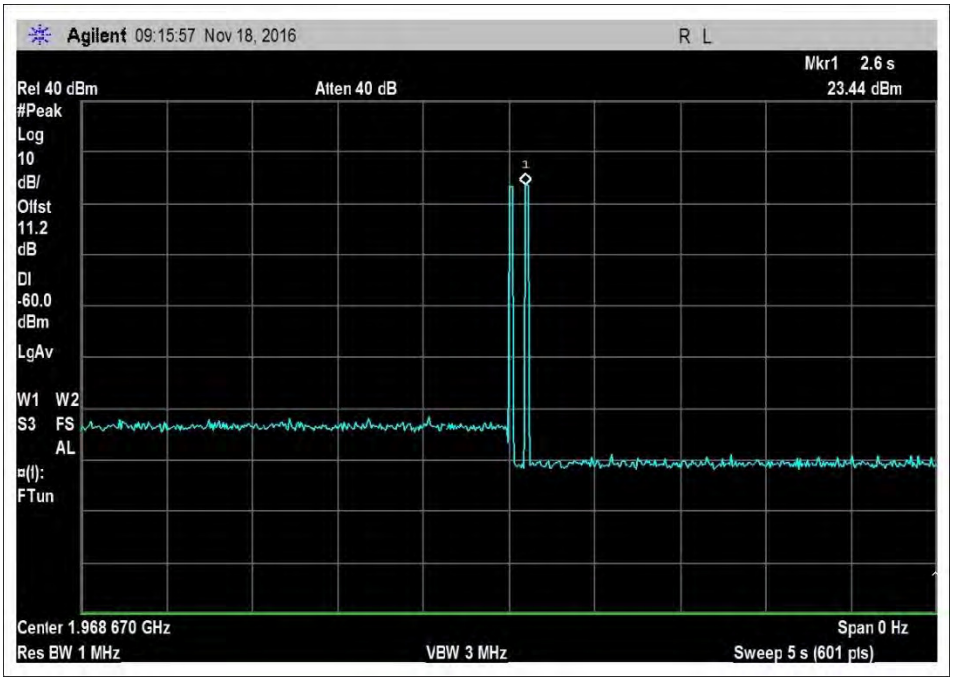
7.11_osc_DL-869-894MHz-Pk



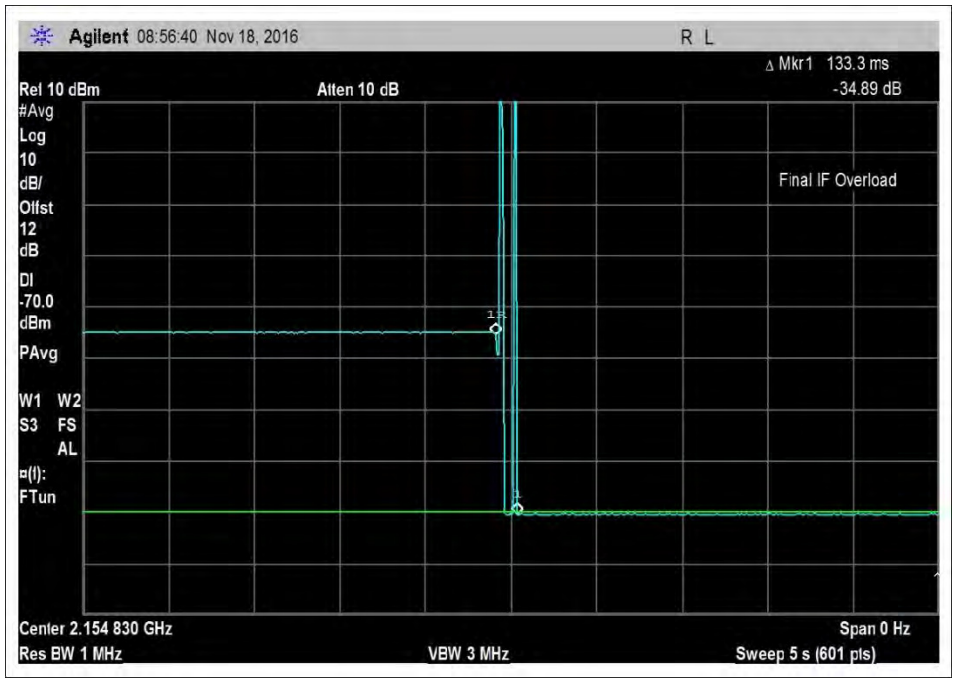
7.11_osc_DL-1930-1995MHz



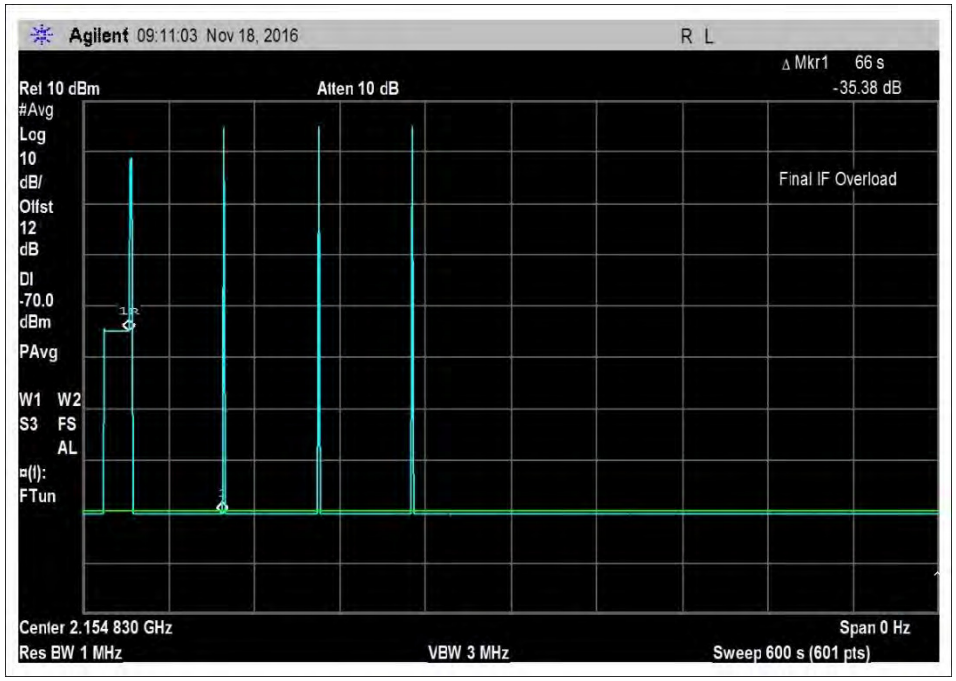
7.11_osc_DL-1930-1995MHz-600sec



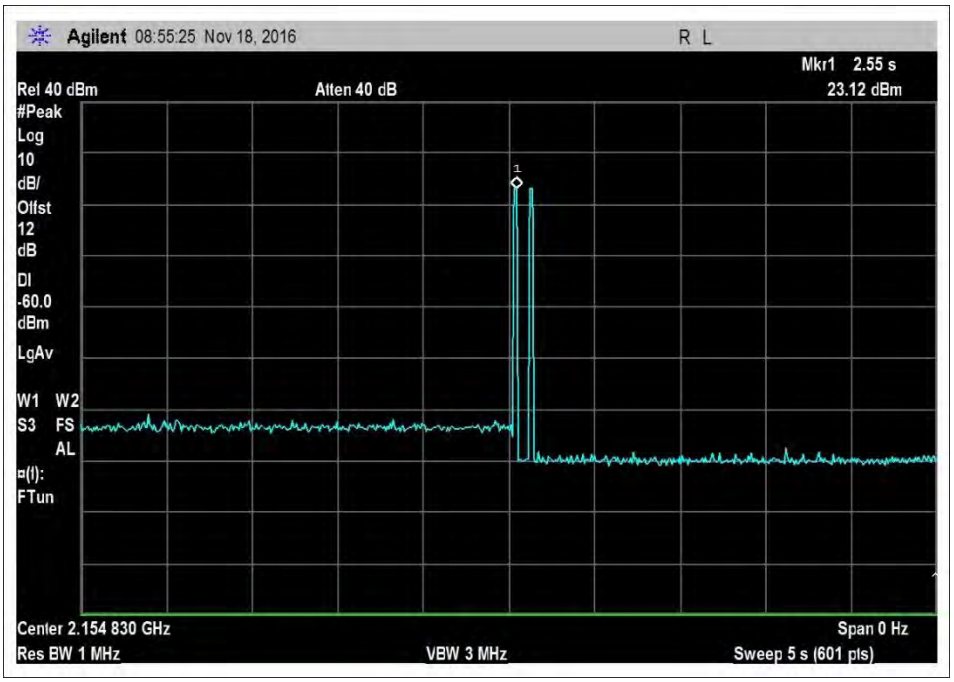
7.11_osc_DL-1930-1995MHz-Pk



7.11_osc_DL-2110-2155MHz



7.11_osc_DL-2110-2155MHz-600sec

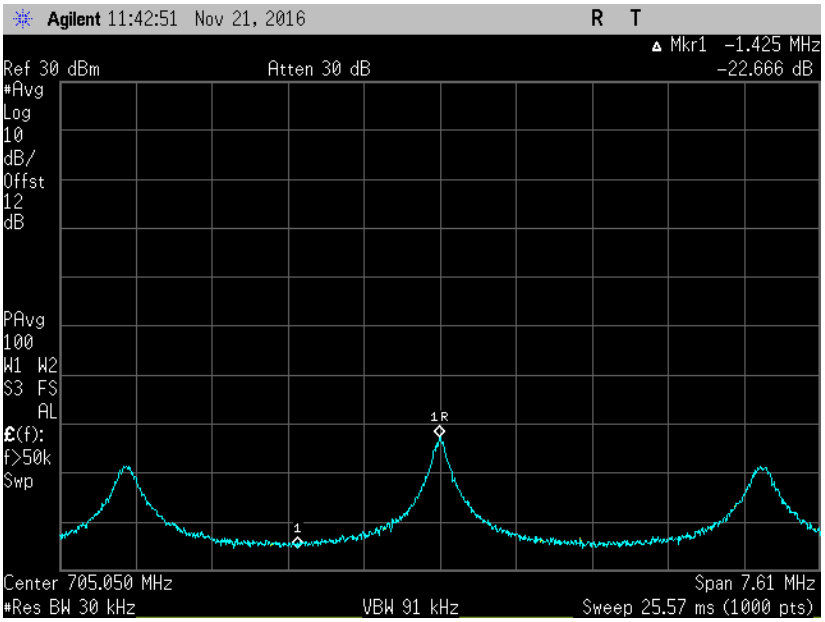


7.11_osc_DL-2110-2155MHz-Pk

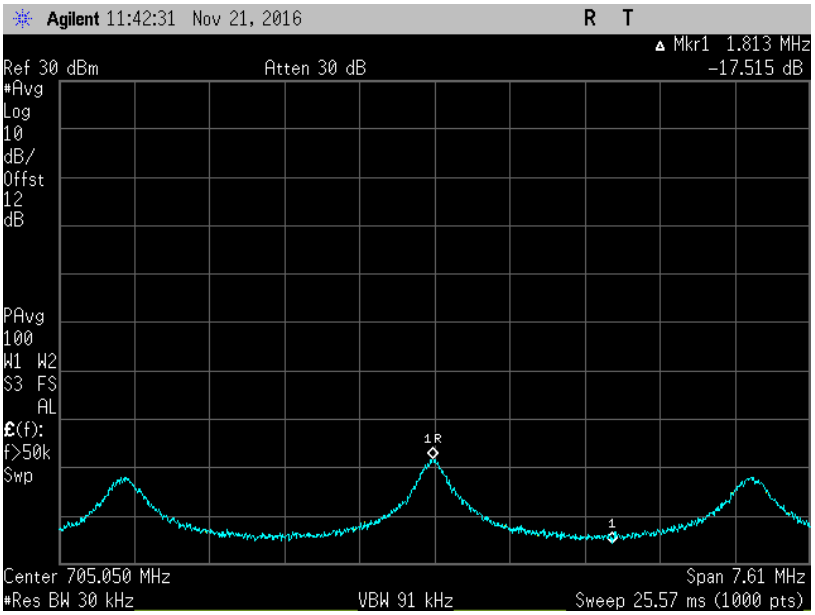
7.11.3 Measuring Oscillation Mitigation or Shutdown

Plots

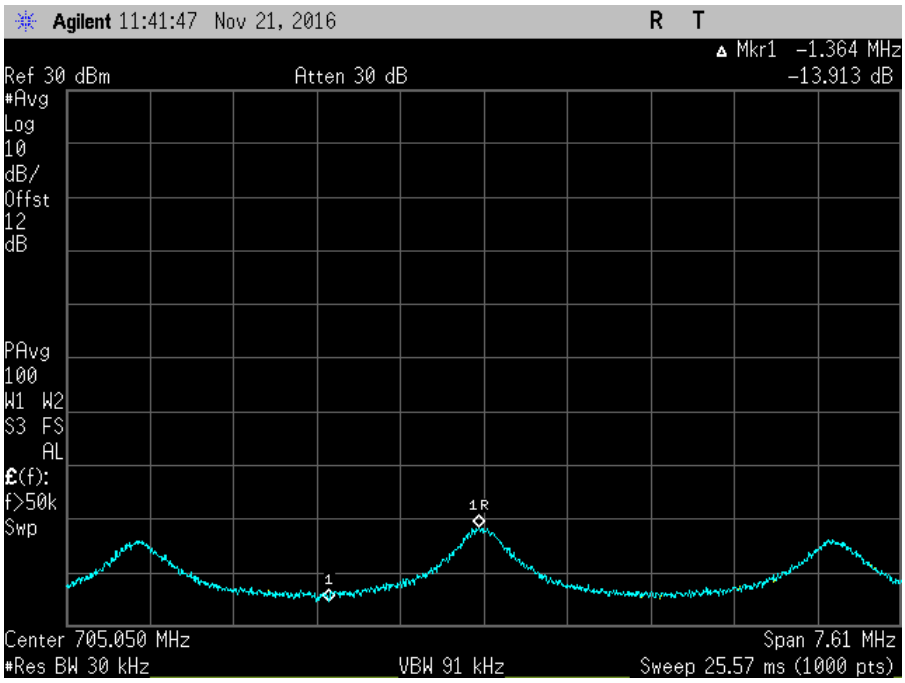
AWGNR, UL



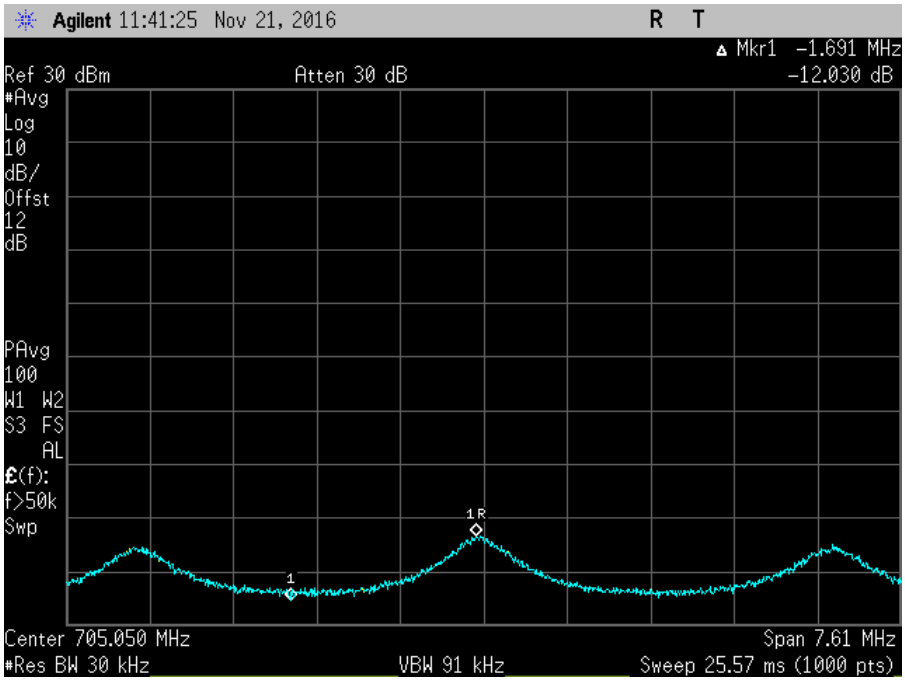
7.11.3_Osc_UL_698-716MHz+0_AWGNR



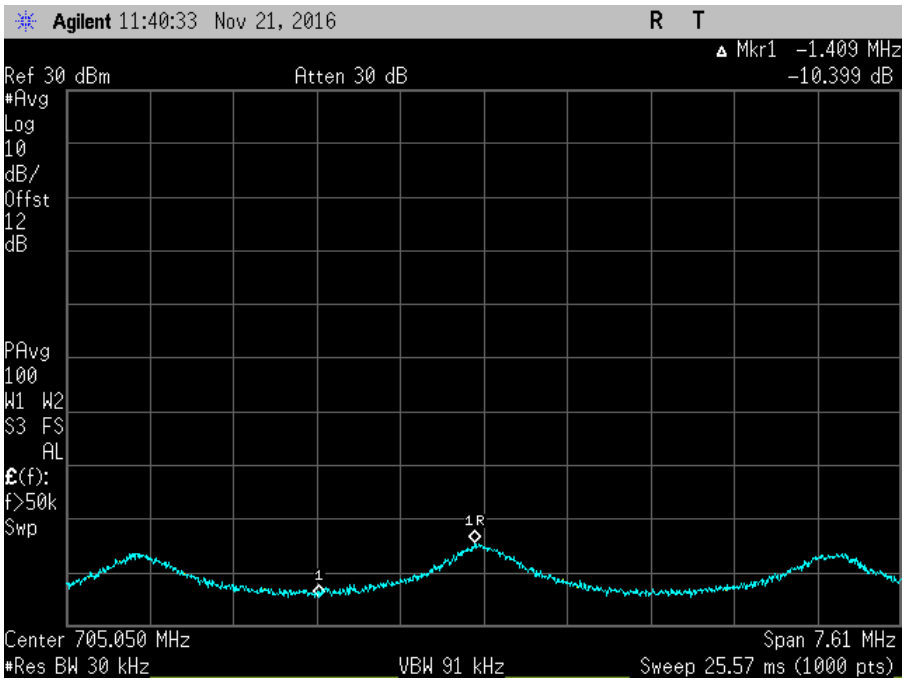
7.11.3_Osc_UL_698-716MHz+1_AWGNR



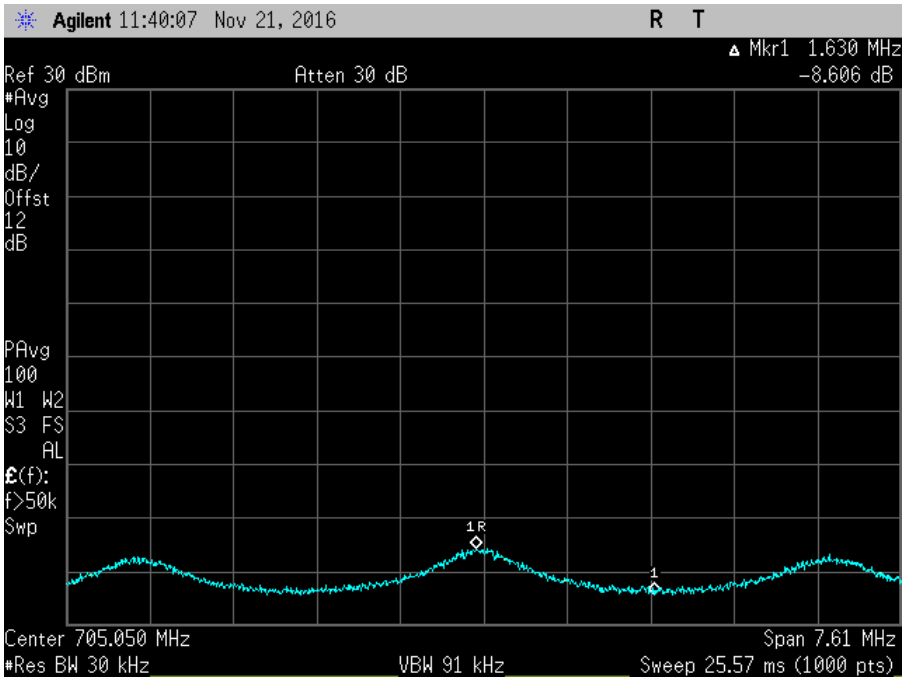
7.11.3_Osc_UL_698-716MHz+2_AWGNR



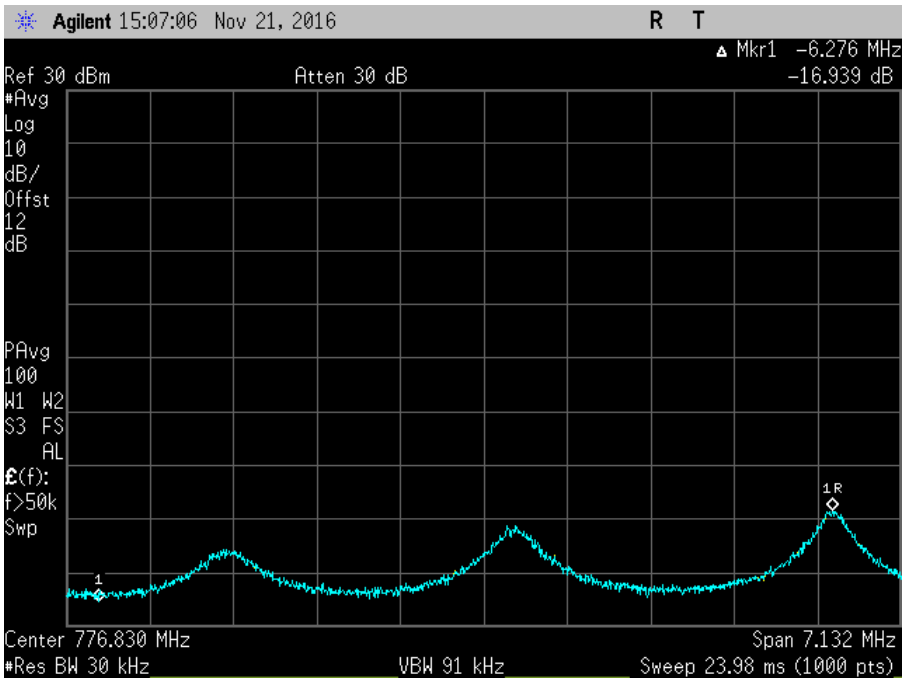
7.11.3_Osc_UL_698-716MHz+3_AWGNR



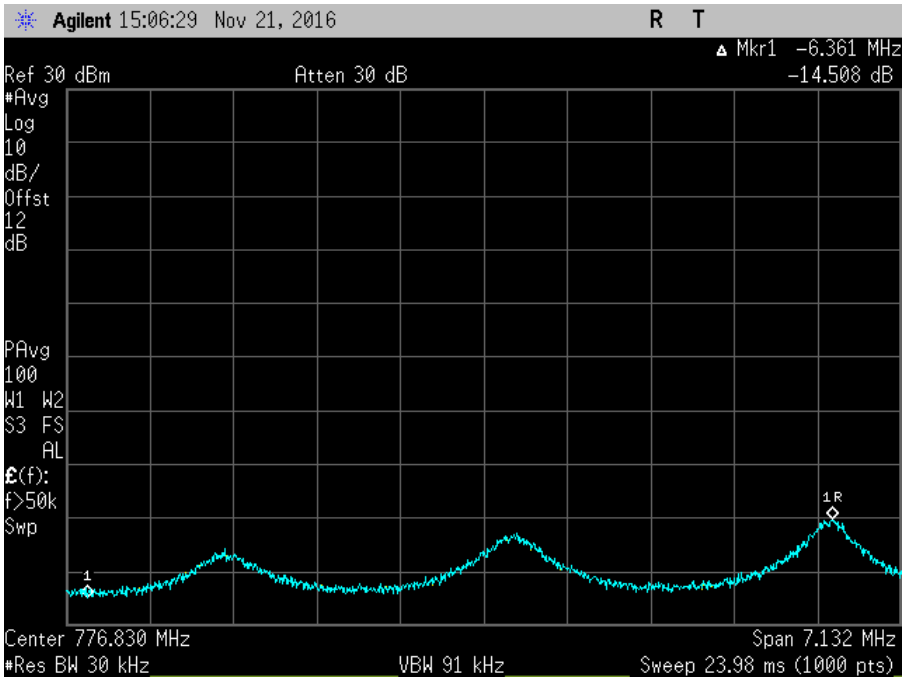
7.11.3_Osc_UL_698-716MHz+4_AWGNR



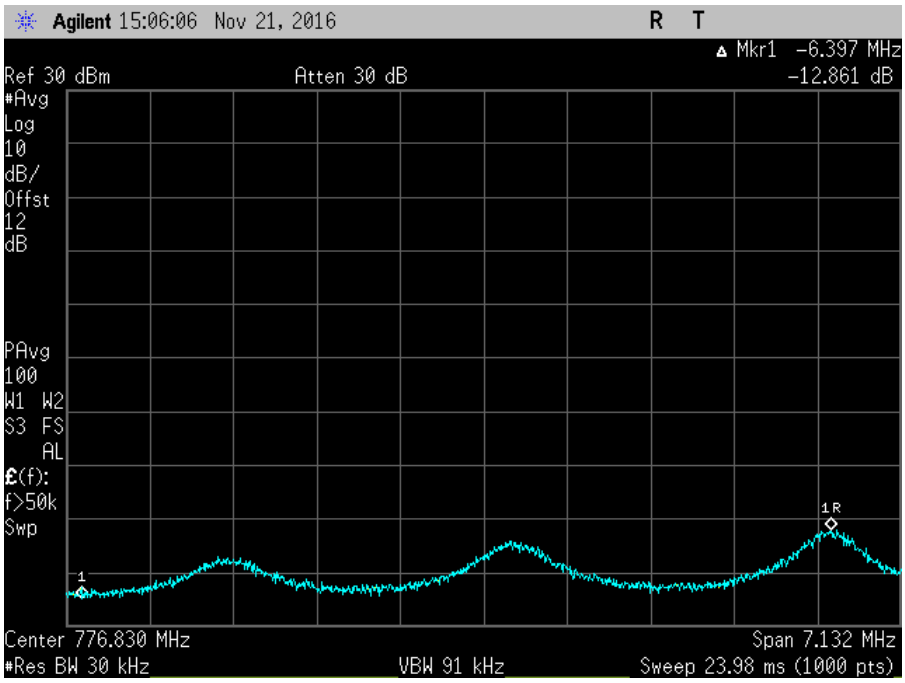
7.11.3_Osc_UL_698-716MHz+5_AWGNR



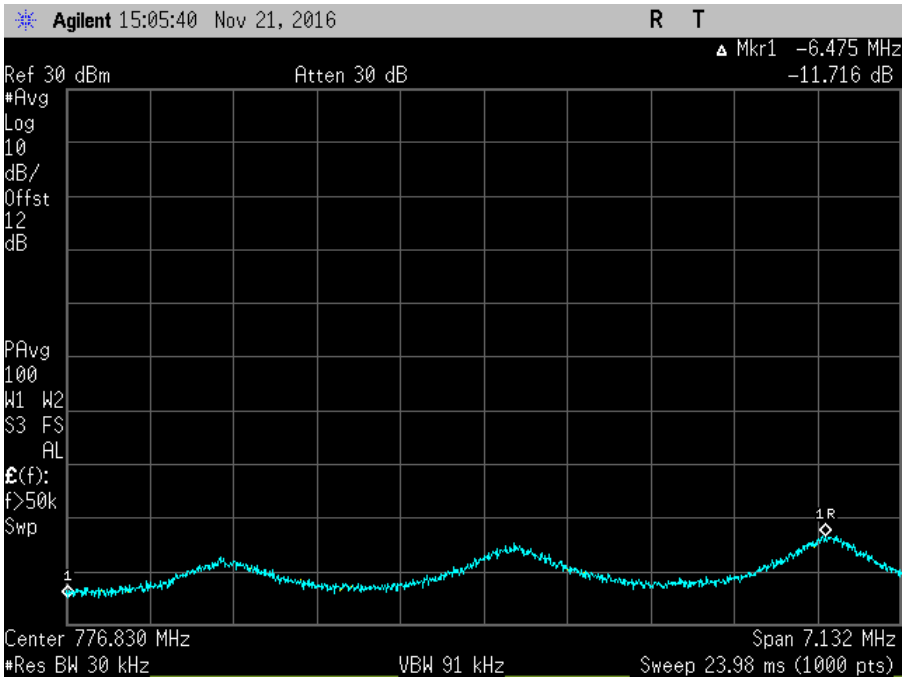
7.11.3_Osc_UL_776-787MHz+0_AWGNR



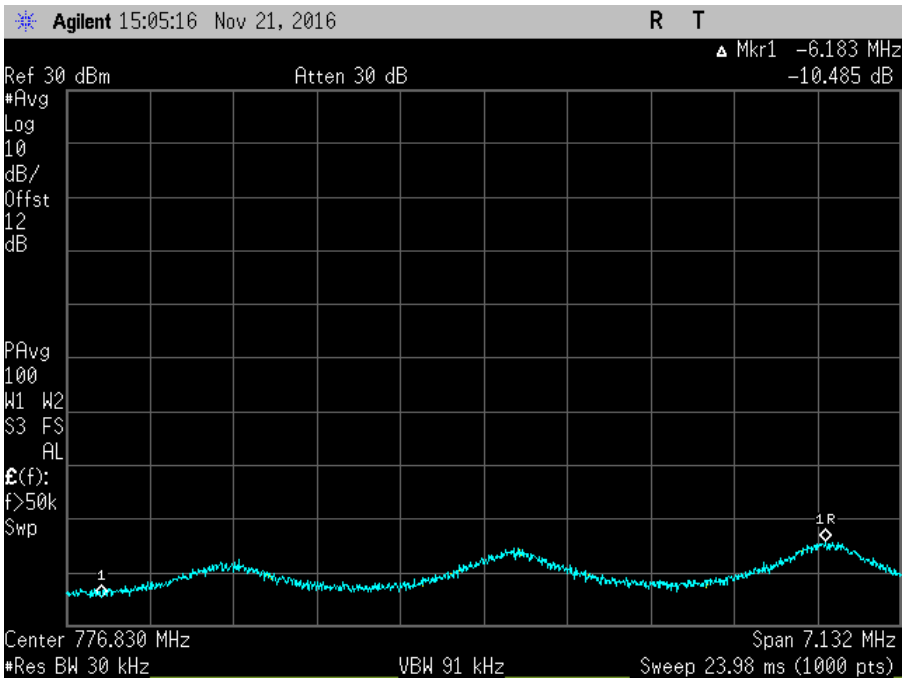
7.11.3_Osc_UL_776-787MHz+1_AWGNR



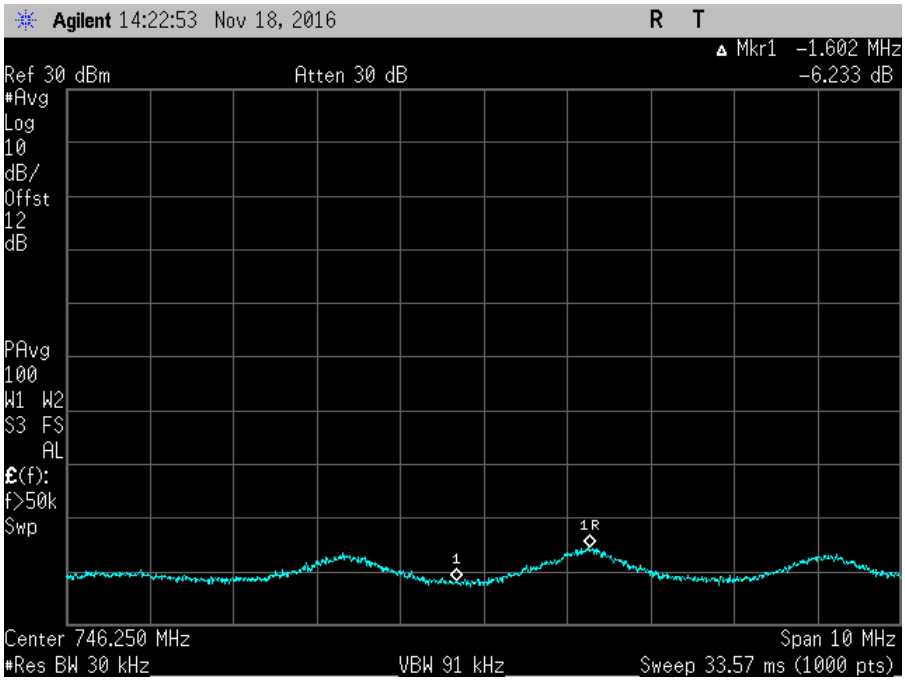
7.11.3_Osc_UL_776-787MHz+2_AWGNR



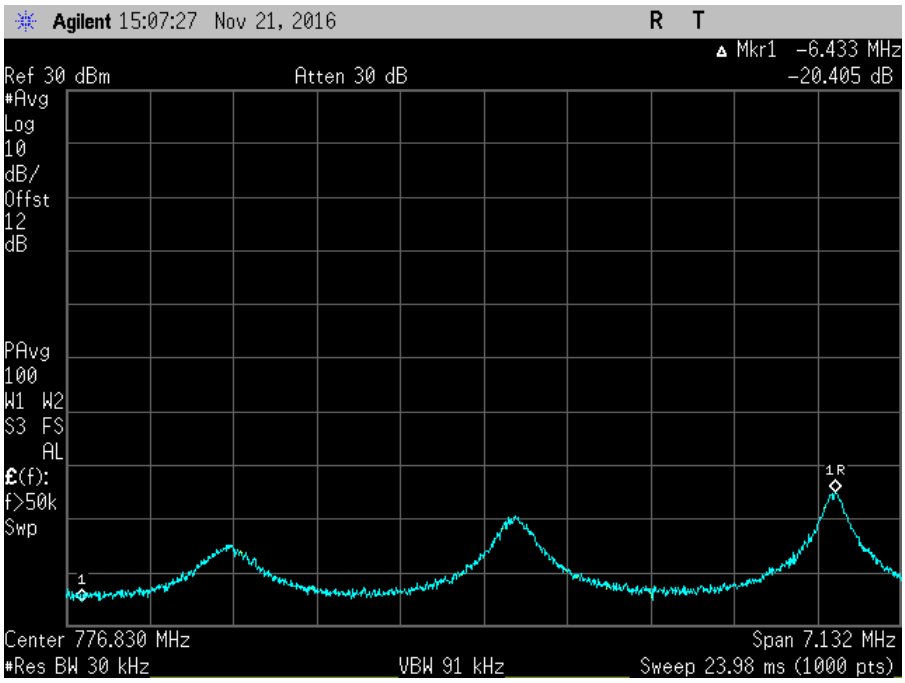
7.11.3_Osc_UL_776-787MHz+3_AWGNR



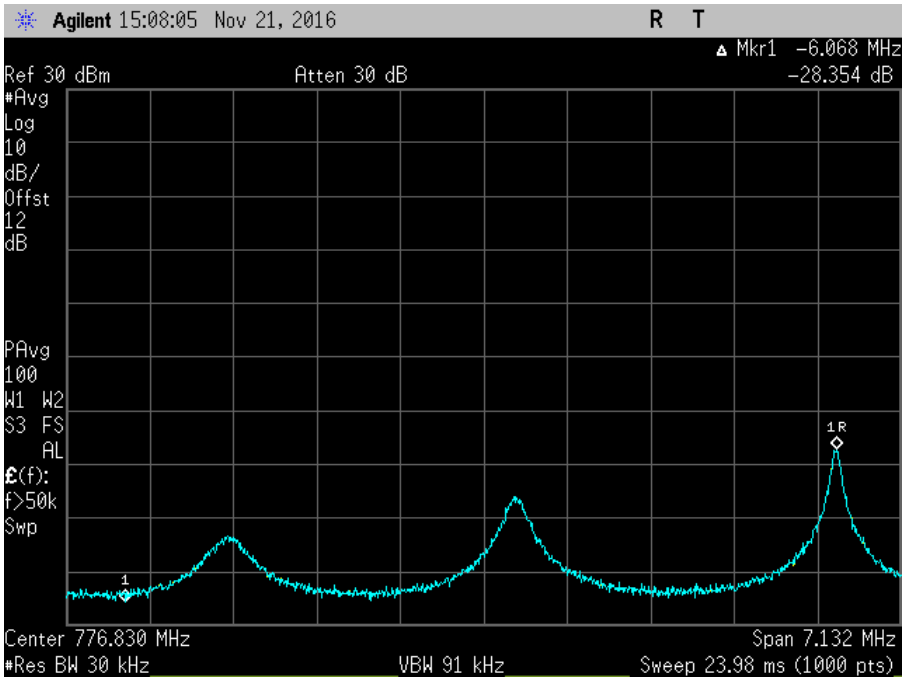
7.11.3_Osc_UL_776-787MHz+4_AWGNR



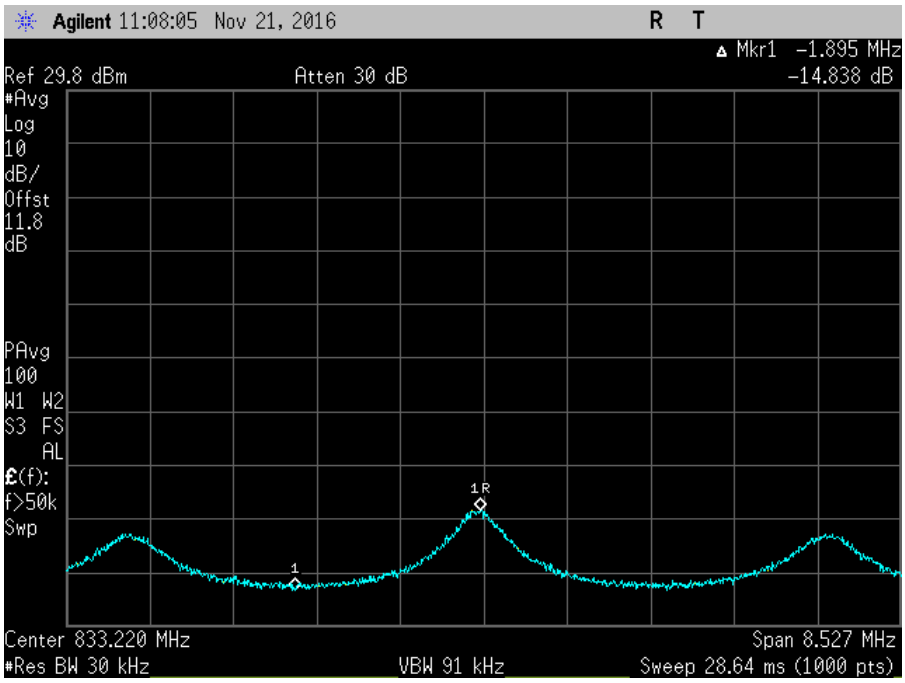
7.11.3_Osc_UL_776-787MHz+5_AWGNR



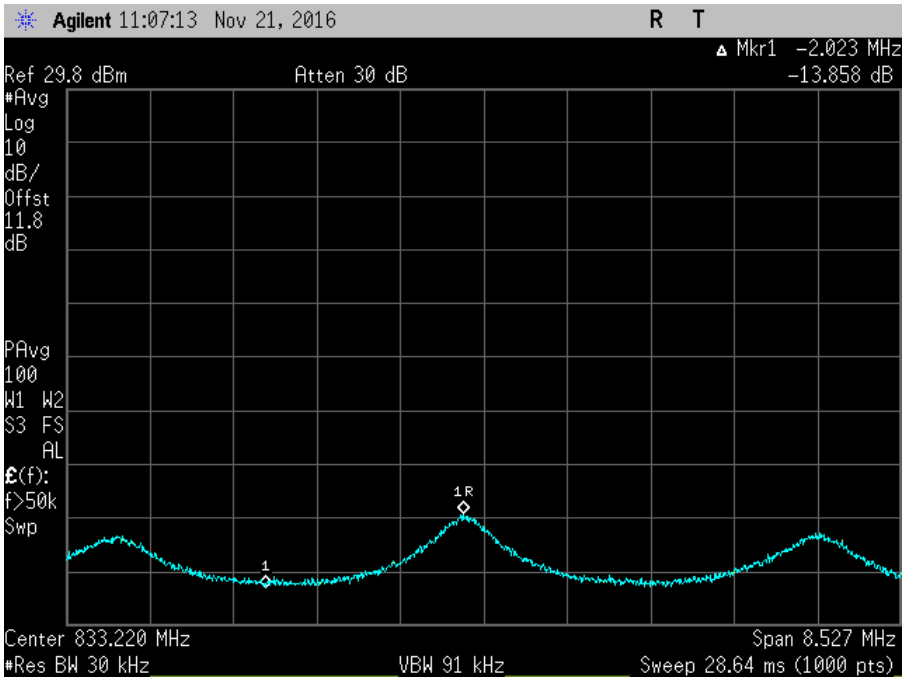
7.11.3_Osc_UL_776-787MHz-1_AWGNR



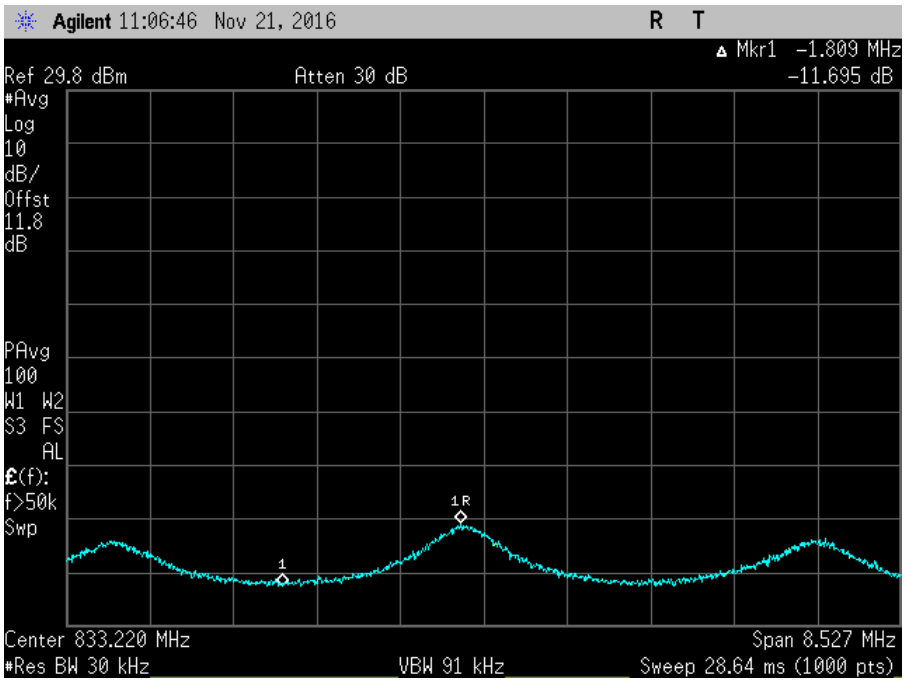
7.11.3_Osc_UL_776-787MHz-2_AWGNR



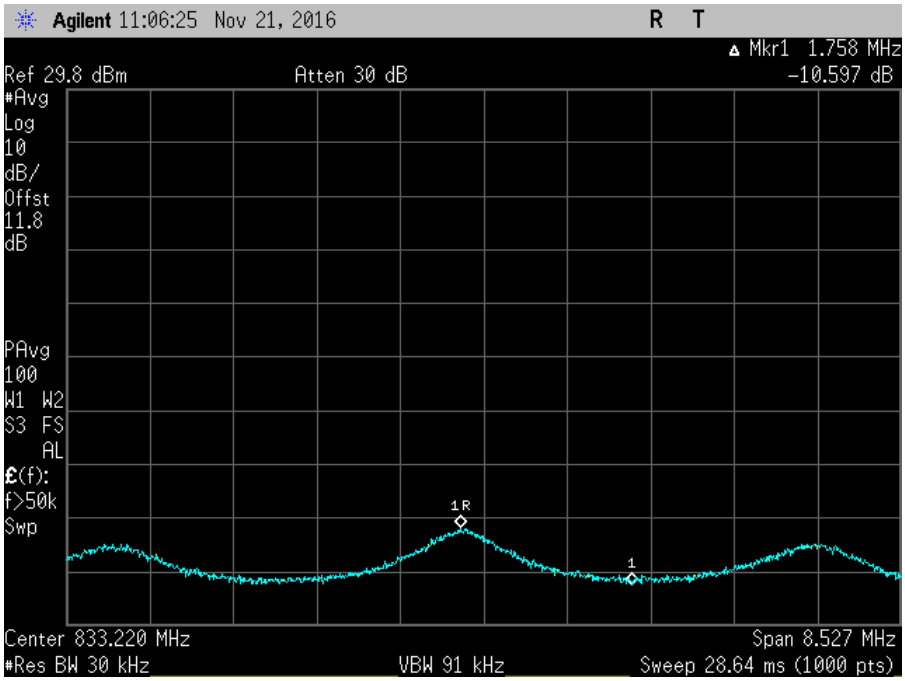
7.11.3_Osc_UL_824-849MHz+0_AWGNR



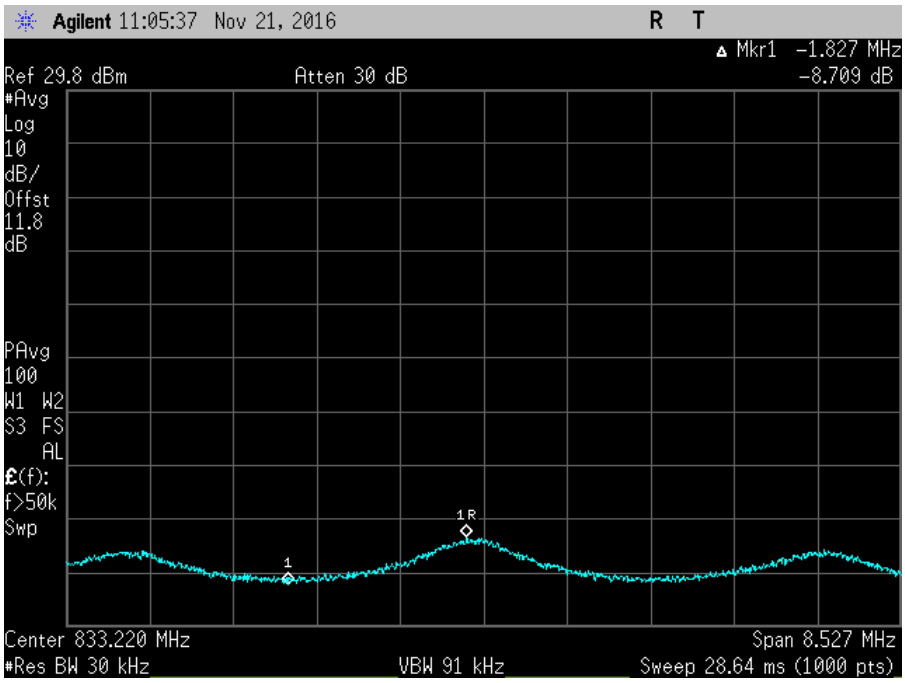
7.11.3_Osc_UL_824-849MHz+1_AWGNR



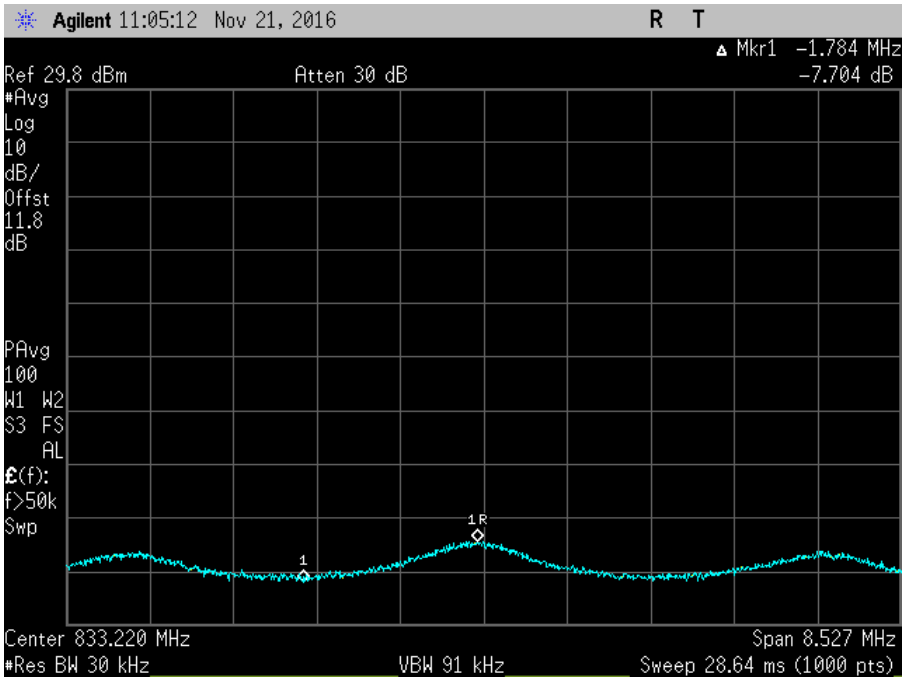
7.11.3_Osc_UL_824-849MHz+2_AWGNR



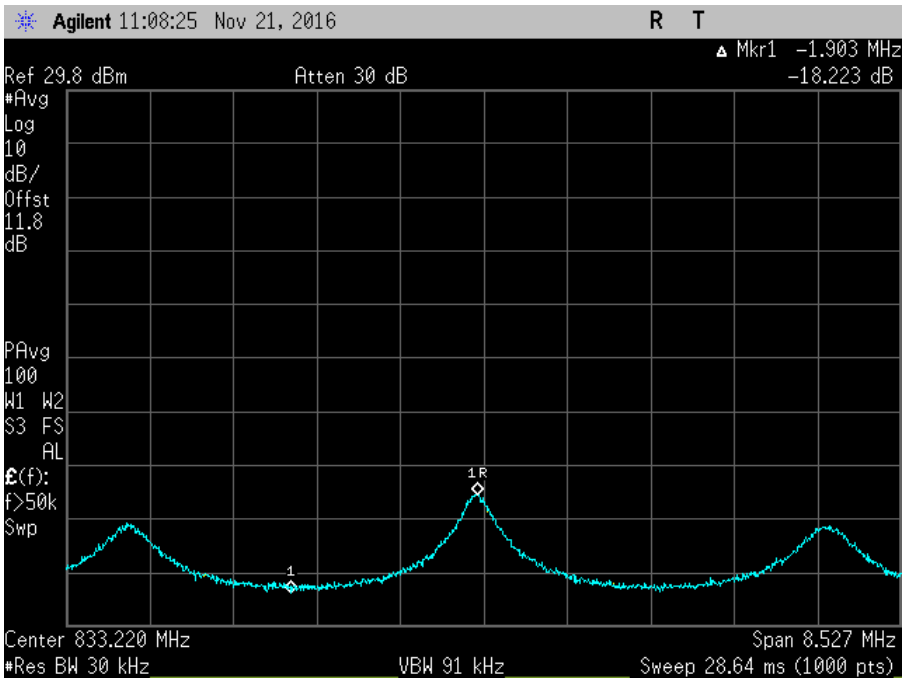
7.11.3_Osc_UL_824-849MHz+3_AWGNR



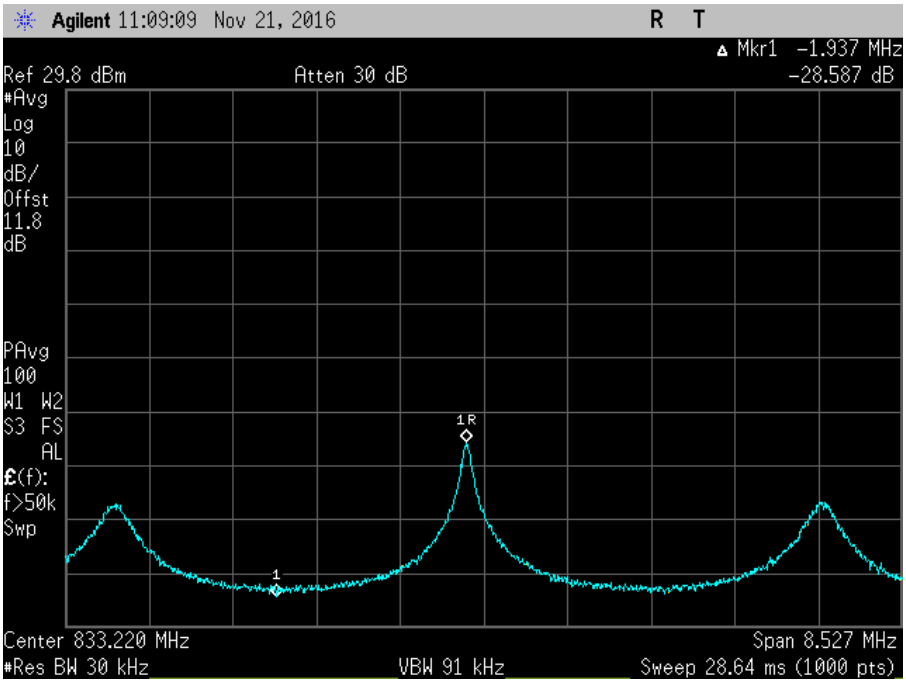
7.11.3_Osc_UL_824-849MHz+4_AWGNR



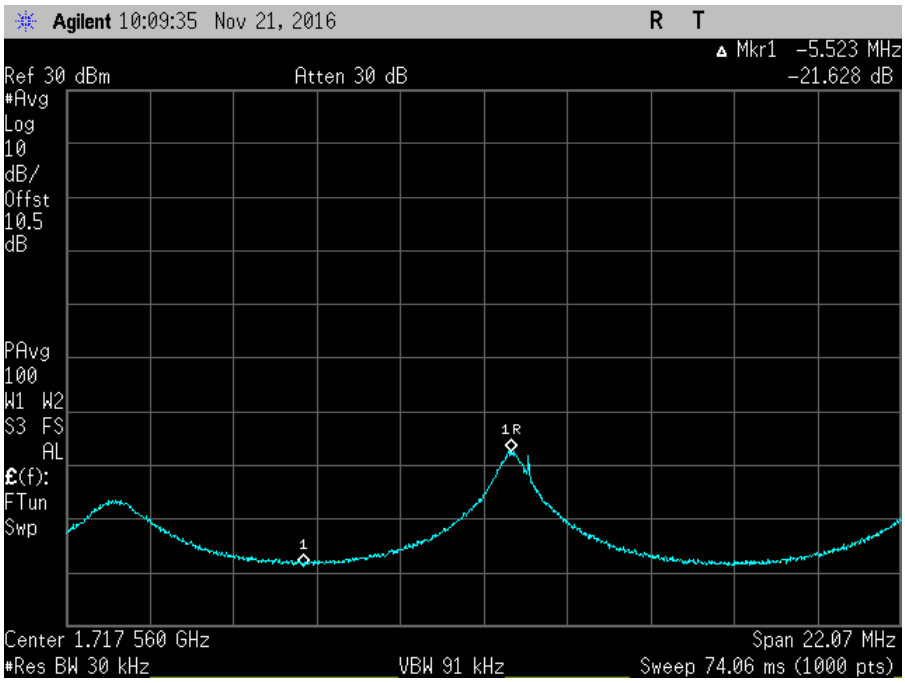
7.11.3_Osc_UL_824-849MHz+5_AWGNR



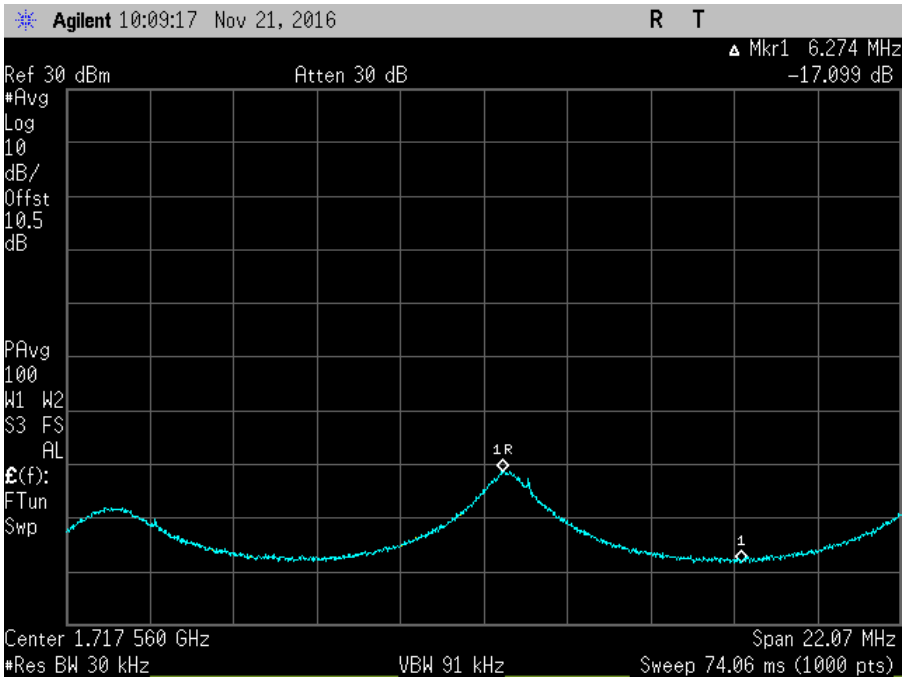
7.11.3_Osc_UL_824-849MHz-1_AWGNR



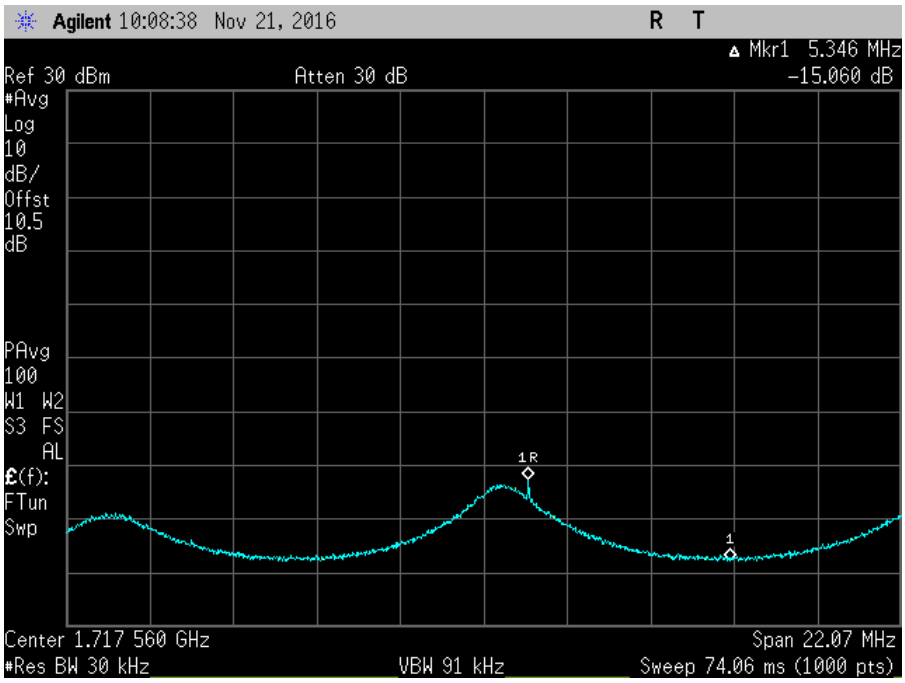
7.11.3_Osc_UL_824-849MHz-2_AWGNR



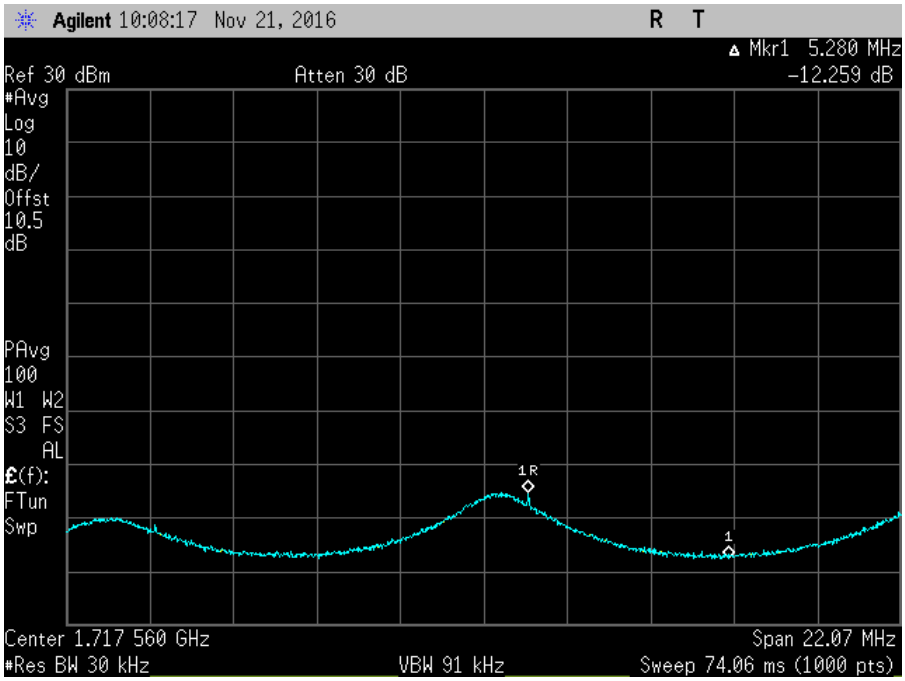
7.11.3_Osc_UL_1710-1755MHz+0_AWGNR



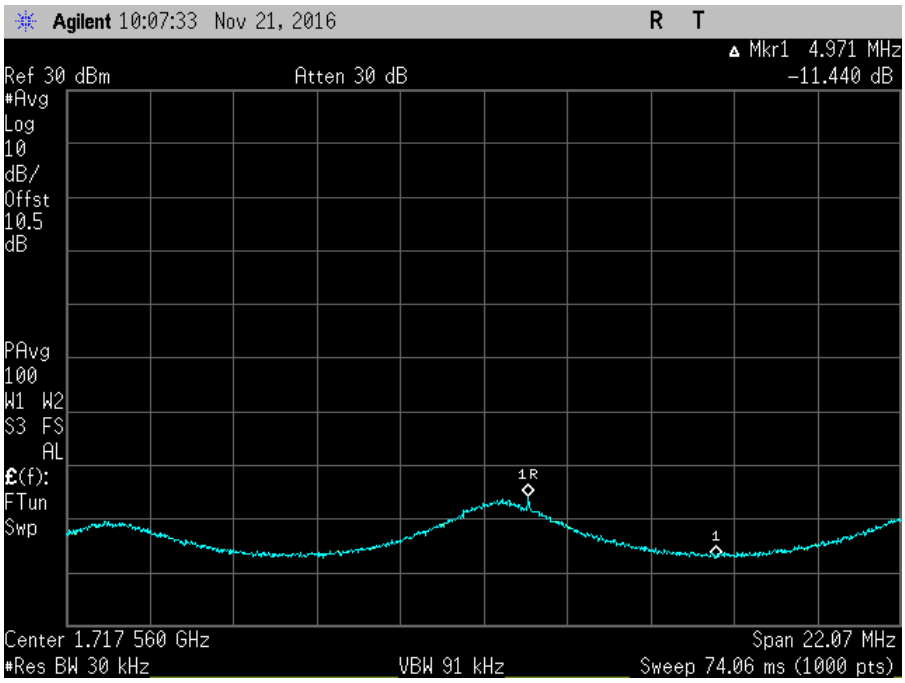
7.11.3_Osc_UL_1710-1755MHz+1_AWGNR



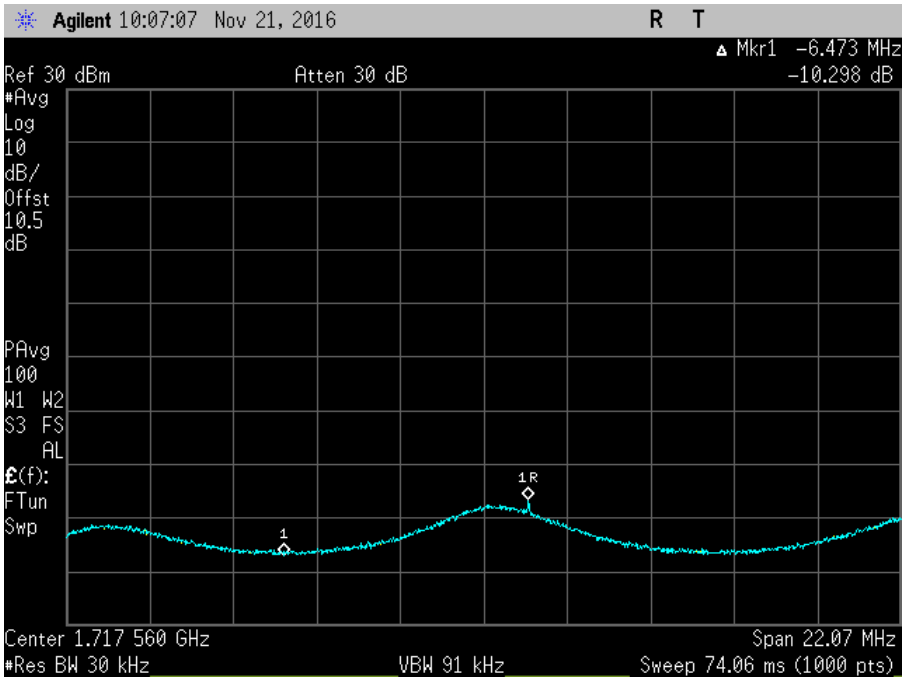
7.11.3_Osc_UL_1710-1755MHz+2_AWGNR



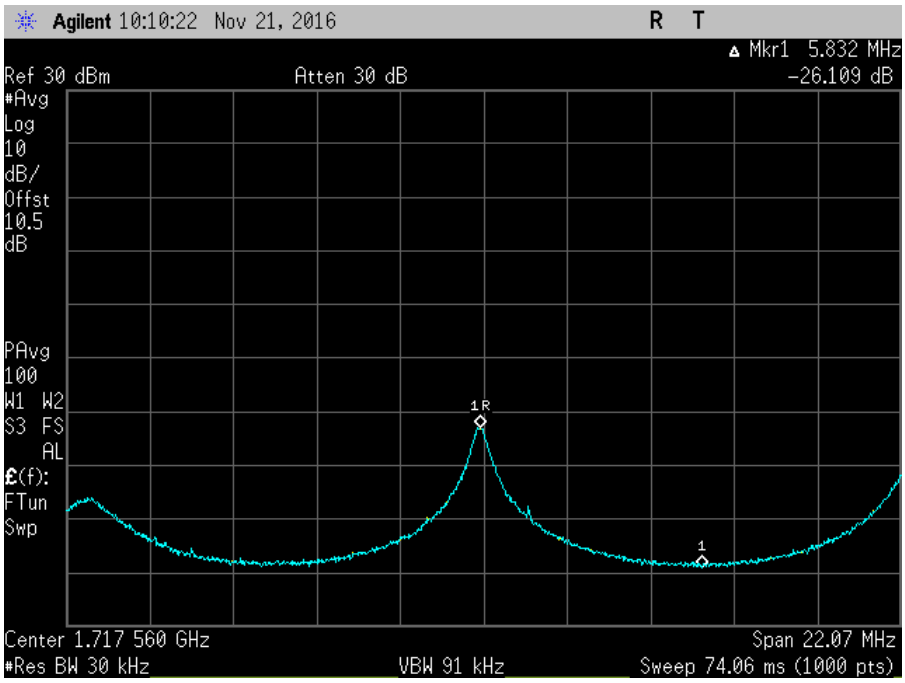
7.11.3_Osc_UL_1710-1755MHz+3_AWGNR



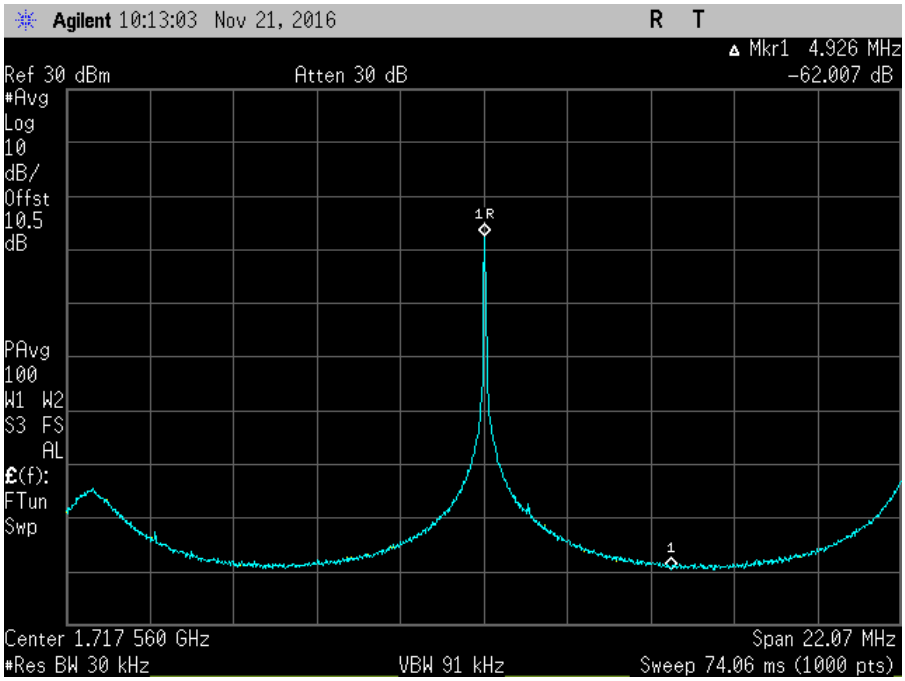
7.11.3_Osc_UL_1710-1755MHz+4_AWGNR



7.11.3_Osc_UL_1710-1755MHz+5_AWGNR

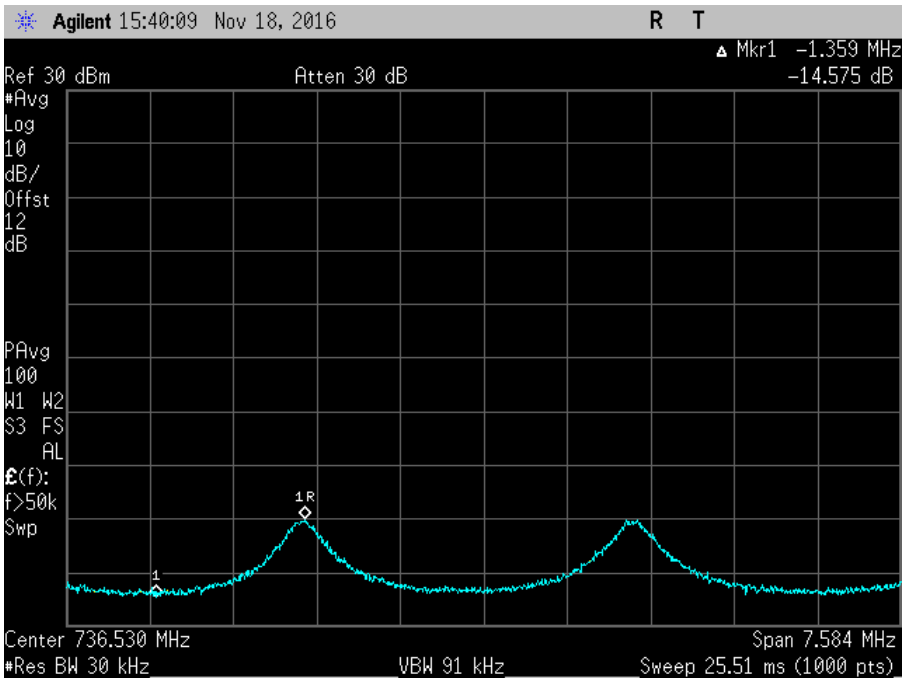


7.11.3_Osc_UL_1710-1755MHz-1_AWGNR

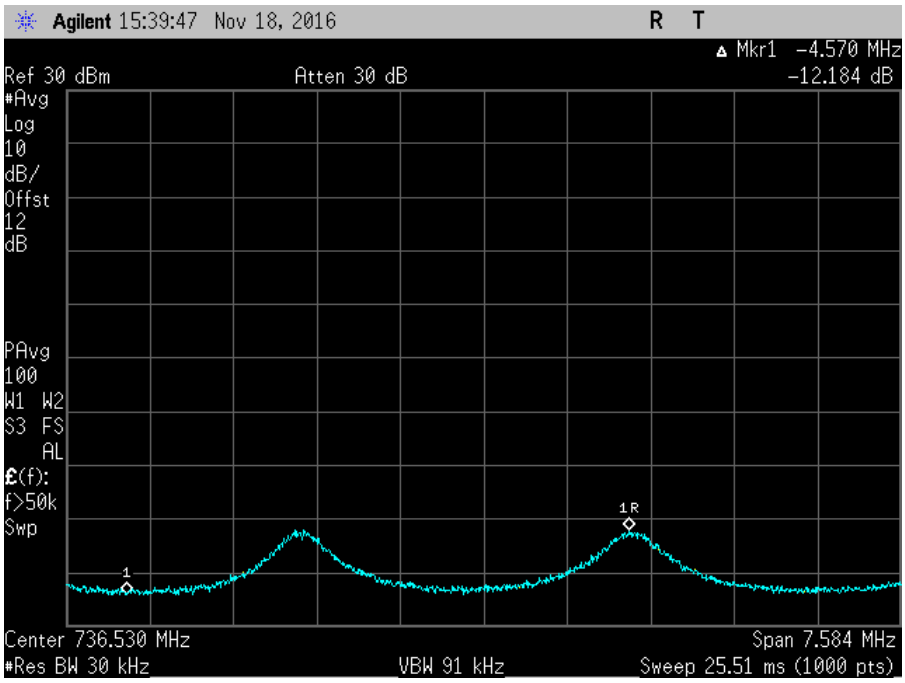


7.11.3_Osc_UL_1710-1755MHz-2_AWGNR

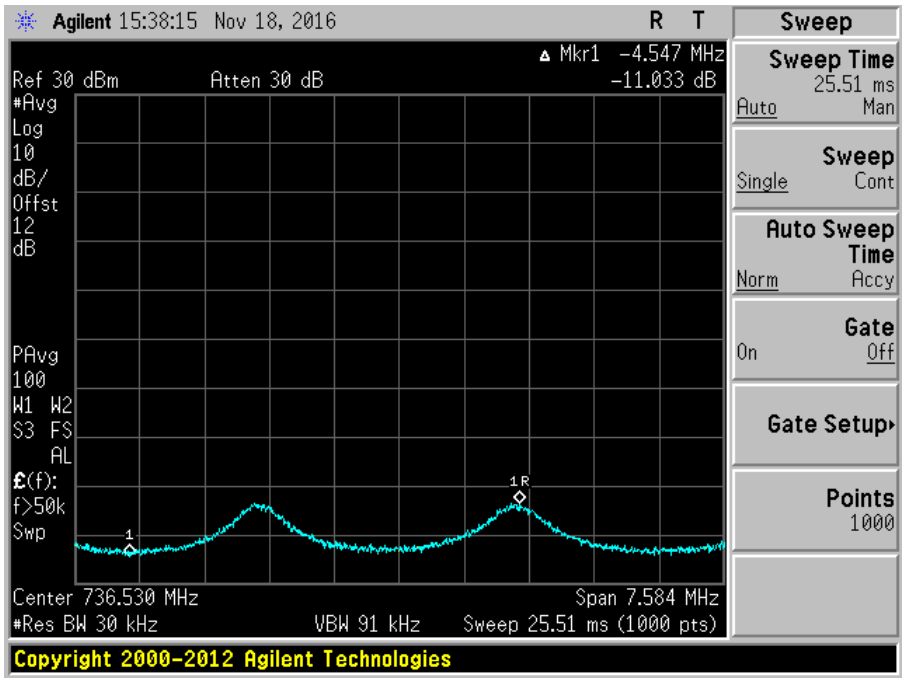
AWGNR, DL



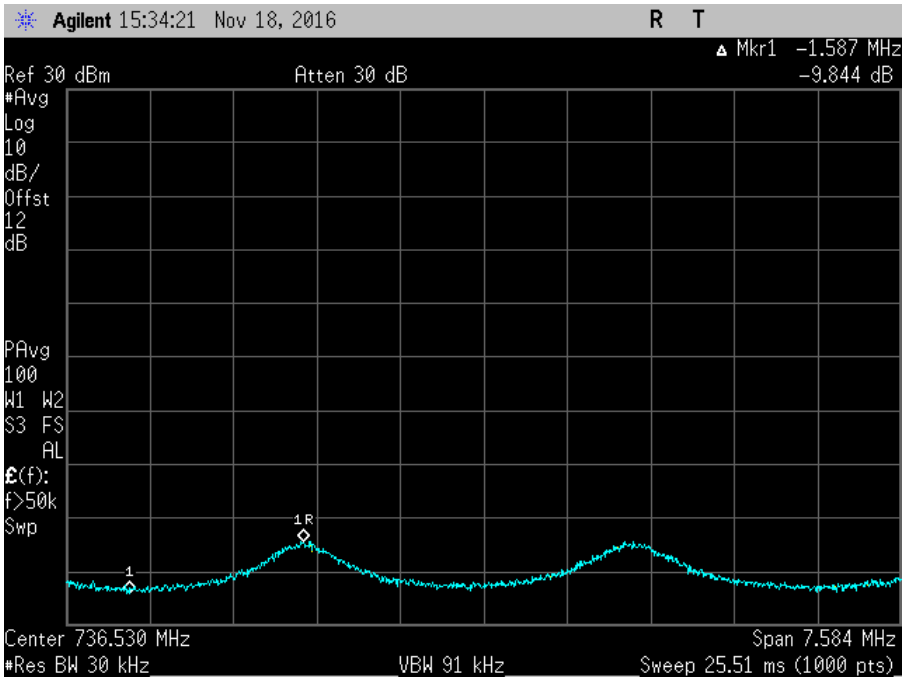
7.11.3_Osc_DL_728-746MHz+0_AWGNR



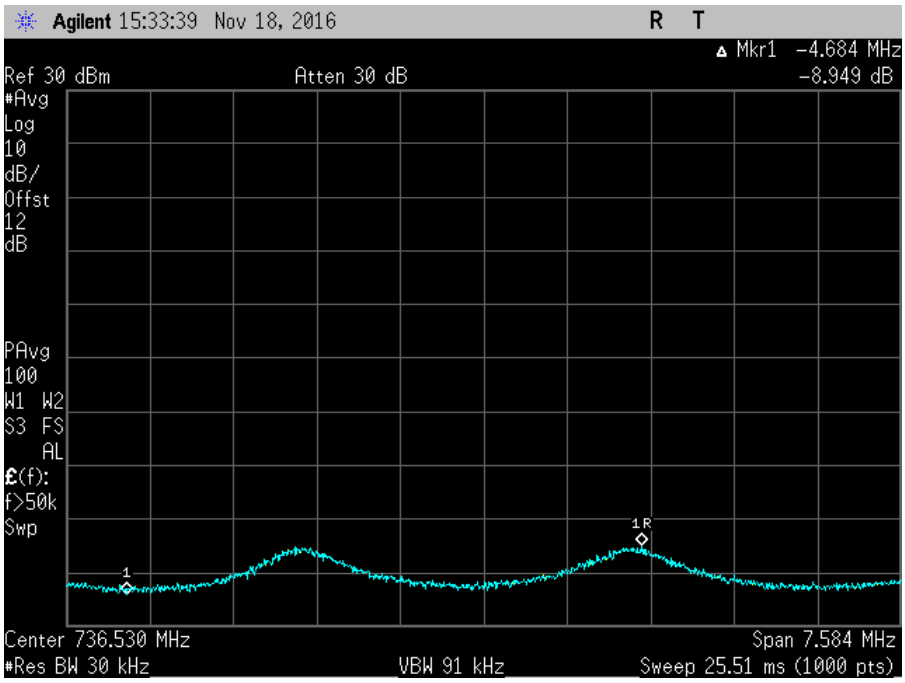
7.11.3_Osc_DL_728-746MHz+1_AWGNR



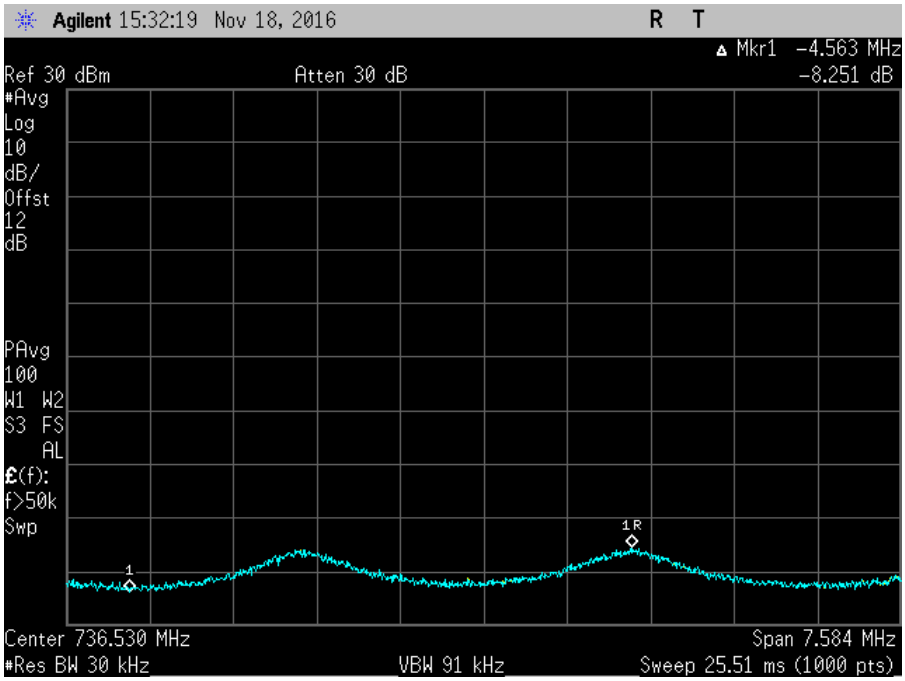
7.11.3_Osc_DL_728-746MHz+2_AWGNR



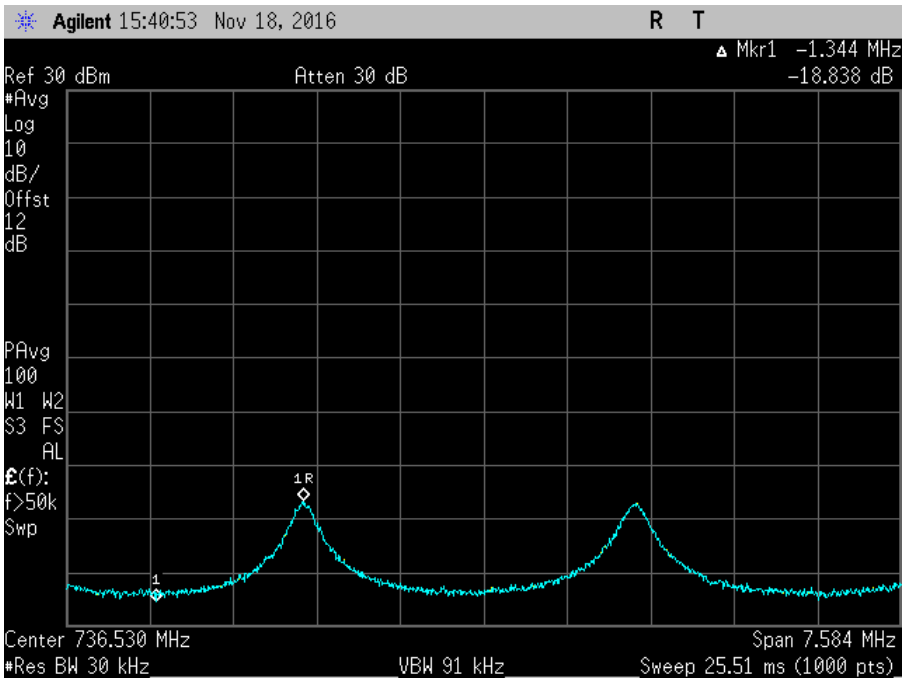
7.11.3_Osc_DL_728-746MHz+3_AWGNR



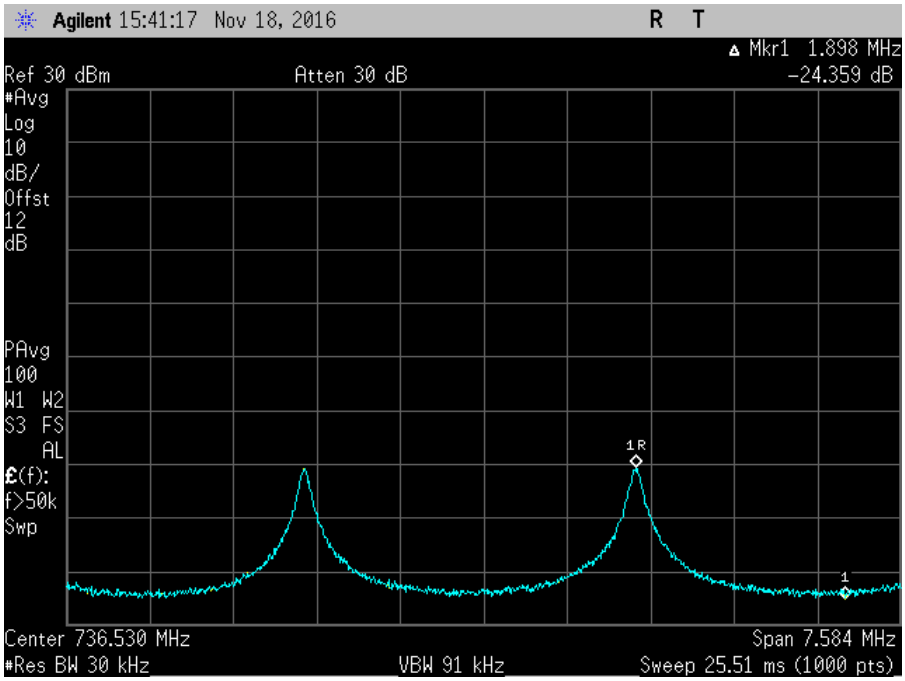
7.11.3_Osc_DL_728-746MHz+4_AWGNR



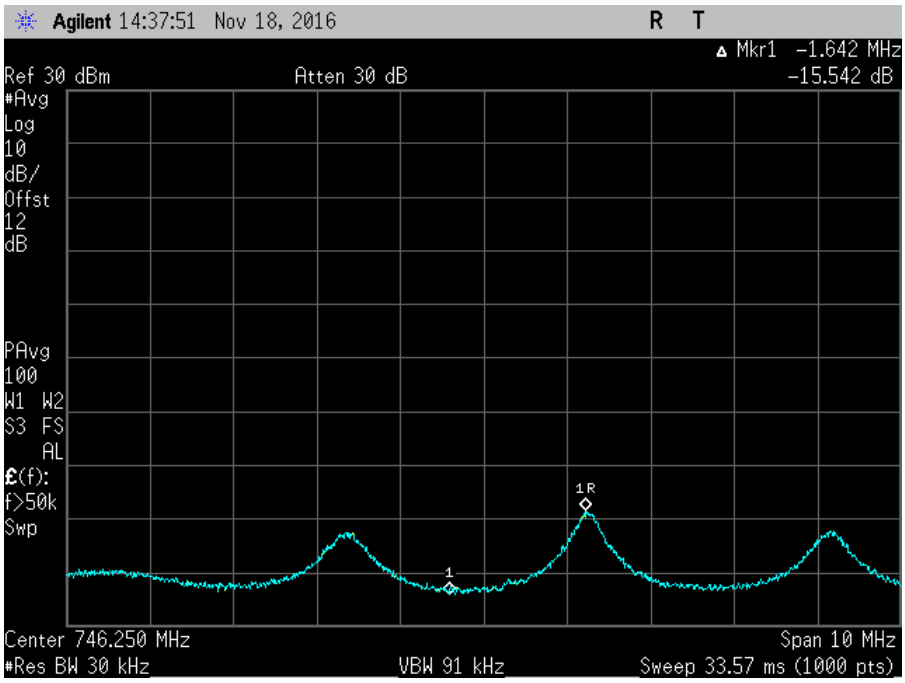
7.11.3_Osc_DL_728-746MHz+5_AWGNR



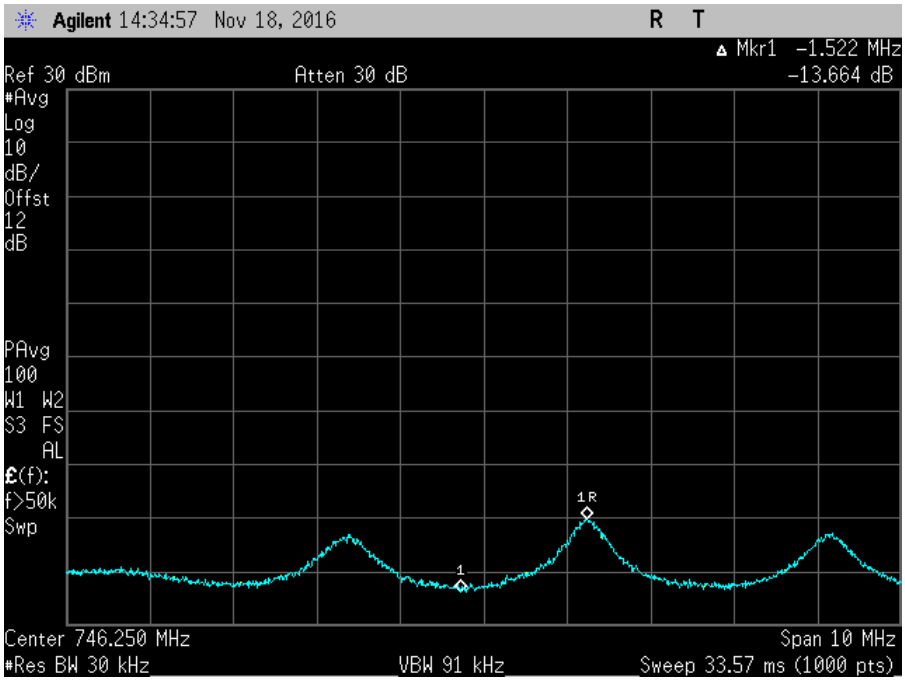
7.11.3_Osc_DL_728-746MHz-1_AWGNR



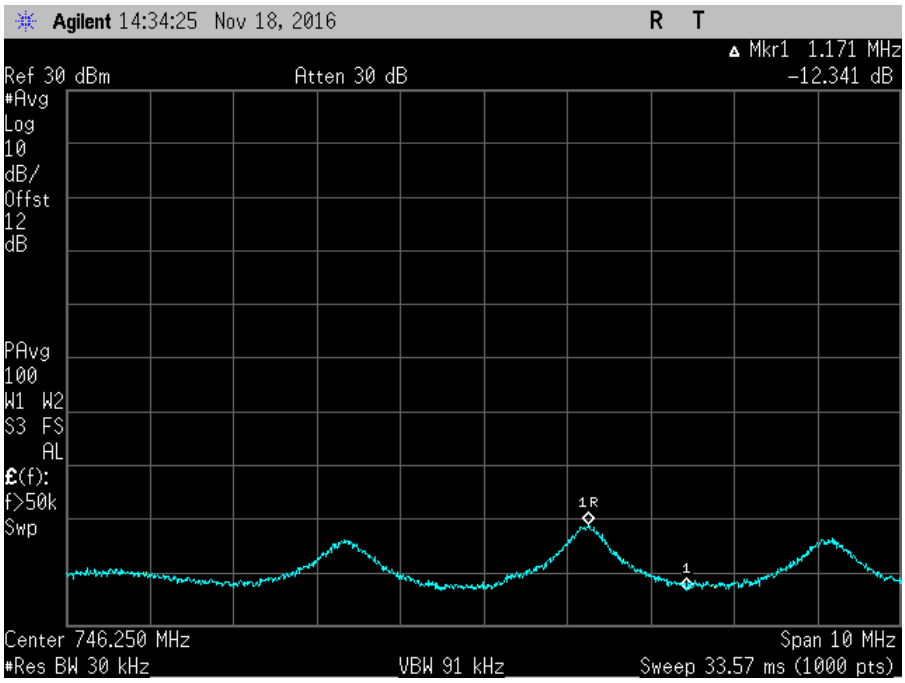
7.11.3_Osc_DL_728-746MHz-2_AWGNR



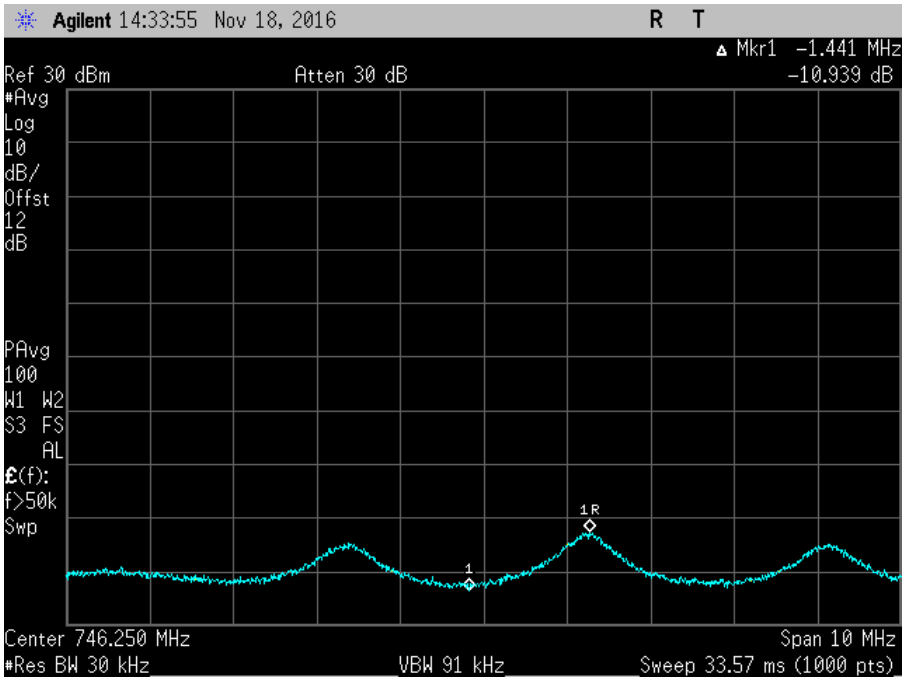
7.11.3_Osc_DL_746-757MHz+0_AWGNR



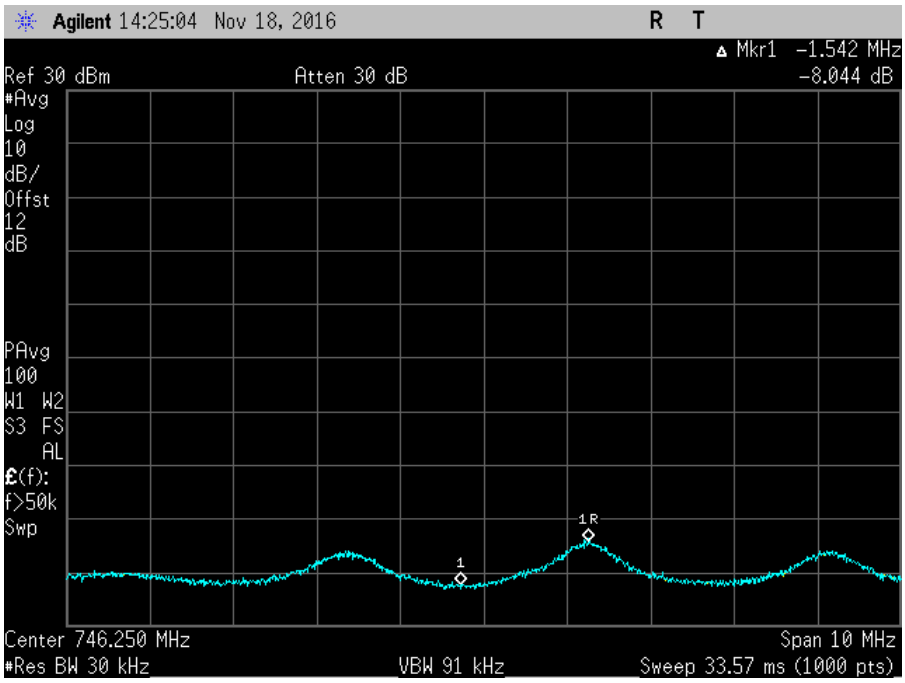
7.11.3_Osc_DL_746-757MHz+1_AWGNR



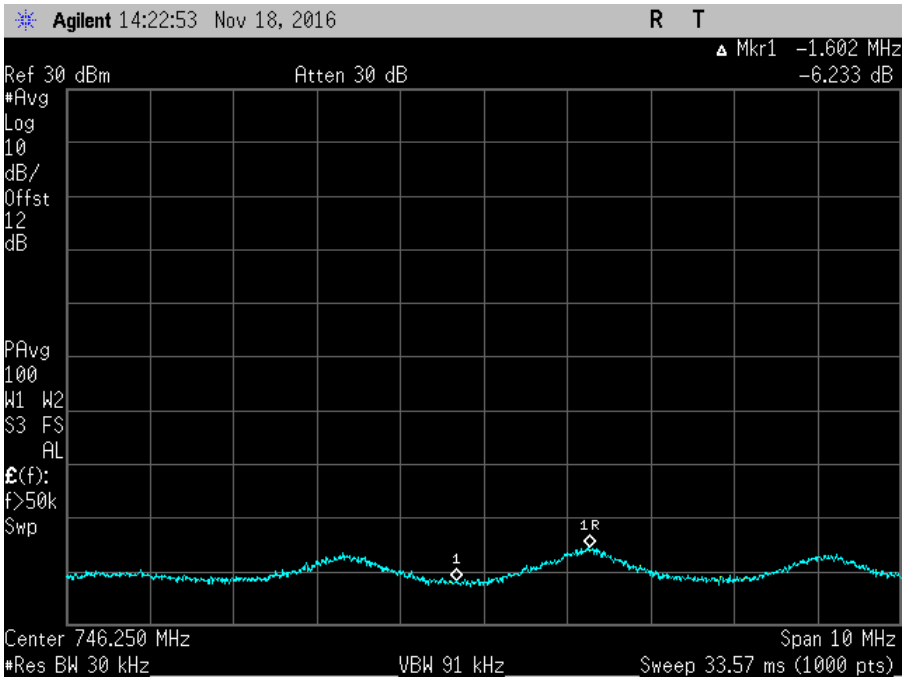
7.11.3_Osc_DL_746-757MHz+2_AWGNR



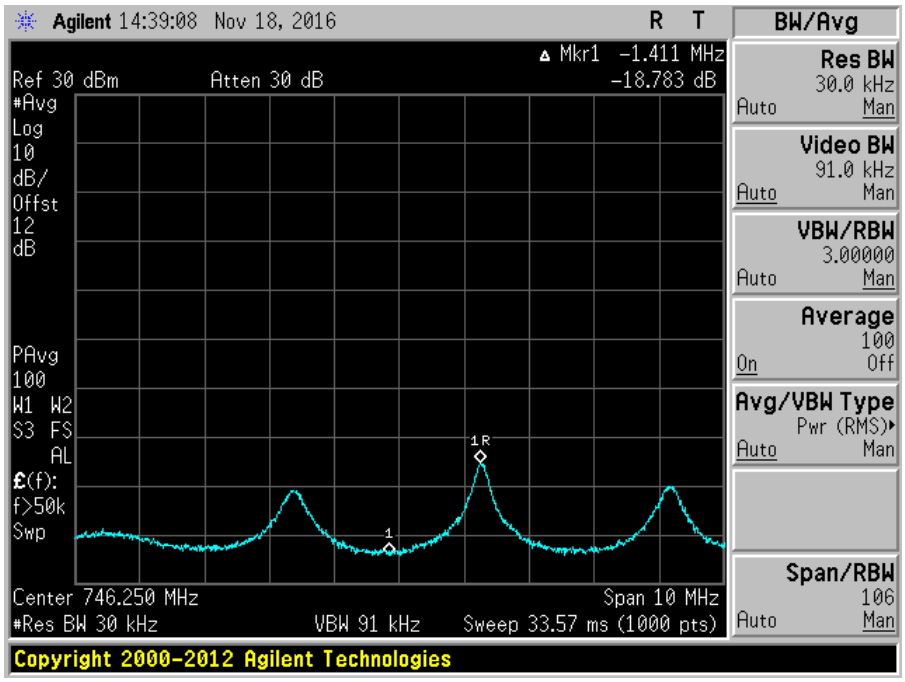
7.11.3_Osc_DL_746-757MHz+3_AWGNR



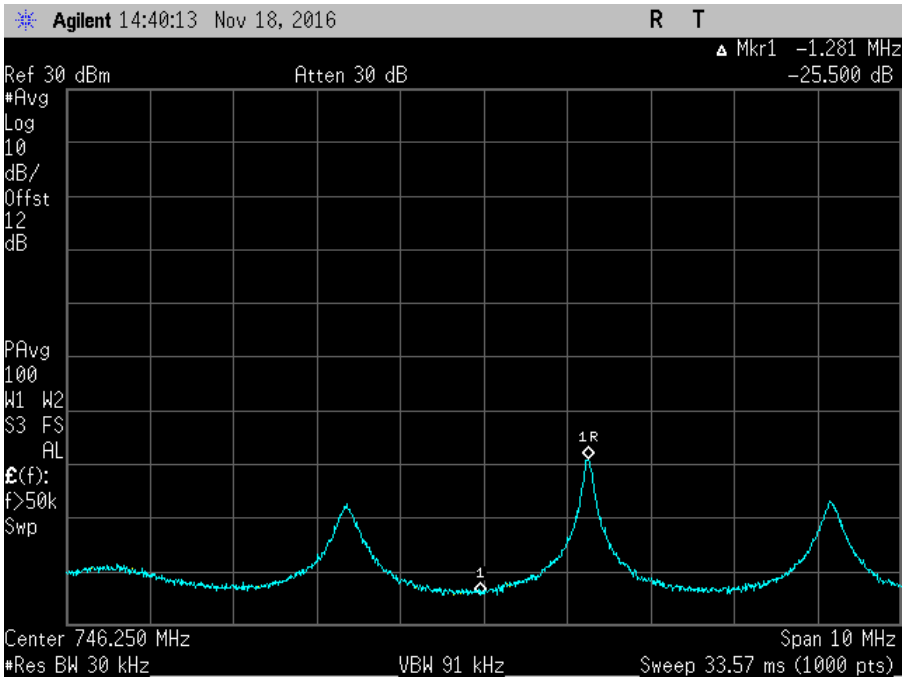
7.11.3_Osc_DL_746-757MHz+4_AWGNR



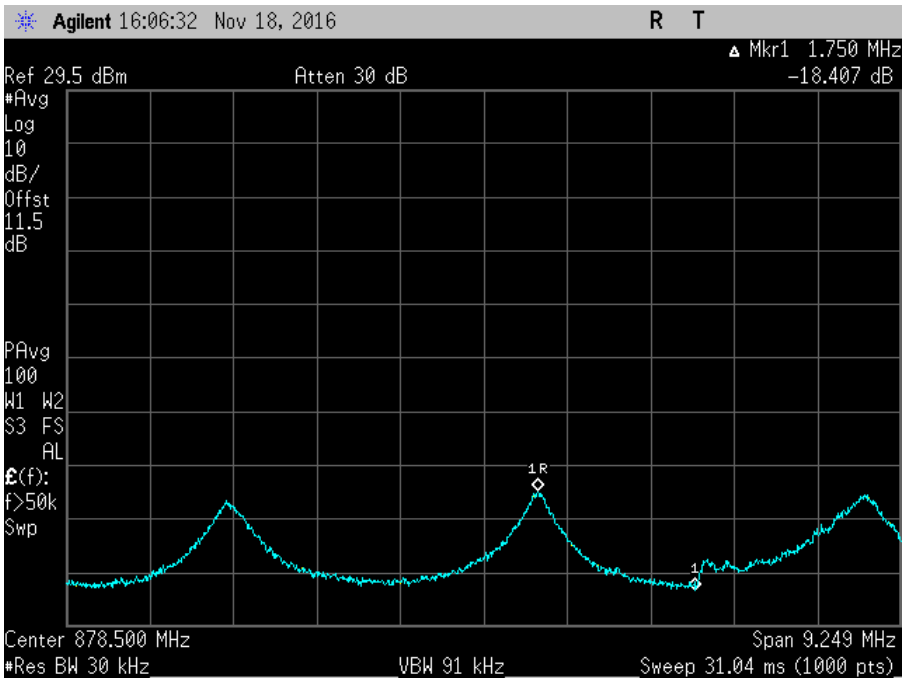
7.11.3_Osc_DL_746-757MHz+5_AWGNR



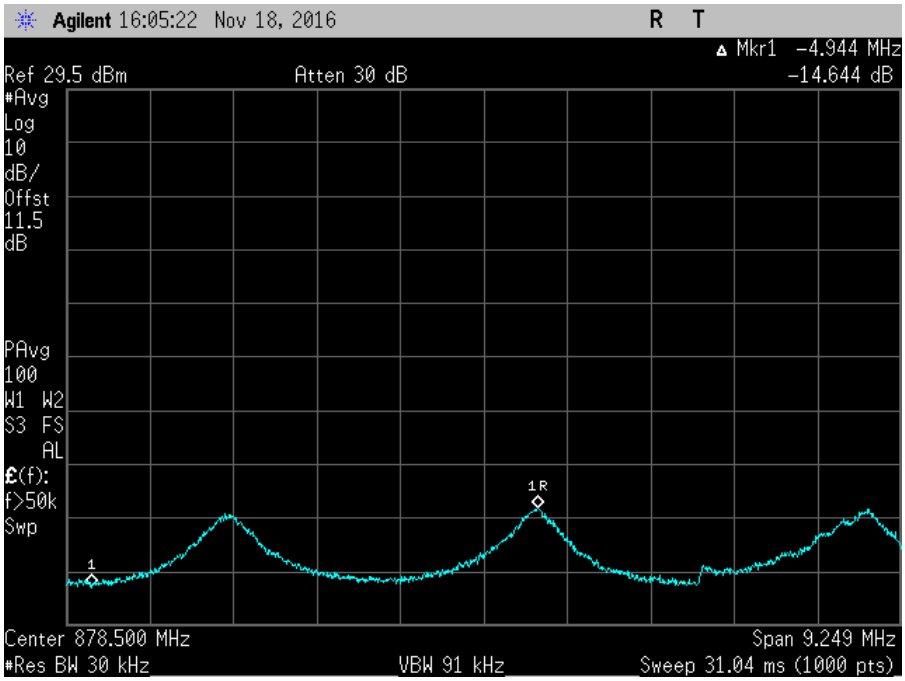
7.11.3_Osc_DL_746-757MHz-1_AWGNR



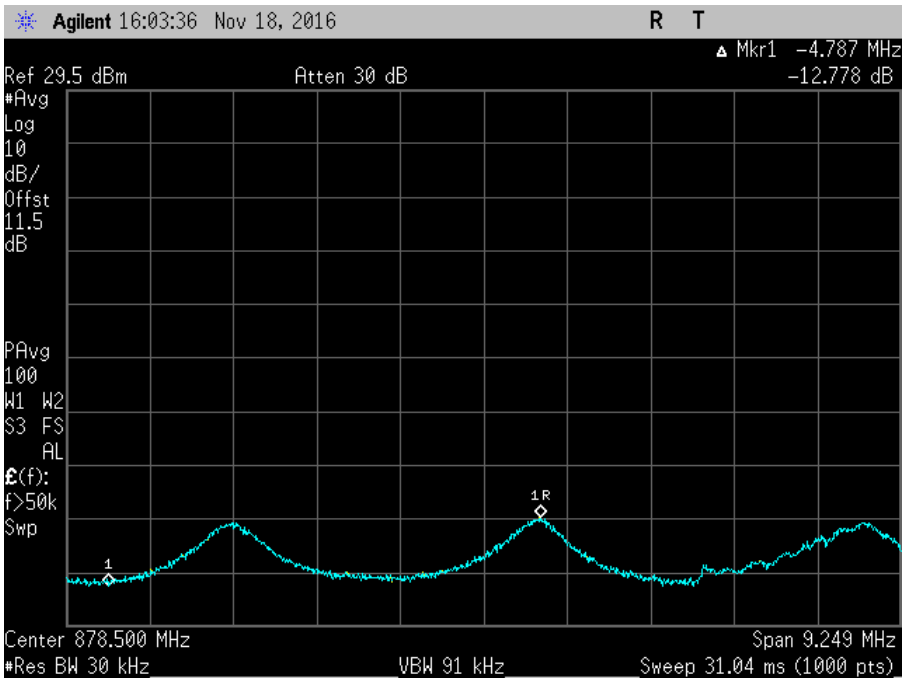
7.11.3_Osc_DL_746-757MHz-2_AWGNR



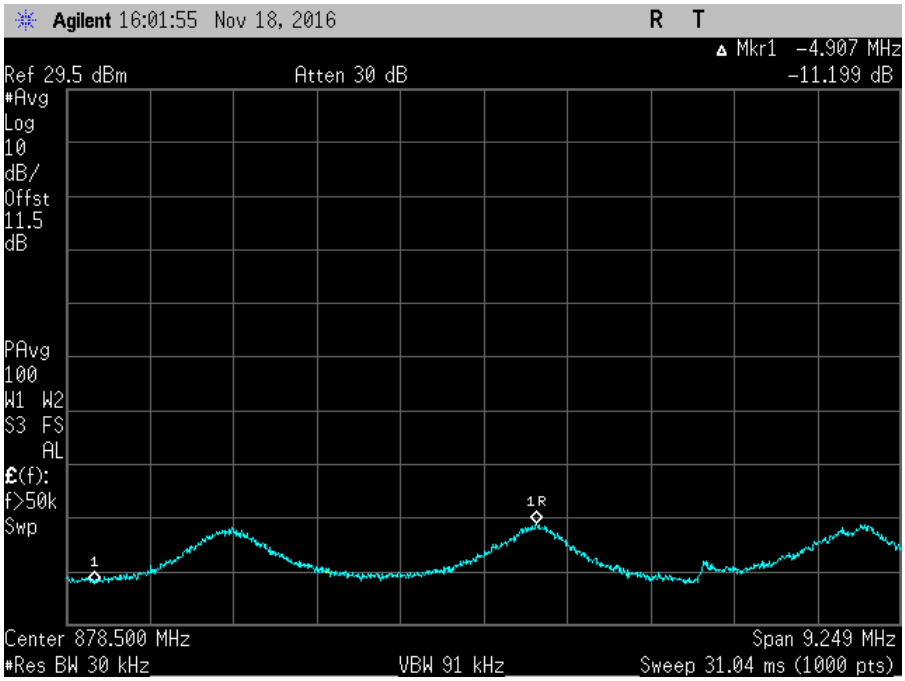
7.11.3_Osc_DL_869-894MHz+0_AWGNR



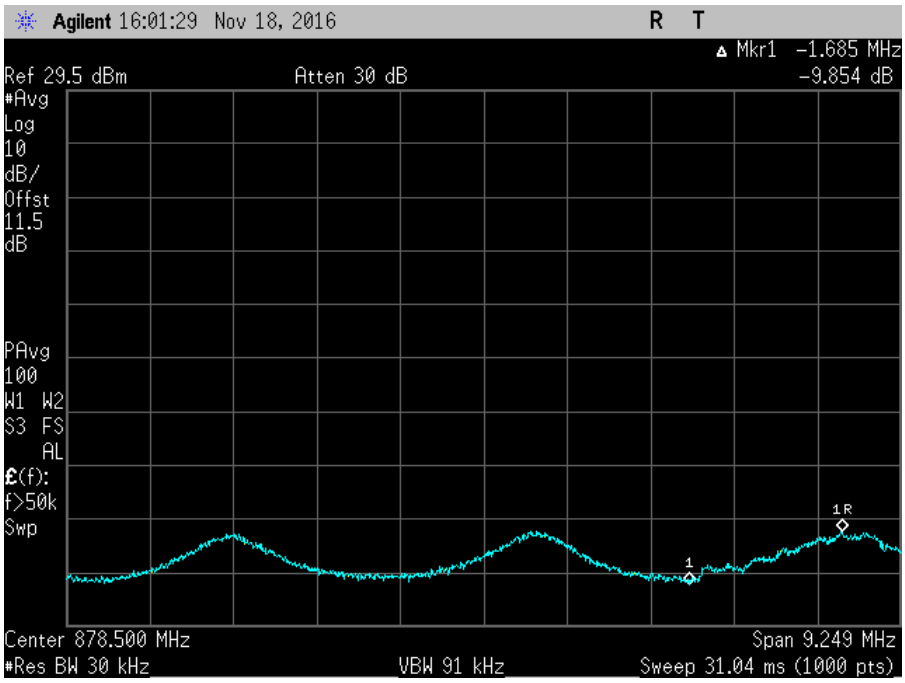
7.11.3_Osc_DL_869-894MHz+1_AWGNR



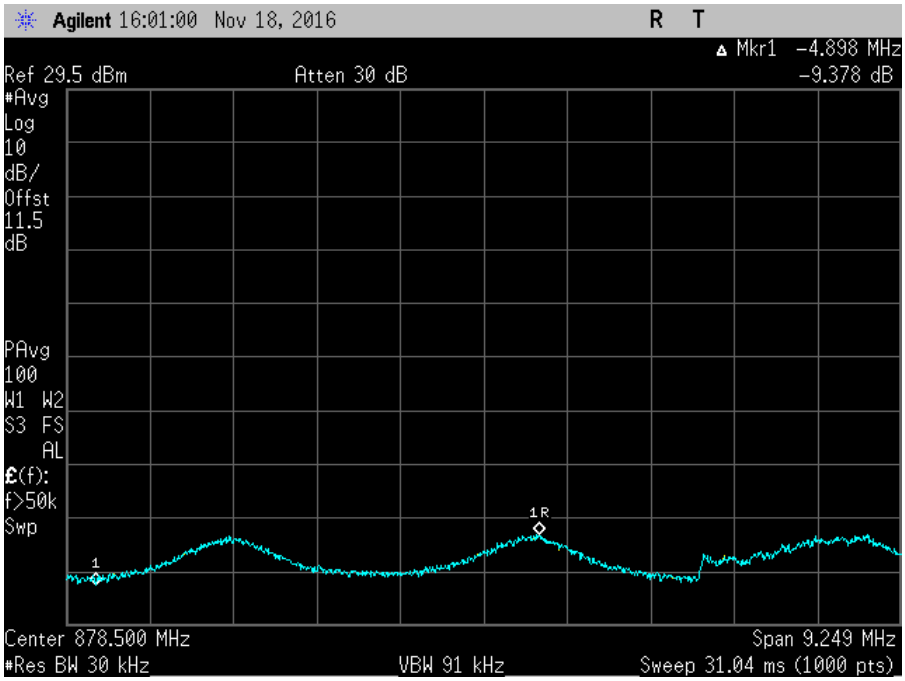
7.11.3_Osc_DL_869-894MHz+2_AWGNR



7.11.3_Osc_DL_869-894MHz+3_AWGNR



7.11.3_Osc_DL_869-894MHz+4_AWGNR



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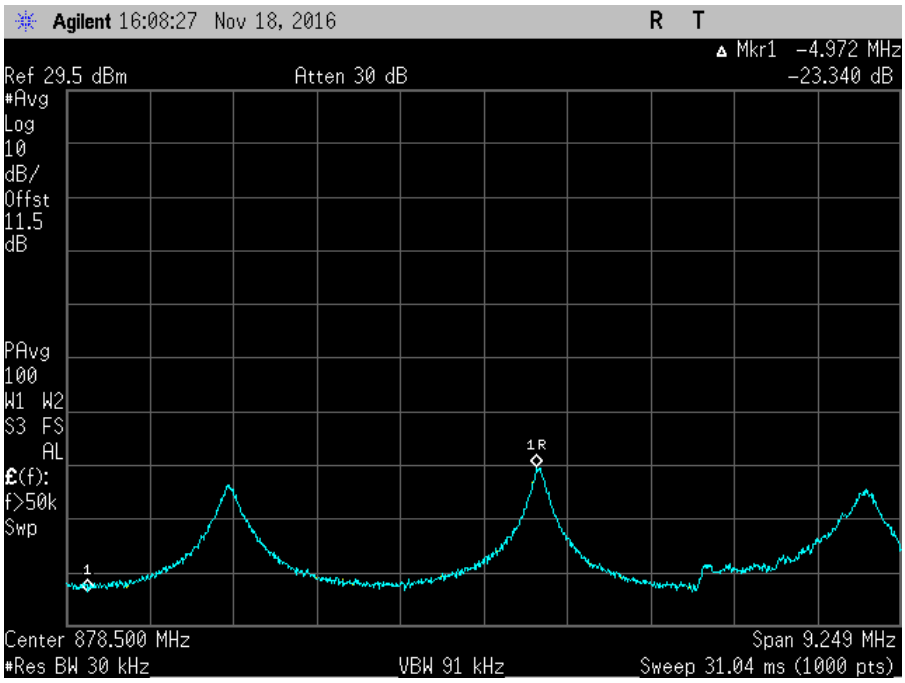
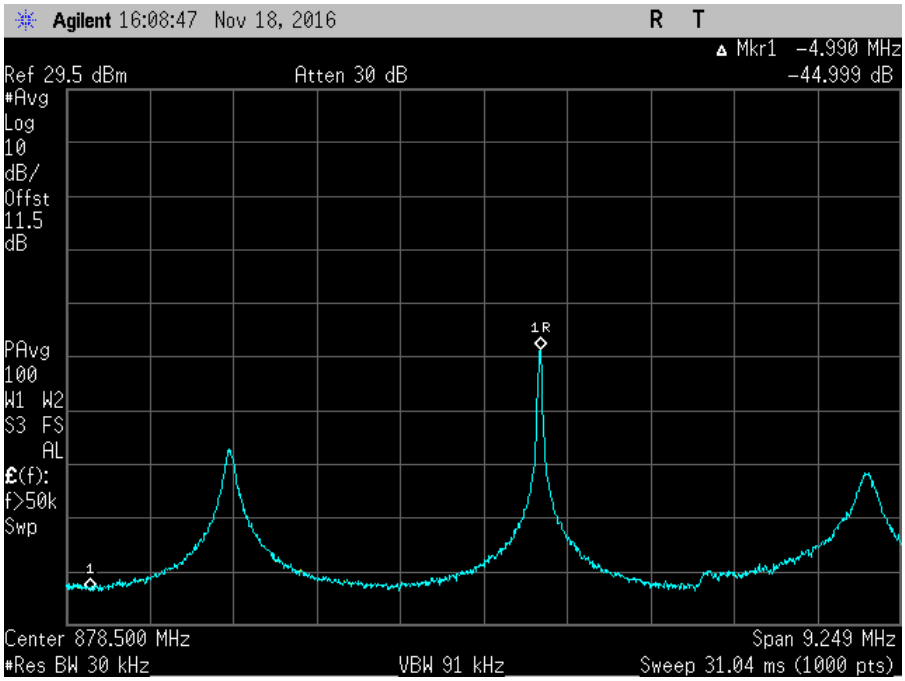
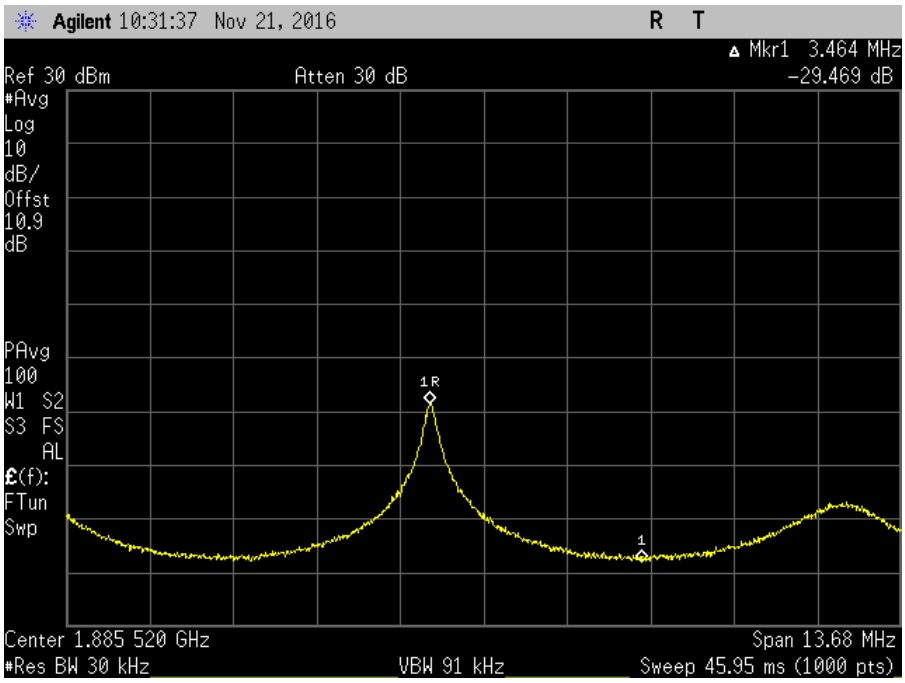


7.11.3_Osc_DL_869-894MHz-1_AWGNR

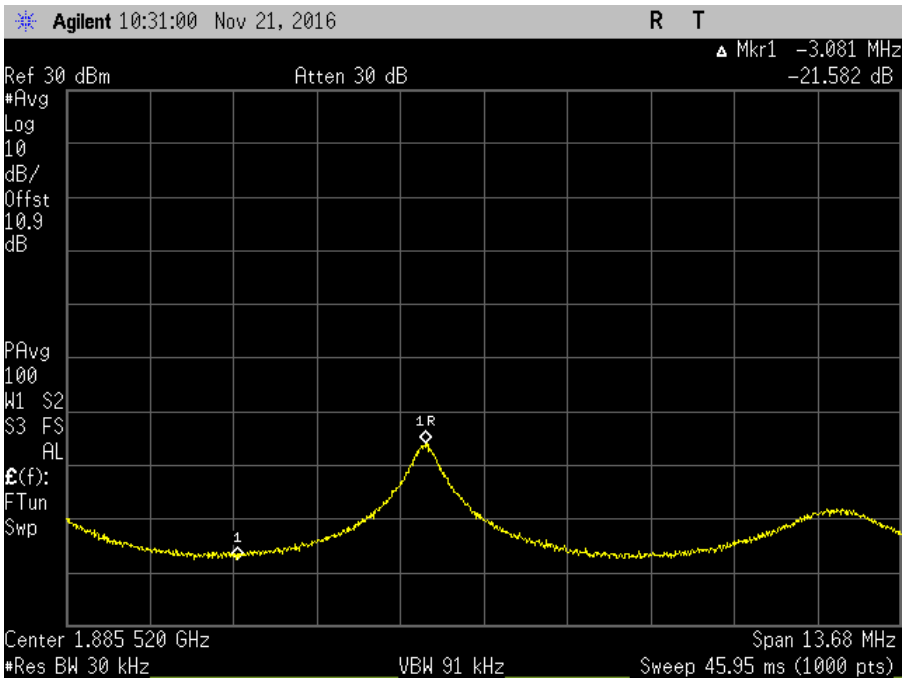


7.11.3_Osc_DL_869-894MHz-2_AWGNR

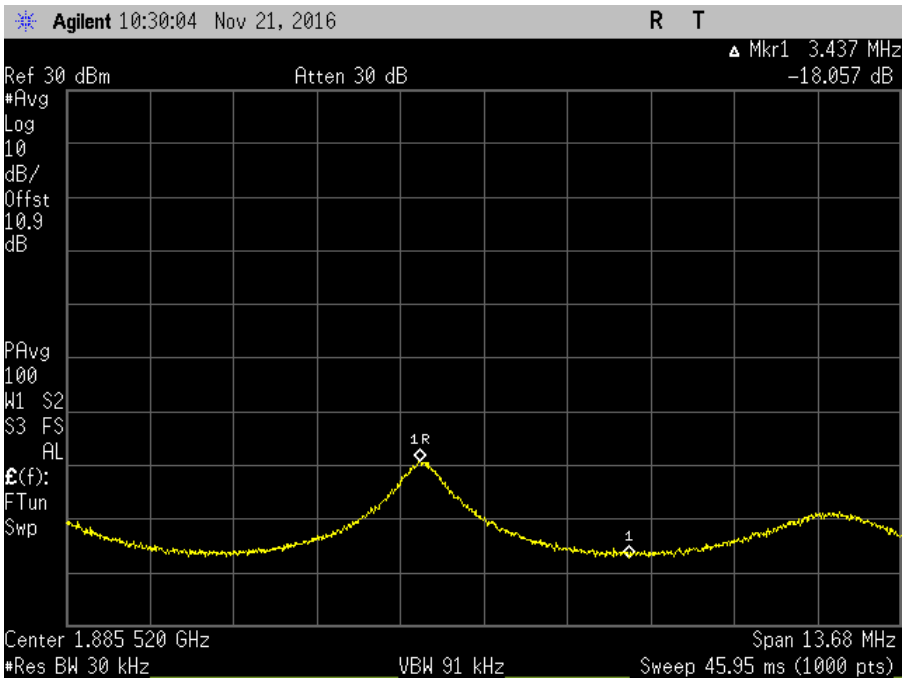
AWGNL, UL



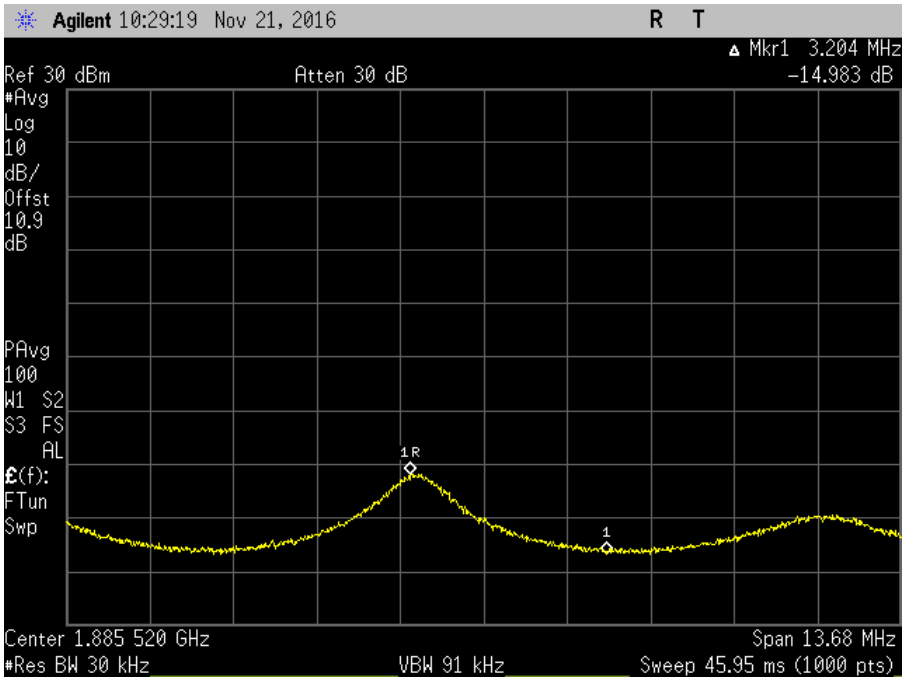
7.11.3_Osc_UL_1850-1915MHz+0_AWGNL



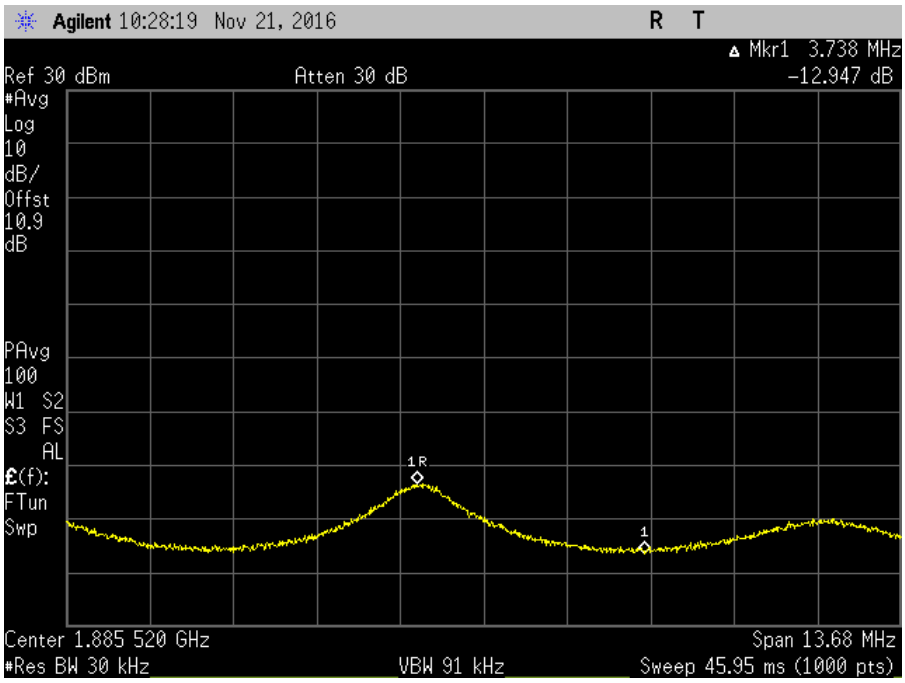
7.11.3_Osc_UL_1850-1915MHz+1_AWGNL



7.11.3_Osc_UL_1850-1915MHz+2_AWGNL



7.11.3_Osc_UL_1850-1915MHz+3_AWGNL



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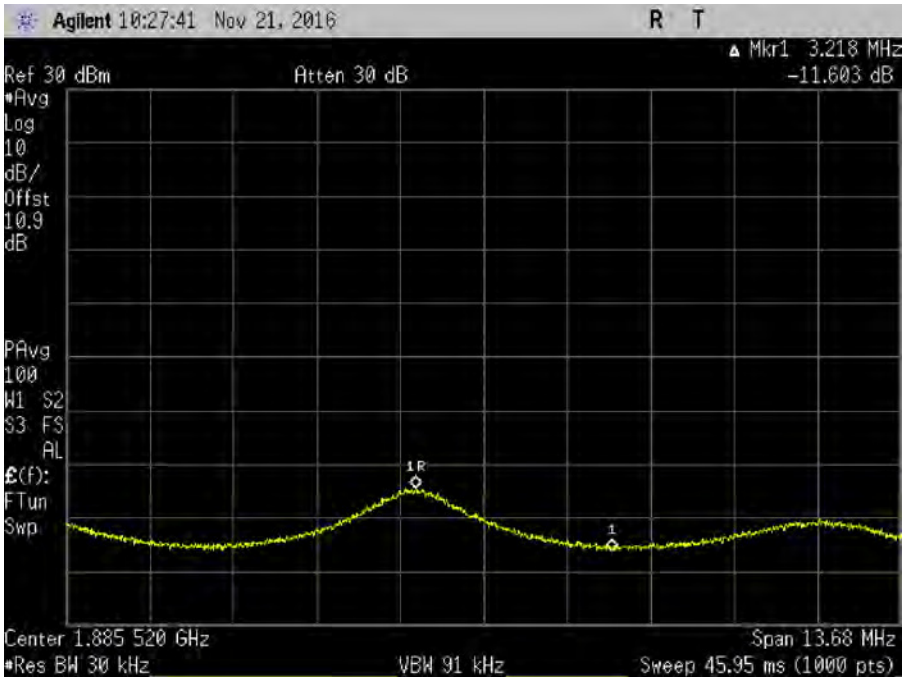

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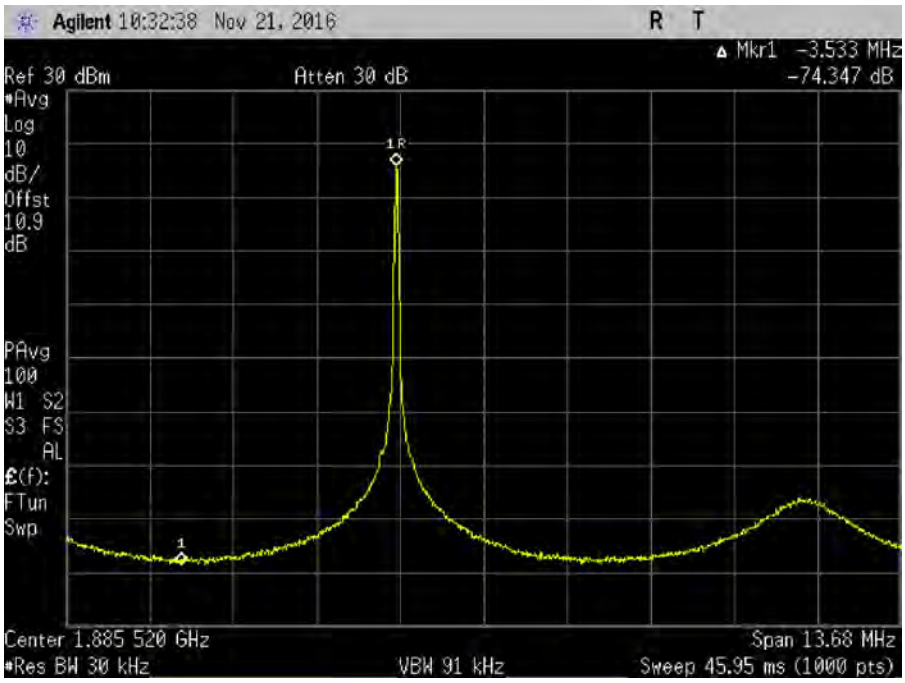
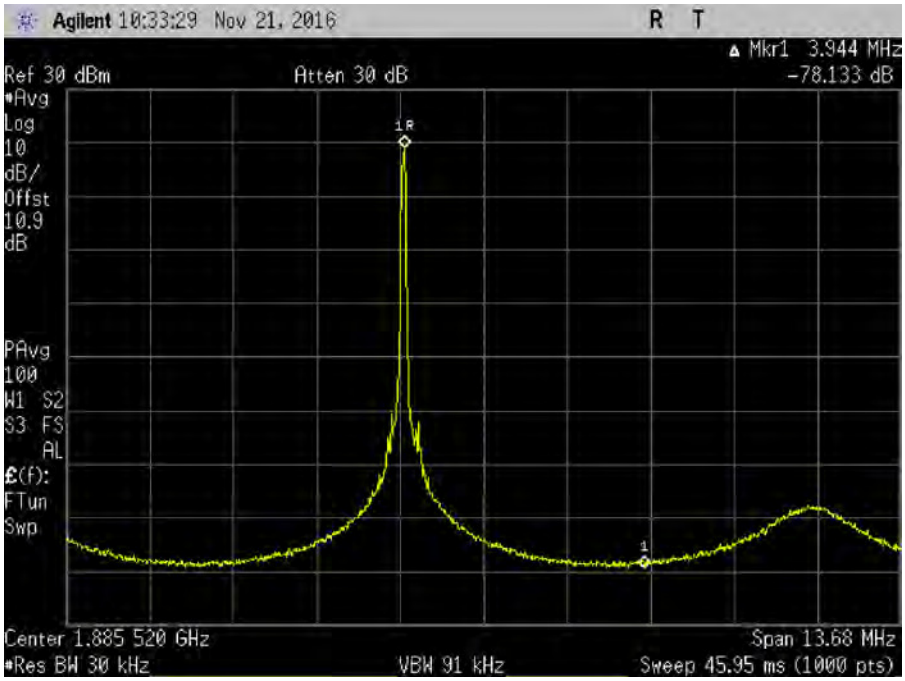
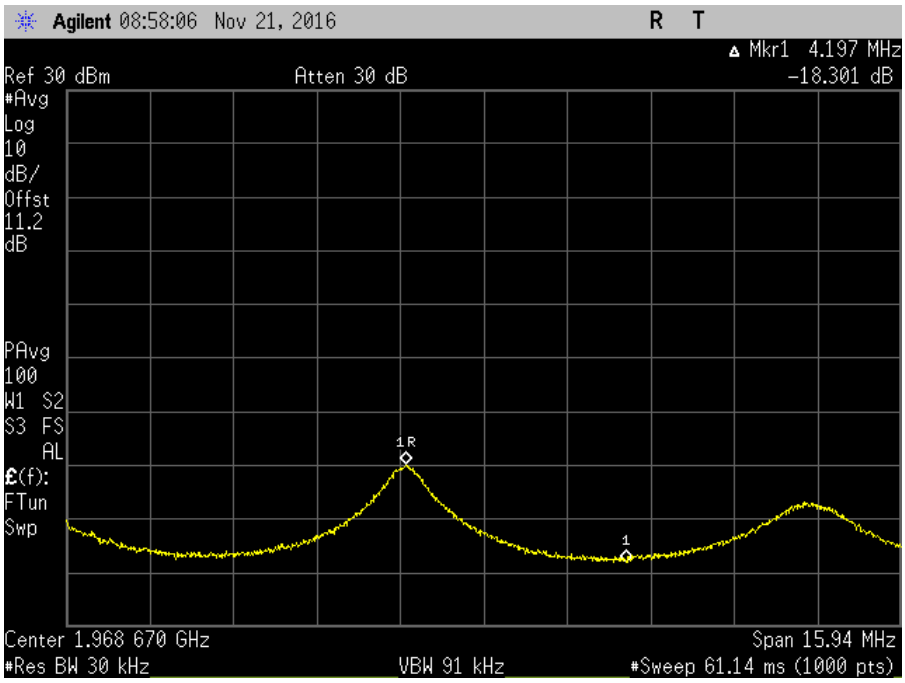


7.11.3_Osc_UL_1850-1915MHz-1_AWGNL

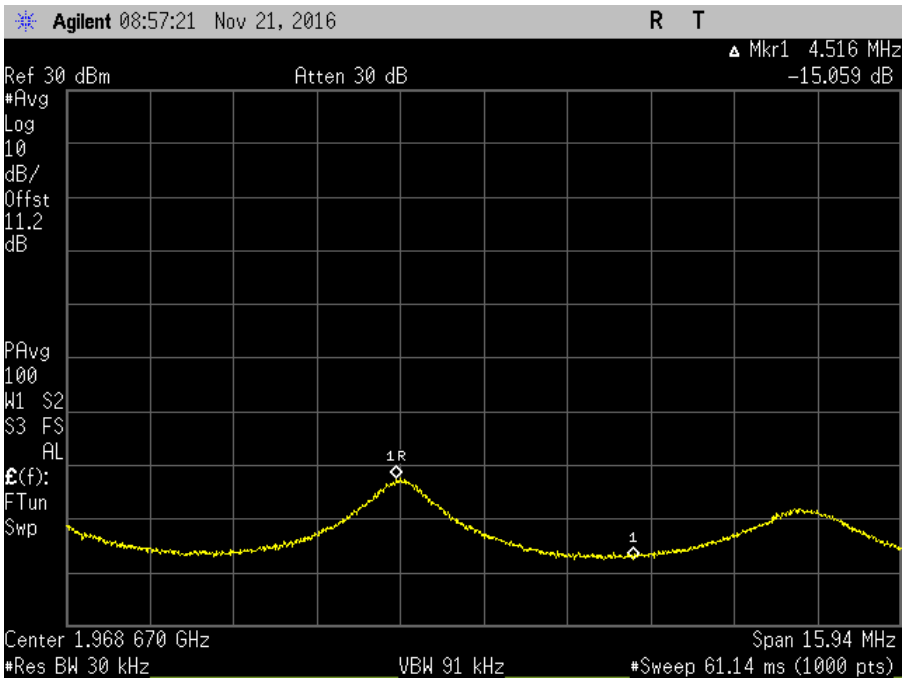


7.11.3_Osc_UL_1850-1915MHz-2_AWGNL

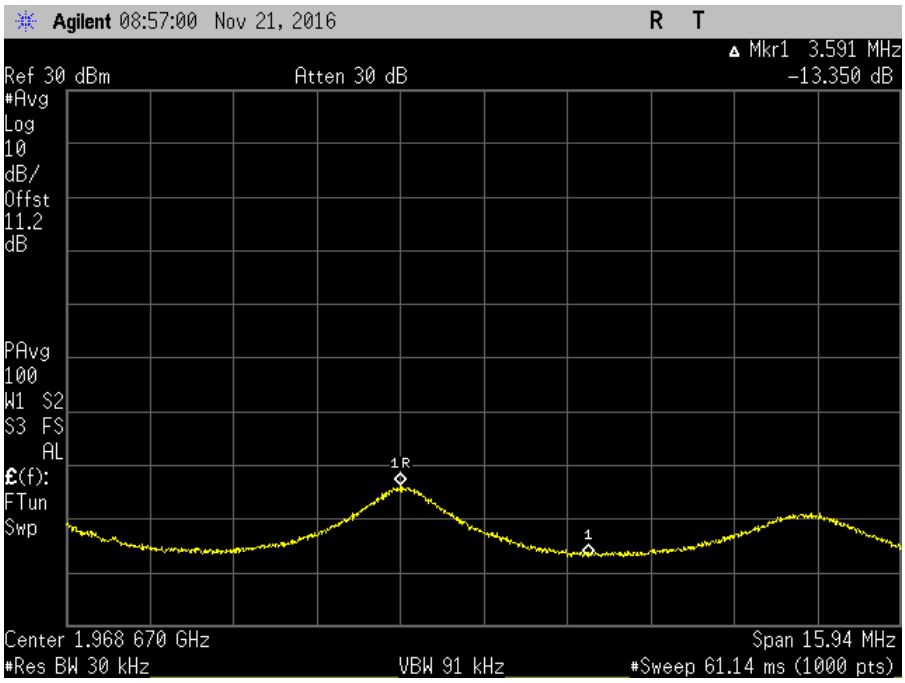
AWGNL, DL



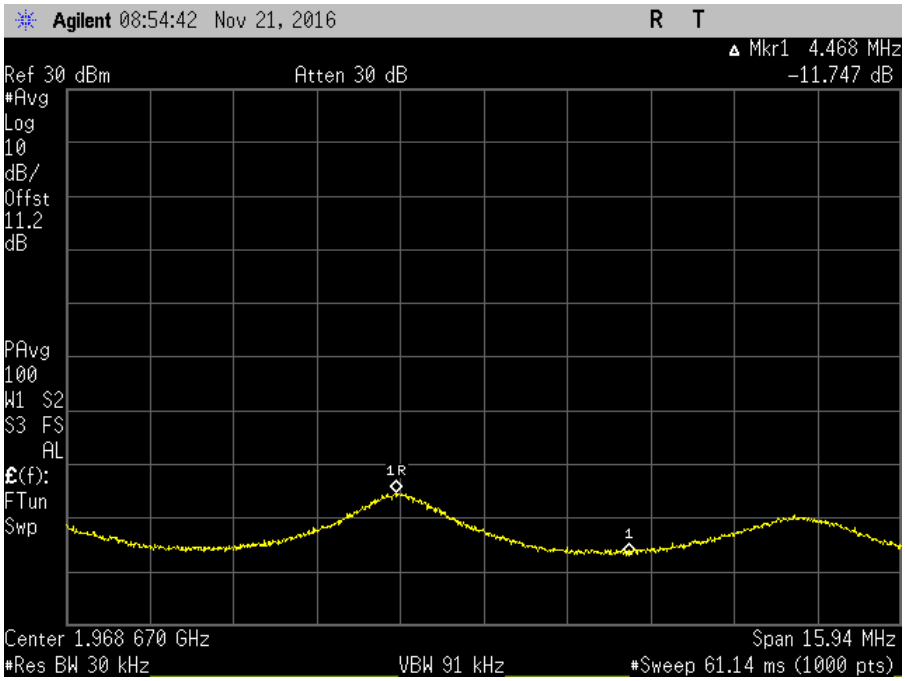
7.11.3_Osc_DL_1930-1995MHz+0_AWGNL



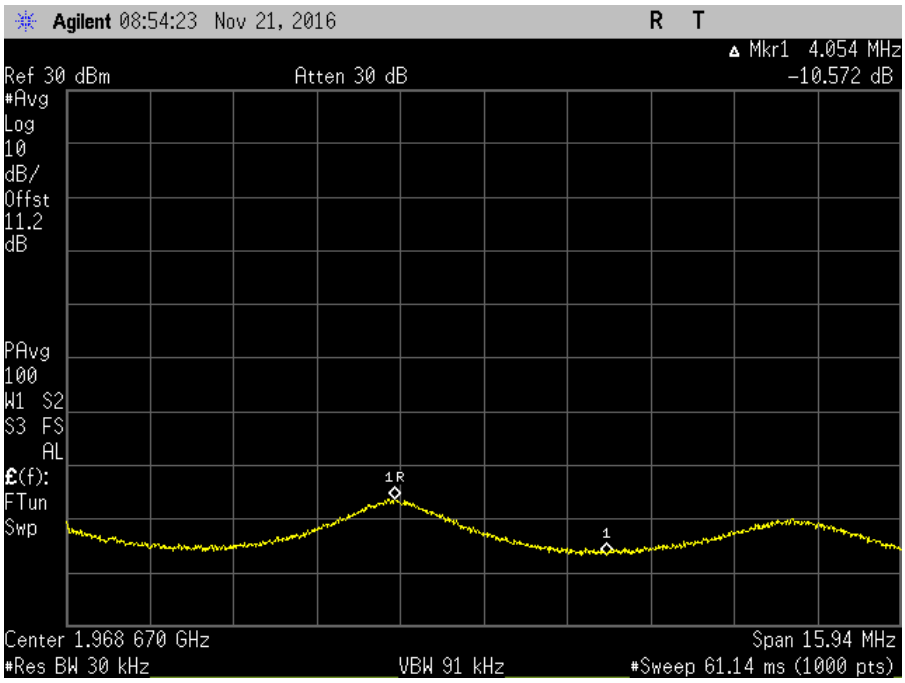
7.11.3_Osc_DL_1930-1995MHz+1_AWGNL



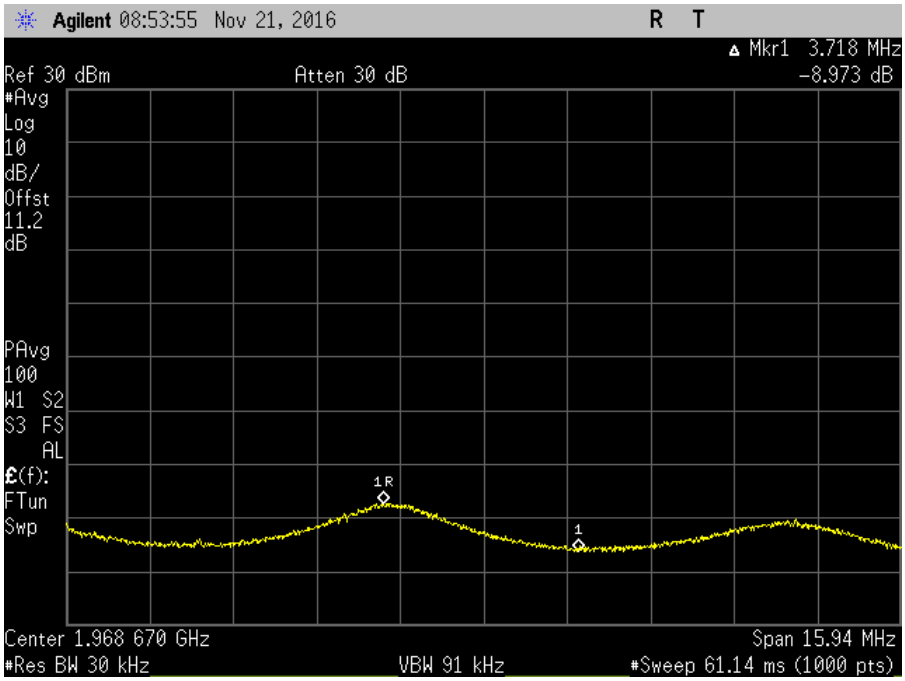
7.11.3_Osc_DL_1930-1995MHz+2_AWGNL



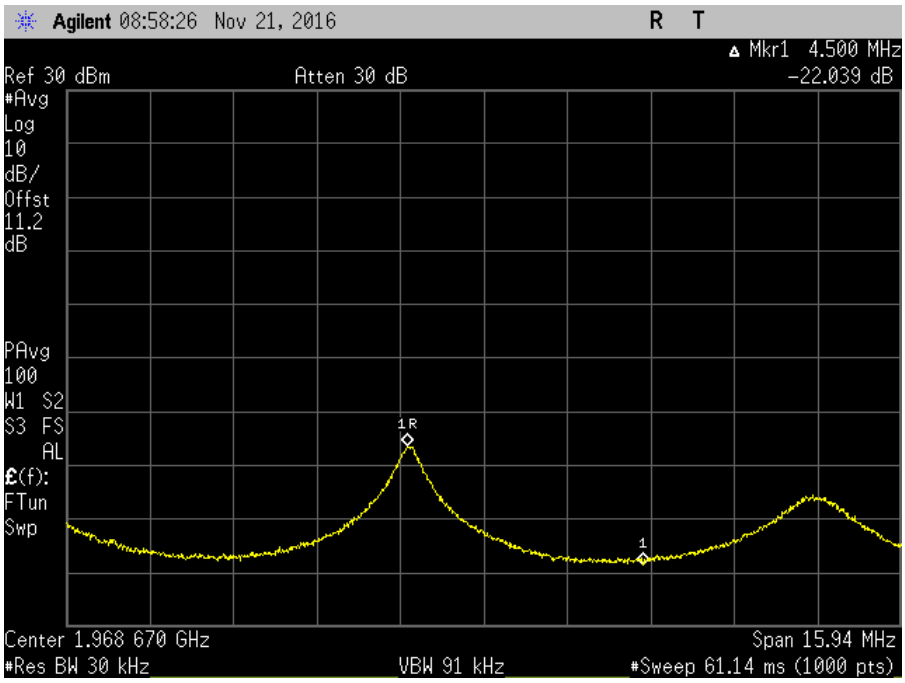
7.11.3_Osc_DL_1930-1995MHz+3_AWGNL



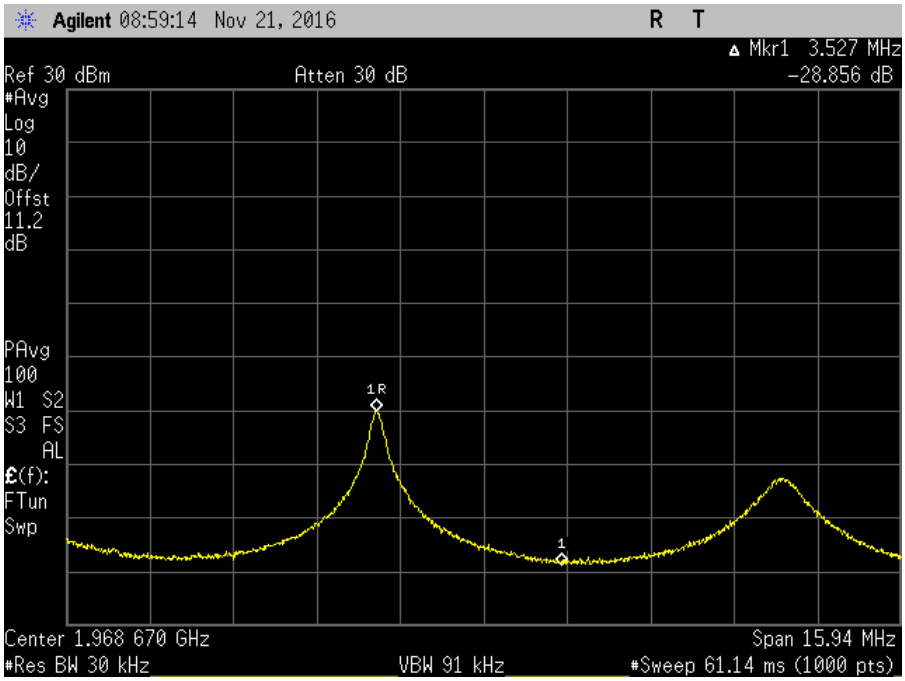
7.11.3_Osc_DL_1930-1995MHz+4_AWGNL



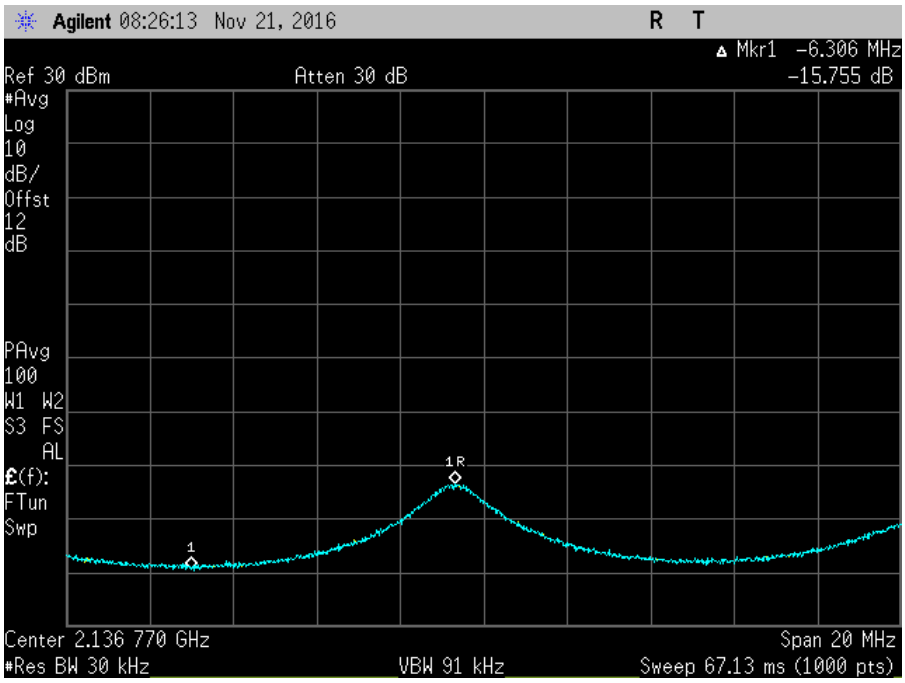
7.11.3_Osc_DL_1930-1995MHz+5_AWGNL



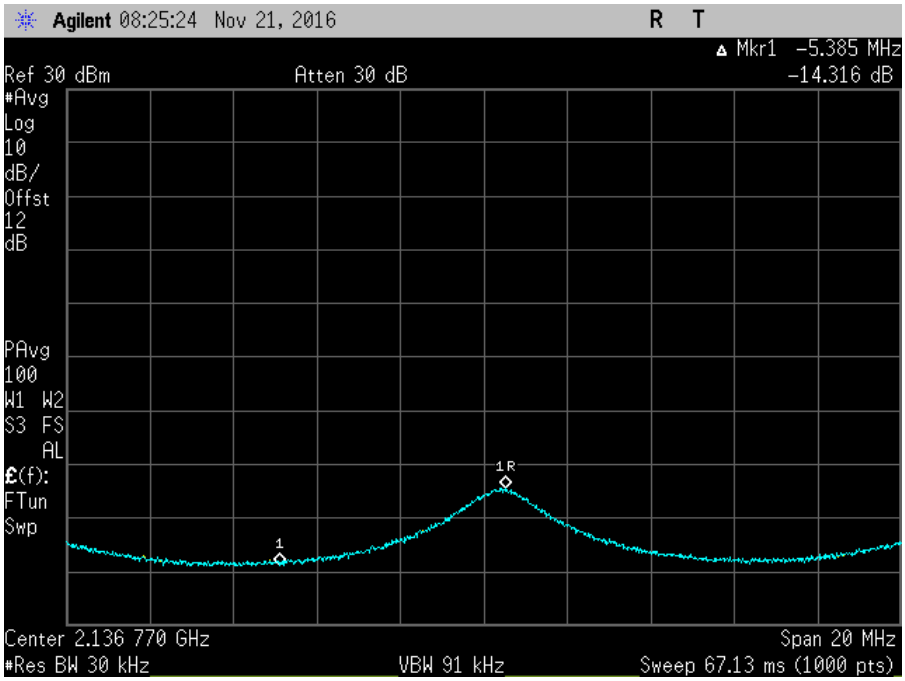
7.11.3_Osc_DL_1930-1995MHz-1_AWGNL



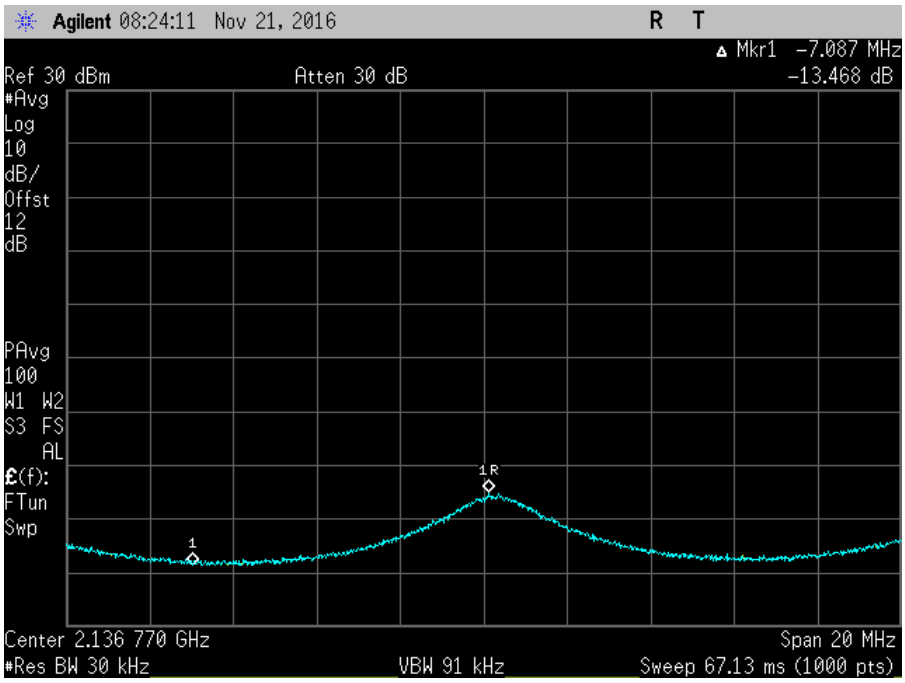
7.11.3_Osc_DL_1930-1995MHz-2_AWGNL



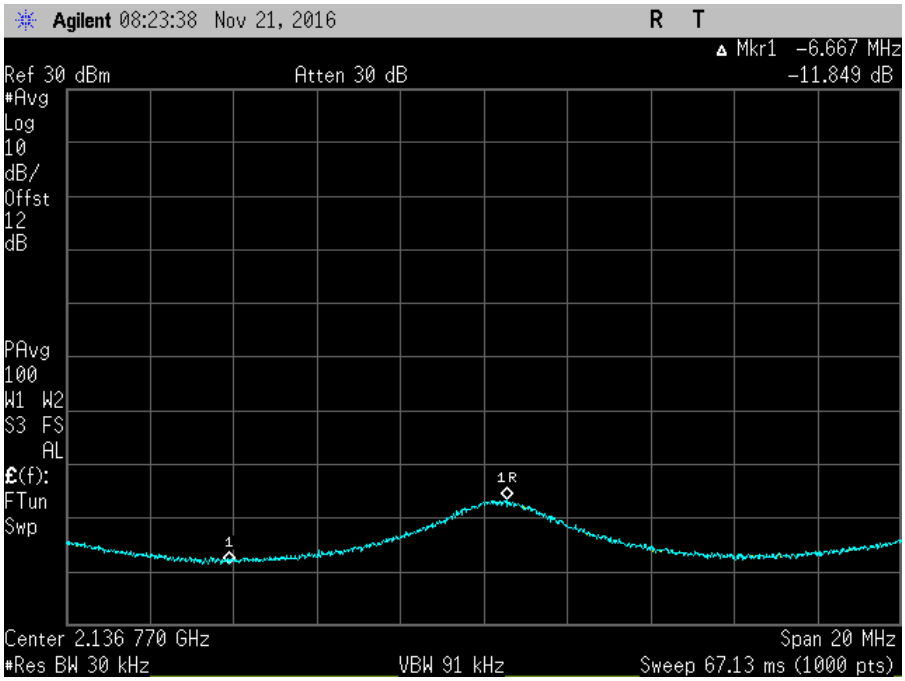
7.11.3_Osc_DL_2110-2155MHz+0_AWGNL



7.11.3_Osc_DL_2110-2155MHz+1_AWGNL



7.11.3_Osc_DL_2110-2155MHz+2_AWGNL



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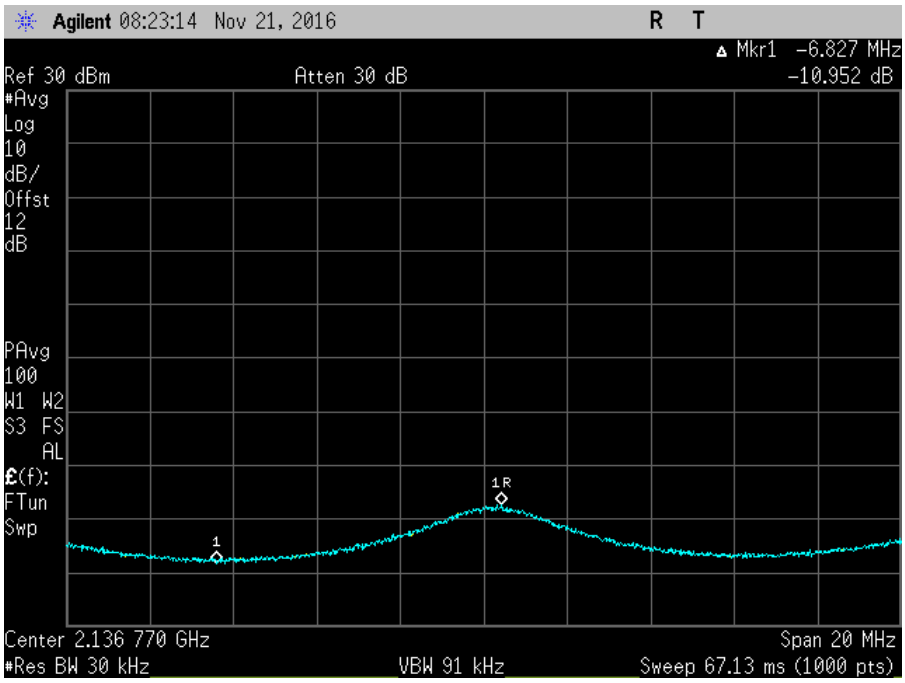
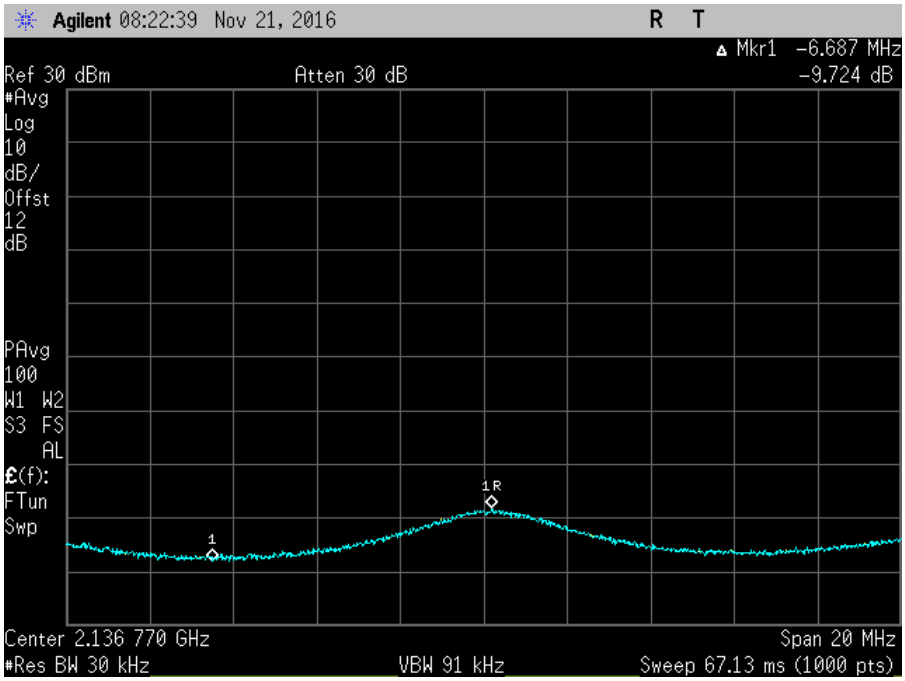
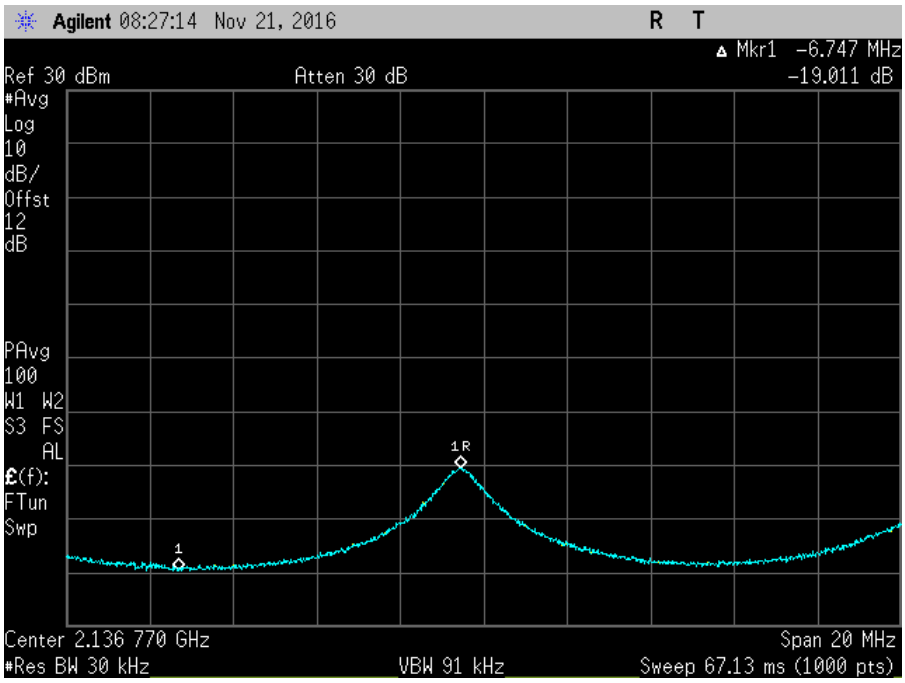


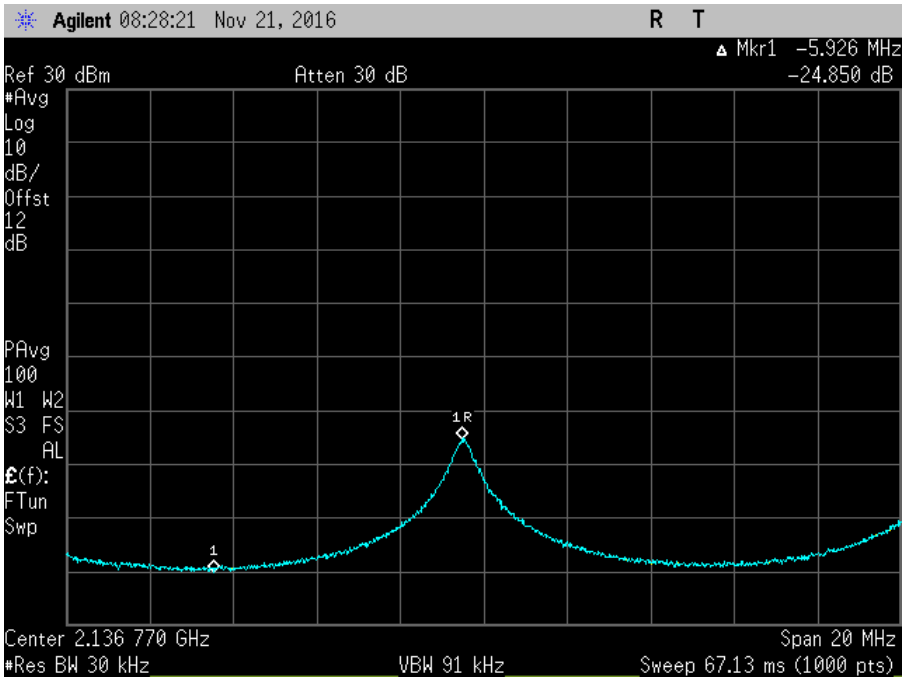
7.11.3_Osc_DL_2110-2155MHz+4_AWGNL



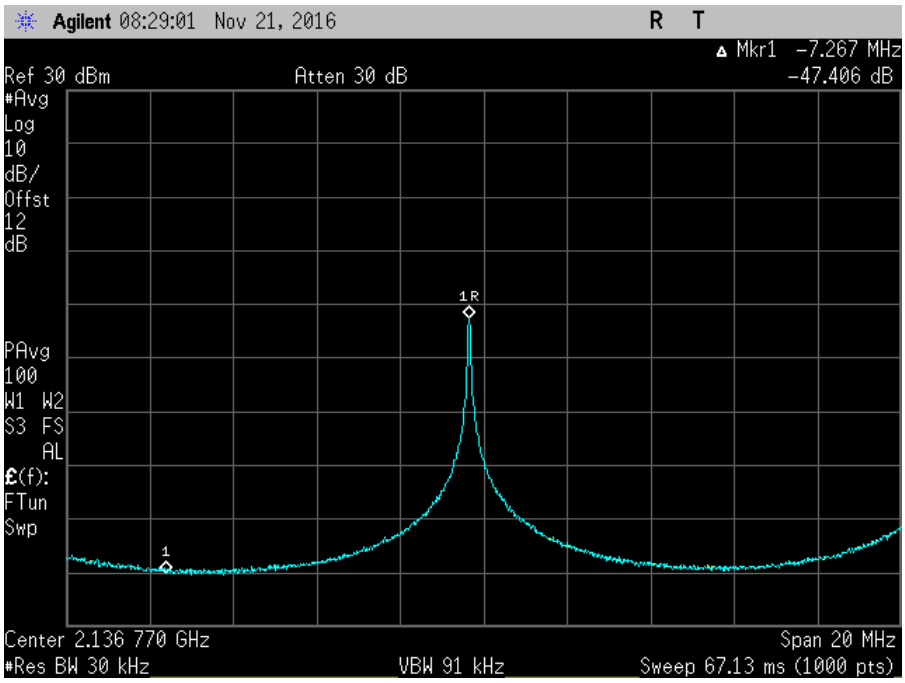
7.11.3_Osc_DL_2110-2155MHz+5_AWGNL



7.11.3_Osc_DL_2110-2155MHz-1_AWGNL



7.11.3_Osc_DL_2110-2155MHz-2_AWGNL



7.11.3_Osc_DL_2110-2155MHz-3_AWGNL

7.12 Radiated Spurious Emissions

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**7.12 Radiated Spurious Emissions / 2.1053 Radiated Spurious Emissions** **47 CFR §22.917(a) Radiated Spurious Emissions** **47 CFR §24.238(a) Radiated Spurious Emissions** **47 CFR §27.53(c), (f), (g) and (h) Spurious Emissions**		
Work Order #:	**98759**	Date:	12/22/2016
Test Type:	**Radiated Emissions**	Time:	8:05:50 AM
Tested By:	**Daniel Bertran**	Sequence#:	1
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 7			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 7			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed CMRS Wideband Consumer Booster with a Wi-Fi Router and TV amplifier installed. The CMRS DL signal and the Wi-Fi Signal are combined at the diplexer and transmit via the indoor antenna.
The Consumer booster UL and DL power and gain parameters are initially measured with Wi-Fi transmitting at mid channel using sequentially 802.11b, g, n20 and n40 signal. Since no significant change in measured power was observed, all other parameters are obtained with Wi-Fi transmitting at Mid channel, 802.11b.

During testing, the (EUT) is placed on the Styrofoam table top.
Five different CW signals (one per each band) are injected sequentially to the input port of EUT using a signal generator. The signal generator is set to produce a CW signal with the frequency set to the center of each operational band under test and the power level is set at Pin as determined from 7.2 section of the test procedure indicated further below.
Evaluation of DL path was performed with signals fed into the Outside antenna port while Inside antenna port was terminated with equivalent 50 Ohm Pasternack load (MN: PE6187 / SN: 1443).
Evaluation of UL path was performed with signal fed into the Inside antenna port while Outside antenna port was terminated with the same above 50 Ohm load.

Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed IAW section 7.12 of the FCC document: 935210 D03 Wideband Consumer Signal Booster

Measurement Guidance v04 Dated February 12, 2016 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016
Firmware: V2.2
Test environment conditions: Temperature: 20.1°C, 43% Relative Humidity and Pressure: 101.3 kPa

TX Freq = > Center frequency of above listed bands.
Modulation=> CW
Frequency range of measurement = 9 kHz- 22 GHz.
9 kHz - 150 kHz -> RBW=200 Hz VBW=200 Hz
150 kHz - 30 MHz -> RBW=9 kHz VBW=9 kHz
30 MHz - 1000MHz -> RBW=120 kHz VBW=120 kHz
1000 MHz-22000MHz -> RBW=1 MHz VBW=1 MHz

Note:
No spurious emissions were found within 20dB of the limit line.
Emissions in the band 1559-1610 MHz were investigated and these were not found within 20dB of the limit line.

27.53(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN01996	Biconilog Antenna	CBL6111C	11/1/2016	11/1/2018
	ANP06049	Attenuator	PE7002-6	5/9/2016	5/9/2018
	ANP00880	Cable	RG214U	5/10/2016	5/10/2018
	P06691	Cable	PE3062-180	6/23/2016	6/23/2018
	AN00971A	Preamp	8447D	2/5/2016	2/5/2018
	P01187	Cable	CNT-195	8/8/2016	8/8/2018
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
	ANP06900	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017
	AN03114	Preamp	AMF-7D-00101800-30-10P	4/22/2015	4/22/2017
	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
	AN03302	Cable	32026-29094K-29094K-72TC	1/29/2016	1/29/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F-12001800-20-10P	5/6/2015	5/6/2017
	AN02694	Horn Antenna-ANSI C63.5 3m	AMFW-5F-18002650-20-10P	5/7/2015	5/7/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP00929	Cable	various	1/25/2016	1/25/2018
	ANP06126	Cable	32022-29094K-29094K-168TC	3/18/2015	3/18/2017
	ANP06904	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017
	ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017

Summary of Results

Pass: All Radiated Spurious Emissions were found with more than 20dB margin of the limit line.

Frequency Range of measurement 9kHz –> 22GHz

LIMIT LINE FOR SPURIOUS RADIATED EMISSION

REQUIRED ATTENUATION = 43+10 LOG P (DB)

For radiated spurious emission measured at 3 meter test distance,

Required attenuation = 43+10 Log $P_{t\ at\ 3\ meter}$ dB
Limit line (dBuV) = E_{dBuv} - Attenuation

E_{dBuv} = Measured field strength at 3 meter in dBuV/m

Power Density (Isotropic)

$$P_D = \frac{P_t}{4\pi r^2}$$

P_D = Power Density in Watts /m^2
Pt = Average Transmit Power
r = Test distance

Field Intensity E (V/m)

$$E = \sqrt{P_D \times 377}$$

$$E = \frac{\sqrt{P_t \times 377}}{4\pi r^2}$$

$$E = \sqrt{\frac{P_t \times 30}{r^2}}$$

$$P_t = \left(\frac{E^2 \times r^2}{30} \right)$$

10 Log P_t = 10 Log E^2 (V/m)+ 10 Log r^2 – 10 Log 30
10 Log P_t = 20 Log E (V/m) + 20 Log r – 10 Log 30

At 3 meter, r = 3 m
10 Log P_t = 20 Log E (V/m) + 20 Log 3 – 10 Log 30

10 Log P_t = 20 Log E (V/m) + 9.54 – 14.77
10 Log P_t = 20 Log E (V/m) - 5.23

Since 20 Log E (V/m) = 20 Log E (uV/m) –120

10 Log P_t = 20 Log E (uV/m) - 120 - 5.23
10 Log P_t = 20 Log E (uV/m) –125.23

Limit line (dBuV) at 3 meter = E_{dBuv} – Attenuation

= E_{dBuv} - (43+10 Log $P_{t\ at\ 3\ meter}$)

= E_{dBuv} - 43 - 10 Log $P_{t\ at\ 3\ meter}$

= E_{dBuv} - 43 – (20 Log E (uV/m) –125.23)

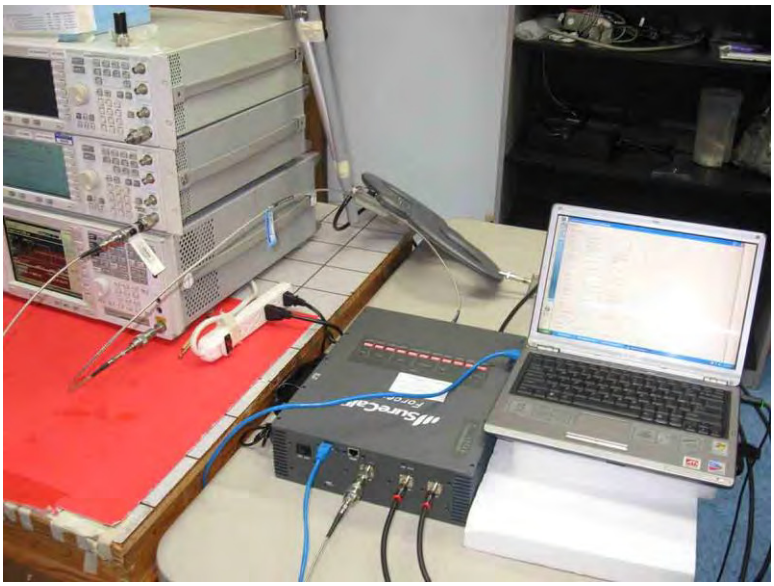
= E_{dBuv} - 43 - 20 Log E (uV/m) + 125.23

= E_{dBuv} - 20 Log E (uV/m) + 82.23

Since 20 Log E (uV/m) = E in dBuV/m= ~~E_{dBuv}~~ - ~~E_{dBuv}~~ + 82.23

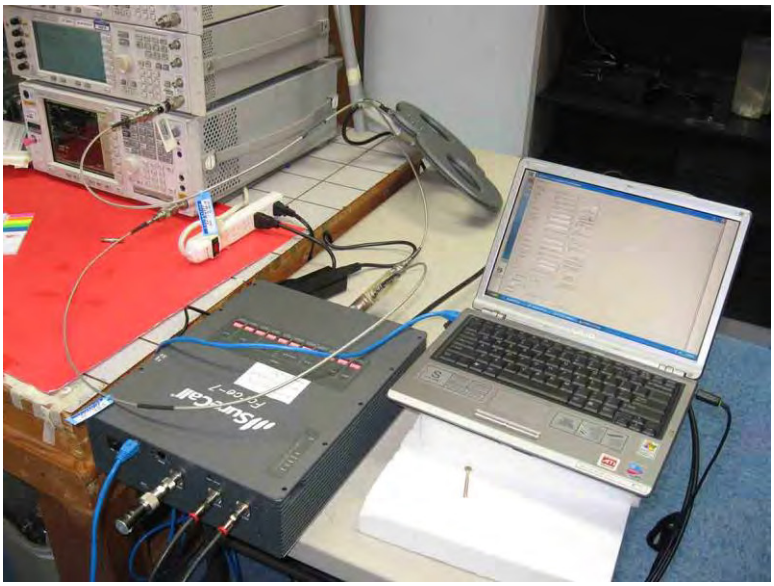
Radiated Emission limit 3 meter = 82.23 dBuV at any power level measured in dBuV

EXHIBIT A: TEST SETUP PHOTOS



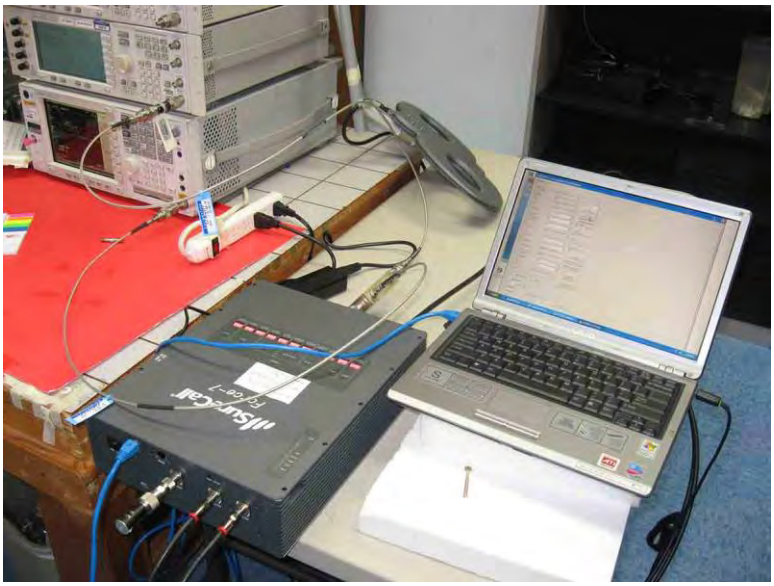
Sections 7.1, 7.2, 7.3, 7.4, 7.5, 7.6 and 7.10 Test Setup

Section 7.7.1 Test Setup

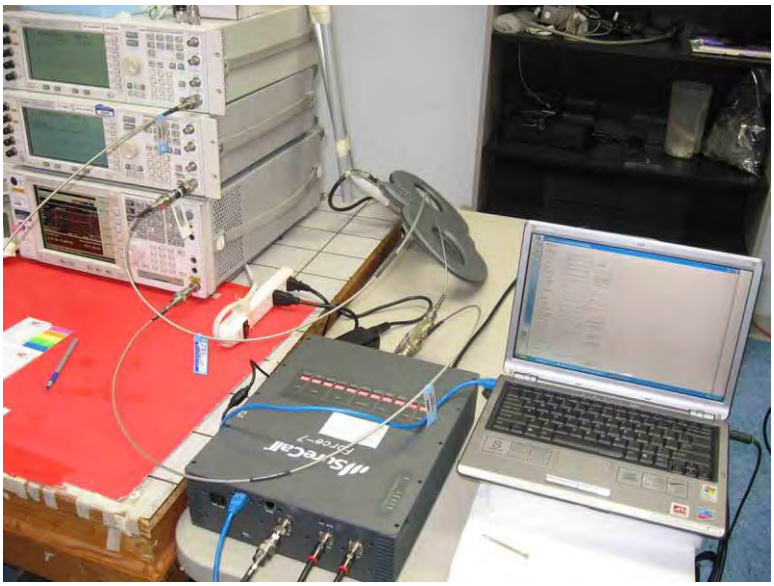


Section 7.7.1 Test Setup

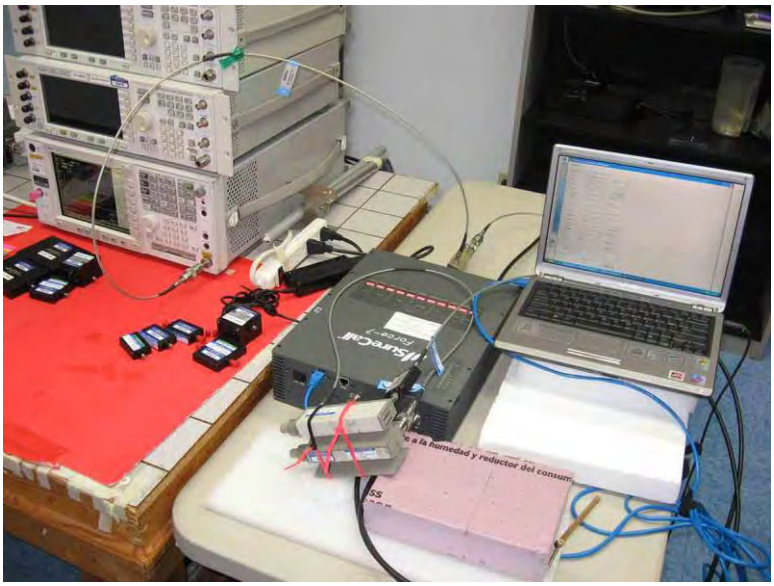
Section 7.8 Uplink Test Setup



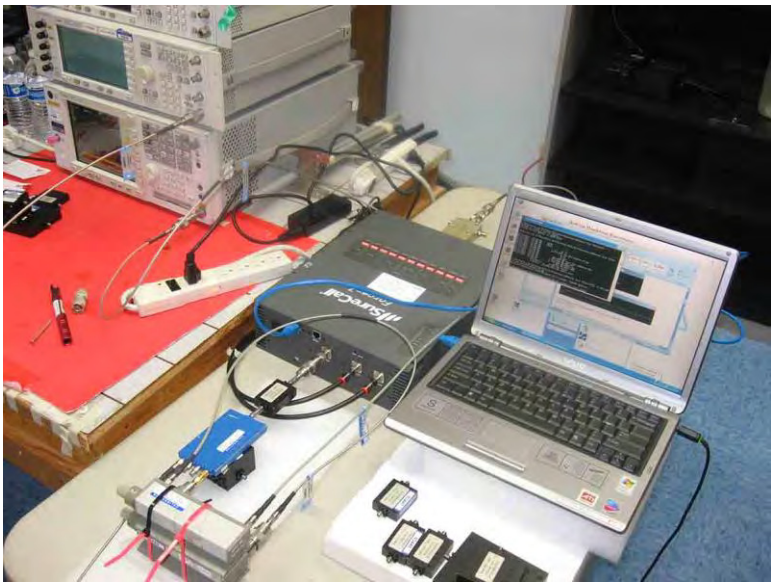
Section 7.9.1 Max Gain Test Setup



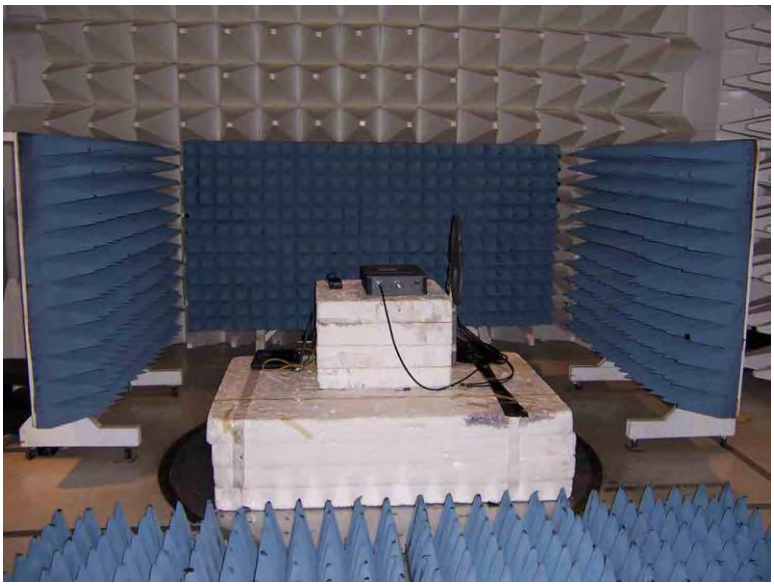
Section 7.9.2 Variable Gain Test Setup



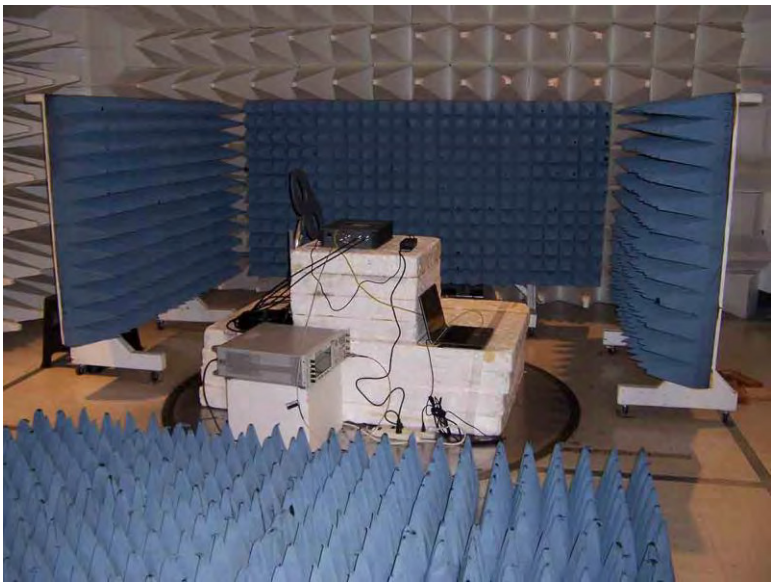
Section 7.11.2 Test Setup



Section 7.11.3 Test Setup



Section 7.12 Test Setup



Section 7.12 Test Setup

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret (“^”) was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.